

NEW MAGIC FOR THE MOVIES

POPULAR MECHANICS MAGAZINE

WRITTEN SO YOU CAN UNDERSTAND IT

REG'D. TRADE MARK, GREAT BRITAIN, NO. 410426

DEC.
25 CENTS
30c IN CANADA

SEE PAGE 818


NRA
CODE

Материал защищен авторским правом

Radio Tube Racketeers FOILED..!

PAUL WHITEMAN TELLS HOW
TO MAKE SURE TUBES ARE
REALLY NEW



NEW RCA SEALED CARTON PROTECTS YOU AGAINST OLD RADIO TUBES SOLD AS NEW

Assures your getting genuine
Micro-Sensitive RCA Radio Tubes

A METAL-LOCKED safe for every radio tube... protection against hundreds of thousands of old radio tubes repolished and slipped into new cartons and sold to the unsuspecting public as new. To guard the marvelous new Micro-Sensitive RCA radio tube, experts have developed the new non-refillable *RCA Sealed Carton*. Strong metal sealing staples lock up the tube from factory to your set. The tube can be tested without being removed from the carton... but the carton must be *completely destroyed* before tube can be used.

To put new life in your radio, ask your Authorized RCA Radio Tube Agent to put new Micro-Sensitive radio tubes in your set... the tubes with these 5 big improvements: (1) *Quicker Start*. (2) *Quieter Operation*. (3) *Uniform Volume*. (4) *Uniform Performance*. (5) *Sealed Carton Protection*.



LOOK FOR THIS SIGN in
your neighborhood. It identifies
a dealer selected by RCA.



TUNE IN on Radio City Studio Party
9 to 9:30 E. S. T. every Saturday night
over N. B. C. Blue Network. Hear the
big stars of your favorite programs.

RCA Sunningham
Radiotron RADIO TUBES

ANNOUNCING AMAZING TYPEWRITER BARGAIN

BRAND NEW MODEL No. 5
REMINGTON
PORTABLE
10¢ A DAY
MONEY BACK GUARANTEE



**10 DAY
FREE TRIAL
OFFER**

BIG PRICE REDUCTION

● Positively the greatest portable typewriter bargain ever offered! Now for the first time Remington, world-famous manufacturer, offers a NEW purchase plan... only 10¢ a day buys this latest model machine! Not a used or rebuilt typewriter. Not an incomplete machine. A beautiful brand new regulation Remington Portable. Standard 4-row keyboard; standard width carriage; margin release on keyboard; back spacer; automatic ribbon reverse; every essential feature found in standard typewriters!



A Gift that Points the Way to Success

For birthday, Christmas, wedding, anniversary or graduation... give a Remington Portable. The one gift every member of the family will welcome. When Dad brings home work from the office, when Brother has reports to get out, when Sister and Mother answer correspondence... a typewriter will do every task faster, neater.

Make Leisure Hours More Fun

A Remington Portable can be carried anywhere and used anywhere. Catch up on correspondence. Write a diary of many experiences. Only a diary will give you a good permanent record of what you have done and what you have seen. You will want a typewriter some day. Get it now!



ACT... WHILE LOW PRICE HOLDS GOOD!

New wage scales in our own factories, and in the factories of the companies which make our materials, point definitely to higher prices. Stocks of machines on hand make possible the present unbelievably low cash price on this machine. Everything points to higher prices. We don't believe that we can maintain the present big price reduction in the face of constantly rising costs in every one of our departments. So we say... "Act fast!"

10 DAY FREE TRIAL OFFER

You can try this machine for 10 days without risking one penny of your money. Not even shipping charges. Send for complete details on this most liberal offer. Get attractive new catalogue illustrating and describing the many Remington models available on unusually low terms. Clip coupon today!

EVERY ESSENTIAL FEATURE found in Standard Machines

Buying a typewriter isn't like buying a suit of clothes. Many Remington portables, seeing 10 years of hard service are still in active use. When you buy... buy a machine with every standard feature. The Remington No. 5 is the most compact and durable portable ever built... includes all essential standard typewriter features. This beautiful machine

represents the height of economy... unequalled economy in first cost... unequalled economy in service.

It is today the best value ever offered in typewriter history... and that statement comes from the company that has constantly made typewriter history. Buy now. It is a real bargain offer.

Specifications...

The Model 5 includes every essential feature found in standard typewriters. It has standard 4-row keyboard, complete visibility, standard width carriage for long envelopes. Carriage return lever of exceptional design for easy and rapid opera-

tion. Margin release on the keyboard. Automatic ribbon reverse. Back spacer. Two color ribbon shift. Variable line spacer. Adjustable margin stops. Auto set Paragraph Key (one of the most useful features found on any typewriter). Weight 11 lbs. 13 oz. Furnished with Pica or Elite type.

TYPING COURSE

FREE

When you get your new Remington No. 5, you will get with it... ABSOLUTELY FREE... a 28-page course in typing. It teaches the Touch System, speeds up work. It is simply written and well illustrated. Instructions are easy as A, B, C. Even a child can understand this method. A little study and the average person, child or grown-up, becomes fascinated. Follow this course during the 10-DAY FREE TRIAL OFFER that we give you on your typewriter. At the end of that time, you should be able to dash off letters faster than with pen and ink.



CARRYING CASE

FREE

With every Remington No. 5, a FREE carrying case sturdily built of 3-ply wood. Covered with heavy DuPont fabric. Top is removed in one motion, leaving machine firmly attached to base. Can be used anywhere... on knees, in chairs, on trains.



Remington Rand Inc., Dept. 52-12, Buffalo, N. Y.

Please tell me how I can buy a new Remington Portable typewriter

This One



Q3EC-3FJ-9RSX

CLIP COUPON NOW

When writing to advertisers please mention Popular Mechanics

MORE IMPORTANT THAN ANY MATERIAL THING



MORE important than millions of telephones and millions of miles of wire is the fundamental policy of the Bell System. It is founded on a spirit of fair dealing with the public, with employees and with those who have invested their money in the business.

• • •

“The fact that the responsibility for such a large part of the entire telephone service of the country rests solely upon this Company and its Associated Companies also imposes on the management an unusual obligation to the public to see to it that the service shall at all times be adequate, dependable and satisfactory to the user. Obviously, the only sound policy that will meet these obligations is to continue to furnish the best possible telephone service at the lowest cost

consistent with financial safety. This policy is bound to succeed in the long run and there is no justification for acting otherwise than for the long run. . . .

“Earnings must be sufficient to assure the best possible telephone service at all times and to assure the continued financial integrity of the business. Earnings that are less than adequate must result in telephone service that is something less than the best possible. . . . The margin of safety in earnings is only a small percentage of the rate charged for service, but that we may carry out our ideals and aims it is essential that this margin be kept adequate. . . . This is fundamental in the policy of the management.”

Quoted paragraphs are from an address by Walter S. Gifford, president of the American Telephone and Telegraph Company, at Dallas, October 20, 1927.

BELL TELEPHONE SYSTEM



When writing to advertisers please mention Popular Mechanics

Материал, опубликованный в журнале Popular Mechanics

Popular Mechanics Magazine

H. H. WINDSOR, Founder

H. H. WINDSOR, Jr., Editor and Publisher

December, 1934

Vol. 62, No. 6

Special Features

Movie Magic—Part I	Roto Section
Sherlock Holmes Up-to-Date	809
<u>The Latest Automobile Brakes</u>	<u>813</u>
Dare-Devil "Water Bug" Riders	818
<u>Epidemics Attacked by Science</u>	<u>824</u>
<u>The Millionth Part of an Inch</u>	<u>830</u>
<u>The Radio Tube Racket Exposed</u>	<u>834</u>
<u>They Have Not Died in Vain</u>	<u>840</u>
<u>Uncle Sam Backs Home Building</u>	<u>850</u>
<u>They Shoot 'Em Anyways</u>	<u>856</u>
<u>Sound Sleuths Battle Noise</u>	<u>874</u>
<u>Fighting Fires in Your Home</u>	<u>882</u>
<u>High Voltage Brings Super-Power</u>	<u>888</u>

(Continued on next page)

Are You a New Era Driver?

WHEN you trade in that old bus and step into a shiny new automobile, you will need to learn some new driving tricks and discard some of the old ones. An ability to operate a worn, antiquated car efficiently is no guarantee that the same driver can get the most out of a modern car. An entirely new kind of "touch" is necessary for today's automobile with its knee-action, synchro-mesh transmission, more efficient brakes and other improvements. An article in the January issue explains the modern driving practices which will enable you to get the most out of the operating aids incorporated in modern cars.

Next Month

HAVE you ever wondered how the man in the movies tossed a rope into the air and then climbed it hand over hand? The second part of "Movie Magic in the Making" explains this trick and many others. And eight pages of pictures in color show how thrilling "trick" shots are made.

Uncle Sam's Dams

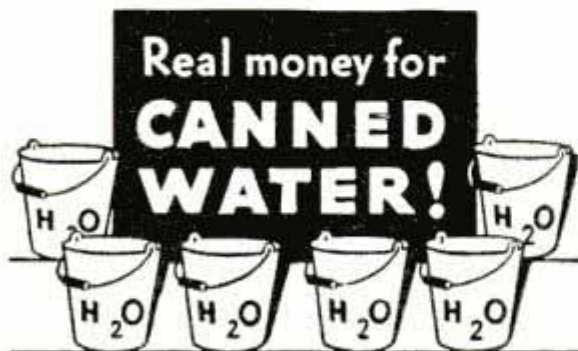
UNCLE SAM today is the world's greatest builder of dams. He is spending almost \$1,000,000,000 on nine vast hydro-electric projects. Boulder dam alone will be able to store the entire flow of the Colorado river for two years. What will all this added water power mean to the nation and what other benefits besides increased power may be expected from these great dams? An article in the January issue explains the government's program and pictures and drawings show the magnitude of these great projects.

New Puzzle Wanted

AN absolutely new puzzle is one of the rarest things in nature and will bring more people to the inventor's door than any mouse trap ever conceived. There is money in puzzle inventing and this has become the part time job of thousands. An article next month tells you what constitutes a successful puzzle and how to go about inventing one.

(Contents—Continued)

Last year
thousands of
people paid



SEEMS queer that people would pay hard-earned cash for plain ordinary water. But last Winter quite a lot of people did just that. Naturally, they didn't realize it. They thought they were buying anti-freeze. And so they were . . . but not concentrated, undiluted anti-freeze. They were buying anti-freeze diluted with water.

How much water? Well . . . the amount of water in a diluted anti-freeze may run as high as 60%. Thousands of gallons of diluted anti-freeze were sold last year with a water content as high as 40%. The car owner who paid for a gallon of such a product actually received 6/10 of a gallon of anti-freeze—4/10 of a gallon of plain water.

Water is cheap . . . If Eveready Prestone were sold as a diluted instead of a concentrated anti-freeze, the price could be reduced enormously. But naturally, for protection against "Freeze-up" you would need to use a lot more.

All-Winter Protection So Inexpensive

In buying a concentrated, undiluted product like Eveready Prestone you know what you get for your money. It is all anti-freeze. Furthermore, you don't pay the canning and shipping costs on water.

Don't risk this Winter without Eveready Prestone protection for your car. Turn to the guarantee on page 14A, and see on the chart how inexpensively your car can have Eveready Prestone's all-Winter protection.

TURN TO PAGE 14A

Can always operate anti-freeze you help avoid freezing & etc

- Advertising
 - giant chair on store roof helps business 854
 - reflector plate for autos may carry 837
- Airplane—air flow made visible for streamline tests . 863
- Ant—killer, with wick feeder 891
- Army, German—cardboard, target for riflemen 823
- Automobiles, Accessories
 - brake equalizer and booster 895
 - fuel filter for small cars 880
 - plug for oil drain attracts metal particles 866
 - opener unlocks door, saves window 900
 - revolving disk on windshield 873
- Automobiles, Design
 - brake equalizer gives hydraulic effect 848
 - lead and bronze bearings replace babbitt 822
- Automobiles, Tires
 - bullet-proof has sponge rubber tube 872
 - deflation indicator flashes warning 891
- Automobiles, Trucks—cooled by fuel from motor . . . 865
- Aviation
 - chute tested on ground in propeller slipstream . 848
 - fireproof suit, floats wearer in water 887
 - "mercy flights" in Far North 849
- Aviation, Design—two motors in nose of plane 900
- Boats
 - how to save yourself when upset 861
 - midget, tows rowboat 829
- Bottles
 - cap remover serves as stopper 885
 - collected as hobby 892
 - sealed in vacuum keeps juices fresh 854
- Card Table—of paper, folds for storing 877
- Cattle—developed for north are part buffalo 863
- Concrete—screed support, adjustable, speeds work . 887
- Diamonds—coat tools used in grinding 821
- Dogs
 - "Easter bonnets" make cars stand erect 873
 - the making of a sled dog 893
- Doll House—like model home 880
- Door Chimes—replace bell 879
- Drill Press—vise has built-in parallels 863
- Elephant—rides in plane and liner 822
- Engines—gas, power increased by back pressure . . . 854
- Fire Extinguisher—chemical, in collapsible tube . . . 881
- Fishing—ice, handy tackle for 855
- Floodlight—gas, high power has super-charger . . . 892
- Furnace—water pan filled by electric humidifier . . . 891
- Garage—old auto on roof, attracts trade 871
- Gauge—self-centering, gives inside measurements . . 827
- Geology
 - dynamite "earthquakes" aid study of earth 855
 - electric chart used for underground testing 896
- Glass—liquid coating saves from deterioration . . . 833
- Goggles—two-in-one, give double protection 823
- Gold
 - folding dry washer, speeds placer mining 837
 - homemade washer run by gas engine 829
 - recovery plant made of mercury and tube 846
- Golf—spinning tee increases driving distance 871
- Gourds—animal and bird figures made from 833
- Hammer—kit holds six varieties of nails 821
- Heating—fuel, four kinds, burned in room heater . . 839
- Historical Landmark—the fort of four nations 867
- Household Devices 898, 899
- Lamp—guard has folding end for removal of bulb . . 822
- Linoleum—block and cutter speed work 823
- Microscope—micro-movie projector fits, any 843
- Model Making—circus parades through city 828
- Monument—Washington, scaffold used to clean 881
- Musical Instruments—tunes from kerosene can 827
- Oil Wells—magnet fishes for tools 839
- Panama Canal—gun-train guards ends of 844
- Parcel—receiver chute, serves customer 846
- Paste Tube—self-closing cap works like clothespin . 900
- Pipe—concrete and asbestos, takes place of metal . . 864
- Potato—seed cutter operated by crank or motor . . . 897
- Power Plant—portable, drills oil wells, water wells . 860
- Radio—easy solutions for everyday problems 905

(Continued to page 6A)

4900 Chemical Formulae In This One Indispensable Book



In this one big book you have at your fingertips practical commercial formulae for making thousands of useful products for your own use and for profitable manufacture. Brand new, encyclopedic in scope, arranged for quick reference, it is exactly the book that every commercial chemist, large or small, has long wanted. 600 Meaty Pages of formulae including many patented, scarce and little known processes, many published for the first time. *Collected by over 60 outstanding industrial chemists and technicians—every formula proved successful by actual test and experience.*

Covers Hundreds of Industries Thousands of Products

You will find, in The Chemical Formulary, methods for making or using:

- | | | | |
|--------------------|---------------------|-------------------|-------------------|
| Abrasives | Disinfectants | Hair Tonics | Photographic |
| Adhesives | Dyes | Incense | Specialties |
| Air Conditioning | Electrotyping | Inks | Polish, Auto |
| Alloys | Etching | Insulation | Porcelain |
| Anti-rusts | Compounds | Jams and Jellies | Preservatives |
| Aromatics | Explosives | Kalsomine | Printing |
| Asphalt | Fertilizer | Lacquers | Refrigerants |
| Bronze Lacquers | Fireproofing | Latex Paint | Rubber, Synthetic |
| Candles | Fireworks | Leather Polishes | Safety Glass |
| Candy Glaze | Fluxes | Liniment | Shaving Cream |
| Carbonizing | Fly Killer | Liquors | Soaps |
| Catalysts | Food Specialties | Lubricants | Solvents |
| Celluloid | Gems, Artificial | Matches | Stencils |
| Cement | Glass Polish | Metallic Printing | Tooth Paste |
| Cream, Cold | Glues | Matrix, Rubber | Waterproofing |
| Coffee Substitutes | Gold, Plating | Mirrors | Zinc Etching |
| Colors for Oils | Grease, Lubricating | Nickel Plating | Zinc Plating |
| Decolorizing | Hair Setting | Oil Sun-Tan | and thousands |
| Preparations | Liquids | Ointments | more |
| Dental Cement | | Paints | |
| Depilatories | | Patent Leather | |

ONE FORMULA ALONE MAY BE WORTH HUNDREDS OF DOLLARS TO YOU

Every formula in this book is of practical, commercial value. The volume is not merely a collection of "household stunts" or experiments for the amateur, but a mine of money-making ideas for everyone concerned with commercial chemistry. In addition, you will find it a quick-reference book for a vast amount of information that you need in your daily work. Send for your copy today.

EXAMINE IT FREE *Send No Money Mail This Coupon*

D. VAN NOSTRAND CO.,
250 Fourth Ave., New York

Send me on approval The Chemical Formulary. Within 5 days after I receive it, I can return it to you and owe nothing. If I keep it I will send you \$2.00 as first payment and I will pay \$2.00 monthly thereafter for 2 months—\$6.00 in all. (5% discount for cash. Same return privilege.) (P.M. 12-34.)

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

Every Needed Fact, Figure, Formula Every Shortcut and Special Method in the WHOLE FIELD of MATHEMATICS

Now in ONE Handy Volume!

For the first time you can have this wealth of practical mathematical information, covering every trade and business, condensed into one handy book for quick reference. This volume puts right at your finger tips instant facts and formulas for making every kind of mathematical calculation. From hundreds of different sources, this priceless information has been gathered together, boiled down into brief, simple language, and applied to actual problems. Every man in business, every man in the mathematical trades, every man who ever uses a tool or has to make calculations or estimates in office, shop, or home, will find here a treasury of money-making, money-saving ideas.



THE HANDBOOK OF APPLIED MATHEMATICS

No previous knowledge of mathematics is needed. No study is required. The specific information you want is easy to find by looking it up in the index. The book takes up every trade and gives you practical methods, easily-worked formulas for solving every problem. Thousands of specific examples show you just how to make your calculations. If your work involves mathematics in any way this complete reference handbook is an indispensable part of your equipment. It is an amazing time saver for any one concerned with engineering, architecture, electricity, mechanics, construction, automobiles, machinery, printing, or any other industrial work; or with accounting, auditing, manufacturing, costs, taxes, or any other business mathematics. No practical man, no house owner who makes an occasional repair, no one who has a home work-shop can afford to be without the valuable information quickly found in this book.

FREE
"RAPID ARITHMETIC"
Cloth Bound
Regular \$1.50 Book

Gives you quick methods of addition, subtraction, multiplication, division, fractions, interest and discount, percentage, calculating powers and roots, and every arithmetical problem. Also many interesting, curious puzzles of numbers, amusing and instructive. Given absolutely free with THE HANDBOOK OF APPLIED MATHEMATICS.

See How Thoroughly It Covers the Needs of YOUR Work

Arithmetic (including Slide Rule), Algebra, Geometry, Trigonometry, Weights and Measures, Mechanics, Excavations and Foundations, Concrete, Brickwork, Carpentry and Building, Lathing and Plastering, Painting, Plumbing, Heating, Machine Shop, Automotive Shop, Sheet Metal Work, Electricity (D. C. and A. C.), Print Shop, Business Mathematics, Accounting.

EXAMINE IT FREE

Send No Money Mail This Coupon

D. VAN NOSTRAND CO.,
250 Fourth Ave., New York

Send me on approval *The Handbook of Applied Mathematics* and *Rapid Arithmetic* free. Within 5 days after I receive the books, I can return them and owe nothing. If I keep them I will send you \$2.00 as first payment and I will pay \$2.00 monthly thereafter for 2 months—\$6.00 in all. (5% discount for cash.) (P. M. 12-34)

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

BUILD RADIO

BUILD THIS SENSATIONAL SET

★ CONTINUOUS BAND-SPREAD ★
ALL-STAR
 ALL-WAVE Superheterodyne

SEND FOR
FREE
 CIRCUIT DIAGRAM
 AND PARTS LIST

Thousands are finding the ALL-STAR ALL-WAVE Superhet easy to build—thrilling to use. Backed by eight leading Radio Manufacturers. Only \$2.50 will start you building this great set. This sum brings you the ALL-STAR FOUNDATION KIT. Includes drilled front panel and base, enlarged schematic, pictorial and wiring diagrams, and instructions showing where each wire goes. ORDER THE ALL-STAR FOUNDATION KIT or SEND FOR FREE DIAGRAM AND PARTS LIST.

RADIO PARTS HEADQUARTERS

ALLIED IS RADIO PARTS HEADQUARTERS. We can supply you with matched high quality kits at consistently lower prices for all circuits including:

- Short Wave Sets
- Broadcast Sets
- All Wave Sets
- Transceivers
- Amplifiers
- Transmitters, etc.

WRITE US FIRST



FREE 1935 RADIO CATALOG

The most complete Catalog in Radio is ready for you. Write for your FREE copy at once. Packed with the latest All-Wave and European-range Radio Receivers—Battery, 32 Volt and Electric Models—Short Wave Transmitting and Receiving Equipment—an amazing Public Address listing—Test Instruments—thousands of replacement parts and accessories—over 100 pages!

NEW SET-BUILDING KITS

Build your own Radio! The new ALLIED Catalog is packed with the latest Short Wave, Long Wave, and All-Wave Set-building Kits. We can supply you with matched Kits for building any radio circuit described in Popular Mechanics or in any other magazine or handbook. Order your kit today or send for FREE Parts Lists.

WRITE FOR YOUR CATALOG TODAY

ALLIED RADIO CORPORATION

833 W. JACKSON BLVD., CHICAGO, ILL.
 Dept. K.

Send me at once:

- FREE 1935 RADIO CATALOG.
- ALL-STAR SUPERHET DIAGRAM and PARTS LIST. FREE.

Name

Address

City State

(Contents—Continued)

Radio, Application—photo-cell relay is weather-proofed906

Radio, Apparatus

- inexpensive set tester904
- million-power loud speaker used at yacht races.853
- overload relay is adjustable.....906
- set in perambulator871

Radio, Automobile—lock protects from removal....897

Radio, Broadcasting

- artists guided by numbered carpet865
- echo vaults add to acoustics of studio866

Radio, Receivers

- all-wave antenna easily installed.....901
- all-wave superheterodyne band-spread over entire range906
- eleven-tube, tunes itself906
- portable, short-wave band spread902

Railroad

- collapsible pole taps line when train stalls....864
- how to weigh steel rail with simplest tools...862
- streamlined auto-rail used in France885
- streamlined train has giant engine895

Razor—rod holds strop at proper tension892

Refrigerator, Electric—defroster with timing unit.859

Rifle—timer shows mature man fastest on trigger.817

Rubber

- "bakelite" sandwich has variety of uses821
- brush, applies wall finishes879

Seat—in park, made from hollow log887

Service Stations—portable, save in changing sites.864

Sewage—gas runs motor to make electricity.....878

Snowflyers—replace dogs in Far North878

Sound—heat made by noise860

Stamp—transparent mount gives full protection..848

Stand—roadside, bottle caps decorate880

Stump—burner uses forced draft847

Sun Glasses—Eskimo, used for air races881

Tape Rule—flexible, takes inside measurements...877

Television—system uses magnetic lens838

Tennis

- robot serves balls for player to strike.....859
- tightener for strings gives uniform tension...843

Theater

- Chinese, uses rich robes and masks886
- portable, brings plays to audience870

Tractor—saves labor for the farmer877

Trousers—lining eliminates belt885

Vanes—prevent blindness entering tunnel853

Water Pipe—arched, spans unstable ground.....847

Weather—barometer shows pressure changes....879

Wire—pulling tool has many uses897

AMATEUR MECHANICS

- Bags—soiled-clothes, on closet door.....926
- Bathroom Accessories—rack for collapsible tubes.918
- Bolt—carriage, flattened edges, prevent turning...914
- Book Ends—pair of railroad907
- Bottle Caps—heavy boxes moved on936
- Boxes—form for making glued913
- Can—perforated, permits use of old paint940
- Canvas—holders for carrying wood930
- Chalk—holder from rubber grip930
- Club House—a cold-weather911
- Conservatory—built in basement931
- Door—block tacked to edge, prevents rattling....909
- Dumb-Bells—made from auto pistons924
- Electrical Apparatus—improving a heater.....926
- Fire—outfit for kindling.....940
- Fire Shovel—funnel used as shield910
- Floor Brush—rubber heels on, protect furniture...910
- Furnace

 - bracket holds chain930
 - suggestions that help in firing935

- Furniture—scars easily removed915
- Game—simplified marble914
- Heating—fan increases efficiency of radiator.....912
- Ice Boat—safe, front-steering, how to build920
- Ink Bottle—disk serves as guide for pen holder...910

(Continued to page 8A)

"With the passage of the National Industrial Recovery Act, there will be placed before all branches of the accounting profession greatly increased opportunities and responsibilities."

*Editorial Note
June 15, 1933 Bulletin
of the National
Association of Cost
Accountants*

The New OPPORTUNITY in ACCOUNTING

—and how you can take advantage of it

NEVER before, has there been as great an opportunity as now faces efficient bookkeepers and accountants.

You know, of course, that accounting has always been a profession of outstanding opportunity—a field in which the capable, trained man could go faster and farther than in almost any other field. But we believe that all past opportunities are going to be surpassed in the next five years.

And here's why:

In the first place, every firm will watch its accounting as never before. This depression has taught executives the vital necessity of knowing all the facts about their business, where their company stands all the time.

Then our new governmental policy—controlled economy—forces the keeping of better and more complete records in every office and plant. It will not be a matter of choice with any firm—it will be necessity.

For instance, the National Industrial Recovery Act, with regulation of production, minimum wages, uniform prices, codes of practices—centers around cost control and uniform accounting within each industry.

The new Federal Securities Act, with its insistence upon publicity of complete facts about every company selling its securities publicly, will compel more frequent and more accurate financial statements—and these in turn call for more and better accounting.

And as business gains momentum, there will be a greater demand for trained bookkeepers and accountants—they will go back to work sooner and in larger proportion than any other group—in fact, accountants tell us the demand will probably soon exceed the supply.

Ask for the Facts

We need not tell you what that means in opportunity for the capable man already in accounting and for the able man who gets into accounting now. Nor need we argue for the practicality and value of LaSalle training in Accountancy—over 500,000 men and women and 1,200 C. P. A.'s have already tested and proved that.

The only question is about *you*—whether you fit into this field and

whether you can and will prepare yourself adequately. For accounting is no magic wand to summon success—it demands much from the man whom it rewards highly.

You can answer that question wisely only when you know the facts. And the coupon below will bring you full facts about these demands and opportunities in accounting today together with the details about the LaSalle 1933 home-study training in Accountancy.

If you are dissatisfied with your present situation—and in earnest about achieving success—get the facts—use the coupon—NOW.



La Salle Extension University

The Institution that has trained over 1,200 C. P. A.'s

LA SALLE EXTENSION UNIVERSITY, Dept. 1264-HR, Chicago

I'd like to see whether I should take up accountancy. Send me—without obligation or cost to me—your booklet *Accountancy, the Profession That Pays*, and full information about your Accountancy training program.

Higher Accountancy

Other LaSalle Opportunities:

If more interested in one of the fields indicated below, check and mail now.

- Business Management
- Modern Salesmanship
- Law—Degree of LL.B.
- Commercial Law

- Personnel Management
- Practical Accounting and Office Management
- Expert Bookkeeping

- C. P. A. Coaching
- Business Correspondence
- Business English
- Stenotypy

Name.....

Present Position.....

Address.....

When writing to advertisers please mention Popular Mechanics



“Greenhorn” Salesman Saves 5 Orders Veterans Lost Through Mistakes!

After This Amazing Little Book Showed Him How!

MY first day as a salesman for my present firm was as disheartening as you can imagine. I was sent out with an experienced salesman who was supposed to break me in. But I didn't learn much. In four cases, where the experienced man was supposed to show me how to handle tough situations he failed miserably.

That night, however, I was attracted by a most interesting item which told about a little book called "Mistakes Commonly Made In Selling." It also told of a most unusual training for salesmen, given by a group of leading sales aces. I found that that little book was free, and I sent for it, to see what it could tell me.

It was amazingly interesting. What made it most interesting to me, however, was that it accurately described the selling tactics of several fellows I had been working with. It showed why they were losing so many sales.

When I arrived at the office next day I said I was going out alone, and I went and called back at every office where we had been before. But I had noted the mistakes listed in that book and I took care to avoid them—especially the ones which I knew the other men had made.

Of course, a greenhorn like me couldn't get all those customers. But I did get five of them! I went back that night with orders in my pocket worth \$75 to me!

If you're like me—ambitious to get ahead and make real money—do what I did, and get that little book.

After you read it, and its companion volume "The Key To Master Salesmanship," you'll see why I enrolled for the marvelous sales training and free employment service given by the National Salesmen's Training Association.

Send Now for These Two Amazing Books

To literally thousands these books have meant the difference between ill-paid slavery in "two-by-four" selling jobs in offices, or in factories, and real success!

Yet these two books are now FREE if you are ambitious and want to make a lasting success in salesmanship. Send for them today. Learn why some salesmen are wasting their lives—hampered by ignorance of the fundamentals of successful selling. Learn, too, how thousands of others have turned their blind ploddings into well-paid sales success. They may well do as much for you. No obligation—mail the coupon now!

NATIONAL SALESMEN'S TRAINING ASSOCIATION

Dept. W-107, 21 W. Elm St. Chicago Illinois

Where Shall We Send Your Copies—FREE!



National Salesmen's Training Association, Dept. W-107, 21 W. Elm St., Chicago, Ill.

Without obligation to me, please send my FREE copies of your books "Mistakes Commonly Made In Selling" and "The Key To Master Salesmanship," with complete information about your training and service features.

Name.....

Address.....

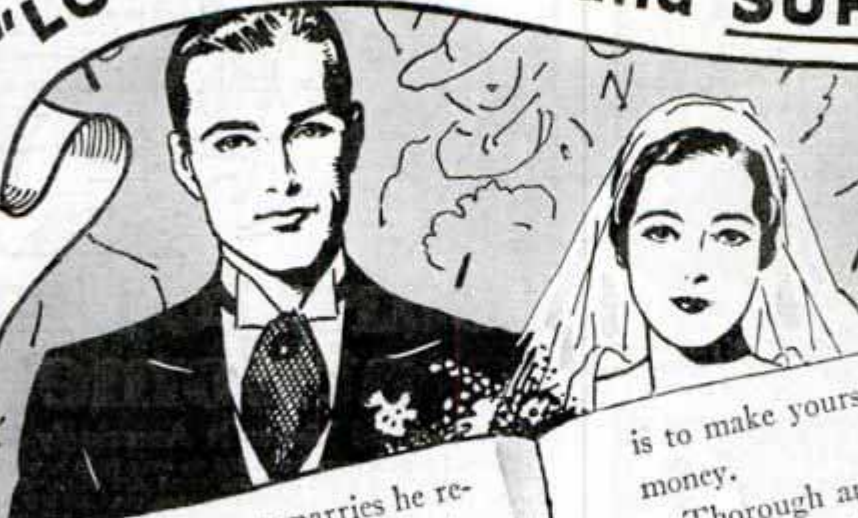
City..... State.....

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

(Contents—Continued)

Inner Tube—prevents bumping against low door...	912
Jig Saw	
attachment for cutting disks on	931
cutting metal on	910
Model-Train—improving the track	936
Mortar Hoe—wetting attachment for	926
Motion Pictures—home, shooting title against ac-	
tion background	919
Paint—luminous, practical uses for	925
Painting—separating matted bristles on brush.....	924
Photography	
coat serves as emergency darkroom	926
trimmer uses safety-razor blade as cutter.....	923
Quilt Blocks—sandpaper makes non-slip patterns..	940
Roof—determining pitch with ruler	936
Sandpaper—strips backed with file	936
Saw—one-man, ax serves as rest for	935
Ship Models	
attaching ratlines to mast shrouds	914
building Roamer, Part II	927
Skates—tubing protects shoe heels against clamps.	912
Square—combination, adapter for using as mark-	
ing gauge	930
Stove Lid—lifter that will not slip	912
Stovepipe—stop prevents sections from collapsing.	914
Tool—fluting, made from old gear	940
Toy	
realistic head on broomstick horse	919
watch-driven	937
Traveling Case—altered, holds entire wardrobe....	909
Venetian Blinds—make your own	932
Warning Flags—rubber suction cups hold on ice...924	
Waste—holder for, to thaw frozen pipes	924
<i>Tin plating small object</i> 931	
<i>SHOP NOTES</i>	
Artist—brushes, held in solution by clothespins...950	
Automobiles, Accessories	
connected to prevent discharging battery.....	957
grille in splash apron cools cylinder oil.....	958
rear-view mirror on wind wing	958
removable box for light hauling	957
Automobiles, Batteries—storage, truck carries....959	
Automobiles, Repairing	
clamp holds free end of pump hose	959
flushing steering-gear housing with hot oil...958	
removing gutter tape from car top	959
rubber hose stops knock in oil-gauge pipe...959	
tight hose connections for water systems	958
Belts—rosin keeps V-belts from slipping	956
Blasting—safety box for caps	956
Bolt, Expansion—holds pipe nipples for threading..950	
Construction—skid chains prevent slipping.....950	
Drawing Board—wrench supports	960
Electrical Apparatus—turning uniform loops.....951	
Garage—foot-operated checks hold doors open...958	
Gauge Block—adjustable, for cutting tie strings...951	
Hack Saw—carrying extra blades	942
Hammer—bricklayers', hollow grinding head of...944	
Ink Bottles—spring caps for	949
Jug—rubber tube helps in emptying large	943
Lathe—die holder for threading work in	951
Manger—horse, front opens for cleaning	944
Metal—colored with chemicals and dry cell	943
Metal Spinning—how to make articles by	952
Milling Machines—kinks for operators	944
Photography—ferrotyping solution for glossy prints.944	
Pipe—welded, has many uses in shop	945
Poultry	
hens' nests from tin cans	945
mash mixture for flocks	951
Printing—form for casting stereotype metal	950
Pulleys—crowning in a turret lathe.....946	
Putty—tool, a for window	956
Sand—what you can do with	941
Saw—old auto axle used as swage	946
Sheet Metal—metal-cutting shears on ladder.....956	
Stencil—paint for all materials	960
Wire—straightened with bent metal tubing.....946	
Wood Chisels—tricks of using	947

"LOVE, HONOR- and SUPPORT!"



WHEN a man marries he realizes his dream—and he also adds to his responsibility. That two can live as cheaply as one, is untrue.

Young man, if you are contemplating marriage, it's much wiser to face the facts right now. Love is a great emotion, but happy married life also depends on money.

The thing to do is to make more money. The way to do it

is to make yourself worth more money.

Thorough and modern training is essential to this. There is no substitute. And today, at this very moment, thousands of men are getting this vital training by spare-time study of I. C. S. courses. Other thousands are making more money because of I. C. S. training. Their first step was mailing this coupon to Scranton. Why don't you mail it?

INTERNATIONAL CORRESPONDENCE SCHOOLS

"The Universal University"

BOX 5539-H, SCRANTON, PENNA.



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



TECHNICAL AND INDUSTRIAL COURSES

- Architect
- Architectural Draftsman
- Building Estimating
- Wood Millworking
- Contractor and Builder
- Structural Draftsman
- Structural Engineer
- Inventing and Patenting
- Electrical Engineer
- Electric Lighting
- Welding, Electric and Gas
- Reading Shop Blueprints

- Telegraph Engineer
- Telephone Work
- Mechanical Engineer
- Mechanical Draftsman
- Machinist Toolmaker
- Patternmaker
- Heat Treatment of Metals
- Bridge Engineer
- Bridge and Building Foreman
- Gas Engines Diesel Engines
- Aviation Engines
- Automobile Mechanics

- Plumbing Steam Fitting
- Heating Ventilation
- Sheet Metal Worker
- Steam Engineer
- Steam Electric Engineer
- Civil Engineer
- Surveying and Mapping
- Refrigeration
- R. R. Locomotives
- R. R. Section Foreman
- R. R. Bridge and Building Foreman

- Air Brakes R. R. Signaller
- Highway Engineering
- Chemistry Pharmacy
- Coal Mining Engineer
- Navigation Air-Conditioning
- Boilermaker
- Textile Overseer or Supt.
- Cotton Manufacturing
- Woolen Manufacturing
- Agriculture Fruit Growing
- Poultry Farming Radio
- Marine Engineer

BUSINESS TRAINING COURSES

- Business Management
- Office Management
- Industrial Management
- Traffic Management
- Accountancy
- Cost Accountant

- C. P. Accountant
- Bookkeeping
- Secretarial Work
- Spanish French
- Salesmanship
- Advertising

- Service Station Salesmanship
- First Year College
- Business Correspondence
- Lettering Show Cards Signs
- Stenography and Typing
- Civil Service Mail Carrier

- Railway Mail Clerk
- Grade School Subjects
- High School Subjects
- College Preparatory
- Illustrating
- Cartooning

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

City.....State.....Occupation.....

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

When writing to advertisers please mention Popular Mechanics

FREE BOOK



"Success in Draftsmanship"

This book will be sent free at once.

It explains how you can learn drafting by mail at home in spare time. Previous experience not necessary.



See coupon
These tools and drawing table sent the day you enroll.

For MORE PAY learn DRAFTING FROM AN ENGINEER



Engineer Dobe (Est. since 1900)

I'll train you until you actually have a good job as a draftsman. (That's my guarantee, or your money back.)

DON'T DELAY getting my free book on "Success in Draftsmanship". NOW—right today—is the time to prepare for that better job. Prosperity is surely coming. *Be prepared!*

Jobs Open Now!

ALREADY there are calls for draftsmen in aviation, automobiling, electricity, machinery and building lines, and in many other industries. Trained Draftsmen will be in big demand. Act now.

Who will get the jobs? Of course the men who've been trained.

"I want that good job; how do I start?"

You start *today* by sending the coupon for this free book. Don't wait a single day. Get the training now. Then YOU will be the one who is trained, prepared, and ready for that good job. So, send that coupon NOW!

This Book is FREE

Send the Coupon

ENGINEER DOBE, Div.33-79, Libertyville, Ill.

Send me your free book "Successful Draftsmanship" and please explain how you will assist me to a good position as a draftsman.

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

Address.....

When writing please mention Popular Mechanics



\$25 to \$100 for one drawing.

Learn to Draw at Home

New Method Makes It Amazingly Simple

Trained artists earn from \$50 to over \$250 a week. Tremendous demand right now for good Art work. Magazines, newspapers, advertisers, printing houses, etc... all buy Art work.

Become an artist through wonderful new easy method of personalized instruction—right at home in spare time. Learn Illustrating, Designing and Cartooning. Actual fun learning this way. Learn to draw and earn big money!

Send for FREE BOOK

Just printed—a new book which describes the latest developments and wonderful opportunities in Commercial Art, gives full details on this new easy method of learning to draw. Tells all about our students—their successes—what they say—actual reproductions of their work—and how many earned big money even while learning! Write for this Free Book and details of big Commercial Artist's Outfit GIVEN to all new students. Mail postcard or letter now.

Studio 1212

WASHINGTON SCHOOL OF ART

1115 15th St., N. W.,

Washington, D. C.



Your 2nd Chance

High School Course in 2 Years

You can complete our simplified High School Course at home in 2 years. Meets all requirements for college entrance, business, and the professions. Standard H. S. texts supplied. Diploma awarded. Separate subjects if desired. Send for Free Bulletin TODAY. No obligation.

American School, Dpt. H-945, Drexel at 58, Chicago

BE A RAILWAY TRAFFIC INSPECTOR

RAILWAY and BUS LINES Demand Men with this SPECIAL TRAINING ACTIVE MEN — 19 to 50 — trained by our short-home-study course as Railway and Bus Passenger Traffic Inspectors, advance quickly in this fascinating, healthful work. Travel or stay near home. Complete our training and we will help place you at up to \$140 per month, plus expenses, to start, or refund tuition. Experienced men earn more. Costs little; terms. Free Booklet gives 16-yr. record.

STANDARD BUSINESS TRAINING INSTITUTE
Div. 212 Buffalo, N. Y.



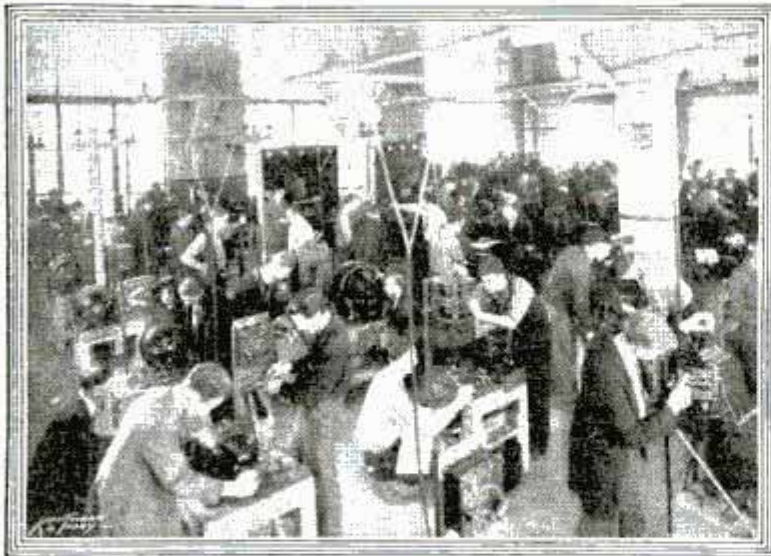
Learn PHOTOGRAPHY at Home

Make money taking pictures. Photographs in big demand. Commercial Photography also pays big money. Learn quickly at home in spare time. No experience necessary. Write today for new free book, *Opportunities in Modern Photography*. American School of Photography, Dept. 1359, 3601 Michigan Ave., Chicago.

LEARN WATCH REPAIRING



AT HOME You can learn by our modern and original system of instruction every part of the Watch Repairing Trade at home as good or better than at a shop. You can earn money while earning and secure a well paying position or start in business after completing our course of instruction. Good watch repairers are always in demand and earn very good salaries. For particulars apply to the Wisconsin School of Watch Repairing 824 E. Mason St., MILWAUKEE, WIS.



STUDENTS BUSY AT WORK IN GREAT COYNE SHOPS

Learn ELECTRICITY

**Pay for Your Training in
Easy Monthly Payments
After You Graduate**

NORED TAPE—NO STRINGS TO MY OFFER—YOU RUN NO RISK! I'LL TRAIN YOU IN MY SHOPS FOR 90 DAYS—YOU GET OVER ONE YEAR TO PAY TUITION AFTER GRADUATION! Make your first payment 60 days after your 12 weeks' Training period and then take over a year to pay the balance in small monthly payments. Your earnings on the job as a Coyne Trained Graduate should make it easy. **I'm willing to back you** in this way because hundreds of my successful graduates have proved to me that the fellow who wants to improve himself and his conditions is the finest credit risk in the world.

Learn By Doing In 12 Weeks In the Chicago Coyne Shops

Do actual work on **Electrical Equipment** worth many thousands of dollars to **qualify yourself for a big pay job.** Learn to wind armatures, be an illumination expert, do signal engineering, be a power plant or substation operator, or prepare for other big-pay electrical jobs. All under individual instruction and on the sort of work you will meet out in the field on a real job.

All Actual Shop Work on Motors, Generators, etc.

The remarkable "Learn By Doing" method used in the great Coyne Shops trains you to master Electricity and its many branches in 12 weeks. Actual shop work—not a correspondence course—you don't have to recite. Instead you do actual work in wonderful, modern daylight shops on the finest kind of Electrical equipment, under personal supervision of expert instructors. That's why Coyne Training prepares you as a real Electrical Expert in such a short time.

You Don't Need Advanced Education or Previous Experience

If you understand simple English you can train the Coyne way—by actual work on up-to-date generators, motors, dynamos, batteries, automotive and aviation engines, electric signs, etc. Do actual jobs you will be called on to do in the field. When you finish Coyne Training you should be able to confidently tackle any job, for you will have actually had similar work during your training.

Electric Refrigeration, Air Conditioning Included Without Extra Cost



The fastest growing industries in America today. Manufacturers and Distributors of Refrigeration and Air Conditioning equipment need **Trained men who have Specialized** in these rapidly expanding fields. Here at Coyne you will prepare to fill a job as Installation and Service man, Shop Mechanic, Tester, Assembler, Inspector, etc. You will learn about various types of compressors, condensers, temperature control devices, thermostatic and expansion valves—you will do actual work on latest types of Refrigerating and Air Conditioning machines. And, it won't cost you one extra cent to get this remarkable training. I include it absolutely Free with your regular Electrical Training.

Mail Coupon NOW!

Earn Living Expenses While You're Training

Many of my students work part time to help pay their living expenses while they are training. My employment Department will also assist you to find a spare time job to cover a good part of your room and board expenses. If you need part time work write me about your problems.

Employment Help for You After Graduation

My Graduate Employment Service will give you real employment help. As one of my graduates you will get assistance quickly, and every help we can give you to locate a job for which you have been trained. In addition to employment help you get consultation service free for life.

Your life scholarship entitles you to come back to Coyne at any time and take up any new subject added to our course.

Get This FREE BOOK

Get the new "Coyne Opportunity Book," giving all facts about Coyne Training. Photographs of Shops showing students at work on modern electric equipment under the personal supervision of Coyne Expert Instructors. Also details of my Spare Time Employment

Offer. Pay After Graduation Plan and Graduate Employment Service. Yours without cost. Simply Mail the coupon.

H. C. LEWIS, President
Coyne Electrical School, Dept. 94-72
500 S. Paulina St., Chicago, Ill.

Send me your big FREE Book about Coyne Training and give me all details regarding your "Spare Time Employment Offer" and "Pay After Graduation Plan" of easy, monthly payments.

NAME _____

ADDRESS _____

CITY _____ STATE _____

H. C. Lewis, Pres.

COYNE ELECTRICAL SCHOOL

500 S. Paulina St.

Dept. 94-72,

Founded 1899

Chicago, Ill.

A GREAT CHRISTMAS GIFT



FOREST FIRE ACTION LAMP

Beautiful scene in colors. Cylinder inside revolves. The fire seems to really burn when the lamp is turned on. Flames and smoke seem to rise through the trees—reflect on lake. Modernistic octagon top and base. Beautiful new oil painting reproduced in full colors on parchment. Complete, ready to plug in. More attractive than lamp we sold for \$5.00 in 1930. New price—

\$1.00 POSTPAID

Send \$1.00 bill or money order for prompt shipment, postpaid. PRINT your name and address plainly. No lamps shipped C. O. D. or on approval. Order as many as you want. Dozen lots \$10.00.

NIAGARA FALLS LAMP Beautiful new picture. Falls really seems to flow. Price same as above.

IGNITION CO.
50 Tompsett St. Omaha, Nebraska

HOW IT WORKS—A striped cylinder revolves about a striped electric lamp, casting an ever changing pattern of light and shadow through the translucent outer shade. This creates action in the picture real as a colored movie. An interesting, unusual and beautiful lamp for any home. Heat is the only motive power.

Information on any book free. Write Popular Mechanics Press, Chicago, Ill.

MAIL FOR FREE INFORMATION

BEDFORD
YMCA
TRADE
SCHOOL

1115 Bedford Ave., Dept. PM-19
Brooklyn, New York City, N. Y.

- Auto Mechanic Talking Pictures
- Aviation Mechanic Welding
- Aeronautical Engineering
- Refrigeration Machine Shop
- Oil Burner Commercial Art
- Air Conditioning Sign Painting
- Electrical Window Display
- Radio and Television Mechanic
- Architectural - Mechanical Drafting

Name

Address

Play the Hawaiian Guitar like the Hawaiians!

FAMOUS NATIVE HAWAIIAN INSTRUCTORS teach you to play this fascinating instrument. ONLY 4 MOTIONS—No previous musical knowledge needed. OUR 52 EASY LESSONS teach you the enchanting music you hear over the radio.

GIVEN when you enroll—a sweet toned HAWAIIAN GUITAR, complete playing outfit and carrying case.

WRITE AT ONCE for attractive offer and easy terms.



FIRST HAWAIIAN CONSERVATORY OF MUSIC, Inc.
9th Floor, Woolworth Bldg. Dept. 250 New York, N. Y.

Approved by New York State Board of Regents
When writing please mention Popular Mechanics

STICK 'EM UP!

Regardless of strength or size defend yourself and friends against any foul attack, from bullets or by gun, knife or club. Subdue with ease persons much stronger than yourself. A complete course on approved American Police Jiu-Jitsu by internationally known police instructor. 151 illustrations with detailed instructions pocket size. 13 knockout blows without using fists. Send One Dollar Full Price, or will send C. O. D.

S. J. JORGENSEN
784 Maritime Building Seattle, Washington

TRI-STATE COLLEGE

B. S. Degree in 2 years. World famous for technical 2-year courses in Civil, Electrical, Mechanical, Chemical, Radio, Aeronautical Engineering; Business Administration and Accounting. Equivalent in technical hours to 4-year course. Those who lack high school may make up work. Low tuition. Low living costs. Located in picturesque hill and lake region. Students from every state and many foreign countries. 51st year. Enter Sept., Jan., March and June. Write for catalog.

4124 COLLEGE AVE., ANGOLA, IND.

GOV'T. JOBS

SALARY TO START \$105 to \$175 MONTHLY

MEN .. WOMEN
Age Range 18 to 50

- Ry. Mail Clerk
- P. O. Laborer
- R. F. D. Carrier
- Special Agent
- Customs Inspector
- City Mail Carrier
- P. O. Clerk
- Matron
- Immig't Inspector
- Typist

- POSTMASTER
- Seamstress
- Auditor
- Stenographer
- U.S. Border Patrol
- Telephone Opr.
- Watchman
- Skilled Laborer
- Statistical Clerk
- File Clerk

OZMENT INSTRUCTION BUREAU, Dept. 111, St. Louis, Mo. Send me FREE particulars "How to Qualify for Government Positions" marked "X". Salaries, locations, opportunities, etc. ALL SENT FREE.

Name

Address



Be a Radio Expert

Many make **\$40 \$60 \$75** a week

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

J. E. Smith, Pres., Nat'l Radio Institute, the man who has directed the Home Study training of more men for the Radio Industry than any other man in America.

Set Servicing

Spare time set servicing pays many N. R. I. men \$5, \$10, \$15 a week extra. Full time men make as much as \$40, \$60, \$75 a week.



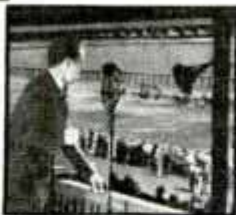
Broadcasting Stations

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



Loud Speaker Apparatus

Installation and service work is another growing, money-making field for trained Radio men.



Television

The coming field of many great opportunities is covered by my Course.



Sample Lesson FREE

Take advantage of this offer. Mail the coupon *Right Now*, and I'll send you *FREE* a Sample Lesson that only my students have received in the past. This fascinating book, "A Bird's-Eye View of Radio," is just packed and jammed with information about this growing industry. The reason I am willing to send it to you is to *PROVE* that my Course is simple, easy to understand, and enjoyable to study. I want to *SHOW* YOU that I can train you, just as I have *ALREADY* trained thousands of men. Many of them with not even a grammar school education, and no Radio or technical experience, have become Radio experts, and now earn two or three times their former pay. Mail the coupon *NOW*,



If you are dissatisfied with your present job; if you are struggling along in a rut with little or no prospect of anything better than a skinny pay envelope—clip the coupon *NOW*. Get my big *FREE* book on the opportunities in Radio. Read how quickly you can learn at home in your spare time to be a Radio Expert—what good jobs my graduates have been getting—real jobs with real futures.

Real Opportunities Ahead in Radio for Trained Men

It's hard to find a field with more opportunity awaiting the trained man. Why, in 1933—one of the worst depression years—the Radio Industry sold \$213,000,000 worth of sets and parts! Radio sets sales increased 45%—tube sales increased 25%! Over 300,000 people worked in the industry. It's a gigantic business, even in the worst business years. And look what's ahead! Millions of sets are becoming obsolete annually. 17,000,000 sets are in operation on which over \$200,000,000 are spent each year for repairs, servicing, new tubes, etc. Broadcasting stations pay their employees (exclusive of artists) approximately \$23,000,000 a year. Advertisers pay 600 broadcasting stations over \$75,000,000 a year for radio time and talent. A few hundred \$40, \$60, \$75 a week jobs have grown to thousands. These figures are so big that they're hard to grasp! Yet they're all true! Here is a new industry that has grown to a commercial giant! No wonder business leaders predict a brilliant future for this great and growing business!

Get Into This Field With a Future

There's opportunity for you in Radio. Its future is certain. Television, short waves, police Radio, automobile Radio, midjet sets, loud speaker systems, aviation Radio—in every branch, developments and improvements are taking place. Here is a real future for hundreds of men who really know Radio. Get the training that opens the road to good pay and success! Send the coupon now and get full particulars on how easy and interesting I

make learning at home. Read the letters from graduates who are today earning good money in this fascinating industry.

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

My book proves that many of my students make \$5, \$10 and \$15 a week extra servicing sets in spare time while learning. I give you plans and ideas that have made good spare time money—\$200 to \$1,000 a year—for hundreds of fellows. My Course is famous as "the one that pays for itself."

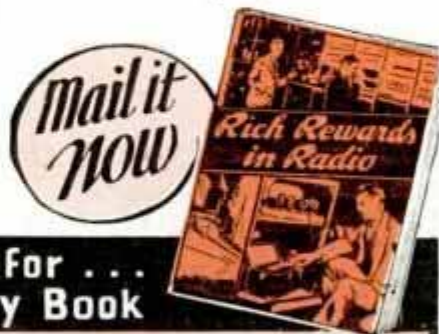
Money Back If Not Satisfied

I am so sure that N. R. I. can train you at home satisfactorily that I will agree in writing to refund every penny of your tuition if you are not satisfied with my Lesson and Instruction Service upon completion. You'll get a copy of this Agreement with my book.

64-Page Book of Facts Free

Get your copy today. It's free to any ambitious fellow over 15 years old. It tells you about Radio's spare time and full time job opportunities; it tells you all about my Course; what others who have taken it are doing and making. Find out what Radio offers YOU without the slightest obligation. MAIL THE COUPON in an envelope, or paste it on a 1c post card *NOW*.

J. E. SMITH, President
National Radio Institute
Dept. 4NP
Washington, D. C.



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

J. E. SMITH, President
National Radio Institute, Dept. 4NP
Washington, D. C.

Dear Mr. Smith: Without obligation send me the Sample Lesson and your free book about spare time and full time Radio opportunities, and how I can train for them at home in spare time. (Please print plainly.)

Name Age
Address
City State

R

Remember

**SAME LOW
PRICE!
\$2.95**

Per gallon



Play safe this year with **EVEREADY PRESTONE**

THE GUARANTEED ANTI-FREEZE

ONE SHOT of Eveready Prestone... *put in now*... will keep your car safe. For every drop of Eveready Prestone is protection from both freeze-up and rust. At \$2.95 a gallon Eveready Prestone is ALL ANTI-FREEZE... no water... no dilution of any kind.

Make the Nose Test: Eveready Prestone, truly non-evaporating, is odorless. But "boil-away" anti-freezes can always be identified by a noticeable odor. Regardless of special "treatments," claimed to decrease evaporation, they will evaporate rapidly when the engine runs at high speeds.

A SPECIFIC GUARANTEE

National Carbon Company, Inc., specifically guarantees that Eveready Prestone, used according to directions, will protect the cooling system of your car against freezing and clogging from rust formations for a whole Winter; also that it will not boil away, will not cause any

damage to car finish, or to the metal or rubber parts of the cooling system, and that it will not leak out of a cooling system tight enough to hold water. National Carbon Co., Inc., General Offices, New York, N. Y. Unit of Union Carbide **UIC** and Carbon Corporation.

IT'S ALL ANTI-FREEZE...NO WATER

When an Engineer Confesses

Here's what he'll tell you about modern automobiles

Automobile engines have greatly increased in size and horsepower. Since 1925 those under \$1000 have been stepped up 79%. Cars over \$1000—50%. Cooling system design has been radically affected. The water passages in many modern radiators are not over $\frac{1}{16}$ inch wide. Thus, because of greater engine-speeds requiring vastly more cooling, the dangers from freeze-up and rust are greatly increased.

Safety from freeze-up and rust

Safety lies in the use of an anti-freeze which protects not only against freeze-up but also

against rust and corrosion. Eveready Prestone reduces the corrosive action of water—95% on Cast Iron and Steel—75% on Radiator Metals and Aluminum. As to freeze-up they are using Eveready Prestone in Little America, where 60° below zero is common.

Don't confuse Eveready Prestone with either glycerine or alcohol. It is *guaranteed* to bring you *all-Winter* protection against freeze-up and rust. It will not boil off. Read the guarantee above, and see on the chart opposite how little it costs to protect your car all Winter long with Eveready Prestone.

When writing to advertisers please mention Popular Mechanics

last winter

FIND YOUR CAR ON THIS CHART

IMPORTANT! The price per gallon of an anti-freeze means nothing unless you know *how many gallons* you will need during the winter. You can't get that information on a boil-away you will need for Eveready Prestone... and here it is. See how reasonably you can get two-way protection *all winter long* against both freeze-up and rust with *one shot* of Eveready Prestone—one shot because it won't boil off, no matter how warm the weather gets between the cold snaps. First cost is last cost—no trips back for more.

MODEL	No. of Gallons			MODEL	No. of Gallons		
	10° above	Zero	20° below		10° above	Zero	20° below
Auburn 6-30, '29; 6-85, '30; 6-52, '34 8-100, '32; 8-101, 8-105, '33 8-50, '34	1	1 1/2	2	Hupmobile M '29; 222, '32; 422, '34 326, '32; 326, '33; 426, '34 390, '34	1 1/2	1 3/4	2 1/2
Austin 1930, '31, '32, '33, '34	1 1/2	1 3/4	2 1/2	La Salle 345-B, '32; 345-C, '33 390, '34	1 1/2	1 3/4	2 1/2
Buick 8-50, '31; 32-50, '32 34-40, '34 60, '32; 56, '33; 60, '34 80, 90, '32; 60, '33; 60, '34 80, 90, '33; 90, '34	1/2	1	1 1/2	Lincoln 8, '31, '32; 12-136, 145, '34	1 1/2	1 3/4	2 1/2
Cadillac 341-B, '29; 355-A, '31; 370-C, '33 370-A, '31; 355-C, '33; 422-B, '32 355-D, '34 370-D, '34	1	1 1/2	2 1/2	Nash 6, '29; 8, '32; 1070, '33; 1220, '34 6, '30; 6-60, '31; 960, '32 8-40, '31; 980, '32; 1130, '33 1090, 1190, '33; 1290, '34 8, '32; 1080, 1180, '33; 1280, '34	1 1/2	1 3/4	2 1/2
Chevrolet '29; '30; Stand, '33; '34 '31; '32 Master, '33, '34	1 1/2	1 3/4	2 1/2	Oldsmobile F29-8, '29; F30-6, '30 L-33-8, '33; L-34-8, '34 F34-6, '34	1 1/2	1 3/4	2 1/2
Chrysler 75, '29; 70, '30 66, '30; 66, '31 6, '31; '32; '33; '34 Royal 8; Imp. 8, '33 8; Imp. 8, '34	1 1/2	1 3/4	2 1/2	Packard 633, '29; 726, '30; 826, '31 8v Sup. 8, '33; '34 745, '30; 845, '31; Del. '32	1 1/2	1 3/4	2 1/2
Continental 40, 60, '33; 41, '34	1 1/2	1 3/4	2 1/2	Pierce-Arrow 125, 126, '29; A, B, C, '30 840-A, '34 836, '33	1 1/2	1 3/4	2 1/2
De Soto 6, '31; '32; 8, '31, '33 6, '34	1 1/2	1 3/4	2 1/2	Plymouth U, '29; '30; PP, PG, '34 PA, '31; PR, '32 PC, PD, '33 PE, '34	1 1/2	1 3/4	2 1/2
Dodge 6, '29; 6, '30; 8, '31 8, '32; 8, '33; 6, '34	1 1/2	1 3/4	2 1/2	Pontiac '29, '30, '31, '32 V-8, '32	1 1/2	1 3/4	2 1/2
Essex-Terraplane 29, '30, '31, '32 6, '33 8, '34	1 1/2	1 3/4	2 1/2	Reo Mate '29; 15, B-2, '30 F.C. 6, '31; F.C. 6-21, 6-25, '32 8-21, 8-25, '32; S-6, '34 Roy. N-2, '33; Roy. 8, '34	1 1/2	1 3/4	2 1/2
Ford A, '29, '30, '31; B, '32, '33 V-8, '32, '33, '34	1 1/2	1 3/4	2 1/2	Studebaker Com. 6, 8, '30 Diet. 6, '32; 6, '33 6, '30; 6, '31 Com. 8, '31, '32, '33; Diet. 6, '34 Pres. 8, '33; Com. 8, Pres. 8, '34 Pres. 8, '29, '30, '31, '32	1 1/2	1 3/4	2 1/2
Graham 827, 837, '29; Cust. 8, '30 6, 8, Cust. 8, '34	1 1/2	1 3/4	2 1/2	Willys 77, '33 39, '33	1 1/2	1 3/4	2 1/2
Hudson 8, '30; 8, '31, '32, '33 8, '34	1 1/2	1 3/4	2 1/2				
Hupmobile L8, '31; Cent. 8, '32; 417, 421, '34	1 1/2	1 3/4	2 1/2				

See pages 4A and 47A

IF YOUR CAR IS NOT ON THIS CHART, see your dealer. Space here does not permit the listing of all cars but he has a chart showing the cost of Eveready Prestone all-winter protection against freezing and rust for all makes and models of cars, down to 60° below zero.



Mechanical Engineering

Learn at Home

MECHANICAL Engineering embraces the design, construction and operation of machines and machine tools. It is a profession which offers almost unlimited opportunities to men who combine natural mechanical ability with technical training.

For this is The Age of Machinery. Almost every convenience, luxury or necessity which we enjoy depends on machinery for its production or adaptability to our needs. Every new invention multiplies the opportunities for competent designers, builders, erecting engineers etc.

One of the best ways to train yourself to secure a position as a Mechanical Engineer is through the home-study courses of the International Correspondence Schools.

These courses are complete and up-to-date, and especially arranged to meet the needs of the student who studies at home.

They are particularly helpful because they are written by well-known mechanical engineers with years of practical experience, who know the quickest, best way to solve every problem.

Just mark and mail the coupon and we'll gladly send you Free Booklets describing the I. C. S. courses in Mechanical Engineering or any other course in which you are interested.

INTERNATIONAL CORRESPONDENCE SCHOOLS

Box 5540-H, Scranton, Penna.

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

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

BUSINESS TRAINING COURSES

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

Name.....

Address.....

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

Occupation.....

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

When writing please mention Popular Mechanics



RUBBER GOODS



AUTO TIRES



LEATHER GOODS

Take an old knife and a can of So-Lo! Dig out a chunk of So-Lo and spread it on the sole like butter. Next morning it's dry and tough! Neat! Waterproof! Non-skid! Wears better than leather.

Hundreds of Uses!

So-Lo mends the sole or heel, i.e. Fixes most anything—canvas, wiring, handles, galoshes, rubber boots, etc. More than 247 other money saving uses.

Ask for "So-Lo" at any Hardware or 5 & 10c Store

Dealers: Call Your Jobber So-Lo Works, Cincinnati

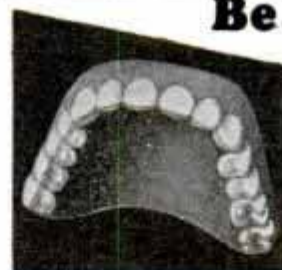


Over 5 Million Satisfied Users

Be a DENTICIAN

Learn at home to make Crowns, Plates, Bridgework, etc., for Dentists. Easy practical way to learn mechanical dentistry at home in spare time. Full equipment of tools and materials included with course FREE. Low tuition. Easy terms. Write for FREE BOOK about this money-making profession that is not affected by "machine age."

McCARRIE SCHOOL OF MECHANICAL DENTISTRY 207 N. Broad St., Dept. 605, Philadelphia, Pa.



A COLLEGE OF ENGINEERING AND ARCHITECTURE

41st Year. Fully accredited by North Central Assn. 4 yr. courses in mechanical, electrical, civil, chemical, fire protection

engineering, science and architecture, leading to B.S. Degree. All student activities—athletics, good living accommodations. Day and evening classes. Bulletin sent on request.

ARMOUR INSTITUTE OF TECHNOLOGY 3306 FEDERAL STREET CHICAGO, ILLINOIS

LEARN WATCHMAKING AND ENGRAVING BY OUR PROFIT-SHARING PLAN OUR GRADUATES SUCCEED

One of our Iowa students started in a very small way—now doing over \$30,000 a year. Another in Wisconsin, over \$10,000 the first year. Day or night classes. Call or write for FREE BOOK. Chicago School of Watchmaking, Dept. 2201, 155 N. Clark St., CHICAGO.

FREE BARGAIN CATALOG of BOOKS

25,000 books of all publishers listed in our 40th Annual Bargain Catalog of 320 pages. Old-time favorites—latest "best sellers." Reference, Fiction, Juvenile, History, Scientific, etc. Serving schools, colleges, libraries and thousands of individual customers. Send postcard today for our new 1935 catalog, "Bargains in Books."

THE BOOK SUPPLY COMPANY, Dept. 124 564-566 West Monroe St., Chicago, Illinois

Let Me Show You **HOW EASY YOU CAN LEARN RADIO AT HOME** *the R.T.I. way*



Many Men
I HAVE TRAINED
Are Now Making
\$35 to \$75 a week
IN RADIO

No matter what kind of a job you have now—no matter how much you know about Radio—no matter what you think about home study—you should see my new book **"Radio's Future and Yours."** And I'm ready to send you a copy of this valuable book—FREE.



Course Quickly Paid For Itself

"Two weeks after I started your Course I made a profit of \$5 on my first Radio job. In the first few months I made more than enough to pay for the entire training. Now I am in business for myself, making a good living and saving money besides."
CHARENCE R. WRIGHT,
 2306 Zimmerman St., Flint, Mich.

This book has started hundreds of ambitious men on the road to better jobs—bigger pay—real opportunities. Take the case of Heliod Villanueva, Morenci, Arizona. Heliod was a helper in an automobile service station. Was making only \$60 a month. Nobody ever imagined Heliod would be making \$75 a week before he was thirty.

Get Into This Field With a Future

Heliod read that Radio was the World's fastest growing industry. And he was smart enough to see that in a new, growing industry there are usually more really good jobs than there are trained men to fill them. He sent for my FREE Book. He enrolled for my "Shop Type" Home Training that is endorsed and recommended by more than 40 leading Radio Manufacturers. And, a little over a year later, he wrote me as follows:

"Dear Chief: When I enrolled with R-T-I, I was making \$60 a month as a helper in an automobile service station. Before a year was over, due to my R-T-I Training, my salary was increased to \$300 a month. I have made many times more money than I ever thought I could make, and I owe it all to R-T-I."



Made \$1100 In Spare Time Radio Work

"I was 55 years old when I enrolled for your Training. Since then I have made over \$1100 in Radio work and am averaging about \$30 a week now. I have had a limited schooling, but found R-T-I lessons very easy to understand."
GEO. H. WILLIAMS,
 5264 W. 131st St., Cleveland, Ohio.



R-T-I'S Famous Advisory Board of Nationally Known Radio Engineers and Executives

Directed and Supervised By Real Radio Engineers

- | | |
|---|---|
| Dr. C. N. Blackburn
Chief Radio Engineer
Stewart-Warner Corporation | Homer Hogan
General Manager
Radio Station KYW,
Chicago |
| Kendall Clough
Chief Engineer
Clough-Brengle Co.
(Radio Engineers and
Manufacturers) | E. E. Gramer
Chief Engineer
Standard Transformer
Corp. |
| Karl Haasel
Chief Engineer
Zenith Radio Corporation | F. D. Whitten
Service Mgr., Chicago
Plant Philco Radio
and Television Corporation |

MONEY BACK IF NOT SATISFIED

Are you willing to "gamble" three cents to get the book that started Heliod Villanueva, and hundreds of other men, on the road to good pay and a real future?

It gives you facts, figures, and inside information about present and future opportunities in Radio. It tells you how many R-T-I students make \$5 to \$20 a week in spare-time Radio Work, soon after enrolling, and all through their training period. It describes my Money-Back Agreement . . . my FIVE Advanced Courses, and the Working Outfits given without a penny extra cost . . . about hundreds of R-T-I students who credit R-T-I Training for bringing them success beyond their fondest expectations.

I'll Train You At Home—In Your Spare Time

Hold your present job. R-T-I Training is practical Shop-Training for the home. My organization has been teaching technical subjects by the home-study method for eighteen years. More than 100,000 men have benefited by my Shop-Type method of home-training.

Get my FREE Book now! Learn for yourself the real truth about Radio and R-T-I home training. You do not risk a penny nor incur the slightest obligation. And filling out and mailing the coupon may mean the turning point in your life. Do it now!

RAY D. SMITH, President
 Radio & Television Institute, Chicago

Mail This FOR FREE BOOK

RAY D. SMITH, President
 Radio & Television Institute (R-T-I)
 2130 Lawrence Ave., Dept. 19
 Chicago, Ill.

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

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

When writing to advertisers please mention Popular Mechanics



\$1,000 Reward

For the Capture of This Man

CONVICT 6138, escaped from the State Penitentiary; Name, Charles Condray; age 37; Height, 5 feet 8 inches; Weight, 141 pounds; Hair, light brown; Eyes, gray.

Easy enough to identify him from his photograph and this description, you may say — but, Condray took the name of "Brown," dyed his hair, darkened his skin, grew a mustache, put on weight and walked with a stoop.

Yet he was captured and identified so positively that he knew the game was up and returned to the penitentiary without extradition. How was it accomplished? Easy enough for the Finger Print Expert. They are the specialists, the leaders, the cream of detectives. Every day's paper tells their wonderful exploits in solving mysterious crimes and convicting dangerous criminals.

More Trained Men Needed

The demand for trained men by governments, states, cities, detective agencies, corporations, and private bureaus is becoming greater every day. Here is a real opportunity for YOU. Can you imagine a more fascinating line of work than this? Often life and death depend on finger print evidence—and big rewards go to the expert. Many experts earn regularly \$3,000 and more per year.

Learn At Home in Spare Time

And now you can learn the secrets of this science at home in your spare time. Any man with common school education and average ability can become a Finger Print operator in surprisingly short time.

FREE The Confidential Reports No. 38 Made to His Chief!

IF YOU ACT QUICK—We will send you free and with no obligation whatsoever, a copy of the gripping, fascinating, confidential report Secret Service Operator No. 38 made to His Chief. Mail coupon NOW!

Write quickly for fully illustrated free book on Finger Prints which explains this wonderful training in detail. Don't wait. Mail the coupon now. You may never see this announcement again! You assume no obligation. You have everything to gain and nothing to lose. Write at once. Address

Institute of Applied Science
Dept. 13-59 1920 Sunnyside Av., Chicago

INSTITUTE OF APPLIED SCIENCE,
Dept. 13-59 1920 Sunnyside Av., Chicago
Gentlemen: Without any obligation whatsoever, send me your new, fully illustrated, FREE book on Finger Prints and the free copy of the Confidential Reports Operator No. 38 made to His Chief. Literature will NOT be sent to boys under 17 years of age.

Name

Address

Age

When writing please mention Popular Mechanics

Air Conditioning



Why don't you get into this profitable new line—replacing old-fashioned heating and ventilating systems in factories, offices, homes, etc., with modern air conditioning equipment? — and planning new buildings for air conditioning? Architects and Builders — heating and ventilating experts — steamfitters and plumbers — must meet this increasing demand for ways of

Controlling Winter and Summer

Made-to-order weather adds much to the comfort, health, and happiness of humanity. Air-conditioned working quarters materially **reduce lost time** due to illness and increase employe efficiency — air-conditioned homes insure **comfortable inside temperatures** regardless of the weather and cut down doctors' bills — air-conditioned apartments bring **increased rentals** that soon pay for the installation.

Air Conditioning offers you a **real chance** to get into a new and growing line where **good-paying jobs** are constantly opening up. Like the auto and radio, this new development is sweeping the country and revolutionizing industry.

What is the "Trade-In" Value of Your Present Job?

When changing conditions threaten to wipe out your present job, it's up to you to fit yourself for something else that will continue to provide **well-paid employment during your working life**. Usually a little **additional information** will adapt your experience to one of the new jobs — often offering **more money and brighter prospects**. Don't wait until your job is kicked out from under you — meet the changes as they come and **ride the wave of progress** to better times.



Our Air Conditioning Course will give you by home study, in a short time, thorough and up-to-date training in this profitable new line. All texts furnished — small monthly payments. Send TODAY for Free Bulletin. No obligation.

American School

Dept. AC945, Drexel Ave. at 58th St., Chicago



ELECTRICAL ENGINEERING

A BROAD, basic, intensive course for men of limited time, complete in one school year. Approved by educators, endorsed by industry. Modern buildings. 41 years' successful experience. Catalog on request.



BLISS ELECTRICAL SCHOOL
122 Takoma Ave., Washington, D. C.



Learn Public Speaking

At home—in spare time—20 minutes a day. Overcome "stage-fright" gain self-confidence, increase your salary, through ability to sway others by effective speech. Write now for free booklet, *How to Work Wonders With Words*.

NORTH AMERICAN INSTITUTE, Dept. 1359
3601 Michigan Avenue, Chicago, Illinois

Improves Handwriting In 3 Hours

Marvelous invention. Corrects poor writing in few days. Amazing results guaranteed. No failures. Positive proof and complete outline mailed FREE. Write quickly.

OZMENT INSTRUCTION BUREAU, Dept. 34, St. Louis, Mo.

Anyone CAN LEARN

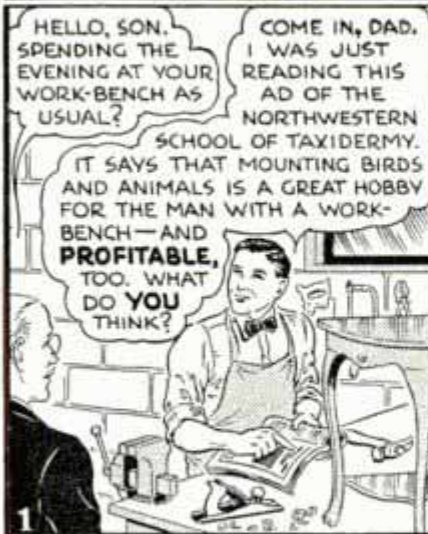
No talent or experience necessary. Fascinating work **Pays Big Money**. Complete instruction book tells about: Alphabets, Colors, *How to Mix Paints*, Show Cards, Window Board and Wall Signs, Ready made letters, Gilding, *Tricks of the Trade*, also gives 100 Alphabets and Designs. Book bound in flexible imitation leather-gold edges, and four ball bearing Show Card Pens. Sent postpaid \$3.00 (C. O. D.) 10c extra.

Ogilvie Pub. Co., 57 Rose St., Dept. 20, N. Y. City

EARN MONEY IMMEDIATELY— WE FURNISH EQUIPMENT TO START !!

Learn to Mount Birds

and Animals—Send Coupon for Free Book!



HELLO, SON. SPENDING THE EVENING AT YOUR WORK-BENCH AS USUAL?

COME IN, DAD. I WAS JUST READING THIS AD OF THE NORTHWESTERN SCHOOL OF TAXIDERMISTRY.

IT SAYS THAT MOUNTING BIRDS AND ANIMALS IS A GREAT HOBBY FOR THE MAN WITH A WORK-BENCH—AND PROFITABLE, TOO. WHAT DO YOU THINK?



WELL, SON, I DO KNOW THAT THAT SCHOOL WAS TEACHING TAXIDERMISTRY WHEN I WAS YOUR AGE—THIRTY YEARS AGO. I OFTEN WANTED TO LEARN IT MYSELF.

IF IT'S AS INTERESTING AS IT SOUNDS, I'M AT LEAST GOING TO INVESTIGATE. AND I COULD SURE USE SOME EXTRA MONEY RIGHT NOW—ALICE WANTS A NEW DRESS AND I'D LIKE A NEW SET OF TOOLS.



NOT SO BAD FOR A BEGINNER. THERE'S A LAMP THAT WILL LOOK DANDY IN MY DEN. GUESS I'LL ASK DAD TO DROP OVER TONIGHT AND TAKE A LOOK.



WHY BOB, YOU CERTAINLY DID TAKE UP TAXIDERMISTRY IN EARNEST, DIDN'T YOU?

I SURE DID. I'VE MADE AND SOLD A BUNCH OF BOOK-ENDS, MIRRORS AND SO ON TO HUNTERS FOR THEIR DENS. AND FUN? SAY DAD, TAXIDERMISTRY'S THE GRANDEST HOBBY IN THE WORLD!



THAT SQUIRREL BOXING GROUP IS ONE I MADE FOR GREEN'S SPORTING GOODS STORE FOR A WINDOW DISPLAY. SO FAR THIS MONTH I'VE BOUGHT THOSE THINGS I WANTED, AND MADE MY WORK-BENCH PAY ME AN EXTRA \$68—JUST FROM TAXIDERMISTRY.



AND I NOT ONLY MOUNT TROPHIES FOR OTHER SPORTSMEN, BUT MOUNT MY BEST ONES FOR THE DEN HERE. WHY DAD, I NOW GET TWICE AS MUCH FUN FROM MY HUNTING AS I USED TO. YOU WOULD TOO IF YOU LEARNED TAXIDERMISTRY.

IT SOUNDS GREAT, SON. WHEN DO I START?

Fun—Fascination—Profits

Be a Taxidermist. All Secrets Revealed. Learn at Home



Save Your Hunting Trophies

Mount (stuff) expertly your valuable **game-birds, animals, fish, game-heads**. Preserve them just like **life**. That is Taxidermy. Learn at home by **mail**. Decorate home and den with nature's art. Make undreamed-of **profits** in spare time, in your shop. You can. Will you? Win fame as a taxidermist. Investigate. Mail **coupon NOW**.



Success Guaranteed

This old reliable school has graduated 200,000 students in Taxidermy. 30 years in business. Our great success permits this **guarantee**. We **know** we can teach **you**. It's a grand money-making **hobby**. You **must** be interested, if you hunt or fish or have a work-shop. **Ask** for the **free book** and learn all about Taxidermy.



Mail Coupon

Or a postcard will do. No obligation on your part. The beautiful **Book**, with hundreds of entrancing **Pictures** is **Free**. Don't miss your **Only Chance** to get this remarkable book **Free and Postpaid**. Write today. State your **Age**.

Northwestern School of Taxidermy
3379 Courtney Bldg. Omaha, Neb.

Wild Game Not Needed

Use **common** specimens; squirrels, rabbits, chicks, pets, owls, pigeons—even frogs. Make useful articles like those shown here. Mount them in human and humorous positions. This is craft and novelty taxidermy. It's **fun—and profitable**. All included in our unique lessons. It's **marvelous**. Write the school this minute.

BIG PROFITS From Your Shop in Spare Time

Many students earn from \$40 to \$75 monthly in spare time. Some earn thousands of dollars each year. Sportsmen bring their trophies to be mounted. Besides you can sell your own **Novelty** groups for homes, dens and for merchants' window display.

LEARN TANNING

The lessons teach tanning harness, sole, chrome leather; also furs. Expert methods. **Very profitable**.

FREE BOOK

Northwestern School of Taxidermy, 3379 Courtney Bldg., Omaha, Neb.

Gentlemen: Please send at once, your free 48-page book on Taxidermy without any obligation on my part. Tell me how I can learn Scientific Taxidermy at home.

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

Address.....





Learn RADIO in 10 WEEKS

**BY ACTUAL WORK ON
REAL EQUIPMENT
PAY**

**FOR YOUR TRAINING IN
SMALL MONTHLY PAYMENTS
AFTER YOU GRADUATE**

Come to Coyne now! Get your training in the World's most fascinating, best paid profession. I train you at Coyne in a practical way so you can be prepared to take a real job and cash in quickly, and, I'LL FINANCE YOUR TRAINING. Two months after you are trained you can start paying me back in easy monthly payments from your earnings. Take over a year to pay AFTER training. Mail the coupon today for details of this plan.

REAL OPPORTUNITIES FOR THE RADIO TRAINED MAN

Prepare for jobs as Designer, Inspector and Tester—as Radio Salesman and in Service and Installation—as Operator or Manager of a Broadcasting Station—as Wireless Operator on a Ship or Airplane—as a Talking Picture or Sound Expert—HUNDREDS of Opportunities for fascinating, WELL PAID JOBS!

10 WEEKS' SHOP TRAINING AT COYNE IN CHICAGO—YOU DON'T NEED ADVANCED EDUCATION OR EXPERIENCE

I don't teach by book study. You get your training at Coyne by ACTUAL WORK on a great outlay of Radio, Broadcasting, Television, Talking Picture and Code equipment. And because we cut out useless theory, you get a practical training in 10 weeks, and that is why you don't need advanced education or previous experience.

TALKING PICTURES—TELEVISION

Talking Pictures and address systems offer great opportunities to the trained man. Television is the great new branch of Radio which is now being developed very rapidly. Be ready for your chance in Television. At Coyne you are trained on real Talking Picture and Television equipment.

Electric Refrigeration—Air Conditioning Included at NO EXTRA COST

So that my graduates may have an all around training which increases their earning capacity, I am including for a short time my big new course in Electric Refrigeration and Air Conditioning. Here is your chance to get a practical training in this great new field at no additional cost.

SPARE TIME WORK WHILE LEARNING

WHEN YOU ENROLL AT COYNE YOU GET A LIFE SCHOLARSHIP. You get Free Employment Service for Life after graduation. And if you need part-time work while at school to help pay expenses, I'll help you get it if you will tell me your problems. Coyne is 35 years old. Coyne Training is tested—You find out everything about my course and my "pay after graduation plan" free. JUST MAIL Coupon for My BIG FREE BOOK.

H. C. LEWIS, President

**Radio Div., COYNE Electrical School
500 S. PAULINA ST., Dept. 94-3H, CHICAGO, ILL.**

H. C. LEWIS, President
**Radio Division, Coyne Electrical School
500 S. Paulina St., Dept. 94-3H, Chicago, Ill.**

Dear Mr. Lewis: Send me your Big Free Radio Book and all details of your Special Introductory Offer—and your plan where I can pay my tuition in easy monthly payments after I graduate.

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

Amazing Sensational Discovery REFINISHES AUTOS Like NEW!



PAYS YOU 245% PROFIT!

Kar-Nu is a new, miracle discovery—a transparent, magic-like fluid with which anyone can refinish any color automobile easily, quickly and economically without polishing, waxing, rubbing or painting. Just wipe it on with a cloth! Immediately dullness, discoloration, shabbiness, sun fade disappear. Instantly, as if by magic, the old finish is rejuvenated and restored to the lustre, life glow and beauty of the original factory finish. As KAR-NU dries it seals the pigment and protects the finish from further wear. Lasts 8 to 12 months. GUARANTEED. Equal in beauty to a repaint or refinishing job which costs \$25.00 to \$75.00.

**Not A Wax
Polish or Paint
Lasts 8 to 12 Months
GUARANTEED**

FREE SAMPLE

Enormous demand! Millions want it! W. L. Morgan of Mass. earned \$10.61 in a single hour. Sell KAR-NU to individuals, fleet owners, garages, auto accessory stores, used car dealers, etc. No experience necessary. Write for FREE sample to prove our claims and territory offer.

KAR-NU CO., Dept. D-30, Oakley Station, Cincinnati, Ohio

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 can SELL! Course contains 26 lessons and over 600 illustrations. All for Only... **\$2.85**

Send name and address for free details.
RAYE BURNS SCHOOL, Dept. M-X, BOX 2194, Cleveland, Ohio

**CRIME DETECTION
SECRET SERVICE
AND
FINGER PRINTS**

**SECRET SERVICE BOOK
FREE**

For 30 Days Reading
No Money Down—Actual Crime Cases—
If You Act Quick!—We will send you this stirring book on Crime Detection, Secret Service and Identification Work for 30 days free reading. Send no money. If you decide to keep it, then send only \$1.90. If not, return it. WRITE TODAY. Not sent to boys under 17 years of age.

T. G. Cooke, Book Dept. 13-59 1920 Sunnyside Ave., Chicago

PERFECT VOICE EXPRESSION
Beauty and power of perfect voice expression will be yours if you develop and strengthen your vocal organ.
100% IMPROVEMENT GUARANTEED
Our method is not an experiment but an exact science, explained in clear, simple manner that will enable you to make use of all the vocal power nature has given you. Solve your voice problem whether it is a defect in speech—your speaking voice—or lack of progress in your vocal studies. Taught by mail.
Voice Book Explaining Perfect Voice Method Sent on Request.—Learn the true possibilities of your voice. Find out about this guaranteed voice course. Entire tuition refunded if you are not satisfied.
**PERFECT VOICE INSTITUTE, Studio 93-59
308 No. Michigan Ave., Chicago, Ill.**

ROOSEVELT AVIATION SCHOOL

Located at Famous Roosevelt Field Complete Facilities for all Aviation Training Write Registrar, Drawer F, Mineola, N. Y.

INDIANA TECH DEGREE IN TWO YEARS

B. S. Degree in Electrical, Civil, Chemical, Radio, Mechanical or Aeronautical Engineering in two years. Located in Electrical Hub of West. Earn Board. Low tuition. Enter Dec., Mar., June. Catalog. INDIANA TECHNICAL COLLEGE, 229 E. Washington St., Fort Wayne, Indiana

**DENISON'S
PLAYS**

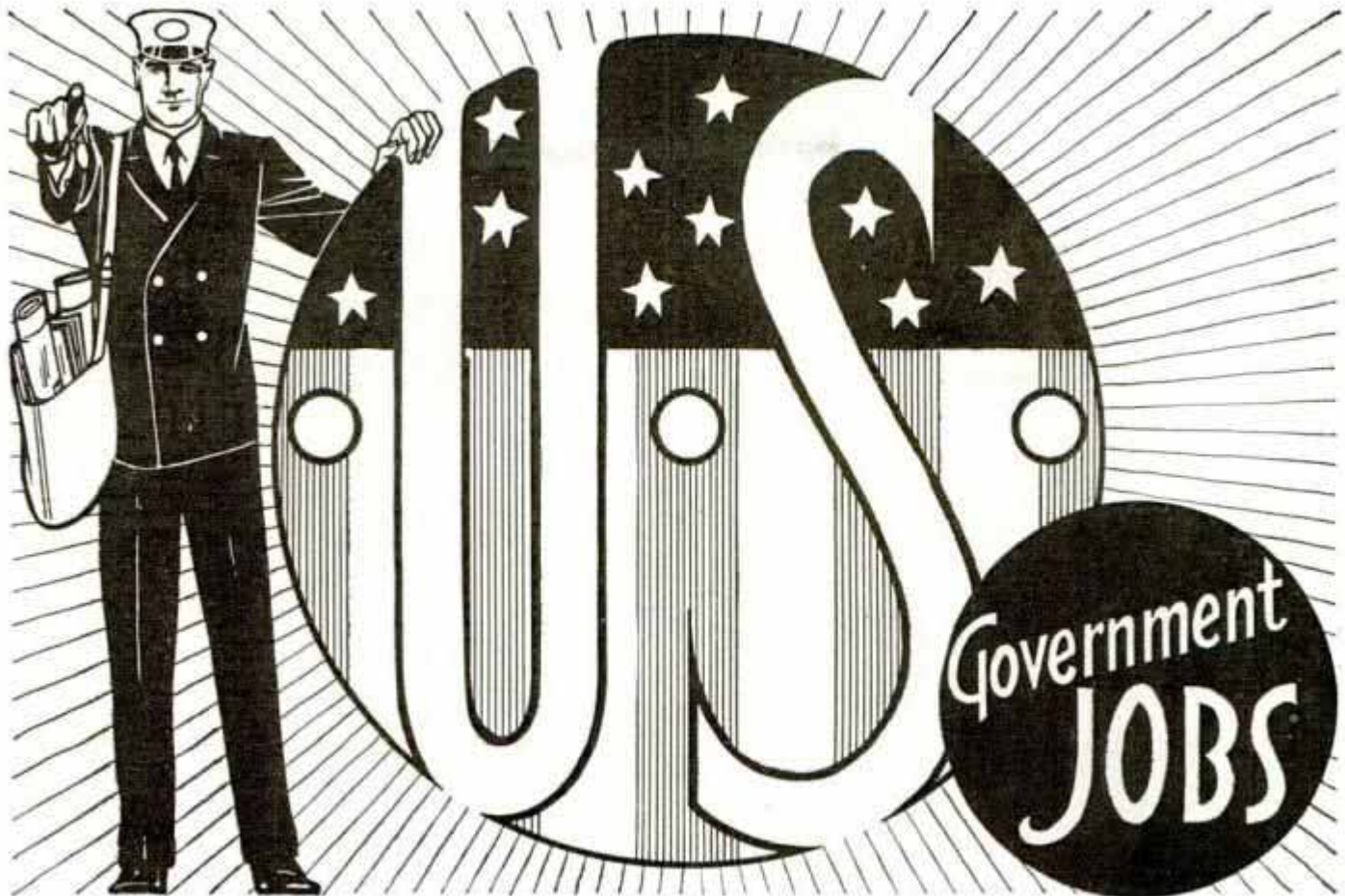
Musical Comedies, Operettas, Vaudeville Acts, Minstrels, Comedy Songs, Make-up Goods.
Catalog Free

T. S. Denison & Co. 623 S. Wabash, Dept. 9, Chicago

**57
YEARS
OF HITS**

**NEW YORK SCHOOL of
MECHANICAL DENTISTRY**

Become a TRAINED Dental LAB Technician. We show you how! Oldest school. Practical training. Day, Even. Easy terms. Tools FREE. Ask for Catalog P. N. Y. SCHOOL of MECHANICAL DENTISTRY, 125 W. 31 St., N. Y. C.



START

\$1260 to \$2100 a YEAR

Many U. S. Government Jobs for Men and Boys 18 to 50

Railway Postal Clerks—Post Office Clerks—City Mail Carriers—Rural Mail Carriers—General Office Clerks—Liquor Gaugers—Bookkeepers—Customs Inspectors—Immigrant Inspectors

A VERY DESIRABLE POSITION

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

PAID VACATIONS

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

City Mail Carriers—Post Office Clerks

Clerks and Carriers get \$1700 the first year regular and automatically increase \$100 a year to \$2100, with further increase to \$2500. They also have 15 days' vacation.

Railway Postal Clerks



FRANKLIN INSTITUTE
Dept. K-174
ROCHESTER, N. Y.

What Will You Earn 5 Yrs. From Now?

Do you earn \$1900 every year? Have you any assurance that a few years from now you will get \$2700 or more a year, every year?

Rush to me free of charge (1) a full description of the position checked below; (2) Free copy of 32-page illustrated book, "How to Get a United States Government Job"; (3) A list of United States Government Jobs.

- Railway Postal Clerk.....(Start, \$1,900)
- Post Office Clerk.....(Start, \$1,700)
- City Mail Carrier.....(Start, \$1,700)
- Stenographer-Typist.....(Start, \$1,260)
- Liquor Gauger—Store-keeper.....(Start, \$2,000)
- Customs Inspector.....(Start, \$2,100)
- Bookkeeper.....(Start, \$1,440)

Name

Address

Use This Coupon Before You Mislay It—Write or Print Plainly.

Many Winter Examinations Expected

Fill out the coupon. Check the job you want and mail it today—now, at once. **DO IT NOW.**

When writing to advertisers please mention Popular Mechanics



Photo by Tornello

... that's all I need to PROVE I can make YOU a NEW MAN!

BY CHARLES ATLAS

Holder of the Title: "The World's Most Perfectly Developed Man"—Won in open competition in the only National and International Contests held during the past 15 years.

ONE week! That's all I need to PROVE I can make you a **new man of vitality and power**. I was once a 97-lb. weakling, with a sickly, flabby body. How I became "The World's Most Perfectly Developed Man" is told in my book, "Everlasting Health and Strength," which I will send you **absolutely free**.

Now I offer you a 7 days' trial of my famous method, **Dynamic Tension**, to PROVE that I can and will put firm layers of muscle where YOU need them most, tone up your whole system, and banish constipation, poor digestion, bad breath, pimples, joy-killing ailments.

I've got no use for tricky weights or pulleys that may strain your heart or other vital organs. I don't dose or doctor you. My **Dynamic Tension** is the natural tested method. It builds powerful muscle, gets rid of surplus fat, gives you vitality, strength, pep that win the admiration and respect of every man and woman.

FREE BOOK! Send for your free copy of my book, illustrated with many actual photos. Learn how I changed from a weak, no-muscle "runt" to the physique you see here. Gamble a stamp to mail my coupon—to learn how YOU can now win life's biggest prize—a handsome, healthy, husky body. Address CHARLES ATLAS, Dept. 8-M, 115 E. 23rd St., New York, N.Y.

**CHARLES ATLAS, Dept. 8-M
115 East 23rd Street, New York, N. Y.**

I want the proof that your system of **Dynamic Tension** will 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."

Name.....
(Please print or write plainly)

Address.....

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

©1934, C. A. Ltd.

Burlington's Diesel-powered "Zephyr" used only \$16.72 worth of fuel oil in its 1,015-mile non-stop run from Denver to Chicago

Photo courtesy Burlington R. R.



Diesel Engineering

The Diesel is **fast replacing old-type engines** in locomotives — ships — industrial and commercial power plants — motor cars and trucks — aircraft — tractors. As a result, many old jobs have been greatly changed or actually wiped out.

New Jobs For Old

Every industrial change throws many good jobs into the discard—but it creates in ore and better jobs. The automobile ruined scores of industries based on providing horse transportation — but the motor industry employs even greater armies of workers. **Radios** supplanted talking machines — **electric refrigerators** wrecked the iceman — **air conditioning** is driving out old-fashioned heating and ventilating systems.

Diesel Engineering is the great opportunity of today. The field is developing with amazing rapidity—on land and water and in the air. **This is your opportunity** to get in on the ground floor of a new and prosperous industry that will provide plenty of good jobs during your lifetime.

Is Your Job Safe?

There is a **growing scarcity of men** trained to install, operate, and service Diesel engines. New Diesel Engineering Course—**just released for home study** by one of America's leading educational institutions—will give you, in a short time, thorough training in modern Diesel engine practice. **All texts furnished. Send TODAY for Free Bulletin.** No obligation.

American School

Dept. D945, Drexel Avenue at 58th Street, Chicago, Ill.

RADIO ENGINEERING

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



Illustrated Catalog on request.

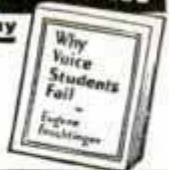
RCA INSTITUTES, INC. Dept. PC-34

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

"Why VOICE Students Fail"

SENT FREE No Obligation to Buy

If you act quick!—we will send postpaid—for 30 days' free reading—new Voice Book dispelling startling VOICE FACTS that may save hundreds of dollars to every man or woman seeking a strong, rich voice for either singing or speaking. 30 days' free reading—then send \$1.00. Otherwise, return it—that's all! **PROF. E. FEUCHTINGER Studio 13-59 308 North Michigan Avenue - Chicago**



Learn to Write

Begin Today. Write for my Free Book, "How to Become a Good Penman." It contains specimens and tells how others learned to write in spare time. Your name elegantly written on a card if you enclose stamp for postage. Write today. **F. W. TAMBLIN, 418 Ridge Bldg., Kansas City, Mo.**



How to Cash-In with Your CAMERA

Magazines, Newspapers, Advertisers, are **BUYING 134,000 photos every week!** Make good money—spare time, full time—taking human-interest pictures that **sell**. Earn while you learn how to take salable pictures! We teach you how by mail. Fascinating, easy! Our **unlimited marketing service** helps you cash in quickly. Write now (no obligation), for **FREE BOOK, "How to Make Money With Your Camera."**

UNIVERSAL PHOTOGRAPHERS
Dept. 712 10 W. 33rd St. New York City

When writing to advertisers please mention Popular Mechanics

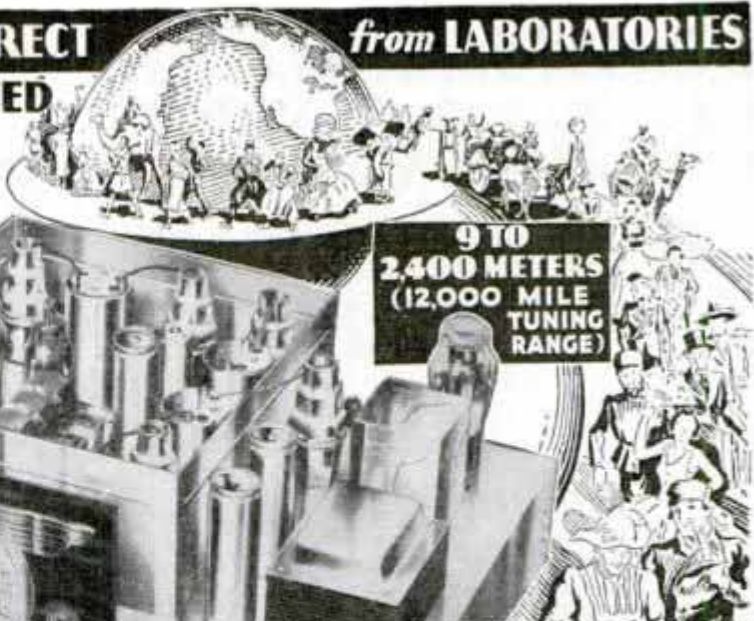
SAVE up to 50% by BUYING DIRECT from LABORATORIES

Thousands Thrill to **GUARANTEED**
World-Wide **HIGH FIDELITY**
Performance
with this.

Amazing
New
MIDWEST

**1935
SUPER**

16-TUBE
All-Wave Radio
(ALL FIVE WAVE BANDS)



**9 TO
2,400 METERS**
(12,000 MILE
TUNING RANGE)

**WORLD'S GREATEST
RADIO VALUE**

\$57.50
with
New
**Deluxe Auditorium-Type
SPEAKER**

TERMS AS LOW AS \$5.00 DOWN

50 ADVANCED 1935 FEATURES

...and 16 tubes make this Super High Fidelity Radio today's most powerful long distance receiver. Its many exclusive features include: Micro-Tenuator . . . Fidel-A-Stat . . . Separate Audio Generator . . . Ceramic Coil Forms, etc.

FEATURES OF NEW-TYPE MIDWEST DIAL

This dial takes the guesswork out of tuning. Now Midwest guarantees that inexperienced persons can secure good foreign reception. Send for FREE miniature of actual rotating dial — which clearly shows the advantages of these sensational features:

1. Dial calibrated in Kilocycles, Megacycles and Meters;
2. Call letters of American Broadcast Stations printed on dial and illuminated;
3. Slow-Fast, Smooth-Action Tuning;
4. Station Group Locator;
5. Simplified Tuning Guide Lights;
6. Automatic Select-O-Band Indicator;
7. Illuminated Pointer Indicator;
8. Silent Shadow Tuning — Improvement on Meter Tuning;
9. Centralized Tuning.

SEND NO MONEY!

**MAIL COUPON TODAY! FOR
AMAZING 30-DAY FREE TRIAL
OFFER AND NEW 1935 CATALOG**

MIDWEST RADIO CORP.,
Dept. 790
Cincinnati, Ohio.

Without obligation on my part send me your new FREE 1935 catalog, FREE Miniature Dial, and complete details of your liberal 30-day FREE trial offer. This is NOT an order.

Use-Agents
Make Easy
Extra Money

Check Here
for
Details

Name

Address

Town State

BEFORE you buy any radio write for the new FREE 1935 Midwest "Fifteenth Anniversary" catalog and see for yourself the many reasons why 110,000 satisfied customers bought their radios direct from the Midwest Laboratories and saved from 1/5 to 1/2. Why pay more than the direct-to-you laboratory price?

You, too, can make a positive saving of from 30% to 50% by buying this more economical way. Learn why Midwest outperforms sets costing up to \$200.00 and more. Never before so much radio for so little money! Midwest gives you triple protection with: One-year guarantee, foreign reception guarantee, money-back guarantee.

SENSATIONAL HIGH FIDELITY RECEPTION

This bigger, better, more powerful, clearer-toned, super selective radio gives you absolute realism—assures you of life-like, crystal-clear tone—unlike anything you have ever experienced before! You will hear one more octave—over-tones—that cannot be brought in with ordinary sets. Now, hear every instrument, every voice, every shade and inflection of speech. Take advantage of the amazing 30-day FREE trial offer. Send coupon today for FREE catalog.

ALL FIVE WAVE BANDS

Only Midwest covers a tuning range of 9 to 2400 meters (33 Megacycles to 125 KC.)—enabling you to easily and successfully tune in foreign stations up to 12,000 miles away with crystal-clear, loud-speaker reception.

All 5 Wave Bands enable you to enjoy today's finest High Fidelity American programs. In addition, you get Canadian, police, amateur, commercial, airplane and ship broadcasts and derive new delight and new excitement from unequalled world-wide broadcasts . . . England, France, Germany, Spain, Italy, Russia, Australia, etc. Send today for money-saving facts!

DEAL DIRECT WITH LABORATORIES

Increasing costs are sure to result in higher radio prices soon. Buy before the big advance...NOW... while you can take advantage of Midwest's sensational values...no middlemen's profits to pay. You can order your High Fidelity radio from the new Midwest catalog with as much certainty of satisfaction as if you were to select it in our great radio laboratories. You save 30% to 50% when you buy this popular way... you get 30 days FREE trial...as little as \$5.00 down puts a Midwest radio in your home. Satisfaction guaranteed or money back. Write for new FREE catalog.

**30
DAYS
FREE
TRIAL**

**OVER 110,000 SATISFIED
CUSTOMERS SAVED 1/3
TO 1/2 BY BUYING DIRECT**
Midwest Cannot Be Equaled



Eng.—DJA, DJC, Ger.—EAQ, Spain, etc. W. C. Geiser, 2250 Yale Blvd.

Admires Wonderful Tone

Canaan, O.—There is not a better radio than the Midwest. Everyone says they never heard such a wonderful tone. We have gotten many foreign stations very clearly. Our Midwest is worth more than we paid for it. Mrs. M. C. Moody, 179 Marshall St.



Gets Byrd at Pole Direct



Hammond, La.—The greatest distance I have required so far in Byrd at the Pole direct, not a relay through LSX, EAQ and VK2ME come clearly as keds. DJB DSC, GSR, come in extremely well. R. T. Purley.

NEW STYLE CONSOLES



The Midwest 36-page 1935 catalog pictures a complete line of beautiful, artistic deluxe consoles and chassis, in four colors. Write for new FREE catalog today! Midwest long range radios are priced as low as \$27.50 as

MIDWEST RADIO CORP.

DEPT. 790 — CINCINNATI, OHIO, U. S. A.

Established 1920

Cable Address Miraco. . . . All Codes

When writing to advertisers please mention Popular Mechanics

QUALIFY for GOOD JOBS DIESEL and AUTO TRAINING

High speed Diesels being rapidly developed for service in trucks, boats, airplanes, streamline trains, power shovels, etc. Trained men needed. Opportunities increasing for good jobs. The trained man must be master of all branches of auto repairing preparatory to entering the Diesel field.

Good Jobs for Trained Men
National Automotive School trains you in both trades—auto and high speed Diesels. Practical shop methods. Expert instructors. A million dollar school to train you by proven methods. Established 20 years.

Earn Room and Board
We assist students to obtain part time jobs during training. **RAILROAD FARE ALLOWED.** We allow coach railroad fare from any part of United States to Los Angeles. You obtain complete auto and high speed Diesel training for price of one course, for limited time.



LATEST EQUIPMENT

SEND COUPON FOR FREE AUTO-DIESEL BOOK

NATIONAL AUTOMOTIVE SCHOOL *Los Angeles*

Dept. PMA-12, 4006 South Figueroa St.
Send Free Auto-Diesel Book and Special offer.

Name.....

Address.....

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





DRAFTING

BOOKS SENT FREE! 
ON APPROVAL
5 VOLUMES BRAND NEW EDITION

For Beginners
Written so you can understand every word, by 22 famous engineers and architects. DeLuxe flexible binding, nearly 2,000 pages, 1546 blue-prints, 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** will prepare you for a good drafting job in less than a year. 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 course in blue-print reading.**

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

A year's consulting membership in the American Technical Society now given free to all readers of this famous cyclopedia of drafting. Many say that it is worth more than the cost of the books.

Complete set of drawing instruments if you send for these drafting books **NOW.** These instruments are made of the finest of German silver, are absolutely accurate and are packed in velvet lined leatherette pocket case. Real \$10 value, but free to you with these books.
AMERICAN TECHNICAL SOCIETY
Dept. D-919, Drexel at 58th St., Chicago, Ill.

American Technical Society, Dept. D-919, Drexel at 58th St., Chicago, Ill.
Send for 10 days' free use New 5 volume set of drafting. I will pay the few cents delivery charges. 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 \$24.50, the special introductory price, is paid. Send latest edition and include drawing instruments.

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

Work at Home

Make up to
\$117 a Week



**OWN A PROFITABLE
POTATO CHIP FACTORY**

Make money right away by manufacturing and distributing a sensational new kind of "Greaseless" Chip that has excess oil "wring" out by new invention. Paralyzes competition, sweeps market. New taste, New looks. New health because they are also "mineralized."

EVERYTHING FURNISHED


Electrical machine and all supplies and equipment, bags, etc., furnished at one cost, no extras. Full instructions and automatic sales plans. Anyone can start at home with no experience. Make money first day—as much as \$23.00 a day actually possible on capacity of one machine selling at wholesale only.

**A. H. Adams, VITA-SEALD CO., Dept. 512
500 N. Dearborn St. Chicago, Ill.**

COSTS NOTHING
to get full facts on this new and different chip, big market, big profits, easy operation. Write for free book, 12 pages illustrated. No obligation to buy, but send name for amazing facts and actual figures.

Learn to Dance

You can learn all the modern dances—the latest Tango steps, the new Fox Trots, dreamy Waltzes, smart Collegiate Steps and popular Society Steps at home, easily and quickly. New chart method makes dancing as simple as A-B-C. No music or partner required. Don't be a wallflower. Learn to dance. Complete course—256 pages, 54 illustrations, sent on 5 Days' Free Trial. Equals \$20.00 course. Send no money. Pay postman only \$1.98, plus postage upon arrival. Money back if not delighted. Catalog Free.



Franklin Pub. Co., 800 No. Clark St., Dept. 9467, Chicago

LEARN CARTOONING

by the method that has developed hundreds successfully. Send name, address and age for free chart to test your ability.

The Landon School, 1738 National Bldg., Cleveland, Ohio

RADIO

ENGINEERING, broadcasting, aviation and police radio, servicing, marine and Morse telegraphy taught thoroughly. Nine months' engineering course equivalent to three years' college radio work. School established 1874. All expenses low. Catalog free.

Dodge's Institute, Ada St., Valparaiso, Ind.

**MAKE
MONEY**

AT HOME!

Learn easy Koehne Method of coloring photos and miniatures in oil. New! No art talent needed. Big demand. Send for free booklet. *Make Money At Home.*

NATIONAL ART SCHOOL
3601 Michigan Ave., Dept. 1359, Chicago



Minstrels



Unique First Parts for complete show with special songs and choruses. Make-up. Catalog Free.

T. S. Denison & Co., 623 S. Wabash, Dept. 19 Chicago

How To Secure A Government Position

Why worry about strikes, layoffs, hard times? Train now for a Government job. Many examinations expected! Increased salaries, steady work, travel, good pay. Let me help you become a Railway Postal Clerk, Post Office Clerk, City Mail Carrier, Rural Carrier—or help you get into any other Government job you want. I was a Secretary Examiner of Civil Service Commission for 8 years. Have helped thousands.

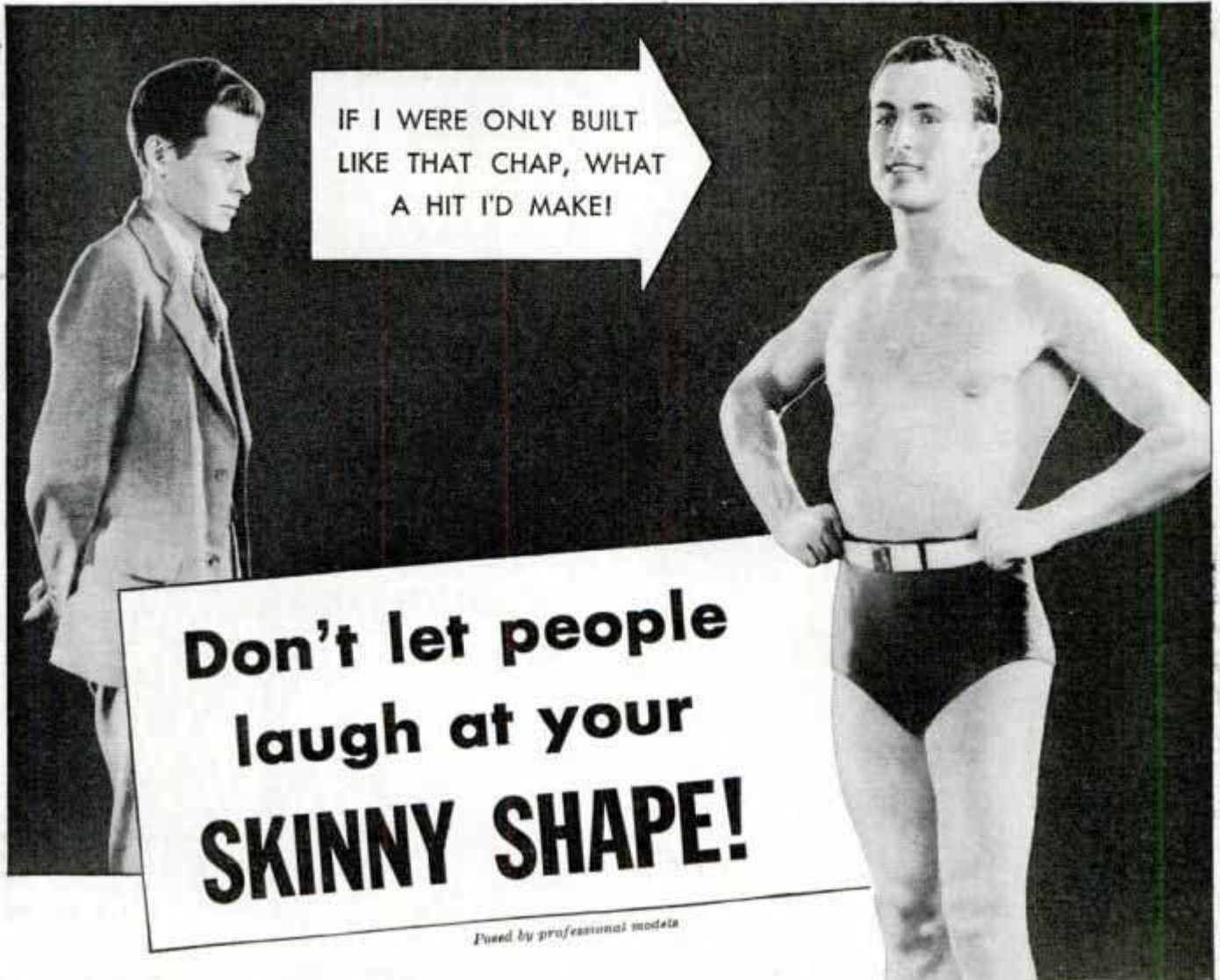
Now FREE My 32-page book tells about the jobs open—and how I help to qualify you to get one. Send the coupon for your copy **TODAY.**

A. R. Patterson, Civil Service Expert
PATTERSON SCHOOL, 812 Case Bldg., Rochester, N. Y.
Please send me without obligation, your free book "How to Secure a Government Position."

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



When writing to advertisers please mention Popular Mechanics



Don't let people
laugh at your
SKINNY SHAPE!

Posed by professional models

Thousands find new way adds pounds *quick!*

Astonishing gains in a few weeks with new discovery. Richest imported brewers' ale yeast now concentrated 7 times and iron added. Gives 5 to 15 lbs. quick!

FOR years doctors have prescribed yeast to build up health for rundown men and women. But now, thanks to a new scientific discovery, you can get far greater tonic results than with ordinary yeast—regain health, and in addition put on pounds of husky flesh—and in a far shorter time.

Not only are thousands quickly gaining solid, good-looking pounds, but also clear skin, freedom from indigestion and constipation, new pep.

Concentrated 7 times

This amazing new product, Ironized Yeast, is made from specially cultured *brewers' ale yeast* imported from Europe—the richest yeast known—which by a new scientific process is concentrated 7 times—*made 7 times more powerful.*

But that is not all! This marvelous, health-building yeast is then *ironized* with 3 special kinds of iron which strengthen the blood, add pep.

Day after day, as you take Ironized Yeast, watch

gawky angles fill out, flat chest develop, skinny limbs get husky. Skin clears, new health comes.

Results guaranteed

No matter how skinny and weak you may be, this marvelous new Ironized Yeast should build you up in a few short weeks as it has thousands. If you are not delighted with the results of the very first package, your money will be instantly refunded.

Only be sure you get *genuine* Ironized Yeast, not some imitation that cannot give the same results. Insist on the *genuine* with "IY" stamped on each tablet.

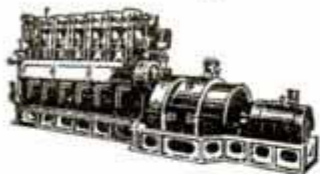
Special FREE offer

To start you building up your health *right away*, we make this absolutely **FREE** offer. Purchase a package of Ironized Yeast at once, cut out the seal on the box and mail it to us with a clipping of this paragraph. We will send you a fascinating new book on health, "New Facts About Your Body", by a well-known authority. Remember, results are guaranteed with the very first package—or *money refunded*. At all druggists. Ironized Yeast Co., Inc., Dept. 5312, Atlanta, Ga.

When writing to advertisers please mention Popular Mechanics

DIESEL POWER

A Coming American Industry



The internal-combustion engine represents man's supreme triumph of machine power. Diesel engineers are in great demand. Many are acquiring necessary knowledge through

spare-time study of this modern I. C. S. Course on Diesel engines. Free booklet!

ELECTRICAL ENGINEERING

—A Great Industry with a Great Future

The new course in Electrical Engineering covers this fascinating field thoroughly. If you are just starting or are partly on the way to a real paying position in this industry, this new course brings the broader knowledge necessary for advancement. The coupon brings complete information.



MECHANICAL ENGINEERING

—A Field with a Future



This course has meant advancement to hundreds of ambitious men, mechanics, draftsmen, blacksmiths, foundrymen, patternmakers, apprentices, and mechanical engineers—men who wanted to get ahead and to earn more money. You will find, as they have found, that enrolling for an I. C. S. Course is an investment in a Bigger Future. Use the coupon!

AUTOMOBILE EXPERTS

are always in demand

The rapid progress in manufacture and service of the modern automobile brings new opportunities to thousands of ambitious and forward-looking men. There's always a demand for trained men. The new I. C. S. Automobile Course will make you a trained man! The time to act is now. Use the coupon.



INTERNATIONAL CORRESPONDENCE SCHOOLS

BOX 5541-H. SCRANTON, PENNA.

Without obligation, send me full information on subject checked below:

- | | |
|--|--|
| <input type="checkbox"/> DIESEL POWER | <input type="checkbox"/> AUTOMOBILE COURSE |
| <input type="checkbox"/> ELECTRICAL ENGINEERING | <input type="checkbox"/> MECHANICAL ENGINEERING |
| <input type="checkbox"/> Architecture | <input type="checkbox"/> Drafting |
| <input type="checkbox"/> Concrete Construction | <input type="checkbox"/> Accounting |
| <input type="checkbox"/> Reading Shop Blueprints | <input type="checkbox"/> Good English |
| <input type="checkbox"/> Civil Engineering | <input type="checkbox"/> Salesmanship |
| <input type="checkbox"/> Diesel Engines | <input type="checkbox"/> Advertising |
| <input type="checkbox"/> Gas Engine Operating | <input type="checkbox"/> Show Card Lettering |
| <input type="checkbox"/> Refrigeration | <input type="checkbox"/> Civil Service |
| <input type="checkbox"/> Chemistry | <input type="checkbox"/> High School Subjects |
| <input type="checkbox"/> Highway Engineering | <input type="checkbox"/> Air Conditioning |
| <input type="checkbox"/> Poultry Farming | <input type="checkbox"/> Inventing and Patenting |
| | <input type="checkbox"/> Aviation Engines |

Name _____

Address _____

When writing please mention Popular Mechanics

Increase Your Earning Power

Apply time and labor-saving kinks to your work. Your efficiency will soon be recognized and you will be in line for advancement.

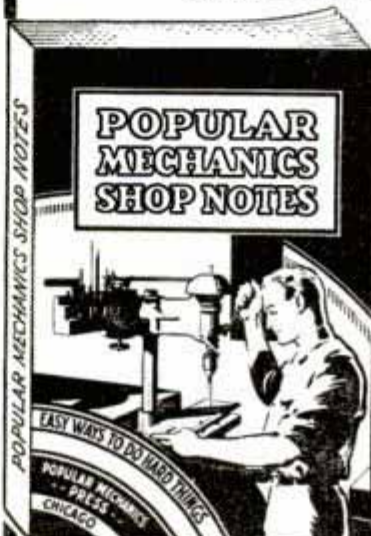
If you do machine shop work of any kind, sheet-metal work, painting, carpentry, auto repairing, farming, concrete work, plumbing, electrical work, welding, building-glass work, general repairing, tool-making, poultry raising, masonry or home repair work, get this

LIBRARY OF 3600 TIME AND LABOR SAVING IDEAS FOR SHOPMEN AND HANDYMEN

RECENTLY PUBLISHED

SHOP NOTES for 1934

480 Articles
580 Illustrations
224 Pages
Price 50c
See partial list of contents below



Including the new 1934 issue illustrated above, there are eight volumes in the Shop Notes Library of 3600 easily understood short cuts to every-day jobs. Here are just a few of the subjects taken from the latest issue.

- | | | |
|--|--|--|
| Auto Generators Converted into Motors | Handles, Personal, for Better Hammering | Sanding Machines, Motor Driven, for Small Shop |
| Air Compressor, Small | Hedge Trimmer, Electric | Sawhorses for all Purposes |
| Bandaw Blades, Tricks of Coiling | Jigsaw, Profits from | Servicing Cabinet, Martha Washington |
| Bandaw, Homemade, for Workshop | Knives and Other Straight Edge Tools, Tricks of Sharpening | Steel Ball Uses in Machine Shop |
| Car Transmission as Clutch on Power Unit | Lathe Tools, Sharpening | Surface Grinder for Finishing Metal |
| Coffee Table, Dutch-Foot | Metal Turning on Wood-working Lathe | Smoking Stand, English |
| Drillpress, What You Can Do With | Naile, Mechanics of Using | Steadyrest, Ball-Bearing |
| Electroplating with Lead, Zinc and Cadmium | Painting Your Home, Tricks of Sharpening | Swadlow, Heavy Duty Saw-Flint |
| Farm, Practical Suggestions for | Punch, Accurate Hole Rafter Framing Table | Table, Modernized Screw-Top |
| Flower Stands, Bent Iron | Routing, Jigs and Fixtures for | Table, Chairside, for Living Room |
| Furnace Draft Control, Electric | Spray-Painting Booth with Forced Draft | Vise, Quick Acting |
| Garden Tractor, Simple | Screws, Tricks of Driving | Welder, Electric Arc, for Small Shop |
| | Sandblasting Light Work, Simple Gun for | |

Each volume contains approximately 450 articles and 500 illustrations and has 192 or more pages. This unrivaled library of shop helps may be secured for a limited time only. After the present supply of books is exhausted the offer must be withdrawn.

*** Send No Money ***

POPULAR MECHANICS PRESS, 200 E. Ontario St., Room 1234, Chicago, Ill.

Send me, as per your offer, the following books. I will pay postman price and small amount of postage. My money will be refunded if I am not satisfied. (Check what you want.)

- 1934 Shop Notes and Lathe Handbook, both for 98c.
 Shop Notes Library (8 vols.) \$3.50.

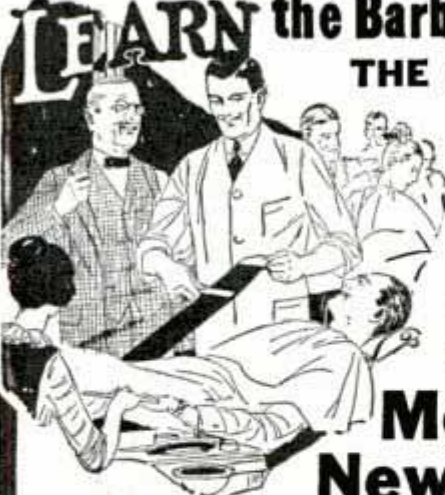
Name _____

Street and No. _____

City _____ State _____

* C. O. D. applies to U. S. and possessions only. If you reside elsewhere, remittance must accompany order.

BE SENSIBLE
LEARN the Barber Trade
 THE COMMON SENSE THING ABOUT LEARNING THIS WORK BY **Moler's New Plan**
Is The Absolute Assurance of Success




The New Plan has made a wonderful business of this Industry. It has created unusual jobs in addition to regular shop work—Traveling Demonstrators—Barber Science Teachers—State Vocational Instructors and other positions not possible under the old method.
 Can earn living while learning. Tools given.
 Write Branch nearest for Booklet B explaining the **MOLER SPECIAL THIS MONTH.**
MOLER SYSTEM OF COLLEGES
A National Institution
 139 E. 23rd St., New York, N. Y.
 59 E. Monroe St., Chicago, Ill.
 810 N. Sixth St., St. Louis, Mo.
 43½ Peachtree St., Atlanta, Ga.
 81 S. Second St., Memphis, Tenn.
 748 Prospect Ave., Cleveland, O.
 111 W. Fifth St., Cincinnati, O.
 839 N. Water St., Milwaukee, Wis.
 1302 Douglas St., Omaha, Nebr.
 1106 Canal St., New Orleans, La.
 559 Michigan Ave., Detroit, Mich.


RAISE FROGS

BIG PROFITS IN "NUFOND GIANTS"
 Breeder lays 10,000 eggs each year. Bullfrogs sell \$1.00-\$3.00 dozen. No experience necessary. Backyard pond starts you. Raised in any climate. Our FREE book "A Fortune in Frogs" explains everything. Write for your copy today!
AMERICAN FROG CANNING COMPANY
 (Originators of Canned Frog Legs and Frog a la Queen)
 Dept. 133-W New Orleans, La.

\$25 A WEEK FOR YOU
 and work 12 hours a week. Great plan (illustrated) to breed PR Royal squabs. Ask for new free Library 4, send 3-cent stamp for mailing. Get details, learn what, why, how, where, 1935 facts.
 Plymouth Rock Squab Co., 633 H. St., Melrose, Mass.




RAISE RABBITS FOR US
 WE SUPPLY STOCK AND BUY WHAT YOU RAISE
 PAYING YOU HIGHEST PRICES—Established 20 Yrs.
 Rabbit book catalog and monthly market bulletin showing prices we pay our breeders, 10c. Address
OUTDOOR ENTERPRISE CO., Inc., Box 400, NEW CITY, N. Y.



OLDEST BEST POULTRY PAPER 12 BIG ISSUES 25c
 Paste or pin this ad on a letter with your name and address and mail it to us with 25c. (stamps or coin) for the next 12 issues. American Poultry Journal
 532 So. Clark Street Chicago, Illinois



Forms to cast Lead Soldiers, Indians, Trappers, Hunters, Wild and Farm Animals. 239 different forms to select from. Every form guaranteed to cast perfect figures. Send 5c stamp for illustrated catalogue.
HENRY C. SCHIERCKE Spencer Rd. GHENT, N. Y.



LEARN AUTO MECHANICS
in 8 weeks!

Earn \$35 to \$75 a week as an Auto Mechanic. Never in the history of the automotive business has there been such a demand for TRAINED men. 8 weeks training fits you for a job that's waiting for you or to open your own repair shop. Read what two McSweeney trained men have done. Hundreds of others can tell you facts equally interesting. Don't look for a job! TRAIN for it!

Farrell, Pa.
 Dear Mac: Please forward me your catalog. I want it to add to my traveling souvenirs. I am working in a modern garage although I have been out of school only four weeks, thanks to McSweeney Training. My best regards to all. M. Klushauk

Rector, Ark.
 Dear Mac: Just a few lines which might interest you. I left your school two years ago last May. Since I left I have not seen a day I could call "hard times." I have been working ever since I left and have averaged in my earnings \$173.00 a month, in spite of the hard times. Many thanks. Thos. J. Sharp

EIGHT WEEKS of Actual Shop Training

No books or lessons the McSweeney way. First you learn the "why" of everything you do; then under competent instructors, you DO the job. You work on real equipment and machines, with the real tools of the auto expert. In eight short weeks you are TRAINED to hold down a permanent BIG PAY job. Any man 16 to 50 can learn. Write today for New Low Tuition Offer.

AVIATION GROUND COURSE

Aviation is coming and coming fast! Prepare now for the wonderful opportunities of the future. Each plane needs many mechanics on the ground.

MONEY BACK GUARANTEE!

In eight weeks of intensive training; actual shop work with real tools on real equipment; you will be qualified to accept a Big Pay Job as an Auto Mechanic. If you are not satisfied with your qualifications, your tuition will be refunded.

FREE Write today for Big Free Book on AUTOS. Get the facts about jobs; and Low Tuition Offers. Mailing the coupon does NOT obligate you. It obligates ME to tell YOU how you can train for Big Money in eight short weeks. Address Dept. 10-12

McSWEENEY SCHOOLS
AUTOMOBILE - AVIATION
CLEVELAND, OHIO or KANSAS CITY, MO.

Write Our School Nearest You

McSweeney Auto and Aviation School,
 Dept. 10-12, Cleveland, Ohio or Kansas City, Mo.
 Without cost or obligation, send me your Big FREE Book on Autos; also full information about your low tuition offer.

Name.....
 Street.....
 Town.....State.....Age.....

I'll Show You How To KNOCK 'EM OUT!

WITH THE PUNCHES THAT MADE ME KNOCKOUT CHAMP OF THE WORLD!

You could practice for years and never discover HOW TO DELIVER A REAL KNOCKOUT! But I can show you in a few minutes! My secret copyrighted knockout blows can be quickly learned. They brought me world fame—my feats in the ring have astonished experts. I was the undefeated and most lightweight champion and hold the undisputed Knockout Record of the World! I earned this by seeking over

500 KNOCKOUTS ALL WITHIN 3 ROUNDS

No man can withstand the force and power of my 5 astonishing knockout punches. They work every time—just let me teach you. I'll double your strength, reach and speed. I will show you how to stand on a handkerchief without being hit—I'll make you punch-proof and fearless. One 16 year old boy writes "Already have 33 knockouts to my credit in 33 fights, all in less than 4 rounds. The secret punch you taught me does the trick."

I TAUGHT BATTLING NELSON—GRIFFO AND HUNDREDS OF OTHERS

who all became Champions. My system must be O. K. I GUARANTEE RESULTS and if you are not 100% satisfied, my 5 complete courses, Fighting, Boxing, Training, Physical Culture, Muscular Development, etc., are FREE TO YOU if they are not the world's best. **FREE TO YOU** Send only 25c and if it is not up to the minute fighting knowledge and greatest fighting record of any man that ever lived, all will be free to you and your 25c refunded plus postage. Send the 25c now—Today.

5 KNOCKOUT SECRETS FREE TO YOU

GUS MARTEL, Dept. 16, 246-5th Ave. New York City

Name.....

Street.....

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

Amazing Invention Turns JUNK Into CASH

Makes Springy Rubber Mats Out of Old Auto Tires. Any Size . .

Big demand from factories, schools, stores, homes. Wm. B. Eagle writes, "My problem is in making enough mats. The first week I got over 200 orders from \$1.00 to \$10.00 each." Harris says, "Sold many the first week—can keep 15 men busy all the time." Gunter writes: "Sold big order to County Commissioners—also have orders for grade and high schools. Many customers repeating second and third time."

5¢ TIRE \$2.00 MAT **NEW IDEA Fully Patented**

Think of the profit. Like making gasoline from garbage or gold from lead. Junk tires at 6c each, quickly cut into strips by simple hand machine. Patented method forms strips into thick, springy, everlasting floor mats. One, nickel tire makes \$2.00 mat. **FABRIX Mat Makers** cleaning up in this brand new business. Start at home on small investment in basement, garage or spare room. Make money from the start. As business grows, profit is so big you can hire helpers and salesmen. One machine keeps four helpers busy. Production unlimited. A Big proposition for capable men. While it is new, get in on the ground floor with the biggest money making plan in years. Write or wire quick for complete facts **FREE**. No obligation.

FABRIX, Inc.
325 W. Huron St.
Chicago, Ill.
Dept. 712



When writing please mention Popular Mechanics

Any Man, or Boy, who has a Passion for Making Things Needs this Book

IT'S ONLY A DIME

This book tells you how to make Electro-Magnets, Electroplating Outfits, Secret Locks . . . and 30 other Electrical Devices. You'll find the directions and diagrams easy to follow. Satisfactory too . . . because everything you make will work . . . 100%.



96 Pages—costs a Dime—Don't go another day without it

You'll never get more real instruction for any dime you've ever spent than what's crammed between the covers of this book. Send 10 cents (coin or stamps) to Dept. F.D.B. 8, National Carbon Company, Inc., New York City.

Now is the Time to Get Ready

for the BIG PAY JOBS IN AVIATION



Government spending millions of dollars promoting commercial aviation. This means there will be thousands of new jobs. Now is the time for you to start training for a good paying job in aviation.

LINCOLN Prepares You—

for success. Government Approved School. Only modern high class training planes with Dept. of Commerce approval are used. Training given for government license as Transport, Limited Commercial, Private or Amateur Pilot. Ground and mechanics school with experienced instructors qualify you as Master Airplane and Engine Mechanic. Airline pilots earn up to \$500 a month! Airplane and Engine Mechanics also earn good pay. 24 years successful experience as mechanics trade school and 14 years teaching aviation. Write now. Please state age.

LINCOLN AIRPLANE & FLYING SCHOOL
209-D Aircraft Bldg. Lincoln, Nebr.

Law!

LEARN AT HOME

Are you adult, alert, ambitious, willing to study? Investigate LAW! We guide you step by step—furnish all texts, including 14-volume Law Library. Training prepared by leading law professors and given by members of bar. Degree of LL. B. conferred. Low cost, easy terms. Send NOW for Free, 64-page "Law Training for Leadership."

LaSalle Extension University, Dept. 1264-L, Chicago

Free DRAFTING TRIAL LESSON

If over 17 years of age send for this Free Trial Lesson in Drafting. Interesting and instructive. Shows how easy to learn at home by C.T.C. Method. We furnish all tools. Get ready now for money-making opportunities opening for trained Draftsmen. Write today. **CHICAGO TECH COLLEGE**
R 145 Tech Bldg., 110 E. 26th St., Chicago, Ill.

THE ORIGINAL HOME STUDY COURSE IN Practical RADIO ENGINEERING

Trained men get ahead. The finest course for men serious about Radio. Catalog free. Dept. P-12, 14th & Park Road, Wash., D. C.

Free BOOKLET Just off the press! **WRITE FOR YOUR COPY TODAY!**

CAPITOL RADIO ENGINEERING INSTITUTE

Half a Million People have learned music this easy way

You, too, Can Learn to Play Your Favorite Instrument Without a Teacher

Easy as A-B-C

MANY of this half million didn't know one note from another—yet in half the usual time they learned to play their favorite instrument. Best of all they found learning music *amazingly easy*. No monotonous hours of exercises—no tedious scales—no expensive teachers. This simplified method, perfected by the U. S. School of Music, made learning music as easy as A-B-C.

From the very start you are playing *real* tunes perfectly, by *note*. Every step, from beginning to end, is right before your eyes in print and picture. First you are *told* how to do a thing, then a picture *shows* you how, then you do it yourself and *hear* it. And almost before you know it, you are playing your favorite pieces—jazz, ballads, classics. No private teacher could make it clearer. The cost is surprisingly low—averaging only a few cents a day—and the price is the same for whatever instrument you choose.



Free Booklet and Free Demonstration Lesson. These explain our newly perfected method fully and show you how easily and quickly you can learn to play at little expense. U. S. School of Music, 712 Brunswick Bldg., New York City.

U. S. School of Music,
712 Brunswick Bldg., New York City

Send me your amazing free book, "How You Can Master Music in Your Own Home," with inspiring message by Dr. Frank Crane; also Free Demonstration Lesson. This does not put me under any obligation.

Name.....

Address.....

Instrument..... Have you this Instrument?.....

LEARN TO PLAY BY NOTE

Piano	Violin
Guitar	Ukulele
Organ	Saxophone
Tenor Banjo	
Hawaiian Guitar	
Piano Accordion	
Or Any Other Instrument	

Learn how to play your favorite instrument and surprise all your friends. Change from a wallflower to the center of attraction. Musicians are invited everywhere. Enjoy the popularity you have been missing. Start now!

Free Booklet and Demonstration Lesson

If you really *do* want to play your favorite instrument, fill out and mail the coupon asking for our

SONGS WANTED FOR RADIO BROADCAST

NEW WRITERS INVITED

Cash Payments Advanced—Writers of Songs Used and publication secured. Send us any likely material (Words or Music) for consideration today. Radio Music Guild, 1650 Broadway, New York.

Learn ADVERTISING at Home

Greater opportunities now in advertising. Learn easily and quickly in spare time. Practical work. No text books. Old established school. Low tuition—Easy terms. Send for free booklet of interesting information.

Page-Davis School of Advertising
Dept. 1359, 3601 Mich. Ave., Chicago

"BECOME A LIGHTNING TRICK CARTOONIST"

Send \$1.00 for Laugh Producing Program of 23 Trick Drawings with Instructions. Catalog of Chalk Talk Supplies Free. BALDA ART SERVICE, Dept. 1, Oshkosh, Wis.

HOME-STUDY BUSINESS TRAINING

Your opportunity can never be bigger than your preparation. Prepare now and reap the rewards in earlier and larger success. *Free 64-Page Books Tell How*. Write *now* for book you want, or mail coupon with your name and address in margin *today*.

- | | |
|---|--|
| <input type="checkbox"/> Higher Accountancy | <input type="checkbox"/> Business Mgm't |
| <input type="checkbox"/> Mod. Salesmanship | <input type="checkbox"/> Business Corres. |
| <input type="checkbox"/> Traffic Management | <input type="checkbox"/> Credit and Collection |
| <input type="checkbox"/> Law: Degree of LL.B. | <input type="checkbox"/> Correspondence |
| <input type="checkbox"/> Commercial Law | <input type="checkbox"/> Modern Foremanship |
| <input type="checkbox"/> Industrial Mgm't | <input type="checkbox"/> Personnel Mgm't |
| <input type="checkbox"/> Banking and Finance | <input type="checkbox"/> Expert Bookkeeping |
| <input type="checkbox"/> Telegraphy | <input type="checkbox"/> C. P. A. Coaching |
| <input type="checkbox"/> Rail. Station Mgm't | <input type="checkbox"/> Business English |
| <input type="checkbox"/> Railway Accounting | <input type="checkbox"/> Commercial Spanish |
| <input type="checkbox"/> Paper Salesmanship | <input type="checkbox"/> Effective Speaking |

LASALLE EXTENSION UNIVERSITY
Dept. 1264-R Chicago

Become a Radio Expert

GOOD JOBS



Learn RADIO-TELEVISION ELECTRICITY-TALKING PICTURES

Times are getting better. Trained men are getting jobs. National will quickly train you to qualify in all branches of radio, television, talking pictures, broadcasting, operating and general electricity. Thorough, practical training. Over \$100,000 in modern equipment. National graduates in demand. Regardless of age or education you can learn profitable trades in a few months.

QUALIFY AS A Radio Repair Man, Television Expert, Control Operator, Station Technician, Sound Expert, Ship Operator, Broadcaster, Electrician and many other jobs.

EARN ROOM AND BOARD WHILE LEARNING 75% of our students earn living expenses while receiving training. We help you get a job. For limited time will allow your coach railroad fare to Los Angeles.

TRAIN IN LOS ANGELES This is the Ideal City. Center of Greatest Activity in Radio, Talking Picture and Electricity. 30,000 successful graduates. School established 29 years. Send for free descriptive book and enrollment details.

NATIONAL RADIO & ELECTRICAL SCHOOL - Los Angeles

Dept. PMR-12, 4006 Figueroa St.
Send Book and full details of Courses.

NAME

ADDRESS

CITY..... STATE.....



SHOES LIKE NEW

EARN UP TO \$2.00 IN AN HOUR
with SAV-AN-UPPER

AS LOW AS **2¢** A Pair

Sensational, new discovery makes it unnecessary to lay shoes aside or throw them away, when they become soiled, scuffed and shabby—saves buying new shoes. Sav-An-Upper makes the scuffed, discolored and faded uppers glossy, neat and good-looking as the day they left the factory, quick, easy, economical. Takes only a minute. JUST BRUSH IT ON. More than a polish—more than a dye. Absolutely new and different. GUARANTEED.

More Than A Polish
More Than A Dye
Guaranteed

Completely Covers the Old Uppers—Won't Rub Off

No matter how soiled, discolored, scuffed, scratched or faded the old uppers may be, Sav-An-Upper immediately restores the attractive, polished, glowing neatness of brand new shoes. Sav-An-Upper completely COVERS the scuffed, unsightly leather, canvas, suede, reptile skin, satin or linen with a tough, waterproof, long-wearing, flexible coating that WON'T RUB OFF. Sav-An-Upper preserves the uppers and adds months and months of extra wear.

Hundreds of Other Money-Saving Uses

Sav-An-Upper is also excellent for renewing trunks, luggage, school bags, shopping bags, brief cases, leather upholstery and cushions, auto tops, harness, reins, saddles, belts, wallets, leather gloves, etc. In fact, any article of leather, canvas or imitation leather becomes scuffed, scratched, discolored or shabby.



FREE SAMPLE

ACT AT ONCE! AGENTS AND DISTRIBUTORS Breaking Profit Records

Men and women everywhere making tremendous profits—up to 202%. Desirable territories are being "snapped up" by hustlers. Get your share of the Big Money. No experience necessary—SEND NO MONEY. Write TODAY for claim proving sample and details.



The SAV-AN-UPPER CO., Dept. D-72, Cincinnati, Ohio

LEARN WATCHMAKING

and become independent. We help you secure a position. Easy to learn. Send for FREE CATALOG. ST. LOUIS WATCHMAKING SCHOOL DEPT. 5 ST. LOUIS, MO.

STEP INTO THE Spotlight




FREE LESSONS •• A YEAR TO PAY

Banish Boredom... Earn Extra Money START TO PLAY VERY FIRST DAY

Picture the joy of playing a snappy foxtrot, dreamy waltz or mellow old favorite on the Xylorimba. No reason why you shouldn't! Xylorimba is easiest of instruments to play and yet the most spectacular. In constant demand by orchestras, radio stations, at lodge meetings and parties. Marvelous opportunity to increase popularity, make big spare-time money. No bothersome practice or exercises. With Free easy lessons you actually Start to Play Very First Day.

BIG FREE BOOK tells all about Deagan line, liberal trial offer and easy payments. Send coupon today for your free copy.

J. C. Deagan, Inc., Dept. 7459, 1770 Berneau Ave., Chicago
Send me, without obligation, full details of Free Trial offer and easy-payment plan on the Deagan Xylorimba.

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

Turn Cheap Oil to Gas Heat

HEATS 25% CHEAPER Than Other Fuels!

Send name for free book on LACO'S sensational new "Mineral-Wick" automatic oil burner. World's lowest priced! Saves 25% of fuel costs. Gives hotter flame with less oil. Goodrich (Me.) says, "Saved me \$50 over coal one winter." Clean, noiseless, double safety features. 15,000 in use. GUARANTEED. WRITE! Get low price, due to simpler design, low factory-costs. Get No-Risk, Trial-Offer and Free Book. SEND NOW! LACO OIL BURNER CO., 1124 Union Ave., Grinstead, Ia.



Look Here, DEALERS! Lower price and fuel savings help my dealers out-sell others. I'll ship you sample burner, on approval subject to examination, no obligation. Write quick for my plan. L. A. COCKLIN, Pres.

CORRESPONDENCE COURSES

Course No. 112—ELECTRICAL ENGINEERING—Very complete and understandable. FREE laboratory apparatus. Comparable with college course.
Course No. 113—RADIO—PUBLIC ADDRESS—PHOTO ELECTRICS—ELECTRONICS—An ultra-modern course in radio, public address, photo electric, and electronic work. Graduates are true "Vacuum Tube Technicians."
Lowest cost—best value correspondence courses in America. Payment Plan (\$1.00 per month). Write for Catalog. LINCOLN ENGINEERING SCHOOL, 855-B S. 37th St., Lincoln, Neb.

5¢ EACH LITTLE BLUE BOOKS

Send postcard for our free catalogue. Thousands of bargains. Address: LITTLE BLUE BOOK CO., Catalogue Dept., Desk 422, Girard, Kansas.

NEW WRITERS WANTED

Be a Journalist. Big opportunity now open for beginning writers to become News Correspondents, Feature Writers, Columnists, Authors. Cash paid for material published. No experience required. We train you. FREE Details. NATIONAL PRESS ASSOCIATION, Dept. C, 3806 Beverly Blvd., Los Angeles, California.

INTRODUCTORY MAGIKIT OFFER

Every amateur can now afford professional magic equipment. New MAGIKIT ready-to-assemble tricks now available at sensational low prices. Designed by Peter Adams, author and authority on magic. Finest materials. Complete instructions with each MAGIKIT product including effort, how it works, how to assemble, suitable patter. Send 25¢ today for INTRODUCTORY CARD TELESCOPE TRICK. Be the first in your neighborhood. FELLOWGRAFTERS, INC., Dept. K, 18 Beacon St., Boston

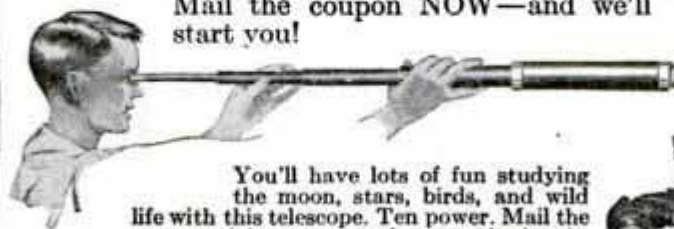
BUILD DUTCH WINDMILLS

Beautiful Your Garden—Make Money Selling to Others. Easy to build from BLUE PRINTS. Model B10 (Hexagon style 30" high) 75¢. Model B25 attractive Dutch Windmill operating DUTCH GIRL CHURNING BUTTER 50¢. Knock Down Kit for Model B25 only \$4.00. Lawn cut out patterns sunbonnet girl, Dutch boy, Tulip Girl and Holland pair. 35¢ each. 4 for \$1.00. For Catalog send 10 cents. Free with order. Craftsman's Model Co., Dept. P14, 2030 N. 41st St., Milwaukee, Wis.

GIVEN WITHOUT COST

Over 300 Dandy Big Prizes Including a Speedy Motorbike!

OH, BOY! Here's your opportunity to win over 300 big prizes *without cost!* Get this 1934 deluxe model motorbike, fully equipped. Win a printing press, open a shop of your own, and make money. Or get this radio microphone and go on the air! Heaps of fun. . . Besides these wonderful prizes, you can earn **CASH PROFITS**. It's easy! Just deliver 3 fine magazines to customers in your neighborhood. No experience necessary. Mail the coupon NOW—and we'll start you!



You'll have lots of fun studying the moon, stars, birds, and wild life with this telescope. Ten power. Mail the coupon right away, and start winning it.



Mail the COUPON

**Jim Thayer, Dept. 440
The Crowell Publishing Co., Springfield, Ohio**

Dear Jim: I want to earn MONEY and PRIZES. Start me at once, and send me a big Prize Book, showing over 300 prizes that I can win.

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

PHOTO-ENGRAVING LEARN IT AT HOME



We Furnish all equipment and materials including large photo-engraving camera complete with lamps, lens and screen. When you have finished the course you can establish a good paying independent business with the equipment furnished or work for others at a big salary. Photo-Engraving offers greater opportunities today than any other industry. Every picture in this issue of Popular Mechanics was engraved by the process we teach you. Earn good money while learning. Write today for our new illustrated catalog which was engraved on equipment such as we furnish. You will not be obligated in any way by writing.
Aurora School of Photo-Engraving, Dept. 1124, Aurora, Mo.

A copper plate to print above picture size 8 by 10 inches sells for \$13.37.



BUCHSTEIN'S FIBRE LIMB

is soothing to your stump—strong, cool, neat, light. Easy payments. Brace for all deformities.

D. BUCHSTEIN CO.
610 3rd Av., So., MINNEAPOLIS, MINN.

Send for Catalog Today

FREE LESSON HomeArt Crafts

GOOD MONEY FOR SPARE TIME

A new easy way. Art novelties in big demand. Get free lesson and quickly learn to decorate Gifts, Brides Prizes, Toys, etc. No experience necessary. Anyone can succeed with simple "3-step" method, and you earn as you learn. Everything furnished, including supply of Novelties for you to decorate and Home-crafter's Outfit.

NO CANVASSING

Just sit at home and make up to \$50 a week spare time or full. Write today for big illustrated book and **FIRST LESSON FREE**. Absolutely not one cent to pay. Lesson is free. Openings in every locality. Write quick.

FIRESIDE INDUSTRIES
Dept. 66-W Adrian, Mich.



When writing please mention Popular Mechanics

BE AN ARTIST

WE CAN TEACH YOU DRAWING in your own home during your spare time. Thirty-five years of successful teaching proves our ability. Artists receive large salaries.

Write today for Art Year Book
SCHOOL OF APPLIED ART
Dept. 194, 10 E. Huron St., Chicago, Ill.



AIR CONDITIONING

today's big opportunity!

AIR CONDITIONING is the next big industry. Mark that prediction! Its opportunities are as big in winter as in summer. Plumbing and

heating engineers must know Air Conditioning—the field in its broader aspects invites ambitious men. And a new, up-to-the-minute course on Air Conditioning now offered by the I. C. S. will help you qualify for advancement in this new field. Full information—free.

INTERNATIONAL CORRESPONDENCE SCHOOLS

BOX 5543-H, SCRANTON, PA.

Explain fully about your course in the subject marked X:

AIR CONDITIONING

- | | |
|--|---|
| <input type="checkbox"/> Chemistry | <input type="checkbox"/> Accountancy |
| <input type="checkbox"/> Radio | <input type="checkbox"/> Advertising |
| <input type="checkbox"/> Aviation | <input type="checkbox"/> Electrical Engineering |
| <input type="checkbox"/> Refrigeration | <input type="checkbox"/> Drafting |
| <input type="checkbox"/> Inventing & Patenting | <input type="checkbox"/> Show Card Lettering |
| <input type="checkbox"/> Architecture | <input type="checkbox"/> Good English |

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



AUTO

BOOKS SENT FREE



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

DON'T SEND A PENNY!

A better job—in the gigantic auto industry, BIGGER PAY—a chance to go into business for yourself and get a share of the huge profits that are waiting for any man who even half tries to improve himself. Learn Auto Engineering with these wonder books a new way—without studying or memorizing. Simply use the JIFFY INDEX to look up the answer to any auto problem. Built by eleven of America's greatest automobile engineers, and written in simple language so you can understand it.

FREE! Privilege of consulting Automobile Engineers of American Technical Society for one year without cost if you mail coupon immediately.

If you send NOW we will include an extra volume No. 7 which covers all 1934 car improvements—knee action wheels, streamlining, booster brakes, etc.

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 set TIMING—how to put your finger instantly on engine trouble and then the quick expert way to FIX it. Newest improvements fully covered. Equal to a complete trade course at less than a fourth the cost.

6 Big Volumes Latest Edition

2500 pages, 2000 Illustrations, wiring diagrams, etc., including Aviation Motors. De Luxe edition, gold-stamped flexible binding.

AMERICAN TECHNICAL SOCIETY.

Dept. A919, Drexel Ave. & 58th St., Chicago, Ill.

I would like to see the new 6-volume edition of your AUTO BOOKS. I will pay the few cents delivery charges only, but if I choose to, I may return them express collect. If after 10 days use I prefer to keep them, I will send you \$2 and pay the balance at the rate of only \$3 a month, until \$24.50 is paid. Please include free consulting membership and extra Vol. 7 as per your offer above.

Name.....

Address.....

Attach letter stating age, occupation and name and address of employer and at least one business man as reference.

at last CARTOONING MADE EASY



NEW, ORIGINAL, COMPLETE COURSE, especially prepared by one of today's cleverest newspaper and magazine cartoonists. Full of punch and interest. 30 fascinating lessons; hundreds of step-by-step cartoons. EXTREMELY EASY. Learn quickly right from the start, either for fun and spare money, or to become a professional cartoonist! Money Back Guarantee. Or, send for Free details. Don't delay.

Complete COURSE only \$2.75

AMERICAN SCHOOL OF CARTOONING
Dept. 112 614 West Austin Ave. Chicago, Ill.

Learn Photo-Engraving at Home

MAKE MONEY Earn money while learning. Large photo-engraving camera, equipped with lens and screen, automatic etcher, and all other equipment furnished. Write for FREE illustrated catalogue and the facts regarding this fascinating profession.

NATIONAL SCHOOL OF PHOTO-ENGRAVING
321 Virginia Avenue, Joplin, Missouri

Play A Tune In 10 Minutes

On your Spanish Guitar, Uke, Tenor Banjo, Mandolin or Banjo Mandolin. No knowledge of music necessary. No practice. Play first by number, then by note. Simply attach E-Z Player to your favorite instrument—press numbered keys and play.

FREE

instruction book with numbered tunes and chords comes with every E-Z Player. Start playing popular tunes by number right off the reel. Be the life of the party—the center of attraction—a radio star. Don't wait. Write today for 3-Day Free Trial Offer and Special Guitar Values. A postcard will do.

FERRY SPECIALTIES, INC.
Dept. 4312 Evanston, Ill.

The Ideal Christmas Gift for a Boy



Here's Fun Galore

Boys want things that will "GO"—things he can race with—scooters, pushmobiles, small autos with motorcycle engines, wind wagons, etc.—Whether on spinning wheels or glistening runners—fast ice yachts, skis, toboggans, bobsleds, motor driven sleds and snow speedsters.

The air-minded boy enjoys gliders and model airplanes. He can turn his back yard into a regular amusement park with all these thrillers—ferris wheels, roller coasters, merry-go-round swings, etc.

How fascinating to imitate the big engineers and make small water wheels, pile drivers, aerial cableways and other things that "work."

When at camp or on the water he needs plenty of ideas for new ways of having fun. Here are dozens such as water bicycles, push boats, water coasting toboggans, water games, etc.

On rainy days and other times when working in his home shop he has the hardest time finding interesting things to make. Here are any number such as electric locomotives, motion picture cameras, wood turning lathes, etc.

All in this great

Boy Mechanic Library

YES—ACTUALLY

4000 Worth While Things to Make and Do

He need not envy the other boys on account of the things they have but can be the boy in his neighborhood to make the others wonder where he gets all his ideas.

Let him get the thrill of having "Made It Himself."
Everything is pictured out and made easy.

4 Big Volumes—Books 1, 2, 3 and 4.

Each Complete in Itself.

Each book measures 7 x 10 x 1½ inches in size, has 460 pages, is profusely illustrated and contains approximately 1000 articles.

Single volumes are \$2 each. Please designate by number when ordering. If the entire set is ordered at one time, the price is \$7.

Will be sent to any address postpaid when remittance accompanies order, or parcel post C.O.D. anywhere in the U. S. Simply pay postman price plus extra postage when delivered.

POPULAR MECHANICS PRESS
200 E. Ontario St. Room 1234 Chicago, Ill.

When writing please mention Popular Mechanics

NEW DIESEL ENGINES

Don't Wait! Diesel Power is

the big, new field for greater opportunities and bigger pay. GET OUT OF THE RUT! BE AN EXPERT DIESEL ENGINEER and advance with this great new industry that is sweeping the world.

LEARN DIESELS in our big, nationally recommended DIESEL Schools and Shops. The original, exclusive DIESEL Schools of the United States and Canada... established many years and always ahead in training and equipment. More engines... more successful graduates... more Big Pay Jobs.

Send for your FREE copy of "Diesel News," containing up-to-the-minute information about the amazing opportunities everywhere for trained DIESEL men.

Book K Explains All Practical School Courses—Day and Night. Book H Explains Home-Study Combination Course.

HEMPHILL DIESEL ENGINEERING SCHOOLS, INC.

2127 San Fernando Road, Los Angeles, Calif.
P. O. Box 101, Chicago, Ill. P. O. Box 892, Oklahoma City, Okla.
507 Westlake N., Seattle, Wash. 1043 Pender St., Vancouver, B. C.
Nation-wide Employment Service is Free to all Hemphill Graduates

62 ART LESSONS

Only **95** POST PAID COURSE COMPLETE

Become Talented Artist With Big Income. This thorough home-study course teaches Commercial Art, Cartooning, Lettering—atomy, perspective, adv. layout, short cuts, tricks of profession, etc. By Alexander Murray, famous Art School instructor. Natural ability not necessary. Over 815 clear, concise instruction plates assure easy, rapid development. 125 sheets of drawing paper included FREE. Complete Course (no more to pay) only \$1.95 postpaid—no need to hurry, pay postman plus postage. Money back if not delighted after inspection. Turn your spare time of today into big money tomorrow.

MUSIC LESSONS IN YOUR HOME



You can play music like this quickly

Write today for our FREE BOOKLET AND DEMONSTRATION LESSON. It tells how to learn to play Piano, Organ, Violin, Mandolin, Guitar, Banjo, etc. Beginners or advanced players. You pay as you learn. Low cost. Easy terms. Thousands of satisfied students. AMERICAN SCHOOL OF MUSIC West Palm Beach, FLORIDA

AUTO-AVIATION MECHANICS

Auto-aviation mechanics and welders are in big demand. Make good money! Enroll now at special low rates. Illustrated literature FREE. Write today.

MICHIGAN TRADE SCHOOL
3750 Woodward Ave., Detroit, Mich.

Write for FREE CIRCULAR

ARTISTS MAKE MONEY

Find out your ability. Send name, age, occupation and address for Free Vocational Art Test.

Federal Schools, Inc., 12134 Federal Schools Bldg., Minneapolis, Minn.

CIVIL SERVICE

VALUABLE INFORMATION FREE
COLUMBIAN CORRESPONDENCE COLLEGE
WASHINGTON, D. C.

Make Money at Home!

GROW MUSHROOMS in your cellar or shed. Exclusive new process. Bigger, better, quicker crops. More money for you! Enormous new demand. Write for Free Book, \$25.00 worth of more.

American Mushroom Industries Ltd., Dept. 889, Toronto, Ont.

When You Build the
"SOVEREIGN"
You Can Build Them All

Complete book on building Popular Mechanics Famous Museum Ship Model "Sovereign of the Seas." Price \$1.00 postpaid.
Popular Mechanics Press 200 E. Ontario St., Chicago



Know Electricity as Experts Know It—and Get an Expert's Pay!

Recovery has begun! The months ahead are charged with significance and expectation. What will you do to get the jump on the other fellow? Thousands of men have used

The Croft Library of Practical Electricity

The Croft Library is a complete electrical educator. It is founded on practice—on 20 years of shirt-sleeve experience—on work as it is actually done. It is jammed from cover to cover with the kind of hard-headed facts you want. Written so that the beginner can easily understand it, yet so sound, so thorough, that it is the daily guide of 59,000 highly paid electrical workers and engineers. Croft tells you the things you need to know about motors, generators, armatures, commutators, transformers, circuits, switchboards, distribution systems—electrical machinery of every type—wiring for light and power—wiring of finished buildings—underwriters' and municipal requirements—Illumination in its every phase—the most improved methods of lighting—lamps and lamp effects, etc.—how to do a complete job, from estimating it, to completion.

No money down—easy payments

Fill in and mail the coupon attached and we will send you the entire set of seven volumes for ten days' free examination. We take all the risk—you assume no obligation. If you decide to keep the books, send \$1.50 in ten days and the balance at the rate of \$2.00 a month. Send the coupon NOW and see the books for yourself.

FREE EXAMINATION COUPON

McGRAW-HILL BOOK CO., 330 W. 42nd St., New York

Send me for ten days' free examination the Croft Library of Practical Electricity. If satisfactory I will send you \$1.50 in 10 days and \$2.00 monthly until the price of \$19.50 is paid. If not wanted, I will return the books postpaid. (To insure prompt shipment write plainly and fill in all lines.)

Name.....
Home Address.....
City and State.....
Position.....
Name of Company..... PM-12-34

Be a TELEVISION EXPERT

LEARN TELEVISION with RADIO—NOW! Fine opportunity for experts in this amazing new industry. A NEW business in a NEW era offers NEW opportunities for big salaries! You learn Radio and Television from the beginning to end in our marvelously equipped labs and studios. You actually operate thousands of dollars worth of expensive equipment. You get expert instruction and skillful guidance by radio-television specialists.

Demand for Television Experts
Television now perfected and ready for the market ON THE NEXT BIG BUYING WAVE. Business leaders predict new system television will require thousands of relay and broadcasting stations. Ultra-short waves will permit eighty thousand television stations in America alone. GET IN NOW and "build up" with the world's next billion-dollar industry.

Five Months Thorough, Practical Training
Qualifies for radio-phone license (1st Class) Complete up-to-the-minute training on modern "workable" television equipment including the new cathode-ray. Practical experience in studio, control room. Transmitter operation of Television Station W9XAL. Employment aid while training and upon graduation. Write for free book "Pictures on the Air" NOW.



FREE FOLDER

S. Q. NOEL, Pres. First National Television, Inc. Dept. A12, Power & Light Bldg., Kansas City, Mo.

Without obligation, send me postpaid FREE! Illustrated Folder, "Pictures on the Air," telling about new opportunities in television. I am 17 yrs. or older.

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

BIG FUTURE USE COUPON

Classified Advertisements

WORLD'S BEST WANT AD MEDIUM

Advertisements in this section, 35 cents per word, each insertion, minimum 10 words, payable in advance
To be inserted under proper classification in January issue, copy should be in our office November 16th

ADVERTISING AGENCIES

INCH Display advertisement fifty magazines, year \$24.00. Wood's Popular Service, Atlantic City, N. J.

OLD Established advertising agency will train limited number of students (men or women) in practical advertising. Opportunity to earn while learning. Advertising Institute, 613 Southwest Building, Los Angeles.

ADVERTISE Profitably: \$15 reaches 6,000,000 Sunday newspaper readers with 24 word ad. Newspaper, magazine rate-guide, free. Chicago Union Agency, 20 West Jackson, Chicago.

ADVERTISE In country weeklies. Lists free. Meyer Agency, 4112 Hartford St., St. Louis, Mo.

LEARN Advertising quickly at home. New easy practical plan. No text books. Interesting booklet free. Page-Davis School of Advertising, 3601 Michigan, Dept. 343-C, Chicago.

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

FOR ADVERTISERS

24 WORDS \$2.40. Mail order circulation 100,000 guaranteed. Goodall Adv. Co., Box 1592, San Francisco.

30 WORDS Printed 10,000 advertising circulars and mailed to prospects, \$1.00. Lee Agency, Sheridan, Ark.

24 WDS. Monthly-weekly combination \$4.98. Magazine free. Darnell, Jackson, Tennessee.

25 WORDS 25 Magazines, 3 months \$1.50. One inch \$6.00. Plans. 36 Liberty St., Brooklyn, N. Y.

10,000 CIRCULARS Printed, mailed to mailorder buyers, \$11.95. Sample? Midget, Warmsprings, Ga.

ADVERTISE: 24 Words in 250 newspapers \$10. Lists free. Advertising Service Bureau, 4650 Drexel, Chicago.

BUSINESS SERVICE

POWERFUL Sales letters prepared. Name business. Jed Scarborough, Maplewood, N. J.

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

INFORMATION

ANY Information desired 25c coin and up. Fred Klotz, Reading, Pa.

AUTOMOBILES

MONOGRAMS. With our instructions you can apply beautiful, everlasting, transfer monograms to your automobile yourself. Send \$1.00 bill for complete set. Print three initials wanted. E. Langen, Whalom, Mass.

SPEED In Auto Racing. Brand new book gives all speed records; drawings, pictures, full description of record cars. Tells how you can build 125-135 m.p.h. stock car and speedway racers. Midgets, conversions, fully described. \$1.00 postpaid; \$1.12 C.O.D. Ray F. Kuns, Dept. B-3, Madisonville, Cincinnati, Ohio.

AUTOMOBILE SUPPLIES

AUTOMOBILE Dealers, restricted territory. New auto lock and safety device. See page 700, November issue, Popular Mechanics. Auto Brake Clutch Locking Device Company, 3420 Irving Park Blvd., Chicago.

AUTOMOBILE Supplies! Radios! Bankrupt stocks! World's lowest prices! Reconditioned AC spark plugs 29c! Hot water auto heaters \$3.98! House radios \$12.85! Paint 95c gallon! Seat covers 98c! 1000 bargains! Free bulletin! Standard Liquidators, 1363-A Gratiot, Detroit.

NICKEL Plating outfits, connect to your battery. No tanks used, thousands in use. \$3.00 prepaid. Gunmetal Co., Ave. J, Decatur, Ill.

GENERATORS. Starters, distributors, magnetos or electrical parts for any auto, truck or bus. New, used and rebuilt. Save up to 75%. Write for prices. State Ignition Service, 2002 South State Street, Chicago, Illinois.

AUTO TRAILERS

BOOK Of camp trailer plans containing fifteen modern designs ranging from 8 to 16 feet. Copy sent postpaid for \$1.00. Toellen Trailer Service, Box 25, College Park Sta., Detroit, Mich.

AUTOMOBILE SERVICE EQUIPMENT

MICROMETER: Measures outside every thousandths between 2 and 5 inches. Permanent accuracy guaranteed. \$1.00. Agents! Schaap, Laurelton, Long Island.

DEMONSTRATORS. Compressor, test bench, 8-hour battery charger—are welder. Guaranteed. Trial and terms. Ken's Equipment Exchange, Box M-1242, Troy, Ohio.

A. C. AUTO GENERATORS

TEN Practical and inexpensive changes converting Dodge 12-V, Ford T, A., Chevrolet Delco 6-V generators into 100-500 watt capacity a.c. generators, or into 32-110-V d.c. motor or generator. Dodge is 500-W self-excited. All in one book illustrated with complete simplified instructions and drawings for only \$1. Autopower, 408-B, S. Hoyne Ave., Chicago.

ELECTRIC Lights—Wind driven—You build them. Write Wind Motor Electric, Ridgway, Mont.

DODGE Generator quickly changed to powerful electric welder. Instructions \$1.00. Neal Brown, Richland Springs, Tex.

MOTORCYCLES, BICYCLES AND SUPPLIES

DIME Secures sample Speedway Racing Magazine, catalog English motorcycles, crash helmets, speed books, supplies. Overhead speed heads for Fords. Clymer, 434 W. Pico, Los Angeles, Calif.

BICYCLE Repair book—Tells everything—Send 25c—Parts catalog free. A. H. Harwell Cycle Works, Dept. 104-M, 6267 Gravois, St. Louis, Mo.

ANY Motorcycle purchased from Knuth's will give real service and satisfaction. Send 6c for bulletin. Complete stock. All models and low prices. Knuth's, 2491 W. Fond du Lac Ave., Milwaukee, Wis.

MOTORCYCLES—Direct to you at rock-bottom wholesale prices. Rebuilt, roadtested and guaranteed Indians, Harleys, etc. Send 10c today for "Bargain Bulletin 43." Crandall Hicks Co., 780 Commonwealth Avenue, Boston, Mass.

HENDERSON, Excelsior, Harley, Indian, used parts, alloy pistons, catalogue and wings pin 10c. Ballak, 100 N. 12th, St. Louis, Mo.

MOTORCYCLE Bargains, lowest prices, bargain sheet for stamp, motorcycle accessories, largest line in America, lowest prices. Largest motorcycle mail order house in the United States. Rochester Harley Davidson Corporation, 129 West Main St., Rochester, N. Y.

SEND 15c For illustrated used Motorcycle catalog. Large stock. Bargains. Indian parts. Accessories. Indian Motorcycle Sales, Kansas City, Mo.

FOR FORD OWNERS

FORD Repair book for V-8 and Model A. Answers 600 mechanical and electrical questions in non-technical language. Used in hundreds of Ford garages. 144 pages. Sold on money-back guarantee. \$1.00, postage prepaid. Trade Press Publishing Co., Montgomery Bldg., Milwaukee, Wis.

BATTERIES

WIND Driven propellers, for auto and 32 volt generators. Charge batteries. Details 10c. Propeller Man, Kindred, No. Dak.

BATTERY Rebuilding information 25c (coin). Gen. Batt. Serv., 78 Glenwood, Minneapolis, Minn.

BUILD New batteries from old, work at home. Daily cash demand. Thousands can be put into service. Send 25c for formula, instructions, mold catalog. Home Occupations, St. Paul, Minn.

EDISON Storage batteries for power and lighting systems. Replace your old lead batteries with the Edison. Built like a battleship. Non-acid. Non-corrosive. Exceptionally long life. Liberal guarantees. Free illustrated literature. See Jay Battery Company, 82 Sterling Avenue, Yonkers, N. Y.

AVIATION

MARATHON J-3 Motor like new. Five hours. Wheels. Tires. Landing gear. Tail assembly. Cheap Glider Motors, 1507 Scott St., Covington, Ky.

SEA And air navigation instruction, books, instruments, government maps and publications. Write for detail. Weems System of Navigation, Annapolis, Md.

UNTIPPED Propellers: ¼, ½, ¾ h.p. motors \$1.75; 40", \$4.00; 48", \$4.25; 51", \$4.50; 54", \$5.75; 59", \$6.75; 64", \$7.50. Harley air drive prints 50c. The J.B.S. Propeller, Lititz, Pa.

NEW Aeroplanes, \$98.00. Quality propellers, \$3.98. Photos, leather bound flying manual, 25c. Hibbs, Ft. Worth, Texas.

USED Airplanes and gliders. \$30 up. Literature 10c. Continental Sales, Box 344U, Indianapolis, Ind.

GENUINE Navy aviators leather helmets, Nutria furlined \$2.95. Aviators flying suits \$15.00 up. Air Transport, Garden City, N. Y.

HUNDREDS Of airplanes. Repairable crackups, \$30 up. Directory 20c. Used Aircraft Directory, Athens, Ohio.

GET Into aviation. Air transport pilots get up to \$7,000 per year; mechanics, \$2,500. Learn at this government approved school. Write for complete information. State age. Lincoln Flying School, 2004 Aircraft Building, Lincoln, Nebr.

MODEL AIRPLANES

BIG Package of model airplane samples. Send dime for packing and postage. Aero Shop, 3050 Hurlbut Ave., Detroit, Mich.

BOATS, OUTBOARD MOTORS, ETC.

OUTBOARD Motors. Reconditioned. All sizes. Johnsons and others. \$30.00 and up. Murray Boat Shop, Traverse City, Mich.

16 FOOT Kayak complete plans November Rudder 35c. Free boatbuilding catalog. Rudder Publishing Company, 15 Murray Street, New York City.

CARTOONING

LEARN Cartooning. Send dollar now for complete picture chart course. Carroll Studios, Box 75, St. Johns Pla. Sta., Brooklyn, New York.

LEARN Cartooning:—30 lessons, 500 illustrations, with drawing pens and pencils. Postpaid complete \$1.00. Scovell Studios, Box 610, Hollywood, Calif.

FREE Cartooning course. For particulars—Miller Cartooning School, 1218 Maple Street, Vancouver, Canada.

CARTOONISTS—20c Brings list cartoon markets, syndicates, etc. Smiths Service, PC, Wenatchee, Wash.

FOR BOYS AND GIRLS

THE Mysterious Geggaw. Fascinating new toy. For young and old. Deceives the human eye. Baffling. Entertaining. With instructions 25c coin. Geggaw Co., 309 Cleveland St., Nashville, Tenn.

EARN Christmas money—Order 50 sets Christmas seals. Sell 10c each. When sold return \$3.00, keeping \$2.00. StNicholas Seal Co., Dent. 43PMD, Brooklyn, New York.

PICTURES AND POSTCARDS

FIFTY Christmas cards and envelopes, your name imprinted \$1.00. Three dandy samples 10c. Personality Company, Hutchinson, Kans.

BOOKS AND PERIODICALS

THOUSANDS Of old magazines. List 10c. Seeley, Box 747, Jennings, La.

GAMES, ENTERTAINMENTS AND PLAYS

KIPPY-HOME Golf course. Ideal Christmas gift for young or old. \$1.95 post paid. S. & B. Sales Co., Newton, Iowa.

PLAYS, Operettas, musical comedies, complete minstrel first-parts with song programs, blackface skits, vaudeville acts, monologs, dialogues, recitations, juvenile plays and songs, musical readings, entertainments, make-up goods. Catalog free. T. S. Denison & Co., 623 So. Wabash, Dept. 11, Chicago.

MAGIC TRICKS AND JOKER NOVELTIES

250 TRICKS In magic 10c. Reeder, 104 So. 4th St., Clinton, Iowa.

TRICK Catalogue, illustrated, 10c. Oaks Magical, Dept. 548, Oshkosh, Wis.

GREAT Fun! Magic writing water 10c. Safe-Chem, New Haven, Conn.

FREE Magic catalog! South's largest line. Amaze—mystify your friends. Be popular. Earn money. Lyle Douglas, Station A-5, Dallas, Tex.

DOLLAR Trick—25c. King, 1130 No. Karlov Ave., Chicago.

CURIOUS, Occult books, magic, novelties. Catalog 10c. Marrelle, 159N State, Chicago.

MAGIC Catalogue 20c. Lynn, 105 Beach, Dept. 3, Jersey City, N. J.

LARGE Professional magic catalogue, 25c. Holden, 220 W. 42nd St., New York.

CHALK TALKS

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

RADIO SETS AND SUPPLIES

WONDERFUL 6 Volt battery midget radio—requires no B battery—\$19.95. Solter Radio Shop, 103 N. 7th St., Minneapolis, Minnesota.

MICROPHONE For broadcasting over any radio, \$1. Faas Research Laboratory, South Orange, N. J.

RADIO Experimenters and set builders. Parts and kits of parts for the auto radio. Little Giant and portable battery sets described by Popular Mechanics. Lund Mfg. Co., Dept. CO, 1730 Foster Ave., Chicago.

FOREIGN Reception guaranteed! Sensational radios, wholesale price. Bart, Knoxville, Tenn.

NEW Farm and all-wave radios. World's cheapest. No-cost sample. J-20th Century Co., Kansas City, Mo.

"POCKET Radio," \$2.15 C.O.D. Order immediately. Particulars free. Neil Tasker, Shamokin, Penna.

RADIO INSTRUCTION

RADIO Engineering, operating, broadcasting courses, also railroad telegraphy and station work. Federal Radio Institute, 424 E. Kilbourn, Milwaukee.

RADIO Engineering, broadcasting, aviation and police radio, servicing, marine and Morse telegraphy taught thoroughly. All expenses low. Catalog free. Dodge's Institute, Ames St., Valparaiso, Ind.

TRADE AND TECHNICAL SCHOOLS

LEARN Watch repairing. You can learn this profitable trade at our residence school or by correspondence in a few months in your own home. Ask for free book A-12 which explains our system and terms. Deselms Watch School, 37 South Wabash Avenue, Chicago, Ill.

NOVELTIES, CURIOS, ETC.

INDIAN Relics, old guns, minerals, coins, list ten cents. N. Carter, Elkhorn, Wis.

AMAZING! Unbelievable! Most unusual novelty made. 13c postpaid. (Dime, stamp.) Daufeldt Service, Atalissa, Iowa.

MAKE Big money molding novelties. Details free. Sample mold 25c. Write today. Stewart's Studio, Q-2102 W. 10th, Chicago.

TOYS AND NOVELTIES

LIONEL Trains, accessories 20% off regular price. Catalogue 10c. Mogull Bros., 1944-J Boston Road, New York City.

STAMP COLLECTING

THE Prettiest foreign stamp portraying George Washington is the famous Polish number 267. We will send this beauty together with the complete set of the picturesque Japanese commemorative issue of 1926, the complete set of the Italian issue of 1908, (5 values), United States \$2.00 and \$5.00 stamps as well as our famous booklet "Building Successful Collections," all for 10c to approval applicants. Globus Stamp Company, 268 - 4th Ave., Dept. 50, New York, N. Y.

SPECIAL Offer: 665 all different guaranteed genuine stamps including: Beautiful collection of Italian commemoratives of 17 different issues. Indo China. Spain attractive commemoratives and airmails, Mauritania, Abyssinia, Victoria, Nicaragua, Oceania, scarce Turkey, Sudan, Georgia, South Africa, Tehad, Salvador, Inini, Russia commemoratives, Dahomey, Persia, Egypt, Guadeloupe, etc. The entire lot of over \$15 catalogue value for only \$1 to approval applicants. Frasek, Incorporated, Lucerne 3, Switzerland.

THE World in a packet—105 different stamps from 105 different countries, including Abyssinia, Afghanistan, Brunei, Falkland, Zanzibar, and others from Africa, Asia, South America, West Indies, etc. Our pamphlet which tells "How to Make a Stamp Collection Properly," together with our large bargain list of albums, packets, sets, etc., all for only 20c. Queen City Stamp Co., Room 38, 604 Race St., Cincinnati, Ohio.

SCARCE Airmail and triangle. Beautiful Uruguay "flying horse" airmail and scarce Guatemala triangle (smallest in the world) are included in our big packet of 60 different stamps from Alouites, Grand, Liban, Venezuela, British and French Colonies, etc. All for 5c to approval applicants. Big illustrated lists free with each order. Write today! Mystic Stamp Co., (Dept. 80), Camden, New York.

FREE! U. S. 30c, 50c, \$1.00 postage dues (cataloging 45c), and 40 other beauties, for 3c postage! New Byrd stamp, for mail going to South Pole, 3c. Block four, 15c. Watermark detector, 2c. 15 different Confederate prints, 10c! United States price-list, free! Approvals with each order. Tatham Stampco, (D125), West Springfield, Mass.

THE Queerest stamps. Our special packet includes world's largest airmail stamp; smallest stamp ever issued; scarce triangle from Bolivia; Japanese "earthquake" stamp; Newfoundland map; weird Afghanistan, Manchuko—and many others. (No Europe.) Price only 10 cents to approval applicants. R. M. Stamp Co., Box 112, Port Chester, New York.

SCARCE Hawaii!!! Bolivia triangle! Packet of unusual stamps containing old Hawaii, scarce Bolivia triangle, famous money stamp (printed on cardboard and also used as currency!); airmails from Mexico and Paraguay; map, ship, animal, commemorative, etc. No Europe. Only 10c to approval applicants. De Soto Stamp & Coin Co., 105 N. Clark St., Chicago, Ill.

PENNY Approvals, that satisfy. Neil Gronberg, Box 5441-P, Philadelphia, Pa.

BASUTOLAND No. 1 new stamp. New country. Free to new friends. We want to tell you about our three kinds of approvals. (450 10c items listed.) Amity Stamp Service, Amityville, N. Y.

URUGUAY, 15 Different, 3c with attractive approvals. Garelon, Calais, Maine.

FREE Set to approval applicants. Bill Stadler, Vineland, N. J.

FREE—2 Complete special delivery sets. To approval applicants. 3c postage. Ferebank, Milwaukee, Wis.

ASCENSION, Papua, Jamaica, Newfoundland pictorial-commemoratives, all only 10c with foreign approval application. Swalley's Service, 1119A Trenton, Los Angeles, Calif.

WANTED Old American stamps. Illustrated list 10c. Stokes, Toronto (2).

FREE! Two choice, rare sets, with order for our famous "Four Star" packet, containing 60 selected, scarce stamps including:—Inini, Andora, Epirus, Patiala, Latakia. Liberal value. Exceptional opportunity. 12c to approval applicants. Kessel's Stamp Shop, Endicott Arcade, St. Paul, Minn.

ATTRACTIVE Set 5c to approval applicants. Rocarek, 1705 Hamilton St., Cedar Rapids, Iowa.

SHANGHAI, North Borneo, etc., 10c with approvals. Western Stamps, 121 W. Second St., Los Angeles, Calif.

SCARCE Paraguay Graf Zeppelin airmail triangle, pocket album, watermark detector, packet stamps from Africa, Asia, Canada, South America, etc., 6c to approval applicants. Glendale Stamp Company, 1342P Linden, Glendale, California.

WORLD'S Prettiest stamps on approval. Premium, Palmer, Box 513P, Jackson, Miss.

YOU'VE Tried the rest now get the best! We have answered all advertisements, compared premiums, approvals, etc., and absolutely proven that our are superior. Send 10c for "Challenge Offer" with approvals. Bargain Stamp Service, 1332 South Hope, Los Angeles, Calif.

MAMMOTH Mystery packet of rare stamps for only 10c to serious approval applicants, also valuable free premiums with every selection afterwards. Our stamps are better and our service is different. Fair-Play Stamp Service, 1215 Browning Blvd., Los Angeles, California.

TRIANGLES—25 Different \$1.00. Echo Stampco, PM-3279 Dundas, Los Angeles, California.

WORLDWIDE Club, South Whitley, Ind. Stamps, coins, "Universal" language. Lists 10c.

BEAUTIFUL Set of North Borneo, package of hinges, perforation gauge, bargain price lists, all for 10c, with approvals. Ideal Stamp Service, 418 Maunee, Toledo, Ohio.

NEWFOUNDLAND Set to foreign approval applicants enclosing .06. Orriss, 309A Kerrigan Av., Union City, N. J.

AGAIN! Two sets French colonies free to approval applicants. Variety and prices unbeatable. 3c postage. Kunler, Cherry, Lancaster, Ohio.

100 STAMPS For a dime and my approvals. Chas. Rinkevitch, 27 Hancock St., Boston, Mass.

20 LICHTENSTEIN .60c To approval applicants. Sodak Stamps, Sioux Falls, S. D.

SAMPLE 25c Key check for dime. Wenkhaus, Beaver Falls, Pa.

AIRMAIL, Triangle, ship, map, and pictorial stamps including islands, small countries—big packet—only 5c to approval applicants. Floral City Stamp Co., Dept. 333, Springfield, Ohio.

125 DIFFERENT (25 Countries)—10c, 250 different—25c. Write for penny approvals. Fine premium with first remittance. Sargent Stamp Shop, 40 Monroe, Grand Rapids, Mich.

BEST Penny approvals including Sudan, Congo, Nyassa, etc. Also 15,000 averaging 1 1/2c. Philatelic Exchange, Asbury Park, New Jersey.

URUGUAY: 25 Different stamps from this interesting country, bargain at 10 cents to approval applicants. Ancher Stampco, Rutherford, N. J.

20 DIFFERENT Argentine 10c. Fred Onken, 630 79th St., Brooklyn, N. Y.

APPROVAL Applicants—Twenty mint Russian (catalogued 83c) and Byrd Imperforate only 5c. A&L Stamp Company, 3905 Norfolk Ave., Baltimore, Md.

100 JAMAICA—Algiers—Great Britain included, also old U. S. to diff. approval applicants for 5c. The Ideal Stamp House, Nazareth, Penna.

MYSTERIOUS Jungle packet from Abyssinia, Azerbaijan, Congo, Tanganyika, Zanzibar, scarce triangle included. 5c. Rosenberg, 3544 West 12th Place, Chicago.

EXCHANGE Your duplicates! New method. Write for details. 1710H North Vermont, Hollywood, Calif.

U. S.—55 Different (commemorative, airmail, etc.) with approvals 9c. Moseley, 4932 Forestpark, St. Louis, Mo.

FASCINATING Bargains! 1c and 2c approvals. Catalogue diargarded. Goldenrod Company, Harrisburg, Illinois.

FREE—Beautiful Spanish Guiana set to applicants for approvals at 60% discount. Charles Cleveland, 806 North Humphrey Avenue, Oak Park, Ill.

FREE! Costa Rica triangle, scarce Turkey octagon, packet gorgeous ship stamps, complete airmail set, watermark detector, interesting lists and coupons! Postage 3c. Approvals included. Midwood Stampco, Midwood Station, Brooklyn, N. Y.

BARGAIN Set, U. S. catalogue and approvals ten cents. Rolando, Parsons, Kans.

FROM Old album pages. Sound quality on approval at third catalogue. Taylor, 6122 Woodlawn, Chicago.

UNITED States mission 50c lb. Canada 75c. 50 Belgium, 25 Canada, 50 France, 15 Peru, 10c each. Misaion Co., 4512 North Racine, Chicago.

AIRMAILS—From Brazil, Chile, Colombia, Ecuador, Mexico—all for 10c with double premium penny approvals. Progress Stamp Service, Franklin Park, Ill.

1,000,000 UNITED States stamps in unopened bundles of 100. Choice of 2c 1894-95; 1c and 2c 1908-10 and 1c and 2c 1912-19 issues at \$1.00 per thousand. Minimum order \$1.00. James Randall, 431 South Dearborn, Chicago.

TWO U. S. \$5.00 stamps—10c! No. 320—35c. Vanvoorhis, Hyndman, Pa.

5 LB. U. S. mixture, \$1.00. 10 lb. \$1.85. Postage extra. Continental Stampco, LaGrange, Ill.

TRIANGLE Stamps, 7 different 10c with approvals. Fort Dearborn Stampco, 5439 Aberdeen, Chicago.

FREE, With approvals. Big packet including airmails, triangle. Postage 3c. Macy Stampco, 8114 Maryland, Chicago.

FREE!!! Russia Ethnographic set or three Spain airmails. Postage 3c. Roberts, 901 F Fourth, Baycity, Mich.

WHOLESALE Monthly. Sample copy sent free. Empirestamp, Dept. MP, Toronto, Canada.

1000 U. S. including commemoratives 20c. Lloyd Johnson, Hawarden, Iowa.

UNITED States! Reasonable to serious collectors! Box 114, Minneapolis, Minn.

FREE!!! Oriental packet and pocket album, 5c with approvals. Hollystampco, 1710 North Vermont, Hollywood, Calif.

WORLD'S Most beautiful stamp, tiny triangle, 10c others, 5c with approvals. Ransom, 1333 Pontiac, Ann Arbor, Mich.

ZANZIBAR—Also Sudan, Somaliland, Tigerstamps, Togoland, Caribbean, Archer, Algerian, Centralamericans, Britishcolonials. This magnificent collection free for 5c postage. Graystampshop, Dept. PM, Toronto, Canada.

100 STAMPS, well mixed, 25c coin. E. Arnold, Box 61, Forked River, N. J.

SUPERB Approvals net prices. Stamps 1/2 to 1/4 catalogue. P. G. Beals, 170 A Tremont St., Boston, Mass.

FOUR Confederate prints—packet unused, 10c. Approvals. Buckeye, 35 West Fifth, Dayton, Ohio.

FOREIGN Or United States mixture \$1.00 per pound (about 4000). Sample 1/4—25c. Approvals sent. Elmer's, 192A Washington St., Boston.

HAWAII, 3 Different, 10c. Approvals. Cameron Stamp Co., 819 Park, Portland, Oregon.

25 CANADA including \$20 different 15c to approval applicants. C. A. Leeson, 674 Yonge St., Toronto, Canada.

SCARCE Indo-China and Paraguay airmails; pocket album, hinges, watermark detector, and big packet stamps, only 5c to approval applicants. Penny Stampco, 633P Maryland, Glendale, Calif.

BUILD Worthwhile stamp collection of rare items, without expense to you. Write for agent's plan. We give large commissions in cash or stamps. Crest Stamp Company, 2194 Lombard St., San Francisco, Calif.

25 BRITISH Colonials 3c with approvals (1/4c). Lejar, 902 1/2 South San Pedro, Los Angeles, Calif.

50 DIFFERENT British colonial stamps 5c to approval applicants. H. Wilcox, Box 142, Torrington, Conn.

MIGHTY Bargain! Includes Triangles, Nyasaland, Bechuanaland, set scarce Plume, and many other dandies. Everything 10c to approval applicants. Clarke, Box 181, New Haven, Conn.

GIVEN, 3 Rare triangles, and package 200 different for only 10c to approval applicants. Harris, Box 21F, So. Hanover, Mass.

105 DIFFERENT, Congo, Hyderabad, Guinea, etc., 3c to approval applicants. Extra—Airmail set free with above. Huenziker, Box 225, Minneapolis, Minn.

20 DIFFERENT Commemoratives, 12 different countries, 10c to approval applicants. Beverly Stamp Company, Box 866, Beverly Hills, Calif.

200 DIFFERENT including 50 different British with Fiji, Cyprus, Canadian commemoratives 10c, approvals included. Mantle Stamp Company, London, Canada.

GUATEMALA 15 Different 5c with approvals. Ephraim Stampco, River Forest, Ill.

CENTRAL And South America packets. To approval applicants only. 50 vars. 15c; 100 vars. 40c; 200 vars. 85c. G. E. Mitchell, Box 743, San Antonio, Texas.

SCARCE Iceland airmail triangle and fine packet of 65 different stamps including Senegal, Jamaica, Guinea, South Africa, Oceania, Nigeria, savages, maps, and animal stamps. Only 5c to approval applicants. Potomac Stamp Co., Dept. 112, Washington, D. C.

STAMPS: 100 Different catalogue over \$2.00 with catalogue 10c. Norman Shultz, Salt Lake, Utah.

1,000 ASSORTED U. S., 25c; 100 commemoratives, 25c; 125 revenues, 25c; 150 precancels, 25c. Jewett, 1204 West Onondaga, Syracuse, N. Y.

LINDBERGH Cover 25c! U. S. bargain approvals! Box 95, Minneapolis, Minn.

PENNY Approvals—10,000 varieties. Baker, Box 56, Ventura, Calif.

110 DIFFERENT Stamps free to approval buyers. Postage 3 cents. Badger Stampco, Milwaukee, Wis.

MALDIVÉ Islands, Brunei, Charkhari, Turks Caicos Islands, \$5 U. S., genuine Baden, and Imperforate Byrd. Absolutely free to approval applicants enclosing 3c postage! Viking Stamp Co., 1 Hanson Place, Brooklyn, N. Y.

WHOLESALE Catalog for dealers. Illustrated. Postage 5c. Frank Company, 4900 Chalcroft, Baltimore, Md.

FREE \$1.00 U. S. stamp with request for 48 page illustrated price-list of U. S. and foreign stamps. Also fine stamps on approval. Reference necessary. New Hussman Stamp Co., 1122 Pine St., St. Louis, Mo.

ONE Pound fine mixed stamps! 50c. Rettig, 105 East 102nd St., New York.

10c EACH, 4 Antigua, 7 Barbados, 30 Canada, 3 Dominica, 5 Grenada, 13 Jamaica, 5 Leeward, 10 Kenya, 4 Montserrat, 15 Newfoundland, 10 Trinidad, 15 Egypt. All 12 \$1.00. Westminster Stampco, 5060, London, Canada.

1000 DIFFERENT 95c—500, 45c; also packets, sets and singles. Price lists free. John Graf, 1874 Loring Place, New York.

40 VENEZUELA, Chile, etc., 5c. Approvals. Maxwellton Stampco, Piedmont, Calif.

ALBUM Free—Spaces for 4000 stamps, 2000 illustrations. Free to buyers of my approval. F. Stern, 24-54 Chauncey St., L. I. City, N. Y.

EARN Cash, stamps. Sell my approval books. Ellison, 2841 West 37th Street, Brooklyn, N. Y.

WEIRD Flying Garuda with 100 different 5c. Approvals. Burke, Marshfield, Vt.

50 OLD Stamps 1c. Album 3c. Bullard, 446 Tremont, Boston.

SENSATION Packet: Coreas, Liberia, triangles, British Colonials 10c. Steele, Springdale, Pa.

ILLUSTRATED Album holding 4000 stamps to approval applicants 20c. Swan Stamps, 605 Swan, Dunkirk, New York.

STAMPS Wanted; for sale; to exchange. Write. C. Ritchie, Watertown, South Dakota, U. S. A.

200 DIFFERENT 10c. Big 60% approvals. Covert Stamp, 39 State, Rochester, N. Y.

FREE! 30 Different Angola, Cape Verde, Guinea, Portugal, Mozambique, St. Thomas. Send return postage. Depraw, Ocean Park, California.

AMAZING Value—35 different U. S.: 1861, commemoratives, air-mail, etc., 10c to approval applicants. Stamp Shop, 809 Holland Bldg., St. Louis, Mo.

THIS Ad worth 25c. If you send for our approvals and buy 50c worth or more—large selection of U. S. and foreign—reasonable prices. Morton Stamp Co., 1121 Olive, St. Louis, Mo.

COMMEMORATIVES—10 Different and 30 other Canadian only 15c. World special—500 different 30c; 1000 diff. 85c; 2000 diff. \$2.50. Approvals with each order. Victoria Stamp Company, London 4, Canada.

FREE!—To approval applicants. Five beautiful airmails from five different countries. Green & Co., Norwood, Ohio.

SCARCE Zeppelin and triangle. Famous Russia Zeppelin stamp and beautiful Lithuania airmail triangle; also big packet of 53 different stamps including Azerbaijan, Epirus, new Martinique, etc., and illustrated lists—all for 5c to approval applicants! World-Wide Stamp Co., Box 600, Camden, New York.

STAMPS Sent on approval. 50% discount. Fred Herzberg, 197 Grantley Ave., Elmhurst, Illinois.

200 DIFFERENT Stamps, triangle, airmail, etc., 10c. R. H. Carlton, 209 W. Fourth, Los Angeles, Calif.

BYRD Commemorative and 34 different U. S. including early issues, high values, commemoratives, airmail, envelopes, special delivery, postage due and revenues cataloging over 85c. All for 7c to approval applicants. Illustrated pricelist free. Curhan Stamp Co., Dept. P, Gloucester, Mass.

NEWFOUNDLAND, 15 Different 5c with approvals. Hudson Co., Plainfield, N. J.

U. S. \$2 Wine 8c with approvals. Arrow Stamps, Plainfield, N. J.

ILLUSTRATED U. S. list, price 50c, large complete U. S. price list free. Stanley Gibbons, 38P Park Row, N. Y.

FREE Dollar packet to one cent approval applicants. Harlan, 5307 S. Marshfield Ave., Chicago, Illinois.

RARE COINS

FREE!—Foreign coin, banknote, and large illustrated coin catalogue,—4c postage. Souvenir California gold quarter size 26c; 3/4 size 53c; both 65c! Round or octagon, set of each \$1.30! Approvals with each order. Tatham Coinco, West Springfield, Mass.

COIN Book, over 800 illustrations, 100 pages. Biggest and best book for price, \$1. Money refunded if unsatisfactory. 100 foreign copper and nickel coins \$1 plus postage. Dealers write for prices on rare coin book. Guttag Bros., 42 Stone Street, New York.

ANCIENT Roman coin with list of all the Emperors and catalog 10c. Geo. Best, Cedar Rapids, Iowa.

WANTED—1931 Cents, many others. List—dime. Michael Smith, Coins, Ambridge, Pennsylvania.

TOP Prices paid for Indian head pennies. Send dime for catalog of coins wanted. The Coinmart, B-1525 East 53rd, Chicago.

12 DIFFERENT Coins 25c; 50 coins \$1.00. Brooks, 624 Cameron, Dallas.

20 ASSORTED Coins 25c, 100 coins \$1.00. Otto Odlehon, Williamstown, Kans.

WE Purchase all Indianhead pennies. Pricelists 10c. Brownlee, 218 Henry, New York.

\$1.00 WILL Buy: U. S. half cent, large cent, Flying Eagle cent, Civil War cent, copper cent, 2c piece, 3c piece, half dime, and 5 different foreign coins. All these for only \$1.00. Lenz, 50 Station L, New York City.

\$5.00 TO \$500.00 Each paid for old coins. Keep all old money. Send 10 cents for illustrated coin value book, 4x6. Guaranteed prices. Buying and selling. Coin Exchange, Box 5, Le Roy, N. Y.

HIGHEST Prices paid for Indian head pennies. Send dime for list of those wanted. Coin Shoppe, Box 407-PM, Ottawa, Ill.

CALIFORNIA Gold quarter size 27c; 3/4 size, 53c; 3c piece and catalogue, 10c. Norman Shultz, Salt Lake, Utah.

UNITED States white cent and bargain selling price list 10c. Arcey, Box 483, Muskogee, Okla.

WE Buy 1907 Indian head cents. Full information one dime (coin). New Miss Mattick Co., Box 3450, Altoona, Pa.

11 DIFFERENT Coins, 3 bills and catalog, 25c. Creamer's, 1112 Somerset, Baltimore, Md.

UNITED States, Large cent, two-cent bronze, three-cent nickel and bargain list, 25c. Thirteen dates large cents, \$1.00. George P. Coffin, Augusta, Maine.

UP TO \$50.00 paid for Indian head cents, half cents \$250.00; large cents \$2,000.00, etc. Send dime for list. Romancoinshop, Dept. 299, Springfield, Mass.

TO \$8 For Lincoln heads; to \$78 for Indian head pennies. All dates wanted. Catalog 10c. Penny Shop, Dept. 90, Cedar Falls, Iowa.

OLD Money wanted. Will pay \$100.00 for 1894 dime, S. mint; \$50.00 for 1913 Liberty head nickel (not buffalo). I pay big premiums for rare coins. Send 4c for large coin folder. May mean much profit to you. B. Max Mehl, H Mehl Bldg., Fort Worth, Tex.

CAMERAS AND PHOTO FINISHING

\$3 UP For amateur photos! Magazines buy seven million yearly. Demand increasing. 'Fullers Foto Folio'—complete instruction, 125 best markets—50c (coin). Fuller, Box 1144, Kalamazoo, Mich.

MAKE Money in photography. Learn quickly at home. Spare or full time. New plan. Nothing like it. Experience unnecessary. American School of Photography, Dept. 3436, 3601 Michigan Avenue, Chicago.

TWELVE Photographic Christmas cards, envelopes, \$1.00. Name imprinted, mail negatives. Rose-Art-Company, Peoria, Ill.

PHOTOGRAPHIC Kit. Contains camera, film, developing and fixing chemicals, printing materials, complete instructions for developing your own pictures. \$1. Artprint, 307 East Evergreen, San Antonio, Texas.

EARN Money! Color photographs. Complete outfit 35c. Brownlee, 218 Henry, New York.

ROLLS Developed—Eight guaranteed Nu-border prints. Two Nu-giant enlargements, 25c coin. Giant Snapshots, Inc., Dept. A, Green Bay, Wis.

GUN Cameras. Aerial machine gun practice. Excellent condition. Reasonable price. Philip E. Myers, 3709 Albatross Street, San Diego, Calif.

FREE—Bargain book—“Central’s Holiday Specials” listing everything photographic and a complete line of microscopes, telescopes, binoculars and weather instruments at lowest prices. Excellent gift items. Write now for free copy to Central Camera Co., Dept. PM-12H, 230 S. Wabash Avenue, Chicago, Illinois.

PRINT Snapshots on handkerchiefs, notepaper, etc., sensitized with photoprint fluid. Dark room unnecessary. Washable, permanent, guaranteed. Send \$1.00 for fluid to print 200 pictures. Park Specialty, 219 Park Place, Hoboken, N. Y.

25 BEAUTIFUL Embossed Christmas cards from your favorite Kodak negative. With envelopes to match only \$1. Films developed 16 prints finished 25c. Summers Studio, Unionville, Mo.

HAND Colored enlargement with each roll 25c. 40 reprints 50c. Colorgraph—S, Dunning Station, Chicago.

COLORED Enlargement with each film developed—a professional enlargement painted in oils and eight Gloss-tone prints, deluxe finish, guaranteed not to fade, 25c. Super quality—Speedy service—Satisfaction or money refunded. LaCrosse Film Company, Dept. 19, LaCrosse, Wis.

ROLLS Developed. Two beautiful double-weight professional enlargements and 8 guaranteed Never Fade Perfect Tone prints. 25c coin. Rays Photo Service, LaCrosse, Wisconsin.

TRIAL Offer. Roll developed and 8 prints 25c. Prints 3c each. Beautiful 10-inch enlargement 25c. Photo Christmas cards or photo calendars 10c each, 14 for \$1.00. Young Photo Service, 405 Bertha St., Albany, N. Y.

16 BEAUTIFUL Gloss prints and two enlargement coupons only 25c. Imperial Film Service, Unionville, Mo.

KODAK Pictures enlarged, 5x7 10c, 3 for 25c. Send negative film. Stanley Studio, Des Moines, Iowa.

20 REPRINTS 25c. Films developed, two prints each negative, 25c. Skrudland, 4118-8 Overhill, Chicago.

FILMS Developed 5c per roll; prints 3c each. Ask for special bargain list. Roanoke Photo Finishing Company, 161 Bell Ave., Roanoke, Va.

YOUR Favorite kodak pictures enlarged, size 5x7, 10c. Three for quarter, coin. Send best negatives (film) today. Address Darmer Photo Lab., Enlarging Dept. 9, Des Moines, Iowa.

INCOME From your camera instead of expense. Low cost home course teaches you to make photographs for magazines, newspapers, advertisers. Tremendous demand. Earn good money wherever you live. Free book. Universal Photographers, Dept. 104, 10 West 33rd St., New York.

ROLLS, Developed, printed, 25c. Mail your films to the biggest and best. Rolls developed and 8 good prints guaranteed plus 8x10 inch enlargement coupon only 25c. Reprints any size 3c each. Geppert Studios, Dept. 130, Des Moines, Iowa.

TWO Crystal stiple enlargements with each roll 25c. Photoshop, 4112-8 Oriole, Chicago.

HAVE You a camera? Send ten cents for recent number of our big magazine, showing how to make better pictures and earn money. American Photography, 116 Camera House, Boston, 17, Mass.

MOTION PICTURES AND SOUND EQUIPMENT

AGAIN We lead! Pathex movie camera and projector \$9.79. New model D-62 motor driven 16mm, 400 ft. projector, rheostat controlled \$19.50. Eastman 8mm camera \$22.50. Stewart Warner Buddy \$19.50. Ampro projector, 400 watt and case \$99.50. 16mm 100 ft. comedies, travel, cartoons 2 for \$4.50. Tripod \$1.49. Electric 16 and 8mm editor \$6.69. Steriscopic Zeiss camera, case, 16 plate holders, double set lens with viewer \$65.00. Graflex cameras f. 4.5 assorted sizes \$45.00. Stewart Warner 8mm tittler \$3.69, 16mm \$3.75. Victor Soundice projector and amplifier complete in every detail, regularly sells for \$500.00, special new \$87.50. Sound-film Victor \$295.00. DeVry model “E” portable 35mm projector regularly sold for \$175.00, special \$45.00 complete. Catalogue and membership free. Library sound, silent, trades accepted. Mogull Bros., 1944-J Boston Road, New York City.

16MM FILM Features rented anywhere \$5.00. Art film 10c foot. Mickey Mouse 4c. Odd lengths 2c. 1000 feet 35mm \$1.00. Remington Pictures, Cincinnati.

NEW 100 Ft., 16mm. subjects, \$2.25, \$2.50, \$2.95. Projector bargains. Big rental library. Dime brings catalogue, two “end” titles. Eastin Films, Dept. 27, Galesburg, Illinois.

WORLD’S Greatest “Passion Play” 16 MM. (new) 5 reels. Rent or purchase. Write Hemenway Film Co., 37 Church Street, Boston, Mass.

DEVELOP And print your own movies. Instructions \$1.00. Millio, 620 Myrtle Ave., Brooklyn, N. Y.

EXCHANGE Library sound-on-film features, new, interesting; also 8mm and 16mm silent films of every variety. Harry Mendelwager, 182 W. 49 St., Bayonne, N. J.

1000 FEET 35mm 75c. Projectors, Features. Savarese, Woodcliff Lake, N. J.

35-MM FILMS, Projectors. Stamp for lists. Box No. 6, Rosedale, Kans.

SOUND Movies, ten feet 10c. Greystone Laboratories, Boston 78, Mass.

WESTERN Features \$4.00. Scenics \$2.00. 500 ft. 85c. Jersey Films, 2075 Richland, Lakewood, Ohio.

8MM FILMS—Mickey Mouse, travel, others. Fine for Christmas. List, two 1 1/2c stamps. Lincoln Film Service, Box 293, Saginaw, Mich.

LEARN The motion picture theatre business. Big opportunities for trained men. Catalog T free. Theatre Institute, Elmira, New York.

8mm AND 35mm Films rented, one cent per day. G. E. Durgin, 21 Otis Street, Somerville, Mass.

100 FEET 35mm 27c; odd reels 80c plus postage. 6 reel features \$6.00. Bargain lists 3c. Hoffman Film Service, 57 Broad, Albany, New York.

BARGAINS, Used theatre projectors, parts, soundheads, turntables, amplifiers, horns. Catalog mailed. S.O.S. Corp., 1600 Broadway, New York.

FREE New 16mm, 8mm bargain lists. Mickey Mouse projector outfits \$4.95. Films 35c up. Art sample 25c. Home Movies, Box 32, Easton, Penna.

BASS Offers for a limited time brand new 100 ft. Stewart-Warner 16mm Cine camera, complete with case, F:3.5 lens, worth \$50.00, at \$18.50 each. Hundreds of other bargains in Bass Bargaingram No. 212 mailed on request. Write to Value Headquarters. Bass Camera Company, 179 W. Madison St., Chicago, Ill.

BUSINESS OPPORTUNITIES

PLASTEX Industries offers industrious men an opportunity to start a business of their own, manufacturing art goods, novelties, souvenirs, etc., in Plastex and marble imitation. 5c material makes \$1 articles. Rubber moulds furnished for speed production. Small investment brings big returns. You are just in time for big Christmas business now starting. Write for interesting booklet mailed free. Plastex Industries, Dept. A, 1985 Washington Ave., New York.

WE Make synthetic rubber molds. Send your models for estimate. We duplicate perfectly. Priced less than one-fourth that of rubber molds. Equally good. If desired, make your own S.R.C. molds. We teach mold making and marblizing in all forms. Send dime for sample S.R.C. composition to test, miniature mold and cast, marblized samples. Literature on mold and imitation marble making. Cowell Institute, Grayling, Michigan.

EARN While learning—men—women—your own cleaning—pressing business. Easy home training. Free outfit offer. Write M-41, Business Ownership Institutes, 2400 Madison, Chicago.

ADVERTISED Products duplicated. Quality formulas. Trade secrets. All lines. List free. Karp, Ch. E., Albee Building, Brooklyn, N. Y.

REVOLUTIONARY Advertising system your opportunity. Fayette Adjustment Bureau, Connellsville, Pa.

TESTED Formulas 30c each. List free. Ogg Laboratories, Tampa, Fla.

BEAUTY Formulas—Ten for 50c. Clenco, Postal Box 17, Verdun, Que., Canada.

HOW To sell formulas. Complete mail-order plan 25c. Duffy, Covington, Ky.

INTERESTING Circulars on tested money making plans. Yours for a stamp. Hawkeye, Grundy Center, Iowa.

IRISH Moss with my formulas will build you a permanent paying business. Address Uncle Artie, 20 River View, Wareham, Mass.

DESIGN, Print your own Xmas cards, new process—cost 1c card. Biggest season starting. Complete outfits \$2.00 up. Stencilcraft, 7214 East End, Chicago.

MAKE Mirrors from old window glass. Complete instructions 25c (coin). Westcott, Clyde, N. Y.

100 PROFITABLE Mail order and local business ideas. Free literature. Blue Label, E7001 Ozark, Chicago.

CASH Income daily resilvering mirrors at home. Replating autoparts, tableware, etc. Portable outfit. Write Sprinkle, Plater, 127, Marion, Ind.

MAKE More money—Our 100-page book tells you how; 50 cents postpaid. Circulars free. Warren, Suite 1229, 15 Park Row, New York, N. Y.

LEARN Taxidermy. Five courses. Blue Beaver Taxidermy School, Lemont, Ill.

WIN Thousands cash. Send 10c list, legitimate contests. World Contest Magazine, 6823D - 17th N. E., Seattle.

10 TRUE-TESTED Toilet specialties formulas 25c. D. Federico, Synthetical Chemist, 52 Penn St., Providence, R. I.

SCREW-HOLDING Screw drivers! Not magnet! Remove, hold, insert screws inaccessible places. Factories, garages, electricians, mechanics, radio, autoists buy; no competition! Quick sales, big profits. Exclusive territories, also foreign. Toolco, 5065 Winthrop Bldg., Boston, Mass.

FIRMS That sell wholesale! Names, addresses, 10c. International Agency, Cincinnati.

\$5 TO \$50 Weekly. Grow fancy “White Queen” mushrooms in cellar or shed. Free mushroom book tells how. American Mushroom Industries, Ltd., Dept. 903, Toronto, Ontario.

DISTRIBUTORS — Supply revolutionary corn remedy to stores. New sales plan results in landslide of orders. Up to 150% profit. Write for exclusive franchise. Reliable Specialty Corp., Buffalo, N. Y.

A FORTUNE Awaits you! New formulas for establishing business at home in spare time. Particulars free. Hetzel, 802 Garden, Hartford, Conn.

ARTIFICIAL Marble making puts you in paying business all your own. Easy, pleasant, profitable work. Interesting particulars free. Marble Institute, 4612 North Hermitage, Chicago.

EARN Quick cash raising mushrooms in cellar, shed, attic. We buy crops. Guaranteed materials furnished. Easy, odorless method. Book free. United, 3848-CP Lincoln Ave., Chicago.

MAKE Big money molding novelties. Sample mold 25c. Write for details on free course in mold making. Stewart’s Studio, C-2102 West 19th, Chicago.

SIGNS And showcards easily painted with letter patterns. Large variety of styles and sizes. Write for free samples. John Rahn, A-2120 Neva, Chicago.

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

MAILING Secretaries wanted. Experience unnecessary. Pay weekly—part in advance. Contract—details, 3c stamp. Nagel Enterprises, 1329 Olive, Indianapolis, Ind.

STEADY Income from drained auto oil; Instructions, 20c. International Agency, Cincinnati.

BIG Profits silvering mirrors, patented process. Easily learned. Write Wear Mirror Works, Excelsior Springs, Mo.

START A mail order business. Plan 50c. Abatta, Box 45, North Bergen, N. J.

LEARN All about casting marble novelties in rubber moulds. Cement secrets. Illustrated catalog and beautiful samples 3c. (So. Calif. business reserved.) John A. Payn, 945 Grande Vista Avenue, Los Angeles, Calif.

SEE Our display advertisement on page 134A this issue. Rapaport Bros., 703 West Ohio, Chicago.

A BIG Income can be made by you at home in sparetime without personal selling or canvassing. Sample work, 10c. “Nu-Era” Distributing Service, 140-p Windemere, Detroit, Mich.

25c BRINGS Offers, profit opportunities from everywhere by mail all year! International Agency, Cincinnati.

ARTIFICIAL Marble formulas. 3 for 25c. Johnson, 4520-Christiana, Chicago.

FREE Books, mail order business. Stamp appreciated. Dolsen Herald, 36 Liberty Street, Brooklyn, New York.

BARGAINS—Paint spray outfit, gasoline engine drive. Terms—trial. Helmick Paint Spray Exchange, M-1243, Troy, Ohio.

GET Lots of mail 25c. Your name listed in 10,000 directories. Roseco, 4627 Glen-shade, Cincinnati.

MAIL Order industries—40 pages opportunities, plans, formulas, 10c coin. Amos Sullivan, Fairport, N. Y.

NEW. Big money makers. No frauds. Particulars 10c. Ralph Brooks, Arkansas, Wisconsin.

WE Buy names. Instructions 25c. Contract. Accounting Service, 9 Washington Ave., Minneapolis, Minn.

REAL Opportunity. Small advertisement starts bringing you quarters through the mail. Plan, formulas, 25c. JoanzArt, Box 911, Baltimore, Md.

MANUFACTURE For profit. Substantial income making today's biggest-selling popular necessities—all lines—from my world famous guaranteed formulas. Get my free "eye-opening" literature. Miller, Chemist, 1708 PMB, Tampa, Fla.

MAIL Order drug store. Let us supply your drug store wants. Information given; stamp appreciated. Mequon Drug Store, Thiensville, Wis.

"SCHEMER Magazine," Alliance, Ohio, prints schemes, ideas, business starters, formulas; winners—\$10,000 to \$50,000 reported. 36th year. \$1. Subscribe now. Six months special, only 30c.

PROFIT With new products. Make, sell, repeat. Guaranteed formulas. Special prices, leads. Biggest catalog free. Gibson, Chemist, BD-4702 North Racine, Chicago.

DIME Brings 500 money makers. Bruce, 1315 E. 63, Chicago.

HOME Manufacture—"Formula-ist," year, 10c. Surprise gift included. Beyler, Tipton, Indiana.

TWELVE New successful money-makers. J. Home, 3949 Metropolitan, Chicago.

LIQUID Marble—Anyone can make! Colorful, glazed! Molded, brushed, sprayed. Rubberlastic molds. Composition flooring. Big money making these! Particulars free. Marbleizing Service, Edwardsville, Ill.

FREE Circulars describing how you can make real, big money in mail order business at your home. Write today, Dept. 8, Mail Order Institute, 669 Marcy Avenue, Brooklyn, N. Y.

100 PROFITABLE Mail order and local business plans. A. Pruitt, Elburn, Ill.

SUCCEED With your products. Learn how. Formulas. Processes. Analytical service. Catalog free. B. Thaxly Co., Washington, D. C.

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

START Little business anywhere. Everything furnished. No canvassing. Maywood, PM 923 Broadway, New York.

SELL By mail. Books, novelties. Bargains! Big profits. Particulars free. B. Eifco, 525 S. Dearborn, Chicago.

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

FREE Booklet describes 87 plans for making \$20-\$100 weekly, in home or office, business of your own. Elite Co., 214 Grand St., New York.

ARTIFICIAL Marble sanitary flooring, instructions covering wood or cement flooring ½ inch thick, fireproof, all colors, low cost. Ornamental casting, concrete plaster papier-mache decorations, garden furniture, statuary, flexible molds, particulars and illustrations free. Chris. Mahler, Elmont, N. Y.

MAIL Order business is your opportunity. Many began small, now earn thousands yearly. No personal contact. Boundless opportunities. Have had over 30 years experience; will help you succeed. Send 25c for valuable booklets, none free. B. Breniser, 257 South 21st, Philadelphia.

FORMULAS AND TRADE SECRETS

TWENTY Latest money-making formulas! 20c brings all! International Agency, Cincinnati.

BE Independent—With our formulas. Manufacture your own products, cosmetics, veterinaries, etc. 1000% profit! Any subject, 50c, 3 for \$1.00. Carroll Studios, Box 75, St. Johns Pl. Sta., Brooklyn, New York.

FREE Formula literature, manufacture products yourself. Thomson, 7309 Pingree, Chicago.

NEWEST Guaranteed formulas. Biggest catalog free. Special prices, leads. Gibson, Chemist, BD-4702 North Racine, Chicago.

500 MONEY Making formulas 25c. Descriptive circulars free. Harvey Teeple, Decatur, Ind.

GUARANTEED Formulas, any purpose—\$1.00. Hollis Community Pharmacy, 197-19 Jamaica Ave., Hollis, New York City.

TESTED Formulas 30c each. List free. Ogg Laboratories, Tampa, Fla.

STOP Money worries. 10 new formulas, money getters. Send \$1.00. Martin and Martin, Chestnut Street, Rehoboth, Mass.

ANY Formula 2 dimes or money back. Westcott, Clyde, N. Y.

500 FORMULAS 25c; Moneymaking literature free. "Ideal," 178P, Parkridge, Ill.

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

ANY Formula 25c coin or refund guaranteed. John Bradley, 1020 Randolph, Detroit, Mich.

3,000 FORMULAS, Facts, processes, trade secrets in Dr. Brown's Book of Formulas—380 pages. Price, postpaid \$1.00. Ogilvie Publishing Co., 57 Rose Street, Dept. 25, New York.

FORMULAS, Plans, ideas. Literature free. Belfort, 4042 N. Keeler, Chicago.

SUCCEED With your product. Learn how. Formulas. Processes. Analytical Service. Catalog free. B. Thaxly Co., Washington, D. C.

FORMULAS, All kinds. Guaranteed. Catalog free. Kemico, 31, Parkridge, Ill.

TESTED Formulas—Newest, guaranteed! Catalog free. Grinstead Laboratory, Edwardsville, Ill.

CHEMISTRY

CHEMISTRY Outfits, Send 10c. Stamps accepted. Safe-Chem, New Haven, Conn.

FREE 16-Page chemical catalogue. Enclose stamp. Photochemicals, 100 Forsyth, New York.

FREE! Sciencecraft Magazine and other valuable literature. Send stamp. Sciencecraft, P 5049 Bernard, Chicago.

CHEMICALS, Laboratory glassware and apparatus. Catalog CP. Biological Supply Co., 1176 Mt. Hope Ave., Rochester, N. Y.

CHEMISTS' Slide rule, editorial Jan. issue, saves time solving equations, gives molecular weights, shows formulas, 391 compounds. Durable precision instrument. Postpaid, complete instructions, two dollars. MWC Company, 508 Andrus Bldg., Minneapolis, Minn.

SEND 10c For new catalog listing chemical, microscope and photographic kits and supplies. Special 30 day offer to those who send immediately. Winn Company, 124Y West 23 Street, New York.

AGENTS WANTED

BIG Money, quick sales to car owners, taxi and truck operators. Auto step mats for running board with individual or firm name or initials molded in rubber. Cost little, outlast the car. No competition. Splendid Christmas gift item. No experience or capital needed. References required. World's largest mat house. Jackson Co., 227 West 34th St., New York.

AGENTS—Make \$10 to \$16 daily commission selling outstanding auto accessory. Sells on sight. No large investment required. Write Karl, 332 Irving Ave., Dayton, Ohio.

100% PROFIT In the mystery cigar lighter. No flint or friction. What makes it light? No wind can blow it out. Retail 25c. Sample and sales plan 25c. New Method Company, Desk PM-24, New Method Bldg., Bradford, Pa.

BRAND New invention. Auto brush. Attaches to garden hose. Washes entire car, spokes and all. 100% profit. Exclusive territory to distributors. Sample \$1.50. Circular free. Beisser Auto Brush Co., 411 E. Fort, Detroit, Mich.

MIRACLE Inhaler for colds, asthma, headaches, sinus, head troubles. Quick easy seller, moneymaker. Homes, offices, stores, factories. Sample, details 25c. Holford Company, Minneapolis, Minn.

\$2.00 HOURLY With new, scientific cream that mends all cloth easily, quickly, invisibly, without needle and thread. Stands laundering. Free sample. Sew-No-More Co., Dept. D-744, Cincinnati, O.

BEST Sellers: Cigars, carded goods, novelties, necessities, incense, blades. Samples, catalog 10c. Easterncity Sales, 8-ES Randolph, Chicago.

RAINCOATS, Jackets: Latest numbers. Lowest prices. Union made. Selling fast. Commissions advanced. Experience unnecessary. Outfit free. Royal, M-724 Roosevelt, Chicago.

MARRIED Man with spare time to distribute free samples coffee, flavoring, food products and make customers. Must devote at least two hours daily and be satisfied with up to \$3 in an hour. Permanent. Blair, Dept. DFS 8, Lynchburg, Va.

GENUINE Mexican opals. Perfectly cut. Edomaco, Apartado 762, Mexico, City.

SALES Kit free. Write for our free offer and catalog of household deals, cosmetics, extracts, etc. Make big money selling your friends and neighbors. Clyde Collins Chemical Co., Dept. PM-11, Memphis, Tenn.

DISTRIBUTORS: Represent manufacturer. Sell Latex—self sealing bandage that breathes. Great demonstrator. Lowest prices. 400% profit. Good repeater. Exclusive territory. Neway, 24-H South Clinton, Chicago.

LIFETIME Opportunity. Surplus world's fair jewelry and novelties. Complete selections \$2.00. Sells \$10.00. Kahn Associates, Wrigley Bldg., Chicago.

OUTSTANDING Seller. Sobrite metal polishing cloth. Steady repeater. Sample free. Peer, 32 Union Square, New York.

SELL Stores sparkling Christmas signs. First day's sales will amaze you. Glitterite Sign Co., 120 Market St., St. Louis, Mo.

SELL Stores and friends multicolored copyrighted magic book, sample 25c. Jaffre, 254 West 31st, New York.

AGENTS—Make big money. Sell key tags. Send 25c coin for sample. Stephen Hollister, Cascade, Wis.

SELL Inhalers. Quick sales—Big profits. Write for proposition. Bernard's, Union Trust Bldg., Sioux Falls, So. Dak.

MEXICAN Feather pictures. Christmas novelty. Send 25c (stamps) for \$1.00 worth sample and details. Mexican Art, Apartado 1593, Mexico City.

\$2.00 HOURLY With amazing invention. Old shoes made like new in five minutes, 6c a pair; not a polish or dye. Free sample. Sav-An-Upper, Dept. D-227, Cincinnati, O.

1000 BEST Sellers, blades 65c hundred, needle books 25c dozen. Free wholesale catalogue. Paty Company, 5P Elston, Somerville, Mass.

MAKE Big money; commissions advanced; sell raincoats, zipper jackets, union made; latest style, quality; lowest prices, experience unnecessary; outfit free. Goodyear, A-712 Roosevelt, Chicago.

TERRITORY Available. Ringanvalve seal stops oil-pumping. Increases compression. One Dollar per tube. Grawall Company, No. Tonawanda, N. Y.

ANTIFREEZE Radiator compound. Great winter seller. Cheaper, better than alcohol. Whirlwind seller to garages. Particulars. Anti-Freeze Co., St. Paul, Minn.

"PREVENTS-RUNS" Prevents silk hose from running. 350% profit. Specialty Mfg., 127 South Broadway, Los Angeles, Calif.

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

AGENTS—Sell 5 glasses California orange jelly, 25c. 200% profit. 5 glass sample 25c. Cutter-Clarke, 5515-M Ruthelen, Los Angeles, Calif.

JUST What you're looking for—a business of your own handling the slickest line of quick-sellers you ever saw. Every one a winner. Take your pick or handle them all. Sell stores, homes, offices. Liberal commissions. By all means investigate. C. H. Hadlock, Dept. 1311, 1837 N. Ogden, Chicago.

SELLS Like hot cakes. Big profits. New laundry soapflakes. Perfumes clothes lastingly, when washing. Territory given. Sunset Laboratories, Lynbrook, N. Y.

AMAZING Corn remover. Big profits for distributors. Write Posco, 760 Milwaukee, Chicago.

MAKE Big money! Commissions advanced. Sell raincoats and zipper jackets. Latest style and quality. Lowest prices. Experience unnecessary. Outfit free. Goodyear, AJ-712 Roosevelt, Chicago.

CASH income daily resilvering mirrors at home. Replating autoparts, tableware, etc. Portable outfit. Write Sprinkle, Plater, 128, Marion, Ind.

STRANGE Ironing cord. Prevents scorching. Saves electricity. Abolishes kinks, snarls. Approved by Good Housekeeping. For telephones also. 140% profit. Samples furnished. Neverknot, Dept. 12-A, 4503 Ravenswood, Chicago.

300% PROFIT Selling new "20-in-1" kitchen utensil. Retail 25c. Costs you \$1.00 a dozen. Sample 10c. New Method Co., PMM-24, Bradford, Pa.

100 BLADES 50c. Shaving cream 4½c. List 200 items free. Mayo, Richmond, Va.

FOR The holidays—our Luminous Crucifix which "shines in the dark" is the most appropriate gift of all. An instant to demonstrate and the sale is made. Big profits. Hannan Co., 2539 South State, Chicago.

PORTRAIT Agents—Lowest prices, portraits, frames. Catalogue free. Picture Man Friedman, 528 Cornelia, Dept. 9, Chicago, Illinois.

SELL Wonderful trouser stretcher, creaser, hanger \$1.00. Agents 60c. Widness, 1461 Fulton St., Brooklyn, N. Y.

DOUBLE-EYED Self-threading needle packages, size 3/9. Blind people thread them. Invaluable for failing sight, necessary for good sight. Sample particulars 10c. Agents wanted. Wm. Oglesby, Vandalia, Ill.

AMAZINGLY Simple spare-time business. Big profits. No risk. Your home is your office. If you want to make real money, here's your chance. Full details free—write quick. Albert Mills, 4674 Monmouth, Cincinnati, O.

BEAUTIFUL Foil window sign letters. Penny each. Popular sizes. Easily applied. Samples, complete working equipment free. Note our ad page 148A. Atlas Sign Works, 7941 Halsted, Chicago.

TWENTY Dollars a day easily made with Quixon the magic wipe-on finish and permanent beauty treatment for automobiles and furniture. No rubbing, no polishing. Free sample and details. General Paint & Chemical Co., Cincinnati, Ohio.

FROST-OFF. Marvelous chemical cloth attachment to wiper, keeps windshield ice free. Sells 35c. Whirlwind seller to garages. Particulars free or enclose 25c for sample. Frost-Off Co., St. Paul, Minn.

AGENTS! We'll pay your bills, steady income for life handling our business in your locality. New territories being assigned for America's fastest selling line. Experience unnecessary. Repeats sure. Details free! Colby Laboratories, 201, Newton, Massachusetts.

PROFIT With new products. Make, sell, repeat. Guaranteed formulas. Special prices, leads. Biggest catalog free. Gibson, Chemist, BD-4702 North Racine, Chicago.

GENUINE Gold letters for store windows. Easily applied. Free samples. Liberal offer to general agents. Metallic Letter Co., 438-B North Clark, Chicago.

NEW Silver tinsel Christmas signs, 9"x12", cost 3/4c, retails 25c, sample free, clean up this Christmas! Lowy, 8 West Broadway, New York.

SENSATIONAL New 15c scissor sharpener proves amazing seller. Make 200%. Sample, details 10c. Dandee Company, 14 North Sixth Street, Minneapolis, Minn.

AGENTS: Smash go prices! Santos coffee 12c lb. 4-oz. vanilla 8 1/2c. \$1.00 size tonic 14c. Razor blades, 10 for 8 1/2c. 100 sticks chewing gum 12c. Christmas cards, 21 in box, 14c. 150 other bargains. Experience unnecessary. Write Carnation Co., PO, St. Louis, Missouri.

SELL "Lucky Seven" Christmas packages! 25c seller—20c profit! Big flash! Particulars free. Three packages 25c. Elfko, 523 South Dearborn, Chicago.

MAKE Products yourself. Formula catalog free. Kemico, 45, Parkridge, Ill.

REGULAR Income; home, office, no canvassing. McArthur Co., Desk 5, Butte, Mont.

MAKE More money selling shirts, ties, underwear, dresses, hosiery, raincoats, sweaters, coveralls, pants, uniforms. Outfit free! Nimrod Company, Department 8, 4922-28 Lincoln Avenue, Chicago.

NEW \$30.00 Value radio given in "free deal." Earn up to \$100.00 weekly. New sales plan. Also auto radios. Meritone Mfg. Co., 3857 North Hamilton, Chicago.

FREE Literature describing many money making plans. Belfort, 4042 N. Keeler, Chicago.

SUCCEED With your products. Learn how. Formulas. Processes. Analytical service. Catalog free. B. Thaxly Co., Washington, D. C.

OPERATE Home mail order business, selling our products. Everything furnished. Superior Specialties, Springfield, Ill.

BIG Money applying gold initials on automobiles. Easiest thing today. No experience needed. Free samples. "Ralco," 1084 Washington, Boston, Mass.

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

BIG Money and fast sales. Every owner buys gold initials for his auto. You charge \$1.50; make \$1.45. Ten orders daily easy. Write for particulars and free sample. American Monogram Company, Dept. 40, East Orange, N. J.

AGENTS—Opportunity to make money; book containing 87 successful business plans; home or office; send for free introductory booklet. Elite Co., 214 Grand St., New York.

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

AMAZING Cleaner. Cleans everything. Sample free. Bestever, 5007P Irving Park, Chicago.

A BUSINESS Of your own making sparkling glass name plates, numbers, checkboards, medallions, signs. Booklet and sample mailed free. E. Palmer, 512, Wooster, Ohio.

PROFITABLE Home business. Legitimate. No canvassing. Maywood Publishers, P-923 Broadway, New York.

OUTSTANDING Easy selling products. No competition. Sample 10c. Mint Co., Baroda, Mich.

SELL Made to measure raincoats. Outfit free. Goodyear Rainwear, 18 West 22nd, New York.

BE Independent. Own your business; experience unnecessary, selling \$10,000 accidental death, \$50 accident; \$25 sick weekly benefits—\$10.00 yearly. Other amounts proportionate. Guaranteed steady renewal income. \$250,000 deposited insurance department. Universal Policy, 716-A Lefcourt Bldg., Newark, N. J.

HIGH-GRADE SALESMEN WANTED

YEAR'S Income in 3 months! New federal, state and code laws create immense demand for simplified record system every businessman must have to protect himself against fines and penalties. Millions users must buy again now. Our men selling 5 to 25 daily our officially approved, copyrighted Liberty Tax Record. \$3.50 cash profit every sale. Repeat commissions without callbacks. Live leads furnished. Big season now. Choice territories going fast. Commonwealth Publishing Company, 508 So. Dearborn, Chicago.

SELL Stores new, sensational counter cards. Special sale, cut prices at 9c. Seven aspirin tablets 5c. Free deals. Up to 177% profit for you and merchant. Razor blades, laxative gum, combs, etc., and many other exclusive, big selling items. No investment to start. Protected territories. Columbus Discovery Products, Dept. PC-35, Columbus, Ohio.

MEN Wanted by world-wide industry—Apply by letter only giving age, experience, references. Industry and reliability main qualifications. Man selected will become authorized Rawleigh dealer on our capital and taught how to establish a profitable business in over 250 farm and home necessities. Man with auto preferred to introduce products and travel steadily. Write immediately. Rawleigh, Dept. L-N-PPM, Freeport, Ill.

GO Into wholesale business without investment. Call on stores with biggest line self-selling counter displays: Aspirin, razor blades, handkerchiefs, breathlets, household cement, 79 different items. Up to 125% profit for you. Experience unnecessary. Write for catalog and plans. Procopax, Dept. 36-DD, 1956 S. Troy, Chicago.

NEW Clothes brush; drycleans 3 ways at once. Revolutionary invention. Saves cleaning bills. Homes, offices buy instantly. Phenomenal profits. Outfit free. Kristee Mfg., Box 1442, Akron, Ohio.

SHOPOSCOPE Sells on sight. 200% profit. Free sample. Wright's, 488 East 18th, Paterson, N. J.

NEW, Sensational 25c and 35c direct store sellers. No competition. Exclusive territory distributors, also direct to consumer all-time, part-time men wanted. Answer fully, stating territory desired. Magic Kleenway, 1954 Goodfellow, St. Louis, Mo.

SALES Demonstrators. U-Kan-Plate with pure silver. 1 oz. polish 20c, 8 oz. \$1. Justice, 904 Walnut, Philadelphia.

SALESMEN: Acquainted with garages, filling stations, to handle local business. Write Colgra, 2626 N. Third St., Milwaukee, Wisconsin.

THOSE Having contact with large users of envelopes can add to their income by representing the Weaver Mailing Envelope Co., 715 Arch St., Philadelphia, (established fifty years)—makers of specialty envelopes in Kraft, Manila, Jute, Water-proof, Cloth-lined, and other papers.

EVERYBODY Buys business stationery. New items. Highest quality. Lowest prices. Free cuts. Quickest delivery. Big comm. daily. Experience unnecessary. Self selling outfit free. Willens, 2132 Gladys, Dept. L, Chicago.

AUTO Accessory salesmen: Complete line fastest sellers. Prices dealers want to pay. Big commission daily. Exclusive territory. National, 1910-BM Wentworth, Chicago.

MAN—Handle regular store route. Place nationally advertised 5c-10c counter card mde. New aspirin deal. 16 tablets 10c. 85 more fast sellers. 100% profit. No investment. Catalog free. World's Products Co., Dept. 12810, Spencer, Ind.

PENNY Each, popular sizes. Non-tarnishable window sign letters. Enormous profits. Free working equipment, sample. Record breaking offer. Note our ad page 148A. Atlas Sign Works, 7941 Halsted, Chicago.

GIVE Profits—Up to \$170 weekly, \$500.000 punchboard firm announces new no investment plan. Season starting. K&S, 4326 Ravenswood, Chicago.

BIG Profits in stationery monogram device. Box 150, Wausau, Wis.

100 BLADES 50c. Shaving cream 4 1/2c. Toothpaste 4 1/2c. List 300 items free. Mayo, Richmond, Va.

MAKE Big money steady. High grade coveralls, shopcoats, pants, shirts, summer suits. Advertising on back. Fast sellers. Free outfit. Strong Mfg. Co., 901 West Jackson, Dept. N-10, Chicago.

NEW Roosevelt calendar and many other subjects. Sells on sight. Every home and business a prospect. Fleming Calendar Co., 6541 Cottage Grove, Chicago.

SELL: Line sign; very hot; hurry. Cost \$1.75 doz. Sample 20c. Accurate, 2432 Milwaukee Ave., Chicago.

SALES Books and labels. Sell sales books in small quantities at attractive prices, also "Allpurpose" pocket label that sells at every stop; good commissions. Technocrat, 81 Kingston, Boston.

NEWEST, Most amazing deal for stores, shops. Inexpensive. Big business increase or money back. Gold mine for salesmen. Outfit free. Stimulators, 343 Madison, Chicago.

AMAZING Zipper pinless clothes line. Lightning demonstration, sure sale every home. Free guarantee sales plan. Dunn Bros, Hempstead, N. Y.

BRAND New grab-bag deal. Going big everywhere—big profits—swift sales—fast repeats. No restrictions. All dealers buy. Act! K&S, 4373 Ravenswood, Chicago.

MAKE More money selling shirts, ties, underwear, dresses, hosiery, raincoats, sweaters, coveralls, pants, uniforms. Outfit free! Nimrod Company, Department 65, 4922-28 Lincoln Avenue, Chicago.

SOMETHING New in fire extinguishers. Red Comet automatics. Proved in west five years. Exclusive territory. Low price opens pocketbooks. Write Red Comet, 404 Comet Building, Littleton, Colo.

SALESMEN—Sell collection systems. 400% commission. Sayers Systems, 2801-123 Sheffield, Chicago.

STICK-ON Window sign letters. 500% profit. Free samples. Metallic Co., 438-A N. Clark, Chicago.

NEW Specialty—Sells every business and professional man. Four \$15 sales daily pay \$280 weekly. Foyer cleared \$4920 in three months. Write, F. E. Armstrong, President. Dept. PM, Mobile, Ala.

SELL Stores or homes—Scissors sharpeners, gas lighters, razor blades, aspirin, breath gum, chewing laxative, adhesive tape, polish, handkerchiefs, polishing cloths, shoe laces, many others. Attractive displays. Catalog free. Superba Co., 8-303, Baltimore, Md.

HELP WANTED

MAN Wanted—Manufacturer established 45 years will finance responsible man with complete stock of guaranteed food, farm and household necessities—you pay when sold. Mighty attractive proposition. Good living right from start with steady increase for industrious man. Big value combination deals and fast-selling specials now in effect. B. M. Anderson just sold over \$330. O. W. Jack over \$308 in one week. Pleasant outdoor work. Experience unnecessary. No slack seasons or layoffs. Write today for "No-Investment" offer. McCannon & Company, Dept. 66MS, Winona, Minn.

REAL Jobs open—Auto mechanical field, aviation. Earn \$35.00-\$75.00 weekly. 8 weeks' training qualifies you. Write for big opportunity book and special low tuition now. McSweeney Schools, Dept. 10-A-12, Cleveland, Ohio, or Kansas City, Mo.

DO You want a splendid chance to make \$60 a week? I'll start you with a local coffee route paying steady weekly income. No experience required. Get free facts, then decide. Albert Mills, 4673 Monmouth, Cincinnati, O.

EARN Quick cash raising mushrooms in cellar, shed, attic. We buy crops. Guaranteed materials furnished. Easy, odorless method. Book free. United, 3848-BX Lincoln Ave., Chicago.

EARN Up to \$25 or more weekly, growing mushrooms in cellars or outbuildings, all fall and winter. We instruct you. Ready market. Booklet free. Adanac Mushroom Company, Dept. 147, Toronto 10, Canada.

EARN Money selling shoes and get a salesmanship course free. Write Byon Bolton, Paris, Ill.

GROW Mushrooms. We show how. Use cellar, shed, etc. Plant now. Overnight crops. We buy. Splendid income. Data free. Interstate, PN-7357 Cottage Grove, Chicago.

BIG Money growing mushrooms. Cellar, idle places. Supplies furnished. We buy crop. Free book. Mushroom Growers of America, BG-433 N. Clark, Chicago.

AGENTS—Mosco corn and callous remover will build you a steady repeat business. Send today for pocket-size trial outfit. The Moss Company, 44 Searle Bldg., Rochester, N. Y.

EDUCATIONAL AND INSTRUCTION

"HIGHER Arithmetic" teaches fast and correct figuring. Frederick A. Smith, 2410 Smalley Court, Chicago.

MILWAUKEE Industries desire to contact earnest young men to learn electric arc welding in their laboratories of the school of engineering. Small training fee. For details write President Werwath, 1020-26 N. Broadway, Milwaukee, Wis.

WANTED: Names men wishing government jobs. \$141.00 month. List positions—tests free. Franklin Institute, Dept. K3, Rochester, N. Y.

HAVE You been disappointed in answering want-ads? Let us write your application letter and get results. Send details enclosing \$2.00. Eberhard, 400 Kinloch Bldg., St. Louis, Mo.

FLORIDA Hotel positions. Instructions. Richard Lee, 22 Wesley, Somerville, Mass.

BECOME A successful investigator. Experience unnecessary. Work at home or travel. Write today for free publication and particulars. National System, 340-G Electric Building, Omaha, Nebr.

STUDY Investigations—Solve crimes—Earn easy money. Write International Secret Service Institute, PM-124, Hoboken, N. J.

JAZZ Piano course. Modern, simple, successful, complete, sent postpaid for \$1. Spencer Music School, 2504 E. 4th Street, Chattanooga, Tenn.

LEARN Doctor of Theotherapy. World-wide instruction. Seminary, South Whitley, Indiana.

MEN Wanted—To learn Machinist trade Tool and Die making, Automatic screw machine. Get experience on actual work. Employment help. Start now. Days—evenings. Write for free book. Allied Screw Machine Co., 601 Lake St., Chicago.

GET U. S. government job—Start \$105-\$175 month. Men-women, age 18-53. Are you eligible for eligibility test? Get our free questionnaire—find out. No obligation whatever. Instruction Bureau, 101, St. Louis, Missouri.

BECOME A landscape architect. Easy to learn by mail. Wonderful opportunity for money-making. Earn while you learn. Write for free opportunity booklet and details. American Landscape School, 805 Plymouth Bldg., Des Moines, Iowa.

U. S. GOVERNMENT Positions. \$1700-\$1900 and up a year. Let our expert (former government examiner) prepare you for a position in the railway mail service, rural carrier, post office, customs and other branches. Write today for free booklet. Dept. 8, Patterson School, Rochester, N. Y.

SHORT STORIES

"THE Plot Builder"—Endless source of plots! 50c. International Agency, Cincinnati.

PRINTING, MULTIGRAPHING AND MIMEOGRAPHING

200 NOTESHEETS, 100 Envelopes, printed, name, address. Send \$1.00. Raymond Lemieux, Danielson, Conn.

PERSONAL Stationery—18 sheets, 18 envelopes, Cellophaned 25c (mail). Liberty, 341-37, New York.

PRINTING, Mimeographing, low prices. Free estimates. Hunt Co., Box 202, Trenton, N. J.

FREE Portfolio colorful letterheads. Send 12c handling. Mark Warden Printing-Advertising, Box 4369, Kansas City, Mo.

6x9 CIRCULARS, \$1.25; 8½x11, \$2.00—Quantities. Folders, stationery, labels—low prices. Samples. Goodprint, Harrisonburg, Virginia.

MIMEOGRAPHING, 8½x11, \$2.99—1000. Samples. Universal, A4629 Michigan, St. Louis, Mo.

250 LETTERHEADS, Bond, 8½x11—\$1.00. Congressional Press, 619 H St., Washington, D. C.

1000 CARDS \$1.40. 500 Letterheads, envelopes, billheads \$1.75. Bradshaw, 3214 Huron, Chicago.

SPECIAL, 500 Letterheads and 500 envelopes, \$2.50. Village Press, Somerset, Massachusetts.

2000 BUSINESS Cards neatly printed \$1.50. Atlas Distributing Co., Roberts St., Pittsburgh, Pa.

ENGRAVURE Printing. Lowest possible prices. Samples free. Sunko, Mohawk, N. Y.

1000 ENVELOPES 6½, Letterheads 8½x11, business cards, \$2.95. Satisfaction guaranteed. Woodprint, Woodstock, Va.

UNIQUE Gummed labels; rubber stamps; engravings. McPherson Popular Print, Middletown, Conn.

PRINTED Stationery and cards. Circular free. Samples 10 cents. Menten, 9313 Glenwood Road, Brooklyn, N. Y.

STATIONERY, Circulars, checks, loose-leaf, ruling, binding. Commercial Press, Batavia, Ohio.

BETTER Grade printing, reasonable priced. Free samples. Economic Press, Leonia, N. J.

1000 BUSINESS Cards, card case, \$1.50. Miller, Printer, Ambler, Pa.

1000 LETTERHEADS, Envelopes, circulars \$2.95. Low prices leaflets, folders, catalogs. Mimeographing, Multigraphing. Samples. Frazer Press, Box 45-D, North Topeka, Kan.

PRINTING OUTFITS AND SUPPLIES

HAND Press, type and complete printers' supplies. Advise equipment you need and we quote prices; or send stamp for catalog. P. Peiffer, 16-A, 6 Columbia St., Newark, New Jersey.

PRINT Your own cards, stationery, circulars, advertising, etc. Save money. Easy rules furnished. Print for others, big profits. Junior press, \$5.90; job presses, \$11; power, \$149. Write for free catalog and full information. Kelsey Co., V-11, Meriden, Connecticut.

NEW Type 29c font. Catalogue dime. National Type Company, Jackson, Mich.

MIMEOGRAPHING Ink, \$1.25 lb.; stencils, \$1.25 doz. Unconditionally guaranteed. Mailmarts, Cincinnati.

PRINTING Outfits Christmas gifts \$8.00. Lists 3c. Landis, Richland, Pa.

REBUILT Presses. Advise size wanted. Send stamp. Exchange D-5, 480 East Main, Meriden, Conn.

DEALERS Wanted everywhere to sell printers supplies. Write for our proposition. (Frank's), 3354 Harrison St., Chicago, Ill.

PRINT Your own circulars, envelopes, with home made press costing less than \$1.00. Illustrated instructions 10c. Carl Edquist, Odessa, Minn.

LITHOGRAPHING, Printing presses, \$4.00 up. "Bargainlists," 1354 Hayden, Cleveland. (Stamp.)

PRINTING Presses, type, supplies. Lawrence, 1426 South St. Francis, Wichita, Kans.

BARGAINS Used presses, type. Send stamp. Box 15, Cambridge, Mass.

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

TYPEWRITERS AND SUPPLIES

TYPEWRITERS \$1.00-\$40.00. Ribbons 15c-35c. Mimeographs, adders, registers, watches. Knight's, 1517 Olive, St. Louis, Missouri.

DUPLICATORS AND DEVICES

POSTCARD Duplicators \$7.50 complete. Agents wanted. Bond Equipment Company, St. Louis.

INCREASE Business. "Excellograph" rotary stencil, clay and film duplicators \$3.85 to \$37.50. Prints anything. Typewritten, penned, drawn, traced. Colors. Folder free. Pittsburgh Typewriter Supply, Suite 518, Pittsburgh, Pa.

RUBBER STAMPS

2 LINES 25c, 3 lines 35c. Cushion mounted. Free list. Stamp Works, 814 Bradley, Peoria, Ill.

RED-RUBBER, 2 Lines 25c; 3 lines 35c. Fehlberg, 921 Farnam, LaCrosse, Wis.

NAME, Address, 2 lines 25c; 3 lines 35c. Stamp Works, Auburn, Nebr.

GUMMED LABELS

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

RAZORS AND BLADES

AFTER-SHARPENER, Makes Gillette type blades shave smoother. New invention. 25c coin postpaid. Dootson, Box 1167, San Francisco, Calif.

SPECIAL Offer. 10 blue steel—double edge razor blades with price list—10c. Other special bargains. Write today. Nalpak, 3225-F Crystal, Chicago.

TOBACCO

GUARANTEED Tobacco—Natural leaf chewing and smoking, 5 lbs. \$1.00; 10 lbs. \$1.50. Cigarette Burley, 5 lbs. \$1.00. Free gift. Howards Plantation, Mayfield, Ky.

SUBAC—The wonder smoking tobacco, blending Virginia grown Gold Leaf, Burley and Turkish tobaccos, 3 lbs. \$1.10 postpaid. Belmont Farms, Box 44, Chatham, Va.

QUALITY Leaf tobacco. Try our package containing 6 marked kinds, \$1.00 prepaid. Price list on request. Farmers Exchange, Edgerton, Wis.

DIAMONDS, WATCHES AND JEWELRY

WATCH Movements, material, tools. Repair instruction. Catalog 5c. Stewart's, Sixth Olive, St. Louis, Mo.

SPECIAL \$6.75 Wrist watch only \$3.38. Clnis Mail Order, West Springfield, Mass.

FOR HOME CRAFTSMEN

BEAUTIFUL Inlaid panel, approximately 11" by 15", containing over 100 pieces of wood, suitable for tray, etc. \$2.00 postpaid. Anton Soukup, 2330 Millard, Chicago.

ANTIQUES, WAR RELICS AND INDIAN GOODS

INDIAN Relics—Arrowheads, 15 for \$1.00; grooved axe, \$1.00; Celts, 3 for \$1.00. Send wants. Bellson Co., Box 229, Marion, Ohio.

THOUSANDS Of pieces antique glass. Write wants. List for stamp. Mrs. Don Hoover, 505 North 8th St., Quincy, Ill.

INDIAN Arrowheads. Good. 10—50c. 25—\$1.00. Paul Summers, Sagerton, Texas.

INDIAN Relics. Beadwork. Coins. Curios. Catalogue and arrow, 6c. Vernon Lemley, Northbranch, Kans.

GUNS, FISHING TACKLE AND SPORTING GOODS

GUNSMITHS' Secrets! Bluing, checkering, engraving, etc., 25c. International Agency, Cincinnati.

BARGAIN List. Benjamin, Crosman, Daisy Air Rifles. J. Warshal & Sons, 1014 1st, Seattle, Wash.

HUNTERS—U. S. Oiler and Thong assembly. Sample postpaid 25c. Hofstetter, Tacoma, Wash.

FISHERMEN—Make your own sinkers with our molds. Several styles, many sizes. Free folder. Reading Instrument Co., Box 78, Reading, Pa.

FIELD GLASSES, TELESCOPES AND MICROSCOPES

FIELD Glasses. New powerful 5 inch. Carrying strap. Marvelous for football, races, scouting. Swell gift. Agency considered. Sent \$1.45 postpaid. Military Binocular Co., 131 S. Wabash Ave., Chicago.

FIELD Glasses. New 5 inch long. Powerful adjustable. Military shoulder strap. Ideal for sporting events, nature study. Xmas gifts. Limited number \$1.50 C.O.D. B. Zeissler Binocular Co., 5435 Cornell Ave., Chicago.

500X MICROSCOPE \$3.95. 30X telescope \$1.98. America's lowest prices. Optical catalogue free. Brownscope Co., 234 Fifth Ave., New York.

MUSIC AND MUSICAL INSTRUMENTS

HAWAIIAN Guitar given students taking course of home instructions. Guaranteed. Paramount Conservatory of Music, 246 East 18th, Vancouver, Canada.

SONG Poems wanted, free examination, 50-50 plan. Song Bureau, Salem, Ind.

MAKE a fine violin! Complete outfits—woods, instructions, patterns, supplies. Fraser, Master Violin Maker, Saginaw, Mich.

WANTED: Original poems, songs. It will pay you to get our proposition first. MMM Publishers, Studio Bldg., Portland, Ore.

POEMS Set to music. Published. Send poems. McNeil, 1582 W. 27th St., Los Angeles, Calif.

REBUILT Band and orchestra instruments. Honestly rebuilt—fully guaranteed. Catalog of new instruments on request. Weymann Company, Dept. M-12, 13th and Arch Sts., Philadelphia.

WRITERS! Poems, music. Amazing offer. Hibbeler D1, 2157 North Avers, Chicago.

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

PLAY Hot saxophone. Complete course—Modern saxophone, twenty-five lessons by Thompson, the master teacher. Thousands have been sold. For teacher or pupil, \$2.00 postpaid—Order today. Caton Publishing Company, 811 South Hill, Los Angeles, Calif.

MUSIC Composed to words. Wonderful proposition. Bauer Bros., Oshkosh, Wis.

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

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

NEW Deal. Write Sequoia Songwriters Service, Sherman Branch, Los Angeles, California.

\$\$\$SONGWRITING\$\$\$. Good money being made from songs through talking pictures, radio, phonograph, music publishers. "Hit" writers revise, arrange, compose music to your lyrics, lyrics to your music. We submit to studios and other markets. Free reading. Send for booklet. Universal Song Service, 671 Meyer Bldg., Hollywood, Calif.

PATENT ATTORNEYS

INVENTORS: Send immediately for your copy of our big, new free book, "Patent Protection." Forty-eight pages of interesting facts. Tells how patent laws protect you; kind of sketch or model needed; simple steps to take without cost; how successful inventors have secured financial assistance; shows interesting inventions; illustrates important mechanical movements. Other men have read and profited by this book. With book we also send free Evidence of Invention form, that you can use to establish date of disclosure. Prompt service, reasonable fees, special deferred payment plan. Strictest secrecy. Thirty-six years' experience. Highest references. Write us today. The facts in our book are worth money to the man with a good invention. Address: Victor J. Evans & Co., Registered Patent Attorneys, 400-P Victor Building, Washington, D. C.

PATENTS—Before too heavy an outlay of time or money is made on an invention, a search of the Patent Office records should be made to determine as nearly as possible whether or not the same idea has been patented before. The cost of this search is small, while the value of the facts it uncovers is often considerable. We offer inventors and manufacturers a thorough, prompt, confidential search service—plus experienced counsel and assistance in every phase of Patent and Trademark practice. Write for my free book containing valuable information relating to patent procedure. Clarence A. O'Brien, Registered Patent Attorney, 58-P Adams Building, Washington, D. C.

INVENTIONS May now be safely marketed before patenting. For information write Chartered Institute, 554 Barrister Building, Washington, D. C.

INVENTORS: Take no action until you have read valuable free booklet of your own association. Write today. Associated Inventors, Inc., Insurance Building, Washington, D. C.

\$40.00—INVENTIONS Patented. Samuel Goldstein, 275 East Gunhill Road, New York.

PATENT Lawyer—Formerly principal examiner in patent office. Satisfaction guaranteed. Charles Haden, 1004 N Street, Washington, D. C.

PATENTS—Proper service for manufacturers and individual inventors. Established 1895. Reasonable charges. Consult Chandee & Chandee, Patent Attorneys, 902 F. Street, Washington, D. C.

UNPATENTED Ideas can be sold. I tell you how and help you make the sale. Free particulars. (Copyrighted.) Write W. T. Greene, 907 Barrister Building, Washington, D. C.

A NEW Deal for inventors: Combined patent attorney and development engineer service. Simple case attorney's charge \$50.00. Search \$5.00; trade-marks complete \$35.00; copyrights \$6.00. J. J. O'Brien, Patent Attorney-Engineer, Reg. 1909, 108 West 42nd St., New York City.

INVENTORS—Send for free booklet "Patent-Sense." Information based on 64 years experience. Lacey & Lacey, Dept. 5A, 635 F St., Washington, D. C.

ESTABLISHED 1864. Milo B. Stevens Company. Free booklet. Patents. Trade marks. Copyrights. Offices: Monadnock Block, Chicago; American Security Building, Washington, D. C.

PATENTS. Instructions "How to Establish Your Rights" and form. "Evidence of Conception"—sent free! Lancaster, Allwine & Rommel, 411 Bowen Building, Washington, D. C.

PATENTS Procured; trade marks registered—preliminary advice furnished without charge. Booklet and form for disclosing idea free. Irving L. McCathran, 700A International Bldg., Washington, D. C.

PATENTS. Booklet free. Highest references. Best results. Promptness assured. Watson E. Coleman, Patent Lawyer, 724 Ninth St., Washington, D. C.

"**INVENTOR'S Guide.**" valuable information free. Frank Ledermann, Registered Attorney-Engineer, 220 Broadway, New York. L. F. RANDOLPH, 302-B Victor Building, Washington, D. C. Low cost. Book and information free.

INVENTIONS WANTED

LONG Established manufacturer with excess machine equipment wants new mechanical products to build. Must be developed past experimental stage. Give description and full details first letter. Address, Room 200, % Popular Mechanics Magazine, 200 East Ontario St., Chicago.

NEW Kitchen and household specialties wanted for manufacture and distribution. Address: Atlas, 3246 North 31st Street, Milwaukee, Wis.

AUTOMOBILE Inventions, devices, tools, etc., wanted. Anything that can be sold through garages and automobile parts dealers. Will manufacture or take output. Room 201, % Popular Mechanics Magazine, 200 E. Ontario St., Chicago.

SMALL Inventions wanted. Stanley Hull, 7829 Euclid Avenue, Cleveland, Ohio.

WANTED: Patented and unpatented inventions. Edwin H. Schrieber, Nashville, Illinois.

INVENTIONS Wanted, patented or unpatented, any size, any material, for any purpose. Now is the time to act. Send us your ideas. A square deal assured. Bosley Mfg. Co., Torrington, Conn.

INVENTIONS Wanted—Patented, unpatented. If you have an idea for sale write Hartley's, Inc., Box 928-E, Bangor, Maine.

FOR INVENTORS

INVENTORS: Send immediately for your copy of our big, new free book, "Patent Protection." Forty-eight pages of interesting facts. Tells how patent laws protect you; kind of sketch or model needed; simple steps to take without cost; how successful inventors have secured financial assistance; shows interesting inventions; illustrates important mechanical movements. Other men have read and profited by this book. With book we also send free Evidence of Invention form, that you can use to establish date of disclosure. Prompt service, reasonable fees, special deferred payment plan. Strictest secrecy. Thirty-six years' experience. Highest references. Write us today. The facts in our book are worth money to the man with a good invention. Address: Victor J. Evans & Co., Registered Patent Attorneys, 401-P Victor Building, Washington, D. C.

INVENTORS: I'll help you with your patent problems. Consultation only. Estb. 1900. Charles A. Scott, 773PM Garson Ave., Rochester, N. Y.

INVENTORS. Sell your unpatented ideas. Highly personalized service. Write American Society of Inventors, Crosby Bldg., Buffalo, N. Y.

PATENTS—Small ideas may have large commercial possibilities. Write immediately for information on how to proceed and "Record of Invention" form. Delays are dangerous in patent matters. Clarence A. O'Brien, 58-M Adams Building, Washington, D. C.

SAFELY Offer buyers your unpatented ideas. Copyright method, 50c. International Agency, Cincinnati.

OUR Manufacturer-clients now want better inventions, patented or unpatented, to meet present industrial conditions. Write Chartered Institute, 558 Barrister Building, Washington, D. C.

GET Your own patents. Book and practically everything necessary \$1.00. Mattison, 600 University, Syracuse, N. Y.

COPY of any patent sent for \$1.00. R. Burch, 904 F St., Washington, D. C.

PATENTABLE Ideas protected. Free certificate of conception for preferential patent protection. Guaranteed Patent Protection Co., Grand Central Palace, New York City.

MANUFACTURERS Everywhere seek new inventions to improve their product. List of wanted inventions sent free on request. Use our legal form for recording proof of invention. Write W. T. Greene, 944 Barrister Building, Washington, D. C.

INVENTORS—Ideas developed into practical inventions and working models built. Electrical problems solved. Lowest prices and confidential service. Reo-Paul Engineering Co., 1208 E. Monument St., Baltimore, Maryland.

INVENTOR'S Universal Educator: contains 900 mechanical movements; 50 perpetual motions; instruction on procuring and selling patents and selecting an attorney, etc. Suggests new ideas. Price \$1.00 postpaid in U. S. A. Address Albert E. Dietrich, 602B Ouray Bldg., Washington, D. C.

INVENTORS: "Making Inventions Pay," our 32-page illustrated book, mailed upon receipt of 3c postage. Crescent Tool Company, Dept. Z, Cincinnati, Ohio.

PATENTS FOR SALE

640 PROMISING Inventions to manufacture. List free to manufacturers; others 6c. Chartered Institute, 555 Barrister Building, Washington, D. C.

AUTOMATIC Toy revolver. Shoots caps and pellets, rapid fire. Simple construction. Cash and royalty. Manufacturers interested write. Robert Duncanson, Iliou, N. Y.

OUTRIGHT—Automotive reverse lock control for automobiles and trucks. I. G. Breneman, Blue Ball, Pa.

HAVE Perfected and patented a hay knife which I want to get on the market. Patent No. 1,427,733. Antonio Graff, Ridgway, Colorado.

BRONZE TABLETS

BRONZE Tablets, hardware, desk plates, wall plates, memorials, grave markers. Bronze, brass and aluminum casting. Wand-key Pattern & Foundry Co., Anderson, Ind.

MODELS AND MODEL SUPPLIES

LIONEL Electric trains and replacement parts. Scale model track material, signals, motors. Illustrated catalog No. 25C free. Model Railroad Shop, Dunellen, N. Y.

STEAM Engine 1" bore and stroke \$3.50. Stamp for circular. 2009 Hilbert St., Milwaukee.

SHIP Model supplies. Raw materials, finished fittings. Satisfaction guaranteed. Send dime for list. Welcher, 203 South Seventh Street, Fulton, N. Y.

MODEL Maker's supplies, new catalog 17A, 15c. Howardeo, 2417 N. Ashland, Chicago.

EVRAV'S Engine catalog (No. 34) or supply catalog (No. 35), either postpaid 20c. Circular free. Evraymesco, Box "C," 28 No. Clinton, Chicago.

THE Modelmaker. The magazine for those interested in building model railroads, boats, engines. Send 15 cents for copy. Modelmaker Corp., 330P West 34 Street, New York, N. Y.

SHIP Models—Build 18" Flying Cloud, Constitution or Galleon. All materials including full-sized plans only \$1.50 from Hancock, 323 Douglas Ave., Portsmouth, Virginia.

MODEL Ship fittings. Dime brings list. Anderson's, 301 Parliament St., Toronto, Ontario.

BRASS Gears and model supplies. Send for catalog. The Pierce Model Works, Tingley Park, Ill.

MODELS—Your ideas developed into practical working models. 30 years' successful experience; thousands of satisfied customers. Confidential service guaranteed. Bank references. Send 3c postage for 32-page book—"Making Inventions Pay." Crescent Tool Company, Dept. Y, Cincinnati, Ohio.

PATENTS. Low cost. Book and information free. L. F. Randolph, 302-C Victor Building, Washington, D. C.

ELECTRICAL SUPPLIES

INSULATION, Wire, varnishes, supplies, etc. Send 3c stamp for bulletin. Autopower, 408-B Hovne Ave., Chicago.

ATWATER Kent high tension coils, 6-12 volts, 25c. General Electric transformers, 21 watt, 115/15 volts, 50c. Emerson motors, ¼ hp., d.c., 32 volts, \$7.00. Minneapolis Honeywell 110 volt thermostats, \$5.00. All new. Large stock of reconditioned refrigeration parts. Edison storage batteries, long life, 5 cell units, 90c cell. Pioneer Air Compressor Co., 33 Warren Street, New York City.

HEATING AND VENTILATION

INCREASE Household heating efficiency. Seven guaranteed plans \$1.00. Fuel-Saver Devices, 900 Manhattan, Dayton, Ohio.

WELDING AND SOLDERING

DEMONSTRATORS, Electric arc welders. Money-saving prices. Used by the government. Trial and terms guaranteed. Hobart Welders, M-1244, Troy, Ohio.

ELECTRIC Arc welder—Build your own from automobile generator. Complete instructions and improved blueprints for 75 ampere outfit \$2.00. C. Carlson, 2212 Grand Ave., Omaha, Nebr.

OXYACETYLENE Welding and cutting equipment. New and rebuilt. Instruction book, prepaid, upon receipt of \$.75. Welders Supply & Mfg. Co., Cincinnati, Ohio.

WELDING And brazing oxy-acetylene equipment, new and rebuilt. Superior Oxy-Acetylene Company, Hamilton, Ohio.

ARC-WELDING Outfit \$1.25. Weld fenders, braze, solder. Lavrow, 4368-W. Warren, Detroit. Stamp appreciated.

SURVEYING INSTRUMENTS

BARGAINS In guaranteed factory rebuilt transits and levels. Largest selection in United States. Buy now. The prices will never be lower. Sale or rent. Cash or terms. Trade your old instrument. Write for new list M-812 just out. Warren-Knight Co., 136 N. 12th Street, Philadelphia, Pa. Headquarters for repairs to any make instrument.

MACHINERY, TOOLS AND SUPPLIES

HARD To get materials plus money-making ideas for inventors, craftsmen and manufacturers. A book every thinker should have—only 10c. The most varied line available of electrical, hardware specialties, metals, bakelites, woods, chemicals, insulations, minerals, compounds and rare materials. Unusual listing of motors, belts, gears, pulleys, bearings, wheels, switches, drives, machinery, tools, flexible shafts, compressors, sprayers, blowers, fans, drills, instruments, welding material, adhesives. Get yours now. 1/20 hp. variable speed, 2 shaft, a.c.-d.c. motor \$3.95 postpaid. E. M. A. Corp., 3539-54 Fifth Ave., Chicago, Ill.

BARGAINS, Demonstrators, electric arc welders, guaranteed, 30 days trial and terms. Write Ken's Equipment, Box 1245, Troy, Ohio.

HARD To get supplies; specialties, tools, magnet wire, insulation, metals, motors, pumps, gears. Catalog 10c. Kostka, 2350-K So. Crawford, Chicago.

WRITE For special Christmas price Home Woodwork Shop, Baltz, 38 S. Dearborn, Chicago.

10"x5" QUICK Change Champion lathe \$125.00; 12" Hendey shaper \$75.00; No. 60 Heald cylinder grinder \$175.00; all sizes and types of machine tools. Send for catalogue listing other bargains. Terms to suit. Cincinnati Machinery & Supply Co., 27 W. 2nd St., Cincinnati, Ohio.

ENGINES, MOTORS AND DYNAMOS

MAKE Your own motors—Model-T Ford generator makes 1/4 hp. motor, reversible and variable speed up to 7000 r.p.m. Dodge 12 V generator makes 1/2 hp. motor. Other generators can be used. All operate on regular or 32 volt current. Complete, illustrated and tested plans so simple a boy can use. Regular price \$2, now \$1 for a limited time only. Be sure to mention kind of generator and current. You can sell these motors at a nice profit. Money back if plans don't work. Rand Co., Dept. 300, 2004 Grand Ave., Kansas City, Mo.

FOR Your work shop—C & N Safety Load Clutch allows full motor speed before taking load. No dimmed lights when starting. For pumps, washing machines, lathes, compressors, saws, any unit starting under load. Replaces regular motor pulley on standard 1/4 and 1/2 h.p. motors. Furnished for V or flat belt to fit 1/2 or 5/8 motor shaft. \$5.50 cash with order. Agents wanted. Contractors Service Company, P. O. Box 552, Attleboro, Massachusetts.

GOVERNORS Control auto engines—stationary or portable power uses. New big discount. No cash down. Special foreign terms. Agents wanted. Candee-Smith Governor Co., 215 North Los Angeles St., Los Angeles.

GOVERNORS For auto engines, \$6.50 prepaid. Satisfaction guaranteed. Wm. Alber, Beatrice, Nebr.

1/2 TO Four horsepower gasoline engines. Bargain lists 10c. Columbia, 4020 West Lake, Chicago.

WINDING Data, 100 AC motors, various horsepower and voltage, \$1.00. Motor Data Co., 3002 Monroe, Kansas City, Mo.

1500 WATT Auto-transformers 220/110 volts \$5.00. Motors, generators, converters. Queen City Electric, 1736 Grand Avenue, Chicago.

MANUFACTURING

MANUFACTURING, Tools, dies, models, stampings. Porsberg Engineering, Northfield, Ohio.

MANUFACTURING, Models, dies, stampings, brasswork, moulds for castings, vulcanizing. Circular free. Baums Metal Specialties, Kansas City, Mo.

INVENTIONS Manufactured in any quantity at low cost. Stampings, dies, models, etc. Estimates and free catalog. Crescent Tool Co., Dept. X, Cincinnati, Ohio.

METAL Articles developed and manufactured. Model making. Reasonable price and first class workmanship. W. F. Meyer Company, Bedford, Indiana.

TREASURE FINDERS

METALSCOPIO, Modelo "Delux," perfeccionado. Localiza: oro, plata, metales enterrados. Tipo radio-eléctrico. Garantizado. Resultados comprobados por muchas personas en distintas partes del mundo. Su manejo es sencillo, económico. Escribanos en español. MetallSCOPE Sales Company, 1031 South Broadway, Los Angeles, Calif.

PROF. Magnetic mineral rods with complete placer book, \$4 value for \$1.75. Many successes. Golden B. Ray Co., 501 7 Street, San Francisco.

BUILD Your own inexpensive radio-active detector. Complete drawings and instruction \$1. John Segee, Dover, N. H.

RADIO Treasure finder tricks exposed and explained by original builder. Send ten cents silver. G. O. Maher, Baton Rouge, La.

CLOUGH System inexpensive radiofrequency detector, easily constructed. Complete instructions \$.50. Clough, Grayling, Mich.

TATTOOING

AMATEURS Tattooing outfits. Easy stencil method. Free list. Chicago Tattoo Supply House, 651A South State, Chicago.

TATTOOING Outfits, supplies, illustrated list free. "Waters," 965 Put-nam, Detroit.

BARTER AND EXCHANGE

SWAP Anything. Send your list and stamp. Stewart Marshall, Rome, Ga.

ROOTS AND HERBS

JUST Out! World's Greatest "Herbalist Almanac." Beautifully illustrated in natural colors. Contains over 500 old-fashioned herb medicine recipes and Indian secrets for home use. 10c (coin) postpaid. Worth dollars! Botanics, 145 W. 112th St., Chicago.

OLD GOLD WANTED

CASH For gold teeth, jewelry, watches. 100% full gold value paid day shipment received. Satisfaction absolutely guaranteed or articles cheerfully returned. Licensed by United States government. Information free. Chicago Gold Smelting & Refining Co., 357 Champlain Bldg., Chicago.

FARMS AND FARM LANDS

INDEPENDENCE, Security assured, North Dakota, Minnesota, Montana, Idaho, Washington, Oregon farms. Bargain prices, easy terms. Descriptive literature. Impartial advice. Mention state. J. W. Haw, 119 Northern Pacific Railway, St. Paul, Minn.

FREE Homesteads—"Pioneer's Paradise." Precious minerals, rare furs, map location, description \$1.00. G. Thompson, Sheridan, Oregon.

FREE! Printed list of foreclosed farm bargains. McKinney & Co., Springfield, Mo.

THE "New Deal"—Good farms are cheaper and rents lower in Minnesota, North Dakota, Montana, Idaho, Washington and Oregon. A small investment at unprecedented low prices today will increase as normal conditions return. Write for free book and low homeseekers' rates. E. C. Leedy, Dept. 457, Great Northern Railway, St. Paul, Minn.

\$5 DOWN, \$5 Monthly, 20 acres in Missouri Ozarks, \$100. Fishing, hunting, trapping. Hubbard, 216 Grossman Bldg., Kansas City, Kansas.

RABBITS

RAISE Rabbits for us. We supply stock and buy what you raise, paying you highest prices. Established 20 years. Rabbit book, catalog and monthly market bulletin showing prices we pay our breeders, 10c. Address Outdoor Enterprise Co., Inc., Box 51, Holmes Park, Mo.

POULTRY

2c PER Chick sexing service. Leading breeds purebred chicks. Special price on early orders. Colonial Poultry Farms, Box 17, Pleasant Hill, Mo.

POULTRY Tribune—Leading poultry magazine. Five years \$1.00; six months trial 10c in U. S. Poultry Tribune, Dept. C-93, Mount Morris, Ill.

DOGS AND PETS

PEDIGREED Smooth Fox Terriers. Nelson's Poultry Farm, Grove City, Pa.

ST. BERNARD Puppies. Beautiful Christmas gifts. Paramount Kennels, 5345-M McKenna, Montreal, Canada.

BEAUTIFUL Pure white police dogs. Ansonia Kennels, Mose, N. Dak.

FITCH

RAISE Fitch fur animals and Angora Wool rabbits. Easy, profitable. Catalogue, market information 10c. Clay Farms, Sharon, Wash.

FROG RAISING

BIG Profits raising jumbo bullfrogs. New industry. Easy. Interesting. Send 10c for literature. American Frog Industries, Box 336, Rayne, La.

WANTED—MISCELLANEOUS

MAIL Us your discarded jewelry, gold crowns and bridges, watches, diamonds, silver, platinum. Money promptly mailed. Goods returned if offer refused. United States Smelting Works (The Old Reliable.) This is not a government institution. 39 So. State St., Dept. 71, Chicago.

CASH For used drawing sets, slide rules, microscopes, engineering instruments, scientific tools. Highest prices paid day shipment received. Satisfaction guaranteed or shipment cheerfully returned. Elman's, 2302-C VanBuren, Chicago.

WEEDS, Roots, herbs—Eighty likely markets, 50c. Bluegrass Bureau, Newport, Ky.

LUMBER

MAKE Gifts, toys. Mahogany, walnut, birch, ash remnants. Forty pounds, mixed \$1.00. Champion, R2705 N. Nordica, Chicago.

PERSONAL

WE Buy Lincoln head pennies. Will pay up to \$2.00 each if over ten years old. Indian head pennies worth up to \$51.00 each. Send 10c for buying catalog. Continental Coin Co., Incorporated, HG-111 W. Jackson, Chicago.

PEN And ink portrait. 50c. Satisfaction guaranteed. Send photo. LeRoy Gensler, 21 Maple St., Lebanon, Penna.

DEVELOP Your personality. Free information. Flow, 6618B Quimby, Cleveland, Ohio.

FORTUNES Await unlocated heirs! 2,000 (authentic) \$1.00. International Agency, Cincinnati.

SEND Dime for 200 year calendar, mystic birthday chart. Amaze your friends. Baltz, 38 S. Dearborn, Chicago.

HYPNOTIZE Instantaneously! New dollar book 25c. Lonk Institute Hypnotism, D-1613, Palatine, Ill.

MISCELLANEOUS

1000 SPARE Time money-making ideas. 146 page book, postpaid \$1.00. Refunded if not delighted. Write for free particulars. Ostlin Printcraft, 1832 Twelfth St., Moline, Illinois.

MEN And women interested in joining advertising outfit going to South America—please write. Wonderful money making possibilities. Adventure. No investment. Portfolio with complete information, route, etc., 15c (stamps). Wagner Advertising Service, 588, Trenton, New Jersey.

AMATEUR Cartoonists can earn \$25.00 week, operating copying and duplicating service for advertisers. 3-M Syndicate, Argyle, Wis.

ALASKA Black bearskins for rugs. Reasonable. Jim Dolan, Valdez, Alaska.

CHESS—Play by mail. Dime brings opponents name and address. John Fleischmann, 124 Grove St., Brooklyn, N. Y.

YOU Are wanted to resilver mirrors at home. Profitable business plating autoparts, tableware, etc. Write Sprinkle, Plater, 288, Marion, Ind.

AMAZE Your friends. Miniature dictionary, approximately one inch square, 18,000 words completely defined in clear, readable type. 25c. Artprint, 307 East Evergreen, San Antonio, Texas.

CUTS Anybody can make. Zinc etching process. Specimens, particulars, testimonials, for stamp. J. C. Day, Windfall, Ind.

SWAPPER'S Friend, B4, Salline, Michigan. Interests swappers, collectors, sportsmen. 50c year, sample 10c.

INVENTORS
Get this
FREE Book

PATENTS AND TRADEMARKS

Patent Your Ideas This Free Book Shows How

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

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

The book shown here contains valuable information that every inventor should know. It tells you just how to go about obtaining a patent for your idea. With the booklet I will send you my "Record of Invention" form on which you may sketch your idea and establish its date before a witness. If a dispute arises this will be valuable to you. Send the coupon TODAY! You will receive the FREE book, the "Record of Invention" form, and full information regarding costs.

Strict Secrecy Preserved

All communications, sketches, etc., are held in strictest confidence and protected by steel files. Your idea will be in trustworthy hands. I have the highest references. It is probable that I can help you. Send the Coupon AT ONCE.

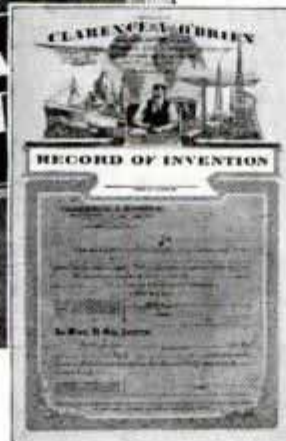
Personal Service

Your case will be handled by a specialist selected for knowledge and experience in certain lines of inventions. His personal attention will be given to your idea.



Above is a view of our drafting and specification rooms. These important departments are made up of men of demonstrated skill and aptitude for the particular phases of patent and trademark procedure to which they give their attention.

**How to Obtain
A PATENT**



ALSO FREE

"Record of Invention" Blank: On request I will send you FREE a copy of my "Record of Invention" blank. On the blank you can sketch and describe your invention and have it witnessed in such manner that it may be of value to you as evidence. Send coupon now and receive this form together with my free book.

**Rush
this
Coupon
to**



CLARENCE A. O'BRIEN
REGISTERED PATENT ATTORNEY
701 Adams Building
WASHINGTON, D. C.

Please send me your FREE BOOK, "How to Obtain a Patent," and your "Record of Invention" form, without any cost or obligation on my part.

NAME.....

ADDRESS.....

(Important: Write or print name plainly.)

INVENTORS PATENT YOUR IDEAS

SEND FOR FREE BOOK



HOW TO OBTAIN A PATENT, written by a Former Member of the Examining Corps (1922-24) of the U. S. Patent Office. If you want to profit by your idea, you should take steps to apply for a U. S. Patent at once. Your first step is to get this Free Book. This interesting illustrated book contains valuable information you should have. It tells you fully how to obtain a patent on your idea in the quickest way. With this Free Book you will also receive a "Record of Invention" form on which you can easily record your idea.

Personal and Confidential Service: Your case will be personally handled only by a Registered Patent Attorney who is also a Former Member of the Examining Corps of the U. S. Patent Office. All communications will be strictly confidential.

MAIL COUPON TODAY for FREE PATENT BOOK and RECORD of INVENTION Form.

MILLER & MILLER REGISTERED PATENT ATTORNEYS FORMERLY IN EXAMINING CORPS U. S. PATENT OFFICE

1638 Woolworth Bldg., Dept. 124A, New York City
MILLER BUILDING, Dept. 124A, WASHINGTON, D. C.
Please send me your Free Book, "How to Obtain a Patent," and your "Record of Invention" form.

NAME

ADDRESS

don't WORRY

Why put up with years of needless discomfort and worry? Try a Brooks Automatic Air Cushion. This marvelous appliance permits the opening to close, yet holds rupture securely, comfortably—day and night.



Thousands report amazing results. Light, neat-fitting. No hard pads, metal girdle or parts to chafe or gouge. Patented in U. S. and 13 foreign countries. Try one 10 DAYS WITHOUT A PENNY'S RISK. You'll be delighted. Free book on Rupture and convincing facts mailed postpaid in plain sealed envelope. Address **BROOKS COMPANY, 111 State St., Marshall, Mich.**

Inventors! WE GIVE RESULTS!



PATENTS

Protect yourself by retaining a legal firm that has been in good standing before the Patent Office over sixty years. . . . Preliminary advice FREE . . . estimate of costs submitted. Write full particulars to Dept. 5-635 F St. N. W. Washington, D. C.

ESTABLISHED 1869

Lacey and Lacey

PATENTS—TRADE MARKS

All inventions submitted held confidential and given personal attention by members of the firm. Form, "Evidence of Conception" and instructions, "How to Establish Your Rights"—FREE!

LANCASTER, ALLWINE & ROMMEL
Patent Law Offices

412 Bowen Bldg.

Washington, D. C.



GEARS

In Stock — Immediate Delivery

Gears, speed reducers: sprockets, thrust bearings, flexible couplings, pulleys, etc. A complete line is carried in our Chicago stock. Can also quote on special gears of any kind. Send us your blue prints and inquiries.

Write for Catalog No. 10
CHICAGO GEAR WORKS
769-773 W. Jackson Blvd., CHICAGO, ILL.

FREE Book on Prostate Trouble

If you have prostate disorder—bladder trouble—get up frequently at night, there should be positive and rapid relief for you—without drugs or massage—without pain or discomfort—privately at home. Our free book tells all. Doctors, Osteopaths, Physical Culture directors, Sanitarium experts use and endorse our method. Easily used. Very simple. No matter what you have tried or how old your case our methods will bring results or money back. Write for free illustrated booklet. Do it now. Relief is at hand.

THE ELECTRO THERMAL COMPANY
2184 Morris Ave., Steubenville, Ohio

No JOKE TO BE DEAF

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



THE WAY COMPANY
729 Hofmann Bldg. Detroit, Michigan

PATENTS

Booklet Free Highest References
Promptness Assured Best Results

Send drawing or model.

ALL BUSINESS GIVEN PROMPT AND PROPER ATTENTION

Listed Patent Lawyer in the latest editions of the Rand-McNally Directory of Bankers and Bank-Recommended Attorneys, published by Rand-McNally & Co., Chicago, Ill.; The Baggott & Ryall Directory of Guaranteed Attorneys, published by Legal Directory Corporation, Boston, Mass.; Flugel's Law List, published by Legal Directory Publishing Co., St. Louis, Mo.; American Lawyers Annual, Cleveland, Ohio; Bankers Service Legal Directory, Bankers Service Co., Boston, Mass.; Eyre's Law List, 9 Park Place, New York City, and the Central Guarantee Co., Bankers and Lawyers Directories, Empire State Bldg., New York City.

WATSON E. COLEMAN,
REGISTERED PATENT LAWYER

Victor Building, 724 Ninth Street, N. W.
WASHINGTON, D. C.

THE FACTS IN THIS BOOK... INVENTORS ARE WORTH MONEY TO

48 PAGES
OF PRACTICAL
INFORMATION
• YOUR COPY
IS FREE

ON receiving this book, one inventor wrote us: "Just received your wonderful book of Patent information, which exceeded my highest expectations. It is indeed a valuable help to anyone who needs Patent protection."

Another said: "Have just read your book and now know many things about Patents I didn't know before. I am very grateful to you for sending me this valuable information."

You, too, if you have an invention or an idea for one, will welcome a book of practical, usable, Patent facts like this.

What NOT to do!

In Patent matters it is important to know what to do and also WHAT NOT TO DO. This book gives the average layman facts that may help him in deciding whether or not his invention is worth protecting, and tells him exactly how to go about getting protection if he decides he is justified.

We tell you: How to make a disclosure of your invention — since established dates may be important — exactly what steps are involved in making application for a Patent; why the Patent Laws protect you; how successful inventors have secured financial as-

sistance; pitfalls to avoid; what sort of a sketch or model is needed.

We give you an idea of the costs; tell you about our special payment plan; show you 115 different mechanical movements that inventors have used in working out ideas.

You are welcome to this information. Your copy of "Patent Protection" is FREE.

How We Help Inventors

For more than a third of a century—it has been our business to assist inventors in securing ALL THE PROTECTION TO WHICH THEY ARE ENTITLED. We have represented not a few inventors, or a few hundred, but THOUSANDS of them in their dealings with the U. S. Patent Office.

We answer questions—thousands of them a year. We study each device to bring out its best Patentable possibilities; we often dissuade

inventors who might have gone ahead with inventions which could not possibly have been protected. We try, by methods of efficiency developed over a long period, to keep expense at a minimum.

STRICTEST SECRECY

You may write us in strictest confidence. Any letter, sketch, drawing, model or any other disclosure sent to us is carefully filed, where it is accessible ONLY to an authorized member of our staff. Nor do we EVER disclose any information relating to an inventor's business without his specific authority IN WRITING to do so. Write us at once for a copy of the book.

Delays can be Costly

Many a man has waited until too late to protect an invention by means of a U. S. Patent. Remember that someone else may be thinking along the same lines that you are right now. This happens frequently. Your copy of "Patent Protection" is ready. Send for it NOW.

Thousands of Inventions

No need to attend the Century of Progress to see inventive history being made. This picture was taken in a five and ten cent store here in Washington. Hundreds of simple, cheap, useful devices—most of them patented; most of them thought-out by obscure inventors. Many of the most successful inventions financially have been of the "10-cent store" variety.



PATENT PROTECTION
A BOOK FOR INVENTORS

Registered
Patent Attorneys

VICTOR 'S & CO. PATENT BUILDING;

500-P, VICTOR BUILDING;

1007-N, WOOD-

CHICAGO; 1010-N

PITTSBURGH; 1010-N

CONWAY BLDG.,

LOS ANGELES.

MAIN OFFICE: D. C.

WASHINGTON, 1640-N

YORK; 514-N

SECURITY BLDG.,

NEW YORK.

Other Offices: New

San Francisco; 736-N

San Francisco; 736-N

San Francisco; 736-N

San Francisco; 736-N

San Francisco; 736-N

San Francisco; 736-N

San Francisco; 736-N

Name.....

Street and No.....

City of Town.....

State.....

By Tonight! Have this Coupon in the Mail to Washington



PLAY GUITAR!



FREE *Gibson* BOOK

Win popularity and bigger income with a Gibson Guitar, Banjo or Mandolin. Trial and easy payments. Free book gives valuable facts. You learn easily. Write today.

GIBSON, Inc. 1151 Parsons St., Kalamazoo, Mich.

Wrestling Book FREE

Learn at Home



Be an expert wrestler. Learn at home by mail. The greatest wrestlers of all, **Frank Gotch** and **Farmer Burns**, both world's champions have prepared the most wonderful course of lessons ever written on Physical Culture and Expert Wrestling. Be strong and healthy! Handle big men with ease. This great free book tells you how. Don't delay. Write now. State your age.

Farmer Burns School, 3379 Elwood Bldg., Omaha, Neb.

CHEMISTRY



Complete, practical home-study courses prepared by some of the best-known chemists in this country, including **ALLEN ROGERS, B.S., M.S., Ph.D.**—Head of Department of Industrial Chemistry, Pratt Institute; **L. M. TOLMAN, Ph.D.**—Formerly Chief Chemist, Wilson & Co. Now Vice-president, United Chemical and Organic Products Co.; **BRADLEY STOUGHTON, B.S.**—Head of the Department of Metallurgy, Lehigh University, and **OWEN L. SHINN, Ph.D.**—Professor of Applied Chemistry, University of Pennsylvania.

Mail Coupon for Free Booklet

INTERNATIONAL SCHOOL OF CHEMISTRY

Associated with the International Correspondence Schools Box 5542-H Scranton, Penna.

Without cost or obligation, please send me full details of your home-study course in

- Analytical Chemistry Industrial Chemistry
 Chemical Engineering Short Chemistry Course
 Pharmacy

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

TEST YOUR ART ABILITY



There is a market for art talent. Test and classify your ability with booklet "Choosing The Right Key."

Our commercial art directors give you their impartial opinion. Dollar brings book, or write for details.

Department B
 Des Moines, Iowa
 Art Supervisors Bureau



ART SUPERVISORS BUREAU

BE A POULTRY EXPERT

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

Free book shows how to get started quickly. You'll be surprised at the amazing profit opportunities in the poultry business. Wherever you live—whatever you do—it is easy to start on a spare or full time basis. Free book tells all. Send for "How to Raise Poultry for Profit." You learn right at home in spare time by methods endorsed by colleges and leading poultrymen. Know how to get the maximum profits from interesting, healthy work. Iron-clad agreement protects you. We have prepared hundreds for good jobs and businesses of their own. Write now for free book. No obligation. National Poultry Institute, Inc., Dept. 312, Adams Center, New York

Finger Print Experts Get Jobs and Rewards!



You can now enter this established, young and swiftly-growing finger print profession offering genuine opportunities for a steady monthly salary, as well as sharing in Rewards. Trained men are being hired at substantial salaries with the opening of each new Identification Bureau by governments, states, cities, detective agencies, corporations and private organizations. Think of your future—investigate this opportunity for Success. Write for Free details. Institute of Applied Science, 1920 Sunnyside Av., Dept. 30-19 Chicago.

QUICK WAY to make money in



RADIO

Modern receivers are demanding men with modern training for service work. New training method and service equipment offer starts you earning almost at once. Up to \$3 an hour easy in a short time. Write today for FREE book of details.

Radio Training Association of America
 Dept. PM412, 4513 Ravenswood Ave., Chicago

Men & Women Earn Cash at Home!



Grow fancy giant mushrooms in cellar, attic, barn. Easy, odorless method. We show you how, furnish guaranteed materials and buy crops. Valuable big book, pictures free if you write quickly. (Est. 1908.)

UNITED CO., 3848 Lincoln Ave., Dept. P-12, CHICAGO

INVENTORS WE ARE A COOPERATIVE ORGANIZATION, OPERATING AT COST, to promote business relations between manufacturers and inventors; TO PROVIDE INVENTORS WITH SALES OPPORTUNITIES. We examine, AND GUARANTEE TO RECOMMEND YOU TO AT LEAST 5 MFGRS., & send you their names, etc. For examination, write 500 to 1500 words about some article in your field giving advantages, uses, etc. Send with ONLY 75c (total cost, including permanent listing) in coin or P. O. Money Order to: **INVENTORS & MFGRS. COOPERATIVE BUREAU, 2101 CHELSEA AVE., BALTIMORE, MD.**

INVENTORS

A patent is a Deed to intellectual property. Property has a value. To obtain patents, trade marks, Write to **ASSOCIATED SERVICE** 18 East 41st St. New York City
 Our 50 years practice is your guarantee
 We perform as we promise

To PROTECT YOUR INVENTION - Use this coupon, NOW

Delays are dangerous and may be very costly. My personal service assures prompt action, strict confidence, and a minimum of expense. I suggest that you 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, mail the attached coupon at once. I will also send my "Record of Invention" form. (Over 37 years experience as a Registered Patent Attorney.)

L. F. Randolph, 302-D Victor Bldg. Washington, D.C.

Please send me at once, free of charge, your 72-page booklet and "Record of Invention" form.

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

A PERSONAL CONFIDENTIAL PATENT SERVICE

LET THESE GREAT BOOKS
HELP YOU TO

Start Your Climb!

*'the Man
who KNOWS
is the Man who WINS'*

Easy to train yourself! These books have helped thousands—

- AIR CONDITIONING**
Live Field; Great Future.....\$4.00
- AUTO ENCYCLOPEDIA**
Dyke's 16th Edition.
Recent!.....\$6.00
- 110-V. GENERATORS**
Made From Old Auto
Units.....\$1.00
- AUTO TRAILER**
Fun to Tour. Make
Your Own.....\$1.00
- BIRD HOUSES**
Build to Sell; Easy De-
signs.....\$1.00
- BOAT BOOK**
Power, Sail, Rowing,
Paddle Plans.....\$3.00
- BOY MECHANIC**
4000 Things to Make.
4 Vols.....\$7.00
- BUILT-IN FURNITURE**
Take Orders, Make
Money!.....\$2.50
- CARPENTRY HANDBOOK**
336 Practical Short-
cuts.....\$1.50
- CHEMICAL FORMULARY**
5000 New Formulas.....\$6.00
- CHEMISTRY, PRACTICAL
EVERYDAY**
Interesting business, or
Life Work.....\$2.00
- CONCRETE WORK**
173 Uses Described,
Pictured.....\$1.00
- DOG TRAINING**
Home, Stage, Movies,
Etc.....\$1.50
- ENGINEER-CUSTODIANS
MANUAL**
Pay Raising Data for
Building Superintend-
ents and Others.....\$2.50
- FARMERS' BOOK**
861 Kinks for Field,
Home.....\$1.00
- V-8 FORDS**
Also "A" and "B"
Models. All New!.....\$2.50
- FROG INDUSTRY**
New! Raise and Sell
Profits!.....\$2.00
- FURNITURE MAKING**
Tools, Materials, De-
signs.....\$2.50
- GARDEN GUIDE**
Better Results, all
Flowers.....\$2.50
- HOW TO DANCE**
Teach Yourself in
Private!.....\$2.00
- LATHE WORK (Metal)**
Drilling, Threading.....\$1.00
- LOCOMOTIVE**
Folding Chart Shows all
Parts.....\$1.00
- LOG CABINS**
Easy Plans; Build for
Profit. Value!.....\$2.50

- MATHEMATICS**
Easy Guide for the Prac-
tical Man.....\$1.50
- MECHANICAL DRAWING**
Learn Drafting; Good
Salaries.....\$1.00
- MONEY MAKING IDEAS**
1000 Spare Time.....\$1.00
- OCEAN LINER "EUROPA"**
Atlantic Speed Queen;
Charted.....\$1.00
- PLUMBING**
500 Facts Every Home-
owner Should Know.....\$1.50
- POULTRY**
Breeding, Management.
Protect Your Profits!.....\$2.00
- PROSPECTORS' HAND-
BOOK**
How to Mine, Appraise,
Equip.....\$3.00
- RADIO**
Amateurs' Handbook;
Circuits, Repairs,
Etc.....\$1.00
- RADIO SERVICING**
Profit by Knowing
Costs, Kinks, Etc!.....\$1.75
- REFRIGERATION SERVICE**
Manual (All Makes).....\$5.00
- REWINDING ELECTRIC
MOTORS**
Fractional Sizes. Value!.....\$2.50
- SHIP MODELS**
Entire Text, Famous
"Sovereign" of 1637.....\$1.00
- SHOP NOTES LIBRARY**
8 Vol. 3600 Wonderful
Shop Ideas.....\$3.50
- STEEL SQUARE**
How to Figure Angles
of Rafters, Roofs, Etc.....\$1.00
- STORAGE BATTERIES**
New! How to Build,
Repair, Charge.....\$2.50
- TOYS**
For Amusement or Prof-
it. Saleable Designs.....\$1.44
- UPHOLSTERY**
Always a Big Market.
Start Own Business.....\$1.60
- WELDING ENCYCLOPEDIA**
All Methods; Hard Jobs
Made Easy.....\$5.00
- WIRING**
Approved Economy
Methods for Homes,
Buildings.....\$2.50
- WOOD TURNING**
Woods, Tools, Methods;
Practical Teacher.....\$1.50
- WOODWORKING SHOP**
Motor-driven. 3 Big
Volumes.....\$3.00
- WRIGHT ENGINE**
Chart of "Whirlwind";
All Parts.....\$1.00

Books sent C.O.D. anywhere in U.S.

Just check the books you want, write your name and address below, and mail the advertisement. It is your order blank. When postman hands you books, pay him the price and few cents postage. If outside the U. S. remit when ordering and include 10 cents per book extra for postage. We have many other books on these and 2,000 other subjects. Catalog free.

Name

City State

Address

Mail to **Popular Mechanics Press,**
Room D 4—200 East Ontario St., Chicago, Ill.

IS THIS BILL COMING TO YOU

SMITHE GARAGE

Name John Doe
Address 413 Main St.

GAS	24	gallons	4	80
OIL	3	quarts		90
REPAIRS	✓			28 00
ACCESS.				
FLATS				50
GREASING				
ALL OTHER				

TOTAL 34.20

THOUSANDS of bills like this were sent out last Winter. Who paid them? Car owners who tried to save a dollar or so by using anti-freeze that boiled off.

Remember those spouting, steaming frozen-up cars you passed last Winter? Lots of those cars had been "protected" with an anti-freeze that boiled away. What good is that kind of "protection?" Why save a few pennies on anti-freeze and spend many dollars for major repairs?

Eveready Prestone will not only save you such expense, but will give you comfort and peace of mind. By actual tests, it protects against rust from 5 to 20 times longer than other anti-freezes. One shot gives full protection against rust, corrosion, and freeze-ups, no matter how warm the weather gets between the cold snaps.

Complete All-Winter Protection so Inexpensive

It's so easy and inexpensive to protect your car with Eveready Prestone (even down to 60° below zero if desired). Turn to Page 15A and see on the chart how little it costs to have all-Winter, one-shot anti-freeze protection for *your* car.

TURN TO PAGE 14A

When writing please mention Popular Mechanics

How Science Measures "AUTO-FATIGUE"



Dr. Andrew H. Ryan, well-known authority, tells you here exactly

how he measured the effects of "auto-fatigue" on the human body during motor-ing, and the astounding facts he discovered.

IT is a well-known fact that thousands and thousands of motorists suffer from 'auto-fatigue.' That is, long, hard drives, covering great mileage, or city driving with its difficult traffic conditions, often produce physical and nervous exhaustion.

"In my laboratory at Chicago, we determined to make a sound, scientific study of the nature and extent of this exhaustion. First, I developed or adapted a number of special instruments, all highly delicate in nature, to make these experiments.

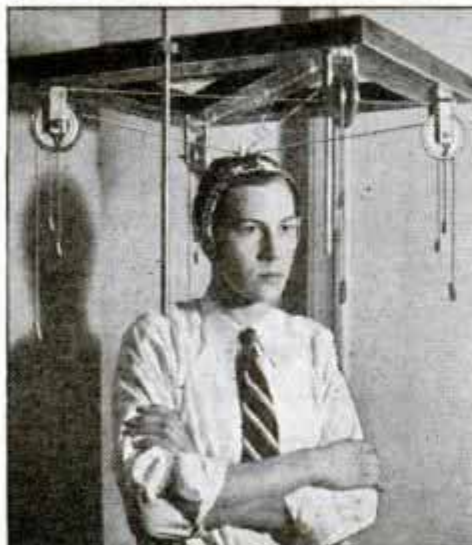
"As subjects, I chose several carefully picked college men, and put them through a series of experiments extending over several weeks. Records were taken every morning before the driving started, then the men set out in a body, using different makes of cars, for 200 to 400-mile trips. Records were kept at varying intervals during the drive, and a complete comparison made at the conclusion.

"Figures for each make of car were kept, and I was interested to note that the drivers on the Dodge car showed 54% to 65% less nervous and muscular impairment, due to fatigue, than on other cars tested."

The astounding results of Dr. Ryan's tests are due to basic and radical advantages in Dodge engineering—to dozens of special comfort features that make riding easier. By a remarkable invention known as Floating Power engine mountings, vibration in a Dodge is completely smothered. Then, too, Dodge utilizes rubber at 56 vital points—protection against road shock, noise, bumps, and rough riding. The Dodge type of independent front-wheel suspension is also a means of increasing comfort. The easy action of hydraulic brakes assures easier, smoother operation—less fatigue.

Anyone can understand that vibration will slowly but surely shake an ordinary car to pieces. With vibration smothered, Dodge, of course, lasts longer. You don't have to pay out money for repair bills that constant vibration causes, either.

Go to any Dodge dealer and ask for a free copy of the booklet describing Dr. Ryan's tests. Drive a Dodge. See for yourself that Dodge is easier to drive, that it is easier on your nerves, that it gives an entirely new kind of comfort. Dodge Brothers Corporation, Division of Chrysler Motors.



POSTURAL STEADINESS TEST—This sensitive instrument measures accurately the amount of body sway (a sign of fatigue).



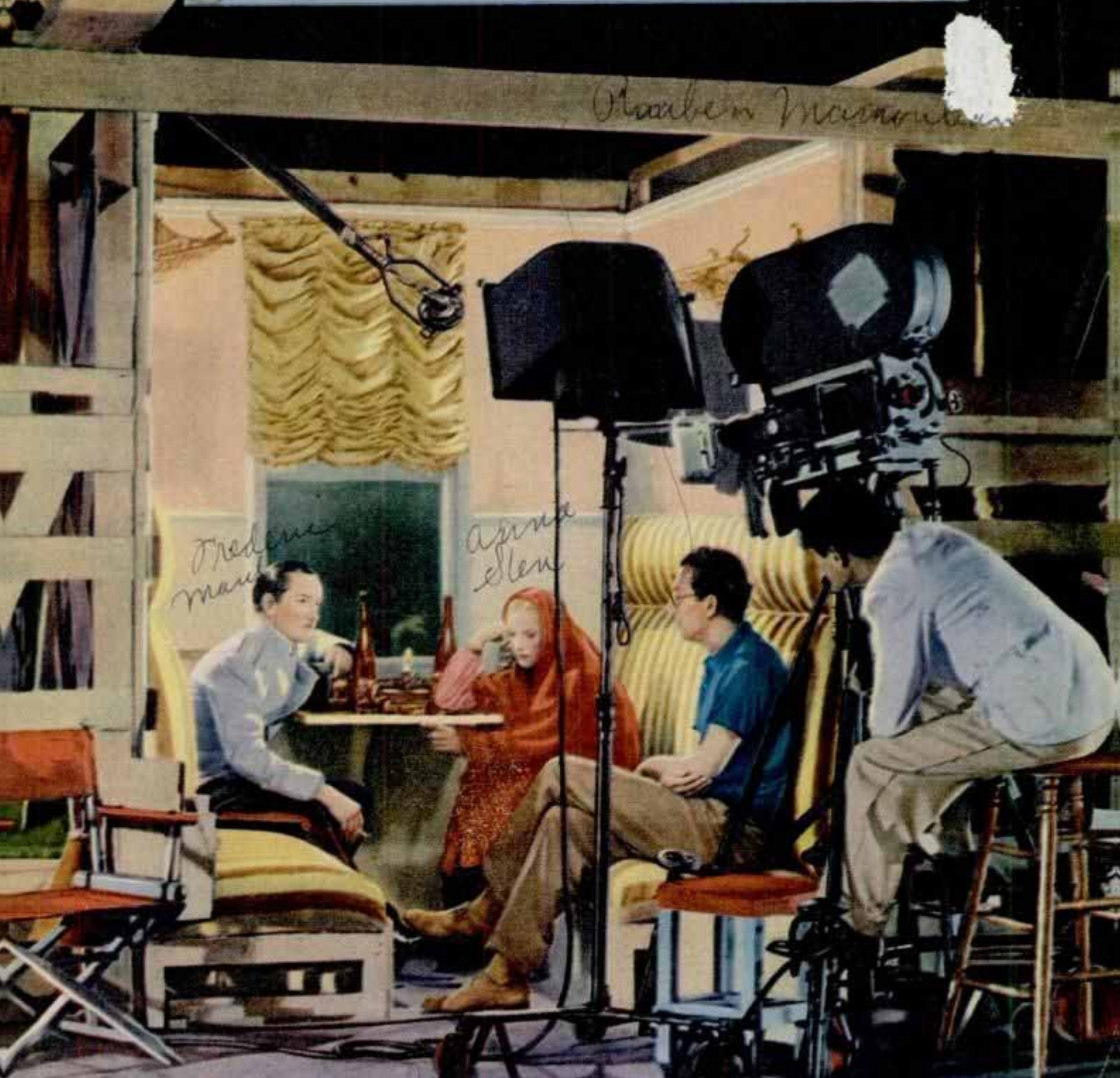
HAND-EYE COORDINATION TEST—This instrument measures hand steadiness and coordination with the eyes, to the *n*th degree.



VASCULAR SKIN REACTION TEST—This instrument records the reaction of the blood vessels of the skin to a tired nerve condition.

When writing to advertisers please mention Popular Mechanics

MOVIE MAGIC *in the* MAKING

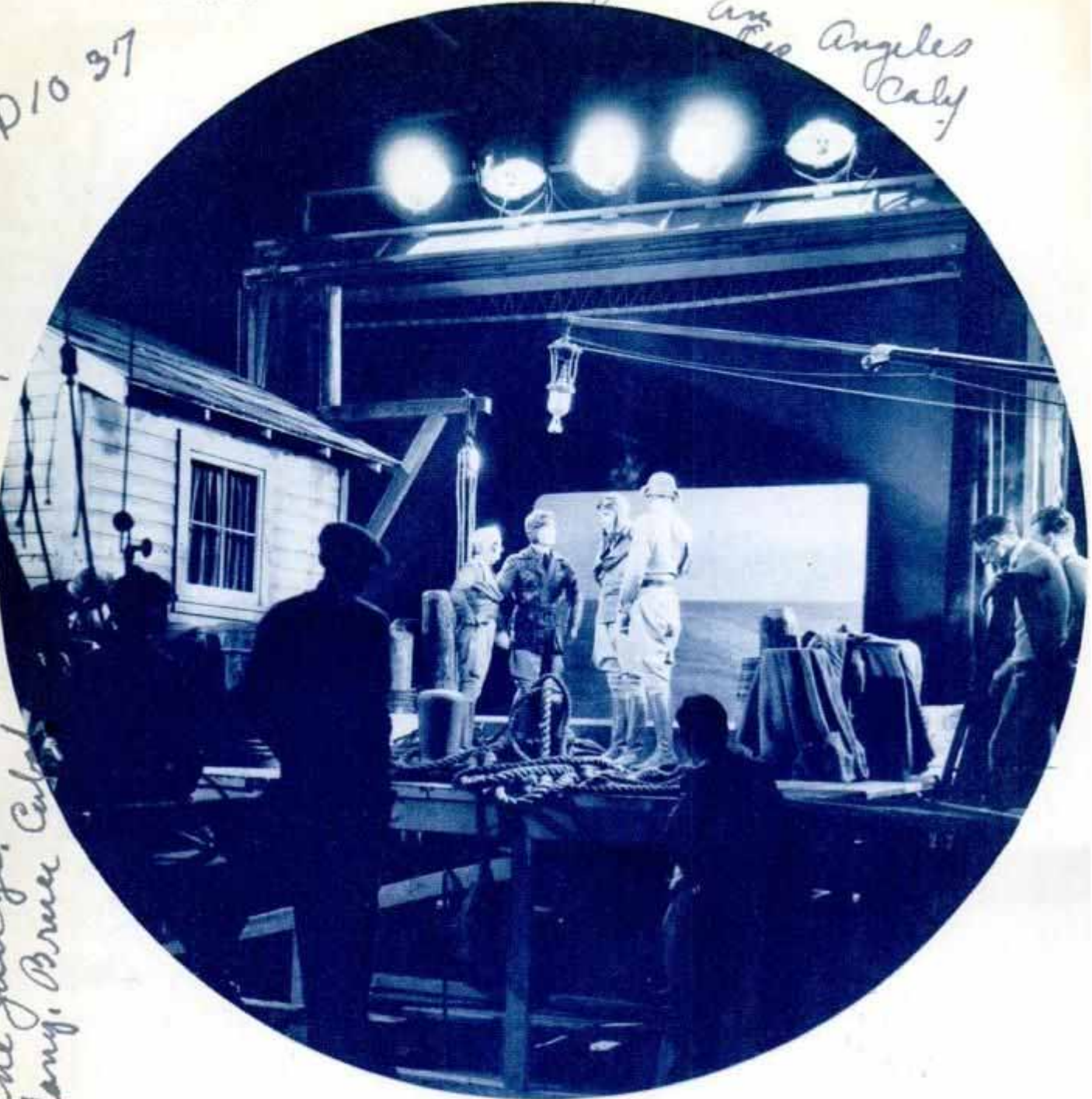


Theaoben Macnamara
Frederica March *Anna Sten*
D1037
Cinemalogue
SCENE from *We Live Again* showing how sets, such as this interior of a compartment on a Russian train, are constructed inside the sound stage where both the scene and the sound are recorded.

Mr. Mos & Sumner - Jr. 10550 Holman
Los Angeles Calif

D10 37

"Flying Circus"
Arline J. Adge, Eric Linder, Ralph
Bellamy, Bruce Cabot



BEHIND this water front scene from an RKO-Radio picture can be seen the "process screen" on which a movie of the ocean is projected from behind.

PART I

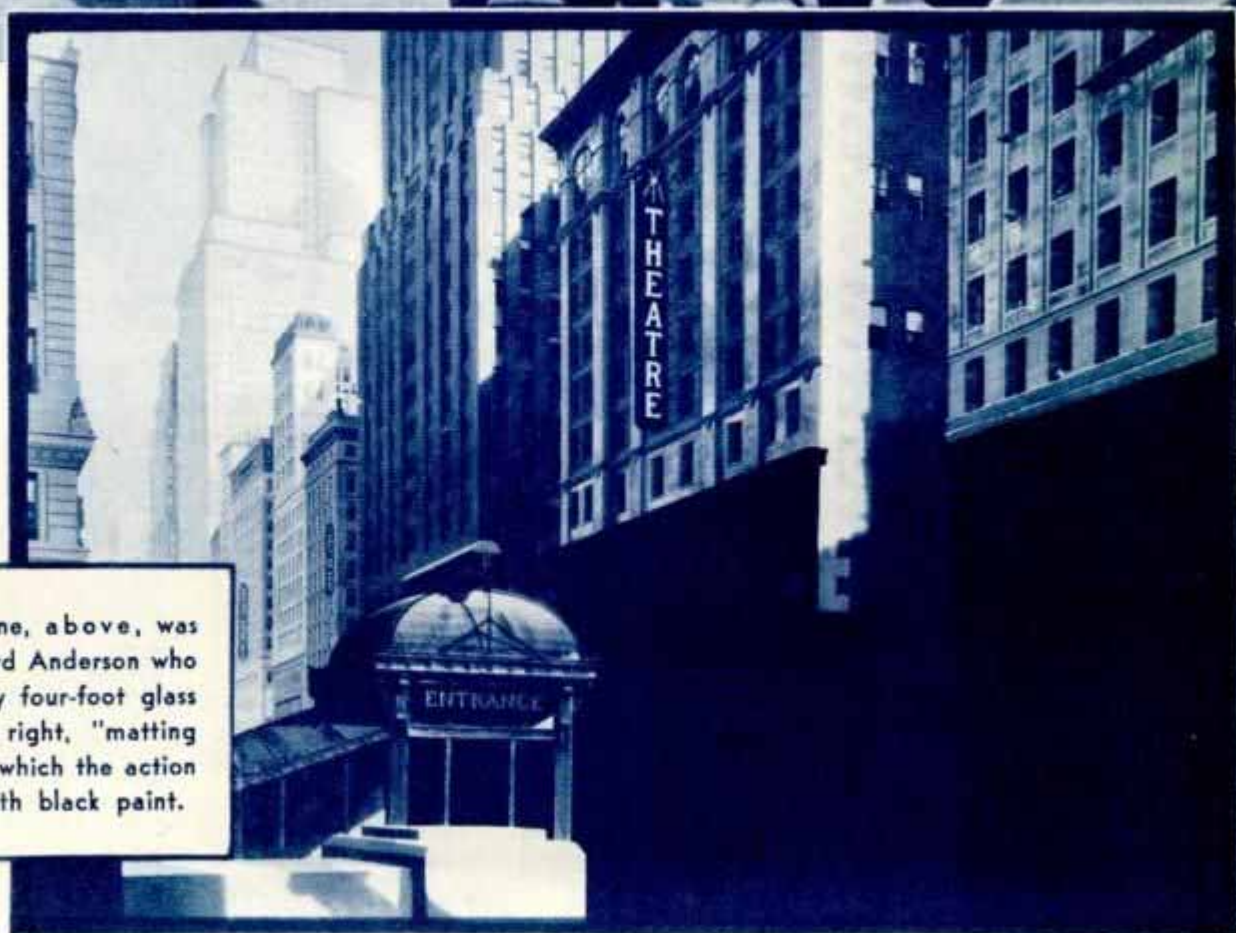
IN Hollywood thick walls padded and insulated like a butcher's ice box separate the everyday world from a strange land of illusion. With your guide you go through the "sound lock" entrance to a sound stage and, like Alice through the looking glass, step straight into a wonderland that makes you gasp. On the set you may find real South Sea islanders rehearsing a native dance. Inside another stage you may see a life-sized yacht stranded on a sandy beach.

filmed you stroll down a paved New York street and turn a corner to come upon the decks and superstructure of a liner rising from the ground, flanked on one side by the entrance to an old world cathedral and on the other by the squalid buildings of a typical Chinese water front. A few yards away, before the tiered boxes of a Roman arena, gladiators are engaged in a duel.

Nothing is impossible in pictures and if a plot calls for a scene that stumps the set designer the job is turned over to the special-effects department. Tricks that defy deception are used when lives would be endangered otherwise or when costs

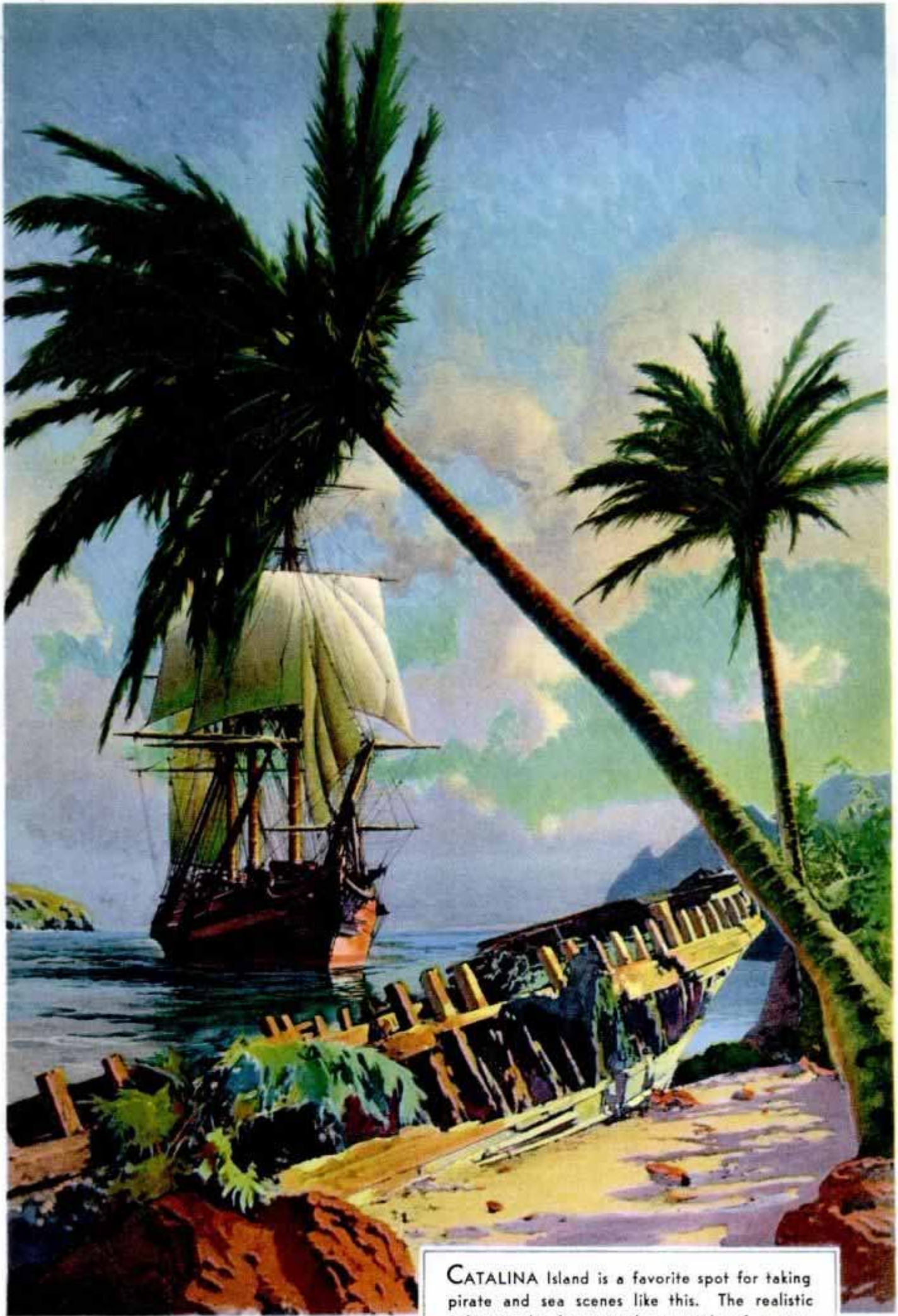
On the "lot" where other scenes are

Inc. Association of Motion Picture Producers
1500 N. Hollywood Blvd. Los Angeles



THE street scene, above, was created by Howard Anderson who used the three by four-foot glass painting at the right, "matting out" the area on which the action was to occur with black paint.

D1031



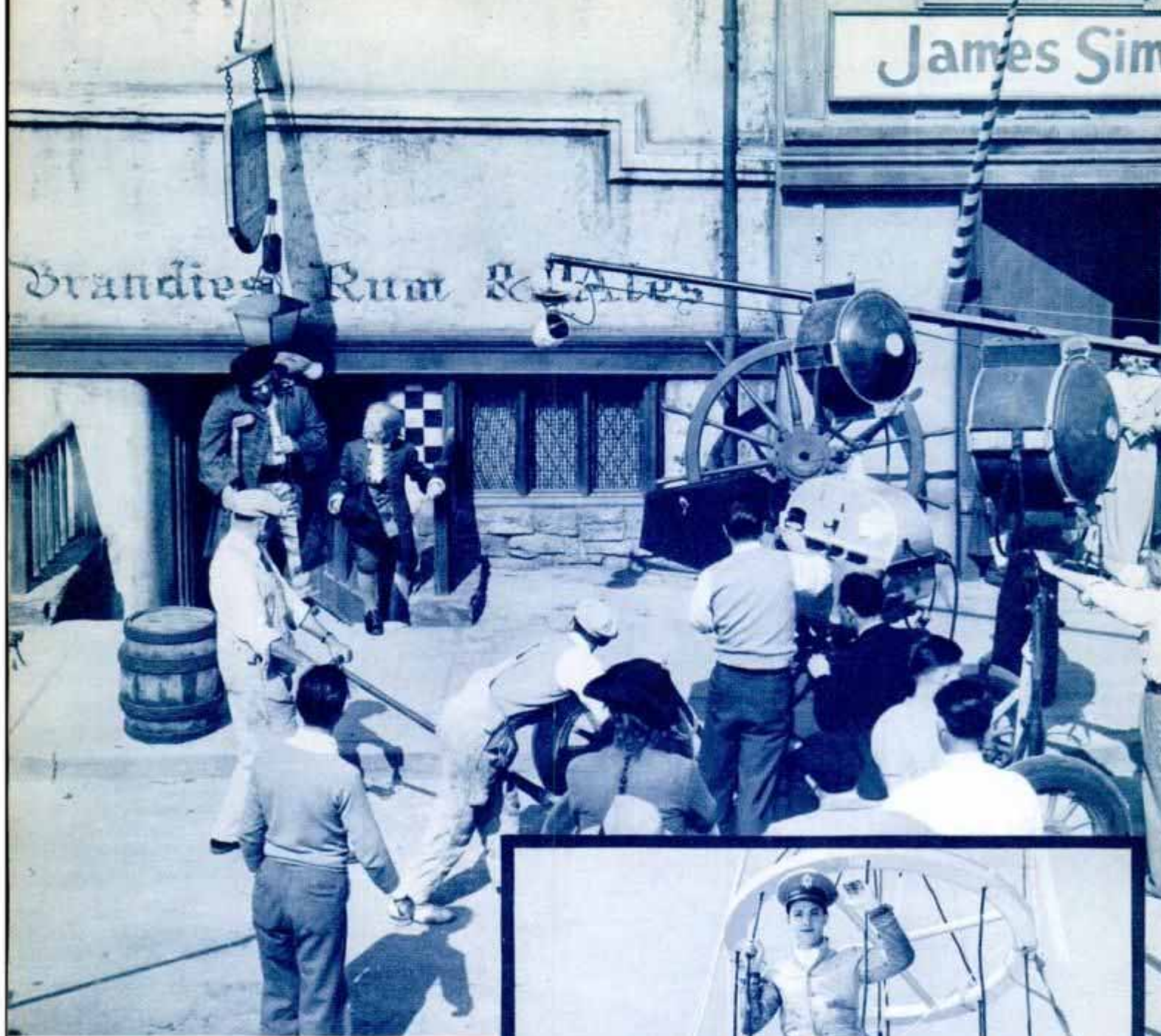
CATALINA Island is a favorite spot for taking pirate and sea scenes like this. The realistic palms in the foreground are made of papier-mache.



FILMING a water scene inside an RKO sound stage. The speedboat cavorts in water inside a built-up wooden tank.

prohibit making a scene in real life. Instead of sending an entire company to Alaska for an Arctic picture a camera crew alone may go to film the scenery. Back in the studio fur-clad actors pose in front of a process screen on which the moving pictures filmed in the north are

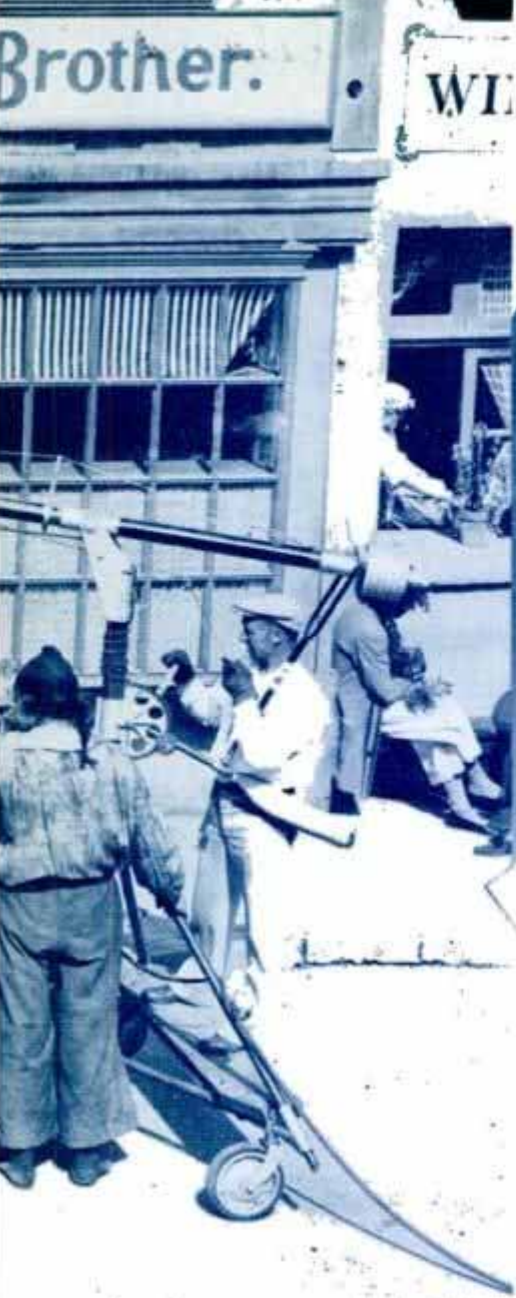
thrown from behind. Under the controlled lights of the studio the result is often better than if the whole picture had been filmed on the distant location. In front of such an animated backdrop a star may be filmed riding through the streets of London, golfing in Italy, and



D1037

ABOVE, the entire recording apparatus, including the camera lights and sound-effects equipment mounted on a platform, is moved along on wheels as the actors continue along the street. The long rod bearing the microphone is adjusted constantly in order to record the speech of the different actors. Right, stratosphere balloon gondola used in Monogram picture and built to exact specifications of balloon which made high altitude ascent.





D1037



CECIL B. DE MILLE and Sid Grauman, studio executives, studying sketches from which sets for a motion picture are to be designed.

hunting tigers in India all in the same day.

Spectacular airplane crashes, the bombing of a city, or the dramatic breaking of a dam are often done in miniature so perfectly that audiences are sure the picture is real. In the miniature department the craftsmen build tiny armies that appear to march and even midget horses, controlled by clockwork and wires, that move with lifelike motions. Accurate to the smallest detail and built exactly to scale, the models often require months to construct. For one picture a futuristic miniature of a city as it might appear half a century from now, with wire-controlled airplanes landing on the roofs, was built. To the single eye of the camera, size is a matter of perspective and often miniature buildings close be-

hind the actors are used to give the appearance of distant backgrounds.

Picture audiences are super-critical and the test of any trick is its realism. One company that recently filmed the sinking of the "Titanic" made certain that the scene inside the dining room at the instant of the crash against the iceberg would be true to life by mounting the entire set on timbers and rollers and coupling it to a counterbalance. Then, when the set was shaken by a truck driven into the hidden timbers at an unexpected moment, the diners were thrown into confusion and the chandeliers rocked realistically.

One of the accomplishments of the movie magicians is to make animals act, or appear to act, exactly according to the
(Continued to page 126A)

Leonel Barrymore as Billy Bones Treasure Island

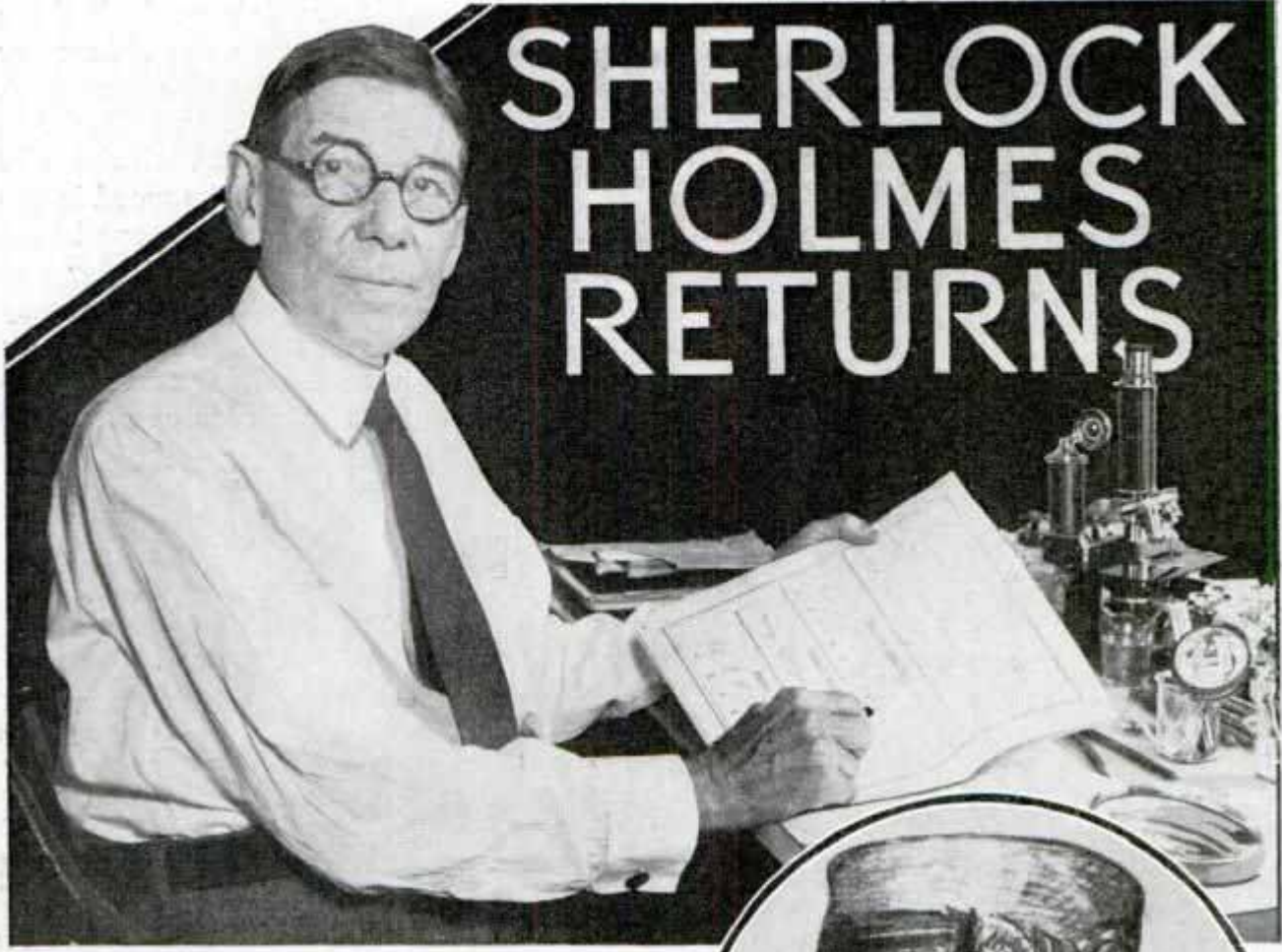


D1837



THIS scene—fifty stories up—was made on stage floor with miniature city as background. Above, surf and sea background are projected from film.

5/218
1115, 17th St. N.W.,
Washington, D.C.



SHERLOCK HOLMES RETURNS

B. C. Farrer, Handwriting Expert, Who Decided from a Study of Ransom Notes That Lindbergh Kidnapers Was German Carpenter

A METHODICAL Teutonic or German carpenter." That is the picture B. C. Farrer, handwriting expert of the treasury department, drew of the Lindbergh kidnapers even before any ransom was paid. This deduction was based on a study of the handwriting of the ransom notes.

Disclosures following the arrest of Bruno Hauptmann in the Lindbergh case seem to indicate that the famous Sherlock Holmes has been reincarnated not only in the person of the treasury department expert, but in the entire system of criminal investigation of the department of justice.

That the writer of the ransom notes was German would be apparent to the expert at a glance. That the writer was methodical is apparent

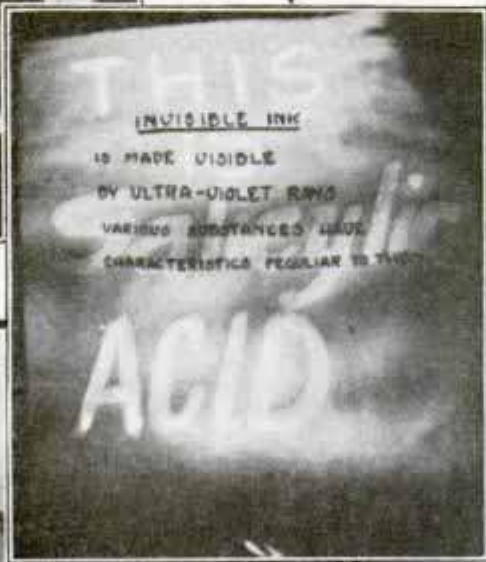


Sketch of Man Who Received Lindbergh Ransom Money Made from Description of Man Who Dealt with Him, and Photograph of Bruno Hauptmann

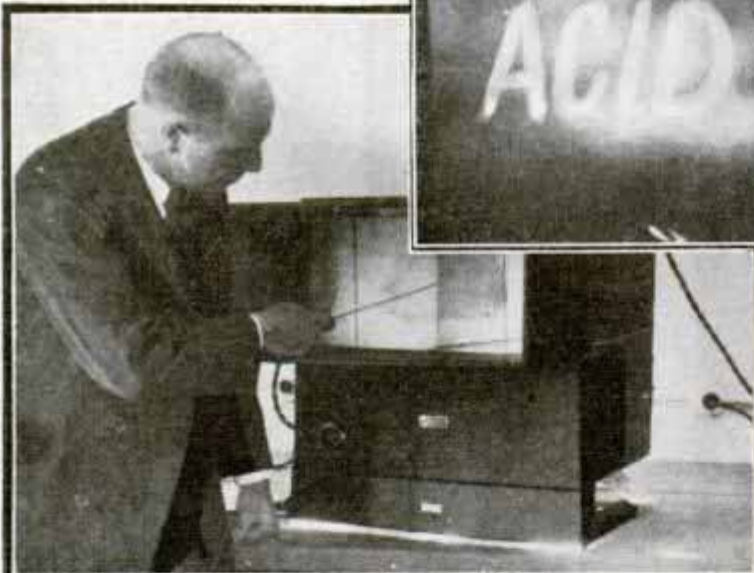
D 12/8
810



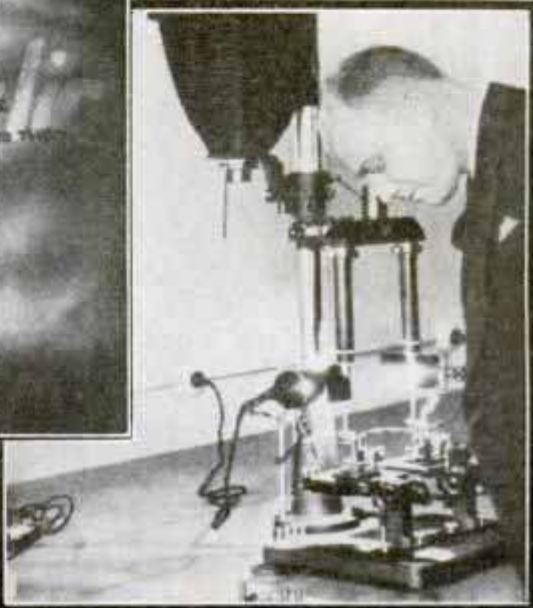
These two photographs illustrate the action of ultra-violet light in disclosing the presence of secret writings made by invisible inks.



were driven flush there was not a single hammer mark on the wood. A broken rung fixed his weight at about 160 pounds. The wood in the ladder was traced to a Bronx lumber dealer, and when the ransom money began appearing in an area with the Bronx district as its center, the



Illustrating the use of an instrument whereby the enlarged images of two separate fingerprints are thrown together on a screen in such a way that the lines of one flow into the lines of the other, if they are identical.



Illustrating the use of a comparison microscope. The enlarged images of the bases of two cartridges or of two bullets are thrown together on a single eyepiece.

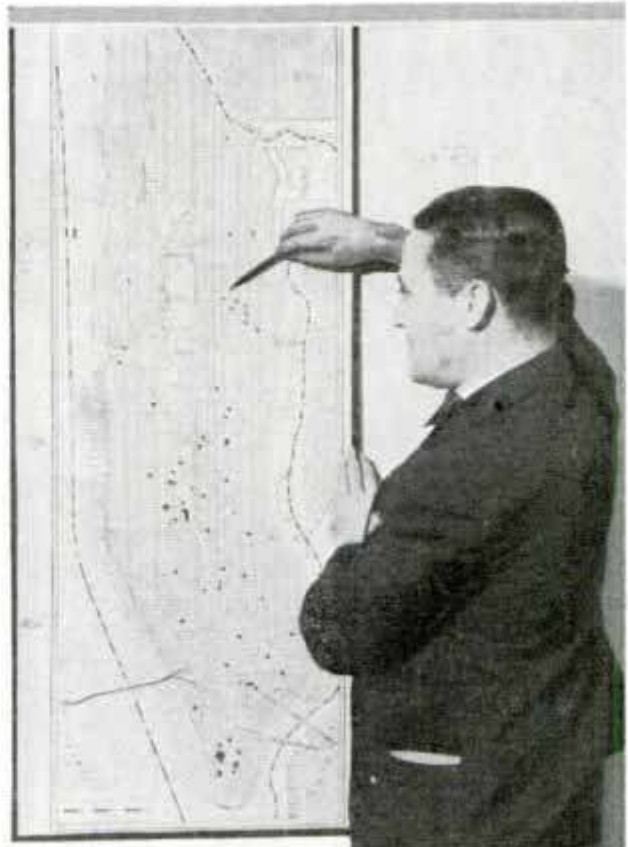
from the deliberateness of the writing and the careful planning revealed in the text. A detailed drawing of the box in which he wanted the money delivered, together with a certain stiffness of the writing, always found in those who work with their hands, and the square holes in the ransom notes evidently punched with a file, indicated that he was a carpenter.

Observations of detectives added to and corroborated the work of the handwriting expert. The homemade ladder used in the kidnaping could only have been built by a carpenter, for the rungs were perfectly mortised, and although forty-eight nails

search was centered in that locality. With emery dust and glycerine appearing on this money under the microscope, further proof was given that the kidnaper was a mechanic or carpenter who sharpened his own tools. A musty odor indicated that the money was kept underground.

But in spite of the accurate verbal descriptions given by Sherlock Holmes, he was never able to furnish fellow detectives with an actual likeness of his quarry. How the department of justice special agents did just this constitutes a distinct advance in scientific crime detection. James T. Berryman, sports cartoonist of the Washington Star, was called in to furnish a pictorial likeness of the man who received the ransom money. Berryman called on John

F. ("Jafsie") Condon, who passed the money through the cemetery hedge in 1932, and obtained a description of the kidnaper. Then going to the public library he requested files of illustrated German magazines. Selecting portraits of the oval Teutonic type of face he made composite sketches of the type. Returning to Condon with the sketches, the aged educator pointed out where the features of "John" differed from those of the composite—the mouth a little straighter, the droop of the left eyelid more pronounced, a line at the side of the mouth, and the cheeks a bit flatter. After four hours of erasing and re-drawing, Condon pronounced the likeness as nearly perfect as his memory could direct. Berryman made finished drawings of these sketches, which were photographed and distributed to detectives working on the case. The remarkable results obtained by Berryman can be seen by comparison of the sketches, reproduced



cross the street and
walk to the next corner
and follow white line
to the road

take the money with
you. come alone
and walk
I will meet you

The boy is on Good Kelly;
it is a small Buca 28 feet
long. two person are in the
Boat. they are innocent.
you will find the boat between
Horseneck Beach and Jay Hook
near Elizabeth Island.

Prisoner's signature

FOLD THIS CARD

7-1730

U. S. GOVERNMENT PRINTING OFFICE: 1931

Above, Map of Manhattan Which Aided in Tracing Ransom Money; Colored Pins Were Placed in Map to Indicate Points Where Money Had Been Passed; Below, Handwriting Experts Claim to See Similarity between Hauptmann's Signature and Writing in Ransom Notes

here, with photographs of the suspect now under arrest.

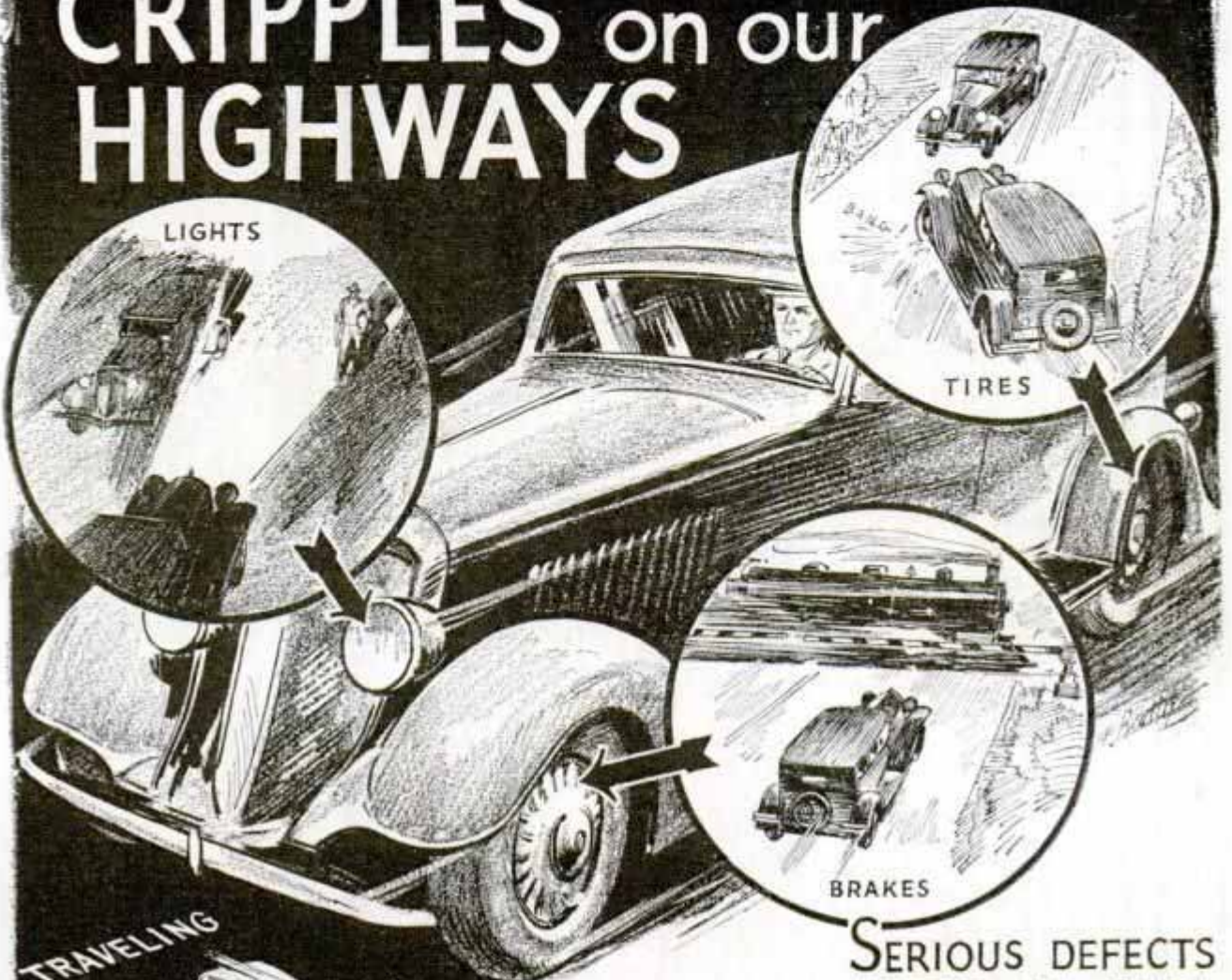
But this Sherlock Holmes method of building up a picture of an unknown suspect from meager clues has not been confined to the Lindbergh case. The labora-

tory of the division of investigation is equipped to take this sort of work in its stride. For instance, there have been over 800 types and sizes of tire treads manufactured in the United States in recent

(Continued to page 134A)

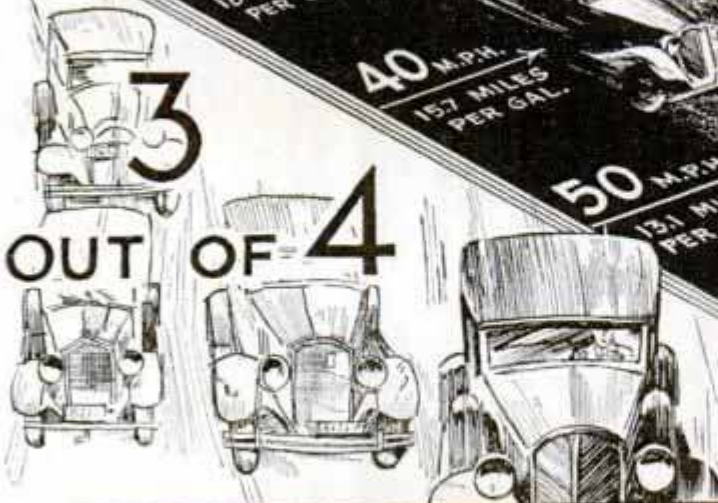
D/232

"CRIPPLES" on our HIGHWAYS



SERIOUS DEFECTS NOTED IN CARS

BRAKES . . . 34%
 TIRES . . . 48%
 LAMPS . . . 69%



EXAMINATION OF MORE THAN 3,200,000 MOTOR VEHICLES IN 1933 SHOWED THAT THREE OUT OF FOUR WERE DANGEROUS BECAUSE OF SOME DEFECT . . .

Note: See Next Issue for Other Hints on Safety First in Driving Your Car

10 1232

How Fast CAN YOU STOP?

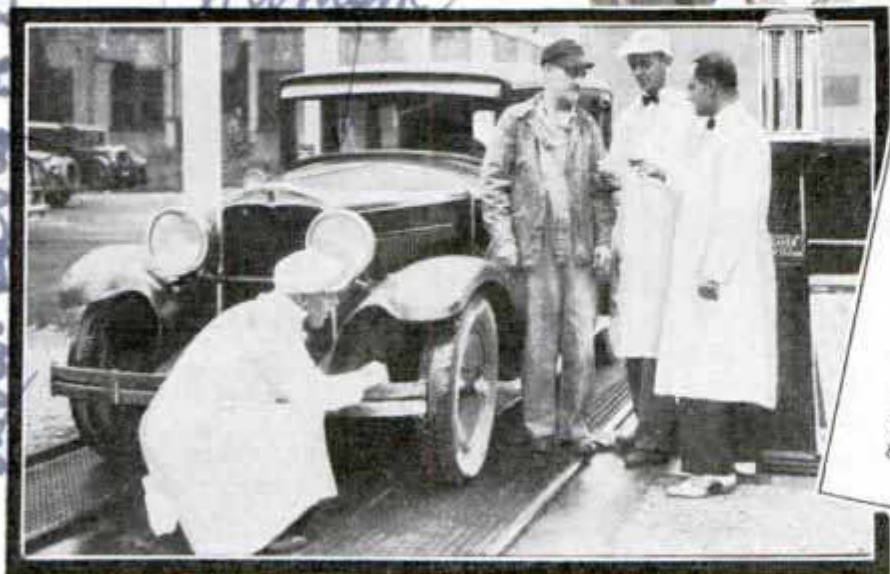
WITH the death toll from automobile accidents increasing all over the country, and the cheapest car built able to do over eighty miles an hour, engineers are turning from brute speed to meet a public demand for "The Safest Car in the World."

Since 1930 approximately 145,000 persons in the United States have been killed on the highways and the total accidents have risen to more than 800,000 a year. "Safety Lane" tests have demonstrated that seventy-five per cent of the cars now in operation are in defective condition.

Safety glass all around, sturdier body construction, driver's license, and, above all, periodic inspection of brakes and tires are being emphasized by legislative enactment in many states. Power brakes and centrifuse drums, to eliminate warping, have helped, but inventors and engineers are still busy on the problem of quicker stopping.

One of the most recent developments is brakes that work on the principle of a disc-type clutch.

(Continued to page 142A)



Average Stopping Distances FOR 4-WHEEL BRAKES	
Speed M. P. H.	Stop Feet
10	5
20	20.5
30	36
40	82.5
50	129
60	186.5
70	252.5
80	330

Top: Latest Clutch-Type Brake; Below: a "Safety-Lane" Test and Table Showing Average Time Required to Stop Car Traveling at Different Speeds

American Disc Brake Co. 813

Chas. H. Smith

Stinson

Road to Angeles Calif

Wagner's Wood Service Co. Inc. D 1197 27 27 S. Mary Chicago

Proposed by Merle Bull St Paul, Minn



Sample of Wood Inlay That Can Be Made Easily with Designs Shown on the Table

WOOD INLAYS MADE EASILY WITH PREPARED VENEERS

Wood inlays, made by gluing beautiful veneers to wooden articles without using clamps or veneer presses, are easy to produce by working with a new process. The veneers, prepared in advance, are treated to prevent curling while the glue is setting. Backs of the veneers are coated with a special glue. After moistening this glue, the veneers are attached to the wooden article by pressure of a hot flatiron. More than twenty-five designs, cut to fit together like a jig-saw puzzle, are available.

HIT-AND-RUN DRIVERS TRACED BY NUMBERS ON LAMPS



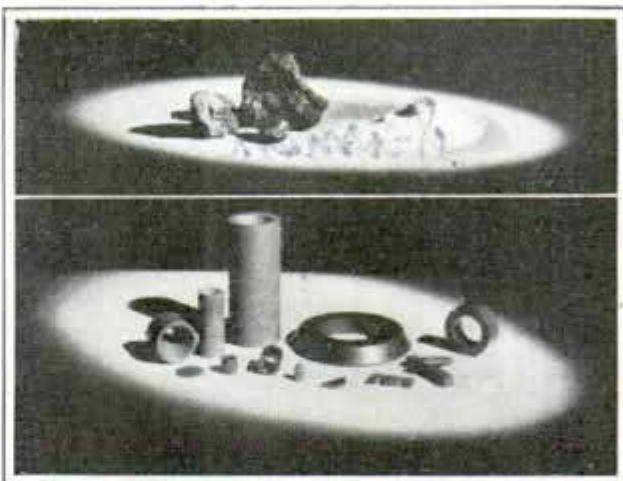
Some cities are considering a plan for detecting and apprehending hit-and-run automobile drivers which involves etching recorded numbers in the lenses of head lamps of each vehicle. The plan is based on the fact that the lenses are often

broken when such drivers are involved in accidents and are the only evidence remaining after they have fled. The numbers etched on each car's lamps would be filed for a permanent record and tracing drivers would be easy if the numbers were found at the scene of an accident.

D 128/

HARDEST MAN-MADE MATERIAL GRINDS BEST ALLOY TOOLS

Tools made of the new hard alloys, known as cemented tungsten carbides, may be cut and lapped with an abrasive that is the hardest material ever produced by man. It closely approaches the hardness of the diamond. This material is chemically known as boron carbides, being a combination of the rare metal, boron, and ordinary carbide. It readily scratches and cuts the hardest synthetic materials. The strongest acids and alkalis do not affect the abrasive, which has a compressive strength of 260,000 pounds per square inch, although it is lighter than aluminum. The material is little affected by temperatures up to 1,000 degrees centigrade, at which point the diamond burns completely. Boron occurs in large amounts in the form of minerals which contain it as an oxide, these minerals being known in the form of borax. The abrasive is prepared in



Top, Boron Carbides; Bottom, Some Shapes into Which the Material Can Be Fashioned

high-temperature electric furnaces. One application of the new material is in the form of sandblast nozzles, which last several thousand times longer than metal nozzles ordinarily used. Other applications will be in grinding of tools, where diamond dust has been used as the abrasive.

Intargia wood see Nov. 1933

Worster Co. Worcester, Mass

Ent. George Smedal of Minneapolis, Minn. D 215

Similar to the one used by...

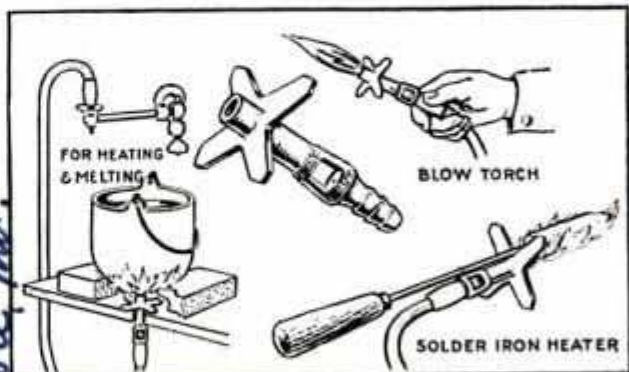
'Shadow Printing' Speeds Up Drafting Work



A Box Like This with Sensitized Paper Tacked to Bottom Enables the Making of True Contours of Small Objects

To enable draftsmen to obtain true contours of small objects, a method of "shadow printing" has been developed. Heretofore it has been difficult for the draftsman to reproduce quickly the true contours of an article such as a percolator for the factory blueprints. By the short-cut method, the model is fastened in an open box having four sides and a bottom. A piece of sensitized blueprint paper is tacked on the inside bottom boards of the box and the box and model are then exposed to the sun's rays at the proper angle for the time required to obtain a clear print. The great distance of the sun in relation to the nearness of the model to the sensitized paper results in an accurate outline. The sides of the box are necessary to eliminate any lateral reflection. The paper is developed in the usual way and on it are placed the dimensions, designs and decorations. Tracing paper is then placed over the shadow print and the shadow is copied.

blow torch and solder iron heater which can be attached by means of a hose to any gas jet or gas connection. It gives an even steady flame eight inches long and one inch in diameter and there is nothing to adjust or get out of order. Construction for back draft eliminates the need for an air tank for a blow flame. The arms on the torch serve as a support to hold the flame above the work bench and to hold the iron in place for heating.



This Gas Blow Torch Can Be Used for Many Purposes, Including the Heating of a Soldering Iron

GAS BLOW TORCH IS COMBINED WITH SOLDER IRON HEATER

Ordinary size solder irons are heated in less than a minute with a combination gas

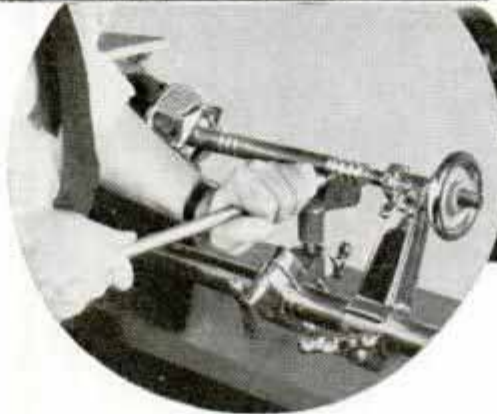
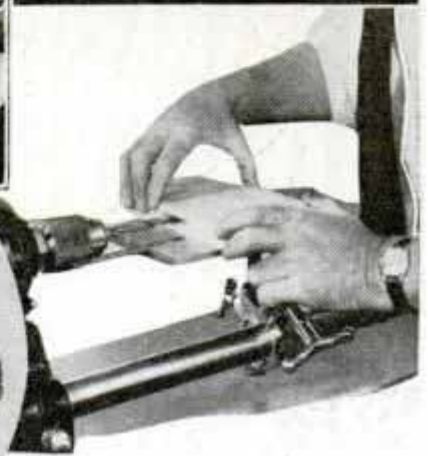
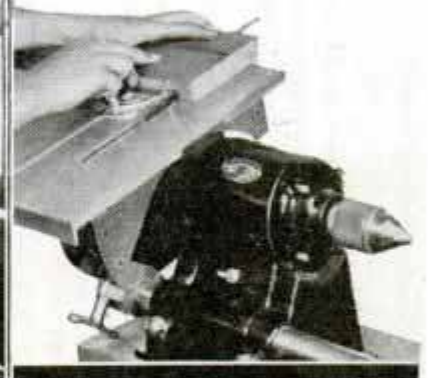
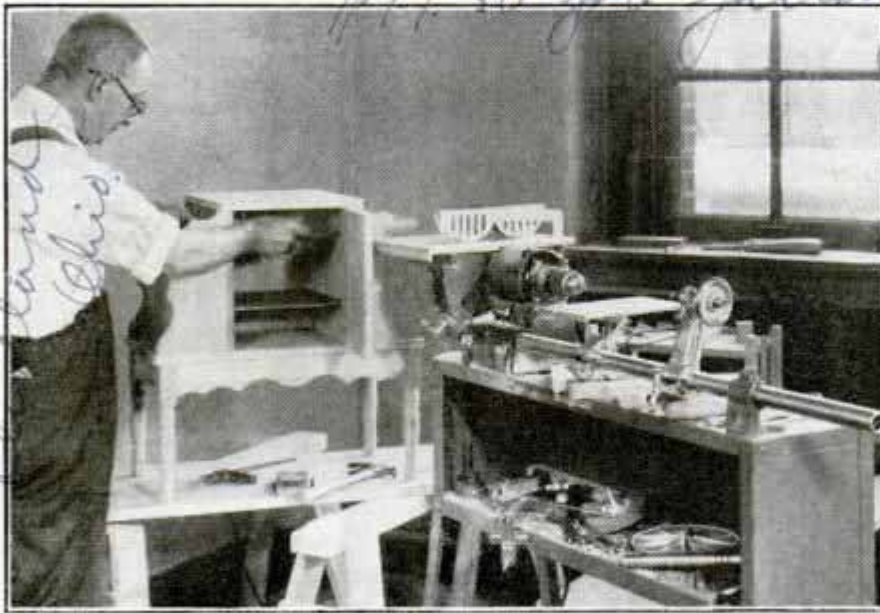
(Drinking straws made of Cellophane are durable, spring back into shape when bent, and are unaffected by carbonation.

The Harvester Co. Baltimore Md. W. Steffenbach, Pres. Chicago, Ill. 1500

D1288

Wood and Metal Workshop in Compact Unit

\$99.50 Job Factory



Top, Left, One-Machine Workshop; Other Photos Show Three Operations of Which the Machine Is Capable; the Equipment Occupies Small Space

So compact that it occupies floor space only eighteen by thirty-eight inches, a one-machine workshop is available to the amateur or professional. The outfit is designed to do all sorts of operations in wood and the softer metals. It has a clamping arrangement for changing from one attachment to another in a few seconds. The workshop can be set up in thirty minutes. Here are some of the things the outfit, announced by the General Electric company, will do: saw wood up to one and three-fourths inches thick; turn wood with a limit of nine inches diameter for face-plate work; turn brass and aluminum; sand flat surfaces and contours; scroll work on wood up to two inches thick and metals including sheet iron; drill wood and metal and cut rabbets and grooves. The machine has a smooth-cutting, hollow-ground circular saw and a full-sized industrial type chuck of half-inch capacity.

edge of a wing leaves a sharp dent. In landing, the horizontal stabilizer at the rear is also bombarded with gravel and rocks thrown up by the wheels and receives its share of dents. To prevent this denting, rubber "shoes" are now being worn on stabilizers and wings. They are



All-Metal Airplane Wing Dented by Hailstones; Rubber "Shoes" Now Prevent Such Damage

RUBBER "SHOES" ON AIRPLANES WARD OFF HAILSTONES

Hailstorms offer a particular hazard to the big all-metal passenger planes. The speed of the ship is its own undoing and even a small stone striking the leading

shaped to conform with the airfoil section and are vulcanized on the leading edge of the wing where they absorb the blows.

General Electric Co. Specially
Appliance Sales Dept. 140 Park
Avenue
New York, N.Y.

D1794

B. F. Smith and Co. Rubber Co.

Timer Shows Mature Man Fastest on Trigger



Using Electric Timer to Record Speed of Reaction to Firing Signal; Left, Timer Attached to Gun

It has long been known that there is a lapse of time between the instant you decide to do a thing and the instant you actually start doing it. This is known as the reaction time and is the period between the instant you decide to stop your car and the instant you actually step on the brake. Young men somehow have gained a reputation of possessing a quicker reaction response than their elders. It has been taken for granted that a young man is justified in taking more chances in driving a car, for instance, than an older man because it was assumed he was able to think and act faster. This reputation of the youngsters for fast thinking was shattered recently by tests with an electric timing device developed by a gun manufacturer. The shooter was told to pull the trigger as soon as possible after he saw a light flash on the target. When he actually pulled the trigger, he closed a switch attached to the gun and the device measured the time between the flash of the light and the pulling of the trigger. Tests with groups of different ages showed that the mature man reacted the

fastest and boys the slowest. Youths from ten to nineteen years required nearly a quarter of a second to pull the trigger of the gun. The best time was made by the group ranging from forty-five to forty-nine years who averaged less than one-fifth of a second, the low man requiring fourteen-hundredths of a second to pull. The average time for the group from twenty to twenty-nine years was .203 second and the group from forty to forty-four set the same average while those from thirty to thirty-nine averaged exactly one-fifth of a second. The average for all men from twenty to forty-nine was one-fifth of a second. For those from fifty to eighty-five years old, the average time reaction was a trifle higher, .202 second, and the figures were not quite so revealing. The age group from sixty to sixty-nine made the best showing with an average of one-fifth of a second, the averages for other groups ranging from .206 to .219 second. One man eighty-five years old had an average reaction time of .218, his slowest time being about the average for the group from ten to nineteen years. It is claimed that the greater experience of the older men did not account entirely for the better marks they set as some had comparatively little shooting experience.

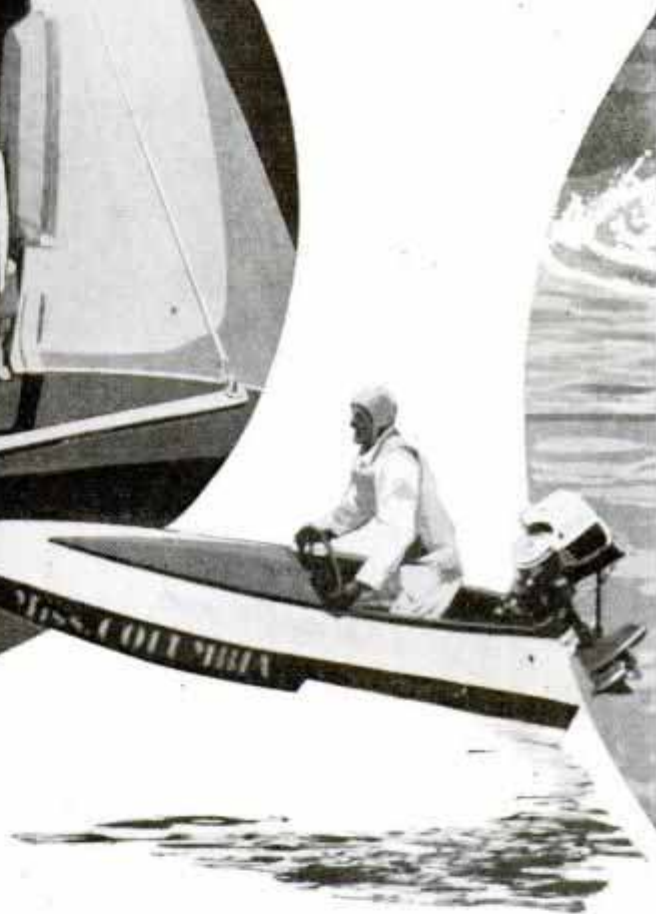
Oct 26, 1917
The following test was made by the
Winchester Repeating Arms Co.
New Haven Conn.

Reference - R. V. Collins,
219 E. Florence Ave
Los Angeles Calif

D/081.

DARE-DEVIL

Starting the Engine of a Racer and, Below, the End of a Jump; a Good Driver "Flies" Thirty Feet across the Water and Goes as High as Eight Feet in the Air



PLUCK and luck go hand in hand in the hair-raising game of riding a match-box boat across rough water at fifty miles an hour. It takes courage to leave the throttle untouched when another boat's wake threatens to spill you. And real luck rides with the winner of a long race, for an acrobatic speed boat is a dangerous mount.

One of the worst things that happens is a spill when half a dozen boats are roaring around a turn so close their sides are almost rubbing. Then a spray-blinded driver in the rear may hit a hole in the churning water that upends his boat and catapults him through the air. The safest way to hit a turn is crouched down in the left rear corner of the cockpit so that the hull can bite the water and avoid a slide.

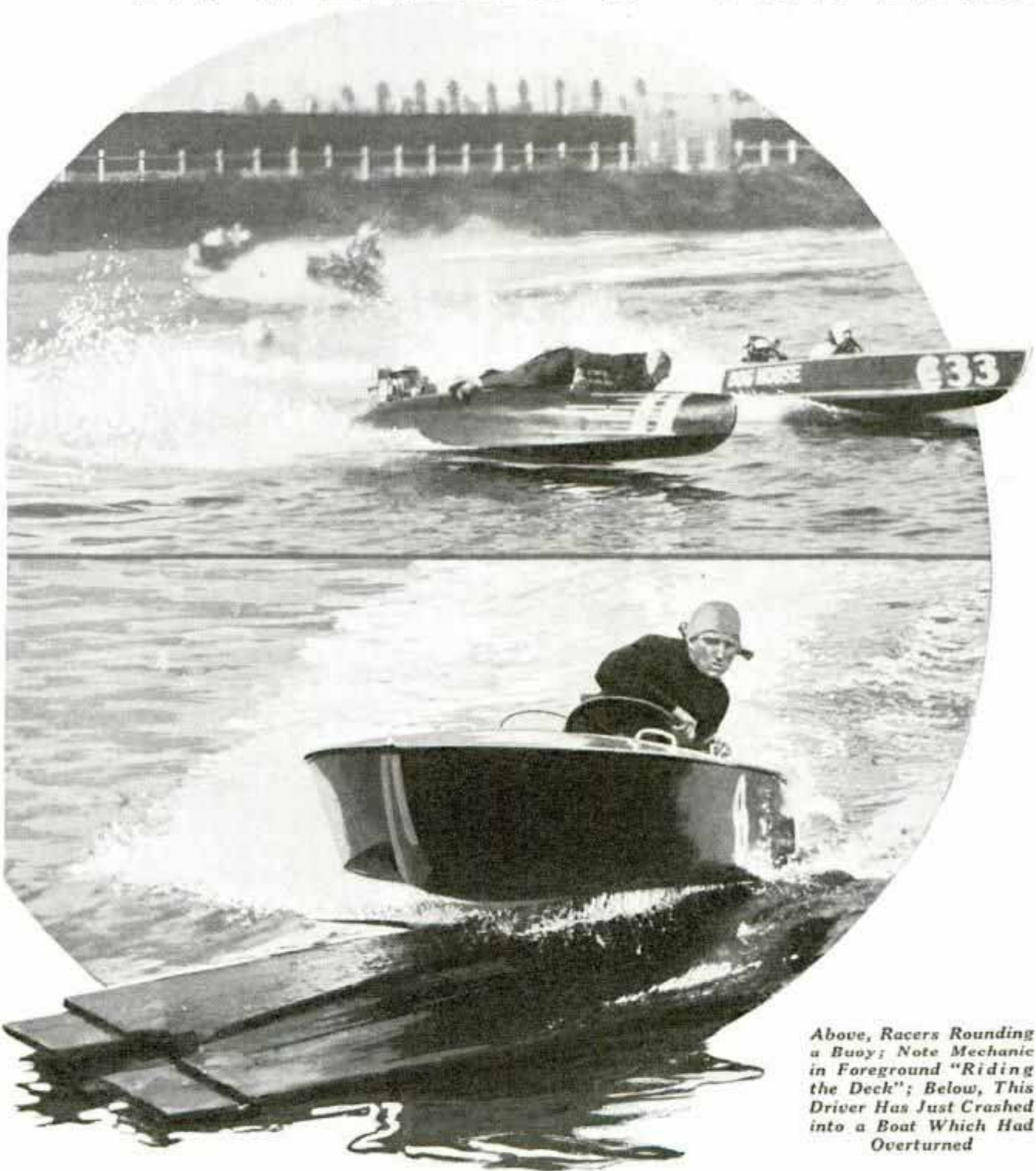
Riding on the "step" in choppy water, the submerged propeller may strike a piece of driftwood that spins the boat around like a top. A higher wave than

usual may catch the bow and turn the boat end for end in the air. Or if the water is choppier than usual the repeated impact against the waves may injure the driver badly. In the two-seater runabouts the mechanic suffers the most for he "rides the deck" to keep the bow down in the turns. In good racing weather the whole hull of the boat rides free of the water half the time and whenever it hits a wave top there is a spine-jarring crash. Mechanics have been pounded unconscious by this rapid fire beating. In a long race a daring mechanic will refuel on the fly, balancing a funnel and a five-gallon can of gasoline over the motor while hanging on with his feet. Yet few who get a taste

Cmd. Thomas E. Lemon, Jr. 105 55
Soliman Ave. Los Angeles, Calif

D1081

"WATER BUG" RIDERS



Above, Racers Rounding a Buoy; Note Mechanic in Foreground "Riding the Deck"; Below, This Driver Has Just Crashed into a Boat Which Had Overturned

of speed-boat racing ever want to quit. One of the reasons, probably, why the game has such a fascination is that any novice may turn out to be a dark horse and steal the show from "big shot" drivers. It takes more than mere driving skill and a good motor to make a record. The tricky little "water bugs" move fastest

when the humidity is high, allowing good carburation, and when the wind kicks up a six-inch chop that permits the hulls to skate from crest to crest.

Among the top-notch drivers are the acrobats who risk their lives in breathtaking stunts. Reg Brown, who hurls his boat through a real brick wall at fifty

Los Angeles Calif



miles an hour, entertains spectators between races with such tricks as jumping his boat through a flaming hoop or hurdling another boat. The hardest part is to keep the boat balanced so that it will not turn over in the air. He also can make a headstand on deck and steer by means of cables at top speed, trade boats on the fly, and drive a golf ball off a bobbing deck. His hardest trick, he says, is to ride two boats Cossack style, with one foot on each of the boats running side by side. Even a slight miscalculation of balance would result in a dangerous spill.

More racing thrills are provided by the modern "short tracks" half a mile long around four buoys marking a square. Driving skill is at a premium and as many as half the entries may "flip" before a race is over. Because of their speed the boats are in a wide turn most of the time and some drivers compensate for this by building non-tip chines on the hulls so



Above, Driver and Mechanic Throwing Weight to One Side to Make Short Turn; Below, a Racing Runabout and a Nose-and-Nose Finish

that the boats will slide instead of turn over in a cross-chop. Even a strong wind, catching the bow high in the air, has turned a boat over in a turn. A steering cable may break or the tiny fin keel may become detached, in which case the boat makes a broadside skid down the course.

If you want to break into speed-boat racing you can do it for \$150 and up. If

you live in the east you probably will want a single-seat hydroplane while in the west the two-man runabouts form the most popular racing classes. In the hydroplanes you have your choice of four types ranging from the A class that carries a twelve-horsepower engine to the F class powered with a sixty-horsepower outboard. In the racing runabouts you must use a hull that is thirteen feet long and weighs not less than 275 pounds. Your class will depend on the size of the engine.

For the minimum price you can buy a secondhand motor and build your own hydroplane hull, a combination that may develop forty miles an hour. If you want everything new and a real chance at a record you may spend as much as \$600 or \$700 for an F hydroplane or an F racing runabout. Most drivers must be prepared to spend almost as much again on maintenance, for repairs are costly on a tiny power plant that "winds up" to five or six thousand revolutions per minute.

A new type that may become popular is the "inboard-outboard"—powered with a marine engine or a converted four-cylinder light automobile engine of 220 cubic inches displacement that is fitted with an outboard drive. Boats of this new class

(Continued to page 128A)

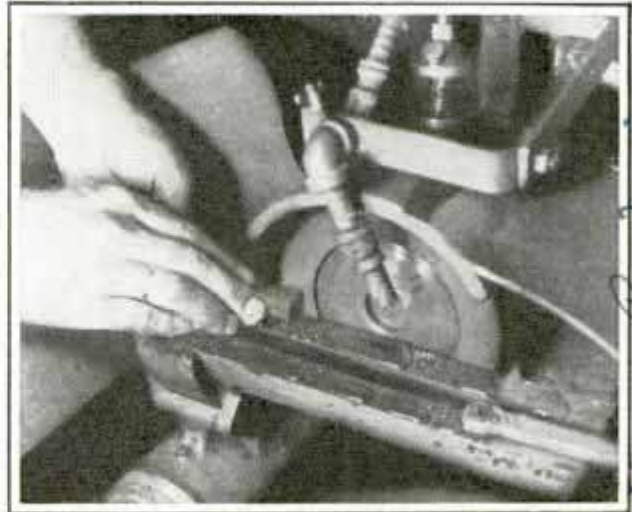
RUBBER-"BAKELITE" SANDWICH HAS VARIETY OF USES



"Sandwiches," consisting of layers of soft rubber between sheets of laminated Bakelite are meeting the demand for a durable and long-wearing material which is as soft and pliable as rubber. Many combinations are possible since the layer thicknesses, as well as the number of alternating sheets, can be varied. The product is being used for gaskets where a combination of strength and resiliency is desired and it is also being used for machine mountings to absorb vibration. It can likewise be employed for table tops, serving trays, wall paneling and similar purposes.

combinations are possible since the layer thicknesses, as well as the number of alternating sheets, can be varied. The product is being used for gaskets where a combination of strength and resiliency is desired and it is also being used for machine mountings to absorb vibration. It can likewise be employed for table tops, serving trays, wall paneling and similar purposes.

REAL DIAMONDS COAT TOOLS USED IN GRINDING



Diamond-Edged Grinding Wheel in Use; Layer of Crushed Diamonds Coats Wheel Surface

Genuine diamonds are being used for coating grinding wheels. Stones that are off color or too small for the market are crushed and graded, mixed with a special bond and coated on a composition form to a thickness of one-eighth inch. The diamond layer is applied to the side of the wheel form for side grinding and to the periphery of the form for cylindrical grinding. Wheels of three degrees of coarseness are produced in this manner, covering a range of work from coarse grinding to production of an exceptionally keen edge. The wheels are used for conditioning the hardest machine tools.

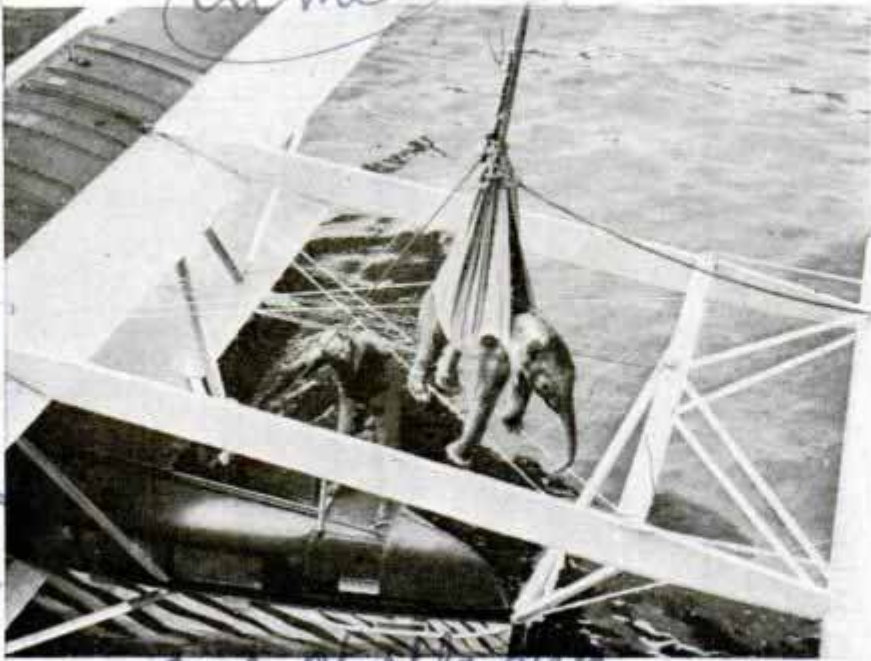
HAMMER KIT FOR HOME HOLDS SIX VARIETIES OF NAILS

Six varieties of tacks and nails used about the home are held in a handy nail and hammer kit which keeps such objects always assembled and ready for use. Turning the hammer head to the right opens any compartment in the top and turning it to the left closes the opening. The hammer has a magnet with which to pick nails or tacks out of the kit.



D 1188
P 1110
The Carborundum Co. Niagara Falls
supplied 2 wooden grinding wheels
4/15 N. Ravenwood Ave
Chicago

Synthane Corp



Lowering a Baby Elephant in a Sling from a Liner on Which It Crossed the Ocean to a Plane in Which It Completed Its Journey

BABY ELEPHANT RIDES IN PLANE AFTER CROSSING OCEAN

At least one baby elephant has become a sophisticated traveler for it crossed the ocean in a modern liner, then finished its journey by plane. The animal was consigned to Bridgeport, Conn., and the boat which brought it across the Atlantic landed at New York. There it was placed in a sling and a crane lowered the baby from the boat into a large Sikorsky plane which carried it to its destination. The young elephant seemingly suffered no ill effects from the trip.

LAMP GUARD HAS FOLDING END FOR REMOVAL OF BULB

Easy removal of the bulb is a feature of the latest electric lamp guard. Made of heavy wire, the guard has a lower section or end that may be opened or closed at will. After the bulb has been screwed into the socket, the wire frame is folded or closed, giving full protection. Opening the end of the frame permits easy removal of the lamp. The



guard is attached to the electric socket by a screw that tightens a ring around the socket. A hook on one side of the guard may be used for hanging the lamp in inverted position.

LEAD AND BRONZE BEARINGS REPLACE BABBITT

Connecting-rod bearings composed of a lead and copper lining with a steel backing are being used instead of babbitt bearings by one automobile manufacturer to increase the life of such bearings to the approximate life of the car. It is claimed these bearings make possible an increase in engine speeds with present engines, an increase in horsepower with no increase in engine size or weight, a shortening of present engines by permitting the use of



Bearings of Lead and Bronze Backed with Steel Which Are Now Being Used in Automobiles

narrower bearings and the possible elimination of the need for oil temperature regulators on some engines. Such bearings

shipped to Martin Johnson
 at 128 W. Commercial St.
 Bridgeport, Conn.
 D1114
 D1175
 D1193
 Joseph P. Frey,
 14114 B. Alameda Ave.

died shortly after
 A. C. Spark Plug Co., Flint, Mich.

Chicago Hardware
Weber + Co 1220 Butlerwood Philadelphia

have been used in aviation engines, in some types of Diesel engines and in the modern high-speed rail cars. During the war it was found that connecting-rod bearings on some airplane engines failed because of repeated flexing of the original bronze backing for the babbitt bearings. Steel was then substituted for bronze, the bearings remaining babbitt-lined. The relatively low resistance of babbitt itself to fatigue under high loads and temperatures then brought about the adoption of a bronze lining with a high lead content. The art of producing such bearings has now reached a stage where they can be made commercially in any quantities and to consistent manufacturing standards, thus enabling their use in auto engines.



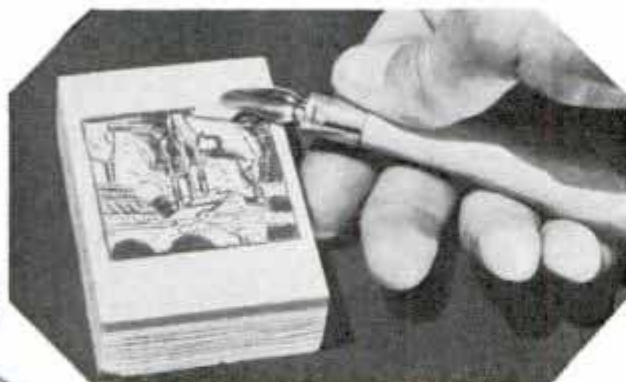
"Ghost Army" Pulled on Wires Used as Targets for German Marksmen

CARDBOARD "ARMY" IS TARGET FOR GERMAN RIFLEMEN

German troops stationed in a barracks near Berlin practice marksmanship with the aid of a "ghost army" which makes its home in a near-by forest. The ghost army consists of full-size cardboard figures representing soldiers. The figures are pulled through the trees on wires, and the marksmen fire at the moving targets.

LINOLEUM BLOCK AND CUTTER SPEED UP WORK

Direct sketching, as well as cutting and gouging, is facilitated by a new white-



Linoleum Block Shown with Improved Five-Knife Cutter That Reduces Working Time

surfaced linoleum block which makes it possible to transfer the subject without reversal of the image. A transfer fluid makes this feature possible. A new cutting tool used in the same work has five interchangeable knives which are held securely in the handle by turning a set screw with a small key.

TWO-IN-ONE WORK GOGGLES GIVE DOUBLE PROTECTION

Serving the purpose of two sets of goggles, a new two-in-one goggle is available for chipping and welding work. One set of lenses protects the worker's eyes against flying chips and particles. Another set, which folds over the first, protects the eyes against dangerous light rays and glare.



Goggles with Light Filter Lenses Raised

C. H. Hunt Pen Co

Wilson Products

D1204
Washington and
Thorn, Reading, Pa

Wide World

D1152

823

D 1023

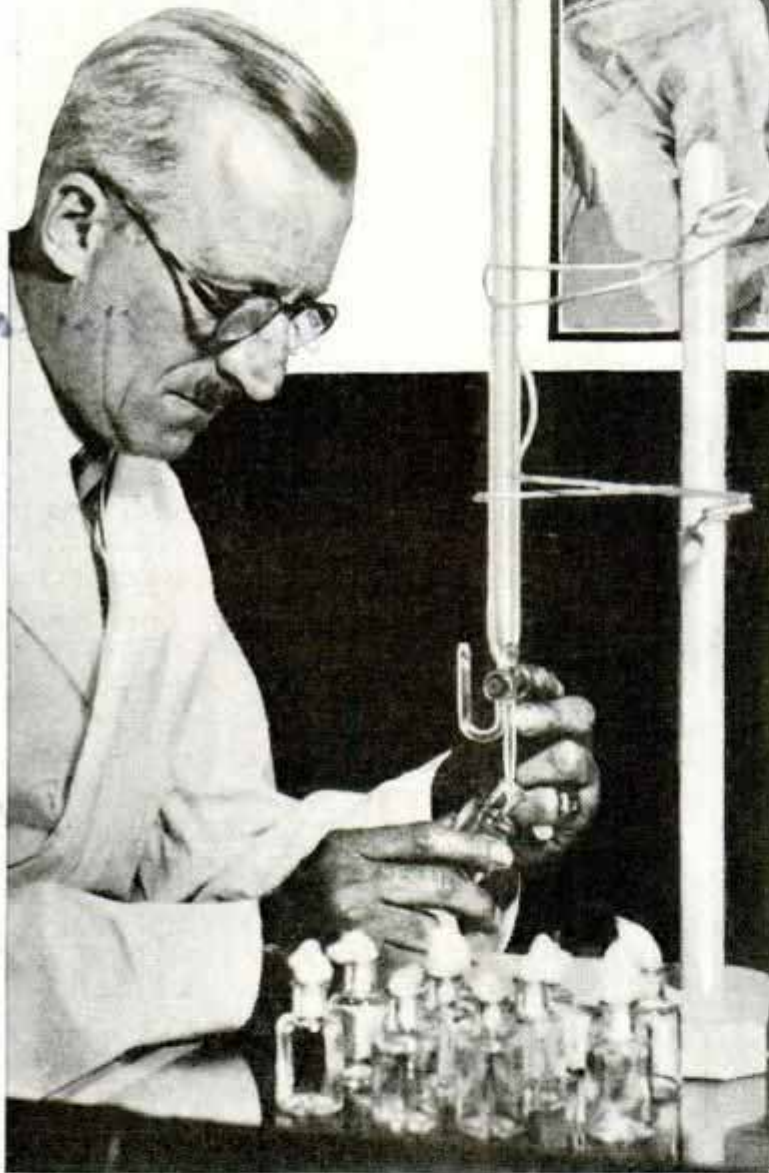
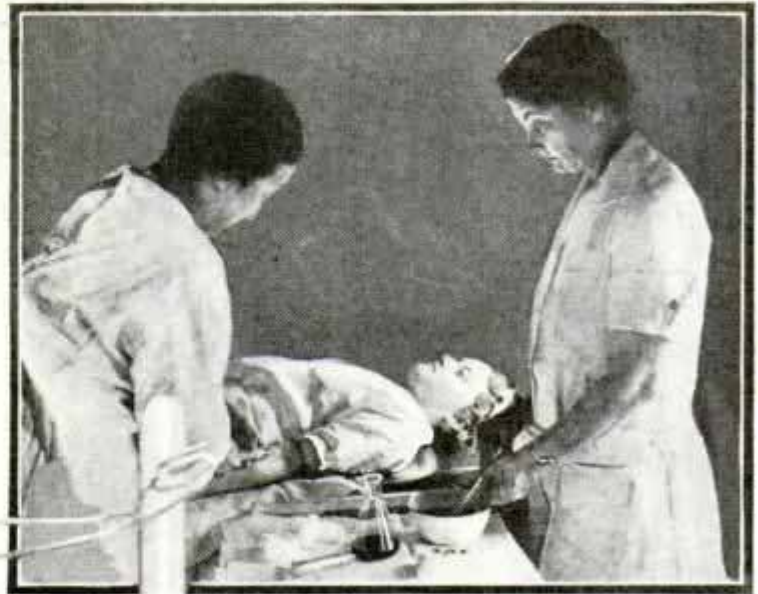
Comr. Maxwell Reed Grant,

541 1/2 Glendale Blvd

Los Angeles Calif

Mysteries of EPIDEMICS

Right, Drawing Off Blood from Volunteer Donor for Use in Preparing Infantile Paralysis Serum; Below, Filling Vials with Serum to Be Used in Fight against the Disease



trated for a hand-to-hand battle with one of mankind's most terrible scourges.

In long rows of beds in the isolation ward of the general hospital the medical men found scores of infantile paralysis victims. From nasal washings and from fluid tapped from the spines of these paralytics, they obtained living virus samples with which to inoculate the monkeys, the only animals whose spinal structure is like that of man, permitting study of the disease without taking human life.

As early as last December, health authorities had begun to marshal their forces along this section of the country, where they believed that infantile paralysis, always a smouldering menace in any part of the world, was about to break out in epi-

CRATES of chattering monkeys, unloaded from express cars at Los Angeles a few months ago, signaled science's latest major offensive in its ceaseless war on disease.

Infantile paralysis, flaring up in near-by desert valleys, was rapidly sweeping across southern California. To the stricken area, famous medical specialists hurried from all parts of the country. Forces were concen-

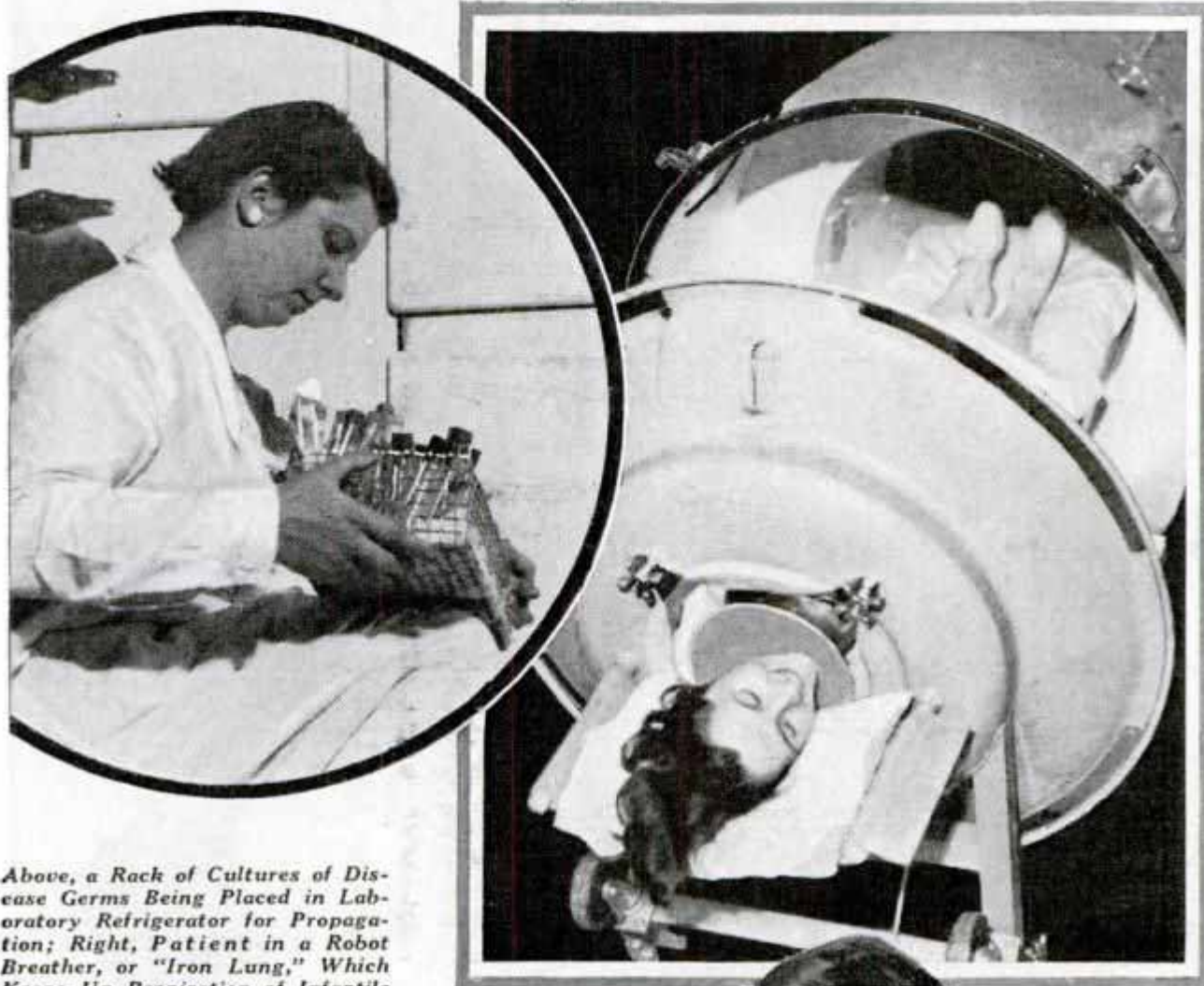
demetic form. The dread disease had been increasing from month to month, following the mysterious law which every three years causes it to burst into unusual activity.

When the disease began to increase the medical forces were ready and an army of experts went into the field. Two hundred health inspectors were enlisted to enforce quarantine and sanitary laws rigidly. Wa-

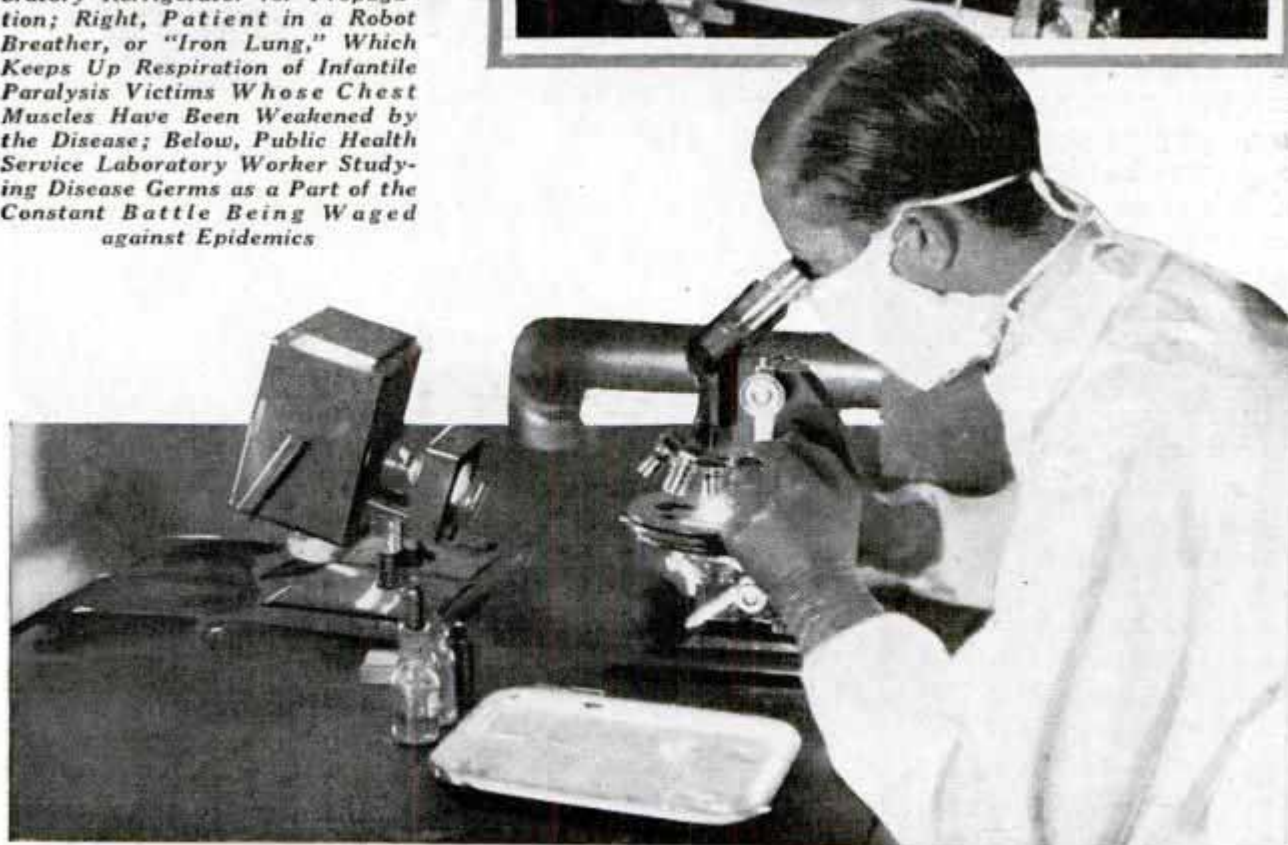
Vertical handwritten notes on the right margin, including the name 'Maxwell Reed Grant' and other illegible scribbles.

Vertical handwritten notes on the left margin, including the name 'Maxwell Reed Grant' and other illegible scribbles.

Attacked by SCIENCE



Above, a Rack of Cultures of Disease Germs Being Placed in Laboratory Refrigerator for Propagation; Right, Patient in a Robot Breather, or "Iron Lung," Which Keeps Up Respiration of Infantile Paralysis Victims Whose Chest Muscles Have Been Weakened by the Disease; Below, Public Health Service Laboratory Worker Studying Disease Germs as a Part of the Constant Battle Being Waged against Epidemics





ter from swimming pools was microscopically examined and restaurants, dairies, and water sources kept under strict scrutiny. A corps of nurses was drafted to visit homes. Every suspect was rushed to a hospital, given serum as a precautionary measure, and placed in an isolation ward under the eye of specialists. Warnings were broadcast by radio, the press, and through the schools.

In bacteriological laboratories technicians began to prepare huge quantities of serum. An appeal went forth for blood. From among 1,400 former patients whose blood was known to contain precious "antibodies" with power of neutralizing the virus, hundreds who had been helped to throw off the crippling paralysis responded generously. In the laboratories, revolving centrifuges, spinning at dizzy speed, separated clear serum from the blood, like dairy



Above, Labeling Culture Tubes from Suspected Disease Victims Prior to Analysis; Below, Removing Colonies of Bacteria from Culture Plates

separators skimming off cream. Its potency tested, it was mixed with an antiseptic solution and bottled in vials to be distributed free to any doctor on request.

In the hospitals, "iron lungs" breathed for those whose chest muscles were par-

alyzed. Experts tested reflexes, tilted beds, and used mechanical contrivances to keep muscles from twisting under the paralyzing influence of the disease. When the fight was won, the work of salvaging the bodies of the paralyzed victims started. Electrical currents, radio waves, and heat are being used to rebuild wasted muscles and rekindle dying nerves. Swimming in a huge salt-water tank, aided by floats and ingenious mechanical devices, many will regain the use of their arms and legs. Few will remain paralyzed, although until recently the disease was regarded as permanently crippling.

In cold statistics, charted from hospital records, looms large the advances in knowledge made since the last epidemic. More cases recognized in time to give serum; few cripples, fewer deaths—that is the brilliant story of medical progress. Meanwhile, from study of monkeys inoculated with the mysterious virus, the experimenters are coming ever nearer the secret of the disease. Although no germ has been found, a vaccine has been developed that may prove a positive cure.

Upon a score or more of centers in different parts of the globe, medical science has recently focused its attention and rushed its field experts to study dangerous diseases in their most virulent form. In Chicago, for instance, tiny amœbas, spread by unclean hands of workers in restaurants and hotel cafes, disseminated a form of dysentery among guests, resulting in more than 100 cases with fifteen deaths before investigators with test tube and microscope tracked the minute parasites to their breeding grounds.

From all parts of the world, reports of disease flow into the central offices of the public health service at Washington. In this way, the service keeps its finger constantly on the pulse of public health. Aided by cooperating local agencies, its experts can not only detect epidemics before they run wild, but can often predict them in advance.

Meanwhile, the greatest mystery of all remains unsolved. Why do epidemics suddenly flare up and spread like wildfire over the earth, then as suddenly die away? Do races of disease germs, like races of men, rise to a peak of activity and power,

(Continued to page 122A)



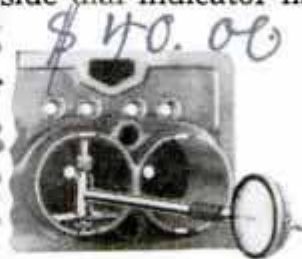
Homemade Stringed Instrument Fashioned from Kerosene Tin; It Produces Unusual Tones

TUNES FROM A KEROSENE CAN CHARM INDO-CHINA TOURIST

Wailing tunes from an instrument fashioned from a kerosene can charm the tourist in Indo-China. The strange instrument, played by a street beggar, produces unusual tones, accepted as musical by natives of that land but perhaps a bit difficult for the Occidental ear. However, the homemade instrument enables its owner to make a living, its odd appearance attracting the eye of passers-by.

SELF-CENTERING GAUGE GIVES INSIDE MEASUREMENTS

To overcome the difficulties of setting a gauge exactly to the diameter of a bore or hole, a self-centering gauge with an outside dial indicator has been developed for making inside measurements. In taking a measurement it is only necessary to move the instrument like a pendulum along the axis of the bore. A spring centers one end of the gauge against the wall of the bore and the dial shows any difference in the bore within one-thousandth of an inch.



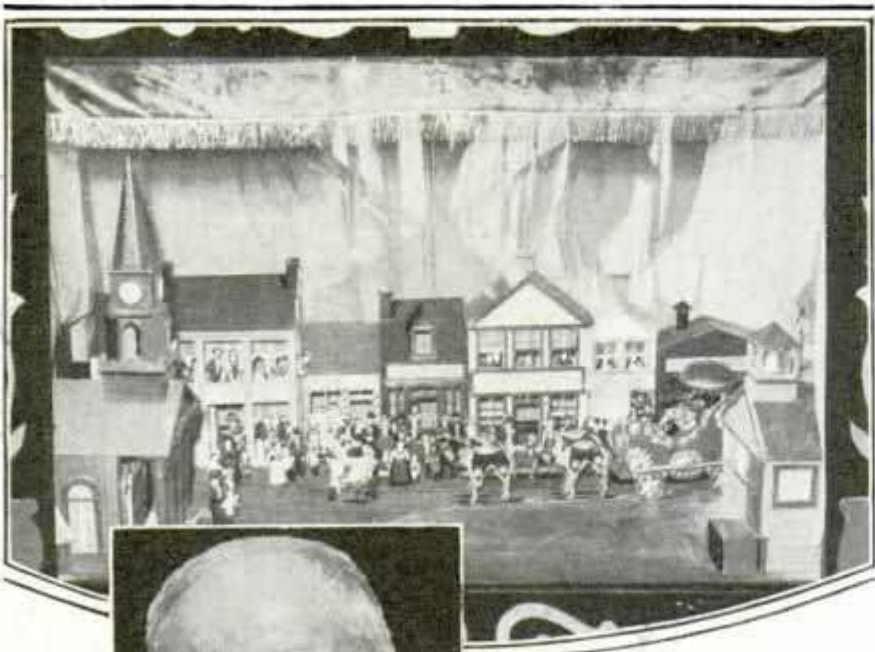
The Patterson Tool & Supply Co.

Mrs. Carl Mahr, Eslinger, O. Germany.

D1172
Comb. Clarence A. Dunaway
846 Westlake Ave. Calif.
D 113
3rd Dayton, Ohio
1238

D1168

Miniature Circus Parades through Tiny City



miniatures of wood, whittled with a jackknife. He also whittled out four cages for performing animals, several circus wagons and many figures representing circus people, and when the circus was finished, he whittled out a town where his circus might parade. He then mounted his animals, wagons and figures on a wheel eighteen feet in diameter, one section being placed along the town's Main street. Revolving the wheel parades his cir-



Miniature Circus Carved of Wood and Placed on Revolving Wheel Which Enables It to Parade through the Tiny Town Shown at Top; the Builder, Inset, Spent Five Years Constructing It

After five years of tedious work, a California man with an absorbing passion for the circus has succeeded in owning one of his own. The jungle where this man trapped his animals, however, was a garage in the back yard of his home and the lions, tigers, elephants and other beasts, including more than 100 horses, are all

cus through the town. As each unit enters, a mechanism animates the animals and figures so the lions and tigers pace back and forth in their cages, the horses move up and down and the clowns go through their antics. A phonograph plays march music as the parade moves and the man behind the scene gives the animals voice.

153
 1919
 J. Leland Elam, Elk Springs, Ark.

D 1021 Bernice and Helen Dillon

Hillsboro, Oregon

using boat
no further data

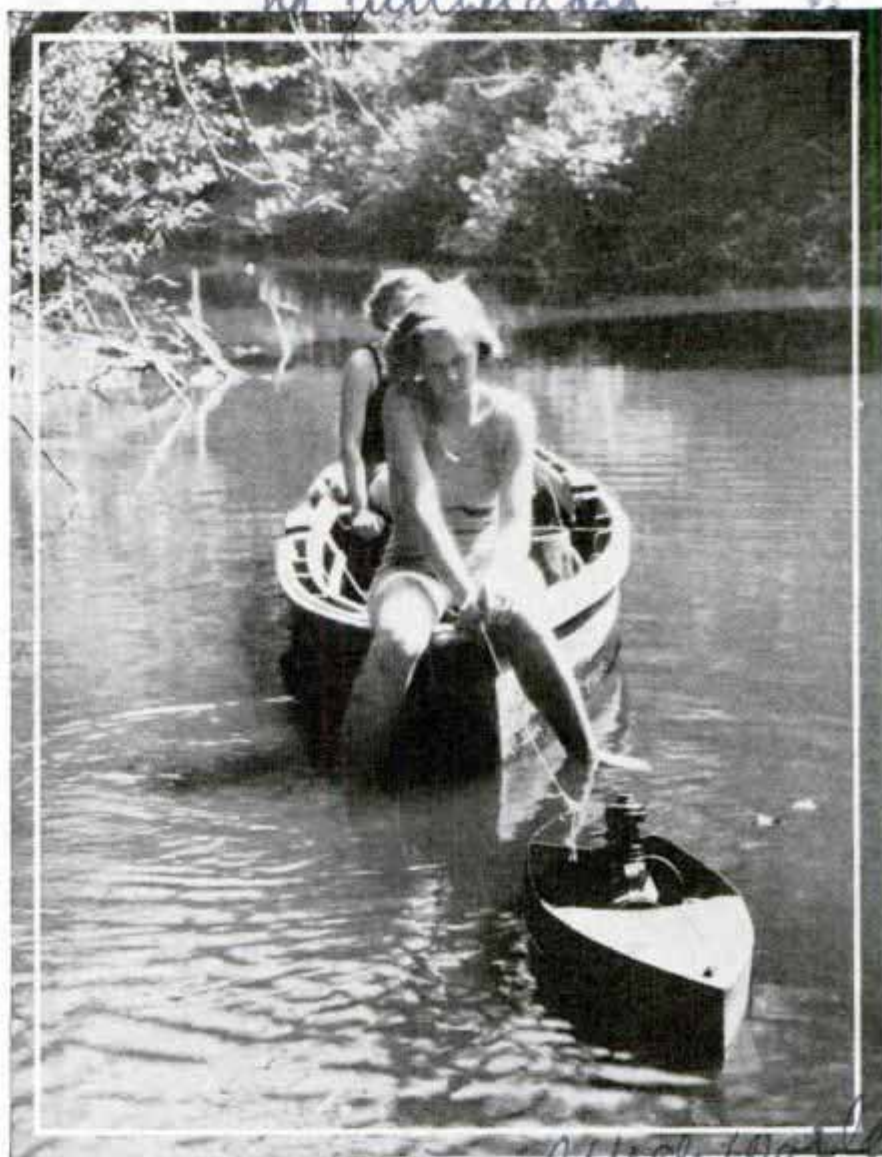
Tiny Engine in Midget Craft Tows Rowboat

Powered by a quarter-horsepower motor, a midget boat constructed in Oregon is capable of towing larger craft, including ordinary-size rowboats. The tiny power boat is guided in the manner of a team of horses, by means of lines attached to the boat being towed. It weighs only twenty-five pounds, small enough to carry easily.

D 1196

HOMEMADE GOLD WASHER RUN BY GAS ENGINE

Mechanical washers are enabling the modern gold miner to operate at a profit on ground that the pioneers were unable to handle. The washers eliminate the slow process of hand panning in districts where water is not plentiful enough to use a sluice box. One homemade washer, with a high rate of efficiency in recovering gold, has been constructed in the west. Economical to operate, it consists of a box-like angle iron frame bolted to two six-by-six timbers. There



Low-Power Boat Pulling Larger Craft with Two Persons Aboard

also is an inner frame. A sand and gravel chute leads to the upper end of the top riffle pan. The two riffle pans have opposite pitches, the lower pan emptying into the tailing flume. Two eccentrics are keyed to a shaft mounted on the outer frame, while two pistons with connecting rods are bolted to the inner frame. The connecting-rod bearings are fitted to the eccentrics on the shaft, with a small gas engine connected to the shaft by means of a V-belt. A centrifugal pump is bolted to the engine. When the engine is started, the washer shakes with the same motion used in hand panning. Daily capacity is about twenty yards.



Mechanical Gold Washer Loaded on Trailer

Walter M. Clabertage 1250 Evergreen St.

Handwritten notes on the right margin, including 'Dillon' and other illegible text.

D1210

The MILLIONTH

Com. Glenn F. Jenkins, Jenkins
New Bureau, 748 Freedmen Bldg



are of hardened steel, the average size about that of a domino. They are made in series so that any measurement, in steps of ten-thousandths, can be achieved by combining two or more blocks, placing them edge to edge. These measurements are accurate to within two one-millionth parts of an inch. They are used to establish standard sizes and for checking precision instruments.

Mr. Johansson has a small hand clamp with jaws adjustable by screws. To test a master block for

Mr. Johansson Demonstrating Accuracy of His Gauge Blocks; Below, Seventy-Six Gauge Blocks Stacked between Jaws of Testing Device Set at Four Inches

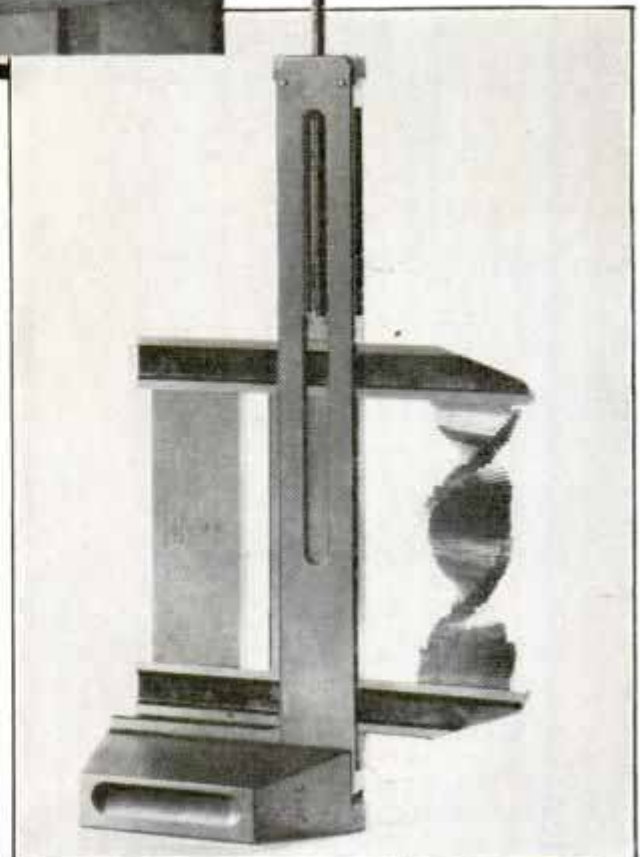
IF you took a four-inch steel bar, one-fourth of an inch square, a fly's weight at one end would bend it the millionth part of an inch.

Or, if it were possible to split a human hair 15,000 times, the result would be a one-millionth part of an inch.

While it is difficult for the human mind to grasp such measurements of near infinitude, they have been achieved by Carl Edward Johansson, the most accurate man in the world.

This celebrated Swedish scientist is associated with Henry Ford in producing the gauge-block system which has been accepted as the world standard of length measurement. Without his discovery, a practical high-precision method mass production could not have been achieved.

Nothing in common experience approximates the "feel" of the gauge blocks. They



Johansson div.
Ford Motor Co.
Dearborn, Mich.

D1210.

PART of an INCH

accuracy the jaws are set and the block inserted between them. If the block slides in firmly the smooth sensation at the finger tips will tell how nearly accurate it is. If the block happens to be infinitely oversize or even a millionth or two scant, the difference can be felt, so finely honed and true are all contacting surfaces. Even a novice can tell the difference between a perfect block and one that is off size.

The sensation is one of rare, silky smoothness. It is yielding yet has a stubbornness that is almost human; absolutely without play but not binding in the minutest degree. A

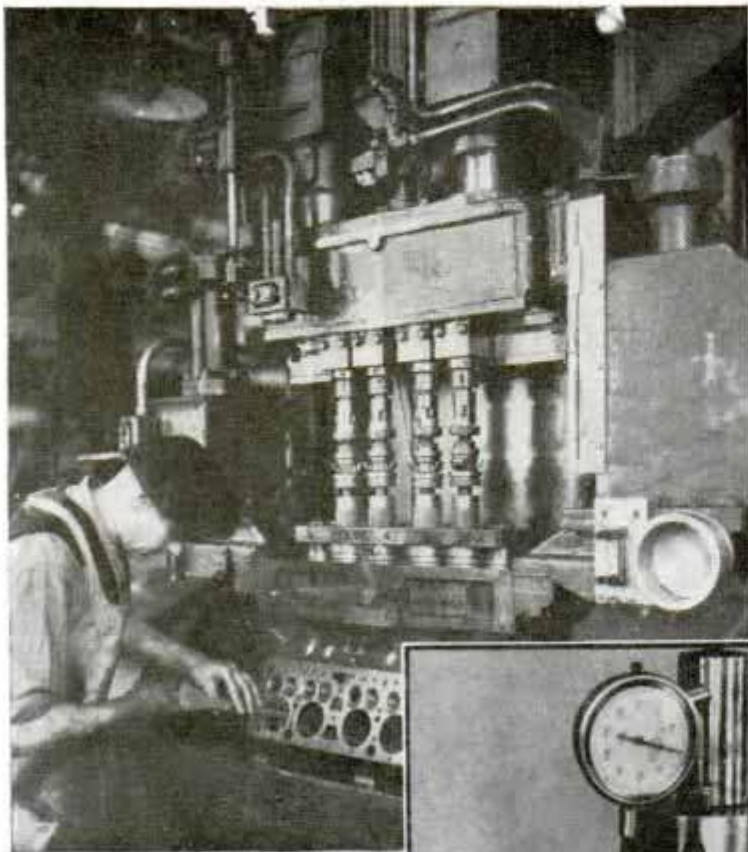
Above, Testing Piston with Amplifier Gauge; Below, Two Gauge Blocks Adhere by Molecular Attraction to Support 200 Pounds



block held between the testing jaws responds to the slightest touch, but it refuses to be suddenly forced. The impression may be at the same time one of downy softness and diamond hardness. It is all an amazing assortment of contrary forces.

The surfaces of the blocks have the appearance of burnished silver. They have been honed down to such a degree of perfection that if slid one on another with a slight inward pressure they will take hold as if magnetized. In a demonstration two blocks sustained a weight of 200 pounds. Atmospheric pressure, capillary power and molecular attraction are given as probable causes of this amazing adhesion.

Even more impressive, to the novice, is the test by which a defect of one-millionth of an inch in a gauge block can be discerned by the naked eye. For this test Mr. Johansson has a plain glass disk about



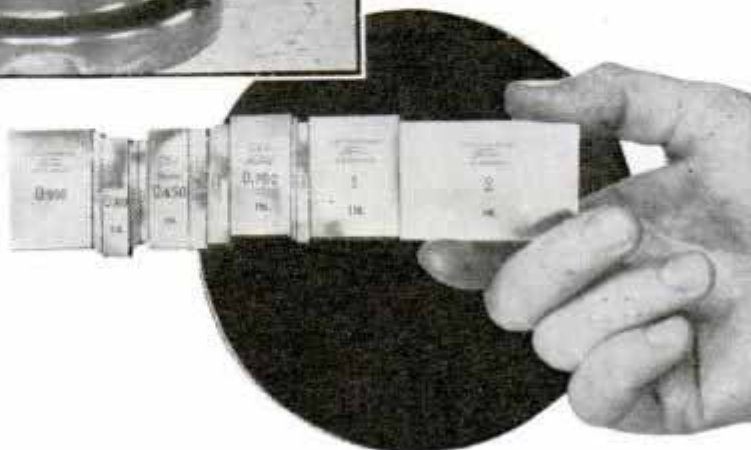
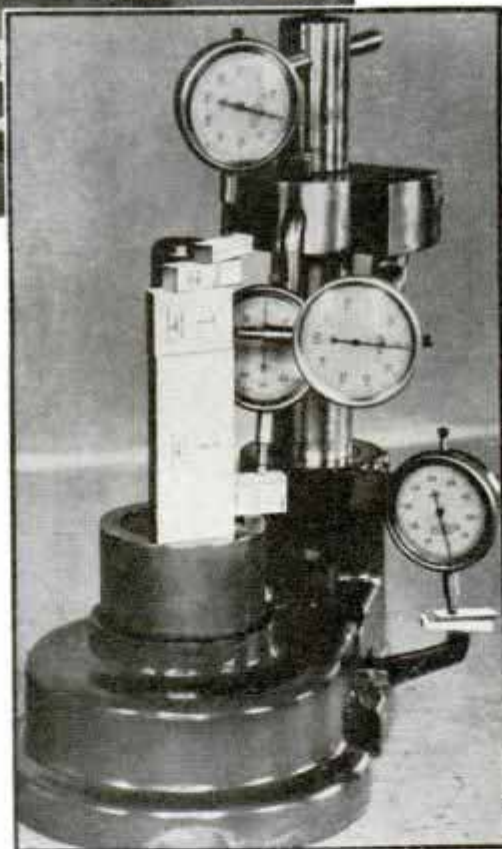
one and one-half inches in diameter. It is slightly prismatic, being, like a wedge, thicker at one edge than at the opposite edge. The surfaces are flat to perfection. When the glass disk is placed flatwise on a gauge block any defect, even though it be infinitely beyond the power of human sight, is detected at once.

Johansson has made it possible for American industry to do away with any need for adopting the metric system, a thing that has been advocated for many years. On the other hand it will never be necessary for European manufacturers, using the meter as a standard of measurement, to learn the inch system. By the use of Johansson gauge blocks, which have been adopted as standard by many countries, manufacturers in any part of the world can work at ease either in inches or millimeters. To make this pos-

sible there has been, in recent months, a universal acceptance of 25.4 as the conversion ratio between the millimeter and inch.

The story of this achievement is one of romance as well as of mastery. In the early eighties Johansson, a Swedish immigrant, was a lumberjack in the northern wilds. With his earnings in the woods he entered Gustavus Adolphus College at St. Peters, Minn. Later he returned to his native Sweden and began his long climb to the unique place which he alone occupies, coming back to the United States in 1923. His method of making the gauges is a closely guarded secret.

Johansson, who has reached his full three score and ten has given the world a new science, some of the physical phenomena of which are not yet understood. In perfecting the gauge block he has solved four important metallurgical problems—first, flat surfaces in steel, an objective long sought; second, perfect parallel surfaces in steel; third, accuracy as to dimensions in steel, and fourth, the effective heat treatment and seasoning of steel.



Above, Even the Heaviest Machinery Is Adjusted to a Fraction of an Inch; Center, Amplifier Gauge; Below, Gauge Blocks so Perfect They Adhere to Each Other

D 71175
 Henry P. Wadsworth
 Ridgewood 833
 N.Y.

Animal and Bird Figures Made from Gourds

Examples of Caricatured Figures Made from Dried Gourds, Balsa Wood and Glue; the Little Girl Is Holding Gourds Which, Before Drying, Weighed Several Pounds



Gourds, the inedible relatives of pumpkins and squashes, are paying dividends to a New Jersey man who conceived the idea of utilizing their peculiar shapes and colorings to model caricatures of birds, animals and other objects. Gourds can be grown almost anywhere but it is difficult to predict the shapes, colors and sizes one vine will produce. They range in weight from a few ounces to several pounds when green and the shapes vary from spheres to grotesque calabashes with large egg-shaped bottoms and long thin necks. Occasionally the shape of a gourd can be controlled during growth by tying it. The choice of subject to be designed is governed by the shape of the gourd. A round one with a slight rise in the center may suggest a lamp base while the variations of the calabash shape can be made into birds and animals. Sometimes two or three are combined into a single subject. The gourd is first dried to a hard shell which is strong and almost as light as a feather. A knife, some white shellac and a paint brush are the simple tools required. The surface is scraped and

brushed over with shellac, then the work of fashioning a bowl, a ladle, a penguin, dish or toy is started. Balsa wood is used to add features which nature omitted, this being attached with plastic wood or glue, after which the gourd is colored as desired. To become workable, gourds must be left in a dry, warm place for several months.

LIQUID COATING SAVES GLASS FROM DETERIORATION

Glass articles in museums and elsewhere can be protected from the deterioration caused by the chemical action of gases in the air by applying a liquid preservative coating recently developed. Such protection is imperative for "soft" glass like Venetian ware and other forms having a low silicic acid content. Such glass is particularly susceptible to "glass blight" although plate glass such as is used for show cases in the city where the air is impure is also greatly benefited by the protective coating, it is claimed.

Dr. W. W. C. Curator, Metropolitan Museum of Art, New York

South Ogden Park, New York

Aug 5 - D McCellan

Com. Don Klasey
4 W. 10 3rd St.
New York

RADIO TUBE

D1138



Left, Hidden Basement Where Old Tubes Were "Rejuvenated" and Placed in New Cartons; Below, Old and New Type of Carton; and Polishing Old Tubes Preparatory to Packing in New Containers; the Man with the Scowl Is Trying Out His Set after Installing Rejuvenated Tubes Bought at a "Bargain"



racket. When used tubes are disguised as new and sold in new-appearing cartons bearing the brand names of reputable manufacturers—that's fraud. When quack doctors claim the power to rejuvenate used tubes—that's hokum pure and simple.

Those are the characteristic earmarks of a racket that has cost the public millions in money and caused much bad temper among radio listeners. The trouble with many so-called "new" tubes is that they are secondhand.

RIGHT under your nose the racketeers are at it again! This time they are selling cast-off, worn-out, and run-down radio tubes with faked guarantees and in bootlegged cartons.

When dead radio tubes show life in the testing meter under your eyes—that's a

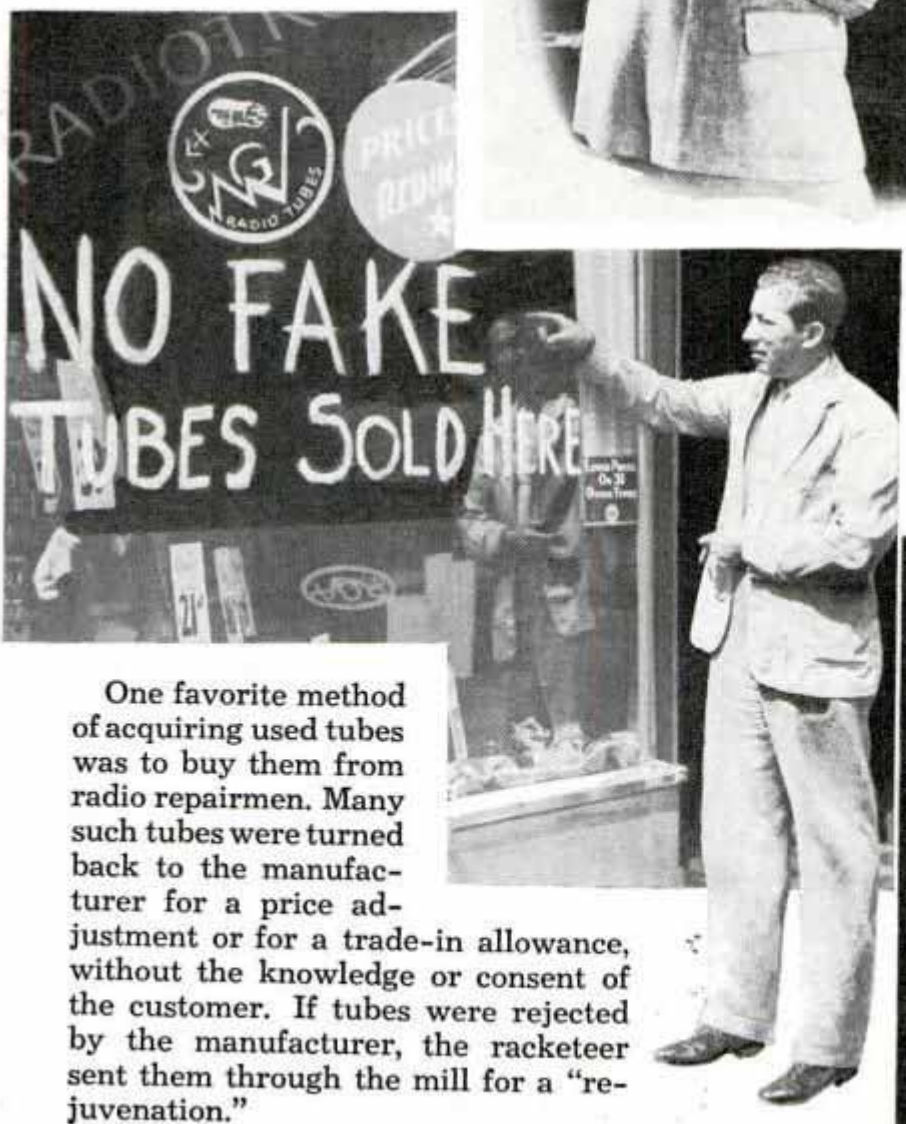
Now the lid's off! A nation-wide investigation by a small army of secret operatives has exposed the inner workings of the racket. Backed by one of the foremost manufacturers in the radio industry, detectives have shadowed the racketeers to all their haunts. They have pursued them

Handwritten notes in the left margin, including "2-5-35" and other illegible scribbles.

Vertical handwritten notes in the right margin, including "part of the racket" and other illegible scribbles.

RACKET *Exposed*

to hideaway shops. They have seen utterly worthless tubes meter-tested to the satisfaction of customers. They have observed the disposing of run-down tubes to "fences." They have followed itinerant peddlers who make a business of collecting cast-off tubes. They have met the tube racketeers across counters and tables. They have seen radio "clinics" where worn-out tubes are "rejuvenated."



Above, a Set with Even a Little Life Left Will Test Up on a Meter; Left, One Dealer's Method of Fighting Radio Tube Racketeers; Below, the Cheating Dealer Places Old Tubes Left by Customers in New Open-Flap Cartons

One favorite method of acquiring used tubes was to buy them from radio repairmen. Many such tubes were turned back to the manufacturer for a price adjustment or for a trade-in allowance, without the knowledge or consent of the customer. If tubes were rejected by the manufacturer, the racketeer sent them through the mill for a "rejuvenation."

Radio tube rejuvenation is a sort of



D1138 836



Left, Radio Service Man Explaining Why "Rejuvenated" Tubes Were Not Bargains; Below, How a Tube Racketeer Conducts His Business and Some "Bargain" Offers

FIRST TIME IN RADIO HISTORY
 YOUR OLD AND WEAK
TUBES
 Completely
CURED
 While You Wait

10¢

Perfect Results Guaranteed or No Charge

First Come First Served!

10,000 RADIO TUBES!
 CHOICE NUMBERS
 Cunningham
 Arcturus
 DeForest

11¢ VALUES TO \$1.50

1¢ TUBE SALE
 Brand New PHILCO, ARCTURUS, CHAMPION, ARROW, and others.

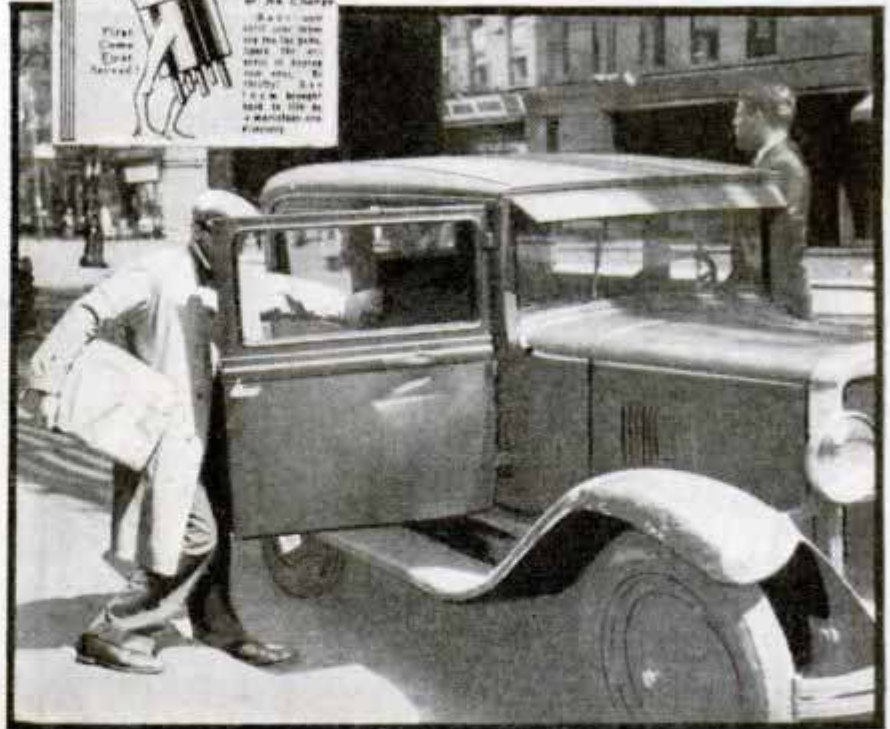
TYPE	PRICE	TYPE	PRICE
01A	1.00	274	1.00
01B	1.00	275	1.00
01C	1.00	276	1.00
01D	1.00	277	1.00
01E	1.00	278	1.00
01F	1.00	279	1.00
01G	1.00	280	1.00
01H	1.00	281	1.00
01I	1.00	282	1.00
01J	1.00	283	1.00
01K	1.00	284	1.00
01L	1.00	285	1.00
01M	1.00	286	1.00
01N	1.00	287	1.00
01O	1.00	288	1.00
01P	1.00	289	1.00
01Q	1.00	290	1.00
01R	1.00	291	1.00
01S	1.00	292	1.00
01T	1.00	293	1.00
01U	1.00	294	1.00
01V	1.00	295	1.00
01W	1.00	296	1.00
01X	1.00	297	1.00
01Y	1.00	298	1.00
01Z	1.00	299	1.00
01AA	1.00	300	1.00

10¢ Sale!
 39¢
 10¢

hocus-pocus by which a knave pretends to have the power to make old tubes perform like new ones. The secret of his black magic is to give the tube a high-voltage shock, which in some cases makes the tube behave properly for an additional short period.

As applied to types like the 01A, '99, '20, '22, and other thoriated filament types, the process, if properly handled, is fairly successful. However, the high voltage employed often results in a complete burnout of the filament. So-called a.c. tubes use different material for filaments and cathodes, and the "hot shot" may bring on many ills to tubes of this general class, although they may be made to give high readings on a brief test.

Of course, meters don't lie—until they become the tools of racketeers. Then the meter needles merely point to the rack-



eteer's cleverness and the customer's gullibility. To complete the process of rejuvenation the racketeer polished the exterior of the tube and placed it in a carton or container bearing the stamp of some

D1198

D1092

reliable manufacturer. The next step was to market the tubes. They were sold directly to some underground distributor or to a radio dealer. Then the stock was ready for Mr. Public.

The dealer who advertises licensed and guaranteed radio tubes for sale at ten, fifteen, and twenty-five cents, or even the full price, may or may not be aware that he is bluffing the public. But when a dealer advertises that all old and weak tubes can be cured of static and "rheumatism" while you wait—for ten cents each—he knows that he is bluffing.

The truth is this: Not a dealer in the United States can afford to sell first-class tubes at sixty to seventy per cent discount without taking a severe loss.

Tube guarantees vary with the individual manufacturer. However, as a rule, reputable manufacturers guarantee their products against defects in materials and workmanship. They then endeavor to allow a reasonable period within which the tube can be returned for adjustment if it fails to give normal service, when not abused. While there is no arbitrary time limit for turning back defective tubes, ordinarily they will not be replaced later than a year after manufacture.

When the manufacturer's service station receives defective tubes, they are tested and replacement is made. The defective tubes are immediately crushed, to make them absolutely useless. How can Mr. Public defeat the tube racketeer? When the time comes to buy new tubes for your radio—do these three things.

Buy tubes made by a reputable manufacturer.

Don't give away old tubes. If the dealer or service man doesn't break them up in your presence, break them up yourself.

Patronize only reputable dealers and service men.

FOLDING DRY GOLD WASHER SPEEDS PLACER MINING

Placer gold mining can be speeded up by using a collapsible dry washer weighing only seventeen pounds, and thus easily carried to new diggings. The ore is dumped into a hopper and passes over a fine mesh screen which is vibrated by an eccentric gear at a rate of 125 times per



Collapsible Dry Gold Washer Which Is Capable of Handling One and One-Half Tons of Dirt per Day

minute. In this manner a ton and one-half of dirt can be handled in eight hours. In addition to the coarser tailings, the finer ore, containing the "flower" gold, drops through the mesh and into the miner's pan. Fifty per cent profit is lost ordinarily by failure to recover this flower gold.

REFLECTOR PLATE FOR AUTOS MAY CARRY ADVERTISING

Metal plates with small reflector jewels are being made in several shapes for attachment to the automobile, as a means of advertising, to designate membership in an automobile club or for some other purpose. One of the plates has a round glass red reflector with embossed aluminum background and red glass front on which the design of the advertiser or the auto club emblem is reproduced. The designs are made by using silk screen stencils.



Names and addresses of manufacturers and dealers in articles described, and any other details in our possession, will be furnished by our Bureau of Information upon request, accompanied by postage.

*Mr. Roy L. Clente
1819 Rosswell Ave.
Long Beach, Calif.*

*Alura Products Mfg. Co.
1400 5th St. S.W.*

Alura metal reflectors

D1092

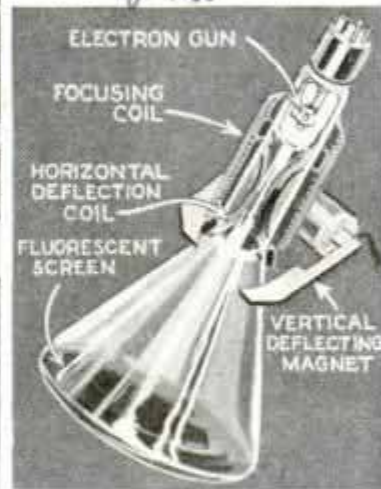
Cantor & Co.

D 1132.

838

Television Laboratories, Inc.
1278 Mermaid Lane.
POPULAR MECHANICS
Mermantown Philadelphia
Pa.

New Television System Uses 'Magnetic Lens'



Taking Picture with Special Television Camera, the Receiving Tube and Image as Received

Television for the home has been brought a step nearer by the development of a system of sending and receiving pictures which eliminates mechanical scanning. This system, devised by Philo T. Farnsworth, uses a "magnetic lens" instead of a mechanical scanner. This is made possible because an electronic image can be bent magnetically although an optical image cannot. This system includes a taking camera fitted with a lens and what is known as a dissector multiplier tube on the end of which the optical image is focused. This image is transformed into an electron image which is in focus at two ends of the tube. At one end of the tube is a scanning aperture which allows one part of the electron image to pass out to an amplifier, and then to the radio or wire. By means of the magnetic lens or deflector coil, the electron image is moved up and down, the upward movement being more rapid than the downward motion. At the same time there is a rapid backward and forward movement. The receiving tube is



fitted with an electron gun which bombards a fluorescent screen at the end of the tube. Ordinarily the electronic impulses from the gun would bombard one spot but the tube is fitted with deflection coils synchronized with those on the dissector tube in the camera. Thus the electron stream in the bombardment moves with the electron image in the receiving tube, the impulses actuating the deflecting coils being sent out between the electronic impulses carrying the image. Broadcasting is over a band of from three to seven meters, thus

Vertical Deflecting Magnet
Horizontal Deflection Coil
Focusing Coil
Electron Gun
Fluorescent Screen
Dissector Multiplier Tube
Amplifier
Radio or Wire

D 976

limiting the radius to about seventy-five miles and necessitating relay stations. By using a special motion-picture projector and the dissector multiplier camera, movies can be transmitted by television with this system.

D1133

FOUR KINDS OF FUEL BURNED IN COMPACT ROOM HEATER

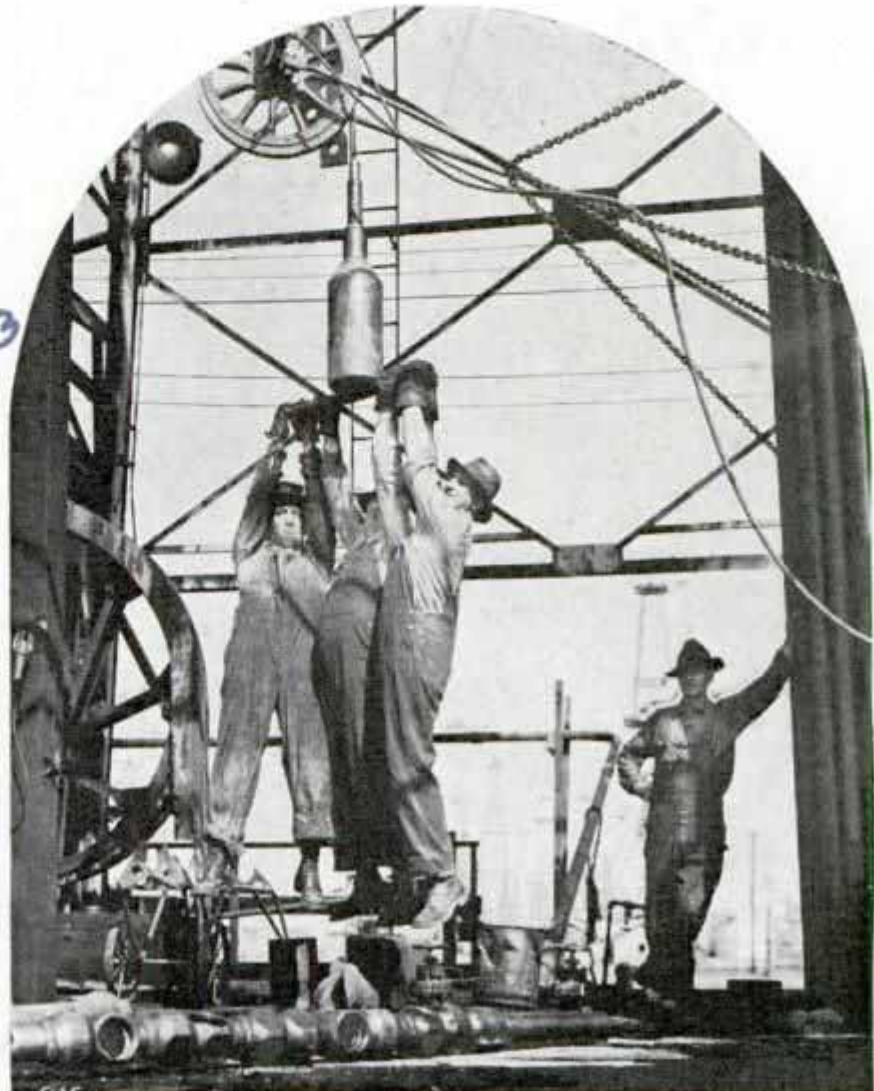
Coal, wood, oil or gas can be burned in a compact heater shaped like a radio or refrigerator and intended for homes without central heating plants. Through the use of a patented air duct, little heat is allowed to escape up the chimney and hence less fuel is required to heat a given area. Secondary heat from the ash box and fire pot is directed downward through the slanting sides of louver openings to keep the floors warm. The stove is equipped with a large vapor tank for humidifying the air and also has a pedal which opens the door when pressed with the foot.

Heatrol's distinctive



Compact and Efficient Room Heater in Which Coal, Wood, Oil or Gas Can Be Used as Fuel

Estate Store Co



Showing Powerful Oil-Well Magnet Supporting Combined Weight of Three Men; It Is Used for Recovering Tools from Bottom of Well

MAGNET FISHES FOR TOOLS LOST IN OIL WELLS

Among the most successful ways of fishing for tools lost at the bottom of an oil well a mile and a half deep is a powerful electric magnet which is lowered into the hole. When contact can be made, the magnet lifts them quickly to the surface. Broken bits, tubing catchers, spearheads, slips, bailer bottoms, and various other metal parts are lost in drilling or later operations and must be recovered or the hole deviated around them. The bigger the hole the larger the magnet that can be used with a consequent greater lifting power. Magnets are constructed from three and one-half to twenty-four inches in diameter. A nine-inch magnet has a lifting power of 1,500 pounds plate stock. The apparatus is installed in a truck on which is mounted the cable drum. Tools have been recovered from a depth of 8,250 feet.

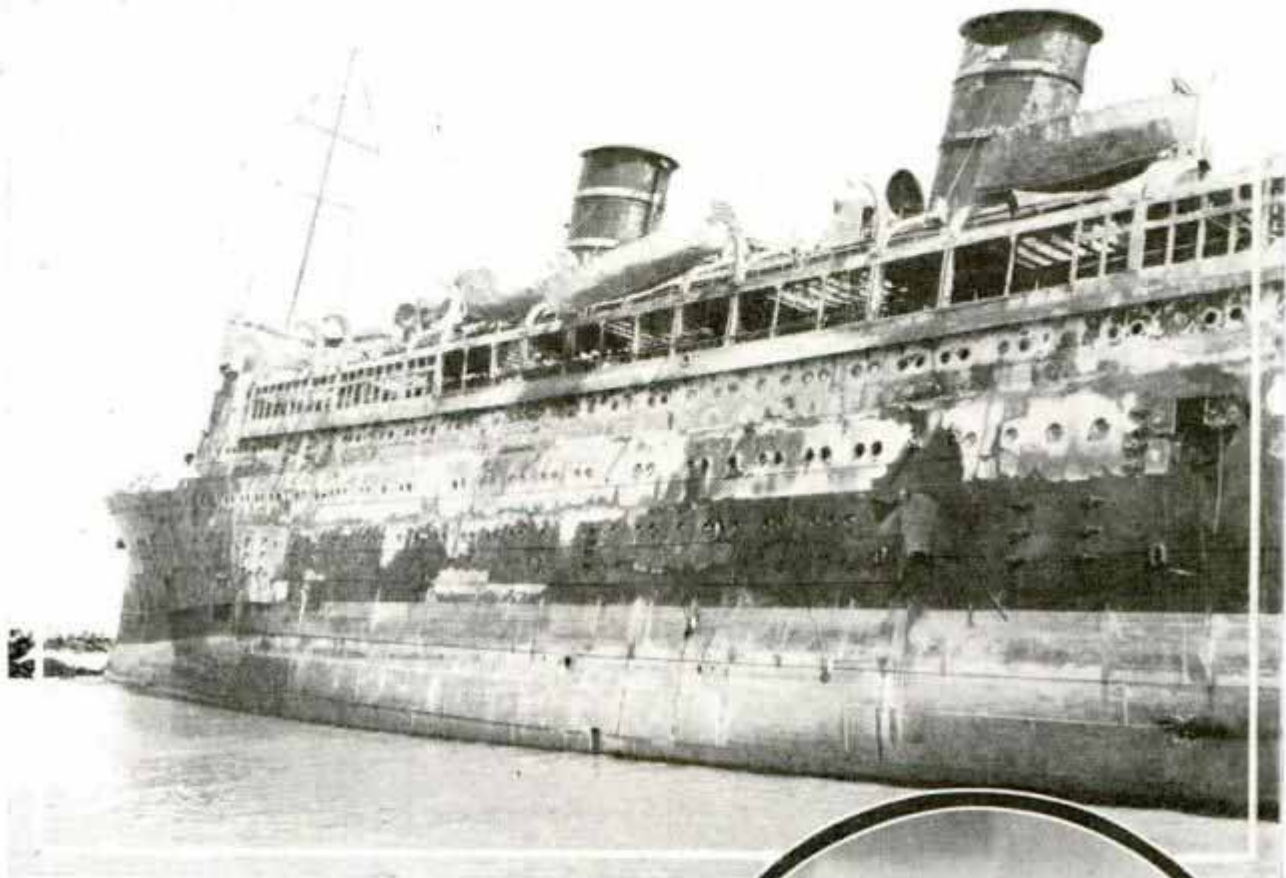
Los Angeles Calif
4439 Santa Fe Ave

Line-Well Co

Com. Robert W. Gordon, 90 The
Infantry Journal, 1115-17th St.
N. W. Washington?
D.C.

D1209

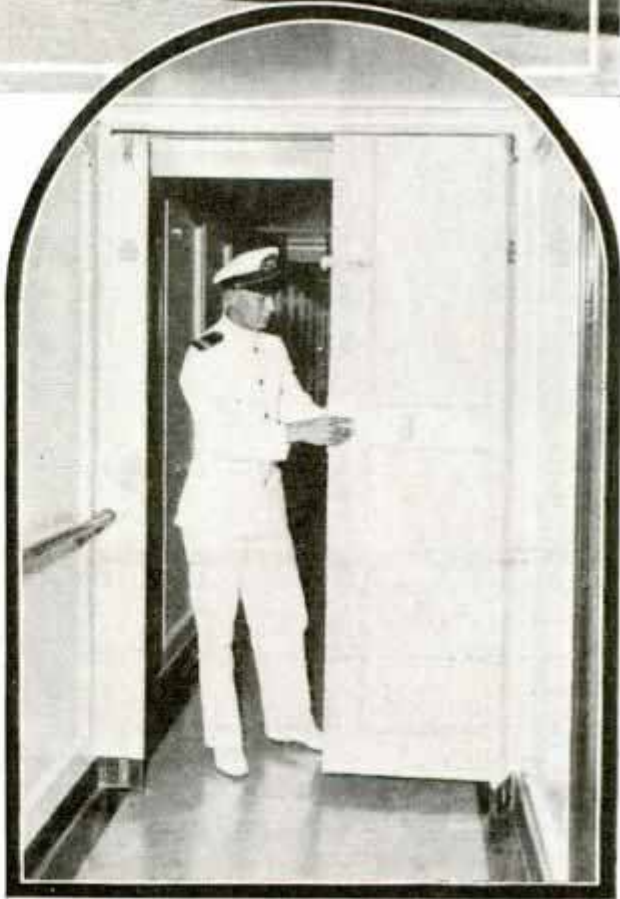
DIED *in* VAIN



followed. In 1871 the steamboat inspectors were given police powers and the dangerous practice was abandoned.

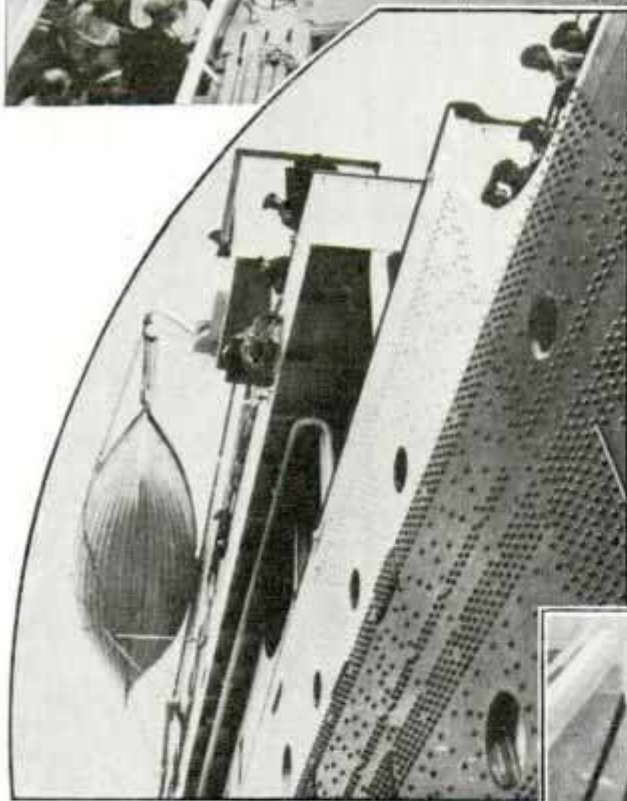
On June 15, 1904, the "General Slocum" burned near New York with the loss of 945 passengers, most of them children. The investigation showed the ship was a mere shell of highly combustible wood; that the mate was unlicensed; that many of the life preservers contained iron blocks to give them the required weight; that the captain made no effort to fight the fire or aid the passengers and that the crew had never been drilled in their duties in case of fire.

Out of this disaster grew laws requiring construction less susceptible to rapid burning, the securing of lifeboats so they could be quickly launched and fire hose that would stand 100 pounds pressure per square inch and would not deteriorate between inspections. The hose and couplings also had to be of uniform size, and the presence of defective hose on board was



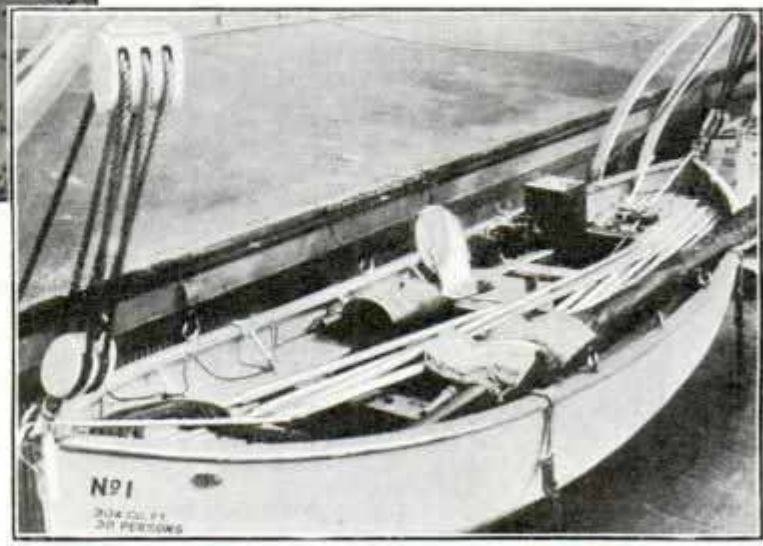
Above, the Hulk of the "Morro Castle" after the Fire Had Spent Its Fury; Below, Fire Doors Like This on the "Morro Castle" Were Not Used

D1209
842



plunged to the bottom two and one-half hours later. The discipline of crew and passengers was perfect. There was no panic, and the boats were filled almost exclusively with women and children and lowered without mishap.

Believing her unsinkable, the owners had equipped the "Titanic" with only sixteen lifeboats, although she was designed to carry forty-eight—more than enough to save everybody aboard, and there was ample time to take off all hands if enough



prohibited. Also life preservers for each person on board were required.

Near midnight of April 14, 1912, the "Titanic," then the world's largest ship, struck an iceberg in the north Atlantic on her maiden voyage. The sea was absolutely calm and the steamer "Californian" was within sight, yet out of 2,201 persons aboard, 1,517 were drowned when the palatial liner

Above, Inspecting Lifeboats and Gear on Liner; Below, Properly Equipped Lifeboat and the "Titanic" Just Before She Sailed on Her Ill-Fated Voyage

D1209
 D1159 - Bausch + Lomb Optical Co. Rochester, N.Y.

equipment had been provided. The "Californian" could easily have proceeded to the "Titanic's" assistance, but the only wireless operator on that liner had retired fifteen minutes before the "Titanic" struck.

The shock of this disaster so aroused public opinion that an international safety conference was called immediately, and from this have come many of the most sweeping reforms at sea. The international ice patrol was organized to patrol the north Atlantic during the ice season, reporting the location of ice so that vessels could be routed safely. No ship has collided with an iceberg since the patrol was organized.

Regulations were also passed requiring vessels to carry enough lifeboats to accommodate all on board. First-class passenger ships were required to carry wireless and enough operators for a continuous watch, while all other ships carrying more than fifty persons on the high seas were required to carry radio and at least one operator.

On November 12, 1928, the British ship, "Vestris," foundered 200 miles off the Virginia coast with 325 persons aboard, and 110 were lost. The day before a heavy gale, blowing from the east, caused the ship to list five degrees. When an extremely heavy sea caused her to roll violently some of the cargo shifted and a permanent list of ten degrees was acquired. Finally, a heavy sea rolled her almost on her beam ends. Water was shipped through the scuppers and found its way to the bunkers, saturating the slack coal and causing a further list. Water now began pouring in through the ports faster than it could be pumped out, and the ship foundered nearly twenty-four hours after the list became apparent. Just a short time before it sank a distress signal was sent. Only

(Continued to page 138A)

D1159
**"MICRO MOVIE" PROJECTOR
 FITS ANY MICROSCOPE**

Designed to fit any microscope, a new projector enables the amateur to produce "micro movies," showing living specimens on a screen. The object under the microscope is projected on a translucent screen through the aid of a powerful light and a condenser. The screen is between the projector and the audience, enabling the op-

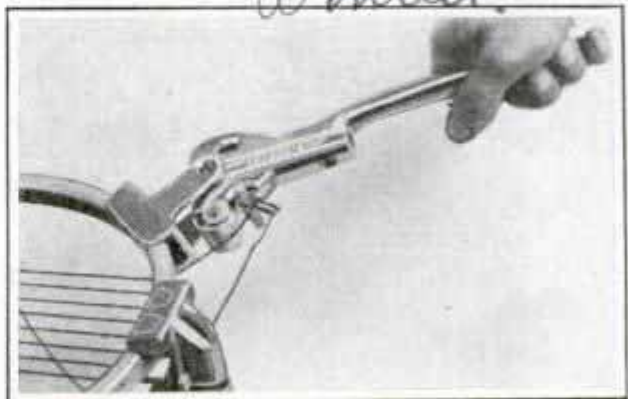


Tracing Microscope Specimen on Paper with Aid of Projector Which Throws Image on Notebook

erator to face his guests. The projector operates on 110-volt alternating current. By clipping a mounted mirror to the eyepiece tube of the microscope, the image is projected on paper or notebook so that it may be traced accurately.

D1165
**TIGHTENER FOR RACKET STRINGS
 GIVES UNIFORM TENSION**

Uniform tension is given to all strings of a tennis racket by using a handy tightener for restringing work. It also eliminates distortion of the frame and the difficult hand pulling work. Tension can be adjusted as desired and in use, it is only



Tennis-String Tightener Which Gives Uniform Tension to Strings without Distorting Frame

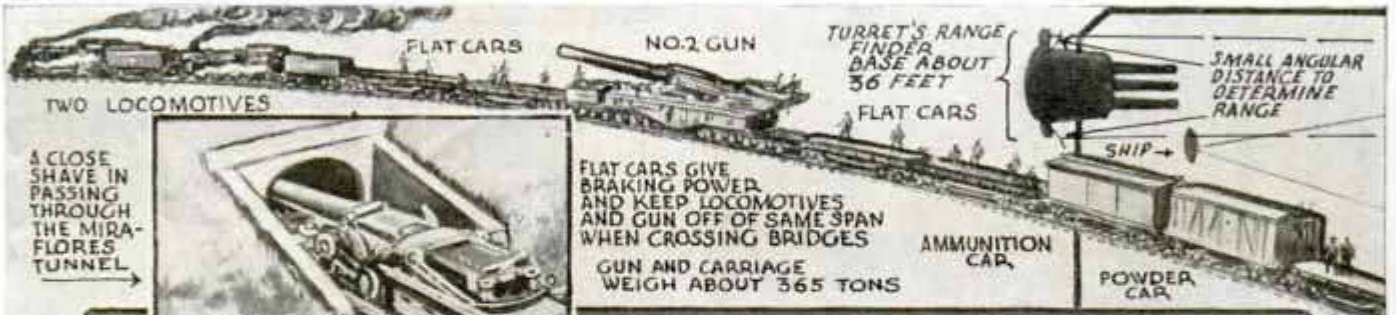
necessary to observe a sight indicator to insure uniformity. The tightener is aluminum and has only two moving parts.

W.A. Bichel, 809 W
 Madison St.

*Logan U. Dean
145 W. 45th*

New York City

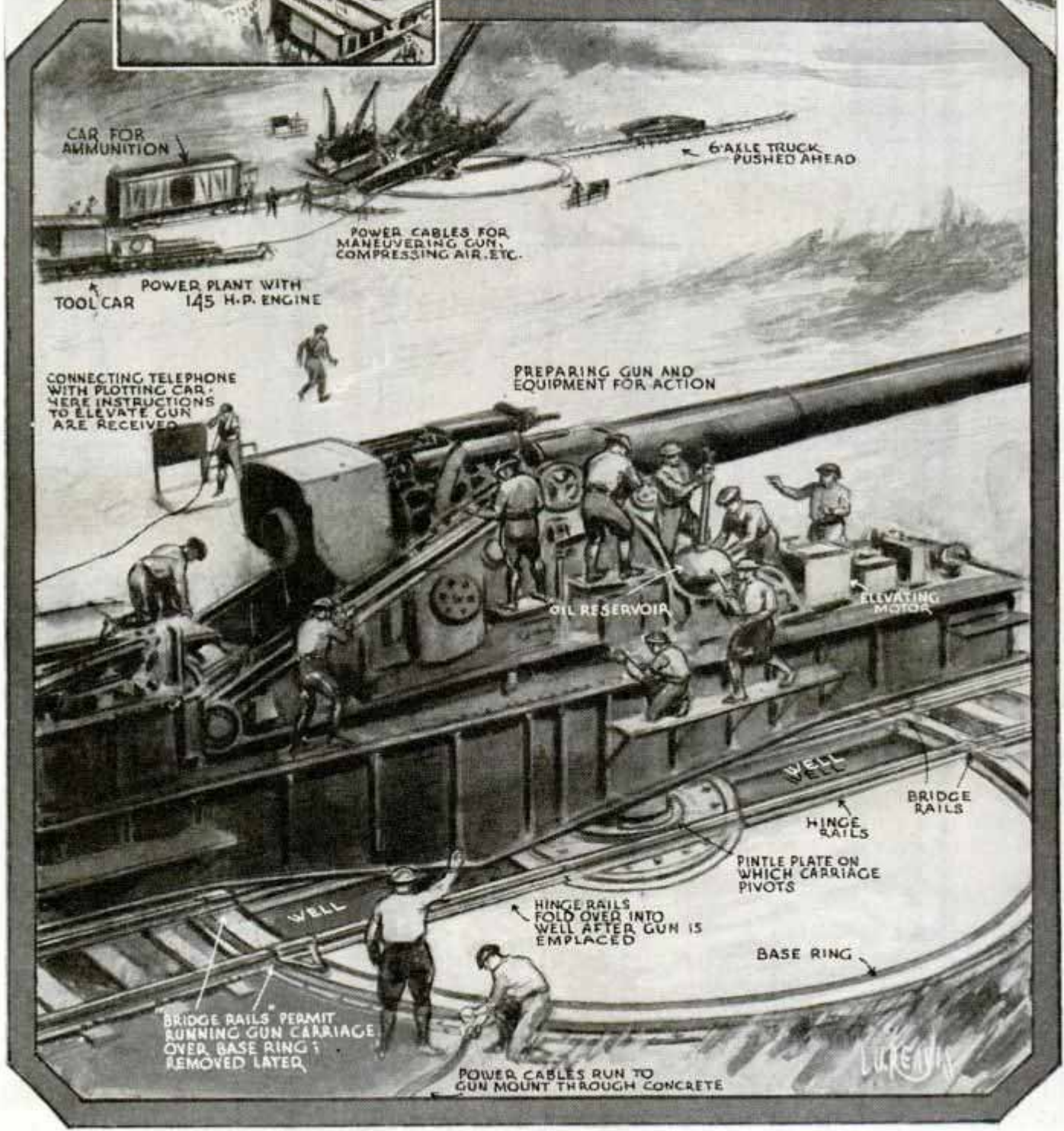
Gun-Train Guards Ends of Panama Canal



A CLOSE SHAVE IN PASSING THROUGH THE MIRAFLORES TUNNEL

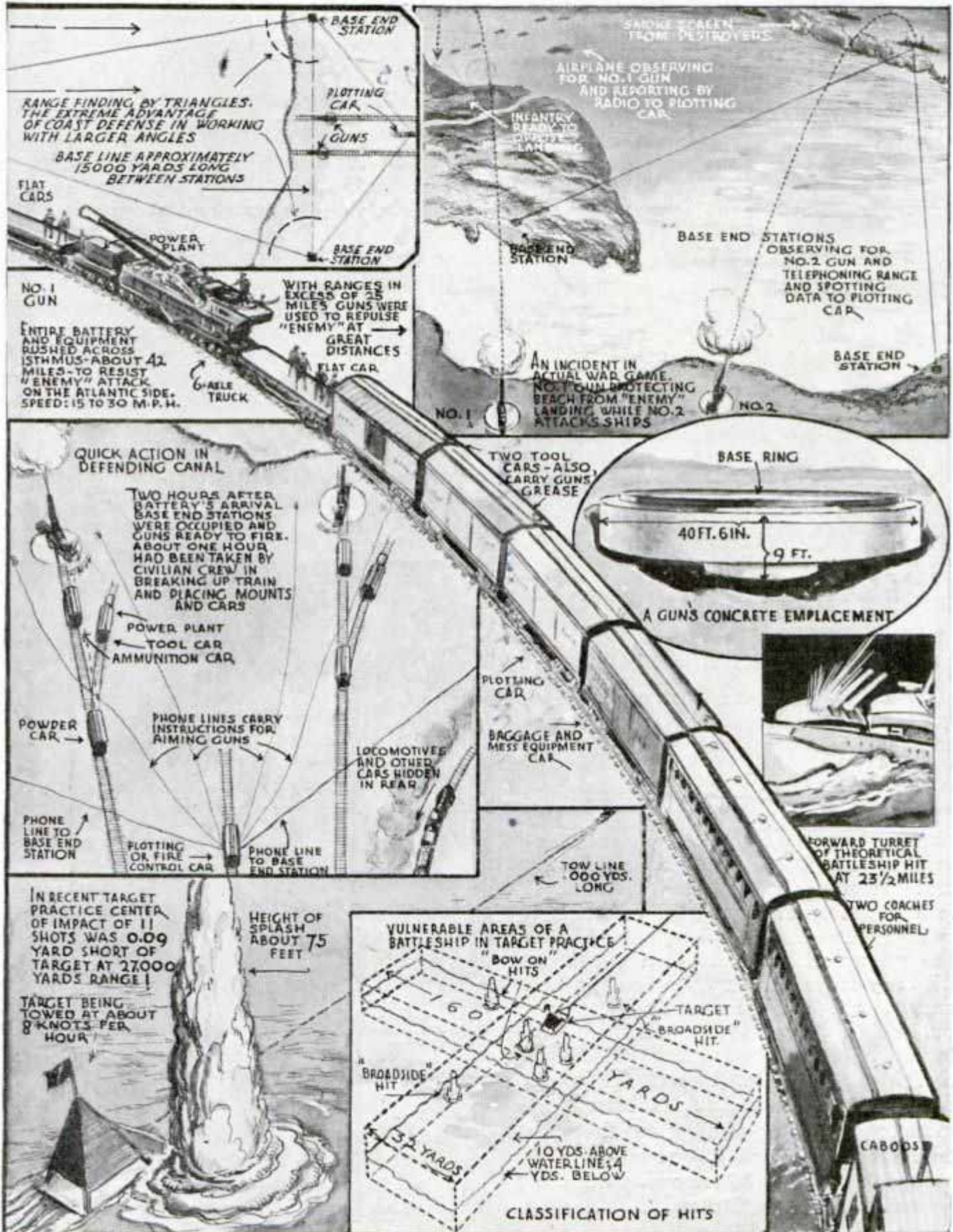


FLAT CARS GIVE BRAKING POWER AND KEEP LOCOMOTIVES AND GUN OFF OF SAME SPAN WHEN CROSSING BRIDGES



Mounted on a Train for Fast Transportation from the Atlantic to the Pacific Coast, Large-Caliber Guns Guard Both Ends of the Panama Canal; Drawings Show How Big Gun Is Mounted After Trip across Isthmus; Manned by 200 Men, the Rifles Fire from the Rails; Full Turn Permits All-Round Firing

Rolling Fort Crosses Isthmus in Two Hours



Speeding from Coast to Coast, Slightly More Than Forty Miles, in Two Hours, the Fort Mounted on a Train Defies "Enemies" at Either End of the Panama Canal; Drawing Shows Some Essential Steps in Hurling Projectiles Weighing Nearly a Ton; the Gun-Train Has Been Tested in War-Game Maneuvers

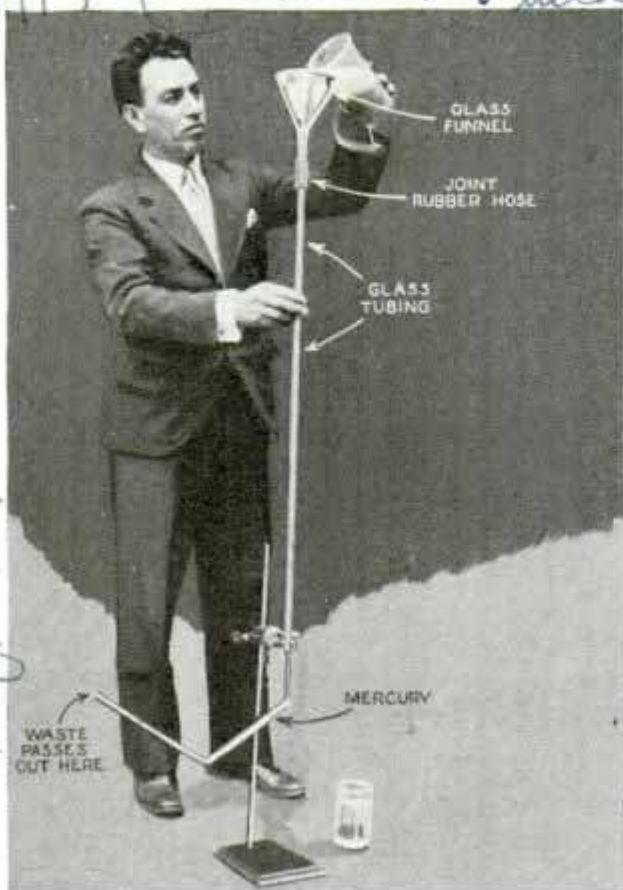
Comp. George H. Eckhardt, 2047 N.

846

Parcel Recovery Chute Co. 40 N. Main Av

East Orange N.J.

D



This Curved Glass Tube and a Flask of Mercury Make an Efficient Gold Recovery Plant

GOLD RECOVERY PLANT MADE OF MERCURY AND TUBE

Gold can be recovered from very low-grade ore with the aid of a simple apparatus which costs virtually nothing to assemble and operate. This apparatus was devised by Samuel G. Gordon of the Academy of Natural Sciences, Philadelphia, and consists of an ordinary glass laboratory funnel, a length of glass tubing and a small flask of mercury. The funnel is attached to the tubing by means of a rubber hose joint, the tubing being bent at the bottom with the aid of a gas flame. Mercury is poured into the bent portion and the ore is crushed and made into a mud or sludge by adding water. The tube is first filled with water after which the sludge is poured in. The sludge passes through the tube and bubbles through the mercury, the waste passing out the open end. The weight of the mercury is so great that it is not forced out of the tube by the column of water and the mercury retains whatever gold the sludge may contain. Recovering the gold from the mercury is as simple. A potato is hollowed out

and the mercury bearing the gold is placed in the hollow. The potato is then roasted and the mercury is driven off, leaving the gold. It is also possible to dissolve off the mercury by using nitric acid.

D1205

RECEIVER CHUTE FOR PARCELS SERVES THE CUSTOMER

Early closing hours in many lines of business are bringing a demand for some means of serving the customer before and after the working period. A parcel receiver chute, to be installed in the front door, has been used with success in New Jersey and is being placed on the market. It is intended for tailor shops, cleaning and dyeing plants, laundries and similar places. Parcels dropped into the chute pass through a double shutter that acts as a safety guard, preventing removal from the outside. The shutter also forces the parcel into a container inside the shop. The chute is equipped with a pencil on a chain and a pad on which the name and

Curator of Mineralogy

Low Harry Muller



Left, Outside of Parcel Chute; Right, Inside View, Showing Receiver for Parcels

address of the customer may be written, together with instructions for handling the parcel. The chute is electrically lighted.

Names and addresses of manufacturers of articles described in this magazine will be furnished by our Bureau of Information upon receipt of return postage.

157076 P. Warnard, Ingenieur,
La Soudre Electrique, s.a

POPULAR MECHANICS

847

Arched Water Pipe Spans Unstable Ground

During the construction of a water pipe line to Lausanne, Switzerland, the contractors encountered a serious problem in a large area of unstable ground. So shaky was the soil that a conduit would have been subjected to the danger of breakage. Tunneling under the area was impractical, due to the great depth of the soil. An arched pipe, extending high above the unstable area and capable of a water pressure of 17,000 pounds per square inch, solved the problem.



Showing Great Arched Pipe That Carries Water over Shaky Soil in Switzerland; Compare Its Height to That of Men in Photo

STUMP BURNER USES FORCED DRAFT

Clearing land of trees for cultivation is facilitated with the aid of a forced-draft stump burner consisting essentially of an electric motor or small gasoline engine driving a centrifugal fan in a housing. Through the outer circumference of the housing project twelve nozzles to which pieces of rubber hose are attached. To the end of each piece of hose a four-foot

length of gas pipe is fastened. To start a roaring fire in a stump, auger holes are bored around the base, all angling toward the middle. Crankcase oil and gasoline are poured into each hole and this is ignited. Then the end of the gas pipe is inserted in the hole and the blast of air causes the oil to burn rapidly. Soon the oil in each hole is burned but by that time each of the pipes is red hot and the stump is afire and burning toward the center. As the fires from the various angles unite, natural draft is provided and the forced-draft equipment can be moved to the next stump. The forced draft can also be applied to any large roots which remain after a stump is burned to the ground as the burner will also destroy them.



Using a Forced-Draft Burner to Destroy Stumps

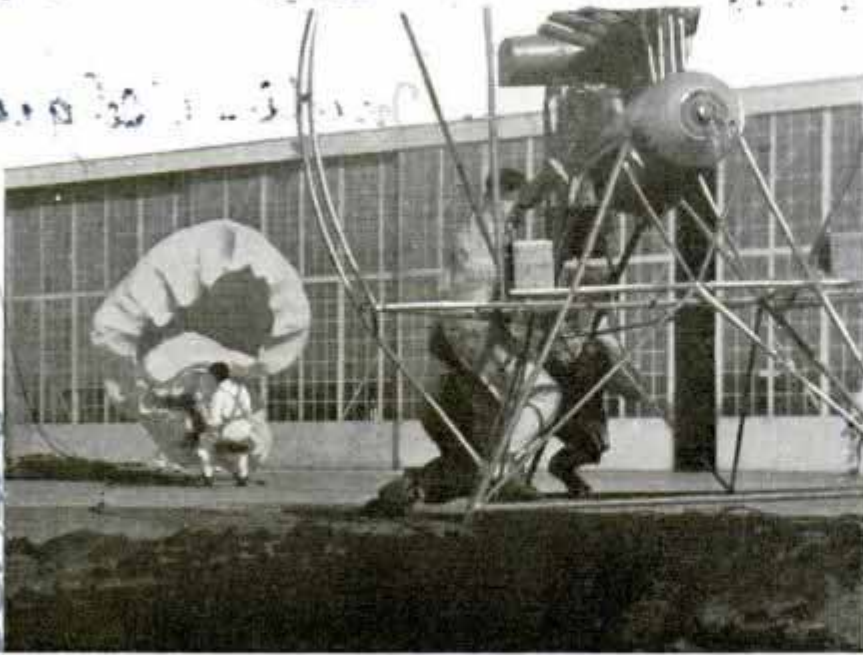
Cook Harold J. Williams Esq
Colchester, Oregon Road

Blacky Heath ne
London, Eng

Bruxelles - Midi - Belguer

Comp. James W. ...

C. Falk, 4522 S. Tacoma Way.

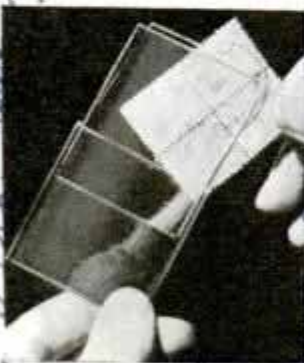


Testing a Parachute Without Leaving the Ground by Allowing It to Open in the Blast of Air from the Propeller Slipstream

PARACHUTE TESTED ON GROUND IN PROPELLER SLIPSTREAM

Students at a California aviation school are required to learn to pack parachutes and they test their efficiency in this work without leaving the ground by opening them in the slipstream created by an airplane engine and propeller. The tester takes a position in the slipstream about fifty feet from the engine and pulls the ripcord on the parachute, at the same time running toward the motor. As the parachute opens he is spun around and pulled along by the big umbrella until guards rush in and collapse it.

TRANSPARENT STAMP MOUNTS GIVE FULL PROTECTION



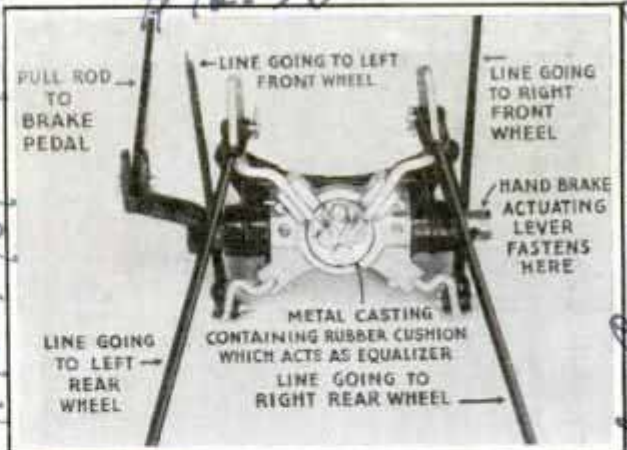
Complete protection without sacrificing visibility is afforded by a new transparent mount for stamp collections. The stamps are protected from handling and from sticking to the back of the mount.

The mount is made of moisture-proof, non-shrinkable material that will not damage the color of the stamp. It consists of a

mount, which contains the stamp, within another mount that may be attached to the collector's book, tray or rack. Thus, stamps may be removed from the outside mount and examined for water-marks or creases without being handled with the fingers or tweezers, the transparent inner mount permitting full visibility.

D1176 HYDRAULIC EFFECT GIVEN BY BRAKE EQUALIZER

Live rubber instead of the liquid used in hydraulic brakes is employed as a cushion in a brake equalizing unit for Ford cars. The rubber cushion contained in a metal casting tends to equalize all four brake lines, thus permitting all the brakes to take hold simultaneously. The unit is installed on the cross shaft under the car, near the center where the



This Brake Equalizing Unit Uses Live Rubber Instead of Fluid to Insure Uniformity

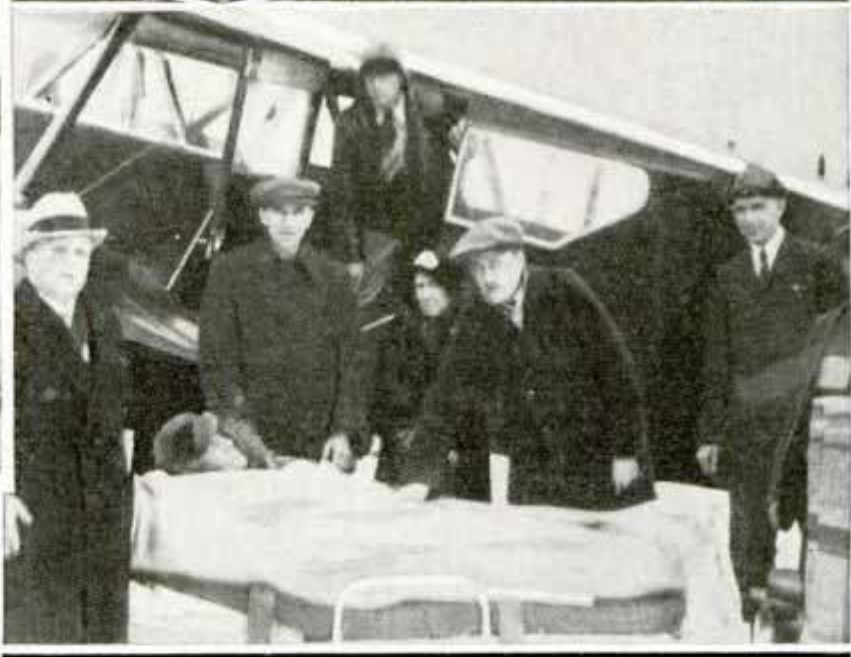
brake lines meet, and it is unnecessary to cut lines, drill holes or make any changes in the braking mechanism at the wheels.

Popular Mechanics Magazine does not publish the name of the maker of, or dealer in, any device described in its pages, but this information is kept on file and will be furnished by our Bureau of Information upon request, accompanied by stamped, self-addressed envelope.

Comb. James Hennessy, 575-16th Ave
 Dan F. Sanders, Cal
 The Urei-Tray
 Mount Co. 3411 W. 1140
 Pat. # 1,956,527
 50¢/day
 Pat. # 1,962,989 - 1,970,696

D. J. Delahanty, City, Ala.
 Brake Co., 1205 W. main

"Mercy Flights" Save Lives in the Far North



Above, Primitive and Modern Means of Travel in Far North; Below, Pilot Dressed for Mercy Flight and Patient Being Taken from Plane after Such a Trip

Airplanes are being used more and more to save lives in the far north where other means of transportation are often too slow or impossible entirely during the winter months. Calls for aid in transporting the sick to doctors and hospitals are received by radio from outlying places and if a plane and pilot are available, they never go unheeded. Most of these "mercy flights" are exactly that and nothing more. The flights are made to save lives without any consideration of pay for the service. In one particularly bad section, all planes but one are withdrawn from service each fall. This one is left for no other reason than to aid the sick and needy. Throughout the

winter, the pilot and mechanic sit in their lonely shack awaiting the crackle of the radio to send them on another trip.

D1177

ELECTRIC LIGHTS ON UNIFORMS ADD BRILLIANCE TO PARADE

The 121st field artillery band uses red, white and blue electric lights to add to the pageantry of its night parades. Each bandman has a red light on his right foot, a blue one on the left and a white light in his cap, current being supplied by small batteries attached to the belt. Separate lights illuminate the bass drum and the drum major's baton.

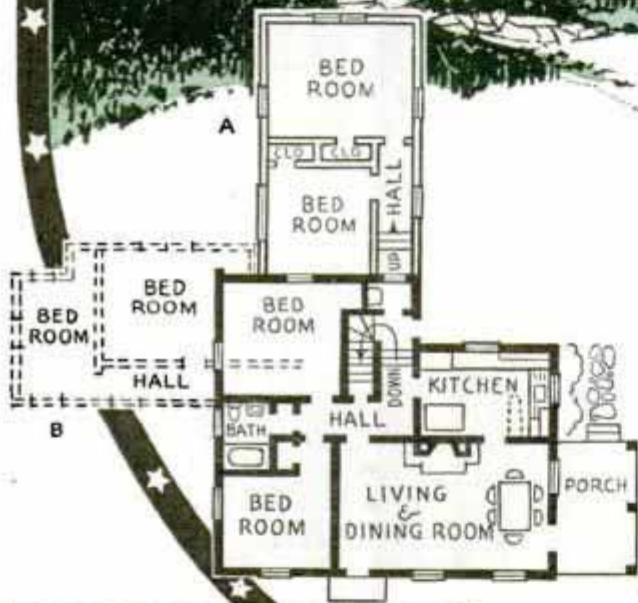
Originated by Warrant Officer E. J. Bartell

Geneville, Wis

D109 3. *Chas. DeWitt W. Gordon*
1195 + 17th St. N.W.

c/o The Drafting Journal
20 Washington St.

Uncle Sam BACKS



UNCLE SAM considers that the home builder is a preferred risk, for he's willing to gamble that he'll pay back any money he borrows to build that dream house, or to brighten up the one he already has.

Uncle Sam isn't going into the banking business. He won't lend you a cent. But he is going to loosen the purse strings of the bankers by telling them that if you don't make your payments he will; and in return for this guaranty, the bankers must treat you as a good risk and let you have the money at a low rate of interest, and give you plenty of time to pay it back.

The Federal Housing Administration, one of the newest of the New Deal bureaus, already has a plan working to finance owners in repairing and modernizing their property, and loans of \$100 to \$2,000 are now available for that purpose. By the first of the year the housing administration expects to have the machinery in operation for granting loans up to \$16,000, repayable in monthly installments over a pe-



One of Farm Homes for Which Plans Are Available and Bathroom, Before and After Modernization

Washington
D.C.

D 1083

HOME *Building*



House Plan, Courtesy Smith and Delos, Architects

1907 Eye St. N.W.
 eriod of twenty years, for new construction. The money now available may be used for maintenance repairs such as painting, roofing, plastering and papering; or alterations to increase the value of the property may be made. Wall board, paint and new windows may provide a needed extra room in the attic or basement, the bathroom may be modernized, the plumbing and heating may be brought up to date, and air conditioning or ventilating fans may be installed. The porch may be enclosed or an extra wing added to the house.



Above, a Three-Room Bungalow Which Can Be Built for About \$1,500; Below, Home as It Appeared Before and After It Was Remodeled

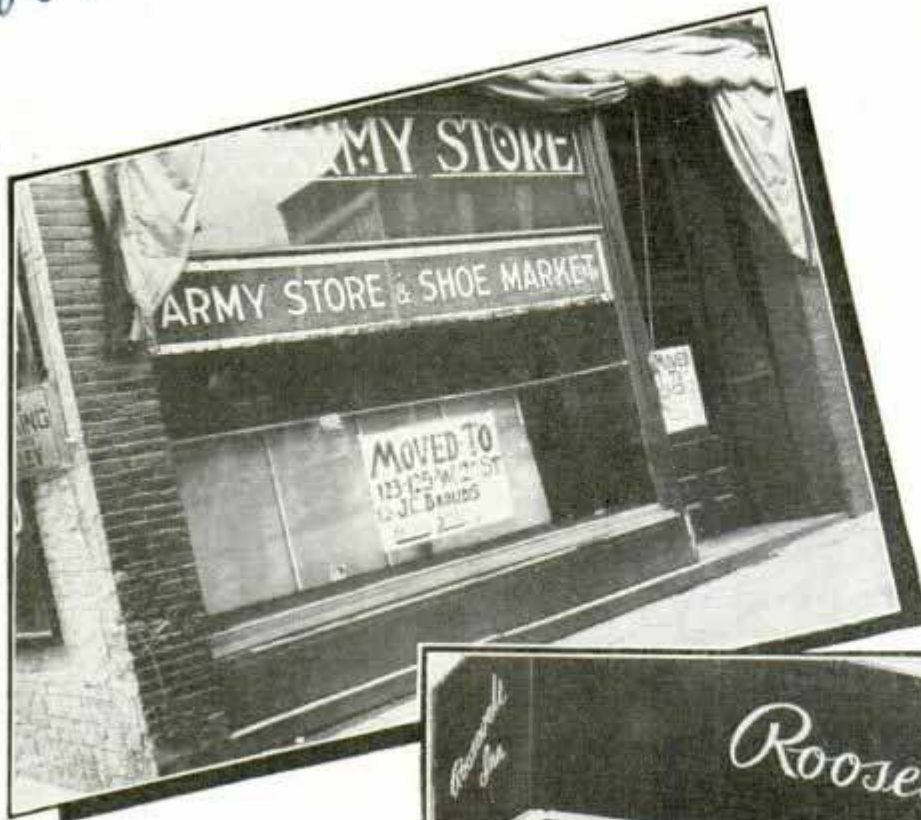


Rural as well as urban property may be improved under this finance plan. In addition to the usual repairs around the house, modern water and lighting systems may be installed, poultry houses and barns may be lighted, a silo can be built, and new fences erected or the old ones repaired. Business property may also be brightened up. A new front, providing greater window display space and a more attractive entrance, would draw new customers to a store or increase its rentability. Torn awnings and obsolete lighting fixtures also can be replaced.

These suggestions offer only a



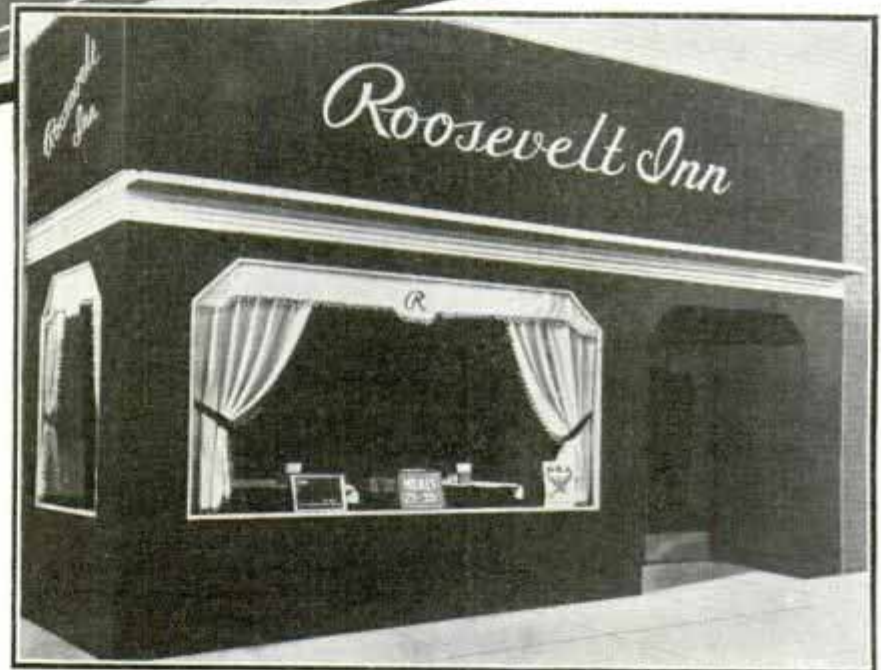
Home of J. P. Schercher, 51
 315 Lane W. Pennell



property or has a "repairing lease" with at least fifty years to run, that his mortgage, if any, is in good standing, and that there are no past due taxes or liens on the property. He must promise to use the proceeds of the loan solely for property improvement. No co-signers or endorsers are required, except that if the individual is married the signature of the husband or wife

bare outline of what may be done. The plan was designed to help owners make any repairs or alterations that will improve any existing building. Structures in slum areas are barred, for another government agency is working on slum eradication. Any property owner with a regular income from any source is eligible for a loan to make these improvements. He may apply at any bank, finance company or building and loan association approved by the housing administration, or to a contractor or building supply dealer.

Loans are repayable in any number of monthly installments from one to three years. The annual income of the borrower must be at least five times the annual payments on the note; thus, a person with an income of \$2,500 a year could borrow not more than \$1,500, for the annual payments on that amount would be \$500—one fifth his income. The only security required is an adequate income and a good credit standing in the community. The applicant must give assurance that he owns the



Before and After Pictures of Typical Modernization Project for a Shop for Which Loans of from \$100 to \$2,000 May Be Obtained

must be obtained. The lending agency is not permitted to charge more than five per cent interest, and no extra charges are permitted except a small fine in case of overdue payments.

There are no restrictions on the rights of the owner to use such materials and employ such methods of construction as he may desire, providing they meet the approval of the lending agency and pass the local fire and building laws. The owner may employ any contractor or labor he sees fit, or may do the work himself.

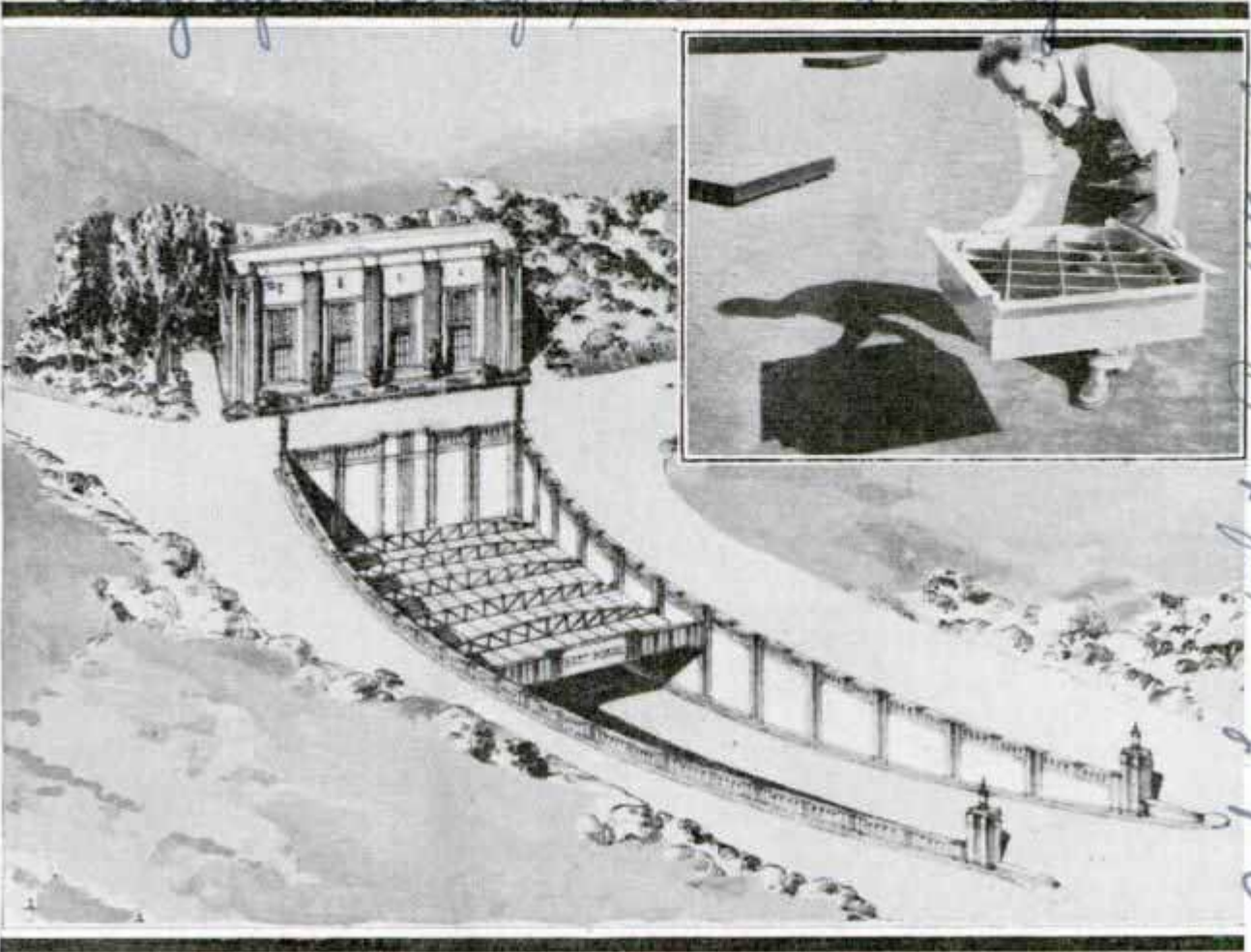
The procedure for borrowing money for new construction promises to be equally

(Continued to page 124A)

Perfected and designed by D. H. 57

Romaine W. Myers, 204 Federal Telegraph Bldg., Oakland Calif

Vanes Prevent "Blindness" Entering Tunnel



Encl. Tom White, Box 79, Alameda Calif

Canopy over Highway Tunnel Entrance Which Diffuses Light and Enables Motorist to Accustom Himself Gradually to Change of Illumination; Insert Shows Canopy Section and Its Shadow

Temporary blindness experienced by automobile drivers entering tunnels from the bright sunlight will be prevented by light transition structures at entrances of the Broadway low-level tunnel back of Oakland, Calif. Extending 200 feet from the tunnel mouth like an immense canopy, the structure will be suspended from overhead trusses to span the four-lane roadway. It consists of five-inch aluminum strips or vanes, some to run north and south and others east and west. One set will break the rays of the morning and afternoon sun and the other will prevent noonday glare from reaching the motorist's eyes. Vanes are spaced in accordance with the results of hundreds of solar observations. Based on a traffic speed of forty-five miles per hour, the structure extends far enough down the roadway to allow the driver's eyes to become accustomed to the lighting within the tunnel, resulting in safer operation of the car at normal speed.

It was found drivers were blinded temporarily if the change from daylight to artificial illumination came too suddenly.

D189

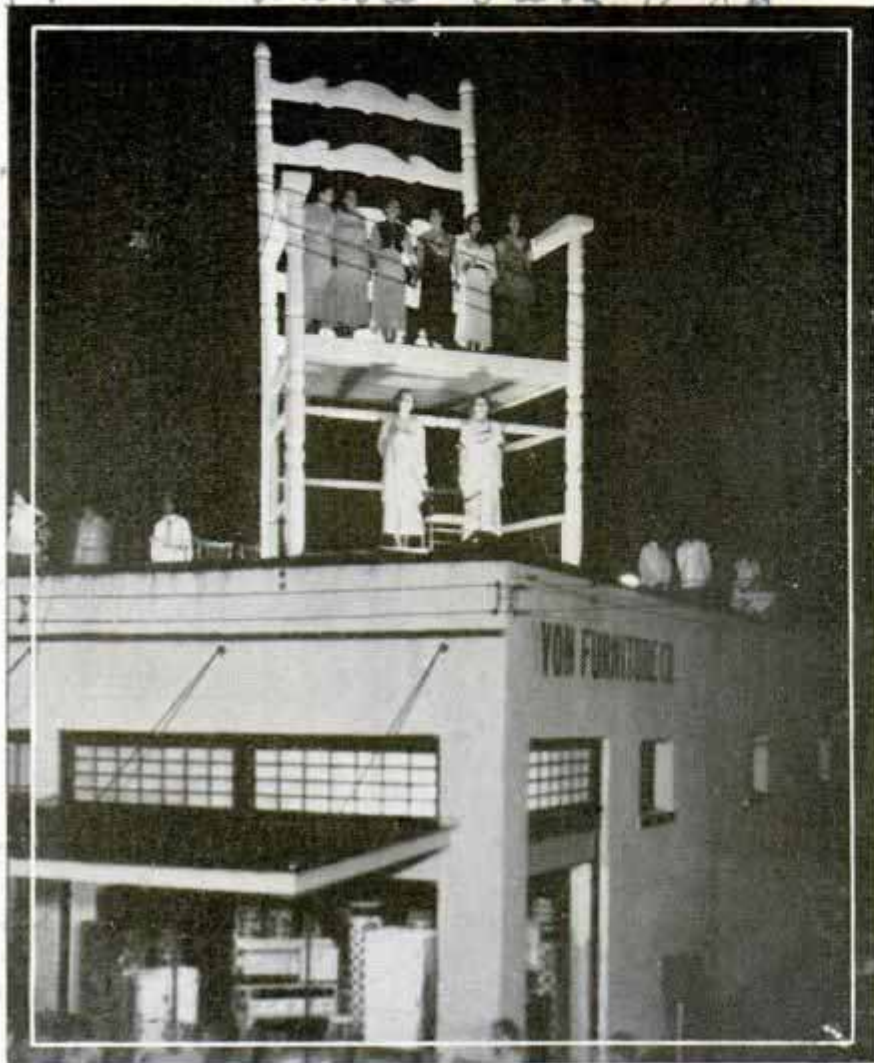
MILLION-POWER LOUD SPEAKER LOUDER THAN THUNDER

Magnification of the human voice one million times is accomplished by a new loud speaker. At full power, the device hurls sound into the air with the force of a fifty-pound hammer. Over flat terrain, in still air, it can project intelligible speech a distance of several miles. It can make the voice louder than a clap of thunder or about 1,000 times louder than the roar at the foot of Niagara Falls. The horn is made of cast aluminum and can be pointed in any direction. The system is controlled entirely by a single push button. The loud speaker, used for the first time at the international yacht races, was designed by engineers of the Western Electric company.

195 Broadway

Chr. J. Williams
216 1/2 Park Ave
Winter Park Fla

D 1148



This Chair, Twenty-Five Feet High, Fourteen Feet Wide and Twelve Feet Deep, Helps to Advertise a Florida Furniture Store

**GIANT CHAIR ON STORE ROOF
ADVERTISES BUSINESS**

at Orlando

Twenty-five feet high, fourteen feet wide and twelve feet deep, a giant chair atop a Florida furniture store helps to advertise the business. The chair, an authentic reproduction of an early American ladder-back chair, is of solid cypress.

**BOTTLES SEALED IN VACUUM
KEEP FRUIT JUICE FRESH**

To conserve the natural flavor, aroma and color of fruit juices indefinitely, one manufacturer employs a vacuum packing process and seals the bottles by means of caps containing valves in order to retain the vacuum. The bottles of fruit are placed in a vacuum chamber and heated after which the air is removed with an ordinary vacuum pump, a rather high vacuum being obtained without drawing off the fruit

juices. The caps containing tin plate valve seats are then hermetically sealed merely by breaking the vacuum. As a secondary precaution, a spot of solder is applied to the opening in the crown to prevent any filtration of air.

**POWER OF GASOLINE
MOTOR INCREASED
BY BACK PRESSURE**

Gasoline engines have not been very efficient because they have been able to utilize only part of the power developed. The explosion of gases in the cylinder gave a push to the piston but the reaction from this push as the piston came back was wasted energy. Now a German inventor has produced a gasoline motor which he claims utilizes this back pressure and which he says is just twice as efficient as the ordinary type of engine.

It is claimed this type of engine will not only cut fuel consumption in half when used in automobiles, but is an ideal motor for planes since the weight per horsepower



This Gasoline Engine, Developed in Germany, Utilizes Back Pressure to Increase Its Efficiency

is halved and the cruising radius of such a motor is increased because of the greater power derived from the fuel carried.

Revilla gagedo num. 37,
apartado Mexico
D 1164
num. 37

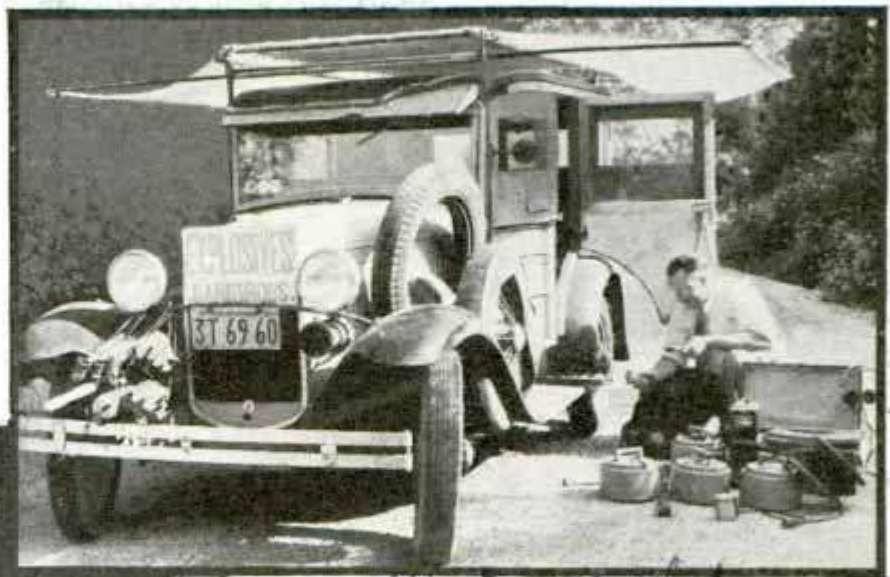
Deutsche Automobile

Cia de Japones al
Alto Vacid, SA

Lawag. Hameln
Germany.

Dynamite "Earthquakes" Aid Study of Earth

Miniature earthquakes, created by setting off small charges of dynamite, are helping scientists study deep-lying rock structures of the earth. Sensitive instruments record the "earthquakes." By studying the effects of these explosions it is possible to locate ac-



Wide World
Truck and Recording Instruments Used to Reveal Underground Secrets with Aid of Explosives

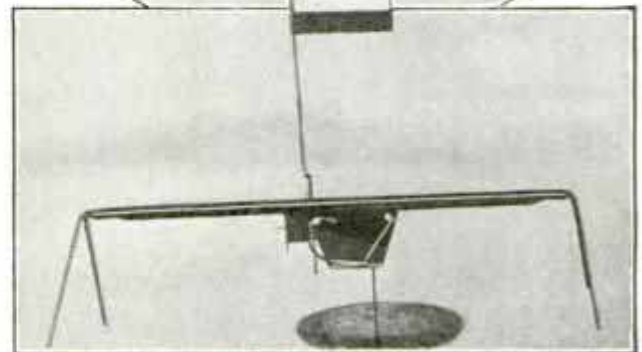


live bait attached to the hook. The line is adjusted for the proper depth for the fishing grounds. When a fish takes the bait, the slight pull releases the line from a bobbin, causing the flag to spring into upright position to signal the strike. After the fish is removed, the apparatus may be instantly reset by pushing the flag back to horizontal position and attaching a new bait. For night fishing, a small electric flash lamp may be attached as a signal.

curately underlying strata of rock as deep as 40,000 feet below the surface. The apparatus also is used to locate earthquake faults, to study the velocity with which earth tremors are propagated, to locate oil shale and to measure the depth of alluvial deposits. Dynamite charges vary from one to forty pounds. The explosive and recording instruments are carried on a special truck outfitted by scientists of the California Institute of Technology.

Pasadena, Calif. D1141
HANDY TACKLE FOR ICE FISHING IS EASY TO ASSEMBLE

So compact that it can be carried in a pocket or a basket, handy tackle for the ice fisherman is available. The equipment consists of a tip-up machine constructed like a small saw-horse about two feet long, fitted with a flag and the usual fishing line. It is placed over a hole in the ice with



Tackle for Ice Fishing Equipped with a Small Flag Which Springs Upright to Signal a Strike

Henry Lullhoff, 2861 N. 24th St. Milwaukee Wis.

Cook Carnegie & Motute, Washington Co.

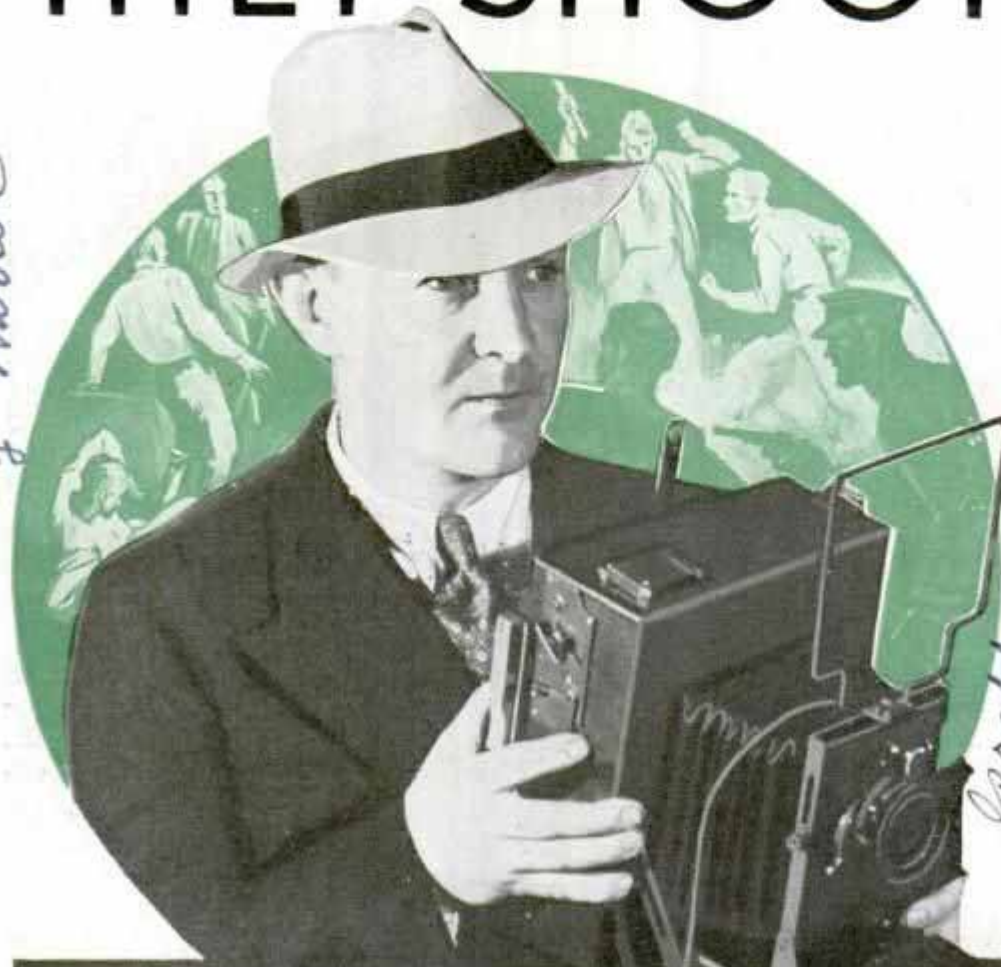
D 1139.

Mr. C. Schmeiermacher
22 E. 69th St
New York

Thomas F. Lavagari, Chief Photographer
Daily Mirror

THEY SHOOT 'EM

This Newspaper Photographer Is Using a Camera Which Takes Photos in Color, One of the Latest Developments in This Field; Below, the News Photographer Must also Be a Sleuth; This Cameraman Is Shooting Down on His Subject from the Roof of a Building



Graphic - converted to color



OF all occupations today, that of newspaper photographer is perhaps the most adventurous. That picture in your daily newspaper of a wounded gangster in a hospital cot was probably obtained by skillful sleuthing as well as actual nerve. That picture of a riot or strike was probably taken at the risk of the photographer's life. Nerve and lots of it, combined with detective ability and a thorough knowl-

edge of photography are the necessary qualifications of the modern newspaper photographer.

"Shoot it anyways"! is the laconic answer which the assignment editor gives when occasionally a news photographer reports it is impossible to get a picture. And, in spite of the apparent impossibility, the photographer generally does "shoot the picture anyways."

D 1139

Taken by M. A. Baron Aerial Ace



above the mist. In twenty-five minutes he has passed Sandy Hook and is on a line with Asbury Park. Losing altitude he finds the fog has almost disappeared. It is still raining hard, but Baron has little difficulty locating the smoke of the burning "Morro Castle." Seven minutes later, the ship is being circled at a low altitude while Baron makes a photographic record of the harrowing disaster.

Picture after picture is taken, while Gulick circles and calls out the time every few minutes. Finally he announces "8:30." That is the deadline. There is a mail plane going west at 10:45. The evening newspapers must be on the street at 11:30 a.m. At 11:45 the London office of the news syndicate must

© International News Photo Above, Burning of the "Morro Castle," a Scoop for the Photographer Who Took the Picture; Right, News Cameraman Starting on Assignment and Scene at Le Bourget When Lindbergh Landed



editor. Quickly Sileo calls Mack A. Baron, his aerial photographer. Then Bill Gulick, ace newspaper camera pilot. Both men are ordered to the North Beach airport. Gulick pauses long enough to phone his mechanic at the field. When they arrive the machine is warmed up and on the line.

It is nearly six o'clock and the fog has not lifted. It is raining heavily. Baron has his aerial camera and a smaller one equipped with special hypersensitive plates which may cut through the fog. They climb into the big amphibian followed by the two mechanics. Sileo's orders were to get those pictures and get them quick. They must be in London, Paris, Berlin and in the newspapers of America that very afternoon! Gulick guides the plane down the East river. He gains altitude, trying to rise

Jim J. Jansky



have the pictures for distribution throughout England and for re-wiring to the Continent. Newspapers and the air mail must go on schedule. And so the plane heads

for the airport. At 8:58 the big plane taxis up to the hangars. Baron makes for a phone. He says but two words, "Got them"! A fast car is waiting. In fifteen minutes he is in his office and his plates are in the darkroom.

The seconds tick on. It is 9:20 and papers are demanding the pictures. The first wet prints come from the darkroom. Baron has done a good job. The prints must be sent by motorcycle to the local papers. They'll be in the hands of readers by 11:30 a.m. Some must be wired to London, some to San Francisco and some must catch the mail plane for Chicago. Allowing for the difference in time, San Francisco readers will be seeing the pictures a little over four hours after the SOS was sent!

Contrary to the impression created by fiction writers, the newspaper photographers do not resort to unfair tactics in beating their rivals.

"The era of breaking the other fellow's plates passed out about twenty years ago" states Thomas Flanagan, chief photographer for the Sunday (N.Y.) Mirror. "The only way to get a scoop these days is to get a better picture than the other fellow or get it before he does—and you can be sure that he'll get it eventually. Once in a while a photographer gets a better picture by trickery. But he'll get an exclusive picture only by sleuthing as cleverly as a headquarters detective."

The most famous example of "shooting it anyways" was the picture of the execution of Ruth Snyder by a daring Daily News photographer who attended the execution at Sing Sing with a small camera with a powerful lens strapped to his leg and the release cable running up the trouser leg to his pocket. This picture, which shocked the world, was a photographic scoop.

Curiously enough it is not the daring flight, the threatening gunman or the other kindred perils which make it most difficult for the news photographer but the crowd or riot picture. Every riot and crowd scene worthy of a news picture generally results in the smashing of at least one expensive camera.

The news photographer literally must "think on his feet." Only half of his job is to get pictures. The other half is to get

(Continued to page 118A)

Tennis Ball Server Which Enables Player to Practice without a Partner



ROBOT SERVES TENNIS BALLS FOR PLAYER TO STRIKE

Sixty balls are served accurately and mechanically by a tennis robot which propels cuts, slices and drives over a net for the player who wants to improve his stroke. The balls are hit back by the player until the machine is empty.

DEFROSTER WITH TIMING UNIT FITS ANY REFRIGERATOR

Automatic defrosting of any electric refrigerator is accomplished by a defrosting device consisting of a self-starting synchronous motor, clock and a relay which



interrupts the flow of current into the refrigerator motor. This interruption of current, adjustable to the size of the refrigerator, is long enough to permit complete defrosting without melting ice cubes or raising the temperature of the refrigerator more than four degrees. The defroster works a pre-determined period of several hours. Defrosting is accomplished without leaving the refrigerator door open.

D 11.39

to change Ball
12 lb and 10 lb
St. Louis, Mo

Acme
D 11.57

cad. no. 934. 1400

Edward Serrano
Forest Hill, L.I., N.Y.

F. M.
D. N. J.
Camden.

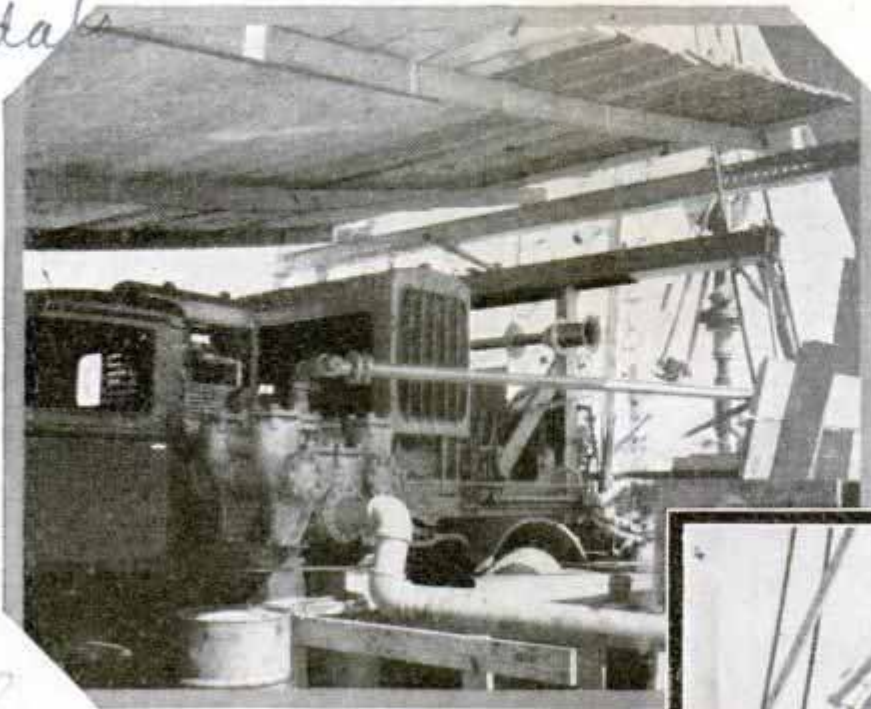
The Frostoff Co. Inc
25 08 42nd Street

D10 82 used by Neymenich & Payne,
Ines Tulsa, Okla

(drilling contractor)

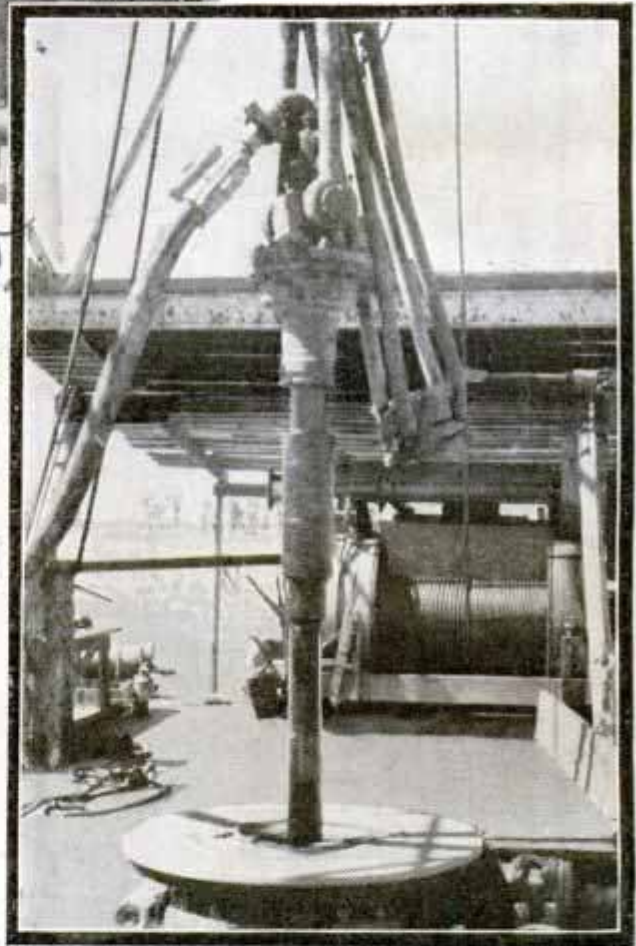
Big Power Plant on Truck Drills Oil Wells

Pro dak



Top, Giant Power Plant in Operation; Right, Drilling Equipment Driven by the Plant

prising thin metal strips of dissimilar metals. Each strip is but one one-hundred-thousandth of a centimeter thick and is mounted on cellulose acetate films of the same thickness. Together film and strip are set on a thin mica frame. The amplifier used to "step up" the tiny electrical current generated at the junction



Developing 250 horsepower and so compact that it can be moved quickly, a new power plant mounted on a truck is designed for drilling oil wells, water wells, lifting or pulling large loads and other heavy duties in farming areas. The plant consists of two motors, of 125 horsepower each, one under the hood of the truck and the other on the truck bed. A special gear synchronizes the motors. Either one or both can furnish the power. Should a breakdown in the truck motor occur on a cross-country trip, a small lever adjustment adapts the other motor to continue the journey. All chains, bearings and gears for the plant may be obtained at any farm implement supply store. Also mounted on the bed of the truck and powered by either or both motors is a large water pump, an electric generator for work lights, a spool of wire line and a hoisting block.

William Snyder

HEAT MADE BY NOISE

Sound waves traveling through the air produce heat, and scientists of the Massachusetts Institute of Technology have developed a sound thermometer to measure the alternating temperatures made by these waves. This thermometer is essentially a very delicate thermocouple com-

of the two dissimilar strips of metal by the heat of sound is capable of responding to one one-hundred-millionth of a volt. The strips are so delicate that they do not disturb the sound field they are measuring and the apparatus is so sensitive that it is capable not only of recording the minute variations in temperature produced by sound waves but of recording these variations when they are occurring many thousands of times each second.

Science Service. 9/26/34

Wanted

Developed by Ellis A. Johnson

Scientific material

© 1919. Capt. Julius J. Paula,

2631 N. Cramer,

Don't Give Up Ship When Your Boat Upsets

Milwaukee, Wis.

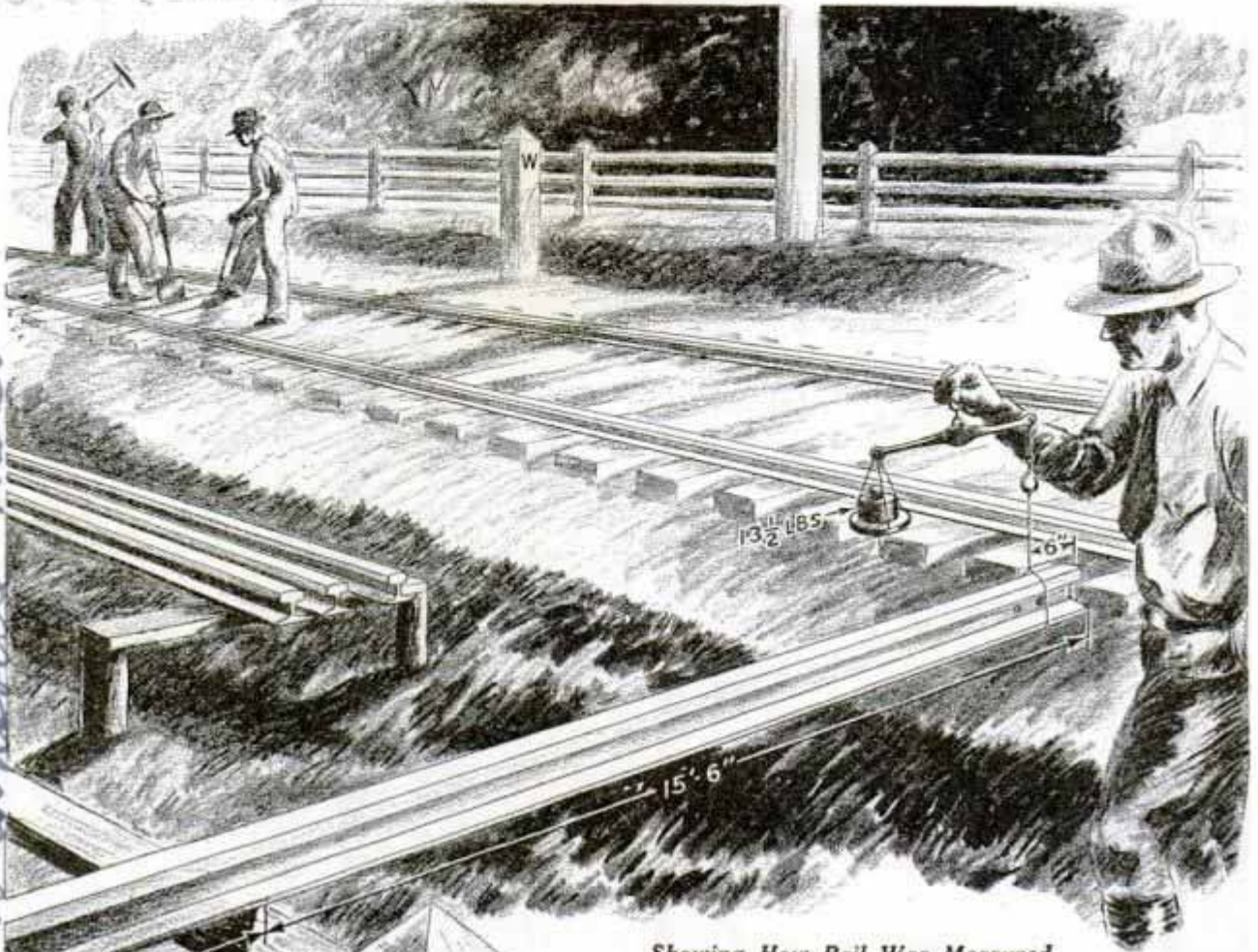
you are not a good swimmer, staying with the boat is the surest way of saving your life. A wooden boat will not sink, even if waterlogged, as these pictures show. In fact a swamped boat can still be rowed and will support several persons clinging to its sides. And rowing a swamped boat is often much safer than attempting a long swim to land. When capsizing occurs, non-swimmers should maintain a hold on the craft and climb to the upper portion as it goes over. Never jump away from an



What is the surest way of saving yourself when your boat upsets? Most persons instinctively strike out for shore, believing it hopeless to try to right the craft or stay with it. But if it is a wooden boat, and if you are very far from shore or if

overturning boat if you can't swim. When the craft is righted, it can be reboarded if two persons take positions at opposite ends and on opposite sides. Climb aboard one at a time while a companion keeps the end you are boarding from going under.

Big Steel Rail Weighed One Foot At a Time

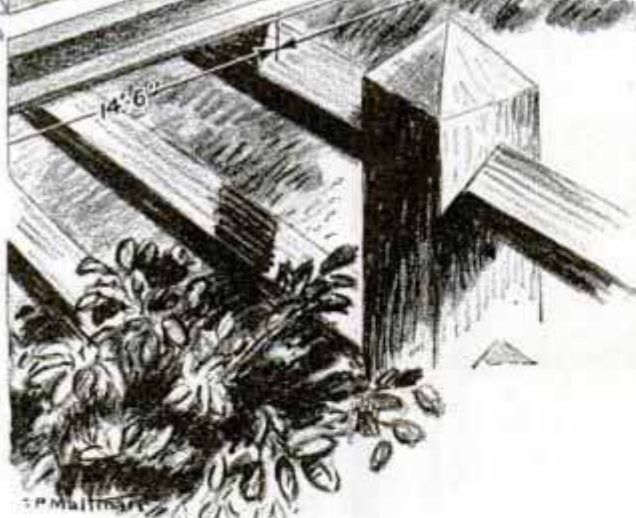


Showing How Rail Was Measured and Weighed with Only the Simplest Tools

measured the rail with the rule, finding it exactly thirty feet long. Then the exact center was found and marked. Next the rail was laid across the sharp edge of a fence rail so the exact center of the rail rested on the edge of the wooden bar. At that point, the rail balanced perfectly, proving the rail was of equal thickness and weight throughout its length. Then the rail was moved six inches to the right, giving a length of fifteen and one-half feet on the right side of the fence and fourteen and one-half feet on the left. Six inches from the end of the longer section, the engineer tied a small cord and to this cord he attached the scales. Upon testing, he found it took exactly thirteen and one-half pounds to bring the rail into balance, thus showing the rail weighed thirteen and one-half pounds per foot. Multiplying this weight per pound by the length, thirty feet, the engineer found the total weight was 405 pounds.

How to weigh and measure a heavy steel rail without adequate equipment is the problem which an engineer solved in unusual fashion while working on a railroad. The rail was supposed to be about thirty feet long and weigh about 400 pounds. The engineer's only tools for determining the correctness of these figures were a two-foot rule and a pair of balance scales capable of weighing only twenty-five pounds at a time. First, the engineer

Cont. Charles A. Allen 865 Providence R.I.
 Whitmanville Mass



Flow of Air Made Visible for Streamline Tests

Flow of air currents around model airplanes, automobiles, trains and other construction has been made visible. A smoke screen, forced at high pressure over the object under test, is used in producing the visible air flow. Tests indicate that the more streamlined an object, the smoother the air currents flow over it, resulting in increased speed because of reduced wind resistance.



By Using Smoke in the Air Current, as Shown Above, the Effects of Streamlining Are Made Visible in Testing Models in the Laboratory

CATTLE DEVELOPED FOR NORTH ARE PART BUFFALO

Farmers of the far north are looking forward to the day when they can have fresh milk and fresh meat during the winter from cattle which, if necessary, can forage on the ranges even in the coldest weather. The Canadian government has started to develop a new strain of cattle hardy enough for the northern settlements and

talo." There are about thirty cattalo now in existence. The cross between buffalo sire and domestic cow resulted in too many deaths, and now the experiment is proceeding with the buffalo mating with the yak, and the resultant offspring mating with domestic cattle.



The Cattalo, Developed to Stand the Far Northern Winters by Crossing Buffalo and Domestic Cattle

farms. The buffalo has been crossed with domestic cattle to produce this strain and the resulting animals are known as "cat-

HANDY VISE FOR DRILL PRESS HAS BUILT-IN PARALLELS

No parallels are needed to true up the piece of work in a drill press vise with built-in parallels. This vise can be used from three sides and V-grooves hold the work straight at all times, making it a simple matter to drill accurate holes in a round shaft. There are three sizes, weighing ten, twenty and thirty-four pounds respectively.



Ten years ago the average motorist spent \$79.30 annually for tires; now, because of improvements, the average is \$14.85.

D 1162 Aviation Section Franklin Institute Philadelphia

D 1167

Experimental Station near Wainwright, Alta.

1146

\$12.50, \$19.50, \$27.50

Job Racine

National Machine Tool Co. Racine Wis.

no data from Chute 1919 to 636 26



Portable Gasoline Filling Station Which Can Be Moved by Truck or Rail to a New Location

**PORTABLE SERVICE STATIONS
SAVE IN CHANGING SITES**

Portable gasoline filling stations have been designed to save the oil company's investment when any location loses its value through changes in road routing. Weighing about five tons and built compactly for easy shipment on truck or freight car, the portable station contains air compressor unit, tire racks, tool racks, desks, stove and rest rooms. The structure is insulated against heat and cold by rock wool placed within the steel walls.

**CONCRETE AND ASBESTOS PIPE
TAKES PLACE OF METAL**

Pipe made of asbestos and cement, combined under pressure into a homogeneous structure of extreme density, is replacing metal pipe for certain industrial purposes. The non-metal pipe is chemically inert and immune to the action of ordinary soil acids and alkalis and is unaffected by

electrolytic action. It is made in large diameters and long lengths and is used for water transmission and handling corrosive liquids and gases.

**LONG POLE TAPS PHONE LINE
WHEN TRAIN STALLS**

Train crews on railroad branch lines in remote sections are sometimes equipped with a long collapsible bamboo pole which enables the crew to establish contact with division dispatching headquarters in case of engine failure or other emergency. The pole has a "Y" prong at one end by means of which contact is made with an open railroad telephone line. When such contact is established, the conductor is able to talk with his dispatcher through a receiver and transmitter at the lower end of the pole, a wire extending from the telephone set to the prong at the top. This method of communication advises the dispatcher immediately of the location of the train and the nature of the trouble.



Using Collapsible Pole and Telephone to Establish Connection with Railroad Division Offices

Cont. Robert L. Blosser, 804 Argyle Bldg. Grandway, Ches

D1163

near Eastern road

Cont. Stanley W. Todd, 250 Park Ave New York

*Johns. Manville Co
H. O. Th. New York*

D 1120.

St. George's Hall England

B.B.C. Productions

Radio Artists Guided by Numbered Carpet

Numbered carpets are being used in radio broadcast stations to designate the positions of singers, chorus and orchestras. The carpets are marked off in numbered squares during rehearsals, with corresponding numbers appearing on the script of each performer. Thus, each artist knows where to stand before the microphone for best results.



© Fox Photos *Delobe*
 Numbered Carpet in Radio Broadcasting Studio Which Designates the Positions Each of the Artists and Musicians Must Occupy

D 1121

REFRIGERATED VAN IS COOLED BY FUEL THAT RUNS MOTOR

Refrigerated by the same fuel that runs the motor, a two-ton truck has been tested under ordinary operating conditions in Detroit with satisfactory results. A new fuel called Petrogas, which is carried as a liquid at a pressure of 135 pounds in two cylinders containing about twenty-three gallons each, is the secret of the fuel-cooling system. This fuel is converted from a liquid under pressure to a gas, resulting in heat absorption and refrigeration of the truck

gas that runs the motor at high efficiency. The elimination of crankcase lubricating oil dilution is claimed, resulting in a large saving on oil. The fuel is marketed at approximately the same price, on a performance basis, as regular gasoline, but it has the added advantage of serving both as fuel and refrigerant. Having an extremely high octane rating, it can be used on high-compression motors. Combustion is almost perfect even in motors of ordinary compression. In tests with the two-ton truck, temperatures in the truck body were held below fifty degrees while outside temperatures ranged as high as ninety-four degrees. The system is said to be adaptable for use in air conditioning of buses and railway trains using internal combustion engines. Engineers believe that it may be a step toward cooling the interior of passenger automobiles.



This Truck Is Cooled in the Process of Converting Its Motor Fuel from a Liquid to a Gas

body, as it passes to the motor. When it reaches the mixing valve and goes into the intake manifold, the fuel has become a dry

One-fifth of all homes in the United States are without kitchen sinks.

Mc Cord Radiator
2588

adv. Maller -
Climate mfg Co
636 Albany Chicago

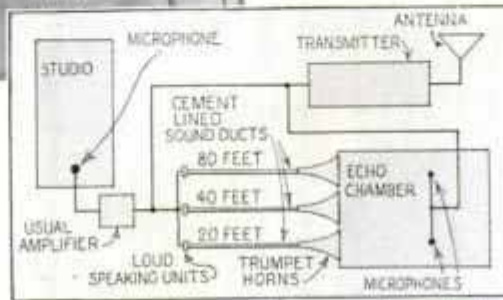
D 1006

Echo Vaults Add to Acoustics of Radio Studio

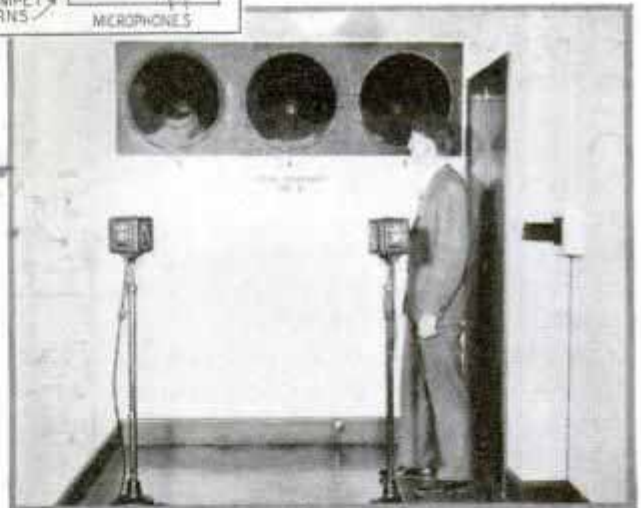


Pipes Carrying Sound to Echo Vault, a Diagram of Plan and Microphone in One of Vaults

by the microphones in the usual way. This sound is then made to travel to three loud-speaking units located near any vault. Attached to the loud-speaking units are three pipes of varying lengths, all lined with cement. Attached to the other end of these pipes are three long trumpet-like horns mounted in the walls of the echo chambers. The original sound passing through these pipes is obstructed by their unusual length and encounters resistance caused by their cement linings, making a lag in the sound when it is emitted from the trumpet horns in the vault. Here the tile and concrete walls, floor and ceiling make the waves



Man-made echoes simulating anything from a political convention to a battle scene in open country can now be produced in any of the studios of the National Broadcasting company in Radio City, N. Y., through the use of echo vaults. By this method the output of a studio fifteen by twenty feet in size can be transformed to the acoustic proportions of a big auditorium. The change can be accomplished by merely turning a dial which has the effect of transforming the studio with its sound-deadened walls into a great acoustic chamber. The idea involves the use of three echo chambers of average room-size proportions located some distance from the studios. When it is desired to simulate a broadcast with echoes or reverberations, the program from the studio is picked up



bounce and these reverberations are picked up by two microphones in the vault and conveyed to the regular transmitter where they are broadcast.

Magnetic Plug for Oil Drain Attracts Metal Particles



Three Magnetic Drain Plugs with Metal Particles Trapped from Oil During Long Run

Small particles of metal cut or worn from working parts of the automobile engine or gears are trapped by a magnetic plug made in sizes to fit the drain of crankcase, transmission and differential. The plug, with magnetized core, catches the free metal as it circulates in oil and grease, holding it until the service man wipes the mass of particles from the plug. Then the cleaned plug is screwed back in place to perform the same service repeatedly.

perfected by C. C. Havens Chief Engineers

D 1131

Patd. mag. plug.

Little Corp. Garinda

D 1110 Mr. John Winters Fleming
240 Wallace Ave
Buffalo, N.Y.



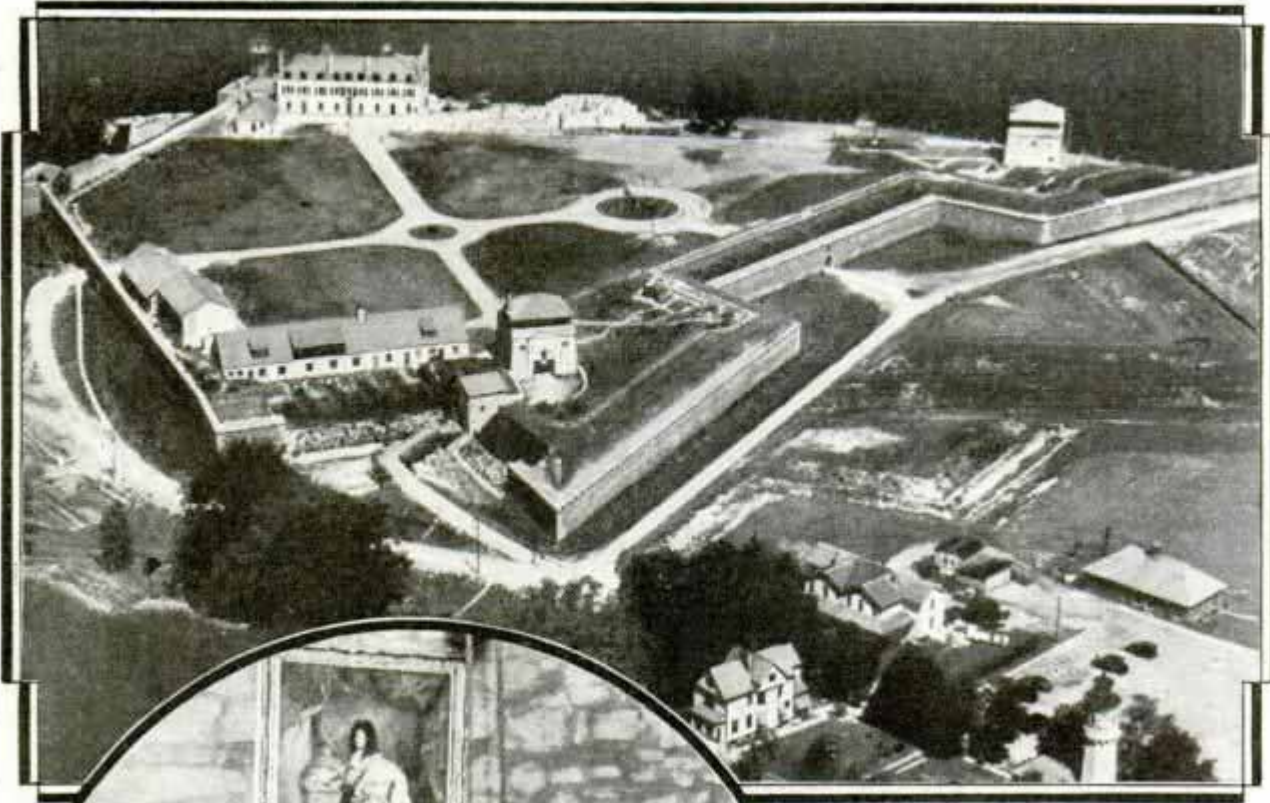
OLD Fort Niagara, unique among the famous forts of the world as the cosmopolitan product of four great nations and veteran of three wars has been rebuilt. It stands today atop the lofty triangular bluff below which the Niagara river flows into Lake Ontario, the result of seven years' research through the archives of four governments—French, English, Canadian and the United States—and seven years of reconstructive work.

The fort, restored by the Old Fort Niagara Association at a cost of \$500,000 is unique in many respects. Its main structure, the old French castle, built in 1726, is the oldest building west of the Hudson river. Old Fort Niagara is the only regular United States Army post to fly at all times the flags of three nations: the triple fleur de lis of the France of King Louis XIV, the double-crossed Union Jack of the England of King George II, and the fifteen-starred and fifteen-barred flag of the United States of George Washington.



The Hot-Shot Oven at Which Fanny Doyle Worked during the War of 1812 and One of the British Blockhouses Forming Part of Fort Niagara

21110



Above, an Air View of the Old Fort during Rebuilding; Left, the Old French Well within the Castle; Below, the Restored Kitchen, Showing the Fireplace, Bake Ovens, Dough Mixer, Cupboards and Mess Table; Not Even the Tobacco and Braided Corn Hanging from the Ceiling Were Forgotten



The site of sanguinary conflicts intermittently fought for nearly two centuries, a veteran of the French and Indian wars, the American Revolution and the War of 1812, the fort for 118 years past has stood as a symbol of peace along the Canadian-American frontier. The French built the old castle, the drawbridge, gate house, powder magazine and barracks. The British added the bake-house and two block-houses and the United States built the hot-shot oven and laid the brickwork surrounding the casement. It was decided to restore each structure to its own period.

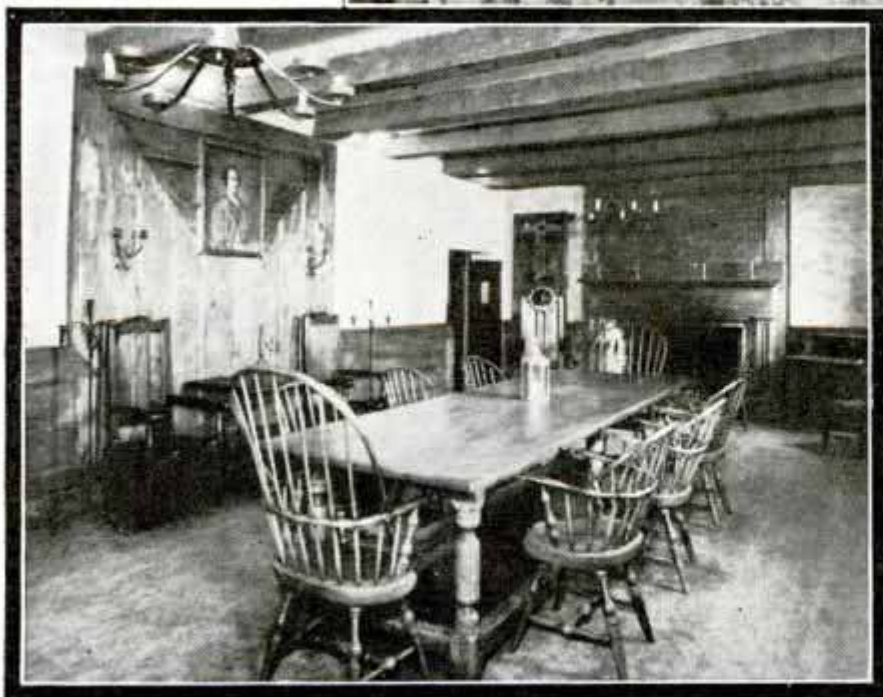
From aging military engineering files of the French, English, Canadian and United States governments were secured copies of the original architectural drawings, plans and specifications of the various buildings. Then architects, antiquarians and historians pored over the assembled plans and drawings to be sure that the reconstructed fort would be authentic.

Most historic of



the little group of buildings is the old French castle. In 1720, a Frenchman known as "the mystery man of the Niagara frontier," obtained the consent of the Iroquois Indians to build "a stone house." The structure was far more fortress than house. It had stone walls four feet thick and an interior well as if anticipating a possible siege. Like Quebec, the castle two centuries ago kept guard over "the lower town," a straggling community at the foot of the bluff, later obliterated.

When the British captured the fort in 1759 they plastered it from subterranean dungeons up through to the covered gundeck atop the roof. All this plaster had to be removed. Similarly, fireplaces had been bricked up and had to be uncovered.

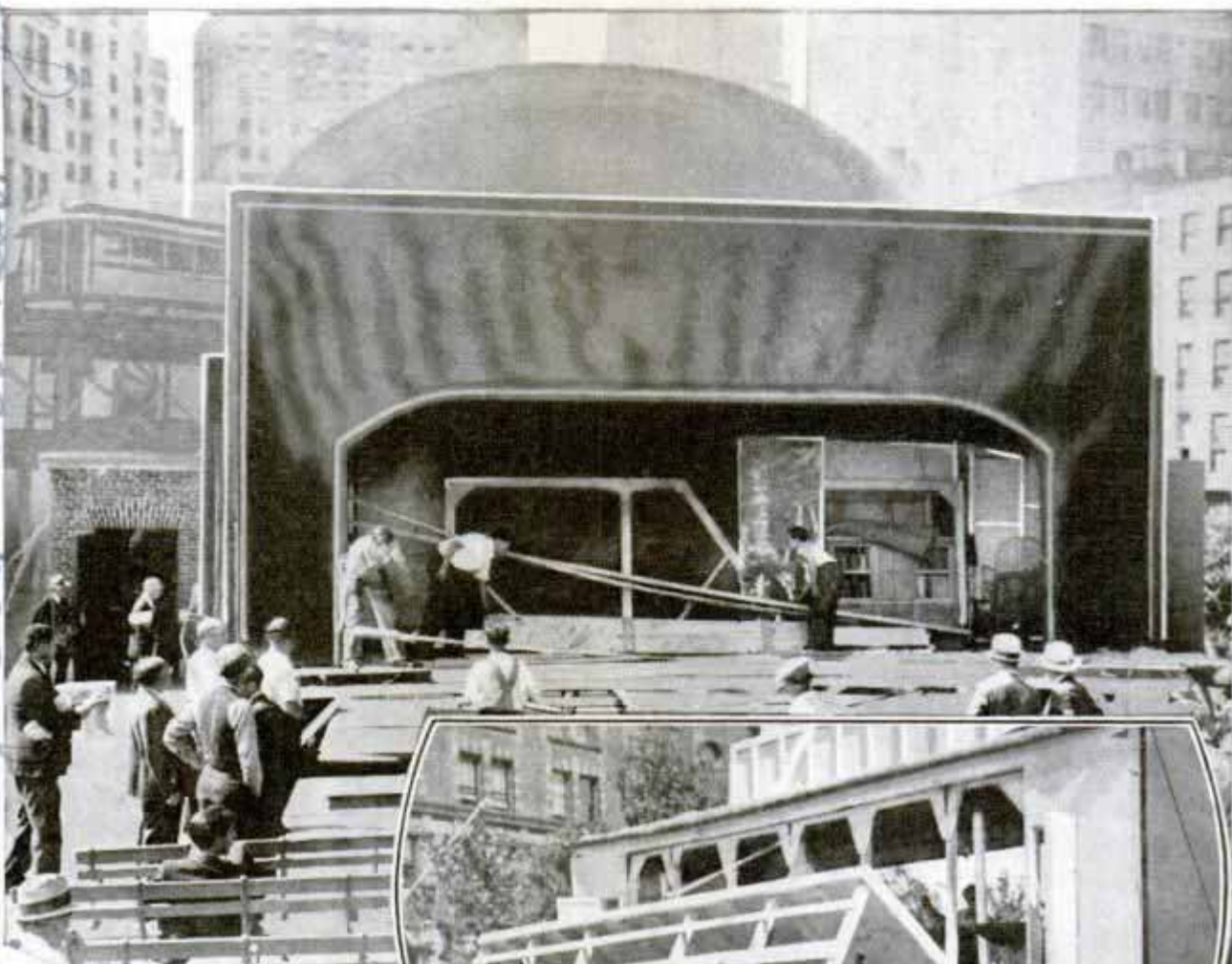


Drawbridge and Gate House at Entrance to Fort, a Corner of the Kitchen and a View of the Council Room of the Old French Castle

Mrs Mary Kelly, 66 W. 9th St New York City

Theater on Wheels Brings Play to Audience

Emergency Relief Administration Portable Theatre of New York City Worked Well, Hauled



Instead of going to the theater, New York people have had the theater brought to them in recent months. As an emergency relief measure for unemployed actors, portable theaters were built and hauled about the city, the actors giving performances daily in parks and other public places. Five such theaters on wheels for a time played to 150,000 persons weekly. The mobile theaters consist of huge vans carrying from three to five tons of stage paraphernalia and are drawn by two and one-half ton trucks. The vans are twenty-eight feet long but have "aprons" front



Stage of Portable Theater, Lowering One of Aprons, and the Theater on Wheels Ready to Travel; the Van Carries a Complete Stage and All Necessary Equipment

Designed and built in studios of Chester Throckmorton, 102 W. 3rd St

and rear to increase their length to thirty-two feet when a play is being presented. On them or in them the whole stage is set, scenic drops are hung from a gridiron above, rolled footlights are placed at the front of the stage and a portable switchboard is connected to some near-by power source. Three dynamic microphones and three six-foot trumpets carry the voices of the actors to the crowds massed before the stage in a park or other outdoor setting. Plays requiring more than a score of settings are often presented. A dressing room is created in the back of the van when the rear apron is lowered and the lighting equipment duplicates that of any modern theater with rolled footlights in three colors turning on a hinge, fly lights, border lights, strip lights, flood lights and even baby spots. The switchboard has the dimmers which produce the effects dear to the heart of every stage manager and the theater is manned by a crew of from six to eight men. When ready for a performance the proscenium opening measures twenty-two feet and the van is thirteen feet high and eight and one-half feet wide.



This Old Car Mounted on the Roof of the Garage Draws Business by Attracting Attention

OLD AUTO ON ROOF OF GARAGE ATTRACTS CUSTOMERS

One New York garage owner advertises his business and attracts the attention of passing motorists with the aid of an old car which he has mounted on the roof of his place of business. Motorists can see the car silhouetted against the sky when half a mile from the shop, and its appearance usually arouses their curiosity sufficiently to make them observe the garage closely as they near it.

RADIO SET IN PERAMBULATOR ENTERTAINS THE BABY

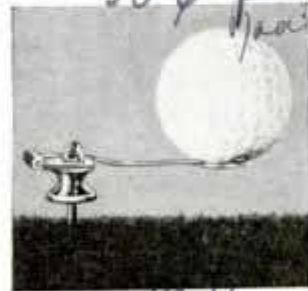


Music for the Baby Is Supplied by This Perambulator Equipped with a Small Radio Receiver

Music to entertain the baby out for a stroll is always available in a perambulator equipped with a radio set. Dry batteries tucked away in a small compartment supply the power and the set is mounted on the footrest with the speaker pointed downward.

SPINNING GOLF TEE INCREASES DRIVING DISTANCE

Made of rustproof metal, a spinning golf tee gives a longer drive than is possible with the conventional tee, it is claimed, because it eliminates all resistance to the stroke. It consists of a metal spike and support on which rests a horizontal arm on which the ball is placed. When the ball is struck the arm is revolved by the force of the blow. It is claimed the tee diminishes slicing and it is said to be virtually unbreakable. It folds up for carrying and can be stored in the pocket.

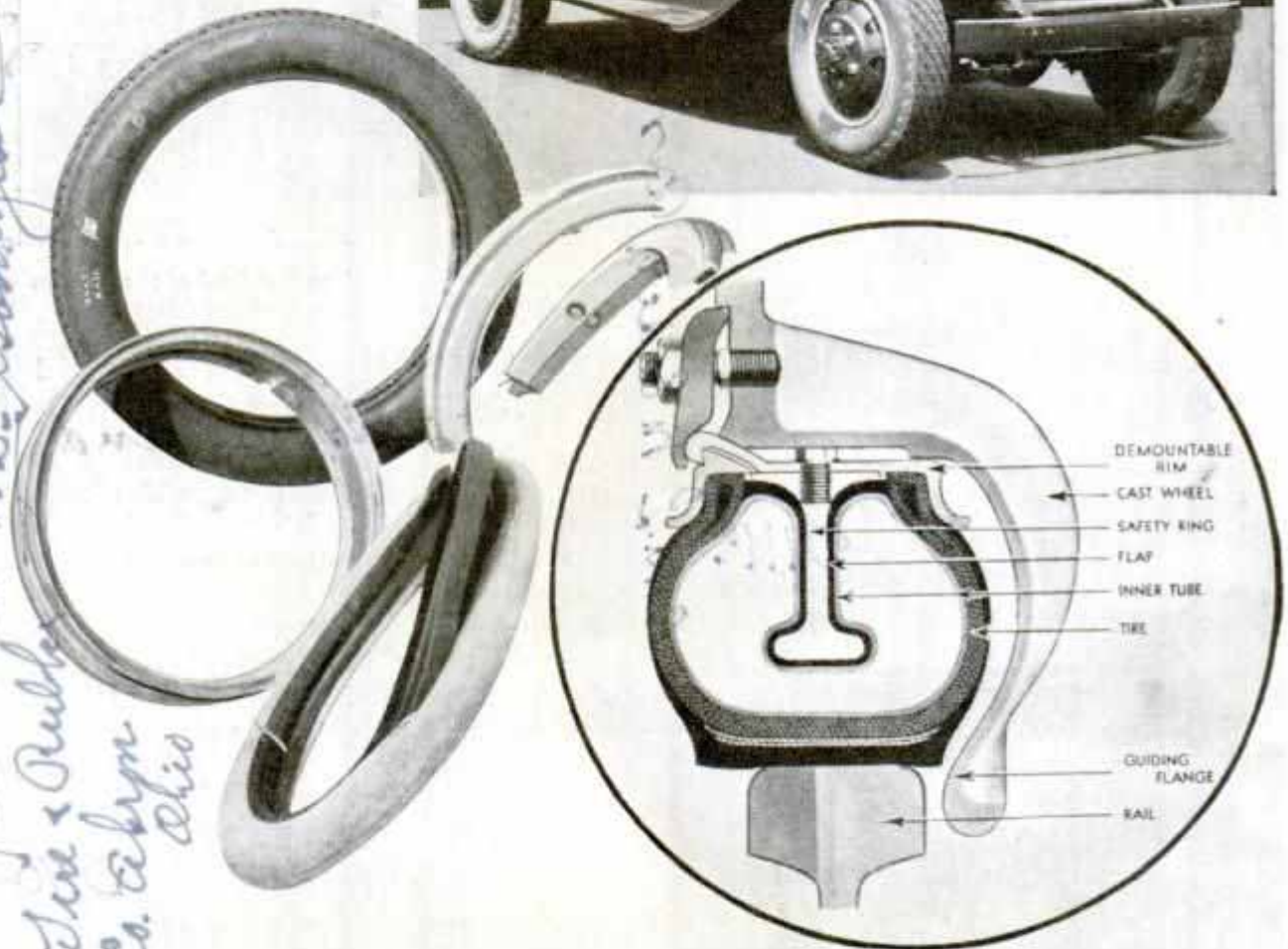


6856 Aglestry Ave
 D1119
 Cm. L. M. Baker, Box 103, Mastic, L.I.
 Ronald H. Miller
 Aglestry Ave
 Mastic, L.I.

101009
 871
 Box 103
 Mastic, L.I.
 D1103
 50 ft
 50 ft
 Arm Mountain
 much
 Long Island
 Spinning Tee Co. L.I.

Bullet-Proof Tire Has Sponge Rubber Tube

Automobile tires intended for military purposes and for police cars are now being made bullet-proof with the aid of a sponge rubber inner tube. A regulation casing is used and no air is necessary in the inner tube.



Car Equipped with Semi-Bullet Proof Tires, Assembly of Tire Equipped with Inner Safety Ring, and Cross Section of Such a Tire When Used on Wheel of a Rail Car

As a result such a tire cannot go flat unless it is literally riddled with bullets. The development of various types of rail cars has brought about an increasing use of pneumatic tires for this purpose. Recently there was introduced a pneumatic tire for rail purposes with a safety ring or inner monorail to serve as a support in case of a puncture or blowout. This tire now has been adapted to trucks and passenger vehicles where it is essential to provide for continued operation in the event of a puncture. It is also used on armored cars, scout cars and military vehicles to lessen

the danger of interrupted operation. The tire consists of a casing, tube, flap, safety ring, demountable rim and, on the rail cars only, a wheel with a safety flange. The casing is of conventional construction but built of special materials to assure long carcass life. Because of the safety ring or inner monorail the tube is kidney shaped and the flap fits around the safety ring and protects the tube from chafing. The ring or monorail restricts the drop of the vehicle in case of a flat tire to less than one inch, hence a car can continue to run even in the event of a blowout. The safety ring

*Michelin Tire Company
of France. U.S. Leodyger
Tire & Rubber
Co. Akron
Ohio*

2620 1106 82nd (1-1)

is of duralumin and due to its strength it is of much smaller cross section than if rubber or wood were used. For this reason it does not materially reduce the air volume of the tire. It also acts as a heat conductor and actually reduces tire temperature, thus increasing the life and carrying capacity of the tire. The ring is made in three sections and fastened to the rim in such a way that there is no danger of shifting, buckling or tipping. When used on rail cars, the tread of the tire is flat and has an angular rib design to aid in driving water and snow from the rails and give traction. For rail cars a guiding flange is provided which continues to operate even in case of a flat tire because the safety ring prevents the flange from striking the fish plates at rail joints or the frogs at switches.

D/126
**REVOLVING DISK ON WINDSHIELD
 KEEPS OFF SLEET AND RAIN**

Remaining dry in the heaviest sleet, rain or snowstorm, a revolving windshield which can be attached to any car is operated by an electric motor. The motor turns the disk at 1,700 revolutions per minute, this extreme speed setting up an air cushion



Bendis Animation Corp Chas Cory 754 Lexington Ave
Revolving Disk on Windshield Operated by Electric Motor to Keep Off Rain and Snow

ion close to the disk which prevents moisture from touching the glass. It is claimed the disk remains dry by virtue of this resilient film of air, even in severe storms.

Mr. Marwood
1114 Regua
**"EASTER BONNETS" FOR DOGS
 MAKE EARS STAND ERECT**



N. Hollywood Calif
me better
Great Dane Puppy Before, During and After Wearing "Easter Bonnet" to Make Ears Stand Up

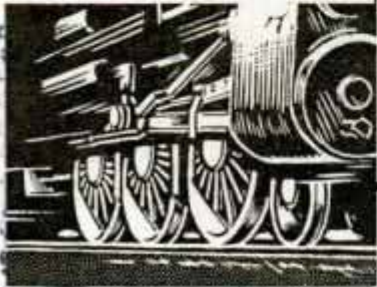
When Great Dane puppies reach the age of three or four months, their owners take them to a dog hospital to have part of their ears removed, that is, if the puppies are intended to become show dogs. After this, the puppies are forced to wear an "Easter bonnet," a contrivance designed to shape the ears so that they will stand erect. The bonnet is held to the head with straps and to the ears with adhesive tape. After its removal, the puppies' ears are pulled, twisted, massaged and even taped into little rolls, all for the sake of beauty. The result is a set of trim, upstanding ears on each dog. It seems that dogs in that class have little or no chance of winning prizes at shows unless their ears have been cropped. Many owners regret the practice, but put their dogs through it because of the shows. There are several states in this country which prohibit the cropping of dogs.

Four-fifths of the homes in the United States have no electric lights and about three-fifths have no refrigerator.

Chronte Mfg Co
634 N. Albany Ave

Miss Y. White
Rt. 70 P, 441 Lexington Ave
New York City

D 427



SOUND

SOUND sleuths have developed a new science—the detection, analysis and measuring of the causes of noise—and have worked out methods of abatement.

The first step is the discovery of the source of annoying sound, and its measurement in actual figures.

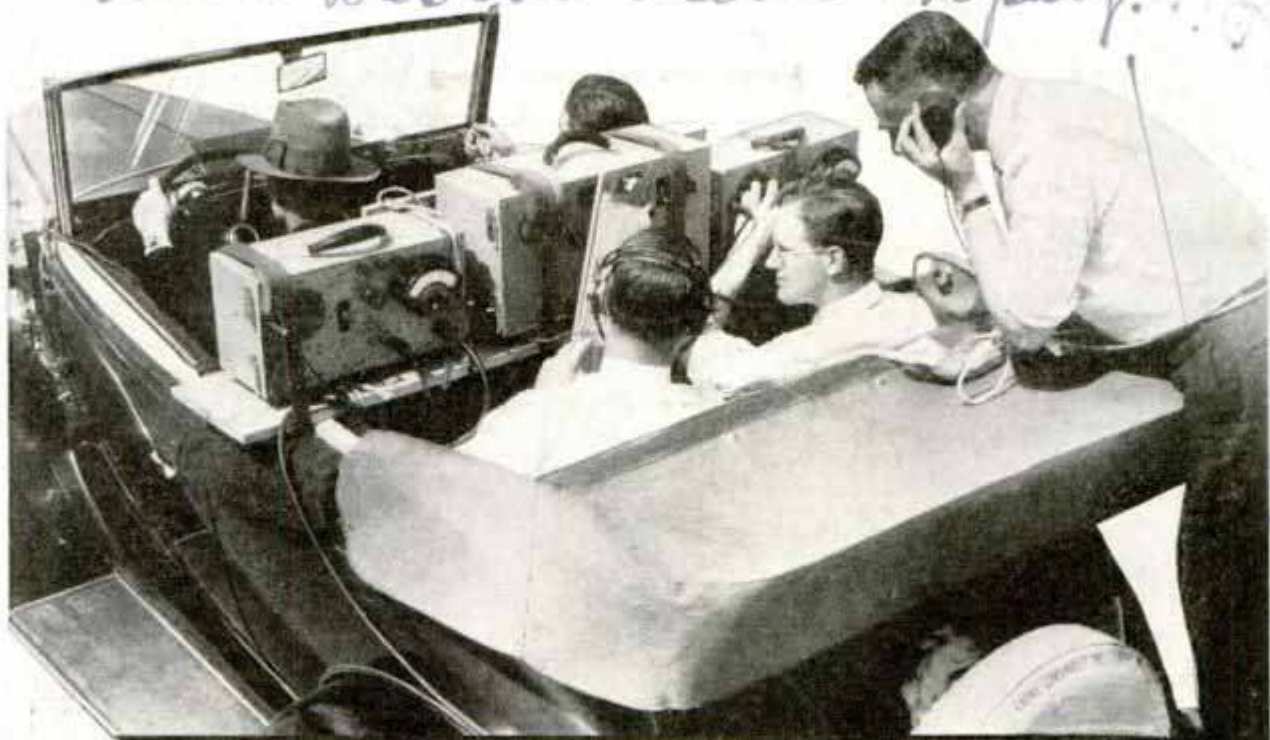
In measurement of sound, the unit is termed a "decibel," on a scale resembling the temperature figures of a thermometer. Zero is the loudness of a sound which the ear could just detect under theoretically perfectly quiet conditions. About fifteen decibels is the lowest noise level which has

been obtained in specially insulated rooms, and about fifty decibels is the minimum which is ever obtained on the streets of a large city.

Along with the study of noise has gone experimentation in means of reducing or eliminating it with absorptive and insulative materials. Two laboratories, one in New York City and one in Los Angeles, test various types of materials.

Some Common Sources of Annoying Noises and, Top, Westinghouse Engineers Diagnosing a Noise with Aid of an Analyzer; Below, Using Meter Which Measures the Loudness of a Sound

Electrical Research Products, 1127
 250 W. 57th St. New York City.
 (Sub.) Western Electric Company.



and Westinghouse Electric
 or info. to E. W. Pittsburgh, Pa.

SLEUTHS *Battle Noise*



Above, Sound Engineers Testing Various Gasolines to Determine Relative "Knock"; Below, Rubber-Shod Horse and Rubber-Tired Milk Wagon, and Testing Refrigerator Motors for Noise

Three ways are adopted for lessening noise. Something may be done to abate noise at its source—to stop the cause—or a barrier may be built up between the cause of the noise and those who may be disturbed by it, or materials may be used in such a way as to deaden the sound.

The latest electric refrigerators exemplify methods of abatement of noise at the source. The motor and compressor hang on springs or are set in rubber. The motor, if rigidly set, would so jar the whole structure that the vibration would cause considerable noise, but these resilient

Left, Making Sound Tests in New York Stadium; Below, Comparison of Average Loudness of Transportation Noises, and Modern Rail Car with Rubber-Tired Wheels



Source of Noise	Noise Level (dB)	Source of Noise
Uninsulated Airplane Engine	120	
Group of 20 Army Pursuit Planes	115	Interior of Subway Train in Subway
Interior of Transporter	105	Interior of Single Motor Cabin Airplane
Tender Mountain Type Locomotive	95	Interior of Subway Train in Open Air
Heavy Street Traffic	85	Interior of Pullman Car
Interior of Electric Train	75	Interior Low Priced Conventional Auto
Interior of Twin-Motor Transporter Plane	70	Interior High Priced Auto
Interior Steam Locomotive	60	
Minimum Street Noise Level—N. Y. C.	50	
	40	
	30	
	20	
	10	
	0	Threshold of Audibility

Obtained only in Special Insulated Rooms

bearings keep down the vibration.

In the case of the new trans-continental planes the noise is lessened at the source by having the engines mounted in the wings on rubber, and by the use of the adjustable pitch propeller. Also insulating material cuts off noise from the cabin. The result is that on these planes persons can converse in ordinary tones. Similar means are used to quiet automobiles.

Street noises of all kinds have been measured and their relative degrees in decibels charted. In some cases methods of lessening the noise have been worked out. A very recent application of the scientific study of noise and methods for its abatement has been made by a large milk distributing company. This milk company's horses are shod with rubber shoes, and the wagon wheels are now equipped with pneumatic rubber tires.

Sound engineers also have done much work in buildings and public places along



the line of acoustic control and in the abatement of unnecessary noise. With the increasing use of machinery and the growth of cities, this noise nuisance is constantly becoming more menacing, hence the science of noise detection, measurement and abatement to combat it in both offices and homes.

Tractor Guide Saves Labor for the Farmer

Pat. 1,916,341

Working a farm with a tractor is greatly simplified by using a guide which does most of the work of steering when plowing, drilling grain, listing for corn or cotton or cultivating listed crops. Rows and furrows are made of a uniform width and straighter than is possible when the tractor is steered manually, it is claimed. The operator is left free to watch and adjust his cultivator or other implement instead of giving his attention to steering when the tractor is moving. A lever lift enables the guide to be raised or lowered easily, a rigid push member drives the guide wheels from the rear, thus eliminating side draft, and raising of the guide wheels does not alter the course of the tractor. There is a side hill adjustment, the tractor and guide can be operated near a fence and there is a guide on each side for listing.

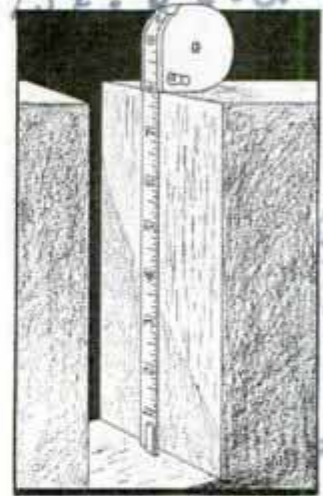


Tractor Guide Which Does Most of Work of Steering When Plowing; a Lever Lift Enables the Operator to Raise or Lower It Easily

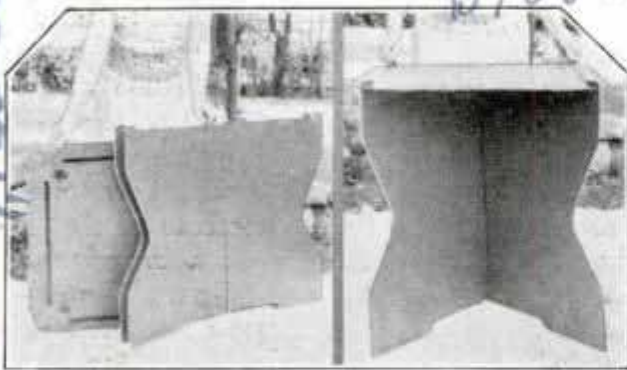
board which forms the legs and the parts are held together by slots and tongues.

D1106 FLEXIBLE TAPE RULE TAKES INSIDE MEASUREMENTS

Eight different types of measurements, including inside dimensions, are possible with a flexible steel tape rule contained in a case especially designed for quick scientific methods of measuring. Among its many uses are included inside, outside, height gauge, depth gauge, layout, radius, trammel and flexible measures. In making inside measures, the flat back of the case is placed against one side of an object and the tape is pulled out to touch the opposite side, the reading being taken at the point where the tape disappears into the case. The case is pocket size and has a lever lock to make it possible to retain any measurement for future reference or to take a measurement in the dark.



CARD TABLE MADE OF PAPER FOLDS FOR STORING



Collapsible Card Table Made of Paper; the Parts Are Held Together by Slots and Tongues

Collapsible card tables made of paper are not only light in weight but fold flat for carrying and are particularly suited to take on an outing or camping trip since they are so inexpensive they can be discarded at the end of the trip. The top is supported by four upright pieces of card.

Wenson Banner Co.,
Ridgefield Park

Master Rule Mfg Co.
Inc. 815 E 136th St

Sold by the Fair, Harold Stetson, Chicago

Pat. 1,916,341

"Snowflyers" Replace Dogs in Frozen North



used to transport supplies over the snow. Called "snowflyers," these machines maintain schedules in the coldest weather found in the western Arctic regions, 1,000 miles north of the Coppermine



Dog Teams in the Far North Replaced with Cars Having Runners and Tractor-Type Wheels

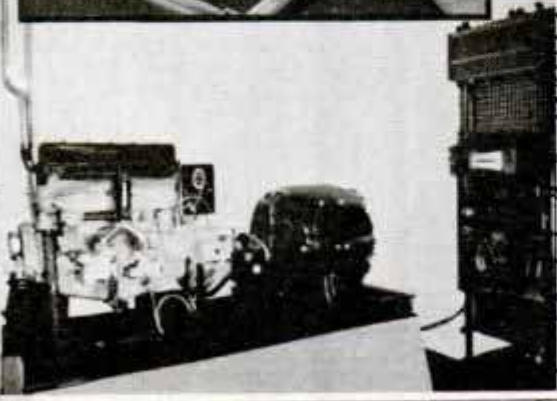
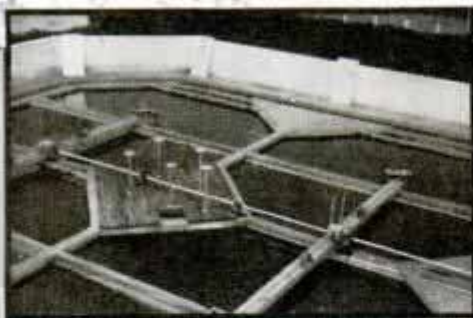
Factory-made for travel in the far North, automobiles with runners at front and tractor-type wheels at rear are being

river. One homemade snowmobile of this type carries supplies to the Canadian airways base on the God's Lake run.

Sewage Gas Operates Auto Motor to Make Electricity

At a cost of less than forty cents per week, the sewage plant at Frankfort, Ind.,

is producing enough electric power to light the plant, run the machinery and light an adjacent fish-hatchery park. This is accomplished by using the gas given off by the sewage to run an old Buick automobile engine connected to a second-hand generator with a capacity of 35,000 watts. Brought in under its own power, the gas is fed into the engine through an ordinary carburetor. The unit is quiet in operation. It has been found possible to adjust the carburetor so the engine starts as well on the sewage gas as on gasoline. An automatic governor admits more fuel as it is needed in varying quantities. The arrangement also supplies sufficient current to heat all the office buildings and the water that they use by means of electric heaters. By applying direct current from this machine to salt, a good grade of chlorine gas is produced for use in the swimming pool operated by the city. Hot water pipes in the sewage reduction tanks speed up the process of reduction, resulting in the production of more gas.



Tank of Sewage from Which Gas Is Obtained to Run Auto Engine; Below, Attached to Generator

D 1031
 Used by Hudson's Bay Co.
 (S. M. Flyer) Corp. New Holstein, Wis.
 Arps. Corp.

on Cormation level

D 1124
 This Leonard (in charge of system)

Sub. Corp. Sewer Soudation

Government agricultural experts have found that sweet corn frozen within four hours after it has been picked retains its original freshness from six months to a year. Freezing stops most of the changes which normally occur rapidly in corn. In the experiments gathering, grading, husking, scalding and cooling for freezing were all completed as rapidly as possible. The scalding, it is believed, temporarily stops the chemical action taking place in the corn and the freezing permanently stops the action so that if served six months later its original freshness is retained.

RISING AND FALLING PRESSURE SHOWN BY BAROMETER

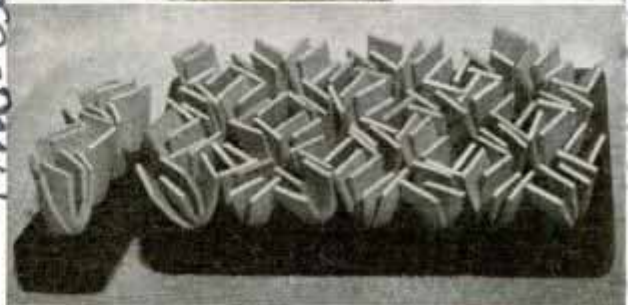
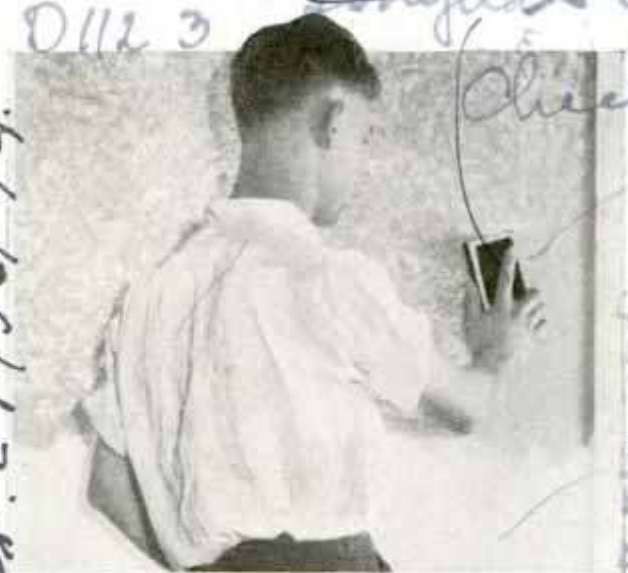
Weather information is given at a glance on a large display barometer with a dial one foot in diameter. A red signal in an aperture at the bottom shows whether the barometric pressure is rising or falling at any time. If the signal shows the pressure is rising, the inner circle forecast to which the dial points is observed, but when the red signal appears in the falling aperture, the outer circle forecast to which the ar-



This Barometer Not Only Indicates the Pressure but Shows Whether It Is Rising or Falling

row points is read. With this instrument it is unnecessary to make a previous setting in order to read the forecast as has been the case with ordinary barometers.

The annual production of buggy whips still exceeds \$250,000.



Top, Using New Decorating Tool; Bottom, Rubber "Bristles" for Producing Odd Effects

DECORATING TOOL OF RUBBER APPLIES WALL FINISHES

Decorative finishes may be applied on walls, ceilings, woodwork, furniture and the like with a new rubber brush that is made in several sizes. The tool is said to be handy for doing better and faster work, producing unusual mottles and blends. The blades are made of paint resistant rubber set in rubber.

DOOR CHIMES REPLACE BELL AND ARE EASY TO INSTALL

Door bells can now be replaced with mellow chimes which operate on the door-bell current without extra batteries or transformers. Installation is simple since it is only necessary to disconnect the bell and connect the chimes in its place. The tone of the chimes is more pleasant than the sound of the bell.



data from Chmite
 mfg. 8-6-36

no pamphlet on...

Box 4673, Kansas

A. H. Slescher & Son

Am. Soc. #1936/74

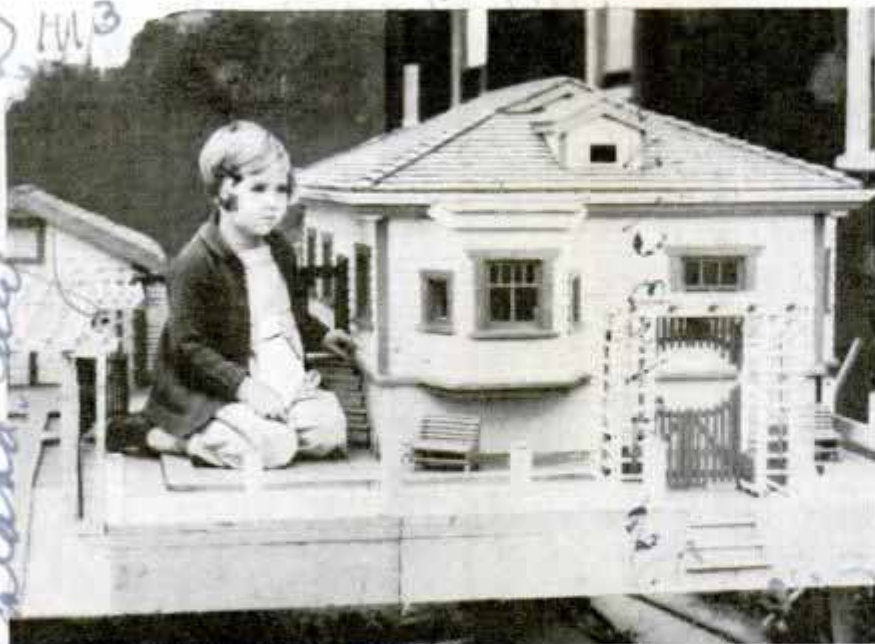
Taylor Instrument Co.
 Wash. D.C. and
 Rochester, N.Y.

Mello-Chime Signal Corp.

Chicago
 Laundale

plus postage
 1-95
 9-95
 4-95

A. S. Spalding & Co.
 518-5th Ave



Doll House Complete in Every Detail, Including Electric Lights, Papered Walls and Windows and Doors Which Open and Close

DOLL HOUSE LIKE MODEL HOME TOOK TWO YEARS TO BUILD

One California man spends his spare time building glorified doll houses, not the ordinary kind of cardboard and glue, but real miniature homes complete with electric lights, papered walls, tiled bathroom floors, parquet floors in the living rooms and windows and doors that open and close. The little homes are complete even to cupboards and closets and each has a garage and even a dog kennel. The builder, a mill worker, began constructing the doll homes when his daughter was small, and now that she is grown, he continues the work as a hobby. His latest doll house required two years to construct.

FUEL FILTER FOR SMALL CARS IS EASY TO INSTALL



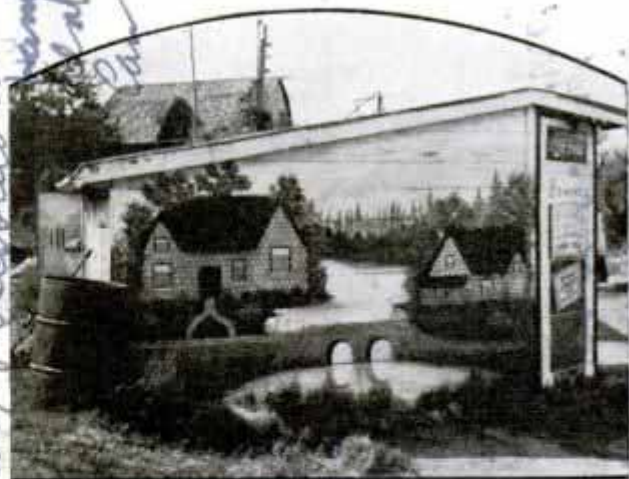
Trouble with clogged fuel lines is eliminated as is also the danger of carrying water or dirt into the carburetor by using a gasoline filter specially designed for Ford cars but which can also be used in some of the other smaller cars. It consists of

a sturdy glass bowl fitted with a metal strainer which will not tarnish or corrode and the necessary connections for installation which requires only a few minutes. The same type of filter is standard equipment on some of the more expensive cars. The filter holds a supply of clean, filtered gasoline, and promotes easier starting since the fuel pump does not drain dry. It also eliminates air or vapor lock, prevents freezing in cold weather by keeping condensation and water out of the fuel pump and enables the

pump and carburetor to operate most efficiently. The glass bowl is easily detached.

BOTTLE CAPS ADD ATTRACTION TO ROADSIDE STAND

When the owner of a roadside refreshment stand found himself possessed of large quantities of pop bottle caps he conceived the idea of decorating the stand with the caps and decided to "paint" pic-



Refreshment Stand Decorated with Scene Made of Pop Bottle Caps and Painted Background

tures with them. As a result the walls of his stand are covered with scenes composed of thousands of the caps in various colors. Such parts of scenes as could not be depicted by the caps were painted in. He also paved the floor in front of the booth with the caps.

*Harry McQuade...
D/123
D/129
Laylors Products Co.
Sarnan City*

*is a...
is a...*

*on road between
Hamilton and...
D/125
D/129
D/123*

*is a...
is a...
is a...*

*Cmt John L. Cooney
3407-19th St W
Washington DC*

GIANT SCAFFOLD USED TO CLEAN WASHINGTON MONUMENT

When it was decided to spend \$100,000 in cleaning and weather-proofing the Washington monument, the problem of how workmen were to be supported on the side of the 555-foot shaft was faced. It was solved by using a giant steel scaffold weighing 600 tons. The steel supporting tubes were set together in such a way that not more than eight and one-half tons of weight rested on any one of the seventy-six posts which formed the ground supports of the structure. The tubes had milled ends fitting into one another and cross bars distributed the weight and added strength. The entire scaffold was so keyed that the weight held the tubes in place. Every six and one-half feet boards were placed to support the workmen cleaning and repairing the monument.



D/1102

Metal Scaffold around Washington Monument from Which Workmen Are Repairing the 555-Foot Shaft

CHEMICAL FIRE EXTINGUISHER IN COLLAPSIBLE TUBE

Small blazes can be extinguished almost instantly with a small liquid fire extinguisher in the form of a collapsible tube like those used for tooth paste and shaving



Collapsible Tube Fire Extinguisher Operated by Squeezing It after Removing Screw Eye in Top

cream. The tube is filled with a liquid chemical and by removing a screw eye in the top and squeezing the tube, the liquid is forced several feet. The chemical, when it strikes the flame, forms a heavy blanket of gas which extinguishes the fire. The contents of the tube do not deteriorate with age or freeze, and remain ready for use indefinitely. The extinguisher is suited particularly for carrying in the car or as a safeguard in the home or workshop.

ESKIMO SUN GLASSES USED TO VIEW AIR RACES

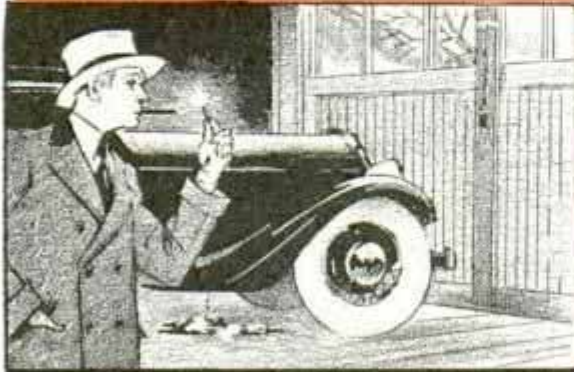
One spectator at a recent air race in Canada equipped herself with a pair of Eskimo sun glasses in preference to the usual amber colored glasses. The Eskimo eye protectors are made of wood with two narrow slits for vision and give the wearer a full view of the object being observed without straining the eyes. The Eskimos use them to protect their eyes from the glare of the sun on the snow in the Arctic and they have been found quite adaptable for sky gazing.



*Cmt. George W. Vashquette
29 S Esquirols Av. Altam., Ont.*

*Woodhill Chemical
Co 76-76 & 76th St*

Mr. Deaver
D 10 33 Gordon, 1115-17th St
NW, Washington, D C



MANY FIRES ARE STARTED BY TOSSING LIGHTED MATCHES UNDER CAR

Fighting FIRES



CLEANING WITH NAPHTHA NEAR AN OPEN FIRE IS DANGEROUS . . .



THIS IS A GOOD WAY TO BURN DOWN A HOME

MOST fires in homes can be avoided by a little thinking and a few simple precautions in advance. Instead of trying to decide what to do in an emergency, why not prevent the emergency? Everyone knows that gasoline mixed with air is a powerful explosive, yet a woman who wouldn't think of having dynamite in the house will pour a pint of gasoline, benzine, or naphtha into an open pan to clean a coat, while the deadly vapor drifts toward the pilot light of the gas stove, ten feet away.

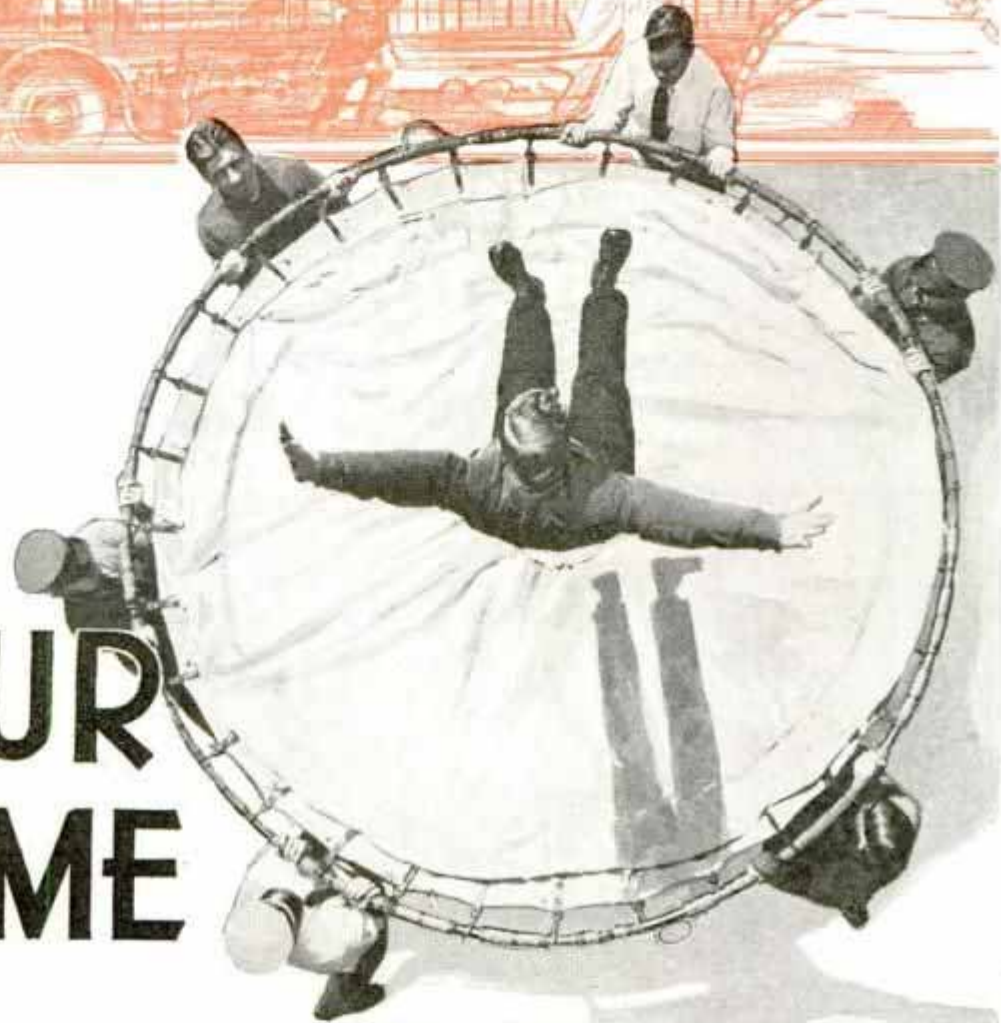
Don't imagine you are safe just because there is no exposed flame near by when using these explosives. Rubber gloves

Handwritten notes in the left margin: "This is a good way to burn down a home" and "Cleaning with naphtha near an open fire is dangerous".

Interview with Calvert
Co. Lumber, Fire Marshall, D10 83
District of Columbia



in YOUR HOME



rubbed over silk can cause a spark sufficient to burn you and your house, as can static electricity caused by rubbing wool, felt, and other harmless looking articles of clothing. More than 2,500 women die from this cause every year, and as many more are horribly burned.

With the custom of placing the garage under the house, the American home has acquired another fire hazard. On cold mornings the choke is left open until the carburetor is flooded. The gasoline drips onto the floor, where it quickly vaporizes. The motor backfires and you have a nasty fire on your hands.

Even if your engine behaves properly, you still have created a fire hazard by flooding the carburetor. If you decide to light a cigaret you don't have to toss the match into the gasoline on the floor for the vapor is filling the room and any flame will ignite it; even a spark when you drop



FIRE FROM ANY ELECTRICAL SOURCE SHOULD BE A SIGNAL TO PULL MAIN SWITCH



A SMALL FIRE EXTINGUISHER HAS SAVED MANY A HOME FROM DESTRUCTION



THE SINGLE STAIRWAY IS OFTEN A DEATH TRAP IN CASE OF FIRE. IT IS USUALLY SAFER TO SMASH A WINDOW TO ADMIT AIR AND THEN ESCAPE DOWN A ROPE OF SHEETS AND BLANKETS

the monkey wrench on the concrete floor.

Do you sleep on the top floor of your home? More than twenty-five people die in dwelling-house fires every day, and four-fifths of these are trapped on top floors. The reason is obvious. Heat rises. A fire in a home commonly starts in the basement or kitchen, and may smoulder for hours, until it finally burns through the floor or cellar door. The pent-up heat, suddenly released, leaps up the open stair well, the pressure increasing every minute



WHEN FAT BLAZES UP, CLAP A LID OVER THE PAN TO SMOTHER THE FIRE . . .



as the superheated air finds no outlet and mushrooms along the hall of the top floor.

About this time you wake up and smell smoke. You open the hall door. Instantly the superheated air leaps through this new outlet, you gasp, fill your lungs with air now 500 degrees or hotter, and are injured so that recovery is unlikely.

As long as we build open stair wells and save a few dollars by neglecting to install an automatic vent in the roof, the occupants of the top floors of such dwellings will face this hazard. The single stairway has become a death trap instead of an exit. In a case like this you have but one chance of escape—keep that door shut! If it is hot to the touch it will be suicide to open it. If it is still cool, stand behind it, brace yourself so it cannot be blown inward when the latch is turned and open it just

(Continued to page 116A)

D1056

show at rare St. Lazare in Paris

Streamlined Auto-Rail Car Used in France

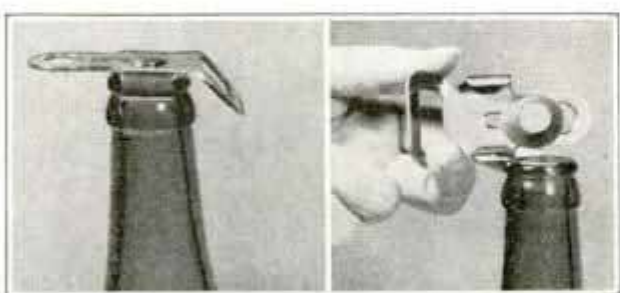


Latest of the Streamlined Trains to Appear on European Railroads, This Coach, at Left, Stands in Strange Contrast to the Big Locomotive

France's version of the streamlined train is a Bugatti powered auto-rail car being used on the Paris-Deauville route. The front is rounded from the rail to reduce wind resistance. Powerful engines drive the train at high speed.

BOTTLE CAP REMOVER SERVES AS STOPPER D1096

Bottles can be opened and sealed with a cap remover designed to pry off metal caps



Bottle Cap Opener Which Can Also Be Used as a Stopper after Original Cap Is Removed

and also provide a tight stopper for the opened bottle. To close the bottle, it is only necessary to push a rubber stopper on the under side of the opener into the bottle

*Auburn Metal Products
- E. Auburn dist*

top and slide a metal fastener over the top to secure it tightly in place. The sealer fits any bottle top.

D1090 TROUSER LINING GRIPS SHIRT AND ELIMINATES BELT

Belts or suspenders are unneeded if the trousers are equipped with a special waist lining which grips the shirt and keeps the trousers in place. The fabric is of mohair with a permanently laid pile which engages with the shirt, holding both shirt and trousers. The lining is being used particularly for sports clothes where a belt or suspenders might interfere with the activities of the wearer.



Whenever you find that you wish to know more about any article in this magazine, write our Bureau of Information, inclosing return postage.

*come.
Hignore
J. S. Reddick, Stockport, England.
Wray, Simpson
Phillips & Co. Ltd.*

Cover Tom White, Box 44

886

POPULAR MECHANICS

Alameda Calif
Rich Robes and Masks Mark Chinese Plays

D 90.



Top and Bottom, Right, Rich Costumes of Chinese Actors;
Bottom, Left, Property Room of Chinese Theater Filled
with Costumes

Life in old China is presented in faithful detail upon the stage of San Francisco's Mandarin theater, which has an all-Chinese staff and actors brought from Canton and Shanghai. Rich robes and masks painted on the performers' faces mark the plays which are presented, nightly from seven o'clock until after midnight. The social status of the characters is shown by the color and shape of the costumes, all of beautiful texture. Colors of the face masks also are of importance. Gentle, straight

character parts are played with the face uncolored, but a deceitful statesman is painted white, an upright man is painted red and a severe or brutal character has his face mask of black or black and white. As many as forty brushes are used in "makeup." The Chinese actor times his movements in rhythm with his surroundings. Sometimes the lifting of an eyebrow, a motion of a finger, a mere movement of the eyes, the wrapping of a long sleeve about a wrist, all ruled by the perfect laws

Tested by Miller
Budget. Courbevoie

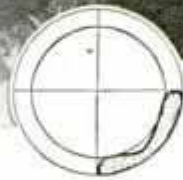
and Elmer H. Crook, 1108 Yac St Santa Monica, Calif

of rhythm, will give the true dramatic sense to the action. Backstage at the San Francisco Chinese playhouse is little different from that of other theaters, except for the absence of the variety and number of curtains and stage sets. Many times a single rich backdrop will suffice for an entire performance. A chair set upon a table represents a scene in a two-story building, the actor climbing to the chair to continue his lines. A play sometimes takes months to present, each night being a continuation. A performance is never repeated. This attests the ability of the actors. Property rooms of the theater contain richly embroidered gowns valued at more than \$50,000 and unusual head dresses.

D1068

SEAT MADE FROM HOLLOW LOG IS HEWED IN ONE PIECE

In Sequoia National Park, Calif., comfortable park seats have been fashioned from sections of large hollow logs found in the forest. Each seat is made of one solid piece of wood, with the middle portion of the inner surface hewn out to give the seat and back surfaces the proper slant.



This Comfortable Looking Seat Was Cut from a Single Section of a Hollow Log

D1109

FIREPROOF SUIT FOR AVIATORS FLOATS WEARER IN WATER

Intended to save flyers from either burning to death or drowning in case of a crash, a fireproof and waterproof suit was tested successfully recently in France. The



France
Tested by Miller
Budget at Courbevoie

W. W. Wood

Testing Fireproof Qualities of Suit of Flyers Which Will also Keep Wearer Afloat in Water

jacket and helmet are fireproof and the trousers, it is claimed, will keep the wearer afloat if the plane should descend in the water.

D1060

ADJUSTABLE SCREED SUPPORT SPEEDS CONCRETE WORK

Accuracy, speed and economy in laying concrete floors are claimed for an adjustable screed support that may be used on the ground, in a metal pan joist system or attached to I-beams of a steel-frame building. It consists of an ordinary lag bolt with a malleable cast yoke for holding the screed. The lag is screwed into the forms to the proper depth, the screed is placed in the yoke and after the floor has been poured and leveled, the entire support is removed from the soft concrete and saved for use again.

Skidby pend.

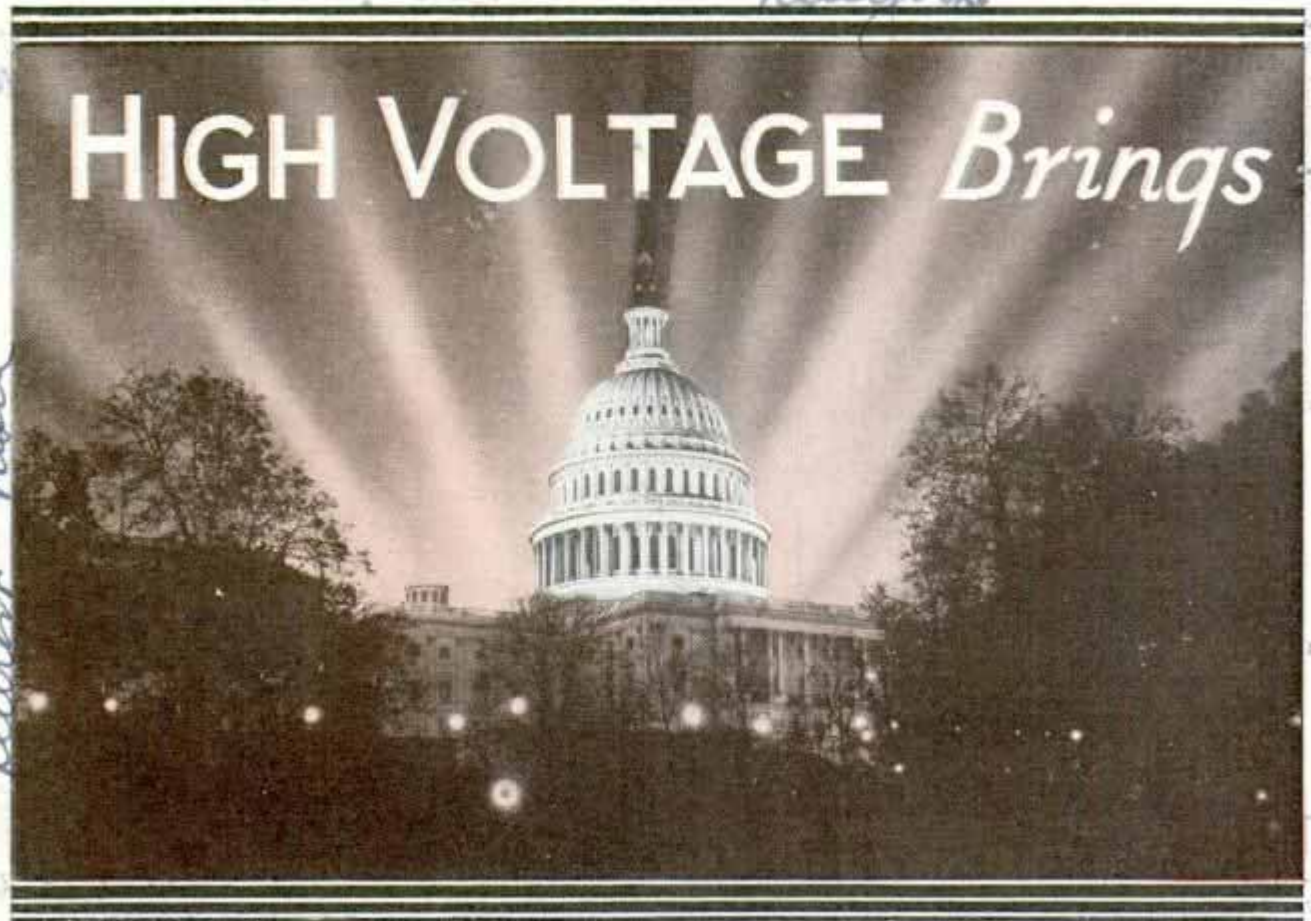


Neptune Specialties Co
2621st San Pedro

Carl Lemglassman
55 W. 86 St
New York

D/1038

HIGH VOLTAGE *Brings*



ONE of Edison's greatest dreams today has come true. Man-made electricity now leaps over mountains, under rivers and across deserts into more factories and homes than any prophet of the nineteenth century ever anticipated.

Barely fifty-five years ago, Edison's famous Pearl Street power station began sending commercial electric current to fifty-nine customers. Today the power utilities of the United States alone serve 25,000,000 paying customers.

No story in fiction can match the rise of electricity in the twentieth century. Forty billion dollars are invested in electric power plants! One hundred billion kilowatt hours of current are served to clients by public utilities. Almost half of our national water power resources are developed. And new schemes for generating power from winds and tides are afoot.

Not only industries, but many farms are now electrified and made to yield several times as much as they did in the nineteenth century with about one-fifth as much labor.

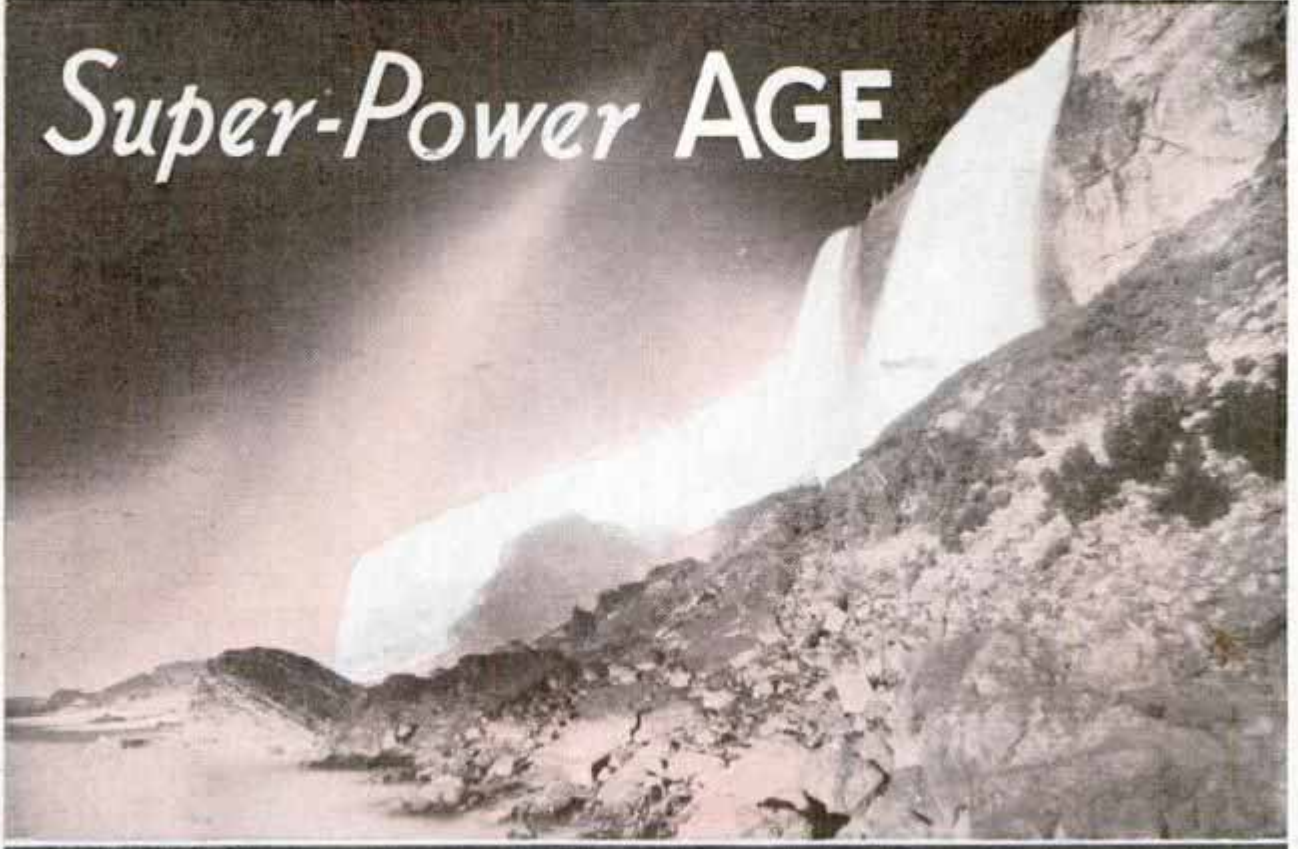
Boulder Dam, with its 1,800,000 horsepower and its 287,000 voltage, Muscle Shoals, Niagara Falls, Norris Dam, Keokuk

Top, Electric Lights Frame Nation's Capitol; Bottom, Rotor for Generating Power from Wind

d. w. Julius Madaras Pres, Madaras Rotor Power Co.
2146 Pennsylvania Bldg
Electric Dept
Cal Burlington, N.J.

Vertical text on the right edge of the page, partially obscured and difficult to read.

Super-Power AGE



and a dozen similar developments will carry us into the age of super-power, when two or more power units are linked into one "power shed," governed by one central control station which distributes the power, equalizes the burden and increases the efficiency of the electric lines.

The story of our great machine age follows closely the rise of electricity. And the rise of electricity is nothing more than the rise in voltage! When Edison began selling 220-volt current from his Pearl Street station, all his customers lay within a radius of one mile—for that was the maximum range of power transmission.

When electric currents climbed to 500 volts, that gave people the unique thrill of riding street cars for the first time. But electric lighting was confined to those homes or factories lucky enough to lie within a two-mile radius of a power station.

Then transformers were improved, Tesla introduced his alternating-current system



Top, Niagara Falls Lighted by Power It Generates; Bottom, Frame for Waterwheel Generator at Boulder Dam

and powerful turbo-generators were built, boosting voltage to 1,000 by 1886. George Westinghouse was a great moving spirit in the development, battling the racketeers who wanted to limit power consumption.

The first commercial power transmission

Arc welded, fabricated.



from Niagara Falls began with Tesla's two-phase system, which was sponsored by Westinghouse. In 1897, power stations were transmitting current under a pressure of 10,000 volts, and one year later they were transmitting at 44,000 volts! Industry was a volt-consuming monster!

When the Chicago, Milwaukee & St. Paul railroad sent the first electric locomotives over the Rocky mountains, it was plain that the company was cutting out a coal-freighting expense. Besides, these 4,200-horsepower locomotives were equipped with regenerating motors, so that in traveling down grade they actually fed current back into the power lines, saving the company fifteen per cent of its power bill.

By the end of the nineteenth century industries were discarding steam-boiler plants, shafting and belting. By 1901, when 70,000 volts were piled on the power lines for the first time, electric rapid transit came into vogue. By 1908, engineers had reached the 100,000-volt mark, and housewives began to cast out old brooms and clumsy irons.

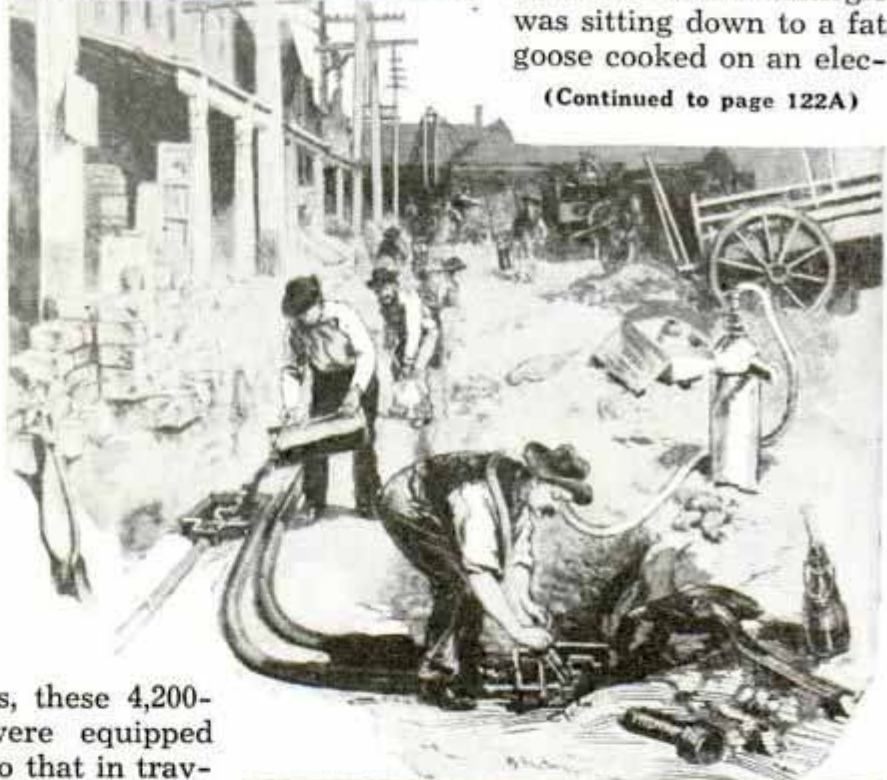
What a change in the cities! Electric signs everywhere. There was a "white way" on Main street, and business could

be carried on night and day.

In 1912, at 140,000 volts, housewives awoke to find new labor-saving devices for the home—the washing machine, the electric toaster, egg boiler, and the percolator.

As early as 1747, Benjamin Franklin had forecast what he called an "electrical dinner," in which the goose would be killed electrically and cooked electrically. About 150 years later, the millionaire Andrew Carnegie was sitting down to a fat goose cooked on an elec-

(Continued to page 122A)

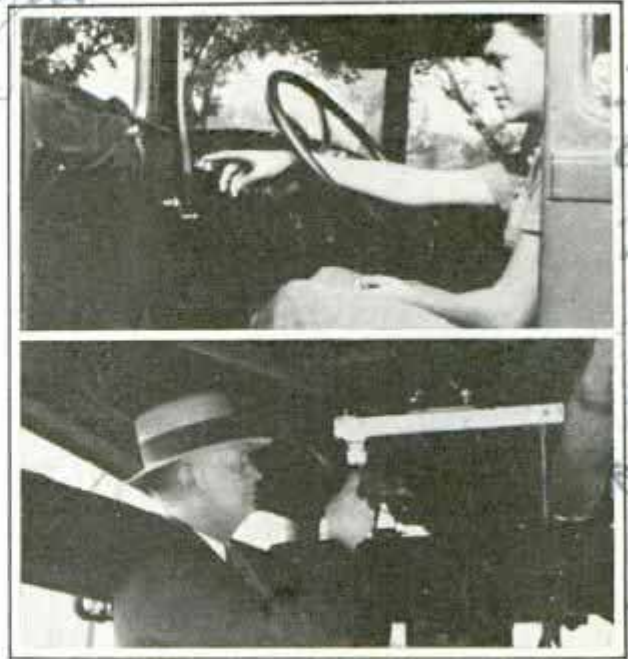


Drawings from Harper's Weekly, 1882, of Electric Wire Tubes Being Laid in New York

By W. P. Singer

PRE-SCHOOL CHILD MOST PRONE TO FATAL ACCIDENTS

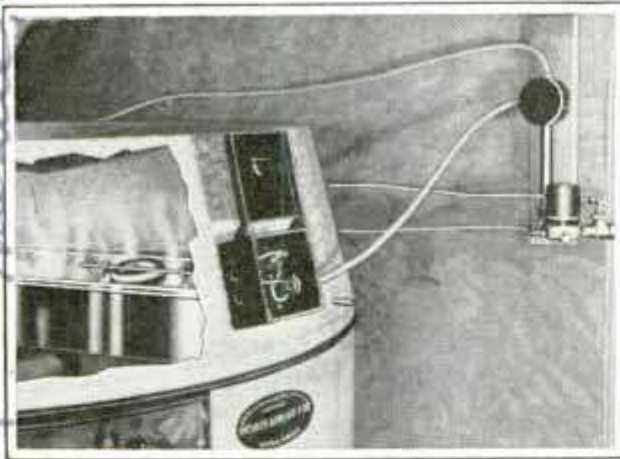
Children under school age are more in danger of death from accidents than older ones who have started to school, statistics reveal. Fatal accidents are almost twice as numerous among children under five as among those between the ages of five and fifteen. Accidents kill more of these small children than measles, diphtheria and scarlet fever combined although the accident death rate for this group has declined twenty per cent in the last few years. Burns, automobile accidents, mechanical suffocation, drownings, falls and poisonings account for about three-fourths of the deaths among small children, burns and scalds alone being responsible for one-fourth of the fatalities.



Equalizer on Chassis Which Flashes Light on Dash When Auto Tire Begins to Lose Air

FURNACE WATER PAN FILLED BY ELECTRIC HUMIDIFIER

No attention or adjustments are required for a warm-air furnace humidifier with an electric control which maintains the proper humidity automatically. A float



Warm-Air Furnace Humidifier with Electric Control Which Keeps Water in Evaporating Pan

controls an electric water-supply valve which releases the required amount of water into the evaporating pan.

AUTO TIRE DEFLATION INDICATOR FLASHES WARNING LIGHT

Tires can be kept at proper pressure at all times without constant checking with the aid of a tire deflation indicator which flashes a warning light mounted on the dash when a tire loses even a slight

amount of air. The indicator operates regardless of how fast you are driving or how rough the roads may be. It saves tires from rim cutting and from damage in case of a puncture since the warning is flashed before much air has escaped. There are no attachments to tires, valves or wheels. The principal part of the indicator is an equalizing instrument which is mounted on the chassis and which registers any slight deflation of any one of the tires.

ANT KILLER WITH WICK FEEDER IS EASY TO USE

Elimination of ants is made a simple matter with the aid of a liquid killer which is contained in a can equipped with a wick feeder which gives a continuous supply of fluid. The tight cover keeps the contents of the can sweet and attractive and prevents leakage if accidentally upset. Each can contains three ounces of fluid and can be refilled without cleaning or washing. Feeders are placed outside the house and can be moved from one location to another until the insects are exterminated.



Scholarship Electric Humidifier Co. Superior Service

Metropolitan Life Insurance Co.

One Madison Ave. New York

D1145

D1122

D1080

D1097

Ant-Kill 3oz. pack

2016 Bellevue Ave.

R. S. Murphy Co. 2220 - 8th Ave. Kearney, Neb. Los Angeles, Calif.

D 1028

General Gas Light Co. Kalamazoo Mich.



Large Collection of Bottles, No Two of Which Are Alike; Note Some of the Odd-Shaped Bottles on Shelves and Cabinet

BOTTLES OF UNUSUAL SHAPES COLLECTED AS HOBBY

Eight thousand bottles, none over four ounces in size, are in the collection of a Connecticut man who has made it his hobby for the last seven years. The bottles are of many unusual shapes, no two being alike.

HIGH-POWER GAS FLOOD LIGHT CONTAINS SUPERCHARGER



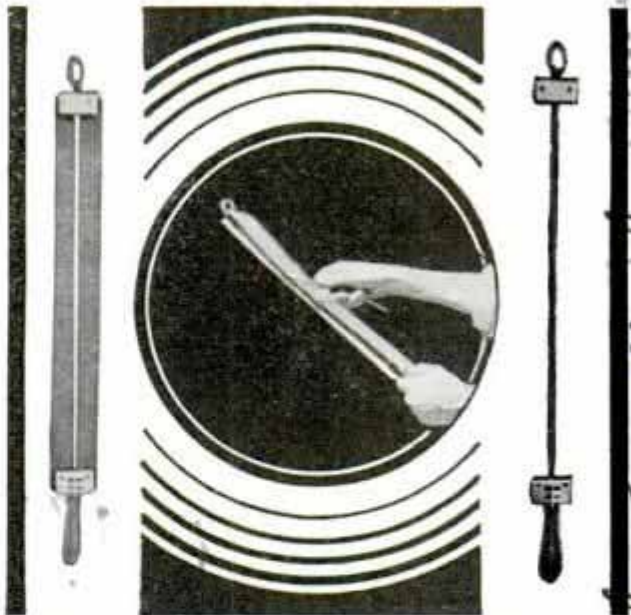
Operating on low pressure gas, either manufactured or natural, a high-power gas flood light for the outdoor illumination of buildings and highways produces 3,000 candlepower through the use of a small supercharger built

into a supporting bracket. The unit is equipped with two new type double mantles which spread the light source over an area of twenty-five square inches as compared with the pencil tip area of electric bulbs of a like intensity. Because of this spread, a yellow non-glaring light approaching that of sunlight is produced. In addition to the 3,000 candlepower lamp, one of 1,500 candlepower, along with a special bracket, has been devised for highway illumination and experiments are being conducted with a reflecting type of gas flood light for illuminating buildings from a distance.

D1053

ROD HOLDS RAZOR STROP AT PROPER TENSION

Stropping the razor with one hand is possible with an adjustable strop holder. It is simple, consisting of a steel rod, two blocks on which the strop is fastened and a handle with interior thread by which the rod can be lengthened or shortened to give the strop the tension desired. Because of the tension regulation, the razor may be



Left, Razor Strop with Rod Attached; Right, the Rod Which May Be Adjusted for Tension

given a more even finish than on strops tightened manually. A modified holder for safety razors also is available.

Stanley Edwin, Old Lyme, Conn.

General Gas Light Co. Kalamazoo, Mich. 824 1/2 Riverside

General Gas Light Co. 301 Water St.

William Ferguson 824 1/2 Riverside

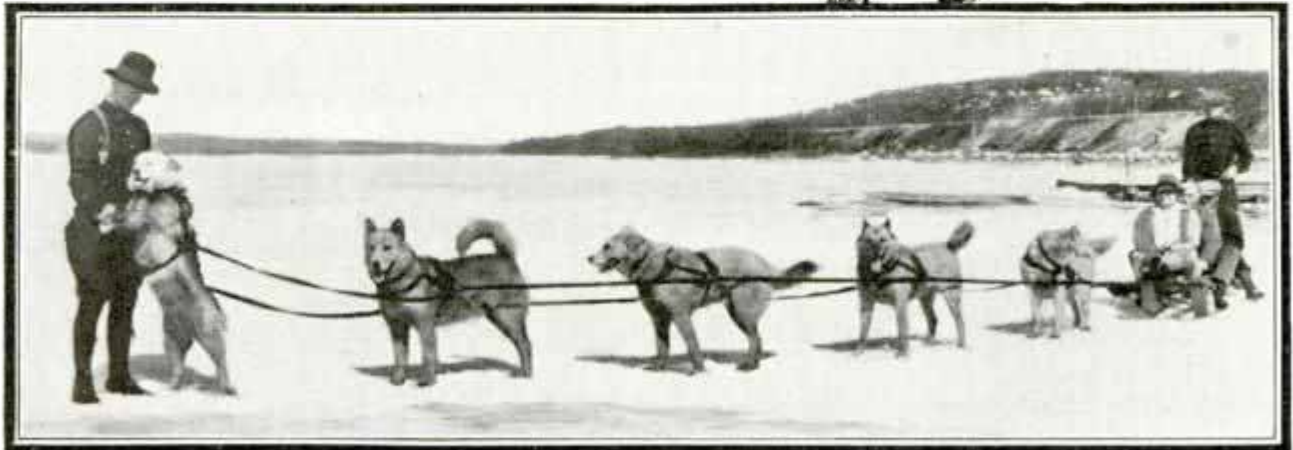
C 2006 Cont. James Montagna
608 Harbor Commission Bldg.

The Making of a SLED DOG



A FUR trader lost his way in a snow-storm. He sent his lead sled dog in the direction he thought was right. Time after time the dog changed direction. Finally the trader gave in. He gave the leader free rein. Hours later, after fighting its way through the heavy storm, the lead dog brought the team and trader to the fur post. Had the trader followed his own sense of direction dogs and man would undoubtedly have died.

That is but one of many stories which



Above, Automobiles Interfere with Dog Racing; Below, a Typical Dog Team of the Far North

Toronto 2nd, Canada

Left, Two Good Dogs and Two Fair Admirers; Below, a Dog Racer, Some of His Dogs and the Type of Sled Used for Racing in the Far North



The Type of Dog Which Pulls the Sleds of the Arctic and Which Is Used in the Dog Derbies

Baffin Island dog

come from the sub-Arctic and Arctic where dogs are still the main means of transportation, and where a sled dog has a high value. These dogs are being improved continually. Originally a mixture of wolf and dog, they are now being bred by the government as well as private individuals in Canada. To the malamute and husky are being added strains of deer hounds and fleet wolf hounds and a faster dog is slowly being evolved for use not only in the Arctic, but also for racing.

These sled dogs, without which no one travels north of the railway line in Canada, are snarling, sulky and quarrelsome beasts. But they have great endurance, and can travel for days, if need be, without food. When extremely hungry they will eat their traces, sealskin boots, and just about anything they can sink their teeth into. One of the unaccountable happenings of the north is the dog disease which sweeps across the country every few years, wiping out hundreds of dogs. The causes of this strange malady are unknown although

(Continued to page 124A)

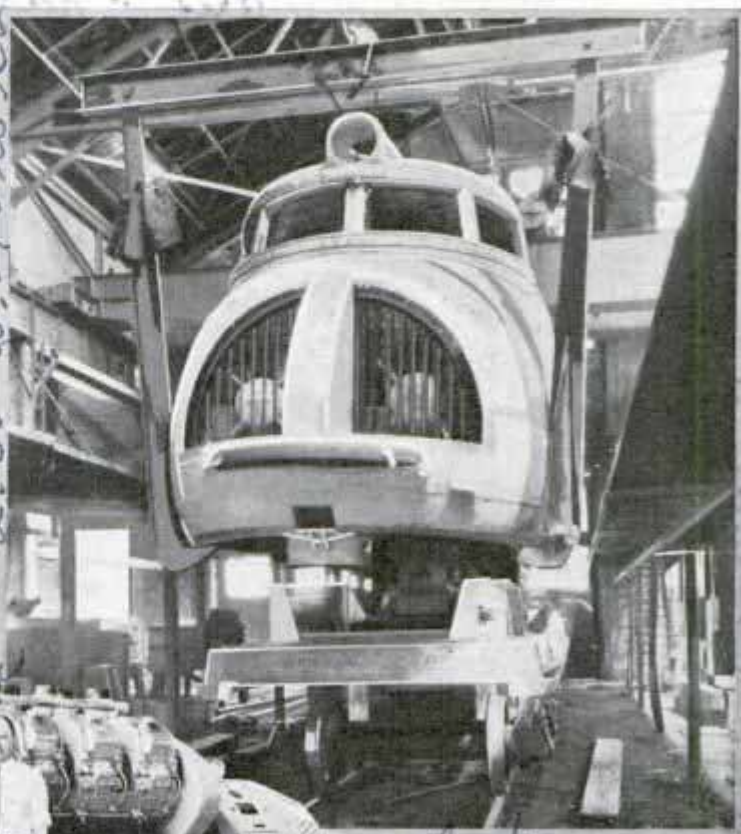
Hudson Bay Co Winnipeg, Manitoba Canada

2006

Latest Streamlined Train Has Giant Engine

Handwritten: *D1029*

Weighing 79,000 pounds, the giant engine, generator and auxiliary equipment of the latest streamlined train will propel six cars at speeds above 100 miles per hour. The engine is a twelve-cylinder, V-type, 900-horsepower Diesel, placed with the generator in the center of the power car. Second of the Union Pacific fleet of high-speed streamlined trains, the six-car unit will contain Pullman cars for the convenience of night travelers. The power car, with an over-all length of forty-eight feet, weighs about eighty



Handwritten: *W. 1950 Engine Co. Cleveland*

clap
Huge Diesel Engine Which Will Power New Streamlined Train, and Power Car Being Placed on Trucks

tons, almost one-half of the weight of the entire train, which weighs 197 tons. Engine and generator occupy a space of twenty feet. The engine was tested for 700 hours before being installed.

no long tubing or hose to leak or break and it is claimed braking power is increased four times due to a booster cylinder and equalization of power. Automatic bleeding and feeding are made possible by the fact that the four cylinders are connected by holes drilled at the top and, being lower than the booster cylinder, the air is forced out as the fluid is poured into the reservoir above the cylinder. Rubber covers keep out moisture and standard lubrication fittings are employed.

Handwritten: *D1084*

BRAKE EQUALIZER AND BOOSTER ATTACHES TO ANY CAR

All of the advantages of hydraulic brakes and mechanical brakes are combined in an equalizer and booster now being offered for small cars. For Fords, the unit, containing four cylinders, is mounted on a central cross member of the frame.



It is connected to the brake rods, the foot pedal and the emergency brake. There is

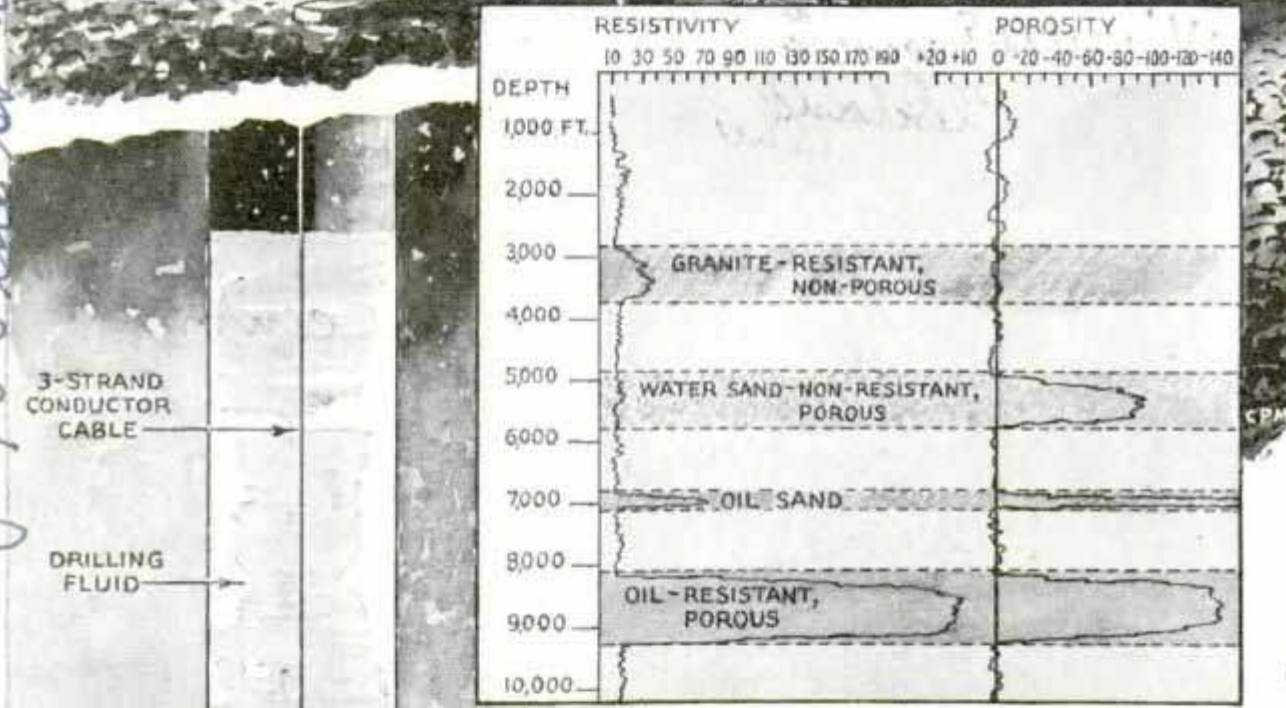
Handwritten: *D1144*

SPEED OF EAGLE MEASURED AT TWO MILES A MINUTE

"Swift as an eagle in its flight" means about 120 miles per hour. This was the speed attained by a golden eagle in the Scottish mountains which was watched by an observer who had an opportunity to time the bird over a three and one-half mile course. During its flight the eagle made an altitude gain of about 1,000 feet.

Handwritten: *Mr. E. C. Underhill*
Mr. J. Frazee Darling
London

D1091 - d. no. C. and. M. Schumberger
 40 Société des Perfectionnements Electriques
 POPULAR MECHANICS
 Procédés Schumberger
 Paris, France



Set-Up for Making Underground Electric Test, and Diagrams Showing How Electrodes Are Placed and How Resistivity and Porosity Differ for Different Materials

By means of an electric chart, delicate and accurate measurements can be made at great depths underground, revealing the nature and content of the hidden rocks. It

is being used in oil-well drilling to determine the kind of rock at any given depth, how much oil the strata will produce, the temperature and hydrostatic pressures of the rock and the slant of the strata. With some additional equipment, the apparatus can survey the inclination and direction of the entire hole or perforate the steel oil-well casing to admit a greater flow. In determining the composition of hidden strata by electrical means, two factors are considered: the degree of electrical resistance of the various strata, and the degree of porousness. Rocks are conductive or

U. S. Schumberger Electrical Engineering Methods 70 Page 26

Emb John Marcy 307 29 21 Hollywood Calif

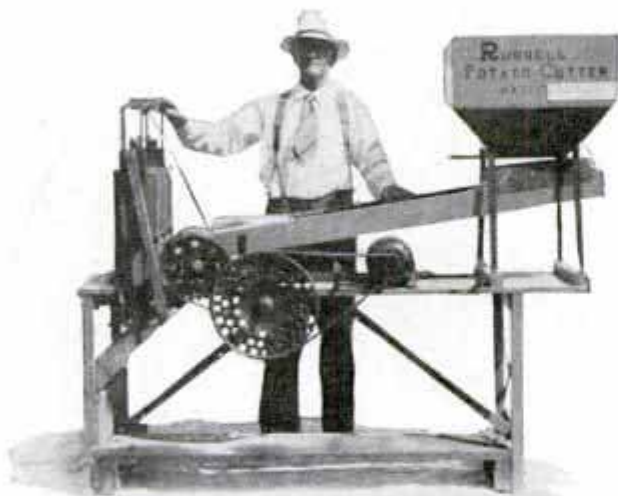
Long Beach, Calif.

Schumberger Electrical Engineering
 2117

resistant to electricity in proportion to the amounts of mineral salts dissolved in the absorbed water they contain. To determine the exact degree of resistance, three electrodes are lowered into the hole on a three-strand conductor cable. The cable strand connected to the lowest electrode runs to a battery at the surface and from that to a ground near the drill hole. Current flows from this electrode into the surrounding earth and travels upward through the structure being measured. The two upper electrodes are connected by their cable strands to the terminals of a potentiometer which measures the differences of potential between the two upper electrodes caused by the passage of the current from the lower one through the strata. From the differences of potential at various points in the hole, the varying resistances at such points are calculated. These measurements are recorded in a continuous automatic graph and a graph of the porousness of the strata is also shown. The kinds of structures are interpreted from the chart by careful calculation of the degrees of porosity and resistivity at the various points.

D1086
SEED POTATO CUTTER OPERATED BY HAND CRANK OR MOTOR

Cutting seed potatoes by hand has been eliminated by a self-feeding rotary cutting machine which can be operated by a motor or by turning a crank. It is claimed



Self-Feeding Seed Potato Cutter Which Can Be Operated by a Motor or by a Hand Crank

this cutter prepares seed potatoes for planting ten times as fast as the work can be done by hand.

J. A. Russell
 Kimball, Neb.



Still Another Use for Wire-Puller Which Was Designed for the Concrete Worker

HANDY WIRE-PULLING TOOL HAS MANY USES

Designed for pulling the wires from concrete walls, a handy tool has been developed to serve many purposes. It automatically grips the wires at any point and will not slip. In a smaller size, it is handy for stretching plumbers' tape, strap iron or wire of any size. The farmer finds the tool useful for repairing wire fences.

D1112
LOCK PROTECTS AUTO RADIO FROM REMOVAL BY THIEF

Removal of the automobile radio from the car can be prevented by a lock that is easily attached. Installation may be effected without removing the radio from the car and without making changes in the set. The device locks the radio to the dash plate on which it usually is installed, preventing thieves from loosening the bolts. Two of the lock models are constructed from solid bar steel, one chrome-plated and the other finished in black enamel.



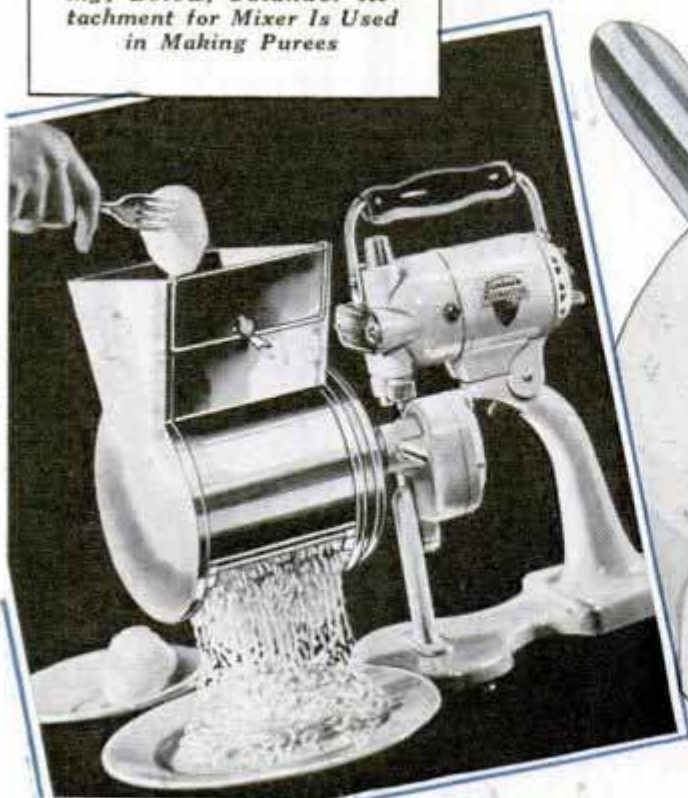
Lockwell Lock Co.
 57 th al W almb. Phila.

Making HOME TASKS



Above, Tank for Soap and Water Attaches to Standard Floor Machine for Shampooing Carpets without Soaking; Below, Colander Attachment for Mixer Is Used in Making Purees

Above, Electric Motor-Driven Ice-Cream Freezer Fits into Cube Compartment of Automatic Refrigerator; It Makes Ice Cream Free from Lumps; Below, Holders Grip Window Shade Tightly on Rollers without the Use of Tacks



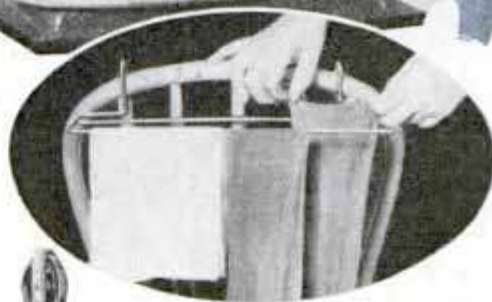
A PLEASURE...



Below, Rack in This Roaster Permits Removal of Roast or Fowl with Ease, Eliminating Danger of Burning Fingers; the Rack Is Lifted from Roaster by Handles on Each Side



Above, Electric Coffee Grinder Solves Problem of Fresh Coffee; Its Top Container Holds One Pound of Bean Coffee and, Being Transparent, Indicates the Amount of Coffee on Hand; Grinding Unit Is Adjustable to Produce Coffee of the Fineness Desired; the Grounds Container Is Quickly Removable and Is Graduated in Per Cup Requirements; the Machine May Be Finished to Harmonize with Kitchen Decorations

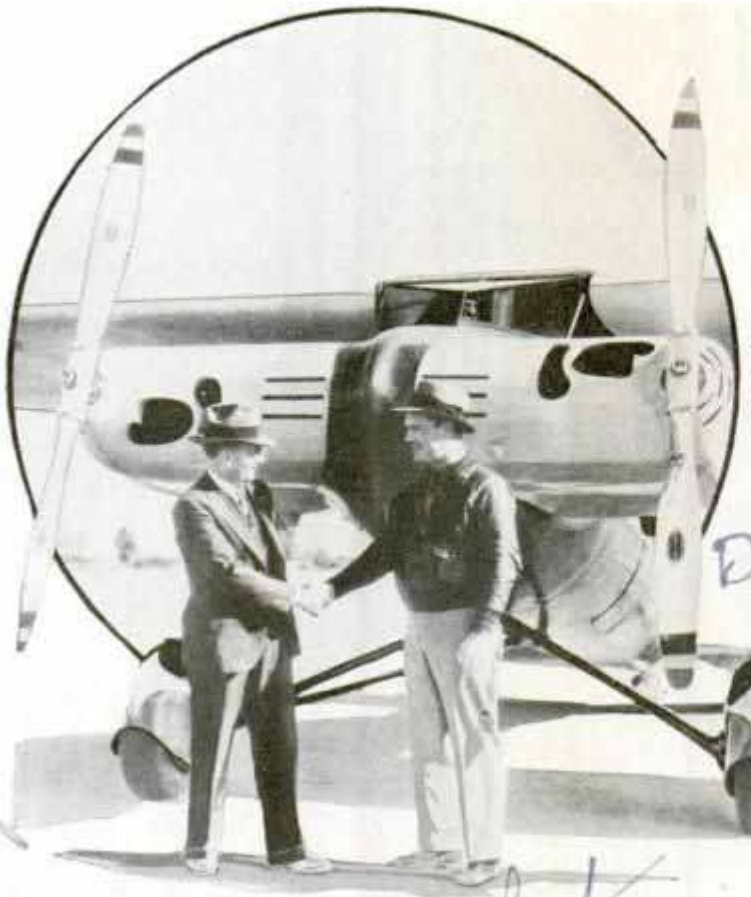


Above, Handy Rack Attaches to Chair Back for Drying Clothes Near Radiator; It Also May Be Attached to Closet Shelf for Holding Coat Hangers or to Wall to Serve as Towel or Tie Rack



Left, Basket Carrier and Pin Bag Ride Line to Make Easier the Task of Hanging Out Clothes; Right, Automatic Pea Sheller Attaches to Electric Mixer; Empty Hulls Drop Out on One Side and Shelled Peas into Bowl on the Other





Plane with Two Motors Set Close Together in Streamlined Nose so One Will Fly Ship if Other Fails

TWO MOTORS IN NOSE OF PLANE MAKE FLYING SAFER

Unusual in design and construction, a "fearless" plane, so named because it is intended to remove much of the hazard of flying, was recently tested successfully in California by Allen Lockheed, its builder. The two motors of the craft are built into the streamlined nose of the fuselage and the additional safety factor lies in the fact that they have been placed so close together that the failure of one will not result in the perilous "circular drift" which has precipitated so many aerial accidents.

SELF-CLOSING PASTE-TUBE CAP WORKS LIKE CLOTHESPIN

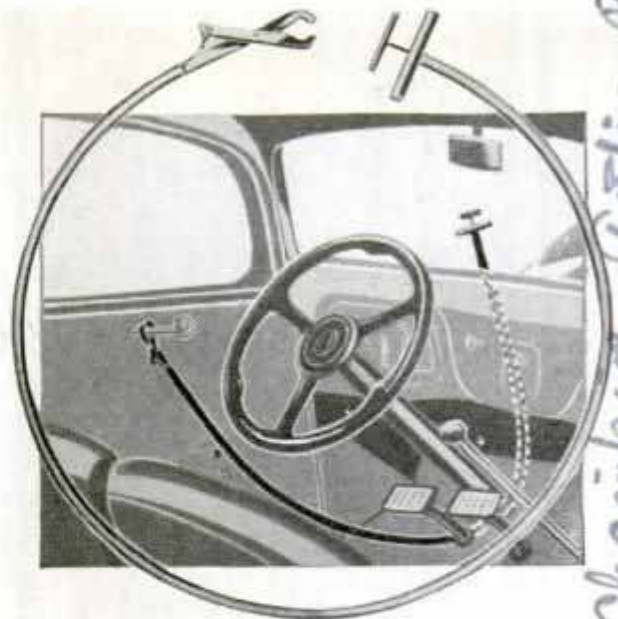


Screwed on in the place of the ordinary cap, a new self-closing cap for paste tubes has a coil spring that causes it to operate like a clothespin. Open-

ing the cap is similar to cocking a gun, by pressing the cap lever. When the upper half of the cap reaches the open position, a catch holds it until the paste or cream has been squeezed out. A button protruding slightly on the right side of the cap releases it to close at a slight touch. Even the small shock of laying the tube in the medicine cabinet will release the catch, making the cap practically self-closing.

OPENER UNLOCKS CAR DOOR AND SAVES WINDOW

When the car owner locks himself out, he need have no worry about getting in again if his garage man is equipped with a door opener which is operated without breaking any glass or damaging the car otherwise. In order to thwart thieves, the opener is sold only to authorized dealers and shop owners. It consists of a copper tubing with a cable inside. This is inserted through the clutch pedal or steering post opening, then by means of hand controls or a grip plunger it is directed to the inner door latch and



Elongated Gripping Device with Scissors Action for Opening Locked Car Doors from Outside

attached by a gripping device with a scissors action. One twist of the wrist then pulls the latch and unlocks the door.

Barbante, Calif

D1104

Champion Anti-Rollby Co. Inc.
One All Lane Mo
1935 Washington

Mr. Curt P. Frank
#3 Old Post Plattsburg Barracks



ALL-WAVE ANTENNA

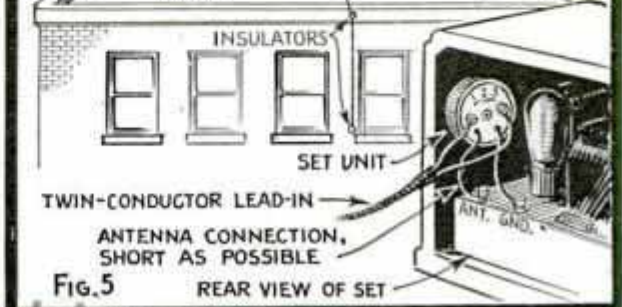
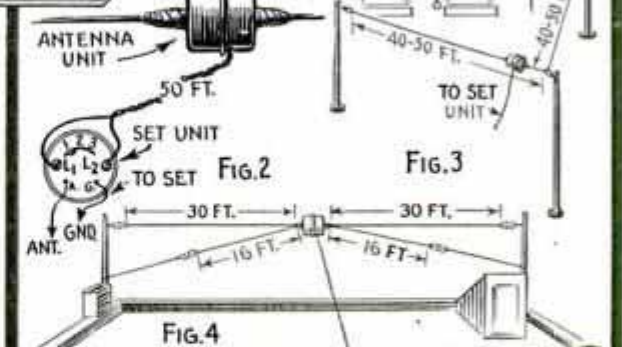
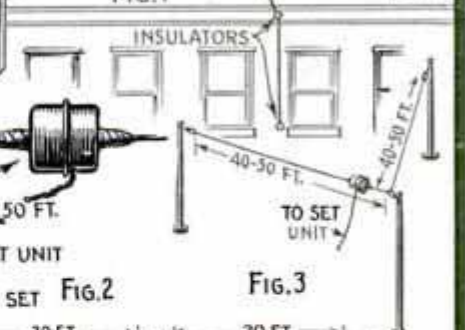
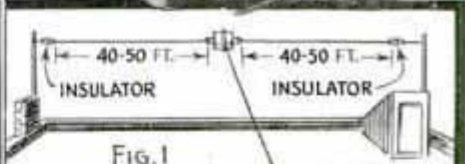
Easily Installed

D4634

MANY owners of all-wave receivers have found that it was necessary to erect two separate antennas, one for broadcast programs, and the other for short-wave signals, preferably with some form of noise-eliminating feature. These require considerable trouble and more room than is usually available. This, however, is no longer necessary as radio engineers have recently developed special antenna kits that combine all the desirable features in a single antenna. The new systems give maximum signal strength and a minimum of background noise. You can install this antenna yourself and demonstrate it to your friends and neighbors, who will probably want you to put one up for them. The system comprises a single antenna, electrically split into two efficient antennas and lead-ins by the differing frequencies of broadcast and short-wave signals. The signals themselves automatically select their own antenna and lead-in circuit for the best results, and no switches are required.

The antenna unit is built into a lightweight aluminum container which houses the necessary impedance-matching and frequency-selecting members. The horizontal wire is cut in the exact center and the unit is connected at this point, as shown in Fig. 1. The terminal lugs are then taped as indicated in Fig. 2. A short length of twisted-pair cable, leading from

(Continued to page 132A)



copy my

*Technical Apparatus Corp
27 Jackson Ave. Long Island*



Beginners can PORTABLE

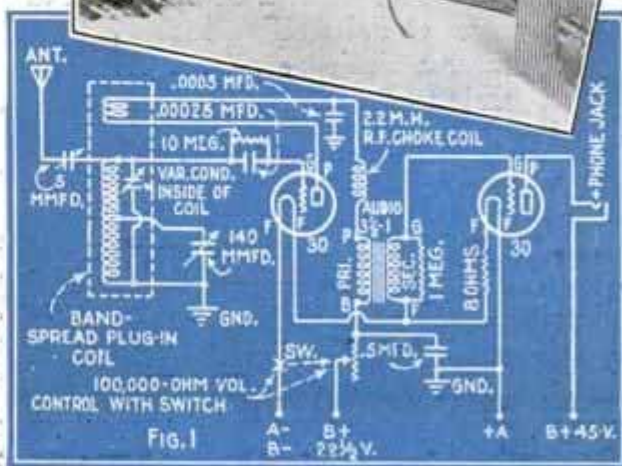
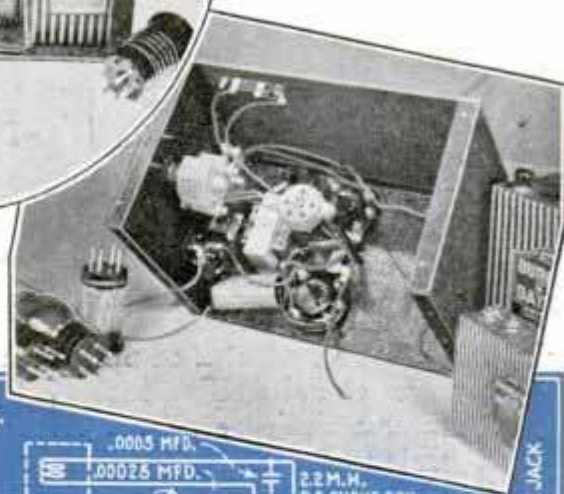
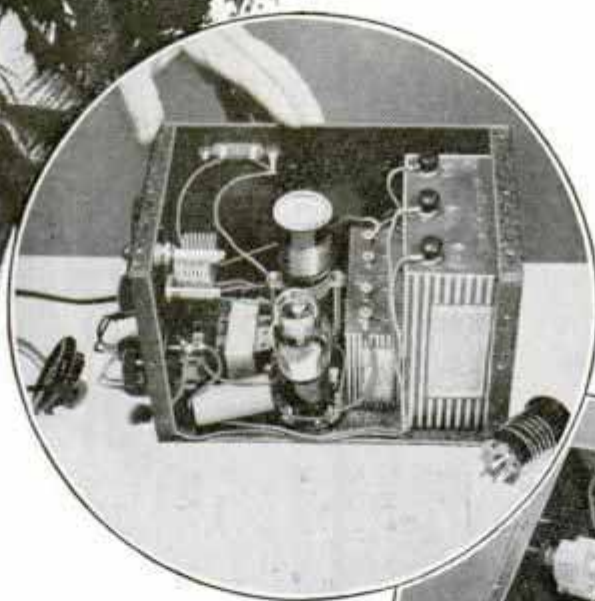
every respect. Canadian and South American stations were received in the Chicago area, and European broadcast programs in tests made near New York City. It is an excellent portable short-wave set for the beginner to build as it does not become obsolete. Should the builder decide to become a licensed amateur he will require a good monitor, and this well-shielded receiver is also suitable for that purpose.

Two type-30 tubes are employed; one is a regenerative gridleak detector and the other a transformer-coupled audio amplifier. There is no crowding of parts and both batteries fit snugly inside the metal case which is 6¾ in. high, 5¼ in. wide and 8¾ in. long. The A-battery consists of an ordinary 4½-volt C-battery, and the B-battery is

By **FRANK LESTER**
W2AMJ

HERE is that really portable short-wave band-spread receiver that you have been waiting for. The cost is low and the construction details are simplified for quick assembly with few tools. This little two-tube receiver is about the size of an ordinary box camera and weighs only 9 pounds complete with its self-contained batteries.

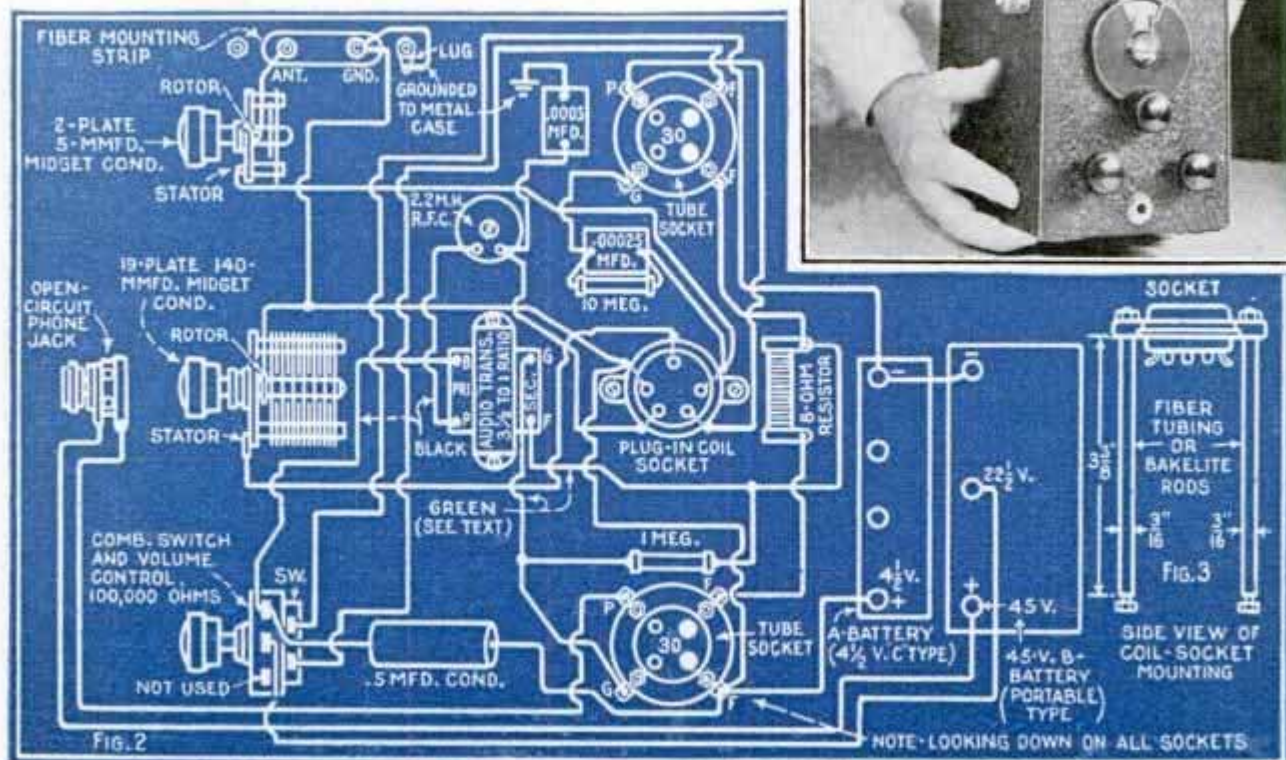
Band-spread coils of a new ready-wound variety cover all short-wave broadcast and amateur bands from 19 to 160 meters. The construction parts, including a drilled metal case, cost \$7.95 and the coils are 55 cents each. The antenna consists of a 20-ft. length of flexible insulated wire which may be thrown over the top of a car or into the branches of a tree. This set may be operated anywhere and the tests on all bands were satisfactory in



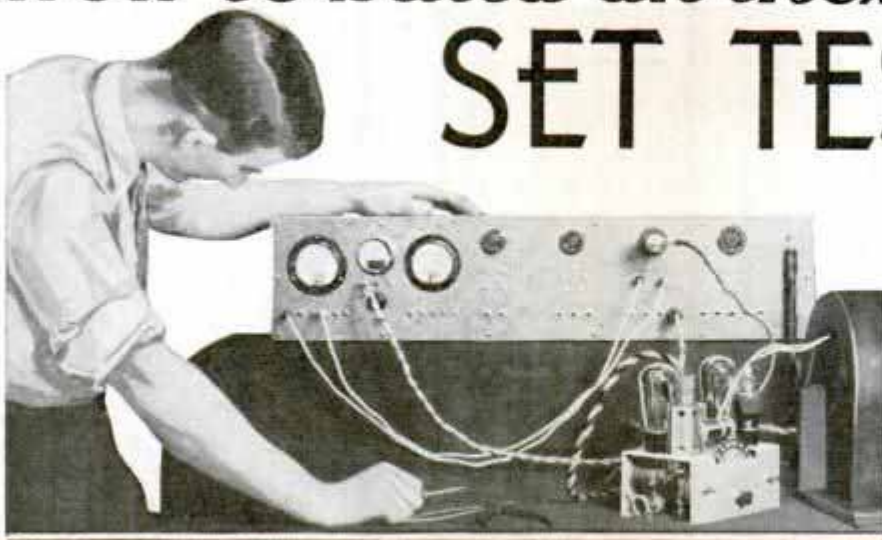
build this SHORT-WAVE RECEIVER

a portable-type 45-volt block. Diagram, Fig. 1, shows the Alden band-spread plug-in coil and its built-in padding condenser within the dotted lines. Each coil is equipped with this little condenser which is provided with an adjusting screw on the top so that it may be set to the bottom of that particular wave band; the regular tuning is done with the 140-mmfd. variable condenser. It will be noted, in the simplified wiring diagram, Fig. 2, that all parts are shown in their relative positions looking down on the sockets. Be sure that your sockets are arranged with the terminals in the same position. Both tube sockets are mounted directly on the bottom of the case and the coil socket, Fig. 3, is elevated about 3½ in. above the bottom of the case so that the various plug-in coils may be inserted through a hole cut in the top of the cover just under the carrying handle. This hole is covered by a tight-

(Continued to page 130A)



How to build an inexpensive SET TESTER



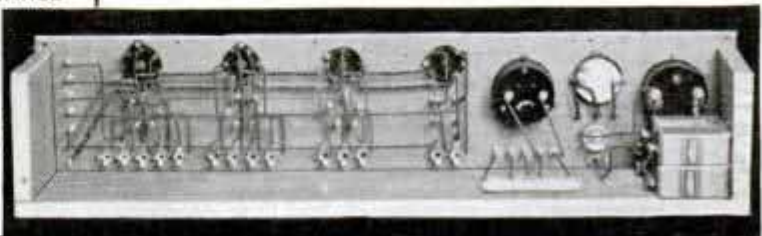
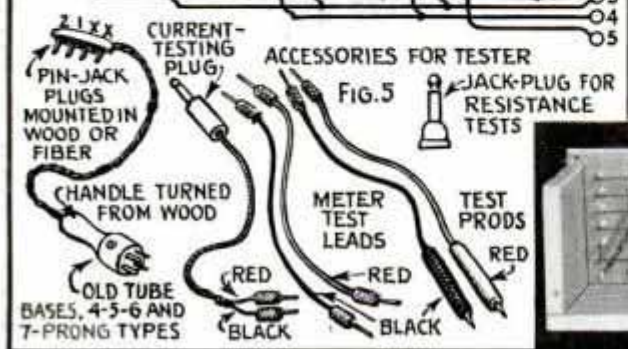
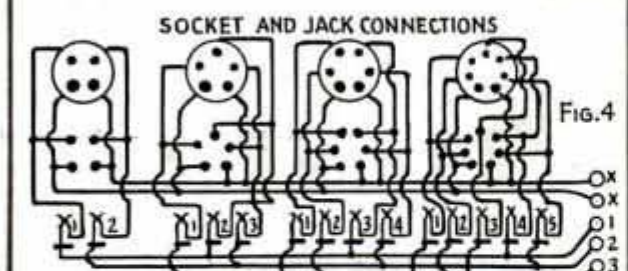
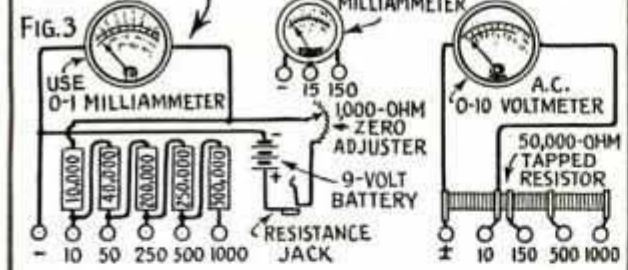
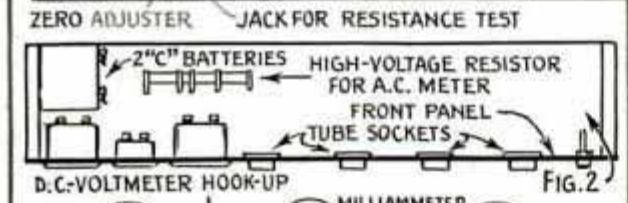
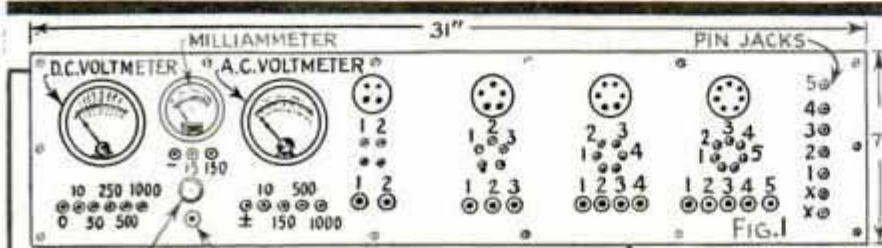
ALL tests necessary to check any radio receiver are possible with this low-cost homemade test panel. The layout is designed for the experimenter or service man's workbench.

The tester provides for checking all a.c. or d.c. voltages from 0 to 1,000 volts; also d.c. current in two ranges, 0 to 15 and 0 to 150 milliamperes. Resistance tests are easily made on an 0 to 500,000-ohm scale to be described later. Voltage and current readings are available on the new tubes as well as older types.

Panel material of any description may be employed; in this case hard pressed board was used. The wood cabinet is made from 3/4-in. stock and the depth is 7 in.

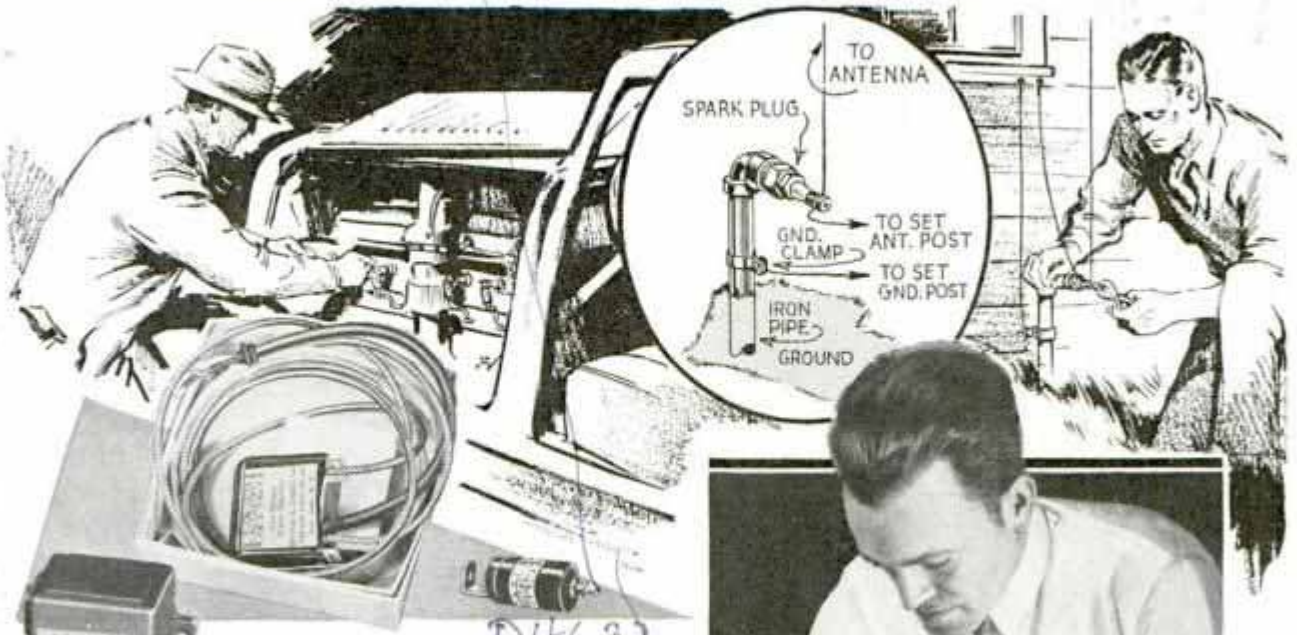
The various parts are arranged as shown in Fig. 2 and the rear-view photo at lower right. It will be noted in Figs. 1 and 4 that the sockets are all mounted with the filament, or heater, terminals down. Midget pin jacks are placed on the panel in the same terminal arrangement directly below each socket. These pin jacks are for the tube voltage tests; the leads to the cathodes, grids and plates are cut in by the small closed-circuit jacks below, for current readings. A separate clip-lead is used to connect the grid cap on the tube in the test panel to the cap wire in the set; this external lead will be noted in the upper

(Continued to page 132A)



Lynch Mfg Co, 57 Casey
Weyford

Easy Solutions for Everyday Radio Problems



D4632
Upper Right, Old Spark Plug Makes Good Lightning Arrestor; Above, Units for Improving Auto Radio; Right, Low-Resistance Inductance for Spark Plugs; Will Not Interfere with Ignition; Center, Automatic Generator Control Compensates for Set Drain on Battery; Increases Generator Output When Receiver Is On; Left, Battery-Line Noise Filter

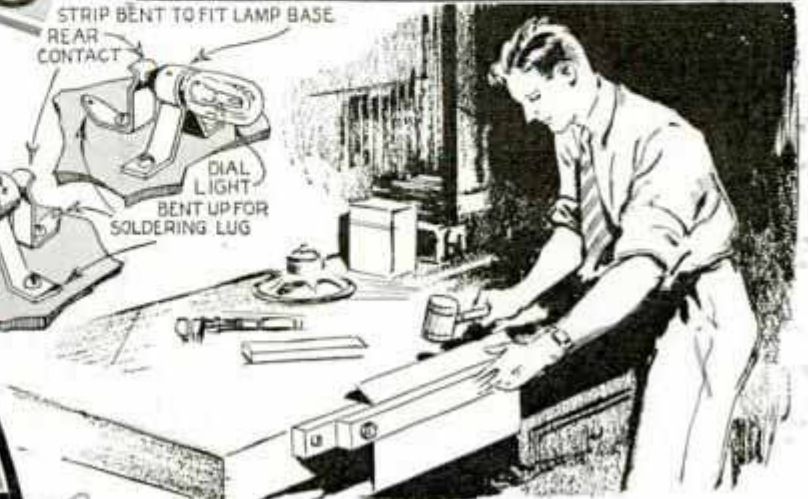
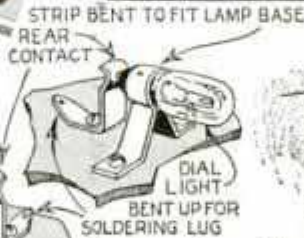


Above, Low-Loss Isolantite Coil Forms; Numerous Holes in Form Make Drilling Unnecessary; Below, Homemade Socket for Pilot Lamp and a Simple Wood-Strip Vise for Bending Sheet Metal

Insulated Tube Cap and Lead Makes Firm Contact and Is Easily Removed



PRICK-PUNCH TO ENGAGE THREADS

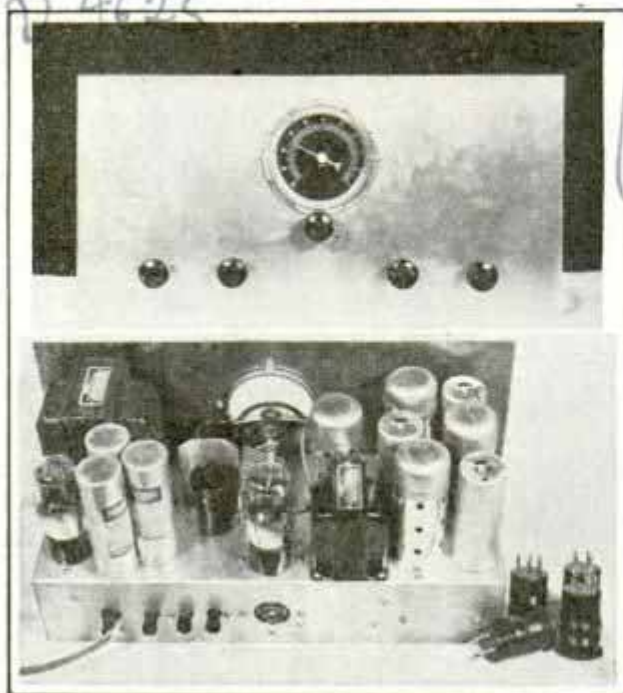


Alden Mfg Co,
Danvers, Mass.

Alfred Radio Corp
833 W. Jackson
Chicago

M Laboratories
1731 Belmont Ave
Chicago

All-Wave Superheterodyne Band-Spread over Entire Receiving Range



Above, Front Panel Showing Airplane-Type Tuning Dial; Below, Top View of Chassis Arrangement

Tuning from 10 to 500 meters, this six-tube super automatically spreads each band selected over 270 degrees on the tuning dial. Eight manufacturers of radio parts sponsor the set for home assembly. A foundation unit and additional materials are supplied through numerous radio parts dealers. Pre-adjusted plug-in coils are employed for the various wave bands.

mitters is prevented by the use of this simple relay that may be adjusted to take care of unexpected overloads. It can be set to open the 110-volt input line when the plate currents exceed any value from 150 to 500 milliamperes. A re-set button restores circuit when overload is removed.

D4559

Photo-Cell Relay Is Weatherproofed

Completely enclosed in cast aluminum case, this photo-electric relay is fitted with tubular visors to protect the lenses in front of the cell and lamp. Weatherproofing overcomes the difficulties normally caused by rain, snow, sleet and the effects of extraneous light when used in outside installations. The circuit operates on standard 110-volt power lines.



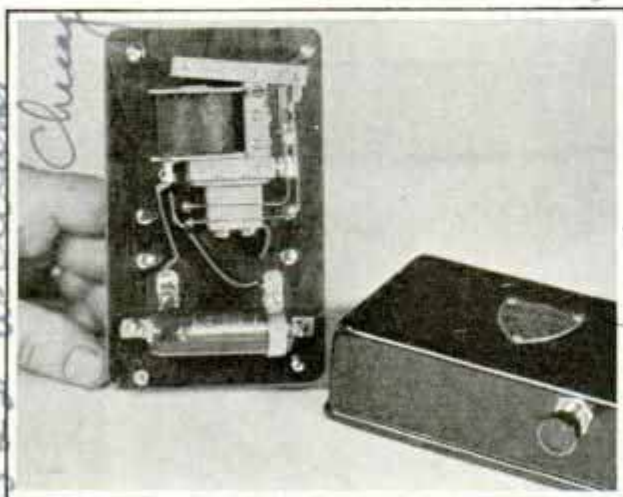
D4606

Eleven-Tube Receiver Tunes Itself

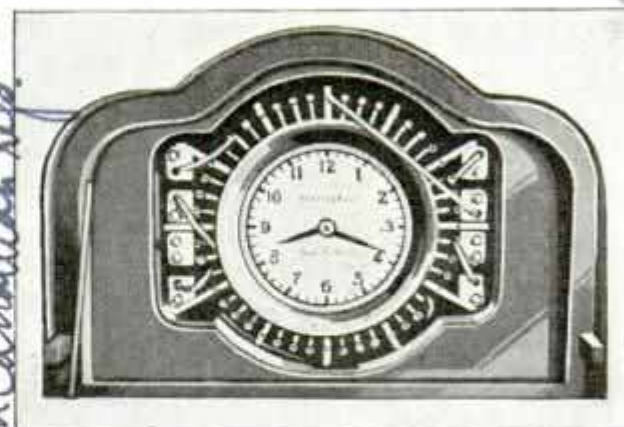
A radio receiver that turns itself on and off, also automatically tunes to any of 14 different pre-selected programs, for any pre-determined time, is now available. An electric clock and controls for the automatic selector are mounted on the instrument panel above the usual tuning knobs.

Overload Relay Is Adjustable

The loss of valuable tubes, transformers, condensers and meters in amateur trans-



Overload Relay with Cover Removed; Clip on Variable Resistor Adjustable for Maximum Safe Load



Jack-and-Clock System That Permits Pre-Selection of Automatically Tuned Stations

Blueprints covering radio construction articles in past issues can be obtained for 25 cents each; when material lists are not included in the articles, these are available without charge on receipt of postage.

Guardian Electric Co
1522 W. Adams
Chicago

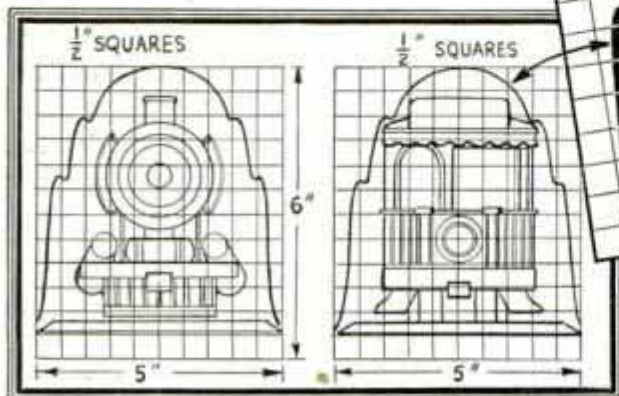
San Canadian see

Water-Kent Radio Co., 4709 W. Washington St., Phila



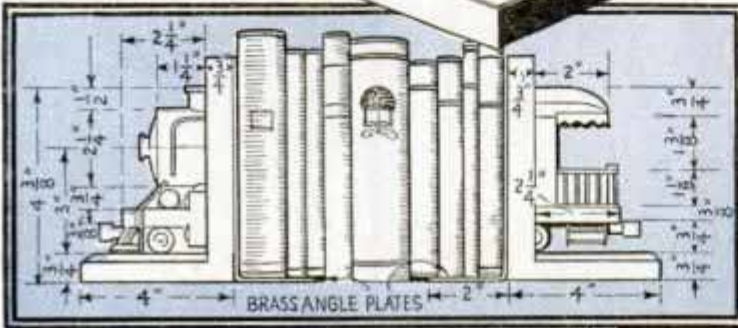
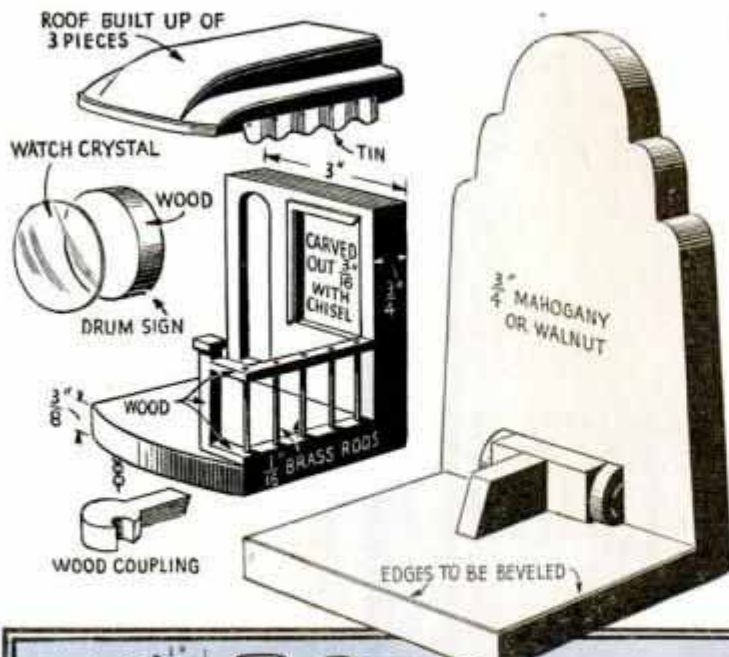
A pair of RAILROAD BOOK ENDS

THE effect of a transcontinental train passing through a row of travel books is decidedly novel, and a pair of neatly finished book ends giving such an illusion will make a very welcome gift. All of the cylindrical parts of the locomotive front can be best done on a lathe, of course, but if such equipment is not available a fairly satisfactory job can be accomplished with a jack-knife. The backs will have to be cut with a scroll or coping saw. Fasten the back on the base with finishing nails and further reinforce it with a brass angle plate screwed to both pieces from the back. Wheels, air tank and cylinders are installed as indicated. The cylinder assembly is built up of three pieces, fastened together with brads and model-airplane cement. This waterproof cement is ideal for model work of all kinds, since it can be had in a colorless variety,



and will hold wood, leather, metal and even glass with great tenacity. The front end of the boiler is fastened to the back with finishing nails and cement, the headlight having been turned on the front end.

Brass rod $\frac{1}{16}$ or $\frac{3}{32}$ in. in diameter is installed for the hand rail, front braces and pilot. In the latter case the rods are set in holes in the bottom part of

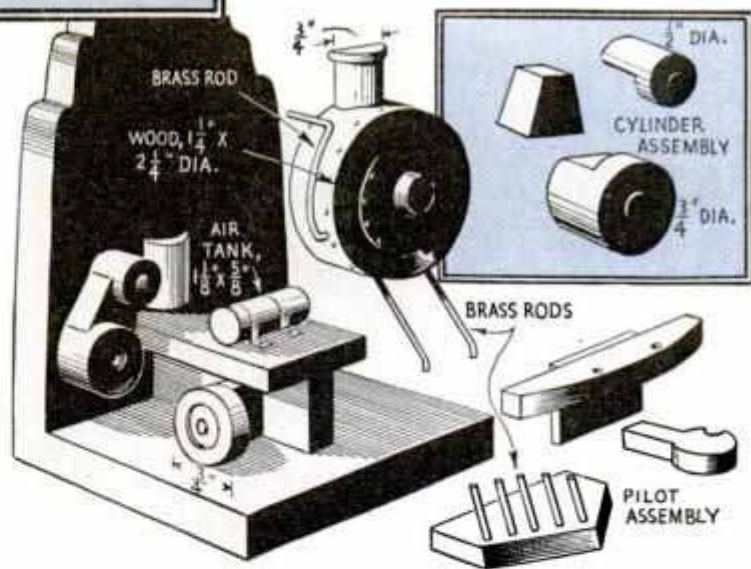


the pilot only, and cut off even at the top to butt against the underside of the locomotive frame. An attempt to insert the upper ends of the rods in holes also would result in some difficulty because of the angle. Dummy couplings are carved from white pine.

In building the observation car, the back end of the car body is recessed to represent the door and window. The latter should be about $\frac{3}{16}$ in. deep, and a square of glass is fitted carefully into the recess, which has been painted black. Wood putty can be pressed neatly around the edges to hold it in place, and a frame molding cemented around the outside of the window. The door requires no glass, but will be improved with a frame molding. Note that the spindles of the railing are brass rod, with top and bottom rails of wood. If you wish to make an extra fancy job, use brass rails as well as spindles. The top of the car is built up of three pieces as shown, with a scalloped awning of tin nailed around the edges. The steps can be made of sheet brass. For the

drum sign on the rear of the observation platform paint a wood disk with the emblem of your favorite train, and cement a wrist-watch crystal over it.

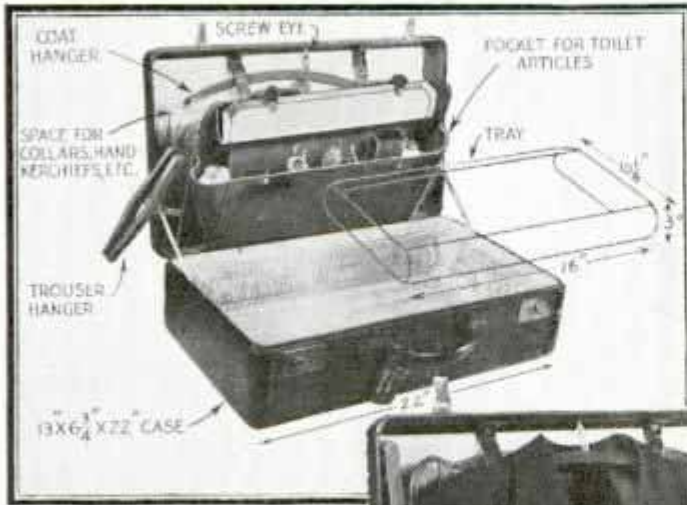
In a job of this kind, the painting is quite as important as the construction. Adhering strictly to the colors used on most trains leaves a rather drab job, and it is suggested that some bright touches be applied. For instance, paint the observation car olive green, but use bronze, or gold leaf here and there. Red wheels with black or aluminum rims are effective, and perhaps red and light grey striping on the awning. The locomotive boiler should be in black, as well as the smokestack, cylinders and base or frame, except along the edge, where it should be bronze or gold. Wheels should match those of the observation car. In each case use a brushing lacquer, which dries quickly, over



a wood filler. Two or three coats will be sufficient with thorough polishing with steel wool between coats. Backs and bases are most effective in a wood stain with a shellac or varnish finish. In the painting, do as much as possible before assembly, as a much neater job can be accomplished.

☞ If salt is sprinkled heavily over soot that has been spilled on a rug, the soot can usually be swept away without discoloring the rug.

Small Altered Case Holds Entire Wardrobe



You can pack a suit, dressing gown, three or four shirts, pajamas, collars, shaving accessories, etc., in a traveling case several inches smaller than the average size suit case. A screw eye is driven in the top edge to hold a coat hanger. The pocket of a discarded case is glued to the cover at the hinged edge. This will hold your toilet articles. Behind the pocket is plenty room for handkerchiefs and collars. Snaps are provided so that the upper end of the pocket can be held in place. A sheet-metal tray, neatly enameled, fits inside the body of the case. In packing, lay the lower end of the coat on the bottom of the case, which will prevent a sharp crease. Then

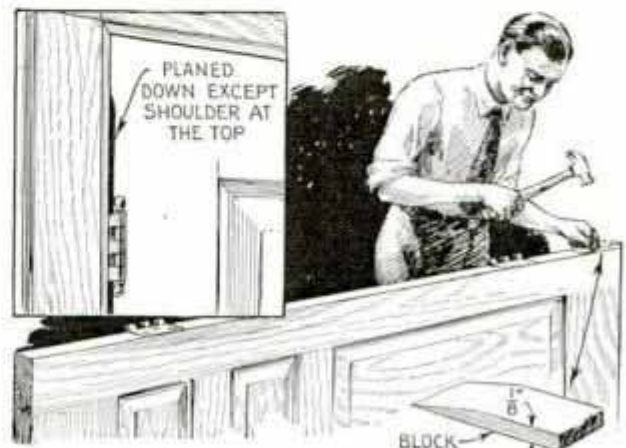


fold the trousers on a piece of heavy cardboard and place them on the lower part of the coat. A dressing gown or rain coat may then be added, and the tray laid on top, after which the case is closed.—W. J. Reed, Aurora, Ill.

Thin Block Tacked to Edge of Door Will Prevent Rattling

Before hanging the doors in a building at a Century of Progress, the rear edge of each one was planed down to leave a small shoulder at the top as indicated. The shoulders bind against the door casings and prevent rattling. Similar results can be had in the home. If you do not wish to plane the doors, nail a thin wedge of wood to the hinged edge of the door.

☐ After waxing your floors, polish the bottoms of the chair rockers to prevent them making unsightly marks on the floors.





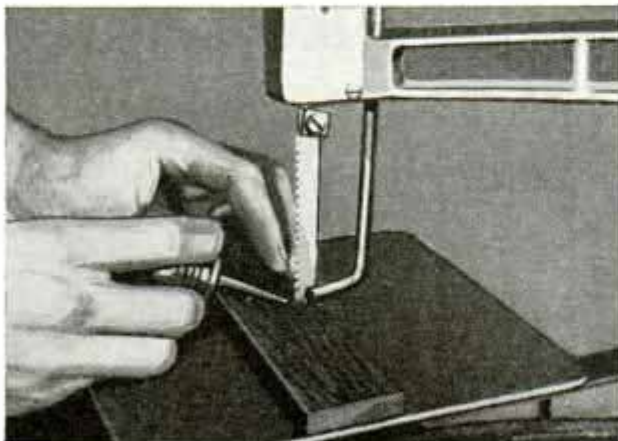
Large Funnel Slipped over Shovel Handle Protects Hand against Heat When Cleaning Stove Fire

Shield on Short Shovel Protects Hands When Firing Stove

Slipped over a short shovel handle, a large funnel provides a shield to protect the hands against heat when firing or removing clinkers from your furnace or heating stove. The lower end of the spout should be removed, leaving just enough to hold the funnel in place.—Fred W. Schneider, Towaco, N. J.

Cutting Metal on Jig Saw

Metal can be cut on a small jig saw by using a section of hack-saw blade. After enlarging the saw slot in the table to accommodate the blade, attach it in the regular way. If your saw uses blades that



Short Piece of Hack-Saw Blade Used to Cut Metal on a Small Jig Saw

have holes in both ends, the hack-saw blade will have to be annealed and drilled at one end as only one end has a hole. However, if the blades clamp in jaws, all you need to do is grind the ends of the blade to fit. Use plenty of cutting oil to prevent heating.

Cork Disk in Ink Bottle Serves as Guide for Penholder

Rolled up and inserted into an ink bottle, a thin cork disk will float on top of the ink and serve as a guide to prevent dipping a pen too far. The disk should be of a size to fit loosely inside of the bottle. Another advantage of the disk is that it helps to keep the ink mixed, thereby eliminating accumulations of sediment in the bottom of the bottle.



Inspecting Photo Negatives for Density and Contrast

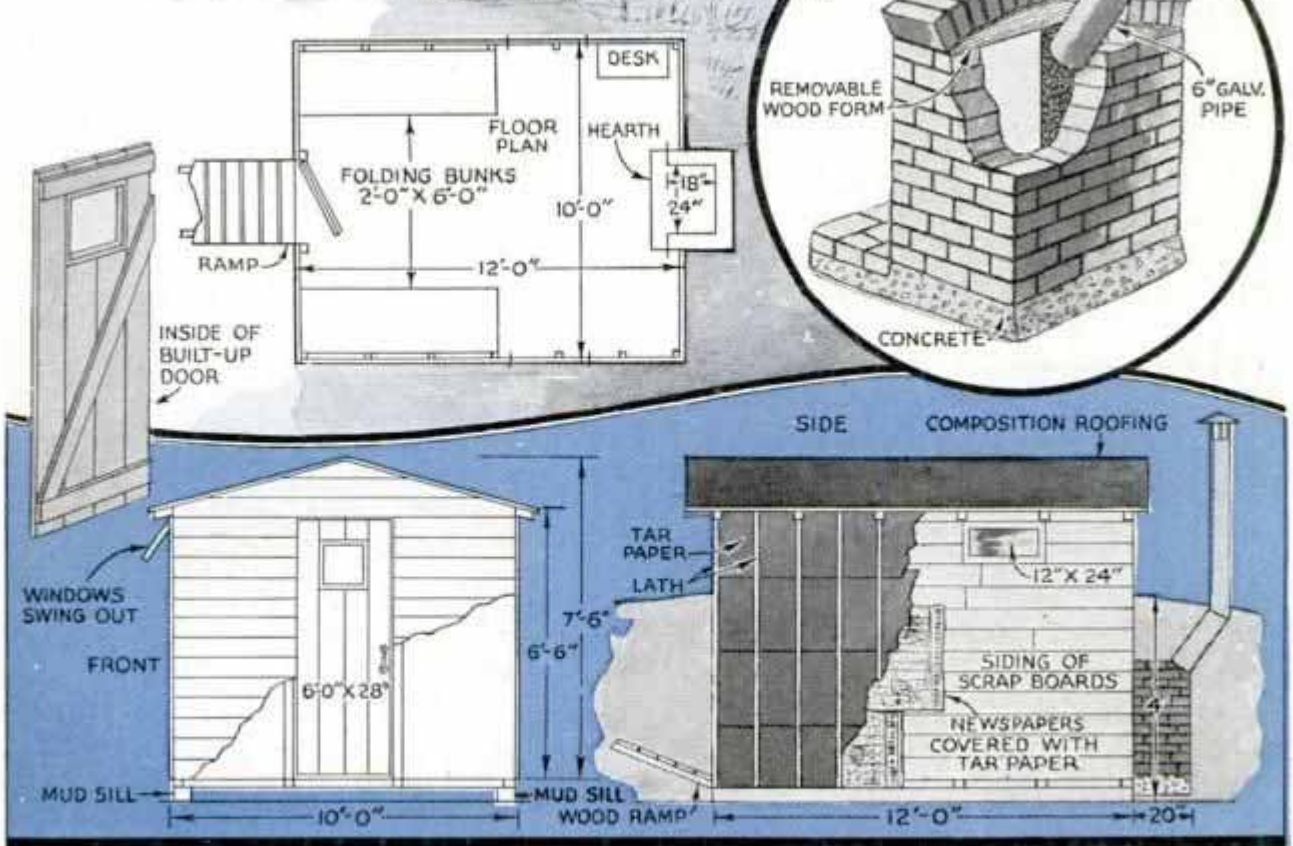
Inspecting negatives after they come from the fixing bath is an easy matter if they are placed face down on the surface of water contained in a black rubber, or black enameled, tray. In this way, by reflected light, they appear as positives, and density and contrast can be inspected to determine if further treatment is required.

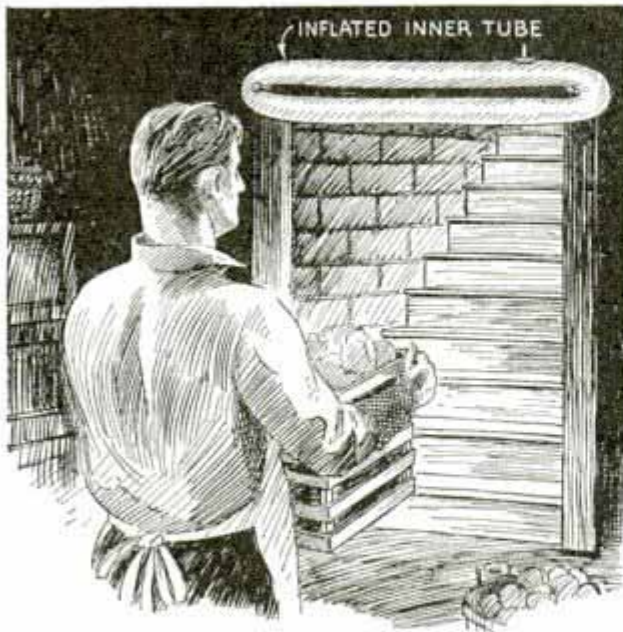
Rubber Heels on Floor Brush Protect Legs of Furniture

Tacked to the ends of a floor brush as indicated, a couple of rubber heels provide excellent bumpers to prevent marring the legs of furniture when sweeping around them. The rubber should project about $\frac{1}{4}$ in. over the edge of the brush. Besides serving as resilient bumpers, the heels loosen gummy substances from the floor that cannot be removed with the brush.



Cold-Weather CLUBHOUSE





Inner Tube Suspended above Low Door in Basement Protects Head from Painful Bumps

Inner Tube Prevents Bumping Head against Low Door

In many places, such as dark basements, where a low doorway is often forgotten and you are likely to bump your head, try this idea to prevent such trouble. Just get an old inner tube that will hold air, inflate it and stretch it across the upper casing of the doorway. It will serve as an effective cushion to avoid these bumps.

Rubber Tubing Protects Shoe Heels against Skate Clamps



better for this purpose than either paper or leather.

To prevent skate clamps from marring your shoe heels, cut off short sections of rubber tubing and slip them over the ends of the clamps. Rubber tubing will be found much

Mending Broken Chinaware

Broken chinaware can be repaired with a cement made by dissolving casein in a saturated solution of borax to form a thin paste. After applying the cement to the broken edges, bind them together and let the article set for a day. Another cement

that sets more rapidly is made by grinding casein into a solution of water glass. These ingredients should be thoroughly worked together by hard rubbing. The cement should be used immediately.

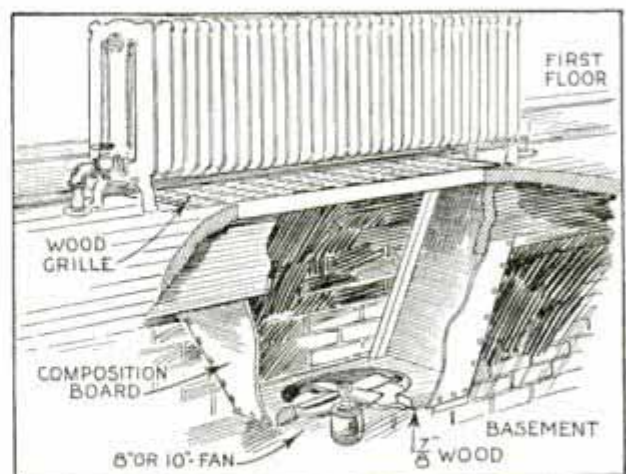
A Stove-Lid Lifter That Will Not Slip

A stove-lid lifter that will not slip is made easily from a piece of spring steel. The ends of the steel are annealed and holes are drilled in them to fit the projections inside of the lifter hole in the lid. After shaping the steel, heat it to a cherry-red color and quench it in water to harden it. To use the lifter, squeeze the ends together with the hand as it is inserted into the lid.



Fan Increases Efficiency of Radiator in Home Heating System

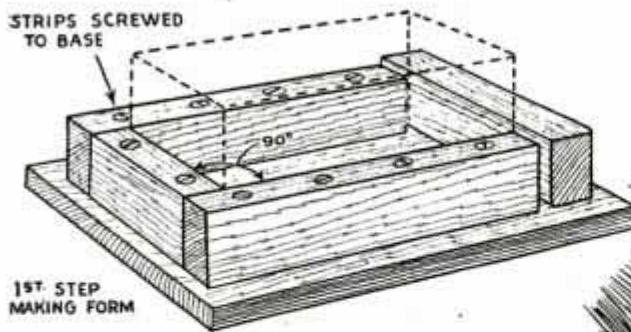
By mounting a small ventilating fan in the basement, as shown, to force air up between the fins of a radiator, it is possible to get a more uniform distribution of heat and thus reduce fuel consumption. An opening in the floor under the radiator



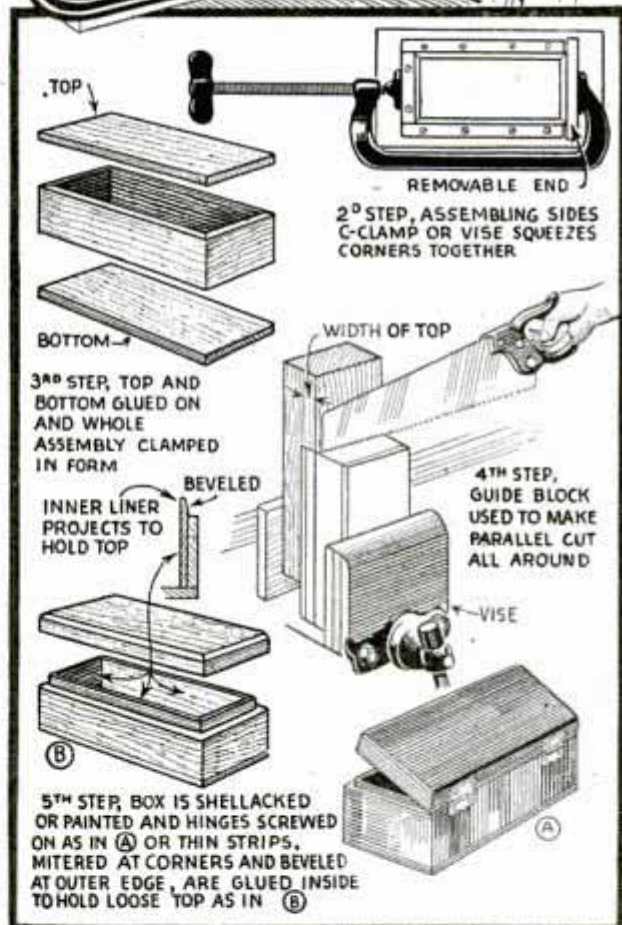
Fan Directs Air Blast around Radiator and Helps to Distribute Heat Uniformly

is fitted with a wood grille, and, in the basement under this, is suspended a wide V-shaped box of composition board, the lower end of which holds the fan.

Form Simplifies Making Small Glued Boxes



Small wood boxes with glued mitered corners can be made quickly and accurately by using a form in which the assembly is clamped. The form consists of three wood strips screwed to a base, the inside dimensions of the form being the same as the outside size of the box. The sides of the box are cut to correct length, casein glue is applied to the mitered ends, and the pieces are then set up in the form. A separate block is placed against the end of the box and the pressure of a C-clamp or vise will then keep the glued edges firmly together. If the form has been impregnated previously with melted paraffin, glue will not adhere to it and the assembly of sides can be removed without trouble. Next, the top and bottom of the box are laid on the glue-coated edges of the sides, and the box is again placed in the form, this time with a block on the top, the C-clamp straddling top and bottom to squeeze these pieces against the sides. After the glue has dried, make a guide block for sawing the box in two, both block and box being held in a vise. The guide block enables you to make a neat cut which will be parallel to the top. Then wood liners, also mitered at the corners, are placed inside the box to hold the cover, or the cover may be hinged.—J. E. Dekker, Chicago, Ill.



Cleaning Windows and Mirrors

Windows and other glass surfaces may be thoroughly cleaned and highly polished with a compound made by mixing precipitated chalk, 7 oz., and tripoli, 2 oz., with a strong soap solution. The latter is made by dissolving castile or an equivalent grade of soap, 2 oz., in boiling water, 4 oz. After the soap has been dissolved, add the chalk

and tripoli and stir until the mixture is smooth. This preparation is applied with a cloth and is allowed to dry, after which the surplus is removed.

☛ Clothespins that have been boiled in salt brine will be toughened against splitting and will not freeze to wet clothes on the line.



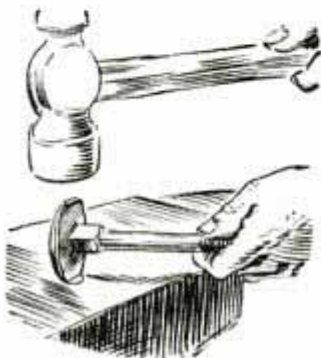
It Takes a Skillful Shooter to Run Up a High Score on This Marble Board

A Simplified Marble Game

Here is a game that will test your skill as a marble shooter to run up a high score. It is merely a board 3½ ft. long and 2 ft. wide having strips nailed to the sides and one end which project 1 in. above the top surface, the end strip being wide enough to elevate the end slightly. The idea of the game is to shoot the marbles with the thumb from the mark at the lower end into shallow holes spaced and numbered at the upper end as indicated.

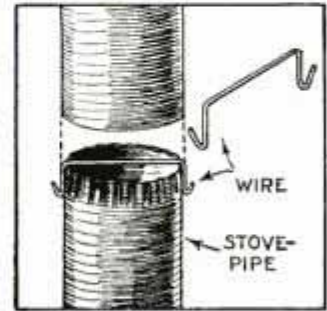
Flattened Edges on Head of Carriage Bolt Prevent It from Turning

To lock a carriage bolt so that it will not turn when removing the nut, a blacksmith hammers over the edge of the head in two places as shown. The projecting edges "bite" the wood surface and hold the bolt so that the nut can be loosened with a wrench.



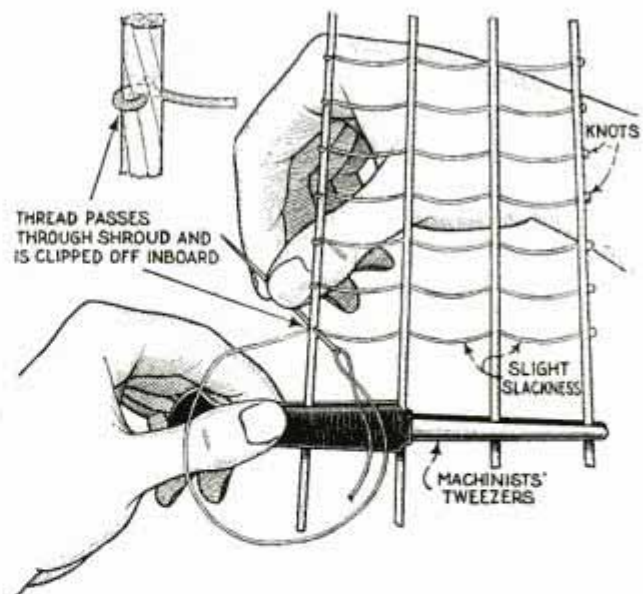
Stop Prevents Sections of Stovepipe from Collapsing

When several sections of stovepipe are put together they sometimes telescope more than intended and allow the end of the pipe to pull out of the chimney hole, which may cause a fire. To prevent this, bend lengths of wire over the crimped end of each section as shown to engage the end of the adjoining section.—Claude E. Johnson, Romance, Arkansas.



Attaching Ratlines to Mast Shrouds of Ship Models

Instead of attaching ratlines to outside shrouds with half hitches as is commonly done on ship models, use the following method: Grip the shrouds horizontally with a pair of tweezers, and with a fine needle, draw the free end of the ratline thread through each one of the shrouds. Passing the needle through both the shroud and the ratline at right angles locks



Ratlines Threaded through Shrouds with Needle Simplifies Job of Rigging Ship Models

the thread, after which the inboard end is cut off close to the shroud and touched with a drop of shellac to hold it. Note that the ratlines are left a trifle slack between the shrouds.—H. T. Bodkin, Chicago.

FURNITURE SCARS

Easily Removed

MINOR injuries to your furniture, such as scratches, dents, scuffs and stains, are easily touched up, hidden or filled. Perfume, hair tonic and similar stains that turn white are removed with some spirits of camphor. Wipe the whitened surface quickly and immediately give the area a brisk rubbing with a dry cloth. A good furniture or wax polish will then bring up the luster; on a satin finish use a furniture polish and on a gloss finish use polishing wax.

Very light scratches can be made invisible by use of either polish or wax alone. Lay on a fairly generous application of the polish in and about the scratch and allow it to dry. Then apply the polish to the whole surface and after it is sufficiently dry rub vigorously with a dry cloth. The first application builds up under the second coat and thus helps to fill and hide the abrasion. Another method of restoring the luster on a surface that is checked or marred is the use of a rottenstone polishing pad. Cut a small square of fine-mesh cloth, lay it flat on the table and place about three tablespoonfuls of the abrasive in the center. Fold the cloth in from the corners and draw it tight to form a rounded polishing surface and at the same time retain the abrasive. Pour a small quantity of boiled linseed oil over the surface of the work and rub with the pad, the



strokes working away from the center with a circular overlapping movement. The polisher should travel across the scratches.

On a dark-stained surface no amount of polishing or rubbing down will obliterate the blemish that goes through to the wood. If the scratch is deep and narrow, first clean out all the loose material, taking care not to break the varnish film at the edges.



Very light scratches can usually be made almost invisible by the use of either wax or polish alone



Fine sandpaper is used to smooth wood filler down to the surrounding surface



Staining a light scratch to match surrounding surface



Then stain a wood filler to a slightly darker shade than the surface to be patched and force it into the opening with a putty knife. Allow this to dry and then coat it with shellac, which permits polishing later. To remove excess filler use 8-0 sandpaper and sewing-machine oil after you apply the shellac.

A careful rubbing with a fine abrasive will remove scratches on turned table and chair legs. Cut a strip of fine-mesh cloth about 24 in. long, dip this in boiled linseed oil, and sprinkle it with powdered rottenstone. Loop the cloth about the turning and pull the cloth back and forth. Apply polish in the same way, with a dry cloth. This method will not do on a light surface. Here it is necessary to omit the rottenstone and instead impregnate the cloth with a wood filler in the natural color. Allow the cloth to dry for a few minutes until the filler stiffens and then rub it into the openings until level with the surrounding surface. Remove the excess with a clean cloth, allow to dry, then sand lightly with 8-0 finishing paper and sewing-machine oil.

If a large surface has been dented, it is generally better to remove the old finish, raise the dent, and then refinish. If the surface is in very bad condition, it will pay to turn the job over to an expert refinisher. However, a simple refinishing job can be handled by the amateur. Take off the old finish with a scraper. Judicious use of a dampened cloth folded to several thicknesses, and a hot flatiron will raise shallow dents to the level of the surrounding surface. Lift the flatiron every few seconds, continuing the process until the depressed area is raised to the proper level. Digs and deep scratches should be filled with a plastic, such as stick shellac, a

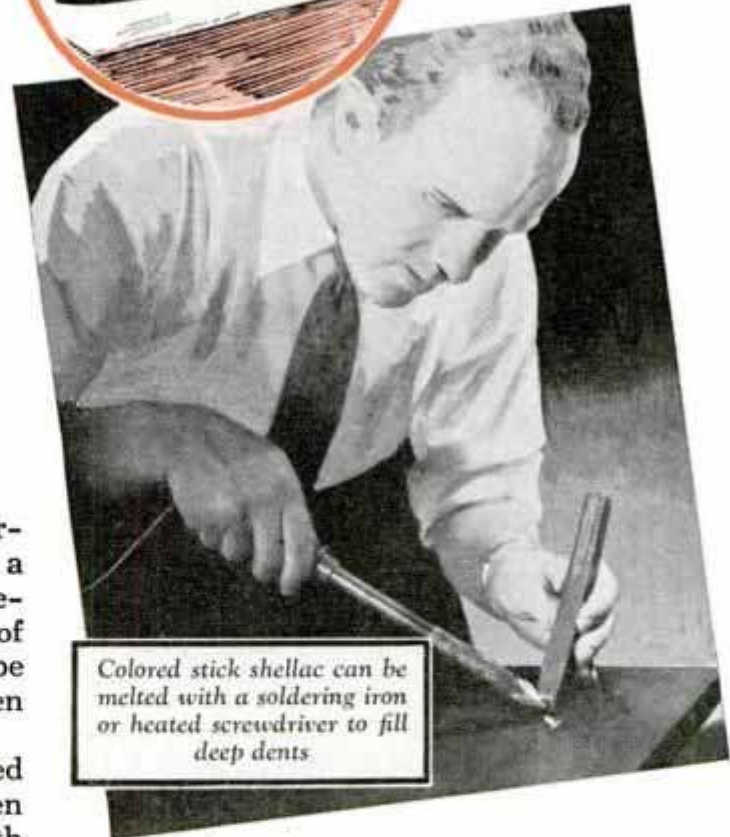


wood-fiber plastic or a filler composed of wood filings and liquid glue. If the wood is to be stained, prepare the surface and do the staining first, then mix or obtain a plastic filler that is slightly darker in shade as the filler always lightens somewhat in drying. Press the filler firmly into the opening and build it up slightly above the level of the surface. When dry, a careful sanding will remove the excess without discoloring the stained surface. The amateur can save much time and work in the final finishing of a surface if he uses a spirit varnish, which dries quickly. Spirit varnish, sold under different trade names, is a satisfactory substitute for either shellac or varnish. It is a thin, elastic product which levels easily and dries dust free in about a half hour. In four or five hours, or overnight, one can sand it and apply the final finish coats of furniture wax to complete the job. It is equally as valuable as an undercoater for high-varnish finish. As a rule lacquers are unsatisfactory for repair work, owing to the difficulty of proper application, and they cannot be used at all on a surface that has been varished.

Veneered surfaces are easily repaired if the pieces broken away have been saved. Simply coat the underside with a quick-setting glue, replace the loose pieces and weight them until the glue is dry. The marks left by a coarse-mesh cloth on a table top where a heavy vase or other object has been for some time can be removed easily by the polishing methods described.



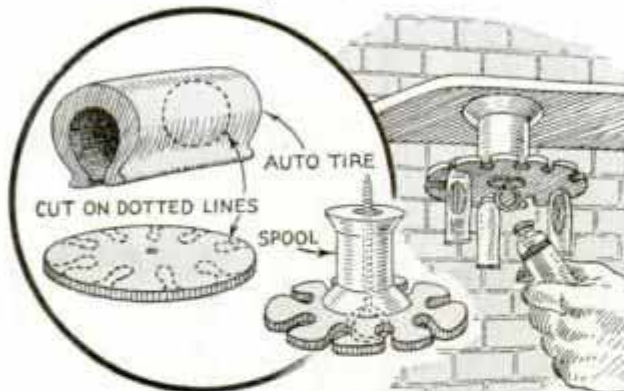
A warm flatiron and a damp cloth will raise many shallow dents; the moisture penetrates the wood, causing it to swell



Colored stick shellac can be melted with a soldering iron or heated screwdriver to fill deep dents

☛ A few drops of boiled linseed oil rubbed into the hands before working on your motor will do much to keep them free of grease and dirt, and a few drops rubbed in after working will loosen the dirt so that it can be washed off.

Circular Rack of Rubber Holds Collapsible Tubes



Held by Notches in Edge of Rubber Disk, Toilet Preparations in Tubes Are Always at Hand

Many toilet preparations such as tooth paste, creams, lotions, etc., that are sold in

small collapsible tubes, can be kept at hand where needed on a simple circular rack attached to the underside of a shelf. It consists of an ordinary spool and a disk of fairly heavy rubber such as you can cut from the side of an old auto casing. Notches are cut in the edges of the disk to take the necks of the tubes. A small hole in the center of the disk admits a screw eye which should be long enough to pass through the spool and is then driven into the shelf as shown.

When banking your furnace fire for several hours, alternate bunches of newspapers with layers of coal; the papers will blaze at intervals and help keep the checked fire from getting too low.

400 BLUEPRINTS for Spare-Time Profits



17 by 22-In. Blueprints Convenient for Shop Use

WINTER SPORTCRAFT

FRONT-STEERING, NON-TIP ICE BOAT—Described in this issue. 786—25c. Other designs available.

HOMEMADE SNOWSHOES—Shows how to bend frames and string with rawhide. 796 and 797—50c.

AIR-PROPELLED ICE SPEEDSTER—Has motorcycle power plant and a streamlined canvas-covered body. 785—25c.

FAMOUS MODELS

"HALF MOON"—Model of ship used by Hudson in early 1600's. 4 prints, 717 to 718a—\$1.00.

"U.S.S. PENSACOLA"—Midget copy of 10,000-ton cruiser. All details to scale. 863 and 864—50c.

Blueprints are 25 cents each or six for \$1.00. Address Blueprint Department, Popular Mechanics Magazine, 200 E. Ontario St., Chicago.

Why not get some new ideas from this valuable assortment of workshop plans that show just how many novel and useful articles are made. Unusual knickknacks are always in popular demand and can be sold at roadstands and through novelty stores. Whether you have only a few hand tools or a motorized shop, you will find something to suit your purpose in our free list of 400 prints. Just enclose 3 cents to cover mailing costs. Here are just a few of the many projects.

NOVELTIES

DOLL HOUSE—41x23x24 $\frac{3}{4}$. 507 and 508—50c.

SPIRAL CANDLESTICKS—Unusual artistic design, maple, lathe and hand work. 624—25c.

NOVELTY WEATHERVANES—Sheet metal, several attractive types. 562 and 563—50c.



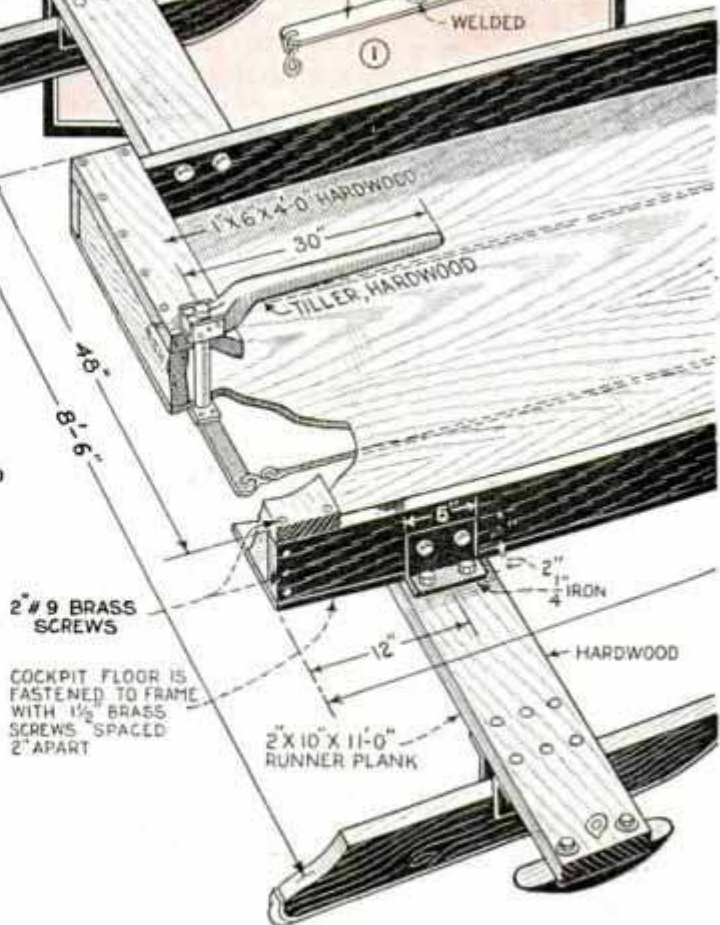
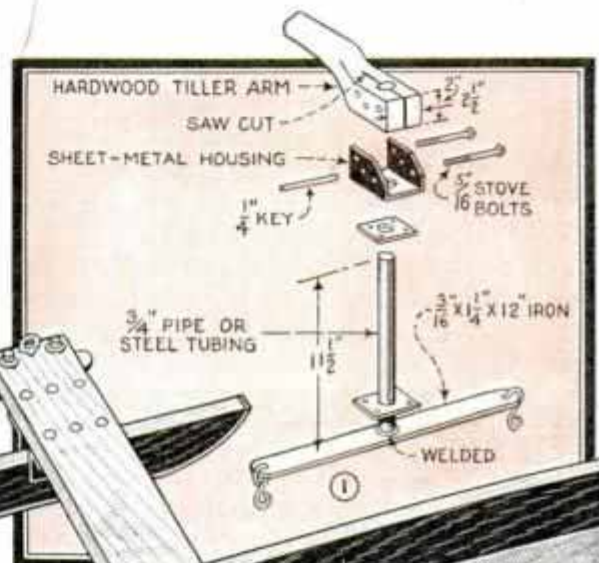
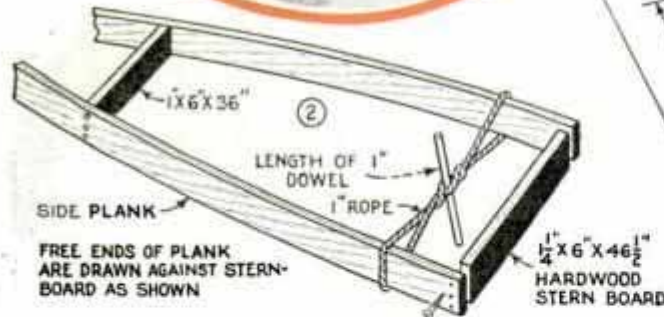
18-Fl. Iceboat (SN 774)

B.P. 786
X346A

Build and Sail this Safe

By
JULIUS FANTA

with four $\frac{3}{8}$ -in. bolts as in Fig. 3. Clear oak may be used for all parts designated as hardwood. Measure 6 ft. from the nose along the side planks and at this point, join the side members to a cross beam or spreader. Pull the free ends of the side planks together with a rope as in Fig. 2 and join to the hardwood sternboard with screws. Before releasing the ends, screw on the hardwood top board. Turn the hull

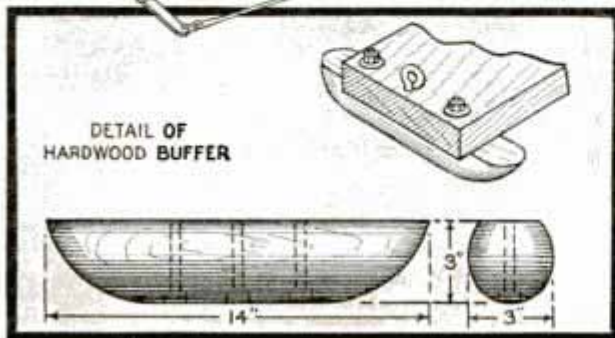
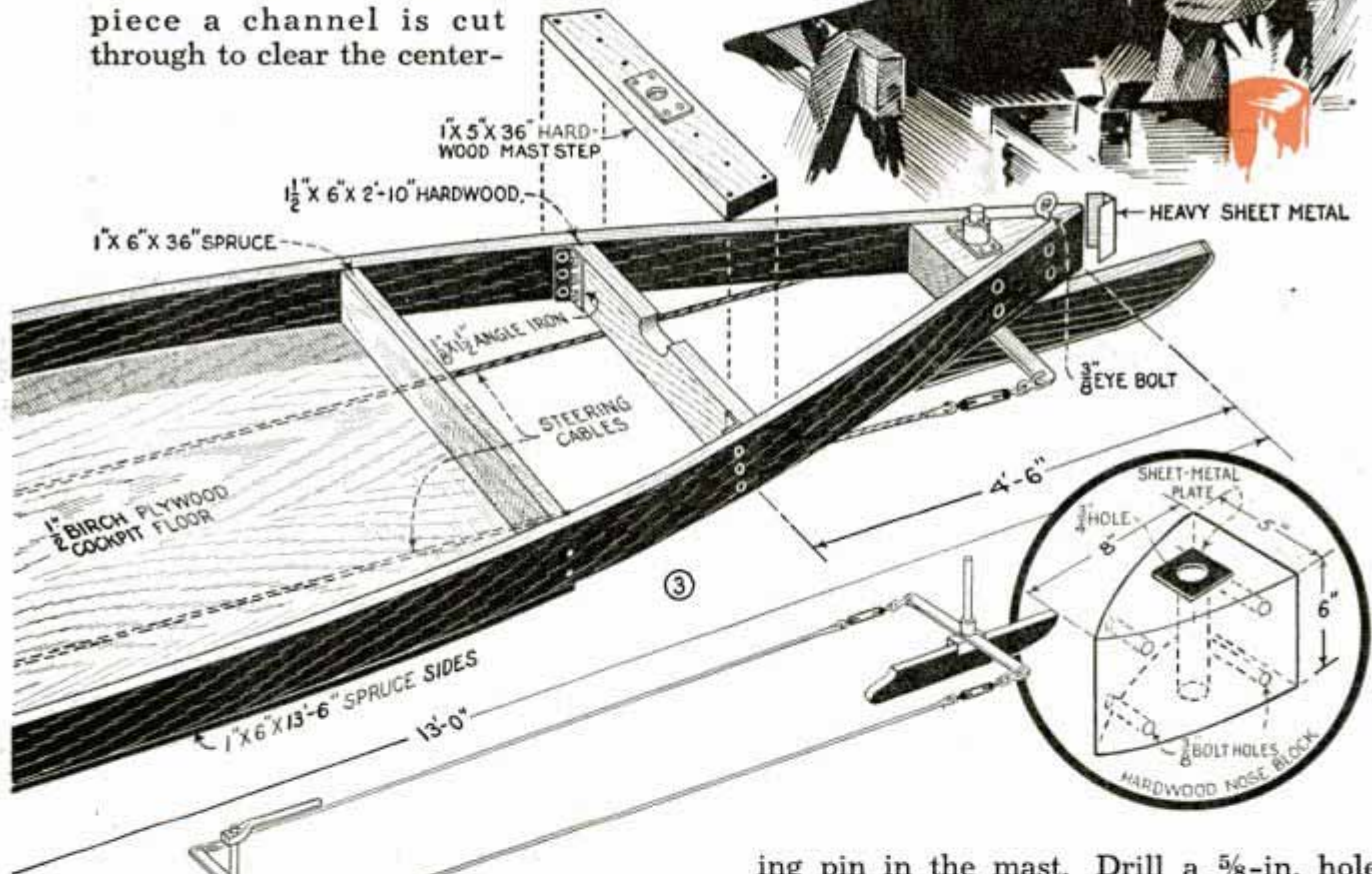
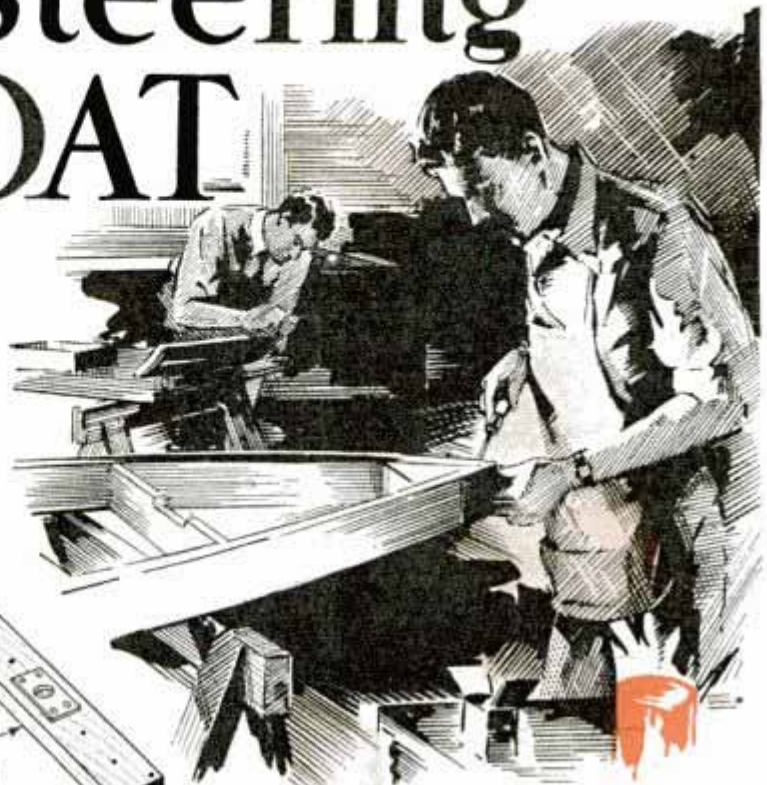


ICE-BOATING has been made safer with this non-capsizing, front-steering skeeter which holds a true course on the straightaway and eliminates spinning on the turns. Buffers or skids on the ends of the runner plank contact the ice when the boat tips, allowing the craft to skid sideways without upsetting.

All materials, including a sail of 75 sq. ft., will cost about \$35. Begin work by beveling the ends of the two side planks and joining them to a hardwood nose block

Front-Steering ICE BOAT

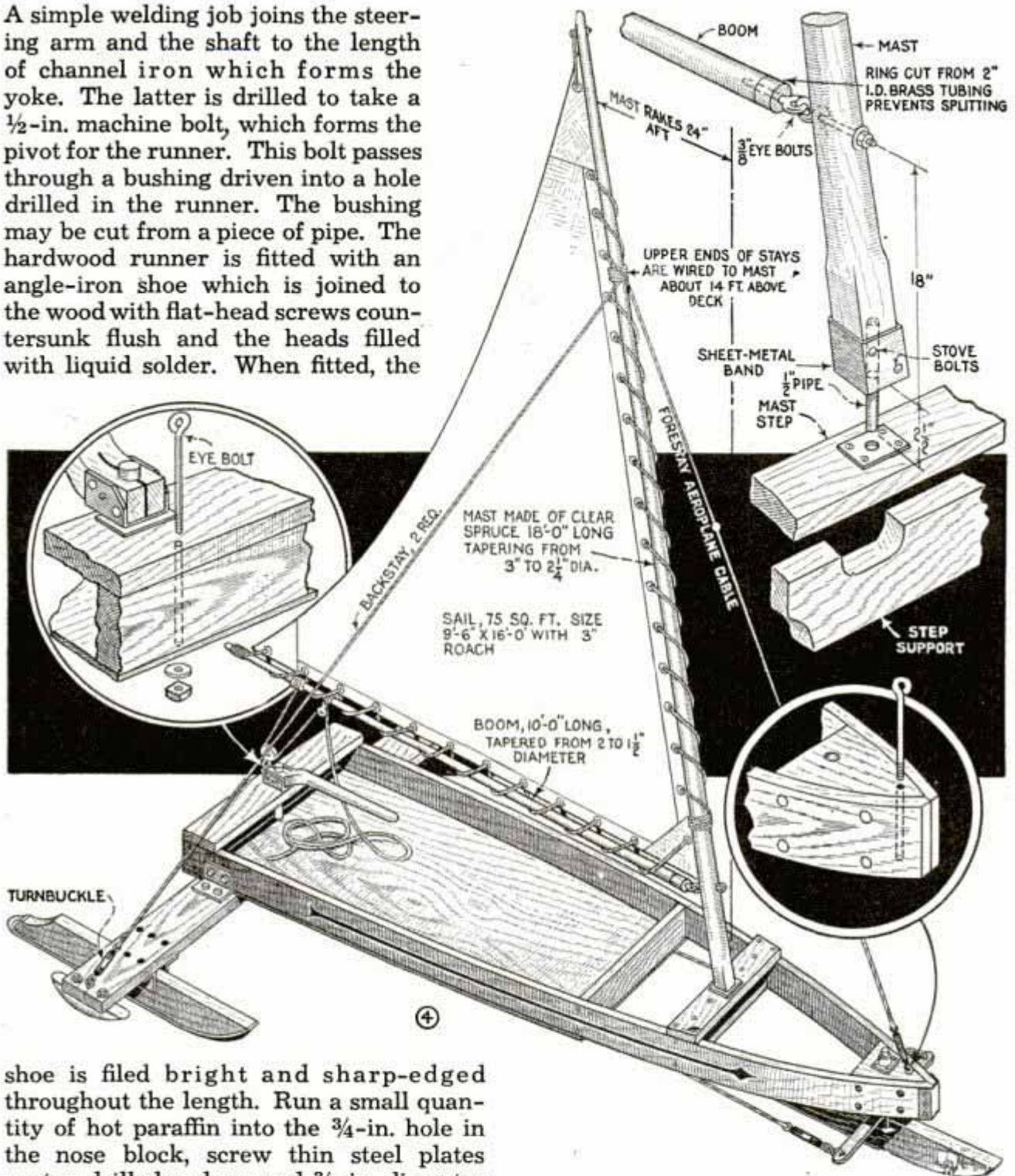
thus assembled upside down and fit the cockpit floor, which is $\frac{1}{2}$ -in. birch plywood. Fasten this to the frame with No. 8 flat-head brass screws, $1\frac{1}{2}$ in. long and spaced 2 in. apart. Next, fit the mast-step support, reinforcing the corners with angle brackets bent to a snug fit and joined with stove bolts. At the center of this piece a channel is cut through to clear the center-



ing pin in the mast. Drill a $\frac{5}{8}$ -in. hole through the hardwood mast step and screw it to the support and side planks as shown. Drill a $\frac{1}{2}$ -in. hole through a $\frac{1}{8}$ by 3 by 5-in. piece of flat iron and fasten to the step with screws. The plate prevents the mast wearing away the step. To complete the hull, fit the metal nose cap shown in Fig. 1. It may be cut and bent from heavy sheet brass and is screwed on.

Fig. 5 details the complete assembly of the front runner which acts as the rudder.

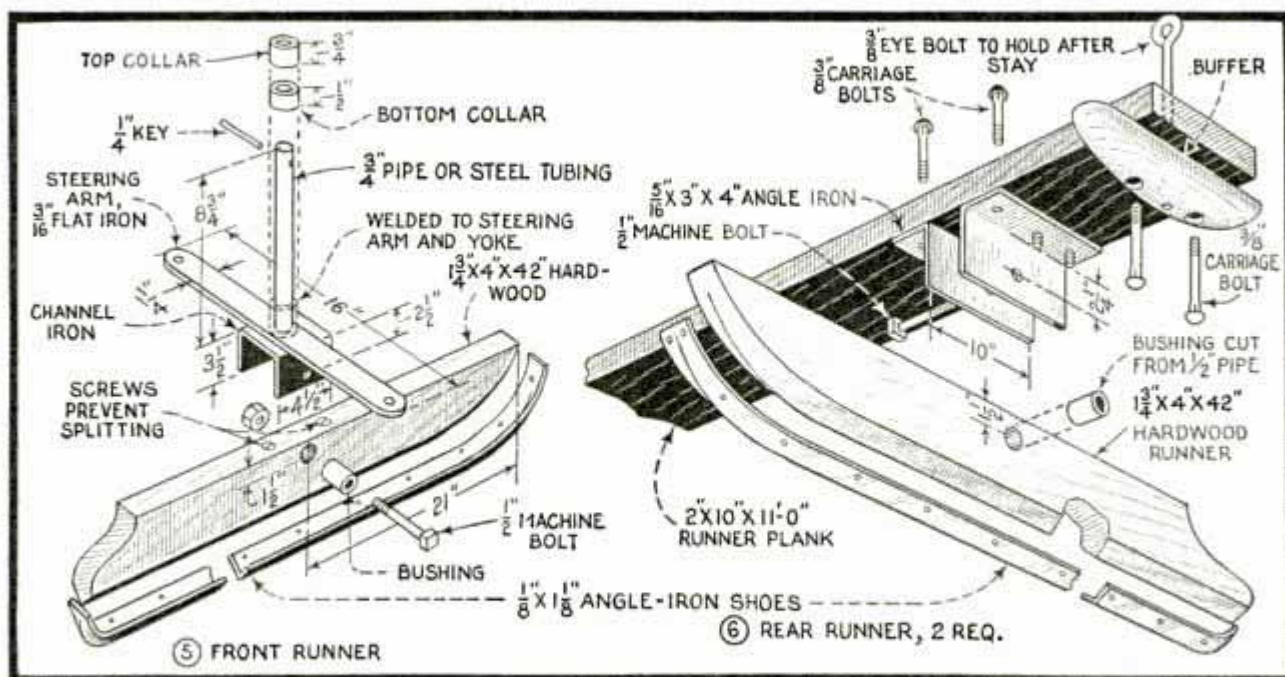
A simple welding job joins the steering arm and the shaft to the length of channel iron which forms the yoke. The latter is drilled to take a $\frac{1}{2}$ -in. machine bolt, which forms the pivot for the runner. This bolt passes through a bushing driven into a hole drilled in the runner. The bushing may be cut from a piece of pipe. The hardwood runner is fitted with an angle-iron shoe which is joined to the wood with flat-head screws countersunk flush and the heads filled with liquid solder. When fitted, the



shoe is filed bright and sharp-edged throughout the length. Run a small quantity of hot paraffin into the $\frac{3}{4}$ -in. hole in the nose block, screw thin steel plates center-drilled and reamed $\frac{3}{4}$ -in. diameter above and below to provide bearing surfaces, and set the runner assembly in position with the $\frac{1}{2}$ -in. lower collar below and the $\frac{3}{4}$ -in. collar on top. A transverse key holds the assembly securely in place. A light tap with a hammer on the upper end of the hollow shaft will bind the key and prevent its dropping out. Fig. 6 shows the construction of the rear runner.

Next, cut the runner plank from hardwood to the size indicated in Fig. 4, which clearly details the assembly of the after

runner. Fig. 3 gives the distance between the runners center to center and also the size and shape of the buffers. The carriage bolts holding the buffer are countersunk below the surface; also the after-stay eye-bolt passes through both the runner plank and the buffer with the nut countersunk below the surface. These holes should be filled with a plastic and planed smooth. Bolt the runner plank to the hull with $\frac{5}{16}$ -in. machine bolts through the angle-iron braces. Also, several bolts of the same



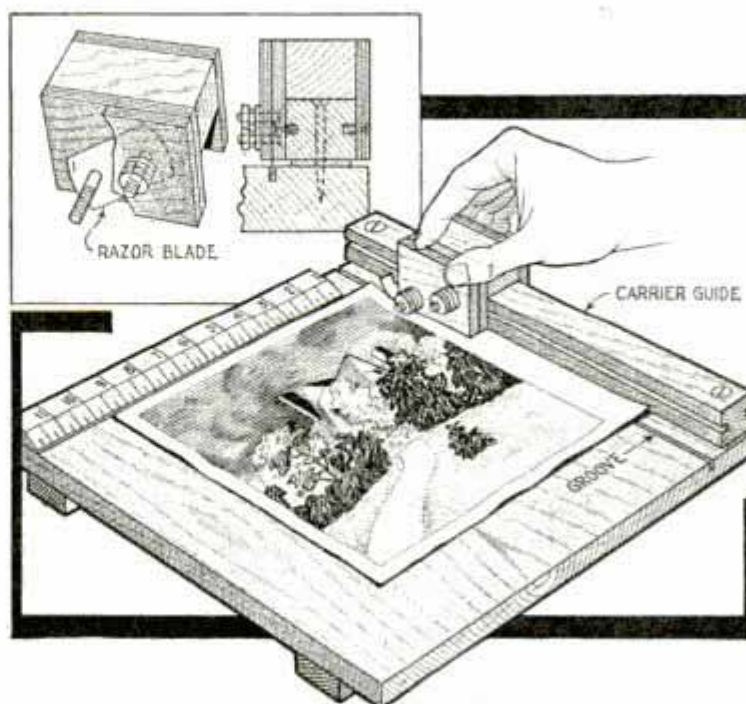
size may be put through the cockpit floor and runner plank. Build up the tiller as in Fig. 1 and assemble on the stern. Set the front runner straight ahead and attach the cables through turnbuckles at the front. Adjust both cables to a uniform tension.

Fig. 4 shows the details of the rigging, including the mast and boom. The mast is a simple tapering job with a plane and sandpaper. Spruce is the wood to use for

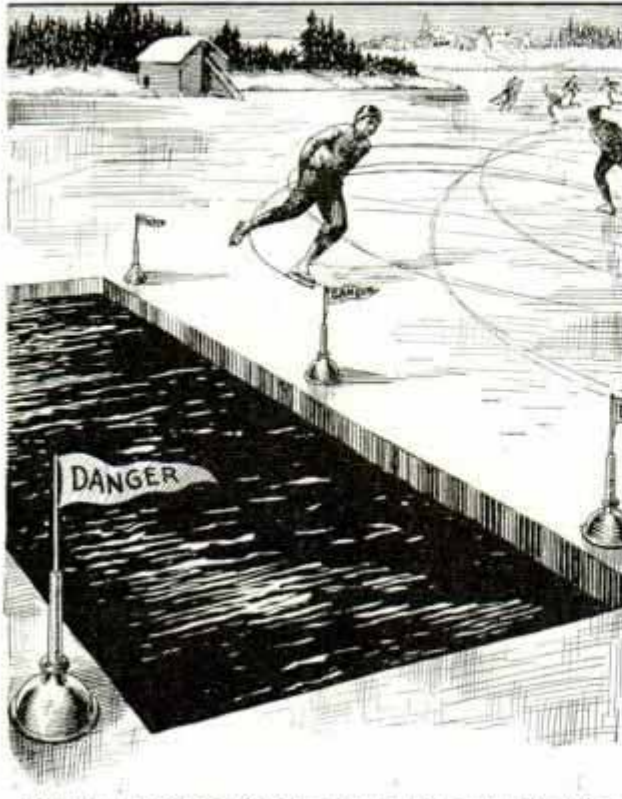
both mast and boom. The lower end of the mast is left in the square and is housed with a band of heavy sheet metal to prevent splitting. One forestay and two after stays are used to hold the mast rigidly in the upright position. The $\frac{3}{8}$ -in. eyebolts at the bow and stern pass entirely through the frame. Finish all wood parts in the natural color with a thorough sanding and two coats of spar varnish.

Photo Trimmer Utilizes Safety-Razor Blade as a Cutter

For trimming photos and drawings, this trimmer is handy. Essentially it consists of a flat board with a ruler fastened along one edge to serve as a guide. The cutter is an old safety-razor blade mounted at an angle on a sliding carrier which is constructed as shown in the upper detail so that the blade will slide into a groove near the edge of the board and at right angles to the rule. Be sure to cut this accurately so that the blade runs free. The carrier is arranged to slide on a guide, which is screwed to the edge of the board and parallel to the groove for the blade. Similar grooves in each side of the guide take small screws or pins of the carrier permitting it to slide back and forth freely.



This Homemade Cutter Trims Photos and Drawings, or Cuts Large Sheets of Paper Accurately



Plumbers' Rubber Suction Cups Support Warning Flags around Holes in Ice-Covered Pond

Rubber Suction Cups Hold Warning Flags on Ice

While harvesting ice from a large pond, which was frequented by skaters, one man found that rubber suction cups, such as are used by plumbers, served nicely to support warning flags around holes where the ice had been removed. The handles were sawed off above the cups and then drilled in the ends to take the flag staffs. If the cups are warmed before setting them on the ice, they will melt it and then freeze fast.

Holder for Waste to Thaw Frozen Water Pipes



A coil spring from an old car seat or bed spring makes a good holder for waste that has been soaked in gasoline and ignited to thaw out frozen water pipes. Straighten one turn of the spring and insert it into a hole drilled in a stick to serve as a handle.—A. S. Wurz, Jr., Rockyford, Alta., Canada.

A coil spring from an old car seat or bed spring makes a good holder for waste that has been soaked in gasoline and ignited to thaw out frozen water pipes. Straighten one

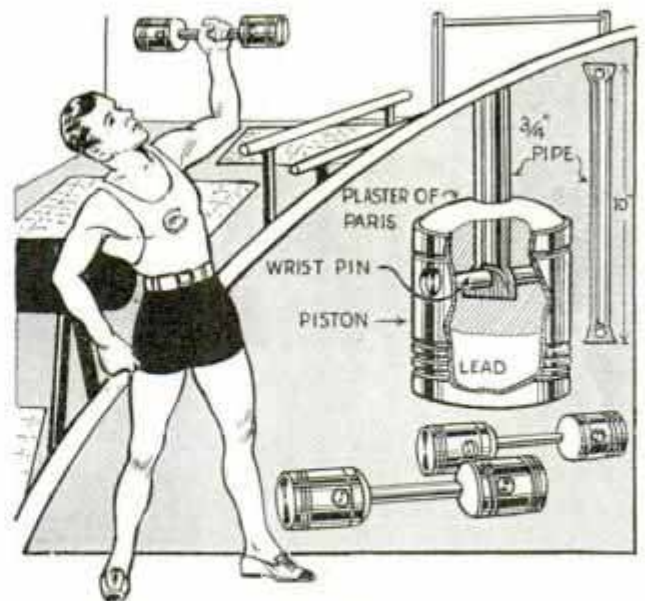
Separating Matted Bristles on Paint Brush

To separate the bristles of a paint brush that have become matted with dried paint, first soak them in gasoline or paint solvent and then rub them back and forth over a wire brush as shown. This will separate the bristles and is less injurious than pounding with a hammer, which is often done.



Dumb-Bells Made from Auto Pistons

Members of an athletic club who needed several pairs of dumb-bells made them from old auto pistons. Each pair consisted of a length of pipe and two pistons. The pipe was flattened at the ends and drilled to slip over the wrist pins, after which lead was poured into the pistons to give them the required weight. After pouring the lead, the pistons were filled with plaster of paris, which was rounded up around the pipe to protect the hands against the edges of the pistons. Dumb-bells of varying weights can be had by pouring the lead into pistons of different sizes.



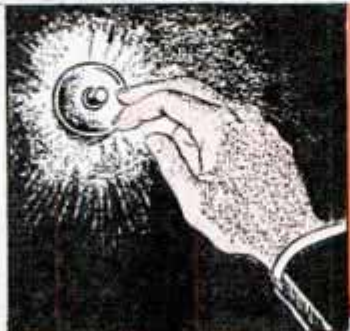
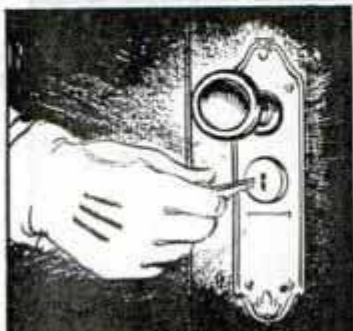
Lead-Filled Auto Pistons Joined Together with Short Lengths of Pipe Make Good Dumb-Bells

☞ To prevent corked bottles from leaking while traveling, apply a thick coating of melted paraffin over the corks after putting them in the bottles.

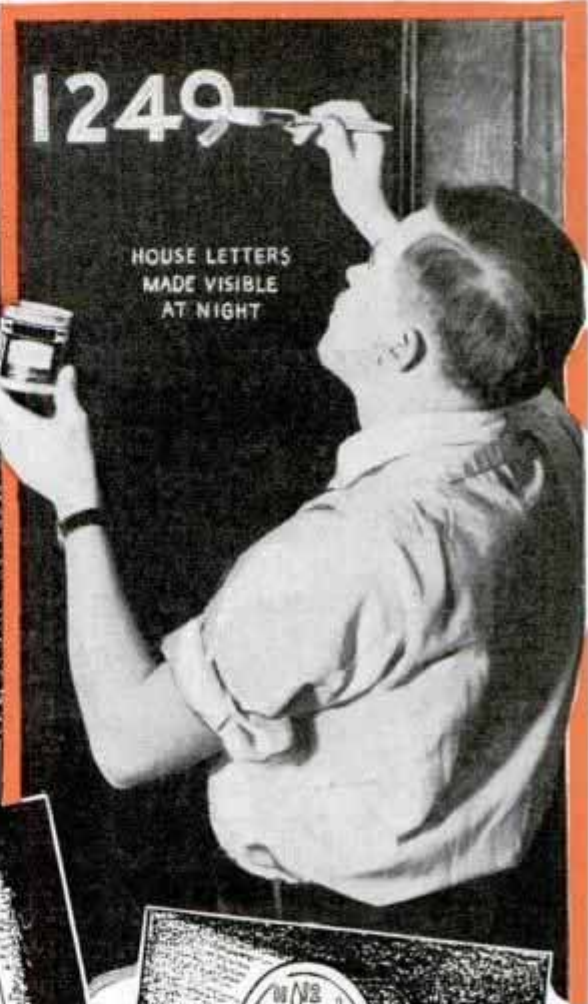
*Hammer Laboratories, Inc.
624 Monaco Central Savings Bank Bldg*

Some Practical Uses ^{Also} of LUMINOUS PAINT

Radiac Chemical Co. One E. 42nd St. New York



Keyholes and door-bell push buttons easily found in the dark if coated with luminous paint



Left, lowest tread of stairway, luminous at night, prevents stumbling Right, lighting outdoor pump on dark night



Signs and display cards in shop windows made noticeable



Switch plates in the house or garage given ready visibility



Illuminating the hands and numerals of your clocks



"Spotting" fire extinguishers and fuse boxes



At summer camps, visitors will be better able to find boat landings if coated with luminous paint

Strobite Co.

35 W. 52nd St. New York



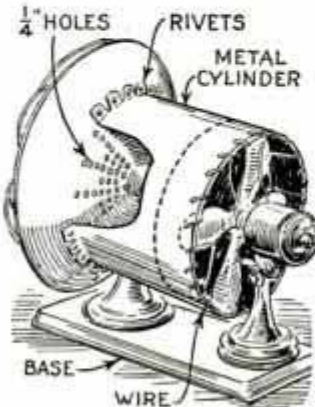
Neat Wire-Mesh Bags Fastened to Closet Doors for Holding Soiled Clothes

Soiled-Clothes Bags on Closet Doors Save Space

Instead of using floor space in bedroom closets to store baskets for soiled clothes, one woman in a small home fastened a wire-mesh bag on the inside of each closet door. Besides saving space, the bags tend to remind the young members of the family to put away their soiled clothes when they remove them.

Improving an Electric Heater

Here is a method of mounting a fan behind an electric heater to get a uniform distribution of heat. Drill several $\frac{1}{4}$ -in. holes in the heater reflector as indicated, and rivet a sheet metal cylinder to it, first serrating one end and bending the tabs thus formed up against the reflector, to which they are riveted. Next mount the heater and fan on a base, placing the fan so that the guard fits snugly inside of the end of the cylinder. Then punch a row of small holes around the end of the cylinder and lace the guard to it with wire as indicated.—F. J. T. Hall, Chicago.



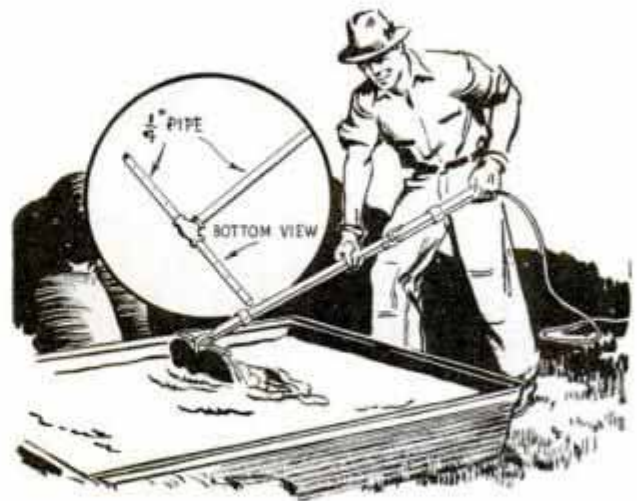
Coat Serves as Emergency Darkroom

If you are ever out with a camera and find it necessary to change films in the light, your coat will serve as an emergency darkroom provided it is made of closely woven cloth or lined with heavy material so that light cannot filter through it. Button up the coat and put the camera inside. Then tuck in the bottom, insert the hands into the sleeves and proceed as you would with a regular changing bag. If the sun is shining, stand in a shady place while making the change.—Sigmund Sameth, New York City.



Wetting Attachment for Mortar Hoe

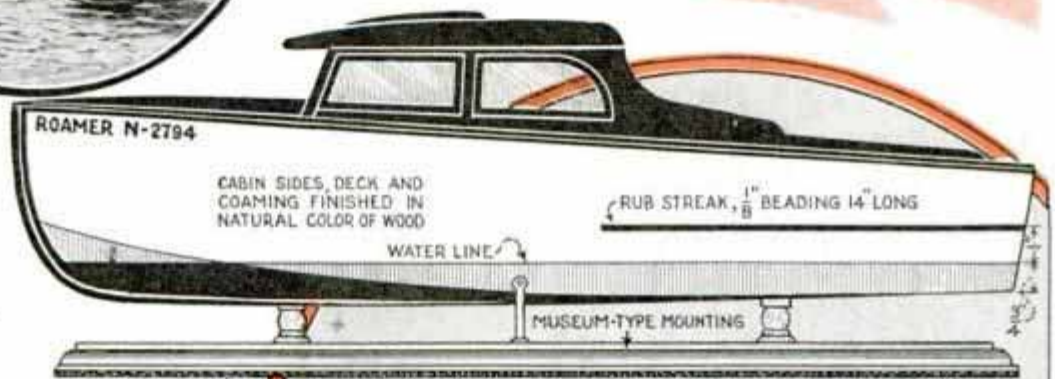
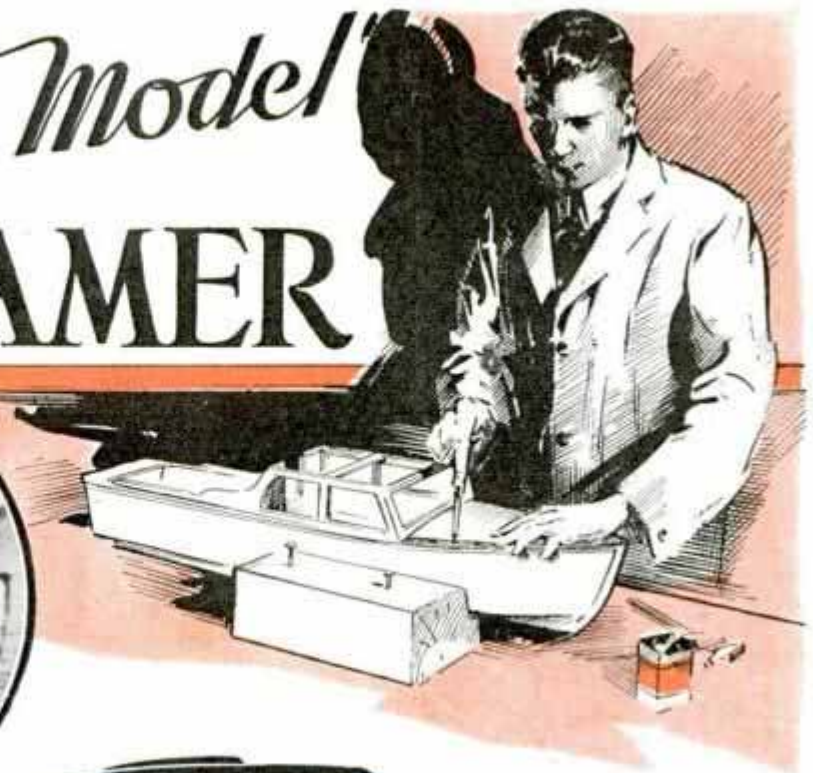
When mixing small batches of cement or plaster single-handed, this attachment on the mortar hoe for wetting the mixture will be found a timesaver. A length of pipe having a tee and two nipples at one end is attached to a garden hose and to the hoe handle. The open ends of the nipples are closed with caps, and small holes are drilled through the underside of each one to direct the water into the cement.



This Attachment on a Mortar Hoe Wets Cement or Plaster as It Is Being Mixed

The flow of water is controlled by a valve in the pipe.—A. H. Waychoff, Tempe, Ariz.

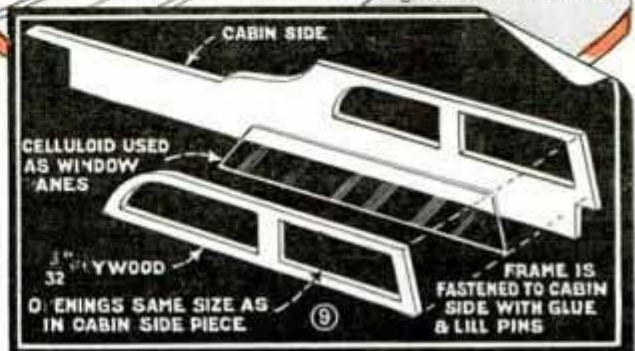
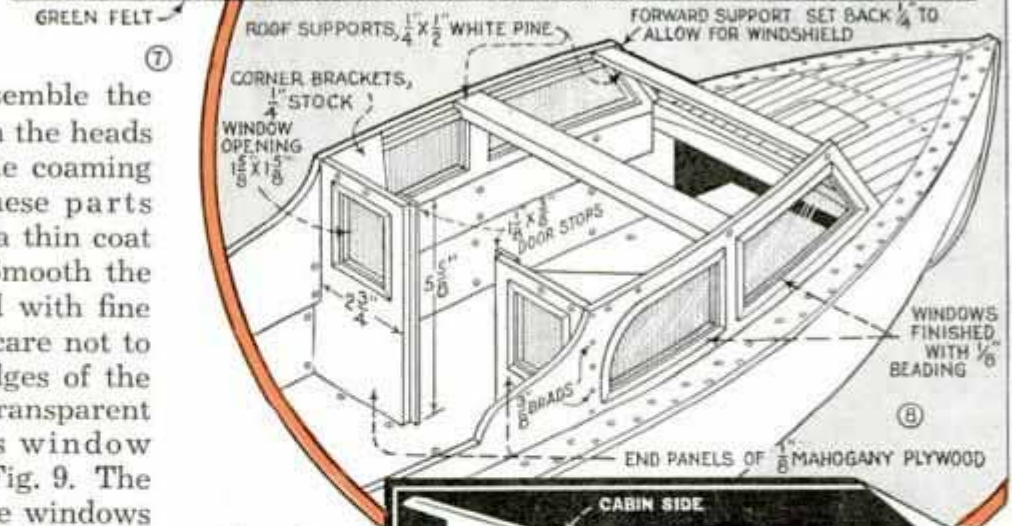
Building a Model of ROAMER

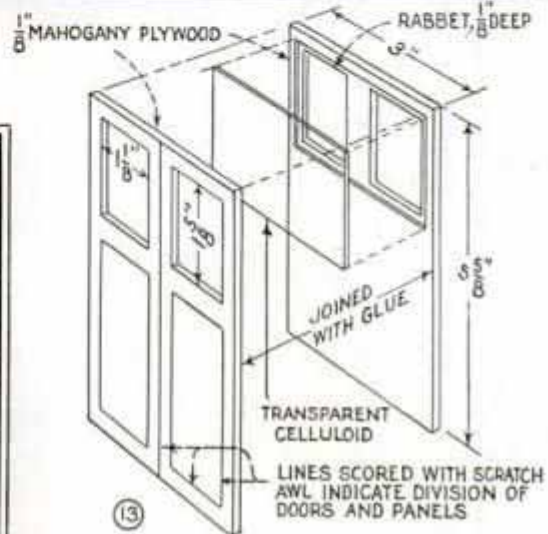
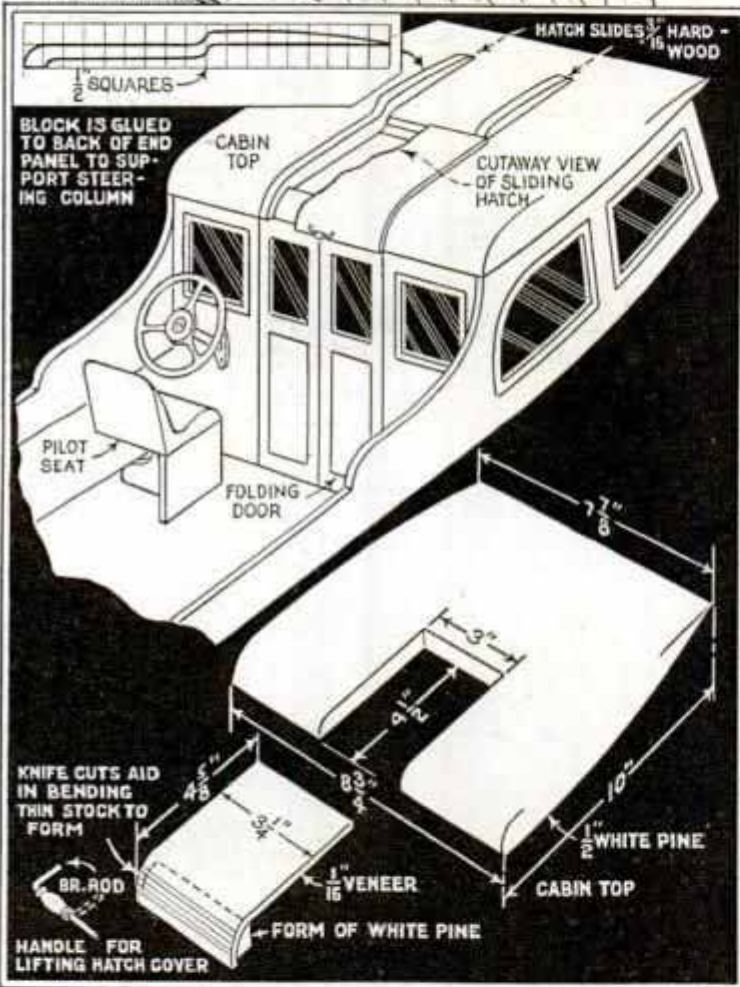
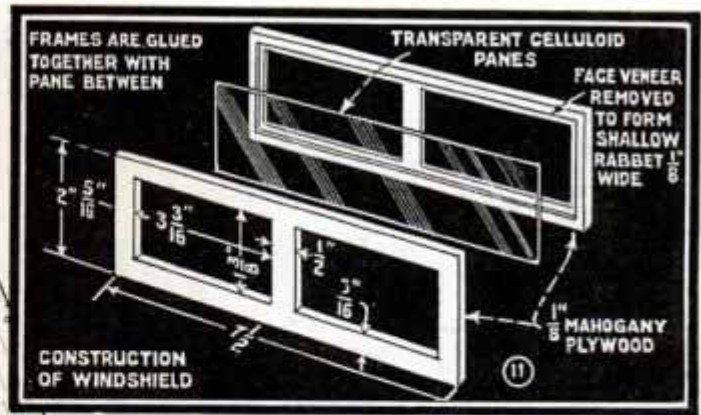
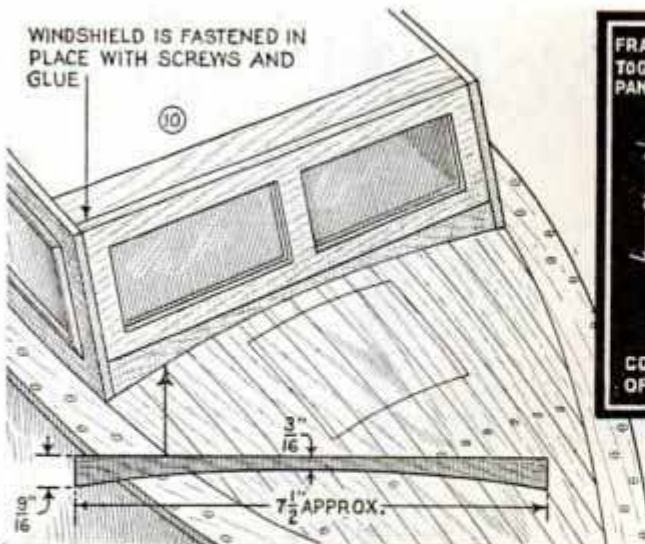


PART II

Cabin Construction and Finish

BEFORE you assemble the cabin, file down the heads of the screws in the coaming and deck. Sand these parts smooth and apply a thin coat of white shellac. Smooth the interior of the hull with fine sandpaper, taking care not to round the inner edges of the coaming. Thin, transparent celluloid is used as window glass as shown in Fig. 9. The outside edges of the windows are finished with $\frac{1}{8}$ -in. beading. After the cabin sides have been screwed in place as in Fig. 8, the top edges are joined by two cross beams, one at the center and one at the forward end, the edge of the latter being beveled and set back $\frac{1}{4}$ in. to allow space for the windshield. The end panels in Fig. 8 are constructed in the same manner as the windshield, Fig. 11, by gluing



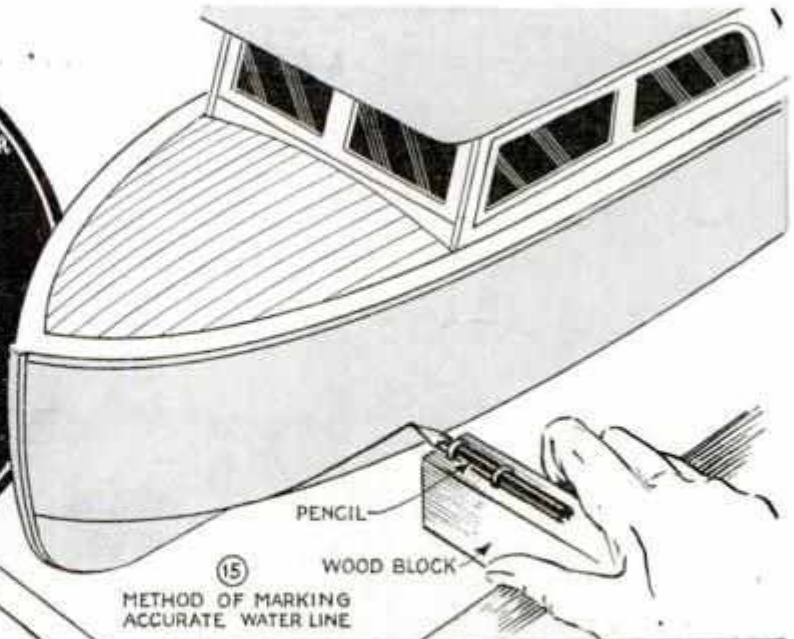
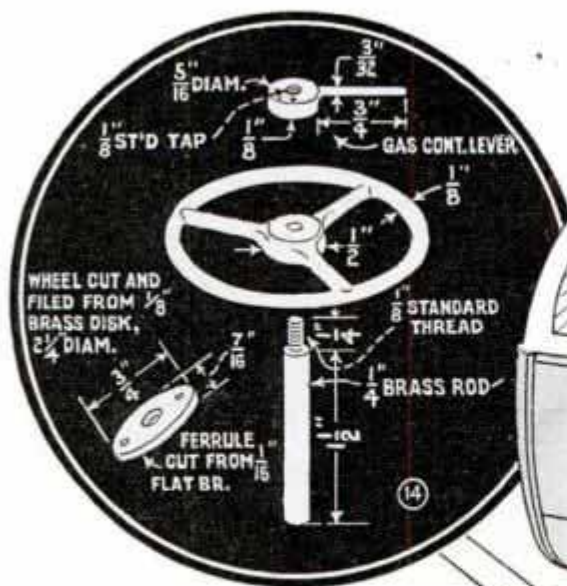


opening and curved to the contour of the deck. This is fastened with glue and No. 0 brass screws.

In making the cabin top, first glue two pieces together to get the required width. When dry, square up and cut the hatch opening, then lay the top on the cabin frame and mark for cutting. After cutting to size, spread glue and fasten the top in place with screws driven into the cross beams and corner braces. Countersink the screw heads so that the top may be planed and sanded to contour. Make and fit the hatch slides and hatch cover. Next, make the folding door as in Fig. 13. Before fastening the door, glue a small block to the back of the left end panel to support the steering-wheel column. Make a handle for the cabin hatch from No. 16 brass wire as in Fig. 12. Make and fit the steering wheel as in Fig. 14. The pilot's seat, Fig. 16, is fastened to the floor. Figs. 7, 17 and 18 detail a mounting having small hardwood turnings supporting the keel of the boat. Two metal braces, made as in Fig. 19, hold the

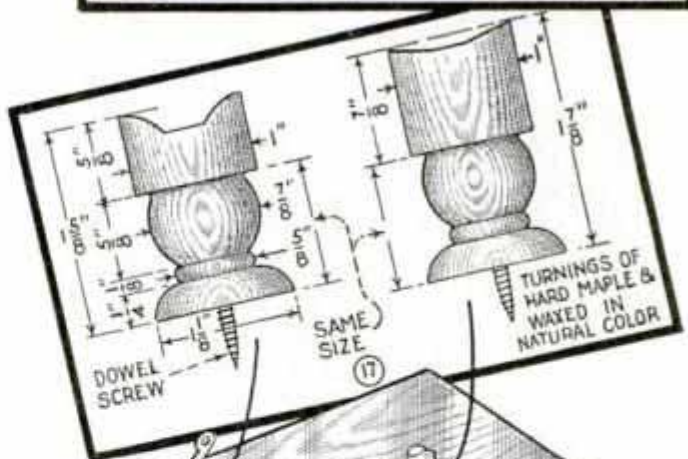
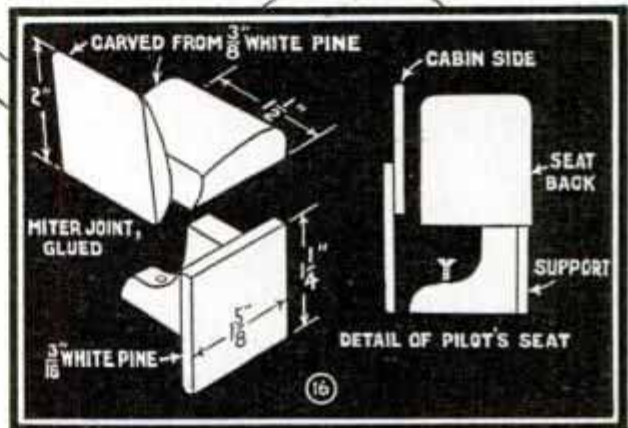
together two thicknesses of 1/8-in. mahogany plywood with the celluloid window light between them. These are joined to the sides with glue and brads and the corner is reinforced with a triangular brace as in Fig. 13. Door stops are glued to the inner edges and the window lights are finished with 1/8-in. beading. The length of the windshield, Fig. 11, is given approximately, as it must be trimmed to fit. A header or sill, Fig. 10, is cut to fit in the

together two thicknesses of 1/8-in. mahogany plywood with the celluloid window light between them. These are joined to the sides with glue and brads and the corner is reinforced with a triangular brace as in Fig. 13. Door stops are glued to the inner edges and the window lights are finished with 1/8-in. beading. The length of the windshield, Fig. 11, is given approximately, as it must be trimmed to fit. A header or sill, Fig. 10, is cut to fit in the



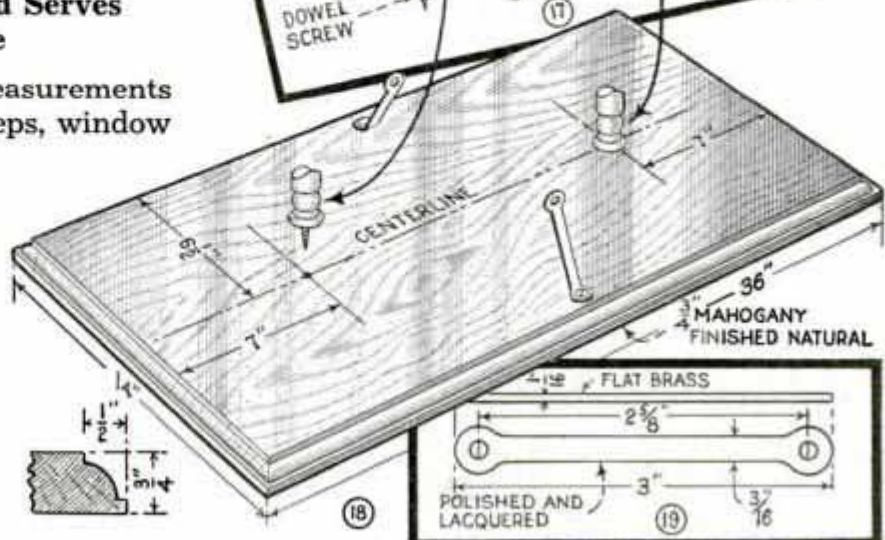
hull in place. The top end of the turnings is formed to fit the contour of the hull at the keel and a spot of glue on the tops of the turned supports together with the side braces, holds the hull securely in place.

To finish, sand thoroughly and paint the entire hull below the coaming with two coats of flat white. Sand lightly between coats and follow with one coat of white enamel. Then mark the water line as shown in Fig. 15, and paint the surface below this with two coats of medium green. The projection of the stem takes the same color. The cabin top, the pilot's seat and the cushions of the rear seat are painted a dull black, and all mahogany parts are finished in the natural color of the wood with a coat of shellac and two coats of high-grade varnish rubbed down with steel wool.



Telescoping Curtain Rod Serves as Rule in Home

Obtaining the inside measurements of boxes, doorways, stair steps, window sash, etc., is not always easy for the amateur mechanic with the tools he has at hand. If a common, flat curtain rod of the telescoping type is available, the removal of the bent ends will leave a tool that is handy for this purpose. The flanges on the rod should be pressed down to hold the adjustment.





Large Bundles of Firewood Are Carried Easily with These Canvas Holders

Canvas Holders for Carrying Wood

Two strips of heavy canvas hemmed around the edges and around hand holes that have been cut near the ends serve nicely for carrying firewood. In use, the strips are spread out on the ground and the wood is stacked on top of them, after which the ends of each strip are folded up over the wood and gripped with the hands.

Bracket Holds Furnace Chain



Screwed to the baseboard, curtain-rod brackets of the type shown in the photo provide a neat holder for keeping furnace chain in its adjusted position. The prongs on these brackets are strong and are springy enough, when pushed together, to hold the chain and make it easy to remove for re-adjustment.

Substitute for Black Enamel

By thoroughly mixing equal parts of spar and asphaltum varnish, a good substitute for black enamel that is lasting and has a glossy finish can be produced. The

spaspar varnish gives the mixture lasting wear and resistance to the elements, while the asphaltum varnish makes it proof against the action of acids and adds the intense black color.

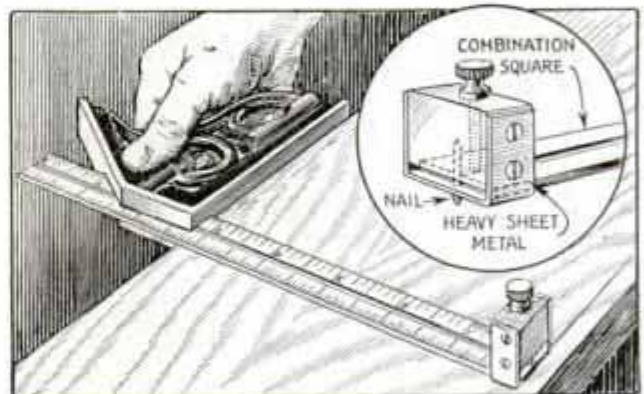
Chalk Holder Made from Rubber Grip of Tricycle Handle Bar

To utilize short pieces of chalk, slip them in the end of a rubber grip as is used on handle bars of tricycles. If the chalk is used on blackboards or bulletin boards in public places, insert one end of a wire paper clip into the closed end of the grip so that it can be fastened to the board with a string. This helps to prevent the chalk and holder from being carried away by an occasional user.



Adapter for Using Combination Square as a Marking Gauge

With this adapter, which is made from a small hardwood block and a strip of heavy sheet metal, you can use your combination square as a marking gauge. The metal is bent around the sides and bottom of the block and screwed in place, leaving a clearance at the bottom sufficient to fit the end of the square. A pointed nail in

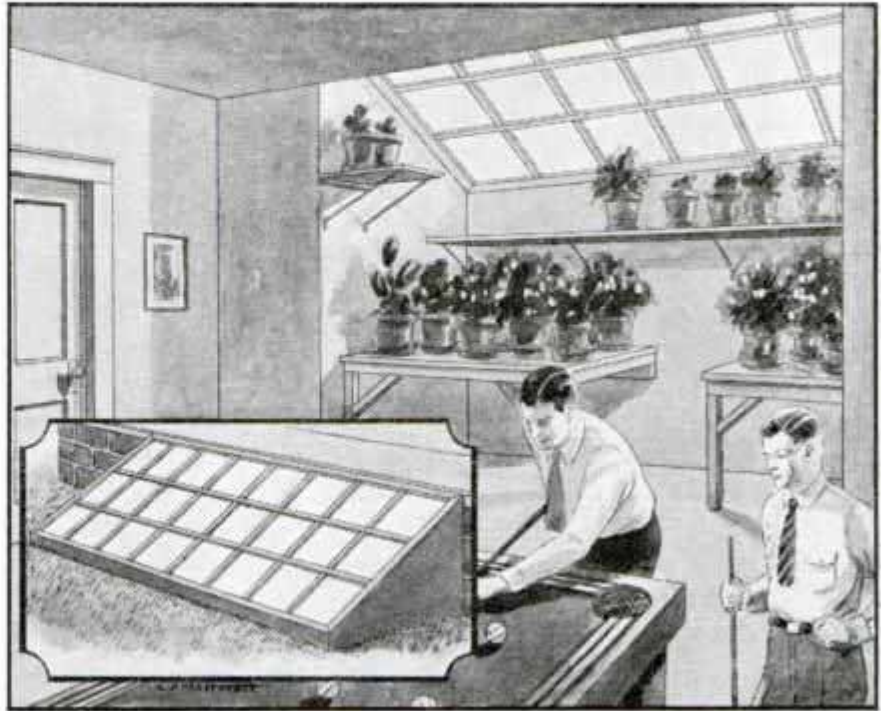


Small Block with Pointed Nail in Bottom Converts Combination Square into Marking Gauge

the bottom of the block near the edge serves as a scratcher and a thumbscrew clamps the block on the square.

Small Conservatory Built in Your Basement

By extending part of the basement wall and roofing the opening thus formed with a sash, you will have a conservatory, and, at the same time, provide plenty of light in the basement. A portion of the basement wall is removed and dirt taken out to make the size of conservatory desired, after which the recess thus made is walled up with concrete, sloping the ends from the top of the house foundation to the ground. The window should be fitted tightly to the concrete walls to keep out wind and water. This can be done with weather stripping and wood framing, or a rabbet to take the frame can be made in the inside edges of the walls when pouring the concrete. The cracks around the frame can then be sealed with putty or with strips of felt and roofing tar.



Improved Attachment for Cutting Disks on a Jig Saw

With this attachment, disks from 2 to 24 in. in diameter can be cut accurately



Attachment Enables You to Cut Accurately Disks with Radii from 2 to 24 In. on a Jig Saw

on a jig saw. The attachment is merely a hardwood block with a slot and a groove cut in it as indicated, the block being about as wide as the saw table and a little longer so that it can be fastened in place with a C-clamp. The slot takes the saw blade and the groove, which is cut at right angles to the slot and terminates in a hole drilled in line with it, serves as a guide in aligning a pivot pin in the center of the work with the saw blade. If it is not desired to drill the work for a pivot pin, a small block with a sharp-pointed nail to engage the underside surface of the work can be used instead. Moving the attachment to the right or left determines the size of the disk to be cut.—Otis S. Sawm, N. Arlington, N. J.

Tin Plating Small Objects

Screws, small machine parts or other items that must be protected from rust and corrosion may be given a resistant, bright tin plate by boiling them for 45 min. in a solution made by dissolving aluminum sulphate, 1 oz., cream of tartar, 1 oz., and tin, $\frac{1}{4}$ oz., in water, $\frac{1}{2}$ gal. The boiling should be done in a zinc container. After removal from the bath, the plated ware should be dried in sawdust. Rubbing with fine sawdust produces a brilliant polish.

1300 Broad St
Providence, R.I.

Empire Noting Co. 337 W. 35th
Prinilla Broad
B.P. 926 aug 27 50 cent
3 styles

MAKE YOUR OWN



bushings on the tilt bar. It is impractical to use pulleys on the tilt bar when this is used for both tilting and support, as it is in this case, but a double pulley on a bracket can be used at the bracket if desired. With this refinement, and the use of ladder tapes (these can be purchased or sewed up to fit) instead of nailed tapes, this simple form of blind makes a very

CONTROLLED light and smart appearance make Venetian blinds desirable for home windows. Each blind consists of a number of horizontal wooden slats, suspended by cords and tapes from a heavier top bar. The blind can be raised entirely—bundled—by pulling on the lifting cords, and the slats can be tilted to any degree by manipulating the tilting cord.

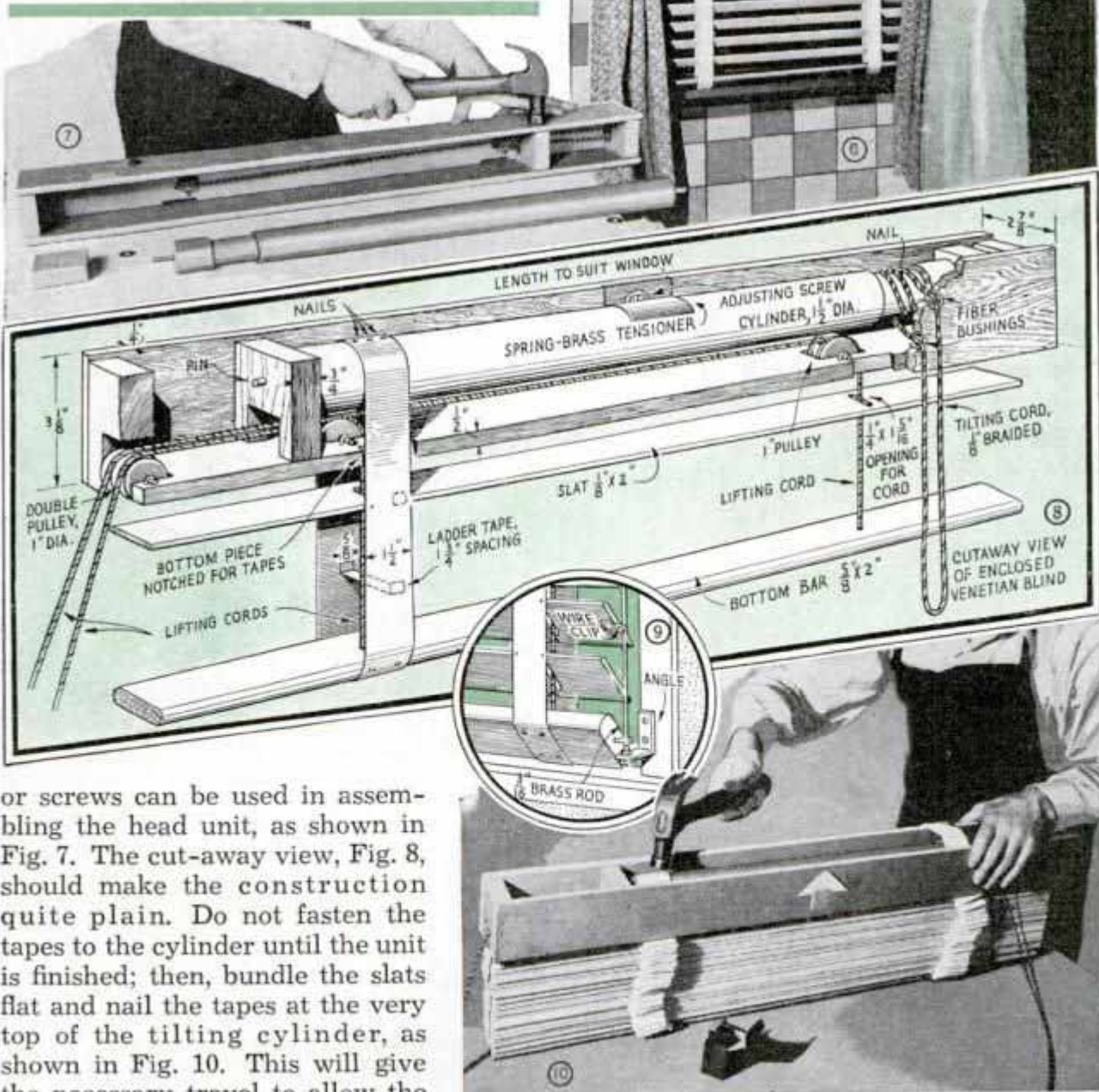
The simplest form of Venetian blind is shown in Figs. 2, 3 and 4. Make the slats first. They are $\frac{1}{8}$ in. thick by 2 in. wide and are to be spaced on $1\frac{3}{4}$ -in. centers, and a sufficient number must be made to span the distance from the sill to the top of the window. Fig. 1 shows the cord holes being routed on the drill press. A jig is necessary here in order to keep the openings absolutely uniform. Use a $\frac{1}{4}$ -in. bit, making the slots about $1\frac{5}{16}$ in. long. The tape that supports the slats is edgenailed to each slat with $\frac{3}{8}$ -in. wire nails, as shown in Fig. 5. Here, again, a jig is necessary to keep the pieces perfectly in line. You will notice that there are no bearings, the lifting cords working on bare wood at the end bracket, and through fiber



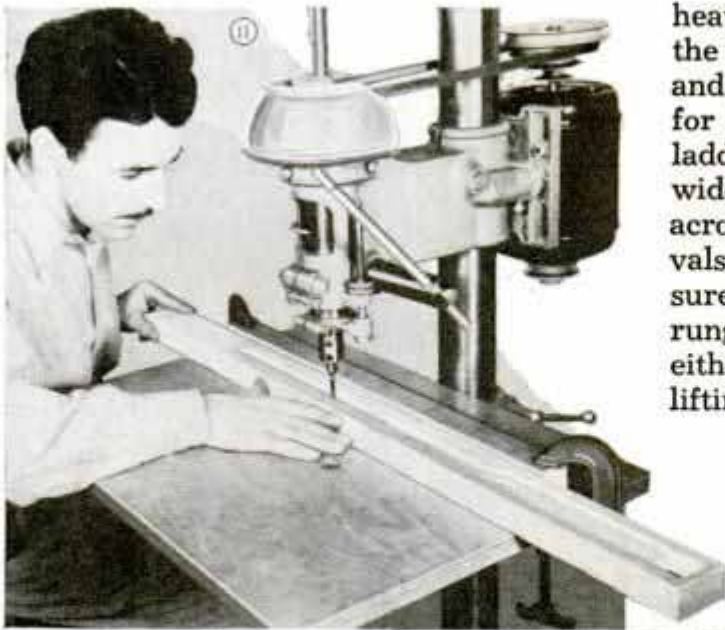
VENETIAN BLINDS

good unit for small windows. Detail B shows a simple form of tensioner which consists of a heavy screw working against a lock washer or a spiral of spring brass. The screw should be turned in just far enough to get the required tension to hold the tilt at any position after it has been set by manipulating the tilting cord.

Figs. 6 to 10 show a blind which is quite a bit superior to the one just described, both in appearance and operation. The lifting cords work over pulleys, and the tilting cylinder is entirely enclosed. Nails



or screws can be used in assembling the head unit, as shown in Fig. 7. The cut-away view, Fig. 8, should make the construction quite plain. Do not fasten the tapes to the cylinder until the unit is finished; then, bundle the slats flat and nail the tapes at the very top of the tilting cylinder, as shown in Fig. 10. This will give the necessary travel to allow the

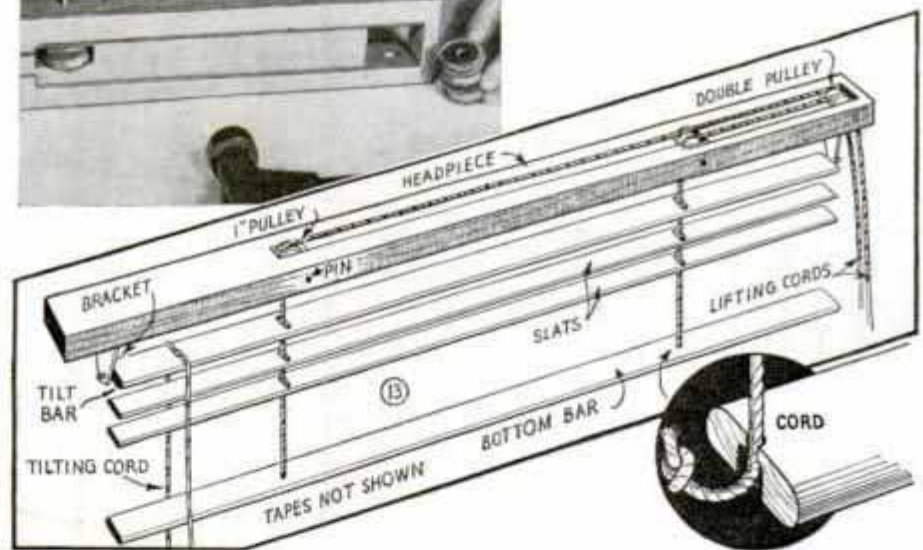
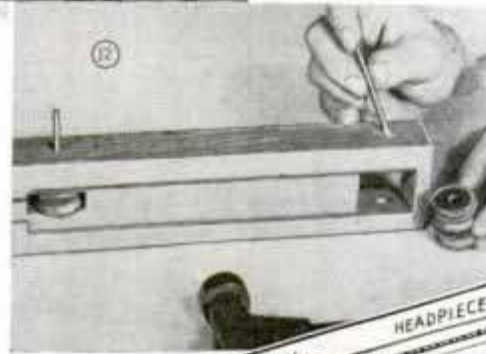


slats to assume any angle. The lifting pulleys can be turned from hardwood, or you can purchase steel pulleys of the same size. The shafts ride flush on the top of the bottom board, and are held in place by pins or staples. Any form of Venetian blind is best worked on some form of guide, such as shown in Fig. 9. The twisted wire clip is fastened to every, say, sixth slat, engaging the metal rod which runs up each side. In some types of blinds, every sixth slat is made $\frac{3}{8}$ in. thick instead of $\frac{1}{8}$ in., allowing the insertion of a screw eye instead of the wire clip.

A third type of blind is shown in Fig. 13. The headpiece for this is routed on the drill press as in Fig. 11. This blind is somewhat on the order of the one first described, but differs in that it uses a headpiece to carry the pulleys for the lifting cords. The tapes, which are not shown, are standard ladder tapes, fitted as already described. Regardless of the blind you make, certain specifications as to materials should be followed. Use a soft, light wood for the slats, such as basswood, white pine or spruce. Do not make the slats any

heavier than the specified $\frac{1}{8}$ in. In width, the regular sizes are either 2 in. or $2\frac{3}{8}$ in., and standard ladder tapes can be fastened for these sizes. If you sew up your own ladder tapes, make them about $1\frac{1}{2}$ in. wide, with rungs of $\frac{5}{8}$ -in. tape sewed across at $1\frac{3}{4}$ -in. intervals ($2\frac{1}{8}$ in. intervals if $2\frac{3}{8}$ -in. wide slats are used). Be sure to allow for a little play across the rungs. It is best to stagger the rungs on either side of the wider tapes, running the lifting cord down through the center. All cords should be $\frac{1}{8}$ -in. braided cord, and it should be glazed to minimize wear. Slats should be painted or lacquered, and a very smooth job is essential. The head-

piece is often stained and varnished to match the woodwork on which it is to be used. For typical frame construction,

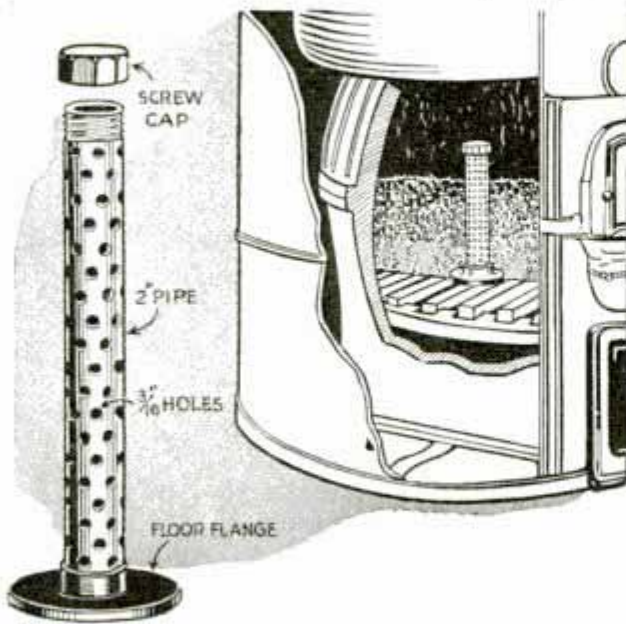


the slats should be of a length to overlap the casing about 1 in. on either side. Where the window is deep enough, the blind is best fitted inside the case, allowing about $\frac{1}{2}$ in. play at each end.

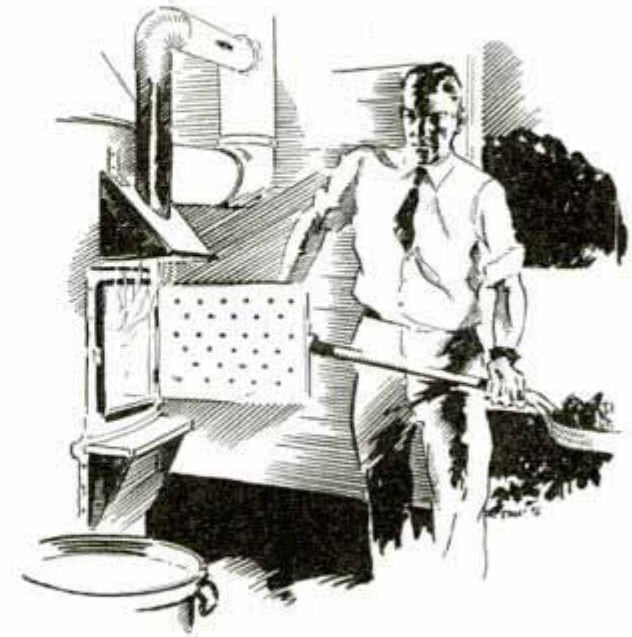
Waterproofing and Strengthening Cord

Heavy cord and light rope may be improved greatly in strength and made waterproof by impregnating it with a thick solution of celluloid scraps dissolved in acetone. The twine should be run lightly through the fingers to remove the surplus solution before hanging it up to dry. Any color of alcohol-soluble aniline dye may be added to the acetone.

Suggestions That Help in Firing Your Furnace



When burning buckwheat coal in your furnace, explosions caused by trapped gases, after the fire has been banked, may be avoided by setting a perforated pipe in the center of the bed. Get a suitable length of 2-in. pipe and drill small holes through the wall. One end is fitted with a flange so that it can be set on the grate. The upper end is closed with a cap. The length of pipe should be such that the top portion will extend about 5 or 6 in. above the banked bed of coal, and its purpose is to conduct air from the ash pit to the space



above the fire. This provides sufficient draft to carry away combustible gases, besides helping to supply air to the coal on all sides to avoid "dead spots." Opening the furnace door when firing often allows smoke to get into the basement, but a sheet-metal hood fitted to the furnace directly above the door, and connected with stovepipe to the chimney, will be found an effective cure. A damper should be installed in the stovepipe and should be kept closed when not firing in order to prevent loss of draft through the furnace.

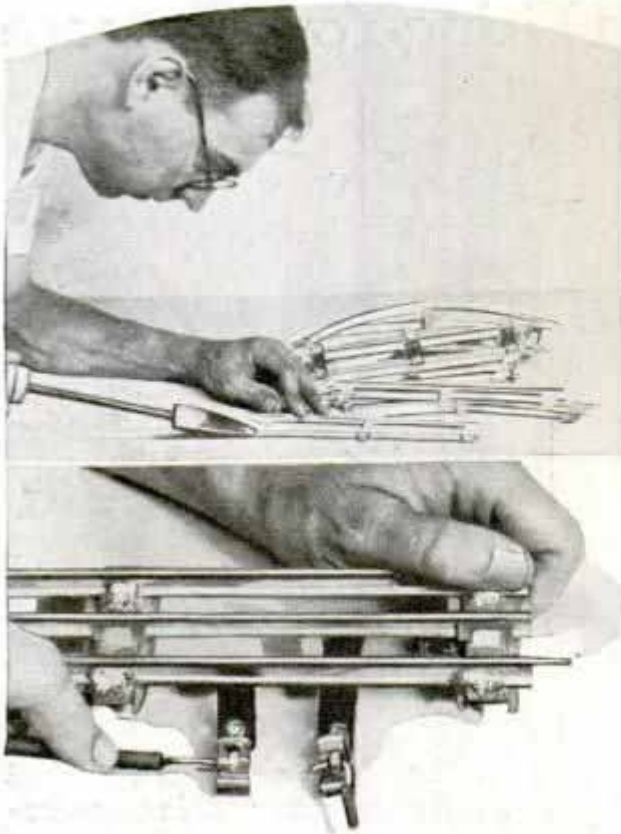
Ax Serves as Rest for Starting a One-Man Saw into Tree

When felling a tree with a one-man crosscut saw, a single-bit ax will be found handy as a rest for starting the saw at right angles to the tree, which is desirable to prevent the saw from binding as it cuts. The blade of the ax is merely driven into the base of the tree at an angle with the handle resting on the ground. This can be done by tapping the heel of the ax lightly with a splitting maul or a heavy hammer. —G. E. Hendrickson, Argyle, Wis.

When sawing spring or tool steel with a hand hack saw, take very short strokes near one end of the saw; this method, besides making the saw cut fast, saves most of the cutting surface of the blade for another job.



Single-Bit Ax Supports Blade of One-Man Saw While Starting the Cut to Fell a Tree

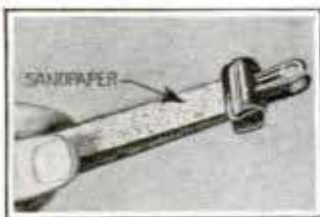


Soldering Model-Train Track to Make It Rigid and Prevent Ends of Rails from Spreading Apart

Suggestions for Improving Model-Train Track

If the underside of each rail of model-train track is soldered near the ends, the rails will not spread apart but will provide a tight fit for the connecting pins. Also, drops of solder applied at the points where the rails are clamped to the ties, will make the track rigid. Another improvement that will permit the track to lie flat on the floor is to use short sections of radio lead-in strips as electrical connectors. Cut the strip in half. One end of each piece is soldered to a rail and the other, which has a spring clip, makes it easy to attach the wires.

Sandpaper Strips Backed with File



A handy sanding jig can be had by stretching the desired grade of sandpaper over a file as indicated. The outer end of

the paper is held with a large paper clip, while the other end is held with the hand. This method of providing a backing for

abrasive paper gives a sanding stick on which the grades of abrasive can be quickly changed as desired to suit almost any type of work at hand.—Ray J. Marran, Kansas City, Mo.

Heavy Boxes Moved on Bottle Caps

Bottle caps provide excellent gliders on which to move heavy boxes over concrete floors. To do this, pry up each corner of the box and place a cap under it. The crimped edges of the caps will penetrate the wood and prevent them from slipping.



Determining Pitch of Roof with a Ruler

When estimating the cost of repairing or remodeling a building, which requires that the approximate pitch of the roof be determined, carpenters often use a folding rule. One end of the rule is folded to a triangular shape, after which it is held in front of the eyes back some distance from the building. Then by sighting through the rule as indicated by the dotted lines, it is set to conform to the slope of the roof. If



Pitch of a Roof Can Be Closely Estimated from the Ground by Using a Folding Rule

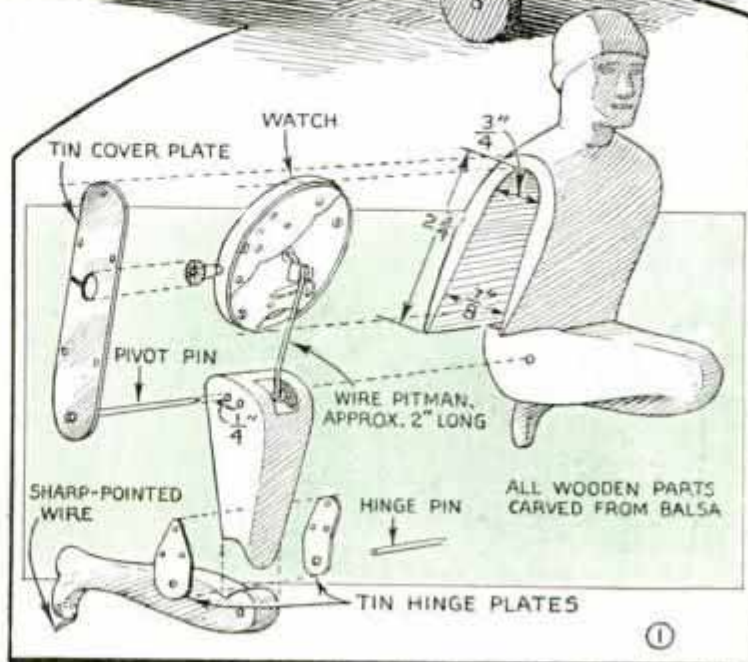
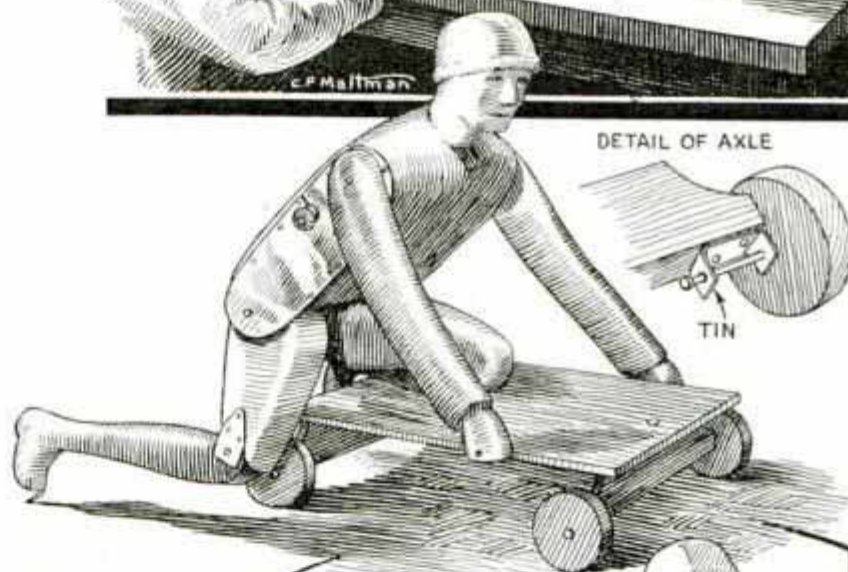
the rule is adjusted to the proper angles, it is an easy matter to determine pitch of the roof.—G. E. Hendrickson, Argyle, Wis.

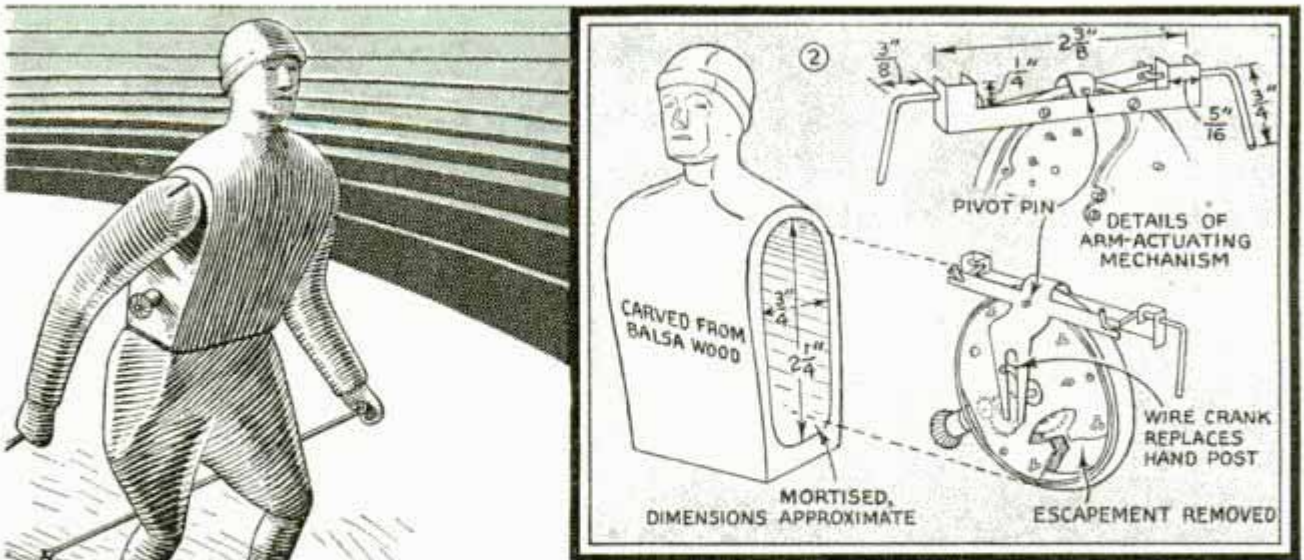
Watch Driven TOYS

By A. J. HONGO

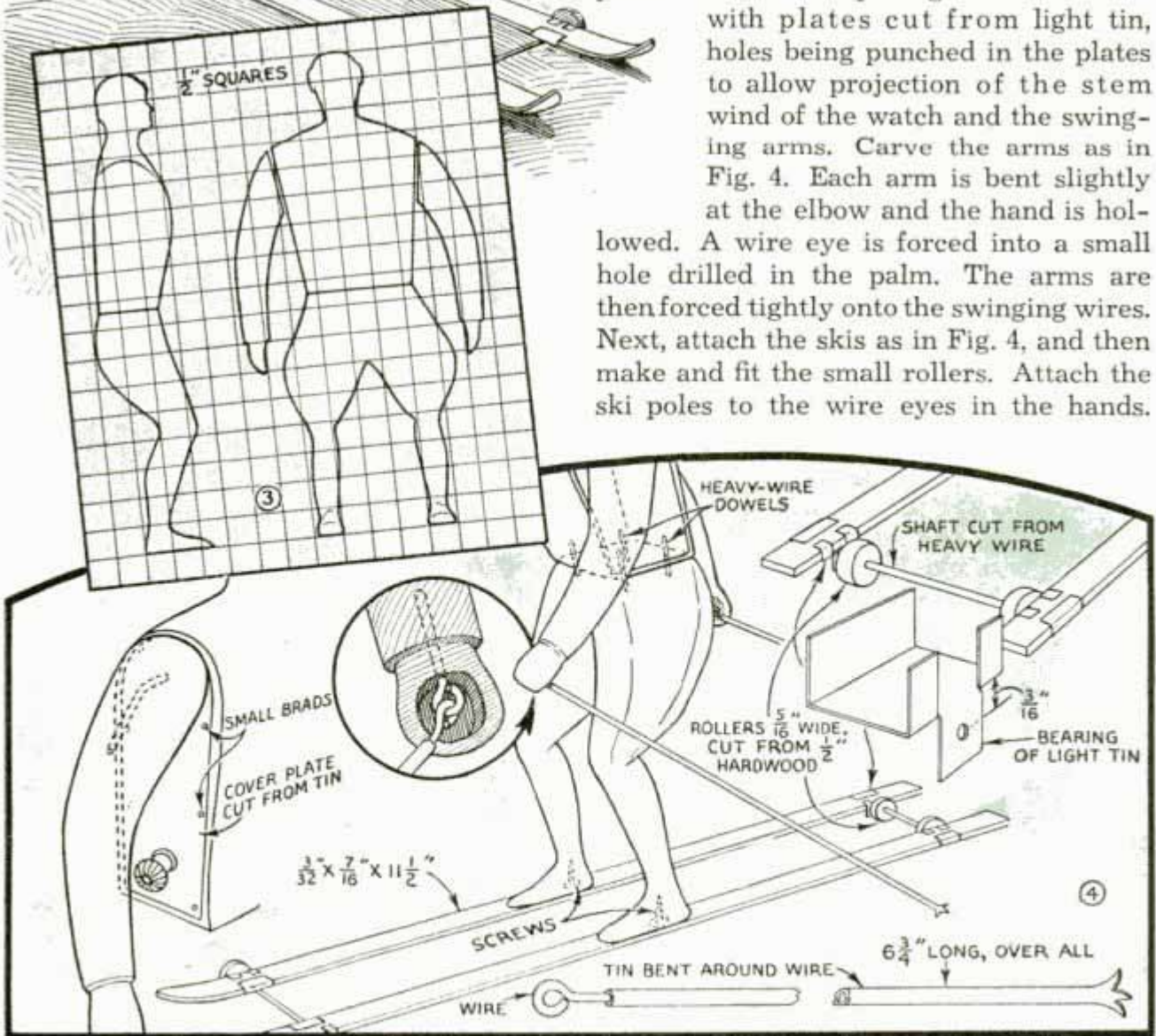
HERE are some new and novel designs of animated toys that you can easily make from a few scraps of balsa wood, small pieces of tin, wire and brads and a discarded watch, which supplies the motive power. First, remove the escapement wheel and rack from the watch so that when the main spring is wound tight the mechanism will run freely. Next, take out the post carrying the hour and minute hands and substitute a stiff wire, bent to form a crank of approximately $\frac{3}{8}$ -in. throw. Note that in the dragon the watch is fitted with two cranks at 180° while the cranks driving the rowboat are made to revolve as one.

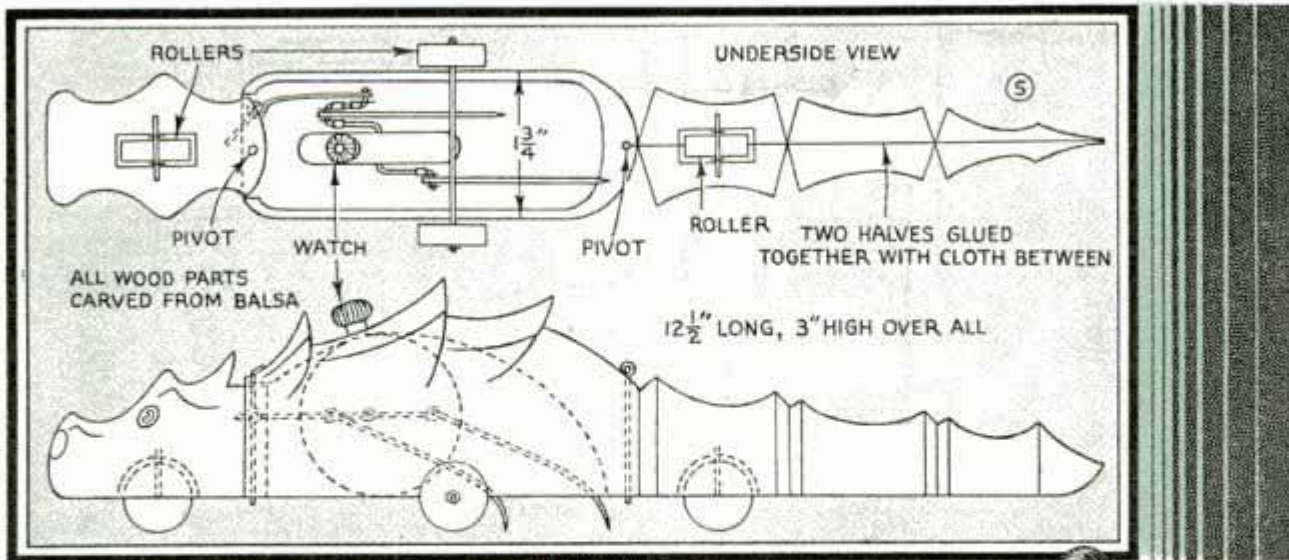
Taking the man on skis as an example, first fit the watch with the mechanism shown in Fig. 2. A single crank is mounted in the hand post and the outer end of the driving crank engages a slide cut from tin and pivoted to the frame of the watch. This in turn imparts a rocking motion to two short arms of heavy wire. Then lay out and carve the figure as in Fig. 3. It may be necessary





to change the dimensions of some of the parts from those given as watches vary in size. Mortise the body of the man clear through and fit the watch assembly in place. Cover the openings at either side with plates cut from light tin, holes being punched in the plates to allow projection of the stem wind of the watch and the swinging arms. Carve the arms as in Fig. 4. Each arm is bent slightly at the elbow and the hand is hollowed. A wire eye is forced into a small hole drilled in the palm. The arms are then forced tightly onto the swinging wires. Next, attach the skis as in Fig. 4, and then make and fit the small rollers. Attach the ski poles to the wire eyes in the hands.



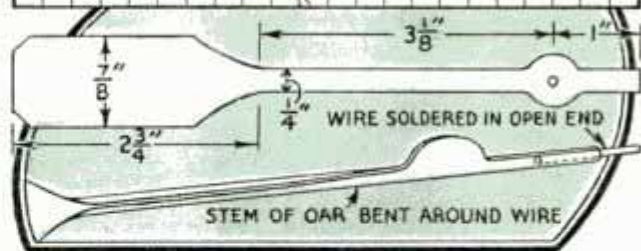
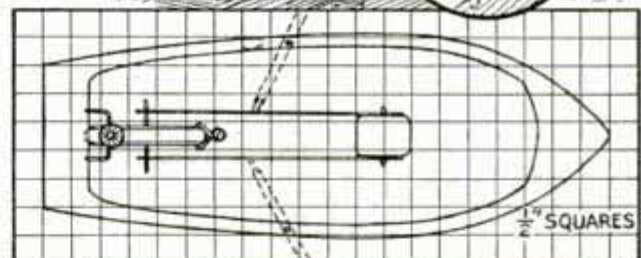
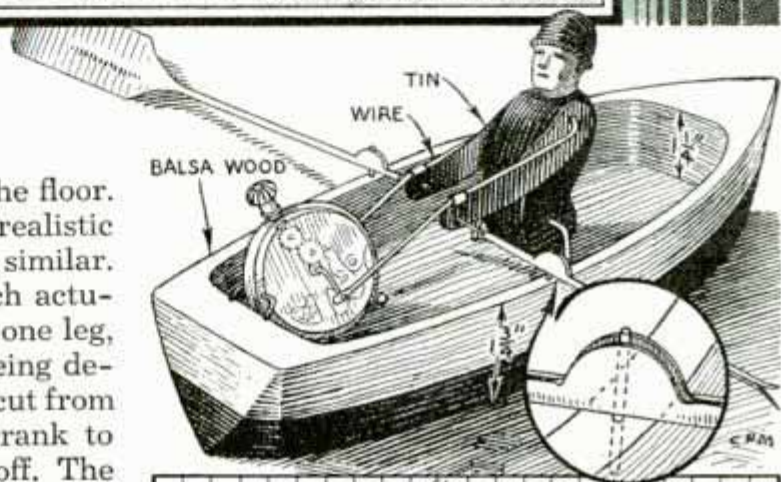


When the watch is wound and the toy placed on the floor it will be moved forward by the ski poles, the sharp points of which engage the floor.

The boy on the wagon is also a realistic toy, the construction of which is similar. See Fig. 1. The crank on the watch actuates a pitman which is attached to one leg, the correct length of the pitman being determined by trial. A small washer cut from tin is riveted on the end of the crank to prevent the pitman from working off. The pivot at the knee must work freely.

The construction of the rowboat is shown also. The hull is carved from a single block of white pine and the watch motor is mounted in the stern. Wire staples are passed through holes drilled in the frame of the watch and pressed firmly into the hull to hold the watch in place. The half figure of the man is hinged to the bottom of the boat and long wire pitmans extend from the shoulders to the cranks. Pieces of tin are cut to shape and soldered to the pitmans to represent the arms of the figure. The oars are made of tin and are hinged to the pitmans at the center and also pivot on oar locks on each side of the boat. When the watch is wound the revolving cranks impart a rowing motion to the oars and figure.

The dragon toy is detailed in Fig. 5. The tail is built up in three separate sections, each consisting of two halves glued together with a strip of heavy cloth between. This is attached to the body by looping the free end of the cloth around a pin made of wire and forcing this into a slot cut in the body. The head pivots on a vertical pin



and a second pitman from an eccentric on the outer end of the driving crank imparts a sidewise motion to the head as the toy moves forward. Short lengths of stiff wire fastened to the cranks and filed to a sharp point at the free end engage the floor or carpet and move the toy forward when the watch is wound, an opening in the lower side of the body allowing these parts to move freely. The entire assembly is carried on small rollers as shown. The toys are painted in bright, contrasting colors.



Kerosene for Kindling Fire Applied with Rubber Bulb Used to Fill Batteries

Handy Outfit for Kindling Fires

If you are in the habit of kindling a fire in your stove with kerosene, a rubber bulb, such as is used to fill storage batteries, is handy for applying the kerosene. Still better, keep the bulb in a screw-top container filled with equal parts of kerosene and used crankcase oil. This mixture is not as explosive as pure kerosene and burns longer.

Small Perforated Can Permits Use of Paint with Skins

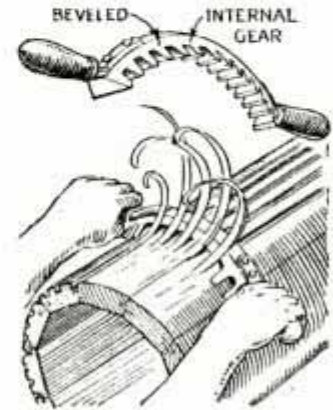
When small particles of the skin that often forms on top of a bucket of paint accidentally get mixed with it so that they are picked up by a brush, suspend a perforated can inside of the bucket with wires. The perforations will permit the paint to enter the smaller can but will keep out the skin particles. The paint brush can then be dipped into the can as shown in the illustration.



☐ A skilled baker says the secret of making flaky doughnuts is to add a tablespoonful of paraffin to the boiling lard in which the dough is cooked.

Fluting Tool Made from Half of Old Gear

For fluting large round work, such as porch columns, a good tool can be made from a section of an internal gear by beveling one edge of the teeth as shown and riveting handles to the ends. When selecting the gear, be sure its inside diameter is approximately the same as the outside diameter of the work, otherwise the flutes cannot be cut uniformly. The spacing of the flutes, of course, depends on the number of teeth in the gear section, every other one of which can be broken out if necessary.—A. H. Waychoff, Tempe, Ariz.



Sandpaper Makes Non-Slip Patterns for Cutting Quilt Blocks

Instead of using a cardboard pattern when cutting quilt blocks, use one made from coarse sandpaper. This is placed on



Patterns Made of Sandpaper for Cutting Quilt Blocks Will Not Slip on the Cloth

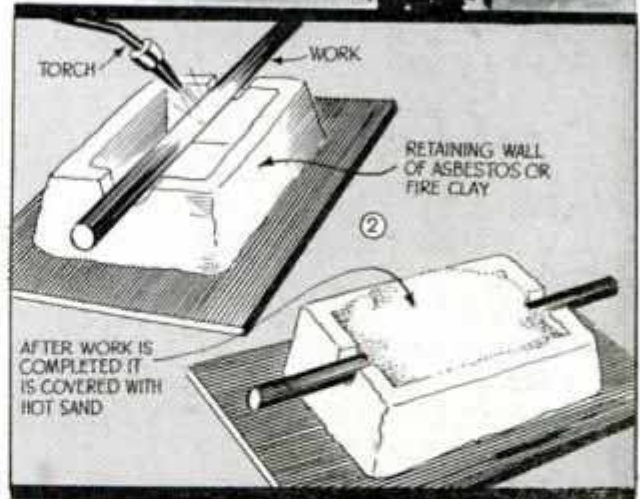
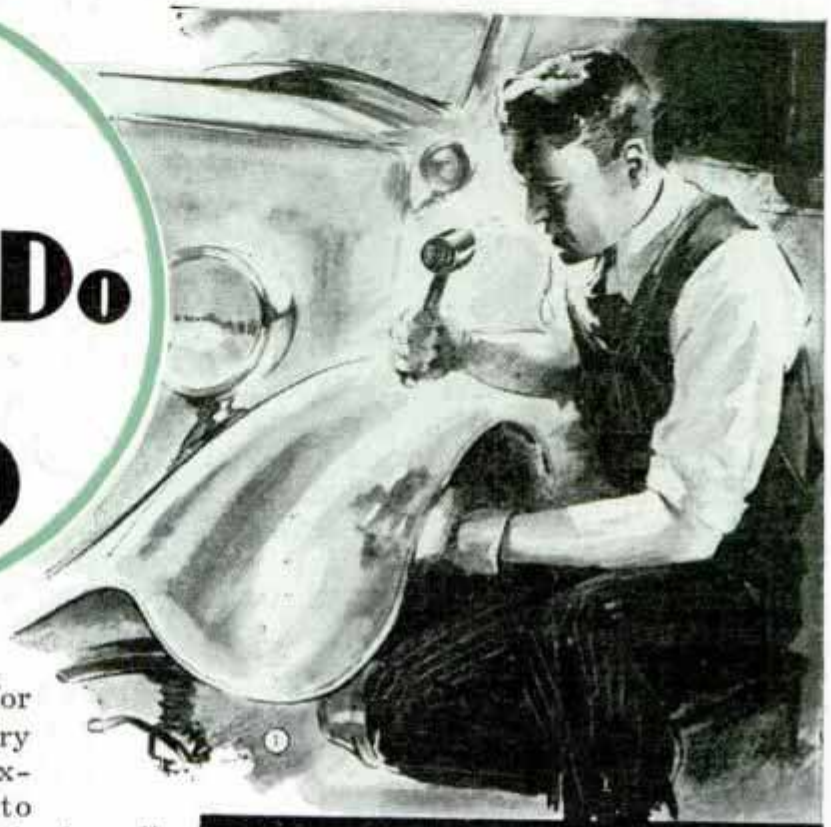
the cloth to be cut with the sanded side down so that it will not slip.—G. E. Hendrickson, Argyle, Wis.



What You Can Do with SAND

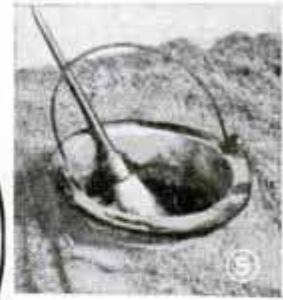
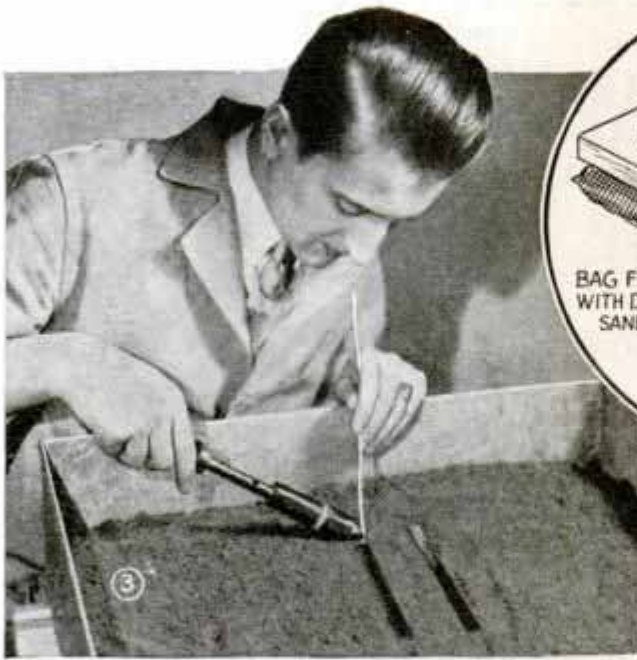
YOU will find frequent use for a small quantity of clean, dry sand in your workshop. For example, it may be necessary to make a uniform bend in a length of small pipe or tubing. If you fill the pipe or tubing with dry sand and cork the ends, the pipe may be bent easily without any danger of collapsing at the bend. Small metal parts that are difficult to hold in any other way can be embedded in a tray filled with clean sand and soldered easily, Fig. 3. To obtain uniform heating of larger parts embed the parts in sand placed in a metal tray. The tray can be heated over a Bunsen burner or any other means at hand. The sand holds the work in place and aids in keeping the necessary uniformity of heat while soldering.

If you wish to keep a liquid warm or hot for a considerable length of time without heating it over an open flame, pour the fluid in a suitable container and embed it in hot sand as in Fig. 5. When it is desired to retain the heat of liquids that have been warmed over an open flame, fill a jar, or any container that will not leak,



with hot sand and set it into the solution.

Hot sand is used to obtain the beautiful shaded effects so often seen in marquetry inlaying. The piece of veneer to be shaded is pushed edgewise into the hot sand and left until the desired shading is obtained. The wood will be darkened most at the point farthest beneath the surface of the



sand. Very delicate and artistic effects are possible in this way.

Heated sand can also be used to retain heat when annealing restricted areas in hard metal parts. This is done as in Fig. 2 by supporting the work on a retaining wall built up of asbestos or fire clay and heating it to a cherry red with a torch. As soon as the work is brought to the proper degree of heat, the space enclosed by the wall is filled with hot sand, which allows the work to cool slowly.

A heavy cloth or canvas bag filled with wet sand and strongly sewed, makes a good dolly for removing dents from auto fenders as shown in Fig. 1, using either a wooden or rawhide mallet. Two other practical uses of small sandbags in the workshop are shown in Figs. 4 and 6. One is used as a caul when veneering a small curved surface. Due to its flexibility, the sandbag is a means of applying equal pressure over a curved surface. Turnings or other irregular work can be held in the bench vise without damage when clamped between two sandbags.

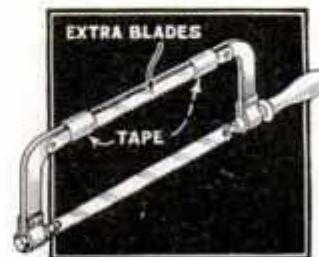
Novel Method of Checking Up on Honey Produced by Bees

One apiarist who wished to know approximately the weight of honey in each one of his bee hives at various times, rigged them with a pointer and a scale calibrated in pounds. To do this, each hive, when empty, was mounted on coil springs taken

from an old auto-seat cushion, a spring being placed under each corner of the hive. A stake was then driven into the ground near the hive and a pointer was screwed to the corner. To calibrate the stake or scale, 1-lb. weights were placed on top of the hive, one at a time, and the divisions marked on the stake.

Carrying Extra Hack-Saw Blades

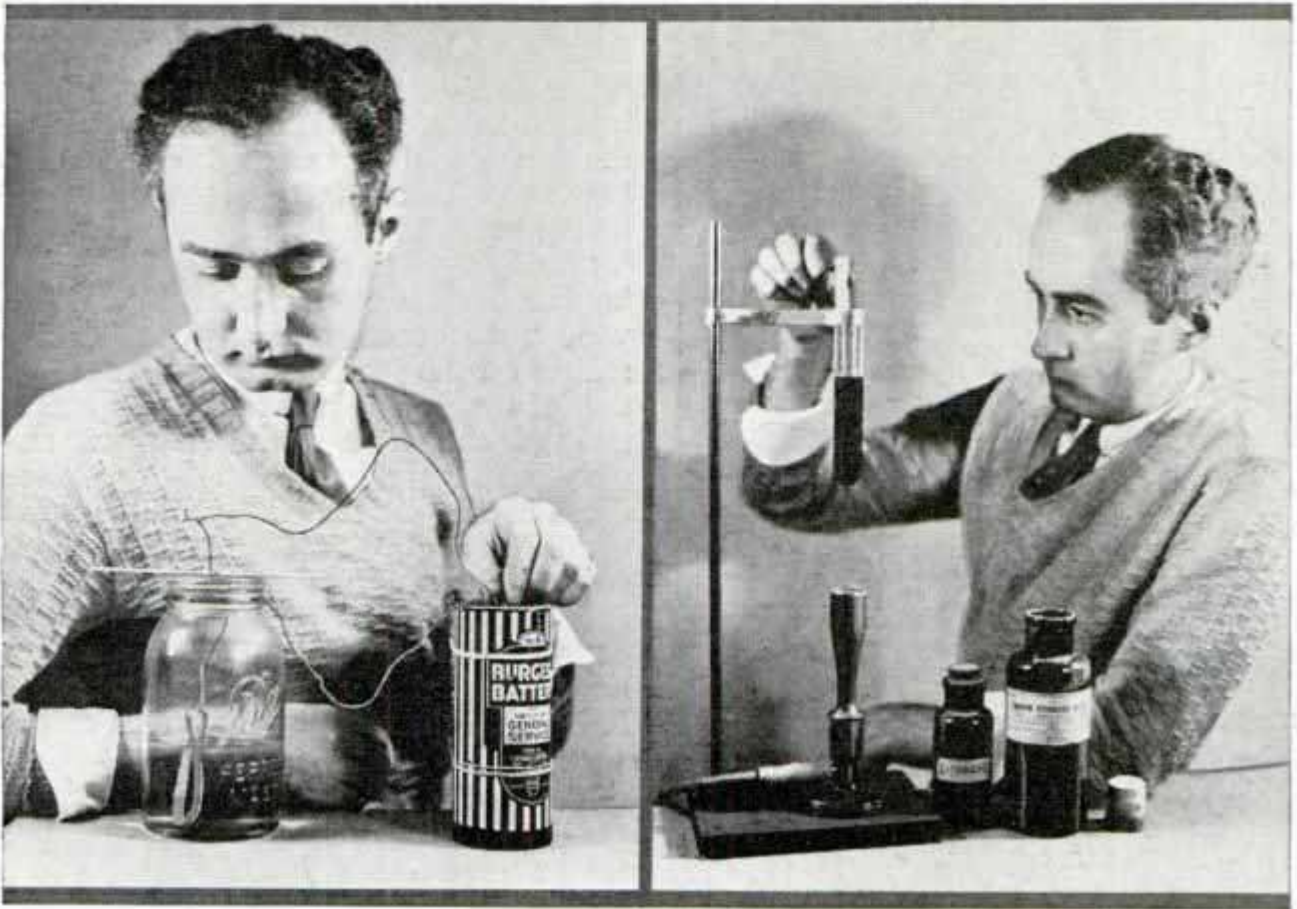
When you go out on a job with as few tools as possible to do the work, an extra blade for the hack saw can be carried conveniently without



losing it by binding it to the saw frame with tape. A still better method is to use wide rubber bands as a substitute for the tape so that

the holder thus formed is always at hand when needed, permitting quick removal or replacement of the extra blade.—Roger C. Dickey, Salem, N. H.

Metal Colored with Chemicals and Dry Cell

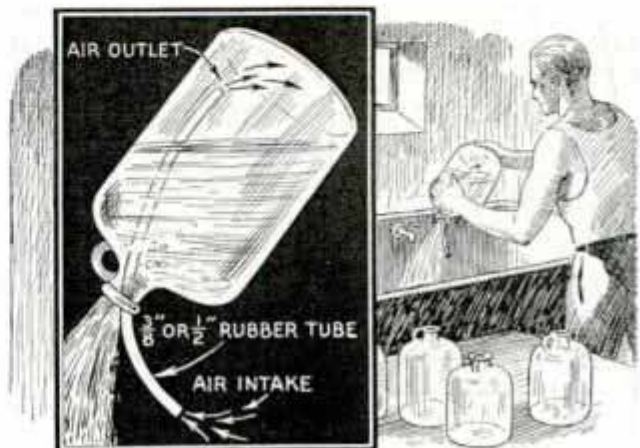


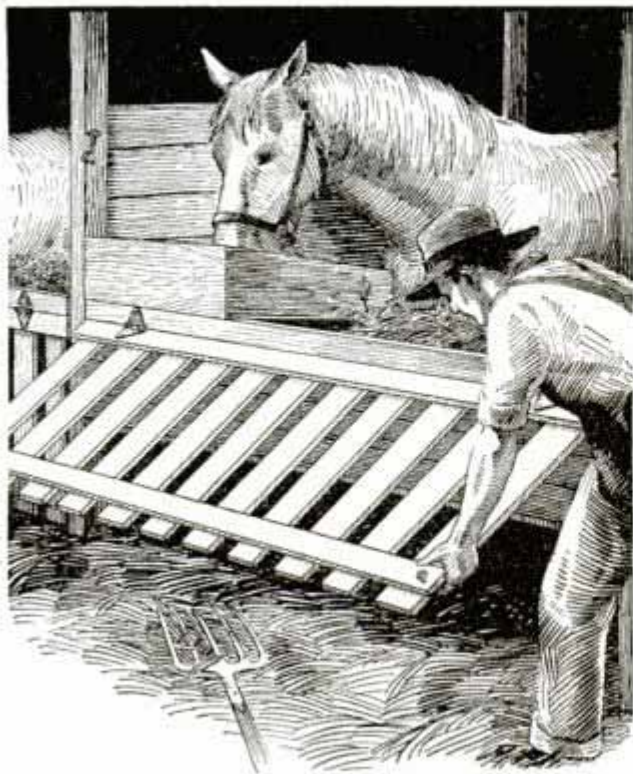
By a simple electrolytic process, using one or two dry cells and a chemical solution, small metal objects may be given various colors and hues up to a deep black. First make the solution by dissolving as much stick caustic soda in a test tube of distilled water as the latter will absorb, heating the water as the soda is added. To this, after pouring it into a beaker, add distilled water to get enough fluid so that the object to be colored can be completely

immersed, and then, while boiling over a flame, dissolve in it all the litharge it will take, adding a little at a time. After pouring the solution into a mason jar, suspend a small piece of lead and the articles to be colored in it with a couple of copper wires, connecting the one fastened to the lead to the negative terminal and the other to the positive terminal of the dry cell. When the parts have been colored as desired, remove them and rinse.

A Small Rubber Tube Helps Empty Large Jugs Quickly

When rinsing a number of large jugs the water can be drained from them in half the time it usually takes by inserting a small rubber tube as shown. This allows air to enter, preventing the formation of a vacuum in the bottom. The tube is also handy when pouring the contents of a jug into a small-mouth container as it allows the liquid to come out in an even stream, which can be directed easily into the mouth of the container. A brass or copper tube will also do, provided the jug does not contain an acid.





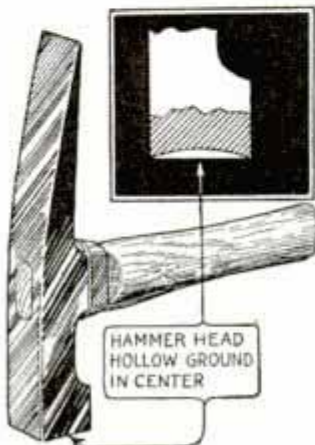
Hinged Front on Manger Opens for Cleaning to Prevent Rats Harboring in Chaff

Front of Horse Manger Opens for Cleaning

Horse mangers that are constructed with tight-fitting boards usually accumulate dirt and chaff which harbors rats and mice. To eliminate the rodents, one farmer built gate fronts to each manger as indicated. These were made of boards spaced two or three inches apart and supported by hinges at the top so that they could be opened for an occasional cleaning.

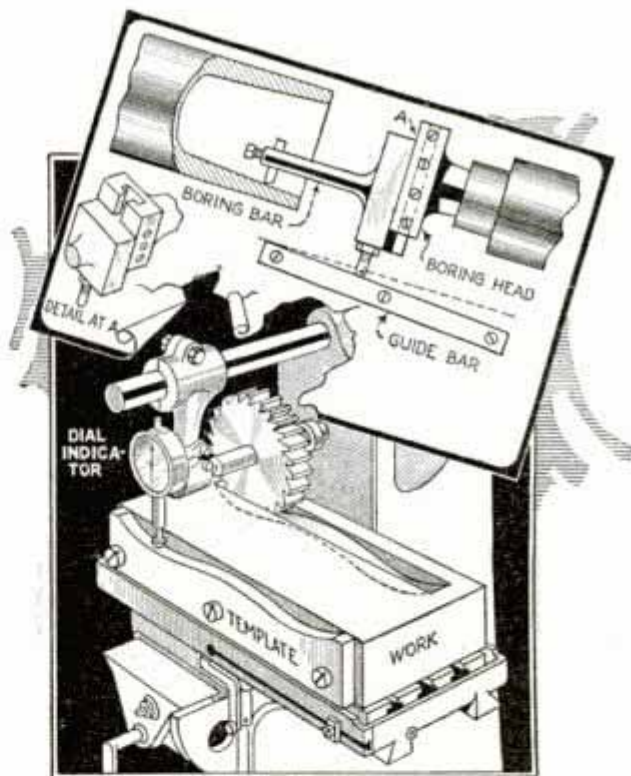
Hollow Grinding Head of Bricklayers' Hammer to Keep Edges Sharp

After a bricklayers' hammer has been used a short time, the edges become rounded and will not split the bricks properly unless the head is ground down frequently. I have found that by grinding the hammer hollow as shown, instead of flat, the edges stay in condition longer.—Teofil Kornylak, Jersey City, New Jersey.



Two Kinks That Help Operators of Milling Machines

Here are two kinks that operators of milling machines will find handy. In the upper detail is shown a method of boring tapered holes. A guide bar is clamped to the machine table at an angle corresponding to the desired taper of the hole. The boring head, which is one generally used for facing work in a drill press, has a boring bar fitted to it. The head is provided with a hardened contact piece, which strikes on the guide bar at each revolution of the spindle and causes the boring tool to feed into the work at the same angle at which the bar is set. In the lower detail is a set-up for contour milling that eliminates much filing and chipping, which must be done unless the work can be machined. A template corresponding to the desired contour of the work, is fastened to it as shown, after which a dial indicator is fastened to the milling arm to rest on the



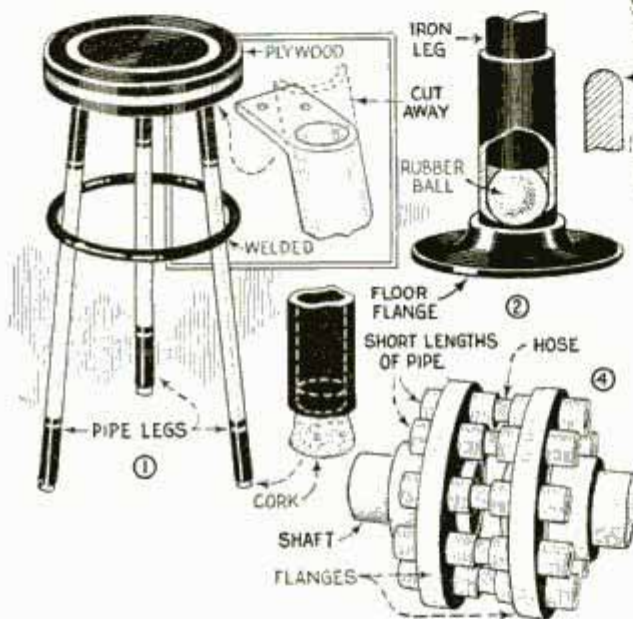
Set-Ups for Contour Milling and for Boring Tapered Holes on a Milling Machine

template. The long power feed is used, and the table is raised or lowered to keep the indicator hand at zero.

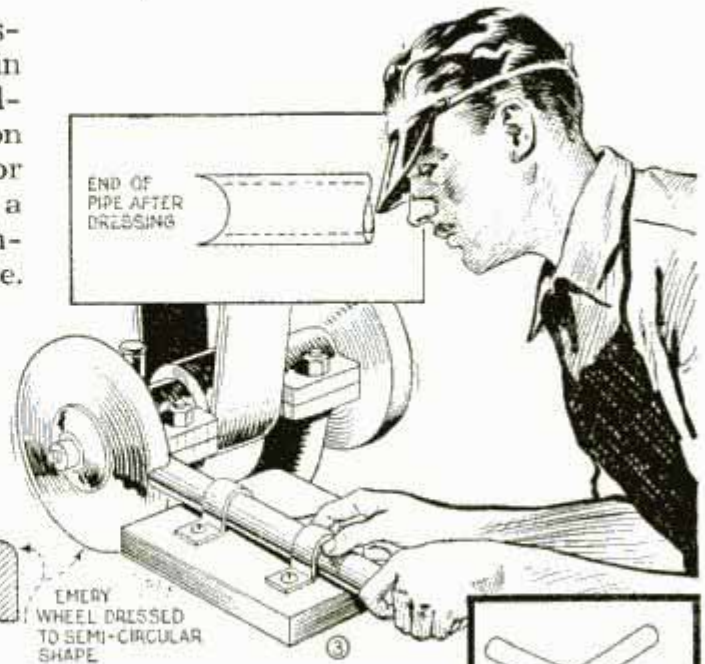
☐ A good ferrotyping solution for glossy prints consists of thin, high-grade machine oil, 10 drops, and denatured alcohol, 1 pint.

Welded Pipe Serves Many Uses in the Shop

Many things can be made of pipe by assembling the parts and welding them in cases where standard fittings do not always lend themselves to the construction desired. To fit pieces of pipe together for welding, you will find it handy to use a grinding wheel as wide as the pipe diameter, dressed down to a semi-circular face. The end of the pipe can then be ground to fit as in Fig. 3, using a jig which consists of a wood block having two pipe straps through which the pipe



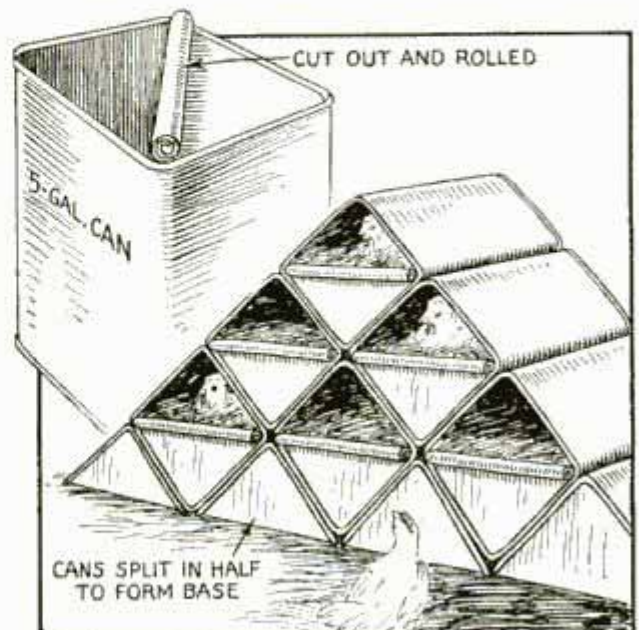
can be slid against the wheel. A shop stool for use where there is much vibration is shown in Fig. 1, cork or rubber feet being inserted into the lower ends of the legs. Bottle corks can be used for this purpose. Short pieces of flat iron are welded to the upper ends of the legs as indicated, and are drilled for screws to permit attachment of a plywood seat, after which a pipe ring or iron band is welded to the legs for reinforcement. Fig. 2 shows a single-leg stool that will absorb vibration, the leg fitting in a sleeve which is held by a floor flange, a rubber ball inside the sleeve taking the entire weight. A strong, flexible coupling may be made up from short lengths of pipe and heavy rubber hose. After aligning the two shafts, a flange is fastened to the end of each, the flanges having previously been drilled for short pieces of pipe, which are welded in place. Both flanges must be made identical so



that pieces of heavy rubber hose, slipped through the pipe nipples will connect the flanges together to form a coupling. The strain of the driving shaft is equally distributed over all the connecting pieces of hose.

Hens' Nests Made from Tin Cans

Good hens' nests can be made by stacking square, 5-gal. cans as shown, first cutting the tops so that the cut section can be rolled toward the center to provide entrances. Two of the cans cut in half diagonally provide a suitable base for six nests.





Using Old Auto Axle and Hammer to Spread Drag Teeth of Crosscut Saw

Old Auto Axle Used as Saw Swage

In the absence of a swage for spreading the drag teeth of a crosscut saw, use a hammer and an old auto axle as indicated instead of a hammer alone, which is often done. By using the axle, the teeth are less likely to be broken off and you can get them spread more uniformly.—J. A. Holloway, Montesano, Wash.

Wire Straightened with Bent Metal Tubing

A method which I have used for straightening wire rapidly without a machine, is to use a short scrap length of metal tubing having an inside diameter somewhat larger than the diameter of the wire. The wire is

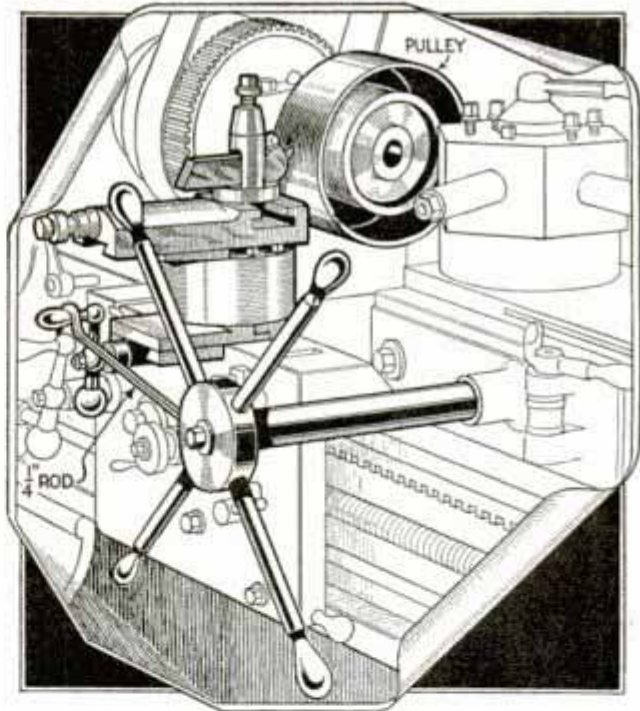


threaded through the tubing sufficiently far so that the end can be gripped. The tube is then dented or kinked with a vise, hammer or other means, the tube being rotated while doing this so that the dents are spaced around the entire circumference, providing a path for the wire in

many different directions, similar to that shown in the illustration. The wire pulled through this tube will come out straight and true.—H. L. Lackman, Philadelphia, Pennsylvania.

Crowning Pulleys in a Turret Lathe

I have found the illustrated set-up handy for crowning pulleys in a turret lathe. A cross slide, tool post and turning tool, taken from a regular metal-turning lathe, are mounted on the cross slide of the turret lathe and blocked up to the right height. When the pulley is ready to be crowned, the tool is set centrally with the rim, and the crank on the cross-slide screw is set with the handle upward where it is held with an iron rod hooked over the sleeve of the capstan shaft as indicated. With the crank in this position, movement of the carriage to the right causes the cutting tool to taper the surface of the work gradually as it cuts toward the right side of the pulley. To crown the other half of



Set-Up in Turret Lathe Utilizing Part of Regular Lathe to Crown Pulleys

the pulley, the tool is brought back to the center of the rim and set with the crank handle down.—Avery E. Granville, Knox, Indiana.

☞ Good tool handles can be made from hickory pitmans of old mowing machines.



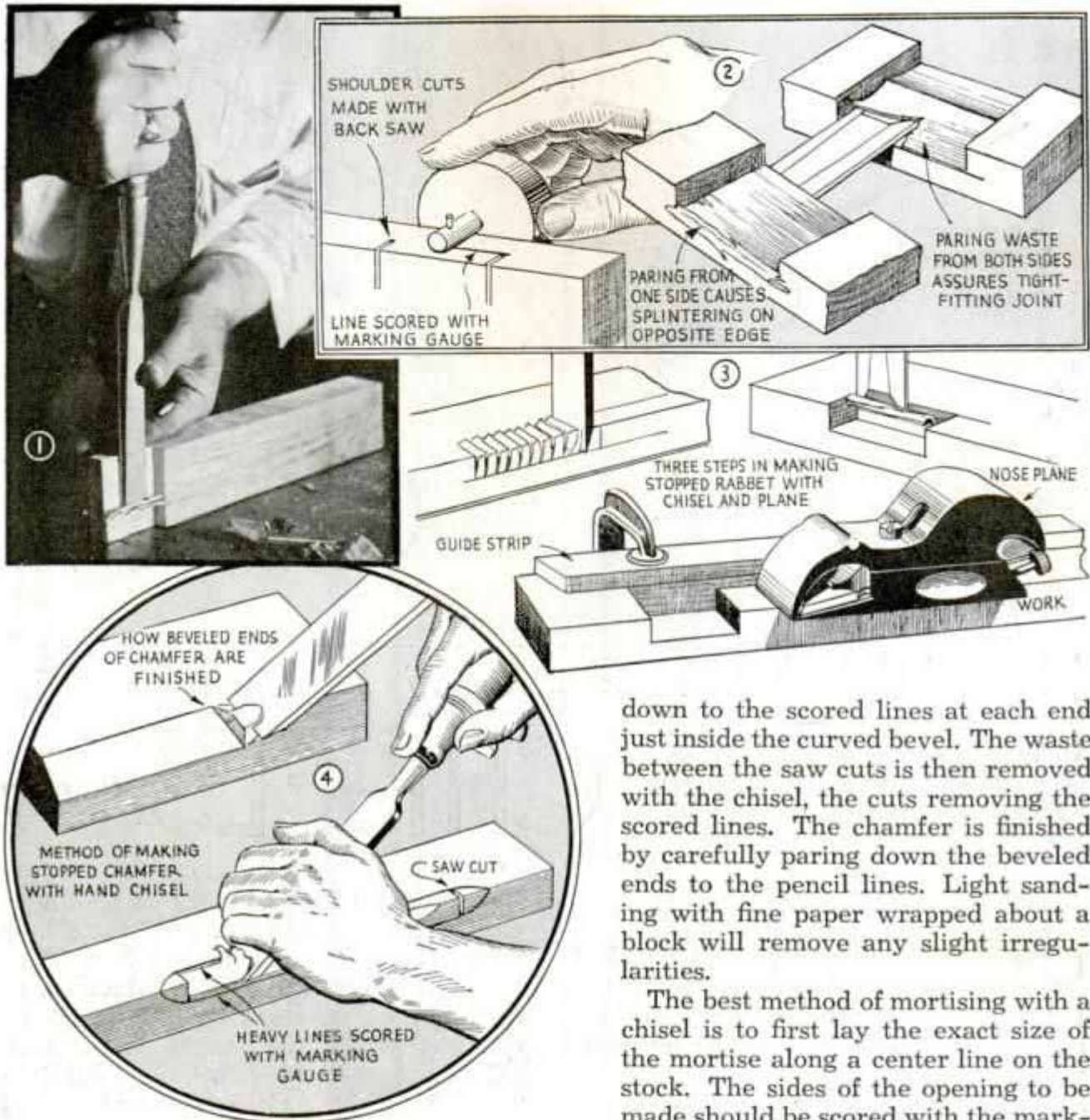
The Tricks of Using WOOD CHISELS . . .

By W. CLYDE LAMMEY

CORRECT handling of wood chisels is of second importance to careful grinding and honing of the cutting edge. The skilled workman seldom uses a mallet when doing close work with a hand chisel. Instead, the pressure is applied with both hands, the cutting edge so guided that it takes off a light shaving at an angle to the grain. If slightly more pressure is necessary to force the edge through a knot or other obstruction, the handle of the tool is struck lightly with the palm of the right hand while the left hand guides the edge. With this method it is possible to work a hand chisel in very close limits without danger of splintering or otherwise damaging the work. The mallet is used only where it is necessary to remove a considerable amount of waste and accuracy is not so essential. The old-style chisel with a square-edged blade still is preferred by many skilled workmen, but a later type with a bevel-edged blade is now more commonly used.

Figs. 1 and 2 show steps in making a close-fitting halved joint. First the shoulders are cut down in a miter box. Then the depth limit of the waste is marked on the edges of the stock by scoring with a marking gauge. The waste is removed with a series of paring cuts, the cuts alternating from both sides of the piece and slanting upward at the center until the maximum depth is reached at the edges, after which the center is pared down to the same level. If you attempt to remove the entire block of waste in one or two cuts, the waste is apt to splinter out at the edge opposite the chisel, thus spoiling the joint. The limits of a recessed joint or mortise should always be scored first with the marking gauge, as the scoring aids in breaking the chip at the proper point and also gives a true line for starting the chisel.

A quick method of making an accurate stopped rabbet is shown in Fig. 3. The waste at the ends is removed first with a chisel, the length of the openings being sufficient to allow the cutter of a nose plane to clear. A hardwood strip is then



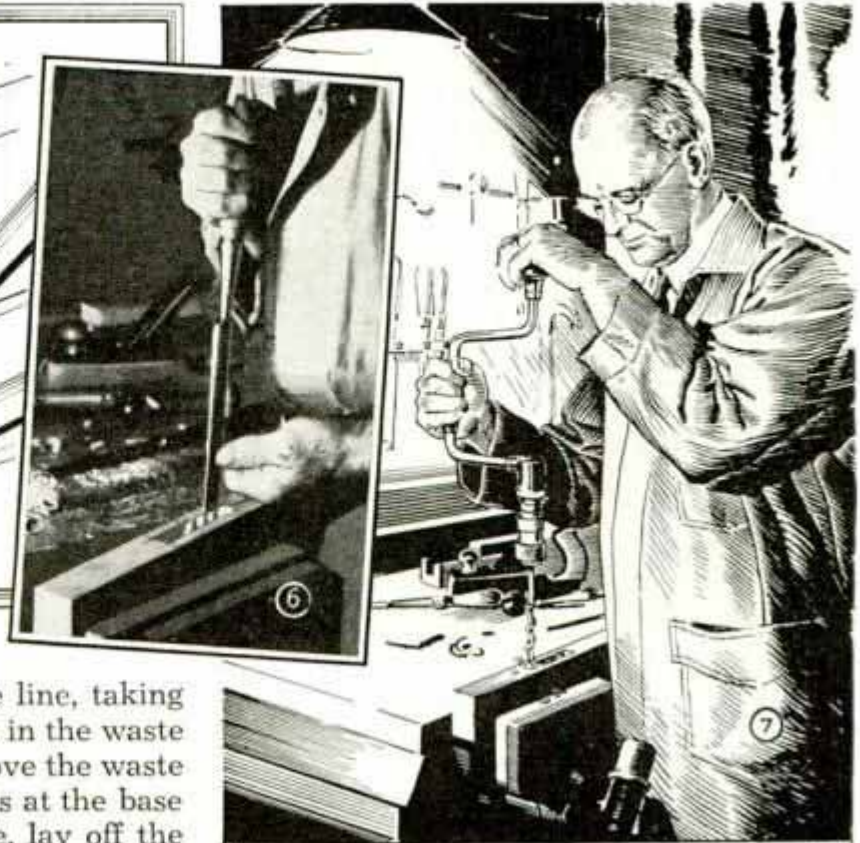
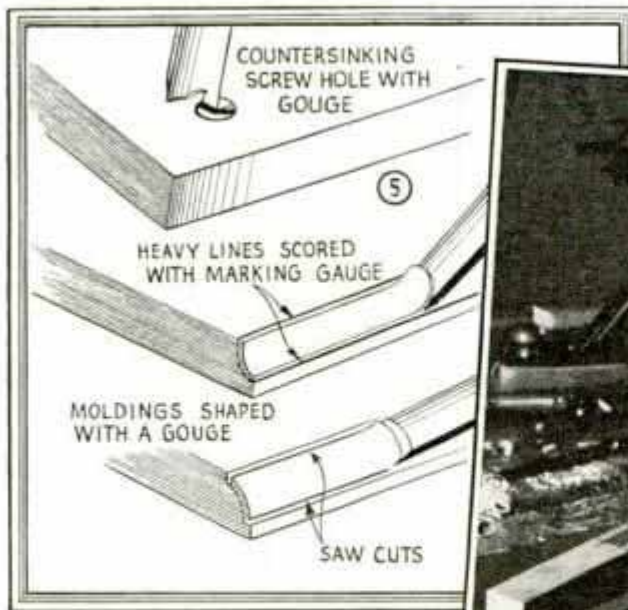
clamped to the stock as a guide for the plane, which is used to remove the balance of the waste. A stopped groove can be made in essentially the same way by first chiseling the groove to depth and width at one end and using a plow or grooving plane to clear out the remainder of the waste.

Another operation which can be done only with the chisel is the stopped chamfer. The procedure is shown in Fig. 4. First the chamfer is laid out to exact size and length with pencil marks on the edge of the stock. These lines are scored deeply with the marking gauge just inside the pencil line so that the scored line will be removed with the waste. Saw cuts are run

down to the scored lines at each end just inside the curved bevel. The waste between the saw cuts is then removed with the chisel, the cuts removing the scored lines. The chamfer is finished by carefully paring down the beveled ends to the pencil lines. Light sanding with fine paper wrapped about a block will remove any slight irregularities.

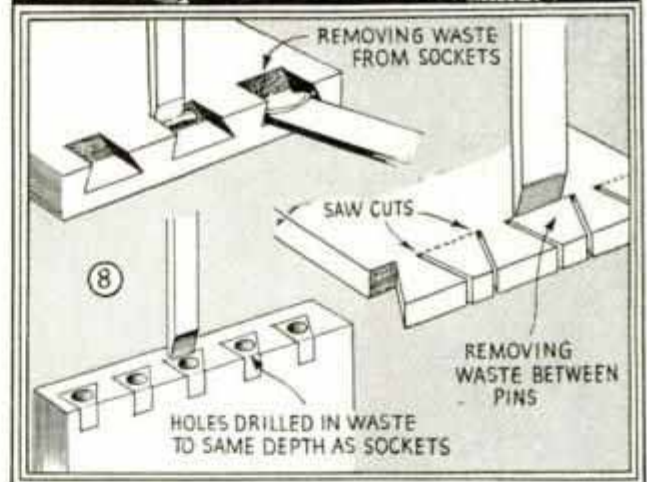
The best method of mortising with a chisel is to first lay the exact size of the mortise along a center line on the stock. The sides of the opening to be made should be scored with the marking gauge. A number of holes of the same diameter as the width of the mortise are then drilled close together and to a uniform depth along the center line as in Fig. 7. The ends of the opening are then cut down with a chisel of the same width as the mortise, as in Fig. 6. A wide chisel is used to pare the waste from the sides, using the line scored in the wood as a guide in starting the chisel.

Essential steps in making a corner dovetail joint are shown in Fig. 8. The usual practice in making dovetailed drawer joints is to lay out and cut the pins first. From these the sockets are laid out and cut in the drawer front. After you have the pins laid out to the proper size in accordance with the width of the stock, saw



down the outlines to the base line, taking care that the saw runs always in the waste and square across. Then remove the waste pieces with vertical chisel cuts at the base line. Using this as a template, lay off the sockets on the drawer front, marking the outlines with a sharp-pointed scriber. Drill small holes at the center of each block of waste and check all outlines with the chisel held vertically, the edge just inside the line in the waste. Continue the alternate checking and paring cuts until the waste has been removed to the bottom of the socket. The checking cuts must be made with the chisel always perpendicular to the stock and always in the waste, otherwise the joint will be a loose fit when assembled.

Gouges of varying sizes and sweeps always are useful in the small workshop. Simple molding shapes can be made quite easily with this tool, Fig. 5, if no shaper or power saw is available. By checking the width with scored lines and using a gouge of the proper sweep, it is easy to do fluting on flat surfaces. With nothing else at hand you can use the gouge to countersink screw heads in the manner shown in Fig. 5. The gouge is also much used in making model-boat hulls where it is necessary to pare down either convex or concave surfaces. The tool is handy for outlining carvings and in irregular recessing. Using a gouge of the proper sweep, you can make the vertical outline cuts for a circular recess or any curved recessed design when inlaying with plastics.



Spring Caps for Ink Bottles

To keep his inks tightly covered, and yet instantly accessible, one show-card writer provided spring caps, as shown in the drawing. A length of spring wire was inserted through each cork and bent as indicated, and then fastened on the wall above the bench. The springs held the corks securely against the mouths of the bottles to prevent evaporation.



The springs held the corks securely against the mouths of the bottles to prevent evaporation.



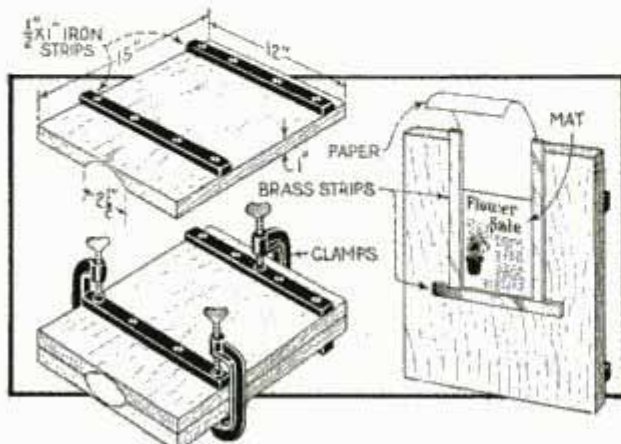
Skid Chains Nailed to Gangplank Provide Footing for Workmen Pushing Wheelbarrows

Old Skid Chains Prevent Slipping on Gangplank

When rain, snow and mud on gangplanks become sources of danger to the workmen, old auto skid chains are used by one contractor to prevent accidents caused by slipping. The chains are merely nailed onto the upper surfaces of the planks and do not interfere with the ease of pushing a wheelbarrow over them.

Homemade Form for Casting Stereotype Metal

Owners of small printing shops will find this outfit handy for casting small jobs of stereotype metal. Two surfaced wood blocks that are dry and free of knots and rosin are used. Iron strips screwed to one

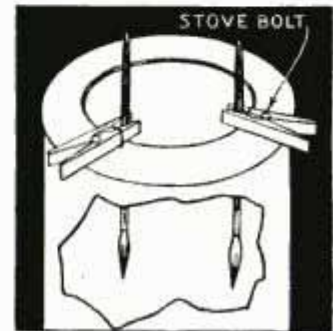


Occasional Jobs of Stereotype Casting Are Done Easily with This Form

side of each block reinforce them and provide a footing for clamping them together. A small bevel in one end of each block facilitates pouring the hot metal. In use, the mat from which the cut is to be cast, is placed between brass strips as shown, after which paper is used to fill out the form and prevent the metal from running under the upper edges of the strips. After clamping the blocks together, the form is heated and the metal poured.

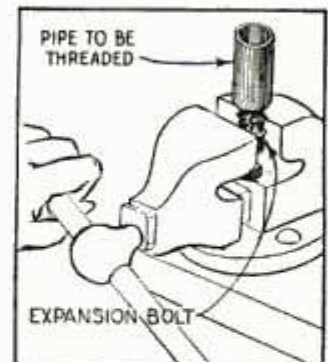
Artists' Brushes Held in Cleaning Solution with Clothespins

Artists, sign painters and show-card writers will find that spring-type clothespins provide good clamps for holding brushes in a can of cleaning solution. Get a can that has a wide rim around the top edge, and fasten the clothespins to the rim with stove bolts which are run through the springs of the pins and through holes drilled in the rim.



Expansion Bolt Holds Pipe Nipples While Threading Them

Held in a vise, an expansion bolt served nicely to hold short pipe nipples while threading them. Each nipple was slipped over the jaws of the bolt, which were then tightened to hold it after which the bolt was clamped in a vise as shown. It was a matter of a few seconds to loosen the bolt and change the nipple to thread the other end. —A. H. Waychoff, Tempe, Ariz.



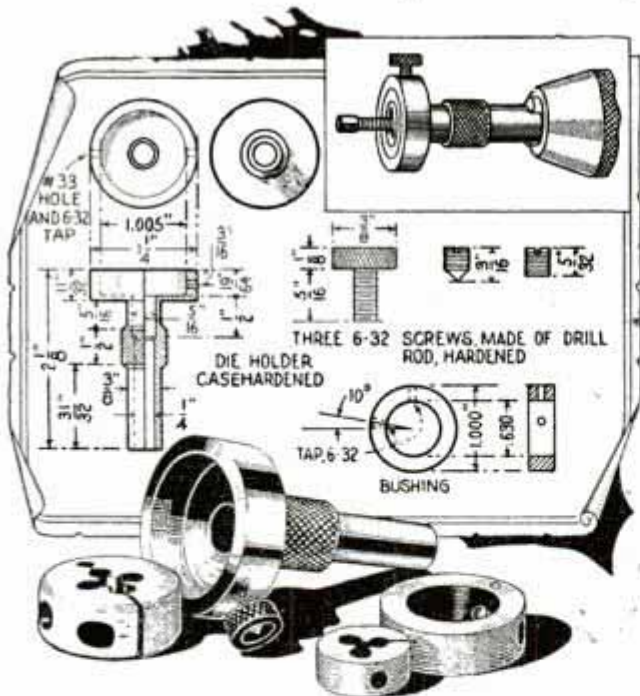
☐ Mixing powdered boracic acid, 5 grains, with each ounce of shellac to be used as an undercoat on wood causes the shellac to dry very hard so that it serves as a filler as well as an undercoat.

Mash Mixture for Poultry Flocks

Many poultrymen are using the following mash mixture with good results: Yellow corn meal, 360 lbs., shorts or ground wheat, 200 lbs., bran, 100 lbs., pulverized oats, 100 lbs., alfalfa meal, 80 lbs., meat meal (60% protein), 100 lbs., dried buttermilk, 50 lbs., and salt, 10 lbs. If skim milk is available, the dried buttermilk can be eliminated and the meat meal reduced to 50 lbs. In this case, 460 lbs. of corn meal should be used in the mixture. Feed only mash for the first three or four weeks and then cracked yellow corn and whole wheat. From the fourth to tenth week feed corn and wheat, 1 part, to mash, 2 parts.

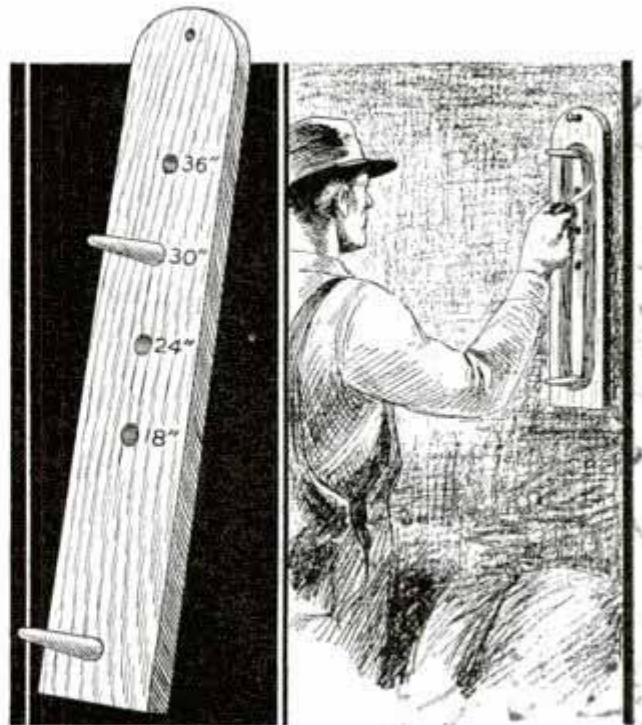
Die Holder for Threading Work in a Lathe

With this die holder, it is a simple matter to thread stock in a lathe. The holder is made from one piece of cold-rolled steel and is casehardened. The shank end is turned to the largest diameter that can be held in the tailstock chuck and the other end is turned to take a large die as shown,



Threading Work in a Lathe Is Done Easily with This Die Holder

after which one side is drilled and tapped for a knurled set screw to hold the dies. The holder is drilled transversely so that the threaded end of the work can project into it. Bushings of various sizes are used to adapt the holder to smaller dies.



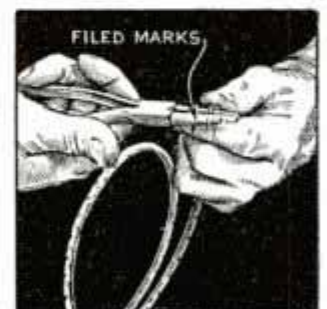
With This Adjustable Gauge Block, Quantities of Tie Strings Can Be Cut in a Few Seconds

Adjustable Gauge Block for Cutting Tie Strings

In mills or warehouses where quantities of tie strings are used, this adjustable gauge block will be found a time saver for measuring various lengths of strings needed. Two tapered wood pegs, one of which is adjustable, are set in holes in a board and the assembly hung on a wall. It is then a matter of a few seconds to set the adjustable peg, loop the string over the pegs and cut it into tie strings.

Turning Uniform Loops on Wires for Electrical Connections

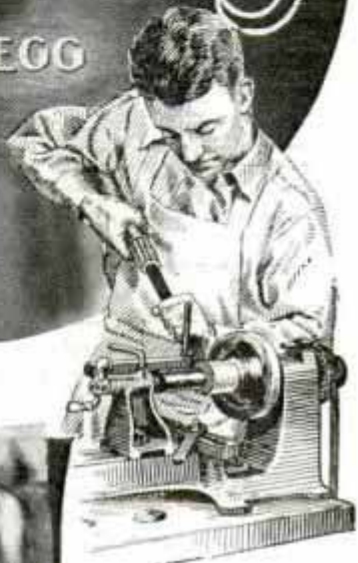
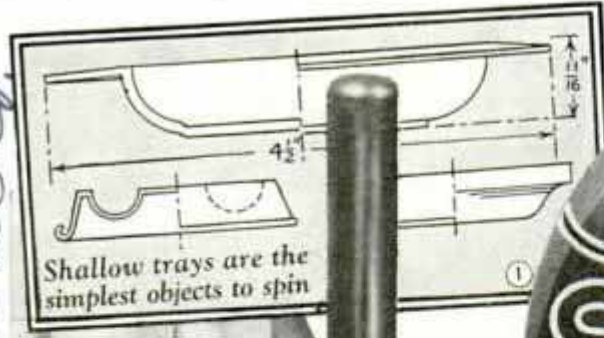
Electrical work often requires that uniform loops be formed on the ends of a number of wires to make connections to terminals. This can be done very easily if three or four equally spaced marks are filed on the outside surface of one jaw of a pair of taper-nose pliers. This will enable you to form as many loops of the same size as needed.—C. E. Packer, Chicago.



Sharp notes 1935

Metal Spinning

by R. GREGG



BEGINNERS in metal spinning should start with simple projects, such as the shallow trays shown in Fig. 1. These can be fashioned from pewter or soft aluminum on the woodworking lathe and a few accessories. The first step in the procedure is shown in Fig. 3—a wood chuck is turned to the exact shape of the tray, and glazed with laundry soap or beeswax. A piece of pewter or aluminum of the required size is nailed over the chuck as shown in Fig. 4. The face of the metal is lubricated with cup grease, Fig. 5. The spinning tool, in this case, is a hardwood stick, rounded at the working end. With the tool rest set at an angle of about 45°, and the lathe running about 800 r.p.m., the rounded stick is applied to the metal, pressure being exerted to expand the metal into the chuck. The stick should not be held in one place, but should be worked constantly from the center of the disk to the rim, and then back again, keeping the point of contact a little below the lathe center, as shown in Fig. 6. The metal will work quite readily into the depression, and the sharp corners of the tray can be worked in with either a pointed metal tool or a smaller stick. Any metal-cutting tool

Shallow trays should be the first projects. Deep objects should not be attempted until you know how the metal reacts

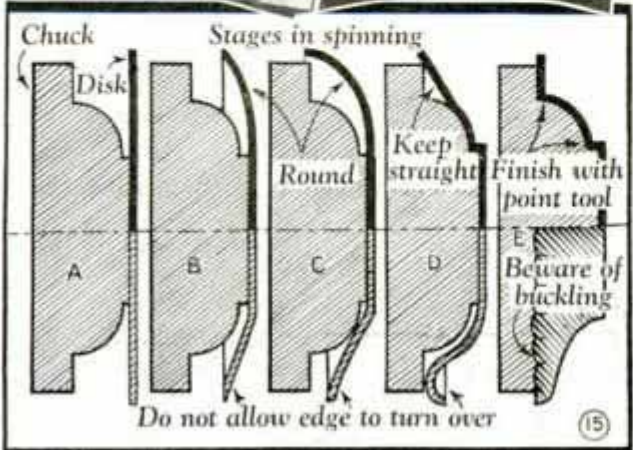
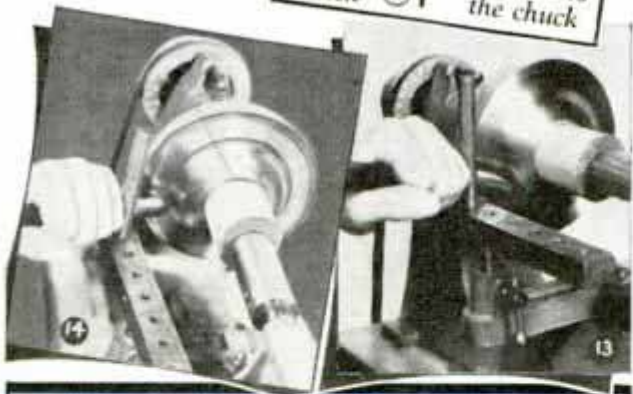
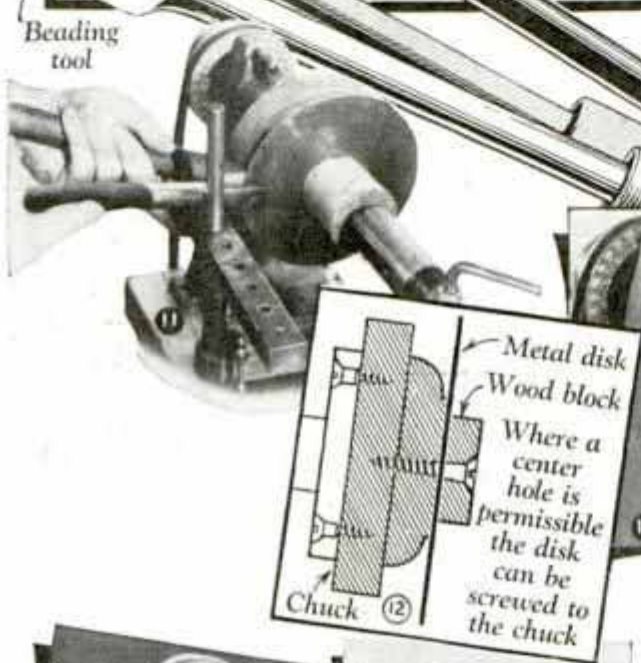
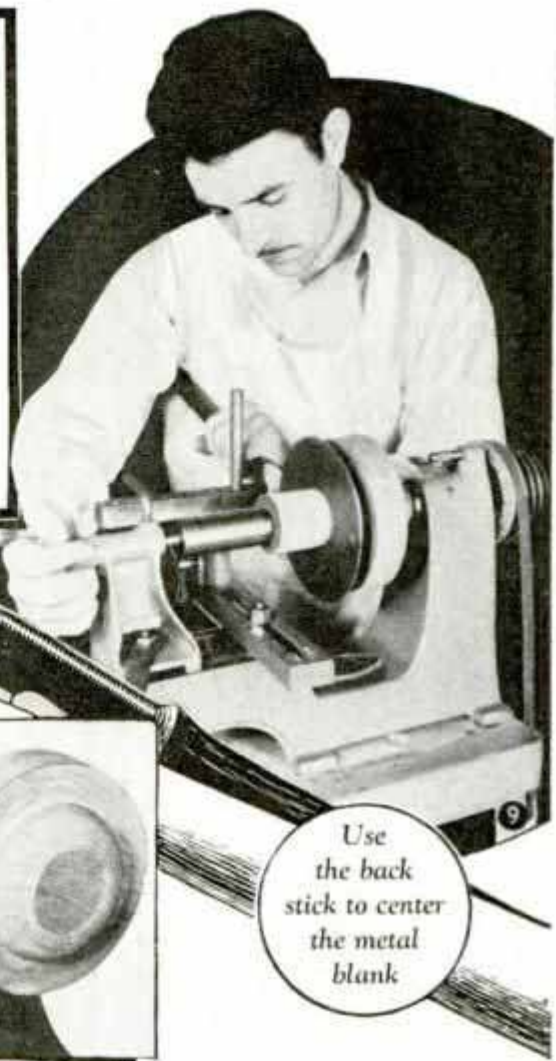
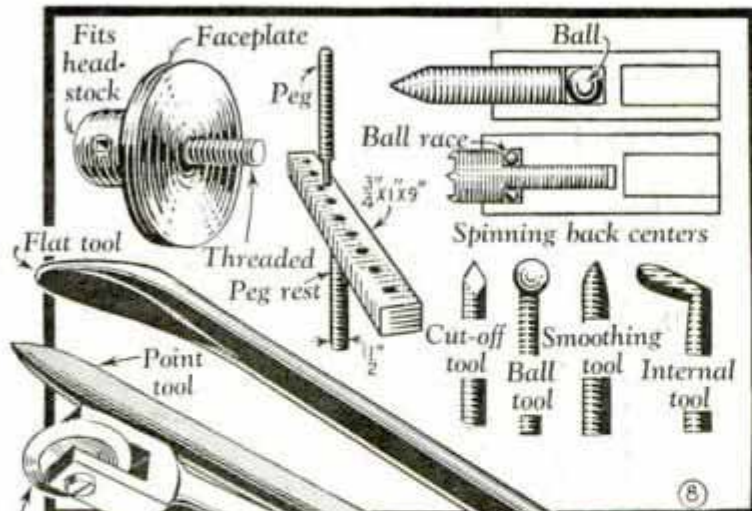
After polishing, cut the tray free with any sharp metal-cutting tool

Also learning tools - W.B. & S. Borice Co. Sept 11. 11. Toledo Ohio

Metal Craft Supply Co. R.I. 27 Aborn Providence, R.I.

Steel Sales Corp. 129 S. Delaware

10 Thomas St



can be used to trim the edge, as shown in Fig. 7.

While the method of metal spinning just described is quite simple and suited for turning of shallow trays, it is not the standardized manner of working. In most spinning projects, the metal is spun around and not into the chuck; also, there is a considerable deviation in the way of tools and accessories. Taking the same project, the chuck would shape up as in Fig. 10. This can be fastened to the regular lathe faceplate; also, the metal disk, itself, can be screwed to the chuck if a hole through the center of the metal is permissible, as shown in Fig. 12. Most spinning work, however, demands a special faceplate, with a threaded projection to take the chuck, as shown in Fig. 8. This diagram also shows the peg tool rest and the spinning back center. As to tools, you can get along nicely with four different types; a "flat tool" for breaking down the metal, a "point tool" for working sharp corners, a "beading tool" for making beaded or rolled



edges, and a "cut-off tool" for trimming the work to size. A final accessory is the "back stick." This is simply a 15-in. length of $\frac{5}{8}$ -in. dowel rod, pointed on one end like a blunt chisel.

With these accessories on hand, you can proceed with the shaping of the ash tray. First, mount the wood blank on the faceplate, and turn it to the proper chuck shape. Now, center a smaller block of wood directly behind the chuck, and bring the tailstock center into place. This second block is the "follower" or "follow block." Its purpose is to hold the metal blank in place. Prepare this block by turning it down to a diameter $\frac{1}{8}$ to $\frac{1}{4}$ in. less than the bottom of the chuck against which it will seat. You are now ready to spin. Insert the metal blank between the chuck and the follow block, centering as closely as possible. Start the lathe. Take the back stick, and, holding it against the fulcrum pin on the tool rest, push it in to touch the edge of the revolving metal disk as in Fig. 2. At the same time, loosen the tailstock slightly, as shown in Fig. 9, and

METALS USED IN SPINNING

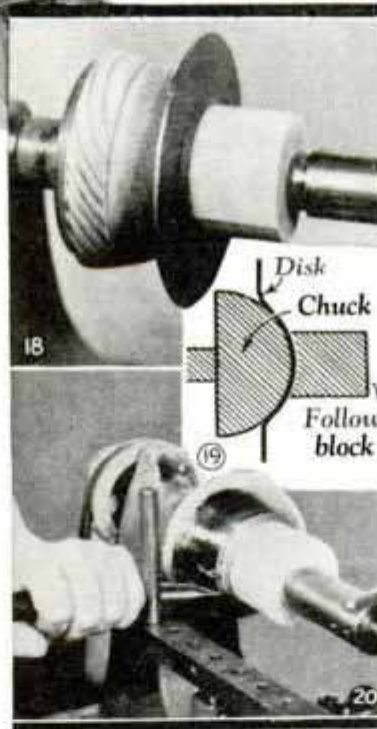
METAL	WORKING SPEED	REMARKS
No. 1 OR No. 2 PEWTER	500-800 R.P.M.	WORKS EASILY—NO ANNEALING
ALUMINUM	800-1000 R.P.M.	USE ONLY SOFT VARIETIES—NO ANNEALING
COPPER	800-1000 R.P.M.	MUST BE ANNEALED THROUGHOUT SPINNING
BRASS	800-1000 R.P.M.	REQUIRES ANNEALING
ZINC	1000-1200 R.P.M.	SOFTEN SAME AS COPPER BEFORE WORKING

USE CUP GREASE OR YELLOW LAUNDRY SOAP AS LUBRICANT

the blank will center itself perfectly. It must, of course, be a perfect circle to start with, with no jagged or projecting edges. After lubricating the blank on both sides, take the flat tool and place it against the left side of the fulcrum pin, which has been placed in the first hole to the right of the metal blank. Exert pressure with the round side of the flat tool, supporting the metal on the opposite side with the back stick, as shown in Fig. 11. Work from the center of the disk to the edge. The metal will form into a saucer-like shape quickly, and from this shape through the successive stages shown in Fig. 15. Fig. 13 shows the metal almost down to the surface of the chuck while Fig. 14 shows the point tool being used to work the metal into the sharp corners. Do not allow the outer edge to turn over, but keep it rounded or straight. Keep the tool rest 3 or 4 in. away from the rim of the metal blank and change the position of the pin as often as necessary to secure the proper working angle. Do not stay in one place too long, but use sweeping strokes over a

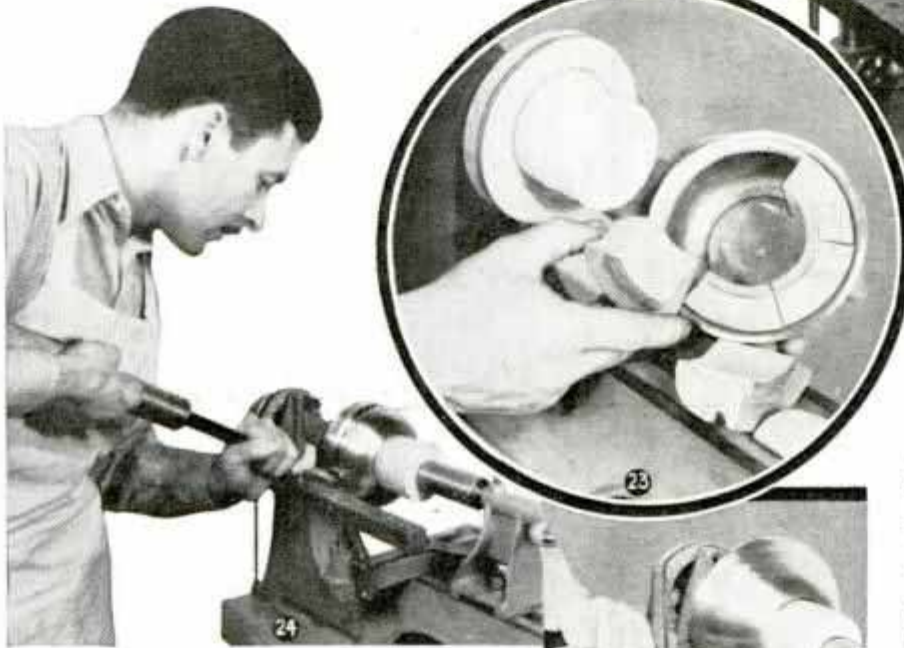
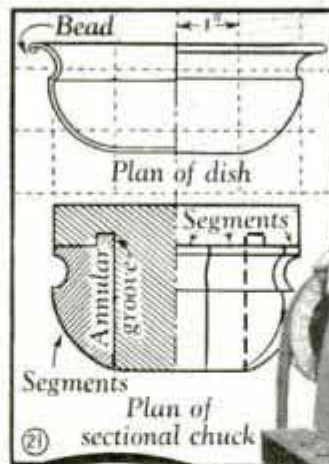
large area. Keep the metal lubricated. Contact the tool with the metal somewhat below the lathe center.

Your first project will show one or both of two common faults: The surface of the metal will show many concentric rings where the tool has cut into the metal and the metal will buckle or ripple at the rim. To correct the first fault, use the round side of the flat tool as much as possible, and let your strokes be uniform. The second fault can be corrected by keeping the metal blank either dish or funnel-shaped without allowing the edge to turn over to



form a bell shape. Work from the center out. Do not form the metal to the exact shape at the rim until you have worked the center portion into place.

A word about the proper metals for spinning: Pewter is ideal; either No. 1 (plate pewter) or No. 2 (triple pewter). Do not use ley pewter (No. 3 pewter) for food or beverage containers as the lead content (20 per cent) makes it unsafe. Aluminum is harder



turned to the shape of the bottom of the object or end of the sphere, and it also has a rim to snugly take the metal blank, as shown in Fig. 17. The actual spinning proceeds as before, switching to the finishing chuck and the special follow block to complete the work. Care must be exercised in smoothing over the original break left by the starting chuck.

than pewter, but yet works nicely and takes a fine polish. It requires no annealing, and, from "dead soft" it will turn up just the right degree of hardness during the course of the average spinning. Do not attempt to work hard aluminum. If necessary to anneal, heat to about 650° and allow to cool. Copper spins nicely, but will harden during the course of the spinning and must be annealed two or three times by bringing it to a cherry red heat. Working speeds for spinning different metals, and their characteristics are given in Fig. 16.

Figs. 17 to 20 inclusive show how a spherical or pointed object is spun. The follow block cannot hold the metal blank in place during the initial shaping. Instead, use a "starting chuck," which is



"Sectional chucks" are the most fascinating to work with, and are necessary when the neck or opening of the spun object is less in diameter than some other part, which is the case with the dish shown in Fig. 21. A starting chuck is first used. This is made like any one-piece chuck, and carries the shape of the dish to the widest diameter. In the foreground, Fig. 22, you can see the dish as shaped over the starting chuck. The sectional chuck consists of a core, around which a

number of wedge-shaped sections and one "key" section with straight sides are grouped. These segments, tied together with string, are slipped over the core; then, the partly spun dish is placed over the whole chuck and the string is removed. After spinning the rounded bottom, Fig. 25, the point tool can be used to spin the constricted neck, as in Fig. 24, while the beaded edge is formed in the manner shown in Figs. 26 and 27. The dish is then slipped off the core, allowing the key section and the other segments of the chuck to be removed from the inside of the dish, as in Fig. 23.

Metal-Cutting Shears on Ladder for Sheet-Metal Workers



Sheet Metal Cut as Needed on Roof with Shears Screwed to Side of Ladder

Sheet-metal workers will find that a cutting shears screwed to one side of a ladder near the top saves time when working on roofs and eaves. With this arrangement it is unnecessary to leave the ladder to cut the various pieces of metal needed for the job. The shears consist of a length of angle iron or steel and a piece of flat iron, pivoted together as shown.

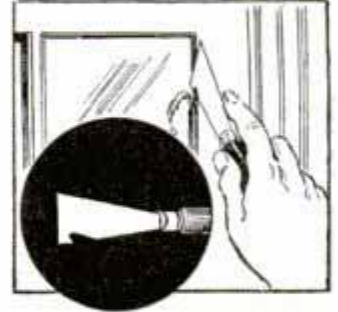
Rosin Keeps V-Belts from Slipping

Slipping V-belts can often be remedied easily, especially in cases where the load is slightly too great by liberally coating them with finely powdered rosin. The surface of the belt should be softened slightly before applying the rosin. If the belt is leather this is best done by coating it with

castor oil, but in the case of rubber or canvas belts, a thin coating of graphite should be used.

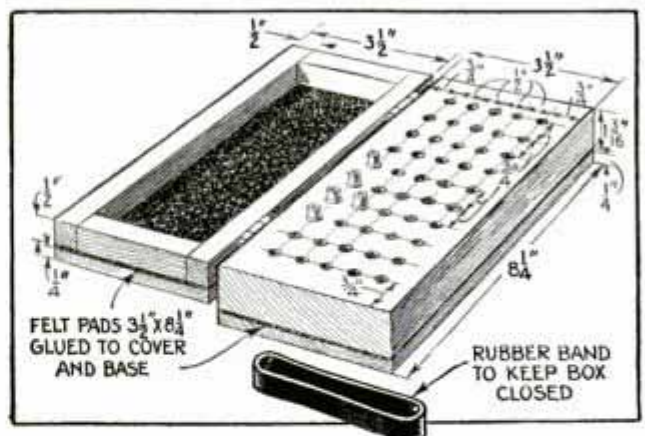
Tool Removes Old Putty from Window

To remove old putty from a window for putting in a new glass, a glazier notched one edge of his putty knife to leave a sharp point as indicated in the detail. With the knife fixed this way, most of the putty is removed at one sweep of the hand.—A. H. Waychoff, Tempe, Ariz.



Safety Box for Blasting Caps

In an effort to avoid injury caused by blasting caps accidentally exploding in workers' pockets, the U. S. department of agriculture has designed a safety box to carry them. It consists of a small hardwood block and a hinged cover, the former having several 1/4-in. holes drilled through it to hold the caps. Layers of felt glued inside of the cover and over the holes on the bottom of the block help to cushion the caps. The bottom is a thin piece of

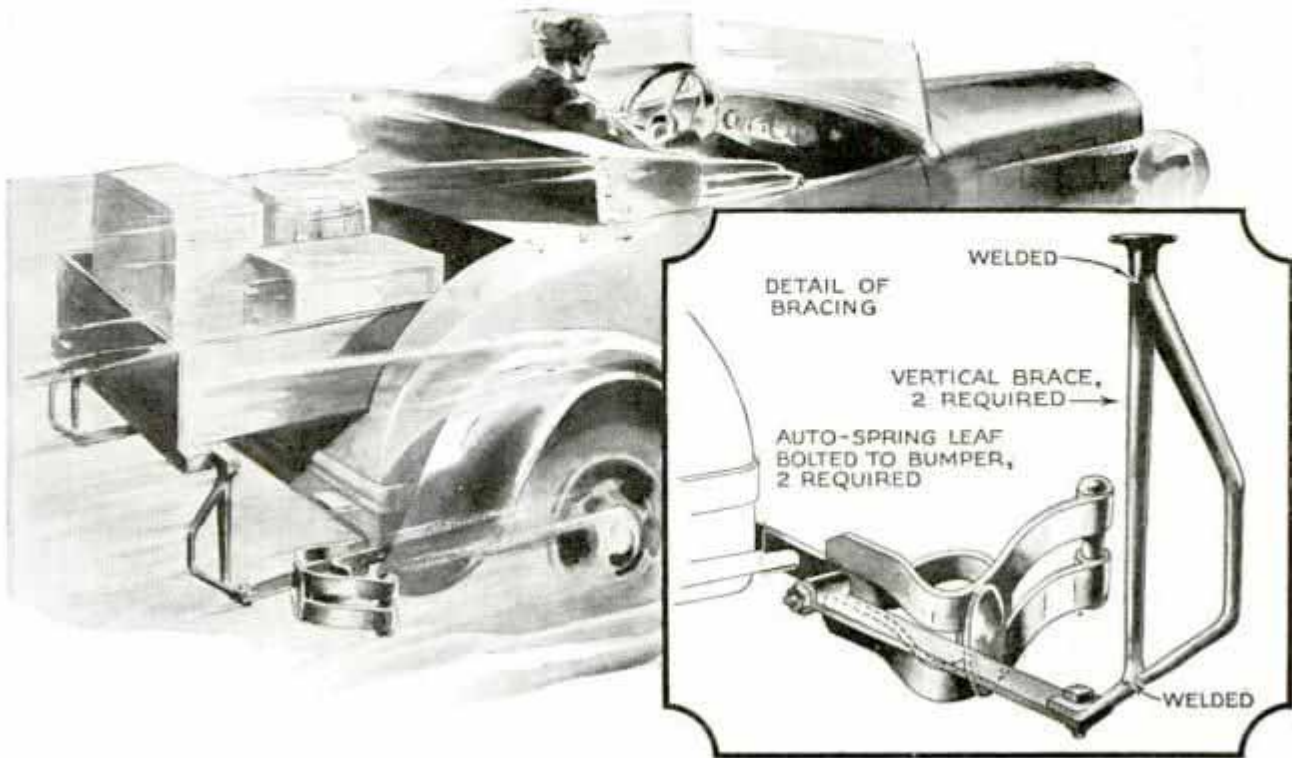


Cushioned Box Made from Hardwood Block for Carrying Blasting Caps in the Pocket

wood screwed to the underside of the block over the felt.

☐ A discarded piston ring that has been broken in half and the ends wrapped with tape makes a good bearing scraper.

Removable Box for Light Hauling in Coupe

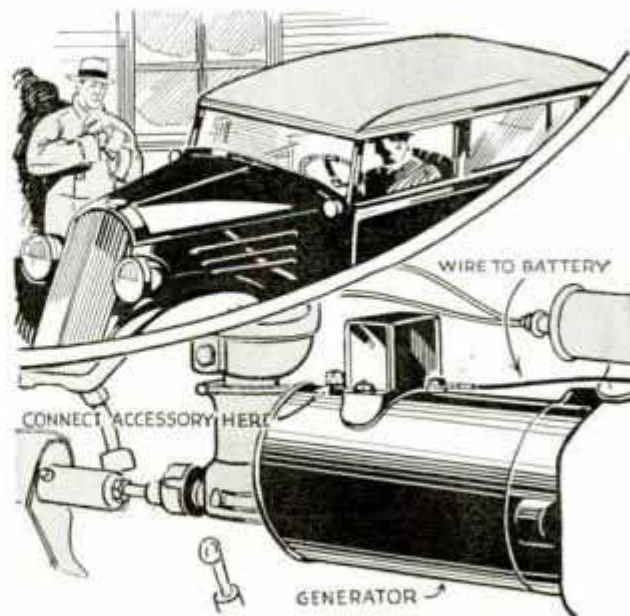


On coupes having no spare tire in the rear and equipped with bumperettes, a box for light hauling can be quickly installed in the rear compartment. Simply remove the cover and slide the box in place. Two vertical braces, bent and welded as indicated, and bolted to sections of old auto spring, support the rear end of

the box, which projects about 2 ft. beyond the car body. The rear bolt of each bumper is removed and a longer one substituted to reach through the eye of the spring leaf. With the leaf resting on the lower member of the bumper, this arrangement is sufficiently strong. To remove the box, take out the two bumper bolts.

Car Accessories Connected to Prevent Discharging Battery

Car batteries are often discharged by inadvertently leaving some accessory such as a defroster, fan or heater motor turned on after parking the car. This trouble can be avoided by connecting one wire of the accessory to the ground of the car, which is the motor or chassis frame, and then running the other wire to the electrical cut-out which is connected to the generator. There are two terminals on the cut-out and if you are in doubt which one connects to the generator, hook the accessory wire to each one in turn while the motor is stopped. The terminal that does not supply current to run the accessory is the one to which the wire should be permanently connected. In this way, the accessory will function only when the motor is running and there will be no current consumption from the battery at any time as all the



current comes directly from the generator terminal.—C. E. Packer, Chicago.



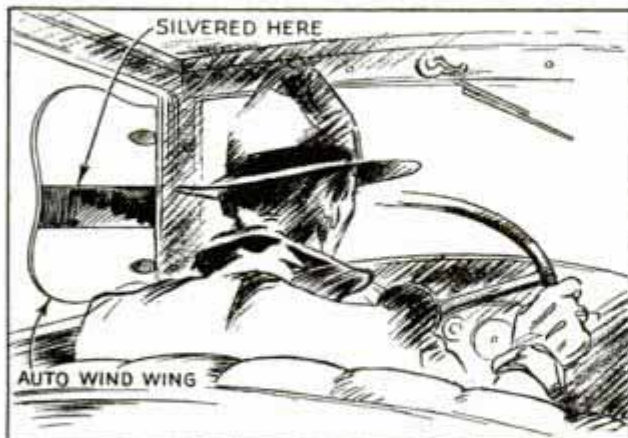
Notched Hardwood Strips Pivoted to Corners of Garage Hold Hinged Doors Open

Foot-Operated Checks Hold Garage Doors Open

Simple checks for holding garage doors open can be made as indicated. Each one consists of a hardwood strip notched near one end and pivoted to the corner of the garage as shown. A stop pin projecting from the side of the building holds the check in position so that the door, when opened, engages the notch. To release, press the projecting end with your foot.

Rear-View Mirror on Auto Wind Wing

Desiring a rear-view mirror on the side of my car, and, at the same time retain full use of my wind wings, I had a strip 4 in. wide silvered across the center of the



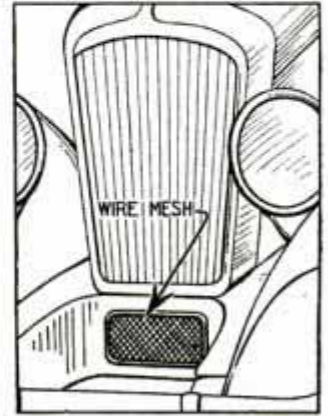
Silvering Center of Wind Wing Provides Adjustable Rear-View Mirror on Side of Car

wing. This does not interfere with one's vision and is easily adjusted to suit the driver. Two thin coats of waterproof var-

nish should be applied over the silvered portion to protect against rain or other moisture.—Eddy L. Brown, Los Angeles, California.

Grille in Splash Apron Helps Cool Cylinder Oil

When a car is driven at sustained high speed, the oil often gets hot and thins out rapidly. On many new cars, this trouble is eliminated by providing an oil cooler. However, on the older cars, the temperature of the oil may be kept down considerably by cutting an opening in the splash apron under the radiator to provide better circulation of air around the oil pan. The opening should be covered with a grille made of heavy wire mesh.—D. Cliff, Boston, Mass.



Flushing Steering-Gear Housing with Hot Oil

It is a good idea to thoroughly flush out old grease in the steering-gear housing on a car periodically, but this is a difficult job on many cars as there is no drain plug. However, if a quart of hot cylinder oil is slowly pumped into the housing and allowed to run out of the filler plug, most of the grease will be dissolved and will then pass out with the oil.



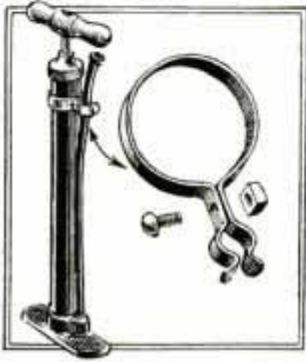
Tight Hose Connections for Auto Water Systems

When renewing auto-hose connections, you can make a tight-fitting job that will not leak by getting a size of hose that is just a trifle too small to be forced over the nipples of the tank and block. The ends of the hose are soaked in gasoline for

an hour, which will cause them to swell enough to be slipped in place. As soon as the gasoline evaporates, the hose will shrink and grip the nipples so securely that hose clamps are hardly needed. However, it is advisable to use clamps as the hose will have a tendency to stretch when it gets old and the rubber loses its elasticity. Hose having wire or extra heavy fabric reinforcement, will, of course, not respond to this treatment.

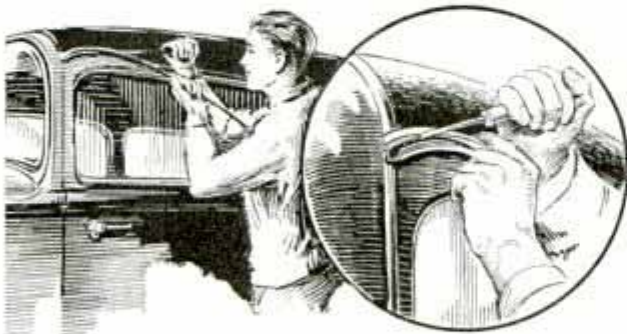
Clamp Holds Free End of Pump Hose

To keep the air hose on his tire pump from becoming entangled with tools in his kit, one car owner fastened the free end of the hose to the pump with a clamp. This was made from a strip of spring steel as shown, and was attached with a stove bolt to the pump cylinder.



Removing Gutter Tape from Car Top

When renewing the covering on car tops, especially those on which the covering extends down over the edge of the top, the gutter and metal tape along the edge can be used again if they are removed undamaged. To do this, insert a dull screwdriver blade under the tape at one end and pry it out. Then shove the tool point along between the gutter and the upper edge of the tape, after which the gutter is



Screwdriver Used to Remove Gutter and Metal Tape from Car Top before Renewing It

prried off. To replace the tape, reverse the procedure, pulling the screwdriver backward as shown.

One-Wheel Truck for Carrying Storage Batteries

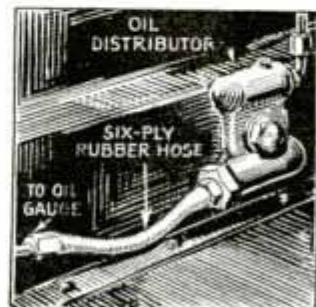


Simple Truck Improvised from Pipe and Fittings for Carrying Storage Batteries in Garage

Because his regular battery truck was frequently borrowed by other mechanics in the shop and seldom at hand when needed, a battery repairman in a large garage made a truck especially for his own use by assembling a 4-ft. length of 1-in. pipe, a tee and a large castor as shown. The castor was held in a hardwood plug driven into the tee, while two iron hooks fastened to the pipe carried the battery.

Rubber Hose Stops Knock in Oil-Gauge Pipe

Sometimes a car will get an annoying knock in the pipe leading to the oil gauge caused by back pressure on the oil pump. To eliminate this trouble remove a short section of the pipe near the pump or oil distributor and install a piece of six-ply rubber hose. The hose should have an inside diameter at least $\frac{1}{16}$ in. larger than the outside diameter of the pipe.—J. L. Baker, Cooper, Tex.





Monkey Wrench Clamped to Edge of Drawing Board Supports It at Angle on Bench Top

Wrench Supports Drawing Board

When you use a drawing board on a bench or table top and wish to set it at a

convenient working angle, but cannot find a suitable block or prop, a monkey wrench will often solve the problem. It is clamped to the upper edge of the board, at the center, as shown, so that it projects vertically. This method of supporting the board is better than the use of props as it does not permit the board to slip off. Also, by thus eliminating blocks, there will be plenty of space under the board which may be used to lay the finished work.

Stenciling Paint for All Materials

A good all around water paint that is suitable for stenciling labels and addresses on shipping packages is made by stirring soluble casein, 1 lb., into boiling water, 5 qts. A small amount of eosine red, nigrosine black or other water-soluble aniline dyes should be dissolved in the water before adding the casein to give the color desired.

The Next Issue

DRESSING UP YOUR HOME FOR CHRISTMAS

Five interesting pages that describe simple methods of getting striking, decorative effects in and about the home, which help to put over the yuletide spirit.

A HAND-CARVED BUFFET, SIMPLIFIED

Method of carving shown in successive steps enables anyone to reproduce this luxurious buffet, or you may imitate the carvings with scroll-sawed overlays.

HOW TO USE WOOD-TURNING TOOLS

Information from an expert that really gets you acquainted with your wood-turning tools and makes it easy to do difficult jobs by getting the "knack."

CASEHARDENING IRON AND STEEL

Enables you to harden the surface of tools, machine parts, etc., so that the metal will resist bending and mechanical shocks while subjected to severe use.

MODEL-LOCOMOTIVE BUILDING

How to take and transfer accurate measurements, finish rough castings and correctly assemble a model locomotive with the least loss of time and labor.

LIGHTED WALL AQUARIUM

Small aquarium hangs on the wall like a picture, and its indirect, electric illumination, in color if preferred, makes an attractive display for your fancy fish.



Ride the CHAMPION Motorcycle

FEEL the thrill of power that has won victory's checkered flag for Harley-Davidson on track and hill all year.

Seldom has one make of motorcycle won so many outstanding victories in a single season. In races, endurance runs, and hillclimbs Harley-Davidsons have scored an amazing total of wins and clean sweeps.

You may never race your Harley-Davidson, but the surging power, flashing speed, and rugged durability are there to call on when you need them—and all riders know Harley-Davidson as the CHAMPION.

Do you know how *easy* it is to buy a Harley-Davidson, and how *little* it costs to run? Let your Dealer tell you about his easy-pay plans, and show you how readily you can afford "The Greatest Sport on Wheels."

*Send the Coupon for
illustrated literature.*

Ride a **HARLEY-DAVIDSON**

Mail this Coupon 

Harley-Davidson Motor Co., Dept. P, Milwaukee, Wis.
Interested in Motorcycling. Send illustrated literature.
Postage Stamp is enclosed to cover cost of mailing.

Name _____

Address _____

My age is () 16-19 years, () 20-30 years, () 31 years
and up. () under 16 years. Check your age group.

When writing to advertisers please mention Popular Mechanics



WHEN YOU FEEL "ALL IN"—

CRAWFORD BURTON... gentleman rider... twice winner of the Maryland Hunt Cup... dean of the strenuous sport of steeplechase riding... and a Camel smoker. Everyone is subject to strain. Hence the importance to people in every walk of life of what Mr. Burton says below about Camels.



SPORTSMAN. Rex Beach, famous big game fisherman and writer, says: "When I've gotten a big fellow safely landed my next move is to light a Camel, and I feel as good as new."

AIR HOSTESS. Miss Marian McMichael (R.N.), of American Airlines: "When the run is over, my first move is to light a Camel. I find a Camel quickly relieves any feeling of tiredness."

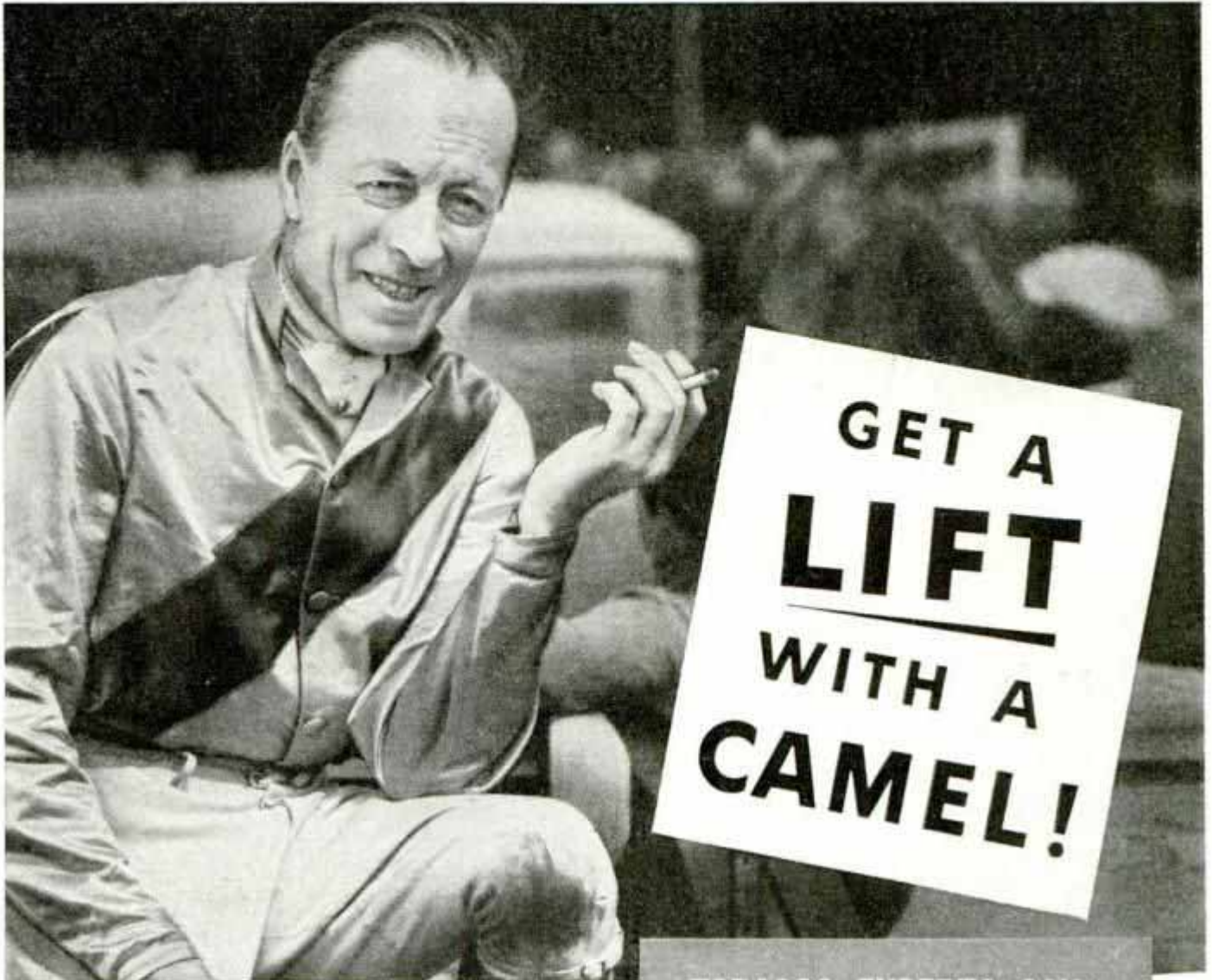


Have you ever tried way of

Crawford Burton, the famous American steeplechase rider, is speaking: "When I'm tired from riding a hard race, I feel refreshed and restored just as soon as I get a chance to smoke a Camel. So I'm a pretty incessant smoker, not only because Camels give me a 'lift' in energy, but because they *taste so good!* And never yet have Camels upset my nerves." Note these important points: that Camels

CAMEL'S COSTLIER TOBACCOS

When writing to advertisers please mention Popular Mechanics



Copyright, 1934, R. J. Reynolds Tobacco Company

this enjoyable heightening energy?

taste so good. And that they make available your stored-up energy.

You have heard the experience of others. Science tells us that Camel's "energizing effect" has been fully confirmed. So try Camels yourself. You can smoke them constantly. For Camels are made from finer and MORE EXPENSIVE TOBACCOS. They never taste flat... never get on your nerves.

TOBACCO EXPERTS SAY:

"Camels are made from finer, More Expensive Tobaccos—Turkish and Domestic—than any other popular brand."



NEVER GET ON YOUR NERVES!

When writing to advertisers please mention Popular Mechanics

TAKE *Dozens* OF SNAPSHOTS AT NIGHT



IT'S EASY. Snapshots at night are now as easy to take as snapshots in the sunlight . . . thanks to super speed film and G-E MAZDA Photoflood lamps. And they're inexpensive, too . . . for G-E MAZDA Photoflood lamps are good for two hours of picture-taking . . . good for dozens of pictures.

All you need is a camera with a fast F/6.3 lens* (use wide open), some super speed film, and a few G-E MAZDA Photoflood lamps in your light sockets. Then you are ready to snap pictures of your family, friends, parties or workshop products . . . indoors AT NIGHT!

Your druggist or camera dealer can supply you with film and lamps. General Electric Company, Nela Park, Cleveland, Ohio.

* Box cameras and folding cameras with slow lenses can get good pictures with time exposures of one or two seconds.

FOR ACTION PICTURES

and shots of babies and pets, use G-E MAZDA Photoflash lamps. They operate simply, in light socket or from flash-light batteries. Enable even box cameras to get lively night shots. Each lamp gets one picture. Retail for 15c.



**GENERAL  ELECTRIC
MAZDA PHOTO LAMPS**

FIGHTING FIRES IN YOUR HOME

(Continued from page 884)

a crack. If the air is cool to the hand it is still safe to arouse the other occupants and attempt to escape by the stairs; but if hot air rushes in and the pressure tries to blow the door back, slam it shut and don't open it again, even if there are others on the floor who should be aroused. A whiff of hot air and you will not be able to do anything for them or yourself.

Your window is seldom more than half open. Use a chair to smash the glass and make the opening as large as possible. The more air you have to breathe the longer you can survive. Then shout to arouse the neighbors or passers-by. Unless it is so short a distance that it is safe to do so, don't jump except as a last resort. Tie your sheets and blankets together to make a rope, fasten one end to the bed or some other heavy piece of furniture, and scramble down. Even if the rope doesn't reach all the way, or your strength gives out before you reach the ground, you will not have so far to fall.

If you try the stairs, crawl along the outer edge of the stairway. The smoke and heat will not be as bad there. If possible, wet a cloth and place it over your nose and mouth; it will enable you to breathe in air that might otherwise overcome you. If you enter another room, close the door behind you and take the same precautions when opening it that you did with your own. That you could safely breathe in the hall three minutes ago is no sign you can now.

The first thing to do when a big fire is discovered is to call the fire department. However, there are many times when a person, discovering the fire as it starts, can be his own fireman and possibly prevent several hundred dollars damage.

Defective electrical wiring or equipment often starts fires. How long is a short circuit? It is a short circuit as long as it is short, and the only way to eliminate it is to shut off the current. In most cases a fuse burns and the current is automatically stopped, but until it is the fire hazard is there. If you see smoke coming from any electrical source, pull the main switch and shut off the current. So know where the main switch is located. Once the current is shut off the fire may be fought the

(Continued to page 118A)

Here's how to take snapshots like this

AT NIGHT!

IT'S EASY TO MAKE THIS PICTURE

Use Kodak "SS" Film. Set your camera for 1/25 second—open lens diaphragm to *f.6.3*. Put 1 Mazda Photoflood bulb in lamp A—2 in lamp B. Distances as indicated.



Sight the subject, click the shutter—and you've made the picture. Photoflood bulbs cost 25¢ each—last for many pictures.

...with Eastman's new high-speed "SS" Film

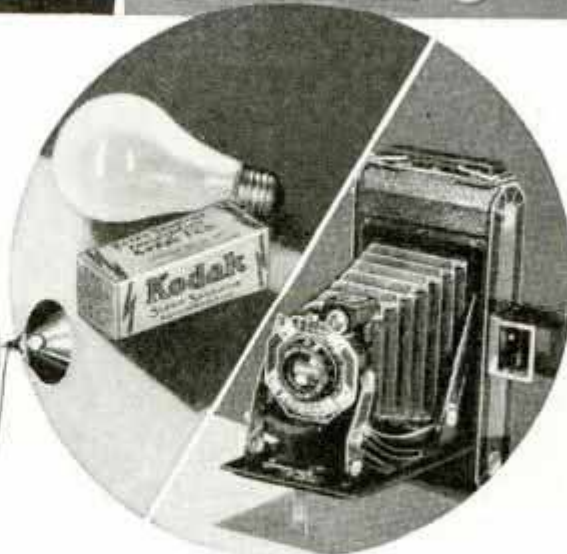
THINK HOW MUCH more thrilling picture making becomes! Now you can take snapshots indoors—at night!

All the "home life" scenes you could never get are at your finger tips—without special skill or elaborate equipment.

* Use a camera with an *f.6.3* (or faster) lens, loaded with Kodak Super Sensitive Panchromatic Film. This high-speed (extra sensitive) "SS" Film does the trick—it's three times as fast as ordinary film under artificial light.

For light, use two or three Mazda Photoflood bulbs. Just hold the camera in your hands as you would outdoors, set for 1/25 second, lens at *f.6.3* opening, and click the shutter. You've made a snapshot. Indoors. At night.

For indoor pictures at night with slower lens cameras (including box models) use Verichrome (or "SS") and a Photoflash bulb—see free folder—with camera set for "time" exposures.



KODAFLECTOR—Inexpensive, efficient... makes 2 Photoflood bulbs do the work of 9. Complete, with stand, reflectors and cord, \$5.

FREE FOLDER... complete instructions on indoor night photography. Photoflood snapshots... Photoflash pictures... all are covered in this free folder. At your Kodak dealer's—or write for your copy today. Eastman Kodak Company, Rochester, New York.

KODAK "SS"—the lightning-fast film, with the green lightning flashes on the familiar yellow box—the film that, indoors or out, in any light, improves picture quality.

KODAK SIX-20 with Kodak Anastigmat lens *f.6.3* is ideal for night snapshots. Pictures 2 1/4 x 3 1/4 inches, price \$17.50. Kodak Six-16, with *f.6.3* lens, pictures 2 1/4 x 4 1/4 inches, \$20.

IF IT ISN'T AN EASTMAN, IT ISN'T A KODAK

THEY SHOOT 'EM ANYWAYS!

(Continued from page 859)

them safely back to the office. However, science has been busy in the newspaper cameraman's behalf, developing new types of cameras for special kinds of work. One is of the "candid camera" type, being small but with a powerful lens. With a camera of this type the photographer can take pictures without brilliant illumination or flashlights and the camera is so inconspicuous that the subject seldom knows he is being photographed. Still another news camera is equipped with a powerful telephoto lens. Such cameras are used at prize fights for, contrary to general opinion, the photographer does not sit in a ringside seat, but in a balcony eighty feet or more from the ring.

The very latest scientific achievement in newspaper cameras is the color camera. By its use, the newspaper is enabled to reprint news pictures in actual color. Due to its complicated operation and the length of time necessary to take a picture, the color camera at first could only be used for posed pictures. But the color picture camera has been so far developed that it has already taken such news pictures as naval planes in flight and courtroom scenes. The color camera is now actually in advance of the mechanical facilities of the newspaper. So far the complexities of printing are such that a color picture may be used only in a Sunday newspaper or a magazine but in the near future, newspapers probably will begin to use color pictures.

What are the chances of the young man to break into the ranks of the newspaper photographer? Very good, according to Mr. Sileo, who points out that newspapers are demanding more and more pictures to tell the story. While such outstanding dramatic pictures as the sinking of the "Vestris" in 1928 were snapped by an amateur it is rarely that a chance accident such as this occurs in which the amateur may prove his mettle. The best way for an outsider to break in, is to submit pictures as a correspondent from his home town, to attract the attention of the photo editor. These, if they possess sufficient news value, are used. Still another way is to start to work in the darkroom of a news photo bureau or newspaper. Some of the best newspaper photographers have gone up the ladder by this method.

FIGHTING FIRES IN YOUR HOME

(Continued from page 116A)

same as any other—with fire extinguisher, water, or by stamping it out.

If that pan of boiling grease on top of the stove starts blazing, don't throw water on it. Water will most likely cause the pan to overflow, spreading the flaming liquid to other parts of the kitchen, also the water will turn to steam and may scald you. When frying in deep fat, keep a lid handy—one larger than the pan. If the fat blazes up, clap the lid over the pan and the fire will die for want of air. If the flaming grease has spread to other parts of the room, throw on sand, salt or flour. If the roast in the oven catches fire, shut the door and let it burn itself out.

If you smell gas, don't strike a match to look for it. Spread soapsuds over the suspected pipe and watch for bubbles. All big fires start from little ones. So keep a good fire extinguisher handy, be sure it is in working order and know how to use it. And remember to direct the stream at the base of the blaze, not just in its general direction.

To avoid being trapped in that top floor bedroom, put in a skylight or an automatic vent above that open stair well. If you are handy with tools, you can make the vent yourself. All you need is a door in the roof, counterweighted so it will open outward. A fusible link, which melts at a temperature of 165 degrees, holds the door closed, but when the heat begins piling up the link melts, the door opens, and gives the fire a natural vent. The door will do nothing to extinguish the blaze, but it will make it possible to remain alive on that top floor long enough to escape.

If your house has a flat roof and you prefer a skylight, don't make it of heavy wired glass that will not break. Before the air becomes too hot to breathe you want that skylight to break. Therefore make it of ordinary window glass, and put the protecting wire above or below it. A hail storm might break the glass, but a new pane is cheaper than a funeral.

☐ Popular Mechanics Magazine does not publish the name of the maker of, or dealer in, any device described in its pages, but this information will be furnished by our Bureau of Information upon request, accompanied by stamped envelope.

Socony-Vacuum Announces REVOLUTIONARY DISCOVERY IN OIL REFINING!

...that will save Millions of Dollars for Motorists this Winter

Socony-Vacuum Clearosol Process purges oil of impurities..New Mobiloil Arctic starts easier . . lasts much longer . . protects engines in zero weather.

THIS WEEK Mobiloil dealers are selling a new kind of Mobiloil Arctic, made in a new way called the Clearosol Process.

By actual test, this oil makes starting as much as 50% easier—lasts up to 25% longer—eliminates gum and sludge.

It flows quickly at low temperatures, yet holds its body under extreme ranges of heat.

Because it holds its body no matter how hot your engine may get, parts *keep clean* . . rings never get stuck . . valves don't gum up.

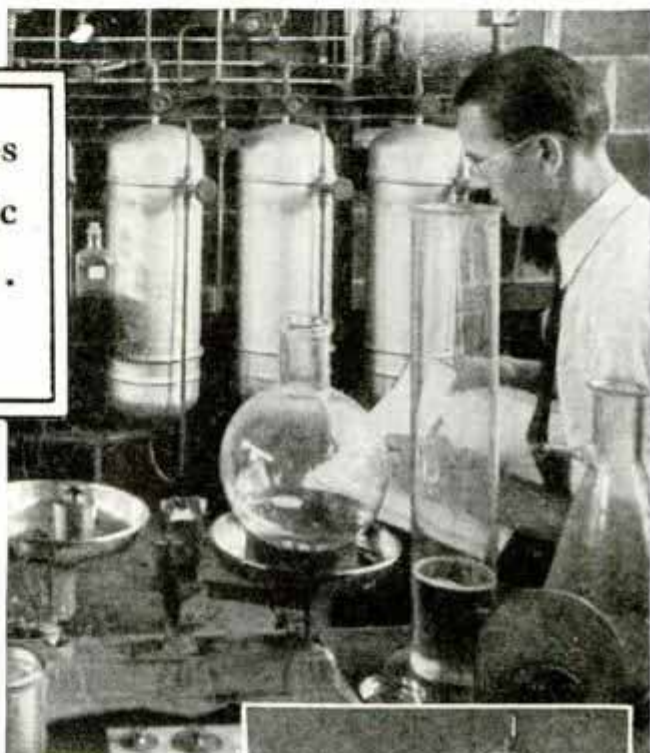
You may well ask, "How does all this happen?" The answer lies in a new approach to oil refining.

In the past, refiners tried to remove natural impurities from oil by acid baths and filters. Socony-Vacuum found a way to *wash away* these non-lubricating elements.

Here's miniature refinery where Socony-Vacuum worked on Clearosol Process. Big tanks like those below hold materials that wash away impurities.

Our new process actually *dissolves* impurities—much as soap and water dissolve dirt! The oil that results is practically 100% pure. Such an oil is naturally worth more to you, but we haven't increased the price per quart by a single cent.

Now is the time to prepare your car for Winter driving. Drain off your Summer oil—and refill now with clean, fresh Mobiloil Arctic. Just go to the dealer who shows the Mobiloil sign with the red Gargoyle—or the familiar sign of the Flying Red Horse. SOCONY-VACUUM OIL CO., INC.



Mobiloil Arctic

MADE BY THE NEW SOCONY-VACUUM CLEAROSOL PROCESS



Do you know how

● To fix furniture and household articles heretofore unfixable?

● To glue permanently . . . models, boats, and all woodcraft?

● To make and repair sports equipment (skis, fishing rods, toboggans, gliders, etc.)?

● To make your own waterproof crack-filler?

**FREE
BOOK**



**TELLS
HOW**

Send for YOURS . . . today

Every handyman, home-craftsman and manual-training student should have this interesting and helpful Gluing Guide. It contains dozens of money-making and money-saving ideas on building, repairing and mending things easily and permanently. It tells how you can glue everything to stay glued . . . in spite of moisture, heat, rough usage or plain neglect.

YOU WILL ALSO RECEIVE

at no cost, a generous trial package of CASCO Waterproof GLUE . . . the same super-strength, wonder-working adhesive used in big woodworking and furniture factories. You will be amazed and intrigued to find that CASCO—a clean, non-odorous powder—mixes so quickly in cold water, forming a creamy, easy-spreading glue that makes all jobs permanent, heat-proof and moisture-proof.

**The Big Secret of
CASCO'S Great Strength**

Unlike ordinary glues and pastes, which harden merely by evaporation, CASCO sets chemically like concrete. You only have to glue it once with CASCO.

Your Hardware Dealer carries CASCO in 10c, 25c, 40c and 65c cans. Also 5-lb. and 10-lb. sizes.

TEAR THIS OUT...MAIL TODAY
(Save 2c—stick it on a penny post card)

THE CASEIN MFG. CO. OF AMERICA, INC.
350 Madison Avenue, New York, N. Y.

Please send me my copy of the CASCO Gluing Guide together with your free trial sample.

Name

Street

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

P.M. 12-34

Suggestions That Help in Gluing Work

An ordinary feather will be found helpful for applying glue in difficult places such as inside corners, dowel holes and small mortises. Another difficult gluing job is the application of ornaments, overlays and light moldings to flat surfaces, as the glue will often squeeze out into the corners next to the ornament. To avoid this, spread the glue on a flat board, which has been warmed slightly, press the ornament against it, and then lift it immediately and put it in place. You will find that just the right amount of glue will be picked up to make the ornament adhere. Since shrinkage of green lumber that has been plain sawed is slightly greater on the side farthest from the heart wood of the log from which it was sawed, glue should always be applied to the side nearest the heart wood as it also has a tendency to shrink the side of the board to which it is applied. In this way, it helps overcome the slight concavity the board assumed in curing. Glue contains moisture, and when applied to wood, it causes a certain amount of swelling, which is only temporary. For this reason, do not glue up cores and then surface them down to thickness immediately, or you will have sunken places at the joints. Let the cores dry first. If you have a solid desk door or similar item which has been partly split and you wish to repair it, take a soft-wood wedge and drive it in at the end of the break. The wedge will spread the crack so that glue can be applied with a feather.—John E. Hyler, Peoria, Ill.

Glue Prevents Knot in Rope End from Untying



When knotting the end of a rope to prevent fraying, it is a good idea to dip the knot in glue and let it dry before using. This will help keep it from loosening. If the rope is to be exposed to the weather or used

where it is likely to get wet, a good grade of waterproof glue should be used.—W. F. Schaphorst, Newark, N. J.

NEW GENERAL ELECTRIC COMPLETE WORKSHOP!

6 MACHINES IN 1

Circular saw • Jig-saw • Sabre saw for wood and metal • 9-inch Lathe and 2 wood-working tools • 8-inch Disc Sander and Sanding Table • Drill Chuck with set of 9 drills.

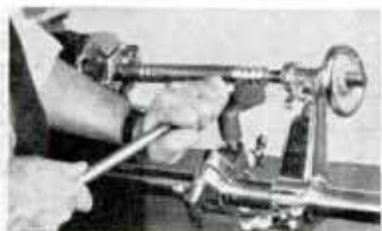
All are instantly interchangeable and adjustable. Just turn the attachment clamp and it's on or off. No bolts to loosen or tighten.



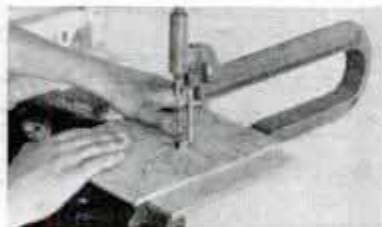
SEE IT AT YOUR
GENERAL ELECTRIC
REFRIGERATOR
DEALER



CIRCULAR SAW



LATHE



JIG SAW



SANDER

See this Efficient, Sturdy, Direct-drive Quality Machine Demonstrated. Banishes All Belts and Pulleys. Complete with Motor, Bench, and Tools

NOW General Electric offers a complete wood and soft-metal working machine for home and shop use. Direct motor-drive eliminates belts and pulleys. Special clamping arrangement makes it possible to change from one attachment to another in a few seconds. Sturdy, reinforced steel cabinet gives the machine firm support—yet it is light enough to be moved at will.

COMPLETE — COMPACT — EFFICIENT!

When you get this complete WORKSHOP—there's nothing else to buy. Motor, bench, drills, tools are all provided. G-E introduces this machine after years of research and development. Compact, high-efficiency ball-bearing motor has $\frac{3}{4}$ " shaft reduced to $\frac{5}{8}$ " at the bearings. The powerful torque and inertia of the armature assure continuous flow of power at the cutting edge. Ideal for the home craftsman, professional woodworker, or small shop. When you see its completeness—realize that there is nothing else to buy—the astonishingly low price will truly amaze you.

COMPLETE!

Motor, Bench
and Tools
43 Parts in All

\$10⁰⁰
DOWN

Balance — Easy
Monthly Payments



FREE! Write for free book giving full description of G-E WORKSHOP. Address General Electric Company, Nela Park, Dept. PM-12, Cleveland, Ohio.

GENERAL  ELECTRIC

When writing to advertisers please mention Popular Mechanics

Want to Bag More Game?



These two valuable booklets, SENT FREE, tell how to improve your shooting! How to aim, lead, practice. Proper gun weight, barrel boring, testing for gun fit, etc. "Days with Super-X" gives actual experiences with Super-X on game, from quail to geese. Hints on blinds, decoys, etc. A world of helpful information worth dollars to you. But we send them absolutely FREE! Mail Coupon today!

2 Shooting Booklets FREE!

WESTERN CARTRIDGE COMPANY,
Dept. L-46 East Alton, Illinois.

Send, FREE, the two booklets, "HOW TO HIT 'EM" and "DAYS WITH SUPER-X."

Name.....
Street or R.F.D.....
Post Office.....State.....

SCIENTIFIC—SIMPLE TO USE Book, "Revealing Nature's Wonders," Free

Made by world-famous lens specialists, the Wollensak Microscope satisfies many scientific needs, yet a bright 12-year-old can operate it. Reveals miracles of Nature everywhere around you. Yields wonderful photographs. Endless entertainment.

- No. 425—Magnifies 100 to 425 diam..... \$18.50
- No. 235—Magnifies 110 to 235 diam..... 15.50
- No. 150—Magnifies 70 to 150 diam..... 12.50
- No. 100—Magnifies 100 diameters..... 5.00
- Slide Set—Make slides at home..... 3.50

At dealers, or direct from us, prepaid. (Also C.O.D. if preferred.) Money-back Guarantee.

BUY AMERICAN

"Revealing Nature's Wonders," illustrates, describes Microscopes, Telescopes, Binoculars, Free. Write today.

WOLLENSAK OPTICAL CO.
870 Hudson Ave. Rochester, N. Y.



COMPLETE Movie Outfit

No knowledge of photography required. You can take and show movies equal to those produced by most expensive outfits. BIG VALUE.

Complete Outfit
\$1375
Postpaid

CAMERA—takes clear, brilliant pictures. Uses 16mm. film, 50 ft. roll.
PROJECTOR—shows pictures, big, clear and life-like. Uses 16mm. film. Operates from any light socket.

DON'T MISS THIS BARGAIN

We also have a complete list of film subjects for any projector. Write NOW for big, FREE Catalogue of Movie supplies.

PARAMOUNT MFG. CO.

Dept. G-75 Boston, Mass.



D1038

HIGH VOLTAGE BRINGS SUPER-POWER AGE

(Continued from page 890)

trical range in his Fifth Avenue mansion. Only a millionaire could afford the luxury of electric cooking in that day, but the mass production methods of electrified industry soon made it possible for almost anyone to enjoy an electrical dinner.

By 1920, when power-line voltages were up to 165,000, electricity was universally recognized as the ideal source of energy. In 1922, when radio broadcasting began, the voltage was up to 220,000 and power lines had a range of 250 miles. Today, Tesla himself foresees the day when industry will demand, and get, electric power through the same transmission as the radio voice.

The all-electric home is a reality.

Soon we will celebrate the completion of Boulder Dam, with a transmission line that transmits vast power to a distance of about 300 miles.

Where do we go from Boulder Dam? There is a cue to follow in the history of power development. In 1895, when transmission lines were carrying barely 10,000 volts, engineers were experimenting with 100,000 volts. In 1910, when the lines carried 110,000 volts, they were working on 220,000 volts. In 1922, when transmission was at 220,000 volts, engineers studied the possibilities of 1,000,000.

As Boulder Dam is hurried into operation with 287,000 volts, the research staff in General Electric and investigators of Massachusetts Institute of Technology are studying currents of 5,000,000 volts!

MYSTERIES OF EPIDEMICS ATTACKED BY SCIENCE

(Continued from page 827)

then decline and fall, later to rise again? Do weather or other conditions periodically render man easy prey for certain types of disease-producing organisms?

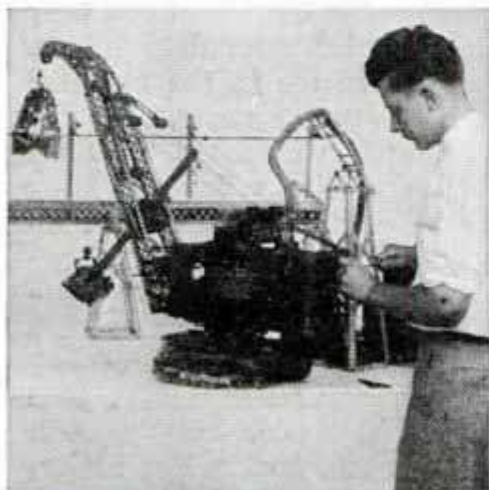
Infantile paralysis has been known, according to recent archaeological discoveries, since at least 3700 B. C. Ever since recorded history, influenza has flared up violently every seventeen years. Usually it becomes a worldwide epidemic, like that which during the world war struck 30,000,000 people all over the globe.

(Continued to page 136A)

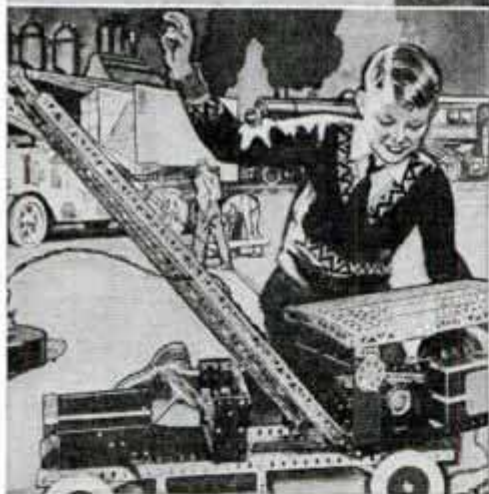
ERECTOR BOY ENGINEERS WIN

NOW COMES A FINER ERECTOR · AND A
★ BIGGER PRIZE CONTEST · FREE CHEVROLET
GRAND TOTAL OF 1,001 PRIZES!

BIG PRIZES!



FIRST PRIZE WINNER LAST YEAR— Here is Eugene White, Jr. of West Fairview, Penna., with his marvelous model of an electric crane and shovel that captured first prize in the 1934 Erector Contest. Look! It's as big as he is. Eugene had his choice of a free trip to any place in the United States, but decided to use the money towards a college education.



YOU BUILD LIKE A REAL ENGINEER WHEN YOU BUILD WITH ERECTOR

In background, a traveling magnetic crane in a steel mill that will lift $7\frac{1}{2}$ tons of metal at once.

Foreground, the traveling magnetic crane made with the New Erector No. $7\frac{1}{2}$ set.



THE NEW ERECTOR SENSATIONAL No. 7 SET—Contains the powerful Gilbert 110-volt motor, all-purpose gear box, girders, gears and other real engineering parts for building over 150 action models. Erector Sets start at \$1.00. Be sure to see the famous No. 4—the “Super-6” Erector—and the Sensational No. 7.

HELLO BOYS! Can you think of anything you can own that will give you so much thrilling fun as Erector? Just listen to this.

With Erector you can build a trench digger—with a real electric motor in it—and make it work just like the ones you see on the highways. You can construct motor trucks, fire engines, aeroplanes, locomotives. Put them together—piece by piece—with your own hands. You can build drawbridges that actually open and close—a towering ship crane such as used in Uncle Sam's Navy Yards—a mighty hoisting engine—and dozens of other thrilling engineering marvels . . . Then you can hook up the powerful Erector electric motor and make them hum with action. You are a full-fledged engineer when you have an Erector—because Erector is just like real engineering.

TUNE IN “THRILLS OF TOMORROW”—Follow “Spike” Butler in his hair-raising adventures. NBC—WEAF network, Fridays, 6:00 P. M. See your local newspaper for other NBC stations.

HERE'S YOUR CHANCE TO WIN A BRAND NEW CAR OR OTHER VALUABLE PRIZE!

How Eugene won his exciting prize is a real true story. Now you can do the same. This year I am having another Erector Contest—with *better* prizes than before. First prize is a Chevrolet auto. Then there are bicycles, cameras—a total of 1001 thrilling awards.

So right now, do these two things. First, mail the coupon below, and I'll see that you get my big illustrated “Look-'em-over” Book and an entry blank for the prize contest. Then go to the nearest toy store and pick out the Erector you want. Take your Dad along. He'll want to share in the fun . . . And good luck in my big prize contest.

Your friend,

A.C. Gilbert

FREE—Clip the Coupon

Mr. A. C. Gilbert, The A. C. Gilbert Company,
421 Erector Square, New Haven, Conn.
Send me the big colored Erector “Look-'em-over” Book and entry blank for the Erector Prize Contest—both free.

Name

Address

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

UNCLE SAM BACKS HOME BUILDING*(Continued from page 852)*

simple. The prospective builder will be required to hold a fair equity in the land or own it outright. He will be able to borrow up to eighty per cent of the appraised value of the property, this value to include the land and the contemplated structure. The maximum that can be borrowed will be \$16,000. The government will encourage long term loans, with installment payments running up to twenty years. With the monthly payments thus actually lower than rent, any family with a regular income will find it economically unsound not to own a home.

The inexperienced builder should consult an architect as the first step. The architect can not only convert your ideas into workable plans, but his services include specifying materials, obtaining estimates from contractors, and supervising the construction. The owner may deal with a general contractor, or with sub-contractors such as carpenters, painters, plumbers and electricians. In the latter case he must prepare a total estimate for submission to the lending agency. The owner may also buy the materials and hire the labor himself, or even do his own work; or he may turn over all details to the architect or general contractor.

With the Production Credit associations, organized under the farm credit act, already in operation, and with the housing survey conducted by the department of agriculture already completed, the farmer will be able to obtain more help in planning than will the city dweller, at least until the federal housing administration has a chance to catch up. Complete working drawings for forty-two types of rural houses are already prepared, and may be obtained at five cents a sheet. County commissioners and local lumber dealers have been furnished with catalogues of these plans, or may obtain them from their State Agricultural College. The farmer may thus select the type of dwelling he desires to build and obtain a full set of blueprints for about \$1.50, while his city cousin must pay an architect for similar drawings. Blueprints for barns, silos, chicken houses, and other farm buildings may now be obtained through the same agencies at prices that barely cover the cost of printing.

**C 2006
THE MAKING OF A SLED DOG***(Continued from page 894)*

government scientists have been working on the case for years. First the animals have a heavy discharge from eyes and nostrils. Then comes a complete loss of appetite. Then follows paralysis of the hind quarters. Then death. They die four to eight days after the first symptoms and ninety per cent of the cases are fatal.

The dogs are trained from early life to take their place in the harness. Soon they learn to follow a leader, and pull in unison. When traveling over ice in the extreme cold weather they wear boots, else the contact with the ice would rip the flesh from their feet. In recent years husky dog derbies are being run at a variety of winter resorts, with three-day races customary in the eastern resorts and two-hundred-mile events the rule at the northern frontier towns. The course for three-day races is usually forty miles a day. The dogs usually make the forty-mile runs in better than four hours. At The Pas, northern Manitoba, and other frontier posts, the race is a straight long-distance endurance contest, with no breaks in the course.

In the three-day races the driver may not change any of his dogs, nor alter their positions once the first day's race is finished. The dogs are marked with black paint so a driver cannot substitute. If one of the dogs breaks a leg or becomes sick, the driver must get along as best he can with the remaining team. And it is not unusual after a hard race to find one or more of the dogs riding the sled at the finishing point. Scouts are posted along the route, and the slightest sign of cruelty to dogs disqualifies a racer. The course in the east is usually along fairly clear roads, but a heavy snowstorm may make traveling hard.

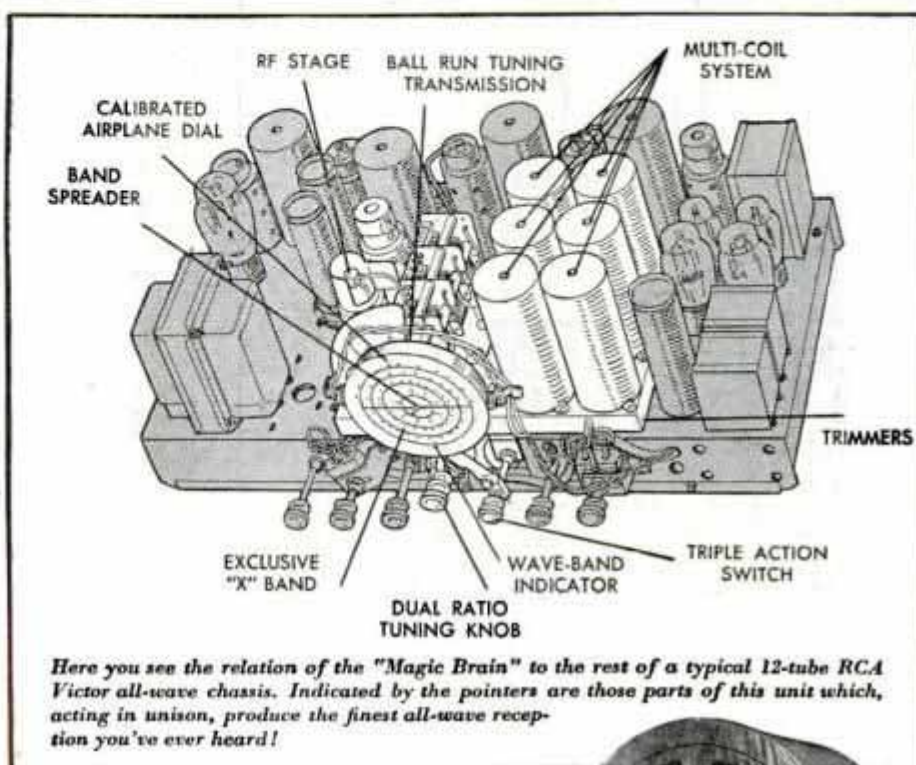
Drivers run behind their sleighs. When the team is going at good speed, the driver rides on the runners. Going up hill he always pushes to help the dogs. In snowdrifts he clears the way as much as possible, for time counts, and the dogs must not be too tired from this sort of work. Fish and meat are fed to these dogs. In the north more fish than meat is on the diet, for fish is a staple food, while meat is expensive. Racing dogs, liable to win purses running into thousands of dollars, are fed red meat in addition to fish, even in the northland.

Science develops a "Magic Brain"

that makes All-Wave Radio actually think!



RCA Victor engineers produce uncanny governing unit in all-wave chassis that is directing force for superior long- and short-wave performance



Here you see the relation of the "Magic Brain" to the rest of a typical 12-tube RCA Victor all-wave chassis. Indicated by the pointers are those parts of this unit which, acting in unison, produce the finest all-wave reception you've ever heard!

Here's the new and exclusive RCA Victor development that permits far greater latitude in all-wave performance. Human in its power of selection and direction of discovering signals, it can be compared to the human brain.

RCA Victor engineers have succeeded in designing the radio frequency ahead of the first detector so that it functions with equal efficiency on all bands. It amplifies the signal you tune *four times*, without acting on noise, cross-talk, image frequencies or other interfering factors. Thus, the wanted signal is *supercharged*, resulting in a four-to-one signal-to-noise ratio and a practical elimination of back-ground noise and cross-talk. Reproduction is clear, with a higher-fidelity tone.

The second great advantage is a separate and distinct set of three coils acting for each band. Each coil is trimmed or adjusted individually for maximum performance.

You get an enormously increased

range in these new receivers—as much as 140 kc to 36,000 kc! Everything, practically, in the world of radio is yours. Also, in "Magic Brain" chassis of 8 tubes or better, an exclusive "X" band is provided—for hourly U. S. Government weather aviation reports. An interesting pamphlet on the "Magic Brain" is offered you, free. Use coupon below.

GET THE INTERESTING ANSWERS to these "Magic Brain" Questions!

- What is the "Magic Brain"?
- Why you get higher fidelity tone?
- What are the 3 reasons for the RF stage?
- How does the multi-coil system work?
- Why is it so necessary?
- Why is high "Signal-to-noise" ratio good?
- What extra mechanical features has it?
- How wide is the KC range?

—the answers to these and many other questions are given for you in a free pamphlet. You are invited to get your copy. Use this coupon now.



TABLE MODEL 128. "Magic Brain" Superheterodyne, domestic, foreign, police, amateur wave \$69.95 bands

"X" Band is on all sets of 8 tubes or more RCA Victor Instruments priced from \$18.75 to \$375, equipped with RCA Micro-Sensitive Radio Tubes. All prices F. O. B. Camden, N. J., subject to change without notice. Any short-wave radio performs better with RCA World-Wide Antenna.

RCA Victor Co., Inc., Camden, N. J. Dept. M

I'm interested in getting more details on the "Magic Brain". Kindly send me the pamphlet you mention.

Name _____

Address _____

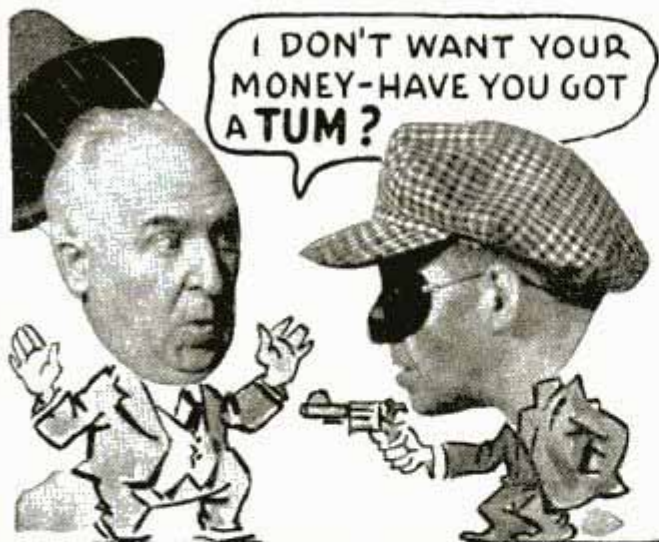
City _____ State _____

RCA VICTOR



RCA VICTOR CO., INC., ONE UNIT OF RADIO CORPORATION OF AMERICA . . . THE WORLD'S LARGEST RADIO ORGANIZATION. OTHER UNITS: NATIONAL BROADCASTING CO., INC. . . . R. C. A. COMMUNICATIONS, INC. . . . RCA RADIOTRON CO., INC. . . . RADIOMARINE CORPORATION OF AMERICA

When writing to advertisers please mention Popular Mechanics



MILLIONS DEMAND TUMS FOR GAS . . . HEARTBURN

IT'S liable to happen any time—that dreaded attack of acid indigestion. That's why most sufferers keep TUMS handy for an emergency. No need to be held up by fear of heartburn, sour stomach, or that nauseating gassy fullness, when your favorite foods appear on the dinner table. Millions now know that TUMS do not contain soda or any water-soluble alkali—to over-alkalize the stomach or harm the kidneys. When TUMS correct the acid condition any excess passes off inert and unabsorbed. 10c a roll at any drug store. The 3-roll package containing handy metal pocket carrier, only 25c.

Free

1935 Calendar - Thermometer, beautifully designed in colors and gold. Also samples TUMS and NR. Send stamp for postage and packing to A. H. LEWIS CO., Dept. 21-FJJ, St. Louis, Mo.



TUMS ARE ANTACID . . . NOT A LAXATIVE

For a laxative, use the safe, dependable Vegetable Laxative NR (Nature's Remedy). Only 25 cents. **NR**

LOG SAWS

MAKE MONEY-BE YOUR OWN BOSS

Turn Your Trees Into Cash

Be independent, start a wood sawing business, have money coming in all the time. Use the portable engine year 'round. Pays for itself. Low factory prices. Big FREE Catalog.

USED BY THE U.S. Gov't.

WITTE ENGINE WORKS
6749 OAKLAND AVE. KANSAS CITY, MO.

VEST POCKET ADDING MACHINE

Adds, Subtracts, Multiplies, Divides. Does work of costly machine. Not a toy. Million dollar capacity. Simple and accurate. Guaranteed 5 years.

FREE TRIAL **\$2.50**
—SEND NO MONEY— Total Cost

Just name and address. We will ship Calculator immediately. On delivery, pay postman \$2.50 (plus few cents postage). (If outside U. S. send check.) 10c additional in Leatherette Case. If not satisfied after 10 days' trial you get your money back. THOUSANDS OF SATISFIED USERS. Write for Agents' Proposition. CALCULATOR MACHINE CO. (Mfrs.) P. O. Box 1118, Dept. 31, CHICAGO, ILLINOIS

MOVIE MAGIC IN THE MAKING

(Continued from Roto Section)

script. The plot may call for a lion to chase a monkey through the jungle. In real life the monkey might dodge out of the picture or the lion might kill it. The monkey is filmed as it runs across the set alone, the cameraman swinging his camera so the monkey stays near the right edge of the film. Then the lion is made to dash along the same path and this time the cameraman "leads" so that the lion is in the left half of the picture. By blending the right half of the first film with the left half of the second a realistic chase is obtained.

In a recent picture it was necessary for the hero to ride a hippopotamus onto a set and then stab it so the animal would stumble and die right in front of the camera. The problem was solved by using a tame hippopotamus and a knife fitted with a collapsing blade. The hippopotamus came charging toward the camera and as the actor raised his knife for the fatal blow the scene was cut. The rest of the picture was made in reverse, with the hippopotamus lying down and the actor holding the knife so that it was apparently plunged in to the hilt. At a signal the animal struggled to its feet and then the actor raised his knife. When this part of the film was run backward the actor appeared to kill the animal in lifelike fashion.

The exciting screen chases that furnish thrills to every one are rarely filmed the way they appear. In some cases, such as an alligator swimming after a dog that has fallen into the water, it may be that the alligator and the dog never saw each other and the suspense is manufactured by cleverly using alternate strips from two different films. First you see the dog struggling in the water, then a shot of an alligator as it comes to the surface and looks around, then back to the dog swimming, then back to the alligator, apparently swimming in pursuit.

(Concluded next month)

Popular Mechanics Magazine does not publish the name of the maker of, or dealer in, any device described in its pages, but this information is kept on file and will be furnished by our Bureau of Information upon request, accompanied by stamped, self-addressed envelope.

BOY CHEMISTS DISCOVER AMAZING SCIENTIFIC SECRETS



SEE HIDDEN SCIENTIFIC WONDERS WITH THE NEW GILBERT MICROSCOPE—Imagine seeing a fly's foot so that it looks as large as a cat's paw—salt crystals so big they appear like lumps of ice—and thousands of other wonders of Nature and science. The powerful Gilbert microscope makes Chemistry more thrilling than ever. Packed with Gilbert Micro Chemistry Sets No. 4 and No. 7 or it can be purchased separately.



MYSTIFIES FRIENDS—WINS GILBERT CHEMISTRY AWARD—You'd never guess in a million years what Winfield Worth of Elizabeth, N. C., is about to do. With a strange chemical you cannot see, he writes a word on his bare arm. Then he brushes over it with another Gilbert Chemical—and presto—the word leaps out in a bright red color. \$50 was Winfield's reward for developing this fascinating experiment.

HOW YOU CAN
BECOME A MASTER
OF
CHEMICAL MAGIC
WITH A
**GILBERT
CHEMISTRY
OUTFIT**

WOULDN'T you like to perform thrilling experiments such as Winfield Worth and thousands of other boys are doing? Have a chemical laboratory of your own! Make chemicals change color—transform liquids into sparkling crystals—and explore countless other mysteries of the chemical world. You might win one of the cash awards Mr. Gilbert gives each year to the boys making the most important contribution to chemical research.

Ask to see the 1935 model Gilbert Chemistry Outfits at your local dealers. But—take a tip from other boy chemists—and make sure the name "Gilbert" is on the box.



GILBERT INVENTOR'S LABORATORY OUTFIT—Picture yourself in front of this marvelous Laboratory Outfit. Dazzling rows of chemicals mounted in real laboratory-style racks. Test tubes, mortar and pestle and other fascinating equipment. A big metal work tray. Large kit box, with detachable legs, that becomes a permanent laboratory. Complete with three exciting books—*Chemistry, Chemical Magic and Glass Blowing*. \$10.95. Other Gilbert Outfits from \$1. Larger sets contain additional books on *Mineralogy & Hydraulic & Pneumatic Engineering*

**\$100.00
ANNUAL AWARD**
and twelve awards of \$10.00 each

"To the boy doing what, in my opinion, is the most important chemical research in 1935, I will make a cash award of \$100.00. To the twelve boys doing the most important chemical research I will award \$10.00 each. Applicants for these awards must not be over 17 years of age, and must send me a full description of their experiments by June 1st, 1935."

A. C. Gilbert

Free Chemistry Book and Exciting Magazine—Fill out this coupon and mail it today for free copy of Mr. Gilbert's book "How to Become a Chemist" illustrating and describing each Gilbert Chemistry Outfit. Also free copy of the thrilling new magazine "Home Chemistry."

Mr. A. C. Gilbert, President, The A. C. Gilbert Co.
408 Erector Square, New Haven, Conn.

Please send—free—illustrated book "How to Become a Chemist" and copy of "Home Chemistry."

Name

Street

City State

When writing to advertisers please mention *Popular Mechanics*

RAILROAD ENGINEER

selects
**NICHOLSON
FILES**

for
exacting
home
workshop job



Mr. E. W. Leaver, twenty-nine years engineer on a leading Eastern railway system, spends his spare time building models of the locomotives he operates. The Pacific locomotive model, shown above, will have a steam pressure of 75 lbs. to the square inch, fire with coal, and pull an estimated weight of 275 lbs.

Mr. Leaver is shown using a Nicholson File to file the foundation ring for the boiler.



"For quality and durability I recommend Nicholson Files to every home craftsman in metal and wood," says Mr. Leaver. "I couldn't get along without Nicholson Files, and as for economy, they have given me the greatest value I have ever received for the money." Nicholson File Company, Providence, Rhode Island, U. S. A.

AT HARDWARE STORES EVERYWHERE

Genuine

NICHOLSON FILES 
A FILE FOR EVERY PURPOSE

Crosman SILENT .22 Rifle

NO CLEANING
LOW COST
AMMUNITION

ADJUSTABLE
POWER

PEEP
SIGHTS

FREE booklet containing important target and game shooting facts. Also free Crosman Catalog—or ask your dealer.

Crosman Arms Co., 404 St. Paul St., Rochester, N. Y.



Has a RIFLED
barrel

DARE-DEVIL "WATER BUG" RIDERS

(Continued from page 821)

may eventually attain speeds in excess of eighty miles an hour, some drivers think. An innovation among Italian race drivers is a four-cycle six-cylinder supercharged outboard fitted to a metal hull. If you have an inventive turn of mind you can join the "haywire" class and race a creation of your own design. Nothing is barred and your boat may consist of two airplane pontoons with the engine in the middle, or a hull fitted with airfoils or hydrofoils.

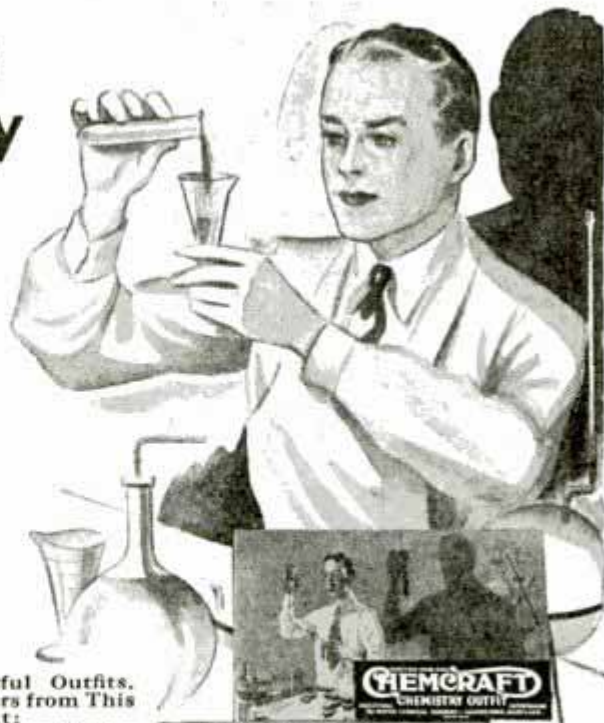
Hull designers in America who have spent most of their time perfecting the bottoms of the hulls are now turning their attention to "teardrop" designs, streamlining the decks to increase speed. One speed boat enthusiast is streamlining his engine and mounting an air rudder on it, while others are experimenting with the "front drive" in which the outboard engine is mounted almost amidships just forward of the step.

The secrets of how to "hop up" a motor to deliver as much as seven or eight miles an hour more than its original speed are revealed by R. V. Collins, motor expert and record holder. First, all roughness in the motor casting in such places as the gas passages, exhaust ports, and transfer ports, must be filed away. Then the entire engine and shaft and propeller assembly are taken down and any high spots on the bearings are smoothed off. Finally, the pistons, connecting rods, and crankshaft are balanced on a static and dynamic balancing machine in a machine shop. Racing rules also allow slightly oversize pistons that fit tightly in the cylinders, but unless you are willing to chance burning up your engine they are not advised until you become an expert at controlling engine temperatures by regulating the carburetor mixture.

Next, you want a blended fuel composed of alcohol, benzol, and castor oil. Then, with half a dozen propellers of different size and pitch and several sets of spark plugs, your engine is ready to race. Whether your boat will be "hot" will depend a good deal on the particular propeller and spark plugs you decide to use. Winning drivers make their choice according to whether the water is fresh or salt, the altitude, the amount of chop on the water, and even the humidity.

Master the Wonders of Modern Chemistry

with a
REGISTERED TRADE MARK
CHEMCRAFT
 CHEMISTRY OUTFIT



WORK wonderful experiments that will show you the secrets of Modern Chemistry; surprise your friends with feats of marvelous Chemical Magic; learn lots of things about Science and Chemistry and astonish everybody with your knowledge of chemical processes—and have a plenty of fun and entertainment at the same time. You'll say it's the best thing you ever did!

It's all easy with a CHEMCRAFT Chemistry Outfit. You can produce hundreds of chemical changes and reactions that will give you reliable information on Chemical Science. You can perform tricks and stunts, too that will keep everybody guessing. These Outfits are scientifically correct and include experiments on every suitable subject of chemical research.

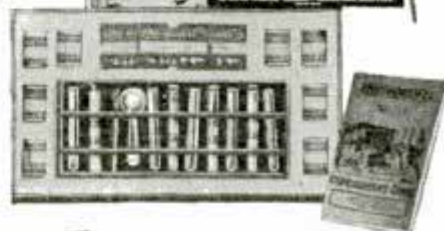
Most Complete, Accurate and Scientific Outfits
More Experiments : Superior Chemicals

Each Outfit contains safe chemicals, all laboratory equipment and a Manual of Instruction. You can repeat every experiment many times. CHEMCRAFT is the original of all chemistry sets; endorsed by teachers and professors, used in schools and colleges; and this year offers greater value than ever—the best of everything in Chemistry!

8 Wonderful Outfits. Select Yours from This Assortment:

No. 1	\$1.00
No. 1½	1.50
No. 2	2.00
No. 3½	3.50
No. 5	5.00
No. 10	10.00
No. 15	15.00
No. 25	25.00

Test Tube Racks now included in all Outfits from \$1.50 up.



MAKE THIS YOUR



CHRISTMAS!

Look for these Outfits in any store where toys are sold. Look for the name CHEMCRAFT on the box; nothing else will give you the same pleasure and information. If the Outfit you want is not obtainable at your local store, we will send it, fully prepaid, upon receipt of price. For additional information, send for the Big, Free Magazine; use Coupon in corner.



This is the No. 1½; 25 different chemicals and pieces of apparatus; 186 wonderful experiments and tricks explained in the Manual of Instruction. You can repeat them all many times. Handy, removable, wooden test tube rack included. A fine chemistry set for any young scientist. Price \$1.50.

The Porter Chemical Co.
 3412 Prospect Avenue
HAGERSTOWN : MARYLAND

This is our New CHEMCRAFT Laboratory Style Cabinet. A complete chemical laboratory in a handy, compact box. Nos. 7½, 10, 15 and 25 are packed in this new Cabinet.

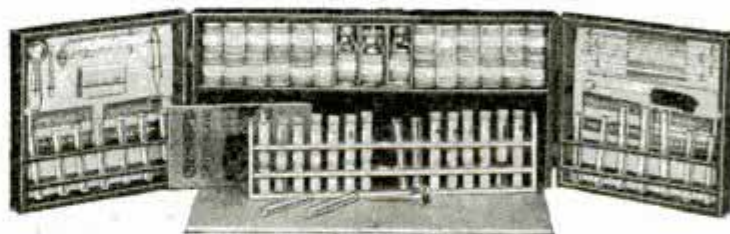
At Left—
 No. 6M—
PRICE
\$6.00



NEW MICROSCOPE SETS

They show you how to get the most information and benefit out of the new Art of Microscopy, and give you everything you need to do it with. Chemistry is combined with Microscopy; these sets contain chemicals and explain reactions that will surprise you when seen under the Microscope; also materials and instruments for preparing and observing your own specimens. The Microscopes included are high grade in every respect. Get one of these complete sets and you will not need anything additional for a long time. The FREE MAGAZINE explains all about them. Send for it!

Here is No. 5, in a strong, mahogany-finished wooden cabinet. A valuable set containing 67 chemicals and pieces of apparatus, with more than 400 instructive and amazing experiments explained in the Manual of Instruction. Much scientific apparatus is included, and a removable, wooden test tube rack. Price \$5.00



Big Magazine FREE

Contains a thrilling story of "How Bob Bronson Saved His Father's Life"; also articles and new ideas in Science and Chemistry, with full information on Chemistry and Microscope Sets.

Name.....

Address.....

When writing to advertisers please mention Popular Mechanics

SHORT WAVE PORTABLE RADIO



BUILD IT!

Compact as
a CAMERA

You'll be amazed that such a trim, small set can give such performance! This 2-Tube Band Spread Portable Short Wave Receiver brings in London, Berlin, Madrid and other foreign stations with an ordinary 15 ft. insulated wire for an antenna!

You can take it any place for it weighs but 9 pounds complete with self-contained batteries. If you want short wave reception when the rest of the family wants U. S. Stations—just take it upstairs and tune in without bothering the others. Or put it in your car and get short wave reception on your week end trip.

What a set! All you need is a screw-driver, pliers and soldering iron to build it from our easy-to-follow wiring diagrams! The price is low for such outstanding quality and performance! Complete kit of parts \$7.95, Kit of 2 tubes, add \$1.44; Kit of 6 batteries, add \$1.18; if wanted wired ready to use, add \$1.35. Coils covering 19, 25, 31, 40, 49, 80 and 160 meter bands are available at 55c each.



FREE Radio Catalog

The World's greatest! 192 pages, over 50,000 items! Big Special Sections; each a complete catalog on these subjects: Latest Broadcast and All-Wave Receivers (2-10 tubes); Public Address Equipment; Radio Replacement Parts and Tubes; Refrigerator Parts.

SHORT WAVE HEADQUARTERS

Big Short Wave Section lists everything for the Ham, Amateur, and Experimenter. Sets, Kits, Transceivers, Parts, etc. All nationally known manufacturers' lines are here.

BUILD YOUR OWN

Short Wave—All wave or Broadcast Receiver. Buy all necessary parts direct from the largest organization of its kind in the world. Scores of kits to choose from in our catalog . . . or build any set or radio device described by *Popular Mechanics* or any other technical or radio publication. You can save money here—because we sell at LOWEST WHOLESALE PRICES!

WHOLESALE RADIO SERVICE CO. INC.

NEW YORK | NEWARK | ATLANTA
100 Sixth Ave. | 219 Central Ave. | 430 W. Peachtree St., N.W.

Dept. PM-124

Enclosed find \$ for following order.
() Band Spread Portable Kit () Kit of tubes.
() Kit of Batteries.
() Send me your new FREE 1935 Catalog No. 56.

Name
Address
City State

BEGINNERS CAN BUILD THIS SHORT-WAVE PORTABLE RECEIVER

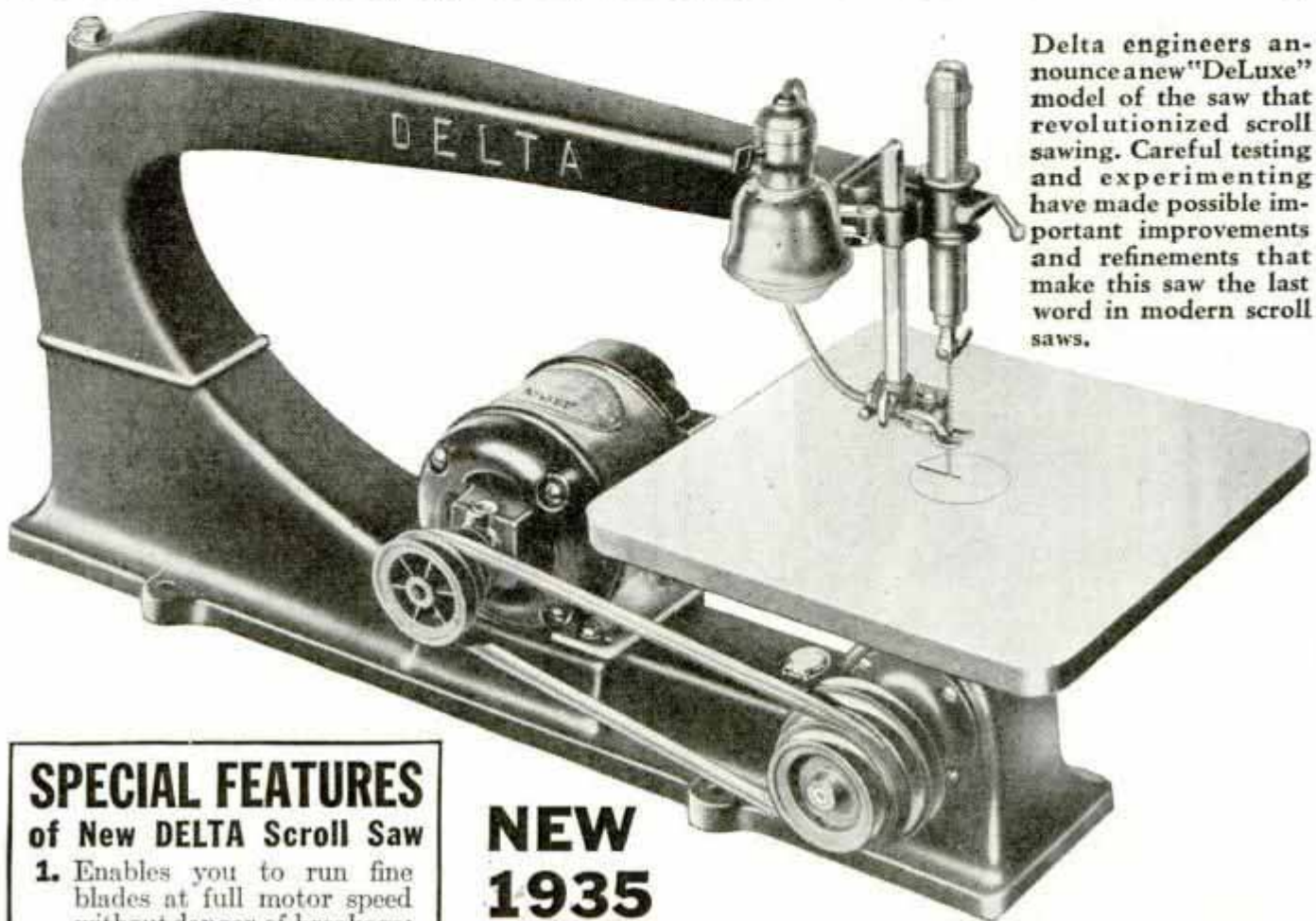
(Continued from page 903)

fitting cover plate. Regeneration is controlled with a 100,000-ohm variable resistor which is combined with the battery switch. Looking at the case from the front, the arrangement of the various tuning controls is exactly as shown in Fig. 2. The 2-plate antenna-trimming condenser is adjusted for best results, with each coil used, while the set is in operation. An open-circuit, midget-type phone jack is mounted under the tuning condenser. It is necessary to insulate the antenna-trimming condenser, and phone jack, from the metal case, but the tuning condenser and variable-resistor unit are mounted directly on the case. A complete material list may be obtained upon application without charge.

The audio transformer and r.f. choke are fastened to the bottom of the case with short flat-head machine screws. All fixed resistors, and fixed condensers, are provided with pig-tailed leads and are self-supporting. An 8-ohm wire-wound resistor is connected between the tube filaments which are in series. This resistor is soldered directly to the lug of a filament post on each tube socket; connecting wires are shown in Fig. 2, as the parts have been spread out to simplify the wiring diagram. An enlarged blueprint of the wiring and layout diagrams is available, those who wish it should specify blueprint No. 204. No. 18 hook-up wire with push-back insulation is used for all connections, which should be carefully soldered with a good grade of rosin-core solder. A hole is cut in the left side of the case, near the top, for the insulated terminal strip which is fastened to the case by means of two short machine screws. This antenna and ground-strip is clearly shown in the various photos. Note that the ground post is connected to a soldering lug placed under one of the mounting screws. In most cases an external ground gives the best results and this may be obtained with a flexible lead connected to a short, pointed brass rod thrust in damp ground, or an ice pick driven into a tree. All battery connections are clearly shown in Fig. 2. The A-battery will last a long time for intermittent use as the tubes only draw a total of 60 milliamperes.

New Scroll Saw

Offers Amazing Performance and Efficiency



Delta engineers announce a new "DeLuxe" model of the saw that revolutionized scroll sawing. Careful testing and experimenting have made possible important improvements and refinements that make this saw the last word in modern scroll saws.

SPECIAL FEATURES

of New DELTA Scroll Saw

1. Enables you to run fine blades at full motor speed without danger of breakage;
 2. Tilting table turns 90° in either direction;
 3. Adjustable blade tension;
 4. Two convenient guide positions for sawing from front or side of machine;
 5. Four speeds without moving motor;
- and many other novel and useful features.

**NEW
1935**

DELTA Motor-Driven Tools

The new "DeLuxe" Scroll Saw is but one of the many new improvements and tools announced this year by Delta engineers. This year the Delta line of motor-driven woodworking tools is more complete than ever before. Delta standards of efficiency, quality, and convenience have been strictly maintained—and Delta prices still kept at their low levels. Good compact motor-driven tools are within the reach of all. Every woodworker will find the new 1935 Delta line of unusual interest.

Send for CATALOG

The 1935 catalog of Delta quality motor-driven tools is now off the press. It is crowded with photographs and information about the new line of 1935 Delta tools. It shows how Delta tools are built to stand the grind of production work, and yet are so low priced as to be within the reach of all. Send coupon so your name will be placed on the mailing list to receive the 1935 Delta catalog without delay. Enclose only 10 cents at same time for Book of Practical Delta Projects, 32 pages of new and novel things to make with many blue prints, working drawings, photographs and illustrations—and complete directions.

NEW BOOK for WOODWORKERS

32-page book "Practical Delta Projects"—crowded with new and "out of the ordinary" things to make—with many photographs, working drawings, and easy-to-understand illustrations. Simple, complete instructions make every project easy to follow. Every woodworker should have this book. Send 10c with coupon. 1935 Delta catalog mailed postpaid.



DELTA MANUFACTURING CO.,

3775 N. Holton St., Milwaukee, Wis. Dept. A-1234.

I enclose 10c (stamps or coin), for which please send me one copy of "Practical Delta Projects." Also place me on your mailing list to receive 1935 Delta catalog of quality motor-driven woodworking tools.

Name..... Age?.....

Address.....

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

Check here if you are a Delta user now.

YOUR CHOICE
Sent for \$1⁰⁰

America's "Largest Mail Order Credit Jewelers" offer these remarkable values.

10 Months to Pay
10 Days Free Trial

Send \$1.00 deposit! State age, occupation, etc. (If possible give 1 or 2 business references.) Dealings strictly confidential. No C.O.D. to pay. Satisfaction Guaranteed or Money Back.



2 Genuine Diamonds

JL-10 . . . Never before a value like this! Dainty, Baguette-effect, ladies wrist watch; guaranteed movement. Set with 2 Sparkling Genuine Diamonds. Link bracelet. \$1.70 a mo.



\$29.75 ELGIN NOW \$17.95

JL-11 . . . Save \$11.80 on this nationally famous ELGIN Wrist Watch! Handsomely engraved. Factory guaranteed. Bracelet to match. Only \$1.70 a month.

Established 1895

ADULTS!
FREE:
38 page
catalogue
Write
Today!

ROYAL
DIAMOND & WATCH CO.
170 BROADWAY, N.Y.C.
Address: DEPT. 11-N



Both Only \$29.75

6 Certified Genuine Diamonds

JL-2 . . . Matched betrothal rings of 14K Solid White Gold. 3 certified genuine diamonds in engagement ring, 3 diamonds in wedding ring. Only \$29.75 for BOTH rings — \$2.88 a month.

JL-2A . . . Wedding Ring only \$12.50 — \$1.15 a month.



Only \$15.75

2 Initials 2 Diamonds

JL-5 . . . Gent's 10K Solid Yellow Gold ring. 2 genuine diamonds; any 2 White Gold initials on genuine onyx. Only \$1.45 a month.

HOW TO BUILD AN INEXPENSIVE SET TESTER

(Continued from page 904)

photo. The numbered pin jacks at the end of the tester are for the cabled pin-plug assembly and receiver tube-socket adapter shown in Fig. 5. The one illustrated is for a 4-prong tube and three others are required.

An 0 to 1 milliammeter is used with high-grade multiplying resistors, to make the d.c. voltmeter. The scale was drawn on white cardboard, employing the old 0 to 1 scale as a pattern. The resistance scale was also calibrated on the 0 to 10-volt range of this same meter. All connections are shown in Fig. 3 and include the open-circuit resistance jack, and 9-volt C-battery used to supply the necessary voltage for the resistance tests. The resistance scale may be calibrated easily with external resistors of known values. The milliammeter is a popular-priced dual-range type. The a.c. voltmeter is converted to read fairly accurate for quick tests up to 1,000 volts, by means of a tapped 50,000-ohm voltage divider. The taps may be adjusted from any 1,000-volt a.c. source and the scale calibrated accordingly.

ALL-WAVE ANTENNA EASILY INSTALLED

(Continued from page 901)

the container, is spliced to any length of similar twisted-pair downlead that is necessary to reach the receiver. This downlead cable consists of a pair of twisted, rubber-covered stranded wires, and is available in any desired length. The spliced connections should be soldered and well taped. Suitable strain and stand-off insulators are provided to carefully insulate the entire system from the building. The set unit, shown in the insert photo, consists of a round, flat-metal casing provided with binding posts for the downlead; also pigtailed leads for the antenna and ground posts of the receiver. This unit couples the downlead to the set and is mounted inside the cabinet as shown in Fig. 5.

Fig. 3 shows a bent antenna arrangement where space does not permit the erection of a straight-line installation. When the roof space is not sufficient for a straight line or bent type, the double-V installation shown in Fig. 4 may be used.

COSSACK JACKETS ● Flap pockets ● Heavy double nap suede cloth ● Talon Slide Fastener ● Adjustable side tabs
Talk about service! Look at this fighter. It is practically windproof and wears like saddle leather. It's eager for any job—sport—or pasture. Tan, Blue.
Even sizes, 34 to 46 inches chest. Order your actual \$4.48 chest measure. Prepaid.
DIXON MFG. CO., 912 W. 48, Kansas City, Mo.



Your Profit 100%

Sell The BRUEHL Tie Clip. A NEW—PRACTICAL and EASY to sell Tie Accessory, sold at a POPULAR PRICE—

THE KNOT is NOT TIED

The Tie is CLIPPED, Reducing WEAR-WRINKLING and CRUSHING

Write for INFORMATION and AGENTS PROPOSITION

The CLIP has already PROVEN its ACCEPTABILITY with many TIE CONSCIOUS Men. Send 25c for sample Clip.

THE BRUEHL TIE CLIP CO., INC., 723 BRISBANE BLDG., BUFFALO, NEW YORK

WORLD WIDE ALL WAVE RADIO \$1.95



Get stations all over the world with this POWERFUL radio receiver! All Wave—15 to 600 meters! Works on two inexpensive batteries! NOT a toy or attachment! Results Guaranteed! Ace kits include all parts mounted on attractive metal chassis and panel. Clear picture instructions. Wire it yourself! It's easy!
ONE TUBE KIT—\$1.95 ● **TWO TUBE KIT—\$2.85**
ALL ELECTRIC 105-125 volt A.C.-D.C. two tube home current set. No batteries needed! Complete Kit \$3.65
Kits wired 75c extra. Tubes 85c ea. Double Phones \$1.25
ORDER NOW! Send \$1. balance C.O.D., or postpaid if full remittance. Postcard brings free literature.

Free!! Large three color Map of the WORLD, valuable Now!
Short Wave data, etc.!! Send 10c for handling.
Ace Radio Laboratories 1619 Broadway Dept. P-12, New York City

Complete POWER WOODWORKING SHOP

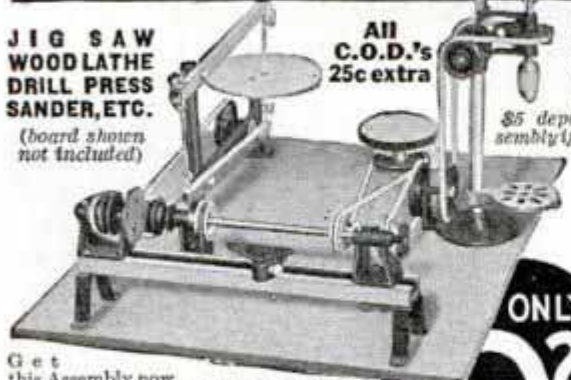
JIG SAW
WOOD LATHE
DRILL PRESS
SANDER, ETC.

(board shown not included)

All C.O.D.'s 25c extra

Motor of 1/10 H.P. or over will run Assembly

\$5 deposit on Assembly (sent C.O.D.)



outside U. S. A. \$10.00)

ONLY \$25 POST PAID

Get this Assembly now and this winter make a few of the many things you have planned, i.e., book shelves, foot stools, sewing cabinets, book ends, wall brackets, corner cupboard, end tables, magazine racks, etc. Easily and speedily done with power tools. Assembly consists of the following tools, which may be purchased separately: Jig Saw equipped with adapters, 1 doz. assorted blades and booklet, "Make Your Own Jig Saw Puzzles" (\$1.50); 2-speed Wood Lathe, 9 1/4 in. Bed (\$2.00); Drill Press complete with chuck (\$2.50); Disc Sander with 6 sandpaper discs (\$1.00); Set Hangers and Lineshaft (\$1.00); 5 Line Shaft Pulleys (\$1.25). **FREE!** The following goods valued at \$1.35 given with each Complete Assembly: 10 1/2 ft. of 1/4 in. Round Solid Leather Belting (\$1.05); 1 Endless Rubber Belt for Drill Press (\$0.25); 1 Doz. Belt Hooks (\$0.05). Assembly may be purchased with \$3 Laths having 2 1/2 in. bed. Simply add \$1 to your order. **AN IDEAL XMAS GIFT FOR MAN OR BOY. BUY EARLY.** Send 5c stamp for 24 page catalog fully describing all our low priced tools.

J&H METAL PRODUCTS CO. 486 ST PAUL ST. ROCHESTER, N.Y.

COPY-STAMP THE STAMP OF A THOUSAND USES



Prints postcards, letters, menus, school-work, notices, drawings, tags, etc. Used by hundreds of business concerns, schools, clubs, churches, and others. Quick, clean, automatic, instantly changeable. FIVE SIZES: \$5.00 and up. **THE STENCIL-STAMP CO. INC.** 53 Park Row New York, N. Y.

AMAZING AUTO COMPASS



Don't lose time and money by taking the wrong road and going many miles out of your way. This new AIRPLANE TYPE COMPASS constantly tells you direction of travel. Sticks to windshield. Base 1 1/4" diameter. ONLY \$1.95 POSTPAID, including Compensator. **SATISFACTION GUARANTEED** or your money refunded if returned within ten days.

AGENTS WANTED!

HULL MFG. CO., Box 245-D12, WARREN, OHIO

Reconditioned MOTORS & PARTS



Write us for prices on guaranteed reconditioned motors, transmissions, rear ends, gears, parts, etc., for all makes of passenger cars and trucks, regardless of age. Million dollar stock. You save up to 75%.

The ORIGINAL **WARSHAWSKY & CO.** 1915-35 So. State St. Chicago, Ill., U.S.A.



BUY OR BUILD! WE'LL HELP!

We manufacture the popular streamlined Banner Trailer with independent wheel suspension; also campers, trailers. We supply parts, blueprints and book of designs. Write today for free literature. Dept. D-3, Trotwood Trailers, Inc., Trotwood, Ohio.

EARN UP TO \$1000 a day **NEW LOW PRICED "PINLESS" CURTAIN STRETCHER!** **NO INVESTMENT REQUIRED!** Just what every housewife is looking for—no pins that tear costly curtains—no heavy wooden frames—just two triple cadmium rods and a hanger. Sell at give away prices. Write for FREE money making details.

THE EVANS MANUFACTURING CO. Dept. PM-124, Cincinnati, Ohio

TIME TO START BUILDING FOR CHRISTMAS



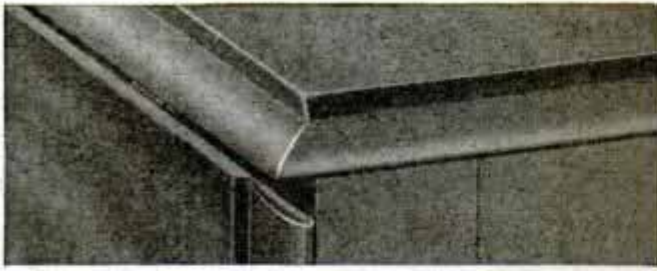
WITH **Genuine MASONITE PRESWOOD**

ONLY a few more weeks until Christmas! Gifts you make yourself will be just as useful . . . appreciated so much more. With PRESWOOD there's no limit to the variety of things you can build. Toys, bookcases, book-ends, tie-racks, desks, game-boards, doll houses and hundreds of others. You'll enjoy working with this *all-wood*, grainless material. If you need ideas for gifts, we have a booklet giving many suggestions, and plans and specifications for making them. Send for your free copy today as well as a sample of PRESWOOD to experiment with in your own shop. This wonderful material is obtainable from leading lumber dealers everywhere.

MASONITE CORPORATION PM-12-34
111 W. Washington St., Chicago, Ill.

Please send me your free booklet, "You Can Make These Useful Things," and a sample of PRESWOOD.

Name _____
Address _____
City _____ State _____



DROP LEAF TABLE CUTS *Easy with a* STANLEY ROUTER-SHAPER

If you have ever tried to make drop leaf table cuts or molding cuts on the edge of a table, you know how difficult it is with ordinary equipment.

These two operations are typical of hundreds that are simple with a Stanley Electric Router-Shaper.

Corner beading, dovetails, inlaying, dado, rabbett and molding cuts are typical of the finishing operations you can do expertly with this inexpensive home workshop outfit.

Thousands of present users are turning out work which compares favorably with the finest furniture factories. Send for catalog which describes the Router-Shaper and shows what it will do.

THE STANLEY ELECTRIC TOOL COMPANY
105 Elm St. - New Britain, Conn.

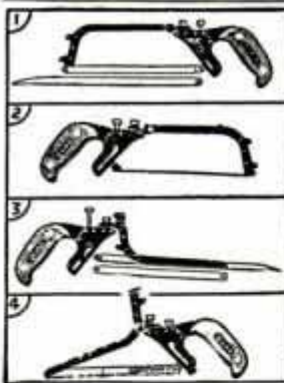
STANLEY ELECTRIC ROUTER-SHAPER

Made by the Makers
of the World Famous STANLEY TOOLS



At Last!

An Electric Router and Shaper
Designed for the Home Workshop



4 SAWS in 1

4 main positions of this new, amazing, adjustable saw permit hundreds of variable and intermediate positions to meet every need. Gets into tightest places. Illustration shows positions: 1. Deep cut. 2. Slice cut. 3. Skeleton or Flush cut. 4. Triangular position. Comes finished in highly polished steel with rubber grip and 2 blades (8" and 12"). Fully patented. Every Electrician, Plumber, Auto Mechanic, Boat Builder and Building Superintendent needs "Quad." Sent postpaid on receipt of \$2.95.

QUAD SALES CO.
17 E. 38th St., Dept. 19, New York City
AGENTS. Distributors wanted.



Toolmakers, Machinists, Patternmakers
A GERSTNER Tool Chest is an Ideal Gift
for Christmas or for any Occasion. Easily
chosen from Free Catalog.

GERSTNER TOOL CHESTS
436 Columbia St. Dayton, Ohio

MAKE MONEY

Casting Lead Toys



Get this complete outfit. Full equipment for casting toys. Also paints to color them. Set of moulds for three different figures in each outfit. Cast all the toy soldiers, cowboys, animals you want. It's fascinating!... and you can earn handsome profits selling the toys. Ask dealer for **JUNIOR CASTER**, or send \$2.50 money order and outfit will be mailed (postpaid in U. S.). State choice of U. S. Soldiers, Wild West Cowboys, U. S. Machine Gunners. Large illustrated Casting Book sent **FREE** on request.

Rapaport Bros.

703 W. Ohio St., Chicago



SEND FOR FREE ILLUSTRATED BOOK

SHERLOCK HOLMES RETURNS

(Continued from page 811)

years, but furnished with the track of a suspected car the department of justice can identify the tires in five minutes. The identification of firearms is now an exact science. Given the bullet from the body of a victim, the expert can tell in a few minutes the make of both ammunition and gun. The same .45 caliber cartridges are used in the Colt automatic and the Thompson sub-machine gun, but in the pistol the rifling is to the right, while in the "Tommy Gun" it is to the left.

Handwriting is a most important factor in building up an actual picture of an unknown suspect. Experts are so well acquainted with the various schools of penmanship that a glance is enough to tell them not only where the writer received his education, but in what period.

Temperament is expressed in the manner of writing. A careless person will write illegibly. A neat letter indicates that the writer takes care of his personal appearance. Small writings and narrow margins show parsimony, while large writing, wide margins, and deep spaces between the lines show a disregard for expense.

The exact occupation of the writer cannot always be told with such certainty as it was in the Lindbergh case. Telegraphers join their words together for speed, persons connected with writing and publishing usually give themselves away by their rapid but still legible writing, together with the use of carets at insertions and the placing of circles around periods or replacing them with tiny crosses.

Attempts to disguise handwriting, incidentally, are invariably futile, for individual traits always creep in. Even block lettering is wasted, for in these days of applying for auto licenses, addressing packages, and other tasks requiring surety of legibility, most of us have had occasion to furnish samples of our lettering. The use of a typewriter is just as damning, for each make and model of machine has its own style of type, while each individual machine has imperfections which identify it surely.

Names and addresses of manufacturers of articles described in this magazine will be furnished by our Bureau of Information upon receipt of return postage.

FOR CHRISTMAS—100% SCALE MODELS IDEAL SUPER-DETAIL FLYING PLANES

with movable controls operated from cockpit

DESIGNED FOR YOU BY FLYING MEN



Stinson Reliant
Wingspan 32 5/16",
exact 3/4" scale,
kit complete \$2.50.



Curtiss Goshawk
Wingspan 23 3/8",
exact 3/4" scale,
kit complete \$2.00.



Boeing P-26A
Wingspan 21 1/4",
exact 3/4" scale,
kit complete \$1.75.



Martin Bomber
Wingspan 35", exact
1/2" scale, with
retractable landing
gear, rotating gun
turret, movable ma-
chine guns, etc., kit
complete \$3.50.

How would you like to have an experienced flying man sit down with you at your bench and help you lay out a model with controls you can actually work from the cockpit—which operate elevator, rudder and ailerons? An exact duplicate of real planes—planes that are winning prizes today.

That is exactly what IDEAL does for you. Experienced flying men—men who have spent their lives designing and flying real planes have laid out these big, beautiful flying models. **That is why you really learn the principles of aviation when you build planes the IDEAL way.** And that is why they are absolutely accurate—perfect, complete, exact in every detail.

Included in each kit are many exclusive fittings specially designed for the Super-Detail models—the most complete kits you ever saw—bright high luster finish—pulleys—control horns—control cable—streamline drag rings, and many other features.

Send check or money order today for the planes pictured.
Also send 15c for folder showing latest model planes.

26 West 19th Street, New York City, N. Y.

IDEAL AEROPLANE & SUPPLY CO., INC.

FREE



BB MAGIC
THE SHOOTERS' DELIGHT

The NEW BENJAMIN 25 SHOT REPEATER with BOLT ACTION—HAMMER FIRE—HAIR TRIGGER—PRICE \$7.50 is the most sensational improvement in air gun history. Send name—address—age—kind of gun you now have—if any—for your copy of BB MAGIC—FREE—A real gun manual based on U. S. Army regulations, etc. Also ask for details of 1934 BENJAMIN SUPER SINGLE SHOT—PRICE \$1.50 and our Special Introductory Offer. Write Now.

BENJAMIN AIR RIFLE CO., 695 N. Broadway, St. Louis, Mo., U. S. A.

ICE-BOATS

Portable, Fast, Sturdy, Low-priced. Winter's Greatest Thrills are yours with a MEAD ICE-YACHT. **SAVE MONEY** by building yours with our Complete Kit easily, quickly, and with sure success. Start NOW and have your ship ready for the season's first ice. Pay as you build. Rush dime for illustrated circular, prices and complete list of materials, fittings, spruce, etc.

MEAD GLIDERS

12 So. Market St., Dept. 12-B, Chicago

Stoves AT FACTORY PRICES!



Send for FREE Catalog

Over 200 Styles and Sizes of Stoves, Ranges, Furnaces—174 ranges, 12 heating stoves, 22 furnaces. More Bargains than in 20 Big Stores. New styles, new features, new colors. Cash or easy terms. Year to Pay—30 days free trial—360 days approval test—\$100,000 Bank Bond Guarantee—24-hour shipments. Over 850,000 Satisfied Users 34 Years in Business

Write for FREE Catalog
The Kalamazoo Stove Co., Mfrs.
291 Rochester Ave., Kalamazoo, Mich.

A Kalamazoo
Trade Mark Registered Direct to You

When writing to advertisers please mention Popular Mechanics



“Gee! One of the silent Coronas!”

You've now got five Coronas to choose from! Nothing like this ever happened before! You can walk into a Corona dealer's and choose from a selection that begins, at \$24.50, with the world's most famous *full-fledged* portable typewriter and ends, at \$64.50, with the most complete and *silent* portable.

Ask your dealer about the entire line—machines at \$24.50, \$33.50, \$45.00, \$60.00, \$64.60—and about the part payment plan.

LC SMITH & CORONA TYPEWRITERS INC
— SYRACUSE NEW YORK —



First and Only
**scale model of the New
 Union Pacific million dollar
 Streamline Train!**

**RIGHT IN
 TIME FOR
 Christmas**

ALL the excitement of operating the new wonder train of the west is yours in the new Lionel Streamline! Not a skimpy, dinky train—but the real thing! An exact scale model, 46" long, 1/45th actual size of the 110 mile-an-hour speed wizard itself! Space here won't permit us

to tell you all about this amazing Lionel Train—and the other brilliant new Lionel models—so do this:

Send at once for the new 1934 Lionel Catalog—36 exciting, colorful pages. Just enclose 10¢ in stamps to cover postage and handling. That's all! Or you can get it FREE at your nearest Lionel Dealer's.

**LIONEL
 TRAINS**

Free
 at your
 dealer's

LIONEL CORPORATION, Dept. M.
 15 East 26th Street, New York, N. Y.

Please rush to me your new 1934
 Catalog. I enclose ten cents in stamps
 to cover postage and handling.

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

**MYSTERIES OF EPIDEMICS
 ATTACKED BY SCIENCE**

(Continued from page 122A)

Tuberculosis seems to run in cycles of 200 years. Since 1850, the cycle has been on the downgrade. There have been four great epidemics of plague which spread to the four quarters of the globe. Most awful was that of the year of the "black death" which in the middle ages almost wiped out European civilization.

Mechanical brains are now aiding the study of these strange cycles of disease. In the chattering of tabulating machines, as hundreds of information-bearing cards are automatically sorted, doctors hope to find a clue. A mechanical brain showed that infantile paralysis most often attacks children who are brunette, have mongoloid eyes, deeply-colored skin, wide faces with widely separated eyes, and certain gland weaknesses. This information may be useful in selecting children who can be given special preventive attention in the future.

Two Johns Hopkins University research men applied mathematics to scores of case records. They learned that if you had several colds this year, you are likely to have a number of them next year. The third year, however, you probably would have fewer; while some people who had been immune would succumb more easily—suggesting that people pass through a cycle during which they are alternately more and less susceptible to colds.

While certain diseases burst out only at intervals, others continually smoulder but seldom become epidemic. Such diseases are limited to a class of people or to a single locality where they are constantly present. For example, cholera is endemic in India, yellow fever in Havana, plague in Tibet. The natives usually build up resistance to the disease. White men in the tropics catch fevers which seldom attack natives, while natives of the South Sea islands die like flies from measles.

Smouldering fires of disease may prove to be the means by which epidemics may die a natural death. In large cities, most people are exposed from time to time to most of the deadly diseases, but do not get enough germs at a time to become sick. Thus their systems build up a strong resistance which fortifies them against disease. In this way nature herself may eventually sound the death knell of epidemics.

30 Days Trial!

NOW you can ride a genuine Mead bicycle 30 days without "buying for keeps." Return it at our expense if not satisfied. Write quick for FREE color Catalog, marvelous new prices, special offers. **SAVE 1/4** buying direct from MEAD!

\$19.95

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



THE RANGER "ACE"

RIDER AGENTS WANTED

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

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

Mead CYCLE COMPANY
DEPT M-114 CHICAGO

FREE! Great new Color Catalog sent FREE—Hurry!

NYOIL

A MOST HIGHLY REFINED OIL

For fishing tackle, firearms, and household appliances, prevents rust. A perfect furniture polish, never gums, is odorless, stainless. A handy can, 35c, postpaid if dealer cannot supply.

Wm. F. Nye Inc. Dept. M. New Bedford, Mass.

PANTS MATCHED TO ANY SUIT

DON'T DISCARD Your OLD SUIT

Wear the coat and vest another year by getting new trousers to match Tailored to your measure. With over 100,000 patterns to select from we can match almost any pattern. Send vest or sample of cloth today, and we will submit **FREE** Sample of best match obtainable.



MATCH PANTS CO.
20 W. Jackson Blvd., Room 1144, CHICAGO

WEAVING MATERIALS BAMBOO RATTAN
Reed, Colored Ruffa, China Grass, Chair Caning, Chair Frames and Stools, Basketry and Furniture Weaving. Send 10c for Catalog. Instructions Free. **AMERICAN REEDCRAFT CORPORATION**
Dept. P 130 Beekman Street New York, N. Y.

Big 3 1/2 ft. Telescope Five sections. Brass bound. Powerful 8-X Lenses. 10-Mile range. Special Eye Piece for looking at the Sun, included **FREE**. Can be used as a Microscope. Guaranteed big value. Postpaid, \$1.75. C. O. D. 15c extra. **Benner & Company, Box T-43, Trenton, N. J.**

Popular!

EASY WITH A P-A

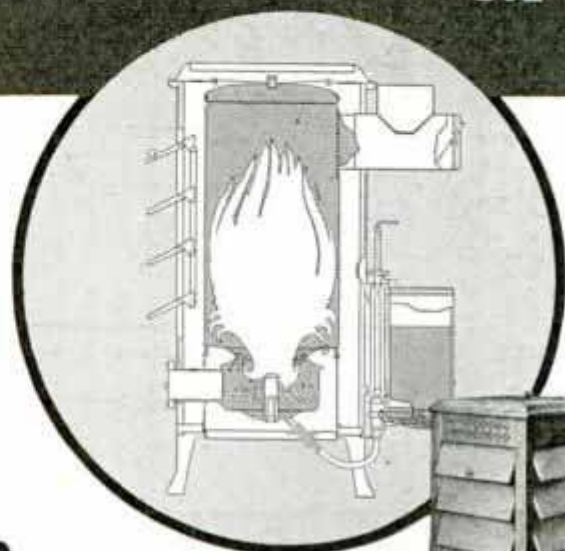
Boy! It's great to be popular! All the big thrills of life are yours with your P-A Sax! And all so easy. Many play tunes first week; join a band in three months, with a free blowing, tone sure. P-A Sax, Trumpet, Trombone, or Clarinet. See your local P-A Dealer. Or write for free booklet. No obligation. Easy terms. Big opportunities in music today. Get started NOW!

PAN-AMERICAN
1203 Pan-American Bldg., ELKHART, IND.

Moderate Price

NOW A NEW TYPE OF HEATING STOVE

HEAT-DIRECTOR BURNS OIL



Projects radiant heat in any desired direction

SEE these amazing new heating stoves at your dealer's. The Heat-Director burns inexpensive fuel oil in a vaporizing burner. Any desired heat volume is at your instant command. Shutter-like heat projectors (patented) on three sides of the Heat-Director direct heat rays at any angle you choose. Draft regulation is automatic.

Heat-Director No. 1007. Listed by the Fire Underwriters. Diagram shows cross-sectional view.

The removable fuel tank holds oil for eleven to forty-six hours. Connections for outside fuel storage are also available.

There are seven Superfex models, three Heat-Directors and four Radiating heating stoves. Porcelain enamel finish. Prices for every purse.

For one-room chilly spots, get a portable Perfection oil burning room heater.

SUPERFEX

Oil Burning *The Mark of Quality*

HEATING STOVES

PERFECTION STOVE CO., 7710-C Platt Ave., Cleveland, O.
Please send booklet on clean oil heat without a furnace.

Name _____
St. or R. F. D. _____
Post Office _____ State _____

FREE BOOKLET FOR YOU

Red Bakelite
Leak-Proof Cap
4 Fluid ozs. →

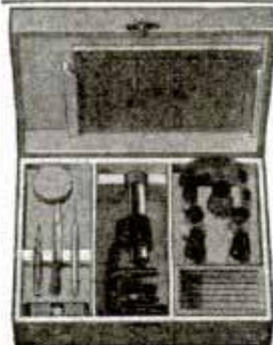
NO BLACK OIL



Esso Handy Oil contains no dirt-laden, graphite-bearing "black" oil. Esso Handy Oil is basically "white" oil... clean, sweet, colorless... not subject to gumminess. It is ideal for use in home, office and car.

ESSO INC., 26 BROADWAY, NEW YORK CITY

**CRYSTAL-CLEAR • 100% LUBRICATING
PREVENTS RUST**



THE BEST XMAS GIFT

A genuinely scientific outfit, equipped with the well known 100-power Wollensak microscope, including all accessories and book of directions for slide making, in a handsome polished-wood gift case..... **\$8.50**

More elaborate sets, with 150-power Wollensak microscope, \$17.50; and with 425-power Wollensak microscope, \$27.50.

Send 10c for new 32-page illustrated catalog listing more than 1500 chemical and biological items at our school prices.

*Source of Scientific Supplies for
Schools and Colleges*
NEW YORK BIOLOGICAL SUPPLY CO.
Box 15, 34 Union Sq., N. Y. C.

**MAKE BIG MONEY
MOLDING PLAQUES, NOVELTIES, Etc.**

Get your share of the XMAS business. We teach you to make your own MOLDS, mold your NOVELTIES and paint them. Sample MOLD only 25c. Write for Details on our Free Course in Mold Making.

STEWART'S STUDIO, Dept. P12
2102 W. 19th St. - Chicago



S

**AGENTS 500% PROFIT
GUARANTEED GOLD LEAF LETTERS**

For Store fronts and office windows. Anyone can put them on. Free samples. Liberal offer to general agents.
METALLIC LETTER CO., 438 N. Clark St. Chicago

MAKE MONEY!

**DEVELOP and PRINT
SNAPSHOTS YOURSELF**

Make Money—Save Money—Make Better Pictures by Developing and Printing your snapshots at home. Make more prints from your old negatives. Learn a fascinating and well-paying profession with a Winner Photoset. Not a toy but a scientifically designed kit containing enamel trays, glass graduate, stirring rod, developer powders, **ONLY \$2.25** fixing powders, printing frame, printing paper, and reliable instruction book. U. S. A.

DeLuxe Set with professional type equipment for the more advanced worker..... **\$3.95**
J. H. Wain Mfg. Co., Dept. 92, 124 W. 23 St., New York

Winner
PHOTO-SET



THEY HAVE NOT DIED IN VAIN

(Continued from page 843)

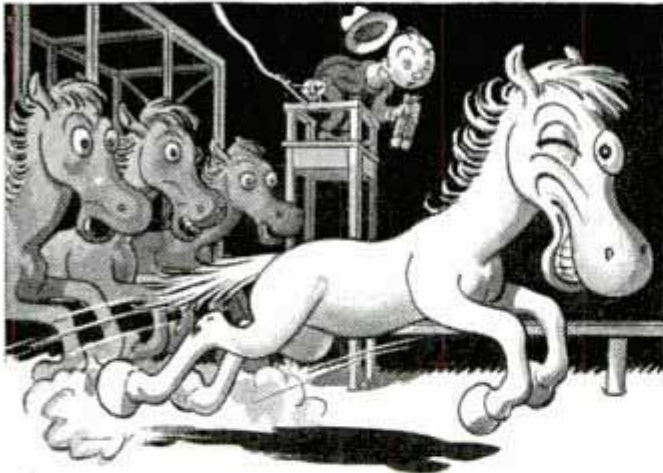
P1204
a few of the lifeboats were launched, and these were handled so clumsily that several capsized. The boats on the high side could not be launched at all, due to the heavy list. A freighter was within forty-five miles of the "Vestris" when the SOS was sent, but had no radio equipment since it carried a crew of less than fifty.

"The lesson that stands out most prominently in this disaster and the lesson that must first be learned," declared the investigators, "is that hereafter we must stress men more than things. In this modern age we are prone to direct our efforts as far as possible toward the invention of mechanical devices that will make things safer. As a result of it, I fear that we have become slaves of these things that we have invented to help us, forgetting that no matter how excellent a device may be, there must be competent men to handle it, and this competency in men must be stressed at sea more than any other place."

It also has been recommended that the salvage laws be revised. Under present conditions a captain hesitates to send an SOS, because it means that a ship coming to his assistance may collect as much as half the value of his ship and cargo. Feeling a responsibility to his employers, he naturally declines to call for help if he feels he has a chance to bring the ship into port himself. According to maritime custom, it is considered a disgrace for a captain to call for assistance, and it is rarely that a master who loses or abandons a ship can thenceforth find employment as an officer.

Last May the Nantucket shoals lightship was rammed by the "Olympic" and sank, seven of her crew being lost. The "Olympic" had been navigating through a dense fog by steaming directly toward the radio beacon on the "Nantucket," and failed to hear the fog siren soon enough to change her course. The lightship now on that station has been equipped with a short-range warning beacon that emits a distinctive warble note on the same frequency. When heard it will warn an approaching vessel that it is no longer safe to steer on the beacon. If this experiment proves successful it will be installed on all lightships.

(Continued to page 140A)



QUICK STARTING WITH CLEANED PLUGS



Remove Oxide Coating with the AC Spark Plug Cleaner—and Your Motor Starts Instantly **5c** a plug

No spark plug can escape Oxide Coating—the chief cause of hard starting. But a thorough cleaning—by a Registered AC Cleaning Station—is a “sure-fire” remedy. Replace badly worn plugs with new ACs—the quality spark plugs.

Look for the “Plug-in-the-Tub”

AC SPARK PLUG COMPANY
Flint, Michigan St. Catharines, Ontario
Plugs for Canadian market made at St. Catharines, Ontario

MOULDS FOR METAL CASTINGS MADE TO ORDER

Metal Toys, Novelties, Ashtrays, Bookends, Model Ship, Aeroplane and Railroad parts, in fact anything of cast metal can be easily and quickly produced in unlimited quantities with Bronze moulds. No experience required. Send sketch or description of article you want to cast for price on Mould and full information. New ideas developed and models made. Write for free Interesting Booklet “M” on Casting Metal.

METAL CAST PRODUCTS CO.

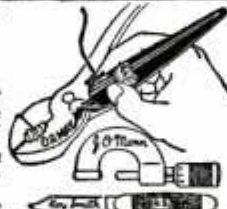
1694 Boston Road Dept. 24 NEW YORK CITY

ALWAYS READY FOR USE LE PAGE'S LIQUID GLUE

BURN YOUR NAME ON TOOLS WITH THE ARKOGRAF

PROTECT YOUR TOOLS FROM THEFT

Write with electricity any name or design on the hardest and finest tools and instruments, or any metal, like writing on paper with pen or pencil. Complete Outfit \$3.50 — Prepaid Anywhere. Interesting illustrated circular free. Write today. Agents wanted. ARKOGRAF PEN CO., 3927 S.E. Stark St., Portland, Ore.





TRADE MARK

"Jorgensen" Clamps

REG. U.S. PAT. OFF.

Your joints can be no better than your clamps. Buy the best, "Jorgensen"—clamps of all types. Pony Fittings go on 1/4 in. pipe (bought anywhere), make clamps of any length—handle large or small work. Fittings for 2 Pony Clamps \$3.00 plus postage, 6 lb. Jorgensen Handscrews, standard the world over, grip straight or on angles. Will not split, spring, or loosen. Two No. 1 Handscrews (10 in. jaw open 6 in.), \$2.80 plus postage, 6 lb.

ADJUSTABLE CLAMP COMPANY
"The Clamp Folks"
421 N. Ashland Ave., CHICAGO

Send \$1 pay postman balance
Chosen for the Home Work Shop, at "Century of Progress," Chicago.

Catalog FREE



NOW IT'S EASY TO CHARGE YOUR CAR BATTERY AT HOME



G-E 5-amp. Home Battery Charger and Wiring Accessories. **\$12.95** Complete (Slightly higher west of Rockies)

Cold weather . . . hard starting . . . many electrical accessories (heater, radio, two horns, etc.) . . . help drain your car battery. Finally, the battery goes dead . . . then it's crank or push to get started. All that's annoying and dangerous. But, you can prevent it. This 5-amp. Home Battery Charger keeps your car battery fully charged always. It's as easy to use as any appliance. Plugs into any A-c. outlet in your garage. Wiring accessories furnished provide easy connection of Charger to battery through special outlet on steering post. Say good-bye to your run-down car battery troubles. Mail the coupon today for complete information.

Section A-8212, Merchandise Department
General Electric Co., Bridgeport, Conn.

Please send me complete information on the new 5-amp. Tungar Home Battery Charger.

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

GENERAL ELECTRIC AUTOMOTIVE PRODUCTS

When writing please mention Popular Mechanics

Let Hoppe Teach You Billiards AT HOME!



Model G55
\$13.50

Gully Ball Return Table
Slightly higher in West and Southwest

Imagine getting the expert instruction of world's billiard champions like Hoppe, Ponzi, Rudolph, Taberski, Layton and Cochran in your own home, absolutely free! That is the startling offer made possible by these new Brunswick Home Pocket Billiard Tables. Boy! Wait until you see them at your local department, hardware or sporting store. These home tables are genuine replicas of Brunswick famous regulation tables—scientifically scaled—with live rubber cushions, 15 brightly colored and numbered balls, cue ball, triangle and maple cues built to scale. Shots are played the same way that you would play them on the regulation tables in the YMCA or billiard room. Mail coupon now for Free Lesson Book by world's best players, which includes illustrations and descriptions of Brunswick's "Junior Playmate" Tables.

THE BRUNSWICK-BALKE-COLLENDER CO.
623 S. Wabash Ave., Chicago, Illinois
Branches in Principal Cities of the United States

FREE! Mail Coupon for Big 56-Page Book of Billiard Lessons by World's Best Players

THE BRUNSWICK-BALKE-COLLENDER CO.
623 S. Wabash Ave., Chicago, Dept. C-1

Without obligation, please send me free 56-page book on "How to Play Billiards as taught by the world's greatest players."

Name -----
Street -----
City ----- State -----



MODELS

Boucher since 1905

The complete line for SHIP MODEL BUILDERS.

These two new books with 96 fully illustrated pages, on SCALE SHIP MODELS, RACING MODEL YACHTS, SPEED BOATS, MINIATURE ENGINES, supplies and accessories. Send 25c stamps or coin for your copies.

BOUCHER PLAYTHINGS MFG. CORP.
Dept. P. M., 125 Lafayette Street, New York, N. Y.

HIGH POWERED TELESCOPE

GENUINE BROWNSCOPIES AT AMAZING PRICES

Most powerful in America for the money!
15 power long range telescope. Can see moon's craters or time on pocket watch a block away. 5 sections. Approx. 3 ft. long. Fine lenses. Brass bound. Can be used as powerful microscope.
Vol. magn. 512X. Only \$1.69 postpaid. C. O. D. 24c extra.

\$1.69



\$1.98

Special Super-Power 30X Telescope.

8 miles to above but more powerful. Guaranteed to see 900 times larger in surface and 30 times closer. 31 mm. objective 4 powerful lenses. Large field. Includes powerful microscope feature. Only \$1.98 postpaid.

BROWSCOPE CO. Dept. 12-M 234 Fifth Ave., New York

RADIO BUILDERS!

Do you intend to build any radio apparatus described in Popular Mechanics Magazine or Blueprints? If so, we urge you to send for our FREE special tabulated list of approved parts for that set. Our more than eight years' experience as the leading amateur and experimenter's supply house is your assurance of intelligent, dependable SERVICE, and our low wholesale prices will please you. Whether you buy one part or an entire kit from HARRISON—YOU WILL SAVE!

NEW WORLD-WIDE SHORT WAVE RECEIVER

POWERFUL - SENSITIVE - ALL-ELECTRIC



Here is a modern Short Wave receiver that gets foreign broadcasts, police calls, amateurs, airplanes, etc. DIRECT with a volume and clearness that will amaze you! 12,500-mile reception record! This set is entirely self-contained and plugs in directly to any 105 to 125-volt A. C. or D. C. house current outlet. No batteries or separate power supply needed! Works on any aerial. Tunes from 15 to 200 meters.

\$5.95

COMPLETE KIT of all necessary parts (including neat metal chassis with all holes drilled) and clear, detailed picture instructions to build this remarkable Three Tube receiver.

TWO TUBE Dry Cell Model (Illustrated) or AC Model—Complete Kit \$4.75. 200 to 625 meter. ORDER NOW!! SEND \$1.00. Broadcast band coils \$1.25. RESULTS GUARANTEED!! Balance C. O. D. FREE Literature.

HARRISON RADIO CO., Dept. P-12, 142 Liberty Street, N. Y. C.

THEY HAVE NOT DIED IN VAIN

(Continued from page 138A)

The disaster to the "Morro Castle" bears out the warning issued after the "Vestris" sank that "men rather than things must be stressed." This fire occurred within eight miles of shore and thirty miles of port, while the surrounding sea was dotted with ships within easy rescue distance, yet an apparently minor fire was permitted to become a conflagration before a call for help was given. Testimony has been given that no attempt whatever was made to close the fire doors, which act, experts say, would have confined the fire to the library where it originated.

Some automatic method of closing fire doors by a fusible link and weight arrangement is patently needed, and such equipment is now available; but the fact that the smoke detectors and automatic fire alarms both failed to register on the bridge, according to testimony, shows the futility of depending entirely upon automatic devices.

It is certain that a strong recommendation will be made that a more efficient method of training, licensing and disciplining crews be introduced. Several members of the "Morro Castle" crew have testified that they had never attended a fire drill and did not know where their stations were. Further recommendations are being made that salvage costs be cut so that captains will not be so inclined to delay calling for help; but the coast guard points out that its business is to come to the aid of shipping and that its services are free. A radio call will cause all coast guard vessels in the vicinity to proceed to the scene of the trouble and stand by to render assistance if needed. Two years ago there would normally have been sixteen coast guard vessels within two hours steaming distance of the "Morro Castle," with several only a few minutes away, but with decreased appropriations fourteen of the boats in this district are now lying idle. Nevertheless two cutters could have reached the "Morro Castle" within two hours if a call had been sent. These boats responded to the SOS, but it was then too late.

Only a guaranty of competent men to man ships in the future can assure us that the victims of recent tragedies have not died in vain.

LOFTIS BROS. & CO. LASTING — WORTH-WHILE —

GIFTS OF JEWELRY

Let us send you one of our new style, exquisite Diamond rings for "her" gift. If you do not think it one of the handsomest Diamond rings ever shown and a tremendous bargain. RETURN AT OUR EXPENSE. Our 76-year old reputation is YOUR GUARANTEE OF SATISFACTION. **BUY NOW BEFORE OUR PRICES GO UP**

No. 11 — Exquisite Ring of Solid 18-K White Gold; Blue White Diamond . . . \$25. \$1.00 a Week

No. 39 — Solid White Gold Wedding Ring; 5 Diamonds \$16.50 50c a Week

No. 13 — Man's Elgin Wrist Watch. Excellent timekeeper, good-looking wrist watch . . . \$16.50 50 Cents a Week

No. 40 — Beautiful baguette wrist watch, natural yellow gold, with silk cord bracelet, excellent timekeeper . . . \$19.95 50 Cents a Week

SEND FOR FREE CATALOG

TERMS: One-tenth down; balance weekly, semi-monthly or monthly your convenience

LOFTIS JEWELRY CO. CATALOG EXPLAINS EVERYTHING. Full Particulars of Loftis Easy Credit Plan. Write today.

30 N. STATE ST., CHICAGO, ILL., DEPT. G 894
YOUR MONEY BACK IF NOT SATISFIED

TO GET A STRONG HOLD OR TIGHTEN LOOSE PARTS

Smooth-On No. 1 restores full usefulness of household fixtures, utensils and tools that would otherwise have to be discarded.

Try it for tightening loose parts and stopping leaks, use it also on your car for stopping leaks in the radiator, hose connections, gas tank, oil and exhaust lines, for patching cracked water jackets, for tightening loose hub caps, mud guards, lamp and tire supports, etc.

Smooth-On No. 1 is simple to apply and hardens to everlasting tightness. Merely follow directions in the Smooth-On Book which is sent free if you return the coupon.

Buy in 7-oz., 1-lb. or 5-lb. can from your nearest hardware store.

Do it with SMOOTH-ON

SMOOTH-ON MFG. CO., Dept. 37, 574 Communipaw Ave., Jersey City, N. J. Please send the free Smooth-On Repair Book.

Name

Address

12-34

VOICE

100% Improvement Guaranteed

We build, strengthen the vocal organs — not with singing lessons — but by fundamentally sound and scientifically correct silent exercises . . . and absolutely guarantee to improve any singing or speaking voice at least 100%. Write for wonderful voice book — sent free. Learn WHY you can now have the voice you want. No literature sent to anyone under 17 years unless signed by parent.

PERFECT VOICE INSTITUTE, Studio 13-59
308 No. Michigan Ave., Chicago

"Xmas Gift" for **TENNIS PLAYERS!**

Earn money and cut your own tennis costs with this "Xmas Gift you give yourself" invention . . . send now for FREE details!

TENNIS STRINGS at LOW PRICES!

Get our Special Introductory Offer on quality SILK strings . . . save money. Stock up. Offer good limited time. Buy Wills' genuine FACTORY-FRESH GUT before prices rise! WRITE quick for FREE Tennis Equipment Catalog, Extra-Income Plan, Special Offers!

Write for SPECIAL Offer

H. E. WILLS CO., 1047 W. 47th St., Dept. 13-59, Chicago

DO YOU

WANT a new business profession of your own, with all the trade you can attend to? Then become a foot correctionist, and in a few weeks earn big income in service fees, —not medical nor chiropody—easy terms for home training, no further capital needed, no goods to buy, no agency. Established 1894. Address Stephenson Laboratory, 1 Back Bay, Boston, Mass.

GO PLACES! with a

BUESCHER

Popularity . . . pleasure . . . fame . . . fortune . . . all may be yours when you play a sweet-toned Buescher Saxophone. **Easy playing** qualities and exclusive Buescher features give you quick mastery. Play tunes the first week . . . make new friends . . . **go places with a Buescher!**

FREE TRIAL; Easy Payments on saxophone, trumpet, trombone, clarinet—any instrument for band or orchestra. **Write now** for free Buescher Book—mention instrument which interests you.

1003-A


BUESCHER BAND INSTRUMENT CO.
1210 Buescher Building, Elkhart, Indiana

TRUE TONE



20,000-Word Book Included

You need not be a scientist to use the simply operated New Gem, yet it is a scientific microscope. Only at much higher prices can you equal its illumination and sharp resolution. Made by America's largest optical institution that supplies hospitals, doctors and colleges. Magnifies 75 to 172 diameters. Yields remarkable photomicrographs. Walnut case and 20,000-word illustrated book included. Extra objective magnifies to 300 diameters, \$2.50 (book II, 20,000 words, included). Ask your dealer.

 Write For Free Literature

Bausch & Lomb Optical Co., 797 St. Paul St., Rochester, N. Y.

BAUSCH & LOMB

END Battery Worries

with **KRW** AUTO-CHARGER



*"It works while
your car is idle"*

No excuse now to have a dead battery . . . latest KRW Auto-Charger for ALL CARS keeps battery up in any kind of weather. Gives all the "juice" needed for positive starting, operating auto radio, hot water heater, defroster and other electrical devices. Light weight, 7 lbs. Only 7" x 4 1/4" x 3". Easy to install, drill one hole in under-dash. The KRW Auto-Charger goes where you go, works while your car is idle . . . simply plug into nearest light socket. Operates on 25 to 60 cycles, using only 50 watts. Can't overcharge because charging rate tapers automatically when battery reaches full capacity. No liquids, bulbs or moving parts. Has two charging rates—2 and 5 amps. Fuse guards against current flow-back if power circuit fails. **\$6.75** F. O. B. Buffalo. Unconditionally guaranteed for one year. Ask any Ford Dealer who we are (Est. 1916). Circular on request. AGENTS WANTED everywhere.

K. R. WILSON • 11 Lock Street • Buffalo, N. Y.

HOW FAST CAN YOU STOP?

(Continued from page 813)

These have fewer parts than shoe-type brakes and are said to last the life of the vehicle without relining or adjustment. The brake, attached to the wheel like ordinary brakes, is now standard equipment on a number of truck fleets in the west and is being installed on police cars and airplanes. In a test a fully loaded oil-tank truck and trailer moving down grade at thirty-five miles an hour were stopped in sixty-two feet, about one-third the distance usually required.

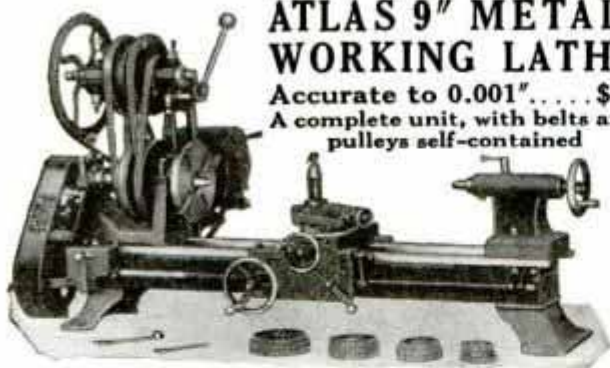
The brake surface consists of two disks of brake lining that revolve with the wheel, pressure being applied equally all around the disks from two sides when the brake pedal is pressed. There is no end-thrust on bearings or axles and the brakes are self-cooling. The brake is not affected by water and is approximately twenty per cent lighter than other types. It is claimed that they permit better control of the vehicle, won't lock, and reduce tire wear due to the smoothness of application. Because of their sturdy construction they are also being used as clutches on marine engines.

Legislating safety into the automobile is being accomplished gradually by individual states. In states requiring drivers to undergo examinations, the accident rate was about thirty per cent lower in 1933 than in states without such laws. Of course, accidents increased generally from 1932 to 1933, but the rate of increase was only one-third as great in states requiring tests of drivers.

California, Connecticut, Delaware, Maryland, Massachusetts, New Hampshire, New Jersey and New York are among the states with driver's license laws.

Regular inspection of automobiles and equipment has been made compulsory in New York, Massachusetts, Delaware, Idaho, Maryland, New Hampshire, Nebraska, Pennsylvania and other states. Delaware operates its own "safety lane," moving the test equipment from town to town. Individual cities, Memphis, Tenn., and Evanston, Ill., have inspection laws and maintain "safety lanes."

Pennsylvania has joined the list of states which will make safety glass compulsory on all motor vehicles after January 1, 1935. New York, Michigan and Massachusetts have similar laws.



ATLAS 9" METAL-WORKING LATHE

Accurate to 0.001" . . . \$79
A complete unit, with belts and pulleys self-contained

It's ready to run, this 9" Atlas Lathe. Self-contained counter-shaft, all belts included in the price. Set a motor on the bracket, plug into a light socket and it's ready to go. No outside shafting to place. No extras to buy. A real lathe, running-tested to .001" accuracy before it's shipped. Six speeds with compound device that cuts out complicated back gears. Efficient V-belt drive. Automatic reversible feed; hollow headstock spindle; graduated compound rest. Cuts 4 to 72 threads.

18" bed (also larger sizes up to 36") of heavily ribbed cast iron machined and ground on precision equipment. IMMEDIATE SHIPMENT for 2 weeks' trial with guarantee of money back if not satisfied. Write for Easy Terms and free illustrated catalog of the ATLAS FULLY EQUIPPED LATHE. Real metal-working Lathes as low as \$40. Write for information.



ATLAS DRILL PRESSES

\$13.95 to \$33.45

Small, medium and big—for bench or floor. Quality-built tools with more and bigger bearings at prices below what you've had to pay up to now. Special construction prevents side-play in quill.

ATLAS PRESS CO.

1843 N. Pitcher St.

Kalamazoo, Mich., U. S. A.



COMPLETE ELECTRIC PLANTS



\$99=

ONAN A. C. PLANTS furnish the same current as city service. Operates Radio, Water System, Refrigerator, all Household Appliances.

SIZES 300 WATTS UP

Direct Current Models as low as \$99. No battery used to start the engine. Easy to install. Available from stock. Ideal for farms, camps, lake homes, and commercial purposes.

D. W. ONAN & SONS, 939 Royalston Ave., Minneapolis, Minn.

SHAW DU-ALL TRACTOR



Hurry! Low prices still in effect but can't be guaranteed! Amazing money-maker for farms, truck gardens, nurseries, etc. Plows, discs, weeds, cultivators, mows, rakes, hoes; runs belt driven machines. Gear shift models, 1 to 5 H. P. Costs 5¢ per hour to run. Write for FREE CATALOG and 10 DAY TRIAL OFFER. Also SPECIAL OFFER to AGENTS. Address nearest office.



SHAW MFG. CO., Dept. 4512
Galesburg, Kansas Columbus, O.

Print Your Own



Cards, stationery, circulars, tags, labels, advertising, etc. Save money. Print for Others, Big Profits; easy rules sent. Will do popular Raised Printing like Engraving. Junior press \$5.90, job presses \$11 up, power \$149. Send for free catalog and all details. - THE KELSEY COMPANY, B-37, Meriden, Conn.

DEAFNESS IS MISERY



Many people with defective hearing and Head Noises enjoy conversation, go to Theatre and Church because they use Leonard Invisible Ear Drums which resemble Tiny Megaphones fitting in the Ear entirely out of sight. No wires, batteries or head piece. They are inexpensive. Write for booklet and sworn statement of the inventor who was himself deaf.



A. O. LEONARD, Inc., Suite 699, 70 5th Ave., New York

BIG NEWS FOR MODEL BUILDERS

MECCANO

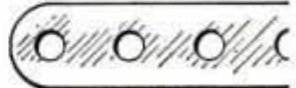
the original steel construction toy presents

SNAP RIVETS

the greatest improvement ever made in construction toys



New Girder



Old Girder

Snap rivets just like the ones used by structural steel workers.

And another new feature! Richly enameled girders—twice as big as the old kind—brilliantly colored in red and green. Makes models look like something when they are completed.

JUST what you regular fellows have been waiting for. Snap rivets to speed up model building. Real rivets just like the kind red-blooded steel workers use. Easy to build with because you just count the holes, and snap in the rivets. Much easier and quicker than nuts and bolts—and the rivets can be used over and over again.

Look at the picture above—see how easy it is? Better still, examine the new models at your dealer's. Don't delay! Go to him and ask him to show you the new Meccano with snap rivets.



No. 5 Our Feature Set

Packed in a splendid wooden chest, with a double tray of parts and a 110-volt motor for alternating current. The big derrick shown above is built from this set. Price complete \$5.00. Sent prepaid upon receipt of price if your dealer cannot supply you.

FREE Fine illustrated catalogue showing the new Meccano Sets and also other members of the Meccano family, including the new Microscope Sets. Use the coupon today.

THE MECCANO COMPANY OF AMERICA, INC.
200 Fifth Avenue New York, N. Y.

The Meccano Company of America, Inc.
Dept. P, 200 Fifth Avenue, New York, N. Y.

Please send—free—beautifully illustrated catalogue.

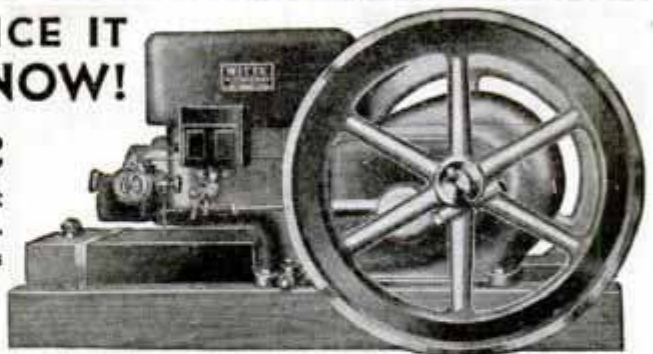
Name.....
Street.....
City.....State.....

World's FINEST ENGINES

AT OUR LOW PRICE IT WILL PAY TO BUY NOW!

WHY are over 95% of auto sales in the "under \$1,000" class? I'll tell you—folks want Real Quality for a LOW PRICE.

It's the same with engines—folks want dollar for dollar value for their hard earned cash. That's why WITTE builds and sells more engines direct than all other manufacturers combined. 27 different engines and combinations. A size and style for every purpose, 1½ to 30 H. P.—\$45 up, according to size and style. Sold direct from factory to you—cash or easy terms. Buy NOW and SAVE.



A SELF-CONTAINED POWER PLANT

Furnished in two styles: open style with Removable Die-Cast Bearings and oil and grease cup lubricators; or Enclosed, Self-Oiling, Timken Roller Bearing model. Either style on wood skids or iron base. Economical to operate on cheap fuels or natural gas, no experience necessary. Tell us what you want to use your engine for and we will, without obligation, recommend the best engine for the job.

SHIPPED FROM KANSAS CITY OR PITTSBURGH
 1749 Oakland Avenue || 1749 Central Warehouse
 KANSAS CITY, MO. || PITTSBURGH, PA.

WITTE ENGINE WORKS



Write today for Catalog and prices.
 Ed. H. Witte, Pres.

World's Largest Exclusive Engine Factory—350,000 IN USE



New Streamlined ELECTRIC TRAIN

"Silver Bullet"



25c
 A complete Electric Train kit for only 25c. Of course this isn't a \$20.00 train, but just listen to what you get for your quarter: the parts for a fast, peppy motor—complete base, wheels, wire, etc.—cardboard construction (shown in illustration), finished in black and silver. Needs no tracks or transformer—a big saving. And as for building it, why, some kids say they have twice as much fun building it as running it—it's so simple! This neat and flashy kit ready to assemble is only 25c, plus 10c postage and packing. Rush your order to: Interstate Electric Company, Dept. 9, Madison, Wisconsin

HAND-EE GRINDER

QUICKER BETTER JOBS
 Weighs 1 pound. Plug in any light socket and do 1001 jobs. Do away with slow hand work. Grinds, routs, drills, carves, sharpens, cuts, engraves. For shop, home or tool kit. (Model A), A. C. or D. C. operation, 110v., 13,000 r.p.m. Order on 5 day trial. Satisfaction guaranteed.



Ask for FREE Booklet

\$10.00
 and up Postpaid U. S. A.
 With 3 wheel shapes Free. Order today.

New MASTER CRAFTSMAN'S SET
 17 useful accessories to grind, drill, polish, sand, cut, carve, engrave, etc. Prepaid \$5.00
CHICAGO WHEEL & MFG. COMPANY
 108 S. Aberdeen St. Chicago, Ill.



CHEMISTS NEW CATALOGS

Catalog listing 10,000 chemicals, drugs, flavors, etc., and 1,700 Scientific Books, sent for 25c. Catalog with 3,000 illustrations of laboratory apparatus, 50c. Glass Still as illustrated, Cap. 1 Qt., \$9.00.
LABORATORY MATERIALS CO., 639 E. 71st St., CHICAGO, ILL.

Pins 35¢ Rings \$1.65
BIG CATALOG FREE Get Yours Today
CLASS PINS—any letters, any year, any colors. Silver plated, 1 to 11, 40c ea; gold plated, 50c ea; sterling, 60c ea. Silver plated, 12 or more 35c ea; gold plated, 40c ea; sterling, 55c ea. Sterling silver rings as shown, 1 to 11, \$1.90 ea; 12 or more \$1.65 ea.
Metal Arts Co., Inc., Factory 44, Rochester, N.Y.

GROW MUSHROOMS

We show you how; use cellar, idle space; plant all seasons; overnight crops. We buy. 540% profit; our service free. Act quick.
INTERSTATE MUSHROOM INDUSTRIES
 PC-7357 Cottage Grove Ave. Chicago, Ill.

BUILD IT YOURSELF

JIM DANDY CABIN TRAILER
 Classy! Boomy! Easy to build at low cost! Plans and instructions only \$1.00—include all Diagrams, Sketches, Photos, Material List, etc. Big Value! Mail Dollar Bill to Jim Dandy, Box 125-A, Wausau, Wis.



MICKEY MOUSE WRIST WATCH! GIVEN!
 or Choice of Cash Commission—Send No Money—Send Name and Address! Boys! Girls! Mickey on the dial and band in colors! Chrome finish case and bracelet—Unbreakable crystal. American make. **WHAT A WATCH! SIMPLY GIVE AWAY FREE** pictures with famous White Cloverine Salve which you sell at 25c a box (giving picture FREE!) and remit as per premium plan book. Other watches, 40th year. Be First. Write for trial order dozen salve and pictures NOW!
WILSON CHEMICAL CO. INC., Dept. 49-F Tyrone, Pa.

Profit from Books

Popular Mechanics Press specializes in supplying books on any subject. Look over this list. Check the books you want, and mail this advertisement as your order blank. Catalog with lists on 2,000 subjects free.

AIR CONDITIONING SERVICE MANUAL Just Out..... \$5.00	LEATHER WORK Artistic..... \$1.50
AUTO RACING How to Build Dirt Track Racers..... \$1.00	LOCKSMITHING Revised Edition..... \$2.00
AUTO REFINISHING Latest Methods..... \$1.50	MODEL MAKING Many Kinds..... \$3.00
BRICKLAYING Plain and Fancy..... \$1.50	MONEY MAKING FORMULAS Thousands of Ideas... \$4.00
CAMPS AND LOG CABINS (Building).... \$2.00	MUSHROOMS Raise for Market..... \$1.75
CARBURETORS (All Makes) New, Revised Edition.. \$2.50	PATTERN MAKING Excellent New Book... \$1.50
CARPENTRY All Forms..... \$2.00	PLASTERING Best Instruction Manual..... \$1.25
CHEMICAL MAGIC Experiment, Entertain, Mystify..... \$1.00	RADIO PHYSICS COURSE Most Complete..... \$3.75
DIESEL HANDBOOK New, Latest Information..... \$5.00	REFRIGERATION Electric, Gas, Be a Service Expert!..... \$4.00
DRAWING Freehand and Perspective..... \$1.50	ROCK GARDENS How, Where, When to Make, Examples..... \$1.25
DRY CLEANING (Practical) and Dyer..... \$3.00	RUBBER ARTICLES How to Make..... \$2.00
ENGINEERS' VEST POCKET Reference Book..... \$1.50	SHEET METAL Construction Work.... \$2.00
FURNITURE REPAIRING Finishing and Decoration..... \$3.00	Steam Engineer's License How to Obtain..... \$2.00
HYPNOTISM Science of..... \$2.00	WELDING ENCYCLOPEDIA All Methods..... \$5.00
INVENTIONS How to Make Pay..... \$2.50	WOOD, COLORING Finishing and Painting \$3.50
LANDSCAPE GARDENING Practical..... \$2.50	WROUGHT IRON WORK Practical..... \$1.35

SEND NO MONEY

Just check the books you want, and mail the whole advertisement. It is your order blank. When postman hands you books, pay him the price and few cents postage. If outside the U. S. remit when ordering and include 10 cents per book extra for postage.

POPULAR MECHANICS PRESS, Room P-12, 200 East Ontario St., Chicago, Ill.

\$ MONEY-MAKING \$ OPPORTUNITIES

For those who need larger incomes or must seek new occupations. The following workable, tested plans are adaptable both to the needs of the country or city dweller either for part time development or principal income source.

Every idea set forth in these books has been used by others for profit. They are well worth your consideration.

Plan No. 1—\$50 a Week with Car and Camera. Paul G. Holt tells you how he made a daily average of \$11.30 profit. Price \$1.50.

Plan No. 2—Radio Servicing. Let an expert teach you how to engage in this money making business. Price \$1.75.

Plan No. 3—Refrigeration Service. Official manual covers all makes. Good service men are needed. Price \$5.00.

Plan No. 4—Automobile Refinishing. Start a lucrative business of your own. Fine possibilities here. Excellent new instruction book. Price \$1.50.

Plan No. 5—Outdoor Opportunities. The raising of small animals, birds and plants for profit. Price \$2.00.

Plan No. 6—10,000 Money-Making Formulas. Complete instructions for the making of commodities at small cost that may be sold at a handsome profit. Price \$4.00.

Plan No. 7—How to Make Money at Home. 100 successful ways for women to make money. Price \$2.00.

Plan No. 8—100 Civil Service Examinations. Covering steady Government jobs. All types of positions. Better business means thousands of new jobs. Prepare now by studying this new book. Price \$3.50.

Plan No. 9—Making Poultry Pay. The proper breeding and management of fowls for higher egg production. Price \$2.00.

Plan No. 10—Fur Farming for Profit. Complete instructions that enable the beginner to succeed from the start. Price \$4.00.

Plan No. 11—Rabbits for Food and Fur. A complete guide to the successful rearing and breeding of rabbits. Price \$2.00.

Plan No. 12—The Frog Industry. Should be considered more as a side line than as a major means of income. Price \$2.00.

Plan No. 13—How to Live on a Subsistence Homestead. Facts and figures on how one family fled from the city and found security and independence. Price \$2.50.

Plan No. 14—New Ways to Make Money. Roger Babson points out to young men and women the profit possibilities in 50 fundamental industries. Price \$2.50.

Any of the above mailed postpaid upon receipt of price or sent C.O.D. anywhere in U. S. Pay postman price and few cents postage.

POPULAR MECHANICS PRESS
Room 1234 200 E. Ontario St. Chicago, Illinois

It's air tight
and
"soup" tight



A safe-cracker's Waterloo!

To make the thick door of an office safe open and close as smoothly as a piston moves in a cylinder, its edges must be *oilstoned* down by an expert. A giant bank vault door may have 90 square feet of hardest alloy steel to rub down with *oilstones*. A Norton Pike India *oilstone* is best for safe doors.

What to use for razors, scissors, knives, planes, chisels, etc? What experts prefer which — and why?

"How to Sharpen" tells who, which and why very clearly and entertainingly. Send for a free copy and get straightened out. You will find scores of valuable suggestions. Many an old timer writes us that he did not know about some of the tricks of sharpening. Your copy is waiting for you. Send for it today.

NORTON  Established 1823
Use what Experts use **PIKE Products**

BEHR-MANNING CORP., U. S. Sales Representatives
Dept. B, Troy, N. Y.

Send me free, Norton Pike Book, "How to Sharpen."

Name.....

Address.....

Astonishing success reports coming in from the first hour of operation prove no experience is needed.



MAKE and Sell Carmelcrisp
The New DELICIOUS FOOD CONFECTION!

Here's your chance to start right in making big cash profits the very first day with new food sensation. Enormous profits on 5 and 10c sales without cut price competition. Easy to operate—but little money needed to start—big season just ahead.

START AT HOME OR IN SMALL STORE

I furnish complete outfit—raw materials—secret formulas—complete plans—help locate and finance you. Make CARMELCRISP, the delicious candy popcorn confection—a food and not a fad. No canvassing.

YOUR FORTUNE

can be made—money worries banished—have a pocketful of cash each night in this sensational business. Pa. man took in \$454.06 first week. Rush name today.

CARMELCRISP MACHINE CO.

1228 High St. Springfield, Ohio

CARMELCRISP MACHINE CO.

1228 High St. Springfield, Ohio

Here's my name. Send all free material.

Name.....

Address.....

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

FREE
Golden kernels of cash—marvelous book of facts mailed free—no obligation—get the facts—act while offer is open



350X MICROSCOPE AND SET

Ideal for the High School Student and home experimenter. This completely equipped set includes a new WINNER 350X Microscope with an optically guaranteed, compound lens system which provides you with clear, undistorted vision. Beautifully finished. Rugged construction. Heavy horseshoe base. Adjustable mirror. Also 100X objective for lower magnification. Set contains: Microscope, 12 slides, Balsam, Specimen Bottle, 12 cover glasses, 12 slide labels, Dissecting needle, Pipette, Forceps, Lens Cleaning Cloth, Glass Rod, Wood Applicators, prepared slide, Instruction Book.



Price, complete, only **\$475**

delivered in U. S. A.

J. H. WINN MFG. CO.

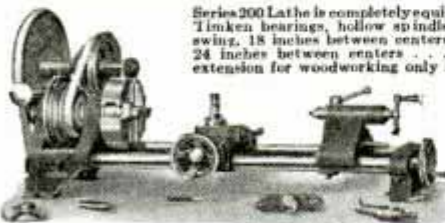
Dept. 93 124 West 23 Street New York

WINNER SET

A PRECISION TOOL

Craftsmen everywhere find SWAYNE ROBINSON'S 200 Series Lathe a home workshop in itself... husky, accurate and dependable. With it they can make most anything because it is adaptable for all kinds of general shop work such as: drill press, milling machine, boring mill, etc. Write for details in this very low cost Lathe.

Series 200 Lathe is completely equipped as illustrated: Tinker bearings, hollow spindle, 4 speeds, 8 inch swing, 18 inches between centers... only \$39.50. 24 inches between centers... \$41.50. 36 inch extension for woodworking only \$5.00 extra.



ONLY

\$39.50

SWAYNE ROBINSON & CO.
250 MAIN STREET RICHMOND, INDIANA

G. E. MOTORS

made by General Electric Co., originally intended for large manufacturer. Specifications: 1-30 H. P.—4800 R. P. M. Universal A. C. and D. C. 110 volts instant reverse. Size: Diameter 3 inch, length 5 inch. Shipping wt. 3 lbs. Add 25c for packing and mailing. Original price \$12.00. Bargain price, while they last. Send for Catalog of Paint Spray Equipment and General Electric Motors 3412.



\$2.45 Each

NATIONAL ELECTRIC TOOL CO.

560 W. Washington

Dept. 3212

Chicago, Ill.

GET THRILLING POLICE CALLS



ON YOUR PRESENT RADIO
Marvel Police Adapter brings in police, amateur, short wave calls. Thrills! Excitement! New entertainment. Quickly attached to any set without tools, drilling or solder. Complete with connections and directions. \$1.00 postpaid. Order today.

Only **\$1.00** Postpaid

Specialties Manufacturing Co. 3836 Grand River, Detroit, Michigan

Jobbers—Dealers

Get our prices on radio lead-in and aerial wire; ground clamps; window leads; Vernier dials; radio knobs; auto antennae; push-back wire and shielded wire.

Inventions Wanted Patented or Unpatented

Our manufacturer-clients now want better inventions, patented or unpatented, to meet present conditions. Write **Chartered Institute of American Inventors** 523 Barrister Building Washington, D. C. "World's Largest Organization of Inventors"

A GOOD PAYING BUSINESS OF YOUR OWN



Raise Guinea Pigs for us. No experience necessary. We supply breeders and buy the young, paying up to \$2.00 a pair. Use your cellar, spare room or barn. Write today for **FREE** book.

RESEARCH SUPPLY CORPORATION

Dept. R-3

2436 West York St., Phila., Pa.

EARN UP TO \$50 A WEEK



MAKE MONEY AT HOME

Home Industries B1 Monthly will show you how. Describes all kinds of profitable, legitimate plans, schemes, formulas, ideas, etc. 32 or more pages. Six months trial subscription, 10c.

Home Industries

Box 84

Irvington, Nebr.



MAKE GLAZED GARDEN POTTERY

Beautiful, colored, glazed concrete pottery made without molds. No experience needed. Use only sand and cement. 2,500 different designs birdbaths, vases, jars, etc. Big profits. Book, color plate, etc., 10c.

NATIONAL POTTERIES, 1115 Hawthorne, Minneapolis, Minn.



BUILD THIS Ocean Cargo Steamer



Popular scale model of old time tramp steamer, from shipbuilder's plans. Only one of many models covered in our 32-page catalog of blueprints, construction sets and fittings. Send 15c for this catalog today. A. J. Fisher, 1002-4 Etowah Ave., Royal Oak, Mich.

MAKE MONEY PRINTING

letter and billheads, circulars, cards, for friends, spare time. Easy to learn, easy to get jobs. **Printing Presses \$12**; new type faces, complete supplies, lowest prices. Send stamp for catalog.



PEIFFER CO., 14-A; 6 Columbia St., Newark, N.J.

ARMY AND NAVY SUPPLY CO.
Bargains—Army, Sport Goods, Firearms, Clothes, Shoes, etc. Send 10c for new catalog, to be redeemed on first order
Army & Navy Supply Co. 4772 Lester St. Richmond, Va.

Men & Women Earn Cash at Home!

Grow fancy giant mushrooms in cellar, attic, barn. Easy, odorless method. We show you how furnish guaranteed materials and buy crops. Valuable big book, pictures free if you write quickly. (Est. 1908.) **UNITED CO. 3848 Lincoln Ave. Dept. PM-12, CHICAGO**

FOR YOUR HOME WORKSHOP

If you like to make things, you will enjoy this new book just published by Popular Mechanics entitled



Make It Yourself

The home mechanic, whether young or old, amateur or professional, will take pride and delight in making many of the things described therein.

Both father and son will find fascination and an association of interest in making useful and ornamental articles for mother to admire upon their completion.

900 Articles All Different

There are attractive ship models, a great variety of toys that operate themselves by means of an ingenious application of mechanical principles, novel amusement devices for indoors and outdoors, for both water and land, unique designs in furniture for children, scores of useful appliances for the home, things of beauty and utility for lawn and garden, etc.

Special articles instruct the amateur mechanic in the care and use of tools, special tools for special purposes, how to read and use plans, how to solder, the making of a handy work bench, cuts, joints and methods in woodworking, automobile repairing, installing radio equipment, house wiring, fixture hanging, working in glass, leather, metal, celluloid, lathe work, utilizing parts of old machines to make equipment that would be expensive to buy, etc.

480 Pages—823 Illustrations.

Size 7x10x1½ in. Cloth Binding

Price \$3.00

Mailed Postpaid upon receipt of price anywhere in the world. If you reside in U. S., Hawaii, Porto Rico, Alaska or Mexico, we will send the book by mail C. O. D. if you prefer.

POPULAR MECHANICS PRESS (ROOM P-12)
200 East Ontario St. Chicago, Ill.



Famous Museum Model

You'll be proud to
BUILD HER!

"SOVEREIGN OF THE SEAS"

Now—begin the BEST model ever published, great man-o-war of 1637! Modelers say, "build her and you can build them all!" A masterpiece.

WONDERFUL NEW BOOK WITH FULL DIRECTIONS ILLUSTRATES EVERY DETAIL AND PART—ONLY

Step-by-step stages. Even a beginner can complete her with ordinary tools. 80-page DeLuxe book shows how to mold "Craftmat" carvings; history, etc. Marvelous value at

Sent postpaid upon receipt of price by

POPULAR MECHANICS PRESS

Room 1234, 200 E. Ontario St., Chicago.



BEAUTIFY WITH CONCRETE

NOW YOU CAN BUILD YOUR OWN GARDEN & LAWN PIECES!
POPULAR MECHANICS' "CONCRETE HANDBOOK"

EASY TO MAKE

Garden Seats—Fountain and Basin—Flower Boxes and Vases—Pedestals and Bird Baths—Ornamental Pools—Sanitary Drinking Fountains—Gazebos—Auto Driveway—Sidewalks—Boat Landings and Docks—Entrance and Garden Walks—Sidewalk Flagging—Narrow Curb Walks—Curbs and Gutters—Wall Coping—Steps.

Practical methods for home, farm, shops. Describes mixtures, molds and home-made equipment. Scores of beautiful useful designs pictured. Start a business—make them to sell!

\$1

GET THIS REMARKABLE BOOK NOW! Ask us to forward: then pay postman only \$1 and postage. ORDER IT!

POPULAR MECHANICS PRESS
Room 1234, 200 E. Ontario Street, CHICAGO

When writing to advertisers please mention Popular Mechanics

For
Pleasure!
Thrills!
Health!



Try SKIING
on
NORTHLAND
SKIS

Used by 90% of the experts and Champions, by Admiral Byrd's Antarctic Expedition and recently voted college men's most popular ski.

Latest models for jumping, racing and touring. Made by skilled craftsmen from the choicest of selected woods. New handrubbed finish that withstands exposure and hard usage.

Free booklet
HOW TO SKI
will help you learn.

NORTHLAND SKI MFG. CO.
95 Merriam Pk. St. Paul, Minn.
World's Largest Ski Manufacturers

"25 WAYS TO EARN EXTRA MONEY WITH A TYPEWRITER"

Here is a booklet you will read, cover to cover! It is literally packed with tried-and-tested, "spare-time" money-making ideas! Whatever your age or vocation, if you really want to earn extra money, it will be of real value to you. Send for your free copy even if you do not own a typewriter. Royal's latest handbook, just off the press, shows how you can buy one and actually make it pay for itself many times over. Use the coupon today. The supply is limited.

ROYAL PORTABLE

Finest of home-sized typewriters

Easy to operate—even if you have never typed before! Fast. Sturdy. Standard 4-bank keyboard. Many exclusive features. 3 models... 3 prices. Monthly payments easily arranged.



Only \$33⁵⁰ to \$60

FREE! SEND FOR ROYAL'S NEW HANDBOOK

Royal Typewriter Company, Inc., Dept. PM-12
2 Park Avenue, New York City.

- Please send free copy of your valuable booklet "25 Ways to Earn Extra Money with a Typewriter."
 I own a (Insert Make).....Typewriter Serial Number..... Please send me the details of your special allowance on typewriters traded in this month.

Name _____

Street _____

City _____ State _____

IN CANS WOOD IN TUBES

**Handles Like Putty—
Dries to Hard Wood**

HOLDS NAILS

HOLDS SCREWS

CAN BE SAWED

CAN BE BORED

CAN BE PAINTED

CAN BE PLANED

This is PLASTIC WOOD

HAS 1001 USES

Plastic Wood is the new discovery that saves money in preventing or making permanent repairs. Check those vital spots—leaky window frames, door sills, leaks in roof, cracks in stucco, cement, brick—wood rot under paint, porch posts, steps—loose tiles, drawer pulls, bathroom fixtures, hinges—cracks in baseboard, shelving, furniture. Plastic Wood is weather-proof—water-proof. It adheres permanently to any clean, dry surface—sold at all leading paint, hardware stores.



FREE Write The A. S. Boyle Company, Inc., 1934 Dana Avenue, Cincinnati, O., Department P. M. 12, for interesting booklet on the many uses of Plastic Wood.



PLASTIC WOOD

6 FUSES in 1 PLUG

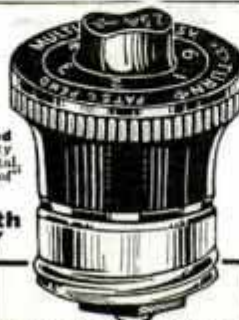
**A Turn to the Right
Brings Back the Light**

New, improved, patented 6-in-1 fuse plus approved by Nat. Board of Fire Underwriters. A necessity in every home, store, office, factory, school, hospital, garage, etc. Safe, economical, absolutely "fool-proof" and shock-proof. Most useful invention in years.

**AGENTS UP TO \$500.00 A Month
Can Earn TO EASY**

Exclusive territory can easily bring distributor agents up to \$500 monthly selling direct to large and small users and at wholesale. Easiest, fastest seller imaginable. Retail 15c. Big profit to agent. Write at once. Send 15c for one sample—25c for 2. Get complete money-making plans.

MODERN APPLIANCES, Inc.
168 N. Michigan Ave., Dept. 508, Chicago



FREE OUTFIT for demonstrating how 6-in-1 works. Write quick! We will tell you how to get it FREE!

STROBOSCOPE

Complete with newly patented electric motor, neon lamp, and book of 100 experiments to be done with outfit. Postpaid \$1.25.

SPECTROSCOPE: Beyond the telescope, below the microscope, reveals secrets of suns and atoms! Hundreds of colored spectral lines of metals. New invention, no toy. \$2.50.

ELECTRIC FUN! 200 stunts with 110 volts, \$1.

CUTTING & SONS, 124 M St., Campbell, Calif.

Be a Finger Print Expert!

You can now enter this established, young and swiftly-growing finger print profession offering genuine opportunities for a steady monthly salary, as well as sharing in Rewards. Trained men are being hired at substantial salaries with the opening of each new Identification Bureau by governments, states, cities, detective agencies, corporations and private organizations. Think of your future—investigate this opportunity for Success. Write for Free details.

INSTITUTE OF APPLIED SCIENCE
1920 Sunnyside Avenue, Dept. 30-29 Chicago, Ill.

EARN CASH—Have FUN Casting Toys with New HOME FOUNDRY

Learn a trade and earn money casting metal toys with amazing new HOME FOUNDRY Set! Opportunity for BIG PROFITS! Big fun, too. Ideal for Xmas gift. (Boys, show this Ad to your parents!) Hurry—visit your Dealer, or order Complete "5-figure" Soldier Casting Set "A," only \$1.25 Postpaid in U. S. Wonderful ELECTRIC Machine Gunner Set No. D-21, only \$2.95 Postpaid. FREE Catalog with Order or rush 3c stamp today. Orders shipped day received! HOME FOUNDRY MFG. CO., 2933 W. Madison, Dept. 13-59, Chicago

AGENTS! NEWEST IDEA IN FOUNTAIN PENS

No. 13 Combination pen and pencil in one. Mechanical pencil on one end and fountain pen on other end, fitted with the new improved stainless durium point. New vacuum filling device, doubles ink capacity. Comes in an assortment of pearl colors. A fast seller. Ideal as a gift. Guaranteed for life.

SPORS CO.
1034 Main St.
Le Center, Minn.

Sample 35c
DOZ. \$2.75

VISIBLE INK SUPPLY

Xmas Offer on Ship Models

Regular \$6.00 Complete Kit of Destroyer "Preston," only \$4.00. Regular \$4.00 and \$4.50 Kits of Historical Ships—Mayflower, etc., only \$3.00. Postage extra on above prices. Kits from 75c up. Make highly prized gifts for modelbuilders. Rush 3c stamp for catalog and special holiday offer.

MINIATURE SHIP MODELS, Dept. R. T., Perkasio, Pennsylvania
Canada—336 Runnymede Rd., Toronto

Catch Fish!

Eels, Mink, Muskrats with our new folding galvanized **STEEL WIRE TRAP**. Write for our **FREE TRAP OFFER** and Bargain Catalog. \$1 Box of our famous Fish Bait FREE to introduce our traps.

WALTON SUPPLY CO., 3509 JUNIATA AVE., ST. LOUIS, MO.

Chemical Research Laboratories

Formula and Process Development. Specializing in the manufacture of Polishes, Emulsions and Auto Products. Analytical and Research. Send for complete list.

25 S. Highland Ave. Ossining, New York

AGENTS Make \$380 Monthly

selling 10 CARTER WINDOW WASHERS daily. Cleans, dries, polishes. No mess. Good licensekeeping approval. Restricted territory. Write today.

Carter Products Corp., 998 Front Ave., Cleveland, Ohio

FREE for RADIO BUILDERS

Complete line of radio parts for all Popular Mechanics circuits and replacement parts for all sets. Also complete amateur equipment. Write for catalog.

Newark Electric Co., 228 W. Madison St., Dept. P. M., Chicago, Ill.

PENNY EACH!!

Beautiful Window Sign Letters. Lowest Price in America. Finest Quality. 5 Year Guaranteed. New Styles. Tremendous Demand. Big Profits. Easily Applied. Record Breaking Offer. FREE Samples and Working Equipment. Hurry!

ATLAS SIGN WORKS, 7943 Halsted, Chicago, Ill.



5,000 CHEMICAL SECRETS

an invaluable reference for:

Chemists
Executives
Craftsmen
Artisans
Technical Men
Engineers

Instructors
Experimenters
Tradesmen
Purchasing Agents
Sales Managers, etc.,
etc.

"THE CHEMICAL FORMULARY"

Let magic chemistry lead you to money and success! Now, thousands of its secrets are ready in indexed, practical, easy-to-find form. Make polishes, cosmetics, farm and shop chemicals, artificial materials, insecticides, colorings, etc., etc., at low cost—sell at big profit to yourself!

Not merely revised—COMPLETELY NEW

Over sixty famed chemist-authors make this greatest book of its kind ever published. More than 600 pages. One easy formula may start you in your own business! Get it NOW! C.O.D. anywhere in U.S.A., or, postpaid to any address upon receipt of price. Amazing value, only \$6. ORDER!

POPULAR MECHANICS PRESS

Room 1234 200 E. Ontario St. Chicago

EASY TO BUILD... BOATS

HAVE YOUR OWN THIS YEAR!

Choose and build the type you've wanted—power, sail, row-boats or canoes! This famous book gives complete step-by-step directions. Hundreds of pictures. No chance for mistakes. Specially written for those with limited tools and skill. All materials now at rock-bottom. Big profit possible if you sell boat later!

POPULAR MECHANICS "Boat Book" SHOWS PLANS, MAT'L'S & METHODS

Also simple navigation, upkeep and repairs. Most detailed, practical guide in boat field—saves you money at every stage of construction. Handsome cloth covers; nearly 300 pages. Only \$2.00 postpaid in U. S. Hurry!

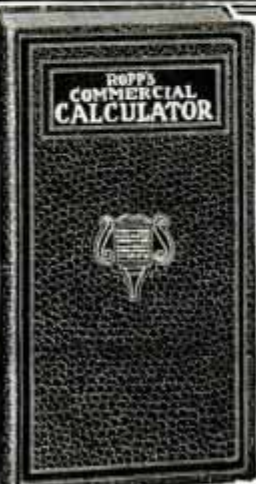
POPULAR MECHANICS PRESS
Room 1234-200 E. Ontario Street Chicago, Ill.

FREE
Booklet with sample pages.
WRITE FOR IT!

Handbook for Farmers

861 discoveries by practical farmers, telling how to make, repair or improve the various devices and machines used about a farm or garden. 683 illustrations. "The Most Remarkable Book Ever Published for Farmers," says one authority. **Send No Money.** When the postman delivers the book to you, hand him \$1 plus the few cents postage.

POPULAR MECHANICS PRESS
Popular Mechanics Building, Room 711, Chicago, Ill.



Mathematics Made Easy by ROPP'S CALCULATOR AND SHORT-CUT ARITHMETIC

Shows the Answer as Quickly as a Watch shows the Time to all Problems likely to occur in the Office, Store, Shop, Bank, Farm, or Factory.

Over 2,000,000 Sold
Explains and simplifies every principle in Arithmetic, Mechanics, and Mensuration.

PRICES POSTPAID
Desk Size, Flexible Keratol Binding, \$2.00
Pocket Size, Art Leather Binding, \$1.00
Pocket Size, Cloth Binding, \$0.50

POPULAR MECHANICS PRESS
Room P-12 200 E. Ontario St. CHICAGO



FREE! Send Coupon for New BIG TRAIN BOOK

American Flyer leads in size, speed, fun-features and real design. Catalog shows many new trains with the latest advanced features and the new ZEPHYR STREAMLINE TRAIN. Select your fun making automatic signals, stations, tunnels, bridges, etc. For 1934, transformers are included in all train sets—nothing extra to buy. American Flyer Trains were the sensation at the "Century of Progress." Dads, too, make railroading a hobby.

American Flyer Mfg. Co. SEND FREE TRAIN BOOK
2248 S. Halsted St., Chicago, Ill.

Name.....

Address.....



MARVELOUS NEW LAMP

Cuts Electric Bills BRINGS BIG PROFITS

Science has produced this "MUSHROOM" lighting bulb that gives the illumination of a 150 watt lamp, yet uses only 100 watts of current. Every store, office, factory buys six to several dozen at a time. Cuts lighting bills by one-third. Guaranteed for 1000 burning hours. Regular price \$1.25. You sell for 85c. Cost you only 45c. Send 25c for Sample and Details.

THE MASTERLITE CO.
Dept. GM 14 110 E. 23rd St., N. Y.



Now! MAKE REAL PHOTO RELAYS

Mysterious New ELECTRIC EYE Photo-cell magically controls mechanical devices, alarms, locks, switches, etc., opens NEW FIELD for invention and research. Full size commercial type Photo-Electric Cells for experimenters now at low cost of only \$3.00, postpaid, with full instructions how to make many strange devices mysteriously actuated by light rays. Experiment at home! Startling results. Scientific, interesting. Fun! Satisfaction Guaranteed. Order today (Send Money Order). Or write for Circular A.



Continental Electric Co., St. Charles, Ill.

When writing to advertisers please mention Popular Mechanics



EASY to Play

WITH an easy-playing Conn band instrument, you can be ready for band or orchestra in 4 to 6 weeks. A sure road to popularity if you start on a Conn. Choice of the world's greatest artists. Magnificent tone. Many exclusive features—yet they cost no more.

Write for Free Book
Ask to see the marvelous new models now being displayed by Conn dealers. Home trial. Easy payments. Write us for free book on whichever instrument interests you most. Mention instrument.

C. G. CONN, Ltd.
1231 Conn Bldg., Elkhart, Ind.

CONN

World's Largest Manufacturers of BAND INSTRUMENTS

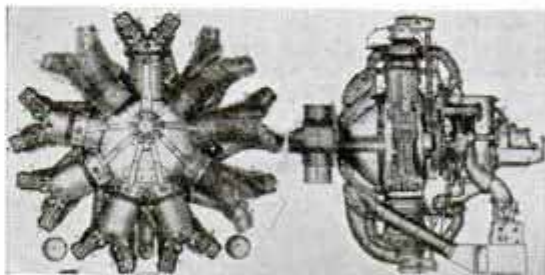
WITH THESE INGENIOUS MODELS

You learn about parts of intricate mechanisms. Everyone is familiar with the "anatomical chart" as a means of teaching physiology. **POPULAR MECHANICS** has applied the same idea in the mechanical field.

Models now ready are:

Wright "Whirlwind" Airplane Engine, Ocean Liner "Europa" (Transatlantic Record Holder) and **Modern Type Passenger Locomotive, Speedy and Powerful.**

Students, instructors, and those mechanically inclined will find these models invaluable.



In this small partial illustration of the Wright Engine Model it is possible to convey only a faint idea of the vast amount of accurate detail shown.

The ingenious way in which all the interrelated mechanism is clearly shown can only be appreciated by seeing and examining the models themselves. The ease with which the detail may be studied will be readily understood as by raising the different flaps the models can be practically disassembled and put together again. The use of many colors has been cleverly employed to make each part stand out clearly by itself. Each part is numbered to correspond with its name found on a printed key. In addition, every important fact of interest about the machine is given.

Sizes range 13 x 22 to 10 x 43 in., unfolded.
Price \$1.00 Each, Postpaid

POPULAR MECHANICS PRESS, Room 1234
200 E. ONTARIO ST., CHICAGO

New "Cyclone" Motor Sled READY!

For Home Builders

Now you can easily build Mead's new, streamlined MOTOR SLED at home from drawings, parts or complete Construction Kit! Low cost. Amazing speed. Seats 2. Rush 10c for Catalog No. 3, MEAD GLIDERS, 12 S. Market, Dept. 112-B, CHICAGO.



LOOK, MEN and BOYS!

Have You Seen Them?

GENUINE LEATHER TIES; can't be told from silk. Fancy patterns: durable, won't wrinkle. **SELL ON SIGHT;** big profits, repeat orders. Be independent, have your own business. **\$5 TO \$10 A DAY EASILY.** Extra bonus for live wires. Send 50c or stamps for sample and kit. Information free.

CENTURY TIE CO., Dept. P, 2333 W. Grand Blvd. DETROIT, MICH.



GET OUTDOORS!

FOR THE WORLD'S BEST FUN AND ROBUST HEALTH Enjoy it 100% with safe, practical equipment! Make devices for all sports in all seasons with ordinary tools and at small cost. What fun you'll have!

NOW! A GREAT NEW BOOK FOR SPORTSMEN—POPULAR MECHANICS' "OUTDOOR SPORTS"

Practical kinks and 650 clear pictures show construction of every device. Easy! Postpaid on order; or C.O.D. in U.S. Don't fail to get this remarkable book—TODAY!
POPULAR MECHANICS PRESS
Room 1234 200 E. Ontario St. Chicago

ONLY
\$2



Give RADIOS AWAY!

Earn up to \$100.00 WKLY

RCA Licensed
NEW MONEY-MAKING PLAN for AGENTS, SALESMEN, DISTRICT MANAGERS. NO EXPERIENCE. PROFITS START IMMEDIATELY LOG CABIN RADIO. Amazing little 7 lb. portable AC & DC radio for home, office, auto, farm, etc. Wonderful tone. Gets police calls. \$30 value. Licensed by RCA and associated companies. Write at once. We'll show you how to make big money giving away these wonder radios and over 30 other popular items.
BECO MFG. CO., 844 W. Adams St., Dept. 28, Chicago

NEW BUSINESS IS MONEY-MAKER FOR MEN WHO ARE HANDY WITH COMMON TOOLS

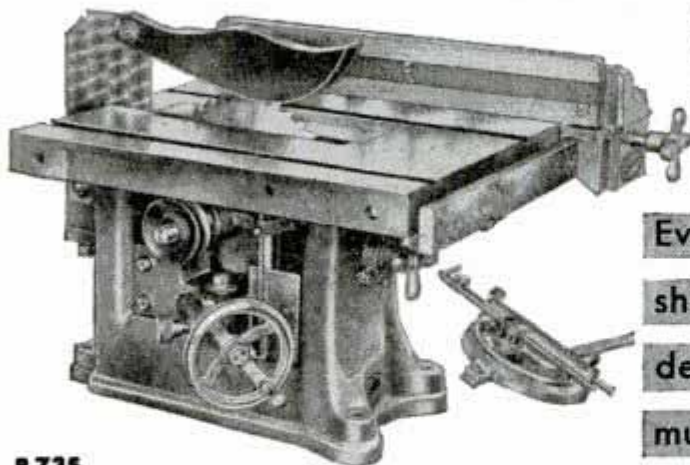
Unemployed? Dissatisfied? Start your own business! Others making money—why not you? Full details in

"BUILT-IN FURNITURE"
SIMPLY TAKE ORDERS—BUILD—AND GET PAID!

Popular Mechanics' big new book pictures and describes modern built-in furniture, closets, cabinets, safes, cupboards, shelves, etc., to utilize waste home spaces. Every owner interested in these practical improvements. You need only fractional amount for standard materials; profits depend on your efforts. Postpaid, \$2.50—order!

POPULAR MECHANICS PRESS
200 E. Ontario St. Room 1234 CHICAGO

1935 DRIVER BENCH SAWS



B735
Bench Saw
21.95 as shown
 including new self-indexing miter-gauge, and 72 page book of instruction.



New 72 Page Instruction Books are included with every major tool and sold separately at 50c each—\$1.50 for set of 4. First ones of their type available. Books in this series: The Bench Jointer & Shaper, The Drill Press, The Lathe, The Band Saw & Jig Saw.

DRIVER . . . the most popular line of homeworkshop power tools . . . now includes five different circular saw models. Every need of the home craftsman or small shop owner is covered. DRIVER superior design and extra quality are yours at minimum cost. See the new lathes, band saws, shaper and other new tools—then COMPARE!

WALKER-TURNER, CO., INC.

1124 Berchman St.

Plainfield, New Jersey

NEW 40 PAGE CATALOG

Obtain from your Local Dealer or Write Direct

100 Shot Repeater HAENEL AIR PISTOL



For target practice, small game, rats, etc. Young men or grown-ups will find these ideal. Well made, strong, powerful, easy loading; nickel or blued finish, wood stocks. 7" overall; wt. 1 lb. FREE 500 Steel BB's. Extra Shot 50c—500. \$2 Deposit on C.O.D.'s.

Single Shot Keenfire: 200 BB's and Targets Free. \$2.45. Haenel Hi-Power Model 26, Rifled; single shot; powerful \$6.95 Catalog; Revolvers, Rifles, Micro and Telescopes, Binoculars, etc. Send 5c stamp. W. LEE SALES CO., 35 W. 32nd St., N. Y. City

For Xmas Gifts \$4.75

5,000 to 10,000 Additional SAFE Miles from Smooth Tires Cuts new pattern back. Used world's largest tire factories, U. S. Govt. New non-skid.

Start a New Business for only **\$6.50** Nothing else to buy!

Owners pay \$1.00 per tire. Less than half hour's work. Many operators do fifteen and more daily. Nothing to sell but service. Full easy instructions sent. Send money order. Get started. Pleasant new business of your own.

KWICK-KUT MFG. CO., 3830 Arsenal St., St. Louis, Mo.



NEW DUAL RAY HEALTH LAMP UNIT

Ultra Violet and Infra Red Ray in One Lamp Health giving. Prevents Rickets and Skin Disorders. Gives Sun-tan—Vitamin "D". Automatic safety control. 110 Volt AC or DC. Free Details. **\$3.50** COMPLETE with Goggles only postpaid. BEYER MFG. CO. 4855 Lincoln Ave. Dept. A-12 Chicago, Ill.

Marvelous AIR CONDITIONER on 10 DAYS' TRIAL

For Steam, Hot Water, Vapor and Hot Air Systems. WONDERFUL INVENTION Actually Saves 25% on Coal Bills. Simple to Install. MONEY BACK GUARANTEE. Free Booklet Humidify for Health. **\$4.65** ONLY post paid LONDON & WARNER, 360 N. Michigan Ave., Dept. K36, Chicago, Illinois

MAKE MONEY! INSTALL YOUR OWN BURNER

At last! A quality burner in the low priced field. Our burners bought by U. S. Govt.! Now you can buy direct at one low price complete with full set of electric controls, wire, etc., plus complete instructions for making your own installation. Write for amazing low price and free literature today!



CHALMERS OIL BURNER CO.
 1236 Central Ave., Minneapolis, Minn.

FREE LITERATURE . . . SEND TODAY!

Ideal TRAILER HITCH BALL JOINT

Also the BULLDOG

MOST PRACTICAL HITCHES MADE!

Combi-Chasi and Ideal Axles; Tongues and Tongue Ends; Inner-Spring Beds; Flush Electric Lights; Stoves; Sinks; Windows; Full Size Blueprints FREE with Parts. Guide to Trailer Building and Catalog of Parts, 25c. **ONLY \$3** Order Now!

HAMMER BLOW TOOL CO., 606 Third St., Wausau, Wis.

GEM-CUT PUZZLES 8 IN ONE

A precision article of interest to engineers, inventors, toolmakers, and all fine mechanics. Not a jig-saw puzzle nor a children's toy. A sure test of skill and ingenuity. Send stamp for circular or a dollar bill for eight puzzles in one.

THE PUZZLE SHOP, 808-20th St., Denver, Colo.

\$400 PROFIT MONTHLY RIGHT NOW IN YOUR SHOP WITH THIS NEW SIMPLIFIED ARC WELDER



Start big paying business of your own. Unusually low prices lets you start in this profit making work at less cost than you imagine. Profits will easily pay for it. Now is the time to buy before inflation comes.

30 DAYS TRIAL AT-OUR-RISK \$30 MONTHLY

Thousands of shops are earning big money with Hobart cashing in on the many profitable jobs and construction work it lets you handle. Check the size you're interested in, tear out ad and mail today to **HOBART BROS., Box M-124, Troy, O.**

- Gas
- Electric
- Belted
- 125 Amp.
- 200 Amp.
- 300 Amp.
- 400 Amp.

SPECIAL OFFER!

GUARANTEED UNDERWOOD

Yours for
10¢ a Day

No Money Down

Sent on
10 DAY FREE TRIAL

\$100.00 MODEL ONLY \$39.90



Positively the greatest bargain ever offered. A genuine full-sized office model Underwood No. 5 for only \$39.90 (cash) or on easy terms. Has up-to-date improvements including standard 4-row keyboard, backspace, automatic ribbon reverse, shiftlock key, 2-color ribbon, etc. The perfect all purpose typewriter. Completely rebuilt and FULLY GUARANTEED. Lowest Terms—10¢ a Day.

Learn Touch Typewriting
Complete (Home Study) Course of the Famous Van Sant Speed Typewriting System—fully illustrated, easily learned, given during this offer.

Money-Back Guarantee

Send coupon for 10-day Trial—if you decide to keep it pay only \$3.00 a month until \$44.90 (term price) is paid. Limited offer—act at once.

INTERNATIONAL TYPEWRITER EXCHANGE.

231 West Monroe St., Chicago, Ill., Dept. 1201
Send Underwood No. 5 (F. O. B., Chicago) at once for 10-day trial. If I am not perfectly satisfied I can return it express collect. If I keep it I will pay \$3.00 a month until I have paid \$44.90 (term price) in full.
Name.....Age.....
Address.....
Town.....State.....

WORLD'S Fastest TRAIN

NOW—model of famous C. B. & Q. "Zephyr." The finest, most modern electric train ever offered. Cast aluminum cars, perfectly streamlined. Individual shatter-proof windows. Positive couplings. New brassless motor (no radio interference). Steel wheels, bronze bearings. Solid T rails, real spikes and wood ties. Runs 120 (miniature) m.p.h., smoothly, quietly. At your dealers or write—



Send today for information, sample rail, tie and spikes—
FREE
RACINE, WISC.



NOW... you can print your favorite negatives onto SCARFS, HANDKERCHIEFS, TIES, Etc.

This new GRAFOTYPE liquid sensitizer is NOT a transfer but prints genuine black and white photos onto cloth that cannot be washed out... No experience needed. No dark room required... Prints in sun or electric light. Start printing in your own home and make extra money... Price \$1 per bottle, enough for 36 prints. Complete, simple instructions included.

MODERN APPLIANCES, Inc.
168 N. Michigan Ave. Dept. G-10, Chicago, Ill.

Make up to **\$150** Weekly GIVING AWAY
FREE RCA LICENSED RADIOS



AND 10 STAR "SPECIALS"

RCA Licensed Home Radio Sets for American, European and South American Reception and our 10 STAR items including Chest of Silver, Man's Wrist Watch, Electric China Coffee Set, Bridge Table and Chairs, Lady's Wrist Watch and other valuable gifts all given away absolutely FREE with our new sensational unique PUNCH SALES CARD PLAN. This is the opportunity of the year—make up to \$150 cash each week for yourself. Every home, car owner, store, office, factory, lodge, club or individual wants these marvelous new FREE RCA LICENSED RADIOS or any of the valuable 10 STAR items.

WRITE TODAY FOR OUR 3 NEW STARTING OFFERS
Start at once making money with our unique sales plan. Write for full information how you can secure any or all of these plans.

Deluxe Mfg. Co., Dept. 138, 173 W. Madison St., Chicago, Ill.

SOLDERING IRON and BLOW TORCH in one!

WONDERFUL NEW INVENTION



Pays for itself in one job! Needs no pump or pressure system—no stove—no charcoal—no separate blow torch. Burns an hour at less than 1/4¢ for gasoline.

AGENTS' OFFER Write for Special Offer to agents. The Justrite is an ideal proposition for either main line or side line—full time or spare time.

JUSTRITE MFG. CO.
20-75 Southport Ave. CHICAGO

"Jewel" Electric Fountain

3 SALES A DAY PAYS YOU \$46.50
Nothing like this beautiful, unique table decoration for homes, clubs, hotels, stores. Automatic water flow on illuminated shade with no water connection. An air purifier, cleanser and humidifier. Write quick. We'll also send you profit facts on our Electric Sign Turntable and Electric Travel Sign for stores. Quick Xmas cleanup for Sales Distributors.



Jewel Electric & Mfg. Co., Dept. 10, 4505 Ravenswood Ave., Chicago, Ill.



ITALIAN ACCORDIONS

OF ALL TYPES. Hand-made, best quality. Buy direct from our factory and save 1/2. Satisfaction guaranteed. Used musical instruments taken in trade. FREE accordion lessons.

ITALIAN ACCORDION CO.
1014 Blue Island Ave., Dept. P-2, Chicago.

Electroplating with Gold & Silver

and other plating information in Shop Notes for 1933. Illustrated. 50 cents, postpaid.
Popular Mechanics Press, 200 E. Ontario Street, Chicago

TEST YOUR KNOWLEDGE

What is an— AIRPLANE ENGINE IGNITION HARNESS?

Aero training begins with motors. Can you name and describe actions of their parts? Can you identify the sensational Wright "Whirlwind," great motor that carried America's famous flyers on successful trans-Atlantic flights? Know aviation! Marvelous new chart illustrates every "Whirlwind" part. Shows how ignition, timing, firing, lubrication is controlled. Shows cylinders, pistons, valves, crankshaft, etc., in exact proportions—how they work together. Gives CORRECT part names so you'll KNOW each. Movable sections in COLORS—you cannot be confused. Unfolds to big 10 x 43-in. size. It's amazing! Special at only \$1—money-back guarantee. Be sure to order one, TODAY!

FREE!
Big list aviation and other books with order for chart.

POPULAR MECHANICS PRESS
Room 1234 200 E. Ontario St. Chicago



Raise Frogs for Profit

NEW BOOK TELLS HOW
The Frog Industry, by W. L. Hannaca. A standard book of instruction, covering every phase of Frog Raising, past, present and future. Frog culture is explained in clear, understandable language. There are many plans of constructing ponds. Also designs for making combination frog feeder and fly traps and the getting of worms and insects electrically. The roly poly frog feeder—a new mechanical feeder. Many illustrations make the explanation clearer and the book more interesting. Price \$2.00 postpaid.

POPULAR MECHANICS PRESS
Room 112, 200 E. Ontario St. CHICAGO

**SUPPRESSED
KNOWLEDGE
OF THE AGES**

What strange powers did the ancients possess? Where was the source of knowledge that made it possible for them to perform miracles? Were these profound secrets burned with ancient libraries, or are they buried beneath crumbling Temple walls?

These wise men of the past knew the mysteries of life, and personal power. This wisdom is not lost—it is withheld from the mass. It is offered freely TO YOU if with an open mind, you wish to step out of the rut of monotonous existence and MASTER YOUR LIFE.

THIS FREE BOOK

Man's intolerance has at times swept his achievements from the face of the earth, yet secret brotherhoods have preserved this sacred wisdom of the ages. The Rosicrucians, one of these ancient brotherhoods, INVITE YOU to write and secure a free copy of the "Wisdom of the Sages." It will point out how you may receive age-old truths. You can learn to MAKE YOUR LIFE ANEW—the fulfillment of your ideals awaits you. Address:

SCRIBE C.K.P.
ROSICRUCIAN BROTHERHOOD
SAN JOSE (AMORC) CALIFORNIA

Information on any book free. Write Popular Mechanics Press, Chicago, Ill.

WIN BY KNOWING
HOW!

SHOW what you KNOW and employers will want you! Easy to train yourself!

*Let These Great Books Point
the Quick Way to*
BIGGER JOBS—MORE MONEY

Today—jobs go to the man who can PROVE his skill; who works with the greatest ease and speed! Prepare for your big chance NOW! Thousands are helped by

SHOP NOTES

NEWEST 1934 EDITION

480 ARTICLES — 225 PAGES — 580 PICTURES

Hundreds of valuable short-cuts and kinks — just what you need to get ahead! Sixteen different trades covered! Begin to LEARN, NOW!

SPECIAL VALUE OFFER! 2 BOOKS

Hurry! Order SHOP NOTES — get LATHE BOOK too—BOTH for 98c post-paid! Bargain!

READY! SHOP NOTES LIBRARY

8 vols. 3600 marvelous shop ideas! \$3.50 complete. 100% value or money back.

POPULAR MECHANICS PRESS—Room 1234
200 E. Ontario St., Chicago



Follow this Man

Secret Service Operator 38 is on the job

FOLLOW him through all the excitement of his chase of the counterfeit gang. See how a crafty operator works. Telltale finger prints on the lamp stand in the murdered girl's room! The detective's cigarette case is handled by the unsuspecting gangster, and a great mystery is solved. Better than fiction. It's true, every word of it. No obligation. Just send the coupon and get —

FREE!

**The Confidential Reports
No. 38 Made to His Chief**

And the best part of it all is this—it may open your eyes to the great opportunity for YOU as a well paid Finger Print Expert. This is a young, fast-growing profession. This school has taken men and trained them for high official positions. This is the kind of work you would like. Days full of excitement. A regular monthly salary. Rewards.

Can you meet this test?

Are you of average intelligence? Are you ambitious? Would you give 30 minutes a day of your spare time preparing yourself for this profession? Answer "yes" and I'll show you how it is possible for you to attain all this. Send the coupon and I'll also send the Free Reports.

INSTITUTE OF APPLIED SCIENCE
1920 Sunnyside Ave., Dept. 93-59 Chicago, Illinois

Institute of Applied Science
1920 Sunnyside Ave., Dept. 93-59 Chicago, Illinois

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

Name _____

Address _____

Age _____

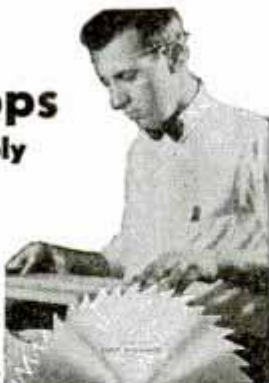
When writing to advertisers please mention Popular Mechanics

for Motorized home Workshops

Your dealer can now supply you with all these fine

DISSTON-Made

KEYSTONE SAWS and TOOLS



CIRCULAR SAWS for cutting wood—6", 1/2" hole; 7", 1/2" hole; 8", 1/2", 3/8" hole; 10", 3/8", 1/2" hole. Cross-cut, Rip, Combination. Prices, \$1.00, \$1.25, \$1.40, \$1.80. Hollow Ground, same sizes and holes, \$2.50, \$3.00, \$3.60, \$4.50.

CIRCULAR SAWS for metal cutting—4", 1/2" hole; 6", 1/2", 3/8" hole. Prices, \$1.40 and \$2.00.

BAND SAWS for cutting wood—Widths, 3/16", 1/4", 5/16", 3/8". **BAND SAWS for cutting metal, fibre, etc.**—Widths 1/4" and 5/16". Lengths of above for all popular homeworkshop machines. Prices, \$1.00 to \$1.10.

SABER SAW BLADES—For wood, length 6", 9 points, 90c doz. For metal, 5 1/2", 19 points, \$2.40 doz. For soft metal, brake lining, fibre, etc., 6", 9 points, \$1.20 doz.

JOINTER KNIVES, Disston-made, Alloy-steel—Sets of three knives, 4", 4 1/4" and 6" lengths, for popular homeshop jointers. \$2.00 and \$2.85 set.

DADO CUTTERS—Two outside and 6 inside cutters. 4", 1/2" hole, \$2.50 set; 5 1/2", 1/2", 3/8" holes, \$4.00 set.

CHISELS and GOUGES for Wood Turning—Good Disston-made lathe tools, 65c and 90c. Complete set of 8, \$5.60.

Ask your dealer for Keystone Saws and Tools. Write us for complete list, with "Valuable Hints for the Motorized Home Workshop"—Included FREE.

HENRY DISSTON & SONS, INC.
1211 Tacony, Philadelphia, U. S. A.
Canadian Factory: Toronto

Do you own V-8 FORD or 1934 CHEVROLET?

DEALERS WANTED



If so, You Need a GIVENS GAS FILTER

Easy to install. Assures you Clean, Filtered Gasoline always. Prevents Freezing in Cold Weather. Keeps out Dirt, Sediment and Water. Carburetor and Fuel Pump Operate at Full Efficiency at all times. Eliminates Air or Vapor Locking. Pays for itself many times in More Economical Operating Costs. No Owner Can Afford to be Without One—GET YOURS NOW!

If your Dealer can't supply you, order direct, price \$1.50 Cash with Order Postpaid; C.O.D. if you prefer. State Make of Car.

\$1.50

POSTPAID

GIVENS PRODUCTS CO., 200 Products Bldg., Kansas City, Mo.

Make Big Profits Filing Saws by Machine

An Opportunity to earn up to \$2 to \$3 an Hour in your own cash business.

Steady growing business, all cash, no canvassing. Start in spare time. No experience needed. No eyestrain. With a FOLEY Automatic Saw Filer you can file hand, band and circular saws, easily, quickly, accurately! Small investment. Send postcard for FREE PLAN and Special Offer. No obligation.

FOLEY MFG. CO., 1216-4 Foley Bldg. 11 Main St. N. E. Minneapolis, Minn.



See the FOLEY Exhibit at the New York Power Show — Dec. 3-8

ELECTRIC TORCH—\$7.50

WELD—BRAZE—SOLDER WITH ELECTRARK

THE "ELECTRARK" ELECTRIC TORCH OUTFIT WILL DO YOUR LIGHT WELDING JOBS, BRAZING, SOLDERING, ETC., AND OPERATES FROM ANY 110 VOLT LIGHT SOCKET A. C. or D. C. The "Electrark" Electric Torch Outfit consists of a reactance-resistance current control unit, mounted in attractive and compact metal case, Electrode holder and torch unit, with cord and plug for attaching to any light socket or outlet. A complete assortment of supplies is included, consisting of Goggles, Welding and brazing materials, flux, instruction book, etc. Everything needed is included. "Electrark" is used in hundreds of shops, garages, etc., by mechanics, repairmen, radio men and electricians. Guaranteed satisfactory or your money refunded. Shipped prepaid. Write for interesting free descriptive literature.

EMPIRE ELECTRICAL PRODUCTS CO., P. O. Box No. 265 SPOKANE, WASHINGTON

SENSATIONAL MOUSE TRAP A Child Can Safely Set It

ALL STEEL—NICKEL PLATED—Sets with finger or foot—No more Nipped Fingers. Remove Mouse without touching—Lightning action. Display Card men and other salesmen build permanent repeat business. Hardware, General Stores, etc. Give qualifications. 2 samples 20c.



WORLD BEATER COMPANY 3954 Drexel Blvd., Dept. 612 Chicago

Locomotive and Launch Engines, etc.

Locomotives 1/2 in. scale up of every type. Launch Engines, Vertical and Horizontal Engines from \$3 up. Compound Engines, Traction Engines, Boilers, Fittings. Castings and Parts. Gas Engines Castings \$10. Every Type of Engine supplied. Send Stamped Addressed Envelope for Lists of Bargains and save money. W. J. WELLS, 112 Shaver St., San Rafael, California

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC. REQUIRED BY THE ACT OF CONGRESS OF MARCH 3, 1933, of Popular Mechanics Magazine, published monthly at Chicago, Ill., for October 1, 1934.

State of Illinois, County of Cook, ss. Before me, a notary public in and for the state and county aforesaid, personally appeared Willis S. Brown, who, having been duly sworn according to law, deposes and says that he is the business manager of the Popular Mechanics Magazine and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations, printed on the reverse of this form, to wit: First. That the names and addresses of the publisher, editor, managing editor, and business manager are: Publisher, Popular Mechanics Co., 200 East Ontario St., Chicago, Ill. Editor, H. H. Windsor, Jr., 200 East Ontario St., Chicago, Ill. Managing Editor, L. K. Weber, 200 East Ontario St., Chicago, Ill. Business Manager, Willis S. Brown, 200 East Ontario St., Chicago, Ill. Second. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given.) Popular Mechanics Company, 200 East Ontario St., Chicago, Ill. L. B. Windsor, 200 East Ontario St., Chicago, Ill.; H. H. Windsor, Jr., 200 East Ontario St., Chicago, Ill. Third. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None. Fourth. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and that affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him. Willis S. Brown, Business Manager, Sworn to and subscribed before me this 25th day of September, 1934. J. GRAHAM, Notary Public. (My commission expires June 16, 1936.)

RAISE FROGS FOR PROFIT NEW BOOK TELLS HOW

The Frog Industry, by W. L. Hannaca. A standard book of instruction, covering every phase of Frog Raising, past, present, and future. Frog culture is explained in clear, understandable language. There are many plans of constructing ponds. Also designs for making combination frog feeder and fly traps and the getting of worms and insects electrically. The roly poly frog feeder—a new mechanical feeder. Many illustrations make the explanation clearer and the book more interesting. Price \$2 Postpaid

POPULAR MECHANICS PRESS, Room P-4, 200 E. Ontario St., CHICAGO

110 VOLT 60 CYCLE GENERATORS

GENUINE 300 WATT "GREAT WESTERN" 110 VOLT 60 CYCLE A. C. GENERATORS. DELIVER PURE ALTERNATING CURRENT IDEAL FOR HOME LIGHTING, RADIO PURPOSES, ETC. Great Western generators are adapted to any service where A. C. service is required away from power lines. (Deliver same current as city mains.) They may be operated from any power source of 1/2 H. P. or more. A 1/2" Diam. shaft extension is provided for mounting pulley or drive coupling. Require 6 V. D. C. excitation from storage battery or Auto generator. Completely enclosed, laminated armature, ball bearings, mounted on special automatic belt take-up spring tension base. Circulate on request.

PRICE \$17.00

EMPIRE ELECTRICAL PRODUCTS CO., Post Office Box 265 SPOKANE, WASHINGTON



**SALESMEN—AGENTS
EARN UP TO \$40.00 DAILY**

20,000,000 Automobile Owners are waiting for salesmen and agents to sell them the Newest Invention to insure greater power, more pep, speed and better performance of their automobile. There is no competition in the GLOW BOMB IGNITION MASTER. It has been put through every kind of test for over one year, before placing it on the market—and it is now ready for those interested in selling and making BIG PROFITS.

It is the most positive answer to real enjoyment in automobile driving, and produces extra better performance from an automobile engine.

Write now for guaranteed money back offer and sales plans.

Metal Specialties Mfg. Co.
Dept. 7-B
3204 Carroll Ave. Chicago, Ill.



NEW ANGLE VISE HAS NO EQUAL Only **\$5.95**

A new invention—at the lowest price in the field. The Patented Angle Vise—accurately graduated in degrees—for all production, tool and general shop use, saves hours in wedging and setting angle plates, making jigs and fixtures. Makes it possible to cut, drill or grind at any angle by means of one, quick, simple adjustment. Has greater strength and holding capacity than ordinary vices. Width of jaws 2 1/2 inches. Construction guaranteed. **SPECIAL LIMITED OFFER**—only \$5.95 plus postage. Or, send \$2.00, pay postman balance due. Send at once.

CHICAGO TOOL & ENGINEERING CO. 8368 SO. CHICAGO AVE., CHICAGO, ILL.

Earn \$3 an hour

FREE
A useful gift
if you write
Promptly.

Interviewing Grocers, Druggists, Tavern Keepers, all store owners taking orders for carded necessities.

\$1.00 Value costs you 13c
Quality Aspirin, Whiskey Chasers, Razor Blades, unbelievable prices. Send for big FREE list hundreds quick money items. Write TODAY full or part time plan!
HALDON PRODUCTS CO., Dept. 1612
1837 Sedgwick St., Chicago, Ill.

Information on any book free. Write Popular Mechanics Press, Chicago, Ill.

BOYS! MAKE THINGS THAT

- Scooters
- Push-Mobiles
- Real Autos with Motorcycle Engines
- Wind Wagons
- Ferris Wheels
- Roller Coasters
- Merry-Go-Rounds
- Swings
- Gliders
- Model Airplanes
- Model Ships
- Model Railways
- Water Wheels
- Pile Drivers
- Cableways
- Boats
- Shop Machinery
- Movie Cameras
- Ice Boats
- Toboggans
- Bob Sleds
- Snow Speedsters
- Etc. Etc. Etc.

GO!

The boy who can DO THINGS is the leader among his friends. Here's a marvelous source that shows HOW!

4000 WONDERFUL IDEAS EVERY BOY WILL WANT!

At the workbench, in camp, on land and water, winter and summer—there's no place or time omitted by these amazing big books. Thousands of plans, kinks and articles on EVERYTHING a boy wants to make and do! Be a leader. It's easy when you own . . .

POPULAR MECHANICS' FAMOUS BOY MECHANIC LIBRARY

Four great volumes each with 460 pages, each with clear pictures and text anybody can understand. Size: 7 x 10 x 1 1/2 inches!

DON'T WAIT! ORDER NOW!

Complete set, only \$7; per book, \$2, postpaid. Or, C. O. D. in U. S. A., paying price & postage.

POPULAR MECHANICS PRESS
Room 1234
200 E. Ontario St. - Chicago

4 BIG VOLUMES
BOOKS 1, 2, 3 and 4
EACH \$2

**"OH! OH!
THIS IS JOE!"**



YOU really need a good gas-mask to play blindman's buff successfully when Joe and his gassy old briar are in the game. That surly tobacco he stokes up with gives him away.

Run a cleaner through your briar, Joe, scrape out the polluted bowl—then fill up with mild Sir Walter Raleigh. This gentle blending of Kentucky Burleys gives off a delicate and seductive fragrance that appeals to merry widows and wary kiddoes alike. Sir Walter Raleigh is cool. It's slow burning. It's pipe smoking at its best. Try it—you'll be the hit of the party.

Brown & Williamson Tobacco Corporation
Louisville, Kentucky, Dept. P-412



Send for this
FREE
BOOKLET

It's 15¢
—AND IT'S
MILDER





**I'll Say
A Merry Xmas**

How proud you'll be to own "CHICAGO" The World's Greatest. They build Healthy Bodies, make Leaders and CHAMPIONS.

**CHICAGO FLYING SCOUT
Roller Skates**

**No. 101
WITH FAMOUS
TRIPLE-TREAD, "TRIPLE-WARE" WHEELS**

Only "CHICAGO" Roller Skates have these patented steel wheels that give More Speed and More Miles at lowest cost. No. 101 shown above, Reg. Price \$2.25. Special Only \$1.95 Postpaid.

NEW Streamline Super "SILENT-FLASH"

Students and Grown-Ups prefer these high Speed, Noiseless Rubber Tire Skates with reinforced channel arch and wide toe clamps. They outwear Steel Wheels. Reg. Price \$4.00. Special Only \$3.75 Postpaid.

Send dealer's name with remittance, if he can't supply. Demand "CHICAGO'S"—name stamped on wheels.

GET CLUB PIN and FREE BOOK

Write Today! Enclose 10c if you want beautiful GOLD P. Skate Club Pin.

CHICAGO ROLLER SKATE CO.

Roller Skates with Records for over 30 years.

4414 W. Lake St.

Chicago, Ill.



**900 WORKSHOP
IDEAS**

Why "putter" when you can make hundreds of articles for beauty, utility and dollar and cent profits?

"Make It Yourself"

Newest edition: 480 pages, 823 pictures. Size: 7x10x1 1/2 inches. Sent postpaid anywhere upon receipt of price or C.O.D. in U.S.A. paying postman price and postage. **\$3**

Send for it!

**POPULAR MECHANICS PRESS
Room 1234**

200 E. Ontario St.

Chicago

INCLUDING:
Toys, Models
Furniture
Garden Equipment
Home Repairs
Sports Equipment
Auto Kinks
Radio Equipment
Workshop Tools
and Machinery
Articles on Working:
Wood, Metal,
Leather, Glass,
Etc. Etc. Etc.

TEST YOUR KNOWLEDGE

What is a—

LOCOMOTIVE CROWN STAY?

Is railroad work your ambition? Are model railways your hobby? Here's the quickest, easiest and surest method to learn about giant passenger engines that haul famous trains from coast to coast in record time! You'll KNOW locomotives if you get a remarkable new chart, now ready! Shows every part "20th Century Limited" locomotive. How fired; how controlled. Shows drive wheels, cylinders, boiler, tender in exact proportions—how they work together. Gives CORRECT names so you'll remember them. Movable sections in COLORS—you can't be confused. Unfolds to big 10 x 46-in. size. Amazing! Special at only \$1—money-back guarantee. Don't miss this bargain offer. Order TODAY!

FREE!
Big list
railway
and other
books with
order for
chart.

POPULAR MECHANICS PRESS

Room 1234

200 E. Ontario St.

Chicago

TEST YOUR KNOWLEDGE

What is—

OCEAN LINER GREAT GEARING?

Do you love ships? Do you make ship models? Here's the quickest, easiest and surest method to learn EVERYTHING about the fleet, palatial ocean liners that sail the seas! Remarkable new chart shows how they are fired, how controlled. Shows turbines, boilers, electrical systems, steering gear, cargo and passenger accommodations. All parts exactly proportioned, with CORRECT names you'll want to remember. Movable sections in COLORS—you can't be confused! Unfolds to big 10 x 40-in. size. Amazing! Special at only \$1 postpaid. Guaranteed satisfaction or money back. Be sure to send for one—Order TODAY!

FREE!
Big list
marine
and other
books with
order for
chart.

POPULAR MECHANICS PRESS

Room 1234

200 E. Ontario St.

Chicago

**Prices Are ADVANCING
Buy at BOTTOM Prices**

All over the world, thrifty, far-sighted people are going to take advantage of this last chance to buy quality watches at these low prices. We bought these watches for you at bottom prices. When these are gone, even our great buying power will not enable us to continue selling these fine watches and diamonds at such low prices.

**Diamond Rings
Wrist Watches**

Write for our New Diamond Ring of Romance and Bulova Wrist Watch Catalog showing marvelous new designs at prices which cannot be continued. Catalog sent FREE. All Watches and Diamonds Sold on Easy Payments.

**Don't Delay—Send for Catalog at Once
SANTA FE WATCH CO.
Dept. C-6, Thomas Bldg., Topeka, Kans.**

**WALNUT AND MAHOGANY
LUMBER FOREIGN & DOMESTIC
HARDWOODS
FOR HOME WORKSHOPS**

Send for Catalog

**O'BRIEN LUMBER COMPANY
2647 S. Damen Avenue CHICAGO**

Catalog No. 34-A Illustrating Electrical, Mechanical and Model Makers' Supplies, Small Steam & Gasoline Engines, Motors, Generators, Lathes, Drill Presses, Bench and Band Saws, etc., 16 & 32 Dyna-Motors, School Projects, Engine Castings, Motor Parts, etc., Books, Blue Prints, Brass and Steel Tubing, Gears, Pulleys, Hangers, Experimental Material.

Big Copy. Mailed anywhere for 20 cents. 25 cents Canada, refunded first order.

**LOOMIS ELECTRIC COMPANY
2822 N. California Ave. Chicago, Ill.**

**BUILD YOUR OWN
HUMIDIFYING SYSTEM**

**FOR AIR CONDITIONING
FOR AS LITTLE AS \$15.00**

Now, you can build and install—within two hours—one of the most practical and efficient fully patented humidifying systems ever devised—a complete Humidifying system for air conditioning. Surprisingly simple construction. Automatic operation. Reduces heating costs up to 25%! Keeps costly furniture, antiques, paintings, etc., from drying out, cracking, fading and other damage. Authorities say, air in most heated rooms is actually drier than on any desert, and that dry air menaces health and comfort. This system protects you from colds and illness, keeps you feeling healthy and fit. Send only 25c. cash or stamps (Postage and handling charge, only) for easy-to-read Blue Prints and Book of Information, giving complete data to build and install. Send at once.

**MOORE MANUFACTURING CO.
607 WEST WASHINGTON ST., CHICAGO, ILL.**

**NEED A BETTER GRIP
ON MATHEMATICS?**



SEND for a copy of "Mathematics for the Practical Man," only \$1.50. By common sense methods it removes the mystery and difficulties so that algebra and even calculus are made simple.

Assuming your knowledge is limited to arithmetic you quickly and easily gain a working knowledge of Algebra, Geometry, Trigonometry and Calculus. Simply pay postman price of book plus the postage when he hands you the package.

**Popular Mechanics Press
Room P12
200 E. Ontario Street, Chicago**

New MILEAGE

WITH

VACU-MATIC

the carburetor control

that

BREATHES!



USERS REPORT

3 to 7 MILES MORE per gallon

MOTORIST SAVES \$180⁰⁰ a YEAR

GUARANTEED GAS SAVINGS!

AT LAST! Automotive engineers have smashed down the barriers to perfected combustion! The new VACU-MATIC solves the secret of greater power! With almost magical action, this amazing invention instantly puts new life and pep in any motor. It adds mileage to every gallon of gasoline . . . produces split-second pick-up, sensitive accelerator response, greater speed and smoother running . . . unfolding a new driving thrill for you!

Entirely New — Nothing Like It!

The self-starter—four wheel brakes—knee action—streamlining . . . and now VACU-MATIC! The greatest motor improvement of recent years! With it, engineers have achieved a practical means of AUTOMATICALLY balancing air and gasoline in correct proportions for ALL speeds! Functioning directly with the manifold vacuum, VACU-MATIC actually "breathes" when needed, giving your motor correct combustion. Sharply cuts fuel wastes, saves dollars in gas costs, reduces carbon and gives your engine new pep, greater power and longer life.

Agents and Salesmen

If you are interested in earning up to \$15 daily, check coupon. Exclusive territories now being granted.

Fits All Cars

VACU-MATIC is constructed of six parts, electrically welded into one unit, correctly adjusted and sealed at the factory. Nothing to regulate. Any motorist can attach VACU-MATIC in ten minutes. Once in, its only reminder is the surge of instant power and speed it gives to the motor and the savings it affords your pocketbook.

The VACU-MATIC Co.,

Wauwatosa, Wis.

RECORDS

What Vacu-matic users say:-

CHRYSLER

Have tried the Vacu-matic and it sure is fine. Better pick-up with a 30% gas saving.—John C. Martin, Pa.

V-8 FORD

I installed both Vacu-matics and they work excellent. On my own V8 Ford I notice wonderful performance in pickup, get-away and gas saving.—Burt Burnett, Mich.

BUICK

Everything you claim about Vacu-matic is true. I now get 20 miles to the gallon. Before I was only averaging 15 1/2 miles.—C. Constantino, Fla.

PLYMOUTH

I am amazed at Vacu-matic performance. It's giving me 5 more miles per gallon.—Walter Zielinski, Ill.

OLDSMOBILE

I am well pleased with Vacu-matic on our Oldsmobile. A test proved it to give 18 miles per gal. Before we considered 13 good.—Arthur Williams, N Y

SAVES \$180 A YEAR

On my Plymouth 6 I obtained an average of 22 miles per gallon, an increase of 7 miles. This means a saving of \$15 a month or \$180 a year.—F. S. Peck, Calif.

CHEVROLET

Please send me a Vacu-matic for a Model A. The mileage on my 1933 Chevrolet jumped from 18 to 22 miles per gal. with Vacu-matic.—Paul P. Haas, Mass.

ALL WELL PLEASED

Enclosed find order for 12 more. Everyone I have sold is giving from 4 to 6 more miles per gallon. I have 3 more orders for V8 Ford. Every body is well pleased.—J. O. Carll, Texas.

MODEL A FORD

Have been using the Vacu-matic for a month. I used to get 20 to 22 miles per gal. Now I get 30 to 33 miles. It is amazing the difference it makes.—James W. Barr, Canada.

NASH

On my Advanced 6 Nash gained 17 1/2% in mileage. The car will idle down to 3 miles an hour and then take gas without a complaint.—J. Showalter, Mo

FRANKLIN

With Vacu-matic I have increased my mileage from 10.1 to 14.2 miles per gallon. I figure I save over \$75.00 a year in gasoline.—R. K. Radtke, Wis.

DODGE

Just completed 2310 miles on 92 gallons in my 1933 Dodge 6. This figures 25 miles while before I averaged only 20 miles per gal. on trips.—Al Fruzyna, Calif.

The VACU-MATIC proves itself on every car. It is guaranteed to give worth-while gas savings, quicker pick-up, and more power or it costs you nothing. Why get poor mileage when it is so easy to save gas with VACU-MATIC?

Free Details

Learn about this remarkable device that so greatly affects the entire performance of your motor. Learn why your car is costing you extra money to operate without VACU-MATIC. See why your VACU-MATIC equipped car will leap away from traffic without sputter or hesitation. Discover a new driving thrill and enjoy the savings. Get the facts! Write today!

FREE OFFER COUPON!

THE VACU-MATIC COMPANY

7617-70 W. State St., Wauwatosa, Wis.

Gentlemen: Please send me full particulars concerning the Vacu-matic and details of your Free Offer. This of course does not obligate me in any way.

Name.....

Address.....

City.....

State.....

 Check here if interested in selling proposition.

When writing to advertisers please mention Popular Mechanics

SENSATIONAL NEW BARGAINS IN HOME WOODWORKING EQUIPMENT



FULL-SIZED BAND SAW

Fast, accurate, easy to adjust. Smooth running. No galloping or chattering. Handles up to 6" material. Write for Bargain Direct - To - You Prices Now!



NEW FOUR SPEED WOOD LATHE

Turns heaviest work up to 8" diameter and 36" long without vibration. Heavy structural steel ways. Amazing Value.

BLUE STAR PRODUCTS
379 Main Street FAIRFIELD, IOWA

NEW DRILL PRESS

New drill press. 3 speeds. Full floating pulley with ollite bronze bearings. Drills to the center of 14" circle.



FREE Send for special - Factory - To - You Bargain Prices and FREE folders on Blue Star Products.

CHEAP OIL BURNER INVENTED SWEEPING THE COUNTRY

Beats Coal or Wood

Slips Into Any Old Stove, Range or Furnace. No Dirt, Ashes—Twice the Heat, Half Cost

COOKS A MEAL for 1c

Beats any oil burner ever gotten out for low cost, perfect performance. Slips into any old stove, range or furnace; burns cheap oil a new way, without generating or clogging up. Intense heat instantly BY SIMPLE TURN OF VALVE.

AGENTS, SALESMEN BIG MONEY



Here's a REAL one. Clark of Ind. sold 93 in 30 days. O'Toole of Mass. sold 164 in July. Get YOUR OWN oil burner FREE and Make REAL Money. Write quick.

TRY AT OUR RISK — 30 DAY TRIAL — prove it ends drudgery and dirt of coal or wood; cuts fuel bills in half, pays for itself quickly by what IT SAVES.

FREE SAMPLE TO AGENTS

offered to one energetic man or woman in each locality who will demonstrate and take orders. Write quick, be first to learn how to make REAL MONEY right now, spare or full time—mail 1c postcard today. UNITED FACTORIES, 183 Exchange Bldg., Kansas City, Mo.



250 Power AMERICAN made MICROSCOPE ONLY \$1.50

Ideal for Student and Laboratory use, this is the most compact instrument made possessing this power. Also has, in addition to its 250X objective, a supplementary 70X objective. Substantial construction. Easy Focusing. Fine Optical system. Horseshoe stage. Adjustable, removable mirror, etc.

FREE for Limited Time, complete and valuable biological outfit consisting of dissecting instruments, slides, instruction book, etc., with each purchase.

J. H. WINN MFG. CO.

Dept. 91 124 West 23 Street New York

Make Your Own LATHE UNIVERSAL MILLER

With our blueprints and castings you can easily construct a highgrade Milling Attachment for any lathe. Unique, simple. Makes any spiral, bevel gears, hobs, cutters, for all work. Differential and compound indexing. Blueprints only (9" lathe), \$2.05. Prints and rough castings, \$15.00. Prints, castings and materials complete, \$48.50 F. O. B. Los Angeles. **CULVER ENGINEERING CO.** Order today. 1428 N. Spring, Los Angeles, Cal.



EUROPEAN RECEPTION GUARANTEED

Listen to Europe or—we refund your money. Short wave and broadcast bands; exceeds many large radios. Amazing distance, volume and tone—complete—no extra. **Agents Wanted—Big Profits—Easy Sales.** Sell radios you can guarantee. Buy direct from factory with 14 years' experience. Exclusive contract right man. Other models—smaller and larger, also battery operated, 32 volt and auto radios. **D. B. WILCOX, 308 W. Randolph, Chicago, Ill.**

PROFITS \$160 to \$300 Monthly—WITHOUT INVESTMENT

<p>AUTOMATIC AIR SERVICE Brings bigger business to you without investment. Beltless, space saving, always ready. \$12 Monthly.</p>	<p>ARC WELDER Profits \$300 to \$400 monthly with one—improved "SIMPLIFIED" Welder. Electric, heated, gas engine drive.</p>	<p>8-HOUR BATTERY CHARGING Put your shop above competitors. Handles electric bills. Double profits. Only \$10 Monthly.</p>	<p>20 MINUTE Car Washer Big profits washing cars—moves 2-3 times, does better job. Savings pay for it. Only \$17 Monthly.</p> <p>Test out and mail this ad. Check items of interest—no obligation.</p> <p>HOBART BROTHERS Box M-1241, Troy, O.</p>
---	--	---	--

WRITE TODAY » Only \$16 Monthly—30 Days Trial to Prove it « OBLIGATION

BIG MONEY!

THIS QUICK SELLING HEATER

You'll find big profits falling in your lap—letting your friends see this marvelous **SUNSHINE RADIANT HEATER**. Every home a hot prospect. Gives clean, live gas heat no matter where you live for 1 1/2¢ an hour. No servicing; no installation—no investment nor stock. You collect profits in advance. Thousands in use! **FREE** Most starting offer ever made! Write quick for full details and make territory reservations.



Makes and burns its own gas. No smoke, dirt or ashes.

SUNSHINE PRODUCTS CO.
Dept. 5013 5127 W. 65 St., Chicago, Ill.

AT LAST! A REAL POCKET RADIO

Can actually be carried in pocket or purse! No tubes—batteries—nothing to wear out. Simply clip to ANYTHING made of metal for clear toned reception! One control—gets all stations to 50 miles; up to 100 miles under favorable conditions. Some users report 1,000 mile reception! **Short Wave and Police Calls also!** No complicated wires or hookups. Fool-proof—and practical—great novelty. Can be used ANYWHERE—while walking, riding, etc.! Complete with tiny phone. Nothing else to buy. Ideal gift. Send only \$1.00 and pay postman \$1.95 plus postage or send \$2.99 (Money Order, Currency, Check). Promptly sent postpaid. Complete Ins. Included. Guaranteed. Order now! (Foreign orders 50¢ extra.) **TINYTONE RADIO CO. Dept. P Kearney, Nebr.**

MONEY in METLMACHS THE MODERN MACH

The 20th Century Invention that revolutionized the mach industry. A real water, child and rat proof safety mach, made of metal. Lights 1000 times or more. Send \$1 for 15 METLMACHES, sell them for 10¢ each, make 50¢ profit. \$1 invested today may mean your future independence. Every dealer a prospective customer. Sample and salesman terms 15¢. Competent men wanted. **Metalmatch Corporation, 115 Water St., Warsaw, Ill.**

MAN IN EACH TOWN To Plate auto parts

reflectors, mirrors, etc., by new method; no capital or experience required. Outfits furnished. Free particulars. Write Today! **GUNMETAL CO., Ave. M, Decatur, Ill.**

EARN BIG MONEY AT HOME!

Raise mushrooms in your basement, cellar, garage, idle places. We buy (top. Experience unnecessary. **FREE Book.** **MUSHROOM GROWERS OF AMERICA, AR-433 N. Clark St., CHICAGO, ILL.**

SHIP MODELS

Get this dandy catalog of true scale models of Flying Cloud, Viking, Blon Nore, Golden Hind, deluxe fittings. Send 15¢ (in coin) for your copy. **ROY HANCOCK, 323 Douglas Ave., Portsmouth, Virginia**

BOYS! THROW YOUR VOICE

Into a trunk, under the bed or anywhere. Lots of fun fooling teacher, policeman or friends.



THE VENTRILO

a little instrument, fits in the mouth out of sight, used with above for Bird Calls etc. Anyone can use it. Never fails. A 16-page course on Ventriloquism and the Ventrilo. All for 10c Postpaid.

JOHNSON SMITH & CO. Dept. 844 RACINE, WIS.

BOY AMATEUR ELECTRICIAN 10c

The HOW and WHY of electricity fully told in simple language that any boy can understand. Scores of plans and instructions for making—dry batteries, dynamos, electric motors, telegraph apparatus, telephones, electric lights, electric door bells, alarms, electric engine, rheostat, mail box alarm, electro-magnets, automatic incandescent flash, electric stunting machine, wireless telegraph apparatus, induction coil, arc light, current reverser, etc., etc. Tells all about electric wiring, static electricity, magnets and magnetism, conductors and insulators, electrostatic induction, electrocution, electrophorus, condensers, Leyden jar dynamo electricity, the voltaic cell, electromagnets, electrolysis, electroplating, electrotyping, how to build a radio for a few cents, etc. 64 pages.

100 Illustrations. 10c. postpaid.

JOHNSON SMITH & CO., Dept. 844. RACINE, WIS.

MAKE YOUR OWN RADIO

Enjoy the concerts, baseball games, market reports, latest news, etc. This copyrighted book "EFFICIENT



RADIO SETS" shows how to make and operate inexpensive Radio Sets, the materials for which can be purchased for a mere trifle. Also tells how to build a short-wave Receiver for bringing in foreign stations, police calls, ships at sea, etc. ONLY 15c p.pd.

Daisy Water Pistol

6-Shot Repeating Water Pistol—very latest design; looks just like a Police revolver.



Blue steel finish. Squirts 25 feet. When diluted ammonia is used in very effective against vicious dogs, tramps, animals. 7 inches long. PRICE 25c POSTPAID.

Put PHOTOS on Silk, Cloth, Wood, Paper, Linen, etc. THIS EASY QUICK WAY



It is now easy to print your snapshots and other photos on any cloth or other fabric surface—cushions, pillows, handkerchiefs, scarfs, ties, hosiery, underwear, paper, wood, linen, etc. The photos are washable. Will not fade or rub off—long lasting. Easy to do. Just follow a few simple directions. One bottle is good for about 50 prints in RICH TONES. Thoroughly practical.

Price for Complete Outfit, only 15 cents postpaid.



Good Luck Ring 25c

Very striking, quaint and unostentatious. Silver finish; skull and crossbones design, two brilliant, flashing gems sparkle out of the eyes. Said to bring good luck. Only 25c p.pd.



JOHNSON SMITH & CO. Dept. 844 RACINE, WIS.

A copy of our NEW CATALOG mailed on receipt of 10c., or the De Luxe Edition with cloth binding 25c. Bigger and better than ever. Only book of its kind in existence. Contains all the latest tricks in magic, the newest novelties, puzzles, games, sporting goods, rubber stamps, unusual and interesting books, curiosities in seeds and plants, etc., unobtainable elsewhere. Remit by Coin, Money Order, Check or unused U. S. Postage Stamps, for all articles listed above. Canadian money, stamps and Postal Notes accepted.

BLANK CARTRIDGE PISTOL REVOLVER STYLE

25c
50c
\$1.00



Three new models now out. 25c, 50c and \$1.00. Well made and effective. Modeled on pattern of latest type of Revolver. Appearance alone enough to scare a burglar. Takes 22 Cal. Blank Cartridges obtainable everywhere. Great protection against burglars, tramps dogs. Have it lying around without the danger attached to other revolvers. Fine or 4th July. New Year's, for stage work, starting pistol, etc. SMALL SIZE 4 in. long 25c. MEDIUM SIZE 5 in. long 50c. LARGE SIZE 6 in. long \$1.00. BLANK CARTRIDGES 50c per 100. HOLSTER (Cowboy type) 50c. Shipped by Express only not prepaid.

CRYSTAL RADIO SET \$1.00



Say what you will about Electrical and Battery Sets, a CRYSTAL set has them all beat for simplicity and clearness of tone. There is absolutely no noise and no distortion—no batteries to buy—no tubes to wear out—no maintenance expense whatsoever. Cost nothing to operate and will last indefinitely. Reception is loud and clear. This Receiver is guaranteed to work equal to the most expensive Crystal Set you can buy. Has a receiving radius of over 25 miles, or under favorable conditions up to 100 miles. Constructed of the finest materials throughout, including super-sensitive crystal, ensuring only \$1.00 postpaid. Or complete with Ear Phone and Aerial Kit—everything all complete—nothing more to buy, \$2.95 postpaid. JOHNSON SMITH & CO., Dept. 844, RACINE, WIS.

CHAMELEONS—25c LIVE, SAFE DELIVERY GUARANTEED



Watch it change its color! Get one of these most wonderful of all creatures. Watch it change its color. Study its habits. Wear one on the lapel of your coat as a curiosity. Watch it shoot out its tongue as it catches flies and insects for food. No trouble to keep. Can go for months without food. Measures about 4 inches in length. Shipped to any address in U. S. A. by mail. We guarantee safe arrival and live delivery. PRICE 25 CENTS POSTPAID.

BIG ENTERTAINER



326 Jokes and Riddles, 25 Magic Tricks, 10 Parlor Games, 73 Toasts, 13 Fairy Tales, 105 Money-making Secrets, 22 Monologues, 21 Puzzles and Problems, 5 Comic Recitations, 10 Funny Readings, 11 Parlor Pastimes, 13 Flirtations, 1110 Girls' and Boys' Names and their Meanings, 10 Picture Puzzles, 69 Amusing Rhymes, 37 Amusing Experiments, Dumb and Dumb Alphabet, Shadowgraphy, Gypsy Fortune Teller, How to Tell Fortunes with Cards, Dice, Dominoes, Crystal, Coffee Cup, etc. Hypnotism, Ventriloquism, Cut-outs for Checkers and Chess, Dominoes, Fox and Geese, 9 Men Morris, Spanish Prison Puzzle, Game of Anagrams, 25 Card Tricks, Crystal Gazing, etc.

ALL-FOR 15 CENTS POSTPAID

PEA-MATIC REPEATER-12 SHOT



Here it is, boys. You can have an immense amount of fun with this new pistol. It shoots 12 to 15 ordinary peas without reloading. All you need do is to load the gun with peas, pull the trigger and keep on firing until the barrel is empty. Then reload and fire again. It is absolutely harmless and safe. Nothing to explode. These pistols sell like hot cakes, so get yours AT ONCE. Be the first boy in your town to own one of these automatic repeating pistols and be the envy of all the other kids in the neighborhood. PRICE ONLY 25 CENTS POSTPAID.

JOHNSON SMITH & CO., Dept. 844, Racine, Wis.

250 Magic Tricks

An excellent little book containing nearly 300 tricks for parlor or stage that anyone can do. Tricks with yards, cards, handkerchiefs, eggs, bottles, azime, etc. Also Second Sight, Shadowgraphy, etc. Profusely illustrated. 10c postpaid.

125 CARD TRICKS and sleight of hand. Contains all the latest and best card tricks as performed by celebrated magicians, with exposure of card tricks used by professional gamblers. Price 25c postpaid.

SNAPPY JOKES. A splendid collection of rich and rare jokes, compiled by a jolly bartender for stag parties, smokers, etc. 10c.

FORTUNE TELLING BY CARDS, dice, dominoes, crystal, etc. Gives meaning of every card, how to deal and lay them out, etc. Price 10c postpaid.

LEARN TO HYPNOTIZE. Book tells how to hypnotize, how to produce sleep, how to awaken a subject, medical hypnotism, hypnotism in diseases, how to hypnotize animals, etc. Price 10c postpaid.

STAR TOY MAKER

Greatest boys' book written. Tells how to make a Finhoise Camera, a Cannon, model Railroad, a Telephone, Boomerang, Telegraph Instrument, Box Kite, Talking Machine, Microscope, Electric Motor, Electric Door Bell, Water Wheel, Fabric Raft, a pair of Skis, a Dog sled, Bird House, Rabbit Yard, etc. 64 pages. 150 illustrations. PRICE 10c.

MIDGET BIBLE. Size of a postage stamp. Over 200 pages. Remarkable curiosity. Said to bring good luck. Price 15c postpaid.

DREAM BOOK and FORTUNE TELLER. Tell your own fortune. With dictionary of dreams and interpretations, lucky numbers, oracles, divinations, palmistry, etc. 10c.

HOW TO THE KNOTS. 32 page book tells how to make different knots, hitches, splices, etc. 100 illustrations. Price 10c postpaid.

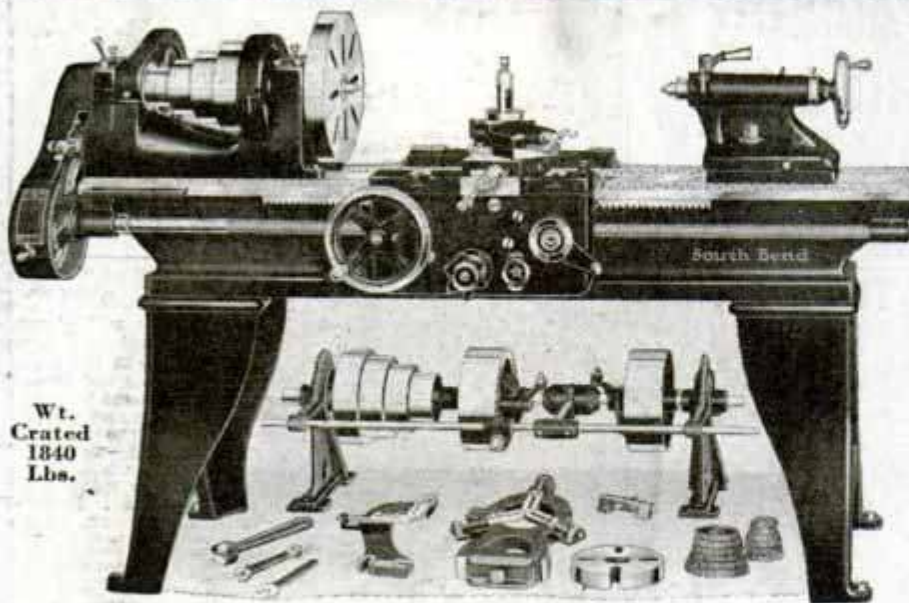
5-MINUTE HARMONICA COURSE. A new easy self-teaching method. Teaches how to play, to see the tongue, tremolo, fully illustrated. Price 15c postpaid.

LEARN TO DANCE. Book contains full instructions in old and new dances. Easily understood. PRICE 25c.

WONDERFUL X-RAY TUBE

A wonderful little instrument producing optical illusions both surprising and startling. With it you can see what is apparently the bones of your fingers, the lead in a lead pencil, the interior opening in a pipe stem, and many other similar illusions. Price, 10c. 3 for 25c, p.pd.

South Bend Back Geared Screw Cutting Lathes



Wt.
Crated
1840
Lbs.

General Purpose
LATHES

\$75 to \$1500

for the

**Auto Service Shop
and Machine Shop**

Easy Payments

20% Down

**10 to 17 Months to
Pay Balance**

16" x 6' Standard Change Gear Lathe as shown above with Countershaft and Complete Equipment..... \$480
\$100.00 down—\$29.00 per month for 14 months

Above lathe can also be furnished in Simplified Motor Driven Type Complete with Electric Motor, Reversing Switch and Equip. for \$542
\$107.50 down—\$30.50 per month for 15 months

THE lathe above is popular in the large service machine shop. It is the practical lathe for servicing mechanical parts of automobiles, buses and trucks of all makes—a general purpose lathe recommended by automobile, bus and truck manufacturers for their service shops. The 6' and 8' bed lengths are most popular sizes. Lathe can be arranged for countershaft drive or motor drive.

shipped immediately on receipt of Down Payment so you can start work.

Before you consider a second-hand lathe, with perhaps many of its attachments missing, look up the prices of a new South Bend Lathe. When you buy a lathe from us on the Easy Payment Plan you deal direct with the factory, and you make your payments directly to us. "Satisfaction guaranteed or your Money Back."

You Can Buy Any South Bend Lathe on the Easy Payment Plan

The tabulation below shows the cash price, down payment and the monthly payment on the popular selling sizes of South Bend Lathes for the Automotive Service Shop and Machine Shop.

Size of Lathe	Countershaft Drive Lathes				Motor Drive Lathes			
	Price	Down Paym't	Monthly Paym't	Months to pay	Price	Down Paym't	Monthly Paym't	Months to pay
9" x 3' Workshop Bench Lathe...	\$85.00	\$21.00	\$ 7.00	10	\$94.00	\$24.00	\$ 7.00	11
9" x 3' Toolmaker Bench Lathe...	140.00	31.00	9.00	12	158.00	35.00	11.50	12
9" x 3' Junior Bench Lathe.....	170.00	35.00	11.50	12	188.00	40.00	13.00	12
9" x 3' Std. Change Gear Lathe..	235.00	50.00	17.00	12	284.00	60.00	19.50	12
11" x 4' Std. Change Gear Lathe..	300.00	60.00	19.50	12	393.00	80.00	26.00	13
13" x 5' Std. Change Gear Lathe..	352.00	75.00	25.00	13	485.00	100.00	29.00	14
15" x 6' Std. Change Gear Lathe..	430.00	90.00	26.00	14	570.00	115.00	33.50	15
16" x 6' Std. Change Gear Lathe..	480.00	100.00	29.00	14	622.00	125.00	34.00	16
16" x 8' Std. Change Gear Lathe..	520.00	107.50	30.50	15	662.00	135.00	37.00	16
18" x 8' Std. Change Gear Lathe..	635.00	125.00	34.00	16	825.00	165.00	42.50	17

SOUTH BEND LATHE WORKS

642 E. Madison St., South Bend, Ind., U.S.A.

Please send me quotation and illustration on the following lathe:

Swing.....Length of bed.....
 Countershaft Drive.....Motor Drive.....
 My work is.....
 Name.....
 Address.....
 City.....State.....

Write for Quotation and Illustration

Let us know the kind of work you wish to do and we will recommend the size and type of lathe practical for your shop. We will also send you illustration, description and itemized quotation on equipment recommended. There is no charge for this service. Use Coupon at left.



SOUTH BEND LATHE WORKS

642 East Madison St., South Bend, Ind., U. S. A.



FACTS YOU SHOULD KNOW ABOUT

**PYROIL
WINTER
LUBRICATION**

Do you know that Pyroil enabled an automobile to climb Pike's Peak with no oil in the crankcase, and with no motor damage—

that Pyroil enabled an automobile to run 922 miles, undamaged, with no oil in the crankcase—

that Pyroil enabled an airplane to fly for 35 minutes, undamaged, with no oil in the crankcase—

that Pyroil enabled a race driver (in Indianapolis 500-mile auto race) to run for 50 miles at 100 miles per hour with no oil in the crankcase, and with no motor damage?

These electrifying feats were accomplished in each case only by means of the surface of **self-lubrication** which Pyroil establishes and maintains (extra and in addition to the regularly functioning lubrication) on all frictional metal within an automobile motor—bearings, gears, shafts—also valves, pistons, cylinders, etc.

What has this to do with winter lubrication? Exactly this: Pyroil actually impregnates the metal; affixes a glossy, slippery, heat-, wear- and dilution-proof surface (of only "breath-like" thickness), and this Pyroil surface protects your motor throughout severest cold from otherwise damaging metal-to-metal clash. In cold weather,

Pyroil protects until the oil gets there!

In cold weather, oil and grease do not circulate immediately nor thoroughly when you start your motor. Thus, metal clashes against metal, often creating more wear and resultant damage than occurs in many miles of driving. When you use Pyroil, the Pyroil surface of **self-lubrication** protects against wear and damage until the oil and grease do circulate. Pyroil is not a substitute for oil or grease. You simply add it by the ounce to each filling of gas, oil and grease. It promotes quick, easy starting; reduces battery power drain; increases power and performance; frees valves; reduces repair bills. Saves many times its cost.

Use Pyroil regularly. Sold the world over. Ask at filling stations and garages, or mail coupon for further important facts. Manufactured and Guaranteed by Pyroil Company, W. V. Kidder, Pres., 512 Pyroil Bldg., LaCrosse, Wisconsin, U. S. A.

DISTRIBUTORS

A lifetime Opportunity is yours with Pyroil. Get full facts. Check square in coupon and mail coupon if you are interested. Openings practically everywhere. Do this at once.



Simply Add TO GAS OIL & GREASE

PYROIL HAS BEEN TESTED BY POPULAR MECHANICS AND IS USED BY POPULAR MECHANICS' PRESS AND PUBLISHING EQUIPMENT.

Genuine Pyroil is protected by U. S., Canadian and foreign patents issued to W. V. Kidder, its inventor. Identified by lithographed, factory-sealed caps, bearing signature below. Not sold under any other name.

Genuine **PYROIL** LUBRICATION PROCESS

Pyroil Company
512 Pyroil Bldg.
LaCrosse, Wis., U. S. A.

Please send further important facts concerning Pyroil's protection against cold weather motor damage.

Please send Distributorship Opportunity facts.

Name.....

Address.....

City..... County..... State.....

*A man and his wife
who had just returned from a
round-the-world cruise spoke of
Chesterfield as "an international
cigarette."*

It means something

... that Chesterfield Cigarettes
are on sale in 86 countries all
over the world.

It means something that
Chesterfields may be purchased
on nearly all ships and at almost
every port.

It means that for a cigarette
to enjoy such popularity, it must
have merit. We do our level best
to make Chesterfield as good a
cigarette as can be made.

*Smokers say . . .
in almost every language*

they Satisfy

Above—Vacuum tin of 50
—air tight—water tight—
fully protected even if sub-
merged in water.

Packages of 20 wrapped in
Du Pont No. 300 Cello-
phane—the best made.