

DEC. 1957

MORE OF THE '58 NEW CARS

35 CENTS

# POPULAR MECHANICS

## MAGAZINE

WRITTEN SO YOU CAN UNDERSTAND IT

REG. TRADE MARK GREAT BRITAIN No. 40436

REG. U.S. PAT. OFF.

The Navy's Bobtailed Fireball  
—Page 121



**TUBELESS TIRES—**

*What Drivers Think of Them*

How to Measure Physical Fitness

*For the Craftsman*

**BUILD YOUR OWN TELESCOPE**

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*Remell Brown*



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\*Optional at extra cost.

This One



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Volume 108

DECEMBER 1957

Number 6

Address all communications to: 200 E. Ontario St., Chicago 11, Ill.

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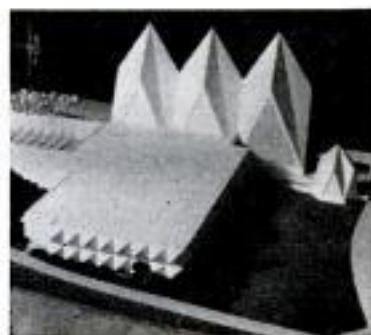
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## Next Month...

**BOLD ARCHITECTURE** will dominate the 1958 International Exhibition at Brussels. One of the startling structures, a symbol of the atom age, will be the Atomium—a 334-foot high model of an iron crystal. In the January issue you'll see a dramatic preview of the 1958 World's Fair



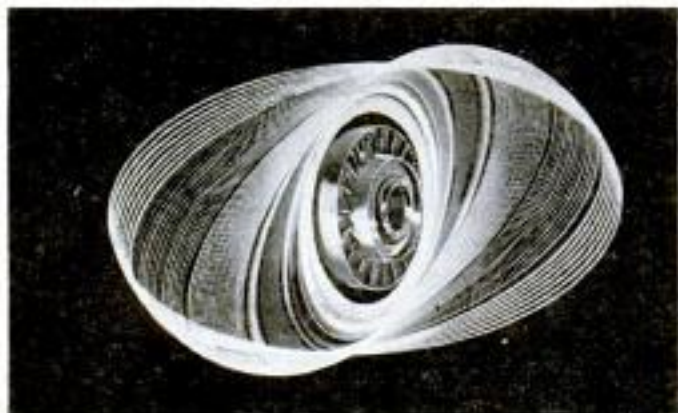


# The car that uses more aircraft principles than any other land-bound vehicle yet built

When you look at that Dynastar Grille — those dual Vista-Vision Headlights—you know you're observing a completely restyled Buick.

And when you drive it, you very soon understand why it was named the B-58 Buick, after the most advanced airplane yet designed.

For this car uses more principles straight from the world of aviation than any automobile in history.



It happened that many engineering ideas that were years in development all came together in one year. And they're all here in this 1958 Buick.

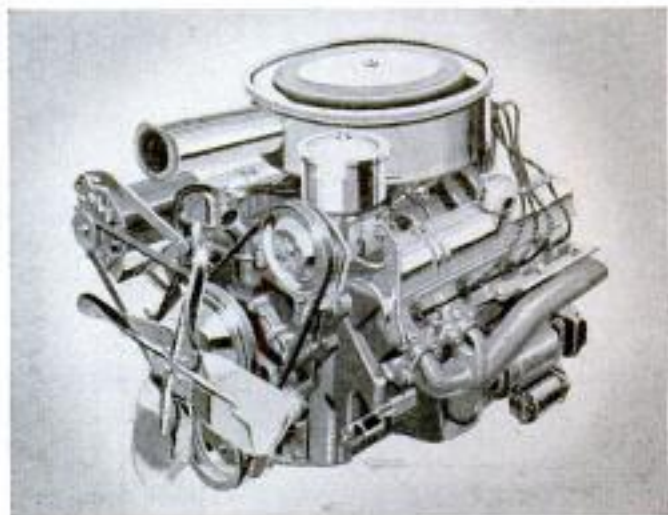
Read about some of these features in this brief article. Then see your Buick dealer for a very convincing demonstration of what these features do for your driving.

**1. Flight Pitch Dynaflow® Has First True, Infinitely Variable Stator** — As you raise or lower your foot on the gas pedal, you automatically change the angle of the blades in this stator. You literally switch the pitch a million ways, just like today's airplane propeller. Oil, pouring through these vanes against the pump

at 180 m.p.h., is redirected to suit every driving situation. You can have maximum power ratio for starting, hills, emergencies. You can have maximum economy ratio for effortless cruising. You're always in perfect pitch.

## **2. B-12000 Engine Develops Thrust of 12,000 Pounds Behind Each Piston Stroke—**

This is the most modern, the most efficient engine it is possible to build for today's fuels. Vertical-valved for compactness, this great power plant exerts a 10 to 1 compression—releases a thrust of 6 tons at each piston's power stroke. Combined with Flight Pitch Dynaflow, that results in superbly smooth and instantaneous



response — a sense of control utterly different from any other car of similar size and weight. Here is the first big car that's light on its feet.

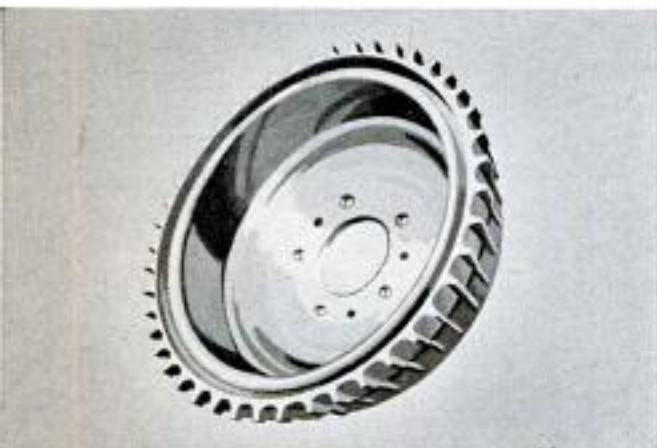
**3. Air-Cooled Aluminum Brakes\* Run Cooler, Make More Quick Stops Without "Fade"**—Aluminum absorbs and dissipates heat quickly — so Buick engineers built the front





When better automobiles are built Buick will build them

brake drums of aluminum. On each drum, they designed 45 fins, which hurl cooling air inside the brake. Still not content, they made all brake linings wider and thicker. The result: Straighter, surer, smoother braking — especially on downgrades. Longer lining-life, even in worst traffic areas.




**4. Miracle Ride plus Buick Air-Poise Suspension\* Is Automatically Self-Levelizing** — Buick's new ride begins with these traditional basics: X-member frame; full-length torque tube, soft coil springs at all four wheels. These, together with new ride improvements such as longer stabilizers and outrigger shock absorbers, produce a thrilling new experience that well



deserves the name, "The Miracle Ride." This same basic Buick ride engineering was made to order for air suspension — makes Buick's new Air-Poise Suspension the world's finest. Four columns of compressed air (in place of the four coil springs) give you an infinitely variable spring rate — same smoothness, same "come-back," same ideal height regardless of road or passenger weight or placement. No other ride approaches it.

BUICK Division of GENERAL MOTORS

*\*Flight Pitch Dynaflow standard on Limited and Roadmaster 75, optional at extra cost on other Series. Aluminum Brakes standard on all Series except Special. Air-Poise Suspension optional at extra cost on all Series.*

*It Looks and Feels Like*  *Flight on Wheels*

# The Air Born B-58 Buick

See TALES OF WELLS FARGO, Monday Nights, NBC-TV and THE PATRICE MUNSEL SHOW, Friday Nights, ABC-TV

DECEMBER 1957

5



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## ACROSS THE DESK



### Model Motorcycle

Our German correspondent, Hans F. Kutschbach, has sent along this photograph of Gunther Gad of Nuremberg with the



tiny motorcycle he built. It is a model of the Zuendapp KS 601. Gad is an apprentice in the Zuendapp shop and it took him several months to build the model.

### To the Editor:

The article, "Science Showman," in the October 1957 issue, page 136, indicates that you cannot sail a boat by blowing air from a fan attached to the boat into the sail. Unless this is a demonstration of air turbulence it isn't a very good demonstration, since it is possible to sail a boat in this fashion if the sail is set so that it doesn't reflect the air particles back into the air coming toward the sail. As a matter of fact, one type of braking action on jet planes uses this principle to produce a force opposite to the motion of the plane. Reflector sails or panels are inserted into the jet blast to direct the blast somewhat forward, which slows the plane down.

William P. Lawson,  
Boswell, Ind.

### To the Editor:

Would you please send us all the information on the plans of "The Traditional House" in the October 1957 PM?

(Continued to page 10)



# WHAT HAPPENS WHEN A MAN DECIDES TO DO SOMETHING ABOUT HIS FUTURE!

The proven rule of "learn more to earn more" took M.E.F. (name on request) from a position of truck driver to that of an accounting executive in sixteen months. Listen to what M.E.F. says:

"I was driving a truck—working long hours and not making much money. I had a burning desire to better myself in life, and decided to enroll with LaSalle. I went along driving my truck days and studying nights and got my first break after completing 35 assignments. I took a cost accounting position. Within one month after starting full-time, I received my first raise, thereafter followed more. One of the greatest thrills of my life came just nineteen months after I started with LaSalle. When our firm opened up a branch office, I was assigned to take charge of the Accounting Department and my salary has doubled."

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Send the coupon RIGHT NOW. Don't lay it aside and say you'll do it later. It can be the means of your SUCCESS—perhaps larger success than you have ever dreamed. At least it's worth considering.

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City, Zone, State . . . . .



# SKIPPED ME AGAIN!



POOR BURT! HE MISSED OUT ON THAT PROMOTION AGAIN!

I WAS DETERMINED TO MAKE GOOD IN MY JOB...BUT DETERMINATION, I FOUND, WAS NOT ENOUGH!

I HAD PLENTY OF EXPERIENCE. AND THE BOSS SEEMED TO LIKE ME. I LACKED JUST ONE THING—**TRAINING!**



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BURT, I'VE JUST MADE YOU THE ASSISTANT MANAGER OF YOUR DIVISION...AT \$15 MORE A WEEK. AND THE WAY YOU'RE GOING NOW, THIS IS JUST THE BEGINNING.



GOSH! THANKS MR. TAYLOR!

I GOT IT, HONEY! I GOT THE PROMOTION! OUR MONEY WORRIES ARE OVER! TODAY'S OUR LUCKY DAY!

TODAY AND THE DAY YOU MAILED THAT I.C.S. COUPON!



WHY NOT MAKE THIS YOUR LUCKY DAY? LET I.C.S. PUT YOU ON THE ROAD TO MORE PAY, RAPID ADVANCEMENT, REAL JOB SECURITY. HERE'S THE FAMOUS COUPON. MAIL IT NOW!



I WAS TIRED OF WAITING FOR "SOMEDAY."  
I MADE UP MY MIND TO ACT! I'D GET THE  
TRAINING I NEEDED...SOMEHOW!  
JANE HAD A SUGGESTION...

I CAN'T QUIT MY  
JOB AND GO BACK TO  
SCHOOL! AND I SURE  
DON'T WANT THAT  
NIGHT CLASS  
ROUTINE IN  
THE CITY!

WHY NOT STUDY  
AT HOME?...THE  
WAY DAD DID...  
WITH I.C.S.



JANE SHOWED ME AN I.C.S.  
ADVERTISEMENT IN POPULAR  
MECHANICS. THERE WAS THE  
FAMOUS COUPON.AND THERE WAS  
EXACTLY THE COURSE I WANTED..

SAY, THEY'LL SEND ME  
A CAREER KIT FREE...  
THREE BIG SUCCESS  
BOOKS.

DAD SAYS  
HE NEVER  
WOULD  
HAVE BEEN  
MANAGER IF IT  
WEREN'T  
FOR I.C.S.



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Welding</li> <li><input type="checkbox"/> Industrial Engineering</li> <li><input type="checkbox"/> Industrial Instrumentation</li> <li><input type="checkbox"/> Industrial Metallurgy</li> <li><input type="checkbox"/> Industrial Safety</li> <li><input type="checkbox"/> Machine Design</li> <li><input type="checkbox"/> Machine Shop Practice</li> <li><input type="checkbox"/> Mechanical Engineering</li> <li><input type="checkbox"/> Professional Engineer (Mech)</li> <li><input type="checkbox"/> Quality Control</li> <li><input type="checkbox"/> Reading Shop Blueprints</li> <li><input type="checkbox"/> Refrigeration and Air Conditioning</li> <li><input type="checkbox"/> Tool Design</li> <li><input type="checkbox"/> Tool Making</li> </ul> <p><b>RADIO, TELEVISION</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> General Electronics Tech.</li> </ul> | <ul style="list-style-type: none"> <li><input type="checkbox"/> Industrial Electronics</li> <li><input type="checkbox"/> Practical Radio-TV Eng'g</li> <li><input type="checkbox"/> Practical Telephony</li> <li><input type="checkbox"/> Radio-TV Servicing</li> </ul> <p><b>RAILROAD</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Car Inspector and Air Brake</li> <li><input type="checkbox"/> Diesel Electrician</li> <li><input type="checkbox"/> Diesel Engr. and Fireman</li> <li><input type="checkbox"/> Diesel Locomotive</li> </ul> <p><b>STEAM and DIESEL POWER</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Combustion Engineering</li> <li><input type="checkbox"/> Power Plant Engineer</li> <li><input type="checkbox"/> Stationary Diesel Engr.</li> <li><input type="checkbox"/> Stationary Fireman</li> </ul> <p><b>TEXTILE</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Carding and Spinning</li> <li><input type="checkbox"/> Cotton Manufacture</li> <li><input type="checkbox"/> Cotton Warping and Weaving</li> <li><input type="checkbox"/> Loom Fixing Technician</li> <li><input type="checkbox"/> Textile Designing</li> <li><input type="checkbox"/> Textile Finishing &amp; Dyeing</li> <li><input type="checkbox"/> Throwing</li> <li><input type="checkbox"/> Warping and Weaving</li> <li><input type="checkbox"/> Worsted Manufacturing</li> </ul> |
|--|--|--|--|---|

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(Continued from page 6)

Which of these two plans has the greatest call? My husband and I have a little bet on. I say Traditional. Thank you.

Mrs. Calvin Nicol,  
Brooklyn 33, N. Y.

During the first 15 days after publication, we have received 215 letters on the Traditional House and 201 on the Modern. We will probably receive thousands of additional letters, so you can see it is too early to claim a victory over your husband. Watch this column for results.—Ed.

### To the Editor:

I have been buying your magazine for the past four or five years and I always wait for the next issue with great interest,



as I believe it is always better than the last. I would like to send you a picture of my SS United States. I made it all out of Icelandic material and, of course, from your Popular Mechanics plans.

Gudni Hermansen,  
Herjolfsgotu 7,  
Vestmannaeyar, Iceland.

### To the Editor:

The article, "The Saga of the DC-3," August 1957 issue, was great. Let's have more like it. It's interesting to know the little-known facts about a truly great plane.

Joe Galvin,  
Melvindale, Mich.

### To the Editor:

In your issue dated August 1957, I noticed a picture of a caddy cart with a club selector fitted to it.

If the manufacturers are interested in an additional refinement, I would suggest fitting a measuring device to the cart: A dial would be set, while standing on the tee, at the distance in yards of the hole—then, as the player walked down the fairway after striking his drive, the meter would reduce

(Continued to page 12)






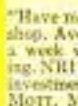
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
 "Started to repair sets six months after enrolling. Earned \$12 to \$15 a week in spare time."—**ADAM KRAULIK, JR.**, Sunnyside, Pennsylvania.

 "Have my own Radio-TV shop. Average about \$100 a week without advertising. NRI training my best investment."—**LARRY P. MOTT**, Miami, Fla.

 "Am doing Radio and Television Servicing full time. Now have my own shop. I owe my success to N.R.I."—**CURTIS STATH**, Ft. Madison, Iowa.

 "Am with WCOB. NRI course can't be beat. No trouble passing 1st class Radio-phone license exam."—**JESSE W. PARKER**, Meridian, Mississippi.

 "By the time I graduated I had paid for my course, a car and testing equipment. Can service toughest jobs."—**E. J. STRICKER**, New Boston, Ohio.

 "Before finishing the NRI course I was employed as Studio-Engineer at KMMJ. I am now announcing."—**BILL DIEZELLE**, Grand Island, Nebraska.

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(Continued from page 10)

the distance by the number of yards walked. When the player reached his ball, he could read the dial and be able to calculate how far remained to play and select his club accordingly.

W. A. Illsley,  
Provincial Secondary School,  
Okene, via Owo,  
Northern Nigeria.

**To the Editor:**



No longer silent is this 70-year-old wooden Indian that graced the cigar stores of yesteryear. Fitted with a two-way intercommunication system, the venerable chieftain can strike up a conversation with passers-by, as for example the day he startled a girl by chiding her for having her picture snapped with her arm about him.

The voluble redskin stands in front of a tobacco shop in St. Thomas, Ont., Can., and is rolled inside every night.

Henry Miller,  
Winnipeg 5, Man., Can.

**To the Editor:**

Herman Eck of Wykoff, Minn., has probably owned and driven the same car longer than any other man in the United States, according to Edward T. Ragsdale, general manager of Buick and vice-president of General Motors. Just to prove it, Eck threw a party a short time ago for the car, marking the 40th anniversary of the purchase of a 1917 Buick. Friends of Eck wrote Ragsdale about it and he sent Eck a miniature of a 1957 Buick and congratulated him on "driving the same car longer than any other person." Eck has driven his car about 144,000 miles and has never been cited for a traffic violation. He had one minor accident in 1921 when a man on horseback ran into him. Eck said he always had serviced his own car and takes pride in keeping it in top running condition. "I bought the car for \$750," he explained. "I said it would last me a lifetime, but people just laughed at me. But I think I can make it last for another ten years or so."

Sorry, no further details from Buick's public relations department about that man on horseback.—Ed.





# INVENTORS

**L**earn how to protect your invention. The U. S. Patent Laws provide that any new and useful art, machine, article of manufacture, or composition of matter, or any new and useful improvement thereof, may be patented if the act of invention is involved. Therefore, every inventor with a valuable invention should take advantage of the Patent Laws and proceed for patent protection in order to safeguard his rights.

A patent gives the inventor the exclusive right to prevent others from making, using, or selling the invention claimed in the patent for a period of seventeen years.

The Patent Laws were enacted for the benefit of the inventor to give him protection for the features of his invention which are patentable. These features must be properly and concisely set forth and claimed in a formal application for patent, in order to comply with the requirements of the Patent Laws. For that reason, unless the inventor is familiar with patent matters, he should engage a competent registered patent attorney or agent to represent him. We are registered to practice before the U. S. Patent Office and are prepared to serve you in the handling of your patent matters.

A specially prepared booklet entitled "Patent Guide for the Inventor", containing detailed information with respect to patent protection and procedure, together with a "Record of Invention" form will be promptly forwarded to you without obligation upon request.

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The firm of McMorrow, Berman & Davidson, with offices in Washington, D. C., is qualified to take the necessary steps for you. We can make a preliminary search on your invention, advise you whether we think it can be patented, and prepare your application for patent.

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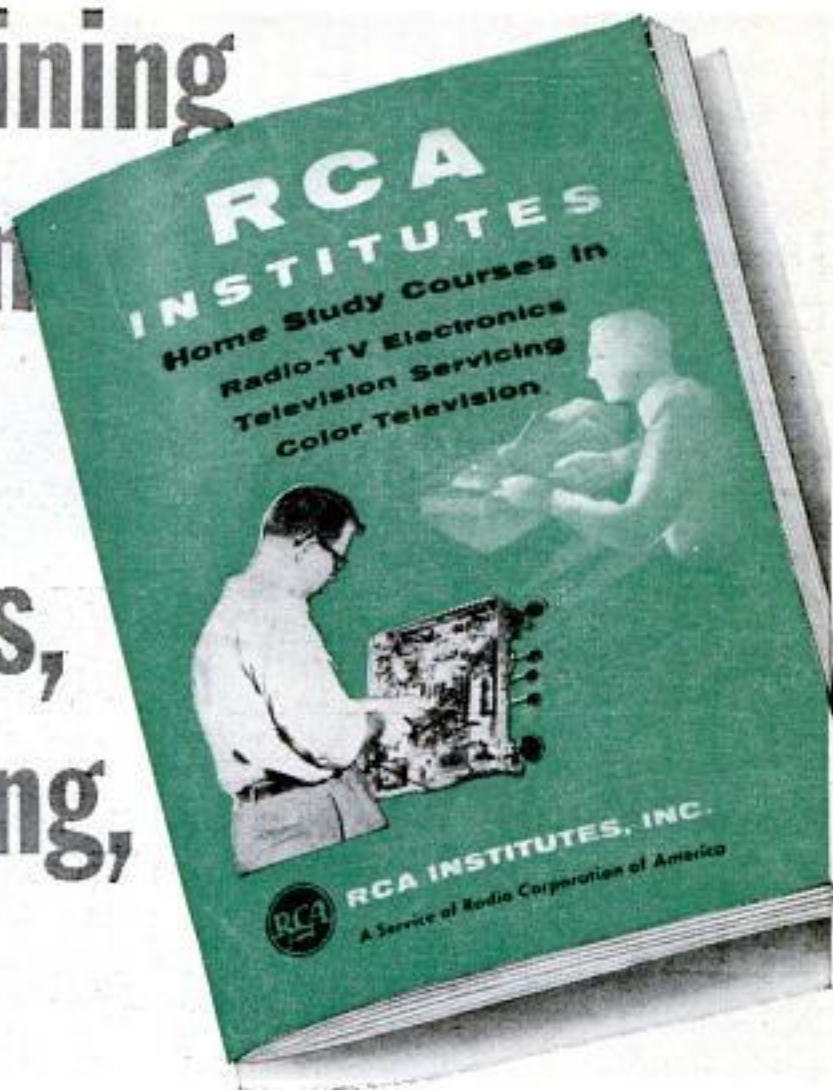
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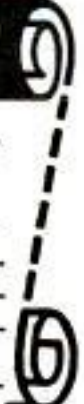
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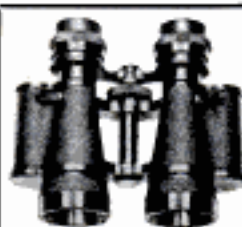
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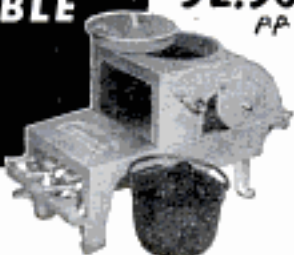
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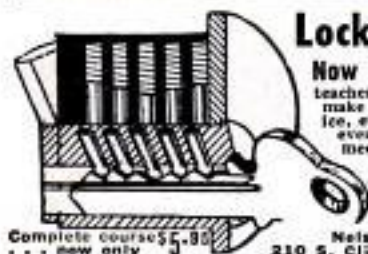
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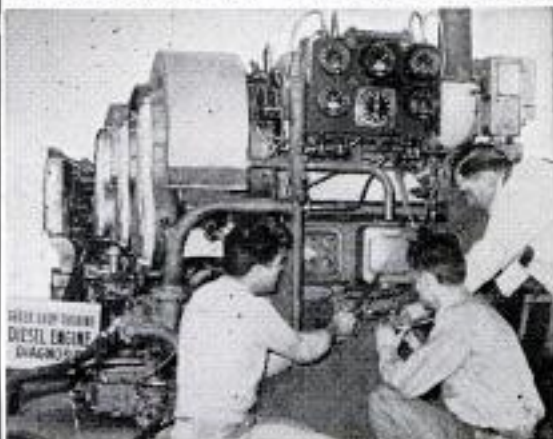
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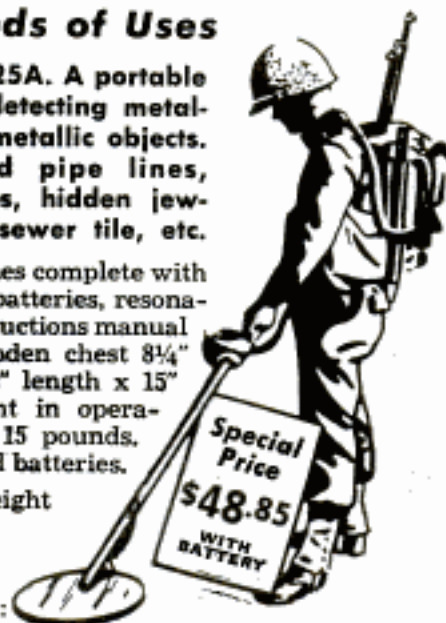
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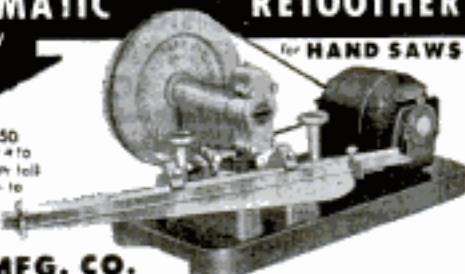
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Blueprints</li> </ul> <p><b>ART</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Commercial Art</li> <li><input type="checkbox"/> Magazine &amp; Book Illus.</li> <li><input type="checkbox"/> Show Card and Sign Lettering</li> <li><input type="checkbox"/> Sketching and Painting</li> </ul> <p><b>AUTOMOTIVE</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Automobiles</li> <li><input type="checkbox"/> Auto Body Rebuilding and Refinishing</li> <li><input type="checkbox"/> Auto Engine Tuneup</li> <li><input type="checkbox"/> Auto Technician</li> </ul> | <p><b>AVIATION</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Aero-Engineering Technology</li> <li><input type="checkbox"/> Aircraft &amp; Engine Mechanic</li> </ul> <p><b>BUSINESS</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Accounting</li> <li><input type="checkbox"/> Advertising</li> <li><input type="checkbox"/> Business Administration</li> <li><input type="checkbox"/> Business Management</li> <li><input type="checkbox"/> Cost Accounting</li> <li><input type="checkbox"/> Creative Salesmanship</li> <li><input type="checkbox"/> Managing a Small Business</li> <li><input type="checkbox"/> Professional Secretary</li> <li><input type="checkbox"/> Public Accounting</li> <li><input type="checkbox"/> Purchasing Agent</li> <li><input type="checkbox"/> Salesmanship</li> <li><input type="checkbox"/> Salesmanship and Management</li> <li><input type="checkbox"/> Traffic Management</li> </ul> <p><b>CHEMICAL</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Analytical Chemistry</li> <li><input type="checkbox"/> Chemical Engineering</li> <li><input type="checkbox"/> Chem. Lab. Technician</li> <li><input type="checkbox"/> Elements of Nuclear Energy</li> <li><input type="checkbox"/> General Chemistry</li> <li><input type="checkbox"/> Natural Gas Prod. and Trans.</li> <li><input type="checkbox"/> Petroleum Prod. and Engr.</li> <li><input type="checkbox"/> Professional Engineer (Chem)</li> <li><input type="checkbox"/> Pulp and Paper Making</li> </ul> | <p><b>CIVIL ENGINEERING</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Civil Engineering</li> <li><input type="checkbox"/> Construction Engineering</li> <li><input type="checkbox"/> Highway Engineering</li> <li><input type="checkbox"/> Professional Engineer (Civil)</li> <li><input type="checkbox"/> Reading Struc. Blueprints</li> <li><input type="checkbox"/> Structural Engineering</li> <li><input type="checkbox"/> Surveying and Mapping</li> </ul> <p><b>DRAFTING</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Aircraft Drafting</li> <li><input type="checkbox"/> Architectural Drafting</li> <li><input type="checkbox"/> Drafting Machine Design</li> <li><input type="checkbox"/> Electrical Drafting</li> <li><input type="checkbox"/> Mechanical Drafting</li> <li><input type="checkbox"/> Sheet Metal Drafting</li> <li><input type="checkbox"/> Structural Drafting</li> </ul> <p><b>ELECTRICAL</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Electrical Engineering</li> <li><input type="checkbox"/> Elec. Engr. Technician</li> <li><input type="checkbox"/> Elec. Light and Power</li> <li><input type="checkbox"/> Practical Electrician</li> <li><input type="checkbox"/> Practical Lineman</li> <li><input type="checkbox"/> Professional Engineer (Elec)</li> </ul> <p><b>HIGH SCHOOL</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> High School Diploma</li> </ul> | <ul style="list-style-type: none"> <li><input type="checkbox"/> Good English</li> <li><input type="checkbox"/> High School Mathematics</li> <li><input type="checkbox"/> Short Story Writing</li> </ul> <p><b>LEADERSHIP</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Industrial Foremanship</li> <li><input type="checkbox"/> Industrial Supervision</li> <li><input type="checkbox"/> Personnel-Labor Relations</li> <li><input type="checkbox"/> Supervision</li> </ul> <p><b>MECHANICAL and SHOP</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Diesel Engines</li> <li><input type="checkbox"/> Gas-Elec. Welding</li> <li><input type="checkbox"/> Industrial Engineering</li> <li><input type="checkbox"/> Industrial Instrumentation</li> <li><input type="checkbox"/> Industrial Metallurgy</li> <li><input type="checkbox"/> Industrial Safety</li> <li><input type="checkbox"/> Machine Design</li> <li><input type="checkbox"/> Machine Shop Practice</li> <li><input type="checkbox"/> Mechanical Engineering</li> <li><input type="checkbox"/> Professional Engineer (Mech)</li> <li><input type="checkbox"/> Quality Control</li> <li><input type="checkbox"/> Reading Shop Blueprints</li> <li><input type="checkbox"/> Refrigeration and Air Conditioning</li> <li><input type="checkbox"/> Tool Design</li> <li><input type="checkbox"/> Tool Making</li> </ul> <p><b>RADIO, TELEVISION</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> General Electronics Tech.</li> </ul> | <ul style="list-style-type: none"> <li><input type="checkbox"/> Industrial Electronics</li> <li><input type="checkbox"/> Practical Radio-TV Eng'g</li> <li><input type="checkbox"/> Practical Telephony</li> <li><input type="checkbox"/> Radio-TV Servicing</li> </ul> <p><b>RAILROAD</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Car Inspector and Air Brake</li> <li><input type="checkbox"/> Diesel Electrician</li> <li><input type="checkbox"/> Diesel Engr. and Fireman</li> <li><input type="checkbox"/> Diesel Locomotive</li> </ul> <p><b>STEAM and DIESEL POWER</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Combustion Engineering</li> <li><input type="checkbox"/> Power Plant Engineer</li> <li><input type="checkbox"/> Stationary Diesel Engr.</li> <li><input type="checkbox"/> Stationary Fireman</li> </ul> <p><b>TEXTILE</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Carding and Spinning</li> <li><input type="checkbox"/> Cotton Manufacture</li> <li><input type="checkbox"/> Cotton Warping and Weaving</li> <li><input type="checkbox"/> Loom Fixing Technician</li> <li><input type="checkbox"/> Textile Designing</li> <li><input type="checkbox"/> Textile Finishing &amp; Dyeing</li> <li><input type="checkbox"/> Throwing</li> <li><input type="checkbox"/> Warping and Weaving</li> <li><input type="checkbox"/> Worsted Manufacturing</li> </ul> |
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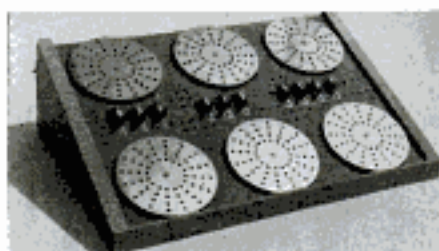


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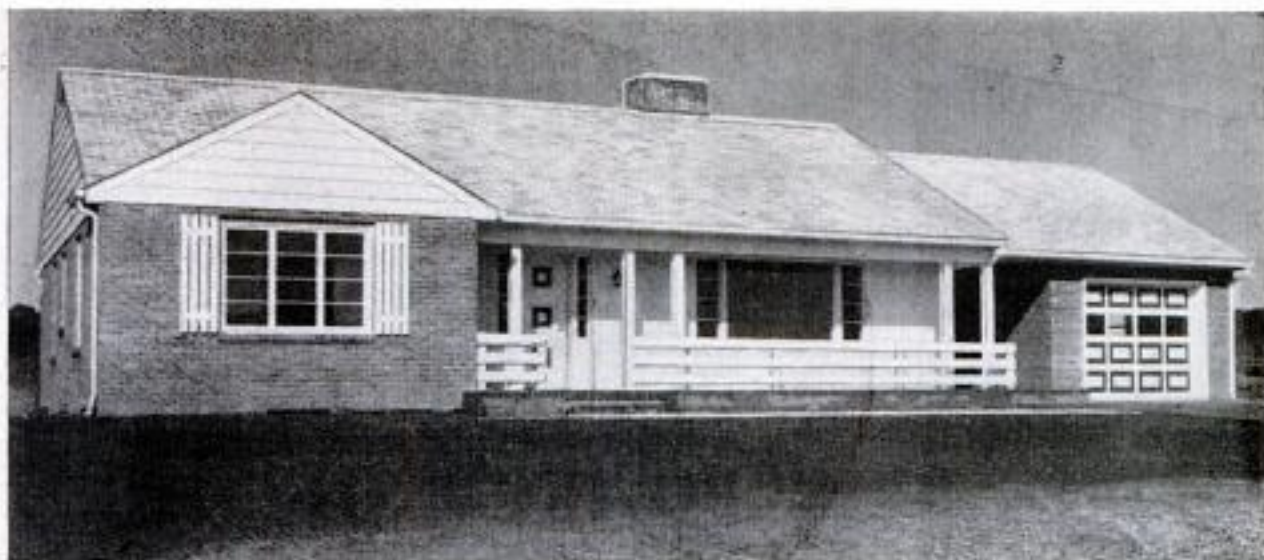


Students in industrial-arts courses started their project by staking out the site for the house

## High School Students

WORKING ABOUT THREE HOURS a day, 84 boys enrolled in the industrial-arts courses at Hagerstown (Maryland) High School built a seven-room brick house as part of their regular instruction program. How well the boys did is shown by the fact that the house was sold for \$21,000. Also, 60 of the students were offered jobs in the building trades. The project had the backing of trade unions and contractors alike. In fact, representatives of both groups served on the advisory committee. The house, including the breezeway and garage, measures 67 by 34 feet. It contains a living room, dining room, kitchen, three bedrooms and a bath. Basic plans for the house were drawn by Standard Homes, Washington, D. C., although the boys added the breezeway, garage and a few other touches themselves. Plumbing and plastering are not included among the building courses offered at the school so these jobs were performed by adult workmen. Excavating for the foundation involved equipment not available at the school and it, also, was done by a private contractor. Everything else, from staking out the site to applying the shingles on the roof, was done by students under the guidance of their teachers. By the time the house was completed the boys enrolled in carpentry, bricklaying, sheet-metal and electrical-wiring courses had received valuable on-the-job training. The house was completed in two school terms.





The boys added the garage and breezeway to the original house plan. The seven-room home sold for \$21,000

## Build a House

Boys in electrical-wiring class acquired plenty of practical experience on project

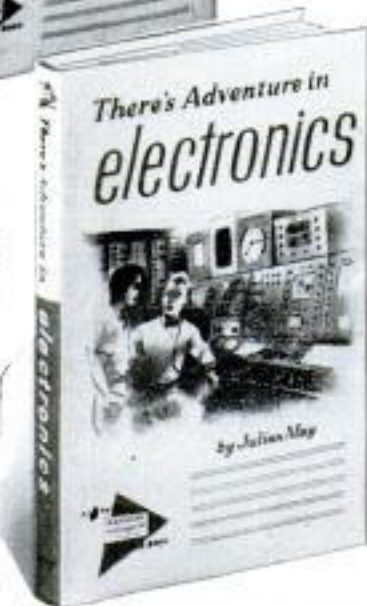
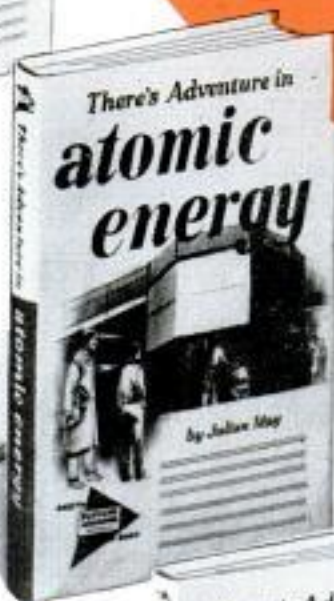
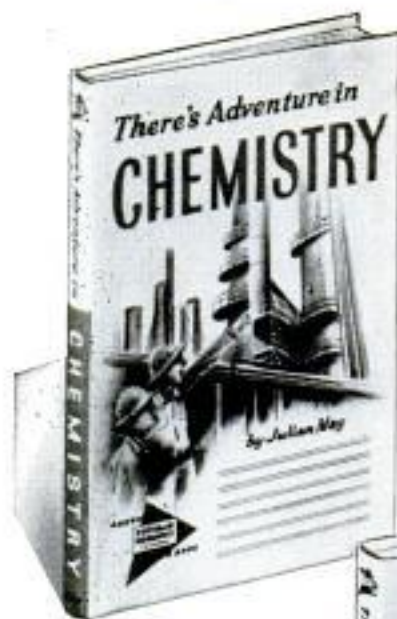


Besides on-the-job training in bricklaying, masonry-class pupils were taught the proper way to lay concrete foundation

Carpentry students used electric power saws. Trade unions and contractors helped supervise the educational project







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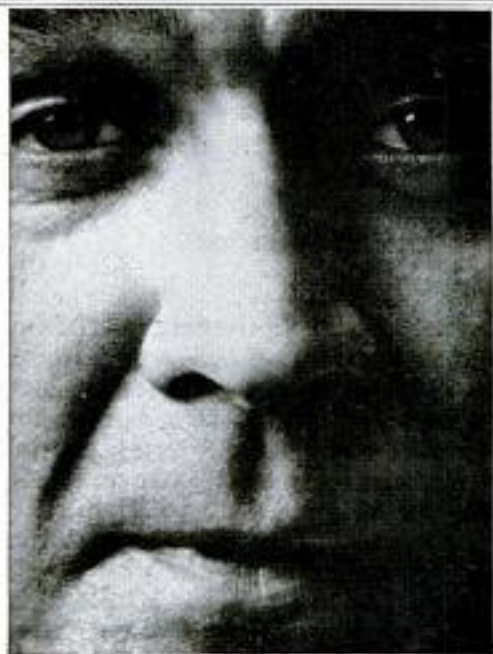


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That was because they didn't know Maria Mitchell. At 12 she could regulate a ship's chronometer; at 17 she understood Bowditch's "Practical Navigator" and was studying science in self-taught French, German and Latin. In time she would become the first woman member of the American Academy of Arts and

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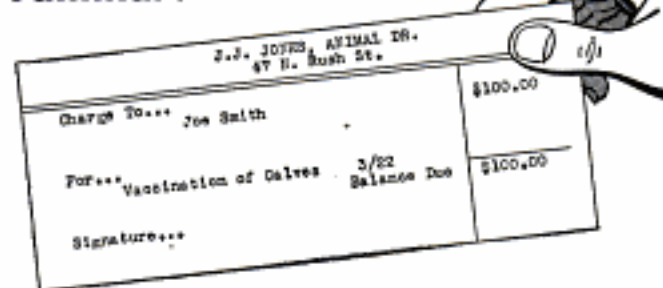
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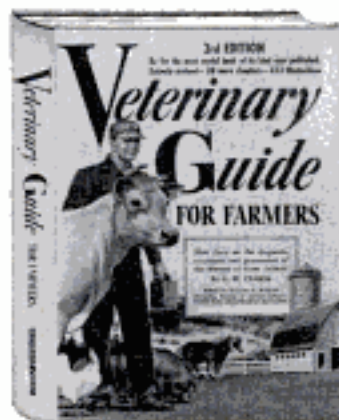


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# SKILLS for AMERICA THE ENGINEERING TECHNICIAN

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"90% of the men on my staff have a technical education. I insist on it. We must have men with technical training or we won't progress. In my case, I feel the training I took through a technical institute contributed directly to my success. It's given me responsibility I wouldn't have otherwise. And that goes for any man eager for advancement—get a technical education first." *Hugo E. Free, Welding Superintendent, The Oilgear Co.*

## THE ENGINEERING TECHNICIAN

By Karl O. Werwath

Chairman, Working Group on Supporting Technical Personnel of the President's Committee on Scientists and Engineers

Perhaps the fastest growing area of higher education in the United States is the technical institute type, which prepares engineering technicians to meet the increasing number of occupational responsibilities in our technological economy.

This growing need for specialized technical manpower is in two directions: the depth of technical know-how and the greater number of trained people required. We frequently refer to the shortage of technical personnel as a "shortage of engineers". Actually, this is only a part of the problem, since the numerous new semi-professional occupations, coupled with the alarmingly small number of qualified engineering technicians to fill them, is even a more serious matter.

The modern industrial nation requires about 200 new four-year engineering graduates per million population per year. At the present, this would mean approximately 35,000 graduate engineers each year. We are graduating considerably less than that number. These engineers are part of an engineering team which should include five engineering technicians for each graduate engineer, in addition to the required skilled craftsmen. In our national educational pattern this relationship is almost the opposite, with less than one-fifth the needed number of engineering technicians now graduating from technical institute type courses. To attain the proper proportions and thus retain our position in a growing technological economy, we in the United States must develop talent to produce annually a greater number of engineers and up to ten times the number of qualified technicians.

But who is this engineering technician? What does he do and what is his preparation for his work? He is broadly defined as one who is engaged in certain vital, fundamental technical functions of product development, production, distribution, installation, operation and maintenance. While the engineer plans,

"Advancement? An adequate technical education is vital to advancement. The training I received in a school of engineering has helped me coordinate the dozens of technical activities in broadcasting, and has led directly to my position of responsibility." *Norbert J. Richard, Engineering Supervisor, Station WISN, Milwaukee, Wis.*



"The man with insight into technical problems because of his training will be promoted by his employer. My position and salary have progressed due to my technical education." *William P. Gainer, Television Engineer, Station WISN-TV, Milwaukee, Wis.*



"The man with a technical education gets first consideration over all others when we interview. This is a policy in our company. We look for men with imagination, a sense for the practical, and the kind of training that enables them to grasp technical problems and solve them. My business partner and I are both graduates of a technical institute. This training has helped us develop our own business. Naturally we believe in its value to others." *Omer M. Larson, Secretary-Treasurer, Federal Store Equipment Co., Inc.*





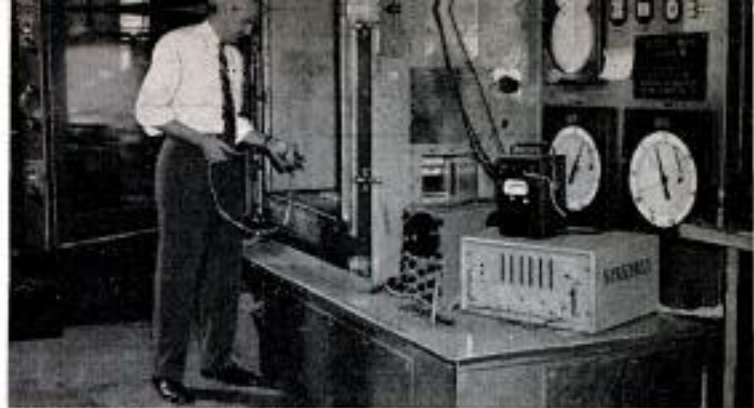
the technician makes and does; while the engineer creates, the technician applies. The technician is often the liaison between the professional man and the craftsman.

There are now over 100 accredited or approved courses in ten major fields in which technicians have become prominent and in which technician employment opportunities have demanded course development. These fields include aeronautical design, maintenance and production; air conditioning, heating and refrigeration; architecture and building construction; civil technology; electronics and radio-television; electrical power and control; instrumentation and watchmaking; metal fabrication and tool design; photographic; and steam, diesel and automotive technology.

Courses are from one to three years in length but generally require two academic years of full-time study. High school graduation or equivalent is needed for admission and most courses have specific additional matriculation stipulations. These programs are briefer and more technical in content than are professional curriculums. They include a heavy schedule of specialized technical subjects and are balanced with a program of related studies in mathematics, physical sciences, and engineering drawing. English, economics, human relations round out most schedules. Such technical institute courses are offered by privately endowed, public and proprietary institutions in many of the metropolitan areas of the nation and generally lead to a degree of Associate in Applied Science with a major in a technical specialty.

The pattern of successfully established programs have two basic, distinguishing factors. First, a technical institute curriculum is planned around the technical specialties and a neatly integrated combination of supporting subjects, both geared to dynamic industrial requirements. It is a specific form of higher education and is not a combination of skill training courses with some aspects of broader education. Second, the course also takes into account that the engineering technician, in executing his work, is a part of management. His education, of necessity then, also includes such training as is required of a leader in a free-enterprise technological environment.

The opportunities in this field open a broad choice of careers for hundreds of thousands of Americans who can also make a real contribution in advancing the interests of a strong, healthy economy and in strengthening the national defense.



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500 DIFFERENT Stamps only 50¢ with approvals. Littleton Stamp Company, Littleton Tl. New Hampshire.

ONE Hundred stamps plus beautiful pictorial mint set only 10¢. Approvals. Robdal Stamp Department, Riverside, Connecticut.

135 DIFFERENT U.S. commemoratives \$1.00. 50-25¢. Request approvals. Harold Holub, 18 East 198th Street, New York 68, N. Y.

200 WORLDWIDE 10¢ To approval applicants. Collins', P.O. Box 125, Shell Beach, Calif.

FOREIGN Stamps, 1¢ to 5¢ approvals. Barr, 467 Oneida, Pittsburgh 11, Penna.

FREE! 50 Different Portuguese; colorful, inexpensive approvals. Elkhart, Box 33, Elkhart, Indiana.

CANADA, 100 Different 35¢ with bargain approvals. K. S. Holmes, London, Canada.

QUALITY Approvals at 2¢ each. Hadrian, 22 East 29th, New York City 18.

FREE! Over 100 different, \$2.50 value, including Israel, British Colonies, U. S., First U. N., Siberia; triangles, animals, sports. Approvals, illustrated catalogue accompany. Send 10¢ for mailing. Gatewood, Box 348, Winston-Salem, N. C.

1958 U. S. Illustrated catalogue free. Stone, 192 Washington, Boston 8, Mass.

FREE Sample! Interesting, informative, illustrated. National Stamp News, Anderson, South Carolina.

### ANTIQUES, RELICS, INDIAN GOODS, CURIOS

SCALPING Knife, spearhead, thunderbird \$4.00. Catalog free. Arrowhead, Glenwood, Arkansas.

ANCIENT Grooved stone tomahawk \$3.00. Indian relic list free. Lear's, Glenwood, Arkansas.

4 PERFECT Arrowheads \$1.00. Smith, 841 N. Tacoma, Indianapolis 1, Indiana.

COLORFUL Indian design beaded belts. Genuine leather. Three-quarter inch width \$1.95, one inch width \$3.95, lengths 20" to 44". State width and length. Excellent gifts. Cheshire Specialties Co., 40 Pine Terrace, Cheshire, Connecticut.

ILLINOIS: Gesundheit—For sale: several hundred Revolutionary, Civil War, Indian muskets, rifles, carbines, swords, bayonets, powder-horns, bullet molds, holsters, canteens, Kentucky rifles, frontiers, duelling pistols, Stagecoach guns, 50,000 collectors cartridges. Many Confederate items, 10,000 coins, Confederate money, 100,000 Indian relics, arrowheads, spearheads, tomahawks, bannerstones, discoids, mounted birds, squirrels, deerheads, steer-horns. Violin wood, agates, fossils, minerals. Gold dollars. Illustrated catalog 35¢. Heicke Armory, Wenona, Illinois.

INDIAN Relics, baskets, weapons. Lists 10¢. Rush, 34, Belvidere, N. J.

ARROWHEAD Making kit, complete instructions, \$2.00. Master lost art easy! Chief Blackhawk, Box 564-N, Kennewick, Washington.

### PRECIOUS STONES, MINERALS

FAIRYSTONES, Genuine, from old Virginia. Only spot on earth found. Only stone worn by many presidents. Stone and beautiful legend \$1.00. Stonehenge, 1809 Brantley, Winston-Salem, N. C.

SAPPHIRE, Topaz, tourmaline, garnet, peridot. Five uncut gem specimens, \$1.00. Ten polished gems, baroque shaped, \$1.00. Free bargain list jewelry, gems. Profitable, easy "do-it-yourself" projects. O'Brien's, 1118M Wilcox, Hollywood 38, Calif.

DIAMONDS: Discounted, registered, written guarantee. Example: Genuine flawless Marshall diamond, 1/4 carat mounted. Your price: \$77.00 plus tax. Write, House of Marshall, 11 Lawrence St., Lyons 3, New York.

LARGEST Gem and mineral magazine tells how to have profitable fun with rocks, gems, jewelry. Monthly, \$3.00 year. Sample 25¢. Gems & Minerals, Dept. A10, Mentone, California.

FIFTEEN Genuine gemstones mounted in attractive case including history of gemstones \$3.00. Individual gemstones 50¢. Major Industries, Box 147, Morris-town, N. J.

CUT Gems, make jewelry—For profit or fun. 100 page magazine tells how; where to get supplies. Sample 25¢ or request free literature. Lapidary Journal, Del Mar 2, Calif.

EARTH Science, the rockhounds national magazine. Subscription \$2.00. Sample 35¢. Box 1357-PM, Chicago 90, Ill.

AGATES, Gems, machines. Free list. Northwest Gems, 2819 North Warner, Tacoma 7, Washington.

### HOBBIES AND COLLECTIONS

ARMY-Navy-Marines—A.F., one regulation military belt with brass buckle plus 25 assorted medals, badges, campaign ribbons, battle stars, patches, ratings etc. All for \$1.00. Supreme Military, Dept. PM, 48 West 27 St., New York City.

MILITARY Miniatures. Civil War. Custer's Cavalry, American Revolution and U. S. Marines. Illustrated catalog 35¢. Bussler Miniatures, Dept. Z, 40 Howe St., Quincy 69, Mass.

COLLECT Handcuffs, legions. Unique, exciting hobby. 25¢ brings list, illustrated article. Patterson Smith, IFL, 269 Shepard, E. Orange, N. J.

MINIATURE Soldiers. Over 700 different sets to choose from. Catalog 10¢. Willard Snyder, 1809 Ranstead St., Philadelphia 3, Penna.

HOBBIES, Models, supplies. 270 page catalog \$1.00. Refunded upon \$5.00 in orders. Joyner's, 221 N. Limestone, Lexington, Ky.

GORGEOUS Shells and marine life from Seven Seas, \$2.00, \$5.00, \$10.00 assortments. Satisfaction guaranteed, cash with order postage extra. Jeans, 42 Evergreen Road, North Fort Myers, Florida.

NEW, 15 Different match covers 10¢ Box 202, Rochester 1, N. Y.

PROPAGANDA Leaflets W. W. II; sample 25¢; Nazi medals, badges, sample 50¢; embroidered swastika and catalog 25¢. Insignia Club, Box 71, Rockaway Park A-94, N. Y.

NAZI Medals listings 10¢. Kingstone, 920 Third, (338) Seattle 4, Washington.

COLLECTORS Matchbook covers. 100 different unused, \$1.00. Catalog 25¢. Album \$3.00. Charles Edelman, 1311-C East 84, Cleveland 3, Ohio.

NAZI Insignia, 12 different \$1.00. Medals, patches, armbands, flags, daggers. Illustrated lists. 15 cents. Hobbyland, 1207 1st St., W., Calgary, Canada.

INVENTING Can be an interesting and profitable hobby. Write for complete particulars. Institute of American Inventors, Dept. 40-E, 635-F St., N.W., Washington 4, D. C.

### CAMERAS, PHOTO SUPPLIES

FREE! Free! Send for your new 52 page photographic bargain book. Over 5,000 new and used items at huge savings. For your free bargain book, write to Dept. 1112, Central Camera Co., Chicago 4, Ill.

KODAK, Bell-Howell, discounts to 40% Photo equipment, appliances, free catalog. Mailers Mart, Box 135-MP 3 Pelham, New York.

COMPLETE, Quality Beseler "Dream Darkroom" kit contains everything necessary to set up modern darkroom in your home. Free booklet, "Fun in the Darkroom," tells how your whole family can enjoy pleasures of darkroom photography, earn sparetime money too. Write Charles Beseler Co., 206M South 18th Street, East Orange, New Jersey.

PHOTOGRAPHY For pleasure or profit. Learn at home. Practical basic training. Long established school. Free booklet. American School of Photography, 835 Diversey Parkway, Dept. 3442, Chicago 14.

PRINT 100 Pictures on cloth, etc., \$1.00. Young, Box 655P, Waterloo, Iowa.

### PHOTO FINISHING

COLOR Processing—High quality, fast service and low prices. Kodachrome developing \$34; prints 27¢. Kodachrome: 35mm. processing, 20 exposures; \$1.45; 35 exposures, \$2.25. Send for complete price list and free mailers. Photo-Mall, Box 216M, Madison Square Station, New York City 10.

3 DAY Service on beautiful personalized Christmas cards from your photo or negative. Write for free sample and information. Lincoln Studios, Dept. K, Box 13, Lincoln, Nebr.

QUALITY Kodak finishing, 8 exposure roll 40¢; 12 exposure 60¢; 16 exposure 70¢. Reprints 5¢. Fast service. Guaranteed quality. 40 years continuous operation. Be a satisfied customer. We do color. Send for mailers. Mail Order Photo Service, Box 397, Watertown, Wisconsin.

AMAZING Photos made invisible, can be developed again, etc. Many commercial possibilities. Airmail \$10 bill (or equivalent currency) for process and samples. International Inventors, Box 871, Copenhagen (O), Denmark.

25 WALLET Size silk finish photos from any picture, \$1.00 with this ad. Original returned unharmed. Studio, Box 701, Springfield, Missouri.

MAKE Better enlargements; BlendOray screens. Any enlarger, no retouching, \$1.00. Nichols Photo, Bristol, Penna.

KODACHROME Processing—8mm roll or 35mm 20 exp., \$1.25. Prompt service. Write for mailer and prices. Color Pix, Dept. P, CPO Box 30, Kingston, N. Y.

FREE! Color snapshot folder. Offers, lists, mailers. Houghton's, Erving, Mass.

12 EXPOSURE Rolls, 35¢, jumbo prints. Guaranteed work, one day service, Lincoln Studios, Dept. K, Box 13, Lincoln, Nebraska.

8-HOUR Service on deluxe jumbo prints. 8-exposure roll developed and 8 jumbo prints 40¢, 12 exposure 55¢, 16 exposure 70¢; 35mm, 20 exposure 75¢, 36 exposure \$1.25. Jumbo deckle edge reprints 4¢ each. Contact prints made if specified. Bay Photo Service, P.O. Box 210, Oakland, California.

ENLARGEMENTS, Heavyweight seven 5x7's or four 8x10's \$1.00. Jack Koons, Huntington Mills, Luzerne County, Penna.

KODACOLOR Prints 25¢. Save over \$1.00 on full roll developed and printed. 8 exposure rolls \$2.25, 12 exposures \$3.45. All color Laboratories, Box 24, Dept. 81, St. Louis, Mo.

PARTICULAR? 8 Jumbos—40¢ 12—50¢. Special; 35 mm., 36 exposures \$1.25. Introductory offer. Flash Foto, Box 38M, Brooklyn 4, N. Y.

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NEW 1958 Bargain discount 8 mm catalogue also 16 mm sound. Write National Cinema, 71 Dey Street, New York City. Specify 7 or 16 mm.

16MM Film sale. Rentals \$3.95. Sound Films, Box 262, Chicopee, Mass.

16MM, Movies, 35 mm, slides, sold and rented. Huntoon Rentals, Bellows Falls, Vermont.

ALASKA Wildlife Kodachrome movies and slides. Free catalog. Mac's Foto, 315—14th, Anchorage, Alaska.

RECORDERS, Hi-Fi. Free catalogue. Carstan, 215 E. 88 St., New York City 28.

5,000 8-16MM. Movie films. Free catalogues. International, Greenvale, N. Y.

FREE! Blackhawk's big new 1958 sale catalog new and used 16mm., 8mm. movies; 2" x 2" color slides; used 16mm. sound projectors! Biggest stock in U.S.A.! Cameras, accessories, supplies, too! Blackhawk Films, Davenport 14, Iowa.

MOVIE Camera film: 8mm. roll \$1.50, 16mm. 100' \$3.00. Free processing. Better Films, 742 New Lots, Brooklyn, N. Y.

8-16MM. Films. Free catalogue, with sample film 10¢. Garden, 690 Howard Avenue, Brooklyn, N. Y.

SAVE 50%! Guaranteed-fresh color, b.&w. movie film! 8mm., 16mm. Free catalog! Eco-R, 47th Holly, Kansas City 12, Missouri.

8MM Movies 50 ft. \$1.00. Special offer—Animals, cartoons, travel, comedies. Send \$1.00. Movieland Films Inc., 16121M Sherman Way, Van Nuys, California.

### MUSIC AND MUSICAL INSTRUMENTS

RECORDS, Hi-Fi. Big discounts. Noelson, Box 211, Wall Street, New York City 5.

WRITE Songs. Big money and reputation. Write for information. J. Gordon Pub. Co., 4700 South California Avenue, Chicago.

SONGS Into dollars. Share \$29 million dollars yearly for new songwriters, song-poets. Songs composed, published, promoted by famous firm. Information, appraisal free. Send to Nerdyke Publishing, 6000 Sunset, Hollywood 28PM, California.



**SONGPOEMS** And lyrics wanted. Mail to: TinPan Alley, Inc., 1650 Broadway, New York 19, N. Y.

**POEMS** Wanted for new songs. Send poems. Free examination. Immediate consideration. Songcrafters, 2724 Arcade Station, Nashville, Tenn.

**POEMS** Wanted for new songs. Send poems. Immediate consideration. Crown Music Company, 49-C West 32 Street, New York City.

**ELECTRIC** Guitars, amplifiers, wholesale. Free catalog. Carvin P.M.M. Covina, California.

**SWISS** Musical movements, \$1.90. Helax, 218 West 72nd Street, New York City 23.

**ACCORDIONS**, Wholesale to everyone. Save up to 60%. All national known brands. Free catalogue. Del Principe, 29 South Cicero, Chicago 44.

**POEMS**, Songs wanted! Publishing, recording. Bengal, 93 Jefferson, Chelsea 50, Massachusetts.

**SONG** Request guarantees royalties. Instructions two dollars. Howard Olenik, Mt. Morris, Mich.

**SWISS** Musical movements. (Best.) \$2.50. Spelman, 131 West 42nd, New York City 36.

**SONGWRITERS**: Melodies furnished 50-50 basis. Records, protection. National Songwriter's Guild, 16H Ocean Shore Drive, Ormond Beach, Florida.

**ACCORDIONS** - Direct from importer. Save 50% and more! Free trial. Lifetime guarantee. Trades accepted. Free catalog. Write Accordion Manufacturers Outlet, Dept. 127-R, 2003 Chicago, Chicago 22.

**VIOLIN** Makers supplies. Free catalog. 309 W. Fourth, Los Angeles 13.

**ACCORDIONS** Wholesale—10 day trial. Free catalog. American Accordion Center, 5329-PM-12, Belmont, Chicago.

**CLARINETS** And trumpets from factory. Save 50%. Free information. Libro's Music Center, 591 Chapel St., New Haven, Conn.

### RADIO, TELEVISION AND ELECTRONICS

**CRYSTAL** Radio experimenters write to Hulet, 305 Hope, Lakewood, N. J.

**FREE!** Giant bargain catalog. Transistor, "Sun" radios, kits, portables, audio, electronics, photographic, optics, tools, household. Write Lektron, 131M Everett Ave., Chelsea, Mass.

**CRYSTAL** Radio kit \$1.00, preassembled \$1.25, phone \$1.75; catalogue. Clearco Crystal Company, 2966 North 4th, Milwaukee 13, Wisconsin.

**GOVERNMENT** Surplus. Radios, parabolic reflectors. Amazing picture list 10¢. Meshna, Malden 48, Mass.

**TAPE** Recorders, hi fi components, tapes. Unusual values. Free catalog. Dressner, 69-02M 174 St., Flushing 65, N. Y.

"20 DX Crystal Set Plans" handbook—30¢. Laboratories, 328-C Fuller, Redwood City, California.

**TRANSISTOR** Kits, parts. Free information. Transit, Box 15-F7, Alden Manor, N. Y.

### BUSINESS OPPORTUNITIES

**UNIQUELY** Different! Profitable mail-order opportunities galore! Powerful advertising copy! Revealing information! Craft, 2494 So. 10th, Fresno 25, Calif.

**TO \$100.00** Weekly. Sparetime, home operated mailorder business. Successful beginner's plan. Everything supplied. Lynn, 10420-N National, Los Angeles 34.

**OPERATE** Mail-order printing brokerage. Details free. Advisory Service, Hartsdale, N. Y.

**MAKE** Money taking orders on leading name brand tools. No inventory to carry. \$1,000,000.00 stock to draw on. Profits up to 50%. Send \$1.00 for giant wholesale catalog. \$1.00. Refunded first purchase. U. S. Supply, Dept. CL-2, 149 Church Street, New York, New York.

**FREE** "Franchise Profit Letter," describes nationwide opportunities. Exclusive distributorships, dealerships, agency operations. Write today. National Franchise Reports, 333 North Michigan, Chicago 1.

**SHINE** Cars without polish. New invention. Lightning seller. Cars gleam like mirror. Samples sent on trial. Kristee 114, Akron, Ohio.

**EXCLUSIVE** Distributorship available in most areas for world-famous cadmium battery guaranteed to outlast your car. Tremendous profit opportunity. Investment for merchandise only. Free franchise. Cadmium Battery, Corporation Dept. 102, El Segundo, California.

**SELL** By mail. Experts give tested methods. Alfano, 19 Pine, Closter, New Jersey.

**CASH** Income collecting local information. No selling. Free details. Dorco, Box 494, Muncie, Ind.

**MAKE** Strong, sawdust, or earthen boards. Build attractive, fireproof houses. 800% profit. Exclusive territory. Bays Laboratory, Oklahoma City 9.

**LET** Me sell your products nationally. I'll send you free information on how to establish sparetime-full time Casecraft business. You build! We sell! Everything supplied. Abars, 807-SE Sunset, Los Angeles 12, Calif.

**OPERATE** Profitable home business, by mail. B. Mann, Woodcliff Lake, New Jersey.

**FOOL** Proof! The amazing method that makes all fortunes. Write: Ideal Industries, 1430-W Monroe, Chicago 7, Ill.

**MAKE** Big money selling merchandise by mail! Possibly a fortune. We supply catalogs, customers names. Fill your orders. Money making details free! Harvey Sales, 5713 Euclid, Cleveland 3, Ohio.

**CASH** From sawdust, seventy methods. Tin-cans, thirty methods. Newspapers, eighteen methods. Instructions 50¢ each. All three \$1.00. Charles Company, 12-XAR, Norwood, Ohio.

**WANTED:** Home producers, to be subcontractors. Cast plastic products for manufacturers in our clearing house service. Thousands of easily made items required. Cash in at home, without previous experience. Plastic Service Associates, Dept. 12-PM, East Boston 28, Massachusetts.

**BECOME** Tax consultant. Graduates earn to \$3,000 every tax season preparing returns evenings. State approved. Union Institute, Hoboken 2F, N. J.

**OPERATE** Profitable mail order business. Write Walter Service, 4159A East 112th, Cleveland 5, Ohio.

**GROW** Expensive herbs for us! Big profits home-business of your own. Year around profitability! We supply everything necessary! Send for free amazing facts and revealing plan. National Herb Exchange, Dept. DR, Gardena, Calif.

"**HOW** To Start a Business" booklet sent free! If you know any trade, go into business for yourself! Learn the 9 easy steps to follow. We've guided 5,000 others to success. Revealing free booklet yours for the asking! Write! National Business Consultants, Office DR, Los Angeles 61, Calif.

**GROW** A living miniature forest or orchard (only inches high), that bears tasty tiny fruit at home. Learn amazing dwarfing secrets! Sensational fascinating hobby, profitable home-business opportunity. Free details! Miniature Nurseries, Dept. DR, Gardena, California.

**BUY** At wholesale prices! Resell at big profits. Brand name merchandise—Appliances, cookware, housewares, watches, jewelry, rings, dry goods, clothing, luggage, tools, sporting goods, toys, gifts, etc. Free 1958 color catalog. Write today. Merit Home Products, Dept. PM-12, 107 Manhattan Ave., Brooklyn 6, New York.

**HOME-Import** mail order business—Import profitable items below wholesale. Experience and product investment unnecessary. Full, spare time. Famous world trader guides you. Free list "157 Imports," details. Mellinger, G70C, Los Angeles 24.

**START** Your own business on credit. Your own boss. 1527 dealers sold \$5,000 to \$32,000 in 1956. We supply stocks, equipment on credit. 200 home necessities. Sales experience unnecessary. Pleasant profitable business backed by world-wide industry. Write Rawleigh's, Dept. L-U-PPM, Freeport, Ill.

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**FREE** Lesson. Repair your TV set, or friends. Amazing new Isotronic system trains you to handle any TV service job in one short week! Start your own business. Save up to \$200 on schooling. Write: Electronic Engineering, Dept. AC-17C, 1038 S. LaBrea, Los Angeles 19, Calif.

**MAIL** Order advertising agency executive reveals sensational no-risk advertising and merchandise methods. Start in office or home; minimum capital; positive profits. Free details! Impact! 3407 Prospect Avenue, Dept. 11-12, Cleveland 13, Ohio.

**MAKE** Money! Sharpen carbide tools and drills. "Do it yourself" in your basement or garage with new patented "Coolie-Grinderlap." Easy to use Re-Lod-Able, Re-Set-Able diamond wheel included. Fine diamond finish gets business. Build steady route, pick up and deliver. Cash business of your own. Machine used by largest companies. Plugs into any light circuit, weight 100 lbs., cheap to operate. Write for free instruction books, prices and territory. DTCO., Box 33, South Haven, Mich.

**HOT** Air heat, your area, sell neighbors, stores, wholesale, retail, sample, \$1.00, unsatisfied, money back. Alvin Richards, 240 S. Exchange, St. Paul 2 Minn.

**LEARN** Flower arrangement and floristry. Start your own business, part or full time. Many good paying positions open. Earn while learning. Send for free book. National Landscape Institute, Studio M-127-C, 11826 San Vicente Blvd., Los Angeles 49, Calif.

**READ** "Mailorder Laws and Regulations" and "Mailorder Rules for Beginners". Learn about necessary licenses, different taxes, legal requirements, etc. Both books, \$2.00. Tasker, 1603 Peach Street, Alexandria, Virginia.

**BIGGEST** Money makers in the field; Acme saw and lawnmower sharpeners. Free literature. Max Mfg. Co., 133 Stockton Ave., San Jose 26, Calif.

**MANUFACTURER** Plastic fishing lures, 95% finished, direct from our moulds. Send \$5.00. You are in business with stock. Returnable. Quaker City Manufacturing Company, 3514-24 N. Lawrence St., Philadelphia 40, Penna.

**OPERATE** Profitable mail order business. Write Universal, 166 N. Seymour, Fond Du Lac, Wisconsin.

**OPERATE** Mailorder printing brokerage. Details free. Advisory Service, Hartsdale, New York.

**MAKE** Extra money. Cash commissions. Everybody buys easy-to-sell advertising book matches. Union label. All sizes. Cuts for all businesses. Powerhouse selling kit free. Steady repeat business. No experience necessary. Superior Match Co., Dept. MX-1257, 7528 S. Greenwood, Chicago 19.

**MONEY** Wants you. Tells 97 ways to "Make A Million." Others have. Why can't you? Free details. Woodward, 1221 Edgewood, Havertown, (3B), Penna.

**MAKE** \$25.00 Or more daily. For more information send \$1.00 to James Montano, 1601 Young St., Santa Fe, N. Mex.

**\$250.00** WEEK Spare time profit possible. Earn at home with new fascinating printing method. \$5 starts you. Send no money now. Free confidential facts and valuable samples. Screen-Print, DR, Los Angeles 61.

**FREE** Listings of unique opportunities. Unlimited profits. Fortune Enterprises, Addison, Illinois.

**100** NYLON Hose rejects \$2.00. Allsheer Mills, 21831 Cloverlawn, Oak Park, Mich.

**TYPIST** Operate profitable mailorder business. Stamp brings details. General Sales, Creve Coeur, Ill.

**EASY** Christmas cash. Your own name on hand-painted tie. Wear yours, receive quick sales. Ideal personalized gift. \$3.50. You keep \$1.25. Starting sample only \$2.00. Get your name sample today. Consumers Counsel, 17811-P Detroit Avenue, Cleveland 7, Ohio.

**100% PROFIT** Mailing needed automotive product. Laircraft, Box J-5008, Detroit 35, Michigan.

**\$69.00** WEEKLY, Sparetime - Easy! Home Venetian blind laundry. Free book. Burt, 2434EP, Wichita 13, Kansas.

**MAKE** Money sharpening saws, lawnmowers sparetime with Foley machines. Cash business, customers repeat. Free book shows how to start. Victor A. Foley Co., Columbia Heights, Minn.

"**TURN** Rags Into Riches." Methods \$1.00. Metro, Box 151-J, Oak Park, Illinois.

**LEARN** Mailorder selling. Pays big! Free Colliers' reprint! Elliott, 252-A Gainsboro, Toronto 8, Canada.



LEARN Real estate by listening to records. Lee Institute, Brookline 46, Mass.

FREE Folder — "137 Successful Home Businesses." Service, Box 636PM, Newport News, Virginia.

BUY Wholesale! Appliances, tools, watches, auto accessories, etc. Huge discounts. United Wholesalers, 1265-F Broadway, New York 1, N. Y.

READ The truth about mail order business from beginner's standpoint. 10,000 word idea booklet "How to Build Your Own Mail Order Business" 50¢ postpaid. Promptly refunded if not satisfied. Robert K. Brown, Box 72, North Tonawanda, New York.

CAMERA Owners! Earn \$50.00 week-ends! Instructions \$1.00, information free! Kline, 935-PM North Austin, Chicago 51, Illinois.

SELL African wood carvings, busts, figures, heads, etc. Huge profits. Details free or \$1.00 with sample carving. Kempe, Box 4098, San Diego 4, California.

LEARN The termite business. Free information. Hamlin Institute, Hamlin, W. Va.

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COLORGLAZED Concrete pottery made without molds. Patented method. Cemetery products, novelties, tiles. Basement leak-sealing. Money-making projects. Booklet, details free. Men only. National Potteries Company, Grand Rapids, Minnesota.

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PLASTERCRAFT Molds and supplies. Pollet Studios, Box 362, Moorhead, Minn.

VALUABLE Distributorship throughout United States. With exceptional high rate of earnings. A business established over 20 years with 200,000 users. Investment \$8,500-\$12,500. Box 1457, 1501 Broadway, New York.

PIANO Tuning learned quickly at home. Tremendous field! Musical knowledge unnecessary. Information free. Empire School of Piano Tuning, Champaign, Ill. (Founded 1935).

MUSHROOMS Quicker, easier, cheaper. Newest facts free. Luxur, 641 South 19th, Newark 3, N. J.

THEY Hand him \$100! Free packet Secret Journal. 919 secrets-plans! Work home. Publicae, Oceanside, Calif.

HOW To grow orchids at home. Profitable, fascinating. Successful home grower shows you how he does it. Free, full details. Orchidland, 100 S. Vermont, Los Angeles 4.

POPCORN And potato chip equipment. Ekins, Box 933 A7, Springfield, Ohio.

BUY Direct from factories—Appliances, cameras, watches! Free details! Cam Company, 6810PM-20th Ave., Brooklyn 4, N. Y.

MIMEOGRAPHING Services pay sensational local profits. Exciting secret plans exposed! Write: Moxelle Mimeo Shop, Bonham 7, Texas.

SELL Books by mail. 400% profit. Royal, Box 368-X, Cleveland 27, Ohio.

REBUILD Batteries; repair dolls; make rubber stamps. "75 ideas" free. Universal, Box 1076-A, Peoria, Ill.

\$34.70 TWO Hours. Manufacturing. No selling. Carlayne Castings, 1803 Fremont, Rapid City, South Dakota.

BRUSH Plating outfits for plating articles in the home and shop. No tanks necessary, silvering mirrors, spare or full time. Free particulars. Gunmetal Co., Ave. H, Decatur, Illinois.

BUY Wholesale! Over 10,000 nationally advertised products. Appliances, cameras, sporting goods, housewares, watches, typewriters, tools, clothing, etc. Send postcard today. Buy-Rite, Box 258, Hawthorne 1, New Jersey.

WANT To make big money at home? \$10.00 profit in an hour possible with invisible mending. Make tears, holes, disappear from clothing, fabrics. Steady year-round demand from cleaners, laundries, homes. Details free. Fabricon, 6234 Broadway, Chicago 40, Illinois.

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OPERATE Mailorder folio business! Free details. Ballard's, 425 East Catherine, Louisville 3, Ky.

MAKE Flexible molds. Cast plaques, figurines. Free sample. Tooker, 1045-R Fairview, Hamilton, Ohio.

NATURAL Molding rubber, extra thick. Free sample. W. Wooley, 1016-A Donald, Peoria, Illinois.

BIG Money raising fishworms and crickets. Free literature. Carter Farms, Plains, Georgia.

START Home business making statuary, plaques, novelties, garden furniture, artificial marble flooring, liquid marble. Make your own flexible molds. Amazing profits. Only \$1.58. Free literature. Popular Mechanics Press, 631 No. St. Clair St., Chicago 11.

WANT More business? Here's an amazing opportunity to increase your sales. Talk to thousands of interested readers of "Mechanics Popular." Our Spanish Edition covers the Latin American countries like a blanket. They're real mailorder buyers. Classified rate 75¢ per word. Try an ad in our next issue. Classified Advertising Department, Popular Mechanics Magazine, 200 East Ontario Street, Chicago 11, Ill.

VENDING Machines—No selling. Operate a route of coin machines and earn amazing profits. 32-page catalog free. Parkway Machine Corporation, Dept. 28, 715 Ensor Street, Baltimore 2, Maryland.

\$70 WEEKLY—Home, spare time. Simplified mail bookkeeping. Immediate income—easy! Auditax, 34757A, Los Angeles 34.

BREED Rare tropical fish at home. Earn big money! Learn secrets! Help fill huge demand. Amazing opportunity! Free plan. Tropical Fish Breeders, Los Angeles 81, Calif.

MINK Raising information free. Complete. Lake Superior Mink Farm. Superior, EEL, Wisconsin.

COPUBLISH Mail Sale Advertiser, leading mail order paper. Details, latest copy, dime. Vanroy Shirk, Lebanon, Penna.

LEARN Photo-negative portrait retouching. Men, women. \$5 hour possible spare or full time at home. Easy, glamorous. Work for photographers by mail order. Pull details sent free. Duval, 100 So. Vermont, Los Angeles 4.

YOUR Own name brand business. No investment; no inventory. Part time or full time. Sell famous brands of appliances, housewares, silverware, radios, vacuum cleaners, lamps, tools, clocks, watches, jewelry, etc., etc., over 1000 items. Join thousands of successful independent dealers. Send for free catalog and dealer price list. H. B. Davis Corp., Dept. 11, 145 W. 15 St., New York City.

11,000 NEW Prospects daily. Baby record books, shoes, albums. Sell mailorder. Use our literature. Write: No-Co-Ro, Capitola, California.

BAKE New greaseless doughnuts in kitchen. Sell stores. Free recipes. M. Ray, 3605 South 15th, Minneapolis 7, Minnesota.

FIX Typewriters. Inexpensive home course teaches factory secrets. Free booklet. Athey, Tarentum, Penna.

MONEY For you! Big profits! Cast plaster figurines, bookends, plaques at home with XL rubber molds. No experience needed! Write for illustrated, 40-page catalog, only 25¢! Plastic Arts Studios, 3403 So. Madison Street, Department 3, Muncie, Indiana.

PLATE Baby shoes, jewelry, gifts, bronze and colored pearl. Free booklet. Platex, 11029 South Vermont, Los Angeles 44.

FREE Catalog. Contains hundreds of businesses, farms and income properties throughout U.S., Canada. Specify type and location desired. Deal direct with owners. U. I. Buyers Digest, 1608 Hillhurst, Dept. PM-3, Los Angeles 27, Calif.

LIQUID Rubber. Make flexible molds. Free sample. Chaney, 1907-A East Road, Jacksonville 11, Florida.

START Home mimeographing business. Pays amazing profits. Literature free. Housel, Lanoka Harbor, N. J.

BOOKKEEPERS, Accountants. Operate a bookkeeping service. Part or full time. Amazing simplified system. Wonderful money-making opportunities. Complete information free. National Bookkeeping Publishing Co., Suite 307, 3435 Broadway, Kansas City 11, Mo.

WE Pay \$3.50 lb. dried. Grow mushrooms. Cellar, shed and outdoors. Spare, full time, year round. We have 25,000 customers. Free book. Washington Mushroom Ind., Dept. 172, 2964 Admiral Way, Seattle, Wash.

\$250 WEEK Cleaning venetian blinds. Patented machinery. Free literature. Robinson, 7213B, Indianapolis 1, Indiana.

FREE Book "505 Odd, Successful Businesses." Work home. Pacific, Oceanside, Calif.

INTERNATIONAL Mailorder business. Complete setup service—Not just instructions. Hermes, 152 West 42, New York City 36.

PLASTERCRAFT Molds, liquid rubber, plasters, flocks, candle supplies. Catalog and manual free. Blue Rapids Supply, Blue Rapids, Kansas.

I Want to send you proof of the wonderful pulling power of Popular Mechanics classified pages. What's your proposition? Write me today. Include literature if possible. F. W. Johnson, Manager Classified Advertising, Popular Mechanics Magazine, 200 E. Ontario St., Chicago 11, Ill.

FREE Folio "\$5,000-\$45,000. Unlimited Vacations." No merchandise. Unknown! Work home, sparetime! Haylings, Carlsbad, Calif.

MARY-Mac agency—motorized vibrator. Cushions, chairs, tables, belts. Mary-Mac Factory, 1013 Powhattan, Dallas, Texas.

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TERMITE Control brings big income and lifelong security. Professional methods bring income within 2 weeks; Free details. Meritrol, 231 17th St., Bakersfield, Calif.

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**\$35-\$200 WEEKLY** Plating baby shoes, making costume jewelry, novelties, etc. Details free. Jo-Ca Electroplater, 7840-D Northwest Sixth Court, Miami 50, Florida.

**1000 MONEYMAKING Opportunities!** Free details. George Lucas, Bellevue 1, Washington.

**\$5000 ANNUALLY** Possible for you in mail order. Free details. Ransse, Box 1719-A, Richmond 14, Virginia.

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**MEN And women wanted** to start home business in spare time with little table-top rubber stamp machine. Easy to earn up to \$8.80 an hour without previous experience. Full particulars free by mail. Send postcard to Roberts, 1512 Jarvis, Room CR-2-L, Chicago 26, Ill.

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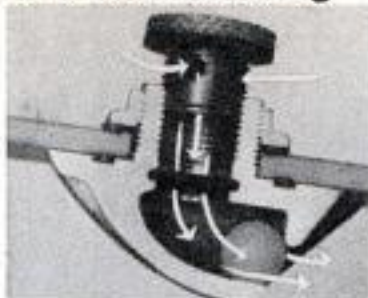
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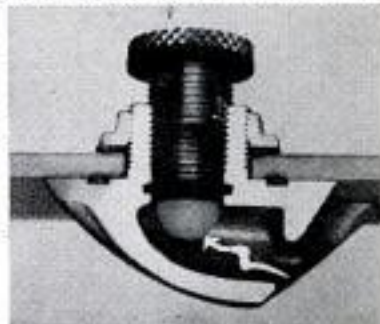
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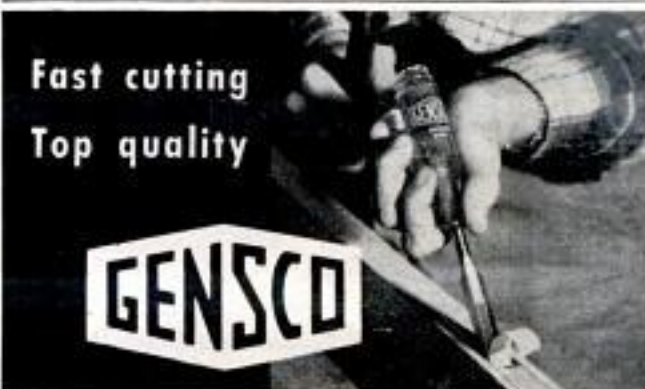


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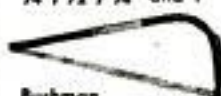
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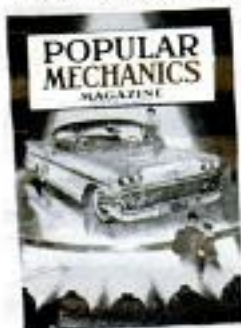


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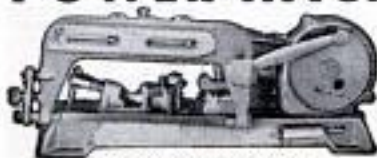
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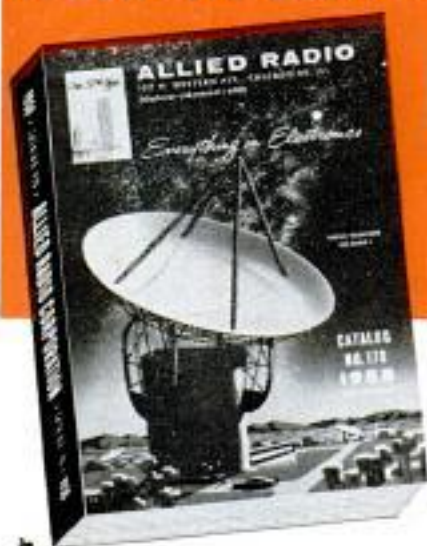
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NOTICE—It is the intention of this magazine to provide its readers with information regarding the latest developments in the mechanical arts. Except where otherwise indicated, this magazine has no information as to any unexpired patents in respect of the developments reported herein. In the event that commercial use is to be made of any of the developments reported herein, it is suggested that legal counsel be consulted to avoid liability for patent infringement. It is not the purpose of this magazine to encourage patent infringement but, as indicated, it is the intention of this magazine to report on the latest developments in the mechanical arts.



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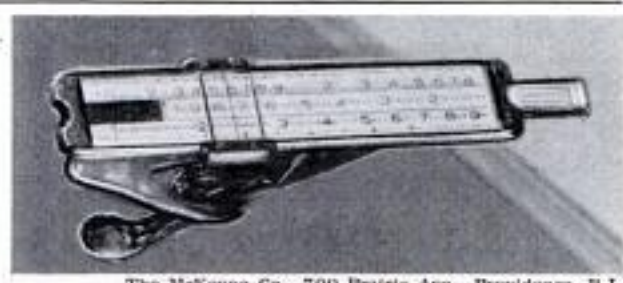
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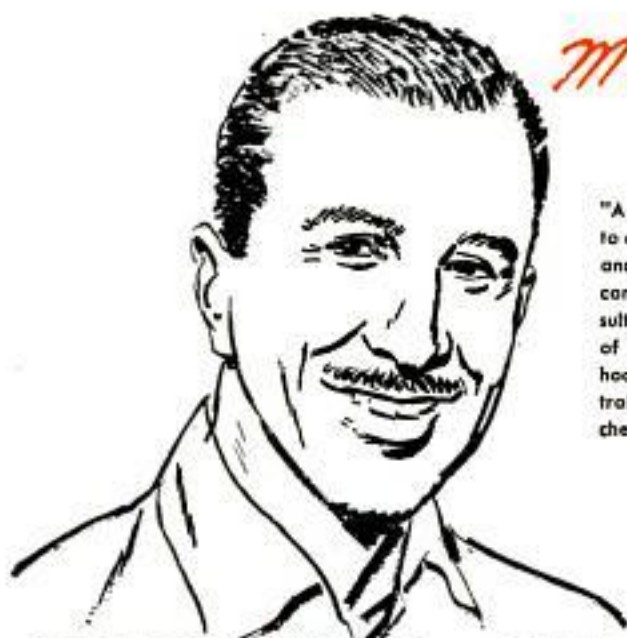


## Laminated Common Lumber Makes Inexpensive Lap Siding

Low-grade lumber forms the core of a new type of broad-lap siding which is less expensive than conventional siding. It is produced by grooving and fitting together common boards so they will resist warping, then covering them with two layers of veneer. An overlay laminate of resin-fiber plastic is added. The common-board core is visible only at the ends, which are usually covered in finished construction. The inset photo shows layers of veneer and plastic on the common board.



# "There's more than one way to improve your gas mileage"



*Mauri' Ross* —experimental test driver and automotive engineer.

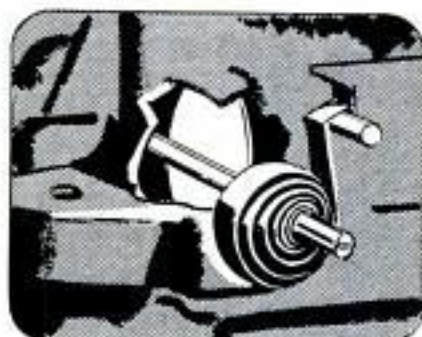
"A professional driver has a lot to do with getting top performance and economy from new cars he tests. But, the best results also depend on a number of intricate systems under the hood. That's why he relies on trained mechanics for needed checks and adjustments."



"Worn spark plugs could be a source of power and fuel loss. Electrodes must be clean, properly gapped and free from corrosion. New plugs at least every 10,000 miles is best."



"A pro always makes sure distributor points are clean and set at the proper distance for best performance. Arcing or cracks in the cap may develop to further decrease gas mileage."



"A trained mechanic checks the manifold heat control valve for possible trouble. A valve that's stuck open delays proper vaporization, a closed valve creates a loss of power."



"The vacuum system must be examined and connections tightened. Air filters should be cleaned. Clogged filters or air leaks upset mixture ratio and cause rough idle and fuel loss."



"Your carburetor should also receive a thorough check for any signs of needed adjustment, repair or cleaning. Proper care assures precision operation and maximum fuel economy."

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# '58's real eye-opener is CHEVY!



And that's a fact. You never saw so much sharp engineering, so many advanced ideas, such stunning changes packed into one year's progress. You'll spend hours studying this one and never run out of surprises. For '58, Chevy's new from the paint on in—and that means body, suspension, chassis, engines . . . the works! Sure, they're lovely to look at. But come on down and get the real eye-opener, the inside story! . . . Chevrolet Division of General Motors, Detroit 2, Michigan.

<ul style="list-style-type: none"> <li>● LEVEL AIR RIDE—100% air springs, front and rear.*</li> </ul>	<ul style="list-style-type: none"> <li>● 3 CARBURETORS on Super Turbo-Thrust V8 . . . and 280 h.p.!*</li> </ul>	<ul style="list-style-type: none"> <li>● NEW WHEELBASE—2½ inches longer for extra room and comfort.</li> </ul>	<ul style="list-style-type: none"> <li>*Optional at extra cost.</li> <li>**Except with Overdrive.</li> </ul>
<ul style="list-style-type: none"> <li>● TURBO-THRUST V8 with combustion chambers in the block!*</li> </ul>	<ul style="list-style-type: none"> <li>● CLOSE-RATIO Synchro-Mesh transmissions on all V8's.**</li> </ul>	<ul style="list-style-type: none"> <li>● NEW BODIES—9 inches longer, up to 2½ inches lower.</li> </ul>	<ul style="list-style-type: none"> <li>● DUAL HEADLAMPS for better light pattern, longer low beam.</li> </ul>
<ul style="list-style-type: none"> <li>● NEW BODY-FRAME design has double-wall cowl for added rigidity.</li> </ul>	<ul style="list-style-type: none"> <li>● 4 COIL SPRINGS with advanced Four-Link rear suspension.</li> </ul>	<ul style="list-style-type: none"> <li>● NEW IMPALA luxury models rival the costliest cars.</li> </ul>	<ul style="list-style-type: none"> <li>● 348-CUBIC-INCH Turbo-Thrust V8's with "gable-roofed" pistons.</li> </ul>
<ul style="list-style-type: none"> <li>● NEW FRAME—has new X-design for extra lowness.</li> </ul>	<ul style="list-style-type: none"> <li>● FUEL INJECTION—top efficiency, instant acceleration.*</li> </ul>		<ul style="list-style-type: none"> <li>● TURBOGLIDE, the super-smooth, triple-turbine transmission.*</li> </ul>



# POPULAR MECHANICS

DECEMBER  
1957

WRITTEN SO YOU CAN UNDERSTAND IT  
VOL. 108 NO. 6



Author drives GM-built Vauxhall Victor past towers, palaces and churches along banks of river in Moscow

*Reprinted "PM Highlights"*

## I DROVE THROUGH RUSSIA

PART I

By David Scott

*34 A Church Crescent, Finchley, London, N.3, England*

THIS IS IT," I thought as we rolled slowly over the bridge spanning the Bug River — 1200 miles and 12 frontier posts from London, which we had left four days before. A Russian sentry at the barrier, his carbine shoulder-slung under a raincoat, eyed the GM-built Vauxhall Victor. "Wait here," he indicated.

An ambulance arrived from nowhere and

deposited a young man. "Good afternoon," he greeted us in English. "I am your interpreter from Intourist [the Soviet travel agency]. Call me Vladimir," he said, climbing into the back seat. "Follow that car." And we were off on our motor trip to Moscow.

The ambulance led the way into Brest, four miles away, whose busy railway sta-

This is the iron curtain. Gate on German autobahn serves as check point for entry into Communist territory







Russian interpreter buys tickets on glass-enclosed bus that moves through Agricultural and Industrial exhibits



Road maps are scarce in Russia, so signboards are erected at major highway junctions to show the way

tion is Russia's westernmost mainline terminal. Although taken aback by this informal penetration of the last iron curtain of all, we had more surprises to come.

Upstairs, in a large room with tasseled velvet drapes and plush armchairs reminiscent of Grandma's front parlor, a serious youth from Intourist explained that there was no customs inspection. We merely had to sign a declaration that we carried no opium, hashish or live ammunition! He waved aside our carnet (the international travel document that permits temporary importation of cars without paying duty), and presented another form on which we promised to take the car out of the country when we left.

Our passports were quickly stamped and we bought some gasoline coupons at 50

Country of paradoxes: Russia has jetliners in regular service, relies on creaking wagons for rural transport







Friendly truck driver hooked up air compressor and inflated tires when author couldn't get air at gas station

cents a gallon. We then bolted a hearty midafternoon meal at the station restaurant, and 22-year-old Vladimir, assigned to us for the duration, said "Let's go."

#### Brest Is First Stop

First stop was at Brest's fuel depot, where 25 liters of 74-octane "premium" gas were pumped into the tank. Prepared for this, we'd had the Victor fitted with a 6.8 to 1 compression head at the factory in England. Once on the road again, Vladimir gave us a small route plan with instructions printed in English.

Moscow, we saw, was 635 miles ahead, and on the way were only 14 towns and six filling stations. The vision of wide-open spaces came to life as we sped eastward.

The broad, tree-lined road sweeps through the flat countryside on the edge of the Pripet Marshes, and you can drive miles without seeing a person or house.

Roadside views are of brown fields reaching to the horizon, peat bogs and occasional signs in the strange Russian letters. The Victor purred on sweetly at a steady 60, slipping by a truck or horse-drawn wagon at long intervals. We were headed for Minsk, 210 miles from the border, our scheduled stop for the night.

#### Cut Speed for Safety

But, as darkness fell, this sparse traffic became a real hazard. The first hazy form caught in our headlights suddenly became an unlit wagon, and the scream of our tires

Everywhere Scott went, people were interested in his car. Here bus drivers and kids peer under the hood







Farmers spread their grain across the highway so the wake of passing vehicles will blow away the chaff



Russian invalids can buy this three-wheeled auto at low price. Engine at rear can be serviced from seat

woke the peasant asleep at the reins. After this near escape we cut the speed to about 45 and flicked on the piercing spotlight.

The wisdom of this precaution was demonstrated a few minutes later when we eased past several logs lying in the road. Beyond them were splintered wooden boards, and finally a dead horse—but no trace of the vehicle that had apparently plowed into the cart.

#### Road Markings Inadequate

There was no warning of a section of road under repair, and only sharp braking prevented us from sailing into a sea of mud and rocks. Signs were inadequate, and the few reflecting signs were aimed at the wrong angle to catch oncoming lights. It was no joke driving now, and we felt in-

Main roads of Minsk are stately boulevards, but author's car took a beating on cobbles of the side roads







Fleet of new Moskvitch station wagons makes a roadside stop near Smolensk while en route to customers

tense relief when the lights of Minsk finally appeared.

Dinner at the best hotel in town was ample, and Vladimir helped us choose dishes like caviar and shashlik from the Russian menu. We ordered with relish, since Intourist was footing the bill. Actually, we had each paid in advance for 13 days at the rate of \$11.25 a day. This covered the hotel, three meals and a traveling interpreter (full time, when away from his Moscow girl friend). Other expenses we paid in cash, but at a special tourist rate of exchange that gave us a ruble for 10 cents instead of the usual 25 cents. With that we could buy a bottle of beer for 35 cents and cigarettes at 10 cents a pack.

Our double room upstairs boasted more old-fashioned luxury, with heavy lace cur-

tains, furniture upholstered in rich silk brocade, a marbled desk and a huge rubber plant. In strange contrast were the exposed plumbing, cold water and stopperless sink of the dingy, mirrorless bathroom. This was one of the many paradoxes of Soviet life that we were to find at every turn in this country that has tried to telescope into 40 years what advanced Western nations have taken over 100 to accomplish.

#### Country of Paradoxes

Example: Russia leads America in hurling a manmade satellite into space, but runs the inefficient side-valve engines that power most of its vehicles on 66-octane gas. With the Tu-104 it is the only country to have jet airliners in regular service, but

(Continued to page 244)

Author stopped at roadside restaurant at Tolochin, 300 miles from Moscow. Meat and potatoes cost 30 cents







## MATS' FLYING WAREHOUSE TAKES TO THE AIR

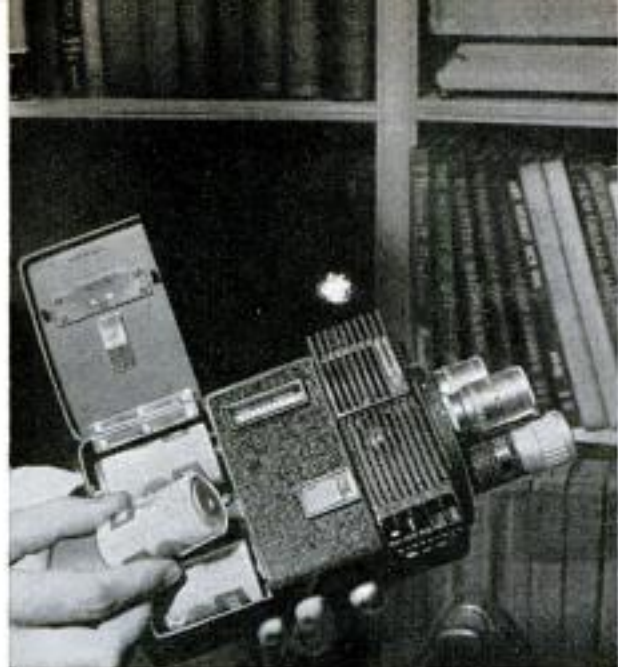


Squat design of massive aircraft puts belly of fuselage two feet above runway. Turboprop engines develop 24,000 horsepower. Cavernous interior of C-133A fuselage is 16 feet in diameter. It will hold 16 Jeeps or, with a second deck, 400 troops



ON THE TWO-MILE RUNWAY at Wright-Patterson Air Force Base in Dayton, Ohio, four T-34 turboprops took a snarling, 24,000-pound bite at the air. Slowly, an unbelievable monster of an airplane began to move under the whip of 18-foot, three-bladed, turboelectric "fans." The plane's wingspan—179 feet 8 inches—would have overhung both sidelines of a football field by more than 10 feet. With its radome on the goal line, its 48-foot-high tail would have towered four stories above the 50-yard line. The craft's cavernous 16-foot-diameter fuselage looked like the interior of a vehicular tunnel. This was the first production model of the Military Air Transport Service's C-133A—Douglas' latest in flying giants. The designers built this flying warehouse to carry a payload of 100,000 pounds for 1000 miles—twice the capacity of the C-124 Globemaster. Through a 12-foot-high loading door under the tail, nearly any ground-force military vehicle in existence can rumble up the plane's self-contained ramp and be stowed, fully assembled. The vast interior will swallow 10 Weasels, 16 loaded Jeeps, or two 40,000-pound bulldozers. A second door near the front of the cabin permits simultaneous loading directly from a truck bed, without benefit of lifting devices. Reason for this is the C-133's unique "squat" when she's aground. The bottom of her fuselage clears the concrete by about two feet. Primarily a freighter, seats can be fitted into sockets, enabling the "133" to haul 200 troops. A second deck might boost the capacity to 400 passengers.





Movie camera operates on flashlight batteries. Signal light in view finder tells when power is too low



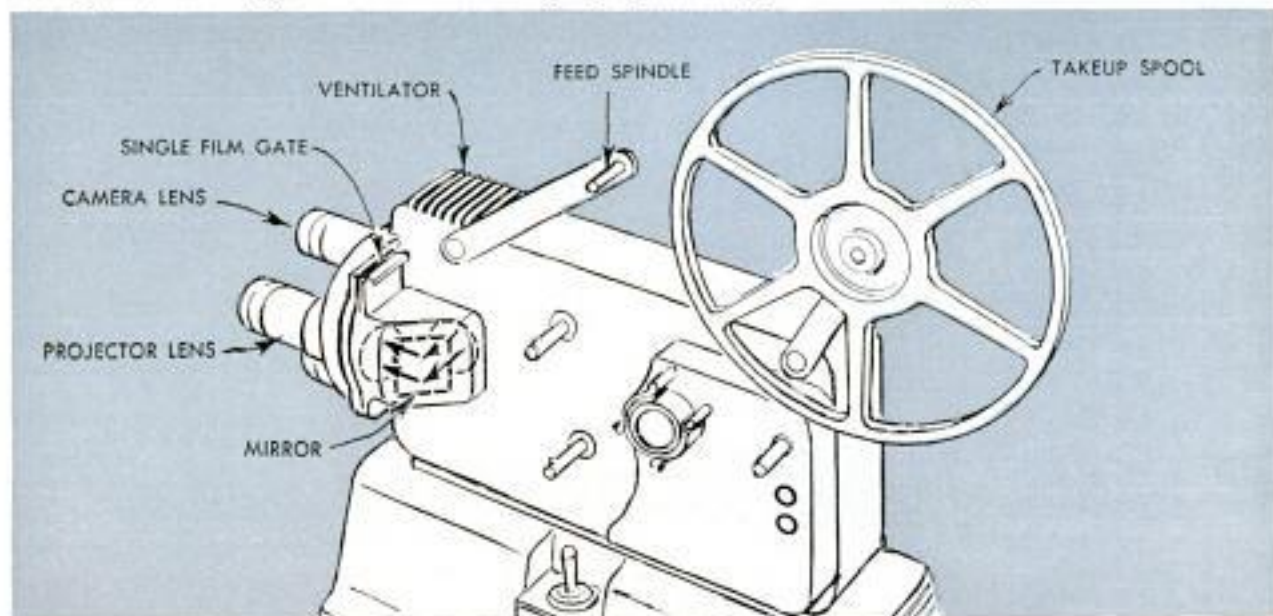
Camera has projector, wide-angle, telephoto, standard lenses. View finder shows field for each lens

## CAMERA DOUBLES AS PROJECTOR

HOME MOVIES can be projected from the camera that took them. The eight-millimeter unit can be converted from camera to projector, and vice versa, in 30 seconds. The same film gate is used for both projection and picture-taking. Pictures are taken on standard double-eight-millimeter film, which is divided during the developing process. It is projected as eight-millimeter film. As a camera, the unit requires no winding since three batteries provide power for a year of average use. A small bulb dims when the battery charge is running low, but the unit maintains a steady film speed of 16 frames per second as long as sufficient charge is available. The entire unit can be carried in a two-part case no larger than a photographer's gadget bag. Or the base section of the bag can be detached for carrying the camera alone.

Lifting feed spindle moves shutter back, letting light from small bulb glance off angled mirror and through projection lens

With side panel removed, base in place, reels attached, camera becomes projector







To start the long test, the cars cross the U.S.-Canada border on the bridge at Fort Kent in northern Maine



Drivers were given daily physical exams as well as psychological tests. Below, at the end of the run in Miami Beach, the drivers congratulate each other



## *De Soto looks for the answer—* **WHAT MAKES A**

**E**VERYBODY TESTS cars. De Soto Division says it's time to test people, particularly people in cars—the drivers.

After all, a car is useless without a driver. What's more important than to discover what makes a driver tired?

De Soto looked for the answer to this question in an unusual seven-day test from the northern tip of Maine to Miami Beach, Fla. This reporter went along as the official press representative.

Two cars made the 2300-mile trip. One was a completely restored, like-new 1929 De Soto roadster—De Soto's first model year. It had none of the luxuries that we now think of as necessities. The second car was a brand-new 1958 De Soto convertible, loaded with today's newest and most convenient extras. De Soto hoped to learn whether the new car with all its power assists was less tiring than the old model.

Guinea pigs for the test were two De Soto engineers, both experienced test drivers. Before the run began they were given intensive tests by a psychologist to determine their normal condition. The idea was to subject them to the stress of driving and to measure how tired they became. They alternated cars—one day in the 1929 model, the next in the 1958 model.

Along on the test was an experienced psychologist. He gave the two drivers several tests every night to measure eye-hand





Driver Cy Korompay, left, and the author stretch their legs during a gas stop on the Massachusetts turnpike

## DRIVER TIRED?

By Arthur R. Railton

coordination, reading accuracy, finger dexterity and reasoning abilities. Blood samples were taken from the drivers every night to discover any physiological effects.

I watched the drivers as they took these nightly tests. I rode with them occasionally (the rest of the time they were alone in the car so there would be no additional fatigue-affecting factors besides driving). I talked at length with the test psychologist, Dr. Joe Motto of Detroit, Mich. and with the project psychiatrist, Dr. A. S. Church, also of Detroit. I drove along behind the cars for hours to see how the drivers responded to traffic conditions.

At the end of the run I studied the report made by the two doctors and, adding that material to what I learned, came up with this account. What it says may surprise you.

First, a word about the two cars. As you would expect, the new, carefully tuned 1958 De Soto made the trip without incident. It was just a breeze for this powerful

(Continued to page 240)



Part of the fatigue test was a climb up Mount Washington in New Hampshire. The cars had no trouble at all. Driver Bill Duckett checks the 1929 engine afterward. Below, coming down from the cloud-wrapped peak provided a good test of brakes





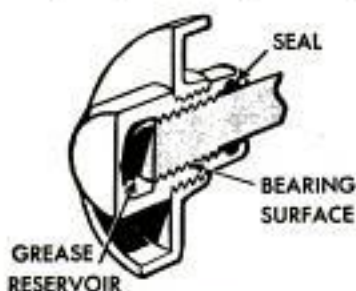
# 1958

## A REPORT ON THE CADILLAC, FORD AND PONTIAC

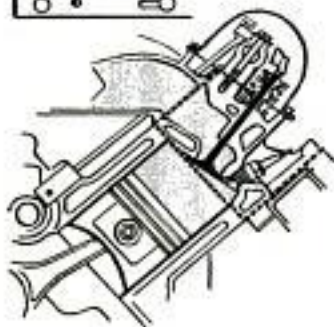
By Arthur R. Railton



Atop Pontiac's rear axle is a U-shaped yoke to stop windup



Ford moves toward the lubed-for-life car with this bearing



Dots outline Ford's new cylinder head that is right-angled to simplify production. Combustion chambers are machined too

A CAR THAT NEVER NEEDS a grease job? It's on the way, say Ford engineers. It could be here today, they think, but buyers might be suspicious of a car without grease fittings.

But the day will come when your car is lubed-for-life at the factory. A big step has been taken—a threaded steel bushing in the front suspension of Ford's 1958 cars. A special lubricant is sealed inside a cavity in the bearing when the unit is assembled. It never has to be greased again.

Work is needed to adopt the principle throughout the car, but engineers say it can be done and will.

Pontiac, with its all-new body, frame and engine is the real big story this month. Its new X-frame permits the body to be lowered without a sharp stepdown in the passenger compartment. It increases torsion stiffness without much added weight. A three-joint propeller shaft is used.

Coil springs are on all four wheels (making mounting of air bags simpler when ordered). To restrict rear-axle wind-up, there's a big U-shaped upper-control arm mounted atop the differential, its two arms attached to the frame. This yoke also provides lateral stability during cornering. Lower control arms take the braking and driving thrust.

Pontiac's new V8 engine has a 370-cubic-inch displacement (as recently as 1953 the biggest engine in any American car had only 331 inches). Compression is upped to 10.5 to 1 on high-performance Pontiacs. Standard compression is 8.6 to 1. Horsepowers range from 240 to 310. Fuel injection is optional on all models.

All three cars under discussion offer air suspension as optional equipment, Ford in its Fairlanes and wagons only. The Ford system differs from the General Motors design in its leveling controls: One for fast leveling, the other for slow leveling.

The fast leveling is actuated when you open a door (it is hooked into the courtesy-light door switches). The door switch operates a solenoid that opens the large orifice in the leveling valves (two in front, one in rear). Because air rushes in volume through the valve, the car levels itself in the time it takes passengers to enter or leave. As long as all doors remain closed, only the slow-leveling orifice of the valves operates. Thus air is admitted to the air bags

(Continued to page 266)

### STUDEBAKER HARDTOP

Studebaker and Packard have a new body style out this month. It's this two-door hardtop, a model that has the room of a two-door sedan, the roof of a hardtop. Previously, the only hardtop offered was the Hawk







Fender tips, front and rear, were extended to make the Coupe de Ville look several feet longer than it is



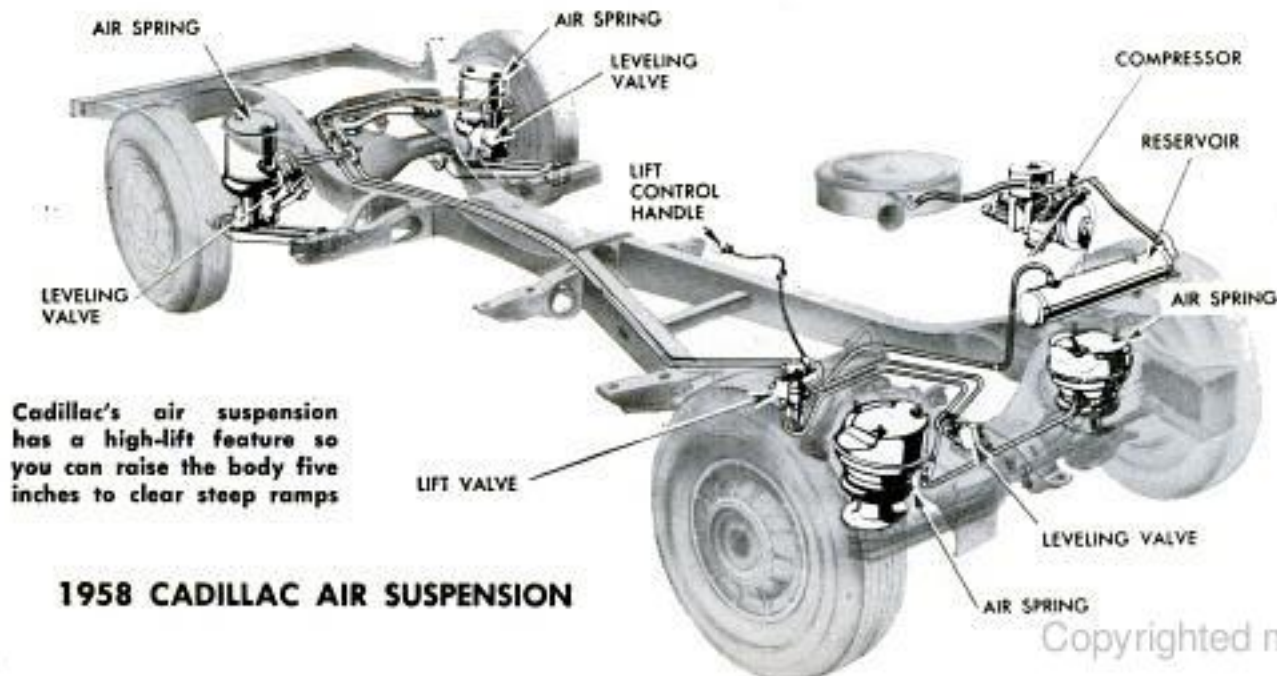
Big change is in the backward slanting tailfins. The rear roof supports are thinner to add visual length

## Cadillac

MODEL FOR MODEL, Cadillacs are not much longer this year. Added over-all length is just under an inch. But they look several feet longer. No magic here, just a visual trick that results from lengthening front fenders and hood and modifying rear-fender shape a little. But there is a new model that's longer: An extended-deck sedan that stretches its trunk an additional 8.5 inches. Air suspension is optional, coil springs on all four wheels standard. Power is up slightly, displacement is unchanged.



Four headlights, a more horizontal grille add what Cadillac calls the "broad-shouldered look" for 1958



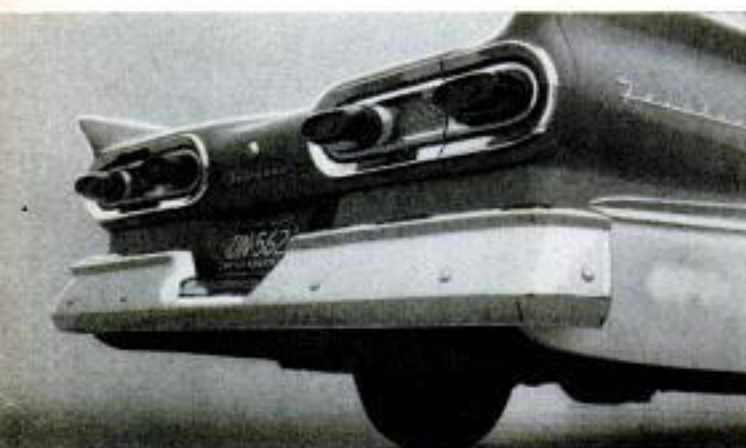
Cadillac's air suspension has a high-lift feature so you can raise the body five inches to clear steep ramps

### 1958 CADILLAC AIR SUSPENSION





New front-end styling and reworked side trim give these Fords a fresh look despite use of the 1957 shell



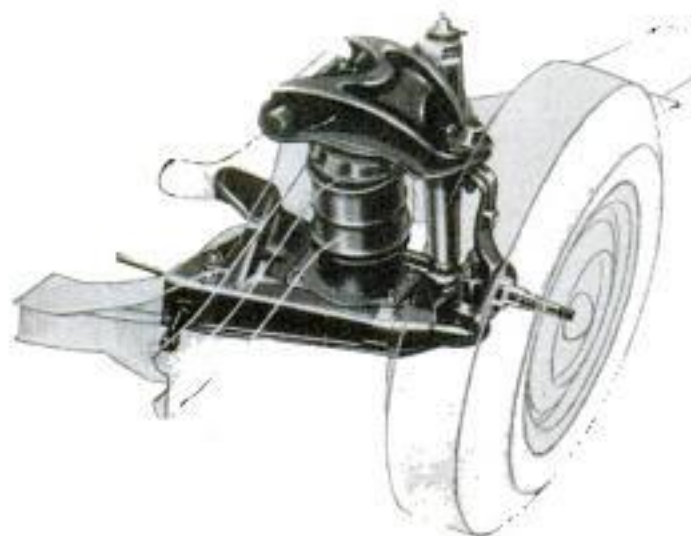
Above, Ford replaced its wagon-wheel taillights with four bold ovals. No bumper guards are used in rear

## Ford

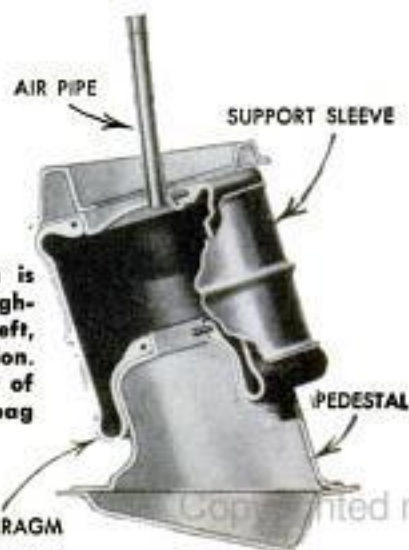
FORD'S BIG CHANGE is under the hood, but it has freshened its 1957 body shell by major front, rear and roof changes.

Four headlights and a perforated grille give a new front look, while at the back, four oval taillights make Ford's the best-lit rear on the road. The trunk lid is deeply contoured and the roof grooved.

With lots of inches (332 and 352) and power (240 to 300 horsepower), the new V8 is designed for efficiency (see page 90). With Ford's new transmission and 2.69 rear axle, it is said to have 15 percent more economy.



Air suspension is optional on high-price Fords. Left, front suspension. Right, cutaway of the Ford air bag



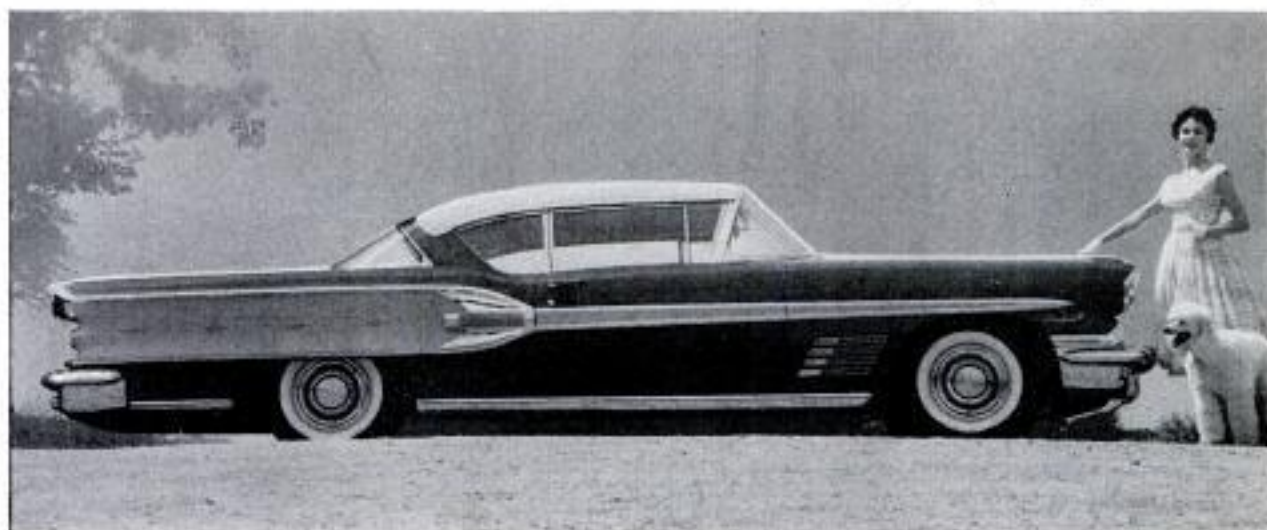
RUBBER DIAPHRAGM

Cop...nted material





Above, Star Chief four-door Safari station wagon. Below, the Bonneville sport coupe has special side trim



## Pontiac

**WHEELBASES** are the same, but that's about all. The new Pontiac is lower by as much as 4.5 inches, wider by 2.2 inches, longer on some models by 8.7 inches. It's big and it looks it.

Flashiest are two Bonneville models: The two-door hardtop and the convertible (another convertible is available in the low-price Chieftain series).

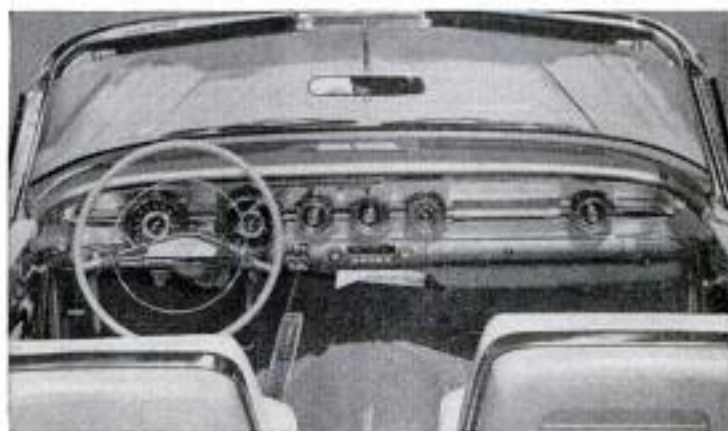
These Bonneville models, billed as family-size dream cars, are 1.4 inches lower than other Pontiacs and have distinctive trim on the sides, sculptured rear decks. The two-door hardtop has a simulated vent in the rear of the roof.

Air suspension is available on all Pontiacs, as is fuel injection. Horsepower ranges from 240 on the Chieftain to 310 on fuel-injected models. All have 370 cubic inches.

Optional on Bonneville convertibles are four bucket seats. A passenger-assist handrail is built into Bonneville dashboards.



Above, front suspension arms are stampings. The center white area is air-suspension unit. Below, optional bucket seats







U. S. Steel photo

## "Big Mac" Links Michigan With Michigan

On November 1 the world's longest suspension bridge was opened to traffic, and motorists for the first time could drive across the Straits of Mackinac. The bridge (See *Popular Mechanics*, January 1957), under construction for 3½ years, links the

southern and northern peninsulas of Michigan. The towers of the majestic five-mile span rise more than 750 feet from bedrock. The suspended section is 8614 feet long. The "Magnificent Mackinac" has a capacity of 6000 cars per hour.

### ***Recommended Reading for Satellite Background***

- ✓ **"Our Missile Arsenal," *Popular Mechanics*, December 1956.**  
A roundup of all U. S. missiles from the smallest to the IRBM (intermediate-range ballistic missile) and the ICBM (intercontinental ballistic missile) designed for intercontinental warfare and to lift satellites beyond the earth's atmosphere.
- ✓ **"Taxi to Venus," by Thomas E. Stimson, Jr., *Popular Mechanics*, March 1957.**  
The problems of our astronautical engineers as they head into spaceship business.
- ✓ **"Stand By for Satellite Take-off," by Fred L. Whipple and J. Allen Hynek, *Smithsonian Astrophysical Observatory, Popular Mechanics*, July 1957.**  
Details on U. S. satellite, how it will cruise through space and its scientific function.
- ✓ **"Mystery Fuels for the Missile Age,"  
by Thomas E. Stimson, Jr., *Popular Mechanics*, July 1957.**
- ✓ **"Space Travel and Our Technological Revolution,"  
by Dr. Wernher von Braun, *Missiles and Rockets*, July 1957.**
- ✓ **"How You Can Spot the Satellite,"  
by Richard F. Dempewolf, *Popular Mechanics*, August 1957.**



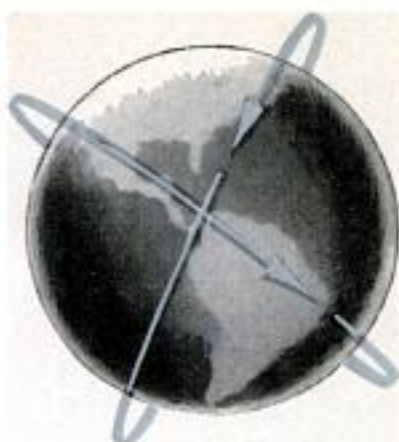
# How Proposed U. S. Satellite Compares With Russia's

IN JULY, 1955, the United States announced its program to launch an artificial moon. Scientific attention all over the world was focused on the proposed satellite. Then, a few weeks ago, a mighty multistage rocket roared skyward from Russia, dropped its spent engines and spat out a tiny sphere. The little moon went whirling around the earth so fast that in little more than two days it could have flown to the moon and back.

How does that first Russian satellite—announced as a practice shot for more elaborate satellites to come—compare with the proposed American moon?

In size the two satellites are almost identical (the Russian is slightly larger) but there is a tremendous difference in weight. The Russian satellite weighs 184 pounds to only 21½ pounds for the proposed American satellite. The Russians launched theirs on a generally north-south orbit while the announced orbit of the U.S. satellite will be generally west to east to take advantage of the earth's rotation during launching. The first Russian satellite simply broadcast its position and possibly the temperature. The American moon is designed to transmit a wide variety of scientific information. The altitudes and rotation times probably will be roughly comparable, but this can't be determined until the U.S. satellite takes its place in the sky.

And when that U.S. satellite finally whirls off into its orbit, there may be several companions waiting to greet it on the fringes of space.



HOW DO THE SATELLITES COMPARE?

	RUSSIA'S FIRST SATELLITE	PROPOSED U. S. SATELLITE
SIZE	22.8-INCH DIAMETER	21-INCH DIAMETER
WEIGHT	184 POUNDS	21½ POUNDS
SPEED	18,000 MILES PER HOUR	18,000 MILES PER HOUR
ALTITUDE OF ORBIT	560 MILES	300 TO 800 MILES
TIME OF ONE COMPLETE ROTATION	96 MINUTES, 2 SECONDS	
ANGLE OF ORBIT	25 DEGREES TO EQUATOR IN GENERAL A NORTH-SOUTH ORBIT	35 DEGREES TO EQUATOR IN GENERAL A WEST-EAST ORBIT
EQUIPMENT	BATTERIES, RADIO TRANSMITTER, OTHER EQUIPMENT NOT ANNOUNCED. ONE SCIENTIFIC INSTRUMENT, A THERMISTOR TEMPERATURE MEASUREMENT	BATTERIES, TRANSDUCER INSTRUMENTS TO REPORT ON AEROPTIC COLLISIONS, TEMPERATURES, IONIZATION, SOLAR RADIATION, COSMIC RAYS, ULTRAVIOLET LIGHT, MAGNETIC FIELD, AND OTHERS
ROCKET USED	MULTI-STAGE ROCKET, CONSTRUCTION DESCRIBED BY VARIOUS SOURCES, 120,000 TO 300,000 POUNDS	TISSOT THREE-STAGE ROCKET, 100,000 POUNDS





"Approaching Anchorage . . . a typical fiord with mountains on each side, Portage Glacier at its end"

## Report From a Roving Editor

*For a man who prefers the old-fashioned automobile to these newfangled flying machines, Tom Stimson had quite a trip up to Point Barrow, Alaska, recently. Our Western Editor at Los Angeles made the flight to visit the DEW Line and "White Alice" radio installations. This is his firsthand report; next month he tells of the White Alice outpost he visited*

### *Dear Boss:*

Traveling to Point Barrow to cover the DEW Line story (Distant Early Warning radar) made a very unique trip and so I'll give you a detailed report. You should go yourself; you'd get the same impression that going up to this arctic outpost, sort of casually and offhand, is almost unreal.

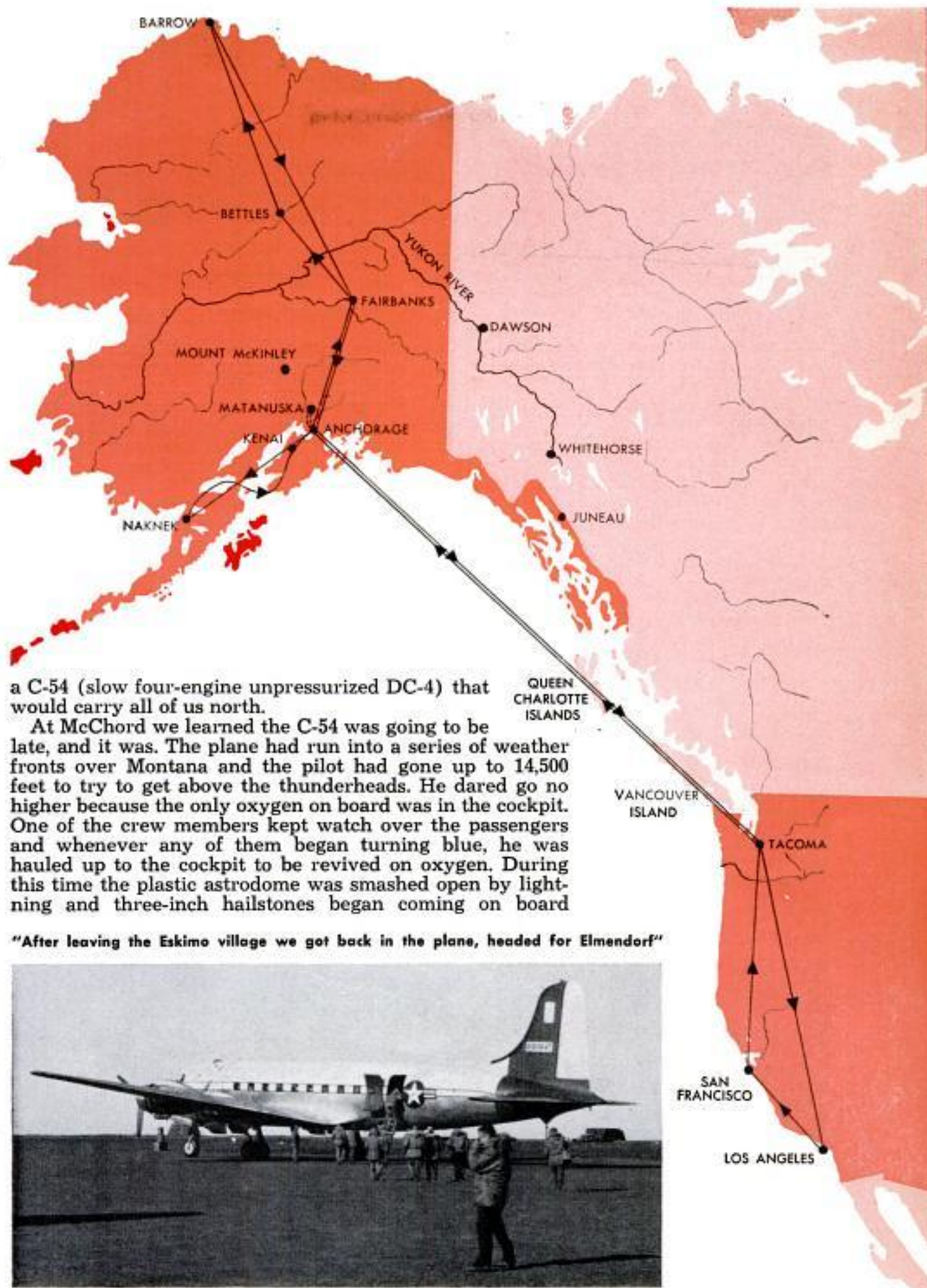
Last Sunday 10 newspaper and magazine people left Los Angeles for McChord Air Force Base at Tacoma. Travel was in a C-47 (two-engine DC-3). We stopped in San Francisco to pick up two writers, and spent a total of six hours jogging along to Tacoma.

There we were to meet the rest of the group from the East Coast. They were in

Tom Stimson (circle) with another correspondent and Eskimo employees of DEW Line at Point Barrow, Alaska







a C-54 (slow four-engine unpressurized DC-4) that would carry all of us north.

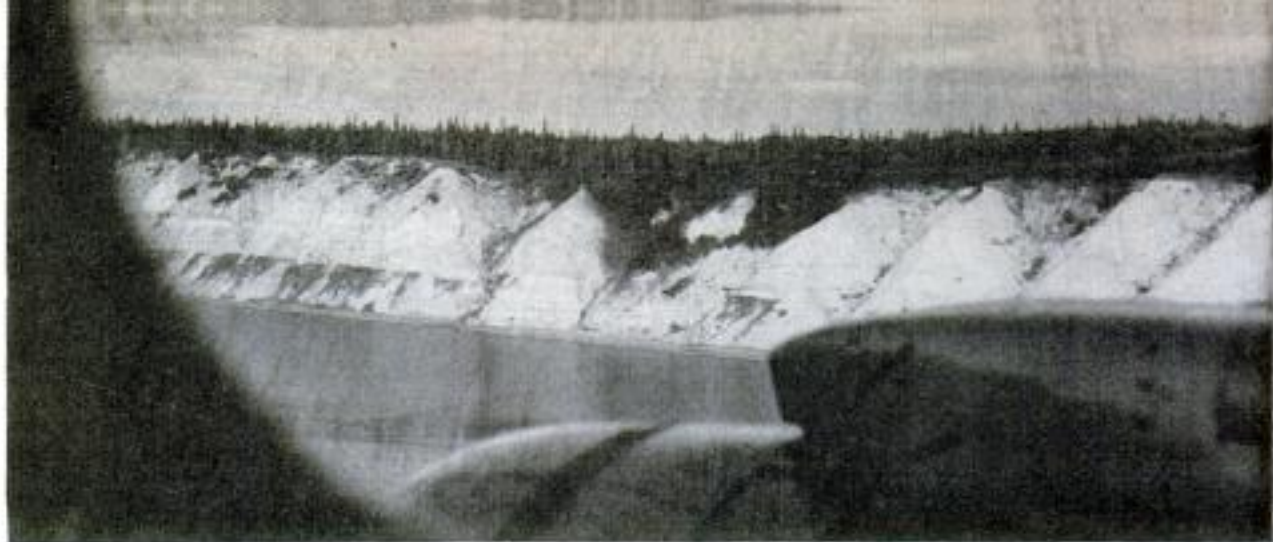
At McChord we learned the C-54 was going to be late, and it was. The plane had run into a series of weather fronts over Montana and the pilot had gone up to 14,500 feet to try to get above the thunderheads. He dared go no higher because the only oxygen on board was in the cockpit. One of the crew members kept watch over the passengers and whenever any of them began turning blue, he was hauled up to the cockpit to be revived on oxygen. During this time the plastic astrodome was smashed open by lightning and three-inch hailstones began coming on board

**"After leaving the Eskimo village we got back in the plane, headed for Elmendorf"**



DECEMBER 1957





"Kenai Peninsula . . . the pilot got the plane down on the water just offshore, at an altitude of 50 feet"

through the hole. Hailstones smashed the copilot's windshield, dented the leading edges of the engine cowlings, and ripped off the upper surfaces of the elevators. I would not have enjoyed any part of this.

Sunday night the Air Force people in charge of the press tour tried via Washington to get another plane. None was available, so the maintenance group at McChord replaced the windshield, bolted a metal cover across the astrodome hatch and resurfaced the elevators. These repairs took most of the morning. We started north at lunchtime, ran the length of Vancouver Island, passed over the Queen Charlotte group, and cut across the Pacific at 9000 feet for Anchorage, flying mostly between cloud layers. At Anchorage we turned north for Fairbanks, passing within 30

miles or so of 20,220-foot Mount McKinley and getting some good views of it.

We were scheduled to stop at Ladd Air Force Base, Fairbanks, pick up parkas and sleeping bags, and continue to Point Barrow. But we'd had a late start, had been nine hours in the air, and were tired. The group decided to RON (Remain Over Night, Air Force parlance) at Ladd, and we did. It was a warm night but by regulations, I suppose, the quarters were steam-heated. We opened all windows and slept on top of the bedding. Fairbanks is pretty far north and it was dark only a few hours.

Next morning we were airborne at six, went up to 9000 feet, and headed for the radio beacon at Bettles, en route to Point Barrow. The plane crossed the winding

(Continued to page 250)

"We 'climbed' the glacier by airplane, looking down at the blue-green ice a couple of hundred feet below"





## Fangio and Behra Test Drive Vespas

Famed racing drivers Juan Manuel Fangio of Argentina, left, and Jean Behra of France examine the new Vespa cars at Roquebrune-St. Martin, France. The four-passenger Vespas were later tested by the race drivers who usually pilot the speedy Maseratis.



## Karmann-Ghia Adds Convertible Model to Stable of VW Bodies

For Volkswagen fans who also like the sleek styling of sports cars, this Karmann-Ghia convertible body is now available on a VW chassis. The design reportedly is based on a law of aeronautics. A cruising and maximum speed of 72 miles per hour is

listed for this model and road-holding ability is said to be good. The Karmann-Ghia coupe body, previously introduced, now has a velvet-lined rear luggage compartment which can be doubled in size by moving the foam-rubber rear seat forward.

## Korean Sibal Makes Debut

Similar to a low-priced American passenger car is the first automobile built in South Korea. The six-cylinder model, shown at its recent debut in Seoul, didn't just roll off an assembly line. It was constructed by the brothers Choe, a pair of mechanics who needed two years of labor to complete the sedan. Most of the work was done with hammers, blowtorches and other simple tools. The name of the car is Sibal, meaning "the start." It cost \$5600 to build.



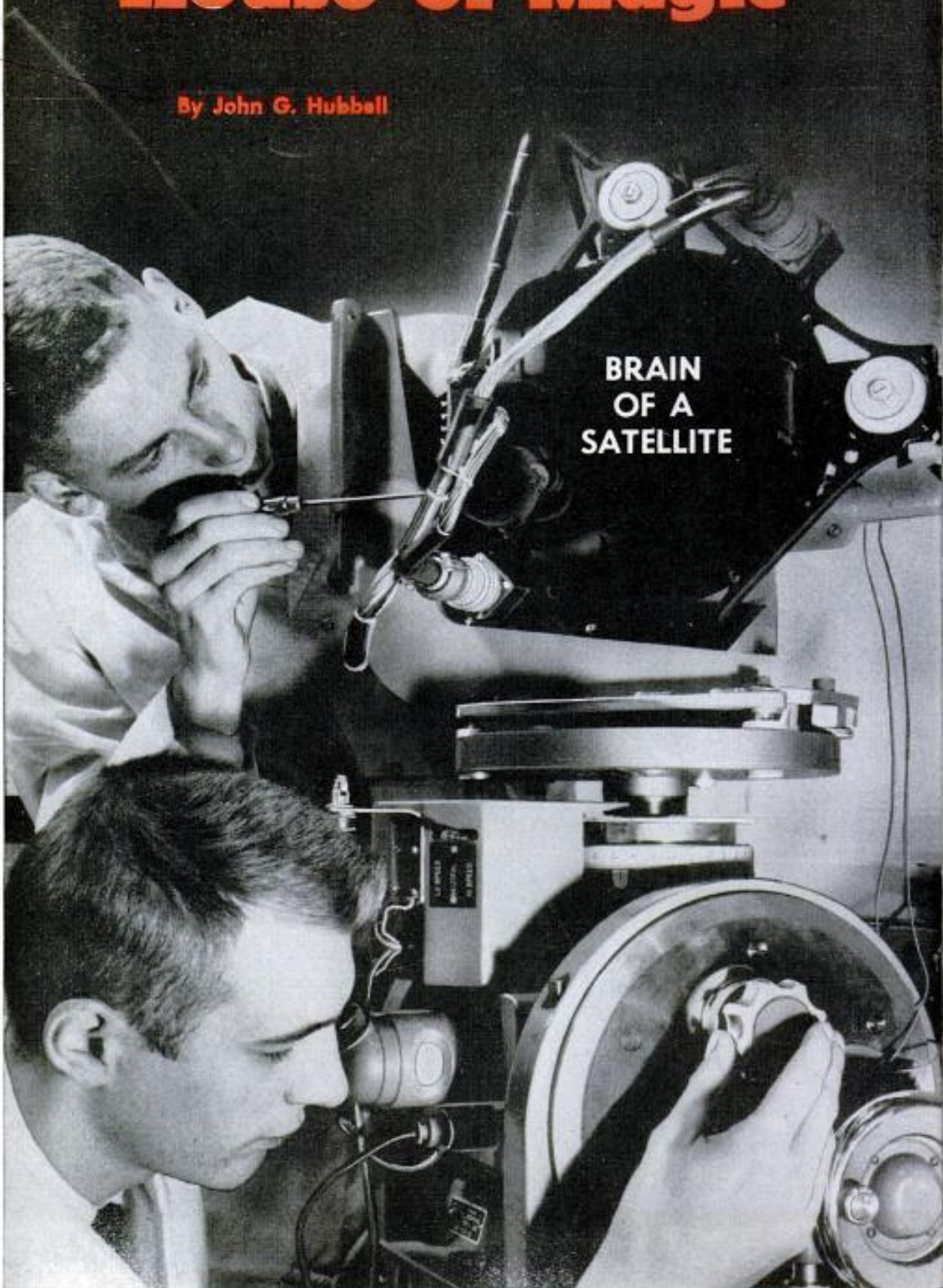


# Honeywell's House of Magic

By John G. Hubbell

BRAIN  
OF A  
SATELLITE

4817 Emerson Ave. S.  
Minneapolis 9, Minn.  
HONEYWELL





**N**OT LONG AGO, at Minneapolis-Honeywell's General Research Laboratories in Hopkins, Minn., I gave a lot of information about our house to Dr. Finn Larsen, Honeywell's Director of Research. I told him the number and approximate sizes of all the rooms, doors and windows, and the type of construction and insulation materials used throughout. To this, Dr. Larsen added some notes about our Minnesota climate, then relayed all the information to a machine five feet tall and two feet wide. In five minutes and 44 seconds, the machine had calculated precisely the amount of heat our house, an eight-room frame dwelling, would lose during the next 50 years, and handed me a heating bill for nearly \$12,000!

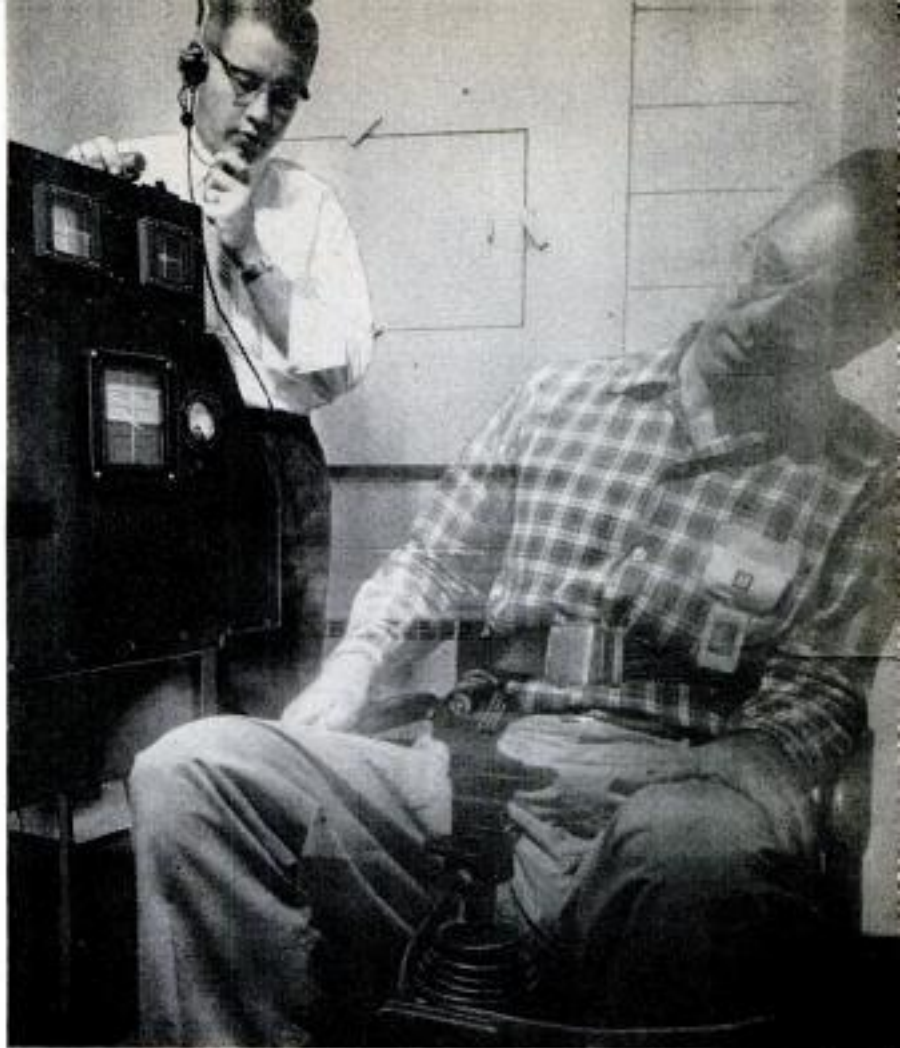
This electronic prophet, called the House Analog Computer, was built by a team of Honeywell research scientists who make a career of improving human comfort.

"We wanted to experiment with new ideas for heating and air-conditioning systems," says Dr. Preston McNall, who headed the project, "but it took too much time and cost too much money to wait out the weather. Often, when the right weather conditions did arrive, they prevailed too briefly. Somehow, we had to create our own authentic weather and make it stand still."

They did just that. The computer can exactly simulate any building's reactions to any climate, throughout its life span. Now Honeywell scientists are able to study at will the effects of climate on any type of house and on new home building materials, in order to develop new heating and air-conditioning control systems which may some day provide the ultimate in living comfort.

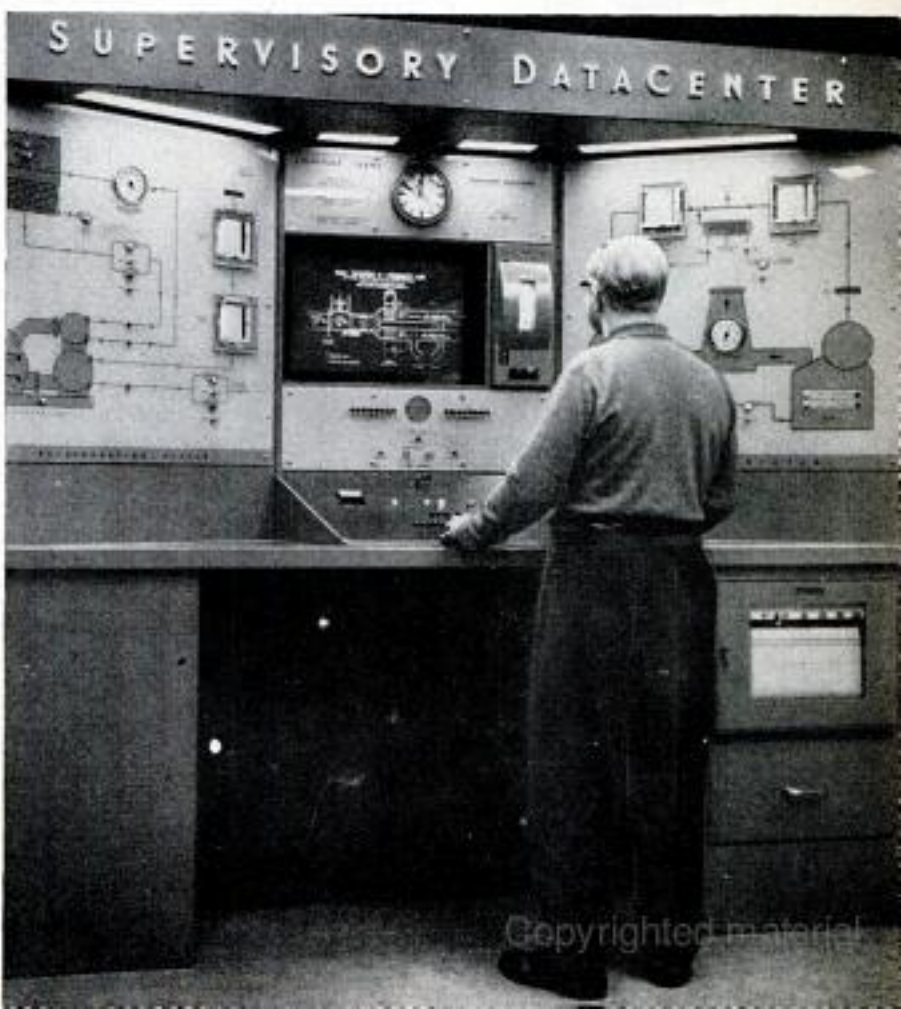
They've been doing things about the weather since a raw March night in 1883 when a young Minneapolis inventor named Alfred M. Butz became exasperated because he had to go down to the cellar to open or close the damper doors on his coal furnace every time the house grew too chilly or overly warm. He began tinkering, and within a few days he found a way to do the job automatically.

Opposite page, Honeywell was given job of devising "brain" for our satellite rocket

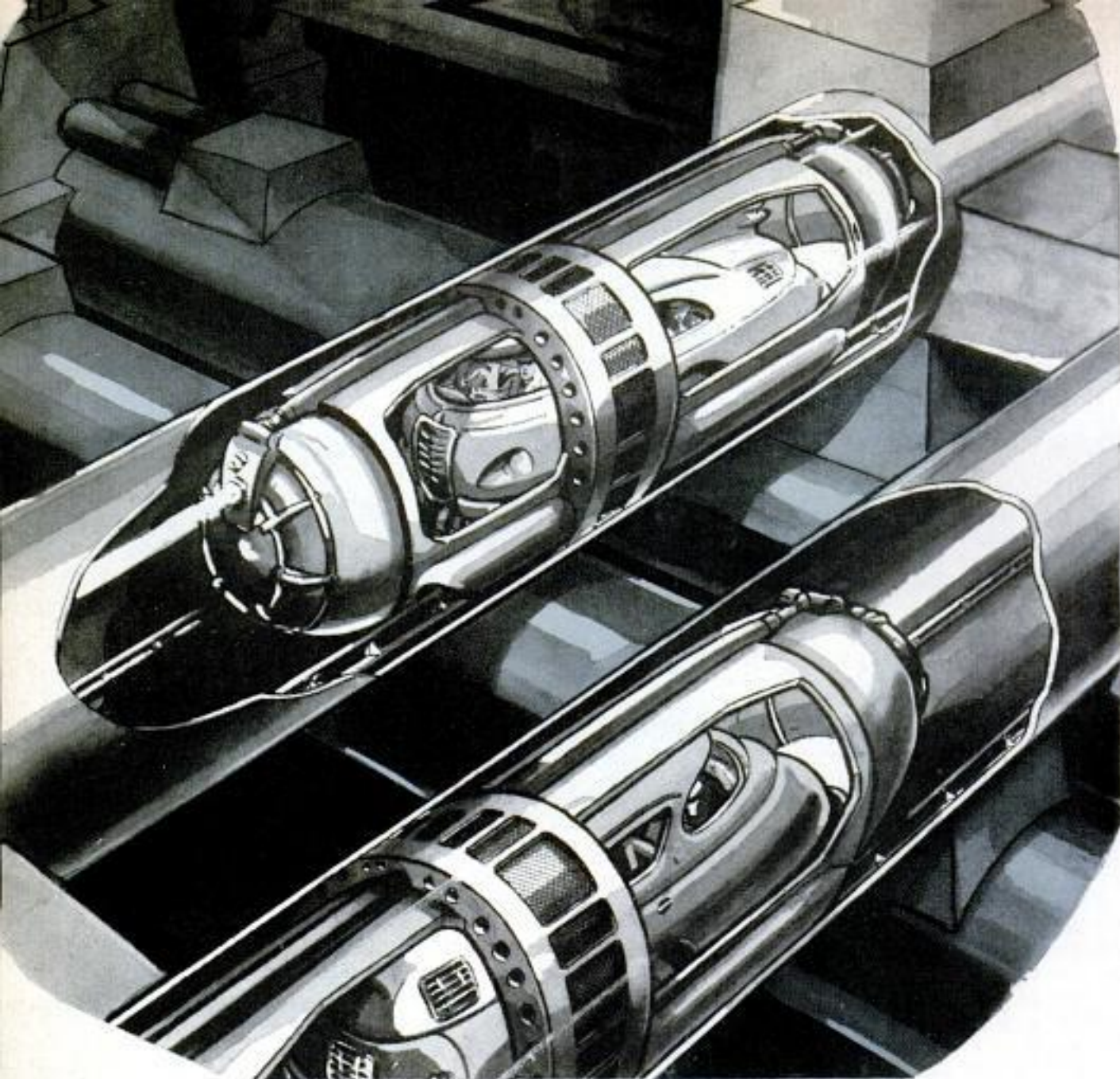


Honeywell engineer whirls pilot in rotating chair. As pilot turns, he tries to read the instruments and react as required

Building engineer pushes button and diagrams of heating system flash on screen, showing him where corrections are needed







Honeywell engineer predicts that by A.D. 2000 cars will zip through network of crashproof pneumatic tubes

It was based on a simple scientific principle: Butz knew that heat makes most substances expand, cold makes them contract; and brass and rubber have widely different rates of expansion and contraction. He cemented paper-thin strips of the two materials together, fastened down one end of the brass-rubber strip, placed the other between two electrical contacts a fraction of an inch apart. Then he ran wires from the contacts to an electric motor he had attached to the furnace dampers. As his house became warm, the strip began warping toward the contact which would cause the motor to close the dampers; as the house cooled, the strip warped back to the other contact, opening the dampers to supply the house with more heat.

Today, 74 years later, the principle Butz worked with has been parlayed into a company that makes 12,740 automatic devices which reach into every facet of life, and range in price from 30 cents for a simple electrical switch to \$2,500,000 for enormously complex equipment which performs office and clerical routine completely, quickly and precisely.

For the first 40 years of its existence the firm, then known as the Minneapolis Heat Regulator Company, concentrated on making the controls which automatically regulate temperatures in tens of millions of homes throughout the world today. But following a merger in 1927 with the

This is probably the first heating regulator ever produced, putting the company in business







M-H engineers, even with help of their hands, had trouble discussing three-dimensional gyro problems



To help themselves in their work, they designed this "talking tool" which pinpoints area under discussion

leading competitor in the thermostat field, Mark C. Honeywell's Heating Specialties Company of Wabash, Ind., the newly formed Minneapolis-Honeywell began to branch out fabulously.

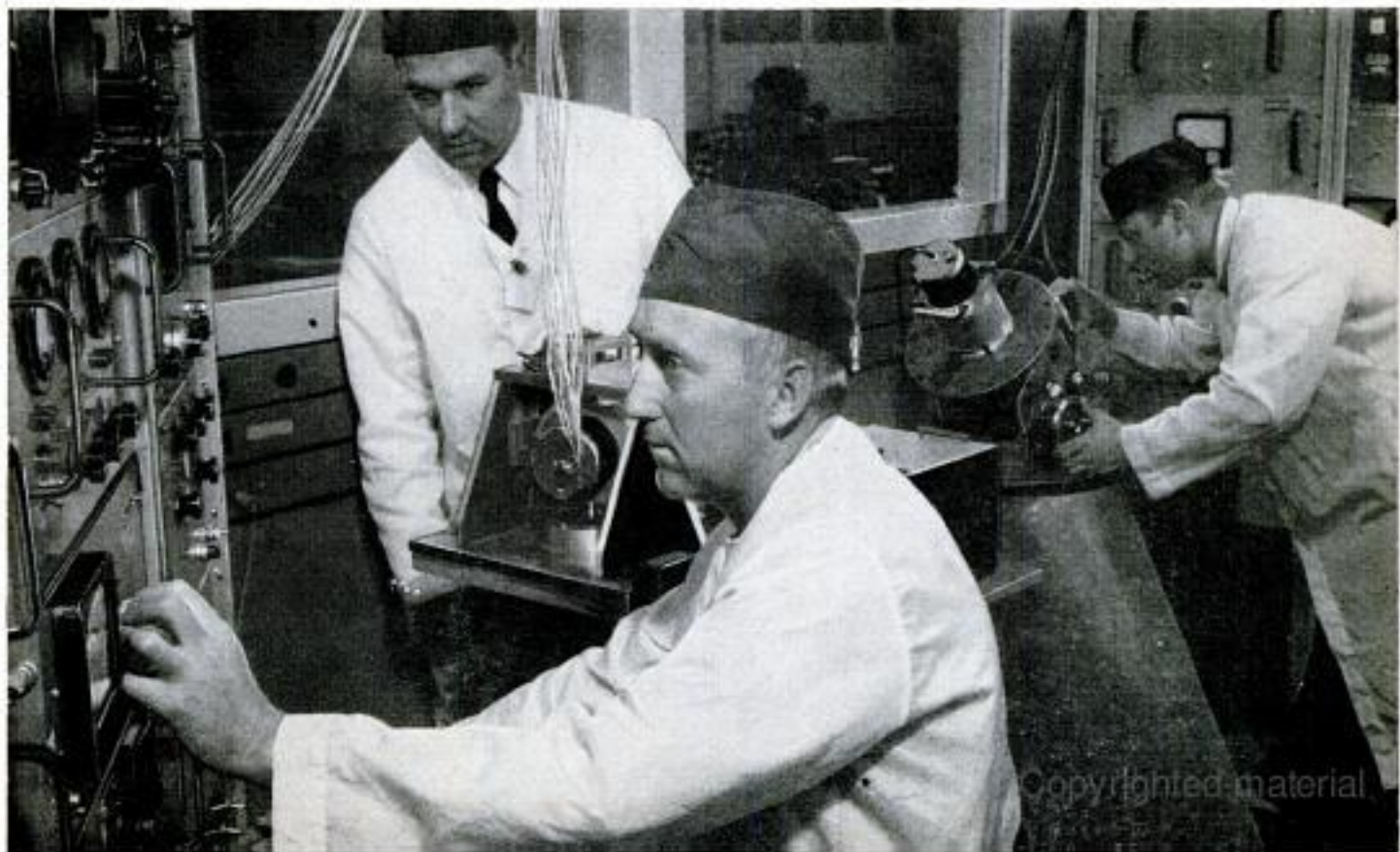
William R. Sweatt, who had been president of Minneapolis Heat Regulator Co., and Mark Honeywell were convinced the heating controls business was just a start. Through the depression years they hired as many good engineers as they could find and urged them to concentrate on new uses for automatic control. Soon Honeywell devices were in the processing industries, controlling temperatures, humidities, pressures and rates of flow of steam, oil, gas,

air, water and chemicals of all descriptions.

During World War II the company made 4,773,561 devices for the armed forces. When officers in the photographic laboratory at Wright Field were looking for a way to hold cameras level and steady during reconnaissance flights, Honeywell engineers devised a mount to hold the camera rigidly on target even in the roughest flight. When the position of the airplane changes even slightly, gyroscopes in the mount instantly sense it, measure the change and signal a delicate mechanism which repositions the mount so fast the camera lens doesn't have time to leave the target!

M/Sgt. Don Hamilton from the Wright

Tremendously accurate gyros are tested in this instrument. Hats and smocks help keep room free of dust







Scientists devised automatic page turner to help polio-paralyzed engineer condense scientific reports

Field armament laboratory watched, absorbed, when the electronic camera mount was first demonstrated. Then, quietly, he pledged the Honeywell men to utmost secrecy and led them to a small, dark room in the armament lab. In the middle of the room stood a table on which was the Norden bombsight. This, he explained, was the best bombsight ever developed; but it was useless unless some way could be found to hold the heavy bomber absolutely rigid during the bombing run. Human reactions to flight deviations just weren't quick enough. Could the same idea which had been used in the camera mounting device be used to control the whole airplane?

Two-story house atop M-H headquarters building is filled with 200 thermostats for heating research



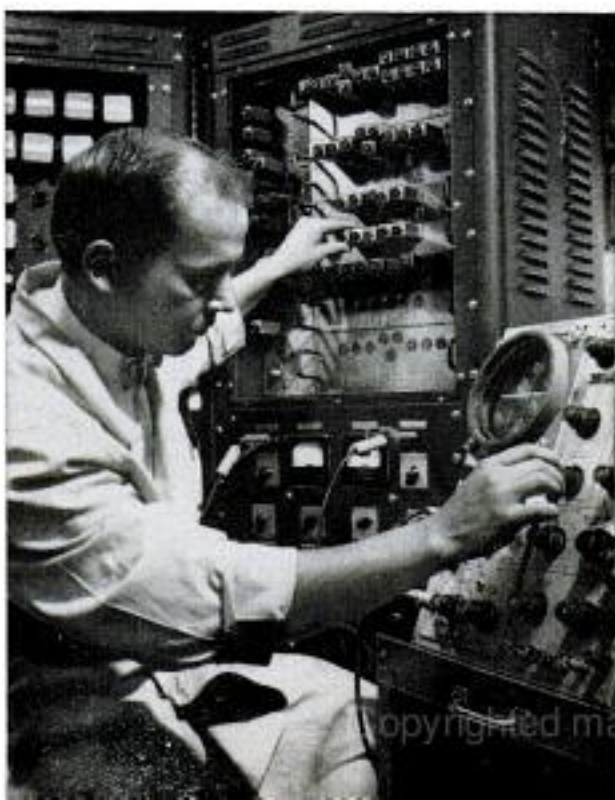
Honeywell's answer, an electronic automatic pilot, has been credited with bringing great numbers of B-17s safely back to England after the manual controls had been knocked out by German flak, or the human pilots had been so badly injured they couldn't fly the planes themselves.

Today, vastly improved versions of that autopilot put the precision in the murderous punch of the Strategic Air Command's B-36s, B-47s, B-50s and the long-range, eight-jet B-52s, and give jet fighters super-human control.

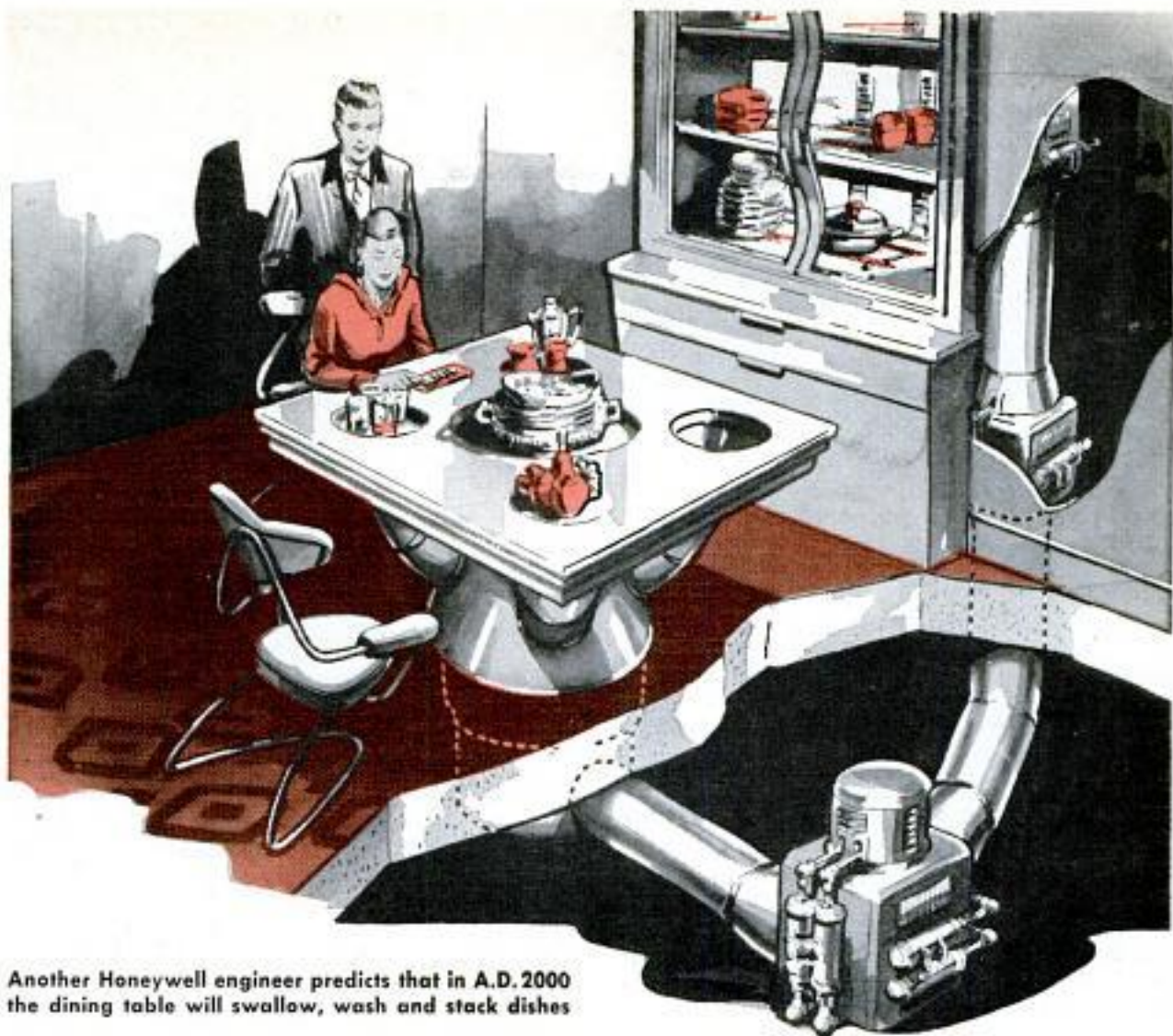
A more recent development is an inertial guidance system for aircraft, which depends greatly for its accuracy on ultrasensitive gyroscopes. The pilot simply feeds information into this device indicating where he is and where he wants to go, and it takes him there through any kind of weather. It needs no outside help from radio or radar, takes no navigational fixes on the sun or stars, is entirely unaffected by the earth's magnetic fields, and can't be jammed by an enemy.

Until a few years ago bearing friction posed a major problem for gyroscope makers. The less bearing friction a gyroscope has to work against, the more sensitive it is and the more accurately it can perform. Dr. Charles Draper of the Massachusetts Institute of Technology developed a gyro rotor sealed inside a container where it floated in a highly viscous fluid. The floating action removes bearing friction, and the viscosity serves to average out disturbing effects. Draper's gyro had incalculable military and industrial potential, but several major gyroscope manufacturers said that mass-production techniques could not be geared to such perfection. Honeywell

House analog computer replaces home at left. It can "imagine" any type of house, tell heating problems







Another Honeywell engineer predicts that in A.D. 2000 the dining table will swallow, wash and stack dishes

said it *could* be done, and since then has produced more than 25,000 for U. S. and Canadian jet fighters and guided missiles.

Last year Honeywell engineers used this gyro to explode the long-standing myth that the Empire State Building sways like a reed when a strong wind blows. The gyro proved that the world's tallest building is also one of the most stable, never moving off-center more than approximately  $\frac{1}{4}$  inch! A much bigger job is scheduled. Three of these gyros will help guide the three-stage Vanguard rocket when it lifts the earth satellite to its orbit in the sky.

Another highly sensitive but extremely rugged gyro is being installed in the gun turrets of tanks, and will enable the guns to fire with deadly accuracy while moving at high speeds across rough terrain.

Meanwhile Honeywell men roam across every path of life, refusing to regard any automatic-control problem as insoluble. For example, there never had been a practical way to heat and cool New York City subway cars. A full car can carry up to 300 passengers, who generate enough excess body heat to warm a 10-room house.

But car doors open and close every few minutes, and the number of passengers continually changes. Honeywell's comfort specialists conquered this imposing challenge with two electronic thermostats, each containing a highly sensitive strand of wire  $\frac{27}{10,000}$  inch in diameter. One thermostat checks temperatures outside the car; the other monitors the interior. At each change in temperature, the wire signals an electronic system which instantly heats or cools the car as required for maximum comfort.

The first time the tuna clipper *Sun Ray*, of San Diego, went hunting with Honeywell's electronic "Sea Scanar," it made a record-breaking 293-ton catch—worth \$70,000—in six weeks. The Canadian whaler *Nahmint* caught three whales the first week it operated with the device. The Sea Scanar fires bursts of high-frequency sound waves in a complete port-to-starboard sweep around the front of the boat. Electronic echoes return to a screen and give the fisherman a panoramic view of the whole area. The sound the Scanar emits when an echo comes back identifies the

(Continued to page 256)





**WE MAY NOT** like it. Europeans may not like it, but it's happening anyhow. European cars are becoming more American. I attended two great international auto shows, one in Frankfurt (Germany), the other in Paris (France) and came away convinced.

The trend is strong. How long it will continue may depend on European prosperity. Cars, like men's suits, are becoming standardized. Nobody objects to this in suits, perhaps nobody will object to it in cars. Here is some evidence of the trend:

- Vauxhall's new Cresta has the same creased roof, three-piece rear window that Buick and Olds featured in 1957.
- The Simca Vedette has tailfins, wrapped windshield and flashy colors.
- The DKW 600 has miniature Dagmars with Cadillac-like rubber inserts on its bumpers. Headlights have slanted shrouds.
- The German Ford is bigger, has more power, an automatic transmission.
- Goggomobil has a bigger model with American-style wrap-around windshield.
- Isetta now offers a rear seat and more power with a bigger engine.
- Auto Union 1000 sports coupe with its canted tailfins looks like a Thunderbird.
- Even the Japanese Prince looks like a cross between a Ford and a GM car.

There are exceptions. Holdouts include Volkswagen (and when VW gets tailfins, the world will tremble!), the Fiat and Renault (although Renault offers a Gordini engine option for "hot" performance).

Colors are brighter. Crowds at Frankfurt admired a purple Borgward with yellow leather interior. The Tatra V8 from Czechoslovakia was purple with a vile green interior.

Meanwhile America still borrows from Europe. At Paris a Pinin Farina two-door hardtop on a 1957 Buick chassis was much admired. When a door is opened, the roof raises itself several inches so you can get

into it without knocking your hat off.

Simple, clean and chromeless, the body was unlike any Buick you've seen recently. Buick (and GM) may be going Italian. If so, the Christmas-tree styling, so long a part of Buick's character, will have to go. This fellow Farina will have none of that—one reason why he and American Motors parted. He takes styling seriously. If you don't like what he does, it's too bad. Take it or leave it, but don't tinker with it.

No official word has been released about Farina working for GM or Buick. But it could be. Buick provided the chassis, however it did not commission the design. Harlow H. Curtice, GM's president, posed for photographs in the car and he was all smiles. This may have been mere coincidence, but such coincidences are more often planned than not in the billion-dollar auto business.

### What About the Shows?

The European shows are big. At Frankfurt, vehicles fill more than a dozen buildings totaling 16 acres. Some companies, like Mercedes-Benz, Volkswagen and Ford, take over entire buildings.

One day at Frankfurt over 200,000 paid to see the show. No dancing girls, no entertainment, just cars from 34 companies.

The Paris show is held in the Grand Palais, a huge exposition hall (another section for trucks and motorcycles is held elsewhere). One Sunday crowd was so large it was impossible to get close enough to see many of the cars. Over a million persons visited the show in 11 days.

Neither show uses pretty girls to make the cars more appealing—a standard American device. At Frankfurt, two shapely girls were handing out literature for a tire company. Their presence was a break with tradition and did not please the other exhibitors.

In Paris, the only girls near the exhibits wore baggy white smocks and were kept busy dusting the cars all day long.

### Cars Are Enough

Apparently, the car is still entertainment enough in Europe. Take Citroen, for example. The 2CV was introduced in 1946 and is the ugliest thing man ever put on wheels. Yet at the Paris show, it was overrun by thousands who looked at it, climbed into it, peered under the hood. You cannot cross a Paris street without being grazed by a 2CV they are so numerous, yet it was a big hit at the show. How much attention would an 11-year-old Chevy get at the Chicago show?

Europeans seem more interested in how a car works than the average American. It

(Continued to page 264)









Above, pretty models are rare in Europe's auto shows but at Frankfurt a tire company had these two

Left, some of the big companies, like VW and Ford, had complete buildings to themselves at Frankfurt

←Continued from preceding page

American cars got little attention at Paris. Edsel, because of its newness, was the most popular design







Despite his handicap, Bill Frank operates a one-man business turning out objects of art in his workshop

## Artist With a Lathe

*He never worked with power tools until he lost his sight*

**B**ILL FRANK OF Chicago cannot see. Yet Bill Frank, working from "mental blueprints," can turn out beautiful wood projects on his lathe. Recently he turned out a real object of art—an attractive mahogany dish weighing only an ounce. The dish is only  $\frac{1}{32}$  inch thick, and he turned it to this paper thinness on a lathe after first cutting the disk on a bandsaw and drilling it for mounting on the faceplate.

Frank lost his sight in an industrial accident 10 years ago. Prior to that, he had never worked with power tools. He learned woodworking from scratch without the help of his eyes. In the past three years he has converted his senses of touch, smell and hearing into a successful one-man business. And he has a fine safety record, marred only by an occasional burned finger tip and one minor cut with a chisel.

His workshop is an eight by eight-foot cubicle in his basement apartment. There, while his guide dog Chinook watches, Frank turns out wood bowls, lamp bases,

His prize project is this mahogany dish, beautiful as fine china—so thin you can see light through it







Special circle-cutting jig has a sliding scale which permits him to set the desired diameter by touch



Turning the workpiece on the jig's pivot point, he saws out the disk, then prepares it for the lathe

trays, Lazy Susans and jewel boxes.

"I work out the design as I go along," he explains. "However, if a customer wants a particular design, I give him clay and he shapes a model. Then I duplicate it."

Frank's workshop, precisely suited to his needs, is equipped with a 10-inch bandsaw, a 15-inch drill press and an 11-inch lathe.

In selecting wood for a project, he feels its end grain, gauges its relative weight and samples its distinctive odor, which will be intensified by friction on the lathe.

"To me, zebrawood smells like a stable," Frank says. "Amaranth from British Guiana is suffocating. Walnut and pine have a bitter smell, and Costa Rican cocobola makes me sneeze. Myrtle wood has a scent like fish glue. Vermilion is another wood with a musty smell, and teak gives off an oily odor. Personally I prefer to work with fragrant Brazilian rosewood."

To demonstrate his woodworking technique, Frank places a pine slab three inches thick on the saw table. He first must cut a disk from it. To aid him in this job, he has a special circle-cutting jig presented to him by Duro Metal Products Company of Chicago.

The jig resembles an oak breadboard, and through it runs a steel channel. Sliding in the channel is a metal scale. A wire "finger" on the scale slips into notches spaced an inch apart in the channel. Thus Frank can measure the distance between the bandsaw blade and a steel pin on the scale by feeling the notches. He then impales the slab of wood on the steel pin, and knows the exact radius of the disk the saw will cut.

Flipping a switch, Frank starts the saw. Its 1/4-inch blade whines through the pine as Frank slowly rotates the slab on its metal pivot. His sensitive ear is tuned to the cutting tone of the blade, and at any given moment he has an accurate idea of

the position of the blade in its path around the disk.

Frank next places a metal bar 3/8 inch thick on the drill table, lowers the drill until it touches the bar, then locks the depth stop on the drill. Thus the drill will penetrate no farther than the preset depth.

"This leaves me enough thickness at the base of the disk to fasten it to the lathe faceplate," explains Frank.

He then uses a center finder to mark the disk, and drills the center hole to the preset depth.

He has a homemade instrument, a hardwood disk, for locating the screws for the lathe faceplate 120 degrees apart. Protruding through the disk are three finishing nails spaced to match the screw holes in the faceplate. And protruding through the center of the disk is a fourth nail. With his fingers, Frank locates the center hole used in cutting the pine disk, and guides this fourth nail into it. Then, when he presses down, the finishing nails leave impressions in the surface of the workpiece. He uses these impressions as guides for the screws in fastening the work to the faceplate.

After mounting the faceplate, he turns on the lathe, using a knee switch. This permits him to turn the lathe on or off without removing his hands from the work. He has notched the post of the tool rest so he can determine the proper working height. Blocks four inches high raise the lathe's head and tailstocks so he can make faceplate turnings up to 22 inches in diameter.

After putting on a respirator, he selects one of his carbide-tipped chisels and places it on the tool rest with his fingertips just behind the cutting edge. First he shapes the outside contour of the bowl. Then, stopping the lathe, he swings the tool rest into position for cutting the recess. His first step here is to turn a small groove about an inch from the edge.





With a drill press he drills a hole which will serve as a maximum-depth guide in his work on the lathe



Using a marking disk he made himself, he marks holes on bottom surface to register with holes on faceplate



Left, with center hole as a guide, he shapes bowl with all the skill of a sighted craftsman. He can tell his progress by touch, sound and even smell

Frank uses five grades of sandpaper to prepare the surface for finishing. The finish includes a coat of sealer, which is followed by three coats of lacquer

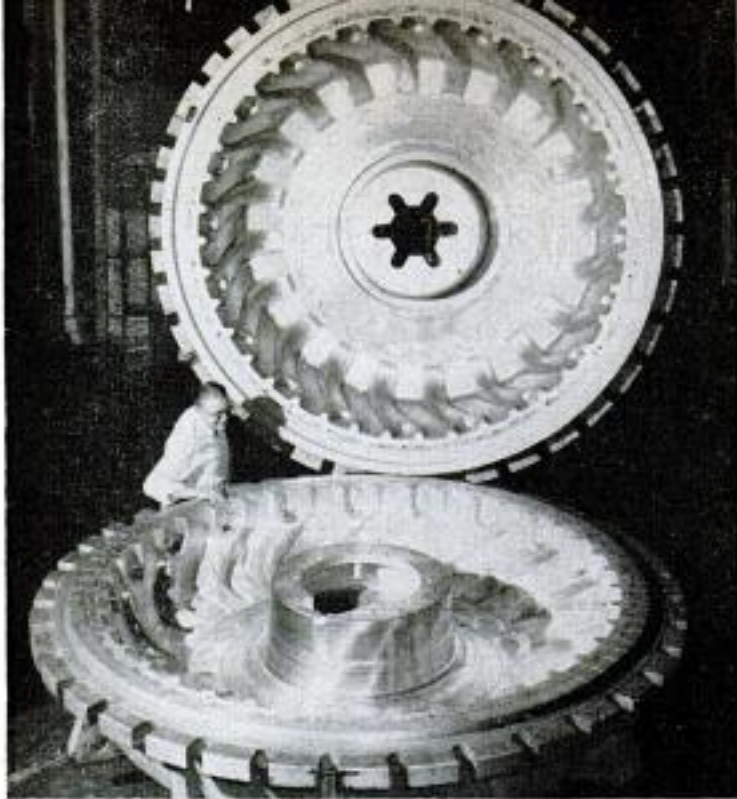
"Although I gauge thickness with my fingertips," Frank reports, "the groove keeps me from going astray as I rough out the interior." He also keeps his ears tuned for the characteristic hum which tells him when the bowl has been turned to the proper thickness.

Frank usually can turn out one of his handsome custom-made projects in half a day. When he's satisfied with his lathework, he smooths the surfaces with five grades of sandpaper. Then a neighbor helps him apply one coat of sealer and three coats of lacquer. As a final touch he brands his trademark, "Woods by Frank," on the bottom of his handiwork.

They are objects of art, created to please the eye by a man who has no eyes to help him. ★ ★ ★







## Aluminum Mold Cures Big Tires

Weighing only a third as much as molds previously used to produce the big rubber tires for construction equipment are new aluminum casting sections. Tires that come from this mold are about 7 feet 6 inches in diameter and weigh 2500 pounds. Producing the tire mold itself was quite a feat. It required 70 separate sand sections assembled on a level concrete slab and filled with molten aluminum alloy. The aluminum mold actually will be used to cure the "green" tires after the inner tubes have been inserted. The tires are cured by heating the mold with steam to nearly 300 degrees F. for six hours while a hydraulic ram holds the sections together.



## Propeller at Bow Maneuvers Ferry

Built to handle 28 freight cars between San Francisco Bay points is the new train ferry, *Las Plumas*. Three main screws at the stern, powered by 700-horsepower diesel engines, provide a speed of 12 knots. But the ferry also has a bow propeller which operates at any angle to the keel for easy maneuverability. The vessel is refueled by rolling a tank car aboard and draining the fuel through manholes in the deck.



## Heat-Beating Steel For Fast Aircraft

Steel that will beat the heat of Mach 4—1000 degrees F. at about 2700 miles per hour—has been developed for future aircraft and missiles. It will be used as skin and in major structural parts. The stainless steel is manufactured in conventional electric furnaces and rolled on continuous strip mills. The manufacturer reports it has high strength, is easily fabricated, can be produced in volume. It also resists corrosion and is economical. The steel is made by a precipitation hardening process, a heat treatment that causes a strong bond between the minute particles of the metal, and contains 15 percent chromium and seven percent nickel.





Dazzling effect of Christmas tree under black light is achieved with various fluorescent compounds. Inset, tree under normal light

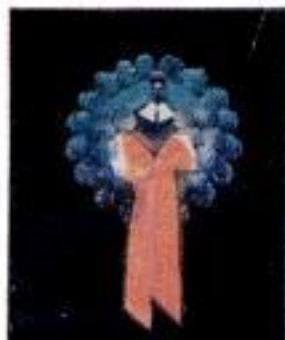
# "RAINBOWS" FROM BOUNCING ATOMS

By Richard F. Dempewolff

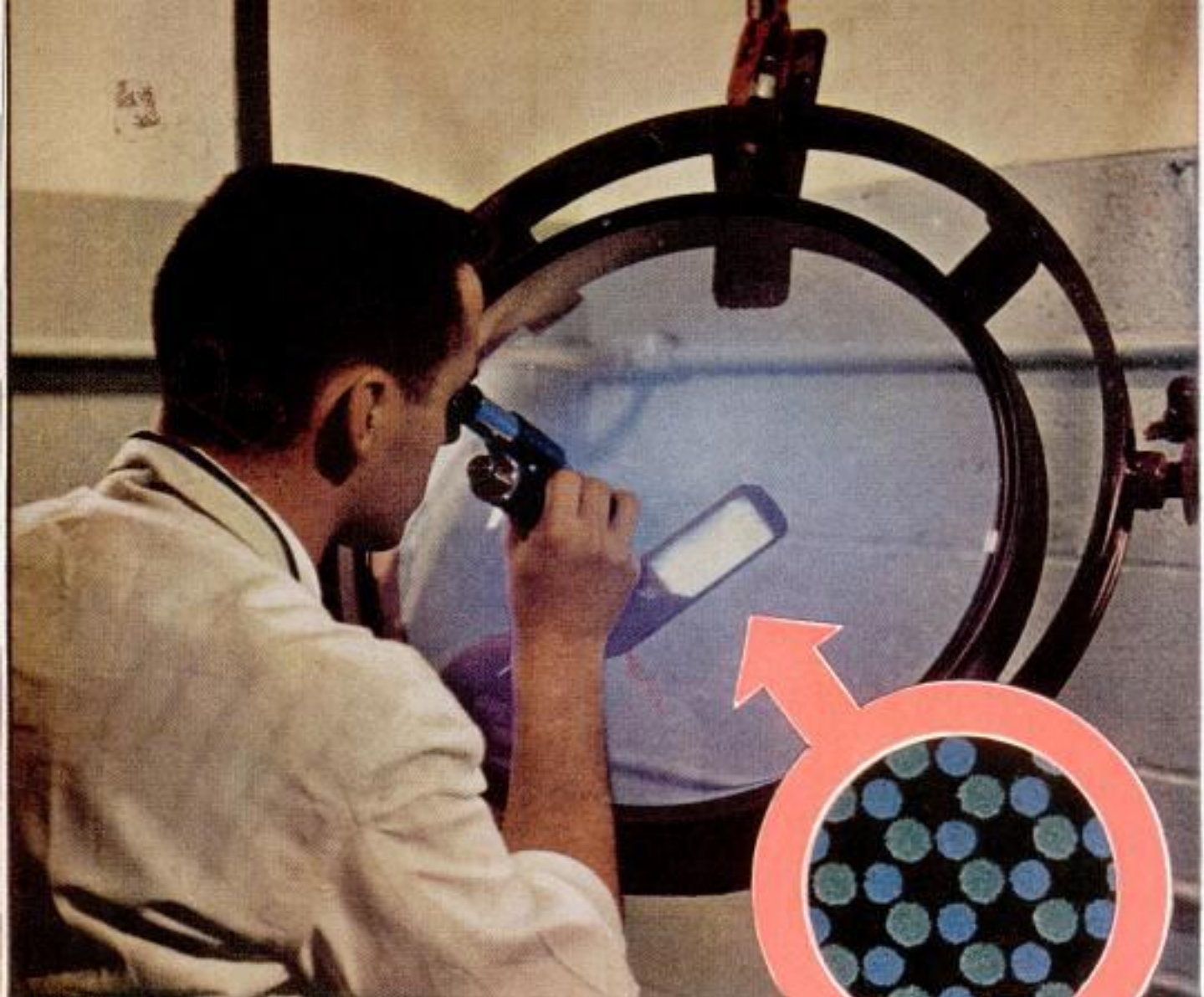
**L**IGHT NO HUMAN EYE CAN SEE is illuminating secrets hidden in the structure of the elements. A darkened room in an old Bayside factory, across the East River from New York's skyline,

doesn't light up when Bill Cooper flicks a switch and floods the darkness with invisible rays. But, instantly, countless excited molecules plunge the room into rainbows of blazing color.

Fluorescent paint and powders lend novelty to Christmas decorations from reindeer to "stained glass"







Technician at Sylvania laboratories uses black light and microscope to check blue and green phosphor dots on color TV tube

A pile of drab rocks in the corner becomes a hoard of brilliant red, green, yellow and purple gems. A seemingly blank blackboard turns into a vivid chart. Stacks of plain paper blaze fiery red and blue. Some sheets that had nothing on them are covered with luminous writing. A clutter of ordinary stamps on a table glows like tiny neon signs.

Bill Cooper, president of Black Light Eastern Corporation, uses this eerie room to amaze people — and usually succeeds. But even more amazing is the job that “short wave” light is doing all over the world. Recently, on a barren granite mountain north of Tonopah, Nev., “invisible” rays pouring from a portable lamp in the hands of a prospector struck telltale fire from nondescript gray rock, revealing one of the richest uranium strikes in the nation.

On a boat in New York Harbor, sanitation experts next spring hope to aim a similar ray at samples of water. Some, containing minute quantities of invisible dye, will glow an unearthly green and, if all

goes as planned, may finally lead investigators to sources of pollution that have been fouling the city’s beaches. Not long ago, the beam trapped a ring of check passers on the West Coast by causing a set of invisible fingerprints to glow green. It saved the life of an Air Force pilot by producing light in a smear of oil seeping from an invisible crack in the plane’s engine block.

Under invisible light, military students read complicated maps and charts in the dark. Hobbyists are building fireplaces whose rocks glow at night, and decorating homes with living colors at holiday time. Collectors are off on a new hunt — for stamps that change color and glow under the ray, and drab minerals that look like a Fourth of July display when the regular lights are out.

Ultraviolet, the invisible ray performing these jobs, is not new. Early in World War II it set airplane instruments aglow so pilots could read them in the dark. The ray was tried as a sterilizing agent, crime





When viewed under natural light, the nondescript rock above looks like what it is: willemite-calcite



Under ultraviolet, the willemite-calcite—one of the most spectacular minerals—glows in brilliant color

Uranium ore may look like this sandy-colored specimen of autunite when seen in ordinary daylight



Ultraviolet reveals concentrations of uranium ore in patches of green against bluish-purple autunite



detector and a host of other things (*Popular Mechanics*, April 1945). Recently, with the development of new lamps that are safer, more serviceable and versatile, scores of new applications are being discovered.

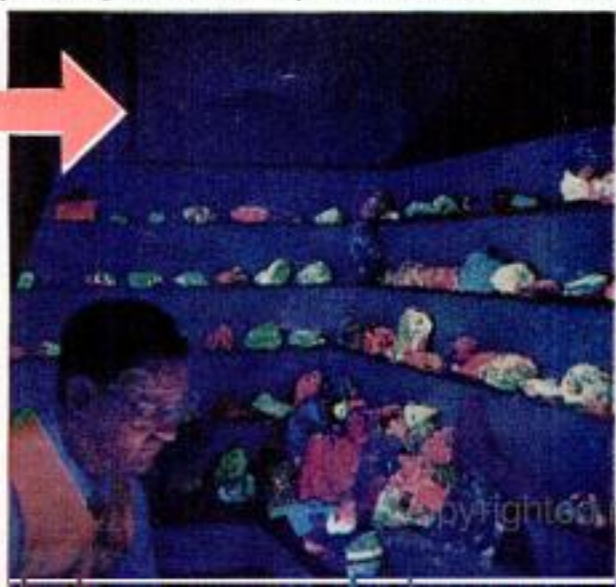
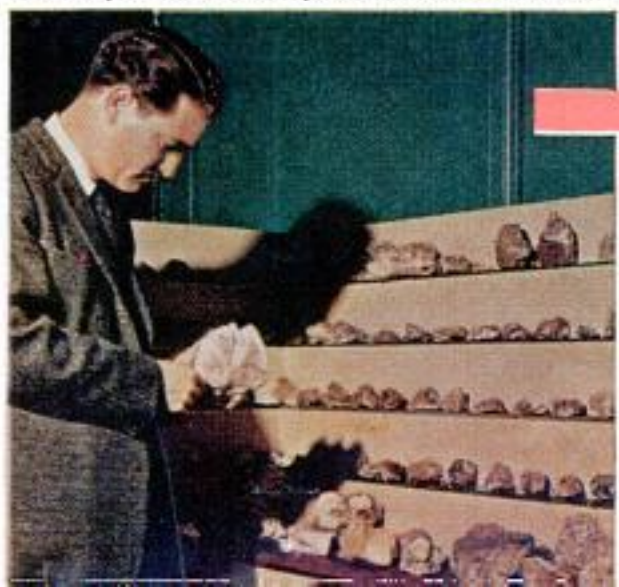
### Ultraviolet Is Invisible

What is ultraviolet? "First of all," explains Cooper, "it's light. It is invisible because its wavelength is shorter than the human eye can detect—just as ultrasonic

frequency in sound is beyond the capability of the human ear."

Light is measured in units called angstroms, and the full solar spectrum has 1,000,000 of them, going from cosmic rays at the low end, to infrared at the other end. All we ever see is a tiny sector of the spectrum between 3800 and 7600 angstroms on the vast scale. At 3800 angstroms, visible light is deep, vibrating violet. Below that, down to about 500, is the ultraviolet zone beyond a human's vision. Actually, this is

Bill Cooper likes to surprise visitors to his office by turning ultraviolet rays on his rock collection







Defense plants use fluorescing pass cards for restricted areas. They glow pink (inset) under black light radiation. Sunlight has plenty of it, but only a fraction reaches the earth to give us a tan or sunburn, since it is filtered out by atmosphere. Above the ionosphere, a man would burn to a crisp under bombardment by the ultra-short-wave radiation of ultraviolet.

What modern science has done is to reproduce certain sectors of the ultraviolet spectrum with electric lamps. Usually these

This is how hands and clothing of a burglar look under black light after contact with tracer powder



are sealed glass tubes containing a gas such as argon, plus a drop of mercury. When energized with electric current, this combination will produce ultraviolet rays.

"Most people," says Cooper, "think ultraviolet and black light are the same. They're not. Black light is a name we give to 'near ultraviolet,' in the range close to visible light. This is long-wave ultraviolet, harmless to eyes and skin. It is used in homes for table displays, mineral collections, black-light kits for children, advertising and so on. Lamps giving off short-wave radiation are called mineralights because of many minerals' response to them. Mineralight radiates in the ultraviolet zones that give you a 'sunburn.' Goggles are used with them since they can damage eyes. These are the prospectors' lamps, sun-tan lamps, therapeutic and sterilizer lamps."

### 3000 Substances Fluoresce

Black light and mineralight between them cause more than 3000 known substances to fluoresce. Fluorescence occurs when the molecules in a substance absorb ultraviolet rays of certain wavelengths and react by moving around excitedly, releasing energy in the form of visible light. That light can be any color of the rainbow, depending on the substance. At home, this can provide startling displays.

POPULAR MECHANICS



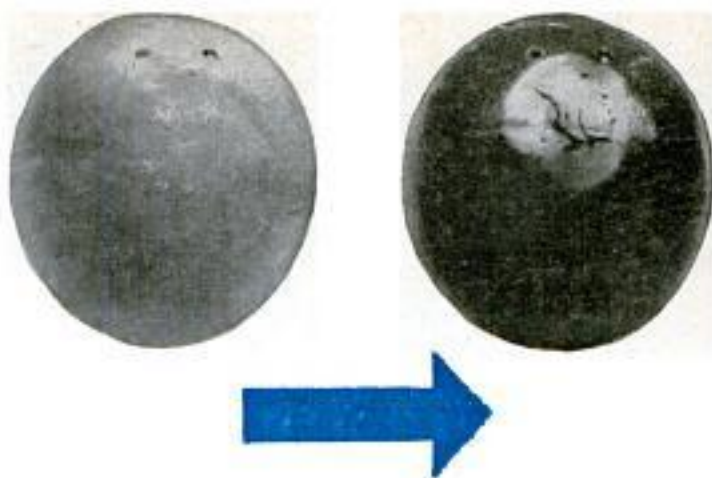
Murals painted with fluorescent oils may appear like blank walls in regular light, but spring to life at night under the black rays. Nowadays fluorescent paints in all colors, for wood, ceramics, indoors or outdoors are easily acquired. Bill Cooper has a thousand suggestions. One of his friends spray-painted a piece of driftwood with fluorescent color for a lamp base. It is gray under normal light, but when the room is darkened, a hidden black light makes it glow green and it becomes a TV light.

To demonstrate the decorative scope of new materials, Cooper set up a plain Halverson Christmas tree in his office and painted it with invisible fluorescent paints, dyes, glitter dust, powders and chalks. It looked like any small white Christmas tree should look in normal light. But when the black light was turned on, coated ornaments glowed, branches glittered with diamonds, packages shimmered with ribbons of light and messages appeared on them.

#### New York's Fluorescent Aquarium

More recently, Bill set up a fluorescent aquarium in New York's Aquarium Stock Company. Invisible fluorescent red, green and blue glitter dust stained the foliage. Naturally fluorescent minerals formed the rocky background. Some sands fluoresce a yellow, and these covered the tank bottom. Invisible fluorescent paint coated the decorative objects. To top it off, a few drops of fluorescein went in the water. In normal light, such an aquarium looks like any other. But in a darkened room, a black light replacing the regular aquarium light converts it into an eerie underwater world of unbelievable color in which tropical fish move shadowlike through glowing green water.

Follow Cooper around for a day, and

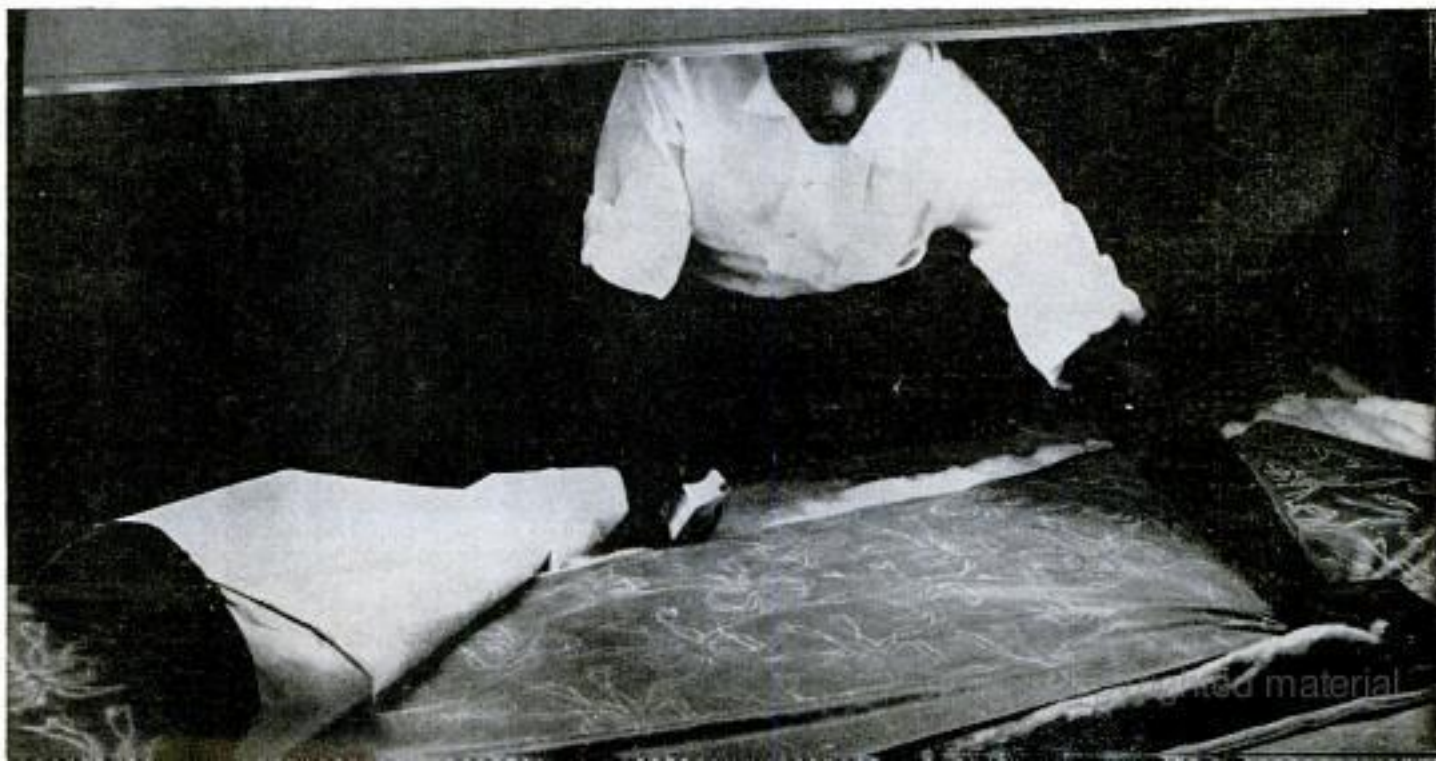


Left, orange under normal light looks healthy, but under ultraviolet, right, "invisible" green rot shows

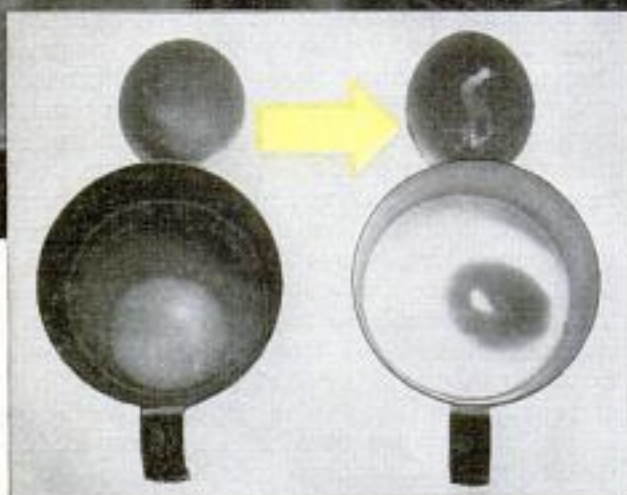
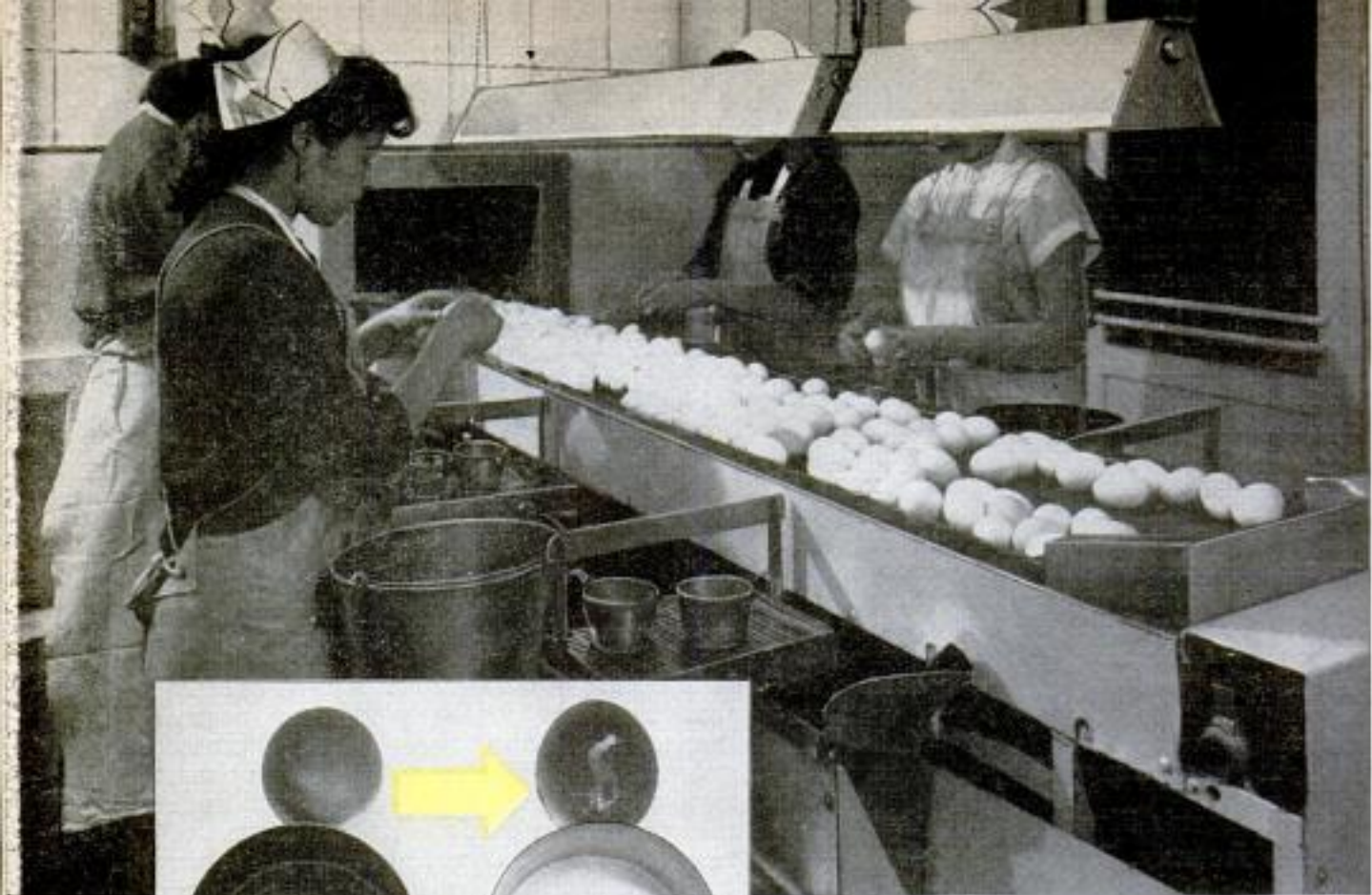
he'll open your eyes to hundreds of items that fluoresce violently in any normal home. Petroleum jelly glows bright blue or green. So does lubricating oil. Some plastic toys and golf tees burn orange or red under the ray. Green bottle glass will often fluoresce brilliant yellow or green, due to tiny traces of uranium in it. Cheap calico may blaze up with all the colors of the rainbow. Moth balls are a vivid purple, waxes shine in many colors, and the average medicine cabinet looks like the trail of a super Fourth of July skyrocket. "Such materials are easily used in creating home-grown displays by anyone owning an inexpensive black light," Cooper points out.

Fluorescent dyes in water can produce some unique effects. Outdoor goldfish ponds, bathed in black light, become glowing fairylands when only a few drops of fluorescein are added. Out at Disneyland's Rainbow Caverns, banks of ultraviolet play across a whole series of roaring waterfalls, each fluorescing a different brilliant color

Textile worker inspects invisible patterns stamped with fluorescent ink—used as guide for stitching







Ultraviolet lamp over egg-sorting table quickly reveals the good and the bad. Left, good egg appears clear under the lamp. The spoiled egg at right is a cloudy green color. Infection shows through shell

due to various mineral salts in solution. The effect is spectacular.

Black light has prompted a whole new field of hobbies. Fluorescent-stamp collecting is just one of them. Inks and paper used in stamps may fluoresce vividly in some issues and not others, making them considerably more valuable. One nondescript stamp in Bill Cooper's collection does a complete color reversal.

Wood carvers have found that black locust, sumac and Oregon-grape root will glow vivid shades of yellow under mineral-light if gathered during summer and fall. They use these materials for carved candlesticks, or in frames for mosaic displays of fluorescent minerals, that are hung on a wall and sprayed with ultraviolet for the benefit of startled guests. "Anyone can make such a display," Cooper reveals, "by laying a half-inch-thick frame on wrapping paper. Bits of fluorescent mineral which are collected at night with black light, are placed inside the frame. Plaster is poured over the stones, flush with the frame. When the plaster is set, turn it over, strip the paper, clean up the surface, and you've got a beautiful fluorescent mosaic."

Dr. F. L. Whiting, a New York dentist, went a step further and made a Nativity diorama using fluorescent stones for the cavelike background in which solid-gold figurines stand. An ultraviolet lamp hidden behind the boxlike frame for the display makes the entire background fluoresce. A Fifth Avenue jeweler used the piece of \$5000 craftsmanship in his show window last Christmas.

#### Many Minerals Fluoresce

Actually, hundreds of known minerals fluoresce. As a result, a new kind of rock-hound is prowling outcrops and old mine workings, hunting only stones that glow under ultraviolet lamps. Such collections, which light up in a gaudy array of spectacular color under radiation, can be interesting and valuable. Many enthusiasts keep specimens in glass bookcases, with ultraviolet lamps hidden along the sides. Some have devoted whole rooms to private "spectaculars." One enterprising collector, Walter Sutter, of Tacoma, Wash., sawed massive specimens of stone into slabs with which he built a fluorescent fireplace in his living room.



Fluorescent-rock hunting can be lucrative even for beginners. A few years ago near some abandoned mines in Franklin, N. J., where one of the greatest stock piles of fluorescent minerals in the country lies on heaps of rubble from the diggings, a mineralight rock-hound unearthed a 100-pound chunk of wollastonite that glowed a fiery orange. It sold recently for \$2500.

Most fluorescent-mineral collectors eventually get into the serious business of prospecting for valuable ores. Portable mineralight short-wave lamps are filtered to screen out nearly all stray visible light, passing only short-wave ultraviolet rays. Prowling the hills at night with these invisible beams, prospectors excite vivid color responses from rocky outcrops containing minerals like scheelite (the tungsten ore), secondary uranium ores, and ores containing production quantities of zinc, mercury and zirconium. "Since 1951," Cooper points out, "mineral light has exposed more than \$100,000,000 worth of scheelite alone by exciting its vivid blue-white fluorescence."

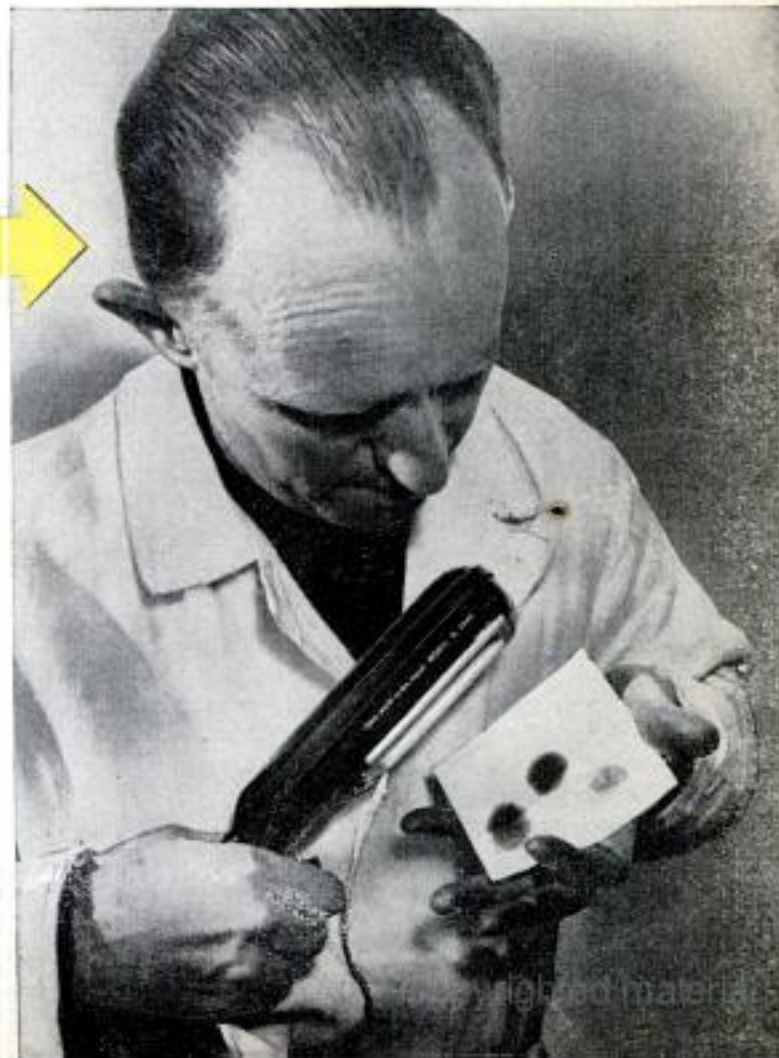
In the Tonopah, Nev., strike, it was a woman and her son, using mineralights, who turned up bright-yellow fluorescence in old granite outcrops—instead of the blue-white scheelite common in the area. It turned out to be autunite, a rich uranium ore. Subsequent mineralight exploration in the area turned up vein after vein of the

(Continued to page 228)



Prospector uses ultraviolet lamp to study characteristics of radioactive ore located by geiger counter

Transmission or crankcase oil leak? Mechanic, below, tests samples of oil which fluoresce differently







Converted from old bus at cost of \$7000, mobile kitchen is ready to handle mass feeding in emergency



Unit carries 280 gallons of LP gas, enough to operate bus, kitchen equipment and lights for 36 hours



Each cooking pot in foreground holds 500 servings

## CD Kitchen Serves 25,000

Operated by a four-man crew, the mobile kitchen of the Dade County, Fla., Civil Defense organization is geared to serve 25,000 meals a day. The meal probably would be a stew and limited to 10 ounces per person, but it would provide emergency nourishment for a community hit by a major disaster. Civil Defense officials plan a fleet of six such mass-feeding units for the Miami area. The unit in the photographs is a converted 1947 Reo bus. The frame was cut and extended 10 feet and the original gasoline engine was modified to permit the use of LP gas. All equipment operates on LP gas. The unit carries a 36-hour supply of fuel.

## "Igloos" Provide Cool Comfort in the Tropics

Igloos in the Tropics? The igloo, ideally suited to the low temperatures of the far north, now has been adapted to the high temperatures of the Tropics. Seven buildings patterned after the Eskimo's traditional abode have been built in Balboa, Canal Zone, Panama. The domes of the buildings have been painted white to reflect the sun's

rays. Roof lines extend to form visors over the windows to keep out the tropical sun and to provide protection from rain. In addition, each "igloo" is air-conditioned. The buildings are connected by covered passageways, also painted white to reflect the heat. The igloos were built for rental as business offices.

Chrysler Airtemp photo





An aerial photograph showing the USS Carronade (LST-1169) in the middle of an amphibious assault. The ship's deck is crowded with landing vehicles, including tanks and trucks, which are being pushed off the bow. Several rockets are in the air, some having just been launched from the ship's deck. The water is dark, and the shoreline is visible in the distance.

## The COVER STORY

The USS Carronade goes into action with three rockets zooming shoreward and another igniting in launcher

*By Joseph Stocker*

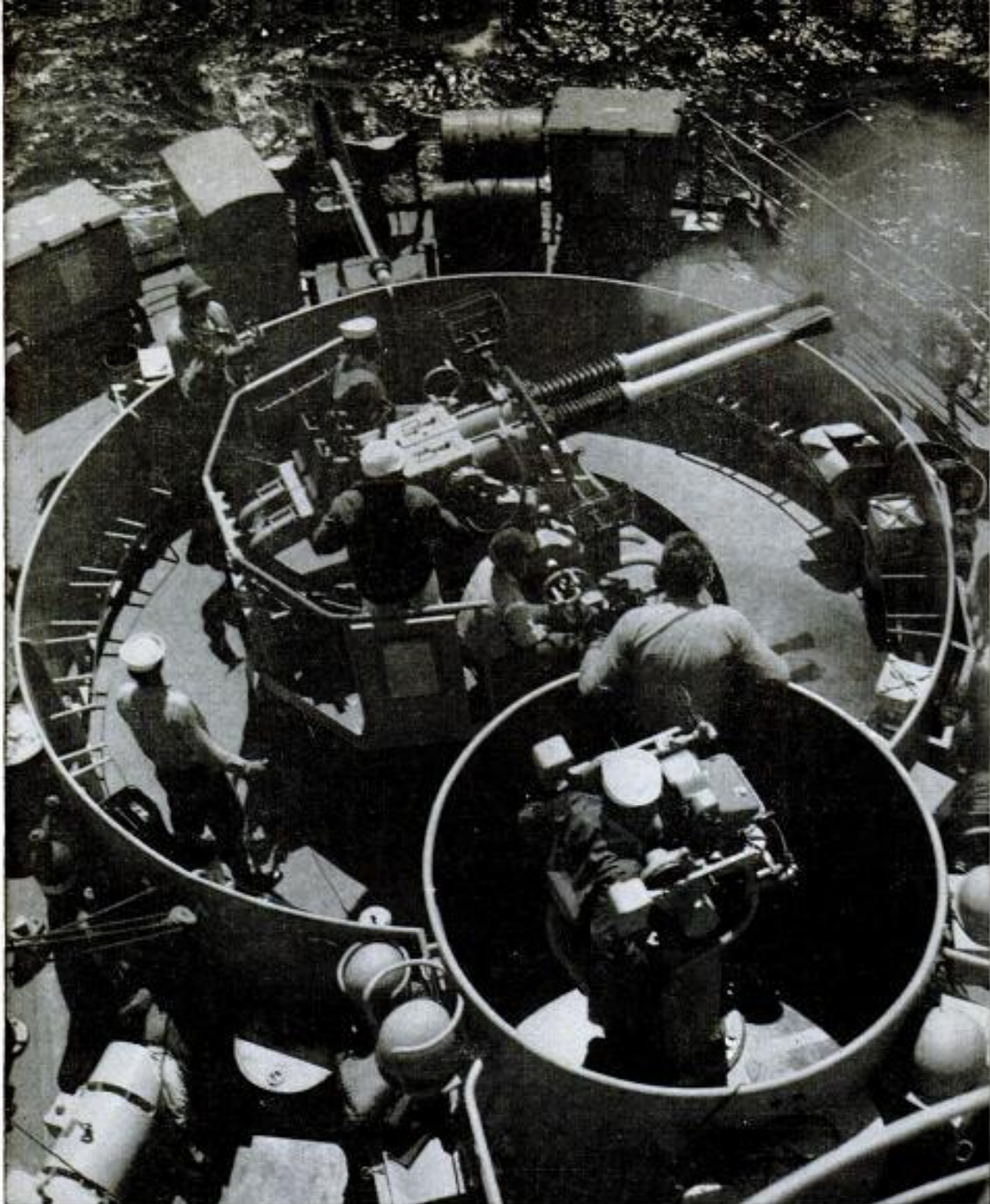
**I**N ANY AMPHIBIOUS ATTACK during wartime, one of the major requirements (along with sturdy foot soldiers who don't mind getting wet) is offshore fire support.

In the Pacific fighting of World War II,

this role was largely filled by destroyers and cruisers. But they couldn't get in close enough to suit the Navy—or the Army either, for that matter. With the development of rockets after the war, the Navy converted some of its LSMs (Landing Ship







**Carronade has conventional weapons, too. Here, 40-millimeter cannons provide support and protection fire**

Medium) into rocket launchers for offshore bombardment. But the LSMRs, as they became known, didn't have the speed or maneuverability that was needed, or an adequate fire-control system.

Today, however, the Navy thinks it has the problem licked. The answer? The USS *Carronade*, a doughty and quaint-looking little bobtailed craft with speed, maneuverability and almost as much firepower as a cruiser.

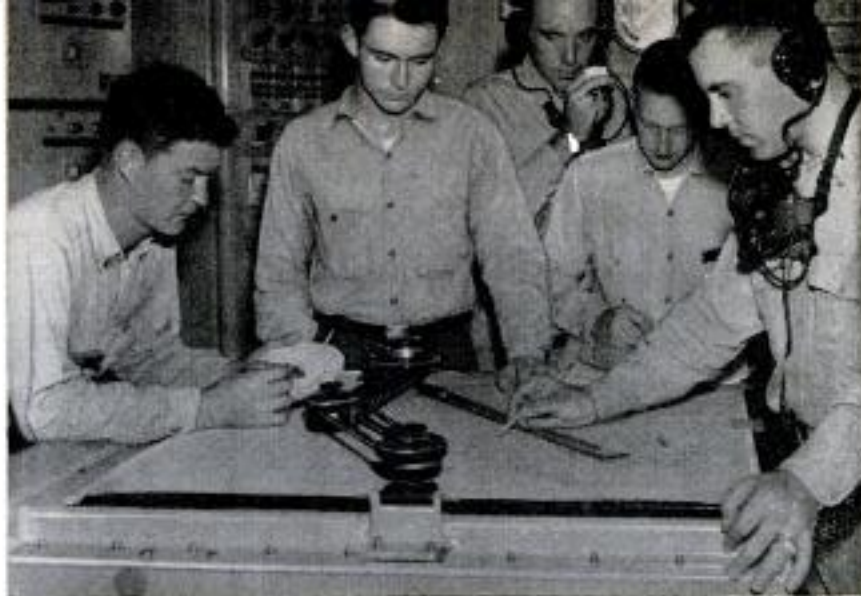
The *Carronade*, first of what the Navy anticipates will be a long and distinguished line of vessels, is known technically as an "inshore fire-support ship." She derives her name from a naval gun developed in

Scotland and first used by the British against the American colonists in the Revolutionary War. She can clip off 17 knots (to the LSMR's 10 knots). She packs eight twin rocket launchers—stubby little weapons scarcely higher than a man's head. And she has controllable variable-pitch propellers which, according to the Navy, make her "nearly the most maneuverable ship afloat."

The *Carronade's* launchers are capable of firing rockets at far greater speed than the old LSMR. Her fire-control system, built around a new-type computer, makes possible a shore bombardment of unprecedented accuracy.



Electronic brain in computer room automatically regulates launchers, fires rockets by remote control, either singly or in salvos with pin-point accuracy

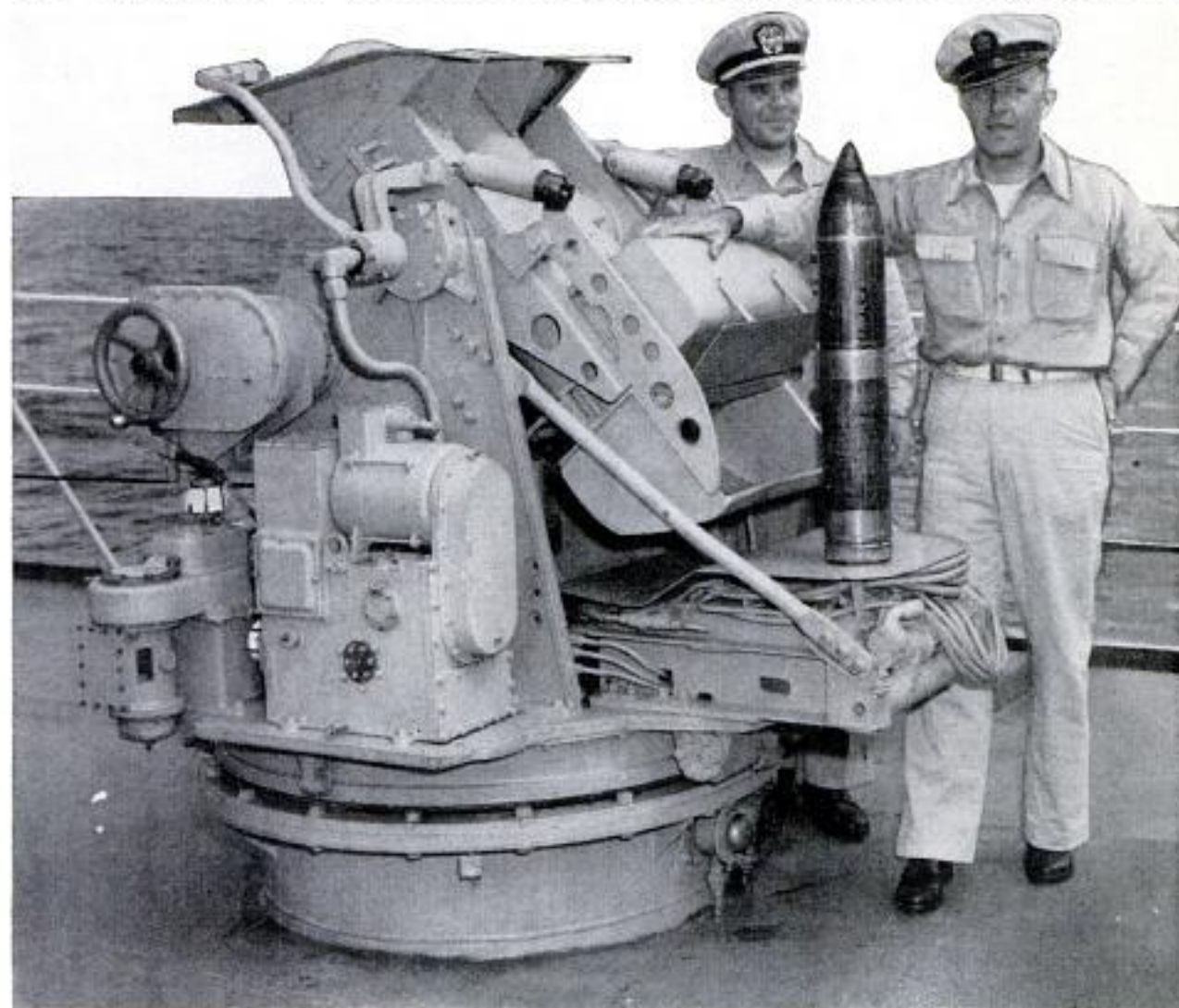


The *Carronade's* five-inch rockets pack the same punch as shells from a five-inch gun. They are spin-stabilized for accuracy and have an effective range of up to six miles. Several salvos can be fired per minute.

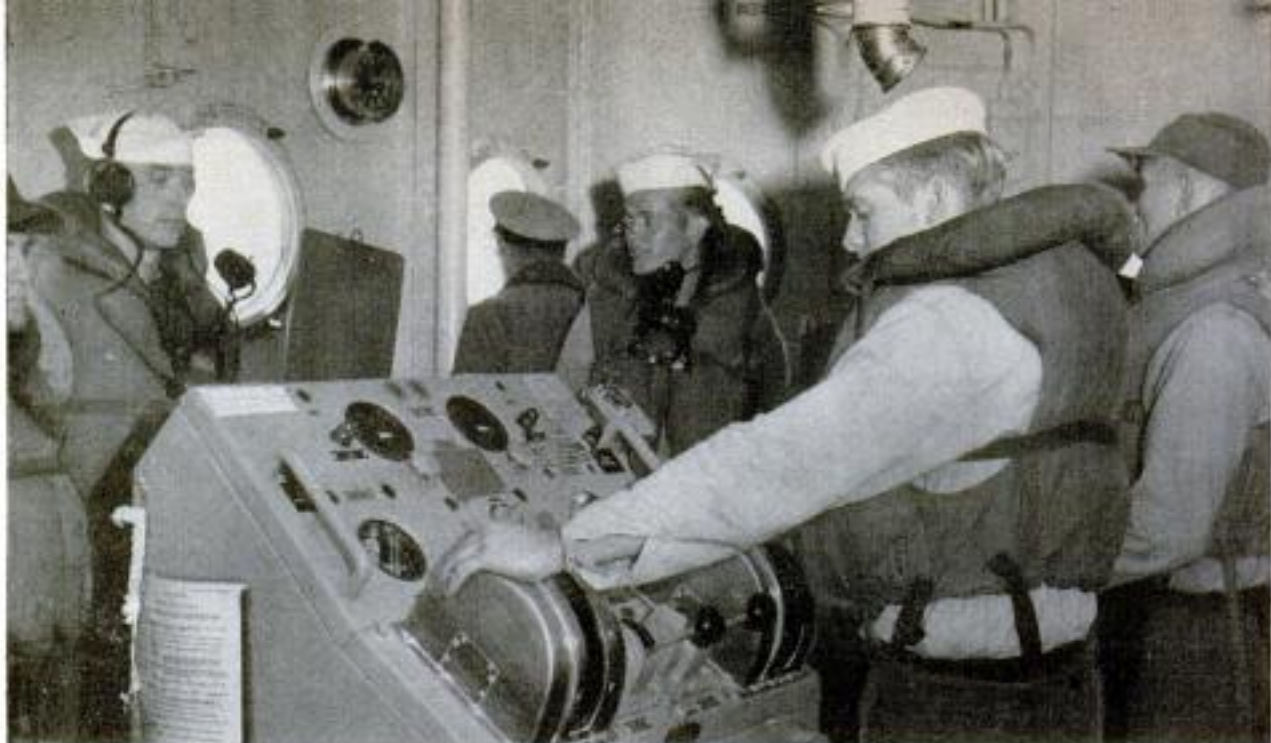
In action, the ship launches its rockets by remote control. No one is on deck. Down in the magazines the handlers load

two rockets into a hoist and press the compressed-air button that shoots them up into position in their launcher. In the computer room, meanwhile, an electronic brain is digesting such information as speed, course, roll of the ship, and distance and direction to the target. Then it automatically turns the launchers and points them at the correct angle. A single rocket or a

Ship's foredeck bristles with eight of these twin launchers. Five-inch rockets have a range of six miles







*Carronade's* nerve center is bridge. She can attain the high speed of 17 knots, is extremely maneuverable

complete salvo can be fired by pressing the proper button.

Immediately after a salvo is fired, the handlers in the magazines load more rockets into the hoists and send them on their way. Within seconds the ship is ready to fire another salvo.

Ten years ago, rockets like these were

not especially accurate. They were regarded as an area weapon. Today accuracy has been stepped up to the point that the gunnery officer on the *Carronade* is apt to be told: "Target, moving tank just below the clump of trees bearing 135 degrees!"

But the *Carronade* has still another  
(Continued to page 236)

Range finder provides data for computer. When off-duty, sailors enjoy the most luxurious ship in the Navy





## "Drive Through" Auto Ferry



Someday an airline passenger will be able to drive his automobile into the rear of a British-built plane, fly economically to his destination, and then drive away out the front of the craft.

These are the specifications of a new airplane that will carry 30 tourist coach passengers in its top deck and six automobiles below. The cars will be able to drive straight through the fuselage using doors at both ends.

The plane is being built by the British firm of Hawker Siddeley, manufacturer of the Hawker Hunter and other military aircraft. A prototype is scheduled for completion next year.

It is designed to be a medium-range, economical multipurpose airplane to provide passenger and freight service at low cost. Powered by four Rolls-Royce turboprop engines, it will have a cruising speed of 300 miles per hour at 25,000 feet altitude and a range of over 2000 miles.

An all-air-coach version would carry 80 passengers, a military type would transport 70 troops and their accessory equipment and vehicles, and an all-freight adaptation would have a pay load of more than 25,000 pounds.

Initially, the British firm plans to build 10 of the airplanes, and hopes to sell them there and in other countries.

### Five-Ton Roller Made From Culvert

Crushing the lumps of plowed soil is sometimes necessary in irrigation farming. A Colorado farmer does this with a roller he made by filling a section of 36-inch culvert with four tons of concrete. Axle and tongue add another ton of weight.

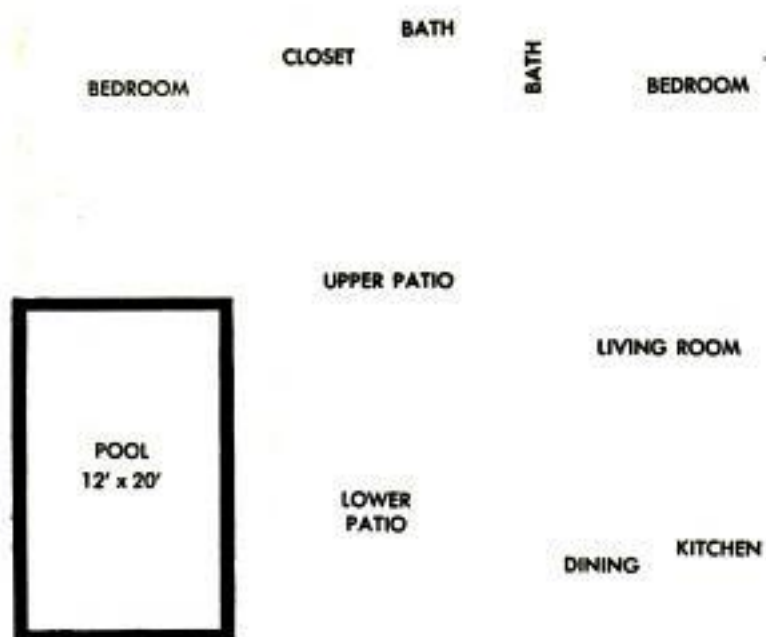
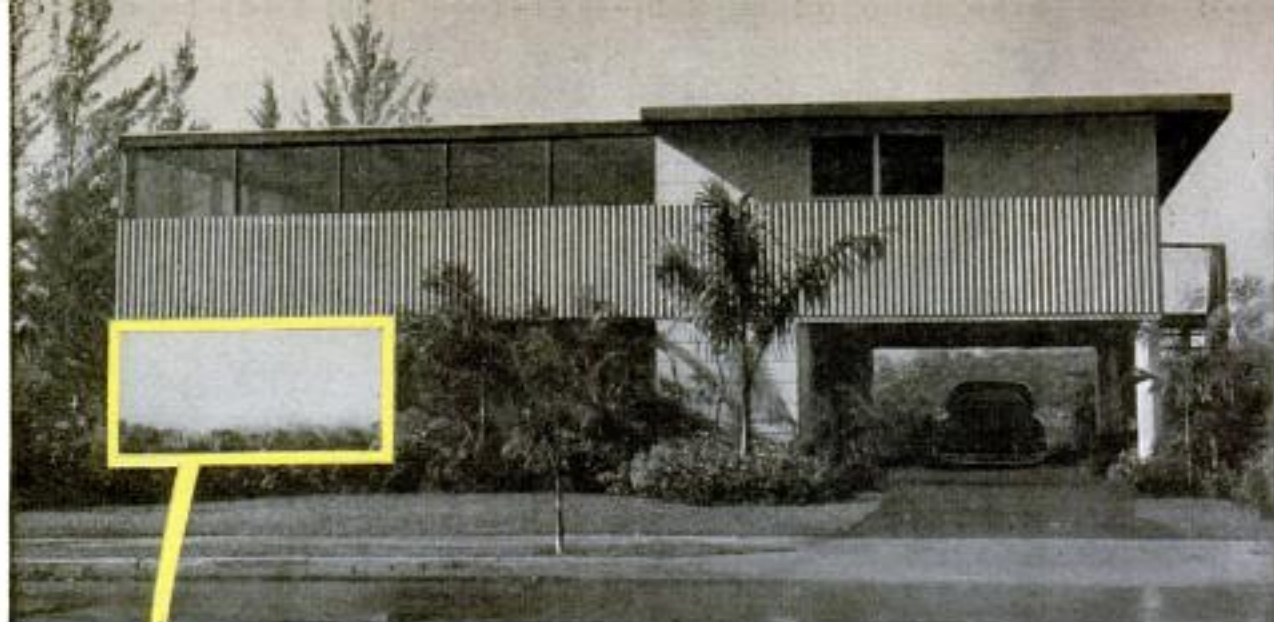


### Tractor Moves German Farmer

When a farmer in West Germany moved into a new home recently, he found the stairway was too narrow for some of his furniture. He solved the problem by loading the furniture on the fork-lift attachment of his tractor and raising it to a second-floor window.



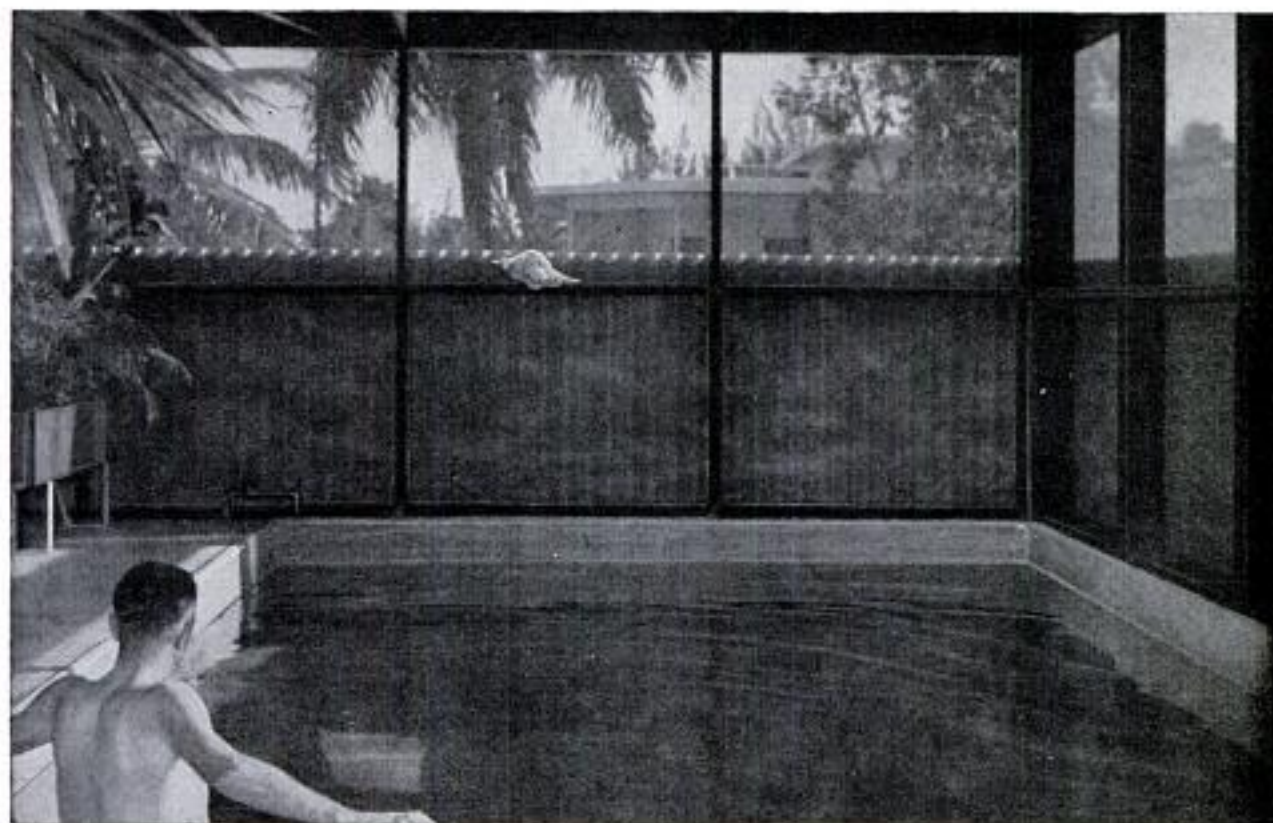




Compact house has outdoor-living areas, including the swimming pool and patios, all under the roof. The living quarters are on second floor

This view is from lounging area at end of swimming pool and looking across the upper patio into living room. Glass doors are pushed back





Surface of poured-concrete pool is at second-story level. Corrugated panel outside screen gives privacy

*By Edward Dickson and Max Hunn*

**T**HE OUTDOORS comes indoors in a house owned by John E. Turner of Miami, Fla., and the key to the structure's unusual design is an upstairs swimming pool.

By going to the second floor with his pool, Turner was able to assemble under one roof on a comparatively small lot a two-bedroom, two-bath home, complete with living room, dining-kitchen area, a pool and sun terrace, spacious patio, carport and utility room. He achieved complete privacy, too.

It was quite a design problem which Turner handed to his architect, Ralph A. Anderson. He wanted to build on a 70 by 80-foot lot. He wanted a good-size home, but he also wanted a swimming pool and a patio for relaxation. Because the lot is just a stone's throw from Biscayne Bay,

there was the problem of minimizing the remote but possible danger of damage from high water swept in by a hurricane.

As Anderson finally designed the house, all essential living quarters are on the second floor, with easy access to the 12 by 20-foot swimming pool and a spacious lounging terrace. On the first floor, Turner obtained his roomy patio, floored in cast stone, and has landscaped it with plants, including palms which extend upward in the house to reach above the balcony of the sun terrace on the second floor.

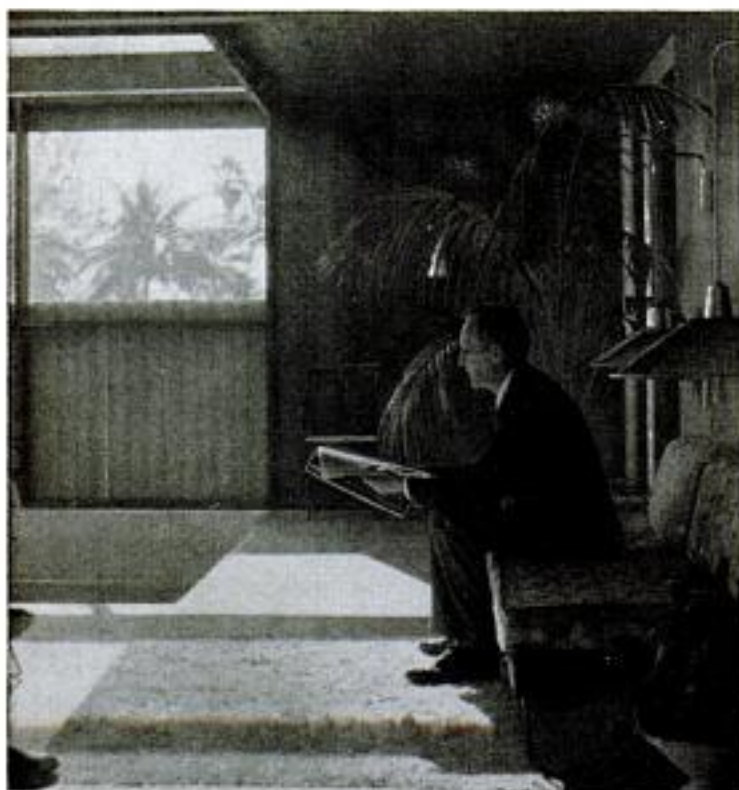
The home has limited yard space but, as compensation, Turner has his shrubbery growing indoors and he has a type of privacy that permits him to entertain at barbecue and swimming parties out of view of neighbors or passers-by.

The house is 47 feet wide and 41 feet





Glass-block window in wall of the swimming pool affords underwater view from the first-floor patio. Trees and shrubs carry out tropical scheme, some extending to second floor. Below, the second-floor patio provides plenty of lounging space near pool



long, of concrete-block construction. Inside there are two distinct areas—the outdoors, represented by the first-floor patio and the upstairs swimming pool and terrace; and the indoors, the upstairs living quarters which can be shut off by sliding glass doors. The pool is supported by the same pilings which were required for the foundations for the entire building; the poured-concrete pool is simply set above rather than into the ground. Pumping-and-filtering equipment for the pool were installed in one corner of the downstairs patio. Screens of matchstick bamboo were hung in this corner to conceal the equipment.

### House Is Compact

By putting the pool upstairs and leaving the first floor as a patio, Anderson was able to compress into a comparatively small area the same features which would sprawl over a large lot with a one-floor structure and outdoor-living areas. At the same time, he has elevated all essential portions of the house above any high-water danger mark.

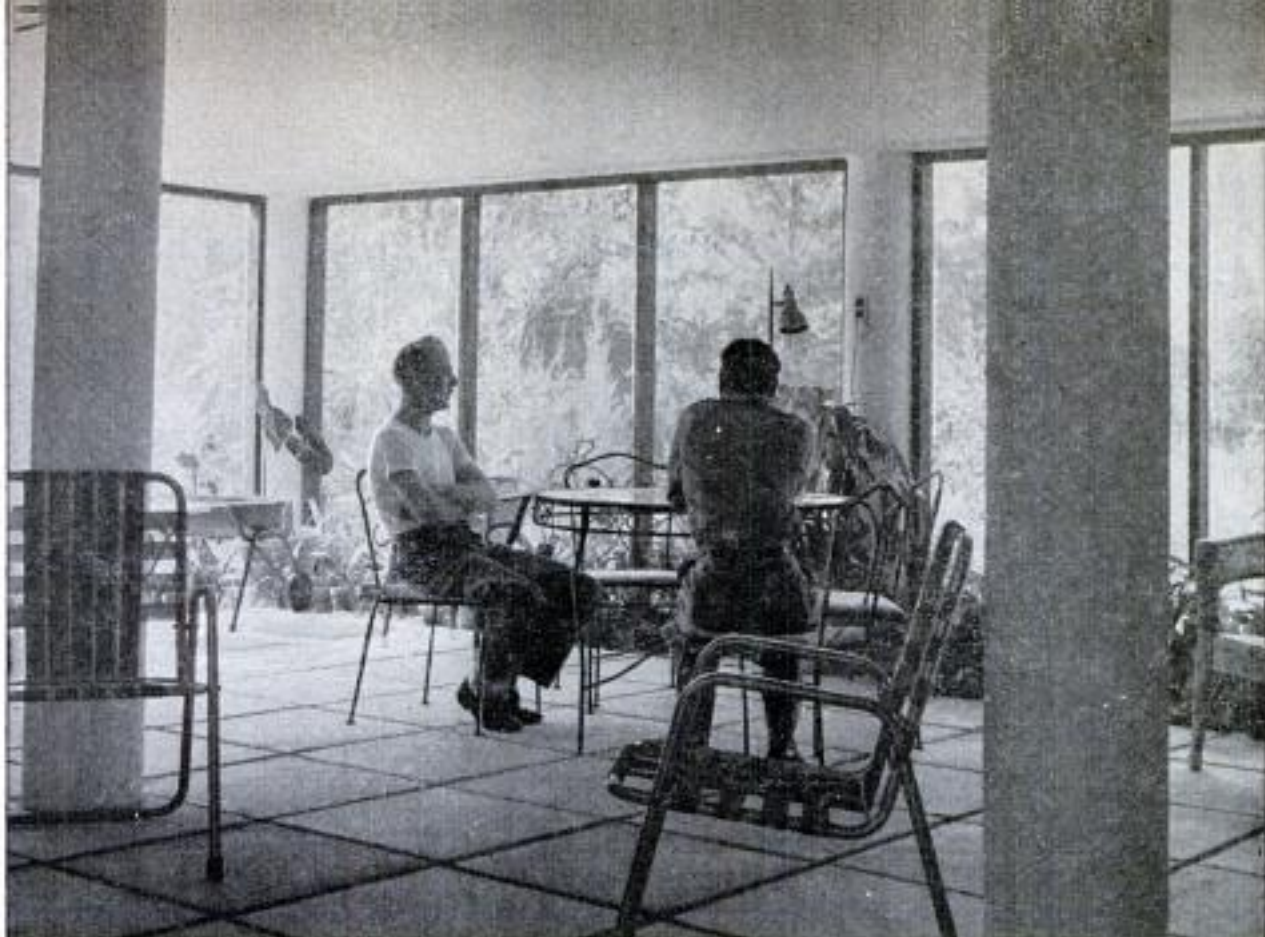
The house is entered through a door in the carport. Inside you are in a screened garden area used for "outdoor" barbecues. Just opposite the door is a glass block set into the concrete wall of the swimming pool. Through this you can look into the interior of the pool at subsurface level.

### Stairs Lead to Pool

Wooden stairs lead to the second floor. There, you turn to the left to the sun terrace and pool, or to the right to the living quarters. The terrace-pool area is screened with plastic which lets in the sun and keeps out insects.

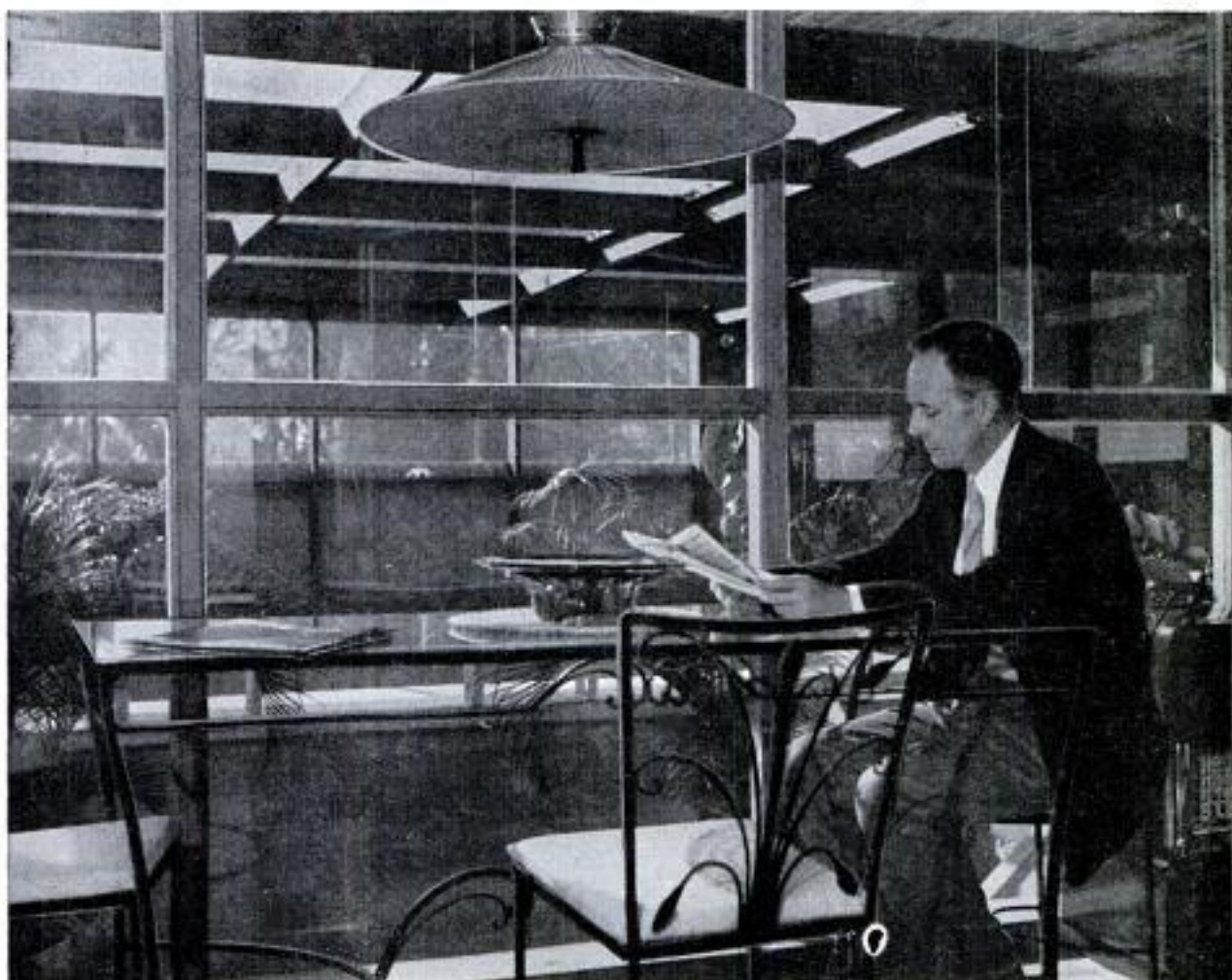
The use of redwood, oak and fir in walls, floors and ceilings of much of the living area gives a warm contrast to the concrete used in the pool area. Sliding glass doors in the living section can shut off the "outdoors" in cool weather without affecting the view. To increase privacy, Anderson used a panel of corrugated weatherproof material as a shield at pool height around the screened area and across the front. The house cost \$26,000. ★ ★ ★



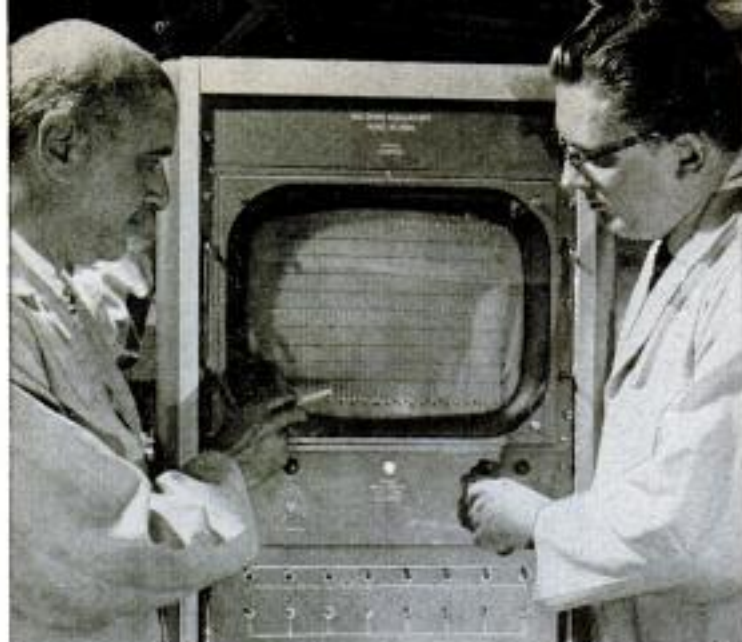


This sunny enclosure is on the first floor behind the swimming pool. Here Turner gives "outdoor" barbecues

Windows along interior wall of dining area provide view across well of lower patio to the swimming pool





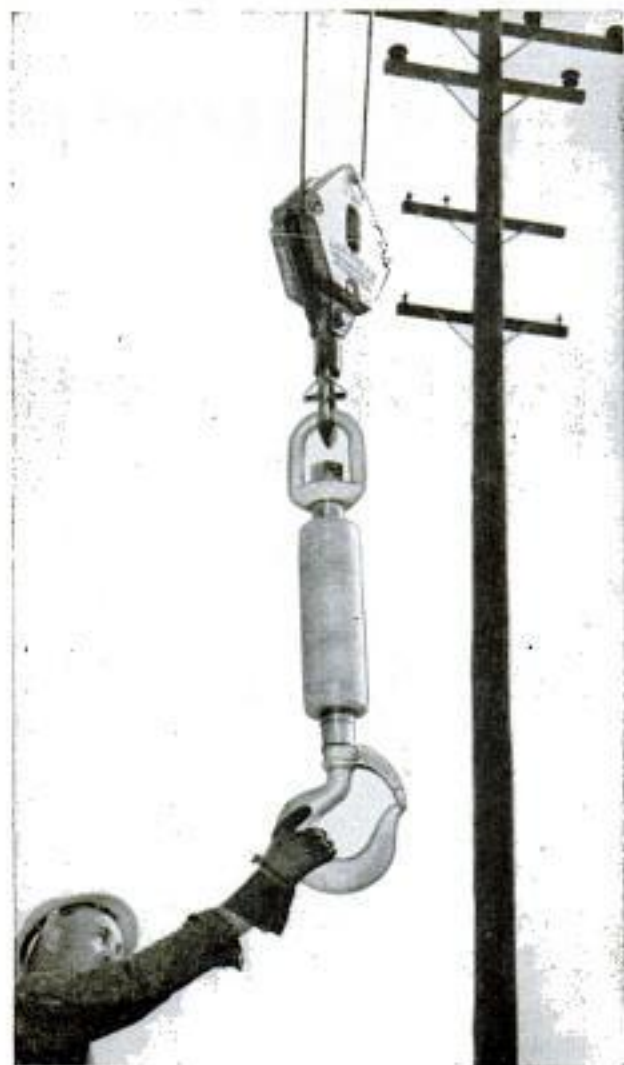


## Bar-Graph Oscilloscope Does Job of 40 Meters

Data from 40 different sources can be measured simultaneously on an electronic bar-graph oscilloscope developed by the International Telephone and Telegraph Company. The scope can be used to study strain at various points along an airplane wing or numerous heat characteristics of an object. Previously, it would have been necessary to have 40 separate meters around a laboratory to measure the data that can be projected on the electronic bar-graph.

## Safety Link on Hoist Prevents Electric Shock

Insulated by a new safety link, hook tenders are protected from electrocution if a crane's boom or cables accidentally touch a power line. The cylindrical link is made of plastic and glass fiber with steel connectors at each end. The links can support up to 25 tons and offer protection from as much as 50,000 volts of current.



130

## Quick Radioactive Test For Moisture or Density

Operating on the principle that different amounts of moisture and density cause a varying degree of radioactivity "scatter," a new field instrument can measure moisture content or density of materials in two minutes. Moisture is measured with a radium-beryllium probe, while density is tested with a cesium-137 probe.



POPULAR MECHANICS

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## Jet Interceptor for U. S. Air Force Flies 1500 M.P.H.

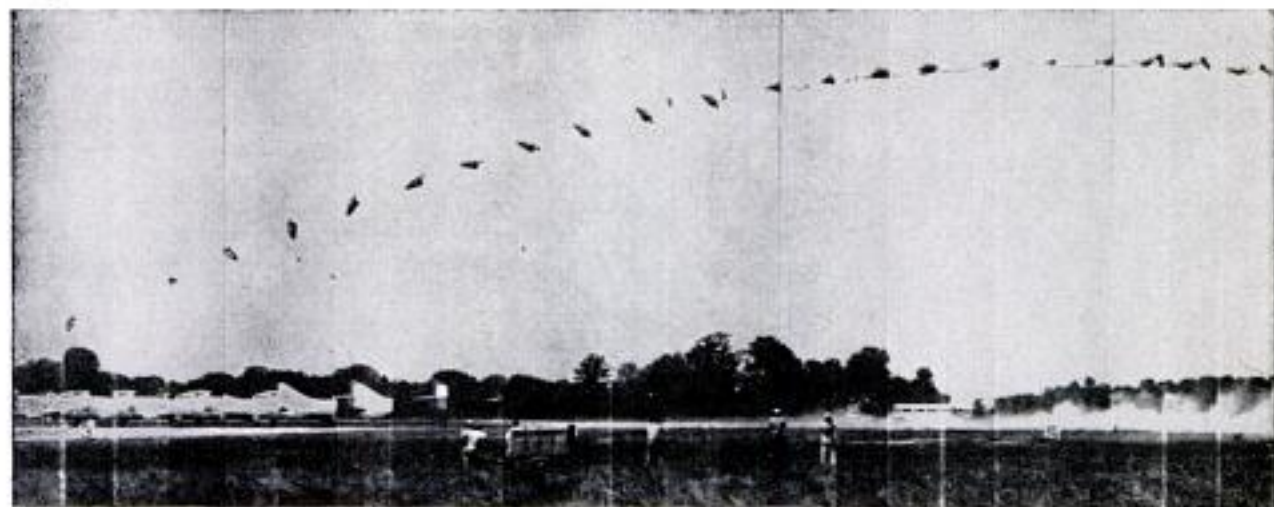
Newest and fastest all-weather jet interceptor in the U. S. Air Force is the F-106A. Called the Delta Dart, the plane can fly about 1500 miles per hour. It resembles the F-102A, except it is larger and the

vertical stabilizer has been squared off. Both planes are used by the Air Defense Command. The Delta Dart is equipped with the most advanced electronic fire-control system ever developed.

## Three-Stage Parachute Saves Pilot in Ground-Level Ejection Seat

For the first time in this country, a man has been ejected from an airplane at ground level and parachuted to the ground uninjured. It was a demonstration of a new ejection seat. A young flyer was ejected from a two-seat Grumman Navy jet fighter during take-off. Three stages of parachutes

opened for his descent to the ground in five seconds. Nearly two thirds of jet aircraft fatalities occur either on take-off or landing, when pilots do not have time to bail out, and 94 percent of the resulting crash landings cause fatalities. The ejection seat was designed by a British firm.







### **British "Bloodhound" Tracks Enemy by Radar**

Scheduled to replace fighter aircraft as England's first line of defense is the new surface-to-air supersonic guided missile with the appropriate nickname of "Bloodhound." Manufactured by the Bristol Aero Company, the Bloodhound has a reported speed of more than 2000 miles per hour. The missile is powered by a Thor-type ramjet engine. The British announced that the new missile will be able to track down enemy weapons by radar. The U.S. Bomarc surface-to-air missile has a reported speed of approximately 1850 miles per hour with two ramjet engines.



### **Electric Eye Adjusts Lens For Automatic Camera**

Movie makers no longer need to miss action scenes while they check the light meter and adjust the lens. A new eight-millimeter camera has a photoelectric cell which automatically adjusts the lens iris as the sunlight or artificial light changes. It can adjust the aperture from f:1.9 to f:16 in less than a second.

### **Metal Measuring**

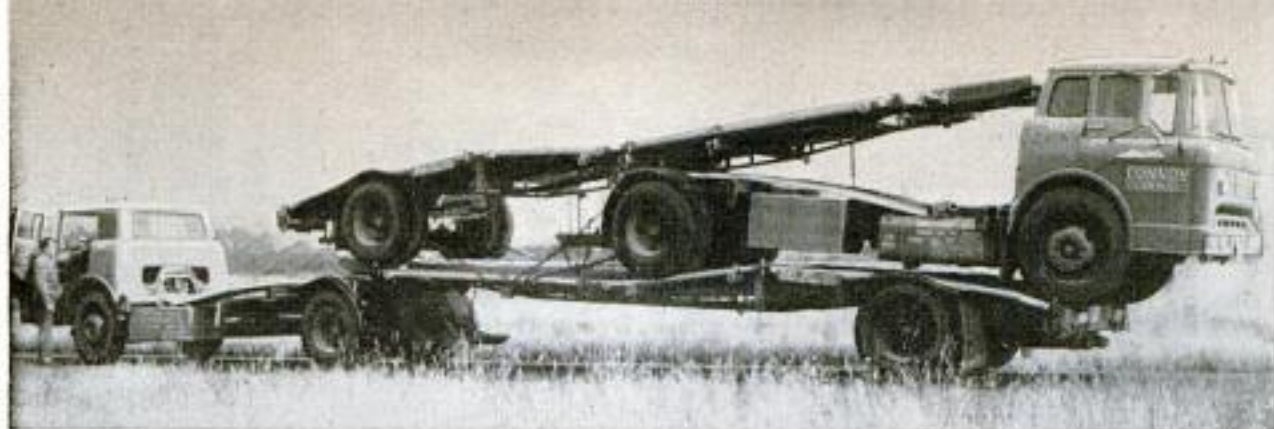
University of Wisconsin chemists have developed a rapid method for measuring metal in solutions. This electrolytic technique is so precise it can measure one part of lead in five trillion parts of solution.



### **Four-Passenger Isetta Has One Rear Door**

Displayed in Munich, Germany, is the "large, family-sized" Isetta, a somewhat grown-up version of the Italian firm's two-seater "motorcoupe." Like the original model, the four-passenger car has the front entrance that swings up. It also has one rear door, on the right side, for entrance to the rear seats. The two-door model has a 19.5-horsepower engine mounted in the rear and reportedly gets about 40 miles per gallon of gas. The new model has a top speed of about 60 miles per hour, according to the manufacturer.





## Big Tractor-Trailer Hauls Twin on Its Back

First there was piggyback, now there's a new one—"truckyback," one complete tractor-trailer hauling another. The equipment was designed by a Portland, Ore., trucking firm to avoid "deadheading" rigs, which costs time and money. It

was made possible with the use of aluminum in fabricating the lighter, sturdier auto-hauling trailers. Total weight of the tractor and trailer is 16,000 pounds. The unit can carry a gross weight of 40,000 pounds or a duplicate of itself.

## Surprise!

Marines now are taught to use inflatable life rafts as "secret weapons" for investigating enemy-held terrain. The enemy observes what is apparently an abandoned, overturned raft. Clinging to the underside, their heads in the air trapped beneath it, are reconnaissance scouts who use the craft for cover while scouting the shore.



## Portable Electric Bomb Hoist Developed for Navy Planes

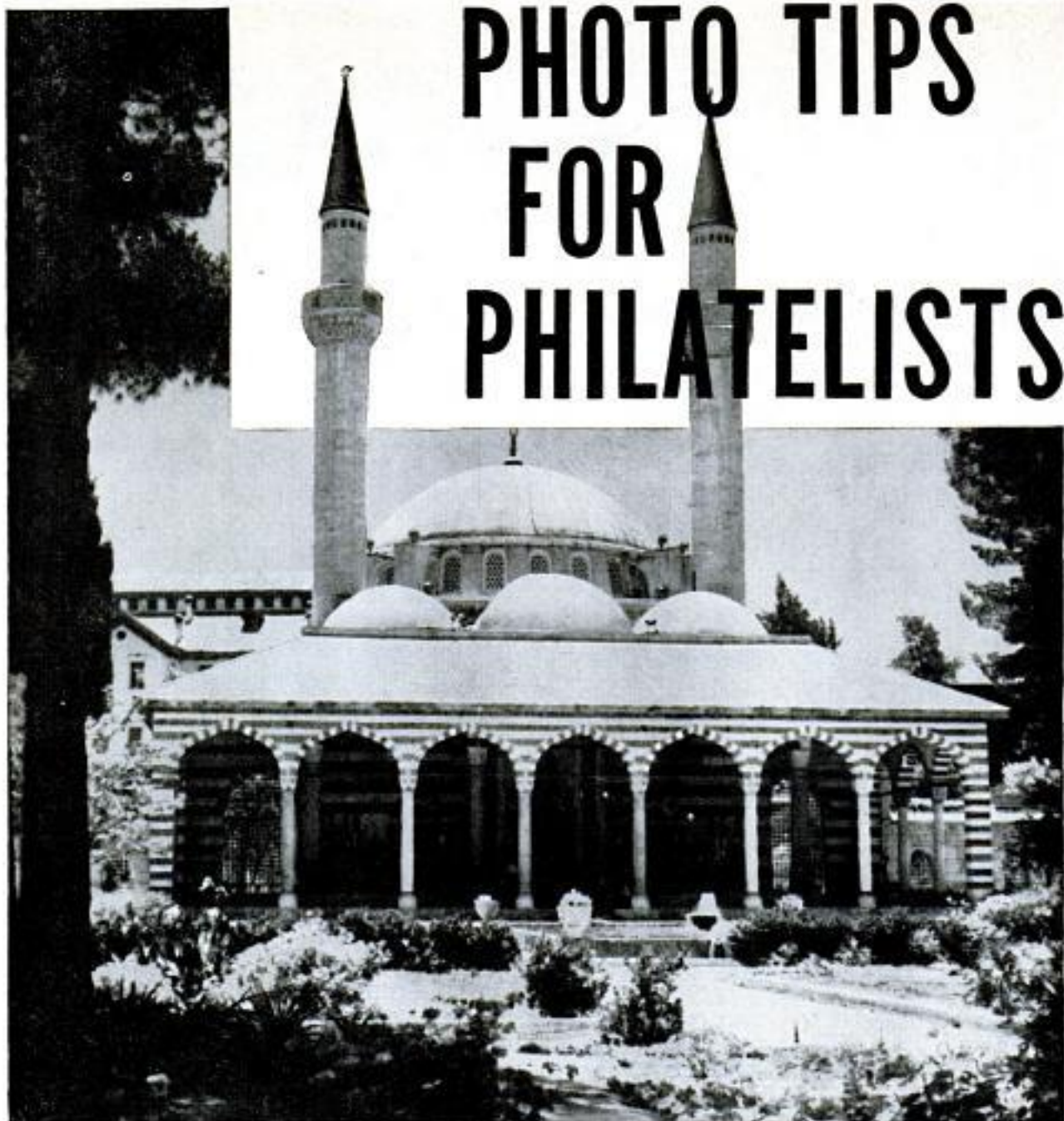
Weighing considerably less than manual bomb-hoisting gear now in use is a 47-pound portable electric hoist developed for the Navy by the Douglas Aircraft Company. The new rig will lift a 2500-pound load at a rate of 15 feet per minute. For loads up to 5000 pounds, the hoists can be

used in pairs. The electric hoist permits safe bomb lifting with  $\frac{1}{32}$ -inch accuracy. The unit requires a single electric cable connected to a deck-edge receptacle or a portable power supply. A hand crank on the cable drum operates the hoist when electric power is not available.





# PHOTO TIPS FOR PHILATELISTS



Stamp collectors who travel can give their albums an increased personal interest by taking their own photos to match the designs on their stamps

**By Ernest A. Kehr, F.R.P.S.L.**

*Stamp News Editor, New York Herald Tribune*

**T**HE STAMP COLLECTOR who owns a camera but hasn't yet used it in his philatelic pursuits, reminds me of the man who owns a basement full of power tools and uses them solely to cut kindling wood.

Photography today is just about the most valuable accessory a stamp collector can use to increase the beauty and interest of his albums, and to help him better study the items in them.

A few wealthy philatelists are engaging professional photographers for the work they want done—and are paying fancy prices for it. Some individuals are doing it themselves, but the potentials of combining photography and philately still are all but unexplored.

Virtually anybody with a camera and a rudimentary



understanding of its use can expect remarkable results with a minimum of practice.

The use of a camera will aid him immeasurably in enhancing the attractiveness of his album. The modern philatelic trend, which stresses the pictorial subject of the stamp lends itself well to photographic treatment.

Whether your camera is an inexpensive box type, or a costly apparatus with a trunk full of accessories is immaterial. Through the intelligent use of what you have, you'll soon turn your stamp album from a dull, commonplace volume into a possession that will fascinate you and any who scan its pages.

The basic aim of a stamp collection is to tell a story of the specimens in it.

Most collectors visit places or buildings which have been used as the subject of a stamp design. If he will take his camera along and shoot a picture of that scene, preferably from the same angle as is shown on the stamp, he will obtain a photograph that can be mounted on the same page as his stamp, to give it that unsurpassed personal touch of human interest.

The camera solves the greatest of cover collectors' headaches. Philatelic interest centers on both sides of a cover (envelope, wrapper or post card). Yet, unless one takes a cover from its moorings on a page each time someone wants to see the back or cuts the envelope open and mounts it flat on the page (thereby destroying its worth), he is faced with frustration.

The camera solves that difficulty. Make a same-size picture; mount it directly under the face of the cover and there never will be any further need to wonder what markings are on the reverse.

But it is really in the field of advanced philatelic study that the camera proves its true worth and adaptability and versatility.

Ordinarily a strong magnifier is sufficient for the detection of printing defects, shifted transfers, plate cracks, die differences, paper, watermarks, repairs or any of the other minutiae for which serious philatelists constantly search.

But working with a glass, which most often covers only a fraction



Use of the proper filter to absorb color of stamp enables the philatelist to study overprints, simplifying detection of fakes



Photographic filters also bring up the faint postmarks which otherwise may not be strong enough for accurate identification



Photographs, when greatly enlarged for detailed study, help the collector to distinguish between genuine and counterfeit



FIRST SPHYNX ISSUE

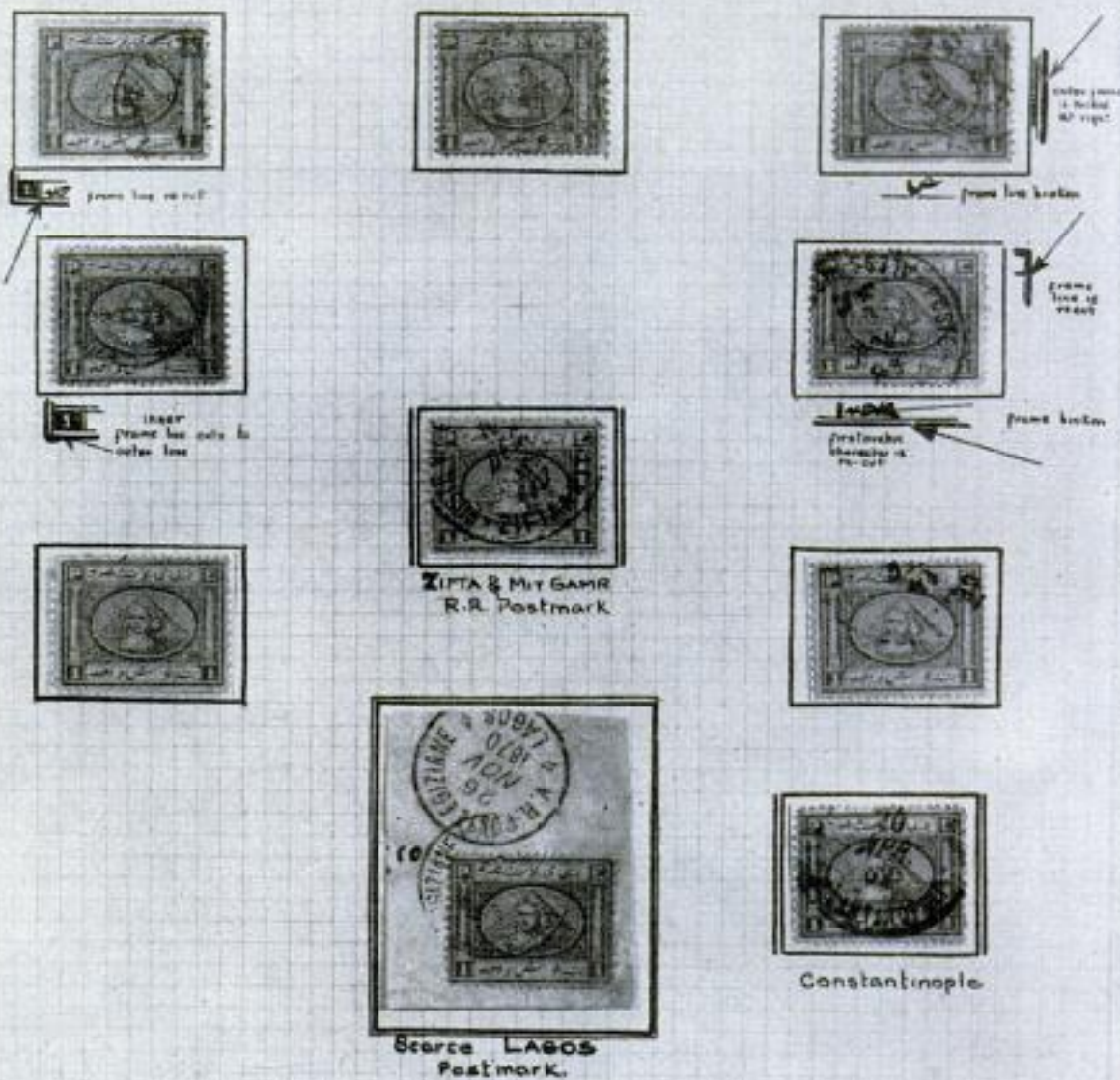
August 8 1867

designed by E. Hoff of Hirschberg Germany  
lithographed by V. Penisson Alexandria

TYPE IV

- A. Cleopatra's Needle is too far to left and is smaller than other types
- B. The three dots in Arabic inscription are equidistant and on same line level
- C. The second Arabic character in upper panel touches inner frame line
- D. Base of the pyramid does not touch the frame at right.

1. Aastre



With a photographic record of each album page, the philatelist has identification in case of theft or loss

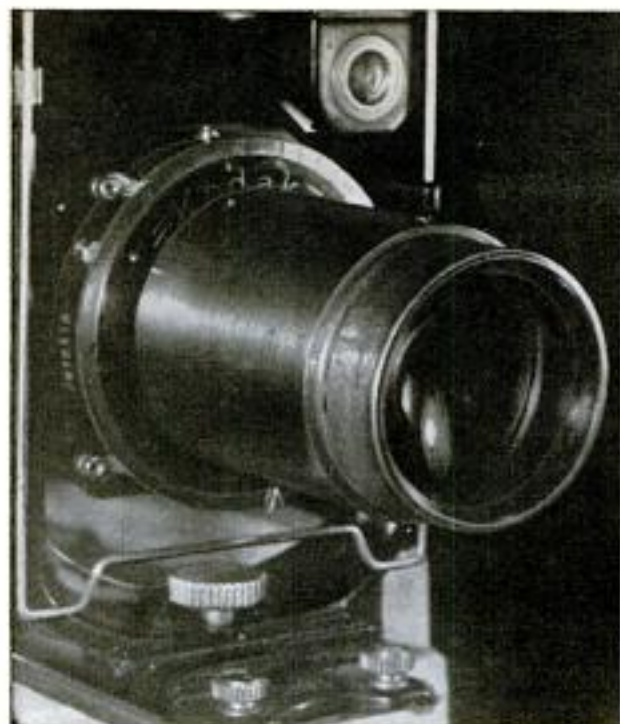
of the stamp area anyway, is a tedious, eyestraining task. Making a photograph of the stamp and then studying the enlarged print, on the other hand, eliminates this inconvenience.

For all ordinary examination, the philatelic-photographer requires only a reg-

ular picture of a stamp, block or cover, the print of which should be enlarged to either a 5 by 7 or 8 by 10-inch size.

For such work one just does a straight copy job, using a process film and shooting the stamp subject against a black background so all perforation teeth stand out





Photomicrographs can be made by adding an engraver's magnifying glass to front of normal lens

strong in contrast. For a matter of convenience I save the black-paper interleaving that comes between my cut film. I then place the stamps to be photographed on these. In focusing, I see that the sheet and the stamps on it just fill the ground glass. In this way I know that my negative images will be the same size without further measurement. I then can make a contact print and get a photographic duplicate, or enlarge to any desired size, up to 11 x 14, and even greater if necessary.

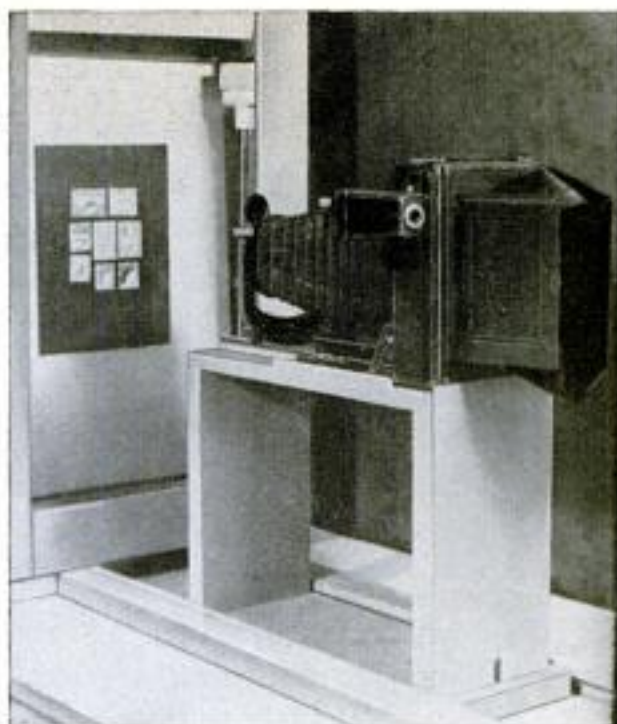
But it is the ability of negative emulsions to "see" what the naked eye cannot perceive, that makes photography a particular boon to the philatelist.

When a stamp is printed in pale rose, yellow, green, blue or brown, it is all but impossible to examine it visually without terrific eyestrain.

Emulsions, however, reproduce in sharp black and white even the tiniest details. Take the one-kreutzer stamp of Austria, issued in 1850. For over 60 years students have been studying that stamp, hunting for trivial design differences that provide clues to original printing arrangements of the clichés. In about 1940, the late Felix Brunner decided to use photography. By studying black-and-white prints of this weak yellow stamp he discovered more about the stamp in half a decade than had his predecessors in three generations.

An assortment of filters for the camera lens adds to the photographer's ability to do useful philatelic work.

Very frequently a postmark is as interesting and as important as the stamp itself



Easy to build, a simple copying rack provides the perfect alignment necessary for precise photography

yet, equally often, it is impossible to clearly read the text of the obliteration, because the color of the stamp happens to be strong and dark.

By photographing that stamp through a filter which absorbs the color of the basic stamp, the finished picture will emphasize the postmark—distinct, clear and readily legible.

The same applies to stamps with overprints. Very frequently an overprinted stamp's value is much greater if it happens to have been made from a surcharging plate that included minor varieties of type fonts. These varieties often are tiny and minute. A filter-photograph of the stamp in question clearly reveals the exact identity of the overprint.

After a little practical experience, the philatelist soon will learn minor techniques that will aid him in other ways.

Suppose he has a stamp, but cannot discover by normal methods of dipping it in carbon tet or benzine, whether it is watermarked or not. The camera will give him an infallible answer. He will place it in his copying frame between two panes of clear glass, light it from *behind*, and then use a filter of the same color as the ink used to print the stamp. If it is watermarked, the design will register on the negative; if it has none, he will see only the texture of the paper.

This same technique is used to determine the kind of paper on which a stamp is printed: Wove, laid, quadrille, batonné, etc. It may also be used to examine a

(Continued to page 238)





### Trucks Tied Together Tote 80-Ton Transformer

To move an 80-ton electric transformer along a highway, two flat-bed trucks were tied together with heavy chains. Drivers had to coordinate their speed and other factors to a split-second while men atop the transformer moved wires out of the path.



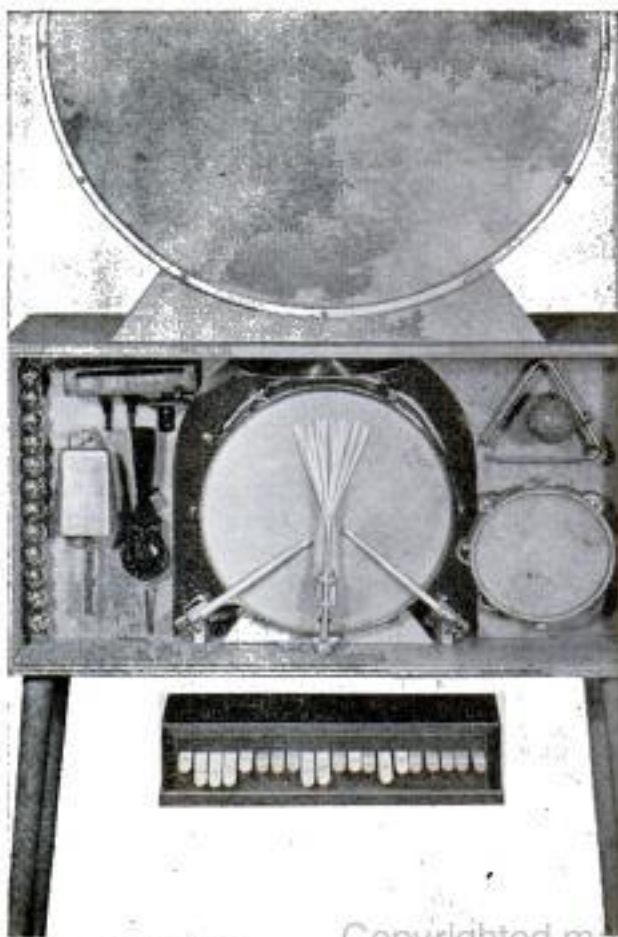
### Electronic Brain With a "Heart" Helps Assign Navy Personnel

Because the Navy's new electronic equipment for assigning personnel gives consideration to personal duty preferences, it's called the "brain with the human heart." The equipment is used to process 40,000 Pacific Fleet orders each month.

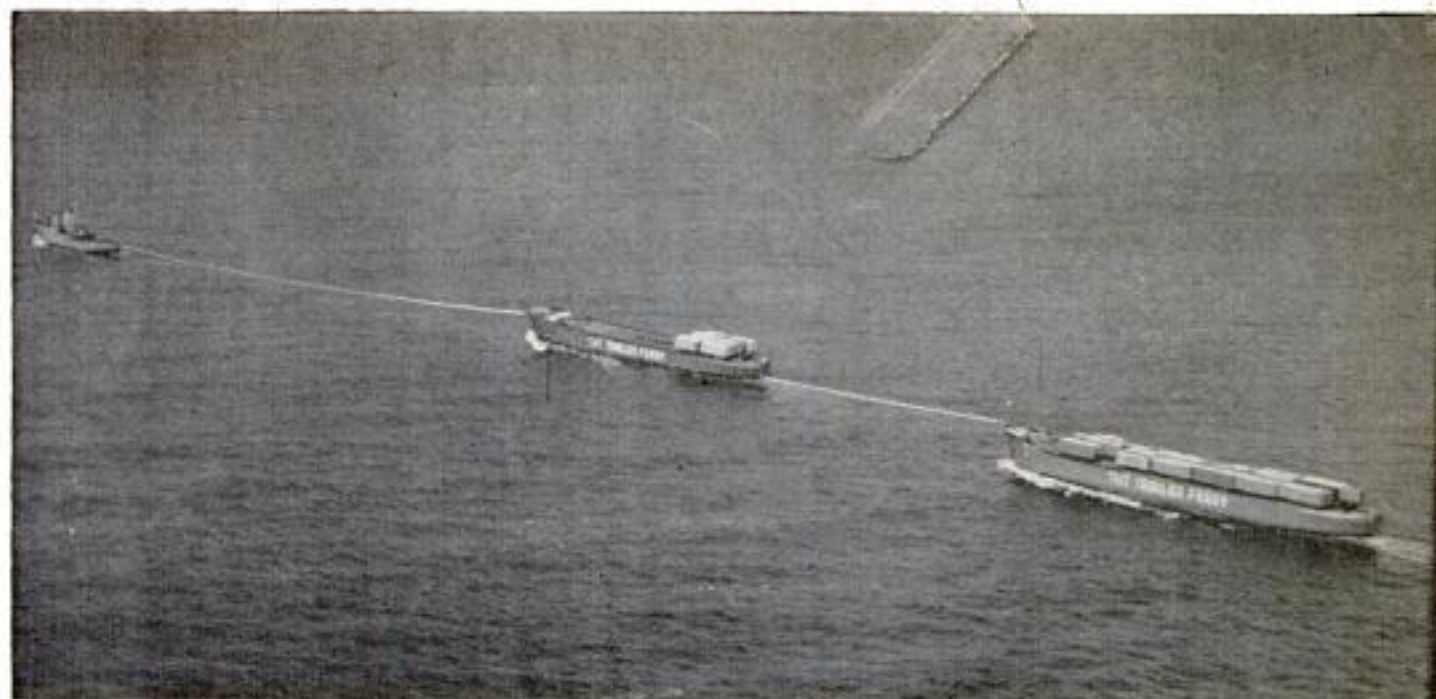
### Electronic Organ Built From Kit of Semiassembled Parts

Now you can build an electronic organ, with a pitch range duplicating many of the great pipe organs of the world, from units of semiassembled parts. The units include a preassembled keyboard, foot pedals and

electron-tube tone generators. The organ has a separate electronic oscillator for each note. An accessory percussion unit can be added to the organ for drum, bell, tambourine, whistle and other effects.



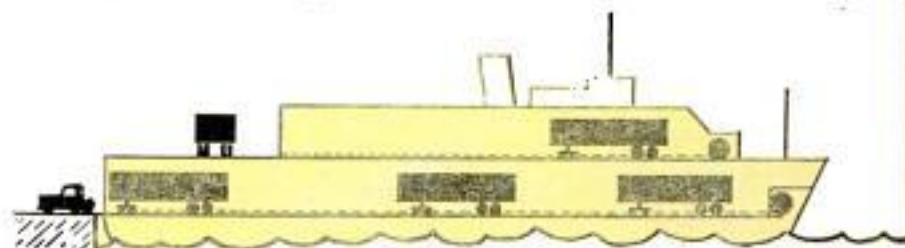




Two ferries, loaded with trailers, are towed by a single tug on a voyage between Puerto Rico and Florida

## Loaded Truck Trailers Ride Ship Across Ocean

HUGE HIGHWAY TRAILERS now are moving freight across the ocean. Trailer trucks can be loaded anywhere in the heart of America and unloaded several days later in the heart of France. Roll-on, roll-off trailer ferries make possible this new type of transoceanic transport. For some time, TMT Trailer Ferry, Inc., has been shipping trailers between coastal and Caribbean ports on converted World War II landing craft. Two such craft, loaded with trailers, are towed by a tug. However, the voyage across the ocean requires a larger vessel. The result is the *TMT Carib Queen*, modified from an uncompleted LSD (Landing Ship Dock). The 475-foot vessel is capable of carrying up to 92 trailers, 97 automobiles and 500 tons of bulk cargo. The craft has a speed in excess of 16 knots. With her ramp in place, the *Carib Queen* can be unloaded and simultaneously reloaded in a scant four hours. Ordinarily an overseas shipment goes through six or more separate handlings between the shipper and the receiver. The big advantage of the new ferrying system is that the freight is loaded only once and unloaded only once. The *Carib Queen* is expected to carry at least 30 percent more cargo than a conventional ship of the same speed and size.



Truck moves trailer across ramp into ship. Trailer then is clamped to dolly and pulled by winch along tracks inside ship

Loaded trailer is backed into stern ramp of the vessel. Through this system, ship can be unloaded and reloaded in four hours







### **HERE'S WHAT THE OWNERS SAY:**

"Haven't had a flat in the last 40,000 miles with tubeless tires."

"My employer operates a fleet of 16 tractors and 22 trailers. This equipment is equipped entirely with tubeless tires which have fewer flats than tires with tubes previously used."

"It is my opinion that tubeless tires are the biggest mistake the tire industry ever made."



### **HERE'S WHAT THE REPAIRMEN SAY:**

"Tubeless tires require more experience and better care in servicing, but are far less hazardous."

"Tire thumping is the big headache in tubeless tires."

"You find more tires with tubes out of round or with a heavy side than tubeless."

"I very definitely feel tubeless tires can be improved by the manufacturers."



# TUBELESS TIRES: MOST OWNERS LIKE THEM

**H**AVE YOU HEARD ANY bitter complaints against tubeless tires recently? These tires became standard equipment on the '55 models, and any such basic change is bound to touch off controversy.

By now the average motorist has had considerable experience with tubeless tires. At the drop of an ounce of air pressure he may find himself involved in a long discussion on tire thump, rim leaks and the value of installing a tube inside a tubeless tire.

Just how good are tubeless tires? Are the complaints justified? Do motorists mourn the passing of the old-fashioned inner tube?

To find answers to these questions, *Popular Mechanics* sent questionnaires to hundreds of motorists all over the country—owners of '55, '56 and '57 cars. Also, because tire complaints eventually end up in the serviceman's lap (especially since tubeless tires can't be repaired by the motorist himself), similar questions were asked of tire repairmen selected at random across the country.

## Decision for Tubeless

The result is a clear-cut decision in favor of tubeless tires. Then why the talk against them? Apparently here, as in most other fields, the dissatisfied motorist is the vocal motorist, while the satisfied driver rolls along without saying much about his tubeless tires.

In any event, 71 percent of the owners prefer tubeless tires; 29 percent, tires with tubes. Furthermore, 84 percent indicated that tubeless tires give less trouble than tube tires.

In general, the repairmen are much more critical of tubeless tires than the owners themselves. These men, in stating their personal preference for their own cars, show a slight margin in favor of tubes: 50 percent prefer tires with tubes; 47 percent, tubeless; and 3 percent prefer a combination of the two—that is, tubeless tires, with tubes added.

## Two Major Likes

The owners have two definite likes in regard to tubeless tires, likes that are mentioned much more frequently than any others: The fact that most punctured tires won't go flat immediately, giving the driver time to reach a repairman, and the fact

that tubeless tires require fewer repairs.

"They retain sufficient air after a puncture to carry me to a service station."—Virginia naval officer.

"Tubeless tires don't go down immediately after small puncture."—Alabama real-estate salesman.

"Gradual deflation when punctures, better traction."—Florida superintendent.

"On my last puncture, nail was in the tire 500 miles before the tire went flat."—Florida student.

"Have had no trouble in approximately 30,000 miles of driving on tubeless tires."—Iowa tool engineer.

"No tubes, good service, less trouble."—New Mexico chemist.

"Long wear, no trouble. Perfectly satisfied."—Arizona teacher.

"Trouble-free!"—Alabama jeweler.

## Less Heat Build-up

Tire manufacturers emphasize one big advantage of the tubeless tire, but only six percent of the owners mention this point.

"A tubeless tire runs cooler in hot weather."—Colorado service-station operator.

"Cooler operation. Tires are less apt to blow out for this reason."—Idaho truck driver.

Other likes, in order of mention, include safety, soft ride, less total cost, better balance and less squealing.

"You get a softer ride on a tubeless tire."—Missouri manager.

"No weights on wheels, but car runs as though tires are in perfect balance."—Michigan medical student.

"No need to buy tubes when new tires are purchased or exchanged."—Washington adding-machine mechanic.

"They make your car ride smoother. No squeal on asphalt roads."—Washington, D. C., secretary.

"You don't have to worry about pinching the tube when you change one, or a leak caused by the tube chafing inside the tire."—Vermont railroad fireman.

"No tube to fool with."—Michigan auto assembler.

"Less trouble keeping them in balance."—Kentucky plant superintendent.

"Less noisy on the road. I like them on curves and take-off because they do less squealing."—Kentucky warehouse worker.

"The greatest handicap that tubeless



# OWNERS' EXPERIENCE WITH TUBELESS TIRES

<b>Had blowouts?</b>	
Yes .....	11%
No .....	89%
<b>Had punctures?</b>	
Yes .....	53%
No .....	47%
<b>Had slow leaks?</b>	
Yes .....	30%
No .....	70%
<b>Have tires pulled away from rim?</b>	
Yes .....	5%
No .....	95%
<b>Have tires developed thump?</b>	
Yes .....	25%
No .....	75%
<b>Which type gives most trouble?</b>	
With tubes .....	84%
Tubeless .....	16%

<b>OVER-ALL RATING</b>	
Prefer tubeless .....	71%
Prefer tires with tubes .....	29%
<b>Would patch own tires if possible?</b>	
Yes .....	23%
No .....	77%
<b>Have repairmen suggested putting tubes in tubeless tires?</b>	
Yes .....	31%
No .....	69%
<b>Do you have tubes in tubeless?</b>	
Yes .....	8%
No .....	92%
<b>Which type lasts longer?</b>	
Tubeless .....	33%
With tubes .....	10%
About the same .....	57%

<b>Which type do you prefer?</b>	
Tubeless .....	71%
With tubes .....	29%

## THE TIRE REPAIRMEN REPORT:

<b>Have suggested putting tubes in tubeless?</b>	
Yes .....	91%
No .....	9%
<b>Which type lasts longer?</b>	
Tubeless .....	14%
With tubes .....	35%
About the same .....	51%
<b>Which type do you prefer for own car?</b>	
Tubeless .....	47%
With tubes .....	50%
Tubeless with tubes .....	3%

tires must overcome is the false rumors started by old-timers and service-station attendants."—Washington, D. C., auto salesman.

"You get a better guarantee than with a tube tire!"—Michigan factory worker.

### Complaints, Too!

But the 29 percent of the owners who prefer tires with tubes are vehement in their complaints. By far the biggest complaint is the difficulty of obtaining proper service.

"Can't find a station attendant that knows how to fix them."—Washington broker.

"Can't repair and mount them without going to a garage."—Ohio engineer's assistant.

"Thumping cannot be repaired as easily. High replacement cost."—Iowa pipe-fitter.

"Some cool mornings they have a thump, but most of that soon leaves."—Georgia aircraft mechanic.

"Continual thumping of tire."—Georgia housewife.

"Had gravel go through a nylon tubeless after only 30 miles of driving. No adjustment from dealer."—Tennessee mail carrier.

"Can't keep the pressure up."—Missouri minister.

"Have thrown the tread off seven tubeless tires in the last two years."—Kansas salesman.

"Won't hold air if wheel develops dent from accident or rough handling."—Connecticut photographer.

"The manufacturer charges the same

whether he supplies a tube or saves that cost. The tubeless tire is one of many small gimmicks for skinning the consumer."—Delaware college professor.

"Cost too much money to buy and repair."—Delaware secretary.

"Biggest mistake the tire industry ever made. Cost approximately \$10 more than the others and aren't half as good."—Connecticut diemaker.

"Have been unable to get tubeless tires to hold up after recapping."—North Carolina manager.

"Too much latex in one tire, and it rolled into balls like golf balls, throwing the wheel out of balance."—Minnesota truck driver.

"Tire is lower cost to car manufacturer, yet costs the consumer the same or more than a tube tire."—Ohio salesman.

"Balance them one day and they are out the next."—Arizona welder.

"I sell tires, and 80 percent of our customers change to tubes when they buy new tires."—Missouri store manager.

"One of my tires is 'leaking rubber' around the rim, paper-thin, shredded."—South Carolina student.

"They don't seem to seal tight if the rim is rough."—Oregon lift-truck operator.

"First set developed separations between tread and cord on four of the five tires in 15,000 miles. The second set separated the same way on one tire at 4000 miles."—Nebraska engineer.

### Causes of Blowouts

Owners who reported blowouts with tubeless tires were asked to describe the

(Continued to page 242)





## "Assembly Line" For Tomatoes

Harvesting 8000 acres of tomatoes requires a mechanical monster with conveyor-belt arms reaching 165 feet on either side of the central unit. A crew of 107 men operates the machine on an 18-mile-long tomato patch near Homestead, Fla. The machine automatically grades, sizes and rejects the tomatoes as they roll into the unit from the conveyors.



## Basketball-in-the-Water Gives New Twist to an Old Game

Aqua-ball is catching on as the latest innovation in swimming-pool sports. With rules similar to basketball, the equipment can be set up in minutes and is adjustable to variations in pool edges. It includes a six-foot heavy-net backstop, waterproof enameled backboard, a steel-frame goal, rustproof frame and base, height adjuster, ball, ball-inflator pump, game rules and installation instructions.

## Thorium Promises Cheaper A-Power

Viewed as the solution to cheaper atomic power, an extraction process has been developed to make thorium serve as a substitute for uranium-235. Scientists at Battelle Memorial Institute, Columbus, Ohio, report a recovery of 99.89 percent purified thorium—good enough for reactor uses.



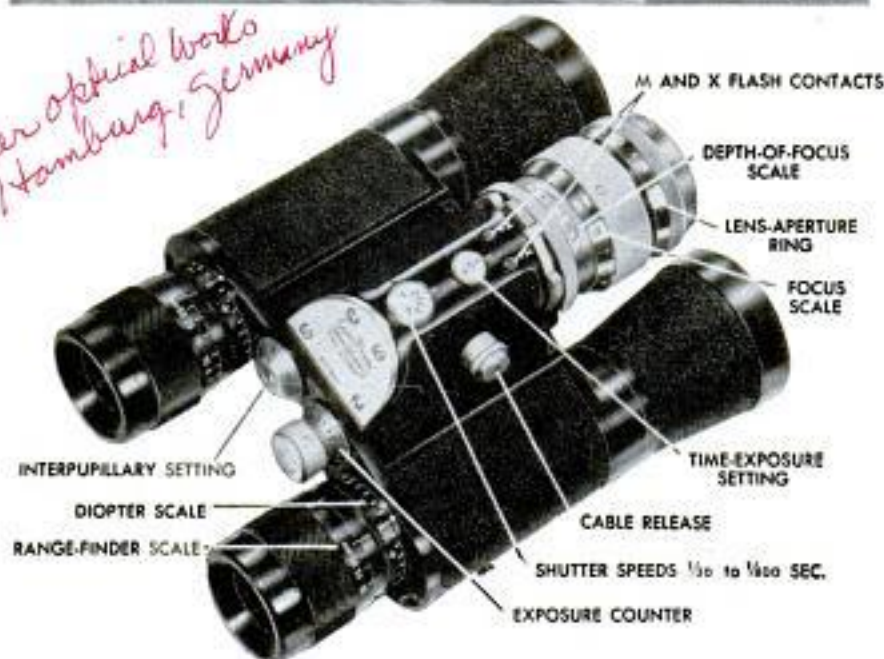




## Honolulu Roof Top Will Rotate

Patrons of a refreshment lounge atop a 17-story office building planned in Honolulu will be able to view most of the city without leaving their chairs. The slowly rotating lounge will make a complete revolution every hour. Windows of the building will have permanent vertical sunshades that rotate electronically with the passage of the sun. Tinted window walls of the lounge will slant outward.

*Möller Optical Works  
Hamburg, Germany*



## Camera Shoots Binocular's View

Taking photographs of what's seen through a pair of binoculars is now a reality. A German manufacturer has combined a 16-millimeter still camera with telephoto lens and a 7 by 35-millimeter binocular. The camera has an f:3.5 90-millimeter lens, and its 20-exposure film is loaded and removed without threading. When the binocular's eyepieces are focused, they are the range finders for setting the camera lens.



## Robot Arm and Hand Has 25 Movements

Designed to simulate practically every motion of a human arm, wrist and hand, a new industrial robot can perform a total of 25 individual movements during any one cycle or sequence. The robot arm was built to handle hazardous operations for an automobile factory, such as taking hot castings from a die-casting machine. The arm will extend, retract, raise, lower and rotate 270 degrees. The hand will open, close and rotate 360 degrees.



**I**N THIS HIGHLY mechanized era, most people know more about their automobile engines than the "engines" that run their own bodies. Yet the study of these chemical power plants we call muscles has fascinated scientists for centuries.

More than 700 muscles provide the force for every human activity, from batting an eyelash to climbing a mountain. Combined, your muscles are rated at three horsepower. They're physically capable of lifting 1000 times their own weight. They work with such efficiency that if the human body were equipped to handle motor fuel, it could operate for 10 days on a gallon of gasoline.

Since 1699 when a Frenchman named De la Hire made the first recorded strength tests by comparing men with horses, scientists have explored the capabilities of muscles. Today, with a nation deeply concerned over the poor physical fitness of American children, their work has gained new impetus.

At the University of Oregon's physical-education laboratory, for instance, researchers are probing everything from muscle fatigue to the effects of athletics on children. This work is directed by Dr. H. Harrison Clarke, who has devoted a 30-year career to strength measurement.

Is it safe for Johnny to play football? Why do some children become top athletes while others don't? For the answers, Oregon researchers have launched an ambitious

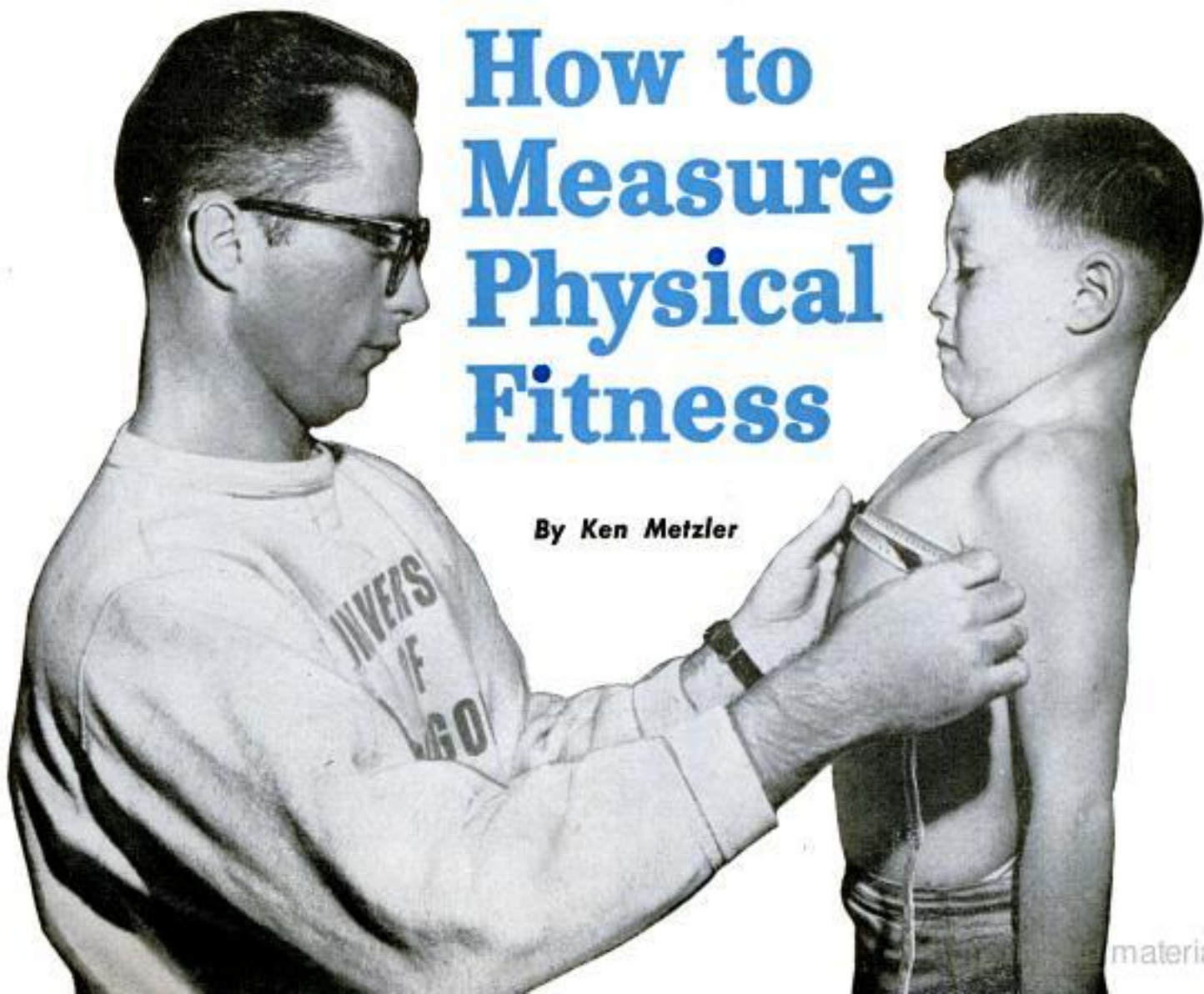


Dr. H. Harrison Clarke, left, discusses University of Oregon physical-fitness project with school coach Theodore Schopf

## A COLLEGE LAB TELLS

# How to Measure Physical Fitness

By Ken Metzler







Physical capacity, above, is only part of Oregon program, organized because of report that U. S. children are inferior to European youngsters in fitness

Ergograph machine measures muscle fatigue. Such tests tell something's physically wrong, but not what. Doctor Clarke's case studies diagnose these causes



study of 560 boys aged 7 to 17. They will record their physical, social and intellectual growth through high school and college. In a few years they expect to answer many questions that have puzzled parents.

In such a study, researchers must measure the capabilities of muscle groups. They use a cable-tension strength test developed by Clarke when he was an Air Force officer in charge of reconditioning convalescents during World War II.

This test was originally designed to determine progress made in helping men to regain their strength. It measures the pounds of strain placed on a cable by persons pulling with various sets of muscles. All major muscle groups are included, even finger and thumb muscles. It's basically the same system that is used to measure stress on aircraft control cables.

When a man shrugs his shoulders, he can put as much as 500 pounds of force behind it, according to this test. The ankle plantar flexors (muscles used to stand on tiptoe) are capable of nearly 400 pounds of force in the average man. That's just on one leg. Thumb muscles can pull 30 to 40 pounds. But because of psychological limits, a person's physical strength is barely touched. It can be increased phenomenally in times of stress. Newspapers a few years ago carried an item about a man who lifted a wrecked car off an injured person. He has never been able to do it since.

Another test in common use measures

Cable-tension test, developed by Doctor Clarke, determines strength of various muscular movements. It's similar to system that tests aircraft control cables





physical fitness. The Rogers Physical Fitness Index has tests for grip strength and lifting capacity of back and leg muscles. The PFI test, as it's called, also has two muscular-endurance tests (push-ups and pull-ups) and a lung-capacity measurement. It was developed in 1925 by Dr. Frederick Rand Rogers. Sets of median scores, or "norms," have been worked out for each age-sex-weight classification. Each person thus competes against a mathematically computed score of 100—par for his classification.

But this test obviously cannot answer a vital question: What causes poor fitness? The test is like a doctor's thermometer—it can indicate something's wrong, but not what it is. With this in mind, Clarke devised a case-study method to diagnose the underlying causes. This is done through personal interviews, plus health-habit, social-adjustment and other questionnaires.

Flabby, unexercised muscles are behind poor fitness more than half the time, Clarke found. Other factors—faulty nutrition, glandular disturbances, worries, even romantic disappointments—are important, too. The PFI score of one college freshman spurted from 63 to 100 in just three months after he learned his miss-

ing soldier-brother was alive and well.

"Whenever I exercise," complained another student, "my heart beats faster. I can feel the blood rushing through my veins. It scares me." The heart always does this in exercise, he was told. When a doctor said he didn't have heart trouble, the youth was persuaded to take a PFI test. His below-par score of 69 spurred him into taking conditioning classes like nothing else could. Eventually he achieved a par score.

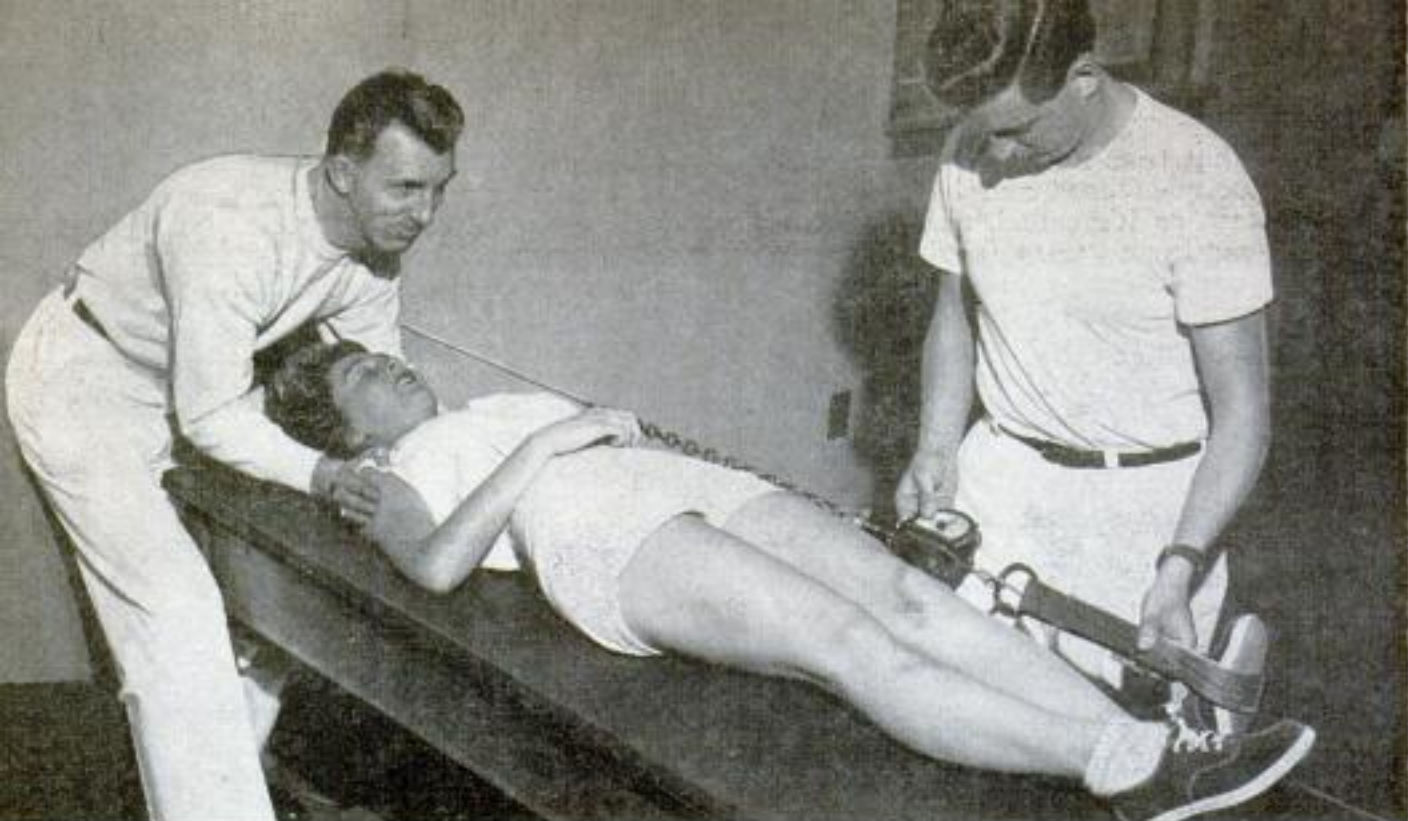
An analysis of hundreds of such case studies has presented a good composite picture of the typical low-fitness youth: 20 percent overweight, below normal in social adjustment, above average in scholastic potential (but doing poorly in actual schoolwork), does not participate in strenuous physical activity, smokes, doesn't get enough sleep.

The report of Dr. Hans Kraus that American children are far behind European youngsters in physical condition

Grip strength is shown by manometer, part of Rogers Index widely used by schools to tell physical-fitness level







Ankle muscles are among the most powerful in the body. Tests indicate they exert nearly 400 pounds of force

## *Next Month*

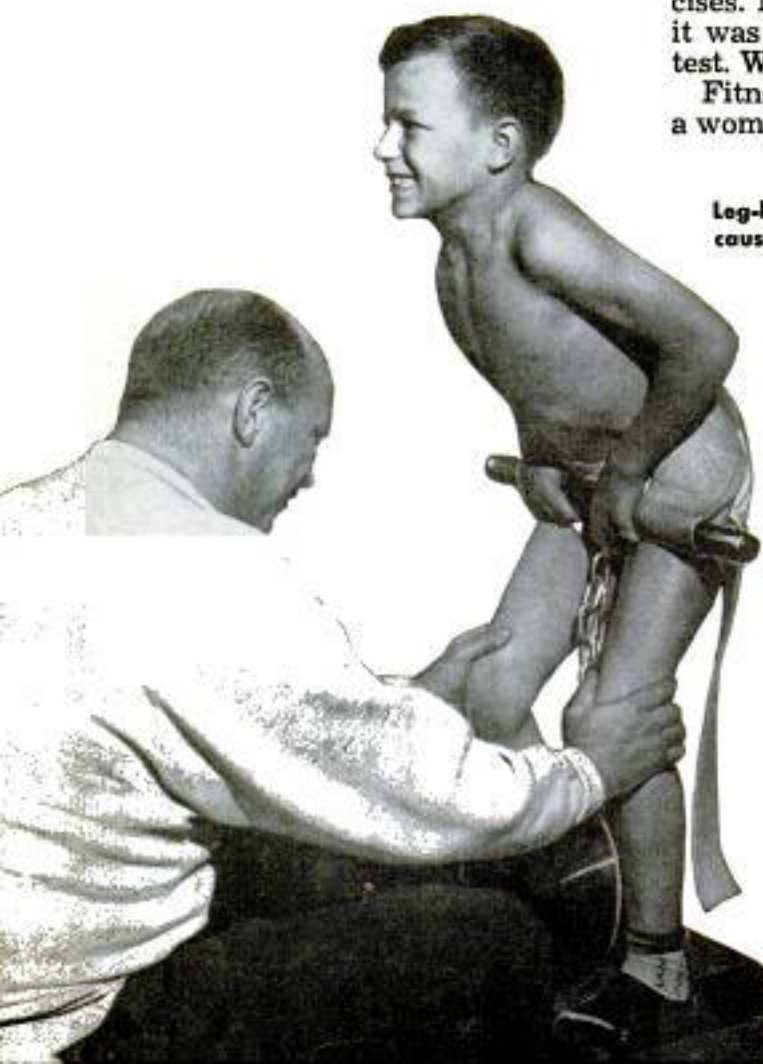
prompted Oregon's physical educators to initiate a unique "physical-fitness pilot study." PFI tests were given to 2500 high-school boys and girls throughout the state. Tests disclosed that one fourth of the boys and one third of the girls were not strong enough to work and play effectively.

But this was only the beginning. High-school physical-education teachers picked out their low-scoring students for special strengthening exercises. Many youngsters exercised at home, too, for it was important to them to make 100 on the PFI test. When retested months later, most of them did.

Fitness is important to girls, too. In the words of a woman physical educator, "We tend to make such

(Continued to page 232)

**Leg-lift measures these muscles. Flabby, unexercised muscles cause poor fitness most of the time, Doctor Clarke found**



**Spirometer tells lung air capacity. Hard exercise will correct run-down condition, toughen muscles**



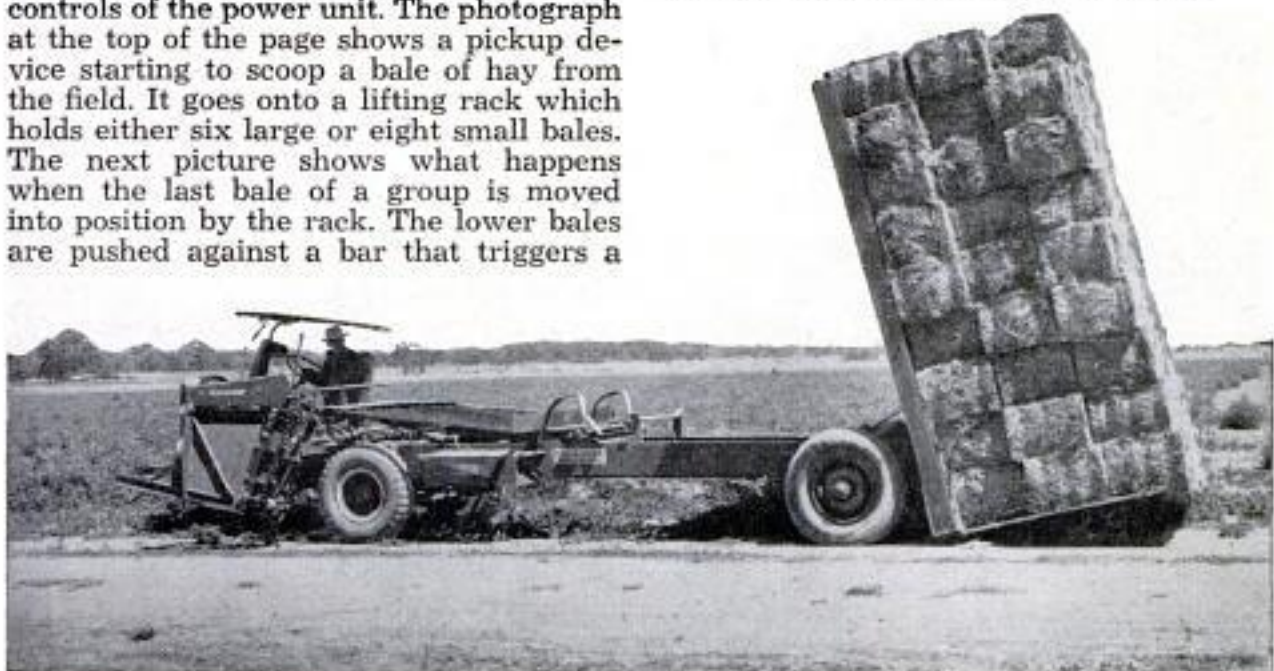




## One-Man Hay Rig Picks up Bales and Builds a Stack

**AUTOMATIC HANDLING** of baled hay from the pickup in the field to the stacking of bales in the storage area can now be accomplished by one man seated at the controls of the power unit. The photograph at the top of the page shows a pickup device starting to scoop a bale of hay from the field. It goes onto a lifting rack which holds either six large or eight small bales. The next picture shows what happens when the last bale of a group is moved into position by the rack. The lower bales

are pushed against a bar that triggers a hydraulic ram. The ram lifts the rack and places the bales on the hauling bed. The hauling bed holds 54 large or 64 small bales, unloads them in a single stack.







# WHAT'S NEW FOR YOU

**PLASTIC DOOR** for the family dog has ingenious overlapping vanes that automatically snap back into place to keep out insects and bad weather. The door is easy to install, and is available in different models for home, doghouse, garage or kennel. One style permits milk and other deliveries inside the house. The doorways can be opened by the gentle nudge of a puppy, or a kitten, and even old dogs can be taught this new trick with a little training

Turen, Inc., Beaver Park, Danvers, Mass.



**DRAIN COVER** prevents basement flooding due to sewer backup in heavy rainstorms. A rubber cone fits over the drain, and is held in place when its crossbar is forced down between the drain bars and turned to straddle them underneath. The device has a spring safety valve that releases excessive air and backwater pressure. It will cover drains up to five inches in diameter. Also available are similar covers for basement-toilet and shower drains

Acme Home Equipment, 3012 W. Devon Ave., Chicago 45

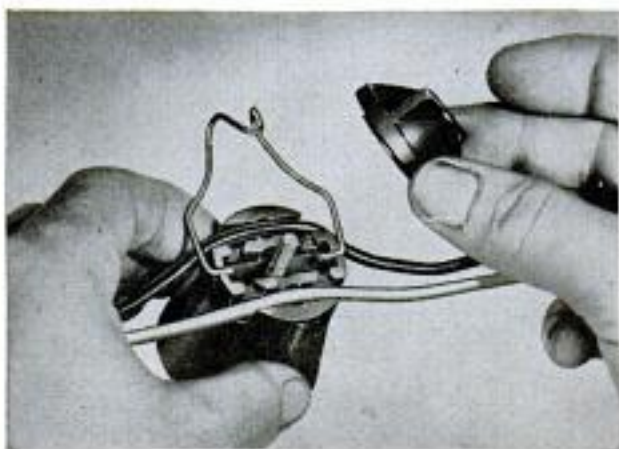
**GLASS HOLDER**, below left, is a coil of steel wire that clips onto the edge of a china, plastic or paper plate. It holds a glass or tumbler so it can't tip or slide off the plate. A coffee cup fits snugly inside when a folded paper napkin is inserted through the top ring. There is a slight angle to the coil so when it is attached to a plate, the glass or cup is held perfectly erect. The clip-on holders come in sets of eight, with either a brass or nickel-plated finish

Practical Products, P. O. Box 137, Martinsville, Va.



**LIGHT SOCKET** for temporary, decorative lighting fastens quickly to wiring without stripping the insulation. It is designed for use on No. 12 or 14 rubber-covered, stranded wire. The connection is made when the socket's cap is screwed on and two pins go through the insulation to contact the wires. An extra ring, molded into the cap, forces the wires into position, while four splines align them accurately. A detachable wire is provided for hanging

Pass and Seymour, Inc., Syracuse 9, N. Y.







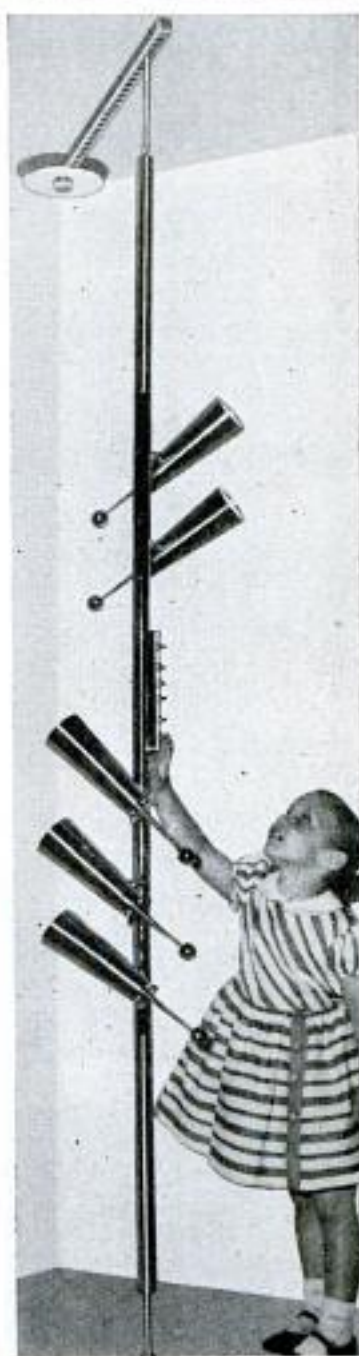
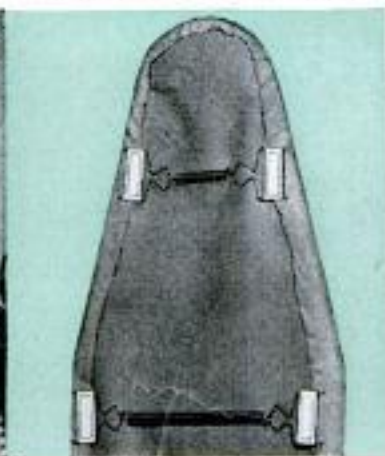
**FINGER-PULL HANDLE** on wall plug soon will be available in matching colors on lamps and electric appliances. The wire comes out the side of the plug. The handle makes it easier to pull the plug out and is safer than the old method of grasping the plug or jerking the wire. Excess wire can be stored off the floor by inserting loops through the plastic handle  
 Miller Electric Co., 120 Main St., Pawtucket, R. I.

**THIN STOVETOP**, above right, is only three inches deep and can be installed on any 30-inch base cabinet with room left for a top drawer. It fits flush and does not require a rim or gasket. The seven-speed switches of the electrical unit turn on an indicator light when a burner is on. The stovetop is available in copper-tone porcelain or stainless steel  
 Tennessee Stove Works, Chattanooga 1, Tenn.

**FLOOR LAMP** right, can be in the center of a room without a cord stretching across the floor. The "lamp pole" moves along an electrical contact strip connected to a ceiling outlet. The pole is propped between the strip and the floor, and a spring unit at the top makes contact. A push-button control operates the lights either as a group or individually  
 Steffel Co., 525 W. Superior St., Chicago 10

**SPRING HOLDERS** keep an ironing-board cover smooth and tight. Four to six are used depending on the size of the board. Wire clips at each end are kept properly spaced by metal straps, which also protect the cover and keep the rolled-under edges flat. They can be used on any type of ironing board and the coil springs maintain a consistent tension  
 Slip Seal Co., 1750 California Ave., Long Beach 13, Calif.

**ELECTRIC SHARPENER**, below, produces exceptionally smooth, keen edges on knives, tools and scissors. Blades are held against a circular oilstone that is attached to a motor. Its gentle honing action does not draw the temper of hardened steel. An angle guide positions the work for the proper edge bevel. The oilstone is reversible for extra-fine finishing  
 E. F. Britten Co., Cranford, N. J.







## They Measure Water in Snow for Hydroelectric Plants



Wading through snowdrifts two miles above sea level is part of the job of making electricity in southern California. That's because the runoff from the melting snow provides the water to turn the hydroelectric generators. Hydrographic teams use a helicopter to reach 18 sampling spots where they measure the water content of the snow and forecast the amount of water available for generating electricity. Last year their forecast was 99 percent accurate.



## It Takes a Bug To Catch a Bug

When you call a Miami, Fla., exterminator to rid your house of bugs, he'll drive up in the most frightening bug of all. It is a strange, popeyed insect that rolls on four wheels. The businessman added a customized body covering to his tiny Isetta car to make it look like something that lives under a flat rock. It is all in the interest of sales promotion.





## Power Saw Converted to Drill for Ice Fishing

Because he didn't like the work of chopping through the thick ice at Lake Winnebago, Wis., winter-fishing enthusiast R. Kocian decided to build his own ice drill. He fashioned an auger blade of steel and

welded it to a shaft. The shaft was attached to the gasoline engine that operates his power saw. The result, above, is a drill that will cut an eight-inch hole through two feet of ice in less than a minute.

## Midget Electric Car Built for Handicapped Boy

Six sensitive switches on a control panel operate power steering, forward and reverse gears, lights and horn of this tiny electric car. It was built for nine-year-old Sandy Clarke of South St. Paul, Minn., afflicted with a rare muscle ailment. Finger movements operate controls.



## "Long-Pole Sled" Circles at 60 M.P.H. for Thrill Ride

Here's a new winter sport enjoyed by a group of men living near Holy Name Lake, Minn. Known as the "long-pole sled," the contraption consists of a sled on the end

of a pole which is turned by the rear end of a car. A gasoline engine furnishes the power. The sled travels over the ice at speeds up to 60 miles per hour.







Removing the "lost" logs from the Texas Long Leaf millpond was termed by workmen the world's dirtiest job

## Timber Harvest in the Mud

By C. C. Springfield

**J. C. "TEX" WALKER**, operator of the Walker Brothers Lumber Mill, Huntsville, Tex., once found a lost treasure of buried timber.

He was walking along a street in Trinity, about 20 miles from Huntsville, when he met an old man—a mechanic for the Texas Long Leaf Lumber Co. of Trinity before the firm had closed for the lack of timber.

Queried on the whereabouts of timber for Walker Brothers' saws, the old-timer said: "No, I don't know where there is any really good standing timber, but I do know where there is some of the best timber in Texas, providing a man'd be willing to go to the trouble to get it."

"I'm willing to go a far piece," said Walker.

"Well, it's here," said the old man, "in the Texas Long Leaf millpond."

Walker snorted. "There wasn't a stick in sight, when I looked at the pond today."

"You didn't look deep enough," said the old man. "Me, I wouldn't have thought so

myself, if I hadn't seen a pond drained in Louisiana, maybe 50 years ago. The bottom was covered with logs—'sinkers'—hundreds of them. They snaked them out and I'll bet they got a million feet out."

"Was it rotten?" asked Walker.

"Not a piece. The water had preserved it. And they're in this pond. Too many times we old-timers over the years have seen some particularly good piece of timber pitched in the pond . . . and never seen it come out. Oh, they're there. I guarantee it."

Walker checked. He found there were logs still in the pond. He made a deal with the millowners to drain the lake and see what was there.

He began emptying the pond. By the time the 20-foot-deep lake, covering some 20 acres, had dropped a few feet, he found that the old-timer had spoken truly. He saw the ends of a few poles rearing their heads from the water. Still more could be seen as the water level dropped. A few





As they left the water, the logs generally shed their bark. Although soaked, they were not waterlogged

days later, he began snaking them out with a dragline.

At his mill, he found that they "cut like cake." Nearly all were devoid of bark; it had dropped off as the logs were loaded or pulled from the pond. Although they were solid, as yellow as candy, and cut easily, still they stank. The smell hovered over the yard and stuck to clothes when worn away from the pond. Just the same, the logs were top-quality timber. Walker also found that they dried both quicker and straighter than the timber that he usually handled.

#### Logs Were 40 Feet Long

During the three months he was grubbing them out of the pond, he uncovered logs that were 40 feet long—too long to haul on his trucks. He found monsters, too, for one 24-foot log scaled out 1200 board feet. He also discovered that this lumber would sell as fast as he could produce it. Today, he hasn't a stick on hand. It was big stuff, the kind of material that was just right for heavy construction—3 by 12 inches by 24 feet.

Pointing to a stack of drying timber, he said: "You just don't get this sort of lumber from second-growth timber. I'll bet there is not a tree in Walker County which will

give you this type of wood." Most of it was high-grade heart timber, precious wood today.

During the early part of his operations, Walker figured that after he got the logs off the top of the surface, he'd be able to dig out another layer at least 10 feet deep under the slush. He missed his bet here because those logs were packed in, sealed almost solid. Instead of getting them out, the bulldozer tore them up.

All in all, Walker reclaimed about 500,000 board feet of top logs. ★ ★ ★

J. C. Walker, who reclaimed the logs, shows some of the sawed yellow timber which "cut like cake"







# Shutterbug Shopping Center

**W**ANT TO TAKE underwater photographs, but can't afford the expensive equipment? Could you use a pocket-size flash reflector? A hand viewer with slide magazine? Here is a selection of these and other new and unique items for the photographer enthusiast. ★ ★ ★



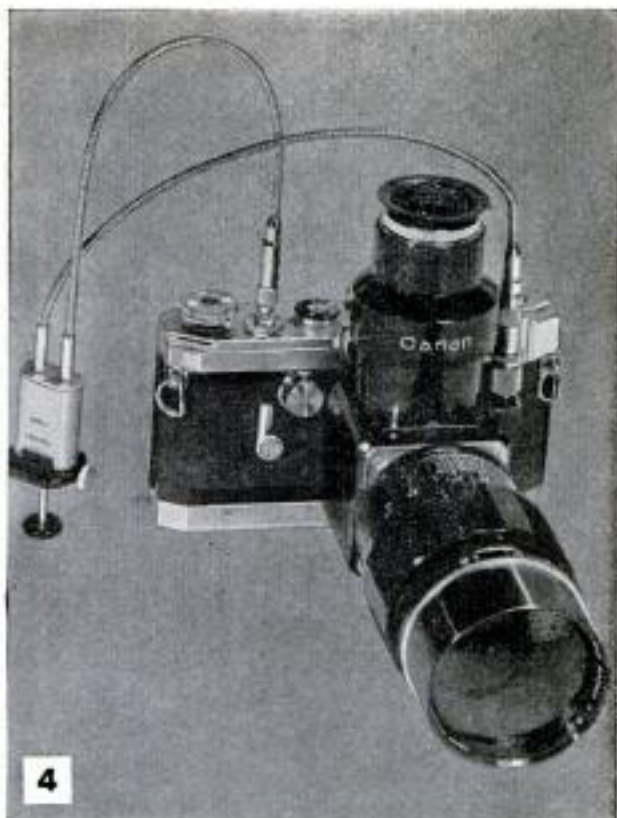
**1. PANORAMIC 35-MILLIMETER** camera takes 355-degree photographs—almost a complete circle. Photo across the pages was taken inside an automobile, starting at left looking out the rear window and ending at right showing the other corner of the rear window. It's done with mirrors. The lens points straight up, at right angles to the scene being photographed. A mirror covers the lens at a 45-degree angle, and spins in a circle to reflect the scene. Below the lens inside the camera, another 45-degree mirror turns at the same time and flashes the lens-formed image onto the film. The film is held stationary, while the interior section of the camera turns and exposes it through a narrow slit. The camera, which was invented in Japan, can't take a full-circle photo because it loses five degrees at the point where the film enters and leaves the picture chamber

Panorax Kogaku Kogyo K.K. 106 Arai Juku 5-chome, Ohtaku, Tokyo, Japan

**2. WATERPROOF CASE** enables the owners of all but the largest still or motion-picture cameras to take underwater photographs. It is molded in one piece, and made of flexible and transparent plastic to permit operation of the camera's controls underwater. The nine by seven-inch case is sealed with a glass cover. Has been successfully used at depths of 100 ft.

W. J. Vost Rubber Corp.,  
2045 E. 12th St., Los Angeles 23, Calif.





**3. EIGHTY SECONDS** of continuous filming at 16 frames per second is a feature of this motion-picture camera. It is available in single-lens and two and three-lens versions. The 16-millimeter camera has an automatic film-threading mechanism, a 100-foot film capacity, five running speeds, a constant-speed motor, and two of the models have a "zoom" view finder to show the exact field covered by the lenses

Bell & Howell Co., 7100 McCormick Rd., Chicago 45

**4. TELEPHOTO LENS** at a speed of  $f:3.5$  and a focal length of 200 millimeters is made from a newly discovered rare-earth optical glass. It has a reflex housing with double-cable release and a lever that automatically cocks the shutter, lifts the viewing mirror and exposes the film in a single operation. The lens is designed for precision performance and all elements are coated for natural color correction

Canon Camera Co., Inc., 550 Fifth Ave., New York City

**5. HAND VIEWER** with slide magazine operates automatically with a push-pull plunger. Enlarging the slides seven times, it is offered either with a battery-powered light source or by plugging it into an electrical outlet. The magazine holds 20 standard two by two-inch cardboard slides. Single slides can be viewed without the magazine. A system of double diffusion provides even image illumination

Airequip, 20 Jones St., New Rochelle, N. Y.







6

**6. CAMERA-LIGHTER** is an actual windproof lighter with a built-in eight-millimeter camera. The metal case is slightly larger than a standard pocket lighter and it weighs 3½ ounces. The camera has a view finder, an f:3.5 lens, fixed focus, shutter speed of 1/50 second, and bulb, an automatic film advance and stop. Its special daylight-loading magazine contains film for 20 exposures in black and white or color  
Silver Bells, Ltd., 600 16th St., Oakland, Calif.



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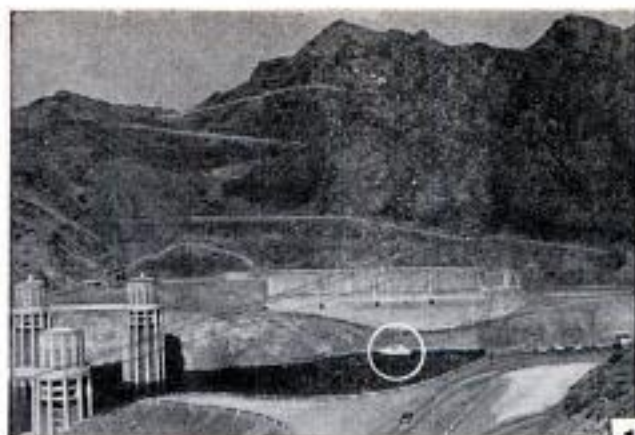
**8. HOME PROJECTOR** shows regular 2¼ by 2¼-inch slides, and easily converts with an adapter to take both 35-millimeter and the new 38-millimeter super slides. It is all-metal in construction, weighs nine pounds and includes the recently developed horizontal-burning 300-watt lamp. The overlapping fan blades not only cool the lamp, but also send air between the condenser lenses and against the film  
Realist, Inc., 2051 N. 19th St., Milwaukee 5, Wis.

**9. MINIATURE FLASH** unit unfolds 11 metal blades like a fan to become a reflector only four inches in diameter. The case is made of ivory plastic, it attaches to any standard camera, uses bayonet-base bulbs and is powered by a hearing-aid-type 22½-volt battery. The blades are opened by turning a knob in one direction, while bulbs are ejected by turning the same knob in the opposite direction  
Carl Zelas, Inc., 485 Fifth Ave., New York City 17



9





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**10. TELEPHOTO COMBINATION** took the sharp close-up picture, upper right, from the far-distant location at left. The system includes a telescope with a wide selection of orthoscopic eyepieces. They match in perfect alignment with a platform that mounts most makes of 35-millimeter and  $2\frac{1}{4}$  by  $2\frac{1}{4}$  still cameras and 8 and 16-millimeter movie cameras. Effective focal lengths range from 750 to 2000 millimeters

D. P. Bushnell & Co., Inc.,  
316 Bushnell Building, Pasadena, Calif.



**11. TWO PHOTOGRAPHS** per second can be snapped with an attachment to the Praktina FX camera. It is a heavy-duty spring motor built to precision tolerances and simple in mechanical design to provide reliable, trouble-free operation. The device weighs 20 ounces and can be connected either before or after the film is loaded. It can be used in all types of rapid-sequence photography

Standard Camera Corp., 500 Fifth Ave., New York City



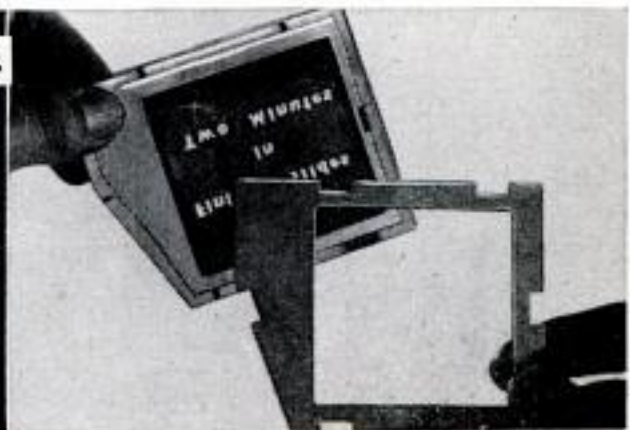
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**12. FAST FILM** makes it possible to snap a picture and project it on a screen several minutes later. The 1000-speed panchromatic film is used in a Polaroid Land camera. The transparency is removed from the camera and placed in a solution to harden the emulsion. It is then mounted in special slides of different sizes. The process is about one third the cost of conventional slides

Polaroid Corp., Cambridge 39, Mass.



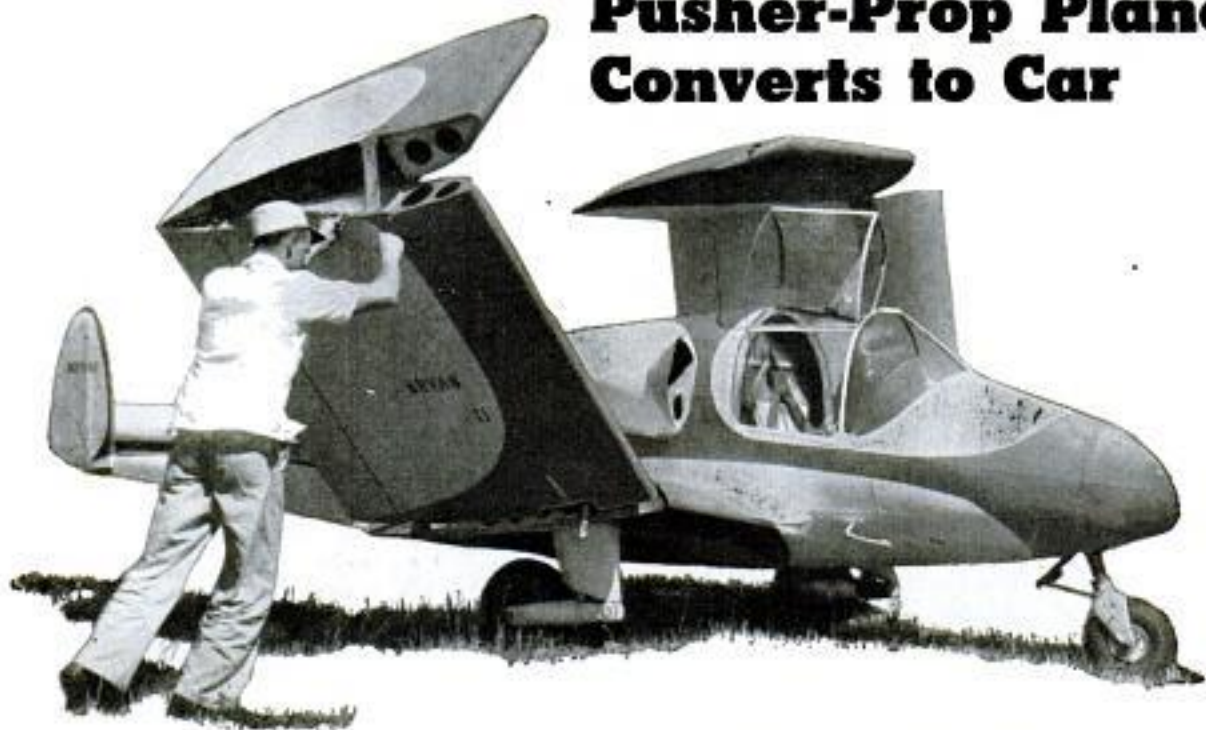
12







## Pusher-Prop Plane Converts to Car



Changing this vehicle from an airplane to a car, or vice versa, takes approximately 10 minutes. The pilot, above, simply folds the wings over fuselage and attaches license plates



WITHIN 10 MINUTES after landing his auto-plane, Leland Bryan, a Highland, Mich., mechanic, can convert it to a highway vehicle. Inventor Bryan simply folds up the wings. Built at a cost of about \$1000, the "hop rod" has a top speed of 95 miles per hour in the air and 60 miles per hour on the road. It carries a car license plate (under the nose in bottom photo) for highway travel and has Civil Aeronautics Authority permission to fly within a 25-mile radius of Bryan's home. He can make longer flights by making special application to the CAA. Bryan constructed the single-seat craft from parts of a standard Ercoupe. The same pusher propeller that drives the auto-plane through the air powers it on the road.



# Radio Electronics

## Television Today



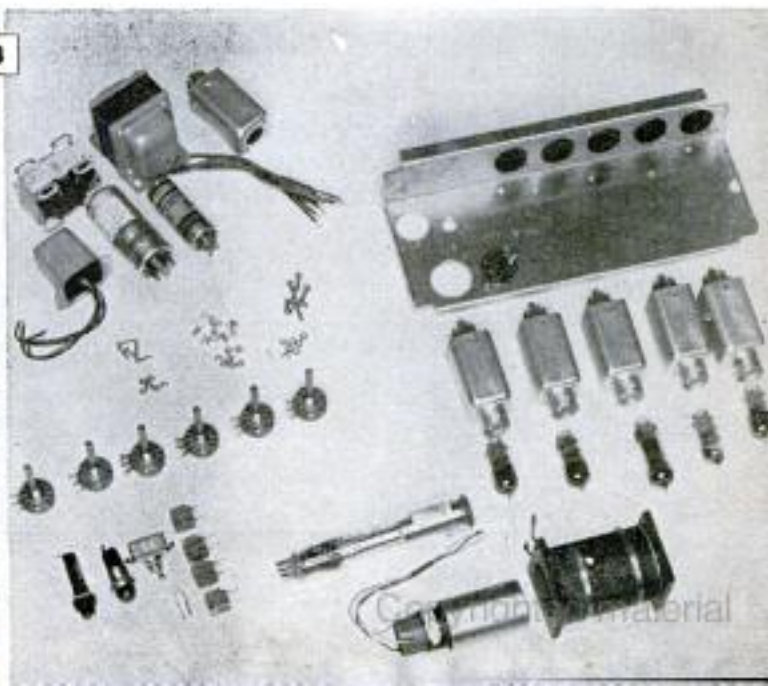
1. As an indication of things to come, General Electric Co. here demonstrates the world's first three-dimensional color-TV system, developed for remote servicing of nuclear reactors. Young lady in photo lines up toy trucks by watching televised image on special receiver through Polaroid glasses. Though currently not feasible for the living room, system can be adapted for numerous industrial applications requiring lifelike closed-circuit TV reproduction



2. One man can install and operate this TV studio which contains all equipment necessary for "live," film or remote broadcasts. Included at less than \$15,000 are film and slide projectors, audio facilities, cameras and transmitting circuitry. All items can be controlled from a single master console. Designed for closed-circuit or wireless broadcasts, system can be used industrially, or by small communities for augmenting national programs with local broadcasts

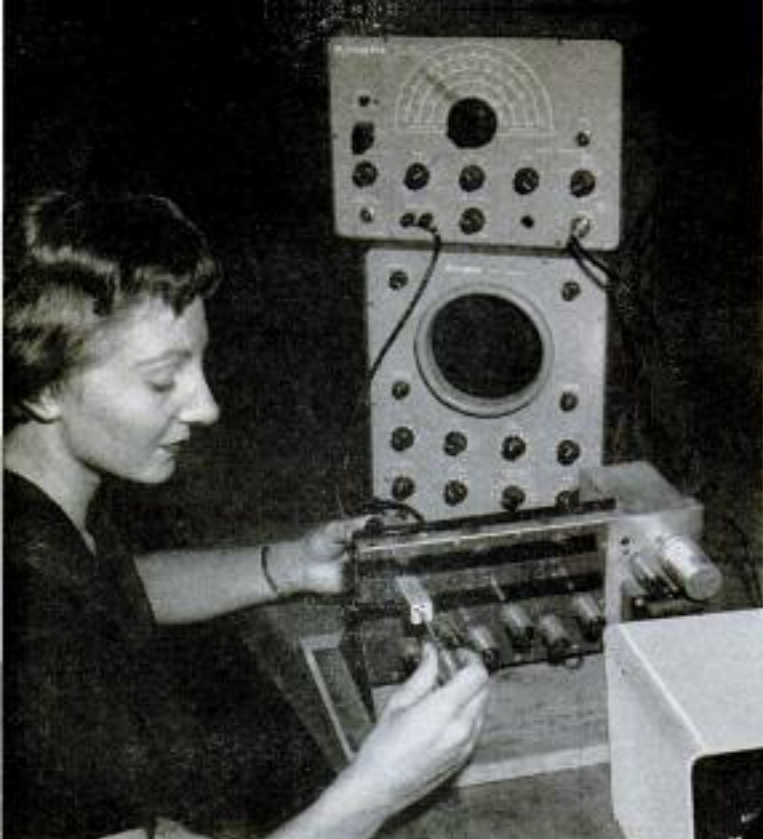
3. Keeping your eye on things is easy and relatively inexpensive with this new television camera designed for closed-circuit applications in homes, schools and industry. Camera, which requires no special lighting, can be monitored by a number of ordinary TV sets connected to it with cables. Or, a number of cameras

may be monitored by a single receiver for complete coverage of a large area. Complete camera costs less than \$500, but unit is also available in kit form at a substantial saving. Five preassembled modules included with basic components, shown below, and simplified circuitry make kit construction easy

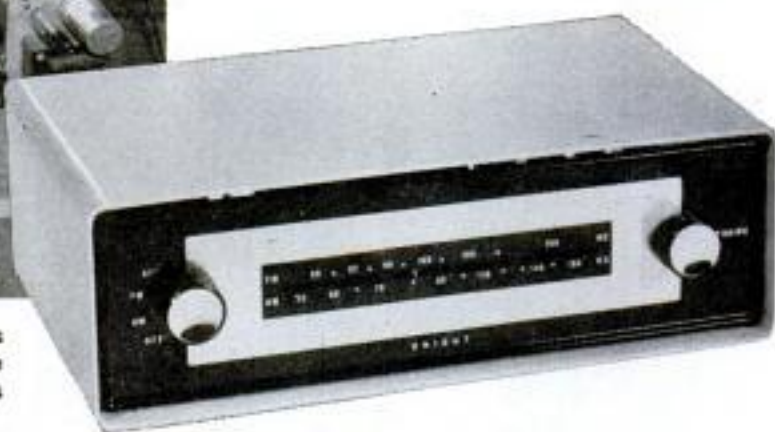




# You CAN Build a Hi-Fi FM-AM Tuner



Carefully prealigned i.f. transformers and close-tolerance r.f. coils obviate need for complicated final adjustments



**H**I-FI KITS have been around for many years. Amplifiers and preamp kits are available literally "by the dozens," and almost any commercially built speaker enclosure can also be purchased in knocked-down form by the hobbyist who wants to save money or who takes particular pride in building his own equipment. But when it comes to hi-fi tuner kits, the choice has been severely limited. It isn't that hi-fi tuners are particularly difficult to design—the large selection of really good commercial units proves otherwise—nor that there is a lack of interest on the part of the kit builder in a high-quality radio tuner. It's just that many manufacturers have been reluctant to package a kit for a component whose ultimate performance depends as much on individual wiring and final adjustment as it does on the choice and design of the circuit. And that's why Allied Radio's new Knight FM-AM tuner kit is of special interest.

Circuitwise, this 9-tube tuner is not very different from many high-quality com-

mercially assembled units. For FM reception there's a tuned r.f. amplifier (for low noise and good image rejection), followed by a mixer and separate, drift-compensated oscillator which provides excellent stability during warm-up and under widely varying line-voltage conditions. Further insurance against oscillator drift is provided by an a.f.c. (automatic frequency control) circuit which can be disabled by the front-panel selector switch for the reception of weak or distant stations.

Two i.f. amplifiers, a ratio detector and an audio-amplifier stage follow in that order. Finally, a cathode-follower output stage permits the use of relatively long cables between the tuner and subsequent amplifier without the loss of signal quality.

On AM, there is a tuned r.f. amplifier, a converter and an i.f. amplifier. This is followed by a detector, using a separate 1N34 diode, an audio amplifier and, again, a cathode-follower output stage. The specifications for the completed tuner are given in the table.

Specifications (shown below) for perfectly aligned tuner. Due to carefully prealigned components, these specifications are approached without the complicated post-construction adjustments formerly required

SPECIFICATIONS:	FM	AM
Tuning range	88-108 mc.	540-1600 kc.
Sensitivity	2½ microvolts for 20 db quieting	3 microvolts for 10-db signal-to-noise ratio (at terminals)
Output	1 volt—with 1000-microvolt signal (I.F.) 60 db below 1 volt	1 volt with 5000-microvolt signal—60 db
Hum and noise	200 kc. at 50% down on curve	8 kc. at 50% down on curve
I.F. band width	60 db	20 db
Image rejection	20-20,000 cycles	20-8000 c.p.s. at 50% down on curve
Frequency response		

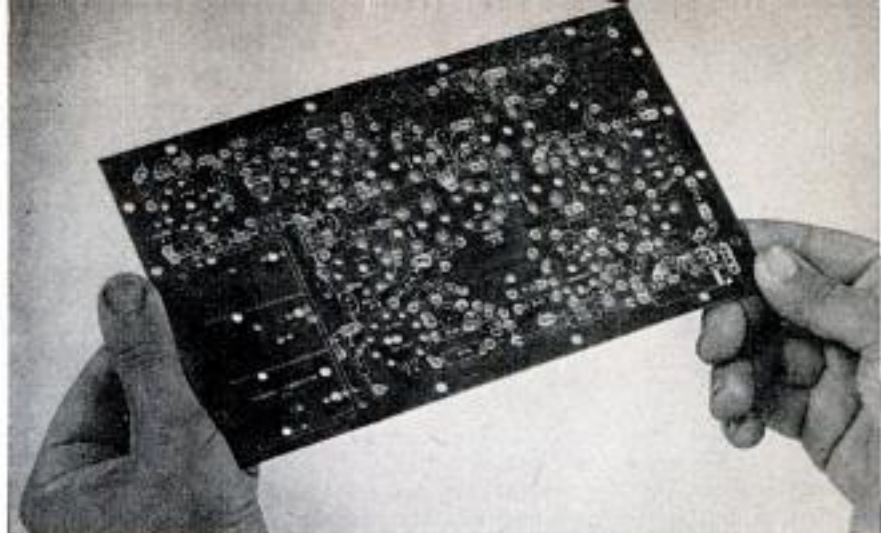


For the potential builder, however, the big feature of this kit is not the circuitry, but the ease with which the tuner can be constructed. Almost the entire tuner is built on an etched and drilled board comprising over 90 percent of the tuner wiring. The top of the board is screened to show the exact location of the various resistors, capacitors and other parts so that, with reasonable care, it is virtually impossible to make a wiring error. The little actual wiring which must be done by the builder is clearly shown in the illustrated step-by-step manual.

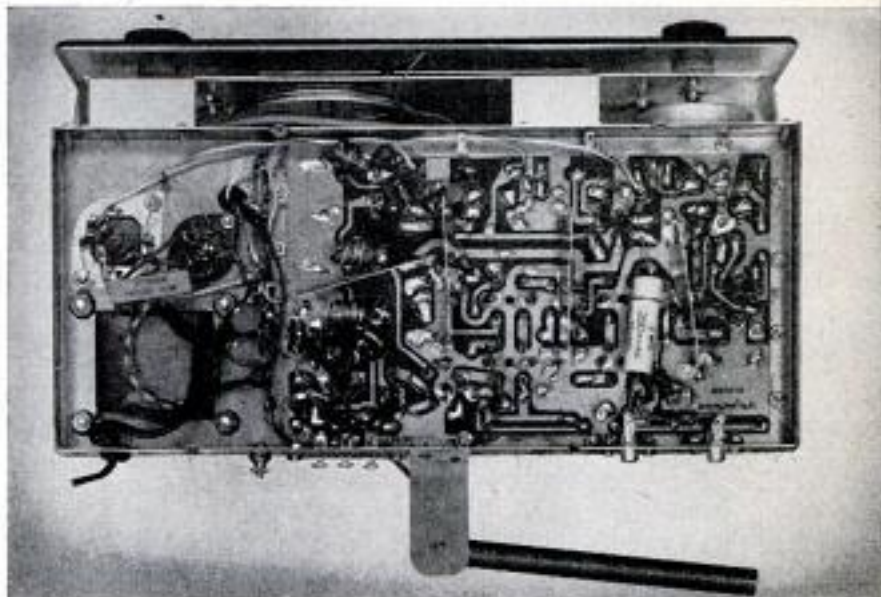
The printed board not only speeds up construction but it permits the use of carefully pre-aligned i.f. transformers and r.f. coils so that the need for final alignment is almost entirely eliminated. With conventionally wired sets, individual wiring methods cause such variations of stray lead inductance and capacity that precise prealignment of associated components is impossible. With printed circuits, however, only the variations in interelectrode capacities between vacuum tubes, even tubes of the same type, can upset the original alignment. But these variations are relatively small and their effects are minimized by the broad-band design of the tuner circuits. As a result, post-construction alignment is required only in extreme fringe areas where the last measure of performance must be gleaned from the tuner. The adjustments which are necessary require no test instruments or special tools.

Designed as a basic tuner, the Knight kit has only a tuning control and a function switch (Off, AM, FM without a.f.c. and FM with a.f.c.). The job of controlling tone and volume is left to the amplifier or preamp with which the tuner must be used.

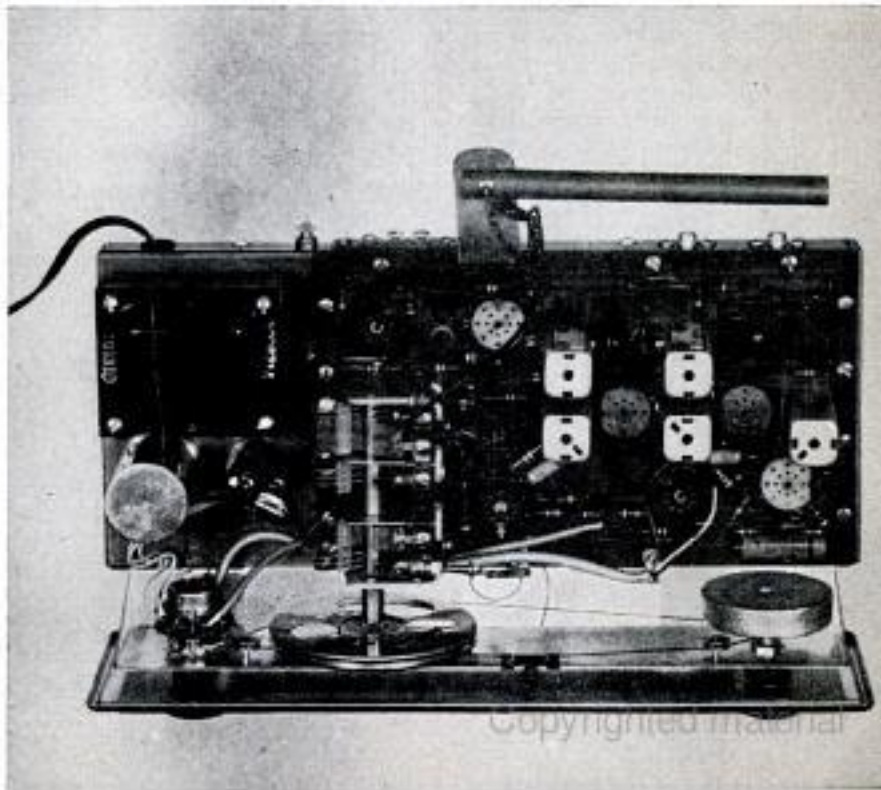
Hi-fi hobbyists planning to take advantage of the many fine musical programs on the air today will welcome the addition of the Knight FM-AM tuner to the long list of hi-fi kits. Its price is low enough to be within reach of even a modest budget; its construction simple enough even for a beginner; its performance good enough to complement associated equipment of highest quality. ★ ★ ★



Screened printed-circuit board shows exact location of most small parts and makes child's play out of the construction of a normally complicated and critical high-fidelity component



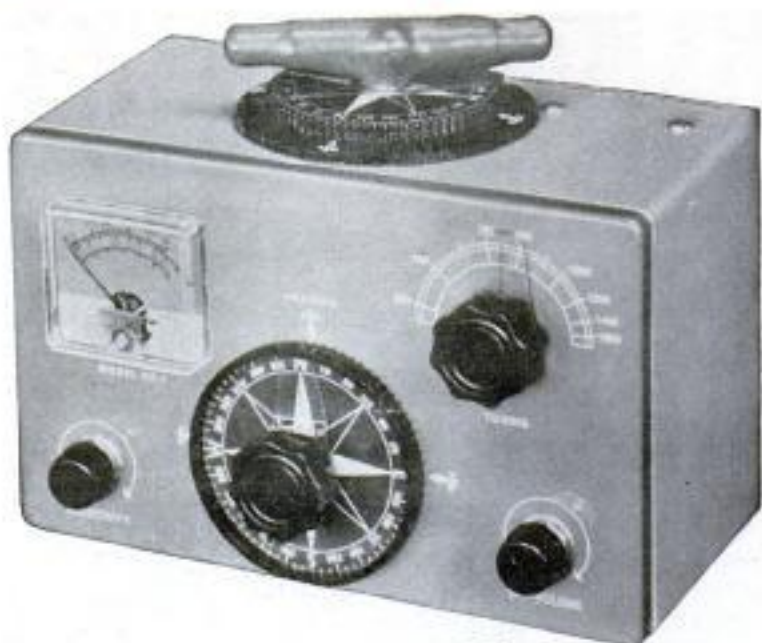
Where's all the wiring? Bottom of completed tuner chassis appears almost empty. Normal wiring is replaced with printed circuit to speed construction and minimize chances for errors. Below: Top of finished tuner chassis before installation of tubes. Adjustable AM loop antenna is mounted on back of chassis





# For Experimenters and Hobbyists

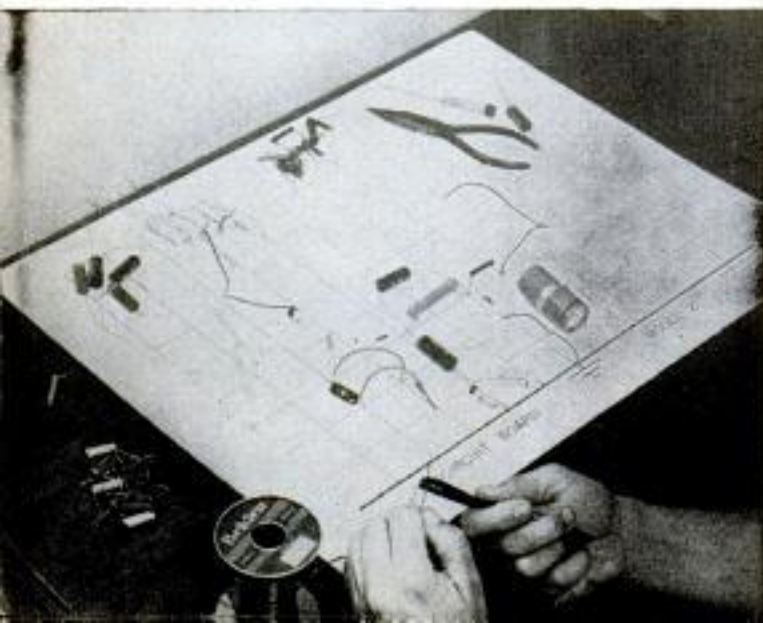
The new Heath Radio Direction Finder Kit seems to be just what the doctor ordered for small-boat owners, pilots and other outdoor-sports enthusiasts who sometimes find themselves out of sight of land or familiar landmarks. It consists of (and can be used as) a sensitive portable radio with a highly directional ferrite antenna. Antenna is adjustable from front panel to obtain a rapid bearing on any station in standard-broadcast band



Discriminating hi-fi-ers can banish annoying "snap, crackle and pop," caused by dust and static electricity on a record surface, with the new ESL Dust Bug which attaches to any record player by means of suction-cup base. Unit loosens and collects dust and eliminates static before it can reach the reproducing stylus

A new "breadboarding" technique permits experimental assembly of electronic circuits without solder or mechanical connectors. Breadboard consists of 130 conductive cells covered with elastic material. Component leads and wires are connected by inserting them in the cells and can be removed quickly without damage to leads or loosening the contacts

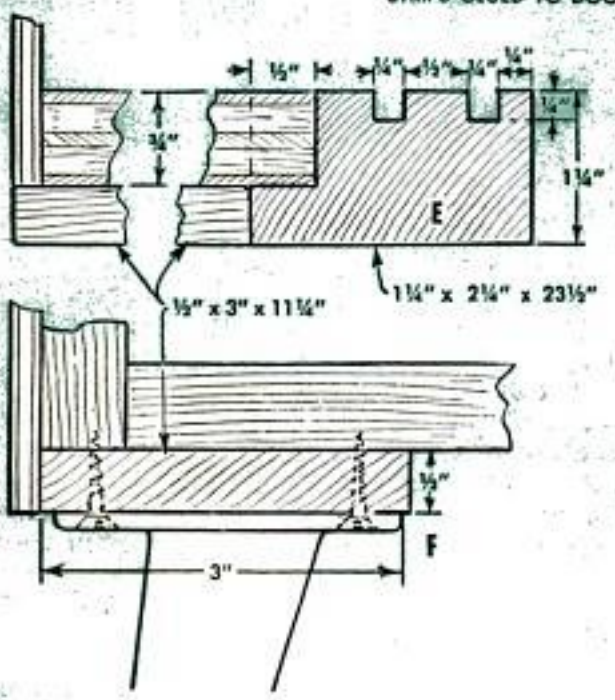
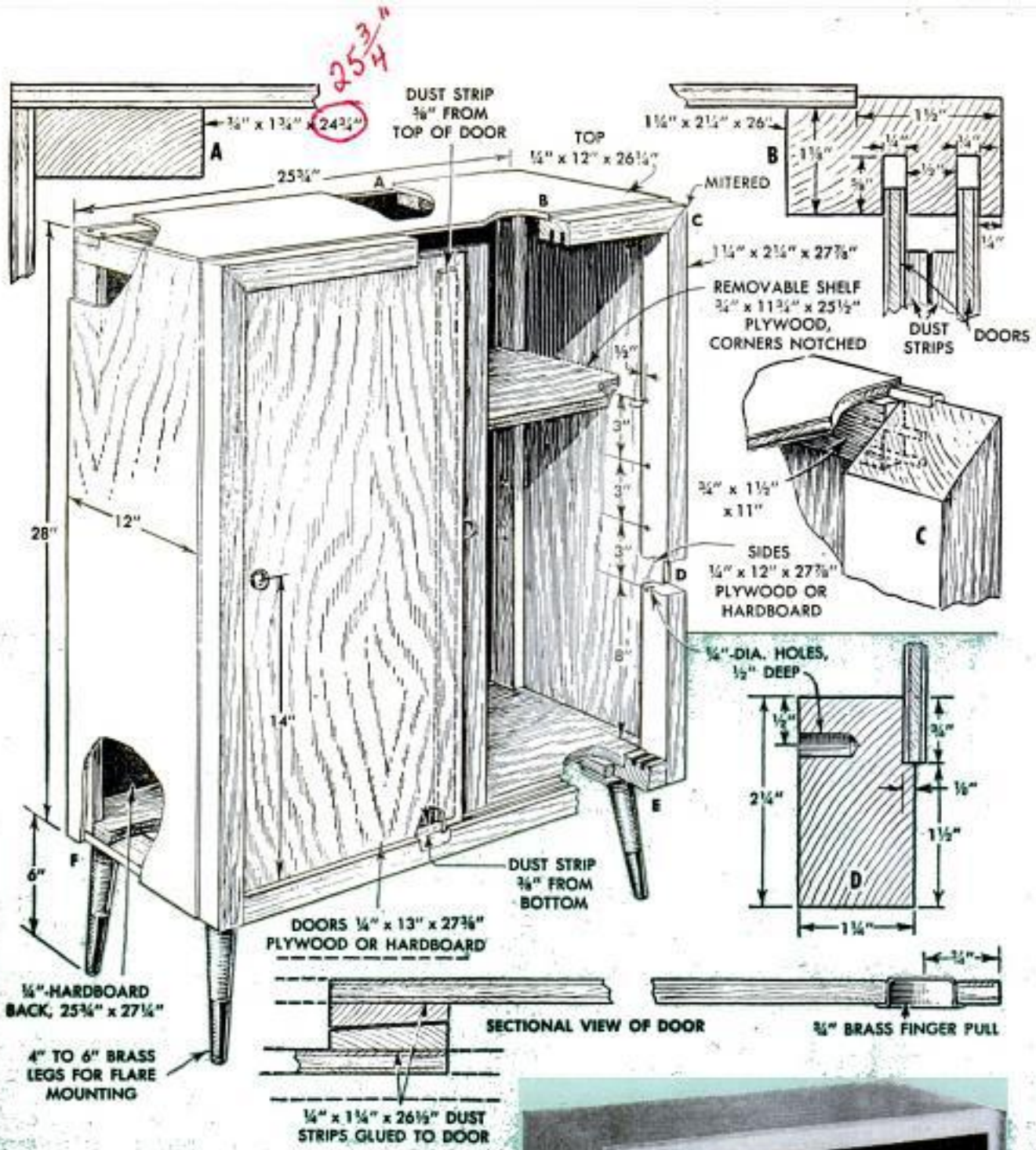
Prospective "hams" can learn code the easy way with new code teacher consisting of a printed-circuit board and "electric" pencil. As pencil is drawn down each slot, the "dits" and "dahs" of the corresponding letters are reproduced by a buzzer. Board also mounts a telegraph key for code practice in the conventional manner. Built-in lamp permits visual transmission













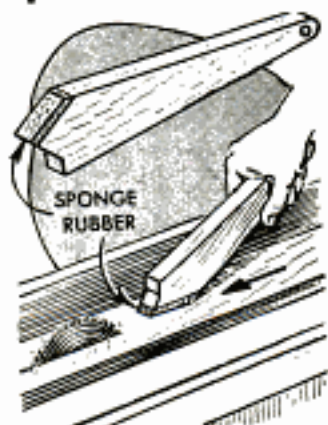
adequately strengthen those corners.

Next, the hardboard back is nailed in position, details A and E, and the two plywood sides added. After rabbeting the ends of the top panel as indicated in detail C, it is glued in place. The 1/4-in. holes drilled in the corner framing members, as shown in the drawing and detail D, accept steel shelf supports that permit adjusting the shelf. These holes should be drilled before assembling the framework at the front of the cabinet. The positions and spacing of the holes may be altered and one or more shelves used if desired.

Notice that the grooves for the sliding doors are cut 3/8 in. deeper in the upper horizontal framing member, detail B, than in the lower one, detail E. This permits installing the doors after the cabinet is completed. To do this, first insert the upper end of the inner door in its appropriate groove and then drop the door in the lower groove opposite the upper one. The same procedure is used for installing the outer door in the outer pair of grooves. Before installing the doors, brass finger pulls are fitted in them as shown, and the upper and lower edges of each door are beveled on the back side for easy sliding.

If hardboard is used for the doors, it can be painted black to contrast with an ivory-colored outer framework at the front. You may prefer to leave the entire cabinet in the natural finish of the woods used, or apply stain and varnish, especially when hardwood stock and plywood have been used for all exterior members. ★★

### Special Push Stick Aids Sawing



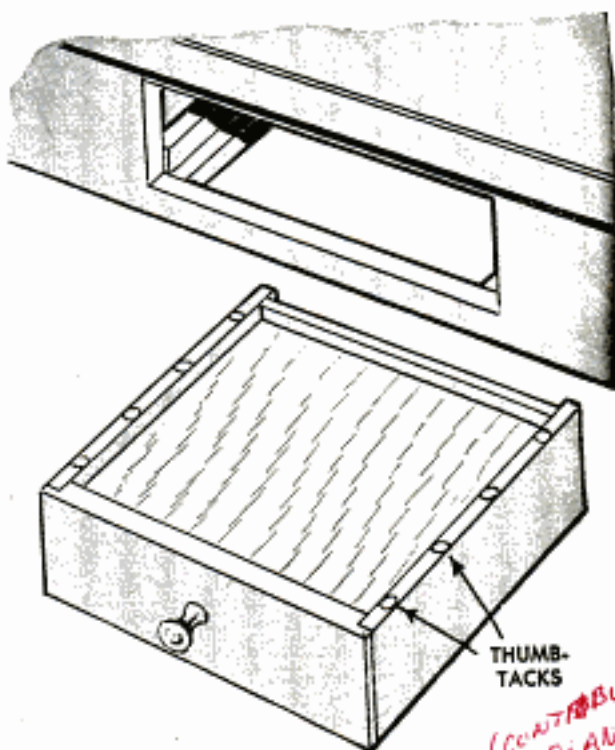
When ripping long stock on a table saw, one craftsman uses a special push stick he designed for the purpose. It's made with a length of sponge rubber cemented to an angled surface cut adjacent to one leg of the V-notch. This permits him to hold the work against the fence and safely push it into the saw. The V-notch is used in the usual manner when the end of the work reaches the edge of the saw table.

Calcimined walls should be washed thoroughly with a sponge and warm water before painting. All traces of calcimine must be completely removed in order for the paint to adhere properly.

DECEMBER 1957

### Thumbtacks Are Drawer Gliders

Heavy shop drawers can be made to slide easily by driving thumbtacks in the bottom edges of the sides as shown. For tight-fitting drawers, it may be necessary to slightly countersink the thumbtack heads to expose only the crowns of the heads.

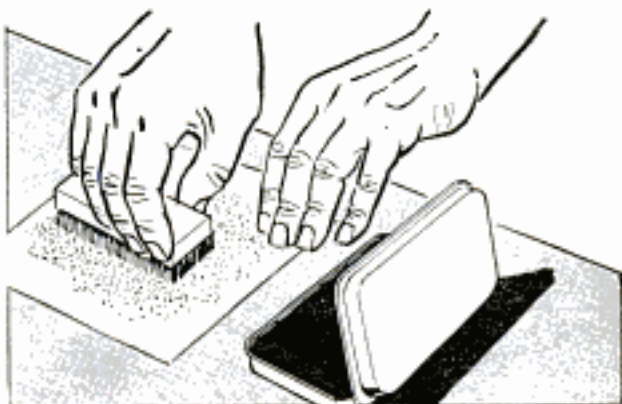


### Prevent Pipes From Freezing

You can prevent water pipes from freezing by painting the exposed pipes with a mixture of equal parts of glycerin and melted paraffin. This precaution can save you an expensive repair bill.

### Shade Ink Drawing With Brush

You can produce a variety of shading effects on ink drawings with a hand brush or piece of sponge rubber. Simply rub them over the surface of a stamp pad and apply the ink as shown in the drawing. Since the edges of sponge rubber tend to produce lines, use only the flat surface.





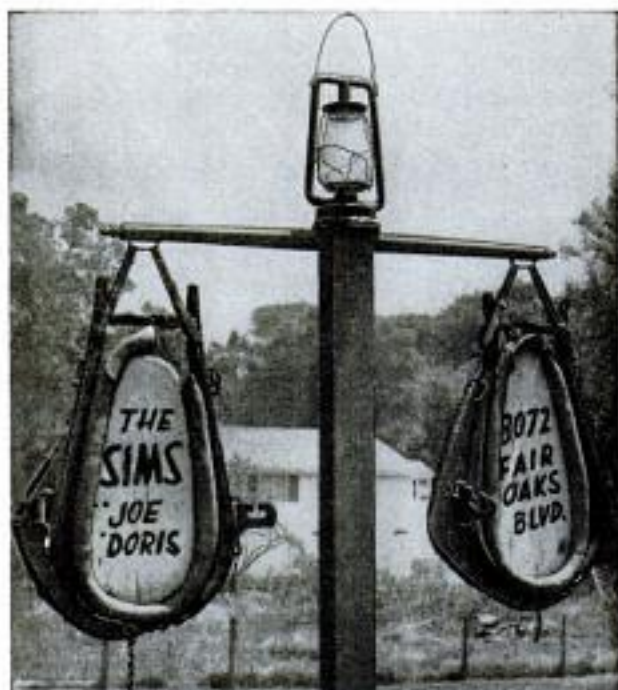
## Miter Box Nailed to Flange and Clamped to Workbench



If you have experienced difficulty in keeping a wooden miter box steady while sawing, try nailing the box to a wide piece of stock. Allow the stock to project at the front of the box so that the flange thus formed can be clamped to the workbench with a couple of C-clamps. Position the clamps so they don't interfere with sawing.

## Horse-Collar House Number

Two old workhorse collars and a lantern of the same period—the latter wired for electricity—have been combined by one homeowner to assemble this unusual name and address sign that is located in the yard.—F. Leland Elam, Sacramento, Calif.



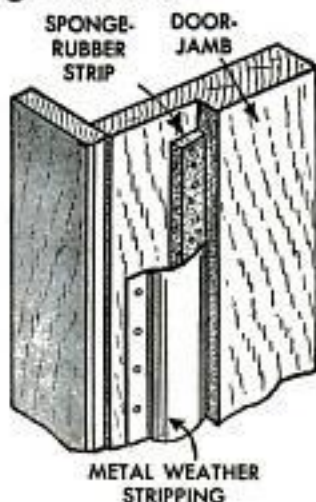
## Gate Made of Salvaged Items

Scrap odds and ends of various materials were combined to make this unusual gate. A length of pipe provides a column on which the gate hinges pivot. The hinges themselves consist of lengths of discarded wooden columns bored to accommodate the pipe column. The "mallet" effect is gained by wrapping the column sections with strips of flat steel, and nailing lengths of split dowels to the gate to appear to be handles. The chain and singletree were salvaged from an old farm wagon.

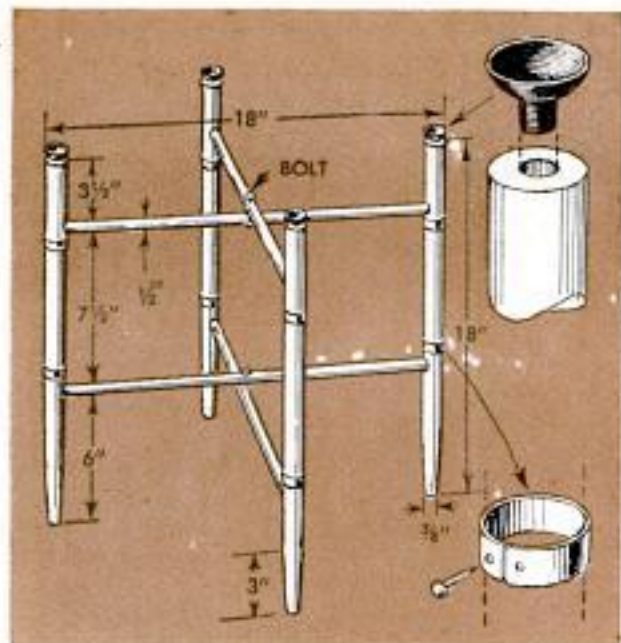


## Weather Stripping Silenced

You can stop that annoying howl of a spring-type metal weather stripping on an outside door when it is subjected to wind pressure by providing a resilient cushion under the weather stripping as shown. For the cushion, use a strip of self-adhering sponge rubber. Usually a  $\frac{1}{8}$ -in. thickness of rubber provides a satisfactory cushion without making the door too difficult to open or close.

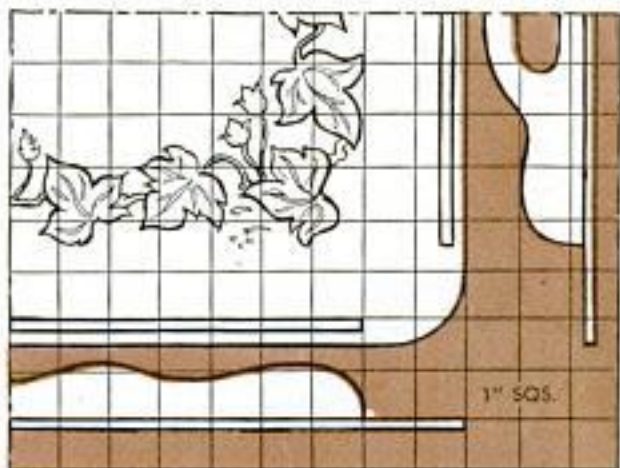
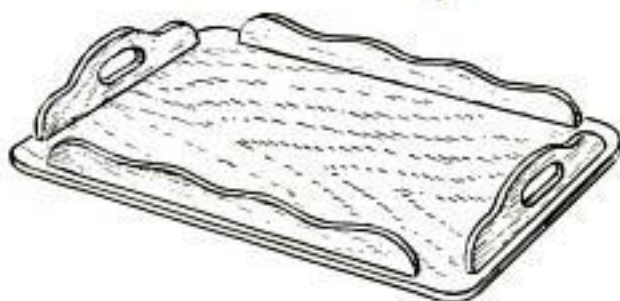






## Tray on Folding Stand Ideal for Snacks

Serving snacks to a few guests or the family is much easier for the hostess when the serving tray can be placed on a folding stand such as the one illustrated. The stand will take a tray of any shape with a radius of 9 in. or more and folds flat for compact storage. Rubber suction cups glued in holes drilled in the upper ends of the legs hold the tray securely once it is pressed in position on them, making the unit very adaptable for use as a TV table, tea table, snack table or end table as desired. If no suitable tray is available, the one shown can be made by making a full-size pattern from the squared drawing and cutting the members from 1/4-in. hardwood plywood and assembling them with glue and nails. The legs of the stand are 1-in.-dia. hardwood dowels, cut to length and drilled to accept the crossrails. The latter are cut from 1/2-in.-dia. hardwood dowels. A hole, drilled vertically through the diameter of each crossrail, accommodates a 3/16 x 1 1/4-in. stove bolt at each pivot as shown in the drawing above. Before gluing the crossrails, 1/4-in.-wide strips of polished sheet brass are wrapped around the legs at two elevations and secured with brass escutcheon pins as indicated in one of the details. The holes for the suction cups, also, are drilled at this time. The legs and crossrails are painted black to contrast with the decorative brass trim on the legs for a smart appearance.



ated in one of the details. The holes for the suction cups, also, are drilled at this time. The legs and crossrails are painted black to contrast with the decorative brass trim on the legs for a smart appearance.

Bertram Brownold, Cedarhurst, N. Y.

## Cooling Photo Developer

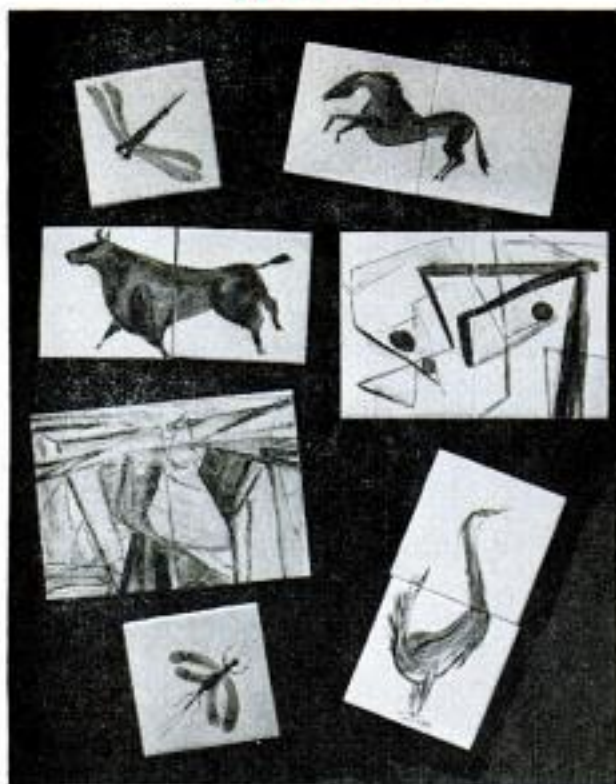
When cooling or warming a bottle of photo developer under a faucet, try inverting a drinking glass over the open neck so that the water can flow down all sides of the bottle. This will permit the water to envelop the entire bottle without entering it.—J. Comstock, Wellsboro, Pa.

## Repair Tackle With Nail Polish

Clear fingernail polish is ideal for quick repairs to chipped plugs, loose rod windings and damaged windings on flies and other fishing tackle. Also, a drop of polish on a mosquito bite will stop the itching almost immediately.

Harry J. Miller, Sarasota, Fla.





1. Figures and designs painted with color-oxide mixtures become part of tile after firing them in kiln

**I**F YOU HAVE a penchant for household furniture that is a bit unusual, here is a coffee table you will want to make. Ceramic tile, some with colorful figures painted on them, are cemented to a panel of  $\frac{3}{4}$ -in. plywood which is mounted on wrought-iron legs to produce a beautiful and serviceable coffee table with a personal touch.

2. Painting figures on tile is easy with paint made from colored oxide mixed with liquid furniture wax



# CERAMIC-TOP

By F. Leland Elam

Color combinations and arrangements of the tile are limited only by individual taste and ability and by the availability of tiles in the desired colors. The  $21\frac{1}{4}$  x 30-in. plywood top used for the table illustrated accommodates an even number of glazed tile  $4\frac{1}{4}$  in. sq., while the edges are faced evenly with 1-in. wide unglazed tile in 1 and  $2\frac{1}{16}$ -in. lengths. Other sizes of tiles can be used for the top and edges simply by cutting the plywood top to the required size. Also, designs as well as figures can be painted on the tiles selected for that purpose, Fig. 1.

Before obtaining the tile, it is a good idea to sketch several layouts, simulating the colors of available tile and drawing figures and designs and locating them for the most pleasing effect. Then, obtain the required tile and place the large ones on the plywood base according to the color plan of the selected layout. Next, remove the tiles that are to be painted. When two or more tiles serve as a background for a single figure, they must be taped together for proper alignment of the segments.

Paints for the illustrations are made up by mixing a small amount of liquid furniture polish (wax base) with a colored oxide that is appropriate for each of the required paint colors. The wax serves as a good vehicle for flowing on the colored oxides

3. Grout is worked into tile joints by moving palm of hand with circular motion over surface of table





# COFFEE TABLE

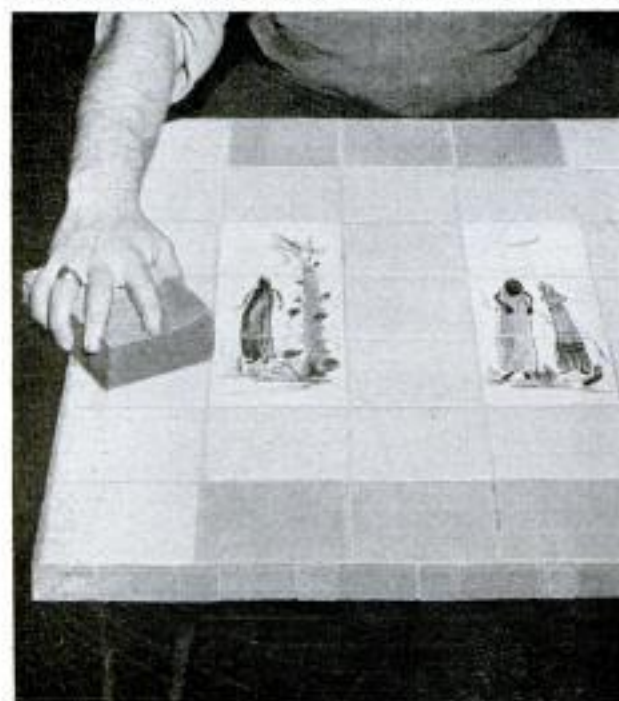
in that it dries quickly, preventing the colors from intermixing. A small brush is used to apply the paint as in Fig. 2.

After the tiles are painted, they are placed in an electric kiln for firing at a temperature of 1750 deg. F. At the moment the glaze on the tile melts, the heat is turned off and the tile is allowed to cool with the kiln door closed. When cooled, the glaze hardens again and the figure or design fuses with it in permanent colors.

The next step is to return the painted tiles to their respective places on the table and begin cementing the tiles, starting at one corner, and being careful to align the outside tiles with the edges of the table. When all large tiles are set, the small ones are cemented on the edges of the table as shown. Ceramic-tile cement is used for both types of tile.

About 8 hr. after the tiles have been cemented, the tile joints are filled with grout as in Fig. 3. For this, portland cement is dry-mixed with powdered brick-red cement chrome oxide. Then, water is added until it attains a consistency of light cream. After the grout has dried for 15 min., the excess is wiped from the tile with a damp sponge, Fig. 4. About 24 hr. are required for complete hardening of the grout, after which a 10 percent solution of

4. After grout sets, excess is removed with wet sponge, being careful not to dislodge it from joints



muriatic acid is applied to the entire tiled surface, Fig. 5, to dissolve any remaining grout particles. The acid is then removed by rinsing with water. Wear rubber gloves when rinsing off the acid and be careful it does not get on the clothes. ★ ★ ★

5. Muriatic-acid solution brushed on tile, dissolves hardened grout particles for removal with wet sponge







## Retaining Groove in Bench Top Keeps Screws From Rolling Off

Screws, nuts and other small parts of an assembly that are placed on a workbench can be kept from rolling off the top by cutting a  $\frac{3}{8}$ -in. groove in it near the outer edges as shown. A groove is better for this purpose than a raised border of wood or metal because the groove will not interfere with work that must be placed over the edges of the bench and it permits easy cleaning of the bench top.

## Wrap Gift With Paper Tablecloth

When you have a large package to wrap as a gift, try using a paper tablecloth of the required size for wrapping material. This makes a neater and more attractively wrapped package than is possible when several sheets of gift-wrapping paper are joined together to cover the package.

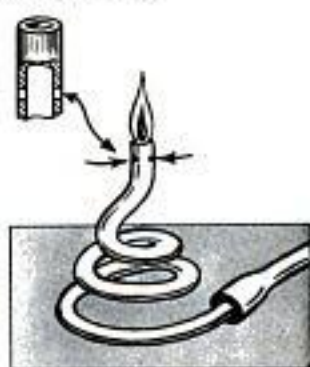
## Jackknife-Style Scribing Tool

Here is a handy scribing tool that you can carry in a trouser pocket, since the sharply pointed scriber can be closed safely in the same manner as a jack-knife blade. The tool is made by forming a loop at the end of a length of stiff wire and pointing the other end. The wire is then mounted on a hardwood handle with a deep groove cut in it.



## Improved Bunsen Burner

When you need a Bunsen-type gas burner for shop-work or for heating household repairwork, this improvised burner can be made in a few minutes. Simply form a length of soft-copper tubing as shown in the detail and drill several small holes in the upper end of the spiral to admit air. A length of rubber tubing connects the burner to an outlet.



## Luminous Tape in Darkroom

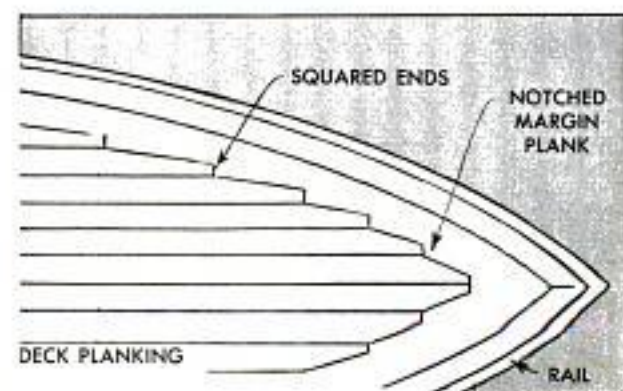
Luminous paint or tape applied on the edges of darkroom shelves make film, holders and film hangers easier to locate in the dark. Select spots for the tape carefully to prevent fogging the film when loading or developing it.

Marshall Lincoln, Fort Wayne, Ind.

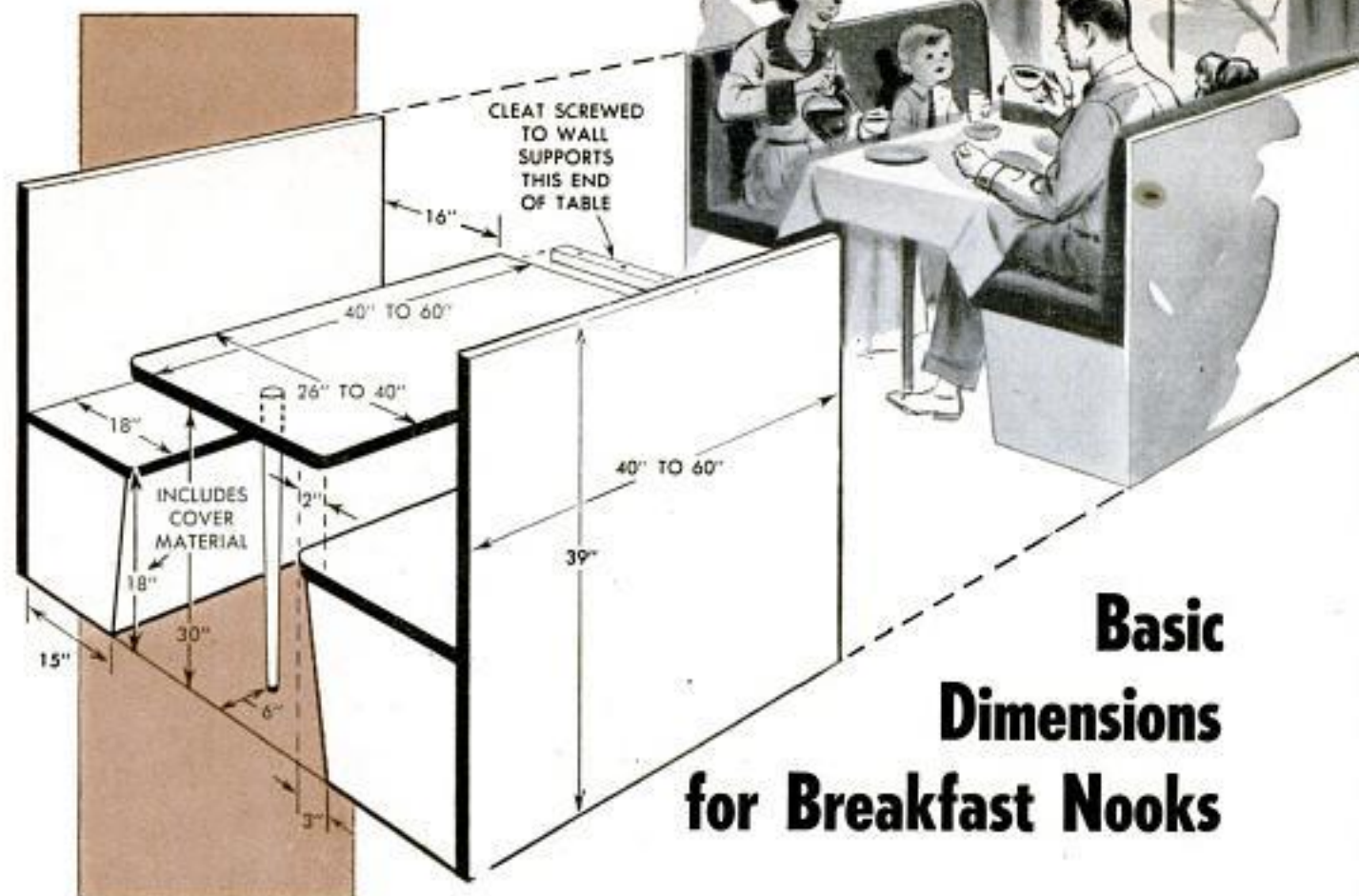


## Notch Ship's Margin Planks

For authentic reproduction of model ships made to scale, the ends of deck planks at the bow should be squared and let into notches in the margin planks, as shown, rather than ending them in sharp points. The squared end of each plank should equal one third of its width.







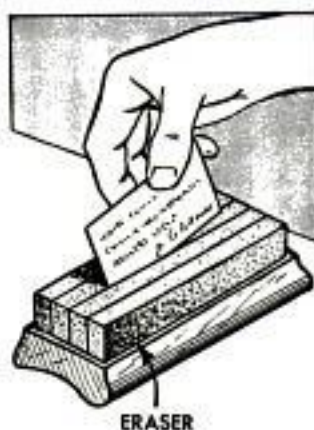
## Basic Dimensions for Breakfast Nooks

When building a breakfast nook it should be noted that dimensions and clearances have been fairly well standardized as given in the above drawing. The most common arrangement for accommodating four persons is to have two benches, one on either side of the table as shown in the illustration. In some cases a single L-shaped or U-shaped seat may be preferable. The table can be supported at the outboard end by means of single wooden or wrought-iron leg and a cleat under the opposite end for attachment to the wall. A crutch tip on the leg prevents damage to the floor covering and deadens sound when dishes contact the table surface. Exposed corners on the table and seats should

be rounded at about a 2-in. radius and are then less likely to cause painful bruises. Seats of plywood or lumber,  $\frac{3}{4}$  in. thick, are the simplest to build and the easiest to keep clean. The seats may be supported in the same manner as the table, or they may form tops of storage bins or cabinets. For increased comfort, seats should be cushioned. However, the thickness of the cushioning material must be calculated before constructing the seats so that their over-all height does not exceed 18 in. The material used for covering the cushions should have a smooth finish since a person sitting on the inside of the table must slide across the seat when entering or leaving.—E. R. Haan, Evanston, Ill.

### Eraser Is Recipe-Card Holder

For handy reference when cooking, one housewife inserts the recipe card being used between the felt plies of a blackboard eraser as shown in the detail. One eraser can accommodate several cards when used in this manner.

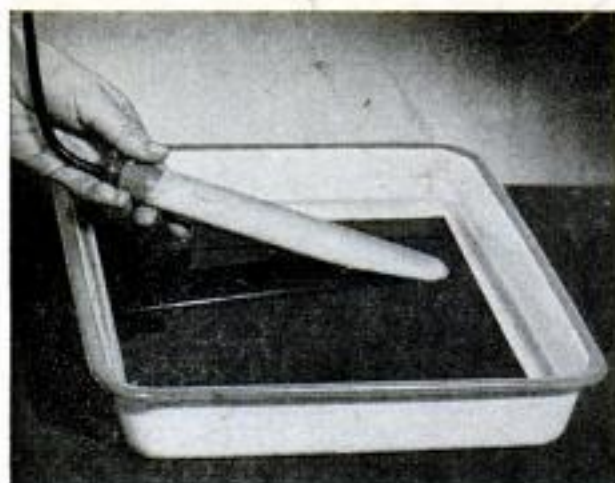


### Tubing Protects Tap Threads

Protect the threads on the taps of your tap-and-die set by cutting sheaths for them from rubber tubing as shown in the photo. The sheaths also will prevent the cutting edges of the taps from damaging other tools stored with them.





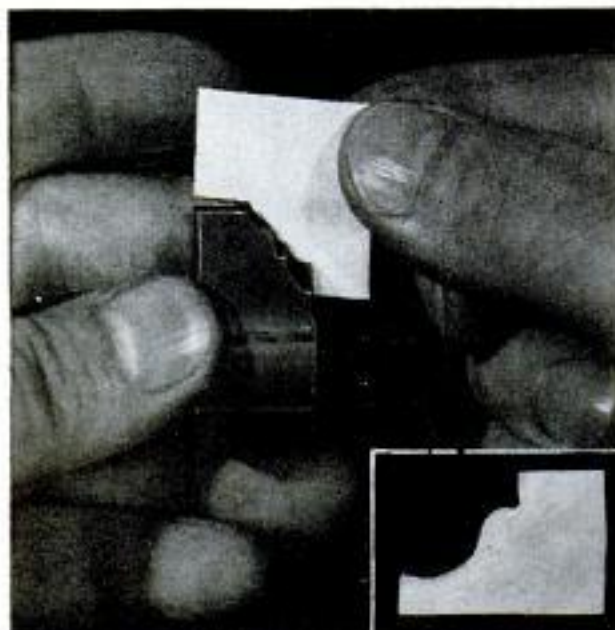


### Aquarium Heater Keeps Developer At Right Temperature in Winter

During the winter months the temperature in most basement darkrooms is below that required to maintain the developer at 68 deg. F. If the developer is too cold, it will be difficult to get full-toned prints and full-scale negatives. To avoid this difficulty, submerge an electric tropical-fish aquarium heater in the developer and set the control so that a constant temperature of about 68 deg. F. is maintained. A 25-watt heater is adequate for use in a developing tray, while a 50 or 100-watt heater would be more suitable for a deep developing tank.

### Checking Shaper-Cutter Profile

Being a reverse of the actual cut, sometimes it is difficult to tell in looking at a shaper cutter the exact profile it will cut. A quick way to make a positive pattern is to hold a piece of paper against the flat face of one blade and tear forward.



# MULTIPLE

By James A. McRoberts

*746 Carroll St., Brooklyn 15, N.Y.*

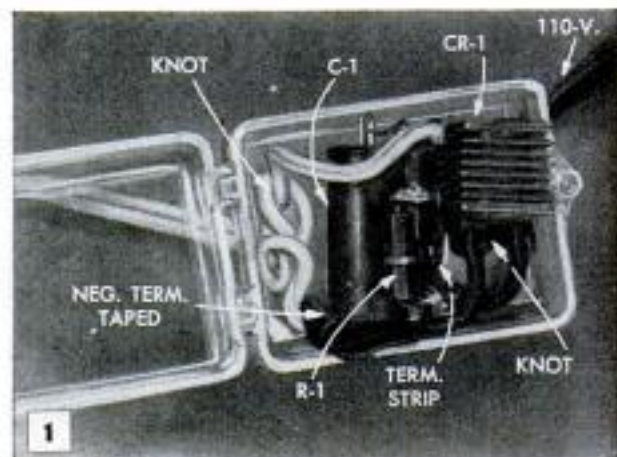
**DANCING NEON LIGHTS** will turn your Christmas tree into a conversation piece when wired to this special flasher. It controls the rate of flash of the bulbs by varying either the resistance or the capacity, or both, of a relaxation oscillator, thus making the lights blink individually and intermittently.

The basic circuit is shown in Fig. 2. A simple selenium-rectifier power supply furnishes d.c. power at about 150 volts to the lamp line. Each neon bulb has its own resistor and capacitor, R-2 and C-2, Fig. 5, which determines the flash rate of the bulb. The power supply will operate as many as 20 lamps without reducing noticeably the flash rate.

Flash rate is determined primarily by the values of R and C (resistor and capacitor) for each lamp of the circuit. The lamp size may be anywhere from  $\frac{1}{25}$  to 2 watts. The smaller lamps will give a brighter flash, with the  $\frac{1}{4}$ -watt NE-7 bulb, Fig. 4, being preferred. The bulb simply acts as a switch when the capacitor charges to its striking voltage. The lamp then partially discharges the capacitor and the cycle repeats. The size of the lamp has very little to do with the flash rate.

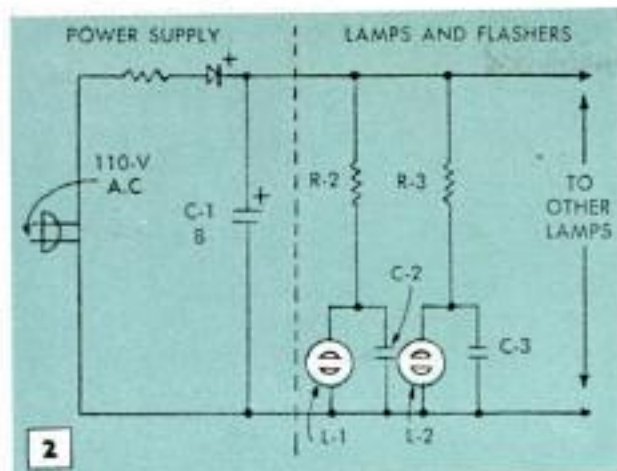
For a 150-volt supply, a combination of a 0.2 capacitor and a 22-meg. resistor, such as R-2 and C-2 for lamp No. 1 (L-1), yields a flash rate of about one flash per sec. With a 22 meg. and 0.1 mfd., the rate is roughly two flashes per sec. Dropping the resistor to 10 meg. and the capacitor to 0.1 mfd. gives about four flashes per sec. If the capacity is raised to 0.5 mfd. and two 22-meg. resistors are used, the rate will be one flash every five sec.

How power supply is housed in hinged plastic box. Black cord is power line, white cord is lamp feed





# NEON FLASHER

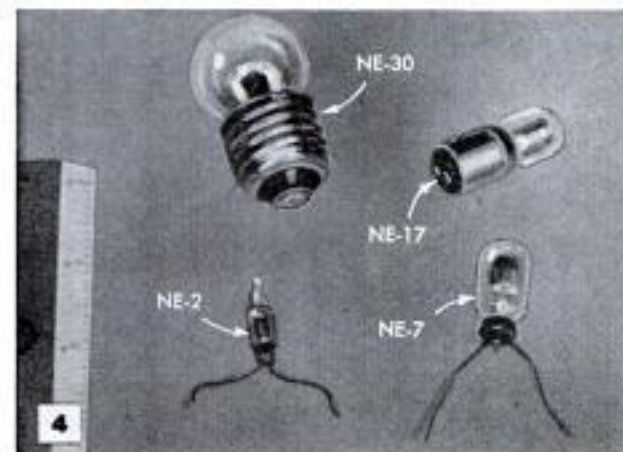


Schematic of circuit shows power supply at left. Additional lamps may be added in parallel across leads

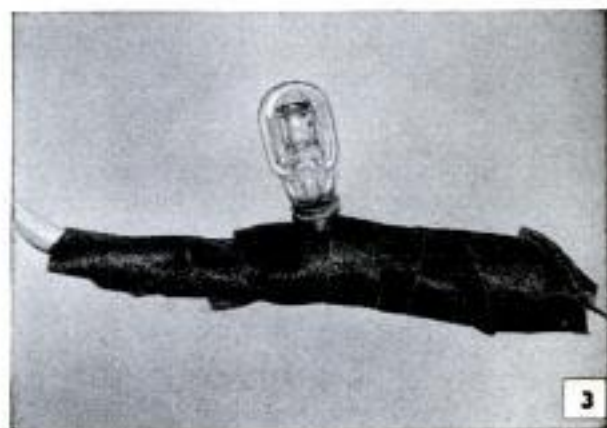
A small plastic case is used to house the power supply which contains the selenium rectifier, surge resistor and the capacitor, Fig. 1. The terminal strip keeps the parts in place, and knots tied in the power and lamp wires prevent tension on the components. The common lead of the lines and the capacitor is simply taped after being soldered.

Fig. 5 shows the method of wiring each flash unit in the string, C-2 being a capacitor and R-2 being a resistor. The leads are soldered and taped and the completed unit looks like Fig. 3. Be careful to tape the connections well since one side of the power line is connected straight through. Also, watch that you do not break the fragile wires of the neon leads. Bulbs with bases may be used, too, such as the NE-17 in place of the NE-7. In using the 1-watt NE-30-type bulb, the wires are soldered directly to its screw base or to a socket to which the capacitor and resistor are attached. Tolerances of the resistors, capac-

Some of the various neon bulbs available. Smaller lamps give brighter flash. NE-7 type is preferred



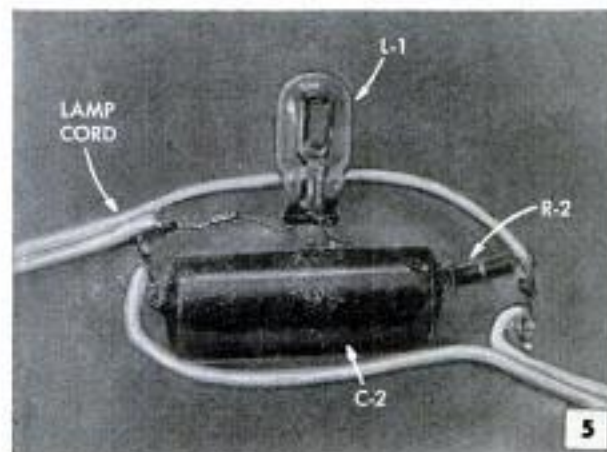
DECEMBER 1957



Here's what each lamp will look like in your string of lights after connections and components are taped

itors and lamps usually allow slightly different flash rates for the same nominal values. Thus, a staggered effect is provided even with the same components. ★ ★ ★

Shown untaped, this is how the components of each flash unit are wired. Space them about 18 in. apart







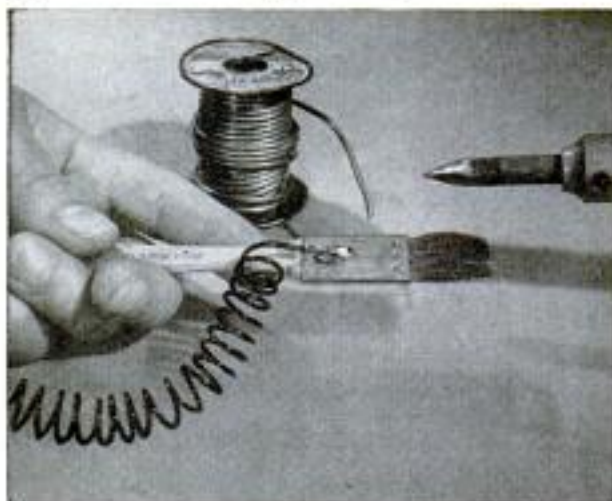
### Preventing Accidental Erasures On Tape Recordings

The sad misfortune of accidentally erasing a tape recording can be avoided in the future on some recorders by keeping a short piece of rubber tubing over the erasing button. In this way, the button cannot be depressed without first removing the tubing.—J. G. Forbes, Los Angeles, Calif.

☐ When figuring the amount of wallpaper needed for a room, make exact measurements of the walls and then deduct total area of doors and windows.

### Ground Wire on Darkroom Brush Removes Static Electricity

A paintbrush used for dusting film negatives, plateholders, etc., should be fitted with a ground to remove any static electrical charge which attracts more dust. To do this, solder one end of a length of wire to the metal ferrule of the brush and fit the other end of the wire with an alligator clamp. When the brush is used, simply clamp the wire to a convenient cold-water pipe.—Ken Murray, Colon, Mich.

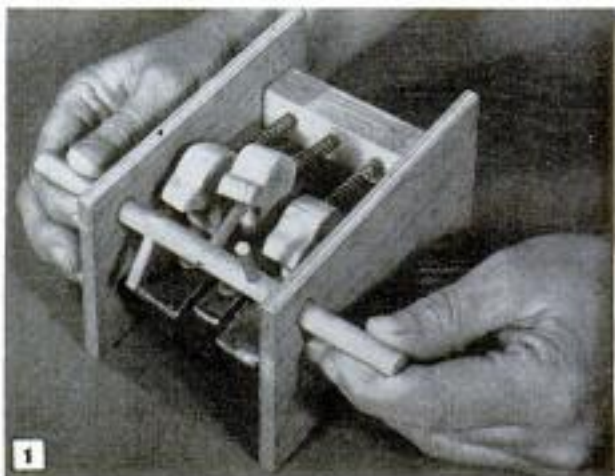


# MUSICAL

By Elma Waltner

**T**ODDLERS OF PULL-TOY AGE will be fascinated by this friendly hen that struts along, flapping her wings and "clucking" a three-note tune. The "music box," Fig. 1, is the most complicated part of the toy and will take the most time to construct. To begin, felt strips are cemented to two wooden spacer blocks that then are screwed between the plywood sides of the box, and spaced as in Fig. 4. Three strips of metal, dimensioned as in Fig. 5, now are drilled to permit using brads to hold them loosely on the blocks. Felt washers are used under the heads of the brads so the metal bars can vibrate freely when struck by the hammers. The latter are cut from  $\frac{3}{4}$ -in. stock to the approximate shape indicated in Fig. 4. The curved surfaces on which the strikers slide should be sanded smooth to assure minimum resistance. Drill  $\frac{1}{4}$ -in. blind holes in the hammers and cement ends of lengths of  $\frac{1}{4}$ -in.-dia. spring curtain rods in these holes. The other ends of the springs are cemented in holes drilled through another spacer block as indicated in the details. Screw this block between the sides of the music box so that the hammers are positioned about  $\frac{1}{8}$  in. away from the centers of the metal bars when the hammers are hanging free. Next, cut the axle 6 in. long from a  $\frac{3}{8}$ -in. dowel. Drill three  $\frac{1}{8}$ -in. holes in the axle, spacing them 120 deg. apart and locating them so that 1-in. lengths of dowel fitted in the holes will be centered on the hammers, Fig. 5. Temporarily install the wheels, rotate the axle and trim the striker dowels so they operate the hammers properly. Now, using patterns made by enlarging the squared drawing, Fig. 3, cut out the vari-

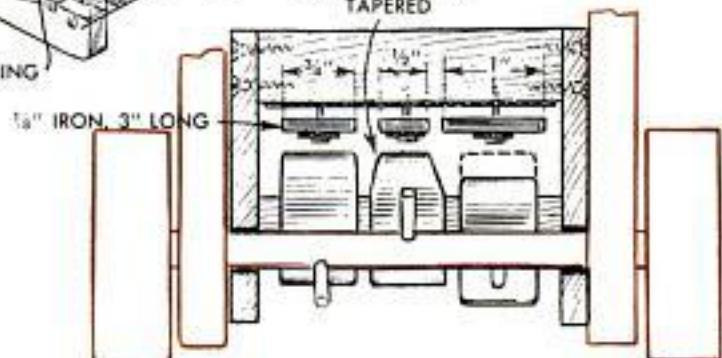
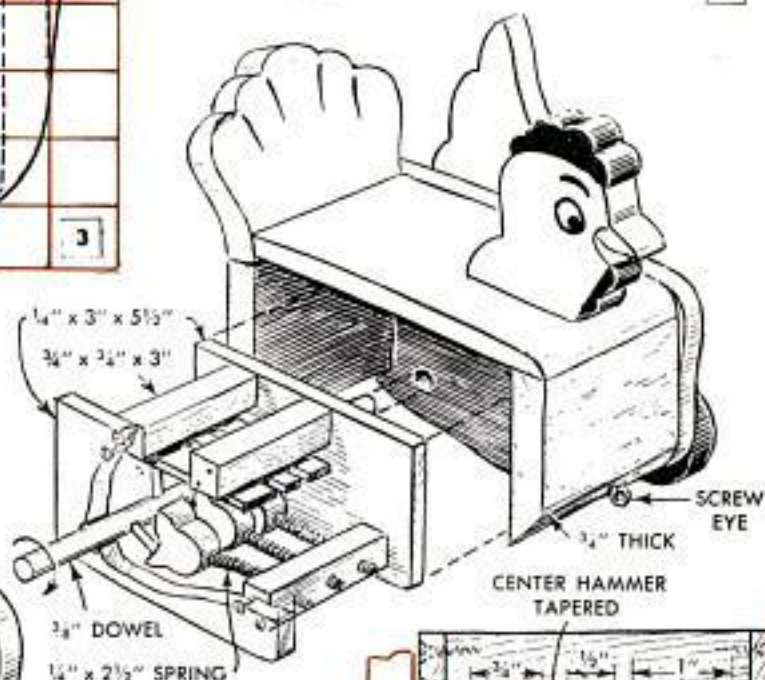
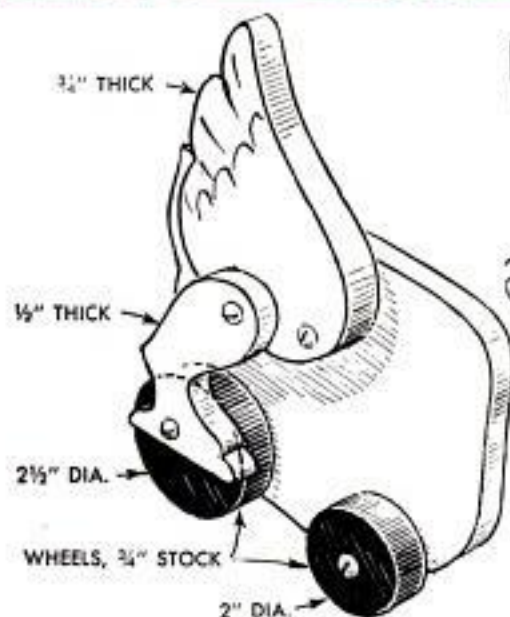
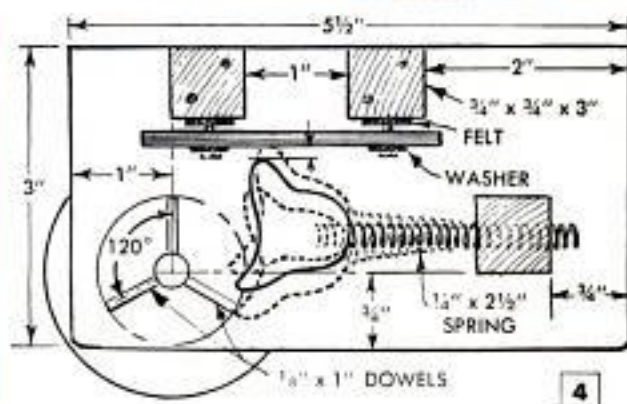
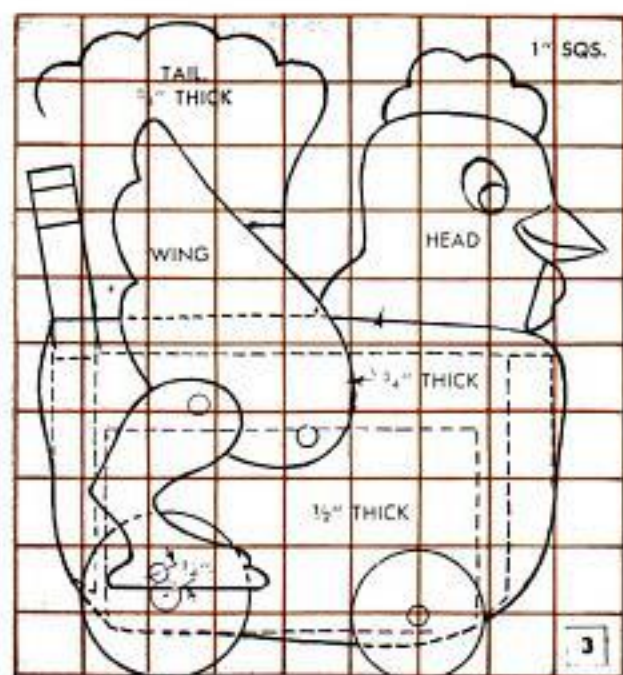
When "music box" is assembled, strikers are adjusted in length to assure the proper operation of hammers





# BIDDY

ous parts of the hen's body and assemble it around the music box. Glue the rear wheels to the axle and attach the front wheels with wood screws. Wings are pivoted to the body by drilling clearance holes in the wings and driving wood screws into the body. The legs are pivoted to the wings and rear wheels by the same method. Position the pivot of one leg 180 deg. away from the other, so the wings and legs will move alternately. Drive a screw eye into the front of the toy to permit attaching a towing string, paint it in bright colors and the hen will appear as in Fig. 2, ready to be towed about. ★ ★ ★

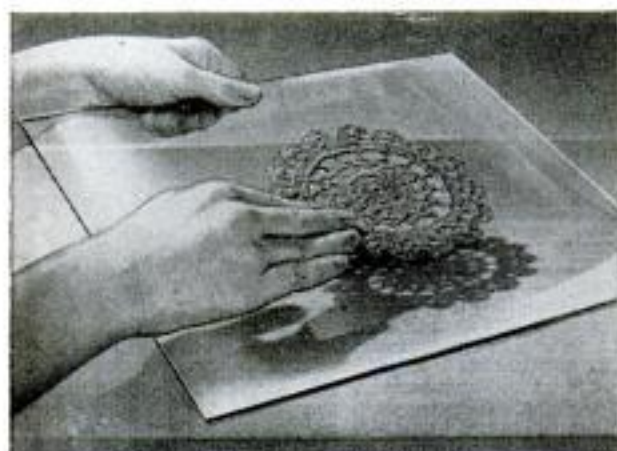






# Solving HOME PROBLEMS

**TO FREE A FROZEN DOOR**, caused by moisture running to the bottom edge of the door and freezing to the sill, apply salt water, using an oil can as applicator

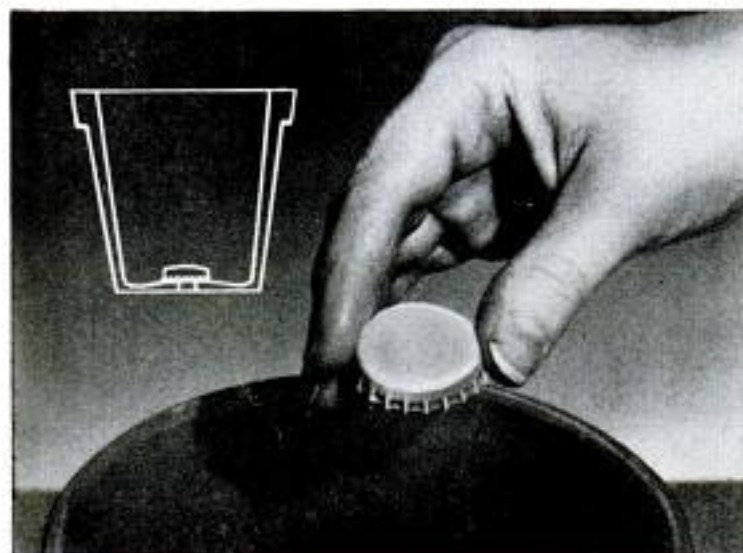


**DOILIES "STRETCHED" ON GLASS PLATE** are as neat as when pin-type stretcher is used. Dip doily in starch, spread on glass or mirror and allow to dry



**THREADING A NEEDLE IS MUCH EASIER** when the end of very heavy thread is first flattened with pliers so it passes easily through oval needle eye

**ASSURE GOOD FLOWERPOT DRAINAGE** without loss of soil by fitting bottle cap over drain hole. It holds in soil, lets water seep out under irregularities in crimped edge of cap



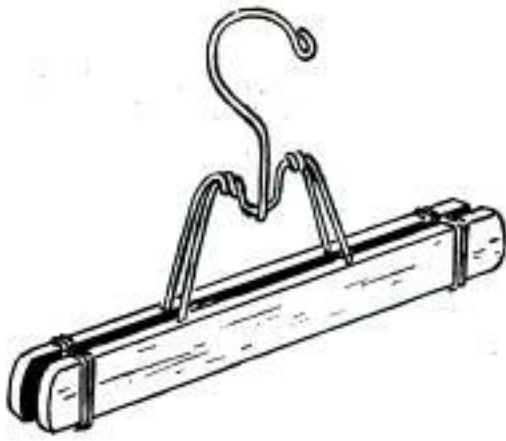
178

**WASHING-INSTRUCTION** tags in envelope on inside of medicine-cabinet door are handy when hand-washing delicate items



POPULAR MECHANICS

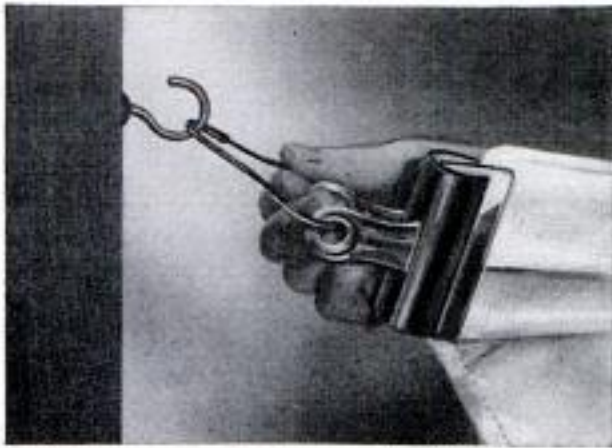




**WHEN TROUSER HANGER LOSES GRIP**, slip heavy rubber bands over ends. Added thickness and resistance of rubber compensate for loss of spring tension



**GET 100 PERCENT USE FROM CANDLES** by dropping one stub into dessert glass to provide wick, melting others and pouring wax into glass around first stub



**PAPER CLAMP IS "THIRD HAND"** when folding bed sheets and other large items. Slip clamp onto shower-curtain ring, fit ring over large cup hook on wall



**KEEP SIZE MARKS IN SHOES LEGIBLE** until shoes wear out by painting over the numbers with clear nail polish when shoes are new, numbers readable

**ROLLED CALENDAR WILL LIE FLAT** if tube in which it is mailed is held over steam to moisten paper before removing



DECEMBER 1957

**REFUSE PAILS EASILY RUSTPROOFED** by polishing the inside with hard wax. Heavy coating of wax also makes the pails easier to clean by preventing food from sticking to the sides

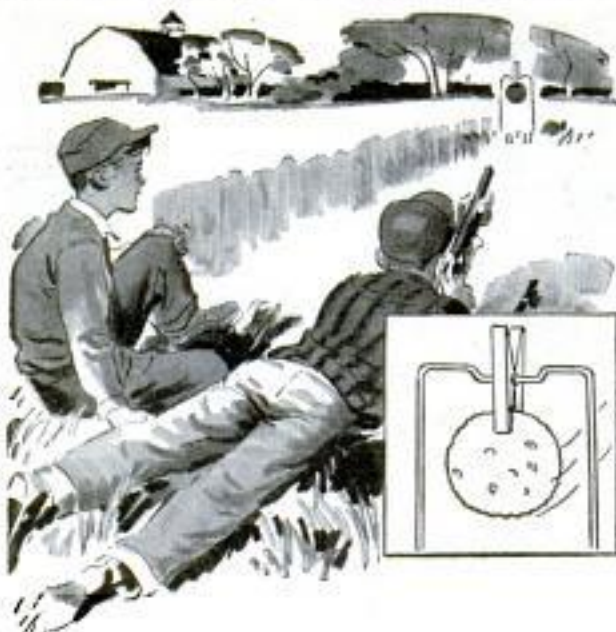


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Copyrighted material



## Self-Setting Target for Air-Rifle Shooting Practice



Air-rifle target practice is fun when you have a target, such as the one shown, that swings into shooting position immediately after it is struck by a pellet. To make the target assembly, a length of wire is slipped through the spring coil of a clamp-type clothespin and the wire bent as indicated. One end of a metal food can serves as a target when it is gripped by the clothespin as shown in the detail.

## Cedar-Shingle Coverage

Calculating cedar-shingle coverage is made easy for both builder and do-it-yourselfer by the rule-of-eight method which can be applied to any amount of shingles at any weather exposure. Here's how it is done: Count the layers of shingles in a bundle and multiply the amount by the number of inches of weather exposure desired. Then divide the result by the number 8 to determine the square-foot coverage per bundle. For example, a bundle usually contains 36 shingles or 18 layers at each end. Suppose the weather exposure desired is 7 in. Thirty-six multiplied by 7 is 252. This divided by 8 gives  $31\frac{1}{2}$ , or the square feet of area that a bundle will cover.

Red Cedar Shingle Bureau

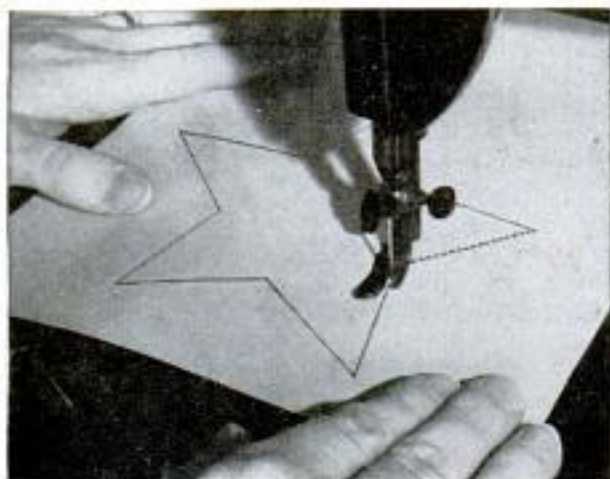
## Wedge Holds Movie Film on Reel



Movie film will not unwind if a square of sponge rubber is wedged between the sides of the reel as shown. Wedges of a suitable size cut from a discarded kneeling pad are ideal stops for this purpose.

## Machine Speeds Perforating

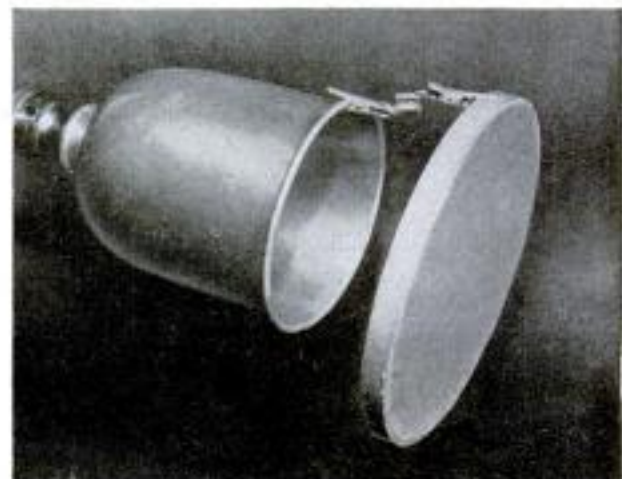
Pricking a pattern to transfer it by the dusting method is a tedious chore when a stylus is used to perforate the paper. A faster way is to use a sewing machine. Remove the thread from the machine and adjust it for a long running stitch. Then run over the outlines of the pattern. Your pattern will be perforated in a jiffy.



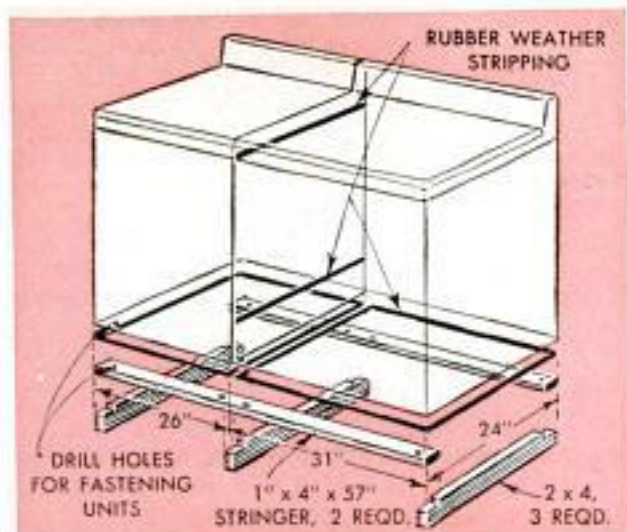
## Improved Diffusing Screen

Two alligator clips soldered together as shown in the photo provide a handy means of attaching a diffusing screen to a photo-flood reflector. The diffusing screen shown here is an embroidery hoop on which a dampened cloth is stretched. The clips used should not be so small as to hold the diffuser too close to the reflector as heat from the bulb may cause the diffuser to burn. The length of the clips can be extended easily enough by soldering them to a flat link. Spring clothespins also can be used.

John J. Rea, Urbana, Ill.







## Wooden Base Keeps Washer and Drier off Floor

Many homeowners are faced with the problem of preventing rust from damaging the bottoms of their automatic washers and driers, especially when the units are kept in the basement. Keeping the units in place when in operation and preventing dirt from collecting under them also presents a problem. All you have to do to solve these problems is mount the units on a simple wooden base made from three 24-in. lengths of 2 x 4 to which two 1 x 4-in. stringers are attached as shown in the photo and drawing. The over-all lengths of the stringers should equal the combined widths of your units plus  $\frac{1}{2}$  in. to accommodate two lengths of weather stripping placed between the units. The center 2 x 4 is located directly under the two facing sides of the units for proper support. Before assembling the base, coat all members with a wood preservative to prevent rot. Use zinc-coated nails or brass

screws to assemble it. To mount the laundry units on the base, remove the leveling screws from each machine and drill holes in the wooden frame for fastening them later as shown. Then, glue rubber weather stripping to all surfaces on the wooden base that will come in contact with the units. Also, glue two lengths of the same type of weather stripping on the side panel of one of the machines, as shown, to prevent them from rubbing each other when operating. With the units in position on the base, use the leveling screws to bolt the units to the base. Integrating both units on one base tends to absorb much of the vibration that causes "travel." Adequate clearance under the units permits sufficient ventilation to prevent condensation of moisture and provides ample space for easy cleaning under them. Also, the work level is improved at this increased height.—R. E. Clark, Aurora, Ill.

### Tool Saves Milk-Can Lids

Milk-can lids can be loosened for removal without battering them if a tool, such as the one shown, is used instead of a hammer. To make it, simply slip a length of rubber hose over a 1-ft. length of pipe.



☐ Next time you want to shine your shoes, and find that there is no polish, try a little paste floor wax. The wax has a neutral color and may be used on either dark or light shoes.

### Screw Secures Chisel Handle

To prevent the wooden handle of a chisel from working loose, one home craftsman cements the handle in the ferrule. Then, a hole is drilled in the ferrule and countersunk to accept a screw as shown in the detail.



☐ Use a cloth moistened with denatured alcohol to clean ivory piano keys, and expose them to the light during the day as darkness may cause true ivory keys to yellow with age.



# ATTRACTIVE PLANTING BOXES for Your Indoor Garden

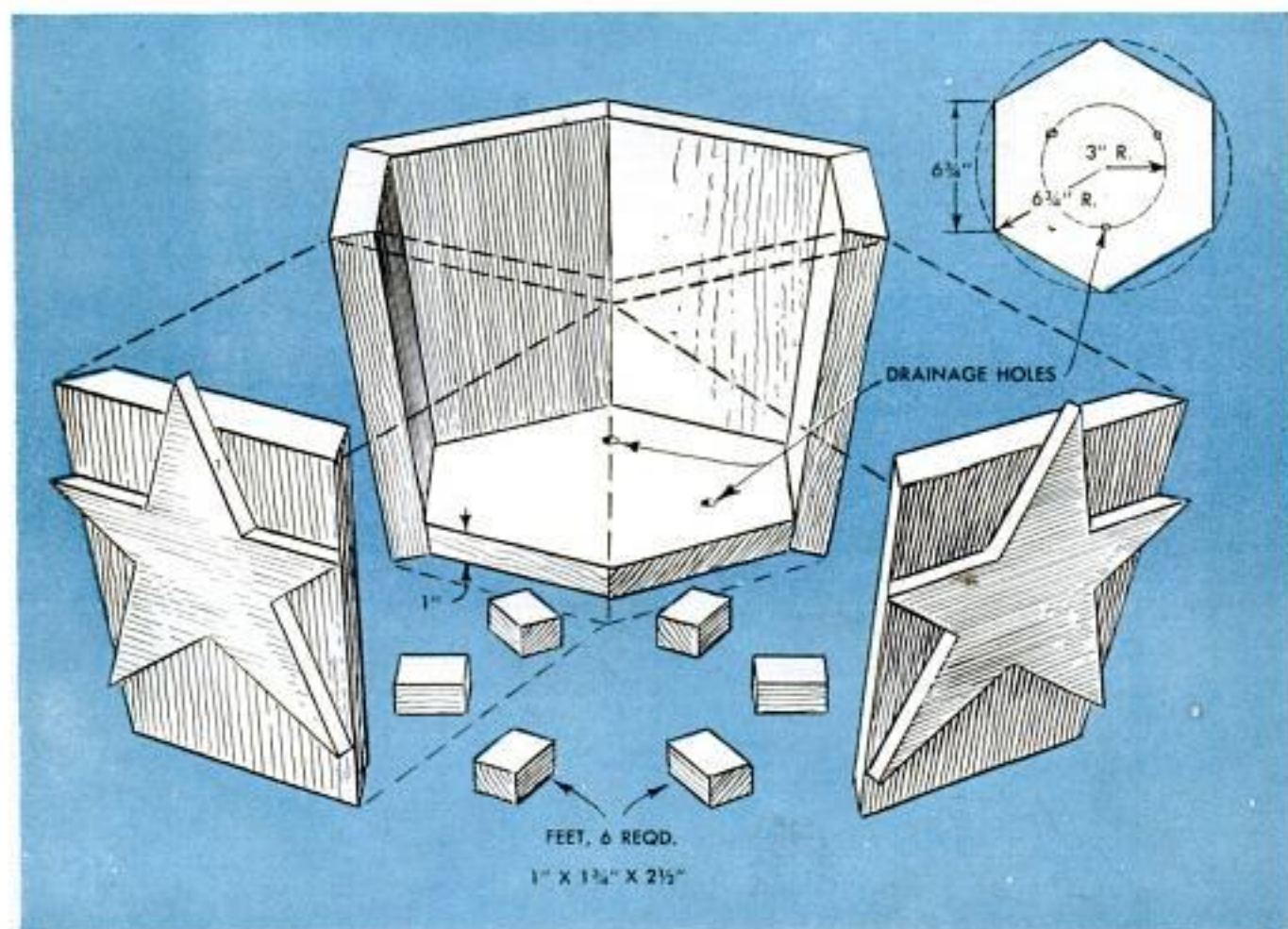
By C. W. Woodson

**L**IVING INDOOR GREENERY can be yours the year 'round with a little careful planning. And by using these planting boxes you can change room decor, plants can be moved about to create attractive color effects. As an example, a live evergreen can serve as a room divider in summer and as a living Christmas tree during the holiday season. The secret of this changeability is the use of the planting boxes and balled specimens rather than making permanent plantings indoors. Balled evergreens in the medium and narrow pyramidal forms, also many other low-growing shrubs, can be made to thrive indoors wherever light, temperature and humidity can be closely controlled. Usually it is possible to meet these conditions in both old and new homes. During the warmer months the larger plants and shrubs can be moved outdoors and utilized as portable decorative features of the permanent outdoor-garden plantings.

To assure long life, use redwood or cy-

press for planting boxes. Coat the interior with hot asphalt, or line with sheet copper, all joints being soldered. Drain holes in the bottom of the box are protected by extending short lengths of tubing through them, and soldering to the liner.

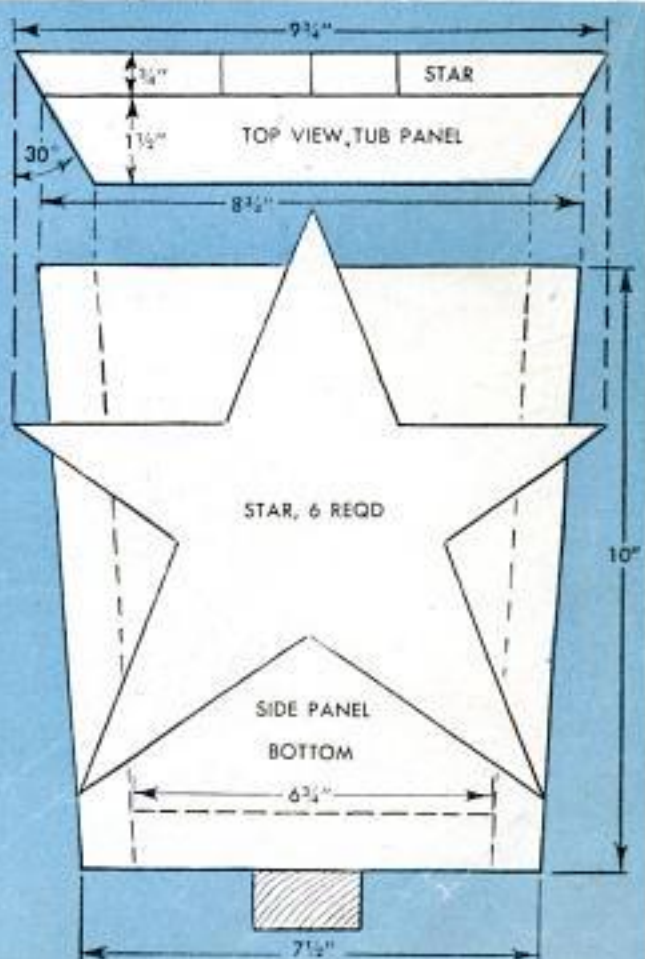
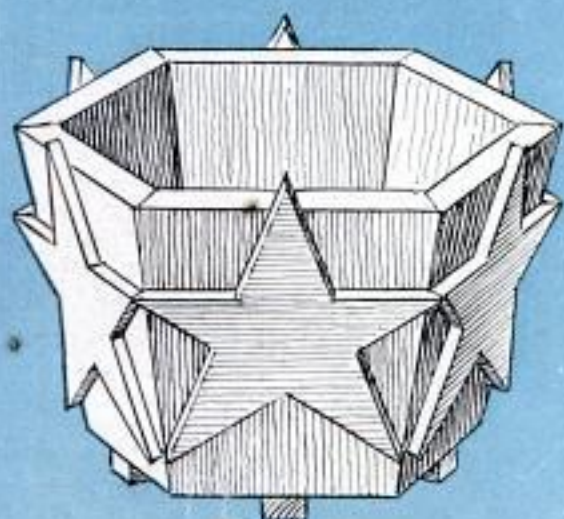
On these two pages are shown detailed drawings of a planting box that is suitable for a living Christmas tree. Stock for the sides is 1½-in. material, the bottom is 1-in. stock. The bottom is drawn by scribing a hexagon inside a circle. The radius of the circle is 6¾ in., which is within a fraction of an inch of being equal to the side of the inscribed hexagon. A slight adjustment of a compass will produce six equal divisions on the circle, to provide six sides for a hexagon. The stars for the planting box are cut from ¾-in. stock and are attached after the box is assembled with glue and screws. This particular container may be painted in bright colors in keeping with the holiday spirit, as it is used generally for a decorated Christmas tree.



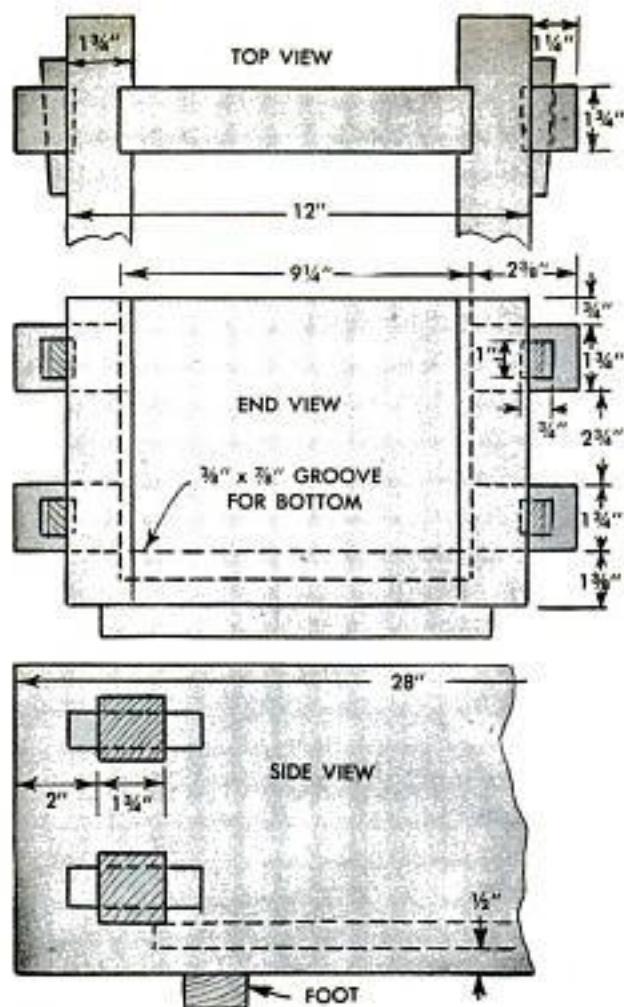




All plant boxes should be raised slightly by the addition of feet so air can circulate beneath and keep bottom dry. Also, all should have drainage holes bored in the bottom to allow excess water to escape. Pieces of broken pottery may be placed over the holes. Copper liners can be fitted to all boxes if you wish



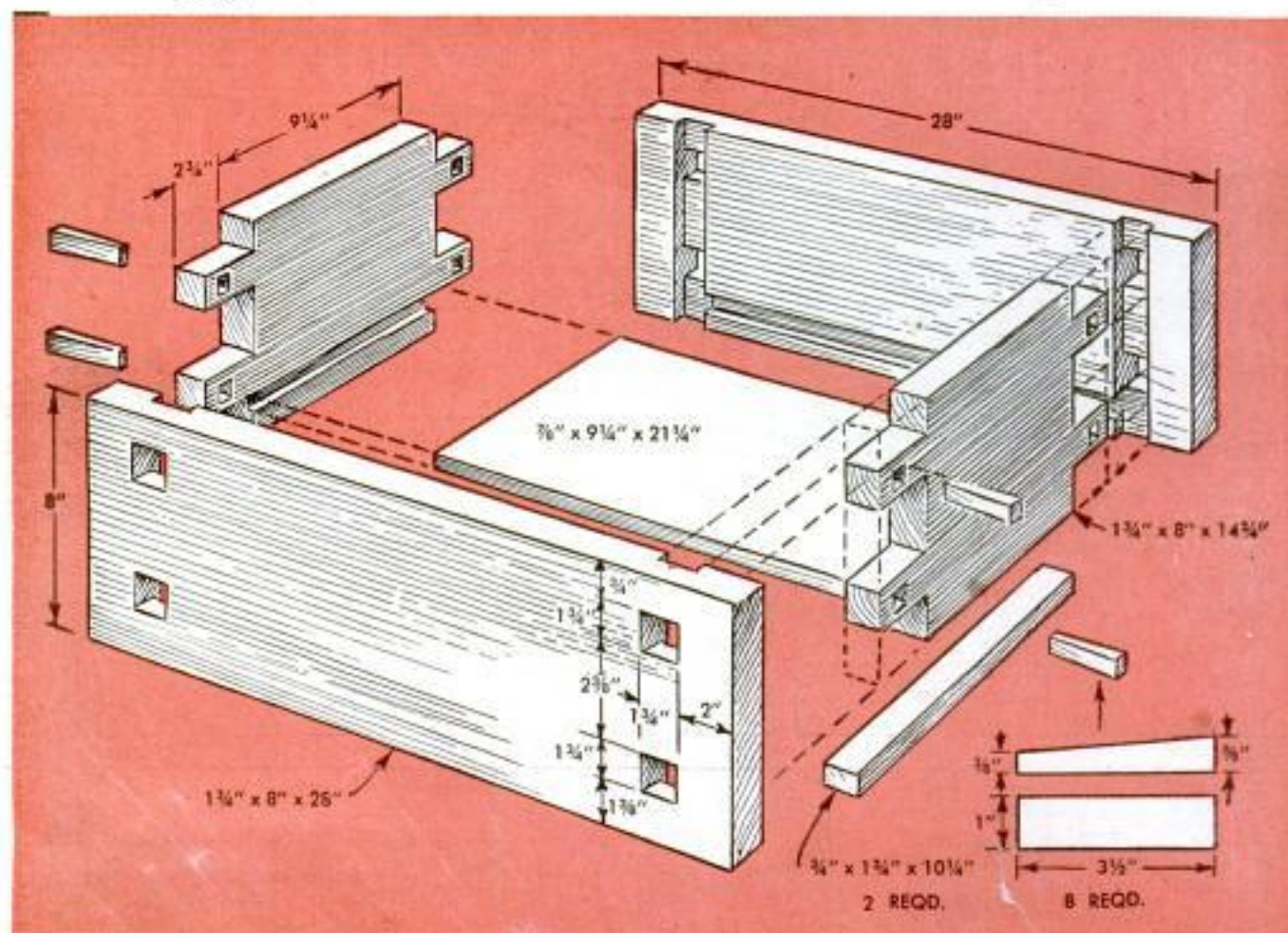




On this page are shown the details of a rectangular planting box of more modern design. Despite its modernity, no nails or screws are used in its assembly. Instead, the ancient method of using wedge-shaped pegs is employed. A mortising bit and a drill press are handy in making the cutouts in the construction of this planting box, but a careful craftsman can use a regular wood bit and a wood chisel to obtain excellent fits between the various components. The sides of this box are cut from 1 3/4-in. stock, the bottom from 7/8-in. material.

Feet for this planting box are strips of wood. Some sort of feet or spacers are needed under all planting boxes that are portable, to allow for drainage and to assure circulation of air under a box. This will prevent any moisture that collects on the outside of the box from remaining long, and causing rot or mildew. A situation that might cause water to collect on the bottom of a planting box would be an overwatering which would cause water to run out the drain holes in the bottom of the box, and collect on the bottom. Such moisture might encourage the growth of harmful bacteria or fungi, that would produce a root-destroying disease in the soil.

On page 185 is shown a square planting box that is ideal for small evergreens and ornamental shrubs. If you have ever

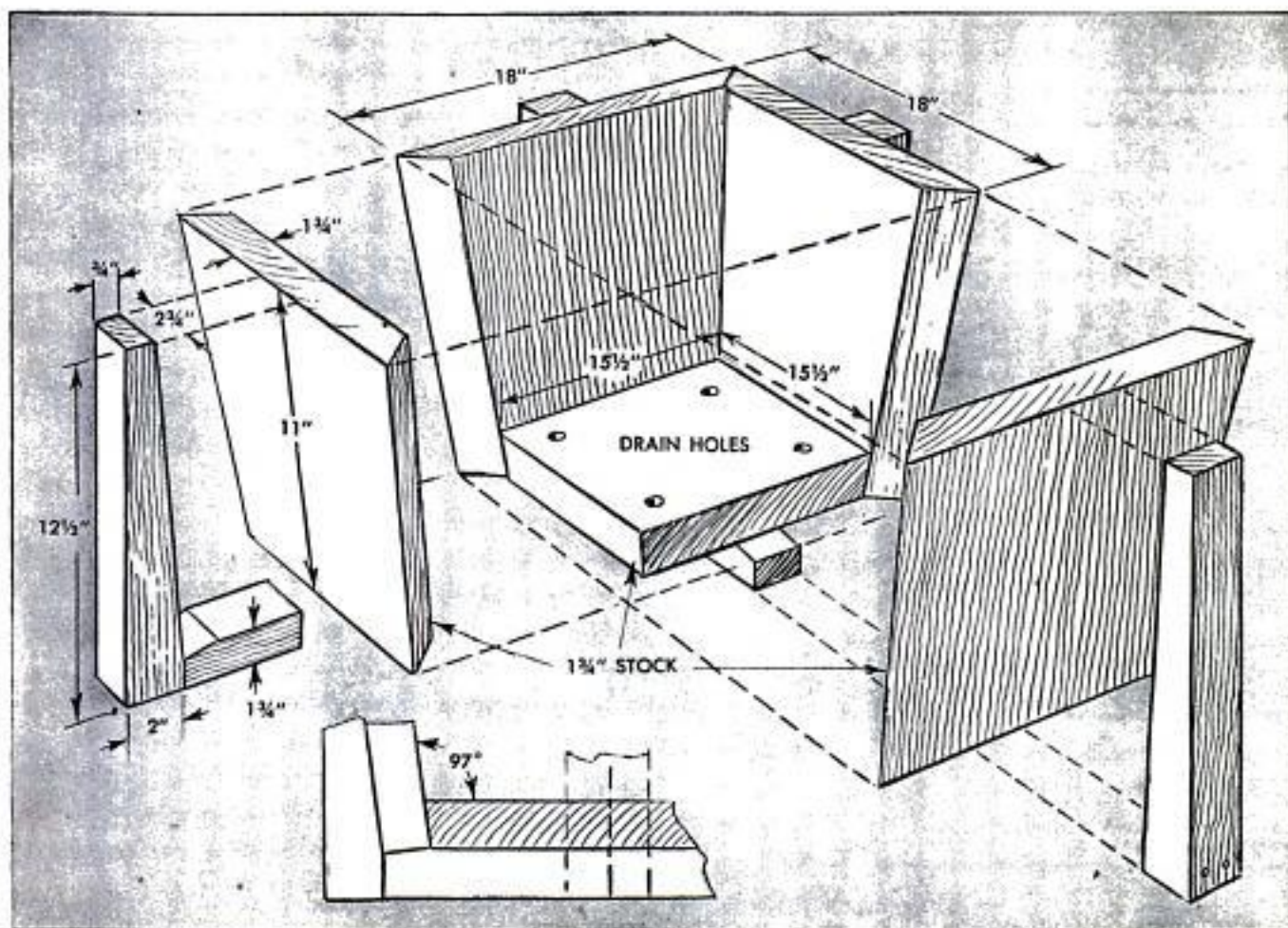




wished you could occasionally change the character or appearance of your terrace by moving the planting to different locations, this container will permit you to satisfy that whim. Some plants that die out in the fall can be kept in bloom almost all year 'round if they are moved indoors before frost occurs. Planting boxes of varying sizes built in the same proportions and design as the one on this page will permit various kinds of shrubs and plants to be moved indoors to beautify your home during the long winter months.

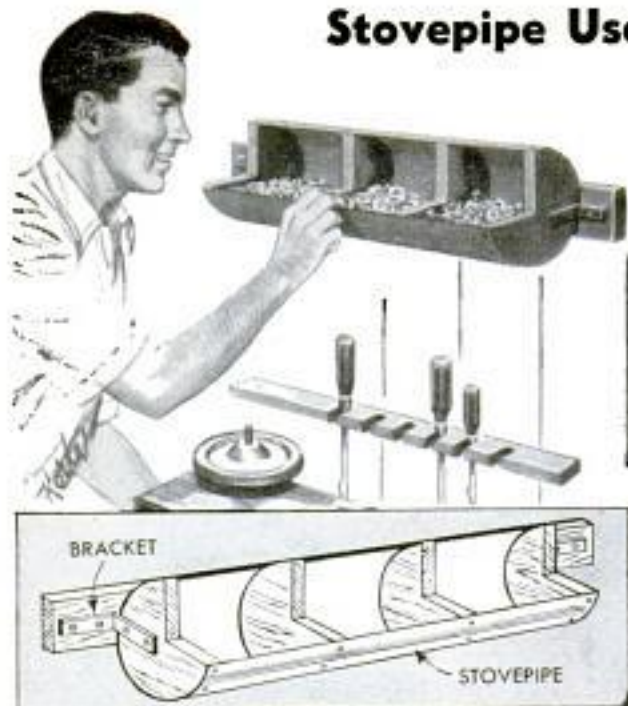
Miniature rosebushes that bloom all year 'round, as well as dwarf fruit trees now are available, and would fit easily into any of the several planting boxes described in this article. Also, you might have a spot in your living room that would require a planting box of a special shape to fit properly. Build it in that space and bring summertime outdoor beauty into your home. It will be easier to forget the cold and blowing snow outside with green, blossoming shrubs inside your living room.

★ ★ ★





## Stovepipe Used as Small-Parts Wall Rack



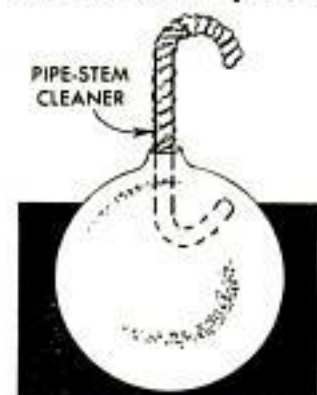
Ideal for small parts is this wall rack, consisting of a length of stovepipe divided into compartments by wooden disks from which a quarter-circle segment is cut. Circumference of the disks should be about one fourth larger than that of the pipe. For example: A 6-in. pipe has about an 18-in. circumference. The disks should be about 6½-in. dia. Any projecting metal can be bent to form a right-angle flange.

## "Drill Bit" for Pilot Holes

Accurately dimensioned pilot holes for wood screws are bored by one craftsman who uses a "drill bit" that is a wood screw of the proper size from which the head is removed. The straight shank of the screw then is chucked in a hand drill, and the holes bored.

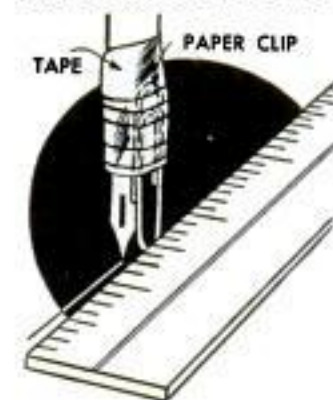
J. A. Comstock, Wellsboro, Pa.

## Tree Ornament Hangers Bent From Pipe Cleaners



Lost hangers for Christmas-tree ornaments can be replaced with hangers bent from pipe cleaners. Bend one end of the cleaner as indicated and insert it in the ornament so it will spring open a little. Form hook at other end.

## Pen Modified With Paper Clip To Prevent Blots Under Ruler



To prevent blots that are caused when ink creeps under a ruler along which a pen is drawn, tape a paper clip to the end of the pen. The clip should extend just short of the penpoint so the point contacts the paper first.

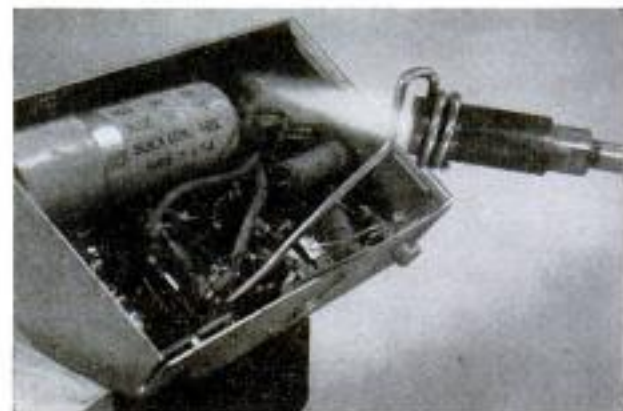
## Rounding Glass Edges

After you have cut a sheet of glass to fit on a table top or other piece of furniture, the sharp edges should be smoothed. An efficient tool that will round the top and bottom edges simultaneously can be made by wrapping a piece of sandpaper over the groove edge of a short length of tongue-and-groove flooring as shown.

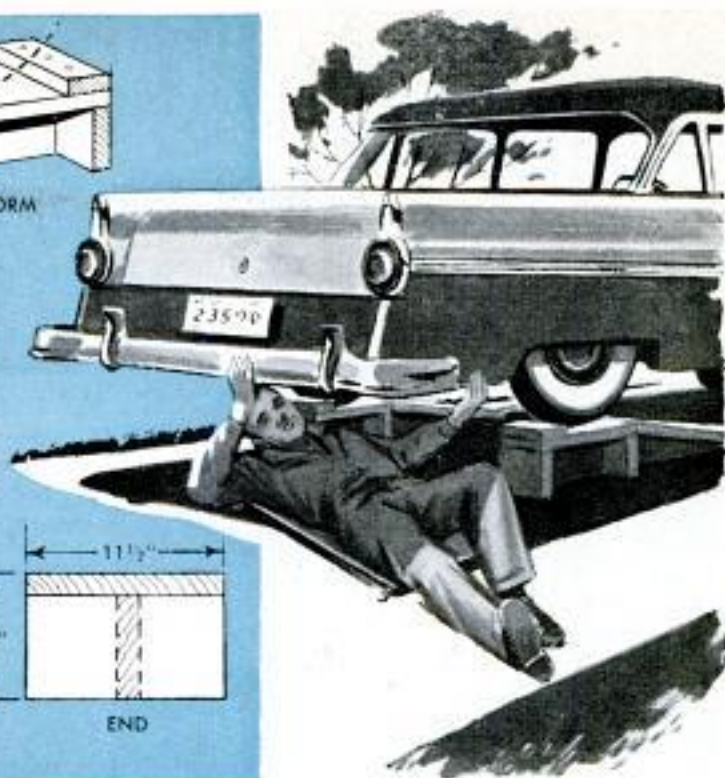
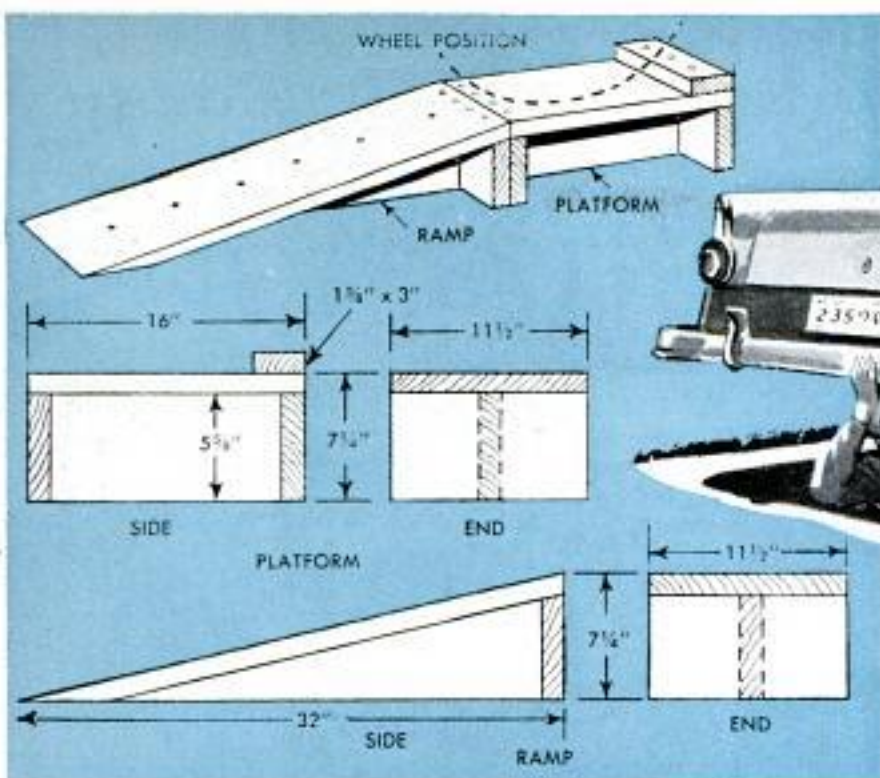


## Small-Parts Soldering Iron

Ideal for soldering in restricted locations, and on small, delicate parts, such as transistors, is this soldering iron improvised from a propane-gas torch and a length of copper wire. Several turns of the wire are wrapped around the torch nozzle, then the wire is bent to pass through the flame and extend 3 or 4 in.







## Ramps and Platforms Elevate Car for Easier Access

Occasional jobs that require you to get under your car, such as draining the crankcase oil or installing a new muffler or tailpipe, can be performed in your garage or on a driveway if you have these strongly built wheel ramps and platforms at hand. Two sets should be sufficient, as there seldom is need for all four wheels of a car to be raised at the same time. In use, the ramps and platforms are arranged end-to-end as shown, and the car is driven or backed up the ramps onto the platforms. The ramps then can be removed until the job is completed to provide more working space under the car. Both ramps and plat-

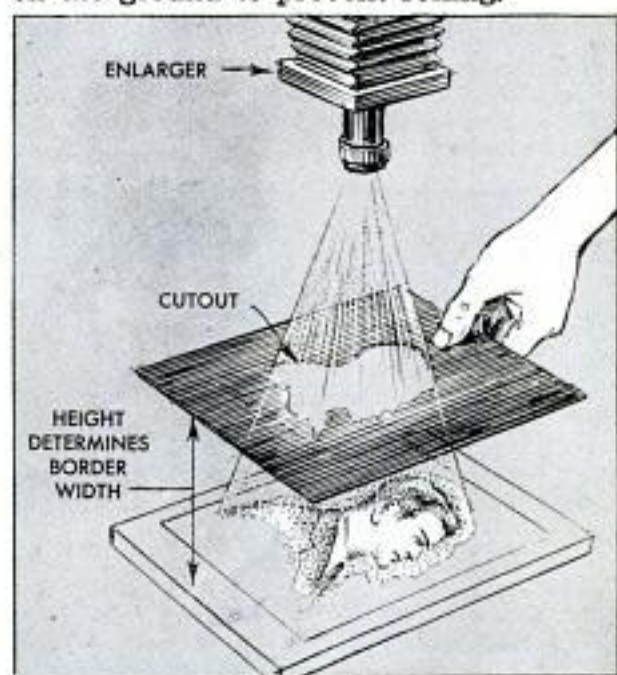
forms are made of 2 x 12 and 2 x 6 stock. Height of the units should not be more than the 7 1/4 in., which is gained when 2-in. stock is placed on top of a 2 x 6. This height provides ample working space under the car, while keeping it steady. To assure maximum strength, use wood screws of a suitable size, rather than nails, to assemble the ramps and platforms. A cleat nailed to one end of each platform serves as a stop to prevent the car wheel from running off. For additional safety, when the car is on the platforms, fit chocks under both the front and rear of one of the wheels that is on the ground to prevent rolling.

## Photos Vignetted on Enlarger With Cardboard Cutout

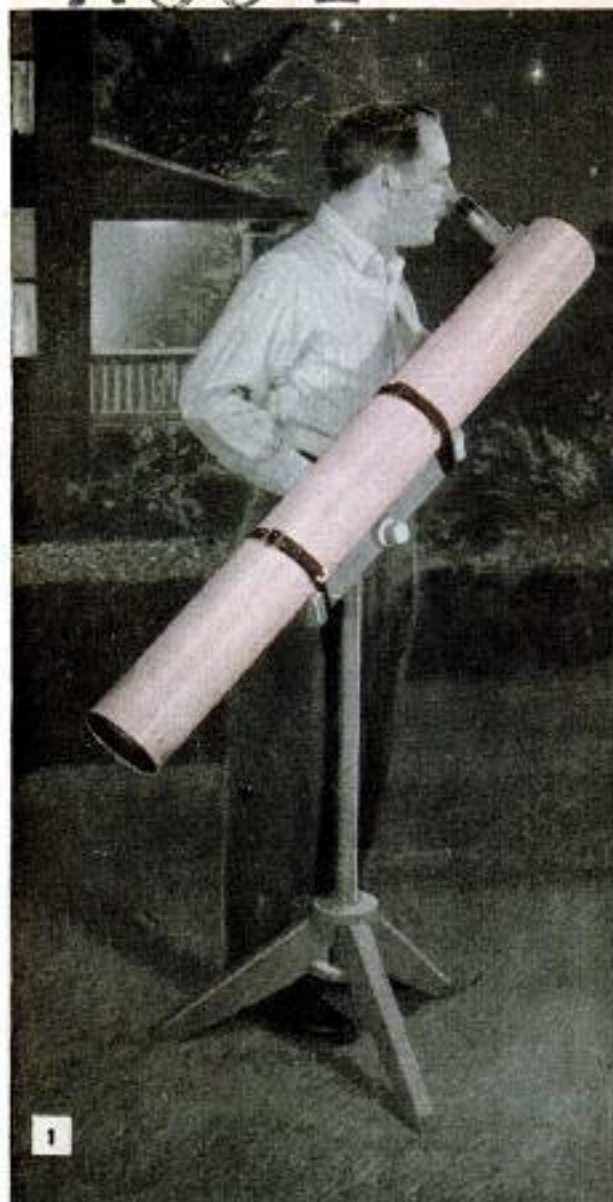
To vignette a photo with an enlarger, first make a mask by tracing the projected image on a piece of cardboard, then cut it out with scissors. The width of the shaded border around the image in the photo is determined by the distance the cutout is held above the enlarger easel.

## Screwdriver Drives Lag Screws

When no socket wrench is available to fit the head of a lag screw that is to be countersunk, a screwdriver can be used instead by modifying the screwhead. Saw a slot in the head of the screw wide enough to accept the blade of a heavy screwdriver. To apply sufficient turning force, it may be necessary to use a wrench on the driver.







# 4 1/4" REFLECTING TELESCOPE

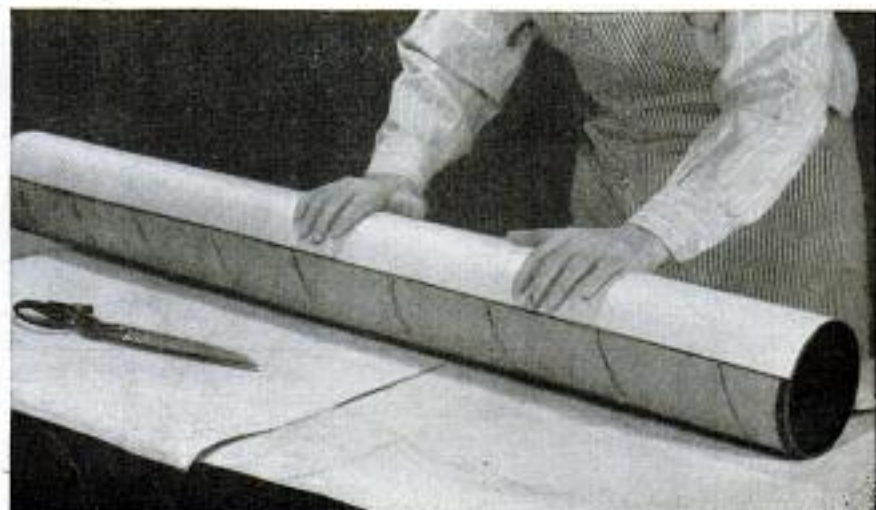
By Sam Brown

HERE IS a powerful reflecting telescope any amateur astronomer or would-be stargazer would be proud to own. The clarity and brilliance of astronomical and daytime views at 60 to 180 times magnification will amaze you. To build the telescope, simply purchase a 4 1/4-in.-dia. concave mirror and an eyepiece assembly with a 1/4, 1/2 or 1-in. eyepiece and assemble these components on a cardboard tube, mount and tripod as shown in the photos and drawings. Also, the eyepiece mount and eyepiece can be made as shown in Fig. 12 if you have access to the necessary power tools. When the telescope is fitted with a 1-in. eyepiece, it has a field of view of about 1 deg. which is equivalent in coverage to two moons, or 52 ft. at 1000 yd. (See Fig. 6 for more performance data.)

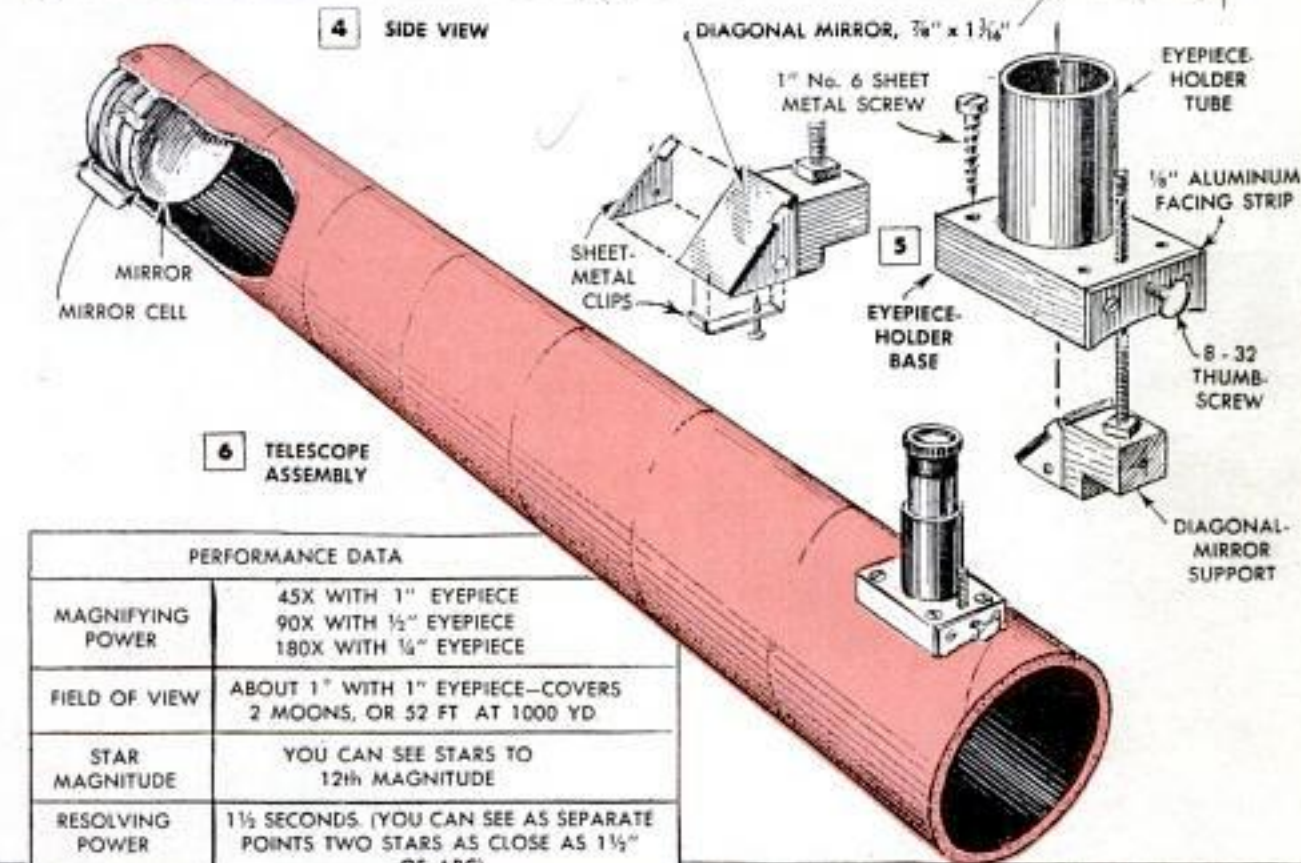
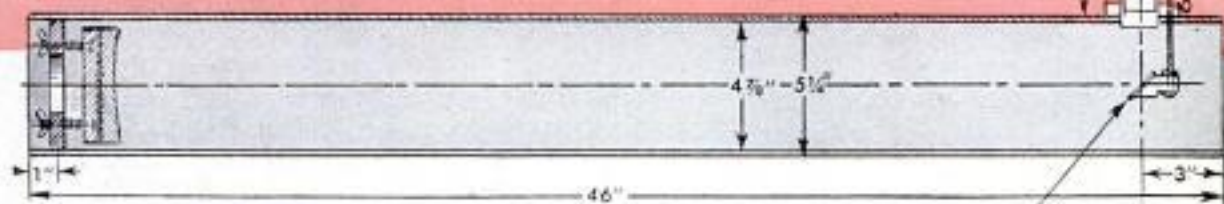
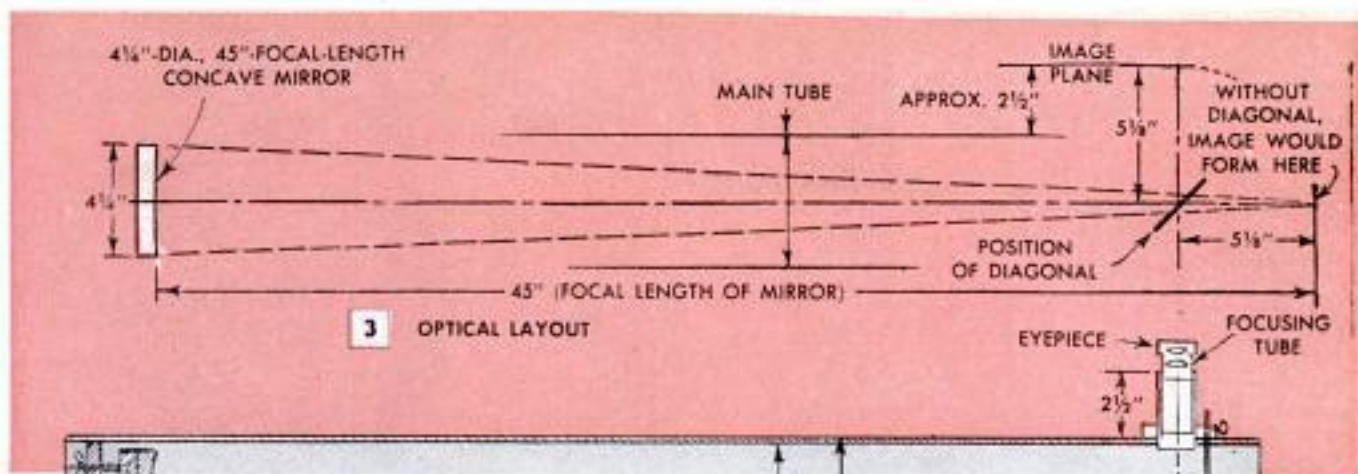
The principal advantages of the reflector over the refractor type of telescope with a lens objective are: (1) The reflector is much less expensive inch for inch of the objective, and (2) the reflector works by reflecting light rays instead of bending (refracting) them and consequently is not affected by color faults usually present to some degree when light passes through a glass lens.

When used with 1/4-in.-dia. eyepiece, this telescope will permit you to see stars to the 12th magnitude

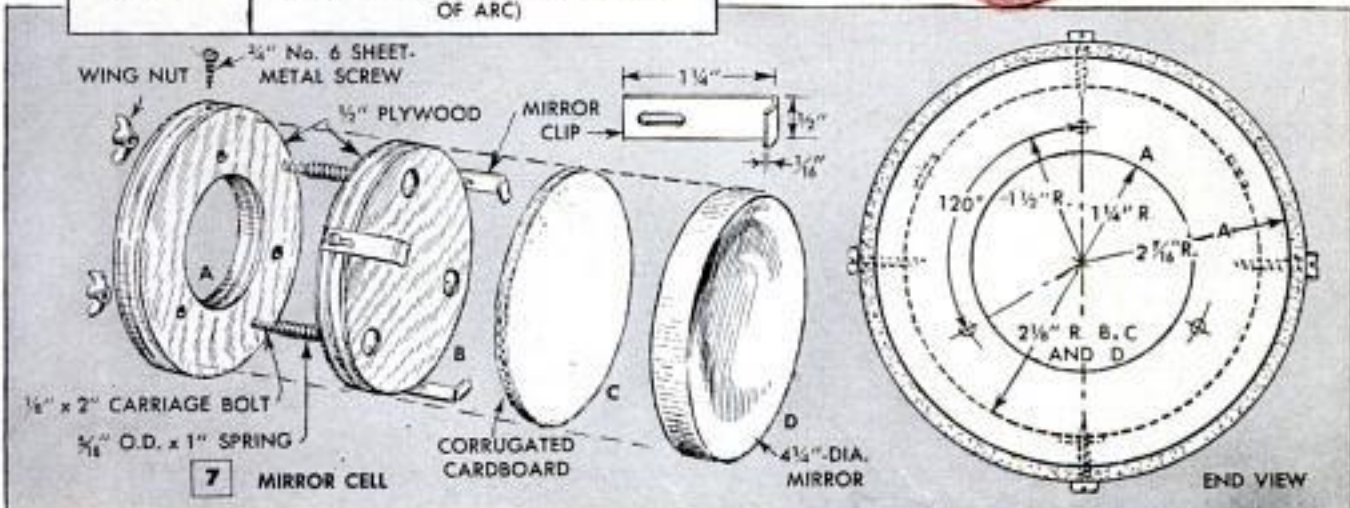
Fig. 2, below, black gummed tape applied on end of cardboard tube protects the edge and gives it finished appearance. Right, after taping both ends of tube, it is covered with enamel-finish paper



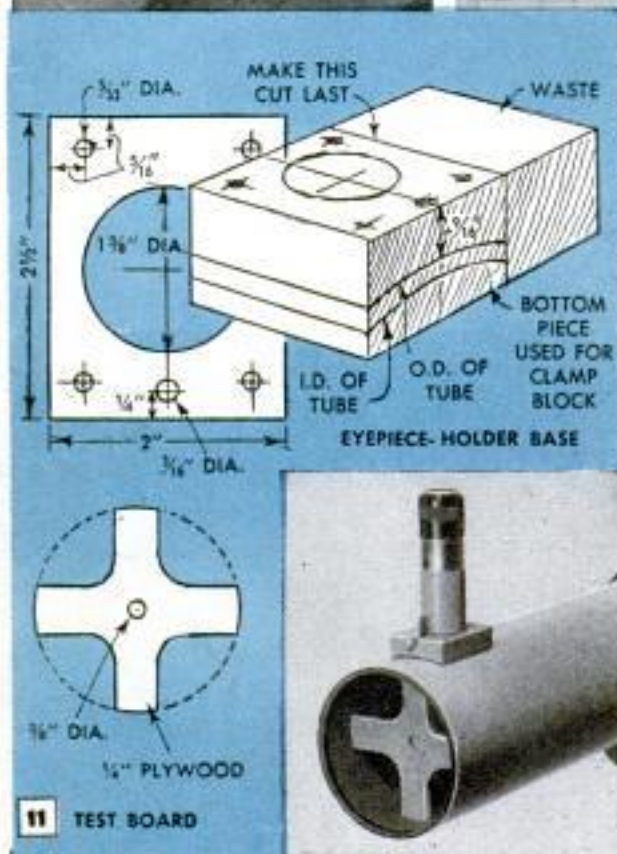
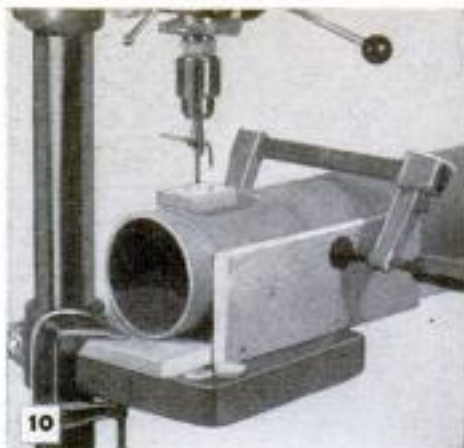
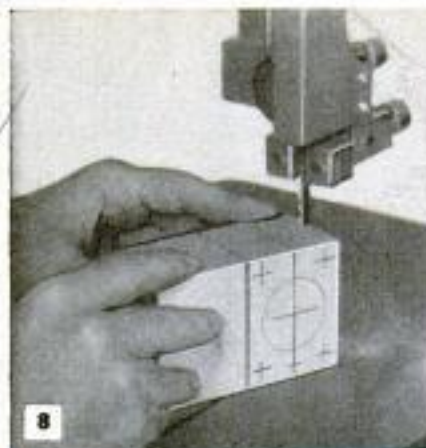




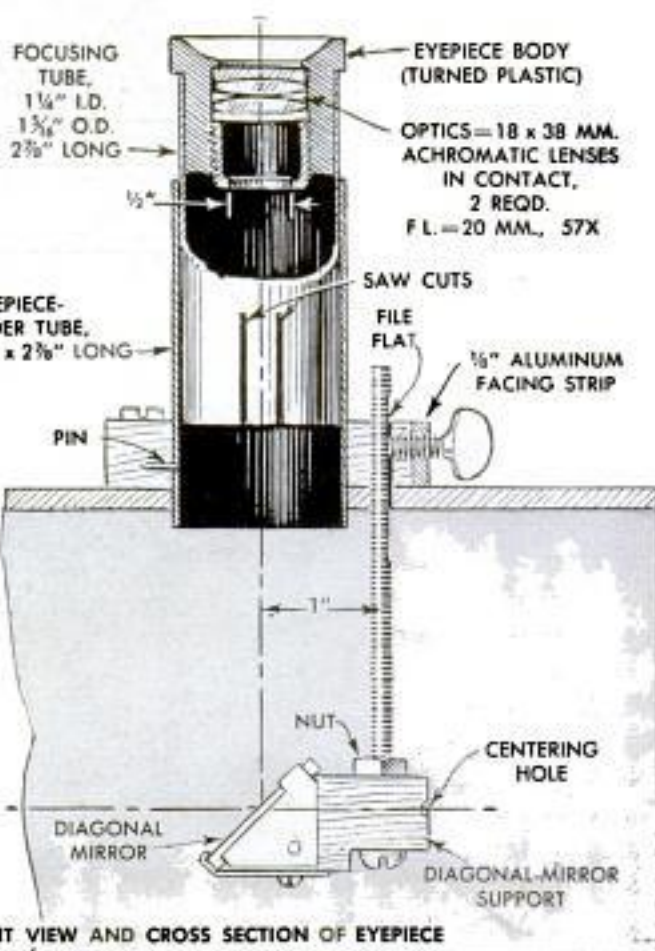
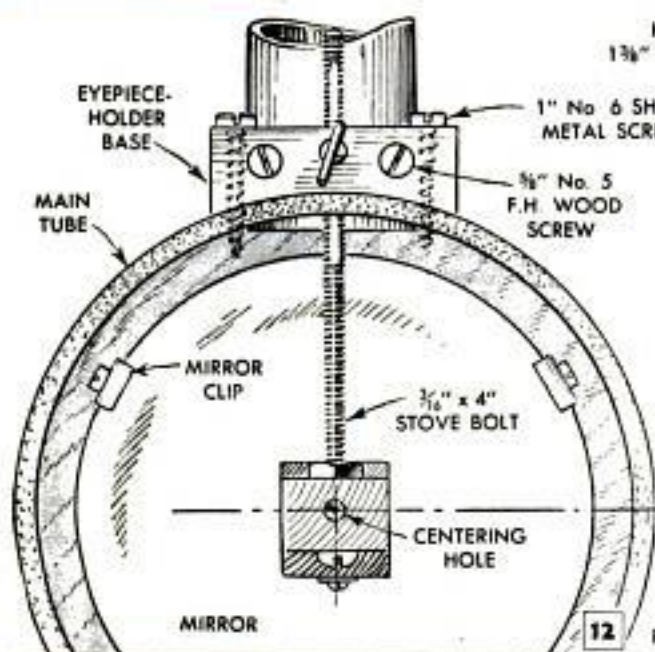
PERFORMANCE DATA	
MAGNIFYING POWER	45X WITH 1" EYEPIECE 90X WITH 1/2" EYEPIECE 180X WITH 1/4" EYEPIECE
FIELD OF VIEW	ABOUT 1° WITH 1" EYEPIECE—COVERS 2 MOONS, OR 52 FT AT 1000 YD
STAR MAGNITUDE	YOU CAN SEE STARS TO 12th MAGNITUDE
RESOLVING POWER	1 1/2 SECONDS. (YOU CAN SEE AS SEPARATE POINTS TWO STARS AS CLOSE AS 1 1/2" OF ARC)



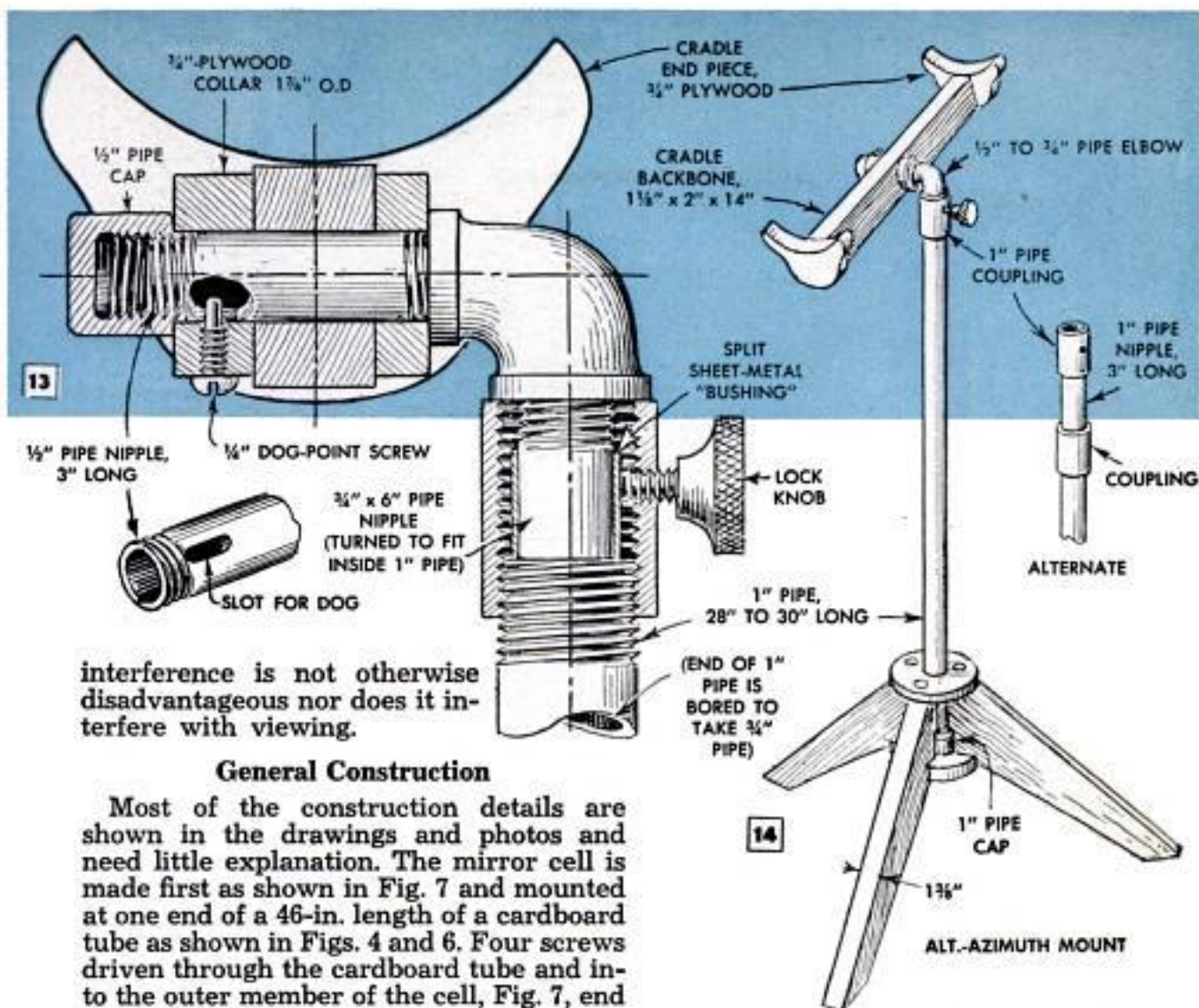




You can get a good idea of how a reflecting telescope works from Figs. 3 and 4. Light from a distant object is reflected and focused by the mirror objective. Without a diagonal mirror that is in a fixed position at 45 deg. from the axis of the concave mirror, the image would form at the forward point as in Fig. 3. The diagonal catches the concentrated light rays and deflects them to a point above and outside the tube where the image can be brought into sharp focus and viewed with any type of magnifying glass. It will be noted that the diagonal is positioned directly in the path of the incoming light. This obstruction blocks some of the light (the center of the concave mirror is "blind"), but the







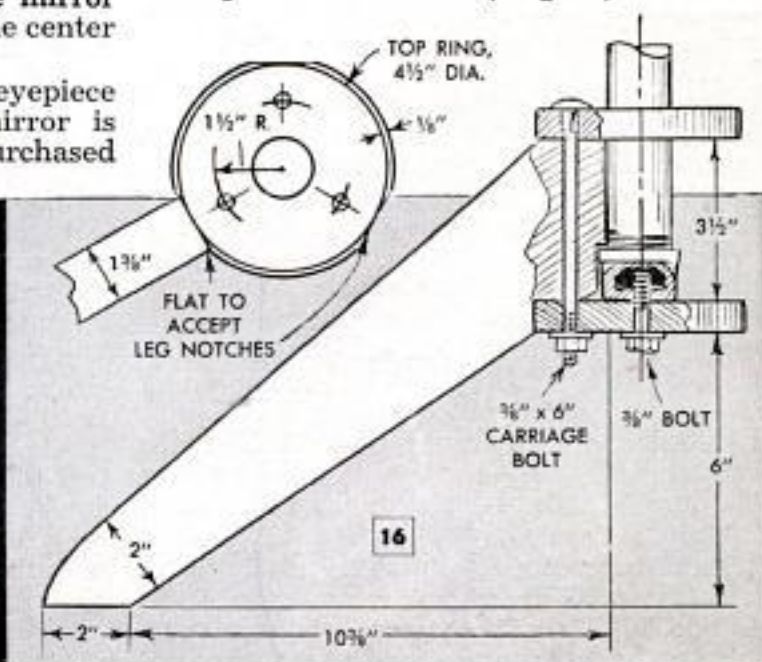
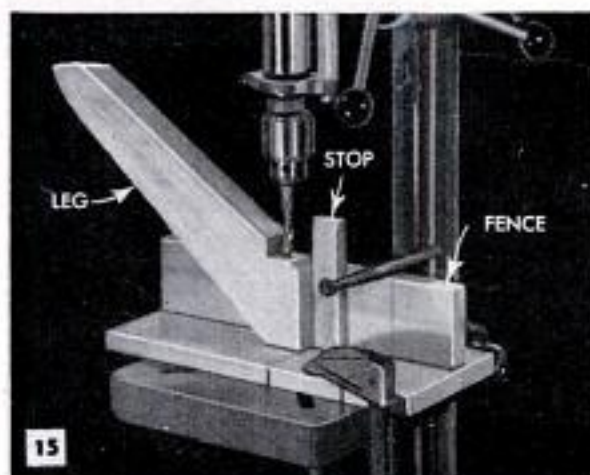
interference is not otherwise disadvantageous nor does it interfere with viewing.

### General Construction

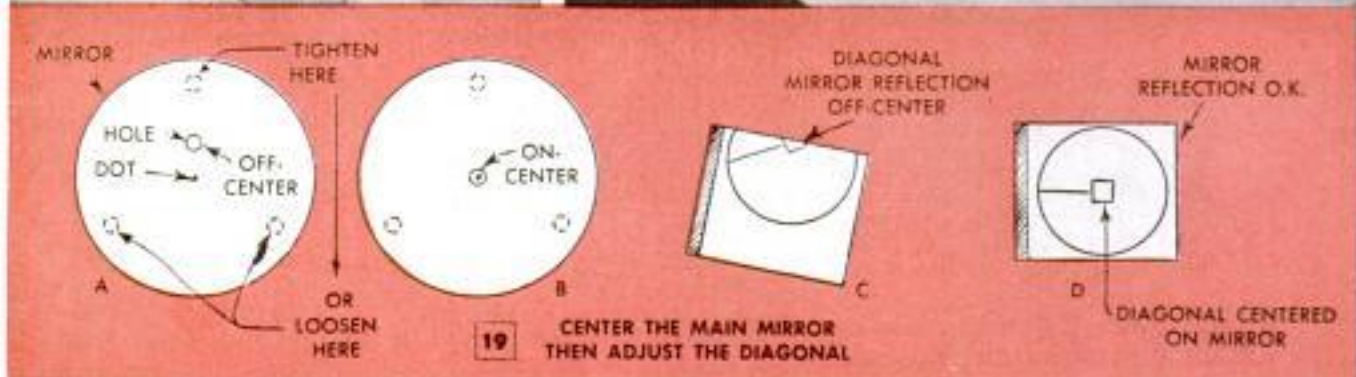
Most of the construction details are shown in the drawings and photos and need little explanation. The mirror cell is made first as shown in Fig. 7 and mounted at one end of a 46-in. length of a cardboard tube as shown in Figs. 4 and 6. Four screws driven through the cardboard tube and into the outer member of the cell, Fig. 7, end view and detail A, hold the cell unit in a fixed position in the tube, subject to slight adjustment. The latter can be done by tightening or loosening the three wing nuts at the back of the cell. This adjustment is necessary to position the mirror so that its axis intersects exactly the center of the diagonal, Fig. 4.

The unit incorporating the eyepiece holder, diagonal support and mirror is made next. This unit can be purchased

ready for installation for about \$10 if you prefer to buy it. The base of the eyepiece holder is a bandsaw and drill-press job as shown in Figs. 8, 9, 10 and 11. The bottom piece of the cutout, Fig. 11, is used for







a clamping block when drilling the holes for screwing the base to the tube and then is discarded. After the base is screwed to the tube, the hole that accepts the eyepiece tube is cut with a hole cutter, Fig. 10, that cuts wood and main tube in one operation.

#### Alt.-Azimuth Mount and Tripod

The mount and tripod shown in Figs. 13, 14, 15 and 16 are rugged units with friction adjustments for any latitude, declination and ascension. The assembly includes a cradle made of wood to which the telescope is held by means of two straps. The other parts are stock pipe fittings that require some machining as indicated. The horizontal pipe shaft on which the cradle is mounted, is slotted to receive the end of a dog-point screw as shown in Fig. 13. This permits the pipe cap at the end to be screwed on the shaft to apply tension on the plywood collar on each side of the cradle without the tendency for the cap to unscrew when the cradle is tilted.

The vertical axis of the mount is a  $\frac{3}{4}$ -in. pipe nipple with the outside diameter reduced to fit inside the 1-in. pipe column, the upper end of which is reamed to provide adequate clearance, Fig. 13. The alternate assembly, Fig. 14, should be used, if a long length of pipe cannot be reamed in your lathe.

Detailed construction of the base of the tripod part of the mount is shown in Figs. 15 and 16. The pipe column of the mount is screwed into a pipe cap that is tapped to

take a  $\frac{3}{8}$ -in. bolt. The latter clamps the tripod assembly securely to the mount by means of two plywood rings as shown. Accurate drilling of the carriage-bolt holes in the legs is done with the fence setup shown in Fig. 15.

#### Collimation

Collimation is the optical term indicating alignment of optical elements. The collimation of any reflecting telescope is simplified by inking a center dot on the concave mirror, using a cardboard mask for proper positioning of the dot as in Fig. 18.

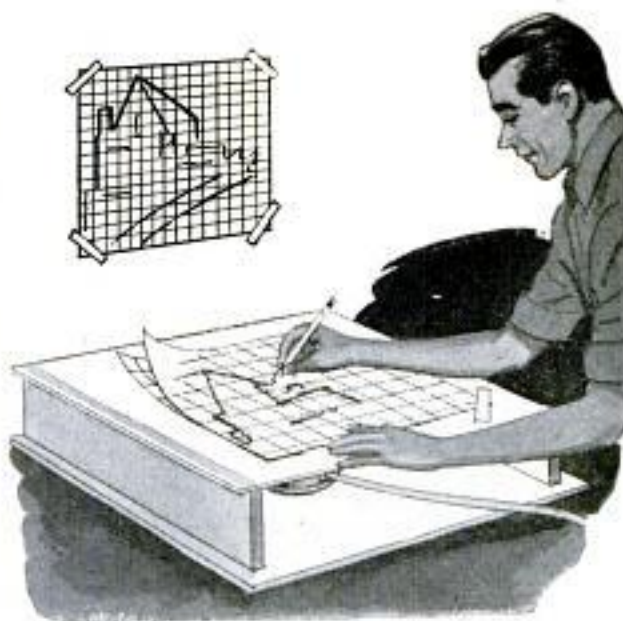
The test board, Fig. 17, is used to align the main mirror in the tube. To do this, light from a flashlight is beamed at the board and the position on the mirror of the reflected hole in relation to the inked dot is noted. What you are likely to see may be similar to the off-center positions of dot and hole as in Fig. 19, detail A. To correct this, simply tighten or loosen the wing nuts on the mirror cell until the reflected image of the hole is superimposed over the dot as in detail B.

After the concave mirror is adjusted, drop the diagonal into position so that it is in the approximate center of the tube. Then look through the eyepiece tube without the eyepiece and note if the reflected image of the concave mirror is centered on the diagonal mirror. A slight turn to the left will correct the misalignment shown in detail C, to bring both mirrors into alignment as in detail D. Now you are ready to use the telescope. ★★★



## Method of Enlarging Drawings Eliminates Need of Erasing

Here is an improvement on the usual method of copying pictures to a larger size with the aid of guiding squares drawn on the picture. With this method, neither picture nor drawing sheet is marked, thus eliminating subsequent erasing. First, prepare a "master guide" of celluloid by scratching squares on it. This guide is placed on the picture to be copied and taped to prevent it from slipping. Squares now are inked on a sheet of paper as large as the sheet on which the enlarged drawing is to be made. Place the drawing paper over the squared paper and tape both to a pane of glass set above a lamp so the squares will show through the paper clearly, and proceed with the drawing.



## Record on Bottle Assures That Developer Is Replenished

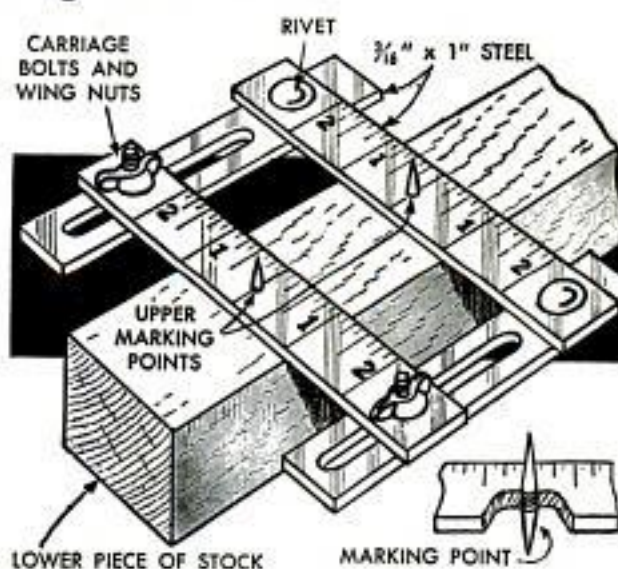


Replenisher must be added to frequently used photo developer to prevent it from deteriorating. To avoid forgetting about the replenisher, each time the developer is used mark the date on a label on the bottle. Later, if there is doubt as to whether or not the developer has been replenished, it is a simple matter to compare the number of rolls of film developed with the data on the bottle.

☐ Plastic berry baskets placed on shelves or in bureau drawers of a child's room help keep toys and small articles of clothing in order, and also add a touch of color to the furnishings.

## Adjustable Jig Permits Accurate Marking of Blind Holes

Aligning blind holes to be drilled for dowels in adjacent members, always a problem, becomes a simple operation when this adjustable marking jig is used. Marking points project from each side of the jig, permitting both pieces of stock to be marked simultaneously. A scale marked on the cross members of the jig permits the points to be centered on the work. Both the slotted and scaled members of the jig are strips of  $\frac{3}{16}$  x 1-in. steel flat. The scaled members are drilled together to assure that the holes are aligned accurately. A rule is used to mark the scales on these members, which are clamped side by side during this operation to assure further accuracy. One scaled member is riveted to the slotted pieces, the other is attached with carriage bolts and wing nuts so it can be moved to adjust the spacing between the holes. In use, the jig is tapped into one member, then the other is placed on top and tapped onto the marking points.



☐ If you need an overnight case, and none is available, simply remove a portable typewriter from its case and use the latter as a substitute.







# On the MARKET

for Do-It-Yourselfers

**1. DECORATIVE ENAMEL** in a pressurized can is made specially for outdoor use on wrought-iron furniture, outdoor grilles, railings and lampposts. Dries in a few minutes to a weather-resistant flat black, especially attractive on all types of ornamental iron. Use on old or new surfaces. Can contains 18 oz.

Sapotin Paints, Inc., 205 E. 42nd St., New York City 17



1

**2. LIQUID WEATHER STRIP** comes in a squeeze bottle. Weatherseals and waterproofs as it dries. Adheres permanently, but can be stripped off. Comes in black, gray, green, pink and white to match most paints. Special applicator tip on bottle is designed to apply a continuous strip of uniform width

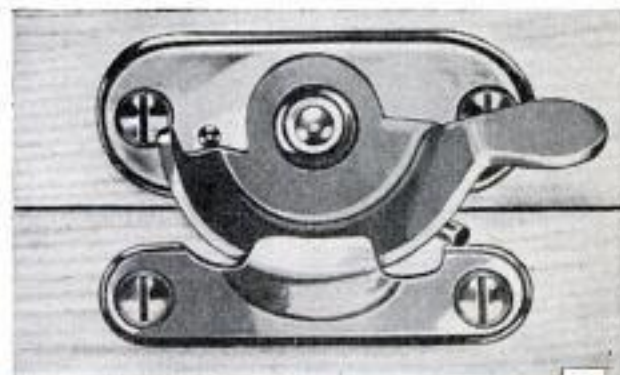
Meridian Products Co., 366 Madison Ave., New York City 17



2

**3. AUTOMATIC SASH LOCK** is spring-actuated, locks when the sash is closed. It's regular sash-lock size and fits any standard wooden sash. Photo shows unit in closed position while details below show how striker releases latch as the sash is lowered to the closed position. Each unit is chrome-finished

Skill Sales Corp., 415 S. Kedzie Ave., Chicago 12



3

**4. LIGHTWEIGHT INSULATING MATERIAL** is poured directly from the bag into the hollow cores of concrete-block walls. Its use is said to cut heat loss through concrete-block walls as much as 50 percent. One 4-cu.-ft.-capacity bag contains sufficient insulating material to fill 16 standard concrete blocks

Perlite Institute, 45 W. 45th St., New York City 36

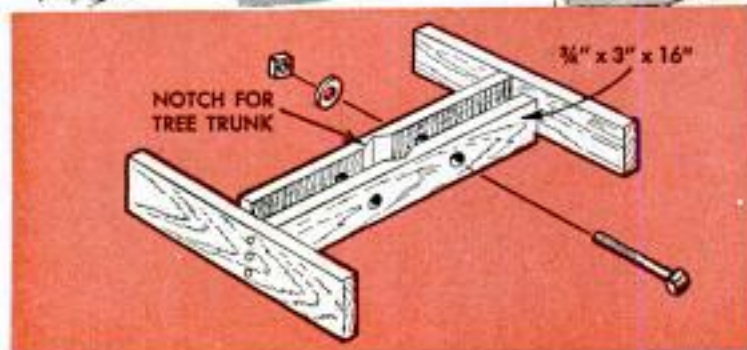


4





## Improved Stand Accommodates Any Size Christmas Tree



If you are putting up the tree on Christmas Eve and the stand that was all right last year now is broken, or just cannot be found, there is no need to panic if you have a couple of lengths of lumber in your workshop. The improvised stand shown in the detail can be made from stock of any size, and of dimensions that will accommodate almost any size tree. If the trunk of a tree is fairly large at the bottom, longer bolts are used in the clamping portion of the stand. If a pan of water is to be used under the tree, use wider stock for the two end pieces so that the clamping members are raised above the floor to clear the pan and let the trunk rest in the water.—A. V. Malone, Pasadena, Calif.



## Holiday Window Decoration For Night or Day

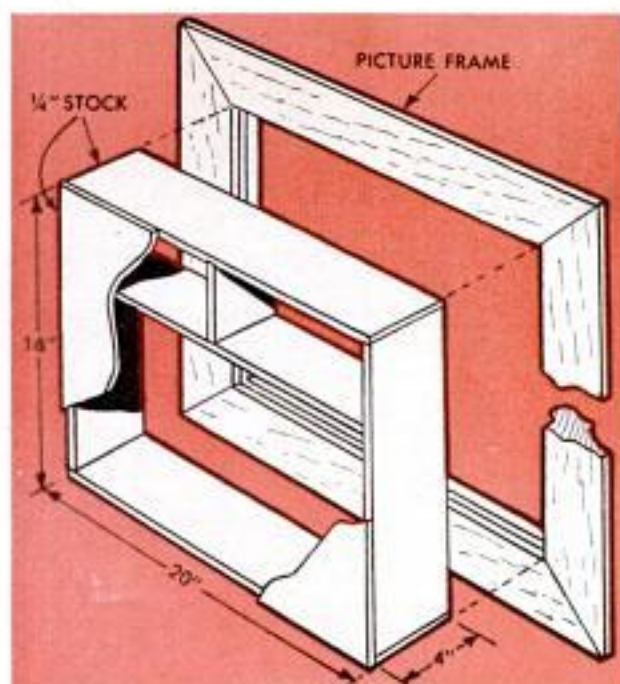
With slight modifications this holiday-decoration idea used by one homeowner can be adapted to any size window. A cutout of a simple drawing is pasted to the glass. Draperies form a background during the day, light shines through the draperies at night to silhouette the drawing. For an added effect, a Christmas-tree light in a foil star shines down on the scene.—Albert C. Speckman, Racine, Wis.



## Modified Cake Pan Is Bird Feeder

You can make a practical bird feeder in a matter of minutes by cutting slits in opposite edges of a cake tin, bending the bottom at right angles and riveting as indicated. Holes punched in the vertical portion of the feeder will permit it to be hung on projecting nails or screws. Accumulation of rainwater in the pan is prevented by the open slits which will permit it to drain away.





## Shadow-Box Display Frame for Dolls

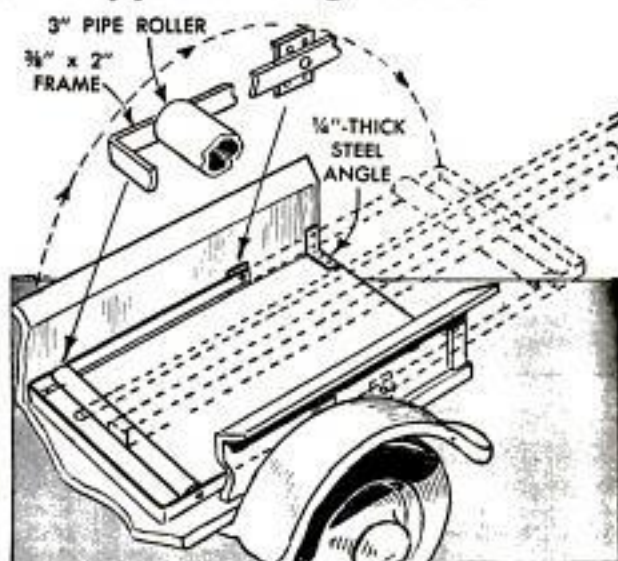
If there is a young lady in your home who is proud of her doll collection, she will be delighted with this shadow-box picture frame that will permit her to display her dolls as "three-dimensional pictures." Large picture frames, such as were fashionable several decades ago, may be found in many attics, and are ideal for the frame for the shadow box. If such a frame is not available, picture-frame stock can be purchased at a lumberyard and made into a frame of any desired size. Dimensions given in the detail are those of the original picture box, which was made from a picture frame found in an attic, so the dimensions should be considered only representative. The size of the dolls to be displayed in a particular picture box will

determine the size of the frame, the number and type of partitions—whether vertical or horizontal—and the depth of the frame. Unless a doll is extremely large, the 4-in. dimension shown for the depth of the frame is sufficient. A greater depth will cause the frame to project too far from the wall on which it is hung. Top, bottom, sides and partitions of the picture box are cut from  $\frac{1}{2}$ -in. stock. The back can be  $\frac{1}{4}$ -in. plywood or hardboard. For a novel effect, use hardwood-faced plywood of a grain and color that will complement room decor. Wallpaper to match that used in the little girl's room also can be used as a background. For an illusion of depth, install a mirror at the frame back.

Mrs. Jean Lyon, Cedar Rapids, Iowa.

## Auxiliary Frame on Pickup Truck Supports Long Loads

Long, but light items, such as pipe and lumber, can be carried in the short bed of a pickup truck by adding a U-shaped frame made of  $\frac{3}{8}$  x 2-in. flat steel. It is pivoted to the inner surfaces of the truck-bed sides on  $\frac{1}{4}$ -in. steel plates as indicated. For easier loading and unloading, a roller consisting of a length of 3-in. pipe is installed near the end of the frame. To make sure that most of the weight of a load is supported on the truck bed, the frame should be pivoted so that the roller is level with, or slightly above, the truck bed when the tail gate is lowered and the frame swung to the rear. When not in use, the frame is swung forward to be out of the way. Although the roller is handy, it can be omitted if desired.





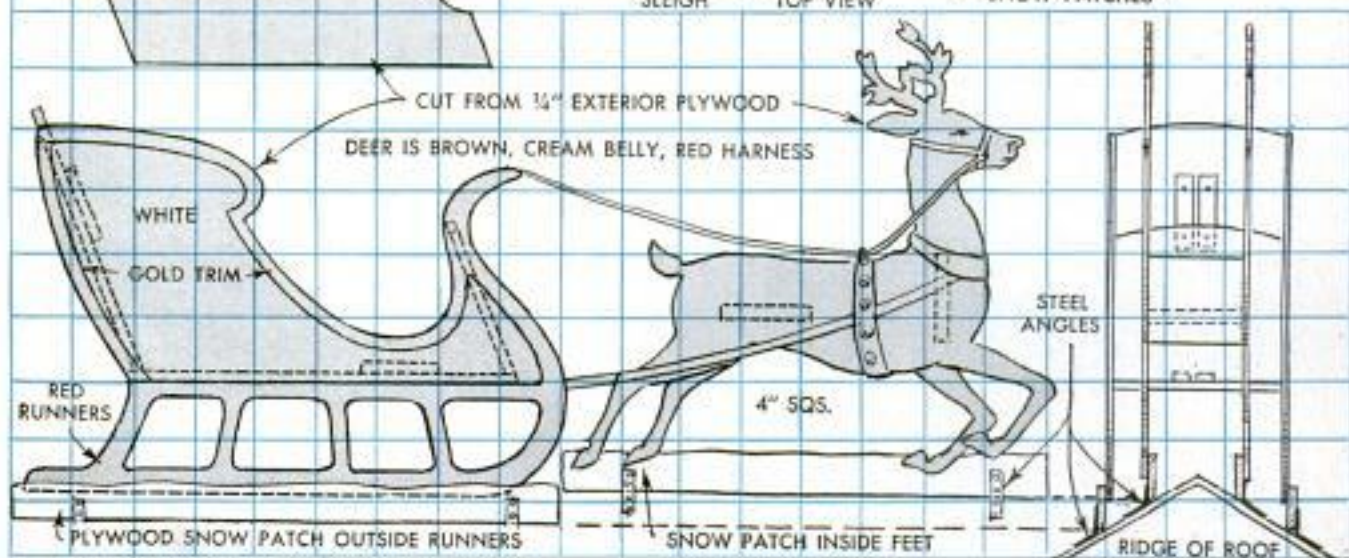
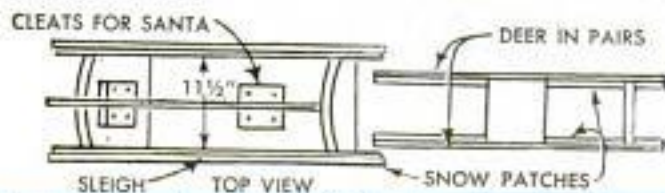


# OUTSIDE CHRISTMAS DISPLAYS

By Hi Sibley

WHETHER IT'S SANTA and his reindeer charging across the top of your roof, or a fireplace on the front lawn, flanked by red-flamed candles, an outside decoration gives your home a special holiday look. Santa, his sleigh and reindeer are jigsawed from  $\frac{1}{4}$ -in. exterior-grade plywood. At least three pairs of reindeer should be used. Santa's toys are carried in a large laundry bag filled with dummy packages and hooked to the back of the sleigh. Steel angles are used to attach the sleigh and deer to the roof. Harness can be painted on the deer, reins are lengths of white plastic clothesline which contrasts with the brown deer. Use a spotlight for night-time illumination.

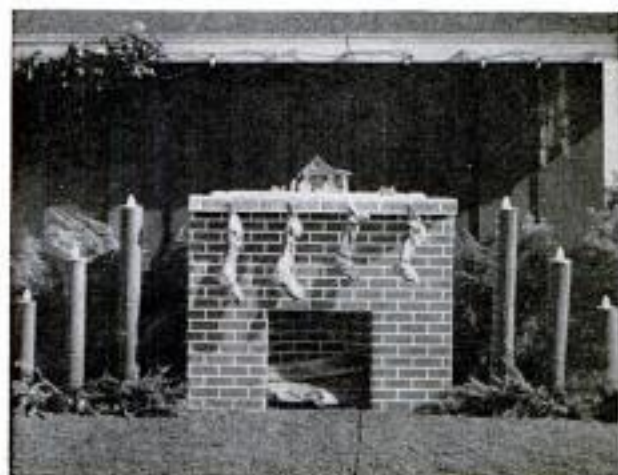
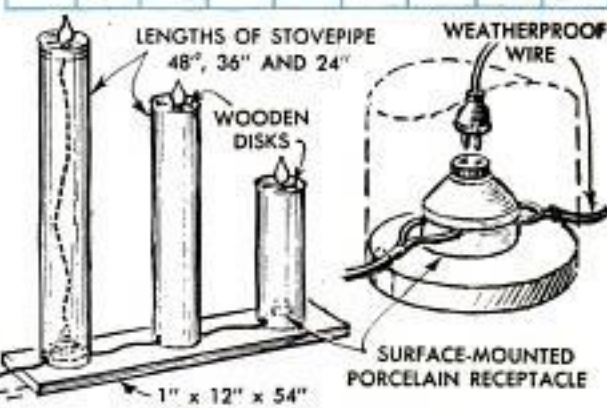
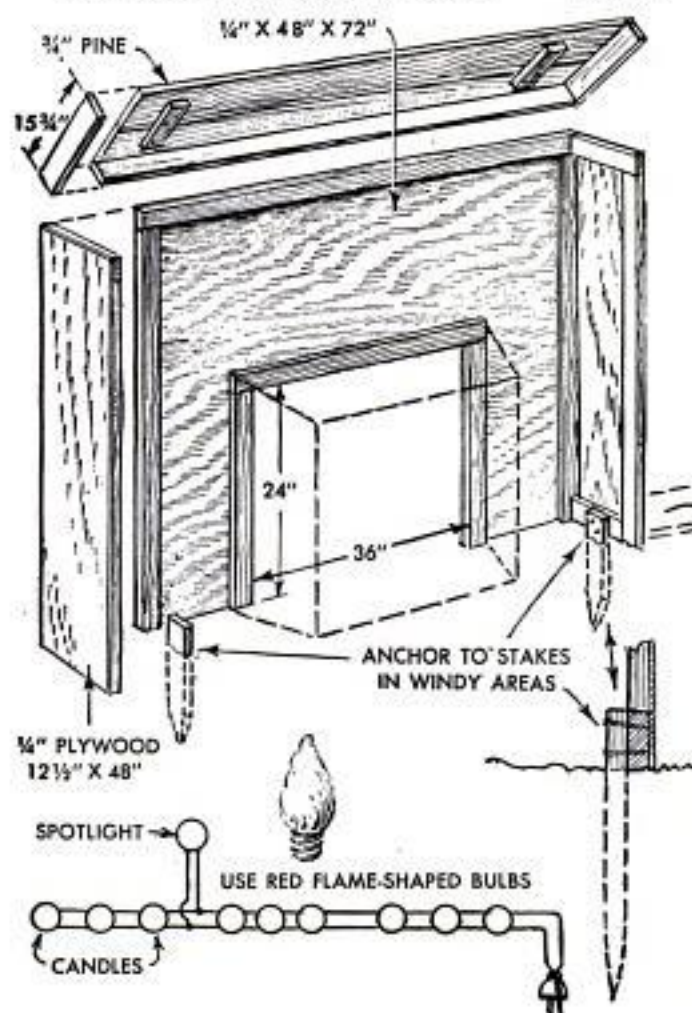
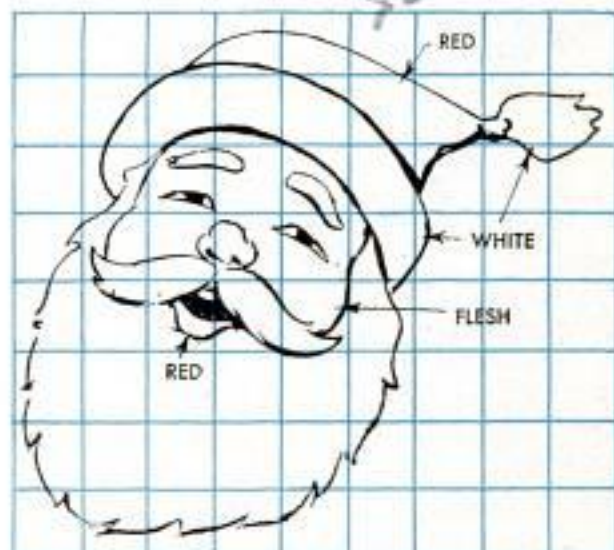
Except for the mantel,  $\frac{1}{4}$ -in. exterior







plywood also is used to make the fireplace which is built around a 1 x 2 framework. Paint the fireplace brick-red, then stripe with white lines for mortar. Paint the inside of the fireplace black. The candles are made from 24-in. lengths of 6-in. stovepipe. One length is cut in half and the sections fitted on full lengths to provide two 36-in. candles. Wooden disks at the top and bottom of each candle keep them in shape and provide a means of attaching receptacles and sockets for the bulbs. The candles are painted a bright red. ★ ★ ★





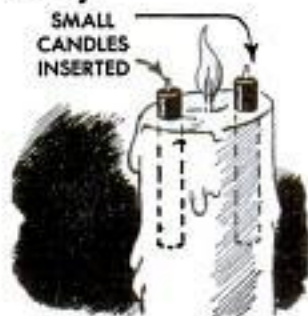
## Salt Box Is Handy Container for Carrying Sand in Car



Every motorist should carry a little sand in his car during the winter just in case he may get stuck on a slick spot next to a curb. One of the handiest ways of carrying sand without spilling is to pour some in a salt box. The pouring spout makes it easy to spread the sand where needed.

## Varicolored Candlestick Melted From Contrasting Inlay

A varicolored candle can be obtained for a table decoration by drilling two or more holes in the top of the candle and inserting small cake candles of contrasting colors. Light the wick on the large candle only and a very pleasing effect will result when the small ones melt and the colored wax flows together.

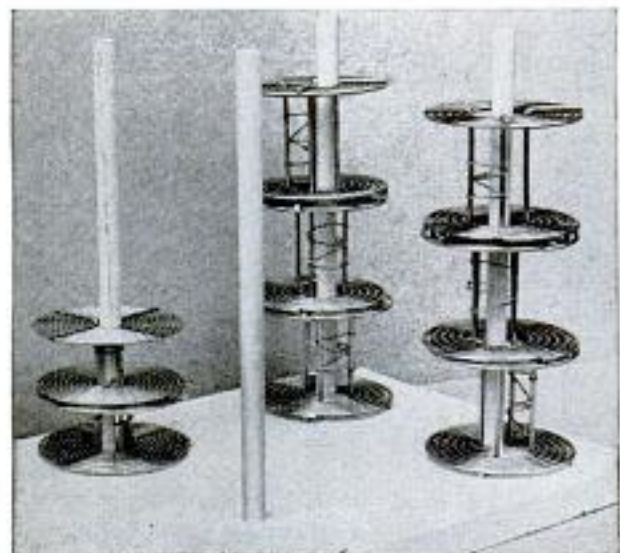


E. M. Wooden, Franklin Lakes, N. J.

Ⓐ rubber spatula is handy when mixing and pouring paint from one can to another. Besides being a good mixing paddle, it is useful for scraping out the final drop.

## Reels Stored on Dowel Racks

Developing reels can be stored neatly in the darkroom on a rack consisting of dowels inserted in blind holes drilled in a shelf. Most reels can be fitted on dowels of  $\frac{1}{4}$  or  $\frac{3}{8}$ -in. dia. Dowels should be long enough to hold three 120 reels. Drill the holes to provide a snug fit, so glue is not needed to keep the dowels in place. This permits them to be removed easily for cleaning the shelf.



## Extending Life of Chamois

Before putting a chamois away to dry, rinse it in lukewarm water to which a small amount of acetic acid or household ammonia has been added. Use just enough acid so that the slippery feeling of the chamois disappears, and the chamois will dry soft and flexible. If the chamois is soiled, first wash it in a lukewarm soap-and-water solution, then rinse it in the water-acid mixture. Do not use hot water.







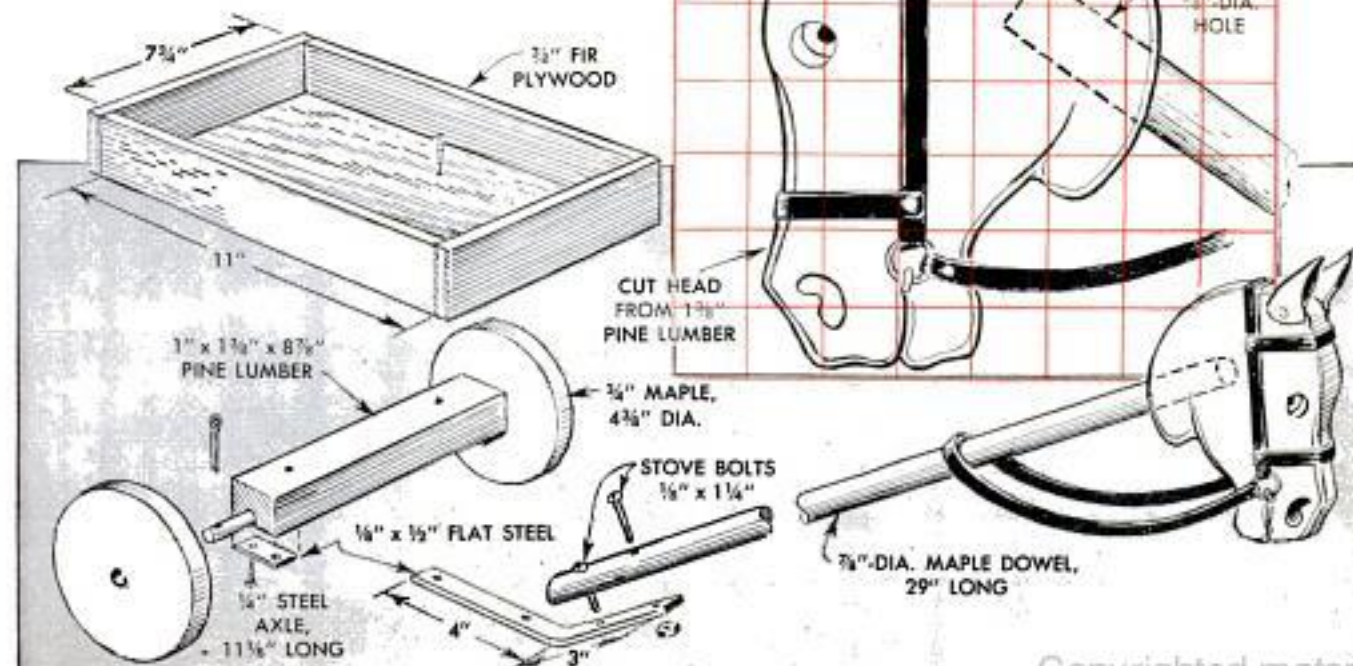
A NIFTY CHRISTMAS GIFT

**X342B**  
**AND CART**

# Hobbyhorse

HERE'S A HOBBYHORSE that will not only accommodate a young rider but permit him to carry a load as well in the attached cart. To make it, first draw a full-size pattern of the horse head and trace it on 1 $\frac{3}{8}$ -in. pine for sawing. The eyes, mouth and nose can be carved or just painted on. The eyes can be carved by drilling part way with a  $\frac{3}{4}$ -in. bit held at an angle. All sharp edges are chamfered and then a  $\frac{7}{8}$ -in. hole is bored for a dowel or broomstick neck. A screw eye with a ring attached is turned into each side of the mouth

to form a bridle bit. Old shoes will provide the leather for the ears, and a narrow belt will make the bridle. The cart is attached to the dowel with a flat-steel bracket.







*Decorations  
for Your  
Xmas Tree*







"Glitter" sprinkled on plastic-foam ornaments will adhere well if foam first has been immersed in water

**C**HRISTMAS-TREE ornaments made of plastic foam are snow-white and crisp-looking, but they do lack the festive glitter of other types of ornaments. However, it takes only a little work to add color and sparkle to the foam. Sequins, which are available in a variety of shapes, sizes and colors can be pinned to the foam with common pins. The ends of the pins are bent over to keep the sequins in place. "Glitter," either the type on sale in art stores, or the edible type used for cake decorating, may be "cemented" to the ornaments by first dipping the foam in water, then sprinkling the glitter on it. Shake off the excess particles and let the foam dry. On the opposite page are shown a number of plastic-foam ornaments. ★ ★ ★

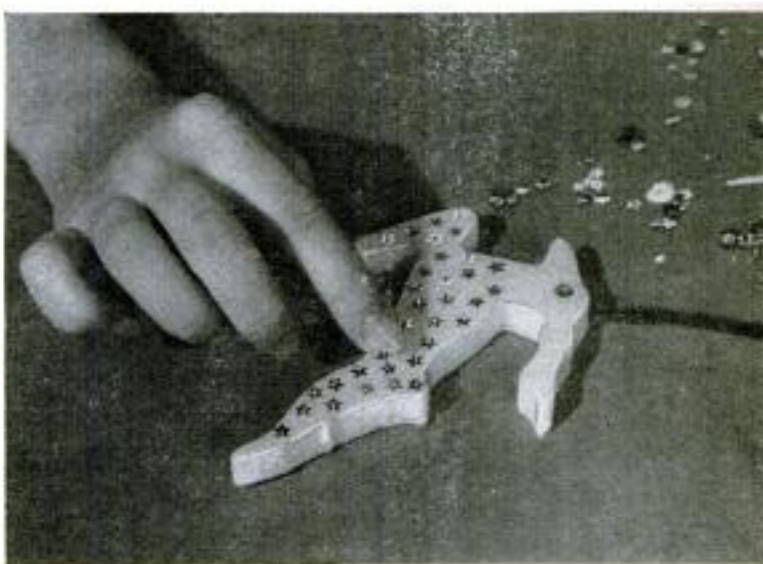
One ornament with sequins, and one without show the difference in appearance of decorated plastic foam



DECEMBER 1957



Above, pin holding each sequin is bent with pliers. Below, pattern of sequins is placed before pinning



Below, no matter what the shape of a plastic-foam ornament, it can be given a new look and sparkle



203

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## Giant Oilcloth Poinsettias Are Unique Outside Decoration

Vivid red poinsettias cut from oilcloth and supported on wire frames decorate the front of this motel in Whitehall, Mont. A cluster of Christmas-tree lights is placed at the center of each flower, and evergreen-covered pipes provide stems. Giant candles are made from cardboard tubes that have been painted red, then splattered white to simulate candle drippings. Outdoor receptacles hold flame-shaped bulbs.

## Baking-Soda "Fire Extinguisher"

Small fires on a kitchen range, caused when grease or oils blaze up, can be smothered quickly by throwing on a handful of baking soda. Keep a box of this "fire extinguisher" handy to the range.

## Three Methods of Cleaning and Refinishing Old Brass

Depending on the type of finish desired, bright, dull or antique, one of three methods of polishing brass is used. For a bright finish, clean the object with a good-quality metal polish, using a soft cloth and brush for carved designs. When the polish is dry, buff to a shine with a flannel cloth. For a dull finish, mix enough linseed oil with

rottenstone to make a mixture the consistency of heavy cream. Rub the object until tarnish disappears, then wipe away rottenstone mixture with a soft cloth dipped in linseed oil. For an antique finish, rub the object with furniture polish, then remove excess oil with a soft cloth. Polish with a flannel cloth.



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- Ch. 2—Installing power tools
- Ch. 3—Portable power tools
- Ch. 4—Operating the circular saw
- Ch. 5—Dado-head techniques
- Ch. 6—Drill-press operations
- Ch. 7—Operating the bandsaw
- Ch. 8—How to use the jigsaw
- Ch. 9—Working with the wood lathe
- Ch. 10—Wood-shaper techniques
- Ch. 11—Fundamentals of the jointer

## ADD THOUSANDS OF DOLLARS TO THE VALUE OF YOUR HOME...

**New PM Book tells and shows how to handle power tools like an expert—and make valuable property improvements**

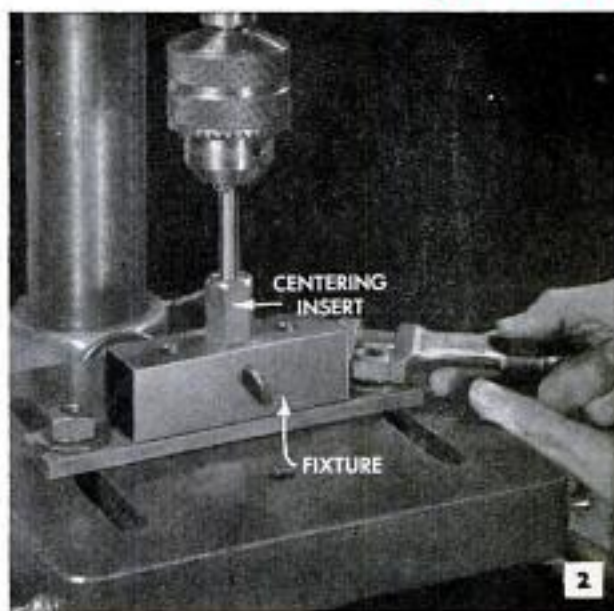
A thorough knowledge of power tools and how to use them will enable you to perform hundreds of major and small projects around your home at *tremendous savings*, and *increase its value* significantly. Now, with the aid of a new Popular Mechanics book, "Getting Started with Power Tools", it's easy, fun, safe . . . and with no previous experience you'll be able to do more home remodeling and repair jobs, make beautiful furniture, toys and boats, or execute many other projects you may have wanted to do, but never could.

This remarkable book, in 160 pages of easy-to-understand text and scores of illustrations, shows you all about the interesting and profitable avocation of working with power tools. Special attention is given to the type of learning problems encountered by the novice, and each major type of power tool is clearly illustrated with captions showing all of its components. But this book is written for the skilled craftsman as well. It contains many helpful hints that will save time and money. It tells what you should look for in planning a power tool shop, and how to lay it out for greatest efficiency. It stresses safety procedures that will benefit even the practiced workman. And various attachments are shown that will convert one tool to multiple duty, thus saving on the total investment. Never before has a book on power tools been written for the home craftsman that provides as much basic information for the novice, and as many down-to-earth work hints for the expert, as "Getting Started with Power Tools". Order your copy today, with a money-back guarantee if not pleased. Send your check or money order to the address below in the amount of only..... **\$2.50**

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SN 59



## DRILL-PRESS WORK SUPPORT *has interchangeable inserts*

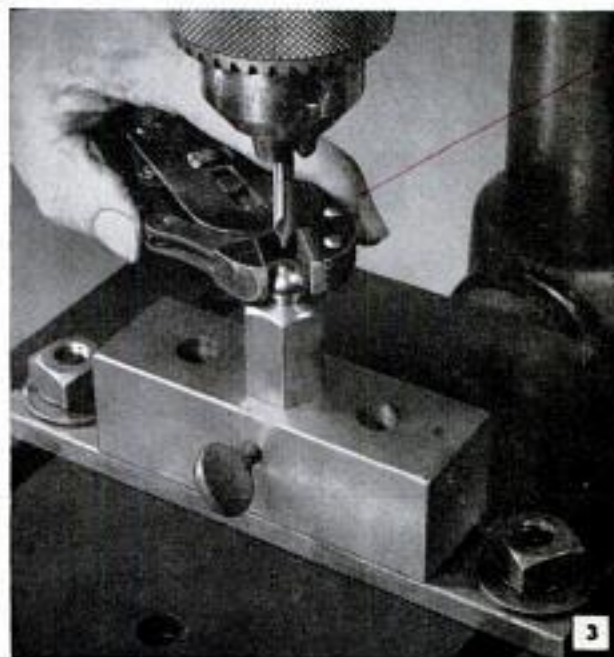
By Walter E. Burton

**W**ORK-HOLDING PROBLEMS are not always solved advantageously by use of a drill-press vise. Final repetitive operations on semifinished parts, holding dissimilar parts for center drilling, blind drilling or tapping can often be done faster and with greater accuracy by using a table fixture having interchangeable work supports. These usually are made up to suit the job at hand, those detailed, A, B, C, D, Fig. 6, being intended only as suggestions. Also, a drill chuck, Fig. 1, or a small lathe scroll chuck can be used to advantage on some types of work. Such chucks must be fitted with a special shouldered spindle to fit the center hole in the fixture.

Two types of work, two work positions and two uses of the stop are shown in Figs. 4 and 5. Where fine accuracy is not involved, the stop permits the work to be held in the hand without danger of injury which sometimes occurs when the drill bit grabs suddenly and spins the work. The stop rod eliminates this hazard. The fixture, detailed in Fig. 6, and shown in Figs. 1 to 5 inclusive, consists of a 4½-in. length of 1½ x 1½-in. mild steel (tool steel also can be used) screwed to a slotted baseplate which is bolted to the drill-press table. Holes in the fixture are drilled ⅜ in. and

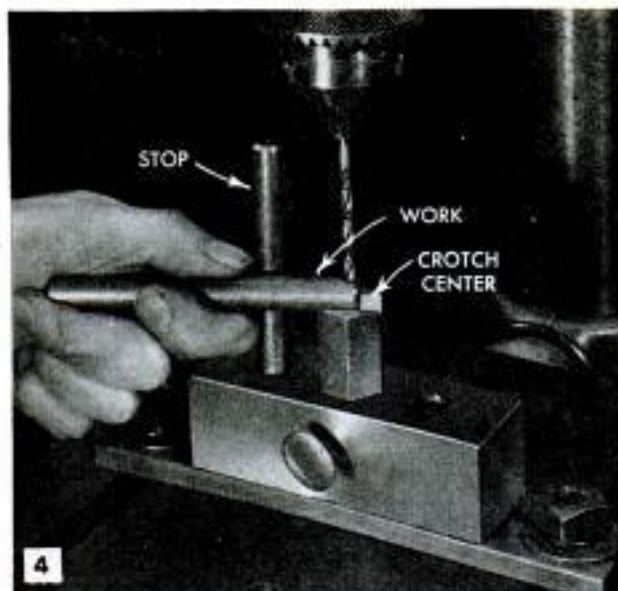
reamed to ½-in. dia. Of course, these holes should be drilled with a drill bit in perfect condition and with the fixture assembled and bolted on the drill-press table in the position in which it will be used. This procedure will assure accuracy.

To align the fixture, Fig. 2, a centering insert, or locator, is used. This can be made

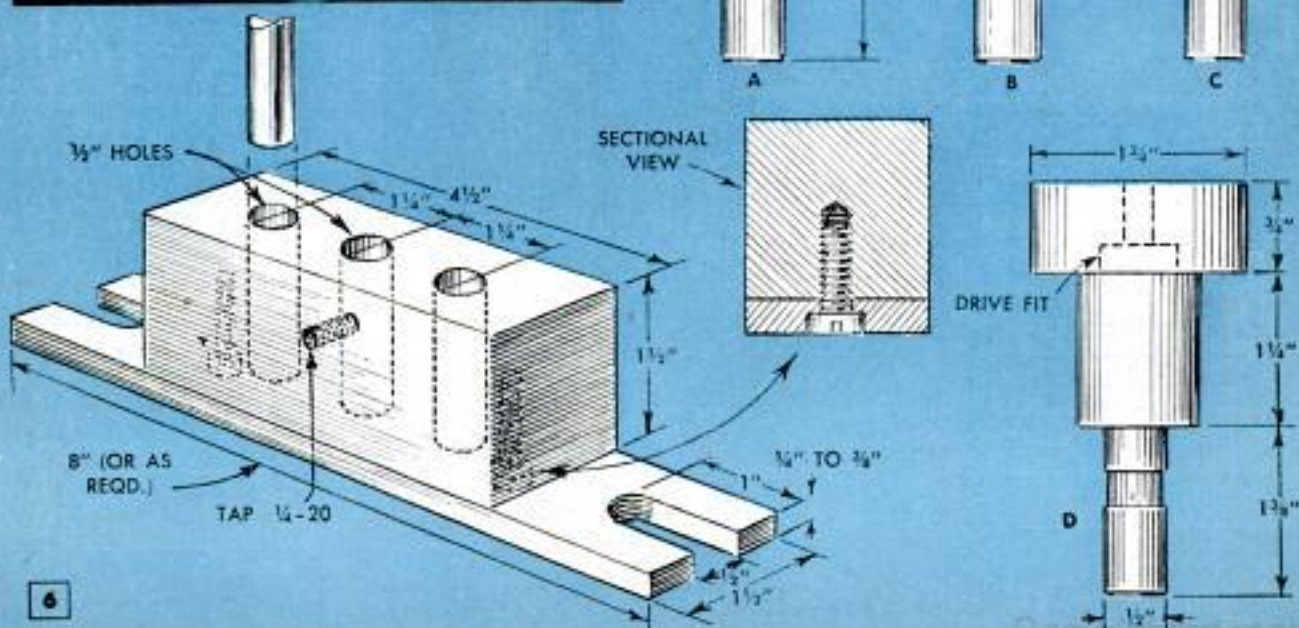
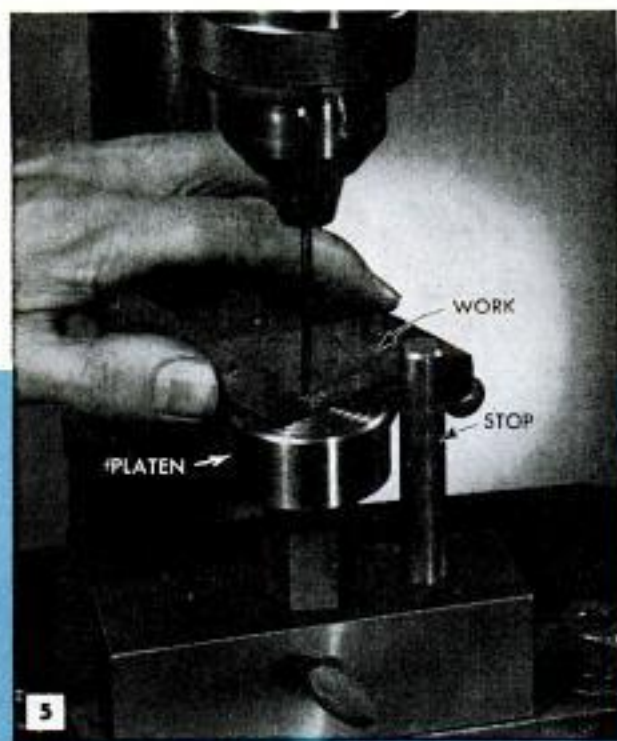


VISE-GRIP WRENCH  
BROADHEAD CARBET  
H560 E.  
71st,  
Cleveland 5,  
Ohio





A stop prevents work from spinning with drill should latter grab unexpectedly. Inserts are held in place by thumbscrew which tightens against spindle



from round or hex stock as in detail B, Fig. 6. This insert also can be used as a work support. The latter is drilled  $\frac{5}{16}$  in. and reamed to  $\frac{3}{8}$  in. Use a short length of  $\frac{3}{8}$ -in. drill rod in the chuck when aligning the parts as in Fig. 2. Use  $\frac{1}{2}$ -in. drill rod for the stop, Figs. 4 and 5.

The platen, Fig. 5, can be fitted with a  $\frac{3}{8}$  or  $\frac{1}{2}$ -in. spindle for use with inserts A or B, or can be turned with a recess for use with insert D, Fig. 6. If used as in Fig. 6, detail D, the parts should be turned to a light drive fit. Spindles for all the inserts can be formed simply by turning down from the 1-in. dia., or by drilling the stock and inserting spindles made from  $\frac{1}{2}$ -in. drill rod. The  $\frac{1}{2} \times \frac{1}{4}$ -in. groove takes the point of the setscrew when the spindle is locked in position in the fixture. This prevents the slight burring, caused by tightening of the setscrew, from interfering with insertion and withdrawal of the insert. The crotch-centering insert, detail C, Fig. 6, can be made with a 45-deg. countersink for centering a ball, or with a 45-deg. (90-deg. including angle) V-groove for supporting round stock, Fig. 4. It also can be made by using round stock or hex stock as shown. The dimensions of the fixture and inserts can, of course, be varied to suit individual requirements. For ordinary work it is not necessary to harden the inserts or the block, but for repetitive jobs hardening will help to maintain accuracy. ★ ★ ★



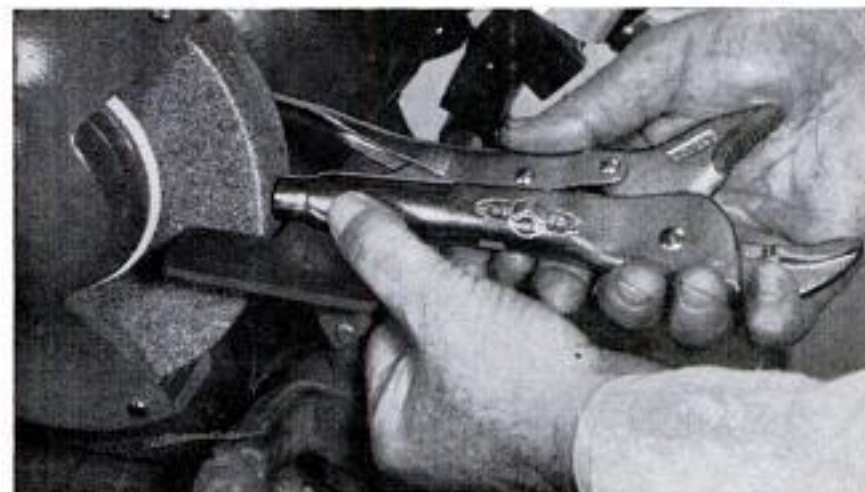
## Improved Holder Confines Torch Flame

This holder will save you the time required to extinguish and relight the flame when welding a job that requires intermittent use of a gas torch. The holder keeps the torch in place and eliminates fire hazard. Just cut a 2-in. hole in a 5-qt. can about 5 in. from the top. Fill the can half full with water. While rearranging the work, insert the torch tip in the hole.

Stanley Clark, East Bradenton, Fla.

## Heavy-Bodied Lubricants For Spinning Aluminum

Commercially pure aluminum which has been annealed generally requires the use of a heavy-bodied lubricant to prevent scoring under heavy pressure of spinning tools. Blanks 3 to 12 in. in diameter spin easily when coated with tallow or petroleum jelly. On somewhat larger blanks ordinary beeswax provides both adequate lubrication and protection against scoring.



## Restoring Grip Of Lever Wrench

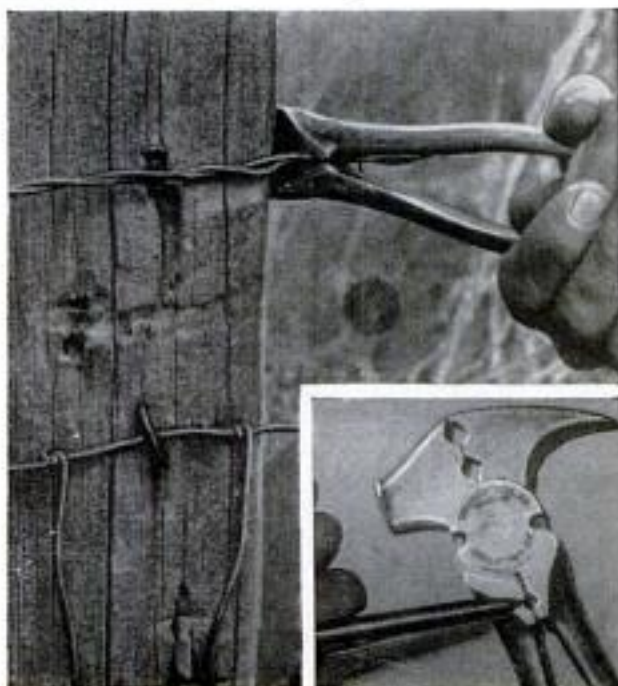
Lever wrenches, or clamping pliers, often wear to the point where the clamping screw will no longer adjust the jaws to grip tightly. When this occurs, remove the screw and grind off the end of the fixed handle. This will restore the original grip of the wrench jaws.—R. Moore, Wellsville, Ohio.

## Pliers Altered to Hold Wire

When the corrugations on the inner meeting faces of fence-plier handles become worn they will not grip barbed wire firmly for stretching. If the wire slips, it will be scored and may break later on. To prevent this, file a half-round groove in each handle, using a  $\frac{1}{8}$ -in. round file. The grooves should register so that they form an opening of about  $\frac{1}{8}$ -in. dia. when the handles are closed. This simple alteration permits the wire to be gripped firmly.

## Cold-Weather Starting Aid

On a severely cold morning when your car won't start it's helpful to remember this trick. Wrap a cloth several turns around the manifold just below the carburetor and soak with boiling water. This warms the manifold and vaporizes fuel for a quick start.





# Christmas SHOPPING

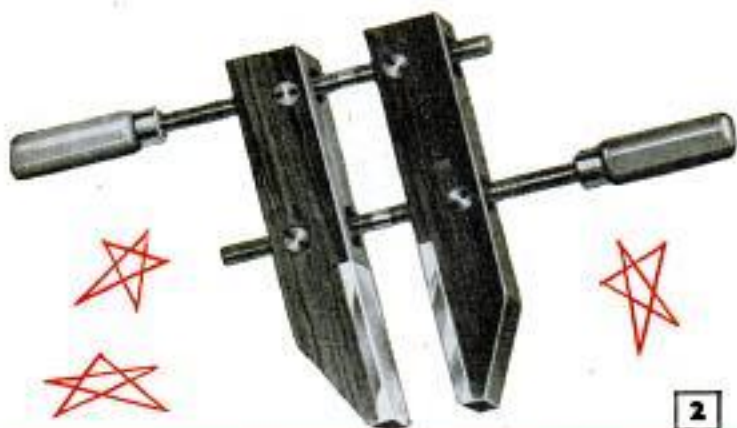


**1. PORTABLE ROUTER** is controlled by a trigger switch mounted in a specially designed "saw grip" handle which permits one-hand operation of the machine. A 1¼-hp. motor spins bits and cutters at 22,000 r.p.m. Accessories include dovetail and hinge templates, an interchangeable planing attachment and shaper table

Porter-Cable Machine Co.,  
106 Exchange St., Syracuse 6, N. Y.

**2. HAND SCREW** is made with soft-metal inserts, or pads, which prevent marring work and also make it easier to remove residual glue which may adhere to the jaws. Otherwise, hand screw is of conventional type with hardwood jaws, threaded steel spindles and wooden handles. Comes in 3 sizes, 4½, 6 and 8½-in. jaw openings

Wetzler Clamp Co.,  
43-15 11th St., Long Island City 1, N. Y.

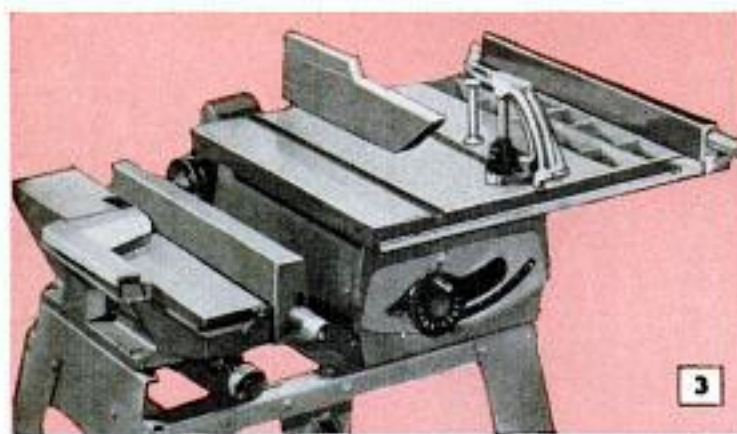


**3. SAW-JOINTER COMBINATION** has several new features. Rip fence aligns automatically and locks at both ends with a turn of the locking handle. Raising and tilting units are operated with one hand-wheel and screws are self-cleaning. Will not clog with sawdust. Miter-gauge clamp grips stock firmly, prevents creeping

Montgomery Ward, 618 W. Chicago Ave., Chicago

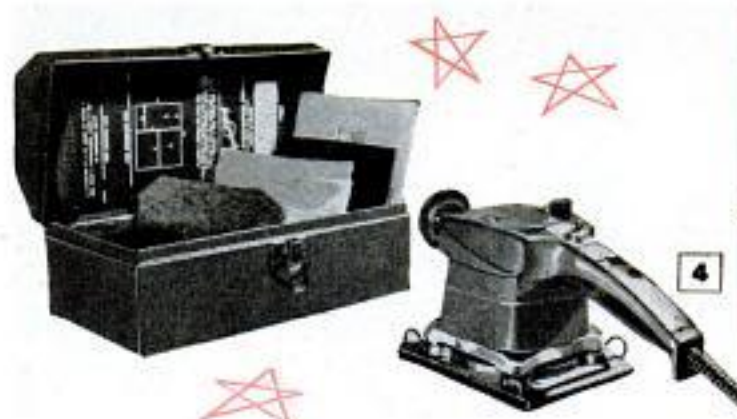
**4. ORBITAL-SANDER KIT** includes the sander, steel carrying case and all the necessary accessories for finish sanding, buffing and polishing. High-speed orbital motion of pad puts an extra-fine finish on both hard and soft wood without scratching or ridging surface. Brings a waxed surface to a high polish with lamb's-wool pad

Speedway Mfg. Co., Div. of Thor Power Tool Co.,  
1843 S. Laramie Ave., Cicero 50, Ill.



**5. BENCH GRINDER** has been designed for home-shop and light industrial applications such as sharpening hand tools, buffing and scratch-brush work. Comes equipped with 6-in. grinding wheel, 6-in. wire wheel, tool rests and wheel guards. Unit is mounted on rubber pads for quiet operation on workbench. Speed is 3450 r.p.m.

The Stanley Works, 111 Elm St., New Britain, Conn.





# FOR TOOLS



6

**6. GLASS DRILL** cuts clean holes in glass up to 1 in. in dia. Edges of holes are sharp, no chipping on either side of glass. Made in two types, one driven by portable drill, the other being motor-driven

*Ju-Go Glass Drilling Machines, Box-884, Journal-844-846, Jersey City 6, N. J.*

**7. PORTABLE-ELECTRIC-DRILL KIT** includes ¼-in. drill, 5 twist-drill bits, 4 wing, or spade-type, bits for wood, screwdriving attachment and a set of 5 countersinks for screws, the latter for 5 sizes of screws

*Skil Corp., 5033 N. Elston, Chicago 30*

**8. SMALL BOLTS AND SCREWS** come in special plastic containers which are designed to fit into individual compartments in a sheet-metal rack. Screws, bolts are packed one size in each plastic container

*Rockford Screw Products Co., Rockford 46, Ill.*

**9. 12-PIECE SET OF CARVING TOOLS** includes all those commonly needed for wood carving and making linoleum-block printing cuts. Over-all length of each tool is 5¼ in. Each is fitted with 4½-in. handle

*A. S. Trading Co., 60 Lexington Ave., New York City 10*

**10. UTILITY TRAY** for drill press clamps to the column to hold drills or a number of finished and unfinished parts in production work. May be positioned as pictured or reversed to clear machine table

*The Western Tool and Mfg. Co., Springfield, Ohio*

(Continued to page 210)



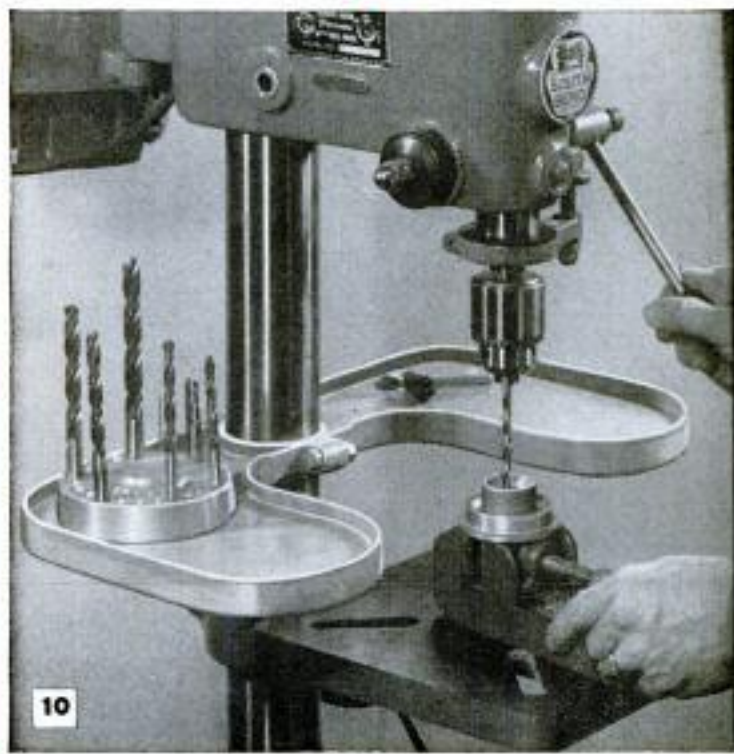
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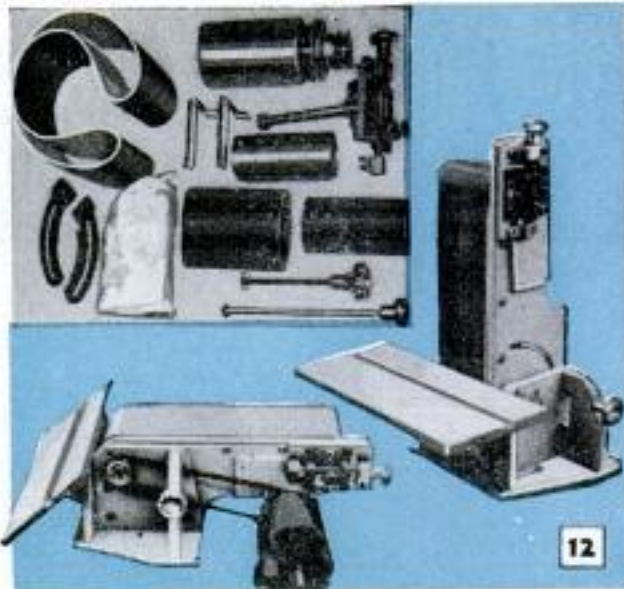
10



# Christmas SHOPPING FOR TOOLS



11



12



13



14



15



16

**11. CONTOUR-SCRAPER KIT** consists of 5 shaped blades and a special plastic handle to which the blades can be attached individually. Used to remove paint and varnish from flat and molded surfaces such as picture frames, reeded and fluted columns  
Mertolan Products Co., 186 Madison Ave., New York City

**12. COMPLETE BELT SANDER** comes in a build-it-yourself kit. All metal parts are completely machined ready for assembly. Kit comes complete with plans and full-size patterns for cutting the wooden parts which you make yourself from plywood as specified

Gilliam Power Tools,  
P.O. Box 6157, Lambert Field, St. Louis 21, Mo.

**13. CONCENTRIC GROOVES** in the upset head of such hand-held tools as cold chisels, stone chisels, star drills and calking irons add a safety factor and also improve balance. Grooves tend to prevent mushrooming of head of tool under heavy blows

Damascus Steel Products Corp., Rockford, Ill.

**14. PUSH-PULL TAPPING ATTACHMENT** designed to be driven by a portable electric drill features an unusual instant reverse which enables the operator to back out the tap by power rather than by hand. Drives any standard tap up to 5/16 in. in dia.

Scott-Mitchell House, Inc., 611 Broadway, New York City 12

**15. PORTABLE ARC WELDER** has a new-type transoidal transformer having a 90 percent power factor at rated output. Welds steel up to 1½ in., cuts ¼-in. steel plate. Operates on 115 or 230-volt a.c. Handles electrodes from 3/32 up to and including 5/32 in.

Brennen, Buell and Weber, Inc., 202 Mott St., New York City 12

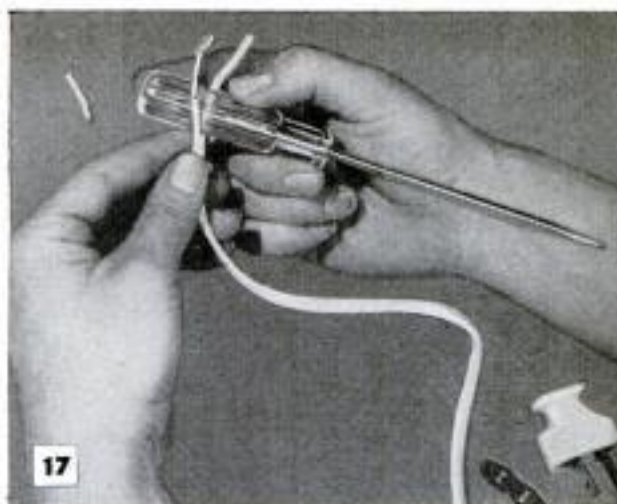


**16. STEPLADDER** locks in the open position so that it cannot accidentally fold while in use. Also is fitted with a sliding bench, or shelf, and handrail unit which can be raised to a convenient working position to hold tools, paint pails, brushes and other accessories within handy reach while standing on any of the steps. Shelf locks firmly in place when raised

The Safe-T-Ladder Co., Huntville, Ohio

**17. SCREWDRIVER** has a built-in wire stripper in the handle which strips any wire up to No. 1 ga., including stranded wire. Handle is conventional shape except that it has a transverse opening through which the wire to be stripped is inserted. The U-shaped cutter which does the stripping is molded into the plastic. The screwdrivers are available in 4 sizes

Wire Stripper Tools, Inc., Glen Head, N. Y.



**18. RADIAL SAW** has all controls located at the front of the machine for easy accessibility, safety and convenient operation. Special motor develops over 2 hp., drives 10-in. blade. Switch is fitted with safety keylock, cannot be closed until key is inserted and turned. Warp-resistant table is built up of laminated wood and is of exceptionally large size

Sears, Roebuck and Co., 925 S. Homan Ave., Chicago 7



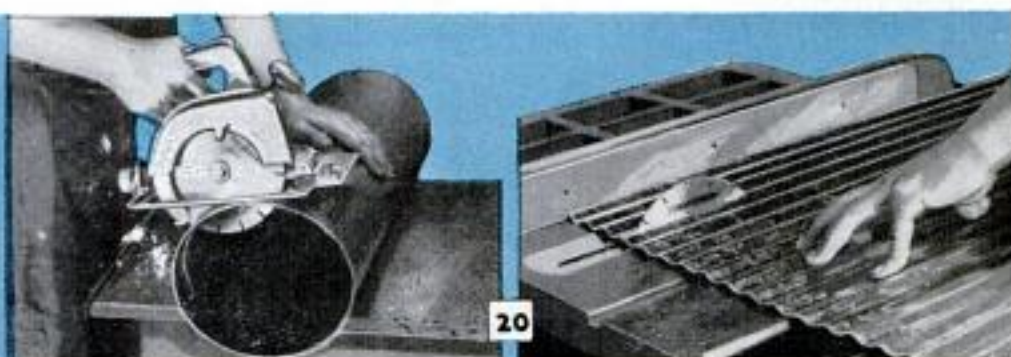
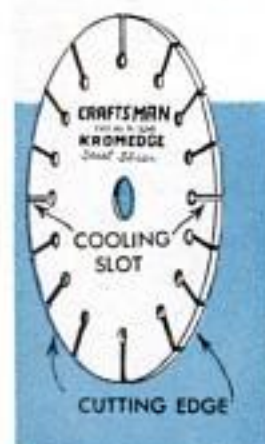
**19. SOCKET WRENCH** has a hinged handle which gives greater leverage and permits operation in exceptionally close quarters. When socket is engaged, pressing down slightly on the wrench head disengages handle and permits it to swing freely in either direction. Releasing wrench head allows it to engage at any point. Meets regular specifications for torque

F & C Tool Co., P.O. Box 5926, Portland 22, Ore.



**20. SAW BLADE** of unusual design cuts thin sheet metals, corrugated roofing, heating ducts, gutters and downspouts. At conventional saw speeds the blade heats the metal to the melting point, slicing its way through stock rather than sawing. Deep slots in edge of blade act as cooling vanes, or fins, preventing overheating of blade at the cutting edge

Sears, Roebuck and Co., 925 S. Homan Ave., Chicago 7



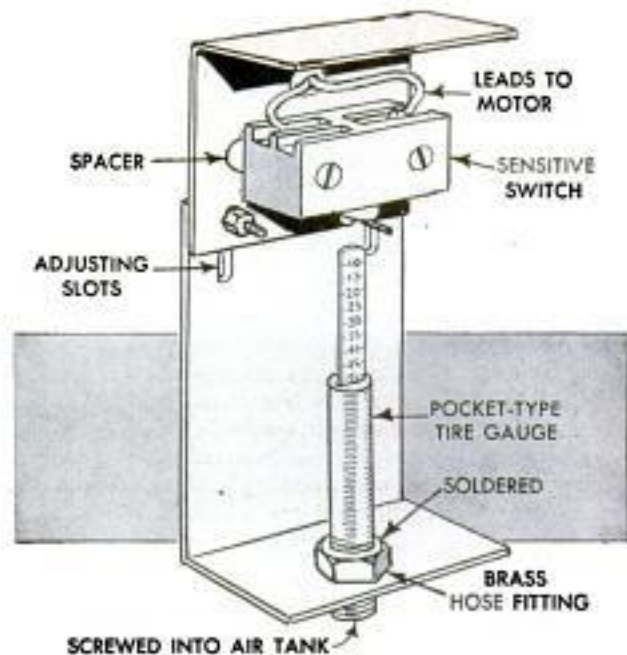




### Groove in Center of Wheel Speeds Grinding

Fine grinding wheels of small diameter often tend to glaze and heat abnormally when grinding the softer metals. This tendency generally can be minimized by cutting a shallow groove at the center of the wheel with a diamond dresser. The groove should be  $\frac{1}{2}$  in. deep, and about  $\frac{1}{8}$  in. wide. The groove reduces the area in contact with the work and dissipates heat.

Frank LaSaracina, New York City.



### Pocket-Type Tire Gauge Actuates Compressor Switch

Here's the pressure switch for that air compressor you're building. It consists of a sensitive switch and a pocket-type tire gauge mounted on an adjustable two-piece bracket, the latter providing pressure control over a considerable range. A short length of  $\frac{1}{8}$ -in. threaded pipe is soldered to the end of the tire gauge, passed through a hole drilled in the lower leg of the bracket and screwed into a tapped hole in the pressure tank. Adjust the bracket so that the plunger of the gauge actuates the switch when desired pressure is reached.

Thomas N. Park, Woodland Hills, Calif.

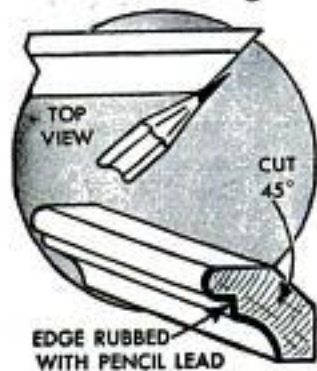
### Clean Holes in Aluminum Alloys Require Special Drill Bits

Drilling holes in aluminum alloys up to  $\frac{1}{2}$  in. in diameter calls for high-spiral drill bits and high-spindle speeds. A cutting speed of 600 r.p.m. at the periphery of the drill bit gives average good results.

Using this figure as a basis of reckoning spindle speeds, a  $\frac{1}{8}$ -in. drill would require a speed of 1800 r.p.m. while a  $\frac{1}{2}$ -in. drill would call for a speed of 4584 r.p.m.

Robert A. Ridout, Glenview, Ill.

### Pencil Shading Aids Cope Cut



A cope cut on the second piece of molding is made easily and accurately if you first miter the stock. Then shade the molding profile with a soft-lead pencil. This gives you a clean, sharp line which is easily followed

with the coping blade. Use a narrow, fine-toothed blade.—Leonard S. Knox, Chicago.

### Nonspill Pouring Spout



Force a section of curved radiator hose over the spout of a 5-gal. fuel can and you eliminate the waste of a lot of gasoline or fuel oil. The extra length of the spout enables you to drop the end into the fuel-tank

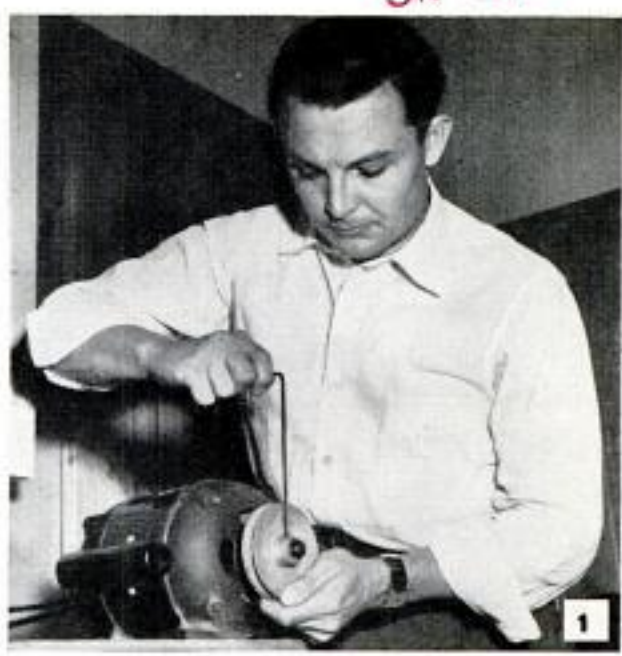
opening before the fuel begins to pour from the spout.—E. V. Reyner, Townsend, Mont.



SN 59

# SETScrew TIPS

PARTS HELD IN PLACE with setscrews are found on all types of power equipment, both in home and industrial shops. On newer power units, setscrews usually are of the socket type of a length which will turn in flush with the surface of the part being held in place. On older equipment you often find headless slotted setscrews of the flush type and also setscrews with projecting square heads. If the latter are used on moving parts, such as pulley or gear hubs, they should be replaced with socket setscrews as a safety measure. Also, socket setscrews that project should be replaced with a screw of the correct length. See the upper left-hand detail in Fig. 2. If the screw projects, it may catch clothing and cause a serious injury.

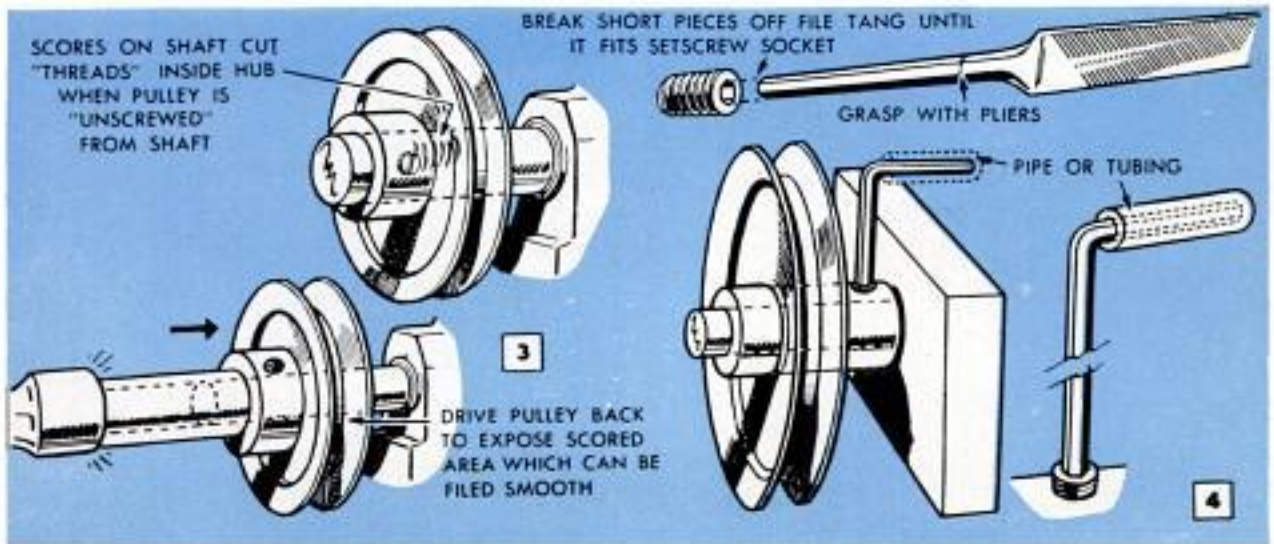
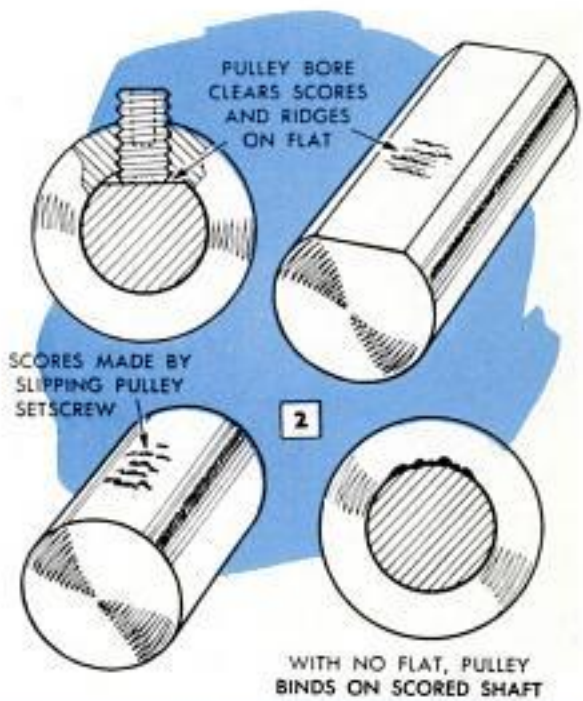


When you loosen a socket setscrew from a pulley hub, use the long leg of the socket-setscrew wrench as in Fig. 1. Be sure that the hex end of the wrench is pressed into the screw socket as far as it will go. If the screw cannot be loosened with the wrench in this position, use the short leg, but be careful not to apply too much pressure.

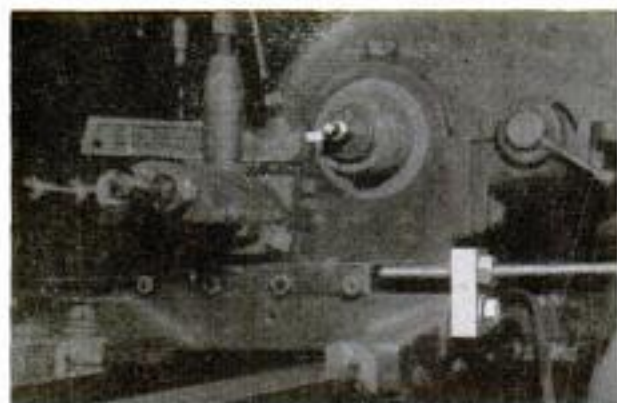
If you place a pulley or gear on a round shaft, file a flat on the shaft as in the upper right-hand detail, Fig. 2. Otherwise the pulley may be extremely difficult, if not impossible, to remove.

Be sure to turn the setscrew out far enough to clear before turning a pulley to remove it from a shaft, upper detail, Fig. 3. If the shaft is already scored, tap the pulley back and remove scores with a file. In an emergency you can use a file tang as a socket-setscrew wrench, upper detail, Fig. 4. A short handle of pipe or tubing, Fig. 4, makes it easier to turn the regular setscrew wrench.

Louis Martin Reitz, Bourbon, Mo.







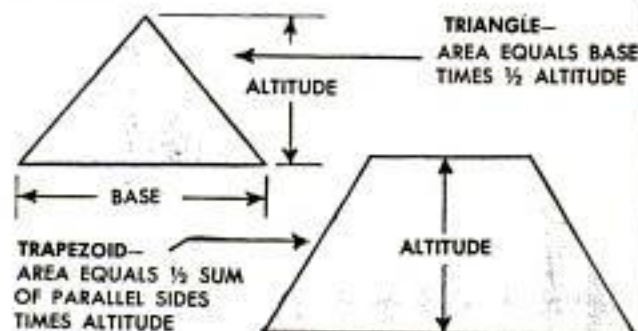
### Cross-Feed Stop for Lathe

When duplicating metal turnings, especially small parts, a cross-feed stop assures consistent accuracy and a saving in time. A  $\frac{1}{16}$ -18 threaded stop rod, a hex nut and a steel block are all the parts you need to make one suitable for the purpose. The block is drilled and tapped for the rod and also is drilled for a setscrew by means of which it is attached to the back slide of the lathe carriage as pictured. The hex nut holds the rod in the desired position. The guard usually will have to be removed from the cross-feed slide so the end of the slide can contact the rod.

Carleton A. Phillips, Corning, N. Y.

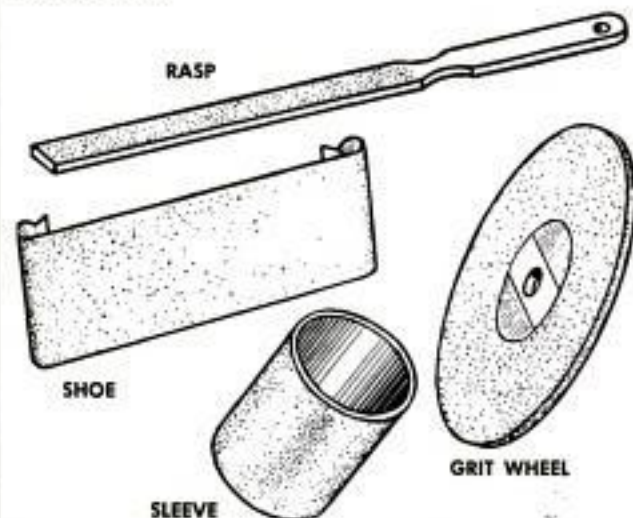
### Calculating Roof Areas

When you need to calculate shingle requirements for reroofing an ordinary gable roof without dormers, you will remember that to figure the area of a rectangle you simply multiply the dimensions of two adjacent sides. But a hip roof usually consists of two triangles and two trapezoids. Figure as in the details. Measuring the roof periphery at the eaves and then multiplying by one half the rafter length gives you the area of a conical roof.



## This New Abrasive Cuts Fast and Clean

**T**HIS ABRASIVE is really new. The abrasive grains are of tungsten carbide and these are fused to steel by a process developed by Skil Corp. It's now available as a rasp for handwork, a shoe for orbital sanders and hand-sanding blocks, a sleeve for sanding drums and a grit wheel, or disk, for use on a circular saw. Photos below and on the opposite page show what it will do in the shop. Cuts wood, metal and plastic faster than any abrasive you ever used. Won't clog or burn the work. The secret of its fast-cutting properties is that the abrasive grains are not brittle—they stay needle sharp. The disk and rasp are faced with two grit sizes. With the disk you can rip and crosscut wood, rough sand and finish, remove waste to the line, run grooves and cope cuts with the speed of a dado head. ★ ★ ★



Above, new carbide abrasive is presently available in the accessories pictured. Below, an orbital sander with shoe does a real job on plasterboard joints







**It's a fast, smooth-cutting rasp for expert work on wood. Needle-sharp abrasive severs the wood fibers. Comes with two grit sizes for roughing and finishing**

**Rough shaping stock to an irregular pattern line as in spiling, can be done by making adjacent cuts and then cleaning out the waste to pattern lines**



**Disk makes grooves any width from 1/4 in. up. You'll be surprised at how fast it cuts. Disk will load somewhat in resinous wood. Clean with turpentine**



DECEMBER 1957



**A smooth ready-to-finish edge on curved work is a sure thing with this carbide-grit drum. It's free-cutting, no burning or discoloration of the wood**

**One side of the disk is faced with a coarse, open grit, the other with fine grit. Does a sharp, clean job of rounding corners without chipping or scoring**



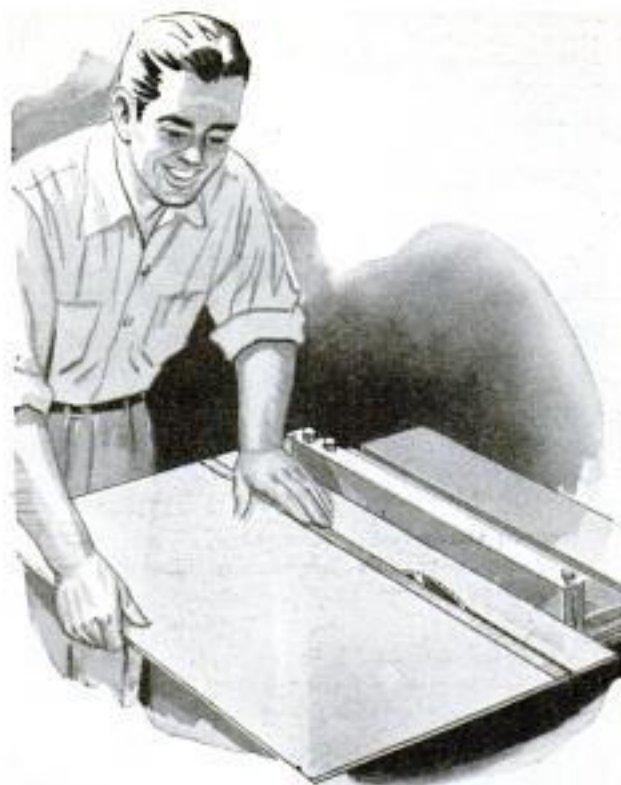
**Disk makes cope cuts of average depth in two passes. Cuts as cleanly as a dado head or molding cutter. Feed the stock against the coarse side of the disk**



215



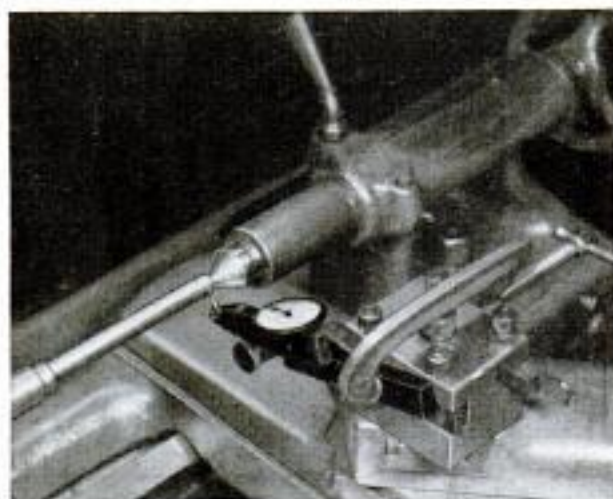
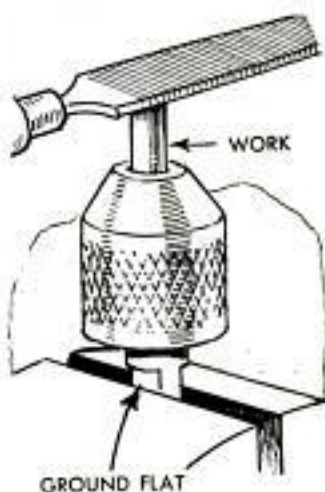
## Masking Tape Prevents Chipping of Plastic When Sawing



Before cutting a sheet of plastic on the circular saw, apply a length of masking tape to the top face of the sheet, the edge of the tape flush with the pattern line. The tape will prevent chipping of the cut edges. Use a crosscutting blade with a light set to the teeth.

## Chucking Round Work in Vise

Here's one way to overcome the difficulty of holding round work in a vise. Thread the end of a short length of steel round to take a screw-on-type drill chuck. File or grind two flats on the opposite end. Then set up as detailed. — Frank Shore, New York City.



## Resetting Lathe Tailstock

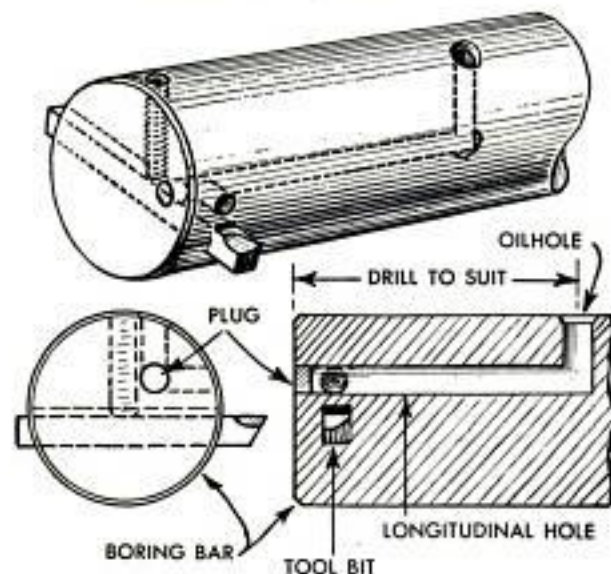
After turning a taper with the tailstock offset it's a rather tedious chore to reset it for turning a straight shaft. Bring the tailstock back to the witness marks on the base, run a light cut on the work and check for taper with a dial indicator. Suppose, for example, the shaft still shows a taper of .004. Zero the indicator at the end of the shaft and move the tailstock (toward operator) until the indicator shows .002. Tighten the tailstock clamp nut and recheck the reading. If the reading holds, the centers are very closely aligned.

J. C. Magee, Schenectady, N. Y.

## Oil Carried to Boring Tool

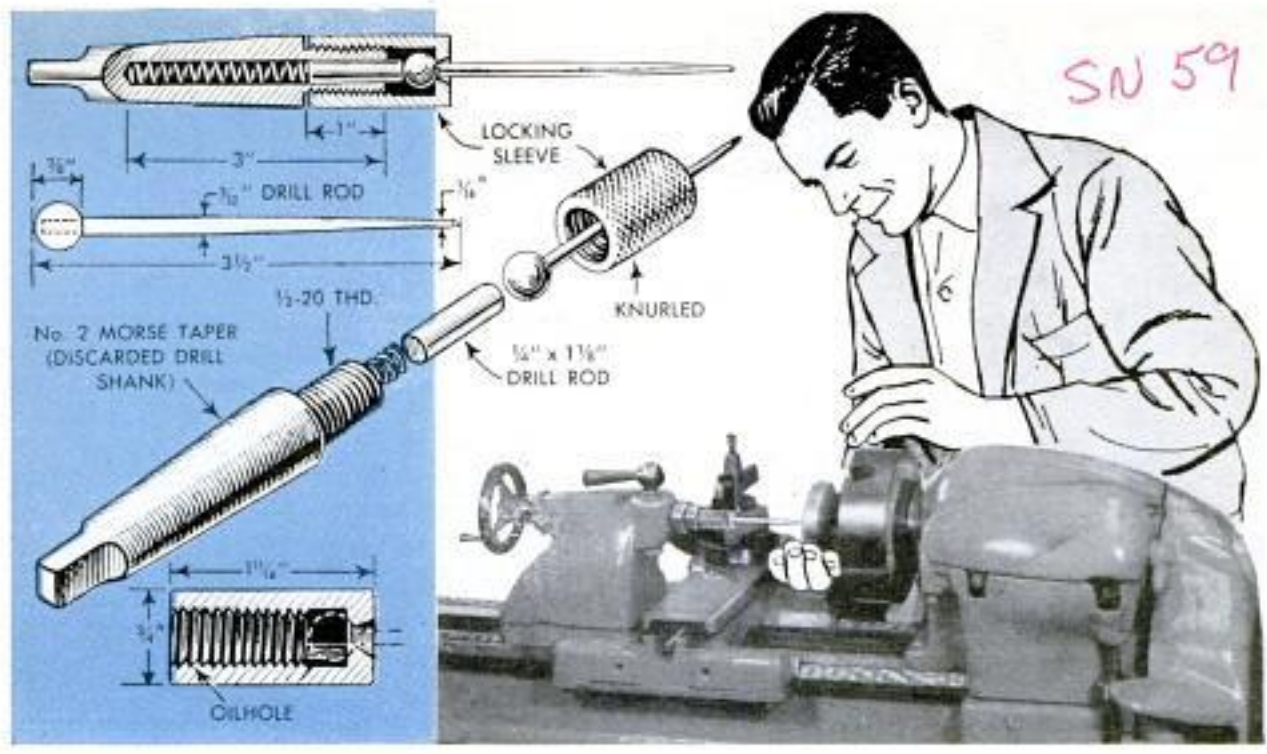
A constant supply of coolant to the boring tool is necessary in production work. In deep bores the problem is to supply oil to the tool in a uniform flow. Large boring bars usually are sufficiently rigid to permit drilling small transverse and longitudinal blind holes in a position to form a continuous passage as detailed. One transverse hole must be drilled directly into the longitudinal hole, entering at a point directly over the cutting tool. The second hole is drilled into the longitudinal hole at right angles to the first. Then the hole system is plugged. By improvising a nozzle, a steady flow of coolant can be brought directly from the pump.

Frank L. Rush, Columbus, Ohio





SN 59



### Shop-Made Indicator Centers Work in Four-Jaw Chuck

When dial-indicator accuracy is not required, this improvised indicator, or wiggler, speeds up the rather tedious job of centering work in a four-jaw chuck. The unit is built up on a discarded drill shank having a No. 2 Morse taper. The large end of the tapered shank is squared, shouldered and threaded to take a knurled locking sleeve as shown in the sectional view. The locking sleeve seats a ball-tipped pointer against a spring-loaded plunger housed in the tapered shank. Drill the hole for the spring and plunger immediately after shouldering and threading the tapered shank without removing the latter from the lathe spindle. This procedure will as-

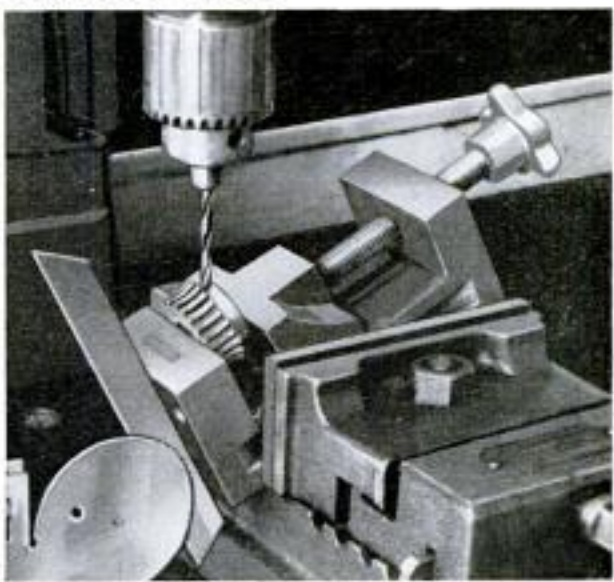
sure concentricity. Make sure that the plunger, which is cut from 1/4-in. drill rod, is a free fit in the hole in the shank. Run a long taper on one end of the pointer and then machine the end to a 60-deg. included angle. Shoulder the opposite end of the pointer to a force fit in a hole drilled in a 3/8-in. dia. steel ball. In use, the work is placed in the four-jaw chuck and centered as closely as possible by eye alone. Then the indicator is placed in the tailstock and the latter is run up until the pointer enters the center hole in the work. Turn the lathe by hand and adjust the chuck jaws until the pointer runs dead true.

C. W. Woodson, Chicago.

### Drilling Angular Holes Accurately in Dual-Vise Setup

Where the angle is not critical, reasonably accurate angular drilling can be done with the setup pictured. It's useful when angular drilling is called for and there's no angle vise at hand. Nearly all drill vises will serve as the second vise in the setup as the fixed jaw usually is squared on the outer face. Set the second vise with a protractor to the required angle with both vises in the position shown. Then clamp the larger vise in position on the table. Don't move the setup after the angle has been determined. Then grind the drill bit to the recommended angle and start the drill with very light pressure. In some cases it is best to put through a pilot hole first, especially if the finished hole is more than 1/4 in. in dia.

H. J. Gerber, Stillwater, Okla.





SN 59

# Soldering Hints

By Ken Murray



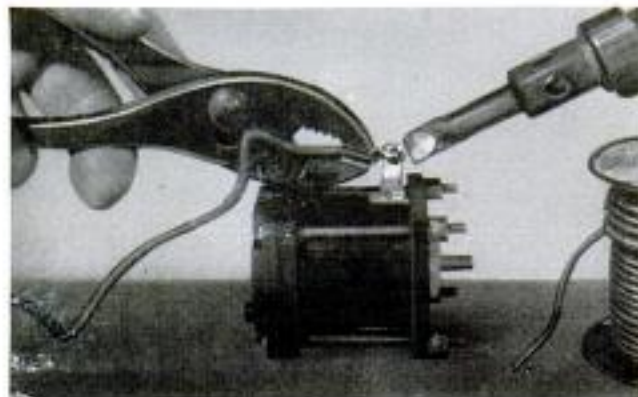
A NEAT AND SOUND JOB of hand soldering calls for chemically clean joining surfaces, heated uniformly to the correct temperature. From there on, the procedures are determined largely by the type of work, its size and the number of separate soldering operations necessary to complete the job. Surfaces are made chemically clean by fluxing and manual use of an abrasive to loosen grime and corrosion. Often the nature of the work will permit abrading and fluxing the surface in one operation. The iron used must be of a size to heat the work quickly to soldering temperature. The flame from a torch is adjusted to concentrate heat at the desired point. ★ ★ ★



**CLEAN AND FLUX** work in one operation. One of the main reasons for failure of a soldering job is lack of care in cleaning the joining surfaces. After cleaning, surface of metal begins to oxidize quickly. This can be prevented by combining cleaning and fluxing. Dip fine steel wool in paste flux, or saturate with liquid flux, and go over surface thoroughly



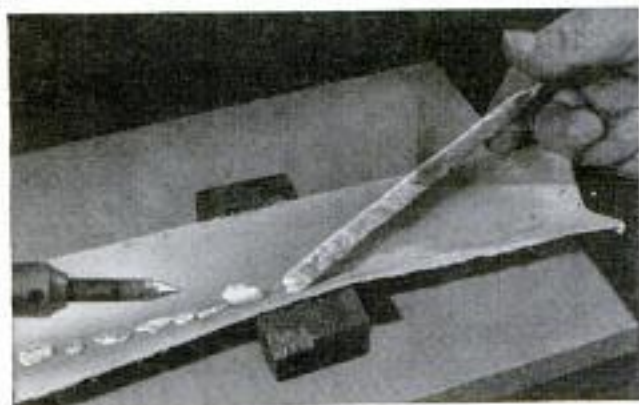
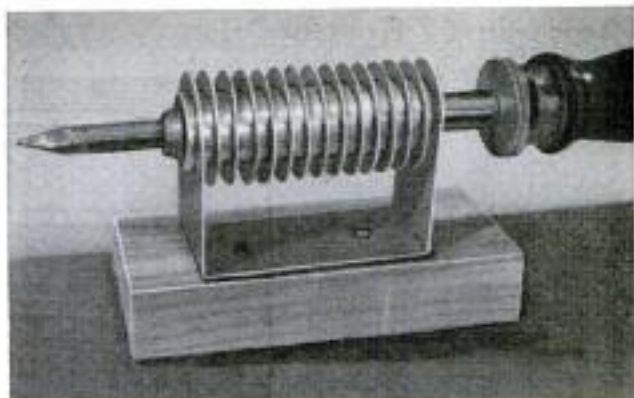
**CUT WIRE SOLDER** into three or more fine strands with tin snips before applying to delicate work involving joining of small parts. By touching one of the strands to heated work only minimum quantity of solder will flow, resulting in a neat, smooth joint. On some types of work it is helpful to cut wire solder into short pieces, each about 1/8 in. long



**BURNING OF INSULATION** can be prevented by gripping insulation close to bared portion of the wire with pliers. Jaws of pliers absorb heat and prevent charring. On some types of work it is possible to grip bared portion of wire just beyond the insulation. This is more effective where nature of work will permit. Avoid gripping insulation too tightly

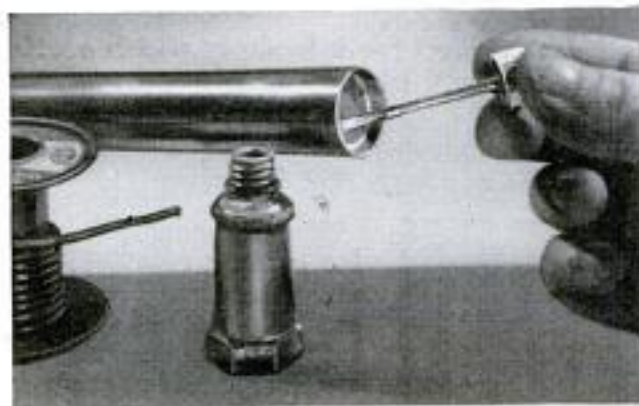
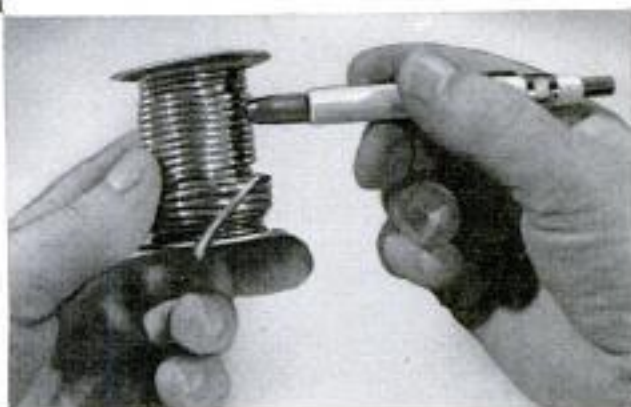


→  
**HEAT-RADIATING STAND** lengthens life of the heating element of your soldering iron where the nature of the work requires that the iron be maintained at full heat for intermittent use. Photo pictures the stand complete and in use. Fins dissipate heat when iron is placed inside while not in use. Also eliminates fire hazard from bench-top soldering



←  
**SAVE SOLDER SCRAPS** by placing pieces in a creased strip cut from sheet asbestos. Apply heat, either with a small torch or large soldering iron, until solder melts and flows in a continuous strip. If asbestos strip is creased sharply at the center solder will harden into a triangular strip which is usable as bar solder when work is coated with paste flux

→  
**RED WARNING MARK** identifies acid-core solder, so that it will not be used by mistake when soldering electrical connections. Mark spool of acid-core wire solder with a red crayon in the manner pictured, then spread the color by rubbing it lightly with thumb. This will leave a thin red film of color on each coil of solder which is easily seen



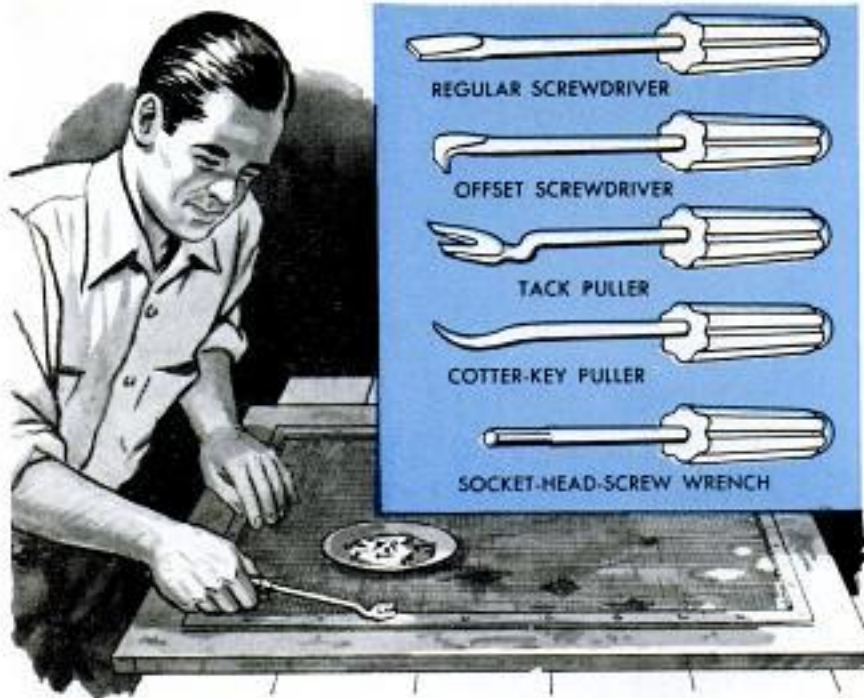
←  
**WHEN APPEARANCE OF SOLDER JOINTS** is a factor, as on certain models and in instrument work, joints are sometimes coated with aluminum paint after the solder has cooled. This prevents a slow darkening of solder due to oxidation. Pour a small quantity of the point into a fingernail polish bottle and use the applicator to apply paint to the joint

→  
**SPRING-TYPE CLOTHESPIN** makes a good clamp for holding small parts in place while soldering. Cover the jaws with two thicknesses of sheet asbestos cemented in place to prevent wood from being charred by heat from iron. Use sodium silicate (water glass) as a cement. For clamping heavier work, pads of an ordinary C-clamp are covered this way





## Damaged Screwdrivers Adapted to Other Practical Uses



Several useful hand tools can be made by reworking discarded or damaged screwdrivers. Anneal (heat) the point and bend the blade at right angles, harden and you have a handy offset driver. Make a tack lifter in the same way, only hammer the blade out while hot to make it wider. A handy cotter-key puller can be made by a similar procedure except that you draw the blade to a point. Bend and harden. Or, cut off the blade, grind square and weld on a section of hex rod to make a socket-screw wrench.—Charles H. Willey, Concord, N. H.

### Drill Bits Stored in Handle

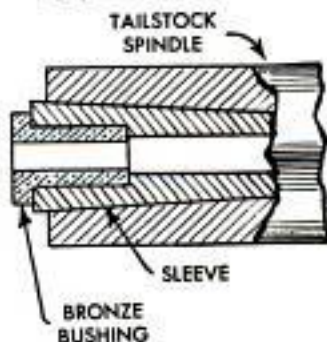
Ever think of storing drill bits in the top handle of your ½-in. portable electric drill? This handle is, of course, removable and usually consists of steel tubing or pipe having one end threaded. Just press a piece of tissue into the threaded end, screw in place and cap with a crutch tip.



A. Vena, Philadelphia, Pa.

### Centerless Work Support

Here's a solution to one of those special machine-shop problems, that of supporting the centerless end of a rod on which a long knurl was to be run. A live lathe center (soft) was squared off at the big end and counterbored for a bushing which carries the free end of the rod.



Frank L. Rush, Columbus, Ohio

### Pressure-Sensitive Tape Holds Blocks on Faceplate for Turning



Small hardwood blocks, for turning rosettes, pulls and other small parts, are easily attached to the lathe faceplate or to a wooden backing disk by means of pressure-sensitive tape. Use of the tape as a fastener instead of the center screw eliminates the need for a screw hole in the work. Several strips of the tape attached to a wooden backing disk screwed to the faceplate will hold a disk up to 2 in. in dia.—D. C. Marshall, Manhattan, Kans.



*These men chose  
before enlistment—  
so can you!*



**Pvt. Floyd E. Van Briesen**  
Brookings, South Dakota  
Graduate, School of  
Agriculture

"I picked my own Army job training, and it was guaranteed for me *before* I enlisted. I chose a fine Diesel Repair course. My instructors were really good, and the training equipment was the best you could find. Now I'm an expert in diesels. I found only the Army offers a deal like this."



**Pfc. Allen M. Voeltz**  
Bouler, Wisconsin  
Graduate, Bouler Union  
Free High school

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Seniors—get all the details on how high school graduates can choose their technical training before enlistment from 127 modern courses. Mail this coupon for your free booklet today. Or for immediate counseling visit your local Army Recruiter. He's listed in the phone book and will give you all the facts—at no obligation!

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Department of the Army  
Washington 25, D.C.  
Attn: AGSN

PM-12-57

Please send me the free Army booklet telling how high school graduates can choose their technical training before enlistment in Modern Army Green.

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America's Newest,  
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Get Choice, not Chance  
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**MODERN ARMY GREEN**





TO TAKE AND SHOW COLOR SLIDES BIG AS LIFE . . .



New Kodak Pony IV Camera features simplified exposure settings, zone focusing. Complete with camera, flashholder, case, slide viewer. Kodak Pony IV Camera Outfit, \$58.40 (Camera alone, \$39.95)



Built-in meter tells exactly how to set camera for just-right exposures! Kodak Signet 50 Camera with two-reflector flashholder, \$82.50 (Kodak Signet 30 Camera, same basic camera without meter, \$55)

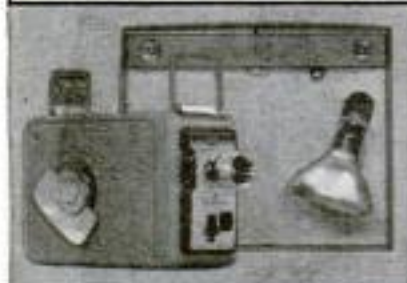


Kodak Signet 40 Camera in luxury gift outfit includes case, Kodak Rotary Flashholder, battery, Kodak Filter Kit. Kodak Signet 40 De-Luxe Outfit, \$96 (Camera and Super-M 40 Flashholder, \$74)

## Christmas Gifts from Kodak

When you open a Kodak Camera Outfit first, you can save all the fun of Christmas—and years to come—in pictures

8mm MOVIES—FINEST FAMILY GIFT OF ALL . . .



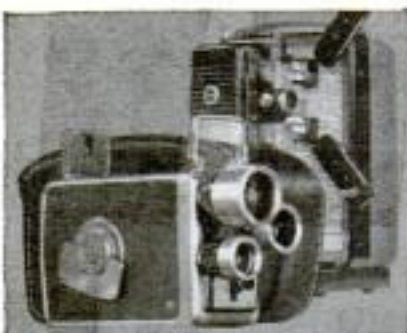
Brownie Movie Camera  $f/2.7$  takes color movies with snapshot ease. Complete with Brownie 2-Lamp Movie Light and flood lamps for indoor use. Brownie Movie Camera Kit,  $f/2.7$ , \$38.40 (Camera, \$29.95)



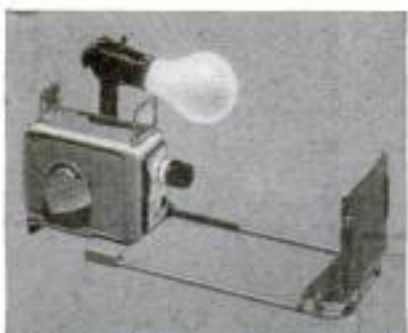
Complete movie outfit—Brownie Movie Camera,  $f/2.3$ ; Brownie 300 Movie Projector shows movies 3 feet wide. Brownie 300 Movie Outfit complete, \$104.70 (Camera, \$39.75. Projector, \$64.95)



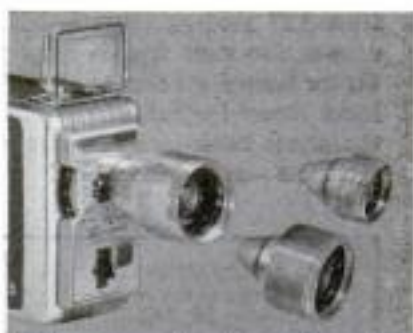
Take and show movies up to 4 feet wide! Brownie Movie Camera  $f/1.9$ , case, 4-lamp light bar, Brownie 500 Movie Projector. Brownie 500 Movie Outfit complete, \$144.95 (Camera alone, \$49.75)



Brownie Movie Camera, Turret  $f/1.9$  takes normal, wide-angle, telephoto movies; Cine-Kodak Showtime 8 Projector shows 8mm movies extra bright. Kodak Super 8 Movie Outfit, \$214 (Camera, \$84.75)



Titles and close-ups are easy with this titler for Brownie Movie Cameras. Includes camera platform, close-up lens, light bar, easel, title cards, "special effect" masks. Brownie Movie Titler Outfit, \$15.95



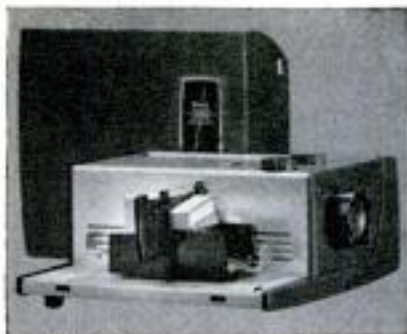
Take panoramic wide-angle or close-up telephoto views with your single-lens Brownie Movie Camera. Converters slip over regular lens. Kodak Wide-Angle and Telephoto Converters, \$18.50 each.

EASTMAN KODAK COMPANY, Rochester 4, N.Y.





Kodak Retina Camera outfits include telephoto and wide-angle lens components, case, carry-all bag. Kodak Retina IIIC Camera Outfit, \$394 (Camera, \$175). Kodak Retina IIC Outfit, \$351 (Camera, \$132)

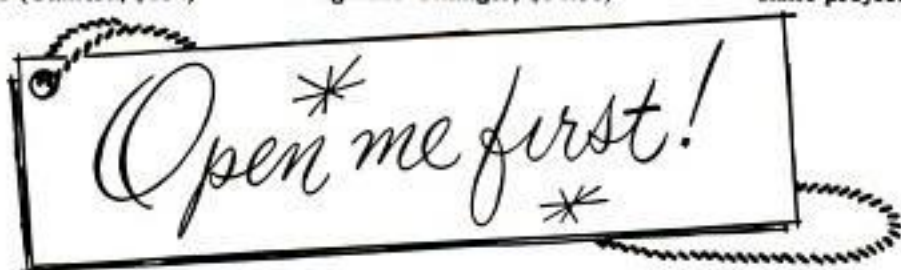


Kodak 300 Projector is ultra-portable, shows color slides big and bright. Quiet; cool; has finger-tip controls. Kodak 300 Projector with Readymatic Changer, \$64.50 (with Magazine Changer, \$74.50)



Complete color-slide outfit. Includes Kodak Pony IV Camera, Kodak 300 Projector. Kodak Pony Color-Slide Outfit, \$104.50 (Kodak Signet 40 Color-Slide Outfit with same projector, \$138.50)

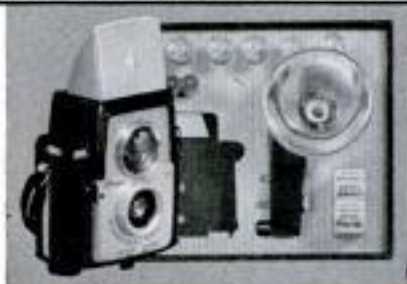
**say**



FOR 'ROUND-THE-CLOCK SNAPS IN BLACK-AND-WHITE OR COLOR...



Brownie Starflash Camera takes color slides, black-and-white and color snaps. Built-in flashholder. Complete with bulbs, batteries, film. Brownie Starflash Outfit, \$9.95 (Camera alone, \$8.95)



Brownie Starflex Camera "previews" your shot, takes color slides and snapshots. Complete with camera, flashholder, batteries, film. Brownie Starflex Outfit, \$16.50 (Camera alone, \$10.75)



World's most popular snapshot camera in a gift outfit complete with Brownie Hawkeye Camera, flashholder, batteries, bulbs, film. Brownie Hawkeye Flash Outfit, \$15.25 (Camera alone, \$7.95)



Preview-finder of Kodak Duaflex IV Camera shows picture *big!* Complete with camera, flashholder, batteries, bulbs, film. Kodak Duaflex IV Flash Outfit, \$25.25 (De-Luxe Flash Outfit, \$38.75)



New Kodak Rotary Flashholder permits you to shoot six flashbulbs without reloading. Two models to fit most cameras. Kodak Rotary Flashholders, from \$10.95 (Batteries not included.)



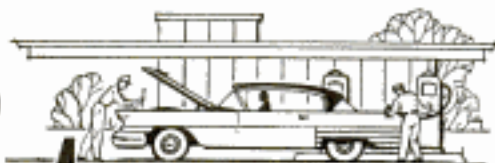
Kodak Photo-Hobby Outfits for developing negatives, printing snapshots at home. From \$10.75

**Kodak**  
TRADE MARK

*Prices are list, include Federal Tax wherever applicable, and are subject to change without notice*



## Shelling out for oil too often?



**YOU STAY OUT  
of this expensive danger  
zone when you re-ring  
with Sealed Power!**

Does your oil stick read low when you pull in for gas? Notice bluish exhaust fumes when you slow down? Miss the old pep and surge your car once had? Stop right now throwing oil money away! It's high time for you to get a Sealed Power ring job and go from drain to drain without buying oil.

### IMMEDIATE OIL SAVINGS

Sealed Power's KromeX Ring Sets are engineered to start you saving on oil bills at once. And Sealed Power's revolutionary new stainless steel oil ring will keep giving you maximum oil control with no smoking . . . will go on resisting corrosion and sludge . . . will assure top performance for *double* the ring life you expect from ordinary rings.

### FREE! BOOK ON AUTO CARE

Want to know more about proper car maintenance? This free 34-page booklet is packed with information which will make you expert at understanding and caring for your engine. Called "Care and Feeding of Engines," it's yours for the asking. The tips you'll find in it could save you hundreds of dollars. For your free copy, write Sealed Power, Dept. G-12, Muskegon, Michigan.



# Sealed Power

## PISTON RINGS

**BEST IN NEW CARS! • BEST IN OLD CARS!**

## Clinic for Homemakers



As a service to our readers in solving the hundreds of problems pertaining to a home—inside or out—the editors of *Popular Mechanics* invite you to present your problems to The Clinic Editor for help and advice. Address your questions to The Clinic Editor, *Popular Mechanics Magazine*, 200 East Ontario Street, Chicago 11, Ill.

### Fence to Drift Snow Over Garden

*Q—I'm told that a low fence erected on the side of the garden plot from which winter winds blow will cause snow to drift over the plot, which will be beneficial. Is this true? And can I build a fence near a strawberry bed?*

*M.B.—Madison, Wis.*



*A—It's true that a board or picket fence placed as you suggest will cause snow to drift over the garden plot if the plot is in the open where the prevailing winds sweep across it. The only direct benefit from the drifted snow is derived from the moisture which seeps slowly into the soil when the drift melts away in the spring. Also, under certain conditions, this additional moisture may tend to stimulate the activity of nitrifying bacteria and thus increase the available nitrates in the topsoil. The drift also will prevent the blowing of dry soil during the winter months. Drifting snow over a strawberry bed by means of a fence could, perhaps, be recommended for the same reasons, but it is advisable to mulch the bed after the ground freezes with coarse straw or other material. The mulch should be removed from the plants in the spring.*

### Stopping Floor Squeaks

*Q—I have oak floors in my living and dining rooms. The floors in both rooms squeak when walked on, not just in certain areas, but all over the floor. In many places the top floor seems to be springy but the floor boards are in good condition and all joints are tight. How can I remedy this trouble?*

*H.B., Rochester, N.Y.*



*A—You do not say whether the house is old or new, nor do you give the thickness of the flooring. If the floor has been laid a number of years, it is probable that the nails holding the bridging between the joists have loosened, permitting the floor to spring irregularly as you walk through the room. This has the effect of loosening the nails holding the top floor to the subfloor. Slight movements between the two floors produce most of the squeaks. Raise the floor slightly with screw jacks and wooden extensions placed under the joists.*

(Continued to page 226)

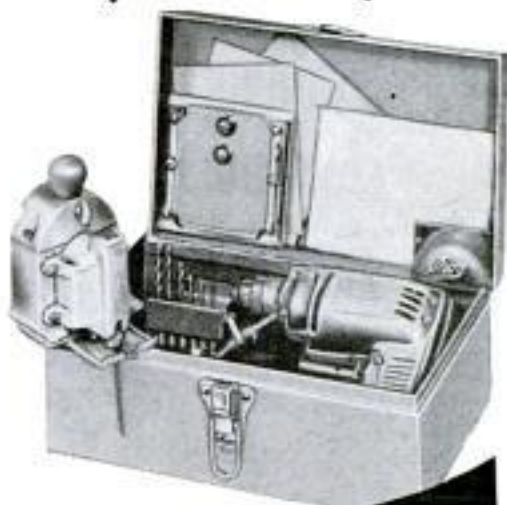




# Drop a hint for a NEW THOR SPEEDSHOP

*Christmas will last all year long!*

When you do your Christmas hinting, make it for something special—a new Thor SpeedShop. It's really three tools in one—a drill, a jig saw and a reciprocating sander, plus seven drill bits, four abrasive sheets, buffing bonnet and a steel carrying case. And you get it all for the Christmas special price of just \$37.50. Quality built—you bet! The basic power unit of Thor's SpeedShop is the ¼" SpeedDrill model 20 (½" in wood). This drill is super-powered with a full 2.5 amperes. Power aplenty for the custom-made accessories. The drill and the accessories were made for each other and for long productive life. Look for the bright Christmas display at your dealers. Ask to see the complete SpeedTool line. SpeedWay Manufacturing Company, division of Thor Power Tool Company, Prudential Plaza, Chicago 1, Illinois.



**\$37<sup>50</sup> buys 3 tools in 1**

See the dealer with the bright Thor display



Includes lambswool buffing pad, 7 drill bits, 4 abrasive sheets, steel carrying case.



**THOR POWER TOOL COMPANY  
CHICAGO**

*Branches in all principal cities*  
World's largest exclusive manufacturer  
of portable air and electric tools





**THE REACH IS RIGHT AND TIGHT**

**with KRAEUTER**

**LONG NOSE PLIERS**



#1781-7"

You can depend on reachability and cutting power with Krauter's #1781 Long Chain Nose Pliers. And your reach will be tight and sure for those hard-to-get-at jobs with the extra long milled jaws of these pliers.

Buy the right line. It's the Krauter line. Krauter tools are unreservedly guaranteed.

Send for catalog #25 illustrating complete Krauter line.

**BUY THE FINEST  
BUY KRAEUTER  
BUY AMERICAN**

MODERN AS TOMORROW

**krauter & co., inc**

FOR 100 YEARS THE FINEST IN HAND TOOLS 1860-1960 NEWARK, N. J.



(Continued from page 224)

Tighten the bridging, driving in additional nails if necessary. Then drill a line of small holes midway between each pair of floor joists, spacing the holes about 6 in. apart and taking care not to drill through the top floor. Select flat-headed screws of a size to fit these holes and of a length that will enter the floor board but will not go entirely through.



#### Garage Doors of Knotty Pine

**Q**—I would like my garage doors to be built of knotty pine in board-and-bleed construction and finished in the natural color like interior woodwork. However, my carpenter does not recommend this; he says doors of this type and finish will soon warp and be difficult to open and close. Is he right? Or is there some finish that will prevent this?

M. E., St. Paul, Minn.

**A**—We are inclined to agree with your carpenter, although it is true that natural-finished garage doors of knotty pine are now quite widely used. If sound, well-seasoned stock is obtained and if the doors can be built and the finish applied immediately to protect the wood from undue moisture absorption, then it is probable that doors of this construction would be satisfactory.

#### Open Joints in Downspouts

**Q**—What causes the joints in downspouts to open? I recently noticed that two downspouts on the north side of my house have open joints.

O. L., Ind.

**A**—Perhaps the most common cause is a partial clogging of the downspout by entrapped leaves or other trash which may build up to the point where the obstruction will collect water which freezes in cold weather. Normally the corrugations in downspout sections allow sufficient expansion to prevent opening of the seam, but if the spout is clogged, the pressure may be sufficient to open the seam. Sometimes it is possible to force the seamed edges back in place and crimp with pliers. Otherwise the section should be replaced.

#### Removing Ceiling Beams

**Q**—Our older home has a beamed ceiling in the living room. I think the trim and the ceiling beams are of oak and it has been stained a dark color which undoubtedly has darkened more with age. We have planned to remove the beams and refinish the remaining woodwork in this one room. We hesitate, however, because of the possibility of weakening the structure in some way by removal of the beams. Without breaking out some of the plaster it apparently is not possible to tell whether the beams are solid or are built up of three or more pieces. What do you think of the advisability of the procedure?—S.T., N. Y.

**A**—In older homes, especially those more than 50 years old, it is quite possible that the beams are of solid stock. However, you do not give the size of the beams or describe their appearance. Neither did you say whether the house is of masonry or frame construction. In older homes the type of construction often determines how the ends of the beams are set into the walls. If, for example, the walls are of solid masonry such as brick or stone, the ends of the beams are sometimes housed in the masonry. This would make removal of the beams somewhat difficult and perhaps not advisable. If, on the other hand, the beams are of hollow, or false, construction and are in a frame structure the chances are good that the ends are supported on a ribband nailed to the studs. If this is the case, then removal would be comparatively simple. Perhaps the best procedure would be to remove plaster at one end of one of the beams. This should reveal not only the type of beam which was used, but also how the ends are anchored in the walls.





# NEVER NEEDS NEW BATTERIES!

## NEW REMINGTON CHARGE-A-LITE

The secret of Charge-A-Lite's revolutionary new storage battery is the newly invented Nickel Cadmium storage cell. Unlike any other battery, it's non-corrosive . . . holds a charge indefinitely when not in use. Charge-A-Lite is simple, rugged. It's hermetically sealed, can't leak, recharges overnight.

To recharge, just plug into any AC socket. The compact, ivory plastic case is 4½" x 2", weighs 3.5 ounces.

Charge-A-Lite comes with spare bulb and unbreakable lens. One year warranty

on sealed unit. At better stores and Remington Shaver Service Centers, or write for name of dealer.

### Bright Idea for Christmas!



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Large, easy-to-follow plans contain illustrated step-by-step instructions and complete bill of materials.



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**\*Use Only Exterior Fir Plywood  
 For All Marine Construction**

(EXT-DFPA® Means 100% Waterproof Glue!)

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Douglas Fir Plywood Association, Dept. 9, Tacoma, 2, Wash.

Please send plans checked below. I enclose 25c for each. (Good in U.S.A. only)

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Address \_\_\_\_\_

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

## Rainbows From Bouncing Atoms

(Continued from page 119)

valuable ore in the seams of the old granite mountain. Mineralight will activate green or greenish-yellow response in nearly all secondary uranium ores.

Some prospectors use ultraviolet to identify or pinpoint radioactive ores that they've located in general by geiger counters and scintillometers. In Pennsylvania recently, a rock-hound got a suspicious reading with his geiger counter on a cliff wall. But where to dig? He wired Cooper to fly in a mineralight, lowered it over the cliff side at night, found his fluorescent ore in an outcrop and went to work on a commercial deposit.

Prowling the wilderness in the dark adds spice to prospecting. Cooper loves to tell about a friend, hot on the trail of yellow-glowing autunite in the New Hampshire forests last summer. A rustle in the leaves brought him up short. As he fanned his invisible light in the direction of the sound, a pair of widely spaced fluorescent eyes glowed at him out of the blackness. Slowly the eyes rose to a height of seven feet. A three-inch row of blue fluorescing teeth grinned under the eyes. "That's when he realized there was a bear out there," says Bill. "You can't see past a mineralight. The bear saw only a faint violet light that hurt his eyes. He finally ambled off."

### Lamps Test Food

Because of ultraviolet's unique ability to make certain things fluoresce in certain colors, it is a supersleuth in many fields of science and industry. On the West Coast black light is detecting spoilage in citrus fruit before it happens. Oranges and grapefruit pass on belts beneath lamps which cause invisible bruise spots to fluoresce a bright purple. Dairies are handling eggs the same way. Pseudomonas, the tiny organisms in egg white that make a bad egg bad, will cause the whole egg to fluoresce a ghastly green under black light. "If you ever saw one," says Cooper, "you'd never eat another egg before checking it first."

Sanitary engineers, toting portable black lights around dairies, are able to detect invisible traces of bacteria-breeding milkstone deposits which glow blue or white in otherwise clean equipment. They are also able to trace rodents by the characteristic fluorescent trail they leave behind them, and thus the engineers discover and clean out the nests.

As a sleuth for solving actual crimes, black light has hung up quite a record in the past few years. In FBI laboratories, as

(Continued to page 230)



# Newest in the LIONEL yards

Look at these locomotives, cars and accessories. Then see them and the newest and longest freight and passenger train sets in action at your Lionel dealer.



Lionel Super "O" Track with its two realistic flat-top "T" shaped running rails and inconspicuous

third rail is authentic even to the molded ties, accurately detailed tie plates and rail spikes.



**NEW**

**No. 345 Culvert Unloading Station.** Crane travels by remote control to car, lowers magnetic lift, picks up culvert section, transports it to station, returns for more. Car included.

**No. 334 Operating Dispatching Board.** At remote control command, man moves across catwalk, changes information in the illuminated slots. Train names can be chalked in.

**No. 55 "Tie-Jector" Car.** Car moves under its own power, throwing ties along-side track. Railside trips control the action.

**No. 128 Animated Newsstand.** Fun-packed! Push remote control button and newsdealer moves to front of stand...newsboy turns and offers paper while pup (believe it or not!) chases his tail around hydrant.



**NEW**



**NEW**



**NEW**



**NEW**

**No. 746LTS Norfolk & Western Loco.** The most powerful steam loco in the Lionel line. A scale-detailed model of the N&W's 16-wheel 250-ton giant. With MAGNE-TRACTION, headlight, smoke... and whistle in the matching tender.

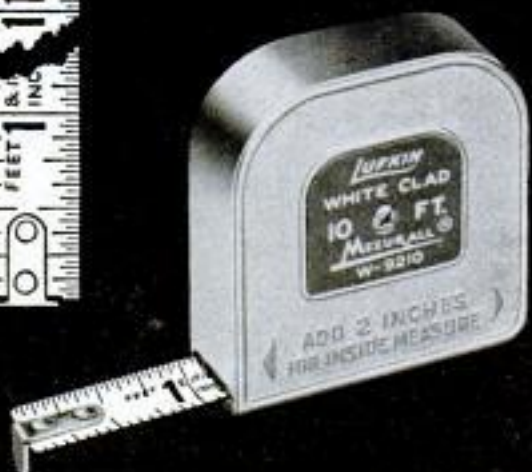
Free New 52-Page Catalog in Full Color. Get your copy at your Lionel dealer.

Hobbyists will want to see Lionel's new HO line as well as the "O27," "O," and Super "O" lines.

**THE LIONEL CORPORATION, 15 East 26th Street, New York 10, N. Y.**



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CRAFTSMEN**



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**MEZURALL  
TAPE RULES**

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**NEW...**

an accurate  
pocket tape  
rule that's  
really  
convenient  
to carry!



*actual size*

**LUFKIN EXECUTIVE  
THINLINE**

484

at hardware, lumber and  
tool dealers everywhere

well as homicide and detective bureaus in New York and the West Coast cities, police have found all manner of things that fluoresce, helping them to track down and identify criminals. Burn and X-ray scars glow vivid pearly white; many kinds of stains have a distinctive fluorescent color under black light. Old tattoo marks that were removed chemically leave a special fluorescence in the skin forever. Bits of dust indiscernible to human eyes often fluoresce like diamond glitter. Invisible traces of lipstick will glow fiery red under the lamp. Irradiated ink will show up, too, and many an altered will or document has trapped a villain when the original writing — which he thought was gone forever — leaped vividly from the page when sprayed with black light.

#### Detectives Use Black Light

The use of invisible tracer pastes, inks, dyes and powders that glow brightly when exposed to ultraviolet, is one of the most fascinating phases of black-light sleuthing. The paste was used to trace thieves who stole valuable copper wire used in government rural electrification installations. Fluorescent paste has also been used on firebox handles to trap people who turn in false alarms. The South Pasadena police have caught burglars who have crawled over a window sill covered with fluorescent powder. Stealing from gasoline tanks at a New Jersey tank farm was stopped when fluorescent dye was added to the tanks. Carburetors of guilty employees fluoresced under black light.

Some store owners are now protecting themselves from phony-check passers by insisting on invisible fingerprints on the check. These prints show up only under black light. If a check bounces, the culprit's fingerprints are turned over to the police.

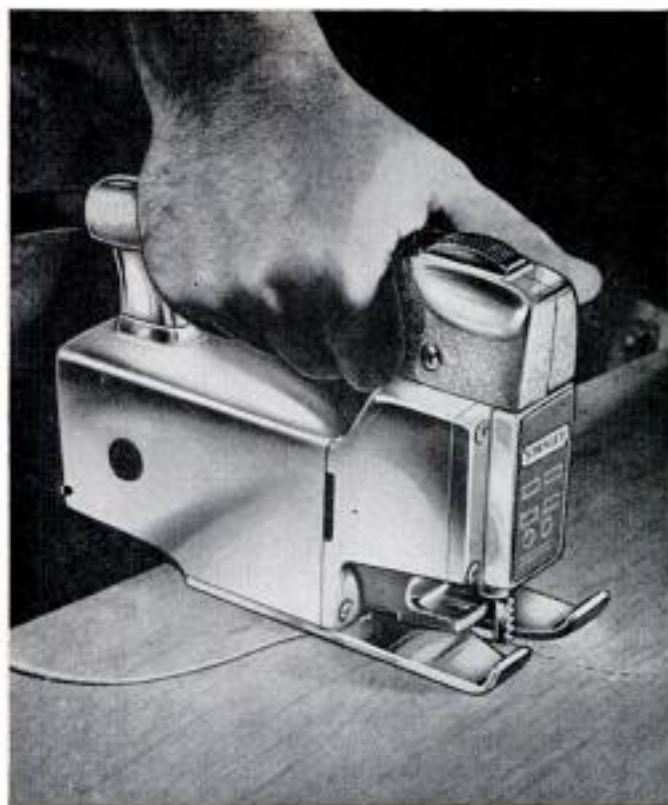
A race track in New England protects itself from phony tickets by printing the official ones with fluorescent ink.

A bee specialist in the San Joaquin Valley uses fluorescent tracer powder at hive entrances to check the trails of his working bees through an orchard. The blossoms visited glow under black light. This helps work out artificial pollination systems for citrus orchards.

Mechanics are now using the natural fluorescence of oils to trace leaks in motors. Each type of oil fluoresces with a different intensity. Art collectors use black light to reveal "doctored" paintings, patched porcelain or fake quartz crystal. Genuine quartz crystal will pass ultraviolet short waves, but glass will not.

It takes a pretty slick fake to fool invisible light. ★ ★ ★





## This New Stanley Sabre Saw makes all kinds of cuts in all kinds of places

*A heavy-duty precision tool*

Introductory price . . . only **\$54<sup>50</sup>**

This portable jig saw cuts 2" lumber, plywood, plastics, sheet metal, etc. And the blades you use have 25% longer life because they have a 25%

longer stroke. It's a fast cutting, smooth-working power saw that makes all kinds of cuts in all kinds of places. Try it and see for yourself.



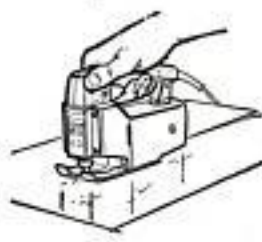
Cutting curves



Cutting up to a wall



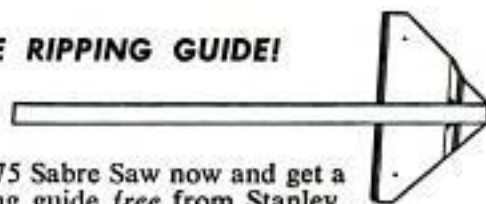
Making plunge cuts



Cutting sheet metal

- 3300 strokes per minute
- Chip blower keeps cutting line clear
- Quick, easy blade change
- Stanley-built heavy-duty motor
- Anti-vibration mechanism
- Cool, comfortable, easy grip handle

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Buy your H75 Sabre Saw now and get a handy ripping guide *free* from Stanley.

Write for free Catalog 400E to Stanley Electric Tools, Division of The Stanley Works, 62D Myrtle St., New Britain, Connecticut.

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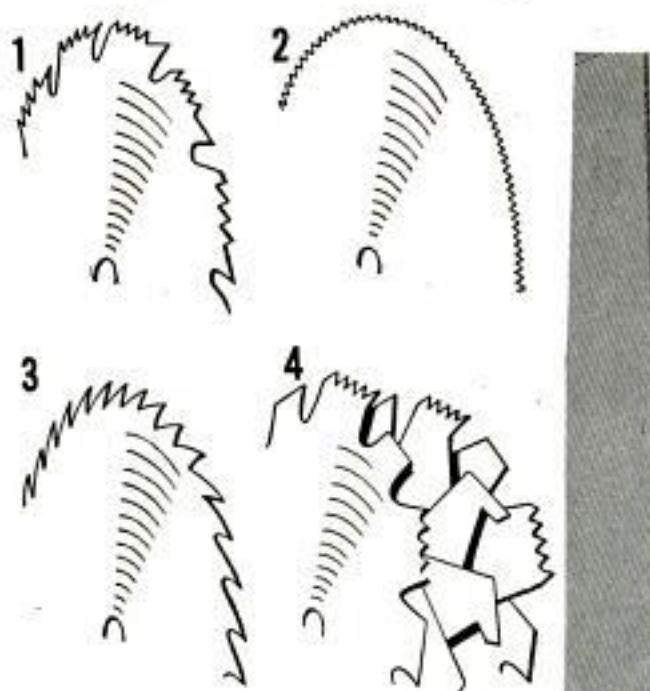
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This famous trademark distinguishes over 20,000 quality products of The Stanley Works—hand and electric tools • drapery, industrial and builders hardware • door controls • aluminum windows • stampings • springs • coatings • strip steel • steel strapping—made in 24 plants in the United States, Canada, England and Germany.



# Nicholson Tool Quiz

How many of these saw blades do you know?



Answers: 1. Combination blade. 2. Plywood blade. 3. Rip blade. 4. Dado cutters.

The modern home craftsman can pick just the right blade for every job that comes up. And he can keep his blades in top cutting shape with Nicholson and Black Diamond files.

A dull blade causes rough lumber edges, sticks frequently, and even blows fuses. Touch up these lazy blades. Nicholson makes a file for every blade that can be sharpened in the home shop. Tell your hardware dealer the type of blade you want to cut better. He'll recommend the proper file. Remember, a sharp blade is safer and more efficient.

**FREE!** "File Philosophy," big new edition on types, use and care of files. Write for your copy soon.



**NICHOLSON FILE COMPANY**

Providence 1, R.I.



(In Canada: Nicholson File Company of Canada Ltd., Port Hope, Ontario)

## NICHOLSON FILES

**A FILE FOR EVERY PURPOSE**

## How to Measure Physical Fitness

(Continued from page 148)

dainty things of our women. But they just can't carry on with life when they're that fragile." Many Oregon high-school girls showed that they could hold their own. A pretty, 104-pound sophomore girl lifted 330 pounds on the back-lift test, 1250 pounds on the leg-lift—better than a lot of boys.

### Happy With Results

Oregon's physical educators were so happy with the results of the pilot study that they plan to make "Operation Fitness" an annual program. The study dramatically illustrated what physical educators have long tried to point out—that the best way to toughen up our kids is to improve the fitness of the sub-par youngsters. Sports programs, so often proposed as a panacea for these ills, won't accomplish this, simply because poorly conditioned youngsters lack the skill and stamina to participate.

There's nothing wrong with the muscles of most youngsters—adults, too—that hard exercise can't correct in time. It opens up thousands of previously collapsed capillaries, tiny "pipelines" that nourish the muscles. It toughens and thickens the walls of muscle fibers, increases the amount of connective tissue in the fibers and enlarges individual fibers. Previously unused fibers develop healthily as repeated demands are made of them.

### Fatigue Not in Muscles

Though muscles become worn-out after hard exercise, much of the fatigue is in the nervous system rather than the muscle itself. Hard-working muscles consume tremendous energy. This is illustrated in "energy cost" experiments—analyzing the expired air of subjects doing rigorous exercise. A treadmill study indicates the oxygen requirement of muscles increases eight times when the pace is increased from 140 to 180 steps per minute.

But muscles recover quickly. This is shown in fatigue studies directed by Clarke at the University of Oregon. In a machine called an ergograph, subjects lifted weights repeatedly with the forearm to the point of exhaustion. When measured 30 seconds later, muscles controlling this movement had lost one third of their strength. But 12 minutes later they were back to 90 percent of normal.

Muscle-fatigue studies have many applications. A few years ago a new insulated rubber boot was designed for soldiers in

(Continued to page 234)





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It's definitely not made for you if you're just looking for "basic transportation"... not this jewel in Buckskin Beige and Gold... the fabulous new FURY that actually outclasses even the FURY of other years.

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*Star of the Forward Look... •Fury by Plymouth*



Korea. How, the Army wondered, did this boot compare in muscle fatigue to the regular combat boot?

Clarke, then at Springfield College, Mass., sent groups of men marching over a rough 7½-mile route with different types of footwear. He measured the strength of ankle muscles before and after the marches. The Army soon had its answer: The insulated boot was twice as hard on marchers as the combat boot (5.82 percent average strength-loss as compared to 2.87 percent for the combat boot). Both were vastly superior to the low-cut shoe which caused a 7.53 percent loss.

### Army-Pack Fatigue Studied

Another study explored the muscle fatigue in carrying different types of Army packs. Groups of college students carried various kinds of 41-pound packs over 7½ miles of countryside. A new experimental pack, which distributes most of the weight around the waist, caused one-third-less muscle fatigue than the combat pack and only one half that of the rucksack. The combat pack affected marchers most in the neck muscles (11¼ percent loss of strength). The rucksack affected the neck and trunk muscles most. But the experimental pack affected no muscle groups significantly greater than the others.

### Continuing Effects

An interesting adjunct to this study probed into the conditioning effects of these marches. The 30 participating college students began with an average physical-fitness index of 104 and emerged after seven marches (52½ miles) with a PFI of 113. They increased their average Army physical-efficiency test score from 253 to 281; the Air Force fitness-test score from 56 to 59.

Through 30 years of such work, Clarke has concluded that anyone without serious organic, structural or nutritional defects can develop sufficient strength to be physically fit—to keep up with the physical demands of living with sufficient reserve for emergencies. Hard exercise is the only means. It must be in ways that offer sufficient resistance to the muscles, whether it's calisthenics, weight-lifting or "combative sports" (such as Indian wrestling).

Persons who have been inactive for long periods should work into severe exercise gradually, giving the muscles a chance to adjust to new loads. But at the same time, no one should shirk hard exercise. As a physiologist once said wryly, "If you must play tiddlywinks, do it with manhole covers!"

★ ★ ★



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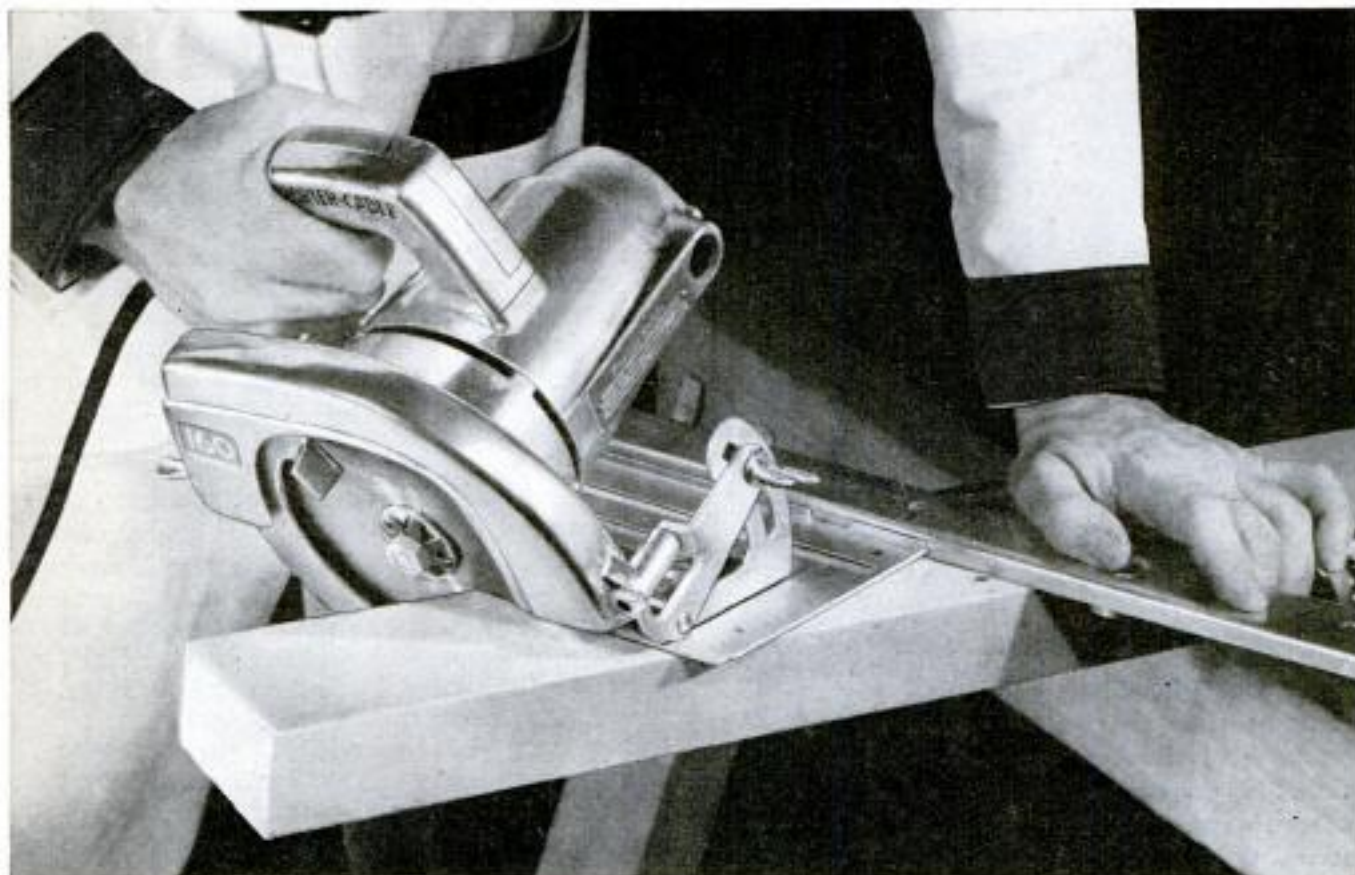
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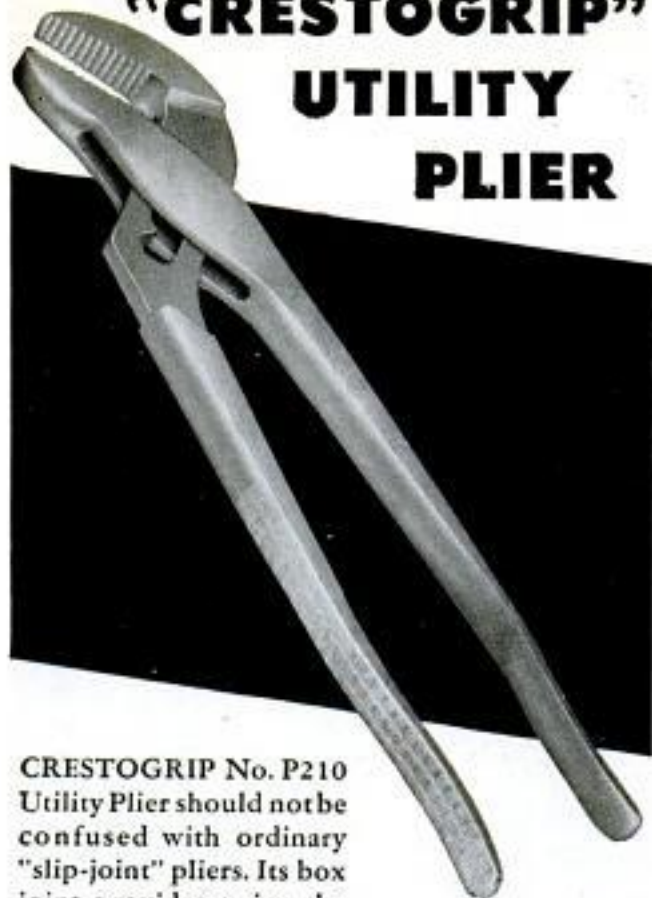
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CRESTOGRIP No. P210 Utility Plier should not be confused with ordinary "slip-joint" pliers. Its box joint provides twice the strength of the conventional lap joint and eliminates sideways twist and strain. Grips flat, square, hex or round objects with powerful leverage. Adjusts to four positions up to 1½" capacity. It has no rivet projections and measures only ½" at its thickest point. Finished in rust-resistant zinc plate.

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**CRESCENT TOOL COMPANY, JAMESTOWN, N. Y.**

## The Navy's Bobtailed Fireball

(Continued from page 124)

advantage that endears her to the gobs and officers who sail her. That's living quarters which are more sumptuous than anything else in the fleet.

The Navy called in Raymond Loewy, the famed industrial designer, to lay out the quarters. He turned the *Carronade* into a reasonable approximation of a floating summer resort. Bunks are separated from each other by lightweight panels. There are individual bed lights. The mess hall is outfitted with four-place tables and upholstered chairs instead of long tables and benches. The galley has electric ovens, a deep fryer, a dishwasher and garbage grinder—in short, everything a housewife (or a Navy cook) could long for. There's an all-in-one entertainment system, with a radio, phonograph, tape recorder-player and individual-volume-control speakers in every living compartment.

All in all, the *Carronade* is the Navy's luxury counterpart of the *Queen Mary*. But, more important, she's a devastating weapon. As one high-ranking Navy official put it: "When I see this fine vessel designed for the specific purpose of pulverizing enemy-held beachheads, I realize how many lives could have been saved had this kind of ship been available to us during the war." ★ ★ ★

## Infrared Rays Cook "Red Hots"

Using the heat of infrared rays, this table unit will cook six wieners in 60 seconds, according to the manufacturer. The ends of the wieners are placed in two troughs of salt water. If subjected to too much cooking, the wieners break, which turns off the electricity. A mercury switch stops the current when the lid is open.

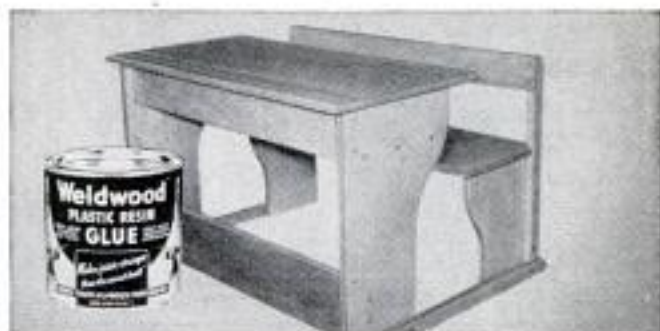


POPULAR MECHANICS



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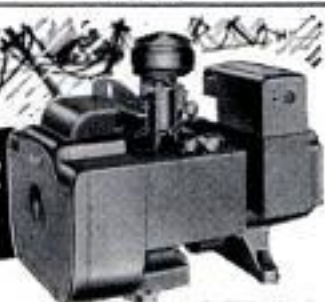
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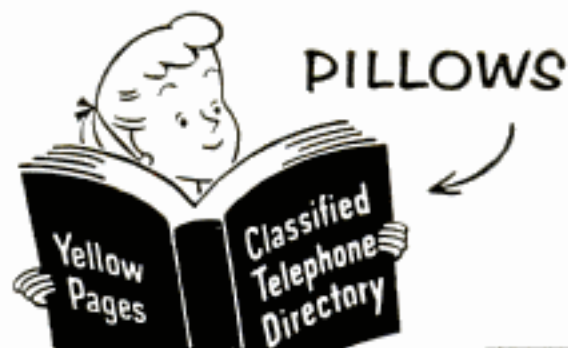
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# Looking for Something?



FROM COSTUMES TO PILLOWS  
*whatever you need-*



Ads displaying this emblem  
make your shopping easy.

## Photo Tips for Philatelists

(Continued from page 137)

stamp's soundness. Even the slightest tear which has been cleverly repaired will be revealed by photographing the stamp.

There isn't a more efficient accessory known to stampdom with which to rapidly detect counterfeits, than the camera and enlarger.

By making an 8 by 10 enlargement of a stamp known to be genuine, and then making one of similar size of a questionable item, the photographer-philatelist can immediately spot the tell-tale differences, no matter how small they may be.

One of the most practical and valuable uses to which the camera can be put, is that of recording a collection. By making photocopies of every page, one has a permanent reference catalogue of his treasured possessions. Should the collection ever be lost or stolen, such a reference is of inestimable value in assisting its recovery, or settling an insurance claim.

Recently a number of famous collectors have made 35-millimeter slides of their stamps for use when addressing a gathering of collectors on some specialty subject. In such talks the display of the actual stamps satisfied only a few of the audience right in front of the speaker. By using slides and projecting them on a screen, the entire audience can see.

(The current Illustrations Law of the United States Secret Service allows the photography in black and white of any stamp in existence, including United States issues. Color photographs may be taken only of foreign issues which no longer are valid for the prepayment of postage.)

There is no end to the versatility of a camera in philatelic work. Each individual gradually will develop techniques of his own, to suit and meet personal requirements. But whether he confines himself to ordinary methods or experiments with new ones of his own, he is certain to find unlimited pleasure, satisfaction and utility in the combination of his photographic and philatelic activities. ★ ★ ★

## Chemists Make New Products From Sugar and Petroleum

Two of the most abundant and inexpensive chemicals, sugars and petroleum products, can now be combined to produce a whole range of promising compounds. Dr. Carl B. Linn told the American Chemical Society that hydrogen fluoride is used as an agent to convert sugars and petroleum derivatives into detergents, germicides, pharmaceuticals and plastics materials.





Something **NEW**  
for your Christmas List!

# 5 POWER TOOLS IN ONE

## NEW Dremel Deluxe MOTO-SHOP



### COMPLETE POWER WORKSHOP IN ONE COMPACT, PORTABLE UNIT

The amazing new Dremel Moto-Shop is the most versatile multi-purpose tool ever invented. Has 1,001 home and shop uses. Basically, it's a 15" Jig Saw with a unique power take-off to which you simply connect other attachments. It then converts to a disc sander, bench grinder, buffing wheel, and a flexible-shaft machine... all powered by a ball-bearing rotary motor. And this professional-quality, portable power shop can be set up practically anywhere — basement workshop, kitchen counter, or card table. Weighs only 12 lbs. As a Jig Saw, it will cut 1 3/4" wood, 18 gauge copper, 1/16" steel — all with the same blade. Foolproof blade guard makes it absolutely safe

— even for children. Handles everything from bird-houses to full-size furniture.

The flexible-shaft is a complete machine shop in itself. Use it for sharpening, grinding, polishing, carving. Collet capacity 1/64" to 1/8".

Moto-Shop is the perfect "ALL FAMILY" workshop — safe for even mom and the children. Helps build a close father-son relationship.

**Model 57 Moto-Shop.** Includes Jig Saw with disc sander attachment only. Other attachments can be added later..... **\$33.95**

**Deluxe Model 57 Moto-Shop,** with all attachments shown ..... **\$49.95**

Price of attachments only, if purchased separately ..... **\$19.95**

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Dremel Straight-Line Action Sanders sand with the grain of the wood. Quickly produce a velvet smooth finish, free from cross-grain scratches and orbital swirl marks. Save a lot of elbow grease, too. Three popular models to choose from —

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At Rockefeller Plaza, De Soto Chief Engineer A. E. Kimberly describes the car to a curious New Yorker

## What Makes a Driver Tired?

(Continued from page 89)

car. However, and this you may not have expected, the 1929 De Soto also rolled along for 2300 miles without skipping a beat. Except for one flat tire and momentary overheating as it crawled in second gear on hot Daytona Beach, the old car performed beautifully.

There was one side trip in the run, a diversion of about 100 miles so the cars could climb Mount Washington in New Hampshire's White Mountains—a favorite test road for all carmakers.

### Old Car Scoots

The tiny old roadster scooted up to the 6300-foot-high, cloud-shrouded peak without even breathing hard. And coming down, its short wheelbase, excellent weight-brake ratio and fast steering permitted it to skitter down the winding road faster than the 1958 model.

Incidentally, although not important to the test, gasoline mileage was measured. The old car averaged 15.5 miles per gallon over the 2300 miles, while the 1958 model averaged 14.5 miles per gallon. This gives a small advantage to the 1929 model, much smaller, however, than many would have expected.

Most people feel that the old cars were much more economical than today's big-engined, big-bodied models. Apparently they were not. The much smaller 1929 roadster with its six-cylinder engine averaged only one mile per gallon more than the big 1958 V8 De Soto.

Sure, the new car went faster and did it more easily on the highways. (It averaged 44.8 miles per hour, the old car averaged 38.7 miles per hour.) Sure, it accelerated better in town. It was more comfortable, warmer, quieter and roomier

(in fact, the 1929 roadster with its top up became downright unpleasant to one driver who confessed to a mild case of claustrophobia in it).

The new car had a radio, a cigarette lighter, a windshield washer, a power seat that could be adjusted up and down, forward and backward to change the seating position after hours of driving. It had power windows, automatic transmission with push buttons, power steering and power brakes. It had just about everything necessary to make a driver's job relaxing and free from fatigue.

The old car had none of these. It had a three-speed hand-shift transmission, vacuum windshield wipers that stopped altogether during a hard pull, nonadjustable seat, cloudy isinglass side curtains, a narrow slit of a windshield with no hint of a wrap-around, poor headlights and a hard ride. It had a solid front axle—no front-wheel independent suspension to absorb road shock. Steering was stiff but accurate.

### What Was Result?

And what happened? How did the fatigue study turn out? What did it prove?

Strangely enough, the tests failed to show that the old car made the driver any more tired than the new car. Occasionally, a driver would report that he felt more tired in the old car, but the nightly tests did not confirm it. Apparently what tires the driver most is not the physical activity. The driver of the old car did eight times as much physical work as the new-car driver. (Counters on the pedals and steering gear of each car measured the actual work done.) Yet, at the end of the day he was no more fatigued than the other driver.

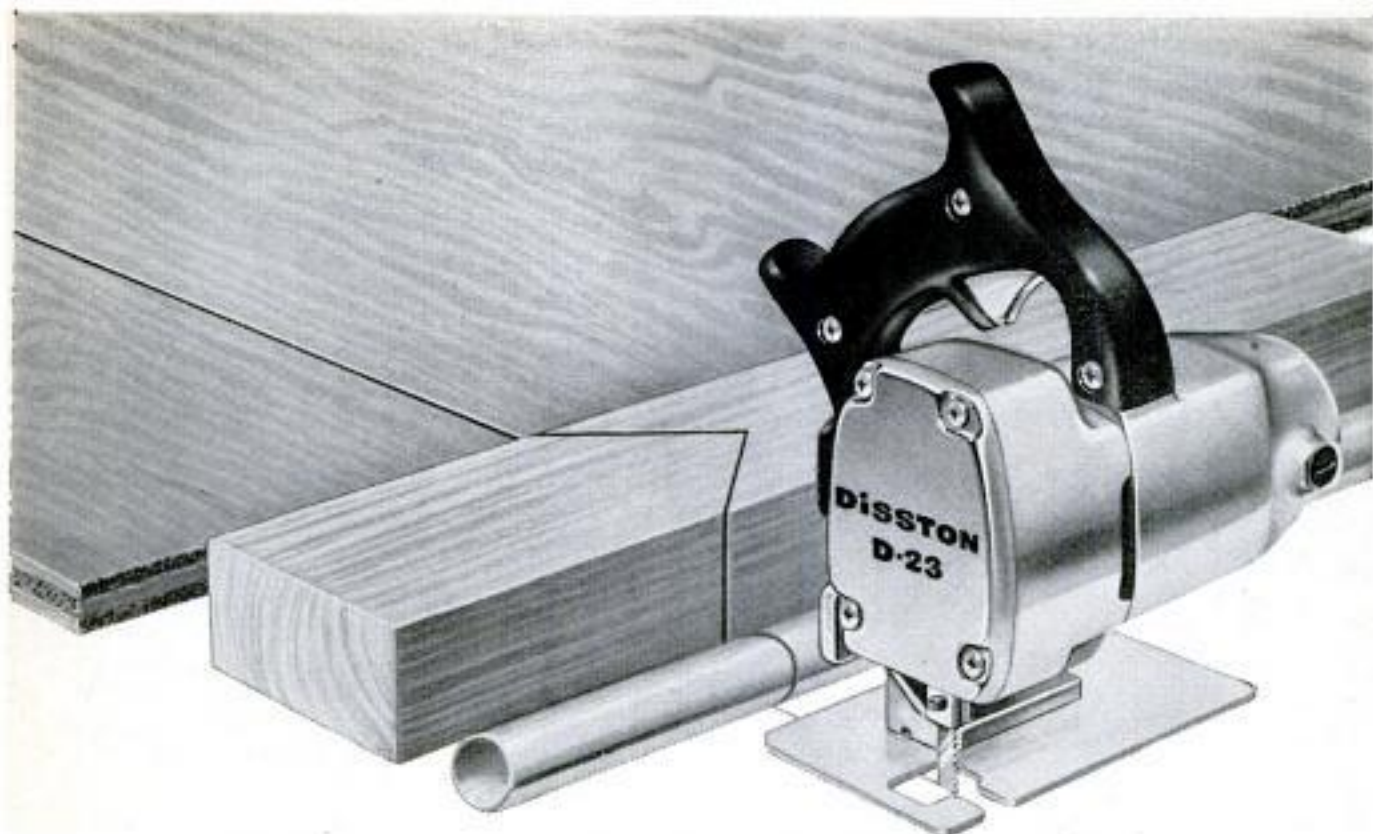
Both drivers tired, but they tired the

(Continued to page 262)



When this Florida coastal storm developed, the top went up the hard way—no push-button top in '29!





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TOOL THAT CUTS WOOD, METAL, PLASTIC

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Oil Filters, Spark Plugs

## Tubeless Tires: Most Owners Like Them

(Continued from page 142)

circumstances. Surprisingly, in more than half the cases—54 percent—temperature was not a factor. These blowouts occurred either at night or on cool days. Speed, however, apparently was a factor. Almost half the blowouts occurred at speeds of 60 miles per hour or higher.

Tire repairmen are not as sold on tubeless tires as the owners themselves. For example, 53 percent feel that tubeless tires give motorists more trouble than tires with tubes. What kind of trouble? Seventy percent of the repairmen list slow leaks as the most frequent cause of trouble. The same percentage states that they have more complaints of tire thump with tubeless tires than with tires with tubes. And 91 percent say they have recommended, at one time or another, that the motorist install tubes in tubeless tires for reasons ranging from leaks that can't be found to peace of mind for the customer.

And significantly, almost every repairman recommends two to six pounds higher pressure for both front and rear tires than the manufacturer's recommendation.

Here are some typical comments from repairmen:

"We can balance a thump out of both tubeless and tube tires. But you find more tube tires out of round or with a heavy side."—Colorado.

"The major causes of complaint can be attributed to inadequate or careless repairs. Various tire manufacturers can contribute materially by eliminating the ridges on the liner, as these ridges have to be completely removed in the affected area before a patch can be properly applied."—Florida.

"A boot will not hold on any sizable cut."—Louisiana.

"Tube-type tires can be inspected 100 percent better for breaks and nail holes."—Indiana.

"On the whole, tubeless tires were not good enough to put on the market when they were."—Missouri.

"Lots of accidents are due to the car sliding sidewise, causing air to leave the tubeless tire."—Oklahoma.

"If for any reason a rim is cut or bent it means a new wheel."—Colorado.

"Tire leaks air through liner but comes out of tire at another spot. It is impossible to locate true leak."—Nevada.

These are the opinions of the men who know tires best—the owners themselves and the tire-repair specialists. ★ ★ ★



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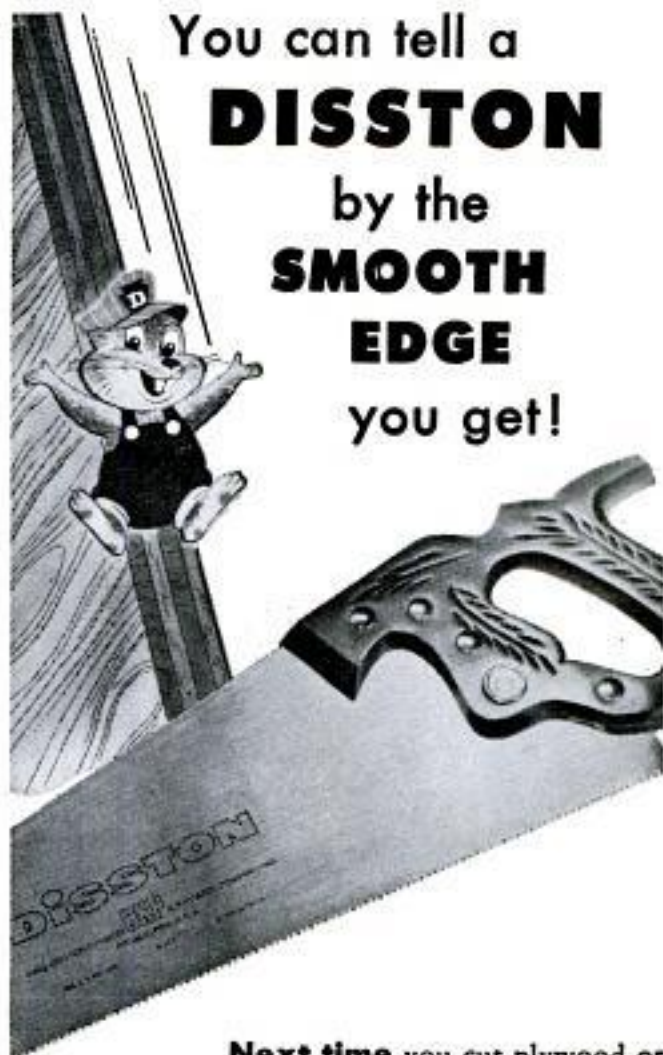
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3. Rubber
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FOR HOME, FARM, AND  
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STRAIGHT CUT  
\$3.10 and  
\$4.10**



Versatile as "Mighty Midget" snips. 10" model cuts 24 gauge metal; 13" model cuts 21 gauge.

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\* Slightly higher in Denver and West. Vinyl handle grips optional and extra.

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**WISS... always a cut above competition**



Minsk-Moscow highway is well surfaced, but side roads are muddy lanes used by horse-drawn wagons

## I Drove Through Russia

(Continued from page 85)

relies on creaking wagons for much of its rural transport. Russia's production and variety of machine tools rivals that of America, but it gave up making ballpoint pens as a bad job, and consumer goods are generally shoddy, expensive and scarce.

More contrasts were seen in Minsk the next morning. This war-devastated city of 412,000 people has been rebuilt with imposing apartment houses and office blocks lining the broad avenues. But when we drove off the main street in a two-hour hunt for a gas pump that both worked and delivered the "high test" fuel, we bounced over bone-rattling cobbles in a road booby-trapped with flooded potholes, with manhole covers sticking two inches above the surface.

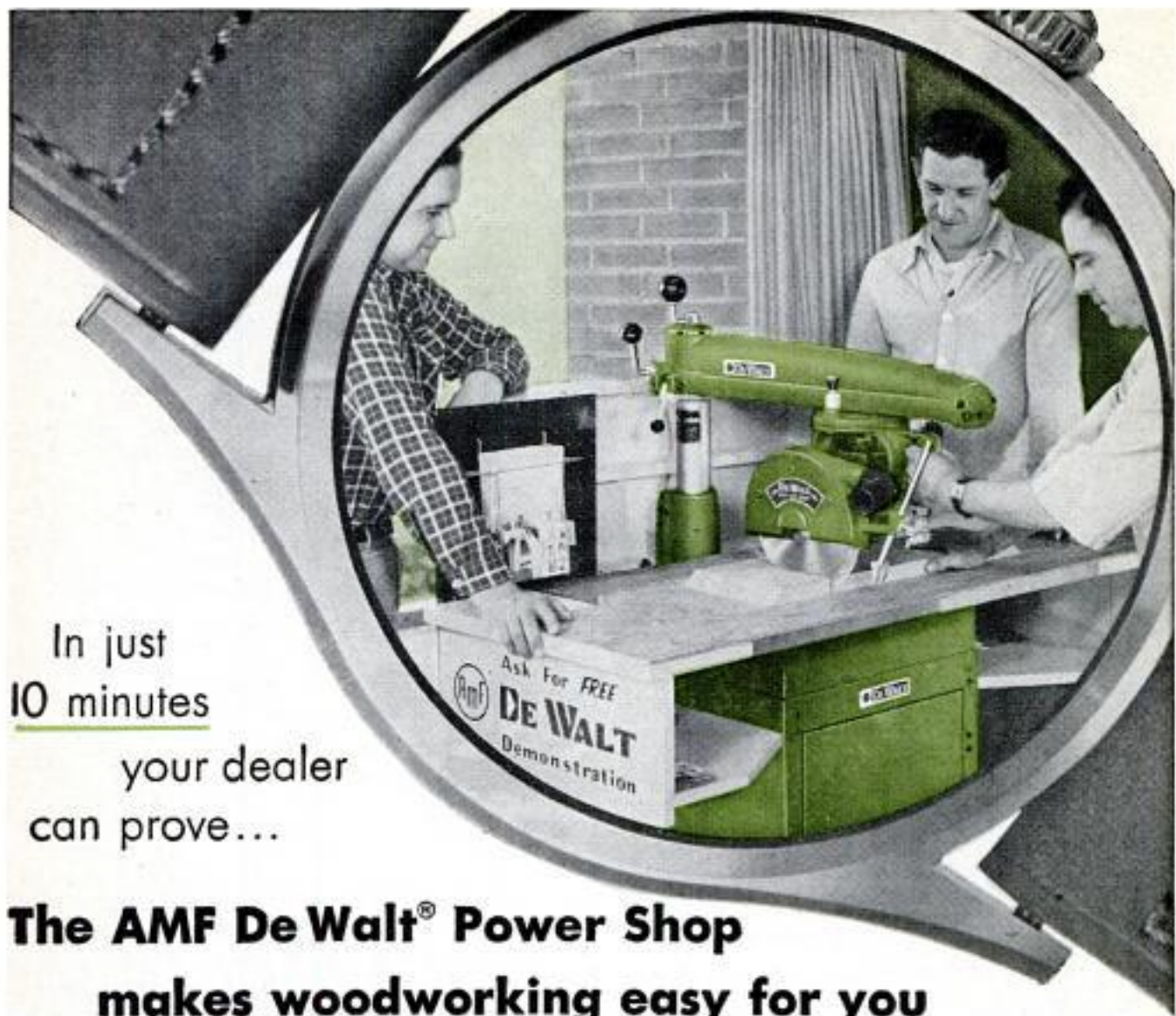
### Late Start for Moscow

After a late start we dawdled along in the bright sunshine with photogenic clouds, and gave up all hope of reaching Moscow that night. The Minsk-Moscow highway stretches for 450 flat miles with scarcely a bend. It was possible to wind the Victor up to an effortless 75 miles per hour—safe, we thought, until an unexpected wavy spot tossed us against the roof. At first glance this road with no speed limit looks a natural for sports cars, but hard suspension here would be murder, and about 65 is top for steady cruising.

Driving through this vastness, so like the American great plains, we saw many places where grain was spread out across half

(Continued to page 246)





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top-side cutting



**SEE** Direct-drive power,  
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the width of the road to dry in the sun. The wake of passing traffic blows away the chaff. Sometimes even small threshing machines were parked and running on the asphalt. Trucks were used to crush flax by driving them back and forth across it.

Our companions of the road were long-distance coaches that seat 32 people in comfort, and use a 180-horsepower supercharged diesel mounted at the rear to thunder along at close to 70. Few passenger cars were seen, and the traffic consisted mostly of gas-engined four-ton trucks. These are the stalwarts of Russian transport, and carry everything from timber and cows to mountainous loads of hay and up to 30 farm workers packed in like sardines.

## **Trucks Take Beating**

They take a terrific beating from both overloading and tortuous roads, and we saw several trucks with dislocated axles rolling with a crablike movement. Once a four-tonner with recapped tires shed a large hunk of loose tread right in our path. Garages are widely spaced in Russia, and every truck driver is both trained and equipped to make major repairs on the spot. More than once we saw a roadside replacement of a broken spring or half shaft. These trucks are really run into the ground. I was told that they normally do 120,000 miles before a major overhaul, and are kept going for up to 500,000.

## **Gas Stations Are Scarce**

Truck drivers take a break at the rare gas stations along the highway, and the bright red Victor always attracted a crowd when it pulled in to refuel. They were tough, roughly dressed men, but always ready to talk and be helpful. At one place where no air was available, a gruff driver brought his truck over, attached a hose to his compressor and inflated our tires.

Their questions were always the same. "Americanski?" eyeing the Victor's panoramic windshield and tailfins. I told them it was made in England. "What's the top speed and fuel consumption?" They nodded approvingly when I gave the metric equivalent of the 75 miles per hour and 24 miles per gallon that we had done with the low-compression head and a diet of the local "liquid asbestos." Then: "What does it cost? Does it belong to you? How long would you have to work to buy one?" Finally the inevitable: "Can we look at the engine?" As a dozen heads peered under the hood, someone always crawled underneath the car to see the suspension. The usual verdict was: "A fine machine, but too low for our roads."

*(Continued next month)*





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LIC PRESS • HYDRAULIC JACK.

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1—Hydraulic Cylinder, 3" bore, 6" stroke. Husky 3/4" solid steel  
shaft. Will lift 10,000 lbs. using 1500 lbs. of pump pressure.  
Clevis mountings that take 3/4" diameter pins. May be used for  
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17 1/4"—retracted. Item #C419..... **12.50**  
1-Gallon hydraulic fluid furnished free with each kit.  
Plus all necessary hydraulic fittings. Total ship. wt.—40 lbs.

ITEM  
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116

• 28" steel handle. Fine for hydraulic presses; snow plows, jacks.  
Dimensions: 6" Diameter, 29" long with 3/4" pipe  
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Clevis mountings that take 3/4" diameter pins. May be used for  
single or double action service. Overall length  
17 1/4"—retracted. Item #C419..... **12.50**  
1-Gallon hydraulic fluid furnished free with each kit.  
Plus all necessary hydraulic fittings. Total ship. wt.—40 lbs.

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7 1/2" x 7 1/2" x 11 1/2". Output rotation  
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ITEM #115

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ITEM #308 — • For electric wheel  
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Ideal for powering electric tools, oil burner,  
refrigerator, lights, or other appliances re-  
quiring up to 1000 watts of power. **1000  
WATTS, 115 Volts, 60-cycles A.C. 3600  
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Rotation counterclockwise. May be driven by  
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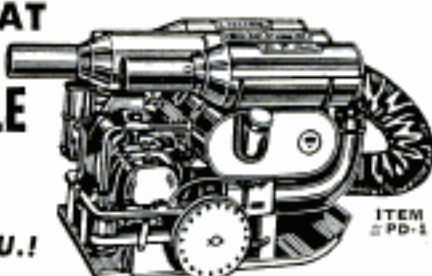


ITEM #1010

**MODEL 700 750 WATTS** A. C. Generator F.O.B. Chicago..... **59.50**  
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Consists of 1 1/2 H.P. air-cooled Lauson gasoline en-  
gine driving super-charger and turbine type blow-  
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FUMES.** Heater and engine burn regular gaso-  
line. 10 gallon capacity fuel tank. Thousands in use  
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FULLY GUARANTEED — REBUILT BY U. S. AIR FORCE  
READY TO RUN — EASY TO OPERATE

Net Weight 200 lbs. Shipping Weight 300 lbs.  
Dimensions: 48" L x 30" W x 30" H  
Government acquisition cost \$500.00

SPECIAL **119.50** F.O.B. CHICAGO or  
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PUMPS ALMOST ANYTHING

Fine for: — • Irrigation • Sump  
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Higgins Type PNB, Model R, marine  
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30 foot head with 3/4 H.P. motor.  
Pump body and impeller are made of solid  
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## Report From a Roving Editor

(Continued from page 98)

Yukon River in its brown hills, and over the brown, barren, arid Brooks Range. There was no snow north of Fairbanks and it turns out this whole region gets very little precipitation. As much as 120 feet of snow falls in the glacier area down south; at Point Barrow the average annual snow-fall is only seven inches.

Leaving the Brooks Range, the pilot began his letdown, for now we were over the Polar Shelf, a flat expanse not much above sea level and filled with ponds, lakes, and winding rivers that loop back and forth. Approaching Barrow we could see the ice pack five miles offshore, with strings of floes reaching out into the open water.

It was cold, windy and showering at Point Barrow and we needed the parkas.

First thing I saw at Point Barrow after getting off the plane was a sign reading "No Parking" in front of the tiny control building at the airstrip. Only 1200 miles from the Pole, and they had traffic rules.

The group toured the overheated buildings of the DEW Line radar installation, then stood through an hour-long ceremony out-of-doors where the weather was bitter. The ceremony marked the acceptance of DEW Line by the Air Force from the construction contractors.

There was then a reception in the large library room of the Arctic Institute, attended by the contractors, the Air Force officers who had flown up for the acceptance ceremony, and officers of the Navy supply ships anchored offshore. The admiral of the supply force introduced me to an artist who turned out to be Arthur Beaumont from Los Angeles, a marine painter I had known 20 years or so ago. He was making the cruise with the supply ships.

On one wall of the library was the pelt of a huge polar bear that had been shot 20 feet from the cookhouse last January. Outside, in cages, the institute has a small zoo of arctic animals that had been trapped for behaviorism studies. They included large foxes, a couple of wolverines and some young, large, brown arctic owls.

After lunch the correspondents visited the Eskimo village a few miles down the beach, using a big amphibious tractor as a taxi. The roads are gravel, raised above the tundra, but still muddy. There are a few trucks and Jeeps but most of the vehicles are tracked types suitable for mud, snow and ice. The Eskimo village is mostly tar-paper shacks and wooden houses, with muddy lanes and standing water. Some of the houses have a pole at each end of

(Continued to page 252)



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for  
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Check the tools you want most and leave this page where "Santa" will see it

### "DYNQ-MITE" POWER WORKSHOP

No. "888" POWER TOOL — 3 tools in 1:  $\frac{3}{8}$ " Drill, 6" disc Sander, and 6" Polisher. 3200 rpm, 4 amp. rating, \$44.95



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turn the "888" into a complete 16-tool power workshop

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CATAMARAN  
FLOATING DOCK  
PONTOON CRUISER  
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UTILITY TANK**



the roof with a few slabs of unappetizing meat strung out on a line between, curing in the weather. The Eskimos who were visible, mostly children, wore summer parkas of cloth with fur around their faces. Winter parkas are all fur. There were some skin umiaks pulled up on the gravelly beach.

We spent a hurried 10 minutes in a store. Curio shops at Fairbanks and Anchorage are full of Eskimo-made, but nevertheless commercial, ivory bracelets, pins, earrings and so on, with prices mainly starting at \$5. The same shops are all stocked with good-looking ash trays and other dishes depicting Eskimos and dogs and Arctic scenes, all signed "Sascha B," which is the trade name of the Brastoff pottery located near my home in Santa Monica.

After leaving the Eskimo village we got back in the plane and headed for Elmendorf Air Force Base, Anchorage. The pilot's windshield was iced up for much of the trip but there was nothing for him to see anyway. We were in the clouds and could barely see the wing tips. We flew at 11,500 feet to clear any mountains on the route.

### A Visit to "White Alice"

Wednesday the plane took us to a White Alice installation at Naknek at the root of the Aleutian Peninsula. White Alice is the code name for the new tropospheric scatter type of radio communications system just being completed in Alaska. Here the "no-see-ums" were a pest; actually they are very visible indeed. We were past the black-fly and mosquito season; these were the only pests encountered.

After lunch in a super-steam-heated dining room and a tour of Naknek, the pilot took us on a little sight-seeing trip on the way back to Anchorage. Until now the C-54 had been handled like the big transport it is—flying straight and level at high altitudes. On this afternoon the pilot gave us the bush-pilot treatment, close-ups of the scenery. He stayed under the lowest level of broken clouds and cruised up valleys and then canyons to the famed Valley of 10,000 Smokes. This scenic spot has been reading *Reader's Digest* lately and no more than a dozen smokes are left. We saw none of them, even at low level.

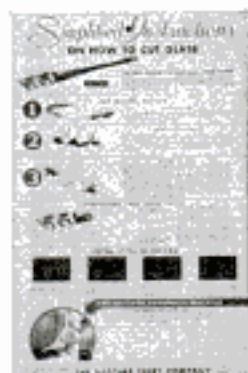
By now there was the wide base of a big mountain in front of us, most of it lost in the clouds overhead, and with glaciers on its sides. We cruised around the shoulders of the mountain at a couple of hundred feet above the steep slopes, and hunted for mountain passes to avoid going up into the clouds. I am a very timid air passenger and along in here I was mentally helping

(Continued to page 254)

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LUBRICONE IMPINGED WHEEL?  
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glass cutter manufacturers since 1903)



SEND FOR THIS FREE CARD. IT TELLS YOU  
"HOW TO CUT GLASS"

It explains how to cut circles, drill holes, etc.

**IT'S FREE**

THE ILLUSTRATED GLASS CUTTER CAN BE  
PURCHASED FROM YOUR LOCAL DEALER

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**THE FLETCHER-TERRY CO., Dept. D, Forestville, Conn.**



What a "HANDY NEW YEAR" Gift for Christmas!

NEW

**WISE-GRIP®**

WITH *EASY* RELEASE

Does more jobs than any other hand tool—EASIER than ever!

Here's that unusual gift you've been looking for—for him! A whole tool kit in one trim, easy-to-carry, easy-to-use hand tool. Is actually super-pliers, all-purpose wrench, clamp and wire-cutter. Locks on with ton grip. Unlocks with "push-button" ease. Outperforms any other single tool in the world. Choice of 7" and 10" models from only \$2.15 to \$2.95.

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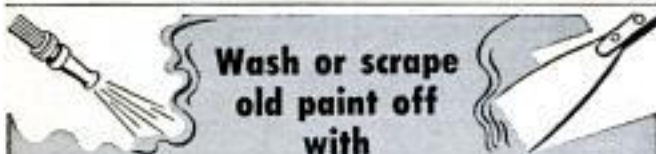


PRESS HERE  
**Click!**

jaws spring open!

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\$2.95

AT ALL  
HARDWARE  
STORES



Wash or scrape  
old paint off  
with

**HEAVY-BODIED KLEAN-STRIP**

**3 WORKSHOP PLANS  
TO FIT YOUR SPACE AND BUDGET**

Build your own workshop! Get complete plans, easy-to-follow instructions and bills of material for three Delta designed shops—plus Delta's New Workshop Reference Manual. Send name and address with 25c in coin to: Delta Power Tool Division, Rockwell Mfg. Company, 502M No. Lexington Ave., Pittsburgh 8, Pa.

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**TOOL CHEST**

FOR YOUR  
HOME WORKSHOP



This may be the lowest cost full-sized chest in America! 4 sliding drawers in blue-gray rugged steel cabinet. 26" x 12 1/2" x 12 1/4". Keep your valuable tools safe, clean and always at your fingertips.

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\$79.50 Kit Form  
\$99.50 Assembled



Drilling, reaming and tapping required on kits

- \* **SAFE...** Dead-man's Switch—Shock-free Electrical System—3 MPH Speed.
- \* **DURABLE...** Cast-Aluminum Structure and Bronze Bearings.
- \* **POWERFUL...** Battery Powered 2 HP Motor Starts instantly.

These vehicles are ideal as Quality Toys or for light industrial use. Small enough to fit into an auto trunk, yet powerful enough to pull a 250 lb. man up a steep slope.

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25% Deposit required with order • Shipped Railway Express Collect

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DECEMBER 1957

253



**3** New **BLACK & DECKER**  
**POWER KITS**  
ring the bell in a raft of jobs!



- Powerful B&D U-3 1/4" Drill
- Choice of three attachments engineered especially for B&D Drills



**Jig Saw-Drill Power Kit** teams B&D Jig Saw Attachment with U-3 Drill. Makes bookends, toys, repairs.



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Black & Decker Tools are priced to fit your budget! Kits from \$39.95—Tools from \$29.95—Attachments from \$10.45. *The Black & Decker Mfg. Co., Dept. M127, Towson 4, Md. (In Canada: P.O. Box 278, Brockville, Ont.)*



The famous  
**U-3 Drill**  
in three new  
combinations



Look under "Tools-Electric"



**Black & Decker**  
World's Largest Maker of Electric Tools

the pilot at his controls. I didn't know then that there was a lot more coming.

After crossing the peninsula we flew across the strait and cruised along the low northern shore of the Kenai Peninsula. We were still sight-seeing, and currently looking for moose. This is best done at about 100 feet above the trees. No moose, so the pilot got down on the water just offshore, at an altitude of 50 feet. We were scaring the sea gulls (and me).

Approaching Anchorage, the pilot cruised up Turnagain Arm, a typical fiord, narrow, with tall mountains on each side, and with Portage Glacier at its end. We "climbed" the glacier by airplane, looking down at the blue-green ice a couple of hundred feet below, went over the top into the peaks, and almost skied down a glacier.

I was alarmed. I made my way up to the cockpit to see what it looked like from there, and we were headed for a black peak sticking out of the ice maybe two blocks ahead. Most of the crew were taking snapshots out of the side windows. They were having a big time and so was I, but not in the same way. We snaked in and out of the peaks, saw a lot more glaciers, and returned to Elmendorf mightily impressed with the plane and the pilot.

#### Party Returns South

On Thursday the C-54 and press party returned south. I decided to RON (hot dog!) at Anchorage to visit another, more typical White Alice site adjacent to Matanuska Valley. The Elmendorf people took me out there by car. The road cuts through Fort Richardson on the outskirts of Anchorage and there is a big sign at each end of the reservation reading "No Big Game Hunting on This Fort." Moose are more than plentiful; the problem is not shooting one, but hauling the 1000-pound carcass to a truck after the kill.

Friday morning I visited some of the officials of the Alaska Railroad. One of their big problems is moose. They kill 200 to 300 of them every year, running them down on curves.

Friday afternoon I returned to McChord, via MATS, in a C-118, which is a plush Douglas DC-6 with the seats facing the rear for safety. Got to McChord about midnight, took a taxi with two other people to the Seattle-Tacoma airport to sign in.

I returned south the next day by United in a DC-6 that required only 3½ hours from Sea-Tac to L.A., overflying Reno, Lake Tahoe and part of Yosemite. Recognized a lot of lakes I have fished. The trip was pretty, but not at all comparable to Alaska. Thanks for a nice trip.

Tom Stimson



# SURPLUS SALE

WAR SURPLUS  
EXCESS INVENTORY  
BANKRUPT STOCK

## MOTOR POWER HACK SAW

Outstanding motor tool bargain. Machine shop power hack saw. Cuts heaviest bar, pipe, angles, etc. fast and accurate. Automatic, simply press switch—it does the rest.  
● Holding vise will handle up to 3 1/2" stock. Uses ordinary hack saw blades. Every farm, garage and plumbing shop should have one.  
SALE . . . (Less motor) . . . \$34.95 Ppd.  
● We have limited quantity complete with 1/4 h.p. motor on base at only \$49.50 Ppd.

## DC WELDING GENERATOR

Finest ball bearing 300-amp 30-v air corp generator. Makes excellent welder, power plant, fast charge battery-charger, etc.  
● Full instructions. Many applications. A real buy. Govt. cost \$300.  
SALE . . . \$23.95 FOB



## FURNACE DUCT BLOWER

New built-in motor turbine type blower. Ideal for improving heating ability of old type furnaces. Force air thru long ducts. Equally good for air conditioning, etc.  
● Complete with 115-v 60-cp. integrally mt'd. motor. 725 cfm. Size 8"x9 1/2" outlet. Overall size 13"x11"x12". List \$40.75.  
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## STORAGE BATTERY WINCH

Powerful fully reversible, ball-bearing gear reduction winch. 1000-2000 lb. pull. Use on 6 or 12-v battery. Holds 40' of 1/4" cable. For trucks, docks, boats.  
Govt. cost \$280. \$46.75 FOB



## ARMY BLOWER-DRYER-HEATER

Marvelous new condition engine driven high-capacity (100,000 BTU) heater-blower. Burns gasoline—tremendous output heated air.  
● Wonderful for drying farm grains, heating warehouses, contractors, etc., starting freeze-up equipment, etc. Complete with long flexible heat ducts. Size 30"x48"x34". Wt. 108 lbs. Govt. cost \$525.  
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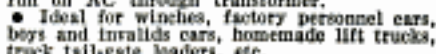
## HYDRAULIC SPEED REDUCER

Variable hydraulic speed reducer. Any speed from 0 to 750 rpm by simply throwing a lever. Handle up to 1 1/2 h.p. Use for midsize cars, shop hand saws, etc.  
Govt. cost \$400. SPECIAL . . . \$47.81 FOB



## GEAR REDUCTION POWER-HOUSE MOTOR

Runs on 6 or 12-v battery  
● Remarkable Govt. gear reduction motor. Extremely powerful. Fully reversible. Gear ratio 100-1. Output speed 50 rpm at 6.0 volts, 100 rpm at 12.0 volts. Unit will also run on AC through transformer.  
● Ideal for winches, factory personnel cars, boys and invalids cars, homemade lift trucks, truck tail-gate loaders, etc.  
● Gears are finest precision all ball bearing. Full instructions for use.  
Govt. cost \$365. SALE . . . \$19.72 FOB



## EXPERIMENTAL RAY TUBE

Spectacular brand new Govt. fascinating educational Cathode Ray tube. Amazing experiments. Uses AC voltage. Makes ultra sensitive detector. Lissajous' experiments, etc. Brilliant green fluorescent screen. Special 905 laboratory type.  
● Booklet on Cathode Ray tube theory and experiments plus instructions for building home experimental oscilloscope with each tube. Wonderful Govt. cost \$52.50.  
SALE . . . \$4.91 Ppd. in USA.



## AIR COMPRESSOR BARGAINS

For painting, cleaning, tires, control terminals. Assemble your own outfit. Lowest prices in U.S.  
● DeLuxe Kit. Compressor, tank, gauge, regulator, paint gun, fittings. How to build instructions. List \$52. SALE \$39.49 FOB.  
● Compressor 1-cyl. \$19.95; 2-cyl. \$49.95; Govt. Air Tank, \$8.79; Regulators, \$3.95; Pop Gun \$1.95; Pres. Gauge \$1.89. Finest paint gun \$11.95. Auto switch \$4.75. All prepaid.



## OTHER OUTSTANDING SURPLUS BUYS

Many buys—power plants, hydraulic pumps and cylinders, hose, plastic pipe, electronics.  
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● Burglar-Fire Alarm System . . . \$3.95 Ppd.  
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### 2500-WATT 60-C AC PLANT

#### CONTRACTOR-FARMER MODEL

FACTORY OVERSTOCK!  
39 brand new leading make portable and emergency use 115/230-v sing. ph. 60-c 2500-w plants. These are the DeLuxe model #1. Powerful rugged with Briggs model 23 engine driving an all ball bearing self-regulating generator. No extra equipment required. Will supply correct voltage from zero to full wattage output to any 2-wire or 3-wire 115/230-v system.  
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● Excellent for camping trips, operating portable tools such as drills, saws, chain saws, etc.  
● We guarantee it a super-buy offered at less than normal dealer cost.  
List \$425. SALE . . . \$239.50 FOB.



## DIAL TELEPHONE

Modern hi-efficiency attractive dial phone. Use for extension to main line on private system. Use several for complete private system, etc. Complete with ringer, dial, etc. Govt. cost \$25.50.  
SALE . . . \$9.95 Ppd.



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● Agricultural Cylinder (6 1/2" stroke) \$14.95  
● Control Valve for DA Cycle . . . \$2.95  
● Pump, 1000 lb. 12 gpm 400 rpm . . . \$5.50  
● Cylinder, 2" bore 10" stroke . . . \$17.95  
● Pressure Gauges, 1000, 1500 or 3000 lb. (Prepaid) . . . \$4.49

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Precision quality level by leading mfg. Excellent for setting foundations, grading, farm contouring, surveying, etc. Powerful optically true telescope, finely graduated azimuth scale, sensitive level adjustment, polished oak tripod, 8 1/2 ft. 3-section rod, fine case, instructions, etc. A wonderful buy.  
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The Table Turns! The Blade Turns! The Blade Travels! . . . and every last motion is made beneath the working surface of the revolutionary new HORTON UNDERBENCH CUT-OFF SAW!  
You've never seen a saw like this before! Works on patented Quick-Set Turntable principle . . . provides the ultimate in speed, safety, versatility. Performs like a portable, radial and hand-saw combined. Positions instantly cuts off at any needed angle (including compounds); changes rapidly from cut-off to rip. All in a matter of seconds! Whether your goal is greater craftsmanship, efficiency, or profit . . . send at once for FREE ILLUSTRATED BROCHURE on this amazing saw! HORTON MANUFACTURING CO., INC., P.O. Box 747-P, Goldthwaite, Texas.

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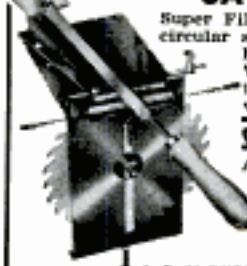
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Value "plus" is built into every Gerstner Chest to guarantee long life and real service. Free Catalog to machinists and toolmakers.  
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## SAW SHARPENING IS EASY



Super Filer No. 11 joints and sharpens hand and circular saws 6" to 10" with all teeth correct in height, depth, pitch, bevel. When file hits steel roller, \$9.95 PPD. teeth are finished. Saw runs true with no side pull. Includes 8" file.

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Automatically controls depth, angle, pitch for all saws. Precision made and calibrated. Use in any vise or clamp. Includes file.

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Engineer  
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## DRAWING INSTRUMENTS

Wherever mechanical drawing is used, professionals and students recognize the quality of VEMCO drawing instruments. Complete sets in beautiful California saddle leather cases, from \$18.45. Individual instruments also available, from \$2.95.



See them at leading  
blue printers, stationers,  
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DRAFTING EQUIPMENT  
OF QUALITY

V. & E. MANUFACTURING CO. PASADENA, CALIFORNIA



### *'Tugit'* GETS YOU GOING AGAIN!

When snow or mud imprisons your car, 'Tugit' gets it out fast! This powerful lever-operated hoist works smoothly at any angle. A 40 lb. pull on the handle lifts or shifts a ton! Compact 'Tugit' operates where a standard hoist would be too big. You get action when the handle end moves only 3 1/2". In placing a heavy part in a tight spot, you can move the load 3/32" at a time. A finger-tip control makes it simple to change from "up" to "down" or into "free wheeling." 'Tugit' Makes 1,000's of Jobs Easy. Get a 1 or 2-ton 'Tugit' for your tool box, car trunk or truck. Small size weighs only 16 1/2 lbs. In building a home or fence, fixing a tractor or clearing a woodlot, portable 'Tugit' saves time, trouble, expense, \$63.50 up. See your Shaw-Box Distributor or write us for Bulletin 388.

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57B-3

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354 W. BROADWAY MUSKEGON, MICHIGAN



Comfortable cow! Temperature regulator is the first ever devised specifically for comfort of dairy herds

## Honeywell's House of Magic

*(Continued from page 105)*

object. The screen shows its depth, distance, course, size and speed.

The U. S. Steel Corporation complained that when temperature-measuring instruments were placed inside open-hearth furnaces, they melted in the 3000-degree F. heat. Honeywell's industrial-instrumentation engineers came up with a gadget that looks through a window into the furnace, studies the intensity of the light inside and instantly translates it into temperature.

For the harried dairyman, Honeywell has developed an electronic process which not only increases butter production by 50 percent, but also gets more butter out of less cream, makes it taste better and stay fresh longer, and at reduced cost. Similar robots keep sharp electronic reflexes at work in bakeries and bubble-gum plants, monitoring ingredients for quality, precisely timing mixing processes, measuring consistencies, and baking and cooking.

Dr. James A. Oliver, curator of reptiles at the Bronx Zoo in New York, complained that when people visited the Zoo, many of his snakes slithered behind rocks, and his alligators and crocodiles submerged in their ponds. Honeywell engineers learned from Dr. Oliver exactly which temperature each reptile preferred most. Now rattlers bask in an 80-degree temperature over radiant-heating panels in the front of their cages, cobras glide contentedly in an

*(Continued to page 258)*



**NOW CUT  
HOLES & DISCS  
IN SECONDS!**

**SLUG  
BEING  
EJECTED**



**"ARCO HOLE-SAW"  
with New Automatic "SLUG-EJECTOR"**

Fits any Electric Drill, Lathe, Drill Press, Motor

Exclusive "Slug-Ejector" pops out discs immediately—therefore works 3-times faster than other hole saws selling for twice as much. 4-shatterproof blades easily exchanged to cut 1" 1 1/2", 2" & 2 1/2" holes thru any 3/4" stock.

Safety-lock prevents blades from "jumping out." . . . **\$5.95**

No. 650 HOLE-SAW as above but with 7 blades to cut 1" 1 1/4", 1 1/2", 1 3/4", 2", 2 1/4" & 2 1/2" holes. . . . **\$7.95**

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No. M-710 (Wt. 53 oz.) Has pull of 225 lbs. on steel block. . . \$16.50  
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**MIAMI MAGNET COMPANY, 3240 N.W. 27th Ave., Miami 42, Fla.**



**NEW, IMPROVED CALCULATOR  
FOR WOODWORKERS only 25c**

Instantly gives information on lumber, nails, concrete mixes, painting materials, etc. Convenient, simple to read. Just set dial for nail specifications, to convert linear to board feet, find bit sizes for screws, compare characteristics of woods. 6" diameter heavily varnished cardboard. Send 25c, no stamps, please to Greenlee Tool Co., 2112 Columbia Avenue, Rockford, Illinois.

**\$40 for 1 1/2 DAY'S SPARE TIME WORK  
GRINDING LAWMOWERS**

Yes, J. H. B. writes, "not bad for a 76 year old young fellow earning \$40 for a day and a half's work" . . . and others are making even bigger money with the Universal Model B Lawnmower Grinder. You, too can make good spare or full time profits in your own business in your garage or basement. We furnish everything you need. Write today. No cost or obligation. Dept. M-127

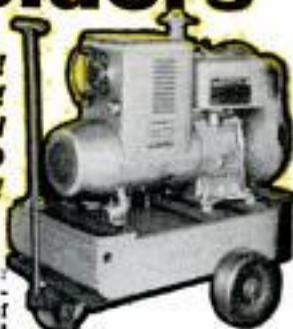
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**EARN  
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with one of these "simplified"  
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**EASY TO USE!  
EASY TO BUY!  
EASY TO CASH IN  
ON THE BIG DEMAND  
FOR WELDING WORK!**



**1 "Husky Boy"**



**2 AC Transformer**



**3 "Bantam Champ"**

You can put more money in your pocket—get into your own profitable business with any one of these highly efficient low cost welders.

**"HUSKY BOY."** 200 amp. "HUSKY BOY" air cooled welds anywhere. It's light, rugged, compact—easily mounts on your tractor or trailer for traveling to emergency repair jobs. Portable mountings for shop use are available.

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Simply connect this Hobart generator only to a good used auto engine. Gives you all the advantages of a factory-built welder. Ask for FREE build your own book.



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**CARTER**  
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**FUEL AND VACUUM PUMP**

This versatile CARTER combination fuel pump provides continuous vacuum for your windshield wipers—at any speed or on acceleration.

You also have the high capacity of the CARTER fuel pump and the high-efficiency of the CARTER ceramic fuel filter... all built into one compact unit. It's easy and economical to install. See your CARTER dealer, or ask your serviceman.

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exposed 85-degree area, and alligators and crocodiles now find the concrete around their pools more satisfactory than the temperature of the water.

In the dry-cleaning business, the trick is to know exactly when and how much water should be added to the dry-cleaning solvent to prevent shrinkage and undue



This is the first electronic automatic pilot designed for American precision bombers in World War II

weakening of the fabric. Honeywell put a tiny, specially treated plastic square embossed with a gold-leaf sensing element in an enclosure connected to the dry-cleaner washer. The device—so sensitive to humidity that it can detect the presence of a teaspoonful of water in an average-size room—constantly measures and regulates the amount of water coming into the washer. Over 1000 dry-cleaning plants have put this system to work. The same kind of device keeps humidity in hospital surgical rooms almost at the saturation point, to help prevent sparks from static electricity from setting off explosions of anesthetic gases.

Company President Paul B. Wishart likes to keep raising the sights of his men. Recently he asked several of his key scientists to set forth in memos what they thought life would be like in A.D. 2000. Here are some of their answers—not "blue-sky stuff," I am told, but rather conservative predictions from highly regarded members of a conservative profession.

• Machines will diagnose and, in many cases, treat human illness. Since sickness usually produces chemical changes in the body before severe onset, frequent, periodic checkups by

(Continued to page 260)



## MODERN IMPROVED LAWN MOWER SHARPENER AND BED KNIFE GRINDER

Sharpen any mower in 10 to 20 minutes. Hand—Power—Reel or Rotary. Modern is actually two machines in one, a Precision Bed Knife Sharpener and a Precision Reel Sharpener. Extra Bed Knife Grinder is Absolutely Unnecessary. New Mower Support makes it possible to sharpen reel without removing bed knife. The fastest precision lawn mower sharpener on the market. Costs Less. Compare Modern's Many Exclusive Features Before Buying. Send for Free Brochure No. 10 SN



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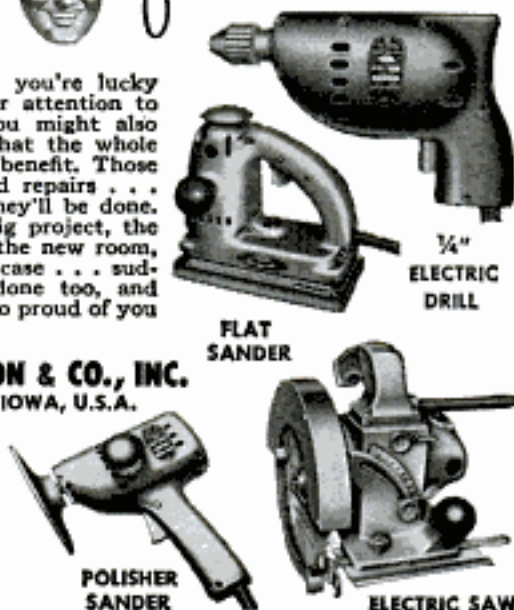
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- Recreation will be the world's biggest industry. Football stadiums, baseball parks and race tracks will be heated or cooled for maximum spectator comfort in any climate. The work week will be about 20 hours long, but work as we now know it will no longer exist—it will be more of a social philosophy.

- Contents of the world's greatest libraries and schools will be available to anyone over special television services. From an armchair, it will be possible to call for any information by coded request.

- Ways will be found to transmit information to the brain in such a way that loss of sight and hearing will not restrict one's activities in any way. And the senses of people with normally good vision and hearing will be strengthened; for instance, it will be possible to see in total darkness.

If these possibilities stagger the imagination, consider the case of Sanford Shaleen, a young Honeywell engineer, who four years ago came out of a bout with bulbar polio completely paralyzed from his neck to his ankles. His career seemed ended until his Honeywell colleagues devised a way to put his brain, still as strong as ever, to valuable use for the company.

They arrived at his bedside with a pulpit-like stand, put a dictating machine next to it and a microphone close to his head. Then they brought in piles of engineering reports. Shaleen's job they explained, would be to read the reports and dictate short, sharp condensations into the machine.

Shaleen brightened, but said it didn't seem practical—someone would have to stay with him and turn each page as he finished reading it. The engineers placed a report on the stand and told him to get busy—pages would turn automatically when he turned his head in the desired direction!

How far will automation go? "In 10 or 15 years," says president Wishart, "industry will be using entirely different types of controls from those in use today. They will be more sophisticated. They will control whole processes, not just isolated production operations." ★ ★ ★



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same amount whether in the new car or the old car. The doctors did not attempt to pinpoint what made the drivers tired, except to hint that it may be due to the anxieties of driving. The new car, apparently as much as the old car, requires the constant attention of the driver in traffic situations. Although he may not have to work physically, he works mentally and perhaps this is why he is just as tired at the end of the day as the old-car driver.

When asked which car they preferred, the two drivers, of course, said the 1958 model. It is, as all agree, much more pleasant and comfortable to drive. It provides a warm, secure haven in which to cover the miles quickly and without anxiety. There is little reason for concern about tires, about engine failure, about not reaching the destination. And, as a result, it is more pleasant to drive. The driver feels that it is easier and less tiring, but apparently it is not, if the tests are reliable.

#### **Future Meaning**

What does all this mean to the automobile of the future? It certainly is not the final study on this subject. There will be, and should be, others. But it does provide evidence that the industry (De Soto Division, at least) senses that there is more to improving a car than merely eliminating physical effort.

As the test drivers themselves state, the only fault with the 1958 model was a tendency to monotony because so much of the work is done for them. With today's straight, stop-free toll roads and through ways, this is a problem that the industry must face. And, if De Soto is any example, the industry is beginning to face it.

More work should be done on monotony, the researchers feel. Some experts feel that monotony causes fatigue. Dr. Church of the De Soto test does not, he feels it is anxiety that tires the driver.

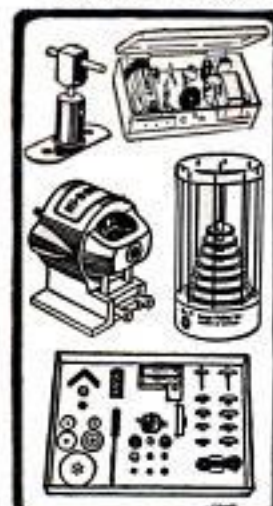
Perhaps there is something to be said for the old cars after all. At least, they did keep the driver occupied. He listened to the tires because he expected a flat at any moment, he listened to the engine because a rod might burn out, he listened for sounds of overheating.

Today's cars make it unnecessary to listen, to be concerned and, the test drivers feel, perhaps this is what leads to boredom and monotony. Whether monotony results in fatigue is a question yet unanswered.

In any case, the De Soto test opens a new field for study—a field that will interest all of us until that future day when we simply dial a destination on the dashboard and our car takes us there while we sleep. ★ ★ ★



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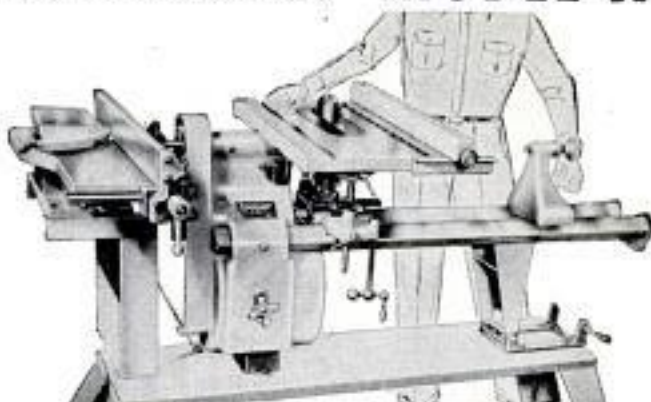
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## European Listening Post

(Continued from page 108)

may be because their cars are simple, more easily understood. They study cutaway models of engines and transmissions arduously. Even women seem interested.

At Frankfort, the tiny DKW 600 was the big hit. It is not yet in production and was displayed to test public reaction. The public reacted. Hundreds stood as if transfixed.

At Paris, the new Vespa 400 was just as big an attraction. No styling tricks here though, just a small elemental machine. The crowd was so big on Sunday you couldn't get within 50 feet of it. No design short of an atomic car would create that much interest in America.

Europe is in transition. People who now own scooters are moving up into baby cars. At Frankfort, one entire building was filled with baby cars of 600-cubic-centimeter displacement or less (about one tenth the size of the 1958 Ford V8 engine).

### American Cars

For the most part American cars were looked at only casually. The mood seemed to be more idle curiosity than true interest. There were no cutaways or operating exhibits, just cars—and the cars were kept locked. Most European cars were unlocked

and people could climb in and jiggle the steering wheel. American cars were marked "hands off please." They are off limits outside the show as well. Few Europeans can afford to buy them or to run them and those who can, soon find them inconvenient on Europe's streets.

Edsel attracted more attention than any other American production car, perhaps because it was the newest (an old Oldsmobile Rocket "dream" car was the biggest spectator attraction at Paris among American cars, but of course it is not a production model). Five Edsels were sold during the Frankfort show.

Most European comments overheard at the American exhibits referred to bigness, expensive operating and licensing costs. Frequent criticisms were heard about poor paint jobs and slipshod trim fits.

Despite such criticism, there's no doubt that European cars are going American. As one German sales manager said, "The next five years belong to the American stylists. Even such conservatives as Mercedes-Benz and BMW will have to go along. People like American styling."

Could be. The next question is: What does this do to the imported-car market here in the States where much of the business is in protest against American design? ★ ★ ★

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### TRANSFORMER WELDER \$24.95 FOR QUINCY

Complete with everything. Ready to plug in. 110 volts AC. Draws 15-30 Amps. Produces 75 Amps, 5 heats. Welds metal from 1/16" to 1/4" using 1/16" to 3/32" standard rods. Guaranteed unconditionally. 10-day trial. \$5 deposit on C.O.D. Does everything welders costing up to \$75 do. 1/4" welder \$7.95 plus 50c for postage.

ESSAY MFG. CO., INC., Dept. 51, Quincy 69, Mass.

## "WE PAID FOR OUR HOME with a Foley Saw Filer"

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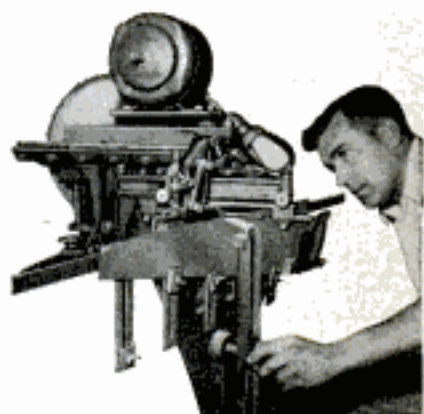
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MAKING  
FACTS\***



Here is the true story of Leslie Patrick—as told by his wife. "I can truthfully say Mr. Patrick made a wonderful investment with his Foley Saw Filer. In 1946, we had only a Model A Pickup and all our belongings were in it. Since then, my husband has done so well with his Foley Saw Filing Machine and repair shop that we bought a house and paid for it; bought a new car and built an addition to our house; and he has got a lot of new machines in the shop. Nicest of all, it is all paid for."

**Make up to \$3 or \$5 an hour**

With the Foley Automatic Saw Filer you can sharpen hand, band, and circular saws just like new. Start in spare time, in your garage or basement. No experience needed. Build up a steady, repeat CASH business which will buy YOU a home or new car. Send coupon for FREE BOOK. No salesman will call.



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**WAR SURPLUS** AND OTHER **BARGAINS** **SAVE UP TO 90%**



**SPECIAL ON \$4770 NAVY AIR-COOLED POWER UNITS**

Tremendous power package. Can be used as a portable or stationary unit. Makes terrific welder.

30D-1A Lawrence, 24V, 2 Cylinder opposed 4 cycle 10 1/2 H.P. Complete with various generators. Net wt. 180 lbs. Gross wt. 250 lbs. Like NEW. With 140 Amps, 24 V. Gen. — \$125. With 200 Amp. Gen. — \$137.50. With AC-DC NEA5, DC side 24 V., 300 Amps. AC side 10.5 Amps. 800 cycle — \$142.50. 300 Amp. Gen. — \$142.50.

**140-1 REDUCTION GEAR** For beaching boats, winches, hoists. Ideal for motor in golf or boys electric car. Built-in (removable) DC motor & clutch. Hi torque, lo speed. Runs on 6-12 or 24 V. Wt. 65 lbs. gross. Approx. GOVT. COST \$300. Like NEW. \$12.00. \*225-1 REDUCTION GEAR, as above — \$13.50.



**BENDIX GEROTOR PUMP & MOTOR** Use wherever fluid pumping required. Excellent for hydraulic installations. Has 3/4" pipe connections, built-in relief valve adjustable up to 1500 lbs. Max. cap. 8 GPM. 1 1/2 H.P., 24 V. motor. Use on 12 to 36 V. Approx. GOVT. COST \$350. NEW, \$10.98.

**CHRONOMETRIC TACHOMETER** Built to U.S. Navy & Air Force specs. Standard brand. For counting revolutions per min. for any rotating shaft. Can be used on speeds up to 3000 RPM. Accuracy to 1/10 of 1%. Complete with male & female tips & shock-proof case. GOVT. COST \$87.50. NEW. Only \$21.95 ppd.



**REVERSIBLE RATCHET WRENCH** Hi torque. Delivers tremendous leverage. 4' handle with reversible ratchet. 4 hexagon nut sockets, 2 3/8", 2 9/16" & 3 1/8". Mfd. by Lowell. Approx. GOVT. COST \$215 per set. Wt. 50 lbs. NEW. Only \$10.95 per set.

**HEAVY-DUTY RHEOSTAT** Ideal for regulating voltage on electric welders. Rated 5.75 Ohms, 100 Watts with double windings & dual female 25 amp, 125 V. receptacles. 7" hi x 5 1/4" x 1 3/4" D. Shop. wt. 2 1/2 lbs. Approx. GOVT. COST \$25. Brand New. \$1.95.



**ARC WELDER KIT \$27.95** Build your own complete make-up package incl. 1 Aircraft DC Gen. 200 Amps, 24 V.; Rheostat, Toggle Switch, 30' new welding cable, Electrode Holder, Welder's Shield, Voltage Reg. Wiring diagram for hookup as welder. Wt. under 100 lbs. Approx. GOVT. COST \$475. Like new, perfect — \$27.95. DC GEN., as above, purchased sep. — \$12.50.



**BUILD YOUR OWN ARC WELDER, LIGHT PLANT OR BATTERY CHARGER \$39.95**

Kit. Incl. 1 Navy NEA-5 Gen. combination AC-DC type. AC 115 V. DC 24 V., 300-300 Amps. 2 complete generators in 1, yet no larger than reg. gen. Ideal for home, shop and farm lighting plants. Delivers 1200 Watts AC. DC side for charging batteries, welding and operating war surplus motors. Also in kit: 2 Voltage Regs., AC & DC. Reverse Current Relay, 30' new welding cable, Rheostat, Electrode Holder, Toggle Switch, Welder's Shield, Wiring Diagram for kit. Wt. under 100 lbs. Approx. GOVT. COST \$650. Kit — \$39.95. Navy NEA-5 Gen. as above, purchased separately, \$27.50.



**R1 GENERATOR KIT** Jack & Heinz or GE. Rated 300 Amps. 24-32 V. With same items as above. Approx. GOVT. COST \$500. Complete 60 lb. kit — \$39.95.

**ESA GENERATOR** Mfd. by Leece Neville. Rated at 12 V.D.C., 50 Amp. Compact power package for trucks, boats, battery charging. Fits any installation. Shpg. wt. 25 lbs. Approx. GOVT. COST \$175. NEW, \$16.50.



**MICROMETERS** Black crackle finish frame. — Easy-to-read graduations in .001. NEW. 0-1" cap. \$2.69 ppd. 1-2" cap. \$3.79 ppd.

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**BENDIX AIRCRAFT COMPASS** For boats, trucks, cars. Pioneer Instrument Co., div. Bendix. Mark VIII. Increments of 1°; 360°. Major graduations every 5°. Magnetic. Can be lighted with 6, 12 or 24 volt standard bulb. Flush panel mounting. Floating card. Tested in our own inst. lab. Approx. GOVT. COST \$250. Perfect. \$10.95 ppd.



**ASTRO COMPASS MARK II** Used by USAF & commercial airlines. Makes pelorus & azimuth circle for air or marine navigators. Great for astronomers. Incl. carrying case. Tested for accuracy in our own lab. Approx. GOVT. COST \$400. Now \$10.95.



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... for long-lasting performance



**Precision Balanced NAIL HAMMER**



One-piece, forged steel, rubber-cushioned, no-slip grip

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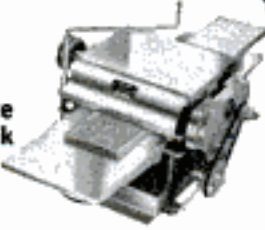
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Convert Rough and Random Size Lumber into Cabinet Finished Stock

Now anyone can make perfect cabinet finished stock from low-cost rough lumber... any size up to 12 1/4 inches wide and 6 inches thick. Turn out high grade finished material at a fraction of the cost you pay lumber yards. Big 42-inch-long bed makes it easy to plane heavy, wide and long pieces... BELSAW self-feeds at 14 to 34 feet per minute.



**USE THIS ONE LOW-COST MACHINE for Planing, Jointing, Sawing, Milling, Tongue and Groove.**

You can easily make flooring, siding and many other popular patterns with your Belsaw. Your Belsaw quickly pays for itself with savings on raw materials and profits on finished stock... a highly profitable machine for custom work. Compare Belsaw with any 12-inch planer on the market... Belsaw gives you more essential features—yet costs you \$50 to \$125 less than others.

Send Today for Free Literature on the Belsaw Multi-Duty Planer.

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**BE SURE IT'S A KING O'LAWN**

The Edger-Trimmer with "That Forward Throw."

**\$79.50** F.O.B. South Gate California

1958 Model Briggs Stratton light weight 4 cycle engine. Total weight of Power Edger — 49 lbs.

**KING O'LAWN** Junior model power edger trimmer shown.

4 models of power edgers and 4 models of power mowers from which to choose

Over 2000 dealers to serve you. A few choice dealer territories are still available. Please write

**KING O'LAWN Inc.** P.O. Box 1068 Tweedy Sta. South Gate, California



Edges 5 feet per second and trims in the hard to get places.

Changes from edger to trimmer in just 3 seconds



## Which Irwin bit bores holes fastest?

**Fastest cutting new Speedbor "88"** for electric drills. Bores 1" holes 2 1/2" deep in just 60 seconds. Increases the average boring range of small power drills. Sizes 1/4" to 1". Only \$.75 each.

**Fastest Boring 62T Hand Brace Type.** Only 16 turns to bore 1" holes through 1" wood. Double cutter action. Sizes 1/4" to 1 1/2". As low as \$1.

**Fastest Boring Expansive Bit Type.** Bore up to 35 standard holes with just one bit. Two sizes give 1/2" to 3" boring range. America's most versatile bit for home and farm. Only \$3.80 for largest size.

### Balanced cutting heads do the job in seconds

Every Irwin wood bit gives faster, cleaner boring in any wood — no matter the type. Spurs and cutters are precision-balanced, to give free and easy cutting action. Made to last for years. Irwin is the wood bit hardware dealers recommend.

Free Booklet tells how to use, select and take care of wood bits. Many pictures. Write Irwin, Dept. 8C, Wilmington, Ohio.

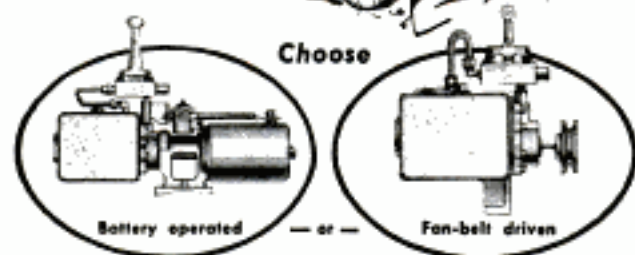
**IRWIN**

• the original solid center auger bit  
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### MONARCH POWER HYDRAULIC CONTROLS

Snow removal is fast, dependable and safe with Monarch Power Hydraulic Controls. Cab-controlled for one-man instant action, the Monarch zips snow plows into operation with ease and speed. See your dealer or write for full details.

**MONARCH ROAD MACHINERY COMPANY**  
1331 MICHIGAN ST., N.E. — GRAND RAPIDS 3, MICHIGAN

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## A Report on Three Cars

(Continued from page 90)

slowly to prevent a constant up-and-down adjustment as the car goes over bumps or rounds corners.

Pontiac and Cadillac rely solely on the slow-leveling system.

Both GM cars have a control knob so the driver can elevate the car body to full lift, enabling it to avoid rear-end drag.

Unlike the GM cars, Ford retains leaf springs in the rear when air bags are not installed. Such an arrangement makes it necessary for Ford to add a trailing-arm suspension link to absorb drive and braking thrust when air suspension is used.

Also big news at Ford is the new V8 which is designed for top efficiency in both operation and manufacture. Despite its greatly increased power and displacement (300 horsepower and 352 cubic inches) it is smaller than the engine it replaces.

It has fully machined combustion chambers that provide more accurate control of compressions among the various cylinders. This results in a smoother operating engine. The big new V8 weighs less than the 292-inch V8 and is said to use less gas.

Machined combustion chambers have shiny surfaces that make it hard for carbon to build up. The new design has no Siamese manifold porting, a frequent cause of engine hot spots. There's more room between the two heads and manifolding is simplified to make the engine breathe easier and more evenly. This aids economy as you don't overload some cylinders in order to satisfy those that are more remote.

Of major importance to the manufacturer (of less interest to the owner) is the fact that the cylinder-head design has its machined sides at right angles to each other, simplifying production-line setups. This cuts costs and assures precision fits.

There's no water jacket around the exhaust manifold on Ford's new V8 which helps thermal efficiency (the more heat you remove in the radiator, the less energy you get at the rear wheels), but also may decrease heater efficiency. It probably will take longer for the heater to warm.

Cadillac's V8 engine has been reworked. Valves are larger and the combustion chamber reshaped to increase compression to 10.25 to 1 (from 10.0 to 1). A new camshaft provides improved fuel economy and smoother idling.

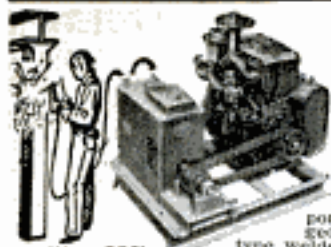
Of less importance mechanically (but of much importance saleswise) is the fact that Cadillac extended its rear-end overhang about nine inches on one model to appease those who say a Cadillac should look like the longest car. ★ ★ ★

POPULAR MECHANICS

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## MASTER D.C. ARC WELDER



**Easy To Use**

Now! a portable rugged, industrial type welder with terrific performance, yet at a price hundreds of dollars less than you'd expect. Senior model made for years of trouble-free, continuous service. High capacity DC welding unit enables you to tackle any job with confidence—easily welds anything up to 2" plate using from 1/16" to 1/4" rods. Built-in stabilizer and cooling system makes arc easy to strike and hold. Dual control rheostat provides low heat soldering, brazing and welding from 30 to 300 amps. Complete with instructions, guarantee and triple V-belt or flat pulley. Easy to hook up and easy to operate.

**WELDER ONLY — DUAL CONTROL MODEL.** Same as above, but drive with your tractor, jeep or gas engine of 1/2 HP or more. (Item 280) Wt. 110 lbs. \$450 value. **\$119.50**

**WELDER ONLY — INDUSTRIAL MODEL** same as above but with ceramic rotary type rheostat providing 74 different heat settings for all types of welding (Item 380) \$500.00 value. **\$139.50**

**COMPLETE POWER MASTER** (illustrated above) powered by a 14.6 hp. air cooled Wisconsin engine. Wt. 480 lbs. (Item 280) Compares with welder costing \$1200. **\$449.50** Factory Special.

**WELDING KIT.** Two 10 ft. leads, welding helmet, electrode holder, ground clamp. Sold only with welder at. **\$10.50**

## HEATING & VENTILATING FAN

(Item 10) Easily installed in furnace pipes. Forces even heat to all rooms. Over range removes kitchen smoke and odors. Powerful, continuous duty motor. 110-120V. AC. Mount in wall or ceiling to ventilate any area. Quiet, super-efficient fan moves huge volume of air. (400 to 600 CFM.)

8" Pipe, wt. 5 lb. **\$6.85**  
 9" Pipe, wt. 6 lb. **\$7.85**  
 10" Pipe, wt. 7 lb. **\$8.85**  
 12" Pipe, wt. 8 lb. **\$9.85**

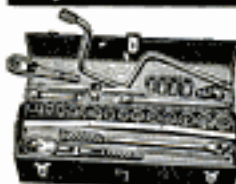


## JET FLOW BLOWER

Tremendous air movement (1800 CFM) and quiet operation make this double inlet 10" turbine blower unbeatable for heating, cooling, drying and air conditioning. Ideal for attic or barn ventilation, converting gravity heating to forced air; spray booth exhausts, etc. Operates with any motor. Includes variable speed motor pulley and belt. Dimensions 10" h x 18" x 16 1/2". Outlet openings 12" x 11 1/2". Wt. 45 lbs. Item 245. Reg. \$54.80. **\$29.50** Factory Special.

**HEAVY DUTY 1/2 HP motor** for above **\$17.95.**

## 52 pc. SOCKET SET



Highest quality, guaranteed non-breakable sockets made by Husky. Beautifully matched chrome thin wall alloy absolutely the best. Contains a complete set of 28 sockets in 1/4", 3/8", 1/2", 5/8", 3/4", 1", 1 1/4", 1 1/2", 1 3/4", 2", 2 1/4", 2 3/4", 3", 3 1/4", 3 3/4", 4", 4 1/4", 4 3/4", 5", 5 1/4", 5 3/4", 6", 6 1/4", 6 3/4", 7", 7 1/4", 7 3/4", 8", 8 1/4", 8 3/4", 9", 9 1/4", 9 3/4", 10", 10 1/4", 10 3/4", 11", 11 1/4", 11 3/4", 12", 12 1/4", 12 3/4", 13", 13 1/4", 13 3/4", 14", 14 1/4", 14 3/4", 15", 15 1/4", 15 3/4", 16", 16 1/4", 16 3/4", 17", 17 1/4", 17 3/4", 18", 18 1/4", 18 3/4", 19", 19 1/4", 19 3/4", 20", 20 1/4", 20 3/4", 21", 21 1/4", 21 3/4", 22", 22 1/4", 22 3/4", 23", 23 1/4", 23 3/4", 24", 24 1/4", 24 3/4", 25", 25 1/4", 25 3/4", 26", 26 1/4", 26 3/4", 27", 27 1/4", 27 3/4", 28", 28 1/4", 28 3/4".

Guaranteed against breakage. A beautiful set of tools that will handle any job in a big do-it-yourself steel box. Wt. 17 lbs. (Item 205) List price \$62.90. **\$29.95** Factory special.

## CABLE HOIST



**2000 lb. CAPACITY.** A fortunate purchase from the Air Force enables us to offer these brand new 2000 lb. electric cable hoists at a fraction of their value. Perfect for material handling, boat hoists, elevators, lift on assembly lines, etc. Two separate 22 ft. lift cables with independent controls permit leveling the load and controlling it perfectly. Rugged ball bearing motors of geared down design 110 volts. Available for A.C. or D.C. Please specify. Makes a terrific portable hoist with our #273 D.C. light plant at \$99.75. Offered at less than 33% of regular cost (Cable not included). Wt. 145 lbs. A.C. Model, item 847A. **\$149.50** D.C. Model, item 847. **\$129.50**

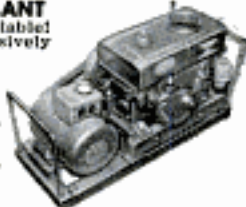
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## EXCLUSIVE! NEW!

### LIGHTWEIGHT WATER COOLED DIESEL GENERATOR PLANT

Never before available! Now offered exclusively by Master Mechanic. A low priced, lightweight, continuous duty, Diesel generator set. Powered by a super rugged, exceptionally smooth running, one cylinder Diesel engine. Operates at conservative 1750 r.p.m. and delivers full 1750-2000 watts of power. Operates on low cost fuel oil. Wt. only 240 lbs. representing a triumph of Diesel Engineering. Complete with fuel filter, oil pressure gauge, control box with duplex receptacle and voltmeter. (Item 830) Special factory price. **\$399.50**

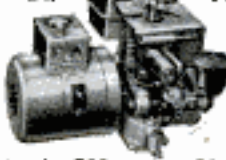
**DIESEL ENGINE only, as above described 3.5 HP (Item 830A)** Wt. 116 lbs. **\$249.50**



### 700 WATTS PUSH BUTTON START

115 v. 60 cye. AC. Powered by a rugged 2.2 HP easy starting Briggs engine. No wiring necessary; just plug in and operate. Plenty of current for any oil burner, freezer, brooder, emergency lights, etc. which require up to 700 watts. Ideal for television and radios. Complete with Voltmeter and built-in winding to charge 6 v. auto batteries. (Item 24.) Wt. 75 lbs. Easily fits in car trunk. Be prepared if storm knocks out power lines. Reg. \$275 value. **\$143.50**

**1200 Watt Plant (Item 45)** same as item 24 but larger generator and engine with 50% greater output. **\$199.50**



## GIANT METAL SHEARS

"PEXTO"  
 Nine inch cutting blade made of special high carbon alloy steel, perfectly aligned and ground. Easily cuts steel pipe up to 12 gauge of 1/2" thick. Overall length 40". Wt. 25 lbs. (Item 18) Regular \$49.50. While they last. **\$14.95**

## FAUCET WATER HEATER

Instant hot water from any faucet for just pennies—sounds unbelievable—but it's true! You just slip MASTEK MECHANIC'S new Faucet Water Heater over any water faucet, plug it in a wall outlet and you've got steaming hot running water instantly for dishes, shaving, washing baby's bottle, etc. Simple and safe—operates on ordinary 110V. house current—costs only 2 1/2 cents per hour for hot water. Ideal for homes, bars, cabins, trailers, etc. Easily regulated from lukewarm to full hot. Fully guaranteed! (Item 408) Wt. 2 lbs. Factory price F.O.B. Burlington, only. **\$4.95**

## JET STEAM MASTER

Now, a super efficient portable steam generator that produces live steam at 100 lbs. pressure in 60 seconds from a cold start! Produces large volume of high pressure steam on 2 pints of fuel oil. Instantly cleans sticky grease, dirt, rust, old paint, etc. off implements and road machinery. Pays for itself in a few weeks. Sterilizes soil. Sterilizes as it cleans—milk equipment, etc. Fully automatic—oil fired with new, built-in lifetime bronze water circulating pump. Draws water from faucet or bucket. Simple and safe—anyone can use it; built-in safety valve. Complete with 12 ft. of hi-pressure steam hose and new triple efficiency steam gun that automatically mixes in soap solution if desired. Wt. 250 lbs. Item 463. **\$349.50** Special factory price.



## PORTABLE LIGHT PLANTS

### 1500 WATT PLANT

115v. 60 cye. AC Push Button Start. Powered by a 3 1/2 HP. Clinton engine. Combines big output with easy portability. Provides emergency power for operating any oil burner, sump pump, freezer, television, lights, communications systems, etc. which require up to 1500 watts. (Item 22) Wt. 110 lbs. Reg. \$475 value. Factory price **\$239.50**



**1750 Watt Plant** Powered by 4.5 Hertz engine. Electric starting & battery charging built-in. Factory price **\$279.50**

**2500 WATT PLANT—Push Button Start** (Item 21) 110/120 v. 60 cye. A.C. A rugged powerful plant. Reg. \$645. Spec. **\$329.50**

**3500 Watt Plant Push Button Start** (Item 23) 115 v. 60 cye. AC. Similar to above, but larger and 33% more capacity. Wt. 270 lbs. Reg. \$780. Factory Price. **\$379.50**

**DUAL VOLTAGE 110/220** for Item 21 or 23—\$30 additional.

We make every type and size of light plants—Write, giving us your requirements!

## BATTERY CHARGING GENERATOR

**Push Button Start**  
 A husky, 750 watt plant (designed for battery charging only) that will charge 6 or 12 volt batteries in just minutes! When mounted with two 6 volt batteries it provides a terrific cold weather motor starting unit, as well as a fast charger! Charges all batteries anywhere—no biline current needed. Ideal for service stations, garages and farms. Comes complete with ammeter and cutout. (Item 821) Wt. 120 lbs. Regularly \$295. Our special, only. **\$119.50**



## Double Acting Hydraulic Cylinder

A powerful cylinder mfr'd. by Massey Harris which develops both a pushing and a pulling action. Will push 8,100 lbs., with a 1000 PSI pump pressure. Cylinder is 3 3/4" O.D. with 6 1/2" stroke—standard heavy duty clevises on both ends. Has standard 1 1/2" pipe thread openings. Can be used for tilting buckets or blades, raising or lowering implements, hydraulic presses, etc. Can also be used as an air cylinder. (Item 802) Wt. 17 lbs. Reg. \$68 value. Special **\$14.95**

**OTHER DOUBLE ACTING CYLINDERS**  
 8" stroke — 3" bore. **\$34.00**  
 10" stroke — 3" bore. **\$4.80**  
 16" stroke — 3" bore. **43.00**  
 24" stroke — 3" bore. **47.50**

We have all sizes of cylinders available.

**HYDRAULIC CONTROL VALVE** — 4 way open center valve with built-in adjustable relief. Controls 1 cylinder or 2 single acting cylinders. Equalizing feature permits easy control even under heavy loads. 3/4" pipe thread on inlet & outlet — 1/2" on cylinder outlets. Easily mounted, finger tip control. Wt. 1 lbs. (Item 822). **\$21.95**

## HYDRAULIC KIT



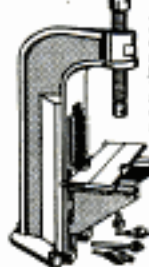
Complete Hydraulic Kit consists of hydraulic hand pump with built-in 2 gal. reservoir and item 802 hydraulic cylinder described above. Pump has a built in relief valve and is rated at 20 tons. Kit is ideal for presses, jacks, snow-plows, etc. Pump is 29" long—8" diam. (Item 836) Wt. 50 lbs. **\$39.50**

**Pump only (Item 836a) only. \$23.50**

**HYDRAULIC HOSE COUPLERS** Connect or disconnect hydraulic lines without loss of oil. 1/2" pipe threads. (Item 810) per set. **\$4.95**

## SCREW-TYPE PRESS

A tremendously powerful press capable of exerting nine tons of pressure. Pays for itself straightening bent parts, or pushing out bearings and bushings. Ideal for manufacturing and assembly operations because of precise control. Massive 1 1/2" screw permits precise control over vertical travel. Extra heavy ribbed yoke has a throat 2 1/2" high; depth capacity for working to the center of an 11" object. Includes 8" x 15 1/2" vise-type table and two pushing arbors. Wt. 150 lbs. (Item 797) Reg. \$149.50. Special. **\$49.50**



**HYDRAULIC PRESS.** Nine ton capacity. See Dec. Pop. Mech's ad for details or write. Complete Wt. 110 lbs. (Item 404) **\$69.50**

Send check or M.O. Prices f.o.b. Factory. 10 day Money back guarantee. SEND 10c for **BIG NEW CATALOG**  
**MASTER MECHANIC MFG. CO.,** DEPT. 3-21 **Burlington, Wis.**





# SOUTH BEND

## 13" Precision Lathes

**for accurate,  
low-cost machining**

These lathes are popular in the toolroom, production shop, or wherever varieties of precision parts are machined. Users prefer them for their simplicity and practically effortless handling. Job set-ups and tooling changes are made so quickly and easily that down-time is held to a minimum. A very complete line of attachments simplifies tooling. Send coupon for complete information.

### SPECIFICATIONS

**Swing**—13 $\frac{1}{8}$ " over bed and saddle wings, 8" over cross slide.

**Distances Between Centers**—28", 40", 52" maximum.

**Collet Capacity**—1" maximum (Collets interchangeable with South Bend 10"-1" Collet, 14 $\frac{1}{2}$ ", 16" and 16-24" lathes).

**Spindle Speeds**—Six to Sixteen 40 to 940 r.p.m. or 20 to 940 r.p.m. approximately.

**Power Longitudinal Feeds**—48 R.H. or L.H., .0015" to .0841".

**Power Cross-Feeds**—48, .0006" to .0315".

**Thread Cutting**—48 R.H. or L.H. pitches, 4 to 224 per inch.








### HARDENED BED WAYS

Hardened and precision ground bed ways can be supplied in lieu of regular at small extra cost—also hardened and ground cross-feed screw.



Up to 24 months to pay.

PLEASE SEND INFORMATION CHECKED:

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