

NOV. 1956

FIRST OF THE '57 CARS

35 CENTS

POPULAR MECHANICS

MAGAZINE

WRITTEN SO YOU CAN UNDERSTAND IT

REGD. TRADE MARK, GREAT BRITAIN, NO. 40826

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IN THIS ISSUE

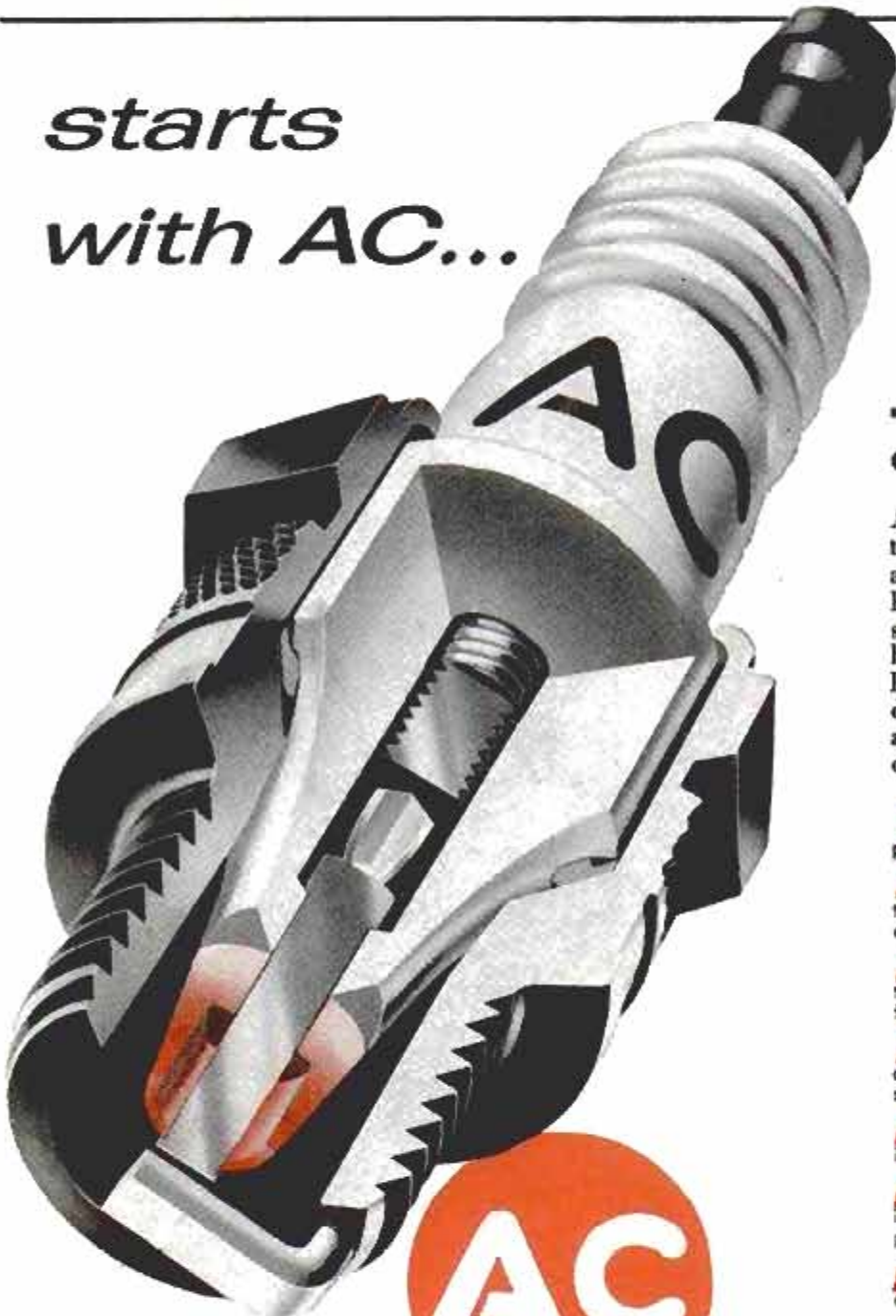
- Six pages of Christmas gift ideas
- A look at the Soviet Navy
- Roundup of the new TV sets
- How dangerous is fall-out?

FOR HOME CRAFTSMEN

ACTION



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have your car's underside checked carefully for holes in the tail pipe or muffler caused by rust or corrosion. If any exist, combustion fumes can seep into your car—and that's particularly dangerous in winter when you often drive with all windows closed. Your nearby Texaco Dealer will gladly make this check for you.

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for
cold
starts

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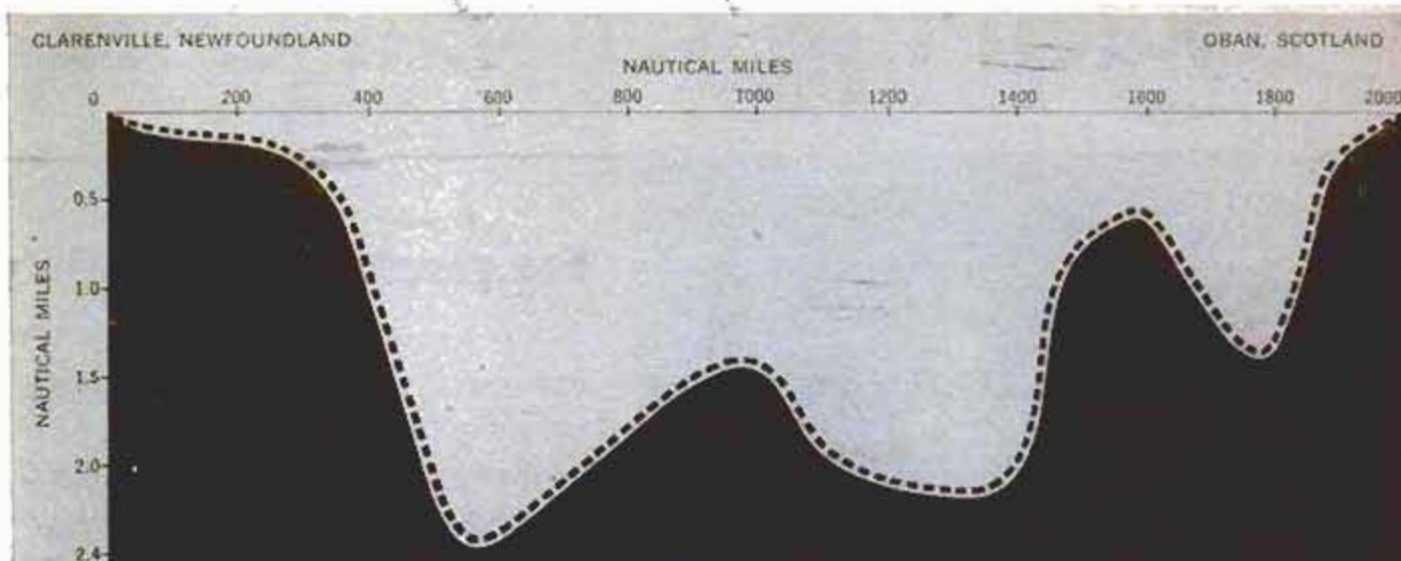


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A great new telephone cable now links North America and Europe—the first trans-oceanic cable to carry voices.

To make possible this historic forward step in world communications, Bell Laboratories scientists and engineers had to solve formidable new problems never encountered with previous cables, which carry telegraph signals.

To transmit voices clearly demanded a much

wider frequency band and efficient ways of overcoming huge attenuation losses over its more than 2000-mile span. The complex electronic apparatus must withstand the tremendous pressures and stresses encountered on the ocean floor, far beyond adjustment or servicing for years to come.

Here are a few of the key developments that made this unique achievement possible:



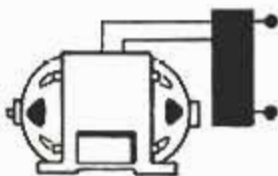
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Next Month

ANY BUGS in those cabbages? They'll soon bite the dust from that duster. In this issue we present the first of three articles by top authorities on the farmer's natural enemies—weeds (page 165), insects (December) and plant diseases (January). Here's down-to-earth information for the farmer on the latest weapons in his arsenal. But there's fare for the town dweller, too: How to maintain a weed-free lawn, how to get rid of that stubborn stump, the finest mosquito repellent ever discovered.

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Number 5

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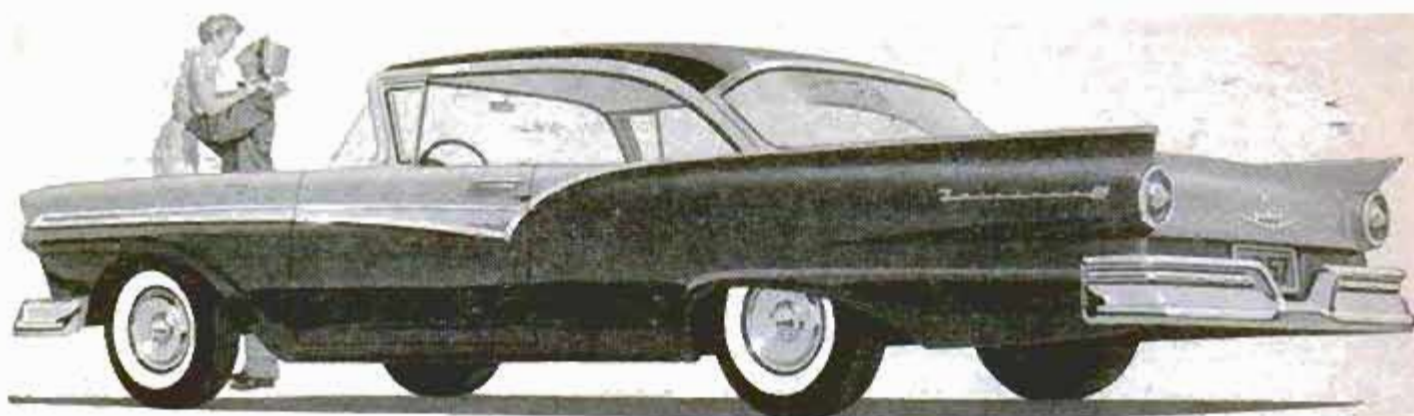
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What put the magic in

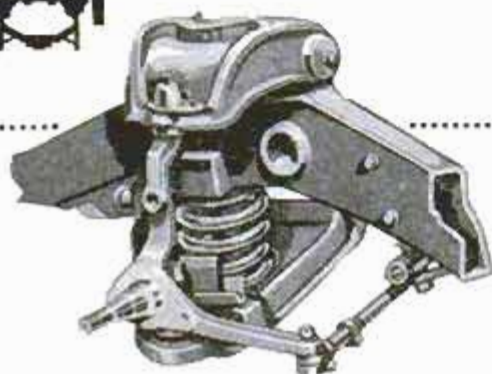
The big news from Detroit this year is the magic of the "Inner Ford" for '57. The magic begins with a bow-shaped frame that sweeps out and dips down between the wheels. Side rails flare out almost 13" further than in '56. Passengers are within (but still above) the contour of the frame.

Side rails thus serve as concealed "side bumpers" of immense strength. This new contoured frame provides the '57 models with the most rugged foundation of any Ford yet.

Ford's new sculptured-in-steel body is secured to this rugged frame by 20 unique



The contoured frame is a ladder-type structure with heavier box section side rails and 5 cross members. Torsional rigidity of this '57 frame is as much as 27 per cent greater.



4-way ball-joint front suspension has been further advanced. New lower suspension arms are swept back so front wheels step over bumps rather than into them . . . a 4-way action for a softer ride.



The magic of the Ford Silver Anniversary V-8's for '57 is centered about the words "deeper breathing." New larger intake valves, king-sized manifolds, and higher lift camshafts help provide a larger volume of fuel-air mixture, thus allowing for superior engine performance . . . up to 245 hp. The popular Mileage Maker Six, the most advanced Six in the industry, has been boosted to 144 hp.

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the new kind of FORD?

live-rubber body mounts. This helps the '57 Ford to give you the solid, silent kind of ride you expect to find only in more expensive cars.

There's magic in three high-performance Silver Anniversary V-8's with up to 245 hp. The new low silhouette carburetor and

higher compression combustion chambers are just a few of the new V-8 engine features that you'll appreciate.

See your Ford Dealer soon. He'll gladly give you the full story of Ford magic for '57, and let you action-test this *new kind* of car with the Touch of Tomorrow.



Even-keel rear springs are longer-leaved and out-board mounted for wider stance, greater stability.



New deep-offset hypoid axle has exclusive straddle-mounted pinion for greater torque capacity, quieter operation and longer life.



Centrifugal-vacuum distributor for V-8's has long-lived ventilated points. Breaker plate rotates on full ball bearings for split-second response to changing engine requirements.



Carburetors are low silhouette type. They give a more homogeneous mixture for better starts.



Air cleaner used with Ford's new carburetor has re-usable pleated fibre filter; offers easier maintenance and more filtering area.

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NOVEMBER 1956

5

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ACROSS THE DESK



To the Editor:

Although electrically driven, a novel model train needs neither batteries nor transformers. Electric current is supplied by a hand generator connected to the rails,



which carry the current to the locomotive. The faster the handle is turned, the greater the speed of the train.

Charles Arthur Oldroyd,
Barrow-in-Furness,
Lancs., England

Life on a Russian Warship

Russian navy ships even "smell different," reports British artist, George H. Davis, who inspected the soviet cruisers *Ordzhonikidze* and *Sverdlov* as well as destroyers of the *Skoryi* class when they visited England recently. After his visit aboard the ships, Mr. Davis prepared for *Popular Mechanics* the drawings presented on pages 148-151.

"The ships are very well found and very clean," the artist writes us, "though the 'smell' of the ship is different to that of a British ship." Having visited many foreign vessels, he asserts that each one has its distinctive smell.

His report to *PM* brought interesting comments on life aboard a soviet warship.

"In the big cruisers of the *Sverdlov* class," says Mr. Davis, "the officers are accommodated amidships; there are two and four-berth cabins just as comfortable as those in American or British ships.

"The crewmen eat and sleep in their main quarters forward and aft. Russian

(Continued to page 8)

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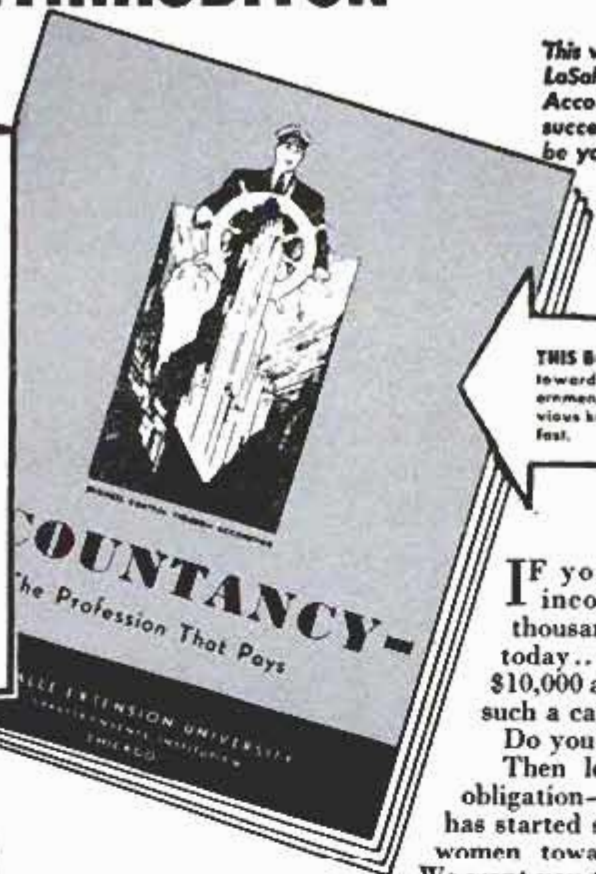
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(Continued from page 6)

seamen sleep in cot beds which fold to the walls. The petty officers have comfortable recreation rooms and cabins. There is, of course, considerable political propaganda in the Propaganda and Recreation Hall.

"Both officers and men are well fed and the big galley that feeds the crew and the smaller one for the officers have to supply the wants of 1050 officers and men.

"The sailors are called at 6 o'clock, do physical training at 6:15 and breakfast at 7. At 8 a.m. the whole crew turns out for the hoisting of the flag. For the rest of the morning they go about their various duties including scrubbing of the wooden decks (using a primitive type of birch broom). At noon the bugle calls the men to their main midday meal consisting of an excellent three-course lunch. Unlike the British navy (but like that of the United States) the ships are 'dry'; that is, no intoxicating liquor is used in men's quarters or ward-room. There are, however, soft drinks to be bought and of course the beloved ice cream. After dinner there is a so-called 'rest period,' then more work until 5 p.m. and at 6, supper is served. After supper those not on necessary duties are able to do more or less as they please within the scope of discipline; instrument playing and dancing are popular recreations and chess is popular with the older men."

Mr. Davis noted that the Russian sailors are not large, heavy men as often thought to be the typical Russian physique, most of the seamen actually being lightweight and five feet six to nine inches in height. He described the vessels as "happy ships" and was amused to observe that the commander always addressed the men as "Comrades," and when the petty officers met him in the morning they first saluted and then shook his hand.

Aboard the big cruisers Mr. Davis saw a large number of cadet "officers in the making," distinguished by a peaked cap instead of the sailor's round cap with black back ribbons. He commented on the extreme "bagginess" of the officers' trousers which "certainly does not add to the smartness of their uniforms."

☆☆☆

From 100 miles northwest of Vancouver, B. C., a strange mystery of nature has defied eight years of scientific investigation. During severe winters there collects on the waters of Bute Inlet, one of the fiords which indent that mountainous coastline, a unique wax of undetermined origin. Under the right weather conditions, it gathers in "ton lots" on the surface or the beaches.

(Continued to page 10)

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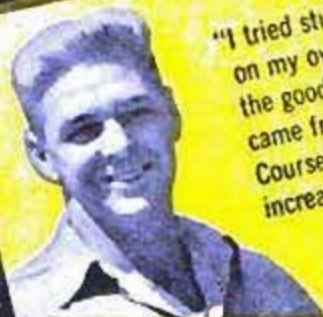
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(Continued from page 8)

Hundreds of scientific tests have been made on this substance by the Institute of Oceanography of the University of British Columbia and by the Pacific Fisheries Experimental Station of the Fisheries Research board of Canada. It is amber-colored both as a solid and a liquid, with a melting point of 50 degrees F. Chemical analysis has shown it to be essentially a wax (fatty alcohols combined with fatty acids), but with only a trace of the glycerides typical of fish and marine-animal oils or of the hydrocarbons inherent in the petroleum. It cannot even be stated whether it is of animal, vegetable or mineral origin.

Among the theories that have been advanced and rejected for substantial reasons are: 1. That it is derivative from sperm or other animal oils; 2. That it is decomposed ambergris; 3. That it is the remains of rotting explosives; 4. That it is a product of decomposed local trees, washed down by the mountain rivers; 5. That it comes from a seaweed.

A similarity in the chemical composition of this peculiar substance and that of the seeds of certain of the sagebrush family of California and Nevada has raised speculation as to whether, possibly, the remains of semitropical vegetation from some former geological era lie rotting in the deep ocean trough of Bute Inlet.

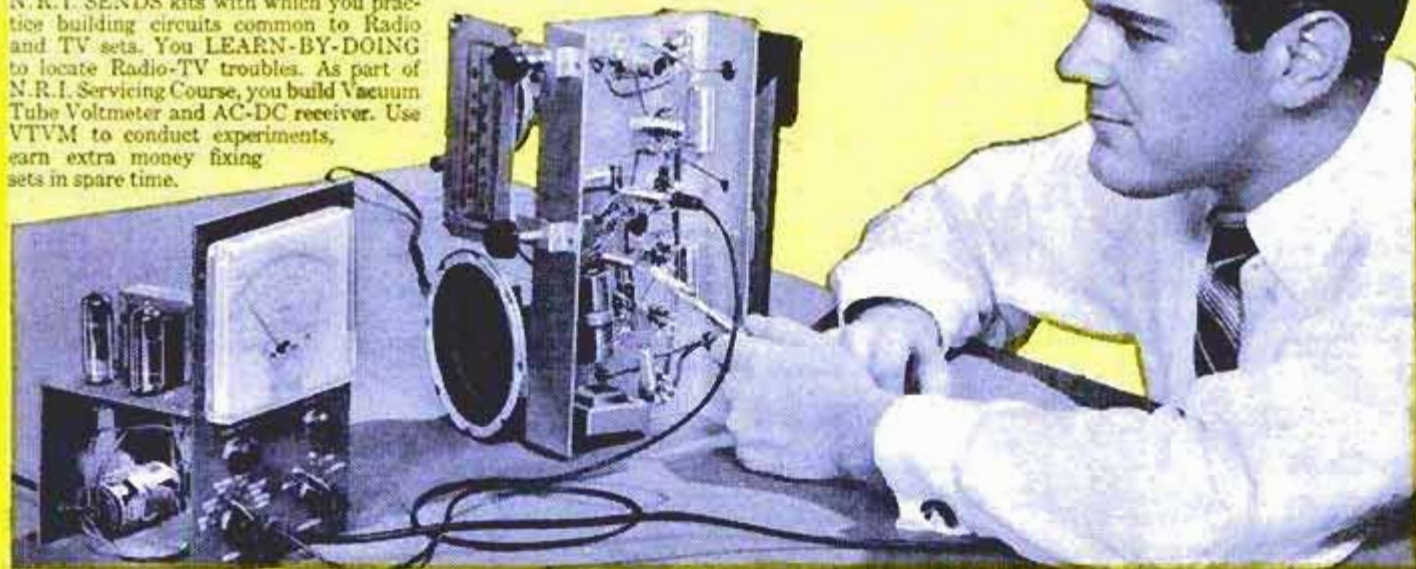
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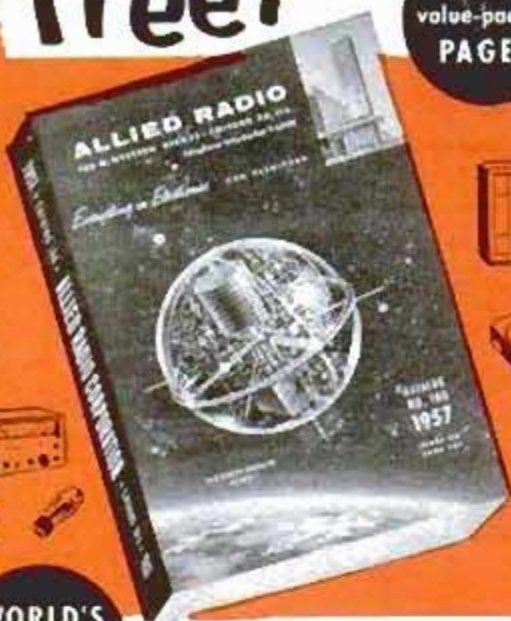
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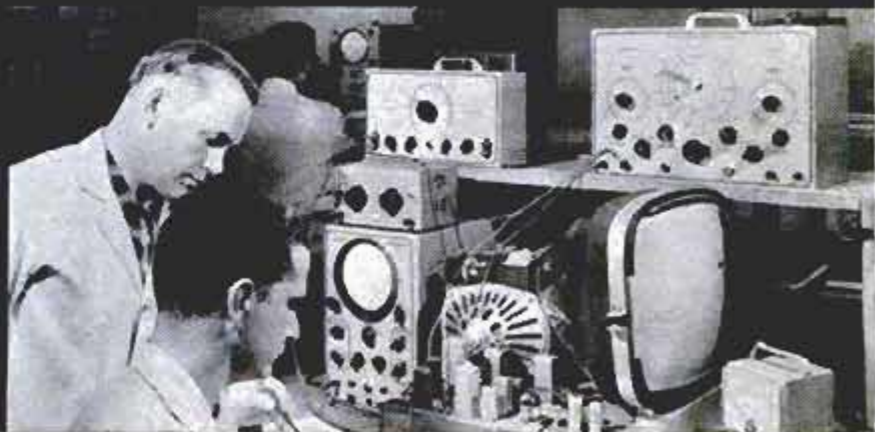
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Harold Gimlen, Flint, Mich. 4/21/54

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Richard Hennis, Little Rock, Ark. 4/20/54

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Hugh Maddox, Los Angeles, Calif. 4/20/54

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William Phillips, Fort Lauderdale, Fla. 4/22/54

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Raymond Lapan, Burlington, N. C. 1/20/54

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Andrew Busi, Jr., Iselin, Pa. 4/21/54

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John Fernandez, Fresno, Calif. 4/22/54

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J. W. Nanton, Jr., Henderson, Texas 7/12/54

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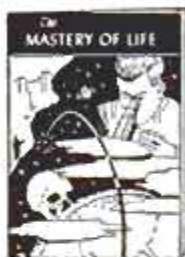
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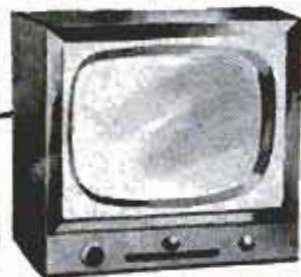
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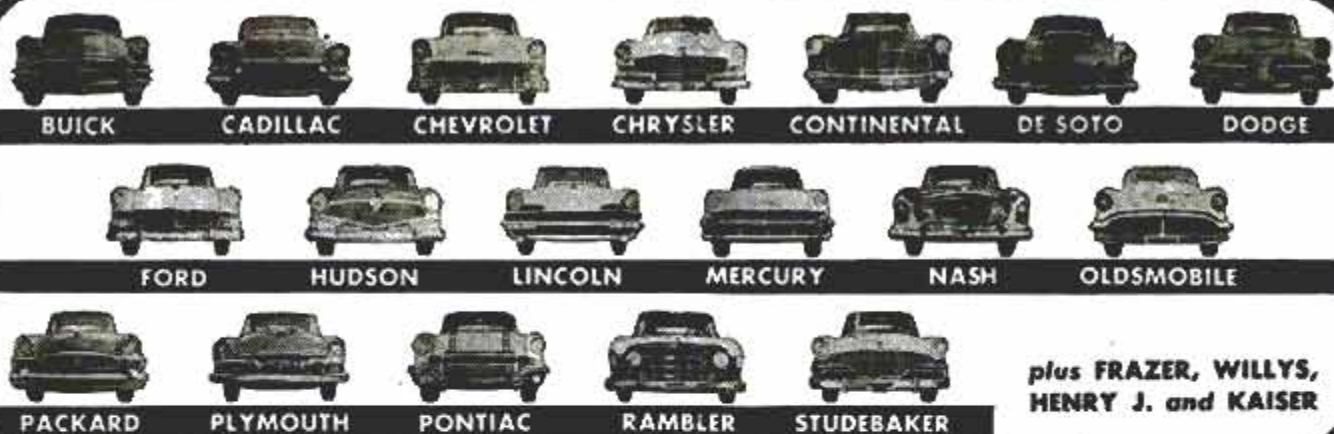
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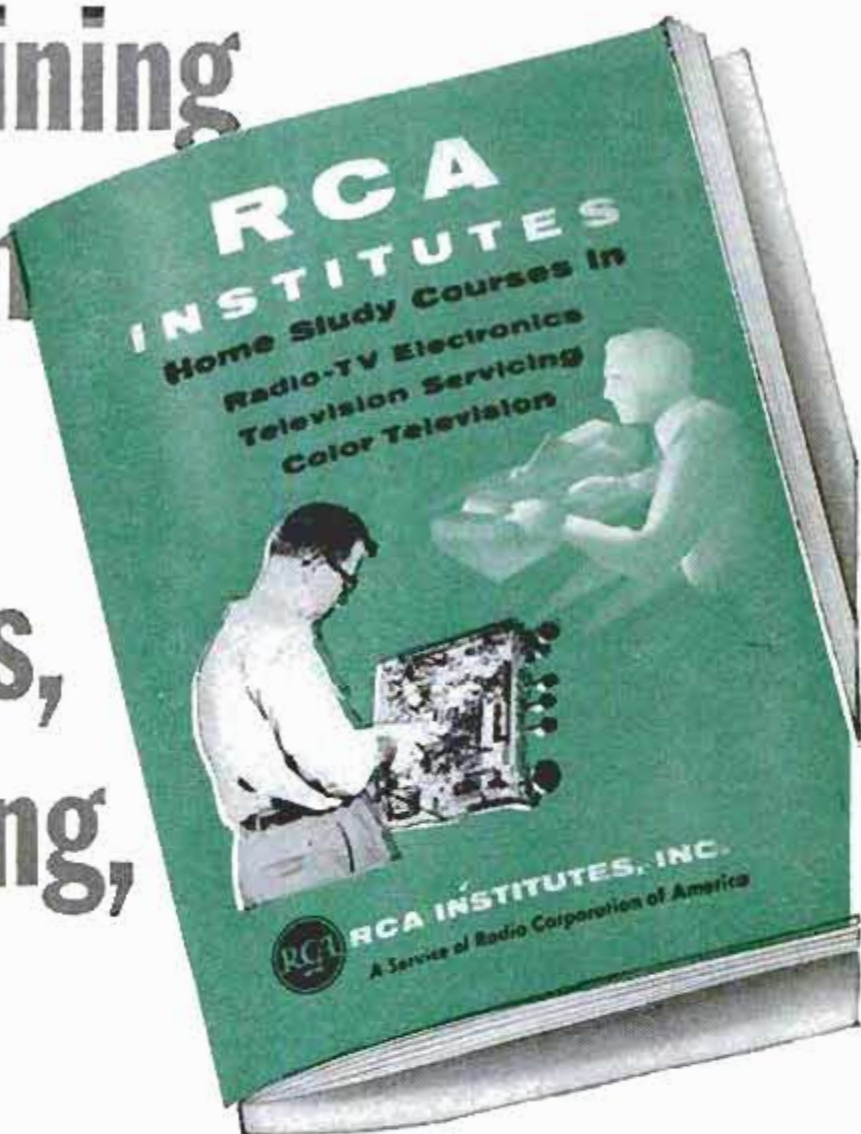
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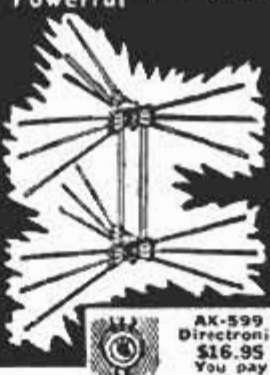
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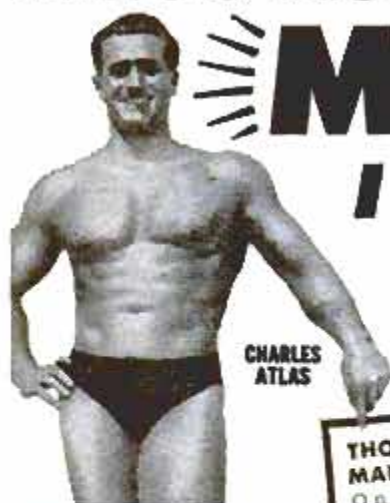
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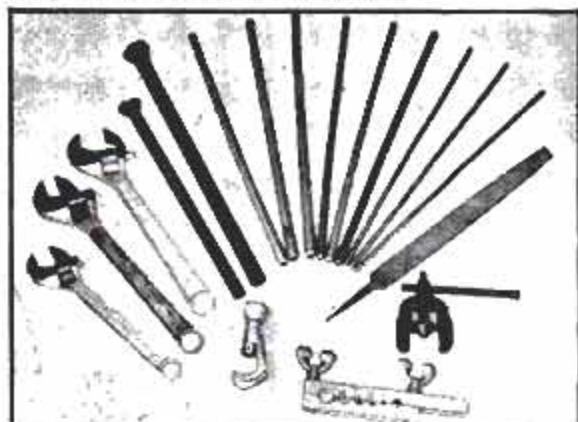
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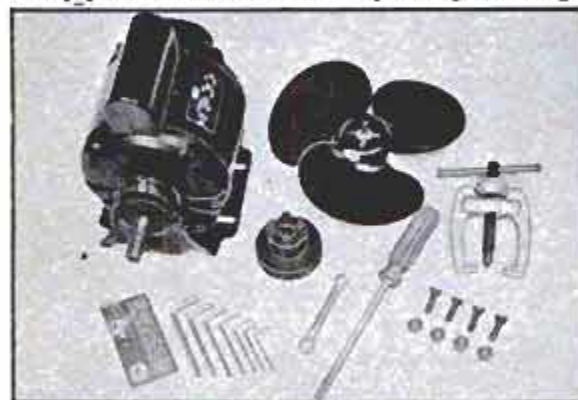
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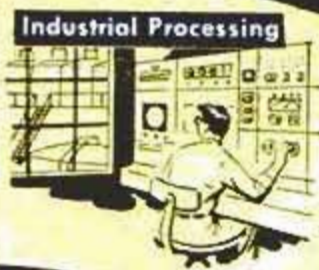
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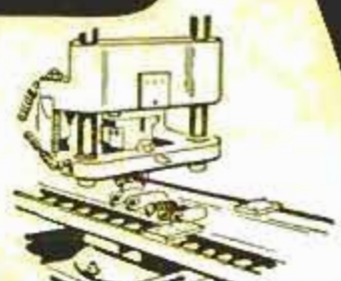
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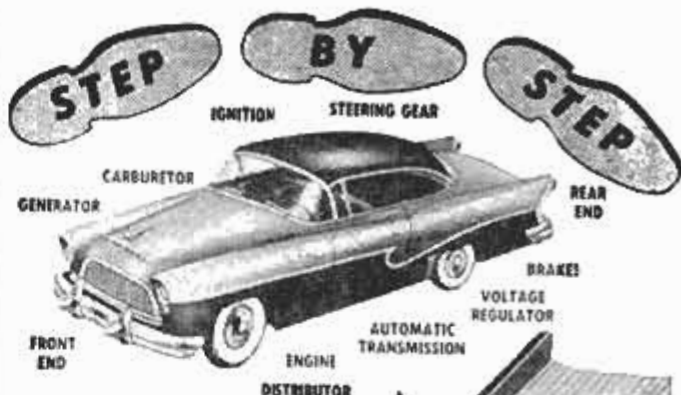
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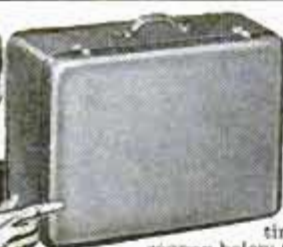
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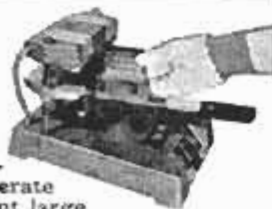
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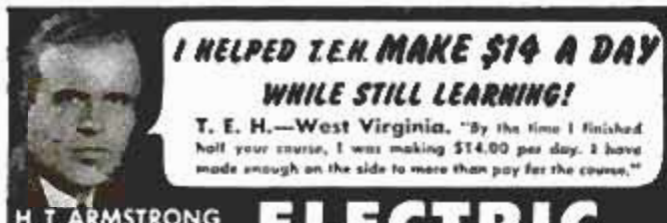
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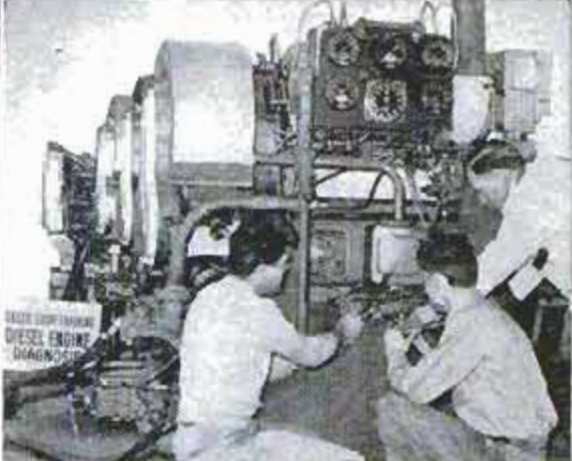
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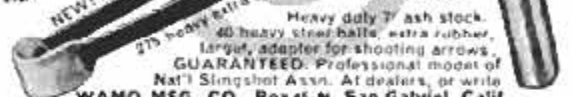


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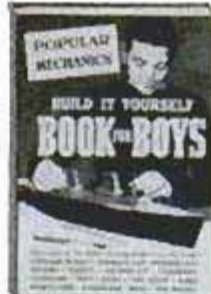


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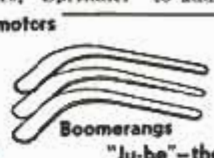
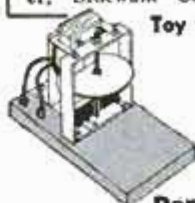


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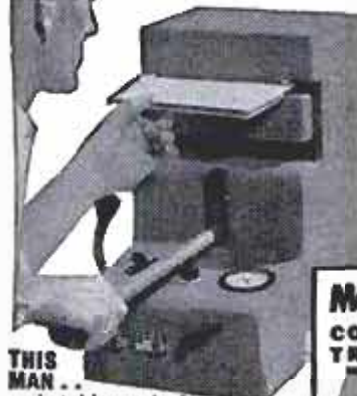
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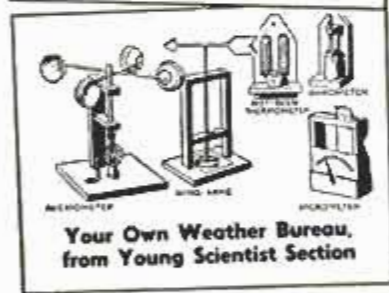
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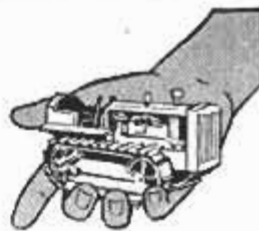


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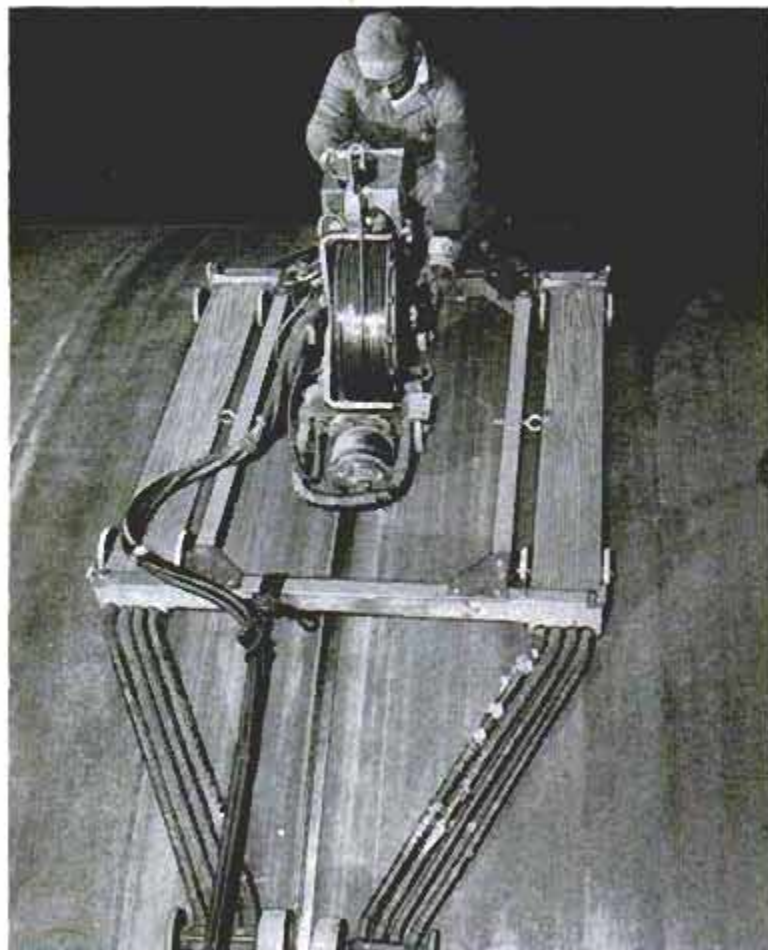
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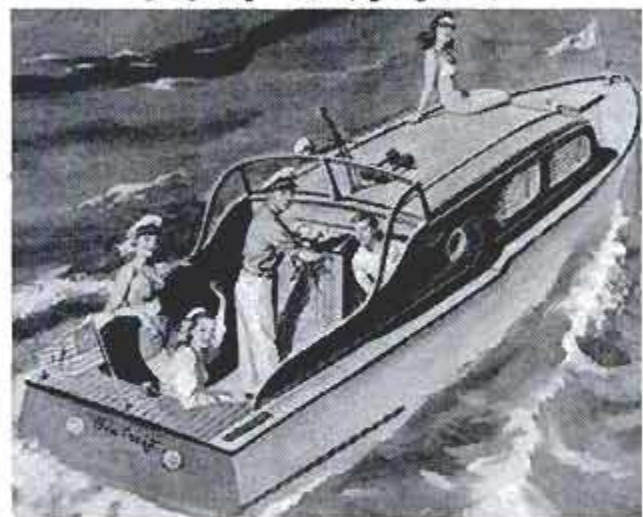
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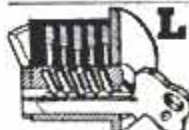
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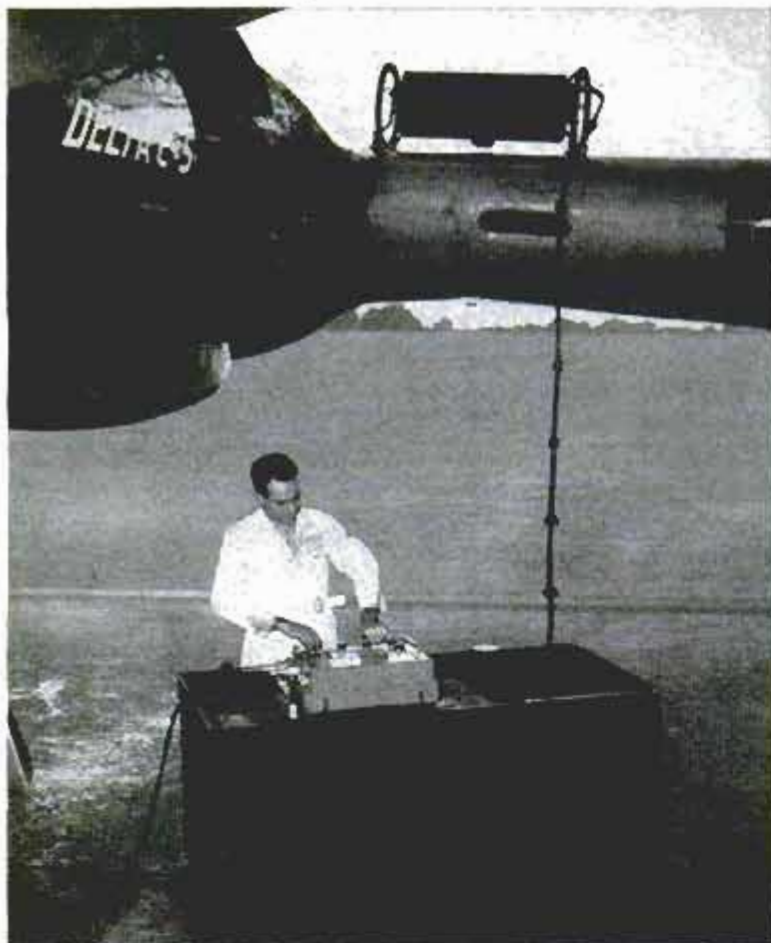


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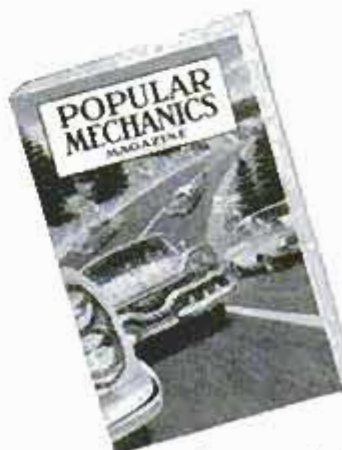
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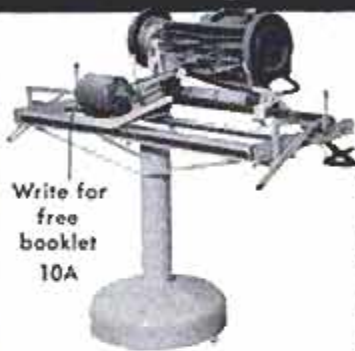
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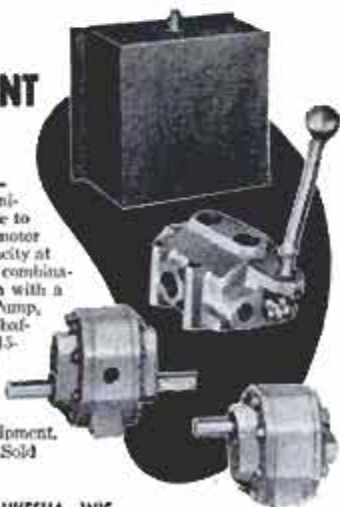
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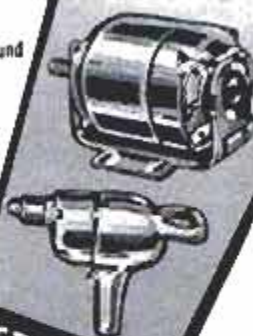


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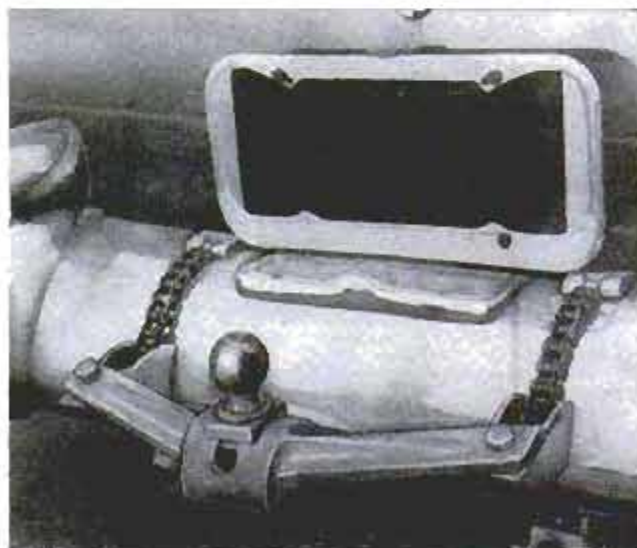


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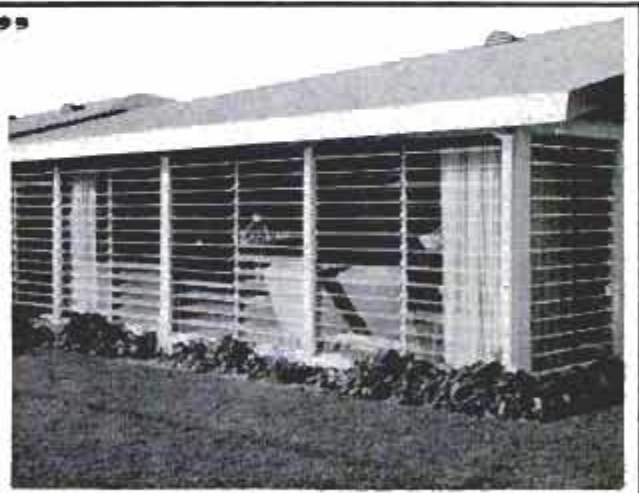
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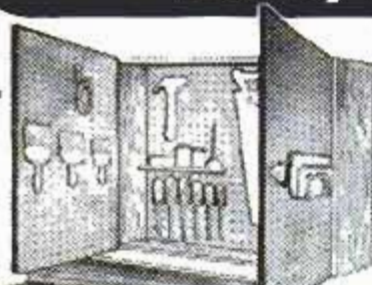
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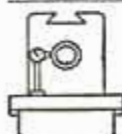
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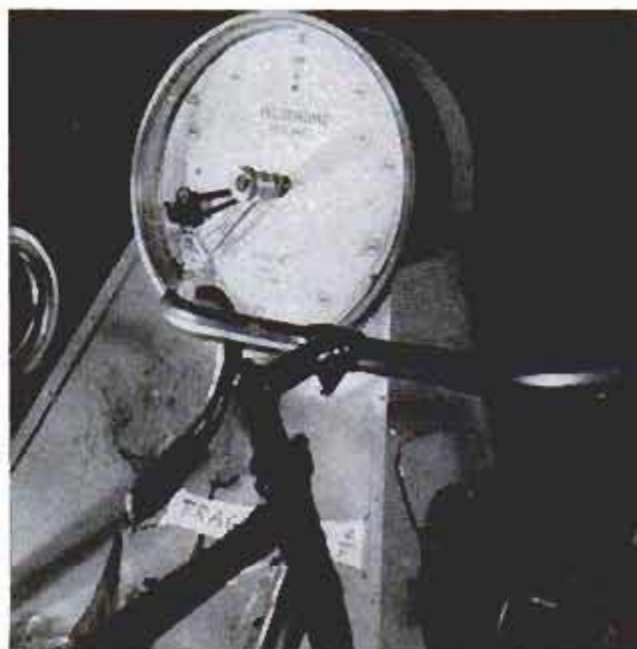
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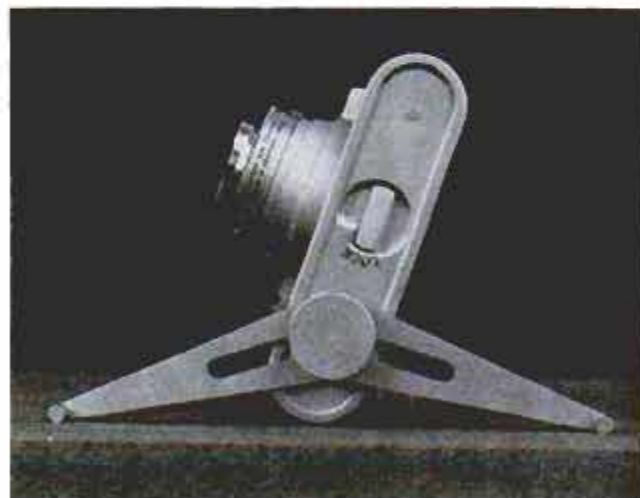


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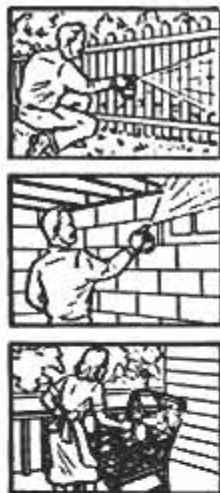
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Space Thermometer

Scientists can take the temperature of the moon or of a manmade satellite with a tripod instrument no bigger than a large camera. The Radiometer, developed by Barnes Engineering Co., collects infrared radiation from the object and converts the received energy into electrical signals that can be translated into a temperature reading. Preliminary uncorrected readings of the moon showed it to be 248 degrees Fahrenheit on its sunlit portion and minus 302 on its dark portion. Earthly studies can also be made of rockets and missiles in flight, of speeding tires and fragile objects like electrical filaments that can't be touched.

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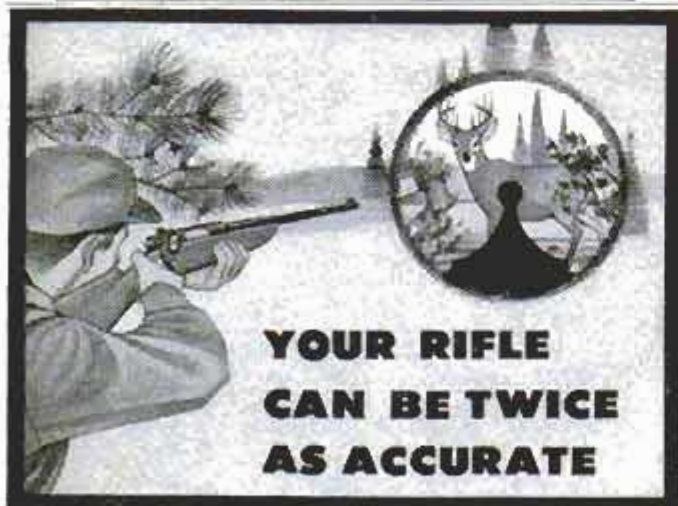


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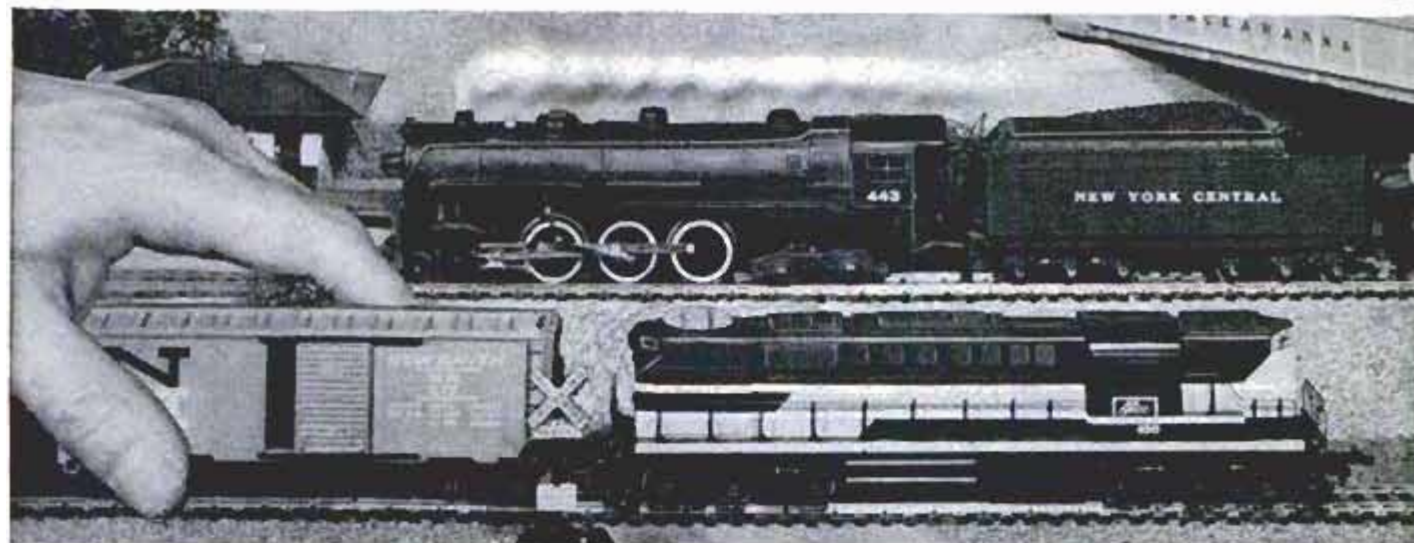
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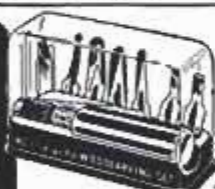
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By Clifford B. Hicks

BACK IN MARCH 1954, an unfamiliar word cropped up in the headlines. On that day a small island in the Pacific was sucked into the ugly fireball of a hydrogen bomb. Scientists found that the island fell to earth as radioactive particles. An area of 14,000 square miles was so contaminated with this radioactive dust that it was temporarily unsafe for human habitation. This island that fell from the sky in a rain of radioactivity was called fallout.

Since that day, everyone from teen-agers in soda fountains to diplomats in secret halls have discussed the effects of fallout. As the word has become more familiar, it somehow has become more sinister and mysterious.

Yet there's little mystery about fallout. Scientists and Civil Defense officials know a great deal about it, and are determined to spread that knowledge as far as possible. They realize that people who know the facts on fallout will respond intelligently to the problems fallout creates. Here are their answers to basic questions:

WRITTEN SO YOU CAN UNDERSTAND IT
VOL. 106 NO. 5



**HOW DANGEROUS
IS FALLOUT?**



Special tower on this ship carried instruments for measuring the fallout during a recent weapons test

"Fountain pen" dosimeter permits a soldier to make quick reading of gamma rays he may have absorbed



Just what is fallout, anyway?

When a hydrogen bomb explodes, the parts of the bomb itself are blown into highly radioactive dust. Other dust particles in the air are also made radioactive. If the fireball touches the ground, tons of earth and debris are sucked up into it and made radioactive. These particles, most of them so small they are invisible, spear upward into the mushroom cloud as high as 25 miles. As they are carried downwind, they gradually fall back to earth. The settling of these radioactive particles on the earth's surface is called fallout.

After the bomb explodes, how soon does this radioactive rain start falling?

Some particles from the explosion early in 1954 no doubt are still drifting through the stratosphere. However, almost all the particles fall within a period of several hours. Consider the 1954 test: At a point 170 miles from ground zero, the fallout began about eight hours after the burst and continued for several more hours.

How far do the particles travel?

It depends on several factors, such as the size of the bomb, the height of the explosion, the velocity of the winds at all levels up to 80,000 feet and the weather conditions. An air burst, for example, causes negligible fallout because only the products of the bomb itself, plus particles naturally in the air, become radioactive. A ground burst draws up a great amount of radioactive debris. The size of the particles and the velocity of the wind determine how far the dust will travel. Rain causes the particles to fall at a faster rate, producing a rainout.

Fallout particles may travel clear around the earth. But if you consider only the danger area—the area where fallout can have serious to lethal effects—then you can calculate some fairly precise answers. Consider the 1954 test again: In a cigar-shaped belt about 140 miles long and 20 miles wide, the radiation would have been fatal to most persons remaining there for 24 to 48 hours.

Why specify "24 to 48 hours"?

A couple of reasons. In the first place, the longer a human being is exposed to radiation, the more damage is done. Just think of it in terms of a sunburn.

In the second place, the radioactivity of these fallout particles declines with the passage of time. The rate of this "decay" depends upon the type of particle, and there are about 90 different radioactive "species" created by the bomb. Some become harmless in a fraction of a second, but others may remain dangerous for



Weather forecasts now make it possible to predict fallout patterns. Map above left shows pattern if a nuclear bomb struck Pittsburgh at a particular moment. At right is predicted pattern exactly 24 hours later

hundreds of years. Fortunately, most of these radioactive species decay fairly rapidly. The rate of radiation one hour after the burst in an area of intense fallout concentration is extremely dangerous. Twenty-three hours later, as little as two percent of that radiation may remain.

What about those "radioactive fish"?

As indicated above, a very small percentage of this radioactive debris has an extremely long life. It's possible, though very unlikely, that a fish would take up one of these long-life particles. It's even more unlikely that a fisherman would catch that particular fish in the vastness of the ocean. Unlikely, but possible.

Can long-life particles be produced deliberately?

Yes, indeed, which is the reason, in addition to its awesome power, that the H-bomb can be such a terrible weapon. For example, the bomb can be encased in strontium. Radioactive strontium has a half-life of approximately 28 years (half its power will be gone in that length of time), so the stuff would continue to be dangerous for several generations.

What's the principal danger from these radiations?

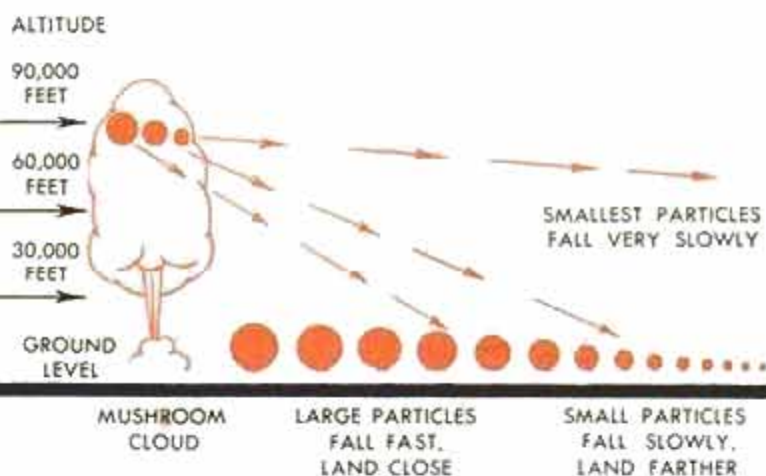
In large doses they are fatal. In smaller doses they can produce lifelong disabilities.

During the recent H-bomb tests, rockets penetrated radioactive cloud to pick up information on fallout



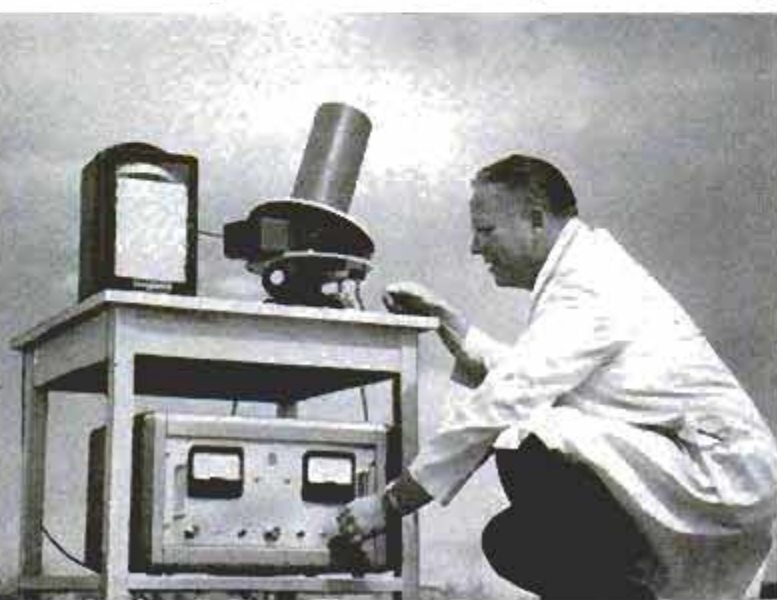


Computer UNIVAC now is working regularly to predict fallout patterns and intensities for the Civil Defense Administration



Of many factors that affect the fallout pattern, the size of the particles is one of the most important. Diagram shows how smallest particles travel farthest from the radioactive cloud

"Sky scanner" is a new instrument now being used by the AEC to detect radioactivity in the air. The scanner is especially useful in tracing clouds which contain gamma radioactivity



But even in still smaller doses they may have a profound effect. Though they may seem to have no effect on a person, they may alter his reproductive genes, causing harmful mutations to be passed on to his children. They, in turn, will inevitably pass them on to their children, and so on.

Is there any chance that weapons tests will increase radioactivity in the atmosphere to a point where it is dangerous?

Radioactivity is measured in roentgens. Total radiation over the first 30 years of a person's life should be kept to 10 roentgens, according to the Genetics Committee of the National Academy of Sciences. On the average, the committee says, we now receive 4.3 roentgens from natural radiation and 3 or 4 roentgens from medical X-rays in 30 years. It further states that we definitely have been receiving increased radiation from fallout as a result of weapons tests during the past five years. However, this increase is not dangerous at its present rate. According to the committee, it could be dangerous if weapons tests were stepped up considerably.

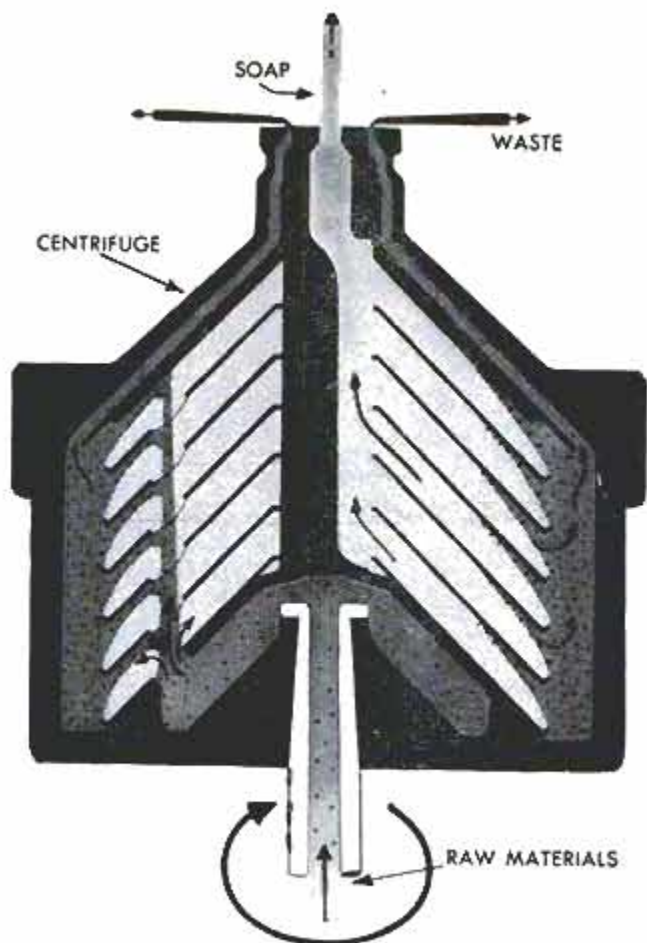
Has anyone made specific studies of fallout—from bomb tests—in the United States?

Yes. The AEC maintains a fallout-monitoring network of some 88 stations throughout the world, including 26 in the United States. (Incidentally, this network is one way government officials learn of secret bomb tests in Russia.)

The AEC recently released a report based on figures from these monitoring stations. The report shows that the gamma dose (the type of radiation that can alter the genes and thereby affect heredity) from fallout is about three percent of the gamma dose from natural sources.

The total fallout, including all types of fission products, is measured in millicuries. The report shows that the highest accumulation has been at Grand Junction, Colo., with 740 millicuries per square mile. The lowest recorded accumulation was in Nigeria with 33 millicuries per square mile.

(Continued to page 278)



American-Swedish News Exchange photos

"Centripure Process" requires comparatively small space. Cutaway of centrifuge shows how soap flows in it

Soap Made in One Hour Instead of Eight Days

Automation has come to soap manufacturing via a process developed in Sweden. Conventional methods take from eight days to two weeks to make soap. With the new process, soap of high uniform quality is made in less than 60 minutes. Raw material is fed into the bottom of a specially

designed centrifuge and saponification takes place in about 20 minutes. Then the soap is passed on through four stages in which it is washed, electrolyte added and spent lye is removed. Solid impurities are continuously removed during the process. Coloring and other ingredients are added.

Clock in a Bottle

Using a method that he has evolved for putting models into bottles, Norman D. Brookes of Luton, England, has constructed and assembled a battery-driven electric clock inside a gallon jug. Using parts designed to pass through the one-inch-diameter neck, he first assembled the clock outside the bottle so that it could be timed and adjusted before it was taken apart and reassembled in the bottle with the aid of surgical forceps and special screwdrivers. The project took a year to complete.

Compounds De-Ice Planes

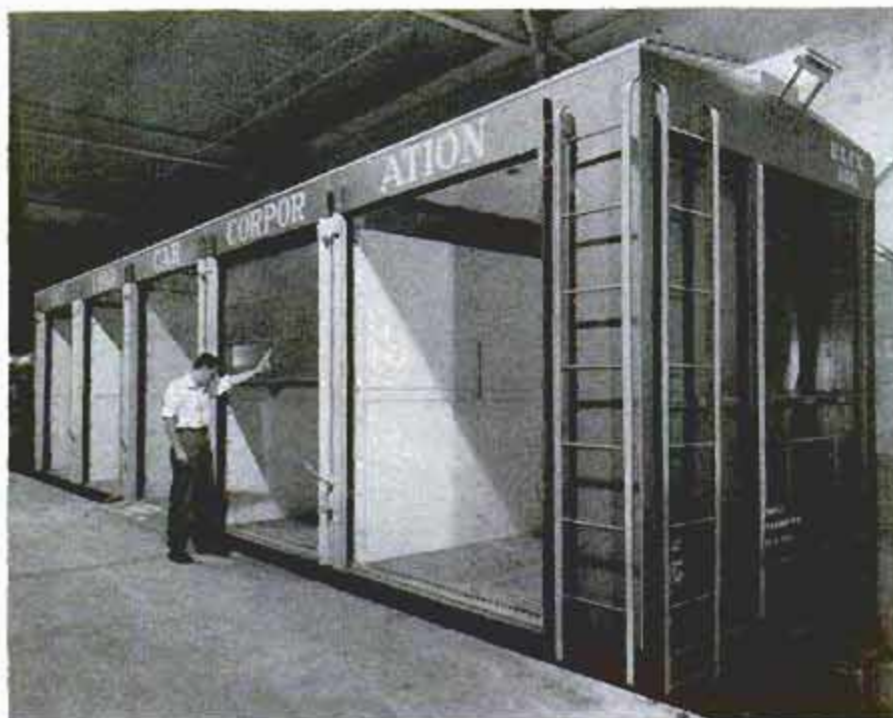
De-icing compounds which can be brushed or sprayed on planes and may eliminate heavy and expensive de-icing equipment are being developed for the Air Force at Armour Research Foundation, Illinois Institute of Technology, Chicago.





Roll-Up Sides Speed Loading

Two men with lift trucks can load a new 10-door boxcar in 10 minutes. Five doors on each side roll up out of the way like overhead garage doors to permit direct loading by the trucks. Hand loading of the conventional boxcar requires 10 to 16 hours, so the car only averages two hours of traveling time out of the 24. The new five-compartment car is expected to average at least 6 out of 24 hours, thereby doing the work of three standard boxcars. Elimination of unnecessary handling cuts freight damage. The multiple compartments reduce the shifting of cargo in transit and permit segregation of shipments as to items and destination. The car, not yet in production, has floors, ceilings, bulkheads, walls and door panels made of a strong, lightweight plastic sandwich.

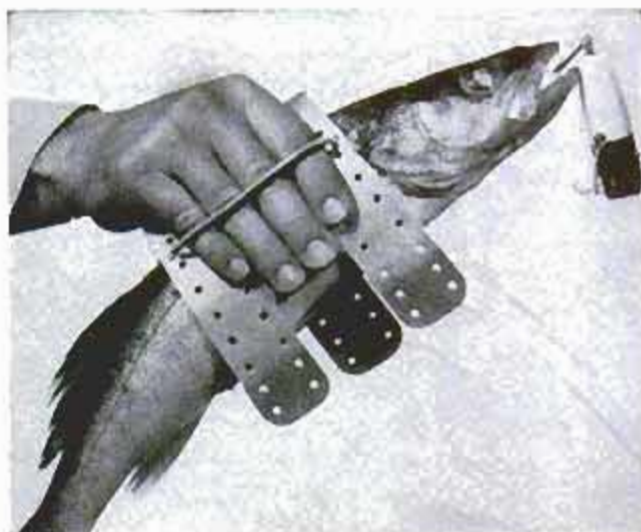


Surgery Sponges

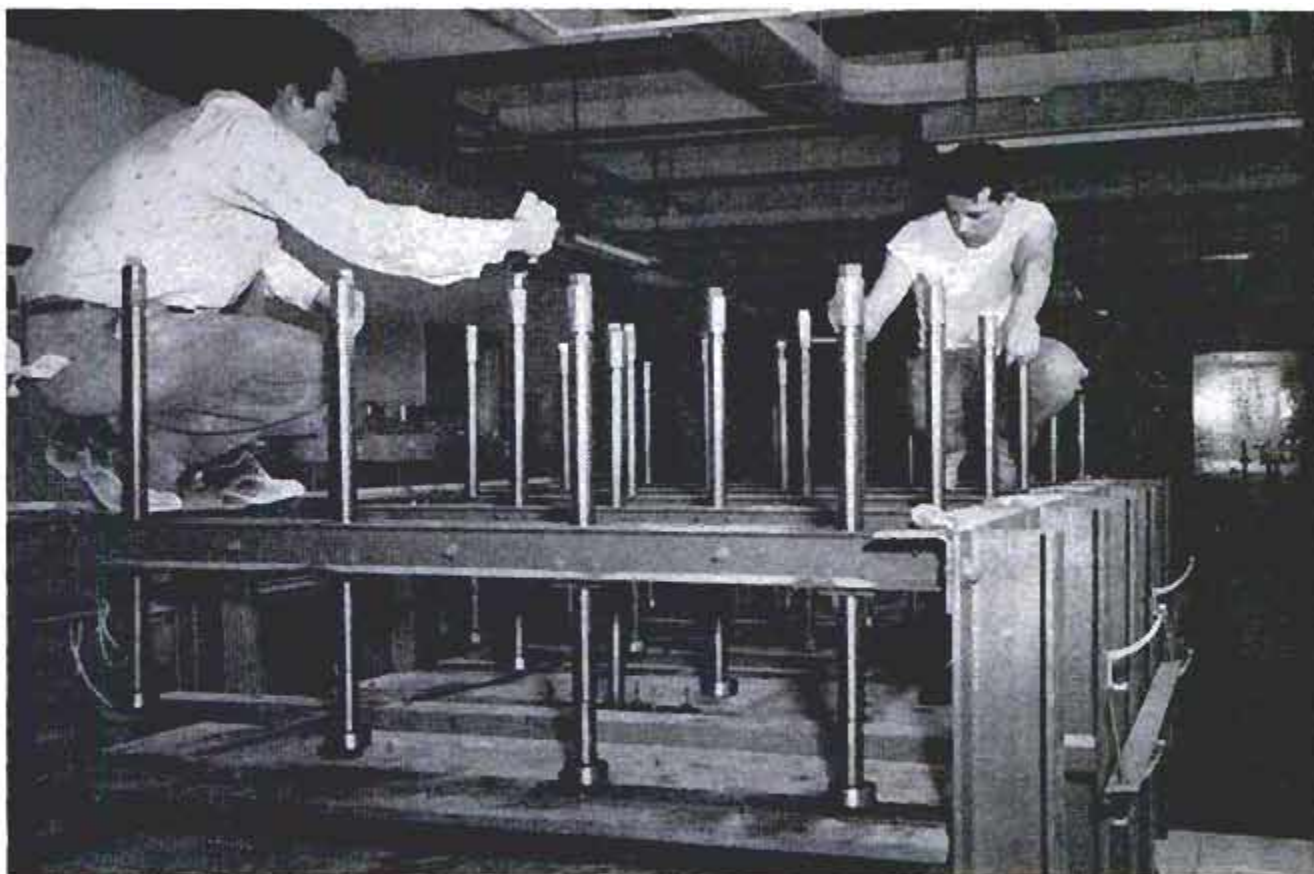
Surgical sponges made of dextran, a derivative of sugar, can safely be left inside a patient to be absorbed after they have stopped the blood or kept a therapeutic agent at a given point.

Metal "Palm" Grips Fish

Anglers can handle their catch easily without danger of gill or fin cuts with a new fish holder. The fisherman seizes the fish in a spring-action metal clamp that fully protects his hand. Tiny prongs on the inside of the clamp hold the fish while the hook or plug is removed and the fish put on a stringer.



If you do not find the information you need in the WHERE-TO-BUY-IT INDEX, starting on page 90, sources of further information are available without charge from Bureau of Information, *Popular Mechanics Magazine*, 200 E. Ontario St., Chicago 11



Oyster-shell panels are placed in big hydraulic press for flattening. Then come burnishing and trimming

Pressed Oyster Shells Form Wall Panels

MOTHER-OF-PEARL wall panels are made of specially prepared oyster shells fastened to a thin backing. This iridescent paneling is applied like wallpaper. The panels were developed originally by Irving Kay of New York as a specialty product for high-priced decorators, but he has recently gone into quantity production. Imported from Australia, the oyster shells are first soaked for many days, then flattened in huge hydraulic presses, burnished and trimmed. The pearly disks are then fitted individually to a base material and set in adhesive. After several days, the rough panels are trimmed to size and the surfaces smoothed over. Through the application of heat and other processes, the panels can be formed to any shape. Aside from wall use, the material is effective as a furniture inlay or for automobile interiors. The biggest wall to be covered with the paneling is in the lobby of the Fontainebleau Hotel in Miami. This project cost \$150,000. The paneling, called KappaShell, sells for \$6 a square foot. It is used in President Eisenhower's personal plane and in the homes of many celebrities. The company's latest job in Europe is a room in Prince Rainier's Monaco palace.



After soaking and heating, shells are covered with special adhesive and attached to backing material. Below, David Kay, the originator, inspects a newly installed wall of the overlapped iridescent shells



1957 NEW-CAR PARADE



Clean and slender are words that describe the new Chrysler. These views of the New Yorker two-door hardtop seem to prove it. Four headlights are available if you wish

Chrysler Family Makes Debut



CHRYSLER'S style theme for 1957 is the dart or wedge. These all-new, freshly styled beauties have a definite airplanish look with down-pointing noses and up-pointing tails. Let's look at them in order.

The Imperial offers a convertible for the first time. Its hardtop models have distinctive landau-type roofs of stepped-up design that give them a "Park Avenue" look.

CHRYSLER





Horizontal lines characterize De Soto's grille

Four headlights are optional. Windshields are double wrapped, being curved vertically as well as horizontally. Windows in the doors are also curved, swinging upward and inward.

Tailfins are emphasized by a sharply sloping rear-deck lid (which the buyer can get with a simulated spare-tire cover embossed on it). There are no up-sticking taillights on Imperial fenders this year. Instead the gunsight theme has been worked into the trailing edge of the fenders themselves. Tailfins are getting so high these days that to mount taillights atop them would raise the lights almost to roof level!

Over-all height of the Imperial has been reduced three inches without sacrificing headroom. Seat height is reduced, however; especially the front seat, which is lower by 2.6 inches.

The car is actually more than five inches shorter than last year. Wheelbase is down to 129 inches, over-all width is increased by 2.4 inches and front overhang reduced 2.4 inches.

Fourteen-inch wheels are standard (this is true on all Chrysler Corporation cars).

Engine displacement is 392 cubic inches. It develops 325 horsepower.

Chrysler Adds Series

Chrysler has added a new series to its line. Both the Saratoga (the added series) and Windsor have a 354-cubic-inch V8 engine (the single-rocker-arm-shaft design); the New Yorker has the 392-cubic-inch V8 (double-rocker-arm-shaft design).

Dodge's two-toning takes advantage of the spectacular tailfins



DE SOTO



Above, De Soto has simplified its rear-end styling. Below, Dodge features a bold, dramatic front end



DODGE



IMPERIAL

Imperial has a completely individual body styling. Note the unusual wrap-over roof treatment at the rear

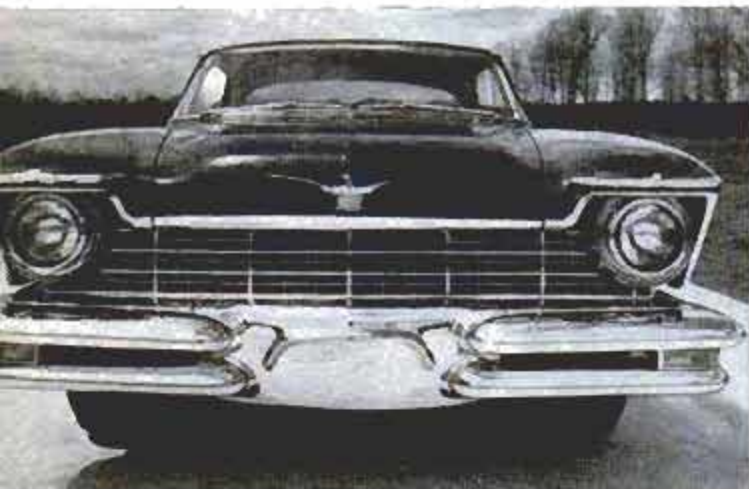
Horsepowers are as follows: Windsor 285 horsepower; Saratoga 295; New Yorker 325.

The Chrysler frame is longer this year, although wheelbase is unchanged at 126 inches. The following innovations are common to the whole line: Torsion-bar front springs; ball-joint front suspension and antidive braking; renewable paper filters in air cleaners; step-down design to provide lower center of gravity and added headroom; flush-mounted air intakes at base of windshield; centerplane brakes;

dash-mounted rear-view mirrors to eliminate a dangerous blind spot; horizontal placement of spare tires in trunk of all except station wagons, and larger, sharply raked windshields.

Stylewise, the tailfins are the most emphatic element at Chrysler Division with the clamshell headlight framing being a close second. Four headlights are optional.

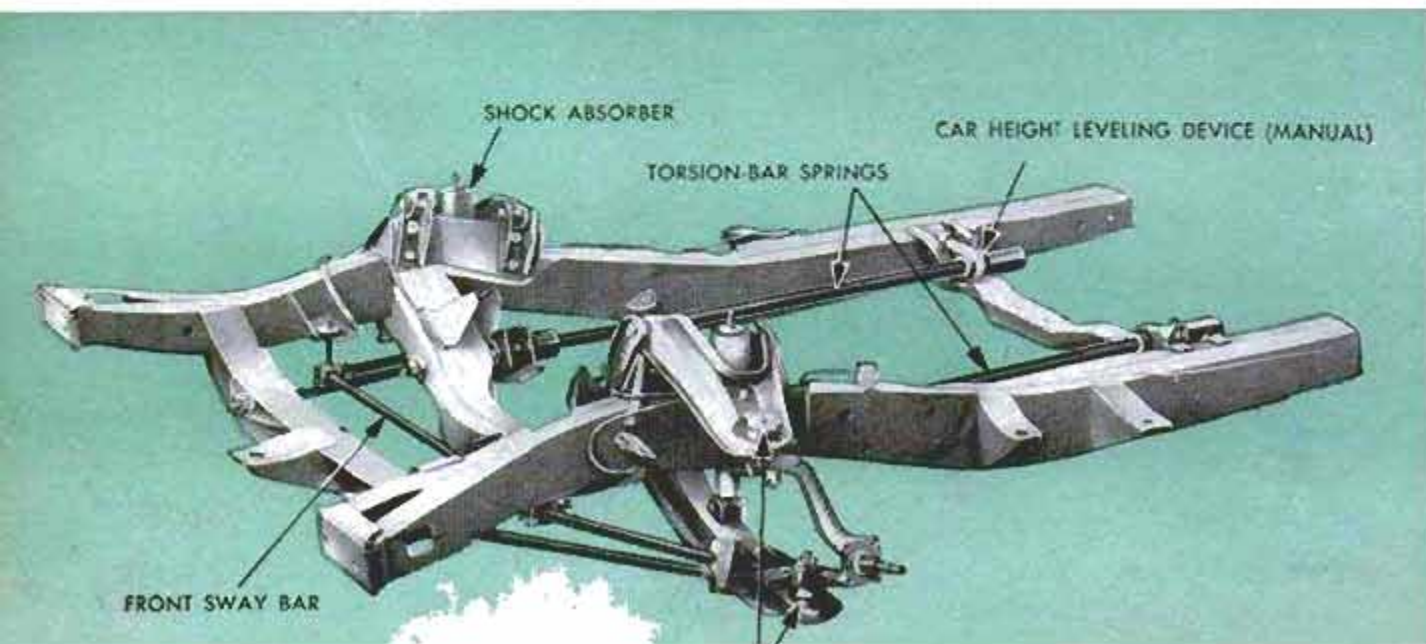
The roof is grooved slightly around its edges and the drip rail is of bright metal to emphasize the low roof line. An unusually large curved rear window in all



Imperial, too, has four headlights at buyer's option

Also optional is simulated tire cover on trunk lid

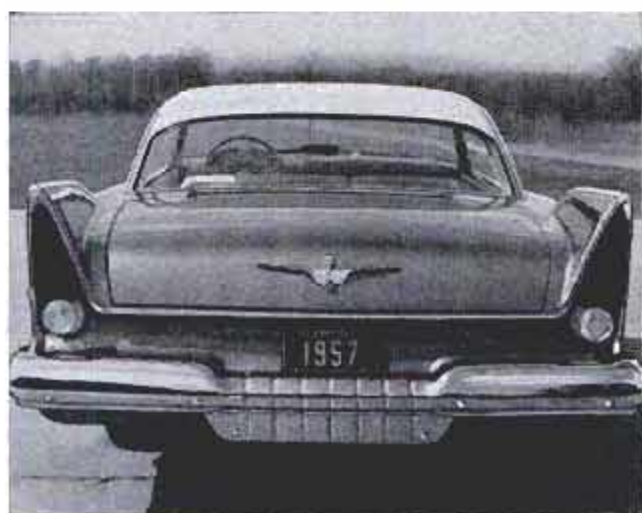
Torsion-bar springs are used on front ends of all Chrysler Corporation cars. They extend about halfway back





Once Plymouth could be called dowdy. But those days are gone forever!

PLYMOUTH



Rear view of the Plymouth emphasizes its clean lines

hardtops makes the roof look very light and slender. All convertibles from Plymouth to Imperial have compound-curved windshields.

The aluminum grille on the Chrysler has a series of horizontal lines. No hood ornament is furnished although dual fender ornaments are optional if you insist on decorating the uncluttered sheet metal.

Rear windows in four-door sedans pivot outward for ventilation.

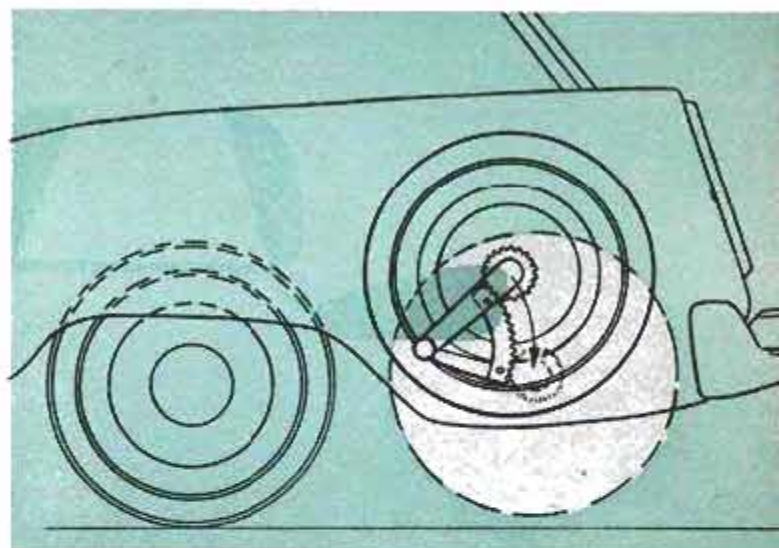
The 1957 Chrysler is actually shorter than last year's model, hard as it is to believe. The lower lines fool the eye.

De Soto Also Adds Series

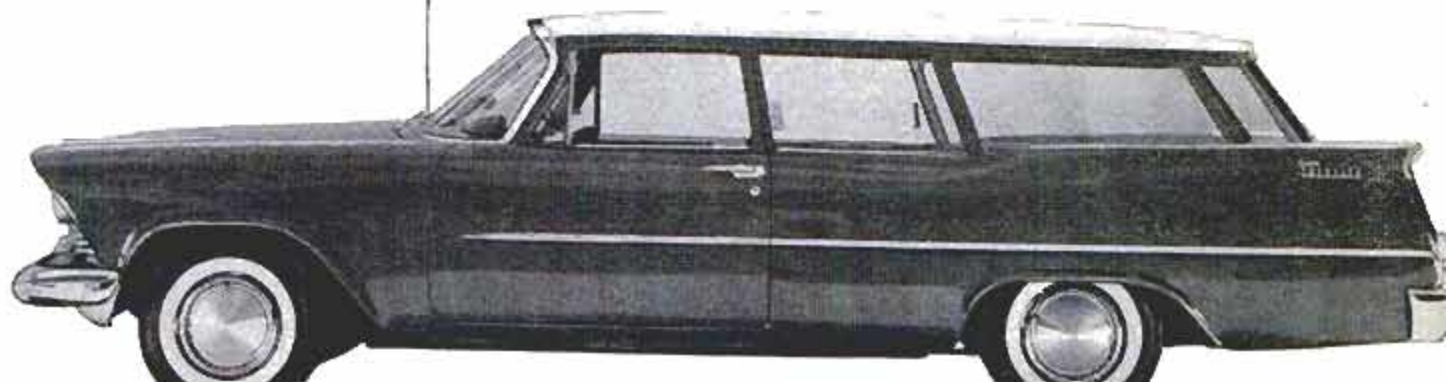
De Soto has a new series for 1957, the
(Continued to page 280)



Headlights are outboard; parking lights are inboard



Plymouth wagons have a locked compartment in rear for valuables. Spare tire and gas tank are mounted within rear fenders. The third seat faces rearward





Chevrolet Gets Fins, Optional Fuel Injection



Top, 210 four-door hardtop. Above, Bel Air two-door



Two wind-splitters replace the usual hood ornament

BIG NEWS at Chevrolet is mechanical. For the first time, fuel injection is offered (at extra cost, to be sure) on a low-price production model.

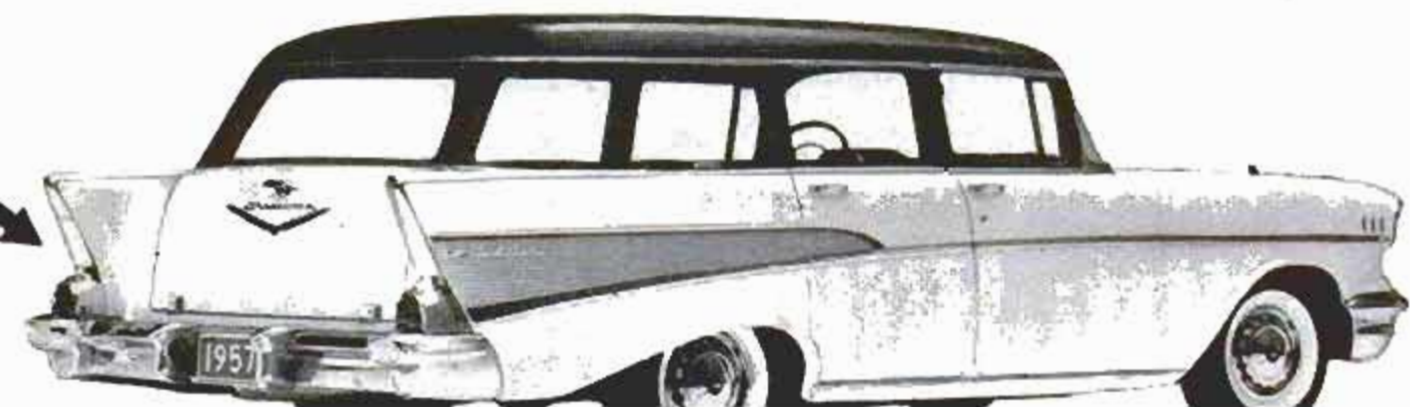
Whether the price of the injection system (unknown at this writing) will scare buyers away is anybody's guess, but it will boost V8 output to 283 horsepower or one horsepower per cubic inch, a remarkable ratio for a production engine.

Style changes are less exciting. Bold tailfins have been added and front grille and bumper are more impressive. Over-all, the cars are 2½ inches longer, but extended fenders, front and rear, make it seem longer. Bodies are lower by more than an inch and 14-inch wheels are standard.

The new triple-turbine automatic transmission features a variable-pitch stator plus a hill retarder that provides braking during downhill runs. This transmission, Chevrolet claims, delivers nearly twice the torque multiplication of a standard converter and shifts without jerks.

Fresh air is taken into the passenger compartment through intakes directly above each headlight, eliminating the slot at the base of the windshield. Ducts carry the air along the fenders into openings at

Below, Bel Air four-door wagon. Arrow points to the location of gas-filler tube behind flap in tailfin



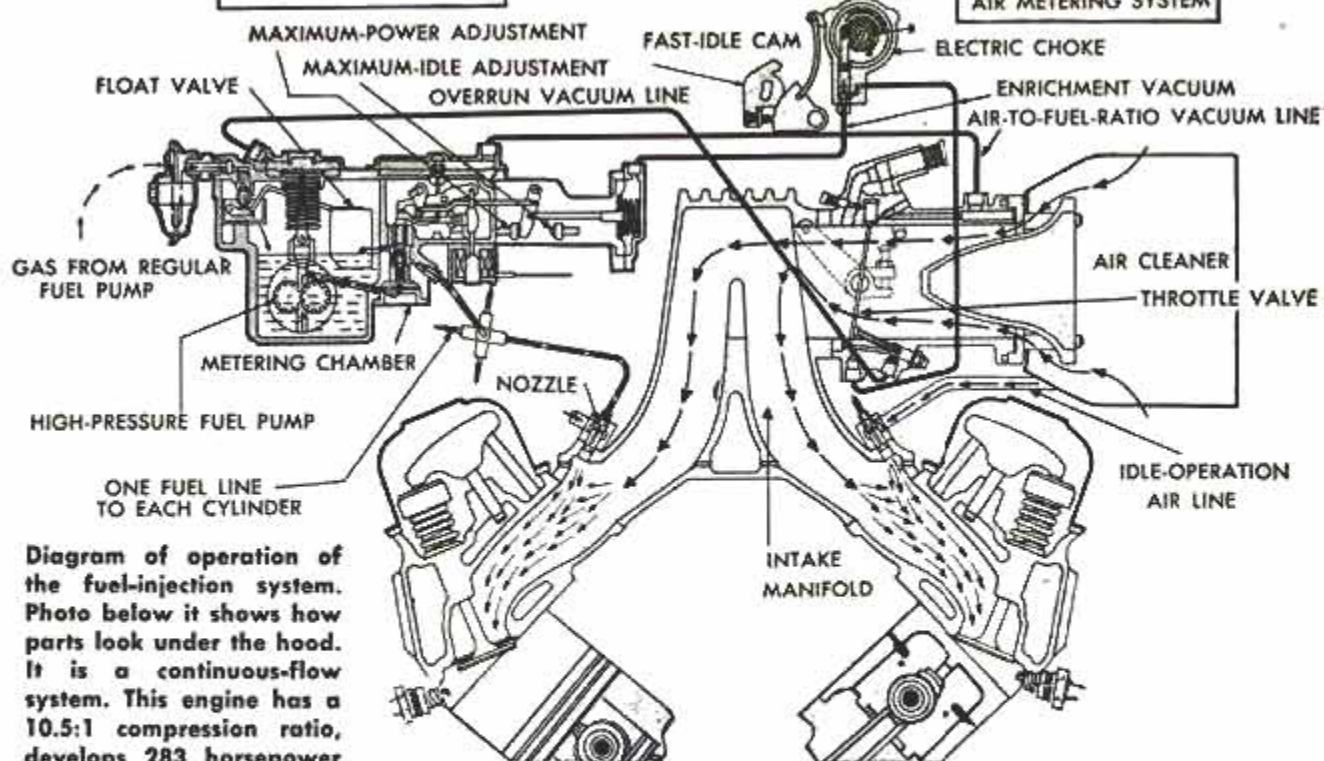
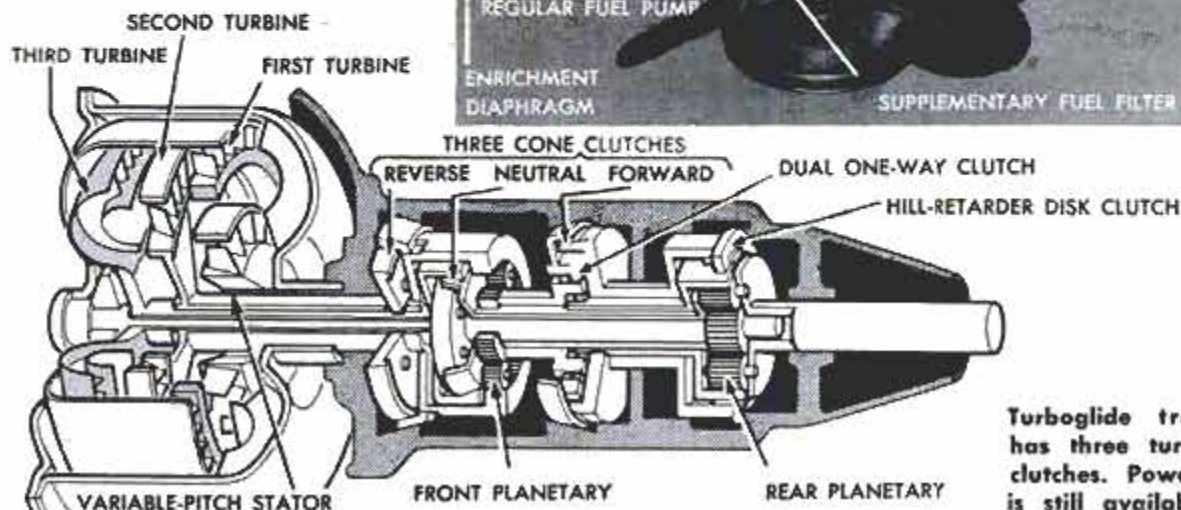
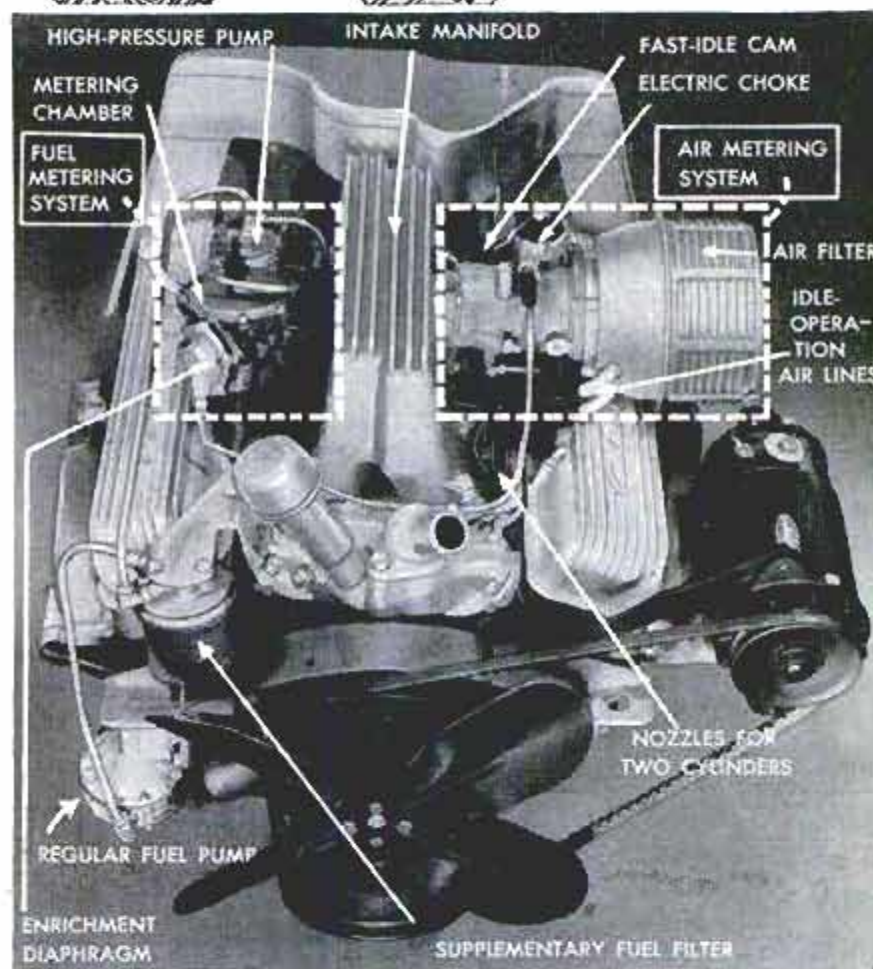


Diagram of operation of the fuel-injection system. Photo below it shows how parts look under the hood. It is a continuous-flow system. This engine has a 10.5:1 compression ratio, develops 283 horsepower

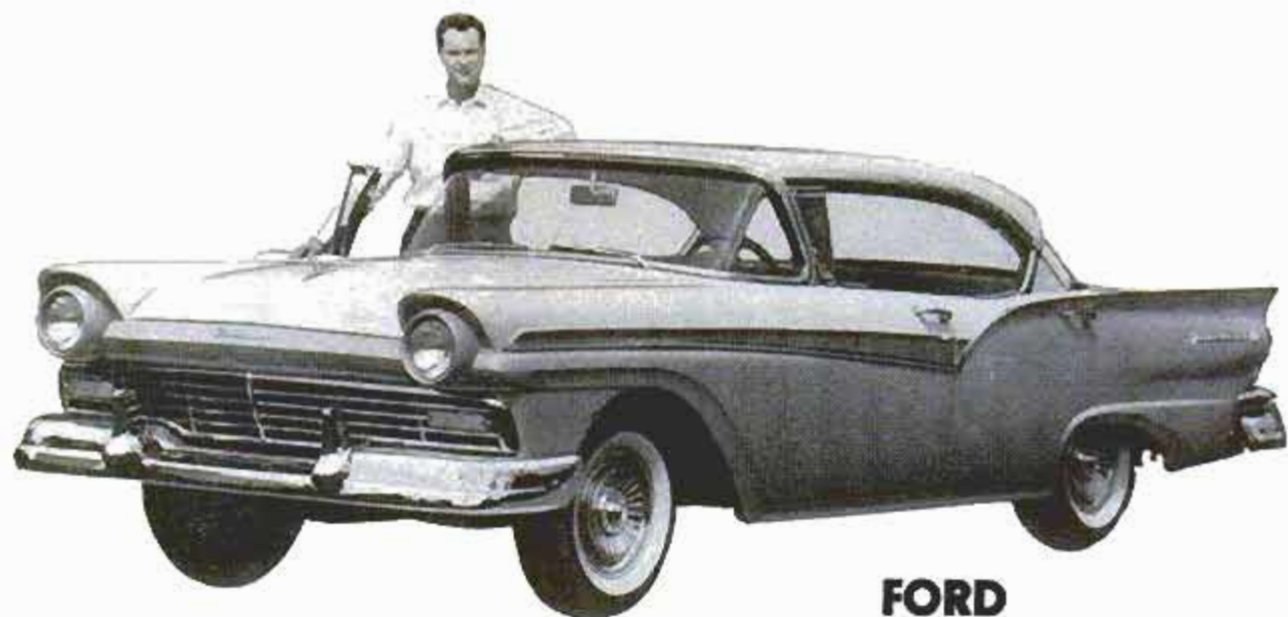
the ends of the dashboard.

Horsepower on Chevrolets ranges from 140 on the six-cylinder model to 283 on the fuel-injection V8. Between these extremes are 162, 185, 220, 245, 250 and 270 horsepower, enough variety to satisfy just about everybody.

Fuel injection and carburetion differ in that an injection system squirts gasoline into the manifold at the intake valve of each cylinder, assuring even distribution. In a carburetor system, gasoline is mixed with air at a central point (the carburetor) and the mixture sucked into the cylinders through long and restricted passages, resulting in starvation of some cylinders. ★ ★ ★



Turboglide transmission has three turbines, cone clutches. Powerglide unit is still available as well



FORD

Ford Family Is Lower, More Powerful



Fairlane tailfins flare outward from larger lights



Above, four-door hardtop is 9 inches longer. Below, wagon has sculptured roof. Note the low hood line

LOW, THAT'S THE WORD for the 1957 Ford. If you require proof, look at the photograph at the top of the page. That man has both feet on the ground!

Fairlane models (like the four-door hardtop above) are four inches lower than in 1956. Custom models are three inches lower. To do this, Ford uses a flared frame, step-down in rear, sharply offset rear axle.

They are all longer, too. Fairlanes are nine inches longer, Customs three inches longer.

There are two wheelbases this year. The Fairlane series has 118-inch wheelbase (2½ inches more than 1956) and the others have 116-inch wheelbase (½ inch more than 1956).

Horsepower continues upward. Tops in the Ford line is a 245-horsepower V8 available on all models. Also available are the 212-horsepower V8, 190-horsepower V8 and 144-horsepower six.

Styling changes are striking and represent the most complete change since the war. Total cost of tooling, development and introduction is said to be \$209,000,000.

Fairlane models feature boldly sculp-





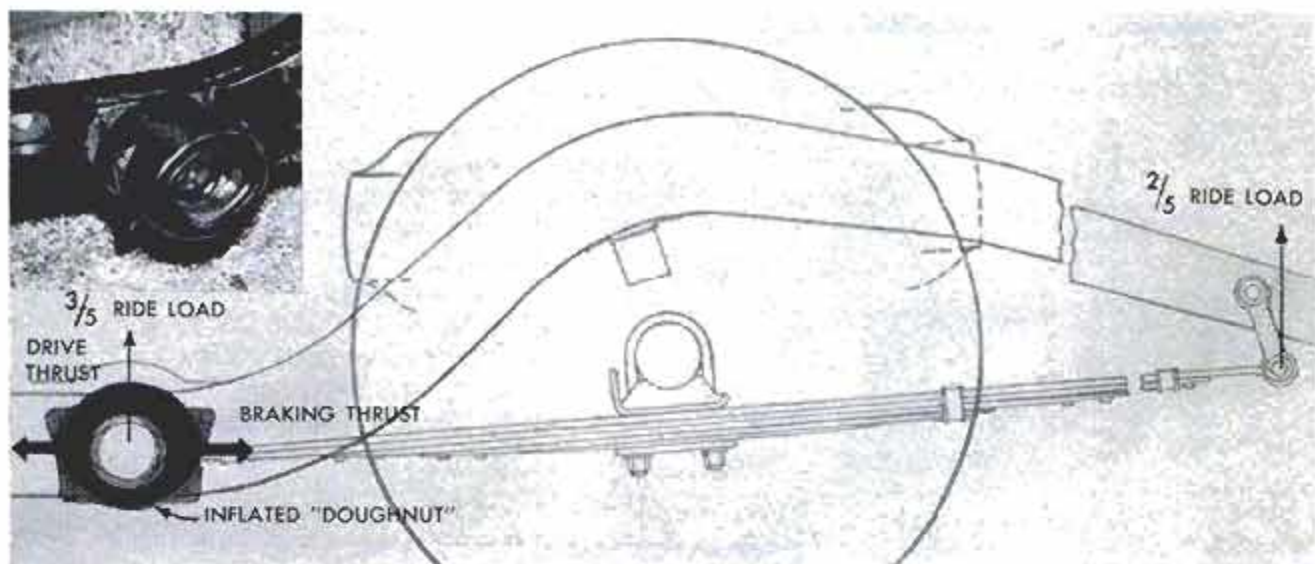
MERCURY

tured ribs that flare out from the center of the body ending above large circular taillights (which are about the only characteristically Ford part in the new styling). Custom models have similar styling, but more subdued lines.

Flatter front fenders and a much lower hood (which, incidentally, is hinged at the forward edge for safety and better en-

gine access) combine to give the car a road-hugging appearance. Windshield shape is changed, the corner posts canting forward sharply. Heater air is drawn through an intake at the base of the windshield.

Station wagons are lower this year and have a sculptured effect on the roof to lessen the "panel truck" look.



Above, drawing of air-filled spring hanger. Insert, upper left, shows how it fastens to frame. Below, the Mercury four-door hardtop is 56.4 inches high





MERCURY

Above, four-door Colony Park wagon is pillarless and has extra-large windows. Roof panel is grooved



To service paper air filter, lift out and shake it



LINCOLN

Steering-wheel position has been lowered one inch and the wheel made smaller so short drivers don't have to look between the spokes.

Ford is bigger all around—even the gas tank has been enlarged. It now holds 20 gallons.

Mercury Goes All Out

Things are changed at Mercury also. A look at the styling proves it. It is a bold approach that is unmistakably different. But under the sheet metal are the parts that really matter and bold developments are there too.

A unique approach to air suspension is an air-filled doughnut inside which the forward end of the rear spring rides. Mercury engineers say that 80 percent of the rear-end vibrations are transmitted through forward spring hangers. By insulating the springs inside a pair of rubber tires (about the size of baby-buggy tires) they discovered they could keep most of the vibrations out of the body.

These forward hangers also thrust the car forward on acceleration and retard the car during braking. The air-filled rubber

(Continued to page 284)

Lincoln offers four headlights for country driving. Left, canted rear fenders end in triangular lights





HUDSON

American Motors Gets V8 Across the Board

AMERICAN MOTORS now offers V8 engines in all three—Hudson, Nash and Rambler. For economy buyers, Rambler alone retains a six.

Horsepower is up: Hudson and Nash have 255 horsepower; the Rambler V8 has 190; the Rambler six 125 horsepower (135 optional). Dual exhausts are standard on the big cars.

Nash features four headlights, arranged in vertical pairs in the fenders (grille-

mounted lights of 1956 have been dropped). All four lamps operate on high beam, only the top two on low beam. Combined, the four smaller lamps project light 100 yards farther down the road.

Hudson enlarged rear-fender fins and moved aluminum insert to the front fender.

Rambler still has 15-inch wheels, the two big cars going to 14 inchers. Roof lines on the big cars are lower by 1¼ inches, decreasing over-all height by two inches.



NASH

Top, Hudson Hornet four-door sedan. Above, the Nash Ambassador four door. Below, Rambler pillarless wagon



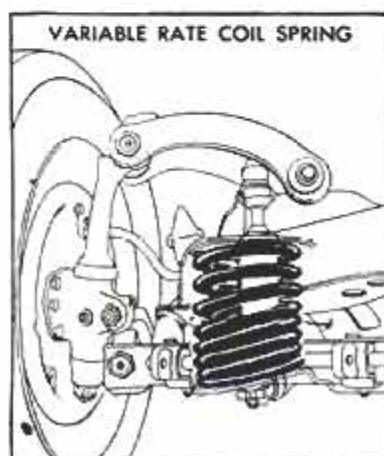
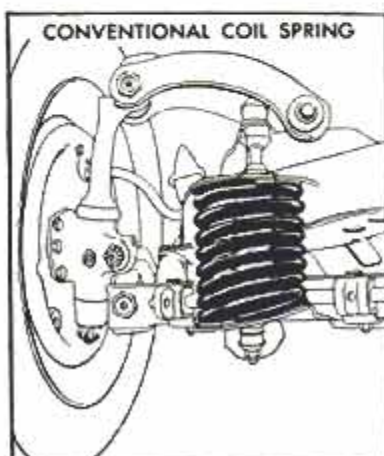
RAMBLER



STUDEBAKER

Enlarged two-toned tailfins are new on Golden Hawk, above and below

Riding comfort under any load condition results from the variable-rate front springs, which have unequal spacing between the coils



Golden Hawk Is Supercharged

STUDEBAKER'S Golden Hawk, the family-size sports-type car, is supercharged for 1957. The blower rams about 30 percent more air-gas mixture into the cylinders, boosting output to 275 horsepower. Last year's big Hawk had 275 horsepower also, but to get it required the 352 cubic inches of the Packard V8. The 1957 Hawk develops the same power with a smaller 289-cubic-inch Studebaker V8.

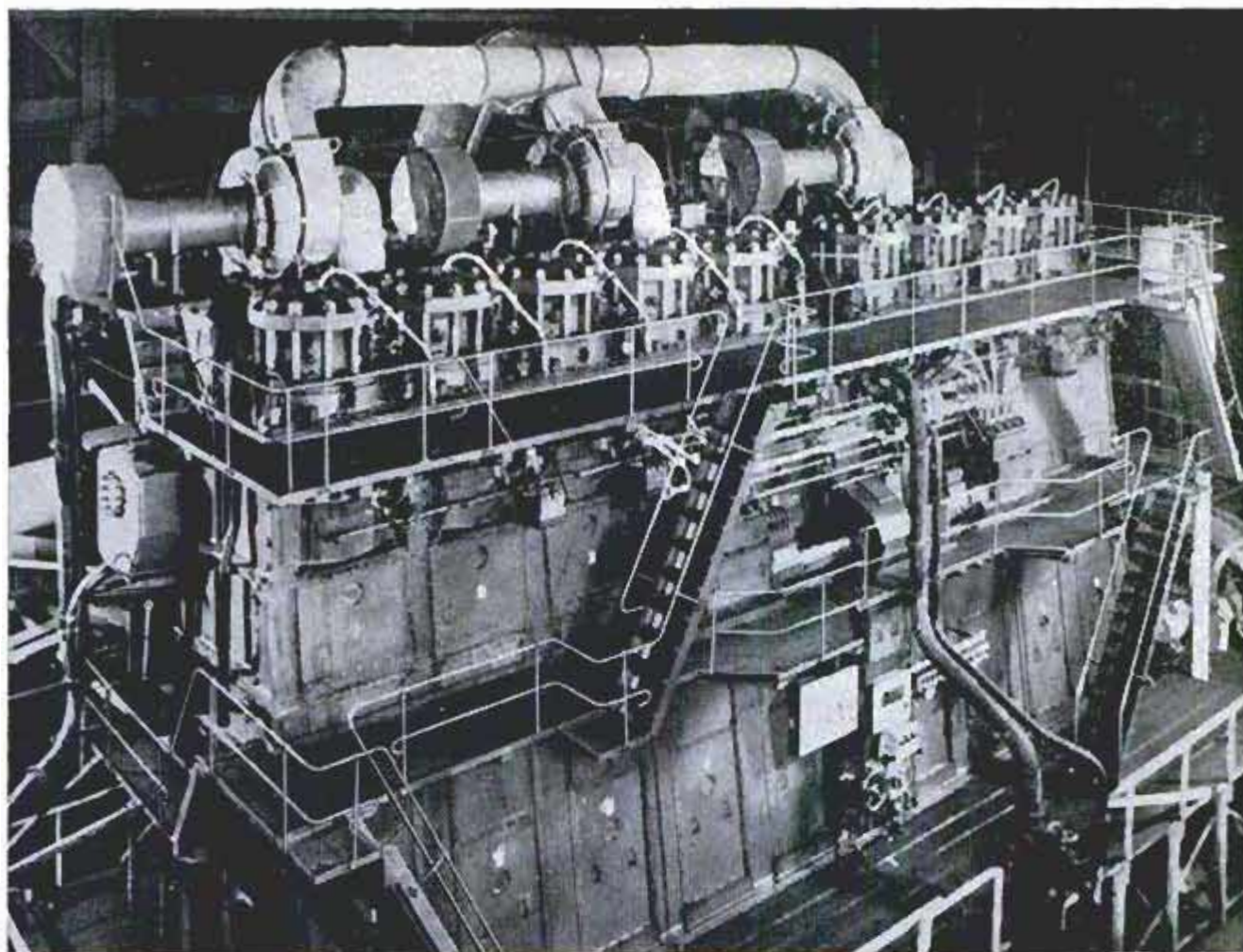
Optional throughout the line, on sedans as well as Hawks, is a nonslip differential that reduces slippage on icy spots.

Riding comfort is improved on all models by variable-rate front coil springs. As load increases, action becomes stiffer.

Styling changes are minor: The Hawk has new tailfins, the sedans have grille and trim changes. A four-door station wagon has been added to the line.



New for '57 is the four-door Broadmoor wagon. It has helper springs in the rear to handle heavy loads



World's "Biggest" Marine Diesel Engine Has 13,200 Horsepower

Biggest marine diesel engine in the world, according to its owners, is the one recently installed on the Japanese cargo boat *Sadu Maru*. The mammoth unit has a

maximum horsepower of 13,200. The nine-cylinder engine is believed to develop respectively the largest total and per-cylinder output yet recorded.

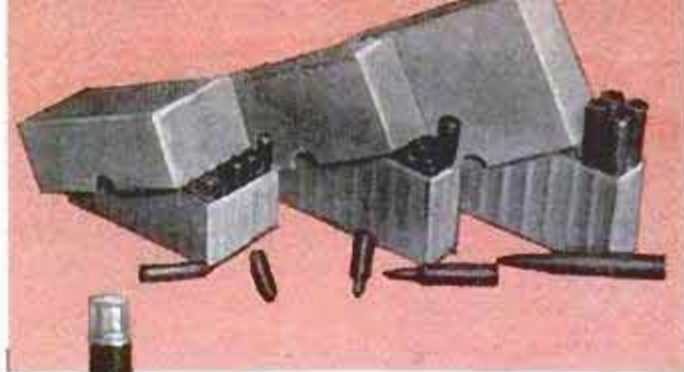
Fountain Pen Fills Itself

Just dip a new fountain pen into a supply of ink and in 10 seconds it will fill itself with enough ink for 7000 words of writing. The pen, made by Parker, has no filling lever or tube. Ink is drawn up into the chamber by capillary attraction. The chamber is covered with a special material that sheds ink, eliminating the need for wiping the pen when it is withdrawn.

Gauge-Block Tester Finds Ten-Millionth-Inch Variance

Light waves, heart of a device measuring the length of precision-ground gauge blocks, can find variances as small as a ten-millionth inch or about one thousandth the thickness of human hair. Micrometers and calipers are checked against master, metal gauge blocks in tolerance control of mass-produced machine parts for guided-missile, jet-aircraft and machine-tool industries.

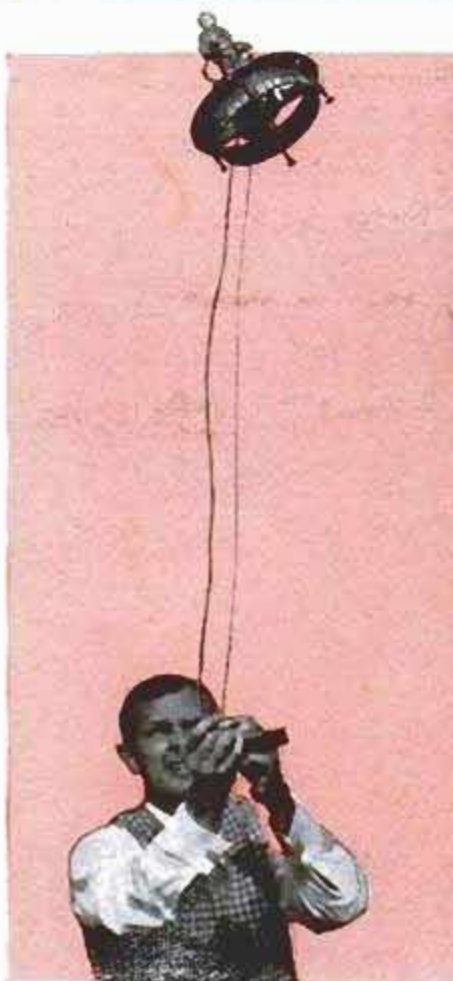




CARTRIDGE BOXES made of a tough plastic and guaranteed not to wear out make a fine gift for the shooter, in white or green
 Brad's Gun Shop, 204 Caladium St., Lake Jackson, Tex.

FOLDING TABLE of wrought iron combined with basket is unusual gift. Folded table is basket handle. Basket also folds
 All Purpose Table, Inc., 22 West First St., Mount Vernon, N.Y.

Christmas



ELECTRIC SHOE POLISHER, called "Shuvalay," will appeal to the man who wants to be well groomed. Polisher fits the hand, has a convenient finger-tip switch. It comes with two brushes and can be used on furniture and wooden items as well as on leather

Portable Electric Tools, Inc., 320 West 34th St., Chicago 24

SCALE MODEL of the Hiller flying platform, built for the Navy, should delight any boy. Flown on control line, flying platform climbs, hovers and turns left or right at the will of the operator. Ducted fan is powered by tiny air-cooled gasoline engine

Wen-Mac Corp., 11511 Tennessee Ave., Los Angeles 64, Calif.



KNITTING AID helps to insure uniform stitches and should be a welcome gift for any woman who knits. Little plastic device holds the yarn at the proper tension and keeps it clean by holding it away from the hands. Speeds knitting along, too

Smith Sales Co., 2962 S. Hancock St., Denver, Colo.

COTTAGE LANTERN, battery-operated, was designed to replace old-fashioned gasoline and kerosene lamps, should make a hit with outdoorsmen. Twin battery is self-contained and attached to the light head by two screw caps. No wire or spring contacts are needed. Light head comes finished in copper or chrome

Burgess Battery Co., Freeport, Ill.



Shopping Center

TINY FIRE ALARM that plugs into a wall outlet will please the homeowner who has everything. It uses no electricity except when shrieking a warning in the event of fire or overheating. Alarm sounds when air reaches 140 degrees, continues until air drops to 100

Laramie Chemical Corp., 290 Main St., Stamford, Conn.



MOST FAMOUS SHIP of her kind, the Nantucket Lightship, has been re-created as 17-inch model, and both father and son would be happy with a kit from which to build her. Loaded with authentic detail, kit contains 180 plastic pieces, needs no tools for assembly

Pym Plastics Corp., Union, N.J.





SIXTEEN-MILLIMETER MOVIE PROJECTOR permits amateur movie makers to add background music and comments to their films without special equipment or an elaborate sound studio. In simplified terms, projector combines principles of tape recorder and movie projector into one compact unit. Inexpensive magnetic stripping is added to the developed film to make the recording possible

Eastman Kodak Co., Rochester 4, N.Y.



OSTERIZER FOR CHILDREN is battery operated, really works, yet is safe. For Christmas, one will be given away with purchase of Deluxe Osterizer—so Dad can get gifts for Mom and daughter at same time

John Oster Mfg. Co., Milwaukee, Wis.

Christmas Shopping

DUAL-PURPOSE BAG is designed to keep hot foods hot and cold foods cold—at the same time. Insulated carrying bag has two inner bags which also are insulated. Hot foods are packed in one, cold foods in the other. With double insulation, cold foods stay chilled six to eight hours, and hot foods maintain temperature four to six hours. Bags are washable

Nappe Smith Mfg. Co., Farmingdale, N.J.

NOISELESS CUTLERY TRAY brings quiet and order to the household kitchen. Compartmented to hold knives, forks, spoons and extra kitchen tools, the tray is made of a soft cushiony material that silences the clatter of the silverware. It was designed to fit easily into standard cabinet-sized drawers and comes in four colors—red, yellow, pink and turquoise

The Wooster Rubber Co., Wooster, Ohio





STEREO VIEWER for the 3-D fan holds 24 slides and feeds them automatically. Uses battery or alternating current.
The Weston Co., Inc., 11 E. 47th St., New York City

MODEL HYDROPLANE, powered by tiny air-cooled gasoline engine, is 18 inches long. Comes assembled; ready to run
Wen-Mac Corp., Los Angeles 64, Calif.



EXPOSURE METER for photographers has booster permitting use in dim light. Booster is auxiliary light cell, in its own case, which plugs into underside of the meter. It boosts low-light sensitivity of meter 400 percent

Kanematsu New York, Inc., 150 Broadway, New York City

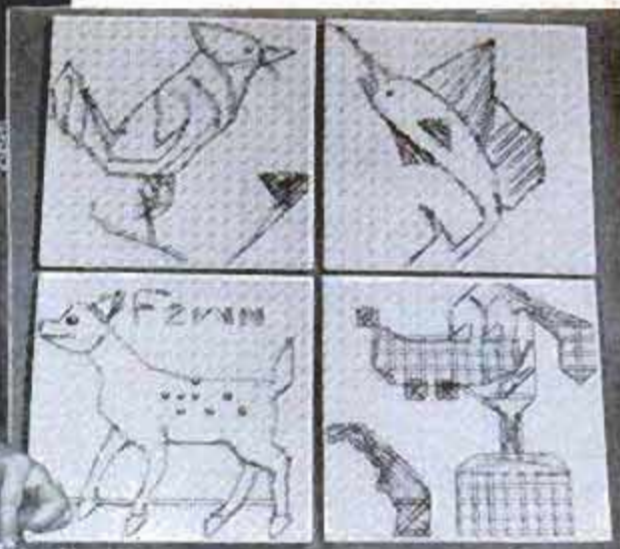
Center

PORTABLE DUCK BLIND, made of 10,000 pieces of raffia, was designed to fit a folding boat made by the same manufacturer. The raffia fits over an anodized, nonrusting aluminum frame. Using this boat-and-blind combination, the duck hunter can shoot over his decoys comfortably and retrieve those that fall in deep water. He can move easily to new spots
The Porta Co., Inc., 32 Neponset St., Canton, Mass.



PLAY TENT or back-yard umbrella or even a beach umbrella—this convertible, portable play shade can be all three. Attaches to clothes pole or any post in seconds; folds into three-foot pack
The Play-Shade Co., 111 S. 13th St., Garland, Tex.





PLASTIC PEGGED BOARD permits youngsters to work out various designs with rubber bands. The board is 10 inches square and colored rubber bands are supplied with it. Conceived originally as entertainment, it also can be used as an aid in physical therapy, restoring manual dexterity

Klotz Corp., P.O. Box 147, Chelsea, Mich.

Christmas Shopping



PLASTIC UNSINKABLE BOAT for children is five feet long. Deck and hull are made of high-impact polystyrene. Inner chamber is filled with Styrofoam. Can withstand rough treatment, yet needs no upkeep. Red deck and white hull; comes with anchor rope

Harbor House, Box 421, Dept. B-12, Saline, Mich.

PLASTIC GUN (lower left) shoots table-tennis-type balls. It works with an easy pumping action and has no springs or levers. Barrel and ammunition are of nonshattering Tenite plastic. When the rubber nozzle is flipped back, 15 balls can be loaded at once

Aek-Aek Inc., 18101 East Ten Mile Rd., East Detroit, Mich.



TOY CONTROL PANEL of "atomic-powered submarine" enables junior captains to be navigators. Battery power steers course as undersea map slides by opening

Alperi-Macine Co., 644 Madison Ave., New York City 22





THIS CAMERA, low in price and high in style, will provide family photographer with box-camera simplicity and economy
Sawyer's Inc., P.O. Box 490, Portland 7, Ore.

MAGIC MOVIE MIRROR, placed over special record on 78 r.p.m. phonograph causes figures to move in time with music
Childhood Interests, Inc., Roselle Park, N.J.



for Juniors

MALTED-MILK MIXER is a toy that does the job like its bigger counterpart. Operated by a flashlight battery, it is strong enough to break up ice cream added to malted-milk mixture, yet is safe for children. When the aluminum cup, which is included, is put in place, the mixer starts automatically
Aluminum Goods Mfg. Co., Manitowoc, Wis.

CRASHPROOF FLYING MODEL of the 1956 Beechcraft Bonanza is made of Duraflex plastic and comes fully assembled with tiny gasoline engine already installed. Durable plastic parts snap back into shape when bent, and will not shatter on impact. Engine has tiny pull-cord starter for quicker, easier starts
Wee-Mac Corp., Los Angeles 64, Calif.



Detroit Listening Post

By Leo Donovan



WHILE YOU ADMIRE the 1957 automotive beauties (many of which are in this issue), here's something to think about:

You can now drive on toll roads from New York to the outskirts of Chicago without seeing a single stop light. And you're not allowed to drive over 70 miles per hour legally anywhere along the way. In fact, only in certain parts of Pennsylvania can you hit 70. Most of the way, the limit is 65 (Ohio and Indiana) and 60 (New Jersey).

So what? you ask. Here's the point: With no stop lights, how can you demonstrate the remarkable acceleration of your new 300-horsepower beauty? With these speed limits, where can you let the power plant stretch its muscles? With broad, multilane highways all the way where will you use the fast-passing ability for darting in and out of traffic? Your 300-horsepower beauty (and perhaps you, too) will arrive at your destination utterly frustrated!

Yet engines get bigger, horsepowers higher. It's a strange business!

Prices Are Up

Industry observers, who have a hunch that customers will resist the higher prices on 1957 cars, feel that this could result in a less frenzied sales market. The reason? They feel manufacturers will cut back production to prevent big inventories.

They see no chance of manufacturers cutting prices. Nor will dealers cut margins to absorb increases. Because dealers have fewer 1956 models to unload, their chances of making money next year are said to be improved. And that is without figuring on a boom year in sales.

General Motors seems to be taking a somewhat restrained attitude toward the competitive struggle for sales. As a result, Ford and Chrysler may pick up a few percentage points in the 1957 scramble.

Right now, General Motors is selling over 50 percent of the market and that's about as big a piece as is considered proper at this moment. Restraint in merchandis-

ing (such as, for example, the absence of a 1957 Motorama) by GM might also give the independents a chance to improve their position.

Better Quality Controls

One result of the dealers' revolt against factory practices was a guarantee by the companies to pay dealers the full cost of new-car preparation and repair services during warranty periods. To keep such charges from becoming astronomical, manufacturers are expected to clamp down on quality control on the assembly line and in parts manufacturing. The real winner in this clamp-down is, of course, you—the customer. Your 1957 car should be better made than those of recent years.

Making predictions can be dangerous because nothing is definite until the car is on the street. Here are some examples of quick switches in recent weeks:

One car was set for a new automatic transmission. It was to have plenty of pick-up plus unparalleled smoothness. Factory engineers worked out drawings, photographers took pictures, everything was set to publicize this new achievement. Then, without warning, the whole thing was canceled. Lots of words had to be "eaten" (and rewritten) and pictures discarded.

Another car had its engineers sitting up nights figuring out a neat, compact solution to the spare-tire problem. They came up with a lightweight, easy-to-use tire that was carried deflated in a small box in one corner of the trunk. Provisions for quick inflation were perfected. The thing worked fine. Engineers beamed. Pictures were taken. Then, bang, the project was tossed out the window.

Here's another example: One 1957 car had most of its publicity artwork completed at great expenditure of time and money. Suddenly the boss decided to get rid of an important piece of trim—a piece that is as obvious as a fat man in a jockey room. (It, incidentally, has been part of the car for many years—can you guess which car it is?) His decision meant throwing away piles of photographs and starting over.

That's the sort of thing that goes on in every company right up until announcement day. It's no wonder the press agents have a weary look at this time of year.

Rumor is that Pontiac will bring out an expensive sports-type car with plenty of horsepower and, no doubt, fuel injection. Chevrolet's optional fuel injection, by the way, was one of the industry's best-guarded secrets. The day the news leaked out, one top engineer in the division confessed it was as new to him as to the inquiring reporters!

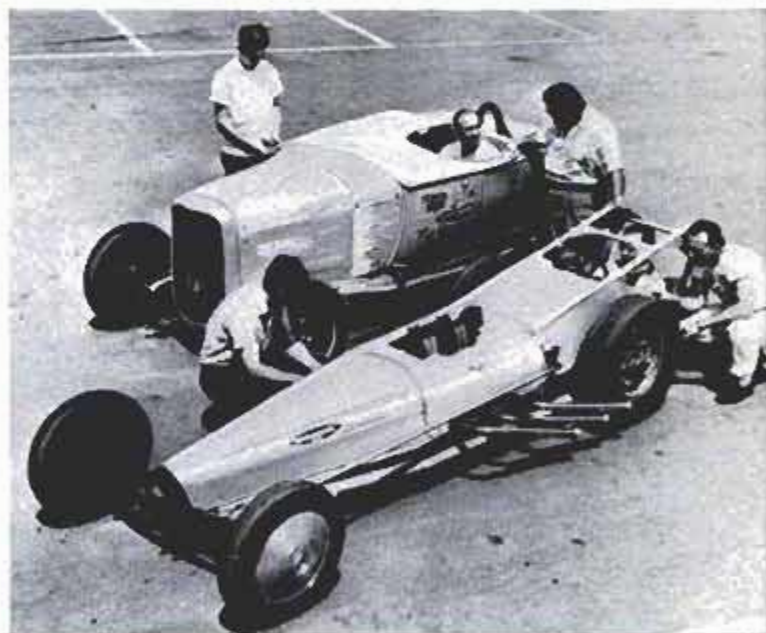


Although you might not recognize it, this coupe has a Fiat body. The front wheels were moved forward on an extension of the frame to place more weight on the rear wheels. This enables the car to get better traction

Weird-Looking Hot Rods Compete in Drag Races

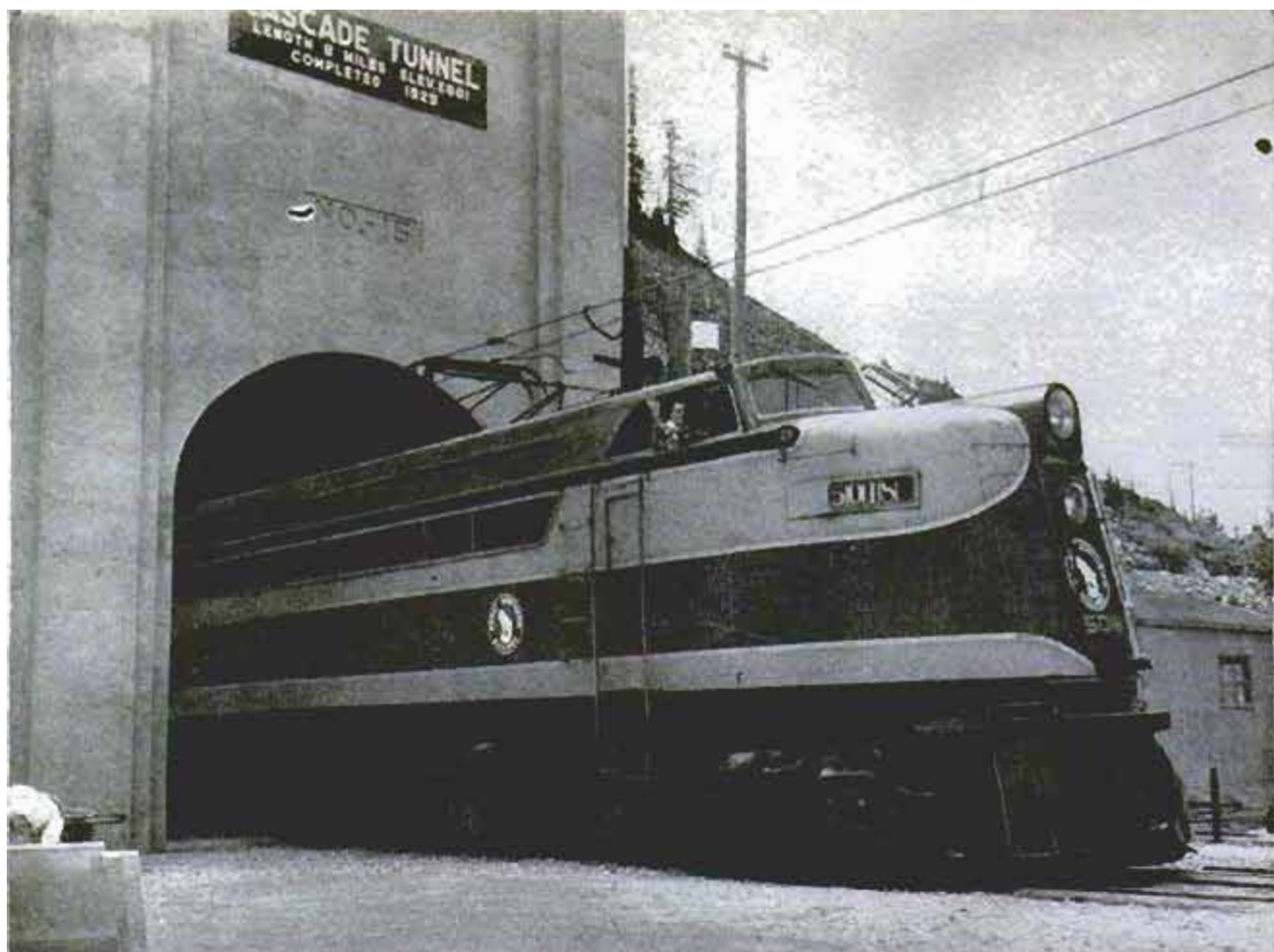
Some of the oddest-looking cars in the world show up at the National Championship Drag Races. These souped-up, cut-down hand-fabricated speedsters resemble the automobiles that most citizens drive only in that they have four wheels. Everything else has been modified in the interest of speed. The only other consideration designers keep in mind is the safety regulations set up by the National Hot Rod Association, requiring roll bars and other forms of protection for the driver in the event of an accident. These cars may be weird, but they are fast.

Front car is of "slingshot" design, with driver behind rear wheels. Rear car is 1932 Ford with Cadillac engine, Hydra-Matic



Lawn Sweeper For Tiny Tractor

From his seat on a miniature tractor the homeowner can sweep up leaves and dump them in a pile for burning. The sweeper, hitched to the rear of the tractor, is dumped by pulling on a cable fastened to the tractor seat. The sweeper can be backed into position for dumping the load of leaves in the hopper.



Last electric locomotive, called "The Box Ox," passed through tunnel late last summer. Diesels took over

Electric Line Gives Way to Diesels as GIANT BLOWERS COOL CASCADE TUNNEL

By Hu Blonk



ENDING nearly half a century of electrified operations in the Cascade Mountains, a unique engine-cooling system has been put into operation at the longest railroad tunnel in the Western Hemisphere, allowing heavily loaded, diesel-driven trains to move uphill through the eight-mile bore. The ventilating scheme, costing \$650,000, blows outdoor air into the long tunnel through big fans installed behind a steel door in the east portal.

Railroad men say there's nothing like it in the world.

Until the ventilation problem was solved last summer, the Great Northern Railroad was required to employ a 74-mile electri-

Big intake fans, seen from inside the tunnel, pull air in from outside and force it through the tunnel



fied zone in the high mountains between Wenatchee, Wash., on the east slope, and Skykomish, Wash., on the west, to drive its heavy freight trains through the bore.

Basic units in the ventilation system are two six-foot fans, each powered by an 800-horsepower electric motor and turning at 1150 revolutions per minute. A special control station and powerhouse has been erected near the east portal to house the motors, electric switches and control mechanism.

The east portal of the tunnel has been reconstructed to house a steel drop door which prevents the air blast from circulating out the near portal and back to the fans. When a heavy-tonnage freight train enters the west portal of the 41,152-foot tunnel, the operator engages the master control, closing the east portal door and starting one of the fans, which forces approximately 220,000 cubic feet of air per minute against the oncoming train.

Prior to ventilating the tunnel, diesel operation of full-tonnage trains was not practical because of overheating of engines. Lighter trains do not require assistance from the cooling system, and all trains westbound downgrade operate without the fans. After a train has passed through the tunnel in either direction, both fans are operated to change completely the air within the bore.

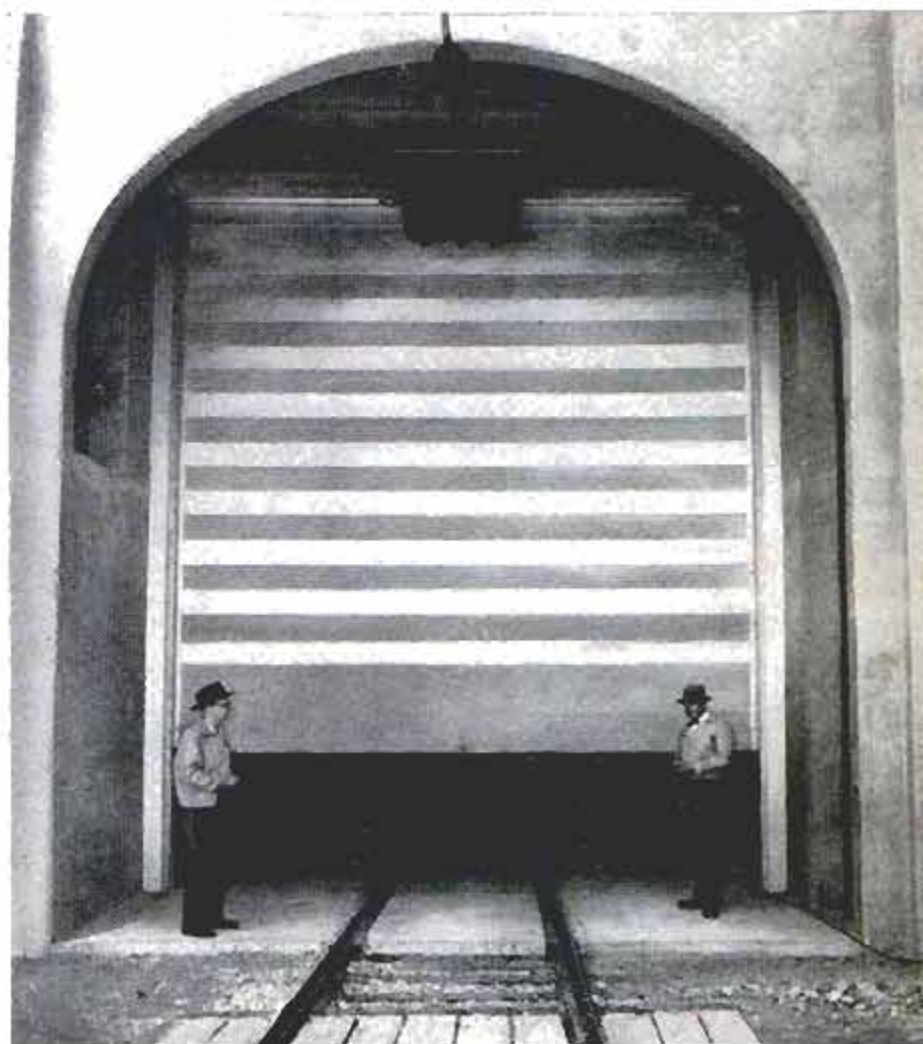
Automatic features of the tunnel include a switch which opens the door and turns off the fans when a train approaches within 3250 feet of the closed portal. A stop signal is provided in the event the door should fail to open. ★★★

☐ Over 100 substances are now packed in self-spraying aerosol containers, bringing the total value of aerosol products produced in the United States and Canada last year to \$250,000,000.



Each intake fan is capable of pushing 220,000 cubic feet of air per minute into the tunnel. Blast cools hard-working diesels

In order to seal off east end of tunnel, so air is forced to travel the length of the bore, steel drop door was installed



KEEPING UP WITH THE ATOM

RESearch at the University of Houston may turn out to be of great importance to the farmer. Laron Golden and C. B. Johnson, shown at right, are using radioactivity to study the role of phosphorus in plant growth. Phosphorus is one of the essential elements because no plant can grow without it. Yet it readily "marries" many other elements in the soil, making it unavailable to plants. Johnson and Golden are using radioactive fertilizer to check how much phosphate is taken up by plants within a given period. So far their tests indicate that it is best to place phosphate fertilizer in concentrated bands to prevent all of it from being lost by "marriage" to other elements.

☆☆☆

RADIATION is now being used on an experimental basis to change sawdust into cattle feed . . . to waterproof shoes . . . to convert paraffin into a rubberlike substance . . . to combine two chemicals into a potent insecticide . . . and to produce a new kind of foam plastic.

☆☆☆

IN ITS 20th semiannual report, the Atomic Energy Commission gave the first details of research to obtain power from a controlled H-bomb reaction. The report points out that deuterium (double-weight hydrogen), if fused with other elements, could be an almost limitless source of energy, as it occurs in great abundance in sea water. Temperatures of 100 million degrees C. would be needed to fuse the deuterium. The biggest problem is finding a chamber for this reaction.

Dr. Hsue-Shen Tsien of the California

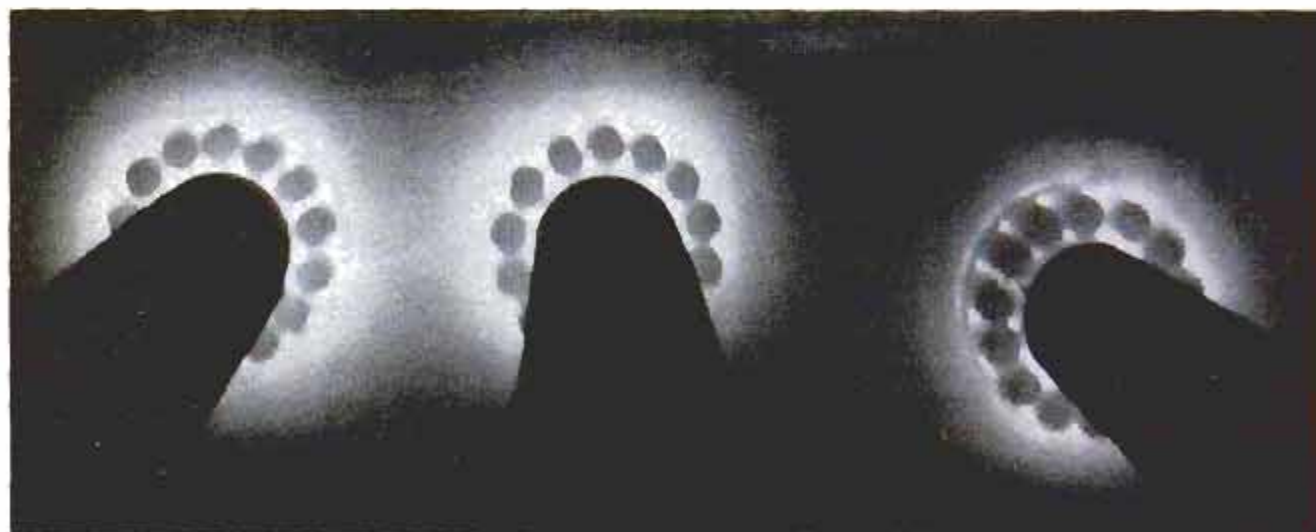


Institute of Technology has calculated that one small "H-bomb power plant" would produce more than five times the electrical energy produced in the United States in 1954.

The AEC report states "it is probable that success will be achieved eventually."

☆☆☆

THOSE "ATOMIC CANNON" below appear to be blasting away into the night. Actually they are tubes extending down into a 20-foot pool of water for highly radioactive fuel elements. The glowing uranium slugs bombard materials lowered into the tubes. The materials then are checked by General Electric scientists at the Hanford atomic plant to determine their change under high-energy radiation.



Imagination

in the Classroom

IN A CLASSROOM in Sauk Rapids, Minn., the engineers and designers of the future are already at work building the machines of their era. The instructor responsible for this forward-looking activity is Alfred Lease, industrial arts teacher, who believes in encouraging the imagination of his students.

Backed by his encouragement, the class has produced such items as "Lease's Lemon," a flying saucer with a 5½-foot diameter, operated by torque, that really flies; a glider-helicopter, built of around-the-shop parts, which actually flies when towed by a car at a speed of 23 miles per hour; and, Herbert Watt, a mechanical man who walks, talks, hears, drinks and does other amazing things.

The flying-saucer frame is made of balsa wood and is powered by two electric motors. Operated by a remote-control panel, the saucer rises vertically on both motors spins when one of the motors is slowed up. The development of the device is so simple that Lease wonders how it has been overlooked. "Torque power is cheap," he says. "It's surprising that not too many have used it before."

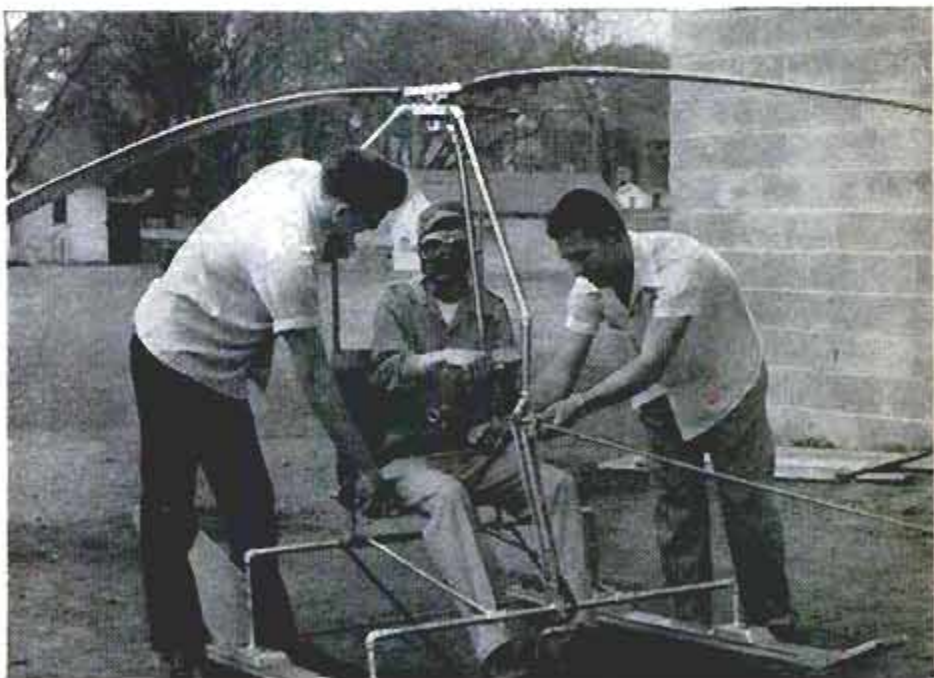
The helicopter was made from commercially supplied plans and built from available parts such as the ⅜-inch pipe used for the frame. Towed by a car at 23 miles an hour, it is released for its gliding flights.

Herbert Watt, the robot, is the second mechanical man to come from this classroom, and is a very capable fellow. He is operated by remote control.

Frame of flying saucer shown at top of page is made of balsa wood and parts of a toy construction set. It has two motors

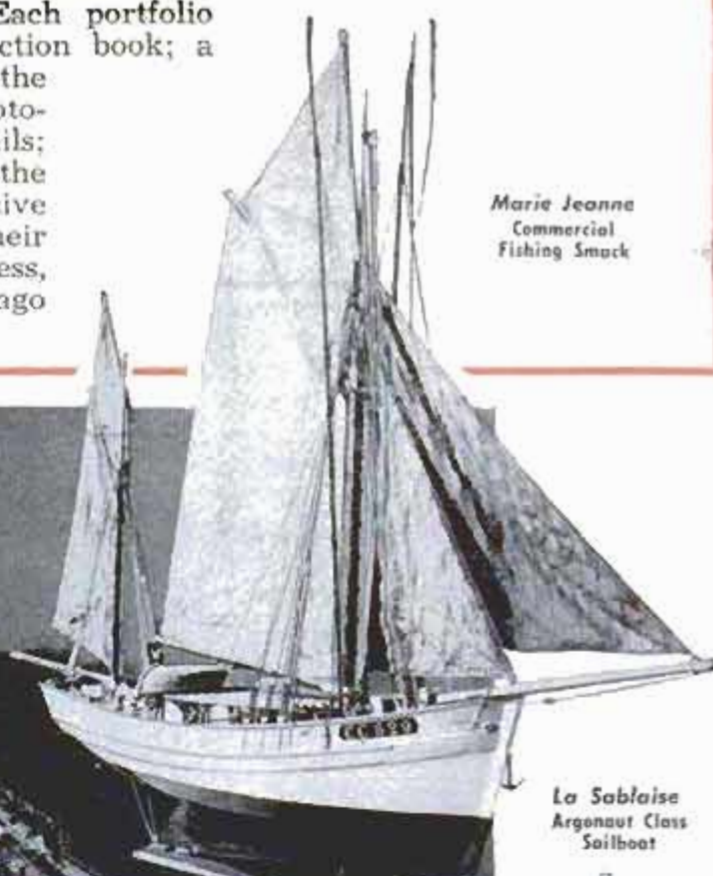
Herbert Watt, the mechanical man, is operated by remote control. Operator wears earphones to hear what Herbert is hearing

Helicopter-glider is towed to flying speed, then released to free flight. Rotors must be started by hand before towing begins

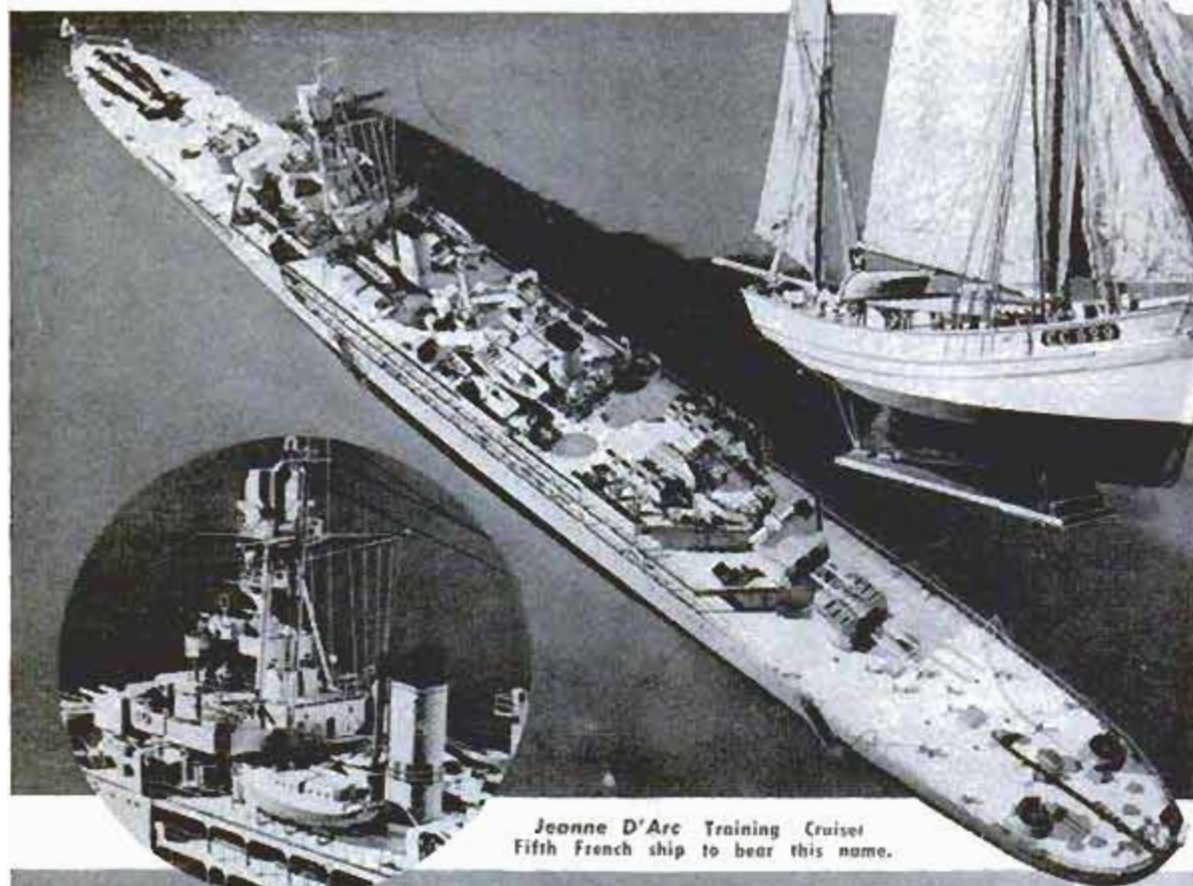


ON THE NEXT five pages we present a feature article on the magnificent ship models of the Musee de la Marine in Paris. *Popular Mechanics* is making available to its readers a portfolio of plans for each of the four ship models shown below. Each portfolio contains: a general 36-page instruction book; a specific instruction book covering the history and characteristics of the prototype, along with construction details; large-size actual photographs of the finished model. For a free descriptive brochure on these plans and their prices, write Popular Mechanics Press, Dept. 80, 200 East Ontario St., Chicago 11, Illinois.

Marie Jeanne
Commercial
Fishing Smack



La Sablaise
Argonaut Class
Sailboat



Jeanne D'Arc Training Cruiser
Fifth French ship to bear this name.



Le Terrible Light Cruiser • Momentous World War II Record



Rigging a model calls for a watchmaker's precise touch. Tiny rope has same number of strands as the original

In the shadow of the Eiffel Tower is the world's smallest shipyard, a fabulous little workshop where craftsmen of the Musee de la Marine build miniature

SHIPS OF ALL AGES

By Robert Sage

Fine detail shows up on *La Royale*, a Venetian galley that carried 378 rowers, 150 sailors and 200 soldiers

Photos by Gene Penn

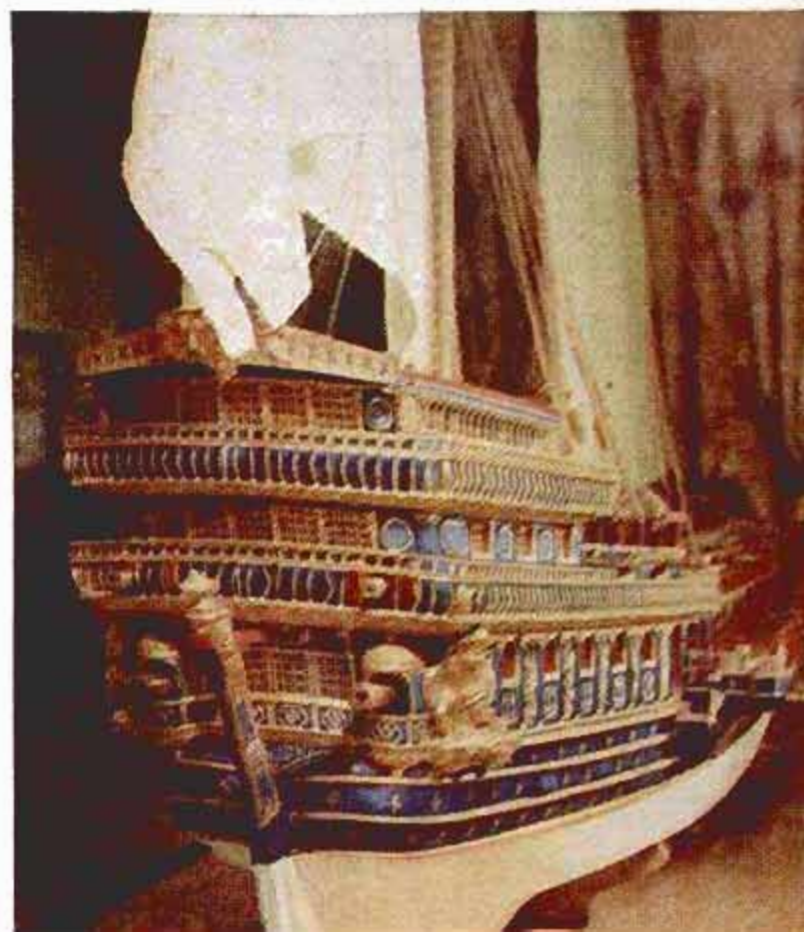
IF YOU ARE a newcomer in Paris, one of the first places you are likely to go is the Place du Trocadero to enjoy the wonderful view of the Eiffel Tower and the wide panorama of the city.

Beside you, as you stand looking at the sight, are the two majestic wings of the Palais de Chaillot, curving out like halves of a gigantic, broken horseshoe.

The acres within these wings house four unusual museums and a number of other things. Among the "other things," on the top floor of the west wing, is perhaps the smallest and most versatile shipyard in the world.

When I visited this extraordinary place recently, the finishing touches were being put on a 14,000-ton aircraft carrier; a beautiful galley was at the halfway stage; the rigging was being repaired on an obsolete "floating battery"; the seats were being fitted into a lifeboat; and three Breton fishing smacks had just been completed.

This and other activities were being carried out by a chief and 15 craftsmen. Everything, of course, was in miniature,





Recent model, the *Arromanches*, carries 35 guns, is complete even to tiny cranes and a miniature helicopter



Exquisite model has Neptune sitting on prow. Original boat was built for Napoleon to inspect a harbor

for this "shipyard" was the neat, airy little workshop that makes the admirable model vessels exhibited two floors below in the French Navy's famous *Musee de la Marine*, or Naval Museum.

The aircraft carrier, a $\frac{1}{100}$ scale model of the *Arromanches* (formerly the British *Colossus*), had been covered with a plastic hood while its 35 pieces of artillery were being made. At various benches, workers were busy fashioning tiny bits of gear with a watchmaker's precision. Before them were midget "lumber piles" of boxwood, maple and basswood. Their tools were few — mainly a jigsaw, some sharp little knives, a bit of sandpaper that served as a plane,

French sailors look over model of clipper ship that shattered records by crossing the Atlantic in 13 days



and a bottle of glue that did the work of nails, screws, bolts and rivets.

Craftsmen Are Authorities

Several of these craftsmen, I learned, are authorities on naval archaeology and students of the innumerable 18th-century treatises on sails, rigging, shipbuilding, naval artillery and marine history. Some are regular sailors, others civilian specialists from the navy yards at Brest and Toulouse.

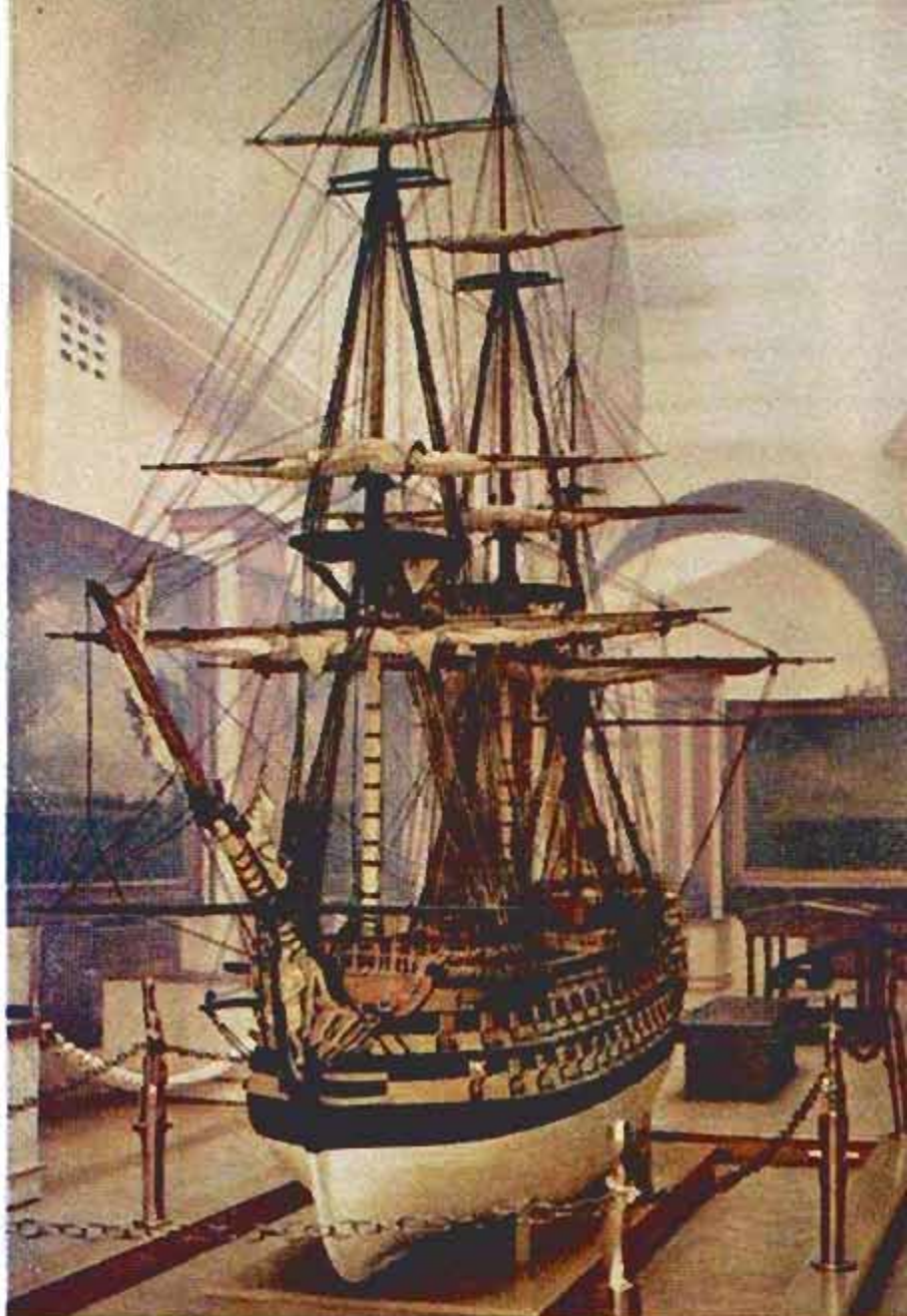
In this pleasant workshop they have recaptured something that is becoming more and more rare—the old-time artisan's love of his craft, his pride in work well done. Here time doesn't count; neither does profit or loss. A job must be done perfectly, whether it requires a month or two years. Roughly speaking, it takes as long for this workshop to turn out a model as it would for a real shipyard to produce the original.

The making of a model starts with detailed plans of the entire craft and its visible gear, drawn rigorously to scale by the workshop's chief, Marcel Caudrelier. To draft the plans of a ship when a model exists is not a superhuman feat, although it is a meticulous one. Similarly with a ship of which the full-scale plans are available. But many of the models are made for the first time, and often part or all of the plans have disappeared or cannot be obtained.

In such cases, Caudrelier gathers every document he can find—photographs, drawings or paintings, written descriptions, partial plans, anything that may yield a little information.

When these have been assembled his real work starts. Not only must he draw the over-all plans of the vessel, but he must prepare detailed plans of every part, and often whole sets of plans for a single accessory.

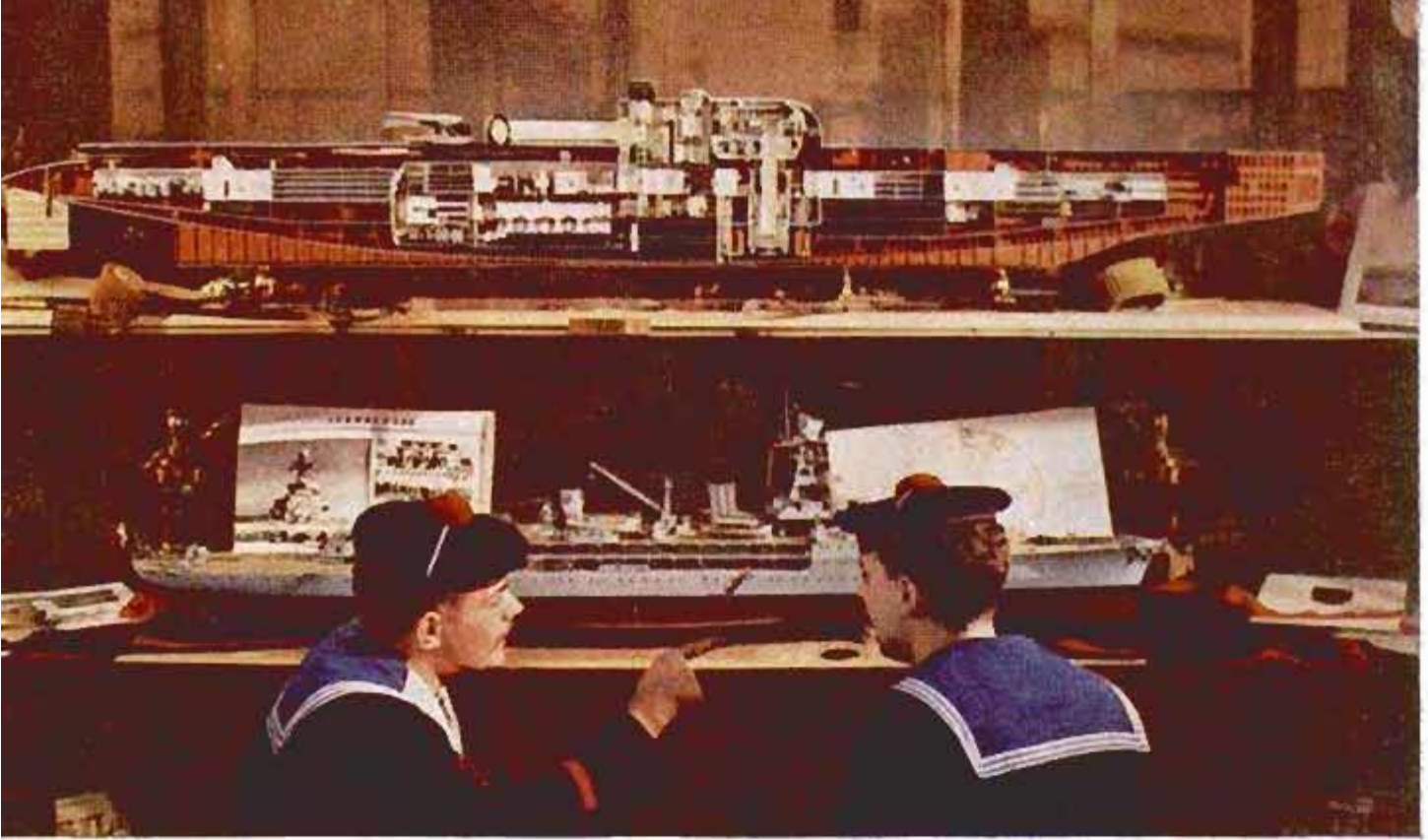
I got some idea of the incredible labor involved when he showed me a tiny gun to be placed on the deck of a warship. Although the gun was only about an inch high and the barrel not much bigger around than a pin, 37 separate pieces were required for its construction, and each of these pieces called for a detailed plan about six inches square.



Second-largest model is 124-cannon man-of-war. Model was built 250 years ago for the nautical instruction of young Louis XV

Here's a cross section of the bathysphere in which a pair of French naval experts made a record descent of 13,500 feet



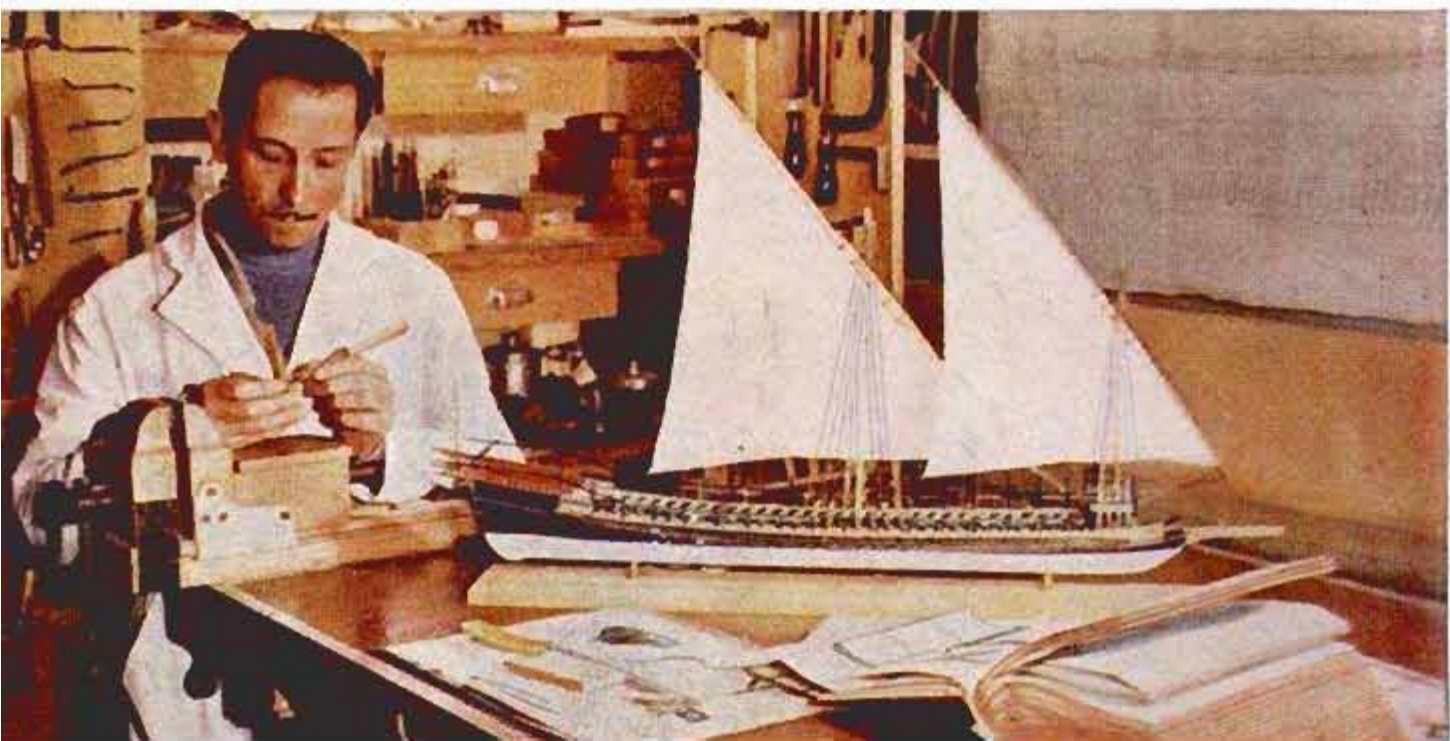


One of the most complex displays is cross-section model of the giant prewar French submarine *Surcouf*, which sank in a collision in 1942. Note reconnaissance plane. Below it is a model of a modern ocean liner



This dainty little ivory ship, the *Ville de Dieppe*, was presented to Marie Louise, second wife of Napoleon, by city of Dieppe upon the birth of a son in 1811

Old books and yellowed drawings reveal details of the ancient ships to the craftsmen. Sometimes weeks of research may turn up only one of ship's dimensions





Gloire, a steam-driven ship that made history, was built in 1859. It was the world's first armored vessel

The many problems that come up in reproducing microscopic objects have long since been solved. The museum's special paint, *maquettine*, spreads over the tiniest parts without gumming, and the workshop manufactures the string-thick rope used in the rigging. The rope has the same number of strands and the same diameter, in scale, as the original.

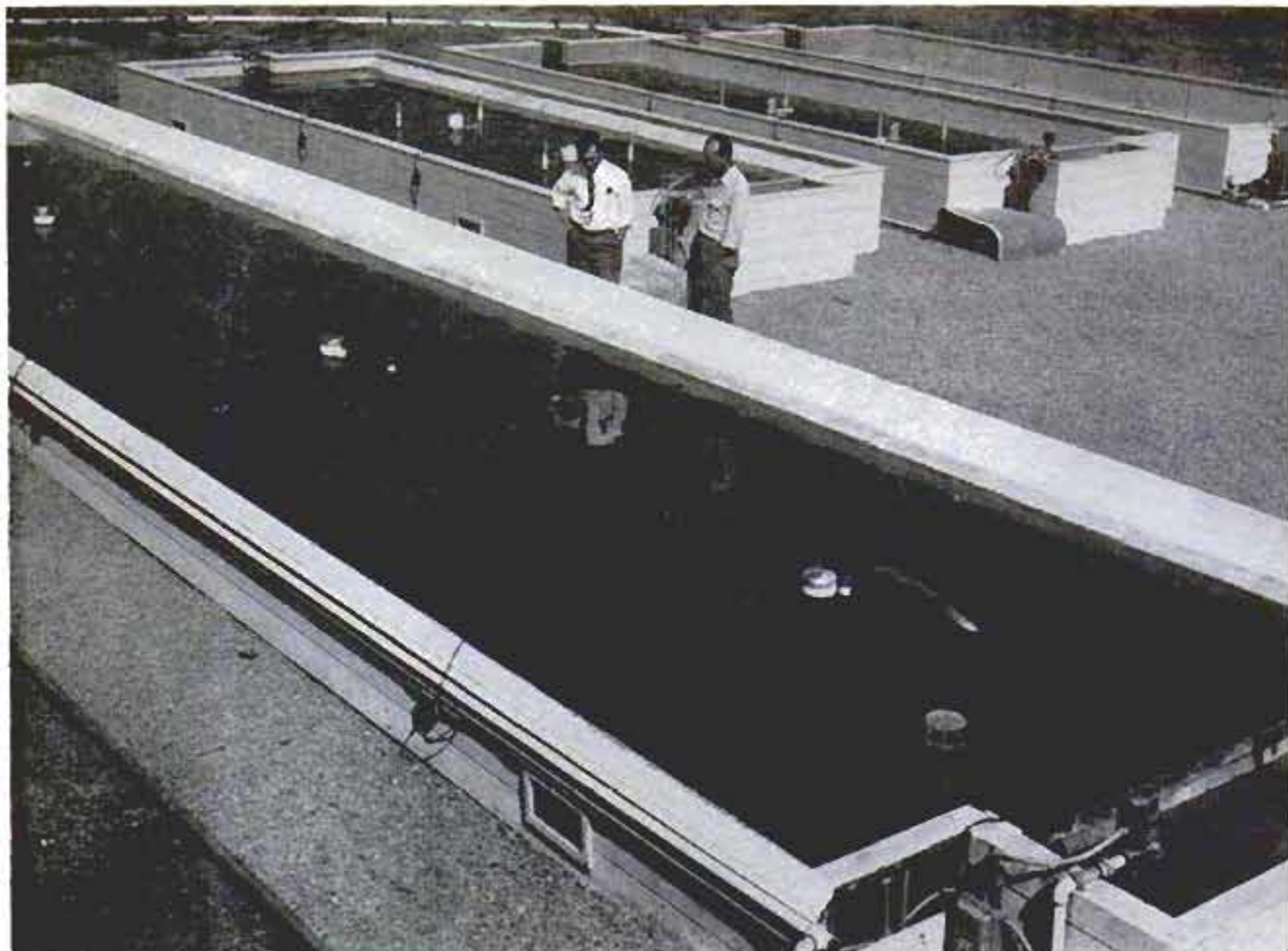
Every portion of a "collection model" is made by hand but, in the case of "series

models," when a lifesaver, a piece of artillery or any other accessory is to be repeated several times, the work is simplified by manufacturing the necessary number of plastic copies from a handmade prototype. On the model of the prewar French battleship *Richelieu* (scale $\frac{1}{300}$), there are no less than 317 plastic accessories.

The museum's workshop "mass produces" certain models in series of 10. The
(Continued to page 242)

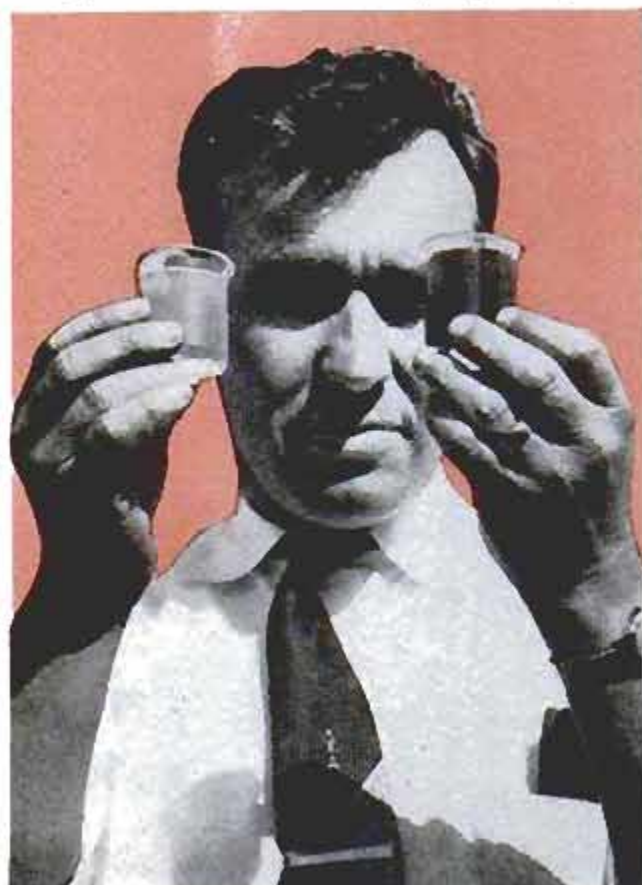
First steamboat was built in France, 16 years before Robert Fulton's. This model still runs under its own power





Sewage is pumped slowly through concrete tanks where it is exposed to sunlight to promote growth of algae

Clear water, usable in industry or agriculture, is one of the end products of the algae-growing process. Beaker at left shows water after processing. Beaker at right contains water with algae growing in it



ALGAE

By Thomas E. Stimson, Jr.

ENGINEER SCIENTISTS at the University of California are studying a new food that has some fantastic properties.

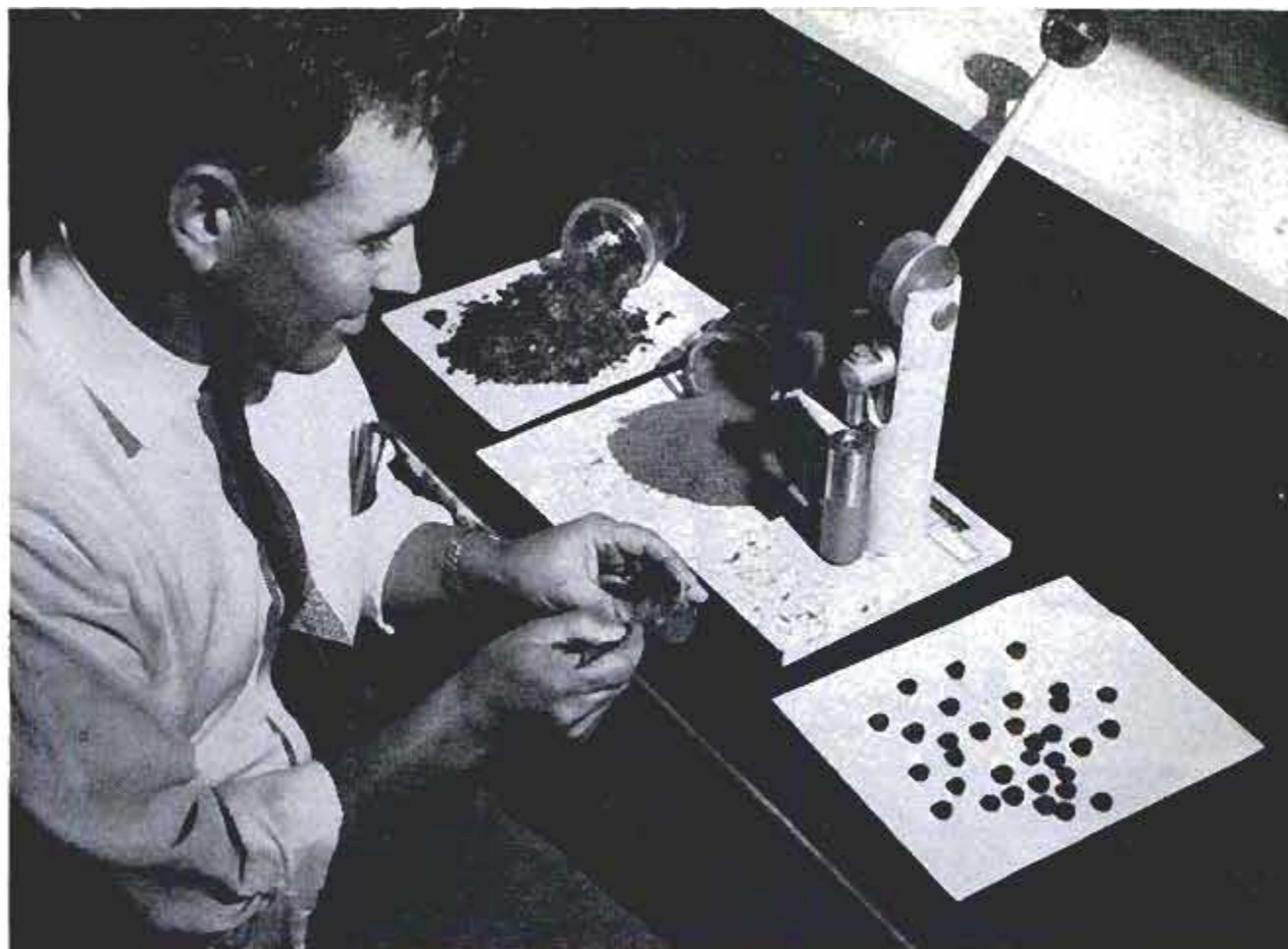
It costs nothing, or less than nothing, to raise.

It can be grown at the rate of 30 to 40 tons per acre per year, as against an average of less than two tons per acre, dry weight, for field crops.

It is more than 50 percent protein. In fact it is higher in protein, fat and vitamin content than any other vegetable substance except a few seeds.

It is grown in tanks or ponds yet requires less than a hundredth of the water used in ordinary agriculture to produce an equal amount of protein.

It is a good energy food for humans although it is looked upon mainly as a food supplement for domestic animals. Chicks gain weight by more than four percent per day on it. Pigs and cattle thrive when it is



Flaked algae, left, are converted to powder, then pressed into pellets for use as supplemental animal food

FOR DINNER

added to ordinary cellulose feed. Dogs and cats love it.

Produced in either powder or pellet form, it is dark green, almost black, in color. It has a flavor something like grass or alfalfa.

This remarkable substance consists of algae that are grown in sewage ponds, then harvested and dried. Algae are common unicellular plants, comparable to a "scum," that grow in warm, quiet waters. They not only flourish in sewage ponds, they aid in converting the sewage into water that can be used in irrigation, industry or, after filtering and chlorination, as drinking water.

The story of algae as a food is one in which two different branches of science contributed their findings to reach some brand-new conclusions.

About 10 years ago research people who were studying photosynthesis became excited over the efficiency with which some green algae use sunlight for growth. Dr. H. A. Spoehr, of the Carnegie Institution, and others made precise studies with the

strain known as chlorella. They found that chlorella has high food value and that it grows rapidly in sunlight when supplied with carbon dioxide and nutrients. Pilot plants were built and many of the problems in growing and harvesting were studied.

Large chlorella farms were envisioned for sunny desert regions on land that was otherwise of little value. Using little water, such a farm would grow its algae in plastic tubes laid on the ground or on the roofs of buildings. Circulating the algal cultures through the tubes, and harvesting the product would all be automatic.

Recently engineers of the Arthur D. Little Company of Cambridge, Mass., surveyed the financial aspects of these proposals. The engineers based their studies on a hypothetical 100-acre farm that would use some 63 acres as growth areas.

Counting all the automatic machinery, it was estimated that the 100-acre farm would cost \$3,220,000. The farm would produce some 35 tons of dry algae per acre per year



Research apparatus measures the gases given off by the dried algae after treatment for use as a fuel

at a cost of 25 cents per pound. With certain economies and further research it was thought that this cost could be reduced and that the algae could be produced at a profit if sold at 25 cents per pound.

However, some cheap proteins such as yeast cost even less. The final conclusions of the engineers were that commercially grown algae can't compete with cheaper proteins at present, but that eventually the algae may become a major factor in the world's food supply.

Meanwhile some entirely different studies were being made at the University of California. Harold B. Gotaas, professor of



Extracting algae from water with separator, above, is not as economical as chemical precipitation method

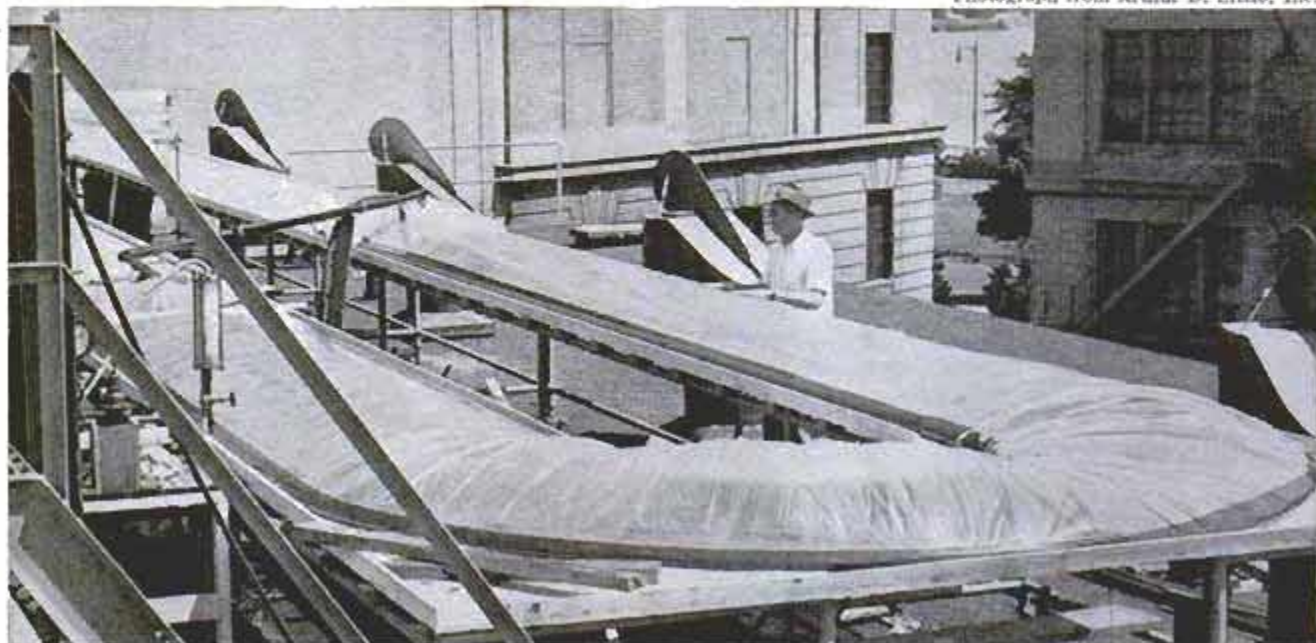
sanitary engineering, Wm. J. Oswald, assistant research engineer, and Clarence Golueke, assistant research biologist, teamed up to investigate a phenomenon that sometimes occurs in sewage ponds. These ponds are areas in which sewage is stored until natural bacterial action has converted wastes into harmless materials.

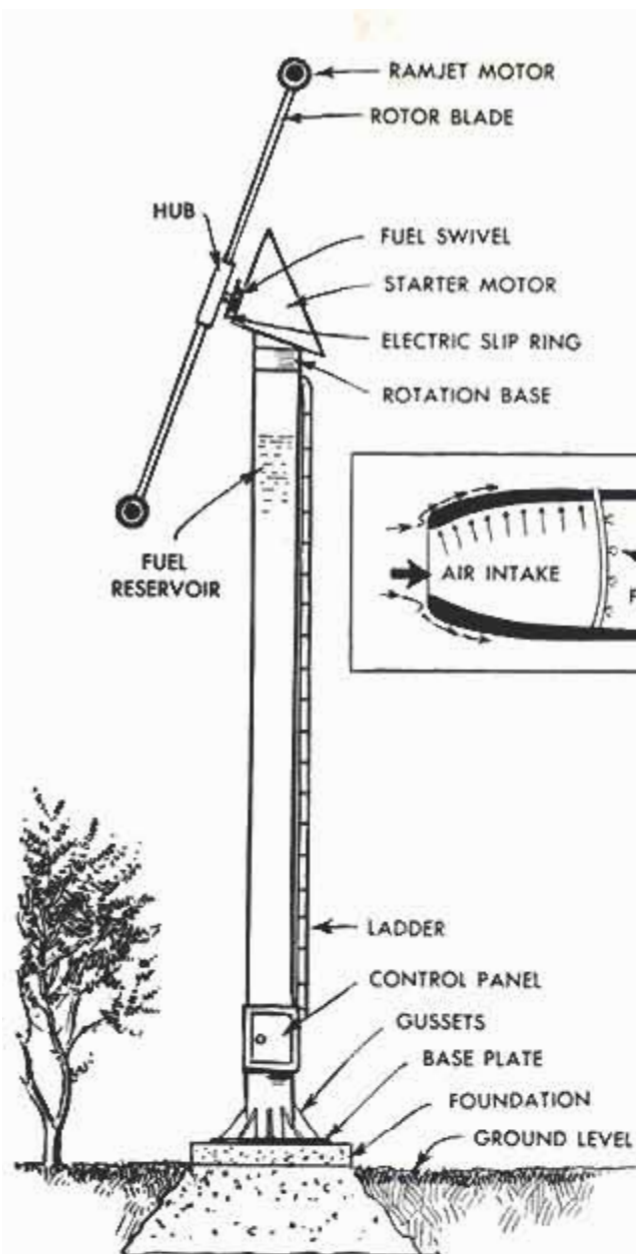
It had been observed that in some ponds the conversion process took place much more rapidly than in others. These special ponds had one thing in common: All of them supported flourishing growths of green algae. It was speculated that the

(Continued to page 262)

Model of a pilot plant designed for use in desert areas where algae would be produced with a minimum of water

Photograph from Arthur D. Little, Inc.





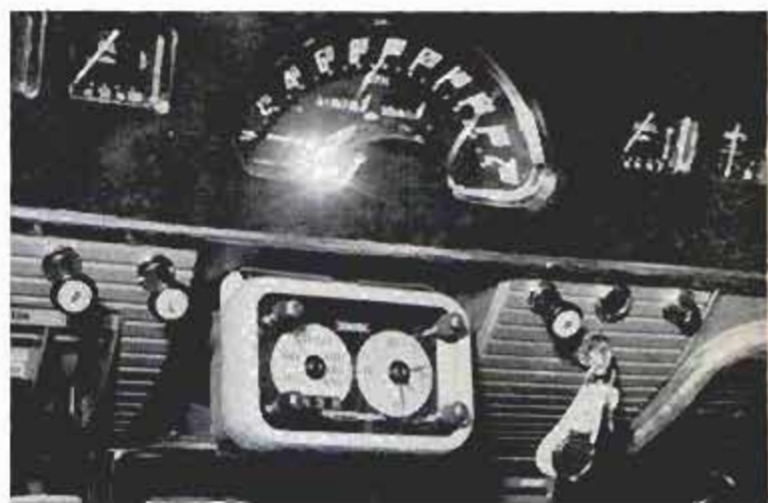
Ramjet Helicopter Rotor Chases Frost From Citrus Groves

Frost is kept from 10 to 15 acres of citrus trees by a ramjet helicopter rotor mounted on a 35-foot tower. The small rotor-tip jet engines release heat to warm the air as they turn the rotor to create an air blast. The cylindrical tower acts as a standpipe to hold 680 gallons of fuel oil or gasoline to feed the ramjets at a maximum rate of 105 gallons per hour. Below 26 degrees, the

rotor would turn almost all the time. The wind machine is operated by touching a starter button, switching on a spark plug and dialing a fuel knob for the desired heat. A truck starter mounted atop the tower revs up the rotor to operating speed. The unit, not in production, was designed by Hiller Helicopter engineer Joseph Beckett.

Sports Timer for Rallies

Auto enthusiasts who take part in rallies will appreciate a mechanical copilot that tells the driver whether he is ahead or behind schedule. There are two dials on the instrument. The driver sets one dial to the average speed he must maintain to keep his schedule. The other dial, consisting of a clock and a third-hand indicator, informs him how much ahead or behind schedule he is at that moment.





Redwood log is held by one tractor, while second prepares to drive wedge

Here's How to Split A Giant Redwood

By Lola Ann Weaver

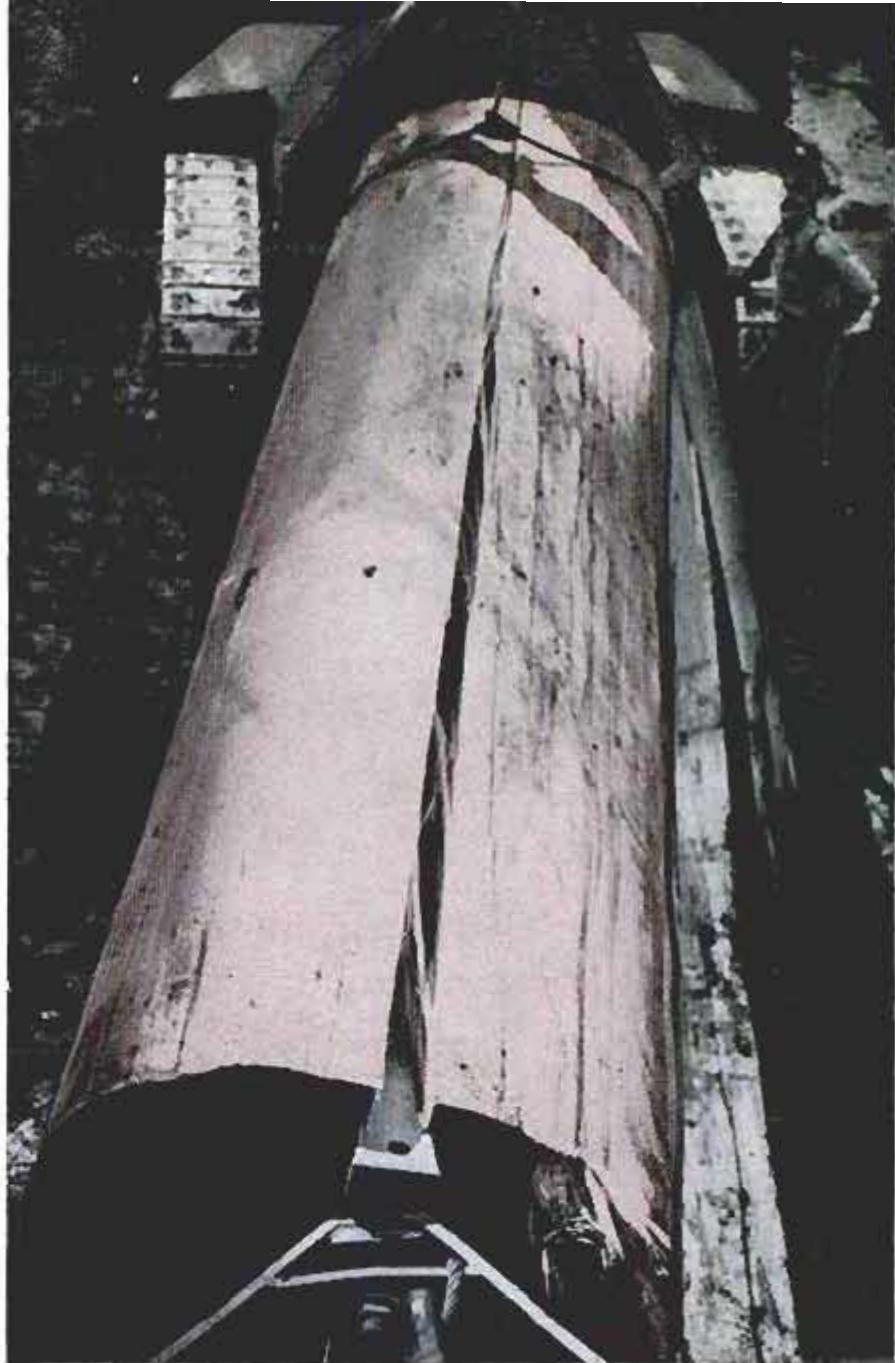
Specially made steel wedge is mounted on a U-frame that fits over shaft of winch, which lowers it into place



LOGGING a redwood forest presents problems not found in forests of smaller trees, the Ladew Timber Company of Orick, Calif., found when they began operations among the giants. Because of the load limits, most redwoods are too large to haul even over our modern highways. They must usually be split and hauled in sections. A truck loaded with a smaller-diameter redwood can sometimes add half of another without being overloaded. The result is a great many trees being split in the woods. Blowing them apart with dynamite, sawing them lengthwise, sledging and hand wedging or picking them up and dropping were methods that not only wasted time, but the split couldn't be controlled and a valuable log might be damaged.

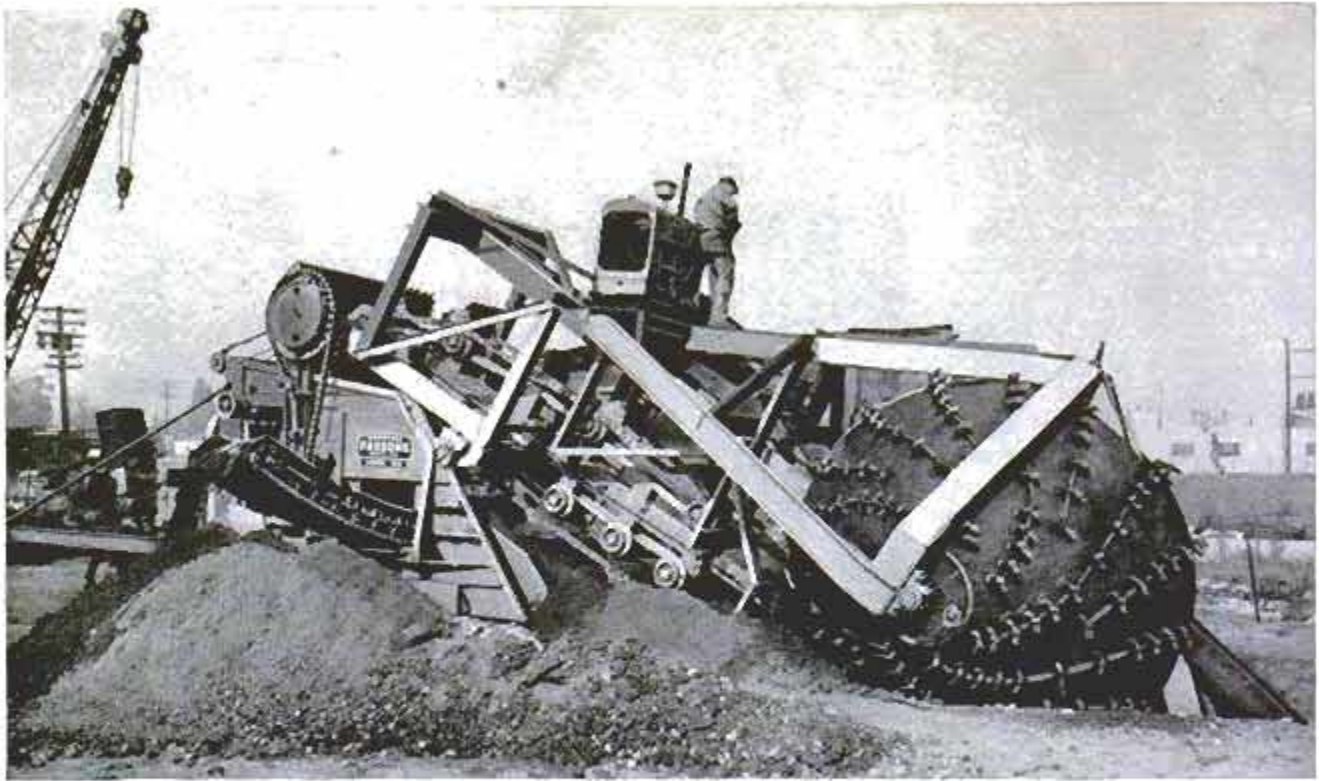
By fabricating a steel wedge and installing it on the rear of a big crawler tractor, these loggers found a simple remedy for this problem. It is made of one-inch by eight-inch steel stock 40 inches long — sharpened to a knife edge. It rotates on a three-inch swivel shaft and is mounted on a U-frame of one by eight-inch steel stock which fits over the shaft of the logging winch. The winch cable is used to lower the wedge into splitting position or raise it out of the way when the tractor is used for other duties. If the winch cable is needed for bringing in logs, it can be unhooked from the wedge.

In operation the redwood to be split is held in the arch of a companion tractor. The wedge is swiveled and can be raised or lowered so the split will occur exactly where required when the wedge is forced into the end of the log. ★ ★ ★



Split in redwood log can be controlled accurately when wedge is used. Older methods for splitting included blowing log apart with dynamite, picking it up and dropping it, and sawing; these took longer, damaged logs

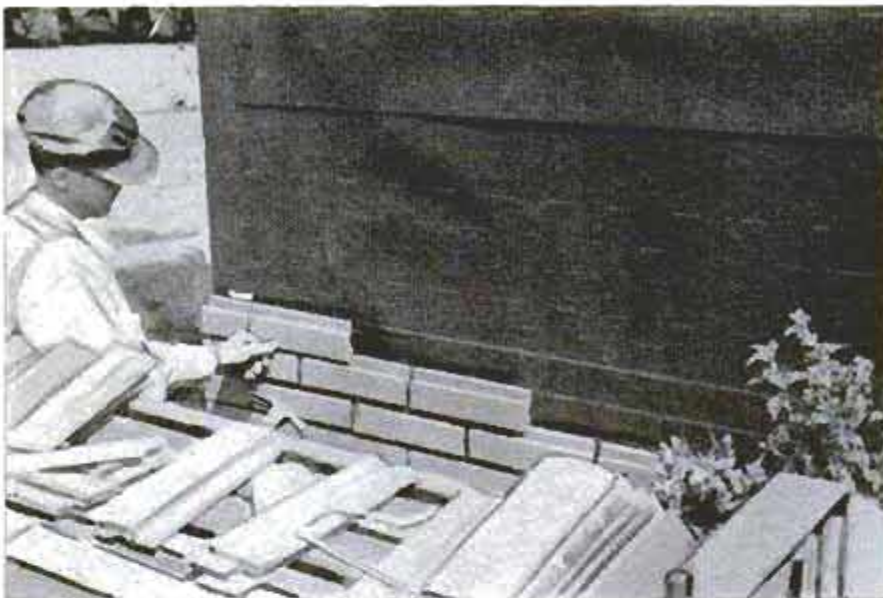




Spiked-Cone Ditch Digger Gouges Trench Four Feet Deep

Two giant steel cones with rows of sharp teeth rotate to scoop earth onto the conveyor of an irrigation-ditch digger. The

digger cuts a narrow trench four feet deep. It is expected to speed ditch construction on a project in California.



Facing goes on quickly, can be applied by amateur. Below, finished house



Nail-On Bricks Look Authentic

You can "lay" a new brick facing accurately and speedily with hammer and nails. Made of hard-burned ceramic clay, the ~~2 1/2 inch~~ thick veneer comes predrilled for the nails. After the first course is laid, the succeeding courses are self-aligning. The hard, vitrified surface of the brick is impervious to moisture and can be wiped clean as easily as a wall tile. A masonry saw or guillotine cutter is used to make the bricks fit around doors or windows. The joints are automatically sized. Mortar is applied to joints to complete the realistic effect of the ceramic facing.

When framing pictures, you can now employ a special nonreflecting glass that permits better visibility from any angle.

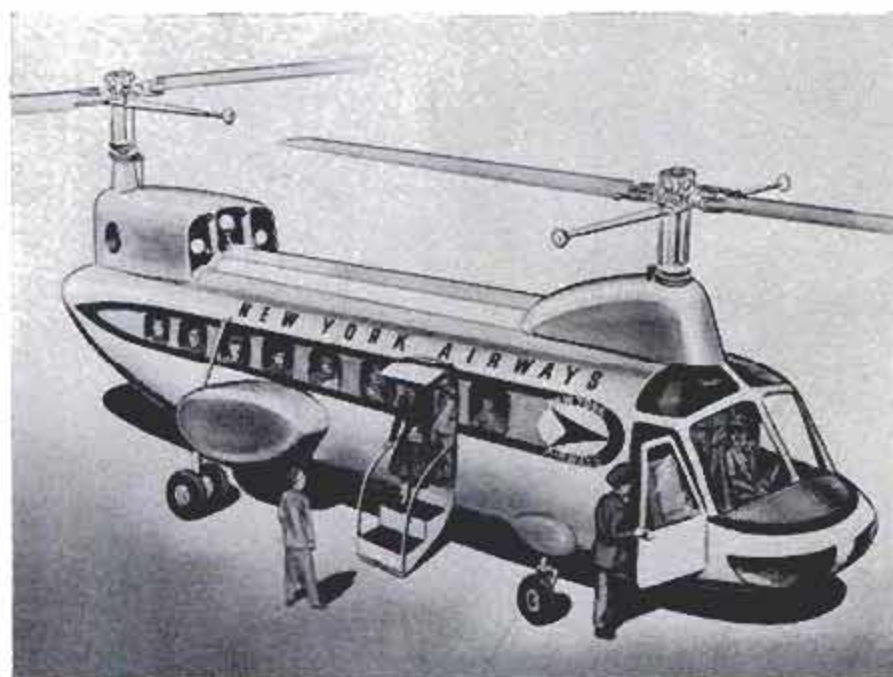
Plastic-Foam Floats are Boat Landings and Swim Rafts

High buoyancy is a feature of a prefabricated marine float made of foam plastic. Each cubic foot of the plastic has a lift factor of 55 pounds. The float, which comes in various sizes, is clad in a wooden shell and is available as a complete unit as well as in knockdown form, assembled from a kit. Five by 10-foot, 6 by 12-foot and 20 by 30-foot floats are being made for use by swimmers and as boat landings. Skids on the bottom ease the job of launching and removing the floats from the water.



Helicopter-Liner Carries 25 Persons

New York Airways is negotiating with the Bell Aircraft Corporation for delivery of Bell's projected D-216 passenger-carrying helicopter. Now on the drawing boards, the helicopter is designed to carry 25 passengers and all forecasts indicate it will reduce operating costs to about 10 cents per available seat mile. Powered by three gas-turbine engines, the D-216 will provide the first "one engine out" performance for a helicopter, since any two of its three engines will



deliver sufficient power to lift its maximum payload. First deliveries of the D-216 can be made within 36 months after contracts are signed.

Auto Burglar Alarm

Set off by any drastic movement of the car body, a burglar alarm sounds the horn automatically, frightening thieves away. Two mercury switches are used to trigger the alarm. One is mounted to the underside of the hood, the other to the underside of the trunk lid. If either is raised, the horn is set in operation. Should the thief jack up the car to steal a tire or wheel, the alarm sounds. Installation is simple. A dash-mounted switch cuts the system when its protection is not needed.

☐ Bogota will be the site of Colombia's first laboratory center devoted specifically to technological research in industry, agriculture and mining.

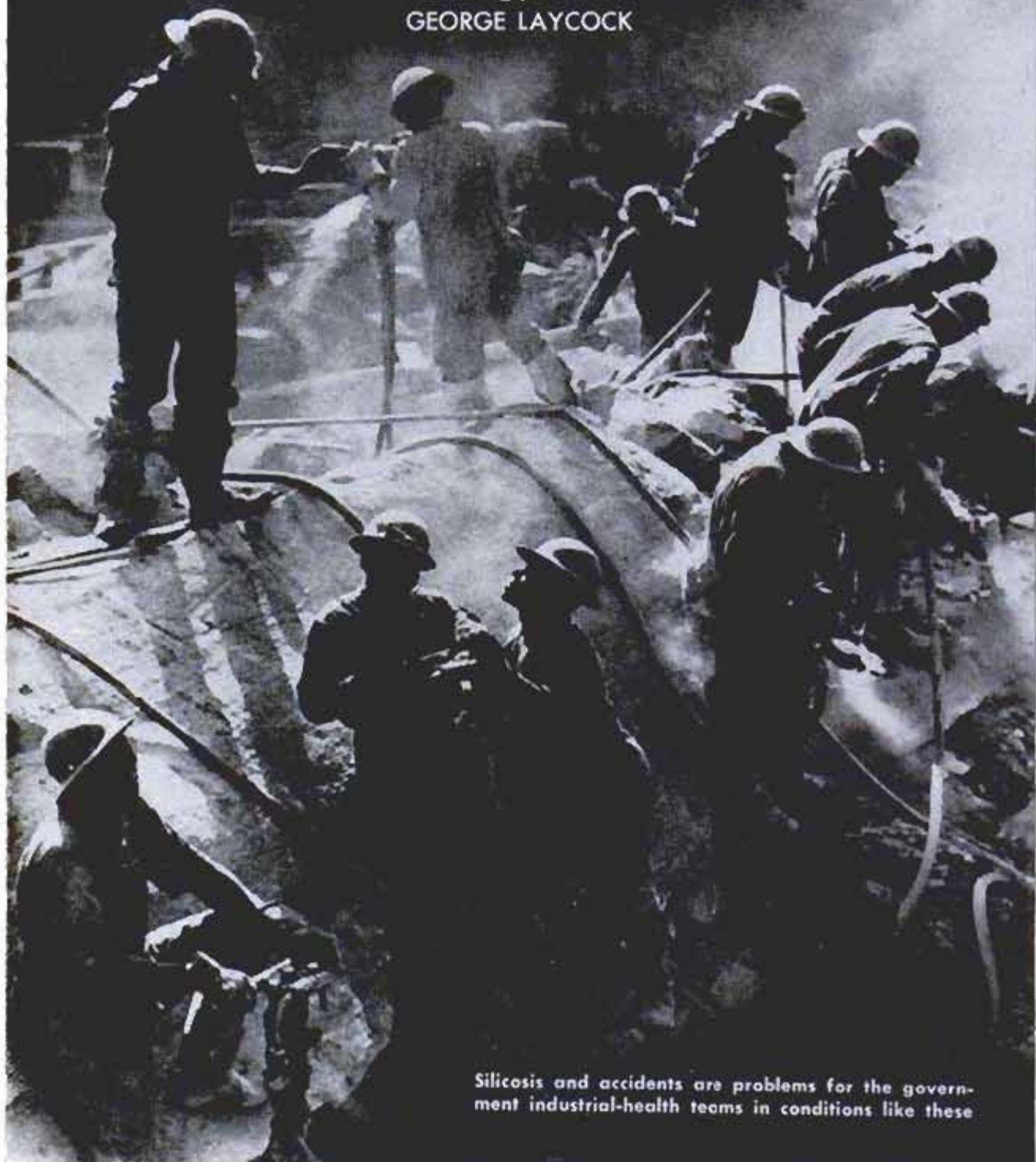
Pencil Serves as Gauge

You can use a mechanical pencil made in Germany as a handy gauge to measure the size of bolts and other small objects. The pencil clip fastens to a sliding jaw that snugs up against the object being measured. The pencil, plated in chromium, silver or gilt, has a four-inch measuring scale as well as a metric measuring scale.



Their Job Is to Guard Your Health

BY
GEORGE LAYCOCK



Silicosis and accidents are problems for the government industrial-health teams in conditions like these

YOU MAY NOT REALIZE IT as you go about your daily work, but it's a big job to guard the health of America's working force. Our industry has grown increasingly complex. Whole new industries have blossomed. Men are working with more new materials and chemicals than ever before. And every job in American industry has its hazards.

Protecting the workman's health has become a profession in itself. Whole laboratories, staffed with specialists and equipped with the latest scientific devices, are the scenes of research aimed at making your job safer. Some of these laboratories are operated by industry, some are privately operated, some are government research programs. In Cincinnati, for instance, is the federal government's Occupational Health Field Headquarters, the government's center of industrial-health research for the whole country. Here some 70 physicians, industrial hygienists, chemists, engineers and technicians labor in the search for ways to make industrial jobs safer.

Recently two of the nation's largest railroad companies called on the Department of Health, Education and Welfare to help them solve a problem. Company officials were concerned by an increase in skin poisoning among their shop workers. Sores on hands and arms were causing discomfort and loss of time and efficiency. The request



Microphone (red circle) in noisy factory picks up sound for recording on tape for laboratory study

Study of mining dust is made at site by government health inspectors in the fight to stop silicosis





Firestone News Service photo

Industrial hygienist for rubber company takes sample of dust near workman who applies pigment to tires

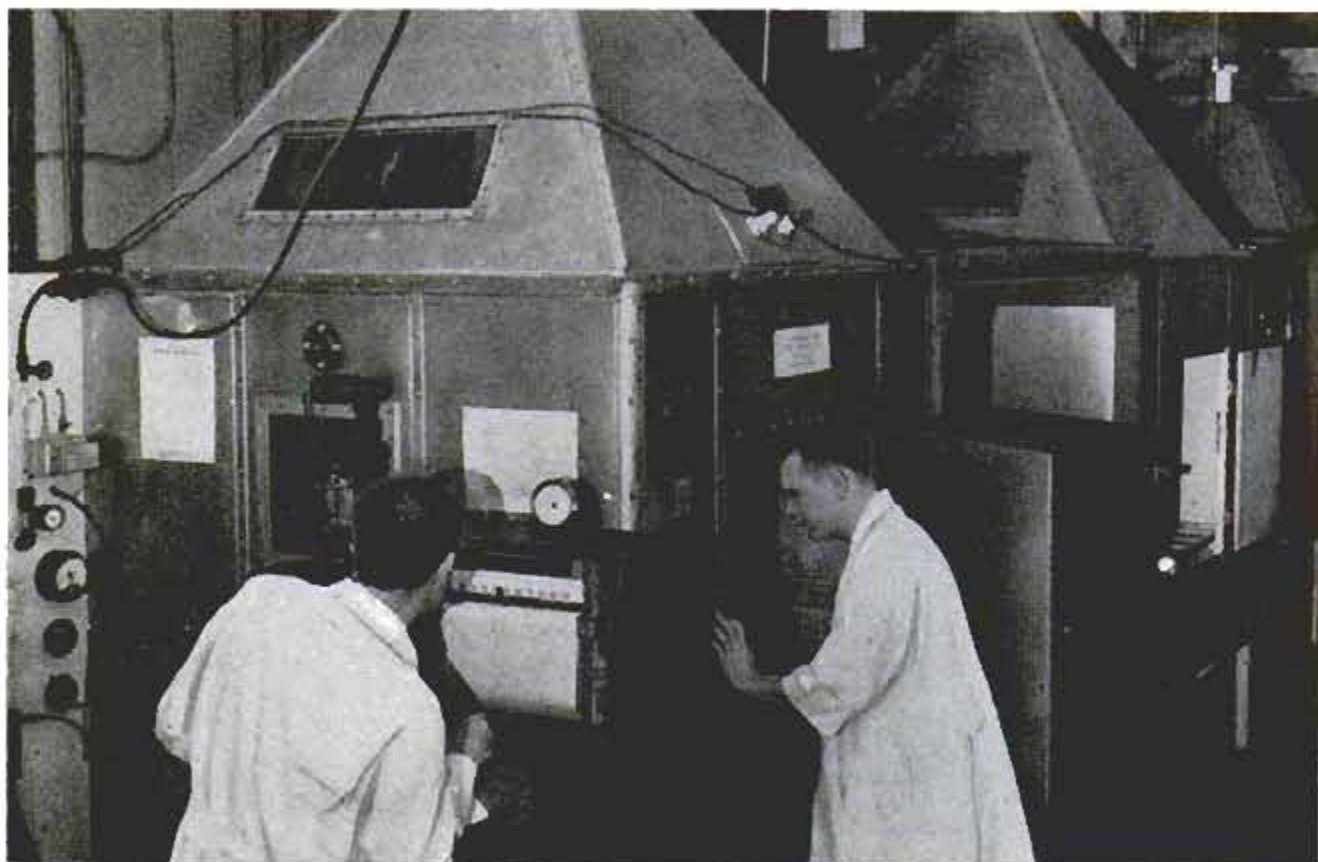
was passed on by Washington to the field headquarters in Cincinnati.

A few days later a small team of specialists showed up in the shops. After some detective work they traced the trouble to chromate being added to diesel radiators as a rust preventive. The solution is also widely used in air-conditioning systems.

Before they left the scene the industrial-health specialists had laid down a program

to clear up the chromate poisoning. They suggested that the shops substitute a different rust inhibitor, one without chromate. They also recommended that the workmen use a milder cleansing agent on their hands and arms and that they wash more often. As final insurance they suggested protective gloves and sleeves, as well as protective ointments for the workmen exposed to poisons. The trouble was cured.

Exposure chambers in government laboratory house animals exposed to polluted air of factory atmosphere



These specialists are accustomed to measuring and working with infinitesimal amounts of poisons. For instance, if they're measuring carbon monoxide in the air they know that the maximum safe level is 100 parts per million for eight hours' exposure. Rates of poisoning which to the average workman seem harmless are known by industrial-health workers to be hazardous.

The problems these industrial-health specialists cope with come in wide variety. Not long ago Juan A. Gonzalez, of Puerto Rico's Department of Health, shipped off to Cincinnati some seeds from a native plant called Indian licorice. Mr. Gonzalez was worried lest the seeds were poisonous.

And this might well concern him. Native Puerto Rican artisans were fashioning the seeds into costume jewelry, especially earrings, which were being sold to American women. If they were poisonous, both the workers and buyers were taking a chance.

At the Occupational Health Field Headquarters, samples of the highly polished and colorful seeds were fed to rabbits, dogs and rats. Within 24 hours one of the test rabbits was dead and the other animals were seriously ill. Newspapers across the country carried the story and the poison-bearing costume jewelry disappeared from the market.

500 Million Days Lost

But most of their research efforts are aimed at industrial plants, mines and agriculture. As our industrial technology has grown so has our need for better protection for the workman's health. American workmen lose about 500 million man-days a year to sickness and injury. This represents a loss of billions of dollars to both workmen and industry.

Industrial-health experts estimate that only about one out of every four American workmen labors in a plant that has a good medical program.

The Department of Health, Education and Welfare estimates that there are some 22,000 well-defined occupations. Three fourths of these call for working with machinery or dangerous substances. The carpenter carrying wood, or the office worker using a duplicating fluid, may suffer a skin disease. The machine worker may be injured by the cutting oils he uses. The stonecutter or miner may suffer silicosis which is caused by breathing quartz dust. Grocers, cannery workers and meat packers sometimes contract skin ailments from the materials they handle. The life guard at the neighborhood swimming pool may contract a fungus disease from the water.

The variety of occupational troubles makes a long and growing list. But most of

(Continued to page 256)



Woman operator of sand slinger wears a protective dustproof nose guard and goggles. Below, workman in rubber tank breathes fresh air piped to helmet





Wood Arches 294 Feet Long Glued Together in Shop

Wood arches 294 feet long—a record length—and nearly eight stories high at their center span a clear distance of 242½ feet to support the four-inch wood roof of a new building near West Palm Beach, Fla. The arches, “shop grown” in Arkansas by

gluing and molding together ordinary sizes of lumber, were manufactured and shipped in four sections, then joined at the Riviera Beach, Fla., building site. They vary in depth from 26 inches at the base to 46 inches at the point of maximum stress.



Navy Helicopter Used for Mine Sweeping

Navy tests have shown that the use of the helicopter as a mine sweeper is a major contribution to the solution of its problem of keeping sea lanes open. During the tests, an HSL-1 helicopter towed a 300-ton salvage derrick about the water with ease. When modified for mine sweeping, the HSL-1 will permit aerial sweeping of large areas with much greater safety for both personnel and equipment.

Please Pass the TV Signal

Airliners crossing the Atlantic could be the vehicles for transmitting London telecasts to New York television viewers and vice versa under a system patented recently by a New Jersey man. The TV signals would be relayed from plane to plane and would require departure of 24 transoceanic planes daily from New York and London at one-hour intervals. Patent rights have been assigned to Bell Telephone Laboratories, which have no plans for it at present.

Soviet Fleet Ranks No. 2



OF THE THREE largest naval fleets in the world today, the Russian navy is now numerically in second place, far inferior to the United States fleet, but considerably larger in numbers than that of Great Britain. The Russian fleet is an attacking force, whereas the U. S. Navy is equipped for both attack and defense, and the British navy is primarily a defense fleet.

There are great differences in the composition of the three fleets. Both the United States and Britain have fine modern aircraft carriers in some numbers, for example, while the Russians have not commissioned a single vessel of this type. Their big fleet of new-type heavy cruisers of the Sverdlov class is designed for attack and for commerce raiding, and not for action against their opposite numbers in the United States fleet, or the smaller, older ships of the British navy. Russian destroyers of the Skoryi class are fine modern ships, fast and well armed, and are designed to lay mines as well as perform the other duties of their class. The mines are released through doors in their square sterns.

The most numerous type of ship flying the naval ensign of the Soviets is their mighty fleet of underwater craft. The number of submarines possessed by Russia is a closely guarded secret, but it is well known that recently a considerable number of very large ocean-going types with a submerged displacement of 2900 tons, a length of 320 feet and a cruising range of 20,000 miles, has been built. In addition to this type, a large number of the smaller seagoing patrol type of 1600 tons submerged displacement with good speeds both on the surface and submerged is being built.

It is generally known that at the moment

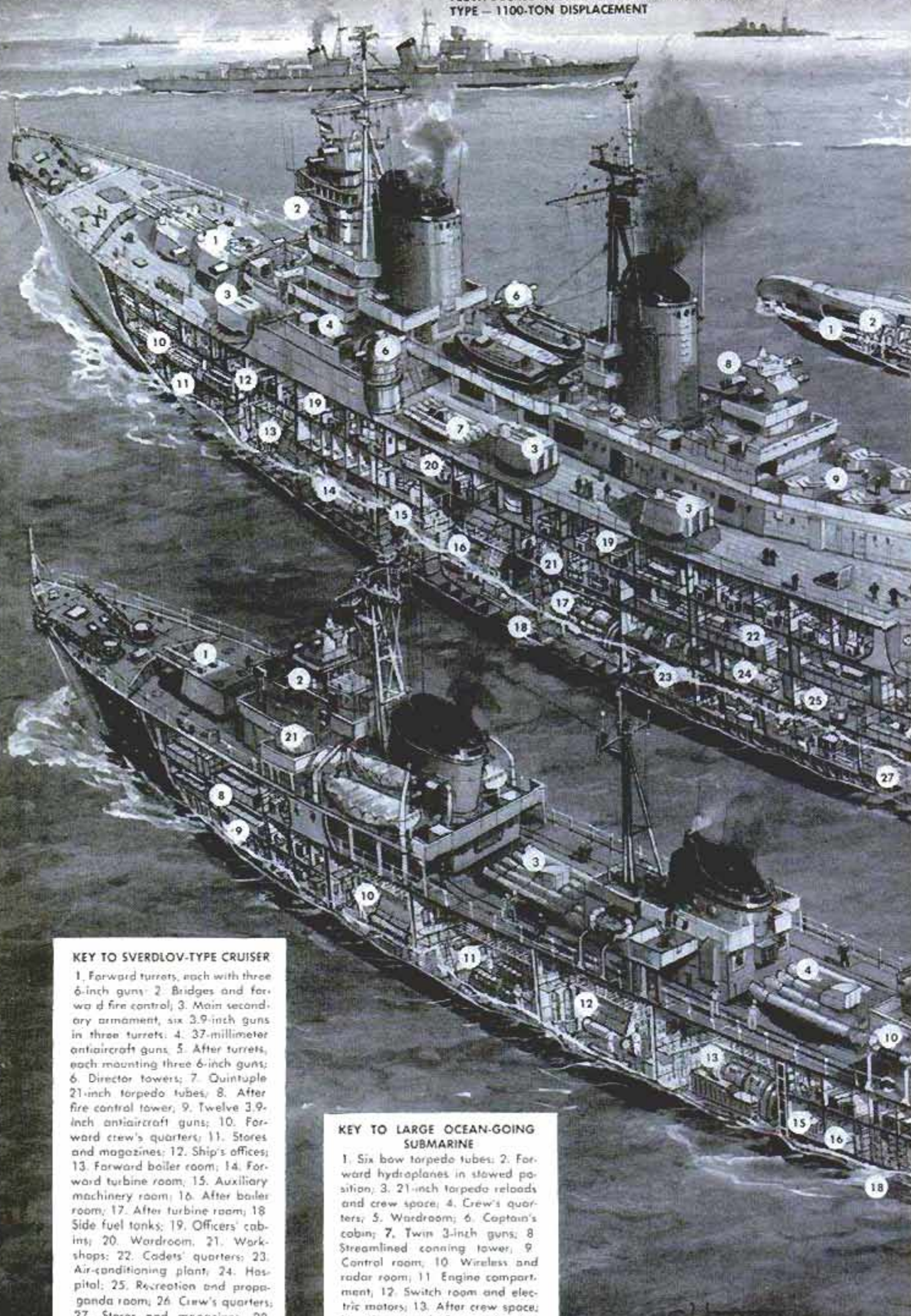
the Russians have about 100 undersca boats in various stages of construction. Conservative estimates say she has well over 400 subs in commission—and the estimates run all the way to 800. Some of these are obsolete and of little fighting value.

Russia's battleships, at least two of her cruisers and several of her destroyers also are victims of obsolescence. That is why the Russians could boast not long ago that they were reducing the size of their fleet. Most of these old ships could be pruned out early and sent to the scrap heap without impairing the fighting efficiency of the fleet.

Frigates are the most numerous type of vessel in the British navy today, a popularity earned as a result of the splendid work done by this type of ship during World War II. In the U. S. Navy, frigates and patrol ships doing similar work reach a total of at least 311 vessels of all sorts and sizes. A considerable number of the fast frigates flying the white ensign of the British navy are converted destroyers which have raised freeboards for improving their sea-keeping qualities—which partially explains the scarcity of destroyers in the British navy.

The Russians have neither a large nor an up-to-date fleet of frigates, their boats being largely ex-enemy vessels and small patrol boats. Rumors say that two new types are under construction, but it is obvious that in a navy designed for attack, the frigate and the seagoing patrol vessel can have but a small role to play.

The paintings on the following pages, made especially for *Popular Mechanics Magazine* by G. H. Davis in England, give an approximation of the numbers of the main classes of fighting ships in the Soviet navy today. ★ ★ ★



KEY TO SVERDLOV-TYPE CRUISER

1. Forward turrets, each with three 6-inch guns; 2. Bridges and forward fire control; 3. Main secondary armament, six 3.9-inch guns in three turrets; 4. 37-millimeter antiaircraft guns; 5. After turrets, each mounting three 6-inch guns; 6. Director towers; 7. Quintuple 21-inch torpedo tubes; 8. After fire control tower; 9. Twelve 3.9-inch antiaircraft guns; 10. Forward crew's quarters; 11. Stores and magazines; 12. Ship's offices; 13. Forward boiler room; 14. Forward turbine room; 15. Auxiliary machinery room; 16. After boiler room; 17. After turbine room; 18. Side fuel tanks; 19. Officers' cabins; 20. Wardroom; 21. Workshops; 22. Cadets' quarters; 23. Air-conditioning plant; 24. Hospital; 25. Recreation and propaganda room; 26. Crew's quarters; 27. Stores and magazines; 28. Fuel-oil tanks in double bottom

**KEY TO LARGE OCEAN-GOING
SUBMARINE**

1. Six bow torpedo tubes; 2. Forward hydroplanes in stowed position; 3. 21-inch torpedo reloads and crew space; 4. Crew's quarters; 5. Wardroom; 6. Captain's cabin; 7. Twin 3-inch guns; 8. Streamlined conning tower; 9. Control room; 10. Wireless and radar room; 11. Engine compartment; 12. Switch room and electric motors; 13. After crew space; 14. After torpedo flat; 15. Snorkel stowed

NEW TYPE FLEET DESTROYER, FLUSH-DECK,
WITH 2100-TON DISPLACEMENT

SEAGOING PATROL SUBMARINE MAKES OVER 20 KNOTS
SURFACED AND 16 SUBMERGED. DISPLACES 1600 TONS

LARGE OCEAN-GOING SUBMARINE OF THE LATER "K" CLASS
DISPLACES 2900 TONS, HAS RANGE OF 20,000 MILES. MAKES
22 KNOTS ON SURFACE, 17 KNOTS SUBMERGED

LATEST TYPE OF HEAVY CRUISER, SVERDLOV CLASS, DISPLACES
17,000 TONS. IT IS 689 FEET LONG, HAS RANGE OF 8000 MILES
AT 20 KNOTS. DEVELOPS 130,000 HORSEPOWER AT 35 KNOTS

**KEY TO SKORYI-CLASS
DESTROYER**

- 1 Forward turret, twin 5.1-inch guns; 2 Bridge and forward fire control; 3 Forward quintuple 21-inch torpedo tubes; 4 After quintuple 21-inch torpedo tubes; 5 After fire control; 6 After 3-inch gun turret; 7 After turret, twin 5.1-inch guns; 8 Crew's quarters; 9 Stores and magazines; 10 Forward boiler room; 11 Forward turbine; 12 After boiler room; 13 After turbine; 14 Officers' cabins; 15 Fans; 16 Cold-storage rooms; 17 Storerooms and magazines; 18 Fuel-oil tanks in double bottom; 19 Fresh-water tanks; 20 Mine doors; 21 Forward 3-inch gun turret

MODERN DESTROYER OF SKORYI CLASS (U.S.S.R. HAS AT LEAST 70
OF THESE) DISPLACES 3000 TONS FULLY LOADED, DEVELOPS 70,000
HORSEPOWER AT 38-40 KNOTS, IS 393½ FEET LONG

U.S.A.
14 14+3 BATTLE CRUISERS

BATTLESHIPS

1 SHIP "NOVOROSSISK" (EX-ITALIAN)
23,622-TON DISPLACEMENT



U.S.A.
23 OVER 10,000-TON
DISPLACEMENT

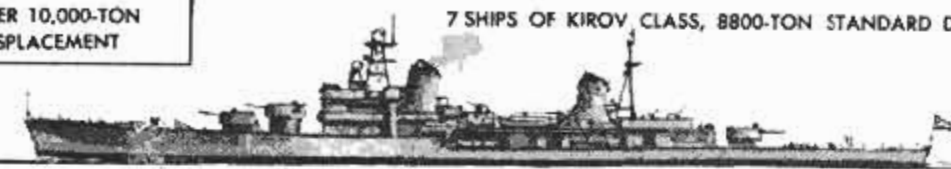
CRUISERS

22 SHIPS SVERDLOV CLASS,
17,000-TON LOADED DISPLACEMENT



U.S.A.
50 UNDER 10,000-TON
DISPLACEMENT

7 SHIPS OF KIROV CLASS, 8800-TON STANDARD DISPLACEMENT



1 SHIP "ADMIRAL MAKAROV" (EX-GERMAN)
7600-TON STANDARD DISPLACEMENT



U.S.A.
349

24 SHIPS, NEW FLUSH-DECK ESCORT
TYPE 1100-TON DISPLACEMENT

OVER 70 VESSELS OF SKORYI
TYPE, 2200-TON DISPLACEMENT

DESTROYERS



22 VESSELS R AND S TYPES
DISPLACEMENT 1800 TONS

7 VESSELS G CLASS, 1500 TONS



2 VESSELS, EX-ITALIAN ARTIGLIERE CLASS
1730-TON STANDARD DISPLACEMENT

7 LENINGRAD CLASS
1800-TON DISPLACEMENT



U.S.A.
208

NEW CONSTRUCTION
VERY LARGE OCEAN-GOING TYPE
2900 TONS SUBMERGED

AT LEAST 100 BOATS
OF VARIOUS TYPES ARE
UNDER CONSTRUCTION

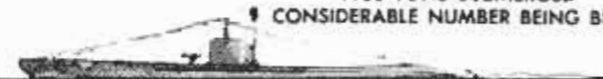
NEW CONSTRUCTION
IMPROVED K CLASS
2200 TONS SUBMERGED

SUBMARINES



NEW CONSTRUCTION
SEA-GOING PATROL TYPE
1100 TONS SUBMERGED
CONSIDERABLE NUMBER BEING BUILT

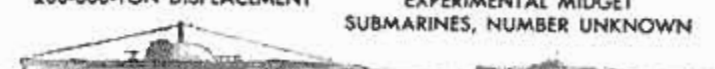
12 BOATS, EX-GERMAN TYPES,
1200 TONS SUBMERGED



24 BOATS OF THE L MINE-LAYING CLASS,
1400 TONS SUBMERGED

72 BOATS, EARLY M CLASS,
200-300-TON DISPLACEMENT

NEW CONSTRUCTION,
EXPERIMENTAL MIDGET
SUBMARINES, NUMBER UNKNOWN

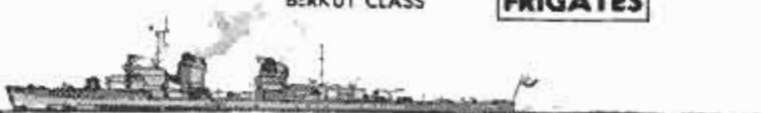


U.S.A.
311

NEW CONSTRUCTION,
FAST DEEP-SEA FRIGATES
(NUMBER UNKNOWN)

BERKUT CLASS

FRIGATES



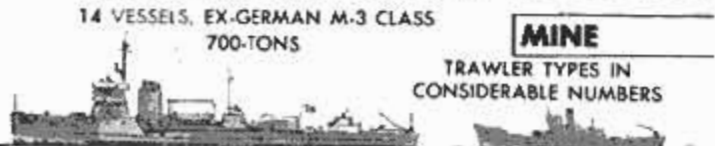
U.S.A.
242

COAST DEFENSE VESSELS
VYBORG (EX-FINNISH) 3900 TONS

14 VESSELS, EX-GERMAN M-3 CLASS
700-TONS

MINE

TRAWLER TYPES IN
CONSIDERABLE NUMBERS



LARGE MINE LAYER, "MARTY,"
6900 TONS

NUMEROUS EX-JAPANESE TYPES
OF VARYING DISPLACEMENTS

NEW
CONSTRUCTION **MINE**



2 OLD SHIPS "SEVASTOPOL"
AND "OKTYABRSKAYA
REVOLUTSIYA,"
ABOUT 23,600-TON
DISPLACEMENT

BRITAIN
5



5 SHIPS, TCHAPAYEV CLASS,
11,500-TON STANDARD DISPLACEMENT

OVER 10,000-TON
DISPLACEMENT **BRITAIN**
1



1 SHIP "STALINGRAD" (EX-ITALIAN),
7527-TON STANDARD DISPLACEMENT

UNDER 10,000-TON
DISPLACEMENT **BRITAIN**
22



2 OLD CRUISERS, KRASNI-KAVKAZ CLASS
DISPLACEMENT ABOUT 7000-8000 TONS



NEW FLUSH-DECK FLEET DESTROYERS,
STANDARD DISPLACEMENT 2100 TONS,
NUMBER UNKNOWN

1 SHIP, LARGE EX-JAPANESE,
2701-TON DISPLACEMENT

BRITAIN
76



2 V CLASS VESSELS,
200-TON DISPLACEMENT

11 VESSELS S CLASS,
1686-TON STANDARD DISPLACEMENT



6 SHIPS, EX-GERMAN TYPES
OF VARYING TONNAGE

5 OLD BOATS OF URITSKI CLASS,
1150-TON STANDARD DISPLACEMENT



19 BOATS K CLASS,
2062 TONS SUBMERGED

EARLY K CLASS,
NUMBER UNKNOWN

BRITAIN
59



5 BOATS, EX-GERMAN SEEHUND CLASS,
800-1000-TON DISPLACEMENT

72 BOATS CHUKA CLASS,
700-800 TONS SUBMERGED



91 BOATS OF LATER M CLASS
300 TONS SUBMERGED

1 EX-ITALIAN BOAT, 900 TONS SUBMERGED



ESCORT AND PATROL VESSELS

90 PATROL BOATS, KRONSTADT CLASS,
300-TON DISPLACEMENT

MANY EX-GERMAN, ITALIAN
AND JAPANESE FRIGATES
1250 TO 2000 TONS

4 EX-JAPANESE
ESCORT
DESTROYERS

BRITAIN
202



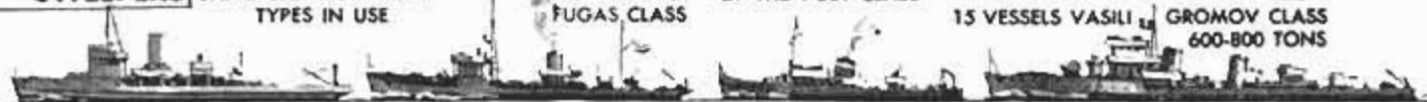
SWEEPERS

A NUMBER OF EX-GERMAN,
JAPANESE AND ITALIAN
TYPES IN USE

40 VESSELS,
FUGAS CLASS

100 COASTAL SWEEPERS
OF THE T-301 CLASS

BRITAIN
315



LAYERS

FAST MOTOR
TORPEDO BOATS

MANY RUSSIAN-BUILT
AND EX-JAPANESE
SUBMARINE CHASERS

MOTORBOATS

NUMEROUS MOTOR GUNBOATS OF
VARIOUS TYPES

NEW CONSTRUCTION
MANY LARGE, FAST
MOTOR TORPEDO BOATS



A LARGE NUMBER OF OTHER TYPES ARE CAPABLE OF MINE LAYING



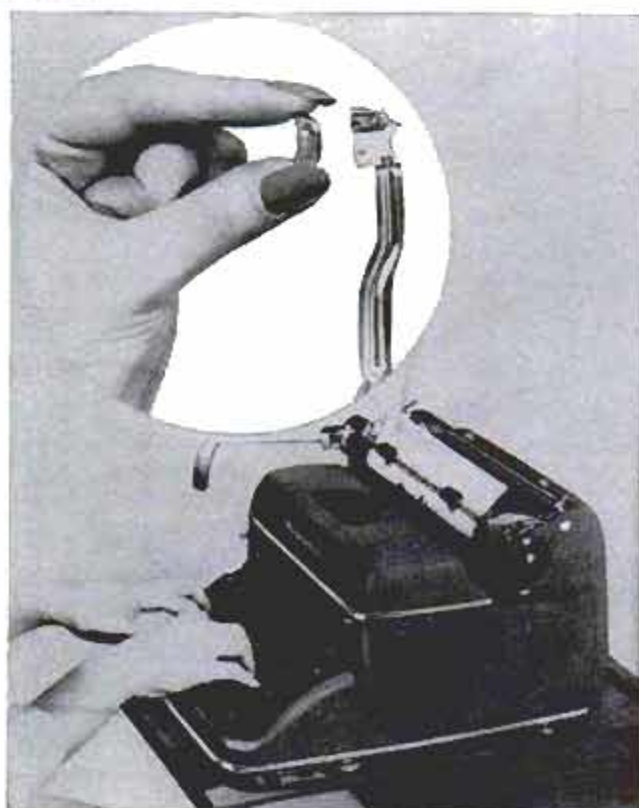
Three-Wheel Car Gets 80 Miles Per Gallon

You can go 70 miles per hour in the Star, a three-wheel car that gets up to 80 miles per gallon of gas. Built by an American firm, it is powered by a one-cylinder German engine. The streamlined body is made of molded glass fiber. Less than three feet high, it is 10½ feet long, 50 inches wide and weighs only 400 pounds.

With two seats and an open deck at the rear for luggage, three-wheel car has body of molded glass fiber

Type Changed With Tweezers On Versatile Typewriter

One typewriter that features interchangeable type can now do the work of several machines. The interchangeable type, available with mathematical signs, chemical symbols, foreign-language symbols, special type fonts, company trade marks or other special-order symbols, can be inserted quickly by the typist. With tweezers, the typist removes the old type from the type bar, selects a new type and locks it in place. A spring-retainer clip on each type block locks the block into place in accurate alignment. The new, versatile typewriter has a 44-character keyboard and provides four extra characters with section and paragraph marks, a plus sign and an equal sign.



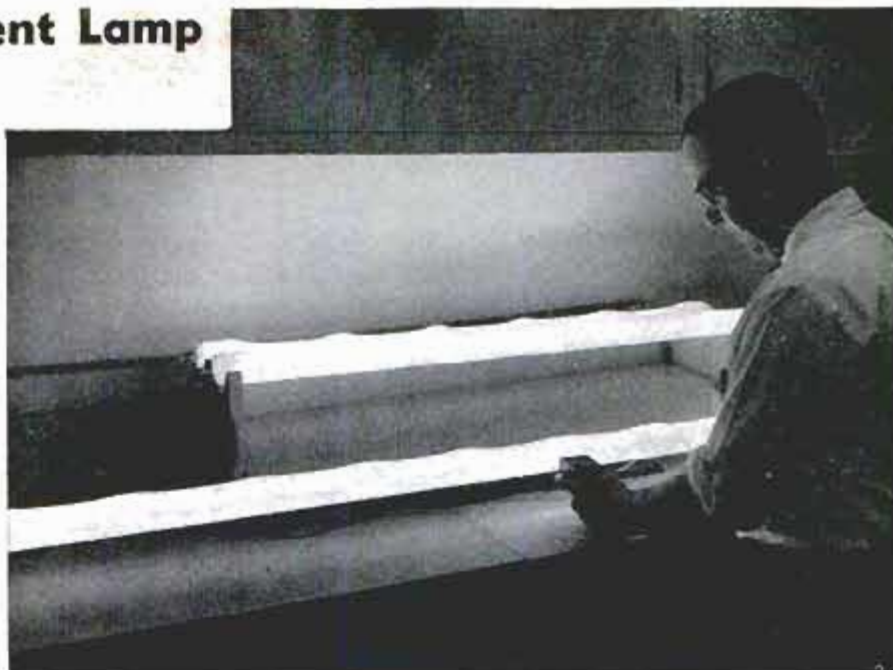
Book Aquarium

Latest thing in children's books is one containing a flat, plastic, water-filled aquarium containing artificial fish. One page holds the aquarium. By changing the other pages, the young viewers see a different underwater scene. The novelty was shown at the Frankfurt, Germany, Spring Fair.

¶ A Japanese-language telegraph printer patented in the United States is designed to print more than 2300 characters.

Grooved Fluorescent Lamp Twice as Bright

Light output of a new grooved fluorescent lamp is twice that of present lamps of the same length. The new, higher-wattage lamp maintains the same efficiency as the older lamps but increases the concentration of light. The grooves increase the area of lighted tube surface and decrease the absorption of light by mercury vapor inside the tube, allowing more radiation to escape. Designed for new installations only, the lamp requires different ballast equipment and a different fixture. The standard 200-watt tube is eight feet long, but four-foot lamps



will be made and six-foot lamps may be developed for street lighting. Other uses will include outdoor floodlighting and signs.

High-Temperature Lubricants Developed for Aircraft

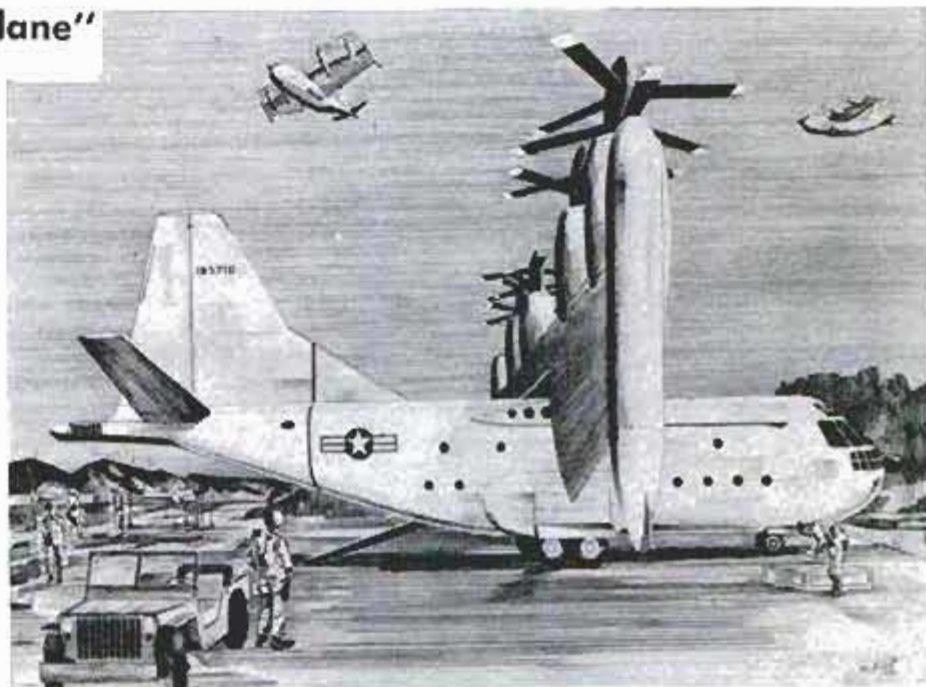
Making another assault on the thermal barrier, General Electric Company has announced that its chemists are on the verge of finding high-temperature aircraft lubricants that will operate between 1000 and 2000 degrees, F. The upper limit in present-day lubricants is around 500 degrees in hydraulic systems and 350 degrees in bearings. The biggest problem facing the chemists working with the new compounds is that, while they flow at red heat, they freeze at around 400 degrees—the point where other lubricants boil.

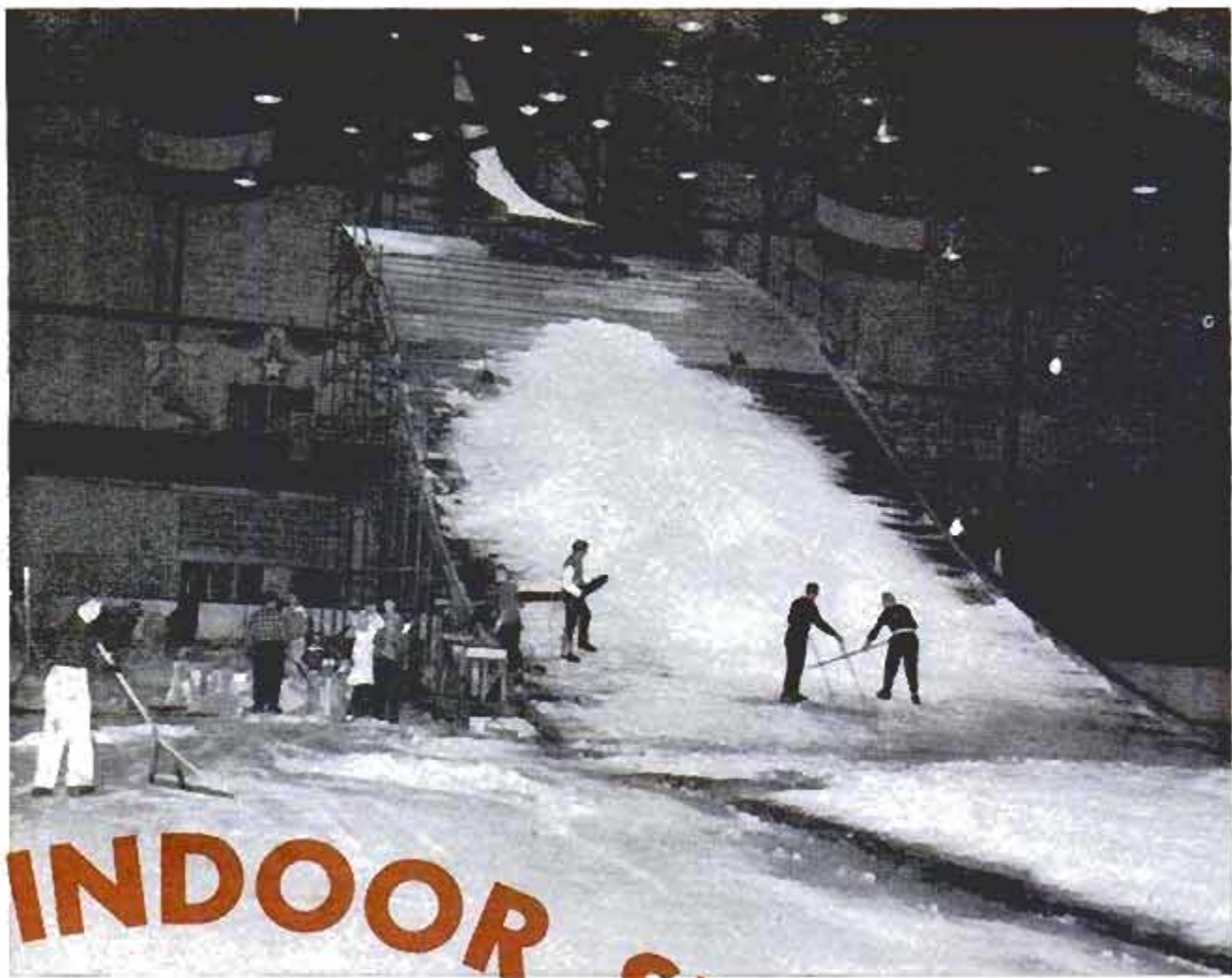
Cube Measures Mercury Density

Fifteen London scientists have constructed a nearly perfect cube of tungsten-carbide with cobalt to measure the density of mercury. The 22-pound, 3½-inch-square cube, which has “no fault that affects its volume by as much as one part in 100 million,” is floated in mercury during the measuring process. It was polished with diamond dust. During the last stages, it was submerged just below the surface of melted paraffin. Differences in light reflections enabled the scientists to make contour maps of the face with contours at an interval of 1/1,000,000 inch.

Transport “Propelloplane”

Army officials are studying drawings of a proposed “Propelloplane” transport that could land a large number of troops in a small jungle clearing or on a tiny mountain plateau. The plane, equipped with Pogo-type propellers, would employ a pivoting wing to take off, land and hover like a helicopter. Once in the air, the wing would assume a conventional horizontal position. The design was by Hiller Helicopter.

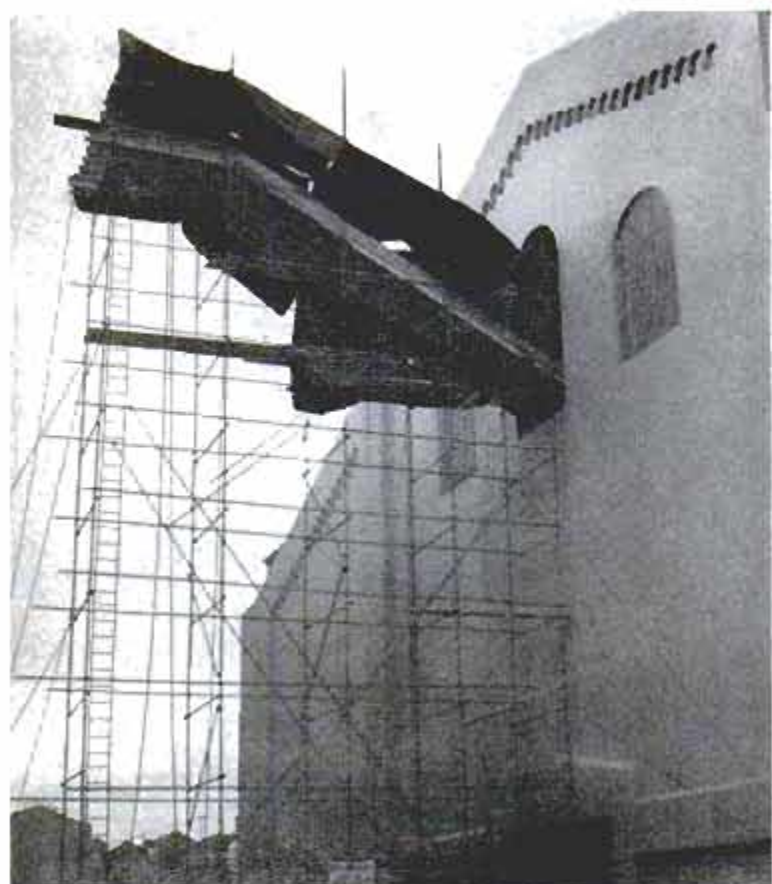




INDOOR

Skiers test crushed ice on landing area built up over seats. Take-off for jump is just under lights

SKI JUMP



SEATTLE'S WINTER carnival features an indoor ski-jumping contest in the Civic Ice Arena that leaves spectators breathless. The jumpers zoom through a hole high in the wall of the arena, hurtle down a frost-planked runway beneath the girders and take off into space just below the highest lights. The slide is 120 feet long, 36 feet wide and has a 35-degree pitch. It is 75 feet high at its summit outside the building. One of the bricked-in windows, high on the arena wall, is removed to accommodate the slide. (The hole is bricked up again after the carnival.) The landing area terminates on the arena floor which is cov-

Supported by scaffolding, top of the ski slide projects through a window high on arena wall. Here jumpers start on their 120-foot run for take-off under girders



Photos by Howard E. Jackson

Slalom competitor Jeanette Burr zigzags between flags on landing area built up over arena seats. Over 200,000 pounds of crushed ice are used to cover the ski run and landing area at Seattle's gala winter carnival

ered with shaved ice. Over 200,000 pounds of ice are needed to cover the slide, decking and landing area.

Because the arena is used by the Seattle Americans' hockey team, the ski jump has to be put up and taken down in a few hours. Erection starts at 10:30 p.m. after a game and must be completed by noon the next day for the ice-coating operation to get under way. The outdoor section is constructed the day before. The work is done by a 65-man crew. Disassembly takes only six hours.

Only the world's best jumpers compete in this indoor event. The Norwegian jumper, Rolf Helle, performs somersaults on six-foot skis because his regular eight-footers might clip a girder as he turns over. Exhibition slalom running is performed on the ice-covered landing area. ★ ★ ★

Indoor ski run is wide enough for double jumpers (Wilmer Hampton and Kjell Bakke) shown soaring off high above spectators in the top-row seats of highest balcony





Geiger With Transistors Fits Shirt Pocket

Uranium prospectors now can carry a geiger counter around in their shirt pockets. Transistors cut down the size and weight of a new geiger counter which operates on two pen-type flashlight batteries. The instrument is only 2½ inches wide and 5 inches long, and weighs 15 ounces.



Compressed-Air Floodlight Can't Cause Explosions

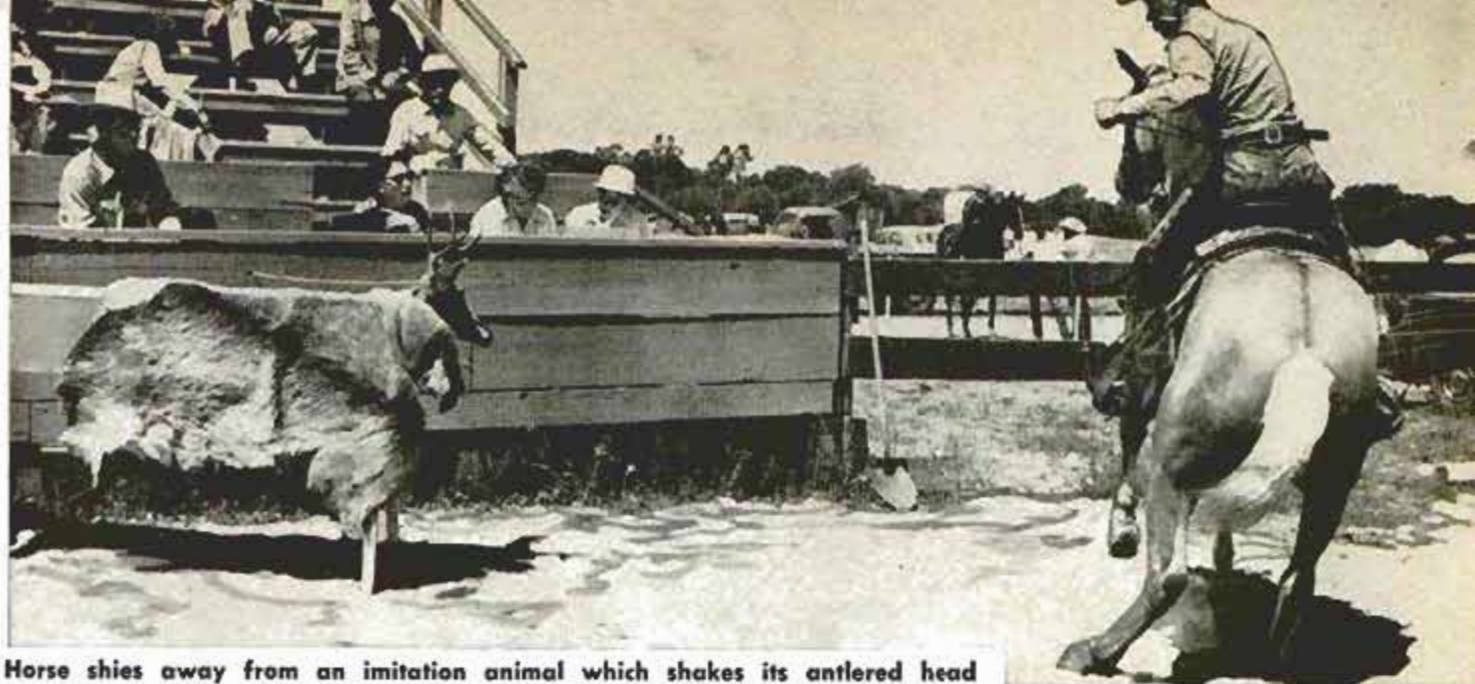
Compressed air furnishes the power to light an explosionproof floodlight. Used in areas of mines and refineries where electricity is not available, the 22-pound unit is connected to an air line that drives turbo-generators inside. The exhausted air cools the 150-watt, 12-volt lamp.

"Portable" Cobblestones Used in Parisian Movie Scenery



Parisian citizens were curious about the new type of pavement being put on one of their streets. Workmen laid down interlocking sections of pavement resembling ancient cobblestones like pieces of carpeting. The new pavement didn't seem like much of an improvement to them. Then it was explained that a motion-picture company was about to film a movie sequence set in the streets of Paris 100 years ago, and the streets at that time were paved with cobblestones. The portable pavement being laid was only a part of the scenery.

Tests over a three-year period indicate that plastic pipe used for water supply does not affect the color, odor or flavor of the water, does not introduce any toxic substance or interfere with chemicals added to the water.



Horse shies away from an imitation animal which shakes its antlered head

Obstacle Course for Trail Riders

By F. Leland Elam

ONE OF THE fastest-growing sports in the United States is the combination of open-country trail riding and trail-class competition in horse shows. Any horse lover can participate with an ordinary saddle horse, plus the time and effort necessary to condition him properly.

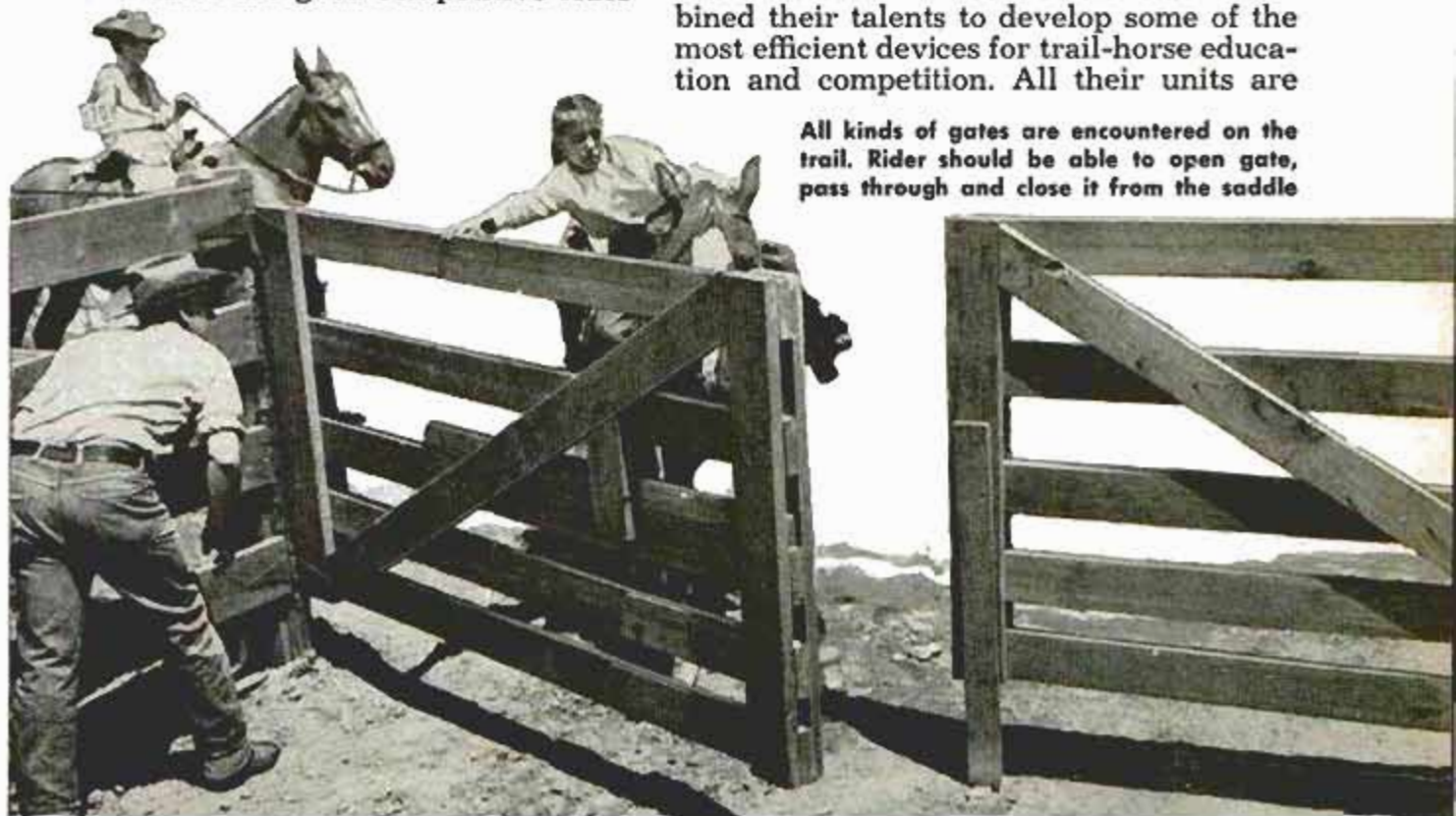
This upswing in trail riding during the past three years is putting at least a half million horses on the trails annually, and has developed the trail-horse class until it has the greatest number of entries and is the most competitive and entertaining horse-show event.

Trail classes are good competitive rides

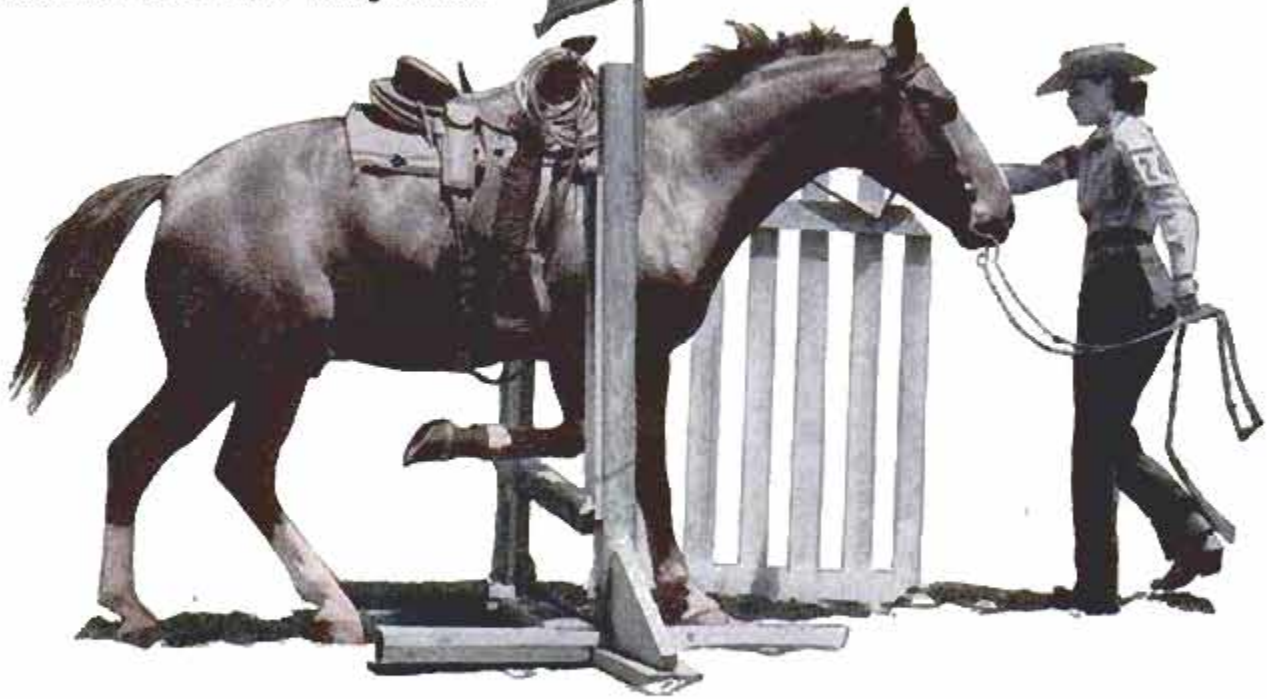
that serve as a training ground for the trail horse. In these classes the horse and rider are subjected to the type of obstacles that they will encounter on the trail.

One of the leading areas for developing trail-horse competition and education in the show arena is the Pacific Coast. A hub for the development has been Sacramento, Calif. Here the Sacramento County Horsemen's Association, The Greenies, Gold Trail Mounties, Sacramento County Sheriff's Posse, American River Riders and Sacramento Ladies Mounted Patrol—all organizations that are a part of the California State Horsemen's Association—have combined their talents to develop some of the most efficient devices for trail-horse education and competition. All their units are

All kinds of gates are encountered on the trail. Rider should be able to open gate, pass through and close it from the saddle



Combination of gate, low hurdle and waving flag makes frightening obstacle to horse. Rider leads mount through hazard



designed to simulate open-country trail conditions.

The upswing in open-country trail riding is pointed up by the fact that controlled trails hundreds of miles long are being or have been set up in many states. California has a nearly completed trail that is 3000 miles long. Many other states, including Vermont, Iowa, Florida, Texas, Arizona, Colorado, Nevada, Oregon and Washington have similar trails completed or nearing completion.

Rider opens this type of gate from the saddle and passes through. Horse overcomes fear of the balloons

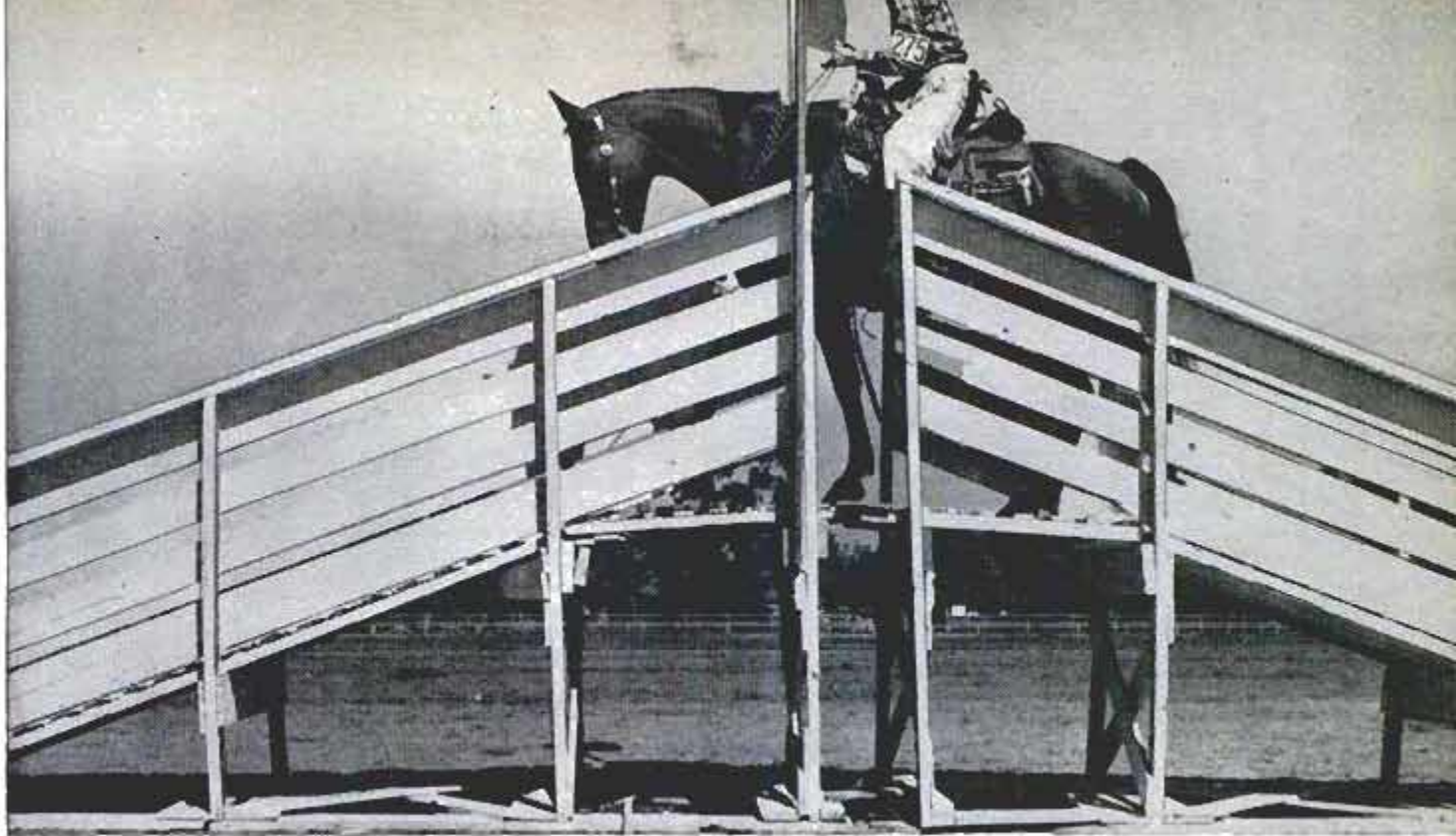
The trail-class obstacles are ideal for training both the horse and rider. The rider must learn to direct his mount over, around or through the obstacle and the horse must learn to recognize the directions and obey them instantly.

Training Forestalls Trouble

This training eliminates much trouble and danger for the rider on the open trails. It sets up a proper understanding between the man and his mount.

In this tough hazard the horse must back between two standards, then turn and back between two more





Bridges of various types may be encountered in open-country trail riding so they are included in the course

Horsemen who set up hazards for trail classes take into consideration all phases of trail riding and build their obstacles to simulate as many of them as possible.

Gates are important in a trail class, for gates of varying types will be encountered on any trail ride. The good trail rider is able to open nearly every type of gate, ride through it and close it without dismounting.

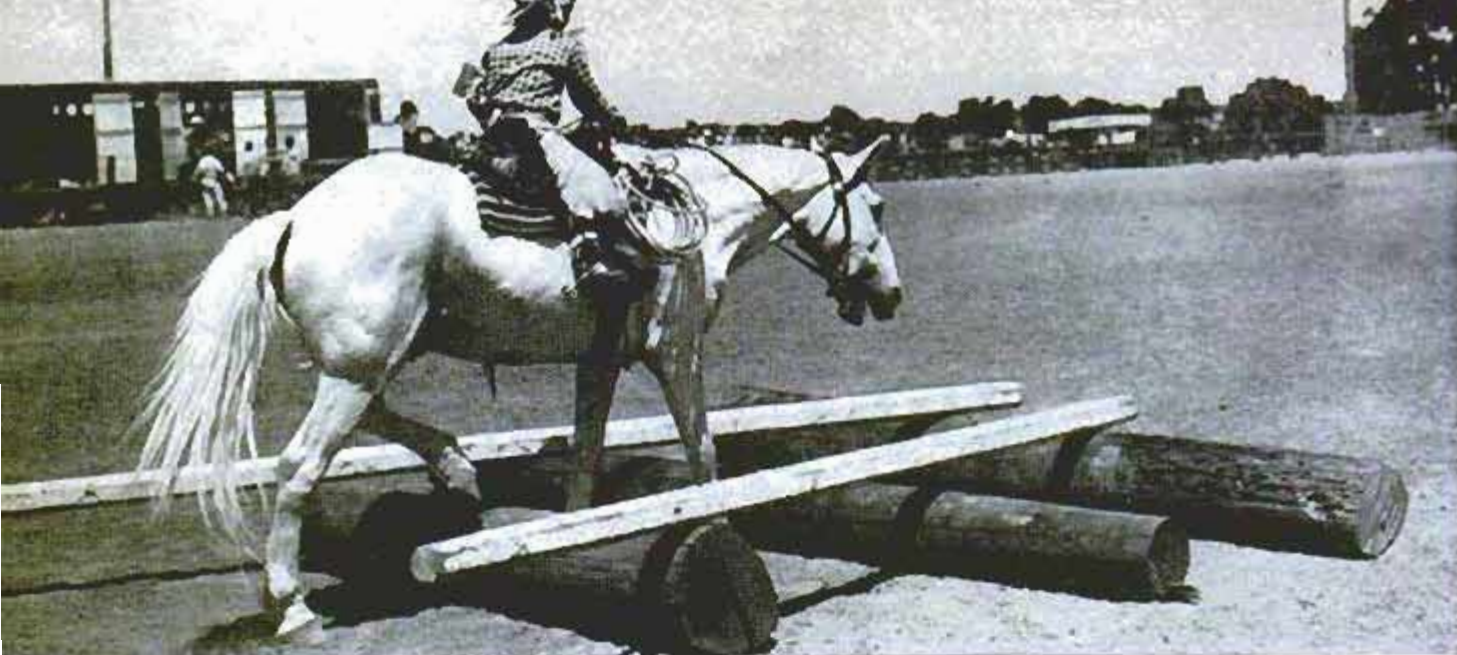
A trail horse should go willingly under branches, through heavy brush or other close quarters. He should not balk at bridges of any type, whether high or low, with railings or without, wide or narrow.

On the trail there is always the chance of coming upon a wild animal, dead or alive, or upon the spoor of one that has passed recently. What will be the reaction of the horse when this happens?

There are a number of methods of testing a horse and rider on this problem. One is to make an imitation animal by fastening the hide of a deer over a rack. A deer head is mounted on the end of the rack on a swivel. A spring is attached to the rack and head at one side, and a rope is fastened to the other side at the antlers. This gives movement to the head. The figure is set at a point where the horse will come across it when he has to

Eyes flare as this mount is called on to carry two riders. Horse becomes accustomed to the extra weight during course





Youngster negotiates intricate hazard on her mount. Narrowing rails of obstacle tend to frighten the horse



Here's a real obstacle. Galloping horse suddenly spots an "animal" at same time it leaps across three posts. Going may be rough on the trail. Here the horse moves steadily through thick brush between bales of hay



advance to some other obstacle such as a bridge, gate or heavy brush. As he approaches, the rope is pulled and the head moves. The spring snaps the head back to proper position.

The trail horse can be thoroughly startled by this development, but in his training he must be taught to overcome the fear and follow the orders of the rider.

Close Quarters

On the trail the horse is quite often called upon to pass through close quarters. One way to teach this is to set panels close together so the animal must pass between them, making a right-angle turn in doing so.

Backing up on the trail is often necessary and it can be in very tight and crooked quarters. One way to teach this is to set up four standards. Two of them must be backed between, then the horse must swing off at almost a right angle to back between the other two.

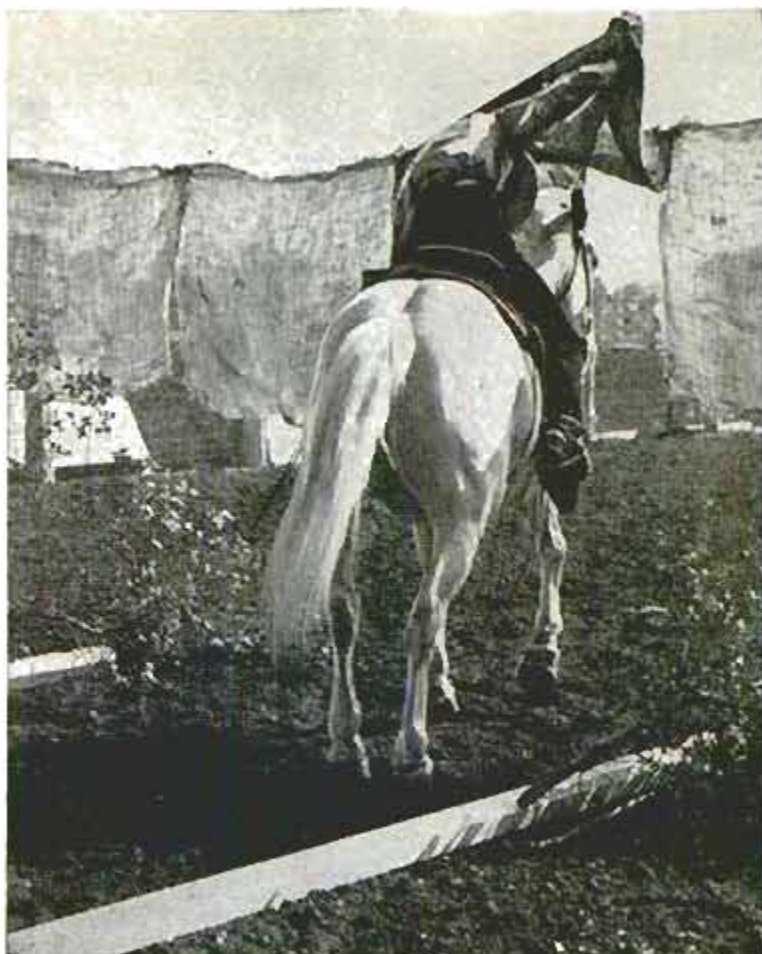
What will the horse do if he is called to carry double? He may have to do so on the trail, and every trail rider should first find out in the show arena what the reaction will be. Carrying double may not bother one horse while the next will really balk at the additional weight. The arena is the proving ground where the horse learns he must carry double if his rider wants him to.

Disturbing Noises

On the trail occasionally the horse may be required to carry something that makes a disturbing noise. To simulate this, rocks are placed in a bucket. The horse is shown the bucket and the rocks are rattled. Then the rider mounts and during the ride continually rattles the rocks. Thus the horse is trained to know that noise on his back will not hurt him.

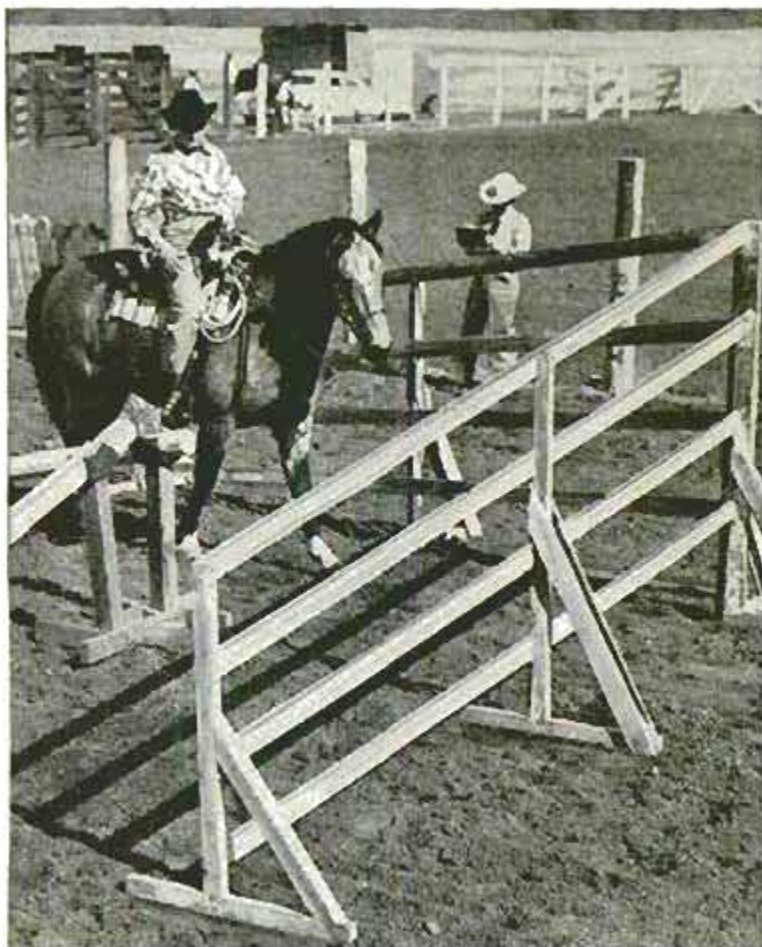
Bridges can present additional problems for it is not unusual for small animals to scurry across them, or for larger animals to bound out from under them as they are approached. Brush that hangs over the bridges can also be a problem. In the show arena obstacles to help solve these are set up.

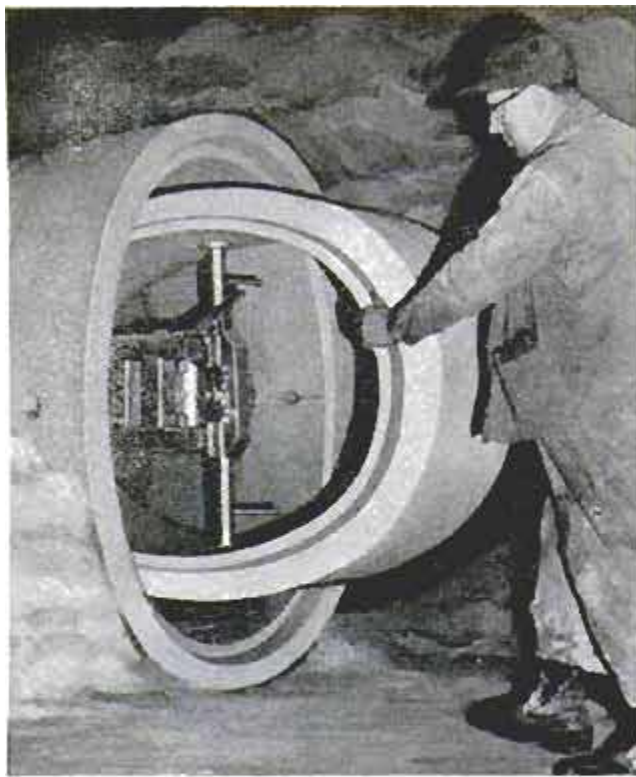
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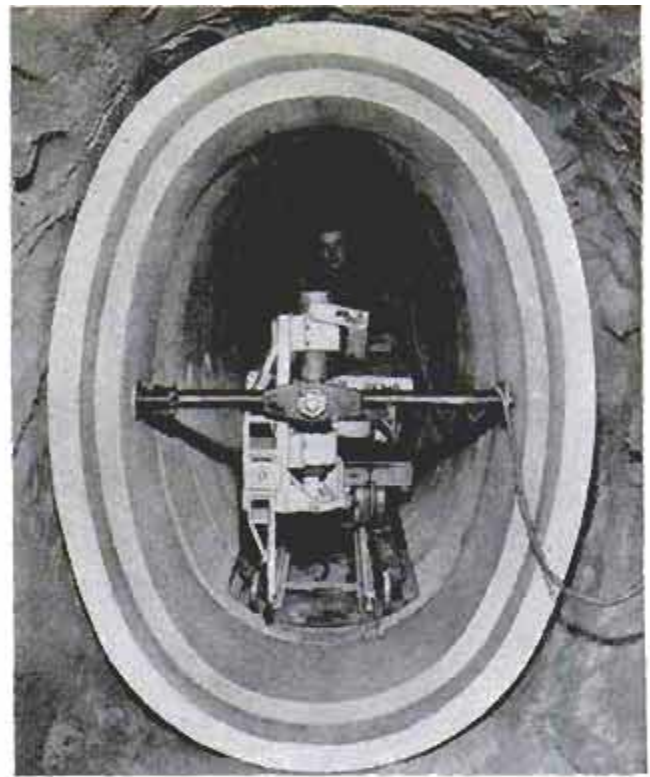
Firm hand is needed by the rider to persuade horse to pass beneath flapping burlap. Sudden breeze may "spook" the horse

Horse and rider pass through an intricate maze of fencing while a judge marks down his criticisms during show's trail-class event





Pipelayer grasps end of pipe section as it emerges from tunnel. He will turn it into setting position

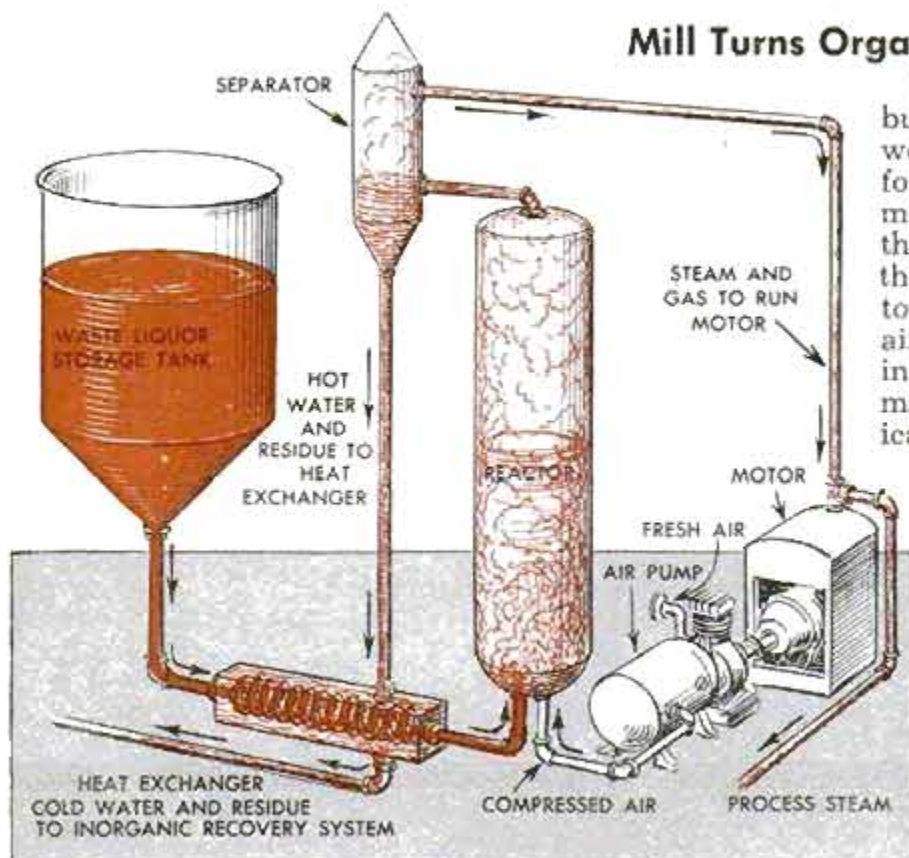


Pipe is still supported by carrying arm of rail car which reverses to set pipe against its neighbor

Oval Sewer Pipe Can Pass Through Section of Same Size

Tunnelers installing deep sewer mains can carry sections of a new oval-shaped pipe through the just-completed portion of the main. The ratio of height to width gives it this advantage over circular pipe. Forms and bracing for finished work are eliminated, which makes for greater safety and

lowered construction cost. Pipe sections are carried through the newly laid main on a car running on a track. At the end of the main, the car supports the section while the pipelayer easily turns it into position. Then the car backs the section of pipe up and sets it in place.



Mill Turns Organic Wastes Into Money

Waste pulp liquors will be burned to produce \$1,000,000 worth of steam power a year for a new Norwegian paper mill. An American invention, the Zimmerman process, flows the dissolved organic waste into a reactor with compressed air. In the reactor, the oxygen in the air "burns" the organic material in a flameless chemical reaction. The heat generated is transmitted to the water in the waste to form steam. The steam, plus nitrogen and carbon dioxide that come from the air, is used to make power. Inorganic materials are recovered in a later step. The process can purify sewage and other organic wastes that are now polluting many streams.

Flying Laboratory For Jet-Pilot Study

Once in the air, a T-29 airliner that serves as a flying laboratory is controlled by a second pilot seated in a cockpit installed in the transport's main cabin. The cockpit and complete electronic control system he operates are those of the F-102 jet interceptor, which employs radar to seek, find and destroy an enemy despite darkness or fog. Hughes Aircraft engineers working on an improved control system study the operation of the system in flight while a psychologist observes the pilot's performance. The transport flies at one fifth the cost of the jet fighter, which couldn't carry even one of the several experts who study a spread-out nonminiaturized version of the control system in the big plane. With the flying lab-



oratory, the engineers can make a series of modifications or adjustments during one flight and observe their effect.



Grip Wheels Dig Into Ice To Prevent Slipping

Wheel slipping in snow and ice is prevented by a cog wheel that is lowered into place against the molding of the rear tire. The wheel's teeth fit accurately into the molding of certain tires so that the wheel turns with the tire. The half-inch teeth dig into snow or ice to give the tire a firm grip. Fixed to the car or truck axle, the grip-wheel unit is raised and lowered by a simple lever connected to the hand brake. The grip wheel does not affect the movement of the car. It is made in Sweden.

"Siamese" Ships Launched Together

Two supply vessels, each 135 feet long and 32 feet in beam, were launched simultaneously at Pascagoula, Miss. They were built in 54 days and are destined to service the oil rigs in the offshore oil fields of the Gulf of Mexico. The launching was actually a "Siamese-twin launching," since both vessels were temporarily welded together and rested on the same cradle for the unique ceremony.

Held together by frame welded between them, sister ships are launched





Crew makes final preparations to launch wartime barrage balloon which will carry fly trap to 1000 feet



Copyright by Mirrorpic

Trap 10 feet long harvests about 7500 flies per day, which are sucked into bag by powerful electric fans

Barrage Balloon Answers Question: How High Does a Fly Fly?

What kinds of flies fly high and how high does a fly fly? These two questions are being answered in England with the aid of a wartime barrage balloon. "Katy," the balloon, goes up 1000 feet each day carrying a trap 10 feet long. Flies are sucked into

the trap by powerful electric fans. Katy's harvest is about 7500 flies per day. Her activities are part of a program aimed at improving crop-spraying methods. When more facts are available about flies' habits, it will be easier to eliminate them.



Kit Tests Uranium Samples While in the Field

Uranium prospectors can test samples in the field with a pocket viewer that is part of a kit. Minerals to be tested are made into beads with chemicals and a blowtorch from the kit. The beads are placed in a plastic chamber in the viewer, and the prospector peers through an eyepiece enclosing a magnifying lens. Sunlight passing through an ultraviolet-ray filter lens strikes the beads and causes them to fluoresce if they contain even one part in 10 million of uranium. Over 30 minerals that activate a geiger counter don't pass this test.

Cellophane Aids Plants

Waste cellophane can prove valuable to the farmer and gardener, tests at Rutgers University show. Shredded into flakes and impregnated with fertilizer salts, it prevents leaching. Used as a mulch, cellophane flakes stop evaporation, protect the soil and control weeds. Waste cellophane, mixed with limestone and fertilizer, can be composted to produce a product with the qualities of commercially cultivated peat.

Mesquite—bane of the Southwestern rancher—here has been given an aerial treatment of 2,4,5-T. Ranchers examine the lush stand of grass that came up when mesquite died

The farmer has three great enemies: Weeds, insects and plant diseases. This is the first of three articles on the weapons being developed to conquer them.



Texas Agricultural Experiment Station photo

By C. J. Willard

*Professor of Agronomy, The Ohio State University and
Ohio Agricultural Experiment Station*



Prof. C. J. Willard

SOMEDAY THE FARMER may have at his fingertips an arsenal of chemical weapons that will kill every growing plant on the land—except those he is cultivating. That's the goal of his ally, the weed-control specialist, whose dream of the weed-free farm now seems possible of attainment.

Just look what's happened in weed control since 1944. Before that, the "man with the hoe" was the symbol of the farmer all over the world. True, in advanced countries the power of the horse or the tractor had replaced the muscles of the man, but the method was still the same: grubbing weeds out of the

Here's striking evidence of the value of weed killers. Right half of field was treated before sugar beets were planted. Note the tangle of weeds at left

Great Western Sugar Co. photo





Soil Conservation Service photo

ground. The few chemicals used to control weeds were chiefly the soil sterilants: Common salt, sodium arsenite and sodium chlorate. No one had developed a practical selective weed killer.

Suddenly, in 1944, this was changed. The years since then have witnessed perhaps the most rapid advance in farming methods since a shaggy cave man planted a seed to become the first farmer.

The spark that touched off this revolution was the discovery of the weed-killing power of a long-handled chemical—2,4-dichlorophenoxyacetic acid. Today we just call it 2,4-D. This chemical has many close relatives, among which MCP and 2,4,5-T are also widely used for weed killing.

Magic Chemicals

Here was a startling discovery. When these magic chemicals were applied to the tops of plants at rates of only $\frac{1}{4}$ to 2 pounds per acre, certain species of plants shriveled and died, yet others were barely affected. Thus it became possible for a farmer to kill most broadleaved weeds in his corn, wheat or rice field without harming his crop.

Since then scores of weed killers tailor-made for certain crops have been developed. We have come to the startling realization that we can find selective herbicides for almost any weed-killing job, and only the lack of a profitable market will prevent us from doing so.

The goal of the weed-free farm may be far in the future, shrouded by years of lab-

TREE AND BRUSH



Texas Agricultural Experiment Station photo

Ammate, one of the deadliest of brush killers, can be applied in dry form or in a strong water solution to a "cup" made by prying out chip between ax cuts

←New machine, powered by a gasoline engine, makes a neat cut to girdle a tree. Such a cut will kill the tree, but application of 2,4,5-T will hasten the job

oratory work and field testing by many crop-control scientists, but at least it seems possible to attain.

I am asked two questions more frequently than all others put together: "What shall I use to kill the weeds in my lawn?" and "What is there about a weed killer that will kill one plant and have almost no effect on the other?" Let's leave the weeds in the lawn for a moment and discuss the second question.

Suppose you spray a 2,4-D solution on a cornfield overgrown with giant ragweed and bindweed. A few days later the annual ragweed and the perennial bindweed are

Comparative amounts of weed seed and wheat from equal areas, unsprayed (top) and treated (bottom)

Oregon Agricultural Experiment Station photo



KILLERS



Texas Agricultural Experiment Station photo

Want to kill a stump? Apply dry Ammate liberally to fresh cuts in top. There'll be no resprouting here

dead, yet the corn appears unharmed. What has happened inside these three plants?

A possible answer is that the physical structure of the plants is so different that one catches and absorbs more of the spray than the other. But that isn't the basic reason.

Different Enzyme Systems

The plants react differently because they have different enzyme systems. The total enzyme systems of a plant or animal direct its entire life. The 2,4-D has a disruptive effect on some enzyme systems but not on others.

Since all species of plants have different enzyme systems, weed killers may have a different and specific effect on each species. In effect, it is the plant that makes the selection and not the chemical. These ef-



Tabs of blotting paper are soaked in sodium arsenite—a deadly poison—and inserted beneath the bark

fects are so specific that we often need to make recommendations for each variety of a particular crop. There are also varieties of weeds which may respond differently. This may well be a reason for conflicting results. At least, it is thus absolutely essential for satisfactory recommendations to identify the particular weed in the crop.

Herbicide action may vary with the weather, the concentration, the method of application and other factors, and may thus endanger the farmer's crop.

It is commonly believed that 2,4-D does not affect corn, yet in one experiment the yield of corn was reduced from 80 bushels to two bushels per acre by one application. This was the wrong formulation, at the wrong time, in the wrong concentration, by the wrong method, but it serves as a warning of what can happen.

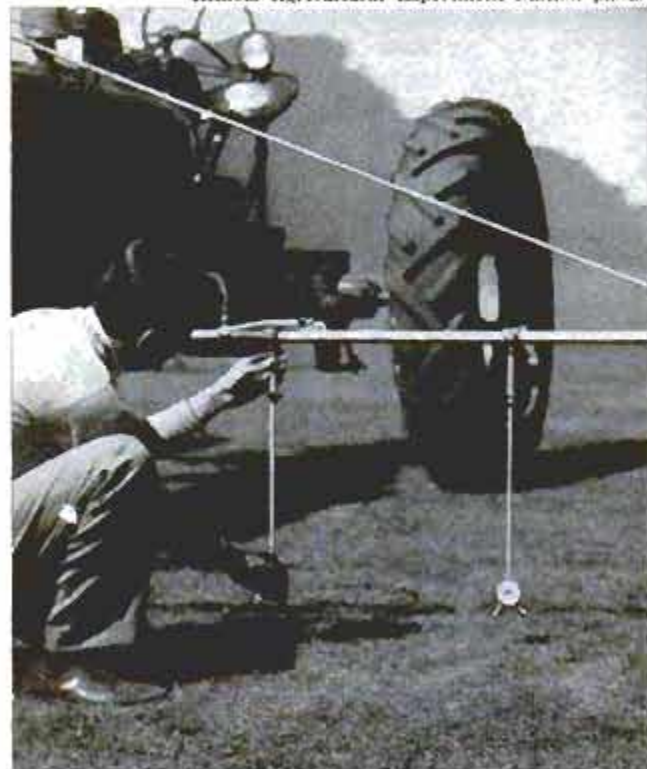
Not long ago, following three years of

2,4-D makes a clean sweep of mustards in small grain. At left is a treated field; right, an untreated one





Texas Agricultural Experiment Station photo
Latest method of controlling Johnson grass, enemy of the cotton farmer, is to spot-treat it with oil. Below, nozzle extensions on boom will keep much 2,4-D off corn which is to be sprayed after it is a foot high
 Illinois Agricultural Experiment Station photo



Texas Agricultural Experiment Station photo
Tractor is equipped with solenoid-release valves. Riders spot Johnson grass, douse it with herbicide

hard work at a half-dozen different experiment stations, a new weed killer was marketed for use on cotton. During the year it was introduced, unusual weather conditions caused the herbicide to kill thousands of acres of cotton. The herbicide is still a good one, but its reputation has never recovered from this blot. A similar experience is possible with most herbicides now in use.

The usefulness of a herbicide depends as much on the way it is applied as the chemical itself. The first 2,4-D sprays were applied in up to 320 gallons of water per acre. Heavy tanks mashed down the crops. Then Harold A. Waters tried the simplest possible approach. To an ordinary paint-spraying nozzle he attached a low-pressure pump, and proved that only 5 to 10 gallons of water per acre could apply the herbicide accurately.

Apply as Droplets

Because modern herbicides are so powerful, we must apply them so that they do not drift and injure desirable plants. They should be applied not as mists, but in droplets which tend to *fall* to the plants. The inexpensive low-pressure pump with what is now known as a weed-control nozzle is ideal for this purpose.

Here are the most up-to-date recommendations for killing weeds in various crops:

Lawns. 2,4-D in a dilute drenching spray is basic. You can even apply it with a sprinkling can, provided you do not use the can later to water the flowers. There

(Continued to page 266)



Morse Scout S4B, 1916 U.S. Army fighter, stands on Wisconsin airfield

Rare World War I Fighter Flies Again

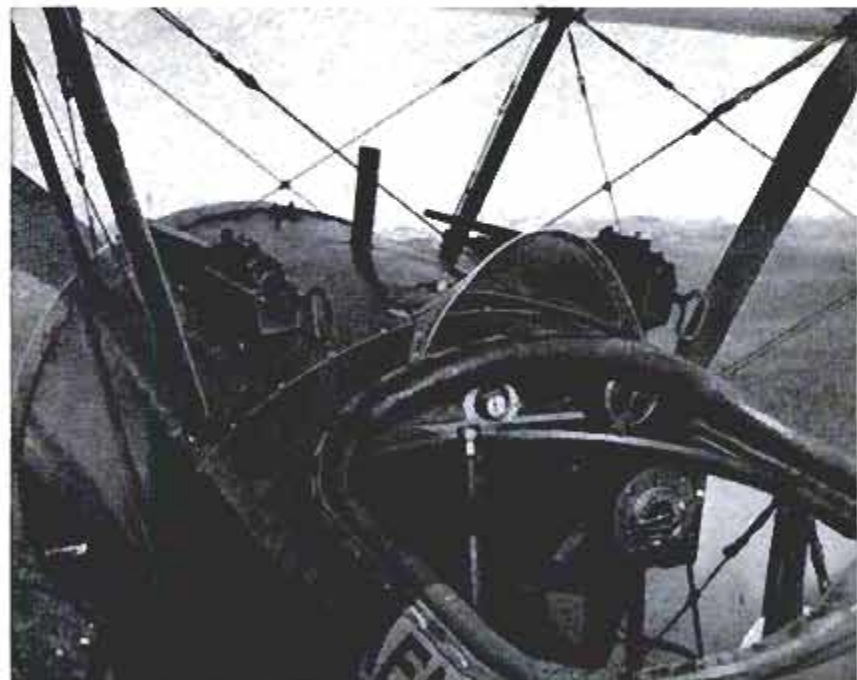
By Phil McCafferty

WHEN Dwight Woodard, a Richland Center, Wis., airport operator, heard one of his students tell of a plane he'd seen in a northern Wisconsin barn, he could hardly wait to see it—especially after the student told him, "There must have been something wrong with it because when we turned the prop, the whole engine turned around." To Woodard, this meant a famous old French Le Rhone rotary engine, unique in that the crankshaft was stationary while the engine and propeller rotated around it.

The plane proved to be a Thomas Morse Scout S4B, and Woodard bought the shell. Woodard spent thousands of dollars and hours searching for parts and rebuilding the ship.



Above, Richland Center, Wis., airport operator Dwight Woodard sits in cockpit of his prize. Below, left, cowl-mounted machine guns in place. Note lack of instruments; pilots depended on "seat of pants" flying instead of instruments. Below, right, old French Le Rhone rotary engine, in which shaft is stationary, and engine turns around it





Electric Eye on Camera Sets Correct Lens Opening

Fully automatic, a new movie camera has a battery-operated mechanism that sets the lens opening to the precise amount the lighting requires for perfect exposure. An electric eye "reads" the lighting conditions and sets the diaphragm as conditions change. If subject moves from bright sunshine into the shade, the exposure is automatically corrected while the camera operates. No attention by the photographer is necessary. Another feature of the automatic camera is a warning signal that pops up in the view finder whenever the amount of light becomes too low for proper exposure, thus preventing waste of film. Current for the exposure-adjusting mechanism is provided by six tiny batteries, similar to those used in hearing aids. The life of the batteries is a minimum of one year. The camera, a Bell and Howell product, has a 20-millimeter f:1.9 lens. Wide-angle and telephoto attachments are available.

Huge Plastic Tarpaulin Lines Pond to Prevent Water Seepage



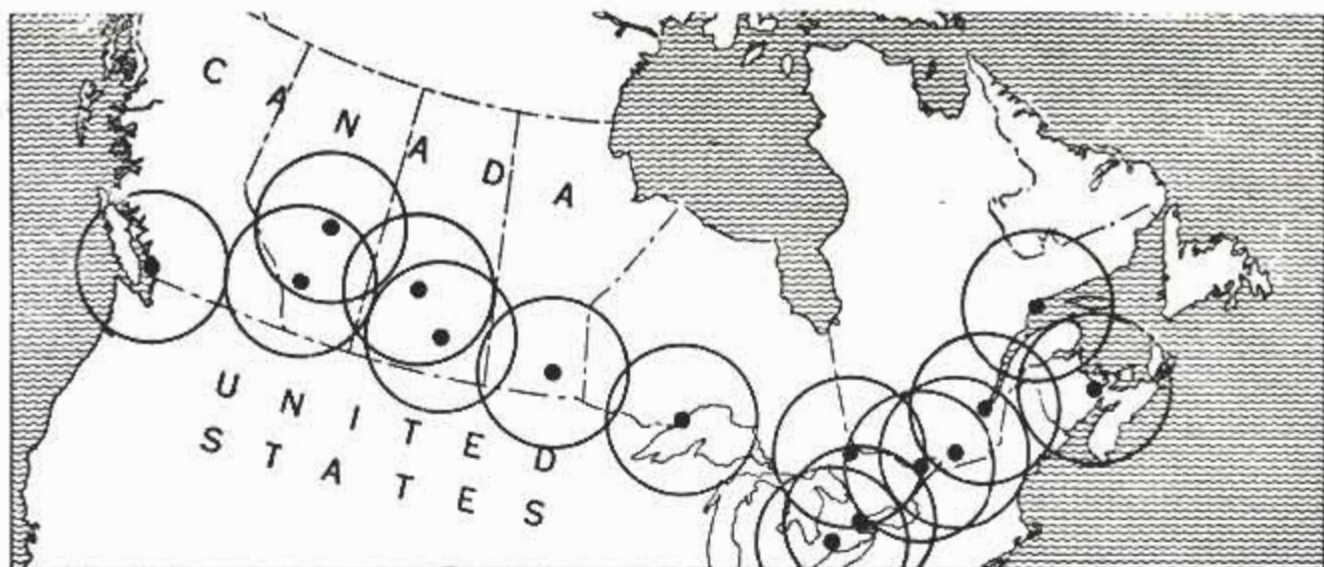
Waterproof plastic tarpaulin, above, is used to cover nearly half an acre of the dry bed of a manmade pond. Below, pond no longer seeps away



When a manmade pond at Clemson College, Clemson, S. C., seeped away, agricultural engineers lined the cavity with waterproof plastic. Strips of Krene plastic, often used for shower curtains, were heat-sealed together to produce a tarpaulin to cover almost half an acre. The plastic liner, which came through the winter undamaged, eliminated the three-inch-a-day drop in water level. Similar liners may be used to hoard water for livestock and irrigation purposes. During a dry period, the water thus saved might spell the difference between crop failure and survival.

Potent Insecticide

Extracted for the first time, a potent new hormone holds promise of an insecticide against which pests cannot develop resistance. The hormone, extracted from insects at Harvard University, prevents metamorphosis.



Below, electronically generated map of the control area is projected on AASR screen at flip of switch

Canadian Radar Network To Control Airspace

Like the rest of the world, Canada's air transport traffic has shot up in volume in recent years—and absolute control of all planes in the air has become essential. To accomplish this, the Canadian government is installing a network of radar at 15 major airports stretching across the country. The equipment, called Airport and Airways Surveillance Radar, will permit each airport to track planes within a 200-mile radius. The AASR system has improvements which enable it to track planes even in bad weather without a cluttered-up screen, and which filter out all unmoving objects so that a moving plane is easily spotted on the scope.



Pocket Vacuum Cleaner Takes Lint From Clothes

You can brush lint and dust from your clothes with a pocket vacuum cleaner that looks like a flashlight. Two flashlight batteries power a tiny suction motor in the head to draw dust into a small bag. The vacuum created is not powerful, but serves principally to prevent dust brushed free from being scattered about the room. The circular brush on the head is swept across the cloth like a whisk broom.

Windshield Rain Repellent

Raindrops roll off an airplane windshield coated with a substance that ends the need for wipers. Made of silicones and waxes, the hard coating, to which raindrops can't stick, is applied in 15 minutes and lasts for several days of heavy rain. The wind and speed of the plane also help sweep the raindrops away. Although not adaptable for autos because of their slow speed, it may eliminate salt-spray crust on boats.

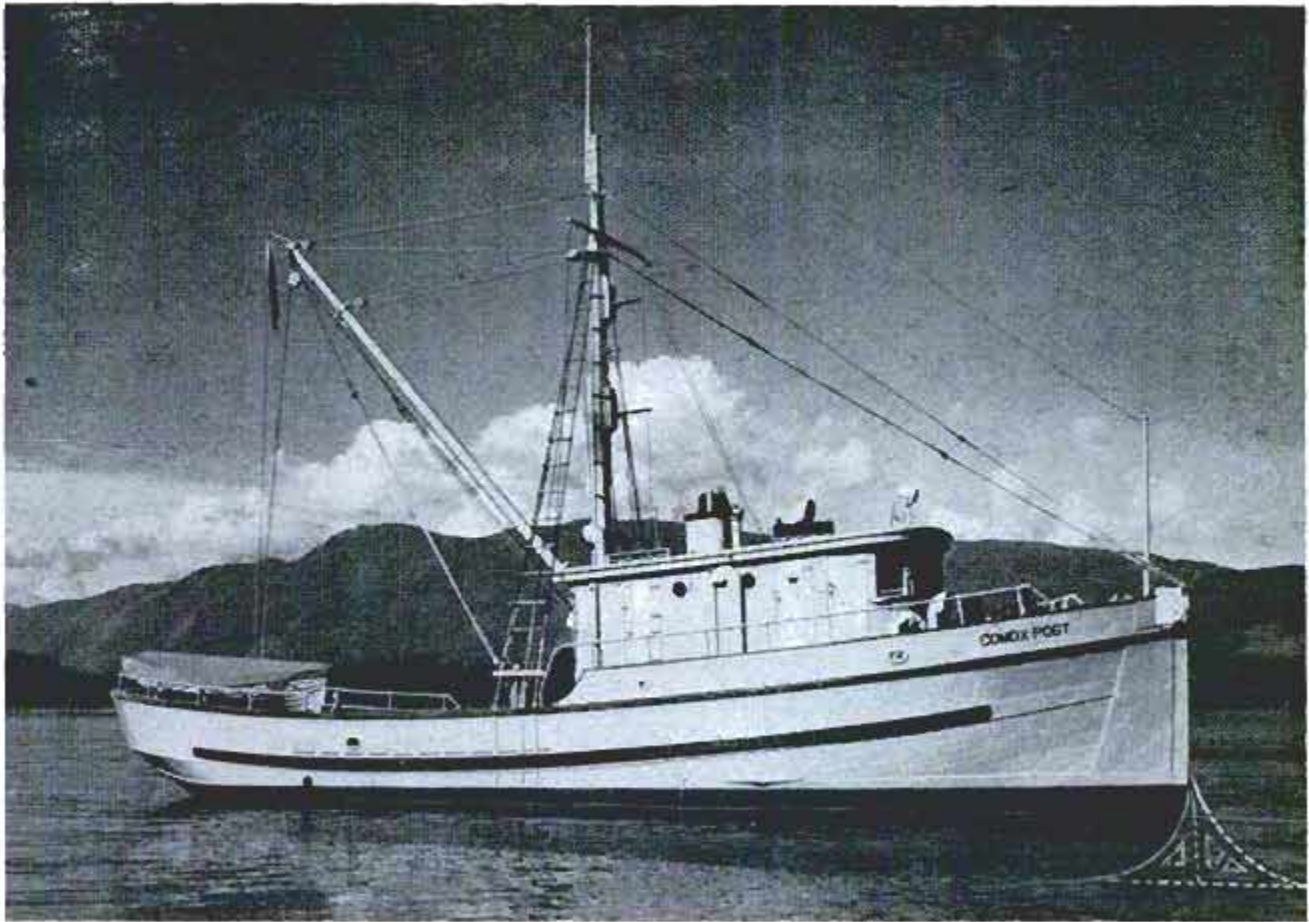


SHIP SPEARS SHARK



Huge 30-foot basking shark is almost cut in two by sharp-edged ram. The sharks, floating lazily near the surface of the water, are no match for the skillfully handled vessel, which heads directly into a

school and catches an individual shark before it is aware of its plight. The hinged ram is carried above the water line in a closed position when not in use. It has a sharp point and a keen upper cutting edge



Dotted white lines on the prow of the Fisheries Department vessel *Comox Post* indicate outline of shark spear

BASKING SHARKS, the bane of the salmon fisheries along the British Columbia coast, are being chased and speared by a vessel mounting a knifelike ram on its prow.

In the first month that the Canadian Fisheries Department's *Comox Post* was fitted with the ram, it killed nearly 50 sharks. Eighteen were speared in a single day in Barkley Sound on the west coast of Vancouver Island.

Basking sharks, named for their habit of floating lazily near the surface, attain a length of 30 feet. When one becomes entangled in a salmon net, it can tear it apart in minutes, destroying hundreds of dollars' worth of webbing. Trolling gear is also damaged when the hooks catch in the sides of the monsters. The sharks feed on the same food as salmon, frequent the same areas and are usually at greatest numbers during the height of the sockeye-salmon-fishing season. Up to 50 may gather in an area where salmon are feeding making it impossible for the fishermen to put down their nets.

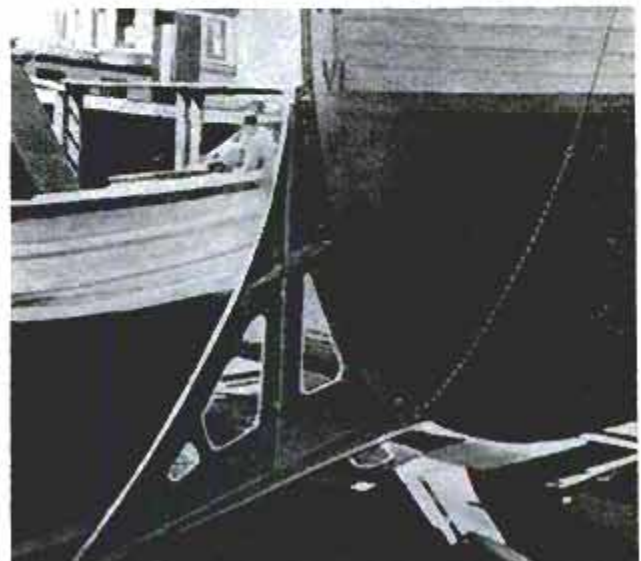
The sharks, which have no commercial value, have been a problem for many years. Harpooning has proved to be successful but slow. Rifle fire is ineffective and a danger to nearby fishermen.

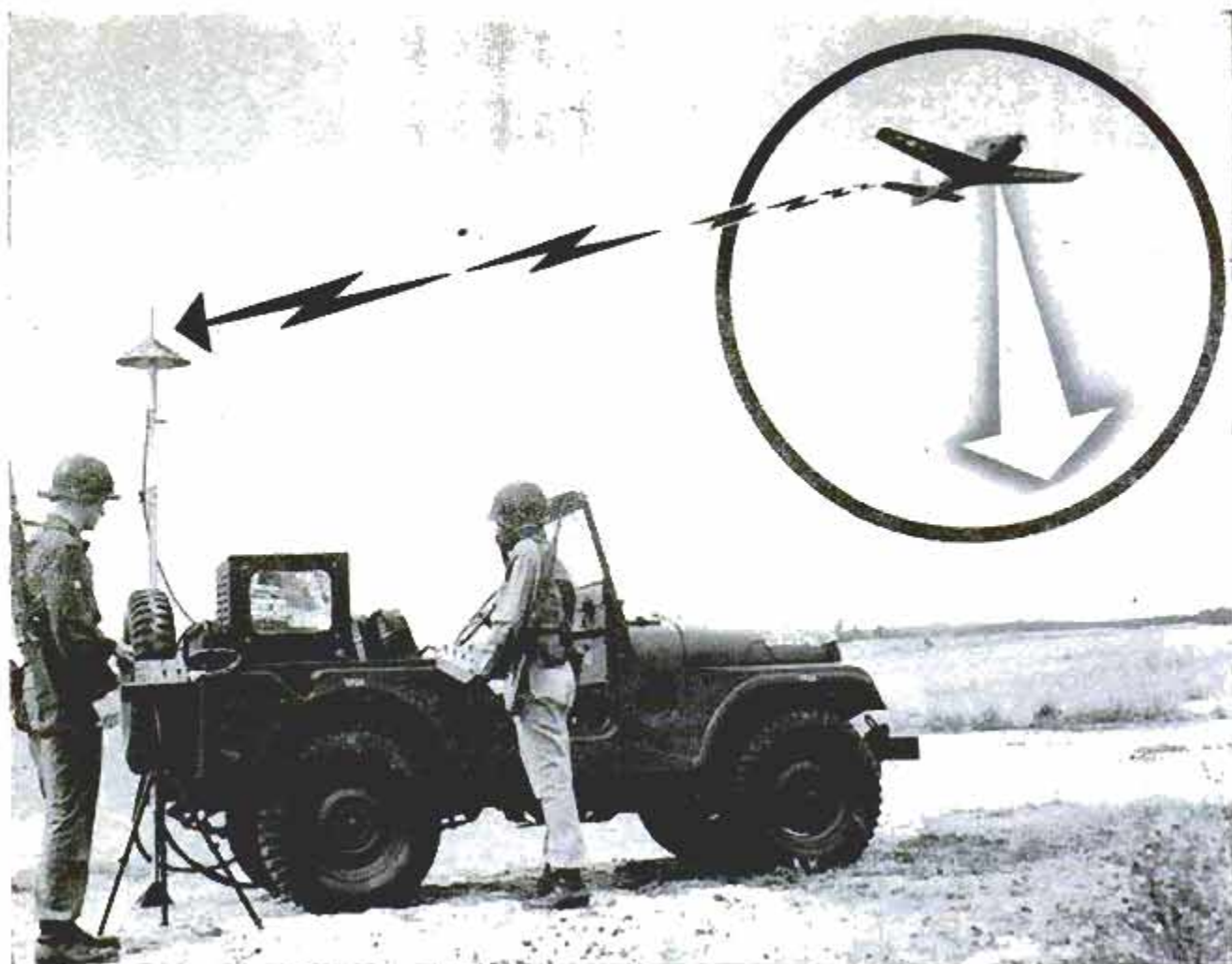
Now, when a group of sharks is sighted, the *Comox Post* steers directly for the

school, picks out an individual floating near the surface, and rams it. This not only reduces the shark population, but breaks up and scatters the school, making it reasonably safe for fishermen to operate in the immediate area.

The triangular ram when not in use is carried like a closed clasp knife above the water line. For operation, it is lowered from a hinge by a cable so its point and cutting edge are just beneath the surface of the water. Chain braces on either side of the bow keep it firmly in position. ★ ★ ★

Ram lowered to killing position. Chains brace it





TV Camera in Drone "Peers" Over Enemy Lines

Army combat commanders can peer over enemy lines with a TV camera mounted in a remotely controlled plane. An L-17 was fitted with a 42-pound autopilot that enables a ground operator to regulate its flight, landings and take-offs within a 25-

mile range. TV pictures of strategic territory beneath the plane are relayed to a monitor set at the 250-pound ground station, which can be carried in a Jeep. It includes radio links for commanding the drone. Still photos can also be made.



Infrared Lamp Over Balcony Makes January Like June

Gerald M. Loeb, Wall Street investment broker, likes to sit on the balcony of his home in Redding, Conn., in shirt sleeves the year 'round. He is able to do this in comfort since he suspended a 5000-watt infrared waterproof heater over the balcony which is on the south side of his house. The balcony is perfectly comfortable on the coldest winter day, Loeb reports, unless a high wind is blowing across it.

☐ Steelmaking furnaces in the United States at midyear had produced more than one billion tons of ingots and steel for castings since the end of World War II.

50 YEARS AGO IN PM
FROM OUR NOVEMBER 1906 ISSUE



MOTOR SWIMMING WITH FOOT AND GAS ENGINE POWER

What with automobiles and motor boats to ride in, motor skates to walk on, and a screw propeller to push a swimmer through the water, it begins to look as though the class in physical culture had little to do but enjoy itself, while a gasoline engine does the work. Of all the varied applications of the gas motor the swimming outfit is the most unique. Its utility would seem quite doubtful, but as a curiosity or amusement it is worth knowing.

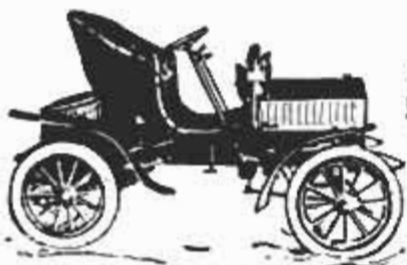
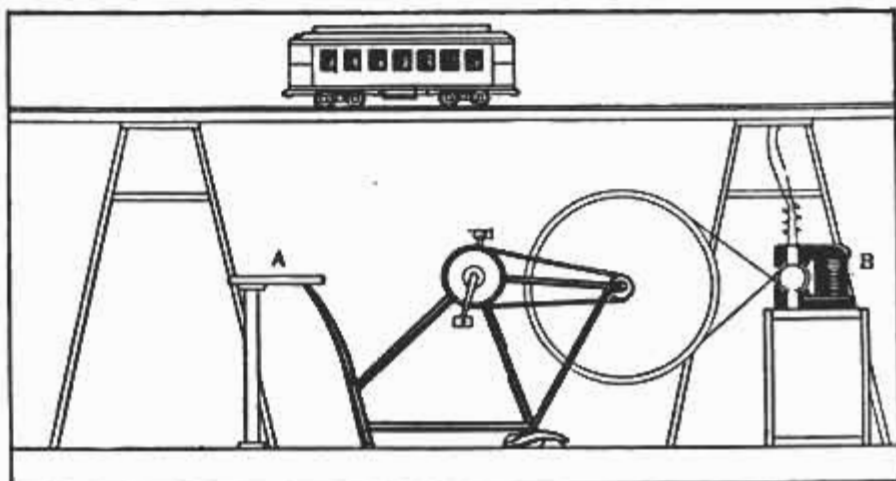
M. Constantini, of Paris, who invented the motor skate, has brought out a motor swimming device which, the Scientific American says, consists of "a waterproof casing containing a gasoline motor which drives a screw. The machine is strapped to the swimmer's back and propels him through the water" at a rate faster than he would

swim, and, of course, without physical exertion. Air bags are used to float the machinery.

An American has also invented a swimming machine, but in his case the swimmer must furnish the motive power himself. This device is capable of considerable speed with comparatively small effort. The operator stretches at full length upon a float which is pointed at the forward end. The propeller is driven by gearing driven by means of foot pedals similar to the pedals of a bicycle. Another float over the machinery serves to support it in the water. This arrangement permits the swimmer to keep his head out of water and to undertake long distances. When tired one has simply to cease working the pedals until rested.

BICYCLE POWER FOR RUNNING MINIATURE TRAINS

Remove the front wheel from the bicycle and in its place fix a seat as at A in the sketch. Take the tire off the back wheel and run a small leather belt around the wheel to transmit power to the dynamo, B, which is connected up, as shown, and causes the little electric car to run when the wheel is operated. — Contributed by Clifford B. Brainerd, Chevy Chase, Md.



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U. S. Army photos

In the new course, recruits fire from foxholes and from behind trees while wearing helmets and combat gear

"Trainfire" Rifle Course Simulates Combat

Stationary targets are replaced by man-size targets that pop from ground



Army recruits in the near future may be given a much different course in rifle marksmanship. A new course, called "trainfire," is under test by the Army. The goal of the course is to reproduce in training the marksmanship problems that the rifleman will face in combat. Instead of stationary targets at known distances, the new program uses man-size silhouette targets, some moving and some stationary, that pop up at unknown ranges. The rifleman also is trained to fire from foxholes and from behind trees, rather than from the formal body positions of the existing course. The new system cuts the marksmanship course from 86 hours to 74 hours.

Lamprey Poison in Great Lakes May Save Trout

Trout-destroying sea lampreys may be cleaned out of the Great Lakes with a chemical developed by the U.S. Fish and Wildlife Service. Dissolved in the spawning beds, it kills the lamprey larvae. If the

chemical proves harmless to other fish and animals, it will see widespread use. The eellike parasite has lowered the trout catch in Lake Michigan alone from a \$3,000,000 peak to an all-time low of \$1500.

TV PARADE FOR 1957

WITH AN ESTIMATED five out of seven American homes already equipped with television, manufacturers in '57 are striving to place a second set in every household. If you already have a

large-screen receiver, you will be interested in the low-cost portables; if your present set has a small screen, the new features may tempt you to buy a larger unit. Here is a sampling of TV for '57.

PORTABLES REVERSE TV TRENDS. Reminiscent of TV's earliest days are small-screen portables included in most 1957 lines. New sets, however, have cases to match the small picture tubes, and improved circuitry provides reception in most areas with attachable indoor antennas. Separately available converters adapt portables for use in cars and boats.



A

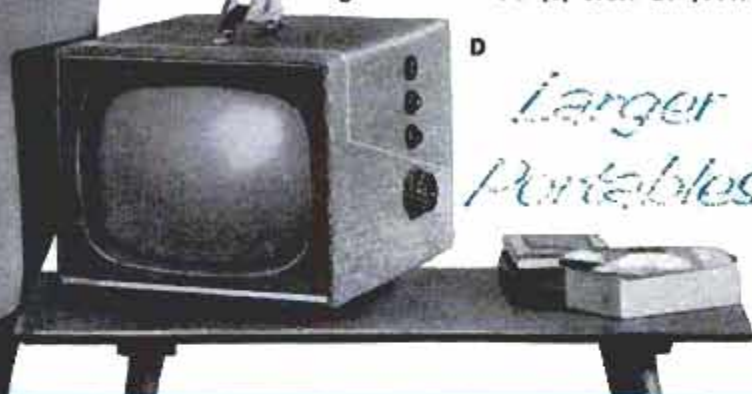


B



C

Emerson's unique 8 1/2-in.-screen set (A) has AM radio and phono jack, costs \$124. RCA's 8 1/2-incher (B) is smallest, measures about 8 by 10 by 13 in., costs \$125 with detachable stand and disappearing antenna. Only slightly larger, Admiral's 10-in. models (C) start at \$99.95. Among larger sets, 14-in. Du Mont (D) has utmost in sensitivity with Cascade tuner and three i.f. stages. Motorola's price leading 14-in. models (E) start at \$99.95. Also available are some 17-in. portables



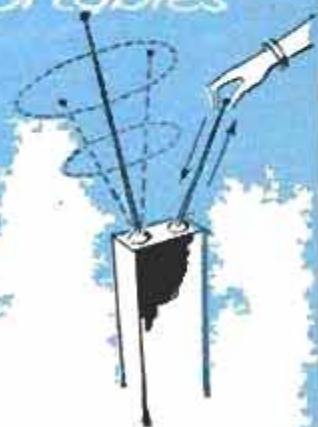
Larger Portables



E

Custom Accessories for TV Portables

Special accessories are available for most portable television sets. These include covers, stands and bases, and attachable "rabbit ear" antennas. Antennas can be adjusted to any angle and fold away when not in use.





The Admiral Corp., first to announce the planned production of a color set below \$500, is now exhibiting this color consolette at a cost of \$499.95

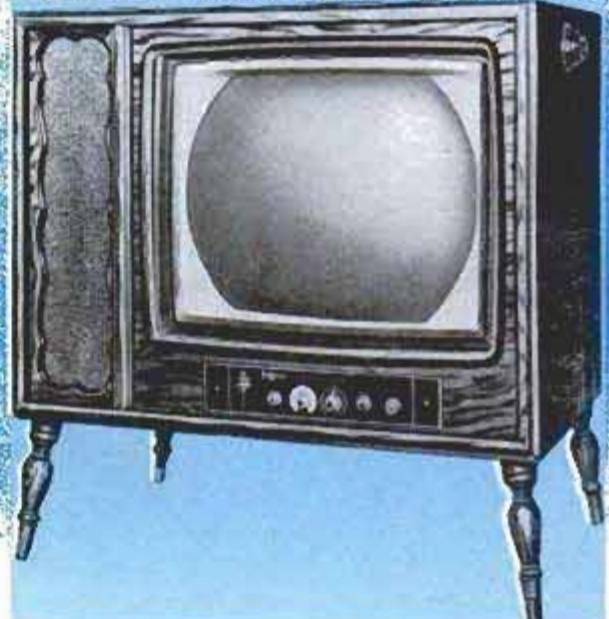
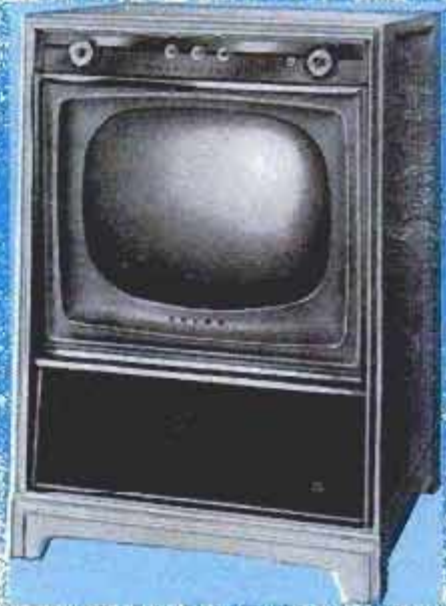


RCA leads the color field with 10 new models. Prices range from \$495 for above table model (stand extra) to \$850 for consoles with hi-fi sound systems

Color Highlights

That color is here to stay is demonstrated by the ever-increasing number of color broadcasts. Most major TV manufacturers have included at least two color models in their 1957 line. Sharp price reductions which have cut the cost of color TV by as much as \$300 are expected to spur sales. Color sets are completely compatible and will provide black-and-white reception of noncolor broadcasts.

Among the latest in color TV is the Westinghouse console featuring the first 22-in. color tube (others are 21-in.). Price still unannounced. The Magnavox \$950 Contemporary, lower left, contains 10-watt hi-fi amplifier with four separate speakers. Of special interest is the Magnavox Gold Seal guarantee providing a full year's parts warranty plus three months' free service. Hoffman's \$775 hi-fi model is shown below, right



Which is the Console?



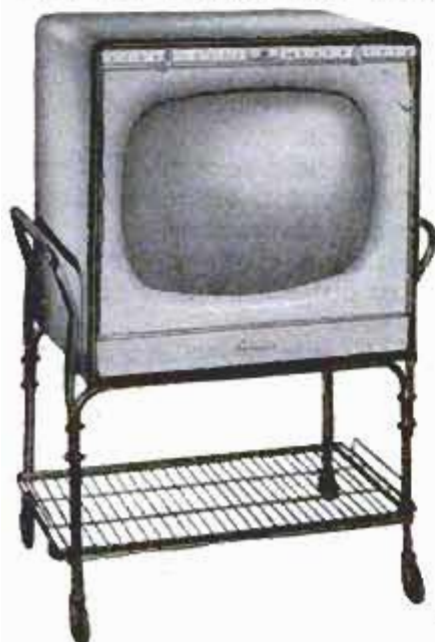
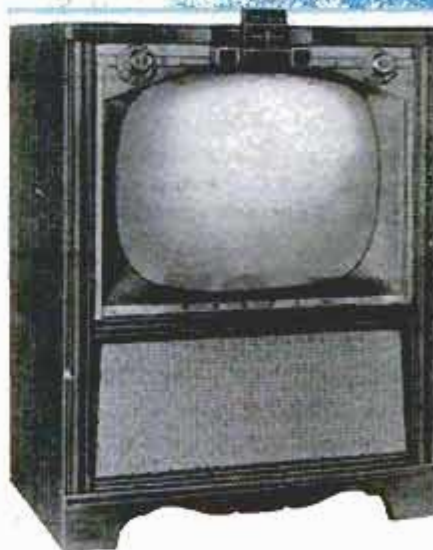
Table models take on a new look when placed on special bases designed to give them that "console" appearance. In fact you may not even recognize the true console. General Electric's \$249.95 model 21T160, upper right. Set at left is GE's table model selling for \$189.95 on a matching base. Center set is Motorola table model with swivel

base. Equivalent consoles usually include larger speakers for improved sound but are higher in price than table models with matching base. Both GE sets shown feature push-button on-off switches and power tuning. Motorola receiver has push-button on-off only, but is also available with power tuning. Sets have 21-in. picture tubes

Latest in Black and White TV

Automation in assembly as well as operation is the keynote of many 1957 sets. While automatic assembly reduces production costs, automatic operation takes the work out of set adjustments. Just touch a button to turn the set on and sound and picture appear at the same volume and brightness level as when the set was previously turned off. Touch another button and the channel selector automatically rotates to the next station. Excellent stability reduces need for "fine tuning" although such controls are still provided.

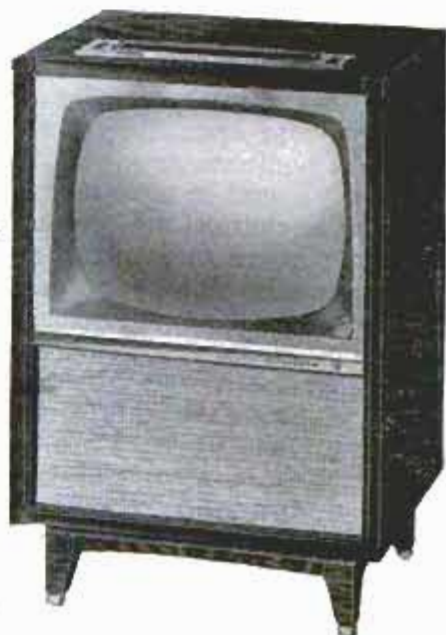
In lieu of touch-tuning, Zenith offers remote control as standard equipment in higher-priced models. Set at right costs \$359.95



Sylvania's exclusive "Cabinet of Light," featured in all models, illuminates entire cabinet front with soft fluorescent glow. 21-in. table model, left, with push-button on-off switch and ratchet tuning, sells for \$289.95



No controls are visible on Crosley console, right, which costs about \$340. Knobs are hidden beneath hinged lid shown in above sketch. Touch bar to right of lid automatically selects stations. Similar bar on the other side turns the set on and off





Remote control is optional in most 1957 lines. Du Mont unit (A) permits station selection, brightness and volume control and audio muting. In addition to these controls, Emerson's model (B) has built-in per-

sonal speaker. Zenith Space Commander (C) and Motorola's Transituner (D) are "wireless." Transituner is used only for station selection. Space Commander is standard equipment in some Zenith sets

Tips on TV Buying

Considering the many new TV models, it is interesting to note that despite widely varying prices most sets of any particular manufacturer are built around a single chassis. In only a few instances is there a difference in basic chassis design of the highest-priced units and that of the medium and low-priced lines (excluding the small-screen portables). Since it is chassis design which largely determines picture quality, the varying prices are due chiefly to features which contribute more to appearance and operating convenience than to actual performance.

When viewed in demonstration rooms, a casual observation may reveal little difference in picture and sound quality of different brands. Yet, some units may provide better performance than others under certain conditions. Here are a number of "look and listen" tests you can make to assure lasting satisfaction with your final selection.

1. Tune in a strong station on several sets and adjust *brightness* and *contrast* controls for best picture. A good picture has all the detail of a sharp, glossy photograph. Carefully compare picture quality of the various sets.

2. Rotate brightness control to maximum. Picture should remain in sharp focus with little or no "blooming" (enlargement of image).

3. Turn contrast control to maximum and watch for evidence of picture "bending" or an annoying raspy buzz in the speaker.

4. Rotate fine-tuning control. Picture and sound should remain good over several degrees of rotation.

5. Change stations. Picture contrast and sound volume should remain relatively constant on all channels.

6. Rotate horizontal-hold control. Picture should remain steady, without distortion, over a large portion of the control.

7. If available, plug a motor-driven appliance into nearby outlet. Picture should remain steady.

8. Turn volume to minimum and listen for any hum which may be audible a few feet from the set. Turn volume to higher-than-normal listening level and compare the over-all tone quality of the various sets.

Any set scoring high in the above tests is likely to perform well in your home, providing it is properly installed and adjusted, and used with a satisfactory antenna system.

the

POPULAR
MECHANICS

WTM 58
CRAFTSMAN



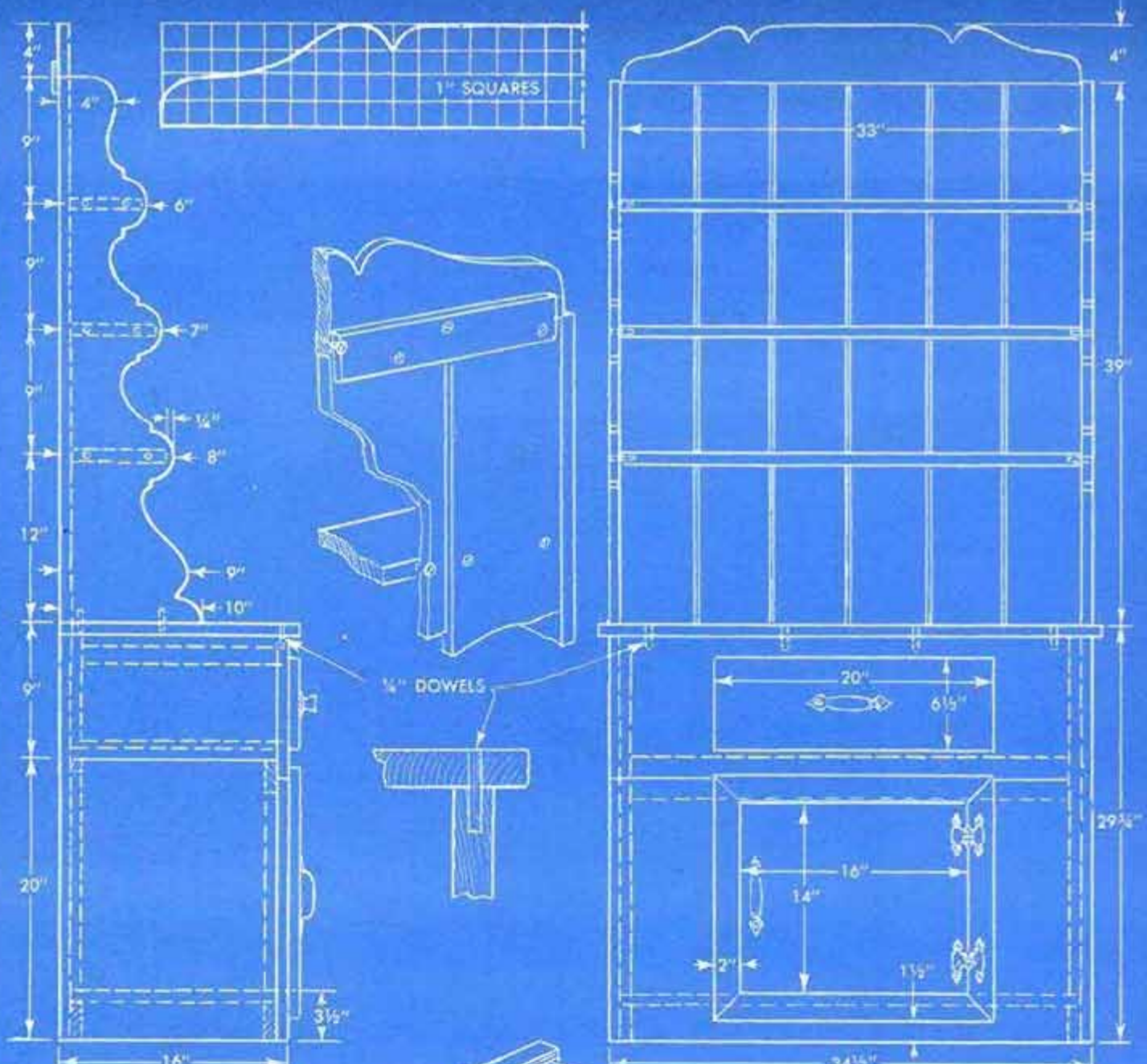
KNOTTY-PINE HUTCH CABINET

By Hi Sibley

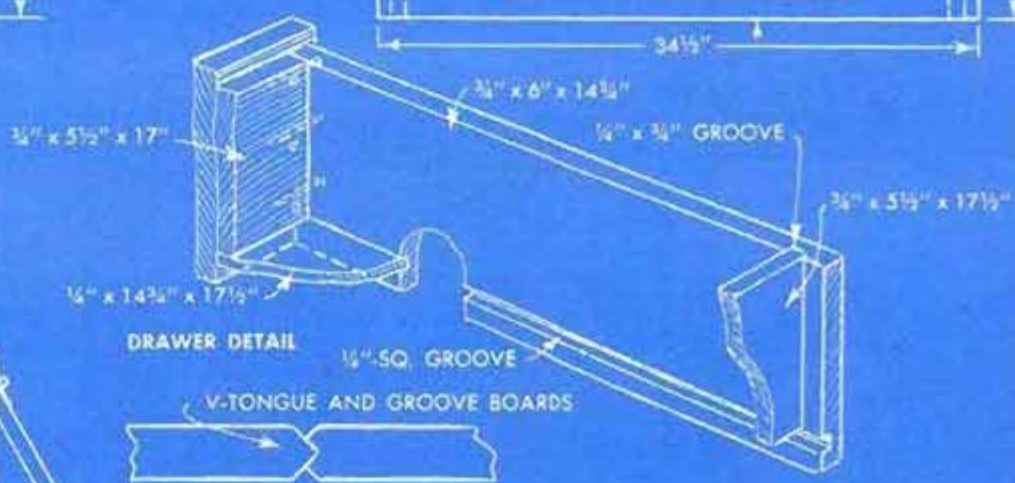
HERE IS A PROJECT designed especially for the home craftsman. The original was made of knotty pine, but any wood with an interesting grain is suitable. Glue, dowels and screws are used to assemble the unit.

Start construction by assembling the base. Storage shelf, ends and counter top are made by edge-gluing equal length boards. Clamp them together until dry and then sand the surfaces flush. Ready-made

panels often can be obtained from your lumberyard. The shelf in the storage area rests on $2\frac{3}{4}$ -in. cleats to bring it to the level of the bottom of the door opening. Drawer rails are made from four pieces of 1×2 , $15\frac{1}{4}$ in. long, and rest on cleats front and back. The front cleat is a $31\frac{1}{2}$ -in. length of 1×3 , and is positioned to bring the top edge 20 in. up from the floor. Front panels are screwed to cleats from the inside. Cut the doorframe members to fit flush with the edges of the front paneling, mitering them at the corners. Either solid paneling

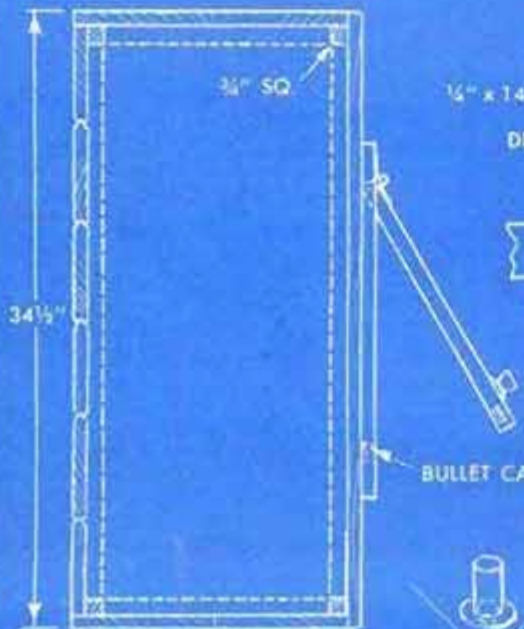


SIDE-VIEW DETAIL

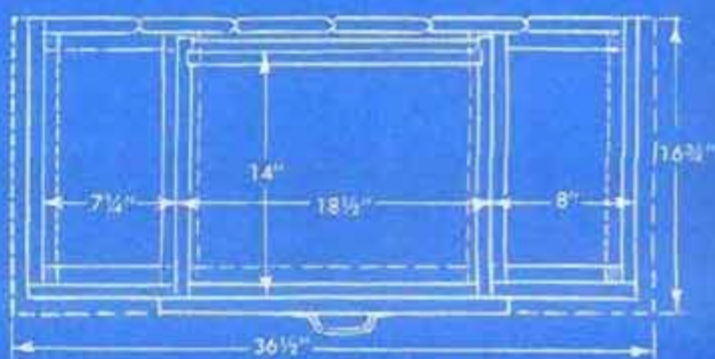


DRAWER DETAIL

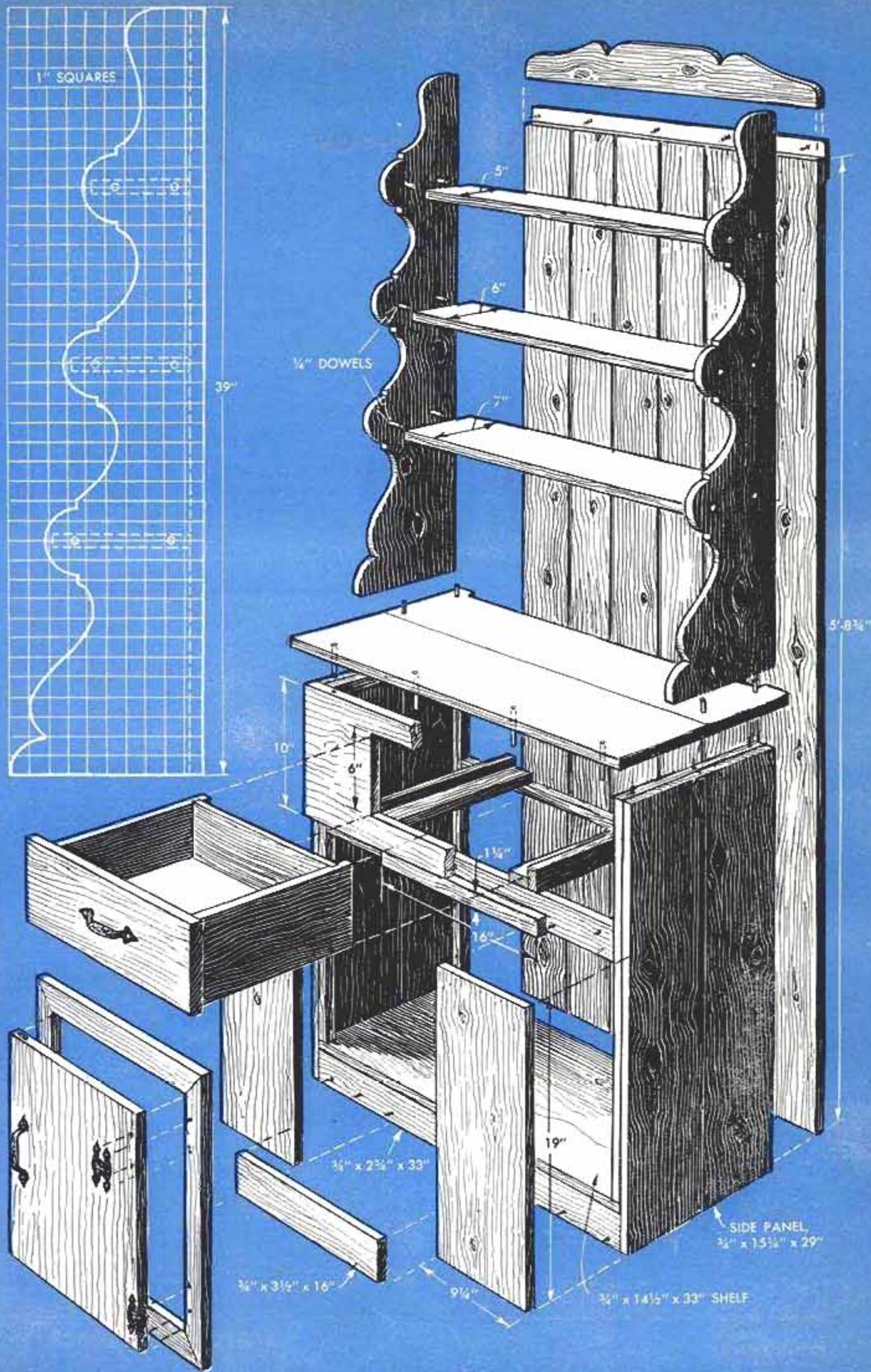
BACK-PANEL DETAIL



CROSS SECTION OF BOTTOM STORAGE AREA



CROSS SECTION AT DRAWER LEVEL





Yates-American photo

Butting end of front panel is sanded smooth for a tight joint. Exposed panel ends are also sanded

or $\frac{3}{4}$ -in. pine-faced plywood may be used for the flush door. Wrought-iron hinges and handles add to the rugged appearance of the cabinet. The drawer can be made without mortised joints by cutting the sides $\frac{1}{4}$ in. narrower to allow the plywood bottom

Reinforcing Loose-Leaf Pages With Cellulose Tape

If loose-leaf pages or spacers are subject to heavy use, try reinforcing the holes with a bit of ordinary cellulose tape. Fold a small piece of the tape over the hole and then repunch the hole.



to be screwed to the lower edges. Recess the screwheads so they will not wear the rails. The back is then fastened between the sides flush with the rear edges. Dowels are used to join the counter top to the base along the front edge. Wood screws driven up through cleats anchor it along the sides. Cut a recess in the back edge of the top $\frac{3}{4}$ in. wide by 33 in. long to accommodate the back paneling.

Six pieces of 6-in. V-tongue-and-groove pine $68\frac{3}{4}$ in. long form the back of the cabinet. Fasten them to the cleats and top panel of the counter with wood screws. Then cut out the two upright supports for the shelves. By temporarily nailing the two pieces together they can both be cut at the same time with a bandsaw. If a scroll or coping saw is used, cut one and use it as a pattern for the other. Fit the shelves between the uprights before fastening them to the counter. Dowels are used to fasten the shelves to the uprights and for joining the assembly to the counter top. Reinforce all shelves with screws driven in from the rear side of the back. Measure the height of the shelves closely and mark the back with horizontal chalk lines to prevent missing the shelves with the screws. Scroll-cut the top piece and join it to the cabinet with a cleat screwed to the top of the rear paneling as shown. ★ ★ ★

Modeling Clay Cleans Type

Ordinary modeling clay is effective for cleaning type on a typewriter that may have become clogged with dirt and ink. Using a piece about the size of a walnut, work it in your fingers until pliable and then press it onto the keys a section at a time. Roll it off as shown, folding the soiled area back into the ball, and rework the clay before cleaning the next section. A small piece will last for many cleanings.

Robert L. Hay, St. Petersburg, Fla.





Decorate With Hardwood Plywood

WHILE THE USE of hardwood-plywood panels on the walls alone will provide beauty and warmth for any room, the use of suitable built-ins will add much to the interest and practicability of a room.

For instance, the use of a planter-

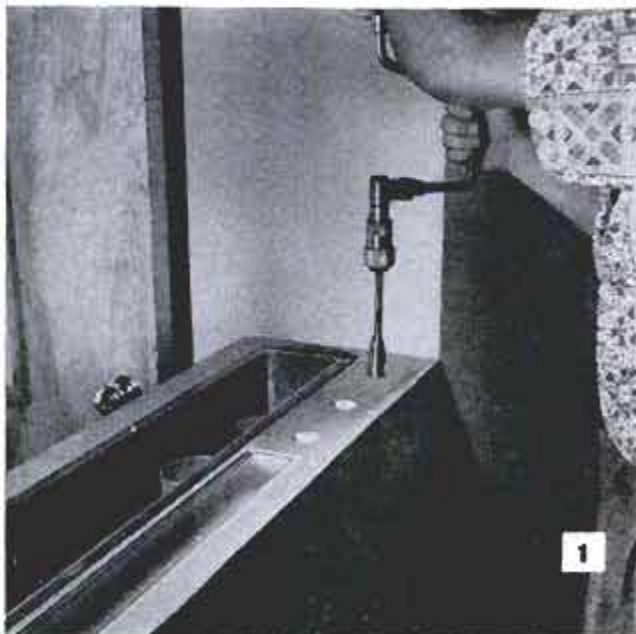
Drill holes for dowels in planter top for snug fit, making sure to drill only halfway through plywood

PART II

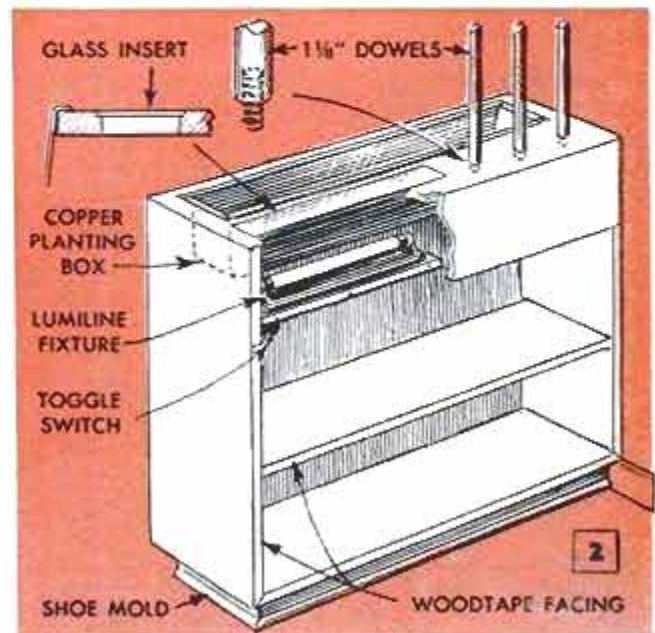
island, as above, gives the effect of a small entry hall without taking any apparent space from the room. The use of indirect lighting adds a dramatic touch to the plantings, the ceiling and down onto the books.

The planter was built completely from

Cutaway drawing shows relation of various parts of planter. Toe space at base prevents marring of finish



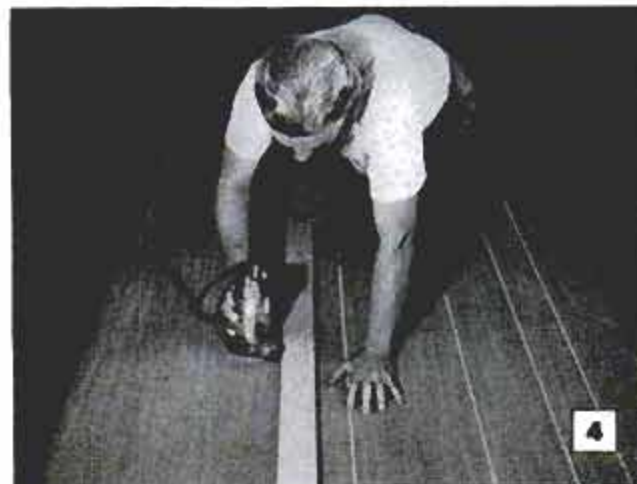
1



2



Although hardwood plywood has smooth surface, sand lightly before finishing. Sand the millwork, also



Running the grooves is simple task, but care must be exercised to keep grooves straight, correct depth

When necessary to leave plywood edge exposed, cover grain ends with Woodtape applied with special solvent



$\frac{3}{4}$ -in. plywood, faced two sides. The base consists of a frame of 4-in.-wide plywood, mitered at the corners so that the plywood stands on edge. This is fastened to the regular flooring with screws and glue blocks, after which a shoe mold is added. Make the base frame about five inches less in over-all size than the unit for toe space.

Then, carefully cutting all pieces of the planter to size, miter all butting edges. This allows them to be joined without the end grain showing. However, on the edges of the open book shelves, covering the end grain can be done, as here, by the use of Woodtape. Easily applied, photo 5, this product provides a simple answer to the problem of covering end grain.

When assembled, make a cutout in the top for a copper planting box. In this instance, the depth of the box is 8 in.; length and width will vary with your plan. The local sheet-metal shop will make the box if you have no facilities. Instruct them to put a 1-in. lip around it as this becomes the sole support.

The Lumiline fixture is mounted on a suitable shelf, screwed to the inside of the planter, beneath which is placed the toggle switch. Placing the switch as shown in drawing 2 keeps it handy yet unobtrusive. For the glass insert over the light fixture, use translucent diffusing glass. Do not use clear glass. Rabbet the top of the planter to take the glass flush.

When installing the large dowels that reach from the planter top to the ceiling, drill blind holes just large enough to take them with a snug fit, photo 1. Cut the dowels $\frac{1}{8}$ in. longer than the actual distance from the top of the planter to the ceiling. Then drill a hole in one end of each pole and insert a spring, as shown in Fig. 2. This feature has several advantages in that it

Occasionally grooves may be fuzzy. Sand lightly with block wrapped in sandpaper, held at 45-deg. angle



solves the problem of how to affix the ceiling ends of the poles, plus the very good feature of easing any future painting of the ceiling. The poles can be removed quickly at any time, and yet the springs hold them firmly in place.

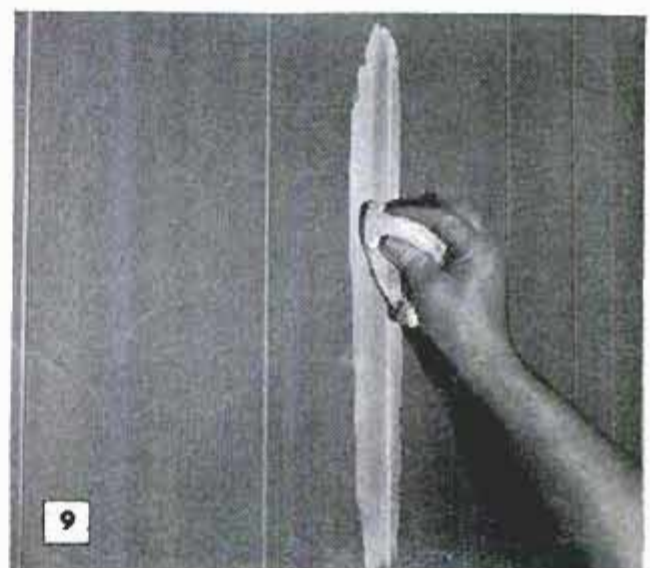
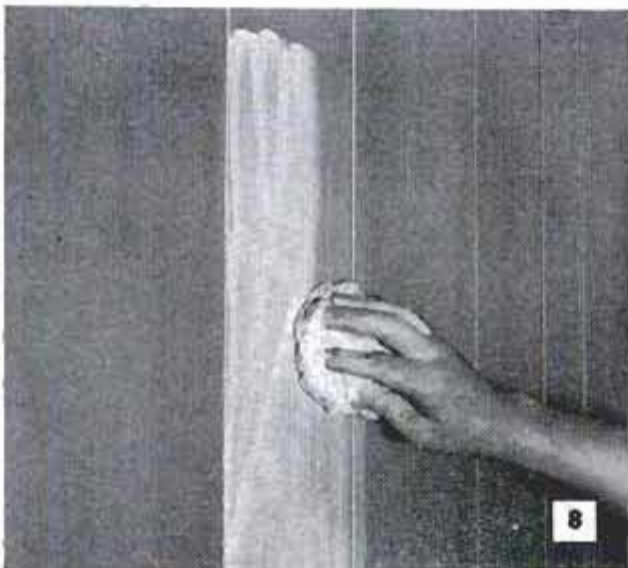
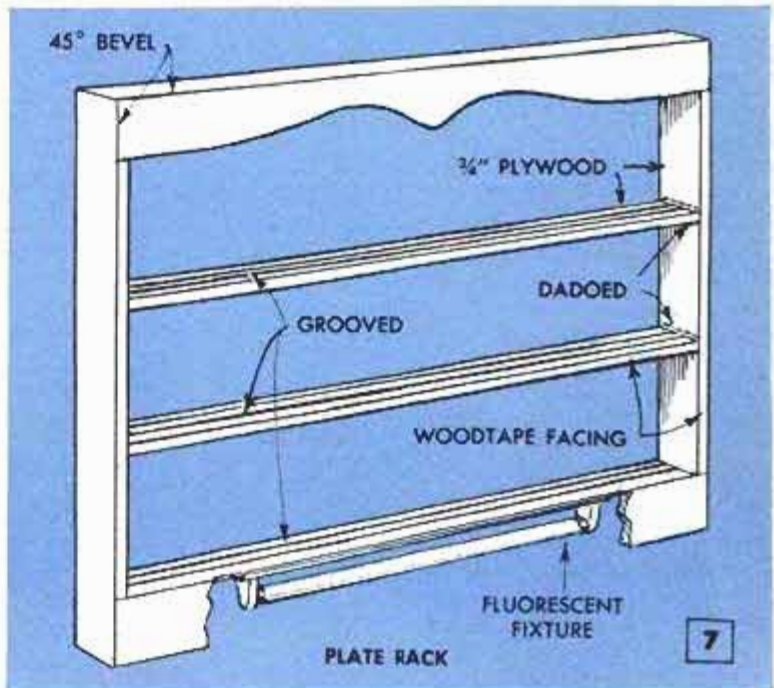
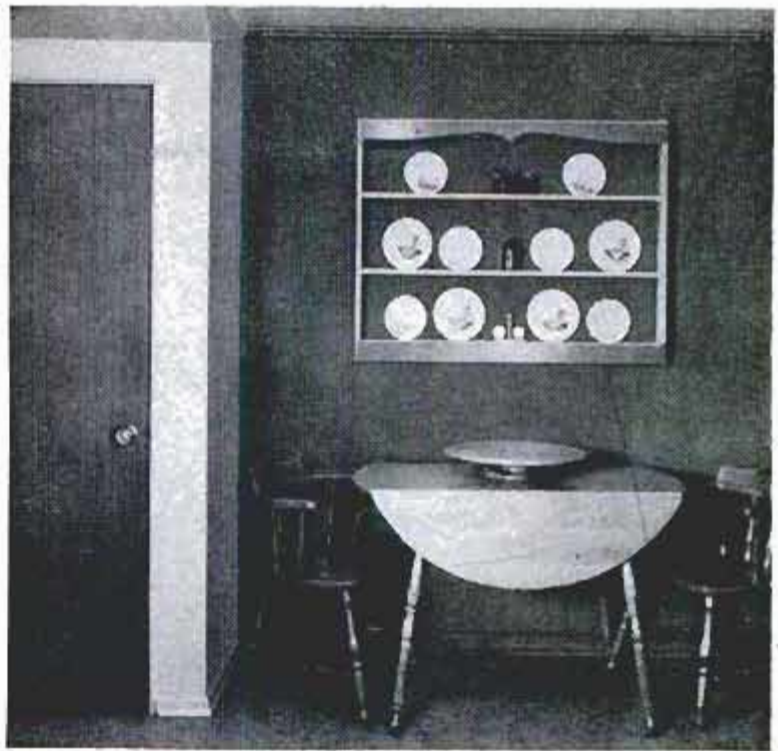
The grooving operation explained last month and shown in this issue, photo 4, should be done with care to produce straight and even lines. Occasionally a groove will be fuzzy on its inner slopes. Sand lightly with fine-grit paper wrapped around a block of wood.

Construction of the plate rail, Fig. 7, is similar to that of the planter. The depth of the unit is four inches and, in this case, the shelves were dadoed into the sides.

As with the planter, plan and install your wiring beforehand. Hardwood plywood, while beautiful in its natural state, is enhanced by proper finishing. Preparation of the plywood for finishing is accomplished with light sanding and thoroughly removing all dust. Then, using cheesecloth or other lintfree cloth, wipe on a stain (in this application, a charreuse stain was applied to remove the red coloring of the mahogany). Wipe the stain *with* the grain. As soon as the stain "takes," wipe surface clean before starting a new section. It is advisable to experiment on a scrap piece of the paneling to make certain you have the color desired.

(Continued next month)

Finishing operations, photos 8 and 9, start with stain of desired color, wiped with the grain then filler wiped against grain, allowing ample drying time. Final finish ends up as satiny smooth luster



Tape Underside of Range to Prevent Damage



When moving a kitchen range to clean behind it, sharp, burred edges on its underside may cause ugly gouges in the floor covering. To avoid this, apply a felt or fabric tape to the edges on the underside. Apply the tape with a waterproof cement, or use a self-adhering fabric which will not become loosened when water-soaked while the floor is being mopped.

☛ To clean plaster figurines, vases, etc., dip them in a starch-and-water solution. When the starch is dry, brush it off with a soft-bristled brush.

Auxiliary Flash Unit Improvised With Extension Cord and Dish Pan

When you wish to make a two-flash shot and have only one reflector, insert the second lamp in an extension-cord socket and clip it to the edge of a white dish pan as shown. An adapter may be used in the extension-cord socket which is set in the "on" position so it can be operated from the camera, though some distance away.

Ken Murray, Colon, Mich.



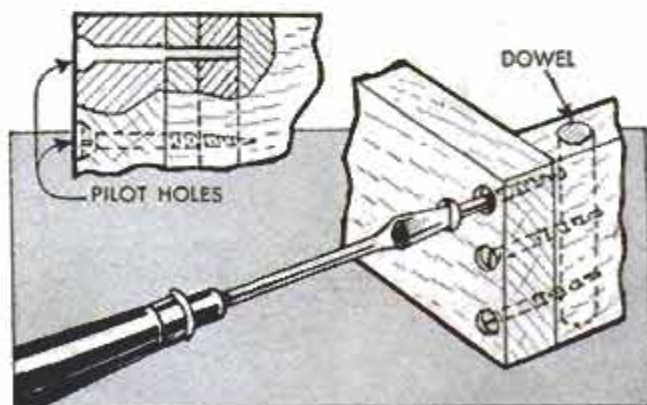
Neat Stick-On Labels From Tape

Labels that stick firmly to fishing-tackle boxes, suitcases, raincoats and children's school clothing are made easily from medical adhesive tape. They may be hand lettered or typed. Stick the blank label on waxed paper; the kind that is used for wrapping food is fine. The paper should be of such a size that it can be inserted in a typewriter. Type the required identification on the label. It will now pull easily from the waxed paper, but will stick firmly to any dry surface that is not waxed or oiled.

Charles H. Coleman, Aurora, Ill.

Anchoring Screws in End Grain

Where a strong joint must be produced by driving wood screws into end grain, there will be very little tendency for the screws to loosen if they penetrate a dowel as shown. The dowel is coated with glue and driven to a snug fit in the hole. Pilot holes for the screws should be drilled through the dowel to prevent splitting.

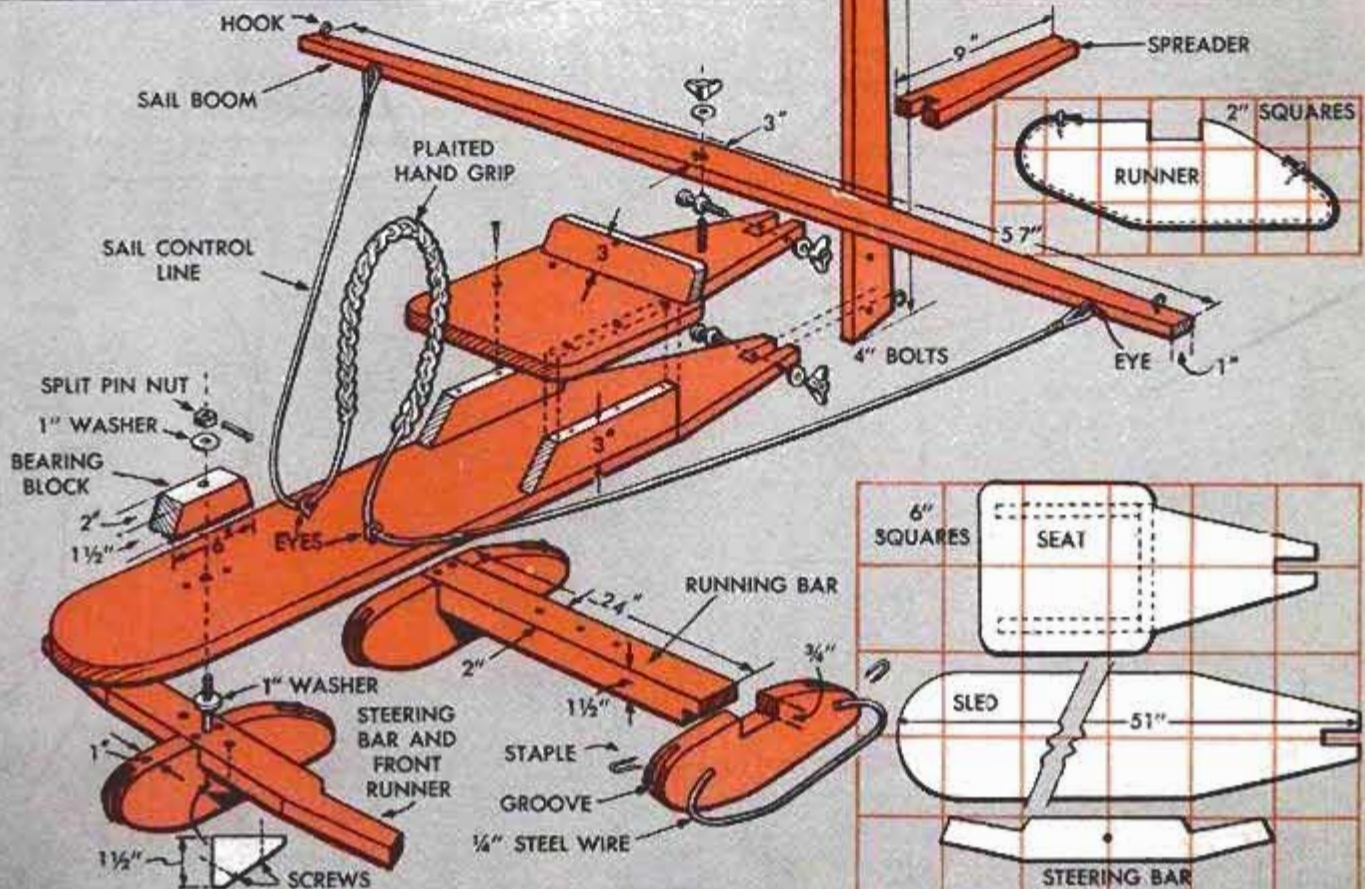
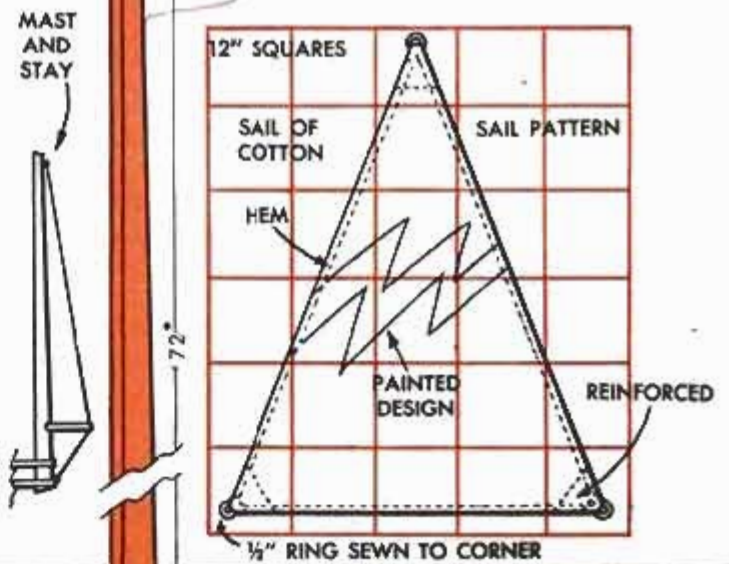


"NORTH WIND"— Boy-Size Iceboat

IT'S A SAFE, sharp performer on the blue ice of a frozen pond; a speedy wind-driven sled on level stretches of hard snow. You don't have to run directly before the wind. You can sail on the quarter with a following wind as much as 30 deg. off the course. The swinging sail boom and front steering give close control on fast runs.

The frame, seat, seat back and seat risers are cut from $\frac{3}{4}$ -in. pine, but the mast, strut and sail boom should be hardwood. Oak, $\frac{1}{2}$ in. in thickness, is just right. Only clear, straight-grained stock should be used. Cut the runners (all three are identical) from 1 or $1\frac{1}{8}$ -in. white pine and groove for the $\frac{1}{4}$ -in. round steel shoes. Notch the runners for the running bar, or spacer, and the steering bar. Countersink the head of the pivot bolt in the front runner. Join fixed parts with screws and glue. When joining, care must be taken to align the notched ends of the seat board and the frame vertically, so that the mast will stand perpendicular. Note that the bolts holding the mast, also the bolt on which the boom pivots, are fitted with wing nuts. Finish the mast and boom in natural color with spar varnish and the other parts with a sealer and colored gloss enamel.

Geo. W. Blow, Arlington Heights, Ill.



Paint Code Identifies Keys



The confusion of fumbling through a fistful of keys to find the right one, or telling someone else by phone which key to use, is avoided by painting a color code on matching key and lock. Paint a stripe on the lock, and apply a matching color to

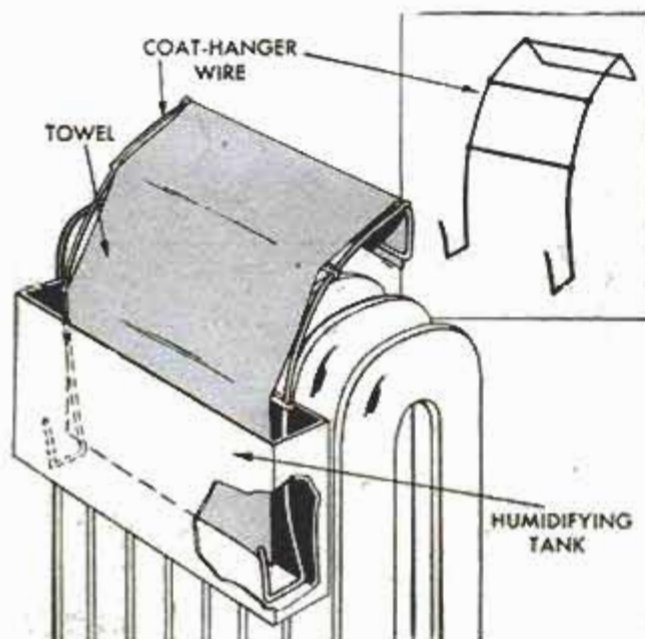
the key. For more than a few locks use a combination of two or more colors, striping the lock and key similarly.

Dowel Plugs Aid Mortise Drilling

Mortises, formed by drilling a series of holes, can be made easier and neater by plugging each hole as it is drilled with a dowel slightly longer than the depth of the hole. The holes can then be drilled closer together leaving less wood between them to be chiseled out. After all holes are drilled the dowels may be pulled out with a pair of pliers and the mortise chiseled clear.—P. Casperson, El Cajon, Calif.

Towel Speeds Evaporation Rate Of Radiator Humidifying Tank

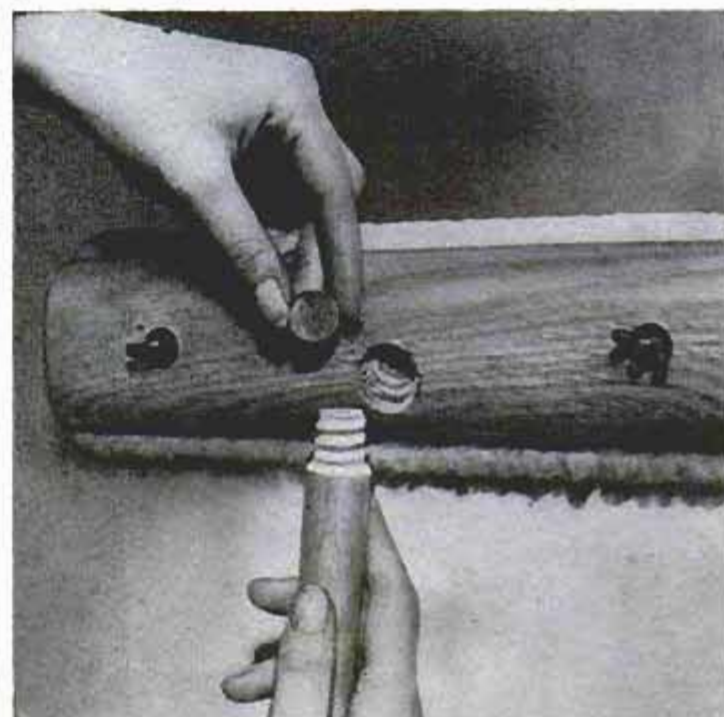
A turkish towel draped over a coat-hanger-wire frame as shown, and fitted in a radiator water pan, will greatly accelerate the rate of evaporation to increase humidity inside the house. The towel, which acts as a wick, may become hardened with lime in a few weeks and will have to be replaced.—Ed Packer, Oak Park, Ill.



Tighten loose handle on household brush by spreading twisted wire and gluing tang back in handle

Bristle Brush-Up

Cork washer placed at bottom of threaded hole in push broom prevents handle from working loose





Half of hollow rubber ball slipped on brush handle prevents paint from running down handle onto fingers. Simply cut ball in half, punch hole in center of one of the halves and push it on handle as shown above



Photograph upper right, use wire brush to clean threads, string, etc. from carpet sweeper or vacuum-cleaner brushes. Avoid pricked fingers when cleaning wire brush by touching lighted match to wire bristles only

Lower left, when storing paintbrush in turpentine, drill hole in handle and hang it on wire arm so bristles do not touch bottom of can. Arm is piece of wire hanger shaped as shown and soldered to bottom of container

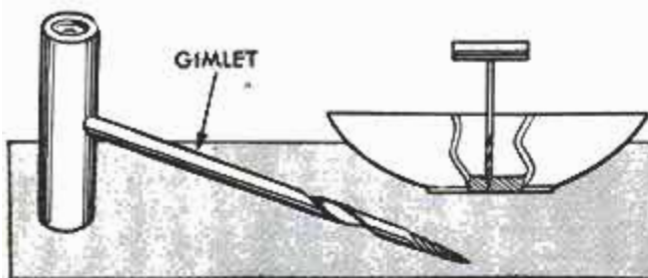


It is easier to clean paintbrush when wire-mesh disk is placed on two blocks on bottom of can of cleaner and bristles are flexed against mesh as in lower center photo. Paint washes off and settles to bottom of can

Lower right, one ordinary and one spring-type clothespin nailed together as shown form adjustable holder for small paintbrush when slipped on rim of jar. Drill small hole for nail to prevent clothespins from splitting

Above, old typewriter-eraser brush with bristles trimmed short so they are stiff and compact serves as handy applicator for paste-type shoe polish. The small brush is especially useful for spreading polish on two-tone shoes with intricate patterns and around soles and fabric insets

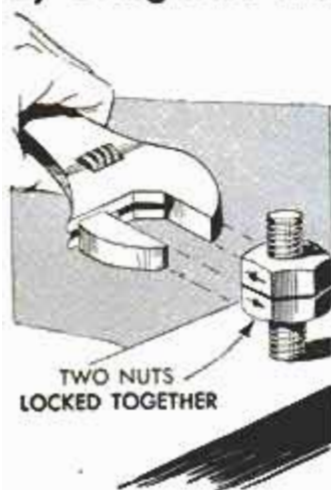




Quickie Bonbon Server

With a 15-cent gimlet and a 6-in. wooden bowl you can make an attractive little candy dish almost as quick as you can say bonbon. Simply turn the gimlet into center of the bowl and leave it there for a handle. It is easier to start the gimlet if a small pilot hole is first drilled through the bowl. A coat of clear lacquer on the steel part of the gimlet will keep the metal shiny. A disk of felt may be glued to the bottom of the bowl to prevent marring.

Threaded Studs Removed By Using Two Nuts

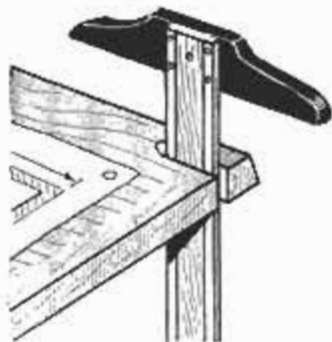


When only the threaded portion of a stud is accessible, use two nuts turned together tightly on the stud to remove it without damaging the threads. Fit a wrench on the lower nut and turn off nuts and stud together. Heating a tight stud often helps to loosen it.

When making boiled starch, drop a little paraffin in it. Clothes starched with this solution will have much less tendency to stick to the soleplate of an iron.

Slot in Board Holds T-Square

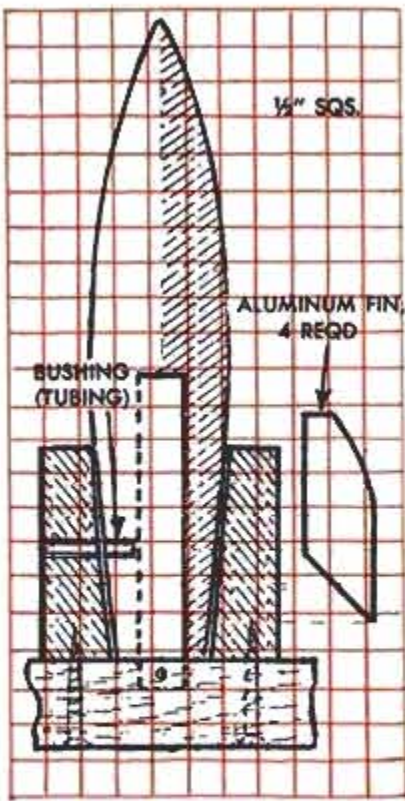
A T-square may be kept conveniently at hand and yet out of the way by hanging it in a notch cut on the edge of the drawing board. The notch should be near the top of the board and may be lined with felt to protect the T-square edges. An additional piece of felt on top of the board extending beyond the cut will prevent disalignment of the crossbar should the T-square be accidentally dropped into the slot. Sponge rubber may be used in place of felt.



Roll-Fed Telephone Note Pad

Heavy sheet metal was used to make this telephone note pad which is equipped with a roll of adding-machine tape as a paper supply. The roll rotates on a 1/4-in. bolt fitted between two pieces of sheet metal welded to the bottom of the L-shaped writing surface. The paper passes up through a slot at the back of the writing table and under a bar welded near the front edge, which also aids in tearing off used paper. Sheet-metal clips welded to the side of the holder grip a pencil, and the entire assembly is attached to the wall with screws through the right-angle flange of the top piece. File all exposed edges on the sheet metal smooth and apply one or two coats of enamel to the completed unit so it will harmonize with the color scheme of the kitchen.—E. V. Reyner, Townsend, Mont.



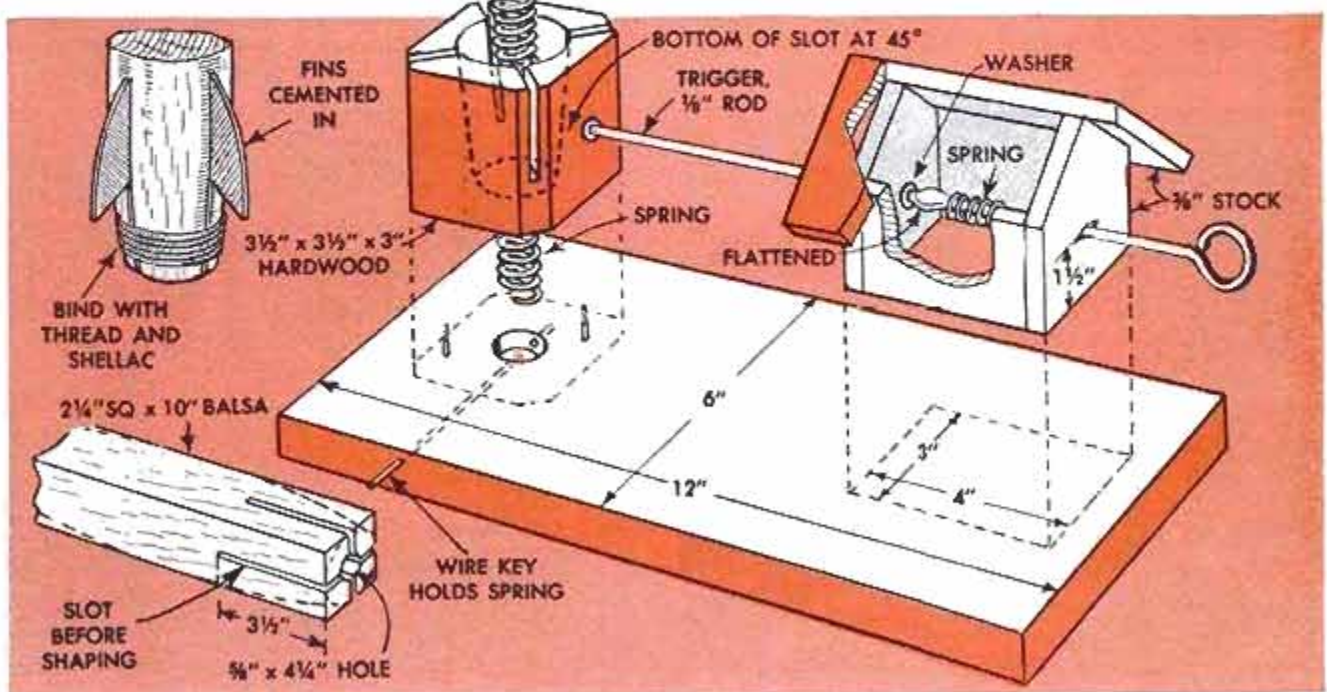


Rocket Ship and Launching Station

By
Hi Sibley

YOUNGSTERS will be delighted with this "toy of tomorrow" that features a fast-flying, lightweight balsa rocket ship that has aluminum tail fins to guide it in flight. Power for the ship is supplied by a coil compression spring concealed in the launching tower. Rocket take-off is controlled by pulling a spring-loaded trigger rod that extends through the "spaceship station." When the ship is pushed down into the tower so that it compresses the spring, one end of the trigger rod fits into a hole in the ship and holds it in place un-

til released. To prevent wear in the soft balsa wood of the hull, the hole is bushed with a short length of small-diameter tubing. Drill a 5/8-in.-dia. hole 4 1/2 in. deep in the end of the balsa block used for the hull, then cut the slots for the tail fins. After the hull has been shaped and the fins cemented in place, bind the end of the hull with thread as indicated. Brush a coat of shellac on the thread and over the hull to seal the wood. Aluminum paint is applied over the shellac to give the spaceship hull a more authentic metallic appearance.



SOLVING Home Problems

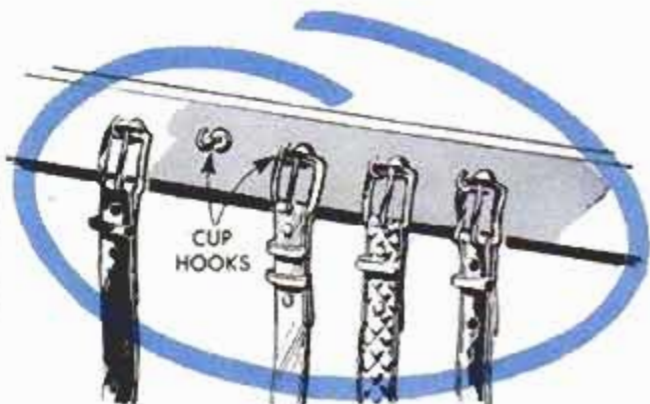


RECIPE CARDS and clippings of new recipes have a way of slipping to the floor or curling at the corners. Prevent this by attaching the card or clipping to the back of a cabinet door with pins or brads



NYLONS can be snagproofed for travel or storage in a drawer or handbag simply by folding neatly and inserting in an ordinary letter-size envelope. Label envelope so that it is not accidentally discarded

CUP HOOKS screwed into the back of a closet door, or into the wall or edge of a shelf, keep dress belts handy and always in good order. Each hook will hold two or more belts hanging by the buckles as illustrated. Space the hooks about 3 in. apart

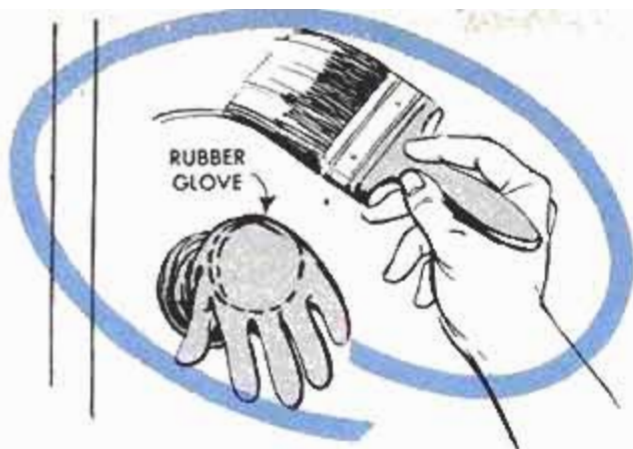


LEGIBLE ADDRESS on a large package is easily written with a matchstick dipped in ordinary writing ink, or India ink if you have it at hand. Matchstick scribes line much heavier than that of a pen. There's less danger of blotting if letters are printed freehand

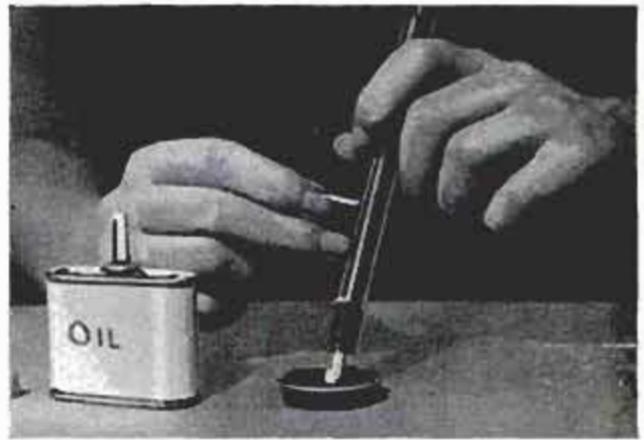


PLASTIC BOTTLE PUMP of the type used with lotions and other thick liquids is easily cleaned by inserting in a tumbler of warm water with detergent. A few strokes restore pump to original effectiveness





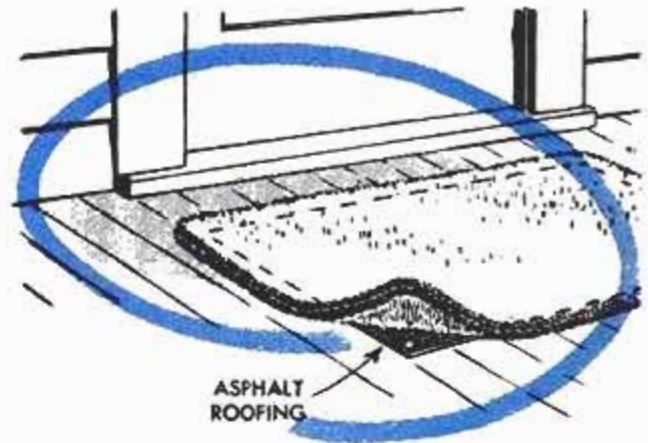
EFFECTIVE PAINT MASKING for doorknobs with round plates can be made from toy balloon or a discarded rubber glove. Just slip the balloon or glove over the knob and hold in place with cellulose tape



FOUNTAIN PEN makes good one-drop oiler, especially a pen on which point has been damaged and is no longer worth repair cost. Fill with light oil and use for lubricating sewing machines, small motors



LARGE COOKIE TIN placed on floor of utility room or hallway catches water dripping from wet or snow-covered galoshes, rubbers and umbrellas, prevents water stains on the floor or rug. If used in hallway, tin should be placed near wall or in corner

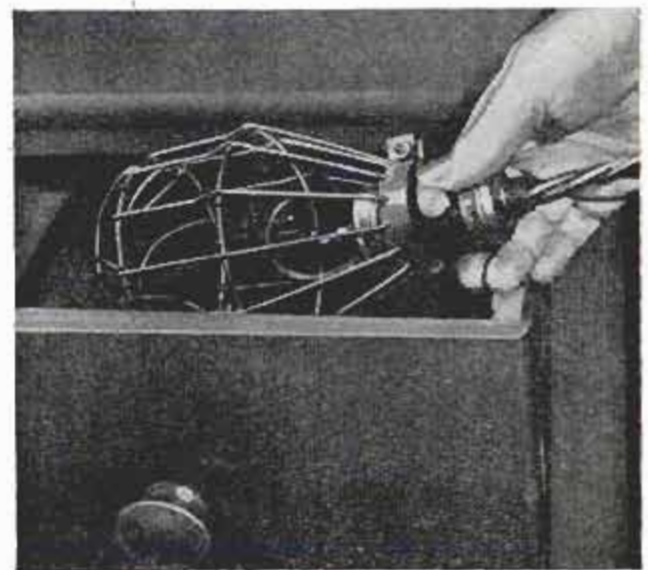


FIBER DOOR MAT will stay in place if you lay it over a piece cut from surfaced roll roofing and tacked to porch floor. The piece of roll roofing should be about 2 in. smaller each way than the over-all size of the mat, so that mat conceals it at all times

SMALL SCREW HOOK, or L-hook, will anchor a flowerpot safely on a sloping window sill. Determine the location of the flowerpot, allowing space for sash to close, then drive screw hook into sill. Place flowerpot so hook enters hole in bottom as shown



HEAT FROM SMALL LIGHT BULB in trouble lamp will shrink wood in a drawer sufficiently so that it can be fully withdrawn and edges planed for an easier fit. Just pull the drawer out as far as it will go without forcing unduly and place lamp inside



see ad, Jan 55, 251

Garage Door Protected by Roll-Type Weather Stripping



Tacked to the bottom edge of a wooden overhead garage door, roll-type weather stripping proves beneficial in three ways. First, as weather stripping, it helps to keep the door closed tightly, shaping itself to the floor and preventing drafts. Second, it prevents the door from contacting the floor, so that moisture is not absorbed that may cause loosening of the paint and rotting of the wood. Third, it reduces the noise of the door striking the floor, and serves as a shock absorber. Since the weather stripping raises the door a trifle from its original position, compensating adjustments may have to be made in the latching mechanism of the door hardware.

It is possible to write black on a glass or bright metal surface with a steel pen by using an ink consisting of water glass, 1 to 2 parts and liquid India ink, 10 parts.

Ear Syringe Used to Blow Lint From Camera-Lens Parts

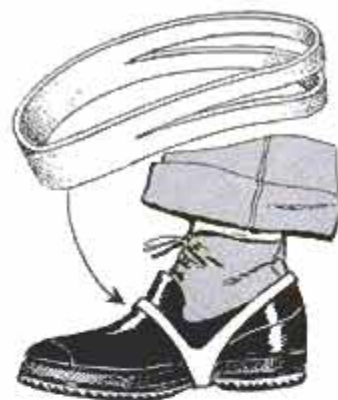
The last step in cleaning a camera is to remove the lint that has settled on the lens. A small ear syringe provides an effective means of blowing the lint from the camera. Blowing with the mouth also helps to remove the debris, but the breath deposits moisture on the camera parts where it may cause trouble later.

Frank A. Javor, North Bergen, N. J.



Straps Cut From Inner Tube Hold Heavy Rubbers on Shoes

Farmers and other outdoor workers who wear heavy rubbers that might be pulled off in deep mud can prevent this by wearing rubber-band straps cut from an inner tube. Each band is slit about half its length as shown. The wide portion of the band fits across the bottom of the foot while the slit portion fits over the instep and around the heel.



Measuring Distances by Pacing

Measuring such distances as the length of a driveway or the width of a plot of ground can be done fairly accurately by pacing, if the average length of your stride is known. To determine this factor, measure a distance exactly 100 ft. long and walk it several times, counting the number of steps required. As an example: If you walk the 100 ft. in 38 paces, your pace would be 2.63 ft. The number of your paces multiplied by this number then would produce the approximate length of any definite distance paced.—O. H. Hampsch, Oak Park, Ill.

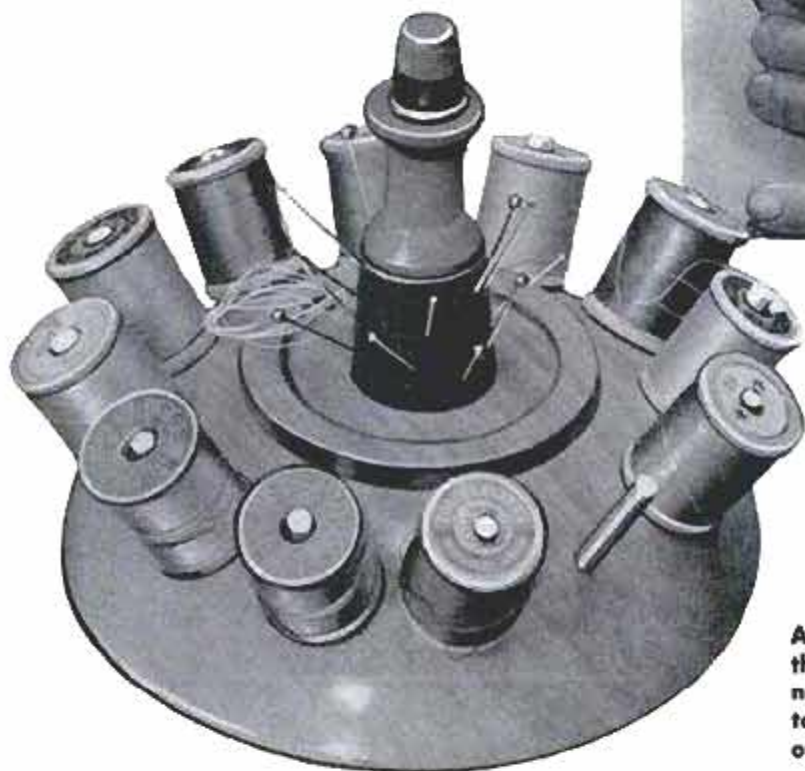
Sewing "Caddy"

It may look like half of a manmade satellite, but it's actually a down-to-earth holder for sewing needs. Made from a 6-in. wooden bowl, dowel pegs, an empty spool and a cork, the unit shown below proves handy for any sewing job. Thread-spool pegs $\frac{3}{16}$ in. in diameter and $1\frac{1}{2}$ in. long are glued into holes drilled at an angle of 50 deg. from horizontal. A longer dowel runs up through the center of the cork pin-cushion and through an empty spool that provides a handle. The dowel projects above the spool to form a thimble rest.

Walter E. Burton, Akron, Ohio.



Peg holes are drilled with bowl supported on an angled drill-press table. A nail driven through a hole in the center of bowl and into a board permits bowl to rotate for uniform drilling



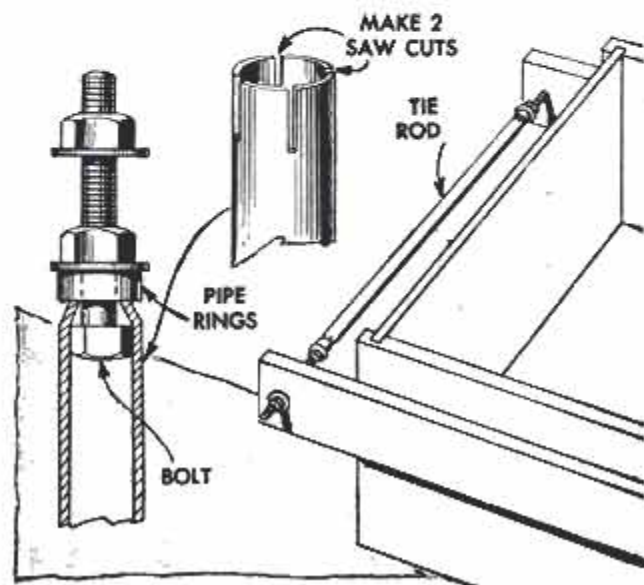
An array of sewing needs is at hand on this completed "caddy" (left). Pins and needles project from a cork at the center, topped by a handle and thimble. A circle of pegs on base holds spools of thread

Standard Pipe and Bolts Make Lightweight Tie Rod

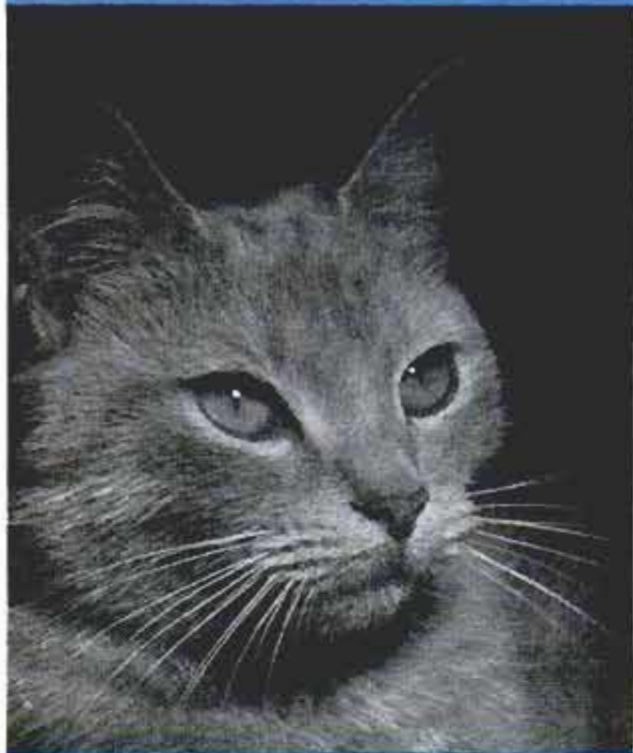
When ready-made tie rods are not available, a quickly assembled tie rod can be made from standard pipe with short bolts fitted in the ends. To do this, first cut two rings for each tie rod off the end of the pipe stock. Then cut the pipe to the desired length, saw two crosswise cuts in the ends, insert the bolt head and bend in the cut sections. After the ring is slipped over the bent sections of the pipe and tightened, the tie rod is ready for use.

Charles H. Willey, Penacook, N. H.

☐ A white, cloth window shade, fitted in regular shade brackets screwed to the wall of a recreation room, provides a substitute projection screen for home movies. When not in use, the screen can be rolled up out of the way.

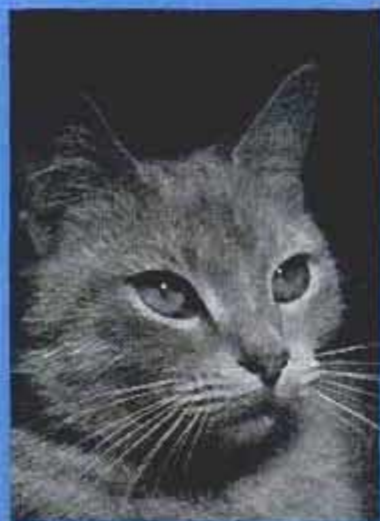


Photokinks 30



Calibrate Your Enlarger

By Joseph Foldes



1

WHEN MAKING several different sizes of enlargements from the same negative, considerable time and darkroom materials can be saved when you work with a calibrated enlarger and use the table of enlarging ratios shown below. You then will get good quality prints having consistently uniform tone values, Fig. 1, without having to make several test strips for each change of print size.

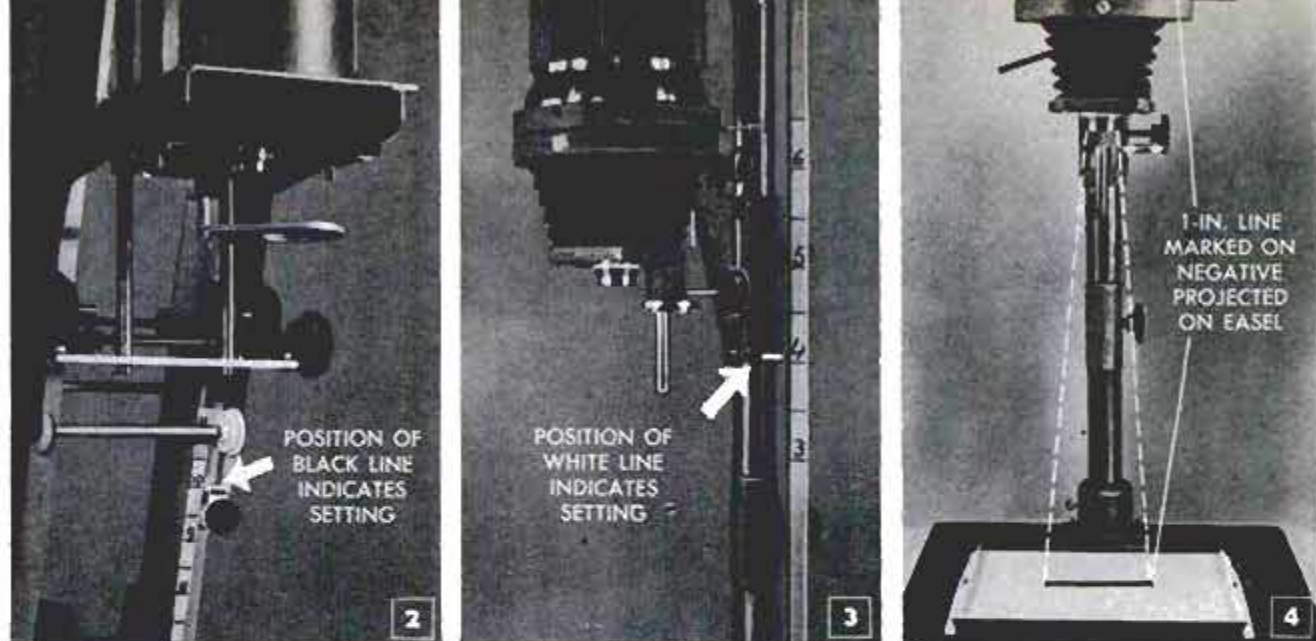
Calibration Scale

First, make the calibration scale, so that you know how many times (diameters) a negative is being enlarged. To establish the number of times of enlargement for any one position of the enlarger head, draw a line 1 in. long on a piece of clear negative or tracing paper as shown in Fig. 6, and place it in the negative carrier. Focus the line on the easel with the enlarger head lowered to give the minimum number of times enlargement to the nearest half unit. Then, raise the enlarger head and mark each intermediate position on the upright or support—2, 2½, 3, 3½, etc., until the enlarger is as high as it will go. If more than one lens is used with the enlarger, a different scale must be made for each of them. The aperture must be the same for all tests and prints.

Fig. 2 shows a calibrated Omega DII enlarger with a strip of white adhesive tape attached to the right-hand supporting beam and the calibration scale marked on the tape in India ink. Select any part on the enlarging head that slides on the upright

Enlarging-ratio numbers are number of times (diameters) projected image is larger than negative

Enlarging ratio as read on calibrated enlarger	Guide No.	Enlarging ratio as read on calibrated enlarger	Guide No.
1½	1	8½	14.5
2	1.5	9	16.5
2½	2	9½	18
3	2.5	10	20
3½	3.5	10½	22
4	4	11	23.5
4½	5	11½	25
5	6	12	27
5½	7	12½	29
6	8	13	31
6½	9	13½	33.5
7	10	14	36
7½	11.5	14½	38
8	13	15	41



When calibrating enlarger like Omega DII, Fig. 2, attach scale to upright. Fig. 3, affix scale on wooden strip for other enlargers. Fig. 4, 1-in. line on negative projected on easel determines the enlarging ratio

and scribe a pointer or index line on it for use as a point of reference when adjusting the enlarger to the desired setting. For the Omega DII enlarger, the upper edge of the locking block is used as a pointer. Since it has a light-colored surface, a black line is painted along the upper edge for easier reading.

On some enlargers it is impossible to attach a suitable material on the upright for marking the scale because it would interfere with raising and lowering of the enlarger head. In this case, mark the scale on a thin strip of wood and hold it next to the upright each time a setting is changed as shown in Fig. 3, or fasten the strip to a

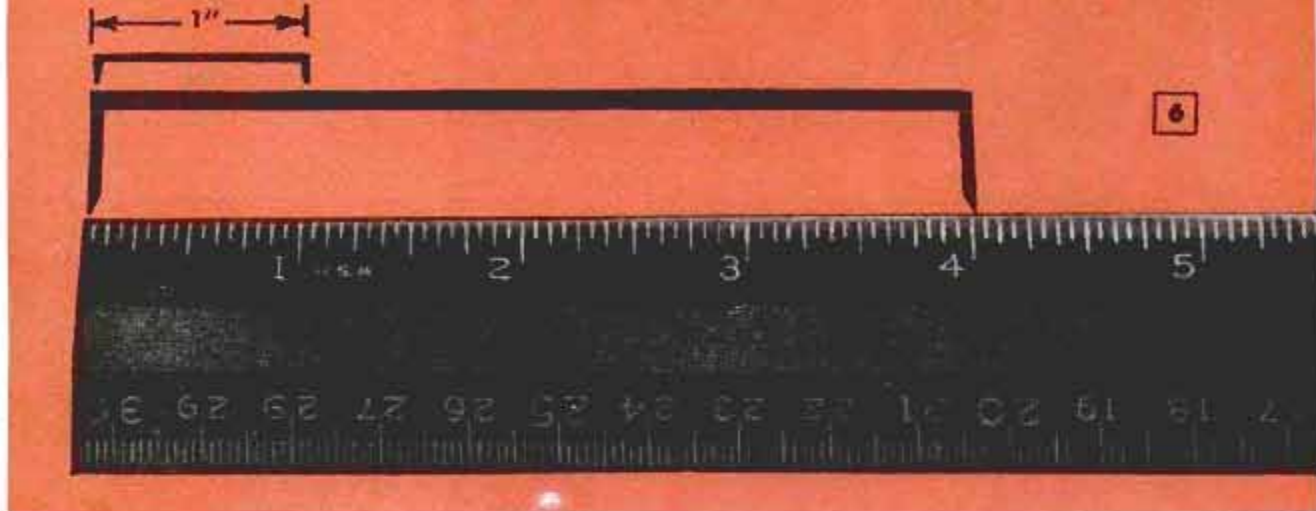
wall bracket positioned so that it is adjacent to the upright for easy reading.

Correct Exposure

To get the proper exposure for any size enlargement, first make a print by the test-strip method, noting the number of times of enlargement and exact exposure time required for a good quality print. Look up the guide number for the test print you have just made, using the table shown and then the guide number for the enlargement about to be made. To arrive at the new exposure, multiply the new guide number by the exposure in seconds of the test enlargement. Then divide the result by the old

3 Determining right exposures for different size enlargements by test-strip method, or by guess, often results in prints that are over or under-exposed as shown in photos below. Use of calibration saves time and assures uniform exposure





To establish number-of-times enlargement for any one (drawn on clear negative or tracing paper) on easel. position of the enlarger head, project a 1-in. line. The 4-in. line above indicates 4-times enlargement

guide number which will give the correct exposure in seconds for the new enlargement. The same procedure applies if the print is larger or smaller than the first (test) print. When an exposure is made with the enlarger head set between lines, 5½ and 6, for example, make a corresponding adjustment in the guide number.

Variables That Affect Prints

Since the speed or scale of contrast varies with the different types of papers, it is necessary to make one test print for each type and grade. The speed of even the same paper may vary somewhat if it is taken from a different lot, making it necessary to

run a test print beforehand for good results.

The illumination and optics used in an enlarger may introduce slight variations, but they are usually insignificant. If it is found that your enlargements turn out consistently darker or lighter than the test print, make an allowance for it by increasing or decreasing the new exposure slightly as the case may be. Other factors entering into the determination of length of exposure are density of negative, color of negative and duration of development. Negatives of medium density and with good tone values simplify developing work. Also, follow through with accurate and uniform timing when processing prints. ★ ★ ★

Linseed-Oil Dip Eases Nail Driving

Nails that are dipped in linseed oil can be driven more easily. This treatment is especially helpful when hard or tough woods are used. The oil also prevents rust-

ing, which damages the wood fibers and reduces the holding power of the nail.

Frank A. Javor, North Bergen, N. J.

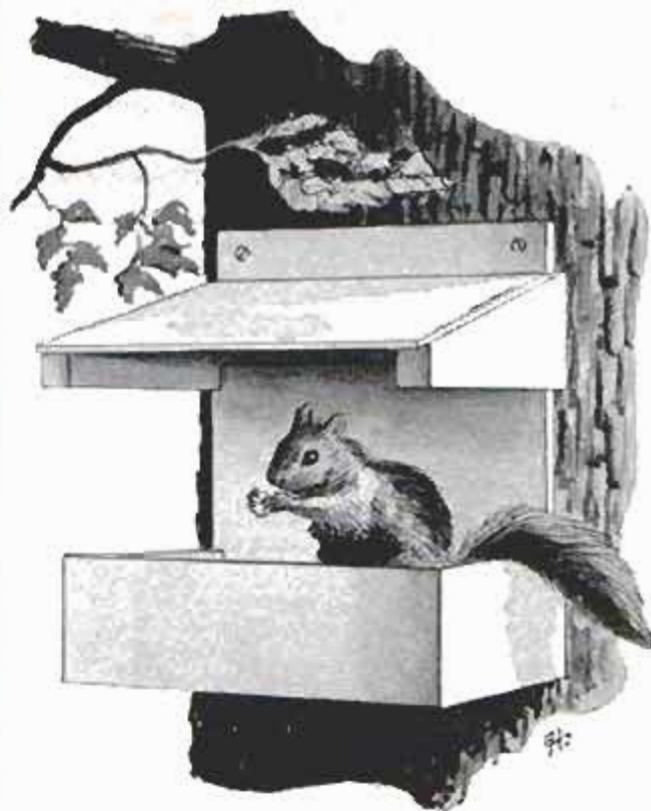
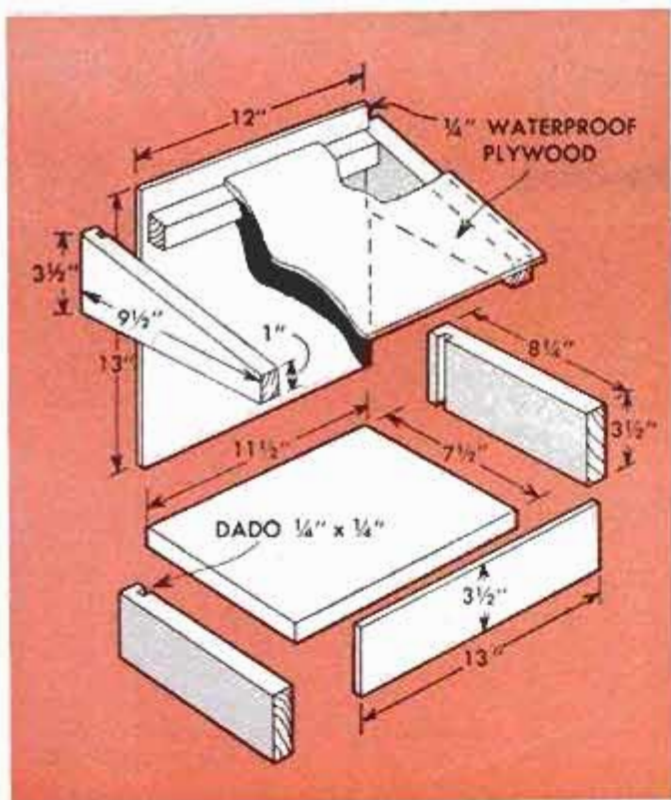


"Magnet Mop" Picks Up Metal Parts

Nuts, bolts and other metal parts are easily retrieved from the floor with this magnetic mop made of one or more bar or dowel magnets taped to the end of a broom handle. Use adhesive tape and attach a magnet crosswise at the end of the handle, adding additional magnets end to end at the sides for wider coverage.



☞ It's unnecessary to mat a water-color painting for framing if, before it is painted, masking tape is used to completely cover the margins, leaving only the area to be painted visible. The tape will prevent splashes and paint runs on the margin, and it provides a good surface on which to test colors and shape your brush.



Feeding Station Provides Food for Squirrels

Squirrels will appreciate this feeding station, especially during winter months, to supplement their cache of nuts. Waterproof plywood is used for the back, roof and front panel; and standard 1-in. stock for the remainder of the pieces. The roof cleat is 11½ in. long and beveled on one

side to fit the angle of the roof, which is 10 x 13 in. In assembling, first attach the floor and cleat to the back panel. Then install the sides and rafters which have been grooved to fit the edge of the back. Finally, nail on the roof and front panel.

Gilford C. Whipple, Binghamton, N. Y.

Deep Bowl Traps Beetles

MOIST COOKIE OR
CRACKER CRUMBS



Beetles that inhabit a basement can be trapped in a bowl with deep, smooth sides, such as the one shown. To make the wooden base with uprights, which provide an easy means of entering the bowl for the insects, tack two wooden blocks to one edge of a

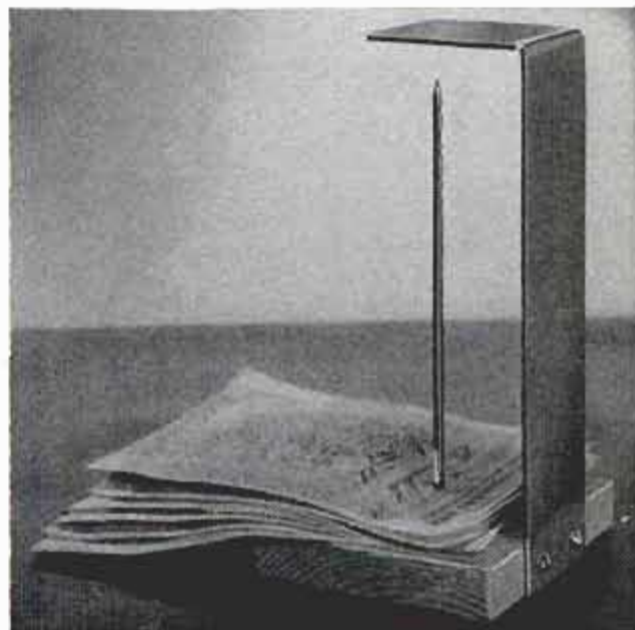
larger block as shown. Place moist cookie or cracker crumbs inside the bowl to attract the beetles. Pour insecticide over the beetles to destroy them.

Arthur Trauffer, Council Bluffs, Iowa.

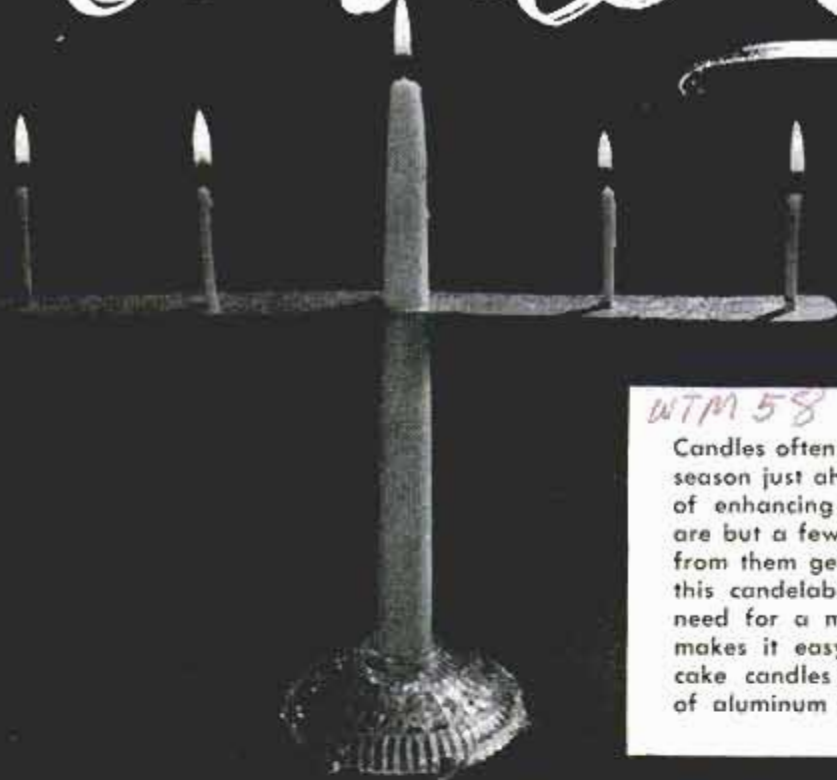
❑ Instead of using tacks or nails to repair loose linoleum, clean the floor underneath and apply a waterproof cement. Weight the linoleum until dry, washing off any cement that may ooze out along the edges.

Guard for Spike File

Injury from a spike file can be avoided by equipping it with a guard as shown in the photo. This is nothing more than a strip of light sheet metal bent as indicated and screwed to the base of the spike.



Candle Story



WTM 58

Candles often make the setting, and with the holiday season just ahead why not start now to devise ways of enhancing the candles you will use? Following are but a few suggestions you may wish to try, and from them get ideas of your own. Take for example this candelabra. Not only does it meet last-minute need for a multiple candleholder, but its simplicity makes it easy to store when not in use. The four cake candles are turned into holes cut in a strip of aluminum which fits over a standard-size taper



Colored "drippings" may be applied easily to a candle by holding a crayon over the flame until soft and then touching it to the top of the candle. Heat will cause the spot of color to run slowly down the side

Add originality to your candles by cutting a spiral groove in them with a wood gouge or similar tool. On colored candles the gouging will produce a two-tone effect as they are usually white inside



A candle which is lit by striking it as you would a match will surprise holiday guests. To prepare it, snip the wick short and dip it in a paste made by soaking the heads of book matches in a little water

If the candles which you saved from a previous occasion have become soiled and embedded with dirt, try cleaning them with denatured or rubbing alcohol. Moisten a soft cloth and wipe the candles thoroughly





Adhesive-tape spools from the medicine cabinet are excellent emergency candleholders for holiday parties. Decorate the outer ring with a length of colored cloth ribbon as shown



A portable electric candle can be made by fitting a flashlight in a length of mailing tube. Cut a slot in the tube for access to the switch, and tape colored cellophane to top to represent flame



Candles can be made to release bursts of fragrance at intervals while they are burning if perfume is injected into tiny holes drilled in the sides of them. Seal the perfume in the holes with shavings from the candle



To make a reflective candlestick holder cut a 5-in. disk of stiff paper with a 1-in. hole in the center, cover it on one side with aluminum foil, and staple it together to form a shallow inverted cone. Then place a candle in the center hole and fill the inside of the cone with plaster or putty to steady the candle

Inexpensive decals offer an easy way of decorating candles. Soak the decals in water for a few minutes and then slide them on the candles, pressing them dry with a soft cloth. If the decals do not stick, remove them, apply a coat of shellac to the candles and then press the decals against the wet shellac



Bars of paraffin are easily converted into novel candles by heating, shaping and inserting small cake candles in them. Warm the bars in your hands or in water of 100 deg. or less before shaping. Use a gimlet or drill to make the holes for the candles. Shellac applied to the paraffin will prevent dripping

Ordinary liquid food color to which has been added an equal amount of denatured alcohol can be used to color candles. Apply the color by dipping or with a cotton swab. Designs and names may be also drawn on the candles with a small brush. To remove the color hold the candles under running cold water



Prevent Child's Balloon From Drifting Away

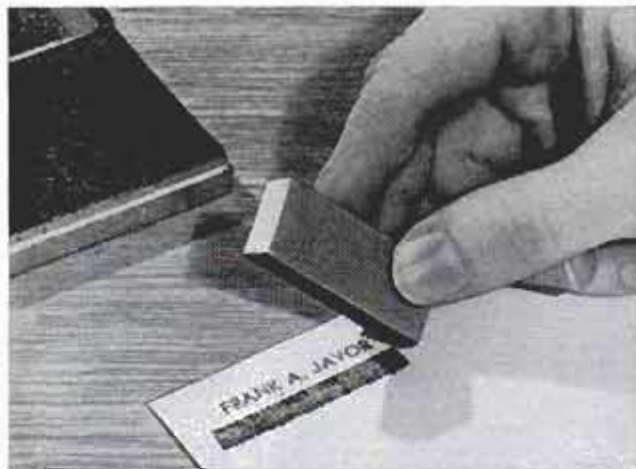
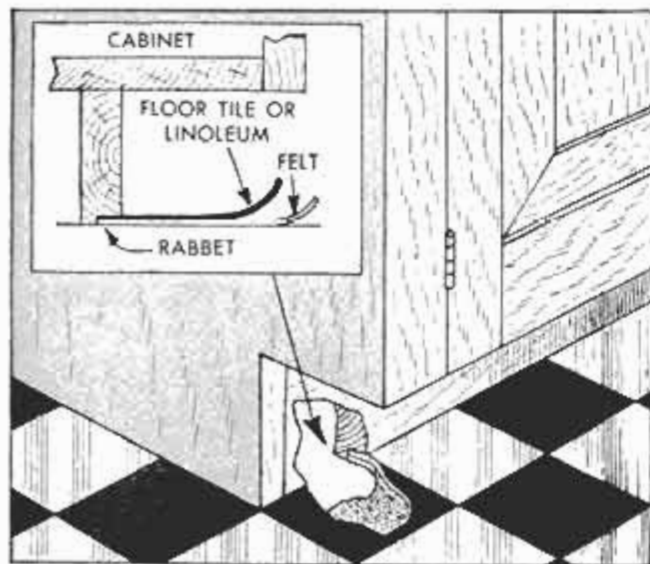


Next time your child has a balloon to play with, prevent it from drifting away by tying an empty wooden thread spool to the end of the string

Base of Kitchen Cabinet Rabbeted To Receive Edge of Floor Tile

Floor tile and linoleum can be fitted easily around a floor cabinet in the kitchen if the bottom outside edge of the cabinet is rabbeted to receive the floor covering. Before the cabinet is installed, the rabbet is cut $\frac{3}{16}$ in. up from the bottom and approximately $\frac{1}{2}$ in. deep. The undercut will allow up to $\frac{3}{8}$ -in. variation.

Victor H. Lamoy, Upper Jay, N. Y.



Stamp Obliterates Lettering

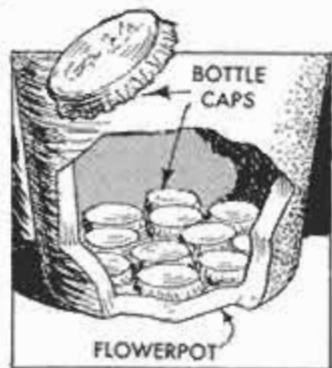
An old address or outdated price is easily blocked out with an eraser and stamp-pad ink. The eraser can be cut to the required size with a razor blade and used the same as a hand stamp. A wooden handle can be glued to the eraser if desired.

Painting Sequence for Door

Visible paint overlaps can be avoided when finishing a paneled door if the proper sequence is followed. Paint the molded edges first, working away from the corners, and then cover the panels. If any paint gets on the rails and stiles while doing the recessed areas, wipe it off immediately. After finishing the panels, start at the top crossrail and work down the vertical stiles, painting each rail as you come to it. Center stiles are painted down together with the outer stiles. Finish by painting the leading and trailing edge, being sure not to get paint on the opposite side of the door. Brush marks in enamel are avoided by using paint of the right consistency and working in a temperature above 65 deg. Paint should be applied sparingly so it does not sag or run, but enough must be used to cover the surface to eliminate touching up.

Bottle Caps in Flowerpot Serve as Drainage Material

When pebbles or ceramic fragments are not available for use as drainage material in the bottom of a planter or flowerpot, metal bottle caps make a good substitute. Place them crimped edge down to cover the entire bottom of the container, thus assuring adequate drainage.



Mrs. Lee Figg, Indianapolis, Ind.



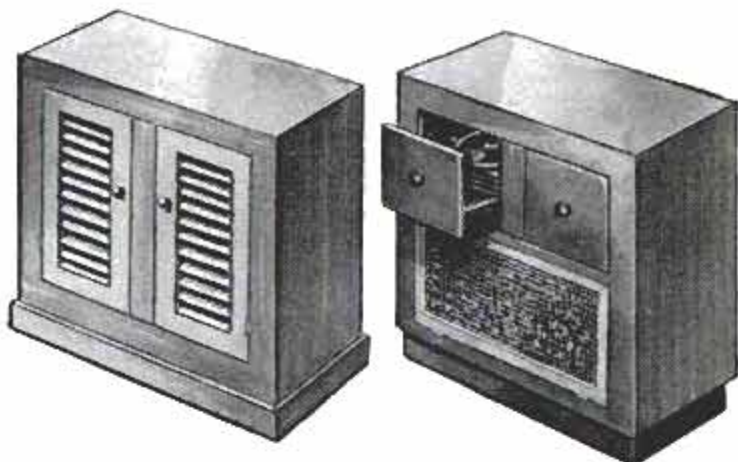
UPDATE THAT RADIO-PHONO CABINET

By William M. Avery

RATHER THAN REFINISH or rebuild that old radio-phonograph cabinet, why not build a "slip cover" for it, using wood and styling that match furnishings either in the den or family room? The cabinet pictured above at the right is made with a top section recessed in a manner similar to a dry sink which provides space for natural or artificial greenery. It is made of selected knotty pine and is designed to fit over the old cabinet pictured at the left, making it unnecessary to reassemble the record player and radio units. The alternate designs, center, suggest a traditional type and one of more modern lines with an island base. As will be seen from the detail the construction of the slip-over cabinet is simple, involving little more shop work than building a box. No dimensions are given. Access to records, the radio-control panel and record-player "drawer," will have to be carefully planned. In the cabinet pictured, the left-hand door is a false drawer front attached to the record-player slide. In this case, false hinges were used. For the alternate designs shown, plywood, faced in the wood desired, can be used for the sides and top.

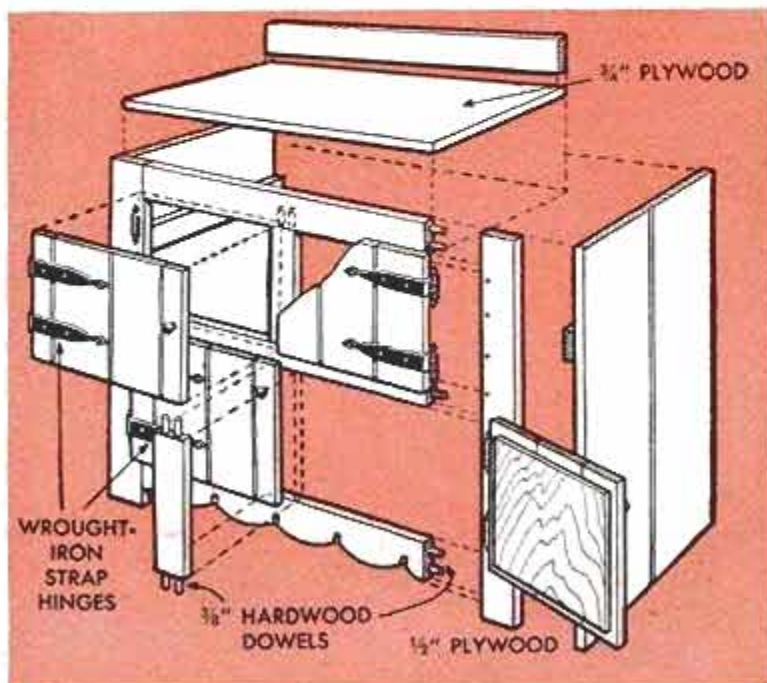


Knotty pine and dry-sink styling go together in this cabinet



ALTERNATE DESIGNS

Here you have a choice of simple modern or traditional design



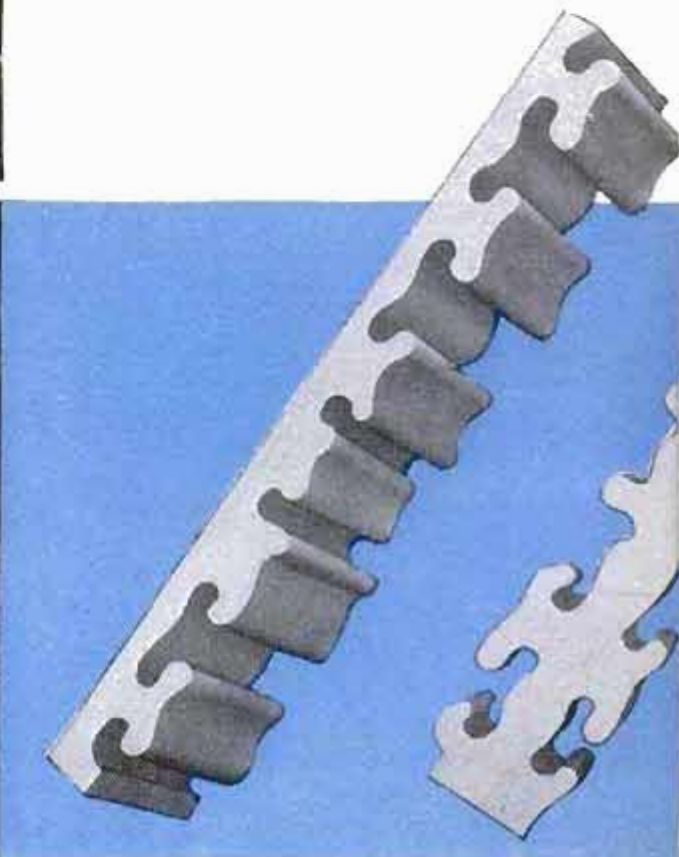
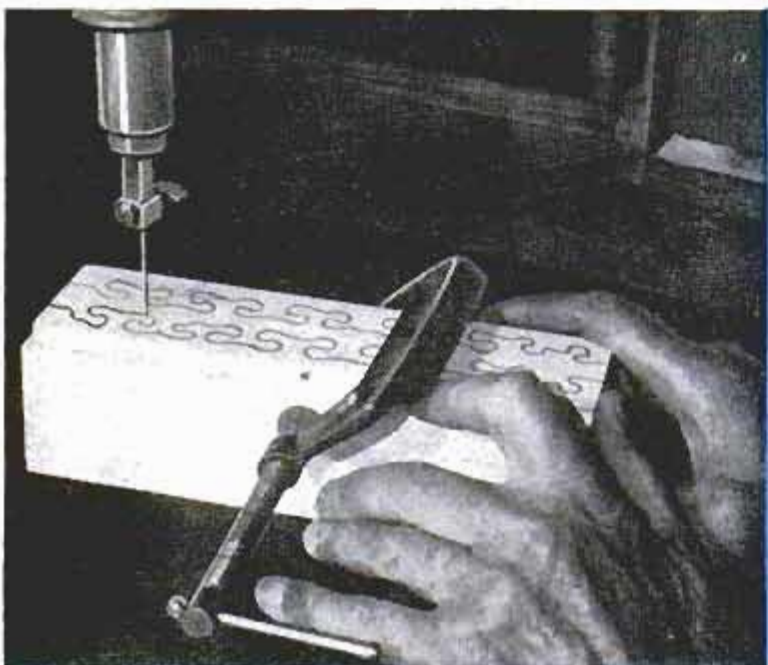
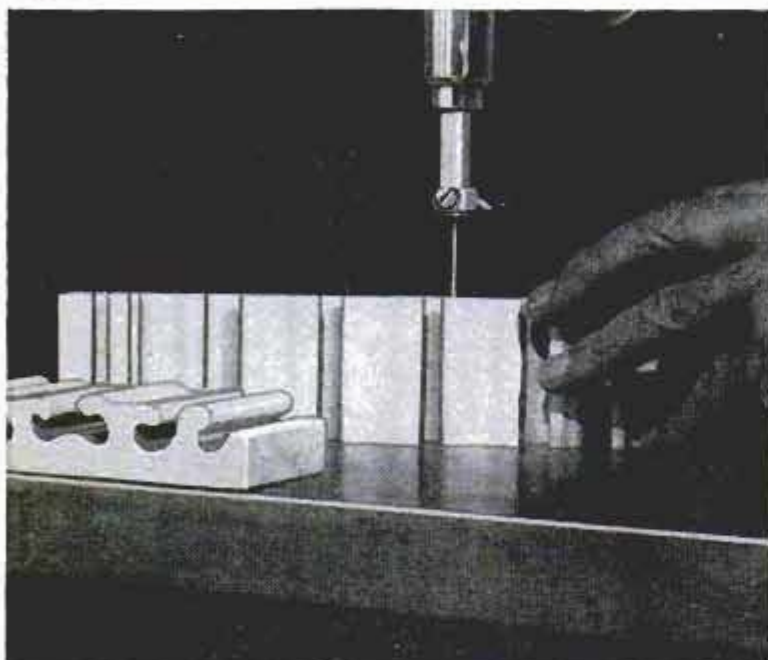
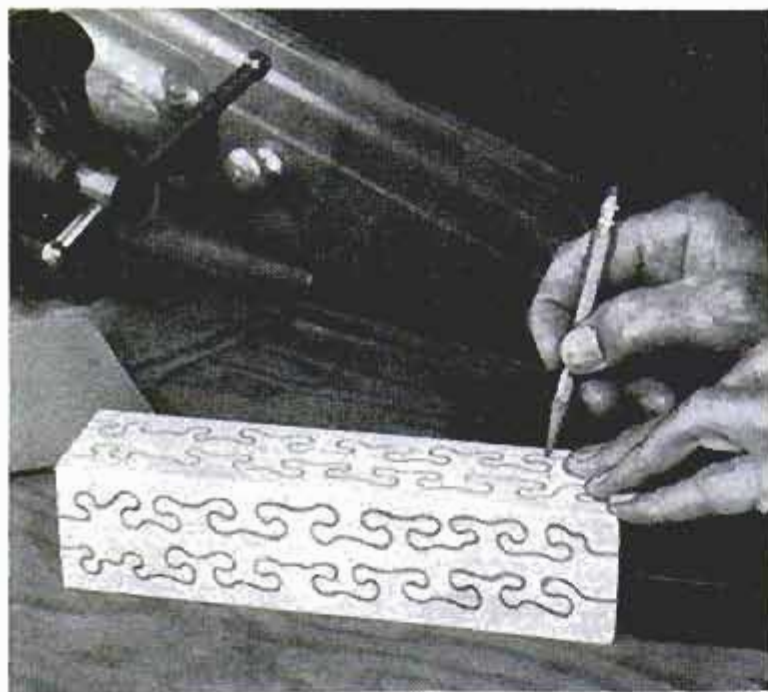
CRAZY JIGSAW

By *Richard Garland*

An interesting pattern of interlocking curls is first drawn on two sides of a block of balsa wood as shown in the photo (left). Make the loops fairly large to avoid sharp turns with the jigsaw blade. A soft lead pencil should be used to draw lines so that marking indentations are not left in wood

Two cuts are made lengthwise along the block following the lines drawn on one side which produces three irregular-shaped strips. Before making the cuts remove the hold-down assembly from the saw. The saw table should be tilted slightly for all cuts, one degree is enough, so that pieces can be assembled from one side only

Fitted back together, the three strips are turned 90 degrees, bringing the other marked side up, and then clamped between two pieces of flat stock to prevent side-ward motion. An extra C-clamp is kept handy for clamping the work behind the blade when the front one is removed. Feed the work slowly, keeping it flat on the table



BLOCK PUZZLE

HERE'S A PUZZLE for you to make which has a two-fold purpose; the first being a lesson in making intricate cuts with a jigsaw, and then hours of entertainment as you and your friends try to put the pieces back together. There are only two requirements for making the puzzle: access to a jigsaw and plenty of patience.

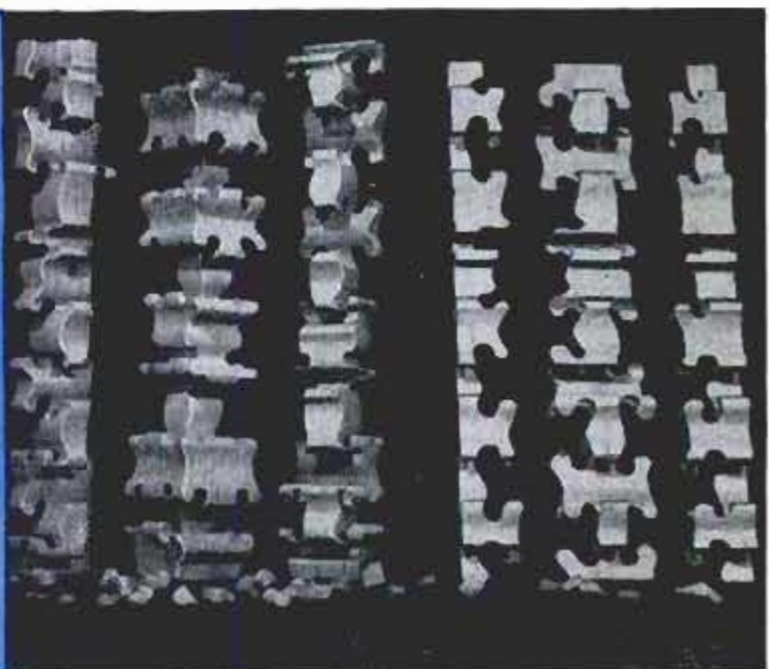
To start with, you'll need a piece of balsa or other softwood at least 2 in. square and 6 in. long. A pattern of interlocking loops is drawn on two sides of the block, and the jigsaw used to cut along the lines. Run the saw as slowly as possible with considerable tension on the blade. Feed the work gradually so the blade does not run off the line or break. If one should break, insert the new blade in the work at the point from which the cut was started. A small magnet will retrieve the bottom end of the broken blade if it cannot be reached with your fingers. Cuts should be made with a slight bevel, so a specific order has to be followed to assemble the puzzle.

★ ★ ★

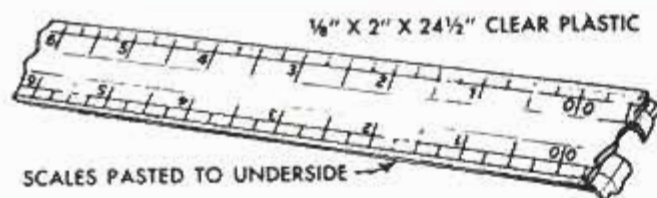


Each of the nine strips formed by cutting the block lengthwise may then be crosscut into smaller pieces making this unusual puzzle even more complicated to put together

Pictured below are six strips as they appear before being cut apart. Crosscuts are made so that the pieces will interlock when put together. As each piece is cut out place it on a table in proper sequence so that the entire puzzle can be quickly assembled to check for fit. Chips caused by overlapping cuts are discarded, creating the effect of missing pieces when the puzzle is being assembled

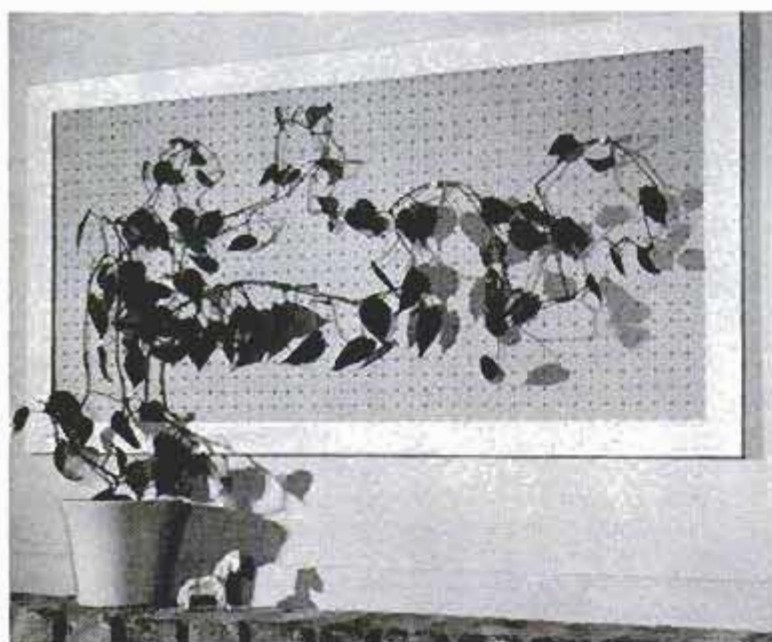


Making a Print-Mounting Rule for Centering



Prints can be placed in the exact center of a mount quickly and easily with a plastic rule like the one shown in the illustration. It is made from a $\frac{1}{8}$ -in.-thick strip of clear plastic $24\frac{1}{2}$ in. long by 2 in. wide. Two scales drawn on stiff paper are glued to the underside of the rule so they can be read through the plastic. The scales start at zero in the center and extend 12 in. in both directions. To use, place the print on the mount. Then place the rule on top of the print and adjust both the print and mount until opposite edges line up with identical markings on the rule. Then there will be an equal margin on both sides of the print. The same procedure is used to establish the top and bottom margins.

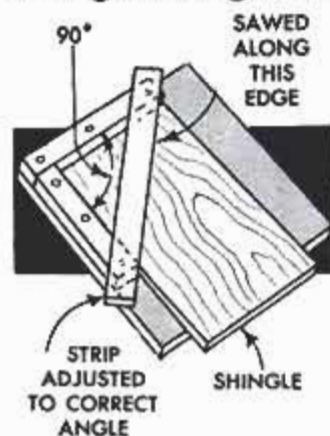
Roy Hancock, Portsmouth, Va.



Golf Tees Support Vine On Mantel Trellis

Climbing plants kept on a mantel are suspended nicely with golf tees set into the holes of this trellis which is made from a sheet of perforated hardboard and framed with door trim. Rabbet the edge of the casing to fit the hardboard. The trellis may be finished with contrasting colors, or the panel painted to match the room decor and the frame finished clear. To hang the trellis on the wall, use two large L-hooks which will fit into the holes of the hardboard. Pointed ends of tees may have to be cut off.—William C. Eymann, Palo Alto, Calif.

Shingles Angle-Cut Uniformly

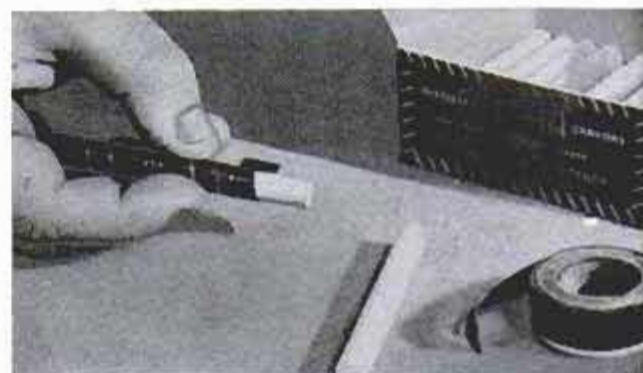


This miter box for shingles aids in making uniform diagonal cuts at the correct angle so that shingles will fit evenly at roof hips and valleys, and on gable-end walls. The guide strip is fastened to two strips of wood nailed at right angles on a large panel. With one

end free, the guide strip is aligned with a mark on the first shingle to be cut, and is then nailed in position. From then on make each diagonal cut in the fixture running the saw along the guide strip.

Chalk Wrapped With Tape Keeps Hands Free of Dust

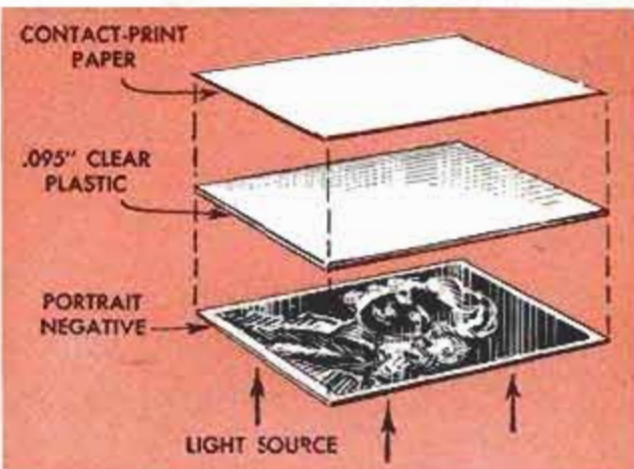
To keep fingers free of chalk dust when writing on a blackboard, wrap the chalk spirally with electrician's plastic tape. As the chalk wears down, the tape is unwound to keep the end clear. The tape helps to prevent the chalk from breaking.

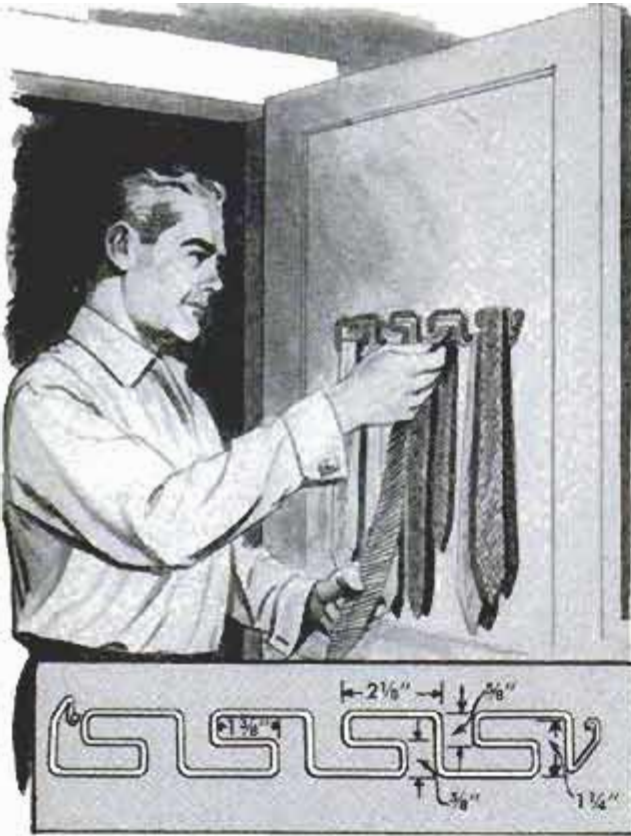


PORTRAIT DIFFUSION

IT IS JUST AS EASY to make a diffused portrait with a contact printer as it is with an enlarger, when a thin sheet of clear plastic the same size as the negative is used between the negative and print paper during the exposure. The ability of transparent plastic to diffuse light slightly is sufficient to soften harsh lines, conceal skin blemishes and reduce contrast generally. For most negatives, clear plastic .095 in. thick will provide adequate diffusion. Thin or extremely contrasted negatives require plastic that is slightly thicker to obtain enough diffusion.

If a heavily diffused print is desired, such as the one at the bottom of this page, it may be necessary to use plastic double the thickness needed to produce a portrait that is only moderately diffused—photograph above drawing. The photograph at the top of the page was printed without the plastic. Be sure the plastic is free of scratches and internal defects, which might cast a shadow and appear as a light streak or spot on the print. When not in use, store the plastic sheets in sheet-film boxes to keep free of lint.—Don Honick, Chicago.





Tie Rack Made From Wire Hanger

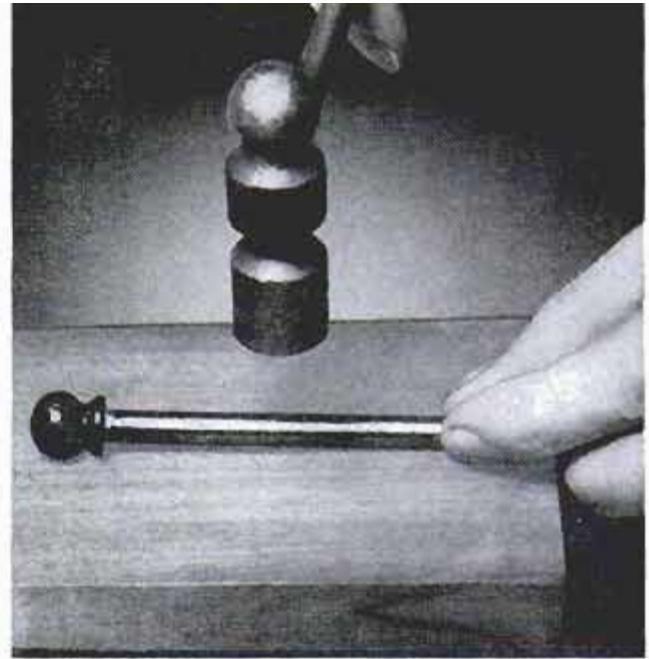
The only material needed to make this novel tie rack is a wire coat hanger or similar heavy wire. First, straighten the wire and then bend it according to the design and dimensions shown in the detail. Repaint the rack and screw it to a wall or door inside the closet. At least two dozen ties can be hung on the rack at three different levels for easy selection.

Frank Shore, New York City.

Heat Reseals Original Wrapper Around Exposed-Film Roll



Film purchased in a moistureproof foil and plastic wrapper can be resealed in the original package, after the roll has been exposed, by using a warm iron. When first opening the package, remember to cut only a narrow strip from the laminated seal, leaving sufficient adhesive to be heated and pressed together when resealing.



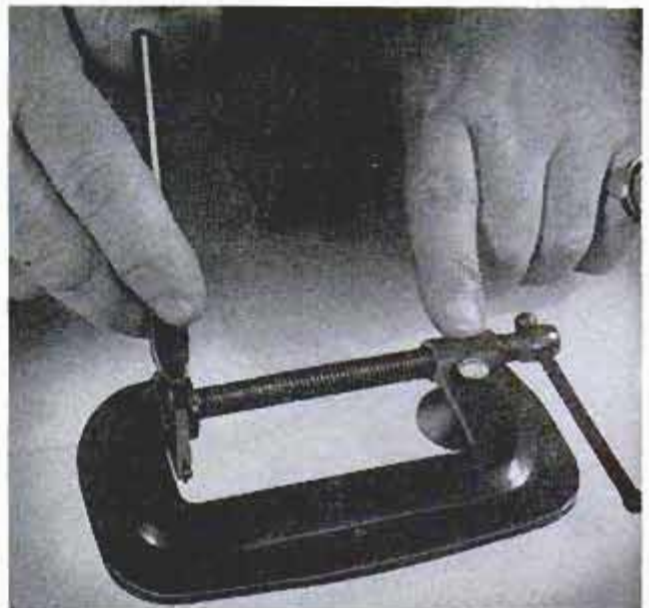
Doors Kept From Swinging Shut

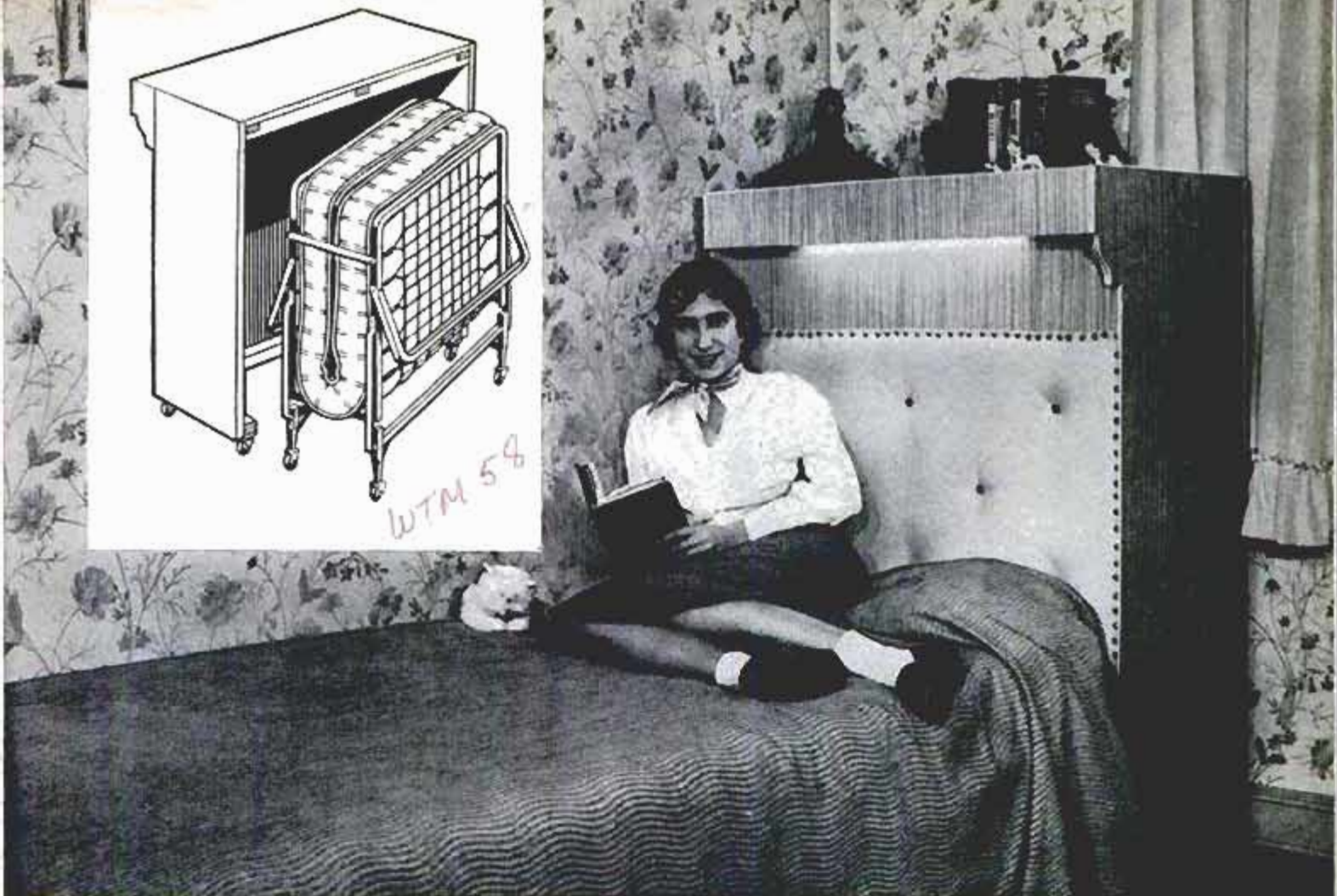
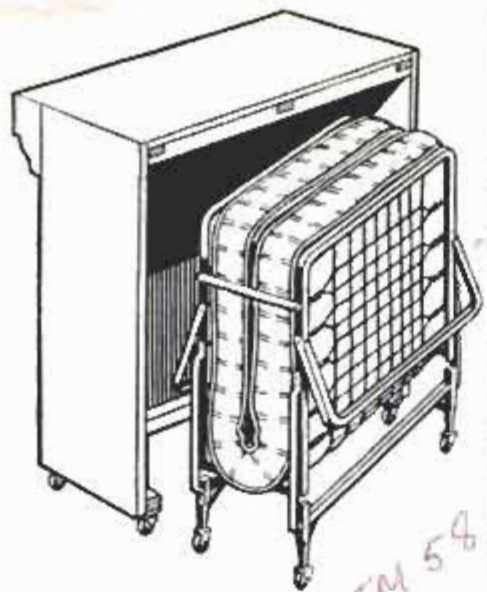
Doors that swing partly shut can be a hazard, particularly in the dark when their position cannot be determined. This situation is remedied without the use of door checks or stops by merely removing one or both of the hinge pins and bending them slightly. The friction of the bent pin will hold the door at any set position.

William Swallow, Brooklyn, N. Y.

C-Clamp Serves as Trammel For Cutting Glass Disks

You can improvise this glass-disk cutter in a few minutes. The clamp pivots on a suction cup equipped with a stud which fits into a hole drilled in the clamp at the handle end. Grip the glass cutter with the clamp, inserting a spacer block between the cutter and the stationary jaw when circles of smaller diameter are cut.

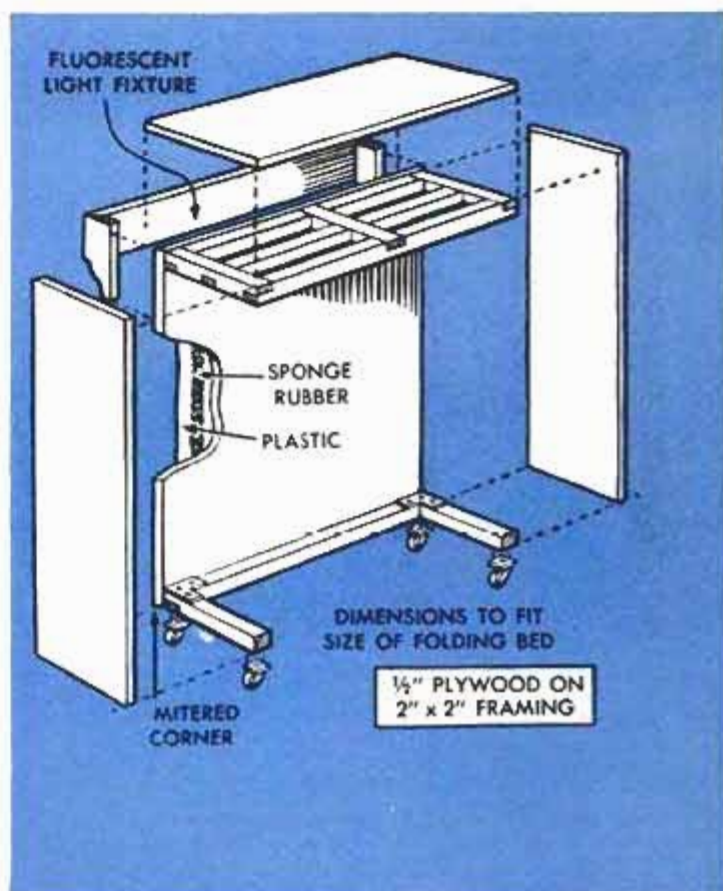




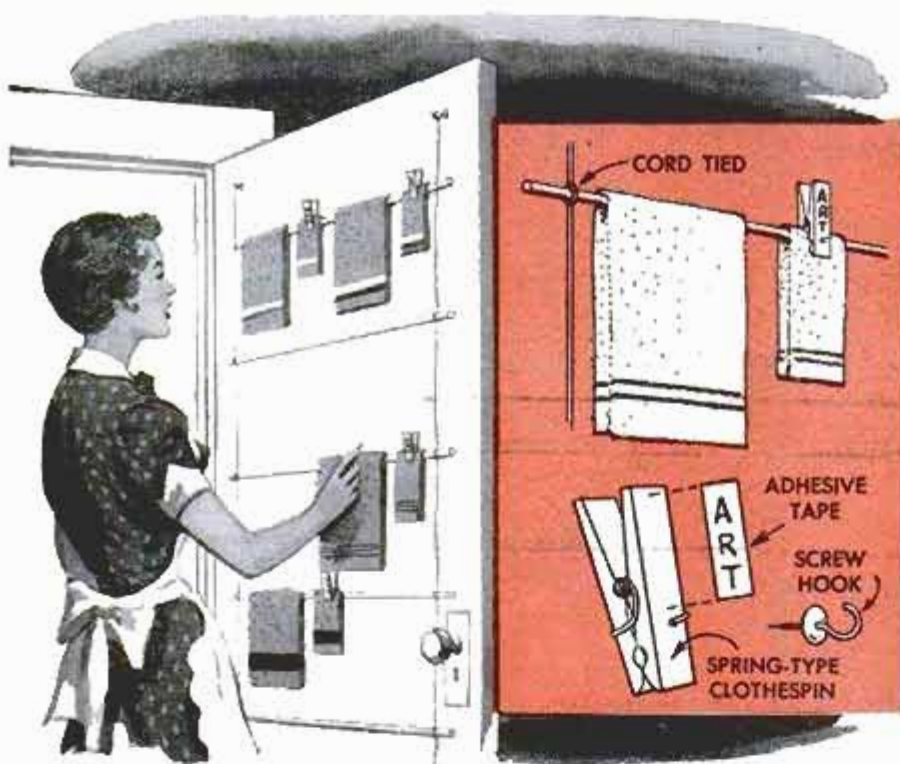
BED STORAGE HEADBOARD

A ROLL-AWAY BED for a week-end guest may be stored in this movable headboard, which can be dimensioned to fit any size folding bed. To make it, construct the upper and lower framework first, using 2 x 2-in. stock. Reinforce the corners of the lower frame with metal angle plates. Then cut the plywood panels to size, miter them at the vertical joints, and fasten them to the frames at top and bottom. Note that the top panel extends out over the fluorescent light fixture. Mount the fixture at the top of the front panel and run the cord through a hole, tacking it to the inside of the enclosure. Fasten the ends of the light shade to the front panel with dowels and nail the front of the shade to the top and ends. Tack a 1-in.-thick blanket of sponge rubber to the front of the headboard and cover it with a sheet of heavy plastic, which is tacked in place with ornamental upholstery nails. Now, turn the headboard upside down and install the casters, preferably piano casters which have a horizontal mounting plate. Turn the headboard back up on its wheels and finish it to blend with room decor.

Ralph Treves, Jamaica Estates, N. Y.



Temporary Towel Rack for Guests Made From Dowels and Cord



This temporary towel rack solves the problem of hanging towels and washcloths for overnight guests in a home with limited bathroom accommodations. The rack, which consists of five $\frac{1}{4}$ or $\frac{3}{8}$ -in. dowel crossbars tied to two lengths of cord and suspended from screw hooks as shown, can be stored in a drawer when not in use. To identify matching towels and washcloths attach a piece of adhesive tape, with a guest's name or initials on it, to a spring-type clothespin and clip the latter on the appropriate washcloth. Paint crossbars and clothespins a matching color.

Replacing a Paring-Knife Handle

A broken handle on a paring knife can be replaced with two pieces of tempered hardboard. First remove the broken handle and use it as a pattern to cut the new pieces. Place them together in a vise and cut a slot in their abutting surfaces to accommodate the shank of the knife. Drill holes in each piece coinciding with those in the shank, apply waterproof glue to the adjoining surfaces, and fasten the new handle to the shank with brads, driving them through the holes. Clamp the handle together until dry and then file the brads flush with the surface of the handle. Sand edges of the handle smooth with fine abrasive paper. Courtesy of Masonite Corporation.



Wrap Your Gifts . . .

to symbolize the occasion or the recipient's hobby, vocation or personality. Look for the full-color story in next month's issue that shows how the experts gift wrap to glamorize the packages and also how they add inexpensive decorations that tend to personalize your gift package.

Battery Clip on Warning Flag Permits Quick Attachment

No time is wasted in tying or wiring a red warning flag to the end of a projecting load on a car or truck when the flag is attached to a large battery-cable clip that permits it to be snapped on or off in a moment. The flag can be attached to the clip by threading one corner of it through the cable end of the clip and knotting it as shown. If the flag has a grommet in one corner, twist a wire loop through the clip and the grommet. The clips can be purchased at most auto-supply stores.





The cover is held open by two arms resting against cleats on underside



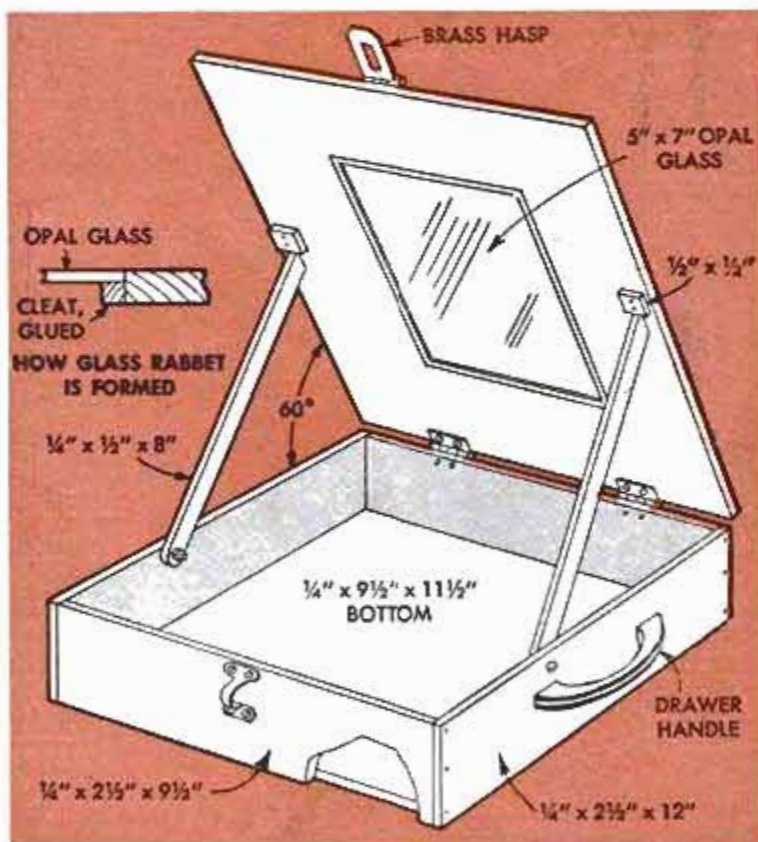
Retouching is done with cover of case open so that light can shine through the ground glass and illuminate the negative

RETOUCHING CASE

By Don Honick

You can do retouching of negatives almost anywhere with the aid of this portable retouching stand. Its glass-fitted cover is designed to be supported at an angle which permits negatives placed against the glass to be backlit, and there is plenty of room inside the case for retouching equipment and materials.

Cut out the pieces for the case from $\frac{1}{4}$ -in. plywood according to the dimensions given in the detail, right. After sanding the edges, glue and nail the pieces together as indicated. A 5 x 7-in. hole is cut in the cover for a sheet of frosted glass. Glue cleats around the opening on the inside edges on which to rest the glass, and then glue the glass to the cleats. Cut two identical support arms from $\frac{1}{4}$ -in. plywood and bolt them to the sides of the case so they will fold inside when the cover is closed, and will position the cover at a 60-deg. angle when it is open. The ends of the arms rest against $\frac{1}{2}$ -in.-sq. cleats glued to the underside of the cover. Hinge the cover to the case and install a hasp and handle. A strip of elastic tacked inside the case will keep retouching fluids from sliding around when the case is carried. Cement a felt disk to each corner of the case bottom to prevent it scratching a table.



Print Contrast Controlled By Brighter Bulb

When making prints with a condenser enlarger, greater contrast can be produced by using a bulb that will give the brightest workable light. Most condenser enlargers will take bulbs of high or low light intensities. With a brighter bulb you can reduce the enlarger aperture so that the depth of field will help conceal slight buckles in the negative being printed.



IS YOUR Wiring Adequate?

PART I

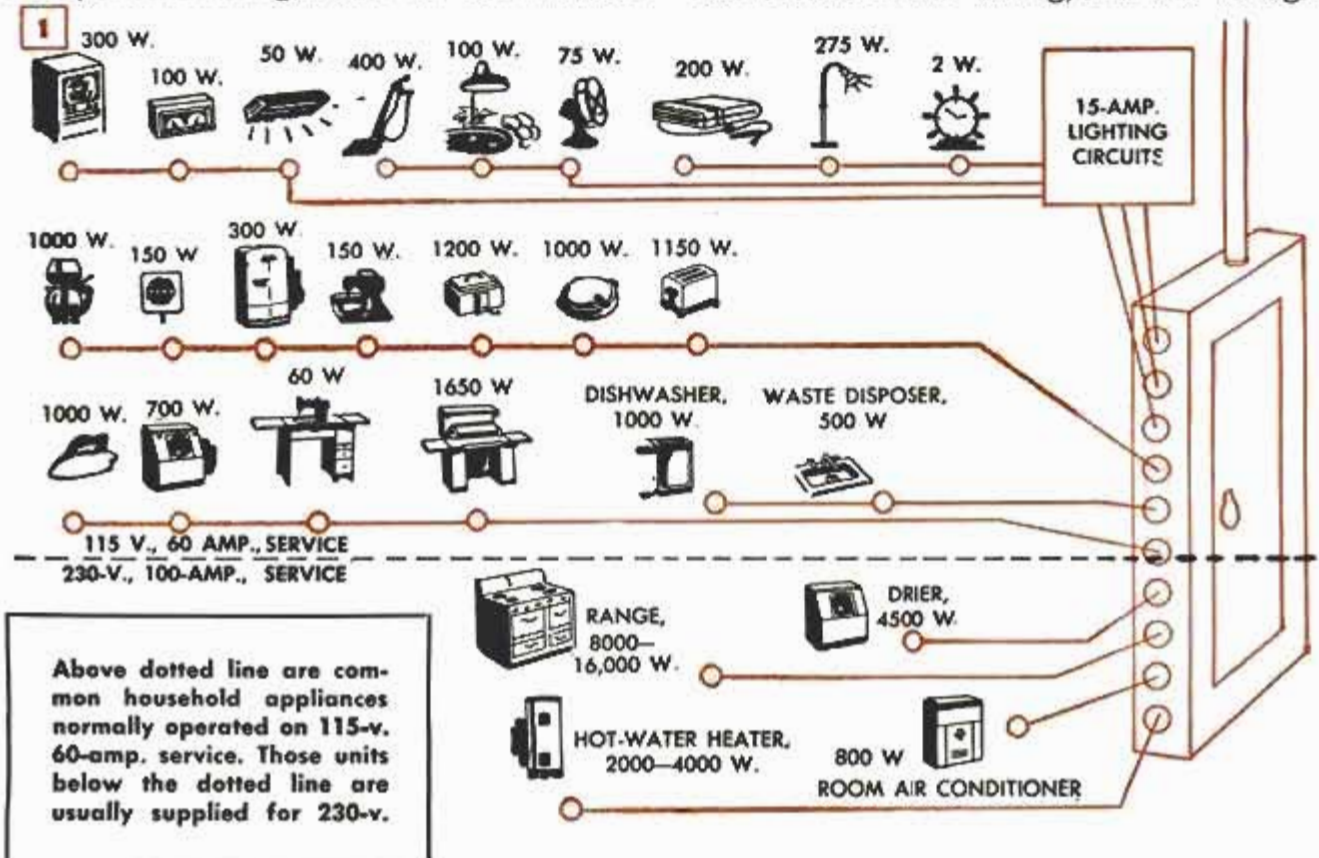
By J. B. Mullen

INCREASING USE OF home electrical appliances and also the higher current requirements of newer-type individual appliances make the wiring of many older homes inadequate to handle the load safely. Compare, as an example, the 300 to 500-watt rating of earlier electric irons with a modern iron which requires up to 1000 watts. The same increase in current requirements is true of certain other appliances. Also, the regular electric service of 20 or more years ago was planned before such electrically operated units as clothes driers, water heaters, home-shop power tools, kitchen ranges and air conditioners

became standard household equipment.

Wires carrying current throughout the house have a certain resistance to the flow of current. This is greater for the smaller sizes of wire and less for the larger sizes, Table I, also Fig. 2. Thus when planning an all-new service, or additions to an older service, the wire size becomes important. Voltage drop on inadequate supply lines not only reduces the actual voltage available at the appliance, it also sets a definite limit to the amount of current that can be carried safely by a wire of a given size.

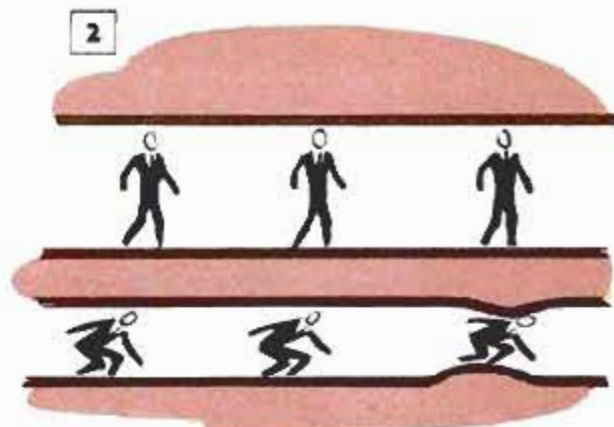
Table I gives safe capacities for the common sizes of house wiring, also the voltage



WIRE SIZE (No.)	RESISTANCE (ohms per 1000 ft.)	MAXIMUM AMPS (indoors)	VOLTAGE DROP PER 50' OF CIRCUIT AT MAX. AMPS	POWER LOSS PER 50' OF CIRCUIT AT MAX. AMPS
14	2.621	15	3.9	59
12	1.650	20	3.3	61
10	1.036	30	3.1	93
8	0.6574	40	2.6	105
6	0.4105	55	2.3	124
4	0.2588	70	1.81	127
3	0.2054	80	1.64	131
2	0.1618	95	1.53	138
1	0.1290	110	1.42	156
0	0.1019	125	1.27	159

RATING OF RANGE	WATT-DEMAND LOAD	CURRENT DEMAND (at 230 v.)	WIRE SIZE OF RANGE FEEDERS (No.)
Up to 12 KW	8,000 w.	34.8 amp.	8
12-13 KW	8,400 w.	36.6 amp.	8
13-14 KW	8,800 w.	38.2 amp.	8
14-15 KW	9,200 w.	40.0 amp.	8
15-16 KW	9,600 w.	41.7 amp.	6
16-17 KW	10,000 w.	43.5 amp.	6
17-18 KW	10,400 w.	45.2 amp.	6
18-19 KW	10,800 w.	47.0 amp.	6
19-20 KW	11,200 w.	48.7 amp.	6
20-21 KW	11,600 w.	50.4 amp.	6

drop at these currents per 50 ft. of circuit. Voltage drop should not exceed 2 percent on branch lines with lights or 5 percent under any conditions. A drop in voltage greater than these percentages is not only power wasted, it can become a hazard. Electric power is measured in watts and many appliances have the rated wattage and voltage stamped on the name plate. From this it is possible to calculate current requirements (amps.) simply by dividing the watts by the voltage. On fractional-hp. motors in such sizes as are used on household appliances, the amperage usually is stamped on the name plate. Using this information it is possible to determine the total current requirements of a number of appliances. Fig. 1, which is purely representative and not intended to be in any way typical, pictures the appliances commonly operated on the 115-v., 60-amp. service, the branch lines



- MINIMUM NUMBER OF GENERAL-PURPOSE CIRCUITS
- FLOOR AREA = (24 x 10) + (28 x 15) + (27.5 x 23)
= 240 + 420 + 632 = 1292 SQ. FT.
 - WATTS LOAD = 3 WATTS PER SQ. FT.
= 3 x 1292 = 3900 WATTS
 - (A) USING 15-AMP. CIRCUITS (No. 14 WIRE)
No. OF CIRCUITS = $\frac{3900}{1725} = 2.3$, OR 3 CIRCUITS
(B) USING 20-AMP. CIRCUITS (No. 12 WIRE)
No. OF CIRCUITS = $\frac{3900}{2300} = 1.7$, OR 2 CIRCUITS

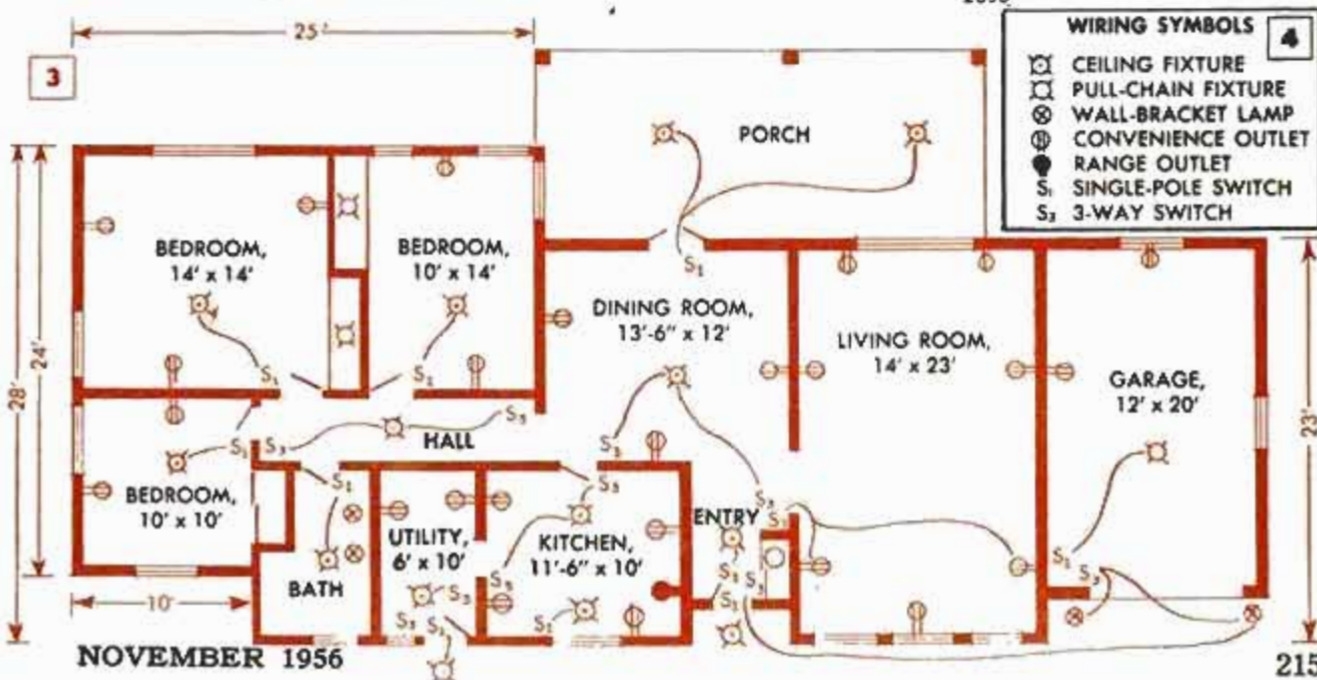


TABLE III
CURRENT-CARRYING CAPACITY OF FLEXIBLE CORDS AND FIXTURE WIRE

WIRE SIZE	OHMS PER 1000 FT	ALLOWABLE CURRENT, FLEX CORD	VOLTAGE DROP PER 50-FT. LENGTH OF CORD (a)	MAXIMUM USE FACTOR (AMPS x LENGTH) (c)	ALLOWABLE CURRENT, FIXTURE WIRE (b)
18	6.630	7 amp.	4.0	430	5 amp
16	4.174	10 amp.	4.2	680	7 amp
14	2.621	15 amp.	3.9	1100	—
12	1.650	20 amp.	3.3	1740	—

(a) At maximum allowable current
(b) As used to connect individual light fixtures to circuit
(c) For 5% voltage drop

being fused to 15 amps. Such units as the electric range, clothes drier, water heater and certain types of air conditioners require a 230-v., 100-amp. service.

The amount of current available at each outlet depends on the wire size of the supply lines, the number of branch lines carrying current to outlets throughout the house and also on the number of taps into current flowing to each branch line. With an inadequate service, overloading of one branch in effect robs others of current and may cause a voltage drop below the nominal limits throughout the system. Wattage used up in line loss heats the wires. The resistance of the overloaded wires increases as they warm up. Thus if overloading goes beyond safe limits for an appreciable length

of time the wires may heat to the point of igniting the insulation. Over a long period of time there is equal hazard in the cumulative effect of a continuing overloaded condition, which is certain to cause a breakdown of the insulation.

When planning an adequate service for an older home, decide on the number of additional outlets, lights and switches. Then you can plan the special-purpose circuits and other wiring which are to be added. Figs. 3 and 4 suggest a procedure in planning. Minimum standards call for one outlet for each 20 ft. of wall, but usually it is better to reduce this to one outlet for each 12 ft. of wall, or simply plan enough outlets so that no point on a usable wall is more than 6 ft. from an outlet, and in the kitchen about 4 ft.

In older homes most of the branch circuits are general-purpose circuits supplying both lights and outlets for appliances.

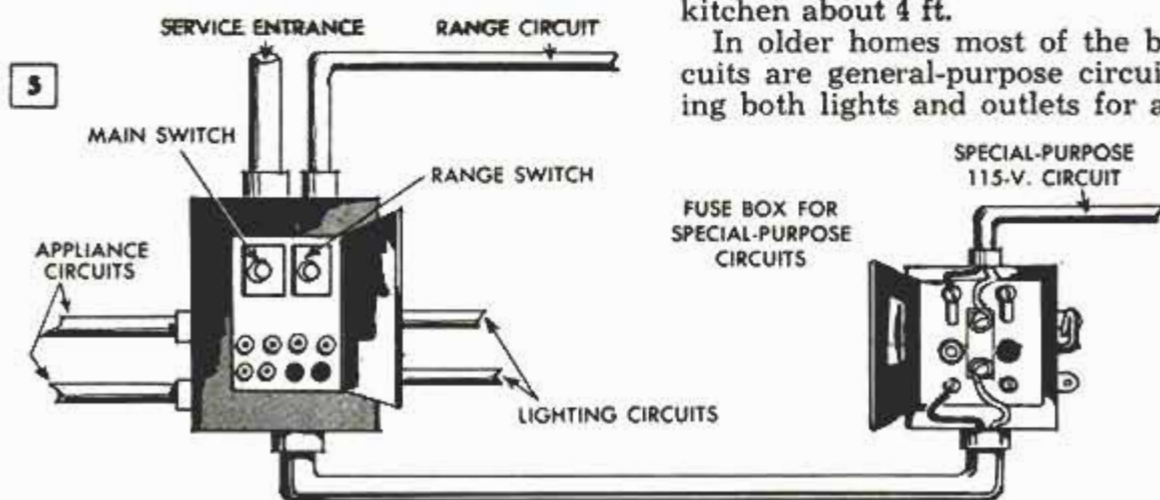


TABLE IV
WHEN TO USE INDIVIDUAL BRANCH CIRCUITS

	CLASS OF EQUIPMENT	EXAMPLES
NECESSARY	Equipment over 16 amp.	Range, clothes drier
CONVENIENT	Equipment vital to home operation	Water pump, furnace
DESIRABLE	Motors, and appliances with large motors	Workshop, home freezer

Usually these will have a capacity of 15 amps., depending on the wire size. This means that the maximum power that can be taken from them is about 1725 watts, less if the wire size is smaller than No. 14. Modern homes will require at least one appliance circuit for outlets in the kitchen, dining room, breakfast room and laundry to handle heavy-current appliances. These outlets usually are wired with No. 12 wire and fused for 20 amps. The appliance circuit should carry all outlets in these rooms (except clock outlets), but no outlets in any other rooms and no light fixtures. Note Tables IV and V, the latter summarizing specifications for branch circuits.

A check list of the actual load on general-purpose and appliance circuits, of which Table VI is a sample, is helpful in planning wiring layout and calculating the total amperage. Note also Tables IV, VII and VIII in this connection.

Individual appliances drawing over 16 amps., such as a range, water heater and the electric drier, require special circuits, Fig. 5. Independent circuits, although not necessary, are desirable for large motors, or groups of motors, such as power tools in the home shop. Independent circuits prevent dimming of lights due to the heavy starting current required by the larger motors. When making up the check list of outlets, lighting fixtures and the wattage of lamps and appliances, include all those appliances you may add in the future. Where two appliances are of a type never used simultaneously, list only the one with the highest wattage. Convert watts to amps. by

TABLE V
BRANCH-CIRCUIT SPECIFICATIONS

Type of Circuit	General-Purpose Branch Circuit		Appliance Circuit		Individual-Appliance Circuit		
	15 amp.	20 amp.	20 amp.		15 amp.	20 amp.	30 amp.
Max. rating	15 amp.	20 amp.	20 amp.		15 amp.	20 amp.	30 amp.
Wire size (minimum)	14	12	12		14	12	10
Size of fuse (maximum)	15 amp.	20 amp.	20 amp.		*15 amp. 20 amp. 30 amp. not over 150% of appliance rating		
Required rating of outlet receptacles	15 amp.	15 20	15 20	15 20	15 amp.	20 amp.	30 amp.
Max. rating of appliance connected to a receptacle	12 amp. 1380 w	12 16 1380 1840	12 16 1380 1840	12 16 1380 1840	12 amp. 1380 w	16 amp. 1840 w	24 amp. 2760 w
Max. rating of permanently connected appliances	7.5 amp.	10 amp.	10 amp.		15 amp.	20 amp.	30 amp.
Lamps permitted on circuit?	Yes	Yes	No		No	No	No

TABLE VI
CHECK LIST OF ACTUAL LOAD
ON GENERAL-PURPOSE AND APPLIANCE CIRCUITS

Room	No. of Outlets	Fixtures and Appliances	Watts	Amperes	
				Gen. Purpose Circuits (a)	Appliance Circuits (b)
Living room	7	Table lamps (6)	1020	8.9	
		Radio	75	.7	
		TV	300	2.6	
Entry hall	1	Ceiling light	100	9	
Hall closet	1	Ceiling light	60	5	
Kitchen	7	Ceiling lights (2)	150	1.3	
		Toaster—1000 w.			
		French fryer—1050 w.	1050		9.1
		Waffle iron—600 w.			
		Mixer	120		1.1
		Iron	1000		8.7
		Refrigerator	300		7.0
Ventilator	150		1.2		
Coffee maker	525		4.6		
Dining room	4	Ceiling light	150	1.3	
Hall	1	Ceiling light	100	9	
Attic	1	Ceiling light	60	.5	
Bedroom No. 1	4	Ceiling light	120	1.1	
		Radio	60	.5	
		Table lamp	100	.9	
Closet	1	Ceiling light	60	.5	
Bedroom No. 2	4	Ceiling light	120	1.1	
		Table lamps	120	1.1	
Closet	1	Ceiling light	60	.5	
Bathroom	3	Ceiling lights (2)	180	1.6	
		Portable heater	600	5.2	
Basement	3	Lights (7)	630	5.5	
		Freezer	350		4.8
Laundry	2	Washing machine	700		7.0
		Ironer	1500		13.0
Porch, outside	1	Lights (3)	220	1.9	
TOTAL				37.5	56.5

Total current: 94.0 amp.
Equivalent watts: 94 x 115=10,800 watts

CHECK LIST - TABLE VII
EQUIPMENT ON INDIVIDUAL CIRCUITS

Equipment	Rating	Amperes		Watts Demand on Branch Circuit
		115 Volts	230 Volts	
Clothes drier	4500 w.		19.5	4500
Workshop Saw	3/4 hp., 10.2 amp.	16.2		1860
Jointer	1/3 hp., 6.0 amp.			
Drill press	1/4 hp., 4.6 amp.			
Water pump	1 hp.		5.3	1220
Furnace	1/6 hp.	2.9		885
	1/4 hp.	4.8		
		<u>7.7</u>		
Total of equipment on individual circuits (except range)				8465
Range	10.6 KW			8000*

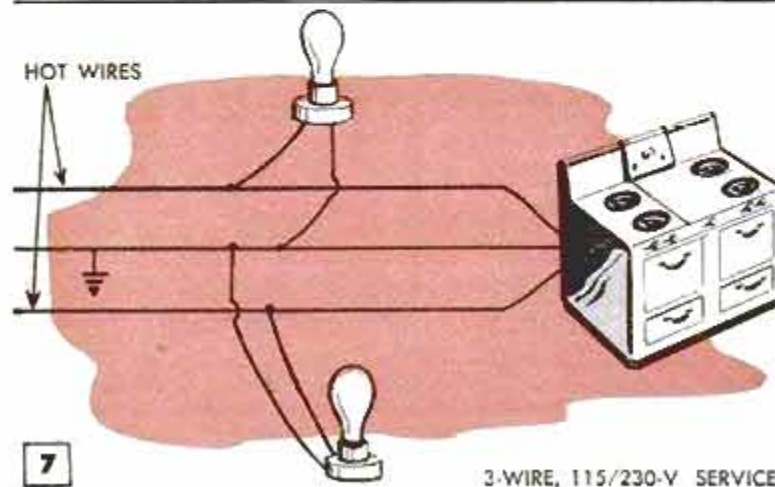
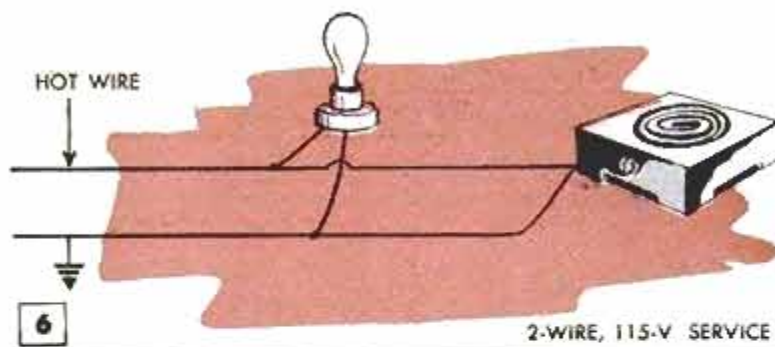
* Range demand figured separately, as shown in Table II.
(Watts demand on all other branch circuits equal to appliance rating.)

TABLE VIII
GENERAL-PURPOSE CIRCUITS

- (A) Using 15-amp (No 14 wire) circuits:
 No of circuits = $\frac{\text{AMPS}}{10}$
 $= \frac{37.5}{10} = 3.75$ or 4 circuits
- (B) Using 20-amp (No 12 wire) circuits:
 No of circuits = $\frac{\text{AMPS}}{15}$
 $= \frac{37.5}{15} = 2.5$ or 3 circuits

APPLIANCE CIRCUITS

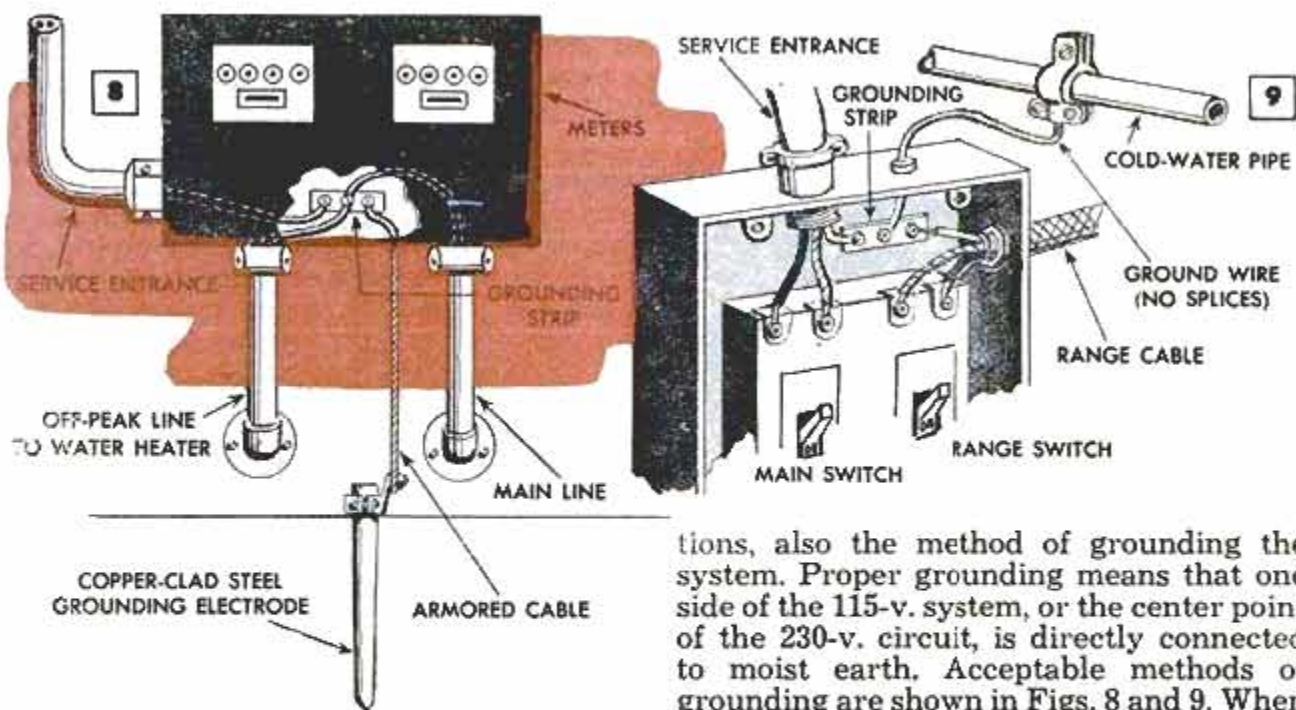
- (20-amp., No 12 wire, circuits)
 No. of circuits = $\frac{\text{AMPS}}{15}$
 $= \frac{56.5}{15} = 3.8$ or 4 circuits



dividing the total by the line voltage and you have the current requirement. Since the load connected to any branch must not exceed its capacity—better slightly under full capacity—you can easily determine the number of branch circuits required to carry the estimated load. This method is reasonably accurate when estimating wiring requirements for both old and new homes, but before actual work is carried out you must make sure that the procedures are in accordance with local and national electrical codes.

When you plan to increase the demand on an existing installation the wire size, service capacity and the type of service, whether 2 or 3-wire, are important considerations. Appliance circuits on No. 12 wire are now required in most localities. Circuits on which lights are used cannot be fused for more than 20 amps. See Table V. Special-purpose circuits, Fig. 5, for larger appliances should use the size of wire required by their current demand. The total current requirement generally is used in determining the size of service-entrance conductors and the amp. rating of the service-entrance switch and the fuses required. The current demand of a range is determined separately from Table III and added to the other requirements. In figuring a new service entrance, either for new construction or for an existing installation, it's best to anticipate possible future demand and go beyond that required at present, both in wire size and type of service.

At present electricity is supplied to homes either by 2-wire 110, 115 or 120-v. systems or by 3-wire 110/220, 115/230 or 120/240-v. systems, 115/230-v. being perhaps the most common of the 3-wire services. The 2 and 3-wire systems are diagrammed in Figs. 6 and 7. The 3-wire system provides both voltages and should be installed wherever possible as it offers several advantages. Because the 3-wire system doubles the voltage, smaller wires can be used from entrance to main switch. Smaller fuses are required. As an example, a 13,000-watt service would require 120-amp. fuses and main switch and No. 0 wire size on a 2-wire, 115-v. system. The same

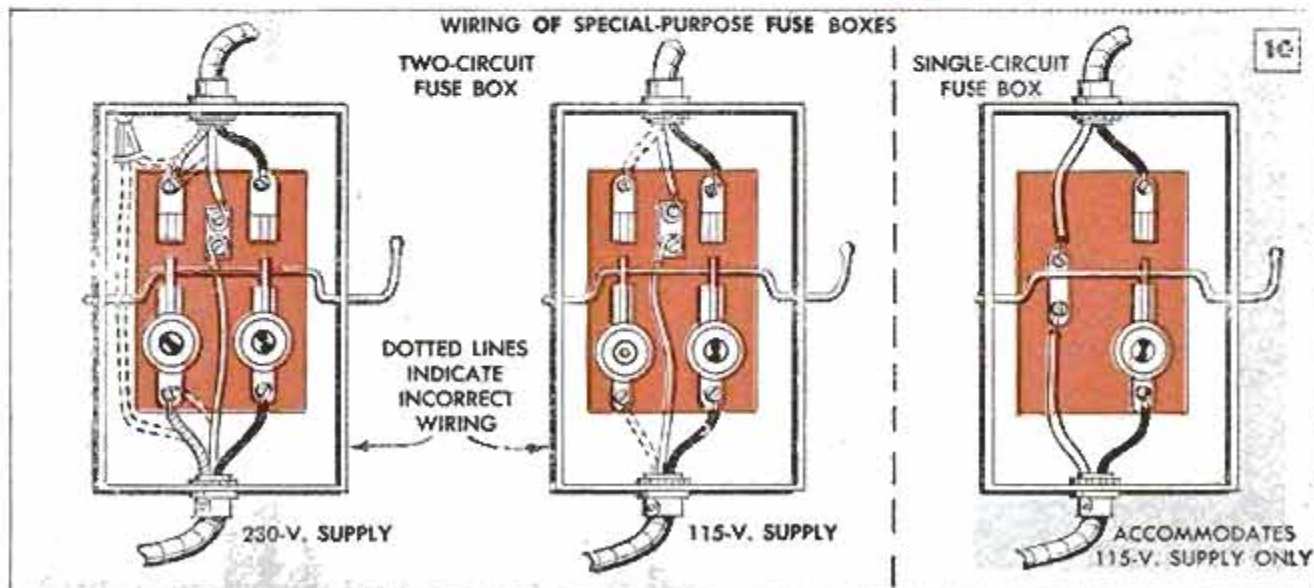


service would require only 60-amp. fuses and No. 4 wire on a 3-wire 115-230-v. system. Appliances which take a heavier current, also larger shop motors, usually are designed for 230-v. current. Motors of $\frac{1}{2}$ hp. and larger generally are arranged for operation on either 115 or 230-v. current. On the higher voltage the units require less current and can be operated with smaller sizes of wire.

Grounding is simple and 230 v. can be obtained even though the potential at no point exceeds 115 v. above ground. The 3-wire system also provides a better-balanced load condition. Most power suppliers require a 3-wire installation when new wiring is added to existing systems.

Existing installations, especially those in older homes, should be carefully checked over before planning new additions to the service. Condition of the existing wiring and the wire size are important considera-

tions, also the method of grounding the system. Proper grounding means that one side of the 115-v. system, or the center point of the 230-v. circuit, is directly connected to moist earth. Acceptable methods of grounding are shown in Figs. 8 and 9. When special-purpose circuits are added to an existing system, wiring through the special-purpose fuse boxes must be properly carried out. Fig. 10 shows acceptable methods. (To be continued)



Draft-Free Ventilation Provided by Arrangement of Windows

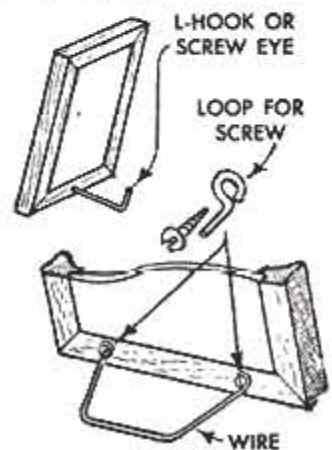


Dry, draft-free ventilation, even during a heavy rainstorm, is possible if your home has double-hung sash that are fitted with combination storm windows. Arrange the storm window as shown, with the screen at the bottom and the glass at the top. Then close the lower half of the inner window and partly open the upper half. The idea is especially useful if you must be away from home when rain is anticipated.

Arthur A. Peterson, Royal Oak, Mich.

Small Picture Frame Held Erect With L-Hook or Bent Wire

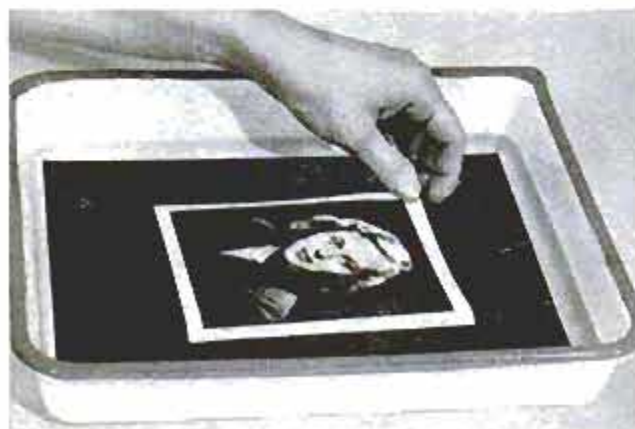
Screwed into the lower edge of a small wooden picture frame as shown, an L-hook will support the picture at a slight angle. A larger frame can be supported in a similar manner by means of a U-shaped wire held with wood screws.



Breaking in Newly Mixed Developer

When starting to use a fresh batch of developer, whether for prints or negatives, it is best to start the chemicals working with a dummy sheet of emulsion. In the case of printing, if the developer has not been "mellowed," it may give a false timing. When developing negatives, the fresh light action of the chemicals combined with the lack of a "stabilizer" would otherwise tend to spot the negatives and cause extreme contrasts. There is no added expense in the conditioning process, since you can use scraps of previously exposed paper or film which you normally throw away. If a sheet of exposed paper the same size as the developer tray is left in the bottom of the tray, as shown, it will aid in determining contrasts when developing prints.

Robert C. Florian, Chicago.



Rubber Stamping in Many Colors

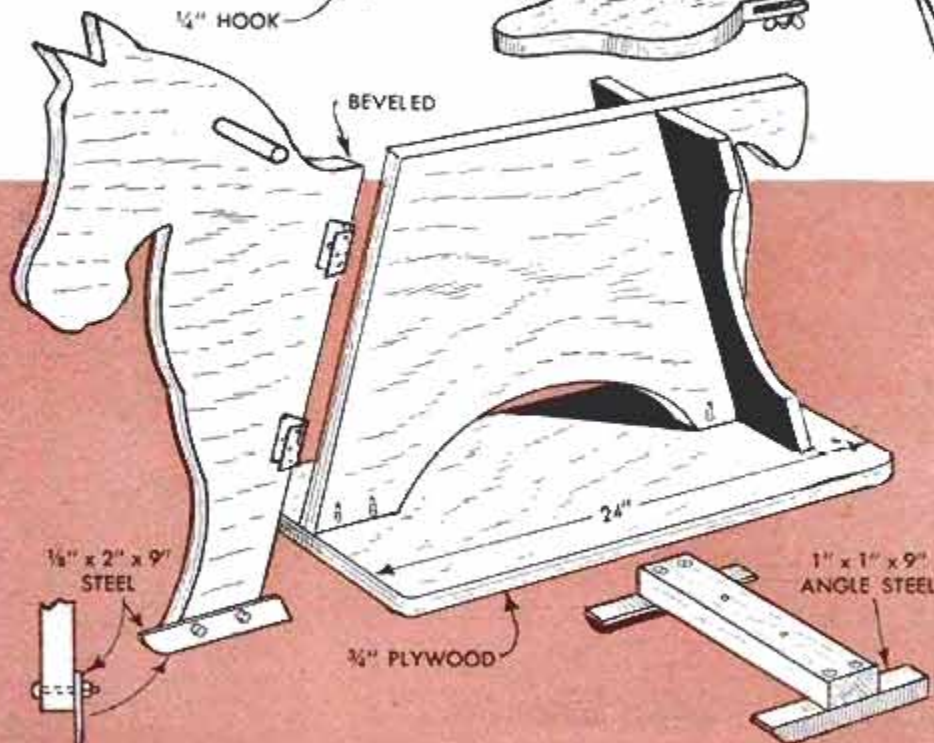
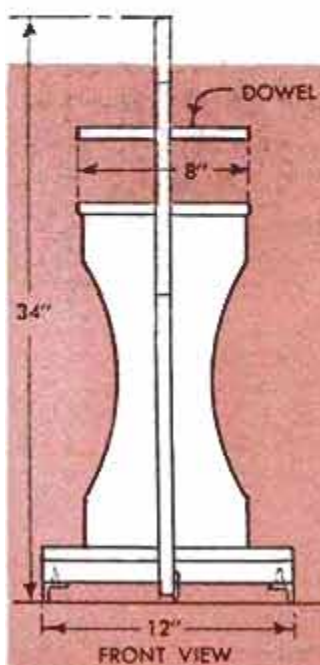
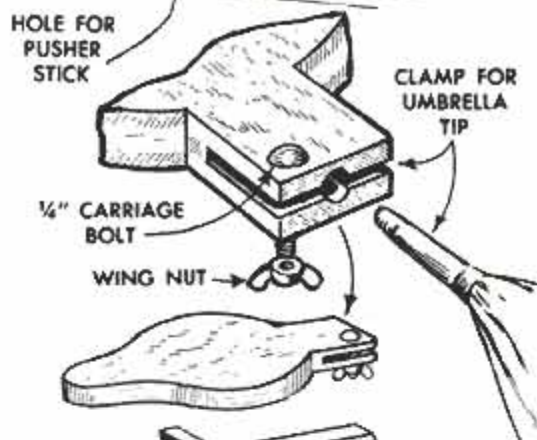
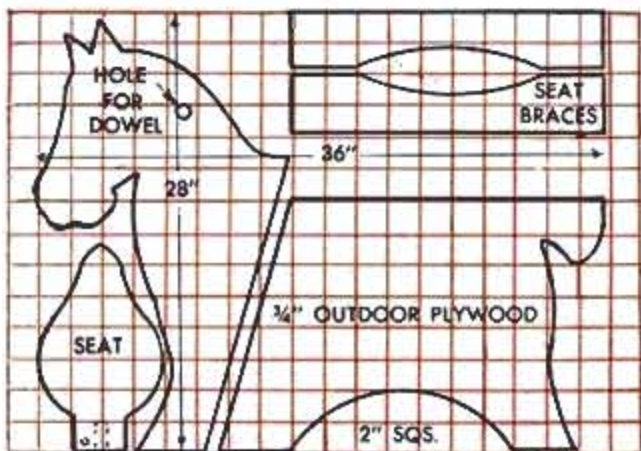
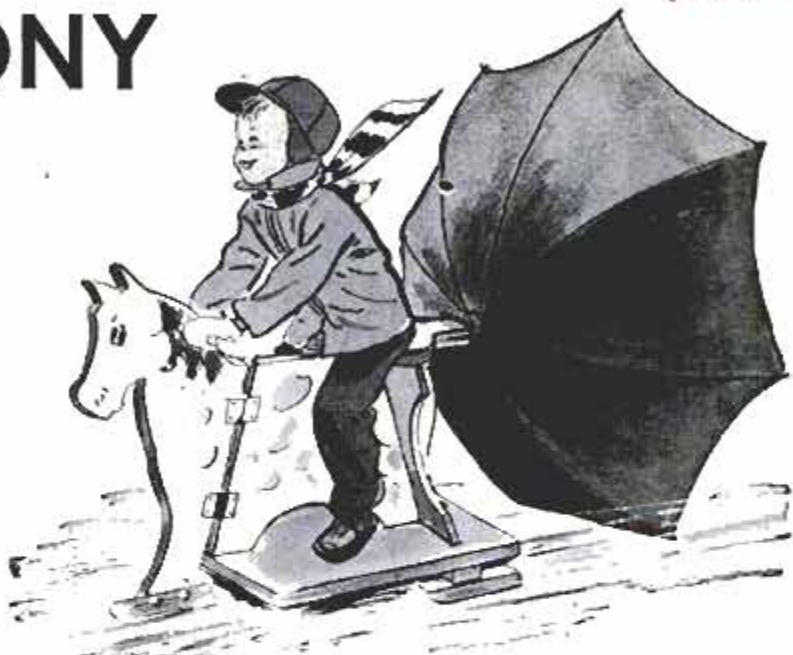
When you wish to make rubber-stamp markings in a particular color, liquid food coloring makes a suitable ink for moistening the stamp pad. Several colors may be combined for a particular shade, mixing three parts of color to one part of glycerin. A temporary pad for a particular color can be made with a few layers of flannel cloth placed in the top of a flat pocket-size tobacco can.—Ken Murray, Colon, Mich.

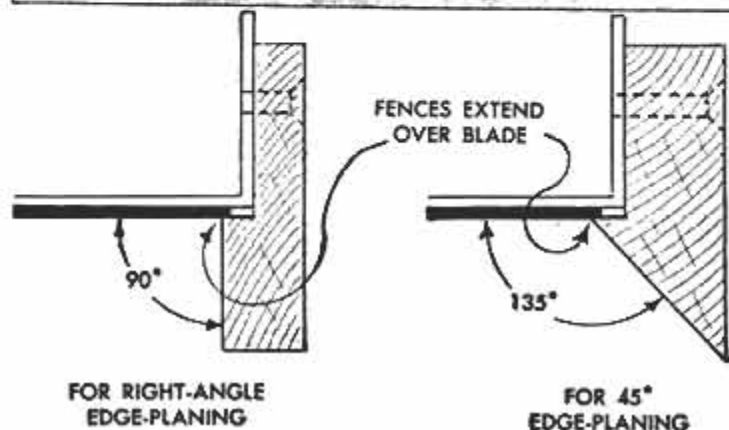
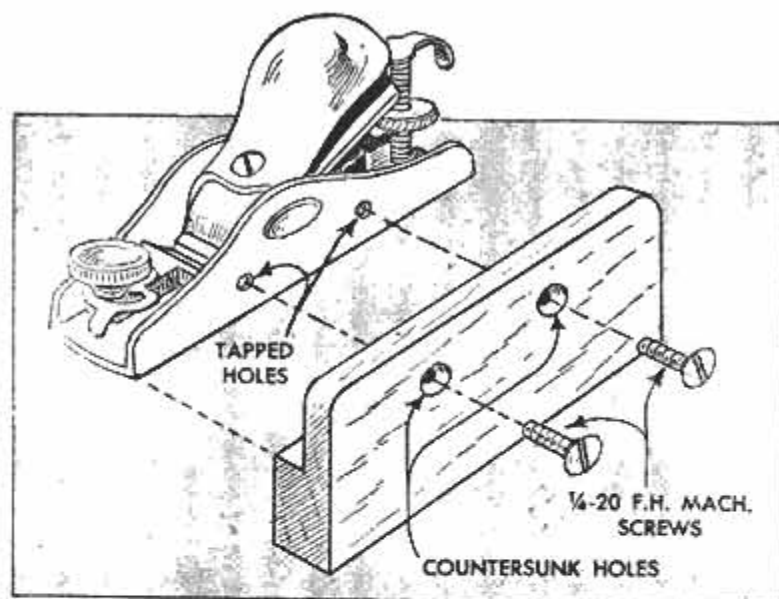


POLAR PONY

By Hi Sibley

JUNIOR WILL HAVE FUN sailing across the ice on his polar pony with an umbrella tail filled by the wind pushing him along. If there's no wind, he can ride it like a scooter or have someone push him. Head, body, legs and footrest are cut from $\frac{3}{4}$ -in. outdoor plywood. The brace for the rear runners is cut from 2-in. stock as is the seat which is drilled and slotted at the back to provide a clamp for the umbrella tip. Large butt hinges join the sections of the pony and provide a positive method of steering.





Plane Has Wood Guide Fence For Edge-Planing Accurately

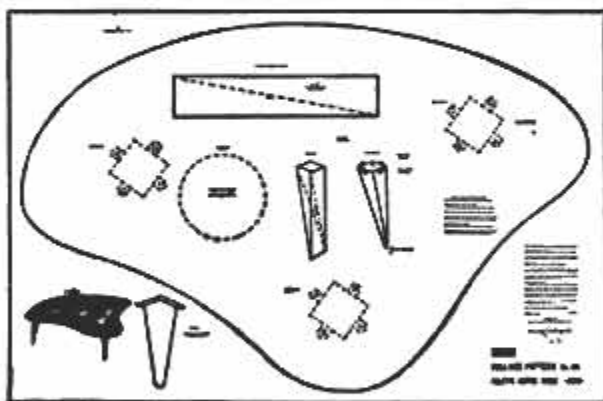
Square or angular edge-planing can be done more accurately if a fence is attached to the side of the plane. Close-grained hardwood should be used for the fence, which is rabbeted along one side so that the block extends under the bottom edge of the plane slightly. Matching holes are drilled in the fence and plane, those in the latter being tapped for 1/4-20 screws. Sand the surface of the block that contacts the work smooth and apply a coat of wax to minimize friction.

Ice Preserves Cut Flowers

When packed with ice in a long box lined with aluminum foil, cut flowers may be transported by car. Place the flowers on the foil which is run lengthwise in the box, pack ice cubes between the stems and seal the foil around the flowers. The ice will keep the flowers fresh and moist, and the foil will prevent water from dripping.—Mrs. Leslie K. Schultz, Cicero, Ill.

Beautiful, Useful Furniture You Can Build WITH FULL-SIZE PATTERNS

You can make sturdy, good-looking furniture, toys, valances, metal lamps—even a 12-foot utility outboard with *PM Full-Size Patterns*. They were all drawn by a professional designer and built in our shop to test fit of parts and construction details.



No. 116. Palette Coffee Table

Above is an actual photograph of Pattern No. 116, a Palette Coffee Table, which is 31½ x 47½ inches at its widest points. It can be made in one evening, if you have a bandsaw for making the curved cuts. Pattern includes complete construction and finishing details. 50c.

Modern Cocktail Table, No. 103. This table is 40 x 19 inches; 15½ inches high. With its metal grill inserts and plank top, it's modern in design and solid as a rock. One pattern—costs only 50 cents.



Love Seat, No. 114. Designed in the Lawson style, this love seat goes with either modern or traditional settings. Uses sagless-type wire springs and foam-rubber padding. Two patterns in the set: \$1.00.



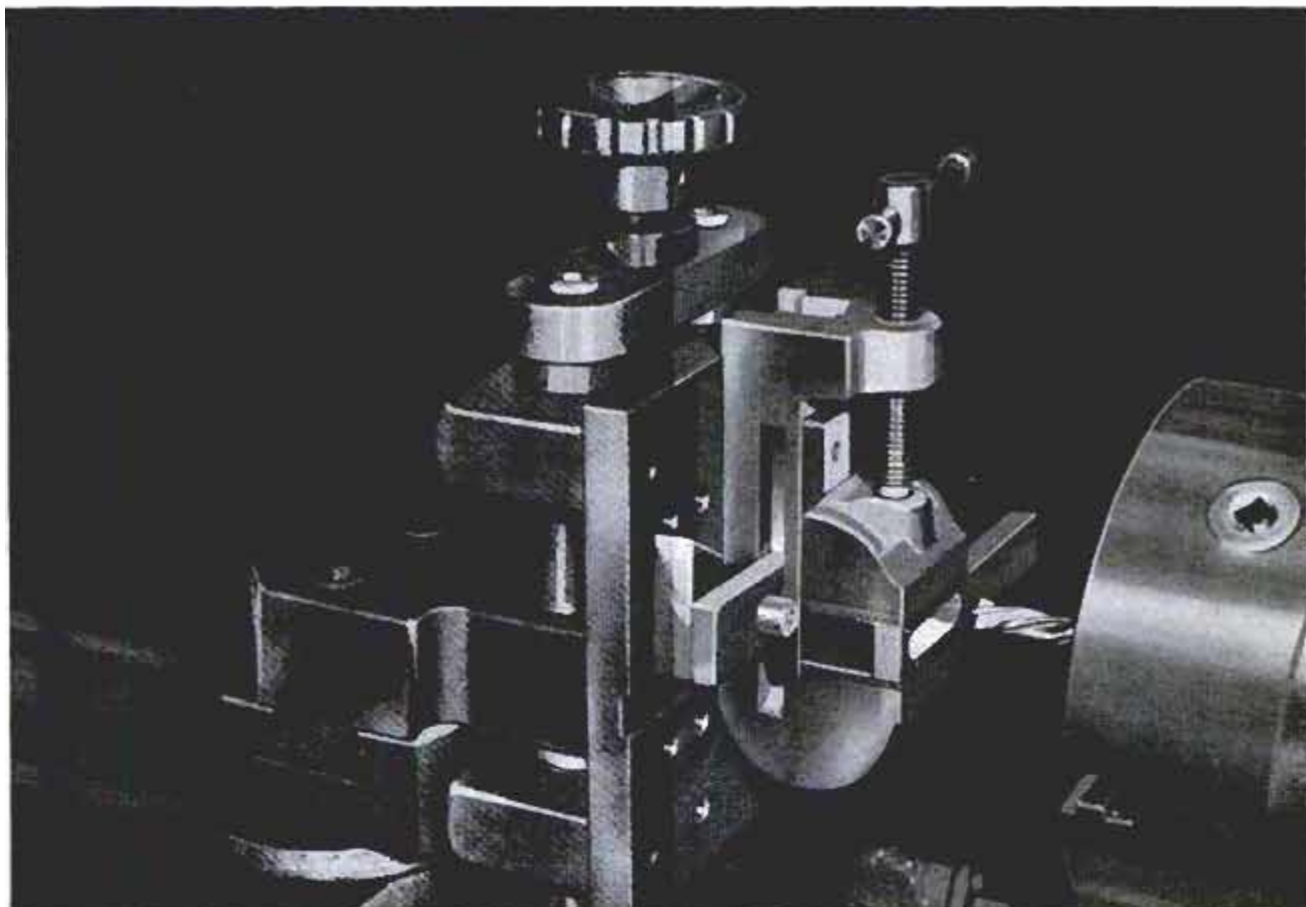
Trundle Beds, No. 102. These beds save space and are safer for youngsters as there is no ladder to climb; have storage headboards, and use standard-size mattresses. Three patterns: \$1.50.



Order today! And ask about the other 20 patterns, all guaranteed to be good—or your money back!

POPULAR MECHANICS PATTERNCRAFT

200 EAST ONTARIO STREET
CHICAGO 11, ILLINOIS



Your lathe becomes a milling machine with this attachment. Unit mounts on compound, replaces the tool post

MILLING ATTACHMENT *for your lathe*

By J. C. Magee

BUILDING A MILLING ATTACHMENT for your lathe is like adding a small milling machine to your metalworking equipment. Nearly all machining on the attachment can be done on the lathe, the only exceptions being certain tapping and filing operations. The attachment pictured above and detailed on the following pages has been especially designed with round slides to eliminate cutting of dovetail slides, an operation difficult to carry out in the small shop with limited equipment. The unit is made with a flat mounting plate grooved on one face for locating work in a true horizontal plane. The location of the groove and the pattern of tapped holes for mounting work, vises and other fixtures is not given, as these must be arranged according to the requirements of the operator.

Before you begin construction note three dimensions carefully, the diameter of the drill-rod slides, the hole diameter on the top and bottom spacer bars and the hole diameter on the mounting bracket. Polished drill rod generally is held to very close tolerances in manufacture, but where you have to machine parts to a sliding fit and a press fit on two rods it is necessary to know the precise diameter of the rods throughout the length. Check carefully with a micrometer. If, for example, both rods check 1.000, or slightly under, then you can hold the hole dimensions in the spacer bars to 1.0005, rather than the 1.005 indicated on the details.

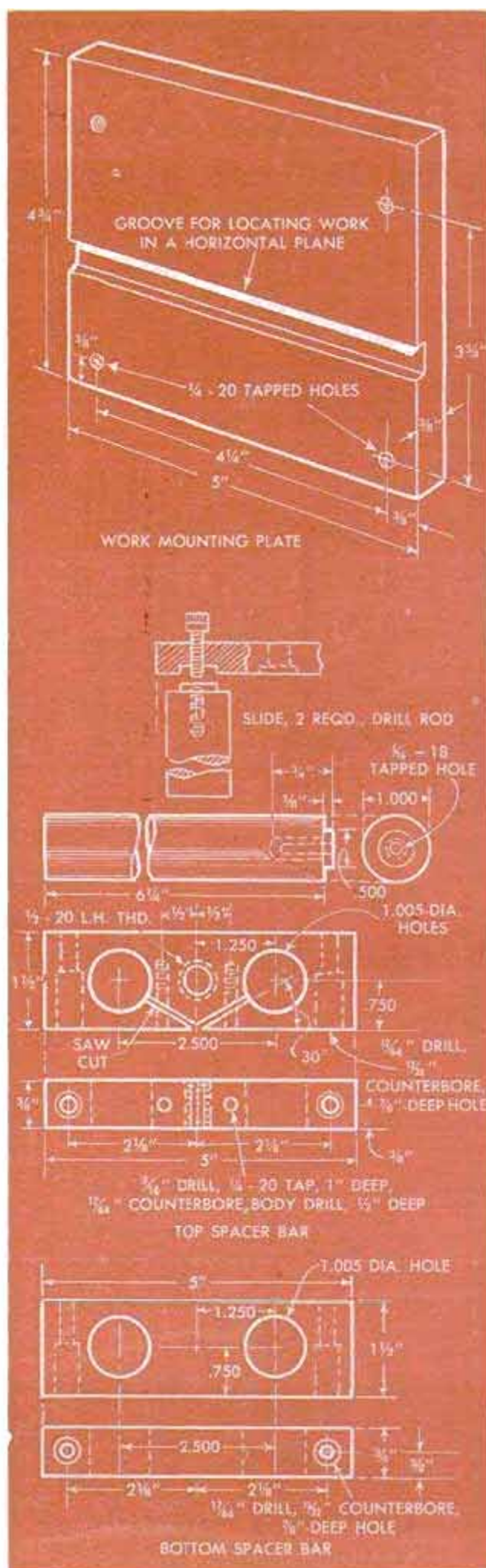
The hole dimension on the mounting bracket, .9997, is calculated to give a press fit of the rods, but it also is dependent to

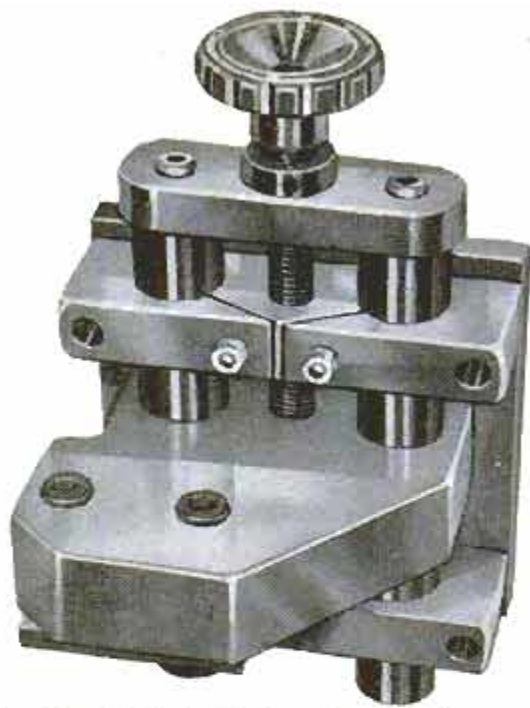
some extent on the mike reading of the rods. If the rods are over (a 1.000-plus reading on the mike) then it may be necessary to increase the hole diameters in the mounting bracket slightly in order to obtain a press fit without heating.

Construction of the attachment can be simplified by boring the top and bottom spacers and the mounting bracket to a close fit on the rods and then using set-screws to hold the rods in the mounting bracket. This procedure will give you an attachment sufficiently accurate for all practical work but not for jobs calling for a high degree of precision. Note that the upper ends of the rods are shouldered $\frac{1}{8}$ in. and the holes in the top plate are counterbored to take the projections. Note also that the arbor flange fits into a counterbore in the top plate. The arbor thread can be right or left-hand as desired. Some operators prefer a left-hand thread on a raising and lowering screw, or arbor. On the original attachment, holes in the upper ends (shouldered ends) of the rods, or slides, were tapped for $\frac{5}{16}$ -in. screws and are so specified in details at the right. However, there is less danger of distorting the projections when hand-tapping the holes if the ends of the slides are drilled and tapped for $\frac{1}{4}$ -20 screws as indicated on the opposite page.

The top spacer bar is slotted after boring, the slots running in from the edge at an angle of 30 deg. Note that the holes for the clamping screws are drilled body size from the edge to the slots. Beyond the slots the holes are drilled tap size. This procedure is necessary to permit a clamping action on the drill-rod slides when the screws are tightened.

It is necessary that the bores in the spacer bars and mounting plate be located precisely, especially the spacing of the holes. To handle such a job with the required accuracy, machinists generally use tool-maker's buttons which are center-drilled and hardened and ground to close dimensions. However, shop-made tool-steel buttons will serve the purpose if you take time to do an accurate job of turning to size. In practice, the buttons are indicated (with a dial indicator) after the work is mounted on the lathe faceplate. As the first step, locate the hole centers, using a scribe on a surface plate. Prick-punch the hole centers, recheck, and then drill and tap for 10-32 screws as in the lower right-hand detail on the opposite page. Mount the buttons on the work and clamp lightly to the large faceplate, counterbalancing with a weight. Then indicate one button (with a dial indicator), shifting the work until the button runs dead true. Clamp the work securely to the faceplate, recheck after





Here's the finished attachment ready to mount on the lathe. Note the slotted bar and clamping screws

clamping, then remove button, leaving work centered for boring. Indicate each button in this manner before boring the hole.

Dimensions of the clamping plate are laid out to fit the compound of a 9-in. lathe. Be sure to check measurements of the compound T-slot before making this part to fit your own lathe, as it may be necessary to alter the dimensions to assure correct mounting. The plate should be a close sliding fit in the compound T-slot.

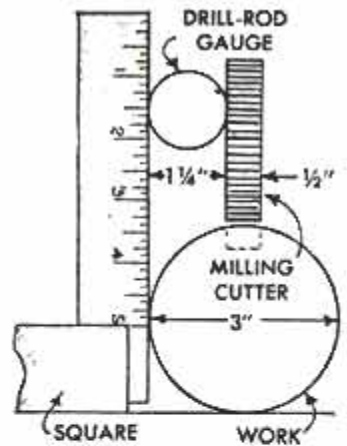
On the original unit the top plate was machined from brass. Use of brass makes a somewhat easier operating unit, as the top plate serves as a thrust bearing for the arbor. However, use of brass is not essential. Steel of the type known to the trade as "free machining" is probably best for making the spacer bars, mounting bracket, top plate and clamping plate. Although the mounting bracket can be cut to the rough shape with an ordinary hacksaw, it may be possible to order it flame-cut and thus save considerable labor and time. If this is done all that will be necessary is to clean up with a file and round the corners.

The handwheel, or palm wheel, shown in the upper right-hand detail on the preceding page, can be made as indicated, or a ball crank substituted. Many users will prefer a ball crank, although a palm wheel gives a somewhat closer control for fine settings of the work-mounting plate. ★★

☐ Concentrate the light in your workshop, if it is equipped with only a bare bulb, by using one of the small deep foil plates used for freezing food. Cut a round hole in the center and slide it over the small end of the bulb.

Centering Milling Cutter

When cutting keyways, the milling cutter can be centered accurately over the work by using a short piece of drill rod as a gauge. To arrive at the diameter of the drill rod to be used, subtract the width of the cutter from the diameter of the work and



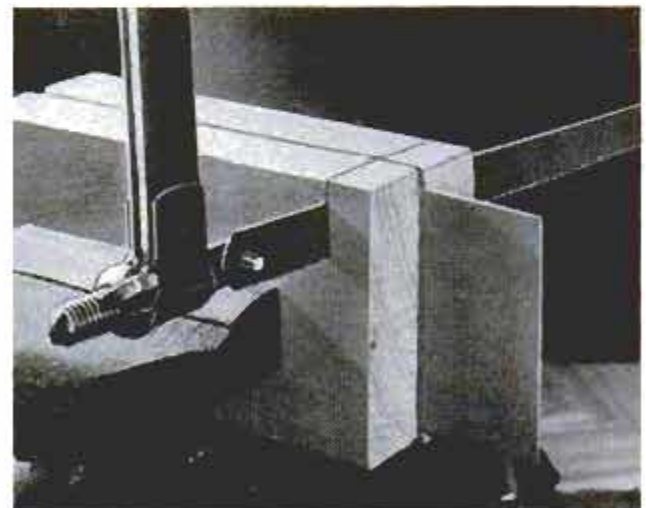
divide the remainder by 2. Place the gauge between the side of the cutter and the vertical edge of a toolmaker's square which is butted against the side of the work. Adjust the worktable of the mill until the gauge just touches both the cutter and the square.

Metal Rib Stiffens Hacksaw Blade For Cutting in Confined Place

When it is necessary to use a hacksaw blade without the frame, a section of umbrella rib crimped over the back of the blade will help stiffen it so it won't buckle when being used. Use pliers to pinch the rib over the edge of the blade and then bind the two together at the ends by wrapping with several turns of friction tape. The taped ends also will provide a better grip on the blade.

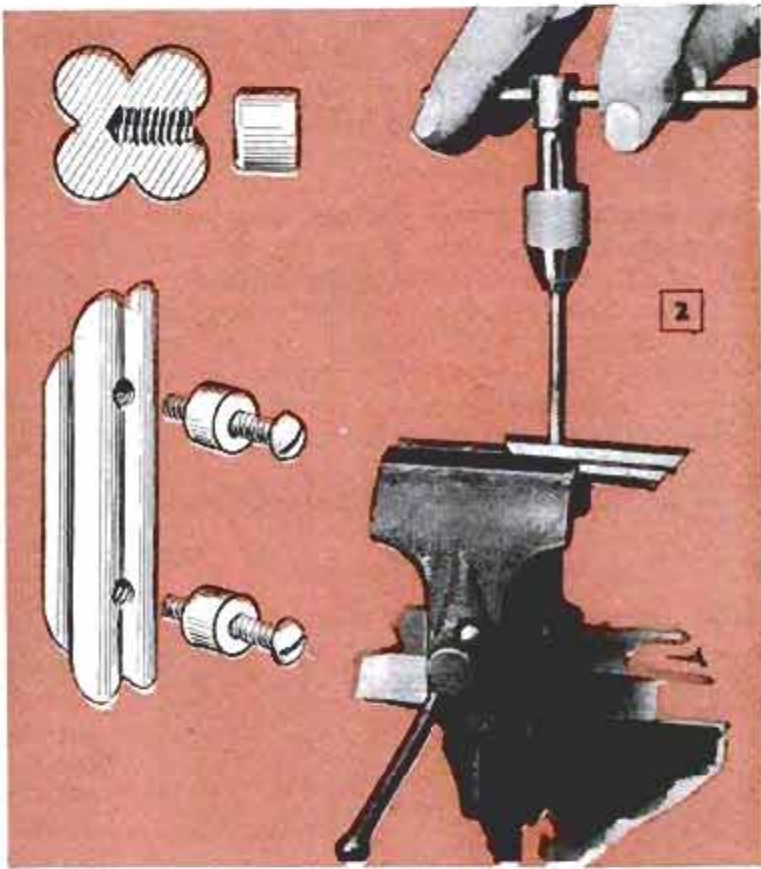
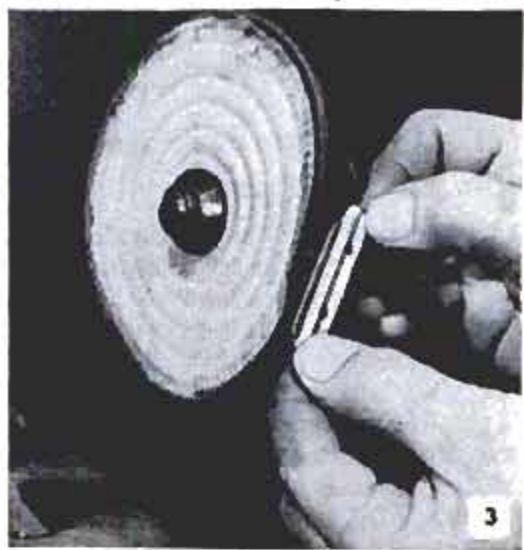
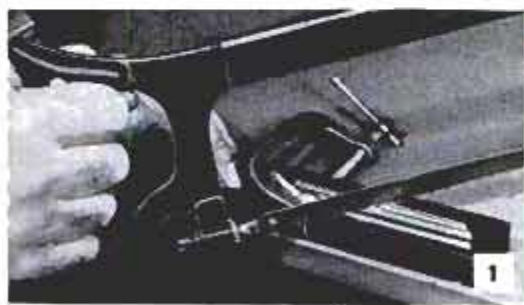
Metal Cut in "Wood Sandwich"

Thin-gauge sheet metal can be hacksawed without being twisted, or breaking the saw blade, if the metal is sandwiched between two scraps of wood and clamped in a vise. Mark a line on the metal, offset 1 in. from the line to be cut, and align it with the edge of the wood. The cut is then made 1 in. from the end of the wood.



CUSTOM CABINET PULLS

By Ralph Treves



IF YOU PREFER something beside stock types of door and drawer pulls, there are many solid-brass fittings and stock of various shapes that can be made into distinctive hardware. Among the fittings that can be used are such things as boat hardware to provide a nautical motif for a game room or a boy's room. Another example would be to use small door knockers as pulls. Solid-brass stock is available in a variety of shapes, including flats, rounds, hexagons and special shapes, such as the stock used to make the door pulls illustrated in this article. This latter type stock usually is sold in odd lengths, and is handled by hardware stores catering to the hobbyist and do-it-yourself craftsman. If stock of an unusual shape is used, cut the ends of the pulls at an angle, so the unusual design is accented. To saw accurate angle cuts,

make a miter box from a metal channel, as shown in Fig. 1, and clamp the stock to one side. Fig. 2 details the method of attaching the pull to the door or drawer. Blind holes are drilled and tapped on the back sides, then spacers, which are short lengths of brass round stock drilled through, are fitted between the pulls and the surfaces to which they are attached. The screws are driven into the pulls from inside the doors so they do not show. To obtain a high polish on the brass, first clean it with steel wool, then buff it on a buffing wheel, Fig. 3, using jewelers' rouge. Do not use brass polish, since the metal must be perfectly clean to receive clear lacquer or plastic spray. Application of either of these two materials will assure that the brass stays shining and corrosion-free for years, eliminating the need for frequent polishing.



Straw-Insulated Hog Shelters Used the Year Around

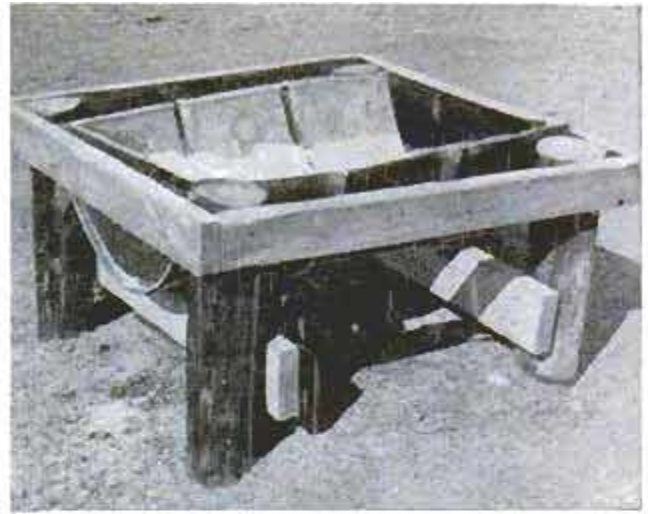
Hoghouses are made usable the year around by one farmer who packs a heavy layer of straw around three sides of the buildings. The straw is held in place by wooden fencing kept upright by stakes driven into the ground. During cold weather, fattening hogs are kept in the buildings; then later, early-farrowing sows use the insulated shelter.

A. M. Wettach, Mt. Pleasant, Iowa.

Utility Box on Corn Planter Holds Seed and Spare Parts



Extra sacks of corn and fertilizer, as well as tools and spare parts, are carried in the utility box mounted on this tractor-drawn corn planter. The uprights supporting the box are 3-ft. lengths of steel angle bolted to convenient points on the planter frame. Angle cross pieces support the box, the size of which is determined by the spacing of the supports.



Mineral-Feed Trough From Drum

This trough for mineral feeding of livestock is braced solidly in a frame of cedar posts and heavy lumber. The trough is an oil drum that has been cut lengthwise as shown, and supported on two pieces of 2 x 6 lumber nailed on the inside of the posts. The top framing is 2 x 4s which are just the right length to hold the drum firmly between the four posts.

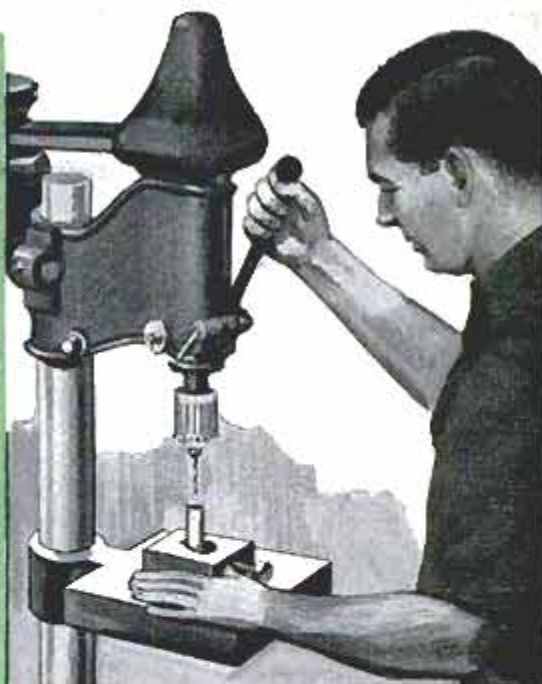
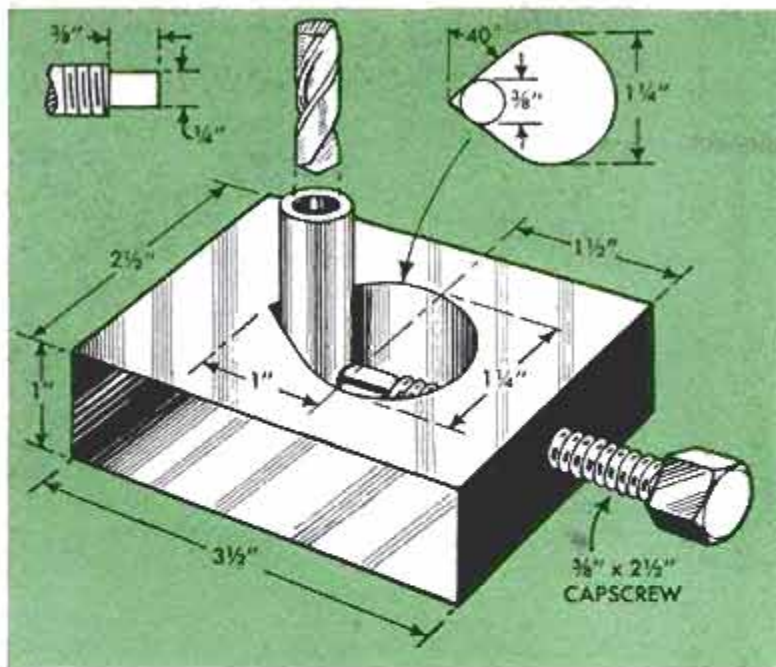
C. F. Marley, Nokomis, Ill.

Cracked Turkey Eggs Patched With Tape for Hatching

Turkey eggs that ordinarily cannot be used for hatching purposes because of cracked or "toe marked" shells are repaired with cellophane tape by one turkey breeder who reports successful incubation of 55 percent for the taped eggs. Almost any size crack can be sealed with tape so that it can go through a hatching process. Small cracks and thin shells can be detected at the time of candling and taped before any further damage occurs.

F. L. Elam, Sacramento, Calif.





V-Clamp Holds Round Stock for End-Drilling

This shop-designed V-clamp was originally made to release a lathe for other work and permit fast end-drilling of short lengths of round stock on a drill press. Using the same design principle, dimensions can be altered to suit any special purpose. As detailed above, the clamp is suitable only for short length of stock not exceeding 1 in. in diameter. The steel clamp

block should be finished all over either by filing or milling. Special care must be taken when elongating the center hole to form the vee, or crotch. The clamp screw can be any handy size, but in any case the end should be shouldered and squared in the lathe and preferably hardened so that it will fit squarely against the workpiece.

C. W. Woodson, Chicago.

Razor-Blade Knife Improved From Small C-Clamp



A small C-clamp fastened over a razor blade will serve as a handle when cutting paper or cardboard. The clamp anvil will slide easily along the surface of straightedge and make clean cuts.



Tubing Bent With Pulley

Recently faced with the problem of bending 48 U-tubes on a 2-in. radius for the cooling coil of an air conditioner, and finding conventional tube-bending devices unsuitable, I tried one idea that worked perfectly. I used an ordinary V-pulley of the right diameter and clamped it by its hub in a vise. Then, by hand I wrapped the pieces of tubing around the wheel. Perfectly round, smooth bends were obtained because the V-shaped walls of the wheel supported the tubing on each side.

J. F. Dundovic, Minneapolis, Minn.

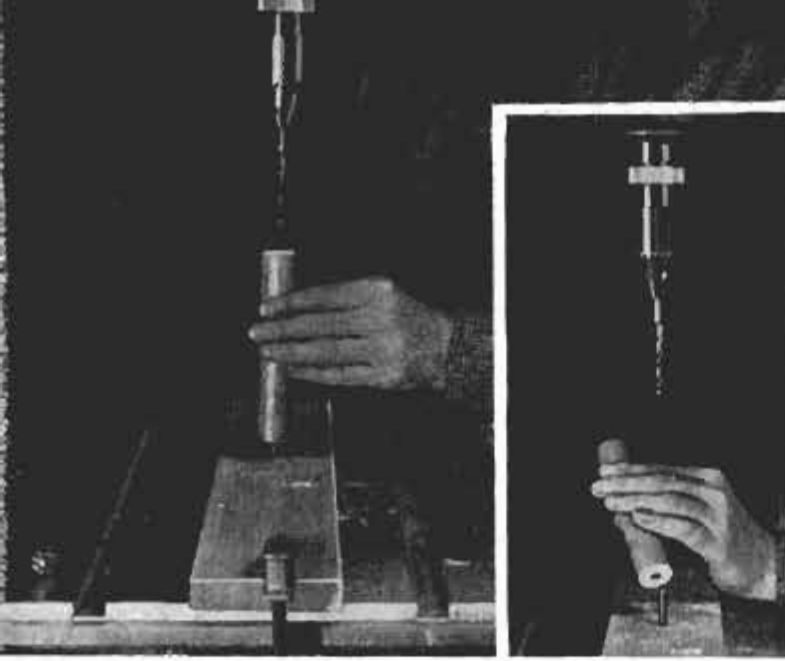
Drill-Bit Size Marked Legibly On Paper Tab Glued in Flute

The drill-bit size written on a paper tab and then cemented in a flute is easier to read than the numbers stamped at the top of the shank which wear off from extensive use. Twist drills down to a No. 30 can be marked in this manner.

SN 58

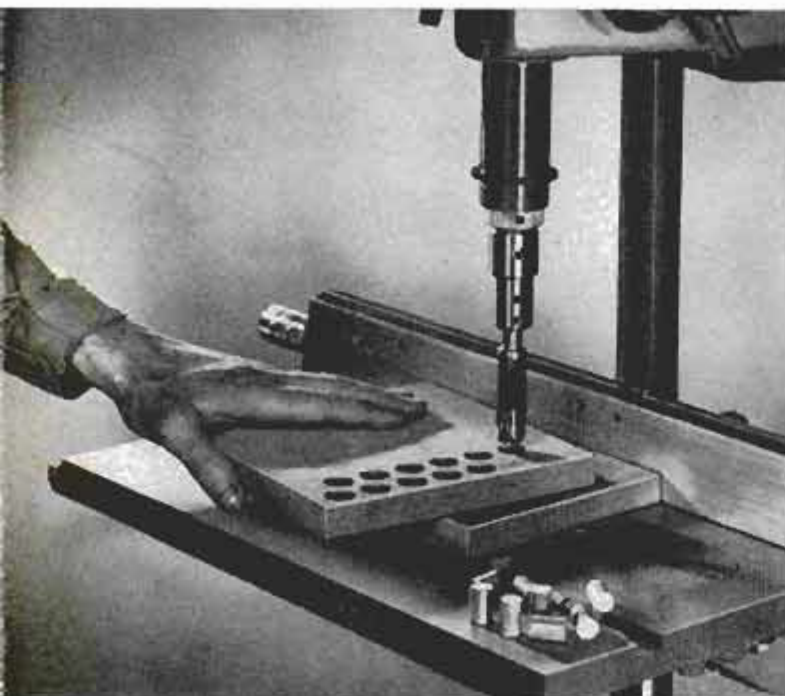
HOW WOULD WITH YOUR

By Chris Nelson
PART I



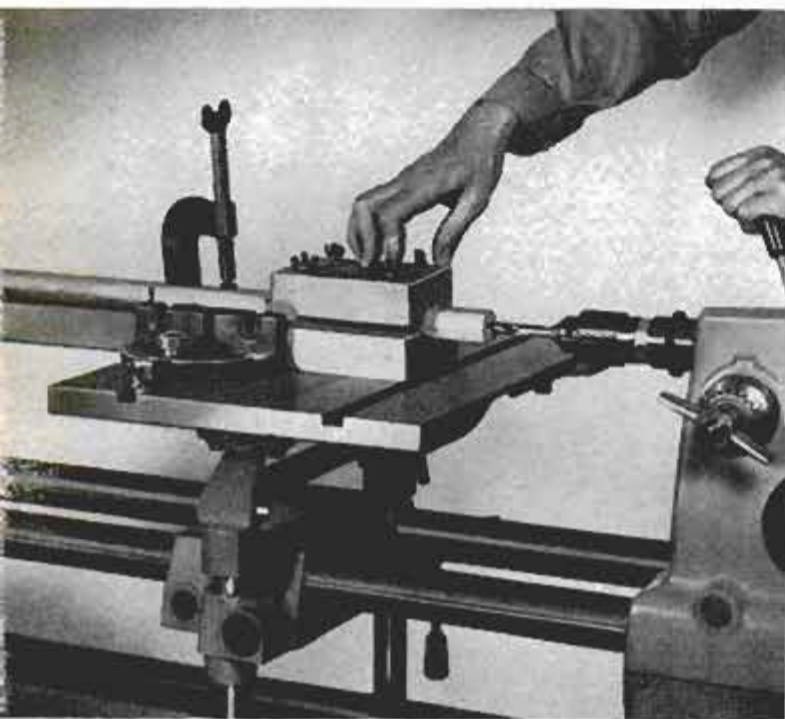
Q—How do you drill a hole in a piece of wood that is thicker than the drill bit is long?

A—MAKE A POSITION JIG so that you can drill from both sides of the work and keep the holes aligned. To make the jig, clamp a board to the drill-press table and drill a hole in it of the same diameter as the hole to be drilled in the workpiece. Next, drill a hole in one side of the work, then invert it over a short length of dowel fitted in the hole in the board. The hole drilled from the opposite side of the work now will be in perfect alignment



Q—What drill-press accessory is especially useful when building furniture where it is necessary to cover the screwheads for a more finished and professional appearance?

A—THE TOOL YOU NEED is called a plug cutter. In effect it is a hollow drill that produces plugs equal to its inside diameter. Plugs are cut from the stock used for the furniture and driven into counterbored holes in which the screws have been driven. The plugs are allowed to project slightly, then sanded flush. Other uses for the plugs include the repair of screw holes that have become oversize. The hole is bored out large enough to accept a wooden plug wiped with glue. A pilot hole then is drilled in the plug and the screw is reinserted



Q—To assure accuracy when drilling a hole down the center of a dowel, rod or other cylinder, what procedure should be used on a drill press?

A—MAKE A CLAMP, consisting of two wooden V-blocks cut on a table saw and held together with bolts and wing nuts. On a vertical drill press it will be necessary to attach the clamp to some sort of a base to hold it vertical. If you have a combination power tool that can be set up as a horizontal drill press, a base will not be necessary, as the work can be clamped to the table as shown in the photograph. Another advantage of the horizontal drill press is that work of almost any length can be end drilled

YOU DO IT DRILL PRESS?

Q—What setup on a drill press will permit accurate drilling of holes to receive splayed legs for a table?

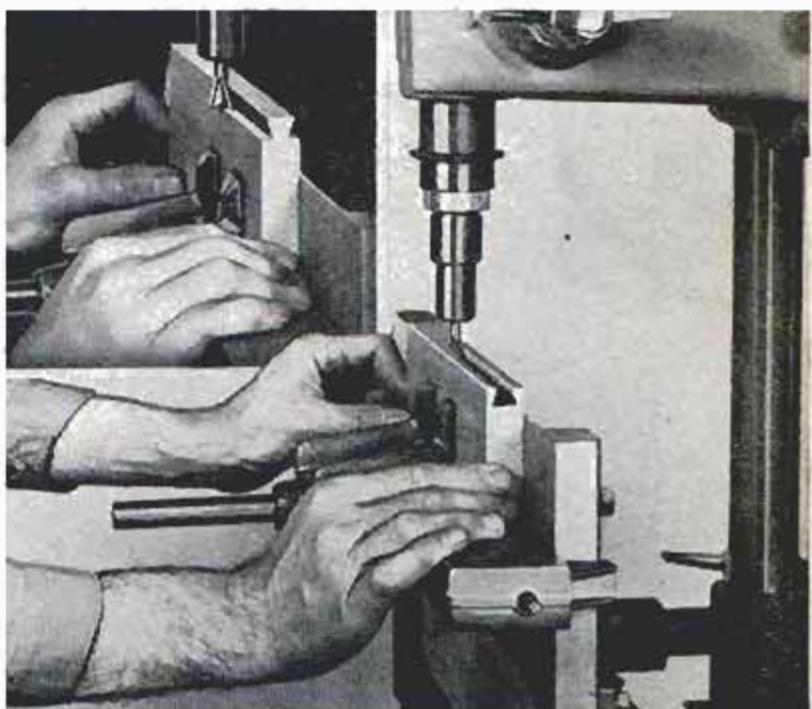
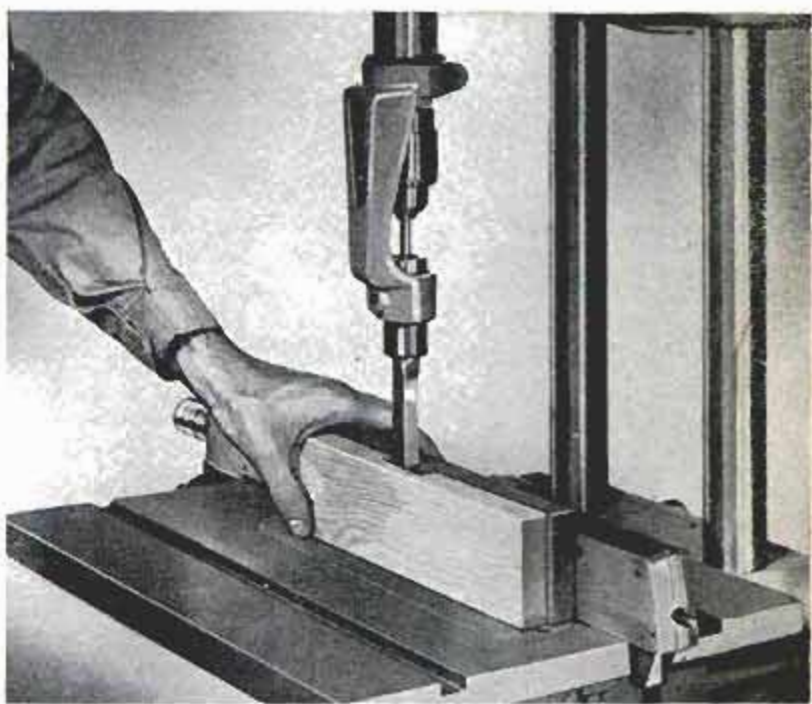
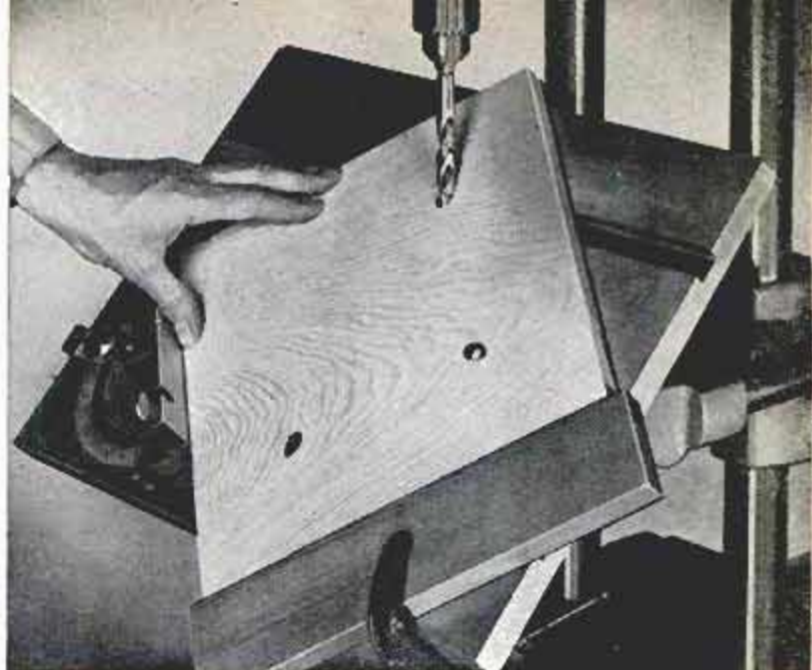
A—CLAMP TWO PIECES OF WOOD to the drill-press table to form a V-block, or, as shown in the photograph, if your drill-press table has a miter gauge, use it for one side of the V-block. Adjust the table to the desired angle, then drill all four holes. This method also can be used for round work by drawing a radius through each hole location and keeping it aligned with the drill bit while drilling the hole

Q—When using a mortising attachment on a drill press to make a side mortise, which is a mortise that is flush with one surface of the stock, how can you prevent the chisel from creeping sideways in the wood?

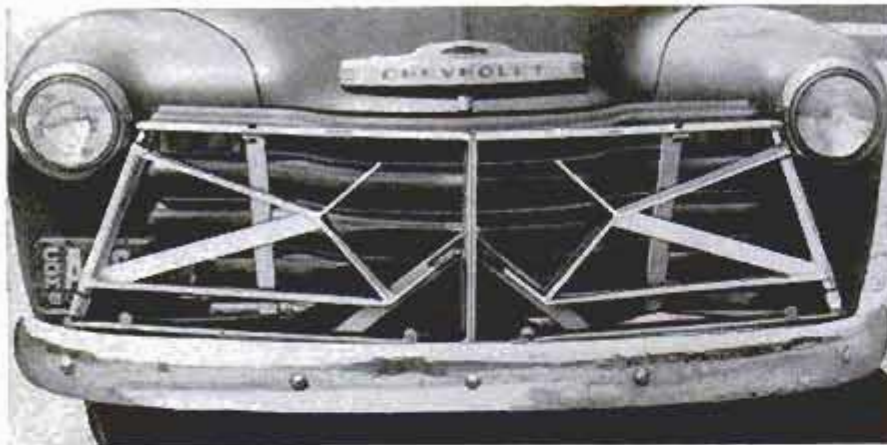
A—PLACE A PIECE OF WOOD between the workpiece and the fence as shown in the photograph, so the chisel will bear against it and stay aligned. If your drill-press table is not equipped with a fence, clamp a strip of wood to the table to act as one. Although the photograph indicates that the work is being held by hand, for safety and greater accuracy, both the workpiece and the piece of wood used to keep the chisel aligned should be clamped to the fence

Q—To make a joint by which two pieces of wood can be joined in a sliding arrangement, what drill-press attachment can be used?

A—A DOVETAIL CUTTER does the job nicely. To cut the slot accurately for the slide, make a setup like the one shown in the large photograph. A fence—which can be a strip of wood clamped to the drill-press table—is used to guide work under the cutter and the work then is held in alignment by a clamp arrangement as indicated. The dovetail tenon is cut in a similar manner as illustrated in the inset photograph. To assure that the wooden members will slide freely, cut the tenon sufficiently undersize to provide clearance, should the wood expand from moisture



Pickup Truck Has Combination Carrying Rack on Front Bumper



The combination carrying rack and grill guard fitted on the front bumper of the pickup truck shown is made of welded steel and is designed to carry boxes, barrels, bags of feed and other objects when the rack is lowered. When it is up the rack serves as a sturdy grill guard. Also, a pivoted bracket can be swung out on either side of the truck for carrying pipe or lumber. Angle iron and flat steel are used for the framework of the unit. The two end bars are $\frac{3}{4}$ -in. pipe that reinforce the rack and serve as shafts for the pipe-carrying extensions. The rack can be raised or lowered by means of simple hinges that are fastened to the bumper supports. The lowered rack is supported by the bumper.—F. Leland Elam, Sacramento, Calif.

Tire Tread on Farm Equipment Permits Highway Travel

One farmer solved the problem of moving his steel-tired farm equipment over blacktop and concrete highways by removing the steel lugs and installing old tractor-tire treads on the wheels. The tires are cut apart and the flat part of the casing riveted to the steel rims as shown. The deep tread still provides sufficient traction for most operating conditions and permits a softer ride over hard surfaces.

Grover Brinkman, Okawville, Ill.



Water Gun Subdues Brooding Hen

When an angry brooding hen hinders the collecting of eggs from a laying nest a squirt or two from a water pistol usually will discourage her. The hen may eventually be trained not to sit on the nests provided for egg laying.

Starting Farm-Equipment Motors

Starting motors on mechanized farm equipment is no longer a difficult task for one farmer who welded a pulley on the shaft of a hand crank to use for this purpose. Driven by a flat belt



and powered by a tractor, the pulley simplifies starting the motor on a combine, elevator or other farm equipment. In cold weather it more readily overcomes the drag of heavy crankcase oil and in hot weather counteracts vapor lock almost immediately. The handle end of the crank, beyond the pulley, is cut off and discarded since it no longer is used.

Peep-Sight Level Measures Tree Height

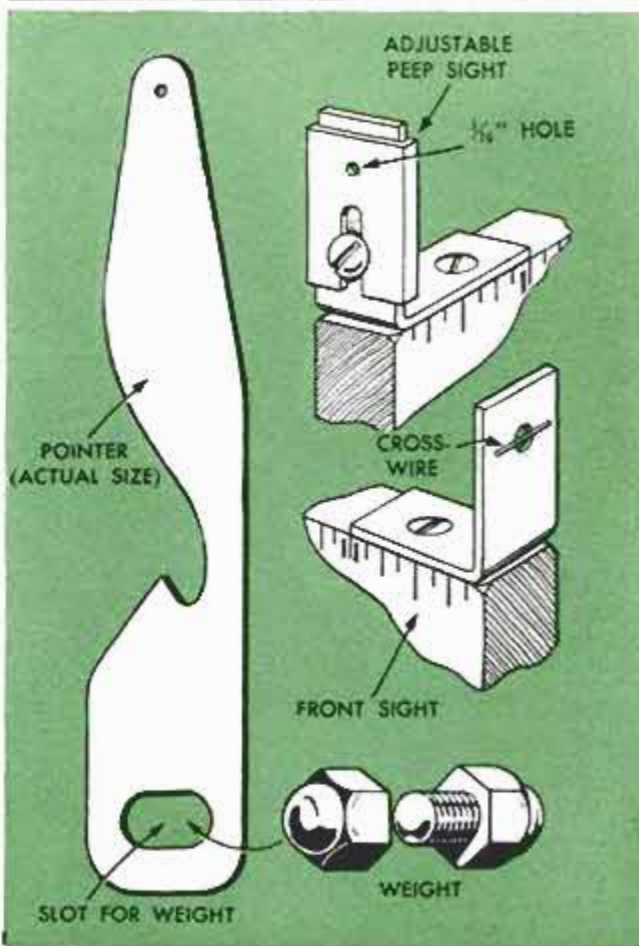
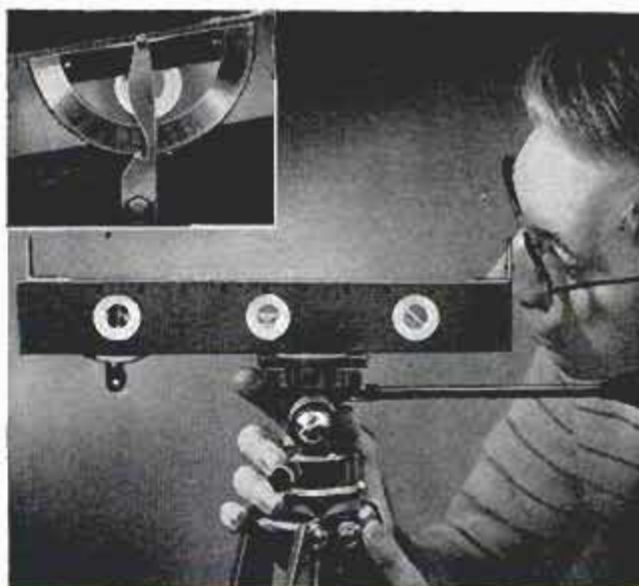
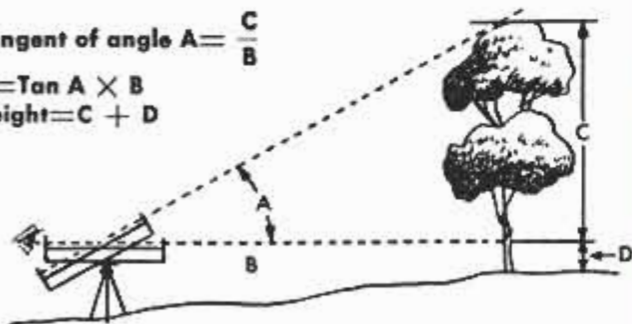
By Walter E. Burton

HERE'S A TOOL which not only aids in laying out a driveway or leveling a plot of sloping ground but also can be used to measure the height of a tree or structure too difficult to measure by other means. It consists of a 12-in. spirit level, two angle-brace sights, a protractor and a weighted pointer. Assembled as shown in the photo at the right, the unit may be fastened to a camera tripod. Precision sights may be purchased for mounting on the level, but relatively accurate sights can be made from two 1-in. angle brackets as shown below and at the right. The protractor is fastened to the side of the level with its center point $2\frac{3}{8}$ in. from the front end and $\frac{1}{2}$ in. down from the top. Cut the pointer from thin metal to the pattern given in the detail. An adjustable balance weight for the pointer is made from a bolt and two cap nuts. Suspend the pointer from a nail driven into the level at the center point of the protractor. For tripod mounting, recess a mending strip in the bottom edge of the level, centering it 5 in. from the sighting end. Drill and tap a hole through the strip to accommodate the mounting screw of the tripod. To measure the height of an object a known distance away follow the formula given below:

$$\text{Tangent of angle } A = \frac{C}{B}$$

$$C = \text{Tan } A \times B$$

$$\text{Height} = C + D$$



SHOPPING FOR TOOLS



1. AUTOMATIC DRILL-PRESS FEED has 3-cycle air-operated traverse, hydraulically controlled drill feed and automatic return to starting position. Foot-pedal control permits use of both hands. Drill can be operated manually, full automatic, or manual approach and automatic drill

General Pacific Corp., 8740 Washington Blvd.,
Culver City, Calif.

2. SANDER-SCRAPER comes with a double-edged scraper blade and attachment for holding a 2½ x 9-in. sandpaper strip. Change from scraper to sander is made by loosening knob and replacing blade with shoe and sandpaper strip. Knob and handle are designed for easy two-handed grip

Hyde Mfg. Co., Southbridge, Mass.

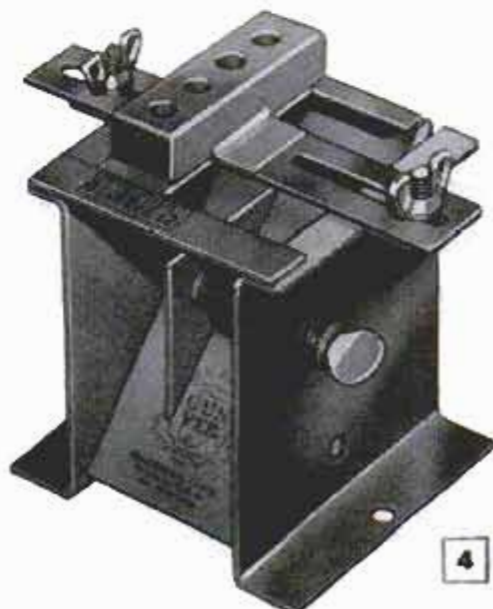
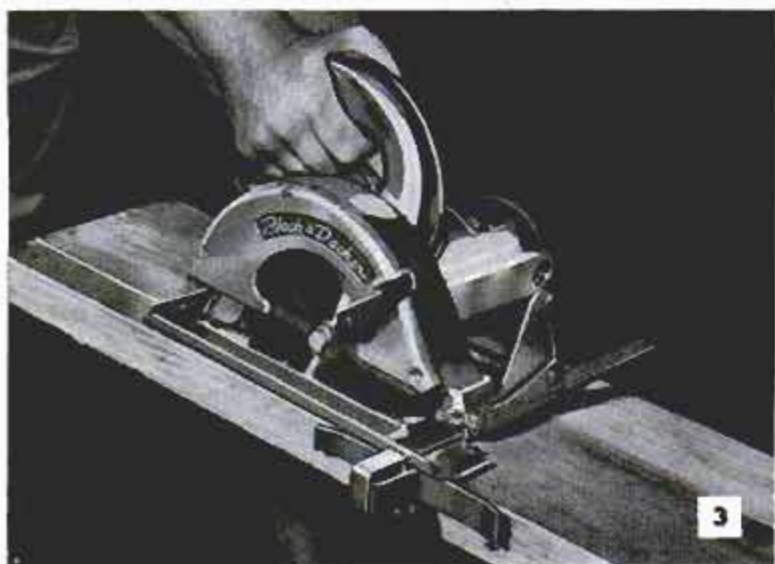


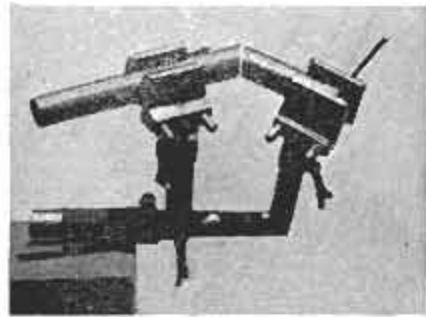
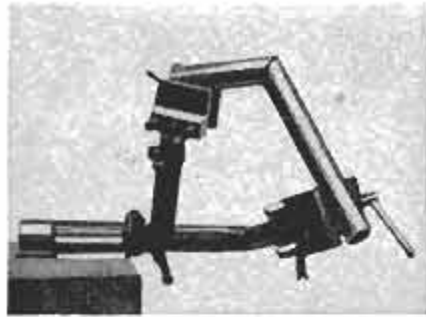
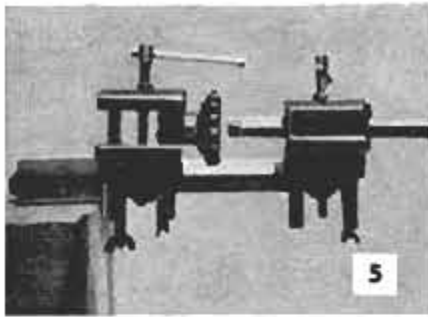
3. HEAVY-DUTY SAW has 6½-in. blade that will cut through a 2 x 4 at 45 deg. with ¼ in. or more of blade to spare. Calibrated quadrant gives angle settings from 0 to 45 deg. Ripping guide has wide shoe for easier control. The built-in chip deflector and open-end handle are new features

Black & Decker Mfg. Co., Towson 4, Md.

4. MITER DOWELING JIG has been especially designed for drilling accurate dowel holes in mitered stock ¾ to 1¼ in. in thickness. Hardened-steel drill guide has 4¼-in. holes spaced ½ in. apart, making it possible to drill dowel hole at any desired point. Use with hand drill or drill press

Gunver Mfg. Co., Manchester, Conn.



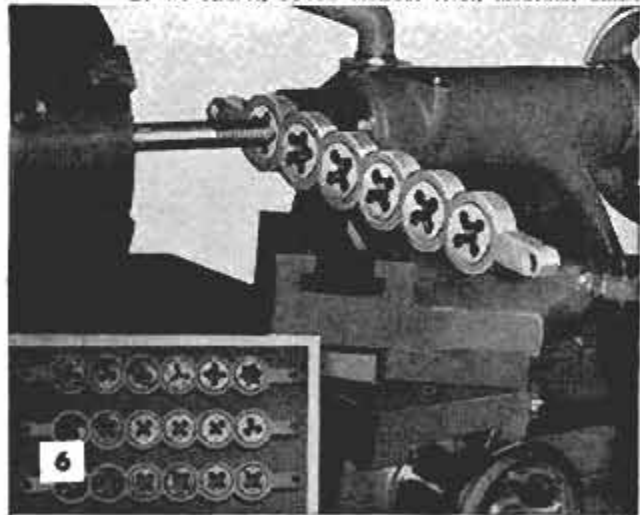


5. UNIVERSAL WELDING VISE holds small work in almost any position required and at a convenient height. When locked in place the work can be rotated through 360 deg. vertically to locate the work in a "down hand" position. Two swiveling vises mounted on tubing slide in or out. Complete unit weighs 22 lb.

D. W. Shurtz, 1346B Melrose Ave., Modesto, Calif.

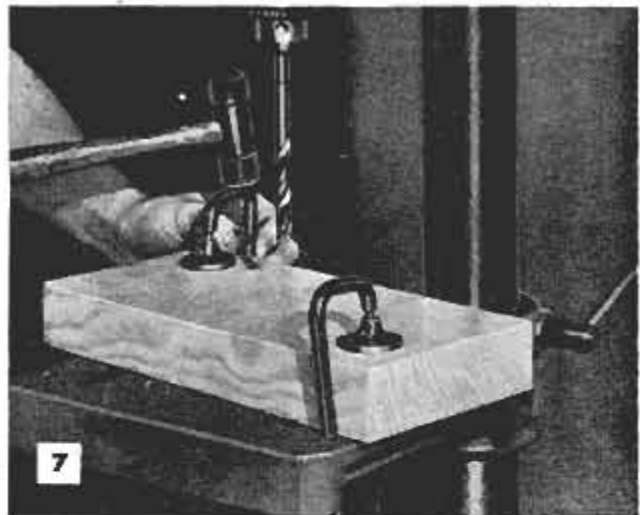
6. MULTIPLE DIE HOLDER comes as a set of 3 holders, each containing 6 threading dies to cut 18 thread sizes from 1/8 to 1/2 in. NC and NF, including 1/8 and 1/4-in. pipe threads. Handy at the lathe where work requires cutting several sizes of threads

Mohr Tool & Mfg. Co., Box 63, Maywood, Ill.



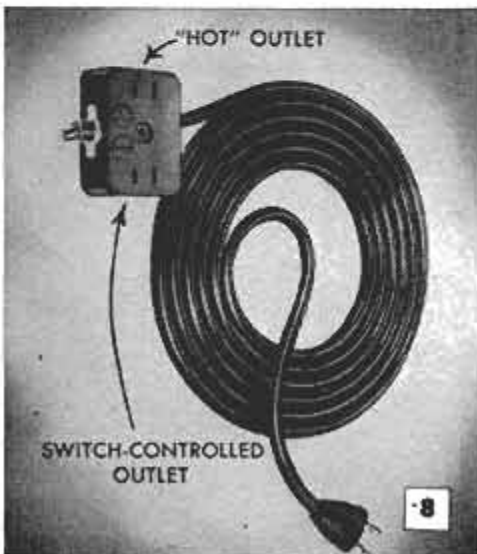
7. WORK-HOLDING CLAMPS are designed for use in holding work on a drill-press table. Holes are drilled near each corner of table and leg of J-clamp inserted. Work is placed under clamp pad and a light tap on bend of clamp locks it in place

Delta Power Tool Div., Rockwell Mfg. Co., 448 N. Lexington Ave., Pittsburgh 8, Pa.



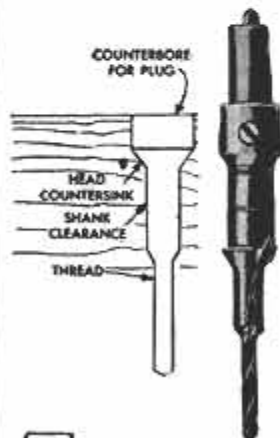
8. FLEXIBLE WIRING SYSTEM for small shops can be built up by using two or more of these 8-ft. power cords. Each cord comes with plug and twin outlet box, one outlet "hot," the other switch-controlled. Outlet box has mounting hole for easy attachment

Unilectric, Inc., Milwaukee, Wis.



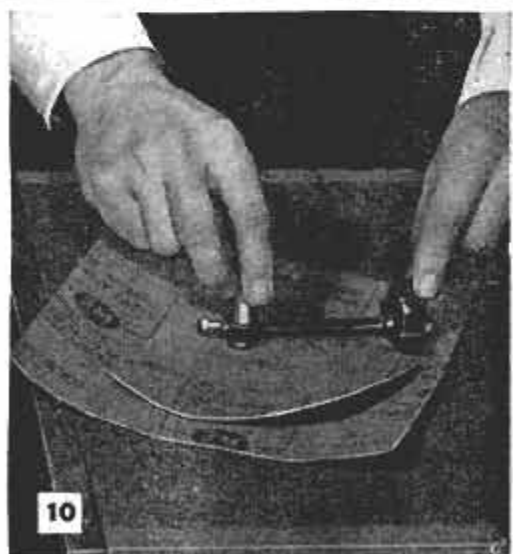
9. ADJUSTABLE COUNTERSINK for screws employs standard twist drill (for pilot hole) which can be adjusted to suit different lengths of screws of same shank size. Countersinks for flatheaded screws, counterbores for plugs. Available for screws No. 6 to 12

Durabilt Metal Products Co., 709 Sip St., Union City, N. J.



10. SANDING-DISK KIT consists of 8-in. disk, and cutter for cutting disks from abrasive sheets. Disk has rubber facing with a pattern of vacuum cups which holds abrasive disk in place. When used on saw, both sides of disk can be faced with abrasive

The Speed Corp., 4734 N. Albina, Portland, Ore.





On the MARKET

FOR THE DO-IT-YOURSELF

PORCELAINLIKE ENAMEL is especially effective for renewing and leakproofing old laundry tubs. Not affected by detergents, soap or bleaches. Spread with a brush, spray or cloth swab. Levels and hardens without brush marks. Comes in white and several colors, and is available as kit

EV-B-Shield Co., Joppa, Md.

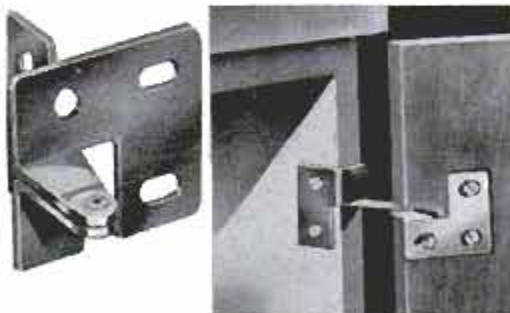


CONCRETE GLUE is made for bonding new concrete to old, renewing steps and walks that have been chipped. Also bonds other material to concrete

Red-E-Crete, Inc.,
1001 Aviation Dr.,
Glendale 3, Calif.

FLUSH DOOR HINGE eliminates face framing from cabinet work, making it possible to cut an entire cabinet front from one piece of plywood

Washington Steel Products, Inc.,
1940 E. 11th St., Tacoma 2, Wash.



HOME FIRE EXTINGUISHER operates automatically when fire in the room raises temperature to 165 deg. Room is immediately filled with dense, flame-smothering fog. Effective on all common types of fires: Electrical, grease, paper and wood. Pressurized container comes with bracket

Cyemba Sales Co., Derby, Conn.

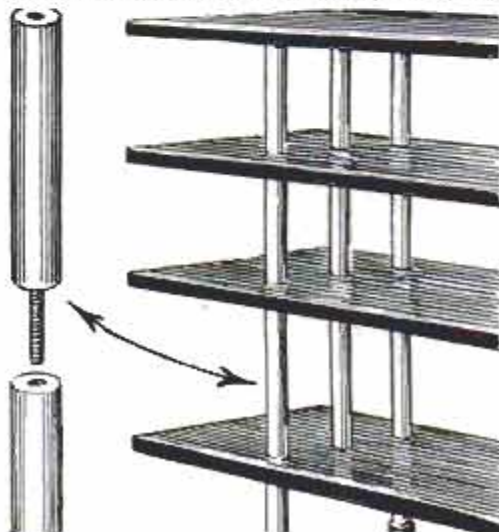


METALLIC PUTTY contains aluminum powder and must be mixed with a curing agent before use. Spreads easily and bonds to metal surfaces. Does not shrink or crack and can be machined or polished to a brightness approaching that of aluminum. Resists acids, alkalies; not affected by water

Smooth-On Mfg. Co., Jersey City, N. J.

METAL POSTS, or legs, that join in sections enable craftsmen to build modern furnishings with a minimum of time and equipment. No screws, nails or glue is needed. Leg sections available in varying lengths

Consolidated Aluminum Corp., 241 Shoreland Bldg., Miami, Fla.





Step out with the New Kodak Signet 40 Camera

It's the color-slide camera specially designed to get the most out of today's fast Kodak Films and the new midget flashbulbs!

You'll step out with confidence with a smart new Kodak Signet 40 Camera. It has the picture-taking range and smooth handling ease that lets you "get" color slides that others miss!

Ask your dealer about the Signet 40's superb $f/3.5$ Ektanon Lens and Synchro 400

Shutter, $1/5$ to $1/400$ second. Have a look at its exclusive dual-reflector flash system. Discover for yourself how fast you can sight, focus, shoot, and advance the films—with *all controls* at your finger tips.

The Kodak Signet 40 Camera, complete with flashholder and dual reflectors, is only \$65.



Dual reflectors for M-2 or #5 and #25 bulbs

Fast, handy, positive finger-tip controls

Rapid thumb-lever film advance

Combined rangefinder and viewfinder

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EASTMAN KODAK COMPANY . . . Rochester 4, N.Y.

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TRADE MARK

HOW TO INSULATE AN UNFLOORED ATTIC



The Fiberglas Do-It-Yourself Bug makes it easy to do . . . with this FREE book!

It's a simple job to finish your attic, add an extra room, enclose a porch or build a screened patio, when you use this 16-page book as a guide. Complete step-by-step instructions take you from start to finish in easy stages and with lots of pictures.

The book even shows how fuel savings *alone* can pay for all the insulation . . . if you install the necessary amount of Fiberglas® Insulation. You'll find out why you need *fully* adequate insulation—not just minimum amounts—to enjoy low-cost comfort *all year 'round*. So for the *easy* way to add a room or finish an attic, and the *right* way to fully insulate for a warmer house in winter at lower fuel cost, and a cooler house in summer, rush this coupon for your **FREE BOOKLET** today!



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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.

Plaster Stain



Q—We've just moved into a new home and we notice a reddish-brown streak on the plastered ceiling of the living room. It cannot be removed by washing and on close examination it appears to be in the plaster and not on the surface. The room has not yet been painted. What could cause this?—B. H., Mass.

A—Judging from your description we would guess offhand that the streak is a sap stain from one of the ceiling joists, or is caused by a slow leak in the roof, or by some foreign substance which found its way into the plaster at the time of mixing and did not show up as a discoloration until the walls dried out. This is a comparatively rare occurrence, but it is a possibility to be considered. If there is a leak and the streak is due to the presence of moisture, repairing the leak may or may not eliminate the discoloration. We would suggest that you first make sure that the plaster is dry, then sand the discolored area lightly with medium and fine sandpaper. The chances are good that this treatment either will remove the discoloration entirely or at least reduce it to such an extent that it will not show under paint. After sanding, coat the area with white shellac.

Screens Rust



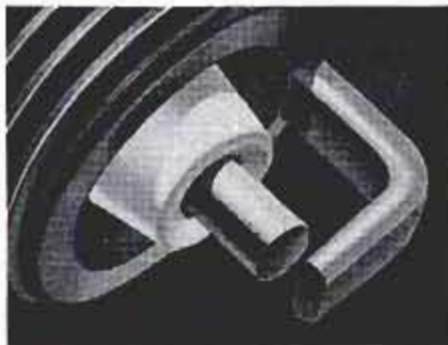
Q—Two years ago I purchased ready-made galvanized window screens and while taking them down this fall I noticed rust spots on some of the lower panels. I was rather surprised as I thought galvanizing would protect the screen for at least 5 years. I coated the frames with spar varnish. I don't want to use paint if avoidable. What other protective coating can I use?—C. N., Mich.

A—We would, of course, recommend painting the screen wire and frames, as the pigment finish is perhaps the more durable when compared with any clear finish. However, if you wish to retain the original natural wood finish then, of course, a transparent finish must be used for refinishing. Spar varnish will give reasonably good service on the screen frames and it also can be used on the

(Continued to page 240)

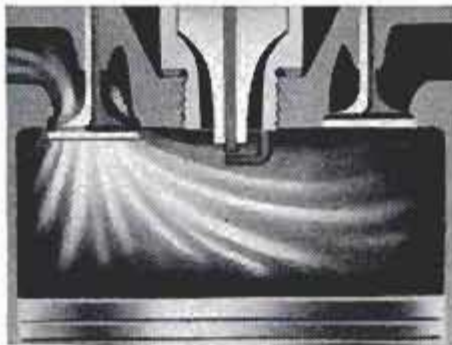
IS YOUR CAR AN OVERHEAD-VALVE V-8? Here's proof that only new **Power Tip** can "fire up" your engine at all speeds!

Why was new POWER TIP developed?



Ordinary plugs frequently fail to give top performance in today's higher-compression, higher-horsepower engines in both city and highway driving. New Power Tip was designed especially to give top performance and economy at *all speeds*.

What does it do for low-speed driving?



Power Tip extends into the heart of combustion—gets hot fast and *stays* hot at low speeds. Hot projecting tip burns away carbon and oil deposits—prevents low-speed fouling, commonest cause of sluggish engine performance and slow starting.

Does it stop high-speed pre-ignition?



In high-speed, turnpike driving, amazing Power Tip *takes full advantage* of the cooling, refrigerating action of the richer air-fuel mixture at wider throttle. This "charge-cooling" effect cools projecting Power Tip and *checks* destructive pre-ignition.

How is POWER TIP different?



Ordinary Plug Tip

New Power Tip

Projecting center electrode and ceramic tip . . . the Power Tip . . . extends spark gap in toward the center of the combustion chamber. Fuel burns more evenly and completely—"fires up" engines for peak performance and economy at *all speeds*.

Who can use new POWER TIP?



You can, if you own a car with an overhead-valve V-8 engine. Power Tip was tested and *proved* in almost every make of today's cars. It is the *only* spark plug ignition-engineered for today's higher-compression, higher-horsepower V-8 engines.

Is it available now for all cars?

Power Tip fits all these cars with overhead-valve V-8 engines: Buick, Cadillac, Chevrolet, Chrysler, De Soto, Dodge, Plymouth, Hudson, Imperial, Ford, Lincoln, Mercury, Nash, Oldsmobile, Packard, Pontiac, Studebaker.



AUTO-LITE RESISTOR SPARK PLUG WITH POWER TIP

Auto-Lite manufactures over 400 products, including Spark Plugs, Batteries, Wire and Cable, and Automotive Electrical Systems . . . sold throughout the United States and Canada.

Care and Feeding of Engines



BY
S. P. CORP

CRANKCASE DILUTION

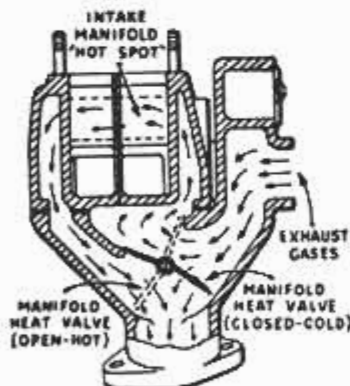
Driving habits can contribute to sludge in your crankcase and sluggishness in your engine. Slow speeds and short trips keep the engine too cool to vaporize the normal condensation. Sludge results. You can help correct this by changing oil oftener, draining out the water with the drained oil. Also, you can increase engine operating temperature by using a 180° thermostat—in which case, use only permanent anti-freeze. Sluggish operation may also be caused by a thermostat which is stuck in the open position. If your water gauge shows engine to be operating at less than 180°, have thermostat checked or replaced with a new one.



SLUDGE IN THE CRANKCASE

MANIFOLD HEAT CONTROL VALVE

The job of the manifold heat control valve is to heat the fuel mixture during engine warm-up, while the valve is closed. It should open thermostatically as soon as the engine is warm. If it is stuck and stays closed, the fuel stays too hot and too lean, the engine may miss, the effect of a good tune-up be ruined. Don't blame spark plugs until you check this valve, which is mounted in exhaust manifold below the carburetor. (In Ford V-8's, it is in the cross-over pipe ahead of the right manifold.) If you find this valve is stuck, free it by lubricating with a mixture of kerosene and soda, or use a good carburetor cleaning fluid.



MANIFOLD HEAT CONTROL

YOU NEED THIS FREE MANUAL

Write for your free copy of "Care & Feeding of Engines," a 24-page illustrated handbook of engine care which may save you a lot of time and money. When you re-ring, be sure to use SEALED POWER KromeX Ring Sets. Their chrome faces fight heat and friction, and they seat fast, control oil immediately, and give you double ring life. Sealed Power, Dept. G-11, Muskegon, Mich.



Sealed Power

PISTON RINGS

(Continued from page 238)

screen wire to give fair protection against corrosion. Although it can be applied to the wire mesh with a small brush, it is better to make an applicator by tacking a strip of pile carpet (a strip cut from an old rug is just the thing provided it is clean) to a block of wood. With this type of applicator you can apply the varnish uniformly to the screen wire. Before refinishing, clean rust from the wire with a stiff-bristle brush. A suede shoebrush is just the thing. To avoid extensive rust damage it's a good idea to refinish the screens as soon as possible after you take them down.

Trimming Evergreens



Q—I have several large evergreens on my property which have grown to a height of about 20 ft., some higher, and now the lower branches on nearly all of these trees seem to be dying out. The trees are what I would call uniformly well-shaped individual specimens and I would like to preserve them if possible. I've thought of trimming them out to a height of 5 ft. or more above ground but have been advised against it. Is there any reason why these lower branches should not be removed? Will the trees be harmed in any way?—A. L., Mo.

A—What kind of evergreens? Unfortunately, you did not say and that makes it difficult for us to give you a definite answer. There are many different forms, or types, of evergreens and pruning, trimming or shearing procedures must be varied to suit. You say your evergreens have grown to a height of 20 ft. or more and that would ordinarily indicate they are of the medium or tall-growing pyramidal type. As a rule the various types require very little trimming or shearing except perhaps to correct growth faults that develop as a result of injury or from other causes. However, there may be some reason to consider pruning the lower limbs of an older tree such as the blue spruce, for example, older specimens of which often have lower limbs practically defoliated from the trunk well outward toward the tips. Generally this is a natural growth process, but sometimes more extensive defoliation is due to what is known as needle cast, which may be caused by any one of several types of fungi. Defoliation of lower limbs gives the tree a scraggly appearance which may justify cutting these off to the height you suggest. When this is done, care must be taken not to damage the bark. Ordinarily pruning of this kind should be carried out in the late fall.

Waterproof Concrete-Masonry Walls

Q—I'm planning a home and intend to begin construction next spring, using blocks for the walls and a concrete-slab floor. Cinder blocks seem to be the cheapest in this locality, but I'm doubtful about using them as I'm told they are not waterproof. What are your recommendations?—K.B., Tex.

A—Cinder blocks are quite widely used in light building construction, both in residential and industrial types. In regular building practice the outside of the wall is finished with cement plaster or cement stucco and coated with a transparent waterproofer. However, for home construction we would tend to favor the use of standard concrete blocks made with cement, sand and gravel or other aggregates used in the regular heavyweight blocks, or lightweight blocks made with light aggregates other than cinders. We think you would find either of these more satisfactory in the long run. To assure a sound, durable wall good practice in concrete-masonry construction must be carried out in all details.



FREE! MASONITE PLAN

shows how to make 18 CHRISTMAS projects!



You don't have to be an artist! Just follow the diagrammed pattern and presto! There's jolly Santa big as life—or bigger, if you choose.

Want to build the Nativity scene for the yard? Or a make-believe fireplace for the living room? Masonite's free plan has these patterns, plus carolers, elves, bells, bows, candles and all the other traditional Christmas themes.

It's fun working with Masonite® panels. They have no knots or grain...won't splinter or crack. They cut cleanly with hand or power tools. And they take all kinds of beautiful finishes.

Durable? Your Christmas cutouts will last for years and years. Weather won't hurt them. In fact, these are the same dense and rigid panels builders use for houses, such as the one in our illustration. Ask your lumber dealer about Masonite panels. And send the coupon now for an early start on your own colorful Christmas decorations.



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Please send me your free folder and more information about Masonite.

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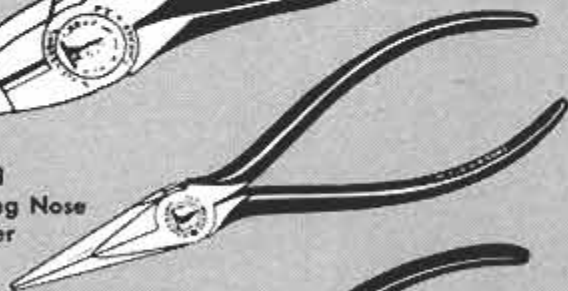
KLEINS

mean a better job

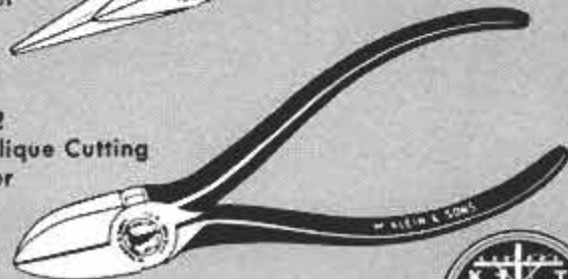
201—NE
Side Cutting
Plier



301
Long Nose
Plier



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Oblique Cutting
Plier



Here are three pliers that will help you do a better job—three tools that should be in every workman's kit.

Klein pliers are recognized by electricians, linemen and good workmen everywhere as the standard of comparison by which other pliers are judged.

The work you do is only as good as the tools you use. Be sure the tools on your bench or in your kit include genuine Kleins, famous for quality "since 1857."



Your hardware store has Kleins in stock or can get them for you quickly. Look for this new display board. It shows the most popular items in the Klein line.

Mathias **KLEIN** & Sons
Established 1857 Chicago, Ill., U.S.A.
7200 McCORMICK ROAD • CHICAGO 45, ILLINOIS

Ships of All Ages

(Continued from page 133)

Richelieu, the first of these, came out in 1946, and since then many other vessels of all types have been "prefabricated."

An exquisite little "mass produced" Mediterranean xebec, for example, was among the wedding presents received by Prince Rainier and Grace Kelly.

One of the first exhibits you will see as you enter the Musee de la Marine is a magnificent model of a frigate mounted on a pedestal and sealed in a dustproof glass case a yard high. The price of this, including the case, is about \$300. The same model made to order commercially would probably cost between \$2000 and \$3000.

Model for Nonexistent Ship

Next to the frigate, you will see one of the richest and most precious exhibits of the entire collection. It is an exquisitely decorated and fully rigged model (scale $\frac{1}{36}$) of a 17th-century 124-cannon ship of the line called the *Louis XV*. No actual French man-of-war ever bore this name, but the model, perfect in every one of its luxurious details, was specially made for the nautical instruction of the youthful Louis XV some 250 years ago.

A little less elaborate but equally beautiful are the museum's models of galleys. These craft were usually about 155 feet long, with a beam of some 20 feet. Most of the deck space was taken up by 25 or 30 rough benches, divided by a catwalk along which a guard patrolled. Approximately 250 galley slaves, chained to their places, tugged at the oars, and the moment one of them weakened, the guard's lash cracked across his bare back. Safely removed from the filth and stench of the human engines, the officers stuck to their quarters in the delicately decorated poop.

First Steamboat

We Americans are prone to think of Robert Fulton as the inventor of the steamboat, but Fulton himself never made any such claim, for he was well aware that in 1776, 16 years before he demonstrated his boat on the Seine, the Marquis de Jouffroy d'Abbans had launched a successful boat propelled by steam. Later the Frenchman built a larger steamboat, which for many years maintained a regular service on the Saone River between Macon and Lyon.

The museum possesses a model of one of Jouffroy d'Abbans' early steamboats, so well constructed that, after 175 years, it can still run under its own power.

France's first propeller-driven ship was

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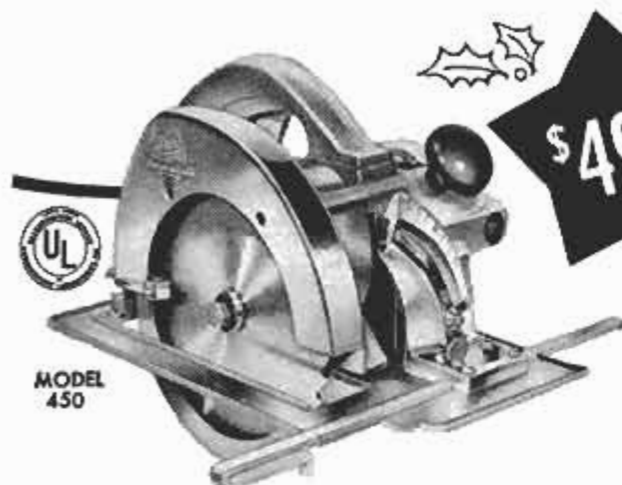


Do your Christmas hinting early!

When the little woman asks for gift ideas, let her know you'd like Thor SpeedTools, the finest tools ever built for home workshop use. Thor is the largest exclusive manufacturer of portable air and electric tools. Every Thor SpeedTool brings the power and precision, the balance and durability you expect from Thor's quality reputation. SpeedWay Manufacturing Co., a division of Thor Power Tool Co.



THOR 3-STAR CHRISTMAS SPECIAL



MODEL 450

\$49⁹⁵



MODEL 25

\$24⁹⁵

This new Thor 6 1/2" SpeedSaw is a must for building furniture, cupboards, closets, built-ins. Its Thor-built stall-proof universal motor takes the blade easily through a 2 x 4 at 45° angle. Other Thor SpeedSaws from \$29.95 to \$64.95—all top values!

Whether you're making 1/4" holes in steel or 1/2" holes in hardwood, this new Thor 1/4" SpeedDrill does it faster and easier, thanks to its extra power. Long grip means easy handling. Other Thor Speed-Drills from \$16.95 to \$65.00, many in kits.



MODEL 15TK

\$34⁹⁵
COMPLETE
KIT

Here's the world's most popular electric sander, in a complete Thor SpeedSander Kit, to help you do a truly professional job refinishing antiques, smoothing unpainted furniture, or polishing to a high gloss. Other SpeedSanders, \$24.95 to \$54.50.



THOR POWER TOOL COMPANY, Aurora, Illinois

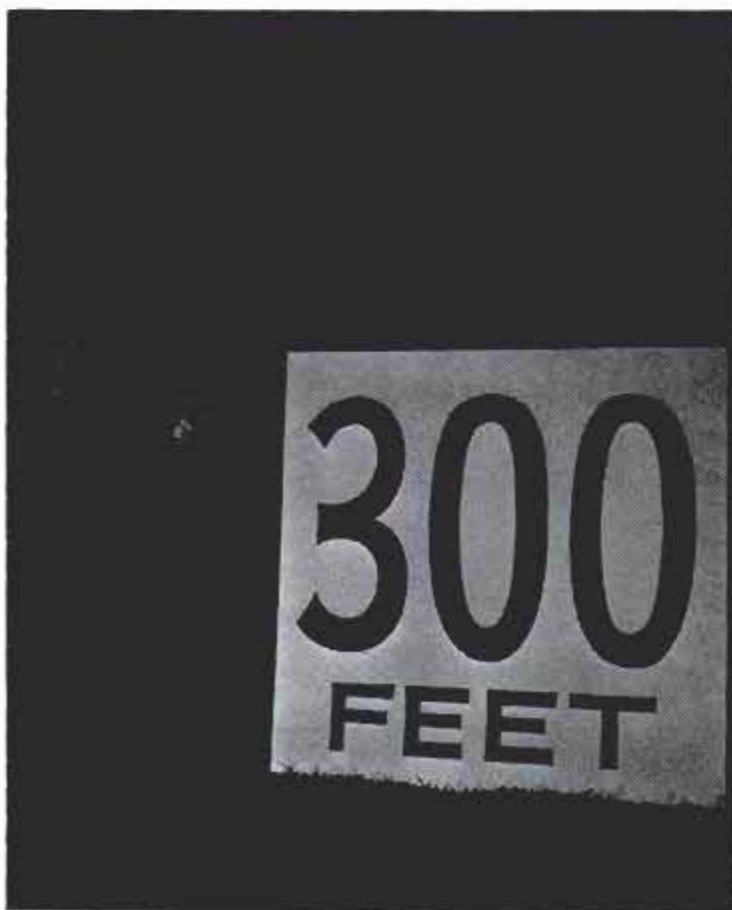
Branches in all principal cities

World's largest exclusive manufacturer of portable air and electric tools

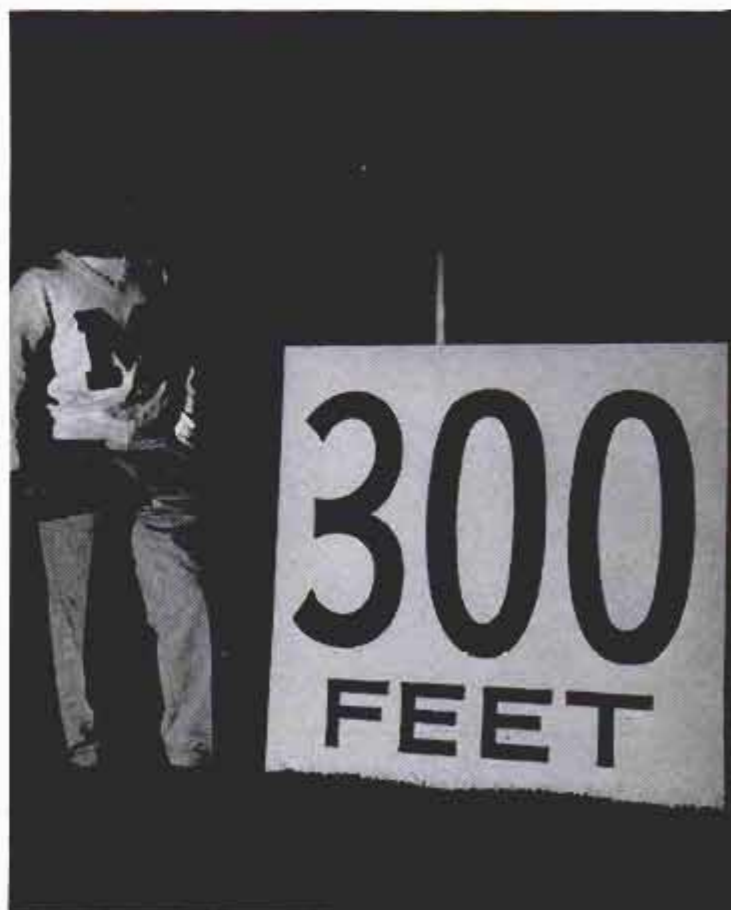


BEFORE-DARK PHOTO OF FOOTBALL FIELD—where the after-dark Headlamp Comparison Test photos,

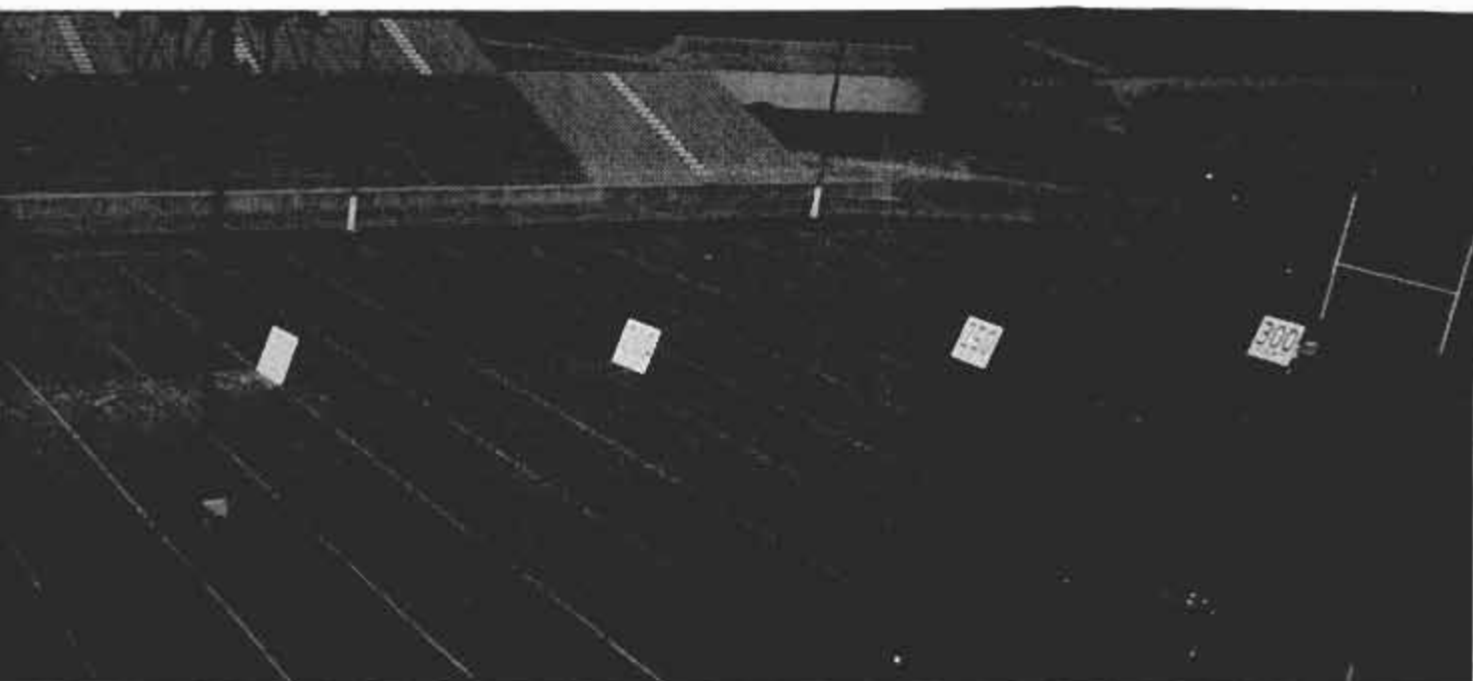
Now...twice the light for



OLDER TYPE SEALED BEAM HEADLAMPS—
Student barely visible at 300 feet.



NEW GENERAL ELECTRIC *All-Weather* HEADLAMPS—
Twice as much light at 300 feet and beyond!



below, were made. Student-model stands at the marker, a full 300 feet from the car headlamps.

safer driving at night!

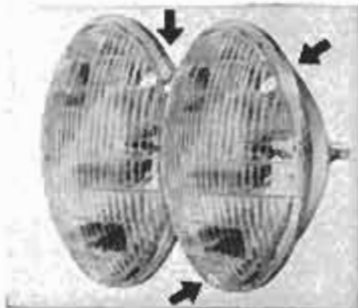
LOWER BEAM OF NEW G-E *All-Weather* HEADLAMPS GIVES TWICE THE LIGHT 300 FEET AHEAD ON YOUR SIDE OF THE ROAD!

Why 300 feet? Because at 300 feet, and at normal speeds, you should see objects *clearly*. Good visibility at that distance is easy with *upper* beams—yet, traffic conditions force you to rely most on the *lower* beam. That's why G. E. redesigned its headlamp lens, upped the wattage, redistributed light in the lower beam. The "Headlamp Comparison Test", pictured at left, shows that you see better at this critical seeing point with G-E *All-Weather* Headlamps—*photographic proof that you can get twice the light for safer driving at night!*

See Better In Fog, Rain, Snow. The special lower beam filament shield in General Electric *All-Weather* Headlamps blocks uncontrolled upward light, reduces kick-back glare, helps you see better in fog, rain and snow.

Is Accurate Aiming REALLY Important? Yes! Road shock and vibration can cause headlamps to become mis-aimed. Aimed high, headlamps glare

into the eyes of oncoming motorists. Aimed low, beams don't project far enough down the road. (If, at a point 25 feet ahead of your car, your headlamps are aimed only 3" low, you get half the light you *should have* at 300 feet!) But G-E *All-Weather* Headlamps have Aim-right Gizmos, (see arrows at right), that help dealers aim them quickly, accurately . . . even in daylight. So, for safer driving, better seeing in all weather, more accurate aiming, replace present headlamps with a pair of G-E *All-Weather* Headlamps today! General Electric Miniature Lamp Dept., Nela Park, Cleveland 12, Ohio.



Progress Is Our Most Important Product

GENERAL  ELECTRIC



Smooth Engine Power
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FEDERAL-MOGUL QUALITY!

Federal-Mogul engine bearings are first choice for replacement in commercial vehicles and industrial engines. They are preferred by men who know their business . . . and their bearings! In your car engine, too, Federal-Mogul bearings restore smooth power, lively pick-up and economical operation. They are *engineered* for dependable performance!

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Ask your Mechanic!

RESEARCH • DESIGN • METALLURGY
PRECISION MANUFACTURING • SERVICE



the *Corse*, a 515-ton aviso built in 1842 and remaining in service until 1890, while the historic *Napoleon*, a 5120-ton, 94-cannon three-mast ship built at Toulon in 1850, was the world's first propeller-driven man-of-war. It had a speed of 13 knots.

The *Napoleon* was designed by a brilliant young naval engineer, Stanislas Dupuy de Lome, who also had the honor of designing the 5618-ton *Gloire*, the first armored ship ever made. Launched in 1859, this famous vessel marked the beginning of modern navies. It was copied by all the great powers and, between 1862 and 1864, France built 11 ships which were almost identical. Models of the *Corse*, *Napoleon* and *Gloire*, as well as scores of other historically important steamships, are exhibited in the museum.

Along with the magnificent models that trace the development of French ship-building are many curiosities. Perhaps the most astonishing of these is the exquisite model of a fully rigged 88-cannon warship which the City of Dieppe presented to Empress Marie Louise when, in 1811 a few weeks after her visit to this port with Napoleon, she gave birth to a son. The allegorical sea horses drawing the ship, as well as every single one of the hundreds of details, including the sails, banners and rigging, are carved out of ivory.

Ebony and Ivory Model

Another exhibit of which the museum is particularly proud is its model (scale $\frac{1}{40}$) of the century-old man-of-war *Valmy*, for this fine ship is built of ebony and ivory, with the metalwork in sterling silver. Six craftsmen worked five years to make it.

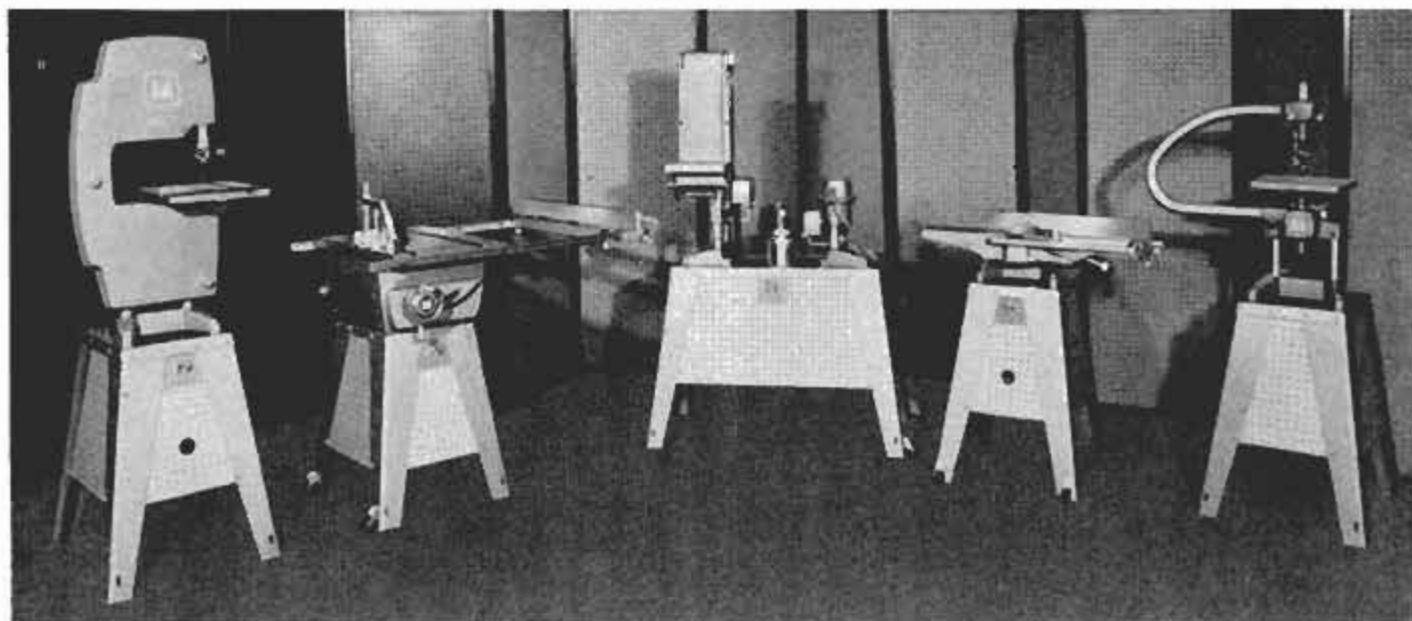
Together with the priceless *Louis XV* and beautifully sculptured 17th-century man-of-war *Soleil-Royal*, these two models are possibly the most valuable in the entire collection. But nobody knows what they or the other miniature vessels in the museum are worth—that is, what price they would bring if put up for sale today. None has ever been placed on public sale.

Even in the rare cases where the museum has actually bought models, the price paid has little relation to what they could be sold for today. A striking example of this is the model of the *Muiron* (scale $\frac{1}{72}$), for which the museum paid 310 gold francs, or about \$77 in 1836.

The real *Muiron* was a 44-cannon frigate built at Venice in 1797. It was captured by the French shortly afterward, and in 1799 brought General Bonaparte back from Egypt to France, successfully evading the British fleet. Bonaparte was so delighted with the ship that he ordered the present

(Continued to page 251)

MAGNA
unveils
revolutionary
new line of
power tools



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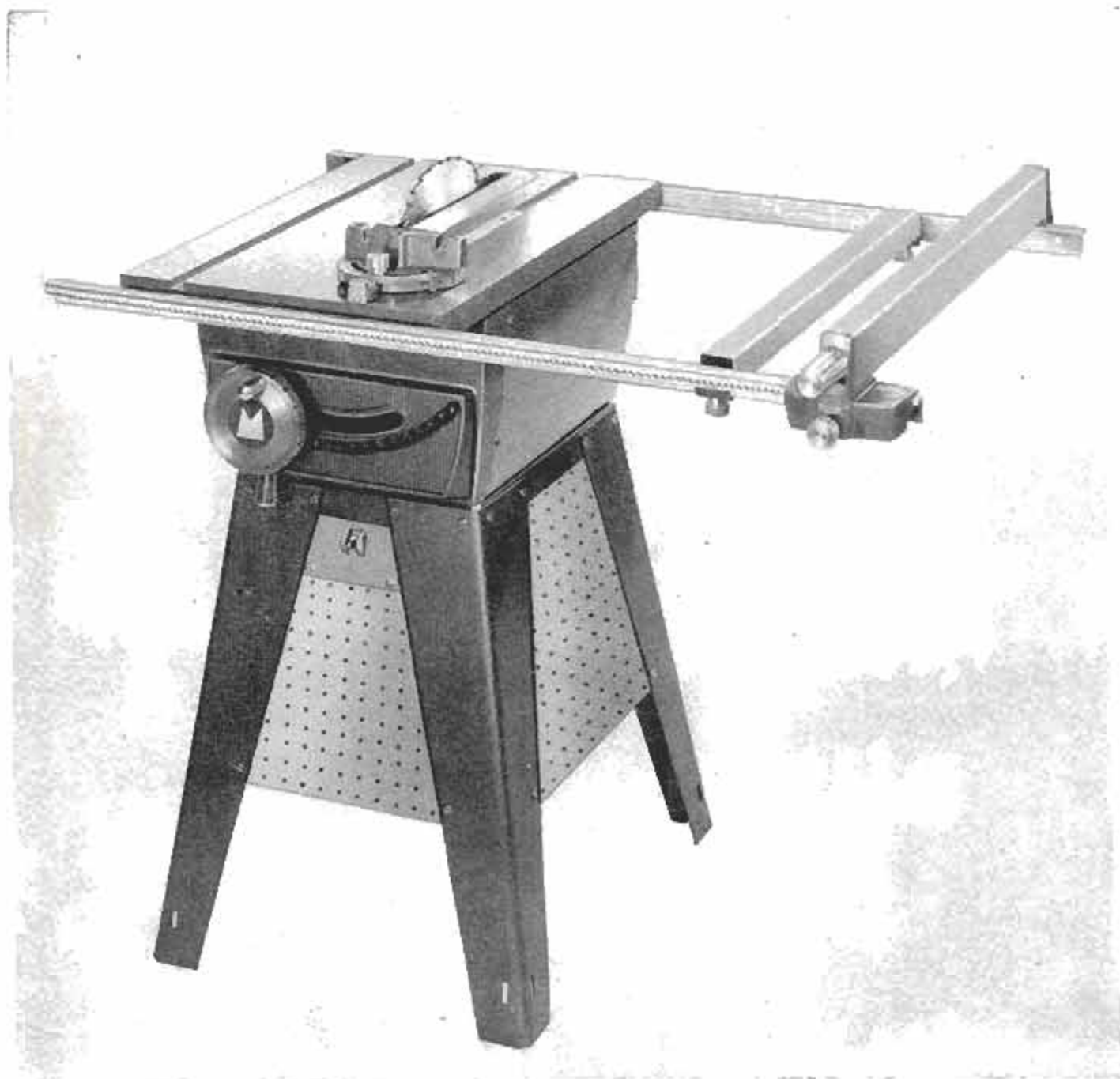
Magna Power Tool Corporation, manufacturer of SHOPSMITH®, the original multi-purpose home workshop in one unit, is now introducing a new line of MAGNA single-purpose power tools.

MAGNA-LINE includes the revolutionary new Magna 9-in. Saw with "The Helping Hand"—a built-in extension which makes the largest effective table on the market;

4-in. Jointer with the longest table, largest fence in its class; 11-in. Bandsaw with automatic blade tracking; 6-in. Belt Sander with automatic belt tensioning; 18-in. Jigsaw with full speed-range; and Compressor-Sprayer with 100-ft. range.

For specifications and full information on the new MAGNA-LINE single purpose power tools, mail the coupon on Page 250.

NEW Magna-Line **NEW** Magna-Line **NEW** Magna-Line

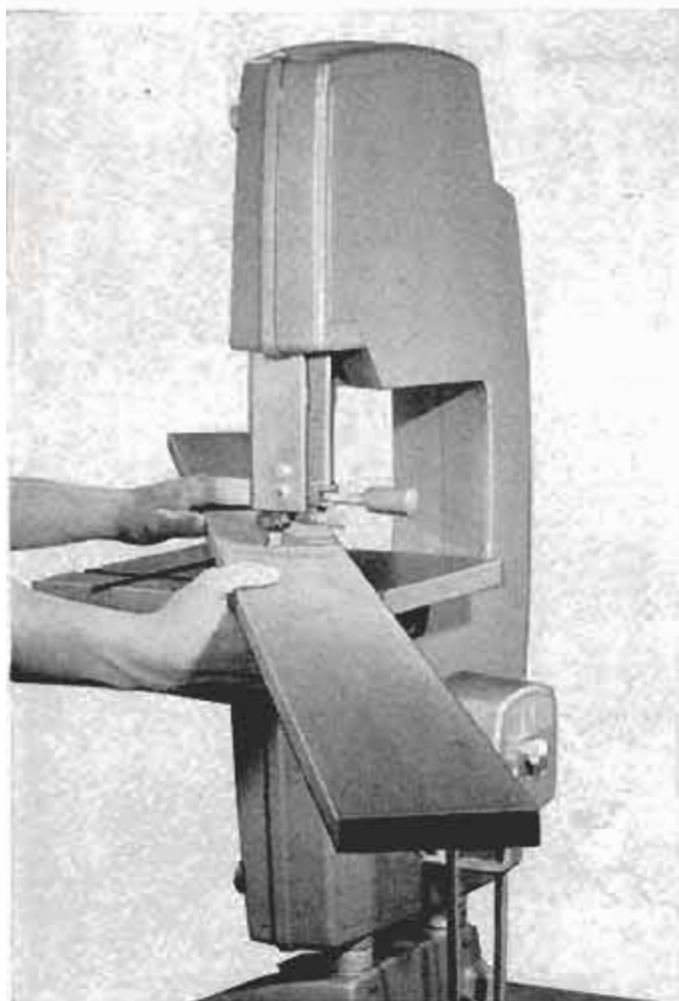


Magna 9-in. Saw with "The Helping Hand"

The new Magna 9-in. Saw is the only tilt arbor saw with "The Helping Hand"—a built-in extension which makes the largest (34" x 24") effective table on the market, allowing bigger rip and cross-cut capacity than any other saw; Epicyclic Speed-gear Control gives you full 45° tilt with only 10 turns of knob, compared with 40 to 60 turns on other saws; Single-Knob Control—push

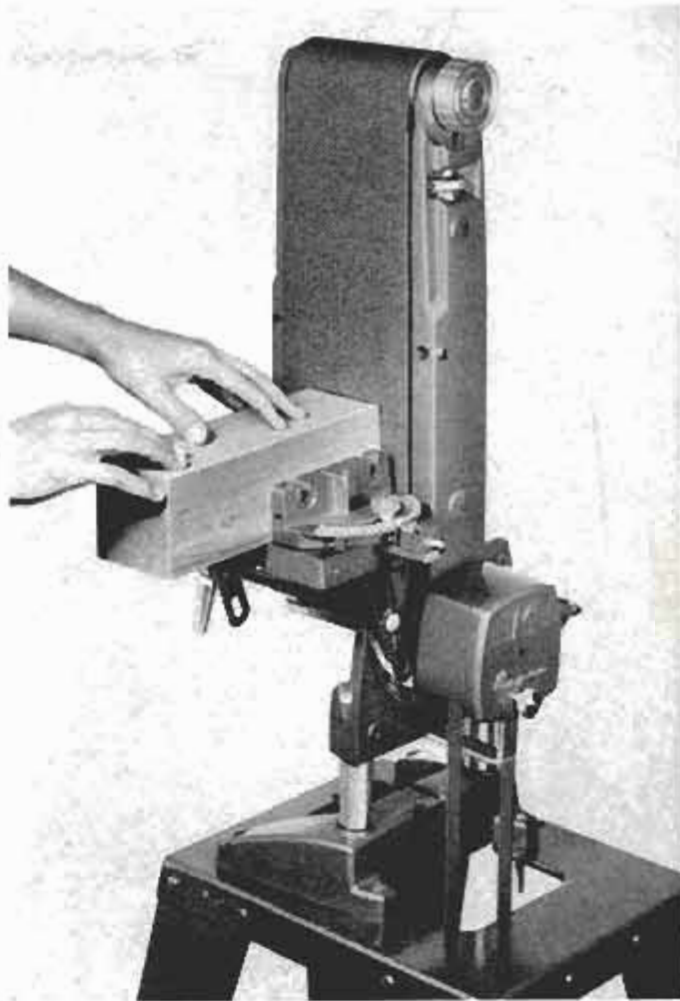
for projection, pull for tilt adjustment; Self-aligning Fence locks front and back with single knob; colored Safety Zone Table Insert cannot catch work piece; exclusive pressure-cast tub front bolted rigidly to table, coordinates all controls; externally adjustable Tilt Stops; constant tensioning of matched twin belts; 3 Auto-Stops on Miter Gauge.

NEW Magna-Line NEW Magna-Line NEW Magna-Line



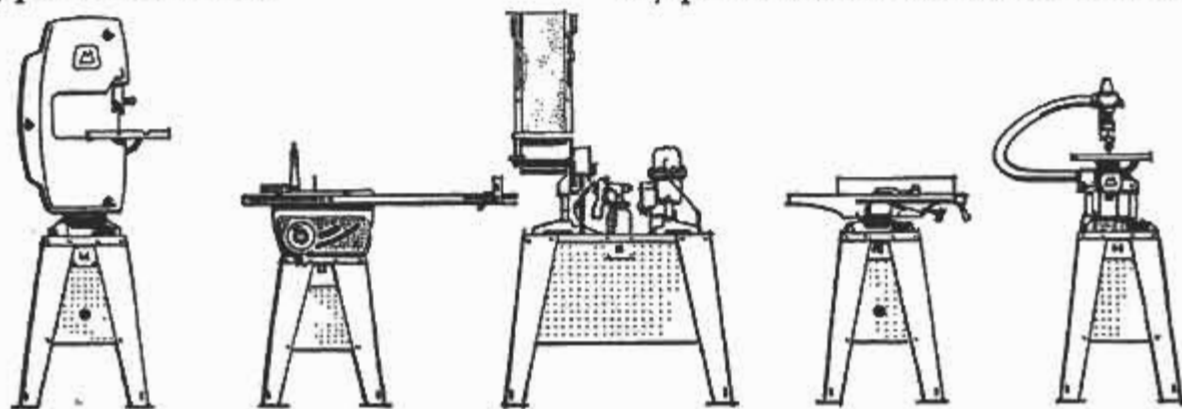
MAGNA 11-IN. BANDSAW WITH AUTOMATIC BLADE TRACKING

A new engineering triumph offering: exclusive Automatic Blade Tracking—greater safety, easy to change blades; Single-knob Blade Guide Control; cross-cuts any length stock (up to 6" width) without throat interference; sealed ball bearings; maximum safety—everything enclosed except essential cutting portion of blade.

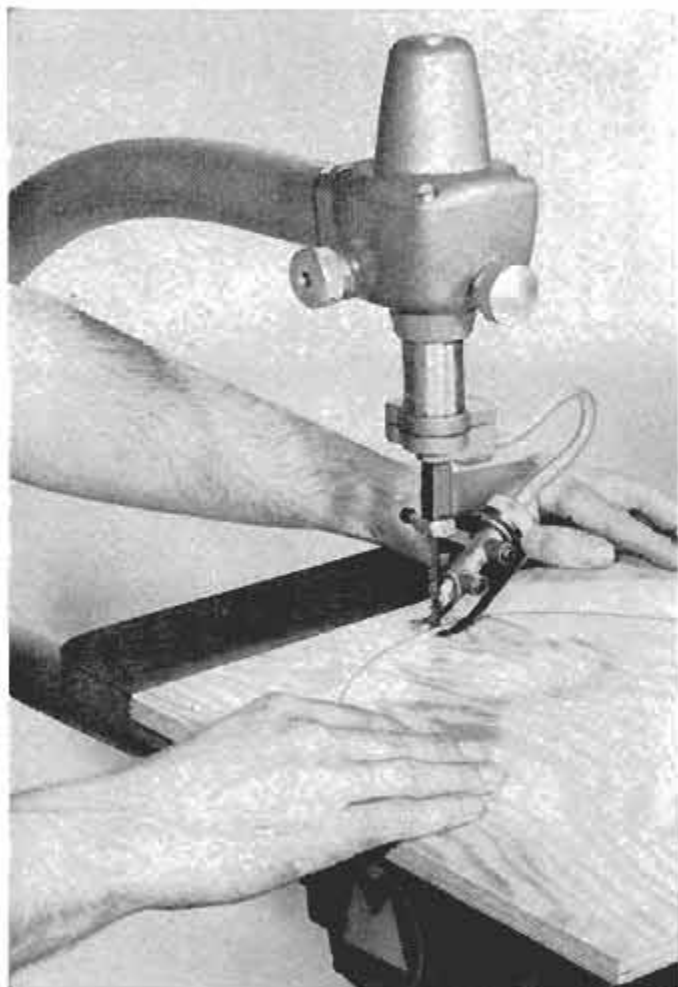


MAGNA 6-IN. BELT SANDER WITH AUTOMATIC BELT TENSIONING

Compare these big features with those of any other belt sander: Single-knob Control gives Automatic Belt Tensioning; instant belt removal; 6-inch by 16½-inch Back-up Plate for large work in horizontal or vertical position; table tilts in either direction, mounts as fence on either side; tilts, locks in any position from horizontal to vertical.

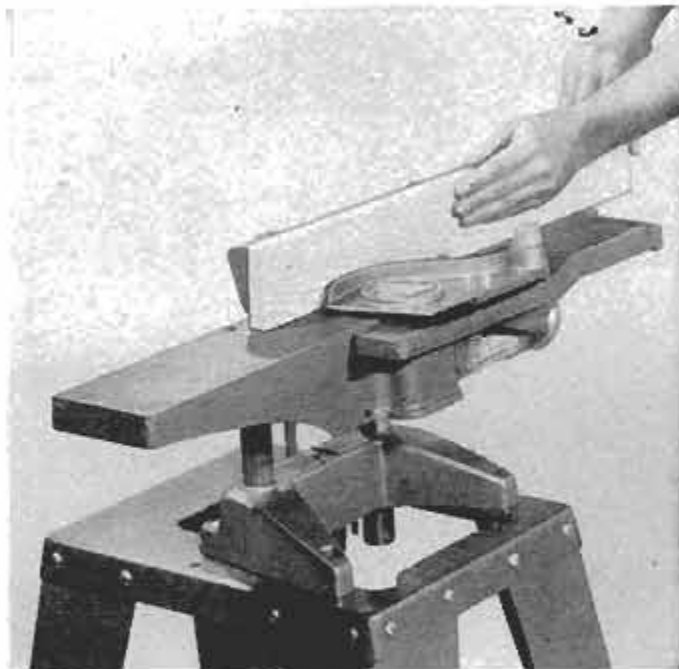


NEW Magna-Line **NEW** Magna-Line **NEW** Magna-Line



MAGNA 18-IN. JIGSAW WITH FULL SPEED-RANGE

The Magna Jigsaw gives you precision, capacity, ease of adjustment. Exclusive Full Speed-range operates as fast as 2500 rpm! Cuts through 2-inch stock at low speeds, smooth-cuts thinnest wood at high speeds. Use it for metal working, also, or as regular saw for straight cuts with heavy blades. Blower keeps cutting-line sawdust free.



MAGNA 4-IN. JOINTER WITH LONGEST TABLE, LARGEST FENCE

The big, heavy-duty Magna 4-in. Jointer with the longest (28") table, largest (3" x 21 3/4") fence in its class, has adjustable in-feed table, fixed outfeed table; One-knob Fence Lock controls tilting of fence, 3 adjustable autostops; Spring-controlled Safety Guard; extra-rigid One-piece casting Fence; knives individually micro-adjustable, safety-tapered.



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model in 1803, and kept it on the desk of his bedchamber right up to his downfall. Obviously the original purchase price of 310 francs furnishes little clue as to what a museum or private collector would be willing to pay for this ship today.

Largest Model

Near the door of the Musee de la Marine stands its largest model, *L'Ocean*, a vessel of 120 cannon, 20 feet long and 16½ feet high. Built for the instruction of sailors, the outsize model somehow came into the possession of a Belgian showman, who exhibited it in country fairs along the Franco-Belgian border. He also used it for another purpose. Every time he brought it into France, its hold was filled with lace and precious stones. The French customs finally caught up to him. *L'Ocean* was seized and eventually given to the museum.

The centerpiece of the vast collection of famous and curious ships, of marine paintings and documents, of figureheads and ship's gear and of all manner of other things that tell the story of man's struggle to conquer the sea is *Le Canot de l'Empereur*. This is not a model but the original, a graceful and beautifully decorated boat more than 57 feet long, which was rowed by a crew of 24 men.

This priceless craft has a curious history. In 1811, when Napoleon announced that he was going to Antwerp to inspect the defenses at the mouth of the Scheldt, it was decided that he must have a boat worthy of him. Plans were hastily drawn up, a sculptor went to work at once on the decorations, and in 21 days and nights of uninterrupted labor the craft was completed. Two days later, Napoleon was taken in it to visit the port. He never used it again.

Stored away in the Brest arsenal, it was only taken out 47 years later, when Napoleon III and Empress Eugenie paid a visit to the naval base. It served a final time in 1903, a half-century later, when President Emile Loubet went to Brest.

After that this fine boat, with the life-size gilt figure of Neptune sitting on its prow and its luxurious cabin filled with dust and memories, lay forgotten at Brest for another 40 years. Then in 1943, at a time when the Germans, confident that they would win the war, were already planning a postwar Paris of their making, it was decided to bring the Emperor's boat to Paris. With the Germans taking charge of everything the craft was loaded on a special car and, since it protruded far over the sides, the track in the opposite direction was cleared during its voyage from Brest.

In Paris, however, manpower could not

(Continued to page 252)



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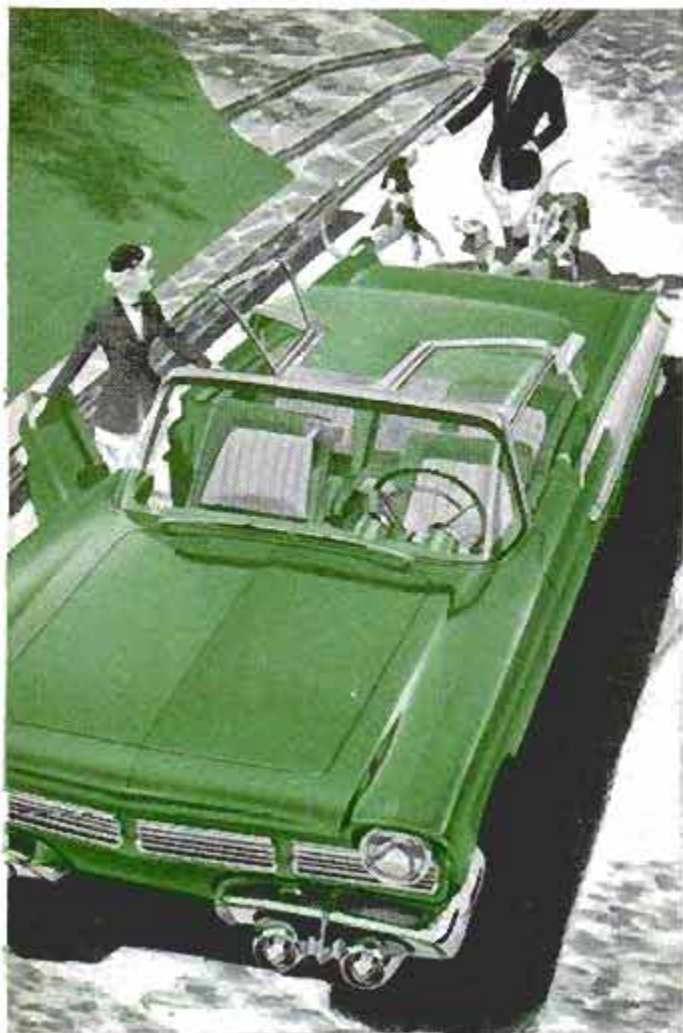


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be spared to get the bulky exhibit into the Palais de Chaillot, and consequently it was left outside in a makeshift shelter until the war's end. A huge hole was then cut in the wall and, on July 28, 1945, 134 years after it was built, the *Canot de l'Empereur* moved into its permanent home. There is also a model of it in the museum.

Beginnings of the Museum

This was one of the final steps in forming France's great ship museum, which had its beginnings 277 years ago, in 1679.

In that year, Jean-Baptiste Colbert, Louis XIV's illustrious minister, took a step of primary importance in the history of shipbuilding. Until then vessels had been constructed almost by improvisation.

Colbert now ordered the superintendents of all navy yards to make a model, on the scale of $\frac{1}{12}$ or $\frac{1}{20}$ of every ship they built, and he further specified that "these models must be made with such precision that they may serve for the measurements and proportions of any ships built in the future."

In the century that followed the orders, magnificent collections grew up in the various arsenals. Members of Royalty and the Court began seeking models to add to their private collections of curios. In this way the arsenal exhibitions were pretty thoroughly ransacked by the influential people of the country.

During the French Revolution many collections of the emigrating nobility were seized and placed on display, but some years passed before these ships, the royal collection and numerous models from the arsenals were united in a single museum. This was opened to the public in 1833 on the top floor of the Louvre.

When the huge old Trocadero was made over into the Palais de Chaillot for the 1937 World's Fair, part of one wing was given to the Musee de la Marine, which by then was run by the Navy. But only toward the end of the war could the museum start moving into its splendid new quarters.

The new museum has been managed from the start by Lt. Comdr. Jacques Vichot.

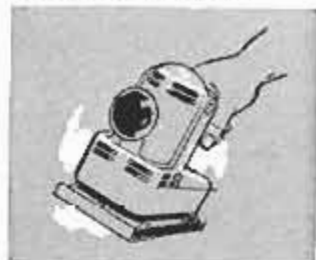
A well-stocked marine library and documentation service is open to the public for research, and naval experts are available for technical information. Twice a month visitors are conducted through the workrooms where the models are built.

The models that have been accumulated over the last $2\frac{1}{2}$ centuries continue to increase. The storerooms are stuffed with models that can't be placed on exhibition. And, a decade after moving in, the Navy is beginning to grumble that its magnificent quarters are too small for the proper display of its incomparable collections. ★★

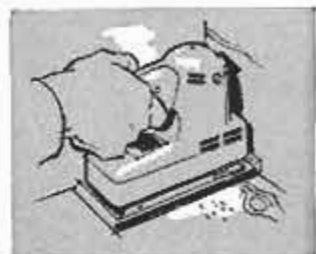
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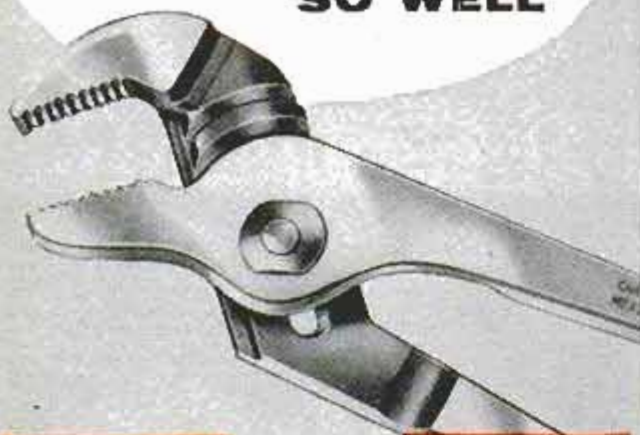
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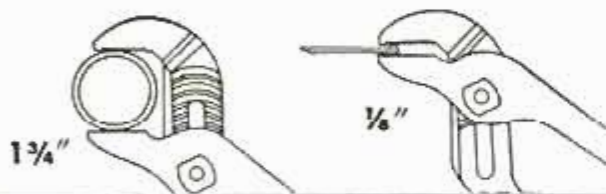
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CHAMPION DEPARTMENT TOOL Co. MEADVILLE, PA.

Obstacle Course for Trail Riders

(Continued from page 161)

In the training of trail horses the rider and the horse should both be properly educated to recognize when an obstacle is not safe for crossing.

The rider should be aware that the horse can often sense hidden dangers that may not be apparent to the human eye. One device used at a horse show was a huge tractor tire covered with a canvas. The depression in the middle was filled with water.

This was an extremely hazardous obstacle. It was meant to be the type the horse should refuse, and the rider should recognize the horse was right. Several horses approached it, then shied away. But most of them, when the riders insisted, proceeded. Each stepped into the hazard and promptly slipped.

Finally one good rider approached the hazard. The horse refused to go through. Three times this was repeated with the same result. Without forcing the horse through, the man rode on to the next hazard.

The judges awarded the rider first place in the event. He and his horse both had trail know-how. It was brought out in the show arena and it would also be put to work on the open-country trail. ★ ★ ★

Radiation Detector Clipped to Clothes

Plastic beads that acquire an electrostatic charge when shaken are used in a new radiation detector that may be clipped to the clothes or placed on a table. The charged beads repel each other and cling to the sealed glass walls of the dosimeter. When 50 roentgen units of radiation have accumulated, however, the beads lose their

charge and fall out of sight. Fifty roentgens is approximately one eighth the amount of radiation the average person can withstand. The dosimeter is intended for personnel in areas where exposure may occur and for the general public in the event of an atomic attack.



Crystal Cave in Kentucky is the nucleus of a cave system larger than any now known in the world, with 32 miles of passages already surveyed or explored.



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Motor carriage rolls smoothly on ball bearings in protected trackways. Simply change circular tool on direct-drive motor shaft and you have another power tool—at *no added cost!*

● **Superior safety and accuracy!** Exclusive DeWalt Safety Key Switch prevents unauthorized use. DeWalt's patented design and rugged precision construction provides *safety and unmatched accuracy* that assures years of superior workmanship.

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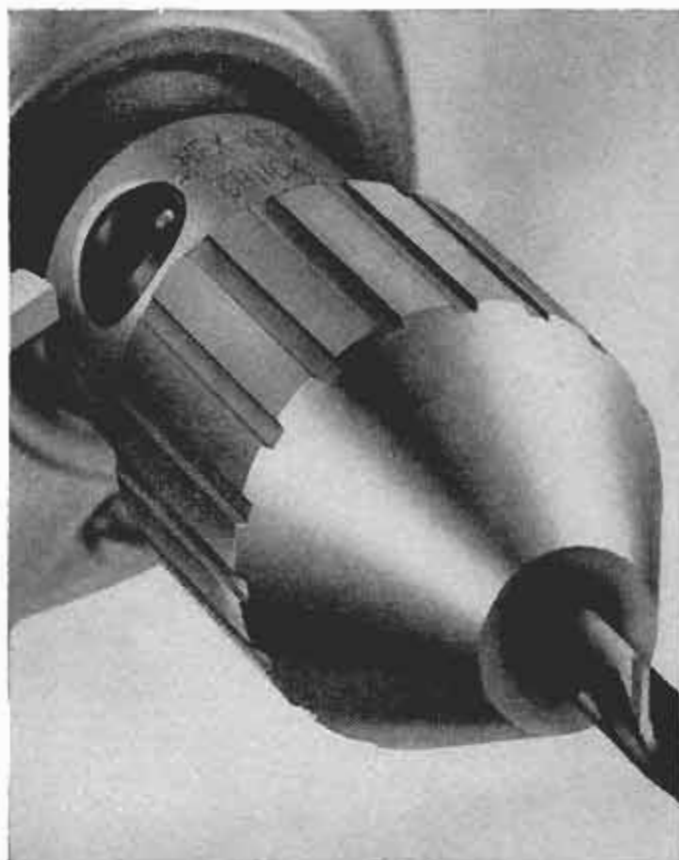
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There's power in this end, too!

Electric drill power isn't all in the motor. There's another kind of power — just as important to you — in the business end of a portable electric drill. It's the gripping power that has to be in the chuck, particularly when you are using sanding and screwdriver attachments that must be chucked on the drill.

Take the drill shown here. It is equipped with a Jacobs Model 6141 Rubber-Flex Hex-Key Chuck. You cannot buy a more powerful grip on a portable electric tool. It is compact, light in weight, and easy to operate. Buy the drill and buy the chuck. Jacobs is a name men go buy!

This Jacobs Hex-Key Chuck *looks* different because it *is* different. A quarter turn of a standard Allen key produces tremendous holding power. It actually produces a gripping leverage ratio of 1000 to 1! Another quarter turn easily releases the twist drill.



Reg. U.S. Pat. Off.

The Jacobs Manufacturing Company
West Hartford 10, Connecticut

Their Job Is to Guard Your Health

(Continued from page 145)

these are ailments or hazards that can be controlled with proper precautions. And here is where the Occupational Health Field Center enters the picture. The center, which occupies one floor of a rambling brick building in downtown Cincinnati, is staffed by experts.

Lab Has Four Sections

The laboratory is divided into four sections: Toxicology, medical, engineering, and the program or planning section which investigates problems and plans the laboratory's work. The toxicologists investigate substances to determine whether they may contain enough toxicants to damage workmen. The medical section deals in treatment. The engineering section works with such problems as mine and factory ventilation and soundproofing.

In addition to the staff in Cincinnati the field headquarters maintains a substation which deals in West Coast industrial-health problems from its Salt Lake City base. The 15 people in the Salt Lake City laboratory send their big problems back to Cincinnati where the laboratory is equipped with the latest scientific apparatus.

One challenge they've tackled in recent years is a study of the hazards faced by uranium miners and millers. The people in this youthful industry were increasingly concerned about their health. They wanted to know if they faced hazards from radioactive dusts and what steps to take to prevent trouble.

Their request reached Cincinnati in 1950, and a crew of two doctors, two laboratory technicians and four engineers and chemists tackled the problem from the Salt Lake City headquarters. They surveyed seven mines, collected hundreds of dust samples, and consulted with numerous uranium workers. They found that over a long time these workmen might face a serious hazard by breathing the radioactive dusts unless proper control measures were taken.

Their next step was to determine the amounts of ventilation needed in a uranium mine to reduce the dust to a safe level. They even built an experimental mine-ventilation project for close-up study. Their work brought a new degree of safety and confidence to the uranium worker. The occupational-health technicians in traveling laboratories are still busy in this field.

Workmen Fainted on Job

In another trouble-shooting job a team of men from field headquarters visited a

(Continued to page 258)



Santa Says:

"A WONDERFUL HOBBY
WORKSHOP GIFT"

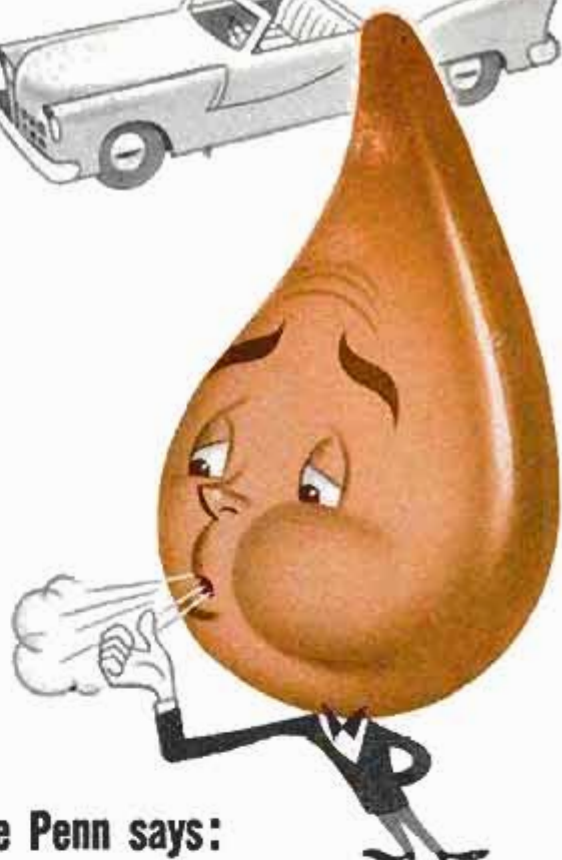
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Take Pete Penn's advice . . . at your next oil change, tell the dealer to put in a brand of Pennsylvania. Carried by good dealers *everywhere*.

Today's BEST Oils

Start with Nature's BEST Crude
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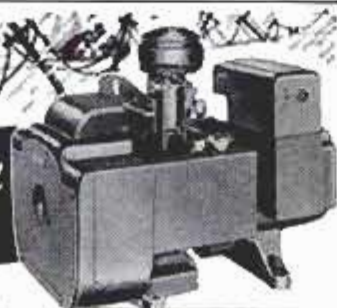
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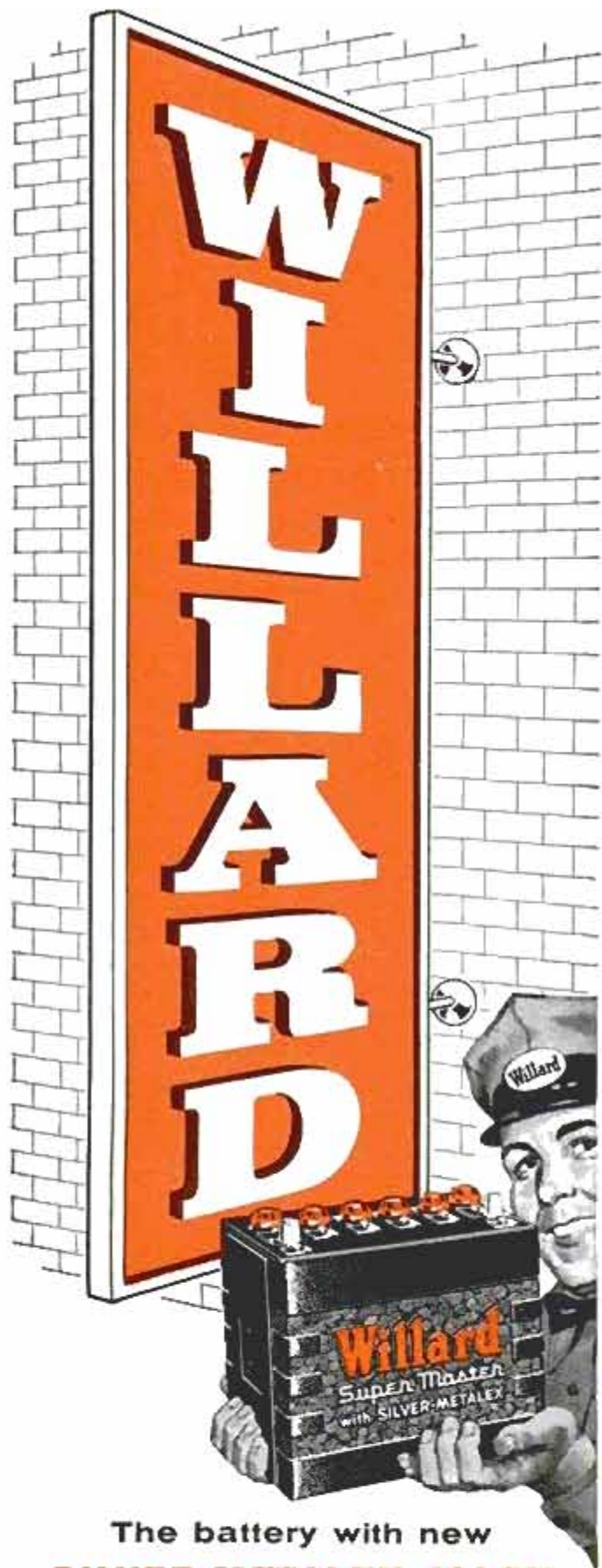
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woodworking shop where the whole community was upset by the fact that shop workmen were fainting on the job. The physician and the industrial hygienist went over the plant with all the thoroughness of good detectives. They showed a special interest in new processes, changes in procedures and new materials being used.

Within 24 hours they found that the workmen were exposed to toxic amounts of lead and phosphate and that these, combined with heat and fast production schedules, were at the root of the fainting.

The investigators left behind a set of simple suggestions which soon corrected the trouble. They suggested that the workmen take more salt tablets to cut heat stress, that new exhaust ventilating equipment be installed in the plant and that the workmen be given more careful and frequent medical checkups.

Dr. W. Clark Cooper, director of the field headquarters, says the biggest single type of industrial ailment is dermatosis. "Occupational skin diseases seldom kill people," he says, "but they cost plenty in lost time and lowered efficiency." Statistics show that about two thirds of all industrial compensation cases are due to skin diseases. One 1951 survey in four states showed that 3100 cases of industrial skin disease cost \$830,800 or \$268 per case. And the industries lost the skill of these workers for the time they were off the job.

One of the simplest cases Dr. Donald J. Birmingham, chief dermatologist, ever tackled was in a rubber factory. Fifteen workers there ran rubber for gaskets through a soap solution eight hours a day. They were suffering serious discomfort from skin troubles. "Wear protective gloves," said Doctor Birmingham, and the trouble was stopped.

Find the Villain

But the solution to the problem is seldom as obvious. Most workmen have their own ideas about the cause of their sickness or injury on the job. And sometimes they're 100 percent wrong. Here's where the industrial-health scientists come in as they did in one Michigan case not long ago. The Public Health Service was asked to check into a serious outbreak of sores on the hands and forearms of workers in a factory making canvas tentage for the Army.

The canvas had been treated and impregnated for a number of things and finally dyed olive drab and these materials stained the workers' arms and clothing. The answer seemed obvious, that the trouble was some place in the materials used on the canvas.

But when the researchers patch-tested ailing workers with bits of material with

(Continued to page 260)

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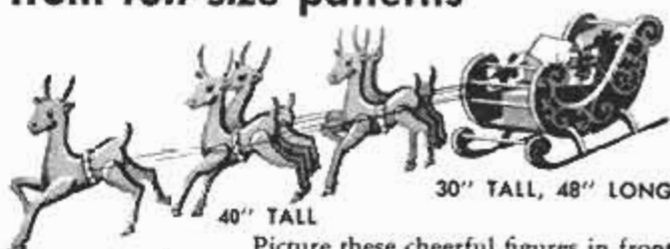


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40" TALL

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Motor Tools

specially designed to bring you today's most wanted features in Power Tools!

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All Darra-James Power Tools can now be purchased for **ONLY 10% DOWN** through our convenient credit plan



4 1/2" JOINTER (Model 845)

Uniquely synchronized to maintain constant distance between table and blades at any depth of cut • Rebbers up to 3/4" planes any board up to 4 1/2" wide • Tables adjust individually for perfect alignment • Ball-bearing construction • U. S. Rubber Power-Grip Timing Belt Drive • 1/2 H. P. continuous duty G. E. motor



8" TILTING ARBOR SAW (Model 825)

A quality tilting arbor saw at a minimum price • Cuts stock 2-9/16" thick • With extensions, rips to center of 33" panel • Motor, guard, and splitter tilt with blade to 45° • Precision-ground cast iron table (18" x 20") stays flat • Lifetime ball-bearing arbor unit • 3/4 H. P. continuous duty G. E. motor



8" TILTING ARBOR SAW (Model 815)

An economy saw that will perform all operations of high-priced models • Cuts stock 2 1/2" thick, rips to center of 18" panel • Blade, guard, and motor tilt to 45° • Table and work stay flat • Precision ball-bearing arbor unit • 3/4 H. P. continuous duty G. E. motor

Ask your dealer about the complete line of Darra-James standard power tools



which they worked, not one of them contracted a new sore from the patch. Then the technicians began to study the materials the workers used to wash their stained hands. Here was the villain. Powerful cleansing agents such as white gasoline, mineral spirits and some hand cleaners were causing the trouble.

Workmen switched to different cleansing techniques and began wearing sleeves and gloves. Within 60 days the trouble was gone.

One of the newer fields the occupational-health experts are tackling with increasing vigor is that of noise in industry. In wood and metal-working shops and on many other jobs noise is sometimes a hazard to the worker. Too much noise may prevent him from hearing a warning of danger, or the excessive noise may lower his working efficiency or even endanger his hearing ability.

Researchers are just beginning their studies in this complicated field. Their work may eventually lead to quieter and more pleasant working conditions.

Even the men who make the money you earn have industrial-health hazards. Fascinating as the task must sometimes seem from the outside, the workers in the United States Mints are often exposed to fumes of lead, zinc, selenium, tellurium and acid mists. The industrial-health watchdogs from Cincinnati have been called to this scene, too.

At their suggestion the mints were equipped with better devices for the control of dusts, excessive noise, better lighting. Now the men who make money go about their task assured of health protection all American workers ask of an increasingly complex industrial age. ★ ★ ★

Thick-Shelled Eggs Coming to Market

Eggs with thicker, more durable shells may soon be coming to market, now that Dr. William H. McGibbon at the University of Wisconsin has shown that shell quality is inherited. The stronger shells are considered more desirable because they hold up better under handling and marketing. Doctor McGibbon has developed strains of hens which lay hard-shelled eggs, and other strains which lay softer-shelled varieties. A thin shell makes up eight percent of the egg's total weight, while the hard shell averages 11 percent of the weight.

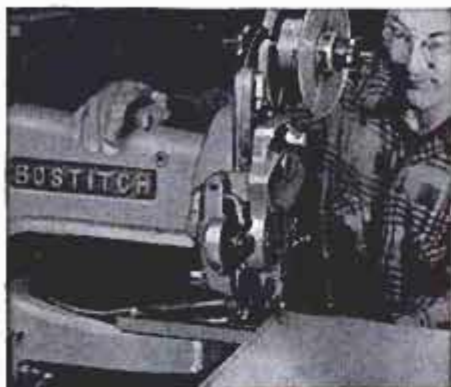
New Zealand is exporting green powdered buttermilk to Malaya and Singapore for use as poultry feed, the green coloring being added to distinguish it from powdered milk for human consumption.

Whatever your business...

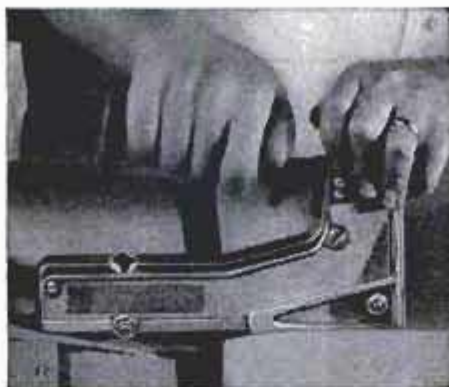
you save money with stapling

Below you see five of the vast number of businesses which report savings with Bostitch stapling. In shipping, Bostitch provides quick, easy carton closures—on seams, tops and bottoms—that actually strengthen the cartons. In production, everything from paper to sheet metal is fastened with Bostitch equipment—

speeding output, cutting costs. A Bostitch Economy Man will be glad to help with your fastening problems. He's one of 375 trained fastening specialists working out of 123 cities in the U. S. and Canada. Over 800 different models of Bostitch staplers use 200 types of staples, tailored to the job.



These steel freezer cabinets, once spot-welded, are now wire stitched. "Bostitch method trims fastening costs by 75%."



Using Bostitch Autoclench stapler, this man says he seals boxes "five times faster" than he can with glue. Saving "over 50%."



Air freight bills stapled to corrugated containers with new-type tacker "hold better than with tape at 1/10th the cost."



Roofers use heavy-duty Bostitch stapling hammers to lay asphalt shingles on new roofs. "Four times faster than nailing."



"Twice as many boxes can be stapled in an hour, with only two-thirds as much manpower." Staplers take up less floor space.



For greatest savings, use only genuine Bostitch staples in Bostitch machines. They're precision-made to work together!

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AT DEALERS WHO
care FOR YOUR CAR



MEMBER PENN. GRADE CRUDE OIL ASSN.
PERMIT NO. 2, OIL CITY, PA.

Algae For Dinner

(Continued from page 136)

algae were supplying an abundance of oxygen, something that was needed by the bacteria for oxidizing the sewage.

At the start, Professor Gotaas was merely interested in learning whether algae might be useful in sewage treatment. It turned out that the discoveries made by him and his associates were much broader than that.

They found that the oxygen given off by the algae helps the bacteria to efficiently digest the sewage, and that at the same time the carbon dioxide and ammonia given off by the bacteria are greedily consumed by the algae. The sewage meanwhile supplies all the phosphorus, magnesium, potassium and other minerals that the algae require.

After studying the independent work that had been done on chlorella the sanitary engineers realized that they had much more than an efficient process for sewage treatment, they also had an ideal method for growing algae.

For the last several years an outdoor sewage-treatment plant using algae has been in operation at the Richmond engineering station of the university. Typical sewage consisting of domestic and industrial wastes is piped from one of the city's main lines and is circulated to a number of long, shallow concrete tanks. Surprisingly, there are no obnoxious odors from the open vats. Only a faint smell reminiscent of freshly cut grass or hay can be detected.

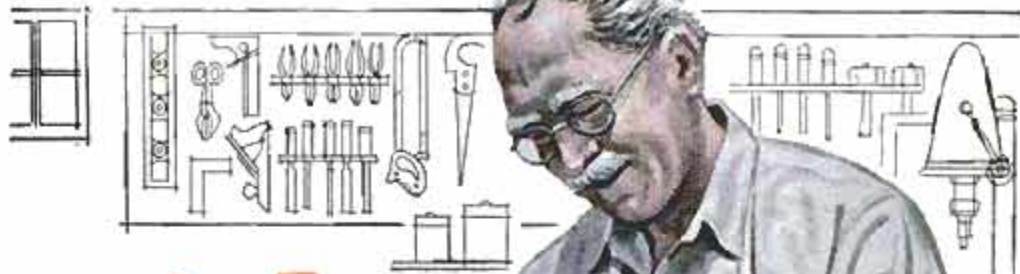
The plant operates almost without human control except for the algae-harvesting operation. Raw sewage pours in at one end, fairly pure water and algae are removed at the other end.

Sewage treatment and algal growth occur together, at the same time. The speed of the process depends on the amount of sunlight that falls on the tanks. This varies with the season of the year and the geographical location. Depending on these factors, the detention period is from one to six days. It is estimated that a three-day treatment would be adequate in 12-inch-deep ponds as far north as New York City or Salt Lake City during 80 percent of the year. In the summer it would be possible to grow algae as far north as the Arctic Circle.

The University of California research group believes that it has worked out most of the major production problems. Now it is seeking the most efficient way of harvesting the algae. The cheapest method appears to be one in which the algae are precipitated by chemical coagulants.

From the day-to-day operation of the pilot plant some very general conclusions

(Continued to page 264)



You Sand Like An Expert with a DREMEL Straight-Line Action Sander



Professional experts sand *with-the-grain* of the wood, to get a velvet finish. And that's the way you sand, when you use a Dremel Straight-Line Action Sander.

Sands in a Straight Line

The Dremel duplicates the back-and-forth motion the old-time craftsman always used when he sanded by hand — before he had a Dremel. That's the secret of getting a finish that is smooth as glass.

Other sanding motions sand across-the-grain — leaving scratches and orbital swirls. These become especially noticeable when you stain, varnish, or lacquer and spoil the finished appearance of your wood.

That's why so many experts — and novices, too — insist on a Dremel for sanding woodwork,

furniture, cabinets, boats, wood paneling, and many, many other projects.

You Can Polish, Also

You're not limited to sanding, with a Dremel. You can remove the sandpaper and slip on a polishing pad.

Then you're all set for speedy, effortless polishing of furniture, your automobile, or any other waxed surface.

Dremel Straight-Line Action Sanders are available in three sizes. See your local power-tool dealer and ask for a demonstration. Compare with other makes for price, performance, simplicity of construction, and ease of handling. A close-up comparison will convince you that a Dremel is your best all-around buy.

See the Dremel at your hardware store.

Give a Dremel Sander this Christmas.



Model 53. Heavy-duty unit designed for rough, medium, or fine sanding. Powerful ROTARY MOTOR will not stall or burn out. 24 sq. in. sanding pad. Wgt. 5 1/4 lbs. Easy handling. \$34.85.



Model 2000 Sander-Polisher. Handyman's favorite for all household or hobby projects. Easy to use. Wgt. 5 lbs. 21 sq. in. sanding pad. Includes steel carrying case, 1 polishing pad, 25 assorted abrasives. \$24.50. **Model 2000 Sander only (less case) — \$19.95.**



Model 8. A sander, polisher, and massager all in one. Light with smooth, powerful action. Wgt. 2 1/2 lbs. 13 sq. in. sanding pad. Includes 6 abrasives, polish pad, massage pad. \$14.85.

D-2

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EVEN THE SMALLEST HANDS can make strong, flexible bonds fast with Pliobond. And they'll last—are resistant to water, oil, chemicals and age—hold fast to virtually any material found around the home.



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SO EASY to use, anyone can make it work—and do a better job faster

SO STRONG it can lift a truck—meet almost any bonding strength requirement

SO VERSATILE it bonds virtually any material or combination of materials—does almost any home or hobby bonding job

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BY
GOOD YEAR

"BONDS ANYTHING TO ANYTHING"

AVAILABLE AT chain, hardware and hobby stores everywhere. Ask for it by name—Pliobond. You'll find it the handiest thing on your workshop shelf.

Pliobond—T. M.
The Goodyear Tire & Rubber Company,
Akron, Ohio



have been reached. One is that the organic wastes from a city of 100,000 population can be made to produce 10 tons of dry algae concentrate per day, at the same time making available some 10,000,000 gallons of reclaimed water. These figures don't include the waste from the usual organic industries of a city that size. Such waste could raise the production figures materially.

A rough estimate is that it would cost from \$80 to \$100 per million gallons of sewage to construct and operate an algae plant. The present cost of processing sewage is from \$30 to \$50 or more per million gallons.

The algae plant could be a bargain even though it cost twice as much to operate. Even at a sales price of six cents per pound the dried concentrate would gross \$1200 per day (for a city of 100,000). Thus the sewage-treatment operation would break even or show a slight profit, as against the \$500 per day the same city now spends.

Algae at a Profit

These figures are the basis for the statement that algae can be produced for nothing, or less than nothing. If the algae were sold at a higher price the profit for treating the sewage would be correspondingly higher. Professor Gotaas stresses the fact, however, that the process is still in an experimental stage and that cost estimates are based on pilot-plant operation. Further economic studies are being made.

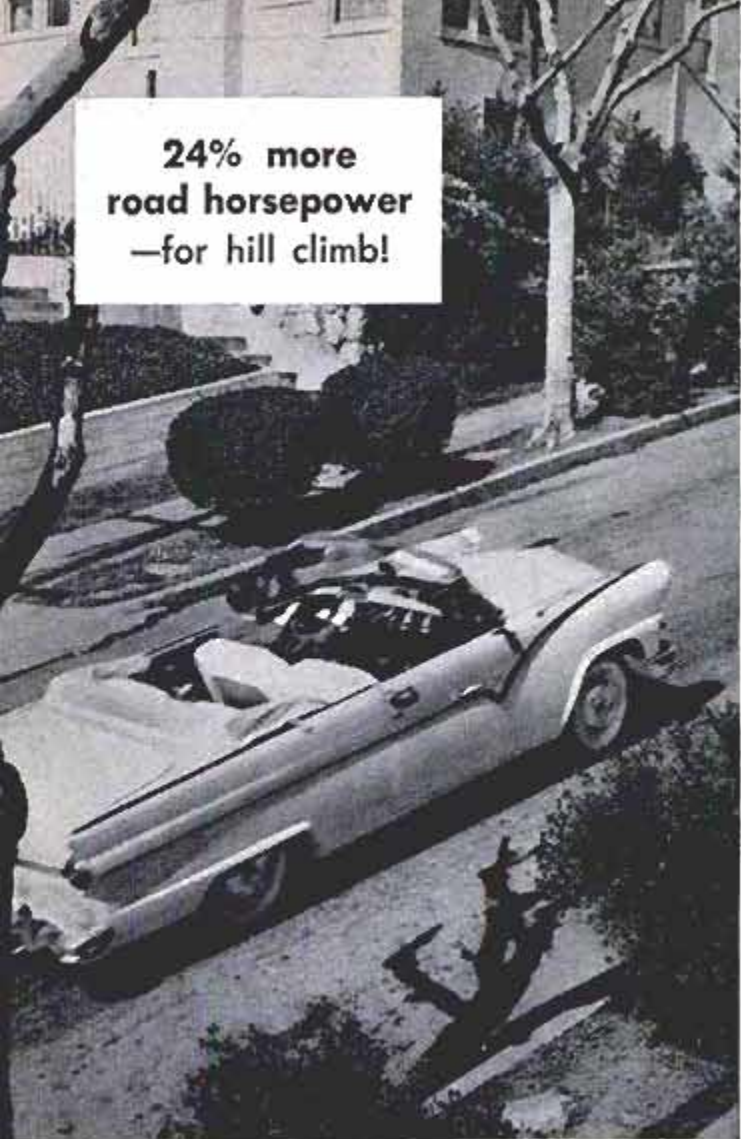
It is said that the United States throws away sufficient wastes to produce 10,000 tons of algae concentrate every day, more protein than is produced on a million acres of land in a year by conventional means.

Algae may have other uses besides being a source of food. The dried concentrate could be a worthwhile source of power. Its fuel characteristics are similar to those of medium-grade bituminous coal although the heat content is somewhat less.

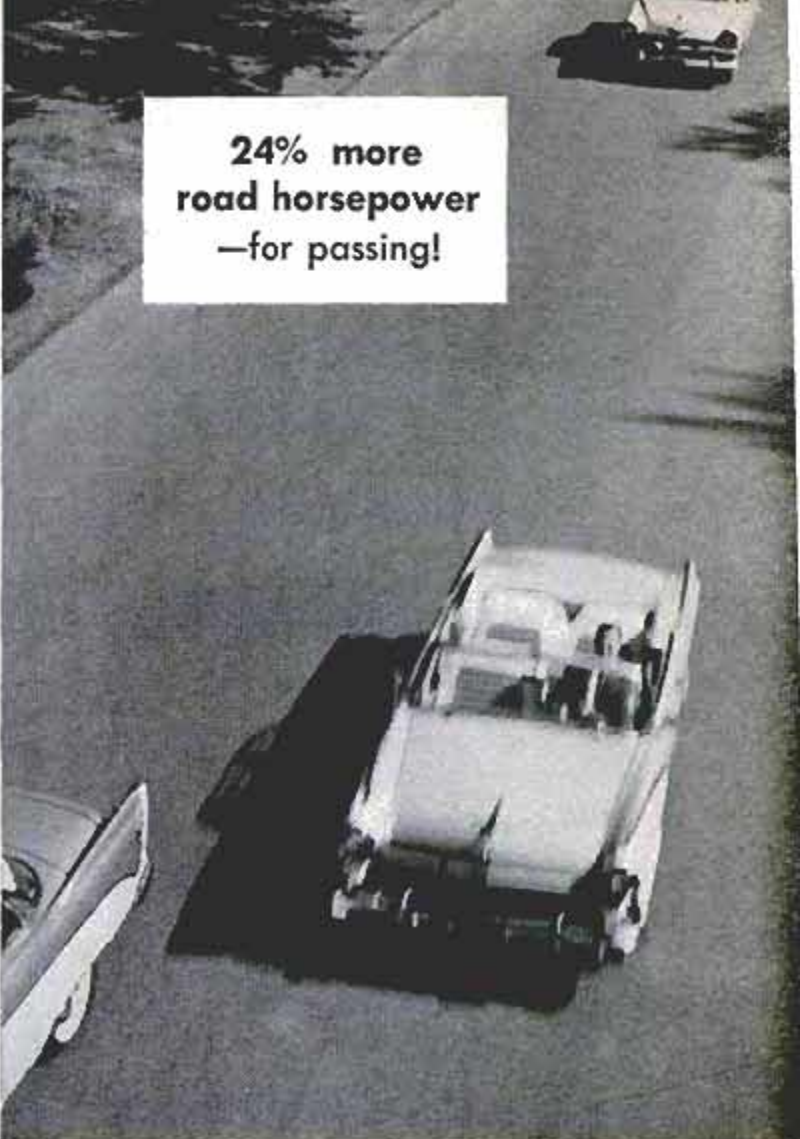
Produces Methane Gas

Fifteen grams of algae can be made to produce 10 liters of gas, of which more than 60 percent is methane. The same gas also contains carbon dioxide and a trace of hydrogen. Methane is a good fuel. It can be compressed, bottled and transported. By means of a petroleum-refinery process it can even be changed into gasoline.

Algae may become an important source of vitamins. They may be used as organic collectors of certain rare elements such as germanium. Alga appears to have an important future, so important that the Rockefeller Foundation and the U. S. Public Health Service, together with the university, are jointly sponsoring the present studies. ★ ★ ★



24% more
road horsepower
—for hill climb!



24% more
road horsepower
—for passing!

In cars that have gone about 10,000 miles without a spark plug change—

New Champions can increase road horsepower by 24%!

TESTS with major makes of cars prove it! Independent engineers took cars whose plugs had run 10,000 miles or so and tested them for power — first with their regular plugs, then with 5-rib Champions with the new Powerfire electrodes.

Nothing about these cars was changed except their spark plugs. Yet there was an *immediate* increase in their road horsepower — the real power actually delivered at the rear wheels! *The average road horsepower gain for all cars tested was 24%!*

It comes down to this: There just never has been a spark plug to match these new Champions with their Powerfire electrodes! Replace your old plugs with new 5-rib Champions today — and you'll feel the difference *at once!*

CHAMPION

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Be sure you get the original **ALLEN-A INSULAIRE***

thermal underwear with Navy's arctic wonder-fabric

**Warmth without bulk for all
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The Navy needed a wonder-fabric—warm enough for far-below-zero weather, yet unusually absorbent so it could be worn indoors or in mild weather without sweltering. And 100% laundry-foolproof.



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Made of down-soft cotton (doesn't itch), knitted in unique 3-dimension pattern. Traps body-heat in thousands of tiny "pockets" for perfect insulation. Rigorously tested for warmth in arctic conditions. Can be machine-washed, tumble-dried. Won't shrink out of size.



If your dealer can't supply you, mail this ad with your name and address for further information to The Allen-A Co., Dept. PM, Piqua, O.



*Trademark

Goal No. 1: The Weed-Free Farm

(Continued from page 168)

are two types of 2,4-D: amine formulations and ester formulations. The ester type is the most active and therefore will have greater effects, but at the same time it is more dangerous to nearby flowers. The label will tell you which is present. The amines are water solutions and make clear sprays; the esters usually are oil solutions and make milky sprays in water. If your problem is mostly dandelions and plantains, use the amine type, as it will easily kill these weeds. On other broadleaved weeds which are more difficult to kill, your best bet is an ester formulation. On these hard-to-kill enemies, apply early in the season, just after they have started growth. Some of these stubborn weeds may require repeated doses.

Eliminating crab grass. 2,4-D does not appreciably affect any of the weedy grasses such as crab grass, quack grass, foxtail and nimble Will. Since your lawn grass and crab grass are both grasses, and closely related, it has been difficult to find a chemical that will kill one without injuring the other. You'll find three materials currently on the market: Phenyl mercuric acetate (PMA), potassium cyanate (PC) and disodium methyl arsenate, introduced last year.

All are marketed under several different trade names, and all are capable of doing an excellent job when conditions are right. However, all three can—and frequently do—burn the lawn grass if applied a bit too strong or when the weather is a little too hot. *Apply them precisely according to the instructions.*

Several new chemicals—one being sold on an experimental basis this year—have given excellent results in killing crab-grass seedlings as they come up. One of these chemicals may well prove as effective an answer to crab grass as 2,4-D is for dandelions. We'll know more next year.

Corn. Many farmers now give corn one spraying and one cultivation, where four cultivations were the rule not so long ago. 2,4-D again is the standard chemical. It can be applied pre-emergence at one to two pounds per acre, but is usually applied post-emergence. Apply it before the corn reaches a height of 10 inches. This catches the weeds in their younger, more susceptible stages. Another reason for early application is that one of the effects of 2,4-D on corn is to make it temporarily brittle, and corn more than a foot high is likely to be broken by a strong wind or the cultivator within 10 days after application. If you feel it absolutely necessary to spray corn more

(Continued to page 270)

ALL WRAPPED UP FOR YOUR CHRISTMAS!
 DISSTON'S World-famous D-23 hand saw—only \$895
 DISSTON-CARLSON 10 ft. Steel Tape Rule—only \$325
 Both together . . . \$1220



Disston tools make fine gifts for the whole family!



DISSTON CARLSON steel tape rules are sturdy, easy to read, famous for high quality. The #3310 has a 10-foot reach; is 1/4" wide; has patented swing tip and 10-second blade change features.



A tip for FATHERS

If your youngster has his eye (and his hands) on your tools, you can make his Christmas merrier with a grown-up gift of a Disston D-23 Hand Saw and a Disston Carlson Rule. He'll get a lifetime of satisfaction from these fine tools. And both you and your son will find you have more family fun when you join forces and "do-it-together."



A hint for SONS

Wondering what to get Dad for Christmas? How about a Disston D-23 Hand Saw and a Disston Carlson Rule? Dad will really appreciate these

fine gifts—and be proud of you for being smart enough to buy Disston. Disston, you know, is the saw carpenters use. If Dad already has a 5 1/2-pt. or 8-pt. Disston, get him a 10-, 11-, or 12-pt. for fine finishing work.



AND a word for MOM!

You can keep *all* the men in your family happy, Mom, with Disston tools for Christmas. (It's a good way to get some work done around the house, too.)

Prices vary slightly in some localities.

SEE . . . TOUCH . . . and TEST
 these and other fine Disston Tools
 at your favorite hardware or tool store.
 Stop in tomorrow . . .

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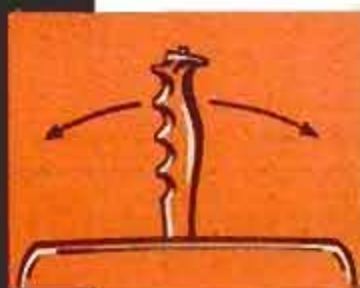
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NEW MARK 75 MARATHON



• Now in production! *Real* outboard power—and safer, smoother, more maneuverable than any engine you've ever handled! Revolutionary 6-cylinder design... a firing impulse every 60 degrees of crankshaft rotation... the smoothness and flexibility of the finest foreign sports cars... single lever control... greatest operational ease of any outboard... *direct* reversing... with no bulky reverse gears! With super hot ignition, these 6 cylinders start instantly, idle smoothly and slowly... give new definition to low speed operation.



NEW SIMPLIFIED SINGLE LEVER CONTROL. *Throttle, reverse, neutral all on finger-tip remote control.*



16 $\frac{2}{3}$ % LESS PISTON SPEED. *Slow-travelling, short-stroke pistons prolong engine life. Other engines, even at lower rpm, have up to 20% more piston speed than this built-to-last Mercury Mark 75 Marathon!*



EQUAL TO A V-12 IN SMOOTHNESS! *Naturally, a 6-cylinder 2-cycle engine has the same number of firing impulses per revolution as a 12-cylinder 4-cycle V-12! Mercury's famous Full-Jeweled Power* guarantees smooth power longer, too!*

*Anti-friction ball and roller bearings throughout.

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REVOLUTIONARY NEW OUTBOARDS!

2. New 10 h.p. Mercury for super-slow trolling!

NEW MARK 10 TROL-TWIN



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12 NEW MODELS >>> 6 to 60 HORSEPOWER

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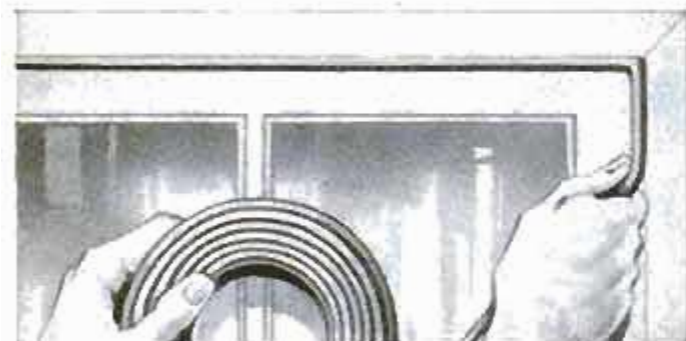
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WEATHER STRIP WITH YOUR FINGERTIP—Put an end to unhealthy, fuel-wasting drafts—Mortite your windows *now*. Weatherproofs any window *in seconds* at so little cost! Self-adhering—no tacks—no tools—just press in place! Use inside or out—no need to go out in cold to apply. Won't crack, chip or peel...can be used over and over!



SOFT ROPELIKE STRANDS, EASY TO PRESS IN PLACE—One-quarter-inch diameter Mortite unrolls like ribbon, moulds into place like modeling clay. Ideal as gasket, caulker, even a base for flower stems. Perfect plugger-upper for many home uses all year long!



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Available at all leading stores.
Send for Free Folder showing
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29¢ • 98¢ • \$1.25

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than a foot high, lower the spray nozzle so the drops will fall mostly on the weeds.

Though the ester type is somewhat more hazardous to the corn, it is often used, but in lower doses, throughout the corn belt. The ester type is less affected by rain or dry weather. With plenty of moisture in the soil, rapidly growing corn sprayed in hot weather may be severely injured by either type of 2,4-D at any age.

Weed grasses in corn. It's ironic but inevitable that when we drastically reduce broadleaf weeds in corn, we invite an increase in the weed grasses. Several new products are available as weapons in this new battle. Dinitros, sold under the trade names Premerge and Sinox PE, when applied at a low dosage just as the corn is coming through and the grasses are in seed leaf, will usually wipe out the grasses. Two promising new chemicals in this field, being tested under the trademarks Karmex DL and Randox, may be on the market generally in 1957. TCB is also a new chemical of promise. Karmex DL and TCB may control all weed growth for four to six weeks after application.

Weeds in small grains. Not long ago spring wheat arriving at market averaged more than seven percent weed seeds. This waste not only had to be disposed of, but it probably prevented the production of twice as much wheat. Again, 2,4-D, frequently applied by plane, has worked a revolution. Most of the common small-grain weeds are susceptible, and the gain in crop yield has been almost unbelievable. But again, as in corn, there has been an invasion by weedy annual grasses. Wild oats are now the most serious single weed threat in the spring-wheat area and there is nothing yet on the market to combat them.

Control of brush. Chemicals have reduced the cost of controlling trees and brush by more than half. On most woody plants, 2,4,5-T is more effective than 2,4-D. 2,4,5-T is more expensive than 2,4-D. Mixtures of the two are widely sold as brush killers.

To kill brush, always use low-volatile ester formulations, applied either in water or in oil solutions. Use about four pounds of 2,4-D—2,4,5-T brush killer to 100 gallons of water to kill brush which is in leaf. To prevent resprouting of stumps and brush, or as a basal application to the lower 12 inches of standing trees, apply a solution of 8 to 16 pounds in 100 gallons of fuel oil (not water) liberally to the top and sides of the stumps or tree trunks, so that some runs down onto the root crown. Brush killer or 2,4,5-T is still more effective if

(Continued to page 271)

applied in frills (continuous ax cuts around the trunk). A machine has recently been introduced to do this girdling several times faster. Girdling will kill the tree without chemical application, but the chemical hastens the job and prevents sprouting.

Ammonium sulfamate, sold under the trade name Ammate, is usually deadly to brush in a water solution of $\frac{3}{4}$ to 1 pound per gallon. This same chemical is frequently applied dry or as a strong solution in frills, cups (notches) or on stumps.

Sodium arsenite, known as a tree killer—and a good one—for more than a generation, is not only a deadly poison but actually attracts livestock. Prof. L. C. Swain of the New Hampshire Agricultural Experiment Station has come up with a new technique that eliminates the poison hazard to animals and man and does a better job. He has devised tabs of blotting paper which are saturated with sodium arsenite. The tabs, inserted under the bark every three to five inches around the trunk, will completely kill the tree at very low cost.

Poison ivy. Use any of the brush killers described above, or a new one on the market this year, amino triazole. Ammate or amino triazole is best to use in town, as the drift is less dangerous to other plants.

Canada thistle. This weed draws more cusses than any other in the northern United States and much of Canada. 2,4-D will easily shrivel the tops, but you have to make two applications a year for at least three years to knock out the roots. Amino triazole is the most promising herbicide we've found yet, though it is too early to make definite recommendations.

Quack or couch grass. Another of the most serious weeds in the northern states, quack grass can be controlled in large areas by cultivation. However, where the land is to go into corn or potatoes, try chemical control with a new herbicide called dalapon. The quack grass is permitted to make five to six inches of growth in early spring, then sprayed with 5 to 10 pounds of dalapon in 40 gallons of water per acre. Two to 10 days later the quack grass is plowed. If you want the field for corn you must allow at least 30 days between spraying and planting, since dalapon injures corn.

Soybeans. This crop suffers as much or more than corn from annual weeds. Tests prove three chemicals reasonably satisfactory, dinitro, CIPC, and a product sold under the trade name of Alanap. Alanap does not control smartweed. CIPC does not control ragweed and dinitro is mean to work with. Take your choice, and remember, there is some hazard to the beans with all three products.

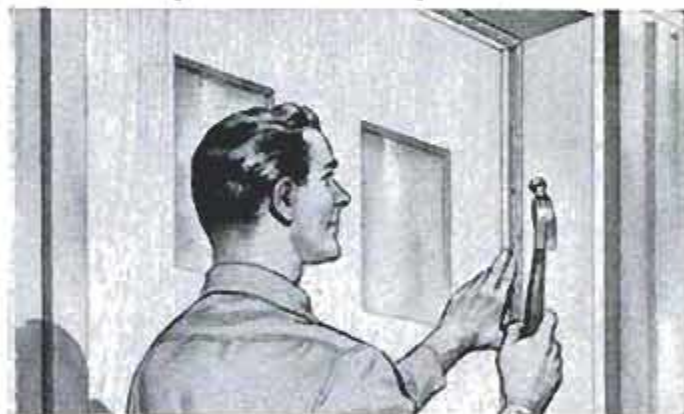
(Continued to page 272)

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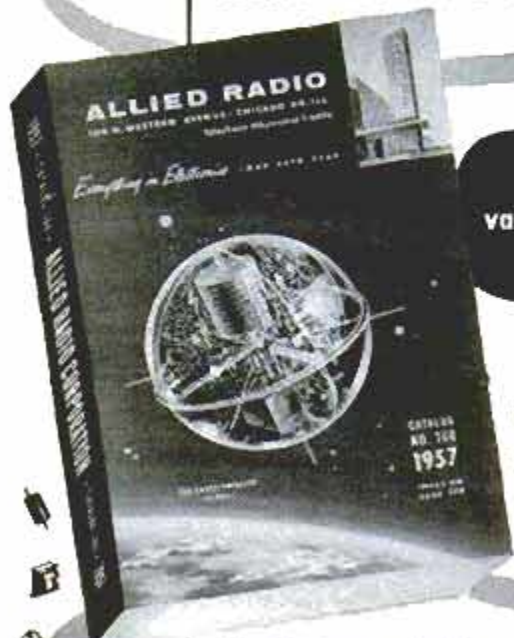
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Sugar beets. Heretofore sugar beets have been a notorious "stoop labor" crop. Chemical control of early weeds in the row has played an important part in the recent complete mechanization of this crop. TCA at five pounds per acre pre-emergence is a standard recommendation for control of annual grasses (except wild oats). Other herbicides are being successfully tried.

Cotton. Cotton, which usually takes the most hand labor for cultivation, has been produced without any hand cultivation by the use of chemicals.

The most generally used pre-emergence herbicide in cotton is CIPC at 6 to 10 pounds per acre. To cut costs, it is usually applied in bands, 14 inches wide or wider, over the rows. With 42-inch rows this reduces the actual amount of chemical to two or three pounds per acre. Use the lower rates on lighter soils. Karmex DL is another pre-emergence herbicide that shows great promise.

After the cotton is up, herbicidal oils may be applied at the rate of five gallons per acre where the cotton is in 40-inch rows. The oil must be directed less than an inch above the soil and may be used not more than three times, at least five days apart. Oil applications must cease as soon as cracks appear in the bark of the cotton.

It is impossible at this stage to make general recommendations on the control of perennial weeds in established cotton. However, Dr. H. E. Rea of Texas has found it possible to control light infestations of Johnson grass by spot-treating them with oils of the Stoddard-solvent type. Obviously this kills the cotton at the point of application as well as the Johnson grass, but so does hoeing, and the oil is both surer and cheaper. Doctor Rea has developed some ingenious solenoid operated sprayers for applying oil from the tractor.

Peanuts. The treatment here is quite similar to that recommended for soybeans. Dinitros and SES used before emergence have given excellent results in controlling annuals, as have most of the other chemicals mentioned for soybeans. So far the control of perennials, such as Bermuda grass, has escaped us, but it seems clear at this stage that complete chemical weed control in peanuts isn't very far off.

Potatoes. 2,4-D is the veteran in this field. It is thoroughly practical as a pre-emergence spray, using the ester type at 1½ pounds per acre in 10 to 20 gallons of water. Spray it one to two days prior to the emergence of potatoes. A warning: Don't use it on sandy soils or in a hot spell.

Strawberries. These have always required costly hand weeding. Preplanting,

(Continued to page 274)

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HYDRAULIC CONTROL VALVE

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postplanting, and winter herbicides are now available to reduce the cost of growing this crop.

Vegetables. These differ so widely that most crops require different herbicides and different times and rates of application. Therefore, chemicals may do more harm than good to a small plot, and a home gardener should stick to his hoe. Here's a check list for the commercial grower:

Asparagus. Apply the new Karmex DW just after the cutting season at one to three pounds per acre.

Squash, pumpkin and cucumber. Alanap 1, applied as a pre-emergence spray.

Tomatoes. These are extremely sensitive to most weed killers. However, some new compounds show promise for use both in direct-seeded tomatoes or as a preplanting treatment for transplants. Watch for news in this field within a year or two.

Cabbage, cauliflower, turnips, radishes, broccoli and Brussels sprouts. TCA gets the nod here, as it has little effect on the vegetables but brings death to grass weeds and some broadleaved weeds. Some new compounds may kill the most stubborn pests, but we're not sure yet.

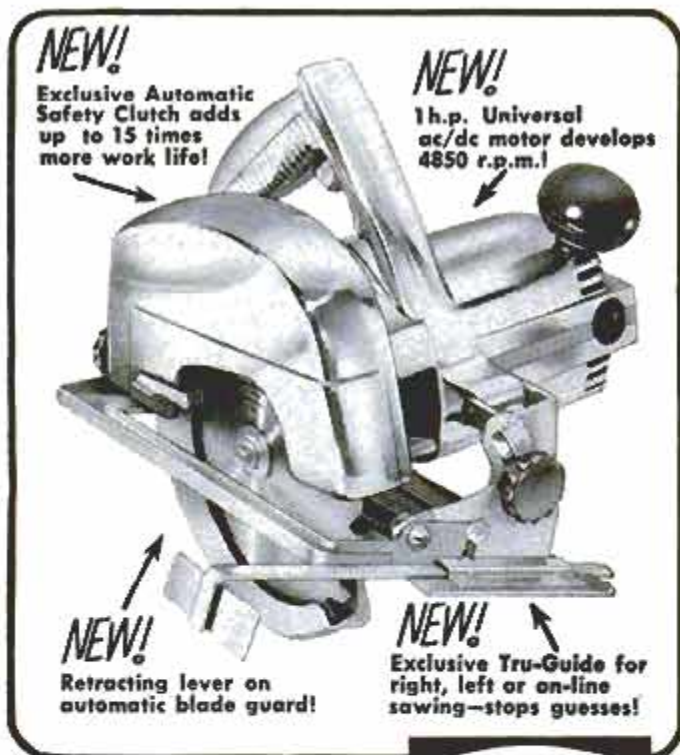
Carrots. Here we have the most nearly ideal weed-control chemical, Stoddard solvent or "carrot oil." Just about all growing plants except members of the carrot family are susceptible to this chemical, so one application will knock practically all the weeds out of carrots.

Unfortunately, we don't yet have the equivalent of carrot oil for other crops. If the farmer doesn't make a final clean-up with a hoe or plow, the weeds which are resistant will increase. This brings up a new and irritating situation: Before long he will have as many weeds in the field as ever, but they will be kinds which he cannot control with our present chemicals.

Even if we can achieve the weed-free farm, the farmer still should loosen the soil by at least one cultivation per season. But his work will be easier and his crops won't be fighting a continuous battle for food and sunlight. ★★★

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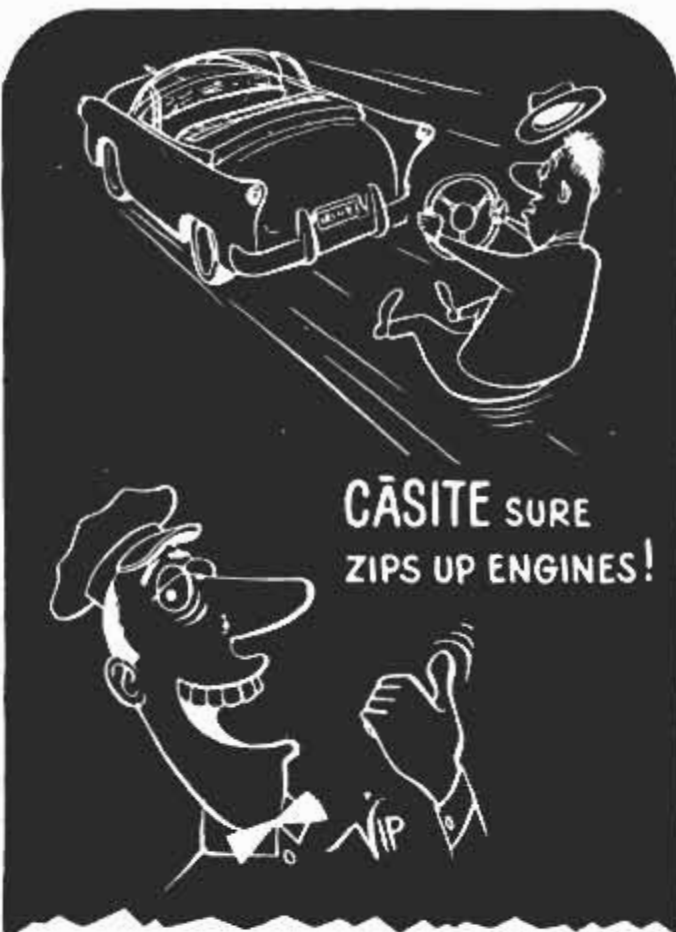
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How Dangerous Is Fallout?

(Continued from page 100)

Further, the report states that strontium-90, one of the long-lasting fission products, is absorbed by humans, plants and animals. The report concludes by quoting the National Academy of Sciences: "Already some children have accumulated a measurable amount of radioactive strontium in their bodies. The amount, however, is quite small—a thousandth of what is considered a permissible dose."

This seems to bear out the opinion of most experts that the fallout from bomb tests at present is not dangerous, but that man must watch the amount of radioactivity he releases into the atmosphere in the future.

Suppose I were in the danger area, and were subject to fallout from a bomb. What could I do about it?

The Federal Civil Defense Administration hopes and expects that our early-warning network would permit target areas to be evacuated. However, fallout can spread 200 miles or more downwind, so a person unaffected by the bomb itself could still be in great danger. He should take cover, cover as deep as possible. An old-fashioned storm or cyclone cellar would be excellent. Next best would be the basement of a home, with all the windows closed. Any cover would help a great deal. The main idea is to prevent dust from falling on you, and to remain in the shelter until you are told by authorities that radioactivity has fallen to a point where it is safe to leave. Eat no food which has been opened prior to the fallout, and drink no water unless you are sure it has been stored in a sealed container.

Is anything currently being done to protect us from possible fallout?

Yes, indeed. The problem is under continuous study by the Federal Civil Defense Administration. New instruments are being developed to measure this invisible danger. And right now the U.S. Weather Bureau is sending out coded fallout forecasts, regularly twice a day. These forecasts, in the hands of proper officials, would permit them to calculate the fallout pattern from a bomb burst at any point in the country, and warn those in the potential danger area to seek cover. ★ ★ ★

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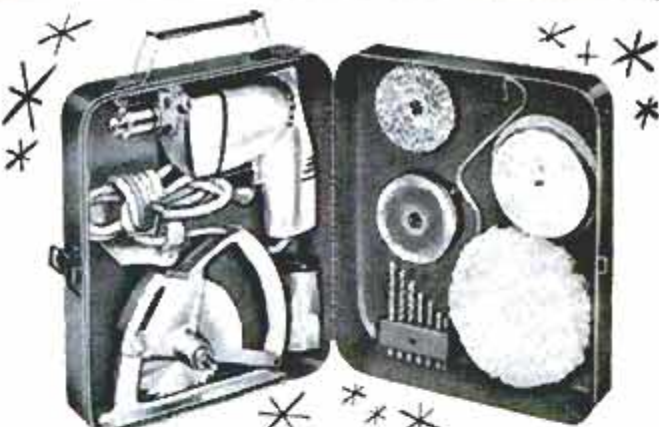
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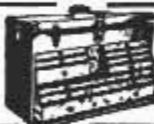
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(Continued from page 107)

FireSweep. It shares chassis and sheet-metal parts with Dodge, adding individuality by using De Soto grille, taillights and interiors. Its V8 engine is the single-rocker-arm-shaft design. Wheelbase is 122 inches, same as Dodge's. Over-all length is 215.8 inches, compared to Dodge's 212.2.

The big De Sotos, the FireFlite and the FireDome, have a 126-inch wheelbase and use the double-rocker-arm-shaft engine.

Horsepowers are 295 for the four-barrel FireFlite, 270 for the two-barrel FireDome, 260 for the four-barrel FireSweep and 245 for the two-barrel FireSweep. Displacement of both FireSweep engines is 325 cubic inches, of FireFlite and FireDome engines 341 cubic inches.

De Soto's over-all styling is simple and clean. From the rear, it retains its distinctive vertical row of three lights in each fender. The front grille is essentially a series of unbroken horizontal lines. Four headlights are optional on all except the FireSweep models.

Dodge Has Swept-Wing Styling

Dodge, even more than others in the Chrysler family, has emphasized tailfins.

Wheelbase is two inches longer, but over-all length only a fraction of an inch more. Width is increased by 3.3 inches and height lowered as much as 5 inches.

Wide-set headlights are hooded under forward-thrusting fenders and, being paired with large parking lights, look like dual headlights. This, plus the rugged grille, makes the car appear much wider.

The three-speed automatic transmission, Torque-Flite, is available on Dodge in addition to the two-speed PowerFlight. Retained is the six-cylinder engine for fleet buyers and the few low-power buyers.

The push-button shift is improved by a neutral-start button. The button automatically puts the transmission in neutral when you press it to start the engine.

Displacement is boosted to 325 cubic inches, intake valves enlarged and compression ratio up to 8.5 to 1. Horsepower ratings are: Coronet six, 138 horsepower; the V8s, 245 and 260 horsepower; and the D500, 285 and 310 horsepower.

Plymouth High Styled

With the Corporation putting its big sales effort on the breadwinning low-price field, Plymouth is out to do battle in a body that looks like a dream car.

Aiming for a bigger chunk of the station-wagon market, Plymouth offers some new

(Continued to page 282)

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Jointer Cutter Bits
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ideas in that body style. The rear seat on all eight-passenger wagons now faces rearward, giving the riders an observation-car view as they drive along the highway.

There is also a lockable compartment in the floor at the rear so you can hide your valuables out of sight, something wagons have never had before. To make room for this compartment, the engineers located the spare tire vertically in the left rear fender. When needed, it cranks down out of its protected compartment. The gasoline tank is located in the right rear fender. The rear window cranks up and down for ventilation and is powered on some models.

Wheelbase is now 118 inches, 3 inches more than last year. Over-all height is only 54.8 inches on hardtops. Belt lines (the horizontal line at the base of the windows) is lowered by about 2 inches.

Although these changes make Plymouth look much longer, by measurement it is a fraction of an inch shorter than it was in 1956. Width is greater by 3.6 inches.

Plymouth, like Dodge, retains the six-cylinder engine. It develops 132 horsepower. The 277-cubic-inch Plaza V8 develops 197 horsepower; the 301-cubic-inch Savoy and Belvedere V8s have 215 horsepower; and a power-pack version puts out 235 horsepower. ★ ★ ★

Gunstock for Camera Eliminates "Jitters"

Squeezed against the shoulder, a new gunstock for cameras tends to eliminate photographers' "jitters." The stock will fit any movie or still camera. Used with a still camera, it permits slower shutter speeds. With a movie camera, it helps the photographer follow moving objects accurately as well as with a smooth panning action.



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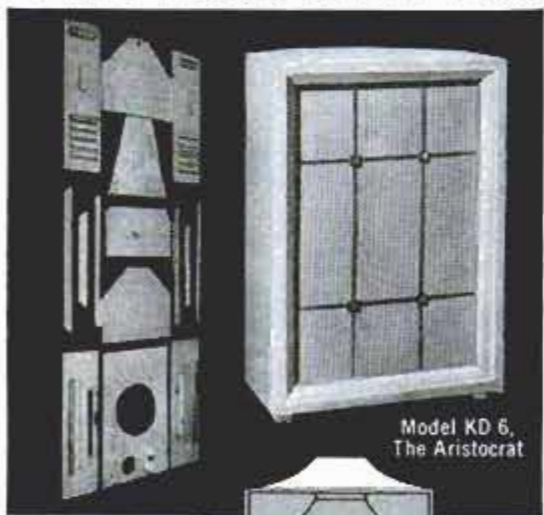
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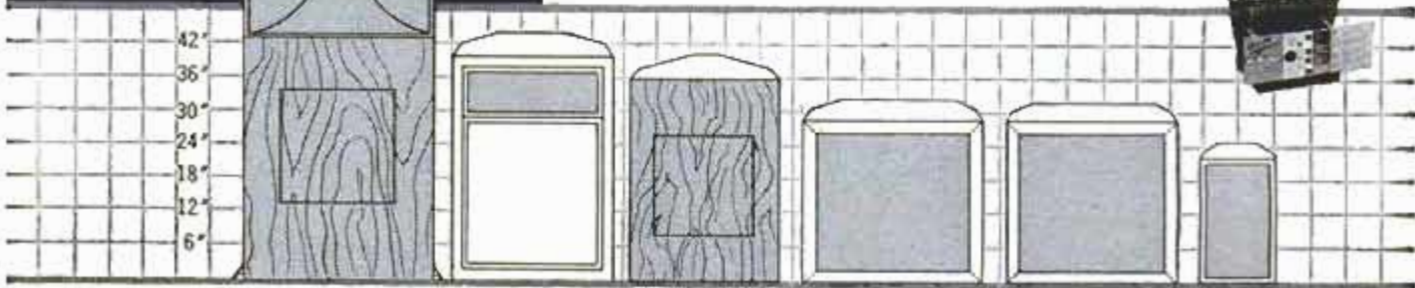
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Ford Family is Lower, More Powerful

(Continued from page 112)

rings or doughnuts soften both these actions. They roll and flex just like the big tires on the wheels, softening road vibrations and driving torque.

Newly designed rear-spring bumpers reduce windup during acceleration. An improved shock absorber dampens extreme wheel movement while driving fast over chuck holes or on washboard roads. All body mounts this year are rubber insulated, there being no tire-carcass insulators as in previous years.

A left-hand-operated keyboard is used to shift the automatic transmission. The neutral-start button simplifies things. To start the car you turn the key and depress the neutral-start button. This puts the transmission in neutral and operates the starter simultaneously. An emergency-brake release button (a foot-operated "hand" brake is used this year) is also part of the control keyboard.

Carburetor air is drawn from inside or outside the engine compartment, depending upon temperature. This reduces choke time under freezing conditions by as much as 50 percent, saving gasoline and minimizing crankcase dilution. When the engine is hot, cooler and denser air is drawn in from outside to increase power.

An automatic clutch allows the engine fan to free wheel at speeds over 40 miles per hour, increasing horsepower at the rear wheels slightly (however, even a trained engineer cannot sense the difference without a stopwatch). The real important gain is not the added horsepower, but the noise reduction. At high speed (when a fan is not needed at all) much of the engine noise is air turbulence caused by the fan whirling at as much as 5000 revolutions per minute. Free wheeling eliminates this and, as an obvious bonus, increases power slightly.

Mercury offers two engines: A 312-cubic-inch V8 of 255 horsepower and a 368-cubic-inch V8 of 290 horsepower. Both have a 9.75 to 1 compression ratio.

The body is longer by five inches. Wheelbase is now 122 inches, an increase of three inches. Over-all height is lowered by three inches. Width is greater by three inches where it counts—in the seating area as well as over-all. Despite a lowered roof, headroom is about the same (a fraction greater) in the front seat and two inches greater in the rear.

Mercury is saving its top line, the Turnpike Cruiser, for introduction at the New

(Continued to page 288)

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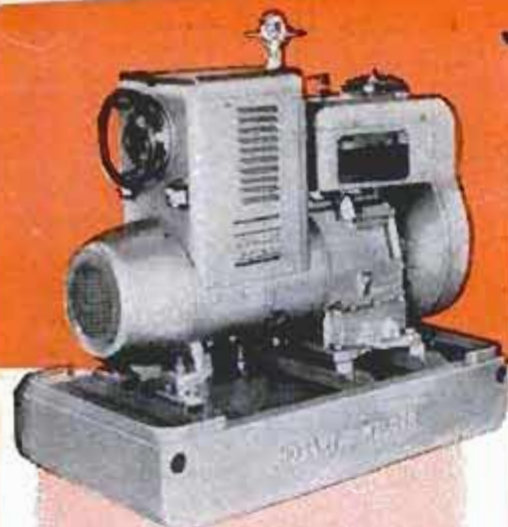
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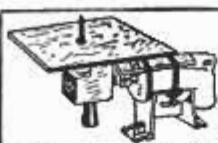
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York Auto Show in December. It is expected to be loaded with exciting innovations although it must necessarily use much if not all of the same sheet metal as these models.

Lincoln for 1957

Principal styling changes in the Lincoln are in the rear fenders and the front headlight arrangement. It is longer by two inches than in 1956 but the added length is in the bumpers.

Rear fenders cant outward in a bold fin shape. Arranged vertically in front are two pairs of headlights (optional in states that permit them).

One all-new body is offered, a four-door hardtop. Continued is the four-door sedan with a slenderized center pillar.

The top two headlights are standard seven-inch units. The lower two are smaller auxiliary driving lights that can be turned on or off independent of the top lights. With all four lights on, there is 50 percent more light on the road. The lower location of the auxiliary lights makes shadows larger so objects on the road become more apparent.

The engine has a redesigned combustion chamber and develops 300 horsepower with its 368 cubic inches. Compression ratio is 10.0 to 1. Four-barrel carburetors and dual exhausts are standard (the tail pipes end below the rear bumpers out of sight where they do not soil the chrome).

Other important changes include a smaller turbine in the torque converter to permit increased engine speed for breakaway acceleration. An extra-cost locking differential minimizes slippage on ice. Adjustable shock absorbers (adjustable by dealer) are also optional.

Another optional feature is an electric door-locking system. By pushing a dashboard button you lock all four doors at once (a light flashes if a door is not fully closed). You still have to lock them individually when you leave the car, however. Power-operated vent windows are another optional feature.

Standard on all Lincolns is a warning light in the fuel gauge that tells the owner when he's down to three gallons of gas. ★ ★ ★

Self-Developing Camera Now Takes Transparencies

Photographers are now able to take black-and-white transparencies with the Polaroid Land camera. The transparencies are made by a new high-speed film (ASA equivalent 800 daylight) and can be made in either 2 1/4 by 2 1/4 or 3 1/4 by 4 inches.

IDEAS FROM WELDWOOD

THIS MONTH'S PROJECT— BUILDING CHILDREN'S FURNITURE FOR CHRISTMAS

This Christmas, you can have a richly rewarding time, and save money on Christmas presents, by giving your children furniture and toys you built yourself. And there are plenty of project ideas in the just completed 144-page book "Children's Furniture You Can Build." (See coupon to get your copy.)

Building any one of these pieces of children's furniture—like those shown on the right—really isn't hard. The well-illustrated book gives careful step-by-step directions. And, to insure your satisfaction, author-designer Bill Baker recommends Weldwood products be used. Weldwood hardwoods—like Samara* and Nakora*—are inexpensive, easy to work and strikingly beautiful. And old-time favorites—like Weldwood fir plywood and Weldwood glues—are used to make even hard-looking jobs easier. You'll find that both amateur and professional woodworkers enjoy using Weldwood products because they can be sure of extra quality.

So, for Christmas gifts your children will enjoy using and you'll enjoy making, send for "Children's Furniture You Can Build."

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Old-fashioned cradle is made of Weldwood birch plywood.



"Desk 'n' shelves" solves youngsters' toy storage problems.



Wardrobe-Chest of Drawers will delight any young Miss.



Ride 'em cowboy, on a safe, sturdy Weldwood Rocking Horse.

This Month's Hint

To make a stronger than normal water-mix putty, substitute Weldwood Presto-Set Glue for the water. W. S., Elmira, N. Y.

The Weldwood Question Box

Q. I want to install some Micarta® with Contact Cement, but I'm afraid I won't position the Micarta correctly and—since Contact Cement bonds instantly—I'm afraid I'll ruin the job. Any suggestions?

A. Actually, it's pretty hard to go wrong if you follow these di-

rections carefully. (1) Coat both surfaces with Contact Cement and let dry. (2) When the surfaces are dry, put a sheet of paper covering the surface on which the Micarta is to be placed. (3) When that's in place, position the Micarta carefully . . . slowly pull out the paper, pressing the Micarta in place. The

Micarta will bond instantly and permanently.

However, if your hand wobbles, or if you *do* make a mistake, good lacquer thinner will dissolve the bond temporarily and allow you to remove the Micarta. After a short drying time, the bond may again be made without additional Contact Cement.



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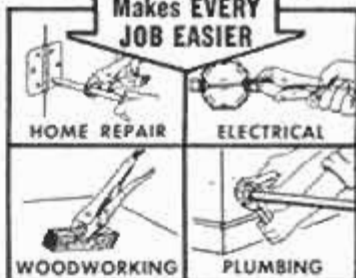


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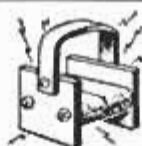
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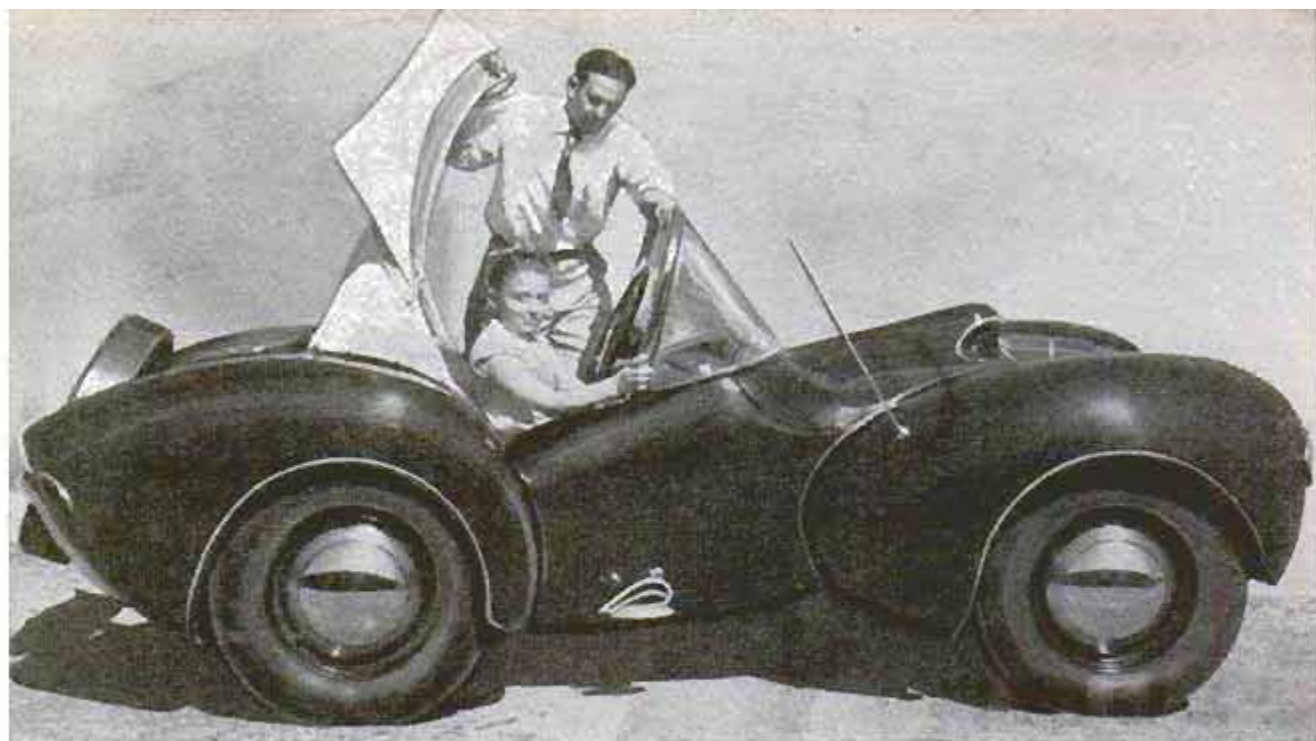
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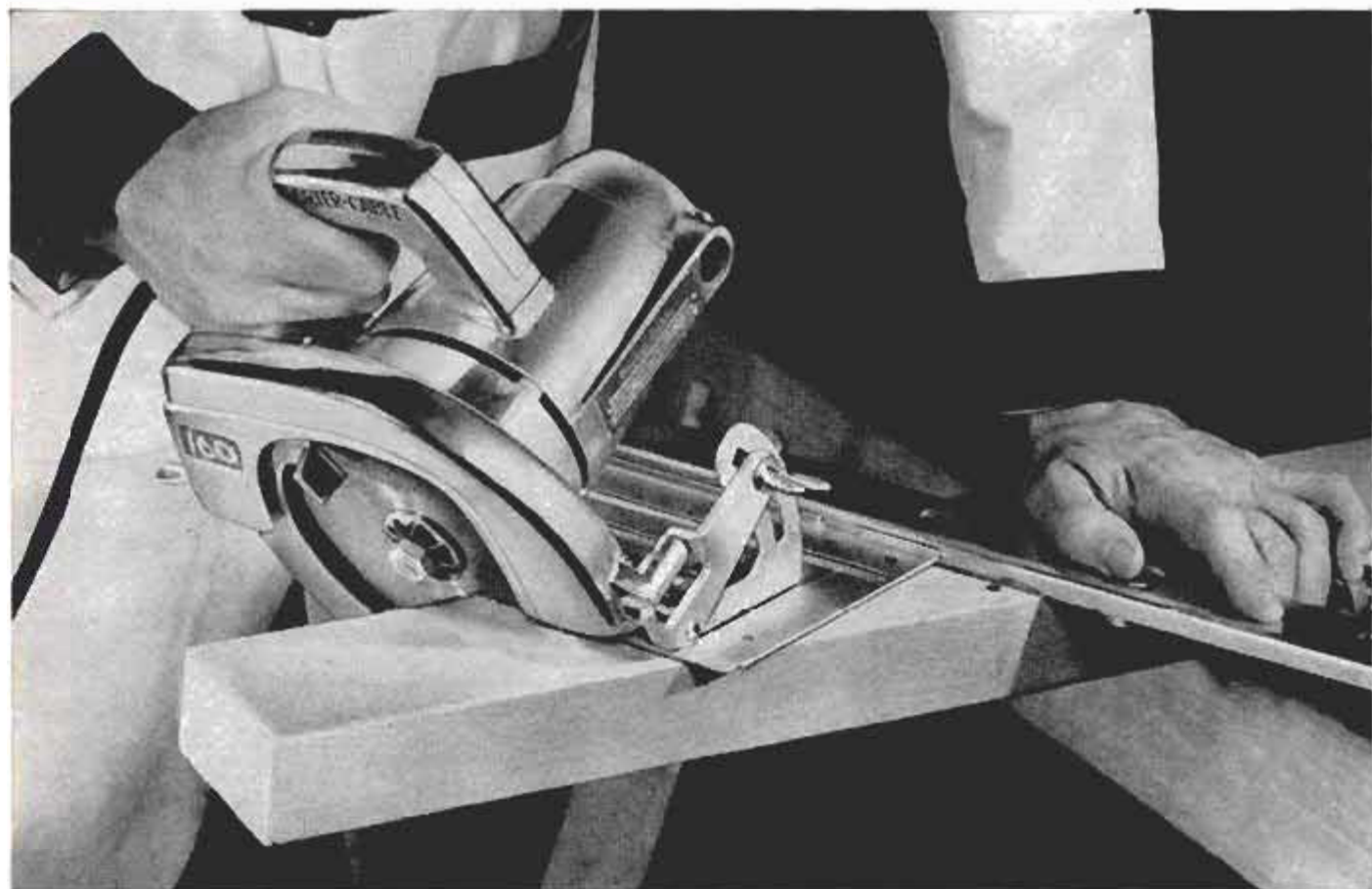
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Standing in the hatchery's trout pond, two men load fish into escalator with dip nets for trip to tank

Trout Go for a Ride On Fish Escalator

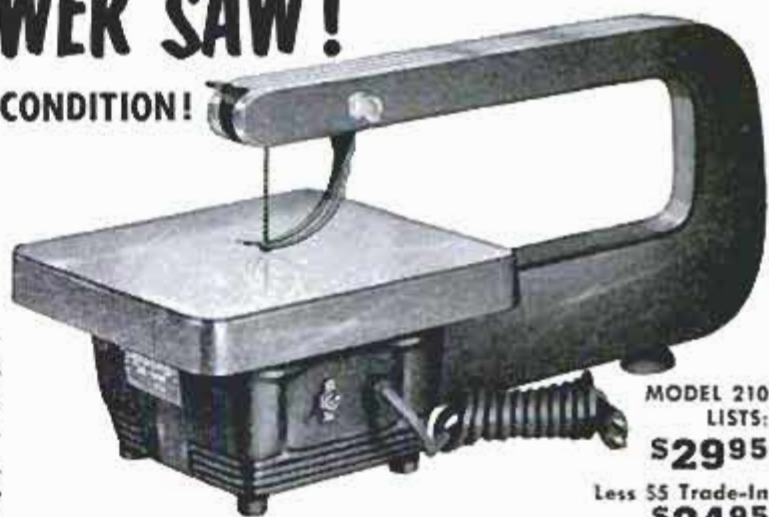
Catchable-sized trout at the Darrah Springs State Fish Hatchery in California take a ride on a portable escalator before they are planted in the state's trout streams. The escalator is used to load the trout into the hatchery's trucks and makes it possible to load the trucks in 15 minutes, instead of the several hours previously required. The escalator consists of an endless rubber belt with cleats three inches high. Two men use dip nets to put the fish on the escalator. Each pocket on the belt holds enough water to assure the fish a safe ride into the truck's tank. The fish are counted by measuring the displacement in the truck's tank after loading.

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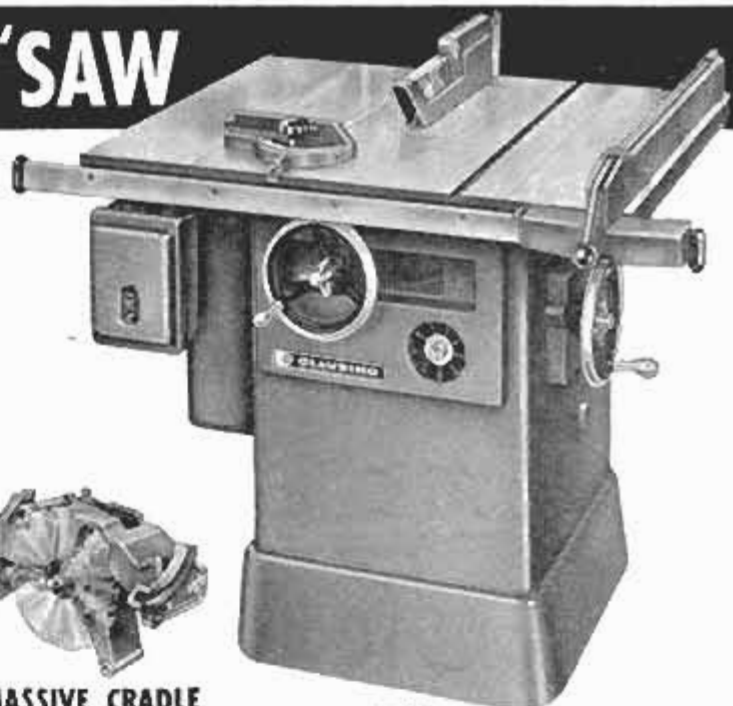
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MARCO 14 \$189.50 Delivered

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ACCESSORIES • FIBERGLAS
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BOX 6188 • LONG BEACH 11, CALIF.

8' to 14' models, factory to you, no dealers, mahogany decks and framework, all brass fastenings, 14' hull kits as low as \$129.50 including freight charges. CATALOG 35c includes Kits, Hardware, Trailers, Fiberglass.

NEW STANLEY Glide-O-Matic

- Positive lock
- Automatic return
- Steel scribes



This rule locks at the measurement you take. Set it, forget it; the rule remembers when you push the lock button.

And when you release the lock the blade glides smoothly home into the gleaming case.

No pencil needed! Glide-O-Matic marks your measurement with hardened steel scribes.

For inside measurements, use the back of the tape. It's graduated in red with the first two inches omitted to compensate for 2" case.

Be precise. Say Stanley. Ask for Stanley Glide-O-Matic at your favorite hardware store. It's a good rule.

3 sizes, each in plastic utility box:
8 ft.—\$1.98 10 ft.—\$2.39 12 ft.—\$2.89

For free booklet on measuring tools and how to use them, write Stanley Tools, Division of The Stanley Works, 62N Elm St., New Britain, Connecticut.

STANLEY

The Tool Box of The World

DRAINS cellars, cisterns, wash tubs; \$7.95 IRRIGATES - CIRCULATES - SPRAYS



Type P Pump has 1,001 uses. Up to 3000 GPH; 450 GPH 80' high; or 1800 GPH from 25' well. Use 1/8 to 3/4 HP motor. Coupling included free. 1" inlet; 3/4" outlet. Stainless shaft. Won't rust or clog! Postpaid if cash with order. Rush your order today.

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Centrifugal and Gear Pumps in All Sizes
LABAWCO PUMPS, Belle Meade 7, N. J.

SPARE-TIME MONEYMAKING OPPORTUNITIES

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HUNDREDS OF BARGAINS

AMAZING OFFERS



KATO A.C. GENERATORS

A WIDE VARIETY FOR ANY ELECTRICAL APPLICATION!

Adaptable to all well-known makes of engines. 350 Watts through 500 KVA and larger. To 600V. Odd frequencies from 15 to 1000 cycles. Also, Rotary Converters, High Frequency Changers, Motor Generator Sets.

FREE FOLDER

KATO Engineering Company
1402 First Ave., Mankato, Minn.

SAW SHARPENING IS EASY

Sensational new Super Filer No. 11 joints and sharpens both hand and circular saws 6" to 10" with all teeth the correct height, depth, pitch and bevel. Easy to use — when file hits hardened steel roller, teeth are finished. Saw runs true and smooth with no side pull. Complete with special 8" file.

\$995
PPD.

"TRU-CIRCLE" saw set automatically sets teeth at 10° or more.

\$295
PPD.

DOWEL CENTERS

Assure positive, quick alignment of major units with ADM Dowel Centers. Insert in drilled holes, press mating piece against points, tap lightly. Centers inscribe exact location for opposite holes. Pairs of 3 popular sizes (6 centers)—for 1/4", 3/8", 1/2" holes \$1.00 ppd.

SUPER SAW FILER NO. 6. Automatically controls Depth, Angle, Pitch, Automatic Depth Control Rollers. Perfect level and angle maintained, and fool-proof depth control for all Rip, Crosscut and Handsaws. Precision made and calibrated for instant setting at desired angle. Can be used in any vise or clamp. Complete with file, only \$6.50 ppd.

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ECONOMY TRACTOR



Thousands
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Write for
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Engineering Products Co.
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Unequaled value! Low price!

America's finest tractor. Ruggedly built. Easy to operate. 790 lbs. Borg-Warner clutch, trans. and diff 140 to 1 reduction. 40% more drawbar pull than ordinary tractors 8-1/4 H. P. engine. 20 quick change implements. HOOD, FENDERS.

VARIABLE SPEED

HYDRAULIC POWER TRANSMISSION



It has Infinite Speeds 0 to 550. Reverse. Automatic Overload Protection; Adjustable Torque up to 180 inch pounds. 5/8" Input and Output Shafts. It will handle 1/4 to 1 1/2 H.P. Motor. Case measures 7 1/2" long, 7" high, 8 1/2" wide. VALUE OVER \$300. Shipping Wt. 25#. On C.O.D. Orders we require a 10% Deposit.

\$54.50

Feb. Chicago

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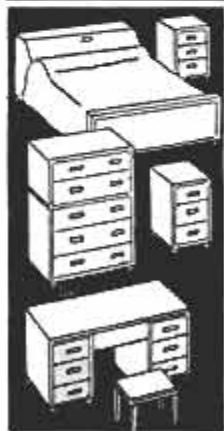
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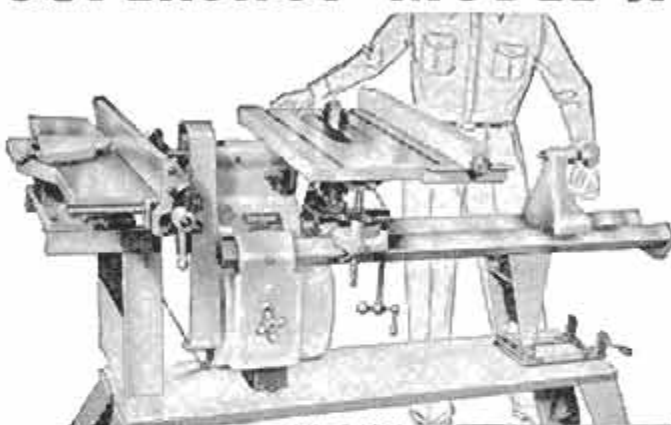


SAVE MONEY, be the envy of your neighbors by making this beautiful bedroom suite yourself! Only a power saw and jointer are needed to turn out this smart suite, featuring bed with storage space, three-piece vanity with cosmetic compartment and makeup mirror, Mr. and Mrs. dresser, and twin night stands with drawers. Letters demanding detailed plans poured in after this furniture was pictured in Popular Mechanics Magazine. Now the 4 plans are ready—easy-to-follow scale drawings—and they're yours for only \$2.00! Send for a complete set today.

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LOOK! All New - All Precision - All Deluxe

SUPERSHOP MODEL X



8" SAW

**WE PAY ALL
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YOUR FREE
HOME TRIAL**

**ONLY
\$139.50
EASY
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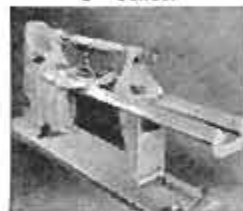
Vert. Drill Press



Hor. Drill Press



8" Sander



30" Lathe



5" Grinder

Never before have you seen so much deluxe, precision-built power tool workshop at any price! Designed for the man who wants the best. Massive cast and precision-machined headstock, self-centering inverted "V" bedways (like precision metal lathes), exclusive non-friction speed changer, extra-large cast and precision-ground saw table. 100% ball bearing, lifetime-lubricated. You save by ordering direct from factory. You are invited to test Supershop Model X in your home FREE. Mail coupon or postcard for FREE brochures, photos, details, specifications, accessory list — and amazing freight prepaid FREE HOME TRIAL PLAN. All free.

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2½x - 4x or 6x RIFLESOPES
10 DAY MONEY BACK GUARANTEE



IDEAL GIFT for DAD or SON
10 DAY MONEY-BACK GUARANTEE

YOUR CHOICE! SAME PRICE!

2½x — Overall lgth. 9¼"
28 ft. FIELD OF VIEW AT 100 YDS.
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28 ft. FIELD OF VIEW AT 100 YDS.
6x — Overall lgth. 10¼"
28 ft. FIELD OF VIEW AT 100 YDS.

NEW PAL-MASTER SCOPES
for TARGET - BENCH REST or HUNTING

Choice of 3 different
powers at the same
LOW PRICE!

ONLY 9.95
WITH MOUNT

COMPARE THESE QUALITY SCOPE FEATURES:

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| 1—ADJUSTMENTS Positive Internal. Direct reading Windage & Elevation Knobs | 4—RETICLE Sharp, Clear Cross-Hair. |
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| | 7—Guaranteed to perform perfectly on ANY RIFLE. |
| | 8—Made by leading American Optical firm. |

MOUNT INCLUDED with SCOPE

SIDE or TOP MOUNTS available with scope to fit most rifles. When ordering specify type mount, gun model number and brand.



11" BLADE

NEW

SPECIAL PARATROOPER FOLDING MACHETE
WITH LEATHER HOLSTER

A new design and a new blade shape with tapered, beveled edge that's honed to cut quicker and deeper! The blade is finest, blue, nickel-alloy steel. The handle is heavy bakelite with diamond point knurl to assure positive, non-slip grip. Blade folds into handle and special steel guard like a giant pocket-knife giving absolute protection to the user. When open a positive safety lock holds blade rigidly in place. A rawhide wrist thong in handle prevents losing knife. Ideal for chopping, cutting or hacking use. Overall 17". Blade is 11". **GENUINE LEATHER HOLSTER** — for machete above. Has belt-loop and long rawhide thong for leg strap. Beautifully double-stitched throughout. **1.50**

MACHETE
2.89
1.50 VALUE

BUILD-IT-YOURSELF
12 INCH BOAT KIT



with **ELECTRIC MOTOR & SPOTLIGHT**

Here is a genuine electric motor driven speedboat that will make many a young sailor happier this Xmas. The hardwood hull and deck are already completed (excepting paint) and is ready for final assembly. Included in this complete kit is an electric motor, flexible coupling, drive shaft with propeller, adjustable rudder, windshield, electric spotlight and other accessories and hardware. Can be finished and ready for launching in one hour. Motor and spotlight operate on 2 standard flashlight batteries. Order now — Xmas delivery assured to Dec. 15.

ONLY 3.95
WITH MOTOR

18" PREASSEMBLED HYDROPLANE

XMAS GIFT BARGAIN



A sleek, single-step hull made of special hardwood. Hull sections are preformed and shaped making the assembly faster, easier and very attractive. All parts, including metal framed, plastic windshield, are furnished. Hull is designed to take a miniature outboard motor.

ONLY 4.95

ELECTRIC OUTBOARD MOTOR

Designed to drive boats like hydroplane above. Runs on two regular flashlight batteries (mounted in boat). Has clamp-on mount. Will tilt and swivel for steering. 1" dia. prop. For boats up to 18".

2.59

23" WINGSPAN



F-51 MUSTANG U-CONTROL AIRPLANE
½ CLASS ONLY 3.95

The famous Mustang Fighter of World War II. An excellent model for the beginner in control-line flying. Easy to build and fly. Kit has many pre-cut and shaped parts for easy, accurate assembly plus large pictorial instructions. Gas powered.

.009 MODEL GASOLINE ENGINE

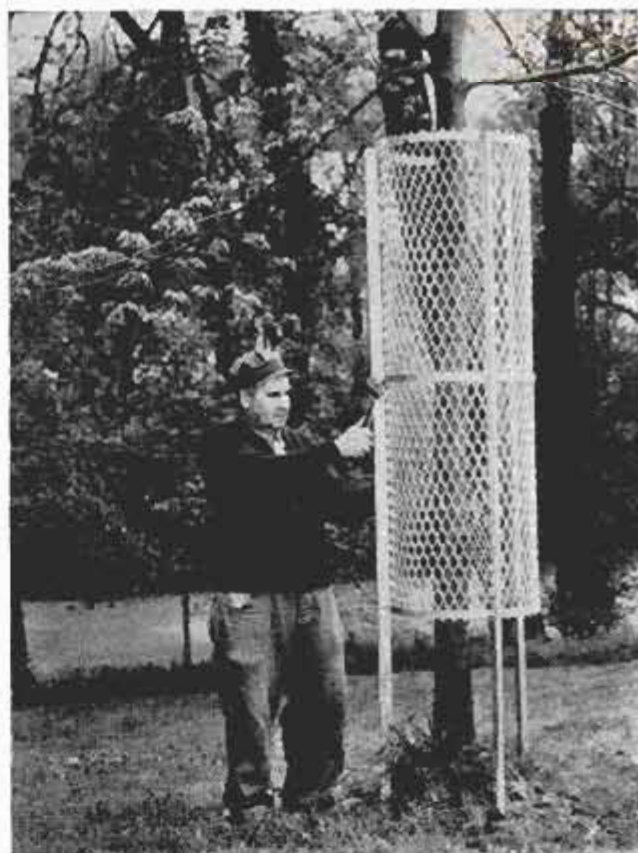


Develops .15 HP at 14,000 RPM. Ideal for Mustang above or similar models. Operates with glow-plug ignition and rotary valve carburetion. Easy starting.

4.95

FREE CATALOG— illustrated showing many more models, supplies, accessories, sporting & camping goods, etc. Send for Catalog C-8.

PALLEY'S—SEE OPPOSITE PAGE FOR ADDRESS



Wheeling Corrugating Co., Wheeling, W. Virginia

Metal Guards Protect Trees

Durable metal tree guards are assembled from a knocked-down package that includes the necessary nuts and bolts. Made of galvanized mesh and sturdy posts that are driven into the ground, the guards are 18 inches in diameter and have a 60-inch mesh height. When the young tree or shrub no longer needs protection, the guard can be disassembled and used elsewhere.

Ball Bearings From the Sky

Microscopic ball bearings are falling out of the sky at the rate of 20 per hour per square yard of earth. That rate of fall, at least, is true in the Southwest where scientists of the New Mexico Institute of Mining and Technology are collecting and studying them. Known as spherules, they apparently originate as dust from interplanetary space that melts and forms into droplets as it enters the atmosphere, or from droplets torn off the molten surfaces of larger meteors.

The micrometeorites are magnetic, perfectly round and average 1/5000 inch in diameter. They are collected by means of glass trays that are filled with ethylene glycol to prevent them from bouncing out or being blown away. The trays are placed in various locations including the top of a 10,300-foot mountain in New Mexico. Later the spherules are removed with a magnet for study under a microscope.



OWN YOUR OWN SATELLITE REPLICA

(COST GOVT APPROX. \$250)

This approximately 15" Lucite plastic ball contains its own electro-vacuum gyro mounted in center, and also many other intricate gadgets and electronic devices. It was used in research and experimental radio controlled drone planes to simulate planetary actions. This unusual piece not only has great breakdown value but in home or office decoration. . . . **795**

AMAZING NEW IMPORT TERRESTRIAL & ASTRONOMIC TELESCOPE

83 POWER
40 POWER
or
23 POWER
PLUS A

VARIABLE 25 and 60 POWER TERRESTRIAL TELESCOPE

Never in our history have we been able to offer a telescope value like this. For our one Low Price you get

- 1-Astronomical LENSES - Three of 23X, 40X and 83X magnification. Achromatic & precision ground.
- 2-Variable Power LENS of 25 & 60X for straight through viewing. Fully corrected for Terrestrial sighting.
- 3-BODY - Steel for a lifetime of use.
- 4-LENGTH - 19-1/2" 22-1/2" extended.

FREE BOOK ON STARS - Tells you all about the stars and the constellations - Where to find them at different times - How to identify them and many other intriguing facts on astronomy.

EXTRA 100X EYEPIECE **750** 125X EYEPIECE **995**

TOP QUALITY IMPORT

83 and 40 POWER ASTRONOMICAL SCOPE

Very similar to the scope described above but has 83X and 40X astronomical eyepieces and the objective lens is 40MM. The variable terrestrial lens is 25X - 30X. All steel body tube is 26" long. Included with the scope is a sun glass, a diagonal prism, an erecting prism, a hardwood tripod and a fitted hardwood case. Ideal for the student, hobbyist, etc. An exceptional Xmas gift!

SPECIAL 4995
EXTRA 100X EYEPIECE - **750**

25 POWER x 30 MM TELESCOPE & TRIPOD

Nowhere but PALLEY'S can you find a buy like this! Here's a scope, complete with a sturdy metal tripod, that you can have a lot of fun with. Use it to spot "hits" on the target, for stargazing, interesting views of the beach, etc. Made of aluminum and chrome plated brass. Field: 62 ft. at 1000 yds. Lens: 1-3/16" dia.

20 POWER x 40mm SPOTTING SCOPE WITH TRIPOD & CASE

Imported directly by Palley's. The finest spotting scope for the money that we have seen. A FULL 20 POWER MAGNIFICATION yet small enough to fit easily in your gun case, knapsack, etc. Has precision ground and polished lenses and prisms throughout. With fully coated objective lens. Eye-piece is fully adjustable. Comes with a sturdy tripod and special leatherette carrying case with zipper enclosure. Weighs only 15 ozs. Overall length 8 1/2".

Optical items in this ad were made by finest, German trained, Japanese Optical Technicians.

NOW 895
2500 VALUE

NEW IMPORT

Objects appear
to be 25 TIMES
CLOSER to you!

2995
VALUE

Only 1995
WITH
CASE

SAVE UP TO 50% ON XMAS OPTICAL BUYS

MAKE THIS A SCIENTIFIC CHRISTMAS
10 DAY FREE TRIAL or MONEY BACK GUARANTEED

AMAZING NEW DESIGN 60 to 600 POWER - 2 EYEPIECE SPECIAL MICROSCOPE

ANOTHER PALLEY SCOOP
HAS 60 - 120 - 200 - 300 - 400 & 600
POWER MAGNIFICATION WITH ILLUMINATED
SUB-STAGE MIRROR and TRIPLE TURRET

Now you can change magnification with a simple shift of the dual eyepiece turret. No loss of focus - No re-adjustments - Your choice of 6X or 20X eyepiece with any of the objective lenses instantly!

INCLUDES THESE ADDED FEATURES:

Has triple revolving turret with 10X, 20X, & 30X precision ground and polished lenses - Dual eyepiece turret with 6X and 20X lenses - New Patented Sub-Stage with a built-in, battery operated light, no external light source needed - A large sub-stage mirror with revolving variable iris - All-metal precision made body, inclines through 90° - Special fitted hardwood case and glass slides. Ideal Xmas Gift!



NEW
IMPORT



XMAS 1695
SPECIAL PRICE 1695

PALLEY 60 to 450 POWER MICROSCOPE

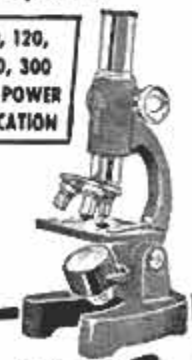
with ILLUMINATED SUB-STAGE
MIRROR and TRIPLE TURRET

Take advantage of our tremendous foreign purchase. Ideal for use by the Amateur, Scientist, Student, in Home Laboratory for study of insects, tissue, minerals, microbes, liquids, etc. ORDER TODAY!!

CHECK THESE FEATURES

Microscope has triple revolving turret with 10X, 20X and 30X, precision ground and polished lenses - Two interchangeable eyepieces of 6X & 15X - New Patented Sub-Stage with built-in light, needs no external light - Large sub-stage mirror for external light - All-metal body, precision made, inclines through 90° - Fitted hardwood case and 3 glass slides. ORDER NOW!!

HAS 60, 120,
150, 180, 300
and 450 POWER
MAGNIFICATION



1295
INCLUDING
FREE 8 P.C. DISSECTING SET
Has scalpel, scissors, tweezers, slides, probe, pins & magnifying glass. All in hardwood case.

SAVE PALLEY 100 - 200 - 300X BUY MICROSCOPE NOW

Perfect GIFT for STUDENT - AMATEUR SCIENTIST

A triple revolving, objective lens turret allows selection of 100, 200 or 300 POWER magnification. Has fine, ground and polished lenses and ALL METAL construction. This instrument is NOT A TOY! Right or left hand rack & pinions make smooth, precise adjustments. Body inclines 90°.

WAS 125 NOW 795



SPECIAL MICROSCOPE LIGHT

Specialty designed to provide proper light for specimen slides on microscope or any other close inspection work. Universal-joint body permits setting at any angle. Heavy metal base with bakelite head and chrome fittings. For 110-120 AC-DC. Has 5 watt bulb, cord and plug. Vary handy.



495

NEW
IMPORT

NEW ILLUMINATED MAGNIFIER

Provides 5 POWER magnification with brilliant illumination for precise inspection of any substance, material or specimen. The head contains a 50 MM lens and has internal calibrated scale to show relative size of subject. Body is nickel plated metal and holds 2 flashlight batteries. Head is molded bakelite. Takes a regular flashlight bulb.

NEW 4-6 OR 10 POWER EYE LOUPES

A 4X & a 6X lens are interchangeable for either power or can be combined for 10X in this one handy two-piece unit.

1295
VALUE

ONLY 495

125

Palley's

TERMS: Send Check, Cash or money Order. 20% Deposit with C.O.D.s. Prices F.O.B. Los Angeles, Calif. Warehouse

2263 EAST VERNON AVE. DEPT PM-11-LOS ANGELES 58, CALIF

Schupack's Amazing Tool Bargains! Save up to 100%!

75 Mounted Wheels & Miniature Cutters. Regular \$11.00 value **\$4.50** Post-paid
 For cutting and grinding on wood, metal or plastic. Includes 26 mtd. wheels and points on 3/32" shank; 24 miniature cutters on 3/32" shank; 25 short shank min. cutters. Will fit all electric drills and hand grinders.

FLEXIBLE SHAFT—ONLY \$4.95 Post-paid
 Fits all electric drills & hand power tools. 35 3/4" long. Oilite bearings. Core of specially wound, high carbon steel wire in flexible steel casing. Will accommodate tool shafts up to 1/4" dia. For lathes, electric drills, etc.

2 DRUM SANDERS
 With 12 Bands in Assorted Grits. 1 1/2" dia. x 1" long on 1/4" arbor with 12 bands. **\$1.50** Post-paid
 One drum, 1" dia. x 1" long on 1/4" arbor with 6 extra sleeves **\$1.00** Post-paid

8 Carbon Steel Wood Bits for Braces. Assorted sizes, 3/32" to 1/4", for drilling on wood **\$1.75** P.P. or metal.

15 Assorted Drills. From 1/16" to 1/2" high speed steel and carbon. Only **\$3.95** P.P.

30 Assorted Drills. Hi-speed steel & carbon. Up to 1/4" dia. **\$2.75** P.P.

12 Assorted Drills. High speed and carbon steel from 1/16" to 1/4" dia. **\$3.60** P.P.

ELECTRIC HAND GRINDER
 Fits in the palm of the hand and has an air-cooled motor that runs at 20,000 rpm. AC or DC at 110 volts. Comes complete with both 3/32 and 1/4" collets. **\$9.50** P.P.

SPECIAL—100 PIECES for ELECTRIC GRINDERS
 Grinding Wheels, Cut-off Wheels, Sanding Discs, Mounted Stones, Honing Stones, Rotary Cutting Burs, Mandrels and other items. **\$1** P.P.

20 Abrasive Rolls, cloth, and 1/4" mandrel for grinding, sanding, deburring metal, plastic, wood or rubber. Only **\$1** P.P.

12 MINIATURE CUTTERS
 For cutting wood, plastic or metal. Assorted shapes on 3/32" shank. For die makers, home workshop, etc. **\$1** P.P.
36 Short Shank Miniature Cutters **\$1**

12 MOUNTED WHEELS and points on 1/4" shank **\$2.65**
 For grinding on plastic wood, soft & hard metals. Regular Value \$8.40. **\$1.60** P.P.

18 Mounted points on 3/32" shank **\$2.50**; 12 mtd. wheels on 1/4" shank **\$3.60**

18 Rotary Cutters P.P. **\$5.85**
 Assorted sizes cutter on 1/4" or 3/32" shank. Will fit all hand grinders. Ideal for cutting wood, metal, or plastic. Brand new.

ADAPTER CHUCK
 With 2 interchangeable collets, opening from 3/32" to 1/4". **\$1.50** P.P. mandrel. Price each only **Adapter Chuck. From 60 to 80 on 3/32 in. Mandrel \$1.00**

10 ASSORTED YAPS. Precision ground thread. All popular sizes up to 1/4". Brand new. **\$2.50**

5 H.S. and carbon drills from 6" to 12" in length. Assorted sizes up to 1/4" diam. for drilling in hard to reach places. A reg. \$10.00 val. for only **\$1.95** P.P.

5 H.S. Taper Shank Bridge Reamers from 13/32" to 1-5/32". All brand new and in excellent condition. Reg. \$25 val. for **\$7.95** P.P.

7 Larger Drills. From 1/4" to 1-1/4" High speed steel and carbon. **\$7.50** P.P.

5 Woodworkers Drills. From 1/4" to 5/8" on 1/4" shanks. **\$2.95** P.P.

2 Circular Saws. On 2 Mandrels—all at one low price, 1" diameter saws on 1/2" Mandrels. For cutting wood, plastic or soft metals. Order at once. **\$1.50** P.P.


112 PIECE ASSORTMENT for ELECTRIC GRINDER
 Here's what you get! Mounted Stones on 1/4" shank. Drum Sander. Sanding Sleeves for sander. Rotary Cutters. Wire Scratch Brush. Bristle Brushes. Circular Saw. Buffering Wheel. Grinding Wheel. Rubber Polishing Wheel. Cut-off Wheels. Rubber Cylinder. Mandrels to fit above tool, ass'd. Sanding Discs. Sharpening Stones, etc. **\$3.95** P.P. \$10.00 value—only.

32 H.S. steel drills, threaded shanks from 3/32" to 1/4". Reg. \$8.50 value, only **\$2.00** P.P.

No C.O.D.'s please
 New Illustrated Catalog 10c

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There are thousands of lawnmowers in your locality: Average \$1,000 profit per 250 mowers with customer satisfaction and repeat business assured. Provide this essential service with an Ideal® Lawnmower Sharpener, the only machine that grinds the reel to "fit" the bed knife. Compare by any standard. The Ideal, backed by 53 years of experience, costs no more. Write today for complete, free catalog.

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GEARS
 In Stock - Immediate Delivery
 Gears, speed reducers, sprockets, thrust bearings, flexible couplings, pulleys, etc. A complete line is carried in our Chicago stock. Can also quote on special-gears of any kind. Send in your blueprints and inquiries.
Send for Complete Catalog No. 10
CHICAGO GEAR WORKS
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BIRCH TABLE LEGS—TOPS PLYWOOD—FURNITURE KITS
 Build attractive, modern furniture pieces with highest grade selected birch table legs. Choice of turned, tapered or bent laminated. Smoothly sanded with brackets, ready to attach and finish. Set of 4, only \$3.75 ppd. Also Aluminum Folding Legs, \$9.95 set of 4. Order now. Write for FREE CATALOG of quality furniture kits, legs, tops, plywood.
BIRCHWOOD INDUSTRIES
 DEPT. 12 FITCHBURG, MASS.



No Leak Lamp
TEST Circuits, Fuses, Outlets easily, quickly, safely. Shockproof. Pull fuses 10 to 100 Amp.
STAR TEST-PLIERS
\$2.95
 \$1.65 add'l for 2 ft. leads. At dealers... or order direct from us. Mailed POSTPAID for 25c add'l.
STAR FUSE CO., 233 Canal St., New York 13, N. Y.



POWER HACKSAW \$58.50
 LESS MOTOR
 F.O.B. Benton Harbor
 Rugged cast iron construction. Wt. 56 lbs., bronze bearings. Draw cut. Auto. return lift. Auto. shut-off. Vise swivels 45°. Cap. 4"x4".
 Dept. PM-116
EXCEL MACHINE TOOLS BENTON HARBOR, MICHIGAN




AUTOMATIC RETOOTHER
 MAKES NEW PROFITS
 for HAND SAWS
 Cuts new teeth in 50 seconds—any size 4 to 10 points. Old teeth fall off as chips. Easy to operate. A perfect job.
BURR MFG. CO.
 8933-N VENICE BLVD. LOS ANGELES 34, CALIFORNIA



CRESCENT TOOLS
Give Wings to Work
 ASK YOUR HARDWARE DEALER

SOLVE YOUR STORAGE PROBLEM
 With TURNBUCKLES Perforated Board fixtures you can easily end space-wasting clutter and keep everything neatly in place until needed.
 TURNBUCKLES do-it-yourself fixtures come in a wide variety of shapes and sizes... fit easily into any wall-hung perforated board... and hold everything from clothing and kitchen utensils to hand tools and garden equipment.
TURNBUCKLES, INC.
 BOX 333, MICHIGAN CITY, IND.
 Send for your free copy of space saving suggestions for home, farm and workshop.



PORTABLE LIGHT PLANTS

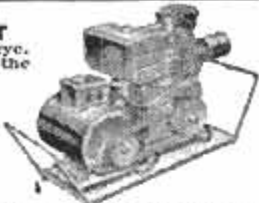
GIANT 2500 WATT PLANT

110-120 v. 60 cyc. AC. Absolutely the best made—exclusive dynamicaly balanced armature—heavy windings develop up to 5000 watt overload for motor starting. Skid mounted—portable. Powered by an easy starting Briggs or Wisconsin 6 HP engine—complete with all accessories; engine easily disconnected for other uses. Big outlet box, voltmeter, no wiring necessary. Ample current for all purposes. Factory warranty. (Item 31) Wt. 210 lb. Reg. price \$585. Special at..... **\$299.50**

Same plant with electric self starter (Item 31a)..... **\$359.50**

Generator only and control box..... **\$169.50**

DUAL VOLTAGE 110-220 available on any of above models for \$28.00 additional.



POWER-FLO 3500 WATT

115-230 v. 60 cyc. AC. A rugged power plant for heavy duty use. Duplex power distribution provides both 115 v. and 230 v. output at the same time if desired. Powered by a big 8 HP Wisconsin engine with triple V belt drive. Has built-in overload protection. A dependable plant for either standby or regular service. Equipped with electric self-starter. (Can also be started by rope) and plug-in outlet box. (Item 108) Wt. 310 lbs. Factory price..... **\$439.50**

GENERATOR ONLY belt driven..... **\$239.50**



(Item 198)

Get the best for less at **MASTER MECHANIC'S** bedrock factory prices!

700 WATT PLANT



115 v. 60 cyc. 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. Regular \$275.00 value..... **\$143.50**

1200 Watt Plant (Item 45) same as Item 24 but larger generator and engine with 50% greater output..... **\$199.50**

We make every type and size of light plants—Write, giving us your requirements!

PUSH BUTTON START

LESS THAN WHOLESALE

1500 WATT PLANT

115v. 60 cyc. 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 Briggs engine. Electric starting & battery charging built-in! Factory price..... **\$279.50**

MASTER-LITE 2500 Watt Plant 110/120 v. 60 cyc. AC. A powerful plant, ruggedly constructed and yet designed for easy portability. Can be started by rope or built in 12 v. electric push button starter. Built-in winding to charge battery. Powered by a big 5.10 HP Briggs engine, complete with all accessories. Includes control box, voltmeter, and handy plug-in power receptacle. An ideal plant for permanent or stand-by service. Wt. 225 lb. Reg. price \$645.00 (Item 21) Factory Price..... **\$329.50**

3500 Watt Plant Push Button Start (Item 23) 115 v. 60 cyc. AC. Similar to above, but larger and 33% more capacity. (Item 23) Wt. 270 lbs. Reg. \$760. Factory Price..... **\$379.50**

DUAL VOLTAGE 110/220 for Item 21 or 23—\$30 additional.



\$239.50
\$279.50



(Item 21)

DIESEL LIGHT PLANT

(Item 1660) Diesel Master—11-12 kw. 110/220 v. AC single or 3 phase. 1800 rpm direct connected. Electric Self-starting. Engineered for permanent power where continuous low-cost, heavy duty service is important. Wt. 1350 lb. Reg. list \$3650.00. Factory Price..... **\$1895.00**



(Item 1660)
\$1895.00

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**

HEAVY DUTY FAN. Semi-enclosed motor, suitable for spray booths, restaurant exhausts, poultry houses, etc. 10" Fan, wt. 8 lbs. (Item 10E)..... **\$11.95**
12" Fan, wt. 10 lbs. (Item 10D)..... **\$12.95**

HIGH SPEED BARN FAN similar to above, but larger, high speed motor moves huge volume of air.
12" Fan (Item 10F)..... **\$14.95**
14" Fan (Item 10G)..... **\$17.95**



PORTABLE BOOM HOIST



Here is a big 8000 to 10,000 lb. capacity boom hoist at a fraction of the usual cost (it's Gov't surplus) — that can pay for itself on one job! Can be mounted as a stationary crane in yards or on build-up.

As a wrecker or mobile crane. Massive telescoping boom is quickly extended from 10 to 20 ft. with a built-in winch. Ideal for erecting buildings, hoisting materials, loading machinery, unloading RR cars, lifting boats from water, laying in sewer pipe, etc. (Item 801) Wt. 650 lbs. Orig. cost over \$350. Special F.O.B. Shelby, Ohio..... **\$89.50**

GIANT METAL SHEARS

"PEKTO"
A 36 inch cutting blade made of special high carbon alloy steel, perfectly aligned and ground. Easily cuts steel plate up to 12 gauge or 1/2" thick. Overall length 40". Wt. 23 lbs. (Item 156) Regular **\$49.50**, While they last..... **\$14.95**

Double Acting Hydraulic Cylinder



A powerful cylinder mfd. 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**

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 1/4, 1/2 or 1 HP motor. Oversized, long life bearings. Includes variable speed motor pulley and belt. Dimensions 19" h x 18" x 16 1/2". Outlet opening 13" x 11 3/4". Wt. 45 lbs. Item Factory Special..... **\$29.50**

HEAVY DUTY 1/4 HP motor for above **\$17.95**.

Send check or M.O. Prices f.o.b. Factory. 10 day Money back guarantee. SEND 10c for..... **MASTER MECHANIC MFG. CO.,** DEPT. 37-P Burlington, Wis.

EXTENSION CORD

Heavy duty and very flexible. Neoprene 14-2 cable. 20 year quality. Wt. 12 lbs. (Item 185) 100 ft. Complete with rubber plug and outlet. A terrific buy at only..... **\$8.95**



NO. 10-2 POWER CABLE. Heavy duty, very flexible, rubber covered, 50 ft. with male and female fittings. Wt. 9 lbs. (Item 502a) **\$10.45**
50 ft. without fittings (Item 502)..... **\$9.45**

NO. 12-2 POWER CABLE. Very flexible rubber covered, special outside shield for grounding power tools, etc. 50 ft. (Item 199) Wt. 8 lbs. **\$6.95**. 100 ft. (Item 200)..... **\$12.95**

NO. 14-8 Conductor Power Cable, heavy duty very flexible, rubber covered, with 8 contact plug & socket. Ideal for tractor-trailer connections (Item 700) 15 ft..... **\$9.95**

52 pc. SOCKET SET

Lightest 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 1/2" drive, 3/4" drive and 1 1/4" drive, plus all necessary extensions, handles, speeders, reversible ratchets, etc.; all uncond. guaranteed against breakage. A beautiful set of tools that will handle any job in a big doghouse steel box. Wt. 17 lbs. (Item 205)..... **\$27.95**

List price \$62.90, Factory special.....

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 21" high; depth capacity for working to the center of an 11" object. Includes 8" x 15 1/2" vise-type table and two nutting arbors. Wt. 150 lbs. (Item 707). Reg. **\$49.50**. \$149.50. Special.....

HYDRAULIC PRESS. Nine ton capacity. See Oct. Pop. Mech's. ad for details—or write, Complete, Wt. 110 lbs. (Item 464)..... **\$69.50**

Variable Speed Selector

Heavy duty, made by B. F. GOODRICH for industrial use. Provides instant speed changes for any drive. For machine tools, dryers, printing, conveyors, production lines, hoists—any operation requiring variable speed. Employs reliable "trouble free" planetary system. No hydraulic power losses. Infinite range, smooth operation, easy installation. 3 sizes: 1/2-1 hp. 30 lbs.; 1-2 hp. wt. 55 lbs.; 2-3 hp. wt. 105 lbs.; Reg. list \$228, \$252 and \$352. Our prices..... **\$79.50, \$89.50 and \$114.50**



MASTER DC ARC WELDERS

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 14 HP or more. (Item **\$119.50**) Wt. 110 lbs. \$450 value.....

WELDER ONLY — INDUSTRIAL MODEL same as above but with ceramic rotary type rheostat providing 74 different heat settings for all types of welding (Item 38b) **\$139.50** \$500.00 value

COMPLETE POWER MASTER (Illustrated above) powered by a 14.6 hp., air cooled Wisconsin engine. Wt. 480 lbs. (Item 280) Compared 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**



(Item 280)

More for Your Money

If there is any one reason why South Bend Lathes are so popular it is because they represent the maximum value per dollar of cost. We invite comparison feature-by-feature with any other make, and are confident you will find South Bend gives you more for your money. Send coupon for catalog.



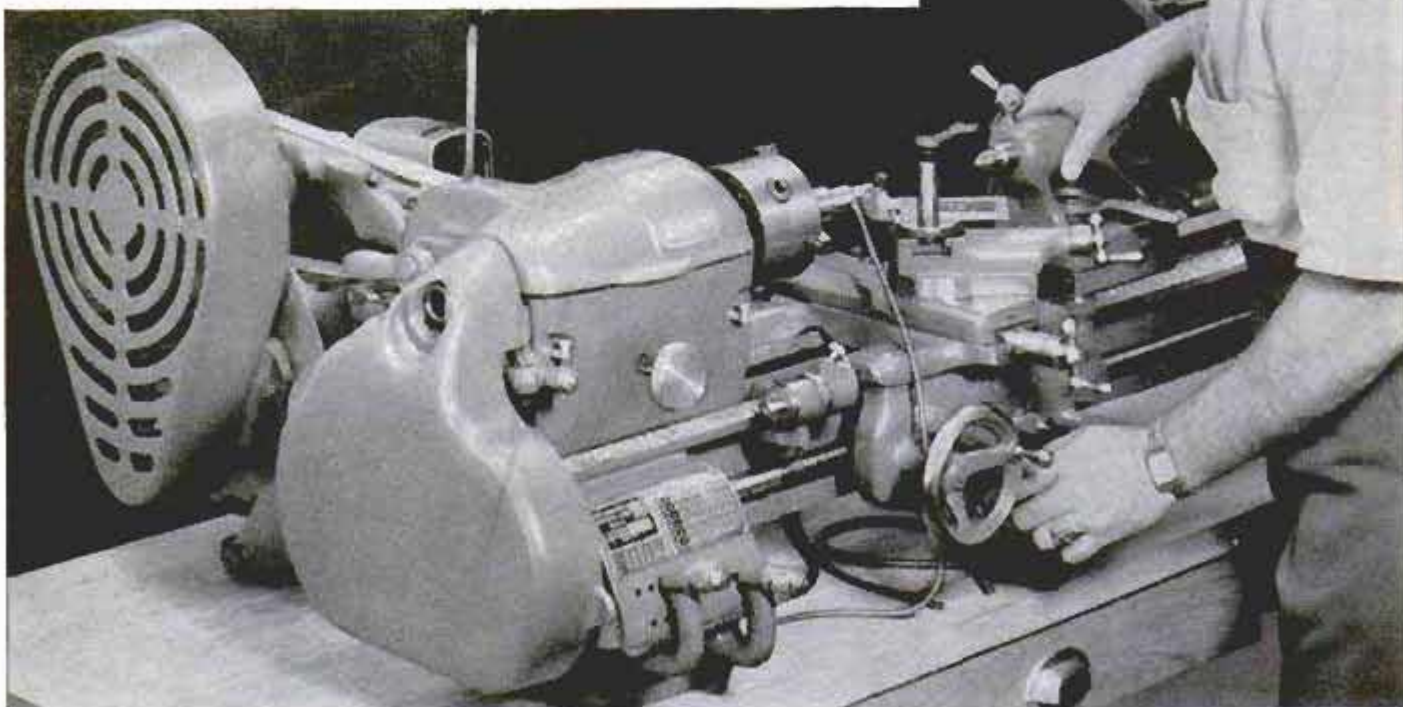
HARDENED BED WAYS

Hardened and precision ground bed ways can be supplied in lieu of regular at small extra cost—also hardened and ground cross-feed screw.

TIME PAYMENTS

only 3¼% interest

Yes, only 3¼% interest on original unpaid balance. Low down payment and balance in up to 24 equal monthly payments.



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9" and 10" BENCH LATHES



10" to 16-24" FLOOR LATHES



DRILL PRESSES



½" & 1" Collet TURRET LATHES



TOOL GRINDERS



7" BENCH SHAPERS



MILLING MACHINES

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Building Better Tools Since 1906 • SOUTH BEND LATHE • South Bend 22, Indiana

Now...the perfect trio of **WELLER TOOLS**
 to **GIVE** or **RECEIVE** for **CHRISTMAS**
SAWING • SANDING • SOLDERING

With one or more of these faultless Weller tools, inexperienced amateurs as well as able handymen and hobbyists can do *hundreds* of homecraft jobs easily, quickly, successfully.



\$19.95



\$14.95



\$7.95

WELLER SABRE SAW

Portable Jig Saw. Seven saws in one. Cuts wood up to 1" thick, do-it-yourself aluminum, composition board, plastic, etc. Makes its own starting hole. Cuts curves, circles (as tight as a coin), intricate shapes. Exclusive strain-relief design eliminates blade breakage. Reciprocal action. Combination knob and handle grip for positive control. Polished aluminum housing. 3 blades and wrench included. Nothing like it at anywhere near its price. Guaranteed. Model 800

WELLER POWER SANDER and POLISHER

Sands down old paint in a jiffy. Puts satin-smooth finish on new wood... but fast. Readies old furniture for refinishing by removing scars, stains and other blemishes. 25 square-inch sanding area—twice that of comparably priced sanders. Straight-line action. Makes 14,400 power strokes a minute. Sands with the grain. Goes all the way into corners. Fits under low places. Guaranteed. Model 700

WELLER COMPLETE SOLDERING KIT

Latest type Weller Gun. Heats in 5 seconds. Triggermatic control. 2 spotlights to light up work. Joins metal parts. Makes electrical connections. Seals leaks and seams. Kit includes Soldering Brush to clean connections, Soldering Aid to twist wires, famous Kester Solder. Another practical do-it-yourself home tool to give or receive this Christmas. Guaranteed. Model 8100K

AVAILABLE FOR CHRISTMAS FROM YOUR HARDWARE DEALER

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Look for this name—it's your guide to quality in small power tools

Trend setting glimpse of tomorrow...the Magnificent

'57 Lark

DREAM STUFF? Call it that. But what a *practical* dream...to pleasure-power your *own* new boat with such commanding drive and speed and stunning modern beauty! *Any smart hull*... forwardly-styled "dream boat" or able cruiser, family runabout or sport fisherman... receives a noble lift when a Lark goes on the transom.

Under the hood purrs a brawny new engine—muscle and tuned for the real jobs of boating—35 *big-load* horsepower! For fast, sure starts there's a new 12-volt system. For cruiser lighting a new heavy-duty generating system is available, with capacity to keep batteries charged at peak. The Lark is *here*—at your Evinrude dealer's *noze*. Look for his name under "Outboard Motors" in your phone book. For full-color catalog of the complete Evinrude line for '57, write **EVINRUDE MOTORS**, 4358 N. 27th St., Milwaukee 16, Wisconsin.

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