

March

MODERN MECHANIX AND INVENTIONS

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15¢
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*The Ford Motor
+
Mailbox*



**TAXI PLANE
FOR NON-STOP
AIR LINERS
SEE PAGE 83**

David Sarnoff, RCA President, Predicts
Television Will Carry the Mails

SKINNY? ADD 5 TO 15 LBS. QUICK—THIS NEW EASY WAY!

NOW there's no need to be "skinny" and lose your chances of making friends. This new easy treatment is giving thousands solid, good-looking flesh—in just a few weeks!

As you know, doctors for years have prescribed yeast to build up health. But now with this new yeast discovery in pleasant tablet form, you can get far greater tonic results than with ordinary yeast—regain health, and also put on pounds of firm attractive flesh—and in a far shorter time.

Not only are thousands quickly gaining husky, handsome pounds, but also clear healthy skin, glorious 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 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 strengthening iron.

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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 back instantly.

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 very first package—or money refunded. At all druggists. Ironized Yeast Co., Inc., Dept. 563. Atlanta, Ga.



Posed by professional models

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IF MEN WORE PRICE TAGS



WELL, your boss thinks of you in terms of so much a week! You are worth this or that to him. How much you are worth depends upon—YOU! You decide the amount chiefly by your ability—by your

training. Why not increase the amount by increasing your training? Thousands of men have done it by spare-time study of I. C. S. Courses. You are invited to earn more money. Mail this coupon.

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

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



draw me!

COMPETE FOR AN *Art* SCHOLARSHIP

Copy this girl and send us your drawing—perhaps you'll win a COMPLETE FEDERAL COURSE FREE! This contest is for amateurs, so if you like to draw do not hesitate to enter.

Prizes for Five Best Drawings—FIVE COMPLETE ART COURSES FREE, with drawing outfit. (Value of each course, \$190.00.)

FREE! Each contestant whose drawing shows sufficient merit will receive a grading and advice as to whether he or she has, in our estimation, artistic talent worth developing.

Nowadays design and color play an important part in the sale of almost everything. Therefore the artist, who designs merchandise or illustrates advertising has become a real factor in modern industry. Machines can never displace him. Many Federal students, both men and girls who are now commercial designers or illustrators capable of earning from \$1000 to \$5000 yearly have been trained by the Federal Course. Here's a splendid opportunity to test your talent. Read the rules and send your drawing to the address below.

RULES FOR CONTESTANTS

This contest open only to amateurs, 16 years old or more. Professional commercial artists and Federal students are not eligible.

1. Make drawing of girl 5 inches wide, on paper 6½ inches square. Draw only the girl, not the lettering.
2. Use only pencil or pen.
3. No drawings will be returned.
4. Write your name, address, age and occupation on back of drawing.
5. All drawings must be received in Minneapolis by Feb. 25th, 1935. Prizes will be awarded for drawings best in proportion and neatness by Federal Schools Faculty.

◀ FEDERAL SCHOOLS ▶ INC ▶

Dept. 324E Federal Schools Bldg., Minneapolis, Minn.



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\$125 IN CASH PRIZES Awarded DECEMBER WINNERS



Mechanical devices for the home will be awarded prizes in the fourth and final contest of a series offering \$500 in cash prizes. Winners of the first \$125 home improvement contest are announced in this issue. FOR FULL DETAILS SEE PAGE 52.

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William J. Kostka
Editor

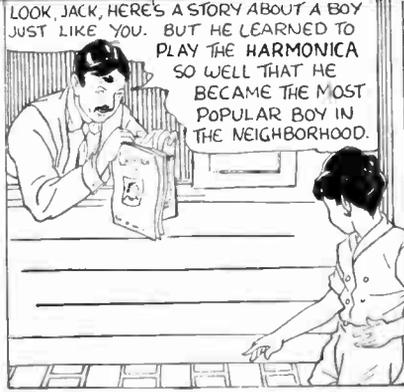
A. Neely Hall
Workshop Expert

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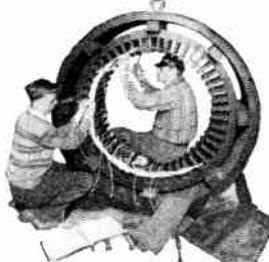
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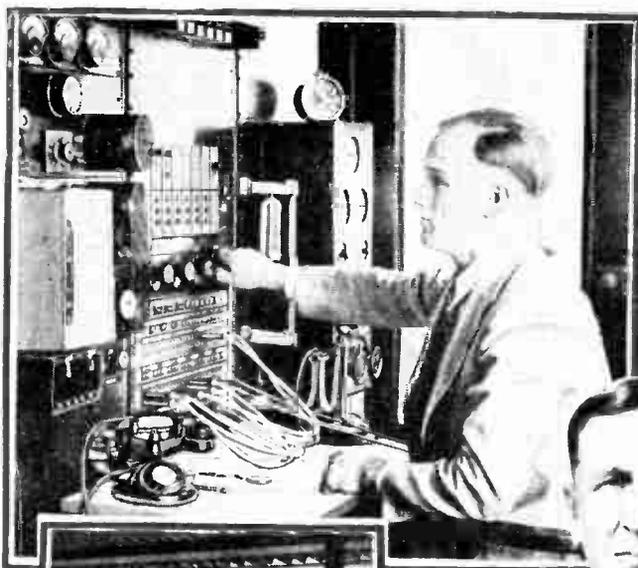
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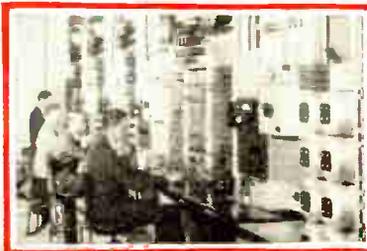
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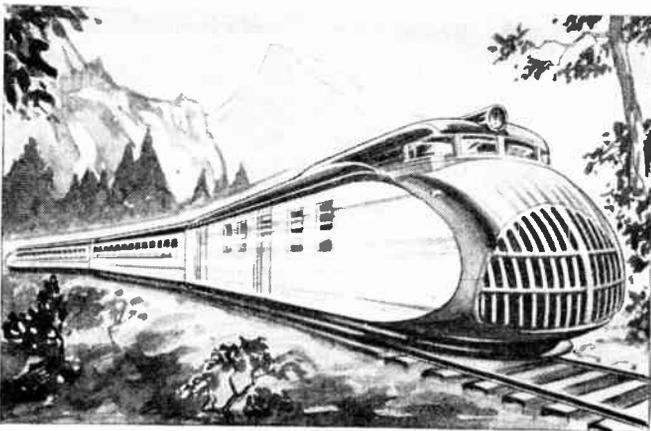
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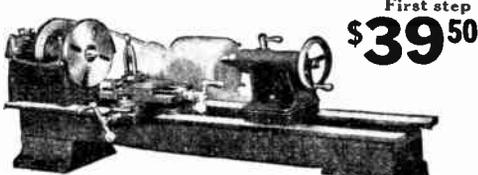
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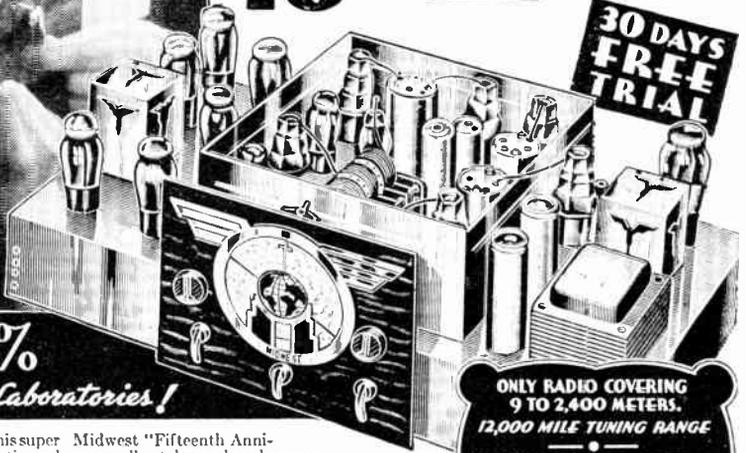
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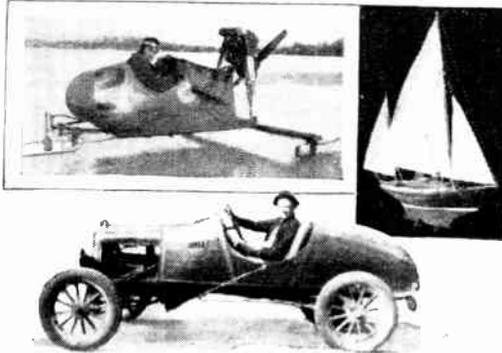
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Random Chips from

MM steps out in a new roto suit to give its readers a more attractive magazine. And here's the first photo of the I. S. M. M. I. charter being sent to all new clubs.



PRIZE WINNERS. Upper left—the air drive ice sled which does 80 m. p. h. brought first prize to Quentin Mohr. Ford Cooke built the MM speedster body with wood, airplane fabric and dope to take second prize of \$3.00. Charles Wittholz' 30-inch model cruising yawl took third prize. It is a scale working model designed for real sailing. Every month the Workbench awards prizes to the three best photos.

DRESSED up in its new suit of roto gravure printing, MODERN MECHANIX AND INVENTIONS scores another outstanding advancement this month. At no increase in price, MM from now on will appear in roto, a more costly process than ordinary printing, but a better, more attractive magazine for its hundreds of thousands of readers.

We are anxious to know just how much you like MM in its new dress. Drop us a card stating your reactions. We'll try to print as many as possible.

* * *

In a letter to the editor William I. Ylimanen of Keeweenaw Bay, Mich., says:

To prove my estimation of MM, I once walked actually 10 miles to get my copy because the local newsstand ran out. Keep up the good work!

Ylimanen, how far will you hike for MM now with its new roto printing and the many big features we have planned for MM?

* * *

Here's a tip to you fellows trying to win prizes in the Workbench contests. We are now planning the early summer issues and the prizes will be going to the summer projects, garden furniture, tractors, boats, auto trailers and the like. Dig through your snapshots for the things you built last summer, if you are not building any summer jobs in your workshop now.

The same applies to readers trying to get \$3.00 apiece for handikinks from MM. Remember we plan the magazine three months or more ahead of time. Now is the time to send in fishing, camping, vacation, and gardening kinks.

18

This month's prize winning pictures are at the top of this page. First prize of \$5.00 goes to Quentin A. Mohr for his ice sled. He writes:

Burlington, Wis.

Dear Editor:

Now that the ice season is here we got our old boat out of moth balls the other day and got her all tuned up.

She is powered with a 61 Harley with a special crankshaft. The body framework is wood throughout and covering is of light tin. She is 7 feet long, 24 inches wide. The front runner plank is 7'8" long and the highest part of the body is 34 inches from the ice.

We clocked her with an auto driving along side on the ice. By the car speedometer she was doing 80 and was not open all the way.

Quentin A. Mohr.

Some speed, eh, for an air drive sled?

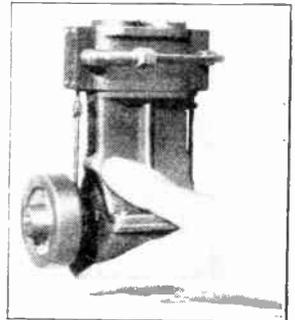
* * *

Ford Cooke walked off with the \$3.00 second prize for his photo of an MM speedster body. He says:

Eaton, Colo.

Dear Editor:

I am enclosing a snapshot of the MM speedster body which I built from drawings in the February, 1932, issue of *Modern Mechanix and Inventions*. The framework is built up of wood and covered with air-



This two cylinder double acting steam engine was designed for model builders by Russell Lamoureux of Minneapolis, Minn. It runs on 1 to 200 lbs. of steam.

the Editor's Workbench

plane fabric. Two coats of clear and two coats of yellow pigmented dope were next applied. This covering has stood up very well under extremely hard use.

Ford G. Cooke.

Blueprints for the speedster body are described in MM's blueprint booklet which you can get for a stamped and addressed envelope.

* * *

Charles Wittholz' model boat took third prize of \$2.00. Here's what he says:

Buffalo, N. Y.

Dear Editor:

Here is a picture of seven months of fun. The project is a thirty-inch model cruising yawl, constructed as a typical yacht of steam bent frames and planking. She represents my idea of what a coastwise hooker ought to be, that is I designed it after a number of years of on and off study at naval architecture.

As you see she is a scale working model, designed for real sailing. I regret that I can't forward a photo of the miniature cabin which contains everything from the hatch to the floor.

Charles W. Wittholz.

* * *

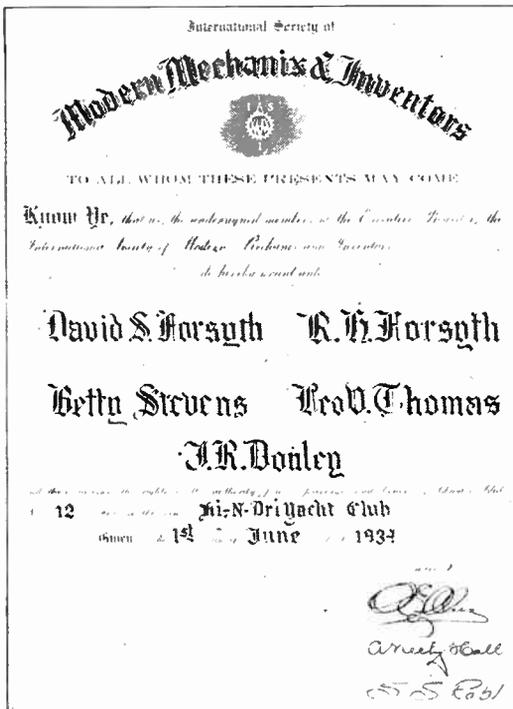
While we're on the subject of boats—many of you have asked us how to go about changing dimensions on various types of boats. We've always vetoed any suggestions to stray from the designer's original drawings, but we've finally given in. On page 100 Sam Rabl, MM's boat expert, tells you just what to do "When You Change That Boat."

Walter Raynor has a great time with the hydro towing glider shown in this department. He says:

Patchogue, N. Y.

Dear Editor:

I am sending some snaps of a hydro towing



Here is a greatly reduced photo of the charter of the International Society of Modern Mechanics and Inventors sent to president of the Hi-N-Dri Yacht Club of Los Angeles, Calif.

glider which I designed and have flown. My glider has been flown by several pilots and they claim it is the best flying hydro glider in the country.

It will take off in a run of less than 100 feet if there is a good breeze blowing. It will take off at a speed of about 20 miles per hour. I

[Continued on page 20]

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[Continued from page 19]



Oilstones win skating races

HOCKEY PLAYERS and champion speed skaters use India *Oilstones* for taking the burr off newly ground skates. Exhibition rink performers are able to leap, dance and gyrate because they, too, keep their fine steel blades very sharp and true with an *oilstone*.

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Lower photo shows Walter Raynor's hydro glider at the start of a tow. Upper photo shows the hydro glider in the air.

flew it myself and had never had hold of a control stick before.

Walter Raynor.

* * *

The International Society of Modern Mechanix and Inventors continues to grow. Some time ago we sent off engraved charters to all clubs organized to date. And as we were sending out the charters, we discovered we erred in the January issue when we said Mrs. Marguerite Bone of the Y's Craftsmen Club of Washington, D. C., was the first woman member of the society. The honor really belongs to Miss Betty Stevens, whose name appears on the Hi-N-Dri Yacht Club charter.

If you're thinking of joining the society, get five or more men together and organize a club. Then write us for an application blank and special subscription rates for club members.



George Geary of Kingston, Ont., is enthusiastic about this MM Tar Baby he built. He says "she is very steady in choppy water" and is a handy boat for fishing.

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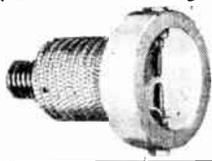
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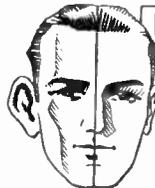
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MM maintains this department to aid readers with their problems

AUTO OIL FREEZES

Every winter the oil has frozen in my car, sometimes on the same day I have had it changed. I can always get it circulating by applying hot water to the motor, but would like to know where the trouble is.—E. H. B., Oneida, N. Y.

It is not the oil in your crankcase which is freezing, but rather a sludge made up of water, carbon, and oil. Water can get into the crankcase through leaky gaskets, or by condensation of exhaust vapors leaking past the piston rings. Too small passages through the oil feed lines, which clog in cold weather, will also cause your trouble.

CAN WOOD BE FIREPROOFED?

Am contemplating the erection of a wooden cabin in the country, which will be left vacant many months of the year. I would like to know if there is any practical method of fireproofing the timbers used in building my cabin.—I. S., Bronx, N. Y.

Wood may be fireproofed by treating it with a solution of 10 to 20 parts of potassium carbonate and 4 to 8 parts of ammonium borate in 100 parts of water. Enough solution must be used to penetrate at least one-quarter inch into the wood. This compound forms a protective covering over the wood when there is excess heat, and at the same time liberates flame-smothering carbonic acid.

AIRPLANE PROPELLER PITCH

What is meant by "pitch" of an airplane propeller? What size and pitch propeller is best for an air-propelled ice sled powered by a motorcycle engine?—M. W. B., Bowdli, Ohio.

The pitch of a propeller is the distance it will advance in one revolution if turning without slippage; it corresponds to the distance a wood screw advances in one revolution when turned in wood. A 4 to 5-ft. diameter spruce prop with 4-ft. pitch is about correct for twin and four cylinder motorcycle engines.

WILL TELEPHONE OPERATE LOUDSPEAKER?

Can you tell me whether it is possible to attach a loudspeaker to an ordinary telephone, so that both sides of the conversation may be heard by everyone in the house?—R. H., Ellis, Kansas.

Since telephone companies in most cities will not permit tampering with their equipment, you will have to use a small public address amplifying system. Place the microphone near your telephone, with a stand near it which will hold the phone receiver. A switch mounted in contact with the telephone hook will turn on the amplifier each time the phone is used, and shut it off when the receiver is replaced.

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Please tell me what mixture to use in place of water to represent waves around a ship built inside a bottle. How can I color the waves?—R. W., Solvang, Cal.

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Can gold or silver mining claims be staked anywhere in this country by the prospector?—F. W. H., St. Louis, Missouri.

Mining claims may be staked anywhere on government land, provided the correct procedure as prescribed by law is followed. Most of the mineral-bearing lands in the United States are now under private ownership; in this case mining rights may be purchased outright from the owner, or the land leased for mining purposes. Claims cannot be staked on privately owned land without the permission of the owner.

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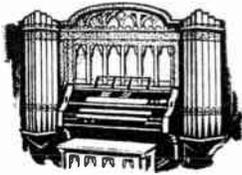


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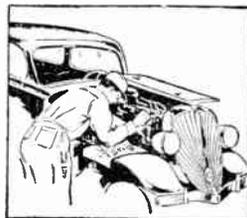
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A new miracle discovery! A transparent magic-like fluid with which anyone can refinish any color automobile easy, quickly and economically without polishing, waxing, rubbing or painting. **JUST WIPE IT ON WITH A CLOTH!** Immediately dullness, discoloration, shabbiness and sun fade DISAPPEAR. INSTANTLY, as if by magic, the old paint is covered with a tough elastic coat which is absolutely transparent, self-leveling and self-polishing. KAR-NU actually fills the pores and rebuilds the old finish. Paint or Duco is rejuvenated, restoring 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 eight to twelve months. GUARANTEED.

SALES GALORE! BIG PROFITS!

Enormous demand! Millions want it! W. L. Morgan, of Mass., earned \$10.61 in a single hour. Sold to individuals, fleet owners, garages, auto accessory stores, used car dealers, etc. No experience necessary. Send no money for sample and details. Get in on ground floor. Just mail coupon—NOW.

Opportunity For Distributors in Foreign Countries

THE KAR-NU COMPANY

Dept. G-41 Oakley Station, Cincinnati, O.

NOT A WAX, POLISH OR PAINT

KAR-NU is entirely new and different—nothing in the world just like it. Now, no need to spend long, tedious, back-straining, muscle-tiring hours polishing, waxing and rubbing to produce a "mere shine" that is only fairly satisfactory—that lasts for only a short time, and that leaves the car looking worse than before when it wears off. KAR-NU is free from the labor and danger of so-called "cleaners" with acids and abrasives that remove some of the finish each time they are used. KAR-NU produces a result that is equal in beauty to a repaint or refinishing job which costs \$25.00 to \$75.00.



This Seal of Approval awarded by the Testing Laboratories of the Automobile Club of Illinois shows that KAR-NU is a product of merit and does all we claim for it.

FREE SAMPLE COUPON

KAR-NU CO., Dept. G-41,
Oakley Station, Cincinnati, Ohio.
Rush FREE SAMPLE to prove your claims about KAR-NU, and Territory Offer.

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Town State

MAIL COUPON TODAY!

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 per cent. of fuel costs. Gives hotter flame with less oil. Goodrich (Me.) says, "Saved me \$60 over coal winter." Clean, noiseless, double safety features. 16,000 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., 235 Union Ave., Griswold, Ia.



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No Dirt
No Ashes!

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

NEW SCIENTIFIC WONDER

"X-RAY" CURIO

10c
3for
25c



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"Silver Only" apparently see thru Clothes, Wood, Stone, any object. See Bones in Flesh. FREE PKG. radio picture films, takes pictures without camera. "You'll like 'em." 1 pkg. with each 25c order. MARVEL MFG. CO., Dept. 88. NEW HAVEN, CONN.

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Make Money Calling on Stores



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My amazing new WONDER TENSION-TIGHTENER invention enables you to increase your racket business—assures uniform string tension—banishes "hand pulling". Low cost. SILK Strings and Instructions, 85c prepaid. Write today for NEW INVENTION DETAILS! W. A. BICKEL, 809 W. Madison, Dept. 23-53 CHICAGO, U. S. A.



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The new and revised edition of "Auto Power" with all the ten original specifications and ten new ones is now off the press. Convert old generators into A. C. and D. C. generators and motors with voltages of 6 to 400 volts, for power, light, welding, and radio operation. Create new generators adaptable for home, automobiles, or trucks. They can be driven by fan belt, wind or water. This book, with complete illustrations, tells you how easily and economically these changes can be made. Also instructions for rewinding auto armatures. 300 definitions of electrical terms, etc. Already used and endorsed by thousands. 1 price, only \$1.00. **AUTO POWER** Dept. A 412 S. Hoyne Ave. Chicago



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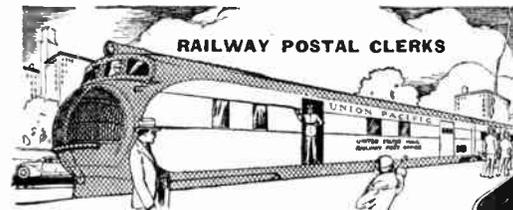


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PICK YOUR JOB MEN, BOYS—18 to 50

Travel—See Your Country

Railway Postal Clerks get \$1,900 the first year regular, being paid on the first and fifteenth of each month. (\$19.17 each pay day.) Their pay is quickly increased, the maximum being \$2,700 a year. (\$112.50 each pay day.)



3 Days On—3 Days Off—Full Pay

Railway Postal Clerks on long runs usually work 3 days and have 3 days off duty or in the same proportion. During this off duty their pay continues just as though they were working. They travel on a pass when on business. When they grow old, they are retired with a pension.

City Mail Carriers, Post Office Clerks

Clerks and Carriers now commence at \$1,700 a year and automatically increase \$100 a year to \$2,100 and \$2,300.

Customs and Immigrant Inspector

Salary \$2,100 to \$3,300. Men 21 to 45. Work connected with examining immigrants and merchandise entering the country from foreign parts.

Winter and Spring Examinations Expected

Many winter and spring examinations are expected throughout the country and those wishing positions should qualify at once.

Get Free List of Positions

Fill out the following coupon. Tear it off and mail it today—now, at once. This investment may result in your getting a life big-paid government job.

FRANKLIN INSTITUTE, Dept. M-292, Rochester, N. Y.

Rush to me entirely free of charge (1) a full description of the position checked below; (2) Free Copy of 32-page book, "How to Get a U. S. Government Job"; (3) A list of U. S. Government Jobs; (4) Tell me how to get a Government Job.

- Railway Postal Clerk.....(Start \$1900 year)
- Post Office Clerk.....(Start 1700 year)
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Name

Address

Use This Coupon Before You Mislaid It

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NEW WAY TO SMOKE

Imagine Taking **LIGHTED** Cigarettes from a Magic Case



If you could carry **LIGHTED** cigarettes harmlessly in your vest pocket . . . and just pull them out at your convenience . . . all ready for smoking . . . wouldn't that be wonderful? Here is a New Way to Smoke . . . just as easy and amazing.

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WHAT A MAGIC INVENTION!

Who ever imagined such a marvelous device. It's Dynamic . . . Revolutionary. We spent a king's ransom and years of effort developing the Magic Case. But now it's here . . . perfected . . . guaranteed . . . ready for the waiting millions. Wherever the Magic Case is shown men and women gather round and gasp with delighted surprise. Everybody who sees a Magic Case wants to own one . . . and it's priced so low everybody can afford it. As a result there is a surging, overwhelming demand for Magic Cases that is pouring thousands upon thousands of dollars into salesmen's pockets.

HERE IS YOUR CHANCE FOR QUICK PROFITS

There are hundreds, thousands, perhaps tens of thousands of men and women in your locality who would buy on sight if they could only see a Magic Case. Think of your money-making opportunity if you had the exclusive right to hand out Magic Cases in your territory. Here's glorious opportunity for you. We have devised a 5 Way Money-Making Plan that shows you how to earn these profits without selling. Get the facts, that's all we ask. They fairly **SCREAM** big profits.

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15 DAY TRIAL OFFER

Take a Magic Case on 15 Days' Trial at our risk. Try it . . . show it . . . see how you're almost overwhelmed with orders. Get our 5 WAY PLAN that shows you how to cash in on this great invention **WITHOUT SELLING**. Act NOW.

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Gentlemen: I'll take you up on your Test Offer. I want a big share of Magic Case profits. Tell me how to start and what to do to put a Magic Case in my hands for 15 Days' Trial at your risk.

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TOWN STATE

Stout Produces FIRST REAR ENGINE AUTO



Above—A side view of the new Stout auto, showing the beetle-shaped design and the driver's seat placed over the front axle.

The most startling and revolutionary evolution in modern automobile design is revealed in this preview of the new "Scarab", designed by William B. Stout.



Right—The floor of the new auto is set to the level of the running board, permitting entire elimination of the running board and allowing five inches of extra overhead room within the "living room."

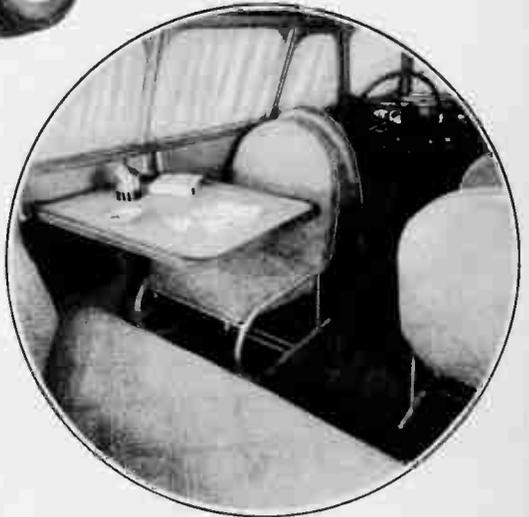
ULTRA streamlined, with an engine mounted in the rear, the driving mechanism over the front axle, and an interior designed like a room in a house, the most revolutionary development in the history of automobile construction was presented to the American public for the first time February 1.

The new car is the Scarab, designed and produced by William B. Stout, famous Detroit airplane engineer who designed the first all-metal airplane and the Ford tri-motor transport ship.

It follows the latest in aero-dynamic design with long windows extending from front to rear to permit clear vision. Fenders and running boards are eliminated; the body of the automobile encloses the wheels.

Following the principles of stress analysis which he propounded in the October, 1933 issue of *MODERN MECHANIX AND INVENTIONS*, Stout has incorporated the body and chassis into one, setting them over a frame of alloy steel tubing after the fashion of an airplane fuselage. The body is suspended below the center of gravity to eliminate "roll," making it possible to dine or play cards while the car takes corners at high speed.

The floor of the Scarab is lowered to running-board height. Each wheel rides on an



A view showing the elaborate interior of the Scarab. In the rear are two movable chairs, a lounge, and a collapsible table. High speed will not jar ash tray on the table.

individual shock absorber, huge coil springs equipped with oil cylinders, extending from the wheel to the lower window lines. They combine with the rear-mounted engine to provide a cushioned shock in collisions.

A built-in lounge and table feature the "living room" interior. The driver's seat is the only one that cannot be moved. The other two can be placed as desired.

Television Will Carry

A twinkling beam of light records a picture thousands of miles away. It is facsimile transmission—an interesting feature of this authoritative article on the future developments of radio and television.

IN HIS struggle for new information, man has been reaching farther and farther into mysteries beyond his accustomed sphere; farther with the runner through the forest . . . farther with camel caravans across trackless plains . . . farther with ships into uncharted oceans . . . seeking speed, and relishing the advantages of new contacts. From the start, mankind has struggled for better communication.

Communication is civilization's pace-setter. The creeping progress of the past was over muddy trails and bridgeless rivers.

Civilization has lagged when communication has faltered. Surprising new arts were developed, employed and eventually lost in the slumber of the ages. Those that endured won their way about the earth slowly. Nations adhered to old ways not so much because they liked to labor in the ancient, clumsy manner, but because improvement remained isolated, undetected, unheralded over long periods to people of other sections.

Civilization has progressed as communication has gone forward. The telegraph and telephone gave modern industry its great onrush. Radio has augmented those services amazingly, not only by providing an unprecedented method of reaching great masses of people instantly and simultaneously, but also by giving the world swifter, surer, more direct contacts.

It has been my policy to refrain from definite prediction as to the time when television might be brought from the research laboratory and offered on a commercial basis to the American public.

Definite progress has been made each year



Left—Charles J. Young shown with the new simplified device for sending photos by radio. Above—A facsimile scanner used in the existing system of international short wave operations.

the Mails

by

DAVID SARNOFF

PRESIDENT,
RADIO CORPORATION OF AMERICA



Above—David Sarnoff
President of the Radio
Corporation of America
and author of this article
on the future of radio.

in research and development leading to sight transmission by radio. The latest development in television research is the perfection of the "iconoscope"—an electric eye—which has advanced the technique of television by facilitating the pickup of studio action and permitting the broadcast of remote scenes, thereby giving to the television transmitter the function of a camera lens.

Through the use of the iconoscope, street scenes and performances in studios have been satisfactorily transmitted and received by television, on an experimental and laboratory basis.

Nevertheless, some important problems re-



The Radio Corporation of America's central plant located at Rocky Point, Long Island. It is in this plant that much of the pioneer work in the field of television has been evolved.

New Photo Cells Make Possible High Speed Televising of Photographs

lating not only to the technical side, but also the commercial side of television still call for solution. These problems relate principally to the cost of erecting and operating the necessary television transmitting stations, their interconnection for wide-range service, the price at which television receiving sets can be successfully manufactured and sold to the public, and the production of suitable programs.

While it is impossible to anticipate the exact time when this development can be introduced on an industrial basis, it may nevertheless be said that the progress made by laboratories and engineers has brought us much nearer the goal when transmission of sight will be added to transmission of sound.

Particular importance, both with respect to

new radio communication service and television, is attached to the research and engineering carried on in the field of ultra short radio waves.

The creation of extremely small radio tubes has produced a new avenue of approach to the problem of using ultra short waves. Tubes have been developed with a diameter of only five-eighths of an inch having the internal elements fitted into a space about the size of a pea. They are especially effective on wavelengths in the region of one meter or below.

My faith in the future of radio science is geared to facsimile and television. And facsimile, the transmission of still pictures, is the gateway to television. These developments will produce not only new means of entertainment, but also new methods of communication.

Since Morse invented the telegraph there has been no radical improvement in telegraphy. Morse, a poet as well as an inventor, created the Morse code of dots and dashes which is still in international use.

No longer must the message be broken

[Continued on page 140]



Upper left—A photoradiogram of the late President Coolidge sent from London in the first test of wireless photo transmission by R. C. A. Lower left—V. K. Zwerykin with his thermionic photo-electric tube which utilizes the power of light, sending out radio impulses whenever exposed. Lower right—A telephoto of the Roosevelt inauguration.



Craftsman Earns Living Making Gold and Silver Telephones

PORTER BLANCHARD, Los Angeles inventor, takes a great delight in beautifying the more simple household articles found in every home and has even gone so far as to produce telephones from silver and gold at a total cost of \$500 each.

The phones, of the ordinary French type are entirely taken apart and dipped into an electroplating solution. Current is passed through the solution to plate the various telephone parts.

Several times during the process, the parts are removed and polished to a glossy smooth finish to insure an even result. The plating is about the thickness of paper.



Photo shows Porter Blanchard, the man who makes his living through his hobby of creating phones in gold and silver.

Triangle Solves Math Problems



The geometric triangle facilitates quick solving of problems.

A TRIANGULAR little geometric instrument recently perfected, is designed as an aid to the mathematician and will, with a little adjustment, furnish solutions to the simpler problems of algebra and certain forms of the more complicated branches of mathematics.

The instrument supplies solutions of complicated formulas involving multiplication, addition and subtraction at the same time. A guide curve aids the operator to read the logarithm of any desired number without numerical calculation.

Swiss Carve Man's Head In Snow



A well sculptured snow head built by the natives of Grimsons, Switzerland. The block is 20 feet high.

HIGH up in the Swiss mountains, snow sculpturing is one of the favorite winter amusements, whole villages often vying in competition. Of especial interest this year was a beautifully sculptured head in Grimsons cut from a block of snow 20 feet high.

Farm Tractor Is Also War Tank

LIKE a broken down plow horse turning into a snorting, spirited cavalry charger, a new farm tractor has been devised that can be converted into an armored tank equipped with gas and machine guns in a space of two hours.

The tractor is of the caterpillar type and is capable of surmounting anything from ditches to fallen trees. Its traction wheels are especially good for work in mud. Scrap metal was used to armor the original model.



The new tank two hours after it pulled out of the fields as a farm tractor. Note the heavy armor and the machine gun.

PARAGRAPH ODDITIES OF SCIENCE



The highest price ever paid for steak is \$48 per pound. This enormous price was paid in Circle City, Alaska, during the Klondike gold rush.—A. Campbell, St. Louis, Mo.

In grain mill and elevator fires, the use of water to kill the flames is more dangerous than the fire itself. High pressure water hoses stir up the grain dust in the building—dust that is highly explosive when touched off by flames.—Robert Lynn, Waseca, Minn.

The age of a fish can be determined by the number of rings on his scales. The scales develop two rings during each year of growth. — C. Reynolds, Long Beach, Calif.



The alligator is the only animal that can move its upper jaw.—Max Bortnick, Fox Valley, Sask.

Man killing clams are often found off the coast of Australia with shells weighing as much as 155 pounds. Pearl divers fear them as no amount of struggling can free a victim from the grasp of their powerful jaws.—E. Eustace, Shrewsbury, N. J.

Two Diving pigs that plunge into the water in search of fish, have been attracting much attention around Lake George, Florida. The pigs have reached the weight of 200 pounds each on their wholesome fish diet.—Thomas Newman, Seville, Fla.



Nic Sprank

Slot Machine Ejects Bad Coins



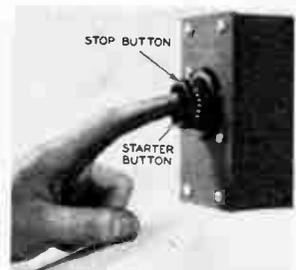
Photo shows a man inserting a coin in the automatic collector at a New York subway turnstile. The collector tests the coin, returning counterfeit nickels through a slot in the side.

SLUGS, washers, and counterfeit coins will no longer admit a person through the turnstiles of the New York subways since the recent installation of ingenious machines that will accept only genuine nickels.

When a nickel is placed in the machine, it first passes before electro-magnets set to reject all coins of suspicious metallic content. If the coin passes the magnets, it goes to a weighing device which throws out all coins above or below the average weight of a nickel. Rejected coins are thrown back through a slot in the side of the machine.

Starter Button Is Fool Proof

A NEW "foolproof" motor starter cannot be started accidentally by a bump or fall, due to the fact that the stop button extends around and beyond a recessed starter button. With this device, a motor can only be started by pressing the recessed button with the finger. The button is designed to prevent accidents.



The stop button extends around and beyond the starter button.

Modern Mechanic and

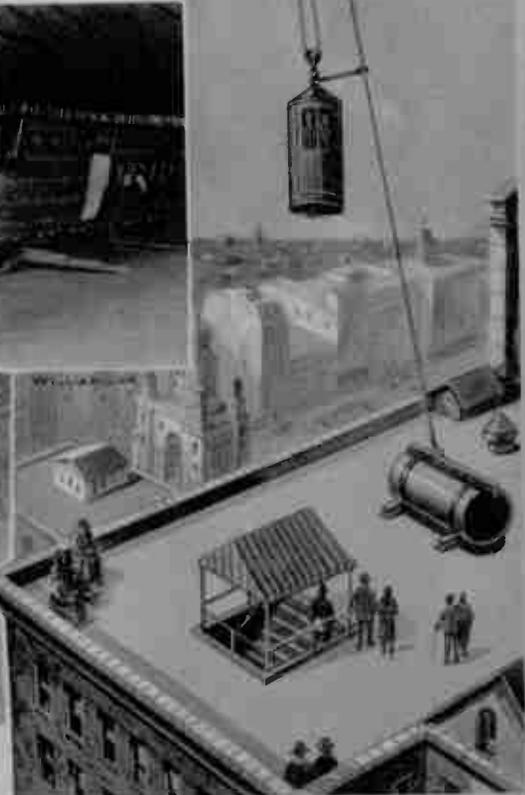
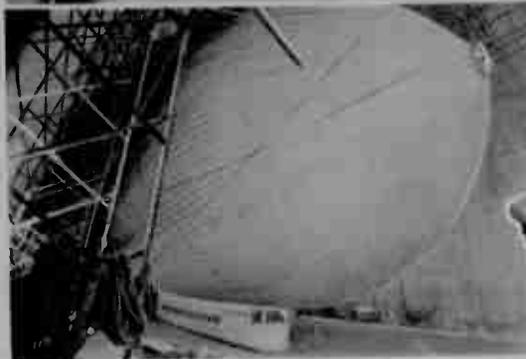
All-Metal Dirigible Lowers Passengers IN ELEVATOR CAR

AN ALL-METAL dirigible now being built for transcontinental freight and passenger service, the first lighter-than-air craft considered practical for commercial use, takes on or discharges its load without landing. The anchor—which really is the main fuel tank—is first lowered. An elevator cage using the anchor cable as a guide then lowers passengers to a rooftop or other convenient location.

A blower type propeller and 2,800 h. p. gasoline engine in the nose of the ship replace the usual gondola power units. The vacuum created in front of the ship and the slipstream around it are expected to give a cruising speed of 120 m. p. h.

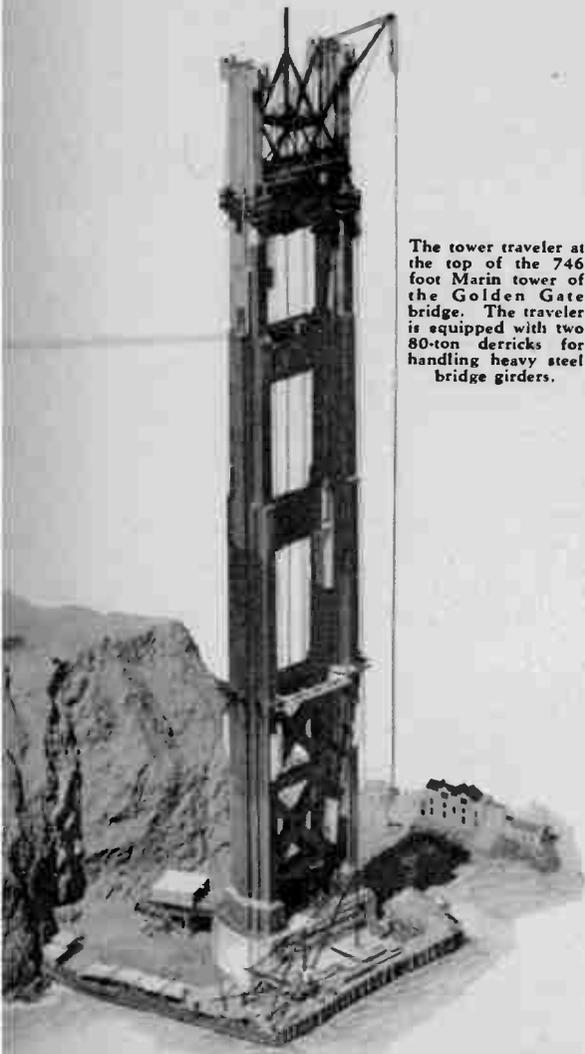
Since these 40-passenger dirigibles may be converted into bombers in three hours, the government is encouraging their production. A million-dollar manufacturing plant is soon to be built at Fullerton, California.

New dirigible hovers anywhere when gas tank anchor is lowered. Right: A loading scene. Ship is 275' long, 75' in maximum diameter.



Passengers are lifted to gondola in metal car pictured above. Bag is made of duralumin, and is one single compartment, with long corrugated strips cemented rather than riveted together. Cruising radius with full load is 3,500 miles.

World's Longest Bridges Span San Francisco Bay



The tower traveler at the top of the 746 foot Marin tower of the Golden Gate bridge. The traveler is equipped with two 80-ton derricks for handling heavy steel bridge girders.

HIGH over the surging tides of San Francisco's Golden Gate, the two towers of the world's largest single suspension bridge stand in defiant majesty as symbols of man's victory over natural forces. And farther back, the eight mile skeleton of towers and piers stretch across the San Francisco—Oakland bay, ready for the spans which will complete this, the world's most costly bridge project.

These bridges, built at a total cost of \$112,000,000, are being erected to aid traffic in and around San Francisco. The bridge to Oakland cuts the 30 mile trek around the circuitous shoreline of the bay to a straight 8¼ mile trip across the bridge; the Golden Gate project eliminates a detour of approximately 80 miles for direct coastal traffic between Canada and Mexico.

Since the beginning of the work on the two bridges, 18 construction records have fallen. Thirteen of these were broken in the building of the San Francisco-Oakland-bay bridge, declared by President Roosevelt to be the



RINCON HILL ANCHORAGE

PIER 519 FT ABOVE WATER

WEST BAY ANCHORAGE 235 FT. ABOVE WATER

THE WORLD'S LONGEST BRIDGE—



The San Francisco Bay metropolitan area comprising nine counties bordering the bay. The long point in the foreground is the San Francisco business district. Arrows indicate the new bridges. Photo courtesy Pacific Gas and Electric Co.

largest construction project started in the United States in 1933, and rated by engineers as tenth among the structural wonders of the world.

Built at a cost of \$77,000,000, 6.7 per cent of the total steel produced in the United States in 1933 went into the construction of this gigantic project. It will support a double highway 235 feet over the bay $8\frac{1}{4}$ miles, from San Francisco to Yerba Buena Island and from Yerba Buena to the city of Oakland.

Fifty-one piers and three cable anchorages were required to make the crossing. Especially unique is the center anchorage in the middle of the West Bay which is designed to take strain from both sides as the common anchorage of two suspension spans. To resist this terrific pull, it is sunk 220 feet into the bed-rock and towers 235 feet above low water level. The anchorage is 197 feet long, 92 feet wide, and has an overall height of more than 500 feet.

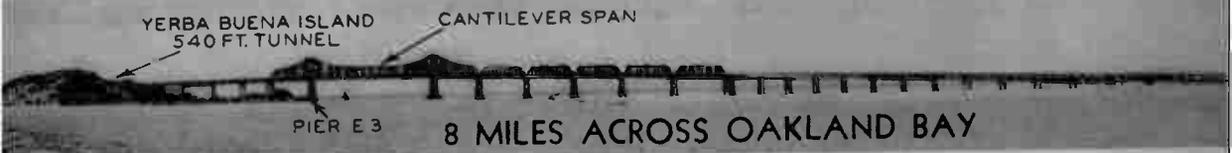
The San Francisco anchorage on Rincon Hill is a gravity type cement cube, a huge

by CHARLES W. GEIGER

A comprehensive article on the Golden Gate and San Francisco Oakland Bay bridges, telling of man's struggle with nature to complete, at a tremendous cost, two of the most daring construction feats ever undertaken by American engineers.



A view taken inside the oval fender showing the metal frame used for lowering the divers into the water and for removing him from the bottom to the surface. Divers were often compelled to work 100 feet under water surveying pier sites.

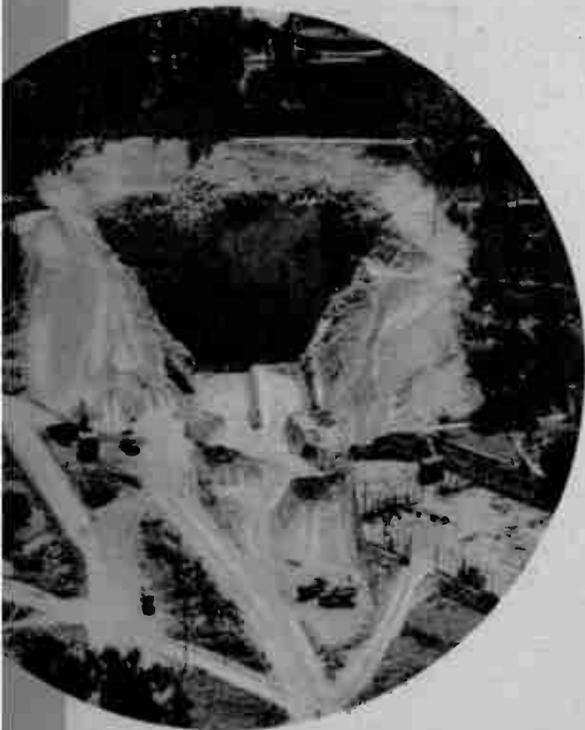


8 MILES ACROSS OAKLAND BAY

OAKLAND BRIDGE ROADWAY TUNNELS THROUGH



Above—Bridge workers handling a steel girder on the Oakland Bay bridge. San Francisco is seen in the background. Lower right—A cross section of the Oakland Bay bridge. Below—Beginning the construction of the world's largest vehicular tunnel on Yerba Buena Island. Photo courtesy Associated Oil Co.

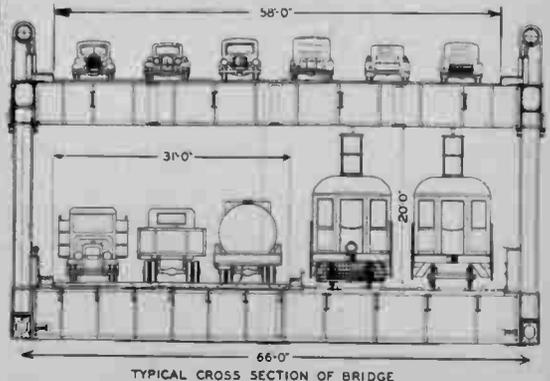


Records Of San Francisco Oakland Bay Bridge.

The world's most expensive bridge—cost, \$77,000,000.
 The world's longest highway bridge—8¼ miles long.
 Has the most piers of any bridge in the world with 54, three of which are anchorage piers.
 It entailed the pouring of concrete 242 feet below water. It required the sinking of a caisson 228 feet.
 Excavation was carried on 242 feet under water.
 It spans 9,000 feet of navigable water.
 The project required the construction of the largest bore highway tunnel.
 It has 70,800 miles of supporting cable.
 It has two suspension bridges built in tandem.
 It was the largest construction project started in the United States in 1933, using 6.7 per cent of the country's total steel output.

Records Set In Building The Golden Gate Bridge.

The first bridge to be built across the open sea.
 The world's longest suspension type structure with a single span of 4,200 feet.
 It has the highest bridge towers in the world—746 feet.
 It has the greatest clearance, 220 feet above the water.



ROCKS AT YERBA BUENA

mass of masonry sunk deep into the earth; supported by its own weight, and rising 200 feet to the level of the bridge. The Yerba Buena anchorage will be accomplished by gouging two cable tunnels 160 feet into solid rock.

Four concrete and steel piers, rising from 474 to 519 feet above the water will support the cables from which the spans of the two-mile double bridge will be suspended.

The use of Yerba Buena Island as a mid-anchorage necessitated the cutting of a 540 foot vehicular tunnel to connect the two sections of the bridge. Seventy-eight feet high and 67 feet wide, double decked and steel-lined, it is the longest tunnel of its kind in the world.

The East Bay crossing between Yerba Buena Island and Oakland will consist of a cantilever span 1,400 feet long with two 510 foot anchor arms, five simple spans each 500 feet long, and 14 truss spans each 290 feet long.

The bridge structure, at its easterly end, terminates two miles from shore in the shallow water and tide flats of the East Bay. Here it is joined by a four-mile fill highway extending to shore at Oakland and then swinging north over the tide flats to Berkeley. The construction of this highway requires one-half million cubic feet of sand fill and 348,000 tons of protecting rocks.

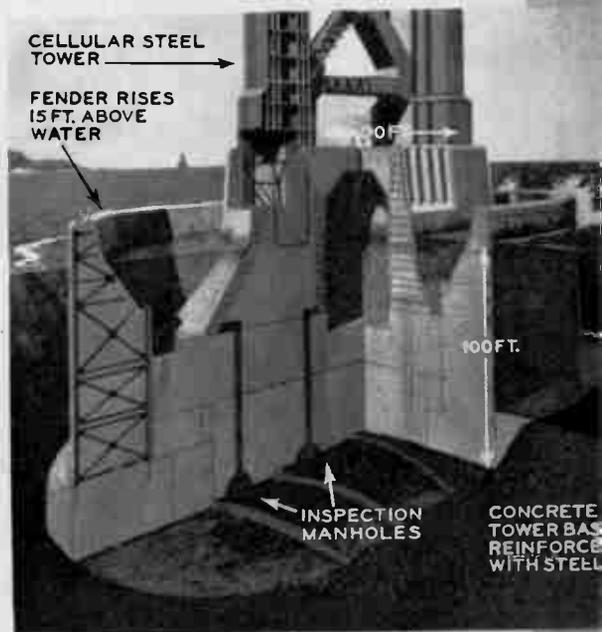
The bridge comes into San Francisco 175 feet over the harbor, so high above sea level that the Palace Hotel of San Francisco could easily be slipped underneath. The lower deck of the bridge, used for heavy trucks and interurban cars, first touches ground on precipitous Rincon Hill; the top deck reaches ground 4,200 feet to the westward. Curved ramps swing from the top deck at Rincon Hill for motorists bound in diverse directions.

The construction of pier E3, adjacent to Yerba Buena Island is a feat that will go down in the annals of engineering history.

[Continued on page 141]



Above—A view of the oval fender of steel construction built to facilitate the pouring of the cement piers. A cement seal inside the steel permitted the water to be pumped out to provide a dry working area one hundred feet below the surface of the water. Photo courtesy Associated Oil Co.



CELLULAR STEEL TOWER

FENDER RISES 15 FT. ABOVE WATER

100 FT.

INSPECTION MANHOLES

CONCRETE TOWER BASE REINFORCED WITH STEEL

Above—Photo shows a cross section of the steel fender rising fifteen feet above the water level to provide permanent protection for the inclosed concrete tower base. Lower left—The diagram shows the comparative sizes and the dimensions of the world's three most gigantic bridges.



Crystal Balls Tracing Planet Paths on Globe Predict Weather



With this crystal-studded schoolroom globe J. C. Brown hopes to predict weather, years ahead, through movements of planets.

Driver Faces Load On New Truck

IN THE newest of contractor's dump trucks, seat and controls are reversed to enable the driver to face the load at all times.

The front wheels, directly under the driver, are used for steering, though these are actually the rear wheels when the truck is in motion. The short wheelbase makes maneuvering of the truck very simple.



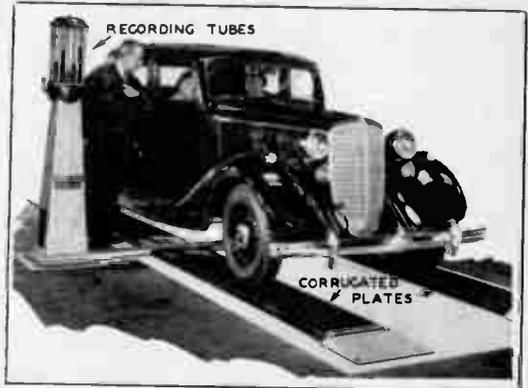
Backward-running dump truck lets driver run up to pit or fill without craning neck. This model carries 6-ton loads.

POSITIVE predictions of weather at any future time are declared possible by James C. Brown of La Porte, Texas, once an eleven year period of tests for his "Astronomer" weather machine reaches completion.

Depending upon movements of the planets for its weather predictions, the machine consists of an ordinary schoolroom globe on which have been traced the paths of the sun and moon. Crystal balls placed in pairs at 45 degree latitude on each side of the equator burn paths around the globe which, in the course of 24 hours, will record any variation in movements of the sun, moon, or stars.

The long test period is necessary to set up charts. Future readings of the machine can then be compared with similar readings on the charts to obtain the weather forecast. Movements of certain bright stars can also be recorded on the globe.

Brake Tester Gives 4 Readings



Entirely mechanical is this auto brake tester. Braking thrust on each floor plate is shown in glass recording tubes. Charts then tell stopping distance of car at any speed.

A SIMPLE brake tester having no auxiliary motors of any kind indicates on calibrated glass tubes the braking power of each of the four wheels, as well as the distance in which the car will stop at any speed.

The car is driven on the device and stopped with a wheel on each of the corrugated floor plates, reproducing true road conditions in stopping.

When a car is stopped by braking, about $\frac{1}{8}$ th of the weight is transferred from the rear to the front wheels. This extra load on the front brakes is accurately recorded by this tester, but not by any static brake test.

Scientist Fakes Voice on Sound Films

DUE to clever experiments recently conducted in Munich, Bavaria, by Rudolph Pfenninger, talking films can now be produced without the aid of a human voice, and musical notes can be produced with a quality of tone purity that cannot be gained by any instrument known to man.

Working in an entirely new field, Pfenninger conducted his work by making a close study of the curves by which sound is reproduced on film. Having determined the exact curves required by specific sounds, he drew them on paper and had them photographed onto a sound film.

Although still in the experimental stages, it is predicted that the idea will soon be practical for film work. Several short films have already been made with moderate success.

Automatic Control Guides Plane



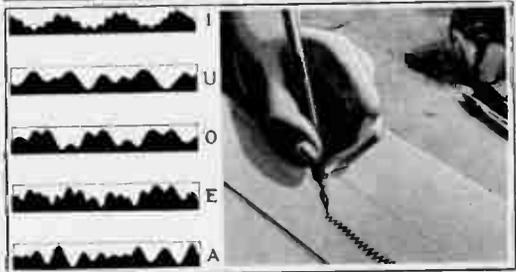
High over Boeing Field in Seattle, aviators test the automatic control which guides a plane in response to pressure on buttons. Human pilots are needed only to land the plane.

"BACK SEAT" driving for aviators is made possible through the new automatic pilot which is said to make a plane virtually fool-proof in the air. By simply pressing buttons the plane will successfully go through maneuvers without human assistance.

The new instrument is gyroscopically controlled. It will take the plane off the ground and level it at the exact height set by the operator at the instrument panel. Thrown into a spin by a wind-pocket, it will cause the plane to straighten out automatically.

The plane needs a human pilot only for landing purposes. During times of war, such a plane could be loaded with high explosives and directed toward its objective by radio.

Inventions, March, 1935



Drawing sound curves to reproduce the human voice. Shown in the lower left are the sound curves for the vowels, a, e, i, o, u. Lower right—Preparing the curves for photos.

Uncanny Machine Forecasts Death

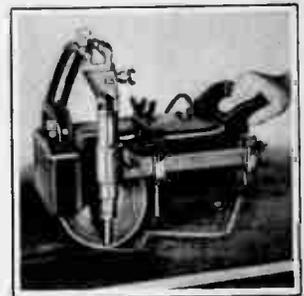
A MACHINE which studies the structural nature of blood cells is said to be able to predict approaching death with more accuracy than it can be done by an experienced physician.

The result of this experiment was reported after the study of 8,000 cases by M. Lecomte de Nouy and his colleagues at the Pasteur Institute in Paris. They experimented with the blood of men, horses and sheep.

In their studies, the scientists used either the serum or the plasma of the blood, both of which are invisible to the human eye but colored in the eye of a spectroscope.

Tiny Motor Drives Cutting Torch

A NEW acetylene cutting torch is propelled smoothly across the cutting surface by a compact motor. The unit is easily guided by the hand to follow all curves and will cut steel plates two inches thick.



Above—The tiny motor aids the hand in guiding the acetylene cutting torch over the cutting surface.

Building a Gold Mine Fortune



A general photo of the mine showing the scaffold, the shaft head, and the power house. The power house was built from salvaged lumber and houses the power plant constructed from the chassis and motor of an old Dodge automobile.



Filing a claim in California's latest gold rush near Mojave. The claim is staked out with three foot monuments covering a statement of claim.

SHORTY PARFET, How Wheery, Walt Ziege and Rudolph Vrobel were determined to find a gold mine—and they did.

Not only found it, but realized it was a rich strike. They put that mine into fairly large scale operations on an initial cash capital outlay of \$4.25!

The story of these four men who knew what they looked for, and did not quit before they found it, is a roaring affirmative answer to the question of whether or not a man without capital but with a vast willingness to work, study and stick to it, stands a chance in the western gold districts today.

When I started on a hunt to find a typical example of what men with nerve, grit, and little cash can do, I heard of a number who started on a shoe-string and now are making good. Significantly, I heard of no small-outfit placer working that was paying more than reasonable wages; most of them not that. The big chance lies in the unworked veins of old established gold camps or new districts so there the hunt started.

Shorty Parfet and his gang were the first outfit I talked with. There was no need to seek further. Here was a case typical, full of genuine help and inspiration for the fellow really in earnest about wanting to find himself a gold mine.

Parfet, whose initials are W. S., is stocky, red-haired where he isn't bald, has a friendly grin, and unlike most miners he talks will-



Howard Wheery at the old hand windlass set over the course of the old vein. The junk made scaffold and shaft head rear high into the air in background, as landmarks of success.

from a Four-Dollar Stake

by ARTHUR HAWTHORNE CARHART

How four Colorado prospectors fought against odds to set up large scale operations in a rich gold vein with a capital of \$4.25 is revealed in this interesting story of a "Small Man" mining camp.

ingly. He was a fighting, able-minded member of Colorado's Twenty-ninth Assembly and lives near Central City. He and Howard Wherry are the old heads; the other two the young huskies. It is a good combination.

"Know a mine when you see one," advises Shorty, "and then just scratch and dig intelligently until you meet up with what you're looking for. Meanwhile study and work."

As an employee to a big mining outfit, Parfet had access to many properties, their records, assays, and the veining system. The others were similarly constantly learning all they could about mining in general and this mineralized zone in particular. You see, it is the old story; you hear of someone who has "stumbled" onto a rich mine, and when you begin to run it down you find there was no stumbling about it. They knew where they were going and saw the way clearly.

Many stampeders cannot recognize gold unless it is the coarse native gold of a rich placer—and then it may be "fool's gold." Truly, the rich ore of this mine looks like rusty clay and muddy iron filings; nothing else. But these fellows knew, when they saw it, that it promised mineral values. Undoubtedly there have been some of those same stampeders who are grouching out of

[Continued on page 133]



Photo shows Walt operating the "hand made" power plant constructed from an old Dodge motor.



Shorty Parfet (standing) and How Wheery with the outfit that discovered the mine—ore, pick, bucket, mortar, a piece of drill steel for pestle, a screen bottomed box, and prospectors' pan used to separate the gold.



TABLE BISCUIT OVEN LEADS NEW HOME GADGETS



TABLE BAKING OVEN makes piping hot, fluffy biscuits right on the breakfast table. New stainless chromium steel baker is heated by powerful electric elements, giving perfect baking in a few minutes. Biscuits are placed on a narrow tray having room for up to eight, and slid into the oven for baking.



WALL BRACKET unit complies with modern-day demand for indirect lighting by providing glareless light. Attached to the wall by a non-slipping needle point pin, it may be moved with ease to any part of the room or house. The shade swings down for direct lighting, if desired.



ONE-CUP COFFEE MAKER has simplicity appreciated by men who must rise early, make their own breakfast. Coffee is placed in central well, maker placed over any cup, then filled with boiling water. Water drips through grounds into cup in about three minutes, when coffee is ready. Tea is made in same manner.

NUT BUTTONS are the smart thing for women's sport and outdoor garments. Hickory nuts, walnuts, and hazel nuts are buffed, polished, matched for size and color, and regular button eyelets attached.



Tractor That "Walks" Has No Drive Wheels to Slip in Mud

A TRACTOR which uses two legs to push it ahead, instead of the customary drive wheels which slip and spin in mud ruts, is the newest in power equipment for the farmer. Though working models have already been built and tested, the inventor cannot state when his machine will be ready for production.

In one of the earlier models, a three-wheeled affair with steering done by the single rear wheel, a small gas engine turns a double crankshaft through a speed reducing belt and wheel combination. Legs attached to this crankshaft propel the machine, one doing the pushing while the other is moving forward for the next step. In heavy mud the tractor would be lifted up as well as pushed forward, and broad paddles placed on each of the "walking legs."



Mud holds no terrors for this tractor—it walks along with first one leg, then the other pushing. In this early model a small gas engine drives crankshaft wheel through a belt.

Gold Ore Refined By Electricity



Equipment at right is used to separate gold from finely divided ore in revolutionary process developed by Elman B. Myers (left). High voltage electricity seizes gold flakes.

GOLD mines in hitherto inaccessible locations may now be worked successfully by means of a revolutionary gold-recovery process developed by Elman B. Myers, radio expert. As much as 98.7% of the gold in the ore is obtained by first crushing the raw mineral to colloidal or infinitesimal particles in a rotor mill, then passing the powder through tubes filled with mercury.

Inventions, March, 1935

Tiny Automatic Clutch Saves Gas

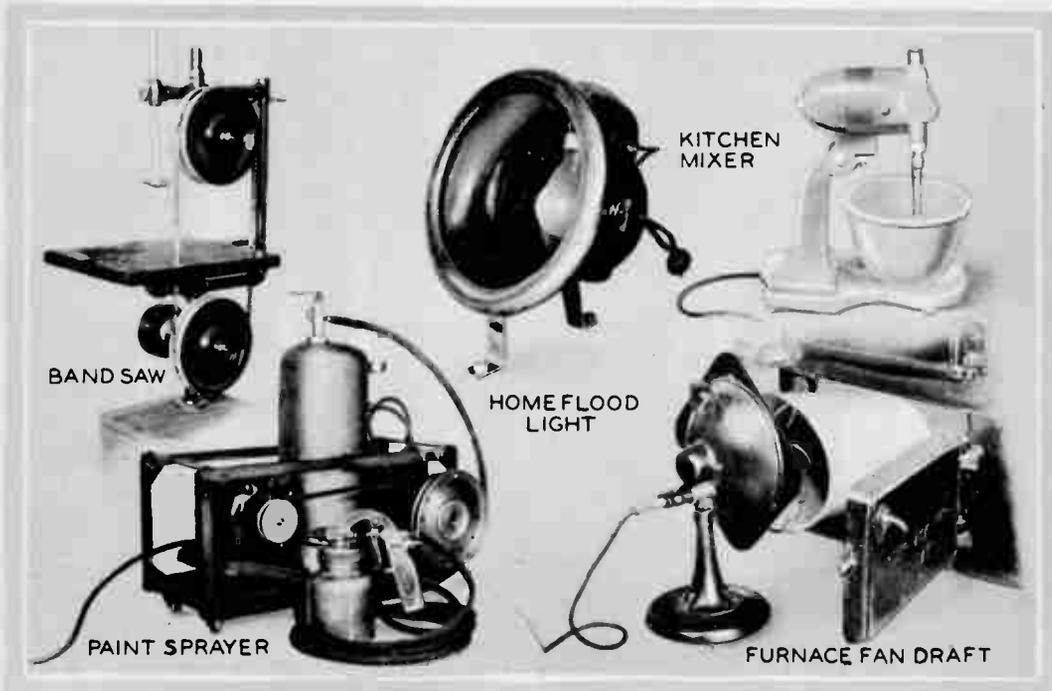
CLAIMING increases of from 6 to 8 miles per gallon of gas on a Ford V-8 car, McKinley Palmer plans to place his midget automatic clutch device on the market this spring. No larger than a tomato can, the simple unit is bolted to the side of the automobile motor, the clutch pedal removed, and a few simple adjustments made. The new clutch is operated by vacuum created in the intake manifold of the carburetor.

Palmer's device automatically controls the clutch in perfect time with the motor, and in addition acts as a free wheeling unit. An older model has been in use for 110,000 miles of driving without attention of any kind. The inventor, who resides in Beverly Hills, California, has spent seven years in perfecting his clutch.



Inventor McKinley Palmer demonstrates simplicity of his new automatic clutch for autos. Device attaches to most modern cars, saves gasoline by preventing racing of engine.

New Contest Offers \$125.00 in Cash;



Above are some suggestions for mechanical contrivances for home which may help in working out your entry for this contest.

RULES FOR FOURTH CONTEST

Designs for mechanical devices of any size, for which there is some use about the home may be entered in this contest. Each entry must consist of working sketches and a clear description, of less than 1,000 words, telling just how the article was made. Photographs, while not required, may be used in place of some of the sketches.

Readers may submit as many entries as they wish, whether or not they have entered the first three contests.

MODERN MECHANIX AND INVENTIONS reserves the right to publish the designs of any winning entry without further compensation to the contestant.

Each contestant agrees to permit MODERN MECHANIX AND INVENTIONS to publish all or part of any entry not winning a prize. Regular rates for the amount of material used will be paid in such cases. No manuscripts or photographs of entries will be returned.

Prizes will be awarded as follows to the fourteen most practical entries: First prize, \$60.00; Second prize, \$20.00; Third prize, \$8.00; Five fourth prizes of \$5.00 each; Six fifth prizes, \$2.00 each; Total \$125.00.

The decisions of judges, who will be editors of MODERN MECHANIX AND INVENTIONS, are final. In case of ties, duplicate prizes will be awarded.

Address your entries to Home Mechanics Contest Editor, MODERN MECHANIX AND INVENTIONS, 529 So. Seventh Street, Minneapolis, Minn. All entries must reach this office before midnight, March 22, 1935. Winners will be announced in the June, 1935 issue. Winners of the second contest for furniture ideas will be announced in the April issue.

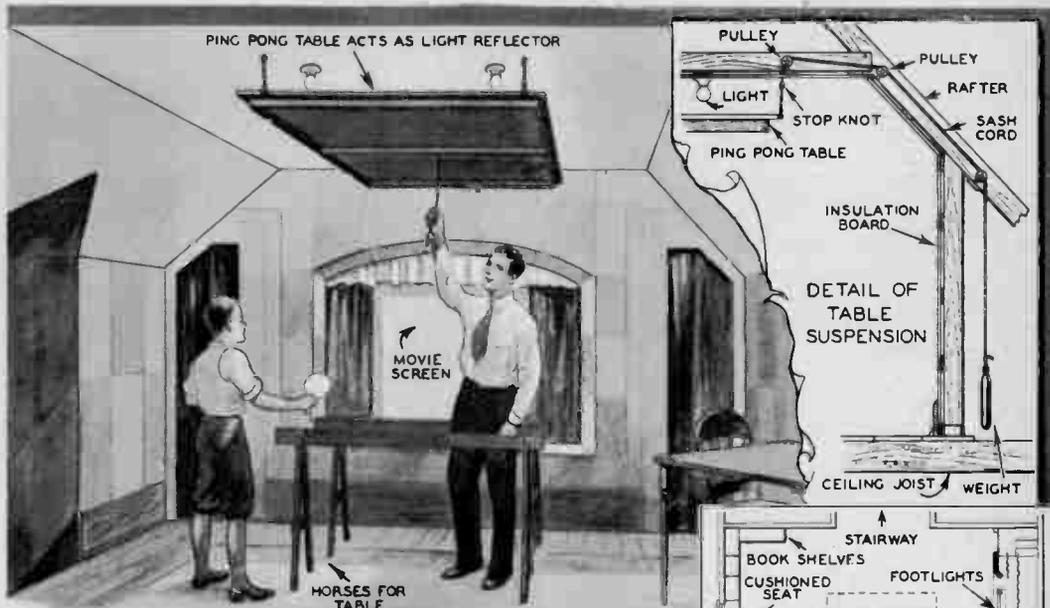
HAVE you ever designed or made some practical mechanical contrivance which either eliminated small menial tasks or improved some part of your home? If you have, or can, here is your chance of winning one of 14 big prizes in this \$125.00 cash contest. Simply tell us, in not more than 1,000 words, how it was built, and include clear working sketches or photographs.

This contest is the fourth and last in the Home Improvement series offering \$500.00 in cash prizes. Submit as many entries as you like, but follow all contest rules.

New uses for old machines offer a fine field for entries. The portable paint sprayer shown above is made from a discarded washing machine engine, an old auto air compressor, and a pressure tank.

Another example is a forced draft unit for the furnace, made from an ordinary house fan. Other suggestions are the home-made band saw for the workshop, the improvised home floodlight made from an automobile head lamp, and the kitchen mixer made from a vacuum cleaner motor.

Here are Winners of First Home Contest



Entries from 31 states and Canada in the first of a series of four contests, offering \$500.00 in cash prizes for home improvements, showed so much originality that judges had difficulty in selecting the winners.

After carefully considering the merits of each entry, the judges, editors of Modern Mechanix and Inventions, awarded first prize of \$60.00 in cash to Leland R. Reeder of Kansas City, Mo. Winners of the remaining prizes in the \$125.00 contest are announced in the next column. Drawings from Mr. Reeder's entry are reproduced on this page. His description of the winning home improvement suggestion follows.

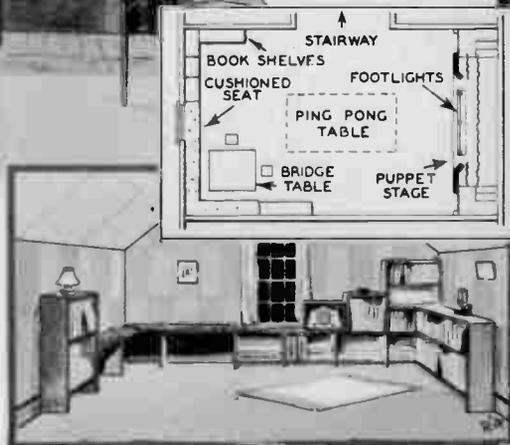
by **LELAND R. REEDER**

THE accompanying plans for a recreation room were designed for use in converting an old-fashioned attic into a cozy room for study, for games, or for presentation of home movies.

Measurements are purposely omitted, since the size of the room available will govern the manner in which this idea is carried out. The attic roof must first be checked for leaks. If existing floor joists are not at least of 2"x6" material, run additional joists alongside the old ones.

Flooring, if old or rough, should be covered with a good grade of linoleum. Build a par-

[Continued on page 120]



DECEMBER CONTEST WINNERS

The fourteen winners of \$125.00 in cash prizes offered in the December, 1934 Home Improvement Contest were selected by the judges as follows:

FIRST PRIZE, \$60.00: Leland R. Reeder, Kansas City, Mo. His winning entry appears on this page.

SECOND PRIZE, \$20.00: H. E. Ramsey, East Lansing, Mich. Entry described a conservatory and clothes drying room addition to the basement.

THIRD PRIZE, \$8.00: Mrs. W. J. Wade, Bridgeport, Conn.; a window nook and increased closet space for bedrooms.

FOURTH PRIZE, five of \$5.00 each: Henry Olzens, Cleveland, O., a simple method of plastering attic walls; Louis Jean, Sacramento, Calif., remodeling home for extra bedroom; John H. Fields, Chicago, Ill., den arrangement for the attic; R. C. Gangwere, Chattanooga, Tenn., remodeling basement; Ernest J. Coons, Crawfordsville, Ind., converting porch to sun parlor.

FIFTH PRIZE, six of \$2.00 each: Joe W. Catt, Chatham, Ontario; Hugo C. Loebel, Amery, Wis.; Arnold Retzloff, La Crosse, Wis.; Lee M. Enochson, Arnegard, N. D.; P. R. Bulkeley, Colorado Springs, Colo.; Adolph Luker, Clear Lake, Ia.

Hose Mixes Cement; Sprays It On Dome



Above—A view of the planetarium dome, erected without costly cement moulds. Inset—A close-up of the mixing and spraying hose used in constructing the huge dome.

Ford Adopts New Decimal System

AS A STEP in the simplification of tool making, designing and manufacturing, the Ford Motor Company has adopted a new system of decimals to supersede the "common fraction" divisions of the inch. This system eliminates the bothersome changing of fractions to decimals. It will be of great help to automobile craftsmen and designers.

Rides Cycle On Handlebar Frame



Daredevil Coindet riding above the handlebars of his speeding motorcycle steering by balance.

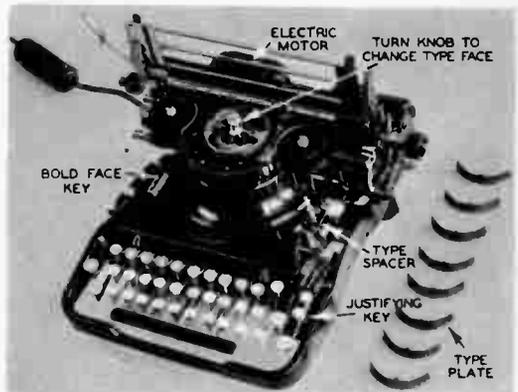
DAREDEVIL COINET, world's champion stunt motor-cyclist has evolved an exhibition trick that calls for a wealth of iron nerves. Speeding along a curved road at fifty miles per hour, he climbs onto a frame over his handlebars and steers the cycle by balancing his body. A fall would result in death or serious injury.

A HUGE hose which sprayed mixed cement from its nozzle was used for the first time in the construction of the new planetarium dome at the Museum of Natural History in New York.

Through this method, the cost of erecting an elaborate system of concrete forms was entirely avoided. Instead, a temporary dome-shaped backing was set up and covered with steel wire webbing. The cement was then sprayed over this in even layers.

Two hose lines feed the unique nozzle. One carries a dry mixture of sand and cement; the other carries water. The pressure within the nozzle changes the mixture to concrete, and it is sprayed on the building to the desired thickness.

Typewriter Has 200 Type Styles



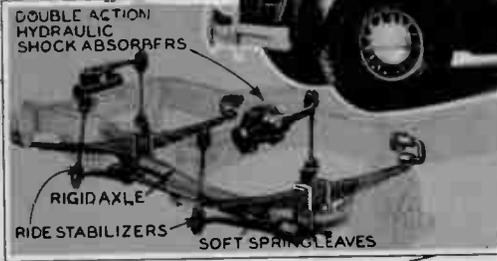
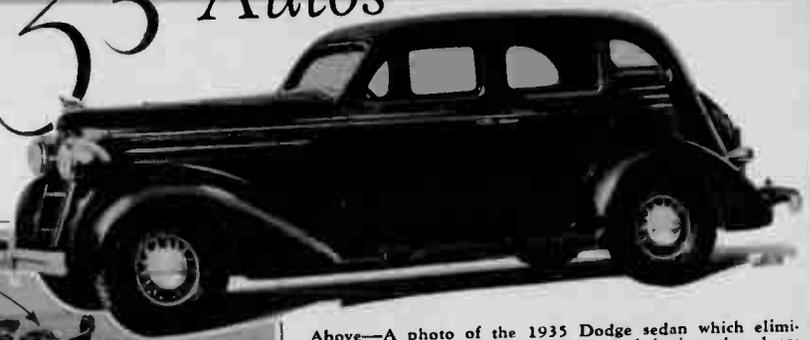
This new typewriter has 200 type faces. It is the same size as the ordinary typewriter, weighs less and has 100 less parts.

A NEW typewriter that uses 200 various styles and sizes of type and characters for most of the leading foreign languages plus 60 different styles of English lettering has recently been perfected.

The machine holds two different styles of type at the same time, but the type faces, mounted on a small metal clip can be changed in a few seconds. Fastened to the clip as a unit, they cannot fall out of line.

Special open-faced types are provided for use with condensed spacing so that a page of typing may be put into a half page without losing its legibility, and an electric motor controls a spring in such a manner that the impression is uniform regardless of how hard the keys are struck.

Mechanical IMPROVEMENTS of 1935 Autos

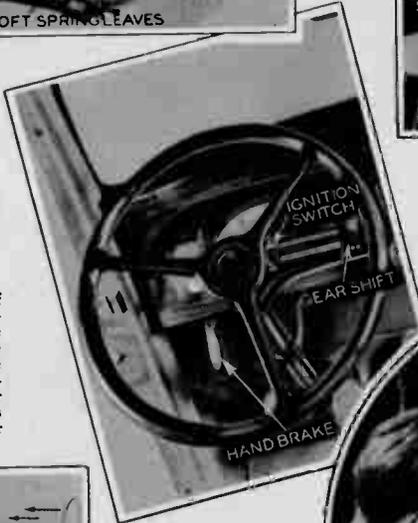


Above—A photo of the 1935 Dodge sedan which eliminates the conventional dust apron, bringing the doors almost flush with the running-board to add beauty of line. Lower left—The Dodge front suspension features softer springs, double action hydraulic shock absorbers and a rubber-cushioned ride stabilizer.

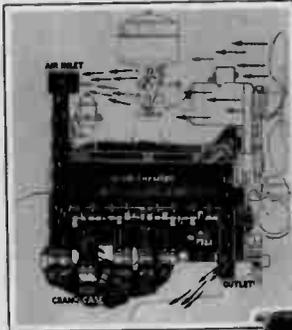


Above—A cross-section of the new solid steel "turret" top found on the Pontiac, the Oldsmobile, and the Master Chevrolet. The roof is composed of a single sheet of seamless steel, extending from the front to below the rear window. This is laid over a section of acoustic felt and fastened to steel bows.

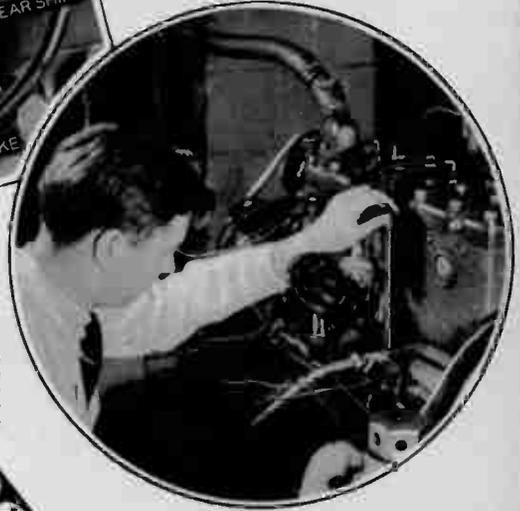
Right—A view of the finger control gear-shift on the steering wheel bracket of the new Hudson. While the car is in gear, the selector lever may be moved and the shift will not change until accelerator is lifted.



Below—The addition of the new crankcase ventilating system in the 1935 Ford V-8 engine is designed to cool the oil and minimize the collection of excess water and sludge. Arrows show passage of air through engine.



Right—A photo of Engineer H. N. Roberts testing the oil temperature of the new Plymouth engine. The new motor has a full-length water jacket and a system of directed water circulation to cut down the excessive heat of a speeding motor.



Right—A side view of the new Ford chassis, stripped to show the new location of the motor over the front wheels, 8 1/8 inches farther forward than the engines of the 1934 models. Both seats are placed between the wheels.



SHARP SHOOTING on the

by
ELMER H. BAUMGARTEN

*Secretary of the
American Bowling Congress*

ARISING hollow roar re-echoes through the room as a gleaming, swiftly-moving ball speeds down the flood-lit alley toward its objective—ten wooden pins set up into a triangular shape. Nearing the pins, the ball cuts into a sharp breaking curve and snuggles between the one and three pins. There follows the crash of tumbling hardwood. Pins fly in all directions. It's a strike!

This is the scene in alleys all over the country as sportsmen fight it out on the line in the most popular of winter indoor sports—bowling.

Bowling is a game that knows neither age nor sex limitations, providing benefits both physical and mental. The game develops coordination of mind and muscle. It strengthens self confidence and calls into play all the muscles of the body, at the same time providing enjoyment that can not be found in any other game.

Unlike most competitive sports, bowling offers full enjoyment to the beginner from the start. The game involves no awkward positions to embarrass the novice; nor does it have many technicalities too difficult for the average person to learn. Of course, there are tricks to good bowling. It is the learning of these tricks plus the resultant polish attained by practice that add to the interest of the game for beginners.

The smashing strike is seldom a gift of fortune.

Watch an experienced bowler. Note that he always begins his delivery from the same spot on the alley, and his ball is always set in motion from the same spot on the foul line. His lithe swinging stride is never ended with a choppy step to stay within the foul-line bounds. He has measured that distance carefully to avoid such a disconcerting short step. The rhythmic back swing, the release of the ball as the right foot touches the floor before the line, and the sweeping "follow through" are all the results of intelligent practice.

Beginners should first of all find a ball that nestles comfortably into the hand. Take a relaxed position at the approach, holding the ball with both hands before the body. Then,



Above—The correct bowling grip as executed by Andy Varipapa, sensational trick bowler. Center right—Proper grip for the straight ball. Lower right—Proper grip for a "hook" or curve ball. Lower left—Joe Falcara, world's champion, demonstrates the correct stance for approach.

BOWLING ALLEYS

1	2	3	4	5	6	7	8	9	10	TOTAL
X	X	X	-	\	X	0	X	\	\	X
30	58	77	86	106	124	132	152	170	190	190

A specimen bowling score is shown above. Explanation of the actual play resulting in this score is found in the article.

in measured strides, approach the foul line, reaching it with the body bent forward from the hips and the left foot forward. Co-ordination and timing should be so perfected that the ball is released from a straight pendulum swing of the arm the instant the left leg is the farthest forward. The right leg should be bent at about a 45 degree angle from the thigh.

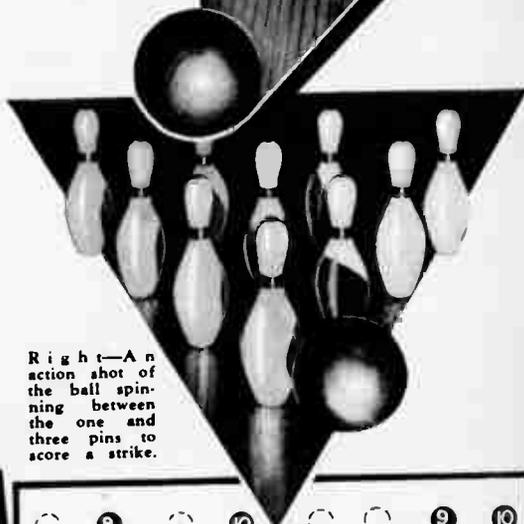
The crashing speed delivery is not necessary to good results. The fast ball squirts the pins off the alley before they have a chance to fall into a horizontal position to cover a wider area on the alley bed.

After a bowler has determined the sort of shot in which he excels, he should shoot with the same approach, placing the ball in the same spot on the foul line with as little variation as possible.

Some bowlers, of course, look at the pins from the time they start their run until the ball is delivered. This is careless bowling, and usually about as effective as shooting a gun in the air to hit a rabbit running on the

[Continued on page 122]

Joe Falcato releases his famous "hook" ball. Note his perfect balance—body bent at hips, left leg forward, and right leg bent at the knee for support.



Right—A n action shot of the ball spinning between the one and three pins to score a strike.



HOW PINS ARE NUMBERED

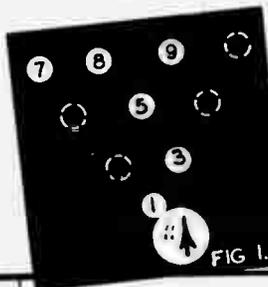


FIG. 1.

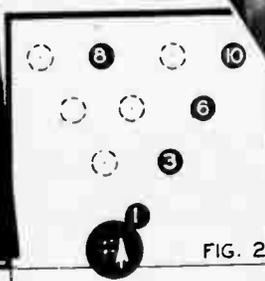


FIG. 2.

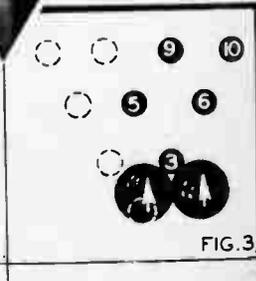


FIG. 3.

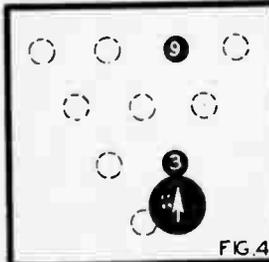


FIG. 4.

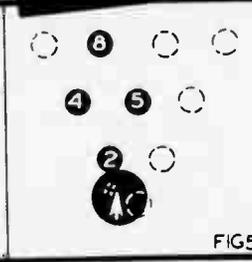


FIG. 5.

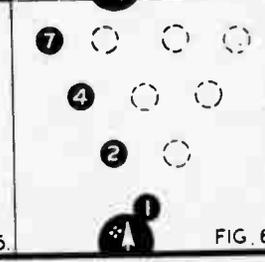


FIG. 6.

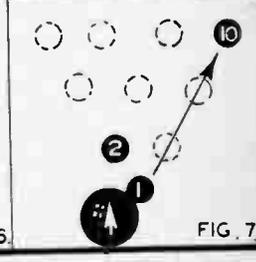
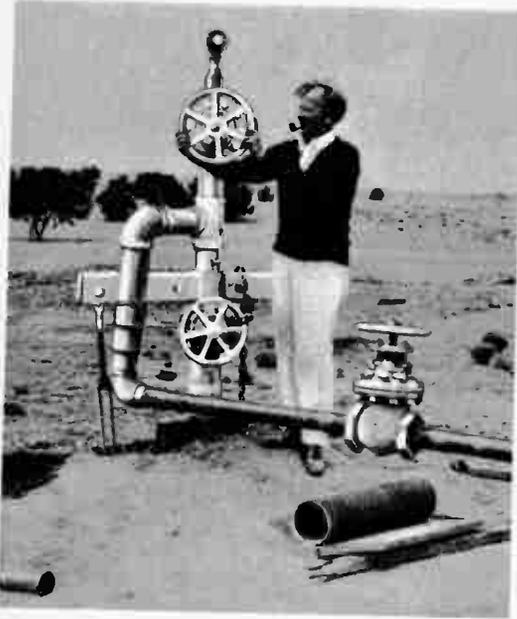


FIG. 7.

Above diagrams demonstrate a few of the spares most commonly encountered in the bowling alleys. The dotted circles represent the pins that were cleared from the alley with the first ball; the full circles represent the pins left standing. The large ball with the arrow shows just at what point the bowling ball must strike the remaining pins to clear them from the alley.

First Carbon Dioxide Line Carries Gas to Dry Ice Plant



Preparing to turn the gas from the Wilcox Dome well into the six-mile pipe line leading to a dry ice plant in a nearby city.

New Gas Puts Victims to Sleep

A NEW gas alleged to have been discovered in the mystery laboratory of Philip del Fungo Giera is said to be so expansive that it can put a whole army to sleep in a minute. It is so powerful that a man carrying a small vial can overcome anyone within a 300 foot range.

The gas puts the victim to sleep for two hours without any harmful effects. The eating of a special pill renders the user immune to the sleep producing gas.

Razor Flips Open for Cleaning



The blade is held in the razor by a clip fastened at the hinged end.

DESIGNED to eliminate the removal of a razor blade for cleaning, a new razor can be flipped open without falling apart. The blade, itself, is unusual, having one edge set for coarse shaving, the other for close shaving.

CARBON DIOXIDE, the rarest natural gas in the world, has been discovered beneath the desert wastes of Wilcox Dome, fifty miles east of Albuquerque, N. Mex., which has the distinction of being the only district in the United States producing natural carbon dioxide.

As yet, only one well has been sunk. It is producing carbon dioxide, 98 per cent pure, at the rate of 600,000 cubic feet per day. Several new wells are now under construction near the number one well. They are expected to be finished in the near future.

As the well holes are sunk, they are filled with pipe, and when the gas comes rushing forth, it is diverted into a main pipe line and carried to a storage tank for future use.

The gas from the Wilcox Dome well is now being piped six miles to a nearby city where it is used in the manufacture of dry ice.

Girls Dance On Stage Ceiling

SONG writers have written fantastic songs about dancing on the ceiling; Joseph Brierly and Roy Lankton, Hollywood inventors, produced an apparatus that made it possible.

For forty-eight weeks, patrons of a big-time vaudeville circuit were mystified to see chorus girls swinging their legs with careless abandon as they danced on the ceiling in a precarious inverted position.

Mirrors and other stage trickery were suspected, but the real truth never leaked out.

Each girl wore a canvas harness beneath her regular costume. The harness, made of leather, fit like a bathing suit and contained an iron ring at the crotch into which was snapped an invisible wire attached to a rolling carriage on a ceiling track.



Photo shows a girl performing while suspended from the ceiling.

Modern Mechanix and

800-Mile GAS Pipe Line Burrows Through Five States



Snaking the pipe line across the Minnesota river near Minneapolis. Tractors pull the closed-off pipe through the water with long chains and cables.



All ditch digging was done by manual labor inside Minneapolis city limits to give work to unemployed residents.



Tractor cranes swung the snake-like pipe line into waiting trenches after crews had joined sections of pipe with flexible couplings. Tractor in foreground is pulling pipe ahead.



Machines like this cut the 2-foot deep trench for the 800-mile line. Map indicates path taken by pipe through five states.

NATURAL gas belching noisily out of wells in the Amarillo fields of Texas is now being used as fuel by residents of Minneapolis, Minnesota, more than 800 miles away. Burrowing its way under prairie and mountain, river and stream of five states, a 16-inch diameter steel pipe line is the underground railroad which makes this remarkable feat

possible. Minneapolis with its 500,000 population and scores of surrounding trade centers is the latest district to become a part of a gigantic nation-wide spiderweb of pipe lines bringing natural gas fuel to over 8,000 cities in the United States.

Clamps and gaskets having great flexibility join together the long lengths of pipe in the Texas-Minnesota line. Crews of men continually assemble pipes above ground, just alongside the trench cut by the digger. Following the workers is a tractor crane, which rolls the long string of pipes into the ditch. Covering machines now fill up the trenches, the pipe lying buried to an average depth of two feet.

Pivoted Doors Resist Wind By Swinging In To Open Out



These bronze doors, installed at Kanawha Valley Bank in Charleston, West Virginia, pivot inward when pushed out, as shown. Compression springs on pivot arms close door.

SWINGING on pivots at top and bottom instead of by the usual hinges, the newest of all-metal doors equalizes wind pressure automatically, and may be pushed open easily against even a 50 mile an hour gale.

The door can really be said to swing in as it opens out, for pressure on the latch side causes the other half of the door to swing inward on the pivoted arms at top and bottom. Light compression springs mounted in the jamb and door itself automatically and silently close the door, and keep it tightly in place.

In an installation at the Kanawha Valley Bank Building at Charleston, West Virginia, three of these pivoting doors, made of bronze, are placed side by side at the entrance. Ordinary door latches and locks are used.

The development of this novel hinging arrangement came about through need for an all-metal bank door which could be opened easily by feminine patrons at all times.

Street Cars Get "Sunshine Roofs"



This double-deck "tram," built for service on the streets of Blackpool, England, has large glass windows over "sunshine deck." Styling of interior and exterior is patterned after modern motor car, with luxurious upholstered chair seats.

"Pal" Enjoys Rides On Bike-Sled

NOTICING that his police dog "Pal" was having difficulties in getting across the smooth ice of a nearby lake, Ralph Gero of Shrewsbury, Mass., proceeded to provide taxi service for his playmate. The novel combination bicycle and sled was made by removing the bicycle front wheel and bolting in its place a sled. Guy ropes run from the handlebars to each corner of the sled.



"Pal" once slipped and slid over the smooth ice of this Massachusetts lake; now he rides proudly on a novel bike-sled built by Ralph Gero, his master.

ENGLAND'S new streamlined trolley cars, advertised as the last word in luxury and speed, boast sunshine roofs on the second deck for passengers who wish to gather sun tan as they ride. The giant double-deck "trams" have luxurious traveling accommodations styled after those in the modern automobile.

Gleaming chromium bumpers and twin headlights add to the motor-car resemblance. Entrance is made through a single wide door at the center of the left side.

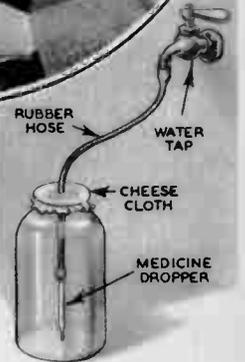
Slicing SECTIONS for MICROSCOPE WORK

Only a razor blade, a holder, and a steady hand are needed in preparing thin slices of plants and animal tissues for study under the microscope.

by J. D. CORRINGTON, Ph.D.



In chipping method of obtaining sections, demonstrated at left, fingernail on left forefinger controls thickness of slice. Use sliding motion when cutting to avoid tearing of delicate tissues. In circle above is rotary microtome, automatic machine used in many laboratories for preparing sections. Knife here remains stationary while object moves rapidly up and down as flywheel is turned. Arrangement of mason jar at right is for washing slices.



COULD you put a camel through the eye of a needle? Absurd, of course, yet it might be accomplished if one sliced up a camel on a microtome. This delicate precision instrument can cut sections of plant and animal structure so thin that the opening in a needle seems as wide as a barn door in comparison.

The microtome is a little like the meat slicer your butcher uses. Some will cut slices of organs only one-half a micron in thickness! This is a slice only .00001968 inches thick—and just about invisible.

In order to observe the detailed construction of plant or animal organs, thin sections must be prepared for the microscope. The free-hand method is used by most amateurs, since the microtomes or slicing machines are very intricate and expensive.

For beginners and for numerous advanced purposes, the free-hand method is as good as any, and far more easy and rapid. Culti-

vate the necessary skill and keep practicing—you will be able to turn out beautiful preparations with no other equipment than a razor.

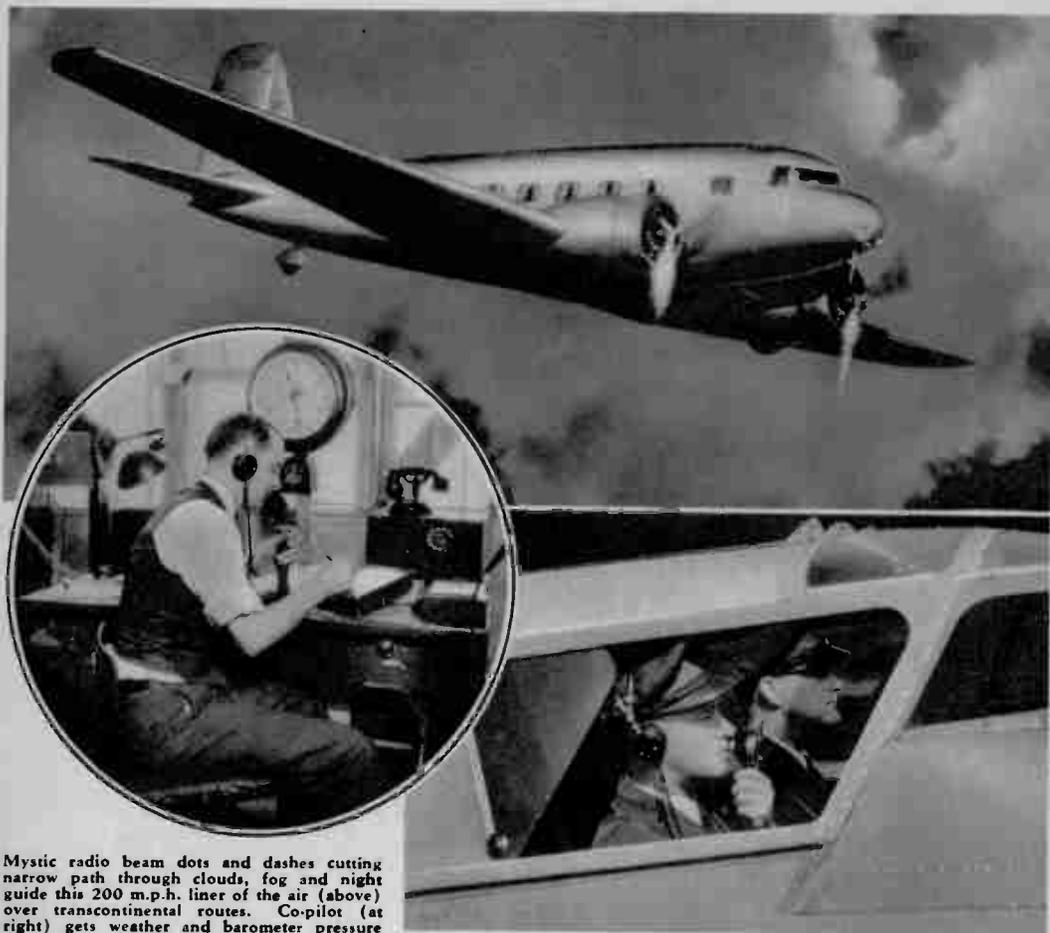
The safety razor blade held in a folding carrier is preferred by most amateurs, since dull blades can be replaced easily. The holders are obtainable at dime stores.

Plant stems may be sectioned as soon as they have been collected. Choose young and green stems for this work, since they cut more easily than older ones. Two slicing methods are in vogue; in the first the thinnest possible sections are chipped off by a downward chopping motion of the knife as illustrated in the accompanying photograph. In the second the specimen is held in the left hand, the knife in the right, and sections cut by pulling the blade toward the operator.

The first method may be likened to whittling, while the second corresponds to paring. In each case the cut made is a sliding, slicing

[Continued on page 130]

Training TRANSPORT Pilots



Mystic radio beam dots and dashes cutting narrow path through clouds, fog and night guide this 200 m.p.h. liner of the air (above) over transcontinental routes. Co-pilot (at right) gets weather and barometer pressure reports from dispatcher (in circle) by means of two-way radiophone system on long waves.

GONE are the so called "good old days" of aviation when most anybody who could take an airplane off the ground and get it back again without cracking it up could obtain an official looking license and forthwith start out hauling passengers through the skies for hire or pleasure.

No longer can novices "practice" on the public. The Aeronautics Branch of the Department of Commerce is tightening up on regulations to protect those who use the commercial air lines of this country.

In tightening up the regulations on transport pilots, the government is merely trying to prevent inexperienced pilots from risking the lives of other people in the sky.

Big time flying has become a big man's job. The transport pilot is the cream of commer-

cial aviators—the cock of the walk at any airport in the world. Masters of all the complicated wheels, motors, and gadgets on an airliner's instrument panel—masters of the air itself are the transport pilots. Dressed in attractive blue uniforms, with wings as big as pigeon pinions spread across the trim official caps, these men are the pride of commercial aviation.

Transport pilots must know a lot more than how to fly an airplane. Anybody can get up to the bridge of an ocean vessel and learn to steer it, but this would not qualify him as captain of the ship. It is the same with the transport pilot. It isn't so very far back to the day when planes had nothing but a clock on the dash panel. The throttle was the only thing in the cockpit, and it had but two positions—"off" and "on."

In that day of clean cockpits pilots thought

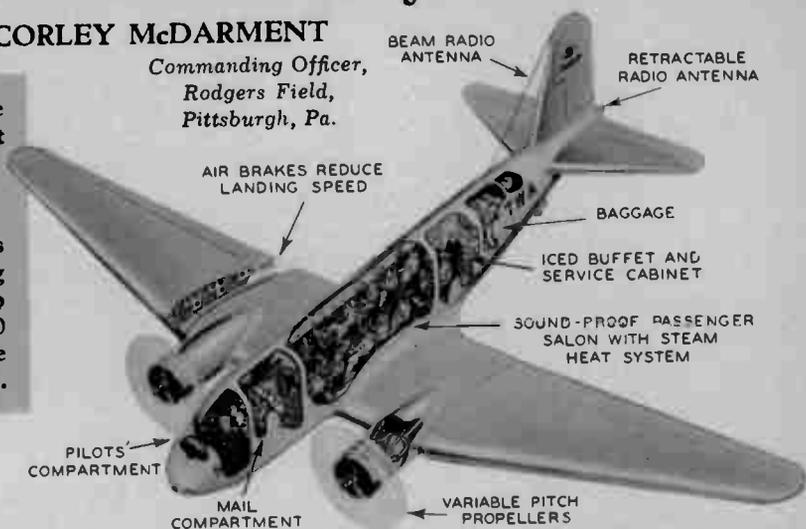
Modern Mechanix and

for HIGHWAYS of the SKIES

by LIEUT. CORLEY McDARMENT

Commanding Officer,
Rogers Field,
Pittsburgh, Pa.

Would you like to be a transport pilot—sit at the controls of a multi-motored giant of the air carrying passengers and mail through fog and dark on radio beam highways 10,000 feet high? Here is the training you will need.



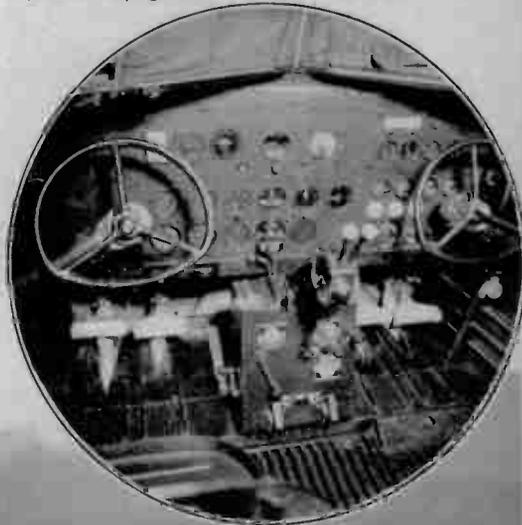
they flew by "feel." After a few of the big "feel" experts went into tail spins when taken up under hooded cockpits, this "inherent flying ability" was mentioned no more.

Today nearly every square inch of instrument board is covered with some kind of a "clock," as all gauges are called by aviators. The pilot of a big modern tri-motored plane must keep his eye peeled on forty or fifty dials inside the plane's cockpit, and at the same time watch the air traffic and check his map with the ground. If he doesn't have to check his map, he must do something harder—keep on a radio beam.

The big test of a transport pilot today comes in blind flying in fog and darkness.

[Continued on page 130]

Phantom sketch of typical transcontinental airliner gives idea of roominess and comfort possible today in air travel with these "flying salons." Pilots sit far ahead of motors.



In circle: Pilot and co-pilot must check these meters and levers constantly, especially when "flying blind." Air travelers enter plane exactly as they would a pullman car. Lives of these people are entrusted to transport pilot, flying over mountain and desert on radio highways.

Harness Supports Spine To Eliminate Use Of Plaster Casts

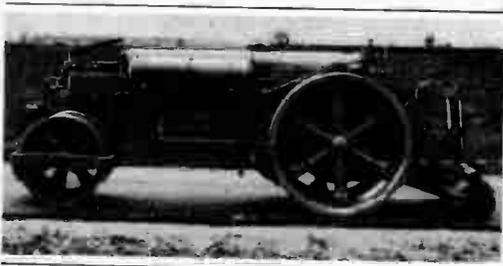


A view of the supporting harness in use. It has three points of support which prevent the slightest movement of the spine.

Rigid Roller Irons Road Smooth

A NEW rolling machine with a third roller produces a three-point plane which gives the necessary level surface desired in the rolling of soft dirt and gravel highways.

The third roller, known as an ironer, is hydraulically controlled and can be raised or lowered to suit the demands of the operator. Since it is rigidly maintained, it cannot rise and fall in the chuck holes of the road, and pushes surplus dirt from the high spots to fill the depressions on the road surface without producing a rolling wave. The ironer has three sections set on a single shaft.



This new steam roller has an additional roller, rigidly maintained to "iron" out irregularities in the road surface.

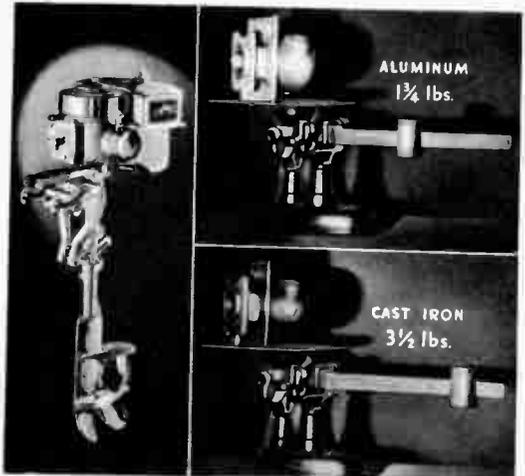
DESIGNED to do away with cumbersome plaster casts, a new harness made of leather and light steel is said to brace the spine perfectly from the hips to the shoulder maintaining firm rigidity in the torso of the patient.

The harness, invented and patented by Dr. John J. Nugent of Ogden, Utah, is composed of three separated braces—at the head, the shoulders, and the bottom of the spine—joined by light steel adjustable rods.

The brace at the bottom of the spine consists of a soft pad firmly held in place by a wide belt around the abdomen. The center or shoulder brace is adjusted to the proper height and fastened to a tight harness that fits the patient like a vest to hold the spine in a straight line.

The top brace consists of a rod, adjusted at the shoulders and bent over the head, which supports a soft leather harness that passes around the chin and the back of the head.

Boat Motor Has Aluminum Pistons

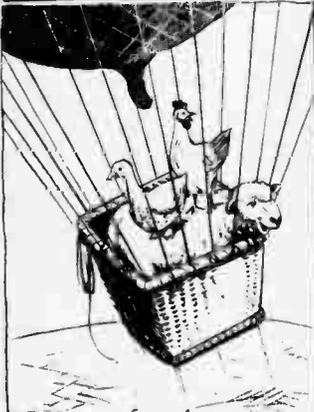


Left—One of the 1935 outboard motors with aluminum pistons and blocks. Right—Comparative weight of aluminum and iron. The aluminum casting is only half as heavy.

OUTBOARD motor building in 1935 features pistons and cylinder blocks of aluminum embodying advanced features of aviation engine design.

Using aluminum and steel materials, one of the leading motor manufacturers has produced a twin cylinder motor that weighs but 37 pounds. The aluminum pistons set in pressed iron sleeves are said to effect easier starting, longer life, and higher efficiency in engine operation.

Around the World in FIVE SECONDS; Nic Sprank in ODDITIES of Science



THE FIRST AERIAL TRAVELERS WERE A DUCK, A SHEEP, AND A ROOSTER!
In Sept., 1783, Joseph Montgolfier at Versailles, France sent a balloon up 1500 ft. Its passengers were a duck, a sheep and a rooster. —
Dubantewicz Kaz, Kenosha, Wis.



TO SAY "THE MERCURY DROPPED TO 40 BELOW ZERO" IS WRONG!
Mercury freezes before it reaches 39 degrees below zero. Alcohol thermometers are used to record low temperatures.
James H. Payne, Manassas, Va.



A SPIDER CATCHES BIRDS!
The *Mygale* Spider of South America is two inches long and has feet that cover an area one foot in diameter. It catches birds for food. —
Warren Barrows, Riverside, Calif.



ADMIRAL PEARY WENT AROUND THE WORLD IN FIVE SECONDS!
Reaching the North Pole on April 6, 1909, Admiral Robert E. Peary stepped one pace from the Pole and walked eight paces in a circle around it. He completed the "journey" in five seconds, passing through all meridians to go "around the world." —
Geo. A. Goepfner, Chicago, Ill.

Nic Sprank

Win \$1! Send your Oddity of Science to Nic Sprank, Modern Mechanix and Inventions, 529 South 7th Street, Minneapolis. No Oddity will be considered unless source of proof of item is included. Do not include Oddities with letters.

Inventions, March, 1935

Man Made Abrasive Rivals Diamond for Wearing Qualities



A steel worker pressure blasting castings with a Boron Carbide nozzle with a wearing quality 1,000 times that of an iron nozzle which was formerly used in high pressure work.

Tiny Motor Driven By Sun's Rays

A NEW "flea power" motor, developing four ten-millionths of a horsepower, operates at a maximum speed of 400 revolutions per minute propelled by the electrical energy produced from the sun's rays.

The motor has an extremely sensitive photo-electric cell of the selenium type which responds even to the rays of an incandescent lamp. The working parts of the motor are directly connected to the cells and operate on jeweled bearings to reduce friction.



Dr. C. W. Hewlett with his "flea power" motor which is driven by the impulses of sun's rays falling on a photo-electric cell to develop one ten-millionth of a horsepower.

SAID to be the hardest material ever made by man—second only to the diamond in wearing quality—is the new abrasive chemically known as Boron Carbide.

Like other abrasives, it is made up in the form of wheels for cutting and grinding. Its extreme hardness makes it practical for use in wire drawing dies to replace the diamond dust formerly used, and it makes a lining for a sand blast nozzle that is estimated will increase its life to 1000 times that of the ordinary iron nozzle.

With the increasing hardness of the steels now used in modern industry, this abrasive comes as a boon to the steel worker providing ease and increased speed in cutting.

Auto Has Separate Wheel Drive



This odd bus eliminates the usual clutches and transmission to reduce maintenance costs. Each wheel is independently driven. The motor is mounted back of the rear axle.

PRIMARILY designed for rail-coach, bus and truck work, the newest in automobiles features four independently driven wheels. Electric transmission is used. The motor attached to an electric generator, is mounted longitudinally back of the rear axle.

Machine Stimulates Hair Growth

ACTING on the theory that manipulation of the scalp increases hair growth, a machine has been invented which is said to be forty times more effective than hand massage. It consists of a cap full of rubber fingers, driven by an electric motor to manipulate the scalp.

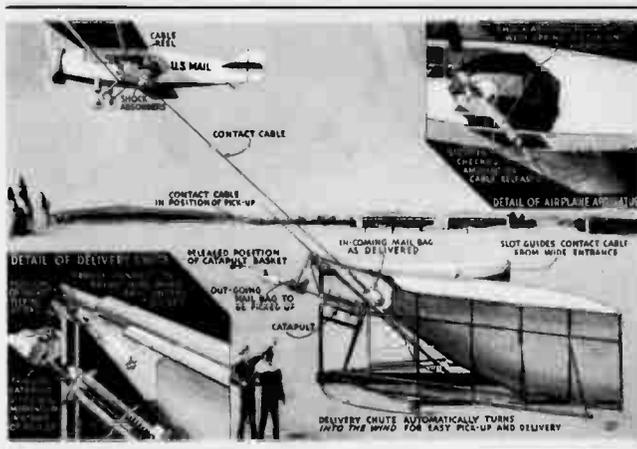


The motor rotates the rubber-finger cap to stimulate circulation. It is said to promote better hair growth and provides general scalp health more readily than hand massage.

Chicago's Airmail Pick-up Catapults Mail Bags To Planes

DRAWINGS revealing the operation of the pick-up device used at the 1934 Century of Progress in delivering and receiving mail from planes in flight have been revealed by the inventor, Dr. Lytle S. Adams of Chicago.

Most ingenious feature of the device is the method by which the incoming bag is released and the outgoing mail tossed into the air. As the plane flies directly over the chute, the comparatively fragile wire dangling from the plane is broken at the mail bag as it reaches the end of a narrowing chute in the pick-up device, releasing the bag. A steel ball on the dangling wire trips a lever which catapults a new sack out of the chute and into the air. Shock absorbers on the plane take up any jars not offset by the catapult when picking up a new bag of mail.



Millions of people at Century of Progress have wondered how Dr. Adams' airmail pick-up device worked. This sketch, released by inventor for first time, reveals details of catapult and ingenious mail-bag releasing mechanism.

New York Has Streamlined Taxicabs



Latest in taxicabs is this streamlined model. Fleet of 1,000 new cars have already been built for use in New York City.

READY to tour the streets and subways of New York City are 1,000 new taxicabs—a fleet displaying the most complete streamlining of any "for hire" car up to the present time, and containing a number of outstanding mechanical features.

In addition to being larger and far more comfortable than the average cab, the new taxis have a highly improved tire intended to almost completely eliminate the blow-out and flat tire nuisance. Heretofore these tires have been used on only the higher priced cars manufactured in this country. Radiator and louver design enhance the effect of speed given the car by careful streamlining. The split windshield is another radical departure from orthodox taxi cab lines.

Inventions, March, 1935

Slot Machine Vends 25c Sunburns

SELLING sunburns at twenty-five cents an installment, new slot machines being installed in Broadway barber and beauty shops are attracting New Yorkers seeking that Palm Beach and California complexion.

Upon depositing a coin in the slot, a violet ray lamp gives off radiations for seven minutes. Patrons are warned to wait three days before the next treatment, said too frequent usage gives painful burns.



Powerful violet ray lamp machine being installed in New York City shops delivers sun tan for seven minutes when coin is inserted. Sun-bathers sit on chair in front of device.



Above—The craftsman put a plate on this drawer but neglected to drill a keyhole. Upper right—Hand-tooled screws, nails and bolts lack the uniformity of the machine-made articles. Genuine hand-tooled bolts usually taper at points.

HOW CUSTOMS OFFICIALS

"Let the buyer beware!" Wormholes created by shotguns, machine-made "100 year old screws," file-worn chairs and green wood antiques are but a few of the tricks used by antique racketeers.

by H. H.
SLAWSON

An antique faker can produce holes in a second that would keep an industrious worm busy for months. He uses small bird-shot in a shotgun. These holes are quickly detected as the edges are much too regular in shape.

WOULD you care to buy the chair from which King Arthur directed the destinies of his "Round Table" knights—or the chest on which Mary, Queen of Scots, nervously awaited the call of the executioner?

The "originals" are for sale—hundreds of them—according to U. S. customs officials who have a back-stage insight to antique "racketeering."

The market is flooded with "rare old antiques" valued at thousands of dollars which are actually worth no more than a dollar a dozen. The adage, "Let the buyer beware!" was never more aptly applied to any business. Though they are not buyers, customs officials are wary.





The photo at the left shows a workman putting worn corners on a Chippendale chair with a file. Right—Small round dots on "old" bronzes reveal that they are electroplated. The bronzes are actually made of lead pickled in sal ammoniac.

EXPOSE ANTIQUE FAKERS

"Our job, under the law," one customs official, who must remain anonymous, told the writer, "is two fold. If entry of the object is claimed under the free clause, we must determine if it was actually made prior to 1830. If it was it can enter duty free. If the object is dutiable, we must check its value. Disputed decisions can be settled by judicial procedure, but in the past twenty-five years a corps of expert appraisers has been organized at the nine ports of entry for antiques, and mistakes are seldom made.

Small Details Expose Fake

"Sometimes it is only necessary to remove a board or two from a crate to spot a fake. Sometimes final decision on the authenticity of the object demands the lengthy study not only of our men but of experts whom we call in from outside. Long familiarity with antiques, however, gives a man ready facility in reaching decisions.

"It is true that a genuine antique expresses its aristocracy unflinching, though we do not rely entirely on looks.

"It is often on the inside of an alleged antique that clues to impositions are found.

The antique faker, we have learned, acts just like men in other crooked lines. No matter how perfect the 'master crime' may be, there is always a slip-up. Something is overlooked and the good detective eventually spots it.

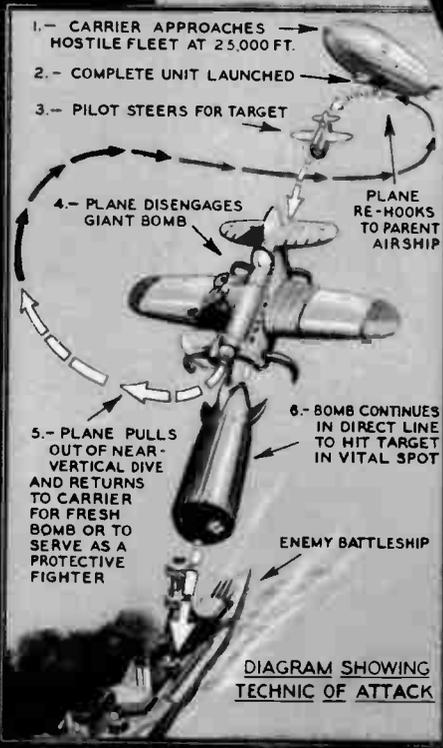
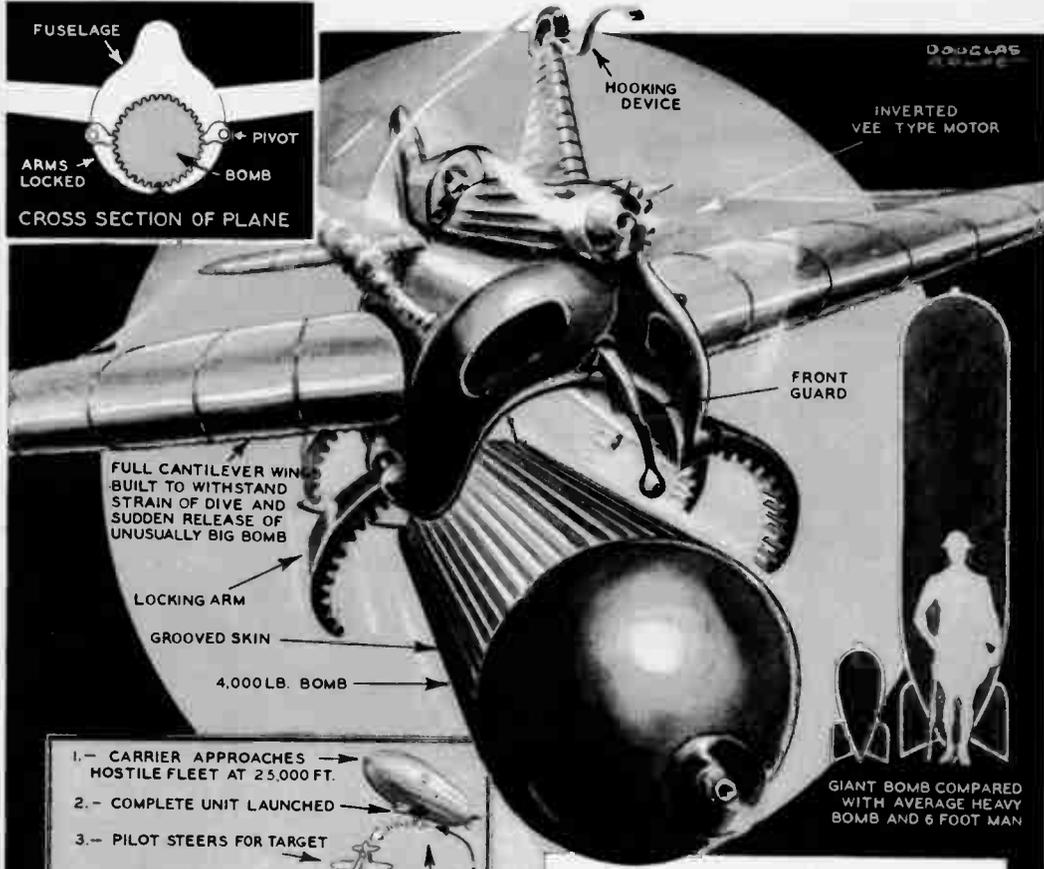
Machined Screws Not 100 Years Old

"This slip-up in the antique fakes is frequently a small detail. There was a desk in here once, exquisitely perfect in design and seemingly above question. The search for flaws got down to the keyholes and, sure enough, on two drawers the plate was in place, but the maker had forgotten to drill the holes. There was no scratch or dent or other indication that effort had ever been made to insert a key in those blind locks for more than 100 years.

"Sometimes we look for screws often found concealed beneath a plug of putty. If they are machine-made screws, it proves that the article was never produced before 1849, when such screws were first manufactured. The hand-filed screw of the early craftsmen cannot approach the uniformity of the machine-made product. They differ,

[Continued on page 118]

DIVING SPIDER PLANE To HURL Big BOMB



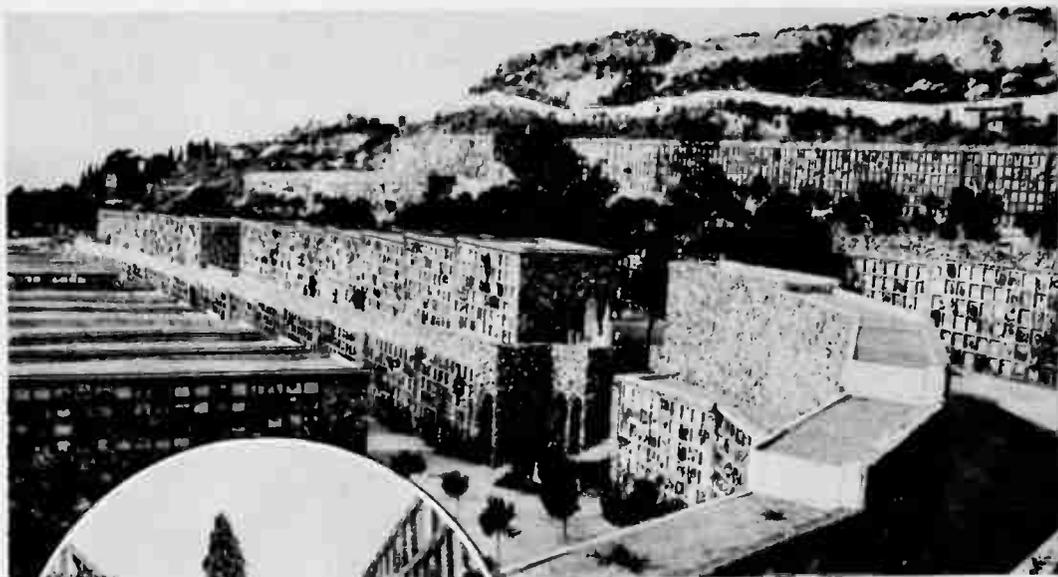
AVIATION'S newest wartime threat is rumored to be a plane, tiny enough so that a fleet of them will fit into a dirigible, which, when released, will guide huge, two-ton bombs to within a few hundred feet of their objective.

Like giant spiders clutching bottle flies, they will zoom into power dives, each carrying tons of destruction.

Fantastic? Not if recent experiments are carried to their logical ends. The use of the power dive as a means of attack is not new.

When attached to a carrier, the bomb becomes an integral part. It is released only when a direct hit is a certainty. After releasing the bomb, the plane can return to the carrier or act as a interceptor fighter.

Unable To Cut Graves In Hills; Use Skyscraper Cemeteries



Photos show the "Streets of Death" in Barcelona. Each skyscraper is divided into squares large enough to hold a coffin.

BARCELONA, the capitol of Spain, set high among the mountains buries her dead in skyscrapers on the mountain side that resemble gigantic filing cabinets.

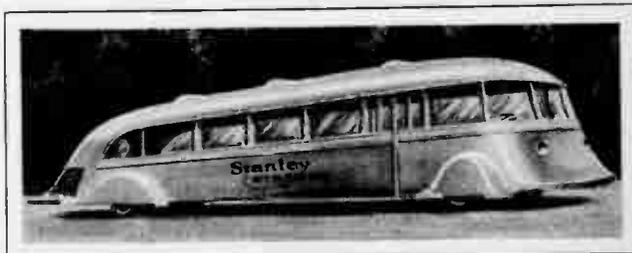
Faced by the fact that they could not cut graves in the mountains, Barcelonians have evolved this strange system of burial. The buildings form long avenues. Each is separated into small squares the size of a coffin. Guards with ladders hang floral offerings on the doors.

New Streamlined, Steam-Propelled Bus Will Make Appearance Soon

STEAM propelled automobiles, once a familiar sight on American highways, are about to return with a new aerodynamic passenger bus, according to a statement recently issued by Harry W. Gahagan, president of the Stanley Steam Motors Corporation.

The new heavy duty bus now under construction is made to conform to the need of truck and bus drivers for performance at a minimum cost. It is claimed that the steam car will give performance equal to that of the internal combustion motor with 25 per cent of the operating costs. Steam busses, it is estimated, will double ordinary mileage and will cut repairs since steam engines have no

valves, tappets, camshafts, timing gears, carburetors and ignition. Lack of engine vibrations, plus increased tire mileage due to lack of gear shifts, are other features of the proposed bus. Construction is now under way, and the bus should appear early in the spring.

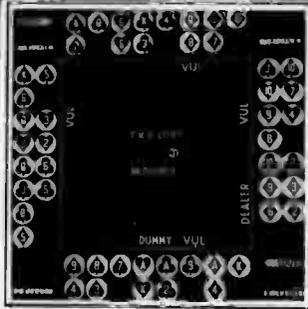


The new streamlined bus is the latest in aerodynamic design with a rear mounted motor to avoid obnoxious engine odors in passenger compartment.

New Score Board Flashes Bridge Game Plays to 500 Fans



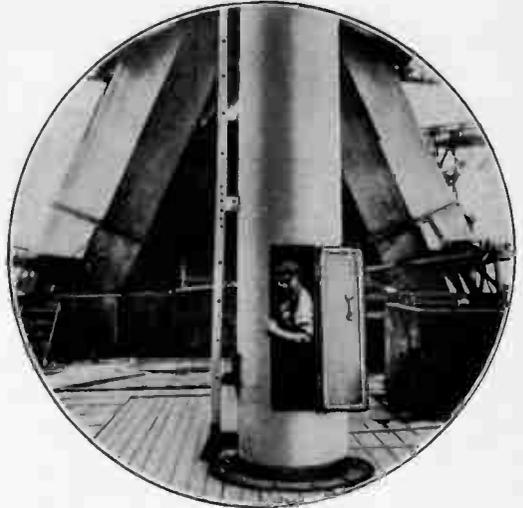
Announcer standing beside table at contract bridge contest informs operator at controls (above) of plays in game for newest of bridge scoreboards, the electrical telebridge. Operator has at fingertips switches which flash on to giant play board, shown at right, plays of bridge game.



AS CONTRACT bridge experts of Chicago and Milwaukee battled for the inter-city title recently, a telebridge electrical score-board flashed every detail of the bidding and play to a crowd of more than 500 enthusiasts. Spectators could follow the contests more easily than if they were standing beside the table, for all playing hands could be seen.

An announcer with microphone, standing just behind the players, informed the operator of the telebridge of each move in the game; he in turn pressed series of switches which flashed those plays on to the board. Electric lights in combination with lettered cards enable plays to be reproduced on the electrical board just as they were played at the table. Trump suit, vulnerability, tricks lost and dummy position are all shown.

Ride Inside Mast of "Normandie"



To reach "crow's nest" of new French liner "Normandie," sailors simply have to open door, walk into hollow steel mast, and be hauled to top in comfort by electrically operated hoist.

Radiator Heat Animates New Toy

HEAT from a stove or radiator operates the newest of noiseless automatic toys, a rocking horse linked by levers to an ever-turning fan blade. Hot air currents or even a slight draft of air set the windmill-like blade in motion, providing a toy motor which has no gears, springs, or weights to get out of order.

In other forms of this top-of-radiator toy there are teeter-totters, dancing men, or animated animals, all kept in motion by the convection current fan blade. Each toy is mounted on a platform to rest on the radiator as in front of a ventilator grill.



Rocking back and forth, yet never getting anywhere, this novel automatic toy gets power from fan blade turned by currents of heat from radiator. Toy has exceptionally long life.

INSTEAD of scrambling up the shrouds to reach the "crow's nest" of the "Normandie," sailors on this vessel simply walk into the hollow steel mast, sit down in a sort of bosun's chair, press a button, and ride in comfort to the observation platform.

The tubular mast is just one of the many features of this French passenger liner, largest ship afloat. She will soon be ready for trans-Atlantic service in competition with the 1,018 ft. long "Queen Mary," now being outfitted at Clydebank, England.

Fish Leap to Eat from Man's Hand



Left—Hugo Vogt is shown kneeling on his dock coaxing a five-pound bass, one of his star boarders, to jump out of the water. Right—An action photo of a gamey northern pike breaking through the water to take a frog from Vogt's hand.

HUGO VOGT, Minnesota angler, has succeeded in taming game fish to the point where they will eat out of his hands.

Beneath the Vogt Long Lake dock, idly waving their tails against the mossy piers, lay many wily northern pike, pan-sized sunfish, and large mouth bass waiting for the tasty morsels that Hugo passes them at regular intervals during the day. Bass and pike will leap two feet out of the water for a frog.

Hugo first became acquainted with his fish when washing sheets in the lake. The fish, attracted by the color, came in, and Hugo tamed them by throwing them bits of food. He trains them against anglers by casting wooden plugs to them without hooks.

Pickup Tool Grasps, Inserts Bolts

A NEW tool has been designed for picking up and inserting bolts, screws or other small objects in places too small for the hand to operate. The tool consists of four fingers



The four grasping fingers of this pickup tool open when pressure is applied to the end of the plunger.

operated by a plunger within a tube. When pressure is applied, the fingers open; when it is released, they grasp the desired object.

Inventions, March, 1935

Machine Makes Instant Ice Cream



Demonstrating the quick action freezer. The liquid is poured in and sprayed on cold cylinder walls to freeze in 40 seconds. It is then shaved off with a cutter knife.

USING a new style freezer, freshly made ice cream can be produced in 40 seconds and delivered to a waiting customer.

The ingredients of the dish, after mixing are poured into the top of the machine where they are broken into a fine spray by an atomizer rotating at the speed of 3,000 turns per minute. The spray is thrown against the cylinder wall, which is maintained at a low temperature, where it freezes instantly.

Ancient Falconry

Hawking, 3,000 year old sport of kings, is being revived. How hawks are trained to hunt birds and small game is revealed here.



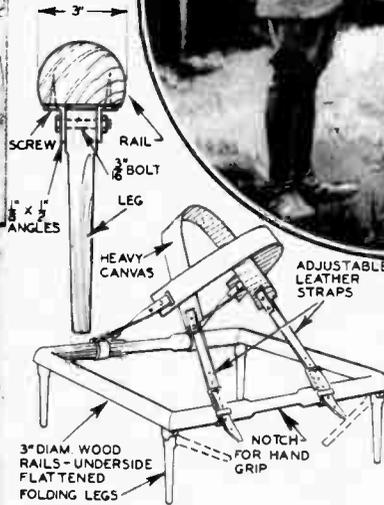
OBSERVE AND STUDY HABITS OF YOUNG HAWKS



YOUNG HAWKS ARE CAPTURED JUST BEFORE THEY BEGIN TO FLY



BIRDS RELEASED IN A DARK ROOM AND KEPT THERE FOR SEVERAL DAYS



Above is a rack for carrying hooded hawks to the field. The birds are held in position by light chains or thongs. At left are details for building the rack. Upper left — the hawk has killed a pheasant. Drawings at left show stages in capturing and training the young hawks for hunting in the field.

THE ancient, colorful, and very exciting sport of falconry, too long neglected by American hobbyists and gamesmen, is being revived in this country, and the jingle of falcons' bells are again heard over many a field and wood as the swift and predatory bird swoops down upon its prey.

Falconry is one of the oldest ways of getting a full gamebag. The falcon, properly trained and subordinated to human will, is a serviceable hunter—especially keen for ducks, grouse, and other game-birds. No winged creature can escape him. The mallard and green-winged teal, both of whom boast a speed approximating 90 miles an hour, are veritable slow-coaches compared with the falcon, who overtakes them with a zooming burst of speed, knocks the fight out of them with one rap of his

Modern Mechanic and

is NEWEST HUNTING Sport

by HENRY MORTON ROBINSON



Above—Hawk hooded with thongs fastened to legs. Drawing at right shows how to make hood and jesses. Boy in upper right holds hawk on gloved hand before releasing to swoop into air after birds or small game. Drawings at right show late stages of hawk training. Pigeon wings attached to fresh meat act as lure.



BIRD HOODED IS TAKEN FROM DARK ROOM TO BECOME ACCUSTOMED TO MASTER'S PERCH AND OTHER HUMAN ENVIRONMENTS SUCH AS MUSIC, SMOKING, ETC



PIGEON WINGS ATTACHED TO FRESH MEAT TO GIVE APPEARANCE OF REALITY. ACTS AS LURE



IF THERE IS NO REAL GAME PRESENT KEEP BIRD IN TRIM BY HAVING ASSISTANT RELEASE A LIVE PIGEON

yellow claws, and then circles down to lay his offering at the feet of his master.

Quite apart from the thrill of taking game with a falcon, the pleasure of capturing and training this "scimitar of the air" is one of the most engaging of leisure-hour pursuits. Falconry is the ideal hobby for the calm-tempered man who loves birds and has plenty of time and patience to get the best out of them. It is not an easy task to train a falcon and I do not advise edgy, irritable persons to go in for it.

The falcon, in spite of his fine name, is really a hawk. Hawks will not breed in captivity. Therefore you must capture your own hawk and you must take a hawk when he is a mere chick.

The best place to look for a hawk's nest is on a mountainous cliff-side or a rocky eminence overhanging a deep ravine. The bird you are seeking is commonly known as

[Continued on page 124]

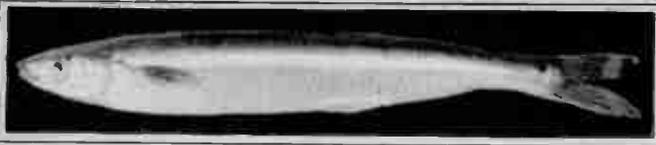
Catch DANCING FISH Without Tackle or Net



Above — With the grunion due to spawn, hungry birds anticipate a feast of plenty.



Above—A promising cove which appears ideal for the grunion spawn. Center — A fisherman drags a scoop-net, made of screening, through the breakers in search of the grunion. Left—The grunion fish, which performs weird dances on the sandy beach, is a short game fish with a green back, silver underpart, and a blue stripe lengthwise on the sides.



ANNUALLY, thousands of people gather on California beaches to watch, with the aid of artificial light, the antics of the silver bellied grunion fish as they emerge from the sea to perform a frolicsome dance on the sand to the rhythm of the pounding surf.

Sportsmen formerly caught the grunion with nets as the gamey little fish came ashore to spawn. The resulting threat of extermina-

tion then put the grunion in a class by himself. As a result of game regulations the grunion is the only fish which must be taken with the bare hands without the aid of tackle or nets.

Just before high tide, the grunion collect in the surf and allow themselves to be stranded by the high waves. The female then digs a hole in the sand with her tail and lays her eggs to be fertilized by the male. The next high tide carries the fish to sea.

Selecting a DOG for Your Favorite Sport

by ROBERT PAGE LINCOLN—*Hunting and Fishing Editor*

THE difference between the trailing dog or hound and the gun dog is that the one follows the trail of an animal by its scent and brings it around to the hunter, while the pointer operates at close range to the hunter and freezes to a point when it scents game. In the latter division are found the setter and the pointer, until a few years ago the most commonly used of all hunting dogs. The trailing hounds belong to another group the foremost of which are the beagle, the coon hound, and the foxhound—in England, the Basset, the stag, and the otter-hounds.

A good trailing hound is valuable if it will trail only the animal for which it is intended. The beagle will follow a rabbit and will not

veer off onto another trail; the coon hound will never leave a coon spoor.

There is also the spaniel, a breed of dog that has had a phenomenal rise in this country. The two spaniels most in use here are the springer and the cocker. Of these two, the springers are the most popular as they are exceptionally good water retrievers and active, tireless hunters. Both spaniels make excellent home dogs, possessing mild, playful natures.

The rise of the pheasant in the country as a game bird has created a demand for a pheasant dog—a dog that will flush a pheasant rather than point him. Here, too, the spaniel has come to the fore.

The Irish spaniel is recognised as the foremost water retriever, but where not used in a boat, the strong, hardy Chesapeakes and Labrador are replacing them. Their short fur also adapts them for field use.



Above—A golden-springer proves his worth as a pheasant dog. Springers make especially good pheasant dogs, as they flush the bird rather than let him run away. Right—Lady, an Irish setter rests after retrieving a crippled pheasant.

Inventions, March, 1935

Long Pipe Line Carries Bulk Cement to Ocean Freighters



Above photo shows a bulk cement freighter ready for loading. A 12-inch pipe line is floated 2,500 feet to the ship on buoys which support the line over the water's surface.

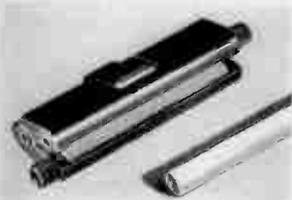


Men on the vessel preparing the filling pipes to receive the rubber hose which is connected to the pipe line from shore.

Cigarette Maker Fits Vest Pocket

A TINY, vest pocket cigarette maker, weighing only $\frac{3}{4}$ of an ounce is the smallest device of its kind ever invented and is said to be mechanically perfect.

In rolling a cigarette, the desired amount of tobacco is placed in a cloth between two rollers. The paper is placed in a slot, and the fingers of the right hand are used to turn the roller knob while the thumb of the left hand governs the tenacity of packing.



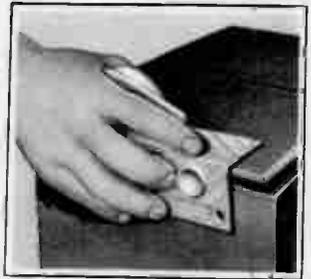
The vest pocket cigarette maker is $\frac{3}{8}$ inches thick and 3 inches long.

U TILIZING the peculiar tendency of dry cement to become fluent or "flood" when mixed with air, a Davenport, Calif., cement company is now loading bulk cement into ships at the rate of 1,000 barrels per hour through a twelve-inch pipe extending 2,500 feet out over the ocean.

The cement is delivered from the plant into four huge concrete silos and from there enters the hoppers of the cement pump by gravity. From here it is forced forward by a rapidly rotating impeller screw into the barrel where it is expanded by air, becoming so fluent that it is easily forced through the line by the screw.

Razor Edged Tool Cuts Carton Tops

A HAND fitting handle and a detachable razor cutting blade have been combined to form a carton opener that will easily shear the heaviest cardboard without fear of damaging the contents.



The razor edge of the cutter is set to avoid cutting carton's contents.

Students Get Coffee From Bananas

R ECENT experiments at the Hawkesbury, Australia Agricultural College reveal that "coffee" can be obtained from bananas. These results were obtained by peeling the fruit and dehydrating it. Doctors are interested in the product as a nutriment for building up children.

How Giant Hammers Forge Seamless Boilers



Photos by
Courtesy of
Bethlehem Steel Co.

Steps in forming of seamless high-pressure boiler shells are shown in these photos. Above: Piercing heated ingot with gigantic steam hammer after ends are trimmed off.



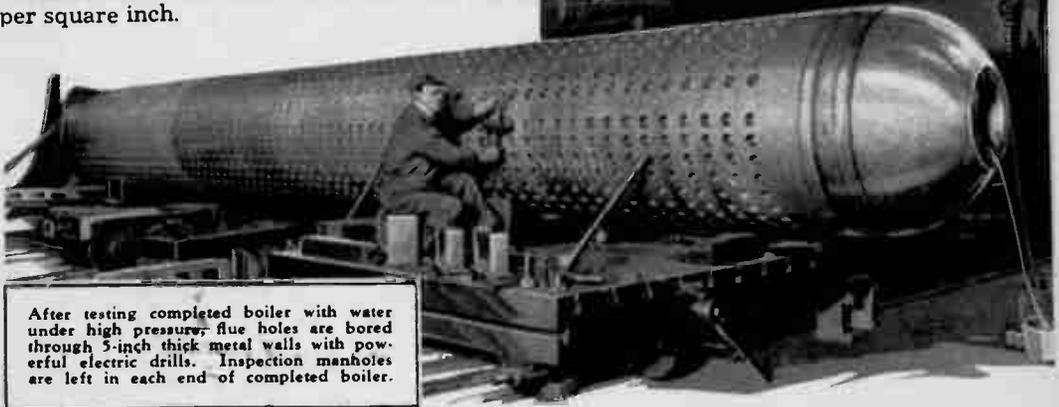
Heated ingot, now in form of cylinder, is being drawn to length and enlarged on steam hammer. Steel cores are used inside cylinder.

IN ONE of industry's most spectacular operations, the forging of seamless steel boilers, giant hydraulic presses squeeze and stretch white-hot 200-ton ingots into 60-foot cylinders of steel, 4 feet in diameter, and with walls over 5 inches thick. Powerful lathes turn off tons of metal in bringing the tube down to size. Heavy boring tools remove irregularities on the inner surface.

High pressure boiler drums made from a single ingot have no joints at which leaks might start. These boilers are used extensively in steam power plants, where they withstand steam pressures as high as 1840 lbs. per square inch.



Forged cylinder is machined inside and out before ends are closed in by final forging process. Lathe used is one of the largest in the world.



After testing completed boiler with water under high pressure, flue holes are bored through 5-inch thick metal walls with powerful electric drills. Inspection manholes are left in each end of completed boiler.

"PLAYER PIANO" ROLL Controls Sky Sign



A plane equipped for electric advertising. The squares resembling a lower wing hold lights which are controlled at will by the pilot.

In circle—"Player piano" roll which controls lights forming letters. Sign can display continuous message of 75 words.

Tiny Ford Has 10 Horsepower

ARISE to ten horsepower over the previous "Baby Eight" is one of the leading features of the new four-cylinder British-made Ford recently on exhibit at the Albert Hall motor show in London.

The new motor, following the modern trend, has a three-point rubber suspension. Body space is increased by pushing the engine farther forward and increasing the overall length of the chassis one inch. The chassis, just as in the "Baby Eight," is mounted over a 90-inch wheelbase with a 45-inch-tread. It has one-eighth the power of the American Ford.



A de-luxe British Ford roadster containing a four cylinder motor which develops ten horsepower—one-eighth the power of the American Ford.

USING a musical siren to gain attention, a new sky sign, designed by Edward Link, Cortland, New York, aeronautical engineer, after five years of experimental work, took to the air for the first time over Miami this winter.

The sign, constructed as a lower wing to a high wing monoplane, is operated from an automatic "feeler" roll. It can display ten letters at one time, using as many as 75 words per message.

Light squares of ten by six inch Dural strip are hung four feet below the mono-wing on a Dural rack. Each square contains 300 lights, so wired that the control mechanism, operated from inside, delivers to each square any letter or numeral desired.

The operating mechanism consists of a rotating roller on which is placed a roll of heavy paper with perforations through which the feeler pins make contact. Each feeler pin controls a letter or numeral. Due to a perforation machine, messages can be changed while flying.

Modern Mechanix and

Asbestos Blanket Thrown Over Blaze Smothers Auto Fire

TO EXTINGUISH automobile fires a new asbestos blanket, demonstrated in England, is simply thrown over a blaze.

The blanket is composed of a cloth-like asbestos and is made large enough so that it will cover a good sized blaze. The principle involved is that fire cannot burn without oxygen. Carbon dioxide forms under the covering and smothers the fire. The blanket can be folded and carried under the driver's seat, but may be used as a warming robe during cold weather.

Camp Stove Has Barbecue Spit



Photo shows the varied uses of stove—baking potatoes and biscuits, frying potatoes, and barbecuing at the same time.

FOLDING flat so that it occupies but little space when not in use, a new camp stove roasts, broils, bakes, or barbecues, using a bed of coals to supply the heat.

The stove is composed of sheet metal, hinged for folding. It contains two racks for baking and broiling and a spit, controlled by a handle outside, for barbecuing. The racks may be interchanged for use as a storage cupboard when the stove is not needed for cooking.

Gunboats To Fight Shark Menace

THE gunboats and seaplanes of three nations, England, Holland and Portugal, will soon combine in an attempt to drive dangerous tiger-sharks from their breeding grounds near the Island of Timor. The main weapons used will be torpedos dropped from circling planes and depth bombs released from the gunboats.

Inventions, March, 1935

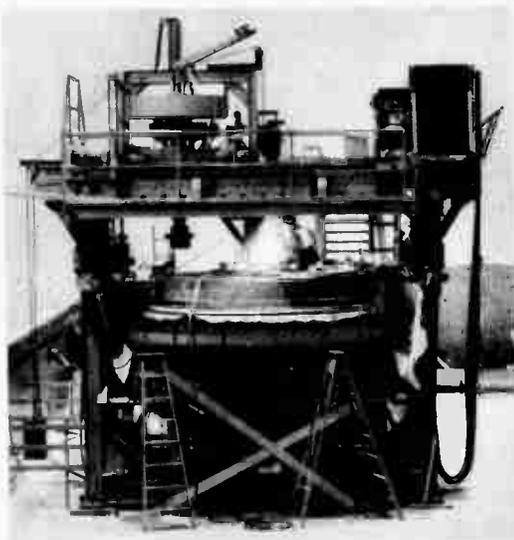


Photo shows how auto fires are extinguished merely by throwing these fire proof asbestos blankets over the flames.

Build Big Grinder For Telescope

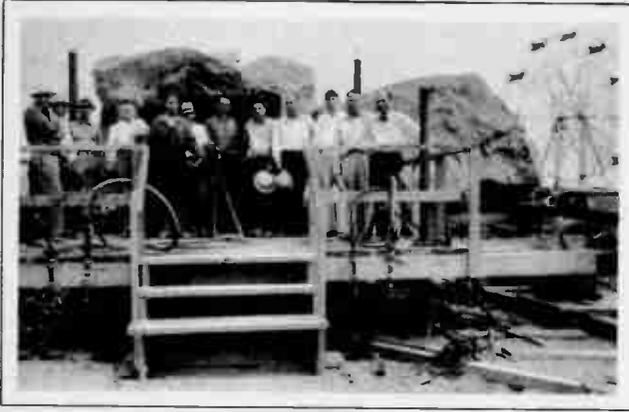
PETTED and pampered like a one-year-old child, an entire building, airtight and impervious to temperature change, was erected especially to house the huge—yet delicate—mechanism designed to grind and polish the new 200-inch telescope mirror poured recently at a Corning, N. Y., glass works.

Using carborundum for grinding and rouge for polishing, the gigantic machine is now at work on a 120-inch mirror, a test project to determine if it is humanly possible to handle the casting and finishing of the 200-inch lens for the Palomar observatory near San Diego, California.



The giant grinding mechanism at work on a 120-inch mirror, a test preceding an attempt to handle the 200-inch mirror.

Amateurs Race Professionals In Rock Drilling Contest



Several of the racing crews gathered on the platform after the race. The winners drilled through the rock, 5½ feet, in five minutes and 38 seconds.

New Reflector Aids Shaving

NEW reflecting mirrors which can be set to throw light upward are designed especially for use in shaving to reflect the overhead light and illumine the shadows under the user's chin.

The reflectors are constructed of light metal jointed at the head and base. Folded, they are easily packed for traveling. They are ideal for dressing tables and can be used to reflect light on all types of fine work.

If a soft light is needed on the baby's crib, it can be obtained by setting the mirror to reflect the night light.



The reflectors, fastened to the wall, reflect the overhead light to eliminate bothersome shadows under the shaver's chin.

ROCK drilling came to the front as a new American competitive sport with amateurs giving professionals an amazingly close run due to the perfection of the machinery. Accompanied by the encouraging cheers of the crowd, several fast drilling crews pounded their way five-and one-half feet through a granite rock at a Miner's Day celebration held recently at Indio, California.

Prizes of \$500, \$300 and \$200 were offered to the winners with the team of Carlson and Hanovich taking first money in the record time of 5 minutes and 38 seconds.

At the judges whistle, contestants snatched their tools, mounted the platform, inserted the steel, made air and water connections, and began drilling.

It is interesting to note that non-professional drillers set amazingly high scores. Drilling machinery has reached such a state of perfection that a mine, now being sunk in Honduras, employs only native drillers, none of whom have seen the machinery previous to the time they were hired.

Double Goggles Work On Hinges

A NEW goggle has hinged dark glasses, for use in welding, which raise to reveal clear glasses for use in chipping, grinding, flattening, forming and other types of work hazardous to the eyes.



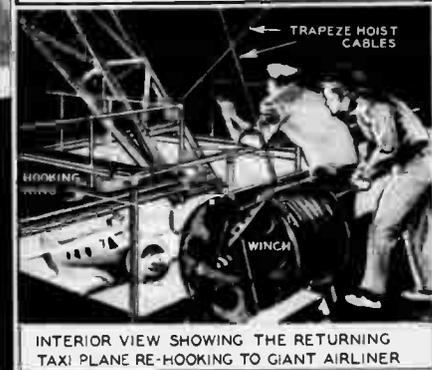
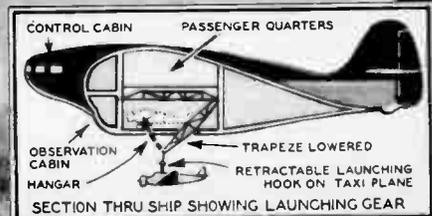
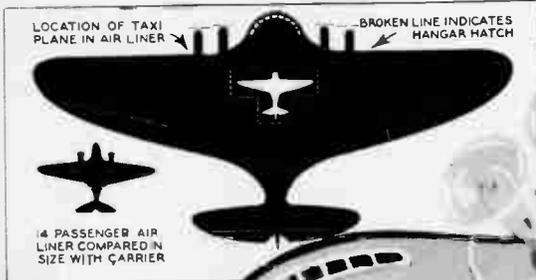
The goggles, fastened to hinge, can be raised to inspect work.

New Device Helps Piano Tuners

A MAN with the sharpest ear in the world cannot tune a piano perfectly due to the minute differences in sound frequencies. It is expected, however, that new electro-acoustic tools recently invented will correct this fault and open wider fields for players and composers. Such inventions would have appealed to Beethoven who often used notes not included on piano keyboards.

Modern Mechanix and

TAXI PLANE Picks Up FREIGHT And Passengers for AIRLINER



HIGH speed taxi planes that can come and go from a giant "mother" air transport at will are proposed as a means of providing fast, non-stop transcontinental air service. The smaller ship, released over a city, would land at the airport to discharge and take on passengers and freight, then soar upwards again to catch up with the slower airliner.

As may be seen from the sketches, the method of launching the taxi plane is very similar to that used by the U. S. Navy in handling pursuit planes on dirigibles. A trapeze crane lifts the small ship into the hull of the transport, where passengers may be transferred to roomy quarters on the airliner.

Modernize YOUR HOME



Above—A rambling old farmhouse before and after remodeling. A sweeping roof smoothens out ungainly lines. Dotted lines indicate how the changes were accomplished.



Dotted lines show the improvements necessary on this old home. Note long roof, window, and square open porch.

ALL old homes are not worthless. Most offensive eyesores in your city, while worth only about \$500 each to a wrecking crew, may be modernized into beautiful homes with little expenditure. Perhaps the siding is rotten and weatherbeaten but it may be fastened to a superstructure that is sound and will give years of service. A new sweeping roof replacing an ugly gable, a window in a blank wall, a coat of stucco over an old wall, or a modern porch to replace the old veranda are but a few methods used by architects in making old homes presentable.

Location means a great deal when considering the advisability of modernizing. Approximately \$9,000.00 is being spent on a house in a Minneapolis suburb originally costing but \$4,000.00 because of its excellent location and its sound structural condition. Under the circumstances, this step is wise, but had the same structure stood in a poor locality, even half this remodeling expenditure would be very foolish indeed. Some years ago another property—a nice corner location—was remodeled at a cost exceeding \$10,000.00. This location remains today, one of the nicest in the city.

When contemplated changes are major

Modern Mechanix and

at SMALL COST

by D. J. C. Parsons
Registered Architect

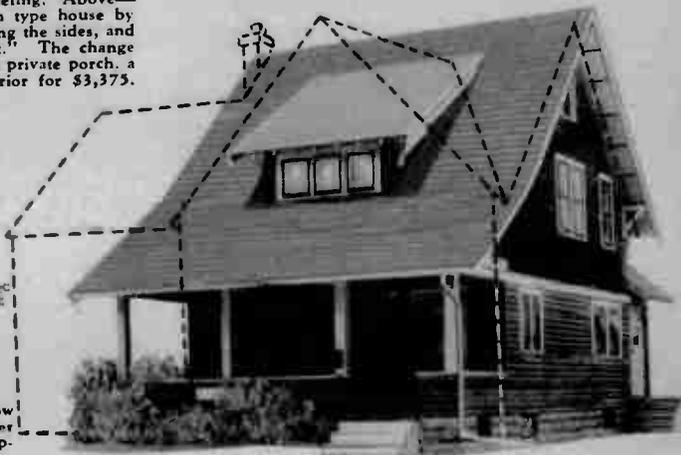


Lower right—A semi-bungalow before remodeling. Above—The same bungalow rebuilt into an English type house by adding a front gable, a side addition, shingling the sides, and putting stone work on the "first floor front." The change brought a larger living room, a coat closet, a private porch, a sleeping porch, and a distinctive home exterior for \$3,375.



FIRST FLOOR

Left—The original plans for the bungalow at right. Right—The first floor plan after remodeling was finished. Black lines represent old walls, grey lines, new ones.



ones, a new porch, an enlarged entrance, additional rooms, conversion of a single family house into a duplex, or turning a single story into a two story house, it will pay the owner to engage an architect. Remodeling requires even more thought and care than does new building. Changes that may seem feasible to the owner are frequently impossible on the job. The study of the situation by one experienced in design and construction may result in a much better, more economical solution than the owner had anticipated.

If it is true that "one good picture is worth

10,000 words," then we will help to visualize the possibilities of home modernization by showing samples of actual remodeling jobs. Figures No. 1 and No. 2, believe it or not, are the same premises. The house originally a semi-bungalow built about 20 years ago, is located in a good residential district with some new and some old homes surrounding it. The owner desired to obtain a larger living room with fireplace, a coat closet, a more privately located porch, a sleeping porch, and a more distinctive exterior.

[Continued on page 122]

Carry Out Sailing Maneuvers On Land With Pivoted Boat

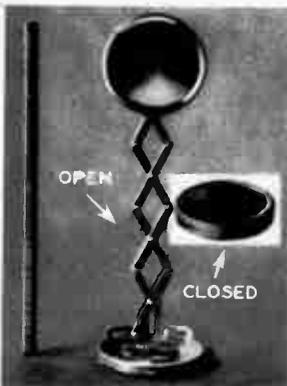


Delicately balanced on a pivoted frame, this sailboat gives training in nautical maneuvers to aspirants for yachting fame, without dangers accompanying first sailing cruise on water.

Pocket Mirror Has Folding Stand

FROM Germany comes this pocket mirror with an ingeniously designed folding stand. Closed the mirror and stand combined is no thicker than an ordinary lead pencil; open, it has about the same height as the pencil.

The mirror is mounted on a folding extension arm in such a way that it can be set at any desired angle.



New German folding pocket mirror, compared in size to lead pencil. Lazy tongs form stand.

The metal cover over the folded mirror serves in the open position as a base or stand.

The mirror is especially designed for travelers, since it eliminates the necessity of carrying a regular shaving stand, and permits use of both hands.

SWINGING, pivoting, and rolling to the dictates of her master, a training sailboat invented by a yacht builder handles as smoothly on land as would the same type of boat on water.

Originally intended as a safe yet efficient way of introducing to his grandson the fine points of sailing, the full-size, accurately constructed boat is being used today even by old hands at the game, in trying out new tactics. So carefully balanced is the boat upon the pivoting stand that she will respond to the slightest change in wind or sail position.

With such an arrangement, anyone can take a training course as a skipper without ever leaving his own back yard. According to the builder, any small sailboat may be rigged up in this manner for land training.

Revolving Shades Fit Tiny Bulbs

SCINTILLATING jewel effects are given with unique revolving light shades made for small electric bulbs. A cone of wire snaps over the bulb, with a sharpened tip projecting at the top. An inverted glass cone on the shade balances delicately upon this point. Heated air, hitting vanes inside the shade, produces the rotation once the shade has been started by hand.



Tiny revolving lamp shade slips over any small electric bulb, gives scintillating effect when turning.

Rubber Lamp Cord "Zips" Open

BOTH conductors of a new ultra-safe lamp cord for household use are encased in a single rubber sheath which can be separated like a "zipper" fastening when connections are made to a wall plug. Cotton tape separates the wires.

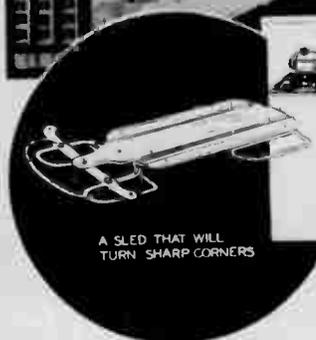


Cotton tape between wires of new rubber lamp cord permits separation of wires in "zipper" fashion.

New POWER For Mechanical TOYS Opens Large FIELD For Alert INVENTIVE Minds



SELF POWERED AIRPLANE THAT WILL FLY WITHOUT THE USE OF RUBBER BAND



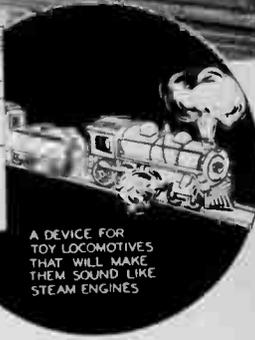
A SLED THAT WILL TURN SHARP CORNERS



NEW MEANS OF POWERING TOY TRAINS, AUTOS, ETC.



TOY SUBMARINE THAT WOULD DIVE AND COME BACK TO THE SURFACE



A DEVICE FOR TOY LOCOMOTIVES THAT WILL MAKE THEM SOUND LIKE STEAM ENGINES

Millions of dollars can be made by catering to the whims of children. Secure advice on protecting or selling your idea by writing the Patent Editor, *Modern Mechanix and Inventions*, 529 S. 7th St., Minneapolis, Minnesota.

COUNTLESS inventors have rolled up tremendous fortunes by the development of new and simple toys as the several hundred manufacturers in this industry are ever in need of fresh attractions. Indeed, at the present time, there is an urgent cry for new material, and consequently we shall devote this month's department to an outline of some of the more pressing problems. Toys can be developed by any man without an elaborate work shop since most of them are made of bits of wood and cardboard. Some of the biggest money makers on record have been perfected with little more than a jack knife.

Investigation of the toy industry brings out one incontrovertible fact concerning the popularity of the various mechanical toys intended for boys; in the old days it was the toy boat and the toy train that attracted a boy. Today it is the toy airplane. Anything new along this line that can be sold to boys will be snapped up quickly at high

royalty. Manufacturers, for instance, are still looking for the self-powered airplane that will fly without the use of rubber bands. A real miniature power plant is needed; something that will drive a toy ship a long distance without running down. Naturally the motor cannot be expensive because of the danger of crashing and because the average boy cannot afford an elaborate machine. Such a motor may bring \$50,000 royalty the first year.

Several manufacturers dealing in wood products and toys are waiting for a system of wooden blocks that will take the place of metal construction toys—an interlocking system of blocks that will permit a youngster to set up solid buildings.

Speaking of toys used for construction, it should be kept in mind that the manufacturers dealing in wire forms are also on the lookout for a method of clipping wire lengths

[Continued on page 142]

Advertising Emblems Glow Weirdly In Cathode Ray Tubes

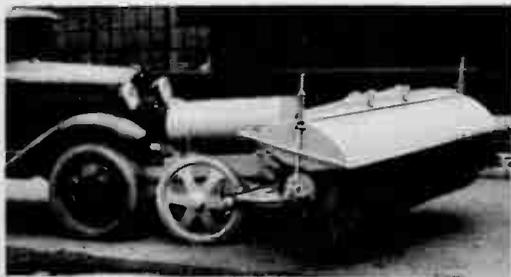


Advertising emblems sealed into these cathode ray tubes glow weirdly under electron bombardment. Gilbert T. Schmidling (pictured above) builds these tubes for store window display. High voltage transformers are needed here.

Any Truck Can Push This Sweeper

SWEEPING of streets at a speed of ten miles an hour is possible with the newest of rotary brooms. The entire sweeping assembly may be attached or taken off in twenty minutes, making the motor truck available for other purposes.

The rotating brush is directly coupled to the front end of the engine crankshaft, through a clutch controlled from the truck cab. The operator may also lower or raise the brush while the truck is in motion. Dust is thrown to one side.



Rotary broom, driven directly by truck engine, sweeps streets at 10 m.p.h. speed. Water contained in tank is sprayed automatically to settle dust as sweeper moves along city streets.

IN ONE of the most unusual of modern forms of advertising, trademarks mounted at the anode position of giant cathode ray tubes are painted in cold light of great brilliancy and dazzling color by electronic bombardment. Displayed in store windows, the tubes demonstrate to shoppers one of the many feats of the electronic tube, and at the same time display a business emblem.

Gilbert T. Schmidling, inventor of the first true cold light, coats these emblems with different chemicals, each giving off a certain color of cold light under electronic bombardment. Over 400 different shades, all of great brilliancy, have already been produced. Any number of colors may be obtained in one tube by using the different chemicals.

Movie Camera Is Also Projector



Combined home movie camera and projector has built in batteries which will operate film motor long enough to shoot 50 reels. When projecting, battery supplies power to bulb.

FILMS may be projected as well as taken with a midget home movie camera marketed recently for amateur use. A tiny but powerful electric motor operated by four flashlight cells drives the film during exposure, and supplies power for the projector bulb. The film used is 9½ mm. wide, but has a picture area about the same as that of 16 mm. film, since perforations are in the center between the frames. The camera has a fast f 2.5 lens, giving usually clear pictures.

Modern Mechanix and



Headphone With Built-In Crystal Set Gets Local Programs

SNAP one lead of this headphone radio receiver to a ground pipe, push the other into a convenient electric socket, and enjoy the programs of your local broadcasting station.

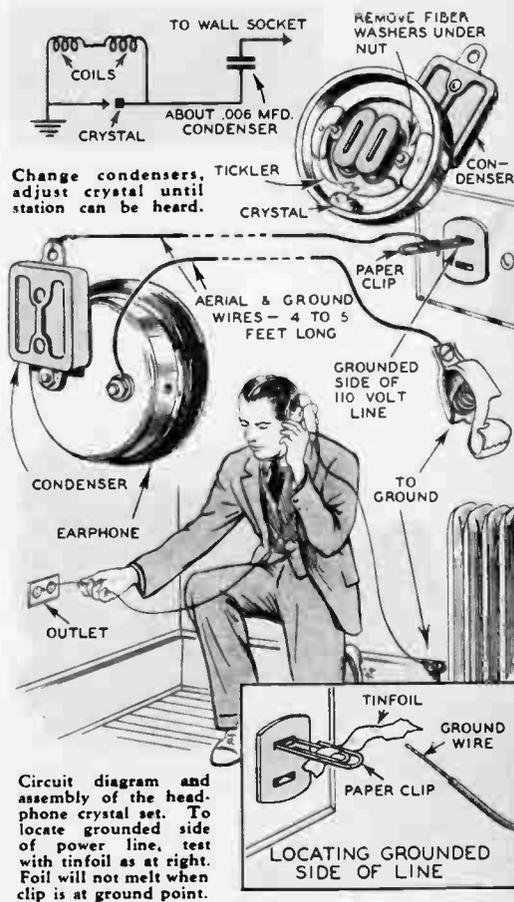
This complete crystal radio receiver is easily built into an ordinary headphone; though only one station can be received with a given set of parts, this station may be changed by varying the value of the external fixed condenser.

Assemble the set as shown in the sketches. Use liquid solder in mounting the crystal, or a standard crystal holder, since any heat will damage sensitivity. Remove the insulating washers from the indicated phone terminal, to ground one end of the coil to the frame.

The grounded side of your house power line is used as aerial, and a radiator or water pipe as ground. Better results will of course be obtained with a regular outdoor antenna.

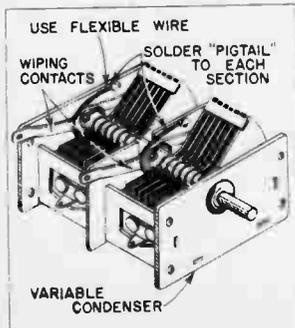
Cover and diaphragm must of course be removed when first adjusting the crystal. Once a sensitive spot is found, a few taps will often reset the catwhisker.

The set may be permanently connected to aerial and ground without damage—programs will then be ready for you each time you lift up the phone. If a headband is used to hold the set, do not attach other phone, the other phone should be left in, but not attached.

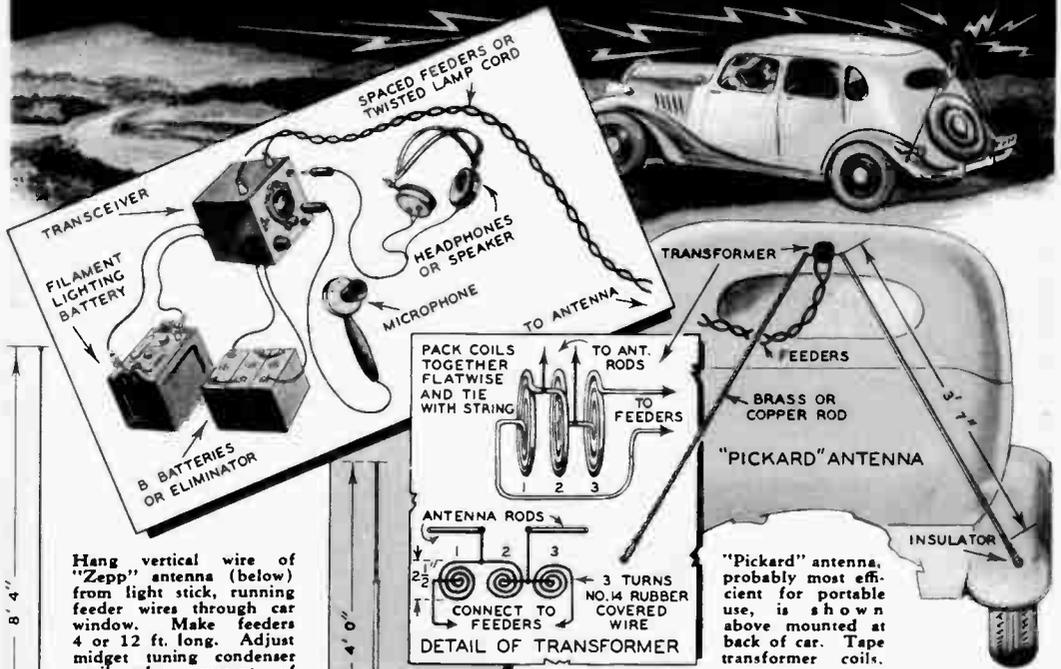


"Pigtail" Leads Stop Tuning Condenser Noises

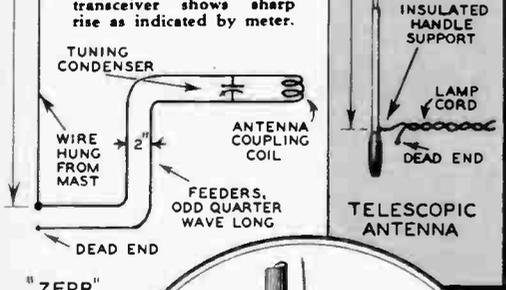
THE wiping contacts connecting the rotors of variable tuning condensers to the frame often become dirty, producing harsh noises and sometimes oscillation when tuning from station to station. One way to cure this trouble is to solder flexible wire or "pigtail" leads from the condenser frame to the rotor, bridging the wiping contact. In gang tuning condensers it is important to do this to each section. Leave the old contacts in place, as they provide proper tension and keep the plates properly spaced.



Use 5-Meter Transceiver on Car or Boat



Hang vertical wire of "Zepp" antenna (below) from light stick, running feeder wires through car window. Make feeders 4 or 12 ft. long. Adjust midget tuning condenser until plate current of transceiver shows sharp rise as indicated by meter.



by L. B. ROBBINS

SINCE the advent of the Transceiver unit, 5-meter transmission and reception from both automobiles and boats has become very popular among amateur radio fans. It so happens that the 5-meter band is the only one in which mobile transmission is permitted by the Federal Radio Commission without annoying restrictions.

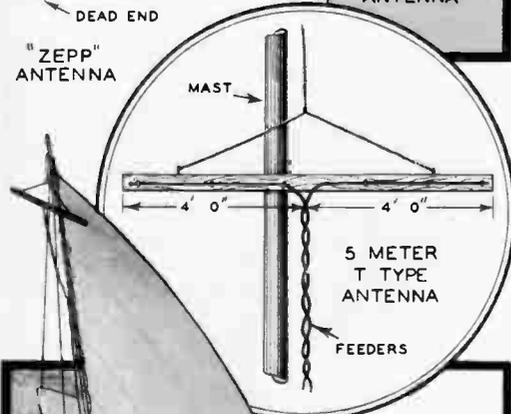
Of the antenna systems illustrated here, the simplest 5-meter antenna system for a car or boat is a four foot vertical rod of stiff metal placed as far away from metal bodies as possible. In telescopic form, it can be easily dismantled as shown in the drawing.

The feeder system for any of these antennas consists of twisted lamp cord of the necessary length, connected to the antenna coupling coil in the transceiver.

Breastplate microphones such as are used in airplanes will be found practical for auto use, since they leave both hands free for driving. Modern transceivers will operate a magnetic speaker on good signals; this may be mounted under the dash.

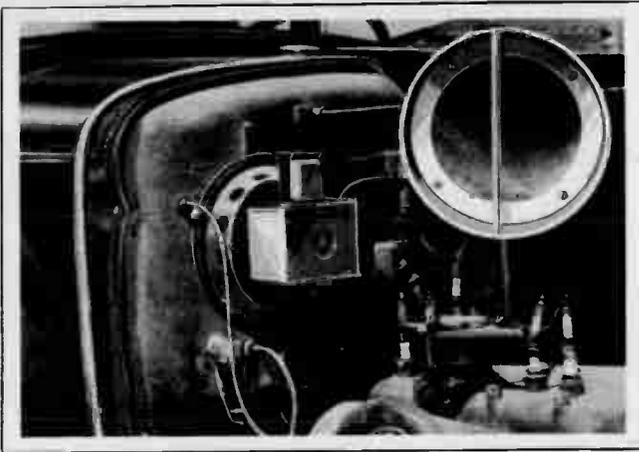
Remember that every foot of height above ground increases the range of 5-meter transmission.

"ZEPP" ANTENNA



This emergency antenna is easily hoisted to tip of boat mast. Twisted lamp cord is used throughout, ends being spread out.

Car Dash Panel Is Baffle Board for Radio Loud Speaker



Photos show front and back of auto radio speaker mounted to use dash panel as baffle board. Grill goes on inside of car, over hole cut in dash.

MOUNTING the speaker of a car radio on the engine side of the dash panel allows more room inside the car, and at the same time provides a large baffle board for the speaker itself, greatly improving tone quality.

First cut a hole in the dash about 1" less in diameter than the speaker. Remove the screen or grill, then bolt the speaker solidly in place on the engine side. Replace the speaker grill on the other side of the dash panel, either by gluing or bolting it in position.

In cutting the large hole in the hard steel panel, drill a series of holes as close together as possible around the circumference, using a power drill, then cut out the disc

with a cold chisel.

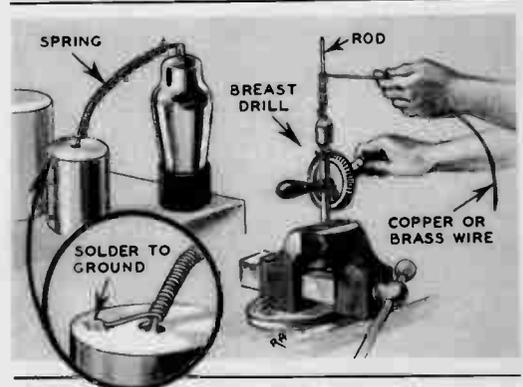
Low note response of the speaker will be greatly improved by this improvised baffle board arrangement.

Neon Lamp Acts As Station Finder

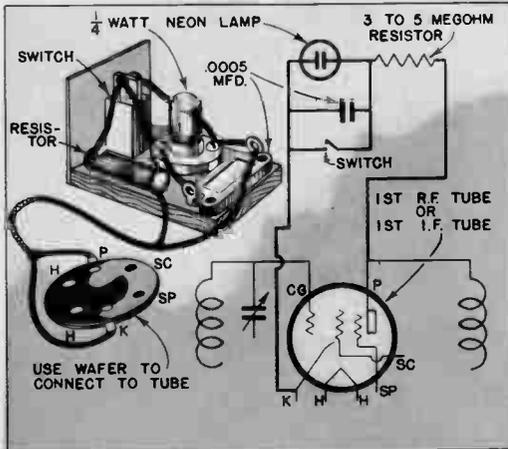
THIS neon lamp tuning indicator will prove a valuable aid in locating foreign stations on all-wave radio receivers not having a beat oscillator. The indicator produces a faint hum in the loudspeaker continually; when a station is found the hum will become much louder. The hum can be eliminated by disconnecting the neon lamp, once the station has been accurately tuned in.

The small neon glow lamp is connected across cathode and plate of either the first R. F. or the first I. F. tube in the receiver, as indicated in the sketches.

Shield Leads With Wire Springs



Here is simple way to wind springs for shielding leads. Ground both ends of spring by soldering to chassis or slipping under convenient bolt on chassis of radio set.



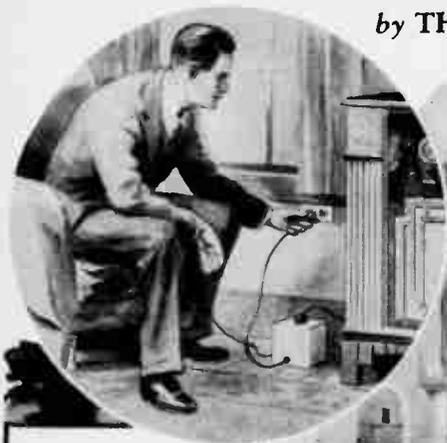
Circuit diagram and suggested assembly of neon lamp tuning indicator. Use waffer made from fiber discs to connect to set, after getting proper tube connections from tube manual.

IN SHIELDING wire leads for radio work, coil springs offer many advantages over common metal braiding. Since they can easily be wound to any desired length and diameter, capacity effects can be eliminated where necessary. The springs are easy to slip over soft wires, and will support the leads.

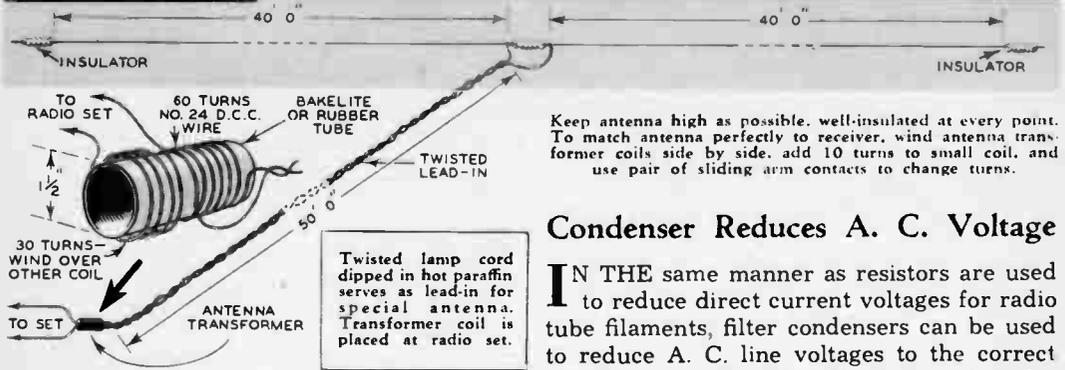
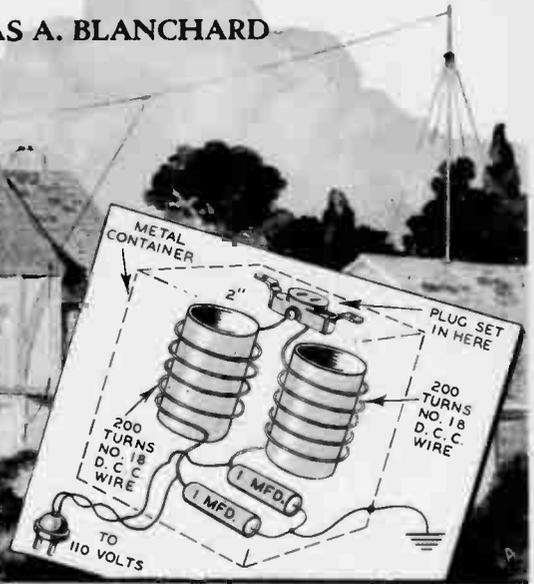
The spring is made by coiling brass or copper wire on a rod of the correct diameter.

Filter Out STATIC from Radio Antenna

by THOMAS A. BLANCHARD



Installation of static-free antenna and line noise filter are shown in above sketches. Mount filter in neatly constructed metal box.



Keep antenna high as possible, well-insulated at every point. To match antenna perfectly to receiver, wind antenna transformer coils side by side, add 10 turns to small coil, and use pair of sliding arm contacts to change turns.

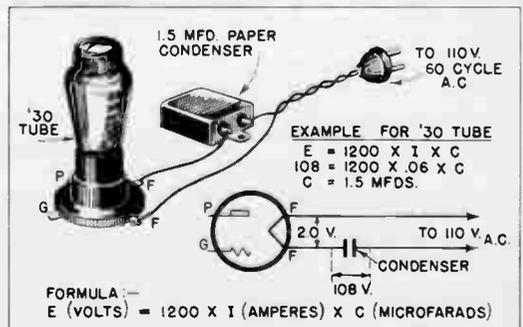
Condenser Reduces A. C. Voltage

IN THE same manner as resistors are used to reduce direct current voltages for radio tube filaments, filter condensers can be used to reduce A. C. line voltages to the correct values for radio tube filaments. A voltmeter should always be used to check the voltage at the filament. Smaller condensers can be connected in parallel to accurately adjust this voltage, since the exact condenser called for by the equation will seldom be available.

MAN-MADE radio static, entering your radio receiver either through the antenna or by way of the power line, is not at all difficult to stop. A special antenna designed to pick up only signals within the frequency range of broadcast stations will cut out interference developed by motors, telephone dials, and other electrical devices.

A capacity-inductance filter in the power line running to the receiver will stop unwanted electrical disturbances from that source. While it is as yet impossible to stop all natural static, it is generally man-made static which gives the most trouble.

The line filter, consisting of two coils each in series with a power line lead, and two condensers in series across the line, with their midpoint grounded to the metal case and to a water pipe, is plugged into a base receptacle.



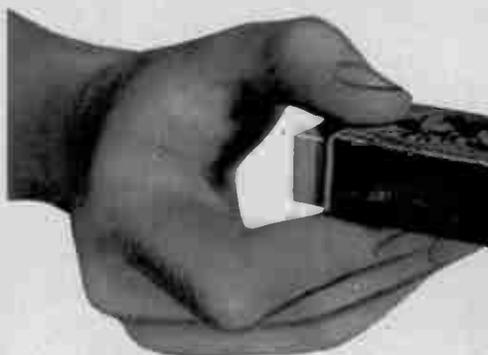
Formula gives condenser size C in microfarads needed to pass given current I and drop voltage required amount E.

Matching Wits With Match-Stick Tricks



MAGNETIC MATCHES cling to each other when pressed together, defying laws of gravity, yet appear same as ordinary matches. Match sticks are first soaked in boiling hot paraffin.

THE LEAPING FLAME never fails to amaze party guests. Match sticks are first soaked in hot paraffin. Two are lighted and held one above the other in the position shown above. Now, if the bottom match is blown out, it will smolder for a second, then burst into flame again in a mystifying manner. Flame travels down gas column.



BALANCING A MATCH on end is not so easy a stunt to do—unless you know how. Performer here balances match easily on top of box held in hand, yet audience fail every time they try. Secret lies in thumbtack inside cover, with sharp point protruding just enough through top to catch into end of match stick. File down thumbtack to needle point.



TRAINED MATCH BOX always lands top side up when tossed on table by performer, while other boxes average "tops up" only 50% of time. Half dollar placed between drawer and outer cover, pushed into center where it will not be visible, is secret of trick. Added weight at bottom of box brings it into position when spinning in air. Noise made by loose matches in box will hide coin thump.

COLORLED FLAME MATCHES should make a hit with patriotic audiences, for the three colors of the American flag may be obtained from the same box of matches. Performer can get matches to burn in red, white, or blue, whichever audience may call for. In this case the match bodies (not the heads) are soaked either in strontium salt solution to give red flame, potassium salt for white flame, and lithium salt solution for blue flame. By cutting matches to slightly different lengths, performer may produce whichever color is called for. Differences in length are more readily noted if box is tipped so all slide to one end. Shake box before allowing spectators to examine it.

IDEAS for Amateur Stage



STAGE properties, the stumbling block of most amateur theatrical producers, are not as difficult to construct as they appear. One does not have to be a woodsman to produce a tree; nor must he go to a quarry to get rocks. Actuality is nice, but deception is much more convenient.

Papier mache is the material most used in stage properties. Used properly, it makes properties not only realistic, but also light enough for quick handling.

Most papier mache props are simply made. A tree, for instance, can be made in a few hours.

All of the pieces are built of 1" Idaho white pine in various widths. Number 2 stock is good enough. If the lumber is reasonably clear of knots, number 3 may be used.

The tree may be made of any size desirable, but we are assuming that this one is 2' in diameter at the base and 12' high. Make four circles as shown in the drawing of 6" stock, fastening them together with cleats of 1"x2" stock. Use 1½" No. 8 screws to fasten your cleats. If your bottom circle is 2' in diameter, your top one should be 1' 6" in diameter, the second one from the bottom 1' 10", and the remaining one 1' 8". Fasten them together as shown in Fig. V with 10 pieces of 3" stock 12' long. Use 8 penny box nails for this job. The rear portion of the tree's circumference (approximately one fourth) should be left open to give an opportunity for bracing the tree to the stage floor. The limb is made by cutting a piece of 12" stock to shape on a band saw or with a key hole saw. Brace it securely on both sides with pieces of 2" stock. To make the tree appear more irregular, nail on several pieces of shaped contour stock as shown in the drawing. Next, cover the whole construction with light chicken wire, fastening it into place with small staples Fig. VA. As you proceed leave a few artistic bumps and bulges. It will add to the natural appearance of the finished product. Have a pail of rather thin gelatine glue



FIG. I



FIG. II



FIG. III



FIG. IV

Making a decorative urn. First model the urn in clay (Fig. I), then paint it with sweet oil, place it in a wooden box (Fig. II), and fill box with plaster of Paris. When hard (Fig. III), remove negative mold, and paint interior with oil. Fill this with paper-backed glue (Fig. IV), let it dry, and remove it with a knife.

Prop Builders

by
LEROY STAHL

cooking on a stove. Take pieces of heavy building paper about 1'x2', dip them in the glue, and then apply it to the tree. Wrinkle the paper, as you proceed, to appear like bark. Care must be taken to have all the wrinkles match. When the glue is dry, paint the tree in either a dark gray or brown, adding suitable highlights and shadows to improve its contour. The tree's foliage is painted on a flat piece of muslin and hung from the flies above. (FIG. V-B.)

The general method of constructing rocks (Fig. VI) is the same as the making of trees. The wooden frames (Fig. 1) are made to resemble rocks as closely as possible. Use 3" stock in the building. Cover the frames with chicken wire (Fig. 2) as you did previously, remembering to keep the form as rock-like as possible. Using the same mixture of glue,
[Continued on page 128]



All properties in this scene, made of papier mache, are easily constructed by amateurs.

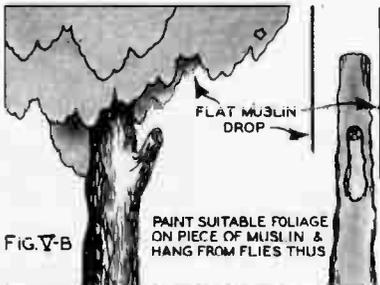


FIG. V-B



FIG. V-A

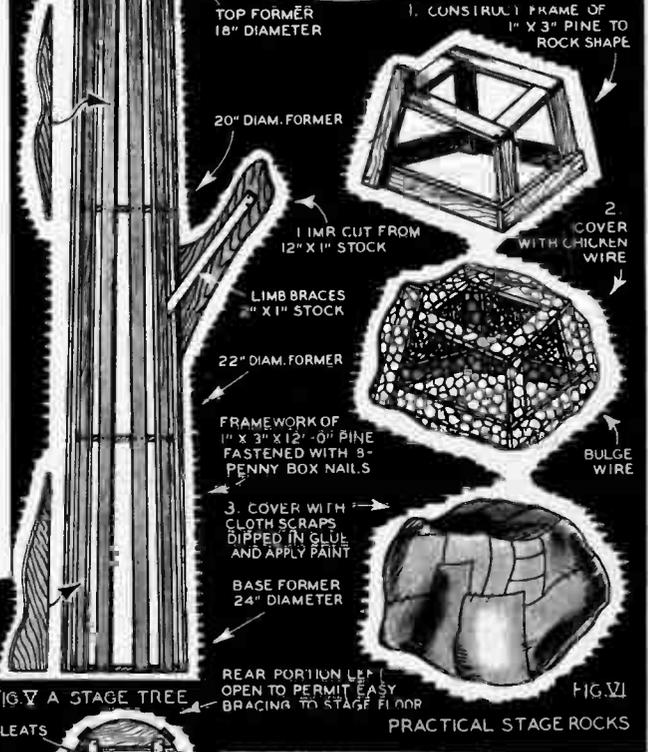


FIG. VI A STAGE TREE

FIG. VI

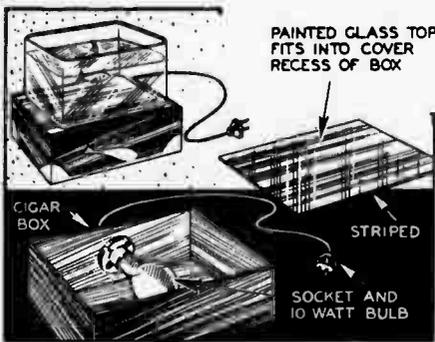
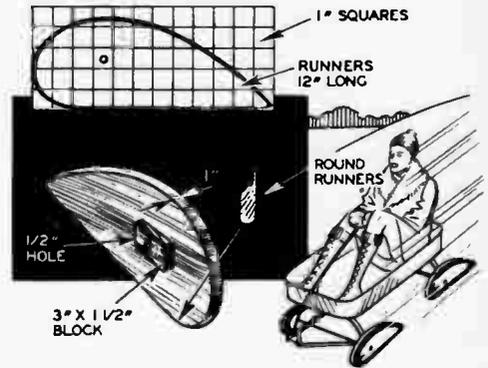
PRACTICAL STAGE ROCKS

Both trees and rocks are constructed over a wooden frame. After the frame is completed, it is wrapped with common chicken wire to conform to the desired shape. Paper is then dipped into hot glue and laid on the wire. On a tree, it is wrinkled to simulate bark. When the glue is dry, a coat of paint is applied as the finishing touch.

HANDIKINKS FOR HOME WORKSHOPS

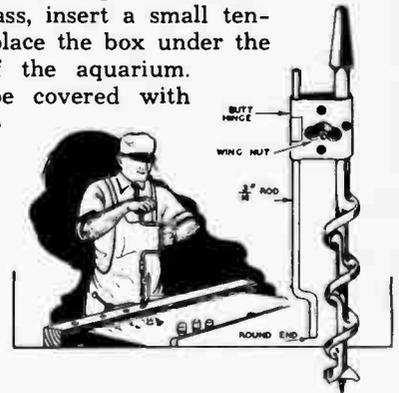
Runners Convert Wagon to Bobsled

A SET of stream-lined runners, easily attached to the axles, convert a summer coaster wagon into a de luxe winter bobsled. The runners should be constructed of inch hardwood with the grain running lengthwise to prevent splitting. They should be strengthened with a wooden brace screwed above the center where it fastens to the axle. When completed, the bottoms should be sanded smooth and treated with linseed oil. Never paint runner bottoms.—Andrew Kobza.



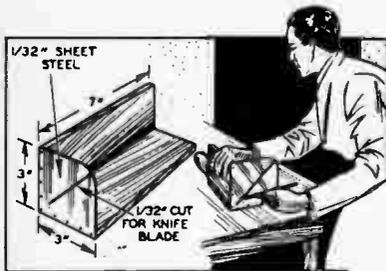
Aquarium Lights Produce Novel Effect

COLORLED lights filtering through the water of small home aquariums produce startling effects. Replace the cover of a cigar box with a hand colored glass, insert a small ten-watt bulb, and place the box under the glass bottom of the aquarium. The box can be covered with paint or cloth to provide a finishing touch.—Sidney Nannes.



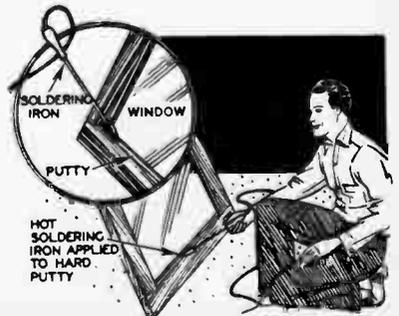
Rod Clamps to Bit Shank as Depth Gauge

A ROD held to a bit shank by a clamped butt hinge is easily constructed, and eliminates doubt and needless guess work when depth boring.—O. E. Olson.



Slotted Box End Centers Lathe Stock

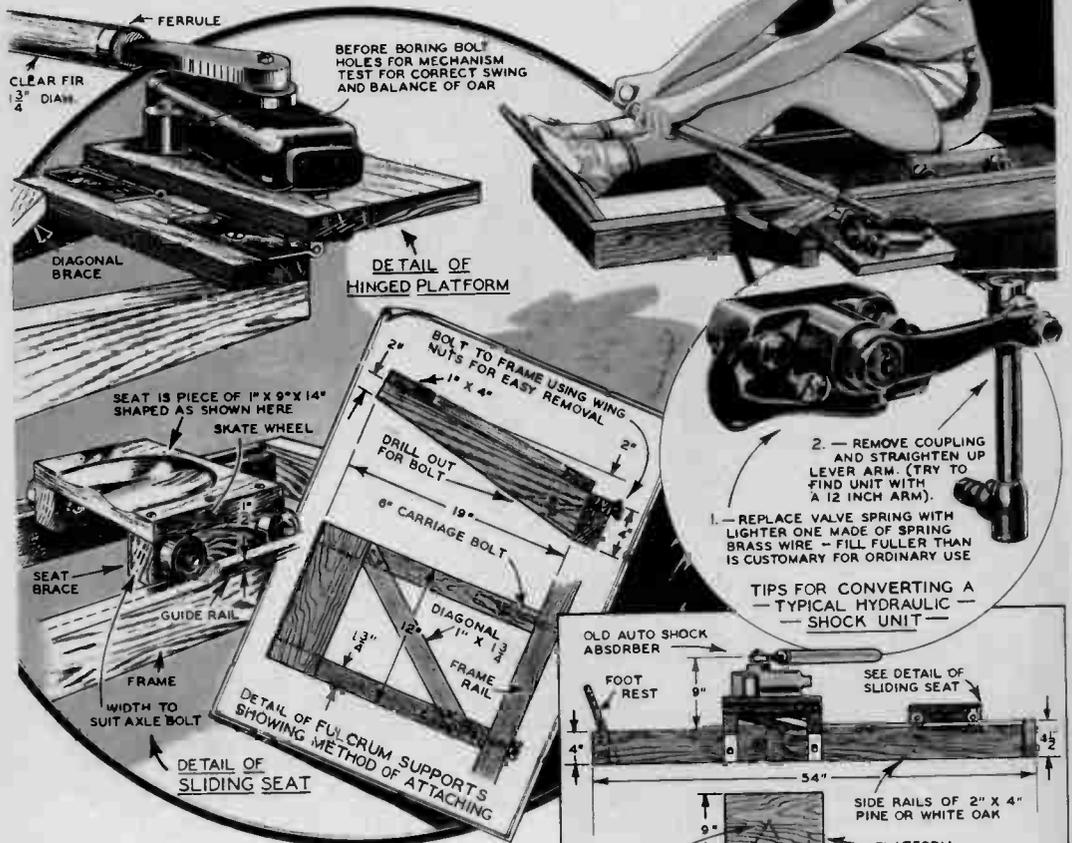
A DEVICE for centering stock in lathe work is constructed of two one-inch boards set at right angles, and a piece of accurately slotted sheet steel. The stock is pushed into the corner and marked along the slot. Then it is turned over and marked again. The lines cross in the center. This may be used to center either round or square stock.—E. F. Richter.



Hot Soldering Iron Loosens Hard Putty

GLASS cutters who are frequently called upon to remove a window pane often find it difficult to do so due to the fact that the putty, hardened by age, sticks to the window frame and chips the glass. This can be eliminated through the use of a hot soldering iron. Draw the iron slowly over the hardened putty, and it will soon soften to the point where it can be easily rolled into balls and removed.—Vernon Tracey.

Auto SHOCK ABSORBERS Make ROWING MACHINE

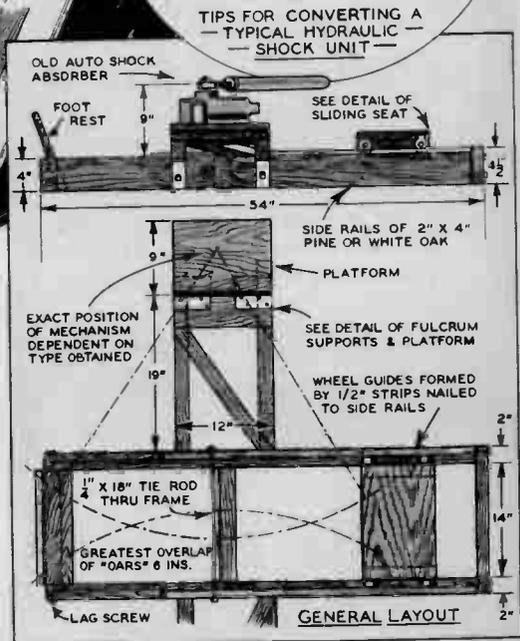


Mount shock absorbers on hinged platform to permit vertical motion of "oars" as in rowing. Construct frame and rolling seat from hardwood according to above plans.

ON THIS hydraulic rowing machine the action of oars in rowing a boat is closely approximated. Leg, back, and arm muscles all come into play on the working stroke, and get their period of rest on the free return stroke.

Almost any type of auto shock absorber having a swing of at least 60 degrees and a 12-inch lever arm may be used here. Packing glands should of course be replaced if worn. The spring is removed from beneath the piston of each unit; in models where the valve is held in place by this spring, make a lighter one from spring brass wire, just strong enough to hold the valve in position during the up-stroke of the piston.

The lever arm must be straightened, and



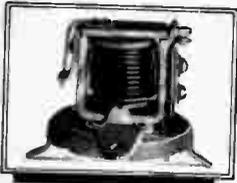
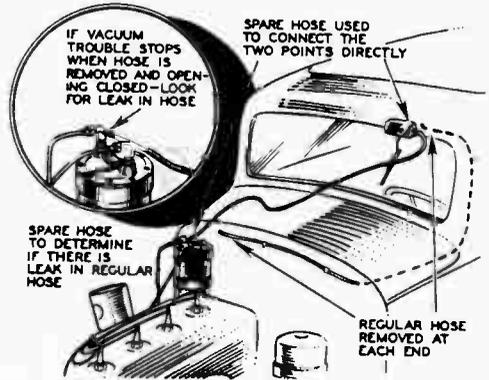
Heavier types of absorbers are best suited for rowing machine. Overhaul as indicated in sketches, then mount.

1 3/4" diameter fir tent pole stock fitted to it. Ordinary automobile oil, in a viscosity which will give the desired resistance, may be used in the absorbers. Use a maximum filling.

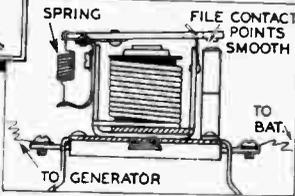
USEFUL SUGGESTIONS FOR MOTORISTS

Locating Vacuum Tank Trouble

VACUUM troubles, in automobiles not equipped with a pump-feed fuel system, are neither difficult to locate nor costly to repair. The common cause of vacuum failure is a leak in the air hose leading to the windshield wiper. The hose connection to the vacuum tank, therefore, should be the first point of inspection in case of trouble. If the wiper refuses to operate and a leak in the hose is suspected, the labor of uncovering the hose is saved by running a spare hose directly from manifold to wiper. Then if it does not work, the trouble is in the wiper.—R. F. Jennings.



Above—A relay switch. Right—A cross section showing construction. Trouble develops either in spring or points.

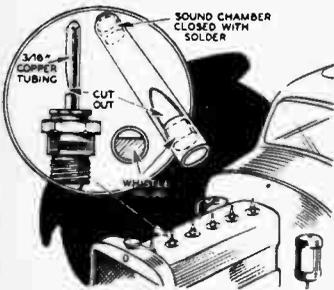
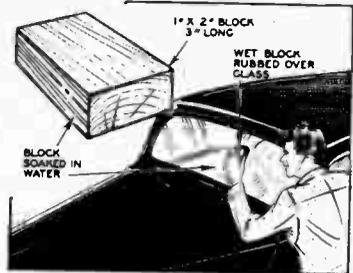


Deadened Batteries Result From Stuck Relay Points

THE points on the relay switch in the circuit breaker between generator and battery often become roughened and stick together when the motor stops. This causes a reverse flow of electricity from battery to generator resulting in a dead battery. Filing these points usually will eliminate bothersome sticking.—Jay Olsen.

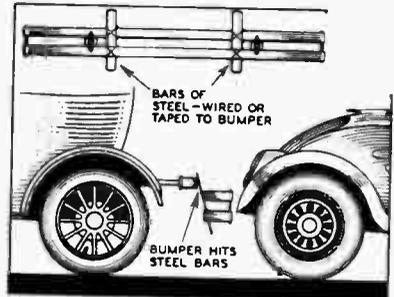
Water Soaked Block Cleans Bugs Off Windshield

THE windshields of automobiles traveling at a high rate of speed during the summer become splattered with insects which dry into a hard, water resistant crust. This can be removed by soaking a 2 by 2 or 2 by 4 block of wood in water and pushing it over the windshield. Softened by the water, the block moves easily and cleans without scratching the glass. In winter, a cloth soaked in a salt solution and pushed over windshield will remove ice.—Maud C. Leachman.



Gauge Stops Whistling When Piston Reaches Top

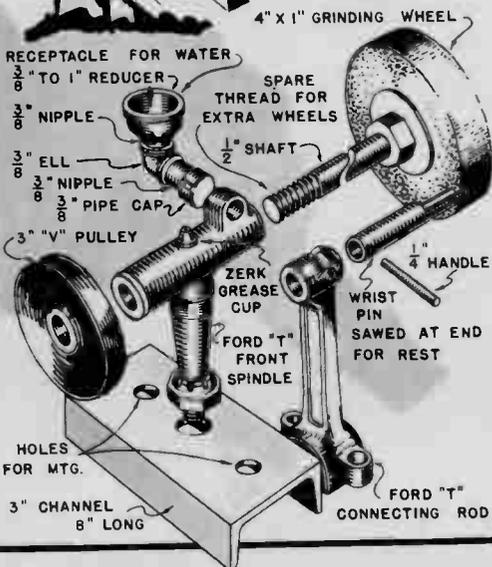
A WHISTLE set into a spark plug opening stops whistling to determine the top dead center of the piston and is very useful when setting timing gears. It is constructed of $\frac{1}{8}$ inch copper tubing set into an old spark plug. The sound chamber is sealed with solder and slotted for air escape.—Mark Doane.



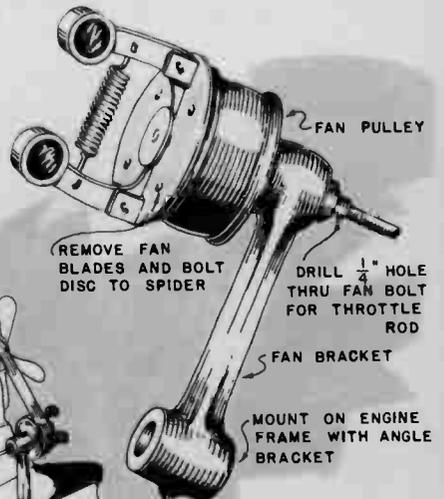
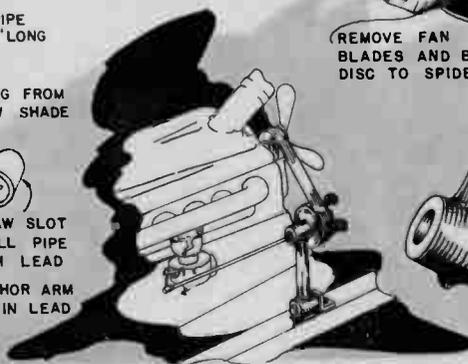
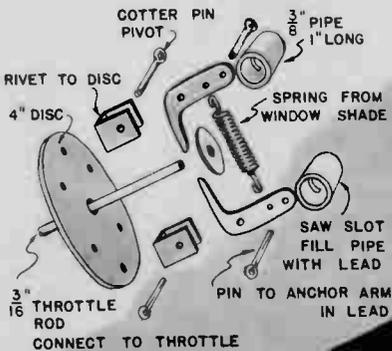
Rod On Bumper Aids In Pushing Automobiles

THE use of a steel rod makes it possible for an automobile with a low bumper to push an automobile with a high one. The bar is placed between the upper and lower sections of the bumper and tied in place with wire or tape. In emergency cases, a tire tool or jack handle may be used as a rod.—Martin Senn.

MAKE SHOP POWER TOOLS FROM OLD AUTO PARTS



Drawings show assembly of heavy duty grinding head and tool rest. Drill hole in spindle for grease fitting. Two nuts hold spindle to channel. Dip tools in water cup to cool.



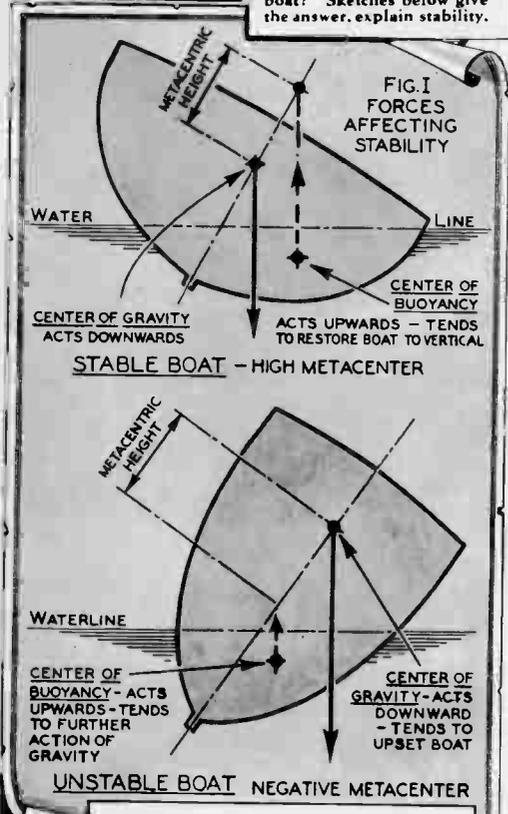
Individual parts of governor unit, pictured at left, appear as in sketch at right when completely assembled. Mount unit far enough out to be in line with throttle, using longer fan belt. Adjust so throttle is wide open when engine is stopped.

WHEN YOU

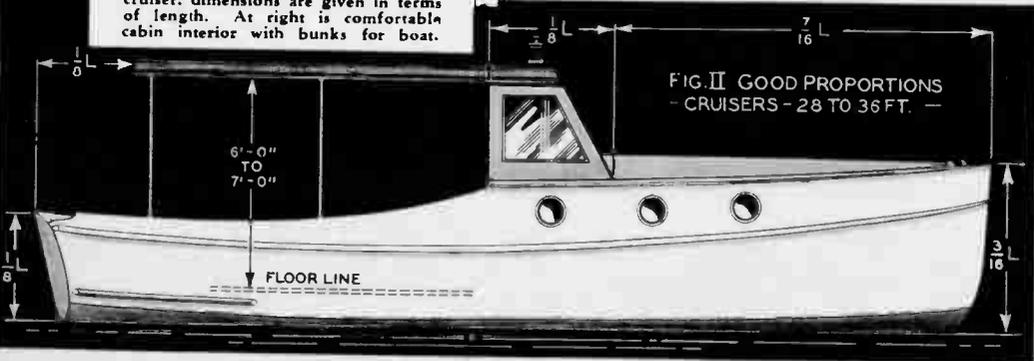
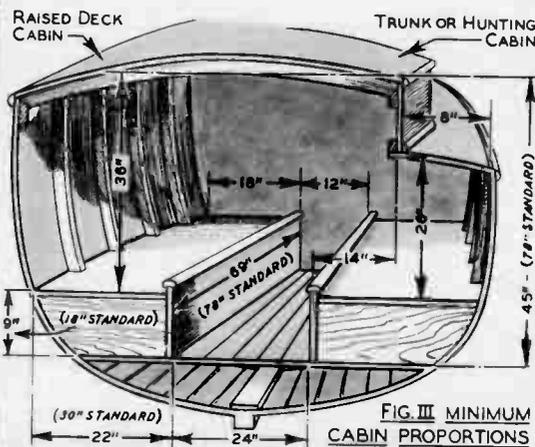
by SAM RABL
Naval Architect



Will high waves tip your boat? Sketches below give the answer, explain stability.



In profile below of well-proportioned cruiser, dimensions are given in terms of length. At right is comfortable cabin interior with bunks for boat.



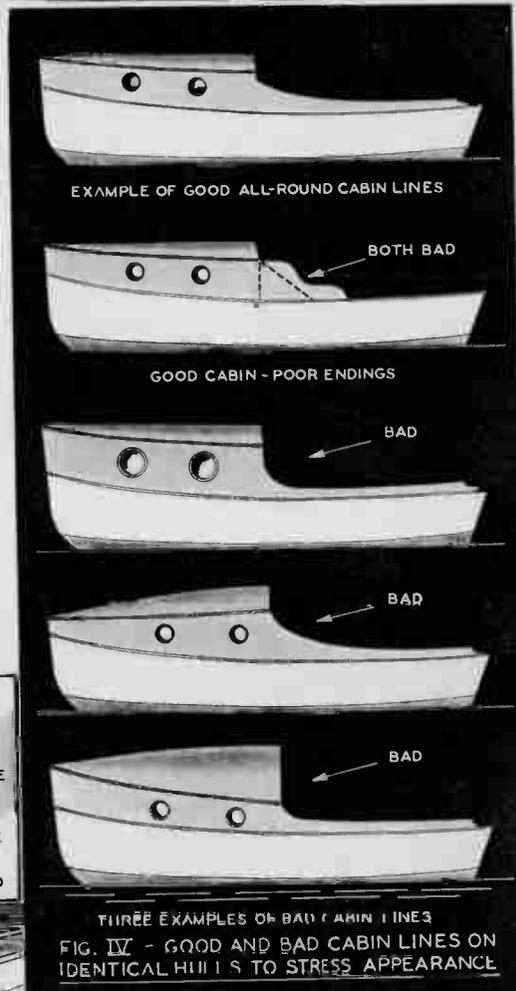
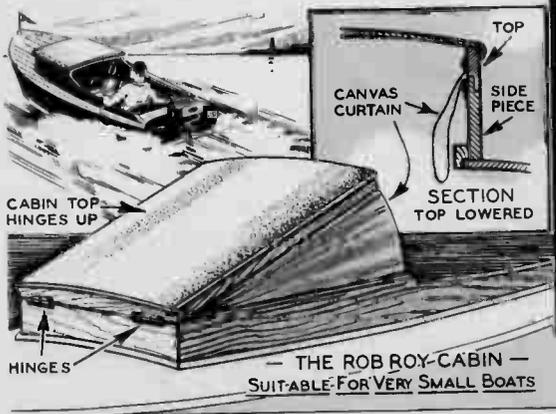
CHANGE THAT BOAT



would take the boat's weight in water to fill the hollow. Now if we were able to solidify this water we poured into the hollow, then remove and set it up on a sharp edge as a fulcrum, the point of balance would be the center of buoyancy.

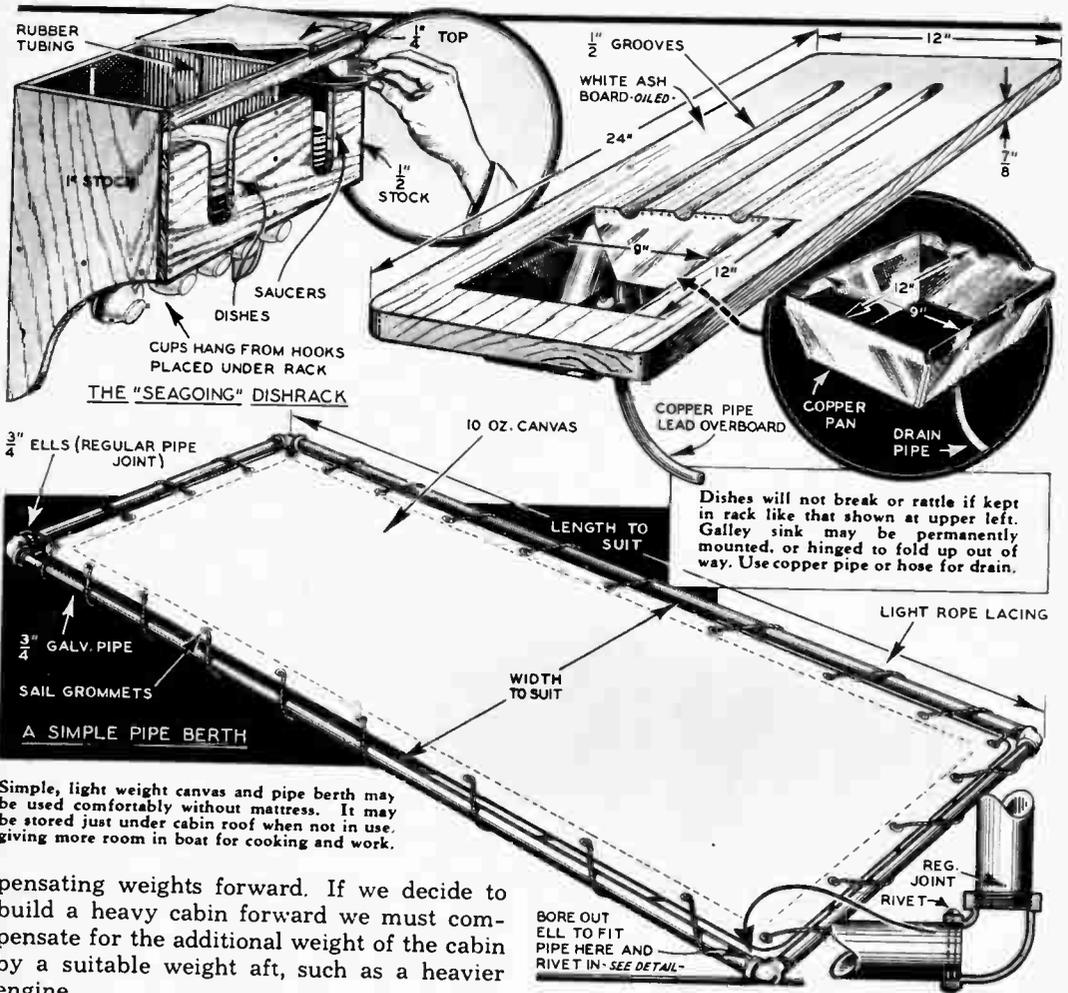
Let us suppose that our boat is floating. If we board her at a point exactly above her center of buoyancy and walk forward, her bow will go down. The amount that the bow will go down will depend first on our weight and next on her size. If we were to walk back, the stern would sink. If we walk to one side the boat will float lowest, or list, on that side, causing a transverse change of trim.

In the making over of any craft we must bear in mind that her first designer so placed his weights that the center of gravity, or the concentrated center of all of the weights was directly over the center of buoyancy. When we install a heavier engine in a boat we must so place it so that it does not affect this trim. If the engine were forward and we decide to place it aft we must in some way place com-



Hinged cabin roof may be raised to give ample head room, lowered in heavy seas to improve seaworthiness. This type of cabin is used chiefly for protection against rain. Constructional details for it are shown at left.

Save Money By Building Your Own Equipment For The Cruiser Cabin



Simple, light weight canvas and pipe berth may be used comfortably without mattress. It may be stored just under cabin roof when not in use, giving more room in boat for cooking and work.

compensating weights forward. If we decide to build a heavy cabin forward we must compensate for the additional weight of the cabin by a suitable weight aft, such as a heavier engine.

Altering of longitudinal stability by placing weights too far forward or aft will not affect the seaworthiness as much as will changes in transverse stability. We have seen how some boats will roll in a seaway while others will be as steady as a pavement.

In the balancing of the solidified water that a boat displaces, we have located the longitudinal position of the center of buoyancy. Somewhere between the waterline and the keel there is a vertical location for this center, this point being known by naval architects as the metacenter. As a general rule, when the center of buoyancy is close to the water line the stability is very good; when it is far below the water line, stability is bad, assuming, of course, that the center of gravity is in a normal position.

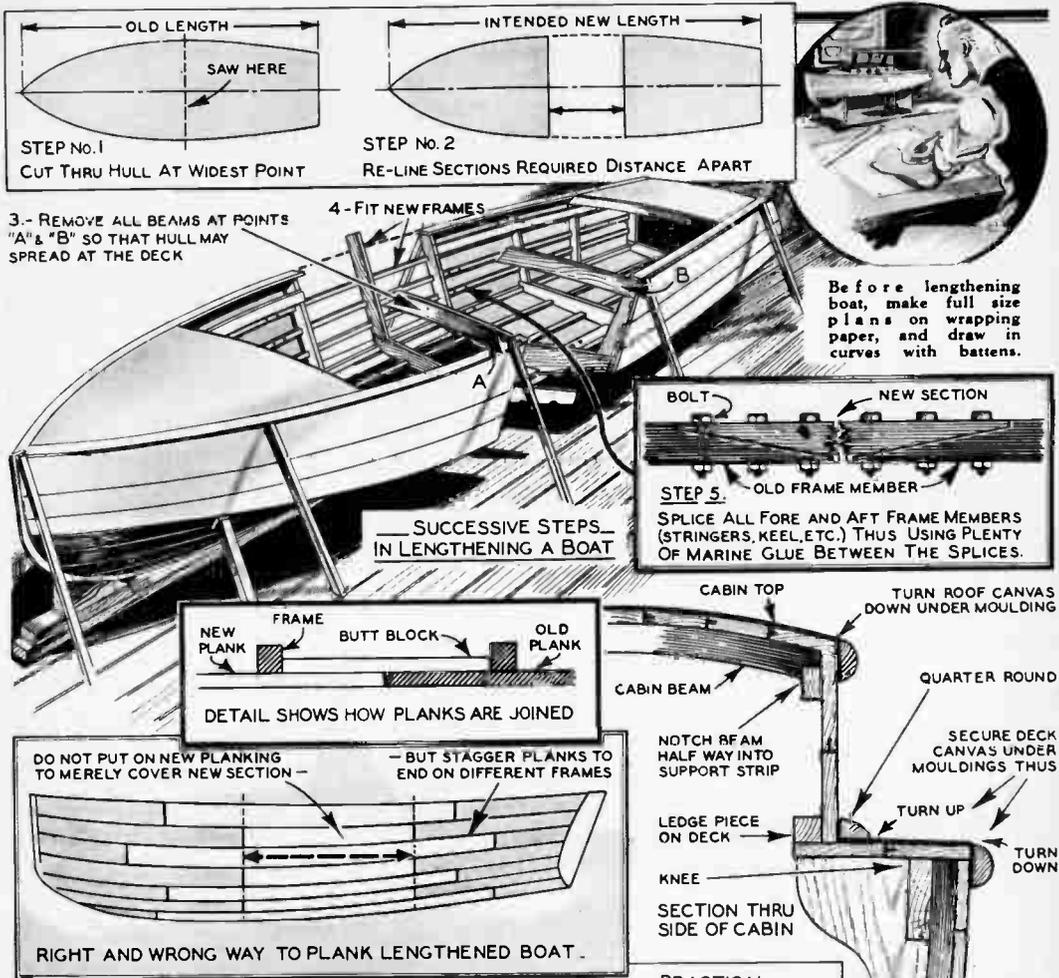
As the boat is heeled or listed over, the cen-

ter of buoyancy in any normal design will move out from center line. The center of gravity will stay in the same position so if we examine Fig. 1 we will see just what the metacenter is. We have projected a line per-

WHEN YOU CHANGE THAT BOAT—

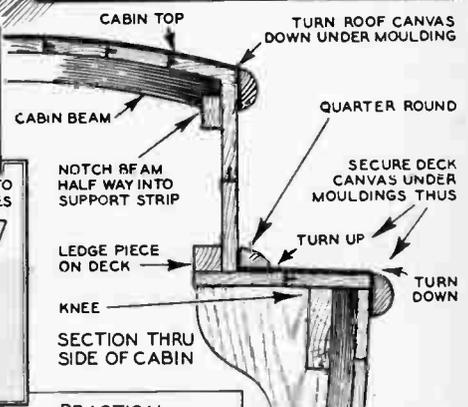
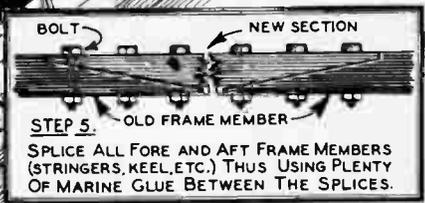
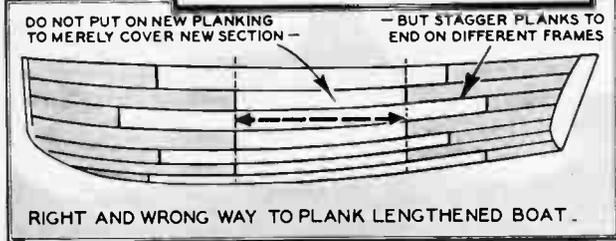
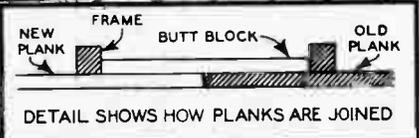
- DON'T try to crowd aboard the accommodations of a boat twice her size. You won't be comfortable.
- DON'T build her too high. She'll appear clumsy.
- DON'T try to make a sea-going cruiser out of a speed boat. It will only end in a failure.
- DON'T try to convert a long narrow hull into a cruiser. There just isn't room for a decent cabin.
- DON'T try to revamp some old boat that you may buy at a wonderful bargain, unless her timbers are sound. She'll cost you more than a new boat.
- DON'T put a lot of money into an outmoded boat without considering her resale value.
- DON'T, if you are not absolutely sure of the condition of a boat, ever purchase her without an expert's advice. And stay away from these "country store" experts!

Use Strong Frame And Planking Splices When Lengthening A Cruiser

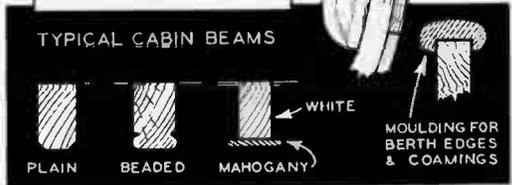


Before lengthening boat, make full size plans on wrapping paper, and draw in curves with battens.

SUCCESSIVE STEPS IN LENGTHENING A BOAT



PRACTICAL CABIN CONSTRUCTION



Above kinks will help beginner planning to lengthen boat and build cabin. Use marine glue freely at all frame joints.

pendicular to the waterline from the center of buoyancy until it intersects the center line of the boat. The distance between the center of gravity and the point where the line from the center of buoyancy intersects the center-line is the metacentric height. A boat with a high metacenter will be very stable but will roll hard and jerky. A boat with a low metacenter will roll long and slow. A boat with a negative metacenter will turn over. A slow rolling boat is desired providing the amount of roll is not excessive. The metacenter we have been dealing with is called the transverse metacenter. There is also a longitudinal metacenter which affects the fore and aft trim; this will not bother us much if we watch the placing of our weights.

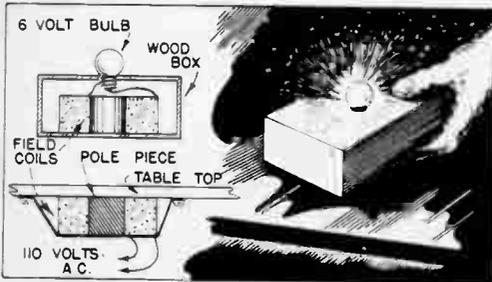
Freeboard, the distance between the waterline and the railing or deck is another impor-

tant factor in seaworthiness. Low freeboard tends to make a stable boat, but one which will take in waves. High freeboard tends to make a boat unstable, so a happy medium must be found between the two extremes.

Symmetry in the ends of boats can improve or destroy seaworthiness. A double ended

[Continued on page 120]

STUNTS WITH ELECTRICITY

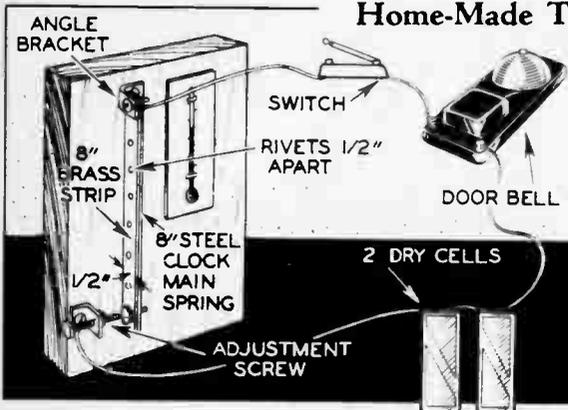
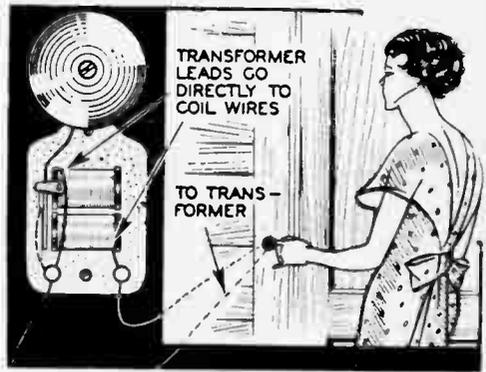


"Magic Light" Glows Without Batteries

MYSTIFY friends by passing electricity through the air to operate a small light bulb. A field coil from an old automobile generator is concealed in the "magic light box," and connected to the bulb. Under the table is another coil with pole piece, this connected to the 110 volt A. C. house current. Current passes from one coil to the other by induction.—R. F. Jennings.

Make Doorbell Work Without Contacts

DOORBELLS which are usually thrown away when contact points become burned away or corroded may be connected to a bell-ringing transformer to work without these contacts. Simply disconnect the wire that goes to the stationary contact point, and connect it to the armature or to the coil directly. Adjust the clapper of the bell or the vibrator of the buzzer until a pleasing pitch is obtained, and your doorbell will be as good as new. The armature will move twice for each cycle, giving a 120 cycle note.—E. J. Novak.

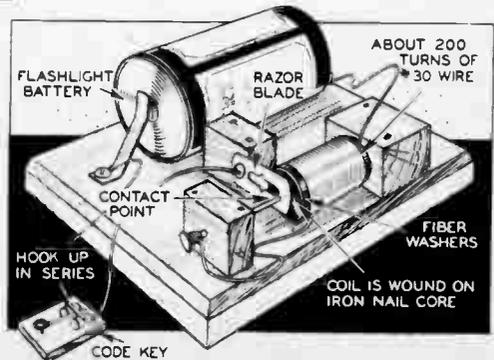


Home-Made Thermostat Is Heat Control Alarm

WARNING you when the house temperature is below normal by ringing the doorbell, this heat control alarm forms a simple and inexpensive substitute for automatic temperature control equipment. Lengths of brass and clock spring are riveted together to form the thermostat element. Connect up to doorbell and batteries or transformer. Place the switch in some convenient position where it can be opened for a few minutes after each alarm.—W. A. Thompson.

High Note Buzzer Uses Razor Blade

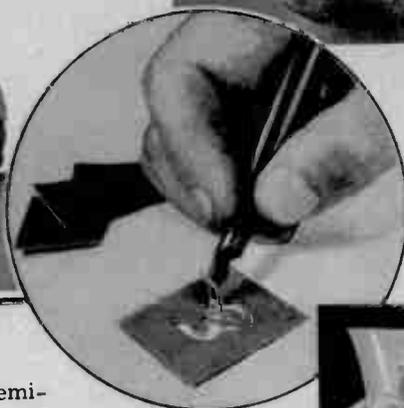
IN MAKING a high frequency buzzer for code practice, a razor blade will be found to have just the right stiffness for the armature. The coil may be about 200 turns of around No. 30 D. C. C. wire wound just back of the head on a heavy nail. The contact point is another nail set into a small wood block, where it can be pulled in or out with pliers. The razor blade is at right angles to the coil.—H. E. Throsel.



Paste Etches Initials in Glassware



Left—Etching initials on electric light bulbs to prevent theft. In etching bulbs, the name is written into hardened paraffin, after which the paste is applied for a period of five or ten minutes. Right—Dipping a piece of wrapping paper in melted paraffin—the first step in making stencils.



Left — After the paraffin has hardened on the wrapping paper, the initials are traced and carefully cut out with a sharp knife. When cutting the letters O, Q, and A, the center sections must be saved to prevent a blurred etching.

WITH an economical, easily mixed chemical paste that can be made and used with perfect safety, it is a simple matter to etch initials, names, and numbers on glassware. Lamp bulbs can be quickly marked for identification; names and numbers can be etched into door and window glass without the removal of the frame.

To make the paste, measure out five teaspoons of sodium fluoride into a wide-mouth bottle, add one teaspoon of zinc chloride and a scant teaspoon of potassium sulphate. Then add sufficient water to make a paste, and mix well in a wooden skewer. This forms the permanent stock material. To prepare it for immediate use, place a little on a sheet of waxed paper and add hydrochloric acid to make a creamy paste.

In etching names on electric bulbs, dip the bulb in paraffin and scratch the name through the wax. Then apply the paste. It will etch only where the wax is removed. In placing initials on glassware, however, a stencil is necessary to obtain uniform work.

To make stencils, dip strips of wrapping paper in hot paraffin. Using letters and initials as a guide, take the point of a sharp knife and carefully cut the stencils. Then affix them to the glass surface by warming the glass and pressing the stencils into place. Warm goblets by filling them with hot water; warm windows by using hot cloths. When cooled, the stencils will stick in place.

Right — A tumbler must be heated by filling it with hot water before the stencil is applied. The wax holds stencil in place.



Left—The dry mixture is prepared for use by placing a teaspoonful on a piece of waxed paper and mixing with acid until it forms creamy paste. The spoon must be dipped in wax before using.



After the stencil is securely fastened to the goblet, the paste is applied with a wooden skewer. Care must be exercised so that the paste fills all the holes in the stencil to insure perfect work.

Making "Third Dimension" Spectacles



Line up stereoscopic lenses as shown, then cement in position as at right to make "third dimension" spectacles. Mount prints on cardboard with rubber cement after aligning.

SEE your own photographs in true perspective with these inexpensive, easily-made "third dimension" spectacles—enjoy "living scenes" where every contour, every figure is distinctly visible.

The principle of the old-fashioned stereoscope, with its double-image views in which figures and scenery stood out in bold relief, is merely applied to your own snapshots.

First get the lenses from an old stereoscope—you can generally locate these at a rummage sale or second-hand bookstore—and a dime-store pair of eye-glasses. Mount the lenses in the spectacle frames, cementing them in with balsam or collodion.

Have two prints made up in postcard size or even smaller for each of your snapshots. Trim off the right margin of one, the left margin of the other. Holding the prints, one in each hand, about 9 inches from the eyes, overlap the pictures until they appear as a single image, giving stereoscopic vision when held at the correct focus.

Tinting Photo Prints With Dyes



To tint photos, completely immerse in dye solution, then allow to dry on newspapers.

USING any of the powdered dyes sold for household purposes, photographs can be tinted in a wide variety of colors simply by immersing in the different dye solutions.

Dissolve the dye powder according to the instructions coming with the package, then place the solution in some flat dish or a photo developing tray. The tray should be deep enough to insure that all parts of the print will receive an equal amount of coloring.

Dyeing the photos in this manner affects highlights of prints more than the shadows.

Mold Stamps With Wood Filler



Carve desired design for marking stamp in soap, fill the mold with wood filler, then trim stamp with sharp knife.

INITIALING of your laundry is easily done with this marking stamp, molded from composition wood.

Carve the desired initials and design on a flat bar of soap. Fill in this mold with wood filler to a depth of $\frac{1}{8}$ " , then allow to dry. Cement the rounded end of a clothespin in place as a handle. Even up the printing surface by rubbing over a piece of sandpaper on a flat surface. When marking laundry, use with an indelible ink pad; for marking packages and other articles, an ordinary stamp pad may be used.

Floodlight Built at Little Cost



Set ring-bolt in metal lamp shade as shown, to serve as photo floodlight.

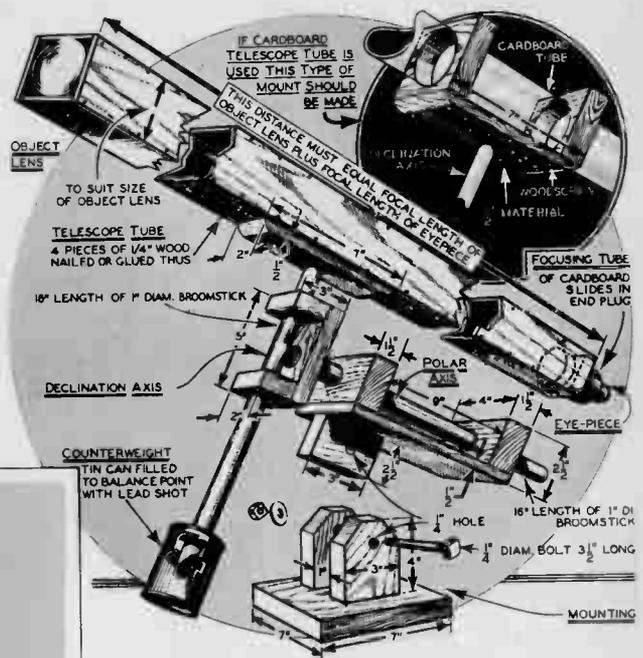
A CONVENIENT reflector for the photoflood bulbs used in indoor photography may be assembled in a few minutes, using an ordinary turn-button lamp socket and one of the metal lamp shades obtainable at any hardware store. A 12-inch diameter unit will prove a convenient size for amateur use.

See PLANETS with \$5 TELESCOPE

THE mountains on the moon, the planets and a myriad of other subjects in the star-filled heavens may be explored with this simple equatorial telescope, costing less than \$5 to build.

You will need either a cardboard cylinder or a square wood tube for the body of this telescope. This tube is mounted on broomsticks turning in wood blocks, as pictured in the diagram, to permit pointing to any part of the heavens.

The correct length of the telescope tube is obtained by adding together the focal lengths of the



This simple equatorial telescope mounting, built by 14 year old Iowa youth, costs less than \$5 including good grade lenses. Tripod stand is made of 2"x2" pine lumber.

object lens and the eyepiece used. A suggested combination of lenses, which can be secured from any good optical company, is an eyepiece with 1" focal length, and an object lens of about 70" focal length. Since the power of the equatorial telescope is the ratio of focal lengths, this would give a magnifying power of about 70 times.

The eyepiece is best mounted in a small

These sketches clearly show how telescope mounting is assembled. Counterweight keeps telescope steady at any desired position, yet enables it to be moved easily when following motion of stars or planets. Lens mountings can be worked out by builder to fit any lenses available.

cardboard tube which can be slid a few inches either way, to offset any errors in calculating the tube length.

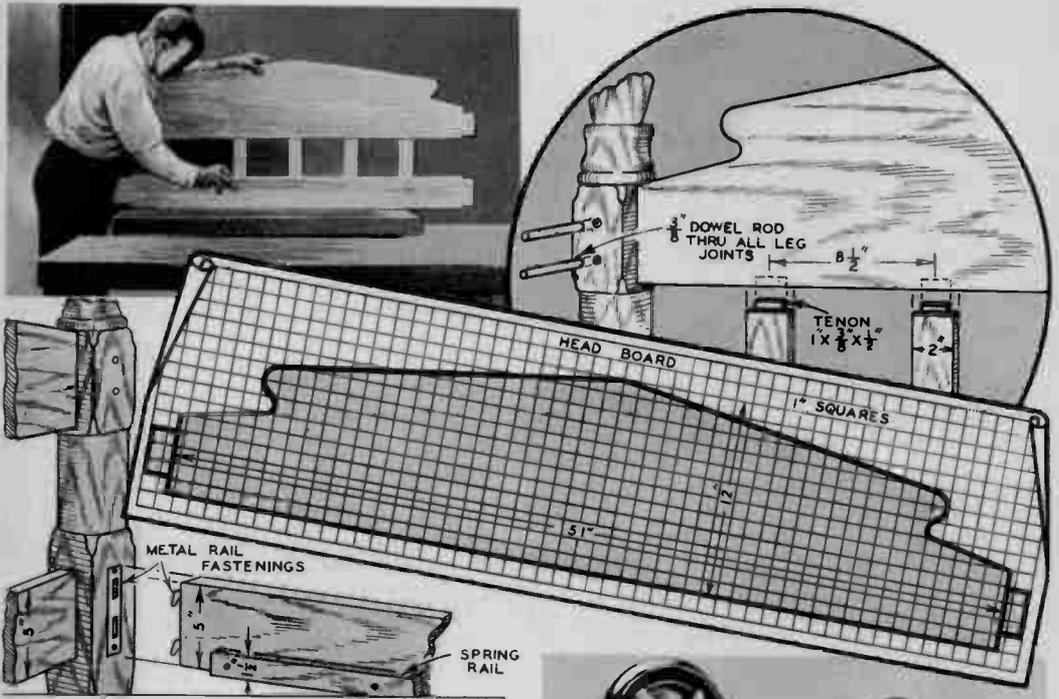
Mount the telescope unit on some kind of stand which will bring the eyepiece at a convenient level for you. A simple wood tripod is used successfully by many builders, and has the advantage of being easy to move around. Varnish or paint all parts as a protection against weather. Paint the inside of the tube a dull black.

As you know, the stars appear to revolve about the North Star—the point towards which the earth's axis is directed. The telescope's polar axis must point at this star, or at the equivalent, the angle of your latitude. This is readily done if the telescope tube is set parallel to the polar axis, and the entire unit turned until the North Star is seen in the telescope. The clamping bolt at the bottom is then tightened permanently.

If you look at objects such as trees or houses, the images will be upside down.

Do not use your telescope in the house by pointing it out through a window pane; the glass will blur the stars.

USE COLONIAL WOODCRAFT



Slats are mortised into head of bed as shown in circle, then checked for alignment for gluing, as in top photo. One type of metal rail fastening which works nicely is shown above.

by O. E. OLSON

TRUE Early American furniture portrays the dignity and vigor of our sturdy ancestors and manifests their determination for security. This full size, four-poster bed is an excellent example of the simplicity of design and durability of construction which seem to have been the paramount issues with Colonial craftsmen.

The most satisfactory wood to use for this project is hard maple, thoroughly air seasoned or kiln dried. As an extra precaution, select material of even grain and uniform color.

Begin by turning the four posts from square stock, following the dimensions in the diagram. The top turning should conform closely with the graphed layout drawing, as the design is distinctly Colonial.

It may be necessary to glue up $\frac{3}{4}$ " stock for the upper cross board on the head and foot as the width is 12". Should this be necessary re-enforce the glue joints with deep



Lay out 1" squares on head board stock, trace in design, then cut out piece carefully on bandsaw, as illustrated in photo.

set dowel pins. Rough-out the cuts on the bandsaw and dress straight edges to line with a plane. Tenons $3'' \times 1\frac{1}{2}'' \times \frac{1}{2}''$ are quickly cut on the circle saw or can be made by hand without a great deal of effort. Two lower cross pieces of $\frac{3}{4}''$ stock 5" in width are required. These pieces require tenons of the same size as the upper cross piece.

Make next the slats, ten in number, of which five, for the head, are $17'' \times 2'' \times \frac{1}{2}''$ and five for the foot are $6'' \times 2'' \times \frac{1}{2}''$. Allowance must be made in length for $\frac{1}{2}'' \times \frac{1}{4}'' \times \frac{1}{2}''$ tenons making the slat stock length 18" and 7" respectively. Mark out the slat mortises on the cross pieces $8\frac{1}{2}''$ from center to center and cut to a depth of slightly more than $\frac{1}{2}''$. Assemble the cross pieces and slats, gluing

ON THIS FOUR-POSTER BED



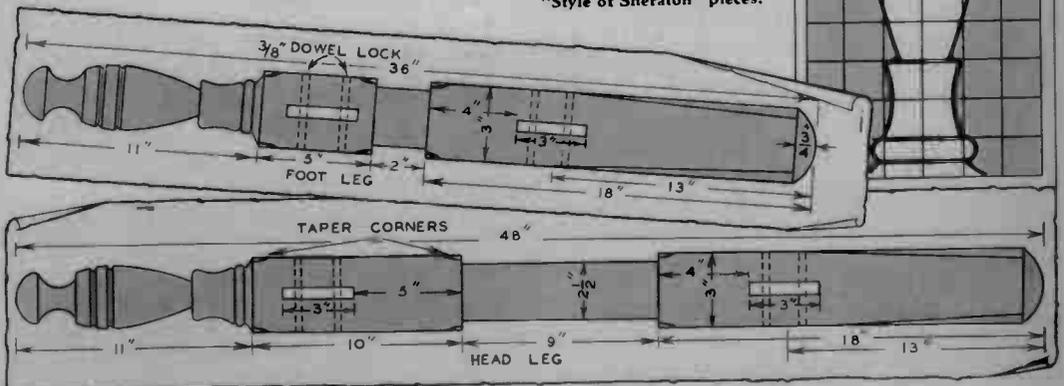
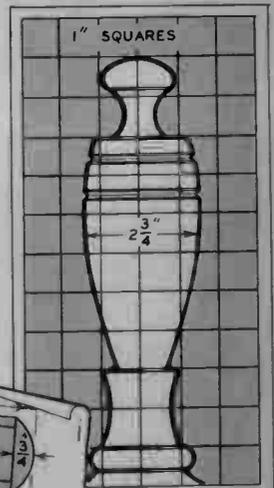
Decided Early American influence in line and construction, rather than exact reproduction of some specific design, is shown in this full size four-poster Colonial bed. The hard maple recommended was used extensively in making Colonial furniture.

all slat joints. Check carefully for squareness while clamping. Casein glue is recommended because of its slow setting qualities, thus permitting more careful work.

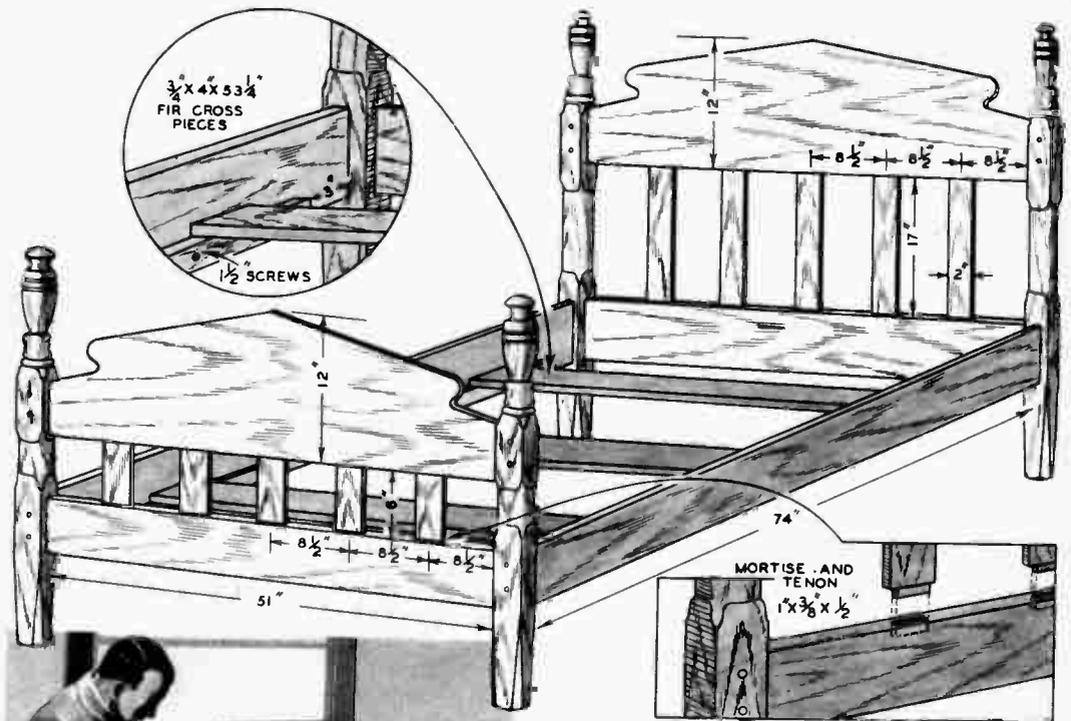
Next cut the mortises in the legs as shown, making them slightly more than $1\frac{1}{2}$ " deep. If you have a mortising attachment for your drill press this job is easy, but even the hand method of boring and chiseling is not tedious, as the mortises are wide and easy to work in. When this is done and the cross assembly securely set, make a test fit of all leg joints. If all draw up tight and even, glue, clamp and let set for twenty-four hours.

Next comes the lock pinning, that feature of Colonial construction so vital to the permanency of the piece. Bore two $\frac{3}{8}$ " holes completely thru each leg in such a manner as to pass thru the tenon of the cross piece. Glue and

Dress down maple stock for bed legs to $3'' \times 3''$ size, carefully locate centers, then set up in lathe and turn top to design shown in squared paper sketch at right. Make sheet metal template of this to serve as guide if you have difficulty in cutting duplicate turnings. Design is distinctly Colonial, found in "Style of Sheraton" pieces.



Mortise and Dowel Joint Assembly Gives Strength to Colonial Bed



Mortise and tenon joints are used in assembling Colonial bed, with wood dowels or lock pinning through corner posts to reinforce head and foot. End slats fit into cross-pieces.

If using light lathe with extended bed as shown in photo when turning legs, do not run lathe faster than 1,200 r. p. m. Sand legs thoroughly, without changing contours.

drive in dowel rods and dress down to the surface.

The rails are of $\frac{3}{4}$ " stock 5"x74". Do not slight the sanding of the rails as they are visible when the bed is made. A strip $\frac{3}{4}$ "x $\frac{1}{2}$ "x68" is screwed to the lower inside edge of the rail. This strip is to hold the three fire cross pieces shown in the diagram. The dimensions of the fir cross pieces are $\frac{3}{4}$ "x4"x53 $\frac{1}{4}$ ".

The hardware for the rail fastenings may be purchased in various designs. Select a strong and serviceable set, preferably one that draws the side rails firmly to the leg. The type shown in the drawing is satisfactory and easy to install. Casters are optional but are not in conformity with the piece. Glass slide plates or silencers are very inexpensive and are more satisfactory.

Next set up the bed and spot sand any rough places or glue marks preparatory for finishing. Apply a liberal coat of raw linseed oil and let stand for several hours. Rub off any surplus oil not soaked in. The oil will give a mellow tone very characteristic of aged Early American furniture.

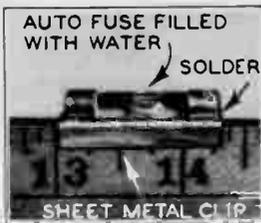
If a color other than the natural is desired, apply an oil stain and rub in with a cloth. A wax finish on hard maple is very durable and brings out the true beauty of the wood. Two coats of wax, each well rubbed, should be sufficient. A more permanent finish can be produced with a coat of white shellac over linseed oil or stain, shellac to be rubbed when dry with fine steel wool. Wax produces a soft satiny finish while shellac gives a bright and more lustrous tone. Either type of finish requires considerable rubbing for the best results.

Standard springs and mattresses, chosen at the option of the builder, fit into the side rails. If an inner coil spring mattress is used, the bottom may be completely boarded over to form a smooth support.

KINKS FOR THE HOME HANDYMAN

Saw Blade On Wooden Disc Cuts Round Holes

AN ORDINARY hack saw blade fastened to a wooden disc performs efficient service cutting round holes in plywood, bachelite, and other thin materials. The cutters are easily and quickly made, and the results obtained compare favorably with those obtained with tools made especially for that purpose. Cut a disc of hardwood to the required size, measure the circumference, and clip a piece of hack saw blade to fit. Drill screw holes in the upper edge on both ends and in the center, and start corresponding holes in the disc to avoid splitting. The metal bit shaft is then inserted in the exact center of the disc. The end of the shaft must be slotted to fit a pin placed in the wood to prevent slipping. This cutter may also be used in the chuck of a drill press.—Clark Eaton.



Discarded Radio-Auto Fuses Make Practical Levels

ABURNED out radio or automobile fuse can be converted into a practical and inexpensive level which, attached to a yard stick, performs with surprising accuracy. Heat the metal end caps and twist them off, taking care not to break the glass. Fill the tube with water or light oil, leaving a small air space, and plug the ends with cork. Secure metal caps on ends with a little glue or cement to prevent leakage.—Kenneth Murray.

Hand Brace Easily Sinks Screw Eyes In Wood

ALARGE number of screw eyes to be inserted into a project, present, as a general rule, difficulties both of time and accuracy to the hobby builder. The use of a small rod slipped through the eye and used as a lever often results in a crooked insertion; pliers are cumbersome and hard to handle with any speed. These difficulties are solved through the use of an ordinary brace to facilitate accuracy and speed. The screw eye is gripped in the brace chuck and the weight of the body helps to drive it in. When using this method, be sure the thread extends straight outward.—M. Fischer.



Cloth Seals Dents In Zerk Type Grease Nipples

OFTEN Zerk type grease nipples become damaged by flying stones to an extent where they do not make a tight seal with a pressure gun, and lubricant cannot be forced into its customary chamber. A double thickness of cloth over the nipple provides a perfect seal. Grease is easily forced into the grease nipples through cloth mesh.—Ross Wheelton.

Mouse Trap, Dry Cell, and Bell Form Novel Fire Alarm

ASIMPLE fire alarm is constructed from a mouse trap, a dry cell battery, and an old door bell. Remove all the parts of a mouse trap but the spring mechanism. This is wired to serve as one pole of an automatic switch. The other pole consists of a piece of tin under the trap arm, separated from it by a layer of paraffin. These two poles are connected to a dry cell battery. When the heat reaches a dangerous height, the wax melts, and the trap arm contacts the tin pole, completing the circuit and ringing the bell.—G. H. Jenkins, Jr.



HOW TO BUY AND USE SCREWS



A noted workshop authority tells you how to specify the gauge, length, type of head, and finish when ordering wood screws.

by VERNE C. FRYKLUND

Industrial Education Division
University of Minnesota

Correct method of holding screwdriver, guiding screw, is shown in the sketch at left.

WHEN you order wood screws, four things must be specified—the length, gauge, shape of head, and finish. If you want some 1¼-inch long flat head bright iron screws of medium thickness, you should ask for 1¼-inch No. 8 flat head bright screws. In hardware catalogs this screw would be listed as: 1¼" No. 8 F. H. B.

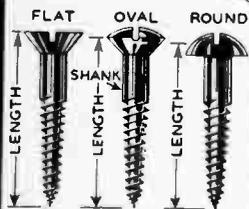
Flat head iron screws are usually sold in the bright finish, and round head screws in the blue finish.

The selection of the gauge used depends upon the job. If the stock is rather thin, leaving very little around the screw, order a small gauge in the length being used.

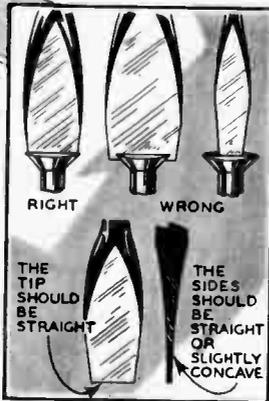
The length of flat head screws is measured over all, while round and oval head screws are measured from the bottom of the slot to the point of the screw.

Flat head screws are used in places where they should be flush with, or below, the surface. Use round head screws in exposed places, where the screws are intended to be decorative as well.

The tip of the screwdriver used should be just as wide as the screw head, and fit snugly in the slot.



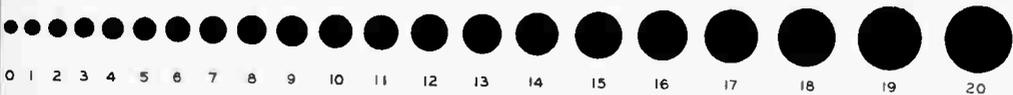
Above screw types are commonly made from iron or brass.



Screwdriver tip should fit snugly and be width of slot.



Holes for flat and oval head screws are countersunk to diameter of screw heads. Apply soap when in hardwood.



SCREW GAUGES

LENGTH	1/4"	3/8"	1/2"	5/8"	3/4"	7/8"	1"	1 1/4"	1 3/4"
GAUGES	0-4	0-8	1-10	2-12	2-14	3-14	3-16	4-18	6-20
LENGTH	2"	2 1/4"	2 1/2"	2 3/4"	3"	3 1/2"	4"	4 1/2"	5"
GAUGES	6-20	6-20	6-20	8-20	8-24	10-24	12-24	14-24	14-24

Black circles give exact size of shank; gauge is term used to specify this diameter, taken just under screw head. Table indicates what screw gauges are standard for different lengths of screws. 1½" screws are available in gauges 4 to 18.

Indirect Lighting Shows Ship Model in Decorative Relief

IN MANY homes a ship model is used to give a decorative effect to mantle or shelf. Often it is hidden in shadow at night. The use of subdued indirect lighting sets it forth in striking silhouette with romantic and imaginative beauty.

Any handy man can create such an effect in a short time. Using a pair of tin snips, cut a metal strip, and fashion it into a spring clamp. Bore a hole in the base, and screw it on the reverse hull of the ship.

Into this clip slip an intermediate sized light socket with a cord and plug attached. Then obtain a T-6½ lamp 4½ inches long, color it with lacquer (thinned to allow the passage of light) and turn it into the socket.

Another method of painting the light is that of putting sizing on the bulb to form a rough base and painting it with water-colors. Various shades of green will provide a good, soft background light for the model.



A ship model silhouetted by a subdued light. The insert shows how the light is constructed and fastened to the ship.

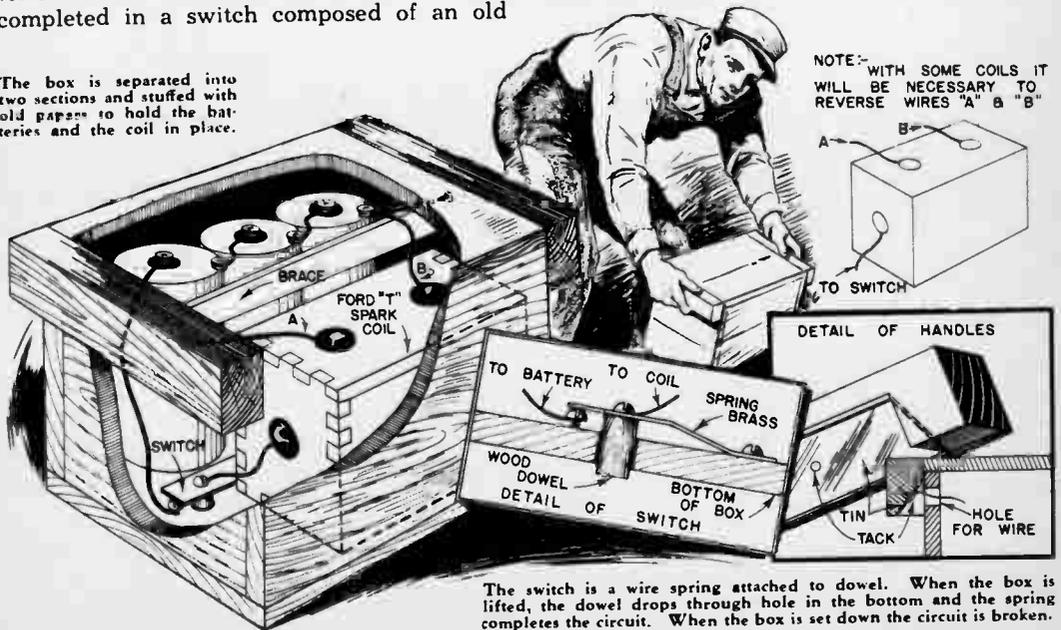
Old Coil, Telephone Batteries, and Box Make Simple Shocking Machine

A TRICK box, designed to shock the person who attempts to lift it, can be quickly constructed with several dry-cell batteries, an old Ford coil, a switch, and a small box.

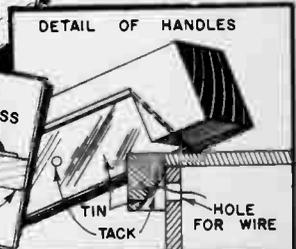
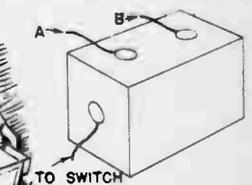
The box is divided into two sections to hold the batteries and the coil in place. The batteries are wired to the coil, the circuit being completed in a switch composed of an old

piece of phonograph spring and a wooden plug. One end of the spring is connected to the battery; the middle is fastened to the plug extending through a hole in the box. The handles of the box are lined with tin so that anyone lifting the box gets an electrical shock from the tin.

The box is separated into two sections and stuffed with old paper to hold the batteries and the coil in place.



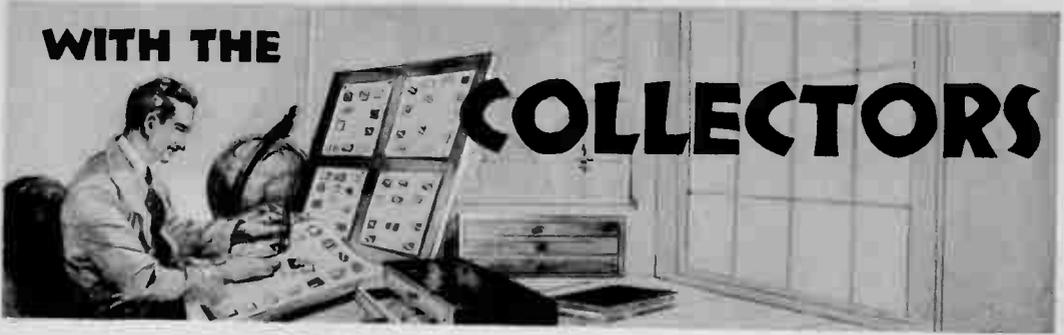
NOTE:- WITH SOME COILS IT WILL BE NECESSARY TO REVERSE WIRES "A" & "B"



The switch is a wire spring attached to dowel. When the box is lifted, the dowel drops through hole in the bottom and the spring completes the circuit. When the box is set down the circuit is broken.

WITH THE

COLLECTORS



Postal Expert Goes To Little America

ENROUTE to Little America with over 60,000 letters to be cancelled in the shadow of the South Pole and then mailed back to stamp collectors is Charles F. Anderson, cancellation expert of the Postoffice Department at Washington, D. C.

Below-zero temperatures make the cancelling of this quantity of mail in the short time available no easy problem. Non-freezing inks must be used.

The tour of Anderson to Admiral Byrd's base is said to be the first time an American postal official has taken mail outside of our territory to be cancelled.

Fables Pictured On Match Boxes



Japanese designers read legends, fairy tales before working up these interesting and unusual designs for match box covers.

FOREIGN match label designers find many ideas for their work in fairy tale books, making the collecting of these illustrations on match box covers one of the most interesting of hobbies.

The story of the crow and the fox, known to all readers of Aesop's Fables, is to be found on boxes put out by a Japanese manufacturer. The flying dragon legend is also represented.



Waving adieu to friends at San Francisco, C. F. Anderson, sets out for Little America by way of New Zealand, carrying 60,000 letters which he will cancel at the South Polar base.

Stamps Honor Two Scientists

SOVIET RUSSIA and Italy honor on stamps two scientists familiar to high school physics students—Galvani and Mendeléev. Galvani's first battery, made with a twitching frog leg, was displayed at Italy's Exhibition of Radio Electrical Biology.

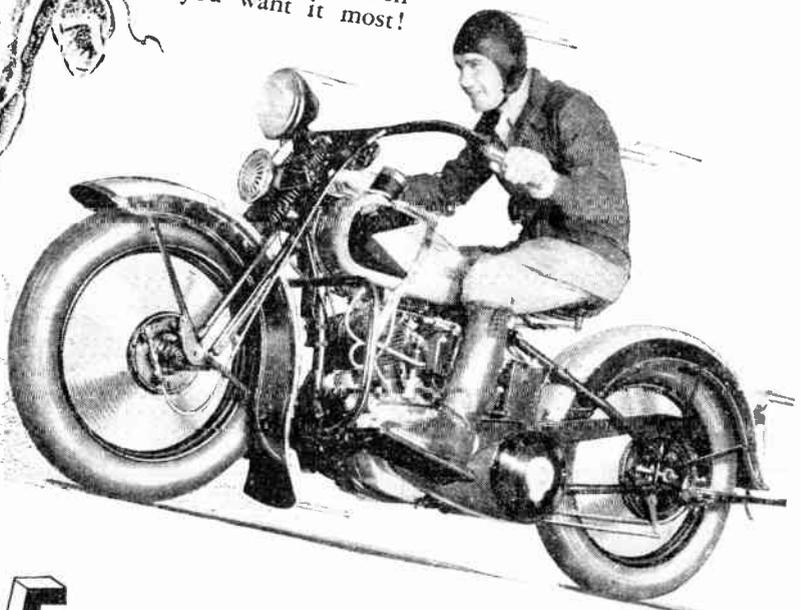


Italy lauds Luigi Galvani with simple portrait on frameless stamp, while U. S. S. R. portrays Mendeléev and Periodic Table of elements which he developed. Stamp dealers can supply both science sets in either mint or used condition.



Riding the PONY EXPRESS!

HARD riders — those men of the pony express. Urging foam-flecked ponies over winding trails. "Make time" — was the watchword of those daring men of other days. And "make time" is the slogan of Harley-Davidson riders today. Their tireless mounts need no urging. A twist of the throttle—and the new '35 Harley-Davidson takes you whizzing along the trail hour after hour. It's got what it takes for thrill-riding. Plenty of get-away — speed — stamina — and high-stepping style. No need longing to own one. Ask your Harley-Davidson dealer about his Easy-Pay Plans. Then have your Harley-Davidson NOW — when you want it most!



1935 HARLEY-DAVIDSON

Mail this Coupon

Harley-Davidson Motor Co. Dept. MM, Milwaukee, Wis.
 Interested in new 1935 Harley-Davidson.
 Send illustrated literature. Enclosing postage stamp to cover mailing cost.

Name _____

Address _____

My age is () 16-19 years, () 20-30 years, () 31 years and up, () under 16 years. Check your age group.



Italian airmail commemoratives.

Italy—Flying Man Aero Stamps Canada—Birthday For Province

STAMP collections someday may become complete history texts, if scenic stamps continue to be issued at their present rate. Canada marks the 150th birthday of the province of New Brunswick with a 2-cent red brown stamp having a seal as the motif. Italy honors Leonardo, who in 1500 drew up plans for a plane very similar to those which fly today.



Seal of Province of New Brunswick, showing three-masted schooner, on "birthday" stamp.

ADLETS FOR HOBBYISTS

STAMPS

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

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 different. Fair-Play Stamp Service, 1215 Browning Blvd., Los Angeles, California.

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. 903, Washington, D. C.

WORLDWIDE cancelled and unused, including Australia, Czechoslovakia, India, Japan, Latvia, Poland, Sweden, Ukraine, Union South Africa, etc. 100 varieties, 20c; 500, \$1.30; 1000, \$3.00. List free. McKee, 111 E. 13th, Covington, Ky.

MALDIVE ISLANDS, Brunei, Charkhari, Turks Caicos Islands, \$5 U.S., genuine Baden, and Imperforate "Park"—absolutely free to approval applicants enclosing 3c postage. Viking Stamp Company, One Hanson Place, Brooklyn, N. Y.

BRITISH TURKISLANDS—Also Congo's—Montecarlo—Nigercoast—Uganda—Djibouti—Ecuadorian—Ivorycoast—Ubangi—Countries collectors need. Free for 5c postage. E.M. PIRESTAMPSHOP, Dent. M.M., TORONTO, CANADA.

FREE! Gorgeous Packet, including Uruguay airmail, beautiful Spain, ship and triangle. To Approval Applicants only, enclosing 3c postage. Royale Stamp Co., South Pasadena, Calif.

AIRMAILS—from Brazil, Chile, Columbia, Ecuador, Mexico—all for only 10c with double premium penny approvals. Progress Stamp Service, Franklin Park, Illinois.

105 DIFFERENT, Guinea, Congo, Hyderabad, etc., 3c to approval applicants. EXTRA—Airmail Set free with above. HUNZIKER, Box 225-F, Minneapolis, Minn.

STAMPS! 100 diff. 3c; 500 diff. 35c; 1,000 diff. 90c! Illustrated Album (4000 spaces) 22c. Approvals sent. Tatham Stamp Co. (D9) Springfield, Mass.

HEADQUARTERS—Stamp Collectors! Lowprice Sets, Penny Approvals. Request selection. Elyria Stamp Company, 437MI, Elyria, Ohio.

FREE!!! Russia Ethnographic Set of Ten Pictorial Stamps, Postage 3c. ROBERTS, 901T Fourth, Baycity, Michigan.

SENSATION: Airmails from 10 countries; U. S., South America; Pictorials 10c. A. Steele, Springdale, Pa.

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

110 DIFFERENT Stamps Free to approval buyers. Postage 3c. M. Badger Stampco, Milwaukee, Wis.

FREE! 25 Different United States to approval applicants. Brownie Stamp Shop, Flint, Mich.

COINS

\$2000.00 FOR 1c. We pay the World's Highest Prices for old coins, encased postage stamps and paper money. Large Cents up to \$2000.00 each, Half cents \$250.00, 1909 cent \$10.00, Indian head cents \$50.00, half dimes \$150.00, 25c before 1873 \$300.00, 50c before 1879 \$750.00, silver dollars before 1874 \$2500.00, gold dollars \$1000.00, trade dollars \$250.00, 1822 \$5 gold \$5000.00, old paper money \$26.00, encased postage stamps \$12.00, certain foreign coins \$150.00, etc., send dime for large illustrated list. Romanocoinshop, Dept. 420, Springfield, Mass.

FREE—Foreign coin, banknote, and large illustrated coin catalogue—4c postage. Souvenir California gold quarter size 26c; \$1; size 53c; both 65c! Round or octagon, set of each \$1.30! Approvals with each order. Tatham Coinco, Springfield—9, Mass.

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, FD-111 West Jackson, Chicago.

FINE old Spanish silver "Pieces-of-Eight," also latest book on buried treasure by Harold Wilkins, World foremost authority. 128 Nelson St., Kingston, Canada.

WE PURCHASE All Indianhead Pennies. Price range 5c — \$55.00. Purchasing catalogue 10c. Photonumismatic, 100 Forsyth New York.

CALIFORNIA gold, quarter size 27c; 1/2 size 53c; 100 different stamps and catalogue coins & stamps 10c. Norman Shultz, Salt Lake, Utah.

OLD MONEY Wanted. \$5.00 to \$2,500.00 each paid for old coins. Buying catalog 10c. Robert Cohen, Box 483, Muskogee, Okla.

HIGHEST Prices paid for Indian Head Pennies. Send dime for list of those wanted. Coin Shoppe, Box 407-MM, Ottawa, Ill.

WANTED—1931 Cents, other coins. List—dime. Michael Smith—Coins, Ambridge, Pennsylvania.

STEAL POWER from the AIR!

NEW INVENTION

Saves Gas

Users report
4 to 6
miles more
per gallon

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.

\$180
Saved by
Motorist!

V-8 FORD I installed both Vacu-matics and they work excellent. On my own V-8 Ford I notice wonderful performance in pickup, get-away and gas saving. — Burt Burnett, Mich.

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 V-8 Ford. Everybody is well pleased.—J. O. Carll, Texas.

PLYMOUTH I am amazed at Vacu-matic performance. It's giving me 5 more miles per gallon. Walter Zielinski, Ill.

CHRYSLER Have tried the Vacu-matic and it sure is fine. Better pick-up with a 30% gas saving.—John C. Martin, Pa.

CHEVROLET The mileage on my 1933 Chevrolet jumped from 18 to 22 miles per gal. with Vacu-matic. Paul P. Haas, Mass.

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.

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.

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 per gal. The difference makes.—James

BIG CARS TOO Everything you claim about Vacu-matic is true. I now get 20 miles to the gallon on my Buick. Before I was only averaging 15½ miles.—C. Constantino, Fla.

VACU-MATIC

The
Carburetor Control
that **BREATHES!**

Now Automotive engineers have discovered the way to more perfect carburetion! The new VACU-MATIC solves the secret of greater power! With magic 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.

New-Automatic - 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 balancing air and gasoline automatically for all speeds. Vacu-matic is *entirely different!* It is AUTOMATIC and allows the motor to "breathe" at the correct time, opening and closing automatically as required. No idling troubles—no carburetor adjustments necessary. Just put it on and forget it! 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 unusual profits, check coupon. Exclusive territories are now being granted.

Fits All Cars

VACU-MATIC is constructed of six parts, assembled and fused into one unit, correctly adjusted and *sealed at the factory*. Nothing to regulate. Anyone can put VACU-MATIC on in a few minutes. Once on 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 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. "On my Nash I gained 17½ percent in mileage," writes J. Showalter. "Car idles down to 2 miles an hour and takes gas without a complaint." Arthur Williams—"On our Oldsmobile a test proved 18 miles per gal. Before we considered 13 good." Albert Richards—"With a Vacu-matic on my Model A Ford I increased from 18 to 24.7 miles per gallon. I am more than pleased. It paid for itself on just one trip."

Free Details

Learn about this remarkable device. See why your car is costing you extra money to operate without VACU-MATIC. Its cost is surprisingly low—often paying for itself on one trip or in a few weeks of driving. Don't drive your car another minute until you learn about Vacu-matic. Get the facts! Write today.

FREE OFFER COUPON

THE VACU-MATIC COMPANY

7617-75 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.

The VACU-MATIC Co.,

Wauwatosa, Wis.



● He's the "trouble-shooter" on all glue problems for LePage's—and he ought to know glue. Born with a glue brush in his hand, he has handled all kinds for nigh on sixty years.

Capt. Johnson was a woodworker at the age of 10—then cabinet maker, blue-water sailor, ship's carpenter, captain of square-riggers, master carpenter and pattern maker.

You're invited to send your problems to Cap'n Johnson because he can tell you whether you are using the right kind of wood, the right kind of joints, a hard glue or liquid glue—or a fast or slow setting glue. He'll tell you what glues will discolor in veneering or whatever the work in hand might be. Feel free to write him on any gluing problem. Just address your letter to Capt. Oswald Johnson, Russia Cement Company, Gloucester, Mass.

RUSSIA CEMENT COMPANY

Laboratories and Factory • Gloucester, Mass.



BIG 1935 LEADER

GENUINE LEATHER TIES

4-In-Hands and Bow's; Men's and Boy's. Fancy patterns. Look like silk. Cleaned with a damp cloth. Durable; won't wrinkle. SELL ON SIGHT. Big profits; repeat orders. Be independent; have your own business. B. M. SOLD 30 IN 1½ HOURS. No sales ability needed. Send 50¢ stamps for sample and kit. Information free.

CENTURY TIE CO., Dept. 7, 2333 W Grand Blvd. DETROIT, MICH.

OLD MONEY and stamps WANTED



POST YOURSELF! It pays! I paid J. D. Martin, Virginia, \$200 for a single copper cent. Mr. Manning, New York, \$2,500 for one silver dollar. Mrs. G. F. Adams \$740 for a few old coins. I want all kinds of old coins, medals, bills and stamps. I pay big cash premiums.

I WILL PAY \$100 for A DIME

1894 S. Mint; \$50 for 1913 Liberty Head Nickel (not buffalo) and hundreds of other amazing prices for coins. Get in touch with me. Send 4¢ for my Large Illustrated Coin Folder and further particulars. It may mean much profit to you. Write today to

B. MAX MEHL, 90 Mehl Bldg. Fort Worth, Tex.
(Largest Rare Coin Establishment in U. S.)

Customs Officials Expose Fakers

[Continued from page 69]

also, in texture and feel. Hand-made bolts also show inequalities and the ends taper to a point. Those made on a machine have the end cut off square.

"In checking on chairs the bottom of the leg is always scrutinized carefully. A chair 100 years old has been dragged around until the ends of the legs have acquired a polish that cannot be imitated.

Green Wood "Antique" Cures

"We turned down a shipment of eight chairs once in the face of assertions by outside experts that they were genuine. The upholstery was ancient in design and quality, but unworn, although the chairs were supposed to be 150 years old. Our examiner pulled out a few upholstery nails and there was no indication that other nails had ever been driven into the chair. A splinter of wood from the exposed edge was tested and it proved to be still green with sap.

"Several years ago we aroused the wrath of an Ohio woman, an interior decorator, whose purchase abroad of several small commodes was held up. The maker had copied old designs perfectly and had used wood of antique appearance for the outside, but the skeleton framework inside was patently new. It even showed the marks of a circular saw, and the runners of the drawers were not even worn down. A scratch through the varnish revealed that the apparently old wood was new too.

"The maker had used what we call a 'dirty stain.' Its composition includes, maybe, mud, ink, rusty nail water, lamp black, or what not. To the uninitiated, this imparts an unimpeachable aged appearance.

Create Wormholes With Shotgun

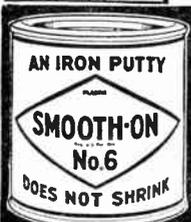
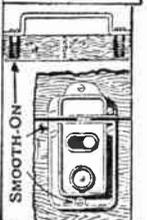
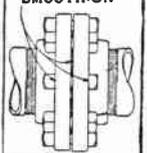
"Wormhole makers ought to remember to pick the bullets out of the wood before sending the furniture over here. Very frequently we find the shot still embedded at the bottom of the hole. And the nature fakers ought to know that real wormholes are never perfectly round or uniform.

"The tourists abroad are the worst hit. They pay fancy sums for supposed antique bronzes. These are made of lead, electroplated by the most modern process and pickled in sal ammoniac to produce the verdigris patina. We turn the object up and the base shows small round dots caused by the action of the electric current. If the bronze had been cast those marks would never be there.

"But the United States government is not out to 'get' anybody. It is an odd sight, though, to see a man who goes to Europe and throws his money around, then comes home and kicks when he gets stuck for a fine at the customs house."

YOU NEED THIS FREE HOME REPAIR BOOKLET

Contains diagrams and simple instructions for emergency and routine repairs that every home and auto owner can and should make himself. Revised edition, greatly enlarged and completely rewritten. Get a copy for your workshop.



Do it with SMOOTH-ON

BE THRIFTY—do your own work—and keep the money otherwise paid to plumbers, repair men and for new parts.

With Smooth-On No. 1, you can stop leaks at joints, seams and cracks in pipes, boilers, heating systems, tanks, pails, auto radiators, water jackets and crank cases, tighten loose parts, reset stripped screws, bolts and nuts, and make dozens of other equally practical repairs—all at almost no cost, and in emergencies without the delay of waiting for outside help.

Smooth-On No. 1 is applied without heat or special tools, hardens into metallic iron and holds permanently under any pressure and on any metal, masonry, wood and tile. Leading power and industrial plants have used it for 35 years, and with this new booklet as a guide, you can make equally successful applications.

When you know where and how to apply Smooth-On No. 1, you will make constant savings. Be prepared. Ask us for the booklet and buy Smooth-On No. 1 in 7-oz., 1-lb. or 5-lb. can from your hardware store.

When You Change That Boat

[Continued from page 103]

whale boat or other boats of the double end type are the most seaworthy. The sharp bowed, wide sterned boats in most cases are the most unseaworthy.

Modern styles have dictated certain definite exterior appearances for yachts. Most every amateur that remodels a boat tries first of all to get full headroom in his cabin. If your boat is under thirty feet in length, don't try it; the finished product will look too high, very likely have a bad roll. A leading naval architect once remarked, "What good is headroom, anyway? The first thing you do when you get into a cabin is to sit down."

If a cabin is really necessary on our boat, we must either design one that will accommodate us, or get a boat large enough to put a decent cabin on.

The best insurance against homely appearances and uncomfortable quarters is a definite plan of operations before you begin. A scale drawing of the completed alterations is by far the best guide.

Strength is necessary in any boat that is to "take it" in a seaway. A good rule to follow in making additions to a boat is to have all new frame members the same size, or larger than, those originally in the boat.

Winners of First Home Contest

[Continued from page 53]

tion across one end of the room, about 6' from the wall, using 2"x2" studding covered with tile-shaped insulation board in bright and varied colors. Walls and ceiling of the room are covered with the same material.

If puppet shows are to be put on, a stage can be built, and a row of floodlights installed. Otherwise just place a silver screen for movies at the back of the stage opening. A curtain with pull cord is highly desirable here.

Opposite the stage, benches and shelves may be built in for use as a study or "Bridge Nook." Make the benches 15" wide and 18" above the floor, then cover with pads of the same material used for drapes.

A ping pong table suspended from the ceiling by four ropes forms a reflector for the six ceiling lights in the center of the room. Sash weights running behind the walls and connected with ropes counter-balance the weight of the table.

Two wooden horses, used in place of legs, make the playing surface more rigid. For the table top use any heavy grade of wall board, and place decorative panel striping on the bottom side. The table when up reflects light back against the ceiling, softening the illumination of the room; when down, light is directed on the playing table, where it is needed.

SMOOTH-ON MFG. CO., Dept. 69,
574 Communipaw Ave., Jersey City, N. J.

Please send the free Smooth-On Repair Book.

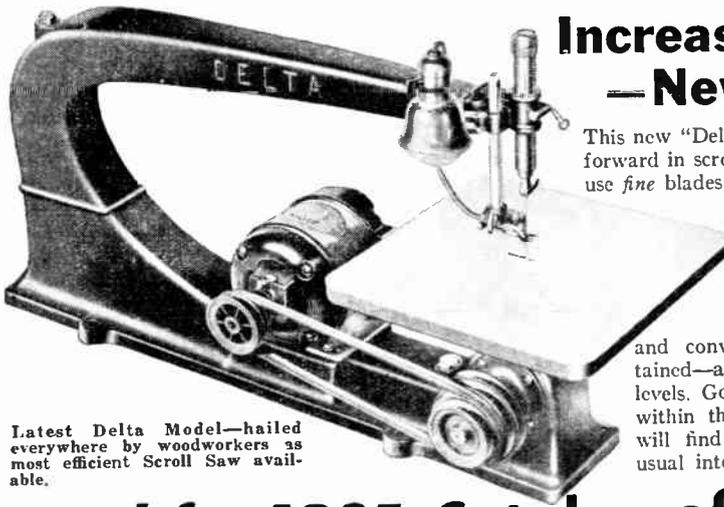
Name

Address

3-35

New Scroll Saw

Increased Efficiency —New Features

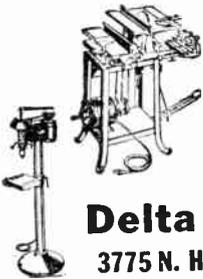


Latest Delta Model—hailed everywhere by woodworkers as most efficient Scroll Saw available.

This new "Delta" Scroll Saw is another great step forward in scroll saw performance. Enables you to use *fine* blades at *full motor speed* without danger of breakage. Has many other novel and useful improvements. 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 1935 Catalog of "Delta" Tools

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 10c 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.



Delta Manufacturing Co.

3775 N. Holton St., Dept. M335, Milwaukee, Wis

DELTA MANUFACTURING COMPANY

3775 N. Holton St., Milwaukee, Wis. Dept. M335

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.....Are?.....

Address.....

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

Check here if you are a Delta user now.

This may be your BIG OPPORTUNITY

Become an expert PHOTOGRAPHER. Growing demand for trained men and women. Wonderful money-making opportunities. Lifetime career. Learn quickly. COMMERCIAL, NEWS, PORTRAIT or MOTION PICTURE PHOTOGRAPHY. Personal attendance or Home Study courses. 25th year. Free Booklet.

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10 West 33rd St., Dept. 153, New York



Earn Cash at Home!

Grow fancy giant mushrooms in cellar, attic, barn. New, easy, odorless method. We show you how, furnish guaranteed materials and buy crops. Valuable big book and pictures free if you write quickly. (Est. 1908.)

UNITED MUSHROOM CO.
3848 Lincoln Ave., Dept. MM-3 Chicago

Fast Runabouts—Cruisers—Outboards

Build Your Own Boat!



Row Boats—
Tenders, Sail
Boats, Canoes

INDIVIDUAL CHARM
ARTISTIC BEAUTY
LUXURIOUS COMFORTS
UNCHALLENGED SPEEDS

and seaworthiness are easily recognized in the Germain-Craft
Boating is clean, healthful sport and building your own boat from our building plans and instructions, full size paper patterns, or semi-erected frames and ready cut materials is a profitable pleasure. Twenty-five models to choose from. Germain boats are backed by more than thirty-four years of careful designing and the construction of many of the finest pleasure and racing craft produced in this country.

GERMAIN BOAT COMPANY
506 S. Niagara Saginaw, W. S. Michigan

Send 10¢ for CIRCULAR

FREE TRIAL LESSON In Free DRAFTING



Tear out this ad, sign your name and address and mail it to address below for FREE TRIAL LESSON in DRAFTING. Prove to yourself how easy it is to learn AT HOME to make Mechanical, Electrical, Architectural or Structural Drawings. DRAFTING is the key to the best paid positions in industry. New opportunities now opening. Get an early start toward a good position while learning in spare time at home. We furnish all tools, etc. Send now, TODAY, for your FREE TRIAL LESSON.

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Thank You for Mentioning Modern Mechanic and Inventions for March When Writing to Advertisers

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.*

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

Abrasives	Disinfectants	Hair Tonics	Patent Leather
Adhesives	Dyes	Incense	Photographic
Air Conditioning	Electrotyping	Inks	Specialties
Alloys	Etching	Insulation	Polish, Auto
Anti-rusts	Compounds	Jams and Jellies	Porcelain
Aromatics	Explosives	Kalsomine	Preservatives
Asphalt	Fertilizer	Lacquers	Printing
Bronze Lacquers	Fireproofing	Latex Paint	Refrigerants
Candles	Fireworks	Leather Polishes	Rubber, Synthetic
Candy Glaze	Fluxes	Liniment	Safety Glass
Carbonizing	Fly Killer	Liquors	Shaving Cream
Catalysts	Food Specialties	Lubricants	Soaps
Celluloid	Gems, Artificial	Matches	Solvents
Cement	Glass Polish	Metallizing	Stencils
Cream, Cold	Glues	Matrix, Rubber	Tooth Paste
Coffee Substitutes	Gold, Plating	Mirrors	Waterproofing
Colors for Oils	Grease,	Nickel Plating	Zinc Etching
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Modernize Home at Small Cost

[Continued from page 85]

Here, in brief, is what was done. The present porch and front dormer were removed. Fortunately, the main roof was of steep pitch—45°—and this fitted in nicely with the English architectural style. The wide overhang was cut off and a simple closed cornice substituted. A large half-timbered gable was placed in front with stone veneered walls to the top of the first story. This addition projects 4 feet beyond the former front wall of the house. To obtain more space, the living room was extended 10 feet toward the south.

The upstairs sleeping porch was added on the south side. Since the new front gable increased the floor area here, this added space, greatly improved the front bedroom, and also improved closet accommodations.

Brown stained cedar shingles were applied to all pitched roofs. Gray stained cedar shingles, 24" long, were laid over the old sided walls with an exposure of about 10" to the weather. Locally quarried limestone was used for the stone veneer. Cement stucco, ivory color, was laid on metal lath.

An example of modernization with a farm setting is also shown herewith. Figure 5 shows a large, rambling farm home, getting along in years. Figure 6 shows the same home after it had been brought up-to-date.

Sharp Shooting On the Alleys

[Continued from page 57]

ground. The results are usually ordinary or less than that.

Another group picks out a spot just beyond the foul line and another spot half or three-quarters of the way to the head pin and endeavor to send their ball over both spots. This method approaches precision, but it is a bit involved.

Spot Bowling

The vast majority of good bowlers use a method known as "spot" bowling. They pick a spot on the foul line from which their particular style of delivery works best and are extremely careful to see that the ball starts from that spot every time. The "spot" bowler always starts for the foul line from the same position on the alley, goes to the line at the same speed, and uses the same back swing. After the ball has left his hand, he watches it carefully, checking the angle of roll and makes necessary corrections when he fails to obtain a strike.

There are three standard types of delivery—the straight ball, the back-up ball, and the hook-ball. The straight and back-up balls are the easiest for the novice to control. The hook-ball, while the most effective strike

[Continued on page 126]

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Falconry Is Newest Hunting Sport

[Continued from page 75]

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The eyas, once captured, should be immediately taken home in a soft padded container, and released in an absolutely dark room. Never keep a falcon in a cage; he will destroy himself by his assaults on the bars. It is important that the bird be kept in utter darkness for the first few days because this reduces the visible number of strange new objects and prevents the onset of a jerky, nervous disease known as "bating." Before the bird is taken out of the dark room, a soft leather hood is placed over his eyes. This hood must fit snugly.

At the same time, strips of leather known as "jesses" are fastened to his legs just above the foot. These jesses are joined to a swivel attachment to which a leash is fastened. Small bronze bells are also secured to each foot.

The hawklet is now ready for his first lessons. Hooded and belled, he is carried on the gloved hand of his trainer for several hours a day to accustom him to his perch on his master's fist. Gauntlets should be worn to minimize the danger of injury from the bird's sharp beak and talons. The young bird is stroked with gentleness. Speak softly to it with the hood over its eyes. Some trainers constantly smoke a pipe in front of the bird for the first three days and nights. The smoke

[Continued on page 128]

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Sharp Shooting On the Alleys

[Continued from page 122]

producer, is very hard to control and cannot be used efficiently without continuous practice.

A set style of play is important. The man who ambles to the line and sends his ball doddering down the alley may be just as effective as the active speed-ball merchant—they vary only in style.

Beginners should pick up a set style early and stick to it. A variation of impressions is only confusing.

How to Score

Scoring in bowling is not as complicated as many persons believe. A bowler is allowed two balls in each frame or inning with which to knock down the ten pins. If he makes them all with his first ball, he is given a strike, whereupon he makes the mark (x) in the small right hand square and adds to the ten for that frame the number of pins he makes with his next two balls. Thirty is the maximum for any frame, and is made if the bowler gets three consecutive strikes—10 for his original strike and 10 more for each strike on his two successive balls.

If the bowler requires two throws in a frame to get the ten pins it is a spare using the mark (/) and he receives his 10, plus the pins he makes with his next ball. The maximum on a spare is 20, and is made when a spare is followed by a strike.

If one or more pins remain after two attempts in one frame it is a miss or blow using the mark (-) and he receives only the number of pins he makes in that frame.

A specimen score is illustrated. It shows that the bowler had this success in one specific game.

In the first frame, he scored a strike, followed by strikes in the second and third. The first strike is worth ten plus the number of pins knocked down with the next two balls. In this case, it was 20, making a total of 30 for the first frame. In the fourth frame, the bowler got eight pins with his first ball. This added to ten for the strike in the third and ten for the strike in the second frame makes 28 for the second frame plus 30 in the first or 58, the total score up to the second frame.

There was a blow in the fourth frame, the bowler getting only nine pins with two balls or 19 for the third frame. This makes the score 77 and 86 for the third and fourth frames. Ten pins with two balls went down in the fifth, and the scorekeeper marked up only the spare marks until the first ball in the sixth was bowled. This was a strike, adding 20 points to the score in the fifth.

The remaining frames were scored in a similar manner.

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29 x 4.75-20	2.5095
29 x 5.00-19	2.85 1.05
30 x 5.00-20	2.85 1.05
28 x 5.25-18	2.90 1.15
29 x 5.25-19	2.95 1.15
30 x 5.25-20	2.95 1.15
31 x 5.25-21	3.25 1.15
28 x 5.50-18	3.35 1.15
29 x 5.50-19	3.35 1.15
30 x 6.00-18	3.40 1.15
31 x 6.00-19	3.40 1.15
32 x 6.00-20	3.45 1.25
33 x 6.00-21	3.65 1.25
31 x 6.50-19	3.60 1.35
32 x 6.50-20	3.75 1.35

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Ideas For Amateur Stage Builders

[Continued from page 95]

dip odd scraps of cloth left over from earlier scenery jobs and apply the cloth to the wire. Apply cloth smoothly, cutting it with scissors as you go around corners. When the rocks are dry paint them in any color you desire.

The first step in constructing stage props from papier mache is to model the object desired out of clay or plasticine on a modelling board. Then make a simple wooden frame deep enough to cover the model and place around it. Paint the model, the board on which it rests, and the inside of the frame either with sweet oil or a strong solution of ordinary soap to prevent the plaster of Paris from sticking. Pour in a thick, creamy mixture of plaster of Paris and allow it to harden. When hard, remove the clay and you have the negative mold. Paint its interior with sweet oil or soap. Tear newspapers or old wrapping paper into narrow strips and dip them in glue, covering the interior of the mold completely to a depth of about one eighth of an inch. When the glue is completely dry, remove carefully from the mold with a thin knife and paint.

Falconry Is Newest Hunting Sport

[Continued from page 124]

is believed to act as a soothing drug on the bird, and also impresses it with the constant presence of its master.

The first feeding is given by candlelight at the end of 48 hours. The mild glow of the candle does not frighten the bird when the hood is taken off for the first time. Small strips of fresh raw beef, warmed slightly, and held in the trainer's fingers, are fed to the bird. Before the end of the meal the hood is replaced, so that the hawk will not associate hooding with the end of his dinner.

After a week or ten days of "carrying" the bird and feeding him by candle-light (he has meanwhile been exposed to other objects, sounds, and persons, quite gradually) he is introduced to the "lure," a very important part of his education. The lure is a rough imitation of a bird, attached to the end of a thirty-foot string. To make a lure, you take a weighted leathern disc and attach pigeon wings to it, in order to give it the appearance of reality. In the center of the disc, some fresh meat is fastened; for the next week or more, all the hawk's meals are given to him, unhooded, on the lure—which he gradually learns to associate with feeding.

Now comes the first step in teaching the hawk to attack. Food is placed in the center of the lure, and it is then thrown a few feet away. The hood is removed, the bird sees the lure, and pounces upon it. If he does not immediately attack the lure, he is hooded

[Continued on page 145]

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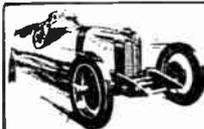


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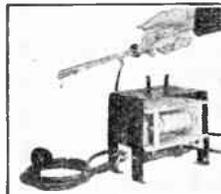
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WELD-BRAZE SOLDER WITH NEW ELECTRARK

ONLY. . . .

\$7.50 PREPAID

COMPLETE With All EQUIPMENT



EASY TO OPERATE

Mechanics, experimenters, garages, home workshops, "Fixit" shops, battery men, all use Electrark Torches to weld, cut metals, braze, solder, and melt. Electrark operates from any 110-Volt A.C. or D.C. light socket. An actual operating cost of less than 5c per hour has been reported. Carry it right to the job, plug in, and operate at a minute's notice. The weight is small. Over-all dimensions only 4"x7"x8", with convenient carrying handle.

NO EXPERIENCE NECESSARY

A complete, illustrated instruction book makes operation simple on the most difficult jobs, and teaches you step by step to do excellent work. Merely plug the Electrark into any 110-V. light socket, put the arc into operation, and start actual welding. The current is small, automatically controlled to fit the work. It generates a pure, steady "flaming" hot arc that is easy to handle and will melt the toughest metals in a few seconds.

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There are so many uses for Electrark that it is nearly impossible to list them all. A few jobs you can do for yourself . . . or for others at a profit are: Repairing cracked auto blocks and castings; Welding auto fenders and bodies; cutting out metal designs; burn holes in the hardest metals; weld and braze decorative iron furnishings; re-babbit worn bearings.

ALL EQUIPMENT—INSTRUCTIONS



All the supplies and equipment needed to operate the Electrark are included in every \$7.50 outfit. With the supplies you can braze all metals, weld, cut metal, solder—not only for yourself—but for others at a profit.

The Instruction book tells you how to do almost any difficult job that may come up. Included are: $\frac{3}{8}$ " carbon electrodes; toban bronze for brazing; $\frac{1}{8}$ " carbon electrodes; Assorted mild steel filler rods; Goggles; Instruction book; Special "quick-way" Solder; and Welding flux. These supplies will last many hours of constant usage and can be replaced at low cost.

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Without obligation to me, send me details of your heavy-duty, master welder, price \$35.00.

Send me complete details of your User-Agent Sales Proposition.

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Please send me, without obligation, your Free Book, "Art for Pleasure and Profit."

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Slicing Microscope Sections

[Continued from page 61]

one that uses the entire cutting edge of the razor.

While a few materials, as plant stems or roots, may be cut fresh, most will be too soft for this treatment and will crush or tear. *Hardening and fixing* to prevent decay are essential. One of the best general fixers for plant tissues is Chrom-Acetic Acid, made by mixing 1 gram of Chromic Acid and 3 cc (cubic centimeters) of glacial acetic acid with 100 cc of water.

Place sections of plant stems, as cut, in a vial of this fixer for 48 hours, then wash in a very gentle stream of running water for 24 hours. Use a wide-mouth bottle fixed up as shown in the sketches, with a drop-by-drop stream of water.

After washing comes the process of *dehydration*, in which the water content of the material is gradually replaced by alcohol, which also accomplishes hardening. Transfer the sections to a vessel containing 50% alcohol for 10 minutes, then into 70% alcohol for a like stay, and finally into 82% alcohol where they may be left indefinitely.

Training Air Transport Pilots

[Continued from page 63]

Government inspectors now give rigid examinations in blind flying; if a pilot gets mixed up too much and becomes panicky, he gets no license—at least for a while.

The Secret of a Good Landing

Learning to land an airplane is easy if a student will remember one point which is seldom stressed or explained to student flyers, perhaps because it is not generally known. It is this: *The human eye begins to focus upon detail at a distance of about twenty feet.* If a student pilot, when approaching the ground for a landing, will note that moment when blades of grass, pebbles, sticks or anything on the ground suddenly loom up in detail, he will know it is time to level off for his landing. A lot of veteran aviators cannot tell how they know when to level off for a landing—they just do it.

Aviation Schools Teach Blind Flying

Despite the many things a regular transport pilot must know and be able to do, it is not at all impossible for a young man to learn to fly and reach this goal in two or three years.

A school for chief transport pilots already exists in the co-pilot job. The big air liners must have co-pilots who have also passed the transport license examination, but they are men usually of much less experience than the chief pilot. Co-pilots take over the controls occasionally, and help watch the instrument board.

425 Power - \$18.50

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Highest magnification you can buy at anywhere near this price. Fine optical quality, too—made by same experts who produce our world-famous movie and portrait lenses. Magnifications, 100 diameters to 425. Corrected for photomicrography. At dealers, \$18.50. Or direct (check with order or C. O. D.) post-paid, under money-back guarantee.

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- 110 to 235-power model, - - \$15.50
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- Home Slide-making Set, - - \$ 3.50

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INVENTORS

SEE PAGE 12

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Plenty of Capital Available for Good Inventions or Business Ideas. We help you raise it. If you have a good idea or invention, patented or unpatented, and want to get into the \$10,000 a year class, send \$1 today for "A PROVED PLAN OF RAISING FROM ONE TO ONE HUNDRED THOUSAND DOLLARS."
MORRIS HITE, 612 Cotton Exch. Bldg., Oklahoma City, Okla.

AT LAST! A REAL POCKET RADIO



Can actually be carried in pocket or purse! No tubes—batteries—nothing to wear out. NO crystals to adjust. Simply clip to any metal object as desks, beds, telephones, etc. One control—gets all stations 50 to 100 miles; Short wave & police calls also! No complicated hookups or wires needed! Verified 1000 mile reception! Foolproof—and practical—great novelty. Can be used ANYWHERE while walking, riding, etc.! Complete with tiny phone. Nothing else to buy. Send only \$1.00 and pay postman \$1.95 plus postage or send \$2.99 (M.O., Currency, Checks). Ideal gift for any boy. Complete Ins., included. Guaranteed. *Over 100,000!*

TINYTONE RADIO CO. Dept. M Kearney, Nebr.

Earn Money with this WONDERFUL NEW INVENTION!

Real Money Maker for Part or Full Time AGENTS!

Make quick PROFITS with new, patented invention—sell on "flash" demonstration. Main or side-line. Big, new market.

Soldering Iron and Blow Torch IN ONE!

Light, portable. Eliminates pump, pressure system, stove, charcoal—ALL!

PROOF IT SELLS—Agent Rowland earned \$300 a month. — Ware sold 60 irons while stopping in hotel! "Going like hot cakes," says Bailey.

WRITE quick—get established for EXCLUSIVE territory. A postal will do!

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Below 1/2 Mfg's. Original PRICE

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NOW Yours for 10 Days No Money Down—



Think of it—over 2 million buyers paid \$102.50 (cash) for this model No. 5 now offered direct-to-you at way below 1/2 original price—and on easiest terms besides. Positively the greatest bargain ever offered. Accept the special 10-day trial offer and be convinced. See the neat, perfect work it does—compare its bright, shiny newness without risk. Recognized as the finest, strongest typewriter built.

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Here is positively the chance of a lifetime to own a World-famous Standard Underwood No. 5 completely refinished at the very lowest price and easiest terms. All complete with modern improvements

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Learn Touch Typewriting,



Learn touch typewriting free! Complete (home study) course of famous Van Sant System given with this offer. Fully illustrated—easily learned.

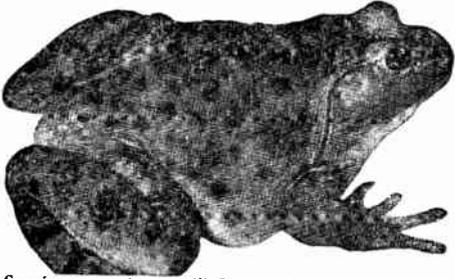
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Send Underwood No. 5 (E. O. B. Chicago) at once for 10 days' trial. If I am not perfectly satisfied I can return it express collect.
If I keep it I will pay \$3.00 a month until I have paid \$41.90 (term price) in full.

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Special breed "Nutond" Giants weigh up to 3 lbs. each.

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MAKE BIG MONEY raising giant frogs. Breeder lays 10,000 eggs each year. Bullfrogs sell \$1 to \$3 per dozen. Biggest money-maker you can raise.

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CANNED Frog Legs opens up a NEW, Giant Market. Wild frogs almost gone. Demand exceeds supply. Be a frog raiser.

START BACK YARD—ANY CLIMATE

Small pond starts big business. No experience necessary. No equipment except fence.

Get the facts on this new industry. Our big FREE book explains everything.



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On small or large scale for our NEW LINE of Cast Metal 5 and 10c Novelties, Toy Automobiles, Ashtrays and other all year sellers. No special place or experience necessary as we furnish full instructions with moulds and cooperate in selling, also buy finished goods. Chance of a lifetime for man with small capital to get into this new and profitable industry. If you mean strictly business and are over 21, write AT ONCE for details as we are now closing arrangements for 1935 business.

METAL CAST PRODUCTS CO.
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Home Manufacturing Enterprises



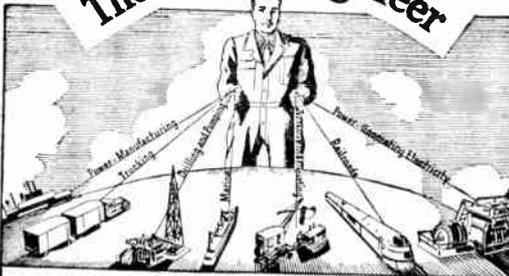
shows you how to make all kinds of useful novelties of wood, tin, plastics, leather, reed. List of contents—Section 1. Novelties of leather. 2. Useful items from cans. 3. Typewriter ribbons. 4. Novelties from wood. 5. Plastic molds. 6. Lawn furniture. 7. Novel baskets. 8. Reed work. Price 25c pp. with six months subscription to Home Industries free.

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Diesel engines — because of their high efficiency, dependability and economy of operation — are fast replacing steam and gasoline engines in power plants, motor trucks and busses, locomotives and ships, tractors, dredges, drills, pumps, etc. — opening up steady, well-paid jobs for Diesel-trained men.

You can get the necessary training at home on all the latest Diesel developments — two- and four-stroke cycles; solid- and air-injection fuel systems; low- and high-speed and heavy duty types; Diesel-electric generating systems, etc. Course includes all text material — with special diagrams making possible quick understanding of this new type of power.

A Gold Fortune from Four Dollars

[Continued from page 49]

the hills who have had the key to riches in their hands and have not recognized it.

"We all had jobs in mines around here," said Parfet. "That staked us to food, shelter and clothing. We'd work days for wages and on Sundays, holidays and summer evenings, we prowled the hills looking for our mine."

Then one Sunday a sample panned rich. The vein was on private property. One that people said had been "worked out." They knew the moment they looked at the pan that here was a find; a new vein nobody else had found—at a spot where thousands upon thousands of miners had passed in years past.

Start Operations on Small Capital

He told how the four kept their heads, and their jobs, after they had struck this find. They worked eight hours for wages, got supper, then went up to the lease and while after-glow lit summer evenings, they put in another day's work on their mine.

Every stick, bolt and bearing of that outfit has been assembled out of salvaged, donated or reclaimed equipment except the sprocket and shaft for which Parfet paid \$4.25.

The two giant timbers of the scaffold and all the rigging on it are salvaged junk.

Let us look inside the cabin on the hill. A very ancient Dodge motor car makes the power plant. It has been cut off about four feet back of the cowl, the gas tank is on the right fender, decking has been built where footboards had been, the front seat has been removed, and the operator sits in a barrel chair facing what has been the left hand side of the car. In front of him, parallel to the car, is the cable drum assembly.

Runs Blower for Forge

As though this were not enough, they put a wooden pulley on the shaft between the engine and the first sprocket, a belt runs from this, and turns the blower for the forge which is on scaffolding above the engine level. Between the blower and the pipe that delivers the air into the side of the forge is a section of automobile tire inner tubing. It is the "expansion" joint. The forge is a section of old smokestack, cut off, set on the ground, filled with dirt and fire cement to close to the top. The air line, fitted with a valve, enters the side of the old smokestack, and turns to come up in the center of the fire cement bowl.

If you searched out every "strike" in the hills you would find a story something like this back of it; but with each confirmatory case you would get new, emphatic evidence that the right kind of men, who will stick, stand a chance of making just as good as those old timers did in early days.

For MORE PAY learn DRAFTING FROM AN ENGINEER

Learn by mail at home

Prosperity is coming. Be prepared for a bigger, better job. Get the training now.



These TOOLS and Other EQUIPMENT Given When You Start



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Engineer Dobe

WRITE for valuable book, "Success in Draftsmanship"—free. See coupon below.

I'LL TRAIN a number of selected students as practical Draftsmen.

Yes, I furnish you all tools and a drawing table. And I'll teach you in a surprisingly short time by mail in your spare time until you actually have a desirable draftsman's job so that you are fully satisfied.

Trained men needed now; jobs pay \$50 a week or more; be prepared!

Keep the job you have now while training. I'll tell you how to start earning extra money a few weeks after beginning my training. Get started now. Send coupon.

Jobs Open NOW!

After training you I help you to a job without charging you a cent for this service. For 30 years employers of Draftsmen have been writing me when they want help.

**Aviation
Electricity
Machinery
Auto Work
Building Work**

All these industries and others, too, must have draftsmen in their offices. These industries are now growing fast; be prepared. You do not need a high school education to learn by the Dobe method. No previous experience necessary. But you must have willingness and a record of honesty.

Money Back if Not Satisfied

You must be entirely satisfied with my personal training UNTIL COMPETENT and UNTIL assisted to a position OR (notice this!) you get ALL YOUR MONEY BACK.

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TWENTY new practical changes for automobile generators. See our advertisement at bottom of page 32. Auto Power, Inc.

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ADVERTISE—24 words in 250 newspapers \$10. Lists Free. Advertising Service Bureau, 4650 Drexel, Chicago.

FREE NEW advertisers rate guide. Brown Advertising Agency, 140 South Dearborn, Chicago.

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\$200 to \$800 monthly in small territorial business. Large profits for you making mushroom spawn at home. Thousands use it. Patented. Only equipment needed—typewriter. No canvassing, all mail order at home. 5c investment brings \$2.50. Enclose 3c. coin, for descriptive folder, bank statements, etc. NORTH AMERICAN SPAWN COMPANY, Ontario Building, Toronto 2, Canada.

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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. 150 other bargains. Experience unnecessary. Write Carnation Co., MN, St. Louis, Missouri.

MAKE MORE MONEY Taking Orders Shirts, Ties, Underwear, Dresses, Hosiery, Raincoats, Coveralls, Pants, Uniforms. OUTFIT FREE! NIMROD COMPANY, Department 132, 4922-28 Lincoln Avenue, Chicago.

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PENNY Each. Popular Sizes. Guaranteed Window Sign Letters. Enormous Profits. Easily Applied. Free Samples. Atlas Sign Works, 7941-G, Halsted, Chicago.

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OPPORTUNITIES Galore—Write for particulars. Over 400 Money Making Ideas, Plans, etc. A. Wolfe, 2085 Valentine, New York City.

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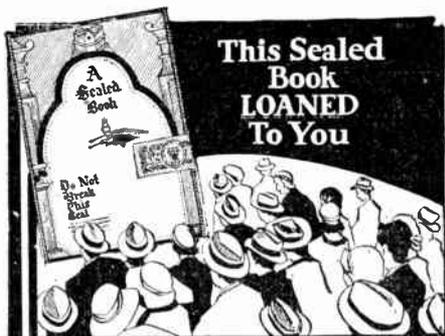
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Name _____
Address _____
City _____ State _____
Attach letter stating age, occupation and name and address of employer and at least one business man as reference.

Television Will Carry the Mails

[Continued from page 38]

down into hundreds of dots and dashes. It is reproduced by light "brushes" that "paint" it line for line. The next step is to flash the complete picture.

The first logical step, of course, is to transmit still pictures and print. That is facsimile radio. The next step will be to send moving pictures. That is television. When the latter is accomplished, it will be possible to see a face or an object through space and to reproduce a newspaper page instantaneously.

The problem of facsimile transmission has not been merely one of circuits and terminal apparatus. Typewriters and recorders have been available, but we needed a successful track to link the transmitter and recorder.

Short Waves Transmit Over Seas

This we have in the short waves used to transmit across the sea and continent. Now we have the micro-waves for inter-city communication.

I am certain that progress will be rapid. Within the next year we expect to have in operation the micro-wave domestic facsimile circuit between New York and Philadelphia for which an experimental license has been granted. The short wave oversea channel has already proved its value in flashing news pictures between Europe and America.

The day will come when radio will dip into the mailbag. If a letter is worth the time required for dictation, for the stenographer to write, for re-reading by the sender and the cost of the stamp, then it is worth fifty cents or a dollar to flash it across the world for quick delivery and immediate answer.

I believe thousands of letters and messages ultimately will fly from city to city, from country to country by facsimile radio.

Television Study Aids Facsimile

The study of television has aided facsimile broadcasts. What has been learned by facsimile research has advanced the prospects of television.

The demand for pictures in all parts of the world of the recent Morro Castle catastrophe taxed the capacity of our oversea facsimile system. A greater number of photos were projected through the air that week-end than ever before in the history of photoradio.

Our international facsimile service now being utilized on the normal short-wave channels, between 15 and 100 meters, is making use of new instruments to improve considerably the texture of the photograph.

In this facsimile system perfected by our engineers, a pin-point beam of light is made to play through lenses on a photograph wrapped around a slowly revolving cylinder.

The light beam strikes the paper like a tiny

[Continued on page 142]

Bridges Span San Francisco Bay

[Continued from page 45]

Here it was necessary to carry on underwater excavation to a depth of 242 feet below the water in order to obtain suitable foundation in the bed of clay.

A compressed-air-flotation caisson enabled the bridge builders for the first time to construct the pier from the surface of the water down.

With the completion of all underwater and structural work, the bridge is rapidly entering the aerial stages.

Golden Gate Bridge

At the present rate, it is expected that the work will be completed in August, 1936, six months ahead of the contracted time.

The Golden Gate bridge, costing \$35,000,000, has not only the longest suspension span, 4,200 feet, but it is the only bridge in the world authorized to be built across the outer mouth of a major ocean harbor.

Gracefully swinging in an inverted arc 220 feet over the harbor, this bridge has a highway with a daily capacity sufficient to handle a string of automobiles reaching from the Oregon Line to the Mexican border, moving at a speed of 22 miles per hour. The roadway to the bridge is graded up in easy, sweeping curves, narrowing to a 60 foot, six-lane highway over the bridge proper. Two 10½ foot sidewalks occupy the remaining space.

The toll terminal has 16 gateways and 12 toll booths to facilitate quick handling of fast moving traffic.

The two towers, one at San Francisco and one at Marin, are identical, each 121 feet wide at the bottom, 846 feet high, and 746 feet above the mean high water level. They are the highest bridge towers in the world—150 feet higher than those on the George Washington bridge in New York City.

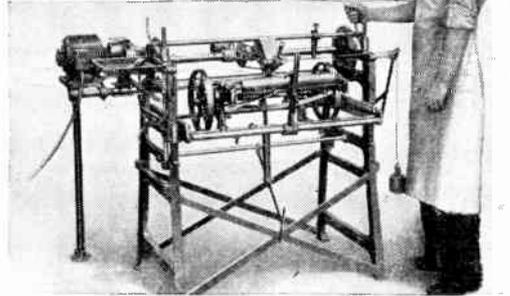
Construct Largest Fender

Engineers throughout the world have been watching the construction of the pier and fender off the Fort Point shore in 100 feet of water which is pronounced the most difficult piece of underwater work ever undertaken by man. To complete this task, a steel fender, 750 feet in circumference was set into the sea—a fender as large as the University of California stadium. Such fenders not only make it possible to pour the piers, but they also provide permanent protection after the bridge is finished.

The concrete work on the piers and the two giant 64,000 ton anchorages required 254,700 cubic yards of cement. The greatest barge fleet ever assembled on San Francisco Bay for a single job was paid \$1,300,000 for conveying the concrete to the bridge. They carried enough of the mixture to build a sidewalk five-feet wide from San Francisco to New York.

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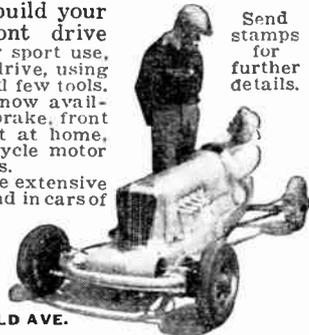
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NAME
ADDRESS

New Power for Mechanical Toys

[Continued from page 87]

together enabling boys to make various articles with pieces of heavy wire cut to different lengths and angles.

The four runner sled has been a big seller for years and vast sums of money have been made with it, but sleds of this type cannot be turned abruptly enough.

The makers of carts and coasters are looking for a revolutionary spring suspension that would be cheap enough to use in connection with articles of this nature.

Who can make a device for attachment to toy steam-electric locomotives that will make them sound like real steam engines? We have the power to drive such a mechanism. All we need is the sound. It would be a big seller.

A new means of driving toy automobiles, trains and other things of this nature is needed. It may be that compressed air can be made to do the trick.

An electrically-driven captive airplane that will circle about a post, the electric feed wires holding it in position, can be sold for five dollars and it would bring in a very comfortable royalty.

A toy submarine that will periodically dive and come back to the surface would be a big seller and a real money maker. The action, unlike that in submarines which to do this, would have to be entirely automatic.

A machine gun that will fire wooden slugs from a cartridge belt would be a fascinating toy for older boys. It should be possible to make a very simple mechanism for this purpose.

Television Will Carry the Mails

[Continued from page 140]

star, each twinkle of which assists in "painting" the picture being flashed to some distant city. A photo-electric cell close to the light beam is instantly affected by the gradations of light from pure white through grays to inky black reflected from the revolving picture.

As the star moves across the face of the picture being transmitted, the variations of light intensity picked up by the photo-electric cell are greatly strengthened by an amplifier and made to modulate the transmitting aerial. That puts the picture on the air.

The process is reversed at the receiving end. A small pin-point beam of light plays across slowly revolving drum upon which is wrapped either a piece of photographic bromide paper or a photographic film.

As rapidly as the picture is completed it is passed through a hole in the wall of the operating room into a dark-room for development by standard photographic methods. It is then ready for delivery by messenger.



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INVENTORS

SEE PAGE 12



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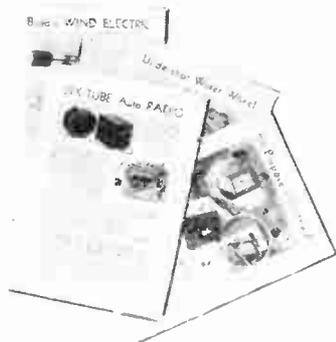
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MINNEAPOLIS, MINN.

Falconry Is Newest Hunting Sport

[Continued from page 128]

again, and the whole process is repeated until hunger drives him to attack the lure instantly.

As the training proceeds, the lure is thrown farther away, and the bird is forced to fly a longer distance for his food, always with a line attached to his jesses. He has become accustomed now to darting at his food, and returning to his master's wrist. When he has learned these lessons (which are the essential points in falconry, and must be patiently repeated every day for a month or more) he is ready to be despatched "free," or unleashed, at the distant lure.

First Flight is Crucial Test

Now for the crucial test of entering your bird, that is, despatching him after live quarry. This should be done on a windless day in open country, free as possible of woods and hedges. Relieve the bird of hood, swivel, and leash, and hold it only by its jesses, which should be grasped firmly between thumb and forefinger as the bird sits on your fist. If there is no natural game present—such as wild geese, sparrows, or even a crow—it is quite legitimate to have your assistant (known as a "cadger" in falconry) place a pigeon in a clump of bushes. At a signal, the cadger "throws up" the pigeon, which starts off into the air with a whirr of wings. The white flash catches your falcon's eye; he fairly catapults himself from your fist, and—if he is a true duck-hawk—will soar high above his prey, hovering over it at an altitude of 1,000 feet. Then with a rush and a jingle of bells, he "stoops" to his quarry, descending upon it like a plumed arrow and breaking its neck with a single blow of his claws.

Use Lure to Tempt Bird Back

Your hunting bird now circles back to your wrist, where he is immediately hooded. If he does not come back, but flies into some nearby tree, there are two ways of bringing him down. The first is by flashing a large brass buckle at him (the buckle is worn as part of the falconer's rig) a signal to which he usually responds. If this fails use the lure on him.

An aspect of falconry that may appeal to many Americans, is the catching and training of these hunters-of-the-air for wealthy sportsmen. A rich easterner of my acquaintance recently offered \$2,500 for a brace of falcons, but not a single trained bird could be found at that, or any, figure. In England, where the sport is more highly developed, a falcon fetches a price of \$350 to \$500. Falconry is coming fast in the United States, and the man who begins now to learn the art of snaring and training hawks is almost certain of a good income when the sport takes a firmer root in our country.

DIVORCE EYE CRUTCHES!



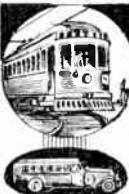
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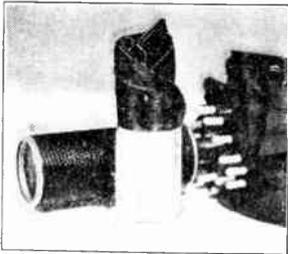
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INDUSTRY PROFITS WITH NEW IDEAS



With an eye to the New Year's football game in Rose Bowl, an alert Pasadena dairyman dispensed milk to his customers in a cone-shaped, waxed-paper bottle which, with the bottom cut out, served as a handy megaphone.

Noiseless antenna systems for all wave reception are said to be perfected in a small unit mounted alongside the antenna and ground posts of a receiver by means of its base lugs. Adjustment brings precision balance between antenna and receiver for greatest selectivity and loudest signal with a minimum of noise.



This rubberized silk umbrella has a hollow handle containing a pair of women's toe rubbers.

Saw horses that will not wobble or collapse are quickly set up with triangular metal brackets which fit over the legs and clamp the crossbar.

A classified guide of everything carried in a grocery

store is designed for the grocery counter as a sales suggestor. It is very small and concise. Using 16 pages with 19 classifications, it may be read at a glance on "visible indexed" pages.

A simplified air conditioning unit, said to be adaptable for any type furnace, can be installed by any plumber and operates at a total cost averaging less than one cent per day.

Kayaks, light Eskimo crafts handled by a long double paddle, non-sinkable and almost impossible to upset, are sold in complete kits which can be assembled in a short time.

A new battery charger designed for home use, may be clamped to the battery without removal from the automobile. Operating at 10 amperes, it is said to charge the average battery over-night at a total cost of less than five cents.

An electric outboard motor, running on from six to twelve volts from a storage battery, will propel an 18-foot boat either forward or backward at a reasonable rate of speed.



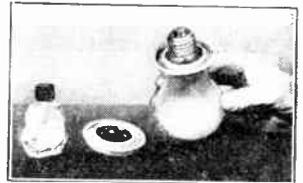
A new ratchet type pipe threader, designed for work where a two-handed threader cannot be used.

A tire calculator takes into consideration the size of the truck and the payload to determine, exactly and quickly, the proper tire sizes for various uses.

A new cellophane insulation has been developed for electric wires which is said to provide the same insulation properties as cotton winding without occupying as much space. Adhesive is first applied to the wire. Then it is wrapped in cellophane, lacquered and baked to form a tough, resistant insulation.

Motors, either spring or electric, are available for toy boats. The electric motor has a permanent magnet and a reduction gear, and operates on 3 volts current furnished by two ordinary flashlight batteries.

A new bridge table features a score pad that springs into the view of all players, a lamp arching over the center of the table, and ash trays suspended rigidly from the corners.



Crystals, in trough, melted by heat of electric light, vaporize to purify the heavy atmosphere of the room.

Editor's Note—Addresses of manufacturers of these and other new products in this issue can be obtained by sending stamped, addressed envelope to MODERN MECHANIX AND INVENTIONS. Manufacturers are invited to submit photos and literature for this page.

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