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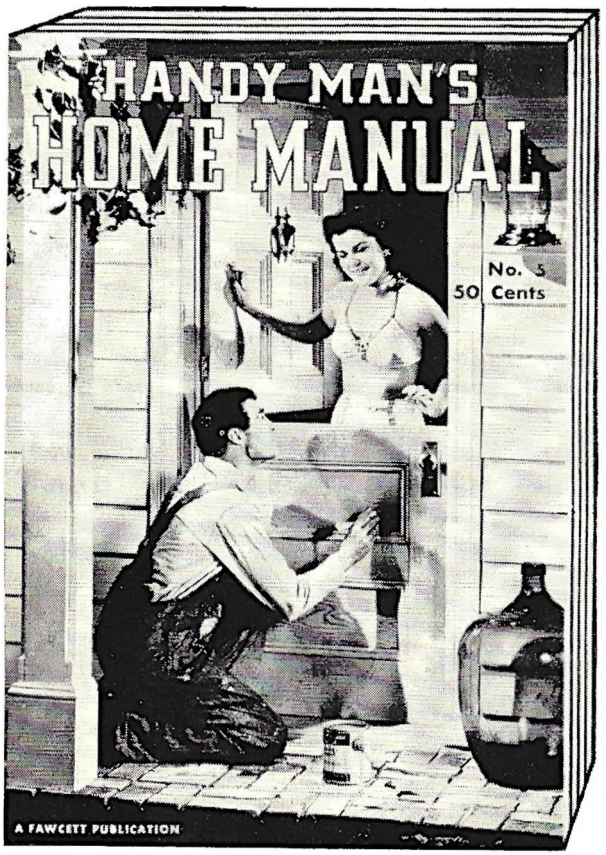

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JULY
1941

Volume XXVI
Number 3

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DONALD
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Don Cooley, whose article, "You're Wanted—For A Defense Job!" appears on page 40, will be remembered by readers of MECHANIX ILLUSTRATED for his highly authentic and informative series of articles on "Your Job," which appeared last year. Don started his career writing detective and adventure stories, and then found a happy outlet for a lifelong interest in science when MECHANIX ILLUSTRATED (then MODERN MECHANIX) was being organized. After five years at the editorial helm, he became curious to know if several South Sea novelettes he had written were authentic as to background, so he spent a summer in Tahiti and returned to New York to become a free-lance writer. In recent years he has been writing mostly on scientific and medical subjects, since he believes that the most fascinating of today's developments are taking place in those fields.

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ROBERT HERTZBERG, Editor

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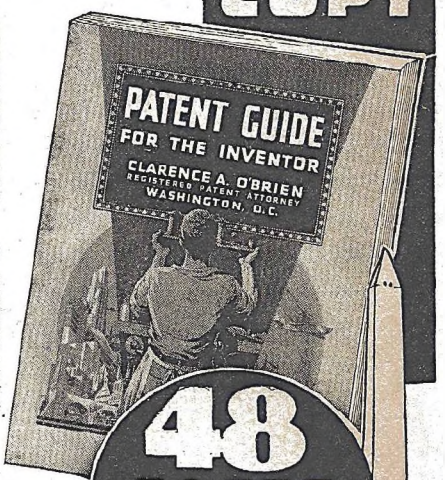

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CHIPS FROM THE EDITOR'S WORKBENCH

WELL the contest is over.

You'll find the names of the winners announced on pages 68 and 69 of this issue, and here's hoping your name is among the prize winners. If it isn't, don't give up. There'll be other chances for you to win in the future and, judging by the excellence of the entries in the present contest, MI readers aren't the type that give up easily.

Our hat is off to Gene Drorio of Brooklyn, New York, who came out on top and walked off with the Taylorcraft Trainer. Gene made a fight of it right down the home stretch and only emerged the victor after a terrific struggle.

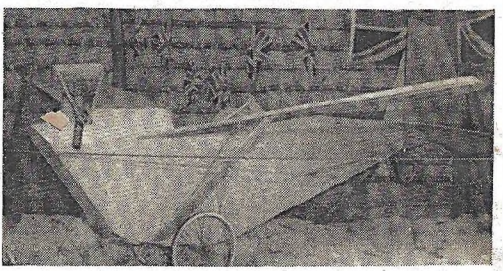
The thing that amazed us about this contest was the great number of people who lost out through carelessness and inaccuracy. Although Gene's winning score was 2,564, there were many entries that topped this figure, some going as high as five and six thousand. However, because they failed to follow the rules of the game, made mistakes in arithmetic, misspelled words, used the wrong grammar, slipped up on when plurals are used or not used, or made their entries so illegible the judges were unable to decipher them, their entries had to be discarded. Gene's entry was the first the judges found which followed *every rule*, used plurals only when they could be used, and seemed to understand the words he had compiled for his puzzles.

But it's all water under the bridge by now and if your entry was not among the winners, we hope you'll take your loss like the good sports we know you are. Please DON'T write to inquire what was wrong with your entry. More than 62,000 readers entered this contest and to attempt to correspond with every non-prize-winner would be a most monumental task. We wish we could have a word with all of you and explain your mistakes, but we can't, and that's that.

* * *

SPEAKING of the contest, we think you will be interested in some statistics worked up by one of the bright boys on the staff of MI. When the total number of entries—62,635—had been received in these offices, our little man went to work to see how much effort had been put into the contest by you readers. Figuring that each contestant worked an average of four hours on each puzzle, our man came through with the informa-

[*Continued on page* 12]



This model of "Hedge-Hopper Harry," built from plans in FLYING MANUAL, won a special award and a blue ribbon for 15-year-old John B. Cash at the 1941 Bahamas Fair, held at Nassau, Bahamas Islands. "It performs beautifully!" John writes. "It has a 2½ h.p. air-cooled motor and I carved the prop from hard wood myself. This picture is taken at the Bahamas Fair, and if you will look closely you can see the blue ribbon I won, attached to the motor."

Such outstanding work, we feel, entitled John to an additional prize, and he will receive an Editor's Workbench check for $3.

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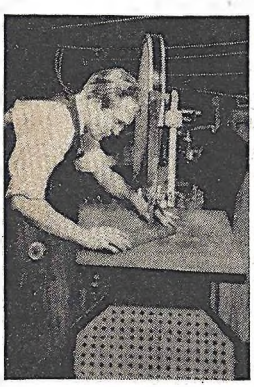
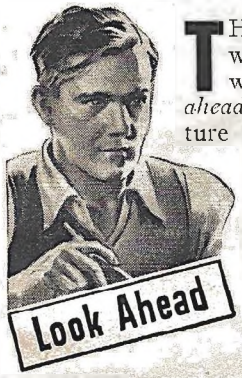


"I have been an ardent reader of MECHANIX ILLUSTRATED and its predecessor MODERN MECHANIX, for a number of years," writes Mike Mitchell, of 313 Woodrow Street, Lyndora, Pennsylvania, "and I think that it is one of the best magazines on the market."

Mike and his father were looking through some old issues of the magazine when they got the idea of building some power tools for their workshop. The mechanical experience which Mike's father has had in the course of his work in a mill no doubt helped the pair to turn out this fine looking bandsaw. The saw table can be tilted 30 degrees from the horizontal plane. It handles work up to 9 inches, cuts to the center of a 46-inch circle, and stands 70 inches high. The wheels are driven at 750 R.P.M. Most moving parts are covered.

Mike, who is nineteen years old, also tells us that he and his father have also recently completed a grinder for their shop. The cost of the bandsaw was about $20.00 the builder writes. That doesn't include the motor. The $5.00 Workbench award that these snapshots net Mr. Mitchell will, perhaps, help buy materials for Mike and his dad's next project.

INVENTORS



THIS is the time of year when ambitious, forward-thinking men *look ahead,* lay plans for the future that may mature into profitable reality. Last year the record-playing attachment for radios became a reality and sold like "hot cakes" at a low popular price. Women's clothes were almost revolutionized by the introduction of the "house coat." The "electric nurse"—a guard against kidnappers—hit the market with a bang. Portable air-conditioners went up in value, down in price. The gearless hydraulic transmission has become a practicality. Farmers saved thousands of dollars with electric fencing.

Every year brings new inventions. There will be more in 1941. Smart men will plant the seeds of invention into the fields of industry, and reap the harvest when it is ripe. So do your spring "idea planting" early.

Where We Can Help

"Planting," as you know, is not all there is to it. It takes watering, weeding, thinning, and pruning to make things grow right. Here is where we can help you: Through more than forty years—good times and bad—this organization of experienced searchers, expert patent draftsmen, skilled patent attorneys, and faithful clerical employees has helped inventors at every step. Our prompt and skillful service has taken literally thousands of crude ideas—many of them sketched with a pencil stub by the light of an oil-lamp—and marched them through to the final, formal grant of a United States patent.

The minute your letter of inquiry, or coupon, comes to this office, a highly trained group of 40 men and women—occupying nearly the whole floor of a big office building—swings into action to serve you. Convenient fees can be arranged.

Many Small Ideas May Have Large Commercial Possibilities

The man who tinkers for years with a big industrial machine, costing thousands of dollars, isn't necessarily the most successful inventor. Think today of markets in the mass . . . of a hundred million people spending nickels and dimes for matches, safety pins, soap dishes, can openers and other household necessities. Think of something NEW and BETTER that the millions will want. LOOK AROUND. See what they're buying at Woolworth's, Kresge's, Walgreen's. Look around your own home, your own neighborhood. Often a small, practical invention is worth more than a complicated machine.

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Chips From The Editor's Workbench

[*Continued from page* 10]

tion that, if one person had attempted to do all 62,635 puzzles, it would take him 35¾ calendar years to complete the job, working every minute and every hour of every day in the year!

Looking at it from another angle, our man decided that it was too much to expect one fellow to work for 35 years without pausing for breath. Therefore, he decided that, if one man worked eight hours a day, seven days a week on the puzzles, it would take him 107¼ working years to finish the job, figuring again that he took four hours for each puzzle.

We hope nobody will take us up on this job and will sit down in an attempt to prove that we were wrong. If he does, and we're still around 107 years from now, we will be more than interested in his report.

* * *

ALONG about now we imagine your mind is running in the same channel ours is and that you are beginning to think about digging out your bathing suit for a little active use. If so, we imagine you'll be more than interested in the story beginning on page 34 of this issue of MI.

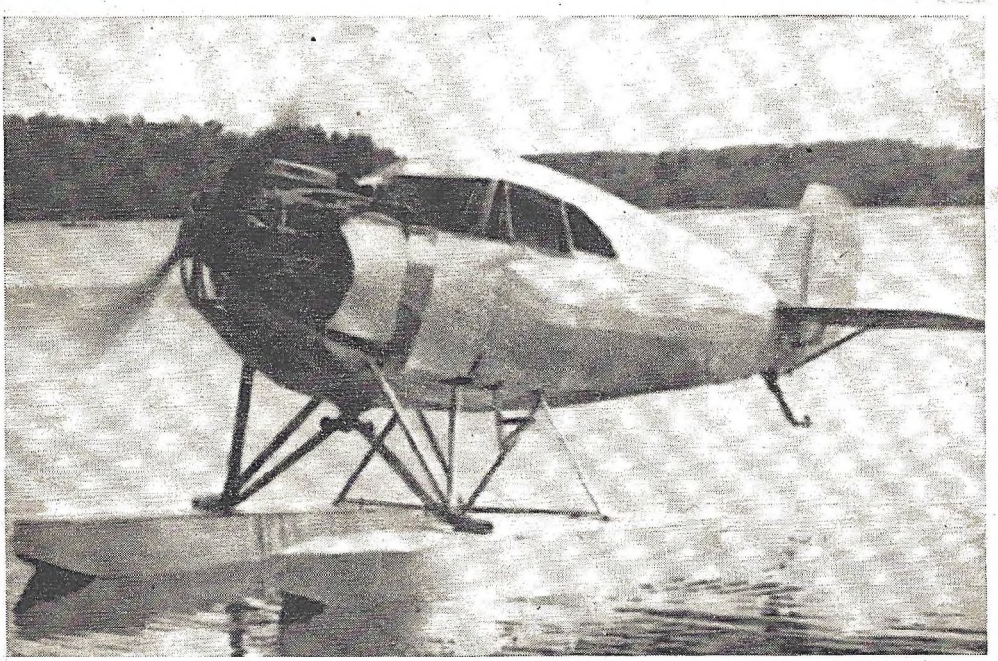
The story, "Man—Meat for the Shark," is truly one of the most amazing yarns we have ever picked up for use in this magazine. As you will note, it is absolute and final proof, if any be needed, that our friend the shark is truly a most unpleasant citizen. The author of the story, Lieut. Horace E. Mazet, presents facts and figures to prove that scientists who claim the shark is not dangerous have just never had any real contact with one of these tough guys of the deep.

Were we to have given you all of the cases of bathers who have been attacked by sharks which Lieut. Mazet sent to us, we would have been unable to run anything else in this issue of MI. We simply had to weed out the best of them and we think you will agree with us that they're honeys. Read the story for yourself, however, and see if it doesn't give you the chills. Don't take it too seriously, though. If you are accustomed to doing your swimming in temperate waters, you are not apt to run up against any sharks.

Even so, we are inclined, after editing the story, to do all our future swimming in the bathtub.

* * *

HERE'S a tip—be sure to reserve your September issue of MI right now! There's going to be a story in it which we think you'll want to read and show to your friends.



An excellent example of the ingenuity and ability of a typical MECHANIX ILLUSTRATED reader, this hydroplane is the workshop child of Herbert A. Sturtevant, of 26 Green St., Hudson, N. Y. Powered by a Chevrolet motor equipped with self-starter, it is built around the fuselage of an old American Eagle. The pontoons are of plywood and are easily removed and replaced by automobile wheels to facilitate towing. The tail skid is convertible into a trailer coupling assembly. Mr. Sturtevant gets a $3 Workbench award for this photograph.

The story we have in mind is written by a gentleman who had never been up in an airplane either as a passenger or a pilot in all his lifetime. His story, however, tells how he went to Roosevelt Field, Long Island, took off in a plane, flew it for an hour, doing banks, turns, dives, climbs and so on, and then landed it all by himself!

Think we're kidding?

You won't if you read the September issue, for the plane used by this writer was a type about which we think you will be hearing plenty in the next few years. Supposedly spinproof and able to be flown by anyone who can drive an automobile, it seems destined to be the most revolutionary step taken in aviation since the Wright brothers did their trick at Kitty Hawk.

You had better order this issue now, for if we know a story when we see one, this one will develop into a sell-out.

* * *

WE HAVE been very much interested of late in reports from Washington to the effect that 45% of the men subject to draft call are physically unfit. This is truly an appalling situation for a country as advanced medically and scientifically as ours is. We are inclined to believe that there is something wrong with our educational setup as it exists today.

It seems to us that our draftees have been ignoring the very philosophy we have preached in this

[*Continued on page* 14]

Editor's Workbench Chips

[*Continued from page* 13]

magazine since its founding; namely, the need for some kind of mental relaxation from our work-a-day world. We think this relaxation can best be found in the workshop or in some form of handicraft.

We don't recall off hand who it was who made the remark that the best vacation in the world for an office worker can be found in a workshop, but whoever said it, we think the gentleman (or lady!) was 100% correct. Whenever we get completely bogged down in the office, we know of no finer way of chasing the cobwebs out of our alleged brain than to go into our workshop and start in on some project or other. We believe you old-time readers of MI will agree with every word of this philosophy and we also believe that if more prospective draftees were MI readers, that 45% figure would be considerably smaller.

* * *

ARE you looking for a job?

If you are, you better turn right now to page 40 of this issue where you'll find some information on how to get yourself employed.

We are referring to Don Cooley's up-to-the-minute article entitled "You're Wanted—for a Defense Job." In this story, Mr. Cooley presents a complete round-up of the Government's need for skilled workers under the defense program. He shows how skilled labor today is in great

[*Continued on page* 16]

Mr. W. McMullen, of 2041 Waterbury Road, Lakewood, Ohio, is the proud owner and builder of this fine model power cruiser *Electra*. Although the plans for the boat ran in the April, 1940 issue of MECHANIX ILLUSTRATED, Mr. McMullen did not complete his model until the frosty weather had arrived. He tested her out for stability afloat, but had the amazing patience to wait for Spring before testing her under power. It's easy to see that the builder put a lot of careful work into the finish of his little craft, and by this time is probably chasing her around in a rowboat. This snapshot nets the builder a $3.00 Workbench award.

DO THE DEAD RETURN?

A strange man in Los Angeles, known as "The Voice of Two Worlds," tells of astonishing experiences in far-off and mysterious Tibet, often called the land of miracles by the few travelers permitted to visit it. Here he lived among the lamas, mystic priests of the temple. "In your previous lifetime," a very old lama told him, "you lived here, a lama in this temple. You and I were boys together. I lived on, but you died in youth, and were reborn in England. I have been expecting your return."

The young Englishman was amazed as he looked around the temple where he was believed to have lived and died. It seemed uncannily familiar, he appeared to know every nook and corner of it, yet—at least in this lifetime—he had never been there before. And mysterious was the set of circumstances that had brought him. Could it be a case of reincarnation, that strange belief of the East that souls return to earth again and again, living many lifetimes?

Because of their belief that he had formerly been a lama in the temple, the lamas welcomed the young man with open arms and taught him rare mysteries and long-hidden practices, closely guarded for three thousand years by the sages, which have enabled many to perform amazing feats. He says that the system often leads to almost unbelievable improvement in power of mind, can be used to achieve brilliant business and professional success as well as great happiness. The young man himself later became a noted explorer and geographer, a successful publisher of maps and atlases of the Far East, used throughout the world.

"There is in all men a sleeping giant of mindpower," he says. "When awakened, it can make man capable of surprising feats, from the prolonging of youth to success in many other worthy endeavors." The system is said by many to promote improvement in health; others tell of increased bodily strength, courage and poise.

"The time has come for this long-hidden system to be disclosed to the Western world," declares the author, and offers to send his amazing 9,000 word treatise—which reveals many startling results—to sincere readers of this publication, free of cost or obligation. For your free copy, address the Institute of Mentalphysics, 213 South Hobart Blvd., Dept. 172T, Los Angeles, Calif. Readers are urged to write promptly, as only a limited number of the free treatises have been printed.

Editor's Workbench Chips

[*Continued from page* 14]

demand. What is more important, however, is that he proves that everyone of us has some skill or other and if we examine ourselves carefully, there is no reason why we all shouldn't land a swell-paying position in some vital defense industry.

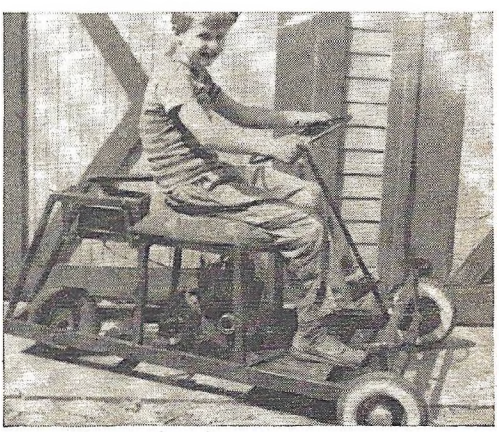
Read Mr. Cooley's article now, if you are looking for work. Above all, take the little test he has prepared to go along with his story. It may be the beginning for you of a long and very remunerative career.

* * *

EVERY now and then we run a story in this book which seems to hit you readers just right. Such a story was "Dollar-A-Day Holiday" in the May issue.

We have been literally swamped with mail from readers who want to know more about the exciting business of hosteling. Apparently, many of you readers have your eyes on an inexpensive vacation, and hosteling seems to be the answer to any problem you may have.

In this connection, we think we ought to call your attention to a little booklet now being offered by the American Pad & Textile Company of Greenfield, Ohio. The book is entitled "100 Do's and Don't's to Make Your Vacation in the Woods Safer, Healthier and More Enjoyable." This little booklet (which isn't really too little) is just packed with helpful hints for vacationists. It tells you how to make a camp clock, how to get dry wood in wet weather, how to keep warm when sleeping in a cold camp, how to tell the depth of a chasm, how to tell how tall a tree is, and just



This is a 25-mile-an-hour "put-put" built by Jack Elston, 14 years old, of 2515 Buchanan Street NE., Minneapolis, Minn. "I got interested looking at the midget autos in MI," Jack writes, "so I built my own. All the parts are home made except for wheels, motor, pulleys and belts. It is powered with a ¾ h.p. lawn mower motor. A friend of mine is shown on the put-put in this picture." Jack's whizzer looks very workmanlike, and wins him a $3 Workbench check.

Editor's Workbench Chips

about everything else you might need on an overland hike.

We have one of these little booklets of our own and we wouldn't part with it for the world. We think you folks could use one too. If we're wrong, forget about it.

* * *

THE boys down at the Federal Communications Commission have our name on their mailing list and thoughtfully send us every little item that comes out of their office. We are most fascinated, however, by a little periodical they get out called "From the Mail Bag."

In a recent issue of this publication was an item of some interest which told about how someone out in California is objecting to advertising on the radio on Sunday. According to him, such commercialism is sacrilegious.

All of which we think is so much hooey. Our friend, the Californian, seems to forget that the free entertainment, music, education and so on which pours out of his loud speaker is made possible by advertisers. We don't like long-winded announcers spouting advertising any more than the complainer from the Coast. However, every time we tend to get mad we remember that if the advertisers didn't pay the bills for our radio entertainment, someone else would have to do it—and that someone would be the guy who listens in.

But we're paying out all of our salary we can

[*Continued on page* 18]

A bookkeeper by profession and claiming to have little mechanical skill, Ray Rehder, 3181 Minnesota Avenue, St. Louis, Mo., turned out this neat mahogany "Buzzer" in his spare time. "I was much surprised at the ease with which I could follow your plans," Mr. Rehder writes. "This boat has two cockpits and a motor well. She makes 36 miles per hour, and will carry five persons at a fairly good speed. I have installed an automobile gasoline tank under the deck between the two cockpits and find, with it, I can run many miles without refueling." Plans for the "Buzzer" can be obtained by writing Fawcett Publications, Greenwich, Conn., and asking for blueprint No. 916. The price is $1.50. Mr. Rehder will receive a Workbench check for $3 for his creditable work.

Editor's Workbench Chips

[*Continued from page 17*]

afford right now. So that lets us out. We'll stick by the advertisers.

* * *

YOU may remember we told you last month to pay particular attention to the story "Crashes Can Be Harmless" which was written by our aviation editor, George Daniels. If you read that story in the June issue, you may recall that it proved conclusively that where American commercial aviation was making its mistake was in trying to *prevent* airline crashes rather than in trying to do something about cutting down the loss of life when such crashes occur.

We are bringing this up again at this time because of the fact that the congressional hearings in Washington into the causes of recent airline deaths are discovering pretty much the same sort of thing as Mr. Daniels brought out in his article. The one thing they are failing to discover, however, is the solution of the problem. In his story, Mr. Daniels gave the solution.

What was it? Well, get out your June issue of

This smooth-looking sloop, the Corky, was built from Blueprints No. 908 by L. Bruce Kelly, 117 E. San Marino Ave., Alhambra, Calif. "She is fast, dry, seaworthy and seats 8 comfortably," he writes. Mr. Kelly has added cockpit coaming, seat and two fore-stays to the original plans. Copies of the blueprints may be obtained for $3.00 from Fawcett Publications, Greenwich, Conn. This photo wins a $3.00 Workbench prize.

Congratulations, Mr. Kelly, and smooth sailing to you! We imagine you're due for some swell times this summer.

"This is my midget auto, 'Spitfire,'" writes Joseph Pagluica, R. D. 1, Oakdale, Pa. "It is one of my first models, and most of the credit should go to the accurate and full-sized prints you furnish in your MODEL BUILDERS HANDBOOK." The MODEL BUILDERS HANDBOOK may be obtained for 50 cents by addressing Fawcett Publications, Greenwich, Conn. A Workbench check for $3.00 goes to Joseph for his snapshot and model.

Editor's Workbench Chips

MI again and take a look. Then, if you agree with us, get out your pen and paper. We imagine your representative in Congress would be interested in hearing your point of view in this matter.

* * *

INCIDENTALLY, if we ever had any doubt about whether you readers are interested in this workbench section, we have plenty of proof right here on our desk. We just received a letter from Bob Hackett of Freeland, Michigan, whose picture appeared in these columns several months ago with the homemade tractor he had built. Since that time, Bob says he has received 463 letters and 38 postcards from MI readers all over the

[*Continued on page* 20]

This "model" plane is quite a handful! It's almost as big as its builder, Harry B. Pace, Buck Hill Falls, Pa., who wins a $3.00 Workbench check for this picture. He put more than 1,700 separate pieces of wood into the construction of the various members, a job that required more than half a year to complete.

We're wondering if Harry plans to enter her in the big model meet in Chicago this month. Hope we see you there, Harry!

The comfort of the kayak in which this young sunbather is seated is due largely to the fine workmanship the builder put into the craft. Mr. Lee Harvey, of 179 Ridge St., Glens Falls, N. Y., built the boat from plans in MECHANIX ILLUSTRATED. (Canvas kayak blueprints are available from Fawcett Publications, Greenwich, Conn., for 50 cents, blueprint No. 915.) The boat is named the "Blue Streak," and although its owner and builder only uses it about once a week, he says, "—I've already become accustomed enough to handling it so that I experience no difficulty in managing it when the lake is really rough, and Lake George can get rough." This picture wins Mr. Harvey a $3.00 Workbench award.

Editor's Workbench Chips

[*Continued from page 19*]

country who want to know how they can build a tractor like his of their own.

As a result, we have persuaded Bob to give us the dope on his tractor and we will run it as a how-to-build item in the August issue. So, if you failed to get the plans from Bob himself, you'll learn all you need to know in the next issue.

Incidentally, we are always interested to hear of your liking one of our workbench projects. So, if one happens to appeal to you, by all means shoot us a letter about it. Don't be bashful. It only costs you three cents.

* * *

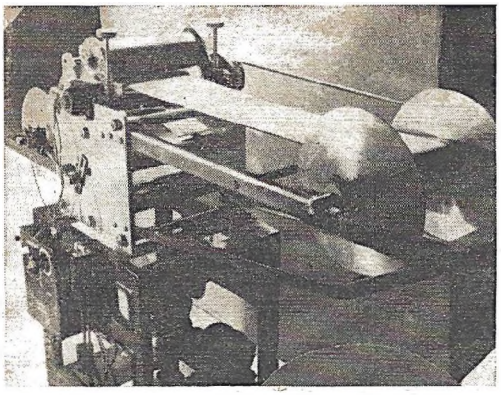
A GENTLEMAN from the Republic Aviation Corporation stopped in our office the other day to give us a little nugget of information which we regard as so valuable and so important we simply must pass it along to you.

This clever craft is a water bicycle constructed by Donald DuBois, Cross City, Fla., and capable of a speed of 10 miles an hour forward or backward. The pontoons are made of a wood framework covered with galvanized tin soldered at the seams, and the balance of the craft is made up of an old bicycle frame, some tubing and a homemade paddlewheel. Donald was inspired by reading MECHANIX ILLUSTRATED, and now is thinking about model planes. For his snapshot and ingenuity, he will receive a Workbench check for $3.00.

The man from the RAC was telling us how they make rivets in his company's plant. According to him, rivets pass through such stages of extreme heat and cold, coming from the depths of the earth and then soaring to the very roof of the sky, they have to be given all kinds of funny treatment before they are ready for use in the plant. Accordingly, rivets for Republic planes are treated first with melted saltpeter at a temperature of 930 degrees F. and a split second later are plunged into icy water. Following this cold bath, the rivets have to be stored in a cold place, and where do you think they put them?

Well, that's the secret. They store them in an ordinary household ice box. We'll have to remember this next time we go to our ice box for a bottle of beer. Look out for rivets!

—The Editor



The original embossing machine with which Winnek made his first lenticulated films for trivision.

Is A Photographic Revolution Coming?

Photographic prints that show amazing three-dimensional perspective; medical X-rays that tell surgeons just how deep to cut and where; advertising signs that peer at you with lifelike reality and magazine covers that do the same thing—these are only a few of the applications of the improved system of stereoscopic photography, known as trivision, invented by young 33-year-old Douglas F. Winnek.

The Navy is writing a contract for Winnek to construct a film magazine for one of their standard Fairchild aerial cameras so that the invention can be tried in accordance with the Navy's rigid standards of perfection.

Key to the Winnek success that now seems imminent has been the development of an embossing machine which takes the photographic film of any manufacturer and puts the lenticulated ridges on it that are the secret of the three-dimensional trivision effects. The film, in its long uncut rolls from the factory, is simply run through the machine and comes out with the vital ridges on it.

Recently, Mr. Winnek showed pictures having 200 ridges per inch and he is now perfecting a 300-ridge arrangement. He says if this can be obtained the eye will be unable to discern the ridges, and by making the film thin, it can become virtually invisible to the eye.

Mr. Winnek makes little claim for unique originality in his use of the lenticulated ridges on film to produce the illusion of depth in film transparencies.

Ridges on a separate screen and in the film itself have a respectable history in the photographic art. His real achievement is the virtually automatic production of these ridges on ordinary film.

The saga of Douglas Winnek sounds like a combination of Thomas Edison and Horatio Alger, for

[*Continued on page 22*]

Photographic Revolution

[*Continued from page 21*]

Winnek came up the hard way via the motion picture industry without formal education in colleges.

While trivision photographic prints represent the large commercial market for his depth pictures, Winnek is momentarily keenly interested in his transparencies in connection with X-ray film. It is possible, he says to mark this X-ray film with a faint cross hatch of blue lines which, on the margins of the film, can be calibrated in terms of the actual depth perspective of the X-ray picture. This means that a surgeon can look at such a picture directly and can determine where and how deep his surgical objective may be.

"Trivision three-dimensional pictures are achieved by the use of an invisible transparent screen which is an integral part of the picture. This screen consists of a series of microscopically small lens bars, or ridges.

"These ridges on the film negative break up the single image of an ordinary photographic impression into a whole series of multiple images on the film emulsion.

"The film is developed in the ordinary way as though the ridges were not present at all. When developed and fixed, the transparency is viewed through the ridged, or lenticulated side. Your right eye sees one particular image out of the infinite number of panoramic glimpses present in the fixed emulsion.

"Your left, however, sees a slightly different set of panoramic glimpses."

Try this simple experiment to discover how greatly different are the two pictures which your eyes observe in normal vision. Hold up a thin object like a playing card or a package of cigarettes edgewise, and about one foot from your nose. Look at it with the left eye alone and then with the right eye alone. It is the combination of these two very different views in your brain which enables you to know that the playing card or cigarette pack has a depth.

Mr. Winnek says that owners of wide aperture lens cameras will obtain the best pictures but that almost any old camera will give an astounding degree of perspective. He estimates that at an increased cost of only 5 per cent it will be possible to process ordinary film into trivision film.

Letters To The Editor

To The Editor:
Dear Sir:

I am sorry that I have not been a reader of your magazine for very long. While looking for something interesting to read one day, I picked up a copy of MECHANIX ILLUSTRATED. It happened to be the one that contained the first part of your contest. Everything in it was interesting. So now, whether my entry to the contest is a prize winner or not, I am positive that I will always be a reader.

I am sure that no matter how far I look I will never find a magazine that covers so many subjects and does it thoroughly—and for the small price of 10 cents.

Sergt. Burton E. Dunn,
Fort Sill, Okla.

* * *

To The Editor:
Dear Sir:

Whether I win one of your many prizes or not, I have had a grand time working out your contest.

To be sure I get *twelve* prizes, I am enclosing a dollar for a year's subscription. Thus, regardless of the contest, I am a winner!

H. A. Smith,
556 Hill,
Grand Junction, Colo.

* * *

To The Editor:
Dear Sir:

The little man who writes your monthly quiz, "You're Right—That's Wrong," must be the same fellow who is writing most of the radio jokes today.

Imagine anyone pulling such a lousy play on words as, "An anecdote is a remedy for poison."

Your anecdotes will have to be a lot stronger than that to remedy the poison of such puns.

Horace Retch,
St. Paul, Minn.

Some pun, eh, kid?

* * *

To The Editor:
Dear Sir:

Since I am a private pilot, I've taken a very keen interest in the airplane tips and articles in your magazine.

I am an architectural engineer, and I find MECHANIX ILLUSTRATED very interesting. I particularly liked the recent article, "Bombproofing America." Here's for the best of luck to your magazine.

Charles E. Kaiser
Manhattan, Kans.

[*Continued on page 24*]

Letters To The Editor

[*Continued from page 23*]

To The Editor:
Dear Sir:

I can't for the life of me see how anyone in his right mind could be silly enough to waste time and money on such things as midget racing automobiles. I should think there'd be some better way to employ wealth and intelligence.

George Grotts,
Kansas City, Mo.

* * *

To The Editor:
Dear Sir:

I am a boy of 11 years and I sure do like your magazine. I take it to school with me so we can learn to build things. My father and mother and all the rest in the family read it and enjoy it and there seems to be something for everybody in it.

Arthur Shannon,
Corpus Christi, Tex.

* * *

To The Editor:
Dear Sir:

This is the first MECHANIX ILLUSTRATED I have ever purchased. The copy I bought was the last in the store. Mrs. Lilley, the owner of the drug store where I got it, suggested it to me. I am an MI monthly reader hereafter. Mrs. Lilley said if everything in the drug store moved as fast as MI, the store would be a daily sell-out.

Patrick G. Hanlon,
Kansas City, Kans.

* * *

To The Editor:
Dear Sir:

My son brought me your magazine as a present, and I am delighted with it. I am making the shoe-scraper in the March issue, then I see a lot of other things to make.

Mrs. O. Sasse,
Swink, Colo.

* * *

To The Editor:
Dear Sir:

Amid the slush that is seen in so many news and cigar shops, it is refreshing and encouraging to find a clean and useful magazine of the high quality of MECHANIX ILLUSTRATED. Mr. Rust, a friend of mine, who is a widely known attorney and leader of the community, keeps your magazine constantly on the reading table of his outer office —a fact which speaks volumes.

W. L. Runyan,
Berkeley, Calif.

Letters To The Editor

To The Editor:
Dear Sir:

How about more war stories? MECHANIX ILLUSTRATED has had some of the best war yarns from a mechanical point of view that I have ever read, but I would like to see more of them. Your magazine has kept away from the stereotyped stuff the others have been running and seems to have had the knack for picking out only the really interesting and new material. But what about more of it?

Dan McMahon,
Jacksonville, Fla.

Take a look in this issue, Mr. McMahon!

* * *

To The Editor:
Dear Sir:

I find MI a very fine and educational magazine. Its plainly listed ideas and prints are simple to follow, and it is a model builder's "extra lift." I can hardly wait until each new issue is on the stands.

Joe A. Hmunavich,
Wood River, Ill.

* * *

To The Editor:
Dear Sir:

I get sick and tired of reading nothing but mushy letters in your Letters to the Editor Column. Doesn't anybody ever get mad at you and bawl the pants off you? And if they do, do you ever print it? I doubt whether you do.

Joseph Prarier,
Bellingham, Wash.

Just you, Mr. Prarier. Just you!

* * *

To The Editor:
Dear Sir:

I am only a tool grinder here in Springfield, but when I read what some of your other readers have written about MI departments, I boil. For many years I have searched through the mechanical magazines looking for such a book as MI. When I first saw it two or three years ago, I started buying it and have been buying it ever since. After I read them, I pass them on to a friend who has a nice workshop. He has made many things, using the ideas in MI, and they are good.

Merton H. Childs,
Springfield, Mass.

[*Continued on page* 33]

MONEYMAKERS Classified

15¢ a Word

MONEYSAVERS

PROFITABLE SIDELINES • HOBBIES • SPECIAL BARGAIN BUYS

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

ADVERTISING SERVICES & AGENCIES

GUARANTEED RESULTFUL mailorder letters, circulars, campaigns, planned, written. Clients everywhere. Moderate charges. Les Finkel, Advertising, 521 Fifth Avenue, New York.

ATTENTION TO advertisers, co-publishers, home workers, opportunity seekers. Copy Free. Charlson, 5 Carpenter, Chicago.

ADVERTISE: 24 WORDS, 149 Newspapers, $6.50. Free Lists. Advertising Bureau, 4515-B Cottage Grove, Chicago.

ADVERTISERS GET our 1941 Booklet. Boyle Advertising Agency, Clinton, New York.

AGENTS WANTED

1,000 BARGAINS—LADIES' Aprons 9c, Hose 5c, Shirts 39c, Turkish Towels 6c, Aspirin 1½c dozen, shaving soap 1½c, Reliable Razor Blades 30c hundred. House Slippers 8c; Hundreds other real bargains. Operate from Auto, Home or Store. Make Big Profits. Postcard brings free illustrated catalog of 2,000 fast sellers. Reliable Jobbers, 930 Roosevelt, Dept. C-7, Chicago.

BIG MONEY applying initials on automobiles. Easiest thing today. Free samples. If you sell printing and advertising specialties we have an excellent sideline featuring Decalcomania Name Plates in small quantities. "Raico," 727 Atlantic Ave., Boston, Mass.

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

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

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

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

REPAIR CHIPPED porcelain or enamel like new. Guaranted. No experience needed. Kit costs $9.50, returns over $200.00. J. Oren Barker, Distributor, Deansboro, N. Y.

TAKE ORDERS for Hosiery—Lingerie. Make big money. Complete line. Low Prices. High commissions. Free outfit by return mail. Rauch, 20m W. Jackson, Chicago.

MAKE BIG Money—sell Elgin, Waltham wrist watches—$3.25—Send for Free Wholesale jewelry catalog. Louis Perloff, 729 Walnut Street, Philadelphia, Pa.

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

"GOD BLESS America" Pin, Patriotic Specialties. Big demand! Rush dime (coin) for sample and plan. United Specialty Company, Smithboro, N. Y.

ADAMS NEW Roach Gum to kill cockroaches. Sample and new profit plan 25c. Adams Products, Desk B, 132 Beverly Drive, Whittier, California.

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

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

PIPE SMOKERS need this for home or car. Sells on sight. Send dime for sample. Scheib, 5602 Baum Blvd., Pittsburgh.

300% PROFIT Selling Gold Leaf Letters for Store Windows; Free Samples. Metallic Co., 448 North Clark, Chicago.

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FREE BOOKLET, explains guaranteed practical business plans, make money at home. Box 218, Granite City, Ill.

TYPISTS WANTED. Good pay. Typewriter free. Details 10c. Richmond, 504Y Broadway, Sterling, Illinois.

SENSATIONAL SELLER. Tool That Makes Good Things to eat. Girard Mfg. Co., Washingtonville, Ohio.

NIGHT DRIVING Goggle—plastic lenses. Gives clear vision—25c. Snyder, 639 Fifth Ave., Bethlehem, Pa.

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CHRISTMAS WINDOW Transfers. Sample 15c. Elven, 1027 Sawyer, Akron, Ohio.

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TWO FIVE-YEAR Guaranteed Fountain Pens With Pencil $1.00. Jack Robinson, Middletown, Missouri.

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MORE MONEY for you at home! Send me $1.00 and I'll send you Money-Making offers from many National firms every week for ten weeks. Address: Harris Opportunity Mail, 408 North Exchange, St. Paul, Minn.

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SELL BY Mail! Make spare-time pay with profitable home mailorder business. Constructive literature explains amazing opportunities. Write Jay, 1131 East 61st, Chicago.

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"MONEY BY Mail", splendid (25c) magazine for mail order operators. Latest, fine money-makers. Full, spare time. Sample 10c. Elkay Publishers, Englewood, N. J.

SENSATIONAL PATRIOTIC Mailing Cards with name and address printed. For Army, Navy, Marine, Aviation Draftees. Particulars Free. CPCS-I Cermak, Cicero, Ill.

1,471 INVENTIONS, DRAWINGS, Formulas, modern ways to earn money. Book $1. Postpaid. Free Particulars. Centofanti, 25 S. Pearl, Youngstown, Ohio.

LET ME help you get the best returns for your proposition. Write to Bill Corvell, 23rd Floor, 1501 Broadway, New York City.

I MADE over 70,000 sales. Sample of article and sales plan, dime and 3c stamp. Broughton, Box 781, Crescent, B. C., Canada.

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FREE! FALCON Candid Cameras. $5.00 Value. Details 3c stamp. Recketti, 2654 Earp Street, Philadelphia, Penna.

CONVERT OLD lawn mowers into electric cutters. Drawings 25 cents. Wheeler Merchantile, St. Petersburg, Fla.

MAKE EXTRA Money Tempering Tools; Copyright Booklet Postpaid $1. Postoffice Box 324, Hagerstown, Md.

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MAKE MONEY at home by mail. Drop postal to James, Box 1436, Long Beach, California.

LATIN AMERICAN Novelties. Big Profits. Sample 25c. Harthum, 2449, 873, Milwaukee, Wisc.

SAMPLES $1.00. ALL Profit. 6x9 Blank Imprints 13c. Frederick Twiford, Goshen, Indiana.

"OPPORTUNITIES" MAILED you for stamp. Mailer Broughton, Crescent, B.C. Canada.

BIG MAIL 3 Moneymaking Magazines 10c. Wolf's, 1340 No. Howard St., Philadelphia, Penna.

1001 MONEY MAKING Ideas. 3c for particulars. Kays, 1078 Geraghty, Los Angeles, Calif.

PEANUT VENDERS $3.00 postpaid. Davis Metal Fixture Company, Lansing, Michigan.

SIGN PAINTING, Lettering, Patterns, Samples Free. Clark System, Ellwood City, Pa.

MAKE MONEY at Home, Amazing Profits. Nassau Co., Winston-Salem, N. C.

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LOCAL AGENTS wanted to wear and demonstrate suits to friends. No canvassers. Partial Payment Plan. Up to $12 in a day. Experience unnecessary. Valuable demonstrating equipment, actual samples Free. Stonefield, 1300 Harrison, Dept. U--819, Chicago.

WILL START you in the Bible business. Opportunity for Masonic men. Colonel William J. Smith, 1211 Chestnut St., Dept. 603, Phila., Pa.

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A LOW priced lawn mower grinding machine operated by hand or power. One day's work will pay for. Stamp appreciated. Anton Wellert, 142 Gaylord St., Binghamton, N. Y.

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CASH FOR butterflies, insects. Good prices. Some $1—$7. Send 10c for Illustrated Prospectus, before sending butterflies. Sinclair, Box 1830-52, San Diego, Calif.

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DON'T BE a Job Hunter—Start your own business on our capital. No hard times; no lay-offs; always your own boss. Hundreds average $3,000 to $5,000 annual sales year after year. We supply stocks, equipment on credit. 200 home necessities. Selling experience unnecessary to start. Wonderful opportunity to own pleasant, dignified, profitable business backed by world-wide industry. Write Rawleigh's, Dept. G-U-MOM, Freeport, Ill.

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WORLDS MOST mystifying pig novelty. Moves eyes, ears, tail. No springs or bands. Actually spellbounds audience. Easy made. Cost 1c. Sells 25c. Inexpensive tools. Unlimited market. Special instructions, make and sell, mailed postpaid $1.00. Experience unnecessary. Lifetime opportunity. Capitol Enterprises, Box 1110, Washington, D. C.

PLASTEX INDUSTRY needs manufacturers on small scale and for big production of Art Goods and Novelties in Plastex and marble imitation. Cheaply and easily made in our guaranteed rubber moulds. Big Chain Store orders now being placed. Interesting booklet mailed free. Plastex Industries, Dept. R, 1085 Washington Ave., New York.

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IF YOU are looking for a chance to devote your spare or full time to profitable work, see our offer on page 18. Metal Cast Products Co., 1696 Boston Road, New York City.

FOOLPROOF RUBBER, mold making, plaster casting, tremendous market, large profits. 24 page instructive catalogue free. Studio, 711 Neely, Muncie, Indiana.

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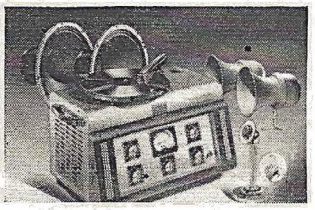

One of the latest amplifying products is this new 30 watt system with built-in phonograph motor and pickup. This unit is designed for universal and mobile use in sporting events, schools, road shows, army manouvers, dance bands, skating rinks, airports, depots, carnivals, etc. Operation is from a 6-volt storage battery or from 110 volts AC. From either source full 30 watts output is guaranteed. Outstanding features include: inverse feedback, electronic mixing, two-tone equalizers, speaker selector, "Safused" speakers, beam power tubes, built-in phono top, standby switch, remote control, silencer jacks and an illuminated panel.

FOR FREE Literature concerning an extremely profitable lifetime, office business, write Cole Associates, Dept. I, Syracuse, N. Y.

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TURN TIN cans into money. Instructions 25c. H. Chaney, 1130 E. 16th St., Jacksonville, Fla.

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YOU, TOO, can earn more. Send your name to Elsmor, Box 26, Flushing, N. Y.

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AVIATION WANTS more Lincoln Trained Men for positions as Airline Mechanics, Aeronautical Engineers, Airplane Factory Mechanics, Commercial Pilots. This Lincoln Government Approved School of Aviation placing graduates in fine big pay positions. Opportunities for many more. Courses from 6 weeks to 2 years prepare for immediate employment. Reasonable rates. Write Today for information. Lincoln Aeronautical Institute (Inc.), 4006 Aircraft Building, Lincoln, Nebraska.

BUILD AND fly your own full-sized Glider. Rugged, streamlined. Easy to build with simple hand-tools. No welding required. Any large field can be its airport. For full instructions, diagrams and plans, mail quarter. Specify Booklet 2. How-To-Build-It Editor, Fawcett Publications, Inc., Fawcett Bldg., Greenwich, Conn.

AIRMINDED YOUNG Men interested in training for entering the well-paid field of aviation as apprentices. Write immediately, enclosing stamp. Mechanix Universal Aviation Service, Dept. A2, Belleville, Michigan.

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

BUILD AND fly your own motorcycle powered monoplane home. Easy, cheap. Tested plans, guaranteed $1.00. Aerotech, Box 175, Dearborn, Michigan.

AIRPLANES, MOTORS, Crackups, Located Everywhere. Complete catalogue 25c. Used Aircraft Directory, Athens, Ohio.

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RADIO ENGINEERING, broadcasting, aviation and police radio. Servicing, Marine and Morse Telegraphy taught thoroughly. All expenses low. Catalog free. Dodge's Institute, King St., Valparaiso, Ind.

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LEARN TODAY'S signwriting, lettering, inexpensively. Details Free. John Warren, 7508 Smith, Spokane, Wash.

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SIGNS PAINTED, reasonable, send sketch. Turner Signs, Box 1893, Chicago, Ill.

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FREE CHEMISTRY catalog. Supplies at 50% Equip complete laboratory. Kemkit Scientific Corp., 397W Bridge St., Brooklyn, N. Y.

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MAKE, DRINK "Pop Fize." Cost less than 20c gallon. Easy to make, refreshing summer soft drink. Formula 25c. The Morval Co., P. O. Box 601-MI., Bridgeport, Conn.

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MODERN COMMERCIAL Formulas. Write: Uneeder Chemical Company, 3005 Third Street, Des Moines, Iowa.

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

FREE FORMULA Catalog. Anything Analyzed $10.00. Western Chemical, Salem, Oregon.

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LIFETIME GUARANTEED mailscale $2.50. 1,000 8-line gummed labels 50c. 1,000 imprinted 24# envelopes 3⅝x6½ $1.95. All 3 postpaid $3.50. Economical Suppliers, Box 753, Bridgeport, Conn.

100 GENUINE ENGRAVED Calling Cards Newest styles. Formerly $4.50; Now Only $1.65 Complete with Engraved Plate. Lowest price in America. CPCS; 5017-MI Cermak, Cicero, Ill.

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PICTURE LABELS—Hundred designs, 10c, Refundable. Arrowprint, MI741, Waterbury, Connecticut.

GUMMED STICKERS—500 for 50c, four lines. Fred Laine, P. O. Box 221. Hibbing, Minnesota.

MIMEOGRAPHING—500 8½x11 $2.00. Excellent workmanship. Lem's, 5712 Stanton, Detroit.

SAMPLES? BETTER printing for less—quicker. Atlantic, Box 653-O. Rock Hill, S. C.

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AIR CUSHION, Knob Handle, Index Label, 1 line, 3 in. or less 25c. 2 lines 45c. 3 lines 65c ea. Add. line 10c.—Blythe Rubber Stamp Co., Indianapolis, Ind.

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

TYPEWRITERS, DUPLICATORS OFFICE DEVICES

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

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

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POSITIVELY GREATEST Free offer—latest Scott's International $3.50 Stamp Album—covering entire World, contains 34,000 illustrated, descriptive spaces; Scott's 1941 Standard $3.00 Catalogue "Philately's Encyclopedia"—both absolutely free to applicants for Foreign Approvals becoming customers! Bargain Stamp Service, San Bernardino, California.

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PHILATOPIC MONTHLY Free—Forty pages. Includes Stamp Encyclopedia. Free. Write Empire Stamp, Dept. MM, Toronto, Canada.

PERU—100 DIFFERENT stamps $1.00. Thousand mixture $2.00. Free new price lists. Atenea, P. O. Box 1940, Lima, Peru.

APPROVALS give you the opportunity to examine various assortments of stamps before buying. This is a special Courtesy Service extended by Stamp Dealers. Cooperate with them by looking over Approval Stamps as soon as you receive them. Then send payment for the stamps you keep; and return those you don't want.

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

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10 YUGOSLAVIAN STAMPS free with 30c order of printed personal stationery. Siccan, 2038 Obear, St. Louis.

50 DIFFERENT U. S. dime, 3c postage. Approvals, Neumann & Co., 6728 W. Finger Place, Milwaukee, Wisconsin.

100 ALL DIFFERENT U. S. Postage Stamps only 30 cents postpaid. Jungkind, Box 806MX, Little Rock, Ark.

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

U. S. WELL mixed 1000 30c. 65—75 varieties. (M) Henderson, 962 72nd Street, Brooklyn, N. Y.

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

100 DIFFERENT CANADIAN 25 cents approvals. Twin City Stamp, Alliston, Ontario, Canada.

1,000 FOREIGN OR U. S. Grab Bags, 15c each, two 25c. Mandy, 630 Bingaman, Reading, Pa.

5 SCARCE EARLY U. S. Covers 10c with approvals. Cheltenham Stamp Co., Cheltenham, Pa.

NEWFOUNDLAND SET Free. Request approvals. Knight, Box 3780, Portland, Oregon.

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

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

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

BRITISH WEST Indies. Rare 19th, 20th. Philips Power, Fanwood, New Jersey.

10 SHIP STAMPS 3c with approvals. Theo. Martin, 2911 116th, Toledo, Ohio.

50 FOREIGN 5c TO Approval Applicants. Hickok, Eagle River, Wisconsin.

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IF YOU are interested in free glassine envelopes with your covers, free membership in a club devoted to covers of all sorts, the best advance information on future events—Write today for free information. American First-Day-Cover Club, Dept. M., Box 107, Dedham, Mass.

INDIAN CURIOS & RELICS

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

30 GOOD OR 12 fine prehistoric flint arrowheads $1.00. Catalog free. Caddo Trading Post, Glenwood, Arkansas.

RARE COINS

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

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ILLUSTRATED RETAIL coin catalogue 10c (refunded). 3000 Quotations. James Randall, 341 South Dearborn, Chicago.

COIN COLLECTORS: Bimonthly price list 10c year. Sample for stamp. C. J. Edgar, 18 Twain, Baldwin, N. Y.

RARE—1922 CENT and catalogue 10c. 1931-S 25c. Landon, 4410-M Lankershim, North Hollywood, Calif.

50,000 COINS, MEDALS, papermoney. Free lists. Mart, 1536 Willington, Philadelphia, Pa.

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12 MEXICAN OR Australian Opals, assorted, $1.00. 12 Genuine Cameos, $1.50. 3 Genuine diamond cut Zircons, approximately one carat each, $1.75. B. Lowe, Box 525, Chicago, Ill.

GENUINE GOLD As Found. For collectors, souvenir seekers. Stamp please for particulars. J. P. Roy, Dept. MI, Andover, Maine.

MAGIC TRICKS, JOKERS, PUZZLES

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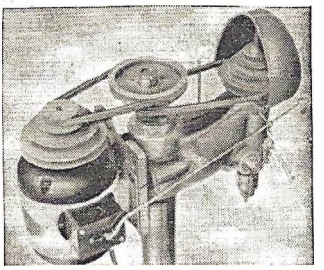

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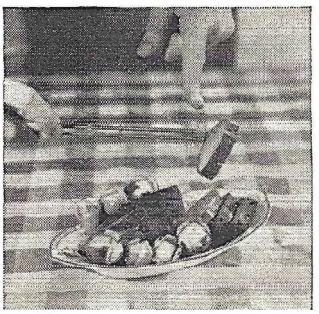
Serving Fork Has Button Release



This newly introduced serving fork has a built-in release pusher. Small articles of food, such as pickles and olives, can be picked up with the fork and then forced off onto the desired plate. The mere pressure of a button on the handle of the fork is all that is necessary to remove the food from the end of it. All parts of the fork are rustproof. All unsanitary handling of food is eliminated through its use.

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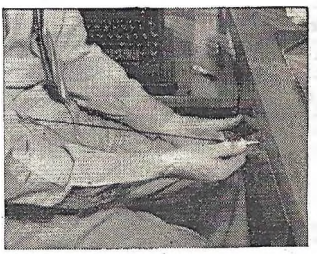

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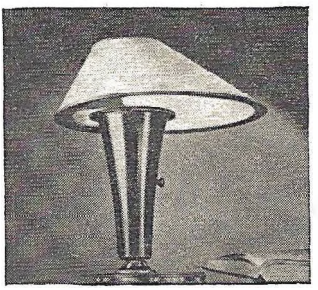

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Letters To The Editor

[*Continued from page 25*]

To The Editor:
Dear Sir:

I'll tell you now, free, that a mathematically perfect score for your three puzzles is 12,518, and not the mere 2,696 mentioned by Mr. Cannon. This is easy compared to the probabilities in some games of chance. I did it in my head, almost.

By an unusual coincidence, the letter "A" inserted in all of the blank spaces in all three puzzles will give the above mathematical maximum. The actual maximum, of course, is far less than this.

A. N. Moore,
Newark, N. J.

* * *

To The Editor:
Dear Sir:

In your June issue, you asked how many readers could find the hole in Mr. Cannon's solution to what a perfect score would be in your contest. If a perfect score can be found that way, I believe I have found his mistake.

Using this proportion: 169/9 as 104/x, with x representing the correct number of points per letter, using an eight letter horizontal word.

We now find that x is equal to 5.53 points per letter. Then multiplying 5.53 by 104, we get 575, a perfect score. Using the same method I got 638 points for the word, Mechanization, and 552 for the word, Aerodynamics. This makes a total of 1,765 points for all three puzzles.

Mr. Cannon's personal score, therefore, instead of being 90 per cent of perfect, as he claimed, actually is 136 per cent perfect!

Ralph N. Clark, Jr.,
Ivoryton, Conn.

Jeepers! Can Mr. Moore (above), Mr. Clark, and the actual winner all be right!

* * *

To The Editor:
Dear Sir:

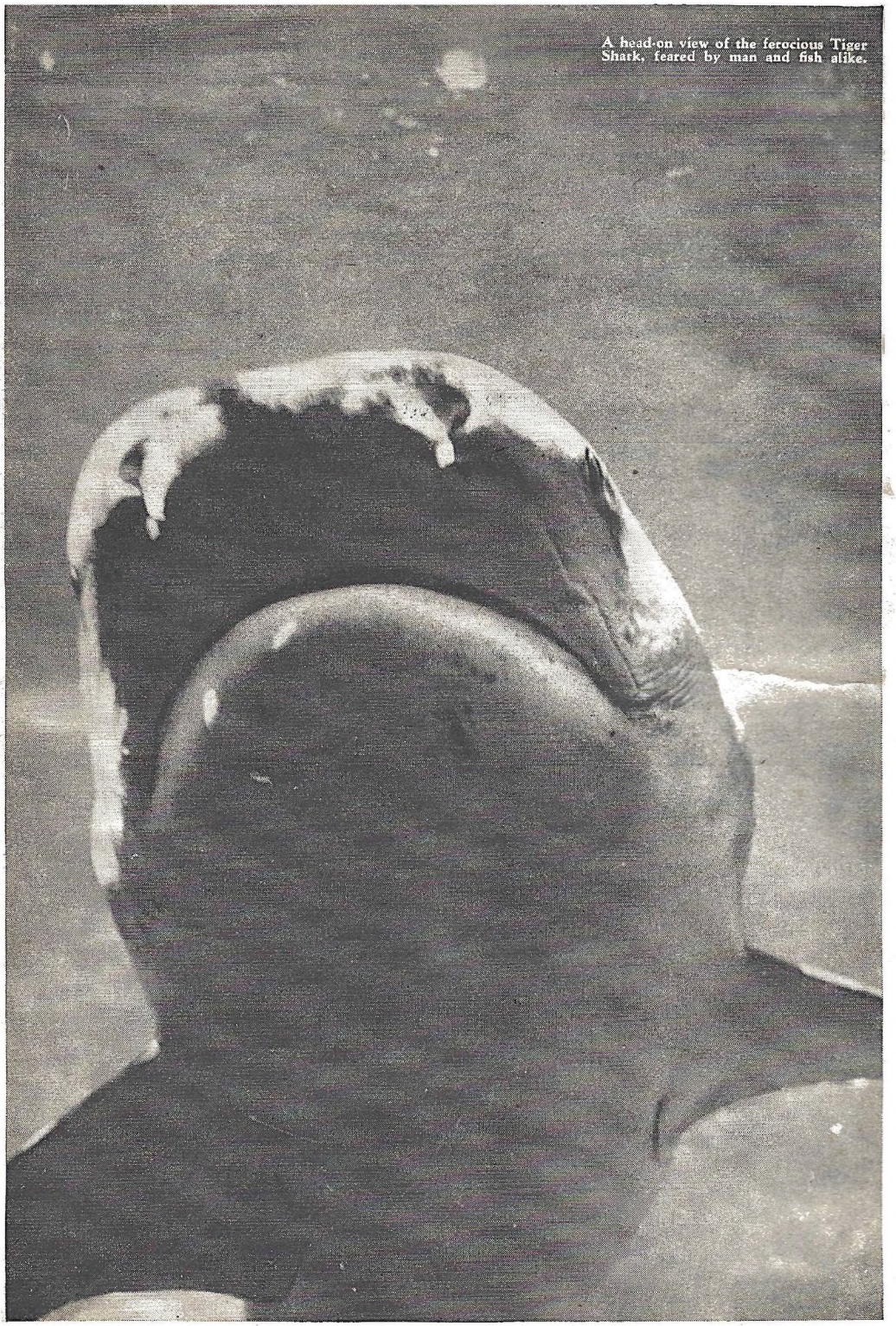
I entered the Words-Within-Words contest, and I worked day and night in the Gary library on it. I sure worked my head off. The small type in the dictionary and the poor lighting system in the library ruined my eyes, as a result of trying to win something that was not meant for me. Everybody told me I was crazy for entering the contest, and they are still kidding me about the airplane.

Thanks, a lot, for what your contest has done to my eyes!

Joe Kramer,
Gary, Ind.

P.S. Even if I had won the contest, I would never have been able to fly the airplane—because of the condition of my eyes!

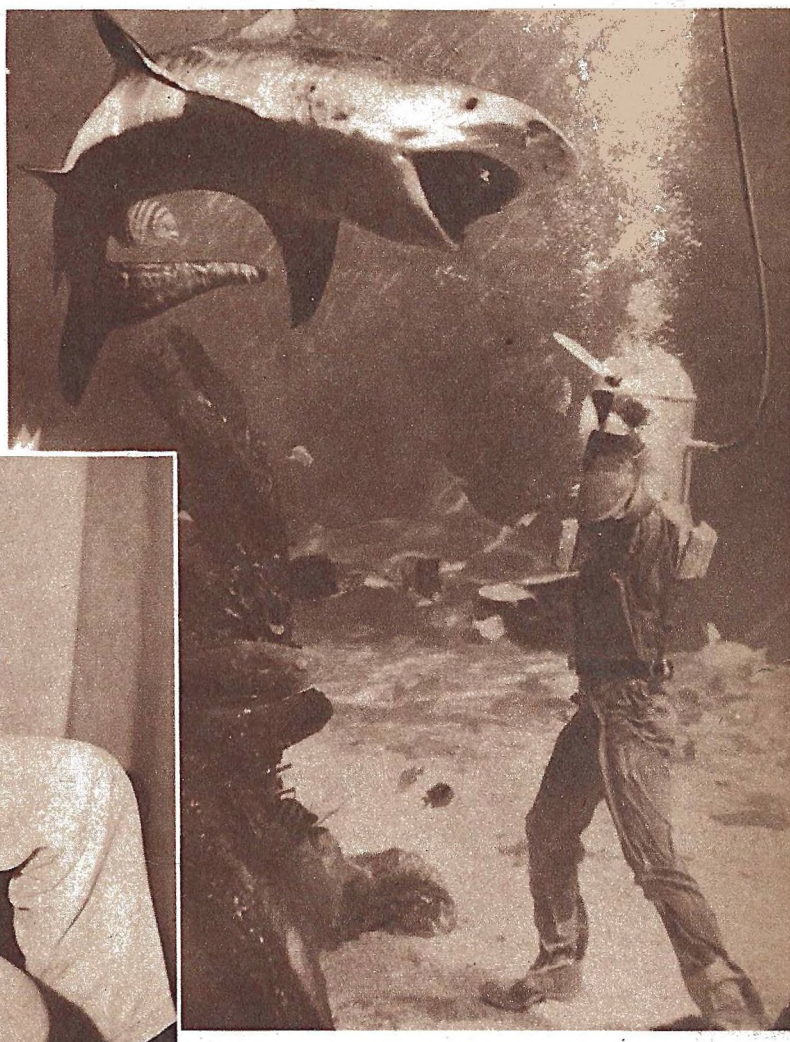
You should have seen the judges' eyes after reading 63,000 entries!



A head-on view of the ferocious Tiger Shark, feared by man and fish alike.

MAN -- Meat For The Shark!

Here is the answer to the controversial question that has raged wherever there's an ocean to swim in: Will sharks attack a bather? In this documented article, Lieutenant Horace S. Mazet, world recognized authority on sharks, settles the subject conclusively.



Above: Staff divers at Marine Studios, Marineland, Florida, carry sharp steel knives when they go into the glass tanks that contain the tiger sharks. These sharks will attack anything that moves, and are considered one of the most dangerous specimens that live in the sea. Left: A photograph of the right leg of Drayton Hastie, who was bitten by a shark while swimming off Comings Point, S. Car., in June, 1933.

by Lieut. Horace S. Mazet, F.R.G.S.

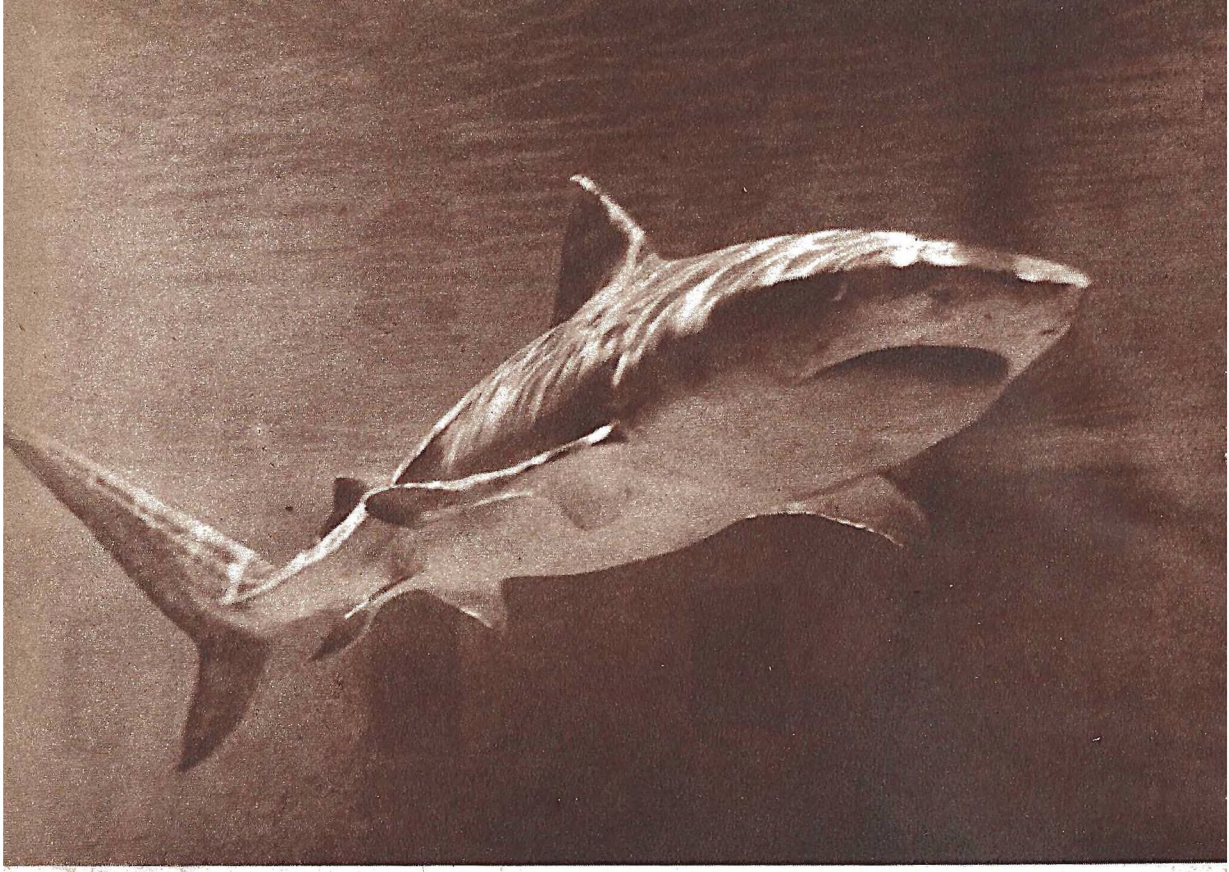
Author of "Shark! Shark!"

"SHARK! Shark!"

The terrifying cry brings hundreds of panicky swimmers churning and splashing into the safety of shore.

A fin splits the water off-shore, like the ugly periscope of an undersea raider and skims in an evilly beautiful arc past the beach. The bathers watch, fascinated, picturing the cruel eyes, the powerhouse of strength and the crushing jaws of the tiger of the sea. The shark rolls, there is a flash of white belly, and he disappears. One of the watchers lets out his breath in a sigh.

Another bather, a skeptic, scoffs, "Aw, why



Not exactly a pleasant swimming companion is the tiger shark shown above, one of the largest and most dangerous of all sharks.

get scared? Sharks don't bite humans. Everybody knows that."

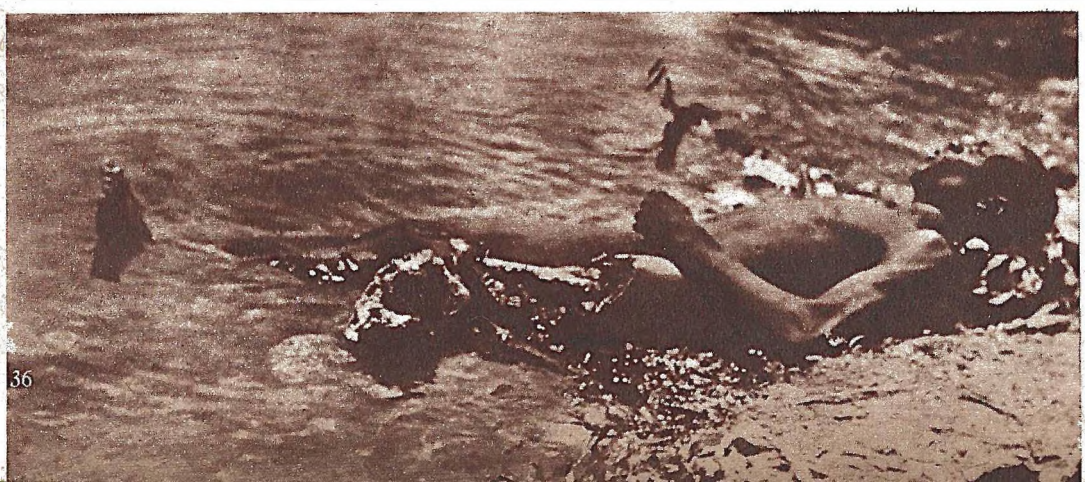
And the argument is on!

Every summer, on thousands of beaches, that scene is repeated thousands of times. Perhaps unknowingly, the skeptic has voiced, in his own words, the gist of what has become a heated scientific argument: "Are sharks man-killers?"

The skeptic has impressive backing. No less an authority than Dr. William Beebe, inventor of the bathysphere and original explorer of the ocean floor, hotly contends that sharks are harmless to men. In a much publicized exhibition, Dr. Beebe swam in waters where a school of sharks was present to demonstrate his certainty that sharks would not attack him. Van Campen Heilner, Field Representative of the American Museum of Natural History, similarly invited attack in shark-infested southern waters. Both escaped unscathed.

Ranged on the other side of the controversy have been such eminent persons as

The gruesome picture below is that of the body of a Negro boy who was attacked by a shark off Cap Haitien, Hati. The upper part of the left leg was entirely exposed to the bone. No barracuda could possibly inflict such a terrible wound.



Dr. E. W. Gudger, ichthyologist of the American Museum of Natural History; Dr. Victor Coppleson, F.R.C.A., of Sydney, Australia, and others.

Now, for the first time in one comprehensive magazine article, MECHANIX ILLUSTRATED presents irrefutable and authenticated evidence, in the form of photographs and actual case histories, which this writer considers conclusive, to settle the argument for all time.

Through years of research, this writer has painstakingly authenticated scores of cases of actual attacks upon human beings by sharks.

In presenting several selected cases which have been verified in every detail, together with authenticated photographs, the writer believes he will have established this one statement beyond dispute:

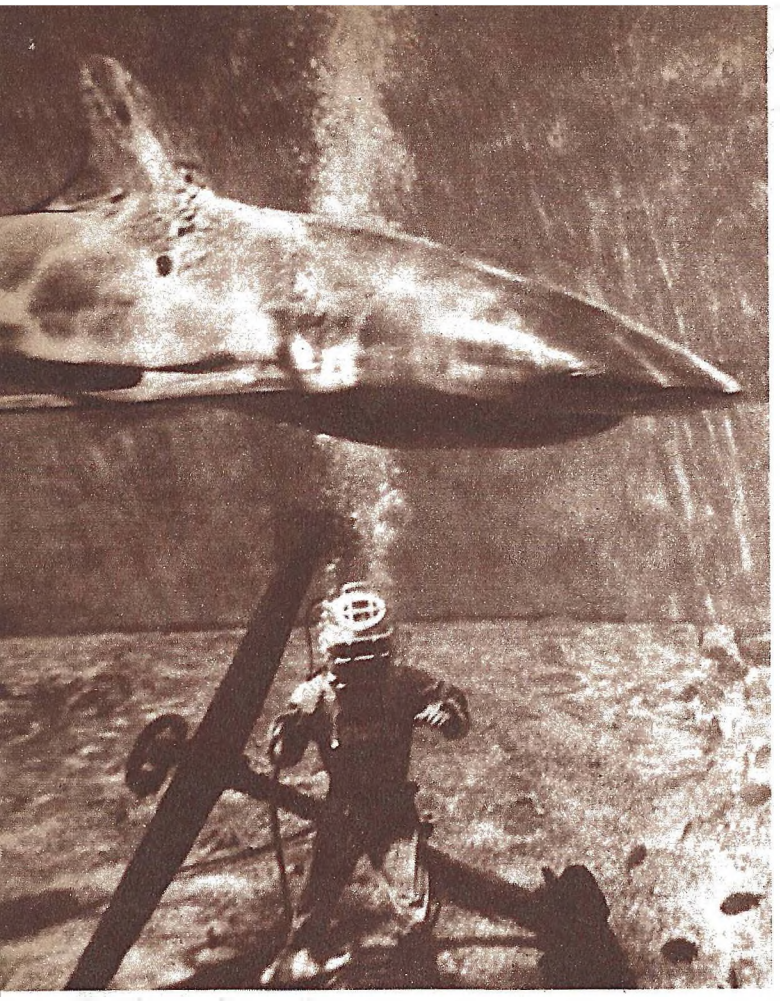
The shark is a man-killer and a man-eater!

Some years ago, Mr. Herman Oelrichs posted a reward of $500 for proof that a shark will attack a human being in *temperate waters.* In our recital of case histories, we shall give in detail one instance of such an attack.

Certain definite characteristics of the shark and its relationship with man can be deduced from the mass of material collected in this study. There are grounds for believing that sharks are cowardly, easily frightened, and usually timid creatures under normal circumstances. Thousands of tourists who have watched native boys diving for coins in tropic harbors swarming with sharks can testify to this fact.

All accounts, however, agree that if a shark is startled by some strange movement in the sea or otherwise molested, or, more particularly, if a shark detects the presence of blood in the sea, it will react in a most savage and terrifying manner, rending to bits anything which lies awash

Above: Securely hooked, a tiger shark is pulled into the well stern of the Marine Studios' expedition boat, *Porpoise,* for the return trip to the Studios. The only sure method of capturing large sharks is with hook and line; nets are used for smaller species. Below is a close-up of the tiger shark, showing the formidable mouthful of teeth with which he is equipped. If any of the monster's teeth are broken when captured, he will grow new ones to replace them in a very short time.



Above: Divers at Marine Studios descend into 18 feet of water to feed by hand large sharks, Jewfish and many other varieties of undersea life. Below: Stuart Smith, special investigator for State's Attorney's office, Miami, Officer Mack Oakford of the Miami Harbor Police, and State's Attorney G. A. Wooley, of Miami, inspect a human arm found in a shark's stomach.

within reach of its ravenous jaws.

In the following case histories of actual attacks on humans in the sea, sources of all information are named, together with dates, places and details. Each fact has been exhaustively checked. The photographic evidence shows, in several cases, that the wounds of the victims, even by the widest stretch of the imagination, cannot be imputed to barracuda or to any other sea creature known to science save the shark.

On March 12, 1934, at Deewhy, near Sydney, Australia, an 18-year-old youth named Frank Athol Riley was suddenly dragged under the water by a shark. Eugene Lawrence O'Toole of South Curl Curl, permanent lifesaver at Deewhy Beach, showed great courage in rescuing Riley. The shark was still attacking the boy when O'Toole ran through the shallow water and swam to his side. He had to enter the blood-stained sea within a few feet of the shark to reach Riley.

"I was standing on top of the steps near the surf shed," said O'Toole, "watching the bathers in case anyone was carried out. I heard screams and saw Riley sink. The water immediately became red and the foam of the breakers passing Riley were red almost to the beach. I ran down the beach to the reel, seized the belt and rushed out to Riley. The shark let him go when I was close. I seized Riley and began to drag him back towards the beach. The shark's fin stood well out of the water as it cruised about 12 feet away. When I got out of the water Allan Slee and other men assisted me

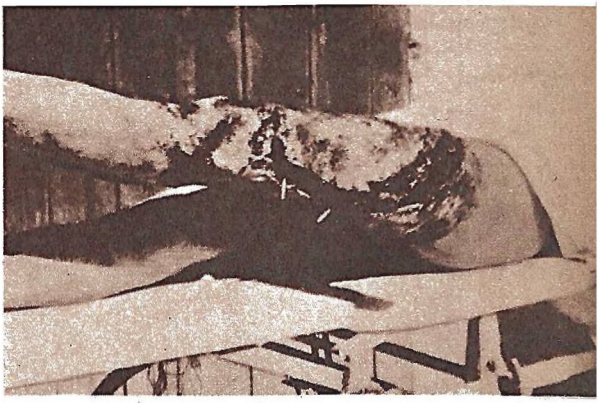
Here is a photograph of a tiger shark feeding, taken at Florida's Marine Studios. Note the size of the dorsal fin.

to the beach. Riley's leg and part of his body had been torn away. I shouted for towels and a number were brought, but Riley was nearly dead and the blood simply soaked the towels. He murmured, 'He's got me. It's gone.' I think he was dead before we reached the clubhouse with him."

This monster was estimated by the crowd which saw it patrolling the beach later on, at from 12 to 14 feet long. The teeth tore off the whole of the left leg and buttock. The shark's mouth was so enormous that it even bit off part of the right side of Riley's body and right leg.

I am indebted to Dr. Victor Coppleson for a valuable list of shark attacks attested to by physicians and scientists and published in The Medical Journal of Australia. The following case is from this report:

An expert Australian swimmer, Leon Ritson Hermes, 16, of Manly, near Sydney, was swimming in the surf at North Steyne, on April 1, 1934. Without warning he was attacked and frightfully mauled. Upon examination at the Manly District Hospital his injuries revealed that he had been struck three times. The flesh was torn from the right leg near the ankle, from above the knee, and from the thigh and hip. He lost so much blood that he was practically unconscious when he reached shore with the aid of other swimmers. Another youth, George Hurd, 17, risked his life to rescue Hermes, but was too late.



The above picture shows the leg of a U. S. Marine private who was attacked by a shark off Cap-Haitien, Haiti, in 1922.

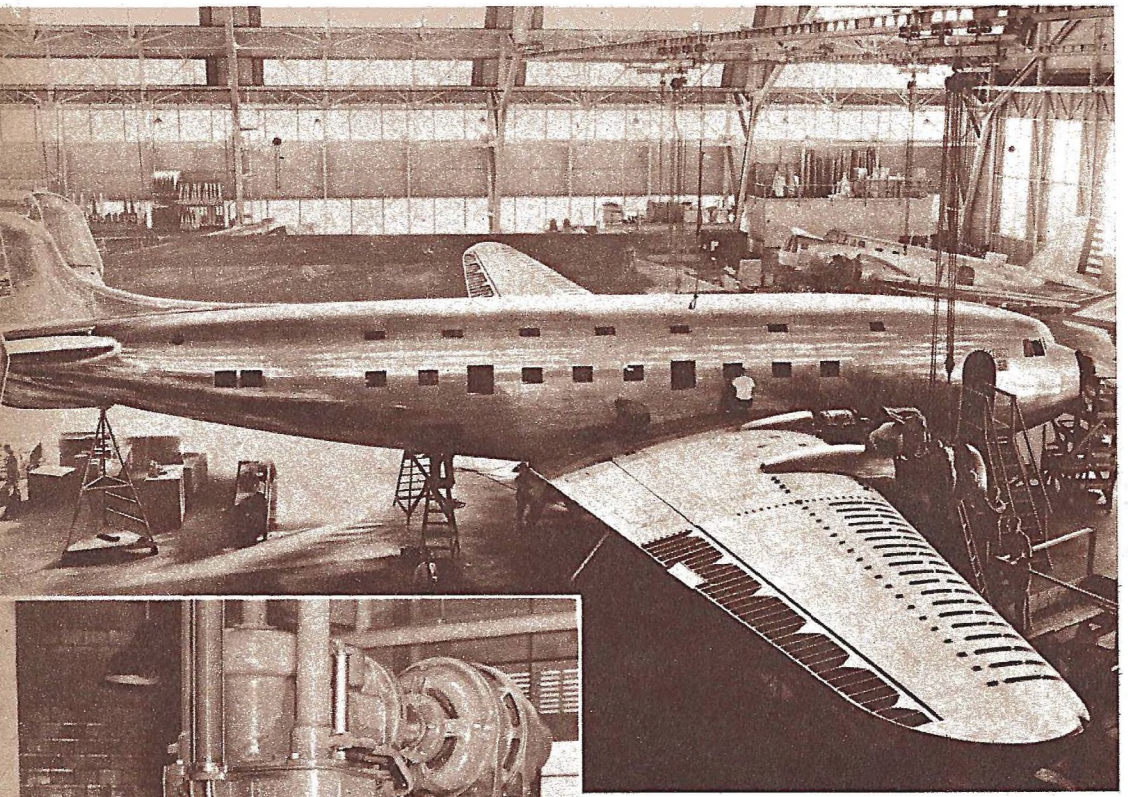
On April 4, 1928, another Australian named A. E. Lane, manager of the Sydney firm of Henry Lane, Australia, Ltd., was killed in a dramatic encounter off Merewether Beach with a shark, dreaded along all New South Wales beaches.

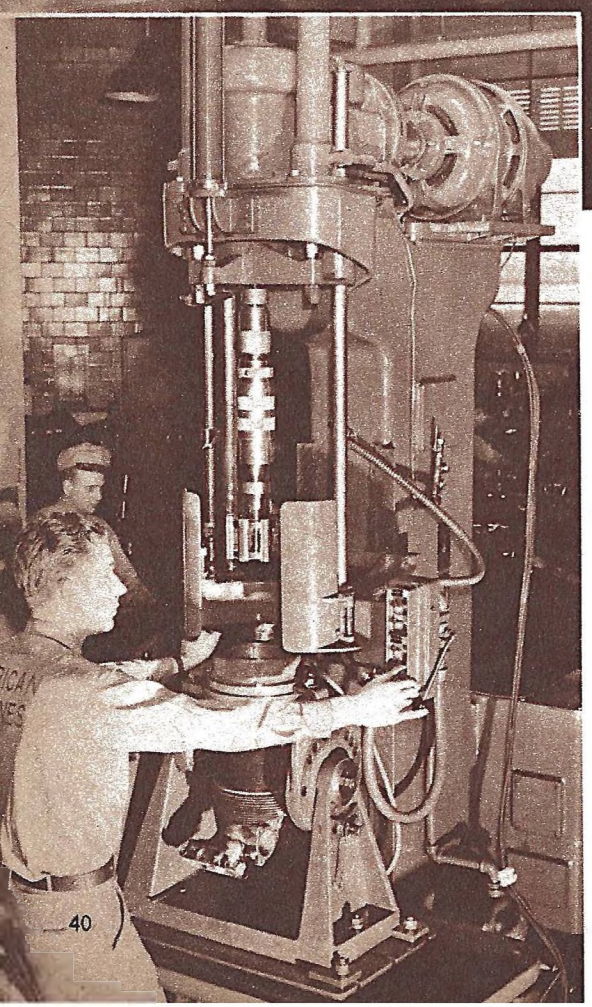
At about 6 p. m., Lane, standing on a sand-bank some fifty yards from the shore, was exchanging pleasantries with a Miss Lucy Donaldson and her girl friend. The water was about waist deep. Suddenly the girls were horrified to hear him shout "Help! A shark has got me!"

The next instant they observed him throw up his hands. Miss Donaldson, with great presence of mind and courage, dispatched the

[*Continued on page* 133]

YOU'RE WANTED--For





Above: No industry in the country is more in need of skilled workmen than the aircraft industry, which must supply airliners as well as thousands of bombing and fighting planes for defense. Left: Men who know how, or can learn to operate machines such as this cylinder honing machine, are answers to the prayers of hundreds of factory foremen.

A SLEEK gray roadster rolled into a California filling station the other day. The driver, a middle-aged business man, looked surprised as he noticed a new station attendant on the job.

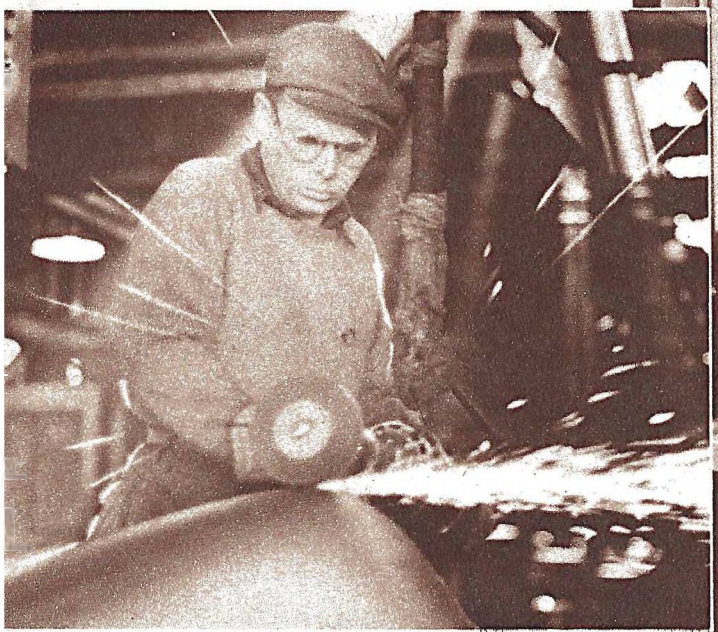
"Fill her up," the driver ordered. "New here, aren't you? Where's Pop? Not sick, is he?"

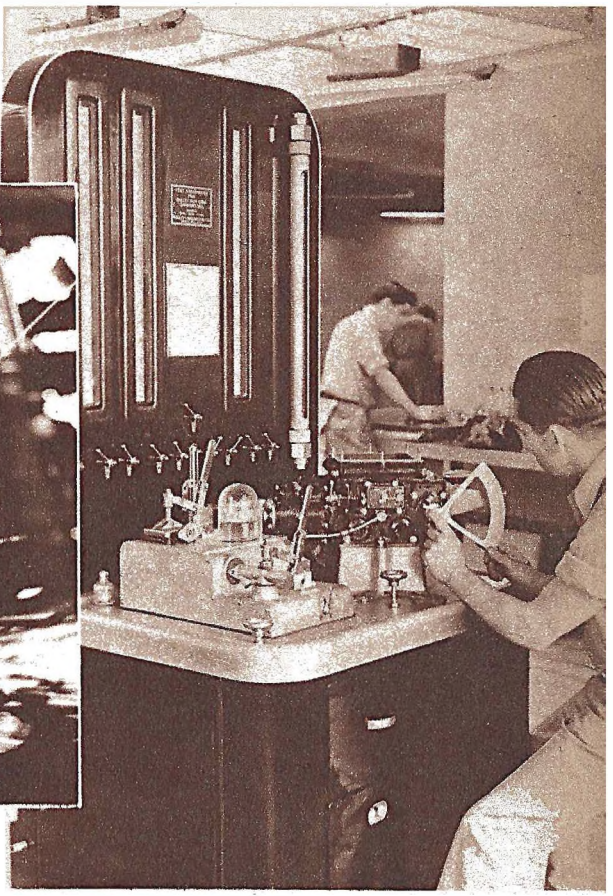
"No, sir. Pop's sitting pretty," said the attendant. "Funny thing. Pop used to be foreman of a one-horse foundry that folded up in the depression. He couldn't get a job anywhere in the trade, and to keep from starving he finally took this one pumping gas. Well, a few days ago a foundry down in L. A. that's up to its neck in defense contracts got hold of an old application blank that Pop had filled out seven years ago. They asked Pop to go on their payroll at about four times what

A Defense Job!

by Donald G. Cooley

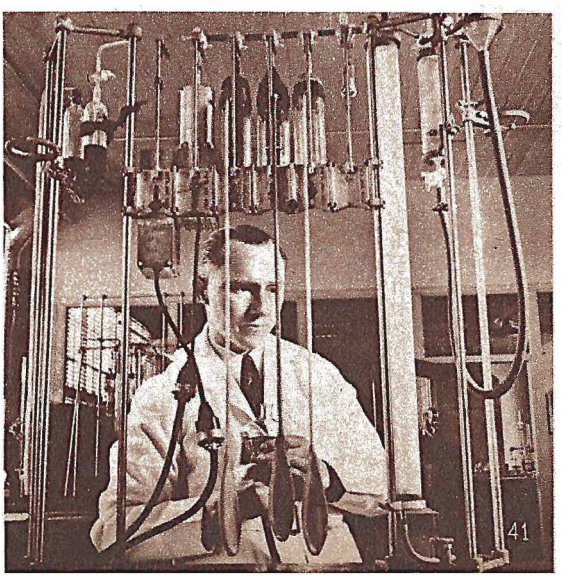
Today is the golden opportunity for skilled and semi-skilled industrial workers. If you aren't one, you can learn to be. MECHANIX ILLUSTRATED tells you how!





Skilled grinders and finishers, such as the workman shown above, are in great demand in a dozen different kinds of industry, particularly those dealing with aircraft and automotive phases of defense.

The man above is shown calibrating an airplane carburetor, while the laboratory worker below is analyzing samples of gas a gear tooth by carburization. Defense needs laboratory workers as well as good machinists.



he was making here, so that's where he is. . . . Ten gallons brings her right to the top."

At about the same time, across the continent, a trailer-truck on the Boston run pulled up alongside a roadside diner. The driver and his helper walked in, sat down at the counter and ordered coffee.

"Say, I haven't seen you here before," the driver remarked to the man in a chef's cap who took their order. "Is Jimmie layin' off?"

"Yeah—for good," said the chef. "Jimmie's always been a radio nut—building sets, monkeying with his own designs, all that stuff. That big electrical works up the line grabbed Jimmie off. Gave him a sweet salary and said if he'd put in a little spare time training in their own shops they'd promote him so fast it would make an acrobat dizzy."

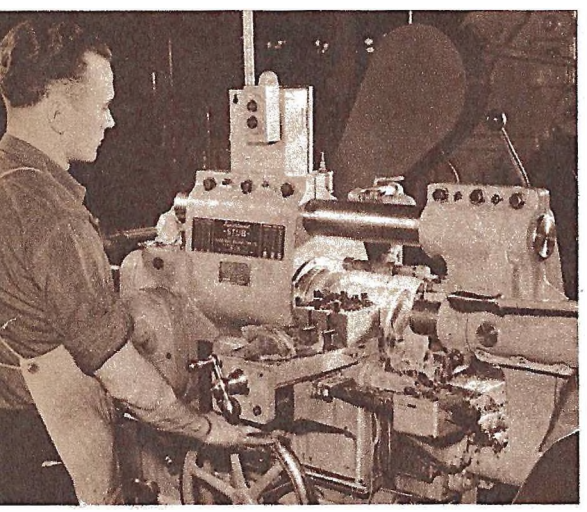
The chef sighed enviously. "Believe me, if I had enough mechanical sense to tell a

Left: A production line in the foundry of the Wright Aeronautical Corporation, Fairlawn, N. J., where cylinder heads for Wright Cyclone engines are cast on a mass production basis for National Defense. The airplane companies need skilled foundry workers.

screwdriver from a cold chisel, you wouldn't catch me flipping eggs in this beanery."

All over the country you hear stories like these. They form a human back-drop for the gigantic picture of defense. Factory chimneys are belching sparks, the clang of steel and the chatter of riveting is loud upon the land as this colossus of a country of ours bestirs itself to an output of tanks and ships, guns and airplanes, unprecedented in the history of the world. But factories, raw materials, even money, are worthless without *manpower* — and that's where you come in.

Official figures on jobs in defense industries are startling. More than two million men have gone back to work in the first six months of defense effort. Conservative statistics place the number of new jobs coming up this year and next at between five and six million. For



This 8-inch "stub" lathe turns the outside diameter and the ring grooves of the iron pistons employed in 2-cycle Diesel engines. If you can operate a lathe like this, consider yourself employed.

ARE YOU FITTED FOR A DEFENSE JOB?

Have you had any experience (even if only a hobby) in woodworking, metal, aircraft, radio, electrical, or automotive fields? _____

Can you read blueprints and follow directions? _____

Are you a painstaking craftsman? _____

Do you like to work with tools? _____

In school, were you good at mathematics and natural science—physics, chemistry, etc? _____

Have you ever taken any workshop courses—operating bandsaws, lathes, planers, welding equipment, etc.? _____

Do you have "hand and eye facility"—that is, a knack for working with tools in close quarters, coordinating mind and muscle, visualizing the relationships of disassembled parts of a mechanism? _____

Have you at any time in the past, no matter how long ago, worked at a skilled trade such as drafting, boat building, carpentering, plumbing, radio, motors, electrical equipment, etc? _____

Have you ever built a boat, constructed scale models, or completed other workshop projects from plans such as appear in this magazine? _____

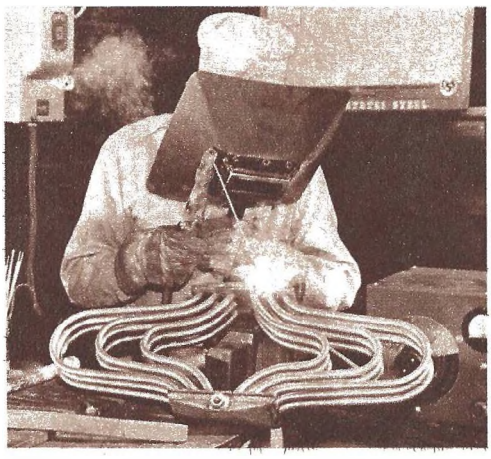
Are you under 62 years of age? _____

Each "Yes" answer indicates that you possess an aptitude needed by industries working on defense contracts.

An idea of the magnitude of America's defense effort may be gained from this view showing thousands of steel cylinder barrels stacked row on row in a corner of the Paterson factory of the Wright Corporation, the nation's largest aircraft engine manufacturing organization.

every billion dollars a year in new defense contracts, a half-million workers will have to be hired before the money can be spent.

Defense contracts already placed require 35 *billion* man-hours of work, according to John D. Biggers, production chief of the Office of Production Management. Aircraft plants alone must hire 700 men a day to keep up to scratch. Employment in shipbuilding will treble in a year's time. The American Society of Tool Engineers estimates the present shortage of workers at four million.



Welding is another craft vital to our nation's defense.

Hollywood film studios already report that carpenters, painters, machinists and plasterers are at a premium because they are guaranteed $75 a week on government jobs, machinists, a year's employment. One call for fifty hod-carriers, guaranteeing $110 a week if men were willing to work seven days, took several days to fill.

What does all this mean to *you*? How do you get a defense job? Do you have to be experienced in a trade? What talents are in demand. Do you have to move away from home? To answer these and dozens of other down-to-earth questions, MECHANIX ILLUSTRATED has gone directly to government agencies and industrial sources for the facts.

As always, it is the skilled worker who is most urgently in demand. But there aren't enough skilled workers in certain fields to go around. For that matter, you may be skilled without realizing it. Men who love tools, who like nothing better than to spend every spare minute in their home workshops, possess to high degree what is called "hand and eye facility." They constitute a vast reservoir of mechanical talent that industry is eager to tap.

Perhaps in your basement workshop you have turned your hand to welding, lathework, electrical assembly, etc., thinking all the time that you were merely having fun. Jack Benson was such a one.

All day he worked as shipping clerk in a department store, but all his spare time was spent in an old barn out in the country where he and a dozen other fellows had formed a glider club. They built their own ships from blueprints, welded and repaired them when they cracked up.

A business man who knew Jack said to him one day: "You're wasting your time as a shipping clerk. Go down to the ——— Com-

[*Continued on page* 136]

Left: George Rubsch, at the left, gets a cup of coffee from one of his assistants. The truck is equipped with a small stove! Below: The super truck goes to work on a wreck.

Titan Of The Tow Trucks!

When bigger and better wrecks occur, you can bet that George Rubsch will be there with his super wrecking truck to tow them away!

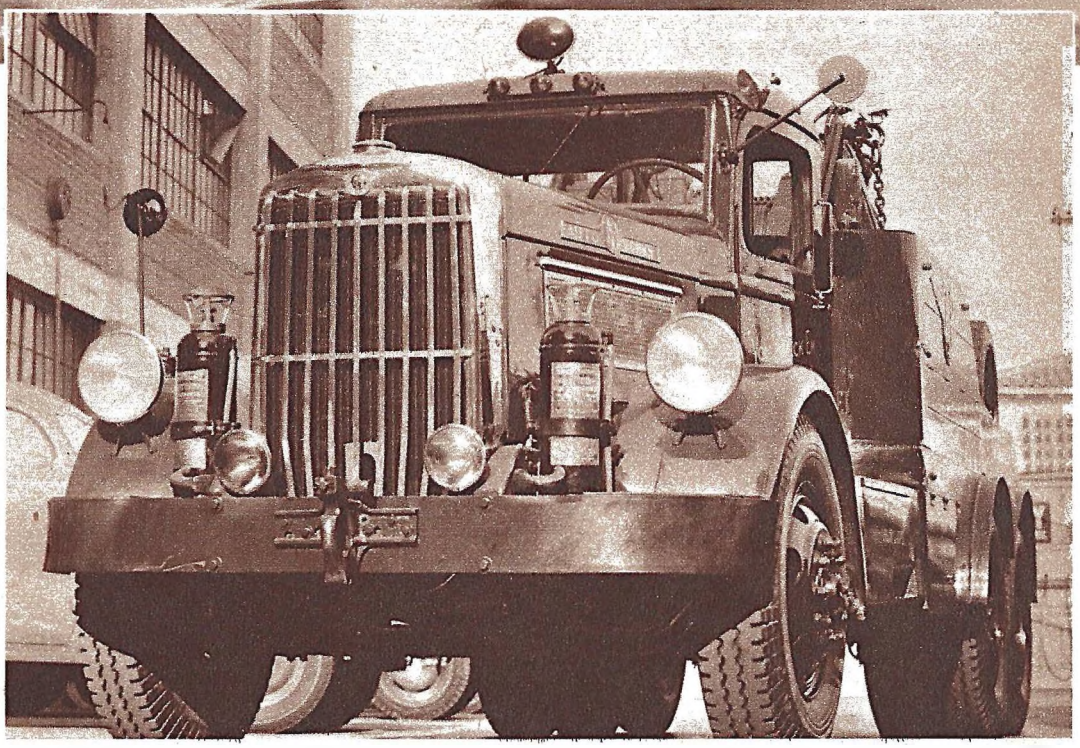
by John T. Lynch

A LIGHT ocean breeze gently wafted a three-ton truck off the pier and plunged it into sixty feet of water in Los Angeles' harbor. Luckily, the driver was not in it. He had taken refuge from the cooling California zephyr in a nearby warehouse. From what had been a large plate glass window—the zephyr had taken care of that, too—he watched his vehicle somersault crazily into the murky water. With mingled emotions he made his way to a telephone and called the A-1 Auto Works, for he knew that here was a job for nothing less than a super tow truck. And he was right. In a short space of time this firm's great emergency unit had driven onto the pier, and in a few hours the somewhat damp truck had been rescued from a watery grave.

This is just one example of how it has paid —and paid—George Rubsch and his crew of big wreck specialists to build, at the cost of $12,800, what is conceded by experts to be the biggest and best equipped tow truck in the world.

Although the number of traffic accidents in which trucks are involved is very low when compared to passenger car wrecks and general highway troubles, when one or more of the larger vehicles gets into a jam

A rear view of the super tow truck, showing the main boom, which is capable of supporting 75,000 pounds. Note the flood lamps for use in night work.

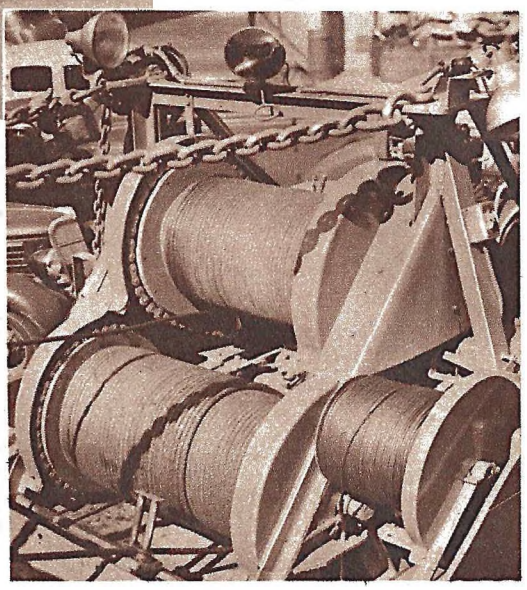


The top picture shows George Rubsch's super tow truck in operation, towing in a big truck and trailer loaded with paper. The picture directly above is of the front of the truck, showing the heavy bumper and chain hooks, as well as fire extinguishers.

it is never anything less than huge. The bigger they are the harder they crack up. Even getting stuck in the mud can amount to a major disaster, if a truck cannot be pulled out by usual methods—and George Rubsch's super tow truck is not around.

A new real estate sub-division was recently so highly touted by the promoters that many citizens moved, bag and baggage, into newly-built houses in the section before the utility firms had time to install the necessary equipment to furnish gas and electricity to the homes. The streets through the "model village" were not yet paved, either. However, the local gas company was doing its level best to get service to the new settlers as quickly as possible; and were getting along O. K. until a high fog came along and turned the streets into trenches of mud. One of the utility firm's trucks, running pipe and supplies to workmen up at one end of the street, became mired, to say the least. Two standard size tow trucks were sent to unmire it. But they couldn't budge the total weight of the truck and its heavy cargo of pipe and tools which amounted to eight tons. After hours of huff-

Left: The A-1 Auto Works does a long distance towing job, pulling a large truck out of a deep excavation. The tow truck has two anchors which brace it for jobs such as this one. Below: A closeup of the powerful winches wound with towing cable, on the back of the super tow truck.



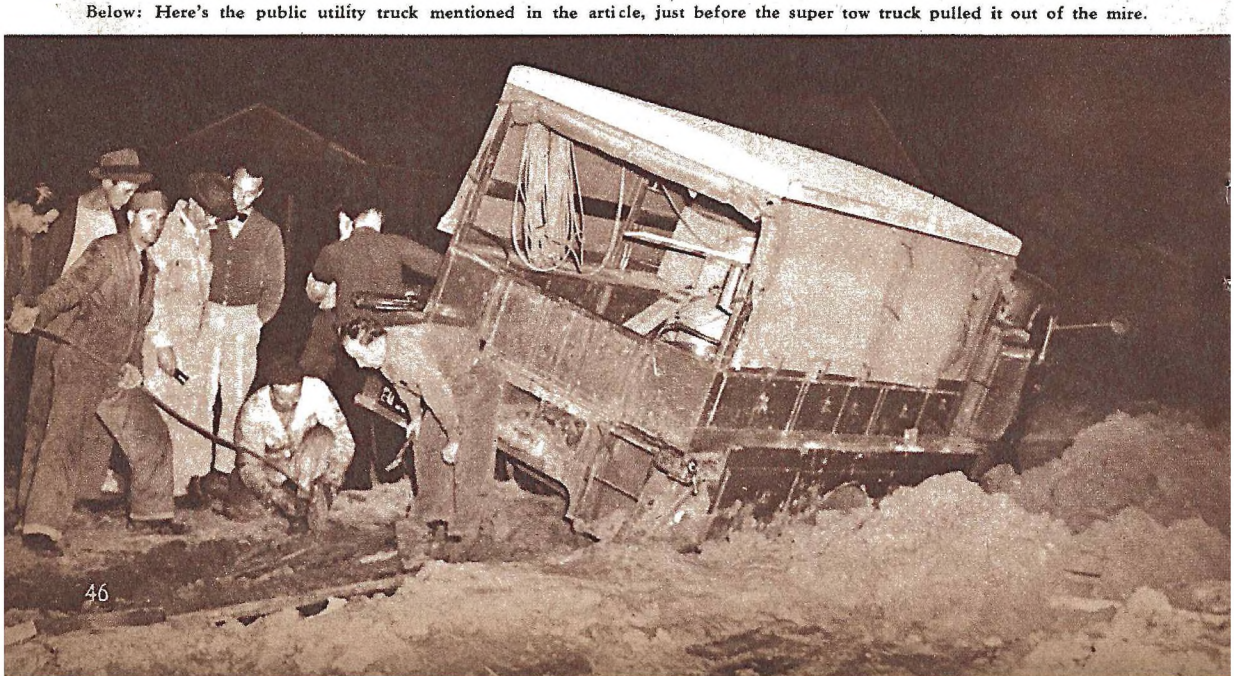
ing and puffing the tow trucks were in need of repairs. Meanwhile, the road was blocked to even lighter trucks that might have been able to deliver the much needed supplies. Then a pair of the utility company's big Diesel motored trucks were called to the scene. But, again, no soap. Even the sidewalk superintendents (only there were no sidewalks) were non-plussed until one of them thought of A-1's super tow truck. One hour later—and it was night by now—the great emergency unit hove majestically into sight. One of the crew alighted and surveyed the situation.

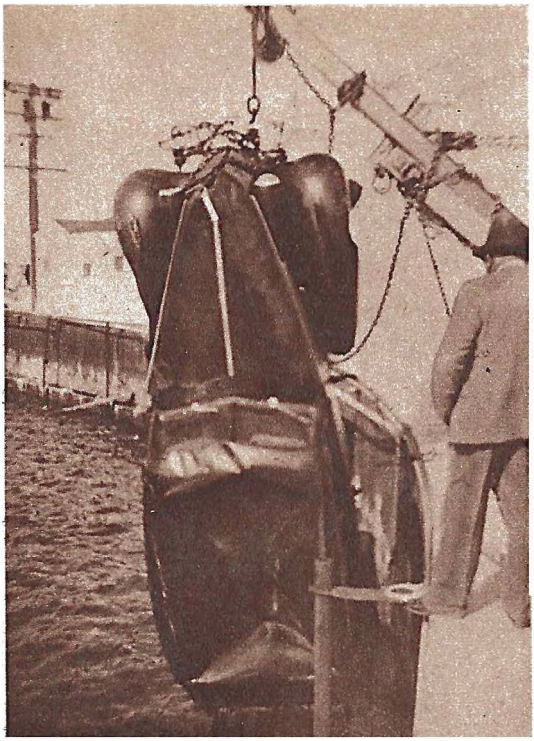
"Think you can pull 'er out?" asked the anxious district manager of the gas company.

"It's a cinch," was the quiet answer. In less than an hour the utility truck was hauled from the mud and chugged happily away under its own power. The crowd of onlookers gave the A-1 boys a round of applause and moved in for a closer look at the mammoth unit, now lighting the whole muddy scene with bright floodlights.

George Rubsch's crew of highway trouble shooters are as proud of the tow truck as was any old captain of his ship. They have become accustomed to much attention at throng-drawing wrecks. They have evolved, from experience, a method of answering the inevitable questions asked wherever the truck appears; this is what might be called a "set speech." Each man has memorized it and can rattle it off on a moment's notice. This particular night was no exception. When the questions began to come thick and fast one

Below: Here's the public utility truck mentioned in the article, just before the super tow truck pulled it out of the mire.





Above: Here's a small truck that ran off the California highway into a culvert ditch, killing the driver. Left: An easy job for the super tow truck is lifting a car out of the water by its front axle. The driver in this case was not in the car when it rolled into the water.

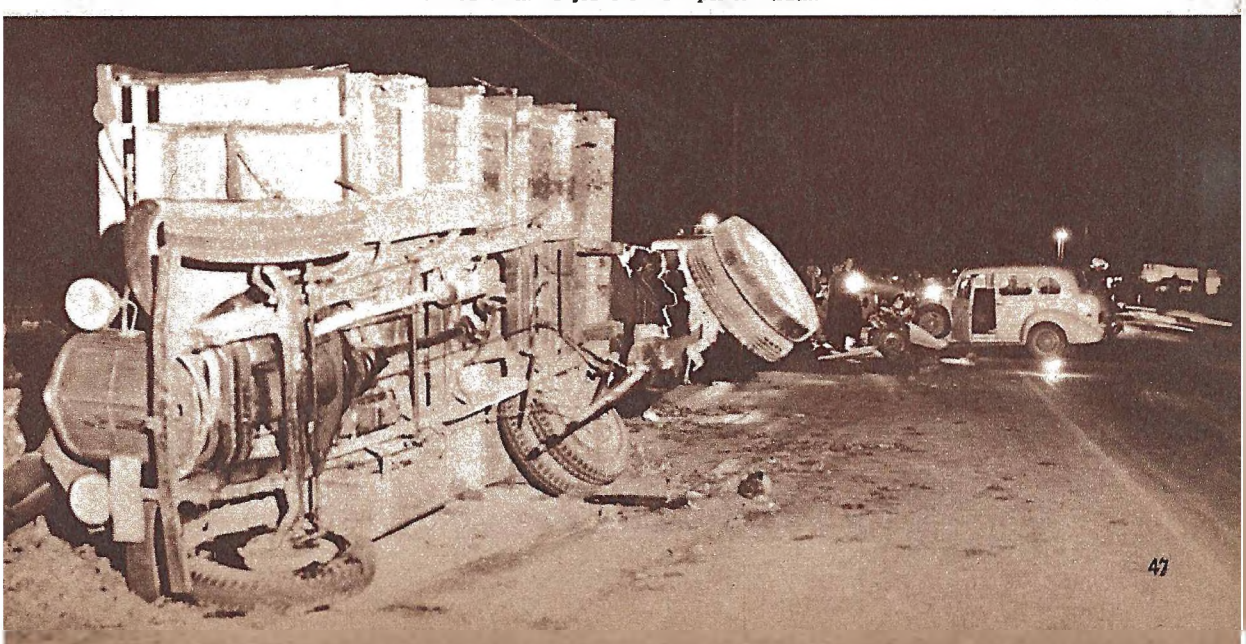
of the men "went into the act." Without batting an eyelash he let 'em have it: "This super tow truck, designed and built in our own plant, embodies every modern device for efficiency and safety in handling the largest trucks and trailers that may be wrecked on the highway, or off of it. It is credited by authorities as being the most capable and best equipped tow truck in the world.

"The unit is 27 feet long, weighs 35,320 pounds, and cost $12,800 to build. It is powered with a 150 H.P. special G. M. C. bus motor. The bed is of ¾-inch steel plate, braced to resist stress and strain from any direction. Built and connected to the deck plate and chassis frame, which is of double strength, is the main boom, capable of supporting 75,000 pounds. When in operation one winch is used to lift and the other to guide the job around obstacles that may be between the tow truck and the wreck.

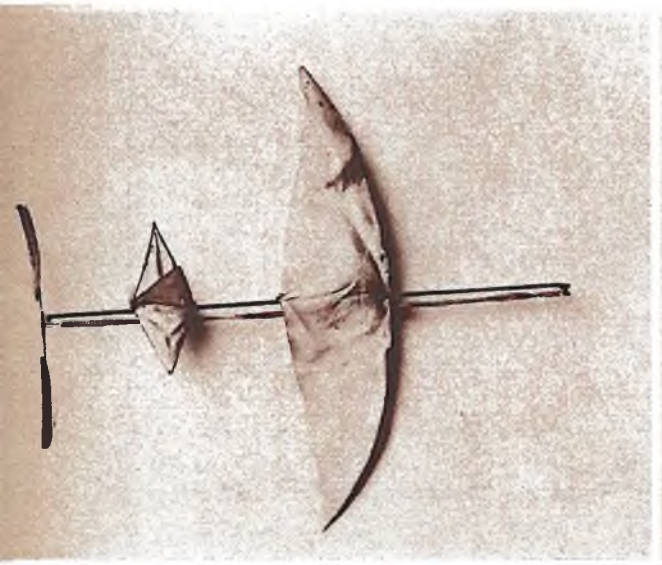
"A Kohler electric plant supplies current which is utilized in many ways. A small winch carrying 2,000 feet of ¼-inch cable is operated by an electric motor and is used to convey heavy cables, chains, and equipment

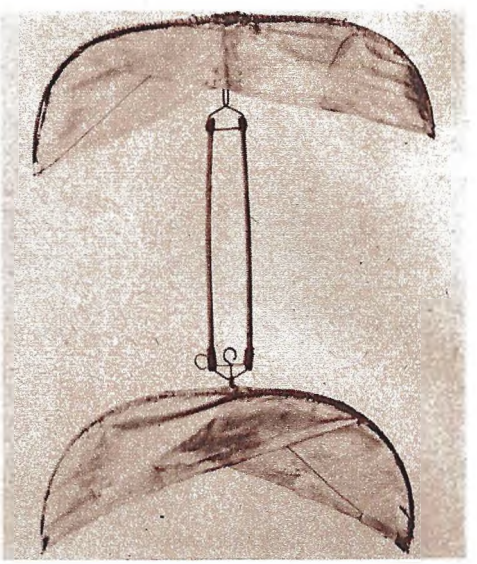
[*Continued on page* 144]

A mean wreck on the California highway, at night. The car and truck have collided, resulting in a smashed car and overturned truck—a job for the super tow truck!

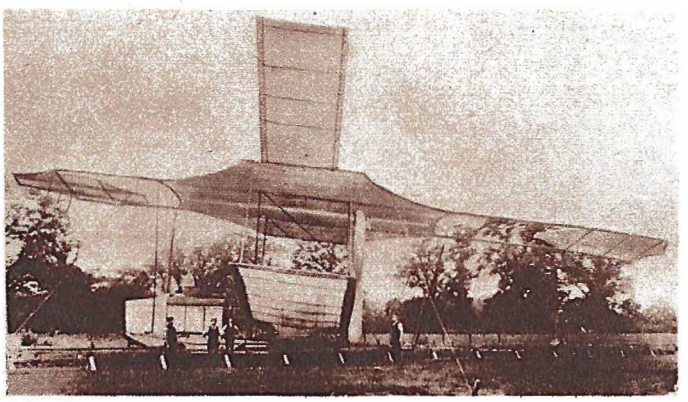


Heartbreaks of The Air!

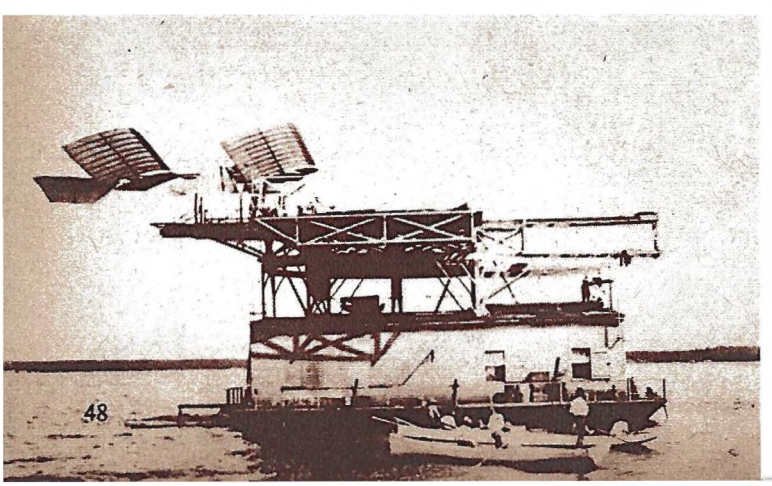




The two models above, now in the Smithsonian Institute, in Washington, were designed and built by the unfortunate Alphonse Penaud in the early 1870's. The model at the left, called the "planaphore" by its creator, was powered by a rubber band, as was the Penaud helicopter, shown at the right. An inventive genius but no salesman, Penaud died in obscure poverty.



Above: The monstrous steam-driven flying machine of Sir Hiram Maxim, guaranteed not to fly by its inventor, almost fooled the highly cautious Sir Hiram!



by

George Daniels

Aviation Editor

WRIGHT, Douglas, Curtiss —those are justly famous names in aviation. The aura of achievement is about them. They are successes of the air.

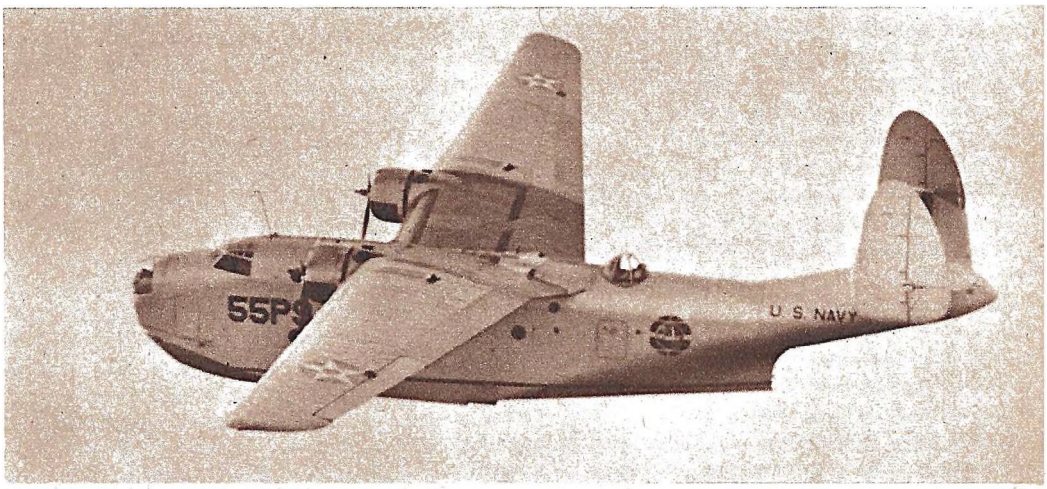
But what of the great failures? What of the inspired men who Might-Have-Been? What of the dreamers and visionaries who could have had their names inscribed at the top of the roster in the Aviation Hall of Fame—had it not been for bad luck, a jinx, or some quirk of fate?

The story of aviation is full of heartbreaks—even of suicide from despair. It is filled, too, with magnificently funny failure; with plain bad luck, and with weird jinxes that seemed determined to keep

Left: Samuel Langley's steam-driven "aerodrome" perched atop a barge in the Potomac River before its ill-fated take-off.

Aviation is filled with success stories, but how about the failures? What of those men who, by small quirks of fortune, were robbed of a glorious place in aviation's Hall of Fame? This is their story.

Right: This is the wreck of Leonard Bonney's gull-wing plane, in which the pioneer aviator and inventor was killed at Curtiss Field, N. Y., on May 4, 1928. Five years were spent in building this radically different type of plane.



Above is a Martin PBM-1, the U. S. Navy patrol bomber, with gull-like wings much like those Leonard Bonney dreamt about.

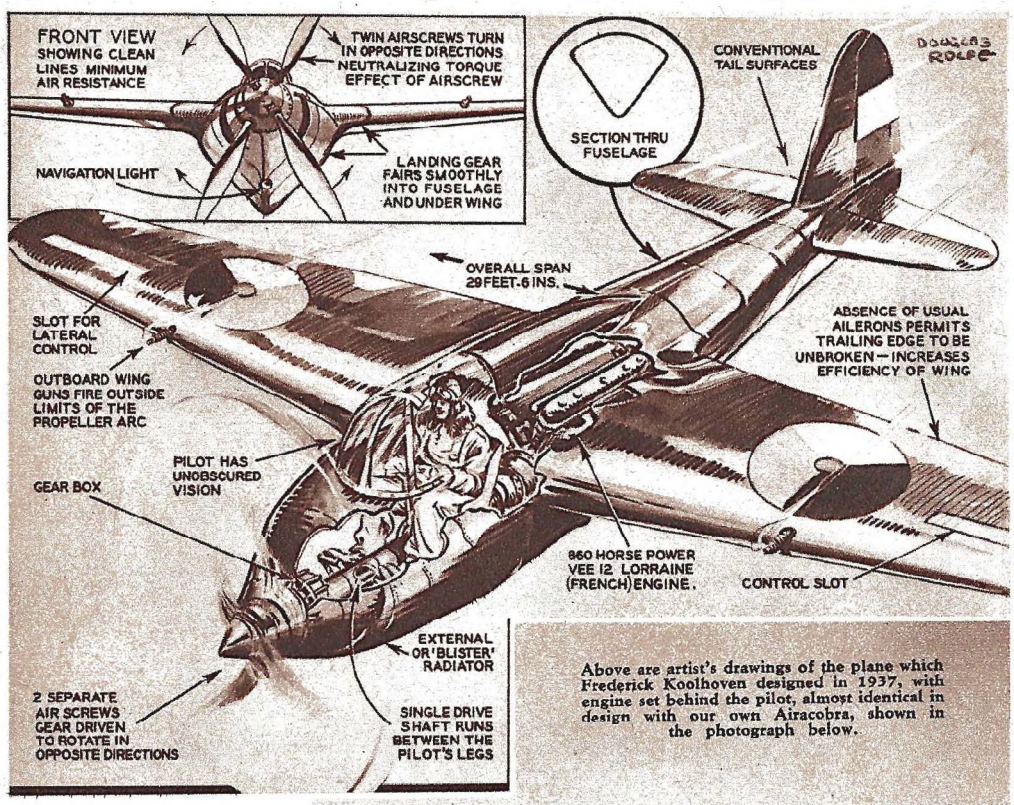
fame from particular men. The story of this side of aviation is little known to the public, though; for Fame bestows her kisses only on those who succeed. It was in the spring of 1880, in Paris, that Alphonse Penaud put a pistol to his head and blew his brains out. Few took note of his death. The few who did, aside from his family and friends, probably shrugged their shoulders and made some remark about "that crackpot inventor."

Yet, with a little luck or a little salesmanship, the name of Penaud might well have ranked along with that of Wright. For Penaud had completed the plans for a most amazing airplane—so amazing, in fact, that every aircraft aloft today contains some of its features!

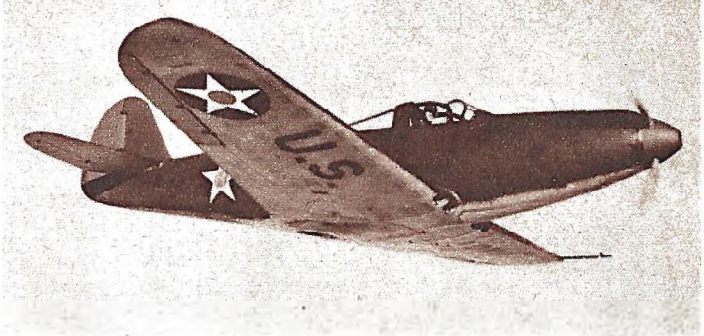
As early as 1871—a full seventy years ago—Penaud had made his first design of a rigid wing ship. As an incidental note on his claim to a fame which he never gained, history records that Penaud was the first person to use rubber bands to power model airplanes.

For ten years or more, Penaud had devoted all his time and ability to his obsession, aircraft design. He was only 29 years old when he finally completed a design on which he was ready to stake his life.

Viewed in the light of modern knowledge, Penaud's creation was unbelievably advanced. It included such features as ailerons, cambered wings, control stick, lateral dihedral, and a towering list of other indispensable elements found in aircraft of today.



Above are artist's drawings of the plane which Frederick Koolhoven designed in 1937, with engine set behind the pilot, almost identical in design with our own Airacobra, shown in the photograph below.



Experts who have studied his blueprints declare there is not the slightest doubt but that Penaud's ship would have flown!

But Penaud was flat broke. Every centime he owned had gone into that design. And, worse yet, like many inventors, Penaud was no salesman.

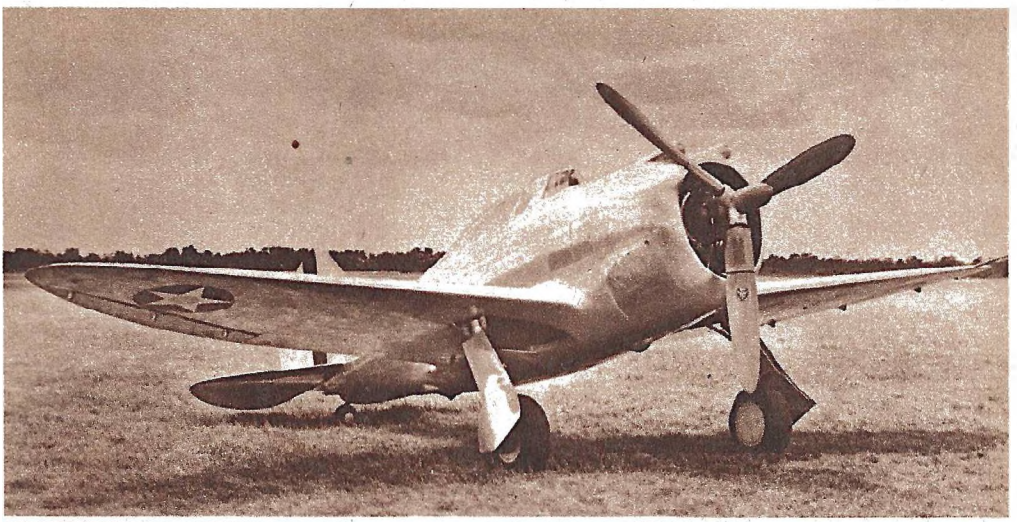
For a solid year, he trudged the streets of Paris trying to find some one with vision enough to finance construction of a model. Had not bad luck dogged him, had he been able to sell *himself*, there is little doubt but that he would have succeeded in flying years before the Wrights went aloft.

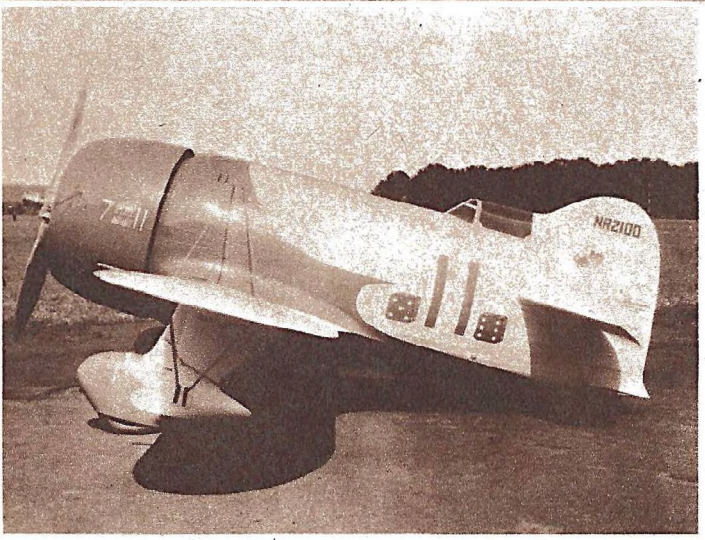
But he couldn't raise a nickel to finance the greatest invention of the age!

At last, discouraged and near starvation, still only 30 years old, he took a pistol and destroyed the cells whose genius might have brought him wealth and glory—with a little luck.

Sir Hiram Maxim, inventor of the machine-gun, made a slapstick comedy out of his failure as a flyer. He came up with the biggest flying machine in the world, a contraption that looked like a Rube Goldberg creation, and which, strangely enough, would actually have flown if Hiram had only let it! Sir Hiram failed to place his name among the immortals largely because he was afraid to!

Sir Hiram began his aviation work in 1893 by casually building an enormous plane, about





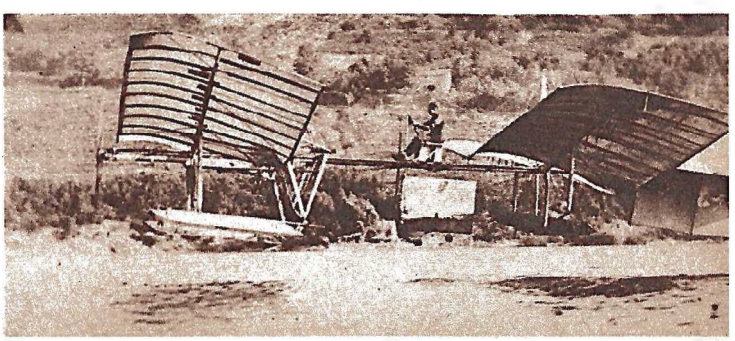
The Republic P-43 pursuit plane, shown above, is a modified version of Zantford Granville's stubby fuselage speed plane, shown at the left. Granville was killed in the tiny-winged speedster in 1934.

twice as big as anything ever attempted before. With equal abandon, he planted a 300-horsepower steam engine in the midst of his aspiring monstrosity. Then he built a circular railroad track for his plane to run on.

To be absolutely certain that the machine wouldn't possibly fly, Sir Hiram added a few thousand pounds to the already staggering tonnage. The ship had a wing surface of 3,160 square feet. An ordinary light plane of today has about 200 square feet of wing surface. Today's biggest passenger plane, the DC-4, has only 2,155 square feet!

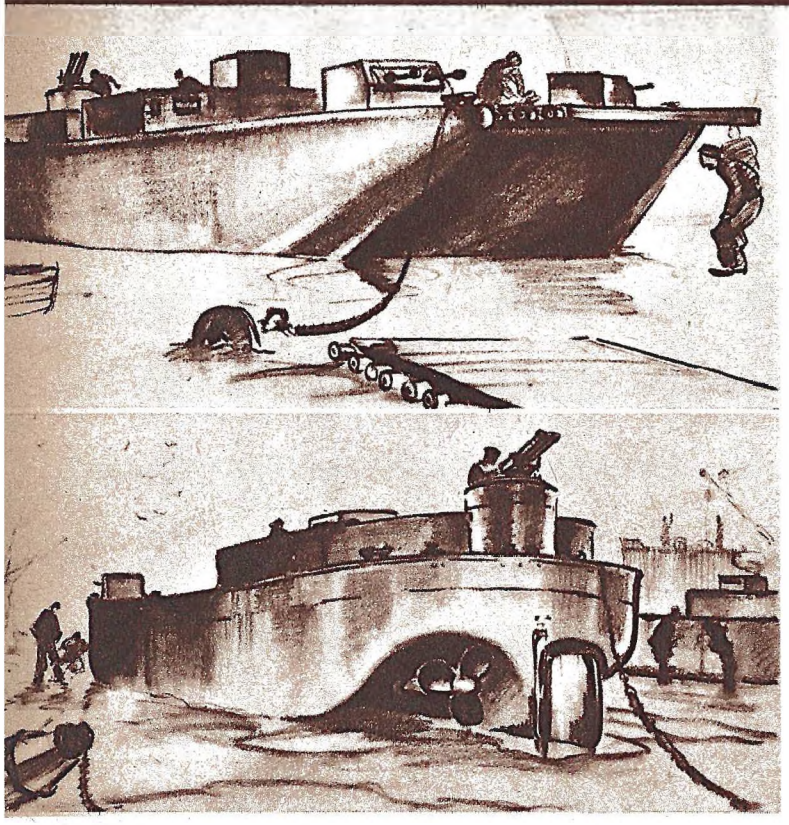
Hiram's idea was simply to test the lifting force of his ship. He didn't want to get too involved. He planned on mounting the ship and reading his gauges in safety, to discover what it would do. The last thing in his mind was flying, because Sir Hiram wasn't quite so sure but that

[*Continued on page* 140]

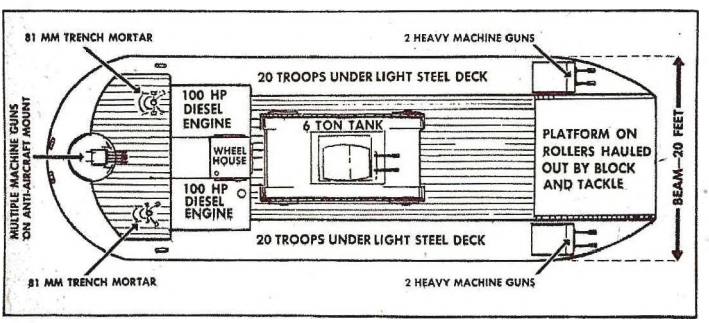


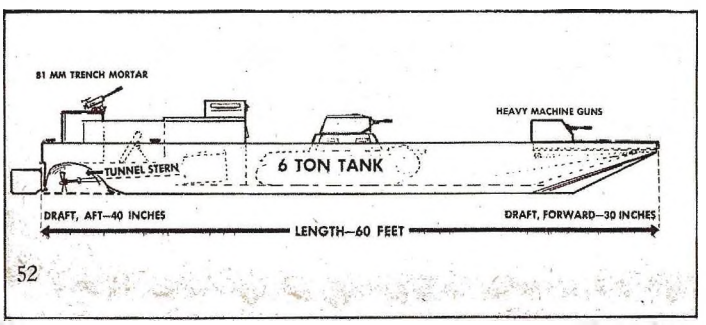
Right: Samuel Pierpont Langley's tandem monoplane, considered a failure while he lived, was flown by Glenn Curtiss eight years after the inventor had died!

Hitler's Invasion Secrets!



The two pictures above show how the proposed invasion barges will appear, fore and aft. The two propellers may be recessed into the hull so they won't scrape the bottom when the barge is run up on the beach. Two propellers are necessary so the barges can be steered by slowing up one and speeding up the other if the rudder should be damaged.





SINCE the fall of France last Spring, the world has been asking itself one question: If and when Hitler attempts to invade England, how will he do it—or try to do it?

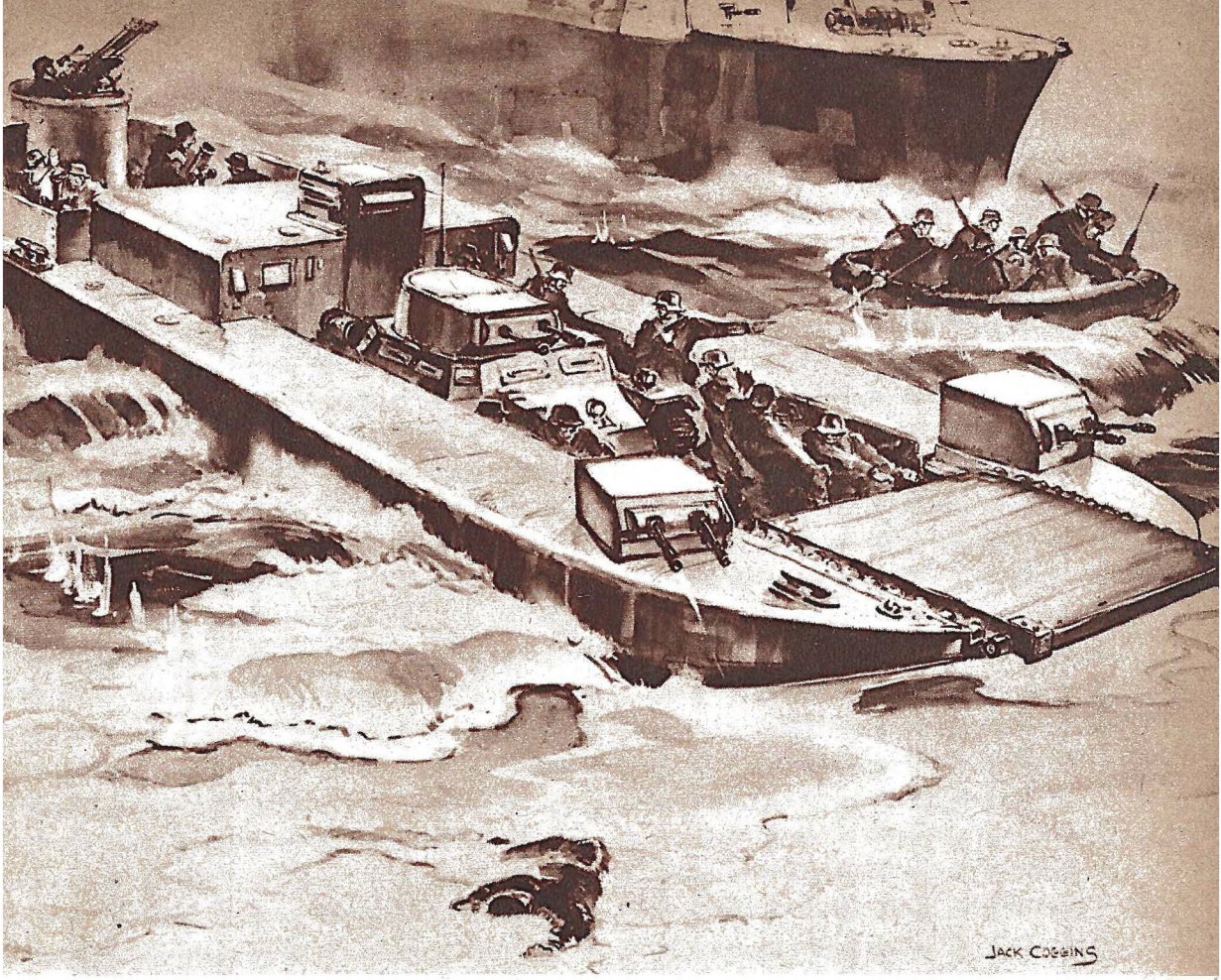
Invasion weather is here. If the Nazis intend to make good their threats, they must invade England between now and August or give up the idea. By this time next year, American aid will have helped make England's defenses entirely too formidable for any such invasion attempt.

Should the Germans try invasion, they'll probably attempt it at night in fleets of great barges, augmented by shoal-draft freighters, of which Germany has thousands. Destroyers and submarines will guard the invasion fleet across the Channel, and an overhead blanket of fighter planes and bombers will protect them during the crossing and while they are attempting to establish a landing base.

No one knows exactly what the barges will look like, how fast they will travel or how many men and tanks they will carry. Varied naval and military opinion pictures them as resembling everything from speedy sea-sleds to clumsy scows towed by tugs or destroyers.

Jack Coggins, well-known marine artist who has drawn the sketches and diagrams on these pages, bases his drawings on an extensive knowledge of functional ship design, combined with a thorough familiarity with the Channel

The two diagrams at the left give an overhead and profile view of the invasion barges. Note the very simple construction.



Here is the actual invasion, as envisioned by Jack Coggins. The troops landing in the rubber boat are from the Rhine River freighter in the background. The whole invasion would be covered by an overhead blanket of Nazi planes.

Coast of England. Before making these drawings, he imagined himself in Hitler's place. If he were going to invade England, he thought, he'd have to be able to transport and land wave after wave of troops. On his ability to do this the success of an invasion would depend.

He realized that he would have to transport these troops across the Channel in boats that could be run up on a beach. Unloading men on small boats from freighters, cruisers or destroyers would take too long. He realized, also, that the troops would have to be preceded by tanks, and that he would have to land light artillery and machine guns on the beach to back up the landing forces.

Hundreds of barges would be needed for such an invasion, which means that they must be simply and cheaply made. They must be shallow-bottomed so they can be easily beached, and they must have room for at least one light tank, with some sort of runway up forward to roll it onto the shore.

To avoid the dangers of wallowing helplessly if their towing ships were crippled, the barges would be self-propelled. They would be sufficiently armed to defend themselves against fighter planes and bombers, but not armed heavily enough to slow them down too much.

Taking all these things into consideration, Jack Coggins designed the invasion barge which appears on these pages. It is 60 feet long, 20 feet wide and made of light steel. It is flat-bottomed and very shallow, drawing 40 inches of water aft and 30 inches forward. It displaces around 85 tons. The invasion barge wouldn't be any bigger than this, Coggins reasons, because any larger ship would be less maneuverable, less likely to slip through the coastal defense traps that will be awaiting it.

The forward two-thirds of the barge is a hollow shell. Steel shelves curve inward to make protective side decks under which

[*Continued on page* 142]

Cutting In On A Fortune!

War has brought the fabulous diamond cutting industry to America, and with it, the unsung heroes who stake a fortune on one swing of a small mallet!

by Lester David

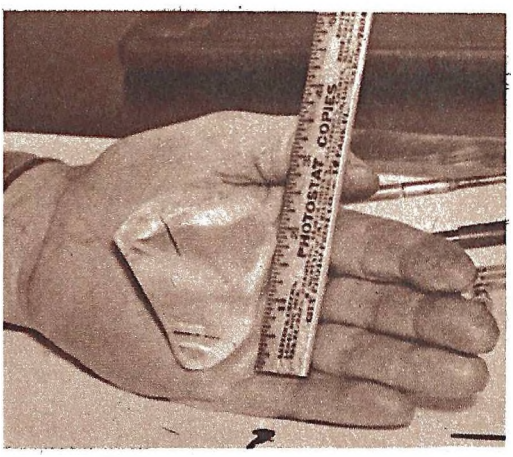
Left: The cleaver poises a mallet over a blade placed in the diamond's groove. On the tap that is to follow, a fortune may be made—or hopelessly lost!

A GROUP of harried men hover around a delicate machine in a New York shop. For eighteen long months they have planned the operation now in progress. For fifteen more nerve-wracking months they must watch a paper-thin blade spin at high speed, knowing that the slightest miscalculation on their part may, in a second's time, shatter a fortune of $2,000,000!

These men, under the direction of Adrian Grasselly, one of the most famous men in his profession, are cutting in on a fortune. They are sawing up the fabulous President Vargas diamond, third largest diamond ever found. They are reducing it—depending upon their skill and luck—either to a mass of powdered diamond dust, or to twenty-three smaller gems which will have a market value in excess of $2,000,000.

It is one of the most trying of all jobs. Diamond-cleavers, such as Mr. Grasselly, have been known to collapse from the intense worry of their task. And in one famous case, the actual death of a diamond-cleaver was blamed directly upon the strain of his work.

The cutting of the President Vargas stone is the dramatic high-light of an even more interesting story—the mass removal of the diamond cutting industry from Brussels and Amsterdam to New York City.



$2,000,000 in the palm of a hand. The President Vargas stone, largest diamond in the world, is measured in the hand of a New York jeweler. The stone is being cut into 23 smaller stones, an operation which will take fifteen months.

When the Nazi blitzkrieg exploded upon Western Europe, the diamond experts of the Netherlands and Belgium were forced to flee for their lives, taking with them what gems and tools for gem processing they could carry. They chose New York as their refuge. Thus one of the most ancient and precise of crafts was torn by its roots out of Europe and transplanted in the new world.

Now the handful of skilled workers capable of processing diamonds are concentrated in a

Above: After being cleaved, or sawed, the diamond is brought to the cutter, who rounds it, or puts a "girdle" on it. He gives it the approximate shape it will finally have. By a slight tap on the wheel he can cause the diamond to revolve irregularly, thus resulting in the desired shape. Another diamond is imbedded in the handle of the tool he uses. Right: Another view of the cutter at work. Only after years of practice is a man qualified to handle the precious stones.

small area in Manhattan. Most of them are members of old world families who have been diamond cutters and polishers through countless generations.

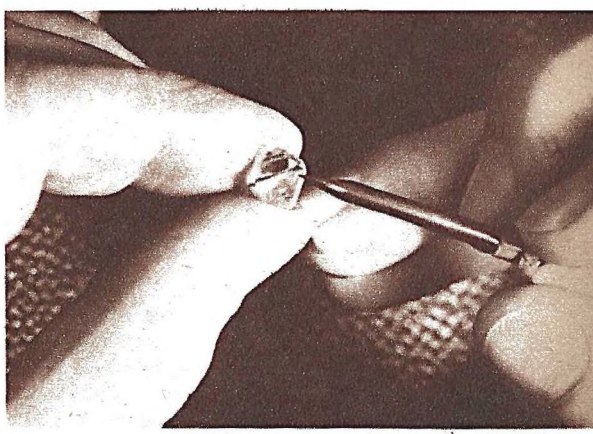
These are the men who, by the matter of a hairsbreadth or with the single swing of a small mallet, may either lose a fortune or create a priceless gem!

In musty cubbyholes they sit, plying their delicate art with virtually the same methods their forebears used in the shops on the cobbled streets of Brussels and Amsterdam back in the medieval craft days. Patient, tireless, wondrously skilled, they transform what appear to be large dull chunks of washing soda into stones that snap and burn with brilliance.

A rough diamond is not a thing of beauty. Dull white in color, it resembles a piece of quartz crystal or dry ice, and occasional darts of inner fire betray its magnificence. When dug from the gem-bearing ores of the Transvaal or Brazil or India, they are octahedral in shape, solid figures of eight plane faces, and often elude the sharpest eye.

So unimportant-looking is a rough diamond that the great Cullinan, by far the largest stone ever discovered, lay for days near the surface in the yellow dirt of the Premier Mine in the South African Transvaal before the sun's rays betrayed its presence to the mine superintendent.

A rough diamond is useless. It must be cut, shaped and polished with the highest degree of skill to take its place as the Queen

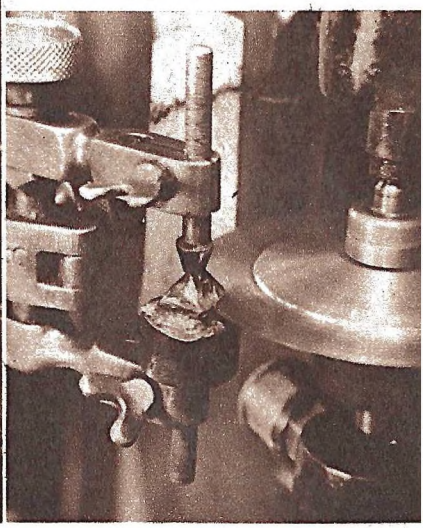


Before it is cleaved, or sawed, the diamond is marked in ink, as shown above. Years of experience and practical knowledge of every type diamond in the world are necessary before a man can even begin to be charged with the delicate task of "marking off" a rough stone. He must obtain from the rough the best possible quality of polished gem.

of Jewels. And it is the diamond cutter's task to bring out all its luminous beauty and sparkle by cleaving or sawing it into workable forms and cutting and shaping the facets.

Just as no two fingerprints are alike, so each diamond has its own peculiarities and must be dealt with in its own way to highlight its own particular merits. And there is no opportunity for experimentation; the

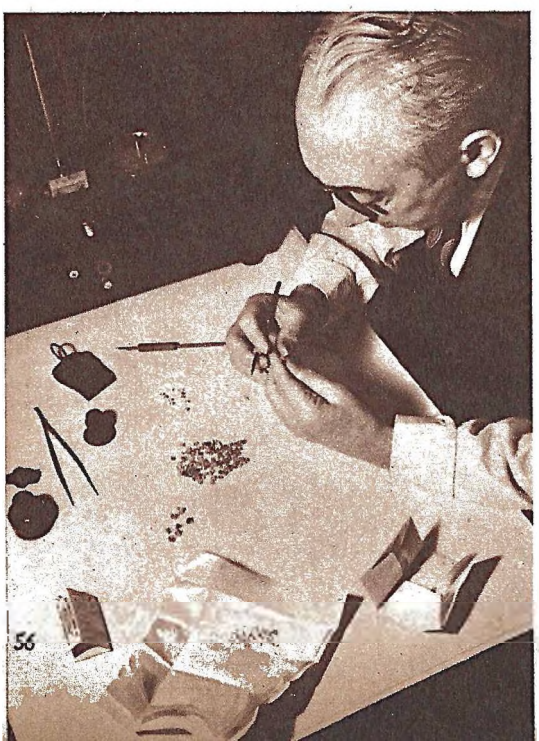
Left: Set in the "dop," a cut diamond is placed on the polishing wheel, which is treated with diamond dust and oil.



cutter must use wise judgment and be right the first time.

Months of close and critical observation are necessary before it is determined in which form a diamond can be cut to its best advantage. It is inspected for weight, flaws and the proper cleavage planes. Upon the decision depends largely the profit the dealer is to realize.

The President Vargas stone was studied, measured and weighed for longer than eighteen months before Mr. Grasselly finally decided to start the work of splitting it. Then



Above, right: Here is a close-up of a 35 karat diamond being cut by the saw. A thin metal disc of phosphor bronze, the saw is edged with a mixture of diamond dust and olive oil. Revolving at tremendous speed, it will take over a week to saw through this stone.

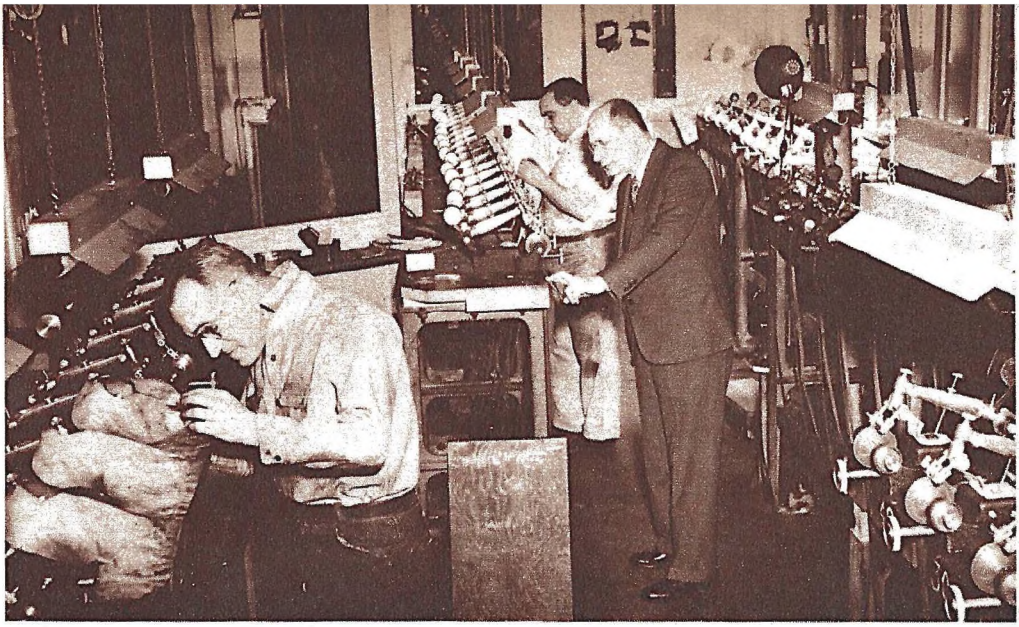
it was carefully marked, and the tedious and delicate job of sawing was started. According to experts in the office of Harry Winston, Inc., owner of the gem, it will be another fifteen months before the task has been completed.

Although diamonds are the hardest substances known to man, they can be split readily enough along their grain. Accordingly, when the decision is made, the expert indicates by little scratches or pen markings where the stone is to be cleaved and the nerve-wracking moment arrives.

The stone is set in a metal container, termed a "dop" by the trade, and bedded down with a matrix of lead or plaster. A dull steel blade about four inches long and two inches wide is placed along the line of cleavage and the expert swings his mallet. If the calculations have been correct, the stone splits into exactly the number and shapes of pieces which were planned. If they were wrong, it is either shattered into hundreds of fragments or cracked into forms undesirable for the finished product. Not only is the stone divided by the single blow, but much of the superfluous material and parts with defects are removed by the same operation.

Probably the most dramatic moment in the

Left: A diamond cutter foreman is examining rough stones for possible flaws. He also makes a preliminary examination of the grains in the diamonds, and determines whether cleavage or sawing is the more feasible for cutting them.



Here is the sawing room of a large diamond cutting establishment. There are over 200 sawing machines, cutting into diamonds ranging from half a karat to 100 karats. Diamonds are sometimes sawed after cleavage.

entire history of diamond cleaving occurred in 1905 when Joseph Assher, leading cutter of Amsterdam, prepared to swing the mallet against the Cullinan diamond. Measuring 3½x2½x2¼ inches in the rough and weighing 3,025 carats, the magnificent gem was purchased by the Transvaal government for $1,000,000 and presented to King Edward VII by the Union of South Africa on the monarch's birthday.

Joseph Assher, to whose firm the cutting was entrusted, studied and planned and mapped for nine months before he lifted an instrument. Years of strain had left Assher's nerves taut as violin strings, and several times during this period he was forced to rest in the valleys of Holland before he could continue.

At length, certain his cleavage plans were correct, he constructed a special set of cutting instruments for the Cullinan and set 3 p. m. of the next day for the job. Assher awoke the next morning dizzy and weak, his temples throbbing. Within an hour, however, his illness appeared to vanish and he ordered the work to proceed as scheduled. But he took the precaution of asking a doctor and nurse to remain in attendance during the cleaving.

His eyes steady, his hand firm, Assher cleared the workroom of all employes and approached the Cullinan. Work ceased in the entire factory men tiptoed around and spoke in hushed tones. On the hour, Assher affixed his blade and struck.

At the first blow the stone was cleft in two, smoothly and cleanly. Each weighed 1,977¼

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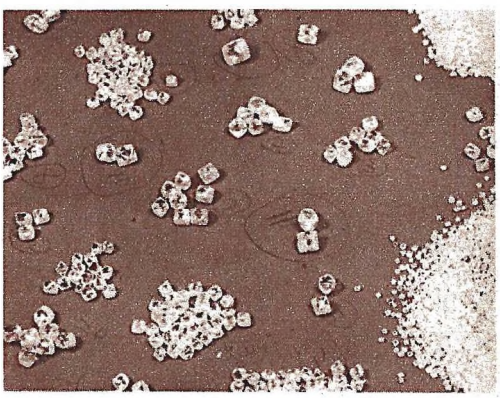
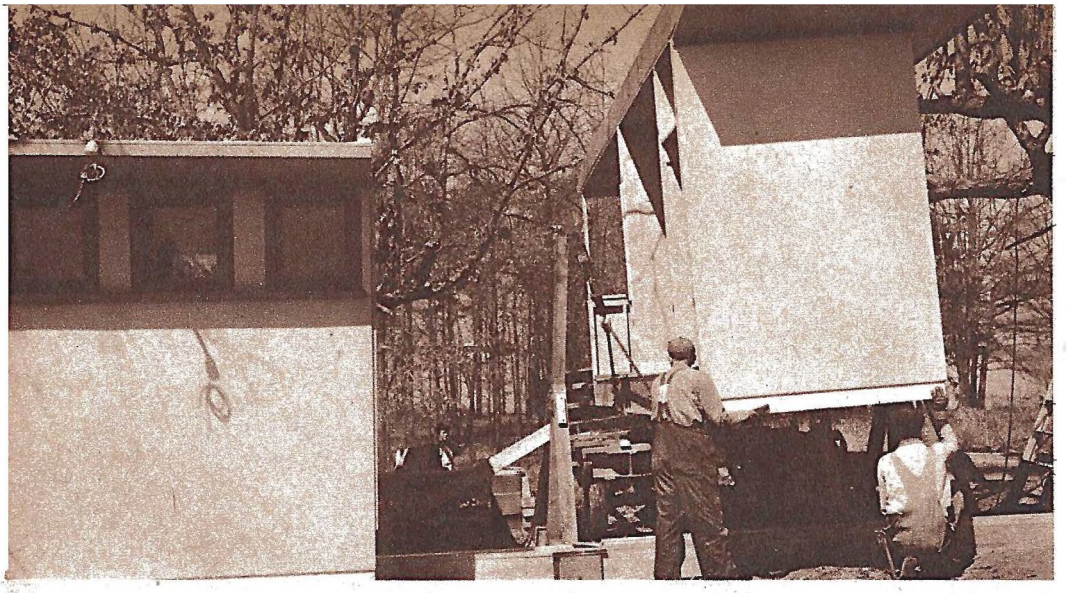


Above is an assortment of diamonds "in the rough." They are uncut and unpolished, valued at approximately $500,000.

The diamonds above are finished stones, valued at one million dollars. There are about 3,500 karats of diamonds shown here.



Here's a section of an assembly line cottage being lifted from a trailer by two ordinary hand-hoists. The section will be lowered to a pair of temporary rails and moved over onto the permanent rails to be bolted to the section already in place.

Houses While You Wait!

Here's the house assembly line. The cottage shown is almost completed, and the workman in the foreground is working on the floor platform of another.

HOUSES—in mass production—from an assembly line! That's the feat just accomplished by the much-accomplished Tennessee Valley Authority. And now, from the TVA house-production factory, the factory-built, portable cottages are beginning to roll.

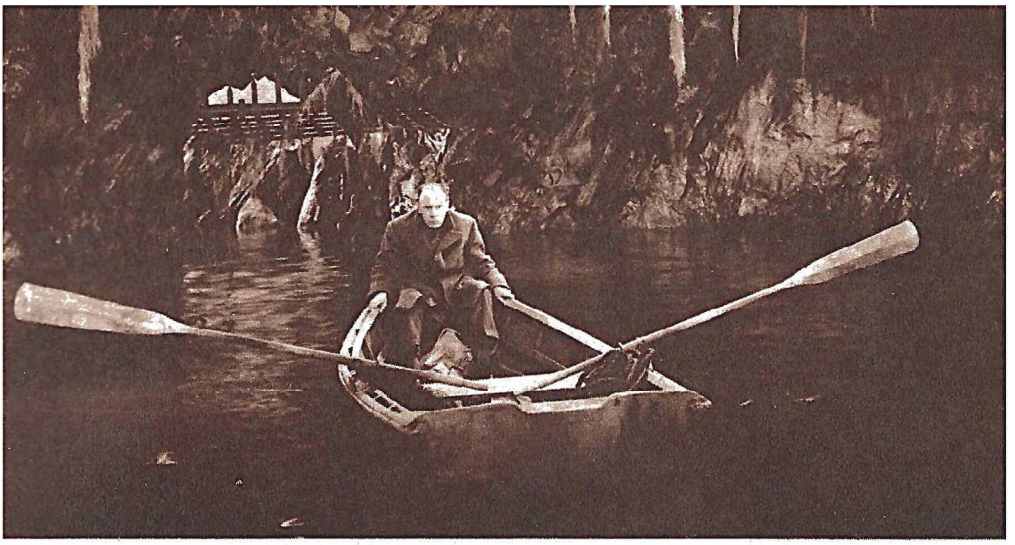
Practically all American products are produced in huge quantities by the typically American mechanized assembly line, and TVA officials, recognizing the advantages of the system, have worked out the details enabling this form of production to be adapted to the housebuilding industry.

Already six cottages have been produced by the assembly lines at Muscle Shoals, Ala. The cottages are for use at Pickwick Dam, Southwestern Tennessee, to complete a license agreement in connection with the operation of reservation facilities. The agreement is between the TVA and the

[*Continued on page* 146]

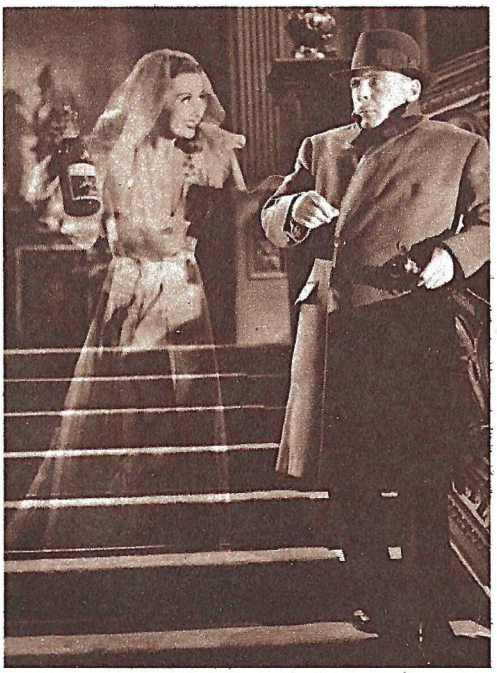
Left: A slice of cottage, representing one-third of the complete building, is mounted on a trailer ready to be taken away.

Mechanix Illustrated



Did you ever see a ghost row a boat? One is performing that trick in this picture, as an amazed Roland Young looks on.

Hollywood—Scientific Ghost Town!



One of the most difficult feats of trick movie photography is a scene such as this one, where Roland Young is confronted by a half materialized Joan Blondell holding a materialized bottle.

Figures materialize and de-materialize; an invisible woman makes footprints in the sand; a boat rows by itself—it's all in a day's work for Hollywood's ghost makers!

by Andrew R. Boone

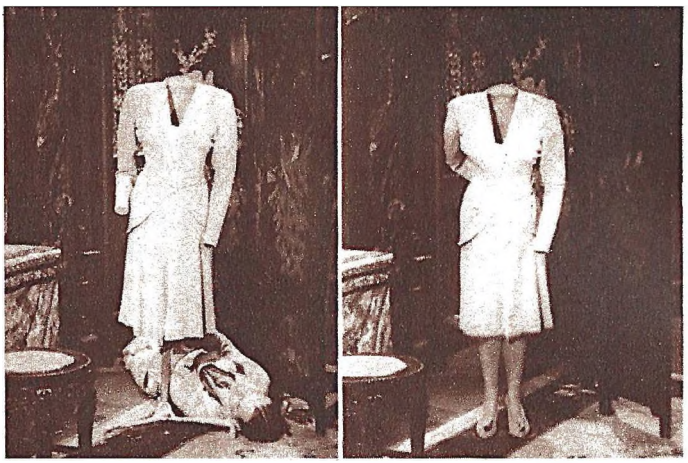
IT WAS early morning on Santa Monica beach in California, and the two lifeguards on duty were enjoying a doze. One opened an eye experimentally and looked out to sea. His eye widened in disbelief and he hitched himself abruptly up on an elbow. Then an expression almost of horror spread over his face. He prodded his pal.

"My Gosh, Joe," he whispered hoarsely, "look quick! Do you see it—or have I got 'em again?"

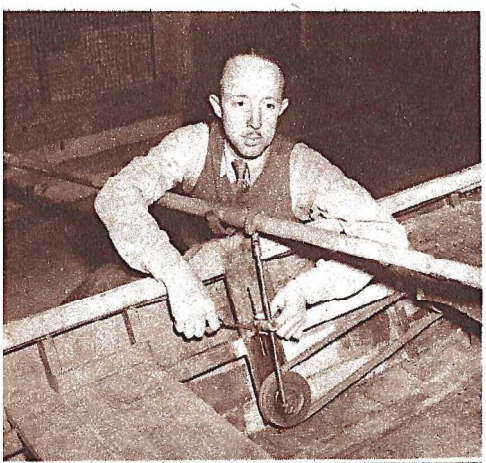
A hundred feet off-shore, just beyond the surf, a small rowboat was skimming along through the water, its oars rising and dipping rhythmically. But there was no one rowing the boat! The oars moved independently—as though worked by invisible hands!

"Great Day!" Joe exclaimed. "Ghosts! Let's get out of here."

The five pictures at the right show how Hollywood technicians turn a dress dummy into a pretty actress. In the first, Wilbur Hackney, prop maker, lies under the dress form and makes the arms move by pulling wires. In the next, Miss Blondell has replaced the dummy, but her head and hands have been matted out. The last three pictures complete the transformation.



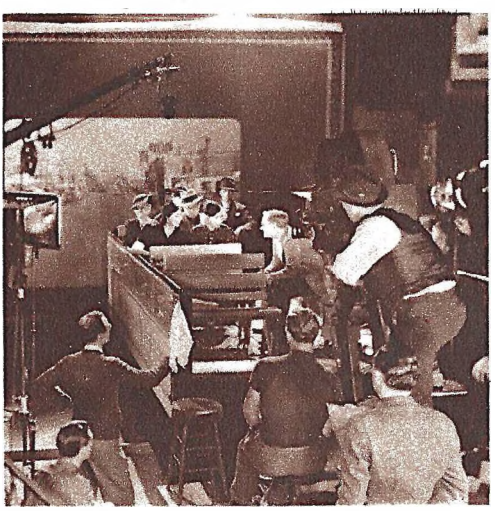
Left: Fred Knoth, special effects engineer, finishes one of the perforated aluminum oar blades. Below: The rowing mechanism.



Ghosts were rowing the boat, all right. But they were movie ghosts, skillfully contrived by the mechanical wizards whose job it is to produce special effects on the screen.

How do they do it? Do they use mirrors and invisible wires? Or is it done with trick photography?

Not more than a half-dozen producers of effects can cause ghosts to do their bidding; theirs is the movies' most specialized profession. In the brilliant sunshine or on a darkened sound stage, they can strike down actors with clubs wielded by unseen assailants, cause a dressmaker's dummy to dress itself with neither eyes nor hands to guide the graceful movements, or de-materialize an



Above is a "process projection background." The bus top is in the studio, the city street on which it travels is flashed on a projection screen in the rear. It will look real in the movie.

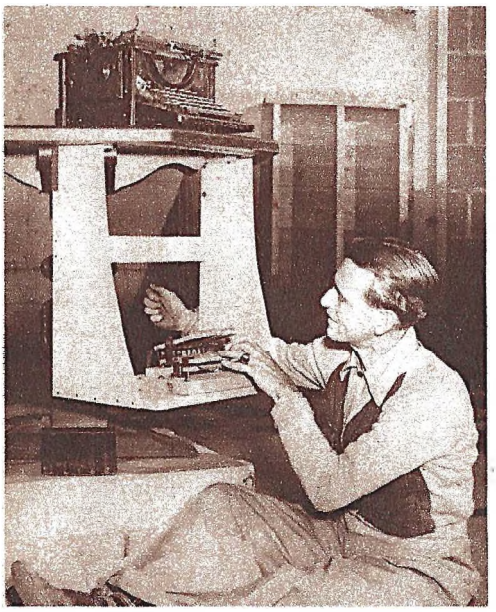
actress right before your eyes and materialize her again among a crowd on the other side of the scene.

Sometimes they perform part of their trickery right before the camera, finishing the painstaking job in the laboratory; again, they erase faces and figures by an ingenious use of mats alone, replacing the people with "blank set," or drop people into a scene where before the camera saw only the walls and properties with which the set was dressed.

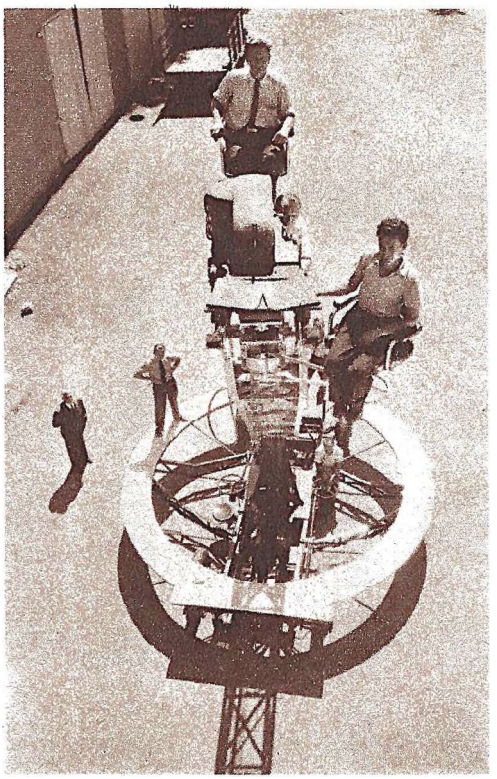
Suppose we look in on Stage Three at the Roach studio in Culver City, California. The camera, trained on a corner of a bed room, centers on a dressmaker's dummy, fitted with a two-piece street dress. Wilbur Hackney, a prop maker, lies on his back under the form pulling wires which cause the arms to move as though the headless and handless figure were dressing itself. When the two arms meet, the action stops and Roy Seawright, head of the special effects department, sketches on the ground glass of an 8x10 view

At the left, this scene, painted on glass, sets the gloomy atmosphere for the picture. Jack Shaw and William Draper are spotting the foreground picture and the background clouds. Below: The road painted at the left comes to life on a second stage. By double printing, this road will be filled into the picture at the left, and the car will appear to wind down from the castle.

Walking through sand, the ghost left feminine footprints. Here those prints are being made on a 30-foot board, with wood and lead plugs fitting into the cut out "feet." The board was covered with sand, the plugs were dropped from below, and presto—the ghost walked!



And here's the ghost's typewriter. An expert typist sitting under the table and using a duplicate keyboard connected by wires to the upper keyboard writes and returns the carriage.



Sometimes the semi-materialized form of a human is followed by a camera riding "long boom." This spectacular device makes possible many different kinds of tricky shots.

camera the dummy's exact outline. Now Joan Blondell, wearing an identical dress, steps into position, continuing the action from that point.

We leave the set now, and visit the process laboratory, where the legerdemain continues. Viewing enlargements of the two negatives

[*Continued on page* 148]

WANNA FOOL A DUCK?

THEY tell the story up in Milford, Conn., about the hunter who saw two black ducks swimming around in the marshes making eyes at each other —only to discover that both were wooden decoys!

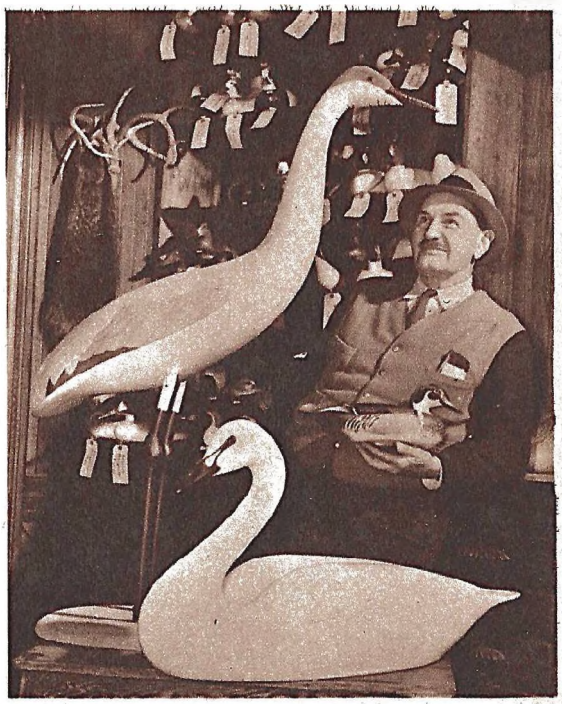
They add that the decoys were products of the workmanship of "Shang" Wheeler, Milford sportsman and oysterman, who operates one of the most unusual schools in the world—a correspondence school in decoy making!

Charles E. "Shang" Wheeler has a good claim to the title of foremost duck fooler of the world. At the recent National Sportsmen's Show in New York City, he took all of the prizes but five in the amateur class for decoy makers—and the other five prizes were won by "students" of his correspondence school.

Shang has been carving decoys ever since the age of eight, when he made a crude decoy of a black duck, using one of his grandfather's wooden birds as a pattern. That was 60 years ago.

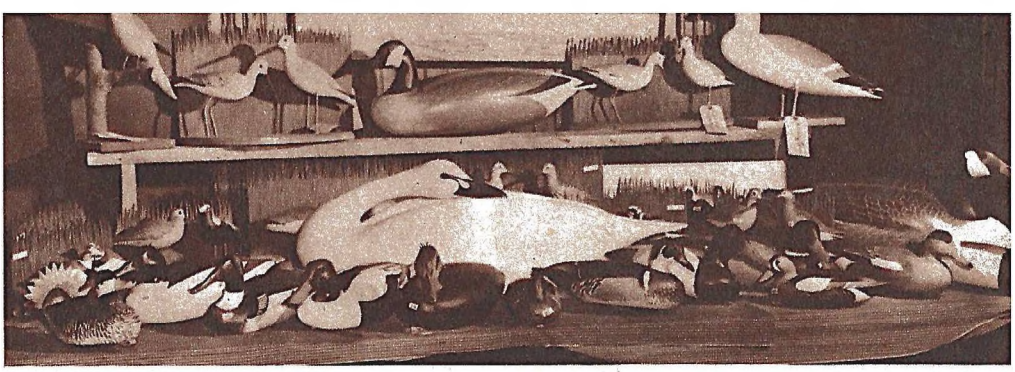
Wheeler has made decoys of every

[*Continued on page* 154]



Charles E. "Shang" Wheeler poses here between his long-legged sand crane replica and his whistling swan. He holds a duck decoy.

The two wooden decoys at the left are male and female, hand-carved by "Shang" Wheeler. At the right is his black duck decoy.



Assembled here are a few of the many life-like decoys, representing many different birds, which Wheeler has fashioned.

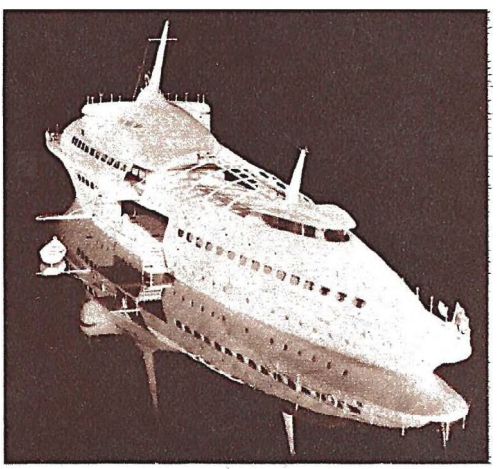
Bel Geddes, Master Showman!

by
Cliff Taylor

A paradoxical combination of stage designer, visionary and hard-headed business man, Norman Bel Geddes is the top man in his field today. Whether it's a circus or a salt cellar, he does the job in brilliant fashion!

Above: Norman Bel Geddes expounds a theory in the drafting room of his office, where everything from the biggest circus on earth to a salt cellar is redesigned.

Below is a picture of the model of an all-steel, streamlined ocean-going yacht, designed by Bel Geddes. The picture below shows the yacht as it would look with deck covers open. Launches and lifeboats are carried inside the boat, and are launched from the side hatches. At the right, on the opposite page, the model is shown with covers and hatches closed, completely streamlined and ready for stormy weather.



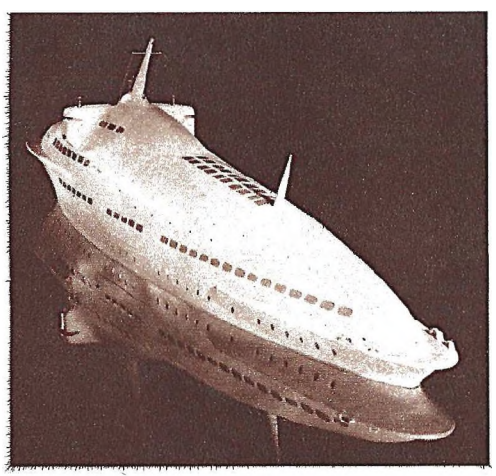
WHEN Norman Bel Geddes was fifteen years old he toured southern Ohio with a small traveling theatrical company, filling in between acts as a none-too-successful magician.

This summer, 32 years later, he's connected with another traveling show—but there's a big difference. For one thing, a lot more people will be seeing his magic this time, and there isn't a doubt in the world but that they'll appreciate it. And for another, the outfit he's tied up with this summer isn't a small show. It's big. It's Ringing Brothers' Circus, the "Greatest Show on Earth!"

When John Ringling North, present owner of the circus, decided it needed a new presentation, he looked around for a man who could do the job he wanted done, a man who could make the Big Show more fascinating, more beautiful, more interesting than it had ever been before. He didn't have to look far.

In Norman Bel Geddes he found exactly what he was seeking. Here was a man who had been a great stage designer, a master at doing things on a fabulous scale. Here was one of the most successful industrial design-

Above: The striking set of the Sidney Kingsley play "Dead End," designed by Norman Bel Geddes. On one side is the street, on the other a huge apartment building. A tank, recessed at the front of the stage, allowed the actors to dive from the dock into the water, giving a perfect reproduction of an East River street scene.



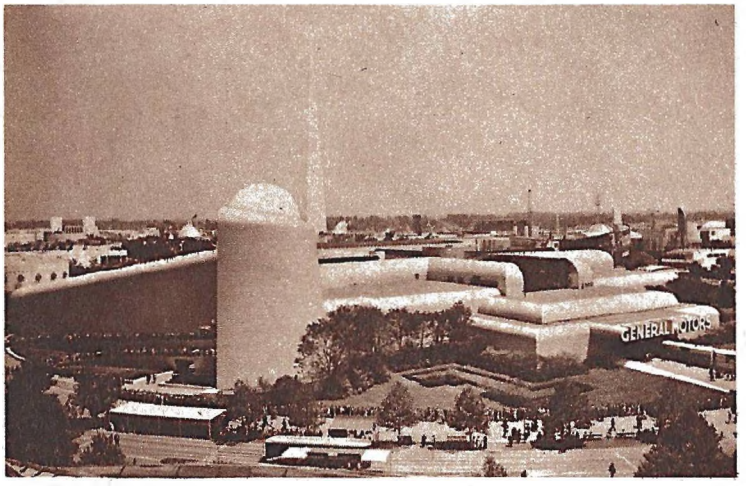
ers in the country, a man whose visionary ideas of design, at first labeled "screwball," had made millions for great industrial concerns. Here was the man who had designed the General Motors Futurama, the most spectacular and successful of all the exhibits at the New York World's Fair. Here, thought John Ringling North, is the man for the circus.

He wasn't wrong.

It's a great combination, Bel Geddes and the circus. The show complements the man; the man complements the show. Bel Geddes has found, at last, a medium where he can say, "Give me forty elephants," and *get* forty elephants!

When you see the circus, you'll see the changes he has made from the moment you enter the side-show Midway. You'll see the menagerie animals in their new, rustless steel cages with background paintings of palm trees and underbrush to make the animals feel more at home. You'll see the amazing tent containing Gargantua and Toto, the show's

Above: A model of the tent to hold Gargantua and his bride, Toto, in the Ringling Brothers' Circus. The tent is radical as there are no inside tent poles, but instead, four outside poles from which the tent is suspended. Next year, the main tent will be of the same design.



Above: A view of the General Motors Building at the New York World's Fair, where 9,600,000 people saw Bel Geddes' dramatic Futurama, a forecast in miniature of the highways of tomorrow.

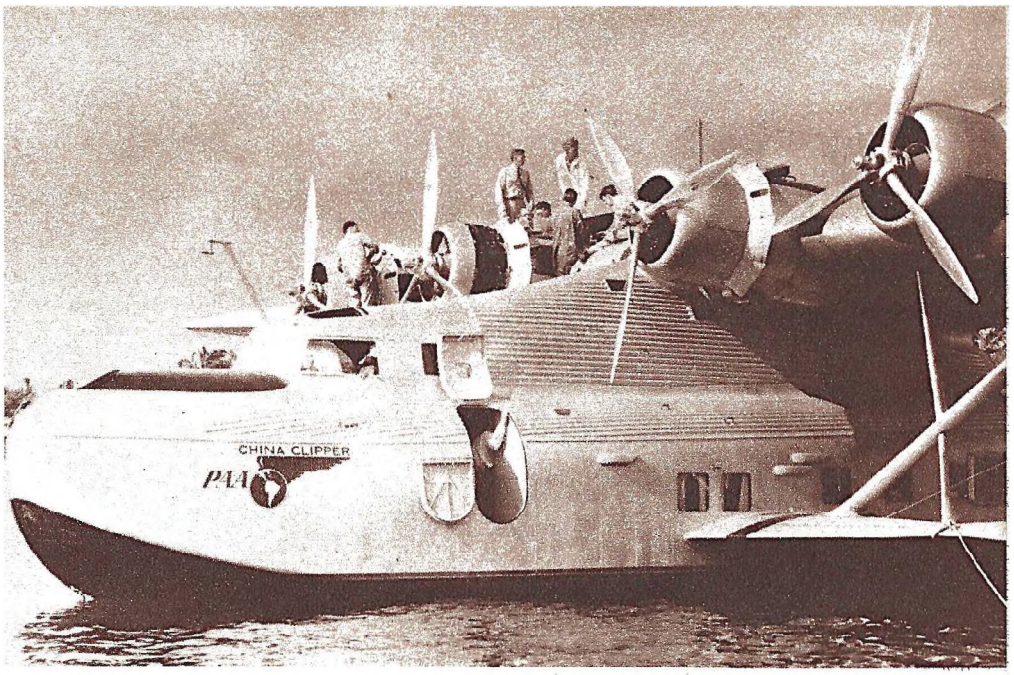
Right: A model of a streamlined sedan, designed by Norman Bel Geddes. The car rides on eight independently sprung tandem wheels, each supplying driving power from a self-contained electric motor. The motors are driven from a diesel-electric power plant mounted in the rear of the car.

gorillas, suspended from exterior steel towers, giving an interior free of tent-poles. Take a good look at that tent, incidentally, because next year the Big Tent will be fashioned on the same lines.

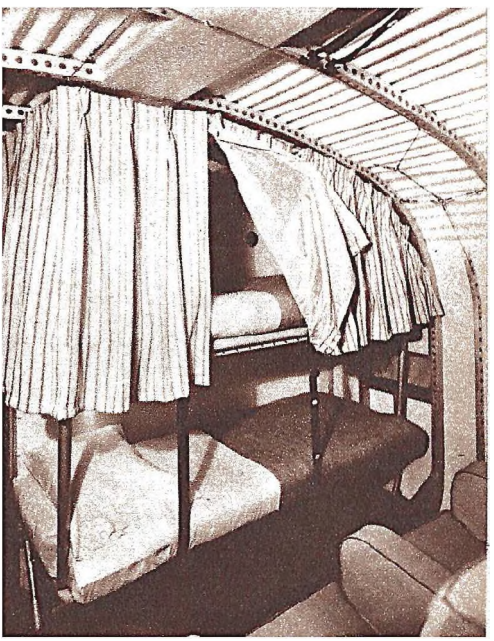
When you get inside the main tent, you'll note the indirect lighting of the rings, you'll comment on the tricky new costumes of the "razorbacks," the boys who set up and tear down the performers' equipment, and you'll be startled by the sawdust, which carries out the patriotic theme of the show by being colored red, white and blue.

But when the "Old King Cole" number comes on, a fabulous pageant of breath-taking beauty, you will realize that here is the climax of Norman Bel Geddes' career, a career that surpasses the wildest dreams of Horatio Alger.

Born in Adrian, Michigan, in 1894, Norman Bel Geddes attended various schools through the Middle



Above is a view of the great China Clipper ship of the Pan American Airlines, and at the right is a section of the interior, which was designed by Norman Bel Geddes. Interior design was especially difficult as weight specifications imposed a number of problems, all of which Bel Geddes met successfully.



West until his formal education was cut short by an unfortunate incident which took place during his first year of high school, at New Philadelphia, Ohio. He drew a highly unflattering group picture of the high school faculty on a blackboard for the amusement and edification of his fellow students. The students liked it, but members of the faculty did not, and Norman found himself no longer a student at New Philadelphia High School.

His experiences with the traveling show the previous summer had more or less convinced him that he was not cut out for a magician, but he still had the hankering for the theater. As a compromise, he went to Cleveland Art School. Finding this not to his liking, he shifted to the Chicago Art Institute, where he shoveled snow to pay his tuition, helped his landlady with laundry to pay for his rent, and worked as a bus boy in a restaurant for his meals.

Seven weeks of this was enough, and he quit to work as an extra with the Chicago Civic Opera Company. He made friends with the superintendent of the Chicago morgue, and in his spare time hung around this grisly institution with a sketchbook to learn about anatomy first-hand.

In the next few years, his career was varied. He worked in a Chicago engraving house. He ran a laundry agency in Ann Arbor, Michigan. He designed auto advertisements for an engraving company in Detroit.

[*Continued on page* 150]

ANNOUNCING!-The Winners

1st PRIZE: Taylorcraft Trainer. Won by Gene Drorio, 1504 60th St., Brooklyn, N. Y.

HERE they are, folks—the MI contest winners!

Out of the 62,635 entries that swamped these offices and kept the editors hard at work for weeks on end, your judges finally selected the winners listed on these pages. The prize-winning total and a detailed discussion of the contest will be found in The Editors Workbench in this issue.

1—GENE DRORIO, 1504 60th St., Brooklyn. Taylorcraft Plane.

2—MRS. ALICE DUNHAM, 635 Church St., Ludlow, Ky. Indian Motocycle.

3—HAROLD CYTRINELL, 2741 Wallace Ave., Bronx, N. Y. Atlas Lathe.

4—LOUIS GROSSMAN, 1312 Avenue M., Brooklyn. Deagan Marimba.

5—EDMUND J. SAMPTER, JR., 333 Reeves Drive, Beverly Hills, Calif. Midwest Radio.

6—MRS. KATHRYN SPEAKER, 112 Russel St., St. Joseph, Mo. Gruen Watch.

7—MICHAEL KEDROWSKI, SR., 197 Charles Ave., St. Paul, Minn. Junior Radio Pilot or MT Scope.

8—LAVERNE NEWTON, 60 Dawes Ave., Roosevelt, L. I. Penn Yann Cartop Boat.

9—MRS. GEORGE W. MUNNIS, 804 Burcham St., Kelso, Wash. Briggs & Stratton Inboard Engine.

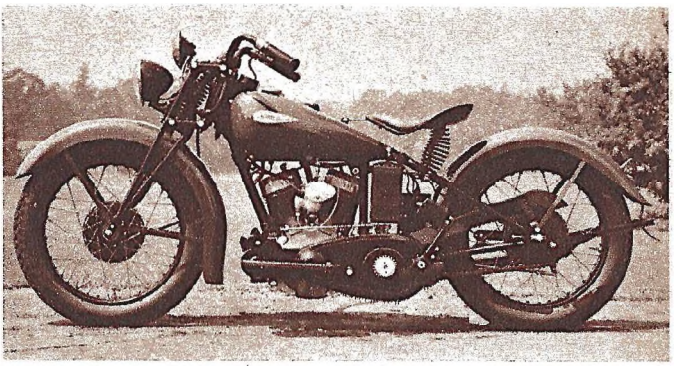
10—MRS. C. H. DUNCAN, 2366 Francisco St., San Francisco, Calif. Mead Glider Ki-yak.

A corner of the MI offices showing a sprinkling of the 62,635 entries in the contest.

11—Dorothy Mohr, 609 West Columbia Ave., Davenport, Iowa. Knight Radio.
12—Charles Baird, 126 West Jewel, Salina, Kans. Zephyrplane Belt Sander.
13—E. Toshi Okar, 333 S. Reeves Dr., Beverly Hills, Cal. Hallicrafters Sky Champion Radio.
14—George J. Meskinis, 1228 Spring Garden St., Phila., Pa. Evinrude Motor.
15—Edna Sprague, Rt. 1, Weeping Water, Neb. Mercury Bicycle.
16—Howard Dunham, Jr., 635 Church St., Ludlow, Ky. Columbia Bicycle.
17—H. R. Bjorklund, 924 Fifth Ave. South, Glasgow, Mont. Marlin Shotgun.
18—A. J. Jones, 49-13 Vernon Blvd., Long Island City, N. Y. Solar Enlarger.
19—Dorothy A. Franklin, 2651/2 Roycroft St., Long Beach, Cal.; A. R. Maxfield, Guildford, Me. Targo Skeet Shooting Outfit.
20—Floyd Scott, 632 Second Ave. South, Glasgow, Mont. Zenith Portable Radio.
21—Margaret Phillips, Box 133, Kremmling, Col. Delta Scroll Saw.
22—George W. Grove, Jr., 26 N. Church St., Waynesboro, Pa. Faredom Portable Workshop.
23—K. B. Keith, 540 3rd Ave. South, Glasgow, Mont. Pflueger Supreme Fishing Reel.
24—R. W. Shoemaker, Box 193, Bakersfield, Cal. Stanley Tool Chest.
25—Wm. H. Jervey, 1257 Morse St., N. E., Wash., D. C. Dremel Motor Tool Kit.
26—Russell Angus, 5548 N. Austin Ave., Chicago, Ill. General Electric Mixer.
27—Harold H. White, 2840 N. Whipple St., Chicago, Ill. Iver Johnson Target Pistol.

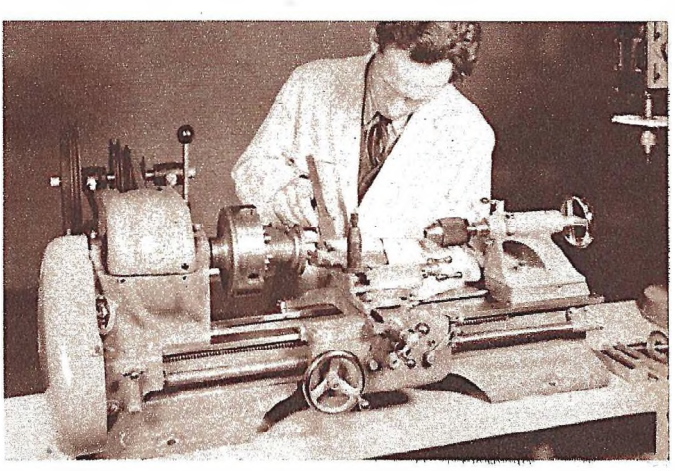
In The MI PRIZE CONTEST!

28—Essie L. Booth, 970 S. Menlo Ave., Los Angeles, Cal. Federal Enlarger.
29—Delbert C. Larson, 507 N. Fifth St., Ishpeming, Mich. General Electric Exposure Meter.
30—Robert Jenkins, 24 Corneal St., Ludlow, Ky. Bausch & Lomb Microscope.
31—Edgar Dennis, 2504 Sheridan Dr., Norwood, Ohio; Herbert J. Idle, 7220 Farwell Ave., Chicago, Ill. Flexible Flyer Skis.
32—Miss Dorothy Carpenter, 2527 1st Avenue So., Great Falls, Mont. RCA Victor Personal Radio.
33—M. I. Dickson, 2006 Seventh Ave., Los Angeles, Cal. Boice-Crane Jig Saw.
34—Rose Bubbs, 431 Melrose Ave., Toronto, Ont. Hein-Werner Hydraulic Jack.
35—Clarence E. Kulp, Route 8, North Kansas City, Mo. Motorola Bike Radio.
36—Eric Ledoux, West Woodstock, Vt. Sheaffer Pen & Pencil Ensemble.
37—A. L. Burleson, 1109 Parker St., Berkeley, Cal. Remington Rand Electric Razor.
38—Mrs. Wm. P. Zimmerman, 2335 Mornvia Ave., Baltimore, Md. Wilson Don Budge Tennis Racquet.
39—Edwin F. Daugherty, 2804 Keyworth Ave., Baltimore, Md. Wilcox-Crittenden Marine Compass.
40—Merle Kritsor, Rt. 1, Waterville, Minn. Kalart Flash Gun Outfit.
41—V. E. Riley, 111 Rossor Ave., Bismarck, N. Dak.; Orville Lamb, RFD 1, Tecumseh, Neb. Casco Electri-Craft Set.
42—Robert Milligan, 2022½ Terry, Seattle, Wash. Blackhawk Wrench Set.
43—H. E. Stish, 310 Second Ave., N. W., Mandan, N. Dak. J. B. Williams Roto Shaver.
44—Bernard Bernstein, 763 Linden Blvd., Brooklyn, N. Y. Gilbert Locomotive & Tender Set.
45—D. A. Durrett, 1856 East 89th St., Cleveland, Ohio. Kalart Flash Gun.
46—John Lapin, RFD 2, Mt. Pleasant, Mich. Alaska Sleeping Bag.
47—Basil Mason, Mechanical Dept., Bay. Tex. Univ., Waco, Tex.; Mrs. H. C. Marmon, 900 North Main St., Bellefontaine, Ohio. DeLuxe Handee Workshop Tool.
48—W. O. Holton, 7049 Overlook Dr., Dallas, Tex. DeLuxe Artizan Workshop Tool.
49—Mr. Edward F. Meyer, 309 Clinton St., Cuero, Tex.; Ronson Table Lighter.
50—Chester Cegielski, 2038 So. 16th St., Milwaukee, Wis. K-D Adverse Weather Lamp.
51—Mrs. Frank Curtis, Route 1, Box 27, Minneapolis, Minn. Axel Rainsuiter.
52—P. Flavin, 10 Ashmont St., Dorchester, Mass. DeJur-Amsco Exposure Meter.
53—H. R. Courtney, 1368 Kelton Ave., W. Los Angeles, Cal. Utica Duxbak Hunting Coat.
54—Leo L. Curtis, 349 Monterey Ave., Dayton, Ohio. G-M Standard Exposure Meter.
55—Raymond H. Harker, Sheridan, Ind. Kirtsen Pipe.
56—Harold Hester, 8081½ El Centro St., Hollywood, Cal. Benjamin Air Rifle.
57—Hugo Carlson, Rt. 1, Sandpoint, Idaho. Weed Tire Chains.
58—Marion J. Cornak, Rt. 1, Twin Falls, Idaho. Brownie Junior Model Gas Engine.
59—Phillip Meyer, 1105 S. Paxton St., Sioux City, Iowa. G.H.Q. Motor.
60—Joseph Yanjer, 2 12 45th St., N. W., Wash., D. C. G.H.Q. Motor.
61—Les H. Larson, 8081½ El Centro St., Hollywood, Cal.; Theodore Haugen, Box 864, Blaine, Wash. Comet Sailplane Kit.
62—Florence LeGault, 508 Palmer St., Fall River, Mass. Foldex Tripod.
63—Mrs. Rose Whiteman, 515 W. 183rd St., New York, N. Y. Gale Kaywoodie Pipe.
64—Mrs. John Levine, 19 Pearl St., Hyannis, Mass. Polaroid Glasses.
65—Mrs. F. W. Burger, 906 Eastman Ave., Green Bay, Wis.; Ray M. Fraley, Lee & Johnson, Inc., Sioux City, Iowa. G.H.Q. Motor Kit.
66—Robert C. Booth, Harlan, Iowa. G.H.Q. Motor Kit.
67—Mrs. Louis H. Taylor, 2305 5th St., Lubbock, Tex. G.H.Q. Motor Kit.
68—Rev. Charles Kaminski, R. 2, Box 188, Marinette, Wis. Haynes Photometer.
69—Mrs. Nellie Lusk, 4905 Cimarron St., Los Angeles, Cal. Moto Saw.
70—Vincent B. Skodis, 12713 Gruss Ave., Cleveland, Ohio; Norman Adrianson, 3834 No. 6th St., Milwaukee, Wis. Boyce-Meier Sextant.
71—George LeGault, 508 Palmer St., Fall River, Mass. Hull Auto Compass.
72—Lester Moore, 1536 Ashland St., Houston, Tex.; Mrs. Ella M. Adams, Great Neck Road, East Wareham, Mass. Red Ryder Carbine.
73—Willard N. Jordan, Box 511—64863, Columbus, Ohio. Handiwold Electric Welder.
74—George Heikel, 3217 Montebello Terr., Baltimore, Md. Kirsten Cigarette Holder.
75—C. Darrell Luce, 1934 N.E. 56th Ave., Portland, Ore. Hull Pocket Compass.
76—Mrs. Gertie Mae Hapley, Church Point, La. Blueprints For "Bonnie."



2nd PRIZE: Indian Motocycle. Won by Mrs. Alice Dunham, 635 Church St., Ludlow, Ky.

77—W. W. Smith, 9 McFarland St., Charleston, W. Va.; Carl F. Krauss, 670 Kinsman St., Warren, Ohio. Blueprints For "Pixie."
78—Vera G. Shonkwiler, RFD 5, Estherville, Iowa; George E. Wilson, 19430 Ormiston Ave., Cleveland, Ohio. Blueprints For "Buzzer II."
79—Dale Hath, Rt. 1, Wixom, Mich. Blueprints For "Zipper."
80—Emery Brown, 43 Shirley Road, Waltham, Mass.; R. A. Ferguson, Sawyer Store, Sheridan, Wyoming. Blueprints For "Chieftain."
81—John Green, 13 Earl Street, Red Bank, New Jersey; Dr. D. H. Soper, Box 104, Nevada, Iowa. Blueprints For "MI Whirlwind."
82—Harry Walker, 10522 Santa Monica Blvd., Los Angeles, Calif. Blueprints For "Electra."
83—William M. Kidney, 91 Chestnut Street, Manchester, Conn. Blueprints For "XP-3."
84—R. H. Money, 621 Maple Avenue, Mayfield, Ky.; Ray Laughner, 21st at Anne Street, Catlettsburg, Ky. Blueprints For "Barbara Q."
85—H. Martin Child, 81 Crooke Avenue, Brooklyn, New York; Donald J. Tierney, 1912 Dodge Avenue, Fort Wayne, Ind. Blueprints For "Jitterbug."
86—Walter Travinski, 795 Meldrum Avenue, Detroit, Michigan; Elaine Hoge, 429 West Manchester Blvd., Inglewood, Calif. Blueprints For "Midge."
87—Mrs. Harold Nelson, 420 Beaver St., Lansing, Mich.; Joseph Arnold, 2868 North 23rd St., Milwaukee, Wis. Blueprints For "Mountain Lake Skiff."
88—Dr. H. B. Newlin, 2171½ North Central Ave., Paris, Ill.; Raymond F. Schoepke, 20 Forest Ave., Fond du Lac, Wis. Blueprints For "Zinky Dink."
89—Milton Fusselman, 2514 North Sixth Street, Harrisburg, Pa. Blueprints For "Tahiti."
90—William Wright, 1412 Larchmont Ave., Lakewood, Ohio; K. A. Bowen, 3804 41st St., San Diego, Calif. Blueprints For "Oriole."
91—Charles Harrod, 1516 Powell St., Vancouver, B. C. Blueprints For "Polaris."
92—Norma M. Burak, 61 Collins St., Danvers, Mass. Blueprints For "Kingfisher."
93—John T. Huron, 82 Blenheim, Columbus, Ohio. Blueprints For "Corky."
94—Robert Malcolm, 650 Cherry Street, Findlay, Ohio. Blueprints For "Pirate Tea."
95—Harvey J. Hoge, 429 West Manchester Blvd., Inglewood, Calif. Blueprints For "Sea Rover."
96—William A. Shipman, Farmdale, Ohio. Blueprints For "Scram III."
97—Kenneth H. Klassy, 1970 Penn Ave. South, Minneapolis, Minn. Blueprints For "Cloud Clipper."
98—Sidney N. Ceton, 1830 Glendale, Muskegon Heights, Muskegon, Mich. Blueprints For "Stormy Petrel."
99—Archie S. Krelling, Newburgh P. O. Box 1734, Cleveland, Ohio. Blueprints For "Pilgrim 22."
100—David Seltzer, 2304 Sedgwick Ave., New York. Blueprints For "Super Sunray."



3rd PRIZE: Atlas Lathe. Won by Harold Cytrinell, 2741 Wallace Ave., Bronx, N. Y.

This Way, Please!

by Ronald Banks

Despite the war, more ocean ships than ever before are entering and leaving New York harbor. Here's the story of the small group of men who train for years to guide them in and out of our greatest port.

Left: Pilot Boat No. 1, of the Sandy Hook Pilot's Association, heading out for Ambrose Channel with a cargo of pilots to meet ships and bring them in.

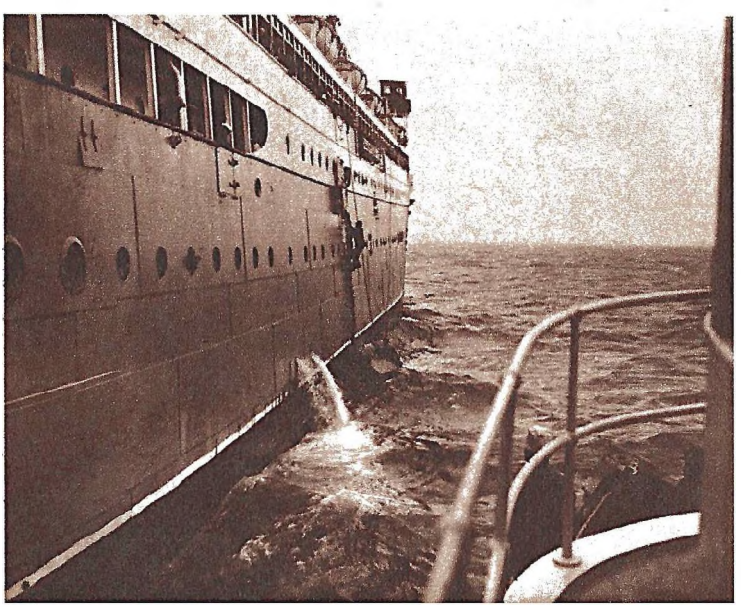
THE huge hull of the freighter looms suddenly out of the mist in Ambrose Channel. The pilot boat draws alongside and George J. Waldie, weather-tanned veteran of 40 years service in the harbor, swings aboard.

"Nasty night," the watch officer greets him. "She's all yours."

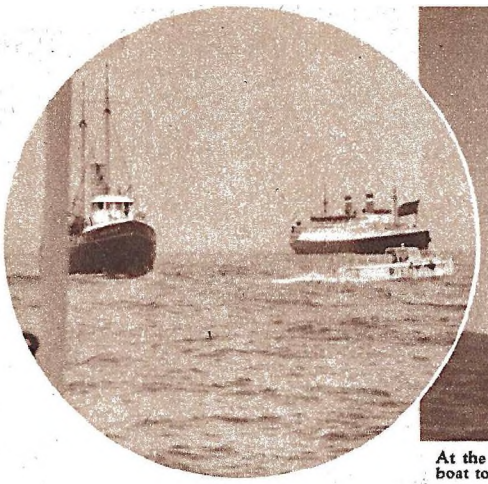
The fog deepens; the red and white lights from the buoys ahead shine dimly offshore. Waldie steps swiftly to the bridge; he speaks softly, unhurriedly to the watch officer.

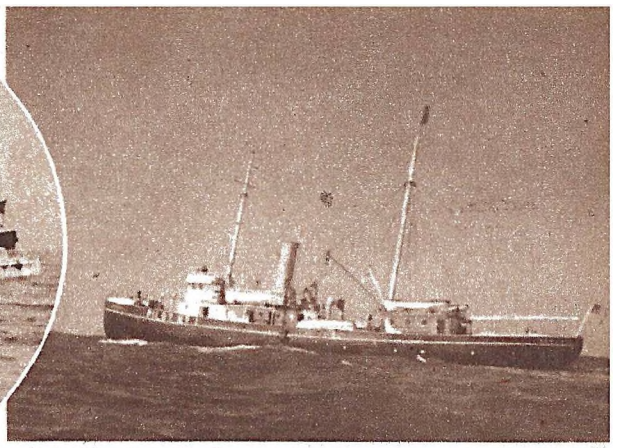
"One-third speed ahead." The officer repeats the signal; a junior officer steps to the engine telegraph and turns the handle to slow. The massive vessel churns ahead toward her pier, the most perilous part of her voyage in the hands of the pleasant old salt who grips his pipe between his teeth as he stares into the swirling mist.

Pilot Waldie and 99 other harbor sentinels are playing vital though unstarred roles in America's far-flung program to feed and arm the British Empire in its life and death struggle and keep the lifeblood of commerce pumping on the high seas. New York Harbor, largest and busiest in the nation, is electric with tension and unprecedented activity these war years. Although passenger travel has virtually ground to a standstill, the volume of freight traffic has zoomed to a new high



Left: A New York harbor pilot boards the liner *S. S. Washington* as it enters the bay.





At the left, the small motor launch is seen carrying a pilot from the pilot boat to the *S. S. Manhattan*. Directly above is another view of the pilot boat.

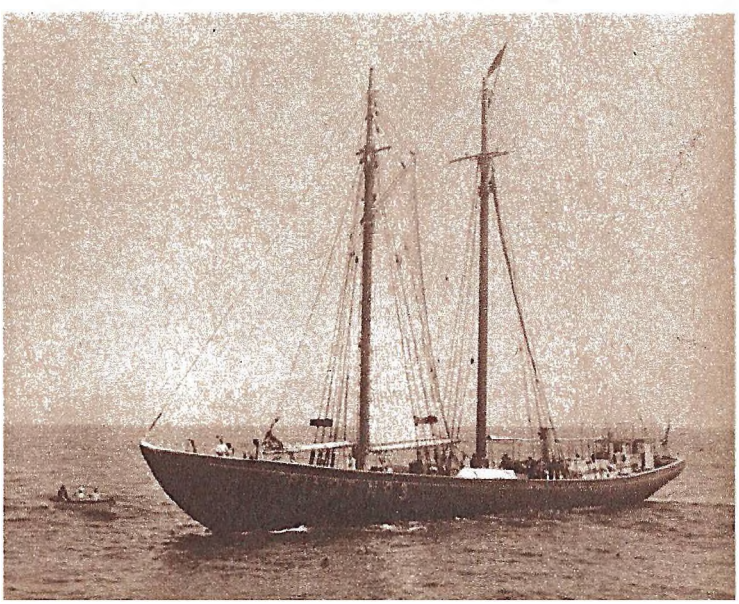
in the port. And it is the harbor pilot's job to chauffeur these vessels with their precious cargoes in and out of the treacherous harbor.

Before Europe burst into war, a total of 11,307 ships . . . many of them passenger liners, steamed in and out of the port of New York in 1938. In 1939, the year Hitler's armies marched, a total of 12,285 vessels were admitted and churned seaward. And the following year, when war on the high seas was most intense, 11,591—more than in the pre-war period—came in and out. Now these totals do not include government-owned or coastwise service vessels which by law are not required to employ harbor pilots. The figures represent ships guided to their piers or out to sea by the watch dogs of the harbor, and show that the pilots are busier now—and with more important work than ever before—than they were when the sea lanes were free of mines and unperiled by submarines and raiding aircraft.

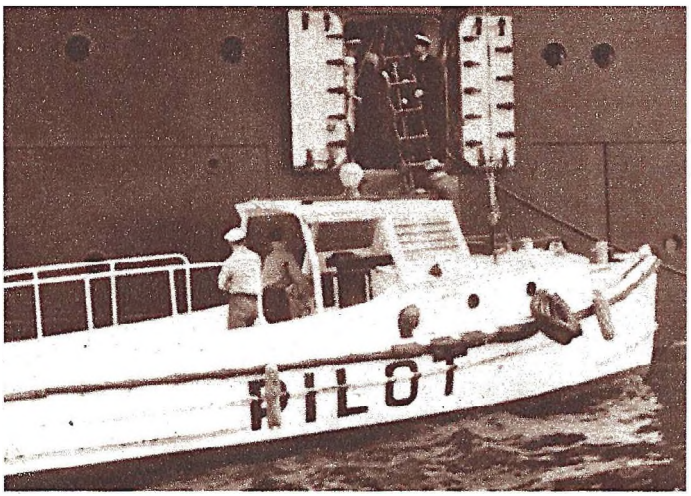
Now it doesn't seem like the most difficult of tasks to guide a ship to her berth after a skipper has brought his craft to the entrance of New York Harbor. Offhand, it would seem an easy job, so why bother to entrust it to a pilot?. Isn't Ambrose Channel, entrance to the harbor, clearly lined with buoys every half-mile? Isn't the skyline of Manhattan through the Narrows an accurate signpost? Why pay $200 to a pilot to bring her in?

Actually, guiding a freight ship through the harbor is fraught with peril and only men with at least 20 years' intensive training are entrusted with the task.

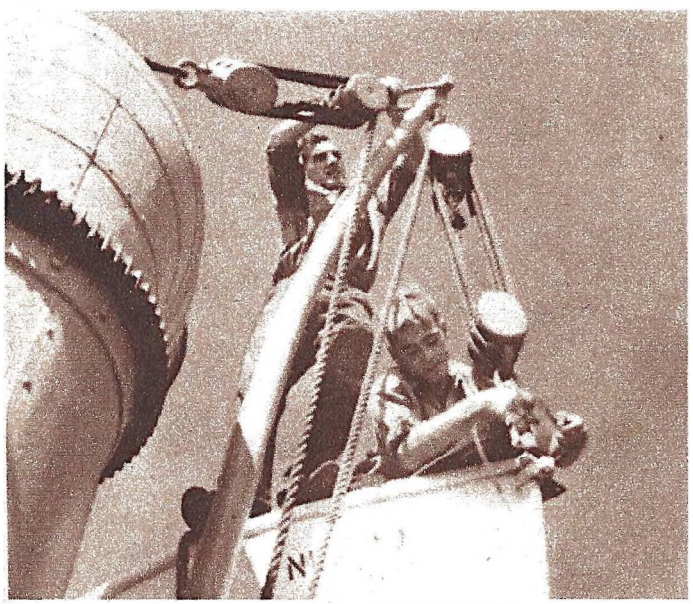
Ambrose Channel, you see, is only 40 feet deep and most of the wide harbor is only 15



Right: A New York harbor pilot boat before steam replaced sails. Rival pilot boats raced to meet incoming ships, the winner getting the job.



A pilot launch, manned by apprentices, ferries the pilot from the pilot boat which lies at anchor in Ambrose Channel to the incoming liner. Here a pilot enters a side hatch.



Twenty years of training is required before a man is permitted to pilot the large liners coming into the port of New York. Here, apprentice pilots are shown lowering a small boat from the pilot boat.

feet deep. Since large freighters draw from 25 to 30 feet of water, they must be carefully led through the charted lanes. In clear weather this is a simple enough job, but when the wind blows a gale, the tides run strong and fog blankets the bay, only the most skilled hand and steadiest eye can bring her home safely.

Add to this the hazard of dozens of smaller craft—ferries, barges, pleasure boats, tugs—dodging and darting about, and it can readily be seen that a trained pilot is the only guarantee of safety for an ocean-going vessel coming into port.

And so, as the freighter's crew prepares to unload its cargo, Pilot Waldie peers ahead as the vessel passes the lights marking the entrance to the Narrows, orders a sharp left turn and brings the ship to Quarantine Boarding Station, Staten Island. The vessel drops anchor and health service inspectors, customs men and immigration officials step aboard. Their business finished, anchor is weighed and the ship heads for her pier.

"Keep her at ten knots," Waldie orders. With all engines reversed, the ship must travel a half-mile before it can stop at this speed, but the pace is ordered despite the fog to permit steering. The rudder must have a moving stream of water to "bite" on.

Forty years of piloting enable Waldie to gauge to the inch the depth of water over which the ship is now passing. But the skipper, jittery, in the mist, decides to use his fathometer as a double-check. It is an instrument which automatically measures the distance from keel to harbor bottom by emitting sound waves and recording the time taken for the echo to return. "You're right again," the captain tells Waldie. The pilot merely grunts.

Waldie orders the ship to hug the right edge of the channel—buoys 26, 27 and 28 are passed. Suddenly the faint sound of a reed horn is heard from the left and the red and white lights of Governor's Island loom. Dimly through the fog can be seen the lights of the Empire State building. . . . Suddenly:

"Full speed astern!" Waldie barks. Full

At the left, an apprentice lashes down a lifeboat, part of his long training before he can become a harbor pilot. Right: Mess is served aboard the pilot boat for all hands. The boat is a model of neatness at all times.

speed astern she is and the ship checks its forward rush. A half-dozen tugs surround the freighter and in a few seconds a tug pilot boards to supervise operations. Four of the tugs push their noses against the ship's bow; another takes a line and pulls the stern to midstream. Foot by foot she is guided to the pier and the vessel is home. Waldie trudges down the gangplank, his job done.

A wealth of seafaring knowledge must be absorbed before the Sandy Hook Pilots Association admits a man to the roster of its select membership. Pilots must be navigators, engineers, meteorologists and practical seamen and their training begins in boyhood.

At 16 or 17 a pilot gets a job at $25 a month as man of all work on one of the two pilot

[*Continued on page* 152]

Apprentice pilots scrub down the decks. These lads must learn navigating, engineering, meteorology and practical seamanship, as well as learning New York harbor inside out, before they can become harbor pilots.

You're RIGHT — That's WRONG

Here are 25 statements, some of them true, the others false. The trick is to separate the *true* statements from the *false* ones—and it isn't as easy as it looks! Use a pen or pencil and check the correct box under each statement and see how you make out! After you've given yourself the test, try it out on friends and other members of the family and compare scores. They'll enjoy it and so will you.

Are you ready? Let's go!

1. Airplanes are shot down in America every day.
   True ☐ False ☐

2. Texas is known as the Panhandle State.
   True ☐ False ☐

3. A glockenspiel is a breed of dog akin to the spaniel.
   True ☐ False ☐

4. If you had a leaky barrel, you would take it for repairs to a kegler.
   True ☐ False ☐

5. The most powerful American airplane motors now being produced are air-cooled.
   True ☐ False ☐

6. Hyssop was the writer of a famous book of fables.
   True ☐ False ☐

7. The Fourth of July is the anniversary of the signing of the Declaration of Independence.
   True ☐ False ☐

8. The paddle used by slapstick comedians is called a bangboard.
   True ☐ False ☐

9. Birds soar on a wing loading of about three pounds.
   True ☐ False ☐

10. Beer tastes best at a drawbar.
    True ☐ False ☐

11. Edgar Bergen is a gastriloquist.
    True ☐ False ☐

12. A doctor, when doctoring another doctor, doctors the doctor the way the doctor wants to be doctored.
    True ☐ False ☐

13. The man who fits your spectacles is called an ocularist.
    True ☐ False ☐

14. A pantechnicon is a moving van.
    True ☐ False ☐

15. The elephant, seacow and porpoise all have a common ancestry.
    True ☐ False ☐

16. Rabbits can swim.
    True ☐ False ☐

17. A Metatarsal Arch is a type of Gothic architecture.
    True ☐ False ☐

18. Photographs can be taken in total darkness.
    True ☐ False ☐

19. You can't eat your ague cake, and have it.
    True ☐ False ☐

20. "Spherical Harmonics" is a musical term referring to oratorios.
    True ☐ False ☐

21. Hiram Maxim, machine gun inventor, was the builder of a 300-horsepower steam airplane.
    True ☐ False ☐

22. Indianapolis, Ind., is farther west than the state of Floride.
    True ☐ False ☐

23. You would expect to find a Molotoff breadbasket filled with Russian rolls.
    True ☐ False ☐

24. Charlie Chan is a famous movie sluice.
    True ☐ False ☐

25. Dry Tortugas are Mexican pancakes.
    True ☐ False ☐

WHAT'S YOUR SCORE?

To get your score simply give yourself 4 points for every question you answer correctly and total the result. If your mark is above 90, you are exceptional; if it is between 80 and 90, you deserve high praise; if it's between 70 and 80, you're good; between 60 and 70, fair; and below 60—well, try again next month!

Answers will be found on page 153

NEWS OF SCIENCE AND MECHANICS

COTTON BUILT HOUSE
KING CAMERA REIGNS
NEW 'PLANE HANGAR
HIGHWAY POST OFFICE

Rocket Helps Fight Fires

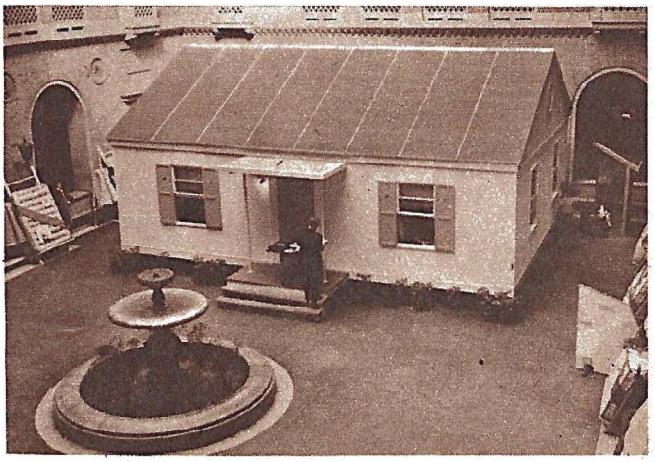
THIS new rocket apparatus has recently been adopted by the London Fire Brigade for use in fire-fighting and rescue work. The pistol has six steel rockets and two communication lines, enabling fire fighters to establish communication lines from fireboat to shore in the shortest possible time.

Streamlined Crib For Baby

PAUL BRY, pioneer in the field of plastic design, has turned his hand to a new baby crib. All the materials are washable, hygienic, strong and durable. The tenite bassinet is hung between two rings. Two shields, made of transparent plastic sheeting, slide up on the end rings to cover the baby wholly or partially.

This Is The House That Cotton Built

THE Department of Agriculture is killing two birds with one stone with this new cotton house, a low-cost, easily assembled unit for defense workers as well as a market for the nation's surplus cotton crop. One-third of a bale of cotton is used in the flame-proof fabric which covers the outside and inside walls and ceiling. Plywood and cotton fabric compose the wall sections.



Timer Solves Traffic Problems

LOOKING like a toy model of a street intersection, a traffic timer has been developed to aid in the proper adjustment and control of traffic lights. The red, green and amber lights on the model's intersection flash in response to manual control in officer's hand, or automatically at intervals governed by gears in background. Problems of any intersection can be studied in miniature.

New Hats For The Army!

THE infantry board of the U. S. Army is exhaustively testing a proposed new type of steel helmet, worn by the soldier at the left in the photo, which has a detachable fibre lining designed for use as a field cap. If adopted, the dual purpose headgear will replace the 1918 style now in use (soldier at right). The lining will then replace the present overseas cap.

Vibrations For "Shopper's Feet"

THE picture at left shows the wonderful effect a new vibration machine has on girls (it works on other people, too) with tired feet. Vibrations from the unique machine soothe fatigued foot nerves and give them a new lease on life. The pampered page girls shown are getting the pedal rejuvenation at the recent convention of the Daughters of the American Revolution. The Army may be considering the use of these machines for its infantry divisions!

We'll Still Take Aspirin

THIS strange contrivance being examined by a Camden, N. J., detective is supposed to cure headaches. It contains an alarm clock, thermometer and an electric motor which runs an egg beater covered with glass. Glass tubes painted gold and a rubber hose complete the thing. It was bought by a housewife from a peddler and turned over to the police when it started smoking.

Rides Scooter Through Pipes

A SCOOTER rider is this water main inspector of Kankakee, Ill., but not for fun. Every day he pushes his scooter through seven and a half miles of mains now being completed at the Kankakee ordnance works. He has to look over every inch of the giant forty-two inch pipes to see that they are in line and properly joined, so this corner of national defense can go ahead on schedule.

Direction Finder To Eliminate "Beams"

A NEW navigation device, designed to make expensive radio guide "beams" unnecessary is being tested on a Braniff Airways plane. When a plane is in flight between stops, the two needles point in opposite directions, 180 degrees apart, because one is tuned to a radio station in the city just left and one to a station in the destination city. As long as the two needles overlap each other, pointing in opposite directions, the ship is on its course.

Clothes Make The Parachute Jumper

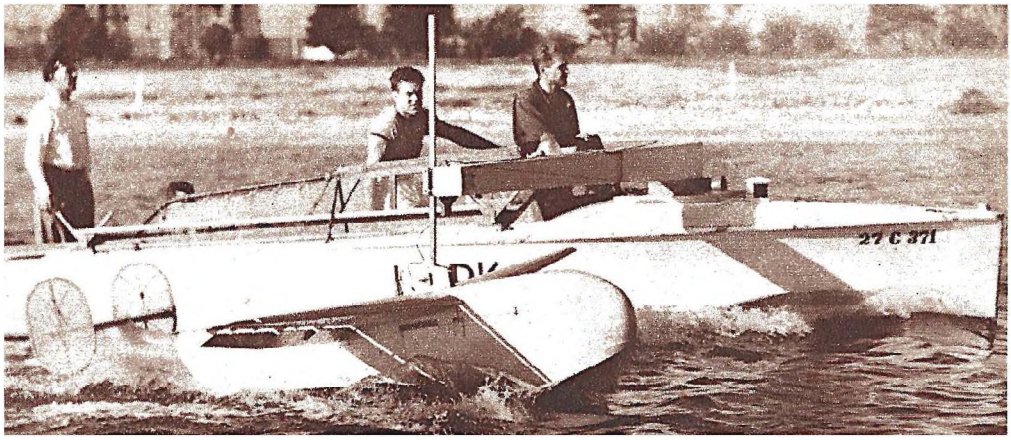
FIVE soldiers of the 501st Parachute Battalion model different suits now undergoing tests at Fort Benning, Georgia, for use by Uncle Sam's army parachutists. From left to right, we see the forestry uniform, for landing in forested areas; the white jumping suit, to be worn over the regular parachute uniform; the wool-lined suit, for cold weather jumping; the leather jerkin jacket; and an experimental suit of overalls and jacket.

New Emergency Truck Makes Its Debut

AFTER several years of research, the New York City Police Department has produced this new truck for emergency work. It can hold 20 men, can be converted into an ambulance or field headquarters, and can be directed from the air. Included in its equipment are ten powerful searchlights, an electric generator, machine guns, tear gas guns, rifles, grenades, ladders, oxygen tents and acetylene torches.

Navy Flier Invents An Aptitude Tester

AN EMBRYO pilot's reactions can be accurately tested in three minutes with this aviation aptitude tester, recently invented by Lieut. Commander Henry W. Wickes, USNR, stationed at Floyd Bennett Field, N. Y. The pilot being tested is required to put out red and green lights by pressing appropriate buttons with his left hand, and keeping a pointer dial tuned in evenly with his right. The inventor is standing at the right.

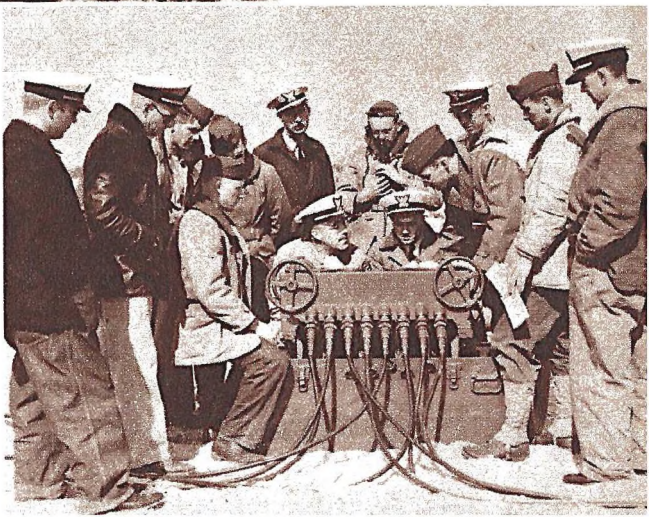


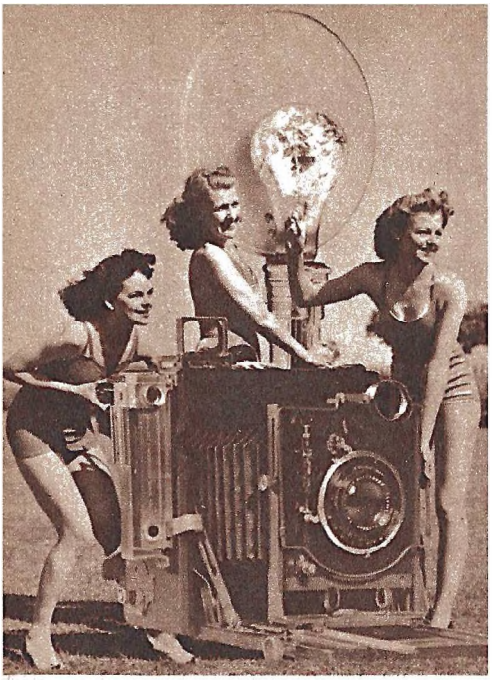
A Model Goes For A Ride

STUDENT engineers of the California Institute of Technology are shown above as they test a $6,000 model of a twin-engine flying boat in an effort to eliminate "porpoising" of amphibian planes in the future. The model is hauled alongside a fast speedboat by means of an outrigger set up. As the boat passes certain points along the shore, motion picture cameras record the travel angle of the keel in relation to the water. An electric-eye stopwatch records speeds.

Coast Guard Rides The "Bucking Broncho"

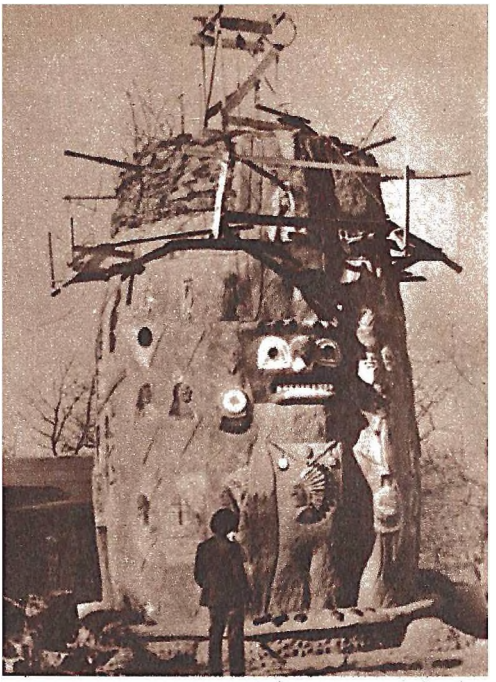
A COAST GUARD officer tries out one of the heavy .50 caliber anti-aircraft guns, nicknamed "bucking bronchos" by the men who fire them. At the right, Coast Guard officers learn how a synchronizer for a battery of such guns works. The synchronizer automatically corrects the sights of the guns according to information received from headquarters on wind velocity and other cogent factors. One of these guns is shown on the cover.





King Camera Reigns

THESE three pretty girls recently took part in the annual Amateur Photographer's Beauty Contest, held at Long Beach, Calif., in which bathing beauties from all parts of Southern California paraded before thousands of amateur camera fans. This large replica of a news-camera, complete in every detail, was used as a novel method of announcing the contest.



Biggest Totem Pole

N. E. GALLOWAY, retired woodcutter of Chelsea, Oklahoma, has been working for two years on this massive totem pole, which is 30 feet high, 24 feet in diameter, and hollow. When the grotesque concrete and steel structure is completed it will stand nearly 70 feet tall. Now on Galloway's farm, it will be turned over to Chelsea Boy Scouts as a museum for handicraft when it is finished.

N. Y. Police Test Bomb-Carrying Truck

POLICE officials of New York City look on as members of the force test a new truck designed to cart away bombs or mines in case this country should ever become the object of an enemy attack. Members of both the New York fire and police departments have been sent to London to observe the methods of the English in handling a great city's defense problems, and their findings are now being used in preparing New York's defense measures.

Wheelbarrow Fire Engine

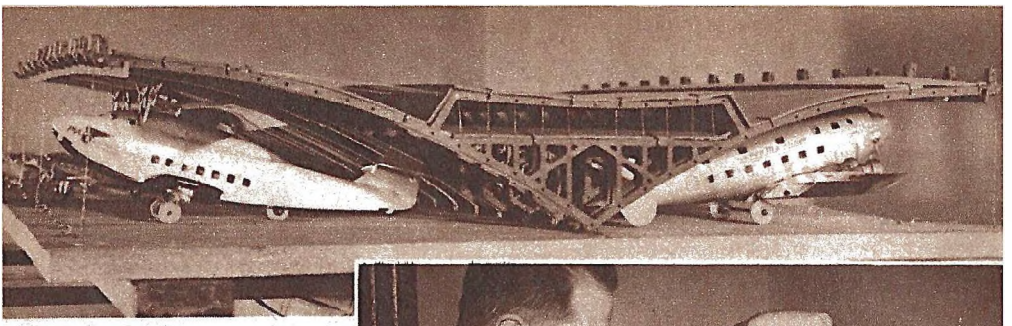
AN EFFECTIVE fire-hose pump mounted on a wheelbarrow is the latest development in London's campaign to nullify the damage of German incendiary bombs. It is shown here being demonstrated by W. S. Morrison, Postmaster General, at a fire-fighting demonstration held on Wimbledon Common. Such small types of engines have proven remarkably effective.

Bottle Of Grade A

YOU'LL never find anything like this on your doorstep in the morning, but the milk industry entered this bit of propaganda in the Mad Arts Ball, held recently in New York City, to prove that there's this much loveliness in a bottle of milk. The unique bottle was fashioned of plastic material, and gathered a great deal of attention for its pretty occupant.

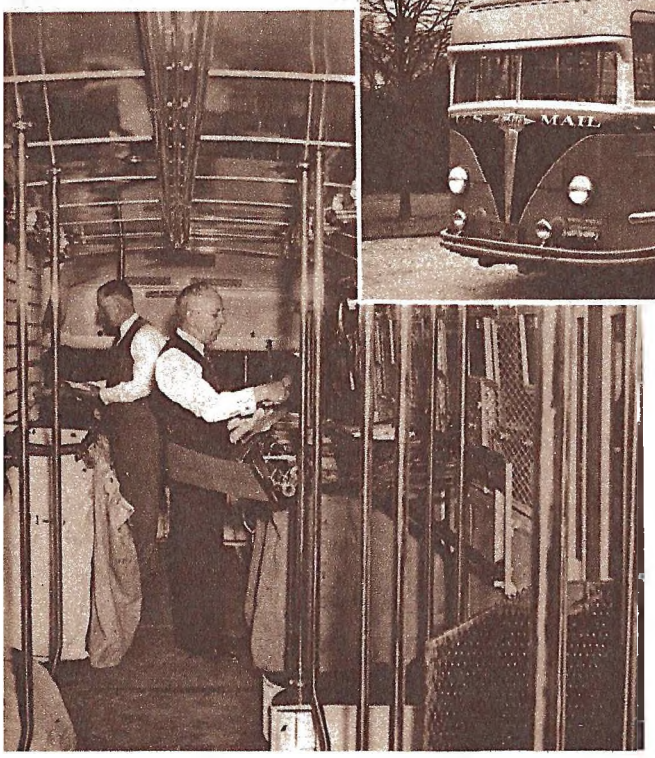
New Device Teaches Soldiers To Shoot!

THE young lady is shown aiming a rifle mounted on the new "Fidelman Rifle Master," a device which, it is claimed, makes it possible to train a soldier to shoot accurately in one-tenth of the usual time. By observing indicators on the device the instructor is enabled to follow every action of the student marksman and to correct mistakes. An instructor is here seen inspecting one of the indicators.



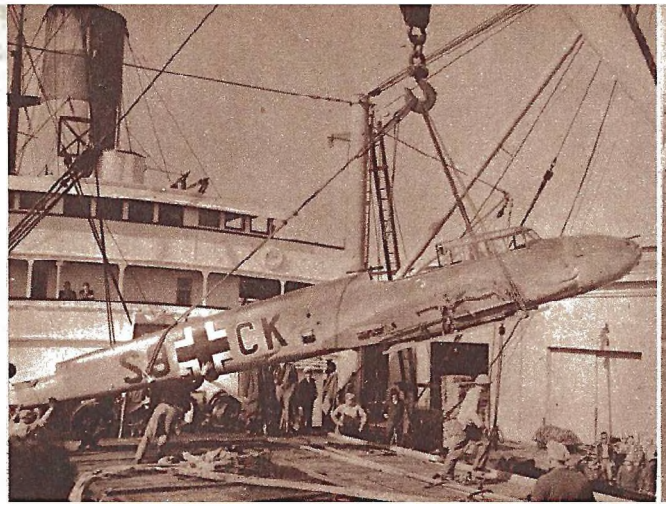
Invents New Type Of Airplane Hangar

PAUL C. CHELAZZI, of San Francisco, shown at the right, points out the features of a new type of construction for use in airplane hangars, which he recently patented. Above is a model of the new type hangar construction, which employs a combination of arch and suspension that makes for ease in erection, and does away with supporting columns.



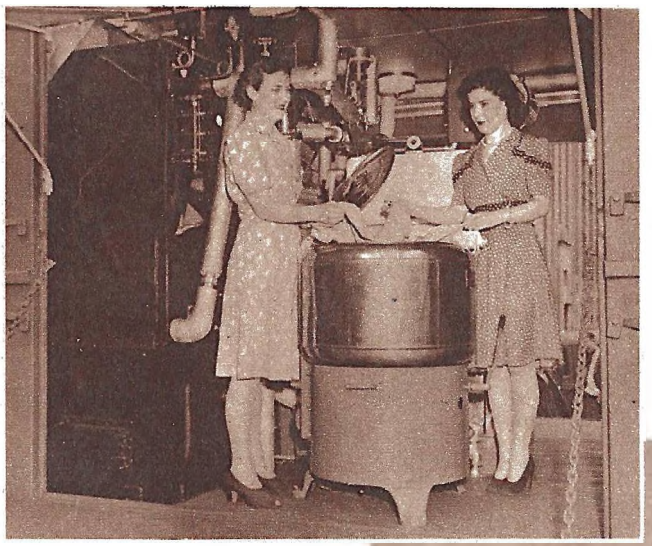
Post Office Takes To The Highways!

SPECIALLY equipped to carry mail in a new highway postal service to start soon, the large bus-type truck shown above was recently exhibited in Washington. Trucks like this will provide service to areas now served by short line and feeder railroads. At the left is an interior view of the "post office on wheels," showing the facilities for sorting the mail.



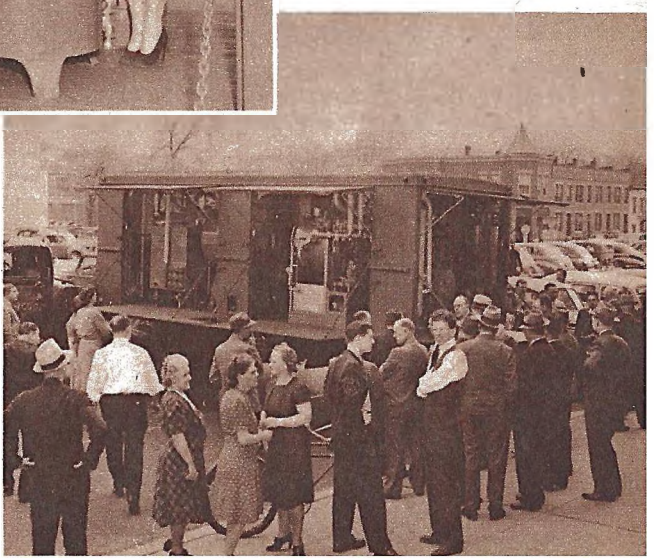
German Plane Arrives In U. S.

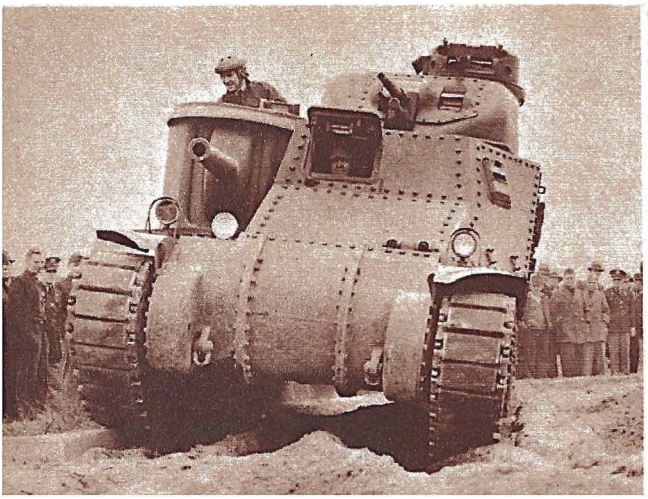
SHOT down over England, the bullet-ridden Messerschmitt 110 fighting plane shown above arrived recently in Los Angeles for careful "piece-by-piece" inspection by engineers of the Vultee Aircraft plant at Downey, Calif. Four of the plane's original machine guns are still mounted. At the right is a photo of the intricate dashboard in the cockpit.



U. S. Army Gets A Mobile Laundry

SHOWN here is one of the four newly developed types of mobile laundry units for use in the army. The young ladies above are trying out one of the washing machines, while at the right, the complete unit is being viewed by spectators in front of the offices of the Quartermaster Corps, in Washington. The Capitol is in the background.



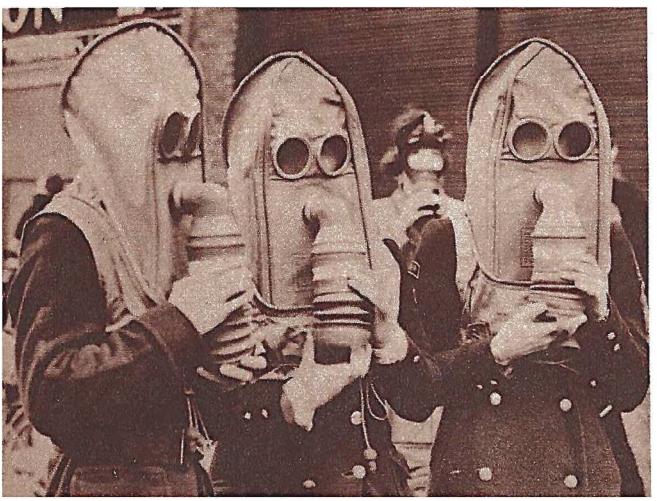


Dreadnaught For Our Land Fleet!

BEFORE a throng of high army officers, British representatives and private engineers, one of the army's "pilot models" of new medium tanks lumbers through the sand at the army proving ground, Aberdeen, Md. Weighing 25 tons, the business-like looking monster carries a 75mm. field gun, a 37mm. anti-tank, anti-aircraft gun and numerous machine guns. This armament was used with remarkable accuracy on a target.

Something New Under The Sun!

CALLED sun vitors, these new gadgets have recently made their appearance on the beach at Atlantic City, N. J. Consisting of a scoop of pressed wood coated with rolled aluminum, the sun vitors are said by the manufacturers to triple the heat of the suns rays. By using it fifteen minutes per day, as these young ladies are shown doing, a person can keep his or her face at an even tan the year round. They should be popular on beaches this summer.



"Head Tents" For The British A.R.P.

LOOKING like creatures out of a bad dream, these British Air Raid Precaution workers are shown wearing a new type of anti-gas helmet during a recent tear gas test, held in Surrey, England. The helmet, which is tent-like in its coverage of the head and neck, is specially designed to protect people suffering from bronchial troubles, and those with weak chests. The girl in the background is wearing a regular type mask.

CRAFTS AND HOBBIES

PHOTOGRAPHY
MODELS • RADIO
THE WORKSHOP
HOW-TO-BUILD

PHOTOGRAPHY

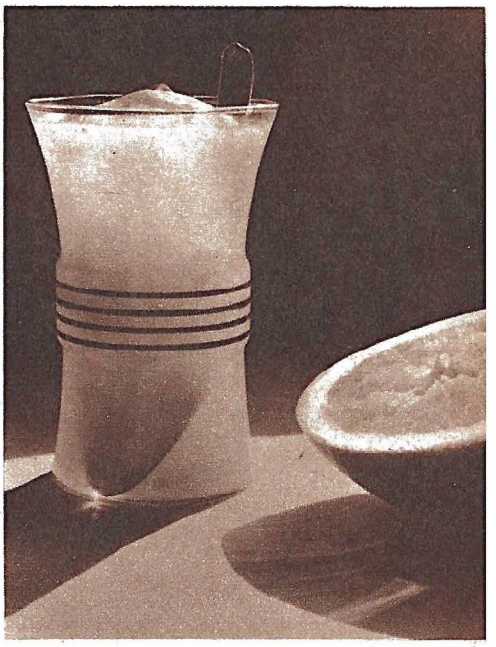


FIG. 1 (above left): A set up for sun spotlighting. The mask accents the contrast between the highlighted spot and the background. Note the supplementary flood reflector in the foreground. FIG. 2 (above right): The dramatic result produced.

The Sun—Your Spotlight

by Paul Hadley

IT IS nice to have a large assortment of artificial lighting equipment at your disposal—spotlights and floods and reflector stands and clamp-ons. In fact, some of the more fortunate amateurs among us have as imposing an array as many small commercial studios.

However, the vast majority of amateurs own comparatively little in the way of high-powered lights. A couple of photofloods, a pair of reflectors, and occasionally a spotlight usually comprises the sum-total of this type of equipment. In fact, in some cases, even the latter aren't available owing to lack of electricity or the wherewithal for making the necessary purchases.

Lacking artificial lighting equipment, the amateur still needn't be denied the pleasures of indoor photography or even table top work. For strong sunlight, streaming in through a south window, makes an extremely efficient substitute.

Although careful work permits the sun to be used as the main light source for indoor portraiture, still life subjects and table tops are even easier to execute by the light of the

FIG. 3 (above): Raw, unsupplemented sunlight can be used to spotlight glassware to excellent advantage. The resulting black background effects a dramatic contrast with the "crystal."

sun. In scanning the advertisements and camera magazines, you'll find that sharp back, or side-lighting is one of the chief qualities of good table top and still life photography. The sun, properly controlled, is an ideal spot source. Your supplementary equipment need only include an additional fill-in light or a white reflector to illuminate the shadows.

Figure 2 shows the dramatic possibilities of properly-directed, sun spotlighting. The sharp cut-off was produced by placing a large cardboard aperture next to the window so that the sun streamed through it. The dark background shadow represents the area of the table blocked out by the cardboard window "mask," as printed from the resulting contrasty negative. In this case, a No. 1 photoflood lamp served as a fill-in light.

The eggs shown in Figure 4 were photographed by sunlight streaming into the window but without the cardboard mask. Naturally, a lens shade is a prime necessity to avoid any slight possibility of lens flare or fog from "wandering" light.

It is quite possible in making photographs of transparent or translucent objects to work by the light of the sun alone, without supplementary fill-in lights or reflectors. With glass subjects the use of the sun as a backlight produces an extremely brilliant effect as it is reflected by the various facets and along the internal structures of the glass. Figure 3 is a typical case of this kind.

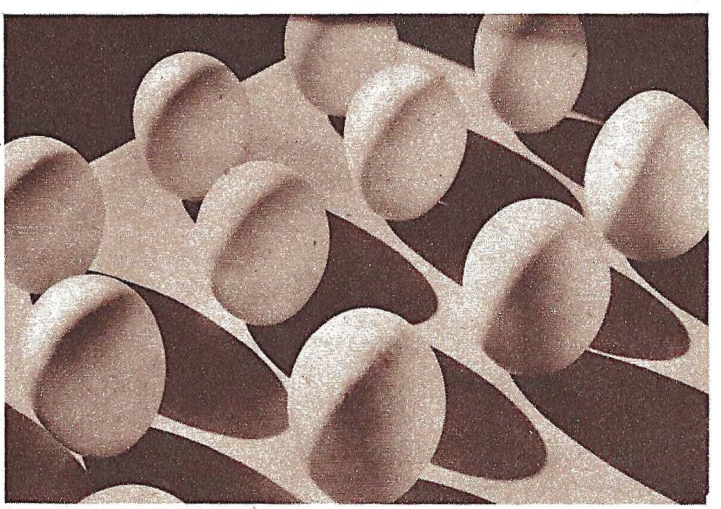
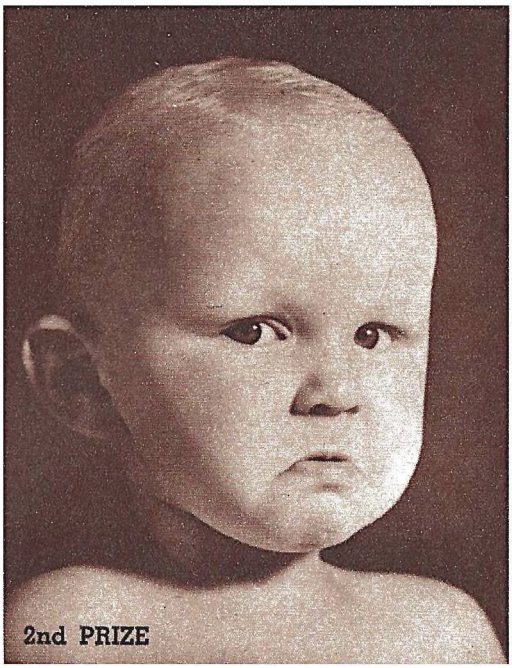
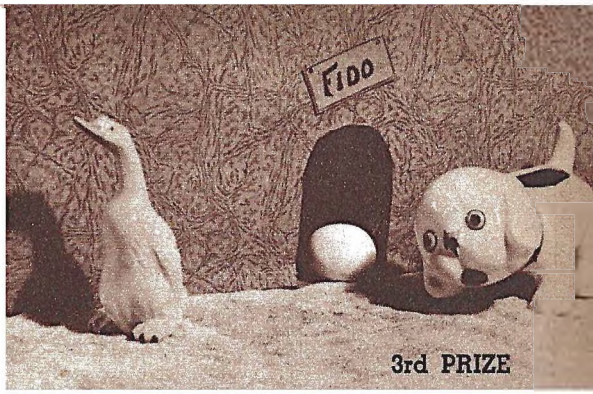


FIG. 4 (above): This subject was illuminated by the sun pouring through an unmasked window as demonstrated in the photograph at the left. The supplementary floodlight in front of the table served to lighten the shadows of the eggs. A white cardboard reflector might have done as well. The eggs were stood on a double thickness of corrugated in which dents were punched.


2nd PRIZE



3rd PRIZE

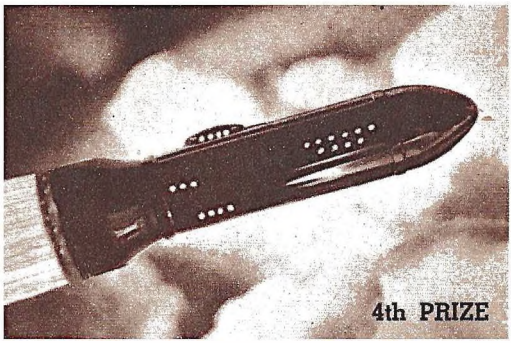

4th PRIZE

PHOTO CONTEST

FIRST PRIZE ($10.00): "Urbanite" by Charles Spector, 71 Broadway, New York, N. Y. SECOND PRIZE ($5.00): By R. H. Ross, 19 Inwood Road, Chatham, N. J. THIRD PRIZE ($4.00): By J. Fraser, 406 East 70th Street, New York, N. Y., 3¼x4¼ Speed Graphic, f/22 at ½ sec. on Superpan Press in Agfa 17; 1 No. 1 photo flood light. FOURTH PRIZE ($3.00): "Rocket Ship" by Robert Scott, Box 556 Saltsburg, Pa., 4x5 Graflex, f/22 at 1 sec. Subject, a flashlight placed on window glass with cotton clouds grouped beside and below it. Backlit by one, 100-watt frosted bulb. Final print from a paper negative.

A brand new contest begins each month—another chance to win one of the four prizes. Submit prints unmounted—no larger than 8x10 inches. With each print, list your camera, film, lens opening and shutter speed, illumination, and developer. Write your full NAME and ADDRESS on the back of each print, and wrap securely with cardboard or corrugated stiffeners. If you want unused prints returned, please enclose return postage. (Published prints will not be returned.) Address: Photography Editor, MECHANIX ILLUSTRATED, 1501 Broadway, New York, N. Y.


1st PRIZE

Mirror Camera for

Above: A typical one-mirror montage. The camera lens was pointed at the man while the girl posed at other side of room.

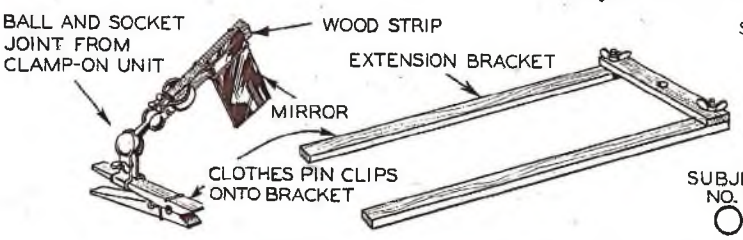
MAKING a photo montage is a lot of fun, but it's also a lot of work when done in the usual way. For you have to fumble with your enlarger and fret and fume before you can succeed in laying out an interesting series of related subjects.

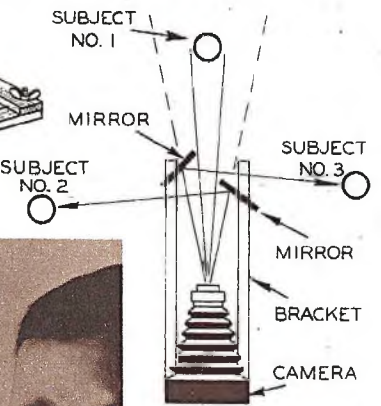
Here's an interesting variation of montage making. But you use your camera instead of the enlarger. And it's all done with mirrors!

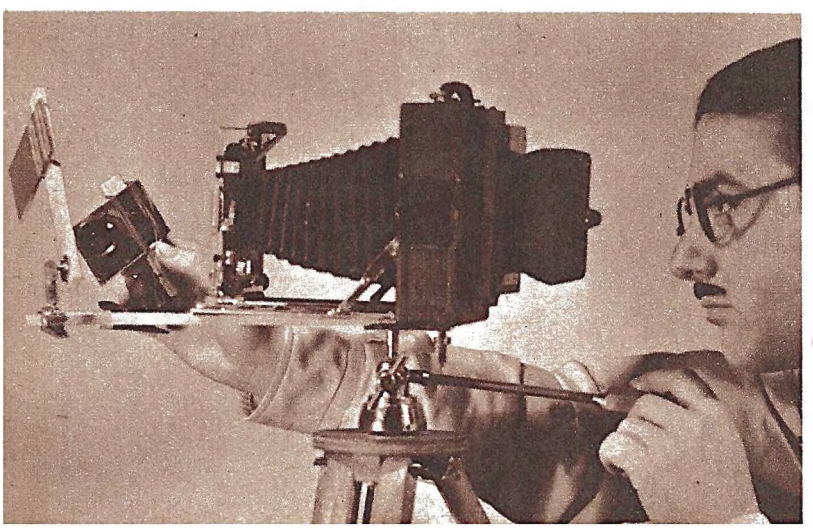
This is how it works:

If you place a mirror in front of your camera lens and set it at an angle, the lens will record the view reflected by the mirror as well as any part of the view ahead that the mirror fails to block out. Of course, the reflected mirror image is a view to one side of the camera and not part of the scene directly in front of it. Therefore, if you pose a subject on that side and adjust a mirror so that his image is reflected into the lens, his picture will appear on the negative, montaged alongside the portion of the view in front of the camera which the mirror didn't block out. Thus, you will have a two-picture montage on a single negative, made with a single exposure.

If you want a three-picture montage, all







Left: Adjusting the mirrors of the montage camera. The photographer observes the effect of varying the mirror position on the ground glass focusing screen of the camera. Above: Detail of the bracket unit and mirror-clamp assembly. Pivot attachments permit the bracket arms to be swung in a horizontal plane. The cross-piece fits over the tripod screw between the camera and the tripod head. Note the mirror reflection rays—extreme right-hand detail.

One-Shot Montage

by Roger Clay

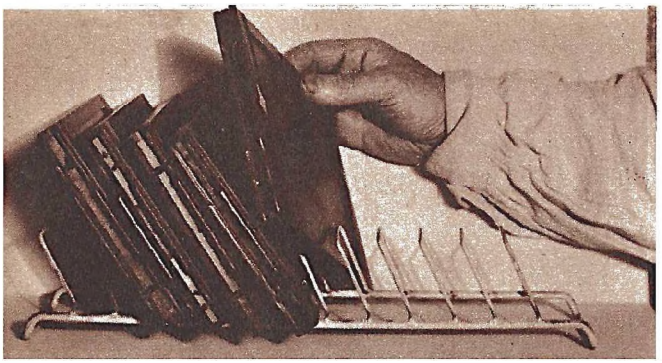
Right: A three-part, two-mirror montage combining the typical elements found at the New York Battery—harbor, tugboats and skyscrapers. Right below: "Dancing Feet."

you have to do is add another mirror.

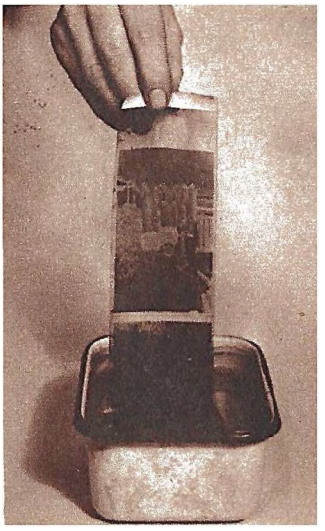
The mirrors used should be of the small pocket type obtainable at five and dime or auto accessory stores. They should be perfectly clean, free from distortion, and without frames. For use, they can be mounted on universal ball and socket joints to permit their adjustment in all directions. Auto accessory stores often have a variety of adjustable mirrors but a simple way to fix up a pocket mirror is shown in the outline detail. The ball and socket joint for this mirror was taken from a clamp-on lighting unit. After being removed from its spring clamp, the ball and socket was affixed in the same manner to a spring clothes pin. The other end of the swivel unit, which held the lamp socket, was fastened to a short length of ¼ x ¾-inch wood, and the mirror was attached to the top of this small block by means of a rubber band.

A simple bracket to hold mirrors in front of the camera, can be made from three lengths of the same type of wood, held together in "U"-shape by pivot fastenings. The dimensions of the bracket should adapt it to any camera with which it is to be used and should be long enough to extend past the lens without being included within the latter's angle of view. The adjustable mirrors are then clamped to these extended brackets by means of the spring clothes pin. The short [*Cont'd on page* 137]

Right: A one-mirror, two-part montage made in the Battery area. Here, the contrast between elements is interesting.



Left: A dish rack makes a handy film or plate holder file. Slots can be numbered and a record kept of the condition of film (whether exposed or not) loaded in each holder.—*L. B. Robbins.*

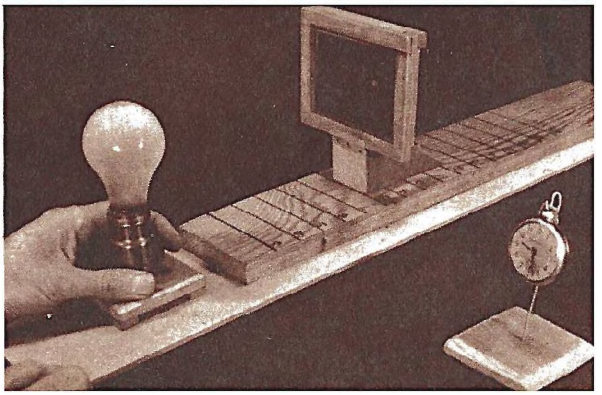


KINKS

Right: Small refrigerator dish can be used for roolfilm development. Hold with one hand.—*Tracy Diers.*

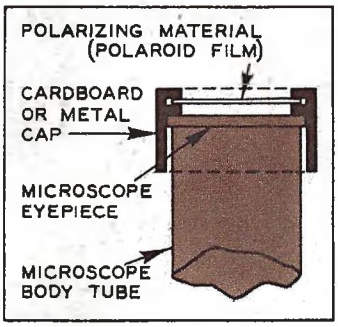
Left: Old calendar pad numbers help keep track of the number of pieces of film left in carton.—*E. K. Melvin.*

Right: Materials for contact printing guide. Complete setup is shown at right, bottom. Lines are drawn at equal distances on baseboard. Printing frame on the block is placed nearer to or further from lamp according to negative density. Time stays constant.—*R. J. Marran.*

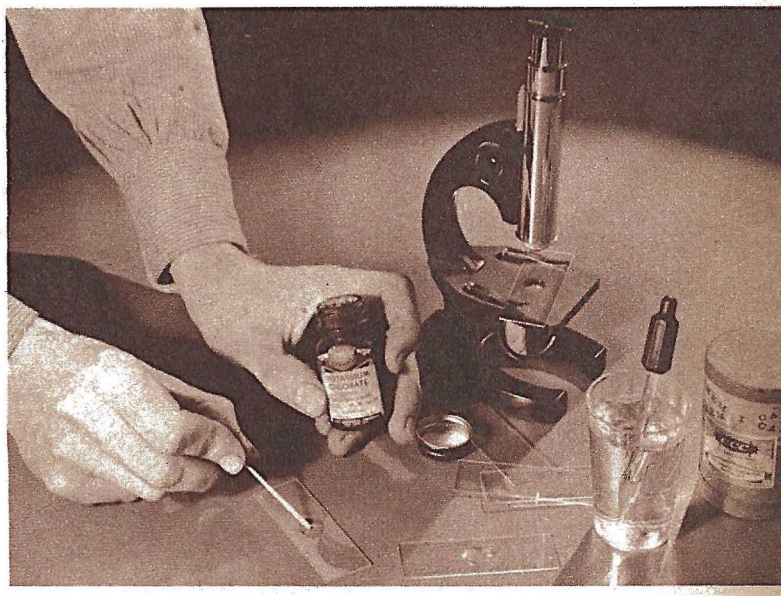


Above: Cellophane held taut in front of the camera lens serves as a filter. The material must be held flat to avoid lens flare and distortion. Place a square of cellophane over the lens; then, press over it a ring of brass tubing which normally fits lens mount loosely.—*Kenneth Murray.*

Crystal Gazing With Your Microscope



Right: To prepare a specimen of soluble chemical crystals, dissolve the chemical in a few drops of water, preferably warm, on a slide, and let the water evaporate. Drawing above shows how polarizing "analyzer" is attached to eyepiece of microscope.

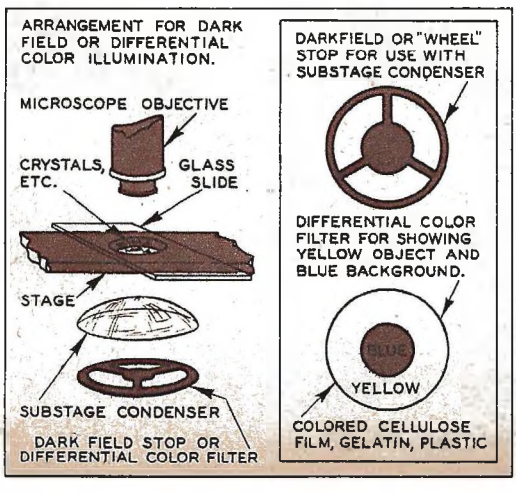


by Walter E. Burton

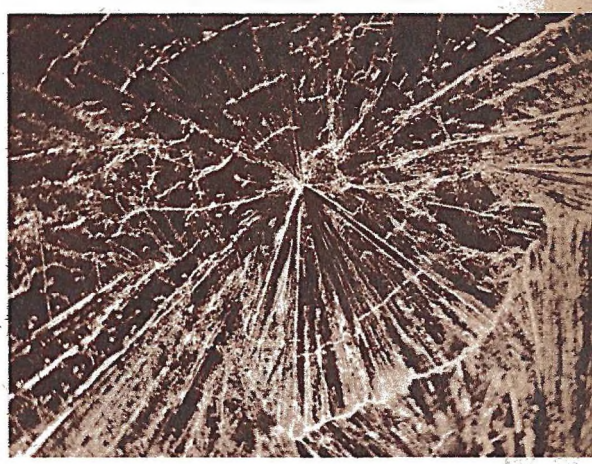
THE Oriental mystic looks into his crystal and sees wonderful things but he has nothing on the microscope owner who turns his magic lenses on the countless crystalline subjects to be found everywhere.

Ready-made crystals are easy to find. Granulated cane sugar is composed of tiny crystalline particles. Ordinary salt is another form; and it is interesting to examine the salt in butter. With a toothpick, spread a bit of butter thinly on a 1″x3″ glass microscope slide. Cover the butter smear with a few drops of xylol, carbon tetrachloride, cleaning fluid, or other grease solvent. Tilt

[*Continued on page* 141]

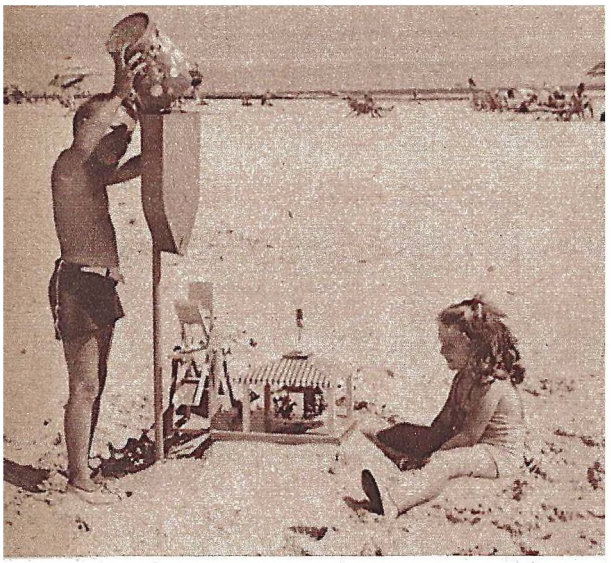


The network of lines below is a deposit of trional crystals as they appear with darkfield illumination.

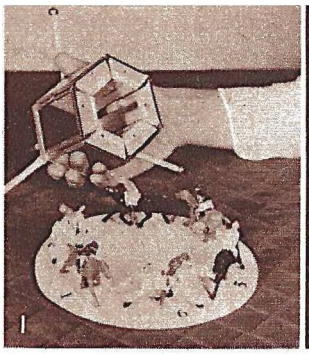


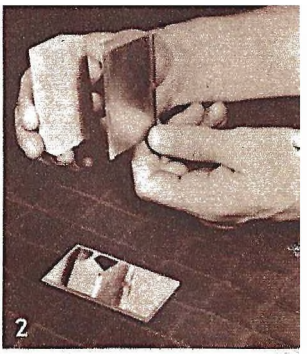
Below: Crystals of potassium chlorate in polarized light. The axes of polarizer and analyzer were crossed, to produce the dark background. The vivid colors of the specimen are lost in a black-and-white photograph.

Toy Carousel Runs By Sand-Power

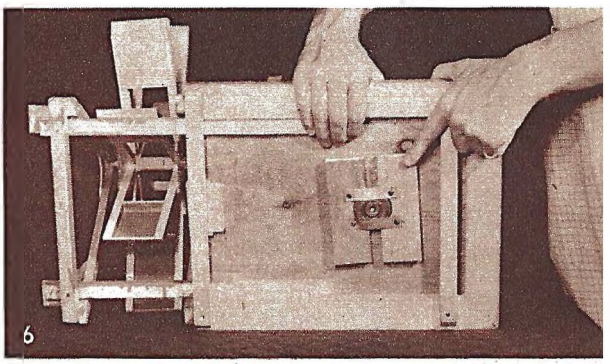


Pouring sand into the sandbox turns the paddle wheel which is connected by pulleys and belt to the carousel.





Lead horses and riders from the 5 & 10 are mounted on a plywood disk with machine screws. Mirror assembly is shown at right.



Roller skate wheel forms the bearing for the merry-go-round. Make dimensions of the carousel to suit yourself, retaining the general proportions shown in these photos.

by Charles and Bertram Brownold

THIS clever little carousel is used as a toy on the beach and as a sort of roulette game indoors. It is made of six lead figures of mounted jockeys from the five-and-ten cent store fastened to a circular piece of plywood. (Photo 1.)

Machine screws hold the lead figures in place. The screws come through from the under side of the plywood and enter holes that have been drilled in the bellies of the horses. The screws cut their own threads in the lead, so do not need to be tapped for.

Behind the mounted jockeys are six mirrors, also obtainable at the five-and-ten cent store. These are called "hand-bag mirrors" and are held in improvised frames of sheet brass nailed to six blocks of wood. (Photo 2.) The upper ends of the blocks are screwed to a hexagonal piece of plywood. Their lower ends are screwed to the same plywood disk to which the horses are attached. (Photo 1.)

Four wooden posts support the roof, and on the posts are four bells hung loosely on metal rods. (Photo 3.) The bells are of the kind used as toy dinner bells and on toy locomotives. Three cut-down curtain rods are fastened to the carousel and the brass knobs with which they are tipped strike the bells as the carousel revolves.

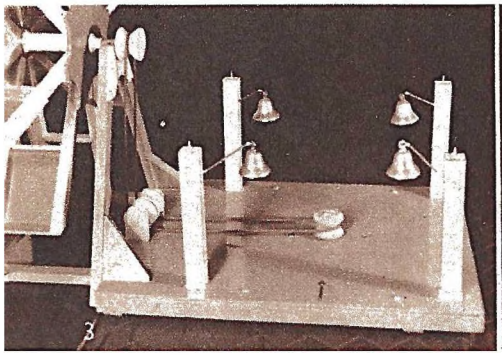
The roof is made of four pieces of ⅛" plywood held together by light molding nailed inside at the joinings. (Photo 4.) The awning stripes on the roof are gummed paper tape obtainable at paint stores and applied after the roof has been painted. The scalloped edge of the roof is made of oak-tag paper glued in place.

The paddle wheel of scrap wood drives the carousel by means of a belt made of flexible electric light wire insulated with bare rubber to prevent slipping.

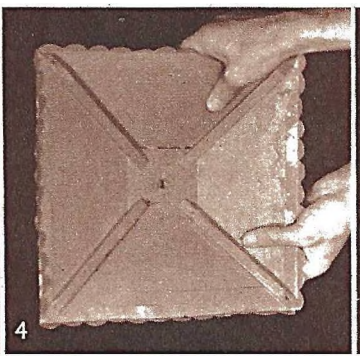
The pulley wheels that carry the belt are made of the ends of thread-spools of the type shown in Photo 5. Both ends of one spool are cut off and glued together to form one wheel.

The vertical axle of the carousel revolves with the carousel. It is a piece of dowel stick of suitable length. Its upper end is in a loose socket in the block of wood that surmounts

In the home or at the beach this little merry-go-round will provide lively entertainment for young and old alike.

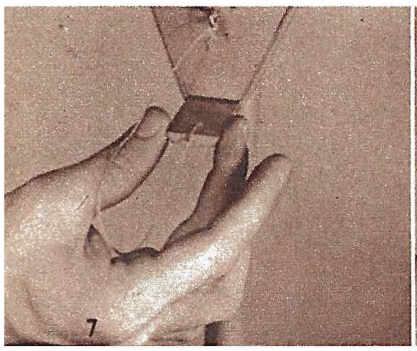


Bells are set on the corner posts.

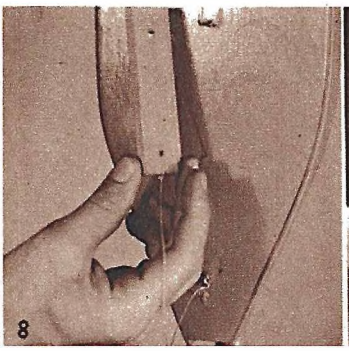


The roof is simple in construction.

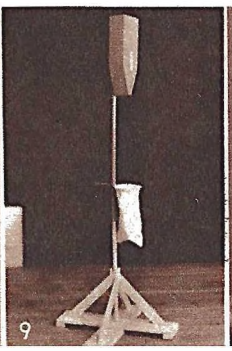
Pulleys can be cut from the ends of spools.

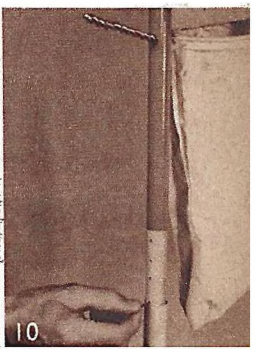


This slide closes the bottom of the sand chute . . .



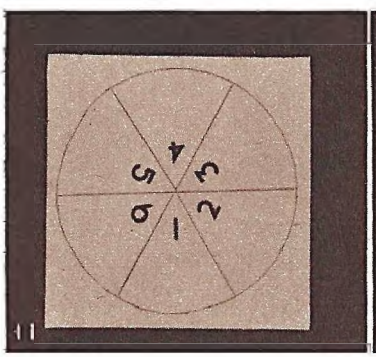
and hangs on a hook when not in use.





Post can be kept at any desired height, as shown above.

the roof. Its lower end goes halfway through one of the improvised pulley wheels which has been fitted with two pins or pegs which slip into holes in the under side of the carousel. One end of a short piece of dowel stick is forced tightly into the lower half of the same pulley wheel, and the lower end of this short stick is forced tightly into a ball-bearing roller skate wheel fastened to the under side of the floor of the carousel house. (Photo 6.)

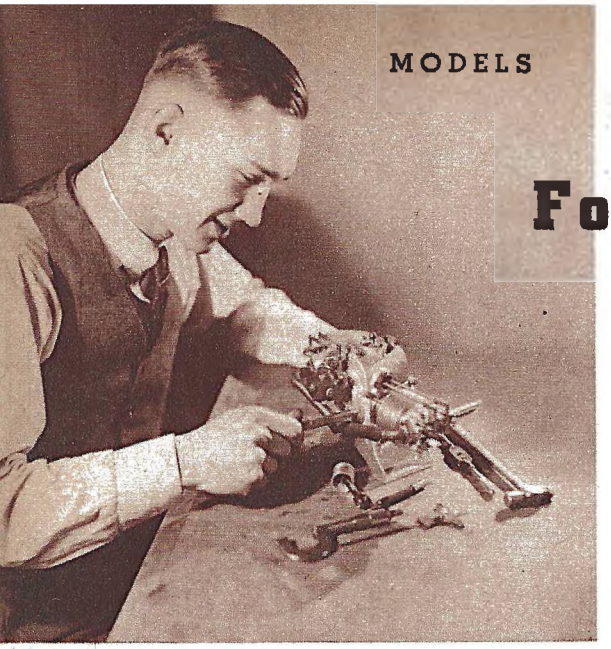


This is the way cloth is marked for roulette game.

The finished carousel. Bells ring as it revolves.

The sand that flows down upon the paddle wheel and turns it, is contained in a wooden box or hopper screwed to a broomstick. The box is made with two sides that taper and two sides of light plywood that can be bent. The plywood sides extend downward about ¼" beyond the tapered sides, thus forming guides for a wooden slide that opens and closes the slit through which the sand flows. (Photos 7 & 8.) The slide is attached to the box by a piece of string and a screw-eye so that it will not be lost. When the sand is flowing the slide is hung on a hook in the side of the box so that

[*Continued on page* 155]



Much can be learned about engines from building this little power plant, and you'll have the thrill of seeing the product of your craftsmanship purr away like a factory job.

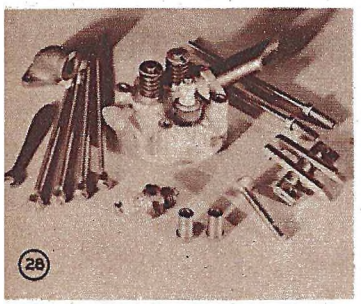
GAS ENGINE For Modelmakers

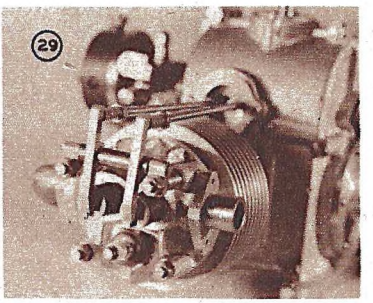
Here is the second installment of the article describing the construction of a 4-cycle, 1 h.p. engine for use in models, boats, compressors, etc.

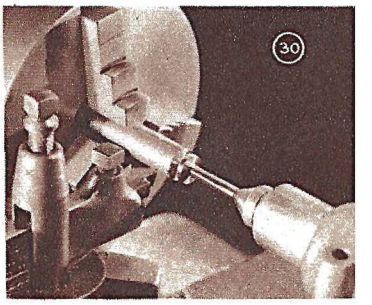
by C. W. Woodson

PART II

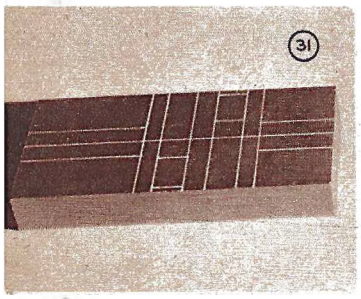
LAST month we covered the building of this engine up to the point where we had a complete "shell," including crankcase, cylinders, head, base and studs. We now take

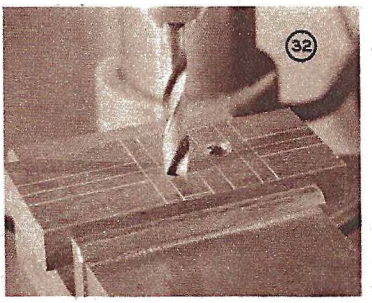


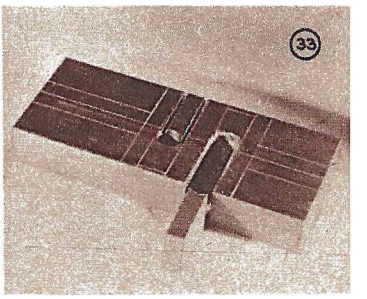




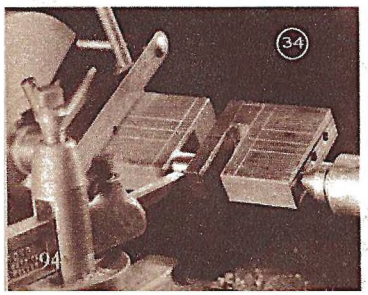
Valve assembly parts are shown above, and consist of guides, rocker arms, push rods, springs, spacers and the valve itself. Note cylinder head with spark plug and exhaust outlet.

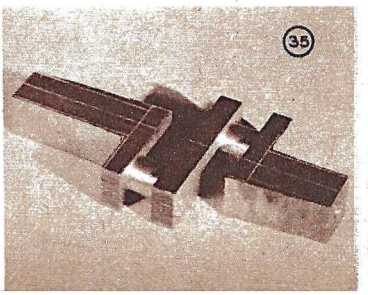


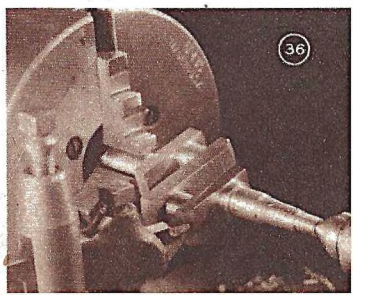


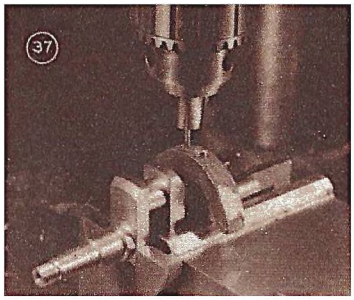


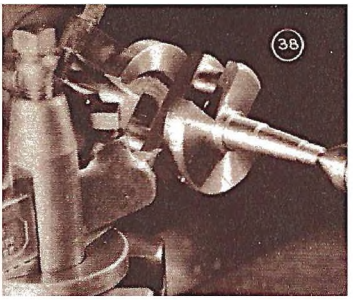
Various steps in developing the crankshaft are shown in the pictures above and below, starting with the rough block of steel in 31, and ending with the beveling of the outside of the crank web in 36. Text gives full details.

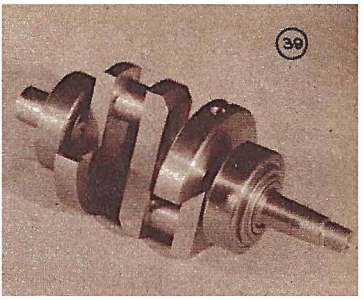


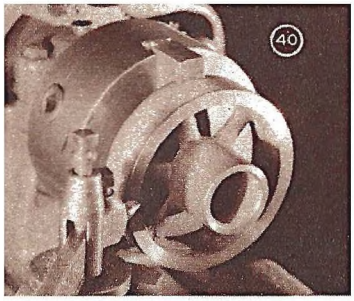


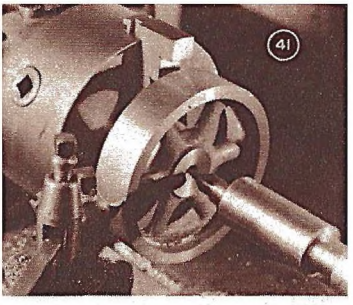


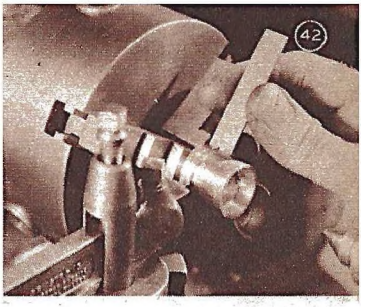










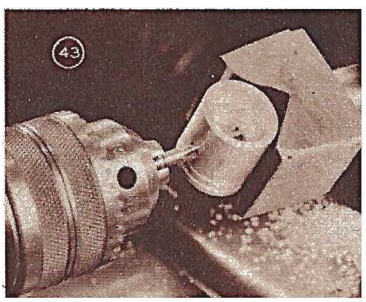


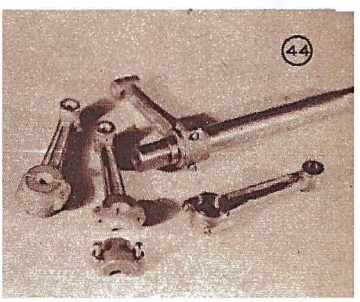
Crankshaft balances are faced smooth and turned to same diameters as the webs, as in 37 and 38. Completed crankshaft with bearings in place is shown in 39. Photos 40 and 41 show machining of the flywheel, while in 42 the ring grooves in the piston are being checked for accuracy.

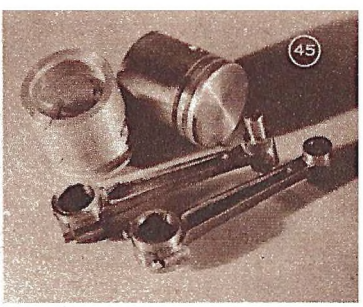
up the "innards," and will make the valve assemblies, crankshaft, camshaft, pistons, timing gears, and associated parts.

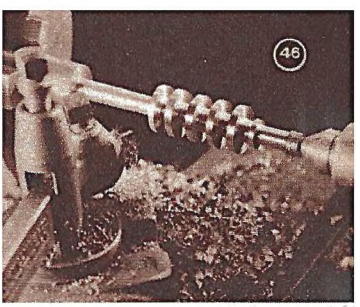
The various parts for operating the valves are made up from stock, round hex and flats being used. These are all fully dimensioned in the drawings and shown in Fig. 28, and in place on the cylinder heads in the close-up photo, Fig. 29. The rocker arms and their bushings were made of bronze while the shaft clamps, rocker shaft and spacers were made of steel. The valves were turned from ½" drillrod while held in a collet where the stem was turned to size and all of the work on the outboard end completed including the valve seat, before being cut off with the parting tool. The stem was then chucked in a smaller collet and the valve head turned and faced smooth. The valve guides are made from hexagon brass rod and

[*Continued on page* 116]

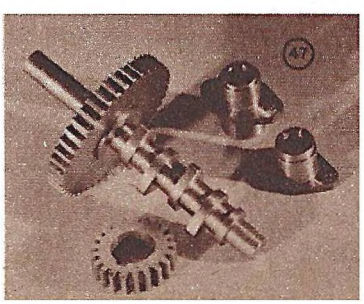


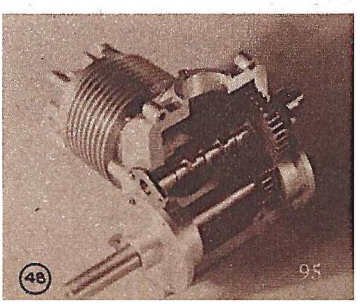


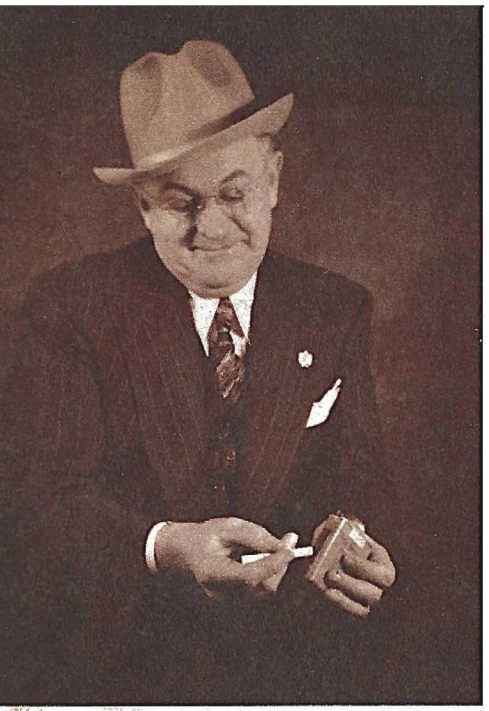




Above are finished pistons and connecting rods, while below is seen the camshaft with its timing gears temporarily installed in the crankcase.







No need to use matches at all. Monk Watson shows you how to light a cigarette by striking it directly against the side of the package. Text tells how it's done.

Matches can be easily fixed to light with a colored flame or to emit gold or silver sparks.

4th Fun With

Safe, mystifying and easily-prepared match tricks for the 4th of July.

A SAFE and sane way of celebrating the Fourth, as well as having fun on any other occasion, is to surprise your friends with these tricky matches. Light a cigarette and extinguish the match before appearing to notice that a friend is awaiting a light. All that you have to do is to strike the same match and it lights again. When superstitious persons object to "three on a match" you can light and blow out one match two, three or four times!

Other surprising stunts that amuse and mystify, but do not cause embarrassment, are done with matches that burn with a colored flame or shoot off dozens of silver or gold-colored sparks; a cigarette that is lighted by merely striking it on a match box; toothpicks that light the same as matches, and a candle that you can remove fully lighted from your pocket—truly a novel form of pocket cigarette lighter.

Material for these stunts is easily and inexpensively prepared. The heads of ordinary safety matches (*not* strike-anywhere matches) are made into a paste and this is applied as desired to other matches, toothpicks, candle wicks, etc. The heads of some matches can be made into a paste by merely soaking them in a little water, allowing the latter to evaporate until the mixture is of a

Soaking the heads of a bundle of safety matches in water. Resulting paste is used to prepare other matches.

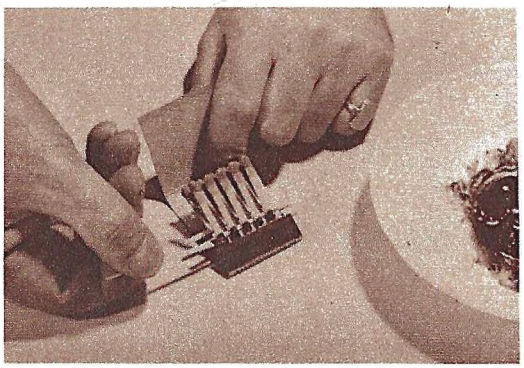
Coating the ends of safety matches with the igniting material so they can be lighted twice.

Above: When you run out of matches, light up with a toothpick!

Left: Bob Hope, radio and screen star, suspiciously accepts a trick match from comedian Monk Watson.

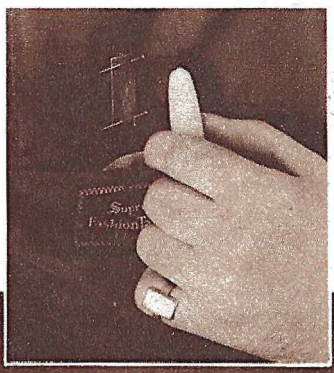
Trick Matches!

by Ken Murray



Preparing book matches. Separate the rows with toothpicks until the material is dry.

Right: Removing a lighted candle from an inside pocket. As the "pocket cigarette lighter" in the form of a prepared candle is withdrawn from the pocket, it is struck against the strip of igniting material.



proper consistency. Other matches contain an ingredient which prevents the heads from freely softening in water. In this case tap each match head with a hammer to loosen the material from the wood and grind it to a fine powder in a saucer, using the bowl of a spoon. Make into a paste with a little water to which a small quantity of liquid glue has been added.

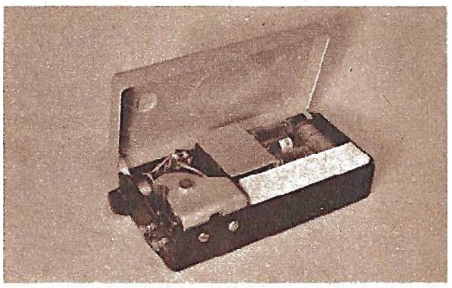
To prepare matches that will light twice, merely coat the plain ends of the match sticks with the paste so that they will each have two heads. Allow them to dry thoroughly before use. To prepare a match so that it will light three or four times, also coat the middle section of the stick. After lighting each end, break the match in half

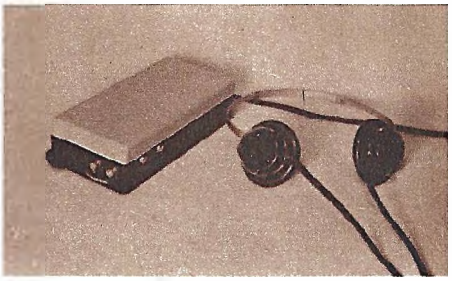
[*Continued on page* 157]

Pocket Pete

A High Performance Portable Receiver Using Three Midget Tubes

A piece of flexible wire clipped to the electric fixture makes an effective aerial for Pocket Pete.





Above: There is no wasted space inside the carrying box of this set! Below: A pair of light-weight earphones completes the Pocket Pete outfit.

POCKET PETE is a tiny receiver made possible by recent developments of tube and battery engineers, namely Raytheon midget tubes and the Eveready 22½ Volt Layerbuilt battery. Due to the high performance and small size of these parts a really outstanding portable receiver is possible.

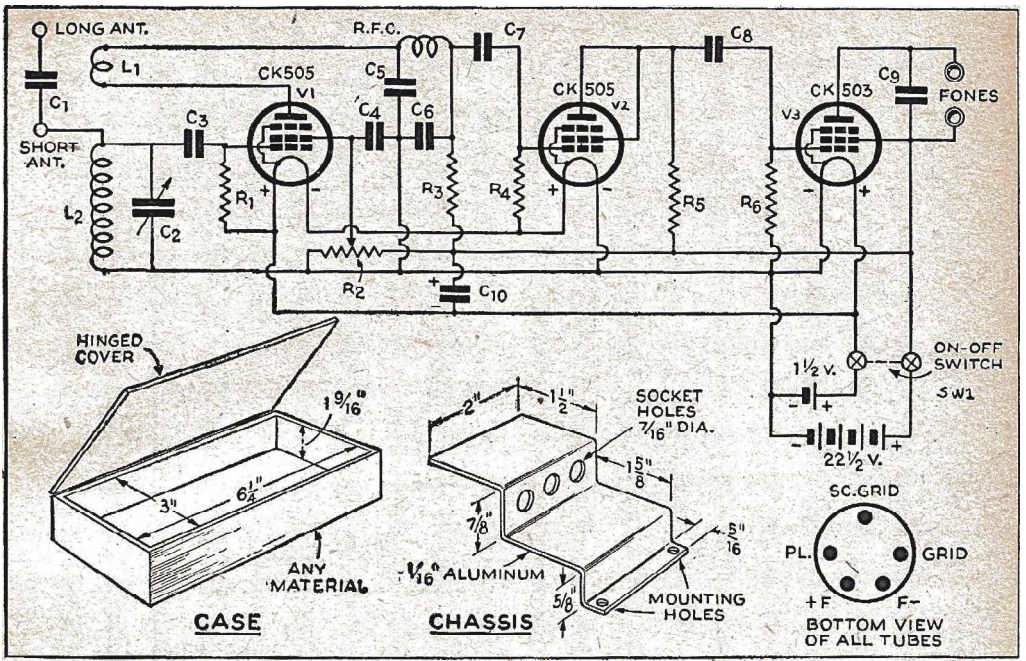
Headphones are used, of course, and an aerial rather than a loop antenna. However, in metropolitan or suburban areas practically any large metal object will serve as an aerial, for which reason an 8-foot length of flexible wire is always carried with the set. A clip on one end of this wire enables it to be snapped on to a water faucet, a light fixture, a bed spring, and similar objects which afford fine pickup. In localities far removed from any transmitter, an aerial and ground may be used with very fine results. Thus the set, which weighs only 1½ lbs. complete with aerial wire and lightweight phones, is ideal for use on vacation, camping trip, or while traveling.

The set is contained in a bakelite case measuring 6¼″ x 3″ x $1\frac{9}{16}$″ thick inside. This case is of a type in which men's belts are sold, and probably something similar will be available in many localities. Most builders will doubtless prefer to construct their own box; practically any material, including wood, presdwood, or metal, is usable. The latter will entail some added work, however, since all battery clips and the terminal posts must be fully insulated from it.

The size given is the minimum that should be attempted unless the builder is highly skilled in small work. Even if made a bit larger the outfit is still very compact.

A perusal of Pocket Pete's circuit will show that it is simply a regenerative detector with two audio stages. The regeneration is controlled by potentiometer R2 in the detector screen grid circuit. Pentode tubes are used throughout, although the first audio stage is triode-connected to reduce the amplification. This may sound odd, but the fact is that on most local stations there is almost too much volume even with the triode connection.

The filaments of the two CK505's are connected in series, since they are ⅝-volt tubes, but the CK503 has a 1½-volt filament and consequently is connected directly across the 1½-volt A cell. The latter is a single medium-size flashlight cell, but inasmuch as the total current drain is only 60 milliamperes,



List of Parts

L1, L2—Antenna coil (Meissner Mfg. Co. No. 14-1496)
RFC—r.f. choke 16 mh. (Meissner Mfg. Co. No. 19-1910)
V1, V2—Detector and 1st a.f. tubes (Raytheon CK505)
V3—2nd a.f. tube (Raytheon CK503)
C1—50 mmf. mica capacitor (Solar MO-1410)
C2—350 mmf. midget variable (Eagle Radio Co., N. Y. C.)
C3—250 mmf. mica (Solar MO-1419)
C4—.2 mf. paper (Solar MP-4161)
C5, C6—500 mmf. mica (Solar MT-1322)
C7, C8—.005 mf. mica (Solar MW-1239)
C9—.004 mf. mica (Solar MW-1237)
C10—10 mf., 25-volt electrolytic capacitor (Solar M-010)
R1—1 meg., ½-watt resistor (I. R. C. BT½)
R2—500,000-ohm variable (Centralab NS-19)
R3—.1 megohm ½-watt resistor (I. R. C. BT ½)
R4—.5 mfg., ½-watt resistor. (I. R. C. BT ½)
R5—50,000 ohm, ½-watt resistor (I. R. C. BT ½)
R6—5 meg., ½-watt resistor (I. R. C. BT ½)
SW1—DPST slide switch (Eby No. 1021)
3—tube sockets (Amphenol 78-5P)
1—22.5-volt "B" battery (Eveready X337)
1—1.5-volt medium size cell (Eveready size C)
2—pin jacks
1—case
1—small knob

it has a very good life. It may be seen just to the right of the tubes in the interior view of the case; the paper cover is removed to enable the mounting clips to make contact with the zinc shell. Two clips hold the cell in place, while a third makes contact with the brass cap.

The "B" battery is the oblong white object at lower right and as it has a contact at each end it, too, is held in place by spring clips.

The receiver "chassis" is bent from aluminum to the dimensions shown. It is easiest to cut the socket holes before bending. The chassis is held to the case by only two screws, those that fasten down the A cell clips.

Beneath the lowest section of the chassis are placed C10, RFC, several of the small resistors, and by-pass condensers C5 and C6. Coil L1 and L2 and the other small circuit parts are under the top bent section. These components, together with the tube sockets, are all wired in place before the chassis is set in the case. Two pin-tip jacks for the phones are fastened to the bottom of the case by an insulated metal strap and are set about ½" away from the side so that the phone tips, which enter through $\frac{3}{16}$" holes, will not project from the case.

The variable capacitor C2 must be side mounted because of its size. The shaft was cut off so that it is only ⅛" long and a hole drilled and tapped in it for a flat head 4-36 screw. The dial, which rests against a shoulder on the shaft, is a 2¼" disk of $\frac{3}{16}$" thick hard rubber. A ⅛" groove in the edge carries a strip of paper with the 0-100 scale lettered in ink, over which is a celluloid cover strip. Only the knurled edge of the disk protrudes outside the case beneath the antenna posts.

Mounting of the regeneration control and the d.p.s.t. on-off slide switch (the latter may be seen to the rear of the tuning capacitor) completes the construction work.

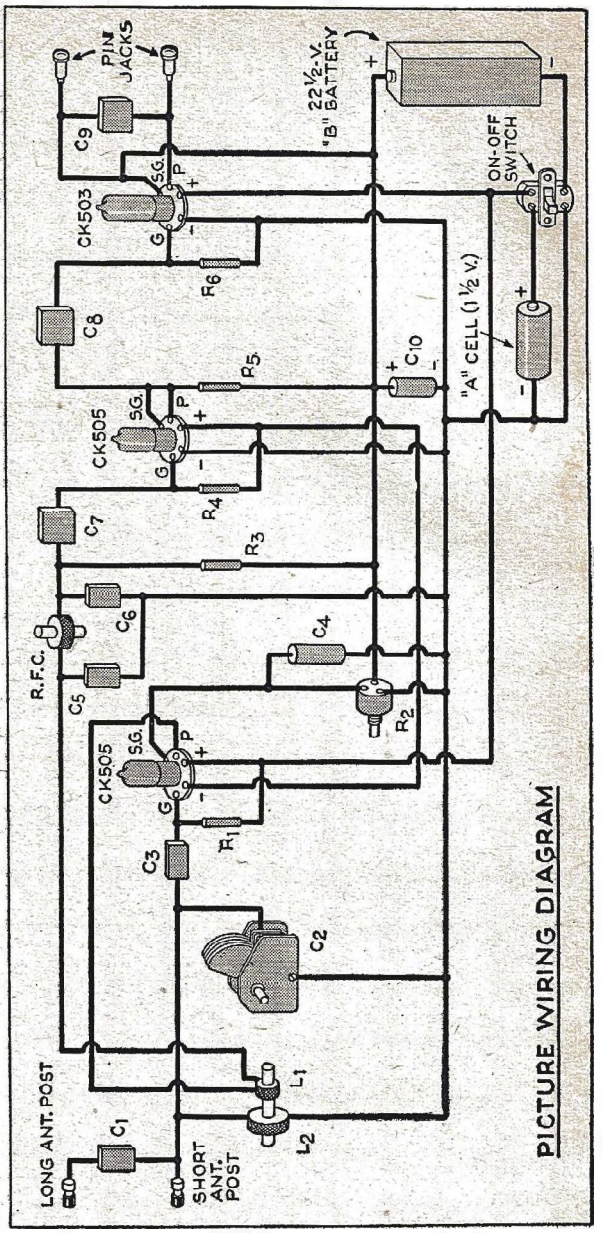
The coils L1 and L2 are part of a standard

broadcast coil, but must be considerably altered. Remove the can and discard it and the terminal strip. L2 is the coil of larger diameter and is wound of "litz" wire containing many fine strands. Ten turns should be removed from this coil. Next carefully peel off 50 turns from L1, which was intended as the antenna winding. Make sure that L1 and L2 are wound in the same direction; if they are not, slip L1 off and reverse it. Now cut the core off so that it is about 1" long overall. An iron slug will be found within the fibre tube and it must be left centered in L2. The spacing between L1 and L2 will be about $\frac{5}{16}$". The outer end of L2 should run to C3 with the inner end to B-, while the inside of L1 goes to plate and the inside to RFC. Be sure all the tiny strands of L2 are connected together when making leads from this coil.

After the parts on the chassis are completely wired and leads are brought off to connect to components fastened to the case proper, the chassis may be put in place and wiring completed.

The only adjustment to make is that of L1. With an antenna of moderate length connected to the long antenna post, slide L1 until the receiver will just go into oscillation at the low frequency end of the band (C2 plates fully meshed) with R2 at about midrange.

This little set will be found to give exceptional volume and also, within the limitations of headphones, very good tone quality. It should be operated with R2 advanced quite near the oscillation point, as with such a setting the circuit is not only more sensitive but also more selective. Oscillation should be avoided, however, as it causes distortion and increases the hand-capacity effect.



This picture wiring diagram may help beginners in wiring "Pocket Pete." The connections correspond with those shown in the schematic diagram on the preceding page.

All parts for this set are standard, and may be obtained from any of the large radio supply houses by mail, if there is no suitable dealer in your locality. Either Allied Radio, Chicago, or Lafayette Radio, New York City, can furnish the materials. You will have noticed that in the chassis drawing "any material" is specified for the case. If you intend carrying your Pocket Pete outdoors very much, as you probably will, we suggest the use of marine plywood ¼" thick, or Presdwood, or any of the other weather-proof composition boards stocked by lumber dealers.

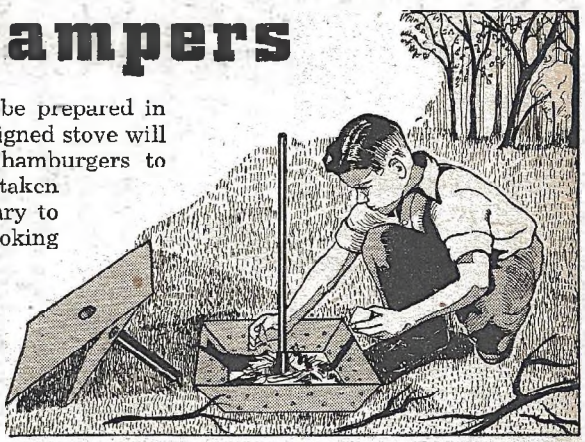
If well made, this is a truly practical little unit, which will give long battery life (total B battery drain is about one milliampere).

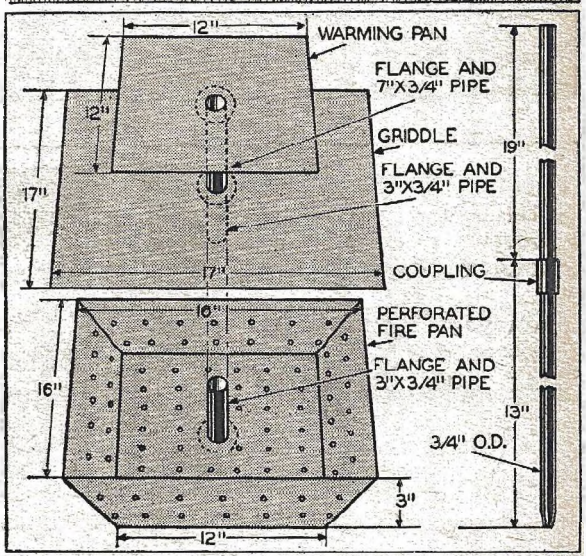
Stove For Campers

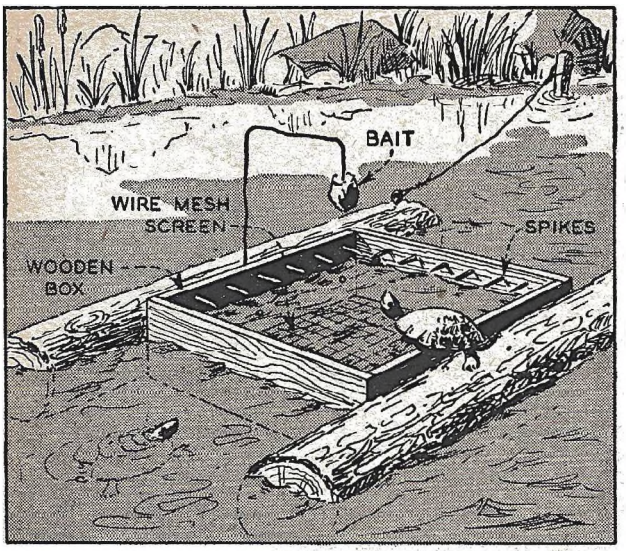
WHEN there are quick lunches to be prepared in camp or at a picnic, this oddly-designed stove will handle anything from hot dogs and hamburgers to large, thick steaks. It can be set up or taken down in a jiffy and as it is not necessary to carry along frying pans, your entire cooking equipment will pack away in a small space. The stove consists of a stake which is driven into the ground, a fire pan, griddle and warming plate. The latter fits over the stake. If desired, the warming plate and fire pan may be dispensed with so that the weight and bulk of the stove will be negligible.

The stake consists of a 13-in. and a 19-in. piece of pipe having an outside diameter of ¾-in. They are fastened together with a coupling, which serves as a support for the fire pan. The end of the stake should be sharpened so that it may be driven into the ground easily, or a sharpened metal point may be added. Form the fire pan of light-weight stove iron, riveting the corner seams and perforating the entire pan with ¼-in. holes so as to provide a draft. Heavier sheet steel may be used for the griddle and warming plates, which are merely squares of the metal fitted with floor flanges and short lengths

[*Continued on page* 143]

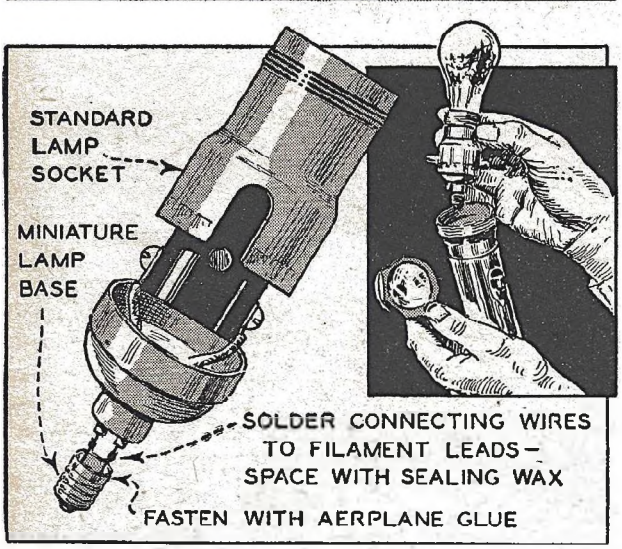






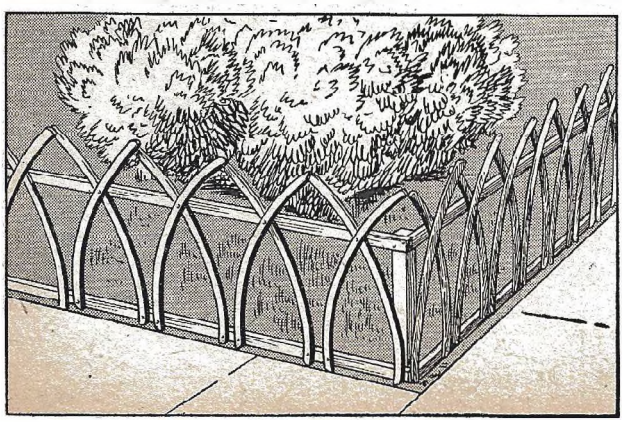
Trap For Mud Turtles

MUD turtles, which consume many fish in lakes and streams, are now being trapped in Wisconsin; not only to save the fish, but also for the profit they bring in the market. Traps used are of various kinds, but one strongly recommended is shown herewith. It consists of a stout board frame, about two feet square, which is provided with a screen-wire bottom, and a series of sharp spikes are driven through, around the top edge, to project inside. This frame is then fastened to a couple of short posts or logs, one at either side, to serve as a float, and a wire attached to one side of the box is bent over, with a hook at the end, to support the bait, which may be liver or the meat of a clam.—*G. E. H.*



Converting Flashlight Into Temporary Flashgun

CAMPERS and tourists, who almost always carry a flashlight, will find this standard-to-miniature socket adapter a practical photographic accessory. With it, an ordinary flashlight can quickly be converted into a temporary flashgun for use with standard base lamps. The base of a miniature bulb, fastened into the neck of a standard socket with aeroplane glue, supplies the miniature screw threads. Light weight wires, for making connections with the socket terminals, should be soldered to the filament leads.

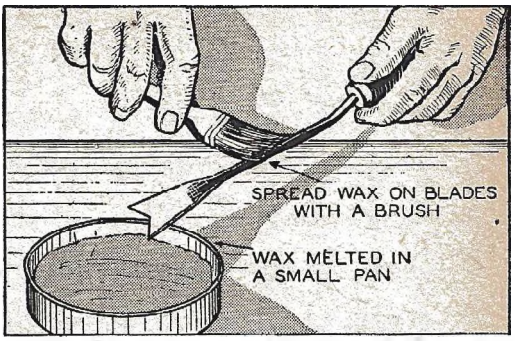


Clothes Hanger Fence

THE drawing at left illustrates a novel picket fence made of old clothes hangers. The builder wanted a low fence to keep dogs out of his front yard and thought of using surplus hangers arranged in a simple, attractive pattern. A pair of wire cutters disposed of the metal hooks after which the hangers were mounted on horizontal supports.—*M. D.*

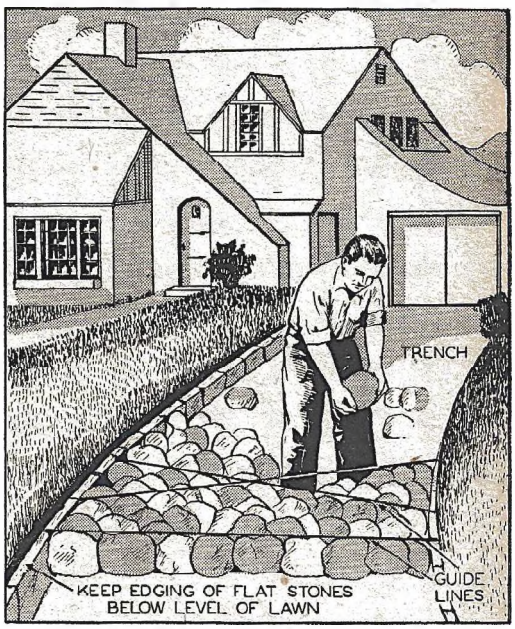
Protecting Garden Tools

EVEN better than rubbing grease over bright blades and knives between usings, or when storing for some time, is paraffine. The wax is melted in a shallow dish and the tool either dipped in bodily or the hot liquid spread on with a brush. When cold, seal against rust is thorough.—*D. V. H.*



Stone Driveways

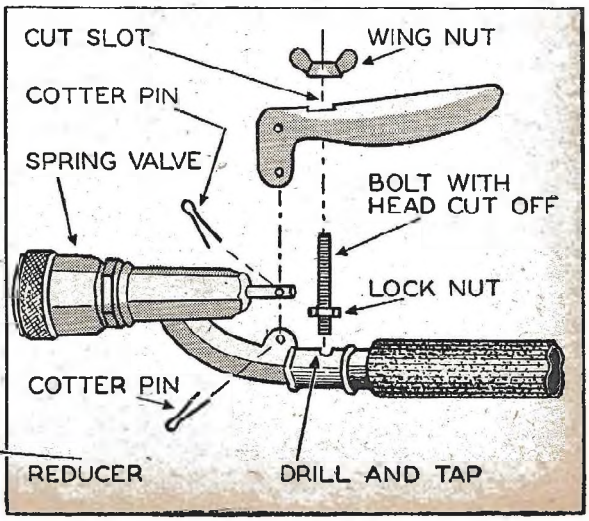
WHEN building a driveway in which a bed of field stone is used as the base, it pays to lay, or fit, the stones into place instead of just throwing or dumping them into the trench. Interlocked in the manner illustrated, the stones cannot shift or spread apart, thus forming a firm foundation capable of supporting the weight of cars and trucks without settling. The small openings left in the stone bed may be filled with the soil excavated in digging the trench.—*J. M.*



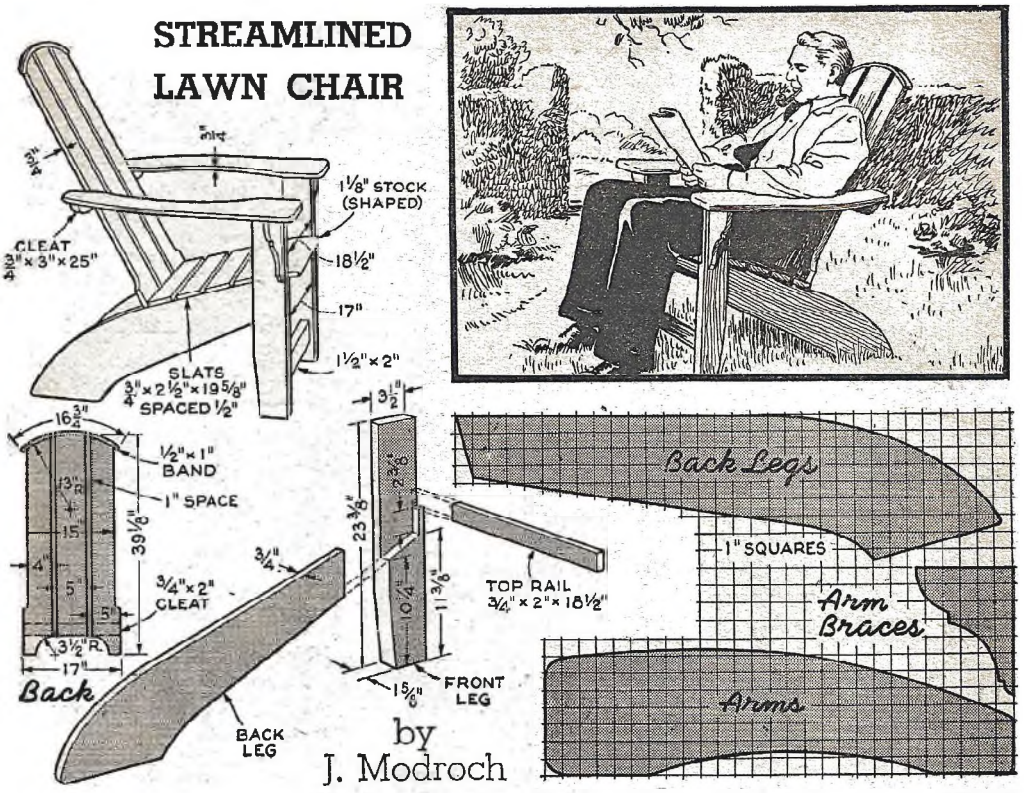
Lock On Spray Nozzle

WHEN not in use for spraying insecticides on plants and trees, the spring-valve spray nozzle of a portable tank spray outfit can be made to double as a lawn sprinkler by providing it with a hold-open lock, as illustrated. First, remove the hand lever by taking out the two cotter pins.

When the wing nut is loose, the valve should be closed. To adjust the stream of water, compress the lever and screw down the nut to hold it in the position desired.—*J. M.*



STREAMLINED LAWN CHAIR



by J. Modroch

YOU can incorporate both pleasing appearance and solid comfort into that lawn chair you're going to build by making use of the refinements found in the one illustrated.

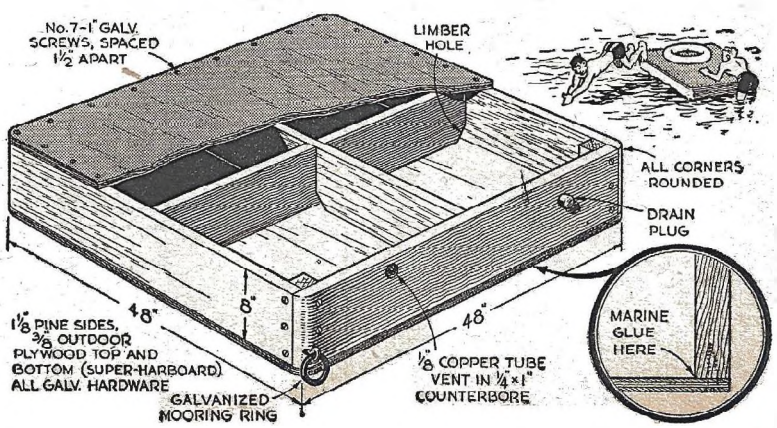
A comfortable sitting position is assured the occupant by joining the seat to the front legs at an angle of approximately 73 degrees, and by tilting the back at an angle of about 102 degrees in relation to the seat.

The use of 1⅛-in. stock for the front slat permits shaping the leading edge of the seat so it will not cut into the sitter's legs. The arms are bowed to allow comfortable changes in body position and all corners are rounded.

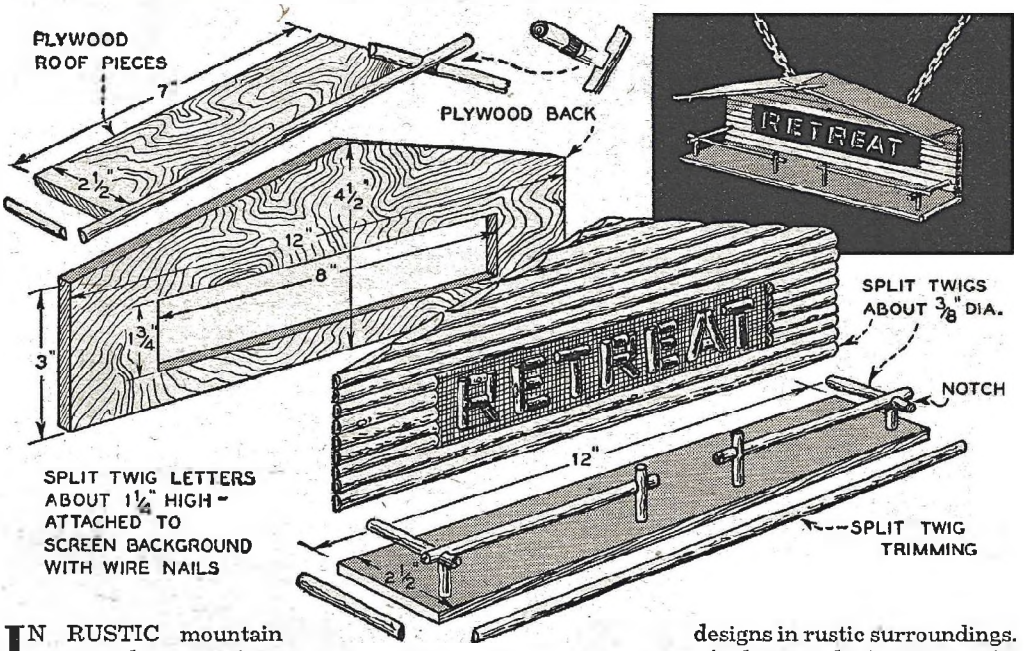
JUNIOR SWIMMING FLOAT

by Hi Sibley

THE construction of this small bathing float is very simple because single-panel marine plywood top and bottom eliminates calking many seams as in the conventional design. Marine glue is applied on all contacting surfaces. Galvanized or brass hardware should be used throughout.



Summer Cabin Name Plaques

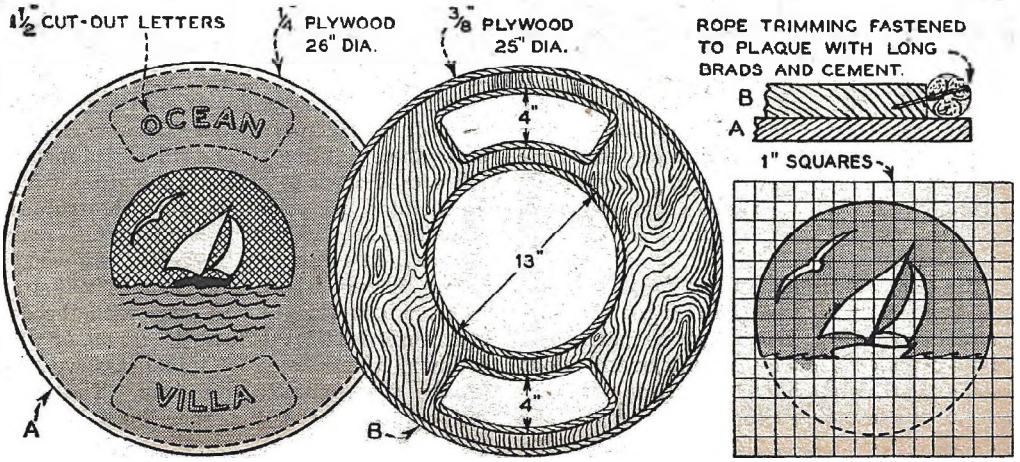


IN RUSTIC mountain surroundings or along the breezy seashore much will be added to the appearance of any cabin with an attractive name plaque in harmony with its surroundings. A glance at the accompanying illustrations will give a clear idea of some practical methods of making cabin names which has a wide application and are quite simple to make up.

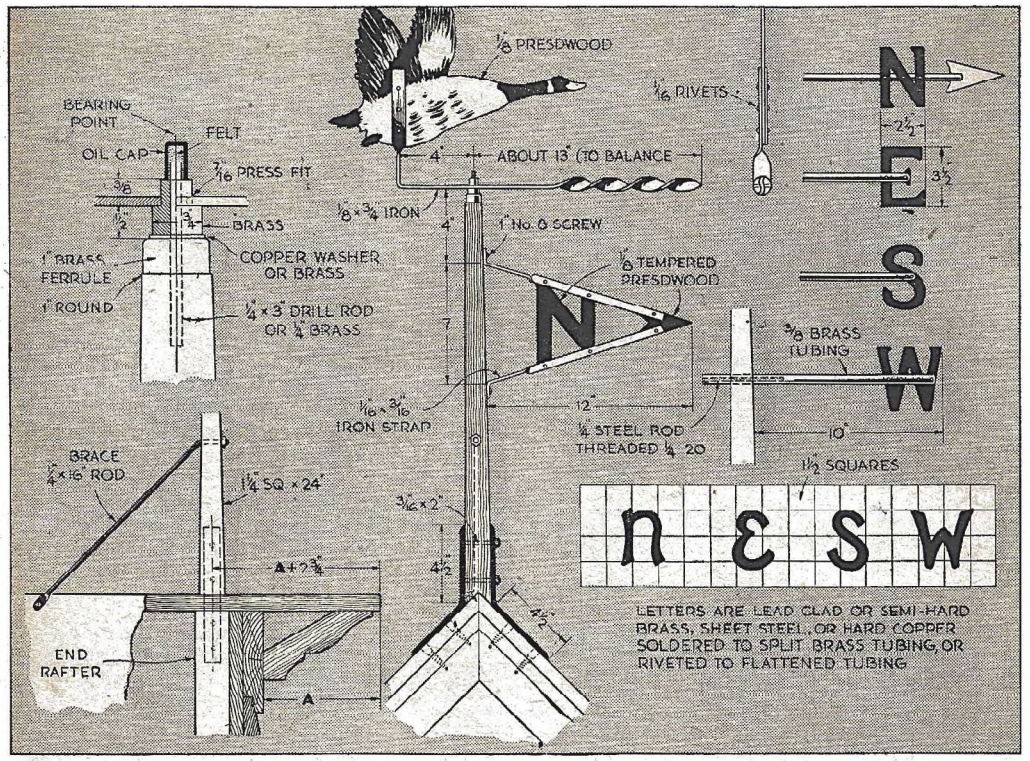
Constructed by a split twig method in log cabin design as shown above, this name plaque is very attractive for log cabins or similar designs in rustic surroundings.

The letters which make up the name are also made from split twigs mounted on a copper screen background. All the light plywood parts are stained to blend with the color of the twigs. Many different twigs may be used for the construction but willow is the most adaptable. They may be used with or without the bark and should be allowed to dry out before applying a couple of coats of spar varnish for the final finish and protection.

[*Continued on page* 157]



MAKE A WEATHER VANE



Correct balance is the main point to watch when setting up your vane. Drawing above shows details of bearing and method of roof mounting.

WEATHER vanes are interesting to make, and if artistically designed, add distinction and charm to any building upon which they are mounted. They are of never ceasing interest to those who observe or study the weather.

In the past the farmer mounted a vane on the old barn, usually a weather cock or perhaps a horse of uncertain design, where it pointed out the direction of the wind and the kind of weather to be expected, a vital matter to the tiller of the soil. The modern vane appears on the home, garage, many public buildings, as well as on the barn, and often expresses in its design the taste or hobby of the owner.

The subjects or motifs for weather vanes are limitless; your favorite pastime or sport, animals, witches, Dutch girls, gardening, historic subjects, and even comic or ridiculous subjects can be depicted. The simple designs shown here are suggestive only, and you will probably want to express your own individuality and ingenuity in the design.

Sketch your design full size and then transfer to ⅛" tempered Presdwood, Super-Harbord marine plywood, or similar composition, which can then be sawed out with a coping saw, keyhole saw, or on a power band saw. The silhouette should be waterproofed by treating with a resinous penetrating primer and several coats of outside paint. (This is to be done only if Presdwood is used. Marine plywood needs no treatment, other than painting.) The silhouette may be left a dull black to simulate metal or it may be painted in colors to suit the subject. (Benite finishes, used for bar tops, etc., make an excellent waterproof finish for Presdwood.)

The silhouette is fastened to a ⅛"x1" strap iron support (length will vary with the design used) with large head ¼" rivets, or with ordinary rivets, with 3" thin brass washers on the side opposite the strap. The strap support is twisted and then bent at right angles as indicated on the plans. The length

FOR YOUR HOUSE

by Alvin Youngquist

of the strap support and the location of the bearing will vary with the design. To work properly the vane must balance from the point of the bearing. In some cases it will be advantageous to add weight near the tip of the strap to offset the weight of the silhouette. At least three quarters of the area of the silhouette should be "behind" the bearing point for effective turning with the wind.

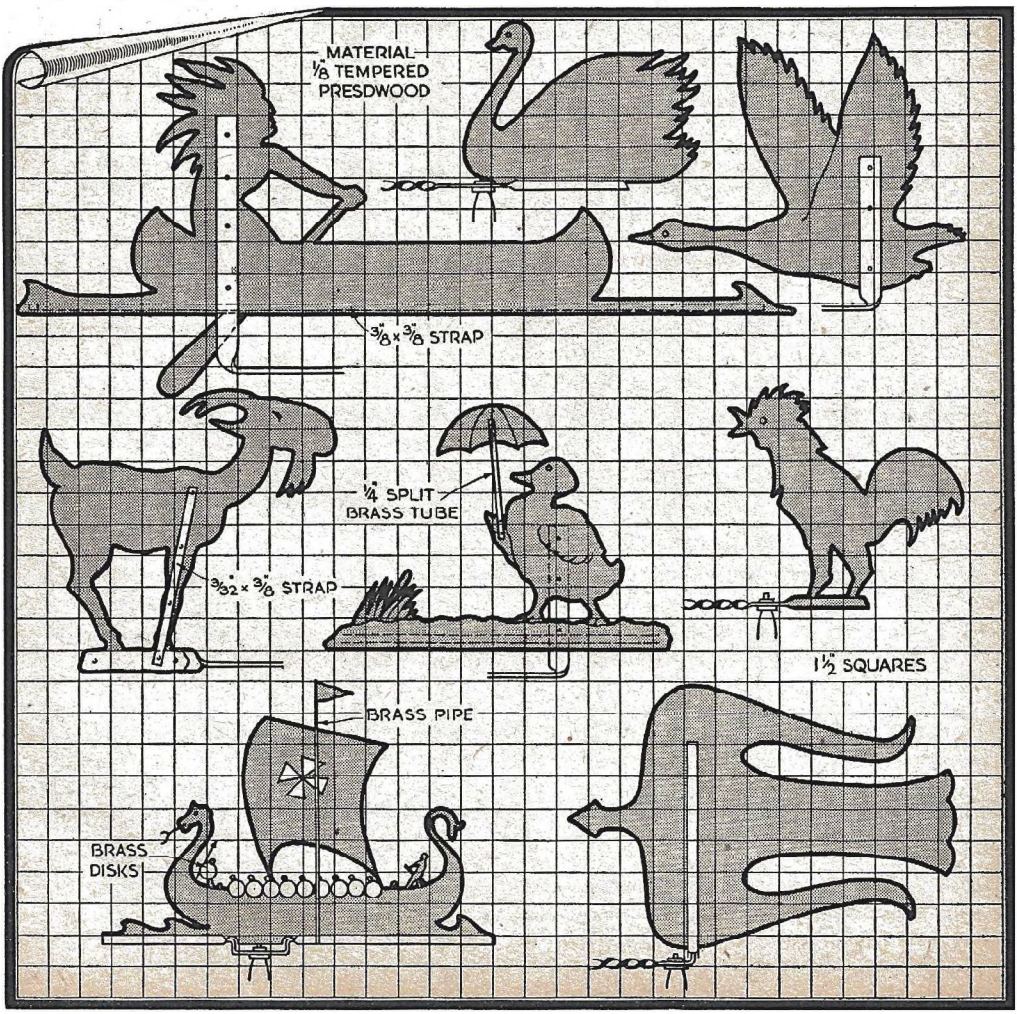
The brass bearing itself is turned accurately to the designed dimensions so that the offset will make a press fit into a $\frac{7}{16}$" hole drilled in the strap support. The bearing turns on a ¼"x3" drill rod or ¼" brass rod.

A cap packed with oil-soaked felt will keep the bearing lubricated. The vane will work, of course, without lubrication.

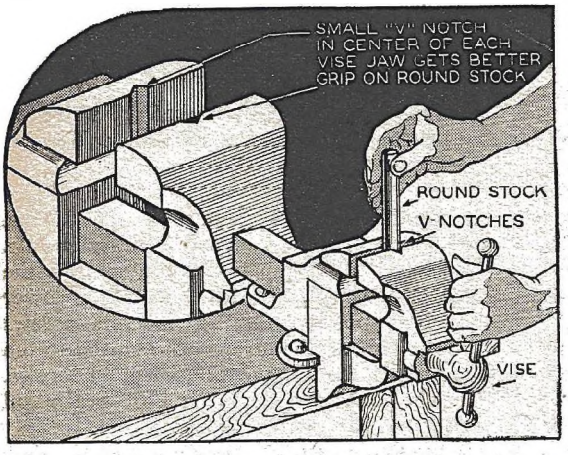
For the post use oak, maple or birch 1¼"x1¼" square 24" long, tapered to 1" dia. at the top to take a standard 1" brass ferrule. Two ⅛"x1"x9" strap irons, bent to suit the pitch of the roof, are attached to the lower end of the post with $\frac{3}{16}$"x2" machine screws or stove bolts. The straps are secured to the ridge of the building with 2" No. 10 screws. For additional support a ¼"x16" brace rod is fitted to the ridge as shown.

The four arms of the compass are optional.

Below are a few suggested designs. Select one and copy it full size or sketch an original one to meet your particular requirements.

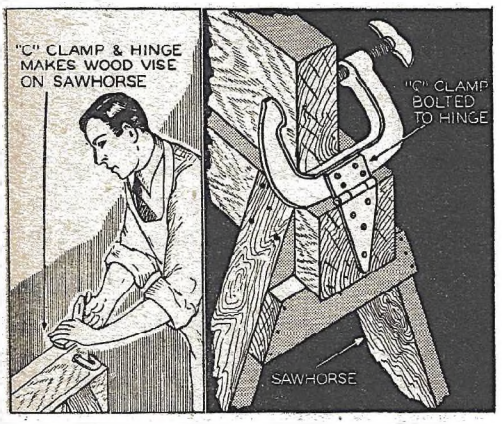


Simplifying



V Notches Help Vise

WITHOUT in any way spoiling the vise for normal use, a small flat V notch filed in each jaw will greatly extend its usefulness. Round stock can then be held securely for cutting or threading without slipping sideways.—*A. H. W.*



Wood Vise On Saw Horse

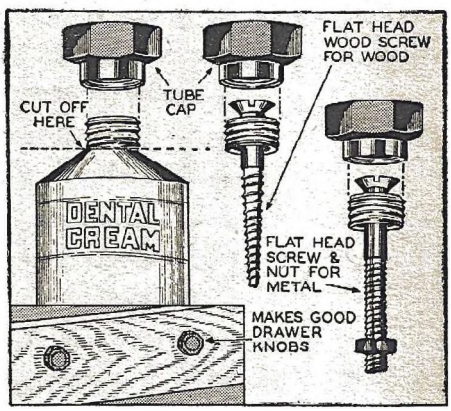
ONE craftsman handles light planing jobs quickly and conveniently by means of a clever improvised vise on his saw horse. A "C" clamp is bolted or riveted to a heavy hinge and attached to one end of the horse, as shown. It holds the work securely on edge.—*V. F. Z.*

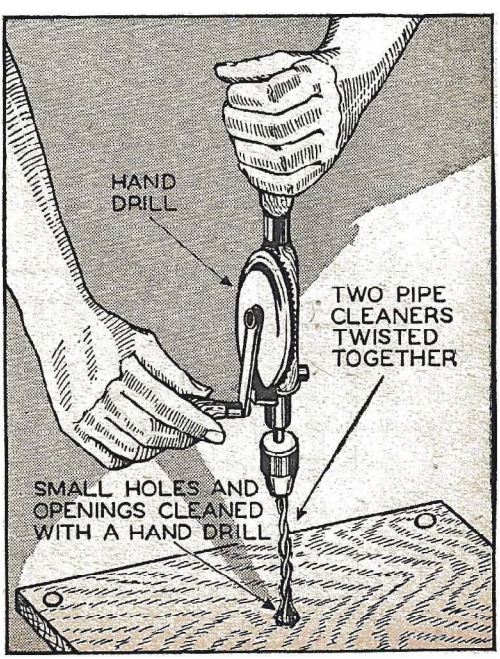
Drill Cleans Small Holes

A RADIO man discovered that by twisting a pair of pipe cleaners together and putting them in a hand drill chuck, a fine hole and crevice cleaner was the result. This use of a hand drill and a pair of cleaners does an excellent job around small machines.—*L. B. R.*

Knobs From Plastic Caps

USEFUL and good looking knobs and handles for drawers, kitchen cannisters, pot covers, etc., can be made from ordinary toothpaste and shaving cream caps. Cut off the threaded top of the tube at the shoulder and fasten it to the desired object with a flat head wood screw of the proper size. Cap can then be screwed back on and will stay put securely.—*A. Z.*

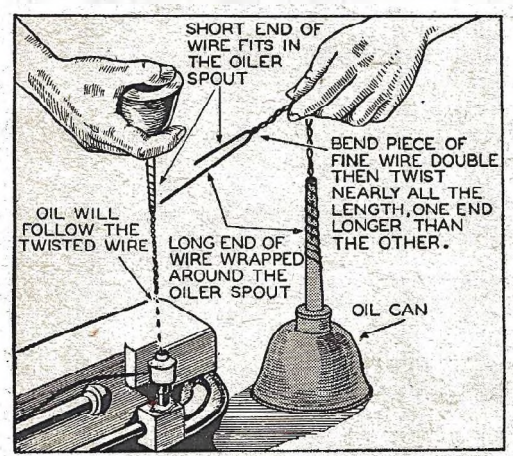




Your Shop Work

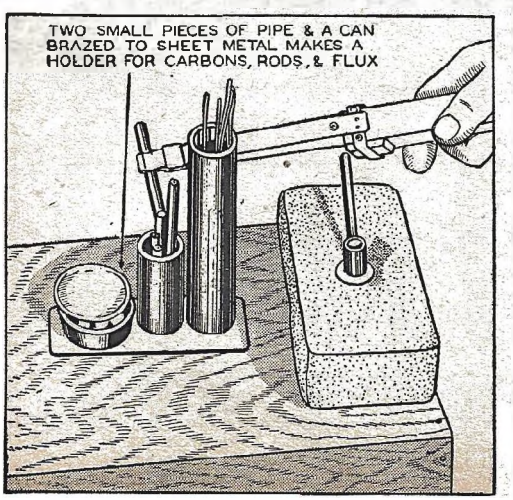
Oiling Hard-To-Reach Places

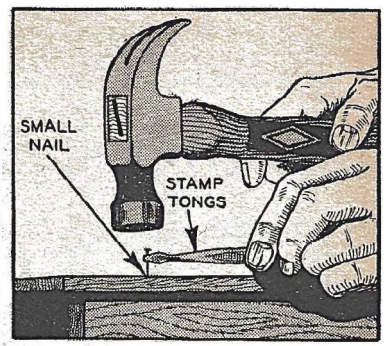
THE drawing below shows a very satisfactory method of effectively oiling out of the way places that cannot be reached with a regular oiler spout. Bend a piece of fine wire hairpin shape, leaving one end a little longer than the other. Twist most of the length doubled, then slip the shorter end down inside the oiler spout. Wrap the long end around the nozzle to hold it in place. The wire may be as long as needed and the oil will follow it.



Holds Welding Accessories

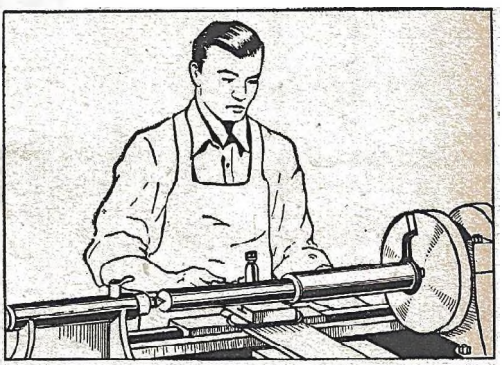
TWO small pieces of pipe brazed to a short length of sheet metal along with a can will form a neat compact accessory unit for a small carbon arc welder. The longest pipe will hold solder and welding rods while the carbons can be kept in the smaller one. The can holds flux for welding purposes.—*B. K.*

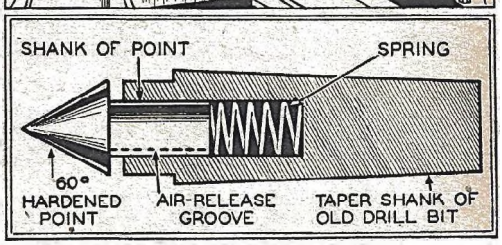




Stamp Tongs Hold Nails

IT IS quite difficult to hold small brads or nails with the fingers when driving them. However, the flattened ends of a pair of stamp tongs are just the thing to hold them with.—*W. S.*





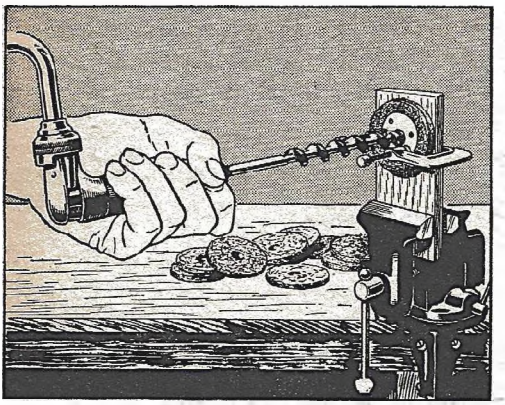
Spring Lathe Center For Filing

WHEN filing work in a lathe, a spring-loaded tailstock center made as shown will be found convenient. As the work expands from the heat of filing, the spring permits the center to move. Thus overheating and binding of work and center are avoided.

Obtain the taper shank of an old or broken drill bit, or machine a piece of steel to fit the tailstock hole. Turn the outer end square, and bore a central hole. Start the hole by drilling, and then bore it to size, which can

[*Continued on page* 154]

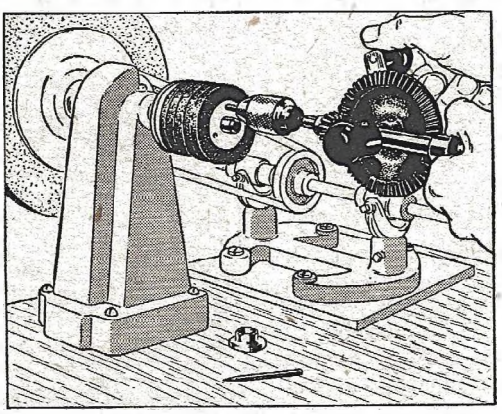
BUFFING WHEEL FOR HOME CRAFTSMEN



Cutting arbor holes in the felt discs is most easily done with an auger bit, as shown above. With one of the metal discs as a guide, two or more pieces of felt are clamped between it and a piece of wood held in the vise.

A VERY practical and inexpensive buffing or polishing wheel is made with scraps of felt, a small piece of sheet metal and a length of No. 9 wire. The wheel about to be described was made to fit a ½" shaft and is roughly 2" in width by 2¼" in diameter. Dimensions may be varied to suit individual needs. Construction of the wheel is as follows:

From the sheet metal cut two discs of 1½" diameter and bore them to fit the grinder shaft with just a slight amount of play. The discs should be cut from stiff material such as medium or heavy gauge galvanized iron. In boring the arbor holes, if a large drill isn't available the holes may be roughed out with a small drill and finished with a rat tail file. Three holes are now drilled, equidistant from each other, between the arbor holes and outer edge of discs, using a $\frac{5}{32}$" drill. The discs should be clamped together in a vise while drilling these holes so that their locations in each disc will match. These holes are to take the rivets which will be cut from the No. 9 wire and hold the wheel together.



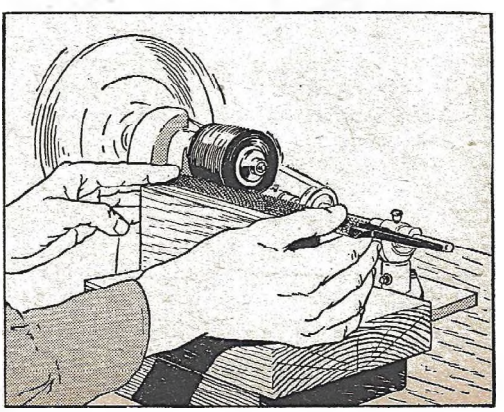
Inserting one of the rivets of No. 9 wire through the buffing wheel. Rivets are cut longer than necessary so they may be sharpened at one end and placed in a hand drill for easy insertion through the felt.

With the metal discs completed, the next step is to cut a sufficient number of felt discs for the width of wheel desired. For the wheel illustrated, 12 discs were cut from an old pad of nearly ½" thickness, uncompressed. Old felt hats are a good source of material if no thicker felt can be found. The felt discs are cut out with a scissors, using a cardboard pattern 2⅜" in diameter as a guide. To cut the arbor holes in the felt, a ½" auger bit was used, boring two discs at a time. Using one of the metal discs as a guide, the felt is clamped between it and a small piece of board with C clamps, and the board held upright in a vise. It is difficult to make clean-cut holes in the felt if the material is thick and soft, but it will not matter if the holes are a bit ragged.

Three rivets are now cut from the No. 9 wire before the wheel is ready for assembly. These should be about 2¾" long, sharpened on one end and slightly peened on the other.

To assemble the wheel the parts are

[*Continued on page 159*]



Final operation is truing up the wheel as shown at right. The edge of a wood rasp, supported so that it is parallel to the grinder shaft, is applied with light pressure to the revolving felt, removing any unevenness.

Mixer-Beater Made From Fan

The head of the mixer tilts back to permit placing of bowls, shakers, etc., underneath. Drawing at right shows two different types of mixing arms.

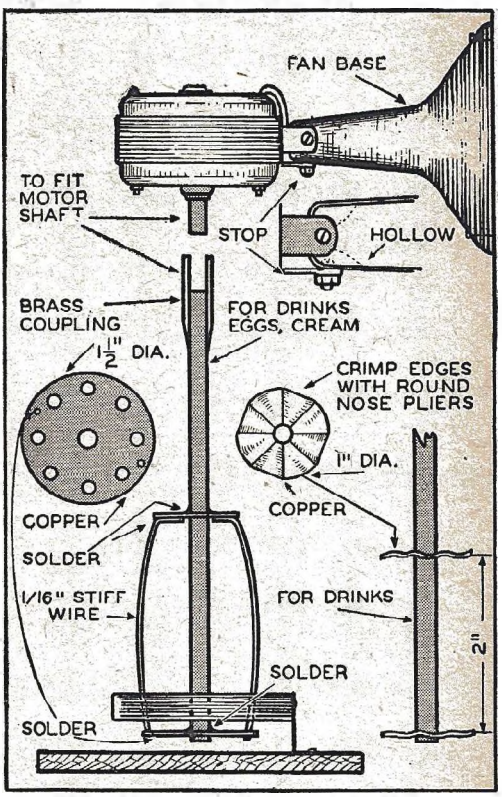
An electric mixer is a great kitchen convenience and need not cost much. Here is one you can make in a jiffy from an old fan and a few scraps.

by Harry Walton

A LOW priced 8" A.C. fan was quickly converted into an efficient kitchen beater as illustrated. It will beat eggs, mix malted milk and other drinks, whip cream, etc.

The fan base is mounted on the wall over a shelf or table and a small stop provided so that the motor can be bent up at will, but cannot be bent down further than to a point where the shaft is perpendicular. A spring-brass clip to fit the shaker cup used is screwed or soldered to a 1" bracket and screwed fast to the table or shelf beneath.

The brass coupling must be a snug fit on both motor and shaft. A piece of heavy-walled tubing will do if both motor and shaft are of the same size. Otherwise a coupling must be bored out on the lathe from $\frac{3}{8}$" brass rod. The motor end is tapped and fitted with a headless set screw, which may be the slotted shank of an ordinary 6/32 steel screw. The mixer shaft shown was made of a heavy curtain rod, from which the brass finish was removed with steel wool. If the shaft is wiped dry after use, it will not rust. A piece of straight copper tubing, with the lower end soldered shut, might also be used.



The upper end of the shaft is soldered into the coupling. The spinners are of copper, soldered fast. For mixing drinks the "wings" shown in the drawing are unnecessary, but they expedite the whipping of cream and egg whites. They are made of $\frac{1}{16}$" stiff brass wire, and can be used only with a deep container of the type shown, or with a much wider one. Liquid will climb the edges of a narrow cup and spatter, if it is not high enough.

Motor and shaft are tilted up so that the cup can be slipped underneath, then pressed against the stop while the cup is pushed between the clip jaws. Most fans have a switch in the base which is convenient for mixing, or an extension switch may be wired up in any desired position.

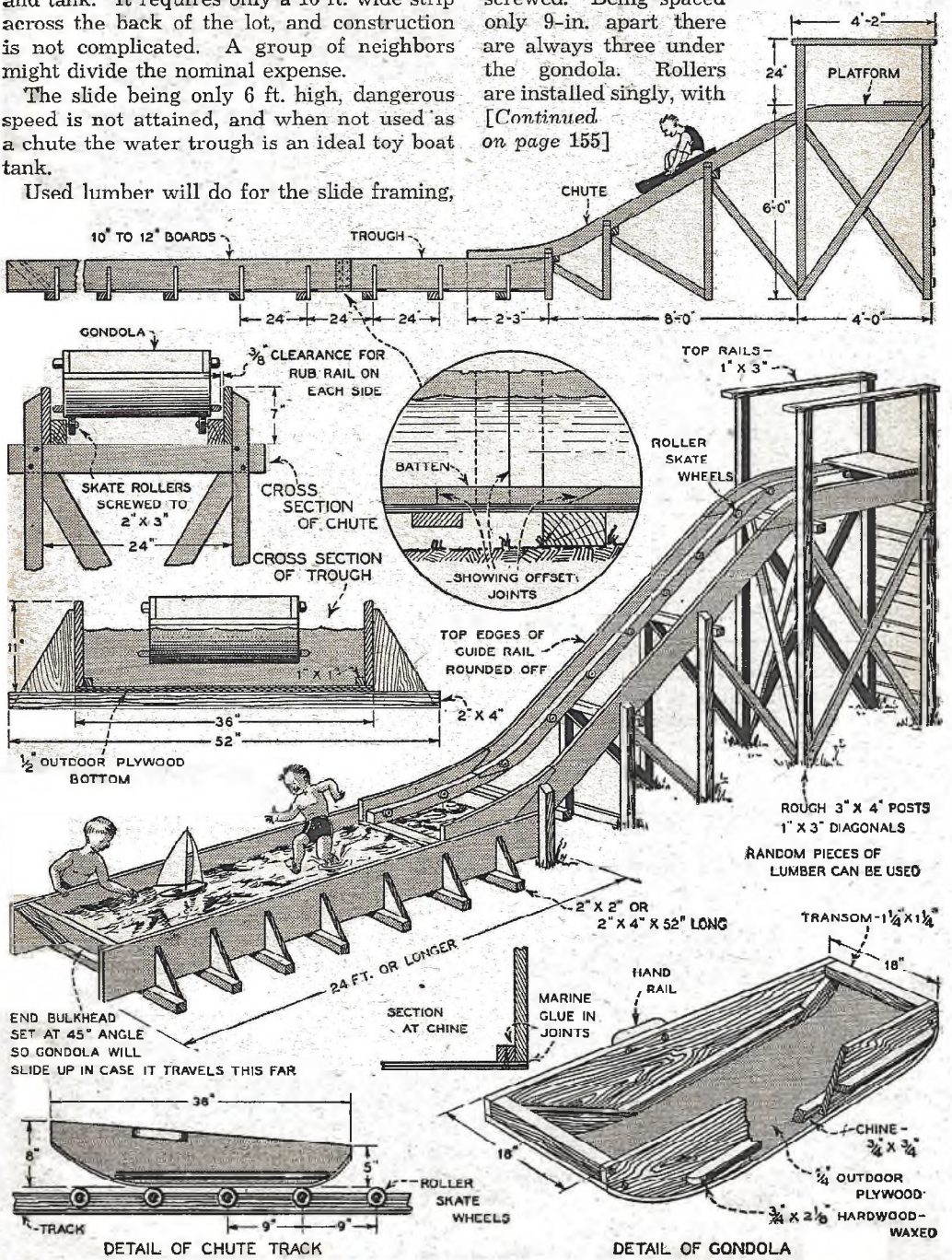
Fun With A Chute-The-Chutes

CHILDREN can have as much fun at home as at the beach with this backyard slide and tank. It requires only a 10 ft. wide strip across the back of the lot, and construction is not complicated. A group of neighbors might divide the nominal expense.

The slide being only 6 ft. high, dangerous speed is not attained, and when not used as a chute the water trough is an ideal toy boat tank.

Used lumber will do for the slide framing, with surfaced material for the guard rails and the 2x3-in. pieces to which skate rollers are screwed. Being spaced only 9-in. apart there are always three under the gondola. Rollers are installed singly, with

[*Continued on page* 155]



DETAIL OF CHUTE TRACK

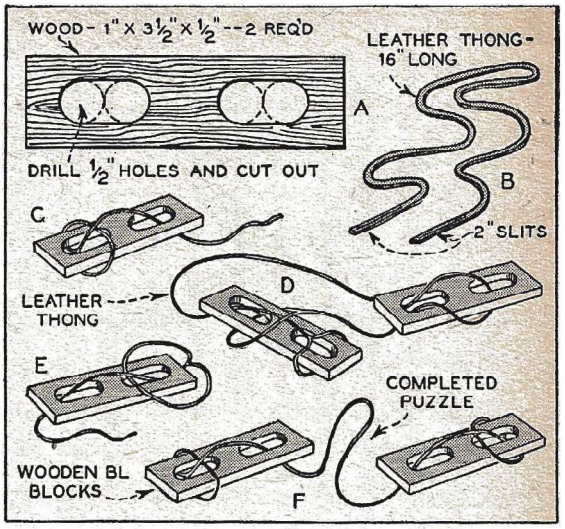
DETAIL OF GONDOLA

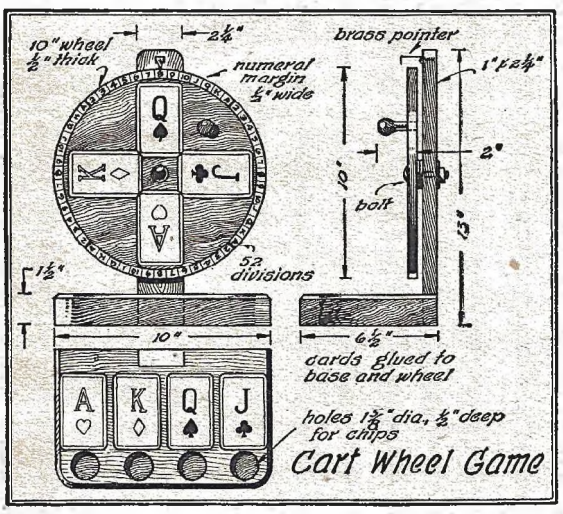
Block And Thong Puzzle

CUT, from ½" board, two blocks measuring 1" wide by 3½" long. In each piece bore two pairs of ½" holes, and cut out the wood indicated by the dotted lines at A so that each block is slotted as at X and Y. A leather thong about ¼" thick and 16" long, slit for 2" close to each end, as shown at B, is the only other equipment needed for this puzzle.

Pass one of the blocks partway through the slit in one end of the thong, and pass the thong through the holes *over* the loop, as in C. Now pass the other end of the thong through the second block and pass the first block through the loop (D). Draw the loop

[*Continued on page* 158]





Cart Wheel Game

HAVE a game of Cart Wheel the next time your friends drop in! Use eight cards from two old decks of playing cards when making the wheel and base of the set. The base is cut out and finished with the upper edge beveled on three sides, and the front corners rounded. Cut out a mortise in the back edge to take the lower end of the upright. Bore four holes along the front of the base, making them large enough for poker chips, and about ½" to ¾" deep. Arrange the Ace of Hearts, King of Diamonds, Queen of Spades and Jack of Clubs as indicated, gluing the cards to the base. The upright piece is at-

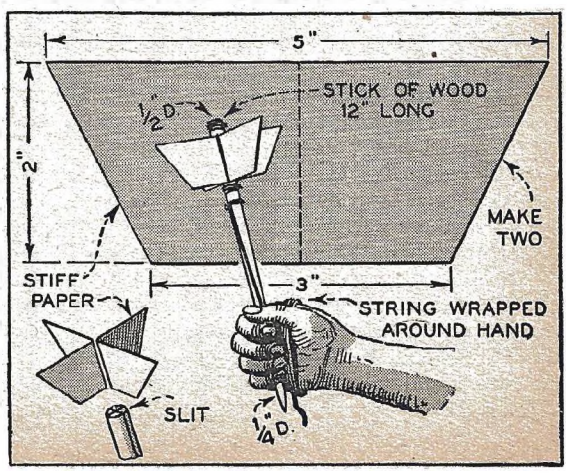
[*Continued on page* 158]

Making A Filipino Arrow

A FILIPINO youth studying in Boston gave a demonstration of the use of the Filipino arrow recently, and now the boys of his school have adopted a New England version of that efficient weapon for target practice. It is surprisingly accurate, once one gets the "hang" of it.

Cut a straight-grained stick of wood a foot long, and tapering from ½" to ¼" in thickness. Willow or alder sticks are ideal. Point the smaller end. Split the other end into four equal parts for a distance of 3".

[*Continued on page* 158]



"BLUE STREAK"

This simple, rubber-powered model plane will fly at blitzkrieg speed for almost a thousand feet. Drawing on the opposite page shows details and dimensions.

by Ralph Baker, Jr.

In place of conventional wheels, a streamlined lead weight forms the landing equipment, lowering center of gravity and increasing model's speed.

POWERED merely by rubber bands, this little model airplane zooms along at the incredible rate of over seventy miles per hour. It travels a measured 300 foot course in about 2.8 seconds. This distance may seem comparatively short, but considering the very high power of this model it is exceptional.

This model has won several contests and holds two records. Many models of this design have been built by friends of the author, and all of them perform excellently.

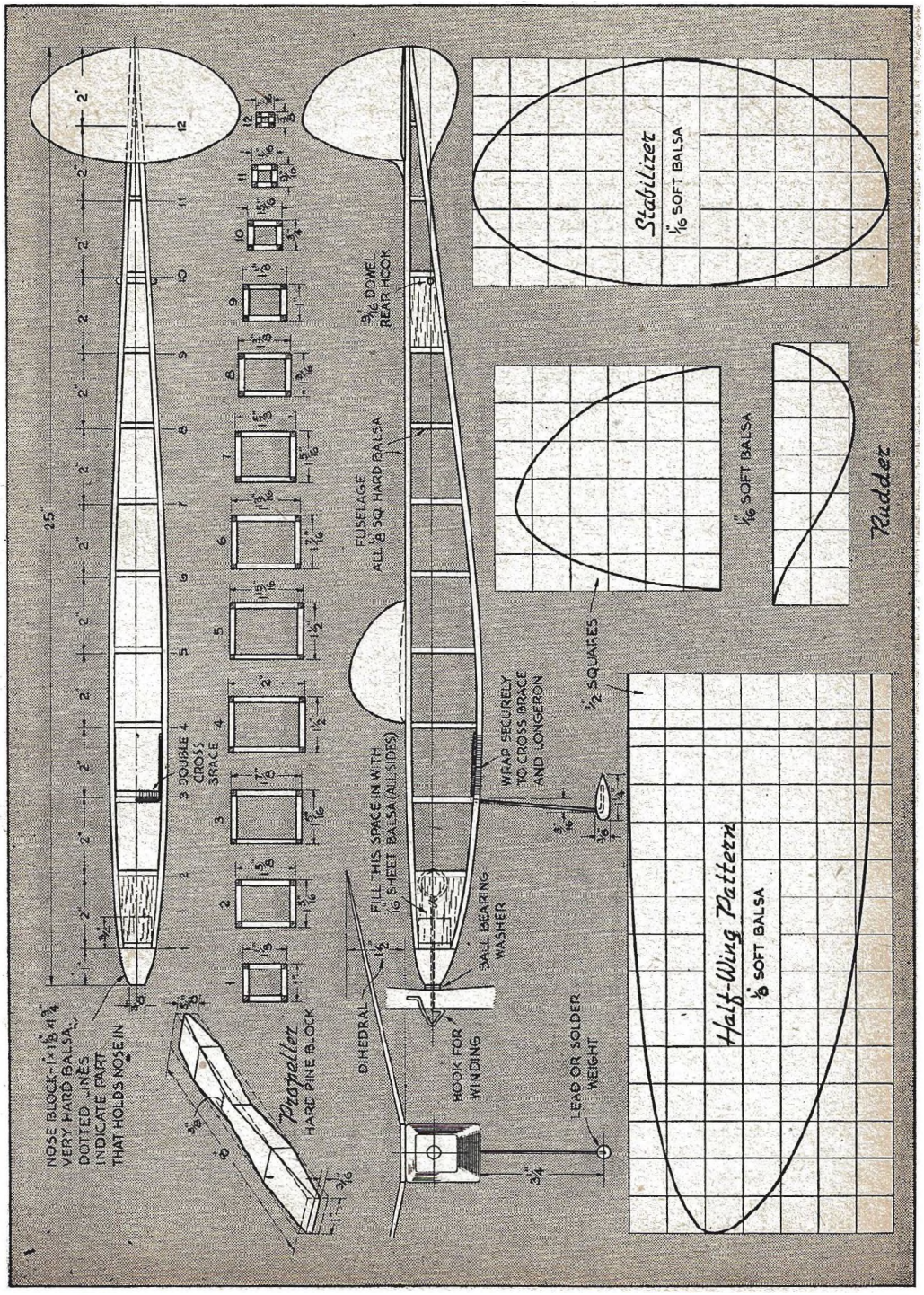
Everything about this model is conventional except the landing gear, which consists of two wheels on most planes; however, instead of wheels a streamlined lead weight is used, the theory being that the weight would cause less drag and also increase the model's stability 100% by lowering the center of gravity.

Being of very simple construction, it can be built in a few hours for a small cost. Study the drawings and read the instructions before beginning to build the model.

Make the fuselage of ⅛" square hard balsa wood. Fill in the indicated sections with $\frac{1}{16}$" sheet balsa for extra strength. Carve the nose block so that the part that holds the nose in fits very tightly. Bend landing gear from $\frac{1}{16}$" diameter music wire and cement and wrap with thread into position. Make the weight from lead or solder. Solder is easier to work with since it can be melted with a soldering iron. Use a file or heavy sandpaper for the final shaping. Cover the fuselage with bamboo paper and give several coats of dope. Make the tail surfaces of soft $\frac{1}{16}$" sheet balsa. Round off the edges with sandpaper and cover with Jap tissue right over the wood. This gives a more permanently smooth finish. Be sure that tail surfaces are lined up perfectly, with no incidence in the stablizer and no turn in the rudder. Make the wing of soft ⅛" sheet balsa and shape to an airfoil section with sandpaper. Cover the wing, also, with tissue paper, and dope. Carve the propeller from a hard pine block. Leave the blades and hub fairly thick, at least $\frac{3}{16}$" for the blades and ⅜"x½" for the hub. Make an airfoil section on the prop blades, sand smooth, and dope several times. Bend the propeller shaft from $\frac{1}{16}$" diameter music wire to the shape shown on the drawings. Wrap adhesive tape around the hook to cushion the wire. Use a ball bearing washer on the prop shaft for more efficient propeller action. The power used is variable according to the length of the course to be flown. Use higher power for a short course and less for a longer one. The exact number of strands must be determined by experimentation. For general flying use about thirty strands of ⅛" flat rubber just long enough to reach from one hook to the

[*Continued on page* 161]

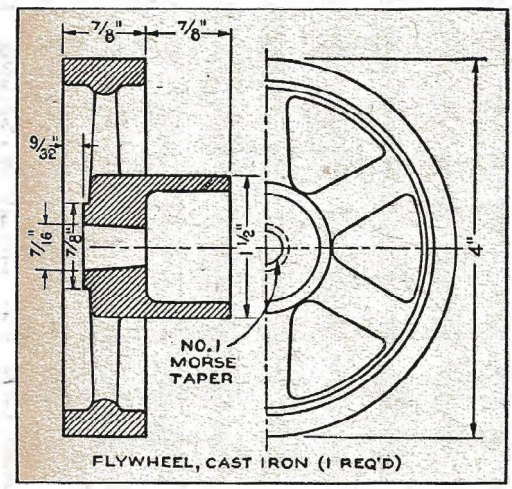
70 M. P. H. Model Plane



Gas Engine For Modelmakers

[*Continued from page 95*]

are a simple lathe job. The spring retainers were cut from a bar of cold rolled steel and slotted to slip over the groove in the end of the valve stem. The valve springs can be made up as shown in the drawings or purchased and brought to length by grinding.

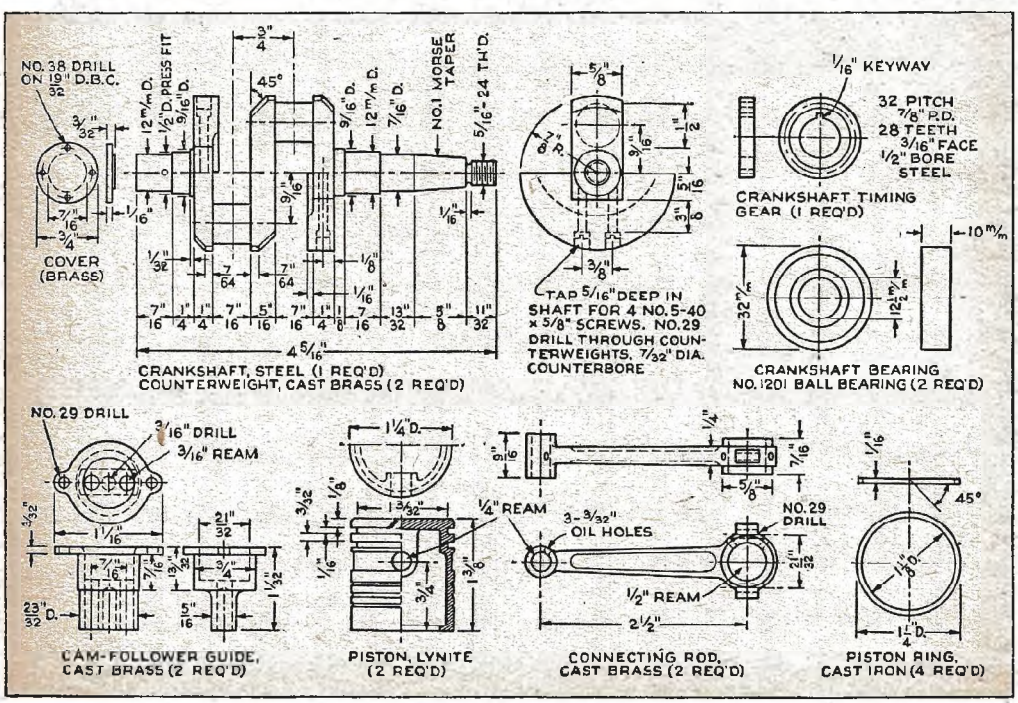


The cam followers were cut from steel as in Fig. 30, and case hardened. The push rods and push rod sleeves were also made up of steel and when these were complete attention was turned to work on other parts inside the motor.

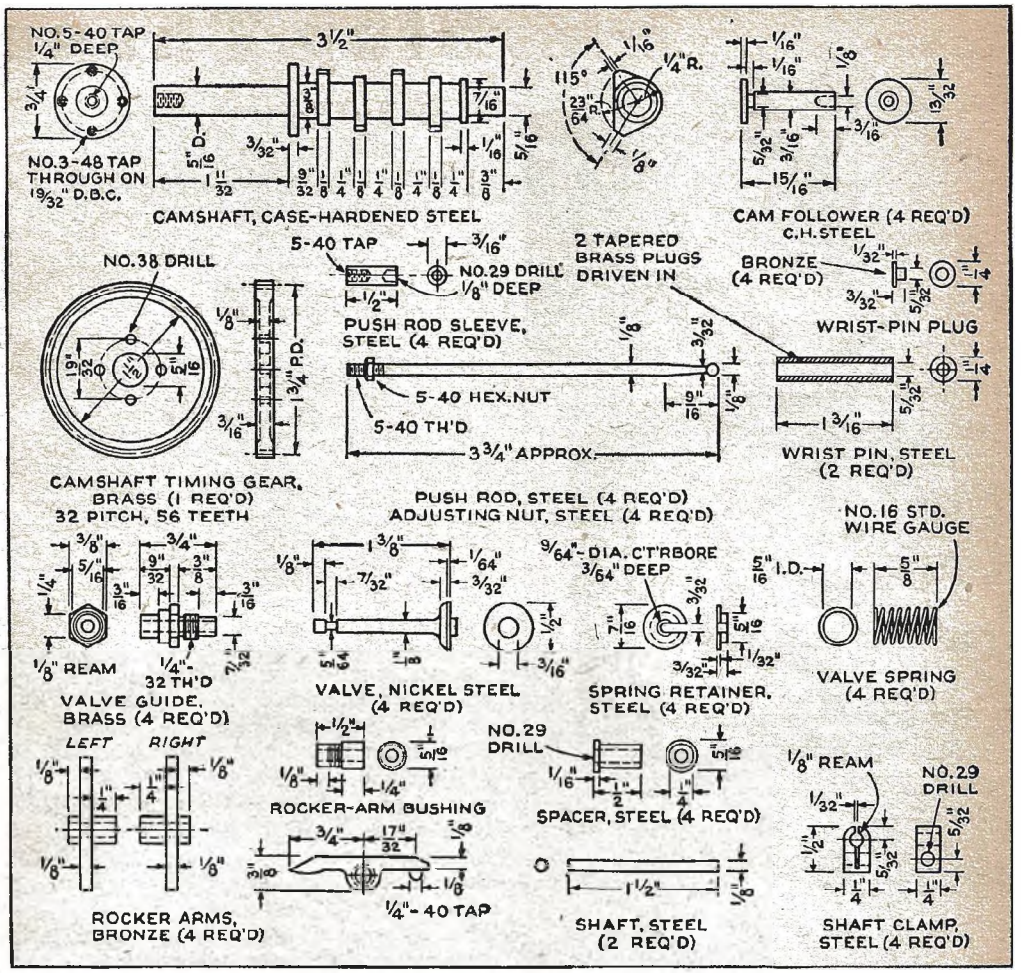
It was thought best at this stage of the work to turn out the crankshaft. This was to be cut from a solid block of steel so dimensions were taken from the drawings and carefully laid out on the steel bar as in Fig. 31. Both ends of the bar were center drilled, the hole in the center being for turning the shaft, while those on either side are for supporting the work between centers while turning the crankpins.

Great care was taken in laying out and drilling these holes as much of the balance and smooth running of the motor depends on their accurate location. Fig. 32 shows the steel bar held in the drill press vise with two holes drilled to aid in cutting away waste stock between the crank throws. These cuts have been made and the stock removed in Fig. 33 while

Left: Finished dimensions and cross-section of flywheel.



Crankshaft, piston and related parts are shown dimensioned in the drawing above.



Make valve parts according to instructions above, which also include camshaft and timing gear.

in Fig. 34 the work is mounted in the lathe and a crank pin is being turned to diameter. To get this turned straight and accurately to size will require a number of cutter bits, ground to various shapes, and some careful work as well. The center of the crank pin was first turned down with a pointed tool and then turned on the ends with a large tool bit ground square on the end and held direct in the toolpost. A slightly pointed tool bit, ground sharp on the side, takes the finishing cuts on the inside of the crank web. The crank pins are next turned accurately to size and the crank webs smoothly faced. This completes the work on these parts and their centers are no longer needed, so the waste metal is cut away with a hacksaw as in Fig. 35 and the work of turning the shaft itself started. In Fig. 36 this has been completed, the taper turned to receive the flywheel and the end threaded for the retaining nut and, as the photo also shows, the outside of the crank web is being beveled as called for in the drawings. The web in the center cannot be turned in this manner as the tool would strike the crank pins, so the lathe was turned over, back and forth, by hand and these bevels cut with a fine feed while the work was held in the chuck and the chuck key used as a hand lever. Hold the crankshaft in the milling attachment while an end mill accurately squares the short end of the outside crank web for mounting the counter balance weights. The crank webs are then draw-filed bright all over, with a fine Swiss file, and the job is ready for the balance weights. These are faced smooth and the slot accurately

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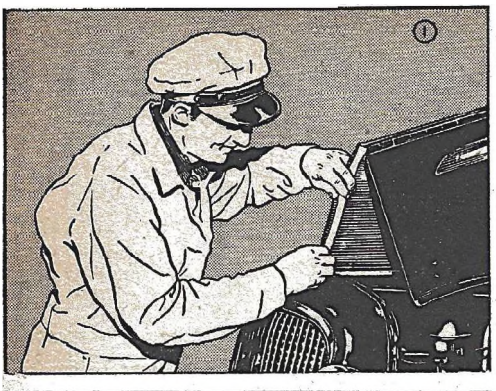
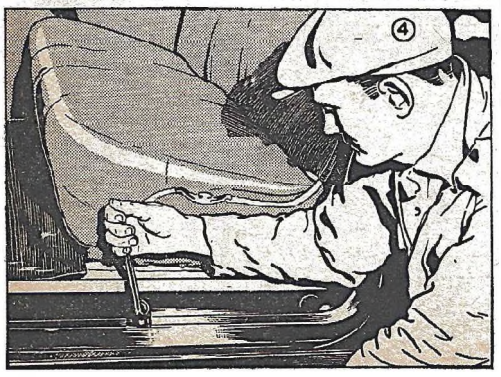




Stop Those

by Rory O'Shane

TO THE average motorist nothing is so exasperating as a car that has developed a bad case of rattles, clatters, squeaks or howling. No car is immune to these protests of time, wear, tear and abuse. But not many automobile owners know how simple it is to remedy the noises that take all the joy out of driving an otherwise quietly performing car.

The secret rests in knowing where to look. Working systematically with a few definite rules in mind, almost anyone can alleviate the situation in a single afternoon.

A good place to look in the very beginning is at the doors. All the moving parts such as lock bolts, door checks and hinges should be well lubricated. Ordinary engine oil is unsuitable because it is overly fluid and absorbs dirt quickly. The best preparation consists of linseed oil combined with a small amount of fine powdered graphite. To take the squeak out of a door check, spread soap along the rod and the noise will disappear (Figs. 6 and 8).

Improperly hinged doors account for a large share of the major rattles. Tell-tale signs are chafed spots along the deck-lids, door facings and body pillars. There are several ways to correct this.

On older model cars shims are used. First remove the door wedge plate and tighten the hinge screws (Figs. 11 and 12). Close the door and, by sighting with your eye or a small ruler, find where the parallel spacing between the door and body is uneven. At these places insert rubber shims between the body hinge half and the body pillars; or else place thin washers over the hinge cap screws at these points.

The doors of newer model cars are generally sprung to correct defective hinging. If the door is slack at the top of the hinge side but too tight at the bottom, swing the door open at the bottom and place a block between the bottom of the post and the door (Fig. 3). When the undue tightness is at the top and the slack is at the bottom, do the reverse.

Misaligned doors give off loud clatters. Outside of an accident, the only cause for the misalignment is defective underpinning. Since merely putting the door back in line will not prevent a recurrence, you must work

Car Rattles!

Old car or new car, you can make it run more quietly by following the suggestions contained in this article!

from the body bolts up through the whole car.

Practically all cars have rubber mountings which insulate the chassis from strains caused by rounding a corner too swiftly or riding on uneven ground. When the body bolts are too loose or too tight, the rubber mountings wear out. Undue strain is then thrown onto the chassis, resulting eventually in a misaligned door. To cure this, insert new mountings where the others have worn away, then tighten the body bolts firmly but not so strongly as to deaden the resilience of the mountings.

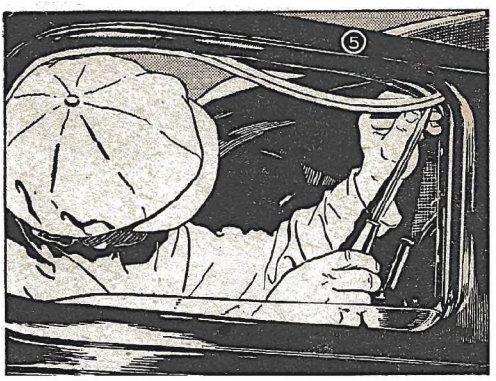
In aligning doors there are a few rules to remember. In raising a door which is too low on the lock side, always place a thicker shim on the hinge pillar on which the door is hung or else place a thinner shim near the lock pillar. To bring down the lock side of the door, place a thicker shim at the lock pillar or a thinner shim near the hinge pillar on which the door is hung.

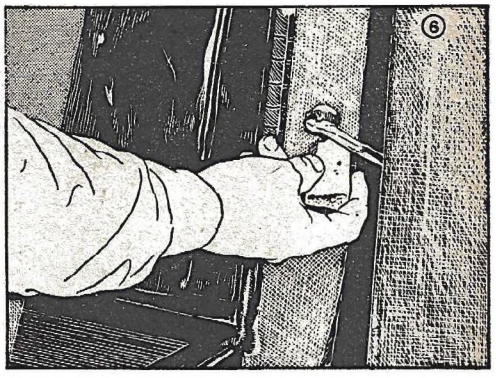
Side play in the spring ends where they are fastened to the shackle brackets gives off a thunderous noise. Natural wear and lack of lubrication are the direct causes. A common practice is to tighten the spring bolts, thereby clamping the shackle bracket or frame end against the spring. But this will afford only temporary relief. The better way is to spring open the shackle bracket and force in as many shims as possible. Then draw the bolts up enough to take up the play (Fig. 7).

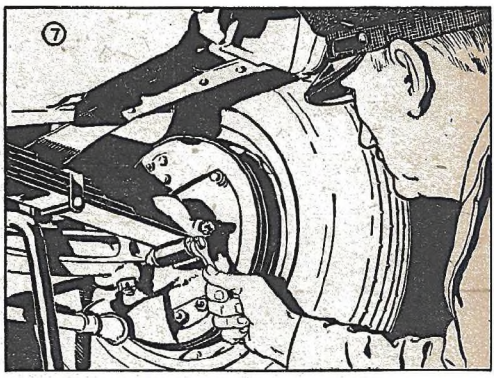
Quite often there will be a noise or vibration when and only when the car attains a certain speed. Very frequently the trouble is in the running gear. Check the tire and wheel assemblies, the shock absorbers and the spring clips for tightness. Another cause may be loose body or floor panels.

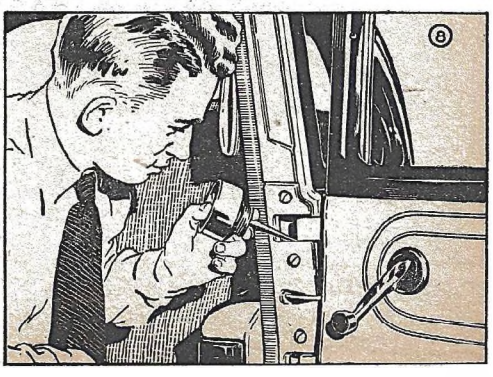
Jerky little squeaks from the hood invariably stem from the points at which the hood comes to rest on the radiator and forward ends of the cowl. If the squeaks fail to subside after the fastenings are tightened, line all the inside edges of the hood with tape or strips of cotton cloth where it comes to rest on the radiator or cowl (Fig. 1).

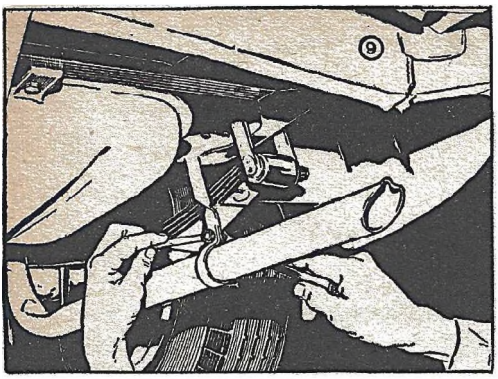
Step into the car. Test the choke, speed-

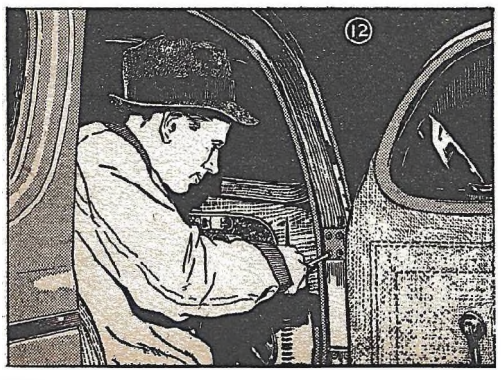












ometer, heater and radio wires to see if they jangle when they meet. You can silence these by using friction tape for an insulator. One place no one ever thinks of looking is under the front seat where the sliding mechanism is bolted to the floor. By tightening the bolt you may eradicate a noise that seemed to come from everywhere but under the seat (Fig. 4.)

It is almost a sure bet that the fluttering noises the car makes when you accelerate from a lower to a higher speed come from loose window channels. Go over each window carefully, tightening all loose screws and replacing lost or worn ones (Fig. 2). If the door panels vibrate against the sides of the door, loosen the trim pad along the top and insert padding (Fig. 5.) The pad material is inexpensive and is carried by all auto supply stores.

In cars not having steel domes there may be a persistent creaking noise from the roof. This is because the roof bow has slipped past the point where it joins with the side rail. Cut away the overhead lining and push the roof bow until it dovetails with the side bow. Since the overhead frame is built to allow adjustment, this is easier than it sounds.

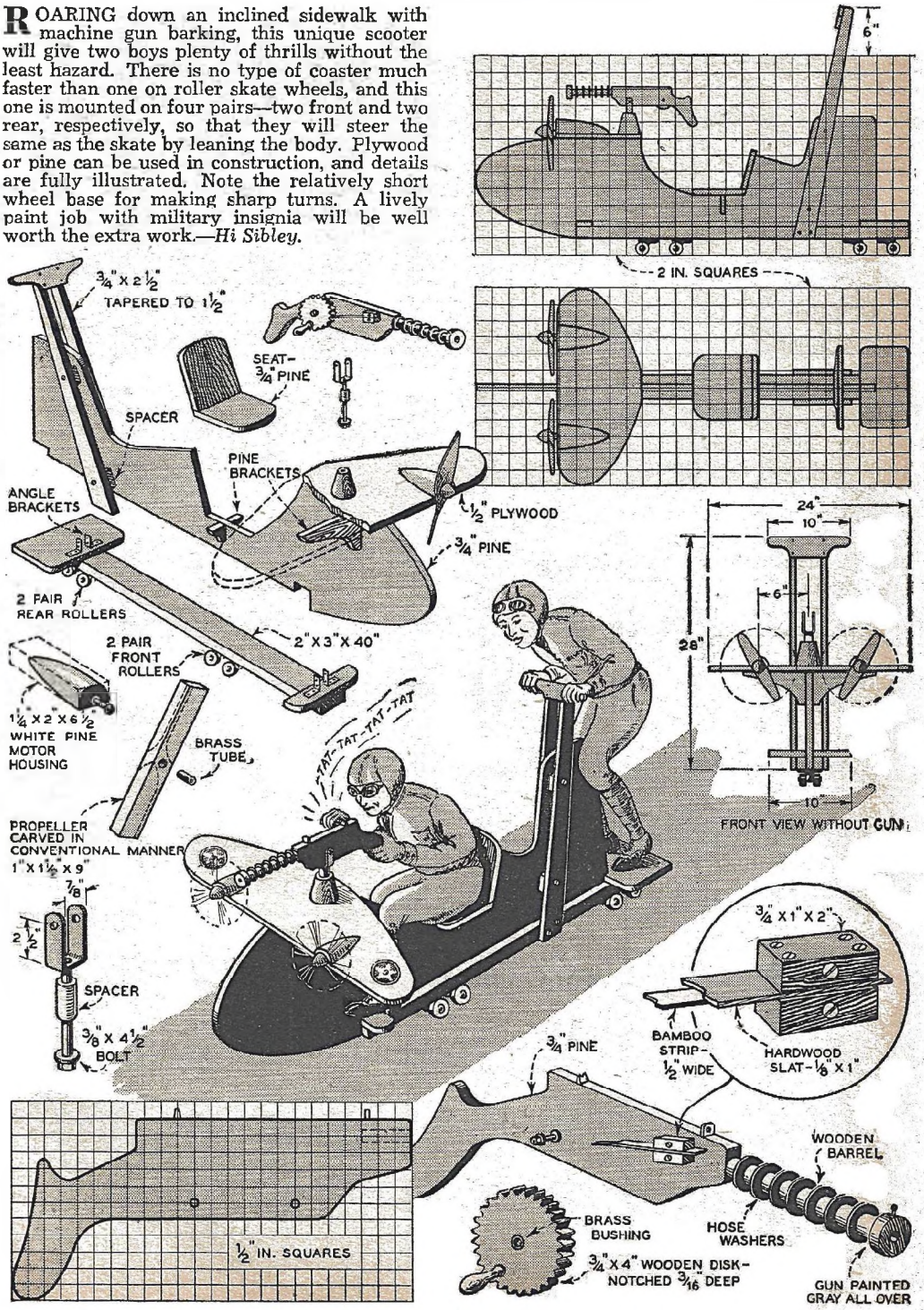
The source of most minor rattles can usually be traced to the external additions of the car, such as license plates, bumper bolts, headlight reflector screws and fender brackets. Tail piece assemblies and mufflers (Fig. 9) often jolt loose. A little plier, screw driver or monkey wrench work will attend to these. License plates that insist on rattling even after being tightened can be silenced by slipping little pieces of old inner tube between the screws and license brackets (Fig. 10.)

A squeaking water pump that lacks a lubrication fitting can make life miserable. To remedy this, run the motor until it is warm, then spill a few drops of light oil down the radiator. This will combine with the radiator solution and circulate until the water pump is lubricated and the squeak gone.

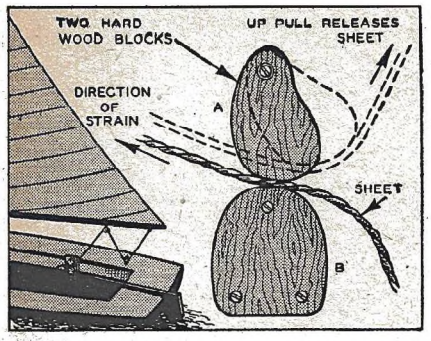
Of course all the possible places from which foreign noises may emanate have not been listed here. In many cases the reader's detective instinct must come into play. Loose tools, items in the dashboard compartment, gear shift heads and a host of other things may be responsible. Odds and ends left in the trunk compartment and forgotten can make all kinds of sounds. But with a little persistence and effort anyone can drive a car as free of noise as the day it rolled off the assembly line.

SIDEWALK SPITFIRE

ROARING down an inclined sidewalk with machine gun barking, this unique scooter will give two boys plenty of thrills without the least hazard. There is no type of coaster much faster than one on roller skate wheels, and this one is mounted on four pairs—two front and two rear, respectively, so that they will steer the same as the skate by leaning the body. Plywood or pine can be used in construction, and details are fully illustrated. Note the relatively short wheel base for making sharp turns. A lively paint job with military insignia will be well worth the extra work.—*Hi Sibley.*



Kinks For Boat Owners

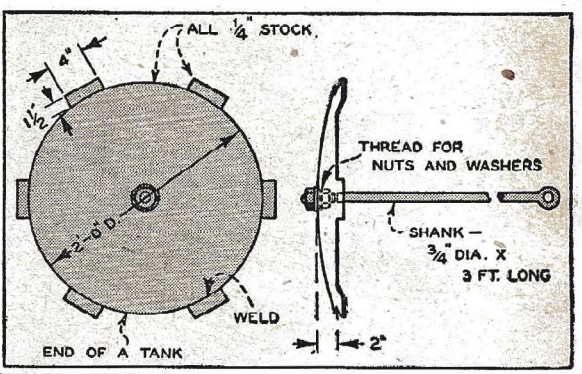


Quick Release For Main Sheet

AN OLD idea that bears repeating is this quick method of instantly releasing the main sheet when sailing under a tricky wind. It consists of two hard wood blocks between which the sheet is pinched while there is a strain upon it. A quick jerk back pulls the toggles apart and clears the sheet.—*L. B. R.*

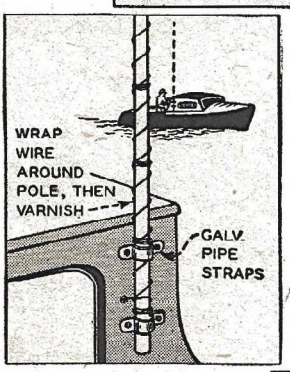
Improved Mushroom Anchor

THE "grips" or teeth on this mushroom anchor make it dig in quicker and better than the regular type. Any average motor boat, 16′ to 25′ will be held by this size anchor, while other sizes may be made to suit the need at hand. A wrecking yard is a good place to get parts cheaply.—*B. M.*



Antenna for Small Power Boats

A BAMBOO pole wrapped with insulated wire, then varnished over and attached to the side of the cabin or coaming with pipe clamps makes an excellent radio receiving aerial.—*H. S.*



Auto Pump Discharges Bilge

A SMALL power boat, using an inboard motor of the regulation type, can be fitted with a good bilge pump as shown in the sketch below. This consists of rotary type pump taken from an old car. Automobiles of ancient vintage that used a circulating pump for

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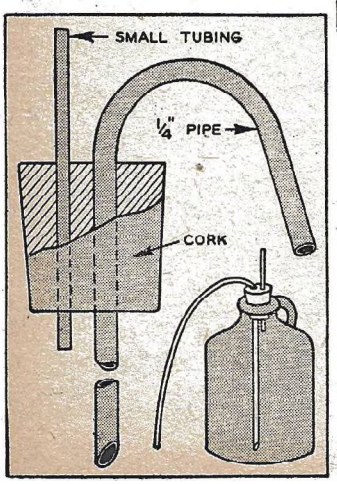

Gas Syphon For Outboards

A GLASS gallon jug serves as a container. It should be kept in a wooden box to prevent breakage. Drill the cork for two tubes, one large and one small, as shown at left. Syphoning is started by blowing

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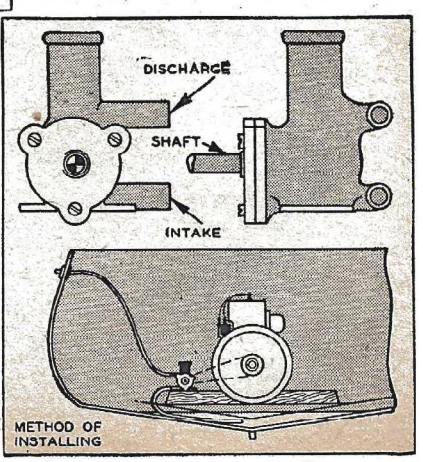
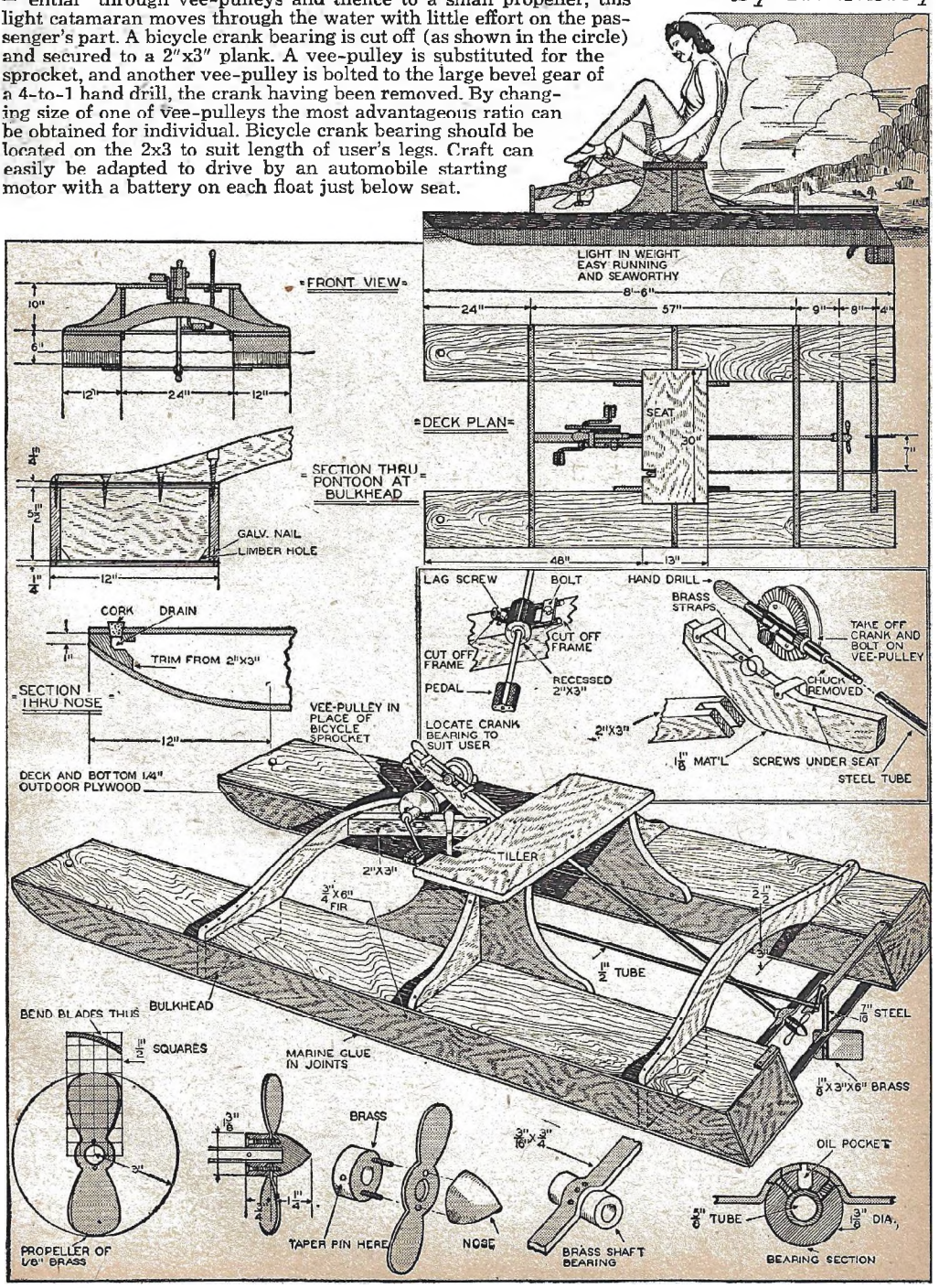


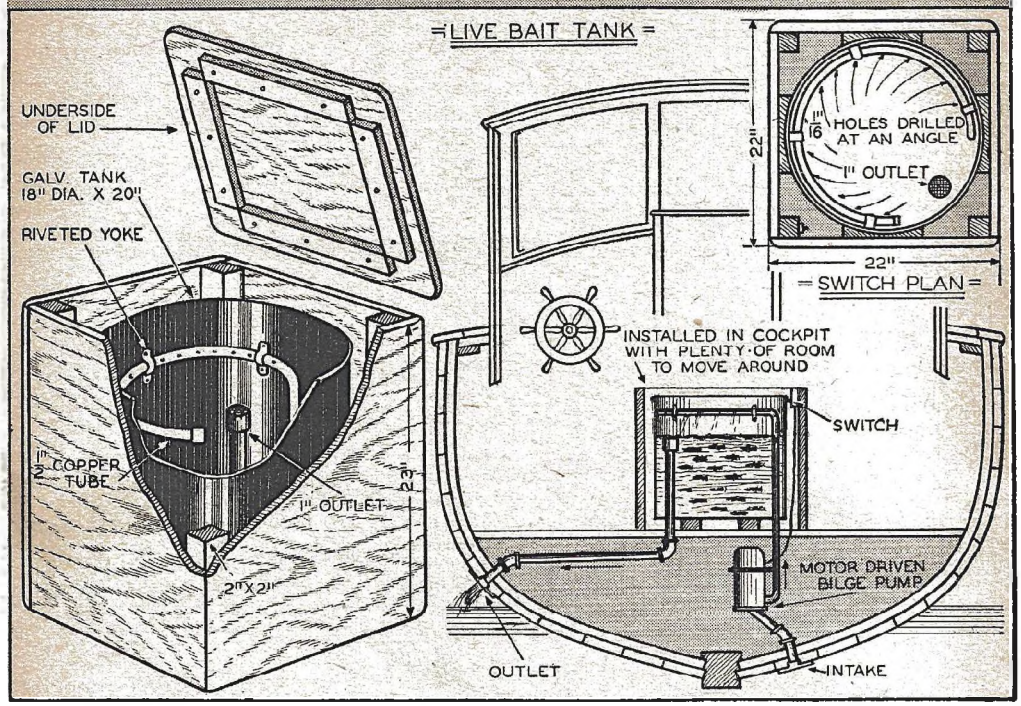
Pedal-Powered Catamaran

by Hi Sibley

PROPELLED by means of bicycle pedals driving a hand drill "differential" through vee-pulleys and thence to a small propeller, this light catamaran moves through the water with little effort on the passenger's part. A bicycle crank bearing is cut off (as shown in the circle) and secured to a 2"x3" plank. A vee-pulley is substituted for the sprocket, and another vee-pulley is bolted to the large bevel gear of a 4-to-1 hand drill, the crank having been removed. By changing size of one of vee-pulleys the most advantageous ratio can be obtained for individual. Bicycle crank bearing should be located on the 2x3 to suit length of user's legs. Craft can easily be adapted to drive by an automobile starting motor with a battery on each float just below seat.

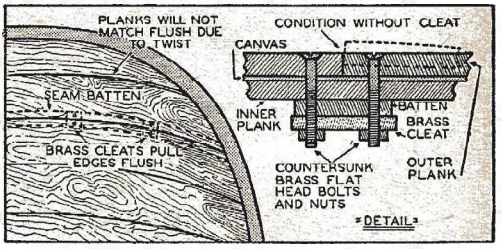


LIVE BAIT TANK has circulating water



A LIVE bait tank is a necessity for fishermen who take their sport in earnest, as it provides the only satisfactory method of keeping live minnows, etc., in good condition. The neat live bait tank illustrated above takes up very little cockpit space and can be comfortably installed on the average small craft. A small, motor-driven bilge pump keeps a constant stream of water circulating through the tank. The wooden box container for the tank is made approximately to the dimensions given from ¾" mahogany, oak or marine plywood. Corner posts of 2"x2" lumber support the sides, which are fastened to the cockpit floor with angle irons on the insides. The top should not be hinged, but should be left loose for easy removal. The tank itself is made from a piece of galvanized sheet steel. Bend it into a circle of the correct size, solder the seam tightly, cut a circle for the bottom and solder in place. The intake from the bilge pump is connected to a copper tube which is bent in a circle around the inside of the tank near the top, and held in place by pipe straps. Small holes are bored in the tube so the water will spray into the tank. Another tube, screened at the top leads to an outlet above the waterline, and carries off the overflow. Set the tank on blocks to permit air circulation underneath.—*Hi Sibley.*

Batten Cleats Align Planks

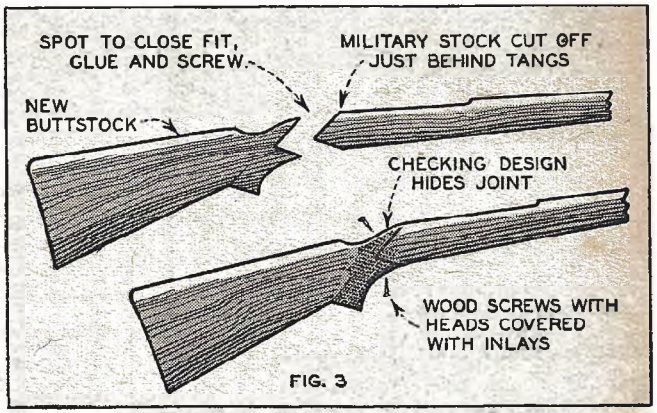


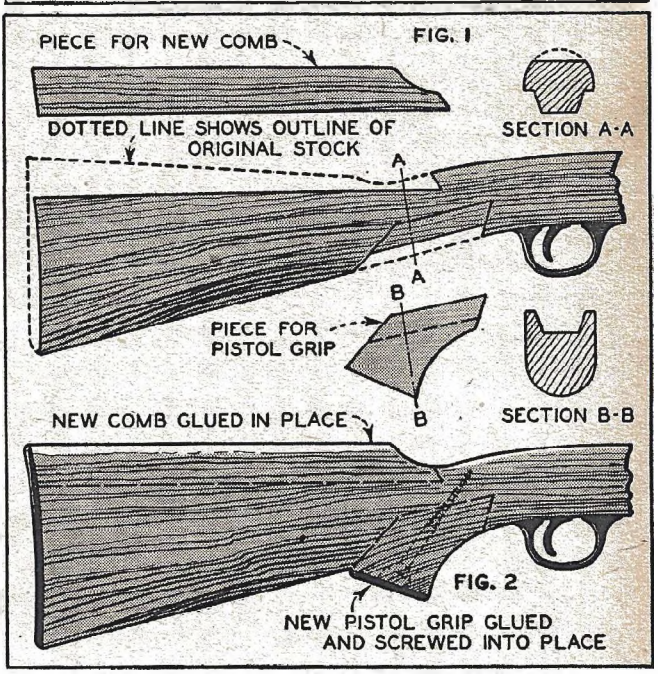
IN THE building of V-bottom and round bottom boat hulls, difficulty in aligning the planks at the bow curves is easily and simply overcome by applying brass batten cleats at the troublesome points. The cleats, 1"x1½"x$\frac{3}{16}$" for average use, are applied as shown with countersunk brass flat head bolts and nuts.—*B. M.*

Remodel Your Rifle Stock

If you own an old military rifle you can easily convert it into a good sporting piece by following the suggestions given in this article.

by Clyde Baker





UNDER our present defense program, high grade sporting rifles are becoming increasingly costly, with deliveries often delayed. Krags, Enfields, and other "obsolete" *but thoroughly good* military arms may still be had, however, at very reasonable cost; and when properly remodeled and stocked, make excellent big game rifles.

Custom made stocks are expensive; and making your own is a job only for the very skilled woodworker, due to the difficulty of inletting the barrel, receiver and magazine. Any shooter, however, who is handy with simple tools, may easily remodel the clumsy military buttstock, into a very handsome sporting stock to his own personal dimensions.

The dotted line in Figure 1 shows original shape of a Krag stock . . . comb too low to be of any use, and no pistol grip. Solid drawing shows same stock cut down for altering, and with the pieces to be added. Figure 2 shows the completed assembly.

Best grade hide glue, or waterproof casein glue should be used, and the long screw through pistol grip is concealed under a neat cap of plastic, hard rubber, ivory, horn, etc., cemented on with Duco cement. The oval outline shows exact size and shape for cross section of pistol grip, as suggested by Col. Townsend Whelen, one of America's foremost rifle authorities. Grip should be slightly narrower up the sides, with circumference at smaller point about 4⅞".

Select walnut matching original stock, as nearly as possible, for color and grain. If stock is saturated with linseed oil (as it most likely will be) scrub it thoroughly with strong *boiling* sal soda solution before attempting the glued joints. When finished, a small amount of penetrating walnut stain may be used if needed. Stock may be finished with varnish or clear lacquer. If it is necessary to use the gun immediately, just rub in plenty of good boiled linseed oil by hand, adding more from time to time until a good finish is built up.

A good job of checking over grip portion

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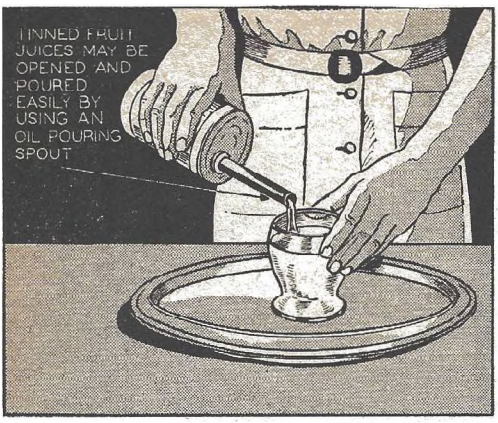
Household Aids

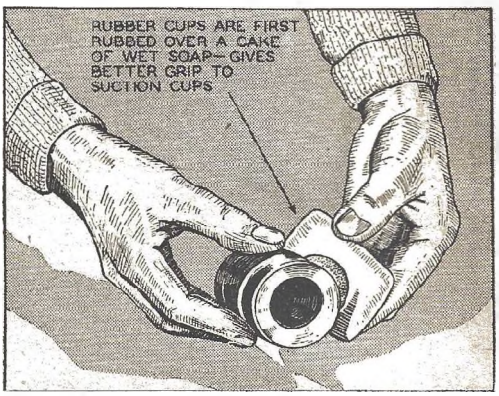


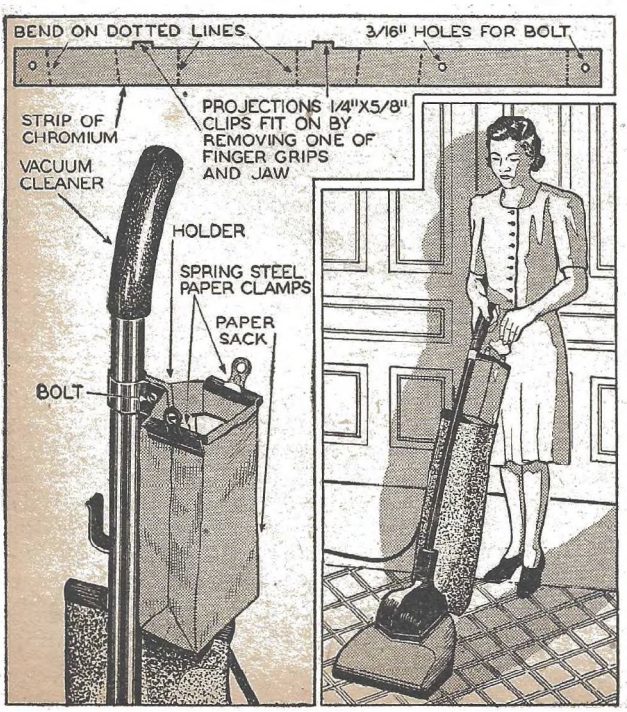
Kitchen Use For Oil Spout

TINNED fruit juices and other canned liquid foods may be opened cleanly and conveniently by using a pouring spout of the type employed in many service stations for dispensing canned oil. These spouts are simply pushed through the top of the can and the contents then drained off. Sterilize the spout before using for the first time, after which it may be left in place while the tin stands in the refrigerator. Automobile supply stores carry these gadgets.—*J. L.*

Soap Aids Suction Cups

SUCTION cups are frequently used around the house for various purposes, particularly on bathroom or kitchen accessories. They stick all right for awhile, but temperature changes, jolting, handling, etc., soon cause them to lose their grip. To make them stay put permanently, rub the edges of the cups over a cake of wet soap before setting in place. The film of soap between the cup's edge and its resting place forms a sealer ring that prevents air from leaking into the vacuum and destroying the holding power of the cup.—*W. S.*





Sack on Vacuum Cleaner Saves Steps

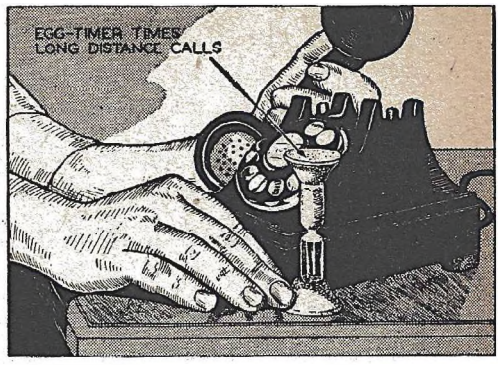
IN EVERY home odds and ends which should not be picked up by the vacuum cleaner are dropped on the rugs. With a paper sack attached to the cleaner, as shown, you won't have to make extra trips to the wastebasket with these particles. Cut and bend a strip of chromium or nickel-plated brass to the shape shown and clamp the sack with portions of 2 regular spring-steel paper clamps. It takes only a jiffy to remove the sack, discard it and fit the holder with a new sack.—*B. N.*

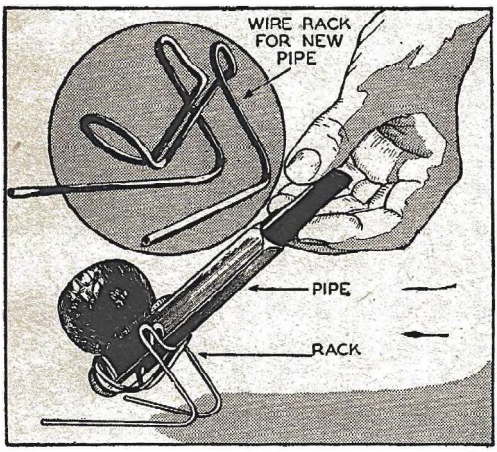
Keeping Floors Nice

TO KEEP floors in good condition, sweep with a hair broom or a broom encased in soft cloth. Wipe them over once a week with cold water and dry immediately. Waxed floors need only cold water wiping occasionally.

Egg-Timer Times Phone Calls

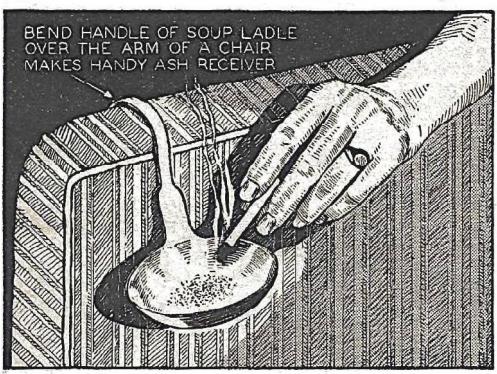
AN EGG-TIMER is a handy thing to have around when making a long-distance telephone call, especially on a private phone where the caller is not reminded at every three-minute interval by the operator. Since the egg-timer works on the same three-minute schedule, a close watch can be kept on the charges for the call.—*W. S.*





← Wire Rack For New Pipe

MOST pipe racks are not designed to hold the new pipes having aluminum shanks. The wire rack shown in the drawing at left is designed to fit these pipes. It can be made in a few minutes. The only tool needed is a pair of pliers. Any kind of wire can be used although copper is probably the easiest to bend to the desired shape.—*R. S.*



Soup Ladle Is Ash Receiver

SINCE up-to-date usage decrees that soup be brought to the table in plates, the old fashioned soup tureen and ladle are outmoded.

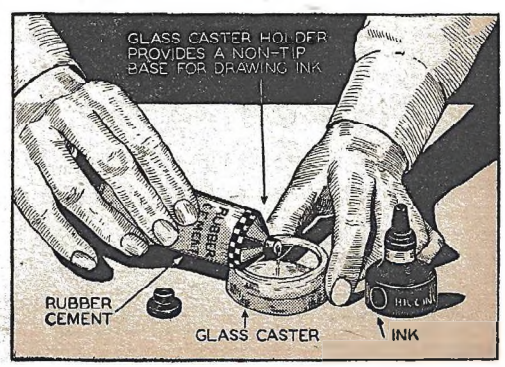
An excellent use for the ladle is to convert it into a handy ash receiver by bending the handle and hanging it over the arm of a chair, as shown in the accompanying drawing.

The bending is done with a mallet on a piece of cylindrical wooden pole set in a vise in such a manner that part of it projects.

When the job is finished, the handle should grip the chair-arm firmly, like a spring clamp.—*B. B.*

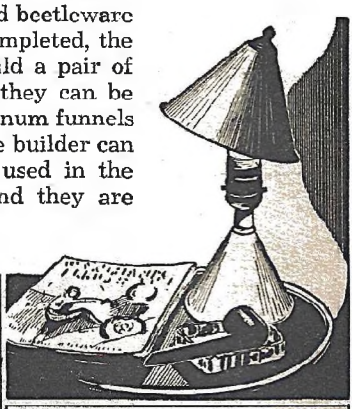
Caster Holds Drawing Ink →

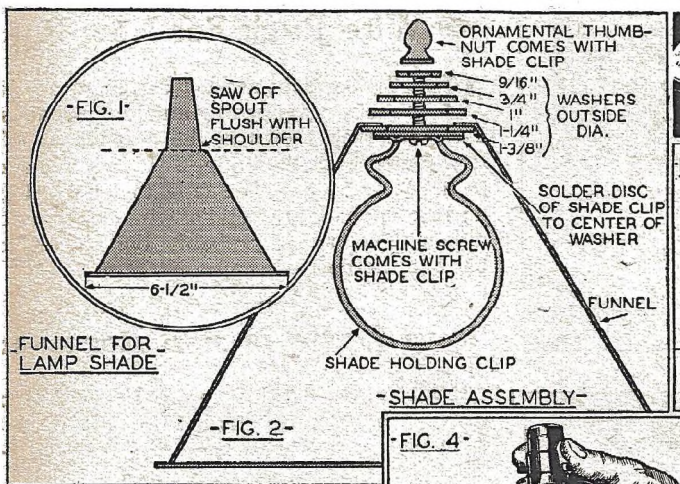
BECAUSE the India drawing ink used by architects, artists, draftsmen, etc., comes in small, comparatively light bottles it is easily tipped over and spilled by accident. An ordinary glass furniture caster can solve this problem very nicely by providing the ink bottles with a solid, heavy base that will not tip over when bumped or jarred. Simply cement the ink bottle in the upturned caster with rubber cement. These casters are obtainable at all 5 and 10c stores.—*W. S.*

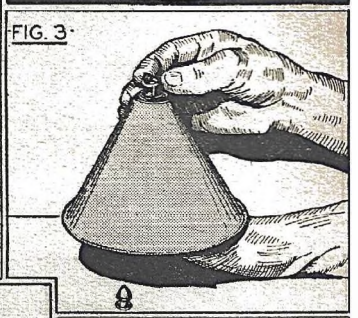


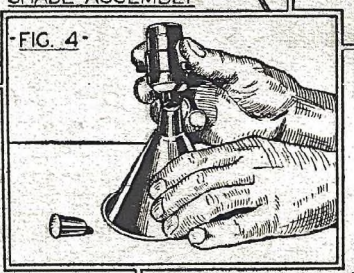
Novel Funnel Desk Lamps

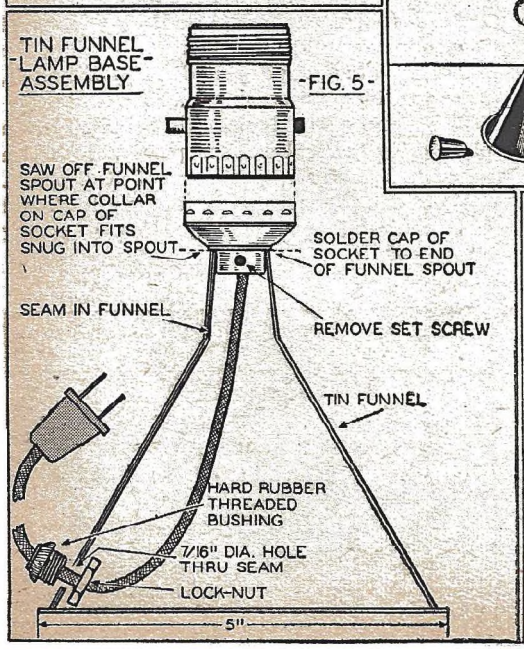
NEAT in appearance, these simple and inexpensive vanity or table lamps can be built easily from ordinary dime store tin and beetleware funnels. Only a few ordinary tools are needed, and when completed, the lamps hardly resemble a home-made job. Anyone can build a pair of them in an evening, and if they are finished with lacquer, they can be used within an hour after coating. Tin, beetleware and aluminum funnels come in several different sizes, and by using his ingenuity, the builder can obtain any combination of them he desires. The funnels used in the illustrations are just the right sizes for easy assembly, and they are standard. [*Continued on page* 160]

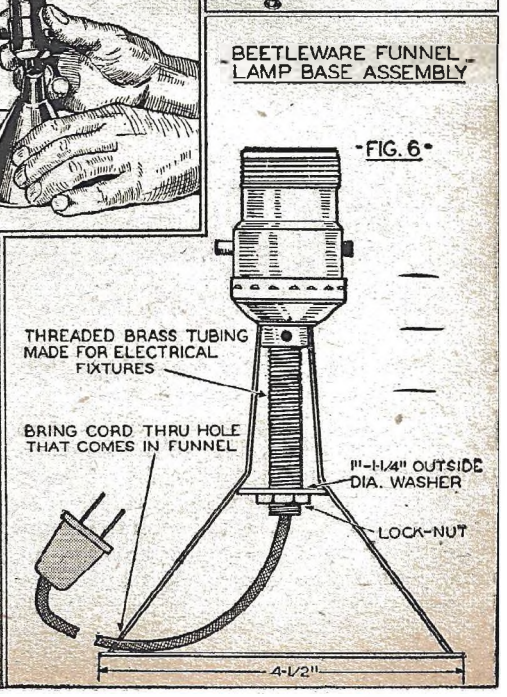






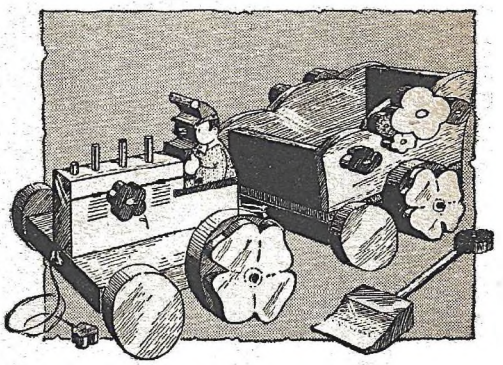






TRACTOR WAGON
is amusing toy

by R. L. Fairall

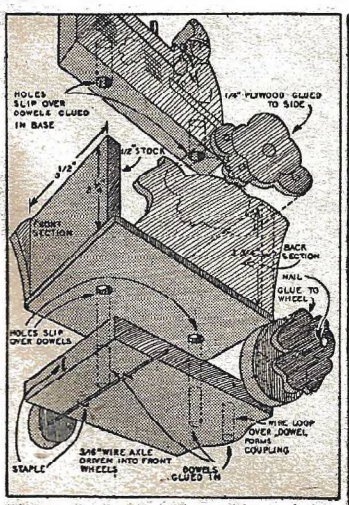


Painted in bright, attractive colors, this little tractor train will provide amusement by the hour for younger children.

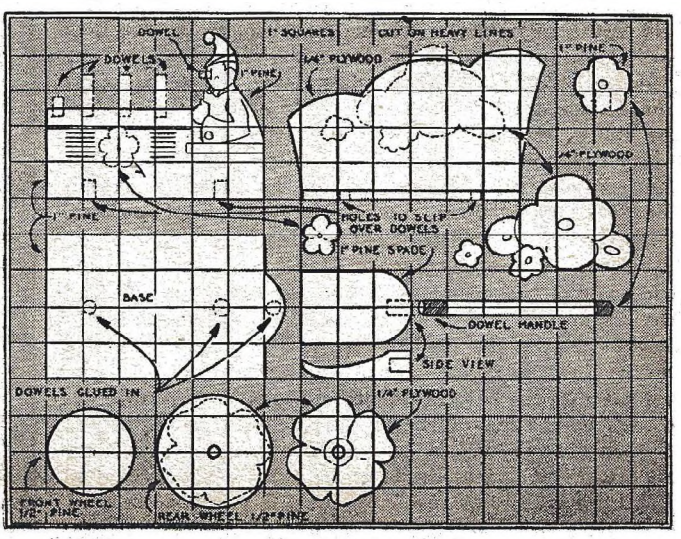
THIS wooden tractor and wagon, having elfland qualities of design, is detachable one from the other and from their wheel bases for added appeal to the small child. A small spade of similar design completes the set.

The toy is simply constructed from 1-in. and ½-in. pine surfaced on both sides, ¼-in. plywood, and ¼-in. dowels. Cut the two wheel bases from 1-in. pine, and glue in three ¼-in. dowels as indicated in the squared drawing. Let them extend ½-in. above the base. Cut the wheels from ½-in. stock, and the flowers for the rear wheels from ¼-in. plywood. Drive a $\frac{2}{16}$-in. wire into the front wheels for an axle, and attach it loosely to the underside of the base with two staples. This axle must turn with the wheels. The rear wheels, being larger, are attached to the side of the base. A hole is drilled through the wheels and flowers, which have been glued and nailed to the wheels, and a nail driven in each wheel for an axle. Next cut the tractor body from 1-in. stock, glue a plywood flower on each side and four dowels in the top. A dowel is also glued in for the nose of the little man driving the tractor. Drill two holes in the bottom to fit over the dowels

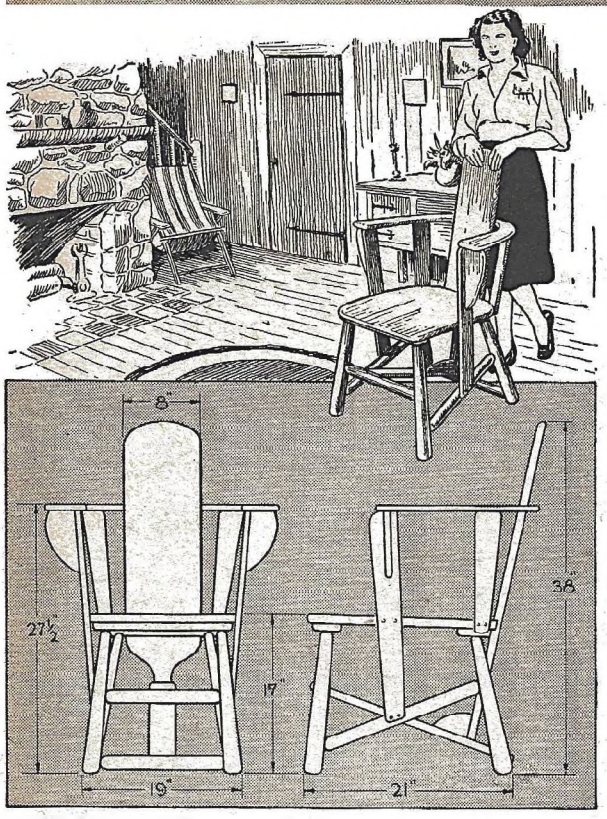
[*Continued on page* 161]



The toy is simply and sturdily made, using pine, plywood and dowels.



CANADIAN "SLAB" CHAIR

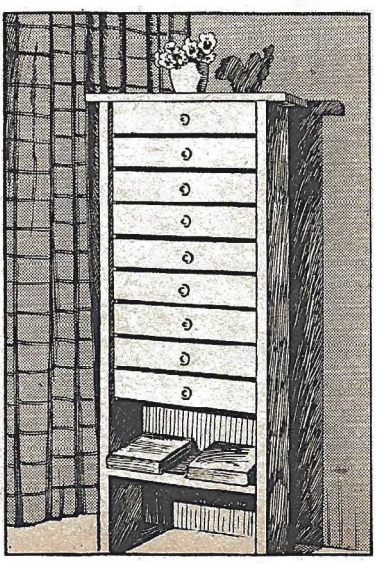


FOR YOUR DEN OR SUMMER CABIN

UP IN the Canadian woods they build comfortable, serviceable furniture from waste log slabs. It is good-looking as well, having a great deal of rustic charm. A sharp drawknife and screwdriver are just about all the tools needed, and materials, of course, cost next to nothing. The chair shown at right is patterned after this "slab" style furniture, and will blend in perfectly with any surroundings calling for rugged pieces, such as a man's den, summer camp or cottage, or for the suburban porch or lawn. If log slabs are not readily available, they can be simulated by irregularly rounding off the edges of dressed lumber. The seat and legs are assembled by driving the rounded ends of the legs and stretchers into ⅝" holes, and set in casein glue. All other assembling is done with 1¼" No. 8 F.H. screws, countersunk and filled with wood plugs or putty.—*H. Goodrow.*

FILING CHEST MADE FROM ODDS AND ENDS

WITHOUT any considerable outlay of money, but a bit of ingenuity and some labor, many practical, as well as attractive articles of furniture can be made from "this and that" picked up at random. Tobacco boxes, kodak spools, old barrels and apple crates are some of the things which have been converted into furniture! Being sadly in need of a filing cabinet, and not having the money to spare for buying one, I decided to make a chest of drawers. From the grocery store, at not any cost, I obtained nine wooden boxes in which chewing tobacco had come. These boxes were 13 inches long; 7¾ inches wide and 3 inches deep—just a nice size drawer and already made! A 13 foot piece of 7½ inch lumber, sufficient for sides and top of chest, was purchased at a cost of 35c; a can of enamel 30c. Lumber from apple crates was used for the back and bottom; the pulls were wooden kodak spools sawed in halves and fastened in the center of each drawer with a screw. The number of letters, papers, clippings, supplies of various kinds, negatives, etc., that I am able to store in my chest is really quite surprising—a nice looking cabinet at small cost.—*J. Casey.*

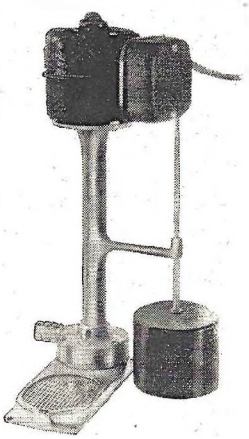


NEW PRODUCTS AND INVENTIONS

LATEST HOME AND SHOP DEVICES • POPULAR PATENT IDEAS

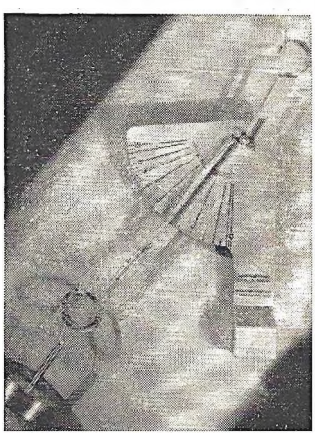
Budding "hams," scouts and others desirous of learning the code will find a new receiver now on the market of great interest. Not only does it provide for reception of both phone and code throughout its 545 kc. to 30.5 megacycle range, but in addition has self-contained facilities for keying and code reading practice. A telegraph key is connected in series with the headphone and the output of the receiver is broken up into dots and dashes as the circuit is keyed.

Home owners no longer need to grope around in the dark looking for the right house. A new plastic doorbell pushbutton offers immediate identification by providing a constantly illuminated nameplate and button.



Boat owners are now offered a bilge pump that does everything but think. Eliminating the drudgery of hand bailing, the pump is equipped with a silent, moisture proof electric motor and mercury switch. Weighing only 5½ lbs., and less than a foot high, it pumps at the rate of 300 gals. per hour.

A new tool intended for use by mechanics in all trades delivers cold light from a curved plastic tip, at the end of which is fitted a powerful permanent magnet which will lift iron or steel objects weighing up to ¾ oz.



A marine speed indicator of the utmost simplicity has been recently developed. It is calibrated in either knots or miles per hour for speeds up to 10 knots or 12 m.p.h. Holding it over the boat's side with line and weight trailing astern gives accurate reading on indicator.

[*Continued on page* 132]

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

New Products And Inventions

[*Continued from page* 131]

The pipe that isn't a pipe is a hearing aid. That is the novel idea for which a patent was recently allowed. While bone conductor hearing aids for the deaf are old, they are usually placed behind the ear. According to this patent the vibrator which transmits the sound is placed in the bowl of a tobacco pipe. The vibrations from the vibrator are communicated to the pipe stem and through the stem into the teeth and head of the user. Instead of a pipe, a cigar-holder, a cigarette-holder, or any similar device may be used to hold the vibrator. The inventor claims that by this sound transmission through the teeth there is an improved power of sound perception. Moreover, the head band of the usual bone type vibrator is avoided. The vibrator is used with the usual microphone and battery.

* * *

Sometimes a large number of applications are filed by different persons for the same invention. Ordinarily contests between applications, known as interferences, involve only two parties. However, as many as ten or twenty applicants may be involved.

* *

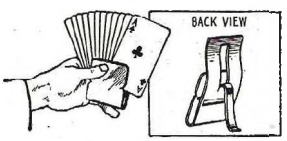
To increase the effective area of the hands of swimmers, a new attachment made of resilient water-proof material may be used. The device has a web-like shape and has a number of slits for permitting finger grips. In swimming, the natural area of the hand effective for propelling the swimmer is small. The hand paddle of this invention spreads the fingers and provides a substantially wide closed surface for pushing back the water. The slits fit closely over the fingers so as to prevent the flow of water through the paddle. In the return stroke of the hand through the water or in removing the hand from the water, the fingers are clenched and resistance of the webs is overcome. The paddles may be used interchangeably on either hand; and they may be made of various stock sizes to fit various hands.

* * *

The English Statute of Monopolies of 1623 is reputed to be the oldest known patent law. The United States has the second oldest patent law.

* * *

Holding a large number of cards in one hand is made simple by the use of a novel patented card holder. The holder is made from a single piece of sheet metal bent on itself so as to provide a front wall and a rear wall. A spring leg cut from the same piece of metal extends downwardly and rearwardly from the rear wall to act as a support when the holder rests on a table top. If the cards are held in the hand, the spring leg provides a finger grip. The rear wall extends above the front wall so that when the cards are inserted between the two walls a large part of the faces of the cards is visible. The cards once arranged in the holder will remain permanently in place until the game is over, thus saving the player much trouble and strain in holding the cards in his hand; and, in constantly arranging and rearranging the cards over and over again.



* * *

To aid in preventing the escape of prisoners from police cars, a new handcuff unit has been invented. The device includes a pair of handcuffs permanently secured to the chassis of the automobile through the floor of the car. A flexible chain connects the handcuffs to the rigid chassis. A relatively simple manner of fastening the flexible chain to the car is by means of a bar or rod which extends the full width of the car through the sheet metal sides of the car. The bar ends are screw threaded and mounted with suitable nuts. The handcuff is stated by the inventor not only to safeguard against the escape of the prisoner, but also to prevent serious damage to the car by the prisoner.

* * *

Other patents granted during the month include a fender guard for reducing side swiping damage and for preventing locking of bumpers; and a tire which signals with a series of "click-clacks" when the tire pressure is too low.—*Morton Leese.*

* * *

Patents Identified

Handcuff	No. 2,226,862
Card Holder	No. 2,231,637
Swim Paddle	No. 2,227,825
Hearing Aid	No. 2,230,397
Fender Guard	No. 2,227,425
Tire Signal	No. 2,227,074

Man—Meat For The Shark!

[*Continued from page* 39]

other girl to shore for aid, and boldly swam to help the injured man.

She saw, as she approached Lane, that he was attempting to beat off the shark with his hand, and the water about him was tinged with red. He was repeatedly attacked by the monster, however, and was almost unconscious by the time Miss Donaldson reached him. The plucky girl splashed the water vigorously, frightening off the shark, and succeeded in half carrying, half dragging Lane to shallow water, where two young men who had run to the scene assisted in carrying him to the sand. The terrible nature of his injuries was quickly apparent. His right hand had been amputated at the wrist as cleanly as though cut with a saw; large pieces of flesh had been taken out of his right thigh and calf, while his right shin had been bared to the bone. The teeth marks of the shark were clearly visible on the body.

Miss Donaldson covered the dying man with her cape and ministered to him as best she could until an ambulance arrived. Lane was dead, however, before he reached the Newcastle Hospital. Miss Donaldson later was awarded the Royal Shipwreck and Relief Society gold medal for heroism.

One case, the history of which I obtained in person from the victim herself, happened just off the Hilo Yatch Club in Hawaii. My friend, Mrs. Hope Snedden Carlsmith, now residing near New York City, lived through an experience as terrifying as any blitzkrieg air raid.

As a bride, Mrs. Carlsmith had gone to Hawaii for her honeymoon. She was fond of swimming, and one afternoon, April 7, 1926, she dived off the Hilo Yatch Club springboard into ten to fifteen feet of water, near the smooth, black lava shore.

Relating her experience, she said, "Then it happened. There was a great rush of water beneath me, and a big shape went by, snapping fiercely at my leg. I could see that my leg had been cut wide open for a foot above and below the knee. The wound did not bother so much as the awful feeling of panic and hopelessness that came over me. I kept afloat and called constantly for help, but at every moment I expected that the shark would rush in for my other leg, or pull me under water and out to sea.

"Then I saw my husband running toward me. When he was opposite me on the shore, he dived in and swam to me, even though he believed he was swimming into a school of sharks. He towed me to shore. Several men, including Otto Rose, game warden of Hilo, helped pull me up onto the lava beach. My husband tore off the necktie of one of the men, found a small stick, and applied a tourniquet. Had he not done so immediately, I would undoubtedly have bled to death.

"It was a month before the wound had healed sufficiently for me to walk again. I was left with a huge scar from my hip halfway to my knee, with two six-inch cuts to the bone halfway to the ankle, and with a curved, two-inch scar on the knee."

In the March, 1929, issue of The Military Surgeon, Dr. James M. Phalen, M. C., tells of a fatal shark attack upon Abraham Morena, 17 years old, an office employee in Panama City. November 4, 1928, Morena went to visit his parents on Taboga Island, in the bay. During the afternoon he was swimming with some companions in the bay. Some rowing races were in progress and Moreno had been clinging to the side of a boat. Suddenly a shark attacked him. There were many witnesses, and all agreed it was a shark, about ten feet long. The occupants of a boat pulled Moreno out of the water and took him to shore. There he was found to be dead.

One of Moreno's legs had been completely severed midway between the knee and ankle. The other leg, severed in about the same place, was hanging by a shred. A section of the abdominal wall had been torn away. Several fingers had been bitten off, and there were deep, punctured wounds on the right arm.

All available boats were employed and soon the shark was captured. When the shark was opened, the missing lower leg was found, together with other flesh and parts of the bathing suit. The shark was of a species known locally as the *tintorera negra*, or the *jaba*.

A case of shark bite is reported in the May, 1922, issue of the United States Naval Medical Bulletin by C. R. Baker, lieutenant commander, and S. W. Rose, lieutenant, Medical Corps. A private of the U. S. Marine Corps, E. C. P., and two other marines were swimming off the Marine Dock, Cape Haitien, Haiti, about 3:30 p. m., August 22, 1921. While E. C. P. was swimming underwater, his companions noticed a shark's tail break water over him. Both men yelled, "Shark!" A moment later, both saw a reddish object in the water close by the shark.

After a few seconds, the shark disappeared, and a moment later the swimmer came to the surface and shouted, "Brothers, the shark got me!" His companions pulled him onto the dock and applied an improvised tourniquet to his left leg, upon which there was a large, ragged wound. The victim, however, died at 9:15 p. m., the same day.

Dr. E. W. Cudger, shark expert of the American Museum of Natural History, reports an attack much closer home. Miss Gertrude Holaday was swimming about 200 feet from shore at the Palm Beach, Fla., municipal beach on September 21, 1931. A "large fish" swam close to her and suddenly bit her. Due to shock and, perhaps, to paralysis of the sensory nerves in the region of the wounds, she had not felt the bites on thigh

[*Continued on page* 134]

Man—Meat For The Shark!

[*Continued from page 133*]

and calf, but suddenly noticed the water about her discolored with blood.

She shouted for help and the lifeguard on duty, Mr. Sam Barrows, dragged the girl to shore. Mr. Barrows reported he saw a large hammerhead shark nearby the girl when he swam to her. Fortunately, Miss Holaday, though badly wounded, recovered.

Mr. Lewis Kornahrens was similarly attacked in the surf at Folly Island, S. C., on July 31, 1924. According to his chart at the Roper hospital, signed by Dr. J. N. Walsh, "the patient says he was standing near the seashore in water about waist deep. He says something that he thinks was a fish grabbed both legs at the same time and that he hit the fish with his fist, whereupon it turned him loose. A Negro man came to his assistance and helped him to shore."

Mr. Kornahrens was treated for lacerated muscles of the left knee and leg, more than 100 stitches being required to close his wounds. Dr. D. L. Maguire of Charleston, removed a fragment of a tooth from the vicinity of the knee. This fragment was sent to Drs. Gudger and Nichols of the American Museum of Natural History, and there was identified as part of a shark's tooth.

The sea at Charleston, S. C., is classified as "temperate waters." On June 21, 1935, 15-year-old J. Drayton Hastie, of Charleston, was swimming at the north end of Morris Island, at the mouth of Charleston Harbor.

As he told me of the attack: "I was sitting in about two feet of water when bitten. As I was sitting down I could see the shark pretty plainly after he caught hold of me.

"Kicking and backing at the same time, I was soon on shore; although this may seem long in the telling, it must have all happened in a space of ten seconds.

"I still have a perfect design of a shark's mouth around my knee, measuring ten inches across. This confirms the statement of my friend who was standing on the bank and who said that the shark was easily eight feet long."

This case was told to me by the Coast Guard aviator who flew to the rescue of the wrecked steamer.

"On November 14, 1927, at about 10:30 a. m., some 100 miles east of Kitty Hawk, N. C., I observed from the air the survivors of the ill-fated Greek steamer *Tzenny Chandris*," said Lieut. C. A. Keller, U. S. Coast Guard. "They were clinging to the wreckage which was strewn over an area of about four square miles. There were about six men hanging to one spar while six more were clinging to another. Two or three men off by themselves clung to small bits of wreckage.

"I saw two dead bodies in belt-type life-jackets spread-eagled in the water, face down. There were about six or eight sharks feeding on each body. The lower extremities of one body were gone!

"As many Greek steamers carry their fresh meat on the hoof, there were many bodies of sheep, goats and chickens floating about. I saw sharks swim up to the bodies and with one swoop disappear under water with their prey. One man in a life ring buoy was thrashing and stabbing at the water with a long stick. I later found that he had lashed his pocketknife to the stick and was *keeping off the sharks* with this improvised spear.

"Perkins was a golfer!"

"I talked later with Commander Coyle, USCG, and he stated that the sharks were tearing at the bodies of the dead seamen as they were taken aboard the rescue boats.

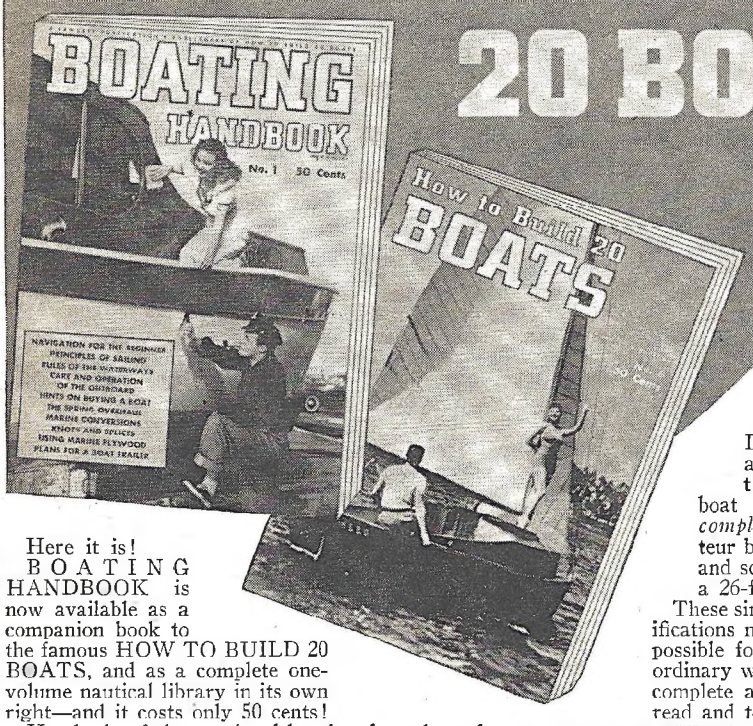
"The area of the rescue took place in the Gulf Stream and the temperature of the water then was about 80° F."

Dr. F. A. Lucas, of the American Museum of Natural History, who made a long and critical study of "shark yarns," has written. "One of the commonest statements is that 'the shark bit off the man's leg as if it were a carrot,' an assertion that shows the maker or writer of it had little idea of the strength of the apparatus needed to perform such an amputation. Certainly no shark recorded as having been taken in these (temperate) waters could possibly perform such an act, though this might occur if a shark thirty feet or more in length happened to catch a man fairly on the knee-joint where no severing of the bone was necessary. The next time the reader carves a leg of lamb, let him speculate on the power required to sever this at one stroke—and the bones of a sheep are much lighter than those of a man."

To those of the Dr. Lucas school, scientists of standing or laymen, I recommend a further close study of the cases herein recorded.

And to Dr. Beebe and Mr. Heilner, I suggest that perhaps they were lucky.

Now—A Companion Book to the Famous HOW TO BUILD 20 BOATS



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(Canadian Orders Not Accepted)

You're Wanted—For Defense Jobs!

[*Continued from page* 43]

pany and if the foreman of their welding department doesn't take you on at double your present salary, I'll buy you a Flying Fortress."

The business man didn't have to make good, but Jack did.

If you are a draftsman, an engineer, a machinist or a chemist, the only reason you remain unemployed is that you don't want a job, or are physically disabled. The reserve of trained men in these and other fields is approaching exhaustion. Realizing that, government and industry have joined hands in a vast program to provide skilled workers that will be needed. This may be where you come in.

"Upgrading" and "T.W.I." are terms applied to this program. The initials stand for Training Within Industry. This means that a man on one job is trained to take over the one just ahead of him. Employers are not only eager to boost a good man up the ladder—they practically furnish an elevator.

Age is no longer the barrier to specialized employment that it used to be. The maximum age limit for new employees in Navy shipyards and Army arsenals has been raised from 45 to 62 years.

"Where do I find the right job and how do I get this training?" you are probably asking. Here again, a government program so new that it is not as widely known as it should be comes to your aid.

Ordinary methods of finding a job—classified ads, commercial agencies, personal contacts—apply to defense jobs as well as others. Less and less, however, are you likely to find defense jobs advertised in the classified sections. This is discouraged by the government in many cases because it sets employer bidding against employer and this in no way increases the number of workers available.

To insure a steady flow of skilled workers, a vast interlocking network of government employment agencies has been placed at your disposal. All services are free. There are 1,500 full-time agencies and 3,000 part-time ones. To find the branch in your community, look for the address of the State Employment Service Office in your telephone directory. If by any chance you fail to find it, drop a postcard to your state capital or inquire at the offices of your city or county government.

Here, in brief, is how the program works: You register at your local Employment Service Office, listing your experience, training, abilities, kinds of work you feel qualified to do. Employers call upon the agency to furnish workers for specific jobs.

Another service performed by these agencies is to keep men from rushing into regions that are rumored to be buzzing with defense activity, but where, actually, there may be a labor surplus.

This national agency has listed fully 400 types of jobs vital to national defense. There is not space available to list them all, but those most in demand, or in which shortages are expected to occur, are:

All-around machinists
Engine lathe operators
Bench machinists
Milling machine operators
Inspectors
Aeronautical engineers
Aeronautical draftsmen
Tool designers
Aircraft final assemblers
Airplane woodworkers
Detail assemblers
Aircraft riveters
Aircraft sheet-metal workers
Radio equipment assemblers
Electrical, mechanical, optical instrument makers
Boring-mill operators
Diemakers
Toolmakers
Turret-lathe operators
Boat builders
Ship carpenters
Ship electricians
Ship fitters
Calkers

Opportunities for jobs vary somewhat in different sections of the country; there may be a surplus of construction workers in one area and a demand for them in another. Your State Employment Service can tell you exactly what the opportunities are in your own area. A general idea of where local worker shortages exist, what types of work these shortages cover, and significant comments for your geographical area, may be drawn from the latest available report of the Bureau of Employment Security, as follows:

New England

"Shortages of skilled workers are prevalent through the region, and shortages of skilled metal tradesmen are acute . . . Age is no longer a bar to employment of applicants who are physically able . . . Among specific occupations in which shortages are reported are machinists, tool and diemakers, tool and machine designers, machine operators, welders, die setters, sheet-metal workers, and pattern makers . . . Shortages of ship fitters and arc welders are reported in Connecticut shipyards . . Difficulty in obtaining weavers and spinners is common to all the textile centers . . . Workers who can read blueprints and are generally handy with tools are being employed in the lower classifications by a Maine shipyard. Another yard expects to accept house carpenters in the near future."

New York

"Shortage of skilled metal tradesmen is acute

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One-Shot Montage Camera

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connecting bar of the bracket should have a hole drilled through its center so that it can be attached to the tripod top under the camera.

The most suitable cameras for one-shot montage work are the single lens reflex and ground glass focusing types. Twin reflex cameras can also be used, but provisions have to be made to permit the camera to be raised after the mirrors have been adjusted, so that the taking lens will occupy the exact position of the focusing lens during adjustment of the mirror. A small box of the right height, which can be slipped under the camera, will serve this purpose.

Montage making with this outfit requires having your subject matter distributed at several different points around the camera, from which the mirrors can reflect them into the lens. Therefore, you must first decide on what your montage is to depict, and proceeding from that point, pose the various set-ups that will tell your story best. In some cases, you may prefer to montage related detail to either side of a subject but beyond the normal scope of the camera lens.

The composition of the three-part "Dancing Feet" montage is an interesting case in point. First, a dancing couple was posed directly in front of the camera and the lens focused on their midsections. Then, another model was posed at the tuning dial of a nearby radio in the same room and one of the mirrors on the camera's extension arm bracket adjusted to reflect the radio into the lower corner of the ground glass screen, without blocking out the image of the dancers. The last model, posed in the attitude of caressing her sore feet, was situated on the other side of the camera, and the second adjustable mirror was used to reflect her image into the lens where it occupied the opposite corner of the ground glass screen. Of course, in order to have all three images in focus, it was necessary to have all three set-ups at almost equal distances from the camera lens, regardless of direction.

An advantage of this mirror montage setup, is that you can choose whatever degree of blending you like between the different images. If you want the various images to blend into each other without showing any definite dividing lines, just take the picture through a wide open lens. However, if you want the pictures to be more distinctly separated without any overlapping edges, stop down your diaphragm aperture to its smallest opening. This will bring the edges of the mirrors into sharper focus, preventing the reflected images from spreading out over each other. The amount of blending between the images can be controlled to almost any degree by studying the images on the ground glass screen and stopping

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You're Wanted—For Defense Jobs!

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. . . By summer all the employable male workers in Schenectady will have jobs . . . 200 men who recently completed the evening industrial course in Lockport have been employed . . . Aircraft plants in Nassau and Suffolk counties are to take on 15,000 workers, most of them trained in high school vocational courses . . . Demand in the metropolitan region for foundry workers, molders, core makers, and pattern makers . . . Prevailing shortages of toolmakers, diemakers, automatic screw machine operators, turret-lathe operators, punch press operators . . . A shortage of coppersmiths, sheet-metal workers, ship fitters and loftsmen . . . A total of 6,000 semiskilled workers are expected this year from aircraft training centers at Lynbrook, Freeport, and Bayshore . . . Age limits have practically disappeared in the skilled occupations.

Middle Atlantic Region

"Surpluses of skilled workers are practically nonexistent in occupations utilized by defense industries . . . Many employers are hiring trainees and giving them further training in their plants . . . Demand for workers in Virginia is largely concentrated in the construction industry . . . A number of Pennsylvania counties indicated a heavy demand for boilermakers, bricklayers, carpenters, clerks, draftsmen, electricians, engineers, grinders, instrument makers, metal workers, and machine operators . . . A growing demand for workers of all types in New Jersey . . . In Maryland a radio parts concern is relying chiefly on trainees from defense training courses . . . In Delaware a chemical company is hiring all the first class mechanics, machinists, pipe fitters and carpenters that it can obtain . . . A severe shortage of many types of skilled workers at Louisville, Kentucky . . . Machinists, metal workers, electrical and mechanical engineers are needed in several industrial areas of West Virginia . . . In the District of Columbia there are no machinists and practically no semiskilled workers available . . . The supply of auto mechanics, body and fender workers, and glaziers is not sufficient to meet the local demand, and there is still a great need for stenographers, typists, and bookkeeping machine operators.

Great Lakes Region

"Concentration of defense activity in local areas of the states . . . General shortages of precision machinists, tool and diemakers and skilled machine operators throughout the region . . . Nowhere is there any significant excess of workers qualified in defense occupations . . . Widespread shortages of highly skilled metal workers are reported in all heavy industries . . . An acute shortage of shipbuilding workers at Manitowoc, Wisconsin, where submarines are being produced. . . . The steel industry still has an ample supply of workers available . . . In Cincinnati there is a definite shortage in the highly skilled occupations . . . There is less emphasis on experience and more reliance on ability.

Southeast and Gulf Region

"Except in Florida, the supply of construction workers is generally adequate. The increased demand for construction labor was marked in Georgia . . . Stringencies will develop for carpenters, brickmasons, electricians, roofers and helpers in Spartanburg, South Carolina . . . Particularly scarce at shipyards are loftsmen, ship carpenters, ship fitters, coppersmiths, marine pipe fitters, marine draftsmen and machinists, all-around machinists, electric and acetylene welders.

Southwest Region

"A definite shortage of qualified workers in nearly all skilled aircraft operations at Wichita, Kansas. Employers are depending upon migration and training schools to provide the needed workers . . . Power sewing machine operators have become scarce in Dallas, El Paso, and San Antonio . . . Vocational training courses in Texas, well under way in most of the larger cities, are giving instruction in sheet metal work, welding, radio operation and repair, automobile mechanics, blueprint reading, shop electricity, airplane mechanics, and machine shop work.

North Central Region

"Local shortages of skilled mechanics . . . Construction workers are migrating to defense projects in other parts of the country . . . Supplies of machinists, tool and die workers, shee-metal layout men, molders, pattern makers, and arc welders are being depleted in Minnesota . . . Local shortages of qualified body workers and skilled mechanics are reported in North Dakota . . . Shortage of skilled machine shop and foundry workers in the Davenport, Iowa area has become acute.

Rocky Mountain Region

"Ample supplies of construction workers are indicated . . . A shortage of plumbers and upholsterers and of metal tradesmen is reported from Arizona.

Pacific Coast

"Demand for sheet metal workers remains high and difficult to fill . . . Construction workers scarce at San Mateo, San Francisco . . . Shortages at Tacoma and Centralia, Washington, are for plumbers, steamfitters, painters, carpenters, sheet-metal workers, electricians, building laborers, hoisting engineers, floor layers and roofers . . . Shortage of shipyard workers at Stockton and Oakland, California . . . Skilled mechanics in great demand at San Francisco . . . Shortages in Seattle include journeyman machinists, turret-lathe operators, molders and boilermakers . . .

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One-Shot Montage Camera

[*Continued from page* 137]

down the lens until the desired degree is reached.

Stopping down your lens will also help bring your subjects into sharper focus should they be posed at varying distances from the camera. Another thing to remember is that all the subjects in your set-up will receive the same exposure, so, in arranging the lighting, see that each is given the same amount of illumination. An exposure meter will prove very helpful.

The effects produced with this mirror montage set-up are distinctly different from those obtained by the usual method of darkroom manipulation. The blending of the images is under your full control and you can see the ultimate effect *before* you release the shutter. You can use from one to three mirrors at a time to combine as many as four pictures in a single exposure. A two-picture montage, which is the simplest to begin with, requires only a single mirror and two subjects. You can add to this combination as you like to produce any desired effect.

Then, too, you'll enjoy montage making much more, once you take the process out of the darkroom into the open, and if you have not yet begun to do your own processing, this one-shot montage camera will permit you to make photo-montages, notwithstanding.

Wanted—For Defense Jobs!

[*Continued from page* 138]

Classes in aircraft production have been started at the Berkeley and Los Angeles branches of the University of California."

It is worthwhile to take an evening to analyze your abilities along the lines suggested by the chart, "Are You Fitted For a Defense Job?" on page 42. Let us suppose that you are an auto mechanic. It happens that there is no shortage of such mechanics, since this occupation is largely one of repair and maintenance rather than manufacture. But the skills that make you a good auto repair man may be adaptable to dozens of jobs in industry. As a mechanic, for instance, you may be skilled in certain types of metal work, in welding, ignition, or just plain blacksmithing. All of these talents are in high demand.

A quick glance at a few official figures on employment increases that have already taken place will give you an idea of the fields in which demand for workers is and will be most urgent. Locomotive, motor, shipbuilding, engine and turbine manufacture shows an employment increase of 75%. The aircraft industry has stepped up its manpower 121%; machine tools, 45%. Foundries, machine shops, steam and hot water equipment, aluminum, small tools, forgings, brass and copper products, electrical machinery, and structural iron work, are fields in which manpower has already increased at least 20%.

The aircraft industry has had to hire and train

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Heartbreaks Of The Air!

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flying was a pretty silly idea, after all. After a few test runs around the railroad track at reduced power, Sir Hiram, as an added safety measure, provided the strange jallopy with top rails, to hold it down and make any tendency toward flight inconceivable.

At long last, Sir Hiram decided to give her the gun and shock himself with a notebook full of instrument readings. He climbed high up in the structure to his perch amid the guy wires and yanked the throttle. The massive propellers went into action with a roar as 6,000 jets shot blazing naphtha against the boiler tubes. His whiskers shimmied in the shrieking gale as he made run after run around the testing track.

The steam pressure began to mount. It went up from 150 pounds to 310. Suddenly the lumbering aeronautical nightmare took off, in spite of the iron top rails. Sir Hiram sat tight as the axles buckled, the rails shattered and the tracks flew sky-high. With an insane surge, the fantastic load of junk headed toward the heavens, hauling the wreckage with it.

That was enough for Sir Hiram. He shut off the throttle. Building an airplane was one thing. Flying was too much! Sir Hiram gave up aviation immediately!

"Oh, him? He's my new grease monkey!"

Samuel Pierpont Langley was one who seemed cursed with a jinx. He began experimenting when he was 55 years old. By 1897 he succeeded in making a 42-pound steam-driven model fly several thousand feet at a half mile per minute. That proved it could be done so old Sam was ready to call it a day.

Teddy Roosevelt, however, tipped off President McKinley about Langley's little flying locomotives. War with Spain made the United States War Department giggle with figurative glee at the prospect of charging around the sky in an iron horse and shoveling dynamite down on the blokes below.

The $50,000 that the government allotted for a full grown flying locomotive seems to have been the cue for the population's hecklers to get nasty. Langley called his strange boiler-birds "aerodromes" although nobody else did. In the course of construction of the full-sized man-carrying aerodrome Langley's co-worker, Charles Manly, went in for superlatives, and developed the most powerful engine for its weight that the world had ever known. In fact, it was much lighter for its power than was the motor that gave the Wrights their initial flight.

The first great test involved a catapult take-off on top of a barge in the Potomac. Manly, father of the aerodrome's sensational 52 h.p. engine, sat courageously at the controls. The motor roared lustily. Great crowds lined the shores. An assistant sent up a rocket to warn the press photographers to have their shutters ready.

The catapult went off with a bang. But the flying machine simply slid off the barge and went to the bottom of the Potomac with a dismal splash.

Langley and Manly were the laughing-stocks of the world. But they were undaunted. They were sure their craft would fly. So, two months later, December 8, 1903, they tried again. Once more the mighty little engine thundered its gallant tattoo and, with Manly at the controls, shot down the catapult track. A guy wire twanged on the catapult frame, fouled, and buckled the tail. Years of work and thought did a tragic half-gainer into the river.

The guffaws rose to a monstrous babel. Langley gave up, and in 1906 he died.

The irony of it was that Langley's plane could—and did—fly! A few years later, the wreckage of the hapless ship was rescued from the dust and cobwebs of the workshop where it had lain since the crash. Broken spars and crumpled beams were replaced. Rusty tie rods were polished, wings aligned, the rugged engine tuned. Then, on May 28, 1914, America's top flight airman and jinx buster, Glenn Curtiss, climbed into the seat, raced across the waters of Hammondsport, N. Y., and took off! Langley's plane with Manly's engine returned to fame like a ghost from the junk pile—and flew!

Leonard W. Bonney was another who couldn't beat the jinx. It was back in 1928 when the bad

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Crystal Gazing

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the slide so the dissolved butter can run off. Repeat until the fat has been washed away. Now, through your microscope, you can see the cube-like crystals of salt (sodium chloride) that remain. Perhaps you'll see some crystals of another shape, for there may be other crystalline substances present.

There are many "permanent" crystals such as pieces of quartz, but to the microscopist the most fascinating specimens are the soluble chemical crystals. He has an endless assortment available: epsom salts (magnesium sulphate), various photographic developing agents such as needle-crystalled hydroquinone, copper sulphate, potassium chlorate, aspirin, and so on.

Preparing, for observation, a specimen of one of these crystalline substances is simple: In the center of a clean glass slide, place several drops of warm water. Drop a little of the chemical into the water, and stir with a toothpick until dissolved. Set the slide aside until the water evaporates. The chemical will reappear as a crystalline layer on the glass. You can carry on your microscope observations without further preparation of the specimen; or you can cover the crystals with a mounting medium and a thin, round or square cover glass for permanent keeping. Among the mediums used to mount various crystals are Canada balsam, thinned perhaps with xylol; liquid petrolatum, and various prepared mounting materials. Often a crystal specimen will keep indefinitely in air, with a cardboard or fiber ring around it and a cover glass cemented to the ring with balsam, to keep out dirt. Best way to determine whether a crystal will keep in a particular mounting is to try it!

You can examine most crystals by transmitted light: that is, by light reflected up through the hole in the microscope stage by the substage mirror. After you tire of ordinary looking, stick your finger tip into the light beam between the mirror and the stage, and move it about until you find a position where the field of view darkens but the crystal remains brightly lighted. This is a crude form of darkfield illumination. If your microscope is a more expensive type, it can be fitted with a special, wheel-shaped stop or a condenser to produce true darkfield illumination. By transmitted light, a colorless crystal is dark against a light field; in darkfield illumination, it is brightly-lighted against a darkened field. By replacing the opaque wheel stop with a colored gelatin or cellulose-film disk of the same shape, you can make the field colored instead of black; and by adding a ring-shaped piece of colored material around the stop, you can change the color of the specimen. A yellow ring and a blue center filter or stop make the crystal appear a bright golden color against a blue field, a sight worth all the effort it takes to produce it.

But if you want to see some *real* color, try

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Heartbreaks Of The Air!

[*Continued from page 140*]

luck bug which seems to pursue those with advanced ideas caught up with Bonney. Five solid years of painstaking work had gone into his historic ship. Conventional designers frowned on the strange machine with its radical gull-like wings. Bonney believed those wings held the secret of superior performance. He staked everything on that belief. On the fourth of May he climbed aboard his weird looking craft at Curtiss Field, smiled a little, and shoved in the throttle.

A curious group of spectators peered down the runway as the peculiar gull wings began to lift. A steep climb followed, and it seemed apparent that the inventor was right. In a moment the ship was 100 feet above the field—then something went wrong. The machine whirled madly, and plunged earthward. Bonney had gambled his life on a wing design, and lost.

If he were alive today Leonard Bonney might point proudly at the United States Navy's mighty PBM-1, the giant Martin twin-engine flying boat for the mid-ocean patrol. Yes, he might watch that great 20-ton mass of flying defense as it streaked across the sky, and he might say, "See those wings? They're shaped just like a gull's."

Zantford Granville is known as one of the hard-luck men of the air. He was a pioneer in modern speed plane design, and had his star been better omened he certainly would by this time have ranked among the immortals of aviation.

By 1931 the speed of airplanes was approaching the 300 m.p.h. mark. Granville was determined to push it higher. He started designing tiny speed ships called by flyers, "all motor and a pair of mosquito wings." Then, in 1932, the Gee Bee monoplane of Granville design hurtled through the air at more than five miles per minute and landed with the land plane speed record of the world.

Granville still wasn't satisfied. His plane company wanted more and more speed. Stubby fuselages were stuffed with engines and tiny wings were trimmed still smaller. But Zantford Granville, like so many others, was too far ahead of his time, and the jinx got him. In 1934, his own lightning fast, low wing racer carried him to his death. And the jinx held on. A whole series of disasters involving planes of this design followed, climaxed by the crash-death of Francisco Sarabia, "the Lindbergh of Mexico," who was killed in a craft of Granville design at Washington in 1939.

Even though he was killed seven years ago, the dreams of Granville live on in the lines of the war planes of today, such as the U. S. Air Corps' P-43, Republic's high altitude fighter. Had hard luck not followed him, what wonders would his genius have created?

Helicopter comes from the Greek, meaning spiral wings.

Wanted—For Defense Jobs!

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250,000 workers in ten months. Another hundred thousand will be needed by October. An early study, already out of date, showed a need for 13,100 sheet-metal bench hands; 12,800 metal bench hands; 7,500 machinists; 4,500 inspectors; 3,600 toolmakers. In the next year shipbuilding must hire another 150,000 men, including 450 anglesmiths; 850 blacksmiths; 1,580 boilermakers; 1,890 coppersmiths; 6,660 calkers and chippers; 9,300 electricians; 31,000 machinists.

With figures like these rolled up in just two industries (unskilled and semiskilled jobs are not listed here, but they have to be filled too) you are almost certain—if you have any mechanical bent at all—to find a dozen fields in which you can go to work at once, or after a bit of brush-up training.

Best of all, you will not only be putting your shoulder to the wheel to help out government and industry in a crucial time, but you'll be well paid for it!

Hitler's Invasion Secrets!

[*Continued from page 53*]

troops can huddle out of gun fire. The barge would carry a maximum of 50 landing troops and a crew of three.

At the front of the barge is a 20-foot wide runway on rollers, operated by block and tackle. Troops could take cover under it during the crossing, and when the barge is beached it could be lowered to the sand, making a landing bridge for the tank, which would rumble off the barge first to make a landing shield for the troops.

Power would be furnished by two 100 h.p. Diesel engines, located in an armored engine room in the aft. The Diesels would drive two propellers in the rear, sending the craft along at from seven to eight knots.

On either side of the forward runway there are two revolving turrets, each containing two 50-caliber machine guns. Directly behind the engine room is an open cockpit which holds two 81 mm. trench mortars, for shelling machine gun nests and barbed wire on the beach. The mortars are movable, and can be carried ashore if the landing is successful. Right behind the trench mortars is a multiple machine gun in an anti-aircraft mount, prepared to ward off fighter planes during the crossing.

St. Louis has made a six year test of anti-skid streets, surfaced with a mixture of dolomite, asphalt and filler.

Scientists are studying tiny platyfish from Mexico, to see whether cancer-like tumors they sometimes develop shed any light on cancer in man.

Crystal Gazing

[*Continued from page* 141]

polarized light for examining crystals. Potassium chlorate crystals, for example, are normally colorless; but when viewed with polarizing equipment, they exhibit breath-taking color of great variety and purity. It's not at all difficult to convert even the cheapest microscope into a polarizing microscope.

Obtain two pieces of sheet polarizing film. Eight square inches of this—several times as much as you will need can be purchased for a dollar. Cut a disk of the film to fit over the microscope eyepiece. This disk can be the same size as the eyepiece lens, and simply laid on it for temporary observation. A more permanent arrangement is to mount the disk in a cardboard or metal cap that fits over the eyepiece. This disk is called the "analyzer."

It is necessary to use a similar polarizing filter, called the "polarizer," beneath the specimen. Cut another disk, this time the size of a quarter or larger, or of a size that will fit the filter ring if your microscope has one. Fasten this polarizer under the microscope stage so the light has to pass through it to illuminate the specimen. The polarizer can be mounted over the light source, if that is more convenient.

With the microscope focused on a crystal specimen, and then with the polarizer and analyzer in position, look into the eyepiece. Be prepared for a pleasant surprise. Crystals hitherto colorless will be seen sharply defined in a blaze of color. Now rotate the analyzer slowly. The colors will change, and the background will become alternately light and dark.

You will want to try the polarizing set-up on various kinds of crystals such as epsom salts and copper sulphate. Try dissolving two chemicals, such as those just mentioned, in the same pool of water, to form a mixed crystal pattern. There is no end to the beauties that you will produce in this way. And then, if you ever exhaust the possibilities of crystal-gazing, try your polarizing microscope on such things as animal hairs, cotton fibers, starch grains from a raw potato, etc.

Stove For Campers

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of ¾-in. (inside diameter) pipe, which slip over the stake and serve as spacers. Keep the griddle well oiled or greased to avoid rust. If desired, the griddle may be made with a grease-retaining rim, or indentations may be hammered into the surface in order to provide depressions in which hot dogs, hamburgers and steaks will fit while frying. In use, keep the fire pan charged with pieces of wood which can be picked from the ground, or if desired carry along a few briquets of charcoal commonly sold for use with portable stoves. Any type of fuel is suitable.—*Ken Murray.*

Titan Of The Tow Trucks!

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to and from the wreck. An electric turbine pump for salvaging liquid cargoes saves owners from losing much cargo as well as eliminating the danger of fires and pollution from dumped oil or gasoline. The Kohler unit also supplies current for five large flood lamps which light an accident brilliantly at night. The tow truck is Westinghouse brake equipped, the compressor operating from the motor and supplying additional air for the air brake equipped dolly.

"There is also an air line and a vacuum line which can be connected back to a tow truck that is being pulled, utilizing the brakes on the wrecked or disabled unit.

"The tires are 9:75x22—ten of 'em—which gives the unit ample road clearance even in rough country and when working off the road. Two automatic anchors brace the entire truck when making extremely heavy pulls where tire friction alone is not enough to hold the truck steady.

"All controls are handled in one place on the left side of the unit which keeps the operator away from moving cables. A first aid kit is carried at all times to render aid to injured persons along the highway. Two fire extinguishers are always ready for use. For the comfort of the crew a small but efficient electric kitchen is carried, too. It supplies food and hot coffee to all hands when working on long, cold jobs. We never have to leave a job for food or water." At this point the speaker, Woody Woodin, paused, took a deep breath, and grinned broadly at the interested crowd. "Well, you asked for it," he said, took a bow, and clambered into his place in the truck. The super tow truck left the scene and headed for the next stop, which was a busy intersection in the center of the city where two tank trucks had crashed into each other when one of the drivers had to swerve away from a small passenger car that had jumped the traffic signal.

"The president of the Mulvaney Construction Company is getting married!"

The idea of running a business specializing in big-time crashes came to George Rubsch after some years of trying to handle a wrecked truck with a tow car built for ordinary purposes. The usual result was that the tow truck would wind up in a more worthless condition than the object of its efforts.

All other garages were in the same fix—so when George Rubsch sounded them out on the subject of a super tow truck they all agreed that it would fill a real and pressing need, especially because trucks were getting bigger and heavier every year, and they were getting quite sick and tired of ruining regular tow trucks in jobs too big for them to handle. Thus, with the advent of the A-1 super wrecker, George Rubsch and his boys became the emergency station to which other garages could turn in an emergency. In other words, this outfit became a super service garage whose best customers are other garages throughout the section.

George Rubsch started his career on a few hundred dollars that he had earned by being Hollywood's first stunt man. For fifty bucks he would ride a motorcycle at top speed into a thirty foot excavation. He added more money to his small stake by piloting some of the first airplanes to arrive in California. He was barnstorming over the state in 1911 with an old Curtis 125 H.P. Too, he holds an assortment of early day automobile speed records.

On opening his original shop with the funds he had earned the hard way, he built, with the help of his father who was an excellent carpenter and tinsmith, the first one of those cigar-shaped speedster bodies that, in a short time, became so popular with the jitter-bug element of that era. For one of these creations, placed on an old Ford chassis, the A-1 garage charged—and got—$700! And they couldn't make enough to supply the demand. Competition arose, of course, so this golden idea did not last long. But it enabled George to buy more land around his small shop, with an eye to future expansion. And expand he did. The original shop was 30'x125'. Although in the same location the shop now spreads over 68,000 square feet. It has spread outward, and is still but one story high because of the nature of the business.

Cutting In On A Fortune!

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and 1,040½ carats respectively, and there were a few carats in splinters. Swiftly he divided the larger portion again into two others, the second smaller piece alone being cleaved into a square brilliant of 309 3/16 carats. From the first piece, the great pendeloque brilliant, weighing 576½ carats, was eventually cut and, named the Star of South Africa, affixed to the State Crown of England. In all, nine large gems and 96 smaller ones were ultimately produced.

That evening Joseph Assher collapsed. His forebodings proved true; the strain of years, topped off by the work and worry of cleaving the great Cullinan, was too much. He died within a month.

Sometimes a diamond is divided by sawing instead of sudden splitting. It is set into its dop after being marked for sawing, this time against the grain, a bar is clamped onto its exposed surface to hold it firmly, and a wheel starts to whir. The machine is provided with suitable adjustments to enable the operator to set the stone at a desired angle.

The wheel or saw is phosphor bronze, ranging from 0.0025 to 0.007 of an inch in thickness. It operates at speeds from 2,200 to 2,400 revolutions a minute, according to the quality of the stone. The sawing process in a one-carat gem consumes one day. Weeks and sometimes months must elapse before larger stones are sawed through.

There are no teeth on these saws. They are impregnated with a mixture of olive oil and diamond dust to provide the necessary abrasive qualities. Phosphor bronze is used because it makes a rigid saw sufficiently porous to hold the abrasive mixture.

After cleavage or cutting, the stone proceeds to the diamond-cut-diamond stage, namely the cutting or "brutage." The stone is imbedded in lead and fastened in the center of a revolving wheel, while another diamond is affixed in a similar way to the end of a movable holder, so adjusted that the movement of the wheel causes the stones to rub against each other. The point of friction is changed at will by shifting the relative positions of holder and wheel, producing the required shape. The top, or table facet, is made first, after which the culet, or flat bottom facet, is formed. Lastly, the long facets extending from the table to the edge and the small facets are cut.

To finish it off, to highlight the many glistening facets, the stone must be polished, or "brilliandeered."

In years gone by this was done by mounting two stones in separate holders and rubbing them together, the two faces smeared with a mixture of oil and diamond powder. Today the process is done on a horizontal iron wheel which revolves rapidly and upon which the stone to be polished is pressed by means of the holder. The polishing wheel is charged with diamond dust. Even with

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Houses While You Wait!

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Pickwick Company, a private corporation operating the facilities at Pickwick Park.

The portable cottage was developed as a result of almost continuous studies by TVA experts. These studies were begun almost at the inception of the TVA, and have continued since, in an effort to find a method of producing cheaply a good, modern home for workers who are called to work in sparsely settled sections where no form of housing is available.

Already TVA officials feel that the new mass-production houses will be a valuable feature in the defense program by making available a portable cottage that can be moved anywhere the workers go, providing good, adequate housing for the men and their families.

Earlier in the TVA program the Authority experimented with cinder-block construction, and dwellings built by that method are in use at Norris, Tenn.

The new cottages are built in sections, each of which contains one complete portion of the building floor, walls, ceilings, and roof, with electric wiring, light bulbs, plumbing, bathroom and kitchen fixtures in place, windows, door, kitchen cabinets, electric cooking plate and refrigeratory already installed and painted, ready for immediate use.

The smaller cottages are in three sections, the larger in four. Each section is 7½ feet wide, 22 feet long, and 9½ feet high, and weighs about three tons. The sections are fitted together with bolts. The construction is wood frame, with exterior of weatherproof insulating fibreboard.

Four workmen can assemble the sections into a completed cottage within four hours. The only parts of the cottages constructed on the ground are the supporting cinder-block piers. Dismantling can be carried out in as short a time as the assembling and a cottage can be transported to another site with no loss except the slight cost of the piers.

The single cottage model consists of a combination living and bedroom, a kitchen, bath, small bunk room and a screened porch. For vacation use it will accommodate four to five persons. The larger cottage is a duplex, and on each side of the central partition is one large room, a kitchen and a bath. The cottages are styled in the modern manner, with flat, wide, overhanging roofs, and either of two exterior color combinations are used, buff with tan, or gray with green.

The six portable cottages already produced by TVA—four of which are duplex—were turned out in the Authority's machine shop at the Shoals by production line methods common to industrial mass production. All equipment used is standard to the average woodworking shop, lumber yard and builder.

In the Shoals machine shop two duplex cottages can be manufactured simultaneously, a total of eight sections. Every section is mounted on small wheels which in turn are mounted on tracks, so that the section can be rolled from one point to the next in the production process. Twelve to sixteen hours' working time is required to complete a section. The cost, including transportation and field assembly, promises, according to TVA experts, to compare favorably with the cost of ordinary construction. The cabins were built by building trades craftsmen working in their appropriate jurisdictions at prevailing wage rates.

The portable cottages so far erected in Pickwick Park have been transported the approximately 60 miles from Muscle Shoals, some of the distance over rough country roads, in a standard truck trailer, one section at a time, in from two to three hours, with no evidence of racking. No special permit is needed for hauling the sections, since they come within the usual legal dimensions and weights.

Officials believe the methods used in building the portable cottages will have especial value in connection with defense and emergency housing. Large groups of low-cost houses, built in this fashion, could be quickly and easily removed from a location after the need for them had been satisfied, and made available to areas where housing deficiencies existed, or where housing was below standard.

Development of the portable cottage was originated by Louis Grandgent, when he was connected with TVA as chief of the architectural section. It was completed by the Authority under the supervision of Carroll A. Towne, with the assistance of the architectural staff, and of the construction staff, under W. B. Richardson. Mr. Grandgent, now on the architectural staff of the United States Housing Authority, at Washington, has been retained in a consulting capacity by TVA for the portable-cottage development.

"Since I've had a few lessons I'm more confident in my driving. I open my eyes now when I pass another car."

Cutting In On A Fortune!

[*Continued from page* 145]

the innovation, the process is slow and requires infinite patience. The cutter relies entirely upon his eye; one false move spells disaster.

And finally the gem is completed. It sparkles and glitters in the cutter's hand, and it is affixed in a pendant to be hung around milady's neck or slipped in a ring on her finger. In the process of creating a fine gem from a rough stone, more than 60 percent of the original weight is lost.

To observe the cluttered workbenches and dusty atmosphere of a diamond cutting establishment, it is difficult to believe that hundreds of thousands of dollars in gems are played with daily. It seems so easy for a precious pebble to be lost, as indeed one was recently at the plant of Baumgold Brothers, one of the largest in New York.

A rough stone valued at $25,000 slipped from the fingers of a cutter and bounded out the window. From far below a plaintive voice called up:

"Hey! Whose throwin' rocks out the window!"

The agitated cutter yelled back:

"That's no rock. That's a valuable diamond." And he scuttered downstairs. On the street he saw dozens of persons on their hands and knees on the pavement, searching for the stone. But they saw nothing glittery, nothing sparkly.

The cutter knew what to look for, a dull-white stone, which he soon found and pocketed.

At another time the entire staff hunted for a half-hour for a finished stone . . . and found it under a cutter's bench, caught by a wad of chewing gum parked there.

But although the cutting industry has been hurled across the ocean by the war, there is little or no creation here of the tiny stones which are used to stud watches, brooches or rings. The masters of this trade, it is said, are still in Holland and Belgium, with only a few having been able to reach America. As a result, prices of the small stones, ranging from 1/3 to 1/500 carat in weight, have almost doubled in value.

Too, America cuts only the larger stones because of the increased labor cost involved. Diamond cutters, of which there are about 400 in the United States, are paid from $120 to $195 a week under the new contract obtained from the employers by the Diamond Workers Protective Union. It takes almost as much time to cut a 1/10 carat stone as it does to cut a five-carat one, and the labor cost is nearly the same. But the latter may bring a market price of $2,500 and the former only about $12, therefore America has been forced to cut only the larger ones.

Behind every large diamond lies a story of blood and death and treachery and intrigue. No famous stone in history has been allowed to pass from owner to owner without its share of crime. But behind these tales lie stories almost as dramatic, if less spectacular . . . the infinite patience, tireless energy and master hand of the anonymous diamond cutter who made the stone beautiful.

Hollywood—Scientific Ghost Town!

[*Continued from page 62*]

frame by frame, William Draper, who tells you all this is very simple indeed—"provided you keep your eyes and fingers timed to a thousand and twenty-two things that may defect your purpose" —carefully cuts out white-topped-black-backed opaque mats with which to cut off parts of the scene.

Twenty-seven mats are prepared. The original negative and a fine-grain copying positive are threaded into the over-head camera. Again, frame by frame, with the camera focused on the mats. Draper copies that section of the negative on which the dummy appears, the mat shutting off underneath light from all other parts.

On frame 27, for example, you see only the dummy. Ten frames later the actress appears in full register. To make the transition, Draper softens the copied image by top-lighting the mat field, gradually dimming these lights until the lower lights fully expose the print. And there you have a ghost come to life.

As a variation of this method developed for "Topper Returns," Draper works with an 8x10 enlargement of a still picture. With scissors he cuts away the parts to be eliminated. The remaining print is bleached by a cyanide treatment. Now, backed by black velvet placed under the glass, the outline is printed in, followed in a second take by printing the surrounding set. As a third step, the girl is printed by a combination of top and lower lighting to any desired degree of materialization. In this manner Draper showed the actress sitting half-materialized on a marble-topped table talking with an actor.

Special effects experts perform many amazing feats, both on the sound stages and in their laboratories. De-materializing humans and bringing invisible ghosts into full-flowered manhood and womanhood are only part of their little-known everyday jobs. Suppose you were ordered to dress a lovely but invisible feminine figure in brassiere and panties. For one such scene, the girl actually faced the camera, but she was invisible as she stood in a suit of black velvet against a black velvet backing. All audiences see is the clothing moving from a chair to their accustomed positions on the unseen person.

How were the two items shown in a well-lighted bed room? An effects specialist made two series of mats, one for each. In the process department, he printed only the clothing, masking off the black background. Next, holding two spaces open with the same mats, he printed a bed room set. Finally, on a third print, he replaced the action with the clothing.

The men who do these delicate photographic transfers liken this tricky printing to photographing the straight edge of a razor blade, then removing that thin line from the negative. So carefully do they match mats, only an experienced observer would detect any overlap.

All this represents only part of the special effects wizards' skill in making pictures seem what they aren't, and vice versa.

Not even a ghost can leave his prints in the sands of time, row a full-size boat across a dimly-lighted lagoon and through the breakers of the Pacific Ocean, and operate a typewriter without some mechanical help. At least not in the movies. Even though the camera crews can photograph the invisible, after a manner of speaking, the prop-shop crews must provide gadgets designed to evoke amazement, bewilderment and laughs.

For example, in one picture two actors were walking down a sandy driveway, when suddenly the comic saw footprints appearing alongside his, matching his steps stride for stride. "No rabbit made them tracks," he muttered, before disappearing in a cloud of silica.

For weeks before the leading man and his stooge strode across that sandy set, prop makers were busy building a platform 25 feet long containing exactly 10 footprints. To make them look natural, impressions were first taken of a girl walking on a long strip of paper. This was laid over the platform, and the steps marked. Now each impression was carefully sawed out, surrounded by a rubber gasket and the "plugs" topped with lead to give extra weight.

After delivering the machine to the set, carpenters propped the heels and soles into place, using hinged sticks. A mixture of wet and dry sand was carefully poured over the entire surface, permitting dry sand to fall with the step and wet sand to remain in place, thus casting a shadow for the camera. When the two actors started their walk, Fred Knoth, special effects engineer, pulled a tripping device under the plugs, causing the sticks to swing forward and permit the steps to fall a half-inch.

Thirteen times, the actors paraded along a course paralleling the ghostly walk. Fifty individual steps appeared in close-ups and long shots, filmed at a cost of $5,000. "Most expensive saunter any actor ever took," commented Knoth, "especially when there was none actually working."

One of the most difficult stunts arranged recently was the rowing of a boat by a girl who wasn't there. Audiences hear her voice, see the oars move in their locks, and the boat move in a straight course through the water; yet excepting when the director wanted to see her perform, the actress was busy on another set or resting at home.

"Boat to row itself," was the only information the prop shop received. Starting from scratch, carpenters first placed a one-h.p. D.C. electric motor in the stern of a rowboat, connecting it by waterproof cable to an outlet 200 feet distant. Next, they installed a 30-1 reduction gear and connected the motor through two V-belts and a cross-head to a pair of eccentrics which moved the oars in an ellipse. Only two weeks

after receiving the order, the foreman installed the oars, locked them in place with U-joints and set screws, and connected them to the driving mechanism through tough nickel alloy steel rods.

These were not ordinary oars. Both blades, constructed of aluminum, contained hundreds of perforations, one-eighth-inch in diameter, intended to reduce the drag as they moved through the water. For, after all this detailed preparation, the oars did not actually propel the boat. Lines fore and aft, handled by men on the edges of the indoor pool, pulled the boat along a straight course and prevented it from drifting outside the carefully determined camera range.

Having demonstrated the ghost's ability to handle the craft on a placid pool, the director ordered the little boat launched through the surf at Santa Monica. It almost frightened Joe, the lifeguard, and his friend out of their coat of tan. What they didn't know was that a storage battery supplied power to turn the oars, and three carpenters stationed on a barge 300 feet from shore were drawing the ghost boat out into the Pacific Ocean.

Not long ago a director sent the studio prop shop this simple order, "Typewriter—must operate itself." Everyone in the place scrambled to read the script, and learned the machine would sit on a table, in full view, and type out a message. Ten days later a standard machine was in place, and when a camera began to grind, spelled out the words, "What has become of Wendell Willkie?"

What trickery caused the machine to rattle off that question with the rapidity of a skilled typist?

When the scene was photographed, a studio typist sat on the floor pounding away at a duplicate keyboard connected by wires to the typewriter keyboard. Later, in the laboratory, a special effects worker matted off the lower part of the table, and copied only that part showing the machine. This complete, he printed in a second film showing the lower half with the wires and control board and girl removed. So accurately do the mats adjoin, no line is visible on the negative.

Whether the mood for "trick pix," as Hollywood knows this type, is to be gay or gloomy, it must be definitely established. For a recent picture the director called for a gloomy castle sitting on a hill, down which ran a narrow dirt lane. A motor car dashed around the curving road, disappearing occasionally behind trees and shrubbery. Unable to find a suitable location, studio scouts brought the problem back to the special effects department.

Shortly an artist was busy painting the scene on a plate glass. Angling across the picture, leading down from the imposing castle to the valley, was a streak of black paint. As the artist worked, a construction crew erected a narrow roadway

[*Continued on page* 151]

Bel Geddes, Master Showman!

[*Continued from page 67*]

He wrote a play that was never produced. He went to Los Angeles to design sets for a small, group theater. He directed a short for a motion picture company. It was his first attempt at direction, and his last.

He was sitting on a bench in a Los Angeles park one day when a headline on a paper beside him caught his eye: MILLIONAIRES SHOULD HELP ARTISTS, SAYS NOTED BANKER. Bel Geddes read the article, agreed with it completely, and marched to a telegraph office where he wired the banker, Otto Kahn, asking him for some of the help he was talking about. To his amazement, Kahn sent him $400, with which he paid off some debts and bought a railroad ticket to New York.

Arriving in New York, he went to Kahn, and the well-known patron of the arts got him a job with the Metropolitan Opera Company designing sets. That was all Bel Geddes needed. From then on, his career was theatrical history.

His name became a byword for elaborate and imaginative stage designing. The striking set in "Dead End," where tough East Side youngsters crawled onto a dock from a man-made "river," was a creation of Bel Geddes. So was the heroic presentation of such shows as "The Miracle" and "The Eternal Road." So were the sets of dozens of other shows, drawing the praise of artists and critics and the envy of other stage designers. But Norman Bel Geddes wasn't satisfied.

"And here's a new feature to speed up loitering pedestrians!"

He felt, somehow, that despite his huge success as a stage designer, he was neglecting the main activity of modern life—industry. Disapproving the way most industrial products look, it occurred to him that he might turn his talents to the business of beautifying them. He expressed it this way in his book "Horizons": "The few artists who have devoted themselves to industrial design have done so with condescension, regarding it as a mere source of income to enable them to obtain time for creative work. On the other hand, I was drawn to industry by the great opportunities it offered creatively."

Accordingly, he began to branch out into the world of ships, airplanes, trains, radios, stoves and houses. He was one of the first men in the country to make a specialty of industrial design.

Perhaps more than any other designer, Bel Geddes lives in the future. Nine years ago he made designs for an intercontinental plane which would have a wingspread of 528 feet, weigh 662,000 pounds, accommodate 451 passengers and a crew of 155, and have a speed of 150 miles an hour. The envisioned aerial Goliath was to be powered by twenty 1,500 horsepower motors, have a lounge 170 feet long and three stories high, five dining rooms, several bars, and be completely air-conditioned.

To accommodate this monster, he designed a floating airport 1,500 feet long and 750 feet wide, which he suggested be placed just off the Battery, in New York City.

Turning his attention to ocean navigation, he designed a streamlined steamship, equipped with a glass and metal "outer skin" for stormy weather. With its storm curtains up, the vessel resembles nothing so much as a big cigar. The fact that some of his more experimental projects have not gotten farther than the paper and model stage doesn't bother him in the least; he keeps on, with bigger and better designs for the future, and has the satisfaction of knowing that a lot of people who would have once laughed, study his most fantastic projects carefully. Too many of his "screwball" designs have been put into practice, and highly successful practice, at that!

A great incentive for Bel Geddes' success as a practical industrial designer is his dislike for the way most things look. He has redesigned ash-trays, candlesticks, cigarette boxes, bonbon dishes, radios, microphones, bottles, scales, telephone pads, gas pumps, fountain pens and radiators. Among his more recent jobs have been the designing of the sets and costumes for the ice spectacle, "It Happens on Ice," and the designing for a building firm of some model prefabricated houses.

Bel Geddes' biggest job, and one which many consider his industrial masterpiece, was the famous General Motors Futurama. He had been doing research on traffic and highway problems for several years, and had drawn up on paper his vision of the highway system of the future. When the

Bel Geddes, Showman!

World's Fair came along, he saw in it a perfect opportunity to expand and exhibit his ideas on highway design. After being turned down several times, he was given the opportunity to present and explain his drawings at a General Motors board meeting, in New York. William S. Knudson and Alfred B. Sloan, Jr., president and chairman of the board, respectively, were interested enough in the idea to invite Bel Geddes to Detroit to outline his plan again at a meeting attended by all the big-wigs of the General Motors Company.

At this meeting, Bel Geddes talked for four hours, at the end of which time, he signed a contract with General Motors to do the Futurama.

Once Bel Geddes and his assistants got to work on the project, they thought of several improvements which raised the cost, originally estimated at around two million dollars, to close to seven million. The Futurama was built on 408 tables, each fifteen by five feet. It contained 500,000 miniature buildings, over 10,000,000 trees and 50,000 miniature automobiles, 10,000 of which were in motion. Generally regarded as the smash hit of the Fair, Futurama was seen by 9,600,000 visitors.

At the present, the circus is his baby. He's done a beautiful job on it, and he's only just begun; he plans to take two years to finish the job he's started, and, from the comments of the customers so far, it's all right with them!

Hollywood—Scientific Town!

[*Continued from page* 149]

on a near-by sound stage, leading 20 feet from its crest to the floor. Several scenes were filmed, showing a miniature car rolling along the grooved path.

In two series of carefully matted exposures, the camera crew copied all the painting save the wandering black line, and only the roadway on the stage. From these prints, they made a new negative, joining the 20-foot road and the four-foot-wide painting. To a man, they defy you to detect the trickery on the screen.

Using an electric eye device, scientists have measured the speed of light at 186,272 miles per second, or 12 miles slower than has been generally believed, and this is believed accurate with no more error than 8.7 miles per second.

Drying automobile paint from the inside out is achieved by electrical energy generated in the car metal by inductive action.

Chemists make Hollywood icicles thus: cellophane and silicate of soda for foundation, dipped in alcohol for stiffness, and in paraffin to induce melting under spotlight sun.

This Way, Please!

[*Continued from page* 73]

boats maintained by the association. In two or three years he is promoted to apprentice pilot at $40 a month and spends the next eight years ferrying the senior pilots to incoming ships or picking them off departing ones. When he can, he studies charts and maps, accompanies experienced pilots on their tasks and, if he shows promise, becomes a watch officer or skipper on one of the pilot boats.

After two more years he takes an examination prepared by the harbor authorities. He is required to point out without hesitation the location of every buoy and landmark; to know by memory the depth of any spot in the harbor in all sorts of tides; to guide a vessel to any point within the harbor merely by swinging a lead to get the depth. If he passes, and the majority do not, he is awarded a license to pilot ships of not more than 18-foot draft.

The junior pilot then takes further examinations every few years to get bigger and bigger vessels until, after 20 years from the time he adopted piloting as a lifework, he gets a ticket to guide any ship, large or small.

The Sandy Hook Pilots Association has a monopoly on bringing in all the big ones from Ambrose Channel or leading them out. But for two centuries before 1895, it was a catch-as-catch-can race to win the big jobs.

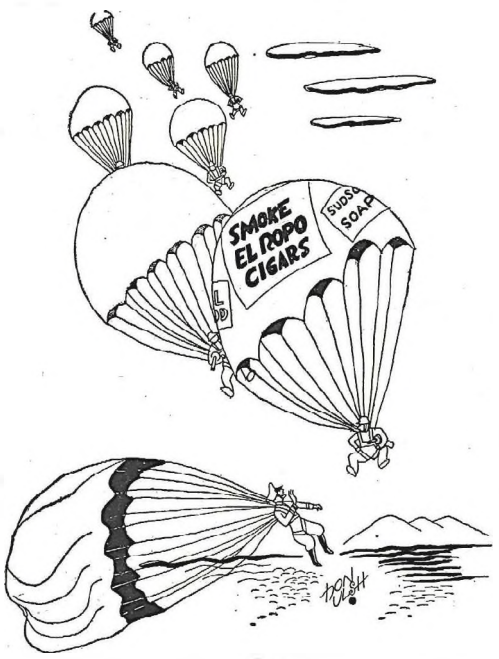
Fearless seamanship and the hottest of races to reach a ship first marked those hectic years and scores of pilot boats were sunk and lives lost before the era ended.

On a stormy night close to the end of the last century, two giant liners approached the harbor and burned blue flares to indicate they wanted pilots to guide them in. But since no law existed requiring the presence of pilots, and since the veterans preferred their warm berths ashore on that night to venturing out in the storm, no pilots came and the ships ran aground with the loss of 40 lives.

As a result a law was passed compelling pilots to stand by at all times and offer their services to all ships who requested them. In another year, supplementary legislation required all vessels but those in the regular coastwise and government service to employ pilots and the monopoly for the work was granted to the Sandy Hook Pilots Association.

The 99 grizzled sea dogs stand ready at all times now to dock ships. They take vessels in rotation as they come in and pool their fees. Thus a pilot gets paid for the number of days he works in a week. He averages from $4,000 to $5,000 annually.

The two pilot boats, anchored off Sandy Hook, are sturdy craft of about 175-foot length and are equipped with comfortable bunks, baths, kitchens and recreations rooms where the pilots wait for their vessels.



"Sorry, McDougal, but the service frowns on side-lines."

It is here that they loll between jobs and recall some of the tales of adventure and daring which have been written into the history of the harbor by their members.

One of their most memorable stories concerns the pluck of a pilot who was assigned one winter's day to take out a tramp steamer loaded with powdered pitch. The sun beat down on the ice-clogged harbor and the peculiar glare set up almost blinded the pilot. In addition, the pitch had been carelessly stored and the dust, which produces acid in unprotected eyes, hung heavy on deck. With acid in his eyes causing untold agony and with the glare making it virtually impossible to see, the pilot stood his post on the bridge and guided the craft safely out through the channel.

"She's clear, sir," he announced to the captain and collapsed. He was treated for months and his sight was partially restored. But since piloting requires perfect vision, he was unable to continue his calling. He went into something less hazardous—he became a sandhog.

Many times pilots have acted Johnny-on-the-spot in harbor shipwrecks. Twelve years ago hymns of praise were sung in shipping circles everywhere for the seamanship of the pilots who dashed to the rescue of 400 passengers on a sinking steamship.

On the fog-dimmed night of December 18, 1929,

the Furness-Bermuda ship *Fort Victoria* was rammed by the Clyde liner *Algonquin* at the entrance to Ambrose Channel. An SOS call ticked out from the *Victoria*: "Ship listing. May have to abandon any minute."

While marine police boats and other craft dashed to the scene, the pilot boat *Sandy Hook* was already alongside, calmly taking off all passengers. When officials arrived, the pilot boat skipper laconically said: "We got 'em all. You can go home now."

It's a risky life, piloting.

[Correct Answers to Quiz on Page 74]

1. True. To "shoot down" a plane, at airports, means to signal a landing.
2. False. West Virginia is the Panhandle State.
3. False. It is a musical instrument.
4. False. A kegler is a bowler.
5. True.
6. False. Hyssop is an herb.
7. False. It was signed July 19, 1776.
8. False. A bangboard is used on a corn picker's wagon.
9. True.
10. False. A drawbar is a railroad coupler.
11. True.
12. False. He would treat him as any other patient.
13. False. An ocularist is a maker of artificial eyes.
14. True. An English term.
15. True.
16. True.
17. False. It is part of the human foot.
18. True. With infra-red equipment.
19. True. It is a symptom of spleen disease.
20. False. They are functions occurring in gravitational theories.
21. True.
22. False.
23. False. A Molotoff breadbasket is a cluster of bombs.
24. False.
25. False. A group of islands off the Florida Keys.

Attention, MI Readers!

We will pay $1 for each true-false statement which we find acceptable. Statements will not be acknowledged or returned. Address the Quiz Editor, MECHANIX ILLUSTRATED, 1501 Broadway, New York City.

Checks have been sent to the following: Victor Van Allen, Box 22, Highbridge Station, N. Y.; Wallace G. Chalmers, 5 Whitney Ave., Toronto, Canada; Mrs. M. B. Espenan, 1708 Government Street, Baton Rouge, La.; John J. Klein, 15 Moore Street, Albany, N. Y.; Robert Bailey, 207 E. Jackson Street, Demopolis, Ala.; Douglas Anderson, 3808 Tenth Avenue S., Minneapolis, Minn.

A Colorado mine produces two-thirds of the world's molybdenum, important toughening alloy in steel industry.

Wanna Fool A Duck?

[*Continued from page* 63]

known bird that inhabits the Atlantic Coast, including at least 11 different varieties of shore birds such as snipe. Strictly an amateur, he has never sold any, but feels that his collection must be worth several thousand dollars. Shang does not shoot many birds now, preferring to do his hunting with a camera. But once or twice a year his trigger finger does get itchy and he tries his hand once more at the sport that started him on the life-long joy of making decoys.

Hearing of Wheeler's skill at making decoys, duck hunters and decoy makers have written him from all parts of the country wanting to buy his lures. Wheeler told them his creations were not for sale but that he would gladly show them how they were made. This was the beginning of his correspondence school.

Those who showed more than the usual interest and promise were sent drawings and instructions on how to make various species. At the present time, he has 15 such "students," and gets a great kick out of watching their development by mail.

In all, at the Sportsmen's Show, Wheeler had 93 decoys on exhibit, including 26 varieties of waterfowl and 11 varieties of shore birds. He walked off with 24 first prizes, 19 seconds and eight third prizes.

Hobbyist Wheeler builds his decoys piecemeal. Fashioning them from white pine, and occasionally cork, he uses pocket-knife, spokeshave and a small band saw. The body is made in horizontal halves, hollowed out inside and fastened together with waterproof cement and brads. The head and neck of a decoy are made separately and secured to the body by strong brass screws that extend up through the neck for special strength. Finishing work is done first with coarse and then with a finer grade of sandpaper.

Then comes the delicate job of painting. Just the right shade of brown, green, black or mottled pattern must be used. His canvasback duck decoy, as an example, has a lead-colored beak, brick red head and neck, brown breast, back and under body. The tail feathers and wing tips are a darker shade of brown. His life-like mallard has an orange beak, iridescent green head, red breast with gray blending into the brown body, black tail feathers edged with white and a pearly-gray under body. These are samples of the color patterns Wheeler carries in his head.

It is only upon close examination that you can tell where the parts of a completed decoy are joined together. Each decoy is equipped with a small piece of lead fastened to the bottom with a brass screw, which acts as ballast and keeps them upright in the water. A 13-ounce lead or iron anchor is fastened to a piece of string secured to a leather loop under the breast. About one-third more string than is necessary to cover the distance from surface to bottom is allowed, thus giving the decoys leeway to bob about naturally.

Of course, such specimens as his whistling swan, sand crane and members of the shore bird families are now protected and can only be used for exhibition purposes, but he enjoys making them all the same. His sand crane replica is four feet high, has a slate-colored body and gray wings and black legs. The shore bird varieties range from the larger curlews to the least sandpiper, the smallest member of the group. Eyes for all the decoys are obtained from a taxidermist manufacturing concern.

His most valued replica is a black duck decoy, carved in a restful swimming pose. It is a dusky brown, with blue iridescent patches on the wings, has a gray head and its feathers are edged with light tan. Made last spring, it represents perfection in the art of making duck decoys.

Wheeler won't admit it, but the local Nimrods claim this decoy is one of the wooden ducks seen swimming around the marshes, making eyes at each other. When you ask Wheeler about it, he just grins.

Spring Lathe Center For Filing

[*Continued from page* 109]

be about one-half the diameter of the end. If possible, grind the hole to final accuracy. Depth of the hole should be 1-in. or so.

Chuck a piece of steel for the point, and turn and grind the straight part to fit the hole, with no sideplay. Length of this shank is slightly more than half the depth of the hole. Machine the point to the usual 60 degrees. Remove and harden. Seat the taper shank in the headstock spindle of the lathe, and insert the point in the hole, without a spring. Fasten it temporarily by running shellac between the end of the taper and shoulder of the point, and grind the point to accuracy. If the hardening process has altered the trueness of the shank extending back from the point, a little lapping with very fine abrasive may make it fit again. Insert a stiff, expanded coil spring in the hole, and adjust it to hold the point a fraction of an inch from the end of the taper shank. The stiffness of this spring can be varied according to the work. That is, heavy work should have a stiffer spring than light. If you find that air pressure within the hole interferes with the spring action, drill a small hole at a backward-sloping angle into the hole, or cut a shallow groove lengthwise the shank of the point.—*W. E. B.*

The King crab of Alaskan waters grows to huge size, small ones weighing 16 pounds and measuring 58 inches from leg tip to leg tip.

Chromium-nickel stainless steel is non-magnetic.

Toy Runs By Sand-Power

[*Continued from page* 93]

it cannot dangle down and get caught in the paddle wheel. (Photo 8.)

The broomstick to which the box is screwed is thrust into the sand when the carousel is used on the beach, but when used indoors the broomstick is held upright in a stand made of a piece of metal pipe braced in a vertical position on a wooden base. (Photo 9.)

The broomstick has several holes drilled through it about an inch apart, into which a nail is thrust. This is for the purpose of adjusting the sand box at the correct height above the paddle-wheel as the table on which the carousel is used may not always be the same height. (Photo 10.)

The paddle wheel projects over the edge of the table when in use, so that the sand can fall through into a cloth bag on a wire frame attached to the broomstick. (Photo 10.) The sand is poured back from the bag into the box after each run.

The horses are numbered from one to six with numerals cut from an old calendar and glued to the disk on which they stand. To make the roulette or racing game, a cloth is marked with a circle which is divided into six segments numbered to correspond to the horses. (Photo 11.) After the sand has run out of the box and the carousel stops, the horse nearest the arrow on the floor of the carousel-house is the winner. The arrow is best seen in Photo 3. The backer of the winning horse collects the chips that the other players have placed on the other numbers on the cloth.

Photo 12 shows a general view of the whole assemblage.

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	$1.35

Chute-The-Chutes

[*Continued from page* 112]

a long, straight-shank, round-head screw for an axle.

The water trough has an outdoor plywood (Super-Harbord) bottom and pine or fir sides, with a batten or "chine" along the joint in which marine glue has been applied before screwing together. The tank should be at least 24 ft. long, which would require a watertight joint about the middle, as shown in the circle.

For a light gondola, use ¼-in. outdoor plywood on the bottom, and ½-in. on the sides, with a chine batten along the joint as shown. A rub-rail of waxed hardwood is attached each side near the bottom.—*Hi Sibley.*

Gas Engine For Modelmakers

[*Continued from page* 117]

milled to fit the weight snuggly over the crank web. They are then faced smooth on the recessed side as this is impossible after mounting. With the weights forced in place on the crank webs the holes are drilled for the screws through the weights into the webs at the same time, as in Fig. 37. The holes in the webs are then tapped while those in the balance weights are opened out to clear the screws and countersunk as indicated in the drawings. With the balance weights tightly fastened in place the crankshaft is again placed between centers, as in Fig. 38, the outside of the balance weights faced smooth and turned to the exact diameter of the webs, which finishes the entire crankshaft. When the ball bearings are slipped in place it appears as in Fig. 39.

With the taper turned on the end of the crankshaft, the flywheel was machined and the shaft hole bored and reamed for an accurate fit. Work being started by chucking the rough casting with the starting pulley face out, as in Fig. 40, where the edge of the pulley and the rim of the flywheel were faced smooth. The inside of the pulley was then bored, and the job reversed in the chuck, being held by tightening the jaws onto the pulley as in Fig. 41. The face of the rim was turned to diameter and a facing cut taken on the edge and also across the hub. The shaft hole was started with a heavy center drill, opened out to size and reamed (Fig. 41) with a number one Morse taper reamer, the work being tried on the shaft at intervals to insure a perfect fit. With the tapered hole reamed to proper depth the flywheel was mounted on the shaft and tightened firmly in place with the retaining nut, and the crankshaft again mounted between centers in the lathe where a light, finishing cut was taken on both the pulley and the wheel. This made the whole assembly, when mounted in the crankcase, run dead true. The flywheel was removed from the shaft and the unmachined parts given a light grey enamel finish.

The pistons were next machined and were chucked by the lug provided for that purpose. The inside of the piston, from the flange on the lower end of the skirt up to the wrist pin bearings, was bored smooth and the outside brought to exact diameter, the cylinders themselves being used as a ring gage.

The piston ring grooves were cut in with a parting tool, and were brought to correct size and depth by using a gage, Fig. 42, which was carefully filed to shape before hand. With this done the piston was removed from the chuck, reversed and rechucked for cutting off the lug, brought to correct length and the head turned smooth. The wrist pin hole was then carefully located, drilled in the crotch center and reamed through both holes as in Fig. 43. With the wrist pins made up, as indicated in the drawings, the pistons were ready for their rings and connecting rods. The rings in this case were purchased, and unless you have made them before, we advise doing the same.

Four stages of the work of machining the connecting rods is shown in the photo Fig. 44. First the rod was held in the drill press vise, and the screw holes drilled for retaining the cap on the big end. The cap was then sawed off with a fine blade hacksaw, the holes in the rod were threaded while those in the cap were opened out to clear the screws, and both the end of the rod and the cap were milled smooth. The cap was then screwed tightly in place and the crank pin hole drilled and reamed to size while held in the lathe chuck where the big end was turned smooth and brought to proper width. The other side of the big end can be finished by clamping to a mandrel, the mandrel then mounted between centers or held in a chuck, and the work finished. The little end was gripped in the three-jaw chuck, turned to shape and the wrist pin hole bored. The rods, draw-filed bright for appearance, are shown complete along with the pistons in Fig. 45.

The camshaft can be turned to precision on a specially built fixture but building the fixture will be as much work as building the entire motor so, in this case, the cams were shaped as accurately as possible by hand filing. They were first turned circular to the proper diameter and width, with the cams properly spaced, from a steel bar as shown in Fig. 46. The cams were then laid out, with great care, to the angles indicated in the drawings and were then filed to shape. The round part or back of each cam was turned circular with a parting tool while the lathe was turned over, back and forth, by hand. This sounds like labor but it did not take long and the accuracy obtained over filing made it worth while. The complete camshaft, with the large gear mounted in place, is shown in Fig. 47 and temporarily set in the crankcase in Fig. 48. The hole in the small stock gear had to be bored larger to fit the crankshaft and was done by chucking dead true, and boring with a small tool. The camshaft and its gears, the crankshaft with its bearings, rods and pistons were mounted in place and when these parts were all running smoothly work was started on the distributor and timer assembly.

Brazil has three airplane factories, and a fourth being built.

Diesel engines are often thought of as heavy, but diesels weighing less than two pounds per horsepower are being turned out for U. S. Army tanks.

Rubber paints for roads are said to resist abrasion and summer heat.

4th Fun With Trick Matches!

[*Continued from page 97*]

so that two more heads will be available.

When the supply of matches appears to be exhausted it is interesting to watch the amazement on the faces of your friends when you remove a toothpick from a holder and strike it into flame. Of course, the prepared toothpick is unobtrusively placed with the plain ones in the holder beforehand. Removing a candle from your pocket, already lighted, is a startling way of answering a request for a match. Coat the candle wick with paste, and pin a strip of striking surface (cut from a book of matches) just over an inside coat pocket. In withdrawing the candle, draw the treated wick against the striker and it will ignite instantly. It is best to prepare a dozen small candles in this manner so that the stunt can be repeated. The wick at each end of the candle can be prepared with match-head paste if desired.

Cigarettes are easily prepared in this manner and a striker can be glued to the outside of the cigarette package. After striking, puff on the cigarette immediately to get it going.

Before coating match sticks with the paste, the latter can be prepared to burn with a colored flame by merely adding a third part of a suitable chemical to each part of the paste. For green, use barium nitrate (or barium chlorate); for blue, copper chlorate; red, strontium nitrate; purple, lithium chloride. For silver sparks, mix the paste with an equal part of aluminum powder or filings; use fine iron filings in the same manner for gold sparks. Matches that will burn rapidly are prepared by soaking 1 inch of the stick adjoining the head with a hot, saturated solution of potassium nitrate. "Dud" matches can be made in the same manner by using a solution of alum or of photographer's hypo; they will light but will refuse to stay lit.

Cabin Name Plaques

[*Continued from page* 105]

By the combined use of plywood and manila rope attractive name plaques for seaside cabins may be easily made. The drawing below will give a clear idea of the method and its application. Most any name and design may be embodied in the plaque and it is just as attractive on boats as on cabins or marine club houses.

The plywood is protected with several coats of paint of the desired color and the rope is coated with clear shellac to retain its natural tint.

A feature of these designs is that by night they will show in attractive silhouette against any backlighting coming from the windows or a porch light. You will find these name plaques good projects for your workshop, which may be converted to profits by making them up for your friends. With the same basic methods much ingenuity may be applied in make-up of different designs.—*M. G. Winterton.*

Cart Wheel Game

[*Continued from page* 113]

tached to the base with a screw. Round the corners of the upper end and attach a brass pointer with a screw, the pointer being cut and bent from a strip ½″ wide and 2″ long. The wheel is turned from stock ½″ thick, and is finished 10″ in diameter. Turn a knob 2″ long as shown, gluing the end in a hole bored in the wheel at a point 2″ from the edge. Bore holes in the center of the wheel and through the upright, bolting the wheel in place with washers placed between wheel and upright, to permit it to turn freely. A lock nut can be used to secure the bolt. Describe a 10″ circle on a sheet of stiff paper, and another circle 9″ in diameter inside, trimming out the paper ring. Divide the paper ring into four equal sections, and divide each section into thirteen divisions, marking them with ink, from 2 to A as shown, to represent the thirteen cards of each suit. Glue the four cards on the face of the wheel, trimming the adjoining corners if necessary. Center each card in one of the four divisions on the dial, so that the numeral "8" will be directly over each card.

The game is played as follows, by as many as six players: Eliminate cards 2, 3, 4, and 5 from each suit. Shuffle and deal one more hand than there are players, the extra or dummy hand going to the dealer. Each player then spins the wheel in turn. If the pointer points to 6 of spades for instance, that player "antes" 6 chips in the pocket under that suit on the base board. If it happens to be 10 or a face card, he must ante 10 chips. After each person has spun the wheel and antied, play is continued. If the dealer is satisfied with the hand he picks up, he may sell the other hand to the highest bidder, but must not look at the hand he sells. The person to the dealer's left plays his lowest number card, regardless of suit. The player having the next higher card in that suit, plays it, and this continues until the Ace of that suit is played, unless play is stopped by a card in the discarded hand. If no player can make a play on a card, the player playing the last card changes to a red suit, playing his smallest, and play continues as before. When a player lays down the Ace of Hearts, King of Diamonds, Queen of Spades, or Jack of Clubs, he takes the "pot" of chips on the board beside that particular card. The first player to play his last card gets as many chips from other players as they have cards in their hands. The player to the dealer's left now becomes dealer and shuffles and deals the cards, while all players spin the wheel and ante the proper number of chips on the proper card on the board. When a player spins an "8" of any suit, all the other players must give him 5 chips, and he is not required to ante. Usually only one or two of the four "pots" of chips are collected in one hand, thereby increasing the number of chips stacked on certain cards, until someone plays the lucky card and makes a wind-fall. At the start of the game, each player is given 25 chips, and charged with that number under his name on a slip of paper. His "credit" is good for more chips in groups of 25, until the end of the game, and a careful account is kept of each player. The player with his "account" paid, and having the largest number of chips at the end of the game, wins the game.—*G. E. Van Horn.*

Making A Filipino Arrow

[*Continued from page* 113]

From stiff paper cut two wings as shown. Fold each at right angles on the dotted line and insert into the split end of the shaft, narrow edge toward the pointed end. Bind the shaft above and below the wings with strong twine. An inch below the wings cut a shallow groove round the shaft.

To launch the arrow you need a cord about 2′ long. Tie a knot in one end, place this knot in the groove, and wind the cord once round the shaft. Carry it down toward the point of the arrow and wind it round your hand. Holding the arrow in the position indicated throw it straight from you. —*J. Horton.*

Block And Thong Puzzle

[*Continued from page* 113]

back through slot X in the second block, and slip it over the end of the block as in E.

Your puzzle is now assembled (F) and the job of the victim to whom you hand it is to remove the blocks from the thong and put them on again. But practice it carefully yourself beforehand, because this is a "sticker."—*E. Guay.*

Auto Pump Discharges Bilge

[*Continued from page* 122]

water circulating or even one of the present day pumps for heater circulation will do. The latter is small of course, but if kept in operation for the entire time the motor is kept running, will suffice.

Sufficient room should be arranged for on the engine bed so the pump can be mounted not too near the engine. Then a suitable gear can be attached to the engine shaft and on the pump shaft to turn the pump when the engine is running at normal speed. A chain drive with a bicycle chain will do the trick.

An intake hose that dips to the bottom of the bilge and a discharge hose running out through the side of the boat will complete the circuit. Using a noiseless chain, well greased, will give silent and smooth operation.—*L. B. R.*

The practice of painting bridges in bright and attractive colors is said to be gaining favor with engineers.

Buffing Wheel

[*Continued from page* 110]

first placed on the grinder shaft, all the felt discs between the two metal discs with matching holes of the latter pieces approximately in line. One at a time, the sharpened "rivets" are now placed in a hand drill and driven through the small holes in the outside disc and then through the felt. Keep each rivet in line and parallel with grinder shaft as it is driven, so that it will come out close to the matching hole of the inside metal disc. Drive the rivets through these matching holes.

With the rivets in place, their sharp ends projecting at one end of the wheel, the entire assembly is now removed from the grinder shaft and the riveting completed. This is most easily done by compressing the wheel with a C clamp placed near each rivet in turn as it is cut off near the metal disc and peened. The latter operation is performed while holding the other end of rivet against a metal riveting block or similar surface. The work may be held at the edge of such block so that the C clamp will not interfere. In cutting off the sharp ends of the rivets care should be taken to make them each the same length; the rivets may be marked for cutting before they are put through the wheel if desired.

The buffing wheel is now finished except for truing up and evening its surface. With the wheel replaced on grinder shaft and secured with shaft nut, the power is switched on and a wood rasp held against the revolving wheel. The rasp should be rested on a support of some kind so that its edge is held parallel to the grinder shaft. Only the edge of rasp need be applied to the wheel, and only with slight pressure, for just a few minutes.

The wheel described will be found an excellent device for polishing and buffing all sorts of small articles, particularly those made of horn, or the various plastics now available to the home craftsman. If desired, the felt may be impregnated with prepared polishing compounds, or a paste of linseed oil and Fuller's Earth mixed to a medium consistency. The compound is simply rubbed into the felt with the fingers and may be replenished as needed.—*E. R. Augustin, Jr.*

Gas Syphon For Outboards

[*Continued from page* 122]

through the small tube. Cork is then loosened slightly and held until required amount of gasoline has been drained off. Pull cork and tubes out all the way to stop flow. This arrangement is very handy for filling outboard gas tanks in rough water.—*H. E. M.*

Probably the oldest visible relic of animal life on earth is a fossil imprint believed to be that of a stranded jellyfish found in red sandstone deposits over 500,000,000 years old.

Novel Funnel Desk Lamps

[*Continued from page* 128]

For the lamp shade, a tin funnel with a 6½" diameter mouth is just right. Using a fine-tooth hack saw, saw off the spout flush with the shoulder, as shown in Fig. 1. The remaining burr should be filed flat. A dime store shade-holding clip with an ornamental thumb nut is used for fastening the shade to the bulb. Remove all loose parts that come with the clip and solder the disc of the clip to the exact center of a 1⅜" outside diameter brass or iron washer. Place clip and washer inside the funnel with the washer contacting the shoulder (Fig. 2). Insert the machine screw that comes with the clip. Four brass or iron washers are now placed on top of the shoulder to form a cone shaped ornament to be capped with the thumb nut (Fig. 3). Fig. 2, gives the outside diameters of the four top washers and shows the simple assembly. When the thumb nut is twisted tight, the entire washer and clip assembly will be secure and there is no danger that the washers will slip out of line. To complete the shade, the outside of the funnel is given a coat of lacquer, and if desired, the inner surface can be given a coat of aluminum enamel. This is best done, of course, before the shade is assembled.

For the lamp base, a tin funnel with a 5" dia. mouth is about right. Saw off the spout at a position that will allow the collar on the cap of the push-switch socket to fit into the spout snugly, and solder the socket cap to the spout (Figs. 4 and 5). Drill a 7/16" hole through the seam close to the mouth of the funnel for a hard rubber threaded insulating bushing and lock nut (Fig. 5). Give the lamp base a coat of lacquer, and when dry, assemble and wire it.

The use of a beetleware funnel for the lamp base has several advantages. Soldering is done away with and no insulating bushing need be used. Beetleware funnels come in several different colors, thus, there is no need to lacquer them. The shade of the lamp can be lacquered to match the beetleware base, or the shade can be lacquered in a color to contrast with the base.

For the beetleware lamp base, a funnel with a 4½" dia. mouth is best. As shown in Fig. 6, the socket is clamped into the end of the spout by means of a length of threaded brass tubing, with a large washer and a lock nut inside the funnel mouth. The lamp cord is passed through the hole already provided in the funnel.

When an aluminum funnel is used for the lamp base, it is assembled in the same manner as the beetleware funnel base. An insulating bushing should be used, however, and the funnel can be given a coat of lacquer.—*Arthur Trauffer.*

Kansas' first commercial oil field was discovered in 1889.

Noted as the world's coldest place, Verkhoyansk, Siberia, has a temperature range from 94 below zero to 102 above.

Tractor Wagon

[*Continued from page* 129]

glued in the base. The wagon box is made of ¼-in. plywood for the sides, bottom, and flowers which are glued and nailed to the sides; and 2½-in stock end pieces. Two holes are drilled in the bottom to fit over the dowels glued in the base. A wire loop in the staple tacked to the front of the base forms a coupling when hooked over the dowel glued in the back of the other base. All bases are the same, making it possible to build and hook up a train of wagons if desired. The spade is cut, as indicated in the squared drawing, from 1-in. pine with a ¼-in. dowel glued in for a handle. A flower, also cut from 1-in. stock, is glued to the end of the handle. A similar flower is tacked to the end of a cord attached to the tractor base with which to pull the toy. Paint with enamel. The following colors are suggested: tractor blue, wagon box red, wheels orange, flowers on wheels red, flowers on tractor yellow, flowers on wagon yellow, orange, and blue; bases blue, dowels on tractor red; figure yellow coat, red hat, face and hands natural wood, spade natural wood, flower red, outlines black.

Remodel Your Rifle Stock

[*Continued from page* 125]

will improve handling qualities and appearance while helping to conceal the glued joint. Remember, however, *never* attempt to check a stock until at least two coats of linseed oil have been rubbed in—otherwise the wood will be brittle, causing the checked diamonds to crack off.

Figure 3 shows a simple, but thoroughly practical alteration. Cut off military stock as shown; and either make a new buttstock, or use a ready-made shotgun stock which can be purchased at small cost. All surfaces of the V-joint should be carefully spotted with chalk or lampblack, and scraped or filed to perfect contact at all points. Use best hide glue or waterproof casein for attaching, and clamp endwise for 24 hours. Two wood screws are then inserted as shown, their heads embedded, and later covered with two diamond-shaped inlays of ebony, bakelite, rubber or ivory.

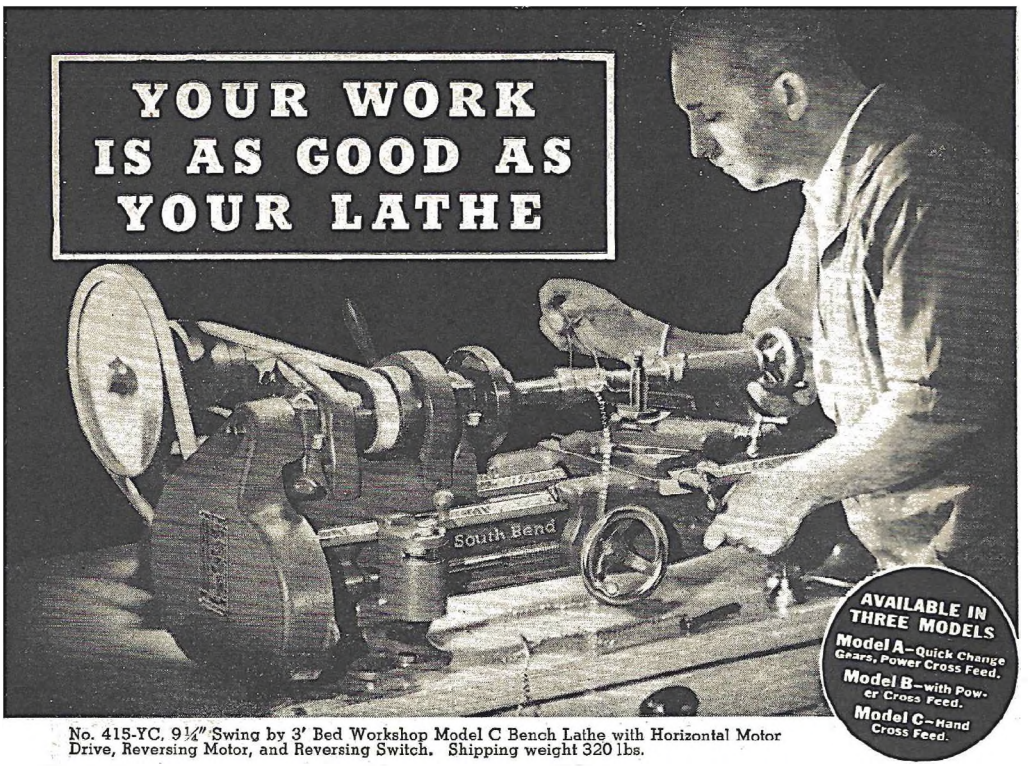
"Blue Streak"—Model Plane

[*Continued from page* 114]

other. This should be sufficient to take the model about 200 feet or more at the speed of at least sixty miles per hour. Add or remove not more than two strands at a time when adjusting the power.

For test flying pick out a large grassy field that will protect the propeller, the only really vulnerable part of the model.

Tobacco free from nicotine has been grown.



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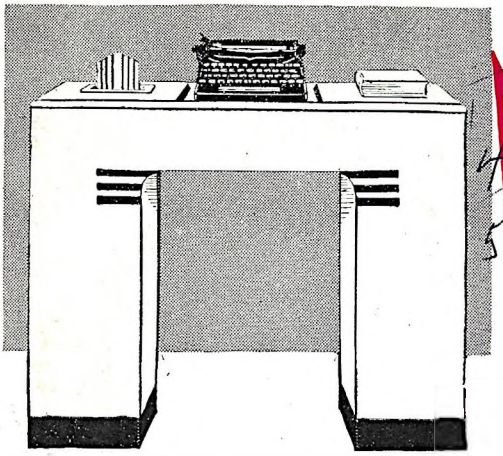

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