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SEPTEMBER

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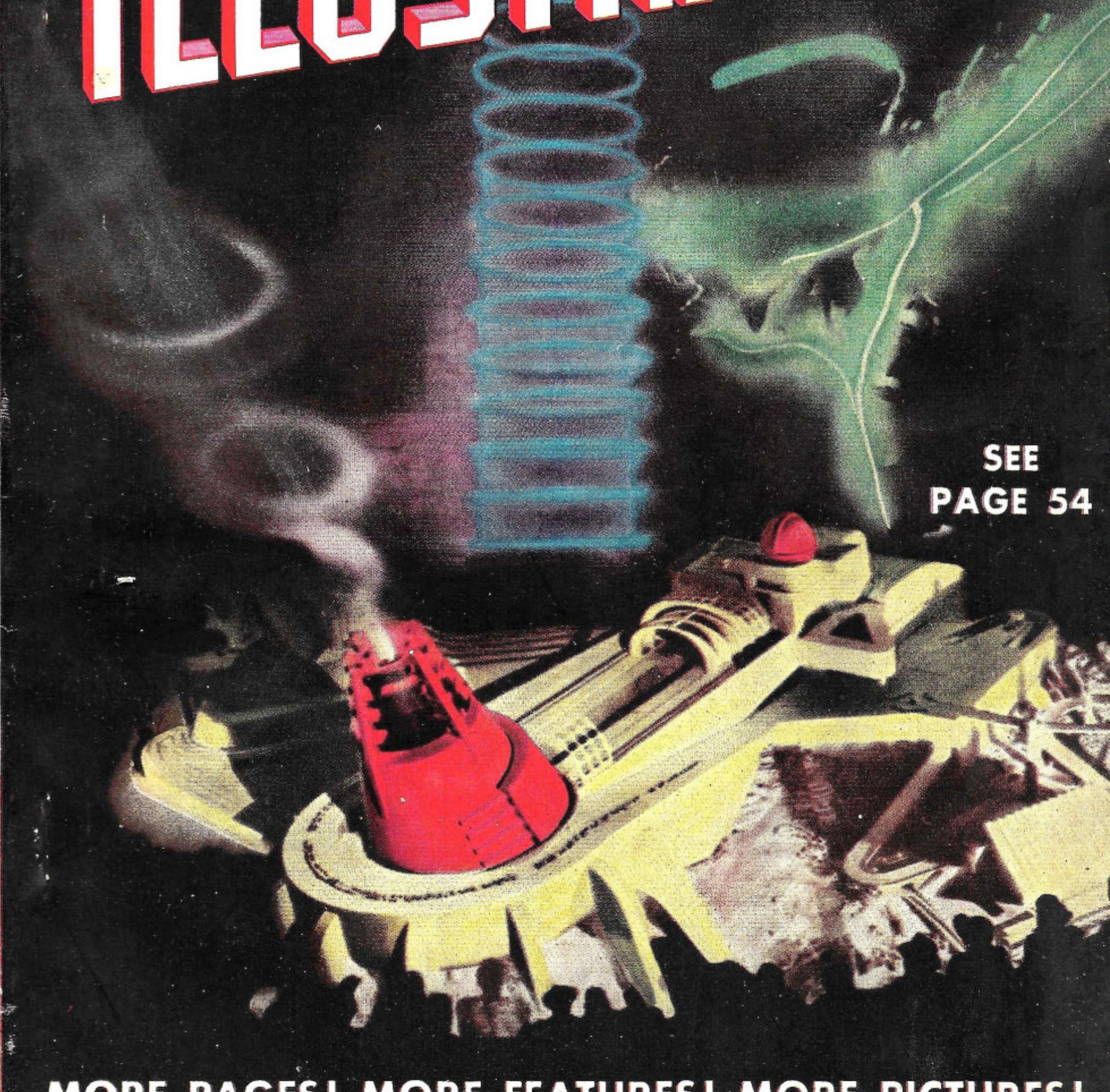

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MORE PAGES! MORE FEATURES! MORE PICTURES!

STREAMLINING YOUR EYESIGHT • PAGE 35

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PHILA. RECORD 9/6

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MECHANIX ILLUSTRATED

SEPTEMBER
1939

Volume XXII
Number 5

SPECIAL FEATURES

[*Continued on page 6*]

NEXT MONTH—

ANOTHER SURPRISE!

YOU will read the third and last—but certainly the most thrilling — of Richard C. du-Pont's articles on sail-planing....

You will go behind the scenes of one of Broadway's newest and most amazing "electric spectaculars" and discover just what it takes to make a blase New York public gape. . . .

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And these are but a few of the features! We won't say anything about the pictures, the home workshop and hobby projects, the plans and drawings, and all the rest. . . .

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DEPARTMENTS

NEW MECHANICAL DEVICES

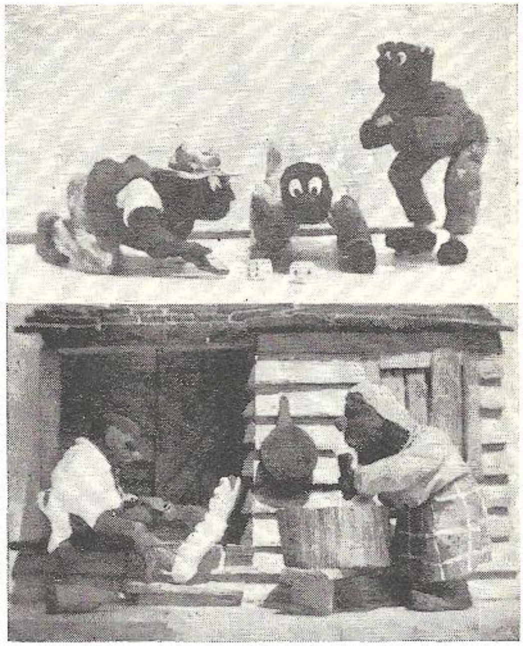
PHOTOGRAPHY

MISCELLANEOUS

Chips FROM THE Editor's Workbench

Send in photos of your completed workshop projects. Each month Mechanix Illustrated awards a first prize of $5 for the best photo and letter received by this department and prizes of $3 each for all other photos and letters used. Do not send negatives. Photos submitted will not be returned unless accompanied by return postage.

An unusual and profitable hobby is that of Gordon Severin, shown above, who carves these humorous little figures from balsa and basswood, then sells them. Gordon, who is a cartoonist, models his carvings after his cartoon characters.



FIRST prize of $5 goes this month to Gordon Severin of Oklahoma City, Okla., who admits he likes a "busman's holiday." Gordon is an architectural draftsmen by profession and draws cartoons as a hobby. Recently he conceived the idea of carving his cartoon characters into wooden figures, hence the array of little men, women and animals shown in the accompanying pictures.

Gordon designs his own chisels and knives for carving the figures from balsa and basswood.

His hobby is a money making one, he informs us. So popular have his humorous little characters become in his locality that he finds it difficult to work fast enough to supply the demand for them.

Looks like a mighty interesting and entertaining way to spend your spare time, Gordon, and well worthy of first prize.

The motor scooter built by George M. Lacy of Benld, Ill., wins a $3 award. Made of angle iron, pipe and tin, it is powered with a ¾-horse power engine souped up to deliver 1½ horse power. It travels at 26 miles per hour and gets 90 miles to a gallon of gasoline, using a Model T Ford carburetor. Clutch and gas feed are operated from the handle bar.

George Lacy's motor scooter, above, gets 90 miles to the gallon of gas and has a top speed of 26 miles an hour. Its engine is supercharged to deliver 1½ horse power.

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THESE FREE BOOKS ARE FOR INVENTORS

AND OTHER MEN WITH IDEAS

"We're only entering the great period of inventive advancement"

—says C. F. Kettering, Vice Pres., General Motors

SOMETIMES we hear people say: "Well, there isn't much left to invent." But Charles F. Kettering, Vice-Pres. and head of Research of General Motors, who helped develop the self-starter, Duco and many other outstanding inventions, **doesn't think that at all.** Not long ago in a published statement, he said:

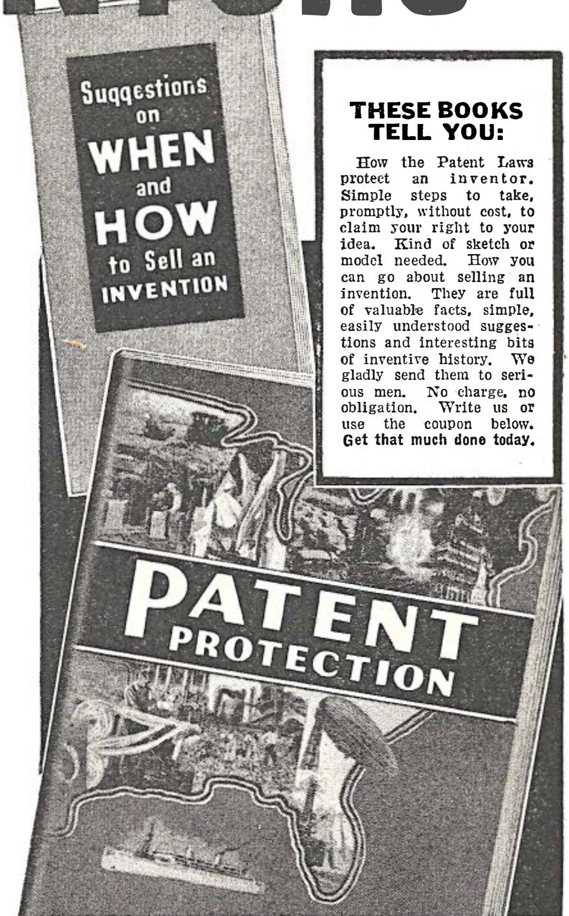
"If we took half the men employed in tool making and put them to working out new inventions, new things, we could snap out of this depression in no time. Our return to normal times depends on new manufactured products that will catch the purchaser's eye, get him to buy and thus start the ball rolling. Change and buying go together. *We are only entering the great period of inventive advancement.*"

Many Little Ideas Have Big Commercial Possibilities

Some of the world's best inventions came from men who didn't consider themselves inventors at all. The telegraph was invented by a painter, the typewriter by a farmer, the hand camera by a bank-clerk, the stock ticker by a dentist. Or look at small inventions. A husband noticed his wife bending a hair pin to make it stay put. That gave him the idea of the crinkly hair pin. One day a golfer got the idea to make a wooden tee. Now wooden tees are sold by the millions every year. There are many similar examples in inventive history. That is why we say that the books shown here are for INVENTORS and Other Men with IDEAS. Whether you consider yourself an inventor or not—**if you have an idea that will make money, save time, save labor, or give pleasure**—find out how you can protect your rights to it.

Our Business Is To Help You

For forty-one years, this organization has been in the business of helping inventors. During that time inventions from every corner of the country have been turned over to us to protect. Some ideas have represented complicated mechanisms; others have been small, practical articles, like a can opener or a new toy. All this has given us a wealth of experience to use for the inventor of today. Here in Washington, we maintain a large staff of experienced Patent Specialists to give you prompt and expert service. Yet because we work efficiently—our fees are low, and if desired we help you with deferred payments. But first, find out exactly what to do to protect yourself. **Decide on that today by sending for your FREE copies of the books shown above.**



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Editor's Workbench Chips

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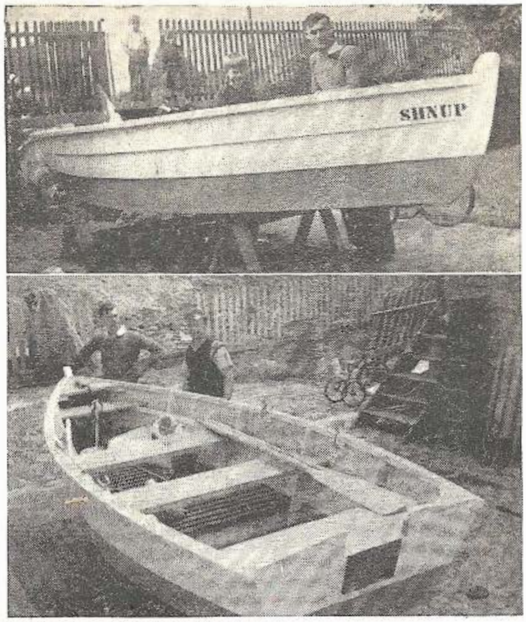
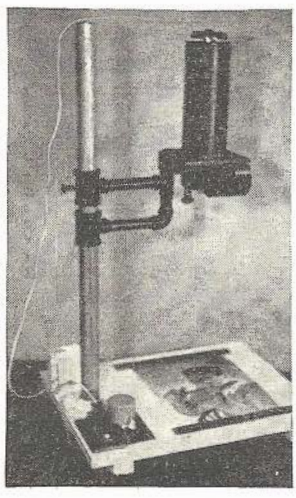


Charles Bull built this trim craft from plans in our book, How To Build 20 Boats. The boat handled like a dream after he launched it, he writes.

We are passing on a $3 prize to Charles Bull of Woodside, Long Island, N. Y., who built a very trim looking boat. He writes: "I don't know when anything has made such a hit with me as your boat book. Being pretty handy with tools, I made a bet I could build one of the boats described in it. After I finished it, it handled like a dream."

* * *



This enlarger is the work of Fred Van Egy. It will cover up to a 2 x 2 inch negative. Fred's own picture is being enlarged in the photograph.

Fred Van Egy of Oakland, Calif., wins $3 for the enlarger he made from an Argus Model C. It has a panel on the side to control light, push button, red safety light, film carrier on each side and screw adjustments to raise and lower the bellows. It has made successful enlargements up to 11x14 inches, but would probably blow up a picture much larger, Fred claims.

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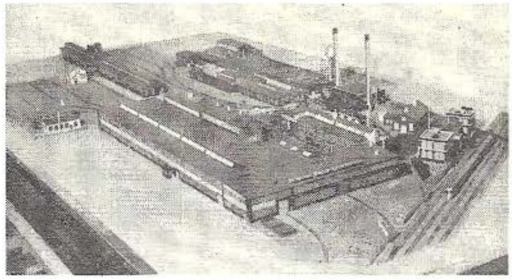

This model of a boiler plant in Kewanee, Ill., was built by Willis Cronau. Three years were needed to complete the project. There are 20,000 windows in the buildings. Scale is 30 feet to an inch.

A model of a plant in Kewanee, Ill., nabs a $3 award for Willis Cronau of that place. The buildings are of 1/16-inch balsa and are fastened to a built-up wooden base. The scale is 30 feet to an inch and the model represents 33 acres of ground and 13 acres of buildings. To give an idea of size, the rails are 3/16-inch gauge and ties are spaced ⅛-inch apart, smoke stacks are seven inches high and the water tower is five inches high. There is a total of 45 feet of track and the complete model contains 20,000 windows.

To make the job look businesslike, Willis placed two locomotive cranes and seven cars of boilers, loaded and ready to be shipped, in the yard. A switch engine is backed into the yard and the streamlined Burlington Zephyr is passing on the main line. He needed three years to complete the model.

It's a swell job, Willis, and couldn't miss winning a prize.

* * *

Henry Plucker of Auburn, N. Y., takes a $3 prize with a very nice looking tractor he built from an International truck, with frame and fuel tanks from a Model T Ford. The tractor has six speeds forward, ranging from a slow crawl to 70

[*Continued on page* 16]

Henry Plucker constructed this tractor from an International truck and a Model T Ford. It has six speeds forward and two in reverse. He claims it will go 70 miles an hour in high. Whew!

Editor's Workbench Chips

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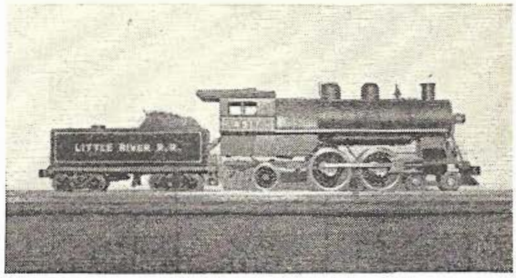
miles an hour, and two speeds in reverse.

It will pull a 16-inch bottom plow, a two section drag, a soil pulverizer or a grain drill easily in second speed.

A good job, Henry, and the little lady in the driver's seat adds to the appearance of the machine. But we would just as soon not be riding with you when you drive it at 70 miles an hour!



James Kendrick built this model of a locomotive from MI plans. He calls it "Midget Mike."

James Kendrick of Ballston Spa, N. Y., gets a $3 award for "Midget Mike," a neat little model of a locomotive and coal car which he built from plans in MI. James writes: "I have enjoyed building this tiny model and through it have discovered a fine magazine. Even if I don't win a prize, I'll be ahead."

Well, James, we're giving you a prize, because we think "Midget Mike" is a nice piece of work.

* * *

William Press comes to the front with an unusual project, a ten-ton steam roller converted into a gasoline powered roller, and for his efforts takes a $3 prize. Driven by a 1930 Buick motor, the roller will roll tar roads for eight hours on only seven gallons of gasoline. It runs 1½ miles an hour in low gear, 1½ miles an hour in reverse, 2½ miles an hour in second and five miles an hour in high.

A first rate project, William!

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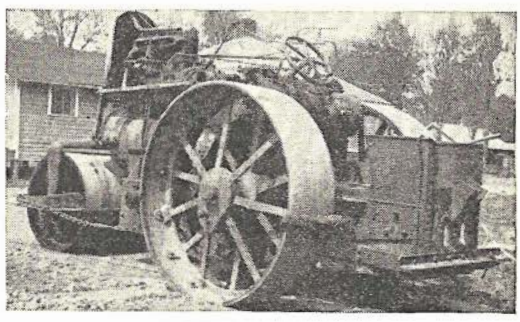

This is a steamroller that is no longer a steamroller! William Press converted it into a gasoline powered roller, using a 1930 Buick engine for the purpose. It will work an eight-hour day on only seven gallons of gasoline.

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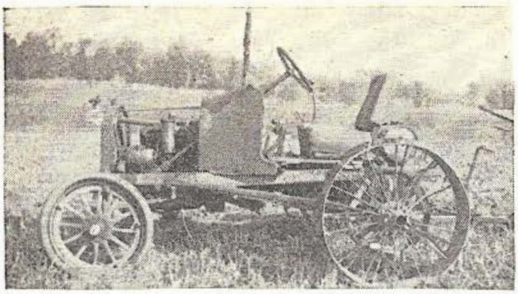

Harry Slack constructed this home made tractor at a cost of $25. It has nine speeds forward and three in reverse, giving it a range of from two to 15 miles an hour.

A home made tractor is the work of Harry Slack of Hope Bay, Ont., and makes him richer by $3. He built the chassis from an old Buick. The tractor has two transmissions and a worm drive rear end off a Model T. Ford truck, with binder wheels clamped on the sides of the truck wheels. It has nine speeds forward and three in reverse, giving it a range of from two to 15 miles an hour. The top of a Ford radiator is fastened in front of the Buick radiator to increase the water supply. The tractor will do a day's work on about seven gallons of gasoline and uses very little oil. It was built at a total cost of $35.

Good work, Harry!

* * *

To C. W. Schien of Minneapolis, Minn., goes a $3 prize for an efficient looking lathe he constructed. A feature is the apron which protects the screw from chips. Headstock bearings are tapered and very large for a tool of this size. Tailstock barrel is seven inches long and has a travel of 3½ inches. A one-quarter horse power engine furnishes the motive power through a countershaft and friction clutch. Spare time over

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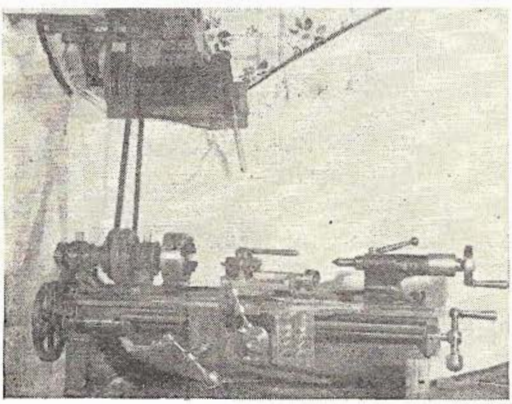

This lathe was built by C. W. Schien. It is powered with a one-quarter horse power engine.

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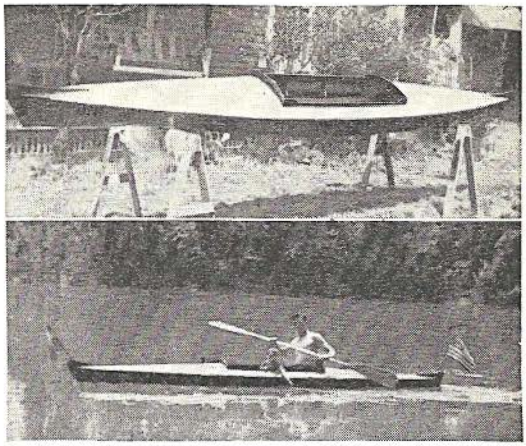


This is one of the fleet of kayaks Bill Minor, scoutmaster, and several of the boys in his scout troop built from MI plans for a 100-mile trip down the Wabash River.

a period of two years was required to complete the project.

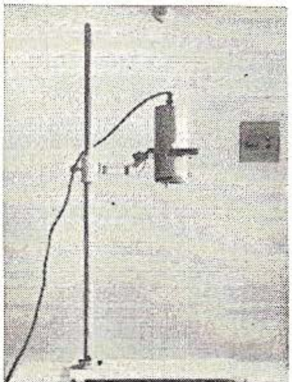
* * *

Bill Minor, a Vincennes, Ind., scoutmaster, wins a $3 prize for the kayak he built from MI plans. Not only did Bill make a kayak. He also organized several boys in his scout troop into a club which they named the Viking Club. Then the group got together and built a whole fleet of kayaks for a 100-mile trip down the Wabash River to the summer scout camp at New Harmony, Ind.

This looks like one of the best ideas we've heard of in a long time, Bill. We'll bet you and the rest of the Viking Club had one swell trip.

* * *

Leonard A. Prehn of Medina, Ohio, built a photo enlarger as his first MI project and for its picture and description we have awarded him a $3 prize. The accompanying photo of his enlarger was taken by Leonard with a miniature camera and enlarged by the enlarger. Leonardused parts available at home in building this apparatus and the total cost of the project was $1.16.



This photo of an enlarger built from MI plans by Leonard Prehn was taken with a miniature camera and "blown up" by the home-made enlarger.

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Editor's Workbench Chips

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William Walker constructed this midget motorcycle, which is driven by a single cylinder engine and has a three-speed transmission. It weighs 275 pounds.

To William Walker of Akron, Ohio, goes $3 for the midget motorcycle he constructed. It has a single cylinder engine and three-speed transmission. The machine has a wheel base of 47 inches and weighs 275 pounds. It will do about 60 miles an hour. A good job, William.

* * *

An elaborate martin house—it looks more like a martin palace to us—knocks down a $3 award for Kenneth Murphy of Canton, Ill. It has 60 rooms, each 7x7x6 inches, and it is five feet square at the bottom. Ventilation is supplied by holes bored in the bottom and in the fifth floor, and air enters each room through smaller holes in the walls.

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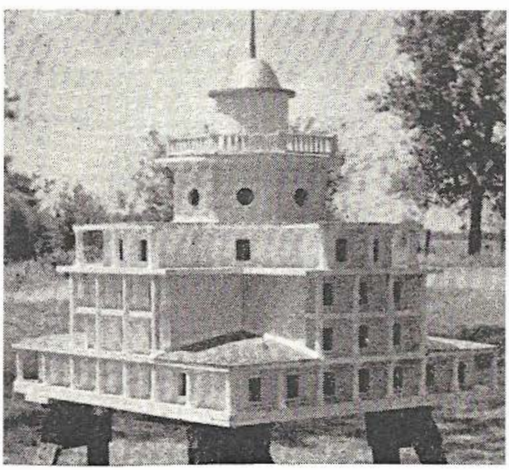

This elaborate martin house was erected by Kenneth Murphy. It has 60 rooms and a ventilating system which circulates fresh air through them all. Materials cost $18.

Editor's Workbench Chips

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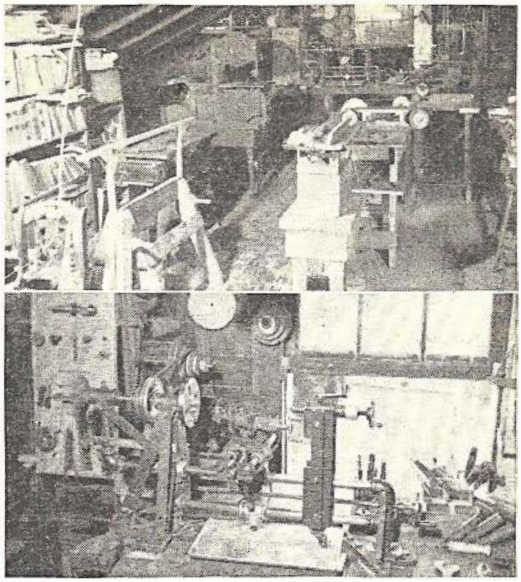

John Twitchell built all the tools for his home workshop, in upper photo. They include a metal turning lathe, band saw, circular saw, belt sander and jig saw. Lower photo gives a close-up view of the lathe, showing compound rest.

John Twitchell of Port Jervis, N. Y., equipped his home workshop with an efficient looking set of power driven tools, all of which he built. Included are a metal turning lathe with compound rest, 12-inch band saw, seven-inch circular saw, belt sander and jig saw. Lathe attachments include a disc and drum sander, drill and spider chuck, boring bars, and a milling cutter.

* * *

A gasoline powered model airplane is the Workbench contribution of J. A. Williams of Clifton, Tex., and wins $3. The plane is powered with a 1/5-horse power engine, weighs three pounds, two ounces and has a wing span of 52 inches. The wing loading is unusually high, but the plane flies beautifully, Williams claims.

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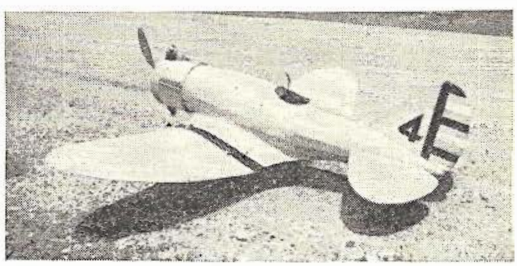

This low wing gasoline model airplane is the work of J. A. Williams. It is powered by a 1/5 horse power engine and has a wing span of 42 inches.

Editor's Workbench Chips

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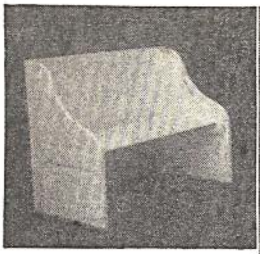
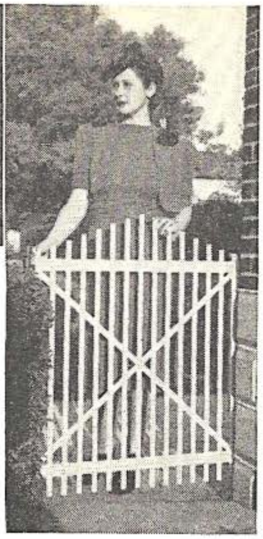




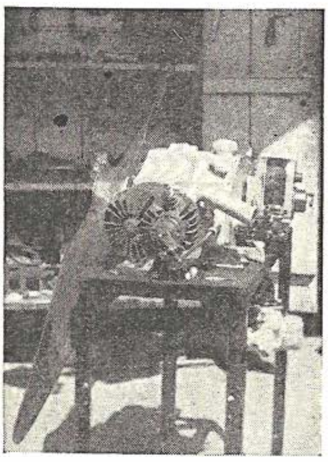
J. Z. Habecker wasn't willing to let an old roll top desk he acquired stand idle. From the sides, back and top he made the lawn bench shown above. After taking apart the slats from the roll, he converted them into the useful and decorative gate seen in the photo at right. The total cost of his work was exactly nothing, except for a few nails and screws.

J. Z. Habecker of Lancaster, Pa., acquired the top portion of an old-fashioned roll top desk and at once put it to good use. First, he dismantled the section holding the small drawers and placed the latter in a convenient spot in his workshop, to hold nails, screws, bolts, etc. Then the sides, back and top became a lawn bench. The slats were then taken apart from the roll and used to make a gate. Total cost of the project was $0.00, except for a few screws and nails.

A very ingenious idea, Habecker.

* * *

From Guantanamo, Cuba, Prudencio Martinez sends us a picture of the Harlequin airplane engine he built from MI plans. Prudencio calls to our attention the fact that where he lives there are no mechanical facilities such as steel forges, foundries, etc.



Prudencio Martinez built this Harlequin airplane engine from MI plans in his workshop in Cuba. He turned out a good job despite a lack of mechanical facilities.

Your engine is a nice job, Prudencio, especially so in view of the handicap of limited equipment. We're sending you the award of $3 which you deserve for your work.

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Editor's Workbench Chips

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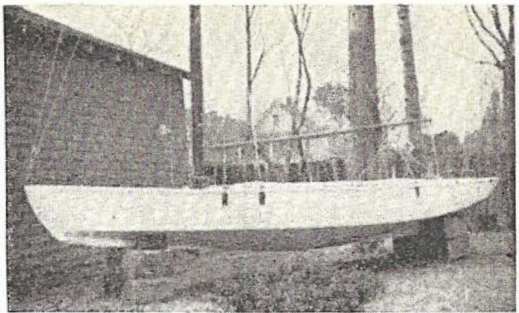

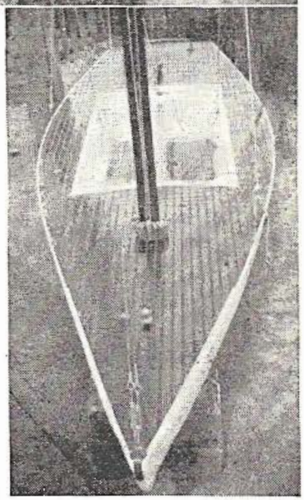

Two views are shown of Albert Nardone's sailboat, the Sunray, which he built from plans in How To Build 20 Boats. These pictures were snapped just before the Sunray was launched for her first trip over the waves.

Albert Nardone of Garfield, N. J., is the winner of $3 for his sailboat, the *Sunray,* which he built from plans in How To Build 20 Boats. Albert informs us that he installed water tight bulkheads in the craft for greater safety. The photos were snapped just before she was launched.

* * *

Roger Fredsall of Torrington, Conn., constructed a chain drive tractor from an old motorcycle engine and parts of old cars, to win his $3 award. The engine will develop ten-horse power and is cooled by a fan aided by the metal cone which encloses the engine. The tractor is steered by brakes on each wheel. The framework is made of heavy angle iron.

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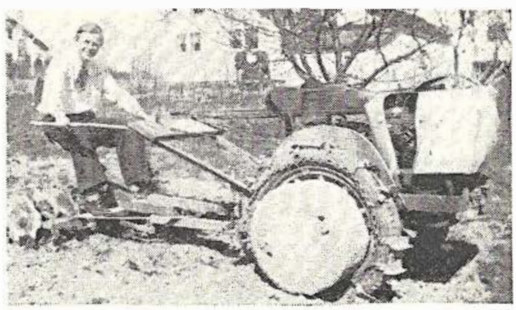

Roger Fredsall constructed this chain drive tractor from an old motorcycle engine and parts of old cars. It cost only $10.

Editor's Workbench Chips

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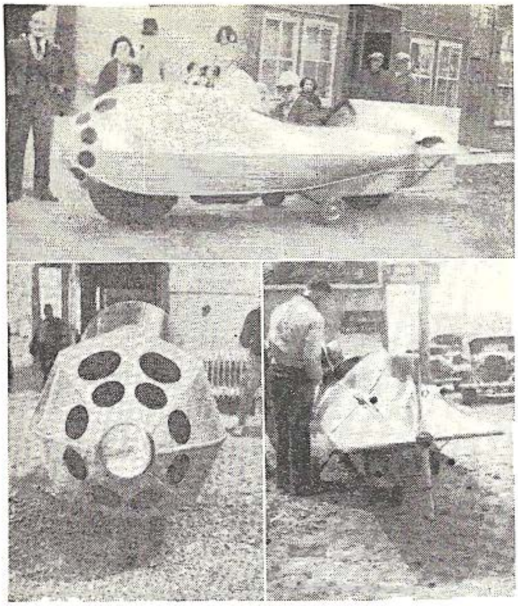


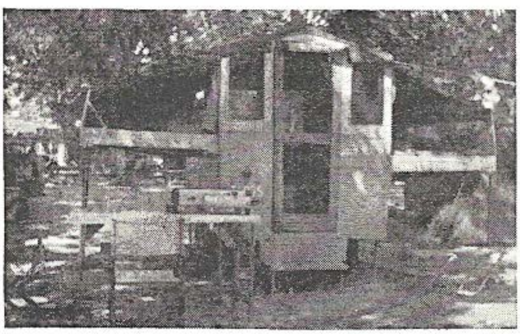
J. E. Marcoux built this bullet shaped speedster. Later he wrecked it when he crashed through a fence while going 60 miles an hour. Luckily, he was unhurt.

A machine which looks like a rocket and which will probably go almost as fast was built by J. E. Marcoux of Cadillac, Quebec, Canada to win $3. The speed machine has a large wheel in front, another behind, and two small wheels, one on each side, to keep it from tipping over when it stops. Power plant is a four-cylinder Henderson engine.

* * *

Adam Hennig of Bridgeboro, N. J., built a bungalow auto trailer from MI plans for a $3 award. The trailer is big enough for four people to sleep in it comfortably and has a built-in kitchen with stove, running water and an icebox.

[*Continued on page* 24]



This bungalow auto trailer was constructed by Adam Hennig from MI plans. The trailer will accommodate four sleepers comfortably and has a built-in kitchen.

Editor's Workbench Chips

[*Continued from page 23*]

A motor scooter powered with a washing machine engine is the work of Leo VanBenthusen. Built at a cost of $18, it will do 60 miles on a gallon of gasoline and has a top speed of 18 miles per hour.

Leo VanBenthusen of Corydon, Iowa, goes to town for $3 worth with a neat looking motor scooter. Powered with a washing machine engine, the machine will travel 60 miles on a gallon of gasoline at a top speed of 18 miles an hour. The steering assembly is made of part of a bicycle frame. The wheels were taken from a small automobile and the fenders are made of light tin. The clutch and brake, mounted under the floor board, and the throttle under the seat are the only controls. Entire cost of the scooter was $18.

* * *

To Milton Harris of Cincinnati, Ohio, goes a $3 award for an action photo of the racing hydroplane he built. It is a single step, pelican design, 17 feet long and with a beam of 56 inches. The bottom is made of half-inch mahogany and the sides and deck of quarter-inch cypress and eighth-inch waterproof plywood. A Ford V8 engine, souped up to deliver 120 horse power gives the boat a top speed of 65 miles per hour.

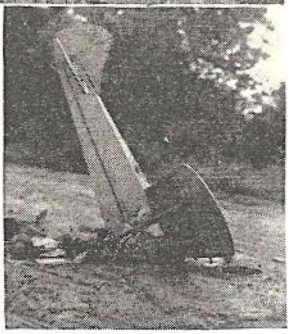
[*Continued on opposite page*]

Milton Harris constructed his speedy racing hydroplane, which has a speed of 65 miles an hour. The power plant is a Ford V8 engine souped up to deliver 120 horse power.

Editor's Workbench Chips

[*Continued from opposite page*]

Charles Sumpter, Jr., built the trim gasoline model shown above. All went well with it until one day the motor quit during a takeoff, with the disastrous result in the photo at right.



Charles Sumpter, Jr., of Lynchburg, Va., built himself a dandy little gasoline model airplane, which performed beautifully in the air, only to be "washed out" in a crash when the motor conked on a take-off. Tough luck, Charles, but we're awarding you $3 anyhow, which should help finance a rebuilt job.

Before the crash the ship would climb at a 45-degree angle and had a glide ratio of from eight to 14 to one. The wing span was six feet and a 1/5-horse power engine furnished the motive force.

* * *

A check for $3 is on its way to Will Cheesman in far off Sydney, Australia, for the trailer he constructed. The frame is of angle iron.

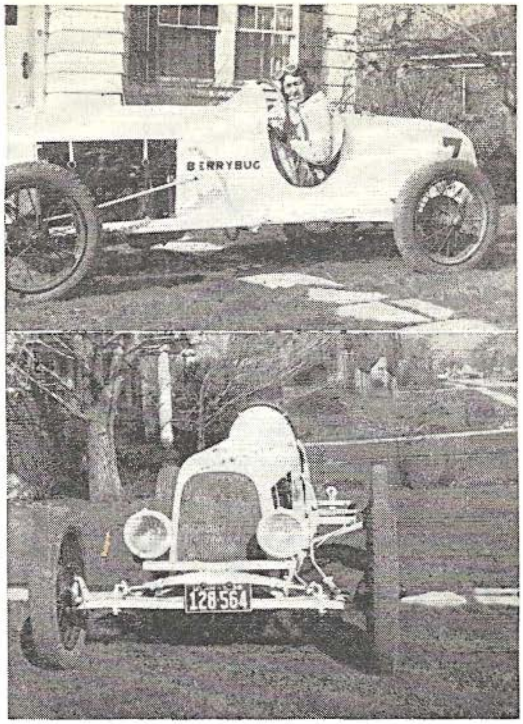
Inside equipment consists of ample cupboards, gasoline stove, water heater connected to both sink and shower compartment, icebox, fans, radio and 200-watt generating set. The trailer has made some long trips and tows easily at all speeds, Will reports.

[*Continued on page 26*]

This trailer is the work of Will Cheesman, who mailed us photos of his work from his home in Australia. Will followed the general plan of MI's Aloha in his project.

Editor's Workbench Chips

[*Continued from page* 25]



This speedy looking racing auto was built by Berry Hutchings from parts of old cars. Total cost was only $35, including the license plates.

To Berry Hutchings of Bountiful, Utah, goes a check for $3 as a result of the rakish little racing auto he built. Differential and front axle are from a Model T Ford, steering gear and engine from a Chevrolet, and radiator from a Whippet. Entire cost of the racer, including the license plates, was only $35.

* * *

Marvin Green of Boyden, Iowa, made a tractor and plow for his five-year-old son, using odds and ends he picked up on the farm. Result: a $3 award for Marvin.

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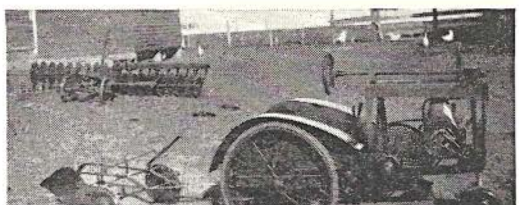


Marvin Green constructed this plow and tractor from odds and ends he collected on his farm. The tractor is powered with a 3/4 horse power engine. A governor holds its speed down to three miles an hour, so Marvin's five-year-old son can drive it.

Products Of Farm Have Many Uses Besides Food

The American city-dweller may have a picture of the American farmer as the man who raises the foodstuffs of the nation but, with the advance of industrial research, the time-honored scene is no longer strictly true.

The U. S. Department of Agriculture has recently compiled a list of the non-food uses of American agricultural products whose publishing takes four pages in fine print in Industrial and Engineering Chemistry.

Even farmers may be surprised to learn that from 86 sources of agriculture there come 133 raw materials useful in other ways than food. And out of these raw materials are fashioned 240 different manufactured products. Finally, the consumer—rural or city dweller—will be amazed to learn that there are more than 400 non-food uses for these products of the farm.

Cattle, of course, have food values as meat but most motorists may not know that cattle grease is a source of glycerol that may end up as anti-freeze for the family car. Or, just to vary the process, the glycerol may become part of the explosive dynamite.

Corn, in contrast, appears in our daily lives as the sizing on the backs of carpets, or as an adhesive, a rayon fiber, a tanning agent, a smoking pipe or as wall board.

Even such items as grapes have non-food uses for the grape seeds yield an oil that appears in lubricants and in soaps.

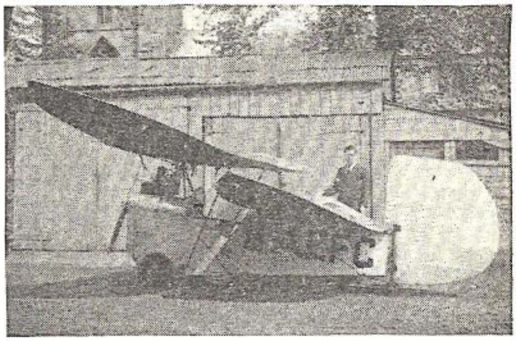
Trees, of course, have a major value as lumber but omitting this item, they and their products do the following things: Make possible book and newsprint paper. Help tan leather. Create fiber-board. Act as an adhesive for lenses. Smoke meats. Yield valuable chemicals like acetone and acetic acid. Furnish dyes and create valuable plastics.

Even the bees have a role. They furnish beeswax which appears in the form of polishes, candles, cosmetics and is used in the lithography which makes today's brilliantly colored advertising pictures.

Editor's Workbench Chips

[*Continued from page 26*]

Powered with a ¾-horse power engine, the tractor has rubber tires, swinging drawbar hitch, enclosed fenders, upholstered seat, rubber grip steering wheels, hand clutch lever and upright exhaust pipe. The motor is controlled by a governor.

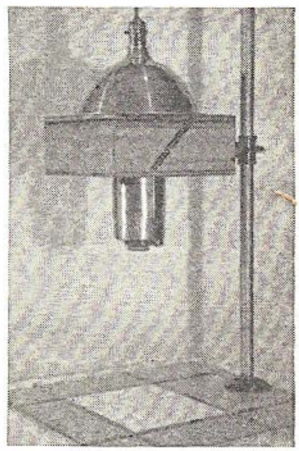


J. G. Crampton is the builder of this Flying Flea plane. It is powered with a four-cylinder, water cooled engine and the main plane has a span of 21 feet. In England, where Crampton lives, home-made airplanes are permitted.

J. G. Crampton of Spalding, Lincolnshire, England, wins a $3 prize for his Flying Flea airplane. A four-cylinder, water cooled engine is the power plant for the little ship. The wing span of the main plane is 21 feet, slightly more than usual in a Flying Flea due to the added weight of the water cooled engine. The rear plane is a trifle shorter.

The plane flies well, Crampton reports, having a cruising range of 200 miles. The gasoline tank, which holds four gallons, is located in the wing.

* * *



This photo enlarger was made from MI plans by Morris Campbell. The entire cost, including an f.8 lens, was only $6.

Morris W. Campbell of West Newton, Pa., gets his $3 for a photo enlarger he made from MI plans, except that his enlarger is a little larger than the specifications in the plans. It is equipped with a 6½-inch, f.8 lens and will take a 5x7-inch negative. Total cost, including lens was only $6, and he wouldn't take $50 for it, Morris reports.

[*Continued on opposite page*]

Editor's Workbench Chips

[*Continued from opposite page*]

Jobs Coming Up

One of the most important series of articles in the long history of MI will start in an early issue. It is our intention to present in this series the important facts about chances for employment in every major mechanical trade or vocation existent. This series is being prepared by men of complete experience in the fields they write about and is intended to answer every question an applicant for the specific field should ask about his own chances for employment. Carpentry, auto mechanics, airplane technicians, sound engineering, plumbing, radio repairing and air-conditioning are just a few of the fields to be explored. We are going to present the various trades one by one, each with a complete story about the job itself, the kind of men it needs, a test for you to determine your aptitude for the job, earning power at various ages of employment and practical tips on how to get started and how to land a job. Believe me, these articles are going to be complete, and written by men who have won their way up in the particular field they write about. In that connection I'd like to get letters from you telling me which fields you want covered first. Just write us a note and we'll give you what you want.

* * *

Your Magazine

"Why has MECHANIX ILLUSTRATED been using that heavy paper in the 'How-to-Build' Section of recent issues?" This has been a recurring question in our daily mail.

Well, mates, it's this way. For the past eight or nine months we've been trying to make MI the biggest and best 10 cents worth of mechanical magazine on the market. To this end, we've slowly but surely been pushing up the number of pages, giving you more feature articles, more pictures of new inventions, more shop projects of every kind. We've raised the main editorial section from 48 to 80 pages, certainly a big increase, you'll admit; the issue you are reading contains a total of 146 pages, and without question represents the biggest 10 cent magazine value on the stands. The rub from our standpoint is that paper is pretty expensive nowadays. Visit any stationery store and see how much *blank* paper a dime buys! If we used shiny white paper throughout we'd lose money; by skimping just a little and using heavy paper for a solitary 16-page form, we just about break even. Anyway, the paper has nothing to do with the novelty, usefulness or general appeal of the projects printed on it. It's all good stuff for home workshop fans, and glossy paper and fancy colors of ink wouldn't make it a whit better.

[*Continued on page* 30]

Editor's Workbench Chips

[*Continued from page 29*]

Lots of Fun

The entire MI office was completely disrupted recently when a quiet chap named Herbert Lozier walked in with a new model racing car he had just finished. Its streamlined canvas body painted bright orange, its chubby balloon tires fairly breathing speed, this airplane-engine powered racer, capable of well over 40 m.p.h., had everybody from the managing editor to the receptionist down on the floor. Did we have fun! It's the type of how-to-build project that "gets" you; the instant you see the pictures and drawings you'll dash into your shop and start on a duplicate. The complete "dope" will be in our new MODEL BUILDER'S HANDBOOK, which will hit the newsstands about the middle of September.

Incidentally, this brand new MI book, containing 144 pages and selling for only 50 cents a copy, is clearly destined to be the "bible" of the model cranks. We've been working on it for months, and we think we've assembled the finest collection of projects ever offered between two covers. If you build only half the models shown in it you'll have a busy and profitable winter.

* * *

Fair Warning

The New York World's Fair is without question paradise for every MI reader. It's science, mechanics and invention glorified to the *nth* degree You can spend days in the magnificent buildings erected by such firms as General Motors, Ford, Chrysler, A. T. & T. Co., RCA, Westinghouse, General Electric, and still want to go back for another look. Funny thing about the Fair: with all the unwarranted newspaper ballyhoo about high prices, the best exhibits, by far, are the free ones. And a personal hint: the so-called amusement area is for suckers only. If you have lots of time and money, go there and have your ears blasted in by the barkers with their powerful amplifiers. If you really want to enjoy yourself, stay in the exhibit area.—*Robert Hertzberg, Editor.*

More than eight and one-half million tons of salt are mined in a year in the United States: half is dry salt and half is in brine.

Deciding that pears are ripe enough for shipping is a headache for California growers, but a new test is under consideration—testing a drop of pear juice for the amount of soluble solids, chiefly sugar, it contains.

Natural color is used in a much greater percentage of amateur movies than in professional films.

Two Types Of Artificial Lightning Produced

Assembly-line production of artificial lightning for routine testing of all transformers to make sure, as they are completed, that they can withstand natural lightning bolts when in service, and artificial creation of "hot" lightning, the kind which sets fires, are announced at Sharon, Pa., by the Westinghouse Electric and Manufacturing Company as the two latest achievements in man's struggle to capture and conquer lightning.

Great 1,500,000-volt, 80,000-ampre bolts of lightning are now crashing down onto every transformer to make sure it is able safely to bypass the bolt without damage to its essential electrical circuits, as it will be called upon to do when out in service on the line.

And now for the first time, through the work of P. L. Bellaschi, an artificial lightning bolt which imitates natural lightning in its ability to set fires has also been created. It differs from the conventional artificial bolt in having a low-amperage, long-duration stroke following the main and leader lightning discharges, similar to natural lightning.

Although the heat of previous artificial bolts is intense and they have enormously destructive explosive effects on whatever they hit unless it is adequately protected, they did not last long enough to set fire to combustible targets, only leaving a scorched hole. The after-stroke of "hot" lightning generates temperatures only half as high as the main stroke, but it lasts between 100 and 1,000 times as long.

The long-duration charge is produced by means of additional capacitators or a transformer from which the charge is "soaked" through a series of resistance and inductance coils in oil and permitted to follow the initial high current discharge relatively slowly.

In demonstrations, "hot lightning" fused sand in a fiber tube, set fire to cotton cloth, and burned holes through copper sheets varying from one thirty-second to one-sixteenth of an inch thick.

Old Violins Found Superior To New

Old violins of the masters—the Stradivarius and Guarnerius instruments—have been found to "speak" more easily than do modern instruments, it was reported to the Acoustical Society of America by Dr. Frederick A. Saunders of Harvard University.

Working with the noted violinist, Jascha Heifetz, Dr. Saunders has been making exact physical studies of new and old violins seeking to find the reasons—if any—why people will pay $20,000 and more for a single instrument.

Studies at Purdue University, reported Dr. Saunders, show that a good and old violin will vibrate when held in the outstretched hand, if one speaks to it from an appreciable distance. An excellent old instrument picks up enough energy from the sound waves to vibrate.

"This means," said Dr. Saunders, "that the player, when doing a very rapid passage, may just succeed in making an old violin speak properly through the whole of it, while the slight balkiness of a new violin might prevent him from getting through it successfully. No wonder such violins command high prices."

A very keen listener, the Harvard scientist added, may be able to detect that an old violin speaks more quickly at the turn of a bow than does a new one.

Seeking a physical reason why this might be, Dr. Saunders is making tests to check the hypothesis that old violins are lighter than new ones.

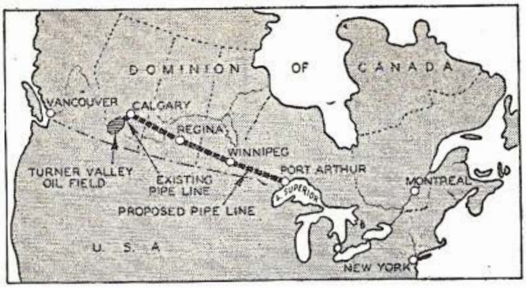
"There is some evidence indicating that they really are," he added. "Some of the constituents of the wood may have evaporated with time. Another cause of ease of response might be that from years of vibration (in use) some of the cell walls in the top plate of the violin may have been broken so that the wood has become more flexible than it was when new.

"There may be changes in the glue also," Dr. Saunders continued. "When the real changes are determined it ought not to be hard to age wood artificially, so as to get the best effects in a new instrument."

The world's biggest ice-breaker ship patrols the upper St. Lawrence in winter months.

It is estimated that compressed gas will replace about 250,000 tons of gasoline in Europe during 1939.

Canada Plans To Pipe Oil Across Continent



Because developments in the past two years have shown that Western Canada has probably the largest oil field in the British Empire, Canadian and British financiers and engineers are making plans to run a pipeline from the Turner Valley oil fields, about 45 miles southwest of Calgary, Alberta, to Port Arthur at the head of Lake Superior. The pipeline, which will cover about half the continent, will be between 1,300 and 1,500 miles long.

The pipeline is planned not only to pipe the oil to the industrial markets of Eastern Canada, which now imports oil from the United States and South America, but also to make available a practically invulnerable oil field to the British Admiralty. Present fields on which the British Admiralty depends end at Mediterranean seaports, in the center of fighting in any future European war. The Canadian outlet from the Turner Valley field would be near the center of the North American continent, far removed from the ocean. Tankers would take the oil from Lake Superior by way of the Great Lakes to the Atlantic and so to England. Three pipelines now operate from the oil field to Calgary.

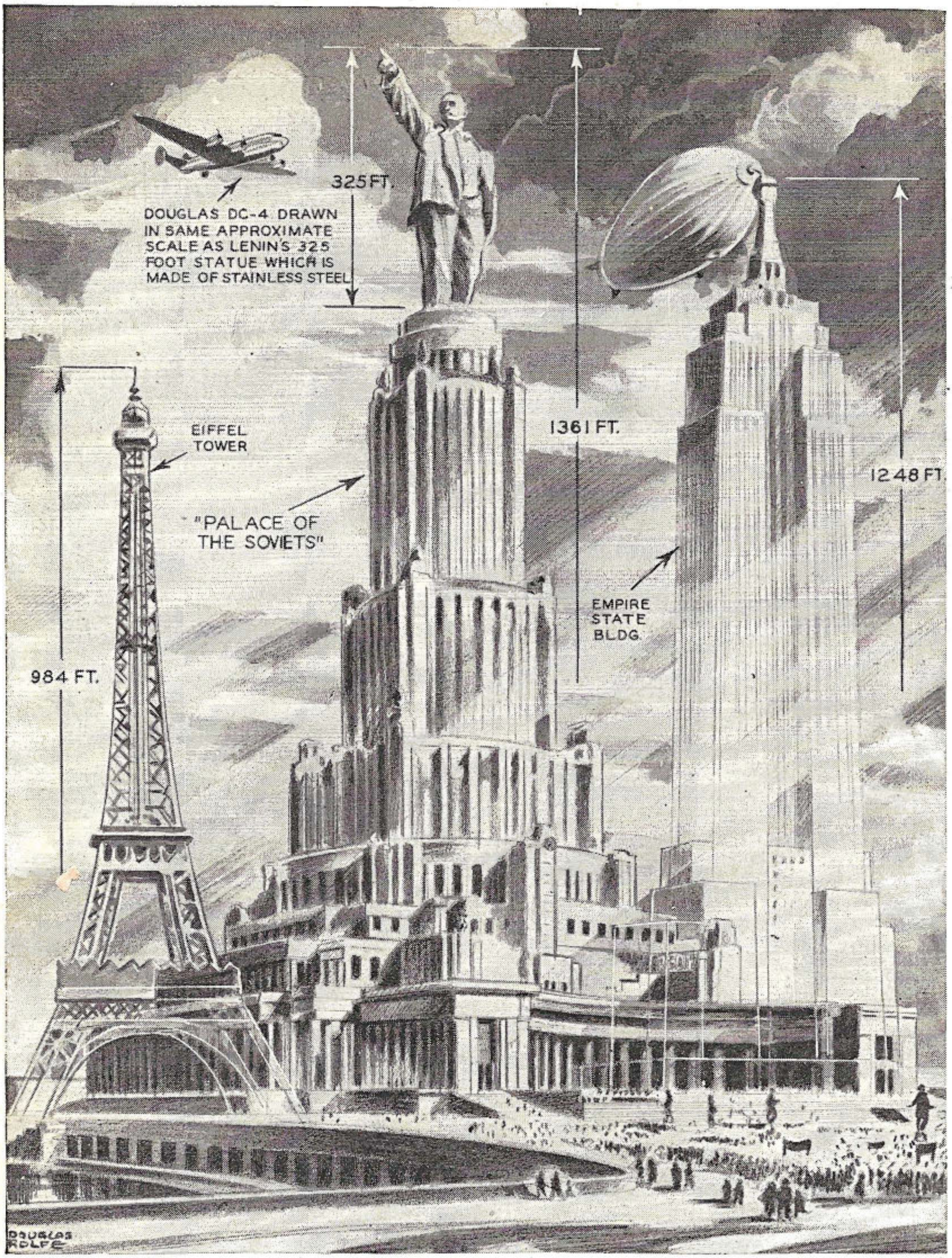
The Turner Valley oil field has been tapped since 1913, but only since 1936 have important wells been discovered. Last year production was 7,000,000 barrels, three times that of 1937. Limited markets have resulted in legislation limiting production. A pipeline will make the field a rival of the Eastern Texas oil field.

Building the pipeline will be cheaper, despite pumping equipment, on the 650-mile route across the Rocky Mountains to Vancouver on the Pacific Coast. But engineers are concentrating on the more expensive route across the prairie provinces to the Great Lakes because of the greater safety of the route in war time and the greater markets in Eastern Canada.

A porous hose through which water can ooze is a good device for watering a flower garden, says Cornell University.

A farmer can get bigger crops by planting and tilling around a hillside, instead of straight up and down the hill.

WORLD'S TALLEST BUILDING



In this drawing, the artist has shown how the "Palace of the Soviets," now under construction in Moscow, will compare in height with the Empire State building, in New York City, at present the world's tallest structure, and with Europe's tallest, the Eiffel Tower in Paris. The Palace of the Soviets will be completed in 1942 and, including the stainless steel statue of Lenin on top, will be the world's tallest and most spacious building. The main hall will seat 25,000 and another hall will seat 6,000. The ceiling of the interior dome will be 300 feet high. The building will be serviced by 120 elevators, 60 escalators, and will contain halls, clubs, galleries, museums, and will house government archives.

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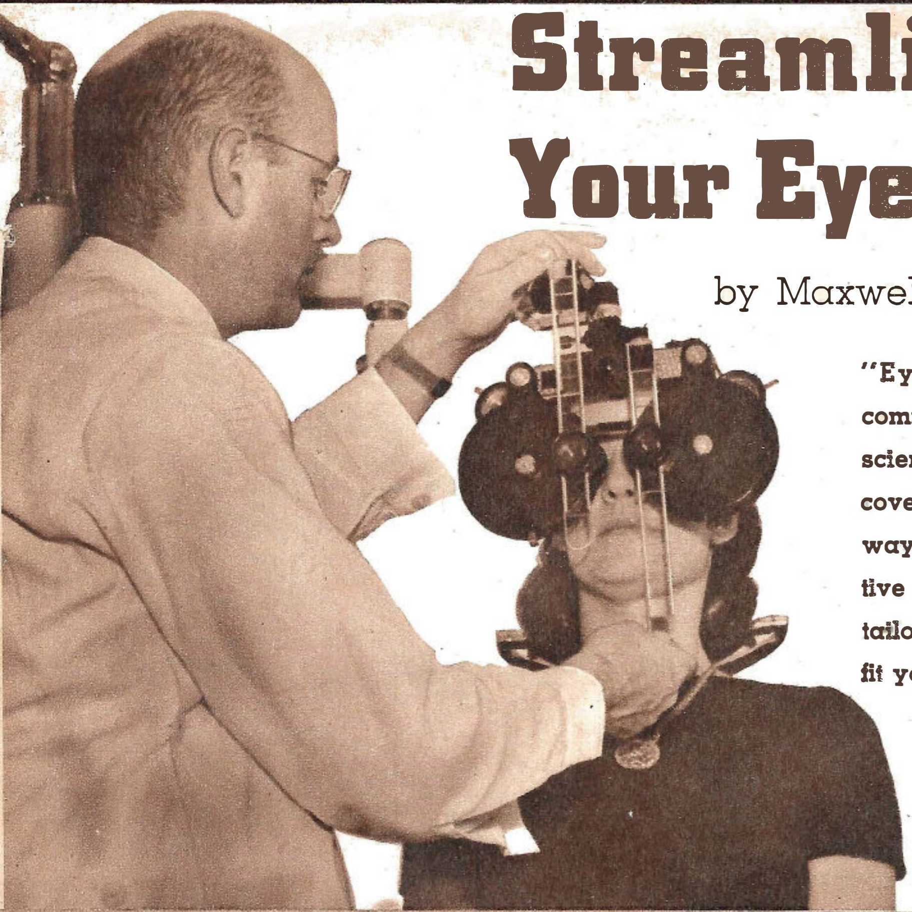
1939

Streamlining Your Eyesight

by Maxwell Reid Grant



"Eyes right!" is the command of modern science, which has discovered amazing new ways of making defective eyes strong, and tailoring your vision to fit your requirements.

The doctor passes a series of graduated prisms before the eyes of the patient to strengthen the eye muscles by causing them to pull harder.

SCIENCE is making amazing strides in the field of eyesight improvement and control, and has reached the stage where your vision can actually be custom-built—made over to conform to the special requirements of any job or undertaking.

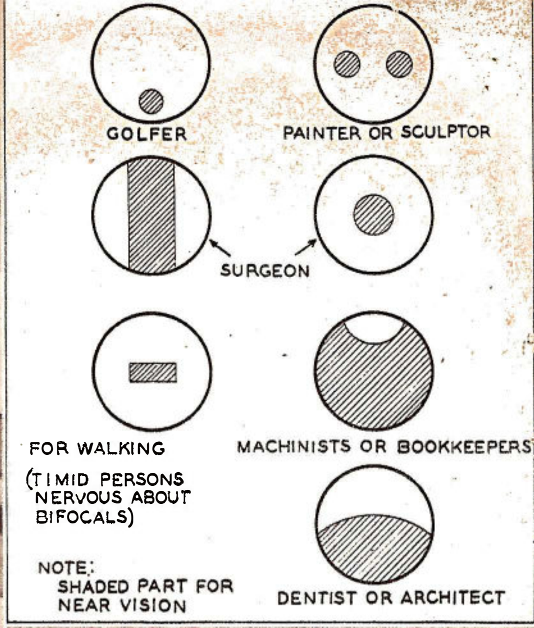
Ingenious devices, simple but effective, have been perfected which streamline defective eyesight, and provide cures for visual cripples.

"If eye weaknesses were transformed into leg defects, nearly every other person you meet would limp," says one eye authority. "Many would be on crutches, others in wheelchairs."

But new aids for limping eyes are giving comfort in ways that not long ago would have been considered impossible. Gadgets ranging from black, sieve-like bakelite "lenses" pierced with dozens of pinholes, to training machines that automatically give your eyes a "daily dozen" to correct strain and strengthen undeveloped eye muscles, are prescribed today by eye experts.

Whether they're grinding individual lens curvatures into the glass bar of a welder's helmet, or fitting a nearsighted airplane pilot with crashproof prescription goggles, the experts are trying to lighten the load on the body's most delicate sensory apparatus, a penny-sized spot containing more sensitive nerve endings than there are hairs on your head.

Experiments have shown that while too much close eye work may overdevelop certain muscles, as an athlete becomes "muscle-



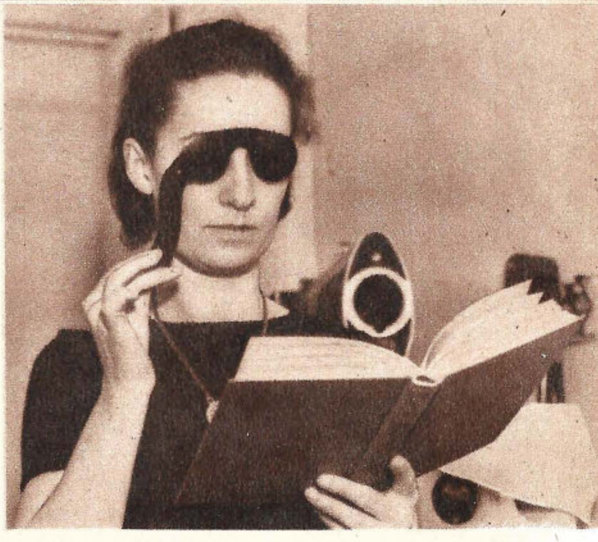
An optometrist's prescription is ground into the eye-bar of the welder's helmet, giving him perfect vision at work. Slits in the lorgnette-like shield below permit the eyes to read without glare which causes some pupils to contract too much for good vision. Above, various types of bifocals.

bound," this condition may be corrected by the right kind of "setting-up" exercises. If you're a typist and have the habit of putting your notebook at your right, you may overdevelop one set of muscles by constantly swinging your eyes to that side. Typists have been known to make their eyes so lopsided that they saw double when they looked straight ahead. Now eye-training devices can correct such conditions by restoring muscle balance. The sensible thing, of course, is to prevent this condition by alternating the position of the notebook.

About a year ago an outfielder of a Western Baseball Club came to Dr. Ernest A. Hutchinson of the Los Angeles School of Optometry. "What's getting the matter with me, Doc? I can't seem to hit the ball anymore."

A check-up revealed his distance perception to be only 80 percent of normal. After a month of eye training to build up muscular coordination, his batting average rose steadily, and soon afterward he was sold to a big league team for $10,000.

A truck driver had been involved in a number of accidents, all of which happened while he was trying to pass cars on the road.



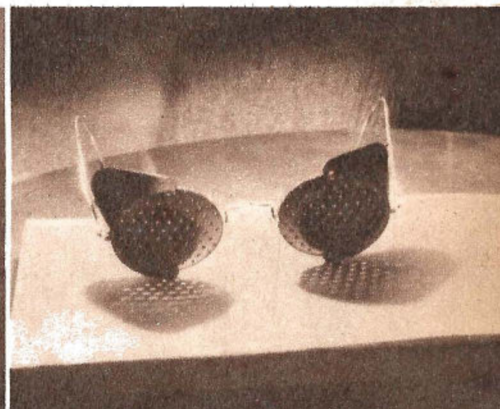
The driver was sent into the clinic for examination. Again, it was muscular imbalance. He responded quickly to eye training, and after two weeks had no more trouble in judging distance.

You wouldn't think eye strain makes your leg muscles tired, but psychologists tested persons under lights of various brightness and learned that while reading was possible at one foot-candle, at ten foot-candles it became so much easier that body muscles generally relaxed noticeably. Under lights ten times brighter, a marked decrease in muscular tension was observed. Poor vision actually makes the whole body tired!

Eye Enemy No. 1 is glare. If you work in a soda fountain where you have to face windows all day, your optometrist will prescribe lenses tinted just enough to kill the glare, yet the color is hardly noticeable. Countless other jobs can be made easier by a little glare-absorbing color in the lenses.

Many people find that "sun goggles" of the lighter shades substantially ease night driving and actually help them see better because glare eyestrain is absent. Then, too, looking at bright lights uses up the purple substance that constantly re-sensitizes the eyes' retina. In many people this material is not rebuilt as fast as it is needed, and a certain amount of night blindness results. For this reason some experienced night drivers help their after-dark vision by taking vitamin A in the form of cod liver or halibut liver oil, carrot juice, or carotene in oil. This vitamin helps to restore the retinal purple and re-sensitize the eye. One vegetable juice stand in Los Angeles does a thriving business selling carrot juice by the pint to radio patrol officers, milkmen, and street-car motormen on night shift.

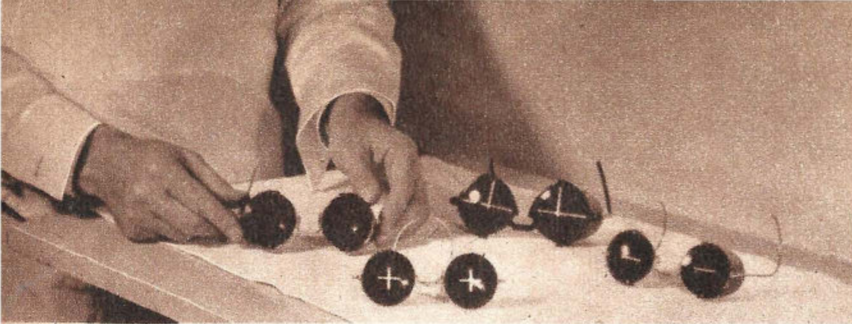
Photo fans sometimes experiment with a "pinhole camera," made by punching a tiny hole in one side of a box and putting a piece of film on the opposite side. The very small



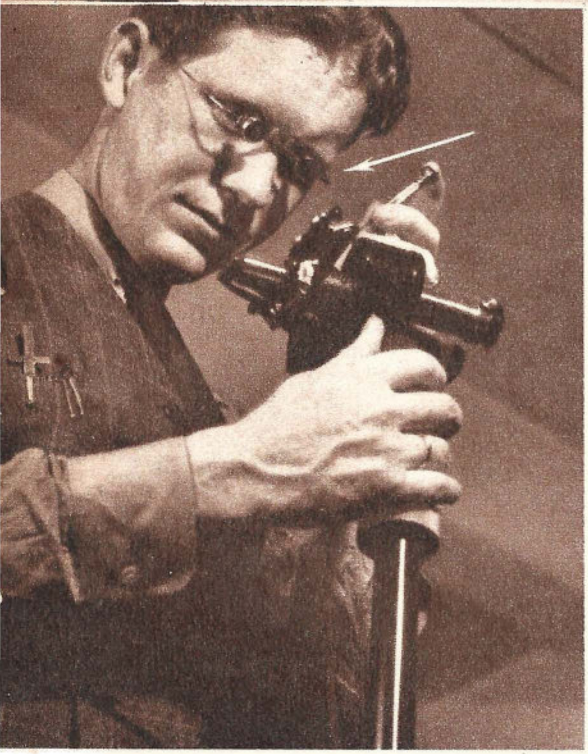
Designed for those suffering from cataracts, these multiple pin-hole lenses also protect the eyes of blast furnace workers.

The binocular loupe, above, gives needed magnification without tiring eye muscles. It preserves the sight of jewelers and watch makers.

Prisms in the right-angled spectacles (right) enable the bed-ridden to read while lying flat. Look straight ahead and you see what is in your lap.



Opaque lensless spectacles, prescribed for se ious eye defects, are shown at left. They are used chiefly in cataract cases. Hardly larger than collar buttons, the spectacles used by the men, left below, are magnifiers for fine tool work.



opening, without glass, makes an excellent lens. If you work around a blast furnace, you might be glad to wear multiple-pinhole spectacles—a pair of bakelite disks pierced with dozens of pinholes to let light in but shield out furnace heat. This is a great eye-saver to glassworkers, for in no trade is cataract so prevalent as among glass blowers—the heat simply cooks the eye and makes cloudy spots in its transparent lens. Strangely, the same pinhole disk will also help a man who already has cataract, for by moving the head a little, he can use the good parts of the eye without being bothered by the cloudy spots. Also, shutting out part of the light causes the pupils to expand and gives more clear area to choose from.

When a man passes forty, his eye muscles become less plastic and do not focus easily for close work. Optometrists ordinarily prescribe double-lensed glasses, with a small spot at the bottom for reading, the rest for distance. Today they are also putting bifocals on young children whose eye muscles haven't learned to adjust themselves, and following it up with corrective exercises until the weak accommodative muscles are strengthened. The burden on eyes lacking in flexibility is being further eased by precision optical workmanship that now makes it possible to grind as many as five different curvatures into a single lens, giving five separate seeing ranges.

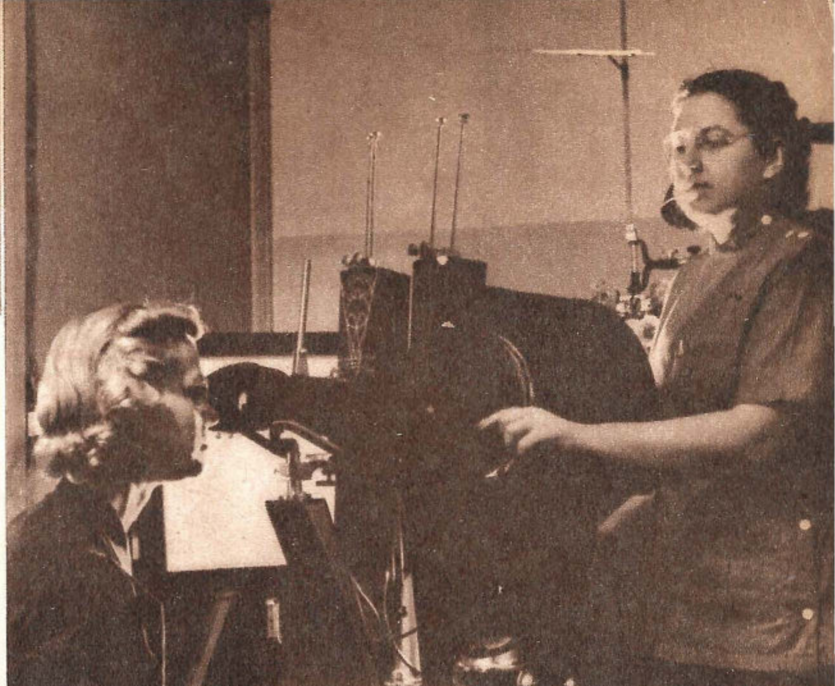
A photographer for a Los Angeles museum seemed unable to focus his camera sharply at four or five feet. A third range of vision for that distance ground into his lenses enabled him to focus equally well at any distance. Trifocals are worn by many persons for greater efficiency in their work or for pleasure.

Dr. Reuben Greenspoon, of Beverly Hills, California, is one who has tailored lenses to meet many special problems in his patient's daily work. If you're a machinist, for instance, he'll fit you with "trifocals" having three different grinds: one focused at arm's length, for setting the cutting tools without getting too close to the machinery; a closer one for reading micrometer gauges; and a third, microscope-range spot for close scrutiny of fine-turned work or for spotting flaws in material.

For the painter or sculptor, who needs to look back and forth from his subject to his work without tilting his head back to peer out of the bottoms of ordinary bifocals, he'll place two near-vision spots on either side of center, with a far-vision space between and all around them.

Perhaps you're a golfer and when you tee off, the ball looks like a white blob, although your old glasses are all right to follow the path of a long drive. For you, Dr. Greenspoon would order special bifocals with a very small spot focused accurately at the putting distance, leaving the rest of the lens

Colored lights, rotated mechanically, (right) train the eyes and help corrective work. Stamp collectors, and others find the two-eyed magnifier (below) an effective aid for close work.



for keeping an eye on the distant flag.

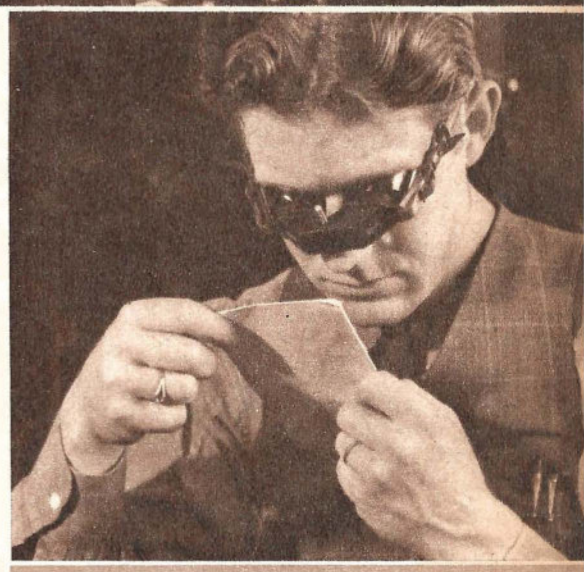
If you're a bookkeeper and need a wide near-vision field for handling big ledger pages, he would advise two-range lenses with only a tiny spot of distance vision at the very top—where it is handy for a quick glance across the room, to watch the clock.

Jewelers, watchmakers, and engravers have always risked eventual blindness from the unequal load imposed by their one-eyed magnifying loupes. Binocular magnifiers were an improvement but they, too, taxed the eyes because looking at very near objects makes the eyes turn inward until you are looking cross-eyed. Now an ingenious combination of lenses and prisms lets the eyes focus straight ahead as if looking at a distance. The lenses do the magnifying and the prisms bend the light rays, thus taking the load off the eye muscles.

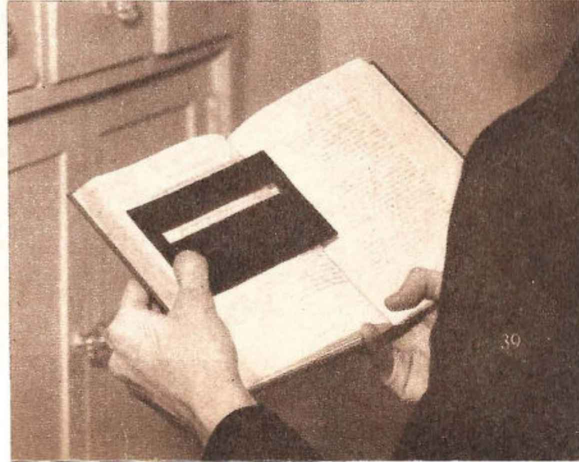
Other close workers—nature students, medical men, instrument makers, opticians, or army officers reading ordinance maps—often prefer double magnifiers mounted on headbands to swing down over the eyes when needed. Some of the instruments have a tiny searchlight built in so the magnifier casts its own beam. Still other persons prefer tiny, light-weight magnifiers the size of a collar button but equipped with finely ground lenses. They can be slipped in front of your glasses or worn separately to give microscopic vision.

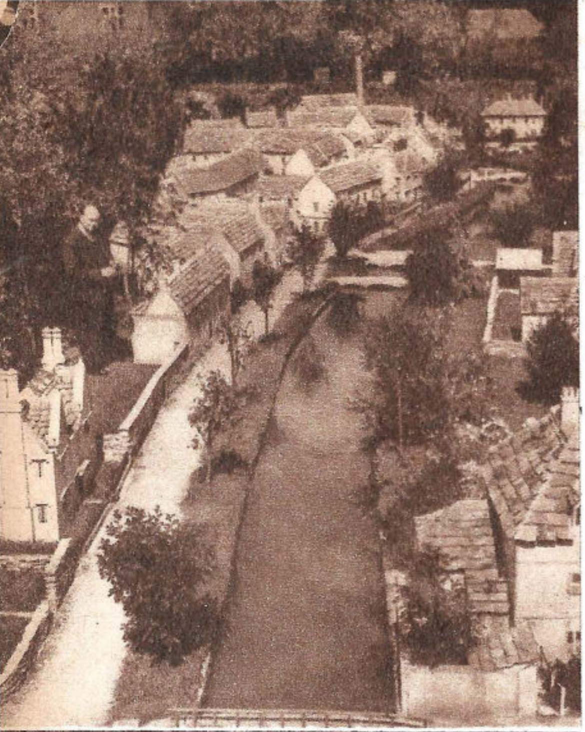
Perhaps the most sensational eye aids are the telescopic spectacles built to give vision to people having only two percent of normal eyesight. Built like tiny telescopes, no larger than one inch from front to back, these spectacles have a large converging front lens and a smaller diverging rear lens, with

[*Continued on page* 127]



Eye Enemy No. 1—glare—is thwarted by this simple device, a piece of black paper with a slot.





Model Village In Garden

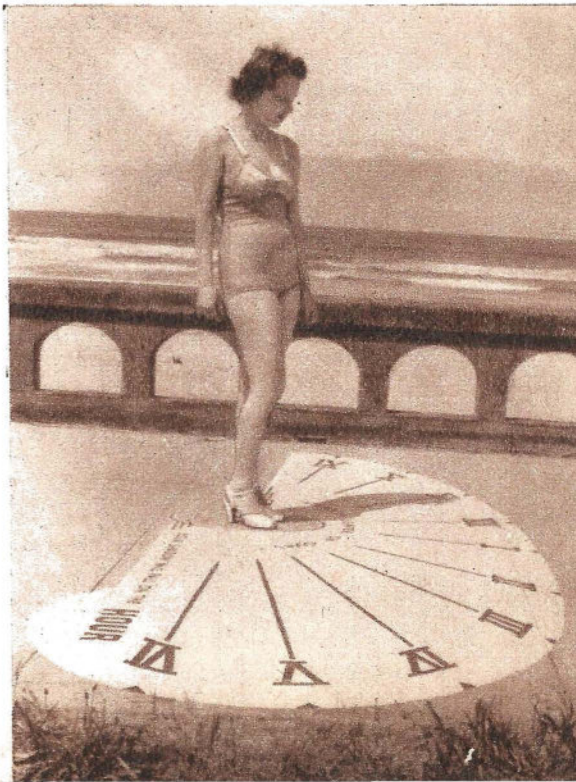
A CITIZEN of Bourton, England, built this unusual model in his garden. The model is an exact replica in every detail of his home village, even to the peaceful river meandering past the quaint old houses. Most of the latter are not much taller than the builder's year old son.

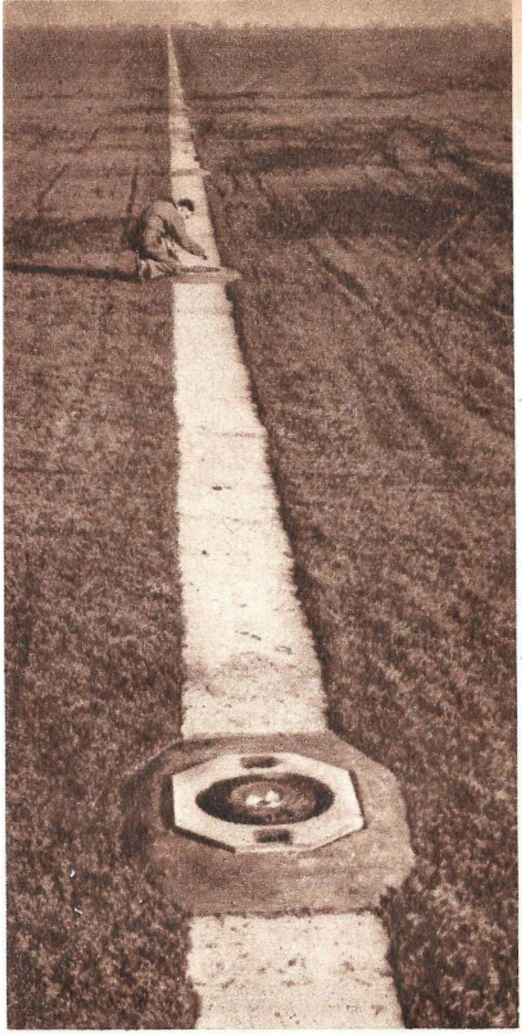
New Anti-Glare Glasses

A NEW type of glasses is being worn in Switzerland to protect eyes from the glare of the sun on ice and snow of mountain glaciers. The tinted section of the glass can be turned into different positions to guard against glare coming from any direction.

Sundial Solves Time Problem

HOW to keep track of the time while swimming has long been a problem, but this clever device at Seaside, Ore., solves it. The swimmer simply stands on the marked spot of a big sundial painted on the beach promenade and reads the time from his or her shadow.



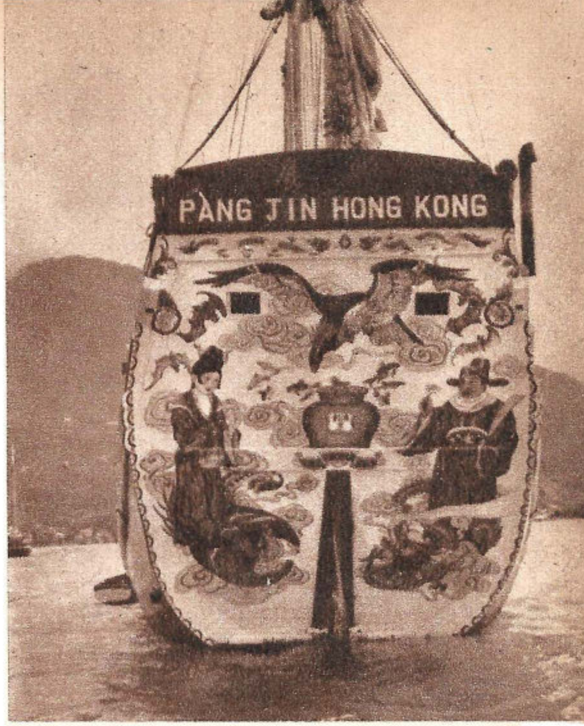


Airport Has Lighted Fog Line

AN ILLUMINATED fog line, designed to facilitate the landing of planes in thick weather, has been installed in a British airport. It consists of a concrete strip 1,400 yards in length. Countersunk electric lamps are installed at intervals of 50 feet, giving an intense light at a low angle.

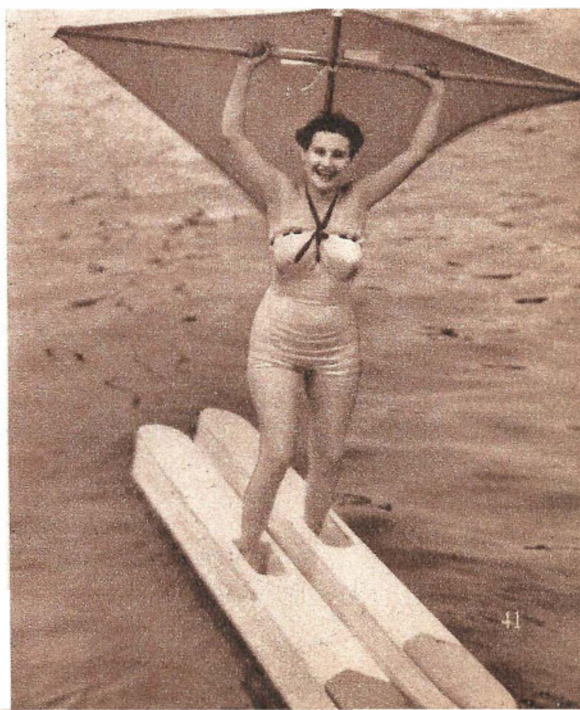
Walk-Sailing New Sport

WALK-SAILING is the name of this new sport which Miss Arlene Lloyd appears to be enjoying in the photo at right. It combines the best features of walking and sailing. Miss Lloyd's water shoes, which are made of balsa wood, are about the size of skis. She has to know her sailing tactics, in order to catch the greatest amount of breeze in her kite-like sail.



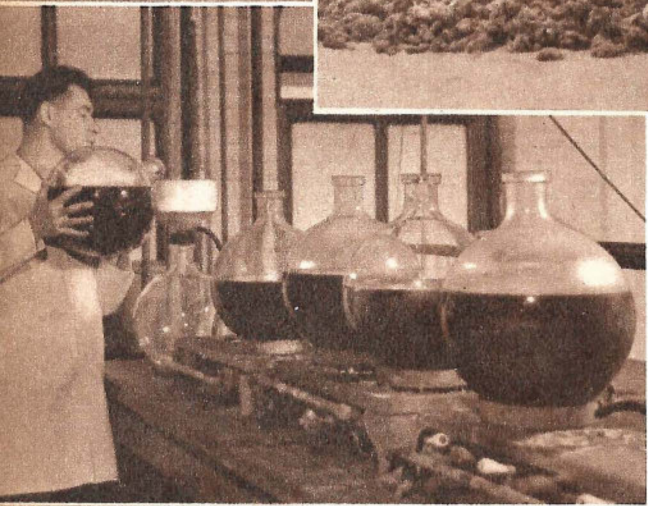
Figures Scare Off Devils

PANG JIN, a Chinese junk, is shown on her way from the Far East to the New York World's Fair. The art on her stern is there because of an old Chinese belief that such figures painted on a vessel protect her by scaring away all the devils and other evil spirits which are apt to be met during a voyage.



Hair, Feathers Aid Cancer War

Right: This pile of hair is the result of several thousand haircuts. It is being packed into a large flask which holds 30 pounds or 1,500 haircuts. Below: Contents of flasks go through purification process. Hair is boiled 10 hours and decolorized by 15 separate treatments. Chicken feathers may be used in place of hair.



Below: The liquified hair or feathers are shown undergoing one of many tests. Below, right: This amount of finished product was made from 2,000 haircuts.

HAIR trimmed from 1,000,000 heads and feathers of 500,000 chickens provide a crystalline substance known as cystine used by eastern laboratories in the widening war on cancer. This new weapon in the fight against disease is a colorless, odorless chemical. Five thousand haircuts provide 100 pounds of hair, which in turn yield only five pounds of cystine.

Janitors in barbershops from New York to Los Angeles collect hair for the Paul-Lewis Laboratories at Milwaukee, Wis., where it is reduced to the white precipitate. First, the hair is packed into large flasks. One bottle,

[*Continued on page* 130]

Baby Crib Made From Barrel

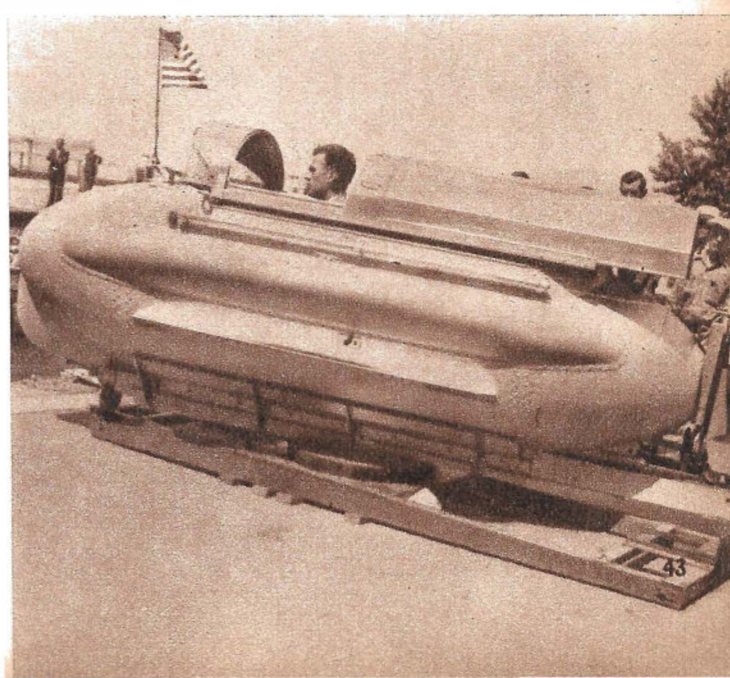
LACK cash for a baby crib? One father did so he built this one at a cost of 60 cents, using an old barrel, some lumber and a little paint. The crib is on display at the St. Louis, Mo., County Hospital. The photo gives a clear idea of its construction.

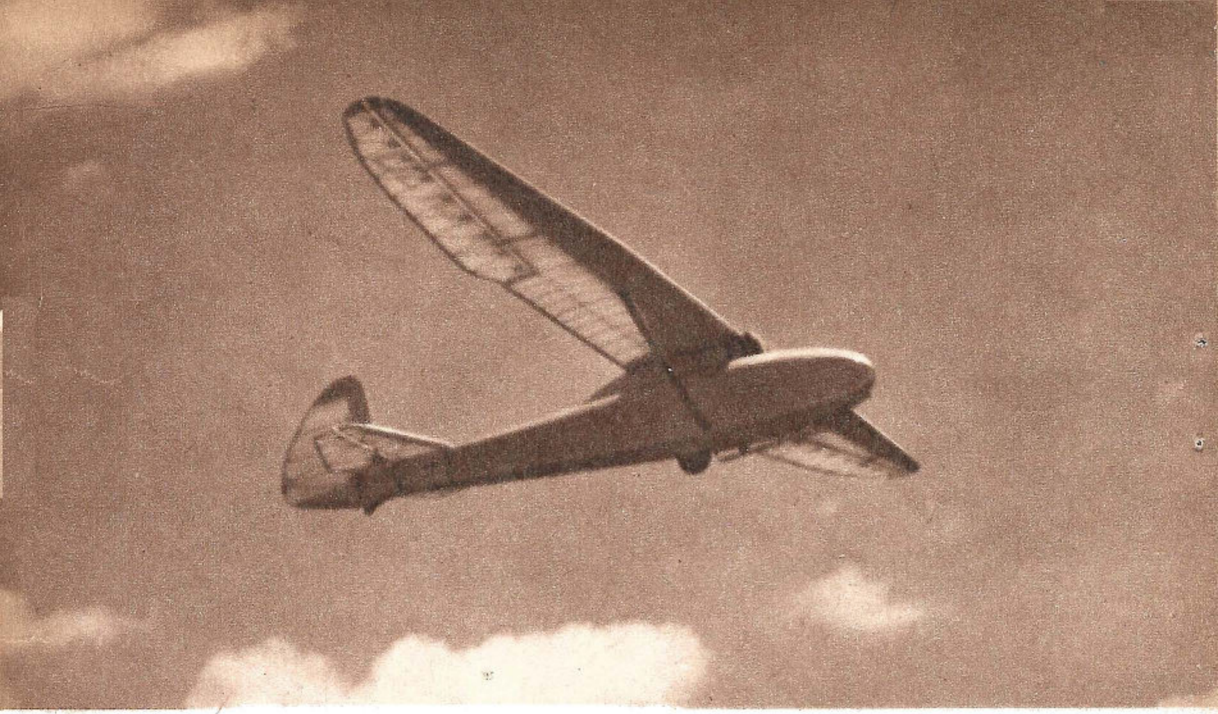
Bicycle Built For Family

CHARLES STEINLAUF of Chicago is no relation to Rube Goldberg but he invented this family bike, with all the comforts of home, which bears a striking resemblance to a Goldberg brain child. The inventor rides on top and steers the machine. His son pedals in the rear. Mrs. Steinlauf, working merrily on her sewing machine, rides amidships, and little Ruth Steinlauf, in the role of sightseer, holds down the forward position. Charles said it was great stuff, but spectators weren't so sure.

Safety Lifeboat Is Demonstrated

A SELF-LAUNCHING, safety life-boat, which looks like a combination of racing automobile and submarine, recently had its first public demonstration. The craft is unsinkable and non-capsizable, and an inexperienced person can launch it from the deck of a sinking ship, Menotti Nanni, its designer, claims. The boat can be manufactured in different sizes to accommodate any number of persons.





Richard C. du Pont in a "Wolf" sailplane at Elmira, N. Y.

SAILPLANE MAGIC

IF YOU wonder about the daring sailplane pilots who float through the air with the greatest of ease, take the case of Jack O'Meara.

In 1931, Jack cut loose from a towing airplane over New York City and headed his ship down the east side of Manhattan Island. He believed that every person, every building, is giving off heat and that the heated air is rising; he intended to show that a man could ride the warm breath of the city. Manhattan, completely surrounded by water, should be a veritable chimney, he thought, from which warm air is constantly ascending.

With no sound but the sighing of the wind about it, the plane glided along the eastern margin of Manhattan. O'Meara was mindful of the fact that the lower part of New York abounded with tall spires and he didn't exactly relish the thought of colliding with a skyscraper!

He soared over the city but all the while his glider continued to drop from his original 3,850 foot height. Failing to find the expected thermal, or updraft of warm air, he banked sharply and headed across the East River toward an airport some five miles away on Long Island Sound. His sailplane continued to lose altitude rapidly and for a while it looked as if Jack would either land in the East River or crack up against a Long Island house or factory. Fortunately his glide carried him across the river and the warm air from a cluster of smokestacks gave him a temporary lift.

Then, just when it seemed as though he must surely land on a roof-top, he suddenly felt himself rising. A powerful upward current was carrying him skyward—2,000, 3,000, 4,000 feet upward. He had struck the warm breath of the mighty city, not over Manhattan itself but across the East River, where this enormous heat-created "thermal" had been blown by the west wind!

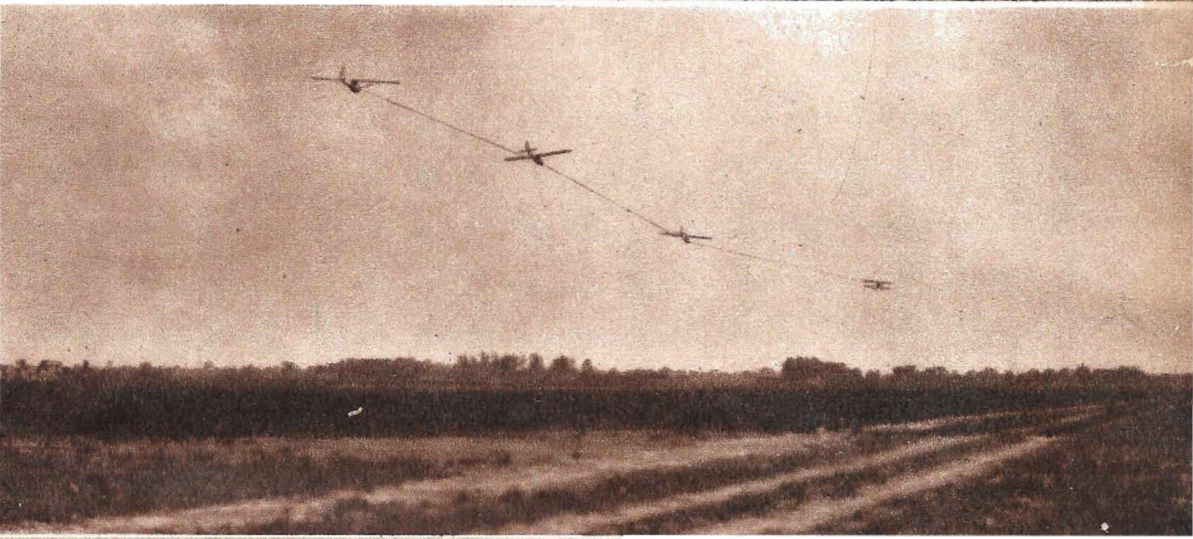
Today the flights of such daring fliers as O'Meara has so increased knowledge of air and its currents that sailplanes have actually flown farther and higher than the best power-driven planes had flown up to about 1911.

Victor Rastorgoueff, a Russian, is reported to have flown a straight line distance of 405 miles in 1937. Erwin Ziller made an altitude flight of 28,215 feet, climbing 20,000 feet in five minutes and flying for over an hour at

Cloud hopping, riding "cold fronts," and hunting for "thermals" are but a few of the thrilling sailplane experiences described in this second of a series of three exclusive articles by Richard C. du Pont, America's former distance and altitude soaring champion and two-time winner of the National Soaring meet at Elmira, N. Y.

by Richard C. du Pont

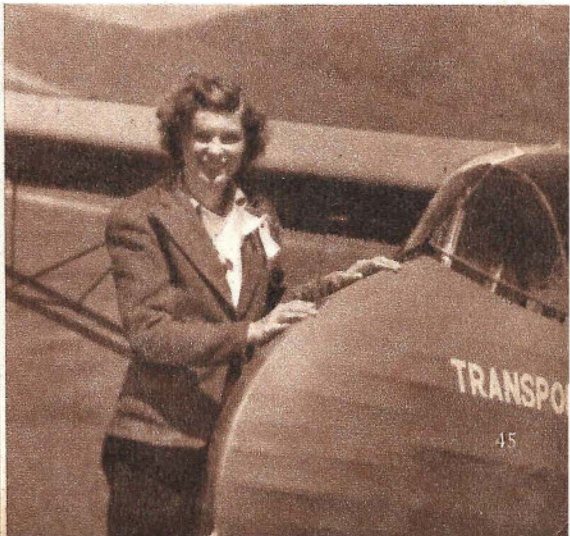
America's Outstanding Sailplane Authority
President, Soaring Society of America, Inc.



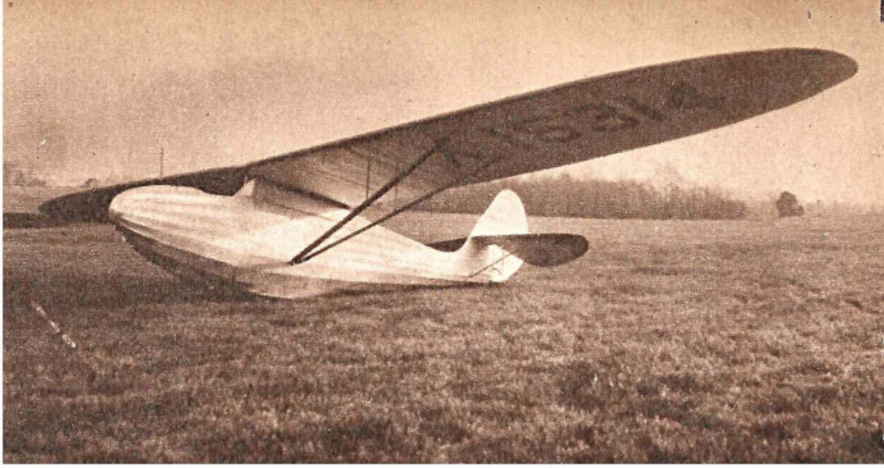
A glider "train," showing three gliders being towed by an airplane. At the top is a picture of Richard C. du Pont in a grounded sailplane. Note the clean lines of the fuselage and wings. Below: Proving that soaring is not a sport for men alone, Lucretia Buxton, one of the best-known women sailplane enthusiasts, is shown with her plane.

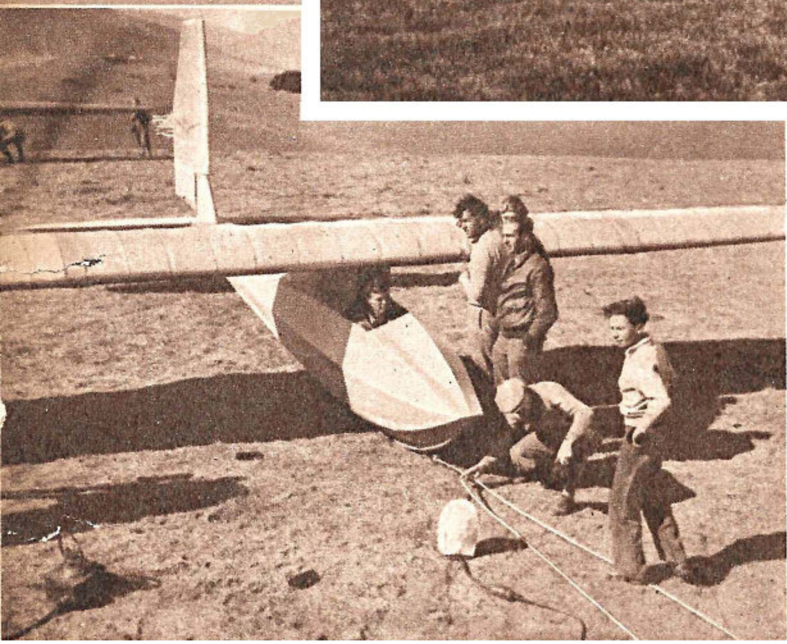
28,000 feet in a temperature 40°F. below zero. Recently, Peter Gloeckner attained an altitude of 30,000 feet.

In America, soaring has made long strides forward and in the spring of 1938 Lewin Barringer, of Philadelphia, rode the thermal currents of the southwest to a new American record, making a flight of 212 miles and reaching an altitude of 6,500 feet. John Robinson and Dick Essery, of San Diego, climbed to an altitude well above 10,000 feet. A direct flight of 21 hours and 34 minutes was made by Lieutenant William Cocke in Honolulu. The American duration record, however, is still under the world mark made by August Boedecker and Karlheinz Zander in Germany. Their time is 50 hours and 15 minutes! Think of remaining in the air that long with a powerless heavier-than-air machine!



Right: A Bowlus-du Pont utility glider, used primarily for training. Below: Colonel Charles A. Lindbergh in the cockpit of a glider as assistants set the rubber cords which snap the craft into the air, during his experiments with Hawley Bowlus at Lebec, California, in furthering motorless aircraft development.





The sight of one of these bird-like planes winging its way through the air is enough to make the man in the street wonder why the thing doesn't come down. Actually the sailplane is gliding downward, but the current in which it has been descending is rising faster than the plane is sinking. Consequently, the plane rises.

The fact of the matter is that the sailplane is constantly rising on invisible air, warmed by the earth's surfaces that draw the sun's heat to plowed fields, streets, and roofs of houses in town and city. What happens is that the air, being heated, is broken away and pushed upward in a succession of invisible bubbles. To these thermal currents other powerful updrafts are added, the latter usually caused by slopes or hills. When slope currents mingle with heat thermals, the result is usually something confusing.

This is the condition airplane travelers dislike because the result is what they call "bumpy" weather, but this same condition is meat for the sailplane enthusiast. The soarer takes his cue from the birds. He knows, for instance, that turkey buzzards are grounded and are unable to do any extensive flying without the help of upward currents of air. Under certain cloudy conditions the soarer knows that he is bound to find a favorable thermal.

The subject of thermals is a story in itself. The worst part about a thermal as far as a sailplane is concerned is that the pilot can't see it. If he could, then soaring would be a cinch and there would be no question but that it could be put to practical use for transportation purposes.

Perhaps the near future will reveal some means for detecting thermal currents. But until that is done the sailplane pilot must rely on accumulated experience and spontaneous guesswork to do his soaring. The smart pilot will watch the birds because they have an uncanny knack of finding the updraft, causing many authorities to believe birds can see thermals, due to changes in the density of air. The pilot must also watch the terrain for areas which absorb the heat and for areas which reflect heat. He must watch the clouds, for a cumulus may mark the top of a good thermal current or itself provide valuable lifting power.

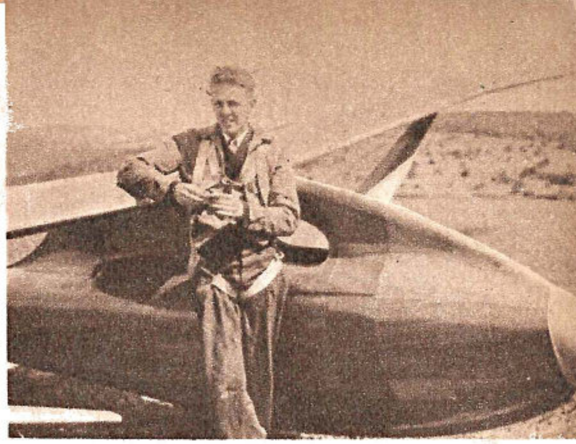
There have been places, for example, in which pilots located thermals by watching butterflies. If you see a group of butterflies four or five thousand feet up you can be pretty certain they have been carried there by currents of rising air. Such birds as eagles, hawks, and vultures are of actual service to sailplane pilots in search of a thermal. One pilot reported having seen a vulture catching a thermal 6 feet off the ground and going up until nearly out of sight without once flapping its wings.

A popular theory which the sailplane pilot has exploded is one relating to the general belief that when a lot of vultures are seen circling over a settled area they are watching something dead or dying. In some cases this may be the reason, but in most cases it simply means that they have located a thermal and are gliding in its updraft.

Although the experienced pilot watches the birds, his best bet is still the clouds. A hefty group of clouds on the "right side" of a thunderhead will enable the soarer to go places. Their method of travel is a form of cloud hopping.

Cloud hopping is a fascinating sport. Also, it has its dangers, as I found out during the 1937 national championship meet. I was soaring at a fast clip when I jumped into a cumulus cloud and rode it for some distance.

As I came out of the cloud another plane loomed ahead and our two ships, each traveling about fifty miles an hour, narrowly missed crashing. I later found out that the pilot of the other plane was Lewin Barringer,



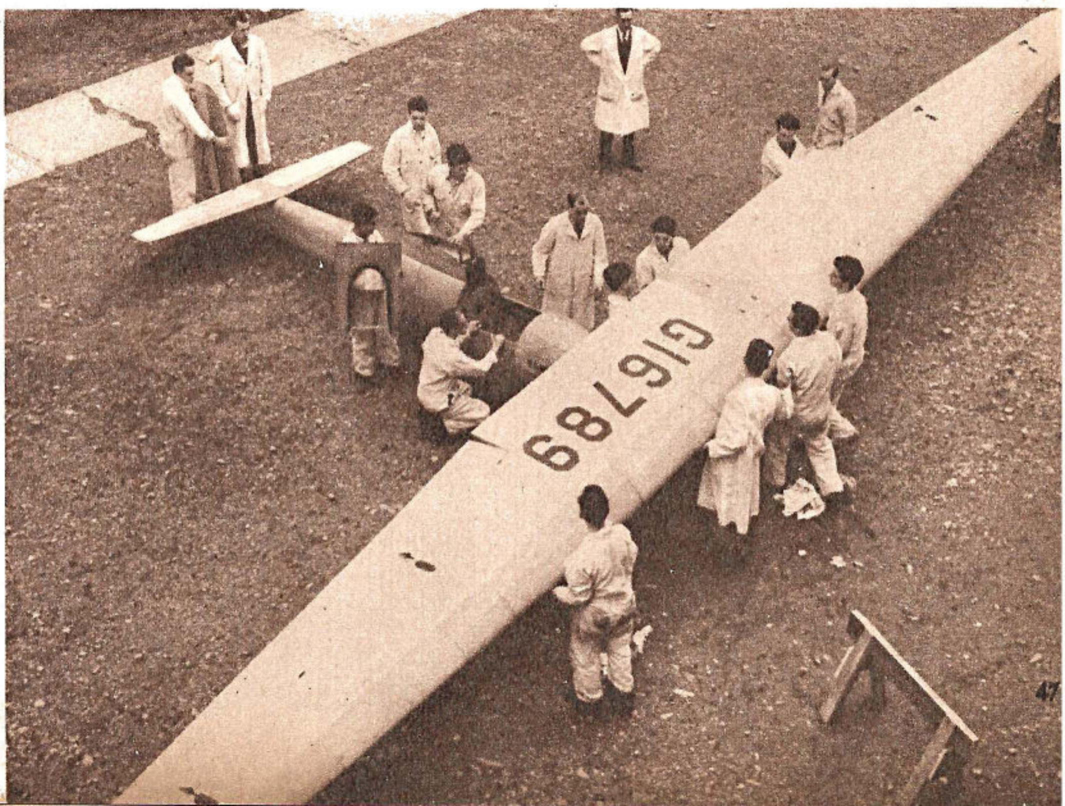
Chet Decker, who beat the author out of the 1936 National Soaring championship at Elmira, N. Y.

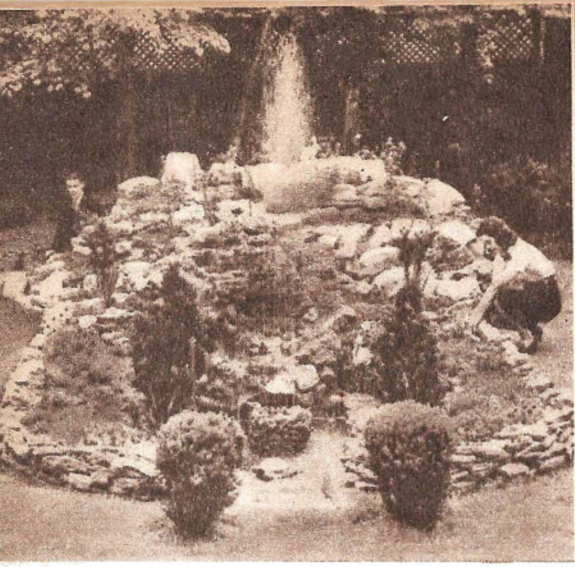
who had sighted the same cloud and was just about to plunge into it, little thinking that this one cloud among thousands in the sky would be already occupied. A little later I plunged into another cloud just as Peter Riedel whizzed out of it in his sailplane. In truth, it was a busy day for sailplanes shooting in and out of clouds without any way of being able to tell whether one was occupied!

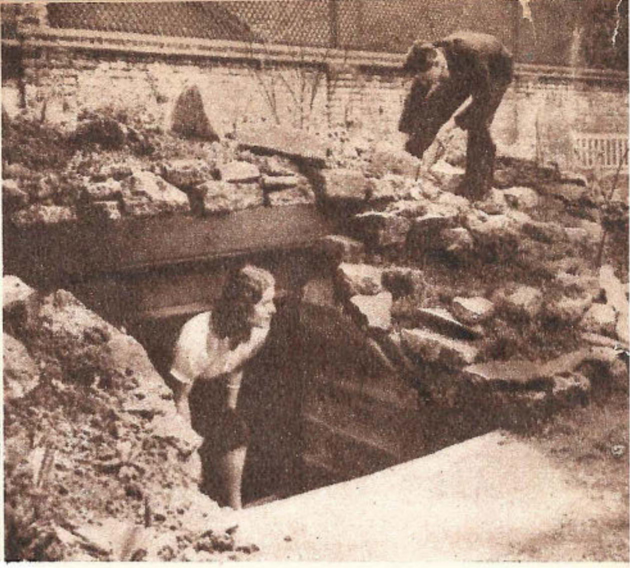
Finding the thermal with which to stay aloft is one thing and finding yourself in a thermal from which you can't come down is something else again! There was the time

[*Continued on page* 128]

A Rhön-Buzzard sailplane, being assembled by students of the New York State Aviation Ground School. This picture shows the long, narrow wing that is the distinguishing mark of all sailplanes.







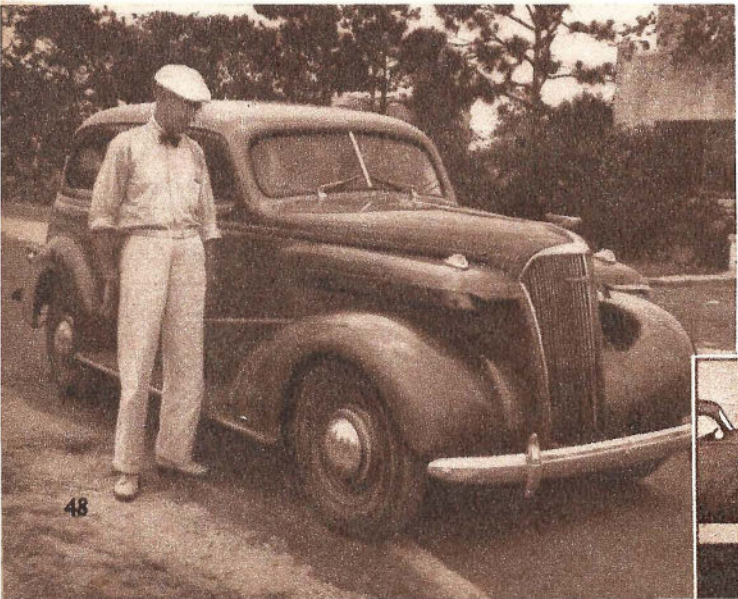
Air Raid Shelter In Garden

THE beauties of a rock garden hide a reminder of war's grimness. During the Sudeten scare of September, 1938, an English dentist constructed this concealed shelter from enemy bombers. It is ten feet long, three feet eight inches wide, and the walls are of solid concrete one foot six inches thick.

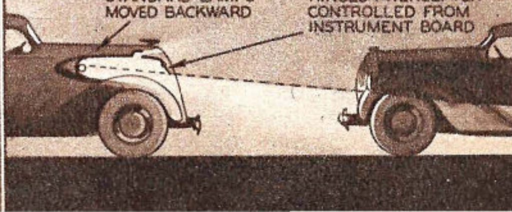
Keeps Smoke Out Of Eyes

WISHING to read his newspaper without the annoyance of clouds of smoke getting in his eyes, an Englishman invented an ingenious device—a flexible cigarette holder of unusual length. Not only does it keep smoke out of the eyes; it also keeps tobacco particles from getting in the mouth. The idea may spread like wildfire—or smokers may find it too much trouble to bother with.

Headlights Pierce Fog

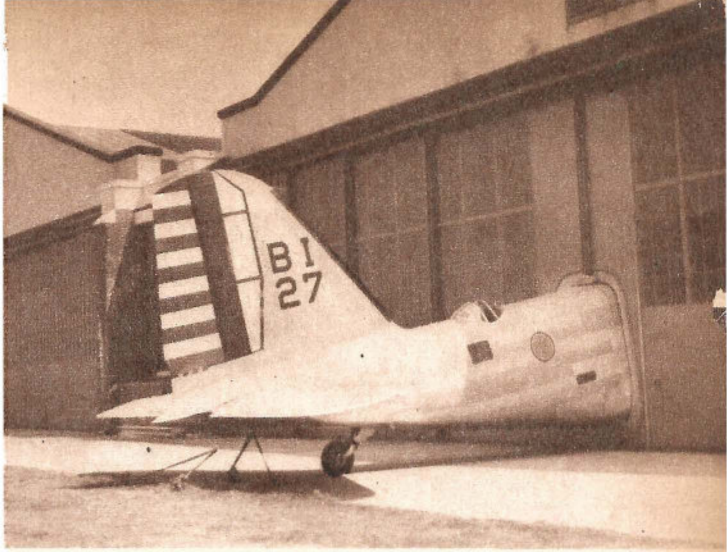


A NEW illumination system for cars eliminates glare and penetrates smoke and fog. It may be installed on any car by bolting to the sides of the hood after the headlights have been moved back 40 to 50 inches. The arrangement is such that it is never necessary to elevate the beam, which is always directed downward toward surface of highway.



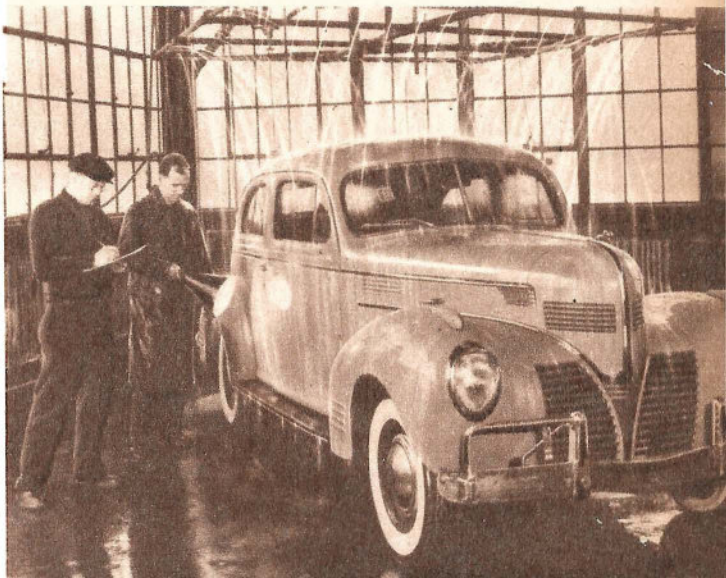
Ostrich Gives Idea For Plane Storage

AT MITCHELL FIELD, Long Island, Army Air Corps base, difficulties arose recently over storage of the giant twin-engined bombers. There were too many bombers and too few hangars. What to do? That was the question. Authorities finally went to the ostrich for advice, with the result that holes were cut in hangar doors so that the planes could be stored with their tail surfaces outside.



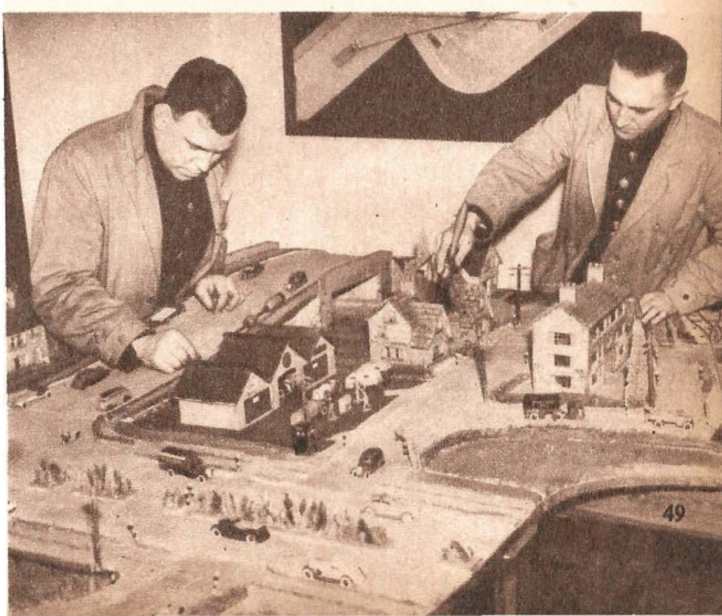
"Rain-Maker" Test Finds Body Leaks

HOW often have you driven your car during a heavy rainstorm and felt an icy trickle running down your neck as water leaked through a tiny opening in the roof? Or watched a small river begin to creep from under the windshield to ruin the crease in your Sunday trousers? To guard against such discomfort, one automobile manufacturer puts all his cars through the "rain-maker" test, which will ferret out the smallest leak, before the auto reaches the hands of a purchaser.



Model Layout Aids Traffic Policemen

TO AID police of an English town in learning the intracacies of traffic handling, a model layout of the town was constructed. The layout shows streets and intersections of the town in miniature, together with roads leading into them. After studying it briefly, traffic policemen can tell what areas are most likely to become congested and thus can plan methods of handling the congestion.



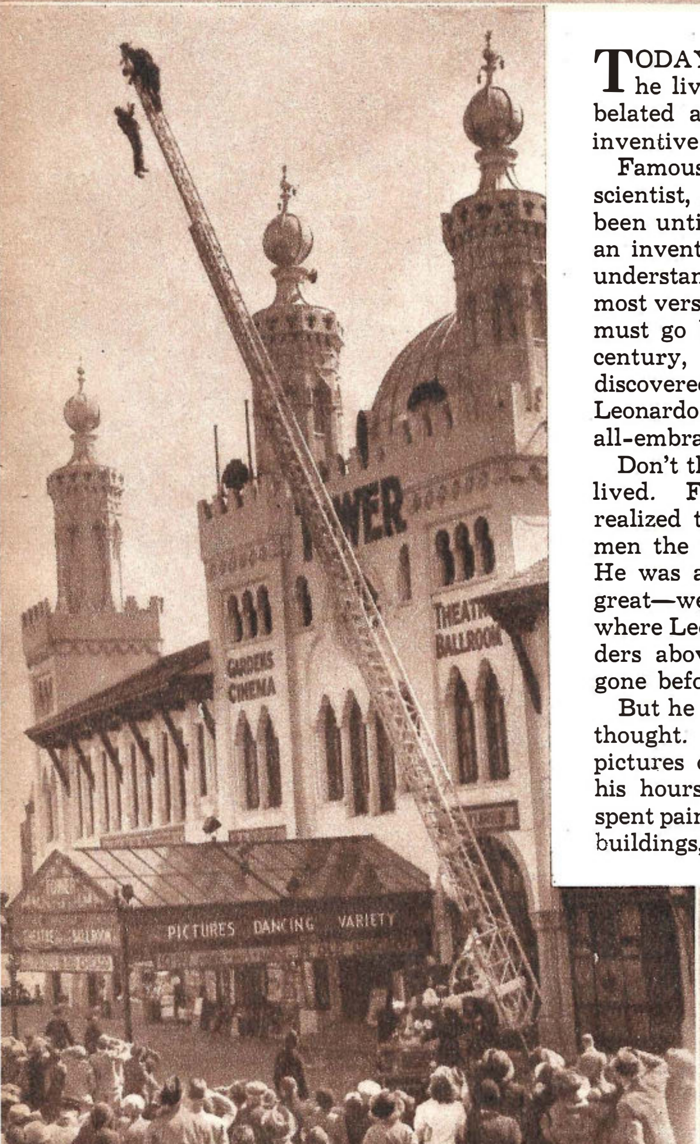
LEONARDO DA VINCI —Edison of Yesterday!

TODAY, just four and a half centuries after he lived, Leonardo da Vinci is receiving belated acclamation as one of the greatest inventive minds the world has ever known!

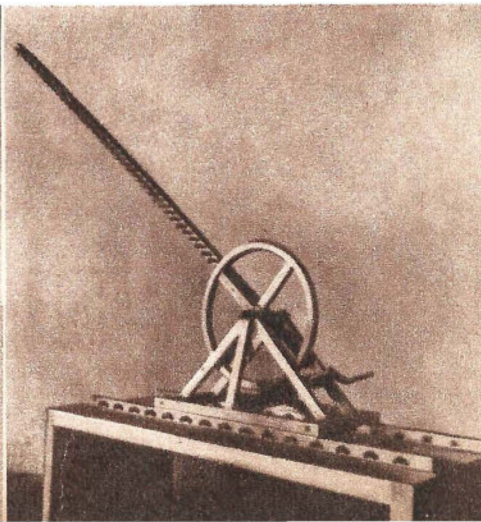
Famous as a painter, sculptor, architect, scientist, engineer and anatomist, it has not been until the last decade that his genius as an inventor has been truly appreciated. To understand just why this side of history's most versatile man has been so neglected, we must go back to the latter part of the 15th century, about ten years before Columbus discovered America, for it was then that Leonardo da Vinci was at the height of his all-embracing career.

Don't think he was unappreciated while he lived. Far from it! His contemporaries realized that he was one of the most gifted men the world had ever known, even then. He was a great painter, a great sculptor, a great—well, it's hard to think of any field where Leonardo didn't stand head and shoulders above anyone who then lived or had gone before.

But he had one weakness, or so his friends thought. He was forever planning, drawing pictures of the most fantastic devices when his hours might so much better have been spent painting great pictures, conceiving great buildings, or doing any one of the other things



The modern 100 foot fire ladder shown here in a rescue exhibition isn't such a far cry from the one at the right, which Leonardo da Vinci designed way back in the 15th century!



Out of the dim and distant 15th century there emerges today, through the veil of over four centuries, one of history's most heroic figures to lay claim to a new honor: The World's Greatest Inventor!

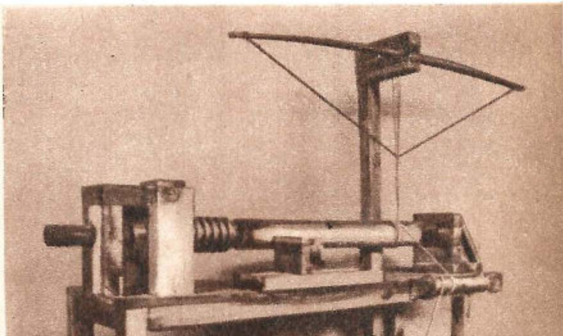
by Cliff Taylor

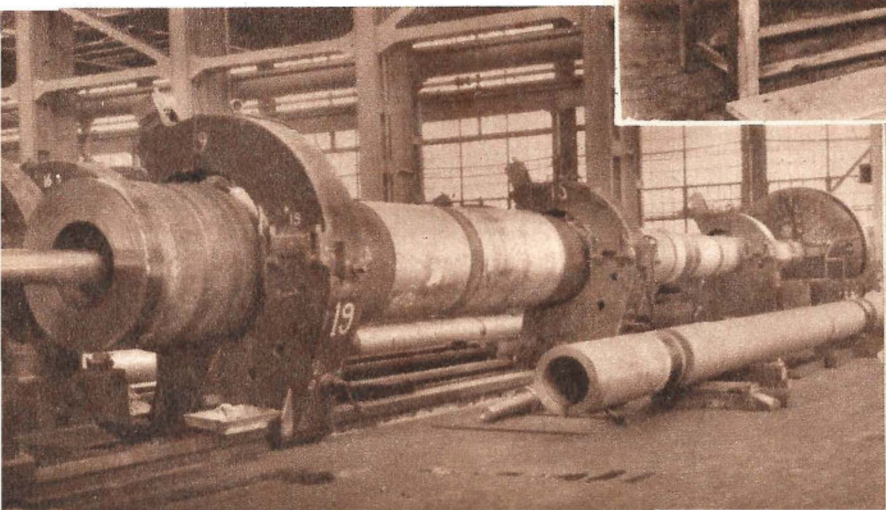
he could do so much better than anyone else. His friends begrudged him the valuable time he "wasted" planning such things as a machine that would enable man to fly, a boat that would stay under water, and other things equally fantastic.

Today we know that had Leonardo left behind him any one with zeal and knowledge enough to extract from the mass of his manuscripts some portion of his inventive ideas and give them to the world, civilization would have been given an incalculable impetus.

As it was, these studies of Leonardo's seemed to his followers and biographers merely his whims and fancies, things to be

Above: Watching birds inspired Leonardo to design a machine that would enable men to fly. Contrast his model with today's great Clipper!





When he designed the lathe above, Leonardo probably had no visions of such a giant as is shown at right—a 204-foot lathe for turning naval guns!

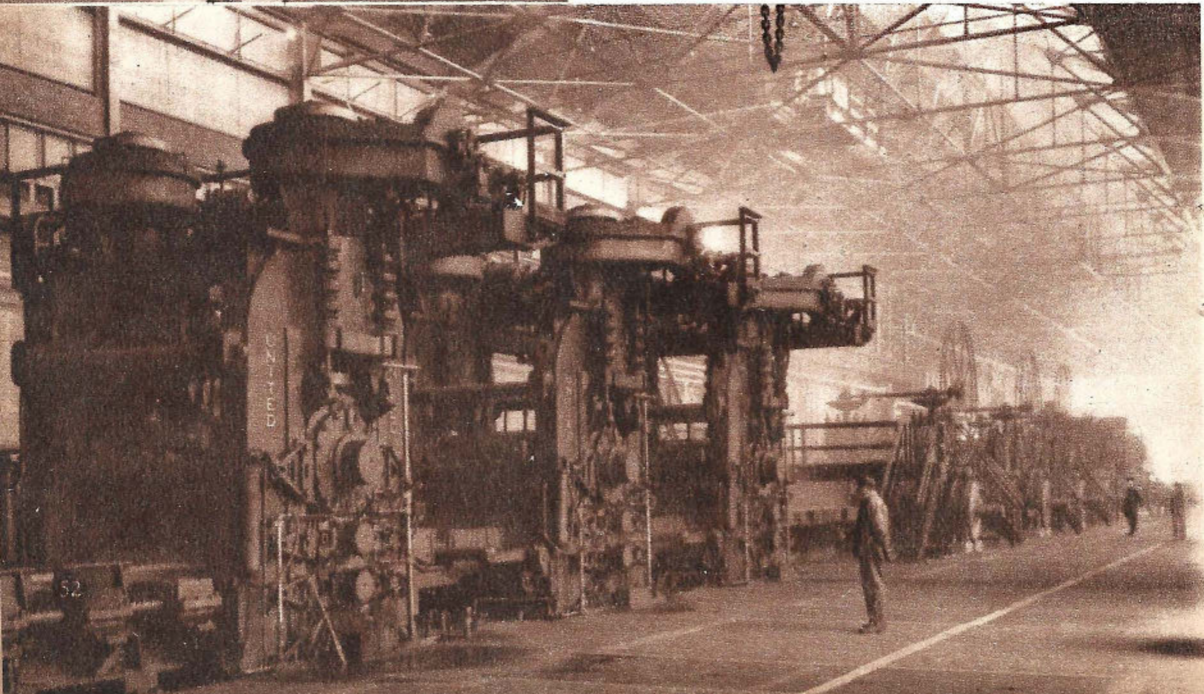
spoken of slightingly and with apology. The manuscripts, with the single exception of a few relating to painting, lay unheeded and unknown, some even destroyed, until the present generation.

In recent years a great body of scholars and editors have been engaged in giving to the world the texts of Leonardo's existing manuscripts and searching for the lost ones. The culmination of their efforts is the present Leonardo da Vinci Exhibition, from May 9 to September 30 this year, in Milan, Italy. This exhibition presents a complete review of the immense and many-sided activities of the great Renaisance painter and scientist. Paintings, drawings, and manuscripts have been lent to the exhibition by Italian and foreign museums, and by private collectors.

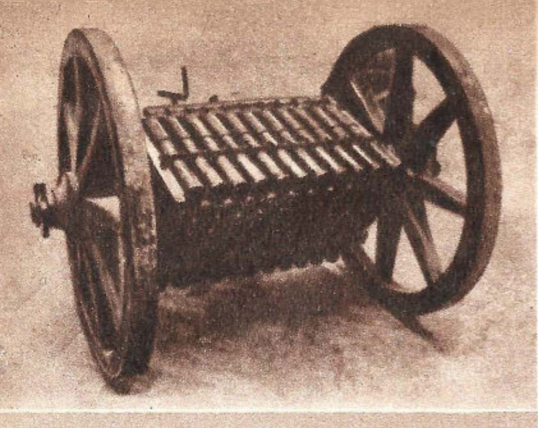
The exhibition comprises twenty sections devoted to the most important activities of Leonardo and includes painting, sculpture, engineering, military and civil mechanics, hydraulics, physics, astronomy, and aeronautics. The feature of the exhibition is the display of the machines designed by Leonardo in which the closest interpretation of the original drawings has been realized.

The working models, some of which are shown on these pages, have been reconstructed according to 15th century technical means and even the raw materials used are those that were presumably available to artisans of the 14th and 15th centuries. The machines are shown side by side with the original designs and with explanatory matter in every case. Plaster casts, tracings, and photographs of his studies in anatomy, architecture, and military art are also displayed.

History tells of no man gifted in the same degree as Leonardo was for both art and science. In art he was an inheritor and perfector, born in a day of great and many-sided



Left: A metal drawing machine designed by da Vinci. Below: Its modern counterpart, a giant iron-rolling mill.



Pre-dating the anti-aircraft gun shown at the right was this multiple-barreled gun designed by da Vinci to fire successive volleys.

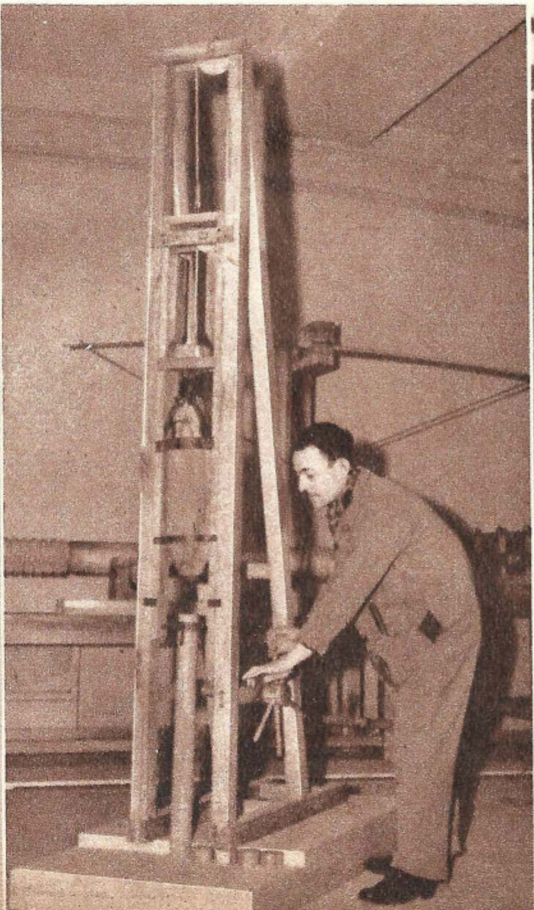
endeavors on which he put the crown, surpassing both predecessors and contemporaries. In science, on the other hand, he was a pioneer, working wholly for the future, and for the most part, alone.

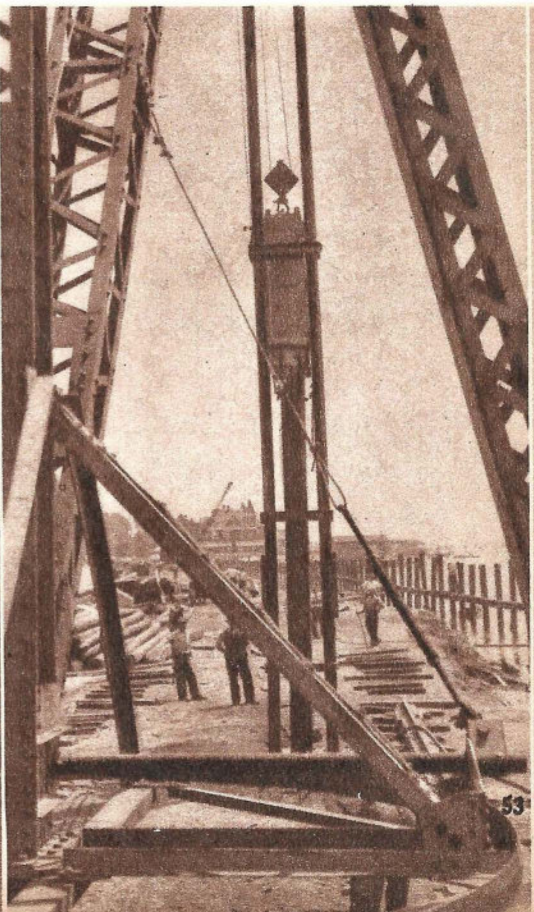
In science he was the first among modern men to set as a goal for himself most of the problems which searchers of later generations have labored to solve. A century before Bacon he showed a firmer grasp of the principles of experimental science than Bacon showed, fortified by a far wider range of actual experiment and observation.

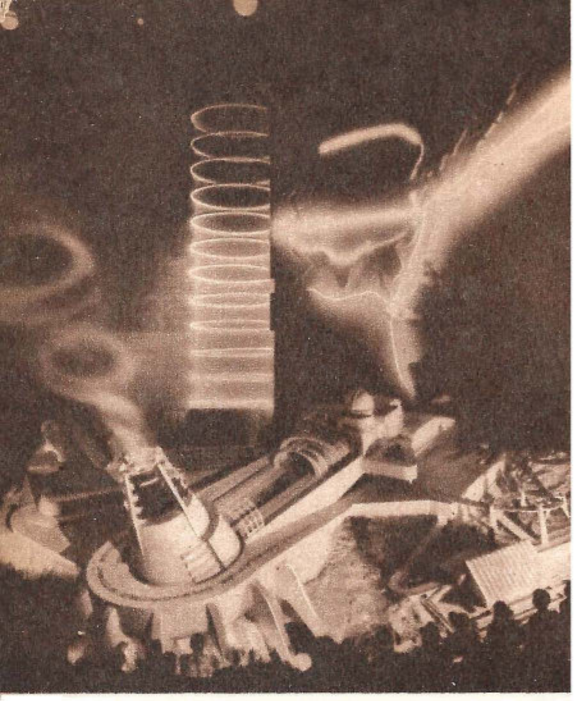
Galileo, Bacon, Newton, Harvey, the Wright brothers—he knew what each of them would some day discover! He was the forerunner of Watts; only he meant steam to project a

[*Continued on page* 129]

Below: An expert works on Leonardo's conception of a pile-driver which, but for motive power, is identical with the 5-ton pressure hammer on the right.





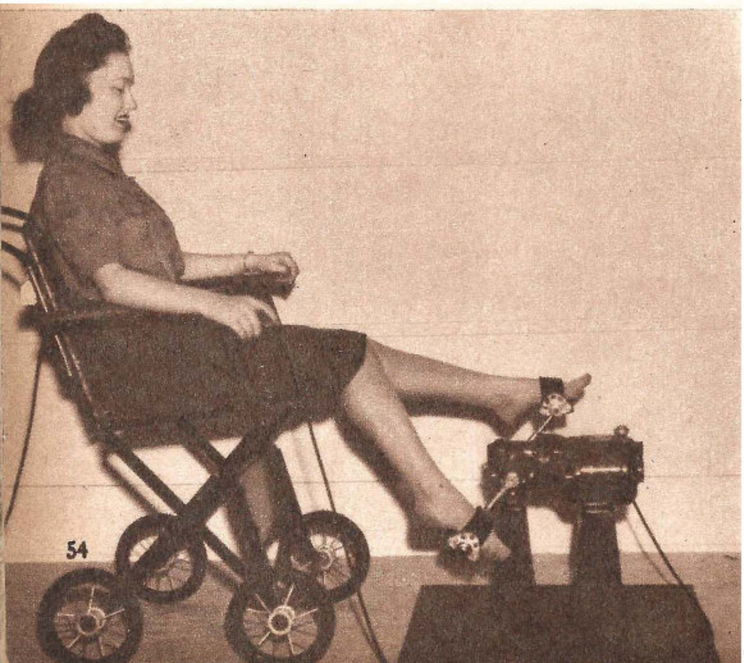


Rocket Port Of The Future

A THRILLING and realistic prediction for the transportation of tomorrow is this "Rocket Port of the Future," shown in action at the Chrysler Motors Building at the New York World's Fair. The shadowy figures in the foreground are spectators who have just seen the rocket ship hoisted to the loading platform, moved into the rocket gun, and fired with a great burst of noise and multi-colored smoke. The exhibit is to show how trans-Atlantic passengers may some day travel via the stratosphere to Europe.

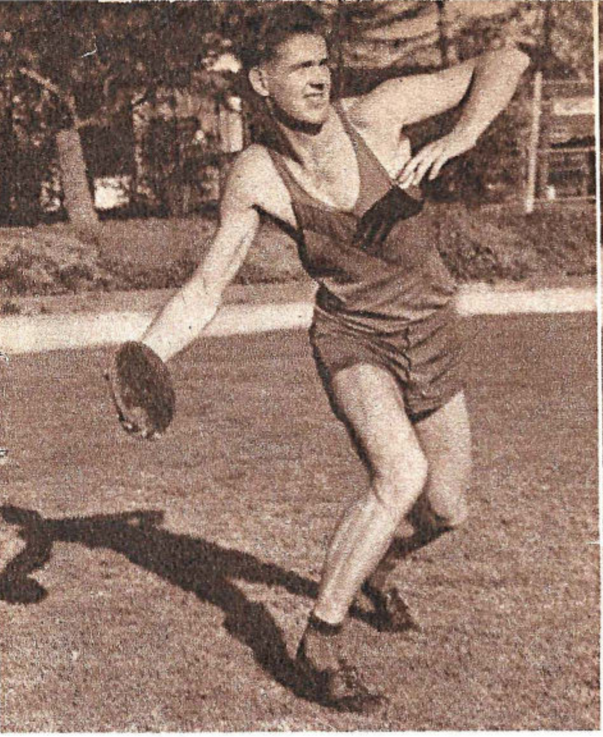
Stick Substitutes For Table

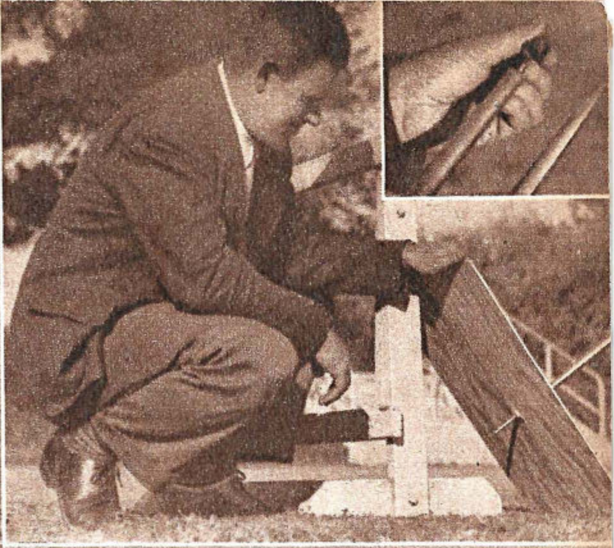
A WORKMAN'S desire for comfort during his lunch hour is responsible for this novel picnic stick, which is a good substitute for a table. Instead of eating out of a dinner pail, the diner takes his food off a plate which is attached at a convenient height to the stick by means of a clip. A smaller plate, attached higher up by the same method, holds sugar, salt and a bottle of ketchup. Another one, lower down, contains pie and cheese. Other plates may be added if the diner wishes a heartier meal.



Machine Exercises Atrophied Muscles

BONE setters say that a person suffering from a fractured limb spends more time recovering from atrophied muscles than from the break itself. An electric "bicycle," which exercises without effort, eliminates much of this, especially in the case of broken legs. It consists of an electric motor which drives two pedals at any speed desired. No strain is put on weakened muscles. The device has proved useful in paralytic cases, also.





Left: An athlete at Los Angeles City College hurls the rubber discus. Above: Coach Campbell studies demonstration of dangerous nature of steel pointed javelin. Inset gives a close-up comparison of the rubber tipped and steel pointed types of javelin.

SPORTS MADE SAFER

WHEN Coach Harry Campbell of Los Angeles City College saw an athlete get confused, try to out run a javelin that was coming his way, and become impaled upon its sharp steel point, he resolved to try to prevent similar accidents in the future. In collaboration with Tom Graham he devised a rubber safety tip resembling the cleat of a football shoe and threaded to screw on the end of the javelin. Thus he made javelin practice safe even on a crowded field where many athletes may be warming up for various events.

Next Coach Campbell attacked the problem

[*Continued on page* 130]

Above: Coach Campbell's rubber shot is shown, bouncing harmlessly off a piece of tile sewer pipe, one end of which has already been broken by a shot of the conventional style. Left: Rubber sideline marker for indicating yards stripes on football field will bend when struck by a falling player, thus preventing possible serious injury.

Two Can Play Big Harmonica

THE mouth organ or harmonica, long a favorite instrument for the old fashioned barn dance and country "hoedown," has grown increasingly popular, thanks to its extensive use by hillbilly bands. Its latest development is a giant harmonica 41 inches long and with a scale range of 320 notes. On it two players can make harmonious duets of "Turkey In De Straw," "Wreck Of The Old '97," and other old time hits. The only disadvantage is that this big fellow is too large to be carried in the pocket.

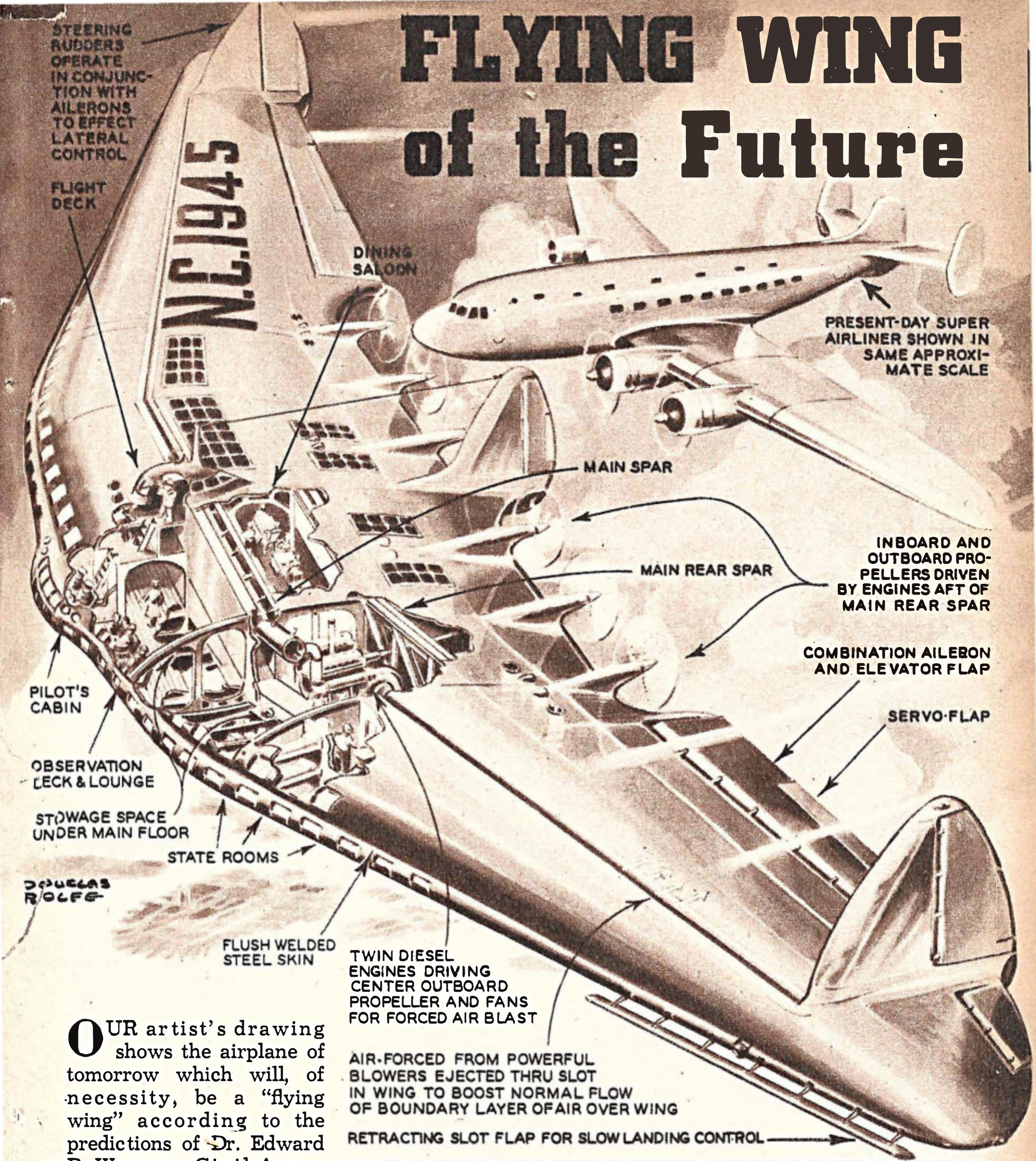
Greenhouse For Window

FOR city dwellers and others who lack garden space or for plant lovers who wish to raise flowers the year round, an easily attached window greenhouse, which brings the garden right into the home, is the latest thing. Constructed almost entirely of glass and steel, the three-shelf unit receives its heat and light from the house, thus enabling plantings to be made in any season. The glass slides can be replaced with screens during the summer. The unit is made in sections for shipment and can be easily assembled.

Circular Window Rotates To Open

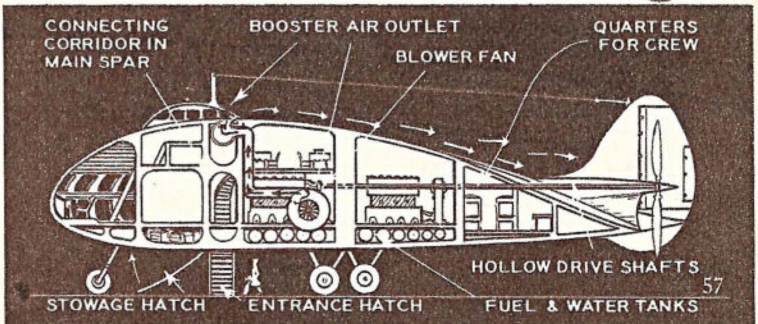
WITH its bottom half mounted on a pivot, a circular window rotates to open for ventilation. It conforms to all architectural styles and is designed for use in halls, lavatories, vestibules and attics. It is manufactured complete with frame, prefitted window, weather stripping, wire screen and hardware for mounting. A lock and fastener holds the window securely in open, half open and fully closed positions.

FLYING WING of the Future



OUR artist's drawing shows the airplane of tomorrow which will, of necessity, be a "flying wing" according to the predictions of Dr. Edward P. Warner, Civil Aeronautics Authority member and internationally known aeronautics expert.

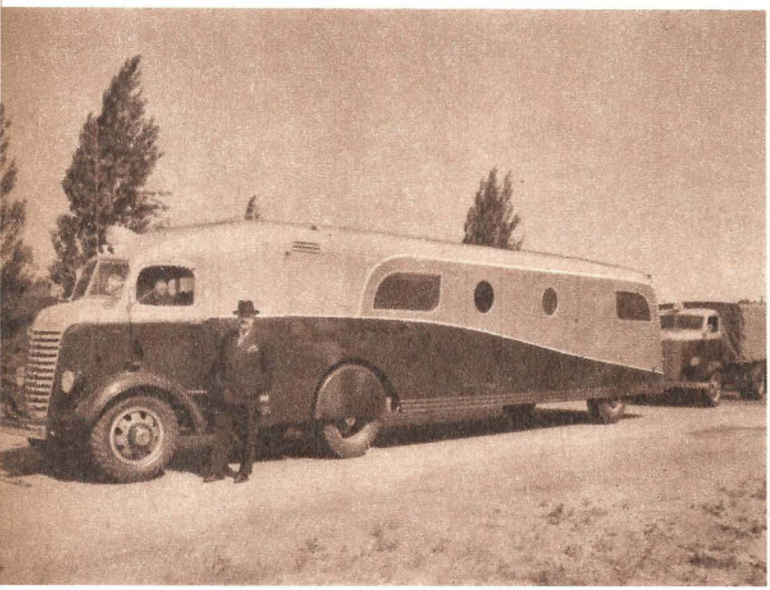
Half the tremendous speed gains made during the last decade, aside from the use of more powerful motors, have been made by [*Continued on page* 130]



CROSS SECTION AMIDSHIP OF SELF-CONTAINED WING

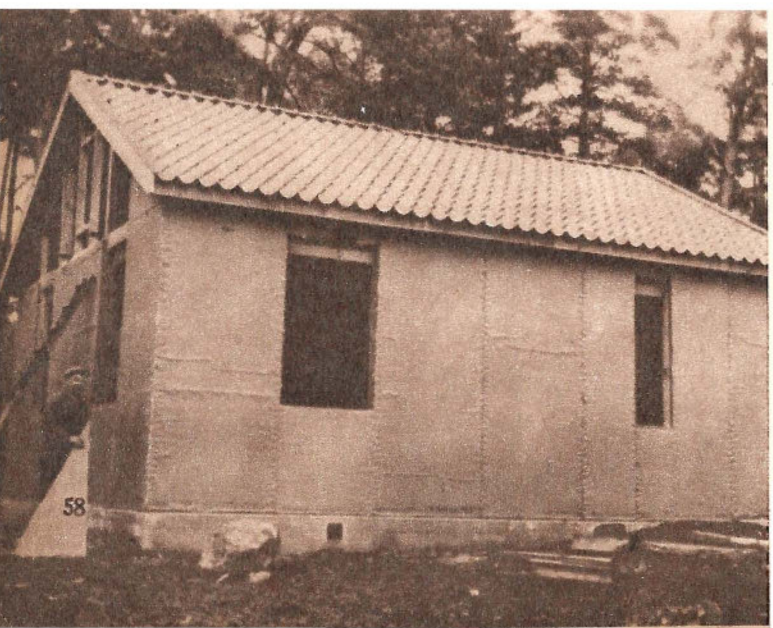
Sheep's Foot Roller Makes Road In Mud

A FIRM farm-to-market road is made in the mud by this sheep's foot roller, designed by engineers to produce the same effect, when passing over soft earth, as the feet of a flock of sheep. The roller will finish off a secondary road at a cost of $3,000 per mile, compared with $10,000 per mile for macadam.



Land Yacht Used For Tour Of Asia

IN THIS huge land yacht, which is equipped with every modern convenience, Lawrence C. Thaw and his wife are making an exploratory tour of Asia, visiting, en route, the rulers of the countries through which they pass. Among the luxuries of the highway "Pullman" are a two-way radio, electric refrigerator, bath tub and shower, running ice water, and air conditioning apparatus. The overall length of the vehicle is 39½ feet and the width is 90 inches.



Timber Is Produced From Pressed Straw

TIMBER made from pressed straw, a product of Sweden, forms the material for the walls of this house. The straw is pressed at a temperature of 150 degrees. The resulting material is light and costs about half as much as ordinary timber. It is waterproof and offers strong resistance to fire. It can be used on any type of building over a framework of steel, iron or wood.

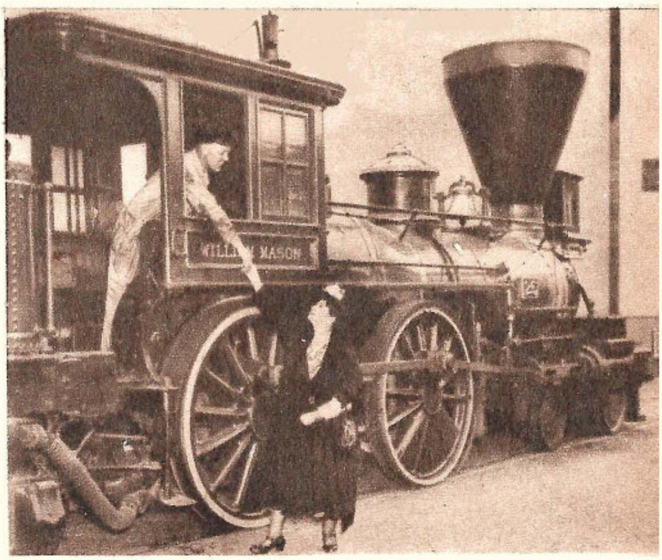
Chair Can Be Reversed

A FEATURE of the annual National Home Furnishing Exposition held recently in Chicago was this dual purpose chair, which is being demonstrated in the photo by Miss Marion Johnson. Except for the design of the upholstery, the top and bottom of the chair are alike. If the owner tires of one design, the chair need only be turned upside down to obtain a new one. This also saves wear and tear on the upholstery.

Bed Concealed In Desk

A HANDY device for small apartments is this new secretary-sleeper, exhibited recently at the American Furniture Mart in Chicago. The single bed, 30 inches wide, fits snugly inside the writing desk, where it remains hidden from sight during the day. When bedtime comes, the writing desk is closed, the door of the bed compartment is opened, and the folding bed is pulled out and made up.

"Casey" Jones' Widow Inspects Old Engine



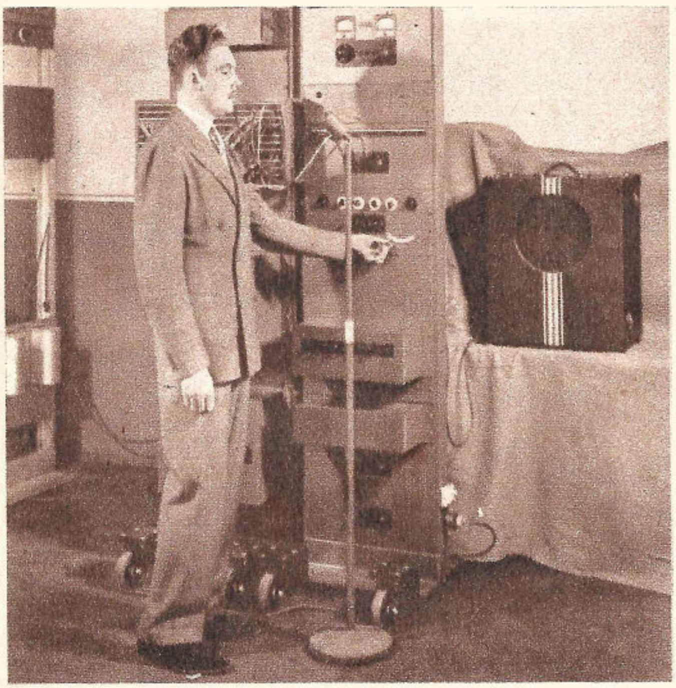
MRS. JOHN L. JONES, widow of the famous engineer "Casey" Jones, who on April 30, 1900, "mounted to the cabin with his orders in his hand and took a farewell journey to the promised land," was a recent visitor at the New York World's Fair. This photo shows her, shaking hands with engineer Herbert Nicholson, who is in the cab of the old William Mason. This venerable engine, which was a common sight in the years soon after the Civil War, is one of many locomotives and trains on exhibition at the fair.

Model Locomotive Made Of Matchsticks

THIS model of an old-time Union Pacific locomotive was built by Fred Rossi and exhibited by him in the American Hobby Show held recently in Philadelphia. The model, reminiscent of the old days of covered wagons and marauding Indians, is made entirely of boiled matchsticks. Rossi needed six months to complete the job.

Spring Heels Make Walking Easier

THESE spring heels are claimed to be the latest aid for prolonging life by their inventor, a Swiss shoemaker. The lower portion of the heel is attached to the upper by means of small springs. These eliminate all jars to the various organs of the body which are experienced by wearers of ordinary shoes.



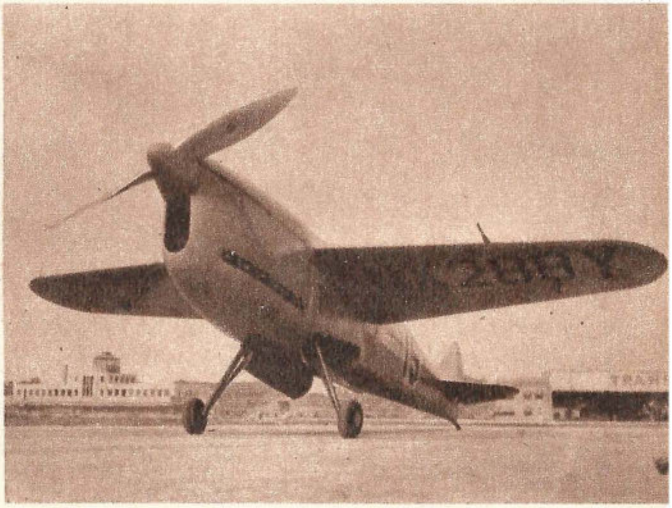
Machine Tears Apart And Rebuilds Speech

A MACHINE that tears speech to pieces and remakes it in new patterns has been developed. Use of these machines for sending and receiving telephone messages would make wire-tapping impossible, unless the wire-tapper had a machine with which to listen. Anyone listening with an ordinary receiver to a call made through the machine would hear only unintelligible sounds. Other possible uses for the machine are the making of voices for animated cartoons and in improving newsreel vocal accompaniment where excitement might make parts difficult to understand.

Pneumatic Life Raft Carries Ten Men

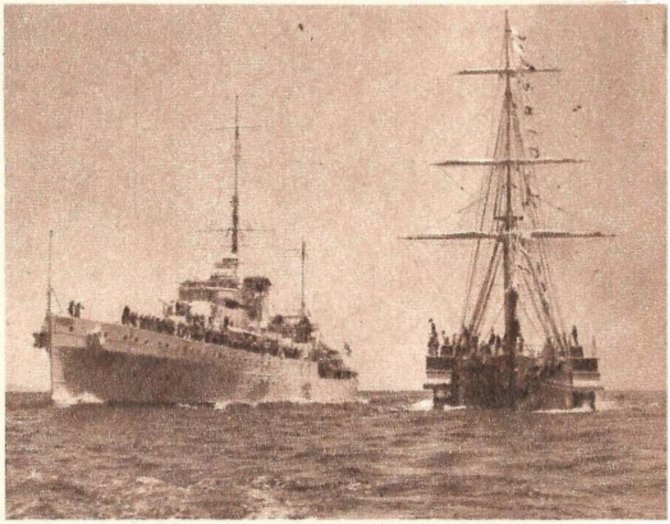
TEN men in a boat! That's the capacity of the new type unsinkable pneumatic life raft designed by the Army Air Corps for large planes making flights over water. In addition to its ten passengers, the raft has sufficient buoyancy to support ten more persons clinging to lifelines attached to it. When deflated and folded the raft occupies about three cubic feet of space. Although designed primarily for Army use, it may be made available soon to commercial airlines.

Speed Plane Tested For Thompson Race



THE new Folkerts racing plane was recently tested at Kansas City Municipal Airport and is speedy enough, its designers believe, to make it a strong contender for top honors in this year's Thompson Trophy Race, headline event at the National Air Races. The ship has a wing span of only 16 feet, weighs 1,600 pounds and is powered with a 400 horsepower Menasco engine. It is said to have a top speed of 360 miles an hour.

Pioneer Steamer Escorts Cruiser



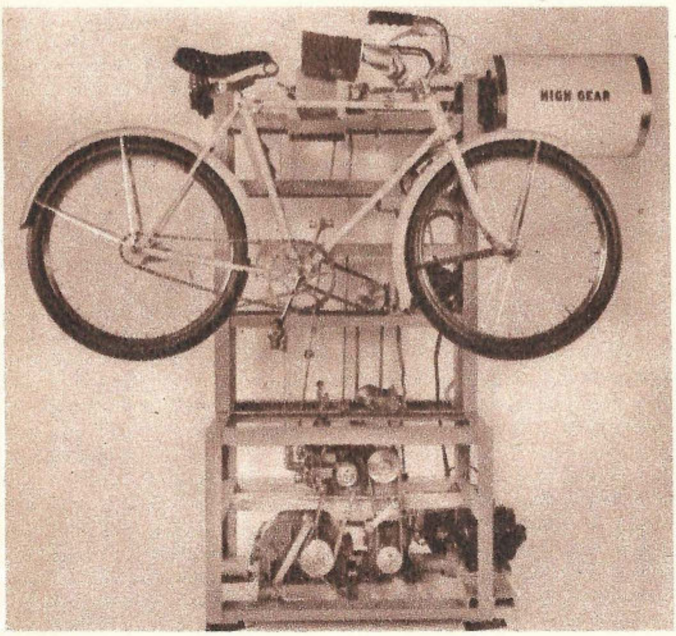
A CENTURY of sea history was spanned when *H. M. S. Orion*, British cruiser on a good will visit to Southern California, was escorted from Los Angeles harbor by the *Dog Star*, reproduction of the first vessel to cross the Atlantic by steam in 1838. The entire company of the *Orion* is shown, lining the rail in a tribute to the historic paddle steamer, which has been rebuilt for a motion picture production.

Loud Speaker Directs Traffic

POLICE of Durban, South Africa, have been conducting experiments with this motorcycle and sidecar apparatus for speeding up direction of traffic. Believed to be the only one of its kind in existence, one of its advantages is that it can be maneuvered or parked in a much smaller space than is necessary for an automobile.

World's Largest Roller Skates

THE world's largest roller skates, a four-wheeled counterpart of the mythical Seven League Boots, were used in Venice, Calif., to advertise the National Roller Skate Derby. The skates are oversize models of real skates and could be used by anyone big enough to wear them. Five feet long, they furnished lots of sport for the kiddies.



Bike Demonstrated By Mechanical Man

A ROBOT was the answer of a well-known coaster brake firm to their need of a rider to demonstrate a bicycle at the New York World's Fair. The bike was required to run in low gear, then high, then coast, then brake wheels to a stop, all in a period of 36 seconds. Doing all this for ten hours a day seven days a week seemed too much for a human rider, so the automaton was devised. His "vital organs" consist of two electric motors, two speed reducers, cam box, two-speed brake, front wheel brake, and numerous pulleys, belts and cables.

Beam Spots Plane In Fog

Above: Pursuit plane uses beam to spot oncoming enemy bombers in darkness. Left: Inventor takes up apparatus to test its efficiency in flight. Below: In demonstration, sensytrol beam on ground locates and records on voltmeter presence of plane in air above airport.

A NEW "sensytrol" power beam device, the invention of Harry Dickens, New York engineer, amazed observers who saw it demonstrated at Floyd Bennett Field, Brooklyn, N. Y. The beam spots any solid objects of more than a yard in diameter in its field and bounces back to its source to register their presence on a voltmeter. It works day and night, under all conditions of weather.

The beam will enable aviators, when flying blind, to determine whether there are any obstacles in their flight path, such as mountains, buildings, etc. It can also be used from the ground for locating planes lost in fog or clouds, or in the event of war, to spot high flying bombers at night. At sea, it can be used to detect the presence of icebergs in a ship's course.

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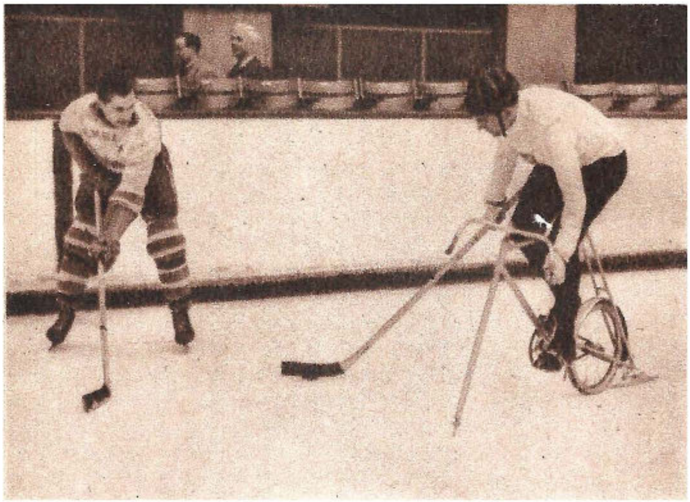
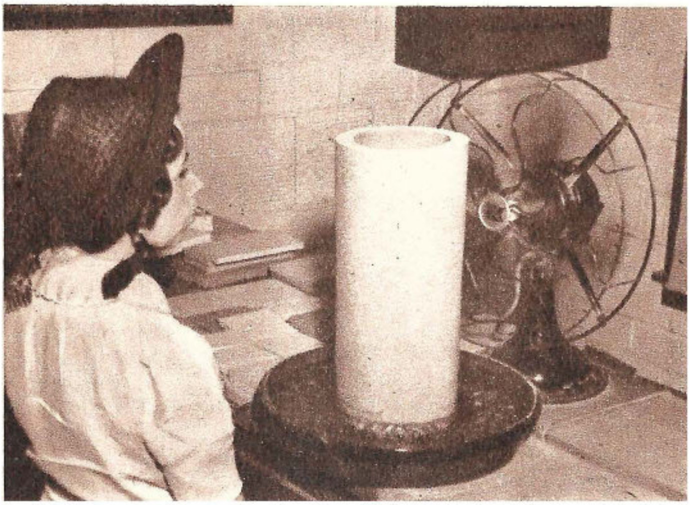


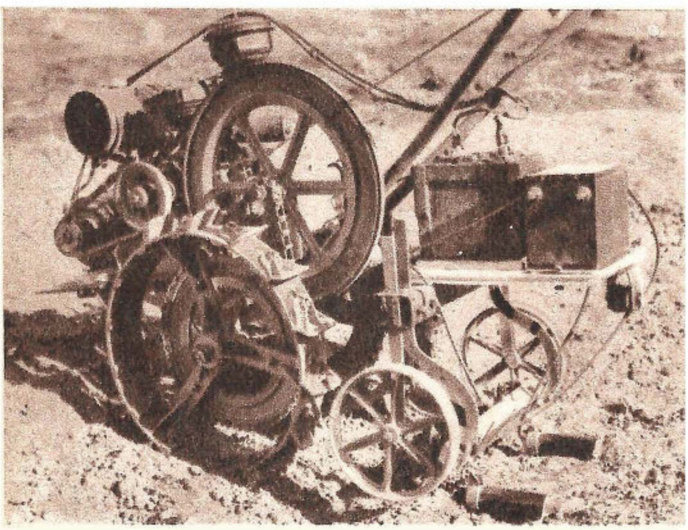
Ice Bike Appears On English Rink

ONE of England's most recent contributions to ice sports is the ice bike. It is similar to an ordinary bicycle, except that a blade takes the place of the front wheel and there is another blade directly behind the rear wheel. The latter is a lot smaller than the average bicycle wheel. In the photo, Freddie Chapman, English bike rider, is shown demonstrating the speed and maneuverability of the ice bike.



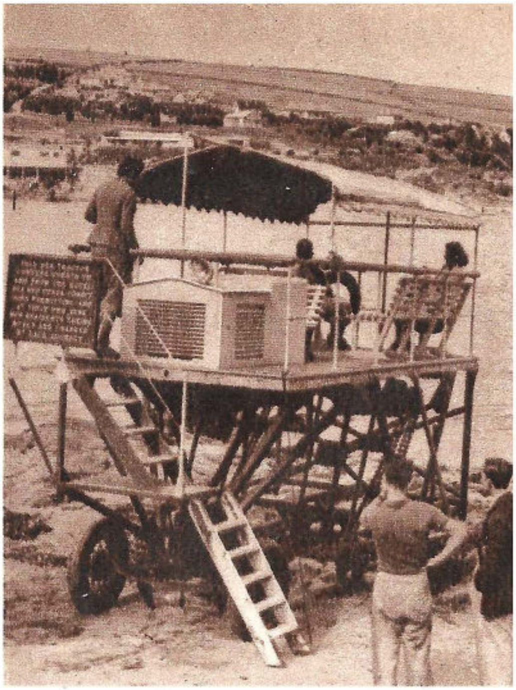
Novel Cooler Lowers Room Temperatures

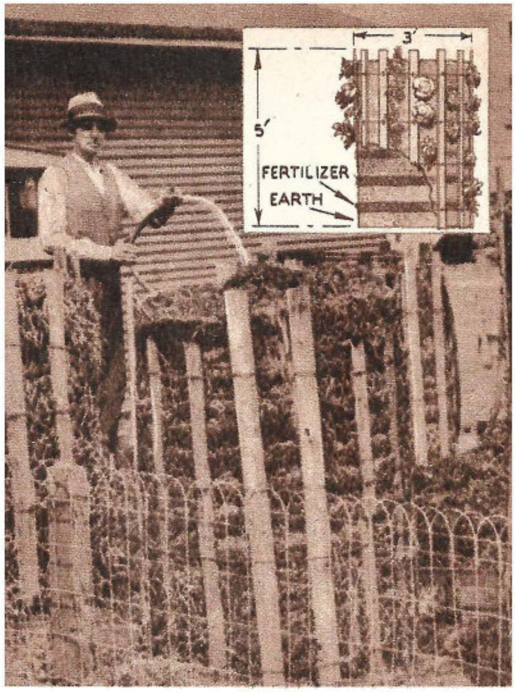
A POROUS section of clay pipe set on end in a pan of water, with an electric fan placed behind it so the breeze from the fan blows on and around the pipe, lowers the temperature of a room about ten degrees on a hot day. The pipe, which absorbs about 45 per cent of its weight in water, raises the humidity by several degrees on days when there is a small humidity content in the air.



Soil Fertilized By Electricity

AN 800% increase in nitrate content is made possible by an electric soil fertilizer constructed by Fred Opp, of Costa Mesa, Calif. A gasoline engine drives a 110-volt A.C. generator, which connects to a transformer delivering 15,000 volts to two electrodes partially buried in furrows in the soil. The whole apparatus is mounted on a walking type tractor, operated by one man.





Shallow Water Ferry

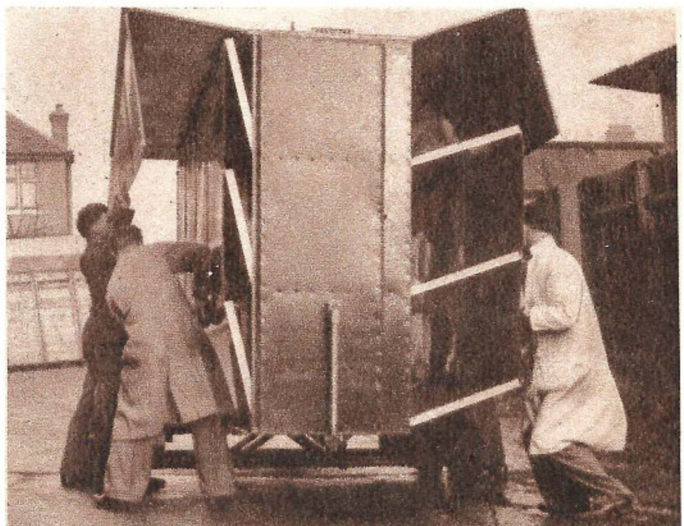
THIS unusual looking vehicle is called a sea tractor. It is of British design and is used to ferry passengers and baggage across a stretch of shallow water between the South Devon coast of England and tiny Burgh Island. As can be seen by the sign at the top of the flight of steps, the sea tractor must have good weather and tide conditions for its over water trip.

Unique Vegetable Garden

DESIRING the maximum crop from the least space, Henry Poppenhagen of Hammond, Ind., made an unusual vegetable garden in a crib. Five feet high and three feet in diameter, the crib is planted in alternate layers of earth and fertilizer. Various plants, growing in the layers of earth, sprout through the sides of the crib. Henry is shown doing a watering job.

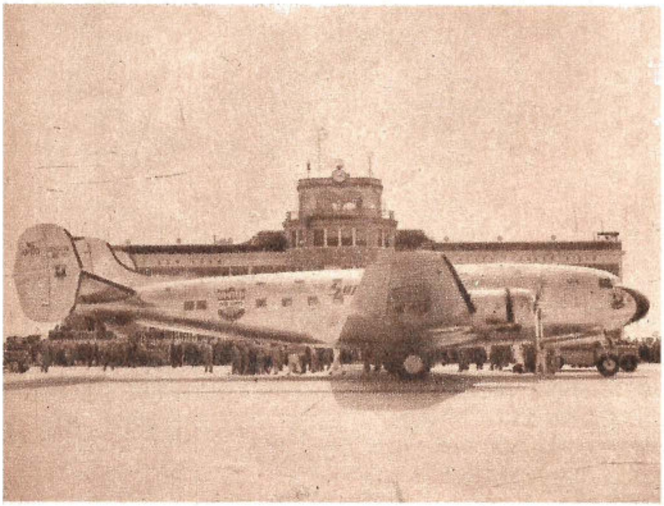
Folding Ambulance Built For Air Raids

A COLLAPSIBLE ambulance for air raids has been demonstrated in London. It will hold 12 casualties lying on stretchers above each other in the sides, with room for a nurse in the center passage. The ambulance can be folded up to a width of only two feet four inches, so that it can be stored in a confined space or pushed along a road partially blocked by debris. Since it is a trailer, the ambulance can either be propelled by hand power or towed behind a car.



Stools Erected For Railbirds

TIRED railbirds now have a chance to rest themselves at the Hollywood Turf Club track in Inglewood, Calif. For the first time in racing history, stools, three lines of them, have been installed for the railbirds' comfort. The stools are mounted at a comfortable height on a leg which is welded into a floor socket. The big question is, however: Will railbirds ever be content to stay seated while a hot race is going on?



Largest Transport Crosses Continent

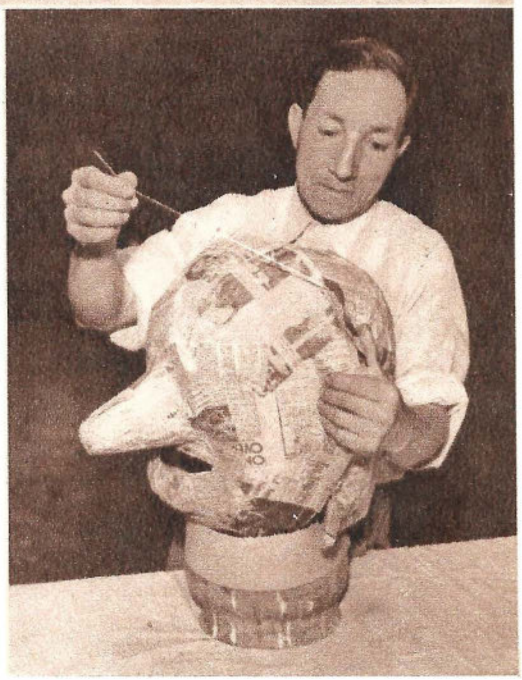
THE huge Douglas DC-4, America's greatest land transport, recently made its maiden voyage across the continent to pay a visit to New York. Weighing 65,000 pounds, two and a half times as much as the Douglas DC-3 now in use on most of the nation's major airlines, the DC-4 has a passenger capacity of 42 persons. An idea of its size can be gained by comparing it with the operations building at Floyd Bennett Field, in the background.

Electric Eel Starts 152-Ton Turntable

ELECTRA, the electric eel, is shown, throwing with her 500-volt current the switch that starts the 152-ton turntable in the Ford exhibit at the New York World's Fair. Holding the eel and wearing rubber gloves to avoid shock are two information girls and Dr. Christopher Coates, aquarist of the New York Aquarium. Copper wire contacts wrapped about her connect Electra through a switch to the control board.

Masks Made of Newspapers

Small gourds form horn and nose on large mask, above.



USING old newspapers, discarded furs, gourds and bamboo as raw materials, Ramon Rodriguez, Los Angeles Mexican, duplicates masks worn at the mask carnivals in Mexico centuries ago.

Having learned the art of mask making at Guadalajara, capitol of Jalisco, Mexico, Rodriguez recently joined a group of fellow artists in Los Angeles' Olvera Street, a section devoted to display of Mexican wares.

There, working in the loft of an old building, he fashions his masks. He creates two sizes, small and large.

To create a small mask, duplicating a clown, senorita or tramp of the Seventeenth Century, he pastes layers of wet newspaper pages over a dummy face. Over the fifth layer he places two wads of paper and a gourd. As other layers are added, these represent cheeks and nose.

In building large masks, he first ties together several circles of bamboo, thus

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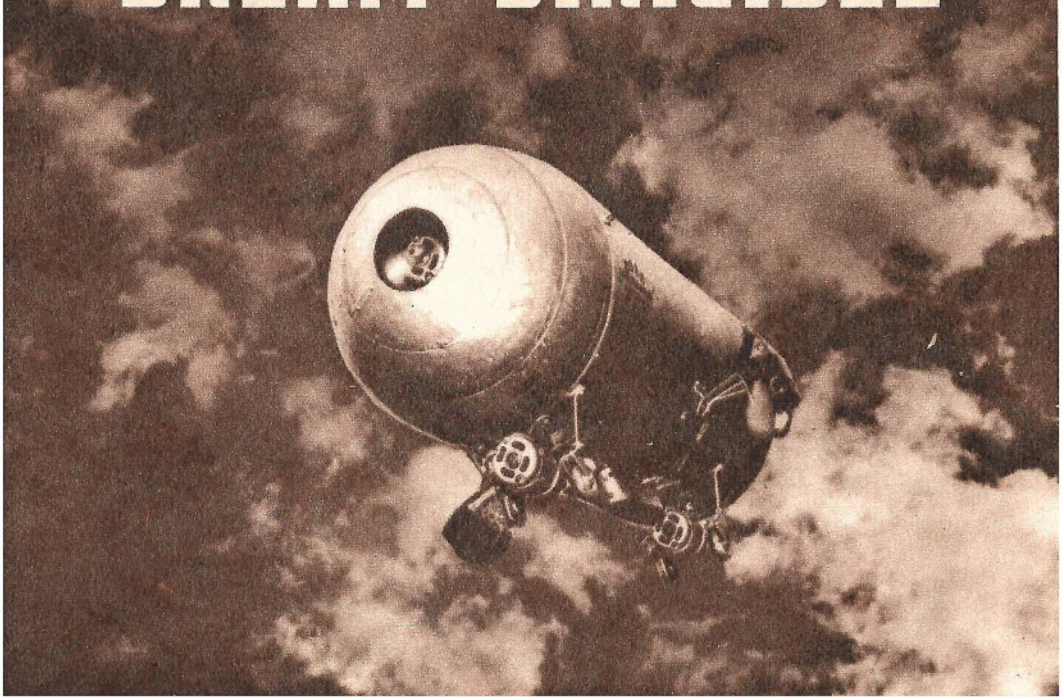
"DREAM DIRIGIBLE"



Will this strange airship, when completed, change all of man's present notions of dirigible design as its inventor claims it will?

DESIGNED to literally move in its own vacuum, a radically new type all-metal dirigible is being constructed by a Los Angeles inventor. Extensive tests with working models indicate that the dirigible will be able to ascend or descend absolutely vertically, can be landed without a ground crew, will travel 200 miles an hour, can turn in its own length, and will have more than twice the lifting efficiency of any lighter than air ship now in use.

The body of the craft is being constructed of a gas-tight aluminum alloy. Small aluminum rods and a system of radiating wires form the interior brace work. The artificial vacuums through which the ship will travel are to be created by means of giant tubes resembling wind tunnels.

One tube will run horizontally the full length of the ship, and will be open at both ends. A propeller at the front end will suck air into the tube, thereby creating a vacuum into which the ship will be pulled. A second propeller at the rear of the tube will push the ship forward into the vacuum. The rear propeller will also increase maneuverability of the ship by sending a blast of air against the rudders and elevators which will be located at the end of the tube.

To further increase the speed of the ship, two external motors will be attached on either side of the gas cell. A conventional gondola will be located amidships.

A pair of vertical tubes, similar in construction to the horizontal one, will be located just back of the nose. A second pair of vertical tubes will be placed near the tail. Air will be blown through these by means of propellers in the tube endings which will be located on the belly of the gas cell. The vertical tubes will be curved around the horizontal tube, joining at the top and bottom openings.

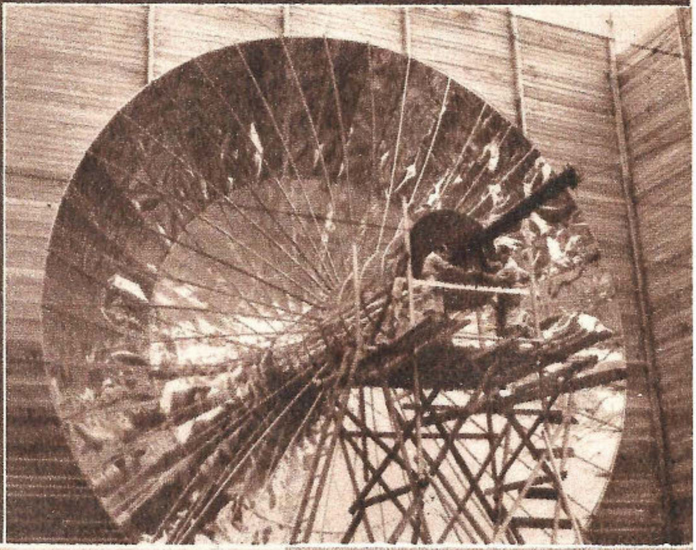
By blowing air upwards through the vertical tubes, a vacuum will be created beneath the ship, thus pulling it down. This action will be increased by the force of the air blowing out of the top openings of the tubes. By reversing the lower propellers, the ship will be forced upward.

At the present time the ship is about one-third completed, the nose looking like a gigantic umbrella. However, the actual construction was preceded by ten years of experimentation with working models.

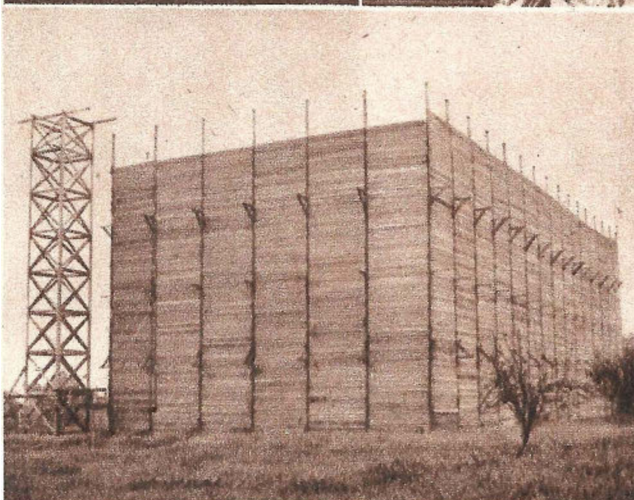
Under Construction!

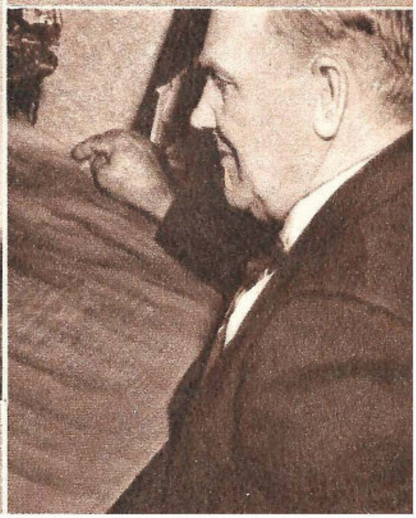
by
R. DeWitt Miller

In a mysterious shed, tucked among the California hills, a new and revolutionary all-metal dirigible is now being built, designed to move in a created vacuum at a speed of over 200 m.p.h.!



Above: The nose of ultra-modern dirigible, which at this stage of construction looks much like a huge Japanese parasol.

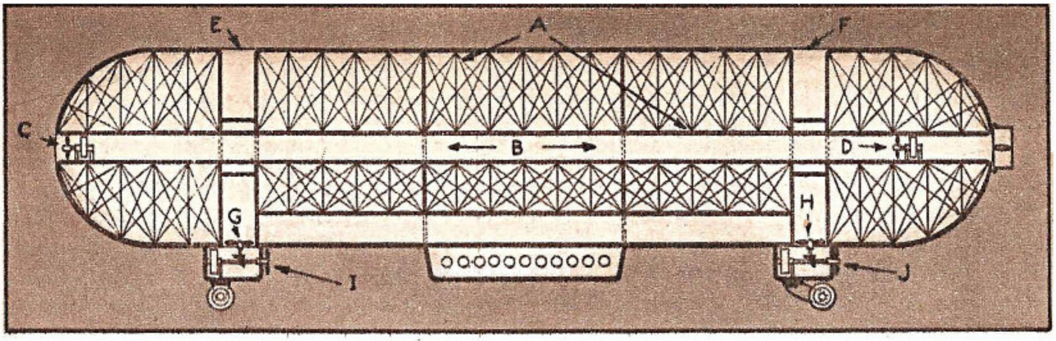




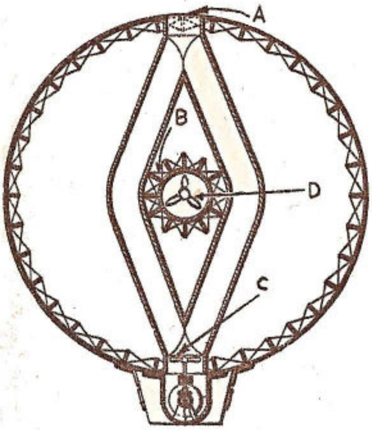
Above: This strange wooden structure, over 60 feet tall, is the cradle in which the new dirigible is being built at Thousand Oaks, California. Right: Thad Rose, inventor of the strange craft.

The first of these models, thirty feet in length, performed satisfactorily when flown by remote control. However, Thad Rose, inventor of the ship, decided that more exact checking was necessary. To provide this, he constructed a three-foot working model which runs on a counter balanced shaft, but is free to maneuver in any direction. With the aid of this, final details were worked out, and construction begun on a 147-foot ship.

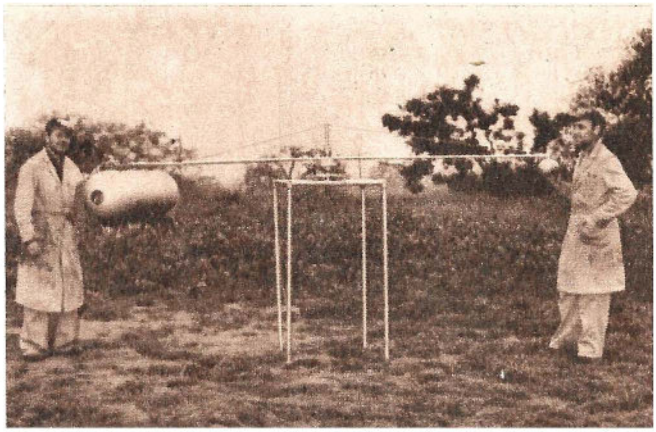
All joints in the outside aluminum shell are being welded, thereby holding gas leakage to a minimum. This, combined with the fact that upkeep on the gas cell will be practically eliminated, will radically decrease cost of maintenance. Through the use of the vertical tubes, the ship will be able to land without a ground crew, thereby further cutting expense. Negotiations are already in progress to sell several of the ships to the government for air mail service. They will be able to land directly on post office roofs.



Construction diagram showing wire-wheel construction A; vacuum tubes B, E, and F; vacuum propellers C and D for regular flight, G and H for vertical flight. Propellers I and J propel the ship.



Cross section of ship. Vertical tube A divides to go around tube B. Propellers C and D form vacuums in the two tubes, the former for straight flying, the latter for up and down motion.



This working model of the all-metal vacuum dirigible runs on a counter-balance shaft which permits it to move in any direction.

The same type of ship, if designed to have the same lifting power as the Macon, would weigh less than half as much as that ill-fated craft, and could be built for one-tenth the cost, Rose claims. He further believes that the metal gas cell when using helium would completely eliminate all fire danger. The vacuum action of the tubes would permit the ship to turn in its own length, and would eliminate the necessity of carrying water ballast.

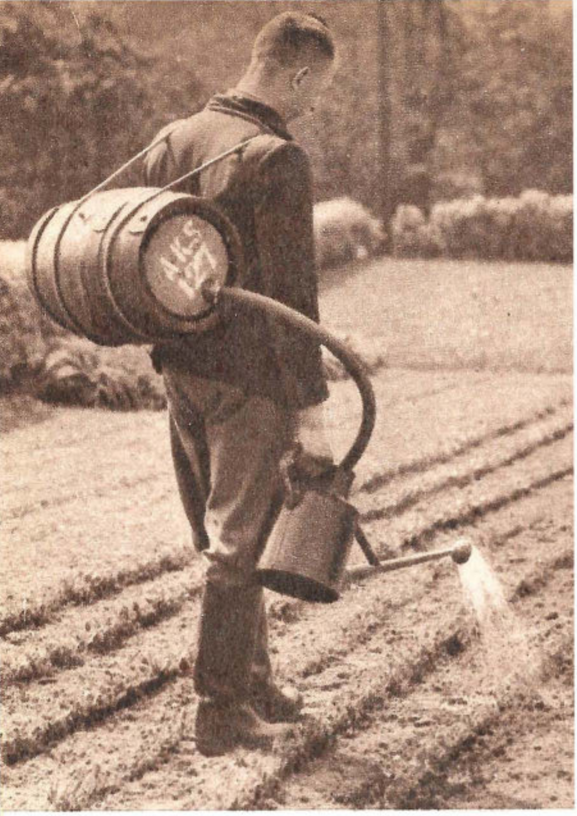
During storms the ship could ascend to the ceiling of the gas, and if still too low, could be forced higher by using the vertical tubes. Through the use of all the motors, a speed of 200 miles an hour could be obtained, according to Rose's calculations.

Reminded that a similarly constructed metal craft collapsed from heat expansion some years ago, Rose explained that his ship will "breathe like a lung," and compensate for a 25 per cent expansion of helium, as well as contain plenty of safety valves.

One of Rose's fondest dreams, and one which he hopes his invention will make an actuality, is that the United States will take first place among the nations of the world in the development and use of lighter-than-air craft, a position that has long been held by Germany.

The dirigible is undeniably a great potentiality for both war and commerce, and to date its possibilities have been largely untapped for any number of reasons, chief of which are the cost of building and operation, the difficulty of maneuvering in bad weather, and the complications involved in landing and taking off. No nation, not even Germany, has made what might be called a success with lighter-than-air craft, as witnessed by the tragic ends of such craft as the Hindenberg, the Shenendoah, the Macon, and other dirigibles of various nations.

Rose's ship is being constructed in a great wooden structure over 60 feet tall, at Thousand Oaks, near Los Angeles, California. Present plans call for the completion of the ship sometime this fall.



Make-Up For Television

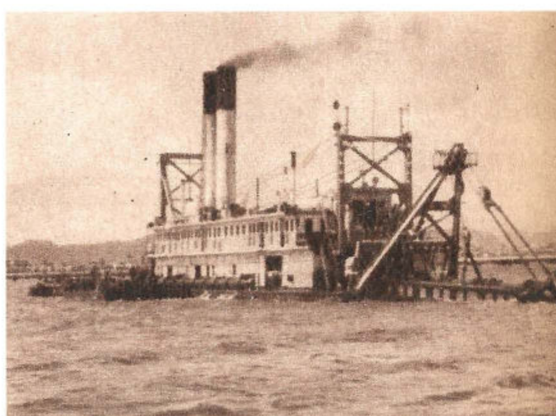
ELAINE SHEPARD, Hollywood film actress, could pass for an Indian in war paint when she wears the new standard television make-up. White high-lighting around the nostrils, eyes and hollows of the throat is necessary for good reproduction. Lips, eyebrows and eyelashes are blue-black.

Increased Water Supply

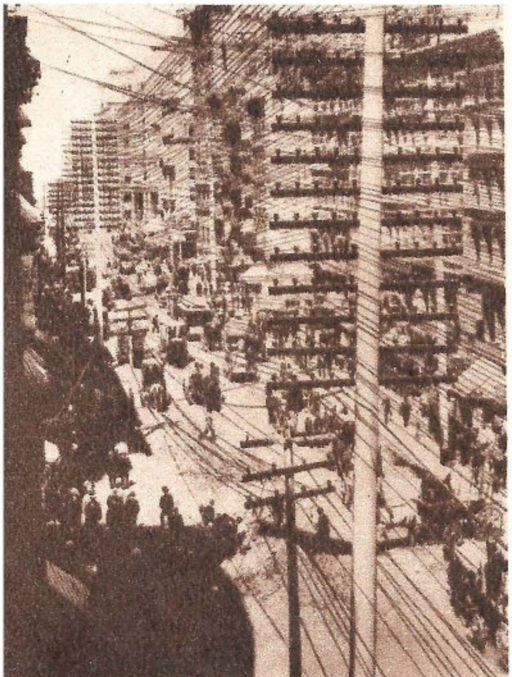
WHEN a recent dry spell was scorching gardens, one gardener devised a scheme to save himself many steps to and from the water tap. He filled a four-gallon keg with water and strapped it on his back, connecting it by means of a rubber hose with an ordinary watering can which he carried in his hand. This novel water "wagon" speeded up considerably the watering of areas which were out of reach of the garden hose.

Old Gold Coins Found In San Juan Harbor

A FLURRY of excitement was caused in San Juan, Puerto Rico, when Spanish gold coins dated about 1800 clogged the machinery of the dredger *Orleans,* working in the harbor. Hopes of immediate treasure faded, however, when it became apparent that most of the coins had been carried through a mile of pipe to Catano, where they lie buried in deep mud. There they have been found by the radio induction ore locater at the right, but would-be prospectors must wait till the mud dries before going into action.



New Cable Conquers Congestion



New York City's lower Broadway in the 80's showing the congestion of overhead wires.

IMAGINE a city street with a thousand rows of telephone poles, each holding aloft sixty wires!

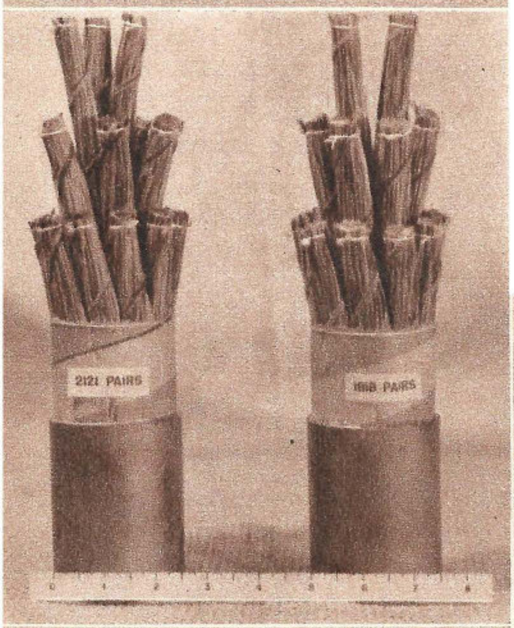
Of course such a street would look more like a bad dream than any kind of a thoroughfare, but without the modern lead-covered cable that's exactly what half the streets in most of our larger cities would look like. The picture at the left showing lower Broadway, in New York City, in the '80's gives a slight hint of what a city street would look like without present day cables, developed in the past four decades by telephone engineers.

The latest development in lead-covered telephone cables has recently been made by engineers of the Bell system with the manufacture of a cable containing 4,242 separately insulated copper wires. Before this, the maximum contained in one cable has been 3,636 wires. Despite the increase in the number of wires contained, the new cable is not a fraction of an inch larger than its predecessor.

Since the diameter of each wire in the new cable is also the same as before, the feat of placing 606 more within the same girth was made possible by an improved technique of wire insulation, a method which reduced the thickness of insulation around each strand. The decrease in each case was one 3/1000 of an inch but this tiny saving, repeated 3,636 times, resulted in a total saving of space sufficient to afford room for additional wires.

The method of insulating wires is in itself a revolutionary development of the last decade. Previous to the invention of this

[Continued on page 130]



Above: A section of the new cable and its predecessor. Right: A splicer at work in a manhole, joining two ends of the cable.

Knocker Made From Shovel

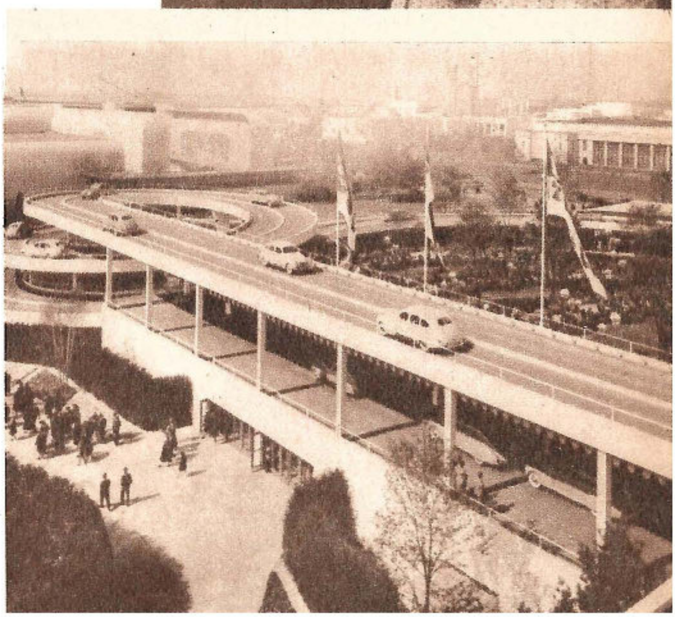
A KNOCKER like the one shown below should make enough noise to bring someone on the run to the door. Made of a shovel, it hangs on the back door of an English country cottage.

Father Solves Baby Problem

A FATHER in Copenhagen, Denmark, has solved the problem of what to do with baby. Not wishing to build a special baby carrier for his bike, he rigged on his handlebars a device which would hold baby's ordinary carriage there.

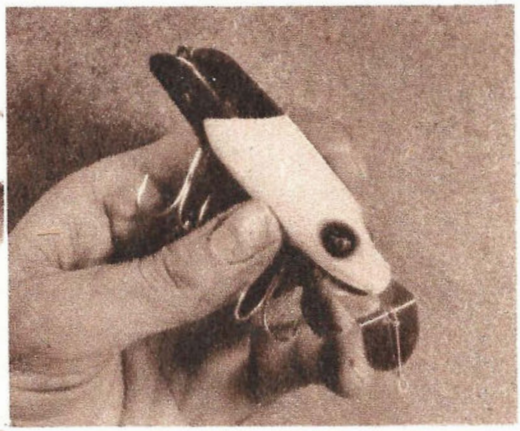
World's Fair Seen From Spiral Road

AN EXCELLENT view of the grounds of the New York World's Fair is obtained from this lofty "Road Of Tomorrow," which runs out of the building housing the Ford exhibit, spirals down and returns to a lower level of the same building. In the right background is the New York City Building, one of the four buildings which will remain permanently on the Fair grounds. Directly beyond the spiral is the General Motors building. Visitors are carried over the "Road Of Tomorrow" in blue, canary yellow, and scarlet autos.



Fishing for Dollars

Fishing offers golden opportunities to the inventor who can think up new ways to improve and simplify present day equipment for the sport!



The "Two Oreno"—the unusual manner in which this versatile lure was conceived is revealed for the first time in this article.

by Ormal I. Sprungman

LATE one night several years ago, E. W. Leusch and H. P. Gibson of the South Bend Bait Company sat down in their office to talk angling inventions. On the desk before them lay a colorful accumulation of new-type baits, the comparative merits of which were being discussed.

During the conversation, Leusch leisurely picked up a shiny Pike-Oreno in one hand and a Bass-Oreno in the other. "If we could only get another idea like the good old Bass-Oreno!" he offered.

Gibson said nothing. Ideas like that just don't grow on bushes. Maybe it was the way Leusch was holding the two baits or perhaps it was the odd angle at which they were being viewed, but somehow it looked exactly as if Leusch was holding a single bait with a Bass-Oreno head on one end and a Pike-Oreno head on the other.

Then—a flash of inspiration!

"I've got it!" yelled Gibson.

Leusch looked puzzled. "Got what?"

"A new type bait—a double-header! Work it from either end—fish shallow or deep—a Two-Oreno! It'll be a sensation!"

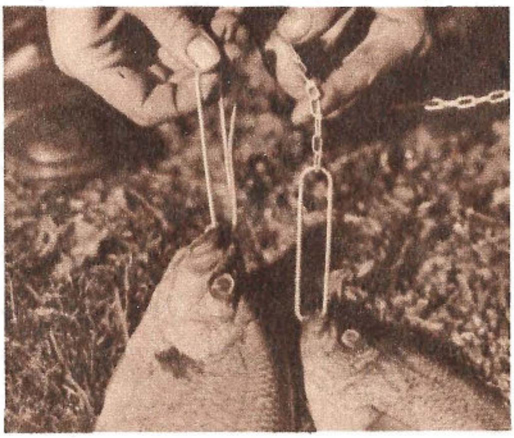
Thanks to some fisherman-inventor we now have transparent lures that won't chip or waterlog. These were unknown ten years ago.

And thus, quite through accident, the Two-Oreno—a highly profitable invention—came into being.

All angling inventions do not have such spontaneous beginnings. When a new bait comes out on the market, you can be pretty sure that it was months, perhaps years, in the offing, that its design, color and action were subjected to much change, and that the

with Angler's Bait

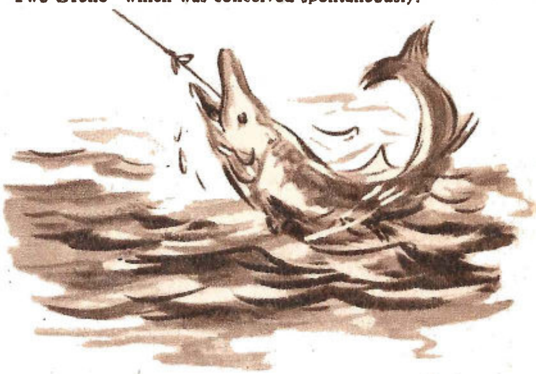
"Why won't it work?" V. W. Luesch, left, and H. P. Gibson, right, Vice-presidents of the South Bend Bait Company, talk over the unique "Two Oreno" which was conceived spontaneously.



Enlarged "paper clips" keep fish securely on a key-ring string. C. I. Carpenter of Minneapolis was the inventor of this handy little gadget.

wobble-plug caught a goodly number of whoppers before it was handsomely boxed for the dealers' shelves.

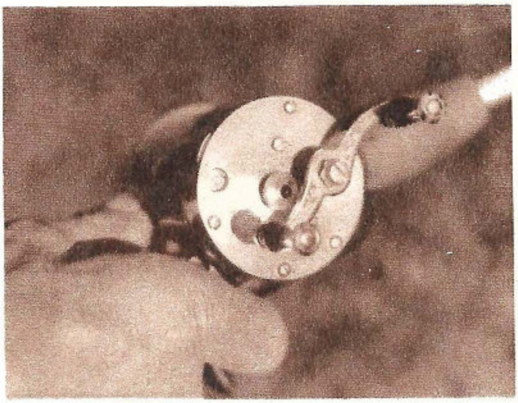
How fertile is the angling field for invention? According to the United States Bureau of Fisheries, the country's 10,000,000 anglers last year spent some $500,000,000 for fishing paraphernalia, licenses and transportation.



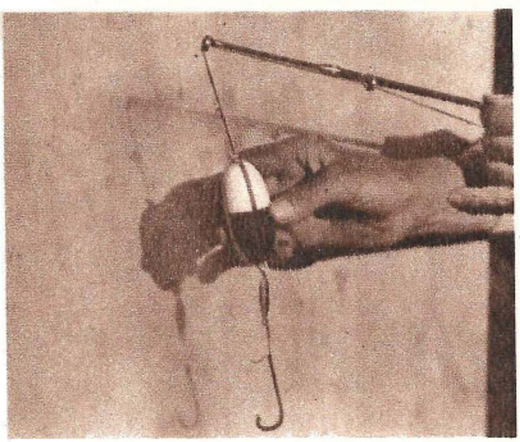
That's a pretty big bite—and no fish story, either!

It means that this hook-baiting pastime has suddenly popped out of the hobby class, welcoming occasional change just like any other big business. When a newly invented gadget fails to take hold, chances are that its need was probably overestimated by the inventor, or, perhaps, like a Rube Goldberg specialty, it lacked the easy portability or uniqueness which fishermen demand. Inventors who are dyed-in-the-wool anglers have the advantage, for they are better able to observe where change is needed, and thus devote their efforts towards really practical ends.

This electrically charged angleworm magnet, inserted in moist ground, is said to fill the bait bucket. The light provides illumination.



This casting reel registers the distance of each cast in the circular window. As the line is retrieved, the gauge returns to zero.



Any angler who has ever tried to cast with a float on his line, set deep, will appreciate the convenience of this casting bobber. A sliding knot on the line is forced up or down to desired length. When cast is made, weight sinks, pulls the line through grooved bobber until the knot reaches the wire loop and stops.

What is the attitude of the fishing tackle firms towards invention in this field? Frankly, several of them have been soured in the past by the lordly attitudes which embryo inventors seem to possess.

"The trouble with many inventors," one executive pointed out, "is that they think that their baby is *the* baby. They do not know that countless thousands of patents already have been granted on fishing baits of one sort or another, that even their ideas may have been patented, although never put into actual production. Most beginning inventors think of their brain-child in terms of large sums of money, usually a figure way out of proportion to the value of the invention itself. While some ideas show merit, others submitted are just plumb crazy, without an ounce of practicability in them."

South Bend's Pike-Oreno, for instance, was developed by a person within the organization, and the idea was worked on for more than two years before it was finally perfected.

"The Trix-Oreno is a splendid example of a lure which was developed on the outside," Vice-President Gibson pointed out. "It was Dr. W. M. Jordan, sportsman of Birmingham, Alabama, who really thought this up and sent it in about eight or ten years ago. It has been a great seller, and the doctor has collected quite a few thousand dollars in royalty from us. We are continually working upon some sort of improvement, but as yet we have hit upon nothing that would better the action of this lure, from the fly rod to the salt water size."

Every budding genius who can whittle a plug wants to set up a wood shed office of his own and go into business. Some of the experts believe, however, that instead of flooding the market with still more baits, inventors should direct their efforts at inventing angling aids to increase the pleasure of fishing itself and to simplify the sport.

The Shakespeare Company, Kalamazoo, Michigan, which has brought out such unique innovations as the silent winding reel for fly rods, and the metered reel which measures fishing depth or the distance of each cast, has a new gadget this year which might easily have been devised by an outsider. Instead. the idea came from someone inside the organization.

"As you are well aware, there is always a slight variation in ferrules on. rods, which makes it necessary to fit these ferrules individually," C. W. Davis of the Shakespeare

Company pointed out. "Thus the tip and handle of one rod are a perfect fit, but the tip of another rod having the same ferrule might not fit the handle of the first rod. Also, frequently fishermen want to have more than one rod on a fishing trip, necessitating the carrying of two handles for the two tips. An examination of our line of rods revealed that there were *seven* different ferrule sizes used on casting rods with detachable grips, so we had the idea that fishermen would welcome a grip that would fit any one of those tips as well as any one of the numerous tips made by other manufacturers. Several ideas for accomplishing this were developed by our design department, and, after considerable experimenting, we brought forth the Adjustable Offset Handle."

This needed device, illustrated in this article, has a set screw attachment where the ferrule enters the handle to accomodate any size ferrule. The handle and reel seat are set at different angles, thus causing the weight of the reel to automatically pull the wrist to correct casting position and relieve possible strain. Its usefulness is obvious.

"It has always been the practice of the Shakespeare Company to be receptive to new ideas from outsiders," Mr. Davis continued, "and we have always been willing to consider the possible purchase of exceptional inventions along angling lines from persons outside our plant."

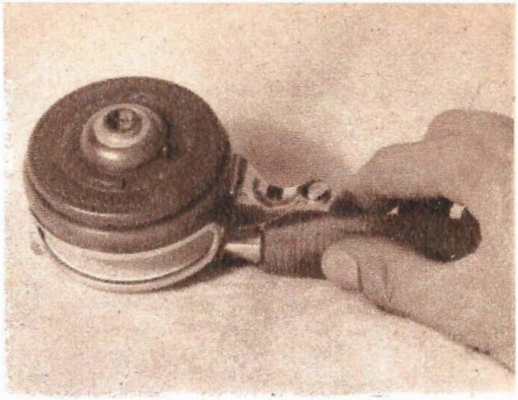
Mr. Gibson, of South Bend Bait Company, also welcomes new ideas. "There are two ways of acquiring ideas developed on the outside—outright purchase or royalty. Some inventors don't patent their ideas before sending them in, and we receive a terrific amount of them in the course of the year. Some write in and say they think they have a splendid idea, and tell us they are sending it to us in confidence, and then ask our advice. You know what that means. If the idea appears to be any good, we have to make a patent search before we can even write an intelligent letter to the inventor."

What is there left to invent? Charles Beard, secretary of the Chartered Institute of American Inventors, a non-profit association with headquarters at Washington, D. C., offers these suggestions on needed improvements in angling equipment exclusively to readers of *Mechanix Illustrated:*

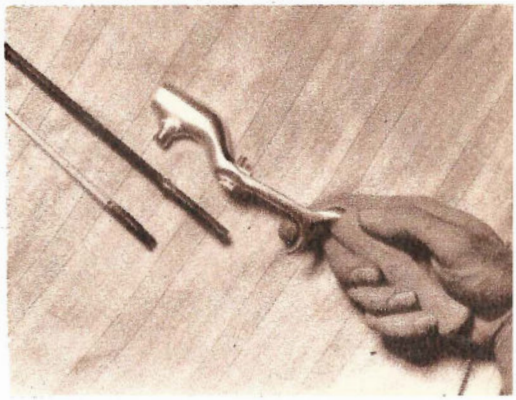
1. An economical, collapsible rod that will not jam.

2. Level-winding mechanism that can be incorporated into low priced reels.

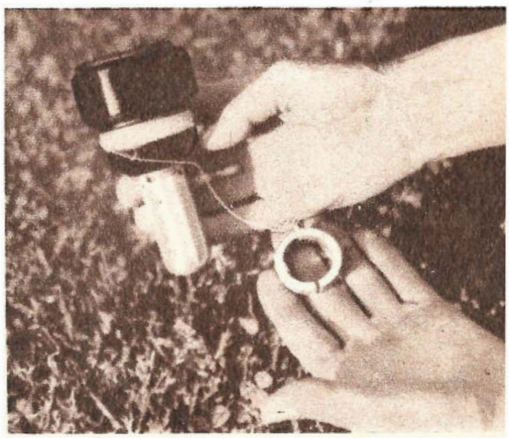
[*Continued on page* 132]



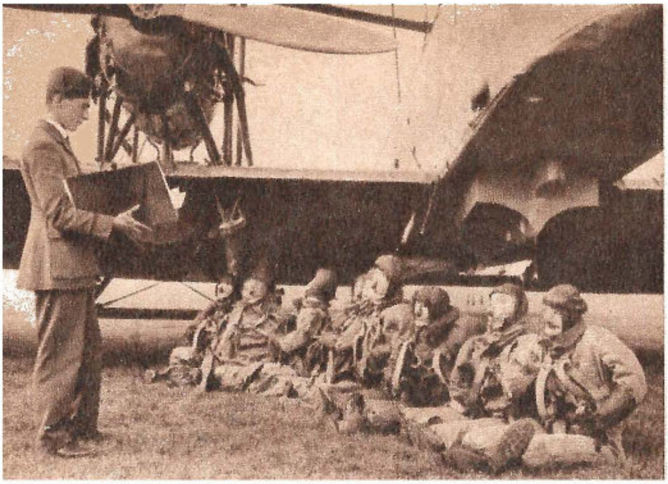
Another contribution to noiseless angling is this silent-winding, automatic, free-stripping trout reel with simplified take-down.



A new adjustable rod handle designed to fit any ferrule. This invention, designed by a company, might easily have come from outside.

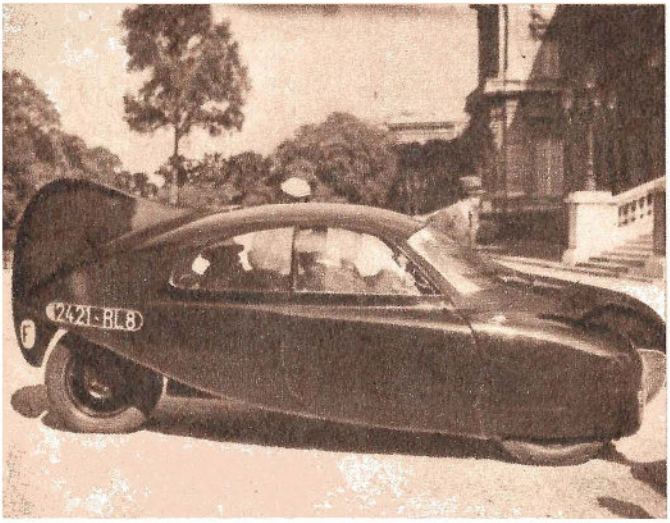


A midget buoy to mark the spot where fish bite best. As lead ring sinks, the line unreels from head of buoy until bottom is struck, then engages tiny hook at one side to eliminate more unwinding. The metal tube, perforated with holes, fills with water, causing buoy to bob upright.



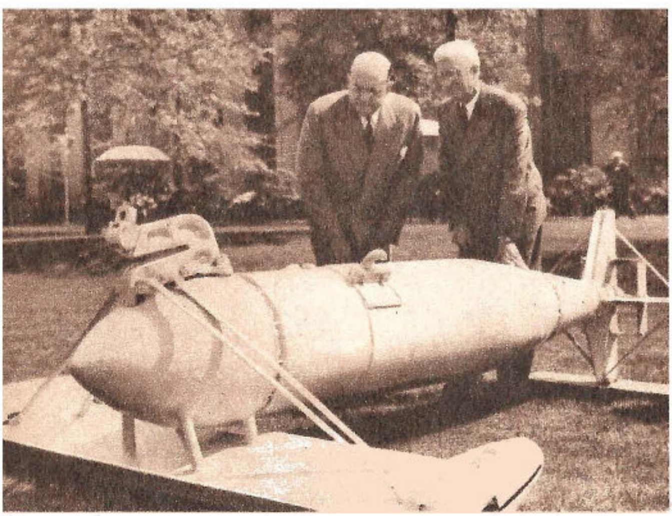
Parachute Jumps Made By Dummies

TO SAVE wear and tear on flesh and blood parachute jumpers, this group of dummies was dressed in full regalia preparatory to putting on an Empire Day exhibition at Henslow Aerodrome, England. In the photo at left an officer of the R. A. F. is shown, giving final instructions to the "daredevils" before they go through with their "death defying" performance.



New Style Automobile Appears In France

THIS automobile, looking like an airplane minus its wings, recently made its appearance on the streets of Paris. It is streamlined throughout, has three wheels and a tail fin, and a single headlight located centrally in front, like the eye of a cyclops. The car is reported to be extremely economical to run, getting better than 50 miles to a gallon of gasoline. No windshield wiper is needed, as streamlining prevents raindrops and insects from staying on the glass.



Navy Uses Paravane To Cut Mine Wires

REAR ADMIRAL HAROLD R. STARK, U. S. N., and Louis Johnson, Assistant Secretary of War, are shown, inspecting a paravane, which is a device used by the Navy to cut minewires and other underwater obstructions. When in service, the paravane is towed behind a ship. This one was part of a recent exhibition of modern war equipment, held at Massachusetts Institute of Technology.

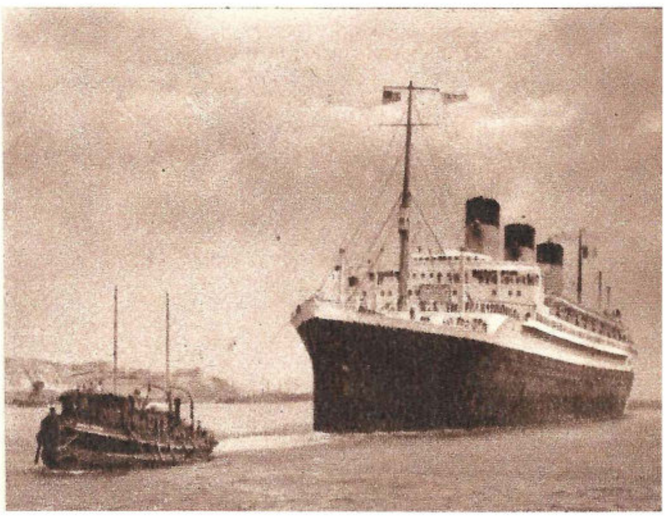
Mice Feel No Pain In Electric Trap

SOMETHING new in mouse traps is an electric one which quickly and painlessly despatches the tiny rodent to the happy hunting ground. Attracted by the appetizing odor of toasting cheese—the electric trap toasts the cheese, too—the mouse eagerly sticks out his neck, expecting to find a hot lunch awaiting him. Instead, he finds an immediate termination to his career in the land of the living.

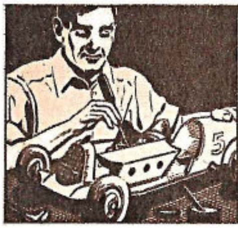
Woman Has Reason To Fear Air Raids

WHEN Sir John Anderson, British Minister for Civilian Defense, planned his bombproof air raid shelters for the populace of England, he failed to think of the London lady at the right. She just can't squeeze through the door of a standard size shelter, despite determined assistance from two of her friends. It is not difficult to see that she has more reason than the average person for hoping that war will be slow in coming to the British Isles.

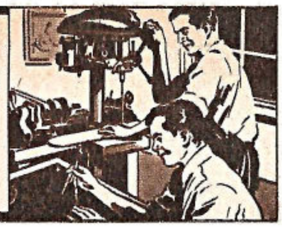
Lone Tugboat Tows Large Ocean Liner



POWERFUL is the word with which to describe a new type of tugboat. In the photo at right the 137-ton Diesel electric tug *Sheila Moran* is shown towing the 43,153-ton liner *Ile de France* at a speed of four miles an hour against an incoming tide in New York harbor. The tugboat is powered with a 900-horsepower, two-cycle Diesel engine. The test was arranged to show the great strength of this type of boat.

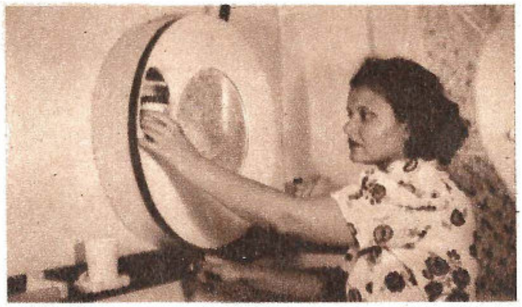


How to Build SECTION



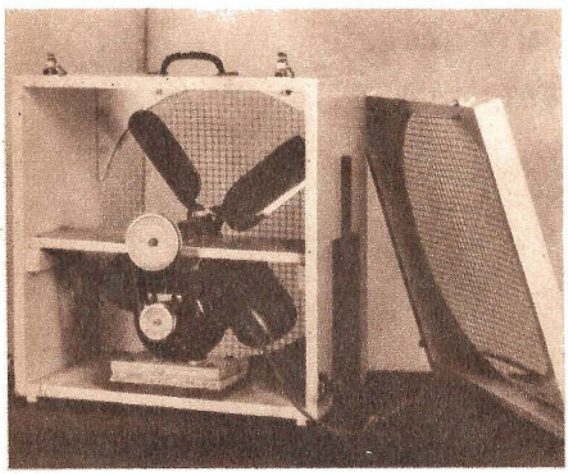
PICK YOUR PROJECT

Illustrated on these two pages are some of the things you can build from the plans and instructions given in this section. Select the one or ones that appeal to you, turn to page indicated.

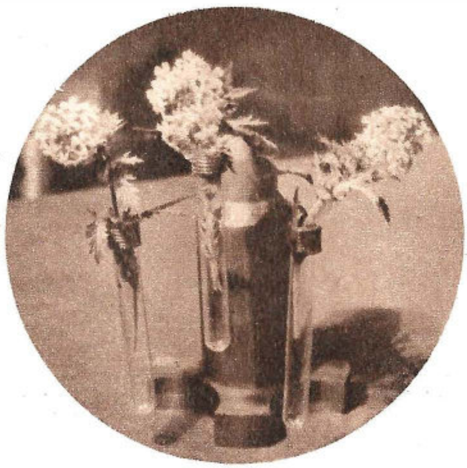


Revolving Door Bathroom Cabinet. Novel wall cabinet requiring a minimum of space. Page 96.

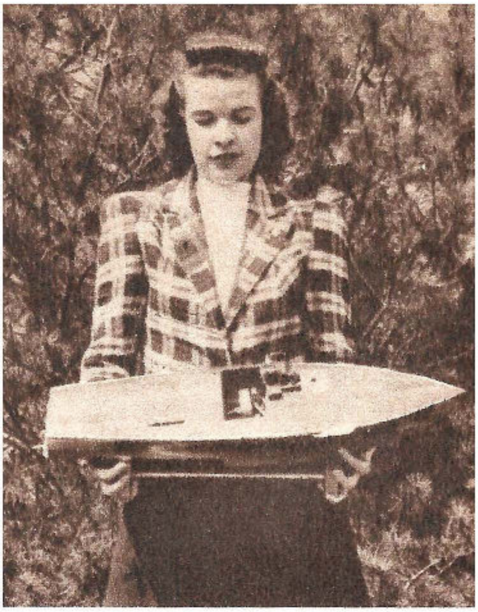
Water Skiing. The sport that's becoming tops in popularity. Plans for making water skis and hints on using them on page 82.



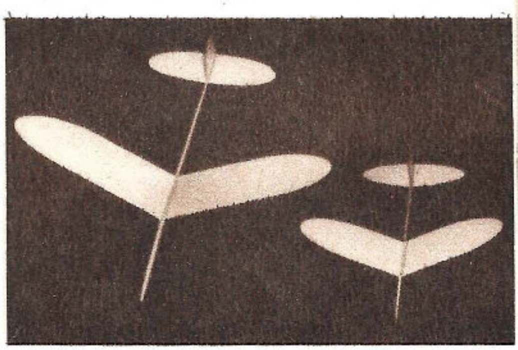
Portable Circulating Fan. Built chiefly of scrap and inexpensive materials, this fan is capable of circulating air through several rooms. See page 84.

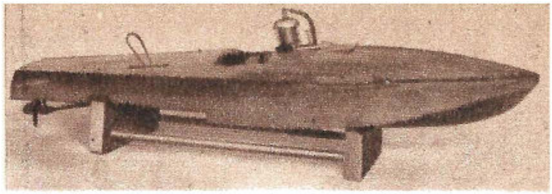


Three Unit Bud Vase. An attractive and useful one evening lathe project. Plans will be found on page 85.



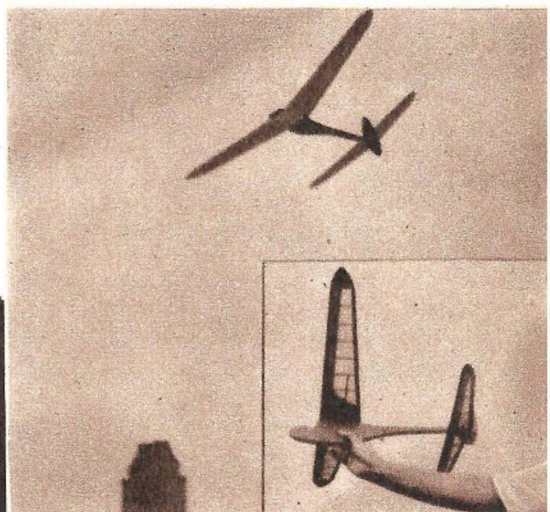
She shall have music wherever she goes. The MI Picnic Portable is an easy-to-build self-contained receiver in an overnight bag. Batteries and aerial inside. Page 112.



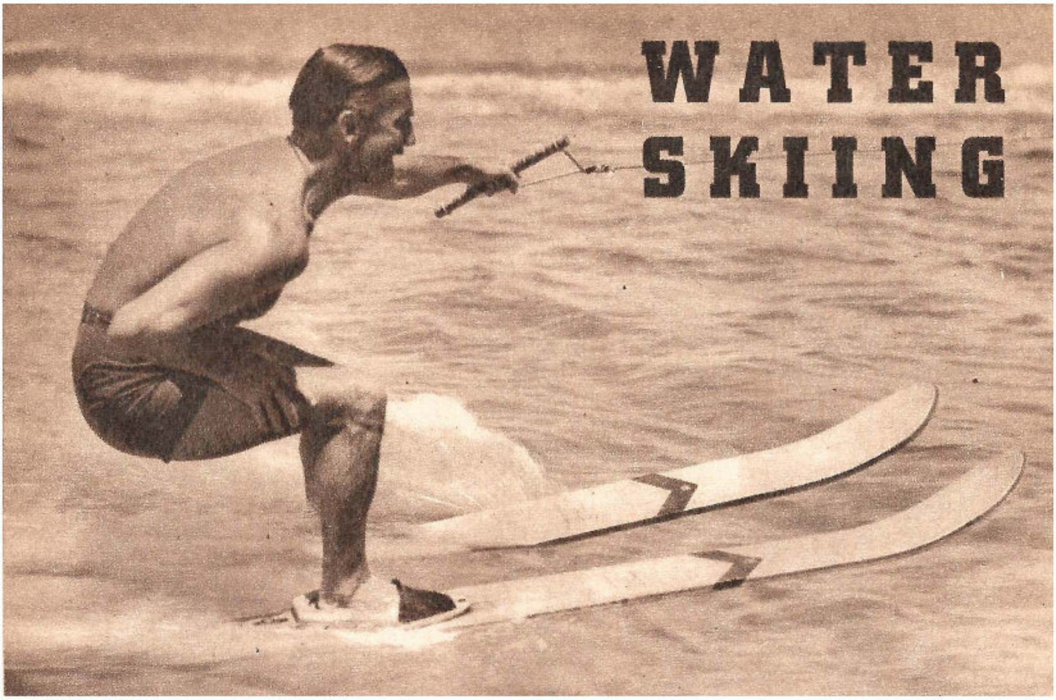


This month's featured model is *Yumping Yimminy,* a 27-in. gas engined speedboat that can race and keep up with the best of them. Complete plans start on page 86.

Marine Pin-Up Lamp. An attractive two purpose lamp with a nautical theme. It can be used as a table lamp or hung on the wall as shown above. Turn to page 108 for plans.



Contest Gliders. Original designs for the three popular gliding model classes. At left, Class A and B solid balsa gliders. Above, Class C hollow-wing sailplane. Page 100.

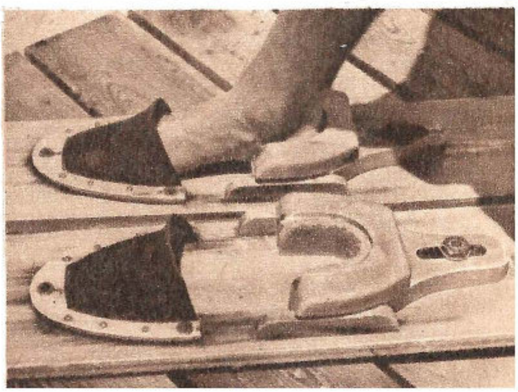


Captain D'Arcy Rutherford, world's foremost water ski expert, demonstrates the correct position for making a turn. In this case, he has turned out to the right of his own boat—note wake in background—and is about to angle back to criss-cross the wake. The tow line is held by the hand towards the boat. In water skiing, as in snow skiing, turns are made by "edging" skis.

THE thrilling sport of water skiing, recently introduced in the United States, originated in the south of France several years ago, and ever since has been extremely popular along the Riviera, especially at Monte Carlo, where thousands have become proficient. It was brought to Nassau by Captain D'Arcy Rutherford of London and Monte Carlo, foremost water skier of the world. At Nassau's swank Emerald Beach Club many winter visitors from the United States learned to ski and became addicted to it. These enthusiasts will undoubtedly carry the sport to all northern U. S. resorts by the end of the summer.

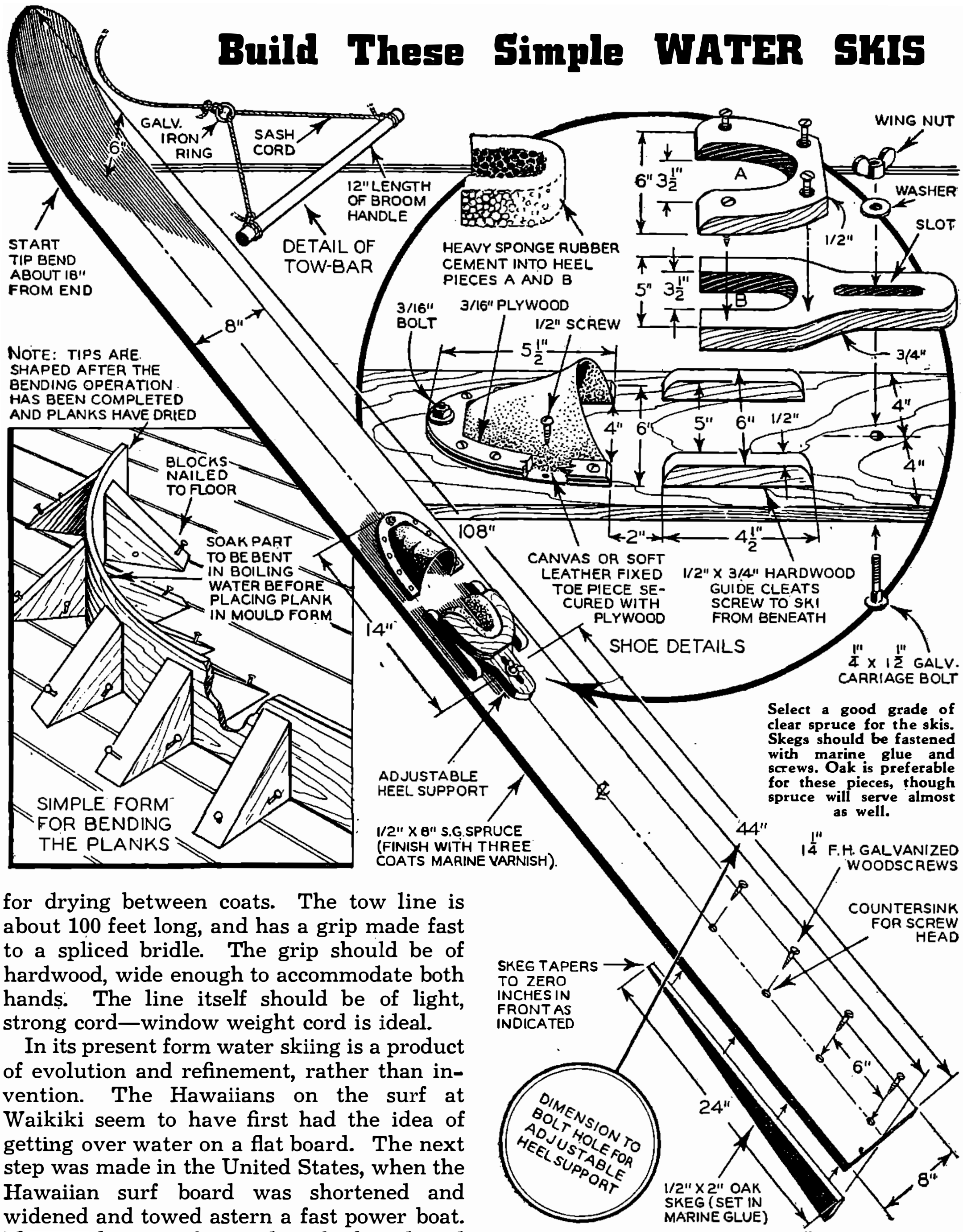
Although the equipment is rather expensive to buy, you can easily make a pair of excellent water skis at very little cost by following the plan shown on the opposite page. The only difference between water and snow skis is that the former are about a foot and a half longer, and twice as wide. They also have a short skeg to hold them to a straight course. The shoe is in about the same relative point of balance. Secure two spruce planks 112x8x½-in. Construct a simple bending form, as shown in the square inset in the drawing. Steam or soak about two feet of the planks at one end until soft. Force slowly into form and leave until thoroughly dry.

It is a good idea to overbend the ends a little, as they will spring back slightly when removed from the mold. Shoe details are clearly shown in circular inset. The wood parts can be jig-sawed out of hardwood or waterproof plywood. After assembling skis and shaping the curved ends, sandpaper to a smooth finish and give three coats of good marine varnish, allowing twenty-four hours



Details of water ski shoes. The front part is of leather or canvas, shaped, but still fitting loosely enough so that the rider's feet come free in case of a fall. Heel support is adjustable for length, and lined with sponge rubber.

Build These Simple WATER SKIS



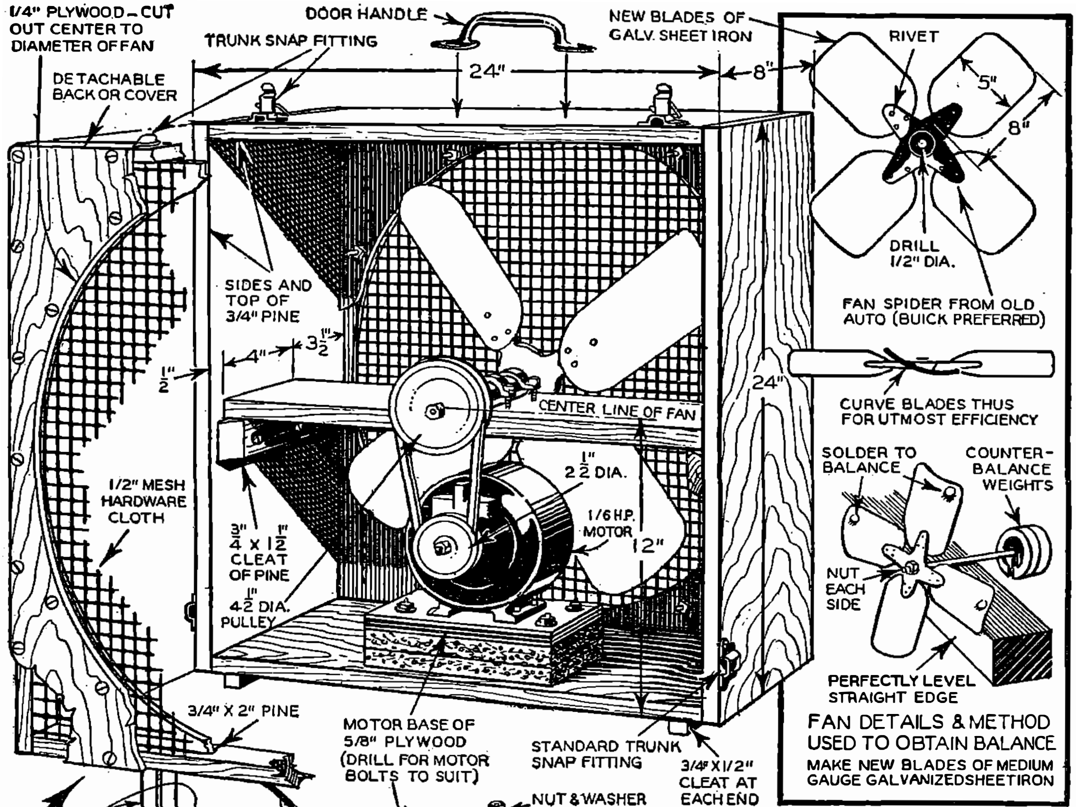
Select a good grade of clear spruce for the skis. Skegs should be fastened with marine glue and screws. Oak is preferable for these pieces, though spruce will serve almost as well.

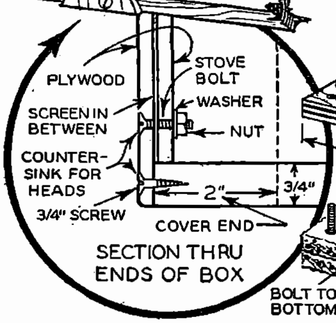
for drying between coats. The tow line is about 100 feet long, and has a grip made fast to a spliced bridle. The grip should be of hardwood, wide enough to accommodate both hands. The line itself should be of light, strong cord—window weight cord is ideal.

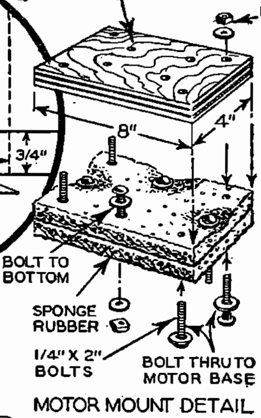
In its present form water skiing is a product of evolution and refinement, rather than invention. The Hawaiians on the surf at Waikiki seem to have first had the idea of getting over water on a flat board. The next step was made in the United States, when the Hawaiian surf board was shortened and widened and towed astern a fast power boat. The tow line was fastened to the board, and the rider held a bridle. Experts began to experiment with narrower and lighter aquaplanes in an effort to lessen water resistance and gain more speed. Finally came a free board, in which the rider held the tow line himself, which was better for experts but rather difficult for beginners. Then, as the boards began to approach the limit of narrowness, twin aquaplanes were used. At first these were held together by a short length of line in the back and front, and the tow line fastened to them while the rider held a bridle. The final step was when either Captain

[*Continued on page* 132]

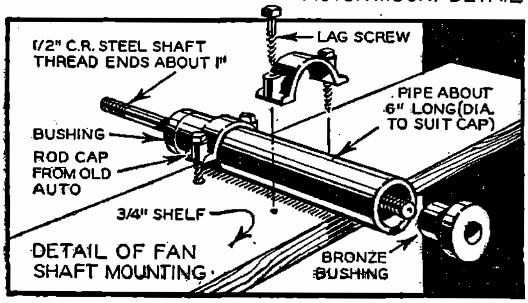
The MI Portable Fan







Motor is mounted on a plywood block, insulated from the box frame by sponge rubber, thus eliminating most of the vibration and hum.



by Lloyd Moore

THIS type fan moves a veritable cyclone of air. If placed in the proper position it can circulate the air in two or three rooms. It is portable, making it easy to locate the place where the fan will do the most good. This fan stirs up the cooler air down next to the floor rather than the warm air from the ceiling or walls as other types of fans do. It is safe for children and pets. It makes very little noise and can be built out of junk parts.

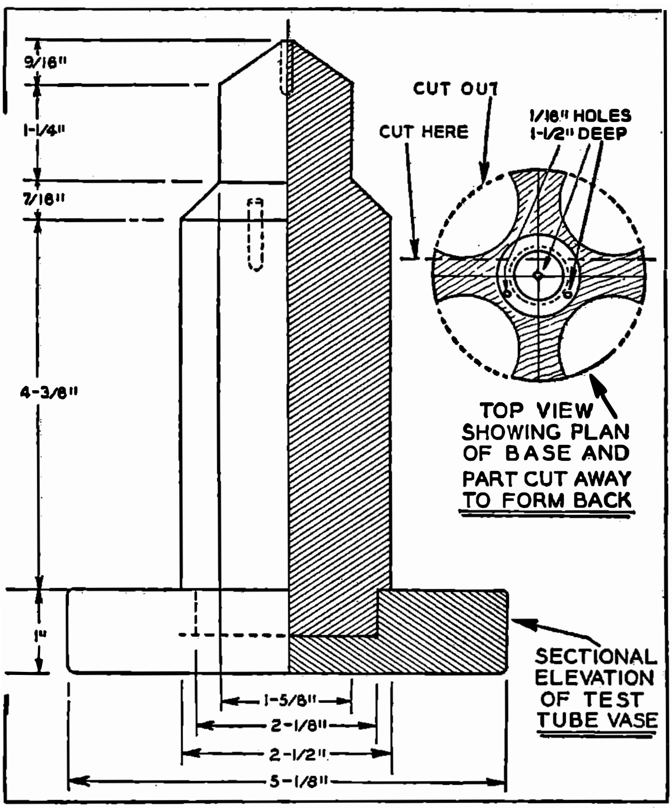
The exact size or layout of the fan will depend on what material the builder has at hand or wishes to use. The original model has a box two feet square to hold the fan. The frame top, bottom, and sides are made from ¾-in. material. A shelf is built to hold the fan bearing. This is mounted so that the fan will be centered in the box when finished. The front and back are made of ¼-in. plywood. A hole is cut in each the size of the fan. The protection screen is made from

[*Continued on page* 133]

Three Unit Bud Vase

A One Evening Lathe Project

by Dale R. Van Horn



THIS bud vase comprising three adjustable units, each carrying a test tube, is just the thing for the occasional table, radio cabinet top or bedroom. Consisting of a base, upright and three bent wires, it can be made in a short time—an ideal one evening project.

Turn down a disc of wood 1-in. thick and 5⅛-in. in diameter. Mark off the area into four equal sections as shown and scribe an arc in each quarter which will leave a solid center more than 2½-in. across. Jig saw out these segments, sand smooth with the small drum sander, then replace in the lathe and turn out a depression in the top side 2⅛-in. in diameter, and about ½-in. deep.

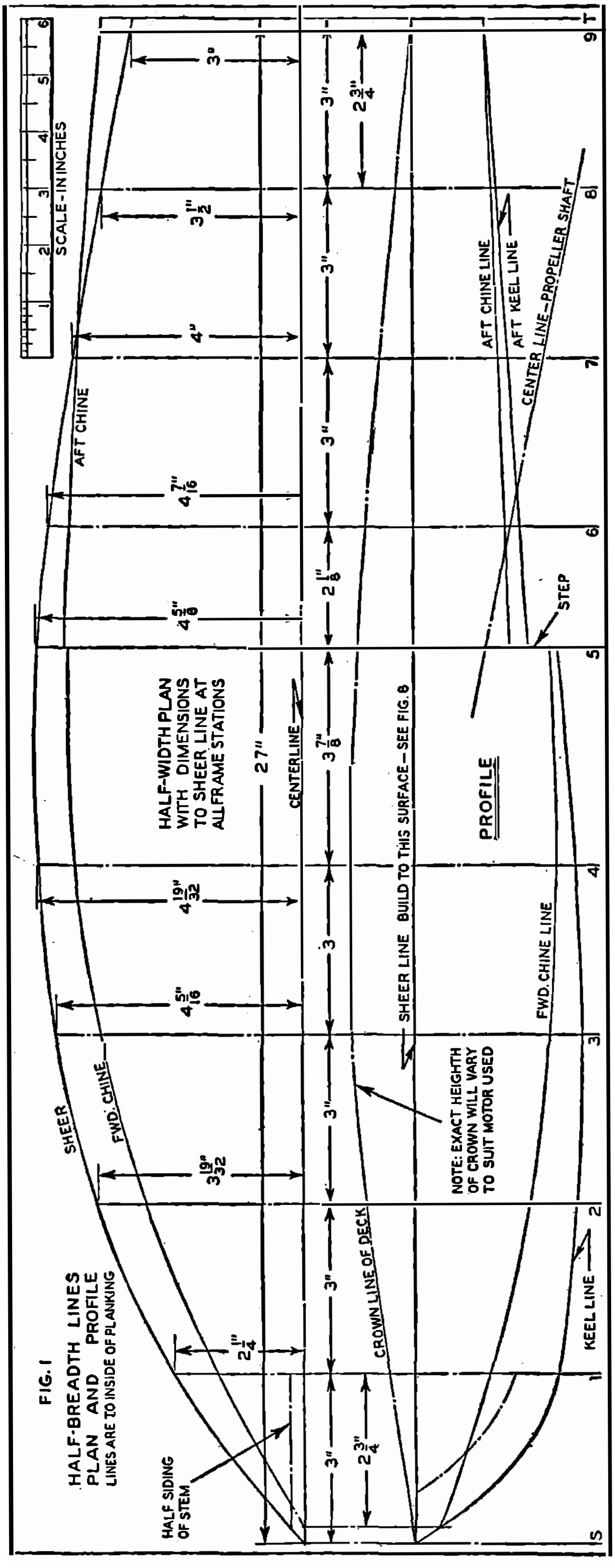
The spindle is 7⅛-in. long, but since you will need a bit of waste at the tail stock end, start with stock 7½-in. long. This is turned down first to 2½-in. in diameter, then the tenon for the bottom is turned ½-in. long and 2⅛-in. in diameter. The other end is reduced at an angle as indicated, the top diameter being 1⅝-in. and is turned down with only ¼-in. diameter left when the sanding and finishing has been accomplished. The tenon is of course not touched with lacquer or wax.

Coat the inside of the base depression with glue wiped evenly over the bottom and sides of the hole, fit the two pieces together and put back in the lathe and turn up the tail stock to compress firmly while the glue dries. Later the waste at the top of the upright is cut and sanded smooth, then lacquered and waxed. Three $\frac{1}{16}$-in. holes are bored in this upright 1½-in. deep; one in the center of the top, the other two on the next lower "level" and directly over the cutout portions in the base.

Set a rod in the metal lathe if you have one with a hole drilled in the end. Insert one end of a piece of No. 12 galvanized wire through this hole and make 7 turns, then hack saw off the portion through the hole and remove. Bend this wire piece to the shape shown and insert in the hole to support the test tube. Three are needed. If the wire relaxes so much after winding that the test tube falls through, turn down the rod until the wire winding is of the right size. If you lack a metal lathe you can improvise a rod—even a dowel—and hold it in the wood lathe chuck. Or a wooden spindle can simply be turned down in the lathe until of the right size and this used. Test tubes 5-in. long and ⅝-in. in diameter are used. The wires are dipped in cinnamon brown lacquer and dried to better conform with the natural tone of the figured gum used for the base and upright.

To complete this vase, the portion of the back including one of the four legs, should be cut off—first with a chisel, then smoothed on the disc sander. Since all the weight is in front, the vase will be wholly stable. More test tubes and wires can be used if desired.

Not the least desirable feature of this vase is that the tubes can be swung in or out.



YUMPING

by

Edward F. Waldron

MANY model boat enthusiasts have looked at the model airplane motor as an ideal set-up for model boat power, but because of receiving conflicting information and opinions concerning the adaptation of these engines to boats, have given the whole thing up as hopeless. Actually, the problem is not at all difficult, as you will see, and *Yumping Yimminy* combines all the best features necessary to produce a speedy, sweet-running, successful boat. She weighs under five pounds with engine, has ample beam to plane well, plenty of flare in the bow to throw the water away from the motor, ventilated step and a minimum of wetted surface. Add to this a perfect balance and you have a well-nigh perfect boat. Before starting construction on the hull, it is best to select and break in your motor, as this is the heart of your boat and needs careful treatment.

The usual motor for model aeroplanes has a bore of ⅞-in. and a stroke of $\frac{15}{16}$ of an inch. It will produce power up to about 6,000 revolutions per minute. Beyond that speed, you can expect little power; in fact, the timing apparatus on most of these engines will seldom function for accurate firing of the cylinder at higher speeds without some adjustment. These engines will turn two-inch propellers efficiently. Some will turn 2¼-in. propellers, but that depends on how well your engine is broken in. Some engines will barely handle a 2-in. propeller; others swing the 2¼-in. propellers madly. However, these are the limits to diameter and you may find that 1¾-in. is even better.

After selecting a motor, a proper flywheel must be secured. They vary in weight from 6 oz. to 14 oz. and from 1⅞-in. to 3-in. in diameter. A comfortable diameter is 2¼-in.

YIMMINY A 27-INCH GAS POWERED STREAMLINE SPEEDBOAT

and is large enough for a wheel of 7 oz. The larger the diameter, the lighter the wheel so the inertia of the flywheel may be kept the same. Your first task is to balance the flywheel. Even if you did buy a balanced flywheel, be sure to check it on a shaft balanced on knife blades or razor blades set level, edge up. Balancing is done by boring small holes in the rim at the heavy point. Break in your engine carefully at slow speeds for an hour or two with an air propeller for load. Never use the flywheel for this work—unless you wish to ruin the engine.

Assuming that you have done all of this carefully, you are ready to commence construction of the boat. First secure the following list of materials:

You will need one piece of board 30-in. long x 10-in. wide x 3/4-in. thick for a building board;
7 strips of pine 1/4-in. square x 36-in. long for sheer, cross braces, chine, and keel;
2 pieces 1/12-in. mahogany 30-in. long x 14-in. wide: use veneer cut—it is cheaper and just as strong;
3 square feet of 1/4-in. plywood;
1 paper 1-in. No. 20 brads;
2 doz. 1/2-in. No. 4 brass screws—round head;
1 doz. copper washers No. 8;
20-in. of 5/32-in. brass rod;
6-in. tubing to fit rod;
6-in. of 1/4-in. brass rod; or 5/32-in. inside diameter heavy wall brass tube;
1 pint model aeroplane glue;
Sandpaper and varnish.

Take the building board and lay out the stations as shown in the plan (Fig. 1). Lay off on

Body plan and profile are shown below and at right, while on opposite page is lines plan. This is laid out full size on building board and frame built directly on top of drawing. Shingled bottom creates a minimum wetted surface, making boat very fast.

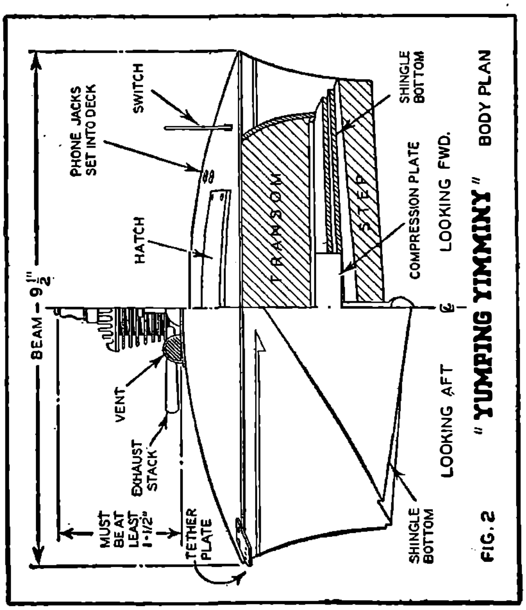


FIG. 2 "YUMPING YIMMINY" BODY PLAN

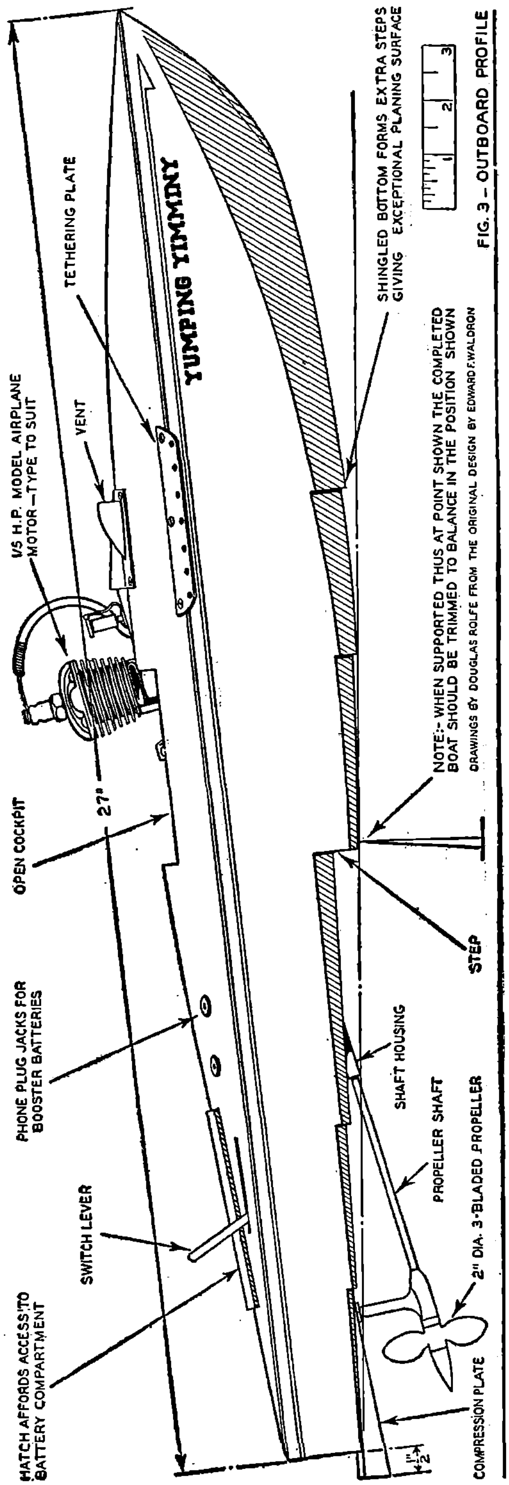


FIG. 3 - OUTBOARD PROFILE

Cross-section drawing (Fig. 4.) showing engine, shaft, strut and propeller installation. Plastic wood fills slot in the bottom where shaft passes through, rendering it watertight. Fig. 5 details sheer framing, starting point of actual construction.

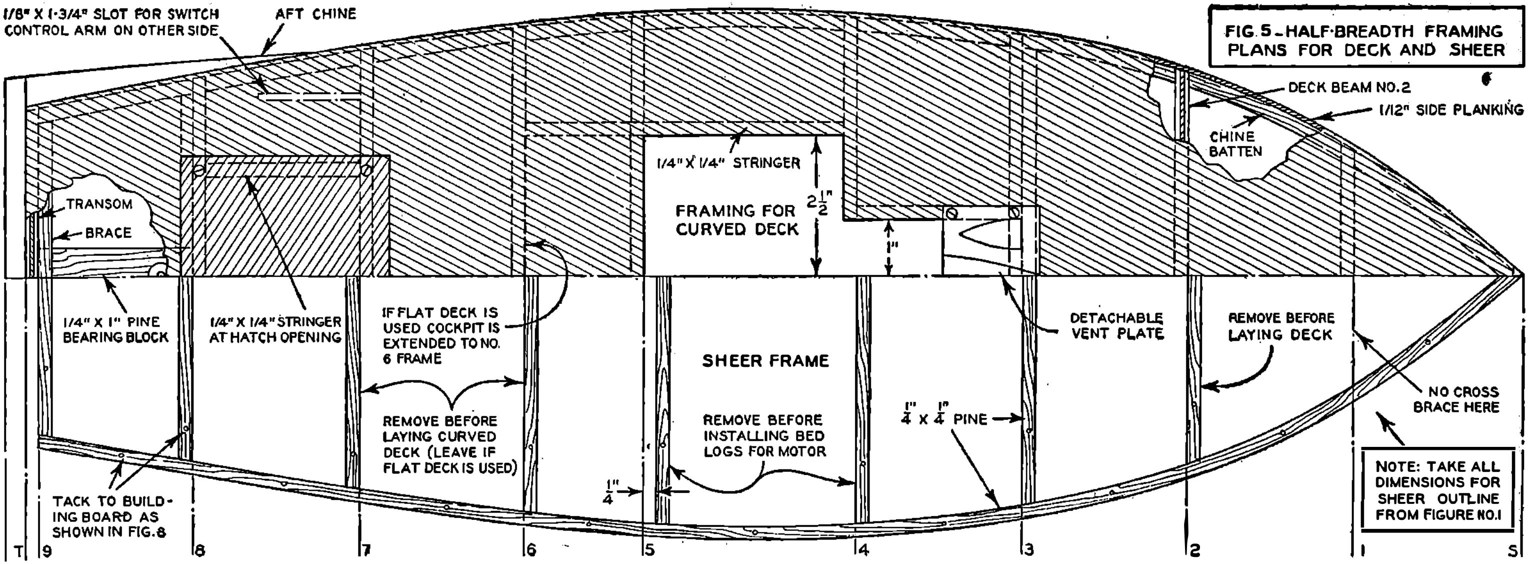
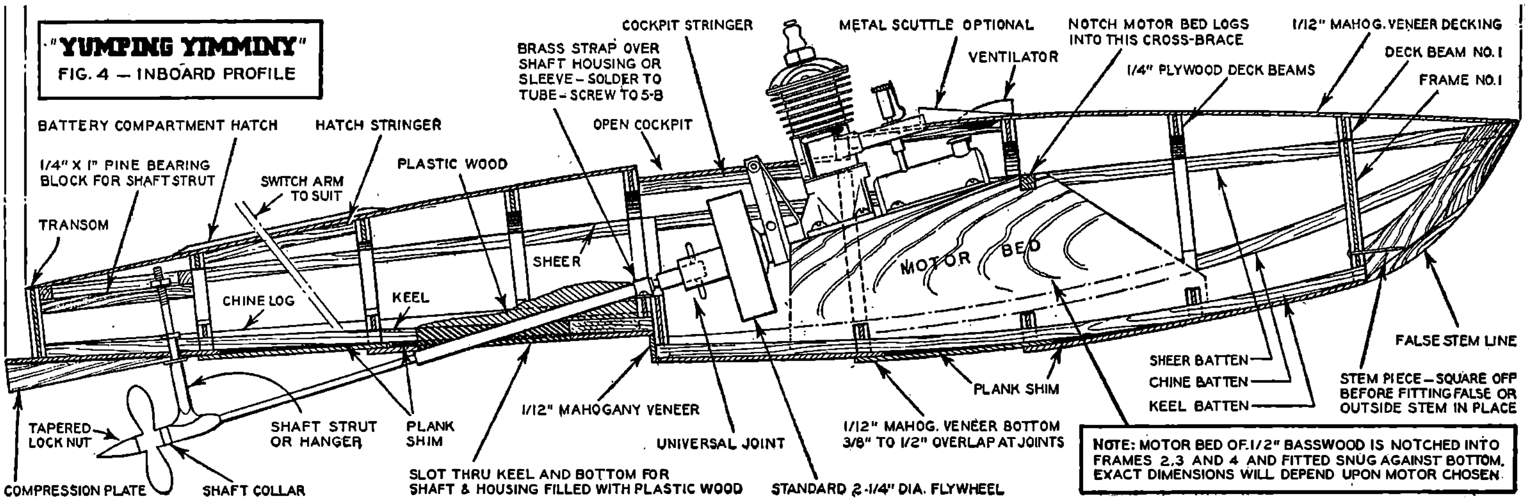


FIG. 5 – HALF-BREADTH FRAMING PLANS FOR DECK AND SHEER



"YUMPING YIMMINY"

FIG. 4 — INBOARD PROFILE

NOTE: MOTOR BED OF 1/2" BASSWOOD IS NOTCHED INTO FRAMES 2, 3 AND 4 AND FITTED SNUG AGAINST BOTTOM. EXACT DIMENSIONS WILL DEPEND UPON MOTOR CHOSEN.

these stations the sheer line. Secure a piece of waxed paper, lay it over the building board, and on top of this lay down the sheer frame (shown in Fig. 5). Simply tack one of the ¼-in. square pieces to the board with the 1-in. brads on the sheer line. Do the same on the other side. At the front, cut these battens off to a taper. Glue together and fasten with a brad driven through, bent over, and cut off. Next cut short strips of this ¼-in. square material and glue crosswise of the frame in front of station lines 2, 3, 4, 6, and 9 one-fourth inch forward of station 5 and behind 7 and 8.

At station 9 drive a brad through each sheer into the cross piece and glue thoroughly. Next cut out the frames from ¼-in. plywood cutting ¼-in. notches in each as shown in frame No. 4 (Fig. 6).

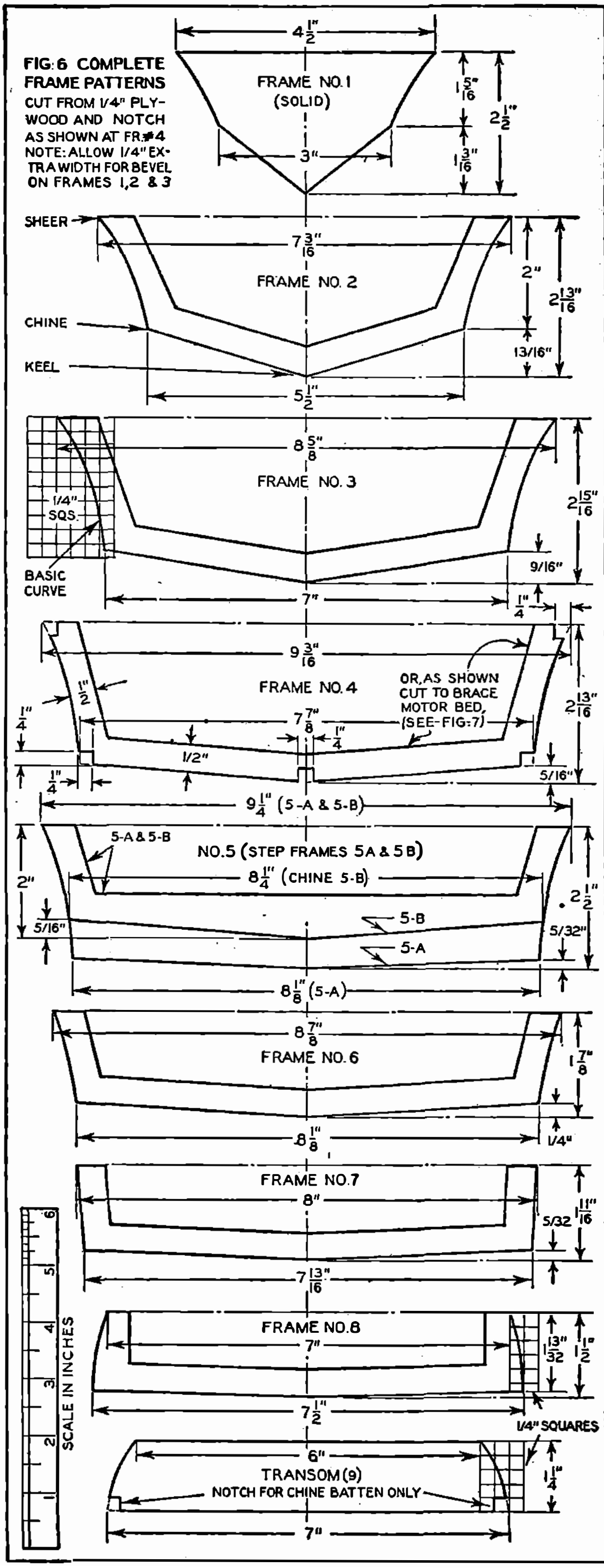
Glue frame 5-B on top of 5-A so that tops and center lines match. This is the step position. Cut out the insides of each frame so that there is about ⅜ to ½-in. material for support remains. (See frame No. 4.)

Leave frame No. 1 solid and cut out the stem piece from ½-in. wood, tapering it to a point. Fit one end to the sheer frame at the bow. Now glue and nail the other end to frame No. 1; and glue stem and frame in place in the sheer frame. Glue in the other frames to the sheer frame. Use the model airplane glue liberally. (The above procedure is shown in the step-by-step construction drawings, starting at Fig. 8.)

Glue the stern on the back end of the sheer frame. Next fit keel pieces and chines into the frames. These are held with brads and glue at the stern. When dry, you are ready for the bottom; and now a new problem enters the picture.

You may plank the boat smooth, or shingle it, or lap it sidewise, but shingling is best. If smooth planked, plank the after part first with 1 piece of wood for each half. Forward it will take two pieces for each side. To use less than two is impossible

All frame patterns are given at right. They should be copied full size on paper, pasted to plywood and cut out to line. Beveling takes place later.



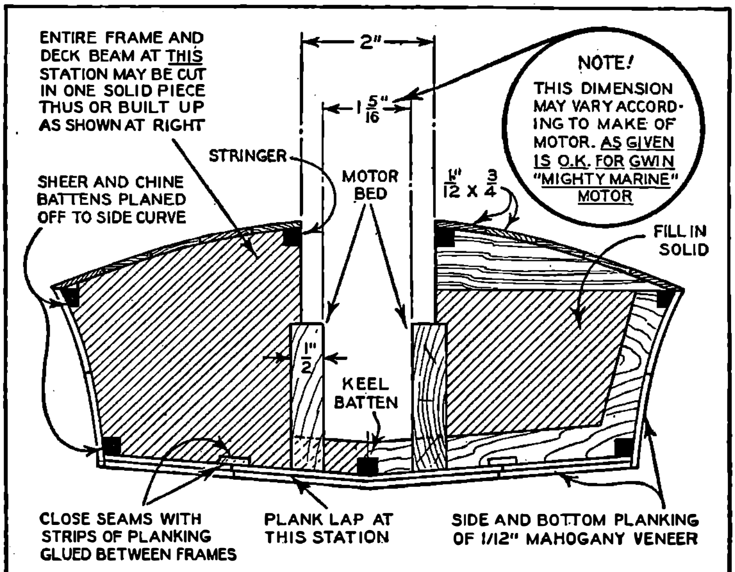


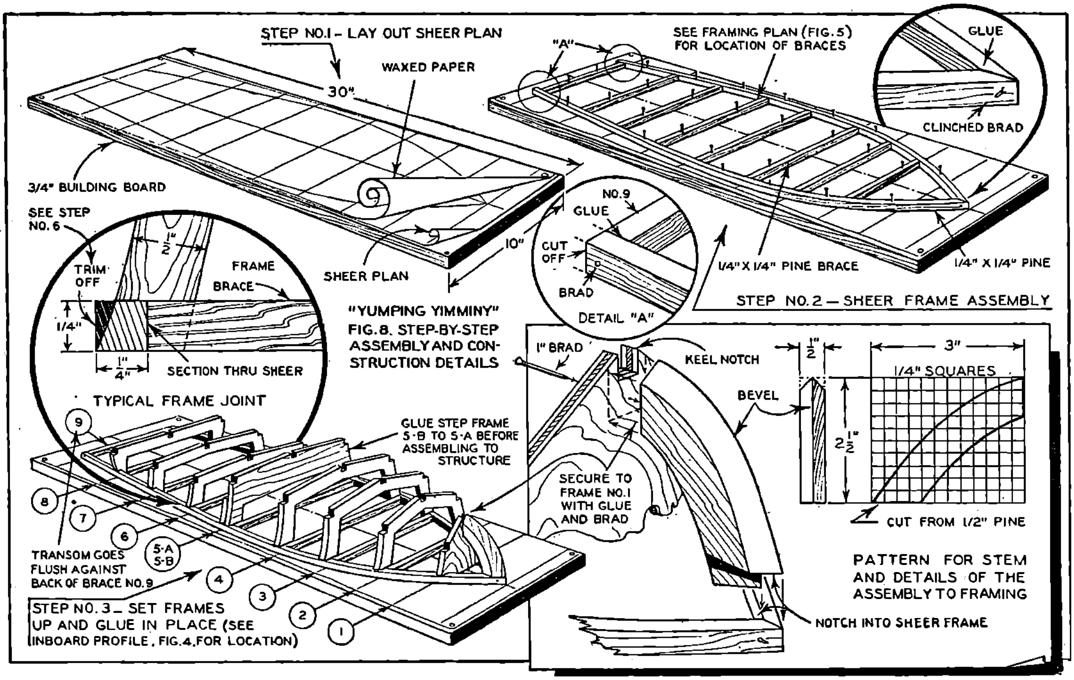
FIG. 7 CROSS SECTION THRU HULL AT FRAME #4

for the bend will cause splitting, Plank without removing from the building board.

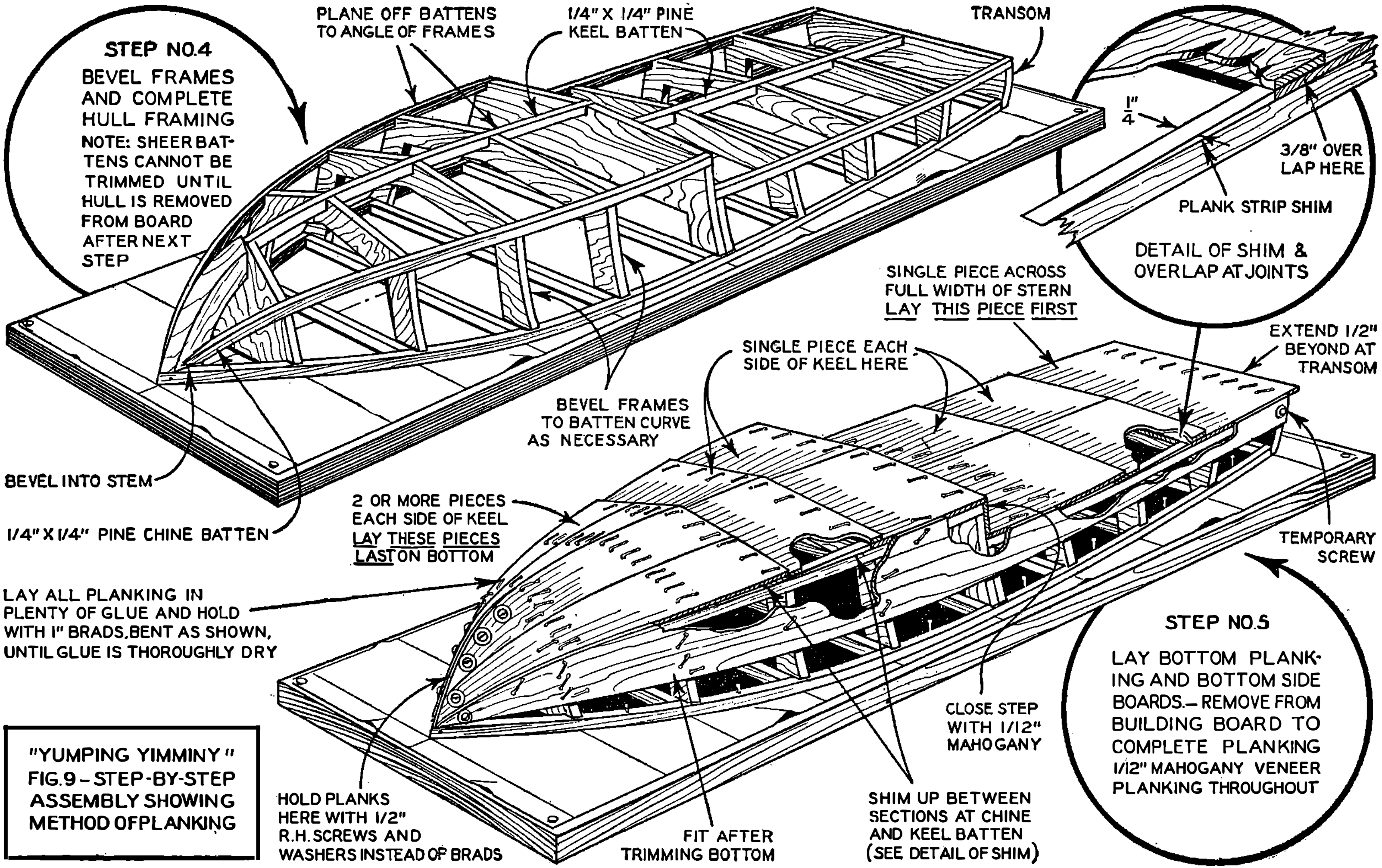
If shingled, it is necessary to run a sliver ¼-in. wide tapering from the plank thickness to zero along the chine and keel before putting on the next section.

If lapped longitudinally, the planks at the chine go on first, then the ribs are shimmed up with pieces of planking and then the next plank lapping at least ¼ to ⅜-in. goes on.

The theory behind these types of planking is as follows: The friction of the boat bottom on the water is greater the more the wetted surface. If the wetted surface can be decreased, the boat will go faster. In small ripples, boats actually travel faster. If the ripples are in the bottom of the boat, the water is lapped from each miniature step in an ever decreasing area until it may approach zero as a limit. The longitudinal laps tend to clear the boat hull lap by lap as the speed increases. *Yumping Yimminy* has a shingled bottom fore and aft of the step. Fig. 9 shows the bottom all on. The planks are put on with a liberal coating of glue under them and held until the glue dries with brads driven part way in and bent over. When the after end is covered, cover the back edge of the

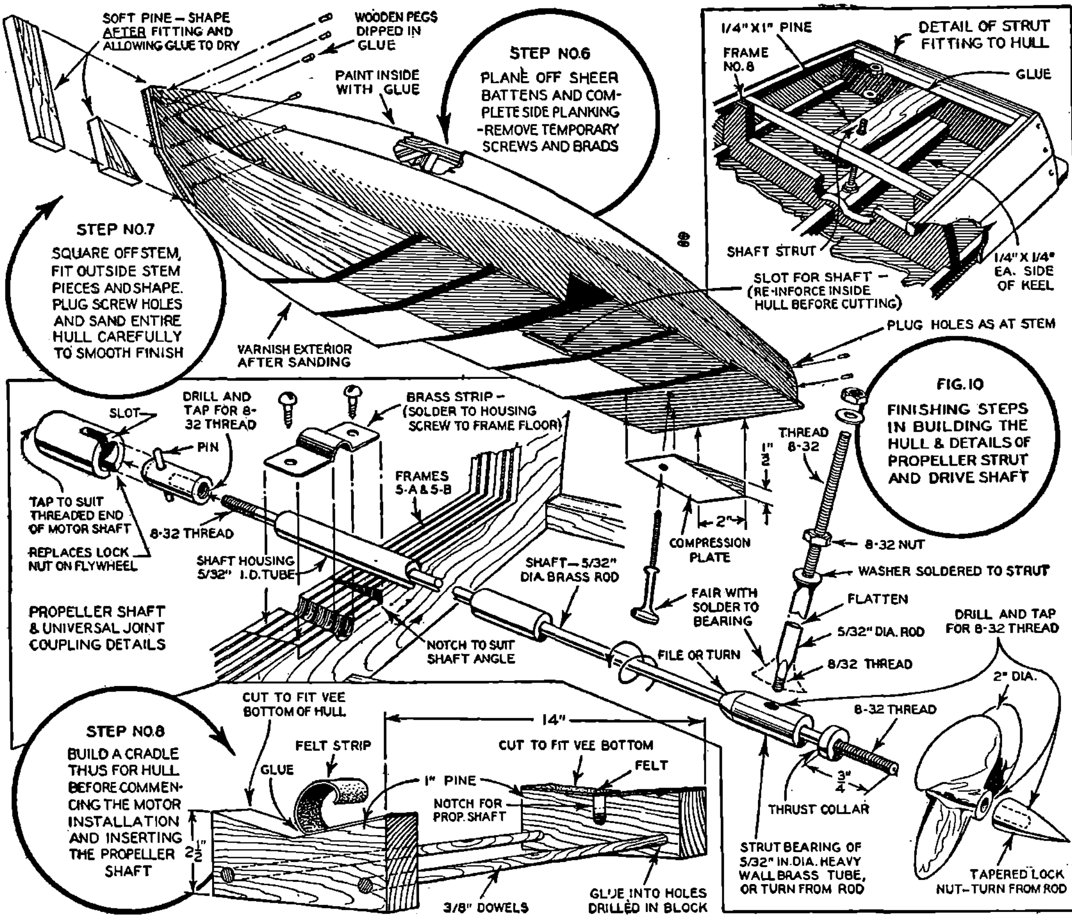


Step by step assembly drawings start above. After sheer frame has been glued together set up the frames at their various stations, drawn on your plan beneath the waxed paper. Glue in place, then cut stem and mount between sheer frame and frame No. 1 (forward bulkhead).



"YUMPING YIMMINY" FIG. 9 – STEP-BY-STEP ASSEMBLY SHOWING METHOD OF PLANKING

Top: Framing complete with chines and keel in place. Frames are beveled and bottom is ready to be planked. Lower drawing clearly shows method of planking. Mahogany veneer is laid in glue, held down with brads until dry except at stem, where twist of planks makes it necessary to use screws.



When bottom planking is finished build cradle and set hull in it. Then plane off sheer clamps or battens and fasten sheer plank on each side. Boat is now ready for motor and shaft installation. Details of shaft assembly are pictured above.

step with a piece of planking glued on and held with brads as before. When dry, smooth off and plank the forward end.

A word of caution is necessary here: Never force the plank; let it bend in its natural curve and fit to place. Forcing will cause bunchy construction.

At the bow where the bend is hard, hold the planking down with a ½-in. round head brass screw driven in through a washer. When the glue is dry, the screw and washer is removed and the hole plugged with a peg that was dipped in glue, driven in and cut off.

After the bottom is dry, trim the edges smooth with the chines and fit the sides. Use two pieces on each side. After the first piece is fastened in place on each side and dry, remove the frame from the building board and glue on the other side boards, which you have carefully fitted. If smooth planked, glue a narrow strip of planking inside the bottom over each seam. If shingled or lapped this is not necessary. When completely planked, before removing any screws or nails, paint the entire inside of the hull with a coat of glue thinned with acetone. This treatment will guarantee a tight hull. Trim off the edges, remove all brads and screws, pegging the screw holes with pegs dipped in glue. Next, square off the front end where the planking was glued to the stem piece and glue on an outside stem as pictured in Fig. 10. When dry, whittle and sand to shape. Sand the whole hull smooth, apply one coat of varnish to the outside of the hull. In sanding, be careful to keep the step ends and all lap edges as square and sharp-cornered as possible. Also in sanding, sand all glue spots off the wood; otherwise the varnish will show light spots where the glue was.

Build a cradle for the boat to rest in, (Fig. 10), and you are ready for the motor installation.

The hull you will notice has definite flares to the sides—the flare running well back to throw the water out from the hull so that it will not strike the spark plug. Since this hull is slightly narrower aft, than at the step position, it is distinctly a direct-drive boat with the engine amidships forward of the step, in contrast to the stern engine gear-box drive type, which are wider at the stern.

Refer back to Fig. 4 and to Figs. 10 and 11 for installation details.

First, make a strut as shown in Fig. 4, and install it just aft of Station 8 after you have reenforced the bottom of the boat with a piece of ¼-in. wood on each side of the inside keel. These pieces are glued in. Cut a slot in the bottom of the hull as shown in Fig. 10 between ribs Nos. 5 and 6, making this slot wide enough for a 5-in. brass tube with $\frac{5}{32}$-in. inside diameter. Make a universal joint for the motor.

Fit the drive shaft as shown in Fig. 10. Now insert the shaft through the brass tube, and the strut. Mount the motor so that the flywheel will clear the bottom of the boat by at least ½-in. and so that the crankshaft lines up with the driveshaft on the boat. Make the motor bed of ½-in. wood and let it lap over three frames. At No. 4 frame there should be a solid bulkhead built in on each side of the engine bed. Use a great deal of glue to hold the motor bed and bulkhead in place, since no screws are used. Do not hesitate to put a ¼-in. square piece of wood in each corner of engine bed and boat bottom in a bed of glue as further anchors.

With the engine in place and the drive shaft placed with the strut bent so that it does not offer any friction, set the brass sleeve in place, solder a strip of brass across the top of this sleeve and screw this strip to the inside of the bottom at No. 5 station. Next, tighten up the strut. Fill the slot in the bottom of the boat with plastic wood mounded up over where the sleeve comes through on the inside of the hull. Turn the boat over and fill this slot from the bottom, too, (Fig. 4). Next make the tapered nut for the propeller. Drill and tap the propeller for an 8/32 thread. You may now install the batteries, switches, phone plug tip jacks (later, in deck), coil and condenser. Plans show the location of these and wiring diagram is given in Fig. 11.

There is now the problem of a deck. The beams of the curved, streamlined deck are made by determining the widths, and the heights at crown centers, then drawing arcs through these three points. Make the beams ⅜ to ½-in. wide, and ¼-in. thick. Remove the cross braces originally built into the sheer frame before gluing on the deck beams. The deck can then be planked with strips of 1/12-in. mahogany veneer, glued and held in place with brads while drying, in the same manner as the bottom.

Just a word about the hull now and the propeller effect. The boat propeller has a tendency to draw water into it by digging a hole under the boat for the boat to fall into. Actually an outward pressure is created on the hull over the propeller that has even burst out the planking of large boats. To overcome this problem, several methods have been

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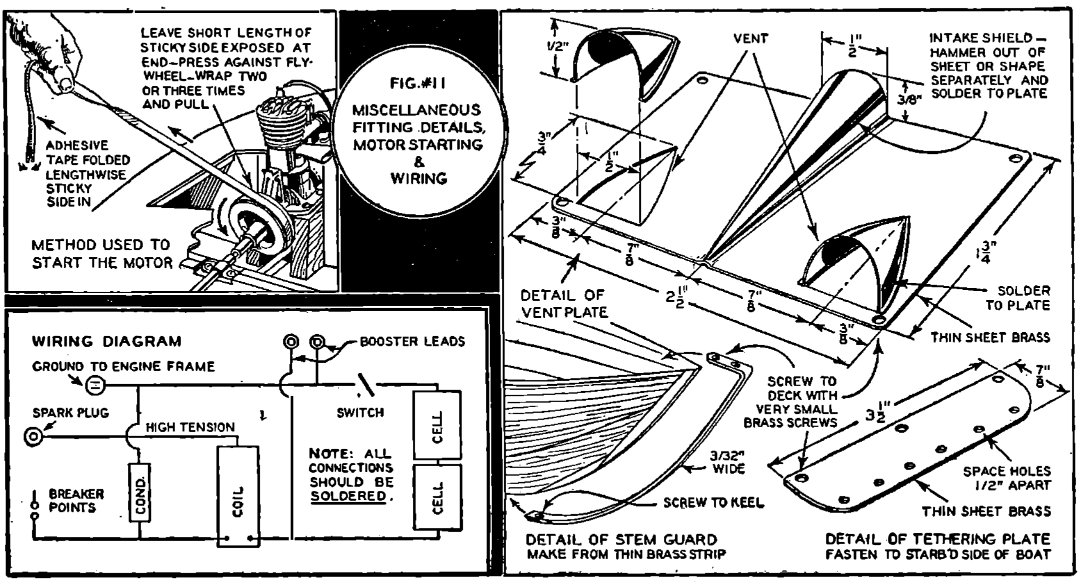
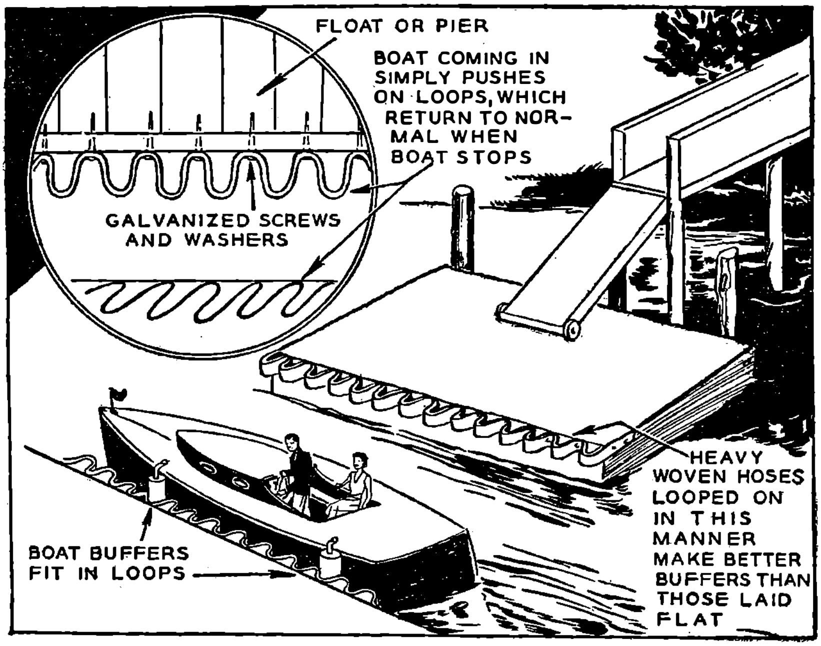
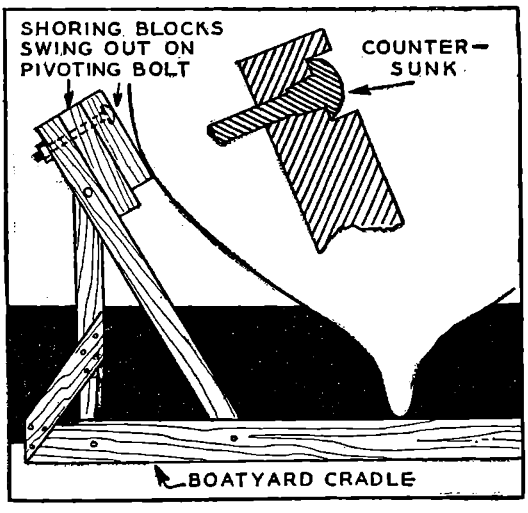


Finishing touches, including wiring diagram, air vent for engine and brass stem guard.

Firehose In Loops Makes Pier Buffer



An extremely effective pier or float buffer can be made with a length of old firehose Nail or screw it to the edge of the dock in loops, as shown at left. The resilient hose will give as a boat comes alongside, effectively preventing scuffing or scraping of painted or polished sides. The loops also act to engage the round buffers generally hung over the boat's side when approaching landing, thus steadying it considerably when tied to float.—*Hi Sibley.*



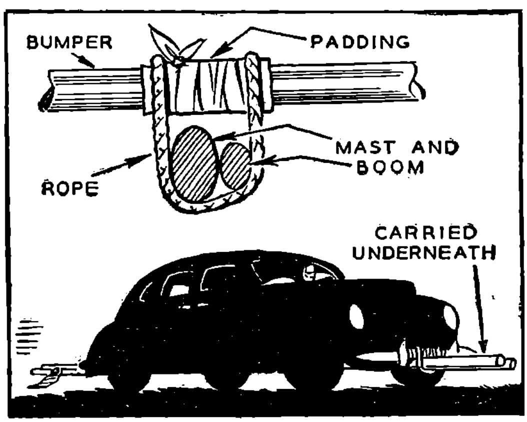
Convenient Pivot Shoring Blocks On Boat Cradle

When moving shoring blocks for painting or puttying a hull they persistently fall, and it is no easy trick to hold the hull balanced while someone gathers them for replacing, especially with a fairly heavy boat. The simple pivot arrangement with a ⅜-in. carriage bolt gives utmost freedom, yet replacing the blocks requires but a moment's effort.—*Bruce MacIntosh.*

KINKS FOR

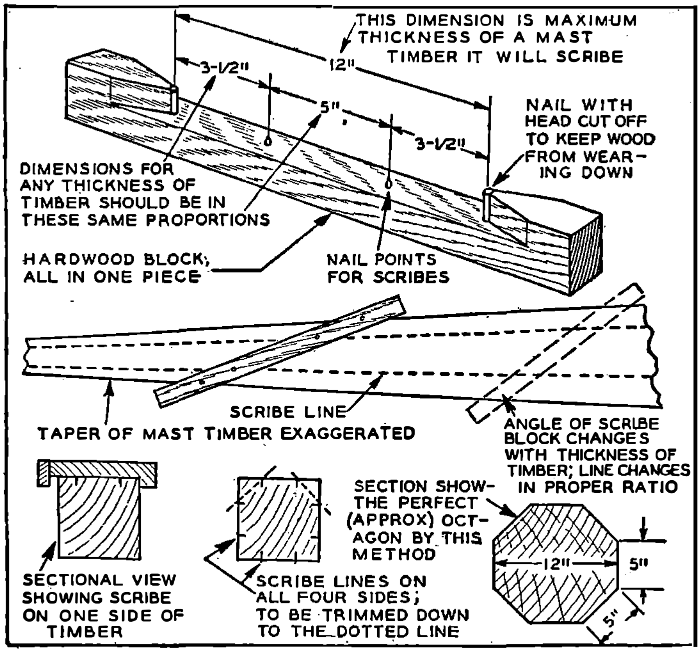
Under Car Sling For Carrying Boat Spars

Rather than risk scarring the car, or an accident from carrying spars on top or on the side of the car, try the method shown below. Bumpers are padded with cloth and the spars or other objects secured tightly by rope slings which should allow for clearance of the axles. The usual red danger flags are tied on extremities. Load carries well with its low center of gravity.—*B.M.*



IT IS frequently a rather difficult task to accurately mark a square tapered spar for cutting to an octagonal shape. An ordinary scribe will not mark the mast timber in the correct ratio—in other words, on a taper mast it will be the same distance from the edge, one end to the other. However, with this simple and ingenious gauge the scribe lines remain the proper *proportionate* distance from the edges. Make the scribe from a solid block of hardwood-mahogany will do—as shown at right. The nail points that do the actual marking should project just enough to make a distinct line. In use, the scribe block is laid flat on top of the spar to be marked, and drawn along with ends touch-sides of wood.—*H. S.*

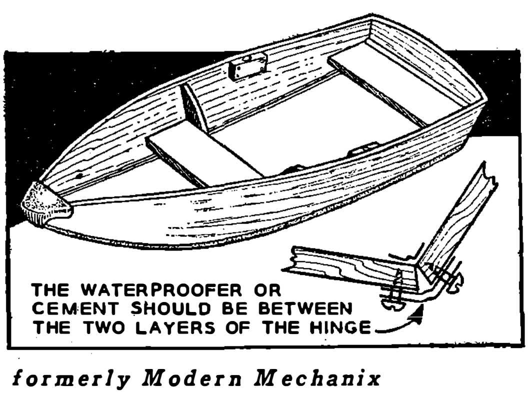
Simple Spar Scribe For Tapered Masts

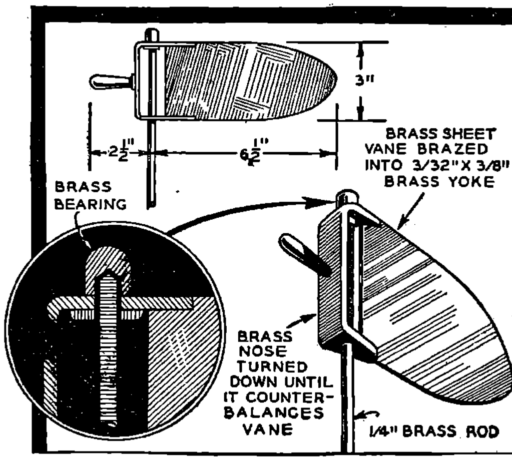


BOAT OWNERS

Waterproofing Folding Boat Canvas Hinges

IN BUILDING a folding boat such as the popular plywood type, or renewing the hinges of an old one, use two layers of medium weight canvas (12 oz.) instead of a single thickness of a heavy grade. The correct way to waterproof these, and still have them remain pliable, is to apply liquid marine glue or patching adhesive cement to their inner surfaces, then press them together. This not only makes hinge more waterproof than anything applied on outside, but prevents glue from wearing off.—*J. A. Emmett.*

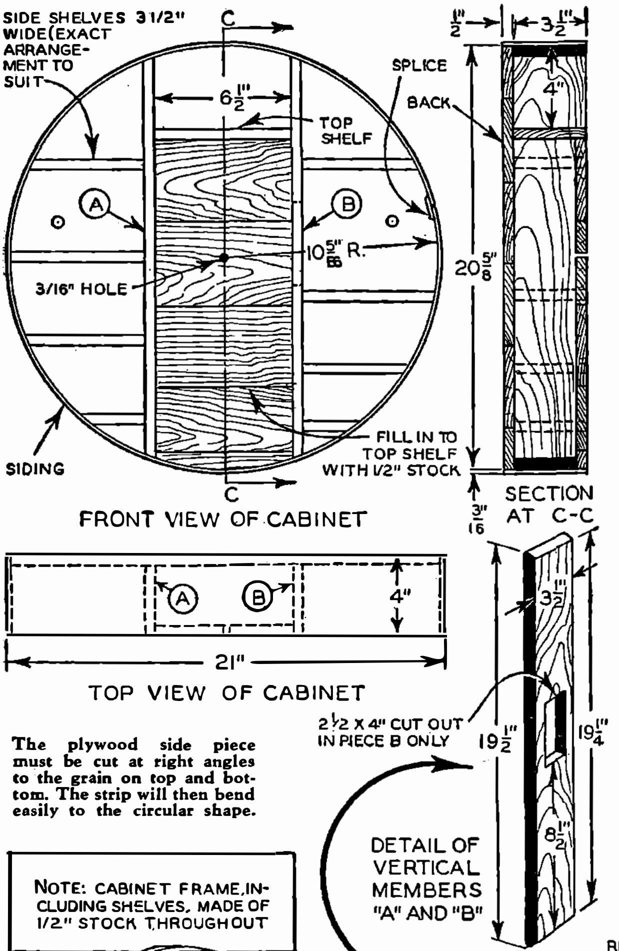




Wind Vane For Sail Or Power Boats

WHETHER under sail or not, it is important at all times to know the exact direction of the wind. Those who do not carry pennants atop their masts, or who wish a more sensitive and accurate wind indicator, will find this easily made brass wind vane the answer to their problem. Mounted on the masthead its extreme sensitivity will instantly show the direction of the air stream. No matter how far over on her beam the boat goes, counterbalance permits accuracy.—*H. S.*

A REVOLVING DOOR

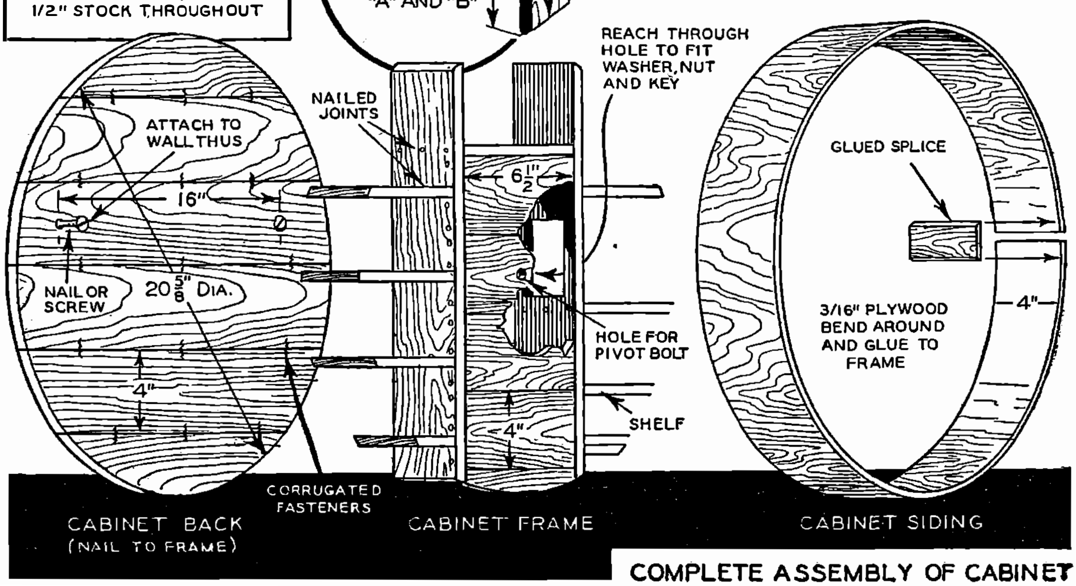


by W. Keith Vining

HERE is the answer to that old bugaboo—the swing open medicine door, for not only is this little cabinet adaptable to a space a little thicker than its own thickness, but it prevents head-bumping, cluttering of shelves (each compartment is separate) and last but not least, you may leave it open to any required compartment, and have your face visible at the same time.

The back and front of the revolving doors are of $\frac{3}{16}$-in. plywood, of identically the same outside dimensions, and hand aperture dimensions. Directly in the center of the back drill a ¼-in. hole, and cutting a bushing of thin metal, apply it in this hole. The front has a hole of 12-in. diameter let in it. The mirror is to be cut from ⅛-in. stock, should that size be unavailable ready made. A mirror backing of the same diameter and thickness is cut from ⅛-in. plywood, and an inch and a quarter hole drilled in the center of this.

Quarter inch shop scrap may be used for the blocking outside of the mirror and between the front and back. When this has been cut proceed with the



COMPLETE ASSEMBLY OF CABINET

BATHROOM CABINET

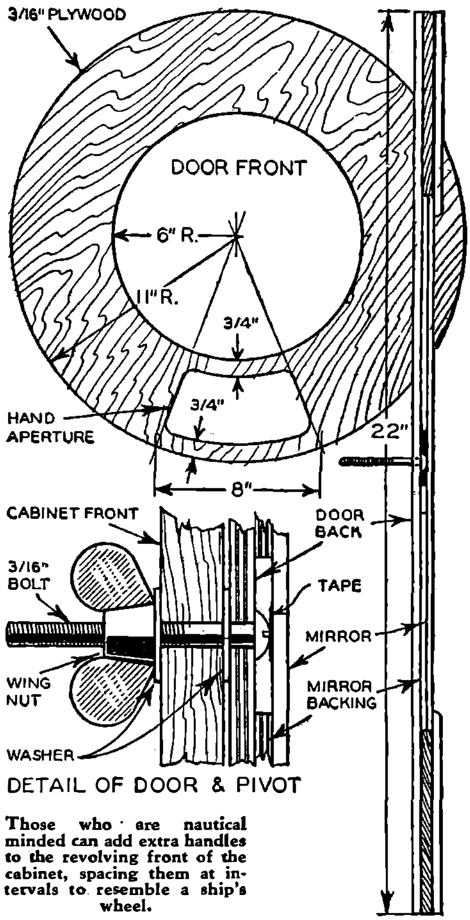
assembly. A piece of tire tape is stuck on the back of the mirror to protect it from the stove bolt head. The stove bolt is $\frac{3}{16}$-in. by 2-in. and a small cotter-pinhole let through the end.

The stove bolt is placed in its hole in the door-back, then the various door parts liberally smeared with glue on their adjacent portions and put in clamps.

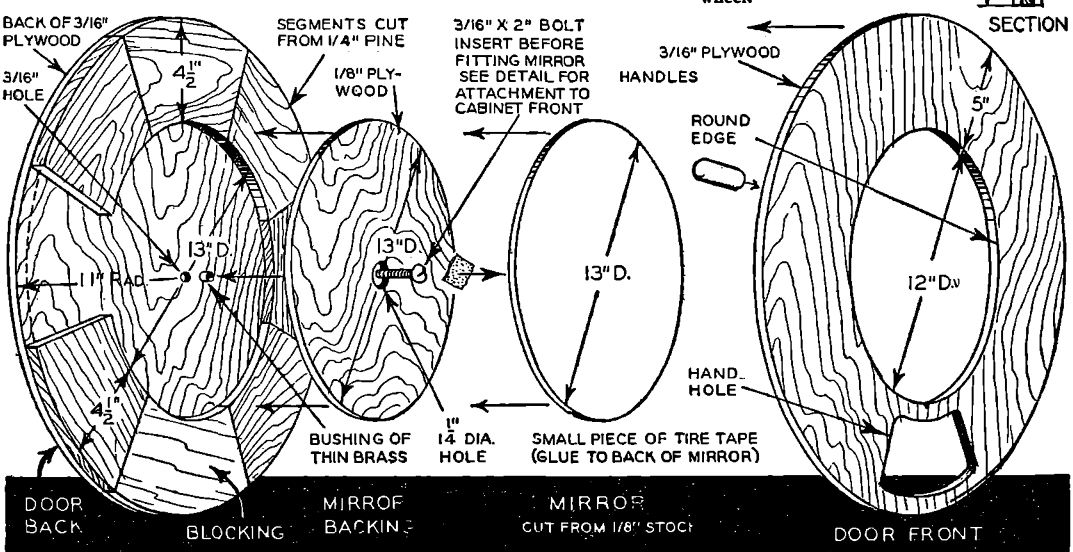
The cabinet back is layed out on ½-in. stock, and held together with corrugated fasteners, while vertical members, and shelves, also of ½-in. stock are scribed and nailed to it. The top shelf should be spaced as indicated, as also the two vertical members. All of these segments are 3½-in. wide. Don't forget to leave a small hand hole in the right vertical member. The section between the two vertical members is built up solid, and a $\frac{3}{16}$-in. pivot hole drilled in the exact center of the cabinet at this point. Now drive holes in the backing to take, wall fastenings; 16-in. is indicated between these holes, since that is the usual stud spacing, but you may suit your individual need here.

Placing the cabinet on a level solid space proceed to gradually bend, glue and brad the $\frac{3}{16}$x4x66-in. plywood siding into place. A plywood or thin wood splice is placed and glued where the ends meet, and the whole cabinet may be tightly bound until the glue is dry.

After painting or varnishing the cabinet, fasten it to the wall. Place mirror in proper position, and apply wing nut, etc., through hand hole.

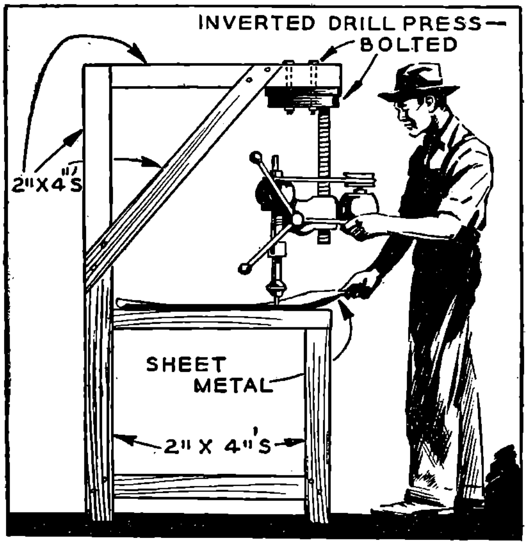


Those who are nautical minded can add extra handles to the revolving front of the cabinet, spacing them at intervals to resemble a ship's wheel.



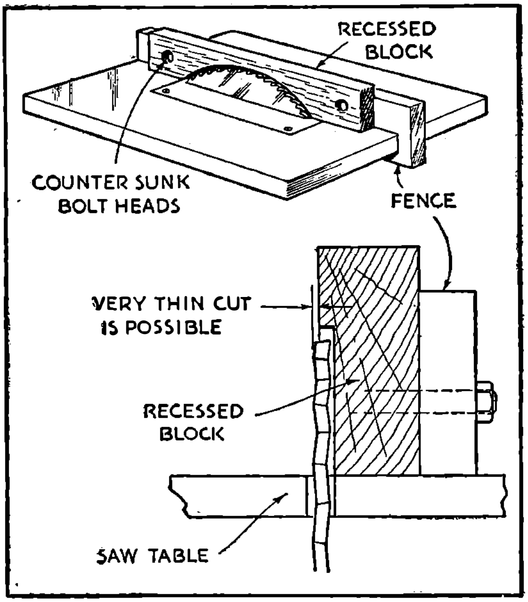
AND REVOLVING DOOR

Upside Down Drill Press Versatile



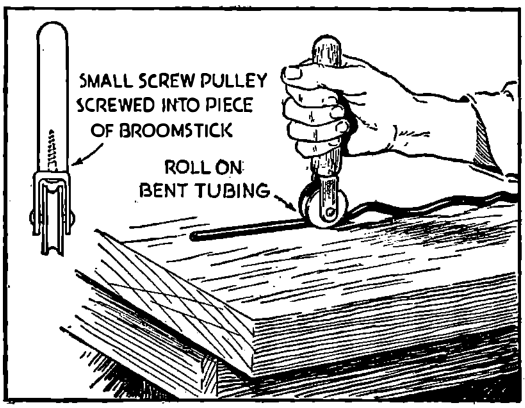
A ROADSIDE sign specialist rigged up a medium size bench type drill press in an upside down position to permit the quick boring of holes to the center of 5 foot squares and circles. The installation is unusually simple and effective, as shown above.

For quickly moving large, heavy sheets in any direction, lay several ½-in. ball bearings on the bench, the sheet metal laid on top of these and the whole job, no matter how big, can be moved with one hand.—*D. V. H.*



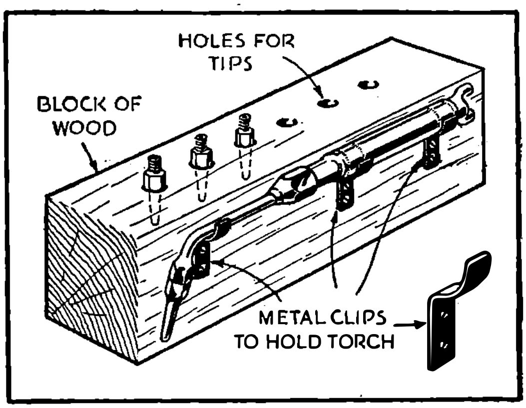
Recessed Block Makes Clean Edge

IT IS not easy to make a very thin cut on the circular saw by using the fence alone. With a recessed block, however, set up as shown, a clean, paper-thin edging cut is possible. Be sure to countersink the heads of the bolts which fasten the block to the fence so the wood to be edged can lie flat against block.—*Lowell R. Browne.*



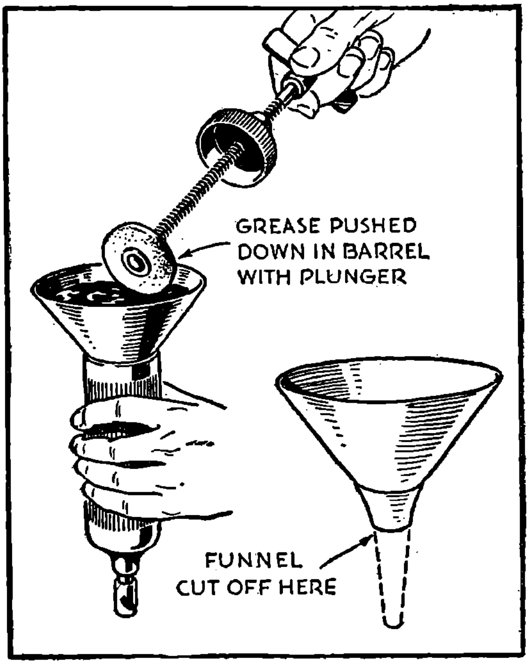
Pulley Straightens Small Tubing

THE handy gadget above will quickly straighten an old or bent piece of copper tubing. It consists of a screw pulley with groove about the same width as the tubing, screwed into a short length of broom which acts as a handle. Rolling it over the tubing straightens the latter.—*A.H.W.*



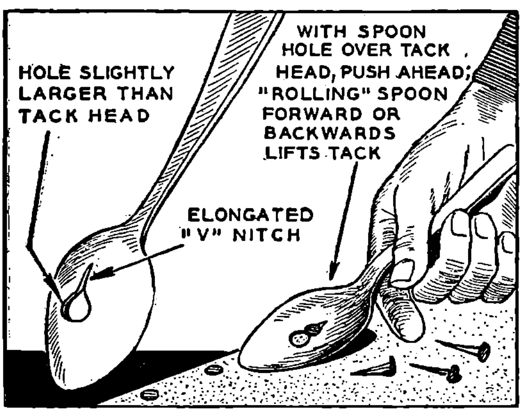
Block Holds Welding Outfit

A 4x4 wood block makes an excellent rack in which to safely keep your welding torch and the delicate tips. Three small yokes of strap iron attached to side of block hold the torch, and holes are bored in the top for the tips. Block is sufficiently heavy to rest solidly wherever stood.—*A.H.W.*



Funnel Keeps Grease From Hands

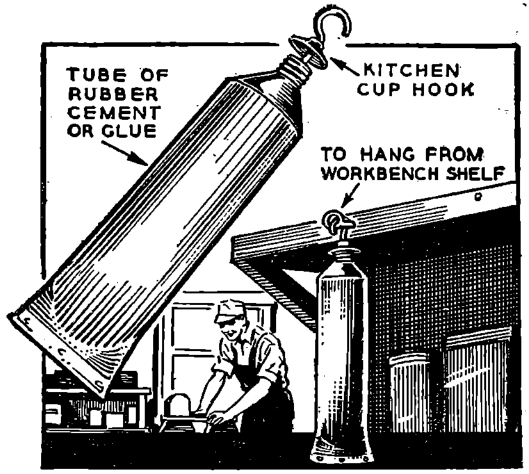
THE usually messy job of filling a grease gun can be made quite clean by the following method. Cut all but about an inch from the business end of a small funnel. To fill the gun remove plunger as usual, then load funnel with grease, using a paddle. Insert funnel into the gun and force grease in with plunger. Remove funnel and reinsert plunger.



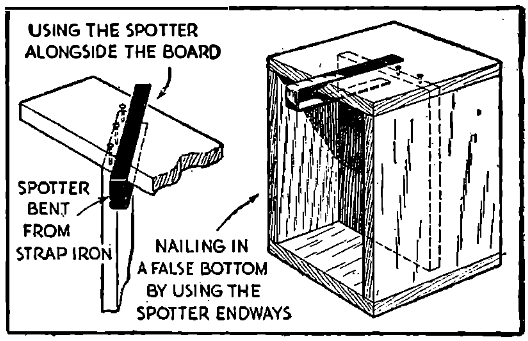
Steel Teaspoon Pulls Tacks

A NEAT tack puller can be made from an ordinary steel teaspoon. Drill a hole large enough to fit over tack head in bowl of spoon, then cut an elongated V notch from rim of hole towards spoon handle.—*A.H.W.*

Protecting Adhesive Tubes



TUBES holding rubber cement, glue, paste, etc., are often damaged to such an extent that the contents are spilled when they are left lying around on the workbench. Or else they get knocked to the floor and stepped on, making a sticky mess to clean up. However, if a medium-sized kitchen cup hook is screwed into the end instead of the usual cap, they can be hung up on a nail within plain view above the back of the bench.—*I.J.S.*

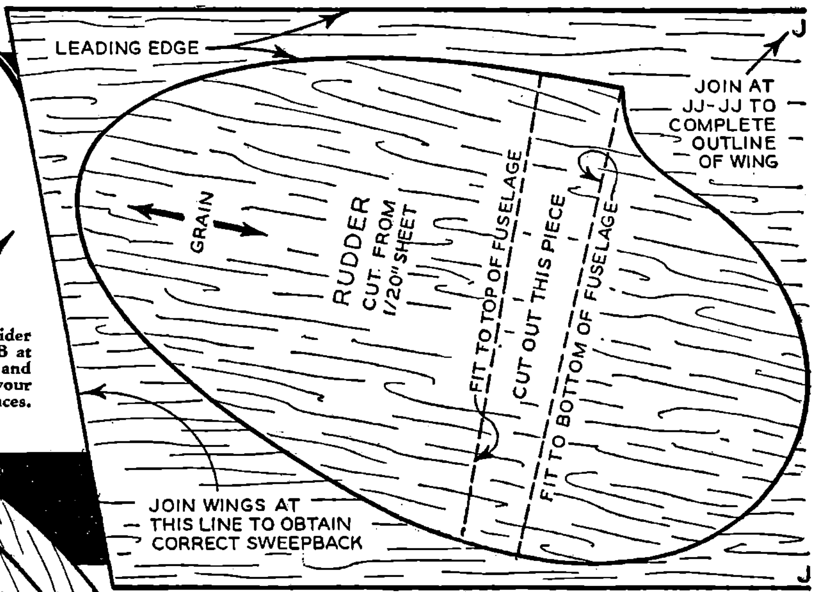


Nail-Spotter For Joints

BENT in short order from a piece of strap iron this nail-spotter will make it easy to fasten boards together without having the nails split out the sides or miss the board entirely. It saves a lot of time lost in measuring and eliminates the necessity of sanding off pencil marks or scratches. Bend the strap iron so two 8 or 10-in. arms are formed about 1½-in. apart. Make one arm about an inch longer than the other. On this arm scratch a mark squarely in line with the one below.

[*Continued on page* 132]

CLASS B FULL SCALE PATTERNS FOR WINGS AND TAIL SURFACES



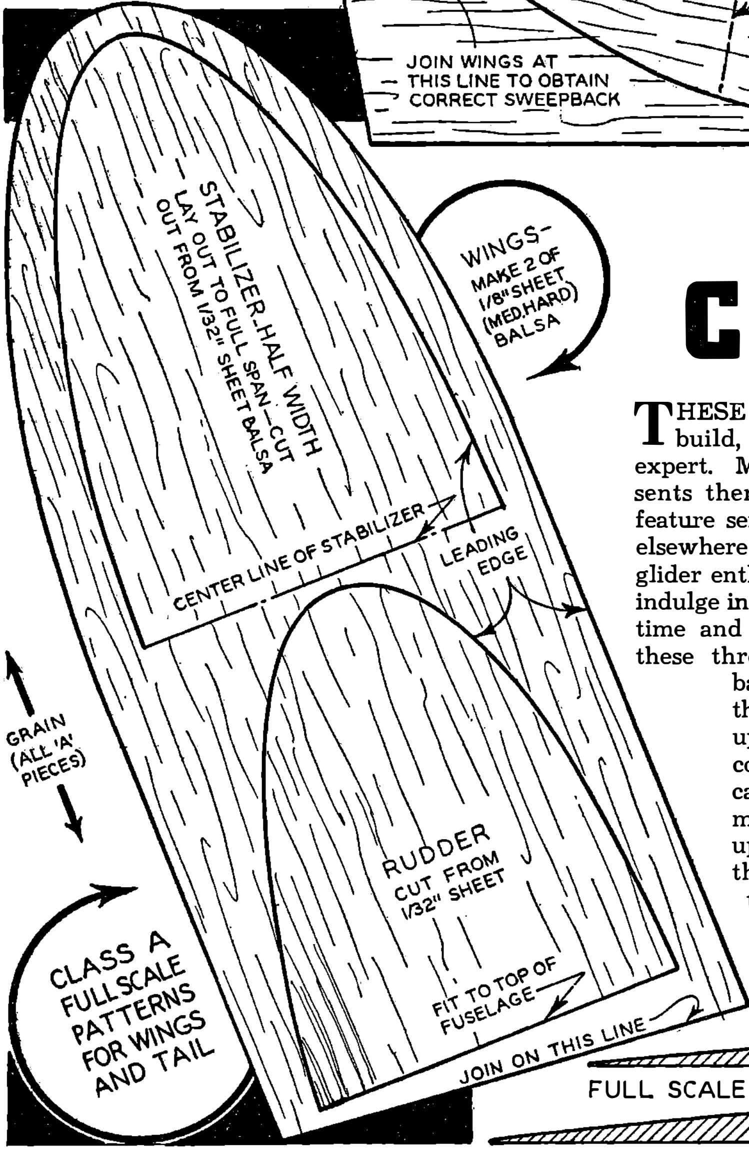
Full size patterns for class A glider are given below and for class B at right. Cut these patterns out and use them as guides in making your balsa wings and tail surfaces.

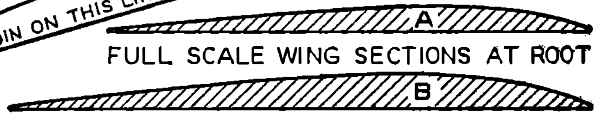
Build Contest

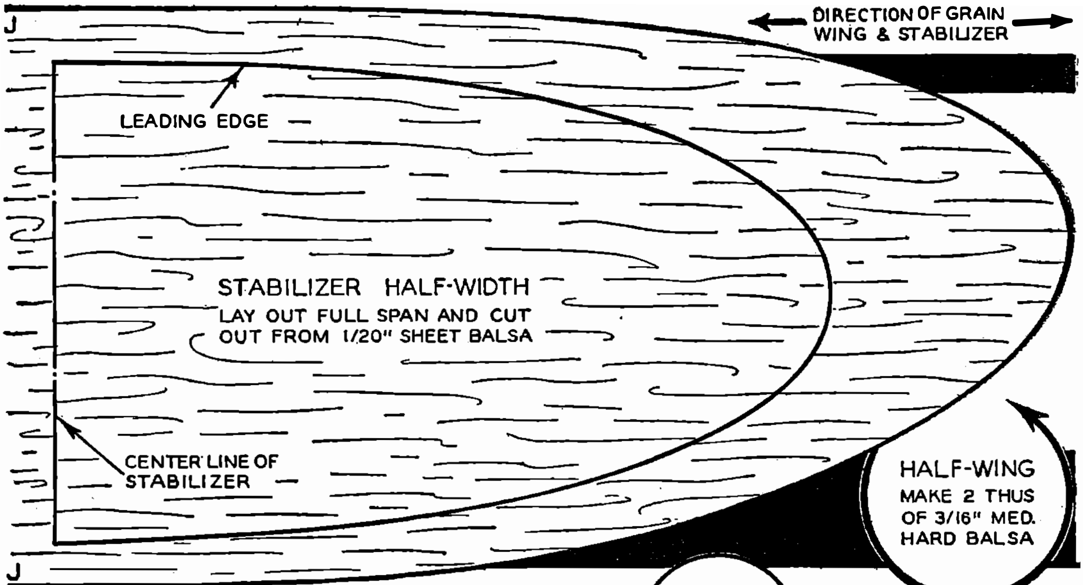
THESE gliders are very simple to build, suitable for beginner or expert. MECHANIX ILLUSTRATED presents them as a supplement to its feature serial on gliding, to be found elsewhere in this issue, for those glider enthusiasts who would like to indulge in this grand sport but whose time and pocketbooks prevent. Of these three gliders, two are solid balsa Class A and B, while the third is a Class C built-up miniature sailplane. All conform to contest specifications and will provide many a thrill as they soar upward on thermals much in the manner of their prototypes.

The larger of the first two

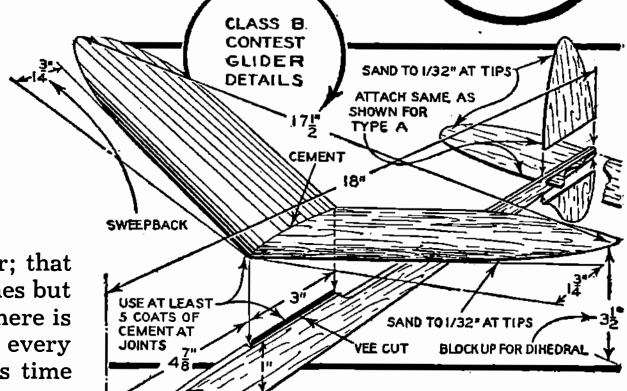
by Alan Orthof







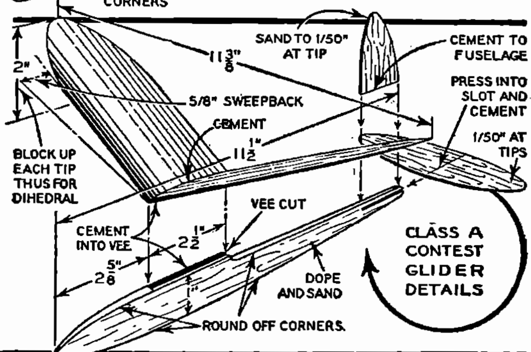
An MI Glider

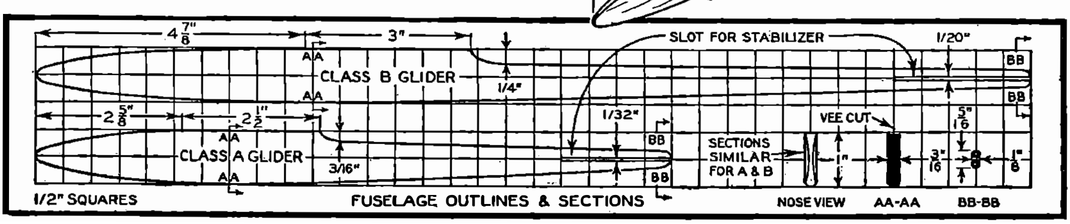


ships is a **Class B** hand launched glider; that means it must have over 30 square inches but under 100 square inches wing area. There is usually an event for this class glider in every contest, and the builder who takes his time in construction will collect dividends.

Carve fuselage from $\frac{3}{16}$x1x18-in. sheet of very hard balsa. Follow the outline carefully and shave the wood down gradually instead of trying to do it all at one time. Taper fuselage toward the tail till it is about ⅛-in. thick, then cut a slot in rear of fuselage as shown, to accommodate the stabilizer. Also taper body slightly toward the nose. Round off all corners and smooth out all knife cuts, first with rough, then fine, sandpaper. Cut a vee in top of fuselage where wing is mounted. Apply at least 3 coats of cement diluted half and half with banana oil and smooth between each coat with very fine

Assembly details for A and B gliders. At bottom are fuselage patterns (not full size).





sandpaper. A surface as smooth as glass will result.

Stabilizer and rudder are cut from 1/20-in. sheet balsa 3-in. wide. Sand carefully to about $\frac{1}{32}$-in. at the tips. Sand from the center and in one direction only or you may split the wood. Finish in same manner as fuselage. When completed mount in place on fuselage as shown.

Carve the wing from a sheet of medium hard balsa $\frac{3}{16}$x3x20-in. Cut the sheet in half making each half separately. A small carpenters plane should be used for shaping the airfoil and tapering the wing. Sand out all plane marks with fairly rough sandpaper until light can be seen through the wood at the tips and trailing edges, when holding them up to a lamp. This will be about $\frac{1}{32}$-in. thick. Now smooth out entire wing, top and bottom with fine sandpaper and finish off in same manner as fuselage and tail. Cement halves together and allow 3½-in. dihedral under each tip. When dry attach to fuselage. At least five coats of cement are required at all joints for sufficient strength as a terrific strain is generated at all points upon launching.

We now come to the small **Class A** glider, having less than 30 square inches wing area. Not many contests are held for this size ship but the many hours of enjoyment obtained from flying makes up for the work involved.

Construction is the same as that of the larger model except of course for the wood sizes. The wing is carved from a sheet of fairly soft balsa ⅛x2½x12-in. Dihedral is 2-in. under each tip. Carve fuselage from hard balsa block 1x$\frac{3}{16}$x11½-in. Rudder and stabilizer are from $\frac{1}{32}$-in. sheet. Assemble and finish in same manner as the **Class B**.

There are many methods of launching these gliders, but the builder must find the one that is easiest for him.

After proper balance is obtained by a few trial flights proceed in the following manner.

Grasp the glider with the thumb and index finger under the wing and launch as you would a baseball, either over hand or side arm. However the side arm might prove easier. If model should spin to the right warp rudder to the left, or vice versa. The model should be adjusted so that a slow right turn is obtained. If model stalls add weight to the nose, if it dives remove some. Be certain that any tendency to dive is not caused by negative incidence in the wing.

Class "C" Soaring Glider

Many hours of enjoyment, both in building and flying may be had with this model sailplane. Being of the **Class "C"** type, that is, over 100 square inches but under 150 square inches in wing area, this ship is ideal for contest work. Its long steady flights and high ratio glides are sure to make the builder proud of his work.

The construction has been simplified in every way possible, without sacrificing strength and beauty.

Materials you will need are:

1 sheet of ½x3x18-in. soft balsa.
2 sheets $\frac{1}{16}$x2x18-in. soft balsa.
4 sheets 1/32x2x18-in. soft balsa
1 sheet of 3/32x3x6-in. medium hard balsa
5 strips $\frac{1}{16}$x¼x36-in. medium hard balsa
1 strip of 5/32x$\frac{3}{16}$x18-in. medium hard balsa.
1 strip of ⅜x⅛x36-in. medium hard balsa
1 strip of 3/32x¼x36-in.
2 strips reed or bamboo.
2 oz. cement.
4 oz. banana oil.
1 sheet of tissue.
6 inches of .040 wire.

Fuselage is carved from a solid block of soft balsa ½x3x18-in. This must be done with great care and time should be taken to do it evenly. Shape the fuselage to the cross section shown with a sharp knife. Smooth out all rough spots, first with rough sandpaper then with fine. The nose of the ship is hollowed out as shown on plan. This is done so that weight may be added for balance. After fuselage is thus-far completed, cut a ⅛-in. slot in rear of fuselage for stabilizer. Apply at least 4 coats of cement diluted half and half with banana oil to the entire body. Sand smooth between each coat with very fine sandpaper. A glass like surface will result.

Rudder is cut from $\frac{3}{32}$-in. sheet balsa and to the airfoil shown. It is finished in the same manner as the fuselage and is not mounted until after the stabilizer has been cemented in place.

We now come to the most difficult part of the glider, the wing. Cut ribs from fairly soft $\frac{1}{16}$-in. sheet balsa. Two of each are required and care should be taken to keep all the notches even. Now shape the trailing edge and cut small slots where shown for the ribs. Pin the lower spar and trailing edge down on the plan, being careful not to split the wood. Cement ribs in their proper places and attach leading edge. Wing tips bamboo or reed, bent to shape over a gas flame. Cement them firmly in place. Allow at least one hour for drying. Remove framework from plan and crack the spars slightly at the center, placing 3-in. dihedral under each tip.

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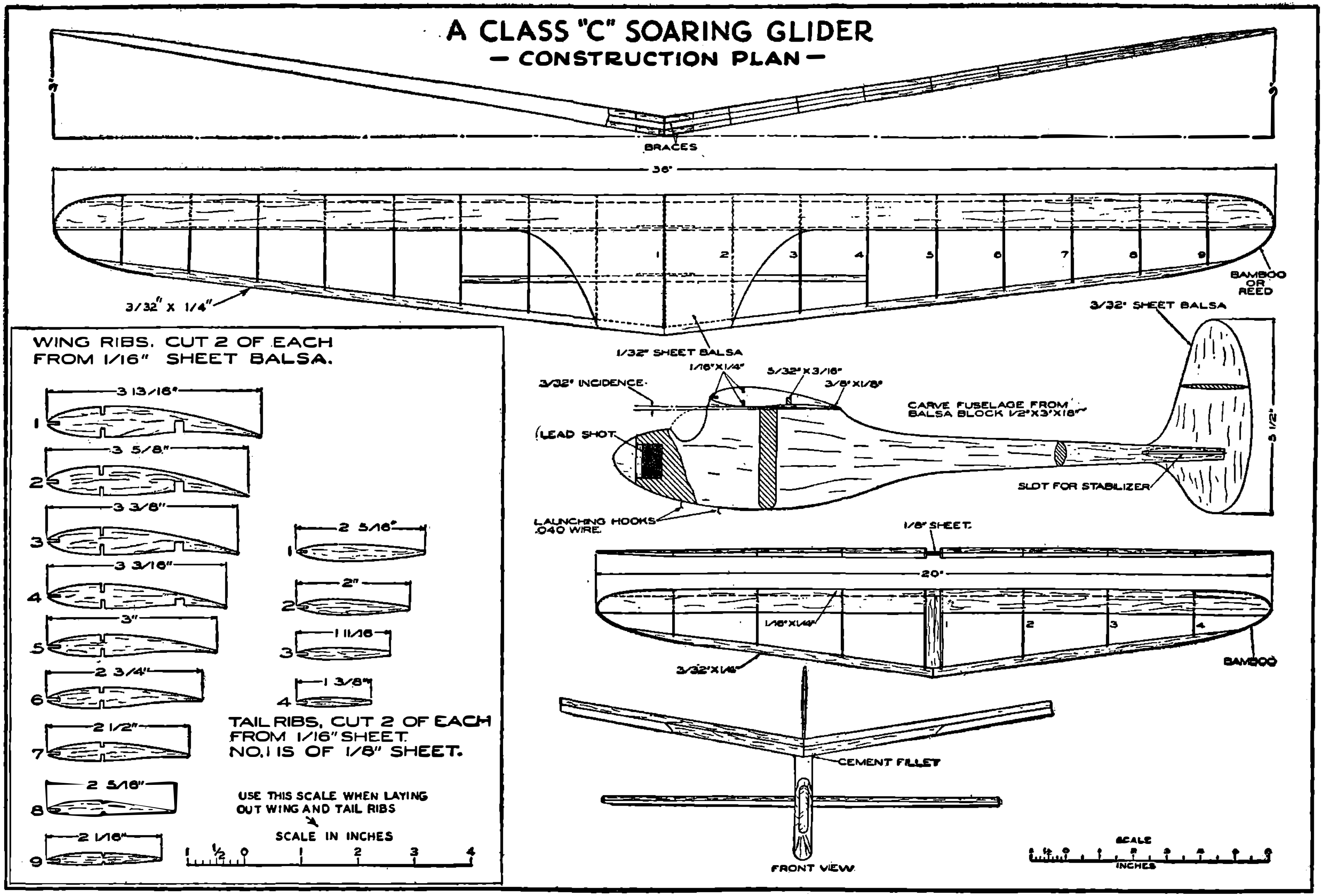
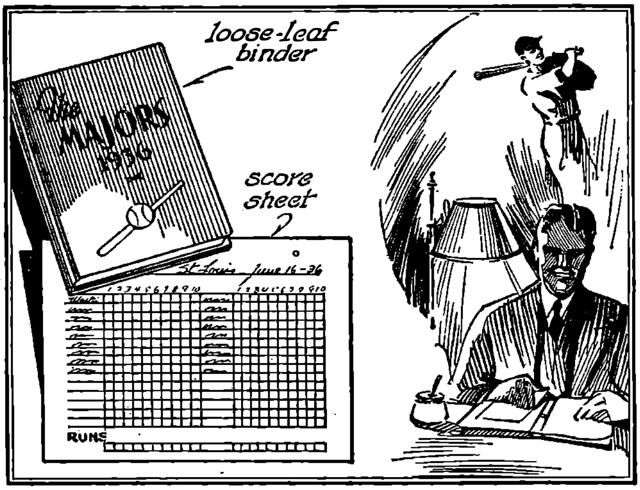


A CLASS "C" SOARING GLIDER
— CONSTRUCTION PLAN —
3"
3"
BRACES
36"
1
2
3
4
5
6
7
8
9
BAMBOO OR REED
3/32" X 1/4"
1/32" SHEET BALSA
WING RIBS. CUT 2 OF EACH FROM 1/16" SHEET BALSA.
3 13/16"
1
3 5/8"
2
3 3/8"
3
3 3/16"
4
3"
5
2 3/4"
6
2 1/2"
7
2 5/16"
8
2 1/16"
9
2 5/16"
1
2"
2
1 11/16
3
1 3/8"
4
TAIL RIBS. CUT 2 OF EACH FROM 1/16" SHEET. NO. 1 IS OF 1/8" SHEET.
USE THIS SCALE WHEN LAYING OUT WING AND TAIL RIBS
SCALE IN INCHES
1
1/2
0
1
2
3
4
3/32" SHEET BALSA
3/32" INCIDENCE
1/16"X1/4"
5/32"X3/16"
3/8"X1/8"
CARVE FUSELAGE FROM BALSA BLOCK 1/2"X3"X18"
LEAD SHOT
3 1/2"
SLOT FOR STABILIZER
LAUNCHING HOOKS .040 WIRE
1/8" SHEET
20"
1/16"X1/4"
1
2
3
4
3/32"X1/4"
BAMBOO
CEMENT FILLET
FRONT VIEW
SCALE
INCHES

Baseball Record Book

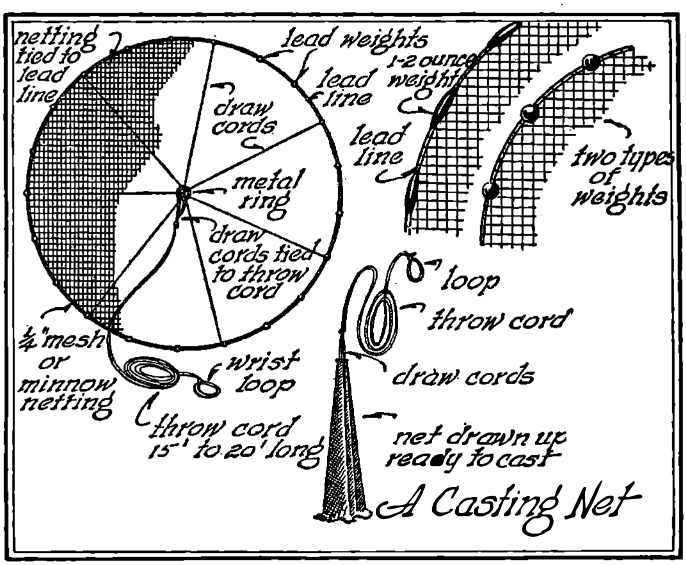


IF YOU are a baseball fan, you will enjoy keeping a record book of the season's totals. Perhaps you can hear an occasional broadcast, and keep a score-sheet of each game that you hear. Box scores and totals appear in the daily newspapers, and you can fill in one section of your book with batting line-ups and box scores, cut from the paper and pasted in your record book. If you are favoring some particular team you will want to keep as complete a record of the team as possible. As the season advances, you can check back on pitchers, batting averages, and so on, and have a fund of information to supplement each game that you listen to.

A loose-leaf binder, with a hundred or so ruled sheets, makes a good record book. Use stiff sheets or blank pages for divisions. The ruled sheets can be penciled off into score-sheets, with space left for names of players and boxes for 10 or 11 innings, in case of extra inning games. A row of boxes below the score-sheet will show the runs per inning. Date the score-sheets, and score simply with a numeral 1 for hits, or zero for outs, with a 1 for each run scored in front of the player's name. A

[*Continued on page* 142]

A Casting Net

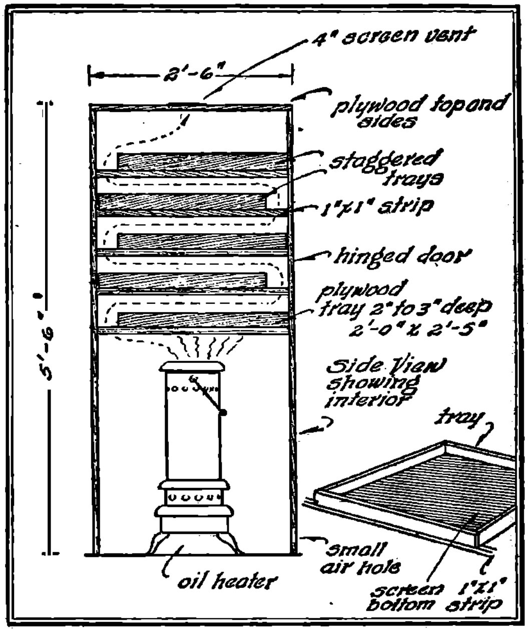


A HAND-WOVEN casting net costing from $8 to $12 is too big an investment for the average angler. Make your own net from minnow netting or, if you use the net for mullet, shrimp or salt water bait, use a quarter-inch mesh. You will need enough netting to make a circular net from 6 to 8 feet in diameter. Two sections of three-foot minnow seine can be tied together to give you the area for the circular net. Find the exact center of the round net, and cut a small opening there, tying the severed strands of netting to a brass or iron ring 1½-in. in diameter. Reinforce the netting around the ring with stout cord, woven through and tied to netting strands and wound over and over the ring. At the outer edge of the net tie the free ends of the netting to stout cord for the lead line. Slip round sinkers over the lead line before tying it to the edge of the net, spacing the weights about 6-in. apart for minnow netting, or a little closer if a heavier net is used. 1 oz. weights will do for minnow netting, but you should use larger weights for an 8-foot net. Use long slotted weights if you cannot get the round ones. At equidistant places around the lead line fasten seven stout draw cords, running them through the metal ring and tying them to one end of the heavier throw cord. When the net is drawn up, with the draw cords under it, the collected cords

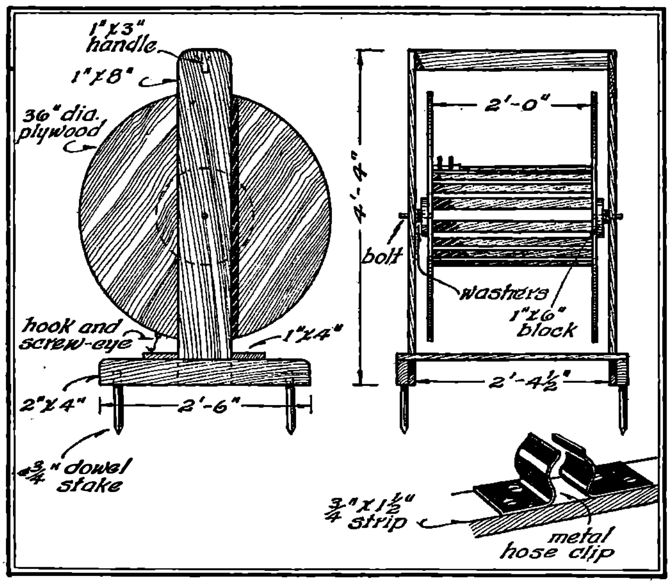
[*Continued on page* 142]

A FRUIT DRIER

DRY your surplus fruit in this simple fruit drier. The four sides and top are panels of plywood or panels of matched boards fitted together and secured with cleats at top and bottom. Made in panels this way the drier can be knocked down and stored when not in use. The cabinet is 2½ feet square, about 5½ feet high, with the front panel hinged at one corner so that the trays and heater can be reached easily. Use a common oil heater, placing the strips supporting the bottom tray a few inches above the stove top. Fasten the one-by-one strips to the inside surface of opposite panels so that the trays can be slipped easily in place. Each tray is made from thin pine boards or strips of plywood from 2 to 3-in. wide, the finished tray being about 2 feet 5-in. long and 2 feet wide. The bottom of the tray frames are covered with wire screen, on which the sectioned or prepared fruit is placed to dry. Stagger the trays as shown in the cross section so that a current of heat will wind among the trays and flow slowly out of the screen vent in the top panel.



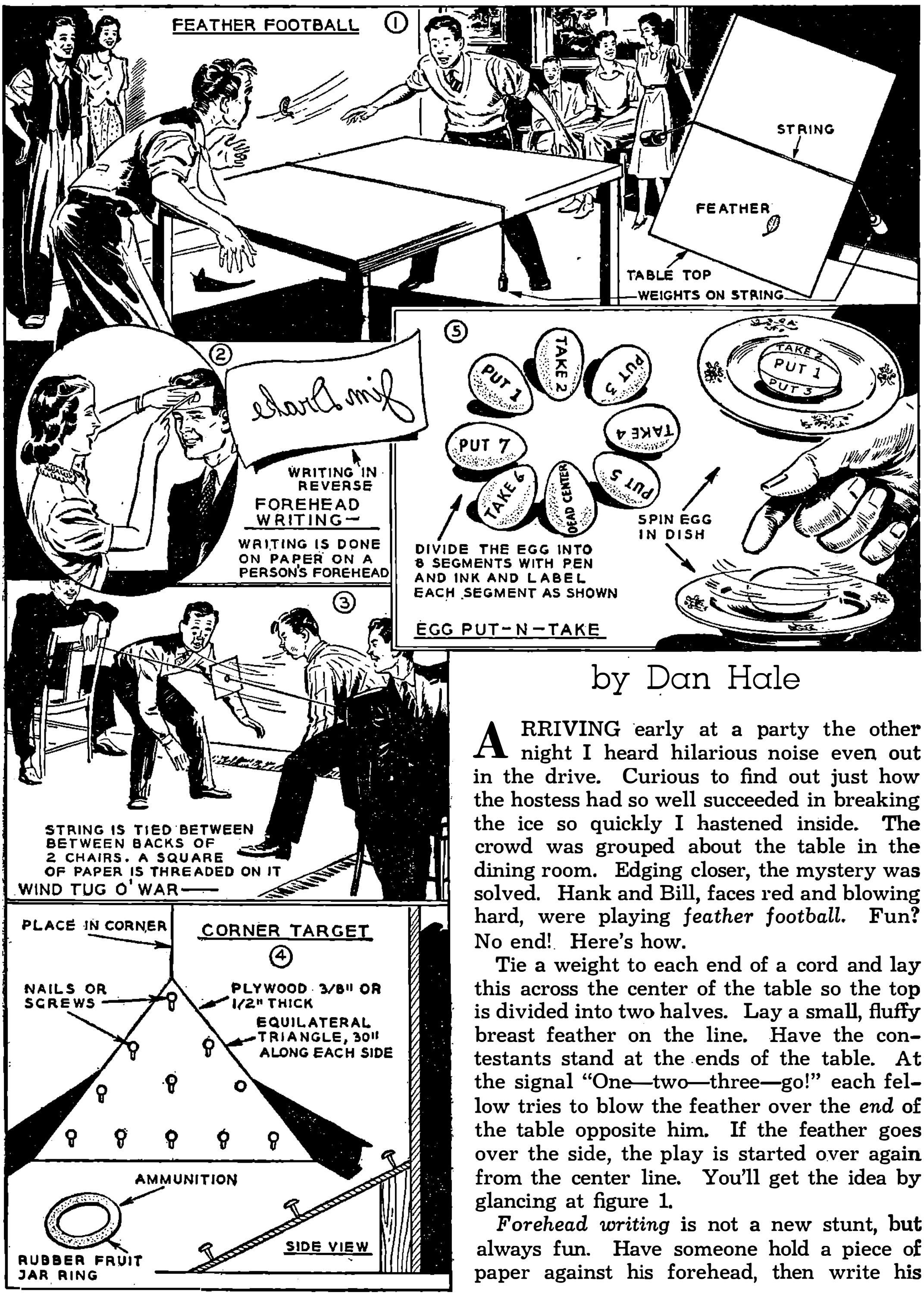
A small opening should be cut in the lower part of the door for fresh air.



Handy Garden Hose Reel

THIS reel will make it easy for you to use extra long garden hose for large yards and gardens. The sides are one-by-eight pine boards 4 feet 4-in. long, the lower ends being attached with screws to 2 by 4 bases, each 2 feet 6-in. long. 1x4-in. boards are nailed across the bases on each side of the uprights to brace them. The space between uprights is 2 feet 4½-in. Use 3-ply plywood for the two sides of the drum, sawing them out 36-in. in diameter. The inside drum consists of ¾ by 1½-in. slats 2 feet long, attached with screws to the plywood wheels, forming a drum about 14-in. in diameter at the ends. Attach blocks on the outside of the plywood sides as shown, and bore holes through blocks and wheels, driving bolts tightly in place. Bore holes in the uprights to take the greased bolts, permitting the drum to turn easily. A 1x3-in. board is fastened between the upper ends of the uprights to form a handle and to brace the frame. A handy clip for holding the end of the garden hose can be bent from strips of brass or galvanized iron as shown, the clips being attached with screws to one of the drum slats. Bore holes in the underside of the 2x4-in. bases for four ¾-in. dowel stakes. Attach a hook to the edge of plywood wheel on one side, and a screweye in a 1x4-in. brace, so that the drum can be hooked when not in use.

GAMES AND PARTY



by Dan Hale

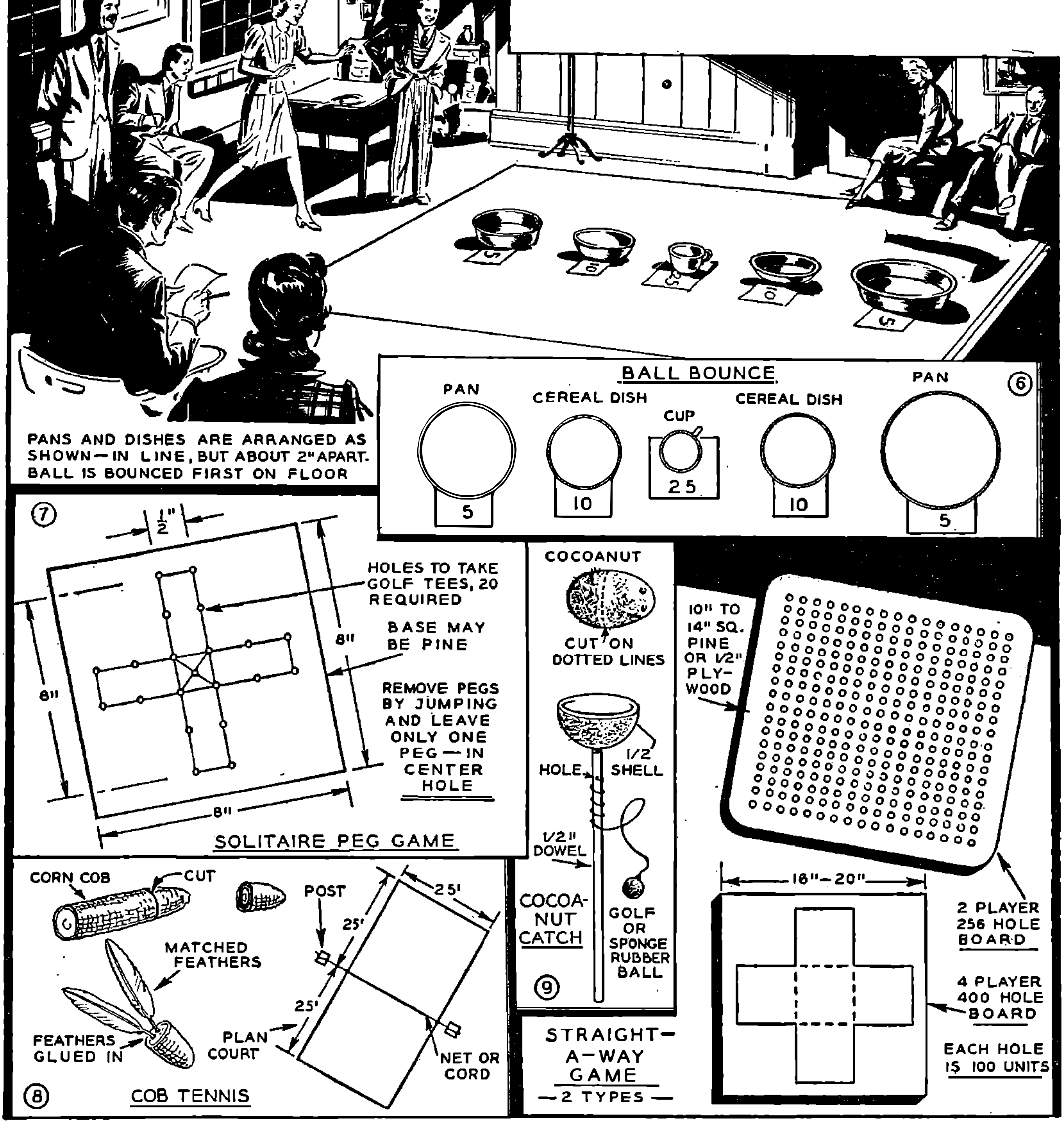
ARRIVING early at a party the other night I heard hilarious noise even out in the drive. Curious to find out just how the hostess had so well succeeded in breaking the ice so quickly I hastened inside. The crowd was grouped about the table in the dining room. Edging closer, the mystery was solved. Hank and Bill, faces red and blowing hard, were playing *feather football.* Fun? No end! Here's how.

Tie a weight to each end of a cord and lay this across the center of the table so the top is divided into two halves. Lay a small, fluffy breast feather on the line. Have the contestants stand at the ends of the table. At the signal "One—two—three—go!" each fellow tries to blow the feather over the *end* of the table opposite him. If the feather goes over the side, the play is started over again from the center line. You'll get the idea by glancing at figure 1.

Forehead writing is not a new stunt, but always fun. Have someone hold a piece of paper against his forehead, then write his

STUNTS

More ice breakers, brain exercisers and general fun promoters for young and old. . . .



name, or some short sentence upon it. This done, you can't make out the crazy lines until you take it to a mirror and read it in the glass. The writing is reversed! (Fig. 2.)

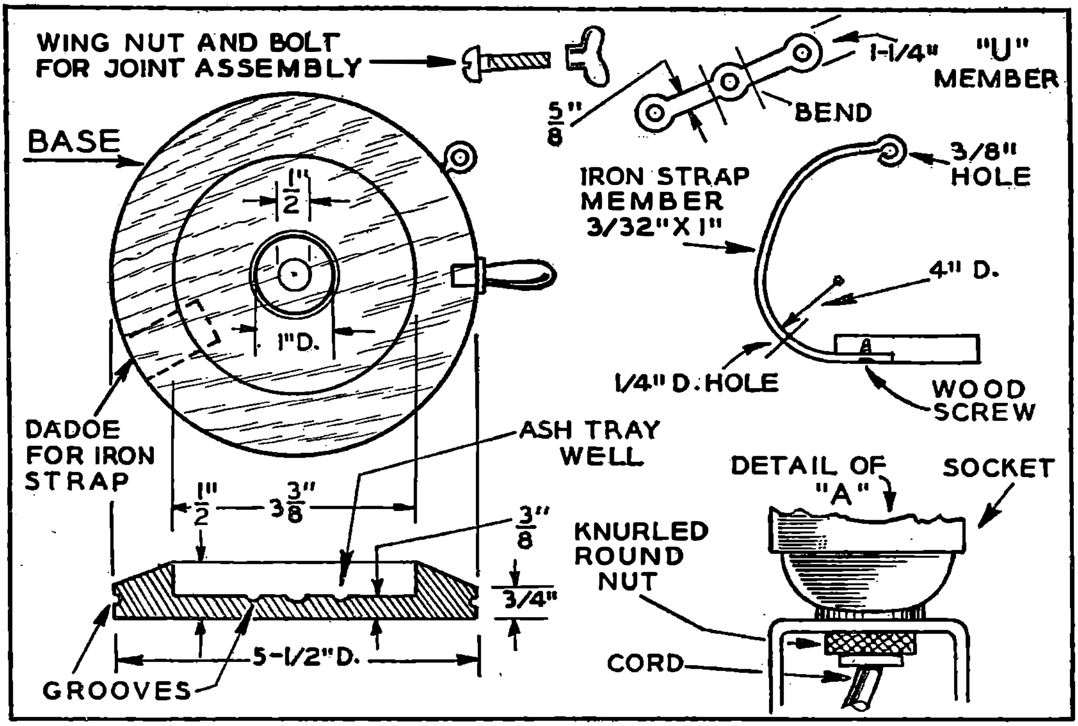
Wind Tug O' War, the layout for which is shown in figure 3, calls for little equipment and strong lungs on the part of the contestants. Tie a string between the backs of two chairs with a 3-in. square of paper threaded upon it. Two players endeavor to blow this paper to one of the chairs from the center. It will probably be necessary for each chair to be occupied.

Corner Target calls for an equilateral triangle of plywood 1-in. or ¾-in. thick about 30-in. on a side. Screws or nails with large heads are turned into this at suitable places and each given a value. The center pegs should be worth the most, the value diminishing towards the edges and bottom. Fruit jar rings are then tossed at this from a discreet

[*Continued on page* 142]

Marine Pin-Up Lamp
A ONE EVENING PROJECT

by Bruce MacIntosh



Dimensions and assembly details of this two-purpose lamp are shown above. Pictures of the finished lamp, showing both table use and wall mounting will be found on page 81.

WHETHER your fancy runs to a table lamp or one for the wall, you will find both in this marine motif design, plus an ash tray convenience, for good measure. Now what more could one ask of a lamp? Modeled around the popular ship's wheel idea, and bearing a shade of nautical decoration, it brings back pleasant memories of summer boating parties.

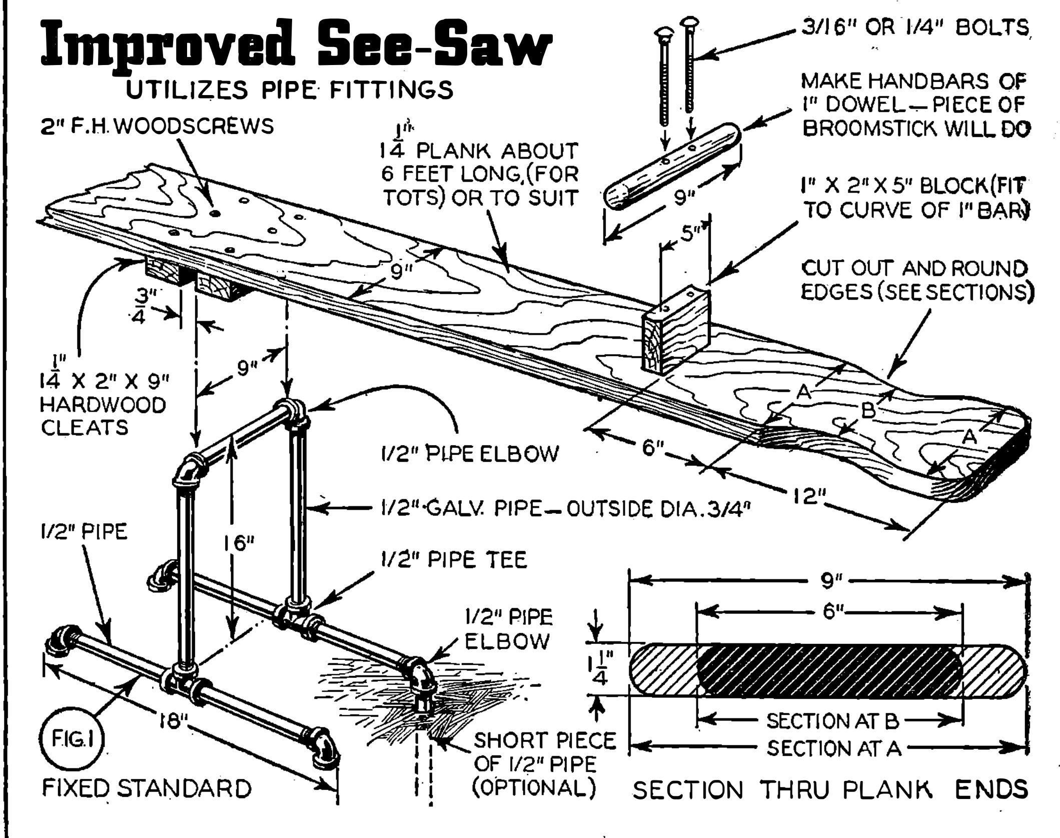
These combined features, however, by no means make for difficult construction; on the contrary, it may well be a one evening project. The metal parts are shaped first, starting with the iron strap member. (This may be of copper, brass or other decorative metal, finished with hammer marks.) A commercial metal bending jig is very handy, but a vise with two sturdy metal pins can be used as in the sketch. $\frac{3}{32}$x1x12-in. is the size of the strap which is formed in graceful curves to the shape given. Tooling blemishes are kept to a minimum for a good finished surface. Two holes are drilled in this strap, one ¼-in. dia., for the lamp cord, and another $\frac{3}{16}$-in. dia., countersunk for a flat head screw to go into the base; both drilled where indicated. The joint, or U member is cut from $\frac{1}{16}$-in. sheet iron stock with a metal cutting coping or power jigsaw blade, or cut to shape with cold chisels and filed. Holes in this piece are each ⅜-in. dia. and drilled before cutting from the stock sheet, as it is easier to hold. Bend the U piece to shape and fit it to the strap piece with a small square shank carriage bolt and wing nut. In the detail drawing will be seen the nut and nipple which secure the socket to the U piece and are supplied by any dealer in house-wiring fixtures. The metal pieces are assembled and given a uniform coat of bronze paint to carry out the tone of the colonial maple base during the making of which the paint will be drying.

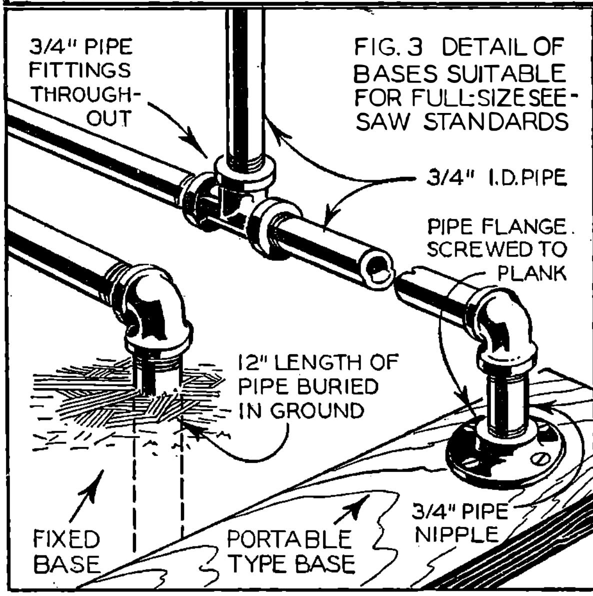
A lathe faceplate is used in the base turning, employing a piece cut roughly round by the jigsaw to a diameter of 5¾-in., and having a thickness of 1-in., preferably maple or birch. A glass ash tray standard with 5 & 10s is used, and needs a well 3⅜-in. dia. by ½-in.

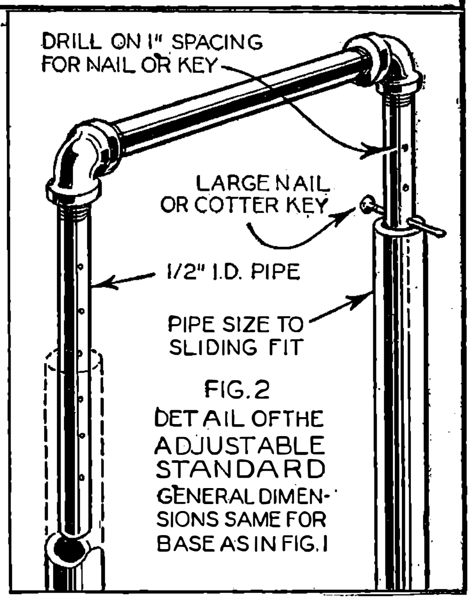
[*Continued on page* 145]

Improved See-Saw

UTILIZES PIPE FITTINGS

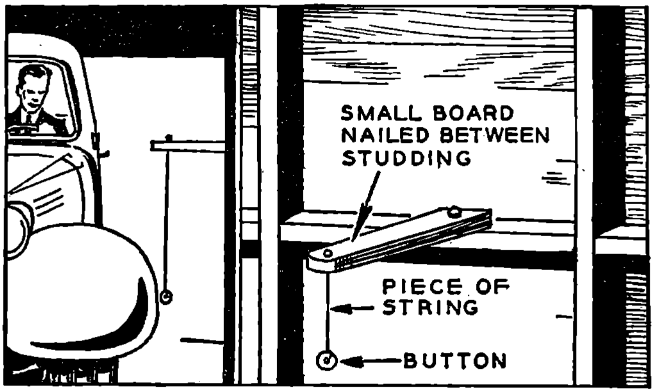






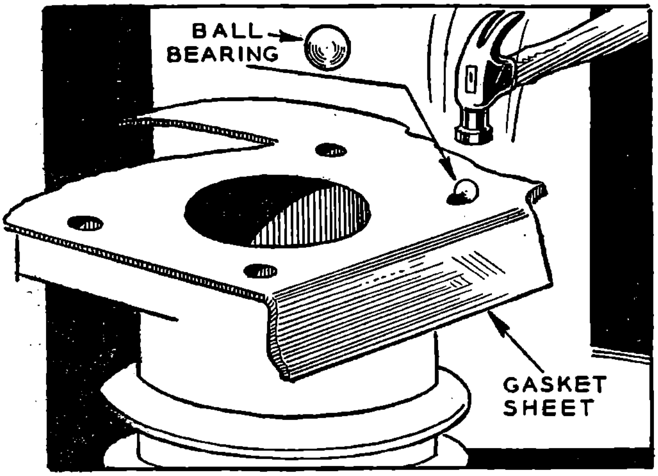
THIS see-saw is an improvement over the conventional type in that the seats or ends of the planks are cut for comfort and all edges and corners are rounded. There is also a hand grip for each "passenger," and the standard is simply made of pipe and fittings. The original was built from scrap material, which cost nothing, except for the paint.—*H.S.*

AUTO SHORT CUTS



Direction Gauge

IT IS rather a ticklish job to drive a car into a narrow garage day in and day out without occasionally bumping a fender. However, the drawing at left shows how a very reliable direction gauge can be easily made to eliminate all possibility of ramming the fenders into the side of the garage wall studding.—*Ivan Stretten.*

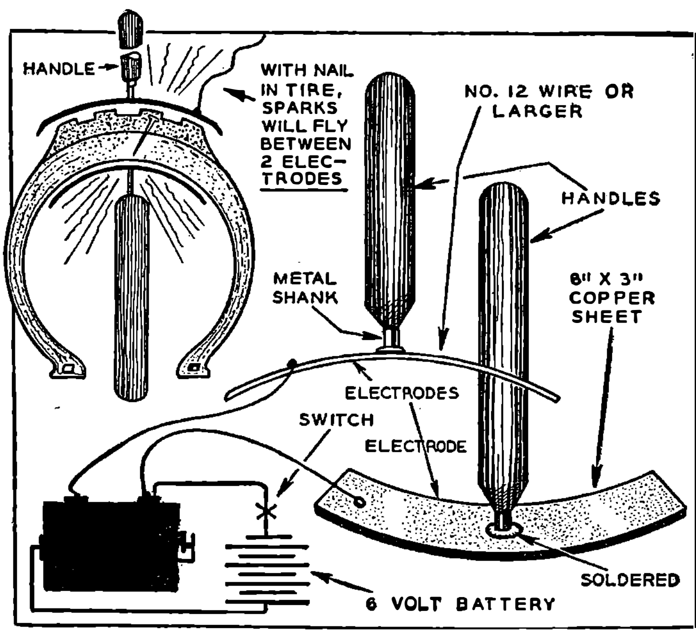


Cutting Gasket Holes

WHEN a ball-pean hammer is not available for cutting the round holding-down stud holes in a cylinder gasket, the job can be satisfactorily done by simply using a suitably sized ball bearing and tapping it with an ordinary hammer. Lay the gasket sheet on top of the cylinder base with ball bearing over the stud hole, then hit it with the hammer, as shown in sketch.—*I. J. S.*

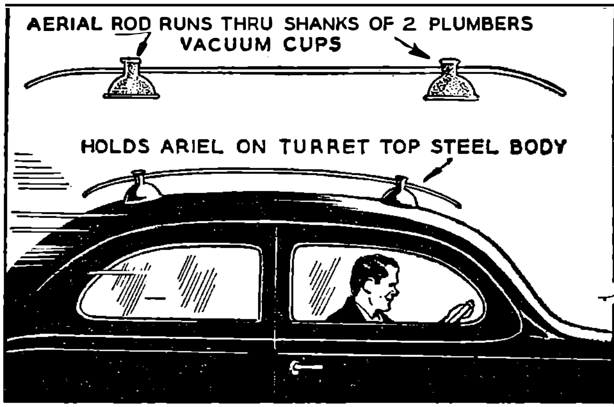
Spark Coil Locates Metal In Tires

THE closest visual examination of a tire may fail to reveal short nails that are imbedded in the rubber. A spark coil can be used to find the exact location of puncture producing objects in casings. The outfit consists of two curved copper electrodes mounted on long wooden handles. To use, connect the secondary terminals of the coil to the lead wires. Place one electrode inside the tire and run the other over outside. Rubber, if unbroken will prevent a spark from jumping the gap. At a point in the tire having an imbedded metallic particle a spark will jump from one or both terminals.—*W. C. W.*



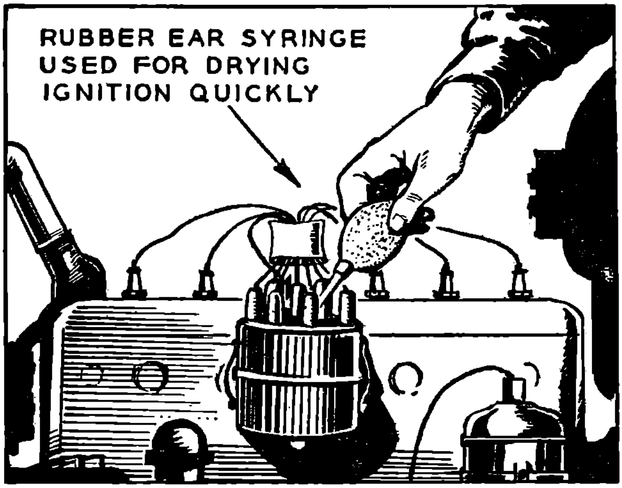
Plumber's Cups Hold Auto Antenna

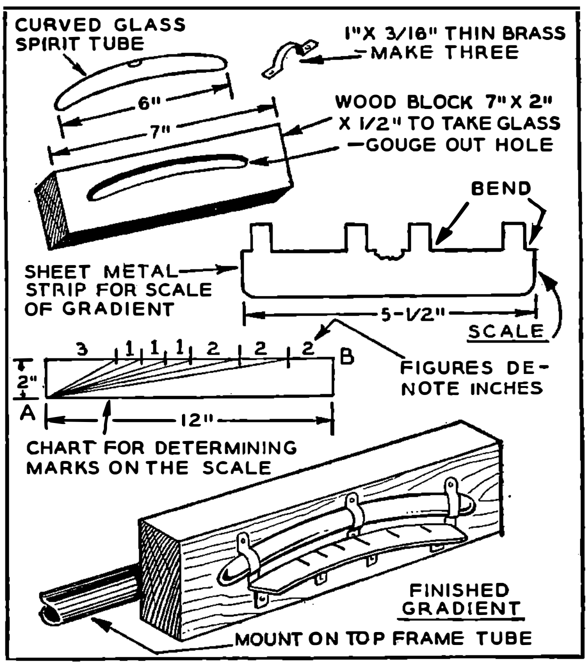
WHEN a roof aerial is used on a steel top automobile, it can be held in place without resort to drilling or welding by means of ordinary plumber's suction cups. Remove the handles and drill holes horizontally through the rubber necks of the cups. Slide the aerial rod through the holes and press the cups down tightly on top of the car. They will hold very well if pushed down once or twice a week.—*A. H. Waychoff.*



Syringe Dries Ignition

MOTORISTS are liable at any time to get their car ignition systems wet, causing stalling or other difficulty, and will be well repaid for the trouble of carrying a small ear syringe in their tool kits. The syringe is first used to suck up all excess water around the distributor and spark plugs, then as a blower to dry the dampness after the water has been removed.—*A. H. W.*





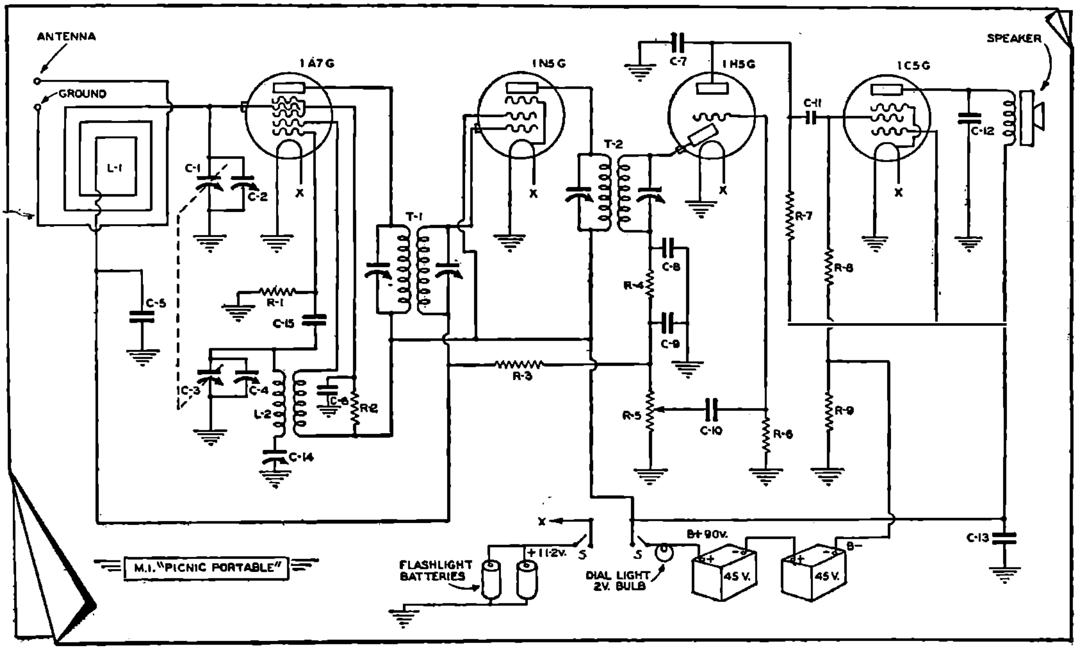
How To Make A Gradient Meter

SO MANY motorists and motorcyclists are interested in the steepness of hills which they climb, and there is usually so much discussion as to the actual gradient, that many have gone to quite some expense to fit their machines with instruments which are capable of registering this data. Most people cannot afford such elaborate equipment, but if they adhere to the following instructions they will be able to make a simple gradient meter of the bubble type, which, although not absolutely steady when the vehicle is in motion, gives fairly accurate results if a stop is made, preferably while descending the hill which it is wished to grade.

First obtain a curved glass spirit-tube with a small bubble, and approximately 6-in. in length. This can be

[*Continued on page* 143]

The MI "Picnic Portable"



In this schematic diagram of the "Picnic Portable," the two small switches marked "S" are actually one double-pole, single-throw unit mounted on the back of the volume control R5.

by Stanley Johnson, W9LBV

FOR those late summer picnics, tuck the MI "Picnic Portable" in the car along with the picnic basket and when you spread out the lunch you can have music regardless of how far you are from the power lines. This compact superheterodyne, which with batteries and loop antenna fits in a fifty-cent overnight bag, is sensitive enough to pull in all of the "good stations" in your locality without an outside antenna or ground. The set is ideal, too, for use this fall at football games to enable you to hear the broadcast while watching the game.

The receiver uses four of the new 1.4 volt low drain tubes in a standard superhet circuit. It operates on two "portable" type "B" batteries and two flashlight batteries. The circuit is arranged so that no "C" batteries are necessary.

The exact dimensions of the chassis used with the set will depend upon the size of the case in which it is installed. The chassis for the set shown measures 2x4¼x6 inches and is made from heavy galvanized iron.

In mounting the parts, follow the photographs as closely as possible. The 1A7G mixer-oscillator tube is on the left side of the chassis approximately half-way between the front and rear. Behind it is the iron core I.F. transformer. Between this transformer and the next transformer is the 1N5G I.F. amplifier. The 1H5G diode detector and first audio is in the rear corner of the chassis. The 1C5G pentode, the only tube without a grid cap, completes the set.

The parts used in the set are all standard with the exception of the 820 ohm bias resistor (R9) for the 1C5G pentode. This resistor is made by filing a nick in a standard 800 ohm resistor and testing the resistor on an ohmmeter. It is probable that a standard 850 ohm resistor would work as well.

In buying the oscillator coil, be certain to obtain a padding condenser (C14) of proper value to go with it; different oscillator coils require different size padding condensers. The I.F. transformers are the iron core type to insure maximum gain.

Wiring the set will require some care unless you are used to wiring multi-tube circuits. Be especially careful in making connections to the tube sockets. You can find information on socket connections in any recent issue of a tube manual. One useful device for cutting down the possibility of wiring errors is to make a *correct* copy of the circuit diagram on a piece of paper. This will give you some preliminary idea of the circuit. Then, as you make connections with hook-up wire, go over the diagram with a colored pencil, marking over each lead as it is wired. If this is done, the chance of forgetting to make connections is materially reduced. "Grounds" may be made by soldering to the chassis wherever convenient—one advantage of a galvanized iron chassis.

Flat rubber covered electric light cord serves for the power and loudspeaker leads. The cables run to the dual switch on the volume control—in this circuit it is necessary to break both the "B" and the "A" voltage.

The loop antenna takes the place of the usual antenna coil in the grid circuit of the mixer. The loop consists of 17 turns of number 26 D.C.C. wire wound on a light wood frame. The frame, which fits the lid of the box, is 8¼x11¼ inches. The loop is taped to the frame and may be further strengthened by doping it with china cement.

It is a good idea to make the preliminary tests of the set before installing it in the case. First of all, plug in the tubes and connect the "A" battery (which may be a No. 4 dry cell or two flashlight batteries connected in parallel). Then, see if the tubes are lighting properly. The tubes glow very weakly; you may have to pull down the shades to see if they are on.

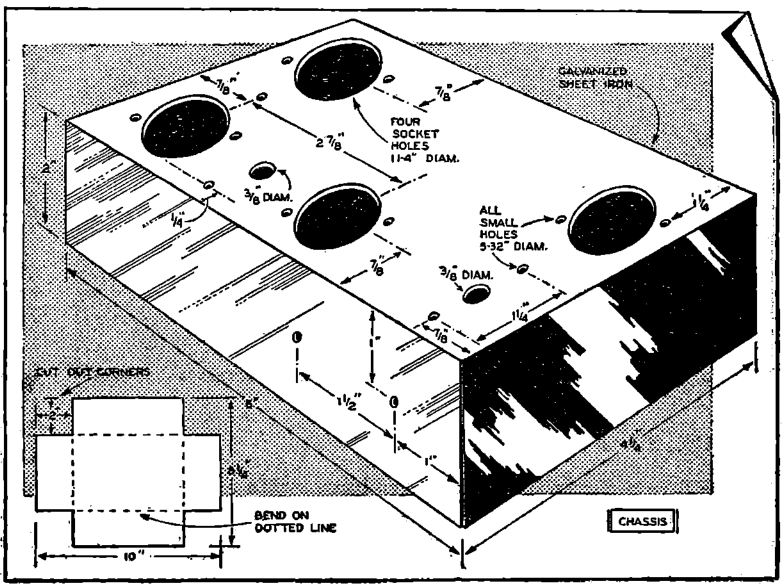
If the tubes are burning as they should, connect the "B" batteries. The "B plus" lead should be fused with a small bulb, preferably a 2 volt, 60 mil dial light bulb. The twenty-cent bulb may save four dollars worth of tubes if there is some mistake made in the

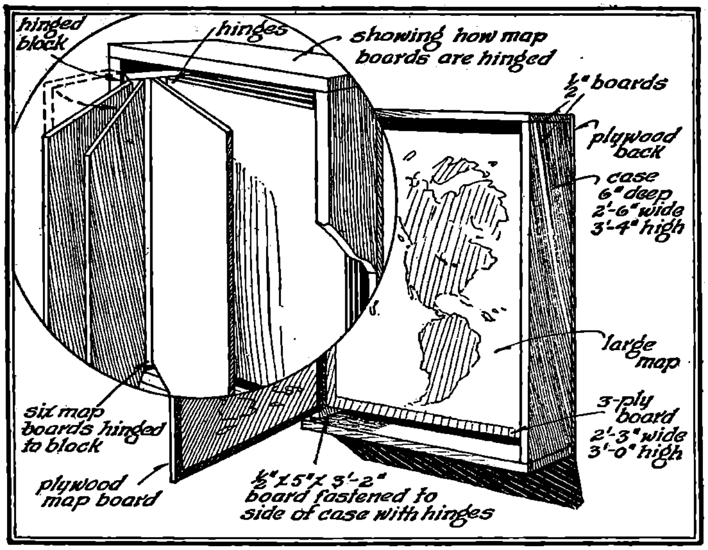
[*Continued on page* 144]

Parts List

C-1, C-3 370 mmf. two-gang variable condenser (ICA)
C-2, C-4 3-30 mmf. trimmer condensers, preferably on condenser gang.
C-5 .1 mf. paper condenser, 200 volt (Solar)
C-6 .01 mf. paper condenser, 200 volt (Solar)
C-7, C-8, C-9 .0001 mf. mica condenser, (100 mmf.)
C-10 .01 mf. paper condenser, 200 volt (Trutest)
C-11, .01 mf. paper condenser, 200 volt
C-12 .004 mf. mixed condenser, 400 volt (mica or paper) (Aerovox)
C-13 12 mf. 200 volt electrolytic condenser (Solar)
C-14 padder condenser (see text)
C-15 .0001 mf. mica fixed condenser (100 mmf.)
R-1 250,000 ohm ½ watt fixed resistor (Trutest)
R-2 70,000 ohm ½ watt fixed resistor (Trutest)
R-3 2 meg. ½ watt fixed resistor
R-4 100,000 ohm ½ watt fixed resistor
R-5 0-500,000 ohm volume control with two-pole-single-throw switch (Trutest)
R-6 5 meg. ½ watt resistor
R-7 1 meg. ½ watt resistor
R-8 2 meg. ½ watt resistor
R-9 820 ohm 1 watt (see text) (Knight)
L-1 loop (see text)
L-2 Pentagrid oscillator coil, unshielded, 456 kc. (Knight)
T-1 456 iron core I. F. transformer, input type (Meissner Ferrocart)
T-2 456 iron core I. F. transformer, output type (Meissner Ferrocart)
Speaker 3 inch magnetic loudspeaker
4 water type octal sockets
2 45 volt "B" batteries (Eveready 738)
1 shielded grid lead (For 1H5G)
2 flashlight batteries (or 4)
1 knob
1 pointer knob with scale
1 chassis (see text and drawings)
Misc. wire, solder, machine screws, etc.
1 overnight bag. Inside dimensions (closed) 4⅜ by 8⅛ by 11⅛ inches
1 2 volt dial light (60 mil.)
Antenna coil not shown in photos; was added later. See text for details.

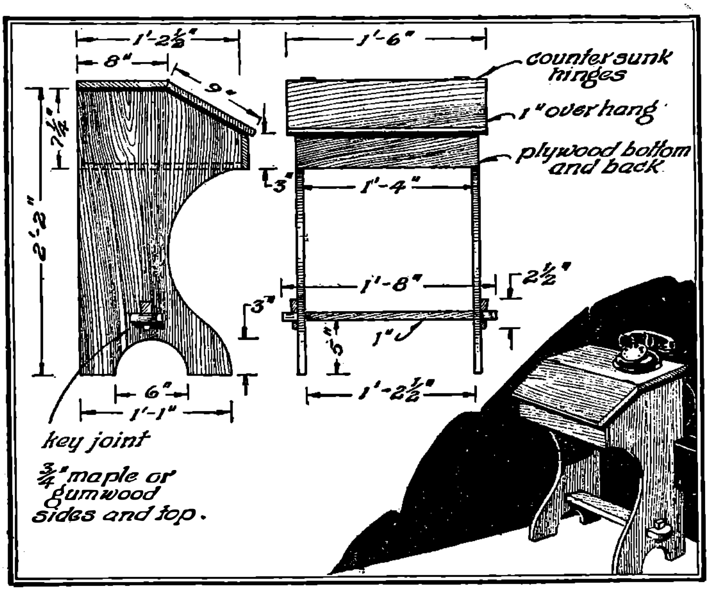
Right: This drawing shows the approximate locations of the holes in the chassis of the "Picnic Portable." Exact positions are not given because these will vary a little according to the makes of parts that are used. With all the parts on hand, it is a simple matter to lay them out so as to allow "breathing" space between them. The inside corners of the chassis should be braced with small L-shaped brackets, riveted or screwed in place. If a heavy soldering iron is available, run a bead of solder in each corner; tip the chassis at an angle so that the solder runs into the joint and fills it.





Swinging Map Case Set

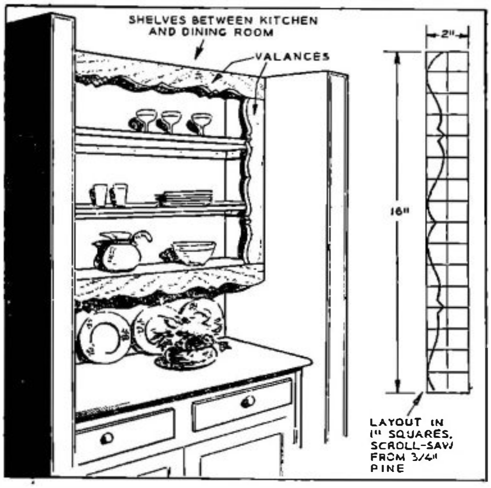
IF YOU like to do your traveling and exploring with maps, make this map set so that you can use large scale maps, showing rivers, islands and small cities impossible to show on small maps. Three plywood panels, 3x5 feet in size cut in two, will make six map boards for the case. Fasten a large map to each side of the boards to complete a set of twelve maps. Make the case of ½-in. pine or hardwood, 6-in. deep, 2 feet 6-in. wide and 3 feet 4-in. high. The plywood pieces should be ¼-in. thick, 2 feet 3 in. wide and 3 feet high. The left edge of each plywood map board is fastened to a swinging board, ½-in. x 5-in. x 3 feet 2-in. high. Use cabinet hinges ¼-in. wide and about 1-in. long in securing the plywood board to the 5-in. swinging board. The map boards are hinged at top and bottom, and are spaced about ¾-in. apart along the swinging board. The latter is fastened with counter-sunk hinges to the left side of the case, permitting the board to swing out as indicated by dotted lines. The maps can be fastened to the boards with thumb tacks, or more permanently affixed with clear lacquer. Cover back of case with a plywood piece, then stain and finish the case.



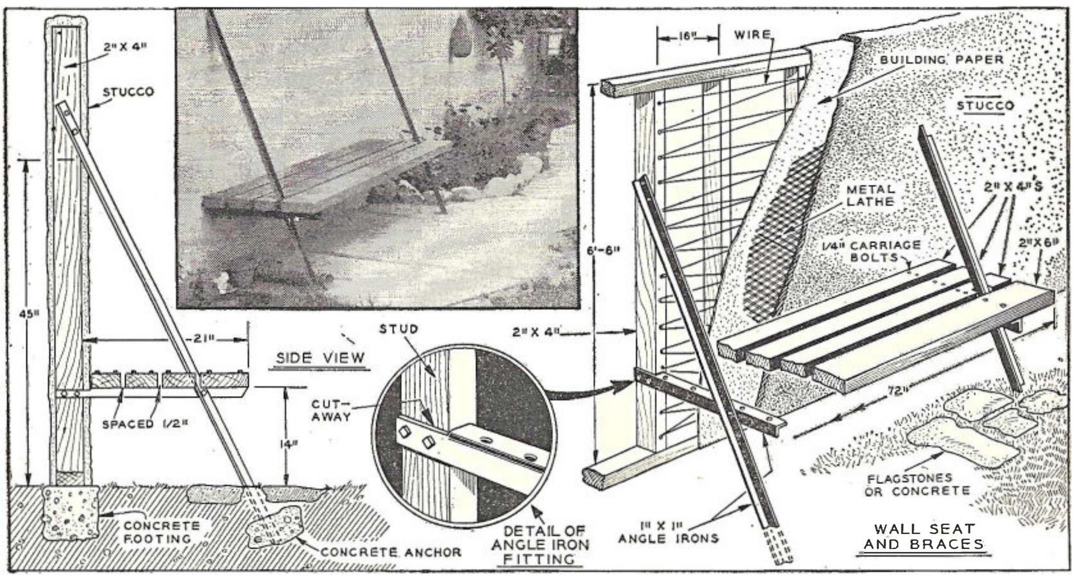
Hoosier Phone Desk

THIS quaint phone desk might have come from the little Red School House. ¾-in. maple or gum stock is used for the top and sides, while plywood is used for the bottom and back of the desk compartment. Use glued pieces for the two sides, 26x14½-in. The upper ends are cut away at one corner for the sloping hinged cover, while the front edge of each side is cut away as shown. The drawer or compartment measures 7¼-in. deep at the back and 3-in. at the front. The top boards, 18-in. wide, overlap the sides of the desk 1-in. on each side, and the sloping board overhangs the front ½-in. so that it may be easily raised. The sloping board is fastened to the adjoining top board with countersunk hinges. The sides are braced 5-in. from the bottom with a stretcher board 20-in. long, 1-in. thick and 3-in. wide. Cut slots in the sides to take the ends of the stretcher board, securing the ends with keys driven in holes cut in the ends of the board. The upper part of the desk is assembled with finishing nails and putty.

Improve Shelves With Wood Valances



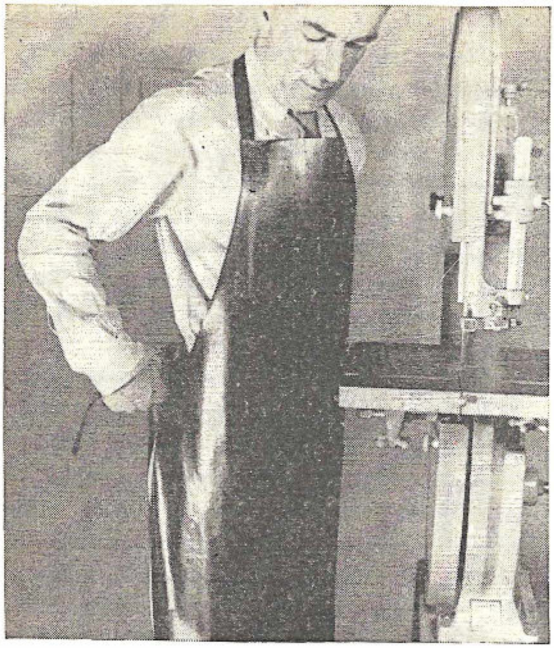
IN NEARLY every home is space in passage-way or nook suitable for shelves, but shelves in themselves are not very decorative. To improve their appearance, simply add wood valances, as illustrated. This makes an attractive as well as useful arrangement in an otherwise uninteresting space. If no scroll-saw is available, white pine is easily sawed to a curve with a coping saw, and smoothed with rasp and sandpaper.



Wall Seat And Braces

A PERMANENT, strong and attractive wall seat can be easily made as illustrated above. Angle iron braces support the seat, which consists of three 2x4 planks and one 2x6. The seat may be installed against the side of the house, or any wall having squarish uprights, whether made of wood or metal.—*Hi Sibley.*

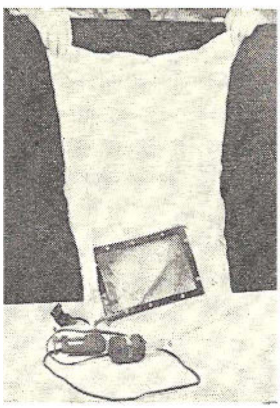
WORKSHOP



Novel Workshop Apron

AN EXCELLENT apron for the woodworker may be constructed from the rubber coated material used for covering auto tops. This material is not expensive and has the advantage of a smooth surface to which dust and chips will not cling. The material is cut to shape and the straps are fastened in place.—*H. R. H.*

Window In Bag Protects Face From High Speed Grinder

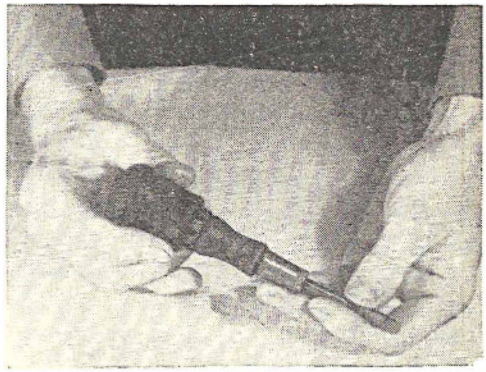


IF AN ordinary bag of fairly heavy material is fitted with an 8x10-in. celluloid window with additional slits at the sides for inserting the hands, difficult high speed grinding operations may be carried on without the danger of particles flying in the operator's face.

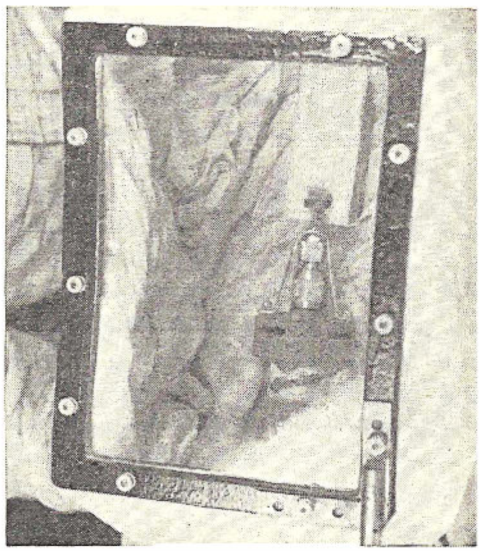
Photo at right shows one hand of operator in interior of bag holding a piece of steel which is being ground by the high speed drill held in the right hand. The progress of the work can be watched at close range. It is especially useful when grinding wood, as all the dust drops down to the bottom of the bag from where it may be conveniently emptied.

Obviously, the window can be non-shatterable glass if desired, but heavy celluloid has been very satisfactory.—*H. E. H.*

Crutch Tip Is Screwdriver Aid

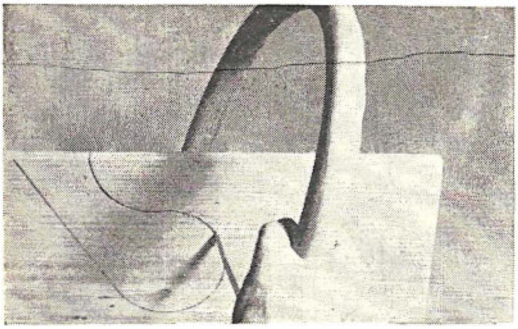


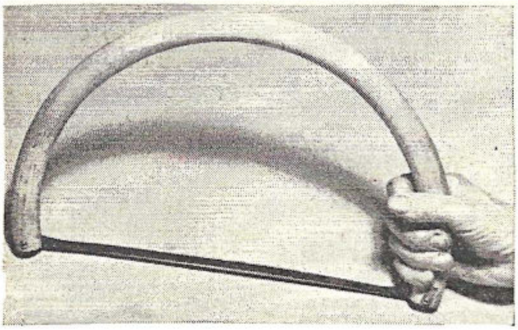
A RUBBER crutch tip is a handy aid when using a screwdriver. It not only prevents the palm from becoming sore but it serves very well as a non-slip grip when the hands are sweaty. It also protects the wood if it becomes necessary to hammer on the handle.—*W. S.*

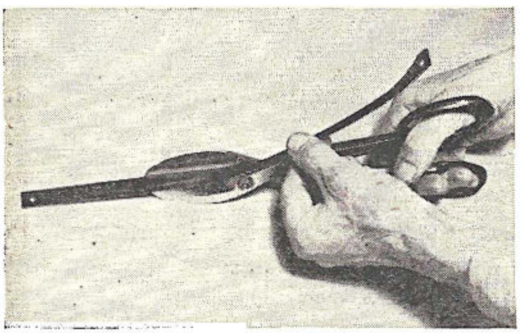


SUGGESTIONS

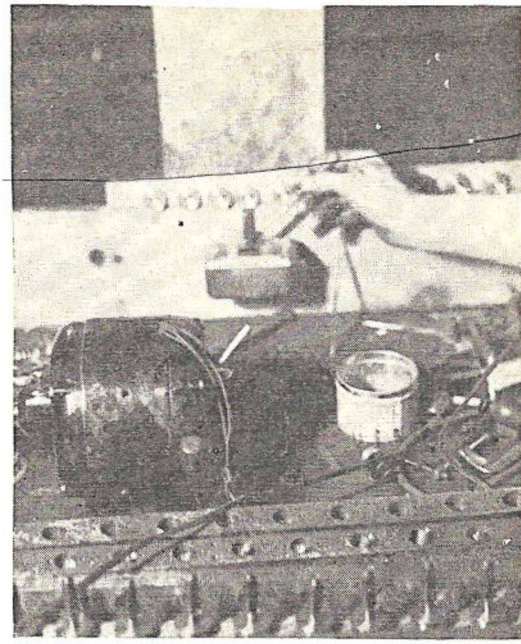
Saw Cuts Circles And Curves





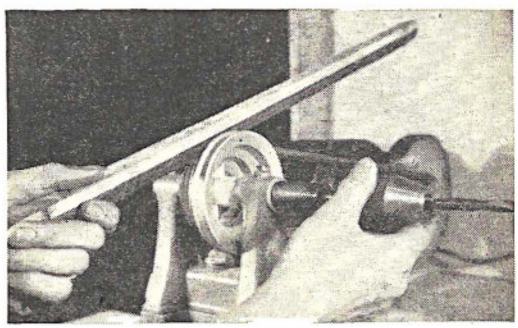


A SAW to cut curves and circles can be made from a piece of wooden steering wheel and a meatsaw blade. A little more than half of the steering wheel is used; slots are sawed in the ends of the section to receive the blade in straight position; holes are drilled through the ends of the section for the screws which hold the blade. For a cross-wise position of the blade, holes for the screws are bored slightly to one side of the slots. The blade, cut from an ordinary meatsaw blade, is an inch shorter than the span of the steering wheel section, so that the proper tension is provided when the blade is attached. Back half of the blade is cut off with tin snips.—*B.N.*



Oil Container For Metal Workers

OLD wall switch boxes make excellent oil containers for metal workers in the home workshop. Mount several, one for instance, on the wall by the drill, another at the back of bench and still another near the lathe. Covers are left in place and the brush sets in the hole where the thumb lever projected.—*W. M.*



Bow Aids In Turning Lathe

AN OLD V belt is cut through and attached with screws to a hardwood strip about 3 feet long. By grasping one end of this "bow" and running it over one of the pulleys on the headstock the spindle is rotated slowly but positively in the direction desired.—*W. C. W.*

Viewing 'Scope For Color Films

To use this simple viewing-scope, merely slip in the colored transparency and point the tube to any light.

THIS handy little "'scope" for viewing your natural-color transparencies is easily built from a few scraps of cardboard and a couple of dime-store magnifying glasses in an hour's time. The instrument is really a simple microscope and it gives a surprisingly clear and life-like view when it is pointed at the light and a color miniature is dropped into the slot.

Cut the handles off two ten-cent magnifying glasses and smooth up the rims. They should be 1¾″ in diameter, but slightly larger or smaller lenses can be fitted into the tube with a little ingenuity. They should focus at from 2½″ to 3″ when placed together, however, and any great deviation from these figures will change things considerably.

From very heavy cardboard ($\frac{3}{32}$″) cut two stage-boards $2\frac{7}{16}$″ square. In the center of each cut a rectangular hole 1⅛″x1½″. Also cut two washers 2″ in diameter from heavy cardboard with the same size rectangular holes in them. Glue one to each stage-board.

The tubes are rolled of lighter cardboard. Most papers have a definite grain which permits rolling along only one axis, so experiment with strips cut both ways of the paper before going ahead. If you cannot obtain black cardboard you will have to paint the inside surfaces with black India ink as you go along.

Cut a strip $1\frac{13}{16}$″ wide by about a foot long and roll up and glue the body tube of exactly 2″ inside diameter. With shorter strips $\frac{7}{16}$″ wide make two stop-rings and slip them inside the body tube temporarily. Now make the draw tube 2⅜″ long with an outside diameter to fit snugly inside these stop-rings. Glue a shoulder tube $1\frac{11}{16}$″ long inside the draw tube for the lenses to butt against. If your lenses do not now drop in place you can build up or reduce the tubes until you get your lenses to fit. They should be separated by a narrow ring merely to keep them from scratching each other; the exact distance between them is not important. A retaining ring glued in holds the lenses in place.

Fish out the stop-rings from the body tube and glue one around the outside of the draw tube and one around the inside of the body

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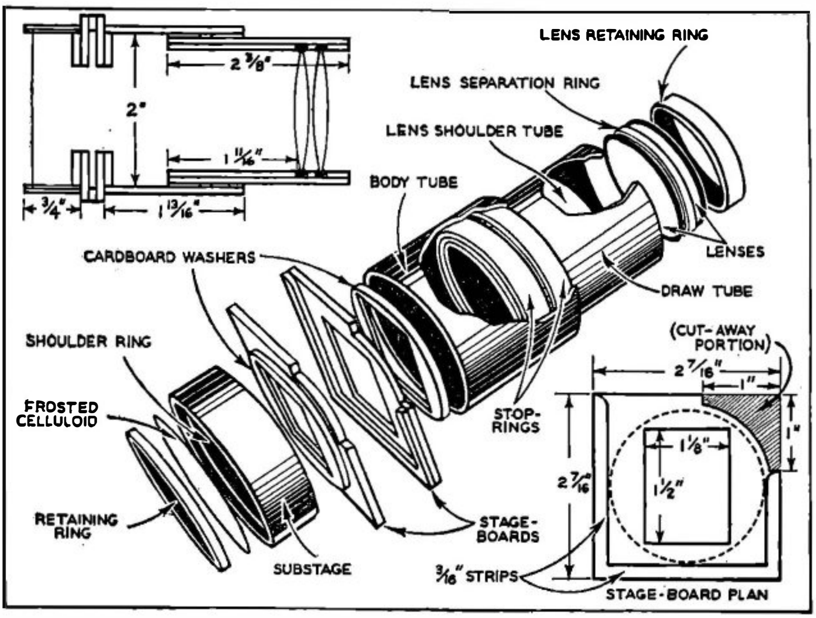
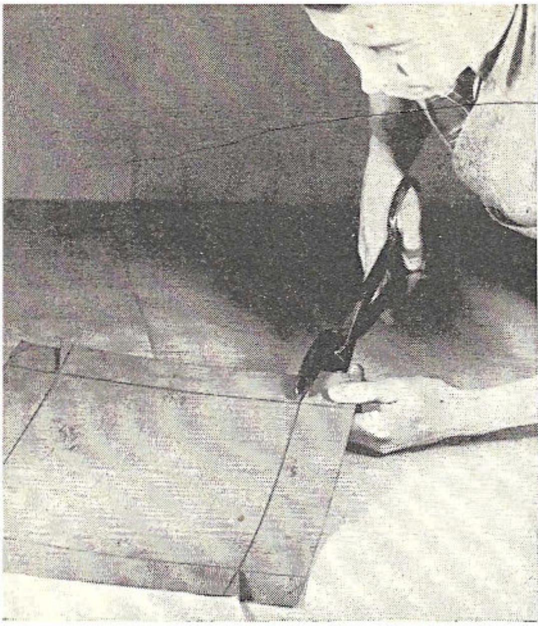


Construction details of the viewing scope.

LIFETIME Photo Trays



Left: Fig. 1, showing cutting operation. Above: Fig. 2, showing how the steel is bent over a short piece of wood in a vise, with a wooden mallet.

LIFETIME trays of stainless steel are absurdly easy to make if you know one simple technical secret, and it is divulged below. Trays may be made up in any size desired, but the one illustrated was made for use with 8″x10″ paper.

A piece of unpolished stainless steel .025″x13″x16″ was purchased for $0.65 (unpolished is the cheapest finish) and laid out to finish as follows:

Sides and ends..................................2″high
Width across bottom.................................9″
Length along bottom...........................11½″
Flare of sides and ends from bottom to top ....½″

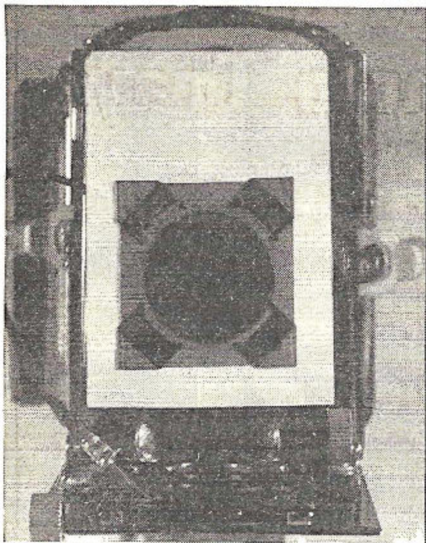
Fig. 1 is the lay-out. To make the corner laps draw a line from the point where the width and length lines intersect to a point on the outer edge $\frac{7}{16}$″ out from the cross line. Use tin snips and cut just to the corner; cutting a trifle short insures tight corner joints. The forming process is clearly shown in Fig. 2. After forming sides and ends, bend the corner laps into position around the ends of the tray. If you are clear on any point, form a trial tray of light cardboard and use it as a pattern.

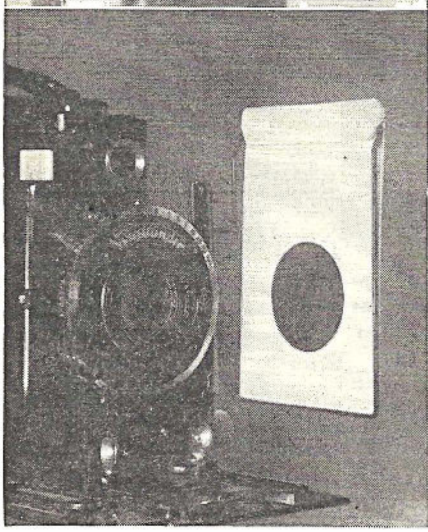
The secret of soldering the corner joints is: 1. A good, clean soldering copper; 2. Two fluxes, straight muriatic acid and cut acid. Apply a coating of straight muriatic and then over this a coating of cut acid. You will find that you can then solder your steel with ordinary half and half solder just as though

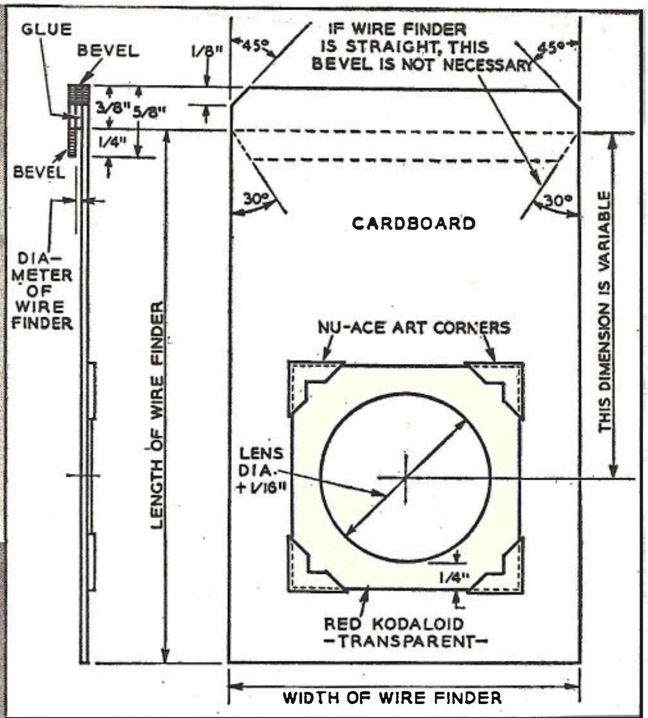
[*Continued on page* 135]

Fig. 3: The completed tray.

Enlarging Filter Holder





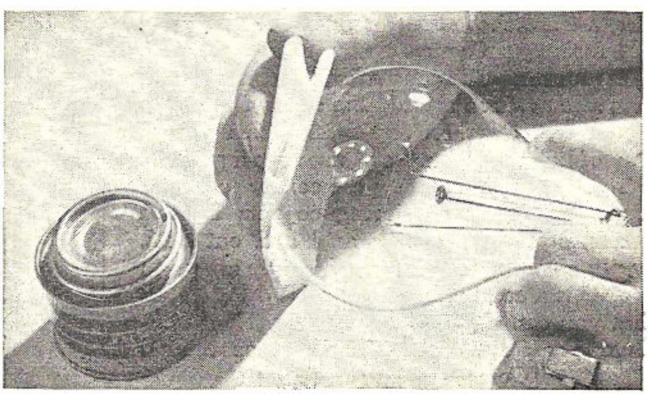


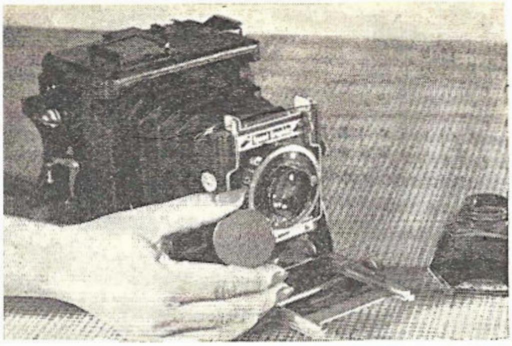
WHEN film pack cameras are used as horizontal enlargers a filter holder to hold a red filter over the camera lens while enlarging is essential. This allows the photographer to place the sensitized enlarging paper in the printing frame or paper holder without danger of fogging, and also for final adjustment.

The holder is cardboard and can very easily be made by following the details. Hole for the lens is cut out by either a steel inscriber or a sharp knife. Filter can be made from a piece of Kodak red Kodaloid or a piece of red cellophane. Nu-Ace Art corners hold it in position.—*W. R. Stamford.*

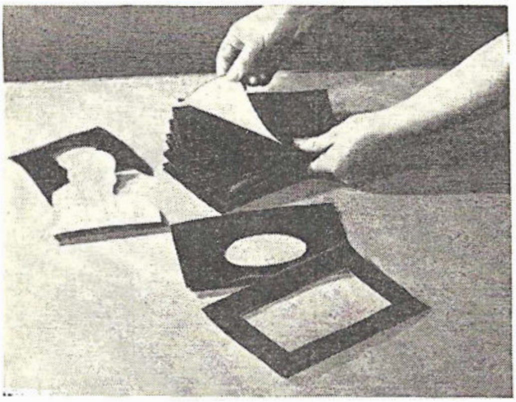
Frosting Enlarger Bulb

ILLUMINATION from clear lamps will be much more even if the lower half of the bulbs are frosted, in order to diffuse all direct light rays. A permanent frosting is secured by rubbing the lower part of the bulb with valve grinding compound, which can be applied with a pad made from a paper towel. Apply the pressure evenly in a circular motion.—*K. M.*





CAMERA KINKS



Save Discarded Printing Paper

WHEN, during printing or enlarging, you miss the correct exposure, don't throw the unsuccessful print in the waste basket.

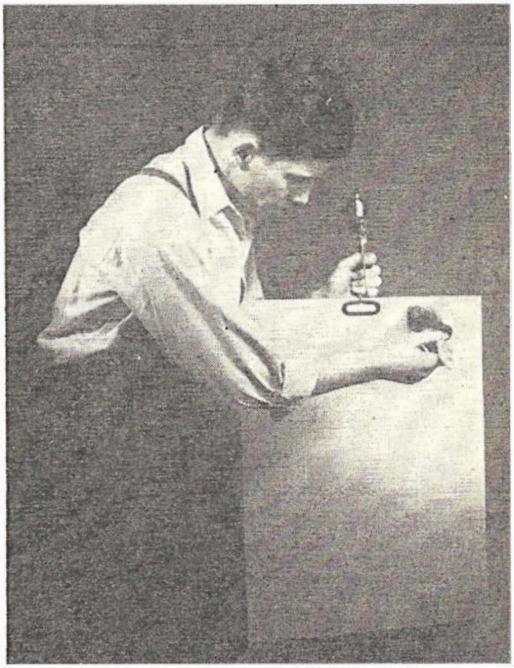
[*Continued on page* 131]

Reel For Extension Cord

WHEN you take your camera and lamps out on a job, a couple of reels of extension cord often come in handy, as you do not always know how far away the electric outlets will be. The reel pictured at right is easily jigsawed from a scrap of plywood, and will hold about 100 ft. of cord. 13x5½-ins. are the outside dimensions.—*Arthur Trauffer.*

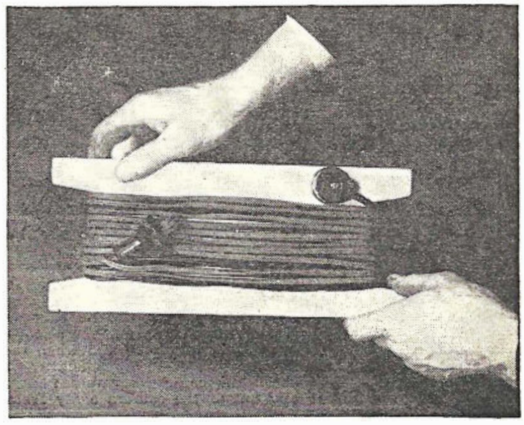
Ink Bottle Top Covers Lens

PROTECTION can be had for your lens at a minimum of cost by using the cover of an ink bottle.—*H. Radzinsky.*

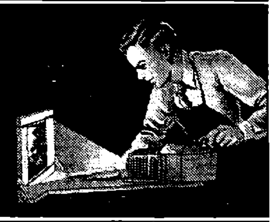


Squeegee Tins Serve Double Purpose

THE black ferrotype tins which you use for drying glossy prints can in addition be used as highly efficient reflectors for making home portraits and other indoor shots. All that is necessary is to coat the back of each tin with aluminum paint.—*K. M.*



AMATEUR PHOTO PUZZLERS



In this department the photography editor will answer any questions or problems relating to cameras of all types, enlarging, developing, printing, taking pictures, and the various phases of home movie making. When sending questions to this department be sure to include a self-addressed, stamped envelope so that we can answer directly in case space does not permit answering in this page. Send inquiries to Photography Editor, MECHANIX ILLUSTRATED, 1501 Broadway, New York, N. Y.

FORMALIN BATH

Q. In a recent Photo Puzzler there appeared information concerning the use of a formalin bath for hardening films. Is the bath used after the film is fixed in hypo?—E. Porter, Banning, Calif.

A. Before immersing film in a formalin hardening bath, you must first fix it and wash it completely in the usual manner. After the regular wash, immerse the film in a weak formalin solution for about 10 minutes. Then immerse the film immediately into clear water, place it in a fresh acid fixing bath for five minutes and wash and dry in the usual manner. A fresh formalin bath should be used each time.

IMPROVISED DARKROOM LIGHT

Q. Is it possible to improvise a darkroom light by using a flashlight?—Vic Reinemer, Circle, Montana.

A. It is quite possible to improvise a darkroom light with a flashlight provided the light source is adequately shaded with red cellophane or ruby glass cut to fit the head of the flashlight.

VINEGAR SHORT STOP

Q. Is it possible to substitute vinegar for the acetic short stop bath?—Charles Kolmar, Chicago, Ill.

A. Vinegar may serve as a substitute short stop bath in an emergency, but its continued use is not recommended. It is, in fact, a diluted and weakened form of acetic.

ACETONE

Q. Many of your photo articles recommend the use of acetone for mending. What is this substance and how is it used?—George Ketchner, Atlanta, Ga.

A. Acetone is a volatile liquid prepared by the dry distillation of acetates—calcium acetate, for instance. It mixes with water or alcohol. It is a powerful solvent of most resinous substances and thus very readily dissolves celluloid. When used for mending or as a sealer on celluloid, a drop of acetone will soften the two edges of the celluloid so that when pressed together, they dry hard and unbroken. Straight, undiluted acetone is available from most druggists.

LIGHT STREAKS

Q. My film always has light streaks. What may be causing this?—W. A. Schnur, Belleville, Ill.

A. Light streaks may be caused by a faulty camera. A pin hole or crack in the bellows will admit light that causes a streak across the film. The back of your camera may be loose and light might streak in from there. Light streaks may also be caused by careless handling of the film when inserting or removing the roll from the camera. The way to avoid light streaks is to check the camera for any faults, and to handle the film in and out of the camera away from direct sunlight.

PERMANENT NEGATIVES

Q. I have had the experience of having negatives fade. How should the image be made permanent?—Ross Williams, Boston, Mass.

A. If the image on a negative fades, it is due to faulty processing. Film must be fixed in a hypo bath for at least 10 minutes if it is fresh and for a correspondingly longer time if the hypo bath is being reused. Then it must be thoroughly washed in running water for at least 20 minntes, preferably for 30 minutes. If running water isn't available, wash the film in at least five changes of fresh water for about five minutes at a time. Careful processing and thorough fixing and washing should give you a permanently fixed image and the negative should not fade in many years as long as it is kept in a cool, dry place. Keep your film away from salt water or salt air if you want to insure its long preservation.

OUTDOOR SILHOUETTES

Q. How should outdoor silhouettes be taken?—James Jordan, Detroit, Mich.

A. Silhouettes inside or outside are taken with the light source facing the camera. In other words, with the light striking the subject from the side away from the camera. When taken in strong sunlight, the subject should stand between the sun and the camera so that the side facing the camera is in the shade. Shoot the subject at a rapid speed to underexpose the shaded side. Be sure the subject blocks out the sun from the lens or you will defeat the purpose of the picture. Silhouettes are sometimes taken at sunset when the sun is low in the Western sky. Then place the subject on a rise of ground with his back to the West. At sunset there is less glare from the setting sun, yet there is enough light behind the subject to give you an interesting silhouette with effective lighting.

PHOTOGRAPHING MIRROR PICTURES

Q. How should the camera be set for photographing mirror reflections?—D. V. Mercer, Orange, N. J.

A. If you intend photographing reflected images only, and exclude the subject, it is necessary to add the distance from the camera lens to the mirror surface to the distance from the subject to the mirror. In other words, if the subject is three feet from the mirror and the camera is five feet from the mirror, the actual point of focus for photographing the reflection in the mirror is three feet plus five feet or eight feet. If you are photographing both the subject and the reflection in the mirror, the focus is merely adjusted to the distance from the mirror surface to the camera lens.

FILM IN HOT WEATHER

Q. What is it about hot weather that causes film to spoil? I have had film in hot places. Sometimes it spoiled and sometimes it didn't. Why?—Charles Greenleaf, Philadelphia, Pa.

A. It is not so much hot weather itself that causes film to spoil as it is the moisture in the air that usually accompanies hot weather. The old adage that "it's the humidity, not the heat" applies in this respect. Film in a hot, dry atmosphere is less likely to spoil than film in a humid atmosphere. If you can manage to keep your film dry in hot weather, the chances are very good that it will not spoil.

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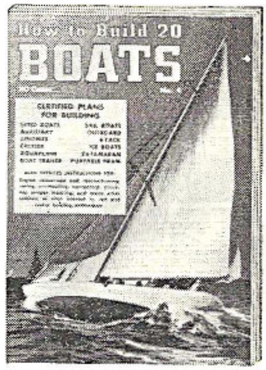

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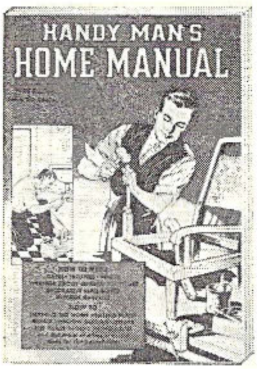

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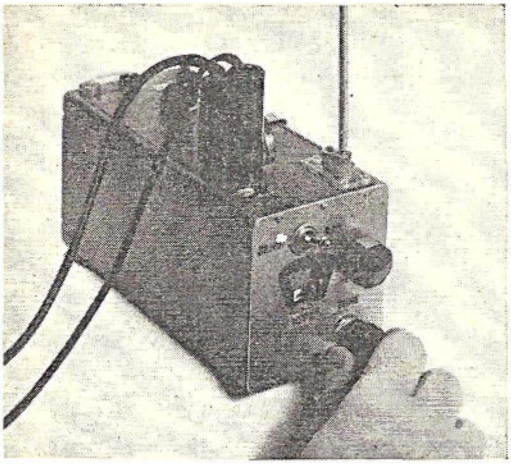
Next Month—Complete Plans For The "Ether Imp"



Imagine a complete radio transmitting and receiving station in a box only 7 inches long, 3 inches wide and 3½ inches high! That's the new MI "Ether Imp," which will be described in detail in next month's MECHANIX ILLUSTRATED. Designed to operate on the amateur 2½ meter band, this unique outfit provides point-to-point voice communication over distances as great as three miles. It uses two tiny "acorn" tubes and operates entirely on small flashlight cells—all self-contained in the pressed-wood case. The aerial is merely a short piece of aluminum tubing that plugs into a jack on the top of the case.

Don't miss the diagrams, construction details, operating instructions, etc., which will appear next month. The "Ether Imp" is a radio project of unusual interest.

Owls Are Blind As Humans In Dark, Experiments Show

Owls can't see in the dark any better than you and I can, British experiments have demonstrated.

Some time ago it was claimed that owls' eyes could perceive infra-red rays given off by the warm bodies of animals, thus enabling the predatory night birds to see their prey in the dark. The experiments were designed to test this assertion.

Electrical apparatus, hitched to the eye nerves of owls under suitable anesthesia, failed completely to register infra-red radiation, although it clearly recorded visible light when tested with an electric lamp. The excised eyes of freshly killed owls also proved unable to transmit infrared rays.

American scientific institutions use about 50,000 monkeys and apes a year for medical research.

Hurricanes Inevitable In Caribbean Region

Hurricanes are accepted as inevitable in the Caribbean region, which quails beneath an average of three of these tropical storms in a year, and the hope for the future lies in engineering to provide more adequate protection against wind and flood and in the perfection of weather forecasting methods to provide warning far in advance of the storm.

Various attempts have been made to stop the winds or to divert them from their path, but none of the experiments have been successful, and scientists generally are skeptical of suggestions that any power now within the hands of mankind is sufficient to cope with the wild force of a hurricane. The terrific strength of the winds may be gauged from scientific calculations which indicate that such a storm will expend in a single day enough energy to run all the power plants of the earth for several years.

Atlantic hurricanes all have their birth in the doldrums bordering the equator. That much is known, as is the fact that the high temperatures and humidity and the calm air peculiar to this region during the late summer and early fall are the conditions essential for conjuring up this type of storm.

Just what provides the "trigger" action that sets the hurricane in motion has not been entirely explained, but the release of latent heat of condensation is believed to supply the necessary energy. Once started the hurricane winds gather speed from their own impetus and sometimes reach a velocity as high as 130 miles an hour.

In the Caribbean, the course of the hurricane is usually in a northwesterly direction, the storm turning northward at the Atlantic seaboard and imperiling coastwise shipping if it does not strike land.

The most destructive hurricane of modern times in the western Atlantic region was the Galveston disaster of 1900, in which 6,000 persons lost their lives. Since that time, Miami and Palm Beach have been among the places hit hard.

On September 3, 1930, Santo Domingo was visited by a hurricane in which upwards of 2,000 persons perished and property worth millions of dollars was destroyed. The toll of dead was increased by deaths due to disease which spread because of the disruption of sewage systems and the contamination of water, notwithstanding the fact that airplanes and ships were rushed to the scene with food and medical supplies.

Twin to the hurricane of the western hemisphere is the typhoon of the Orient. Like the Caribbean hurricane except in name and direction of its whirl, the typhoon is held in even greater dread but the vastly larger number who suffer its tyranny do so because the East has not built the strong defense of sea walls and stout buildings that guard the West from the seasonal invasion of tropical storms.

Great Crowds Attracted To Airports Of Nation

America has a new free show and her citizens, young and old, but particularly young, are taking to it like Romeo to Juliet.

Airports throughout the country are becoming the hosts of ever larger crowds, particularly on sunny Saturday and Sunday afternoons, curious to see the airlines' great passenger birds.

Not every airport is the mecca for the community crowd out for the sun and the thrills, but Pittsburgh, St. Louis, Chicago, Indianapolis and other cities find that all roads lead to their airports. Instead of the crowds decreasing as aviation (so it would seem) becomes more of an everyday affair, they are getting larger and larger.

The airlines are tickled silly over such interest, naturally, for they find much truth in the experience of a Dutch airline, K. L. M., which flies all over Europe and from The Netherlands to the Far East. The Dutch have learned that these airport hangers-on are the most fruitful field for finding new passengers—better far than the people who can be reached by advertising in newspapers and by similar means.

The Dutch, as a matter of fact, have made a good thing out of the Hollanders' curiosity, for ten Dutch cents admission is charged. That is about five cents in American money. Guided tours to their facilities are also operated, with the charge set at half a guilder or fifty cents Dutch. And the thorough Hollanders even find use for spare Douglases or Fokkers they might have around, taking passengers up on short sightseeing hops for five guilders. American lines rarely run sightseeing trips of this nature.

Biggest aviation show in the U. S. and the one that is pulling in the crowds the most is the Pan American Airways base on Treasure Island, at the Golden Gate Fair in San Francisco Bay. With the Fair in mind, Pan American officials put a glass partition into their giant hangar. From behind it, the air-minded curious may watch Boeing and Martin clippers being made ready for the long haul to the Orient, and may watch them depart.

Pittsburgh provides more fun for its spectators than most of the domestic ports because the radio conversations between planes and the control tower are heard over the loudspeaker system. Not only is the spectator seemingly "on the inside" of what goes on, but he has a ringside ear for the occasional surprise.

When Lieut. Ben Kelsey was "loafing" across the continent at 400 miles an hour on an unannounced flight in the Army's Lockheed XP-38 twin-engined pursuit ship, he passed over the Pittsburgh control tower. Imagine the crowd's surprise (and the embarrassed control towerman's) when a voice came out of the ether saying his airspeed was 397 miles an hour. The towerman told the airlines to get out of the way pronto —there's an Army rocket up there. Everybody heard him. You can bet they liked that.

Air Engine Research Slowed By War Scare

There are not likely to be any breath-taking jumps in airplane motor powers in the next few years. There will be no completely new designs. Blame it on Hitler.

Because the German air program has scared the other powers into production, the fundamental, long-term research needed now to double engine powers, an accomplishment of the last few years, is not going to be done. There are just not enough top-flight engineers to do both jobs if each is to be handled successfully.

Engine powers will increase, to be sure, but in small steps and as experience, better materials and refinements enable more power to be taken out of what is basically the same design.

Another factor playing against any such phenomenal growth as in the last few years—from 750 peak horsepower to upwards of 2,000 today—is expense. With the per horsepower expense of development, now more than $1,000 a horsepower, rapidly increasing and the total horsepower climbing, the cost of fundamental development work on a big motor is virtually prohibitive. One engineer mentioned $5,000,000 as the minimum research fund necessary to develop a 4,000 horsepower engine.

"But," he asks, "who will put up that sum? Congress will gag at the thought. I know we can't." He is connected with one of the largest aircraft engine firms in the United States—one which has only recently begun to build motors from a design which cost millions and took ten years to produce.

Besides that, the aeronautical engineers are not too keenly interested in getting their power in much larger packages than at present, for increasing numbers favor more powerplants instead of bigger ones. It keeps the eggs out of the same basket. All the new transport designs, for example, with one exception, are fitted with four motors, and one model is very little larger than the present two-motored planes of the airlines. Engineers are thinking of six-engined jobs, too.

These are some of the things now being talked of by engineers with the Allison Engineering Company, of Indianapolis, builders of 12-cylinder motors rated at 1,000 horsepower for protracted runs and doubtless more than that for take-off, and of a 24-cylinder motor whose take-off rating may be as high as 2,400 horsepower. And as one of the "big three" of the large airplane-engine groups, thoughts of its engineers should bear weight, particularly since engineers with the other two firms echo so many of them.

There are more than 200 species of willows.

There are about as many calories in an orange as in a whole canteloupe—100 in each.

Tiny Amount Of Chemical Ends Hardness In Water

Soft water that will neither produce objectionable scale or corrode plumbing can be produced cheaply from water of the hardest variety by dissolving in it a tiny amount of a simple chemical, sodium hexametaphosphate, two water supply engineers report.

The new treatment, which requires only two parts of the chemical per million parts of water, was first tested at Delaware, O., and has been put into use in the water supply system of Columbus, O.

Known as the "threshold treatment," it solves difficult but extremely important problems which the average citizen may never be in a position to realize and which have plagued water supply engineers for years.

Hard water, unless previously softened by either acid treatment or by lime softening, makes it impossible for a user to get a good soap lather when washing. In industrial plants, it deposits hard scale in boilers and pipes, making them less efficient and leading eventually to breakdowns.

But the lime softening process is difficult to control, Charles P. Hoover, superintendent of the water purification plant in Columbus, and Owen Rice of the Hall Laboratories in Pittsburgh, point out. And the acid treatment processes have an undesirable feature—the corrosion of piping.

The sodium hexametaphosphate may be added before filtration, but the best procedure, they recommend, is addition of this chemical after filtration. It is entirely non-toxic in its effects on human beings. Applied first to the specific water supply problems of some factories, the new method was thoroughly tested for toxicity before the Ohio State Board of Health would permit its trial in a city water system.

The stabilization effects are found even at temperatures approaching the boiling point of water, making it extremely useful in treating boiler waters. Trouble with scale in hot water heaters is often encountered even following partial softening or the addition of lime or soda ash for corrosion control, in the absence of the sodium hexametaphosphate.

In the acid treatment lime or soda ash are frequently added to eliminate the danger of corrosion. In those cases a slight protective scale is wanted. But the difficulty is found in adding exactly enough lime or soda ash to deposit just enough scale and no more.

Testing 2,000 thermometers in a season is one service to Florida fruit growers given by the state's Horticultural Protection Service.

Looking ahead, the Bureau of Public Roads estimates that 25,000 miles of new 4-lane roads will be needed by the United States in the next 25 years.

Streamlining Your Eyesight

[*Continued from page* 39]

corrections to do away with distortion and color effects. If a man can make out the largest headlines in the newspaper, the telescopic lenses will enable him to read the ordinary sized type. The telescopic lenses also can be built as lorgnettes for street, home, or theatre wear. Many elderly people who have groped about in a dark fog for years, again can see familiar objects. Often they have to learn to read all over again for they have actually forgotten the very appearance of many words.

Another triumph of the optician is the "contact lens," ground to mathematically true curvatures and tailored to fit the eyeball and correct its malformations. You pick up the disk of glass with a rubber vacuum cup, put a few drops of saline solution on the surface, and slip the lens into place. The eyelids close naturally over them and the "spectacles" are completely invisible.

Some cases of extreme nearsightedness can have the field of vision increased as much as fifty percent by this method, making it unnecessary to peer. The lenses may be opaque, so as to conceal any discoloration of the eyeball, such as red spots; may be lightly tinted except for a central spot, reducing glare; or the centers may be colored to change blue eyes to brown or brown eyes to blue, which is often necessary in colored motion pictures when the actor's or actress' eyes photograph poorly. Baseball and tennis players, hunters, swimmers, lecturers, politicians, champion skiers, and actors find the lenses valuable and perfectly safe.

Glassmakers now are producing an "armorplate" glass so strong you can't break it with a hammer—thus making possible safety goggles perfectly corrected for welders, boilermakers, and other men who need protection against flying sparks or chips of steel. Safety goggle lenses are given a routine manufacture test of dropping a 5/8-inch steel ball on them from a height of six feet. In an accident they're like a piece of armor plate in front of your eyes. For dress-up wear they are new, "free-wheeling" rimless glasses that ride on spring mountings so a bump to the frames doesn't snap the lenses off.

Sometimes doctors trick the eye into better seeing by a bit of magic which you can easily demonstrate for yourself. Looking closely at a friend's eye while you cover his other eye with a card. As the blocked eye is darkened, a nervous reflex automatically opens the other pupil so it can see better. If one eye is very poor, the optometrist may put a "blinder" lens over it to stimulate the other to greater sensitivity.

If bright lights or sunlight on your book makes you wince, make a simple shield out of black paper by cutting out a long horizontal slot just high enough to admit two or three lines of type. Place this over the page, moving it down as you read. If your vision is poor you will note quite

[*Continued on page* 128]

Sailplane Magic

[*Continued from page* 47]

that the late Warren Eaton and myself were flying our sailplanes from the Big Meadows Field in the Virginia Blue Ridge mountains. It was rapidly growing dark at the time and we were about to come down, but when we tried to do so we could not. The air was rising so fast over a wide area that it was impossible to lose altitude.

"It was the most hair-raising experience I ever had," Eaton said afterward. "I had to dive at 85 miles an hour to get down through it, and for a while it looked as though I wouldn't be able to lose altitude."

This was an "evening thermal," usually encountered over regions which store up heat during the day (such as wide expanses of forest or water) and give it off as night falls. Evening thermals supply the smoothest air. Incidentally, during the daytime large expanses of forests or water make poor gliding country.

Some of the long-distance as well as long-duration flights were achieved by pilots who cleverly shifted from favorable day to favorable night thermal currents. They did this by picking out the favorable clouds during the daytime and then shifting the region of their flight to water or forest as evening drew on.

The daring sailplane pilot can experience some interesting flights if he is willing to take a chance on a "cold front." This is a condition in which a cold air mass is pushing forward and under a warm air mass along a line often hundreds of miles long.

The story is told of a "cold front" which swept across Europe in July, 1935. This stretch came down from the Arctic, or Iceland, and swept eastward across Germany. Directly in its path were three pilots in their sailplanes. All at once the three pilots found themselves rising at a terrific rate.

It was a storm all right. It was a "cold front" in which they were caught. Turning eastward, they rode across the storm for miles until they were finally able to dive out of it and land. That was the occasion in which the world's record of 313 miles for a duration flight was established. Another experience of a pilot riding a cold front was that of Kornfeld, related in the first article of this series; he landed safely, but his plane was badly riddled by hail.

These various soaring flights and soaring techniques have contributed much to our knowledge of meterology as well as to our knowledge of handling powered planes. Much has been learned from thermals, too. But the day someone invents a thermal detector, so that the pilot can detect them readily and easily, will mark the beginning of a new era in transportation. Think of it—carrying passengers and freight in powerless planes!

Perhaps equally as possible may be the discovery of some means whereby engineers will be able to create their own artificial thermals for the purpose of keeping passenger and freight carrying sailplanes aloft.

To say that soaring is safe and thrilling is actually an understatement. No one can really appreciate the sensation unless he or she actually makes a flight. Such a trip is not always possible, but I can give you a very graphic description of one of my most interesting flights, one which occurred several years ago.

I will describe this thrilling flight next month.

Streamlining Your Eyesight

[*Continued from page* 127]

an improvement because the eye, relieved of the annoying glare, relaxes and opens its curtains wider. Again, opaque lenses with narrow horizontal openings, like the knife-edge eye slits Eskimos use to guard against snow blindness, help by cutting out most of the light, actually making the eye in some cases see better!

Some eye trouble goes beyond the eyes to the brain, and doctors have had baffling cases which finally were cleared up with the discovery that one eye got a slightly smaller image than the other. The brain simply couldn't seem to understand these differing pictures, though the difference was perhaps only one to five percent. Special "iseikonic" lenses now equalize the images and give relief to the tired brain.

Cut two identical portrait negatives in half down the middle of the nose; rearrange the pieces and you'll probably find the composite face formed by the two right halves will be fatter than that made up of the left halves. That's why, in the old days, glasses sometimes didn't give perfect comfort—the lenses were centered equally from the bridge of the nose, whereas most faces are wider on one side than the other. Nowadays, good optometrists are using a tube-like instrument through which they can look at the eye against a calibrated scale and measure its centering accurately. Sometimes there will be as much as six millimeters' difference in spacing from the center of the nose to the centers of the eyes; or one eye will be slightly lower in its socket than the other. In cases such as this—as well as in most eye defects—careful examination and measurements, plus accurate grinding, gives smooth-fitting lenses that are always comfortable.

Government scientists have invented a new food article from surplus by-products; namely, wafers or chips made of cull potatoes, skim milk, and salt.

Temperatures of 120 degrees are common in Death Valley, California, in summer.

Leonardo da Vinci—Edison Of Yesterday!

[*Continued from page* 53]

missile from a cannon. Experts say that had he had some power like gasoline at his disposal he would have completed his aviation experiments. He knew a method of remaining for a long time under water, but he refused to tell of it because of the "evil nature of man."

Among the 200 working models of inventions at the present exhibition are a machine for grinding curved mirrors, a machine for drawing copper wires, an oil press, a double spindle screw-cutter, a printing press (pre-dating similar presses preserved in the Gutenberg museum by about 150 years!), a boring and polishing machine for cylinders, and, perhaps most astonishing of all, a model of the principle of automatic gears—the same principle of which is incorporated in the differentials of modern automobiles!

One of the most interesting phases of Leonardo's inventive mind is shown by the devices he designed for military use. He introduced a steam gun, the barrel of which rested for about a third of its length in a bed of hot coals. When heated, the expansion of the barrel loosened a screw which caused water to flow from a cistern onto the heated portion, the resulting steam driving out the cannon-ball "with a great noise and fury."

He also introduced a breech-loading cannon, a double-hulled boat (the modern counterpart is the anti-torpedo bulge on naval vessels), and several multiple-barreled cannons.

This, then, was Leonardo da Vinci the inventor—ardently feeling his way in the work of experimental study and observation in every branch of theoretical or applied science in which any beginning had been made in his age as well as in some in which he was the first pioneer. He was full of new ideas concerning both the laws and the applications of mechanical forces. His architectural and engineering projects were of a daring which amazed his contemporaries, while his inventions are today amazing people of this, the twentieth century!

History presents few figures more attractive to the mind's eye than Leonardo da Vinci—the most versatile genius the world has ever known!

Masks Made Of Newspapers

[*Continued from page* 67]

roughing out head shape, nose and ears. Again, layers of paper are added.

As final steps, the rough masks are painted white, after which other colors are added. Fur from discarded coats, muffs and neckpieces provides hair for heads and other trimmings.

Rodriguez, whose masks are seen at carnivals throughout the west, developed his idea from masks seen in Mexico. When complete, the paper mat is only 1/32-inch thick. Largest masks weigh seven pounds, the smallest 1½ pounds.

Flying Wing Of The Future

[*Continued from page* 57]

leaving things off the outside of the plane, and the other half by cleaning up those which remained.

The other avenue through which increased speed for the same amount of horsepower is to be gained is through control of the boundary lair of air passing over the wing. Tomorrow's "flying wing" may well contain pumps or blowers to aid in this control.

Omission of external parts is no easy matter. If it were, it would already have been accomplished. Every part which is removed must be replaced in function by one of the remaining parts. If the tail assembly is dropped, its control functions will have to be incorporated in the wing. That introduces certain design difficulties. Putting the engine inside the wing may eliminate drag, but it also introduces new cooling problems.

The great problem facing the airplane designer today is how to gain additional speed without sacrificing long range, load, or passenger comfort.

The "flying wing," which would result from removing all external projections is not practical for ships less than 300,000 pounds, in weight, or more than three times the size of the largest plane in existence today! Wings must be thick enough to provide comfortable passenger accommodations.

Sports Made Safer

[*Continued from page* 55]

of a safety discus, for a direct hit by the ordinary kind might easily kill or cripple a man for life. Result was a rubber discus, weighted and shaped so as to meet Olympic requirements, but cushioned so as to minimize the danger of injury. Next came a rubber shot for the shot-put event—a ball slightly larger than the standard shot but of equal weight. Testing by dropping it on lengths of tile sewer pipe, he found that it would bounce harmlessly while an ordinary shot would shatter the pipe.

A further development was a flexible sideline marker for football fields, made of heavy sheet rubber so that if a player should fall upon it he would not be hurt. Campbell's unusual equipment already is in use in some leading colleges, where athletic fields are crowded, and is expected to reduce materially the dangers of competition.

Hair Aids Cancer War

[*Continued from page* 42]

filled with 30 pounds, represents 1,500 haircuts; or it may contain selected feathers from 800 chickens. The hair is boiled 10 hours and cooled overnight. Then, after being filtered, neutralized, decolorized by 15 separate treatments, and washed in alcohol and ether, the cancer-fighting precipitate is finally purified.

Cable Conquers Congestion

[*Continued from page* 72]

process, wires intended for cable had been insulated by wrapping paper ribbon spirally around them. Then it was discovered that paper pulp could be formed around the wire, and now giant machines literally manufacture a thin coating of paper right on the wire, 60 strands at once, as they path through a bath of pulp.

The cable core of 4,242 conductors is built up from these individual strands by first twisting two wires into a pair, then binding 101 of these pairs into a unit. Finally 21 of these units are twisted together, and the core, after being dried out in vacuum ovens, is sheathed with lead that is forced through dies under great pressure.

Perhaps the greatest contrast between the old and new methods of cable manufacture is to be found in the manner of applying the lead sheath. The antecedents of the swift and sure lead presses of today were ex-sailors. To the accompaniment of their chanted "Heave Ho," the core was actually pulled through lengths of lead pipe by hand. Plumbers were then called in to "wipe the joints" and make one continuous lead pipe out of various sections. Lead presses made this procedure obsolete shortly before 1900.

Just what such advances in cable manufacture mean can best be understood when we realize that it would require seventy rows of telephone poles, each holding sixty wires, to carry the wires contained in just one of the new cables. Under one street corner in New York City today there are 282 cables, containing 560,000 wires!

The work of cable development has had a profound effect on modern life which is difficult to appraise, but it is safe to say that without the modern cable, embracing its tightly packed wires, the modern city as we know it could never have been.

Beam Spots Plane In Fog

[*Continued from page* 63]

Its possibilities are practically unlimited, its inventor claims.

This electrical frequency beam reaches a circumference of 250 feet and travels at a speed of 170,000 miles a second—almost as fast as light. The apparatus which throws it is encased in an aluminum shell weighing less than ten pounds and using 180 volts from dry cell batteries.

The beam has already been tested up to a range of 14 miles, picking up and registering the New York World's Fair trylon from a plane flying at an altitude of 3,000 feet. Its demonstration was the result of 19 years of laboratory and research work, which culminated in the granting of basic patents by the U. S. Patent Office for power projection based on revolutionary concepts in the field of electricity by utilization of microwaves.

Viewing 'Scope For Films

[*Continued from page* 118]

tube. You can now fit these two elements together and glue the whole thing to one stage-board, fitting it over its washer and spreading glue around liberally. Now is the time to cut away the corners of the stage-boards to the shape shown to give your fingers room to grasp the slides later. Glue small strips of heavy cardboard 3/16″ wide between the two stage-boards in three sides as shown. This leaves a slot for the slides to drop in.

The substage should be easy. With a strip 5/8″ wide, form the shoulder ring, glue it in place around its washer, and glue another tube 3/4″ long around it. This leaves 1/8″ for the frosted celluloid disk to drop into, to be held by another retaining ring the same as the lenses were. If you can't get frosted celluloid use two disks of clear celluloid with another of tissue paper between them.

Cover the outside of the whole scope with black paper or leatherette, touch up any bare spots with *waterproof* ink (otherwise you will be getting your fingers smudged when you use it) and you have a very neat and convenient little gadget to add to your photo equipment.

Save Discarded Printing Paper

[*Continued from page* 121]

Instead, when you see that the print will not develop to the proper point, switch on the white light and allow the paper to blacken in the developer. Do this with every hopeless print. Then fix and wash them along with the other prints.

Eventually, you will have a supply of black bromides which will be found useful in many ways. They can be cut into masks for contact printing or dodging. When it is necessary to focus the enlarger while the sensitized paper is in place, a black bromide can be laid over the paper, face down, and the focusing done on its white back. The light will not pass through to spoil the paper underneath. Silhouettes can also be cut from them and in time, many other uses will crop up for this otherwise waste product.—*Louis Hochman.*

Vitamin A is important to airplane pilots, since a lack of it may result in night blindness.

A fume detector has been devised, which measures the amount of invisible, poisonous mercury fumes emitted in certain factories.

Out of 64 chemical elements found in soils, 58 have also been found in plants.

Fishing For Dollars

[*Continued from page* 77]

3. Better fly-tying and lure-making equipment.
4. Simplified, more dependable, operating mechanism for automatic reels.
5. Spinners, especially with improved connection of spinners to hooks and flies.
6. More complete ice fishing equipment, such as tip-ups, etc.
7. New lures. Probably new and more efficient *methods* of manufacture would be of more commercial importance than the actual design of the lure itself.
8. Better methods of processing lines.
9. Improved compositions for floating lines and flies.
10. Efficient, non-backlash mechanism for reels.

"Should a reader devise an improvement that is definitely appealing, his first concern will be to safeguard his rights, then realize upon them satisfactorily," Mr. Beard explained. "The only permanent protection is a patent, and the inventor will do well to consult a reliable patent attorney.* However, if the inventor is not able to bear the expense of patenting, he should know that his priority rights can be safeguarded for a reasonable time through executing a suitable form of *proof of invention.* While the law always contemplates the ultimate filing of a patent application, reasonable delay will not invalidate his rights. The law exacts no impossibilities. Many times it has happened that the first and true inventor prevailed over a later inventor who was first to patent. In such instances, the earlier inventor has not been guilty of negligence, but has been diligent in endeavoring to secure means for patenting through the sale of his new idea. Frequently, the manufacturer, when convinced of the value of the invention, will bear the cost of patenting."

In conclusion:

Don't put time and money into ideas utterly impractical from a commercial standpoint. Don't insist on an immediate report on your invention. If at all worthwhile, it will require research, and tackle makers are busy people. Don't get an exaggerated conception of the value of your invention. Don't offer an invention for sale at $10,000 or any other absurdly large sum. Reputable tackle companies know the true value of an invention in their field, and they will not cheat you. Don't circulate the same idea simultaneously to more than one firm. It isn't good business. And if things don't work out exactly as you had planned, don't become antagonistic. You may ruin the whole field for the serious-minded worker.

*Write Patent Office, U. S. Dept. of Commerce, Washington, D. C., for free booklet on patent information.

The first milk bottle was invented by an American in 1884.

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280 great storms in eastern United States.

In the past 50 years weather records show about

Water Skiing

[*Continued from page* 83]

Rutherford or George DuCros of Paris—or probably both at about the same time—had a pair of aquaplanes made in the shape of snow skis, but slightly longer and wider, and rode them holding directly to the tow line.

Water skiing is much easier to learn than snow skiing. Only the start is difficult, and within a half an hour most beginners are able to enjoy themselves. Snow skiers will find it a wonderful conditioner for winter sports; and those who have never skied will find that it will help them when they begin on snow. Opposed to the different techniques required for hard crust, breakable crust, wind-blown crust, powder, wet, or any of the other types of snow, water comes in only two varieties; smooth and rough. As on a bumpy downhill course, rough water requires that the knees should "hinge" and absorb the shocks.

No one has ever been injured by water skiing, as falls are always off to the side. The skis have loosely fitting "shoes" that hold the feet (see photos). In the event of a fall, the skis go free and float to the surface. Contrary to the popular idea that falling into water at high speed is dangerous, Captain Rutherford has fallen at 62 miles an hour; hitting the water, crouched low, he rolled and skidded as though on a greased slide. On losing speed he got a ducking—and found that there was only one casualty; he had lost his pants!

Between 20 and 30 miles an hour is the ideal speed. Under 20, the skis are heavy and inclined to be wobbly, as they do not plane properly; above 30, some effort is required on the part of the skier, as water friction increases. It is possible for an experienced rider, being towed behind a speed boat, to make short runs at 70 miles an hour.

Length of runs is a matter of training. Captain Rutherford has skied for two and a half hours on one run, and made a crossing of the English Channel, from Dover to Calais, in one hour and five minutes.

Nail-Spotter For Joints

[*Continued from page* 99]

This is the 0 mark. From here carefully measure off points ⅛-in. apart to the end. Inch lines along the other side of the 0 mark will come in handy for equally spacing nails or for measuring. The spotter may be used in either of two positions, one with the lower guide arm bearing against the side of the work, or by touching the work at the end. In the latter case the small divisions help in finding half the board's thickness. The eye alone is used in the former.—B. K.

Eastern states supplied over four-fifths of the United States lumber cut from 1800 to 1935, but the lumber industry is now drifting west.

The MI Portable Fan

[*Continued from page* 84]

hardware cloth ½-in. mesh. This can be fastened by clamping ¼-in. plywood on the back or by using small bolts with large washers. The back is made removable by mounting it on a small frame held in place by "suitcase" type snaps.

Now for the fan itself. A little care in constructing and balancing the fan will be time well spent. Use a spider from an old auto fan as a base for constructing this larger fan. At a used car parts place pick out a good heavy auto fan that has not been bent or broken. (One from an old model Buick is ideal for this purpose.) Remove the blades by either drilling the rivets out or grinding them off. Take care in this and the following work not to bend this spider, as the fan will not be quiet and smooth running if the spider becomes warped. Cut four new blades from galvanized sheet iron. In the original they are 5x8 inches. Cup the new blades slightly to make them scoop up the air better. They must all be cupped the same. Drill holes and fasten them to the spider by rivets in the same manner as the original blades. If no rivets are at hand the right size, use nails or small bolts cut off for rivets. Next mount the fan on shaft. The shaft can be a piece of ½-in. cold rolled shafting. Thread the shaft for about an inch. Turn one nut on as far as it will go. The fan can then be put on and the remaining nut tightened from the outside.

Now mount a counterbalance on the other end of the shaft to be used while balancing the blades. This may be a small flywheel or similar object that will have no effect on the balance. The fan is placed on a straightedge next and the light and heavy sides noted. Solder enough on the light blades to even them up. The fan should stop in any position without turning one way or the other. It may take quite some time to get this part right but it must be done to have a smooth running fan when finished.

A couple of bronze bushings serve for the fan bearing. These are stuck in each end of a piece of gas pipe. The bushings are then reamed out so the fan shaft has oil clearance. If you cannot do this part of the job yourself it can be done at any garage or machine shop. A couple of end caps from connecting rods are used to hold this bearing firmly to the shelf.

The original unit uses a 1/6 H.P. motor with a speed of 1,750 r.p.m. The motor is mounted on a one inch thick pad of sponge rubber. (Two layers of ½-in. sponge rubber as used for kneeling pads are just the thing.) This thick cushion prevents any of the motor hum from reaching the frame of the fan.

V type pulleys and belt are used. In this model **a** 2½-in. pulley is used on the motor and a 4-in. pulley on the fan shaft. The idea is to move the blades slowly enough so that a small motor will pull the fan and still run it fast enough to circulate the air.

Yumping Yimminy

[*Continued from page* 93]

tried. The first was to place the propeller out beyond the stern of the boat in free water. This caused more cavitation (suction) because the propeller could draw in surface air and thereby lost its grip on the water; placing the propeller deeper helped some.

A streamlined nut on the propeller long enough to fill in the center of the thrust line was also helpful. It was also found that a down thrust at the stern of the boat or a slight downward curve at the back was helpful provided the propeller was under the hull at the hollow of the curve. Compression plates were also found effective; they should begin at nothing just slightly forward over the propeller and increase in thickness until filling a space nearly 25% of the propeller area at the top. The plan shows a compression plate in place on this hull, figured for a 2-in. propeller.

Now is the problem of the propeller. All model propellers that you purchase are merely castings and the blades vary in pitch. You can of course make a series of templates but you will then have to use them. However, you may lay the propeller on the work bench and bend each blade so that its middle is 45° from the bench. This is fairly accurate and as much as you can expect from the common variety of castings.

We still have the problem of cavitation remaining. The boat with engine running may be placed in the water and go ahead very slowly until given a slight push when it will fairly jump ahead and go tearing along at a fine speed. This is a critical point. You have very nearly the right propeller when this happens. Another ⅛-in. in diameter will give you the perfect propeller for your engine and hull. A contra propeller, however, may make the first propeller as effective as the second or even more so. This device is merely a fin on the bottom of the strut centered on the shaft line and held horizontally. The edge toward the propeller is twisted slightly in the direction of propeller rotation.

Such an arrangement has been found effective in changing the direction of the water before it enters the propeller, preventing the chopping action of the thrust and giving a smoother and more powerful flow of water into the propeller.

In operating the boat a metal plate is fastened on the right side of the deck about half way from the midships to bow position. This plate is about three inches long with holes every ½-in. To this a light fishline is attached and the boat allowed to run in a 52½-foot radius circle. This circle is 1/16 mile per lap. So get out your stop watch, tune up your motor, and let her go!

Build An MI Contest Glider

[*Continued from page* 102]

Coat break with cement. When dry attach top spar and insert the braces as shown on plan. Give all breaks at least two more coats of cement and allow ample time for drying. The leading edge is covered with $\frac{1}{32}$-in. sheet balsa on top only. Center section is covered on both top and bottom.

Due to the fact that the stabilizer is constructed in the same manner as the wing, except that there is no dihedral, detailed instructions are not necessary.

The wing is covered with Japanese tissue, the grain running lengthwise. Banana oil is used as the adhesive. Cover the bottom first, in small sections, sticking the tissue to every rib. This gives the wing "under camber." The top is covered in two sections, left and right halves. Attach tissue to center, then to the end rib, cement down along leading and trailing edge when wing has been completely covered spray lightly with water. When dry trim tissue with a sharp razor blade. Cover stabilizer as above but do not attach tissue to bottom of ribs. Spray the entire tail assembly lightly with water, hold straight until dry to prevent warping. With a soft brush apply at least four coats of banana oil and allow to dry thoroughly between each coat. When dry cement firmly to fuselage in positions shown on the plan. Apply enough coats of cement to form a fillet where the wing joins the fuselage.

Flying this ship is quite different from the general run of ships. In contests a thread tow line no longer than 100 feet in length is allowed. A small hook in the shape of a figure 8 is attached to one end. Slip this hook over one of the launching hooks, the front one for windy weather, the rear for calm. Then run along slowly until the glider is overhead, stop running and the model will automatically release itself from the hook.

However before the above method is tried the model must be perfectly balanced. A few hand launched trials will tell the builder whether or not more weight is needed in the nose than the hollowed out section will hold. If so, clay should be used for added ballast. All turn adjustments are made by warping the rudder either to the left or right.

Before flying your model be sure that the wing and stabilizer are free from any warps that may have occurred while the surfaces were under construction. Above all do not put any unnecessary strain on the wing and do not rush the flying of your model.

The wearing of trousers is traced back to Central Asia, where horses were first tamed and ridden.

An expert at spearing big sea game says that an octopus, even when not fully developed, is far stronger than a man.

Lifetime Photo Trays

[*Continued from page* 119]

working with tin. "Cut acid" is made by dissolving small pieces of zinc (which may be cut from an old Mason jar lid) in straight muriatic acid. Put in as much zinc as the acid will take. Three or four ounces of acid (obtainable for a few cents from your local druggist) is enough for a dozen such trays.

Sweat the laps carefully, test for leaks and wash the job clean. You now have a tray at about one-fourth the retail price, one that is exceedingly substantial and will give a lifetime of service. You, as I did, will say, "Why haven't I done this before?"

Food Harvest From Sea Called Impractical

Germany's hope of harvesting tiny marine plankton from the sea for their food content, is doomed to economic failure, it appears from studies on collecting these organisms already on file at the Woods Hole Oceanographic Institution.

German scientists have reported that the larger kind, known as zooplankton, have a nutritive value equal to the best meat and the smaller phytoplankton have a food value equal to rye flour.

There is little quarrel about the food value, reports Dr. George L. Clark of Woods Hole in the current issue of Science. A typical catch of zooplankton when dried shows 7 per cent fat, 59 per cent protein, 20 per cent carbohydrates, and 14 per cent chitin and ash.

Sharks, whales and other kinds of fish feed on plankton almost exclusively so that the nutritive value is demonstrated. Moreover, shipwrecked crews have been known to sustain themselves on plankton strained from the sea with handkerchiefs.

However, explains Dr. Clarke, it is virtually impossible to get enough plankton to consider it a commercial food source. Knowing the size, mesh and towing speeds of nets fine enough to gather them, it can be shown that it would take two and a half hours to catch enough plankton to feed a single man for one day.

It would be necassary, moreover, to strain them out of a volume of seawater equal in size to a football field and about a yard deep, or about 7,500 cubic meters of water.

The problem of catching enough plankton seems to have comparable handicaps with that of getting gold out of the sea. There is plenty of gold—and plankton—in the ocean but the economics of filtering and treating enough water to get them out takes the problem from the realm of practical reality into one of academic interest only.

About 200 parts of an automobile are made wholly or partly of plastic.

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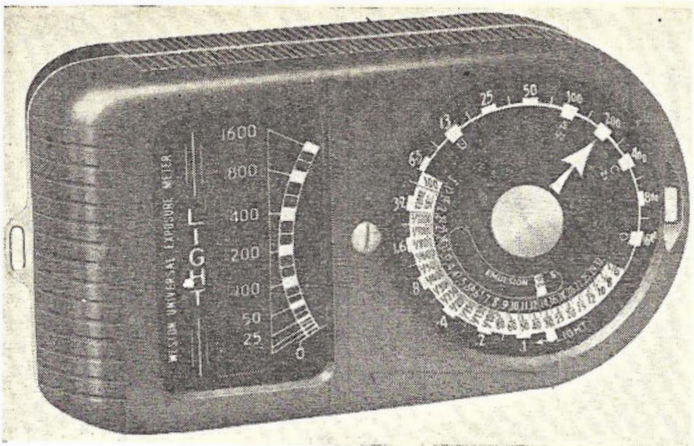
New Photoelectric Exposure Meter



Accurate measurements in weak light, automatically changing "high light" and "low light" scales, increased number of exposure values, and sharply directional viewing angle are some of the features of a new photoelectric exposure meter, intended for general photographic purposes. The molded case and open face dials make the instrument easy to use.

MAGAZINES Halfprice! Catalog 10c. Magazine Exchange, MI Baseline, San Bernardino, California.

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MOTORSCOOTERS, Midget · Cars! Easily built. Wheels, tires, motors, etc. Low prices. Literature and complete plans for scooters and midget cars 10c. Honsaker, Masontown, Pa.

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MANUFACTURE from Phospholene. Cleaning fluid 1c gallon; bleach 2c gallon; hand soap 2c pound; and ten fast sellers. Sample 25c. Details free. Western, 402 Climax Bldg., Cleveland, Ohio.

IF YOU are looking for a chance to devote your spare or full time to profitable work see our offer on page 26. Metal Cast Products Co., 1696 Boston Road, New York City.

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SUCCEED With Your Products. Make—Sell. Formulas. Accurate Analyses. Catalog Free. A. Thaxly Company, Washington, D. C.

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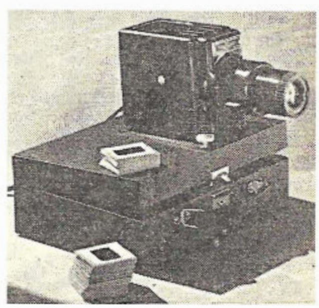
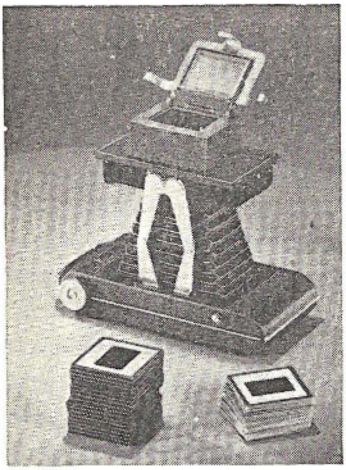
Molded Projector For Transparencies



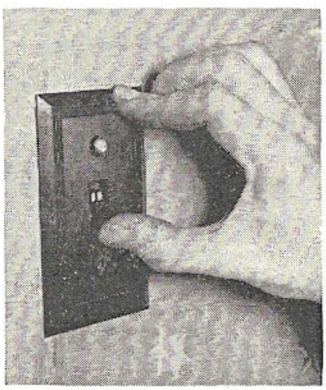
This new molded projector, designed for mounted Kodachrome color transparencies, measures only 2-8/8 by 5¼ by 4-⅝ inches high, but throws an image almost 4 by 5 feet on a screen. The carrying case acts as a convenient support for the instrument during projection. The cover of the case can be tilted by means of an elevating screw, to center the pictures on the screen.

Enlarger Needs No Darkroom



The new Kodak transparency enlarger will make enlarged black-and-white negatives from Kodachrome transparencies quickly and without resort to a darkroom.

Radium Screw Locates Electric Light Switch

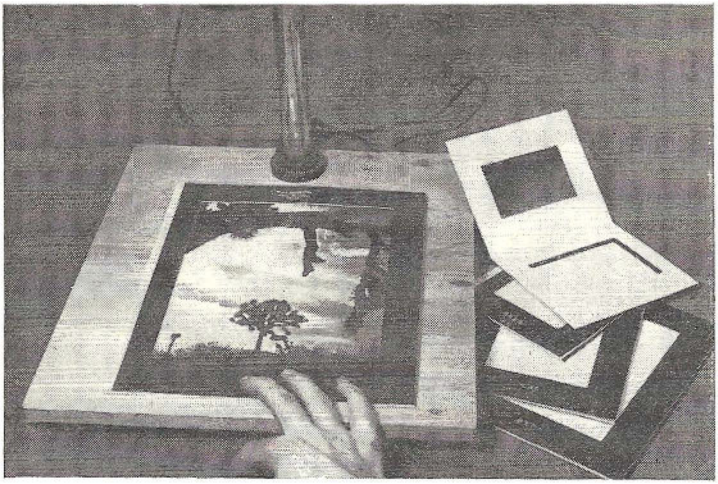


A self-luminous radium screw that replaces one of the conventional screws holding the plate over a wall switch enables the switch to be located easily in the dark.

"Robot Foot" Device Tests Auto's Brakes

A member of the engineering staff of a well known automobile manufacturing firm is shown explaining the workings of a newly developed "robot foot" which replaces the driver's foot in making precision tests of braking efficiency. He is pointing to the small lever (arrow) which the test driver trips to release a 90-pound pedal pressure provided by compressed air. Electrical devices then register pedal pressure and deceleration on a moving tape.

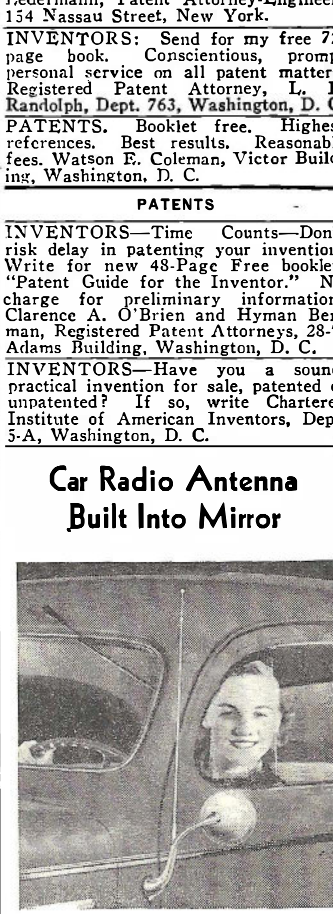
Book Type Mask Insures Even Borders



Even borders on enlargements are easily and quickly made with a book type mask now available. Furnished in sets of five for 2½x4, 3½x5, 4x5, 5x7, and 8x10 enlargements, all, with the exception of the first one, make a quarter inch border. The white background of the mask is excellent for focusing.

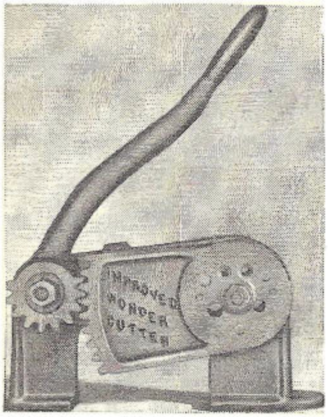
INVENTORS—Time Counts—Don't risk delay in patenting your invention. Write for new 48-Page Free booklet, "Patent Guide for the Inventor." No charge for preliminary information. Clarence A. O'Brien and Hyman Berman, Registered Patent Attorneys, 28-T Adams Building, Washington, D. C.

Car Radio Antenna Built Into Mirror



A solid one-piece fixture, easily installed on any car, includes the car's radio antenna and a rear view mirror. In addition to its own surface, the antenna uses the entire bracket and back of mirror for reception.

Wire Cutter Handy For Foundry Use



An improved wire cutter will cut all kinds of core wires and rods up to and including ⅝-inch in diameter. Screw holes enable it to be bolted to any convenient bench.

Device Keeps Air Circulating

A combination ash receiver and air circulator keeps air moving through a room. It takes cool air from the floor and recirculates it in all directions.

Increase Planned In Number Of Engines In Airliners

Paying heed to near approach of the day when the air traveling public will demand four-motored planes as a result of giant ships such as the DC-4, the Douglas Aircraft Company of Santa Monica, Calif., has worked out a plan to convert the huge fleets of twin-engined DC-3s now in standard airline service into four-motored airplanes.

For about $30,000 apiece, the world's most famous builder of transport planes will put four 600-horsepower engines in place of the two motors of about 1,000 horsepower each and will rebuild the wing at the same time so as to improve its safe flying characteristics, it was learned. Leading edge wing slots and more rounded wing tips will be installed, eliminating a tendency present Douglases have of stalling at the wingtips first.

About 150 DC-3s, many of them only a year or two old, are operated by the major airlines who fear that unless some such arrangement is made their planes will be rendered obsolete in the eyes of the public because of the greater impressiveness of four-motored ships.

The four engines will give superior reliability, the Douglas company and almost all aeronautical engineers feel. In the first place the planes will be able to fly on any two of the four engines and the chances of two engines of four going out are enormously less than the chances of one out of two engines failing. Second, smaller engines are more reliable than larger ones because the operating strains are less and because the industry has had more experience building and using them.

An intermediate sized four-engined plane, the DC-6 is also planned. It will carry the same number of passengers as the present of renovated DC-3s, 21.

Youth May Be Prolonged By Vitamin Discovery

A vitamin discovery that may be an approach to man's eternal quest for continued youth has been made at the University of California.

Gray hair has been darkened and other signs of premature old age reversed by feeding concentrates of the vitamin, which is an unidentified member of the vitamin B family found in yeast, rice bran and liver. But the results, reported by Drs. Agnes Fay Morgan and Helen Davison Simms, were obtained on rats, a black guinea pig and two young Boston bull pups.

In response to an inquiry, Dr. Morgan said no human applications of the discovery yet has been made. She also expressed the hope that the public would not write to her because she has already been "deluged sufficiently" with requests for the vitamin.

Asked whether this unknown factor in yeast provided the end of Ponce de Leon's search for the Fountain of Youth, Dr. Morgan replied:

"Being a Californian I have nothing to do with Ponce de Leon."

The premature aging that resulted when the animals were deprived of the vitamin is due to the effect of the vitamin lack on the ardenal glands, Dr. Morgan's latest studies indicate. The vital cortex of these glands showed wasting and shrinking at post mortem examination of rats that had lacked the vitamin in their diet.

With a new process employing rubber and continuous vulcanizing designs can be embossed economically on cloth, leather, or imitation leather.

Alabaster is a variety of gypsum.

Games And Party Stunts

[*Continued from page* 107]

distance of say 12 feet. As figure 4 shows, the triangle fits snugly into any corner and adds novelty to the game, since "bank" shots off the wall are permissible.

With no more than an egg and a plate you can improvise a dandy party game that will take but a few minutes to prepare. Call it *Egg put-n-take.* Draw with pen or pencil, 8 lines from one end of the egg to the other to divide the surface into fairly equal sections. Mark each section either put or take and give the amount. Then spin the egg to learn whether you profit or lose. A large circle may play this game. Not once in a hundred times will the egg stop with the line right on top. A referee may be needed then. See figure 5.

Ball Bounce is played after you make a trip or two to the kitchen. You'll need a cup, two cereal dishes, two pans or pie tins. If the table is too small, place them as shown in figure 6, on the floor about 2 feet apart and with a piece of paper protruding from under each to indicate the value of the "holes." Two players at a time, play the game. A ping pong ball is bounced first on the floor from back of a line 5 feet back of each end dish, then into one of the containers. There will be more misses than hits, at first. The players have a choice of trying for the farther, more difficult cups which count up faster, or the nearby, larger but lower value dishes. It will be a good idea to put some sand, cotton or cloth in each dish to hold the ball, once it drops inside.

Solitaire Peg, calling for a block and pegs or nails, has a number of variations. One type is shown in figure 7. Lay this out on a piece of white pine and bore small holes where shown large enough to take golf tees. To begin the game, place a peg in every hole except the center. When you finish—if you finish!—all pegs must be removed save one which stands by itself in the center hole. If you haven't played this game in any of its variations you will be vexed no end more than once. But it's a dandy to while away an evening and other odd hours.

Cob Tennis is a garden or backyard game played with tennis racquets and a "bird" made from part of a cob and two balanced feathers. The racquets can be dispensed with, if desired. Substantially, the game simulates badminton or tennis but is played in a small area if necessary since the "birds" have no great distance. Equipment needed is shown in figure 8.

You'll have to buy a cocoanut before you can play the game of *Cocoanut Catch,* the needed items for which are shown in figure 9. Choose a nut as symmetrical as possible, as large in diameter as you can find in the pile. Saw this squarely in two. If you have a band saw, it'll be a cinch. Otherwise, clamp the nut and halve with a hand saw after draining off the milk.

Pry out the meat, drill a hole in each end and glue the cups to the ends of maple dowels (or sticks you can whittle out easily) as indicated. Turn a screweye into a couple of golf balls or sponge rubber balls and connect to the sticks with about 3 feet of cord. The object of the game—played by two—is to see who can get the ball into his cup the greatest number of times in 5 minutes. This is a great deal harder than one would at first suppose and is done by deft tossing. When the ball is cupped, the player sings out "One!" when the next is cupped "Two!'" and so on.

Straight-a-way is another peg game. It will remind you perhaps of Chinese Checkers. There are two types of boards. The smaller board with 256 holes is for two players. Lay out the board, then bore small holes at the corners of the squares. If you have a drill press, so much the better, but a hand drill will also do it. Cut a lot of round toothpicks in two. Color one pile blue, the other red or yellow, by dipping them in dye. Each player has a handful of the pegs all of the same color. They take turns in inserting pegs. The object of the game is to see which one can first get a *straight line of* 5 pegs of one color first. The line may be up and down, to the right or left, or diagonally. The object, too, is two-fold. To win, you must not only get your line first, but block the attempts of your opponent.

The larger Straight-a-way board is for 4 players and totals 400 holes. Each square is 10 holes high and 10 holes wide. Four colors of pegs must be used. Skewer sticks from the meat market can also be obtained, cut to length and colored.

A Casting Net

[*Continued from page* 104]

should come 3 or 4-in. above the metal ring. The throw cord should be from 15 to 20 feet long, even 30 feet in length for use in the surf.

Tie a loop in the end of the throw cord, so that you can slip it over your left wrist when casting the net. Coil the throw line and hold it in the left hand, with the net draped over your left arm, lead line down. Catch the lead line in the right hand and, with a swinging motion cast the net out from you so that it flies out, round and flat, when it strikes the surface of the water. The lead line drops quickly, snaring the fish, and you should give several tugs on the throw cord to draw in the bottom of the net, bagging the minnows or fish. With a little practice you can learn to cast the net easily, with good results.

Baseball Record Book

[*Continued from page* 104]

more accurate way is to number the players, and place small numerals in one corner of the box, to show how the play went, such as second baseman (2) to first (1) for the out. Letter the cover of your record book with some appropriate name such as THE MAJORS—1936.

How To Make Gradient Meter

[*Continued from page* 111]

purchased through almost any hardware or tool shop at slight cost. Next cut a strip of wood 7-in. long, 2-in. wide and ½-in. thick. Square the edges, and, laying the tube on the wood in a central position, pencil its outline; then gouge it out so that the tube is sunk in the wood about ½-in. The hollowing out may be ommitted if you haven't the necessary tools, but it is invaluable for steadying and protecting the glass tube. Give the wood a coat of black enamel. Partly fill the groove with liquid glue and press the tube gently into it.

Now cut three strips of thin brass, 1-in. by $\frac{3}{16}$-in., and bend to shape shown. Pierce holes at the ends with a bradawl or other sharp instrument, and then fix them over the glass tube, one in the center and one near each end. Use small wood screws for this in preference to nails, for the pounding of the nails might fracture the glass tube.

Next cut a piece of tinplate or brass to the shape shown. Then pierce and bend back the little tongues and curve the strip to the contour of glass tube, painting the convex face with white enamel; when dry, fix it on the wood block, close to the concave side of glass tube, using small wood screws as before.

Now your instrument is complete with the exception of marking off, and this can be done as follows: Mark out on paper a diagram as illustrated, draw a rectangle 12-in. by 1-in., then mark off from the left-hand side distances of 3-in., 4-in., 5-in., 6-in., 8-in., and 10-in.; connect these points with the corner marked (A) and they will then represent gradients of 1 in 3, 1 in 4, and so on. Now pin the chart to a wall, adjusting its position so that when the lower edge of the gradient meter back is placed against the base line the bubble in the glass tube will be dead central under the middle brass clip. Now place the edge of the wood block against the 1 in 12 line, and on the quadrant make a mark under the center of the bubble, doing this with all the other angles.

Having one side of the quadrant marked, the other may be done by drawing the lines on the chart from the right-hand corner (B) and proceeding as before. The marks should now be permanently drawn in with a drawing-pen and black enamel, the figures being painted under their respective positions.

When fitting your completed gradient meter to your car, motorcycle, or other vehicle, make sure that the wheels are resting on a perfectly level surface and that the little bubble in the glass tube rests at zero.—*I. J. S.*

Potatoes turn green from sunburn and are bitter and inedible.

A bombing plane uses up about a ton of gasoline for a fairly short expedition.

The MI "Picnic Portable"

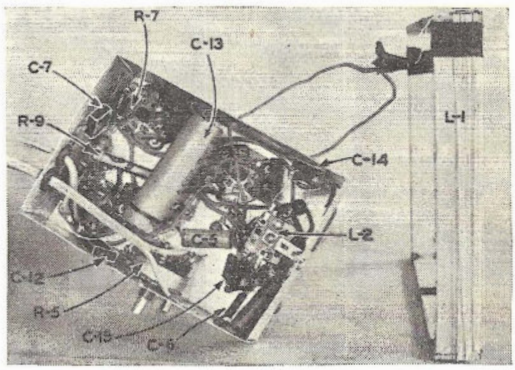
[*Continued from page* 113]

wiring which would put full plate voltage on the tube filaments.

There should be a loud click in the loudspeaker as the "B" batteries are connected. Now, tune the variable condenser across the dial. If you live near a broadcasting station, you will probably hear it, although it may be weak.

Once you have picked up a station—if there are no strong stations in your locality better have the set lined up by a service man who has a test oscillator—you are ready to make the alignment adjustments.

The first step is tuning the I. F. transformers. With the set tuned to pick up the station, adjust the trimmers on top of the transformers until the signal is the loudest (most transformers are aligned at the factory, so little adjustment will be necessary).



Underside of the chassis and close-up of the loop. The frame of the latter is made of thin strips of wood, and the wire is merely taped in place.

The next step is to adjust the padding condenser. This is adjusted for maximum volume with the set turned to a station close to 600 kilocycles.

For the final aligning of the trimmer condensers (C2, C4) on the variable condenser sections, the set, batteries, and loop should be arranged as nearly as possible in the manner in which they are in the completed receiver. In aligning the set shown in the photographs, the chassis was placed inside of the loop and the batteries mounted between the chassis and the loop, as they are when the set is closed.

Tune in a station at the high-frequency end of the band. With an insulated screwdriver, adjust the trimmer (C4) on the oscillator section of the two-gang variable condenser to approximately half capacity, retuning if necessary with the variable in order to pick up the station. The final step is adjusting the trimmer (C2) for the mixer stage for maximum volume. It may be necessary to go back and "touch up" all trimmer adjustments for maximum efficiency.

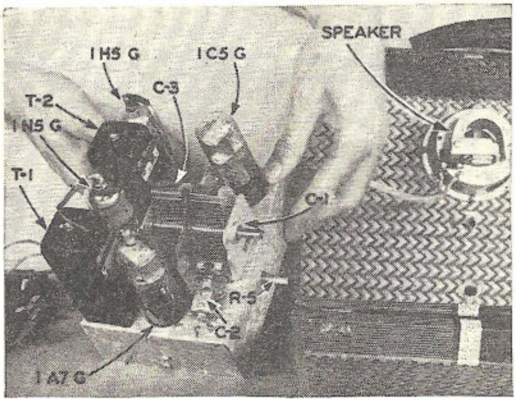
Once the set is aligned, you are ready to install

[*Continued on next page*]

The MI "Picnic Portable"

[*Continued from preceding page*]

it in the case. If the overnight bag is the inexpensive fiber-board variety you can cut the hole for the loudspeaker with a sharp pocket knife. The dial is cemented to the front of the case.



Distribution of the parts on the top of the chassis of the "Picnic Portable." In mounting the speaker in the face of the overnight bag, make sure it clears the movable plates of the tuning condenser C1-C3.

This set, like any radio, works best with a good antenna and ground, although the loop is sufficient for reception of the stronger stations. For "DX" reception, however, an antenna and ground should be connected to the antenna coupling coil, which consists of a single turn of wire wound on the frame close to the loop.

Marine Pin-Up Lamp

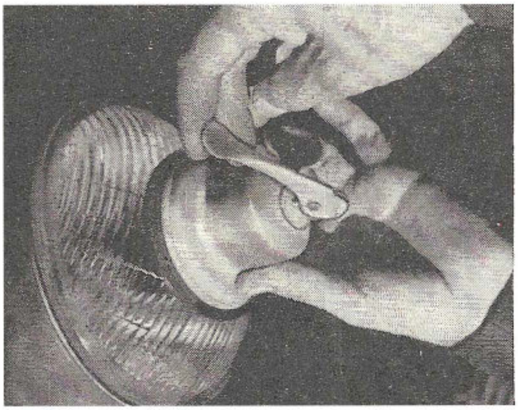
[*Continued from page* 108]

deep, this being turned now, along with any decorative grooved rings in the well for when the lamp is hung on the wall and the ash tray removed, of course. A slanting face is turned in the balance of the base face, as seen with other complete details in the cross-section. While the base is in the lathe drill the wheel spoke holes, six at 60 deg. apart, 3/8-in. from the back, using a 1/4-in. bit, making them 1/2-in. deep. Sand with fine garnet paper while in the machine. After removing the base from the lathe a space to take the strap end is cut between two spokes, 1/8x1x1 1/4-in., using saw cuts and chisel or dadoe cutter. A small painted screweye is set directly opposite for straight hanging.

Turning of the spokes is done in two set-ups, cutting three each time from one piece of stock between centers, and following the drawn dimensioned shape. Cut the pieces almost through, take them from the lathe and finish cutting with jigsaw, then sandpaper the stub smooth. All other sanding is best done in the lathe. Glue in the spokes, then stain the wood parts with maple varnish stain, two coats, finish with extra fine sandpaper and oil, followed by furniture wax paste.

New Ideas for Home & Shop

Names and addresses of manufacturers of products described below will be sent free to any reader on request, provided a stamped, return envelope accompanies the inquiry. Mention date of issue when writing.



A suction tool strong enough to pick up 40 pounds dead weight is handy for the auto mechanic. It is designed especially for removing glass parts or hub caps and for pulling out soft dents in car bodies.

A crayon made for writing on hot metals will not melt or run off. When used on cold metals, the mark is not obliterated by heating.

A propeller for outboard motors changes pitch automatically so that it can be used for trolling. The slower the speed of the motor, the lower the pitch of the propeller.

A new mineral product which replaces sand makes a harder and tougher concrete. It is crushed, washed, dried and graded for size and is usable with mastic floor patching material.

Aluminum alloy bags, designed for air travel, combine lightness with strength. They are equipped with rubber seal gaskets which keep out moisture and dust.

A polish cleans and replates silverware at the same time. It polishes but does not plate gold, steel and chromium.

A quick acting paint remover, which contains no caustic or alcohol, will remove paint in ten minutes, usually after one application. It won't burn or harm brushes.

A paint scraper which uses old razor blades contains slots for shifting the blade to various positions and a compartment for extra blades.

A small outboard motor with an adjustable mounting bracket will run on storage batteries.

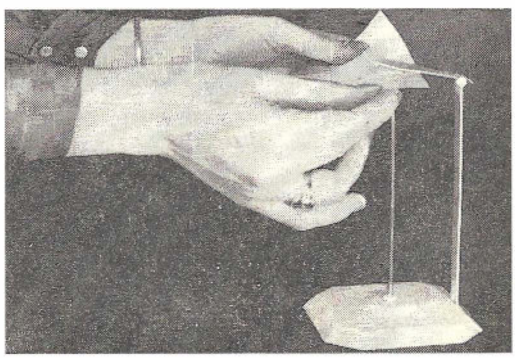
Hot water is instantly available anywhere in the house by means of a portable electric heater which holds two gallons. It can be attached to the faucet by a copper or rubber hose.

Paper plates lined with aluminum foil have an attractive silvery appearance and are particularly suited for serving moist foods.

Economy and better food preservation results in an electric refrigerator with the thermostat removed from the cold box so that food load and room temperature govern its operation rather than temperature of the freezing unit.

A rapid air-drying enamel, which is elastic and adheres well to wood and steel, sets in 20 minutes and gives high gloss in one coat.

A scale has been designed to resist rust and acids without working in a pool of oil.



This latest style desk spindle is provided with a side brace which supports a hinged protective flap, thus guarding against injury to hands or clothes from the sharp point.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