

EXCLUSIVE: I Flew the Flex-Wing

POPULAR MECHANICS

NOVEMBER, 1961

35 CENTS

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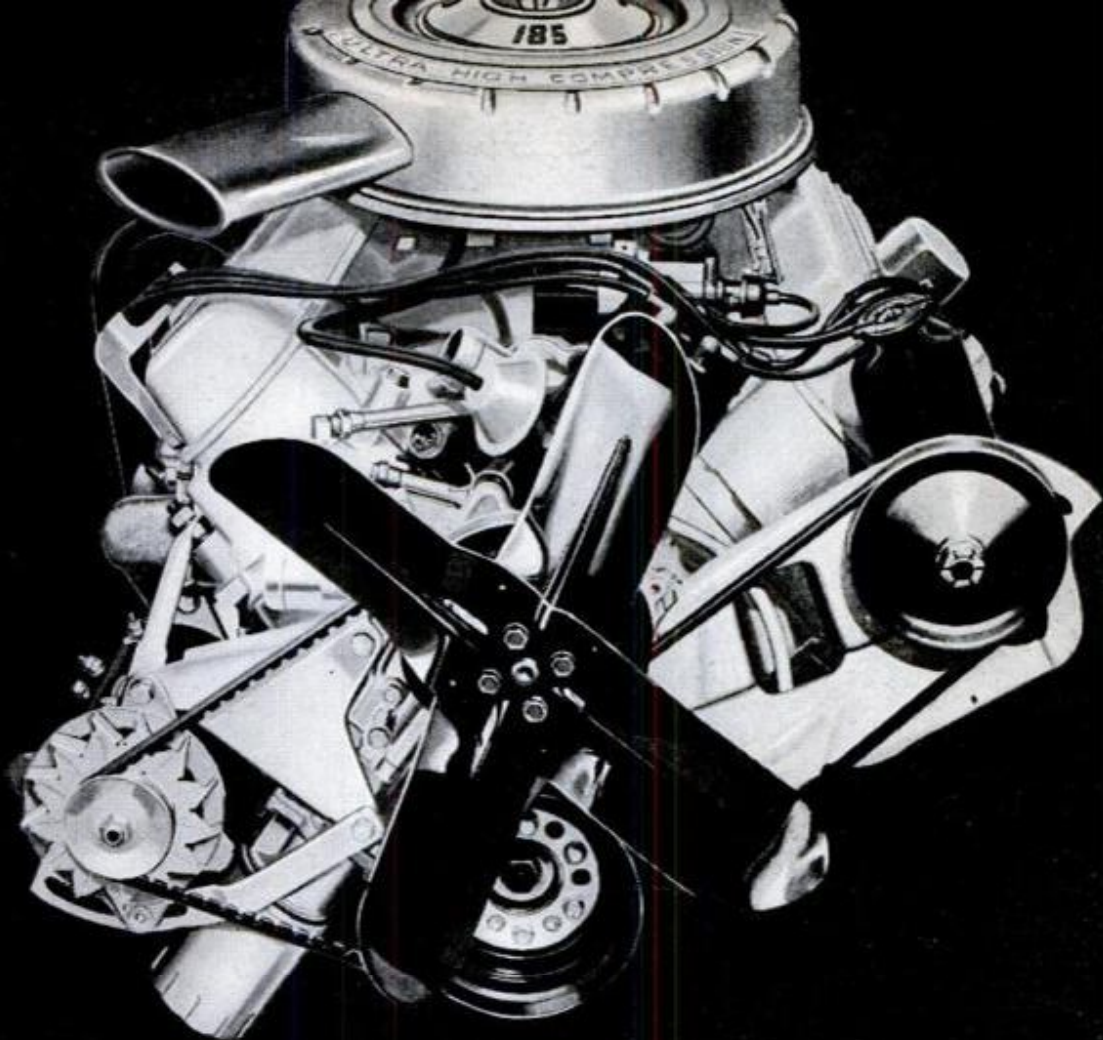
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POPULAR MECHANICS®

NOVEMBER 1961

VOL. 116

NO. 5

COVER PHOTO BY DON HONICK

INTERNATIONAL EDITIONS • SPANISH: Mexico-Caribbean, Southern Hemisphere • FRENCH •

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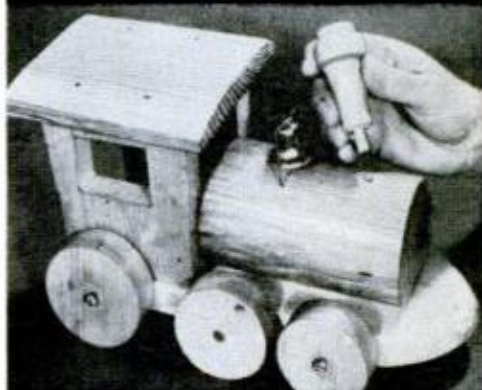
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Impala Sport Coupe

'62 Chevrolet

*Built for people who want room,
refinement and riding comfort found in
much more expensive cars*



Chevy II 300 2-Door Sedan

the new Chevy II

Built for people who want modern basic transportation in the best Chevrolet tradition. Here they are—a totally new line of thrift cars from Chevrolet, encompassing a whole new concept of engineering simplicity to clamp down on service and maintenance cost. Bolt-on front fenders, roomy engine compartment and easy accessibility of adjustable components are just a few of the maintenance advantages of Chevy II's unique design. Thrifty 4-cylinder engine (also satin-smooth 6) wrings extra miles out of a gallon of regular. Unique Mono-Plate rear springs do away with the friction and harshness of old-style springs to give you a remarkably smooth ride. These and a host of other surprises in nine spanking new-sized models, including station wagons and the soon-to-come hardtop and convertible.



A New World of Worth from Chevrolet

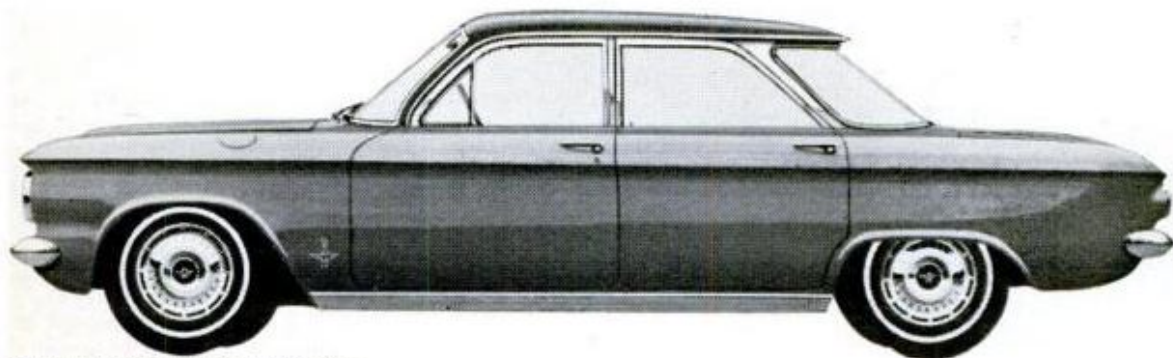
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**Optional at extra cost*



Corvair Monza 4-Door Sedan

'62 Corvair Monza

Built for people who go for sports car driving but don't go for sports car prices. Here's more that can't be copied—from the car that started the bucket seat* brigade. Bigger brakes combined with that special Corvair blend of rear-engined traction and precision steering give you an ever surer, more secure command of the road. There are saucy new styling accents and tasteful interior trim for '62. Yet—with all these refinements—the new Corvair is as sparing as ever on gas. Get on over to your dealer's and discover these and all the other delights that await you in this newest version of America's most renowned rally car. . . . Chevrolet Division of General Motors, Detroit 2, Michigan.

**Bucket front seats are standard on the Monza Club Coupe, optional at extra cost on the Monza 4-Door and Station Wagon.*

CHEVROLET • CHEVY II • CORVAIR • CORVETTE



OVER THE EDITOR'S DESK

Sorting Out Gee-Bees

On page 115 of the June PM, you picture a plane and label it the Gee-Bee. I always thought the Gee-Bee was Roscoe Turner's plane that is now at Weir Cook Field in Indianapolis.

Crookston, Minn.

BOB FLOODEEN

There was a series of Gee-Bee racers built by the Granville brothers (G-B) in the '30s. Jimmy Doolittle flew one to a speed record of 294.38 m.p.h. in winning the 1932 Thompson Trophy race. The Gee-Bee on page 115 has no connection—it was the one and only built by George Bogardus (G-B) and named by him.

Agribusiness?

On page 116 of your May issue, you claim Lancaster County, Pa. to be the richest agricultural county in America.

For the past 11 years, Fresno County, Cal. has been known as the World Capital of Agribusiness, leading the nation in the value of farm products sold.

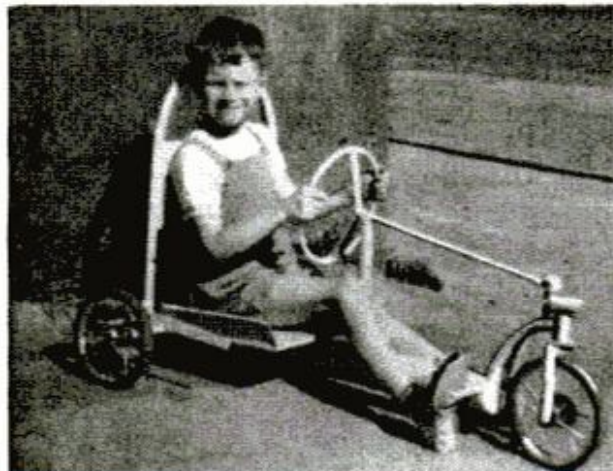
Fresno, Cal.

ED SODERBERG

According to the Lancaster folks, Fresno cheats by irrigating. Seriously, though, irrigated Fresno certainly appears to be the richest agricultural county in the U.S. The Lancaster people still claim to be the number one nonirrigated county.

Three Wheeler

Being a regular PM reader for years, I have made quite a few of your handyman articles, the most recent being the pontoon boat and the family runabout *Swish*. For my two boys I made an electric car and tractor and this three-wheeler go cart. I am



now making a 6 by 11-foot air boat using a 1929 Chevy engine.

Prospect, South Australia K. E. DUNNING

That energy of yours is a good example for us lazy galoots. The air boat might make a good magazine project, if enough PM readers are interested in it. How about a picture of it when you have her launched?

Hearing-Aid Radio Speaker

Could you please tell how to incorporate a built-in speaker into the *Hearing-Aid Radio* (June '61 PM)? Though not hard of hearing, I am going to incorporate the microphone; I have other uses for it.

At what spots in the schematic could I connect an outside antenna and ground to increase the range of the receiver?

Fairfield, Cal.

DAVID NORRIS

Using both a microphone and loud-speaker would give you a loud, squealing feedback, Dave. To increase the receiver's range, ground any of the ground points in the circuit, then tape a flat coil of insulated wire to the top of the antenna coil. Leave one end of the flat coil unconnected and connect the other end to your antenna.

Who's Knocking?

Re the September issue article, *How to Sell Your Own House*, since when did one American earn a writer's fee by knocking the legitimate profession of another? What has Paul L. Theurer got against a licensed real estate person earning a living? . . .

East Orange, N. J.

S. A. HART

Real Estate Broker

Author Theurer made no attempt to knock anyone's profession, Reader Hart. He simply reported the experiences some people have had of saving money by selling their own homes.

Survival at Home

Your article on wilderness survival, Aug. and Sept. PM, was an interesting experiment. Would an urban family be able to make such an exodus in time of actual nuclear attack?

First, roads would be impassably clogged with cars of other fleeing families. Second, supposing you reached your wilderness retreat, so would hundreds of other panicky people, many without resources, equipment or the knowledge or physical ability necessary for survival. Third, you presumed that the area chosen would be free of fallout, but defense against radiation would depend upon happy discovery of a cave—preferably one with a supply of luckless rabbits and a bubbling spring.

If you are in a primary target area, flight

(Continued to page 12)

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will prove that you can become an expert

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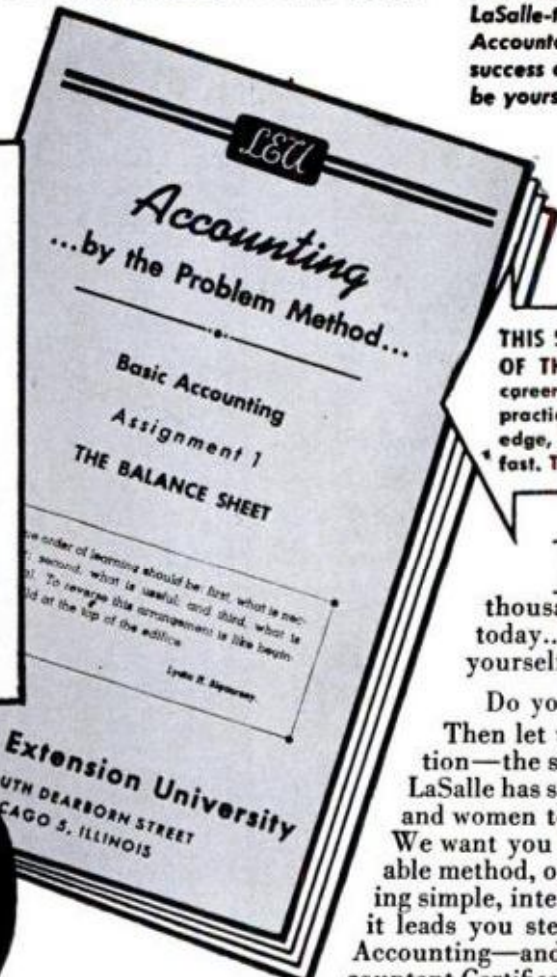


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I'M SICK AND TIRED OF WAITING!



1. **EVERYTHING** COMES TO HIM WHO WAITS? THAT'S A LAUGH. I WAITED FOR THE BREAK. WAITED 'TIL I WAS SICK OF IT. HOW LONG CAN A GUY WITH A WIFE AND 3 KIDS GO ON DREAMING?

HONEY, THERE'S NO OTHER WAY, I'VE JUST GOT TO GET MORE TRAINING. OTHERWISE, I'M STUCK

BUT JOHN, YOU CAN'T AFFORD TO STOP WORK AND GO TO COLLEGE NOW. THERE JUST HAS TO BE ANOTHER WAY



2. MY WIFE AND I THOUGHT ABOUT IT, TALKED ABOUT IT, WORRIED ABOUT IT. WE WERE STUMPED. WE THOUGHT WE HIT A DEAD END

THIS IS THE TRUE LIFE STORY OF JOHN W. HARVIN, JR. DAYTONA, FLORIDA. FROM OUR I.C.S. SUCCESS FILES

3. LOOK AT THIS: I.C.S. HAS A COURSE IN SURVEYING AND MAPPING. DO YOU SUPPOSE IT'S ANY GOOD?

WELL, JANE'S HUSBAND TOOK AN I.C.S. COURSE IN ACCOUNTING—AND SHE SAYS IT WAS THE SMARTEST THING HE EVER DID!



ONE DAY—MY LUCKY DAY—I TOOK A CLOSE LOOK AT THAT FAMOUS I.C.S. COUPON. I'D SEEN IT BEFORE A THOUSAND TIMES. BUT THIS TIME I REALLY LOOKED

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LOOK—IT SAYS THEY'LL SEND YOU A CAREER KIT FREE. THREE BIG SUCCESS BOOKS

I'M GOING TO SEND THAT COUPON. THIS MIGHT BE JUST WHAT WE'RE LOOKING FOR!



4. THAT SETTLED IT! I DECIDED TO FIND OUT WHAT I.C.S. WAS ALL ABOUT. AFTER ALL, WHAT DID I HAVE TO LOSE?

5. WHEN I SAW THE THREE FREE BOOKS, I KNEW I'D FOUND THE ANSWER. I ENROLLED —AND I WAS ON MY WAY!

THIS STUDYING AT HOME SURE IS SAVING ME TIME. LOOK HOW FAR I'VE GOTTEN ALREADY

FROM THE WAY THEY HELP WITH YOUR INSTRUCTIONS, YOU'D THINK YOU WERE I.C.S.'S ONLY STUDENT



6. JOHN HARVIN'S SUCCESS STORY CAN COME TRUE FOR YOU, TOO. HERE'S THE FAMOUS I.C.S. COUPON. LOOK IT OVER. CLIP IT. MAIL IT NOW!

THAT RAISE WAS JUST THE BEGINNING, IT'S SO GOOD TO LOOK AHEAD WITHOUT WORRYING. WE'RE ALL SO PROUD OF YOU, JOHN!

HONEY. THE BOSS TOLD ME I'VE GOT A REAL FUTURE NOW!



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Sold at most Service Stations, and Auto Supply Stores.



GUMOUT Cleveland 4, Ohio

(Continued from page 8)

would be the only solution—if no blast-proof shelter were available. Otherwise, the immediate construction of a fallout shelter would answer the problem of survival. Even a basement with provision for screening the door and any window against radiation would be preferable to taking to the highways. Our area had a small sample of panic a few weeks ago when we were menaced by a roaring forest fire. People were rushing about in all directions and the road was the most dangerous place to be. Oakhurst, Calif.

L. E. BEHNEY

Good points, Reader Behney, although most of us procrastinators don't have the home shelter or shielded basements.

Dreamboat Behavior

Built this 15-ft. *Swish* using your March '58 PM instructions, working week ends and after school during my spare time. When I first launched it, observers from shore told me it planed better than most



factory-made boats they had seen. Powered by a 35-horse outboard, it looks and behaves like a dreamboat.

Moodus, Conn. JOSEPH M. KOSTOSS

Any idea how fast the rig will go, Joe? Other readers might like to know.

Tipping the Hard Hats

Our hard hats are off to Ted Berland for his splendid article, *These Men Work the Superhot Lines* (July '61 PM). It was truly great, well-written and one of the few articles about linemen outside of the trade magazines or the obituary columns. Thank you.

I.E.L.P. Co.

L. L. HOLLAR

Guthrie Center, Iowa

When a "pro" tells us an article about his specialty is on target, we are the ones who should do the thanking, Reader Hollar.

The Editors

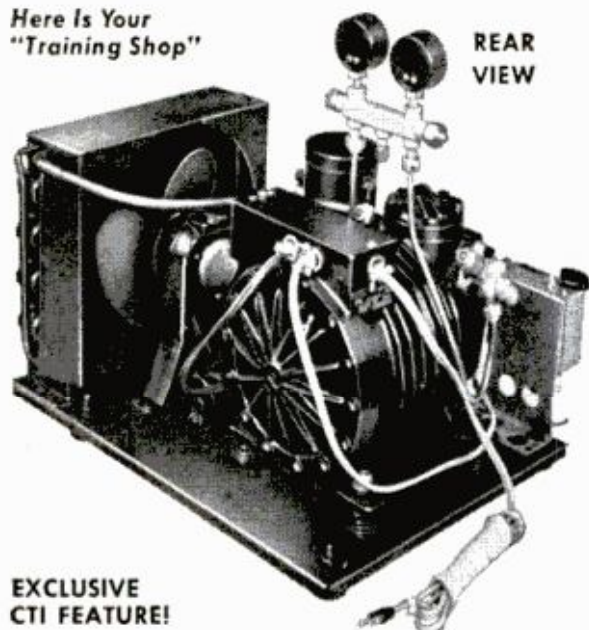
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25 KITS—20 SHOP PROJECTS

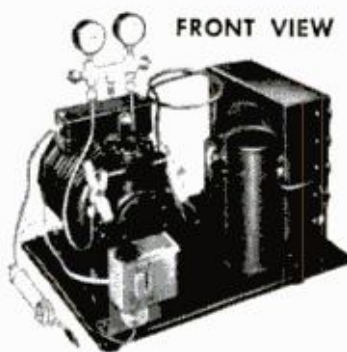
Illustrated above is a view of the new CTI condensing unit, fully assembled. This is a commercial-type, heavy-duty, 1/4 h.p. unit. You build it from 25 kits of parts (and with tools) that CTI sends without extra cost. In addition, CTI includes 20 Shop Projects, which simulate the kind of problems you are likely to encounter in the field. After assembling your condenser, you may then build an air conditioner, freezer, refrigerator or milk cooler.



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TUNE IN ON THE INVENTORS

Sticky safety for drivers on slippery streets is promised by patent No. 2,971,793 granted Glen and Dale Peterson of Tulsa, Okla. It's an inexpensive gritty coating that can be applied to tire treads from a pressurized spray can. The grit, mixed with a glue, dries quickly to give traction, and lasts long enough for a short trip before it wears off, leaving the tire as it was before.



Another cold weather problem, certainly in the citrus-growing South, is the smoke, smog and soot caused by conventional smudgepots. Howard Martin, of Waterford, Calif., has been awarded patent No. 2,972,208 for a smudgeless smudgepot which uses a blower-driven burner to produce clean, hot air, then blows it toward the trees.



Freezing wouldn't bother your trees if you could move them indoors. That sounds ridiculous, but a full-grown tree can be transplanted safely with the invention that

won patent No. 2,977,716 for Lewis Pearce of Berea, Ohio. With his device, a deep trench is cut around the tree and a cable is dropped around the root system. The two cable ends are attached to a pulley system and are alternately tugged by motors to produce a cutting action which separates the tree core from the surrounding earth.



Growing things have always presented all sorts of problems. One of the oldest problems is birds—whether a flock of crows or neighbors' chickens—who would rather eat your newly-sown seed than scratch for their own. Morely R. Kare, of Ithaca, N. Y., has been granted patent No. 2,967,128 for a bird-repellent coating for food. The coating is completely distasteful to birds but harmless and even pleasant to humans, and the idea is to sprinkle some treated food, like corn, around the garden. After a sample or two of what they thought would be goodies, the birds decide that your garden isn't a cafeteria after all, and leave it—and your real seeds—alone.

Copies of the original patents may be ordered for 25 cents each from the Commissioner of Patents, Dept. of Commerce, Washington 25, D. C.

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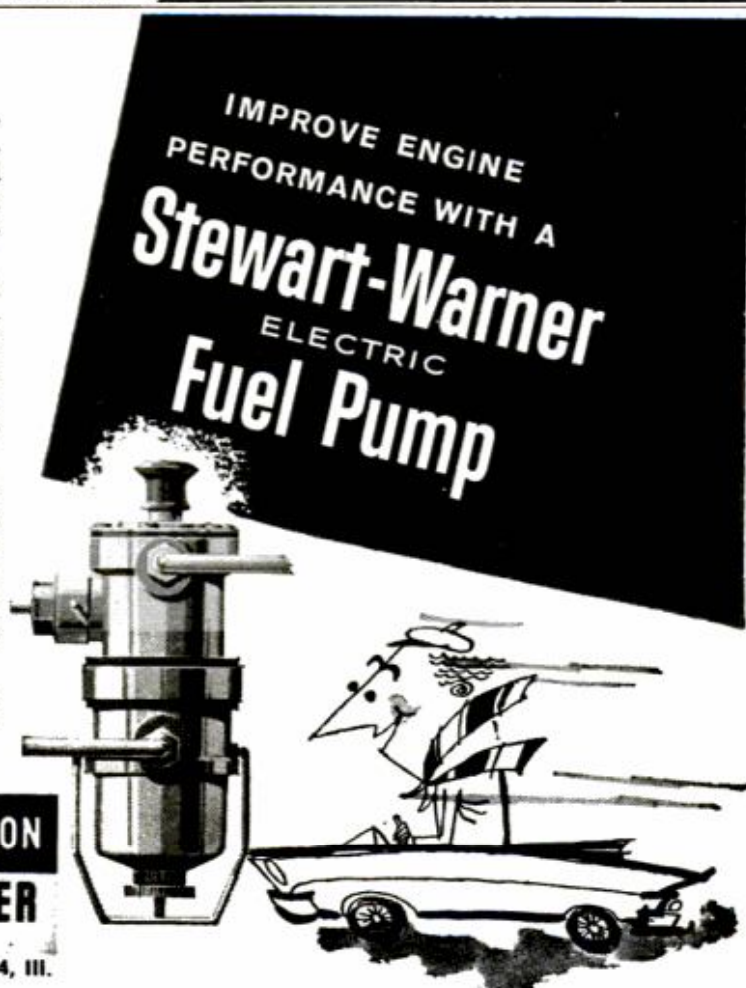
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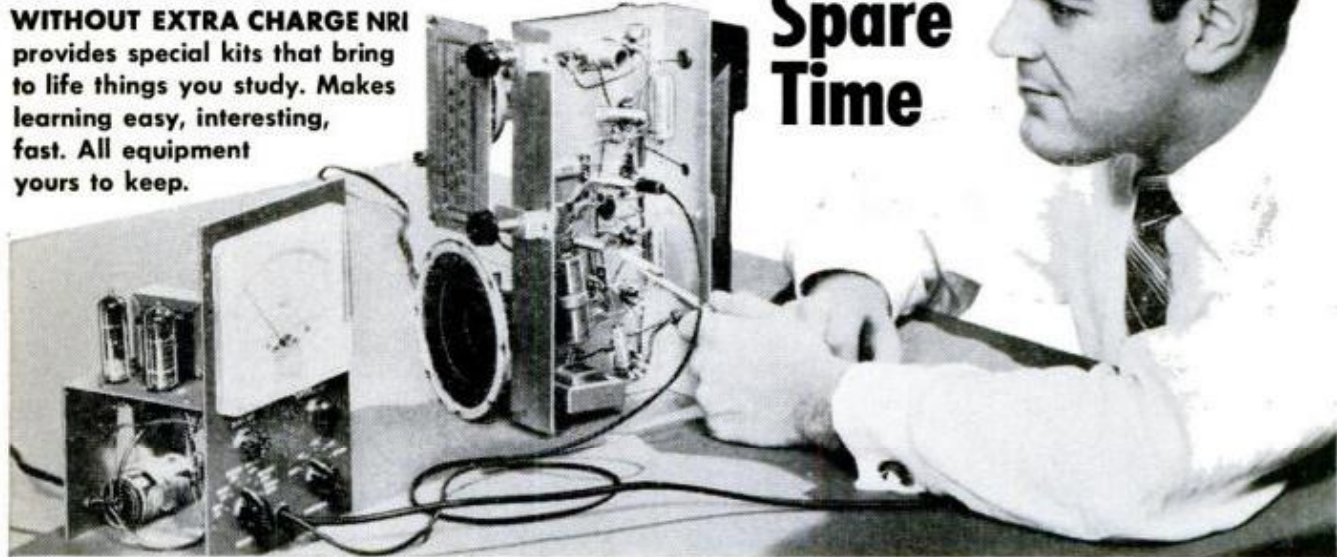
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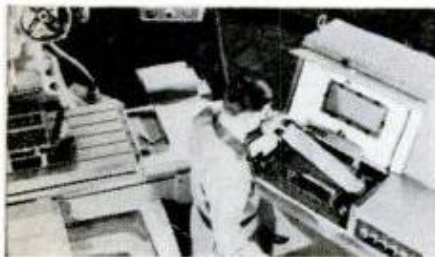
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J. M. SMITH
President

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Thanks to NRI I am in a top position with the Federal Aviation Agency in the Navalds Electronic Section. **JOE DUCKWORTH**, Fort Worth, Texas.

Four months after starting your course I left my job in a hardware store to work at Raytheon Manufacturing. Now I am an engineering assistant in Microwave Power Tube Research and Development Laboratory. **LEONARD BLOOM**, Newton Centre, Mass.



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SIDELIGHTS FROM THE PENTAGON



By William R. Kreh

A 12-year-old girl with a flair for science put the White House and the Navy into a small flap recently. It seems she sent to the White House an elaborate plan, complete with drawings, for building a naval base under Antarctica. The White House bucked it over to the Navy to write the customary polite brush-off. But some wag with a sense of humor marked it: "Build it! J.F.K." and passed it on up the chain of command. It worked its way through channels until someone called the White House and said the Navy would build it, but where was the money coming from? The White House didn't take to the joke at all. In fact, naval intelligence and the Secret Service were ordered to investigate and try to find out who put the J.F.K. on the paper. No one's saying whether the wag was caught.



Frozen runways can be made stronger by combining glass fiber with seawater before freezing. This increases the structural strength of ice 10 times, the Air Force has found in its Arctic operations.



Combat appetites are under study by the Army. Does a soldier prefer ham and eggs or pancakes before entering battle? Would a paratrooper rather drink coffee or hot chocolate before leaping behind enemy lines? Do troops eat more or less when under stress?

Answers to these and other questions on the preference and eating behaviors of combat soldiers when they're in danger are being sought in a special study being made at Fort Bragg, N.C., where the stresses of going through paratrooper and ranger training are as near to actual combat as can be found in peacetime. Results of the experiment will be used to set up new guides for ration planning in combat.



Asthma sufferers in California have been finding relief in the Alameda Naval Air Station's pressure chamber recently. Groups of children and adult sufferers have been spending as much as five hours at a time in the low-pressure chamber at a simulated altitude of 8000 feet. It's part of a Stanford school of medicine project to see just how much the change of altitude relieves the asthma. If the experiments prove successful, doctors might call for such treatment for asthmatics during severe attacks.

It's a dog life for Air Force sentry dogs. The Air Force has started a new feeding program which changes the daily fare for the dogs from cooked meat to prepared dog food. Previously the dogs were given a ration of 1½ pounds of grade "A" beef a day; now they get an equal amount of dry ration. One canine was reported to have growled, "How do you get out of this chicken outfit?"



A general got dumped square on his . . . ah . . . khaki pants recently entering the Pentagon. Result: After 20 years they're putting windows in the doors. Ever since the building was erected the entrances have been guarded by heavy windowless doors. No one going out could see anyone coming in and vice-versa. As a result there were numerous collisions. But it had to happen to a general before the building engineers decided to put glass inserts in the doors.



A top-secret infrared device is being built for the Navy that is so sensitive it can measure the cooling of the moon during a total eclipse. The heat detector, which has surpassed all others for accuracy, operates at 452 degrees below zero. The Navy's not saying what it's going to be used for.



Weapons change but not the noise, and because of this a special Navy weather team at the Pacific Missile Range, Point Mugu, Calif., is constantly on the lookout for conditions which could make the sound of a missile firing become destructive.

When winds and temperatures are higher aloft than at launching pads, the ear-shattering noise can be turned into a window-shattering beam miles away. This is because these weather conditions can cause the circular sound waves to be bent back to Earth rather than going on out harmlessly into space. The special Navy team at Point Mugu uses weather balloons and computers to get a picture of conditions before a shoot. If the sound could return to Earth, the launching may be called off.



You think life's too short? Then pity the poor pion—one of the 30 known elementary particles that account for all forms of matter and energy in the Universe. Naval Research Laboratory scientists have just measured its lifetime as only 1/200,000,000,000,000 of a second. This is a million times briefer than any other natural process yet measured. Its time of existence was measured by the time it took to travel, at almost the velocity of light, 1/3,000,000 of an inch through a photographic emulsion. ★ ★ ★



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SIDELIGHTS ON AVIATION



A shrinking number of commercial flights is carrying an increasing number of passengers, cargo and mail.

The decline is directly attributable to the new jets which, because of their speed and load capacity, can carry more passengers and cargo farther and faster in fewer flights, and the trend seems to be continuing, especially on overseas routes.

According to the Federal Aviation Agency, the annual number of passengers boarding domestic flights passed the 50 million mark for the first time while the number of flights dropped nearly 100,000. On international carriers, the number of passengers increased an unprecedented 10 percent, cargo 5 percent and mail 16 percent.



The eyebrows of the officer in charge of such things shot up a few notches when he read a report that airmen assigned to a satellite tracking station were reading such books as "Caesar's Gallic Wars," "The Way of Chinese Art" and "The Complete Works of Francois Villon."

His eyebrows went back to normal when he read the terse explanation. The men are stationed on Kodiak Island in the Aleutians where reading material is limited and television reception is lousy.



Gold-filmed alumino-silicate glass, capable of withstanding temperatures up to 200 degrees C. and as low as 8 degrees below zero C., has been developed for British aircraft windshields.

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Best foreign customers for U.S. civil aircraft, according to Aerospace Industries Association, are Argentina and Canada.

In the first six months of 1961, Argentina purchased 100 aircraft valued at \$1,989,100, and Canada 124 valued at \$1,706,900.

Kevin W. Brown

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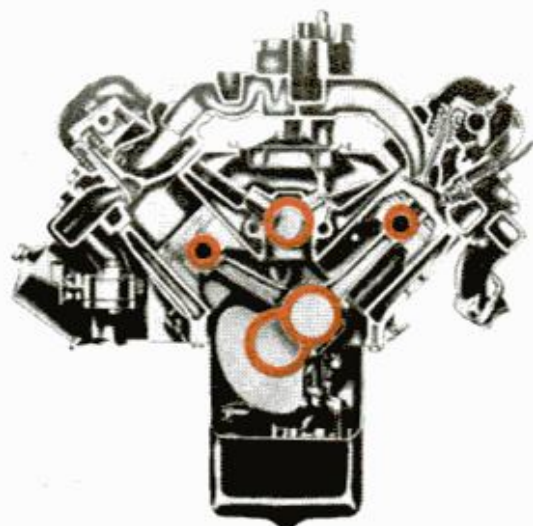
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Survival is becoming more and more a topic of conversation these days—survival in the wilderness (PM, August and September '61); survival in fallout shelters; survival in any kind of unfavorable environment. If you've done any sort of survival planning, you know how important it is to have a ready supply of food and water in sealed, portable containers.

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2. Three 3½-ounce tins of pemmican—the old Indian staple survival food. It's a conserve of raisins, apples, dextrose, peanuts, shortening, soy oil, vanilla and salt. Sounds strange, but I understand that this government formula tastes pretty good, and it's loaded with food value.

3. Seven one-ounce bars of Hershey's tropical chocolate, which will store safely in temperatures up to 165 degrees.

4. Seven ounces of malted milk tablets, the Alpinist's energy staple, which can also be dissolved in water to make an emergency baby ration to replace milk or formula.

5. Seven ounces of C-ration crackers to be eaten with the pemmican. They're high in food value and also provide some bulk.

6. Two packages of dehydrated soup—sort of a bonus. The soups, which will stay good for at least 15 months, are the shortest lived of the food items. The others are good for about five years.

7. A can opener and a can of "canned heat." The food can will make into a stove, and the fuel will keep it going for an hour and a half to heat water for the soup.

The pack sounds like a good idea, not only for survival under an attack, but also for emergency food in a flood or storm, or for rations aboard a far-ranging cruiser or aircraft—even on a back-country hunting or fishing trip. It's packed by MacDonald-Bernier Co., 62 Long Wharf, Boston 10, Mass., and sells for \$8.95.

Dick Kiepatnik

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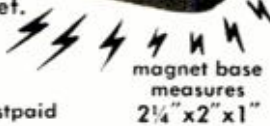
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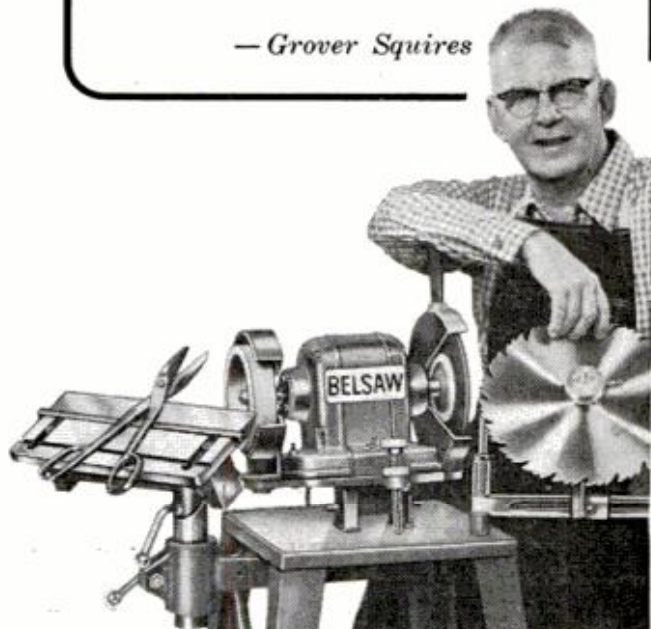
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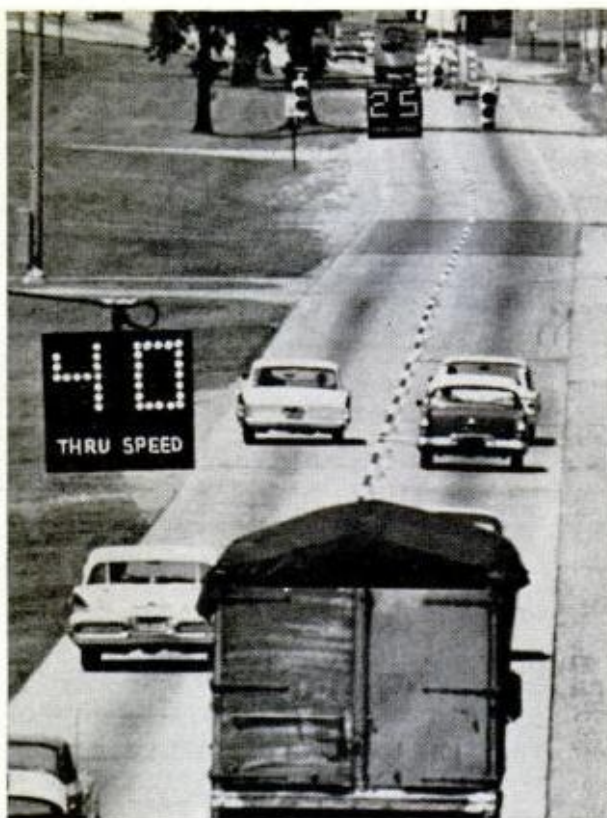
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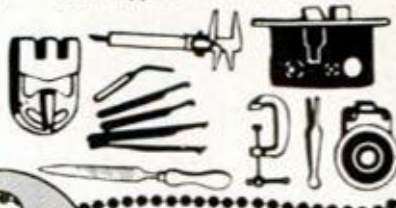
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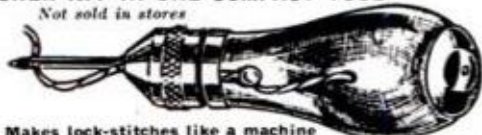
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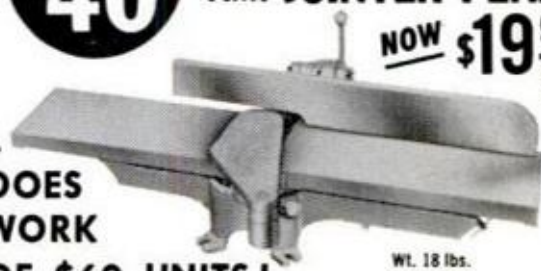
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BULLETINS FROM THE WORLD OF SCIENCE

The five Great Lakes were carved out of rock by ancient rivers and not by glaciers, as has been thought, according to geologists from the Universities of Michigan and Minnesota who drilled the bottom of Lake Superior this summer.

Cores from the lake bed indicate that glacial deposits were laid down in deep rocky valleys existing long before the last ice sheet retreated north 10,000 years ago.

Patients may get a shot of an old-new type of anesthetic for major operations, if a new technique further proves its value.

Dr. John C. Krantz, Jr., of the University of Maryland School of Medicine, and a team of co-workers have succeeded in putting one form of ether into a solution, making an emulsion that is compatible with elements in the blood, affects blood pressure only slightly, works quickly in small amounts, and lets the patient recover rapidly with very few side effects. This had been a goal of medical science for some years. Heretofore, the only anesthetics that could be injected were effective for only short periods of time.

Giant kelp from the ocean is literally being thrown into the fight against forest fires in the Northwest.

Air tankers dump water thickened with the kelp algin into fires. The solution evaporates slowly and when attacked by fire forms a scum on the exposed side, but remains wet underneath. After it has dried, a tough film something like polyethylene remains that seems to help prevent smoldering or rekindling of the fire.

Chew your gum on both sides of the mouth advises Dr. Robert D. Ralph of Washington, D.C. and you'll avoid "jaw joint syndrome." This is an earache that develops on the side opposite the one where the gum is maneuvered. The tenderness in the ear disappears quickly when patients start chewing on both sides.

Should you now have the syndrome, the doctor suggests aspirin.

James Biery

Sunspot Cycle Is Mirrored in Mud

Layers of sediment taken from 300-million-year-old lake beds around the world show 11- and 22-year variations caused by temperature and rainfall changes presumably induced by solar variations, says Dr. Roger U. Anderson of the University of New Mexico.

Other scientists at a New York Academy of Sciences conference on solar variation and Earth's climate further reported that sunspot numbers rise and fall in agreement with the same cycles.

This lends evidence to the long-held opinion that sunspots and related solar variations have a decisive influence on Earth's climate.

Gun "De-Spins" Space Vehicles

Called REPPAC, for repetitively pulsed plasma accelerator, a plasma-propulsion machine may keep future space vehicles on course by stopping unwanted spinning and tumbling motions.

Its advantage over conventional rockets and gas jets for this purpose is that it shoots off an energetic stream of material at extremely high speeds to obtain thrust, and a small amount of it goes a long way. Conventional methods require more fuel.

The plasma (a gas whose atoms have been broken up) reacts with a powerful magnetic field which accelerates the gas particles 50 times a second and discharges them at more than 22,000 miles per hour. The REPPAC is a T-shaped gun in which small amounts of gas are turned into the plasma and then propelled into a vacuum chamber.

Star Beams Radio Signals

Astronomers have tuned in the first true radio star, a station named 3C-48 that sends signals 10 million times stronger than the sun.

It was located by scientists at California Institute of Technology's radio observatory, Owens Valley, and lies in the constellation Triangulum, which is close in the sky to the Andromeda Nebula.

Spectrograms made at Mt. Palomar showed that the star, or its surrounding gaseous cloud, contains ionized calcium, ionized and neutral helium and possibly oxygen ionized many times. Its spectral lines do not show hydrogen, generally the main fuel in stars and almost always seen in stellar spectra.

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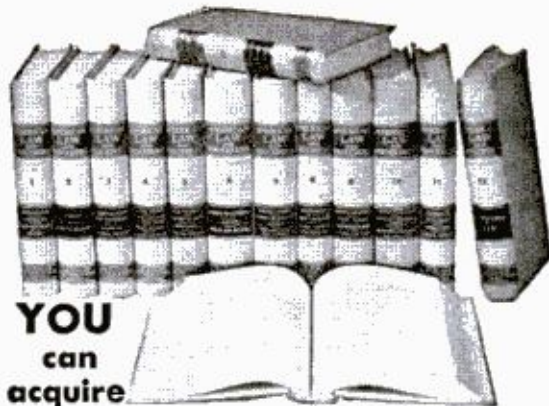
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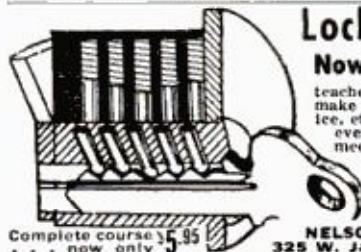


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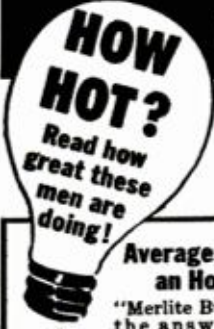
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Accounting —

A STEPPING STONE TO TOP INDUSTRY POSITIONS

by B. Richard

Presidents of many of the largest corporations in the country have risen to their present responsible positions through the field of accounting.

More and more in evidence is industry's demand for highly trained accountants to help plan new record keeping systems and procedures for use with electronic data-processing equipment, which is coming into ever wider use. Companies all over the country are making greater use of accounting information in their business practices.

Complex tax systems and the growth in size and number of publicly held business corporations are contributing factors to the importance of accountants in today's business world.

With these factors in mind, it's easy to see how beginning accountants with the necessary training can progress to chief accountants, senior auditors, controllers, treasurers and, in many cases, corporation presidents.

Industry is not alone in offering opportunities for trained accountants. The government, for example, employs many accountants to work on financial records of government agencies or business firms subject to government regulation. Government accountants are also often assigned as internal revenue agents, investigators and bank examiners.

Public accounting also provides a wealth of opportunity to the trained accountant, and about one-third of all accountants are in this field. Public accountants or public accounting firms offer their services to individuals or companies on a fee basis. Beginning accountants in this field advance as their experience and ability grows in dealing with top executives in other companies.

Public accountants can become managers, supervisors or partners in the accounting firm for which they are working.

Accounting is the second largest field of professional employment for men. A 1958 survey revealed that there were almost 400,000 accountants and auditors working in this country. Of this total, about 60,000 were certified public accountants who had passed comprehensive examinations and met the educational and experience requirements of their states.

While there is a fine opportunity for men in all types of accounting, the untrained accountant is likely to be assigned a routine job with little chance for promotion. A college education is not a prerequisite for a successful accounting career and most states have no specific educational requirement even for CPA candidates, but a thorough education in accounting principles, methods and techniques is essential for rapid advancement.

For this reason, many accountants have found of particular value correspondence courses and part-time educational courses offered by private institutions. Correspondence courses and part-time classroom work have been responsible for the advancement of literally thousands of accountants throughout the country.

Even highly trained accounting specialists have found that educational courses offering training in new or different types of accounting are a big help in broadening advancement potential.

Correspondence training has been of special value in preparing skilled accountants for their CPA examinations. This examination, provided by the American Institute of Certified Public Accountants, is

used in all states and must be passed before accountants can call themselves "certified public accountants."

The advantage of correspondence training and part-time classroom work is that full-time jobs can be held while this extra education is in progress. In this way there is no interruption of earnings and family men can train to take advantage of the extra earnings that accounting offers.

Another advantage of accounting is that employment opportunities exist in all parts of the country. The greatest number of accountants are employed by private industry and wherever industry is located, accounting opportunities usually exist. In the past, public accounting was restricted primarily to major metropolitan areas. This is changing, both because accountants with public accounting firms are going into business for themselves in new areas, and because large companies continue to open branch offices in smaller communities.

Starting salaries for inexperienced accountants vary according to the training and preparation undertaken by the beginner. Recent surveys show that it is possible to start at \$450 per month and that salaries of accountants with five years of experience are about 50 percent higher than the starting rate. Able accountants usually advance rapidly, and there is no limit on their earning power as they progress into management positions.

For more information on accounting and other important fields of employment, write for Popular Mechanics career-guidance booklet **SKILLS for AMERICA**. Write to Popular Mechanics, Department SFA, 200 East Ontario Street, Chicago 11, Illinois.

MEN PAST 40

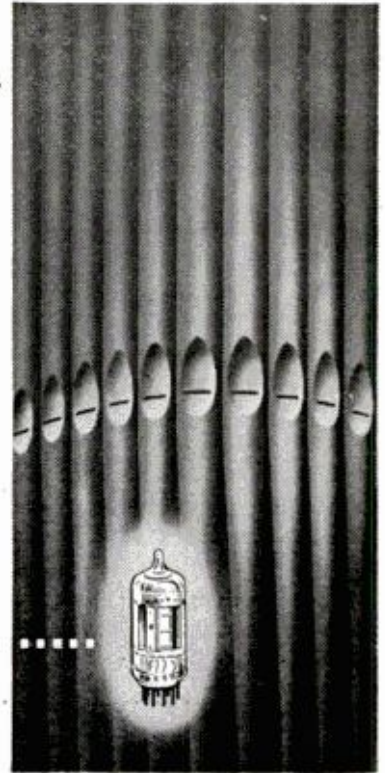
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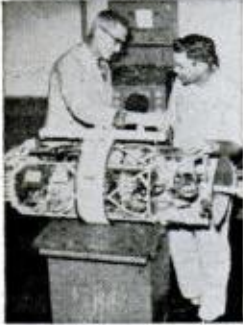
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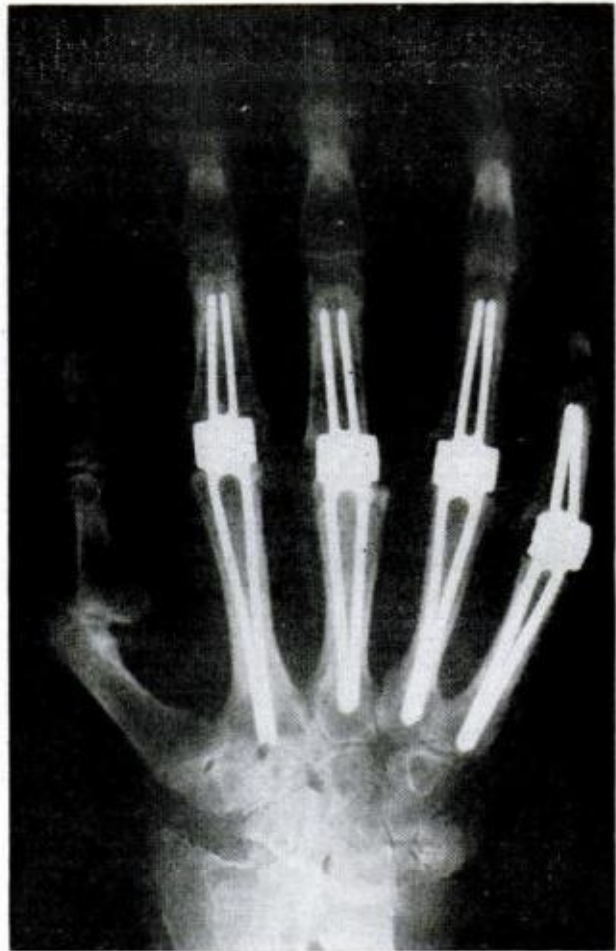
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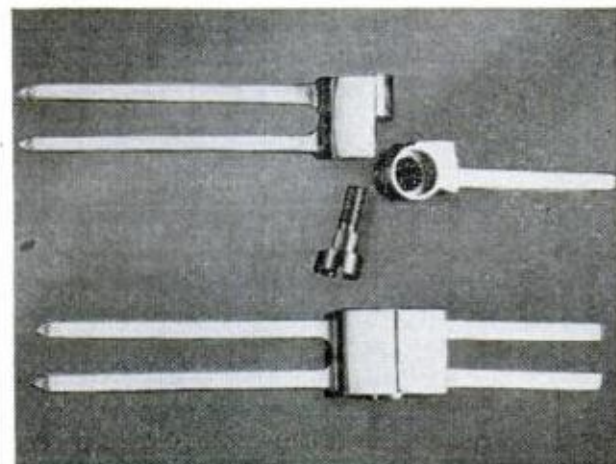


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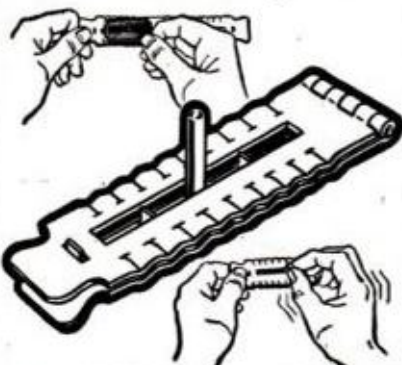
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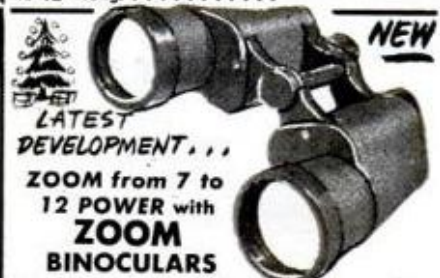
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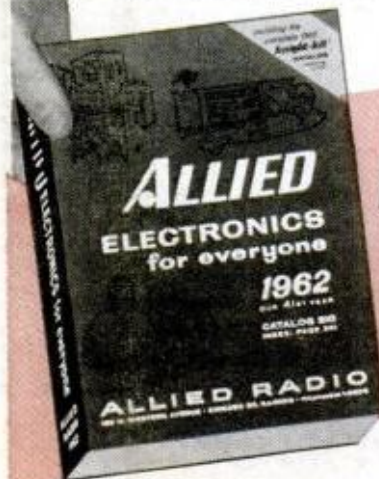
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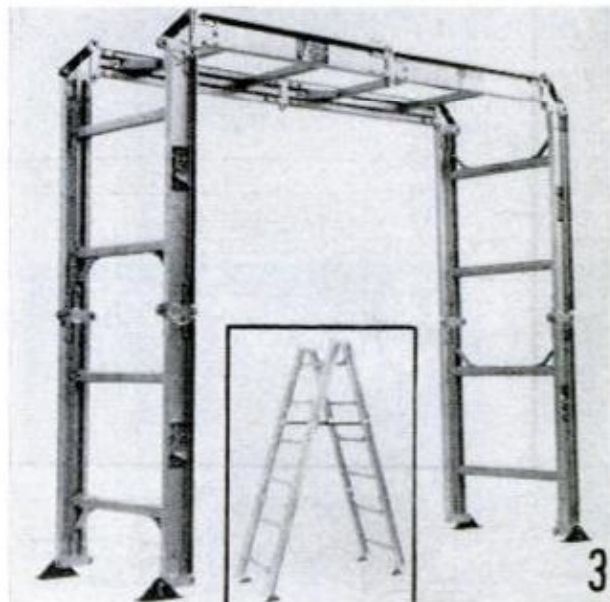
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A Mister Donut franchise. America's fastest growing chain of roadside donut shops has immediate franchise locations available in the U.S. and Canada. Cash in on one of North America's fastest growing industries. On yearly sales in major unit \$156,000, your profit \$31,000 net, junior unit \$78,000, your profit \$21,000 net. Benefit from big business practices such as volume buying, experienced supervision, merchandising, sales promotion, and national advertising. No experience necessary, we train you. Cash investment required from \$10,000 for junior unit to \$25,000 for major unit. For details write Mister Donut, Dept. PM2, 91 Providence Highway, Westwood, Mass.

BIG Money - Operate your own fix-it shop. Service all household appliances; irons, fans, refrigerators, automatic washer-dryers, etc. Do house wiring, commercial wiring. Rewind motors of all sizes. Sharpen mowers, skates, saws. Buy needed spare parts wholesale. Free book. Christy Trades School, A-1403, 3214 W. Lawrence, Chicago 25.

\$50.00 IN Your mailbox every day. Sensational home mailorder business. Cameras \$2.35; watches \$2.60; radios \$1.93. Hundreds of fabulous items. 500% profits. What, where, how to buy and sell. Thousands now doing it. 128 pages loaded with complete information sent immediately. Satisfaction absolutely guaranteed. Send \$2.00 to: Impex-E, 714 Howard Avenue, New Orleans 12, Louisiana.

AMAZING Profits in exterminating. Full time - part time. Free details. Baylab 21M, Cambridge, Maryland.

FREE Information about all kinds of business opportunities in all 50 States. No obligations. William Donoho, 493 8th St., Chico, California.

\$1.00 BRINGS You \$18.00 spare-full time home business opportunity! Amazing new velvet-spray transforms old cheap lamps, TV-radios, figurines, furniture, anything, into valuable products! Free samples. 50 business opportunities booklet. Send no money. Flok-Kraft, NR Los Angeles 61.

MAILORDER Home business. Get free copy, "Make Money in Mailorder." Mailco, 1554 South Sepulveda, Dept. T70B, Los Angeles 25, Calif.

IMPORT-Export opportunity, profitable, world-wide, mail-order business from home, without capital or travel abroad. Established world trader ships instructions for no-risk examination. Experience unnecessary. Free details. Mellinger, 1534 S. Sepulveda, Dept. T70B, Los Angeles 25, Calif.

LEARN Landscaping and the growing of plants. Start a profitable business part or full time. Free information without obligation. National Landscape Institute, Dept. MC-111, 11826 San Vicente Blvd., Los Angeles 49, Calif.

START Your own business on credit (U.S. and Canada). Your own boss. 1344 dealers sold \$5,000 to \$25,500 in 1960. We supply stock, equipment on credit. 200 home necessities. Sales experience unnecessary. Pleasant profitable business backed by world-wide industry. Write Rawleigh's, Dept. K-U-PPM, Freeport, Illinois.

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

MOST Profitable aspect of mailorder is cheapest to try! Write: Simon, Box 87-PM5, Peiham, N. Y.

LEARN Professional TV servicing in one week! Fabulous new simplified system. No big expense. No studying. No tools or equipment. Spare, full time. Own your own big profit business! Save! Amazing but true! Free sample lesson, illustrated "How To" booklet. Write: TV Systems, Dept. EC-17B, 1038 So. LaBrea, Los Angeles 19, Calif.

BECOME Tax consultant. Graduates earn \$1,000-\$3,000 every tax season preparing returns evenings. State approved. Union Institute, Lakewood E-2, N. J.

MAKE Extra money - Big cash commission plus premiums for you and your customers. Sell advertising book matches. Sensational new tenorama, glamour girls, hillbillies; dozens others. All sizes. Quick daily sales; big repeat business. Free master kit makes selling easy. No experience necessary. Superior Match, Dept. MX 1161, 7530 Greenwood, Chicago 19.

WANT A raise? Better job? Promotion? Short-cut help, free. Webster House, 2038-5 Mockingbird Road, Columbia, South Carolina.

RETAIL Financial opportunity one hour a day. \$207 per month; two hours, \$496.80, etc. Dietary food supplement, T.V. advertising. Secure distributors, sell wholesale. Big volume, big profits. Free literature. Write Leroy Turner, 2834 Hilltop Rd., Concord, Calif.

YOUR Own wholesale business. No inventory. No investment. Thousands of nationally advertised brands direct from factories. Write: A. & H. Wholesalers, 97 Pulaski St., Brooklyn 6, N. Y.

900% PROFIT. Fast sellers by mail. Write DABL, 1218 16th, Golden, Colo.

EVERYBODY Likes candy and popcorn specialties. Learn to make professionally home. (Our 50th year.) Ragsdale Candies, B-107, East Orange, New Jersey.

PROFITABLE Career! Learn food cost control accountancy-management in 3-weeks. Tremendous demand: Restaurants, grocers, etc. Income guarantee over \$500.00 monthly. Write for: free literature-lesson. National Cost-trol Systems (PM-11), 101 Capri Lane-9, San Antonio 1, Texas.

NATURAL Molding rubber, extra thick. Free samples. W. Wooley, 2801-A Latrobe, Peoria, Illinois.

GET Samples, magazines, offers galore! Your name in 5000 mail directories 25¢. Results guaranteed. Muskoka Mailers, 1438-C4, Huntsville, Ontario, Canada.

MAILORDER. Profitable beginners information. John's, Box 943-PMN, Miami, Florida.

NEED Better job? Bigger earnings? Study secrets others use. "Finding and Changing Employment" tells how easily safely. Send \$2.98 or for information. Prompt orders receive bonus "Top Secret to Success in Your Job." Learn to Earn Co., 345 West Ave., Tallmadge, Ohio.

RE-CAST Junk batteries into new. Latest achievements. Battery Laboratories, Bayou LaBatre, Alabama.

MAKE \$20.00 per hour. Learn hand engraving. Engrave from glass to steel head of pin. Engrave for us. Send 25 cents. Engraver, 722 Market St., Victoria, B.C., Canada.

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

OPERATE Profitable mail order business. Write Fred's Enterprises - Importers, 322 Pinnacle, Belleville, Ontario.

FREE: "How to Win Contests." Contestar, Box 51-PCB, Des Plaines, Illinois.

MAIL-ORDER Pays big. Complete home set-up - no inventory. Details free. National Mail Order Corp., Box 828, Dept. 1N, Wayne, N. J.

REPAIR Hydraulic jacks. Easy, profitable. Write: Hydraulics, Box 4104, El Paso, Texas.

YOUR Own baby shoe bronzing business. Instructions, equipment, supplies. Metalizing, glassing, Pearl-Kote. We finance. Free booklet. Dept. A, Box 5036, Inglewood, Calif.

HOW To sell books by mail. Box 51-BPMA, Des Plaines, Illinois.

EARN Good income sending us information. Weekly paycheck. Details 10¢. Thomas, Mount Wilson 8, California.

PACKAGE At home for profit! We supply everything. No selling. Free home business details. HPC, 2212BB Jesse Street, Los Angeles 23.

MONEYMAKING OPPORTUNITIES

NEW Automotive invention needed by every motorist. Big profits selling to service stations, garages, auto supply stores, hardware stores. Amazing rack deal. No risk introductory offer. Free details. Write: Safety Plug Lock Corp., Dept. P. 1270 B'way, N. Y. 1, N. Y.

FREE! Amazing new book of money making opportunities and mail order bargains. Write today! Dept. PM, P.O. Box 1123, Chicago 80, Illinois.

MANUFACTURE Beautiful, lightweight vases, patio stones, wall panels, artistic room dividers, etc., with new foam-crete plastic. Amazingly fast, easy, money-making system. Complete formulas and instructions only \$3.00. Or free details. Plasticon Company, Box 105, Grove City, Penna.

FREE. 200 Ways to make money by mail. Arch, 614 West Twelfth, Gastonia 1, N. C.

MEN — Women! Start money-making plastic laminating business at home in spare time. Material that costs 11¢ brings back \$2.58. No canvassing or selling but mail orders brings in \$20 a day. Write for full particulars free. Rush name on postcard to Warner, Room CL-2-L, 1512 Jarvis, Chicago 26, Ill.

MAKE Money sharpening saws, tools, knives, scissors, clippers, surgical instruments, etc. Grinding outfits low as \$34.95. Manual furnished. Write Treyco, N. Tonawanda, 15, N. J.

EASY To start rubber stamp business at home in spare time. Make up to \$9.80 an hour without experience. Facts free. Write Roberts, 1512 Jarvis, Room CR-2-L, Chicago 26.

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

VENDING Machines. No selling. Operate a route of coin machines and earn amazing profits. 32-page catalogue free. Parkway Machine Corporation, Dept. #26, 715 Ensor Street, Baltimore 2, Maryland.

EARN Money evenings copying and duplicating comic cartoons for advertisers. Adservice, Argyle 1, Wisconsin.

YOUR Own, easy-to-start, home mail-order business, sparetime. Fascinating; profitable! Information free. Alfano, 19-PM Pine, Closter, N. J.

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

READ "Progressive Mailtrade." The magazine that tells how to make money by mail. Quarter brings sample and special offer. Progressive Mailtrade, Box 357, Sheboygan, Wisconsin.

AMAZING Successes through franchises! Become exclusive franchise holder your territory. Information rushed. National Franchise Reports, MP-528, 333 North Michigan, Chicago 1.

LEARN The secrets of repairing junk batteries, generators, starters, profitable, easy, at home. Free particulars. Batteryman, 3465 Forrest, Santa Clara, Calif.

\$25-\$50 WEEKLY Possible, re-writing news items, jokes, poems, recipes, for publishers. Some worth \$10 each. Details free. Service, 81-D, Knickerbocker Station, N.Y.C.

LEARN Plastics fabrication for extra income. Low cost home training now available. Write for free booklet. Interstate Training Service, Dept. D-3, Portland 12, Oregon.

WIN Contest money. General Contest Bulletin gives hundreds of tips. Lists current contests, rules. Sample magazine 25¢. General Contests, 1609½ East 5th Duluth 12, Minnesota.

"HOW To Win Contests" manual may bring you riches! Contains successful formula professional winners use. Guaranteed. \$5 postpaid, or request free literature. Paragon Enterprises, 11 Mott St., DT-4P, New York 13, N. Y.

OFFICE Work—home, sparetime. Refundable moneymaking instructions 50¢. Interstate, 37-1 Besch, Albany 9, N. Y.

GETTING Dollars in your mail. Send 10¢ for eye opening literature. Donovan, 79-PM Greenbelt, Levittown, New York.

PUZZLE Contests! Cash prizes! Details free! Spence, Box 11569, St. Petersburg, Fla.

MAIL Catalogs! Highly profitable! Sample, instructions, 10¢. Lewis Bartlett, Richland, Georgia.

\$50 DAY Spare time live bait business. Send \$1.00, complete set up, details. D. C. Breeder Farms, R-39 Gladstone Ave., Toronto 3, Ont., Canada.

\$20 DAILY Spare time plating baby shoes, making exclusive jewelry, novelties. Ask about free examination offer. Jo-Ca, 468-D Northwest 79th Street, Miami 50, Florida.

AMATEUR Artists! Turn your art ability into money. Hamilton, Box 4-E, Astoria 5, N. Y.

RECEIVE Moneymaking offers galore. Name listed 6 months \$1.00. Satisfaction guaranteed. Homeworkers Guide, King, N. C.

SIMPLE, Pleasant mailorder can net \$12,000 year. Write: Simon, Box 87-PL2, Pelham, N. Y.

PRACTICAL Mail order. Start small. Moneymaker, 722-21 East Silver Spring, Milwaukee 17, Wisconsin.

MAILORDER Business learned easily. Write: Easco, Box 323, Grand Rapids 1, Michigan.

START A profitable subscription business in spare time! We need men and women (young and old) as representatives for all leading national magazines. Liberal commissions on all subscriptions. Supplies free. No experience needed. Send this ad with your name and address to: Popular Mechanics, Room 11-O, 250 W. 55th St., New York 10, N. Y.

"FORTUNES In Formulas." 10,000 trade secrets, 900 pages, \$3.95 (Free brochures). Berthoff's, 739 11-P Sylvania Avenue, Toledo 12, Ohio.

CHOICE Sparetime moneymakers. Literature 35¢. Harrison, 248 So. Hackett, So. Beloit, Illinois.

EXCEPTIONAL Opportunity. Earn lifetime income. \$1000 monthly possible. \$1.25 details. P.O. Box 1853, Tulsa, Okla.

MAKE Money with your power saw. Boyce, 3956PM West End, Chicago.

YOU Need only a mimeograph machine and a ruler to put yourself in a business that can make you financially independent. Details free. The Graphic Garret, Box 9312, Arlington 9, Virginia.

RAISE Crawlers, redworms. Odorless soilless method. Three Oaks Ranch, Dresden, Tenn.

FABULOUS Profits raising earthworms! Picture folder free. Excello, Kosciusko, Mississippi.

CARS. Buy-sell from backyard. People come to you. \$150.00 weekly easily. Start parttime with own car, grow Complete course, send \$2.00. Bud Arthur, 104 Susan, London, Ontario, Canada.

OPERATE Profitable manufacturing business. Valuable information free. Colen, 7731-PM Yates, Chicago 49.

\$480 MONTHLY! Taking four orders a day with fast selling art service. Write today! Portraits, 128 Roosevelt, Redwood City, California.

FIBER-GLO Gives beautiful, 3-D, textured effect to your own, and commercial greeting cards. Easy, colorful, profitable. Unlimited markets. Complete kit \$3.00. Reyncraft Industries Box 84, Northbrook, Ill.

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BEAUTIFUL Japanese paintings. Samples \$2.00. (Guaranteed). Sheremeta, Box 36201C, Los Angeles 36.

IMPORTERS Sale. Radios, recorders, binoculars, others. Free brochure! Importico, Enka, North Carolina.

JAPAN: Direct mail-order 26 page catalogue: dolls, novelties, business information, manufacturers' names, addresses, \$1.00; Japan's Trade Directory, 3000 companies, \$3.00. Send cash. Clarence Yamagata, 814 Toginbiru, Marunouchi, Tokyo.

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SCIENCE Treasure chest. Do hundreds of experiments. Order No. 70.342-CZ—\$5.00 postpaid. Request free Catalog—CZ, Edmund Scientific Co., Barrington, New Jersey.

NEW Concept of atomic structure. Nuclear theory challenged. 30 pages, 25 cents ppd. C. F. Krafft, 4809 Columbia Road, Annandale, Virginia.

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ILLUSTRATED Catalog: Chemistry, mineralogy, biology 25¢. Tracey Laboratories, Evanston, Illinois.

UNUSUAL Chemistry books, courses, kits! Rare chemicals, cheap! Catalog 25¢. NSC, Box 11133, Palo Alto, Calif.

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AMAZING New book of science experiments, formulas, and catalogue of laboratory supplies. Only 35¢. National Scientific Co., 13 S. Park Avenue, Dept. PM-11, Lombard, Illinois.

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NEW Chemistry catalog, 25¢. Laboratory Sales, Box 161-A, Brighton, Mass.

FORMULAS, PLANS, ETC.

ANTI-FREEZE, Waterless handsoap, re-silvering mirrors, all \$1.00. Nelko, Box 3462, Merchandise Mart, Chicago 54.

FORMULA Trade secrets. 10,000 to choose from. Information free. Norris Sales Co., Alpine 3, Tennessee.

FORMULAS For latest money-making discoveries. New! Good! Valuable literature free! Miller, Chemist, 1517-D, Tampa, Florida.

LATE, Modern manufacturing formulas. List free. Moon Chemical, Martville, New York

FORMULAS—All kinds. Amazing big catalog, 10¢. Kemixal, Park Ridge, Ill.

MODERN Formulas. Satisfaction guaranteed! Jack, Chemist, Box 25157, Los Angeles 25, California.

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BOXES, Plastic. 200 sizes. Free list. Althor, 170 Bay 23 Street, Brooklyn, N. Y.

NEW! Electric plastic laminating kit. Hobby. Easy. Profitable. Details. Burr, 330 East Center, Kalamazoo, Mich.

NEW Liquid casting plastic, clear, colors. Embed real flowers, butterflies, photos, coins. Send 25¢ for two handbooks "How to Cast Liquid Plastics" and "How to Make Extra Money at Home." Castolite, Dept. M-101, Woodstock, Illinois.

AMERICAN Plastic laminating press. Finest, fastest for exciting new business. Terrific demand. American Machine Manufacturing, Box 1246, Savannah, Ga.

CREATE Original artistic Christmas gifts. New instruction manual tells how to do plastic embedding and molding. Manual \$1.00. Catalog 25¢. Castcraft Corporation, Dept. M-1161, P.O. Box 555, Palo Alto, California.

CELLULOID Scrap assortment, \$6.00 postpaid. P.O. Box 333, Kearney, New Jersey.

AGENTS WANTED

RADAR Detector, sunvisor. Distributors, agents wanted. Sample \$39. Transmatic Co., Sedalia, Mo.

BIG Profits selling chamois to service stations, car lots. Steady repeat business. Free details. Inka Industries, 1606-H Roberts, Houston 3, Texas.

FREE Sample. Beautiful curios! Sell on sight! Apartado 9036, Mexico City.

START Your own business, selling the "World's Most Usable Bible." Sales quick, easy, and profitable. Extra bonuses; free insurance; other benefits. Write International Book Company, Department M, Box 118, Wichita 1, Kansas.

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YOUR Own business—Used suits \$1.50; overcoats 65¢; mackinaws 35¢; shoes 12½¢; ladies' coats 30¢; dresses 15¢. Enormous profits. Catalog free. Nathan Portnoy Associates, 2109-AA Roosevelt Road, Chicago 8, Ill.

MAKE Up to \$50.00 a day soliciting delinquent accounts. Terrific commissions. Write today. National Credit, 304Y Pickwick Bldg., Kansas City 6, Mo.

BIG Profits. Stamp social security plates, key protectors. Sample 50¢. Catalog free. General Products, 11 No. Pearl St., Albany 7, N. Y.

YOUR Ad in this space will get some good agents for you. Yes, I'll prove it. Write for Folder "A" right now. P. W. Johnson, Classified Advertising Manager, Popular Mechanics Magazine, 200 E. Ontario St., Chicago 11, Ill.

MAKE Profitable men's-women's wear. Sample free. Sunmade, Brockton 64, Mass.

SUPER-CHAM. Amazing new product wanted by millions everywhere. 101 uses—cleaning, drying, polishing. Sample \$2.00 postpaid. Information free. Good profit. Renlim Company, Box 143, Babson Park, Florida.

AUTOMATIC Bed warming sheet, you sleep on, not under. Outsell electric blankets 10 ways, costs less. Generous profits. Patented Products Corp., Dept. PM-111, Danville, Ohio.

PERFUMES. French type, imported essence. Saleable, 12 assorted sample bottles \$1.00. Catalogue. Parfums DiJon, 122 East 25 St., New York 10.

MAKE Most extra cash with world's biggest line Christmas cards, gifts. Introduce friends, neighbors to over 150 Christmas, everyday box assortments, 600 big money-makers. Pocket up to 50% profit plus big cash bonus. Free giant color catalog; samples on approval. Arrow Greetings, 513 Fourth Ave. S., Dept. 83-G, Minneapolis, Minn.

FOG-STOP Windshield cloth. Instantly removes blurry mist, frost, sleet, snow. Stops windshield fogging. Samples sent on trial. Kristee 87, Akron, Ohio.

DAMASCENE Earrings! Exotic Orientalism. Huge profit. OHGA, PM-303, Siganikusatu, Japan.

REAL Diamond rings. Nationally advertised. Sell direct. Make big middleman's profit. No investment. Experience unnecessary. Free catalog, details. Gleamlight, 111-B10 North Columbus, Mount Vernon, N. Y.

FREE Colored portrait sales kit. Portraits, 402-PM Hazlett, Baltimore 29, Maryland.

EARN Big money introducing amazing Color-V. Makes ordinary TV show in beautiful colors. Low \$2.98 price, sells like hotcakes. Free details. Excellent Buys, Dept. PMC-1, 34 E. 12th St., New York City 3.

CUDDLESOME Australian Koala bears, boomerangs, kangaroo purses and other irresistible, original Australian novelties. Terrific profits, easy selling. Webster's International Agencies, Melbourne S.2, Australia.

MEN, Women, teenagers. Hottest import yet. Territories going fast. Terrific door-opener. Magic pad container. Money back guarantee. Send dollar for sample, particulars. Facman, Box Nine, Sparta, New Jersey.

EARN Up to \$50.00 weekly spare time. Sell guaranteed Quick-John, exclusive enzyme formula for septic system troubles. High profit margin, excellent repeat orders. Ryter, Madelia 4, Minn.

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FURNACES, Gas water heaters, air conditioners, car parts, and awnings, 40% discount. Price books 50¢, refundable. Honey Heating, Box 168, Anna, Ill.

GENUINE Wholesale catalog. 50 cents, refundable. Gift. Cerny, 9700 West 56th Street, La Grange, Illinois.

JUST OUT! 356-page catalog—save to 50% on auto parts, accessories. All makes, models. Send 25¢—refundable on first order. Whitney, 1919 PA-11, Archer, Chicago 16.

ALUMINUM Combination storm doors, windows, awnings, folding doors, etc. Furniture, housewares, appliances, jewelry, tools, chain saws, mowers, etc. All items listed below wholesale. 125 page catalog. \$1.00 refundable first order. Wholesale Supply, 42 East Pembroke Rd., Danbury, Conn.

MILLIONS Of items wholesale. Details free. Write: BBBL, 1218 16th, Golden, Colo.

WHOLESALE: Name brands! Catalog \$1.00 (refundable), guaranteed. National Wholesalers, Tupper Lake, New York.

BUILD This exciting vacation cabin for \$200. Complete blueprints \$3.50. A. Beck, LeMars, Iowa.

LARGEST Wholesale supply source in U.S.! Furniture, clothing, appliances, housewares, automobiles and accessories, tools, sporting goods, hobby supplies, farm equipment, imports, new products, bargain merchandise. Free details. Associated Wholesalers, Box 108-DD, Lincoln 1, Nebr.

BARGAINS! Closeouts! Specials! Catalog 25¢. Reavis, Box 1134-PM, Lufkin, Texas.

DISCOUNT Catalog, general merchandise. 25¢, refundable. Chapman's Gifts, 1802 Barth, Flint, Michigan.

100,000 PRODUCTS Wholesale! Terrific bargains! United Wholesalers, 1265-M Broadway, New York 1, N. Y.

TEAR Gas pens \$3.75. Not sold to minors. Calumet Tear Gas, 8826 Commercial, Chicago 17.

TREMENDOUS Wholesale buys! Big catalog! Postcard! Spartan, 1236-M Winona, Chicago 40.

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FREE! Name brands catalog! Your own high profit business. Sell name brands, full or part time. No inventory, no investment. More than 2,000 name brand items; lowest wholesale prices. Watches, jewelry, cameras, hi-fi, stereo radios-phonos, appliances, housewares, hardware, power tools, luggage, musical instruments, garden equipment, sporting goods, toys, many others. 8 floors of name brands. Million dollar inventory. Orders shipped complete in 24 hours! Send for free, beautifully illustrated catalog now! Separate wholesale price list. H. B. Davis Corp., Dept. PM, 145 W. 15 St., New York 11, N. Y.

BUY Below wholesale! Thousands of nationally advertised products. Drugs, clothing, housewares, cameras, jewelry, hardware, sporting goods, etc. Postcard brings price list showing actual factory cost. Buy-Rite, 310 Main, Bennington 2, Vermont.

NEW Deluxe multicolor below wholesale catalog, automobile catalog, and others. Housewares, appliances, refrigerators, freezers, washers, dryers, television, radios, furniture, clothing, luggage, binoculars, phonographs, recorders, cameras, projectors, tools, typewriters, watches, jewelry. Name brands. Huge discounts to 70%. Postcard: Selbyco, Decatur 15, Ill.

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WHOLESALE: 850,000 Items. Supply source directory 25¢. Idealer, Park Ridge, Illinois.

USED And new watches \$2 up. Free list. Southern Watches, 5-PM So. Wabash, Chicago 3.

ELECTRIC Guitars, amplifiers, wholesale. Free catalog. Carvin PMW, Covina, Calif.

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MAKE Extra money—Big cash commissions plus premium for you and your customers. Sell advertising book matches. Sensational new tenorama glamour girls, hillbillies; dozens others. All sizes. Quick daily sale; big repeat business. Free master kit makes selling easy. No experience necessary. Superior Match, Dept. M-1161 7530 Greenwood, Chicago 19.

MAKE Big money taking orders for Stark dwarf fruit trees. Everybody can now grow giant size apples, peaches, pears in their yards. Also shade trees, shrubs, vines, roses, etc. Outfit free. Stark Bros., Desk 30152, Louisiana, Mo.

CALENDARS, Novelties. Full or part time. Liberal commissions. Fleming, 6535-A Cottage Grove, Chicago 37.

SENSATIONAL New longer-burning light bulb. Amazing free replacement guarantee—never again buy light bulbs. No competition. Multi-million dollar market yours alone. Make small fortune even spare time. Incredibly quick sales. Free sales kit. Merlite (Bulb Div.), 114 E. 32nd, Dept. C-74L, New York 16.

WILL You wear new suits, sport coats without one penny cost and agree to show them to friends? You can make up to \$40.00 in a day even in spare time, without canvassing. Stone-Field, 532 South Throop St., Dept. F-926, Chicago 7, Illinois.

MEXICAN Leather hand stitched wallets \$3.00 value. Send \$1.00 for sample. Leather Company, Box 71-P, Nestor, California.

MILLIONS Sold—razor blade resharpeners. Retail \$3.98. Details. Sharpener, Box 66, Youngstown 1, Ohio.

MAKE Extra money selling advertising matchbooks. Free catalog and sales outfit. Matchcorp, Dept. PM-111, Chicago 32.

SEEKING New products? Get my outfit 47 money-making specialties. Latest conveniences for home, car. Send no money. Just your name. Kristee 50, Akron, Ohio.

SENSATIONAL Sideline retailer and jobber salesmen. Warson Mfg., Naperville, Ill.

SELL TV indoor antennas to stores. Packaged in plastic display rack bags. Sample cost 95¢, \$10.00 per dozen. Sell for \$5.95. Knox Electronic, Galesburg, Illinois.

TAKE Over your area—Agents, dealers, farmers make \$250 up weekly selling nationally advertised Campbell's Gro-Green concentrated plant food supplements, increase protein and mineral content of grains and forage. No investment. Credit given. Everything free. Ideal proposition for corn and feed men. Campbell Co. (Est. 1928), Rochelle 52, Illinois.

AMAZING. Folding, easy connecting, pickup tow-bar. Inexpensive. Guaranteed. Salesman making terrific profits. Literature free. Carson Industries, Faxon 1, Oklahoma.

TRANSISTOR Radios. Big profit. Florenz, 439 Race St., Cincinnati 2, Ohio.

EARN Big commission full or part time. Build profitable business of your own selling America's largest line low priced business printing. 360 page catalog samples hundreds of items used daily by business people. Imprinted ball pens low as \$8.95 for 100. Big full color catalog low priced advertising specialties included. Free sales kit. National Press, Dept. 8, North Chicago, Illinois.

MAKE Up to \$50.00 a day soliciting delinquent accounts. Terrific commissions. Write today. General Finance, 304V Pickwick Bldg., Kansas City 6, Mo.

IF You're interested in making money in selling, see the hundreds of exceptional opportunities in Salesmen's Opportunity Magazine. Send name for your copy, absolutely free. Tell us what you're selling now. Opportunity, 848 N. Dearborn, Dept. 17, Chicago 10, Illinois.

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CALIFORNIA Job opportunities are available. Why delay? Determine a happier future now. Employment experts analyze your job potential, list firms presently hiring. Write for free information and application. California Unlimited, 646 — 15 Ave., San Francisco 18. We deal with people; not statistics.

SELECT U.S. and overseas jobs. Firms, salaries, benefits, addresses, procedures supplied. Write for free information: International Occupations, N. Y. International Airport, P.O. Box 100-C1, New York City.

UNLIMITED Employment. U. S. A. & overseas. Top wages. Supervisory, clerical, construction, etc. Skilled, unskilled. Free transportation. Unusual opportunities. Complete information plus worldwide project listings. Only \$2.00 (\$2.25 airmailed). Satisfaction guaranteed. International Opportunities, Dept. B, 109 W. 42, New York 36, N. Y.

WANTED—Men, women. Civil Service job list for California, Nevada, and Hawaii. Send \$1.00 to Job Reports, P.O. Box 36532, Los Angeles 36, California.

CALIFORNIA Jobs, (guaranteed). \$2.00 (airmailed). Sheremeta, Box 36201C, Los Angeles 36, California.

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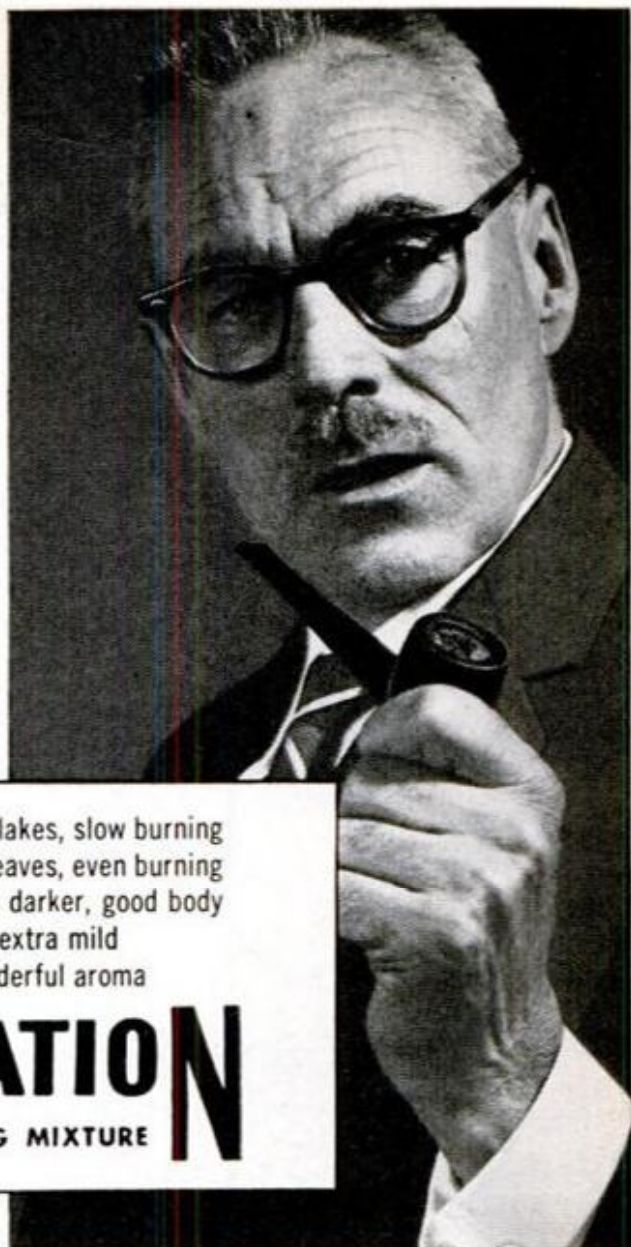
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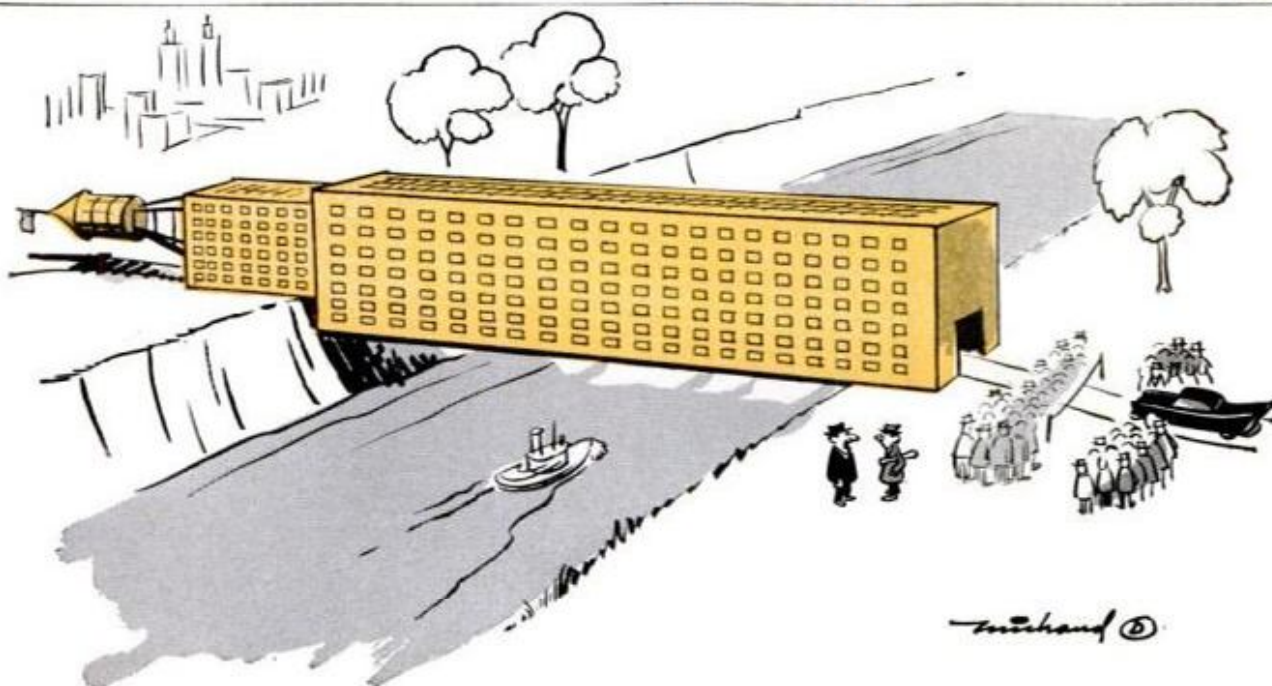
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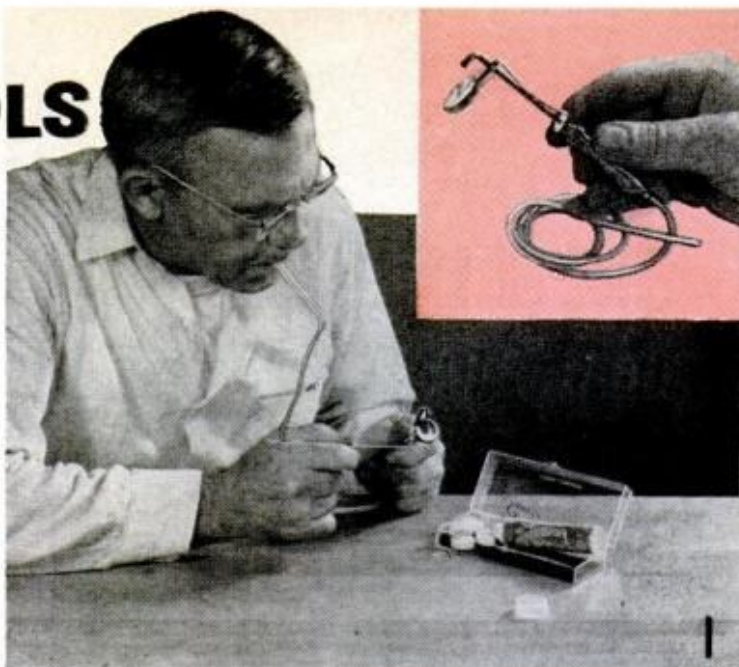


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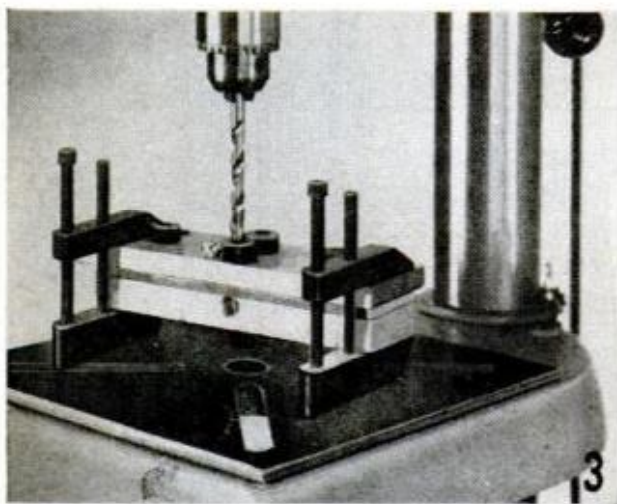
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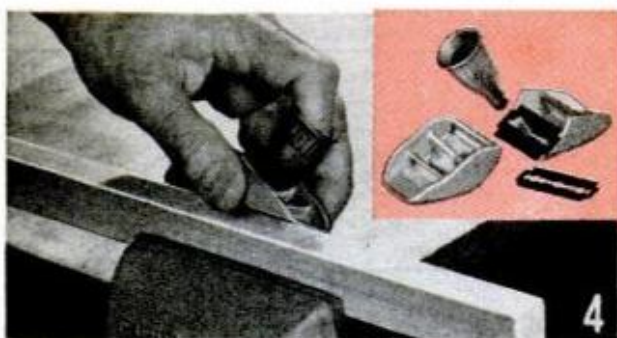
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3

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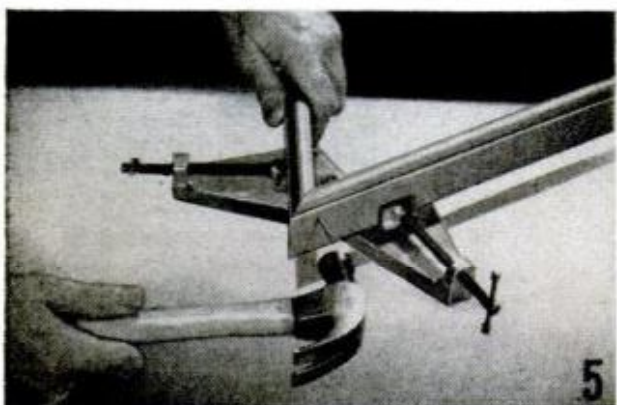


4

3. CLUBFOOT PARALLEL clamping system eliminates the screw obstruction of conventional parallel clamps. May be used for stack-sawing, drilling sheet metal, surface grinding of irregular parts and matched drilling operations. Per pair: \$9.95. Made by Baron Mfg. Co., 6090 Riverside Ave., Riverside, Calif.

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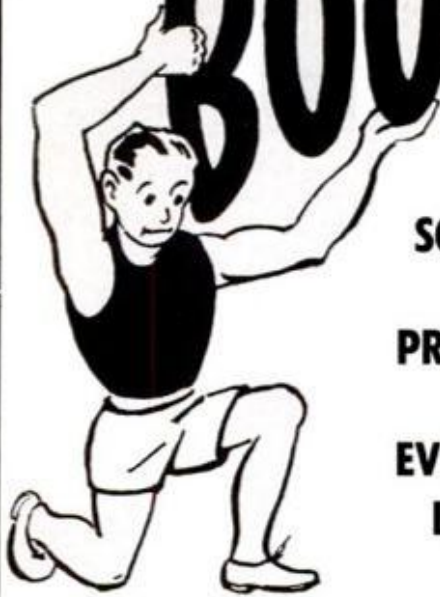
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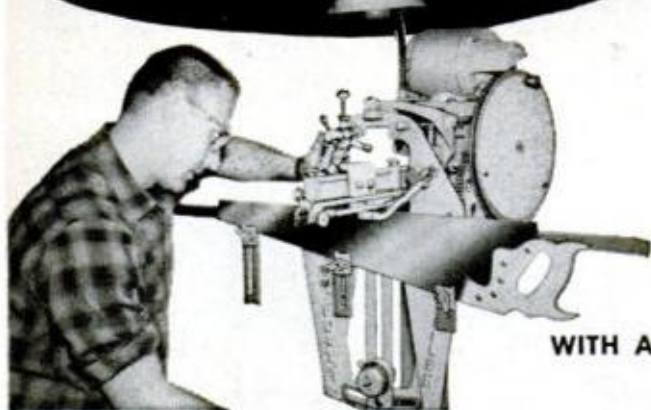
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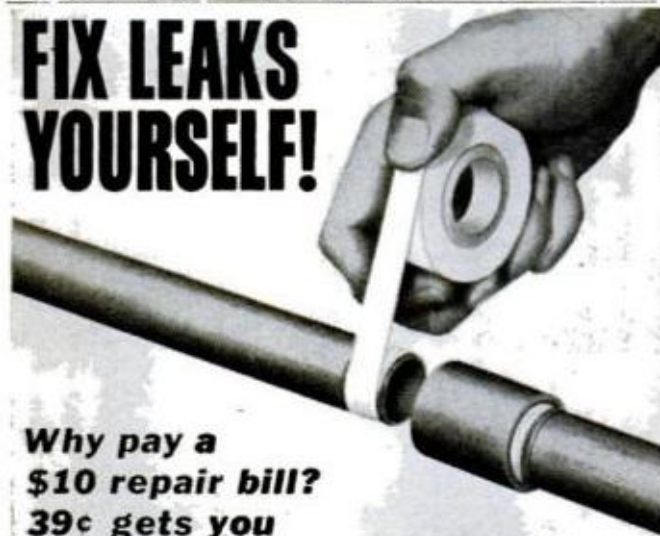
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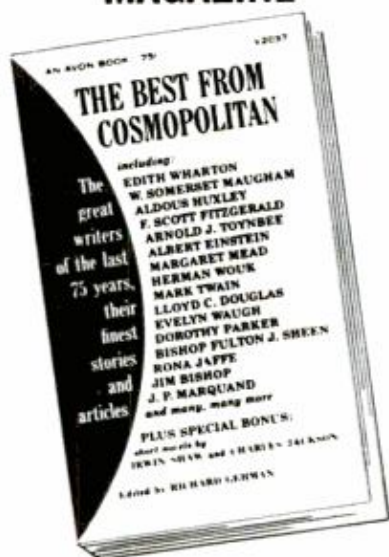
■ CHOICE OF
6 STYLES;
MANY COLORS

■ JUST BRUSH
OUT SOIL
AND SPOTS



BY WOLVERINE

THE BEST FROM 75 YEARS OF A GREAT MAGAZINE



THE BEST FROM COSMOPOLITAN

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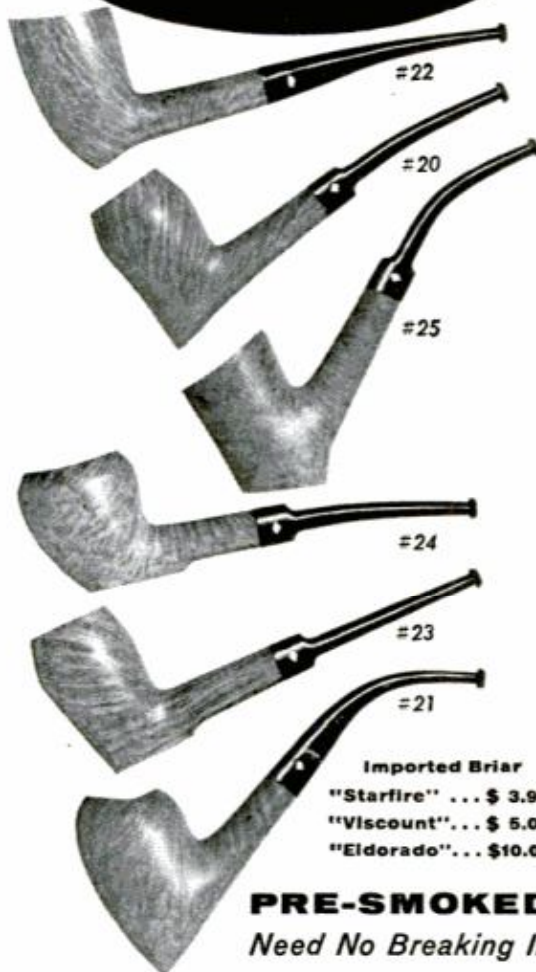
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NOVEMBER 1961

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My Maid

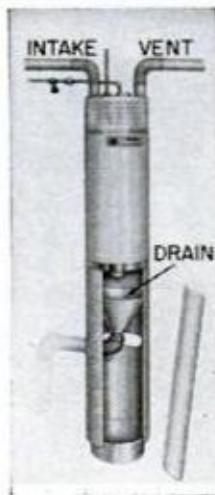
AQUAMATIC BUILT-IN HOME CLEANER

"Down the Drain with
Household Dirt . . ."

featured page 194 Sept. issue
POPULAR MECHANICS

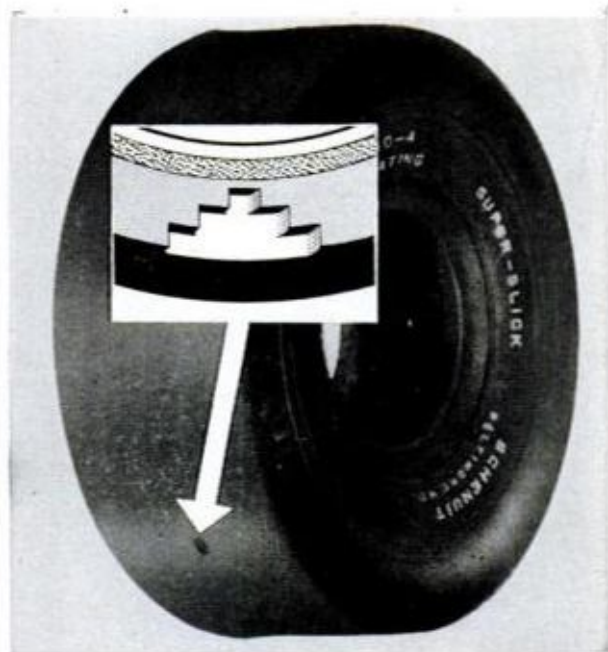
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at a touch of the total bar. Made of high-im-
pact plastic, it measures 10 by 5 $\frac{3}{4}$ by 2 $\frac{1}{2}$
inches and can be used in the home, school
or office. Manufacturer is Hassenfeld Bros.,
Inc., Pawtucket, R. I.; price is \$4.00.



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Tread level indicators molded into the
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Each of three distinct steps down is equal
to one-third of tread thickness. The man-
ufacturer is Schenuit Rubber Co., Balti-
more, Md.

A number of one-man mail order enterprises are paying their owners an income of \$40,000 to \$50,000.

SPECIAL OPPORTUNITIES



Mail order is big business. Annual catalog sales volume of Sears, Roebuck and Co. is over 700 million dollars!

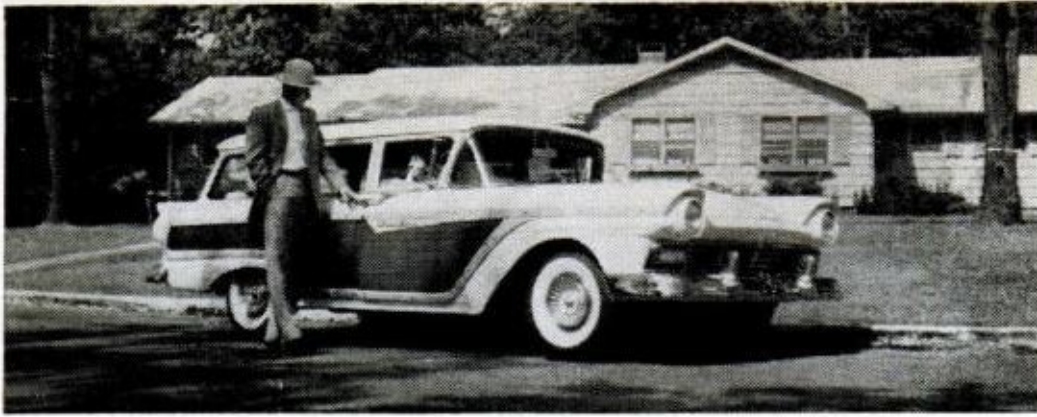
HOW TO START

Your Own Mail Order Business

You can make a fortune by mail. New firms will set you up in a fabulous mail order business of your own! They'll make up your catalogs, prepare your advertising, supply mailing lists and even ship your products for you!

By Robert Stephenson

When Anthony Sambati injured his back and was laid off from work he never dreamed it would be a blessing in disguise. Bedridden for weeks, he decided to start a small mail order business. This was something he could run right from his own home and required very little capital to begin. In fact, Sambati started with less than \$85.00.



After a short time in mail order, Sambati soon had a beautiful home with all the luxuries of a successful businessman.

He figured that a small mail order business might provide a temporary income to support his family until he got back on his feet. His first step was to obtain a franchise from a large wholesale mail order firm which supplied him with all the necessary catalogs and mailing literature. It wasn't long until his spare-time venture blossomed into a booming enterprise. Drawing a small salary and pouring the rest of the profits back into the business, he soon had others working for him! Today he owns a large retail store, his own warehouse and a beautiful home with all the luxuries of a successful businessman.

Sambati's story is typical of a number of men and women who began a small mail order business with absolutely no previous experience, and made a huge success of it. These 'little' people are quietly pocketing big profits every day—many content to keep the business small . . . spending an hour or two each day in the privacy of their own home. No bosses, time clocks or small pay envelopes. No door to door selling, in fact, you never even meet your customers face to face.

Yes, a small one-man mail order business is ideal for anyone wanting a chance to gain financial security and independence. Yet thousands try mail order each year and fail, simply because they don't learn the few simple secrets of success early in the game.

Take the case of Bud Sheer who had been working for a theatre in a small New Jersey town. With only a few hours spare-time to spend each morning, he tried mail order to supplement his regular income. Like many beginners in this field, Sheer was faced with the problem of finding good mail order items which would have a high mark-up and repeat sales potential. But the biggest obstacle was the expense of printing a catalog.

Then he heard about the A. J. Statile Co. of Hillsdale, New Jersey — an organization set up to aid the small mail order beginner.

He wrote to A. J. Statile Co. for full information, sent in his application for a franchise and within a short time the cash began rolling in. Today Bud Sheer *owns* the theatre he once worked for. Sheer attributes his success in mail order to the A. J. Statile Co. Actually, the theatre he owns has become a side investment.

He still uses the beautiful 300 page mail order catalogs supplied by A. J. Statile Co.

How does the Statile Co. help the beginner get a sound start in mail order? Very simply. Just as Henry Ford made automobiles within the reach of the general public—by mass production and large volume.

Let's take a few specific examples:

(1) All franchised dealers of A. J. Statile are offered ready to mail catalogs and sales literature. Each mailing piece has the dealer's name and address printed right on it. By printing millions of catalogs, Statile is able to offer these at a fraction of their regular cost. The artwork and layout costs for these catalogs would run into thousands of dollars for the beginner if he were starting from 'scratch'.

(2) Since all mailing material and catalogs contain your name and address, all orders come directly to you. Yet you don't have to invest one penny in inventory. All merchandise is stocked for you. In fact Statile has over \$3 million dollars worth of mail order merchandise at your disposal.

(3) All packaging and shipping is done for you. You simply send a shipping label to Statile together with the wholesale cost of the items, and the merchandise is shipped directly to your customers under your own shipping label.

(4) A consultation service is provided to answer any questions you may have. You receive a secret list of over 100 national magazines which run free ads. You'll be shown how to obtain free publicity on your own mail order items. In addition, you obtain trade names and addresses of over 150 other mail order wholesalers who drop-ship top mail order items for you. You'll also be given all the government laws and regulations pertaining to a home operated mail order business. These laws are a 'must' for all beginners.

All this valuable information is covered in the Statile Mail Order Survey which every new franchised dealer receives from Statile before they begin. Formerly sold for \$25.00, this survey has become the 'bible' of the trade. Mr. J. M. of Baltimore, Md., writes, "To tell the truth, all the information in regard to obtaining free ads is alone worth the \$25.00 I paid you . . ." J. D. of Kalamazoo, Mich.,

states, "Just a personal note to say I am most satisfied with my \$25.00 investment. Your sales plan is simple and well organized . . ." These are only a few of the many testimonials received praising the Statile Mail Order Survey.

(5) The catalogs and mailing literature offered by Statile Co. cover every conceivable mail order item. You select the field you are interested in . . . BABY ITEMS, TOYS, APPLIANCES, VITAMINS, BOOKLETS AND



The thrill of receiving money in your morning mail is one you'll never tire of.

MAIL ORDER COURSES, you name it, Statile has the catalog or mailing piece. Select your market, order your mailing literature and you're in business.

(6) You'll be told how to compile your own mailing lists—and this is the most important part of your business. Many a beginner has fallen by the wayside simply because he mails his catalogs to a poor list of names. Suppose, for example, you offered a beautiful scale model of a 40' Chris-Craft cabin cruiser by mail. You would probably make your mailings to boating enthusiasts and the chances are that nine times out of ten your mailings would show a loss instead of a profit. How would Statile help you solve this particular mailing list problem? He would show you where to get the names and addresses of *actual owners* of 40 foot Chris-Craft cabin cruisers! Surely every owner would like to have a scale model of his own boat. Strange as it may seem, such a mailing list is available to anyone. The secret is where to find it. This is just one example of how an experienced mail order expert giving you personal advice, may mean the difference between success and failure!

This same method of obtaining selective specialized mailing lists may be applied to practically any market . . . selling baby items to new mothers, selling toys to young children, etc., etc.

So much for starting your own mail order business. Now, a word of caution. **OBTAIN YOUR MAIL ORDER FRANCHISE FROM A**

REPUTABLE MAIL ORDER FIRM. Unfortunately, during the past few years a number of ads have appeared in newspapers and magazines offering to start people in mail order. The ads are grossly misleading. Many imply that you can become a millionaire over night if you use their catalogs. Beware! Particularly if they operate their own mail order business direct to the consumer. These firms compete with their own franchised dealers! They could just as well mail all the catalogs themselves. They don't need you.

Other shady firms fail to drop-ship your orders promptly, thereby losing customers for you. In mail order, prompt shipment is an absolute requirement for a successful operation.

Deal only with firms whose business is preparing catalogs and shipping merchandise. They operate on a strict wholesale basis for franchised dealers exclusively. Such a firm is the A. J. Statile Co. Letters from successful franchised mail order dealers speak for themselves. A woman from Milwaukee writes, "It has been better than my expectations." A gentleman from California states "we are quite pleased with the response we are receiving." Another man from Wisconsin writes, "To say the least, I am more than satisfied."

Yes, a small mail order business offers you an opportunity to earn a second income, or—if you work at it in earnest, a chance to strike it rich. The young housewife in St. Louis may be content to make an extra \$20.00 a week . . . the office worker in Los Angeles may be aiming for \$150.00 weekly full time business . . . and the ambitious schoolteacher in Newark may reach \$20,000.00 a year. What is your objective? Set your own goal, pick your own hours, and the sky is the limit.

Even a government report stated that a number of the most successful one-man mail order enterprises make as high as \$40,000 to



Big firms will carry all stock for you. They ship orders direct to your customers using your own shipping labels.

Your Own Catalogs of Top Mail Order Items!



A. J. Statile Co. will prepare your catalogs, write your sales letters, supply mailing lists and even ship merchandise for you, using your own shipping labels!

\$50,000 a year! But frankly, this is the exception rather than the rule. Most mail order operators are content to earn a comfortable living doing little physical work, but enjoying their work thoroughly! We don't say you'll be a mail order millionaire or another Sears & Roebuck, but if you're looking for a business of your own with financial security, the answer is mail order. If you've already tried mail order with little or no success, don't give up! Try to analyze what went wrong. Success comes only to those who keep trying and learn from their own mistakes. Again we emphasize, deal only with a reputable firm.

The A. J. Statile Co. has been in business for over twelve years.

They gladly furnish bank or trade references upon request. They are probably one of the largest mail order wholesalers in the country. Whether it be toys, gifts, vitamins or appliances—they've got it ready to ship under your label WITHIN 24 HOURS!

Firmly convinced that no other business offers the tremendous opportunities of mail order, A. J. Statile, president of the firm, is an outspoken advocate of the man or woman who wants to start in business for himself. As Statile puts it, "by all means, start your own business and start NOW! If you want a chance at security and financial independence make your choice mail order. There's nothing like it. Absolutely nothing!"

FOR FREE DETAILS

Mail coupon below — no obligation

A. J. Statile Co., Dept. 16 • Statile Building • Hillsdale 16, N. J.

Dear Mr. Statile:

Please send me complete FREE details telling me how I may obtain a franchised mail order dealership with your firm. I understand I am under no obligation and no salesman will call on me.

NAME..... AGE..... SEX.....

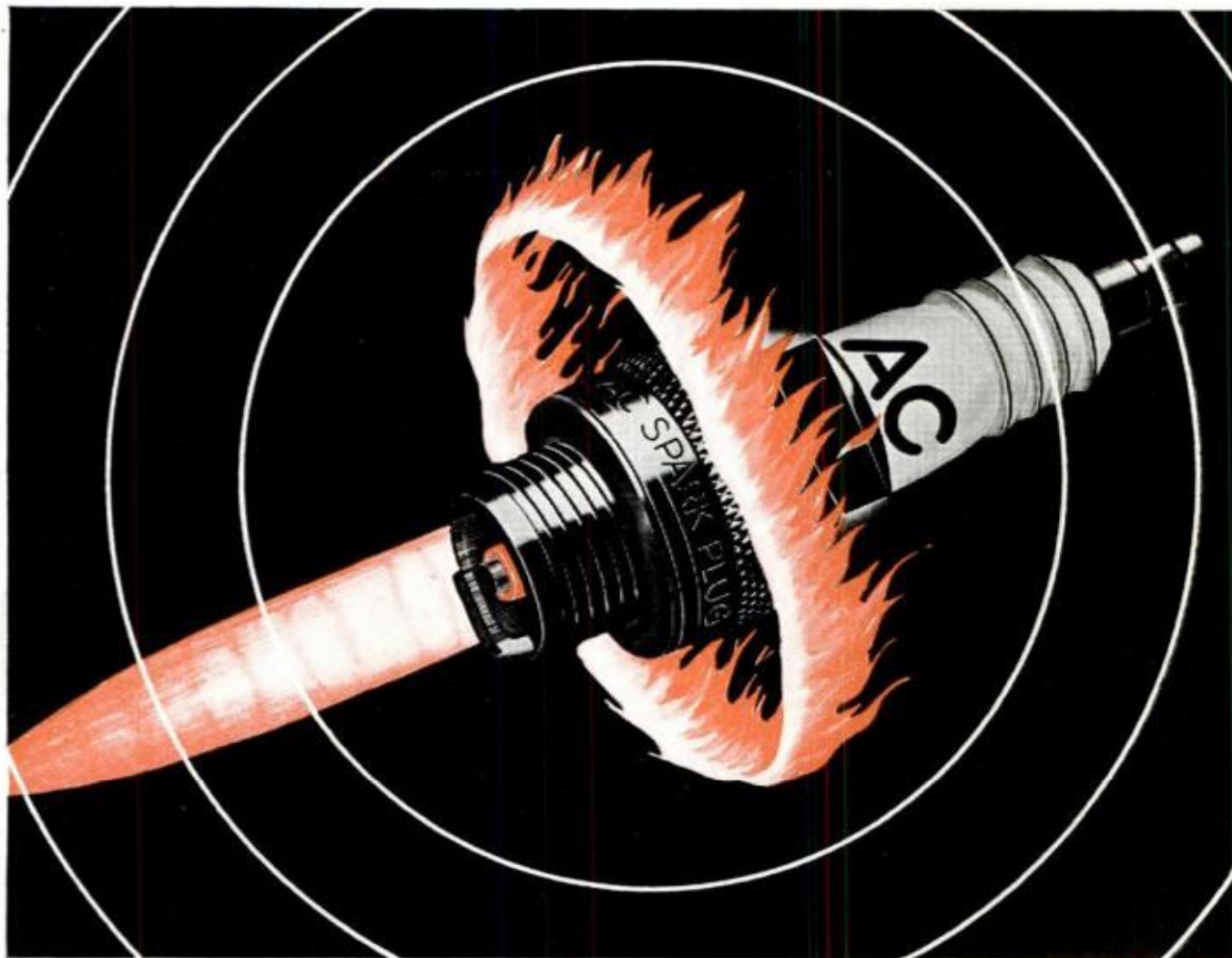
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(Advertisement)

POPULAR MECHANICS



Get maximum A**CT**ion from today's high octane with AC Fire-Ring Spark Plugs

AC Fire-Ring Spark Plugs are designed and built for the fast power-producing action of today's high octane gasolines and high compression engines.

Your selection of ACs for your car provides you with spark plug construction made-to-order for the tremendous pressures and temperatures of modern engine combustion. AC Fire-Ring Spark Plugs feature heat bonded inner seals for positive protection against gas leakage and overheating—

massive chrome-nickel-barium electrodes for longer electrode life—and the exclusive Hot Tip that heats faster, cools faster for sustained smooth power performance.

At your next spark plug change, get the spark plug made for the explosive action of high octane gasoline—and remember, you get AC quality only under the AC name. Ask for A**CT**ion . . . ask for AC!

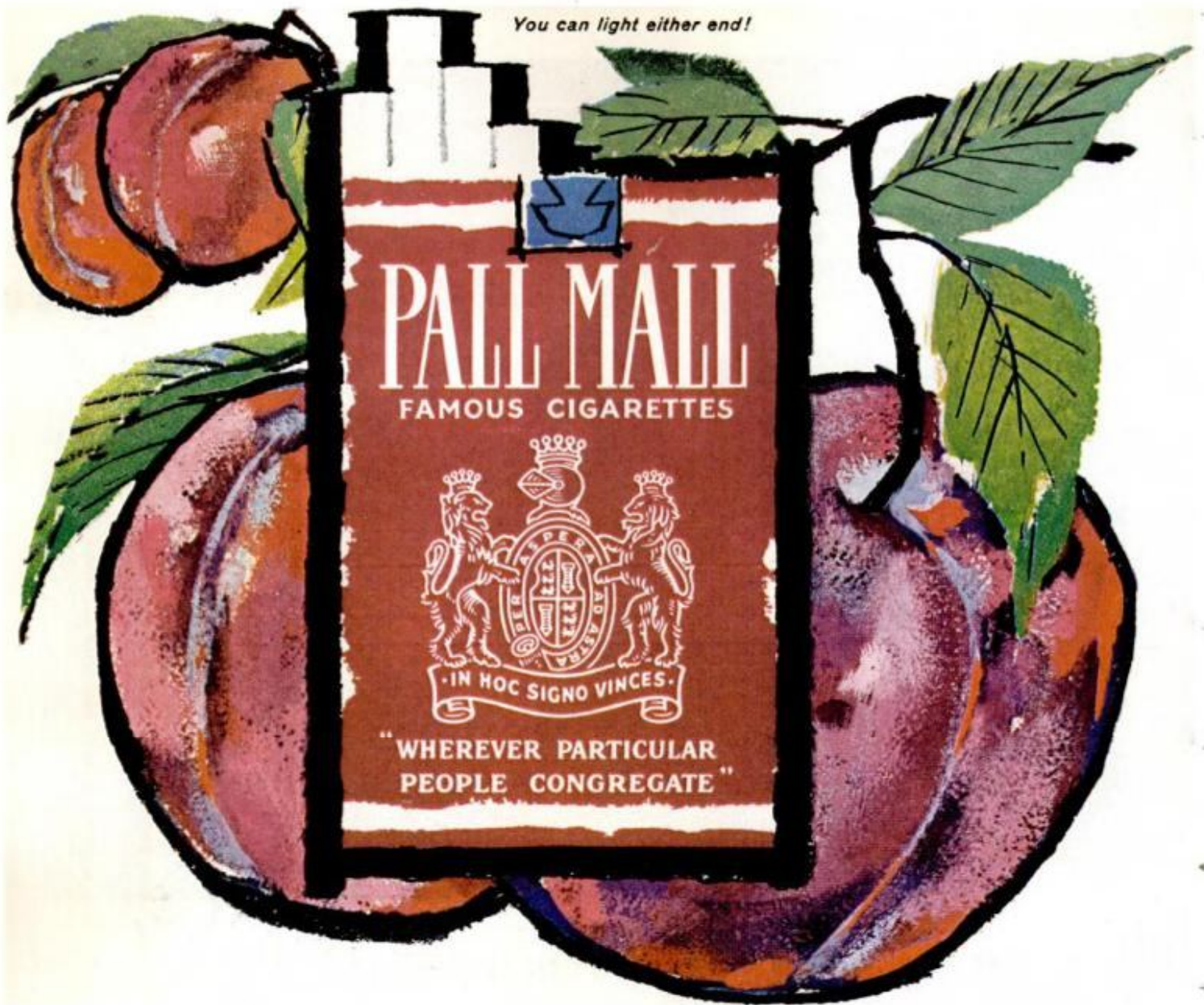
AC SPARK PLUG  THE ELECTRONICS DIVISION OF GENERAL MOTORS

powerful
you get **A**CT**ion** with



FIRE-RING SPARK PLUGS

You can light either end!



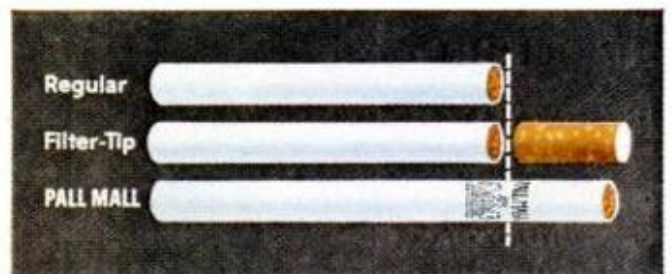
Pall Mall's natural mildness is so good to your taste!

So smooth, so satisfying, so downright smokeable!

See how Pall Mall's famous length of fine tobacco travels and gentles the smoke naturally — makes it mild — but does not filter out that satisfying flavor. Never too strong. Never too weak. Always just right! Enjoy satisfying flavor . . . so friendly to your taste.



Outstanding
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COMPARE ALL THREE! SMOKE "TRAVELED" THROUGH FINE TOBACCO TASTES BEST.

See the difference! With Pall Mall, you get that famous length of the finest tobaccos money can buy. Pall Mall's famous length travels and gentles the smoke naturally . . . over, under, around and through Pall Mall's fine, mellow tobaccos. Makes it mild . . . but does not filter out that satisfying flavor!

**EXCLUSIVE
FLIGHT TEST**



**By
Lou
Everett**

Test Pilot, Ryan Aeronautical Company

I Flew the

Pterodactyl Flex-Wing **Hottest Thing in Aviation**

NO ONE HAD EVER flown an aircraft like this before. It was a brand-new development of the Space Age. Yet at the same time it was a throwback to a flying machine in use millions of years ago.

The limp fabric of the arrow-shaped wing hung loosely from its supports. There were no control surfaces. The fuselage was an open platform on four wheels. In front, I was strapped to a seat from an old light plane and was holding the control wheel of a World War II bomber. Behind me the little 100-horsepower engine was warming up.

To a large extent the flexible wing was a nylon-and-aluminum copy of



MODEL GLIDER, left, and full-scale craft, below, show arrow-head shape of Flex Wing design



MAIN PARTS of craft are labeled at right. It's now being tested with 185-horsepower engine and rudder

the leathery membrane that the pterodactyls of the Jurassic Age used for gliding flight.

Would the odd craft fly smoothly, as we hoped? Would it snake violently from side to side or possibly pitch up out of control and crash? The first lift-off was going to answer these questions and a lot of others.

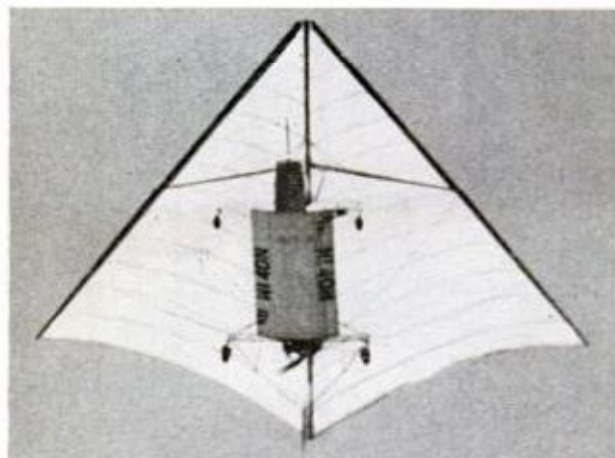
I advanced the throttle and the machine started down the runway. Overhead, the fabric ballooned up into its airfoil shape. At 30 miles per hour the machine was getting light and I eased back further on the control column. We were airborne!

My sensations were different from those experienced in any other aircraft. The platform remained level during the climb, and so the upward motion seemed like that of a helicopter. Now and then the platform rocked gently back and forth or from side to side in gusty air, yet the cloth wing remained completely stable.

I tried a turn, rolling the wheel to the left, and the plane began a slow left turn. The platform itself remained level; it was the wing that shifted and caused the turn. The airplane was performing beautifully.

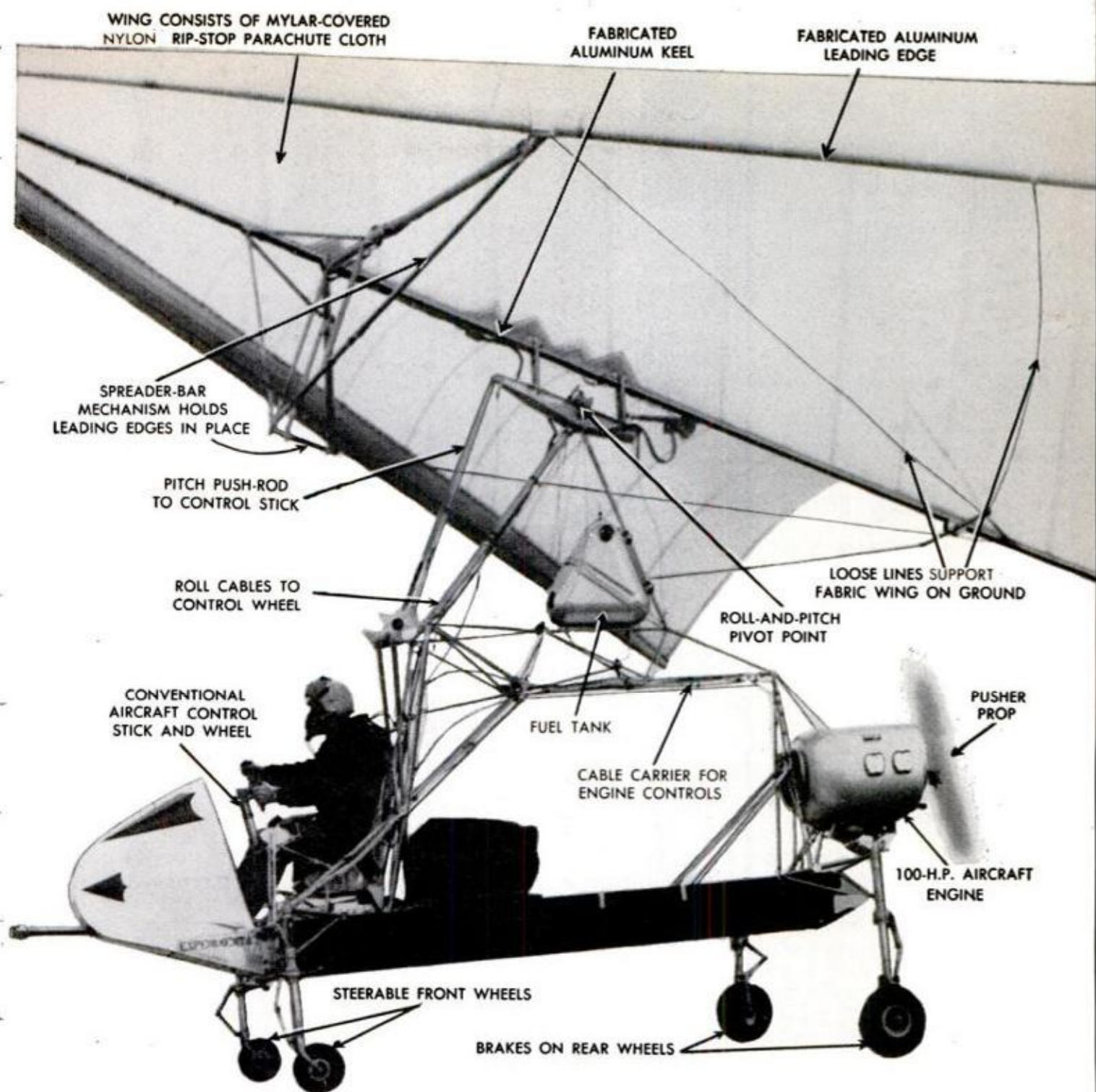
As project engineer and test pilot for the Flex Wing at Ryan Aeronautical Company I was feeling out the characteristics of a "test bed" that may be the forerunner of many different kinds of vehicles.

The Flex Wing may be an answer to the



RADIO-CONTROLLED MODEL goes through taxi tests at Langley Research Center of National Aeronautic and Space Administration. The principle of the flexible wing originated with Francis M. Rogallo of the NASA





desire for a cheap and roadable personal aircraft. It could be the solution to the Army's need for an airplane that requires no more training than learning to drive a truck. It might be used for towing cargo behind a helicopter, increasing the helicopter's pay load up to sixfold.

As a temporary auxiliary lifting device, it could help get heavy transports up out of short fields. Used literally as an airbrake, the lifting surface could reduce the landing speed of a Mach 3 transport from 220 knots to no more than 69 knots.

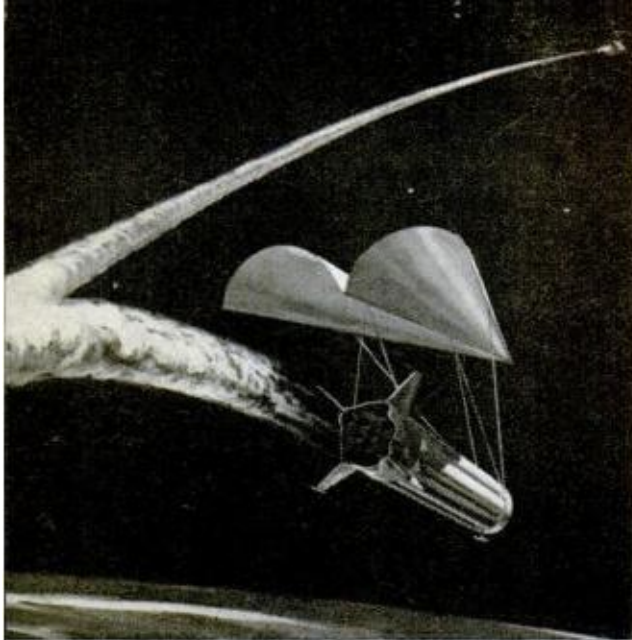
As a small paraglider it could allow a paratrooper to spot-land just where he wished. Collapsed to minimum space on the jump plane, it would automatically spread its leading edges when released. The para-

trooper could steer in any direction and control his rate of descent to land where he wanted.

Larger paragliders steered by radio are being considered for lowering heavy rocket boosters and space craft back through the atmosphere. In fact the first dramatic use of the Flex Wing may be for returning a Mercury astronaut's capsule to a slow landing at an airport, avoiding the hazards of an ocean recovery.

Our test bed at Ryan is not a prototype for a production airplane. It is for research alone, hence all its cables and linkages are exposed. We can make adjustments without opening a lot of panels.

Supported above the fuselage at a single pivot point is a V-shaped frame that con-



Wing will return rocket boosters, carry TV, tote cargo . . .

FLEX WING PARAGLIDER could bring burned-out Saturn booster back to earth

RADIO-CONTROLLED DRONE could be used for observation duties, relaying television pictures back to its launching site

sists of a central fore-and-aft aluminum tube called the keel and two side members or leading edges that sweep back from the nose of the keel to form an angle of 50 degrees. Spreader bars hold the two 28-foot side members in place.

Attached to this frame is the "rag" wing, 555 square feet of nonporous fabric. The original wing consisted of nylon sealed with Mylar but this has been replaced with Dacron cloth sealed with a resin as the Dacron is more durable in sunlight. The wing is simple, lightweight and inexpensive.

Control is by "C.G. shift" — that is, by shifting the plane's center of gravity in relation to the wing's center of pressure. The fuselage is literally hinged to the wing, so when the pilot pulls his control column back he actually moves the fuselage aft a

slight distance in relation to the wing itself. With the center of gravity moved aft, the wing automatically tilts to a climb attitude.

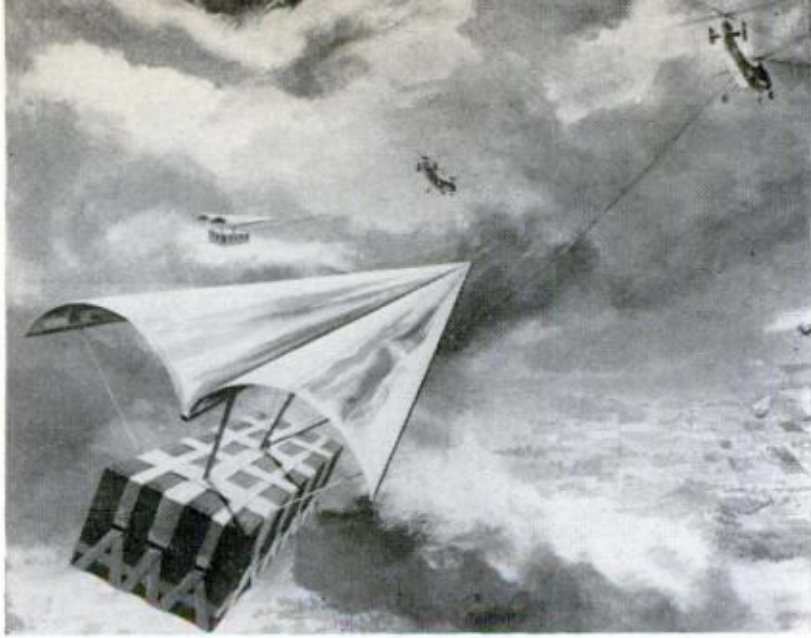
To descend, the pilot pushes the control column forward, moving the C.G. forward and causing the wing to reduce its angle of attack. To make a turn the pilot applies left or right wheel, shifting the C.G. so that the wing rolls in the desired direction.

A rudder was recently added to provide better control when taking off or landing in a side wind. The original engine has been replaced by a larger 185-horsepower engine to provide better climb characteristics. In a production aircraft a power-control system probably would be used, since it takes a heavy hand to maneuver the present machine. A simple power-control system can be designed. It would eliminate the rocking-chair effect created by air gusts.



DRONE for the Marines will resemble this prototype. It will be radio-controlled and can be used for such tasks as TV reconnaissance of the enemy

MOTIONLESS, the wing of the craft lies limp. The wing is composed of 555 square feet of Dacron cloth sealed with resin. It's a lightweight and relatively inexpensive wing



... and gently land paraglider troops

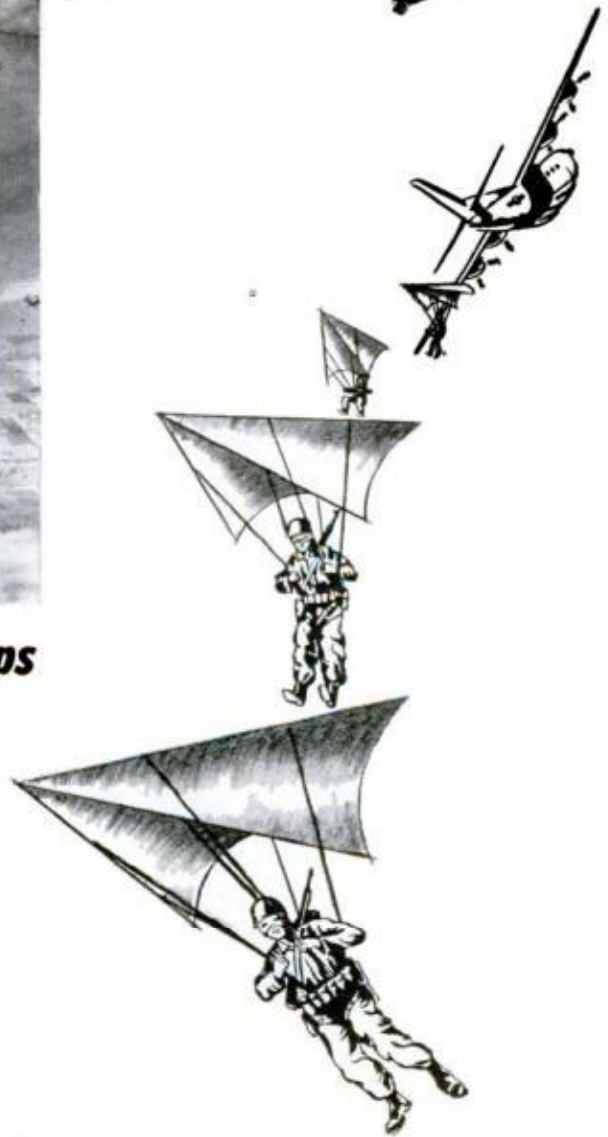
HELICOPTER may be able to increase payload as much as 400 percent by use of flexible-wing cargo carrier

Ryan has no plans at present for building a production Flex-Wing aircraft. The wing is not a high performance airfoil, though it is an efficient weight carrier. It could make a good slow-speed utility vehicle.

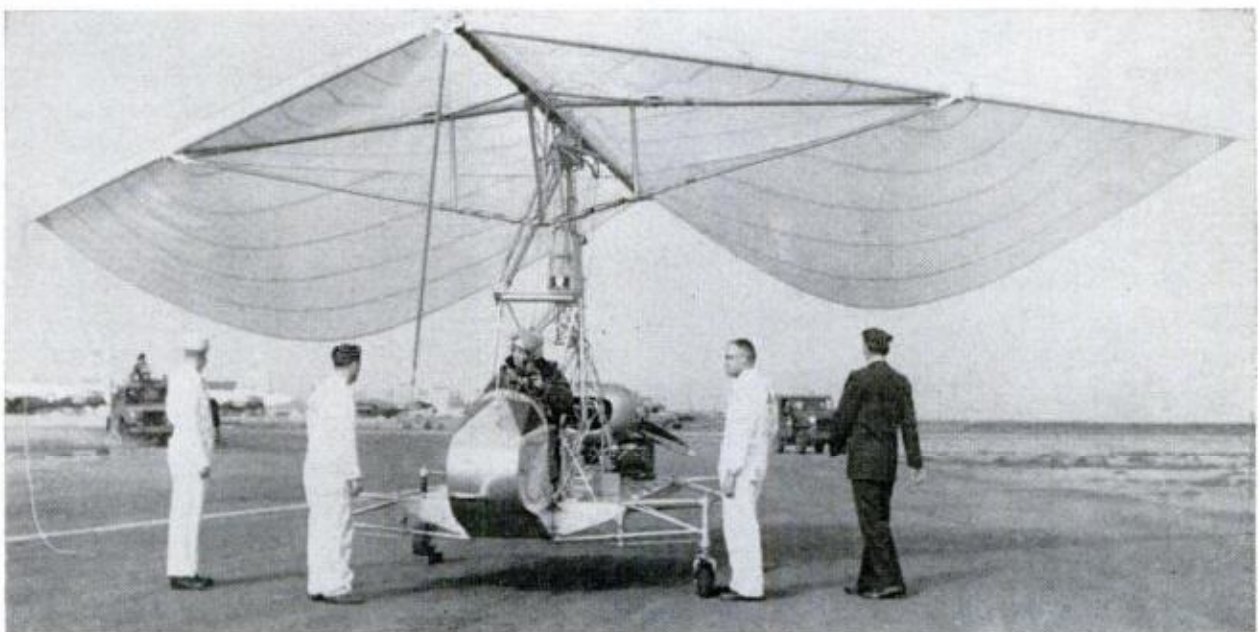
Cecil Craigo, program manager, suggests that a Flex Wing would make a very good flying pickup truck for, say, a rancher. It could be about the same size as the present test bed, trimmer in appearance with the control system enclosed in fairing. The present low platform would be retained for easy cargo handling and the landing wheels would be left exposed. Their drag is unimportant at low speeds.

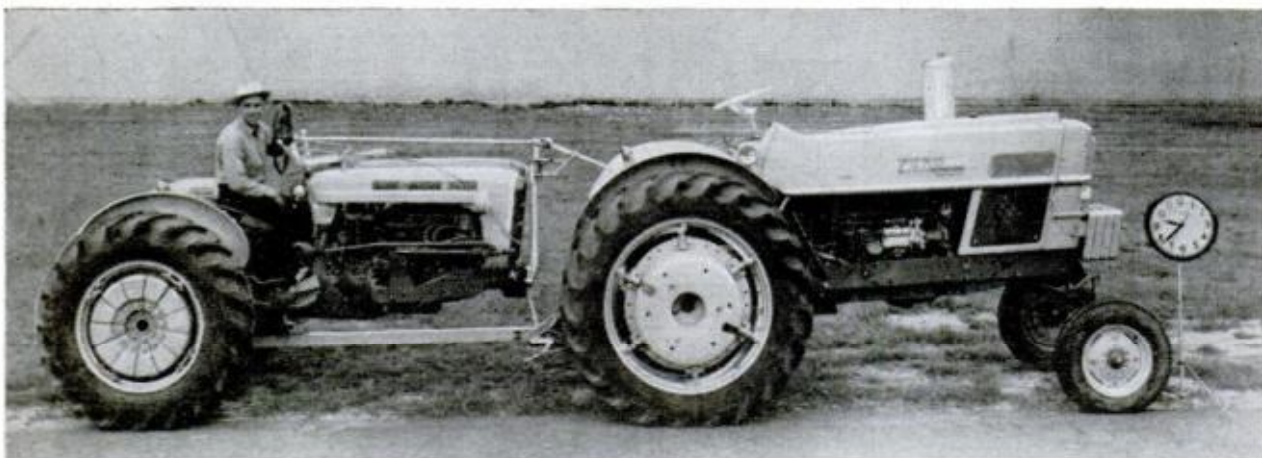
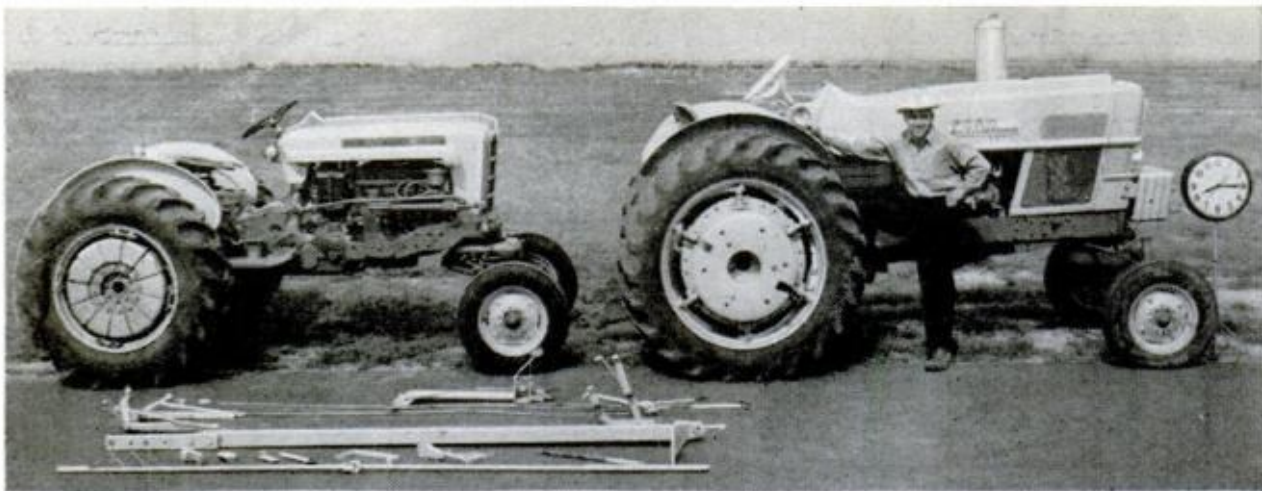
With the pilot and enough fuel on board for an hour and a half of cruising, the craft would weigh 1000 pounds and could carry 1000 pounds of cargo. It would take off in

(Continued to page 260)



TROOPS could come down swiftly, yet land gently. Maneuverability of wing would let them pick dispersed landing spots





Tractors Can Pair Up in a Tandem Team

One man can team up two tractors, one behind the other, to get a four-wheel-drive tandem tractor producing over 100 horsepower and capable of pulling seven and eight-bottom plows.

Developed by Ford Motor Co., the coupling of a general-purpose tractor and a Ford 6000 tractor (which has power-shift transmission that can be remotely controlled) takes about an hour and a half.



Mini-Bike From a Kit

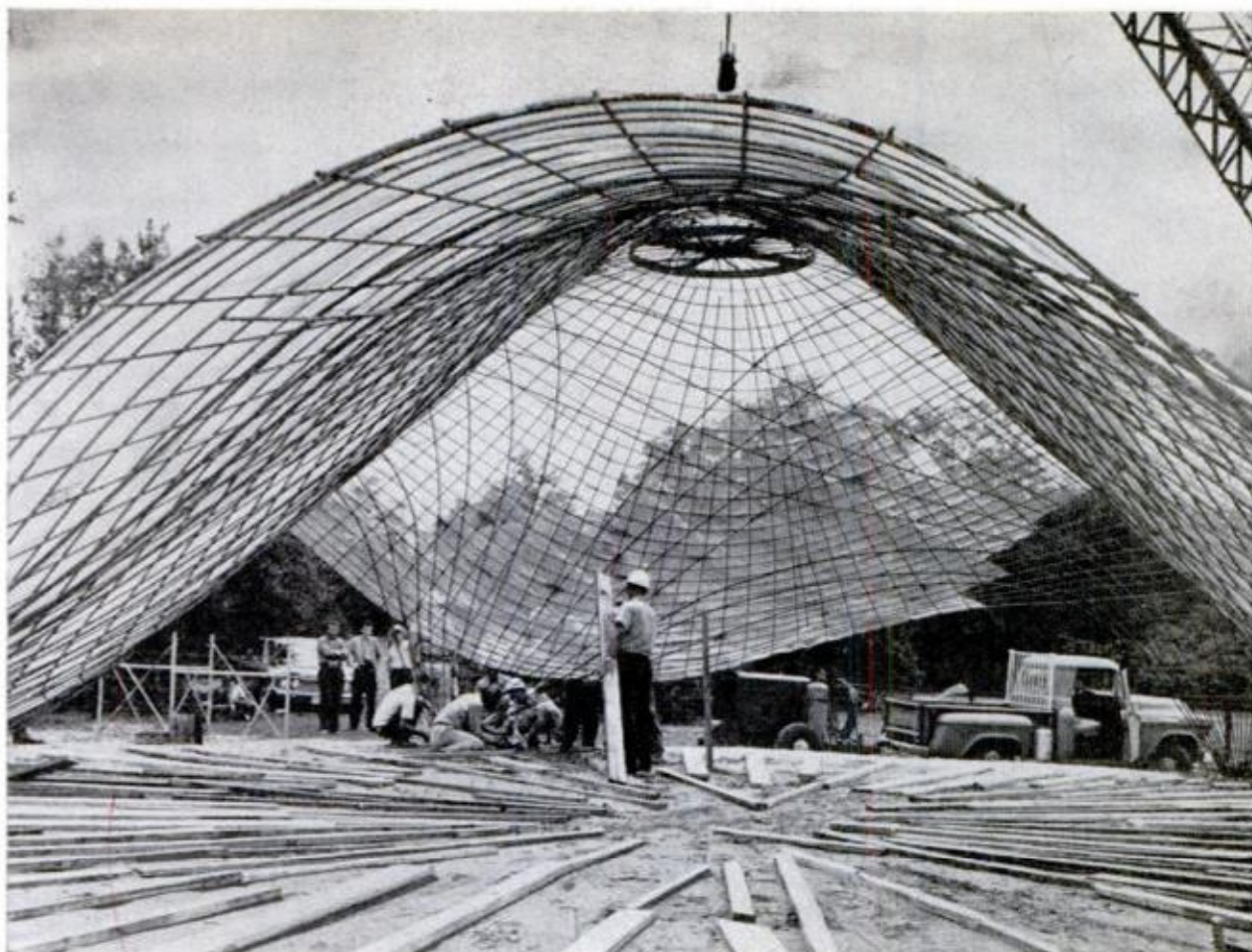
Do-it-yourself construction kits have appeared in the mini-bike field.

A St. Louis, Mo., firm has brought out three kits. One includes only castings and blueprints and sells for \$39.50; a second kit comes without engine, clutch, or gas tank and sells for \$119.50; the third, a \$149.50 kit, contains the complete works.

The last kit, with engine and all parts needed for a scooter, will make a buzz bike weighing 65 pounds. The two-cycle engine develops 2.5 horsepower.

Kits are available from O.K. Engineering Co., Box 2073, Benton Park Station, St. Louis 18.

So accurate is the bat's sonar equipment that it can dodge wires only slightly thicker than a human hair. The flying mammal can hear an echo from a target as tiny as a mosquito, compute its speed and direction, and swoop to attack in less than a second.



They're Raising the Roof—and Walls, Too

Builders are springing a new building into shape in College Station, Tex.

Metal lath and reinforcing rods are joined on the ground to form a flat shape. Then cranes lift the shape, and the legs of the

shell are drawn in, springing the building to proper form.

Concrete is sprayed on for body and structural support. The building was designed by Prof. James H. Marsh III.

Toothbrush Is Fountain

When the handle of a new toothbrush is placed against a faucet, the handle becomes a drinking fountain. It's always available to provide a rinsing swish after a person brushes his teeth.

The shape of the intake portion of the handle is such that it will fit all sizes and shapes of faucets says designer Harold Perry of Alexandria, Va. The stream of water may be directed to the distance most convenient for drinking purposes.

Children are encouraged to rinse bacteria from their mouth after brushing because they find the handle-fountain fun, says Perry. He designed the multipurpose brush to do away with the bathroom drinking glass, and as an aid for traveling men and service men.







THIS WAY, PLEASE!

By Richard Dunlop

EVERY YEAR Andy Frain's ushers show 30 million people to their seats. They shepherd crowds safely and comfortably not only into ball games, hockey matches, prize fights and national political conventions but to funerals, society weddings and store openings. All of this moved Chicago sports writer, John P. Carmichael to dub Andy "Head of the House of Usher."

"We handle 75 to 80 events a day," Andy calmly says, his blue eyes twinkling behind horn-rimmed glasses. "Given 48 hours notice, we can muster 20,000 ushers."

On a single night Frain, the world's foremost crowd engineer, will often have 7000 men on duty in 22 cities from coast to coast. They will take tickets, fend off gate-crashers and break up crowd bottlenecks. If need be, they will call a doctor, stop a riot or put out a fire. At Chicago's Marshall Field and Company Andy Frain ushers every day warn customers to watch their step on the escalators. They also handle the crowds at the Kentucky Derby. At a wedding they may park the cars, and at funerals they are often retained as professional mourners and pall bearers.

Months before a big public event a phone call comes into one of Andy Frain's regional offices or into his Chicago headquarters in a shabby building across West Madison Street from the Chicago Stadium. Andy likes to take these calls himself. As he listens, he doodles with a red pencil on a sheet of paper. He jots down the essentials.

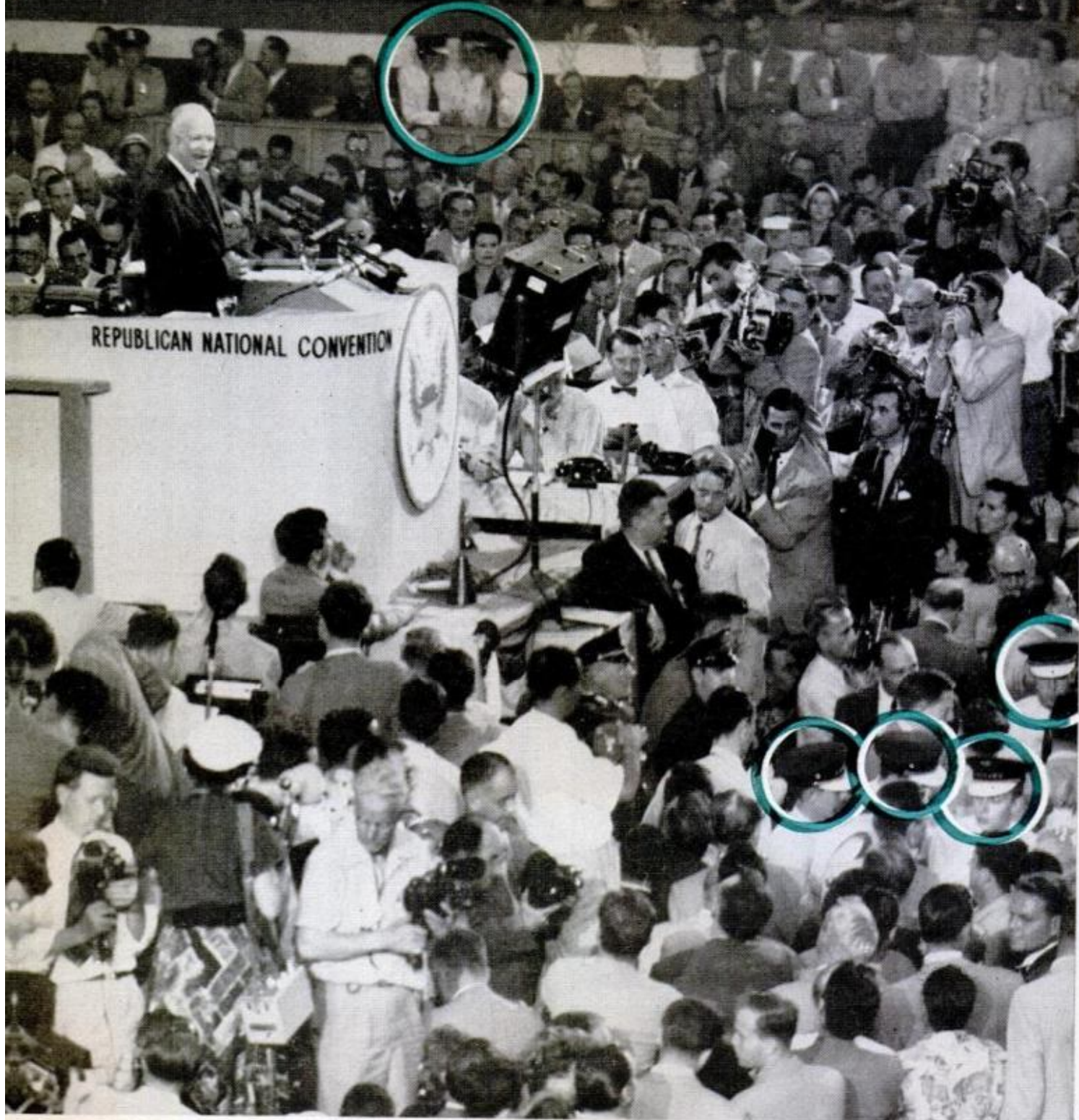
"Thursday, 29, September, the President," he writes.

"Are you going to have seats in the foyer or the grand ballroom?" he demands. "What about the Secret Service? You'll have a lot of crashers—a lot of people who just want to see the President. First thing we'll have to do is to go down to the hotel and look it over."

Although Andy knows from experience every important public gathering place in



ANDY FRAIN, above with son Mike in uniform, eases a record crowd into Chicago's McCormick Place. Below, ushers march opening day crowd into Navy Pier



ONE PRESIDENT, seven Frainmen and a small section of a national political convention crowd—one of the toughest to handle. Big crowds, mob demonstrations and hundreds of gate crashers give the ushers a real workout

PLANNING convention strategy and tactics, Frain and usher supervisor use map of Chicago's International Amphitheatre to plan crowd flow, station ushers, and to anticipate traffic jams and potential trouble spots



TOTING giant balloons in a Christmas parade is all in a day's work—this group may be pallbearers tomorrow

the United States right down to such intimate details as the location of the wash rooms and the air-conditioning ducts, he always tries to start a new job with a visit to the premises. There he studies entrances, exits, seat locations and the degree of ramp rise. He locates aisles, gates and parking lots so that he will know where to post his ushers, doorkeepers, and ticket takers and where to base his trouble shooters. He plots crowd movements, overflows and bottlenecks with the skill of a materials handling expert laying out a modern factory. Rest rooms and refreshment stands are noted on the maps as he works up his grand strategy.

In one respect he is a stickler. He has a fireman's hatred for locked doors and absolutely refuses to take a job unless every exit door in the place will open easily. In the days before Frain the sergeants-at-arms at national political conventions kept all the building doors locked to keep out intruders. Andy would not agree. He finally compromised by sealing the unlocked doors with easily torn strips of red paper. To be sure that the doors would not be opened except in emergencies, he started a rumor that the sealing had been done by the U.S. Secret Service.

As Andy wanders about the cavernous

emptiness of the Miami Beach auditorium or huge new McCormick Place in Chicago he makes careful estimates of the number of people who can pass a given spot in a minute or in an hour. He compares crowd movements which his men, counters in hand, have tabulated in other places. For example, if he is called upon to take children through the toy department of a Denver department store to meet Santa Claus, he can study the figures he has compiled over the years conducting youngsters to Saint Nick's lap at Marshall Field's. He knows that he was able to move 257,456 visitors through the corridors of Chicago's Merchandise Mart to see the Brussels Fair exhibits on display there and that at nearby Medinah Temple for 29 days the crowd moved at the rate of 9195 people a day or 1150 per hour. Using these figures, he can estimate accurately crowd flows in similar circumstances elsewhere. His estimates are rarely off more than 50 individuals an hour.

"Crowd flow is one thing," admits Andy with a shake of his head, "but crowd behavior is another."

Andy knows, for example, that an afternoon crowd of ball fans is easy-going and sunny. They rarely drink more than a little beer and cause little trouble. The only rancor they feel is directed towards the umpire. Evening crowds are more difficult, tending to reflect the day's frustrations and fatigue. Football fans drink more than baseball fans and are quarrelsome, but the real troublemakers are fight fans.

"About the third or fourth round of a tough match, everybody's blood pressure is way up," explains Andy. "When the usher tells you not to smoke, you just punch him."



TOURING an empty auditorium before the crowd arrives, Frain and a chief make last-minute arrangements

Crowds differ around the country too. As might be expected, a Miami crowd takes an hour to enter a stadium while New Yorkers, keyed up to what Andy calls a "grab-a-sandwich-and-rush mentality," would take only half that time. Detroit and Chicago crowds hustle too, but folks in St. Louis, Louisville, Nashville and Knoxville or any

RESOURCEFUL FRAINMEN remove a hysterical Elvis Presley fan the hard way—over the heads of the crowd





BRITAIN'S QUEEN ELIZABETH visits Chicago, and Frain (right center) and his men worked with police for two wild days to control crowds of millions of curious, enthusiastic greeters who followed her everywhere

place in Texas are slow. Just to show that it is not entirely a matter of climate, Andy points out that Minneapolis crowds take their time too.

"You can seat more Southerners in a given amount of space than Northerners," observes Andy. "They are not only friendlier, but they don't wear the bulky overcoats that take up room in the North."

Stormy Tempers

Andy studies weather reports for the day of a big event. He has learned that if the weather is cool, a crowd will arrive briskly just before game time setting up a traffic of up to 2500 persons an hour through each turnstile in a big-league ball park. If the weather is warm, the crowd arrives early at a rate of about 1000 persons an hour through a turnstile. Rainy weather brings late crowds to an indoor event. Bright, clear weather often means there will be vacant seats. When the weather forecaster predicts thunderstorms, the people are in as threatening a mood as the weather, and he braces his men for the outburst of temperament that he knows will break with the arrival of the crowd.

Long before a major event the tickets are printed. Andy prefers to be in on the ticket planning. He then can see to it that the ducats are big, easy to read and imprinted

on a special cardboard which is difficult to counterfeit. Through an ingenious system of ticket colors and numbers he directs people to their proper gate. Ordinarily, the colors indicate the area, and the numbers the gate. If Andy's on-the-spot studies show that Gate One will take 3000 people an hour, Gate Two 2500 and Gate Three, 3500, he has the printer run off the right number of tickets to give each gate an efficient rate of flow.

Once Andy has determined his master strategy, he sets up his vaunted triple-defense system, which he first introduced to the 1932 Republican Convention in Chicago.

"The system we put in at that convention is still the one we use today," he says. "There was a front line of ticket checkers at the outer doors. They saw that the people had tickets. Then there was an inner line of ticket takers at the turnstiles. Backing them up at every gate was a roving trouble shooter."

At the World Series Frain ushers shout directions through megaphones directing knots of bewildered ticket holders to the right turnstiles. At most events ticket checkers are located at least six feet before the turnstiles to keep the crowd from mushrooming before the ticket takers. "A mush-

(Continued to page 248)



SCIENCE OVERSEAS

By William Kreh

The secret of a good golf swing? Six English scientists have begun a three-year project to try to find it.

"At present," says Sir Anynsley Bridgland, president of the Golf Society of Great Britain, "the ingredients that constitute the perfect stroke are not known. Many famous golfers have tried to explain the secrets of their performance, but when observed in action do not practice what they preach."

The researchers will examine the muscle action of a perfect golf swing, set up a formula for it, and then try to mass-produce the swing.

A super-bathyscaph has been launched by France for exploration of the greatest ocean depths. Named *Archimede*, this 61-ton underwater explorer will go into operation early next year with one of its first missions reported to be probing of the 34,000-foot-deep Kuriles Pit of northeast Japan.

The *Archimede* will be able to bore holes and take geological samples, and collect specimens of marine life. It will have a two-man crew.

When Israel shot off its first rocket recently, it was called Shavit II. Naturally, people wondered what had happened to Shavit I. The explanation: There wasn't one.

Calling the rocket Shavit I would have required using the Hebrew letter Aleph. This is the symbol of the political party Mapai, and possibly would have been regarded as electioneering for the campaign that was going on at the time of rocket's launch.

Women, have been fixing their faces for at least 1900 years. Archeologists excavating a 1900-year-old Roman cemetery in the Syrian city of Homs found one tomb containing a woman's skeleton which also held ivory boxes of white face powder, eye-shade sticks, tubes of perfume and ivory hairpins.

Russian "super race" experiments were revealed recently by Dr. R. A. McConnell of the University of Pittsburgh. According to Dr. McConnell, the Russian biological experiments indicate that scientists could "speed up the evolutionary process so that

perhaps 50,000 years of development will take place in the span of a lifetime." The purpose would be to quickly develop a race with high creative and intellectual ability.

Hawaiian Institute of Geophysics scientists are going to attach tide gauges to an abandoned communications cable running between Hawaii and the U.S. mainland. The pressure gauges will warn the islands when a tsunami wave is heading their way.

The 400-mile-long cable will be hoisted to the surface, pressure gauges added, then lowered in several hundred feet of water.

The gauges will measure the height of the wave by deep-sea changes in pressure. This information then will be sent back to the islands over the cable.

Rising at Parkes, Australia, is a radio telescope that will be able to track satellites better than any Russian or American equipment.

It will be 210 feet across, cover an area as big as a football field, and cost \$1,800,000. Scientists say it will be the most refined in the world and second in size only to the 250-foot dish at Jodrell Bank in England.

A team of Swedish doctors, in Uppsala, say they've found a new method to tell pregnancy within 90 minutes. The method, based on an analysis of the presence or absence of hormones in a test tube, is cheaper and more accurate than other biological tests, which may take weeks. Co-discoverers Prof. Carl Bemzell and Dr. Leif Wide have made more than 1200 tests, all of which provided accurate results.

Future ships may no longer knife through the waters with sharp-edged prows. Experiments by Prof. Takao Inui of Japan have shown that a bulbous bow can result in a large reduction of power requirements from a ship's engines.

The *Kurenai Maru*, a 3000-ton passenger vessel, was equipped with a whale-shaped bulbous bow, following recommendations of Professor Inui. Tests with the ship verified his findings with models that ships equipped with bow and stern bulbous fittings—rather than those that are knife-edged—need from 20 to 25 percent less power. ★ ★ ★



DESIGNED BY GHIA and built by Karmann, this sports coupe fits on 94.5-inch-wheelbase VW 1500 chassis

New VW 1500 Sports Specials

AFTER THE announcement of the new VW 1500 passenger sedan and station wagon by Volkswagen (PM, July 1961, p. 81) it was only a matter of time before the luxury versions of the new car would appear. There are three new models, all built by Karmann of Osnabruck, West Germany on stock VW 1500 chassis. First, there's a convertible with 4-5 passenger capacity which utilizes many of the VW 1500 sedan's body parts, much as the present

Volkswagen convertible utilizes such parts.

Next are the companion two-passenger models designed by Ghia of Italy and built entirely by Karmann on the VW 1500's platform chassis. There is a hardtop coupé and a convertible. All three new 1500s are powered by the new 53 horsepower air-cooled four-cylinder engine. The new Karmann VW 1500s are not expected to reach salesrooms before spring of 1962. Prices as yet are unannounced.

USING AS MUCH as possible of VW 1500 body sheet metal this convertible has two trunks, and seats four





PM EDITORS Dick Kirkpatrick (left) and Don Dinwiddie and research chemist Dr. Caroline Miller (center), study dissected baseballs and results of chemical analyses of their component materials as reported in October PM

FOR THE HOT-STOVE LEAGUE: More on Those Baseball Changes

AS THESE WORDS are being set in type, crews of researchers are still working on the tests we began in last month's issue. At Armour Research Foundation, a chemical analysis team is completing their qualitative and quantitative comparisons of the materials built into major league baseballs from several periods. Down the hall, a mechanical test crew is assembling a machine that may be the world's most complicated fungo bat. It will swat dozens of sample balls with an actual bat to measure their "liveliness." And down the street, on the campus of neighboring Illinois Institute of Technology, a wind tunnel expert is studying the aerodynamics of a batted base-

ball. As these crews add findings to a growing stack of reports and opinions, evidence is beginning to mount up. The 1961 big league baseball is not an exact duplicate of the ball that Babe Ruth put out of parks 60 times in 1927.

Chemical tests have shown that materials change from year to year. Rubber-and-cork core composition has definitely changed. The rubber layers around the cork core show some variations but a spectrographic examination of the rubber itself, shows that it has remained pretty much the same.

Thickness and weight of wool and cotton yarns used in the windings have varied. And because any changes in yarns may

require—or cause—changes in winding tension, and since winding tension affects the liveliness of the finished ball, we should get some interesting performance figures in that area.

Some Wind Tunnel Findings

The wind tunnel tests showed that several 1961 baseballs had higher, wider seams than a 1927, a 1929 and a 1931 ball tested. These create a rougher surface and a boundary layer of greater turbulence near the surface of the new balls, which helps insulate them from drag effect. As a result, the drag coefficient of the new balls tested was 10 to 20 percent lower than that of the old balls. This means it should be easier for the new balls to travel farther. Actual impact tests will help determine whether this could make the difference between a long fly ball and a home run.

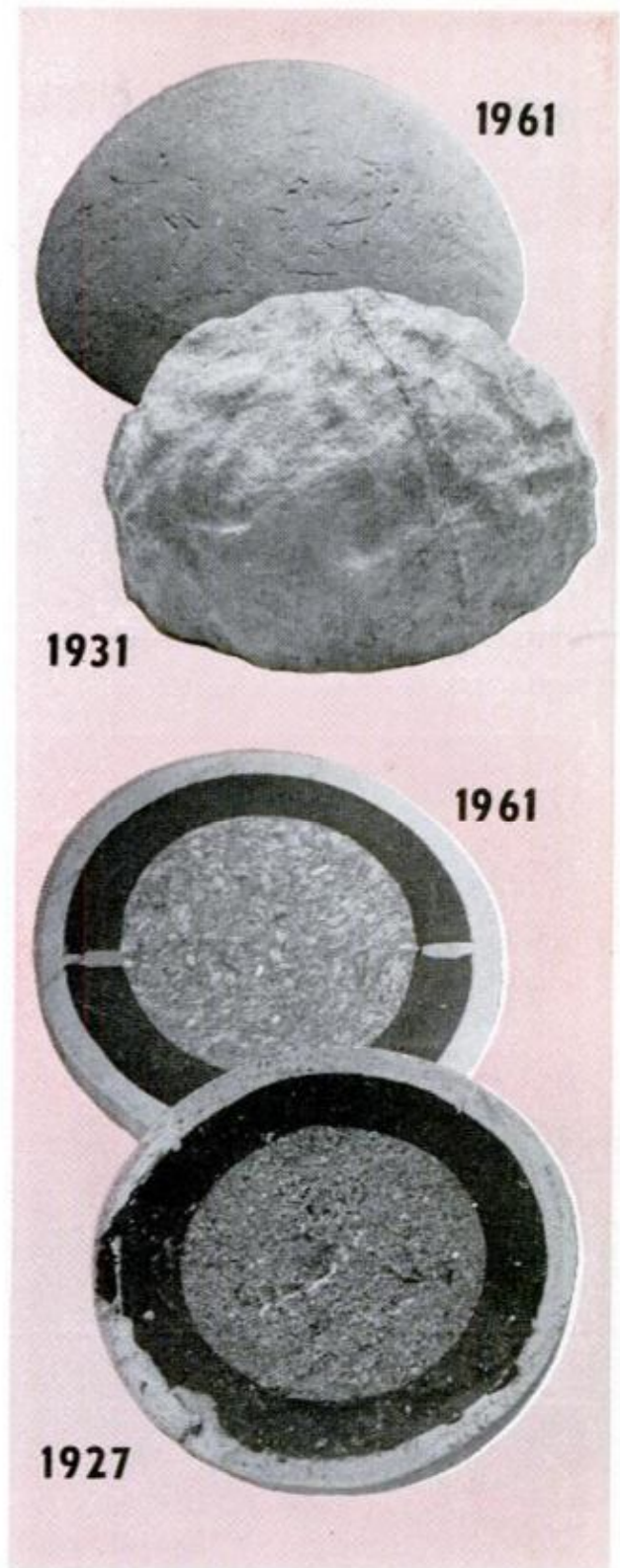
In the meantime, if you have an old Major League ball handy and care to check it against "specs" of what it should have in it, here they are:

The modern cushion cork centered ball, being used from 1926 to the present, begins with a $\frac{1}{16}$ -inch ball of cork composition with a small percentage of rubber added. Twin black rubber shells $\frac{5}{32}$ -inch thick are fitted over the cork with a thin red rubber "washer" between the edges. Over the black rubber goes a red rubber shell $\frac{3}{32}$ -inch thick; the resultant rubber core is a ball $4\frac{1}{8}$ inches in circumference. The twin-shell technique ended an old problem; molding a single rubber layer around a cork core often squeezed the cork out of round.

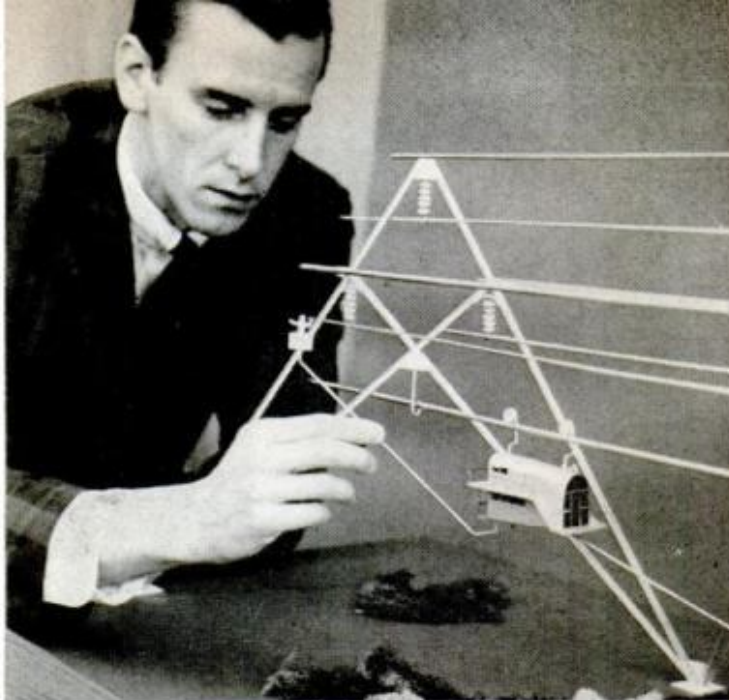
Over the rubber core goes a winding of 121 yards of coarse four-ply Australian blue-grey wool yarn to make a $7\frac{3}{4}$ -inch ball, then 45 yards of three-ply white wool yarn to bring it to $8\frac{7}{16}$ inches in circumference. An outer layer of 53 yards of three-ply blue-grey wool yarn brings the size up to $8\frac{3}{4}$ inches. The final winding is 150 yards of fine cotton, which is coated with rubber cement to prevent unraveling. The cotton winding brings the size to $8\frac{7}{8}$ inches.

The cover is made of two identical "figure eights" of carefully-selected horsehide leather from .050 to .055 inches thick. Each is punched with 108 stitch holes around the outer edge. The cover halves are wet, then hand stitched into place with about 88 inches of five-strand thread, waxed to resist the tanning agents used on the horsehide.

Those are the basic specifications on the baseballs we are testing. And as soon as all of our returns are in, we'll give you what should be a conclusive report on whether a "rabbit ball" does or does not exist.

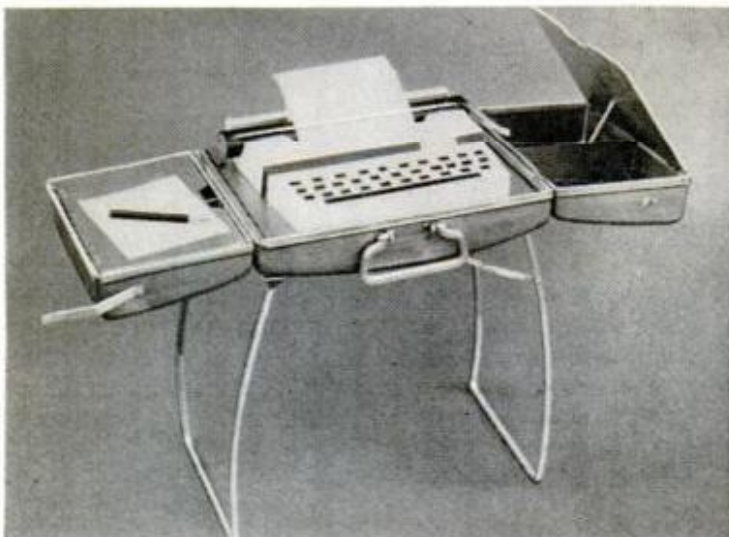


THE CORE of the problem? Outer rubber center of '31 ball, top, shows marks from yarn windings not evident on '61 counterpart. Softer rubber or tighter windings? Core cross section of '27 ball, bottom, shows almost same basic structure as '61 core, but seems to have been made by a different method, and composition cork is denser and almost 40 percent heavier. A heavier core requires less yarn to bring the ball up to weight. Do loose windings make a softer ball?



MULTI-SYSTEM'S monorail car can repair the utility structure

PORTA-DESK, less than twice as thick as portable typewriter case, holds typewriter, paper, folds to desk



Ideas in Aluminum

Students in design schools, tackling an aluminum-design project, dreamed the metal into some exciting shapes.

They include an overhead system that supports electric transmission lines as well as a monorail transportation system. The Multi-System structure is braced by pipelines that carry oil and gas.

Another student designed an electric-powered runabout to retail under \$1000. Top speed is 30 miles per hour. It weighs 1000 pounds and ranges 60 miles on charge of six batteries.

These were among the projects shown by students in the 1961 Alcoa Student Design Merit Awards competition.

Restarts Hearts

Moving a rubber block up and down to compress and release a patient's chest once per second, a machine called the external artificial circulator mechanizes a new closed-chest heart resuscitation technique.

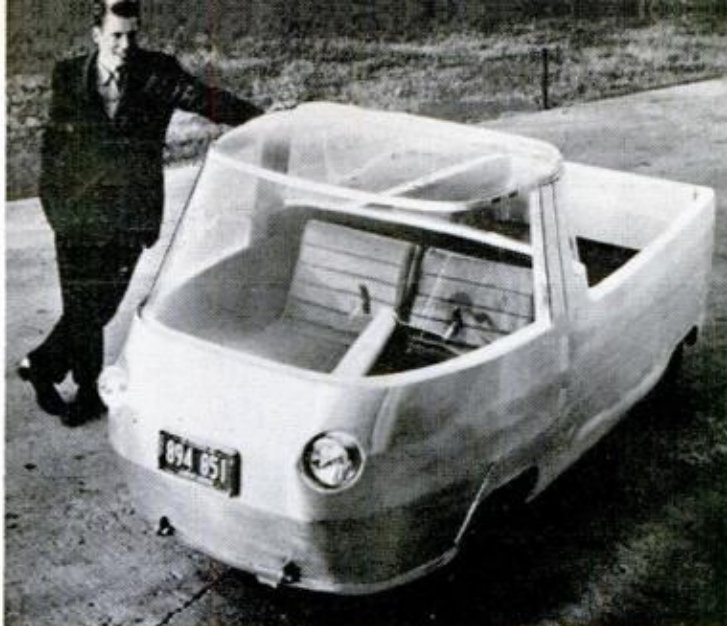
It consists mainly of an electric motor and gear box on a table that can be positioned above a supine patient. A plunger with a fist-sized rubber block is attached to the gear box through a hole.

Developed by two Oregon doctors, the machine was recently reported in "Medical News."

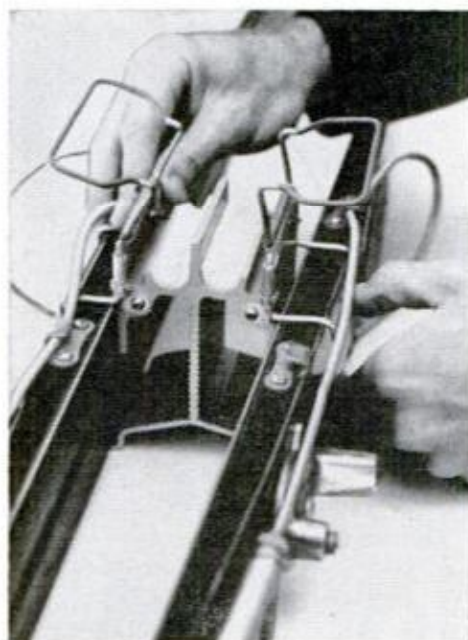




SKI TOTE weighs 10 ounces and holds skis and poles with pairs of pivoting clamps



ELECTRIC CAR is 54 inches wide, 117 inches long, has tilt cab. Tuberosity chair supports all sizes with three rubber cups



Sonar for Divers

Where are the fish? How deep is the lake? Is the car sunk over by the snag?

These questions are answered for divers by a handheld sonar system that operates at depths to 200 feet. It shows distance to large objects over 100 feet away by a light that flashes on a dial.

The unit is seven inches in diameter, eight inches long, weighs 11 pounds in air and is slightly buoyant in water. A battery powers it for 40 hours. Available at \$195 from Raymond Development Co., Watertown, Mass.



Performance Report on the New Ford Fairlane

By Jim Whipple



SOFTLY SPRUNG Fairlane sedan will lean a good deal in cornering but handles well, goes where you aim it

ALTHOUGH IT IS in fact a totally new car, Ford's 115.5-inch-wheelbase Fairlane represents the return engagement of an old favorite—the traditional “family sedan.”

And it might be added that Fairlane's appearance on the automotive scene is supposedly a result of “popular demand” for the size car represented by Fords, Chevies and Plymouths of 1949 through 1956. If you recall, those were the days before the “low-priced three” became (including Dodge and its protégé Lancer) “the widely-priced ten.”

A comparison of the Fairlane's basic specifications with an average of the corre-

sponding specifications of Ford, Chevy and Plymouth V8s of 1955 will prove how closely its dimensions mirror those of the popular-priced 1955 V8 four-door sedan:

	'55 Low-Priced Average	'62 Fairlane
Wheelbase	115.1	115.5
Length	199.3	197
Width	74	71
Height	61.0	55.5
Weight	3192	2921
Horsepower	163	143

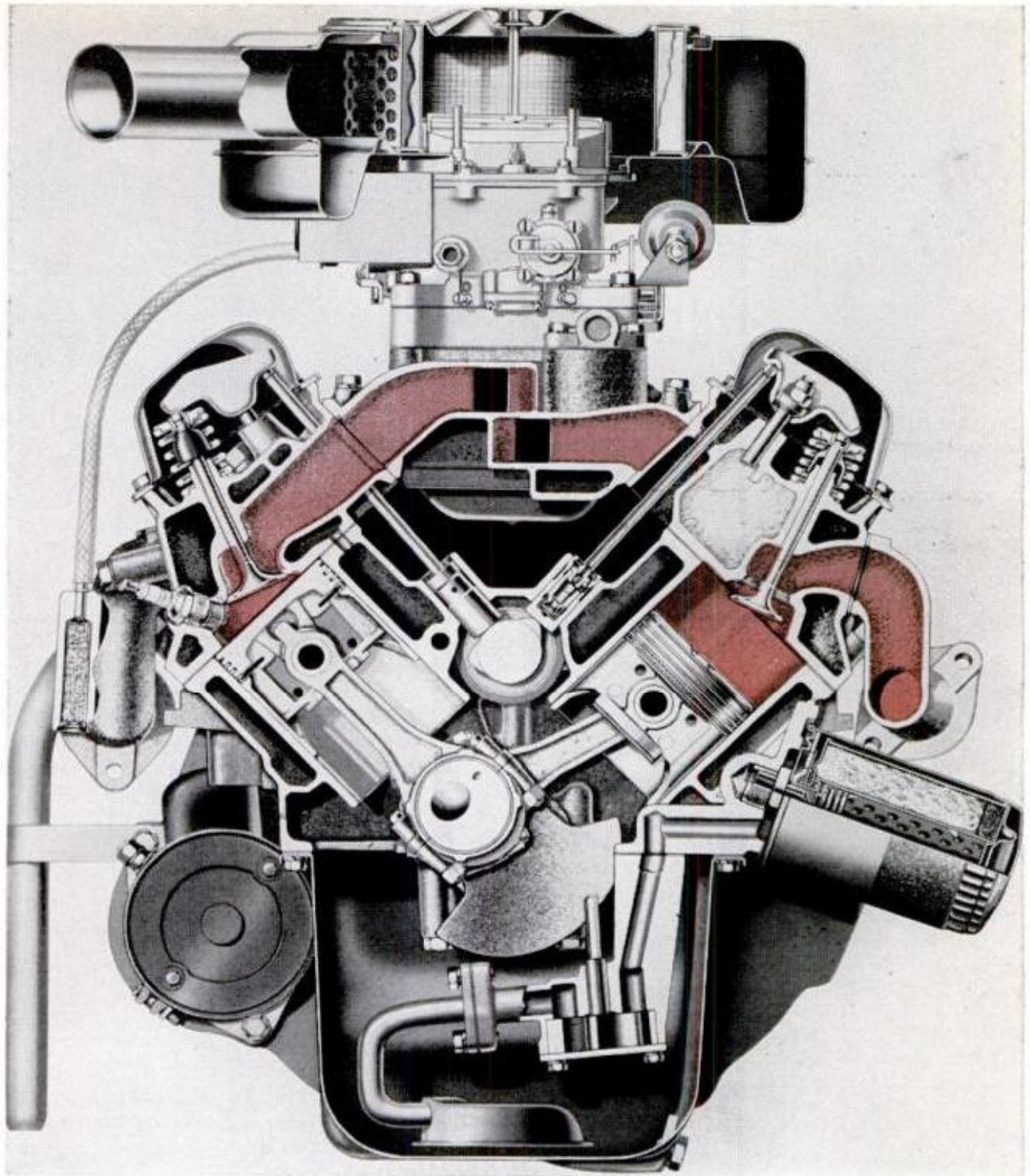
The greatest differences are in weight, height and horsepower. And these differences themselves reflect not so much a change in character or capacity as the ad-

SQUARE TRUNK has 29 cubic feet of useful, accessible space. Filler for 16-gallon tank is in the center



HOODED DIALS make up instrument cluster of speedometer, fuel and temperature gauges, warning lights





SHORT BLOCK, SHORT STROKE V8 is Fairlane's optional power plant. It develops 143 b.h.p. at 4500 r.p.m. Color shows path of fuel mixture from dual carburetor direct to intake valve, left. Short route for exhaust is shown at right. Note stud-mounted rocker arms of cast iron. They are lubed via hollow push rods

vances brought about by space and weight-saving unit construction that permits the same passenger and luggage space as in the heavier body and frame cars of the '50s.

What we have in Fairlane then, is not just another compact, but the logical development of the 1955 Ford, including all the advances in engineering, that might have taken place had Ford (along with its competition) not gone into making longer, lower, wider cars.

The '62 Fairlane offers just about the same array of power options as the typical

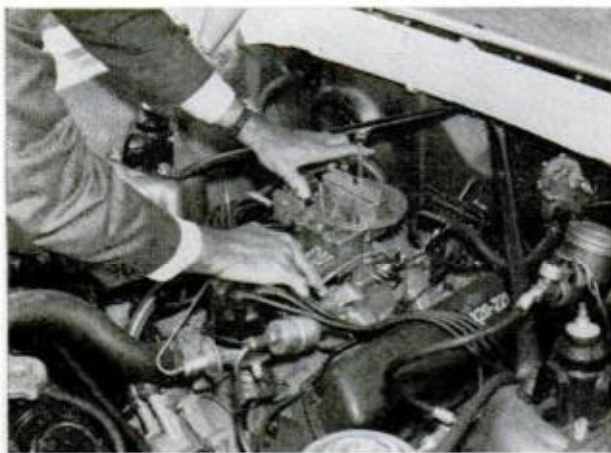
low-priced car of 1955. There's a choice of the new 221-cubic-inch V8 of 143 horsepower, or the 170-cubic-inch six-cylinder engine of 101 horsepower—the same one that's an option on Falcon and Comet.

With either engine you can get two-speed (plus torque converter) automatic transmission or three-speed manual synchromesh with column shift. As an economy plus for V8 buyers, overdrive is available with a gas-saving 3.50 axle ratio.

Other V8 axle ratios are 3.00 to 1 for automatic transmission and 3.25 to 1 when



SOLID, SENSIBLE and conventional lines with typical Thunderbird roof profile mark Fairlane 500 for as one of the Ford family. The wheels are 13-inches, tires 6.50, and brake drums are 10 inches in diameter



DISTRIBUTOR, CARBURETOR and other top-of-the-engine items are easily serviced. Plugs take reaching

car is equipped with manual transmission.

Sixes are equipped with 3.50 to 1 axles combined with manual transmissions and 3.20 to 1 when equipped with automatic. Power steering of the link-boost type is optional on all but manual-transmission sixes.

In performance the Fairlane V8 will equal or better the score of its 1955 Ford ancestor. PM was given an opportunity to test drive a Fairlane four-door sedan with V8 and automatic transmission for a day at Ford's mammoth Romeo, Mich. proving grounds. With two other men aboard we rolled up over 80 miles on winding black-top, gravel and on the five mile concrete oval and high-speed straightaway.

On the oval we hooked up PM's fuel meter and checked gasoline consumption at constant speeds.

FUEL CONSUMPTION—V8, Automatic Transmission
(Miles per gallon at constant speeds)

30 m.p.h.	26.5 miles per gallon
40 m.p.h.	23.7 miles per gallon
50 m.p.h.	20.8 miles per gallon
60 m.p.h.	19.7 miles per gallon
70 m.p.h.	16.5 miles per gallon

We found that the Fairlane compared favorably with other compact V8s in performance as well, using a stopwatch and corrected speedometer readings to check acceleration. The car's performance is a bit better than that of the similarly equipped 1955 Ford which was a larger and thirstier V8 of 272 cubic inches.

ACCELERATION PERFORMANCE—V8, Automatic Transmission

0 to 30 miles per hour	4.9 seconds
0 to 40 miles per hour	7.1 seconds
0 to 50 miles per hour	10.2 seconds
0 to 60 miles per hour	14.1 seconds
50 to 70 miles per hour	10.1 seconds
60 to 80 miles per hour	14.7 seconds

For those who are conscious of gallons per dollar as well as miles per gallon, Ford has kept the compression ratios of both Fairlane Six and V8 well within the limits of tolerance for regular grades of fuel; ratios are 8.7 to 1 for the Six, 8.5 to 1 for the V8.

Cast iron is used for both the block and cylinder head of the 211-cubic-inch V8 which weighs just 130 pounds more than the 170-cubic-inch Six. It is an over-square, short stroke design with a bore of 3.50 inches and stroke of 2.87 inches.

This engine is cast by new foundry techniques utilizing a combination of sand and plastic resin binder to form the cores around which the water jackets and cylinder bores are cast. These cores are packed under pressure permitting thinner engine walls of precise, uniform thickness resulting in greater strength and less weight.

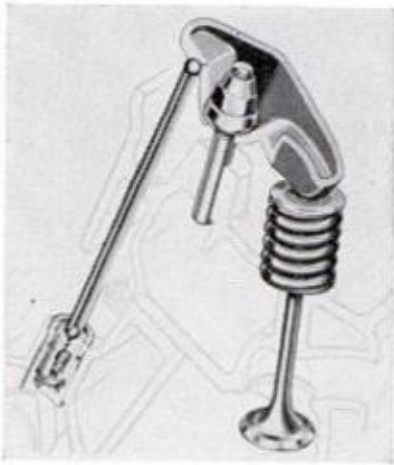
A unique combination of exhaust crossover and an aluminum, water-heated "collar" between carburetor and manifold combine in helping keep fuel mixture at correct temperatures.

Fairlane's unit body, available only in two and four-door sedan models has bolt-on front fenders. ★ ★ ★



FACE OF A FORD on this Fairlane may be confused with other Ford products but few will tag it as a GM or Chrysler car. Note the solid, one-piece bumper that needs no guards, contains turn lamps

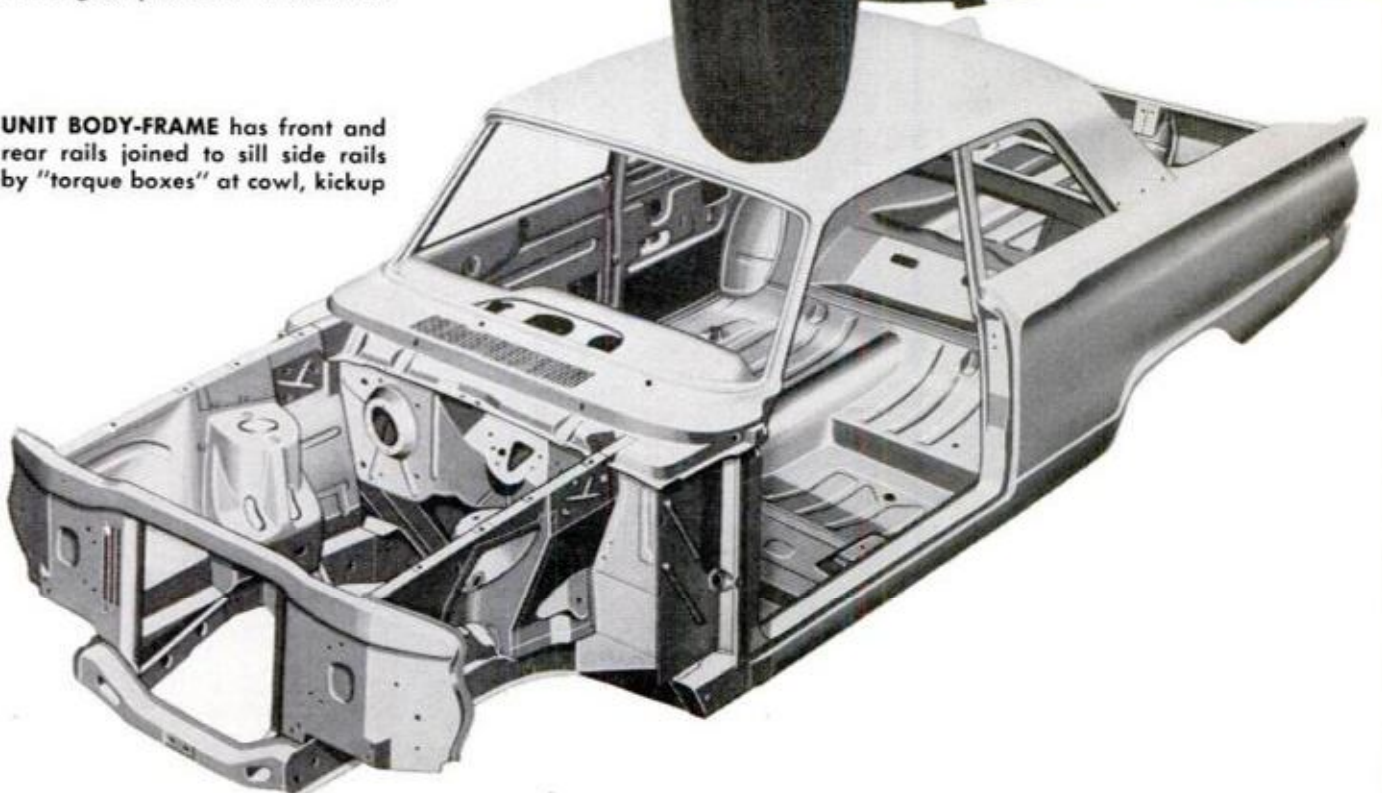
CLEAN-LINED rear end on Fairlane 500 has embryo fins, bulls-eye tail lamps, and etched trim panel like its big brother Ford Galaxie

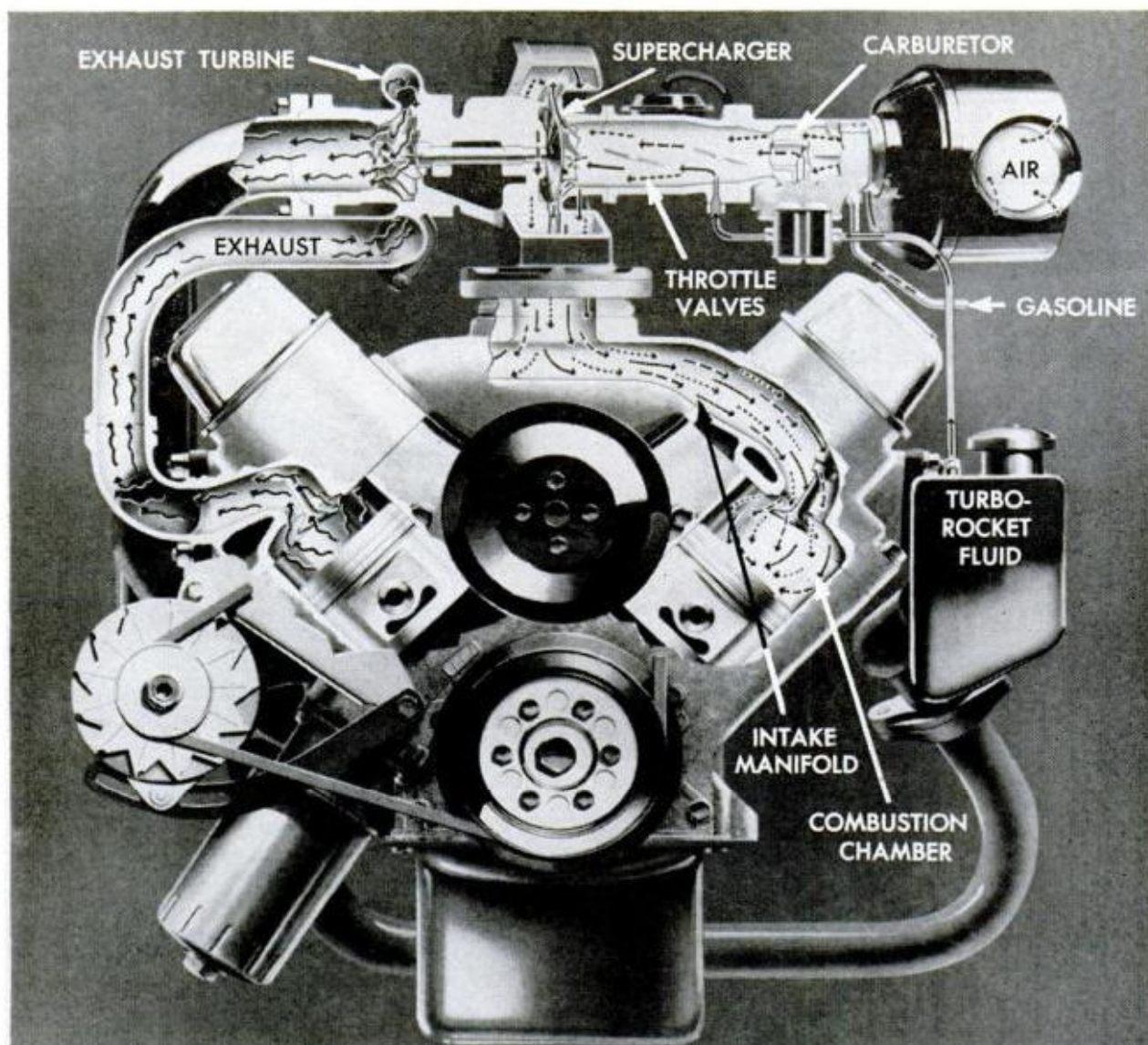


CAST IRON rocker arm of Fairlane valve gear pivots on a ball stud



UNIT BODY-FRAME has front and rear rails joined to sill side rails by "torque boxes" at cowl, kickup





Aircraft-Type Supercharger for Sports Model F-85

A NEW, high-performance version of the 215-cubic-inch aluminum V8 engine will be introduced by Oldsmobile in a limited production sports-type model of the F-85 early this winter.

The "Turbo-Rocket" will feature the fuel induction technique of turbo-supercharging, pioneered by the aircraft industry on World War II fighter plane engines. It is the first application of a turbo-supercharger with fluid injection on a commercially produced automobile.

The turbo-supercharger increases power output by pumping more of the air-fuel mixture into the cylinders.

Through injection of a specially-formulated "Turbo-Rocket fluid," combustion is controlled by maintaining a more uniform burning rate during combustion to avoid detonation or "ping." Because of this, the turbo-charged engine operates at a highly efficient 10.25:1 compression ratio on readily available premium gasolines.

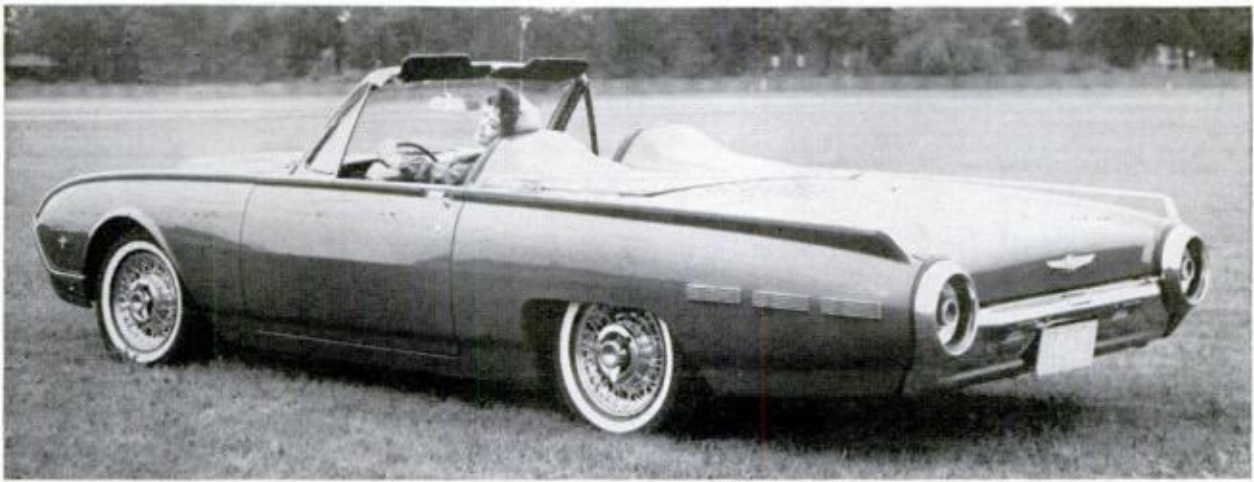
The turbo-charger system is driven by

the energy in the exhaust gas and not by gears, chains or belts like most superchargers which use direct engine power to run them even at speeds where supercharging is not required.

According to Oldsmobile, the Turbo-Rocket engine has the advantage of being able to deliver economy when it is wanted and also to supply plus performance when the driver demands it.

The Oldsmobile exclusive design incorporates in the Turbo-Rocket a turbo-charger manufactured by the Air Research Division of Garrett Corp., makers of turbo-chargers for the aircraft industry.

The Turbo-Rocket engine will put out approximately one horsepower for each of its 215 cubic inches and in so doing will approach a goal constantly sought by automotive engineers. The engine's power-to-weight ratio is extremely low at 1.88 lb. per horsepower. The lightness gained by the use of aluminum should reduce the operating costs of the car. ★ ★ ★



SPORTS ROADSTER with headrest tonneau cover and wire wheels



LANDAU COUPE' has upholstered vinyl top, chrome bars

T-Bird Sprouts More New Feathers

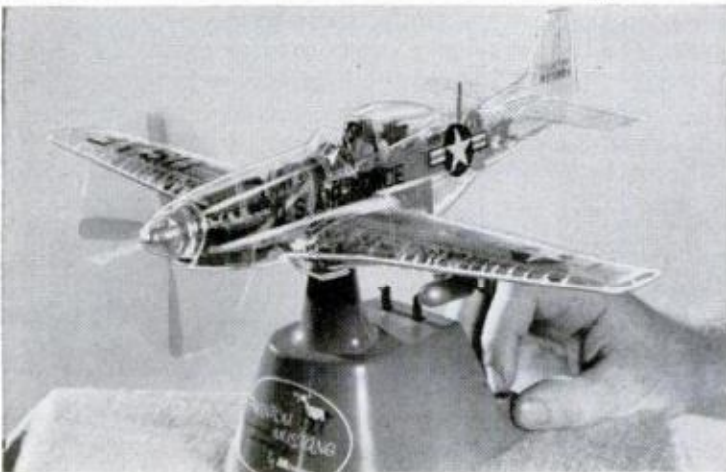
Two latecomers to the Thunderbird line for 1962 are the Sports Roadster and the Landau Coupe. These new models are in addition to the standard hardtop and convertible. The Sports Roadster is equipped with a racy package that includes real chrome wire wheels and a dashboard grab handle. It also features a fibreglas tonneau cover that seals off the rear seat compartment and incorporates two padded headrests for front seat passengers. This makes

the 'Bird temporarily a two-passenger car.

The tonneau cover matches the color of the car and the headrests are covered in the same material ordered for the car's upholstery—either leather or vinyl. The Roadster's convertible top and side windows can even be raised with the tonneau cover on.

The Landau Coupe' owes its elegant appearance to eye-catching chrome side bars and a distinctive top that sports a black or white-grained vinyl covering.

Model Reveals Inside Story of Famous Fighter



Buttons and levers in the base of a transparent model of the F-51 Mustang control the plane's landing gear, propeller and bomb-release mechanism.

Major parts of the plane—engine, controls, guns, etc.—are visible through the transparent skin. An electric motor inside the scale Rolls Royce/Packard Merlin engine spins the propeller; another in the plastic base actuates the landing gear.

The F-51 kit, by Monogram Models, Chicago 32, sells for \$4.98.



By Jim Whipple



That Bird You Saw Wasn't a Cardinal Quality Soars on Chrysler Corporation's '62 Cars

That painting of a new, small car seen on the cover of a recent issue of another science magazine wasn't the **Cardinal**, **Ford's** up-coming four-passenger compact. The artwork, and the article inside were a wide-screen symphony of guesswork. However, they are right on basics—the **Cardinal** is a front-drive car with a water-cooled V-type engine, as *PM* reported in August '61, p. 74.

But everyone, *PM* included, who guessed that the **Cardinal** is a look-alike with **Ford of Germany's Taunus** is wrong. It isn't. We've seen the prototype. And even this model will undergo sheet metal changes before it reaches the public.

A most interesting Question-and-Answer session took place recently when **Chrysler** Division's General Manager Ed Cole parried the thrusts of journalistic curiosity.

Asked if his new compact **Chevy II** might soon replace the standard-size **Chevrolet**, Cole replied, "No, but we are prepared to shift production from the (big) **Chevrolet** to **Chevy II** if the market shifts that way."

Now this doesn't mean that GM's biggest division is ready to scrap a car that sells over a million units each year, for just a few minutes later Mr. Cole remarked that **Chevrolet** engineers were "working on" a larger-than-**Chevy II** unitized-body car.

Chevrolet Division itself provides one of the best examples of the industry's new look of flexibility. It is obvious that **Chevy II** was waiting in the wings—well into prototype development stages—in the winter of 1960, as management waited to see which way the winds of public preference would blow.

When it became evident that the public desired a car of **Chevy II's** size—evidenced by zooming **Falcon** sales—**Chevrolet** had one ready to market in just 18 months. What a contrast to the slow reactions of just a short time ago when **Ford** made a wrong guess on **Edsel** three years before the car went on sale.

Turning from the immediate past to the immediate future—and the prospects for

an American-made **Volkswagen**-sized car, **Chevrolet's** Cole said that his division had this type of car under "study" (what a splendidly noncommittal word) but were waiting to see whether or not owners of less than 100-inch-wheelbase cars wouldn't upgrade to something a bit larger in the **Chevy II** or **Corvair** size brackets. Discretion in this case may very well be the better part of valor.

It's always a pleasure to report good news, especially when it follows a long siege of trouble. We were much impressed with the tremendous improvement in quality control shown in the finish and fit of trim on the first production runs of **Chrysler Corporation's '62** models.

Paint jobs on everything from **Valiant** to **Imperial** were excellent—better than anything we've seen on **Chrysler** products in recent years.

There's been an improvement in operation of controls too. Particularly outstanding is the smooth, precise working of the brand-new column shift on manual transmission **Dodges, Plymouths, Valiants** and **Lancers**.

Who or what is responsible? Answer: a lot of hardworking people in engineering production and inspection, not the least of whom is Harry Chesebrough, vice-president in charge of quality control. Harry attributes **Chrysler's** pulling up of socks to the Corporation's Clairpointe quality control pilot plant where initial samples from parts manufacturers are tested for perfect fit and where constant rechecking of all components takes place.

If **Chrysler** cars continue to be as well built as the early '62s, we will expect to see the Corporation increase its share of the market beyond the disappointing 9.2 percent of the current year.

Here's a piece of cake for the drag strip set—this one from Ed Cole himself. You will be able to put the basic **Chevrolet** 327-cubic-inch V8 engine into the **Chevy II**. It'll be a bolt-in swap available through dealers complete with beefed up front springs and four-speed stick. Go man, gone! ★ ★ ★



Rocket Retrievers

Collecting fragments of ill-fated rockets from the water off Cape Canaveral is the job of a highly specialized firm headed by Lou Berger, former Navy officer. Berger's skindivers work from boats offshore.

When a missile explodes shortly after leaving its pad, cause of the failure often isn't known until the fragments are recovered and studied by experts. Gathering of the fragments also keeps them from falling into unfriendly hands.



Viewer for Night Combat

Troops in the field can see in the dark with no more effort than using binoculars with a new infrared viewer now on order for the Army and Marines.

The transistorized unit combines optics, infrared image converter tube, 1.3-volt battery and infrared flashlight in one small package. The user sees as if he were using a flashlight and looking through a monocular. The Metascope is made by Varo, Inc., of Garland, Tex.

"Now Hear This"—and Listen to That

Converting easily from a "talker" to a "listener," a new all-electronic portable bull-horn amplifies the voice of the user, and (with the position of the horn reversed) enables the user to hear sounds

that are out of the normal hearing range.

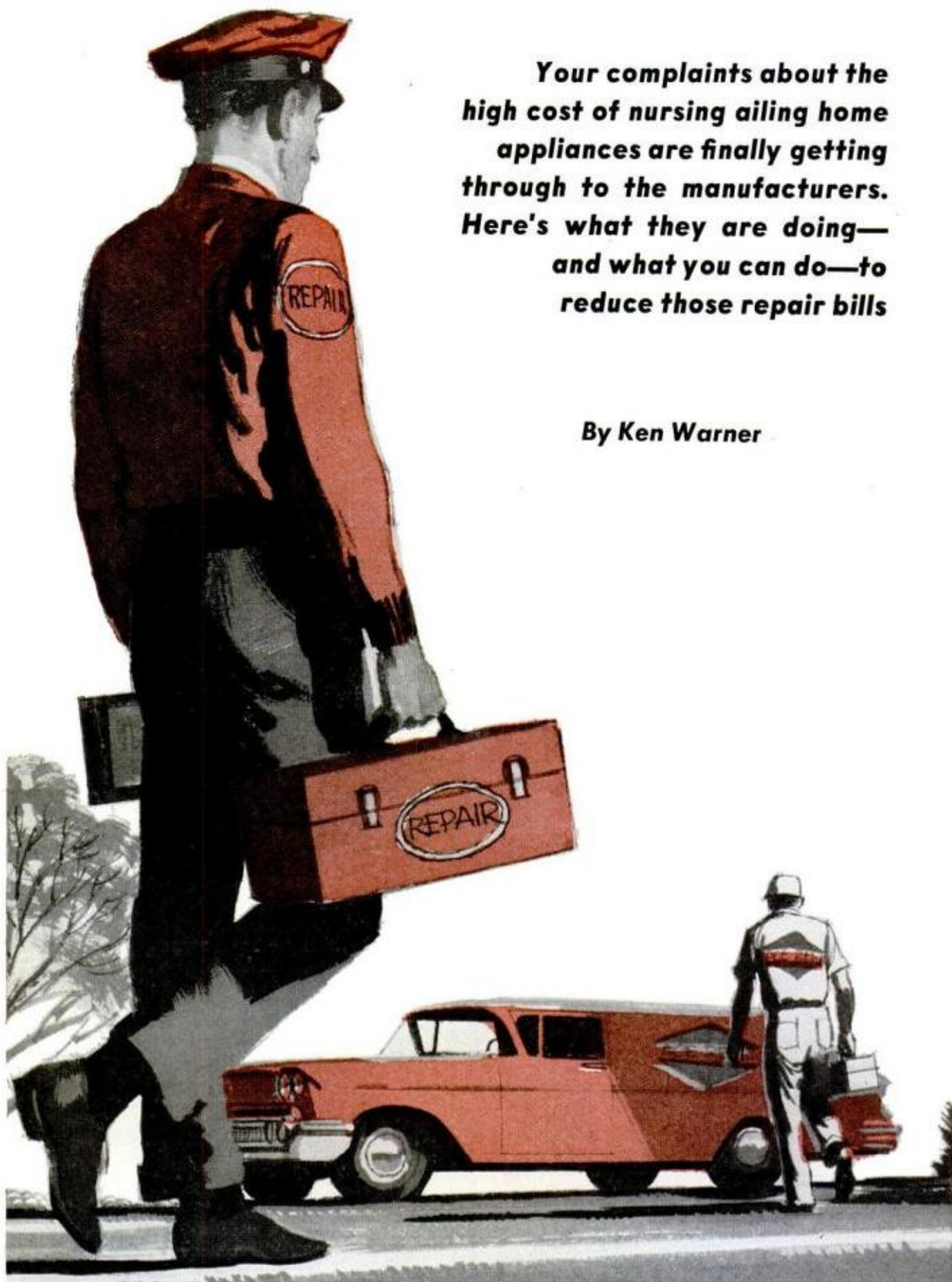
The Rangerhorn uses six C flashlight batteries for power. The price is \$14.95, and the manufacturer is Electrosolids Corp., Van Nuys, Calif.



MUST APPLIANCE REPAIRS

Your complaints about the high cost of nursing ailing home appliances are finally getting through to the manufacturers. Here's what they are doing—and what you can do—to reduce those repair bills

By Ken Warner



COST YOU SO MUCH?

IT COSTS \$2.85 in labor charges to replace a light switch in a refrigerator in Chicago. That's after you pay \$3.95 for getting the man there, and of course, you also pay for the light switch. In a Chicago suburb, the bill for installing a new pump, drive belt and filter seal in a washer recently came to \$17.29, for parts and taxes, plus \$7.20 in labor (including a \$5.95 minimum) for a total of \$24.49.

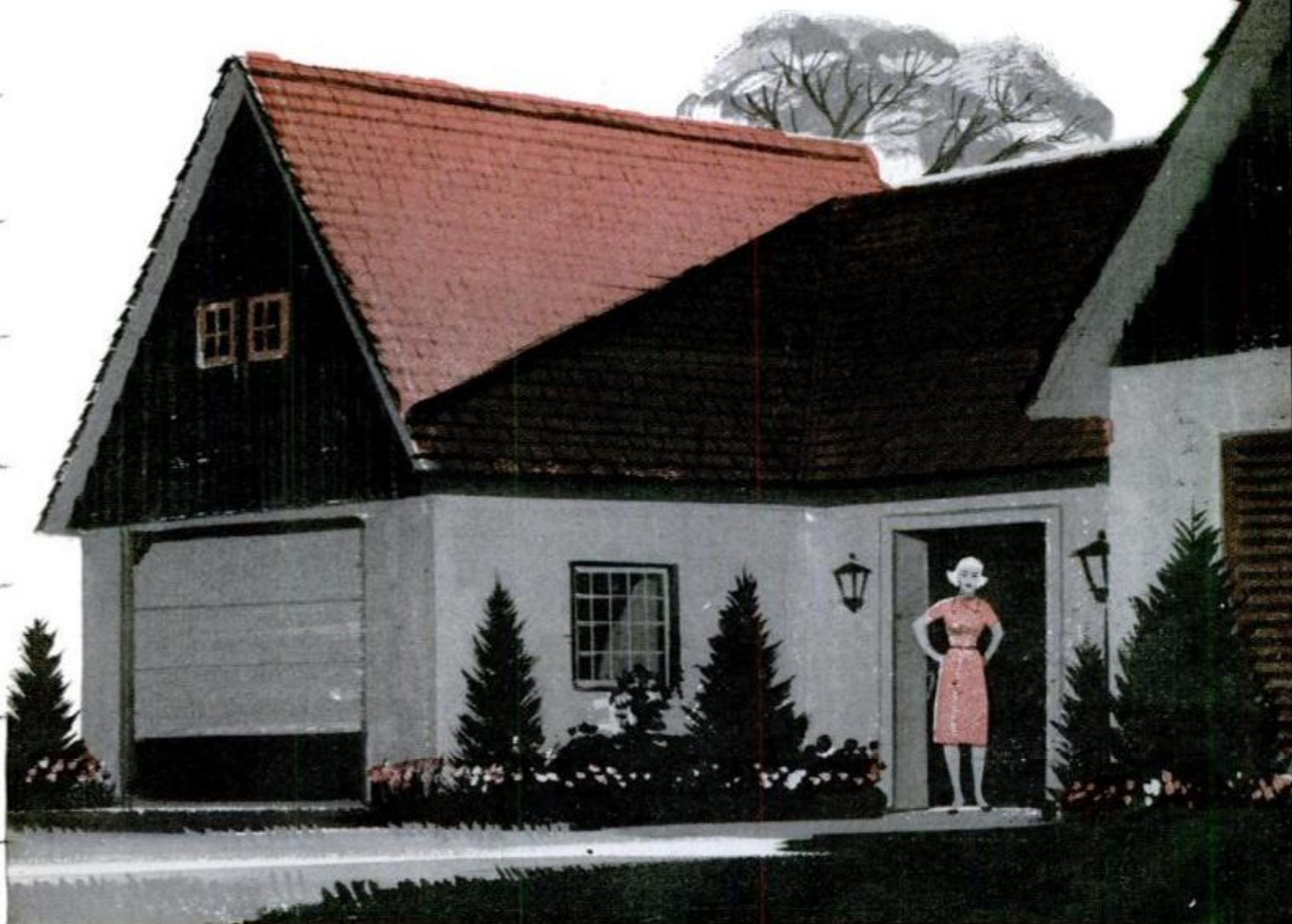
A big job, done in the suburban shop, looked like this: Replaced transmission, new belt, new pump, new leaf assembly: for parts and tax, bill of \$54.50, plus \$35 in labor. Total: \$89.50.

There are two basic reasons for today's service problems and those big bills: They just don't build appliances like they used to and they don't sell them like they used to, either. While there is some evidence that things may get better, there will still be some unnecessary difficulties for a few years yet.

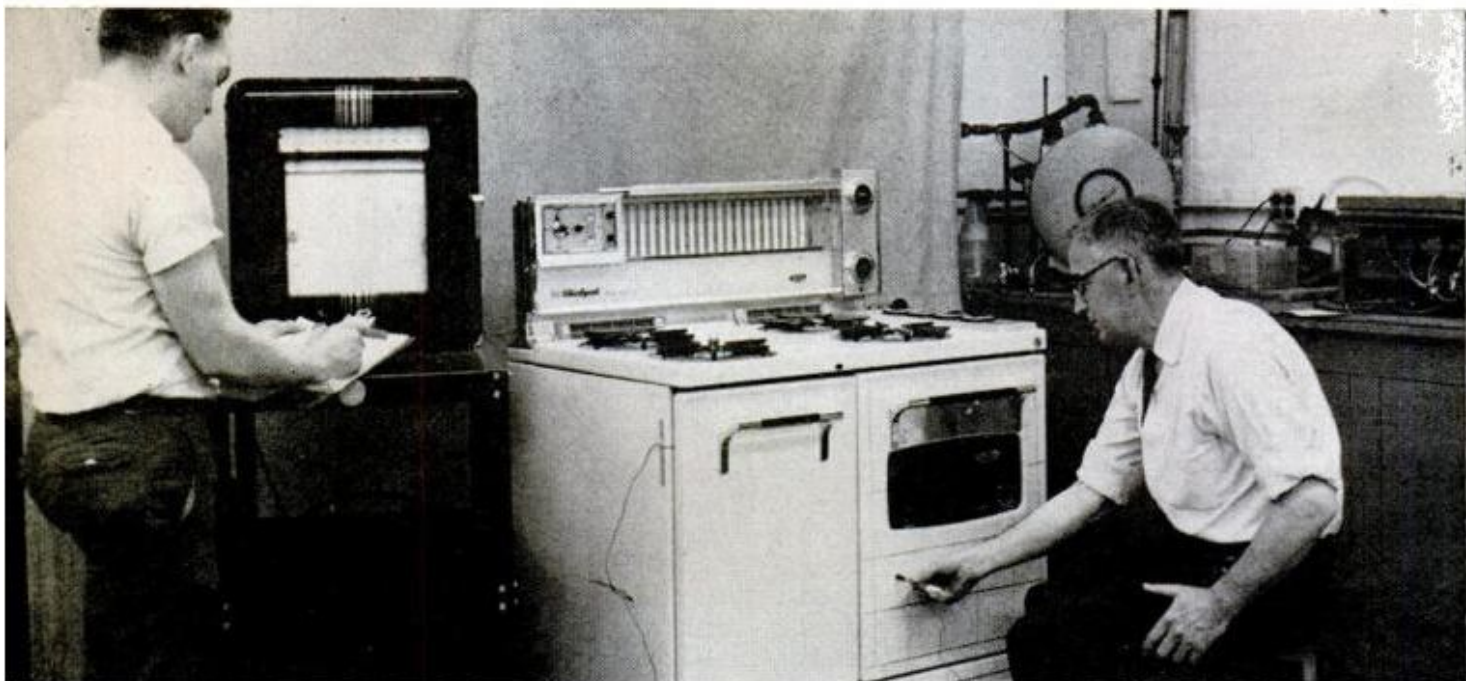
One reason for this is that as late as 1956, appliance factories were still making service problems on the production line and, worse yet, were shipping them out to market. During 1959 and 1960, for example, one manufacturer spent an estimated \$5,000,000 making good on one defective 1954-1956 washer. There was a bad timer, a pump that regularly failed, and a bad transmission all in one model. It was cheaper to replace the machines than to send out "fix kits" for repairs, even for a year's production.

About the same time, another manufacturer picked up its own out-size repair bill by selling an ill-fated, poorly-tested washer. It added to its problem by taking the "dump" route to get rid of the nightmare; they sold the inventory at low prices, then furnished "fix kits" galore. Some dealers nearly went broke on this bargain."

Of course, it isn't only laundry appliances that make problems. The automatic-defrost refrigerators—a worthy development now



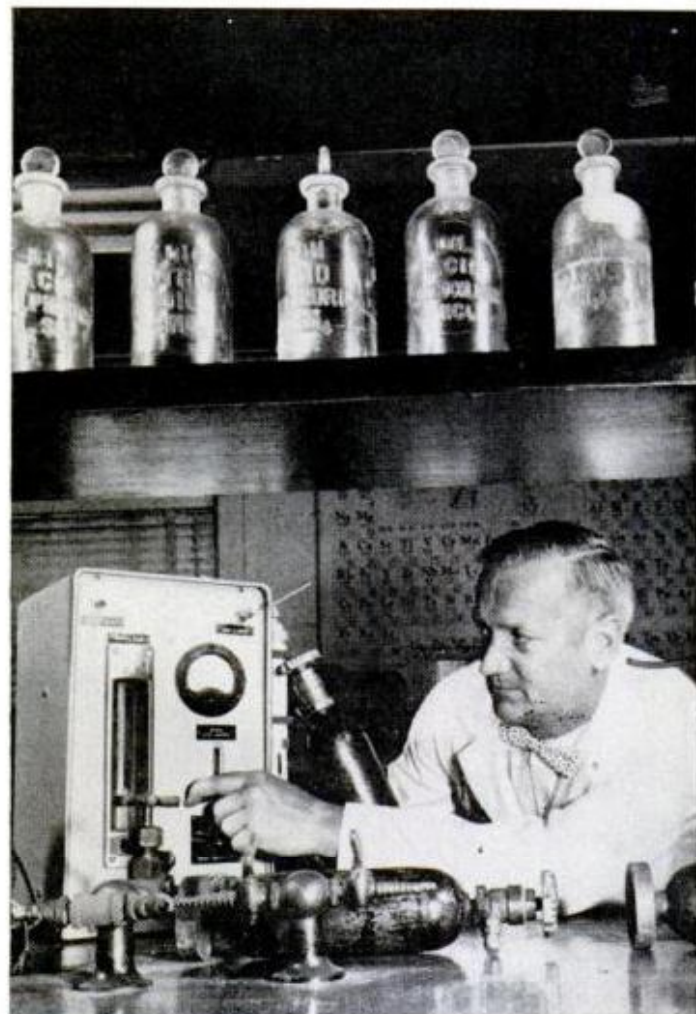
Manufacturers control quality



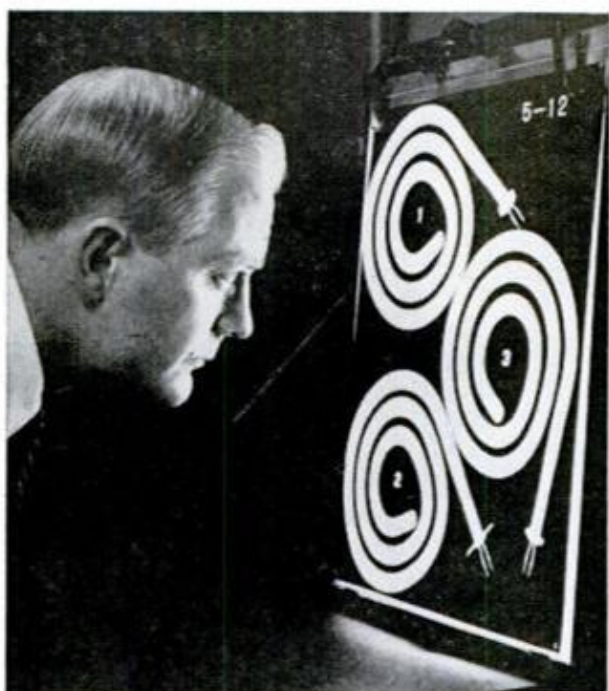
LABORATORIES of manufacturers now are not only testing products as they roll off assembly lines. These men are gauging how well a range holds its temperature. They also study reports of "in-use" trouble more than ever

TURNED UP HIGH, shaking on a floating stand, a new washer is studied to find possible vibration effects

CHEMIST works electrolytic water analyzer to make sure a refrigerator does not hold too much moisture



to some degree But . . .



X RAY is a new check on quality control. Technician studies position of coils within sealed range units

VENTING a washer in installing it into an Indiana home. Everyone concerned hopes it's trouble-free

almost standard—had one manufacturer's dealers groggy with work for months on end in 1957, until they learned how to deal with a dime-sized lump of ice that persisted in clogging up the works.

Eighty Percent Disasters

The washer problems are examples of what appliance people call a "disaster," meaning high percentages of total production are affected—as high as 80 and 90 percent. Most common production problems that result in repairs for customers are little things—a batch of bad gaskets were installed, or there was an early run of loose tolerances in an accessory, and so on.

How do these repair-making problems develop in the million-dollar operations of manufacturers who have platoons of engineers, testers, survey teams, home economists, and production experts who rank among the nation's best?

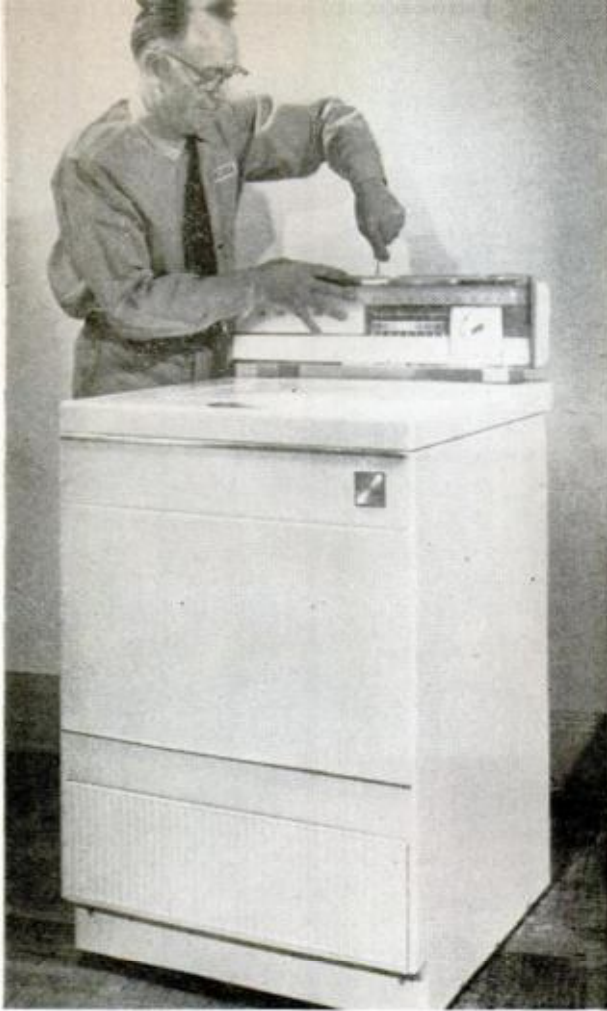
Here are some explanations:

Competition tempts sales engineers and real engineers into rashness over materials, components, features. To get the price down, they sometimes take a chance, but the cheaper way is not always good for serviceability. For example, some plastic parts now used in impellers, pumps and

(Text continued on page 118)



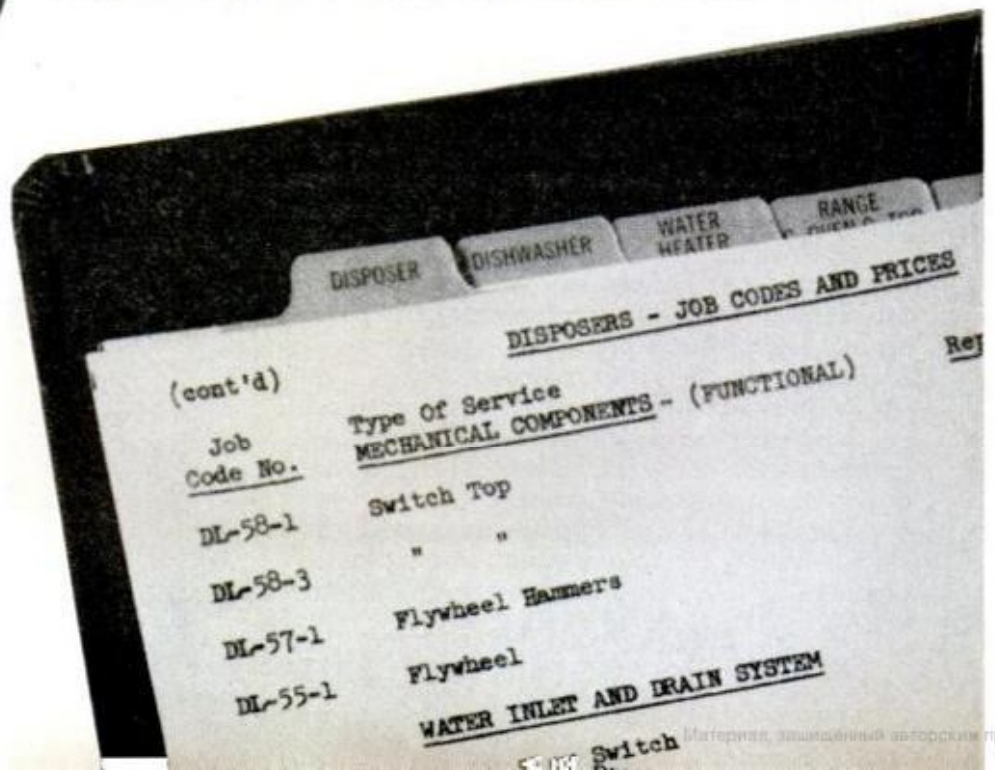
*Once you own
the machine . . .
you own its
problems too*



FOR EASIER REPAIRS, many appliances, such as this washer, are being built for servicing from the front, and in the home, which saves shop work. One manufacturer estimates this feature saves 33 percent in service time



CUSTOMERS FOR SERVICE are getting a chance to check up on the work and the costs. One manufacturer has its servicemen leave a postcard so the customer can write, evaluating repair work and the conduct of the "Red Carpet" serviceman. Other manufacturers have servicemen carry a flat-rate charge book (see below) which describes the job to be done and its cost



What you are entitled to . . .

Free service during the period of the warranty according to the terms of the sale. As a general rule, major appliances carry a full labor-and-service warranty for a year from the date of purchase or delivery (find out which). Small appliances carry similar warranties, though here they often call for return of the device to the factory and sometimes are replacement guarantees; and such items as TV, radio, stereo sets usually carry a parts-and-labor warranty for 90 days, a parts-only deal for a year. (The difference between the two words **warranty** and **guarantee** is practically nil, and the two are used synonymously. Therefore, you have to find the specific terms of the offer you are getting, no matter what it is called.) These warranties in any case apply only for defects in the machine present when you purchased it or developing during normal use. This means that the serviceman who finds a nail in the pump of your washer is entitled to charge for finding it. Make sure the bill-of-sale shows no notation that would change the maker's policy.

Fair service after the warranty period is past. However, for this you must pay at the going rate. In the event you are not satisfied, and can show why you are not, by all means complain, the squeaking wheel gets the grease. However, shouting won't get you any further than a nice quiet purposeful letter (don't threaten ever—just inform and say you expect action) and you can show the letter, with its dated complaint to other interested parties later, if you keep carbons and if you need to do so.

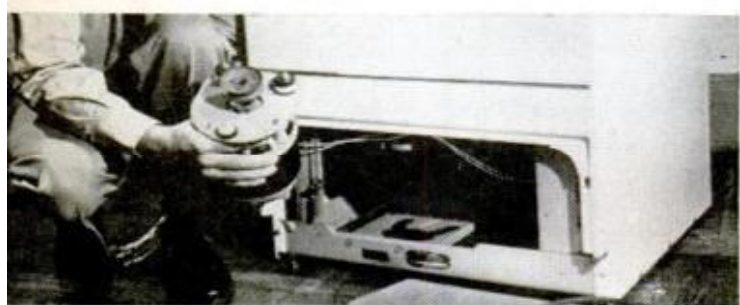
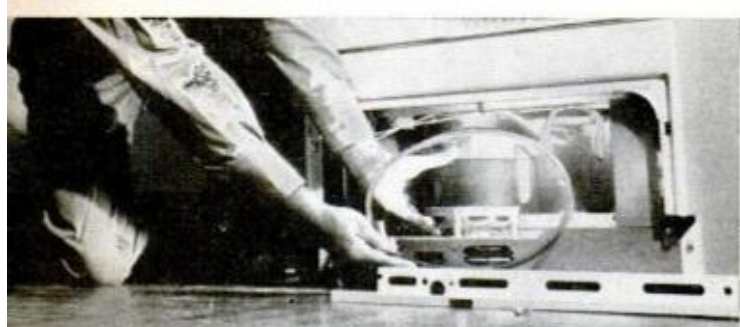
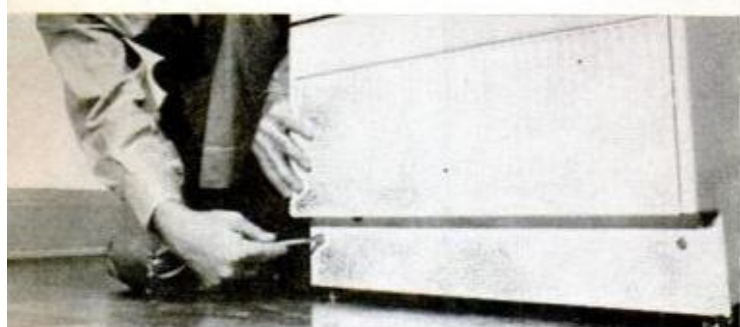
Satisfaction with the machine, the workmanship, the treatment you get from everyone concerned. When appliance people say they "guarantee" some device, they generally mean they will keep it running, not that it is perfect. When the amount of inconvenience reaches the ridiculous stage, it is time to talk about exchanging the device, getting a major shop job for free, or whatever other action will stop the problem. As complaints develop, it is smart business to keep a record of what you asked for and what you got, with dates. Since in-warranty service is free, you usually don't get receipts. If, in the end, neither the dealer nor the distributor satisfy you, and your com-

plaints are legitimate, write a careful letter, including dates and other pertinent facts, to the president of the manufacturing firm that made your appliance (your newspaper or library Thomas Register of Manufacturers on Standard Advertising Register will give you his name and address if you want it) and ask him to do something. Send it special delivery, but don't send it registered mail, as many firms have solid policies against accepting registered letters. (It's a favorite stunt of the amateur inventor and acceptance carries legal implications.) You will get action. Most such letters start a chain of events that wind up with the distributor having to report to the president just what action he has taken to satisfy you, the customer. It won't do any good to do this, however, before you have given the local people every opportunity to make things right.

There will be some service bills during the life of your appliance. A fair estimate for an automatic washer is \$20-\$30 a year after the warranty period. In other words, for a five-year life, you will spend perhaps \$80-\$100 over the price of the machine. If you are careful, it will be less. If you consistently overload the machine, it will be more. Service on such appliances as refrigerators, air conditioners, ordinary gas and electric ranges will cost less than this figure, of course. Dishwashers and dryers and elaborately automatic ranges will almost equal the washer. You might say that such complicated machines **automatically** have more problems.

There will be fewer big bills if you make a practice of getting your appliances checked out by a qualified man once or twice a year. You can do this at the minimum rate, and often can stop problems in advance. For example, a little rumble can be adjusted out of the drive and save bearings, a poorly-fitting door gasket puts a heavy extra strain on a refrigerator, certain clicks and buzzes and hesitations during a washer cycle can forecast timer trouble that can be saved with adjustment. It is like tuning the car: There's a lot of difference between \$7.50 to adjust the drive shaft end play (on a washer) and \$40-\$75 for an overhaul, yet the one may proceed directly from the other.

	CAUSE		CORRECTION
	25. Loose bolts or screws		Tighten foot bolts, support plate bolts, cylinder retaining bolts, frame and balance mech. screws Check by visual inspection and correct cause
	26. Interference between cylinder and tank		Check spring, replace if necessary
	27. Weak clamp spring in balance mechanism		Reinforce floor
	28. Weak floor		Adjust valve clearance to .061-.064
tor	29. Air bleed valve too close to bleed arm		Check for cabinet and tank interference or wear in motor to transmission coupling
ads	30. Not enough tank motion		Adjust for .002 to .010 clearance between lower jaw and leaf spring with shim in out position
defective			Check for air leak defective comp Free or replace
V & P	31. Stable frame positioned incorrectly		Replace leather
	32. Insufficient clutch torque		Replace spring
ns	33. Intake, exhaust, or relief valve on compressor stuck		Replace
akage	34. Piston leather in compressor defective		
	35. Broken piston return in compressor		



CONFIDENCE in repair work is being established by firms that supply repairmen with guides—which the customer may see—which shows symptoms of ailment, and directs repairman how to correct it. With new designs, troubles which in the past had to be taken to the repair shop, now can be corrected in your home

transmissions—where metal parts formerly were used—just do not stand up, servicemen say.

Too much speed-up brings service irritation. This gadget, or that widget, a sales manager screams, must be in the line and ready for the distributor showing in 60 days. Now it might take six months to test the new widget properly, but the engineer has to deliver. Sometimes it works, sometimes it doesn't.

The manufacturer buys some problems. Such items as valves, pumps, compressors, timers, and gaskets are vital, but most are furnished by outside suppliers. Many service calls can be traced to faulty parts not made by the company that puts its name on the machine. This of course should not release the manufacturer from responsibility of seeing that the parts function properly.

Housewife Testing

The manufacturer's laboratory cannot duplicate the actual use of thousands of machines in thousands of homes. The range

(Continued to page 234)

What you can do to save money . . .

When an appliance won't start. First, double-check the power supply. Plugs work out of the wall, or kids pull them out, fuses blow, occasionally the door safety switch may hang up, and, in the case of a washer, sometimes an overload will cause the overload switch to cut out the current.

Next, in the case of a washer, check the water supply. Make sure the faucets are on—you can usually feel the water pressure or hear it.

Now, if there's power and water, things should happen. Go over your starting procedures again, and make sure no selector buttons or switches are part-way down or stuck. Almost always, when an appliance worked fine the last time you used it, but now won't start, something has changed. Try to figure out or remember what it is—a different wall receptacle, kids fooling around, disconnected parts from cleaning (such as oven elements in an electric range).

If the trouble seems to be in the machine itself, try the time-honored methods of clicking the switches several times, cycling the control dial all the way around, slamming the door. Chances are, in the absence of loud noises or burning smells, the problem is minor when a machine won't start.

If all else fails, read the instructions.

If you do get it started, but don't know why, go ahead and use it, but get the serviceman over to check it before the next use. It's cheaper in the long run.

When an appliance quits. If it makes loud noises, bad smells, grinding sounds, anything alarming, just pull the plug out of the wall and call the serviceman.

If it just stops, quietly, stop and think before you fool with anything.

Chances are with a washer that either it is hung up on a sticking switch or it is not getting water. Note just where the machine is in its cycle so that, if necessary, you can give the serviceman some advance notice of the trouble.

Now, try and check the same things as when an appliance won't start. On a refrigerator, work the cold control back and forth and rock the unit gently. With a washer, make sure the load is balanced, then try the reset button if the unit has one; run the dial through the cycle again.

And double-check the instruction manual.

Again, if you do get the machine going, and are not sure that it is all right, the best bet is to get it checked by the serviceman.

When you have to call the serviceman. Have the model number (usually a short combination of letters and numbers) and

the serial number (less important, usually a 6-8 digit number plus one or two letters) written down to be sure to get them right—so the service truck will have the right parts on it. These numbers are to be found, if your instruction manual doesn't show them, on a brass or aluminum plate either on the back of the machine, or behind the front service panel on the bottom.

Be able to answer the question "What seems to be the trouble?" That is, know when it stopped, what sort of noises or smells (hot wires, for example) it made, that it isn't a lack of power or water.

Make sure your name, address and phone number get taken down clearly. If there is a genuine emergency, such as gas leaking, or food spoiling, make this plain. Don't expect a washer-load of clothes to be treated as an emergency, however, as almost every call they get involves some inconvenience to the customer. It is almost always a case of "first come, first served."

When the serviceman shows up, if he arrives in a private automobile, get some identification from him, unless you recognize him—and do it before he's in the house. If you've never dealt with the firm before, get as many of the financial details as possible in advance—that is, is there a service charge just to make the call, to what does this entitle you, will the serviceman accept a check, will he be sure to consult you before making extensive and expensive repairs?

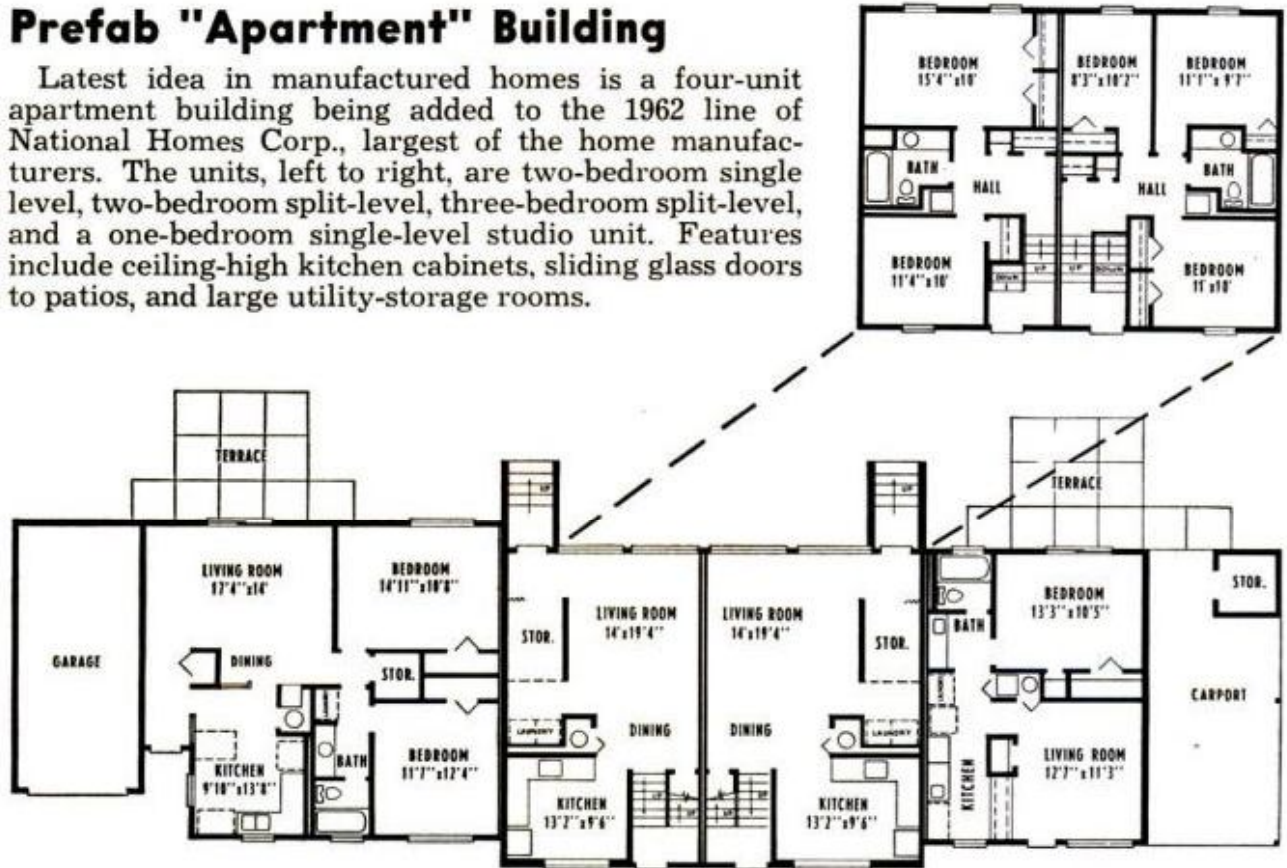
Fortunately, there are few sharpies operating in the home-appliance service business, but there are some. In any event, a serviceman who is warned against spending any large amount of your money without checking with you, and who is not allowed to get the machine out of the house, has very little chance to pull an expensive fast shuffle. Almost every instance of shady operation reported in appliance repair is connected with a shop job. Usually, the sharpie diagnoses linkage trouble, for instance, as a need for a rebuilt transmission, and jerks the machine out of the house before anybody who knows machinery has a look at it. Don't let the machine go until you're sure—there are legitimate major repairs that have to be done in the shop, but not often.

Your best safeguard is to deal with the man who sold you the machine—he wants to sell you another. Next best is your neighbors' or friends' advice. And the factory outlet—listed directly under the brand-name in the classified directory—won't be a shady operation, though it will charge for every service performed.



Prefab "Apartment" Building

Latest idea in manufactured homes is a four-unit apartment building being added to the 1962 line of National Homes Corp., largest of the home manufacturers. The units, left to right, are two-bedroom single level, two-bedroom split-level, three-bedroom split-level, and a one-bedroom single-level studio unit. Features include ceiling-high kitchen cabinets, sliding glass doors to patios, and large utility-storage rooms.

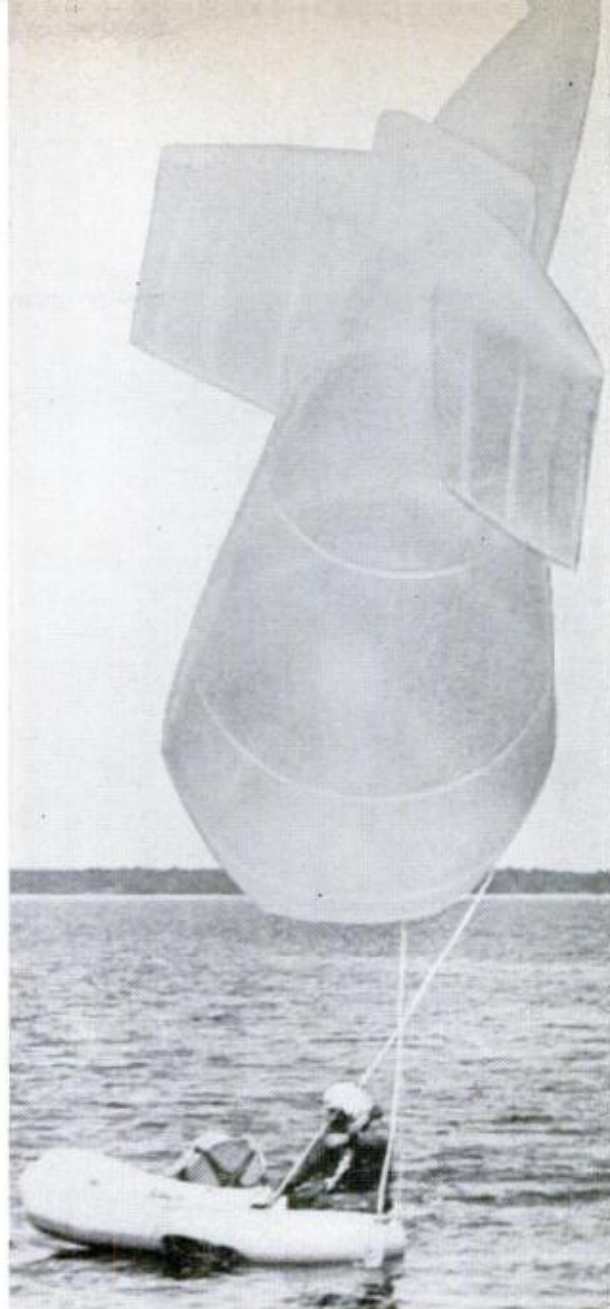
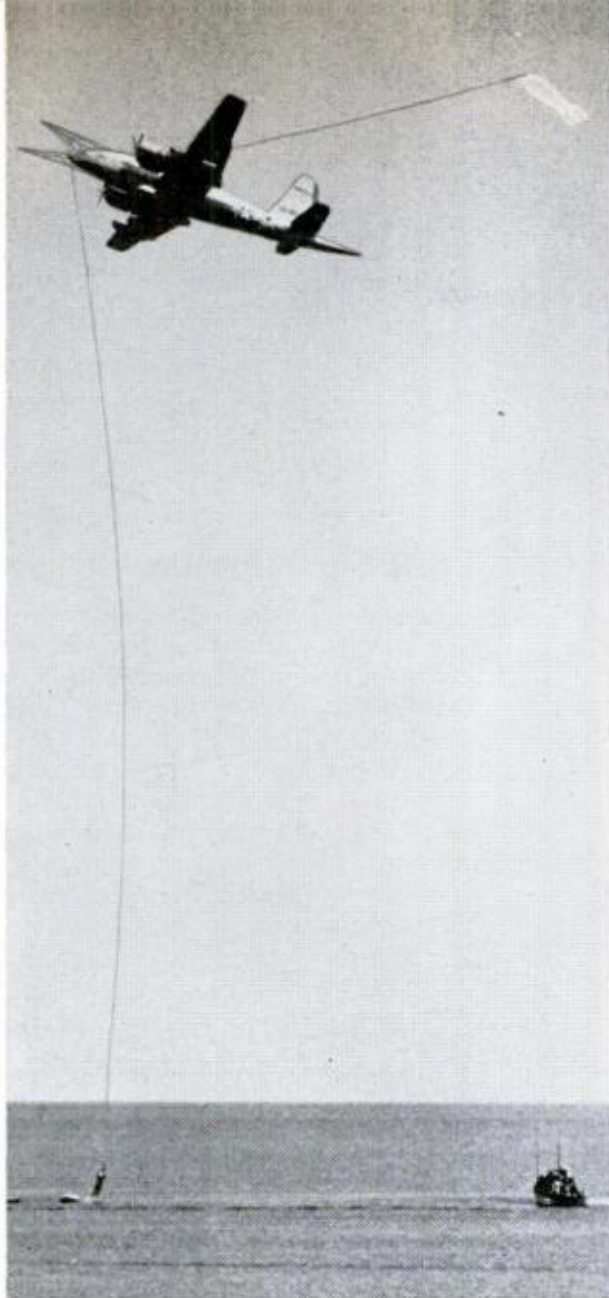


Printed-Circuit Prototype Kit for Engineers



Engineers can now produce printed circuit prototypes right at their desks. Kit contains perforated copper plated boards, acid resist tapes in strips and spots, and ballpoint tube of resist ink. Etchant provided in plastic bags, uses plastic container for etching bath. Takes approximately fifteen minutes from start of layout to finished board. Designed by Corning Glass, distributed \$8.95, Newark Electric, Chicago, Ill.

ADDRESSES of manufacturers and persons mentioned in this issue are published in the monthly Where-to-Find-It list, available free from Service Bureau, 200 E. Ontario St., Chicago 11, Ill. Send a stamped, self-addressed envelope.



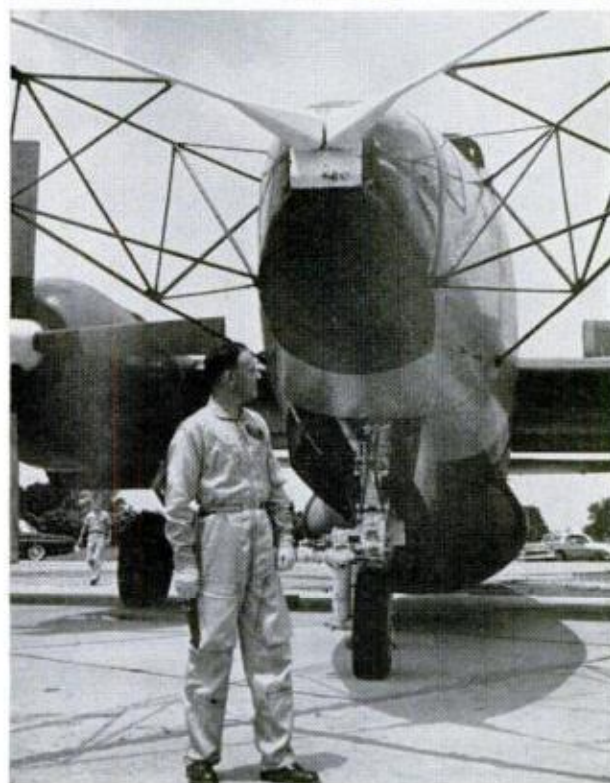
Skyhook Saves Stranded Sailors

CAPABLE OF rescuing persons shipwrecked at sea or stranded in remote land areas, a Navy skyhook system uses a long nylon line, an inflated balloon and a huge forklike yoke in the nose of the aircraft.

In rescue operations, a specially designed packet is dropped to the stranded sailor. It contains the 500-foot nylon line, the balloon envelope, a helium bottle and a harness that is donned like a pair of coveralls. The man dons the harness, inflates the balloon and releases it. The aircraft approaches the line just below the balloon and snags it at about 150 miles an hour.

The balloon breaks away and the line is automatically secured in the crotch of the yoke. It is then hooked through a bottom hatch onto a powered winch and the man is reeled into the plane.

The man experiences an initial stress roughly about one-third that experienced in a parachute jump. The whole operation lasts about seven minutes from initial snag.





Mach-2 Training Target

Last month the first missile target with the speed and altitude capabilities of supersonic fighters became operational.

The XKD2B-1/A-12, a joint Air Force - Navy project, can fly at twice the speed of sound up to 70,000 feet. A self-contained guidance system takes it to its designated target area.



Portable Playpen

Ten feet in diameter, this playpen has smooth metal disks at the bottom of each post, allowing it to be slid from place to place along the lawn without damage.

Four feet high, it has all-steel construction, including 5-gauge 2 by 6-in. rustproof galvanized wire mesh with smooth tops.

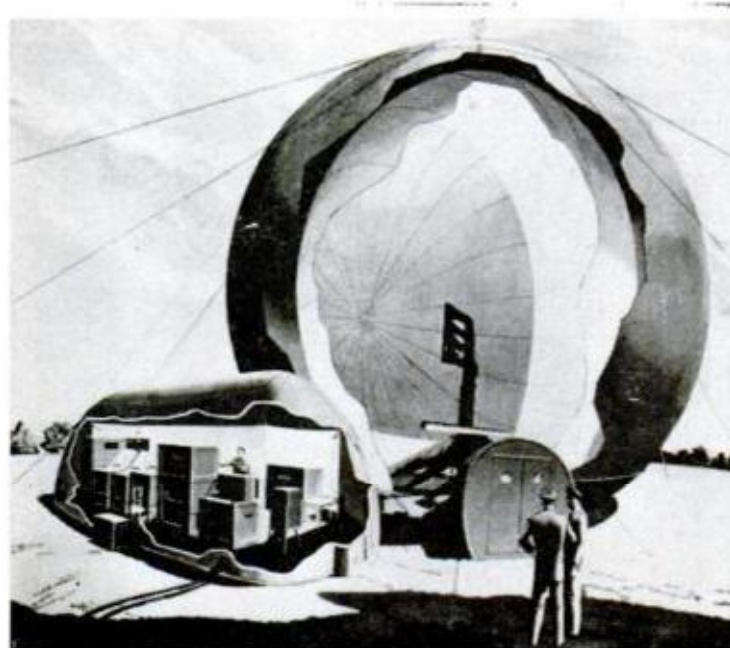
Made by Walsh Manufacturing Corp., Charles City, Iowa.



DC-4 With a Bulgy Nose

Intended to ferry cars and passengers over the English channel, an old DC-4 had a new forward section attached to its old fuselage, making it 12 feet longer and allowing five cars to be driven into the fuselage beneath the flight deck which is now in the raised section of the bulge.

The new version of the old plane is called a Corvaire.



Cloth + Air = Radar

Made of fabric, and supported by air, an experimental radar set (65-foot radome, 35-foot antenna) may help the U.S. Air Force move around more quickly its Composite Air Strike Force—the unit sent to put out "brush fire" wars. At present the tactical unit must unbolt and bolt a metal antenna.

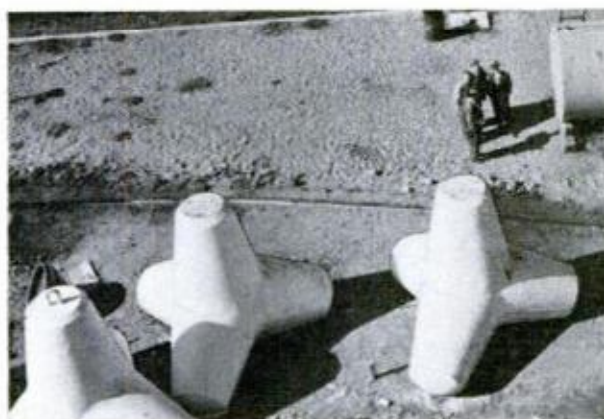
The antenna is made of woven glass fiber cloth coated with a vinyl formulation; an inner coat carries silver particles to give reflective properties. Put in a 200-pound package, the antenna could be used in space, it is thought, for communications, radar and solar power supplies. It would absorb sun energy to get power for radar.



Tetrapods Tame the Tides

Looking like children's game jacks that have been transformed to giants in a horror movie, 25-ton tetrapods guard the ocean entrance to Crescent City, Calif.

Some 1300 of the giant four-pronged tetrapods, cast in concrete, serve as the city's breakwater. Set in an interlocking configuration, they throw back the waves, and only dig deeper into the sand with each pounding blow from the sea.



Recorder Gets an Earful

To keep tabs on the condition of patients after they have undergone operations, doctors are fastening on them such recording devices as one that fits to the ear to record diastolic and systolic blood pressures and pulse rates.

This recorder works by shining a light through the patient's ear and onto a photo-cell.

Part of a complete system called the Body Function Recorder, developed by the Minneapolis-Honeywell Corp., the ear attachment is plugged into a central control system, along with the recorders of some dozen or more patients. The whole system records body temperatures and respiration rate also.

An alarm is sounded automatically, summoning medical personnel to action, whenever a dangerous condition develops in a patient.



Football's Fabulous

Don't try to keep your eye on the ball to follow today's fast pro football game. Watch the man who handles it from center. He's running the show

EDITOR'S NOTE: Norm Van Brocklin, 35, head coach of the new Minnesota Vikings in the National Football League, is one of pro football's all-time great quarterbacks. A 12-year NFL veteran, he was last season's Player of the Year.

In 1950, 1952 and 1954 "The Dutchman" led the league in passing. Twice he was first in punting (1955, 1956). He has played in five championship games and on two world title teams, including the defending champion Philadelphia Eagles.

His all-time completion record is 53.6 percent, and he still holds the record for yards gained passing in a single game—554, set against the Giants in 1951. He is the author of Norm Van Brocklin's Football Book, published by The Ronald Press Co.

OF ALL TODAY'S spectator sports, professional football probably is the fastest-paced, most varied, and consistently thrilling. And of all players in the game, the quarterback is the focus of action. He's the field general, play-starter, passer, and sometimes punter and field-goal holder or kicker as well.

Yet few fans really understand how he works, why some plays click and others don't, and what to watch for during a game. Take what happens when the offensive team forms at the scrimmage line. After the huddle, when the players trot to their positions, many fans assume that's it—the play is set.

But not in pro football. This is the moment when some of the most important decisions in the game often are made. As the quarterback stands behind center, apparently ready to take the ball, you'll see him look over the defense before he starts shouting signals. He'll establish where every man is stationed. If anything isn't as expected, he may call a new play right at the line—what we call an "automatic" or "audible."

Why such last-minute changes? Pro football long ago ceased being a game of muscle alone. If you plan to send a fullback on an off-tackle smash, for example, but a linebacker is stationed right in that spot at the line-up, you change no matter how logical the play seemed before.

You may change for any number of other reasons. Sensing a special defensive stunt is one. A favorite surprise, for instance, is blitzing or "red-dogging" linebackers. Instead of covering their positions, they try surprising the quarterback by crashing through the line and upending him before he can hand off or pass. Teams with strong pass rushers, such as the Chicago Bears, New York Giants and Baltimore Colts, love to try this.



Foremen

By Norman Van Brocklin
As told to Alfred Balk

LIKE PUTTING THE MAIL on a passing fast freight, New York Giants' Charley Conerly hands off on a straight line buck—maybe. Maybe he's faking. If you were the opposing linebacker, what would you think?



Though pros are experts at hiding telltale mannerisms, if you're alert you can even detect some clues from the stands. A linebacker may "cheat up" to the line at the last minute, trying for a split-second head start in getting through. A tackle, knowing he'll have to protect territory vacated by a blitzing linebacker, may line up differently. Discovering these things is like finding gold.

The quarterback also must know exactly what defensive formation he's facing. While the offense is huddling, you'll see the de-

fensive captain, hands against chest, signaling the formation to his men. It may be a man-to-man or a zone, in various alignments: 4-3 (four linemen, four linebackers and three safety men), 4-4, 5-4, 6-1—all presenting different strength.

There are short cuts for spotting each. If it's a zone, for example, when an offensive man is sent out as a flanker, the corner defensive halfback will move up to cover him while the weak-side safety man moves toward the middle. Seeing this, if the quarterback has made a certain call, such as a



CHICAGO BEARS' quarterback Bill Wade comes up from center and hands off to—or does he? Maybe he'll fake to the first back and hand to the second. Trying to watch the ball may only get you fooled . . .



COWBOYS' QBs Meredith (17) and Heinrich watch play while keeping in touch with coach stationed upstairs

DALLAS COACH Tom Landry makes a point from sidelines for halfback Bercich while Meredith looks on. Players even study each other



long pass down the middle (which a zone is strongest against), he'll change instantly to a maneuver like flooding the secondary with pass receivers.

Do audibles or automatics occur often? Quarterback Johnny Unitas of the Baltimore Colts estimates he resorts to audibles more than two-thirds of the time in some games. Y. A. Tittle of the San Francisco 49ers says he changes half his plays. In my playing career with the Los Angeles Rams and Philadelphia Eagles, I depended on audibles about a fifth of the time.

Quarterbacks may appear busy on the field, but they're no less occupied before a game. We sift scouting reports, we run and rerun movies of our last game, and games of our opponent.

What do we look for? You can look for these points, too. They include a team's favorite defenses; their first, second and third-down probabilities; who calls their defensive signals and what his tendencies are; who is their best pass-rusher and whether he rushes hard on each play or only when signals call for it. Also, which



THERE. After a spin and a fake, Wade gives it to halfback Jim Dooley. Other options; the pitchout and the big gun, the forward pass. Below, Giants' Conerly, braced and calm amid a battle, stands and delivers





IN THE HUDDLE, Cowboys' Meredith, left, is boss, but he's helped by information from players, the coach, and grandstand spotters—even players on the other team

UP OVER THE CENTER, right, QB may continue with his huddle decision, but he may change at the last minute and use an "audible" to set up a new play

pass defenders cover their men loosely and which are so aggressive they can be fooled on certain maneuvers; which linemen can be "trapped" (let through, then blocked from the side); which ones are likely to make mental errors in certain situations.

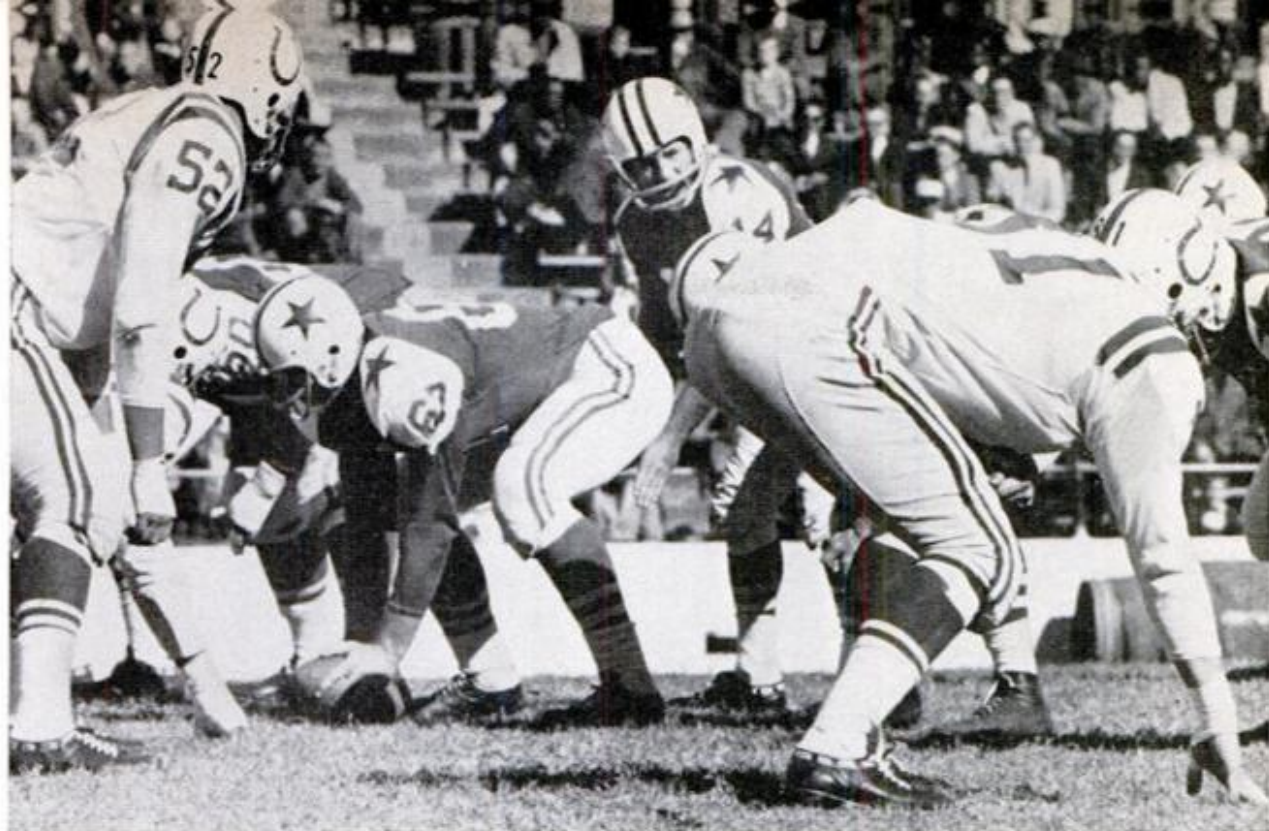
Before last year's championship game, Eagle assistant coach Charley Gauer had noticed that the Packers' kick-off team had two fast men on the right side and a slower man on the left. Just for that game, we set

up a special blocking pattern designed to open up a long, wide alley for halfback Ted Dean. Late in the game this resulted in a 58-yard kick-off return to the Packer 39.

On the first series of downs in a game, sometimes you'll see a quarterback "going for broke" with a climax play or long pass. He uses that series to test the defense. If they've changed habits since the last game, he wants to know early in the game.

During the game you'll notice that





coaches and teammates talk with the quarterback more than any other player. Like the Central Intelligence Agency, he's collecting information. Coaches on the bench provide it; an assistant coach with a phone high in the stadium does also.

What goes on in the huddle? Because we approach the game seriously, there's no dawdling or horseplay. Once in the huddle, the QB has the next play selected—or, in the case of such teams as the Cleveland

Browns, because the coach calls the plays, it will have been sent in with a lineman. He calls it quickly.

"Four right, 25, full, trap, on 3." This tells every man all he needs to know.

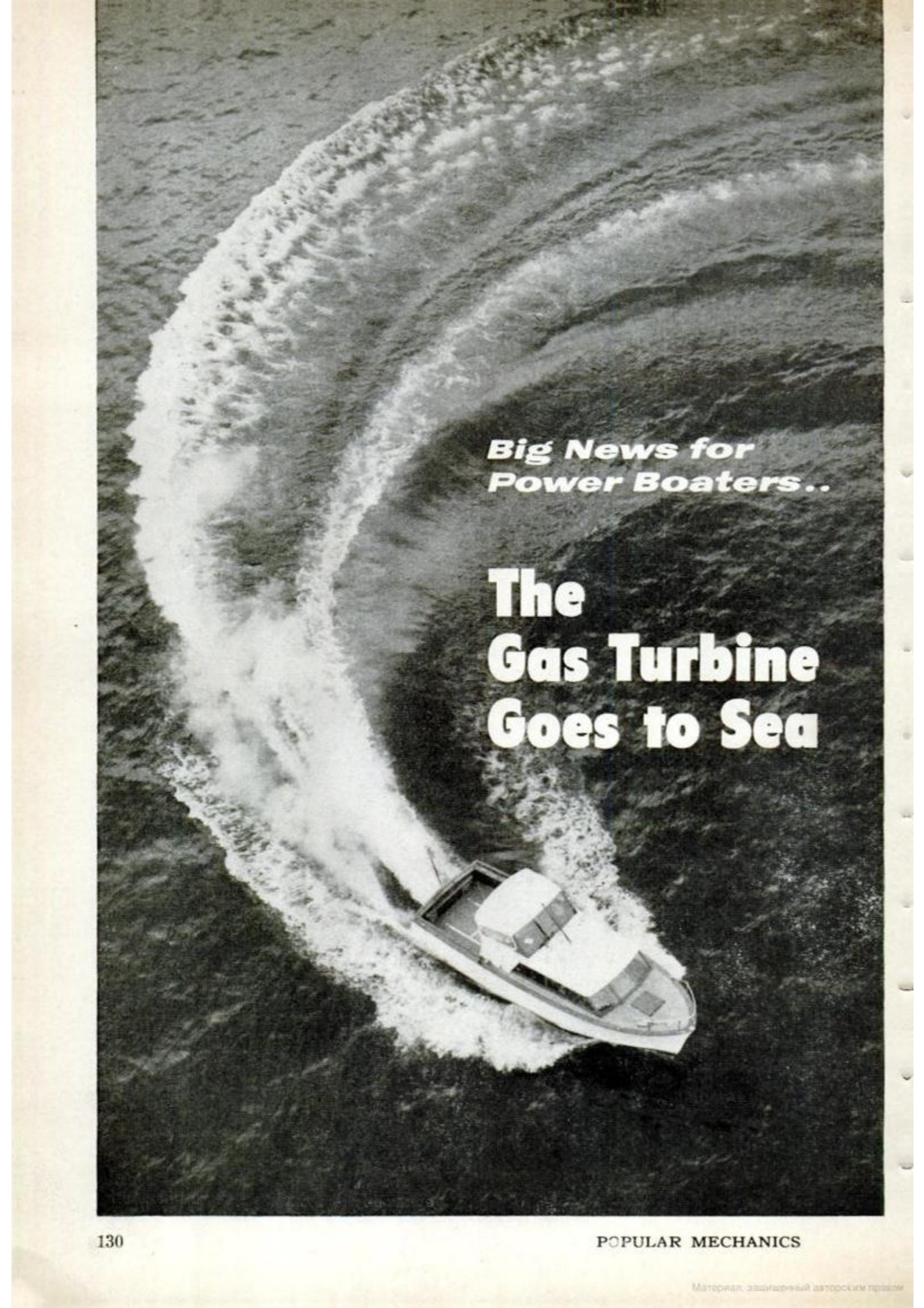
"Four right" is the formation; "25" the ball carrier (the left halfback is designated "2") and the hole he'll go through ("5" means over right tackle); "full," the backfield style, in this case a fullback fake;

(Continued to page 230)

LOS ANGELES Rams' Frank Ryan runs one out, left. Pro quarterbacks seldom run; author Van Brocklin admits he ran with the ball "only out of sheer fright"

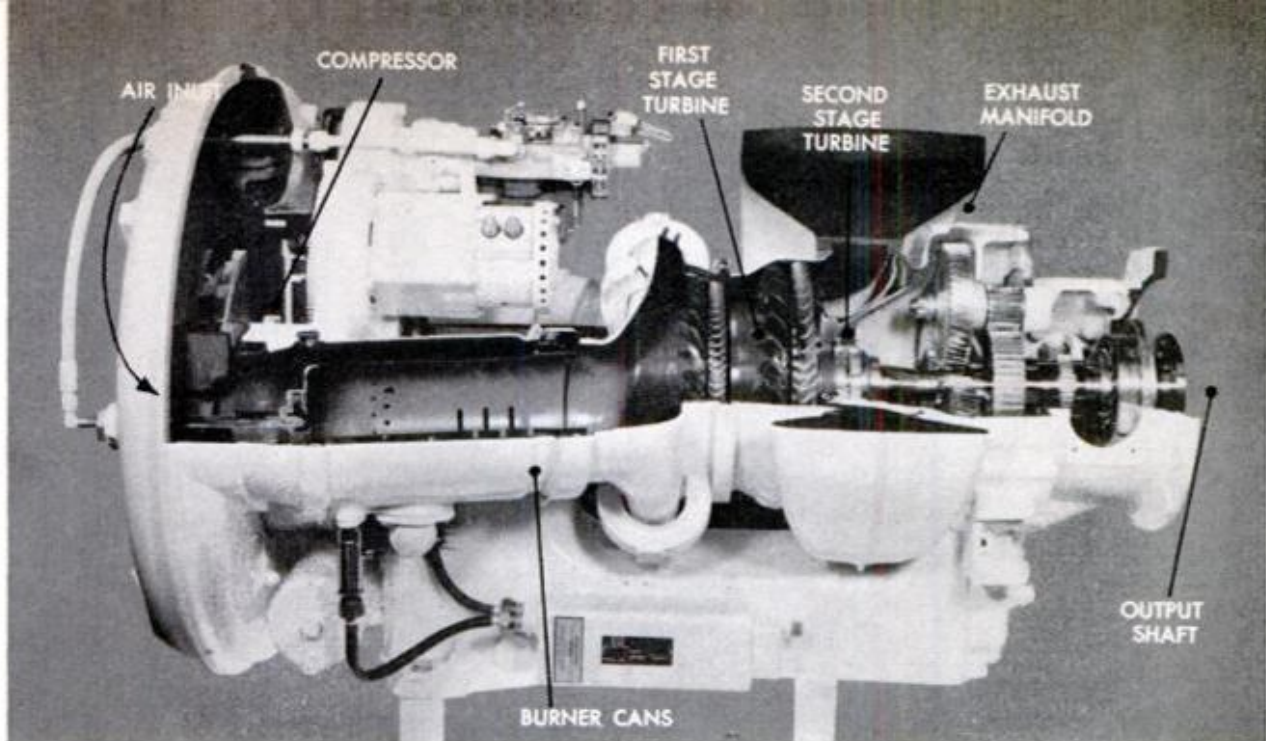
CONCEALING BALL behind his hip, Detroit quarterback goes wide on option play. He can pitch out, pass or run from there. Green Bay Packers photo





***Big News for
Power Boaters..***

**The
Gas Turbine
Goes to Sea**



BOEING'S TURBO-MARINER—260 horses in a 625-pound package with gears, clutch, shift, starter and instruments included. Note lack of any connection between first and second stage turbines—a complete floating drive

By Chris Edwards

THE GAS TURBINE ENGINE—turbine for short—pushed pistons and props out of fighters and bombers because it delivered performance. Commercial airlines followed years later when turbines nearly doubled transport speeds, and for the same reason—they gave better performance.

Now, turbine power for boats offers a similar boost in performance.

Take one 26-foot cabin cruiser, for example. A 260-hp. gas or diesel piston engine churns out a top speed of 18 m.p.h. But with a gas turbine, top speed on this same cruiser jumps to 33 m.p.h. Two hundred and sixty turbine horsepower packed into only 625 pounds makes the difference.

Boeing's Turbo-Mariner, for example, weighs 400 to 500 pounds less than comparable 260-hp. piston engines. So, with the same horsepower at much less weight, you get performance from the turbine power plant that you can't buy with any other kind of power.

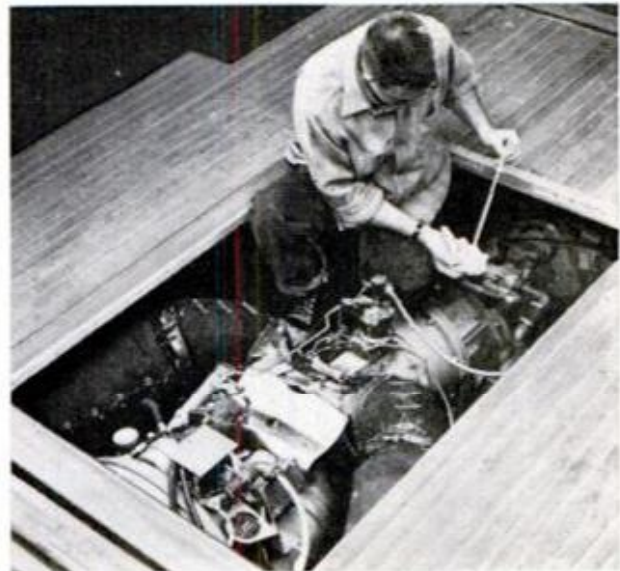
Packaged as a complete marine power plant, the Boeing Turbo-Mariner comes equipped with reduction gearing, clutch and reverse shift, push-button starter, instruments, and a simple one-knob control. The engine itself weighs only 335 pounds. Reduction gearing and accessories add the additional 290 pounds.

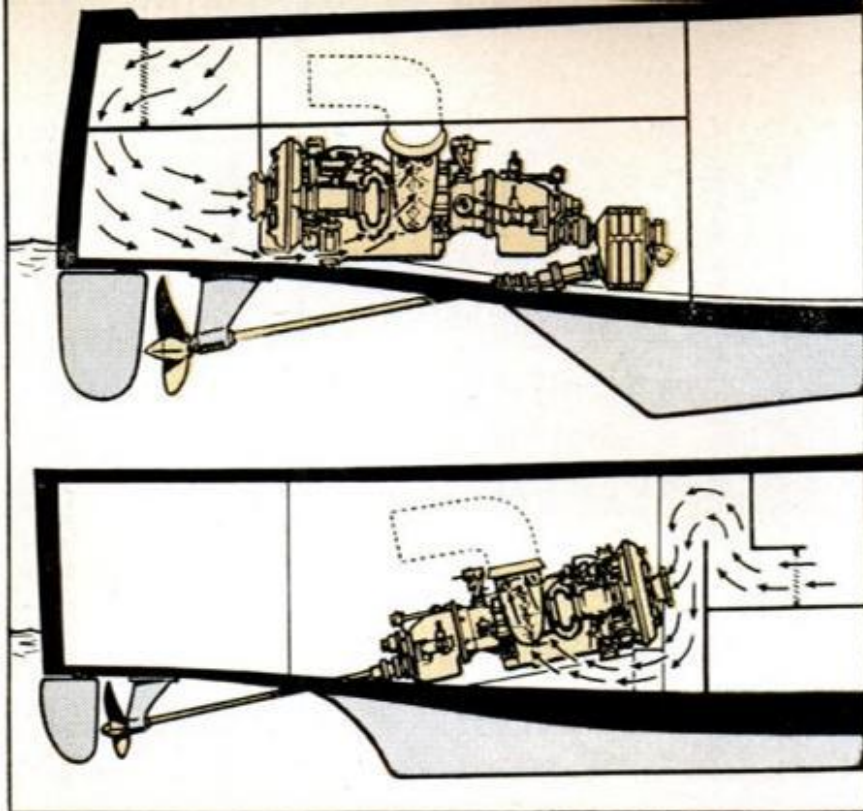
How about vibration? With no pistons pounding, turbine power is smooth and vibrationless. Except for a whirring purr you might think you are aboard a sailboat. Compare the ever present vibration aboard a propeller-driven airliner to the smooth flight of a 707 jetliner. You feel the same



PROPOSED TURBINE-POWERED hydrofoil cruiser, with turbine mounted in bow, will top 45 miles an hour

COMPACT TURBINE mounts flush under deck of 26-foot test boat shown at left. It's only two feet high





TWO TYPICAL INSTALLATIONS.
Top, V-drive to keep engine aft;
bottom, conventional mounting.
Arrows show intake air flow;
dotted lines show exhaust ducts

smooth power in the turbine-powered boat without any hull-thumping vibration.

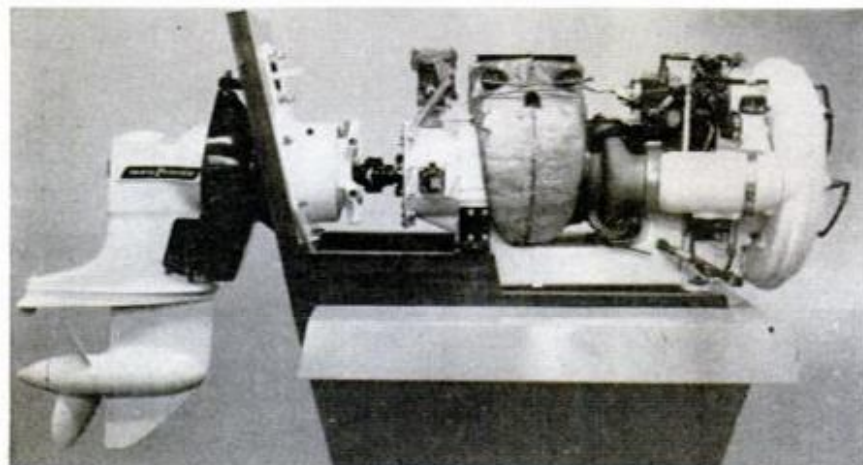
Nor is the Turbo-Mariner's light weight and smooth power a sign of weakness. From a forward speed of 15 m.p.h. the 26-foot cabin cruiser can crash-stop in half its length by throwing the power plant into full reverse. Do the same thing at the 33-m.p.h. top speed and the cruiser stops in two lengths. During shake-out tests the Turbo-Mariner was cycled from full speed ahead to full reverse 200 times in quick succession. When the boat reached full speed in reverse, the engine and gearing were jammed forward again to full speed ahead. After this series of rugged reversing cycles, the turbine power package, protected by the engine's built-in torque-converter and free-floating turbine wheel design, showed no strain.

Like most turbines the Turbo-Mariner can thrive on a varied diet. Normal fuels are automotive or Navy diesel oil and ordinary home heating diesel-grade oil. By

making an adjustment to the governor and a change of fuel nozzles, the engine can burn white gasoline, kerosene, alcohol, or JP series jet fuels. In emergencies when nothing else is available, the turbine can operate up to five hours on automotive or aviation gasolines of any kind. Octane rating means nothing to the turbine.

Everyone knows a turbine is supposed to gulp fuel like a skid-row bum guzzles wine. For many early turbines this was true. Even today a gas turbine uses more fuel per hour—but you get farther in that hour if the gas turbine is in a boat. And the turbine fuel costs less. Let's get back to the 26-foot cruiser again. Operating at full speed (18 m.p.h.) during test runs, the piston engine burned about 18 gallons of gasoline per hour. At cruise (28 m.p.h., 5 m.p.h. below top speed), the turbine burned about 28 gallons of diesel oil per hour. The two power plants burned one gallon of fuel per mile. The difference in speed was

(Continued to page 242)



EXPERIMENTAL installation of turbine with MerCruiser stern drive unit would give turbine's high performance with flexibility and maneuverability of a conventional outboard engine



Helicopter Training on a Leash

Designed for self-training, a one-man helicopter makes all the usual maneuvers without ever rising more than a few feet. It can go up, down, tilt, change direction.

The Whirlymite, built by Del Mar Engineering Laboratories of Los Angeles, Calif., is mounted on a large flexible arm connected to a free-moving air-cushion platform.

Artificial Lake for Radioactive Water

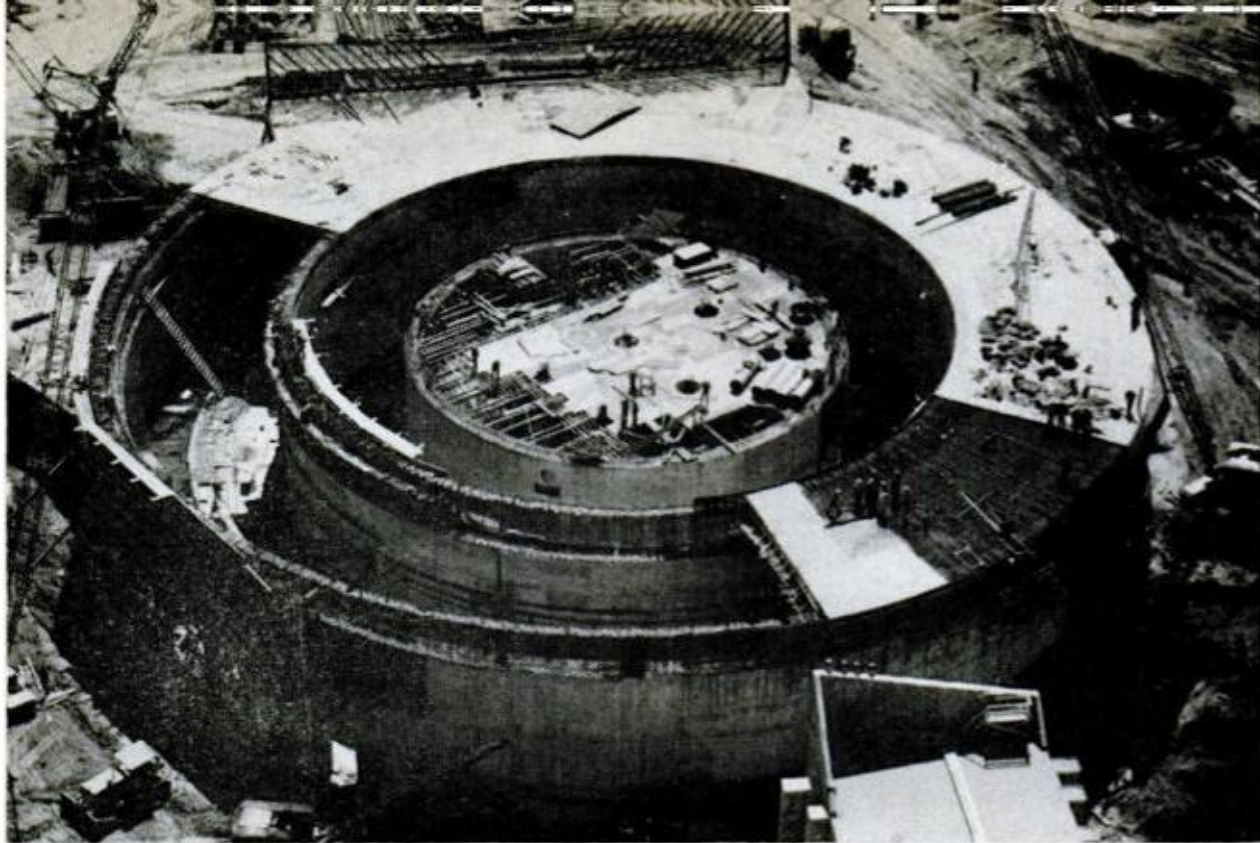
More than 1,000,000 gallons of radioactive water from Canada's Chalk River atomic research center can be stored in an artificial lake which is lined with polythene.

The lake normally will be empty; it will store water that becomes contaminated

from circulating, as a coolant, around uranium fuel rods in a nuclear reactor to keep them from melting.

The lake measures 180 by 175 feet and is 18 feet deep in the center. A concrete lining would absorb radiation.

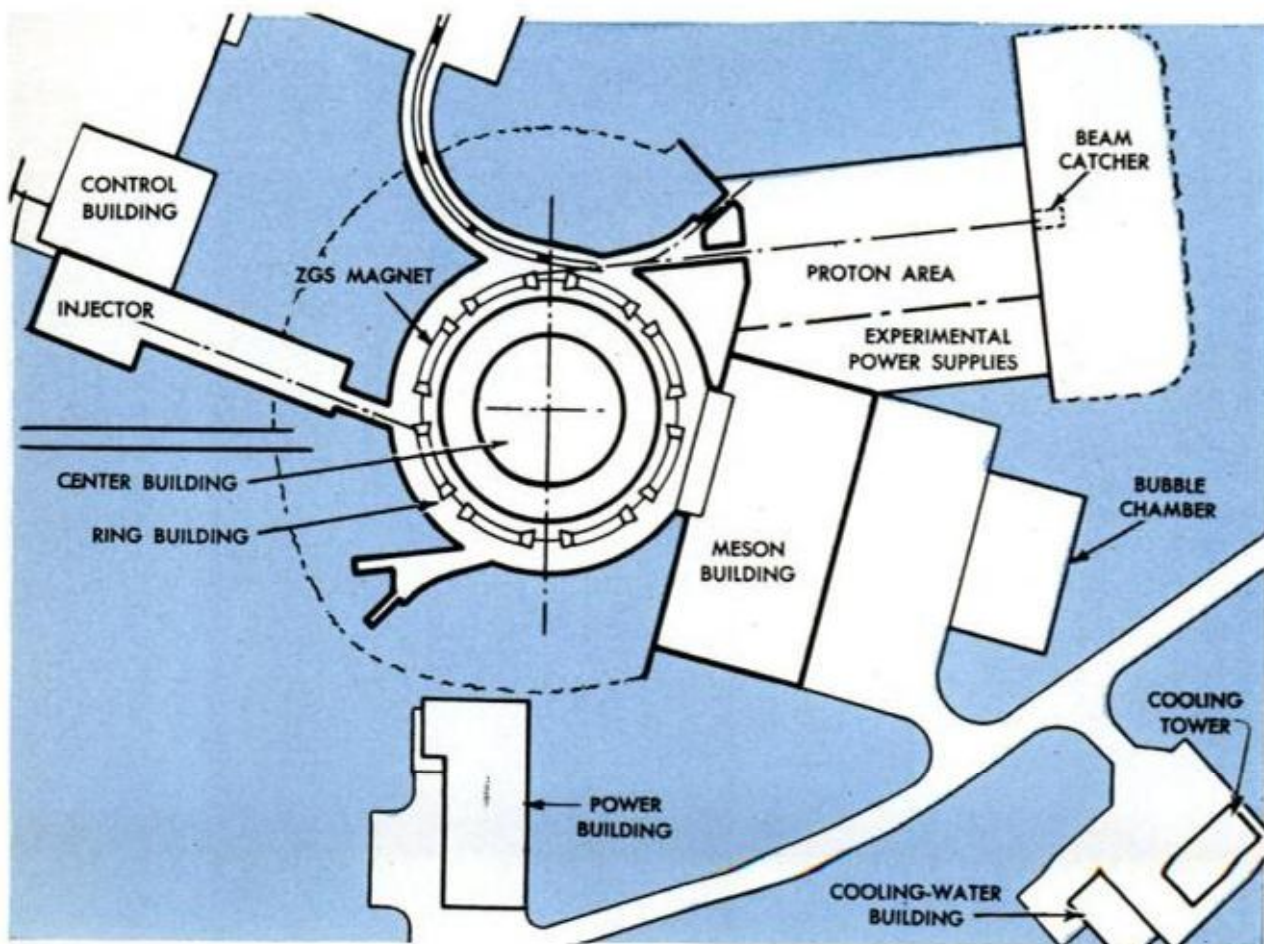




Doughnut Will Drive Protons to Pieces

Coiling around a field at Argonne National Laboratory, Lemont, Ill., is a doughnut-shaped building which will house a Zero Gradient Proton Synchrotron, a machine that shoots protons, small nuclear particles, with such energy—12½ billion

electron volts—that when they collide with protons at rest they will produce little-known pieces of matter (mesons, hyperons, antiprotons and antineutrons). The speeding protons will be kept on course by eight 600-ton magnets.



Igor Sikorsky, born in Russia in 1889, was designing and building flying machines before he was out of his teens. Since coming to the U.S. in 1919, he has developed transoceanic air clippers, helicopters, and organized an aircraft company for which he is still a consultant



My Most Exciting Moment

FROM THE EARLIEST DAYS of my aviation activities I had two long-range ambitions. One was to create a successful helicopter. The other was to design a large airplane with an enclosed cabin and several engines. Both ideas were considered impossible in the early days of aviation.

In September, 1912, I succeeded in persuading the management of the Russian Baltic Co., to authorize the construction of a large four-engined airplane. The ship was designed and constructed in spite of numerous difficulties, but it was generally predicted that it would never fly. I had confidence in it but I still waited with great interest for the tests of the new aircraft of which I was the designer and planned to be the test pilot.

The intensely interesting moment came when, on May 13, 1913, I had the *Grand*, as it was called, wheeled out and, for the first time, made an attempt to take off. I was sitting in the enclosed cabin fairly high above the ground. With no wind in my face I had the impression that the ship was accelerating very slowly yet the fact that the ailerons and elevators became active indicated that the ship was gaining speed. Finally all the shocks under the wheels ceased and I saw the Earth gradually moving away. The ship was airborne. It was flying!

The sensations of flight in a closed cabin with no wind and the beautiful view from the windows were novel and exceedingly pleasant. For a few moments there was an exciting and happy feeling of success, of the vindication of all the hard work, great expense and the confidence that had been placed in me. Then I had to focus my attention on becoming quickly familiarized with the responses to the aircraft controls which included several completely novel features such as its great size, its unprecedented heavy weight, the enclosed cabin, and the influences of four engines in line on the wing instead of one in the center.

In subsequent flights I was able to remain aloft up to one hour and 50 minutes and to establish several world records. The aircraft proved capable of flying under good control with any one of its four engines out of commission. The enclosed cabin offered greater comforts to the passengers and greater conveniences for the pilot and the navigator with his charts.

This confirmed in full our hopes and expectations for the success of this first four-engined airplane, which became the forerunner of the large transcontinental airliners that form the backbone of rapid transportation all over the globe.

A handwritten signature in cursive script, likely reading 'Igor Sikorsky'.

Guns for the Blue and Gray

—from modern Italy

Young American goes to Europe to build replicas of guns used during Civil War

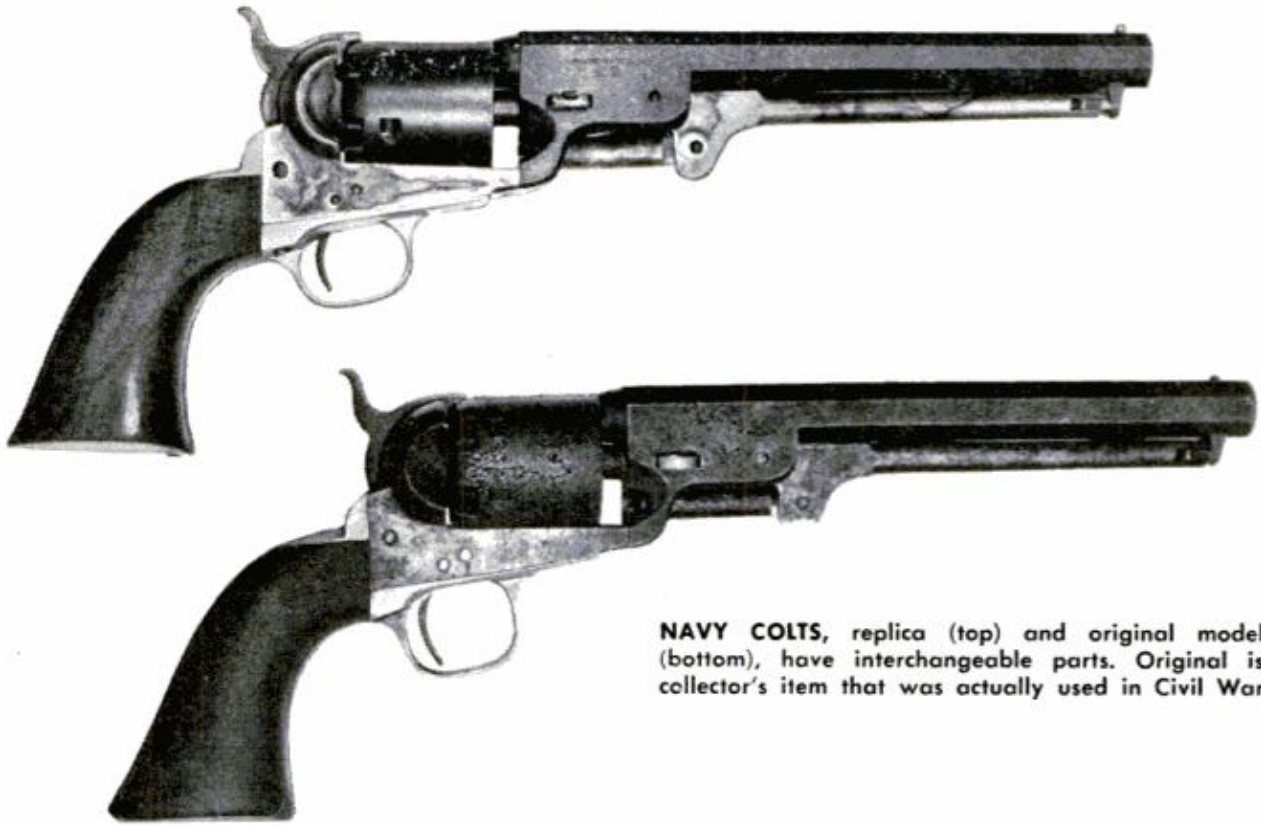
By A. Delman

WHEN 30-YEAR-OLD Val Forgett of Ridgefield, N.J., decided to cash in on the current interest in Civil War firearms, he triggered an unusual success story. Today he is probably the world's only large-scale manufacturer of replicas of Civil War guns. All of the guns fire.

Among those made by his Navy Arms Co. are the .36-caliber 1851 Navy Colt and its two Confederate imitations; the Leech & Rigdon and Griswold & Grier .36-caliber percussion pistols; the

VAL FORGETT, who created firm that reproduces Civil War guns, examines one of its products, a Navy Colt





NAVY COLTS, replica (top) and original model (bottom), have interchangeable parts. Original is collector's item that was actually used in Civil War

.44-caliber Remington Army revolver; the .36-caliber Remington new-model belt revolver; the .36-caliber Sheriff's model Yank and Reb revolvers; the .58 Remington single-shot carbine; and the .44 Remington six-shot revolving carbine.

All the revolvers list at \$89.95 and the rifles at \$125.

Because these historic powder-burning muzzle-loading firearms demand greater shooting skill than the modern automatic, marksman find a more exciting challenge.

"Every gun shoots a little differently," Forgett says, "and each man has to learn his own gun."

Adding to the fun is the fact that these guns don't use standard ammunition. You buy percussion caps and cast your own lead ball. It's kind of do-it-yourself firearm.

A pleasure of another kind is that ammunition costs are only about one-fifth of that for contemporary handguns.

Forgett hit upon the idea of reproducing Civil War shooting irons because, as an avid gun collector and Civil War buff, he was keenly interested in these weapons and enjoyed shooting them himself. Sportsmen who shared his enthusiasm, he reasoned, would also get a charge out of this new adventure.

In addition, the coming Civil War centennial in 1961 made it a matter of timeliness to revive the guns which had helped decide the conflict.

Forgett chose the first model he reproduced on the basis of its popularity.

"The 1851 Navy Colt was one of the most widely used guns Colt ever made," he says. "It was the unofficial sidearm of the U. S. Navy and was also used by many Union Army officers during the Civil War.

Another advantage was one of economy.

With the same machinery which turned out the Colt, he could also produce the two other guns, since except for the shape of the barrel they were exact Confederate counterparts of the prized Navy pistol.

Forgett's reproductions are so close to the original models that the parts are interchangeable. He does not, however, give his guns a dull, "antique" finish.

"We're making reproductions," he says, "not fakes."

These military guns are accurate up to twenty-five yards and are as free of safety and jamming problems as the modern pistol.

They are not, however, useful for hunting because it takes too long to load them.

As the first step in his manufacturing venture, he trekked up to Colt's Patent Fire Arms Manufacturing Co. in Hartford, Conn., and maneuvered his way through old Sam Colt's original designs for the Navy 1851. Forgett was almost defeated in advance at the sight of the numerous manufacturing problems involved, then made up his mind to take the risk and go ahead.

A major difficulty was to adapt modern manufacturing techniques to the production of old guns. The use of Colt's mid-19th-century methods would have cost a fortune.

Since Forgett is an engineer, one of his



YUGOSLAVIAN WALNUT is seasoned in special sunlit room for later use as stocks of 1863 Remington rifles

ingenious solutions was to design special tooling machinery which increased efficiency and reduced expense. In another move to sidestep profit-destroying domestic production costs, he went abroad and persuaded a reluctant Italian arms manufacturer to start low-priced construction of the guns in the little valley town of Gardone, near Brescia, Italy.

This manufacturer was one of a number of skeptics who predicted that while Forgett might sell a few of his out-of-date weapons, he would never top the 1000 mark.

However, in the first year he sold almost 5000 Civil War guns.

Orders have flown in from all over the world, including Libya, Australia and Sweden, as well as the United States.

The next gun he put on the market was the .58-caliber Remington 1863 which he describes as the most accurate muzzle-loading military rifle of all time. A stumbling block in its manufacture was the scarcity of top quality walnut long enough for the full stock.

Forgett and his agents scoured Europe, almost despairing of unearthing the wood, when they finally tracked it down to an unsuspected hiding place—Yugoslavia.

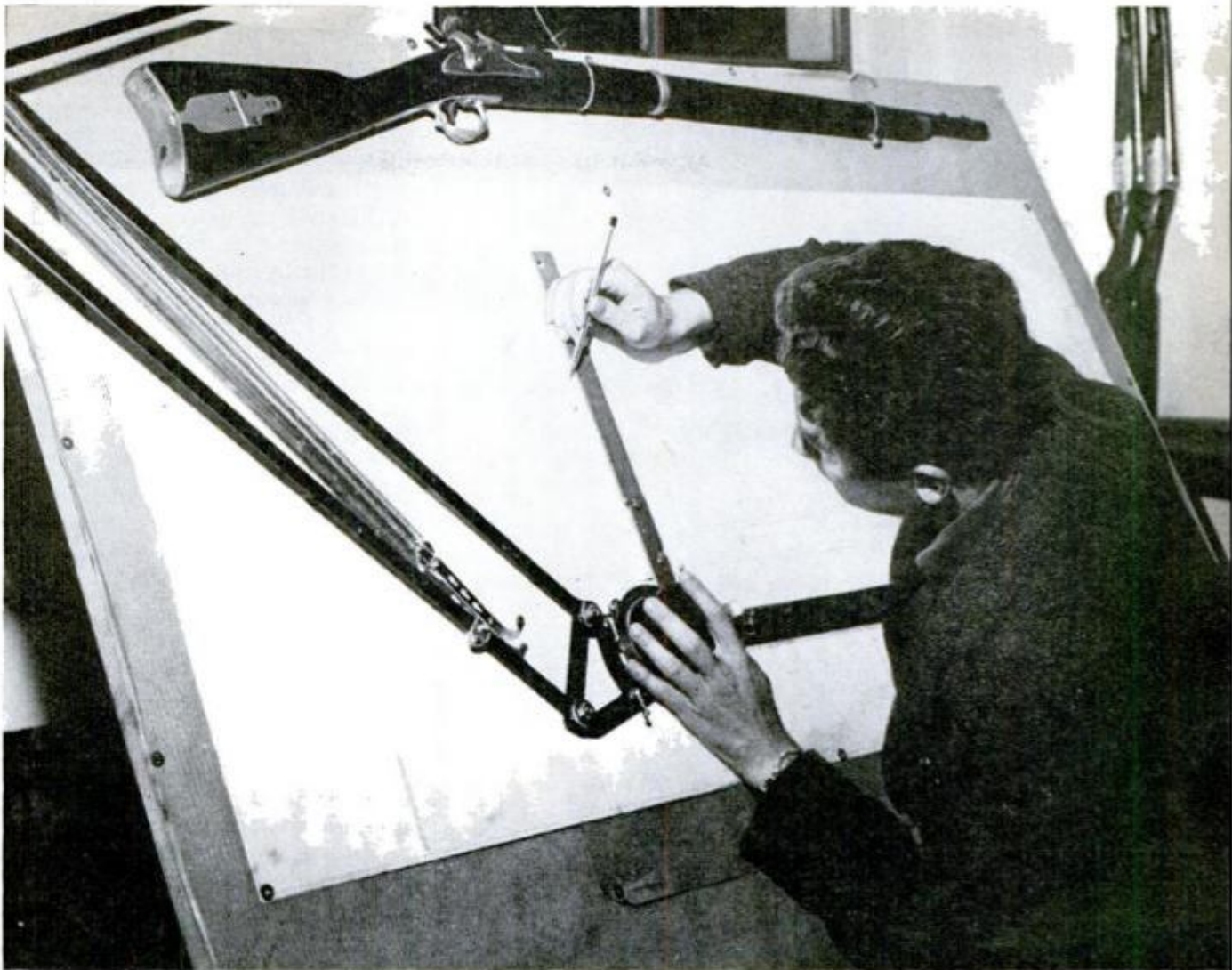
Current plans are to bring out a new reproduction every few months.

"It's a good idea to give the customer something new a couple of times a year," Forgett philosophizes. "This keeps him from getting tired of your product, and keeps the business going . . . ah . . . great guns." ★ ★ ★

FINAL INSPECTION of pistols is made by Forgett's Italian agent. Guns are then dipped in tub of grease (left) to prevent rust

RIFLE LOCK on .58-caliber Remington is carefully checked before installation

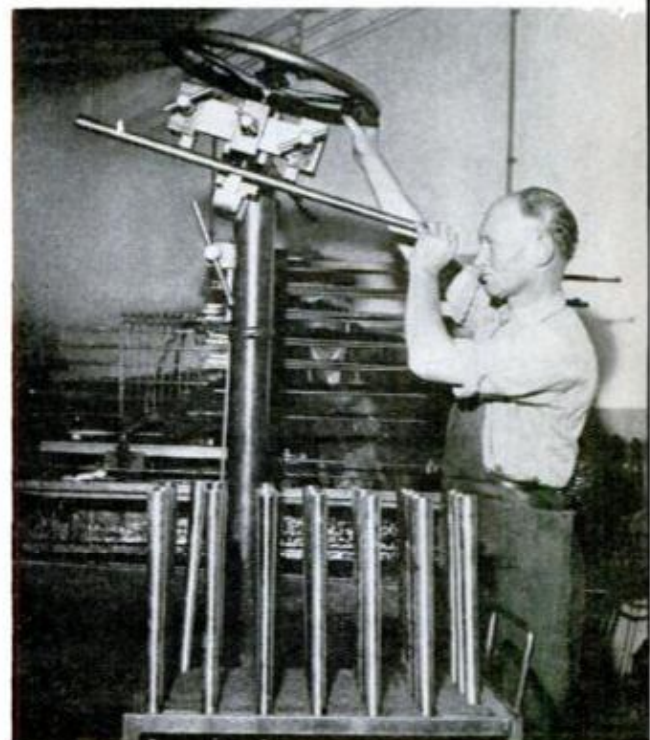




ITALIAN DRAFTSMAN draws the blueprint for a Remington replica, using an original 1863 rifle as his model

ITALIAN GUNSMITH files revolver frame. Forgett went to Europe to make replicas because of high labor costs in U.S.

ITALIAN MACHINIST straightens a rifle barrel after hole is drilled through center





Kid-Sized Bulldozer

Junior-grade engineers now can get in all the practice they need for doing those big construction jobs.

A new pedal ride designed for children combines in one multi-control unit a bulldozer, a fork lift, a scoop, an earth mover and a front-loader cargo carrier.

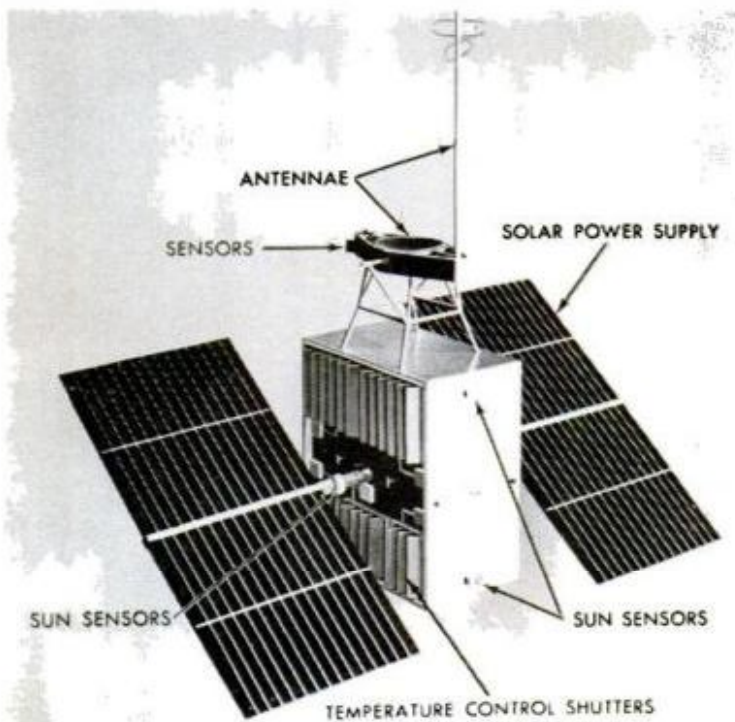
Called the Lif-Tup, the toy ride has two controlling sticks which allow the pint-sized construction equipment operator to make quick turns and to engage in flashy zig-zag maneuvering.

The ride is made by the Universal Manufacturing Company, Inc., P. O. Box 5637, Bossier City, La.



Stretchers Float on Air

Demonstrating a new use for vehicles working on the ground-effect principle, British Royal Medical Corps personnel give two patients a bump-free ride on an air-cushion stretcher carrier. The vehicle, which works on the same principle as bigger ground-effect machines, balancing the load on a trapped "bubble" of air, is powered by two small industrial two-stroke engines operating fans at each end of the air chamber. A stretcher fits on each side of the engine compartment. It's made by Folland Aircraft.



For Talk Around the World

To prove the feasibility of microwave satellite communications to beam signals around the world, the Army, Navy and Air Force have teamed to develop a relay system called Advent. It will require three satellites which will orbit Earth at 22,300 miles above the equator at a speed of 7000 miles per hour so that each satellite would stay in the same spot in relation to Earth.

High-speed radio teletype and voice broadcasts beamed to a satellite will be received, amplified and relayed to Earth.

The satellites each will consist of a vehicle body, two solar cell paddles and Earth-oriented antennas. Solar energy will be converted into electrical energy by photovoltaic cells.

By
Max Hunn

Wild Animals Pose Here



NATURAL SHOTS of wildlife are made by putting animals inside small corral and photographers outside fence

IN A WILD, rugged area in southwest Florida, photographers get natural, wild-animal pictures without blinds, stalking or creating fake backgrounds.

It's a unique photo corral developed by the Florida Game and Fresh Water Fish Commission, whose photographers produce pictures in authentic settings with a minimum of problems. East of Punta Gorda, three-and-a-half acres of typical Florida scrub palmetto, pines and underbrush have been enclosed with an eight-foot, hog-wire fence (the bottom foot underground), equipped with eight photographers' platforms and special releasing chutes, and converted into an unusual photographic set.

Each platform is four feet above the ground, outside the fence, and positioned so that no other photographer accidentally gets into the background. From the photo

corral have come a series of wildlife pictures — both stills and movies — which are being used in TV shorts, educational movies, publicity releases, and educational pamphlets by the commission.

To date, deer, bears, panthers, wildcats and alligators have been photographed. Completely wild animals would panic if trapped and placed in a corral. The solution was to borrow wild animals who were accustomed to cages. Such animals, while not domesticated, lose their fear of man, and learn not to injure themselves in their enclosures.

Fortunately, a source of such wild models is nearby at Bonita Springs, where the Piper brothers — Bill and Lester, famous wild-animal handlers — operate their Everglades Wonder Gardens, featuring every type of Florida wildlife. All the animal

Mama Bear Gets Careful Treatment . . .



actors are furnished by the Piper brothers.

Setting up for a photographic session has all the earmarks of a Hollywood production. The fence is carefully camouflaged with freshly cut, green palmetto fronds. No human tracks are made which might accidentally appear in the pictures. The underbrush is carefully trimmed permitting a clear camera view, yet not changing the wild appearance. Then the animals are brought to the corral in special cages and released into the photo area via special chutes.

Through experience, the camera crew has learned that the animals can be maneuvered into position by preparing special trails. Deer love tobacco and eagerly follow

a trail of cigarettes. While shooting a beehive sequence, a trail of cookies entices a bear on stage.

Probably the most disappointing actor was a female bear who refused to tear honey-laden bee hives apart. The stage was set, the honey-filled hives in place, and the bear coaxed on stage with cookies. Then the script went sour. As she opened the first hive, a bee stung her on the nose, and Mrs. Bruin abruptly departed and no amount of persuasion could coax her back.

During a shooting session (which usually lasts several days), every type of equipment is used, ranging from 35-mm. to 4 x 5-inch still cameras, and 16-mm. movie cameras. Both black-and-white and color film

Baby Bears Are More Congenial



are used, although the movies are predominantly shot in color.

Most of the photography is done in late spring and early fall when the vegetation is best. Also, the cooler weather is easier on the animals—and the mosquitos aren't as bad on the cameramen.

Getting animals into the corral is relatively simple, but retrieving them isn't. Panthers have to be roped by men on horseback. Deer usually can be led back to their cages with tobacco, except for the frisky ones. Several times it has been necessary for men on foot to tackle them, and don't think an adult deer is an armful of fluff. In the case of a seven-foot 'gator, it was necessary to rope and drag him from the spe-

cially made water hole. Bears can be equally difficult and usually are recaptured by trapping in huge drums. Wildcats are netted on foot.

Has the project paid off? Yes, the commission says.

"The first camera project repaid the cost of building the corral," declares Robert Dahne, chief of information-and-education for the commission. "We'd have to keep our cameramen in the woods for a year to duplicate the results we get in one hour in the photo corral."

P.S. The cameramen would rather work the corral, too. It has simplified many of their problems in wildlife photography.

And it's safer.

★ ★ ★



Bus-Boat Cruises Florida Waterways

Take one 36-foot surplus landing craft and one 30-foot passenger bus, saw off the bus below the window line, weld the two together, and you have a comfortable, seaworthy cruiser for something less than the

traditional thousand-dollar-a-foot cost. William O'Brien, of Miami, Fla., powers his craft with a 150-horsepower truck engine, gets 10 knots and a 300-mile range. He reports that "she handles like a baby carriage."

Champagne From Mink Slipper

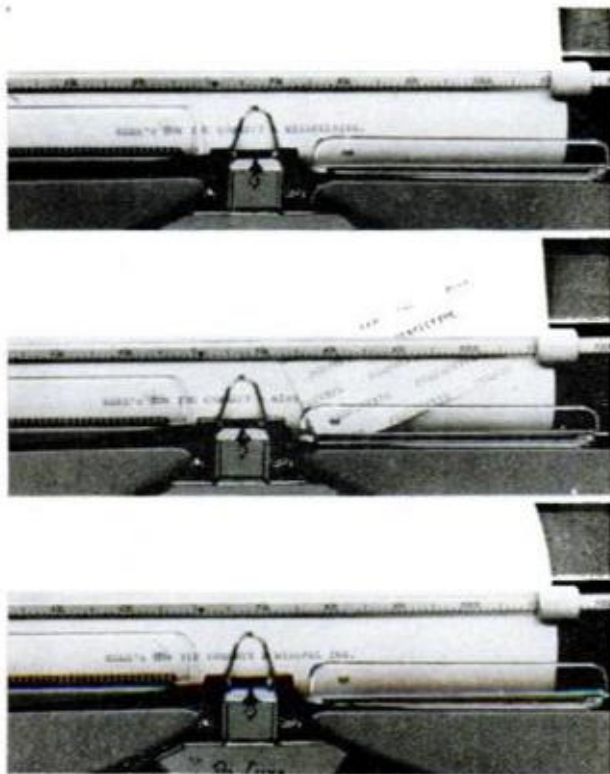
Made of pink mink and gold snakeskin, this slipper has a champagne container in its heel with a small tap from which the champagne can be poured.

The slipper is made by L. & W. Theckston, Ltd., of England, and was displayed at a recent slipper fair in Blackpool.



Strip "Whites Out" Typing Errors

Typing mistakes can be undone easily by "whiting out" with a new treated paper slip. You place the strip over the mistake, repeat the error, and it disappears; the paper works like carbon paper but prints in white. It's made by Perry-Sherwood Corp., 255 Park Ave. South, New York 10.



Samples Wheat 80 Feet Deep

Using a pointed nozzle with special slots and six-foot sections of a tube within a tube, a pneumatic wheat probe can suck up samples of stored grain from as deep as 80 feet or more.

The samples enter the slots in the nozzle and are air-lifted through the inner tube to a separator where they are held for inspection. Nozzles are available for either coarse or fine grain.

The unit is produced in two models, one for probes up to 30 feet and one for deeper probes.



"Pacemaker" Trains Runners

Like a greyhound chasing his mechanical rabbit, Japanese track star Saburo Yokomizo is paced in a workout by a remote-controlled pacemaker in Tokyo's National Stadium. Running just ahead of the runner on a track built parallel to the cinder track, the device helps perfect the exact lap timing required in modern track competition. In addition, it carries a radio "walkie-talkie" system that gives constant communication between runner and coach all the way around the track. The \$41,700 training aid will help train Japanese runners for the 1964 Olympics, scheduled to be held in Tokyo.



Cross-Spring Pivot for Space

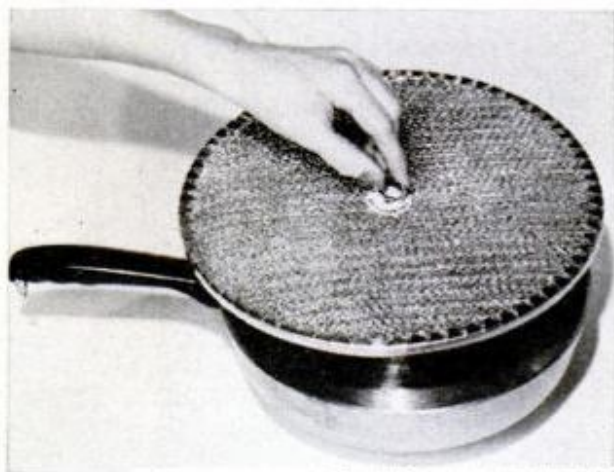
Called "frictionless" by the manufacturer, a new flexural pivot bearing is intended to replace ball-bearing assemblies and jewels in similar installations requiring a rotational movement of 60 degrees or less. The bearing, which is an improvement of previous cross-spring flexures, has flat steel springs forming a web between two separated sections of a tubular bearing. It is the flexing of the cross springs that allows movement, but without rubbing of one part against another. The device, made by the Bendix Corp., is expected to have many applications in space, since it is not affected by radiation, high temperatures or vacuum, needs no lubrication, and has a long service life.



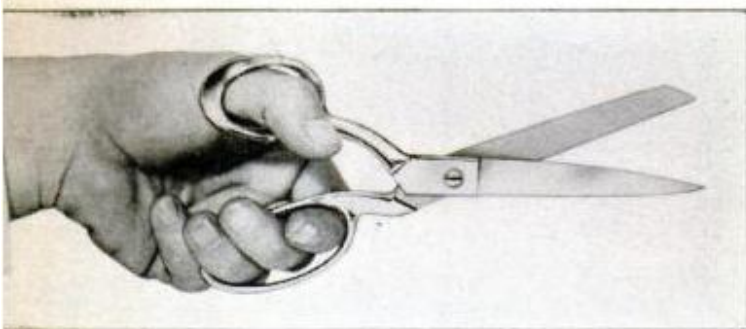
WHAT'S NEW FOR Your Home



ALUMINUM DRAPERIES consist of four-inch-wide S-shaped sections that interlock for complete light control. A cord-and-pulley system open and close draperies. Price varies with size. Made by Louver Products Company, 6611 Salt Lake Av., Bell, Calif.



FRY-PAN FILTER keeps grease from spattering without making pan airtight. Steam escapes and foods are fried normally. Filter can be washed with dishes. Retail at \$1.19 for large size (11½-inch diameter). Made by Research Products Corporation, Madison, Wis.



LEFT-HANDED TRIMMER designed for lefties who have trouble using right-handed tools, has been added to line of left-handed scissors made by Acme Shear Co. of Bridgeport, Conn. The eight-inch trimmer (\$3.50) can be used in home, school or factory

BABY CONVERTIBLE can be used as playpen, dressing table, bassinet or bed. It has telescoping legs, adjustable floor, roller wheels for moving from room to room and "wetproof" mattress. Also collapses for easy storage. Spring buttons and matching holes control length of legs. Bed bottom can be moved up to bassinet or dressing-table height by inserting wire hook at each corner into matching hole. Nylon net is washable. Frame is steel, and floor and shelf are hardboard. It is sold (\$33) by Tigrett Industries of Jackson, Tenn.



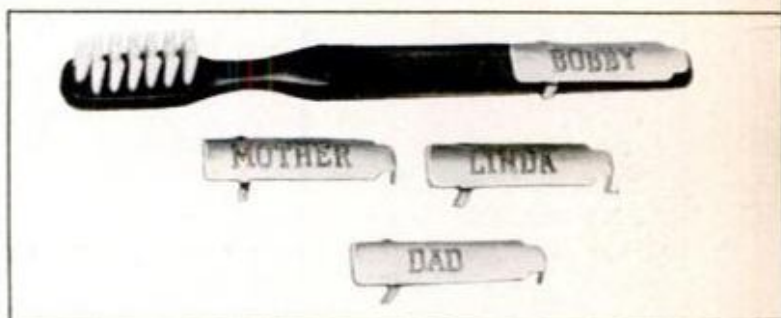


NESTLE NURSER, which holds baby bottle in place, can be hung around mother's neck, leaving her free to telephone, read, cook, etc., or can be hung from crib, play pen or car bed. Plastic, it is sold (\$1.98) by Underwood Products, Grand Prairie, Tex.



ELECTRIC RANGE with built-in look features two independent ovens at shoulder level, four cooking units on counter, each with variable speed control, and large cabinet underneath. Made by Thermador Electrical Manufacturing Co., Los Angeles, Calif.

TOOTHBRUSH IDENTIFICATIONS can be made with name plates that are attached to end of brush with three hooks. Price (75 cents each, four for \$2.95) includes name engraved in block letters in gold tone or silver. From K & F Distributors, Yonkers, N.Y.



INSTANT SALAD, tossed thoroughly but neatly, is possible with special covered bowl that includes double twirler. Top and bottom of bowl interlock. Holds enough salad for six servings. Retail at \$2.98. Maker is Daco Products, White Plains, N.Y.



FERTILIZER STICKS, available in four balanced formulas for different trees or shrubs, can be inserted into ground for plant feeding. Ingredients are absorbed by roots. Gard-N-Sticks (12 sticks for 98 cents) and made by Gansco Products, Toronto, Ont.





DR. DONALDSON with "super salmon." Finger points to clipped adipose fin, breed's identifying mark



HOME TO SPAWN after three years of fattening in the ocean, salmon heads up Portage Bay fish ladder

They're Farming Super Salmon

By
Chris
Edwards

The Northwest's newest "crop" is one of its oldest products—salmon. A new method promises to double or triple the take, and might pay \$30,000 per acre of "farm" per year . . .

THE BEST ANSWER so far to the old problem of declining salmon runs is "fish farming"—a method that brings returns thirty times greater than the natural rate of one tenth of one percent survival from eggs to adult fish. Aiming at restoring, or even improving, the salmon runs in the Northwest, the state of Washington is expanding the number and size of fish farms in the state. At the same time Dr. Lauren Donaldson, at the University of Washington, has developed a breed of "super salmon," tailor-made for fish farmers through years of selective breeding.

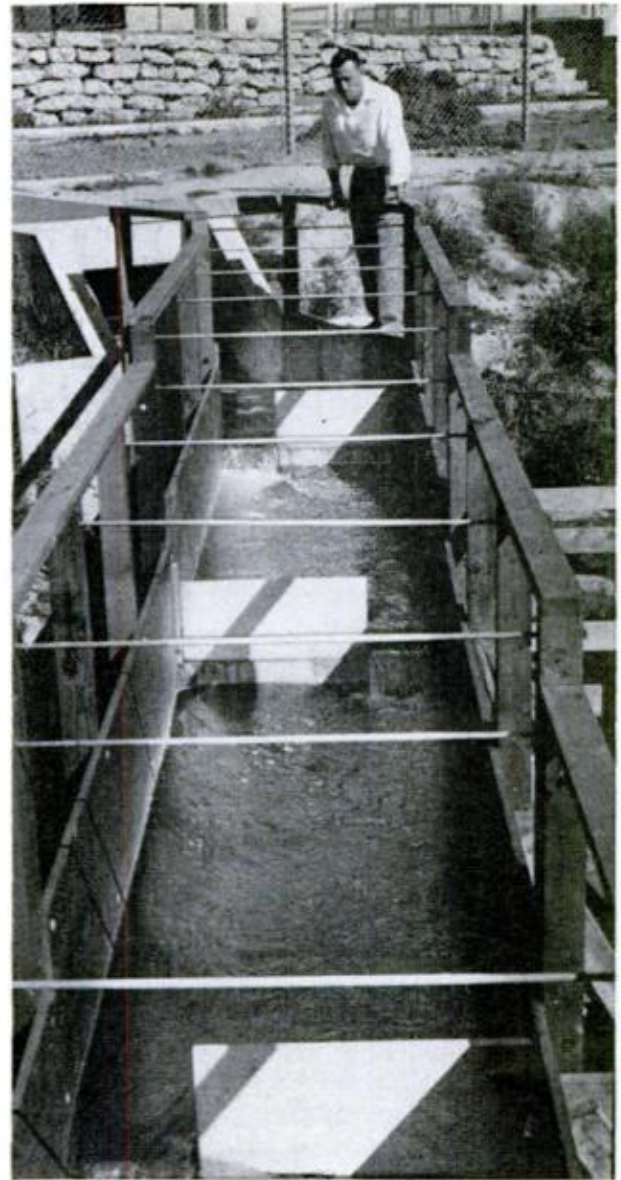


REMOVING EGGS from spawning female. Since they die after spawning, they are killed before stripping

This fall (1961), about 5000 Chinooks will thread their way up Seattle's boat-busy ship canal, through the government locks into Lake Union's fresh water, onward into Portage Bay, and then make a sharp left turn directly toward the University's fish ladder. The incredible homing instinct of the salmon enables full-grown adults to find the exact spot where they were born after three or four years at sea. How a salmon can hit a target as small as a four-foot fish ladder after a period of several years and thousands of miles of swimming is still a baffling mystery, but a convenient phenomenon for fish farmers.

From the 5000 Chinooks Dr. Donaldson expects to harvest 12 million eggs. Out of these he will keep two million for continuing his project of further developing his "super salmon." Ten million of the eggs will be released to Washington's fish farms.

Operated scientifically, fresh water ponds



FOLLOWING their unerring homing instinct, salmon return up ladder to ponds where they were raised

can be stocked with 100,000 salmon fry per surface acre. During the time the tiny fish grow to fingerling size, that is about 3 to 6 inches long, about 40 percent of the fry will be lost. This means that out of the original 10 million eggs hatched and planted, six million salmon fingerlings will be released to find their way into the ocean. About 10 percent of the fingerlings released will survive in the ocean and return as adults.

Still, from six million fingerlings, 600,000 salmon will return for harvest by sport and commercial fishermen. Figuring each of the mature salmon at \$10 apiece for 15 to 30 pounds of fish, the salmon produced from 200 acres of farm ponds would be worth \$6,000,000 to fishermen. That's \$30,000 worth of fish for each acre of fish farm ponds if used only once. When in full production, the ponds will yield three crops per year. The figure of 600,000 fish is important because that is about double the number of

Chinook caught from the salmon produced by the whole Columbia River stream system.

Dr. Donaldson's salmon are not ordinary fish. They are the product of intensive selective breeding over a 12-year period. They are rightly termed "super salmon." Compared to a normal, wild Chinook salmon, Dr. Donaldson's salmon return in a three-year cycle rather than four. Yet they are, on the average, heavier than the four-year fish because they were selected for rapid growth. The super salmon also produce up to twice as many eggs per female compared to wild or stream-run salmon. Other factors considered in selection are: A high survival rate, resistance to harsh environments, such as higher than normal water temperatures or water polluted from industries, and higher commercial food value both in appearance and nutrition.

Eggs are kept in covered pans with fresh water flowing over them constantly until they hatch, about 60 days later. The tiny fry are fed 30 to 40 times a day at first. In the ponds the salmon grow to fingerling size in about three months. At the University of Washington, fingerlings released to Portage Bay down the fish ladder weigh about 100 to the pound. To be able to identify them later, one or more of their fins are clipped. While losing a fin for later identification might appear to handicap a fish in surviving the rigors of life in the ocean, studies show no apparent loss.

Survival of salmon at Dr. Donaldson's laboratory has averaged 3.3 percent from eggs collected to adult fish returning up the ladder. This compares with one tenth of one percent for wild salmon. In addition, records of catches of clipped-fin fish by

sport and commercial fishermen indicate 5.6 fish were caught in Washington waters for each fish returning up the ladder.

Ordinarily a female salmon spawning in the headwaters of a stream will lay an average of about 4000 eggs. From these 4000 eggs only 40 fingerlings will survive long enough to enter salt water. That's a 99 percent mortality before the salmon ever get out of fresh water. In the ocean and up to the time the adult salmon begin their return swim, 90 percent of the remaining salmon will have been eaten by seals or some other predators in the ocean. Out of the original 4000 eggs, only four salmon are left. That's "two for fishermen and two for the creek," as Dr. Donaldson puts it. The remaining pair can then start the cycle over again by laying and fertilizing 4000 eggs. When this percentage is disturbed, the fish population declines or increases. During the past several decades, salmon have been averaging fewer each year.

Since the greatest mortality rate occurs in fresh water, raising the fry in ponds greatly increases return of mature salmon. Instead of getting only four mature salmon back from an original hatch of 4000 eggs, more than 100 and possibly as many as 150 can be expected to return from fish farms.

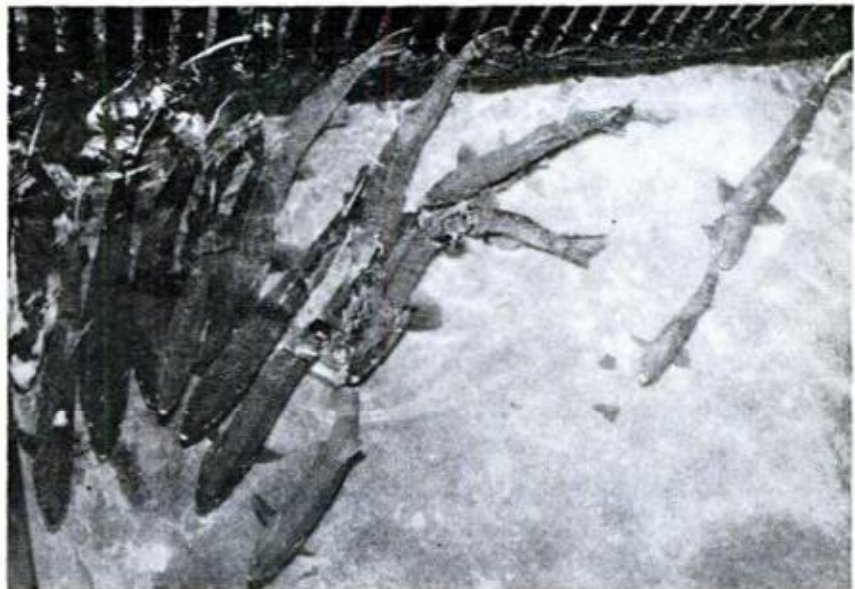
"By cutting the loss of small salmon and keeping them in fish ponds until they are able to take care of themselves," Dr. Donaldson states, "we can build back the salmon runs—not only to their former heights but double or even triple those numbers. When this happens, fishermen can look forward to catching more of the fighting salmon. And there will be more salmon—canned, frozen, smoked, kippered, and fresh—for everyone." ★ ★ ★

RAISED IN TANKS, salmon "fry" are moved into tanks of increasing size. Right, careful fin clipping marks farm salmon for ready identification when they return. Loss of fin doesn't seem to bother them





PICKING SALMON for further breeding, University of Washington students harvest part of "crop." Spawning returnees, below right, gather in pens. Collected eggs, below left, are "checked in" at the salmon hatchery





Instant Bicycle Folds Up for Easy Storage

It takes about 30 seconds to fold or unfold a bicycle that can be ridden in the conventional manner, then stored in a trailer, boat, tent, apartment, airplane or car trunk—or even carried on a bus or train. It's an answer, too, for those who don't have space for storage of a conventional bicycle.

The seat and handle bars can be adjusted to fit tall or short riders, and can "grow"

with children while they are growing up.

For storage, the seat comes down, the pedals fold up and the handle bars twist over the front wheel. Then the frame is unfolded back until the front and rear wheels are aligned.

Porta-Cycle is sold only by direct mail at \$69.50 by wico, P. O. Box 58405 PR, Los Angeles 58, Calif.



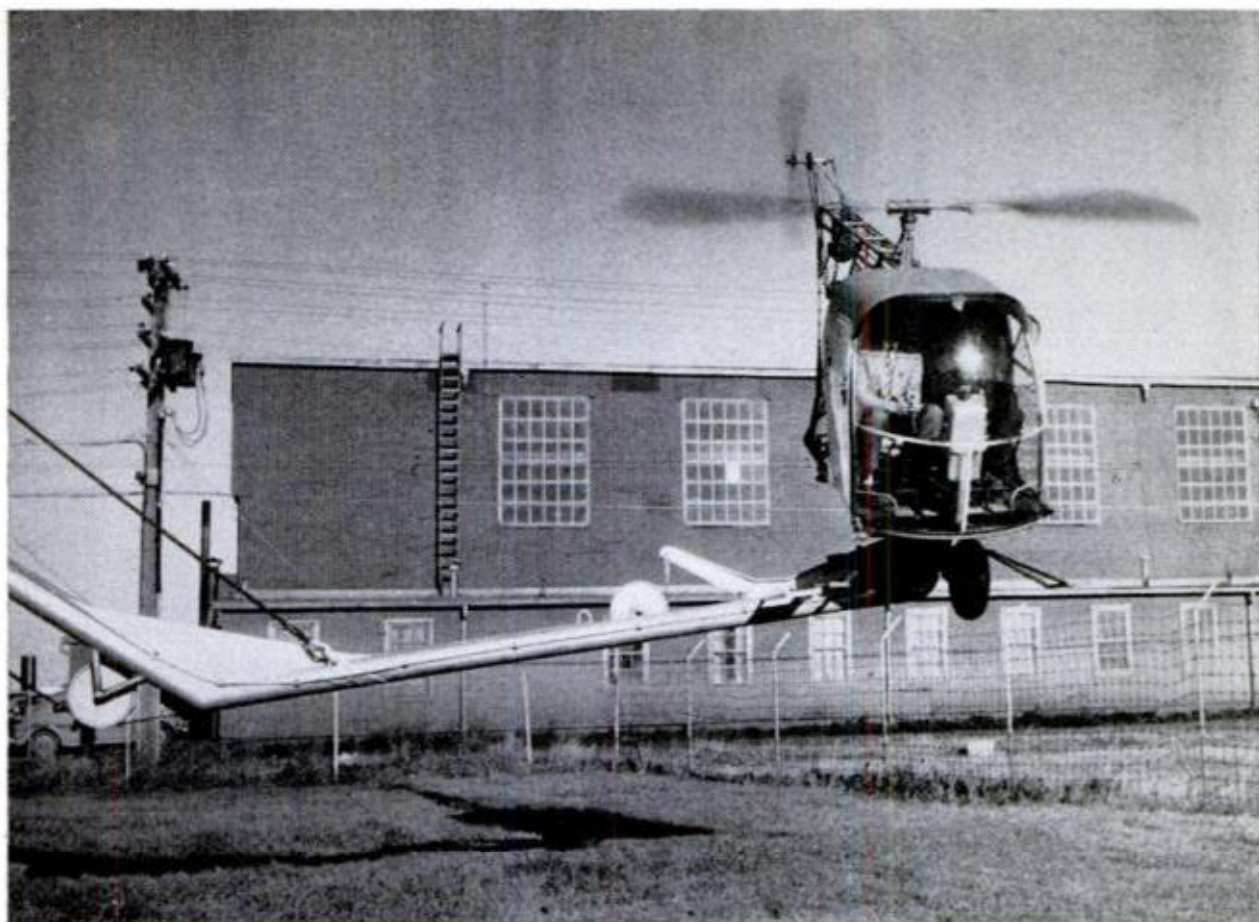
Lots of Muscle

Capable of spectacular lifts, a new cargo loader has a rated lifting capacity of 70,000 pounds. Its manufacturer claims it is the largest vehicle of its kind.

Its fork carriage can be rotated 12 degrees back and 90 degrees down from vertical. The lift height with forks level is 17 feet, 2 inches. The forward reach is 6 feet, 2 inches. When parked, the vehicle is 12 feet, 2 inches tall.

The first commercial version of the Super 70 is in service at Seward, Alaska, loading and unloading cargo from ships to storage and from storage to flat cars and trucks. Military versions are in use in Antarctica.

It is manufactured by Transitier Truck Co. of Portland, Ore.



Like the Real Thing

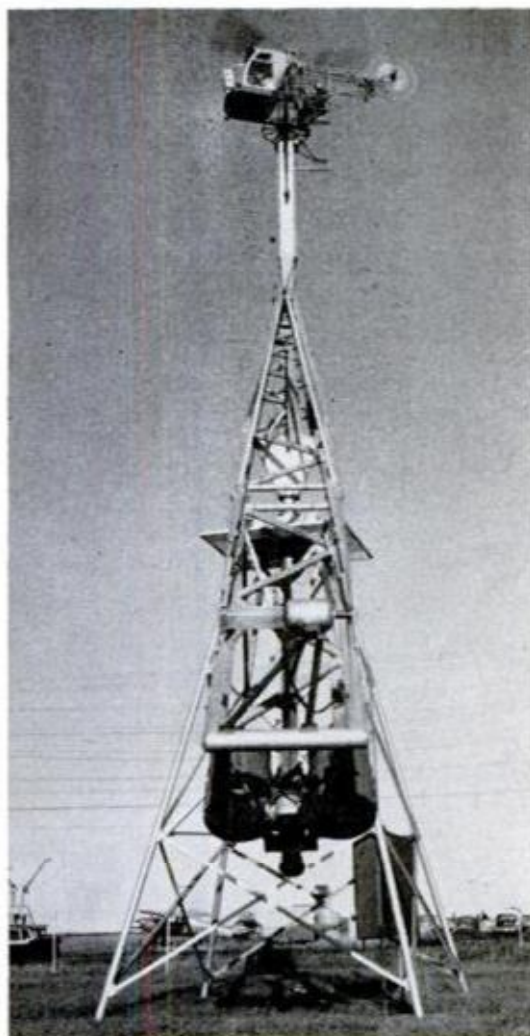
Powered by electricity, a training device simulates the flight characteristics of a helicopter with realism and safety.

The fuselage is mounted on one end of a long arm and counterweights on the other end balance it during maneuvers. The cockpit has dual controls for instructor and student. The Jaycopter can reach a maximum height (right) of 76 feet.

Plastic Antenna for TV or FM

Made from flexible Koroseal, with a silver circuit printed on it to conduct the signals, a new indoor antenna for FM radio or television has been introduced by RF Industries of Summit, N. J.

The antenna is intended to be installed out of sight, behind draperies, on the back of furniture or even under the rug.





Merry Christmas

Dear Crafters:

Christmas comes but once a year and am I glad! Seems like the mad rush gets worse each year what with all the department stores to visit and letters to answer. Frankly, I could use some help and if you think you can make a few of the gifts and decorations suggested on the following 27 pages, I'd have no trouble in making it on the 25th, I'm sure.

Santa Claus

NATIVITY IN PAPER

THIS STYLIZED nativity group will make a handsome conversation piece for your mantel or table. Constructed entirely of paper, it can be stored easily and will give many years of enjoyment.

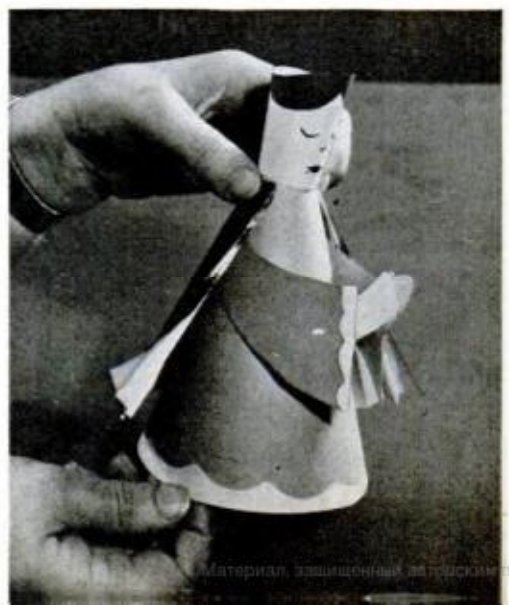
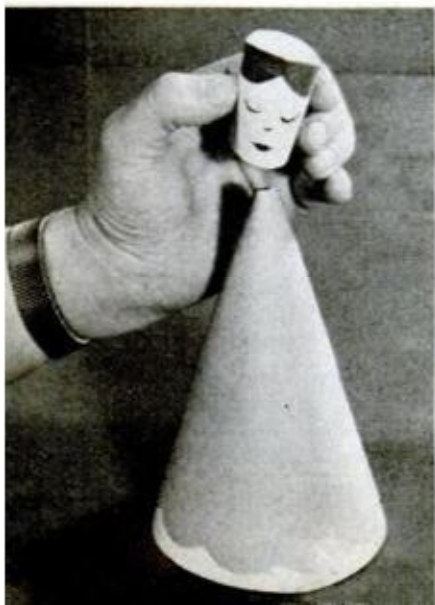
You'll need a number of different papers. The body cones are made from a light, flexible posterboard. For the heads, oak tagboard is used because its creamy color comes close to flesh tones. Fancy wrapping

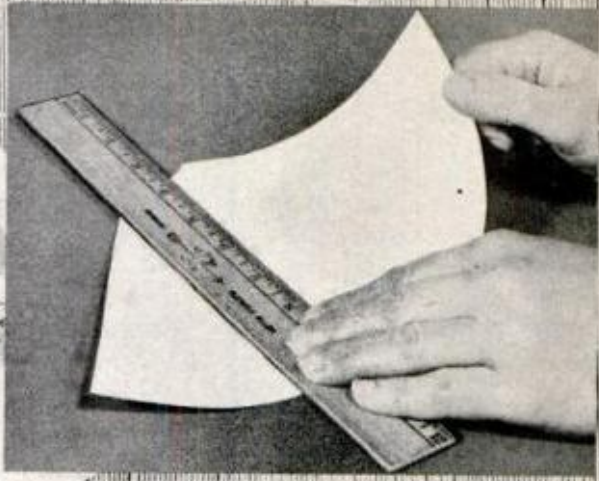


VIRGIN'S HEAD is attached by putting a few drops of glue around the bottom edge and fitting it on the body

ARMS OF VIRGIN, though already curled, can be further shaped by drawing them between the thumb and forefinger until the desired curved shape is obtained

HANDS ARE GLUED together and the cape is attached to the shoulders. Be sure that the bottom edge of cape hangs away from body





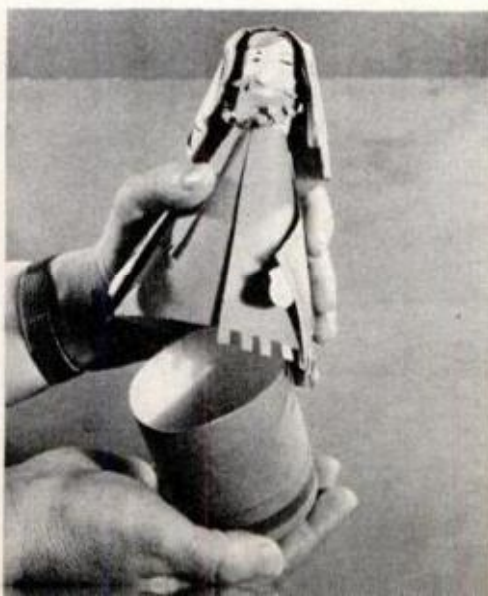
CONDITIONING PAPER by drawing it over edge of the ruler helps make it flexible

A HARMONIZING BACKDROP for this nativity scene can be made from a piece of unfinished matchstick drape

HEADRESS, pattern L, is folded into pleats before being mounted

JOSEPH'S BODY should be mounted on the base so that it leans slightly backward

HAIR IS CURLLED by rolling only one strand at a time



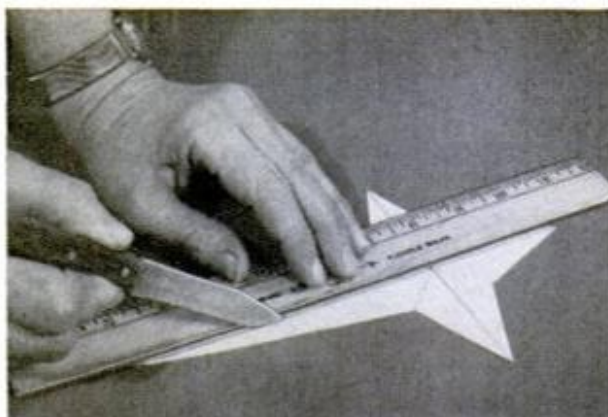


papers, especially the rich metallic types, are combined with other colored papers to make capes, borders and decorations. Gold and silver lace-paper doilies become haloes and decorations for the kings' robes. Water colors are used to add the faces.

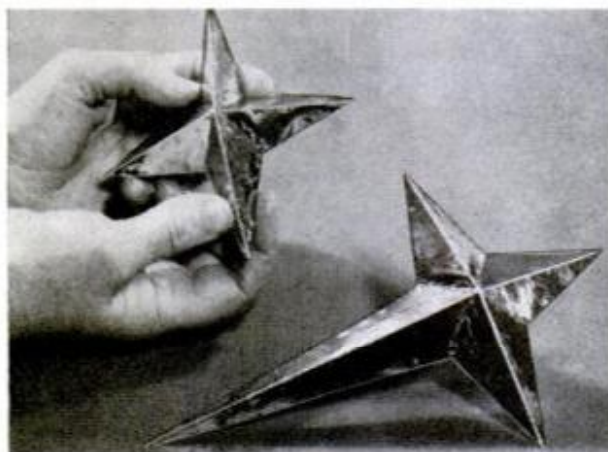
If you can obtain the cardboard in a variety of colors, it can be used as is. However, if sheets of the right quality are available only in white, you can cover them with colored construction paper. When you purchase the paper, ask the clerk not to roll it for this makes it difficult to flatten again. Carry it home flat.

As each piece is cut to its proper shape, the paper should be flexed in order to condition it for rolling into a conical shape. To do this, draw it between a hard surface and a ruler or pull it down over the edge of a table. Be careful not to crack the paper in the process.

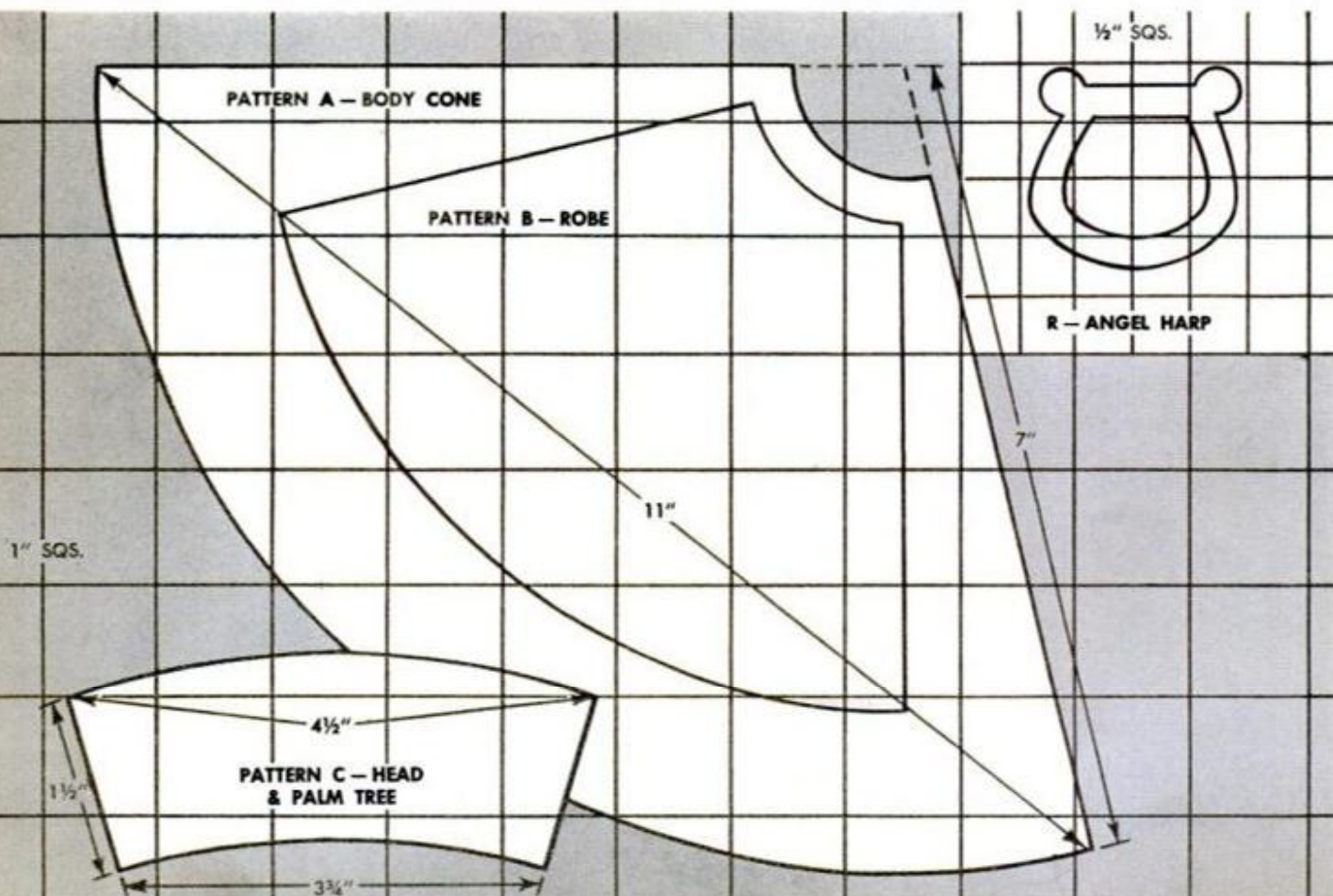
Pattern A is used to make the Virgin's body cone, pattern C for the head. Roll these cones, lap the edges and glue. Cut the hair from brown paper and glue it to the head before mounting the head on the body. The arms are made from pattern D and the sleeve sections covered with paper to match the body cone. After gluing the arms to the back of the body, cut the robe following pattern B. Curl back the front edges and glue it to the shoulders. Pattern

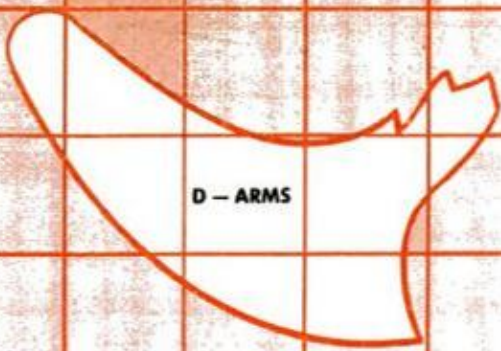


BEFORE BENDING STAR, score the solid lines on the upper side and the dotted lines on the lower side



STARS ARE SHAPED immediately after being covered with metallic gold paper. If the glue is allowed to dry, the brittle paper will crack along the creases





H - NOSE



G - SHAWL

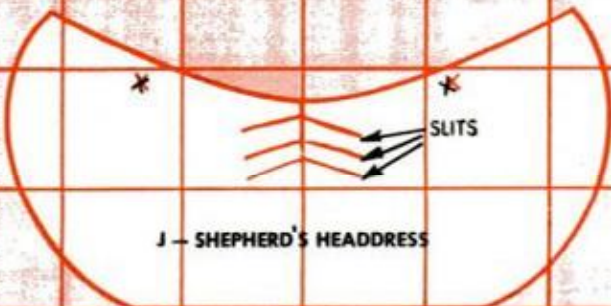


F - HAIR

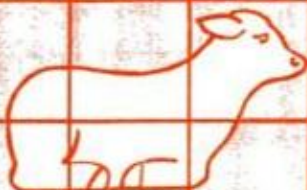
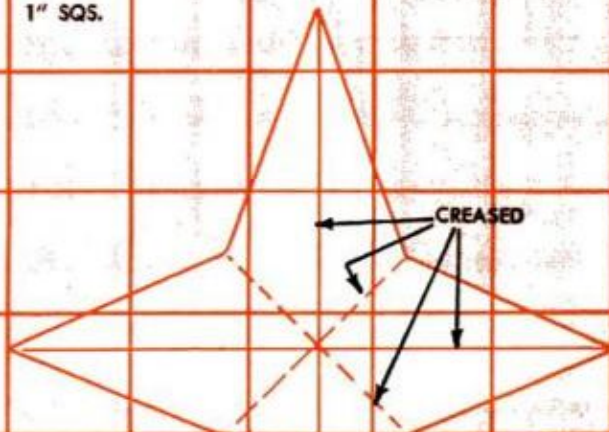


E - BEARD

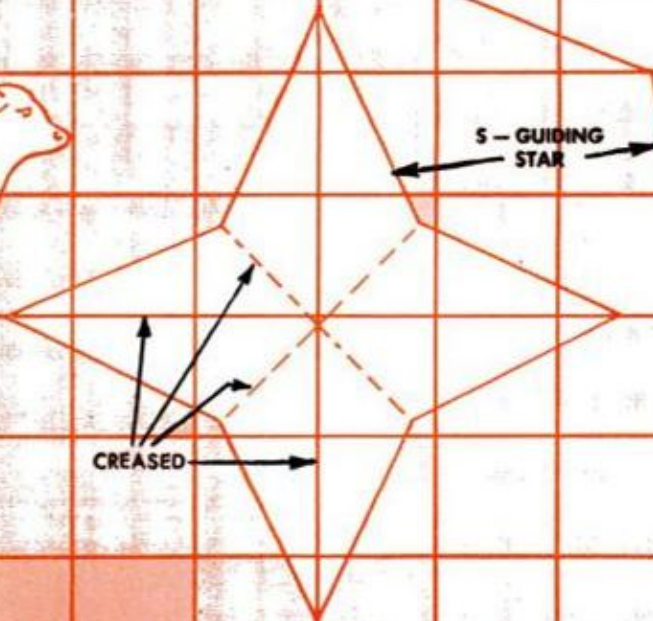
1" SQS.



CREASED



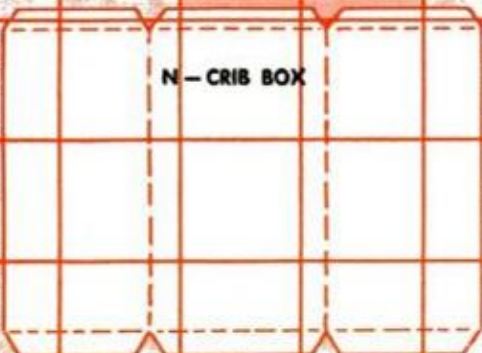
S - GUIDING STAR



K - LAMB

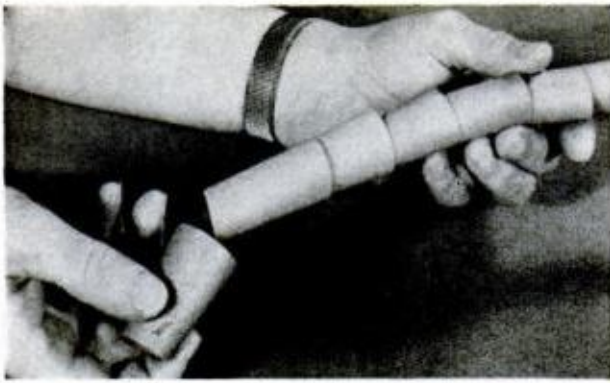
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N - CRIB BOX



O - CRIB ENDS

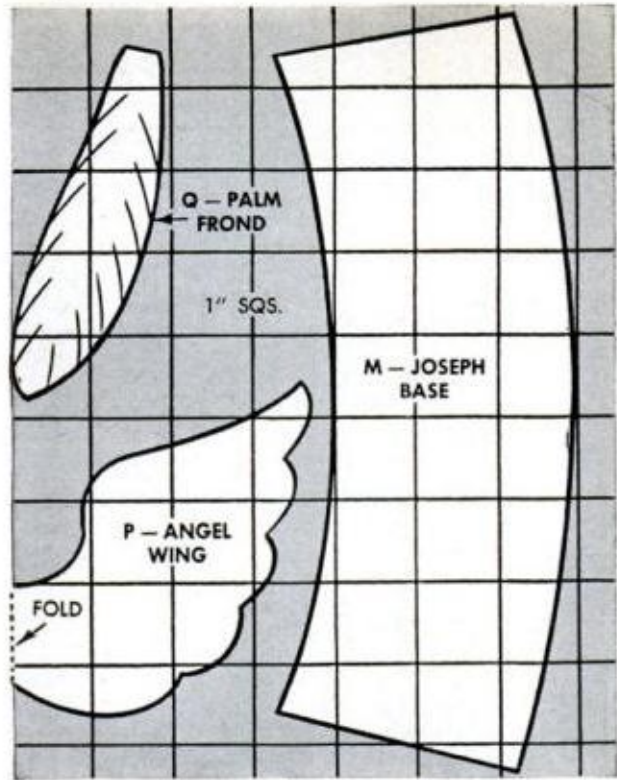
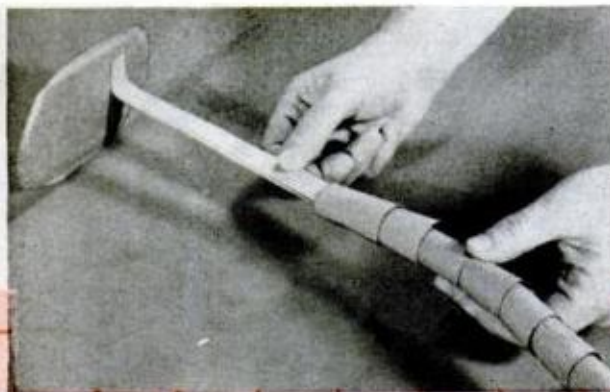




TRUNK OF PALM TREE is made in sections from the same pattern used to make the heads for the figures



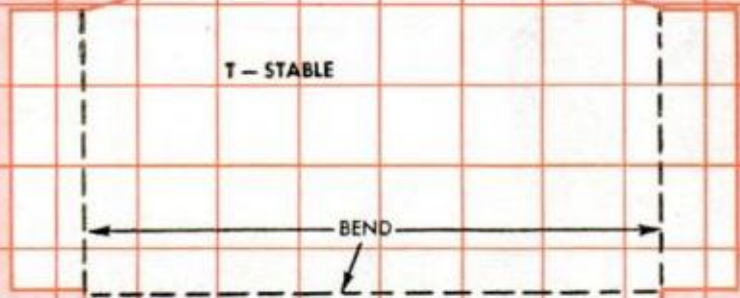
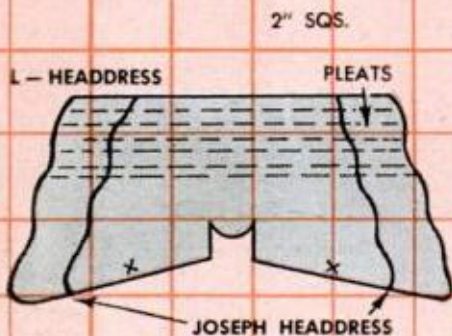
PALM FRONDS, above, are glued to the top of the tree trunk. The trunk support, below, is made of two pieces of cardboard cut to follow the trunk's curve



L is used for the headdress. Pleat it along the dotted lines and glue "x" edges together. Finally, glue the rounded tab edge down and attach the headdress to the head.

Joseph's head is prepared in the same way as that of the first figure. Cut the beard and hair from brown or black lightweight construction paper using patterns E and F. To curl the beard, roll individual strips of fringe around a toothpick. Shape the nose, pattern H, by creasing it along the center line and gluing the side tabs to the face so that the center is raised above the surface. Make Joseph's headdress from pattern L,

(Continued to page 222)





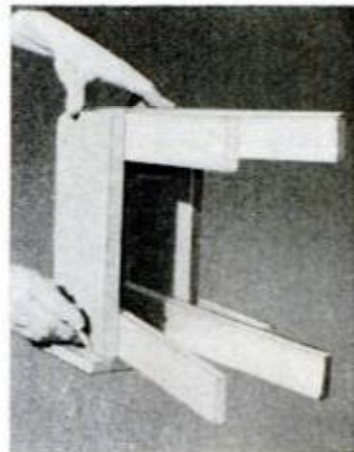
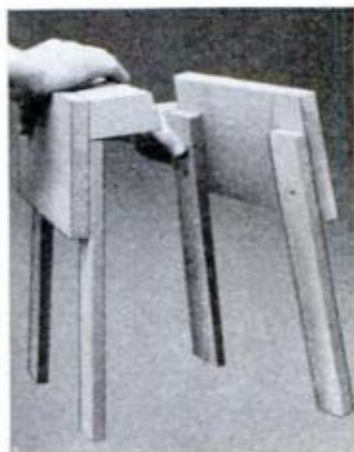
RIDE 'EM COWBOY



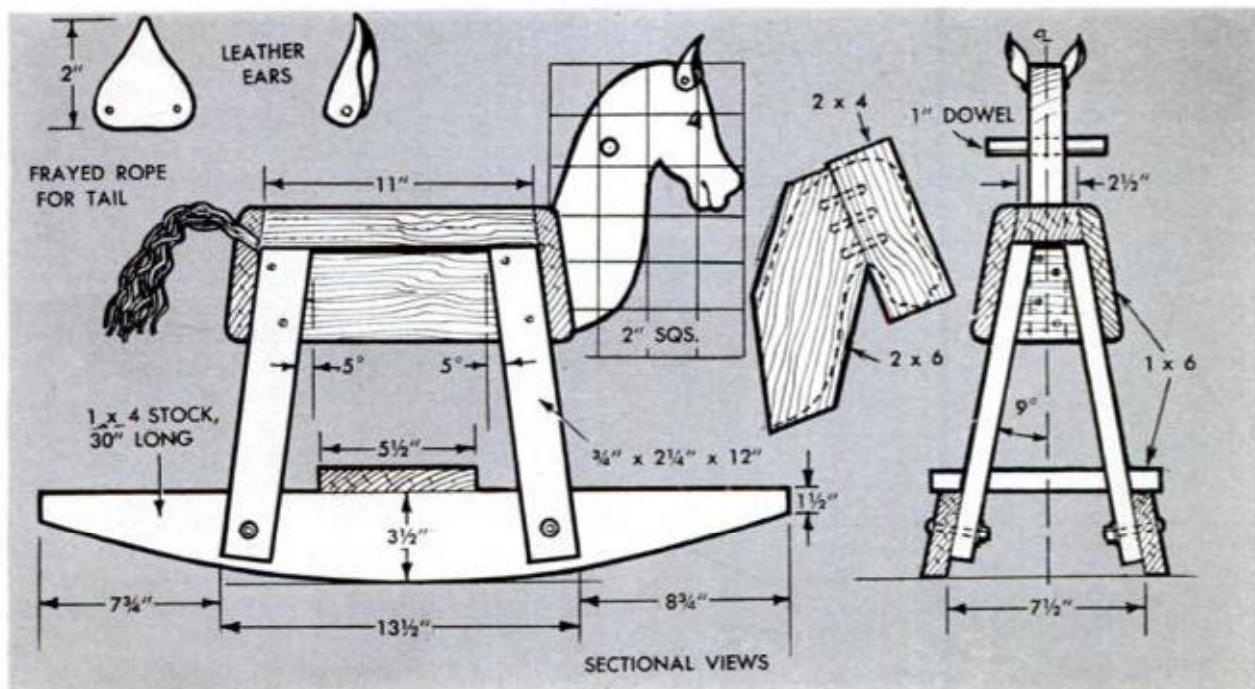
THANKS TO TV westerns, the old-fashioned rocking horse is still a popular Christmas toy and here's a palomino that will delight your little cowpuncher no end. Common 1 and 2-in. dimensional lumber is used throughout, the rockers being 1 x 4s, the legs 1 x 3s, the saddle and footrest 1 x 6s, etc. Most of the horse is simple enough to make with hand tools.

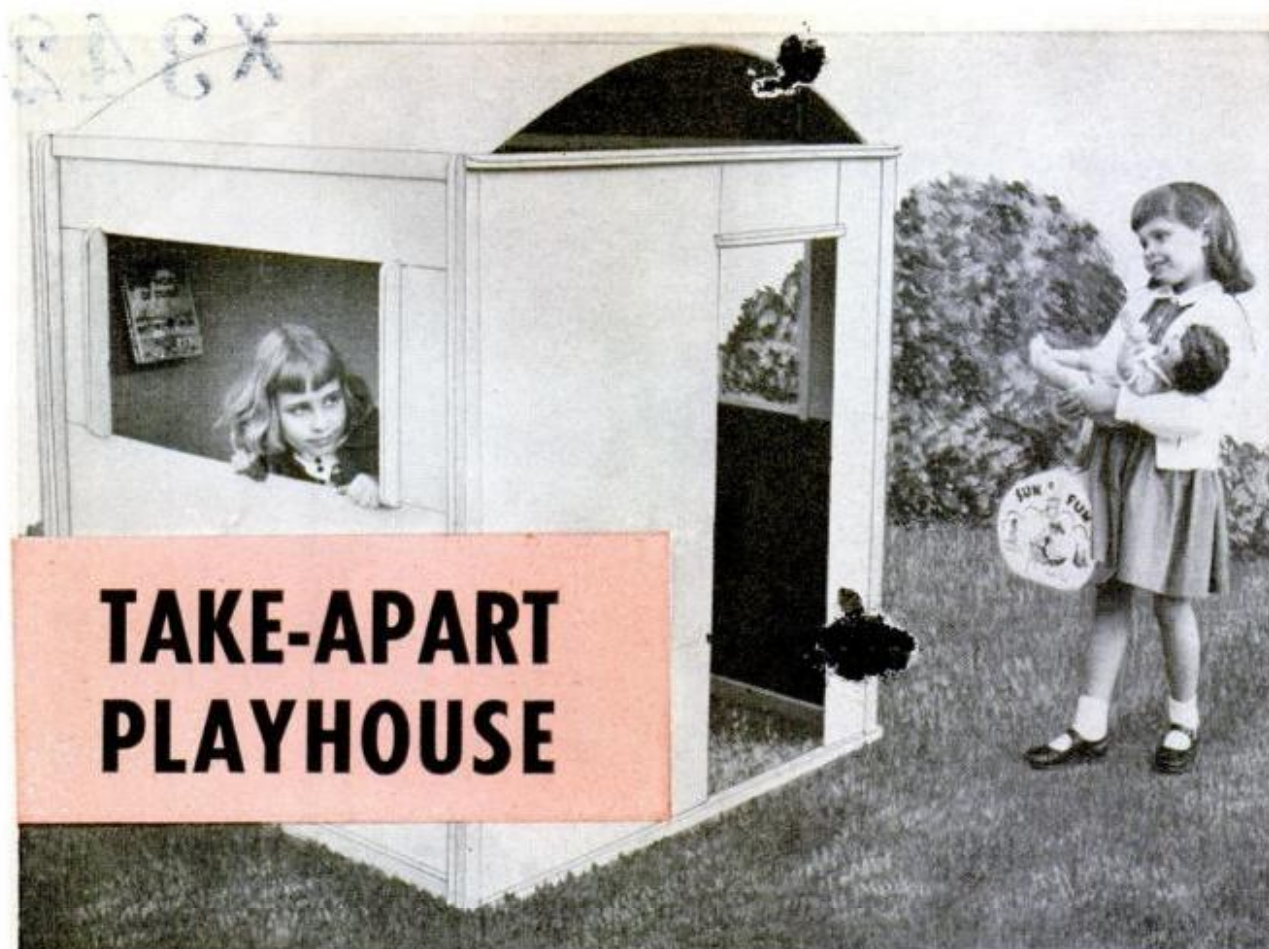
All the parts are glued, $\frac{1}{4}$ -in. carriage bolts being used to attach the rockers and #10 x $1\frac{1}{2}$ -in. wood screws for all the rest. Exposed screw heads should be set below the surface and puttied over before painting. Before drilling the holes for the carriage bolts, clamp the rockers to the legs and adjust them to make the horse rock evenly. You can either make the head from a built-up blank of 2-in. lumber as indicated or salvage the plastic head from a broomstick hobbyhorse. Paint the horse gray or tan and dapple it with spots of color from a can of spray paint.

—Robert Hoppough



LEGS ARE ATTACHED from inside before body is completely assembled. Angle of end pieces is taken from work





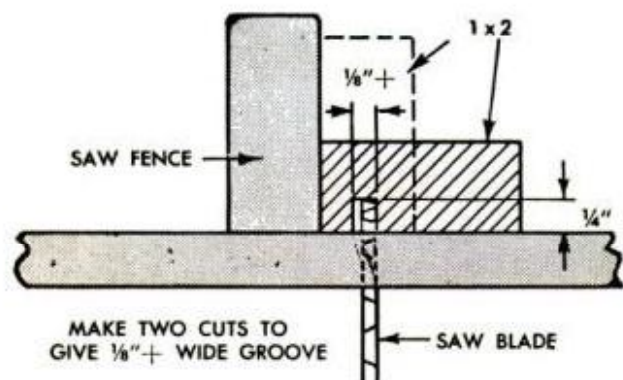
TAKE-APART PLAYHOUSE



WONDERING what to make the kids for Christmas? You can't go wrong with a playhouse, especially this one. They'll have fun with it the year 'round for it is small enough to set up indoors for winter play.

Measuring only 4 ft. square, it comes apart in five flat panels by removing just eight wood screws. Best of all, it's easy to build, especially if you have a circular saw to run the grooves in the frame members.

As for materials, you'll need two sheets of $\frac{1}{8}$ -in. tempered hardboard, eight 8-ft. and two 6-ft. lengths of 1 x 2, two dozen cadmium-plated #10 x $1\frac{1}{4}$ -in. wood screws and a $\frac{1}{4}$ -in. dowel 12 in. long. If you plan



to have a perforated wall in the rear, as shown in the photo above, you'll need a 4 x 4-ft. panel of $\frac{1}{8}$ -in. perforated hardboard and a 4 x 6-ft. panel of tempered hardboard to replace one of the 4 x 8-ft. panels.

To groove the 1 x 2 frame pieces, set your circular saw to make a $\frac{1}{4}$ -in.-deep cut as shown in the detail at the left. You'll have to make two passes in order to make the grooves wide enough to accept the $\frac{1}{8}$ -in. hardboard. Groove eight 4-ft. lengths of 1 x 2 along the face and eight 4-ft. lengths along the edge. Round and notch the ends of the former, leave the others square.

Following the cutting diagrams, cut one of the 4 x 8-ft. panels into 24-in. (actually, $23\frac{7}{8}$ in.) widths. From the other panel cut the 4 x 4-ft. roof piece and the 6-in. strips to complete the doors and windows. Assemble each wall, using glue and one screw at each corner, and trim the hardboard where necessary to fit. If the perforated panel is used, trim it to size and fit the 1 x 2s around the edges as before.

The front and rear walls are joined to the side walls with screws only, two holes being drilled for them through each vertical member of the side walls. Also, $\frac{1}{4}$ -in. holes are drilled in the top framing of the side walls and short dowels are glued in them to hold the curved roof panel. The door and window fill-in panels are next.

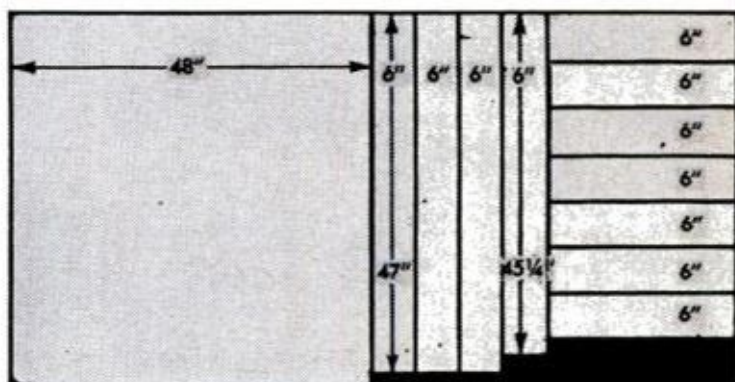
Trim them to fit flush with the rest and glue them in the grooved members. Finally, strips of 1 x 2, grooved and slotted to fit over the edges of the fill-in pieces, are installed to add rigidity and trim to the openings. It will take at least two people to spring the roof in place between the dowels in the side walls.

When finishing, you may use one bright color throughout or paint the hardboard portions of the walls one color, the wood a second color and the roof a third. In any case, the easiest way to paint the walls completely is to take the house apart and paint each wall, plus the roof, separately. Whether you plan to use the playhouse outside or indoors, all parts should be painted on both sides. Also, be sure to paint the exposed edges of the hardboard itself. When the paint has dried, reassemble the playhouse and it's ready for play.

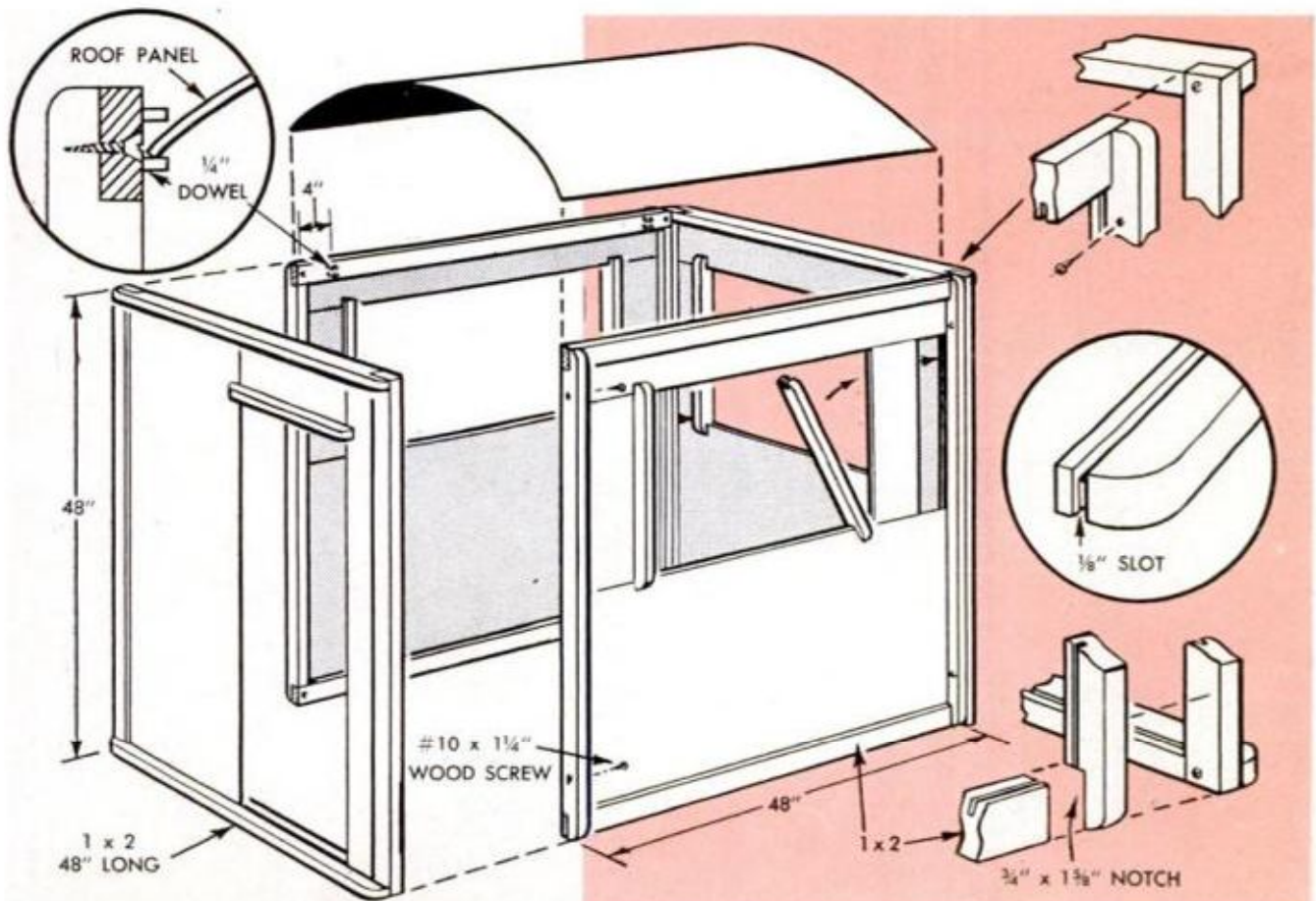
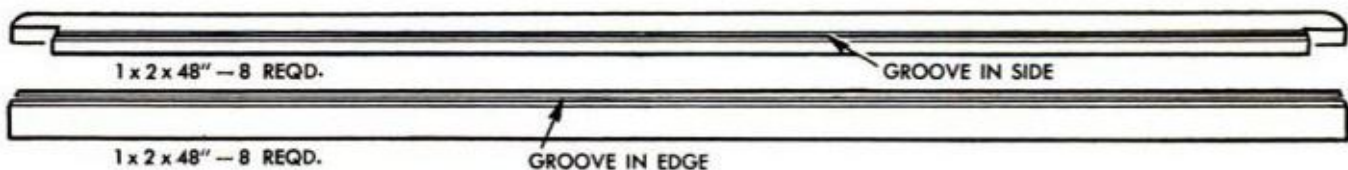
—Dave Swartout



1/8" x 4' x 8' TEMPERED HARDBOARD, 2 REQD.



PANEL CUTTING DIAGRAM



DANISH CANDLE

GIFTS that are unusual are always happy surprises and the simple elegance of this one will become more exciting when the candle is lighted. Known as a Danish candle, the flame burns in a recess, giving an iridescent, translucent glow which is even more striking when the candle is of colored wax.

The three-legged candle holder is formed from 8-in. lengths of $\frac{1}{4}$ -in. brass rod, each leg being formed to the shape indicated in a jig as pictured below. To bend each leg, clamp the jig to the bench top, remove the center stop and make the first or cup bend. Then replace the stop and make the second bend. The stops are $\frac{5}{16}$ -in. washers held with screws and positioned to coincide with the leg outline which is drawn full size on the jig. Place five or six washers on each screw.

The three legs are soldered together tripod-fashion, positioning them equidistantly and binding together temporarily with wire. The solder is flowed down from the top where it will be concealed by the candle. The latter is molded in a 3-in. hollow rubber ball, cut in half. Thread a length of string wick through a nail hole in one half and cut a $\frac{1}{2}$ -in. pouring hole in the other. Then tape the two halves together and fill with wax. When the wax hardens, the ball is peeled off, the wick is cut back and the outside of the finished candle is scraped smooth.—Robert Micals

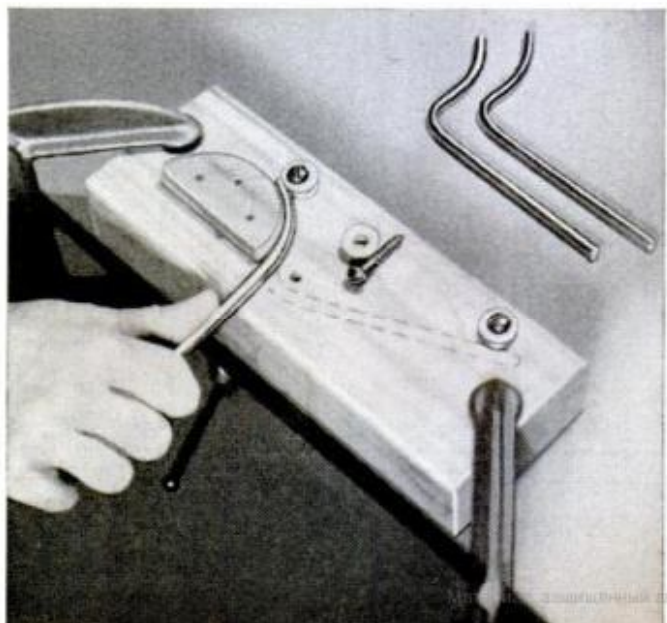
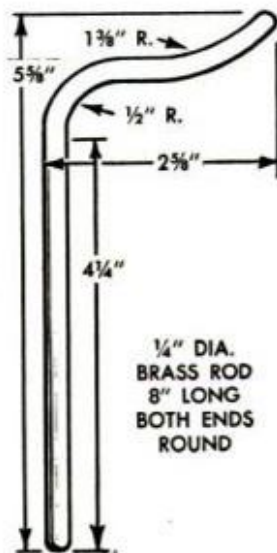


PROP BALL in a tin can, left, and with a funnel made from aluminum foil fill with melted wax. As it cools, wax will shrink and a depression will form at center around the wick. Allow the wax to harden



AFTER WAX is hardened ball is peeled off, lower left, care being taken not to scratch or dent candle. Scrape candle with sharp knife to a uniformly smooth surface. Then buff to a high polish with a soft cloth

BENDING JIG, right, for making legs of tripod consists of 2 x 4, 10 in. long to which are attached a half disk of plywood having radius of $1\frac{3}{8}$ in. and three stops, each consisting of washers held by screws





X733

ALL ABOARD!

Holiday special makes its first run on Christmas day



THIS ANIMATED pull-toy train will puff its way straight into the heart of any toddler lucky enough to get it for Christmas. As it is pulled along it puffs, or chuffs, realistically enough to please any junior railroad buff and all the time it's in motion the brakeman signals with his lantern from a window in the caboose.

Take the locomotive and caboose first so that you get these well along before the holidays. Then if you get pressed for time, you can complete the open car and the coal car, or tender, in an evening if necessary. Using Figs. 7 through 10 as the starting point, note closely in Fig. 10 the assembly of the mechanism that animates the brakeman. It's a simple parallelogram-type affair actuated by two pegs, or lugs, placed 180 degrees apart on the rear axle of the caboose. The axle is a $6\frac{3}{4}$ -in. length (cut it a trifle longer to begin with) of $\frac{3}{8}$ -in. dowel and the actuating lugs are $\frac{1}{2}$ -in. lengths of $\frac{1}{8}$ -in. dowel glued into the holes in the axle with the ends projecting about $\frac{1}{4}$ in. Note

in the sectional view, Fig. 10 that one arm of the parallelogram pivots on a screw while the other pivots on a dowel which passes through a clearance hole in the base of the caboose, the upper end being glued into a hole drilled into the body of the brakeman. The lower end of the pivot is a force fit in a hole centered through the arm.

Two pieces of coat-hanger wire with the ends bent at right angles and forced into holes in the wood arms, connect the ends of the parallel arms as you see in the bottom view of the assembly, Fig. 10. When bent, the U-shaped connectors must be exactly the same length.

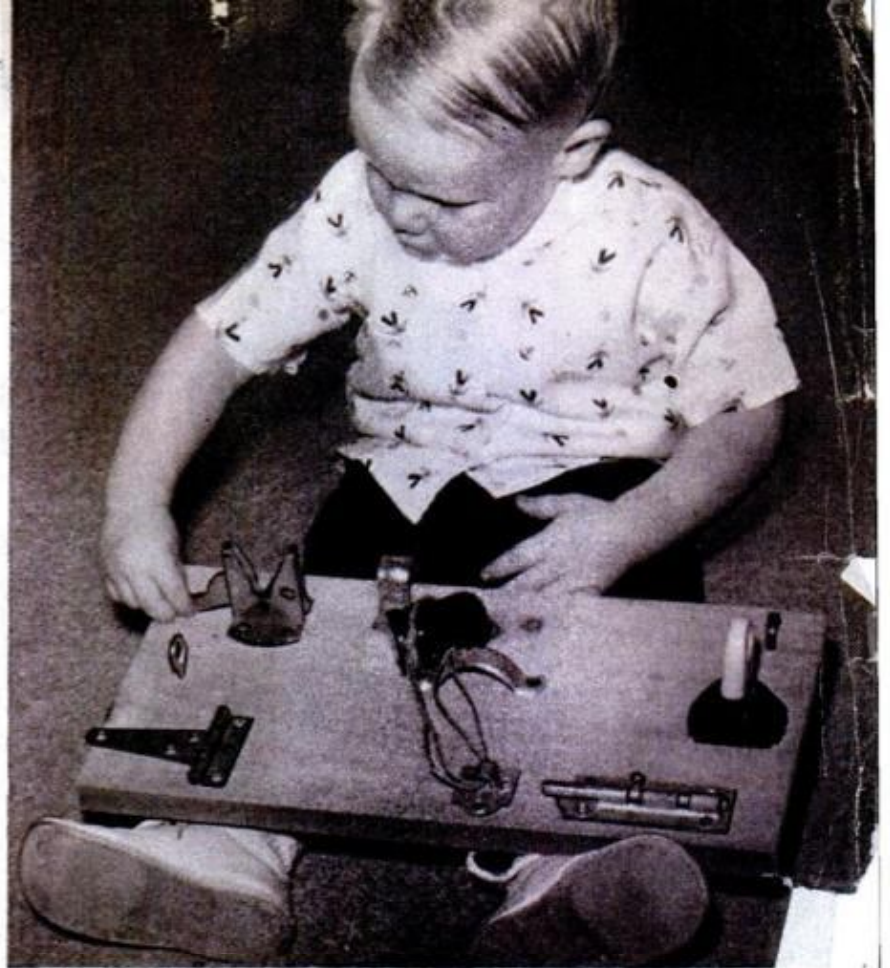
The brakeman is turned from a $2\frac{1}{2}$ -in. length of 1-in. dowel, the arms and lantern from $\frac{1}{2}$ -in. dowel stock. Note in Fig. 10 that washers are placed between moving and stationary parts to provide smoother operation and offset any tendency of the parts



Fascination Board

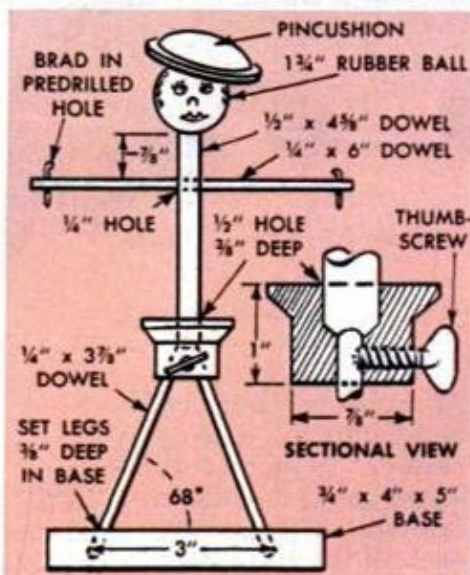
Small youngsters will amuse themselves for hours with this playboard. They'll thread string through the holes, move any part that's movable and sometimes just pound on the whole thing to hear the rattles. To make it, select a smooth board and attach such common items as a hinge, hasp, toggle switch, door bolt and the like—as many as possible containing some moving part. Be sure to file down any rough metal edges and sand the board completely smooth.

—Alan W. Farrant



Susie Sew and Sew

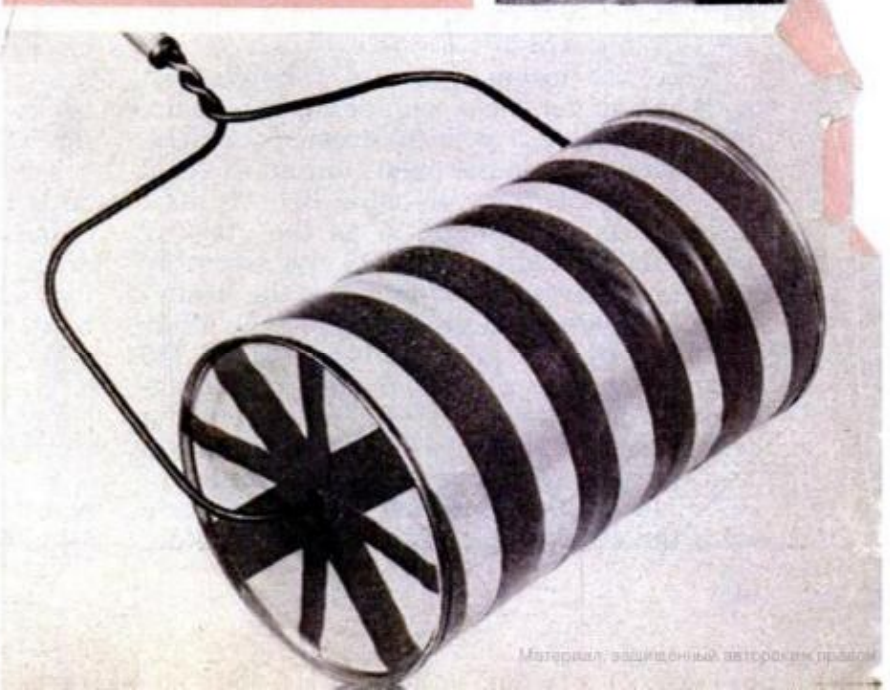
Decorative and always handy, this pert manikin holds nine spools of thread, and an assortment of pins and needles in its cushion beret. All drilled holes should hold dowels securely yet permit them to be pulled out easily to remove spools. If the thumbscrew doesn't hold the legs tightly enough, slip a $\frac{1}{2} \times \frac{3}{4}$ -in. piece of tin between the screw and the legs. For an extra feminine touch, finish the body of the manikin with a coat of colored nail polish.—Robert Micals

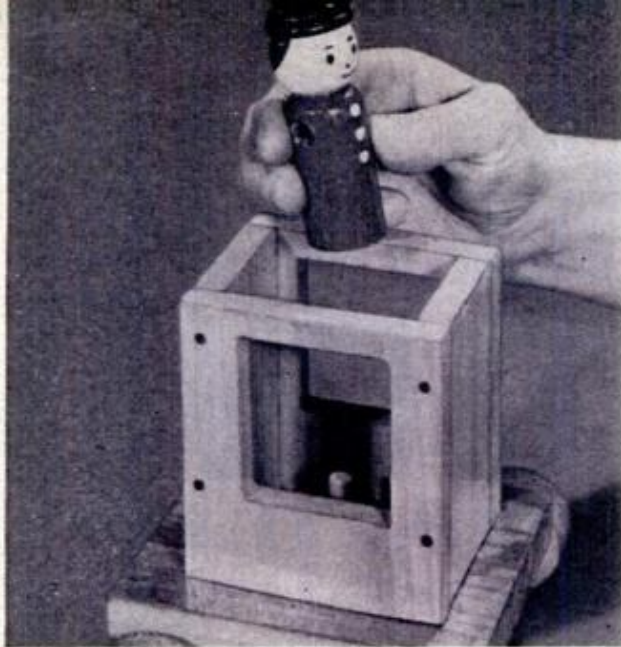


Tinkle Bells

You'd hardly recognize the toy at right as an empty No. 5 fruit-juice can, but that's just what it is. Punch center holes in both ends of the can and insert a heavy wire coat hanger for the axle. Bend the coat hanger as shown, twist the ends together and fit them tightly into the end of a café curtain rod. Punch a small hole in one end of the can and drop in several small bells. Finally, use bright-colored self-adhesive paper to cover this hole and decorate the toy.

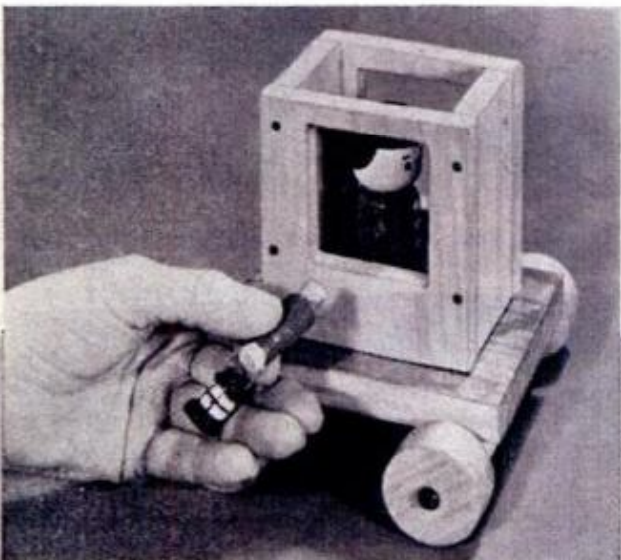
—R. B. Joselyn





7. BRAKEMAN must be painted and mounted in his caboose before the roof of the car can be attached

8. LANTERN is attached to the brakeman's hand by means of a fine wire handle which allows it to swing

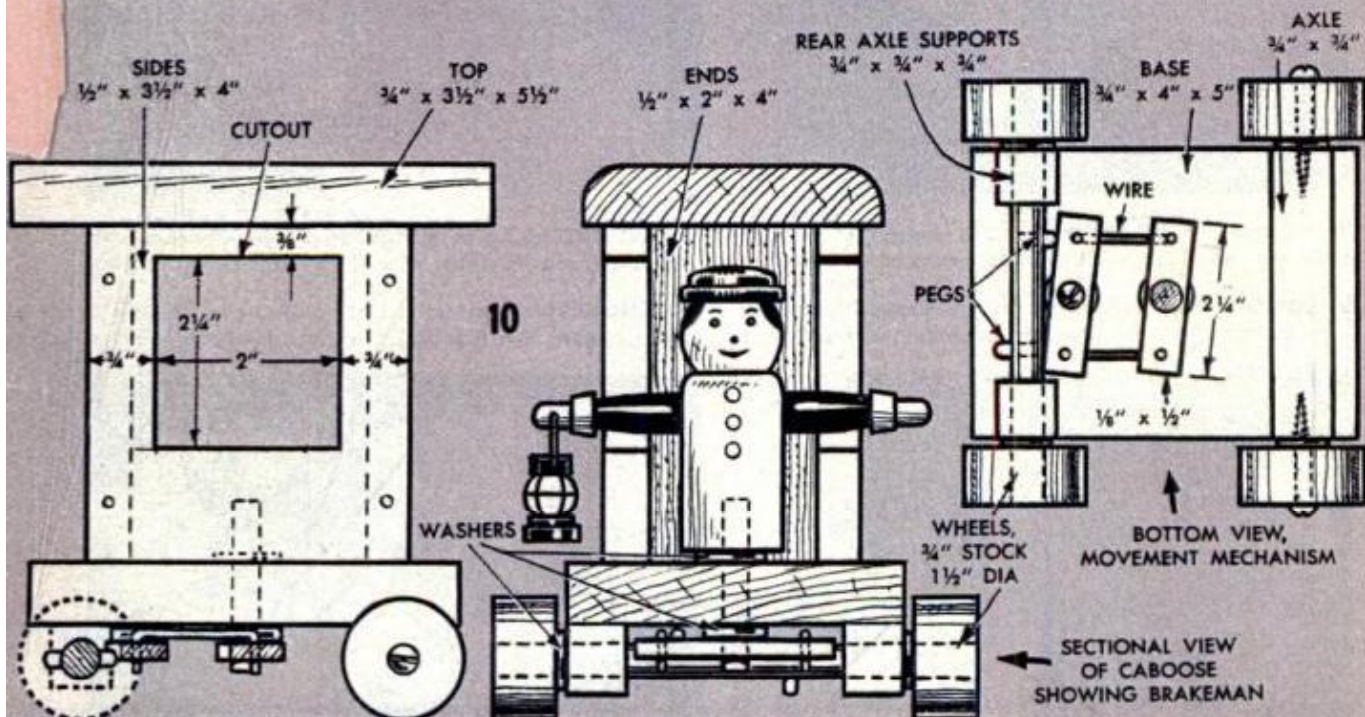
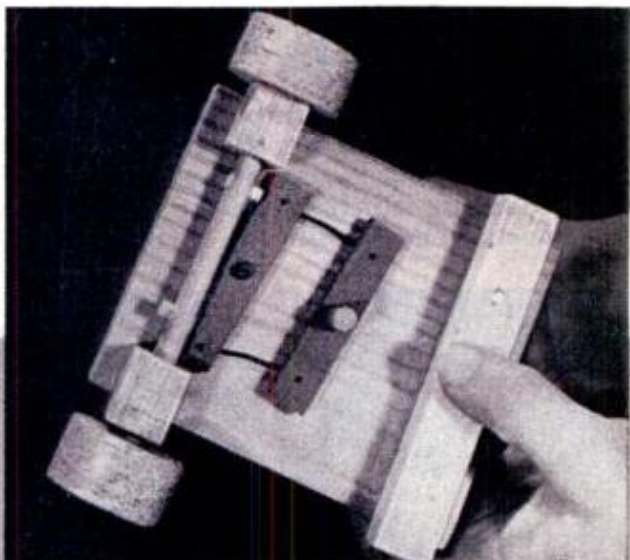


The center axle is a length of $\frac{3}{8}$ -in. dowel center-drilled for a short length of $\frac{3}{16}$ -in. dowel, the ends of which project equally when it is glued in place in the hole in the axle. These projections depress the end of the spring and release it, the action permitting the spring to snap back and strike the cardboard disk over the counterbore, which forms a resonance chamber.

The rest of the locomotive is simple box construction much like the car, tender and caboose. Note that the leading and trailing pairs of wheels on the locomotive, also those on the car and tender, turn on round-headed screws, which serve well as axles. Finish by first applying a sealer and then enamels in the colors that suit your fancy. Use only enamels that do not contain lead.

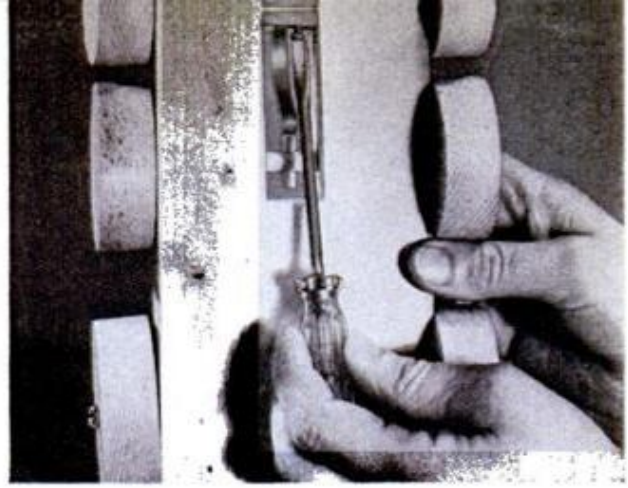
—Elma Waltner

9. DRIVE MECHANISM which controls the brakeman's movement is mounted on the bottom of the caboose

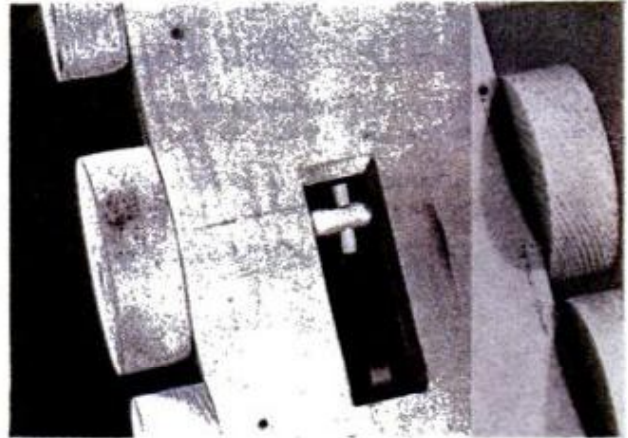


to bind. Balance of the caboose is easy box-like construction as you see in Figs. 7, 8 and 10. Wheels are cut to a width of $\frac{3}{4}$ in. from $1\frac{1}{2}$ -in. round stock. Two wheels are center drilled for round-headed screws which serve as axles. The rear wheels are center drilled $\frac{3}{8}$ in. and are glued to the axle.

Now the locomotive. Start by turning the boiler to a length of 5 in. and a diameter of 3 in. from a short length of 4 x 4. Plane a flat on the boiler $1\frac{3}{4}$ in. wide. Then counterbore one deep hole and bore one shallow hole centered along the flat as in Fig. 11 and also Figs. 1 through 6. The latter is a clearance hole for the axle lugs. The outside diameter of both holes should be 1 in., the smaller diameter of the counter bore $\frac{3}{4}$ in., as in Fig. 13 the upper right detail. Shape the base and cut the slot through as in Fig. 12. Now, you bend a short length of clock spring to the approximate shape shown in Figs. 11 and 13 and attach it to the forward end of the slot in the locomotive base with two screws and a hardwood clamping piece as in Fig. 12. Next, you cut a disk from thin cardboard or a postcard and glue it in the counterbore as in Figs. 3 and 13. As you will note, the axle carrying the center pair of locomotive wheels actuates the spring which strikes the cardboard disk twice at each revolution of the wheels.



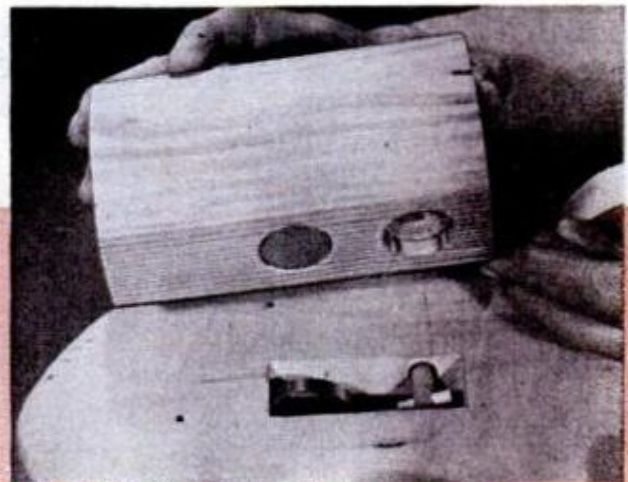
1. NOISEMAKER, a section of alarm-clock spring, is held in place with a small piece of hardboard



2. AXLE PEG engages the free end of the spring and snaps curved hump against the sounding board



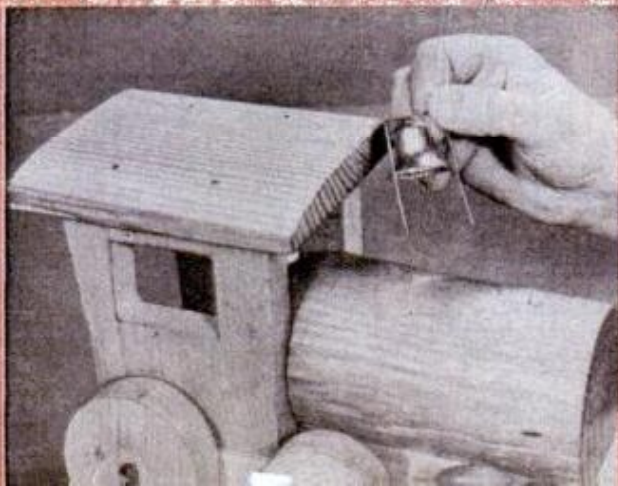
3. SOUNDING BOARD about the weight of a postcard is glued flush with surface over sound chamber

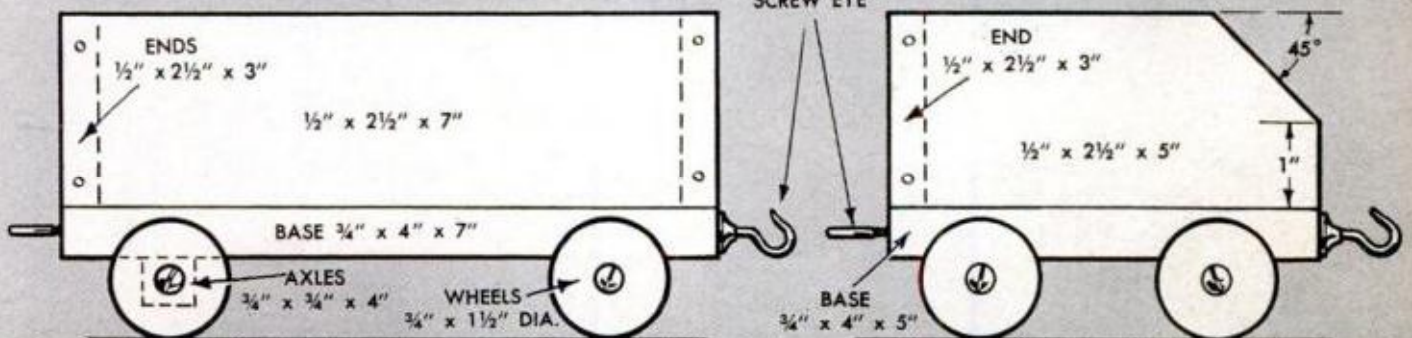
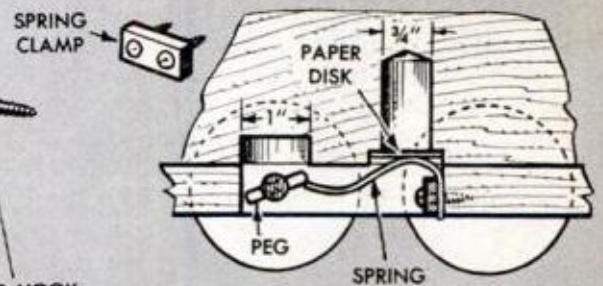
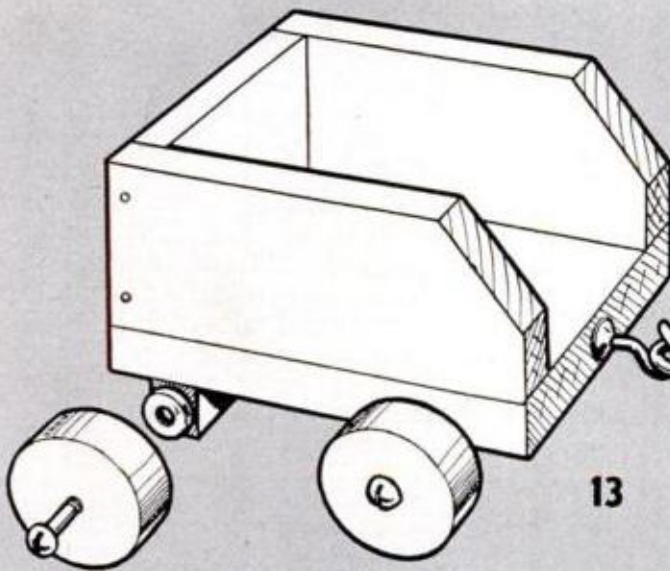
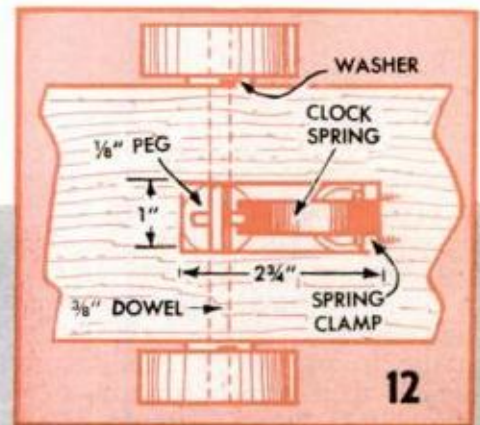
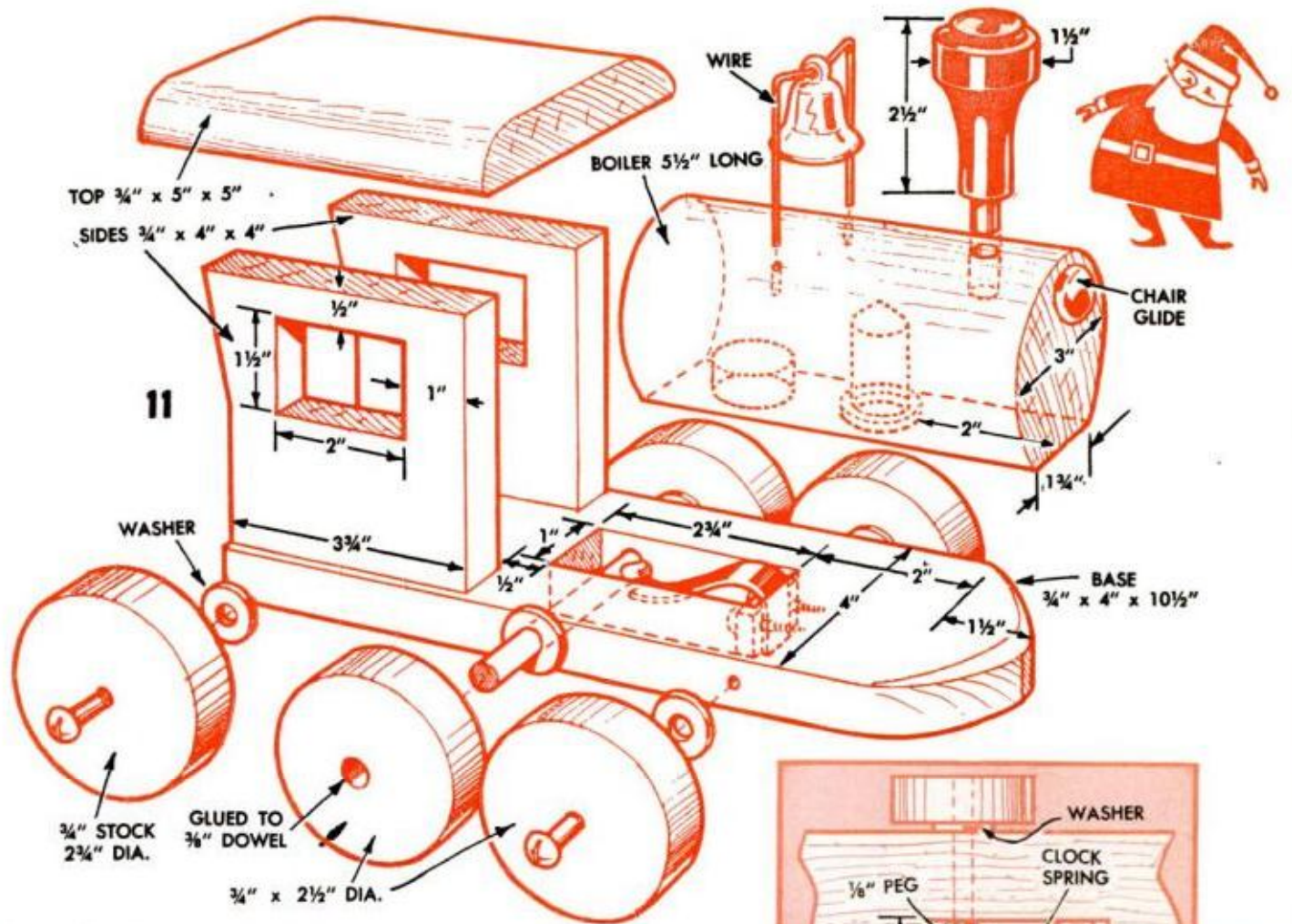


4. SECOND HOLE in the boiler allows clearance for the axle peg to turn when the wheels are turned

5. ENGINE BELL is mounted on a U-shaped length of wire whose legs are inserted in holes in the boiler

6. SMOKESTACK is turned to a diameter of $1\frac{1}{2}$ in. and pegged into the boiler ahead of the small bell





MOSAIC-TOP SEWING BOX



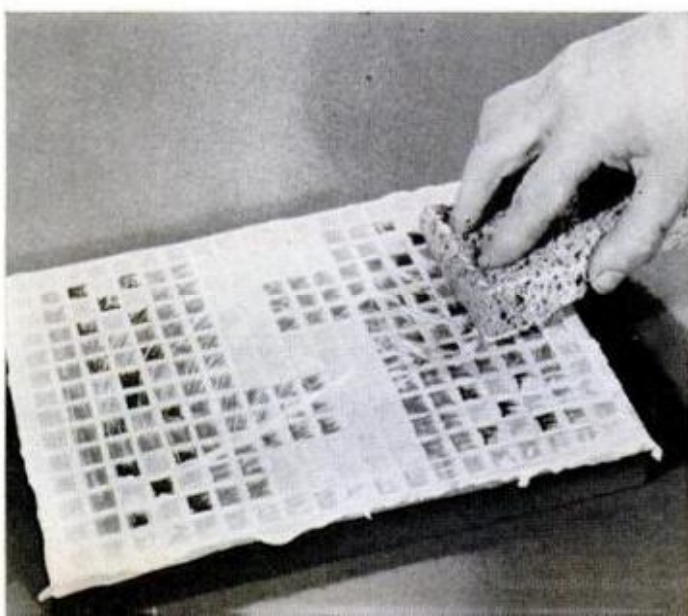
HANDSOME ENOUGH to be used anywhere, here's a gift that can be made to serve a number of uses. It can be fitted out as a sewing kit, it can be lined to serve as a trinket or jewelry box, it will store your bridge cards, keep track of gloves—you name it. Except for the top and bottom, which are cut from walnut-faced plywood, the whole thing is made of solid walnut stock, hand rubbed to a rich finish. The drawing shows clearly how the parts go together. Use glue and clamps in assembly. When assembling the lid, place the walnut-faced top piece face down and note that it

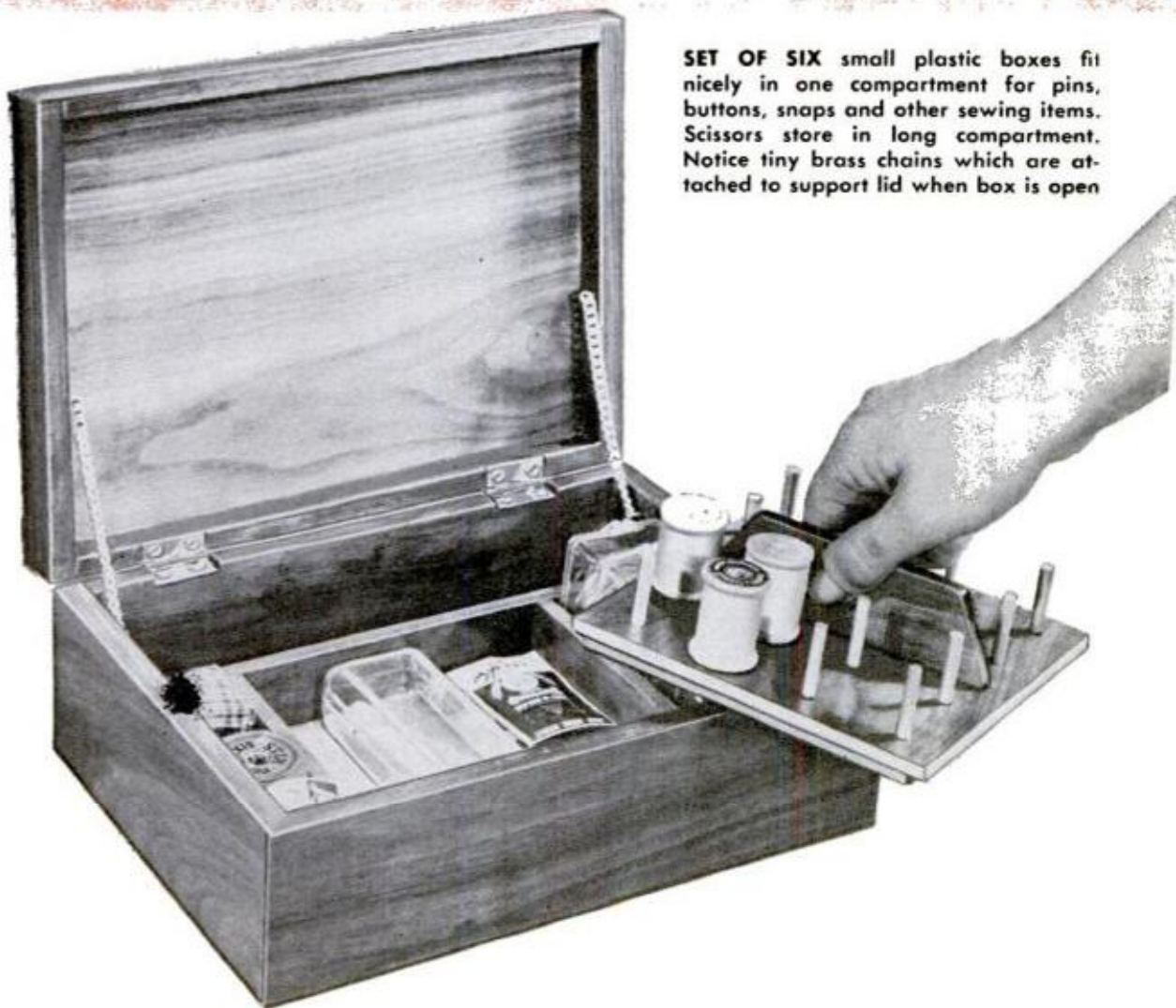
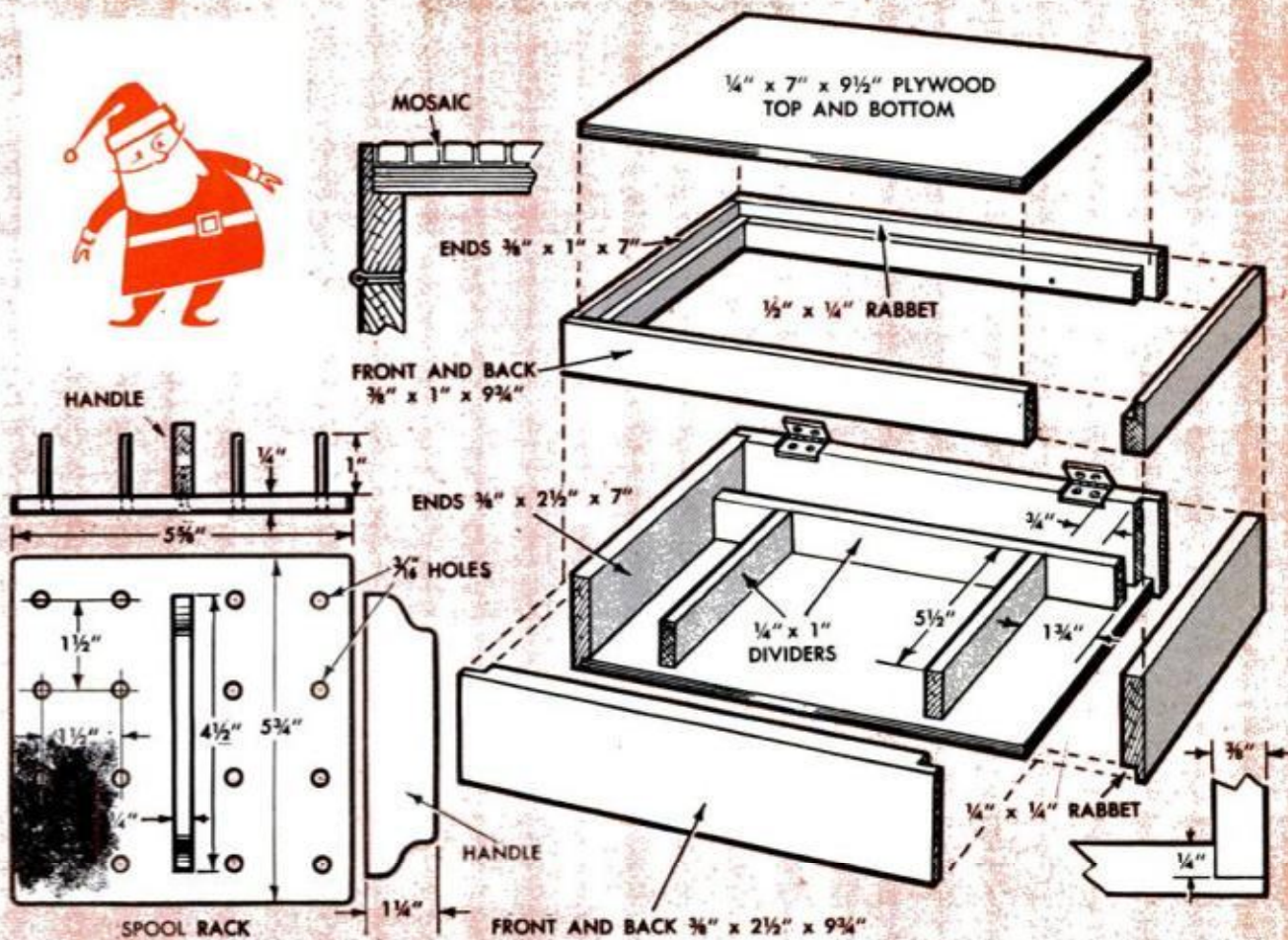
TILES ARE APPLIED individually to ruled-off surface, following color-keyed design worked out on paper

must rest $\frac{1}{4}$ in. below the rabbeted side members to form a recess for the mosaic tile overlay.

The mosaic design is first worked out on paper ruled off in $\frac{1}{2}$ -in. squares. It can be a monogram or other attractive design. The lid is likewise ruled off in $\frac{1}{2}$ -in. squares, then shellacked and $\frac{3}{8}$ -in. tiles are cemented to it, following the paper pattern. The tiles are applied individually by first soaking them off the paper backing on which they normally come. Finally, grouting is applied and the excess wiped off with a damp sponge.—*Elma Waltner*

JOINTS BETWEEN TILE are filled level by pouring grout over surface and removing excess with sponge





SET OF SIX small plastic boxes fit nicely in one compartment for pins, buttons, snaps and other sewing items. Scissors store in long compartment. Notice tiny brass chains which are attached to support lid when box is open



KIDDIE KITCHEN

ANY ONE OF these three pint-size appliances is bound to bring squeals of delight on Christmas morning, for what little girl hasn't dreamed of having her own stove, sink and refrigerator, just like Mommy's?

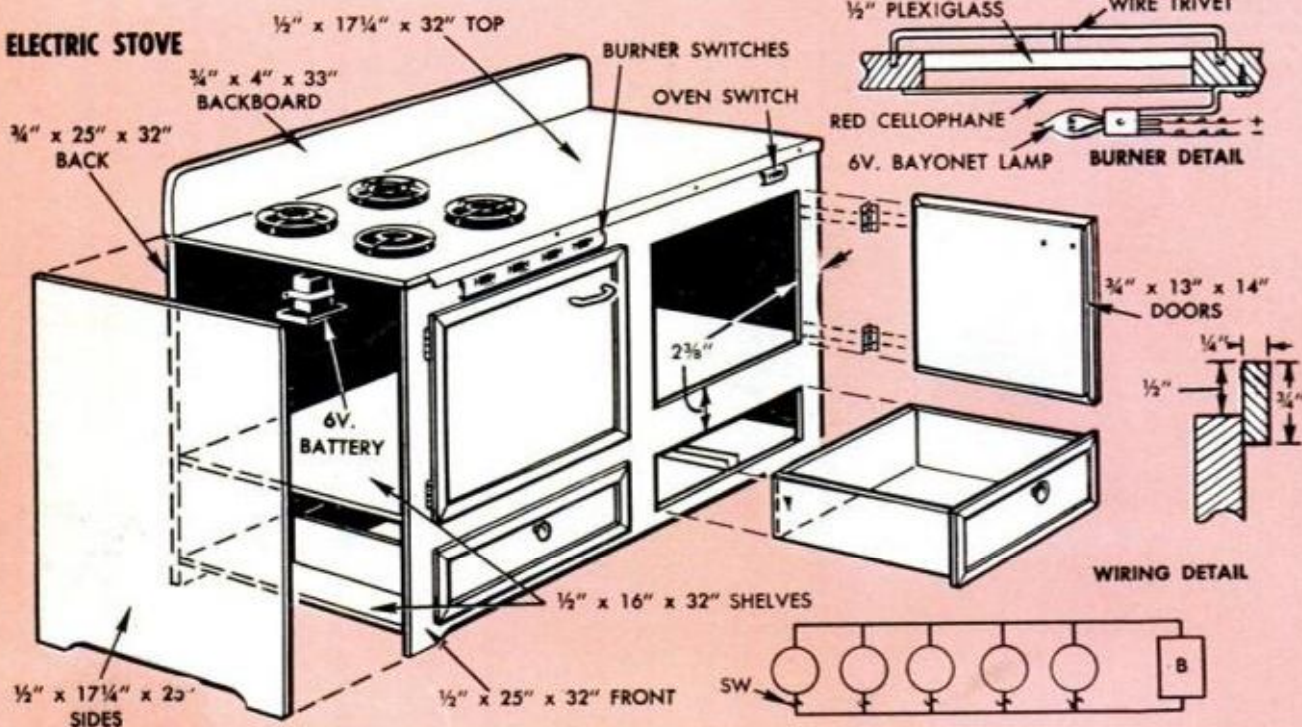
The stove is a simple box construction of $\frac{1}{2}$ -in. plywood with glue and nails used to fasten all joints. Switches on the front panel control the realistic burners and oven light which are powered by a 6-volt lantern battery mounted inside on the back of the stove. When a burner switch is turned on, it lights a small bulb mounted under red cellophane in the center of the circular burner cutout, causing the burner to glow red as if it were hot.

The drawing below details construction. When the stove is assembled, round off all exterior edges by sanding so that they resemble a real stove. Fill all cracks with wood putty and finish with white enamel.

The sink is constructed similarly, both glue and nails being used. Two rectangular polyethylene pans set in cutouts in the top serve as a double sink. The faucets, which are regular sink faucets, are attached to close nipples running through the splashboard and held in place by pipe caps. Trim is a matter of personal preference, but the sink can be

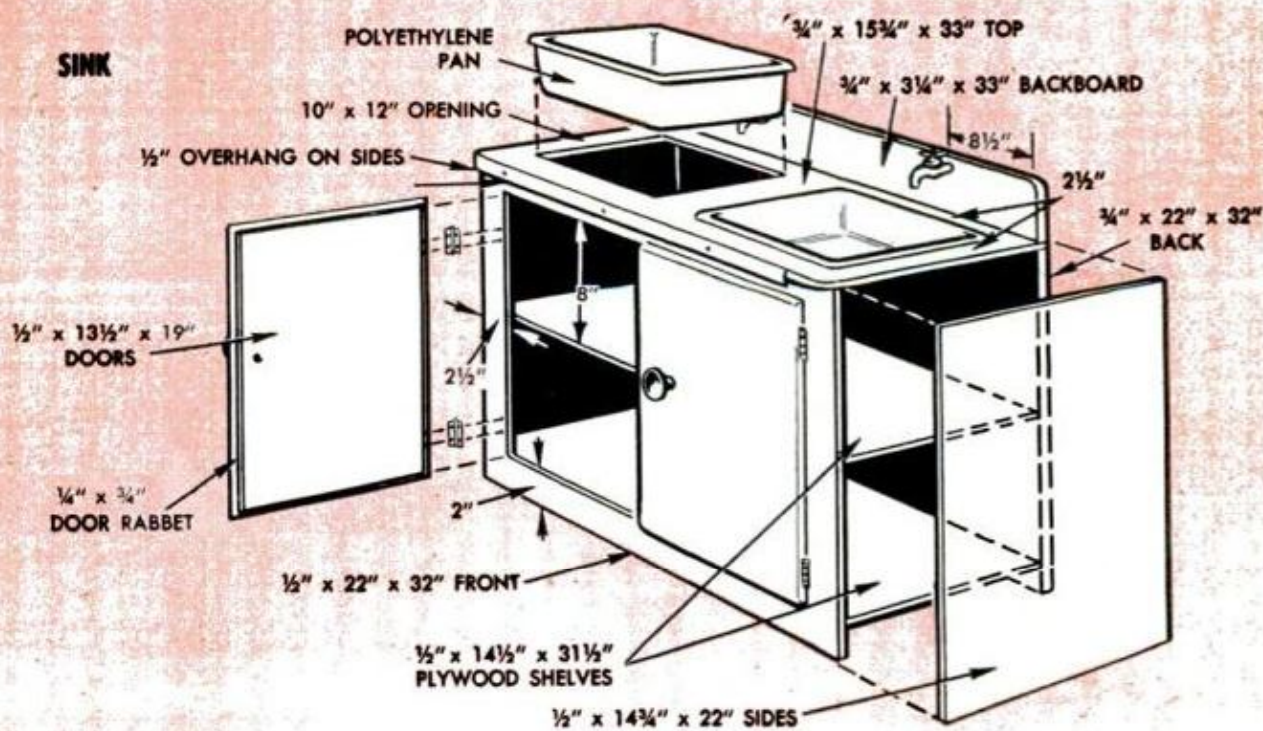


ELECTRIC STOVE





SINK



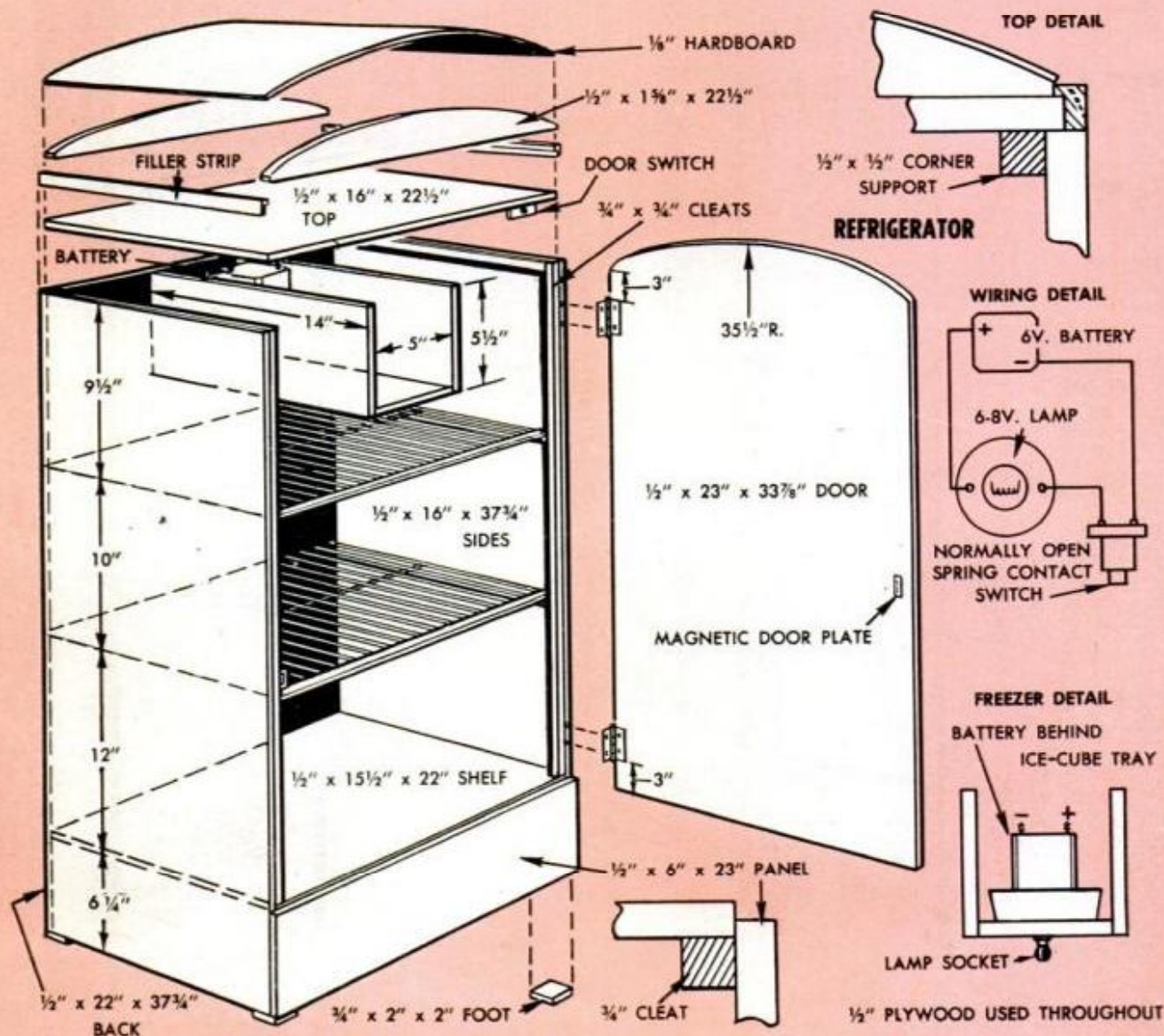


made more realistic by covering the top and splashboard with linoleum and metal edging.

While the refrigerator, with its light and all, is basically the same type of construction as the other two units, the top is assembled separately and mounted as a unit. First, nail the curved pieces to the plywood top and attach the filler strips. Then glue the hardboard top to the end pieces using an epoxy glue and C-clamps. Fill the gap between the edge of the hardboard and the filler strip with wood putty and mount the unit.

Finally, round the edges of the top with a belt sander or by hand. The shelves rest on wood cleats attached to the sides. If possible, salvage a couple of shelves from an old refrigerator. Otherwise, use any strong perforated material.

—D. A. Williamson

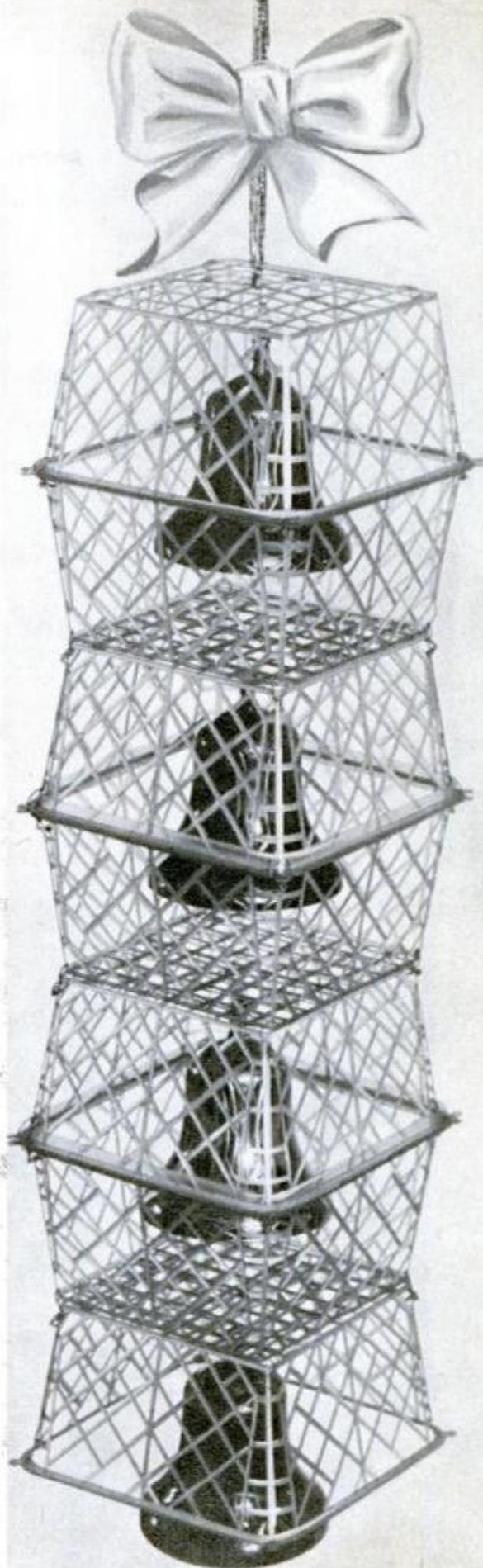
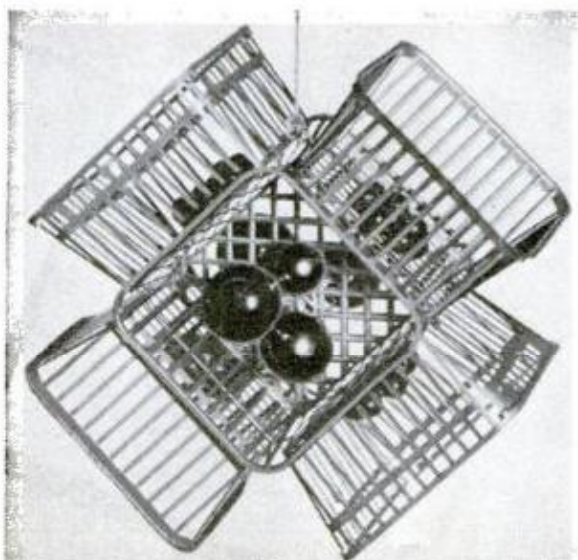




Ring Out The Old

From such common items as berry boxes and tree ornaments you can create unusual doorway decorations which will spread Christmas cheer throughout the house. The tower of bells (right) is made of seven green plastic berry boxes held together with fine wire. The bells, each of a different color, are suspended from the center of the inverted boxes. The mistletoe hanger (above) is made of two papier-maché berry boxes glued together, dusted with gold glitter and trimmed with green rick-rack and red sequins. Six plastic boxes are used to make the design shown below, all being wired together, sprayed bright gold and decorated with clusters of small balls

—Bob Joselyn



X618



Say It With Silk

Silk-Screen printing makes your greeting cards say "Merry Christmas" in a personal way





OF ALL THE millions of greeting cards that will be mailed this holiday season few will bring the Christmas message with quite the warmth and feeling of the card that has been handmade and printed by this photographic-silk-screen process. Your card made by this

method will be both personal and individual; there will be no duplicates.

Although the silk-screen process is in itself very old, in this procedure it is tied in with photography which greatly enlarges its scope. You create your very own greeting card design, using as subjects almost anything of your choice that expresses your thought for a relative, friend or acquaintance at Christmastime—yourself, your family, your house, your dog, your activities. The sample card used in outlining the process is a suggestion of how to proceed.

You'll need all the equipment and materials listed in the table. Silk-screen equipment can be purchased as a kit and you can add the other materials necessary, such as film or plates, card stock and envelopes, masking tape and artist's brushes.

The first step in the procedure is to determine the final trimmed size of your card to fit a stock-size envelope. A simple color sketch of the card is next made to determine the color combinations and, of course, the final appearance of the card. This should be worked three times the final size, Fig. 1. Having determined the design and made the rough layout, you make a black-and-white drawing three times the final size as in Fig. 2. This should be done on artist's illustration board in India ink. You can avoid much of the hand lettering by obtaining letters printed on clear acetate from art supply dealers. This product comes to you as a sheet, Fig. 3, and you simply cut out the letters you want and work them into your design. To do this, you make up each



CAMERA AND SILK SCREEN EQUIPMENT

1. Camera, 2 1/4 x 3 1/4 or larger ground glass back
2. Film holders
3. Enlarger, 2 1/4 x 3 1/4 or larger
4. Usual dark-room equipment, trays, thermometer, etc.
5. Light box with a diffused glass top for use in working on

negatives and positives

6. Silk-screen frame, minimum size 10 x 12-in.—16XX silk
7. Squeegee, 6 to 8 in., for use in screening
8. Base board for screening plus hinge clamps for screen
9. Dryer or fan which can be used for drying the screen

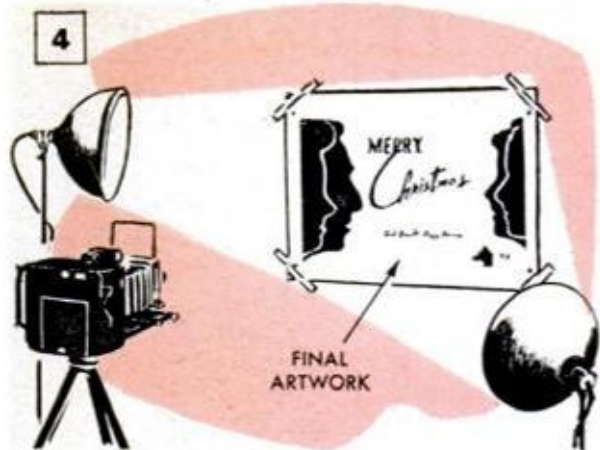
MATERIALS

1. Kodalith Ortho film or plates
2. D-11 or Kodalith A & B developer
3. Ektagraph film
4. Ektagraph activator
5. Ektagraph stripping solution
6. Water-soluble blockout (from a silk screen supplier)
7. Oil-base silk screen colors red, green, white, blue, yellow, gold, etc. (from silk screen supplier)

8. Solvent such as mineral spirits for washing out screen
9. Card stock
10. Envelopes
11. Masking tape, 1-in.
12. Large white, lintless blotters
13. Artist's brushes for hand touching and opaquing, No. 4 or 5, red sable

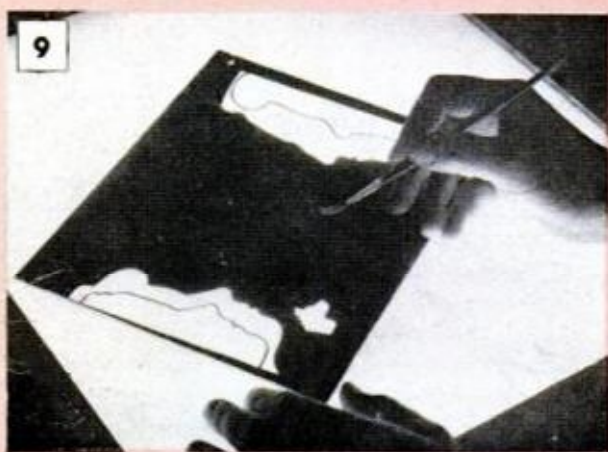


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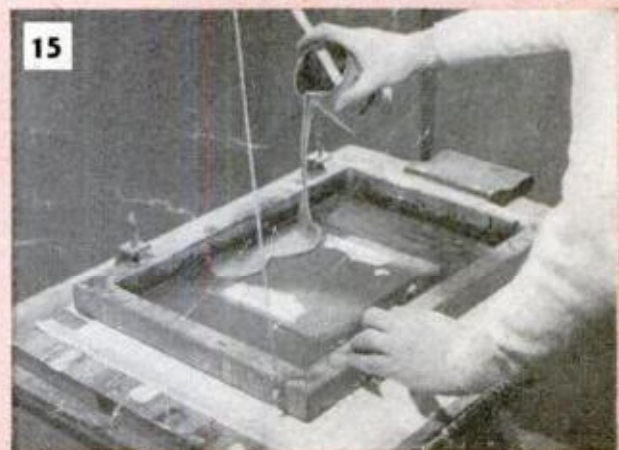
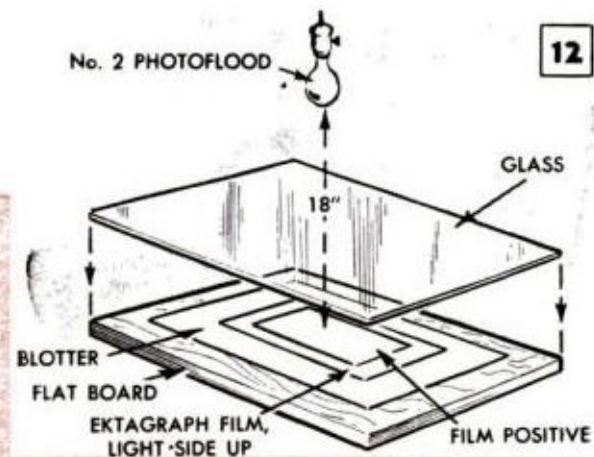
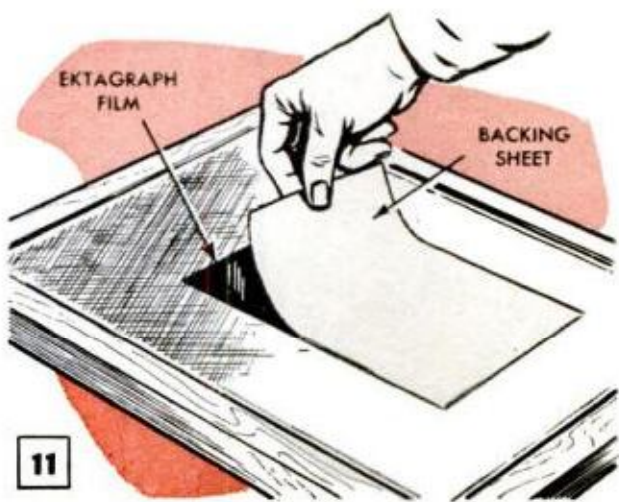
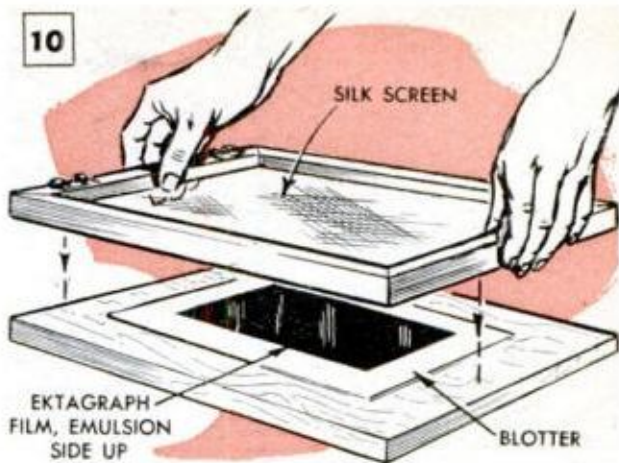
line of type needed, paste it on a separate sheet and photograph it to the exact size you want, using the high-contrast Ortho film listed in the materials list. From the negative you make a print on high-contrast paper, making sure the type is exactly the size you need. Then you paste this on the drawing you have made of the card.

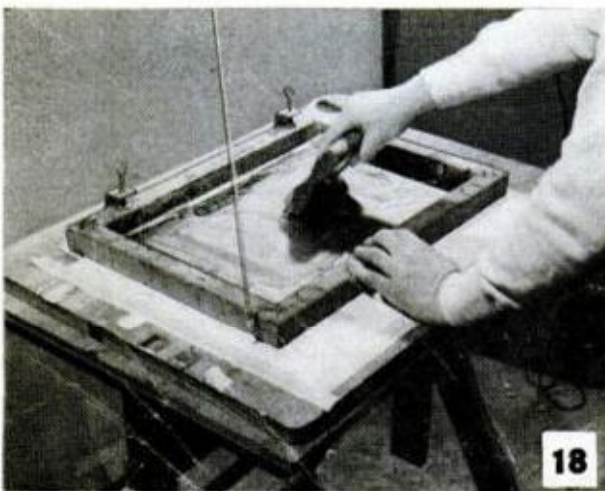
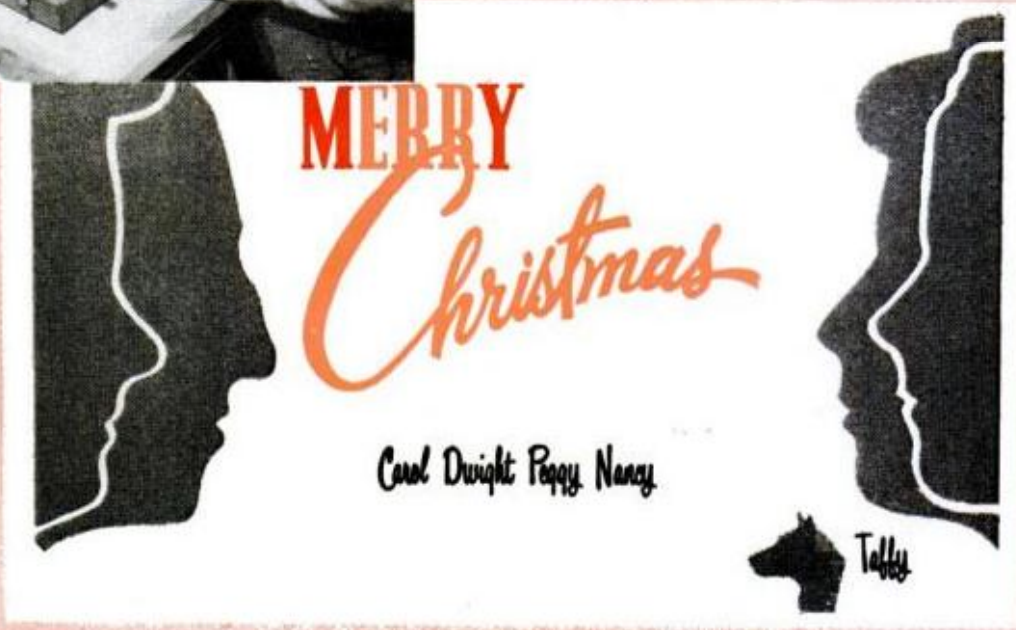
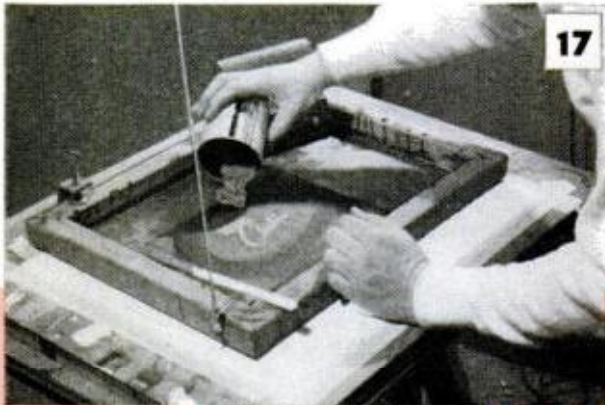
Now clean up the drawing to remove all finger marks, smudges and pencil lines. White out any spots of ink with artist's white and be sure that all black areas are fully filled in, that is, are intense black throughout. If you're using more than one color, then color register marks are inked in just outside the working area. Now you're ready to shoot the copy to get an



original negative. Use at least two No. 2 photofloods as a light source, setting up the work as in Fig. 4.

Using this negative you make a positive on Kodalith film, Fig. 5, using your enlarger and making the positive the same size as the finished card. If you are printing in a single color, this ends the photo process. But if you are printing in more than one color, say red, green and gold, you go farther and make a contact negative again in Kodalith film for each of the colors from your positive. Then on the red print, you opaque all of the image area except that which is to be red; on the green all the image area except that which is to be green; likewise on the gold. This procedure is pictured in Figs. 6 through 9. You now have three new contact positives from the negative. After these are made and developed in D-11 developer you are ready to contact the positives to the Ektagraph film. In using this film be sure to follow all instructions in detail. Fig. 12 shows in detail how to proceed. Start with a piece of $\frac{3}{4}$ -in. plywood a trifle larger than the silk-screen frame, placing the blotter first and then the Ektagraph film with the light side up. Then place the film positive with the emulsion side contacting the light side of the Ektagraph film. In this way you are exposing through the light side of the film. After exposing, Fig. 12, follow the developing in-





structions, using the Ektagraph activator and after the image is entirely black, keep it in the activator for about 25 seconds, then transfer to the acetic-acid bath.

Washout the Ektagraph film (which now is a stencil) with 95-degree water, making sure to remove all the milky emulsion on the black areas. Give special attention to the light areas as these are the areas through which the ink will be transferred. Now lay Ektagraph film, emulsion side up, on a blotter placed on the plywood base you have been using, so that as you look at the film it is reading positive. Fig. 10. Place the silk screen, with the silk still wet, over the film, lightly pressing the screen into the emulsion and using a blotter on the top side to remove excess water. Place the screen in a dryer or in front of a fan.

After the screen is thoroughly dry begin wetting the film on the bottom side of the screen with the Ektagraph stripping solution, using a piece of fine cheesecloth. Keep

(Continued to page 240)

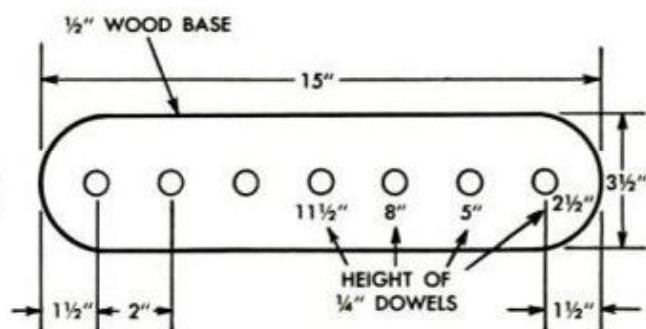
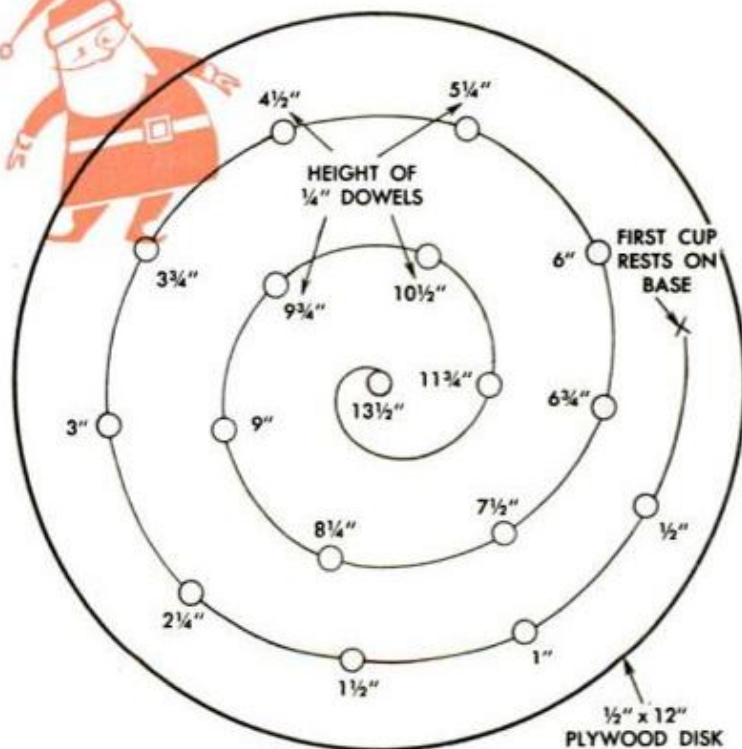
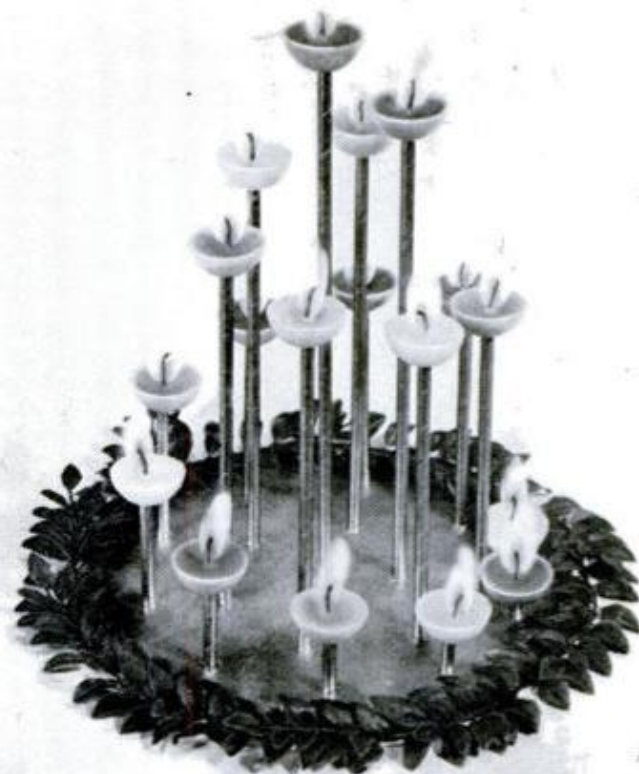
LET THERE BE LIGHT

CHRISTMAS and candles go together like Eastertime and lilies. And now the soft glow of candlelight gets a new twist in these novel candelabras designed as centerpieces. One, pictured at the right, consists of eighteen tapers arranged in an ascending spiral, the other having the conventional seven tapers of graduated height.

Candles for both candelabras are molded in the cup shape you see by using a plastic refrigerator egg carton as the mold. Buy twelve-compartment cartons, use one as the mold and cut the cups from the others. In making the spiral candelabra attach the cups to the ends of $\frac{1}{4}$ -in. dowels with small screws. Note the lengths of the dowels in the detail. Glue the dowels into holes drilled in the circular base.

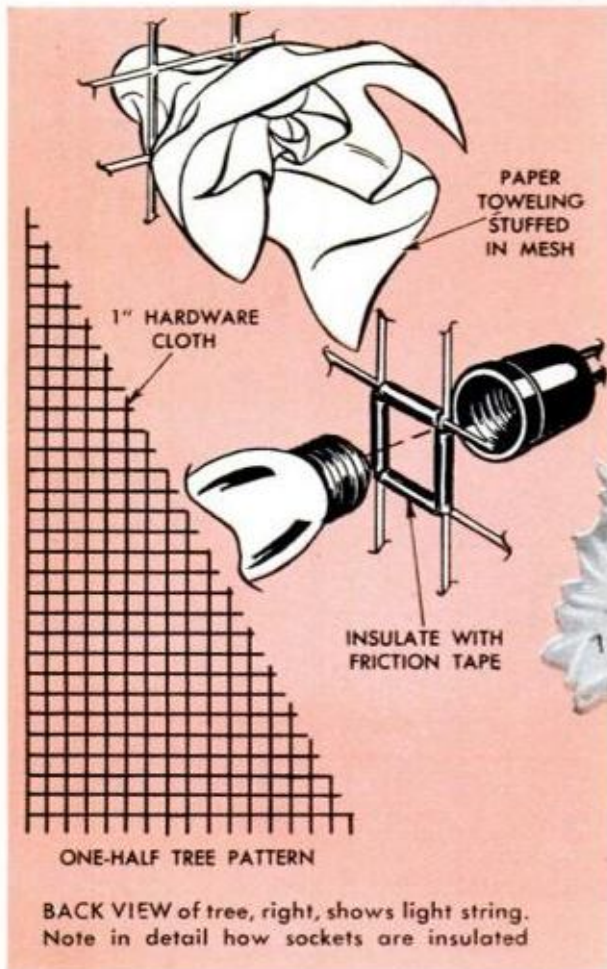
Melt old candles of varying colors in a double boiler and pour the wax into the egg cup molds. Just as the wax begins to harden place the wicks. When hardened remove the cup-shaped candles and place in the candelabra cups. Proceed in the same manner in making the seven-taper candelabra.

—Theodosia Carpenter



Grow a Yule Tree With Paper Towels

EVERYDAY MATERIALS, such as paper towels, 1-in.-mesh hardware cloth and a painted pole which serves as a trunk, are used to grow this one-of-a-kind Christmas tree. Cut hardware cloth to triangular shape according to half pattern, then curve it slightly across width. Trunk is a 1¼-in. wood pole about 48 in. long, tapered at one end and painted white. Attach hardware-cloth cutout to pole with staples and set lower end of pole in flower pot filled with sand. Locate lights, but before pushing sockets through mesh, tape all four wires of each mesh as in detail. This prevents possibility of electrical short. With light string in place finish tree by pressing individual paper towels through mesh. Cement a suitable ornament to top of trunk, attach ornaments to tree with pipe cleaners. You also can make a cone-shaped tree using same materials and methods.—Maurine Krohne



KEEP THESE IN MIND

All-Weather Bird Feeder

While bird feeders come in all shapes, sizes and price ranges, one of the most economical and practical of them all can be made from an old garbage can cover and the lid from a cheese box. You can obtain the cheese box lid from your local grocer. Drill four holes 90 deg. apart in both the cover and the lid. Then cut four 6-in. lengths of wire and bend both ends of each piece to form hooks. Hang the box lid from the cover, first drilling a few small holes in the bottom of the lid to allow any water which might accumulate to drain out. To hang the feeder, hook the end of a long piece of wire through the handle on the cover and wrap the other end around a tree limb. If desired, the feeder can be given a coat of paint to dress it up.—*Gene R. Griffin*



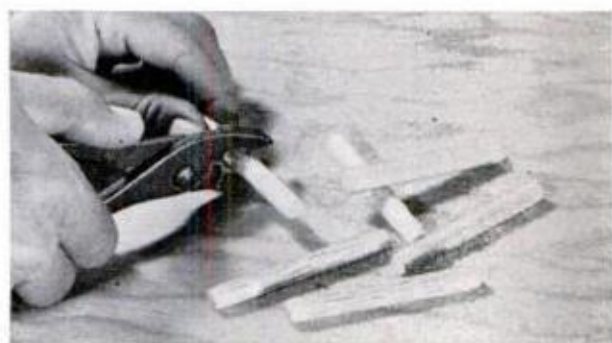
Ball Handles for Files

Discarded golf balls make excellent palm-fitting handles for files and other tanged tools such as carving chisels and gravers. Just drill a small hole through the center of the ball to take the tang in a snug fit. The resilient rubber core of the ball will grip the tang tightly. The ball provides an easy, comfortable grip that gives sure control of the tool.—*Bil Toman*



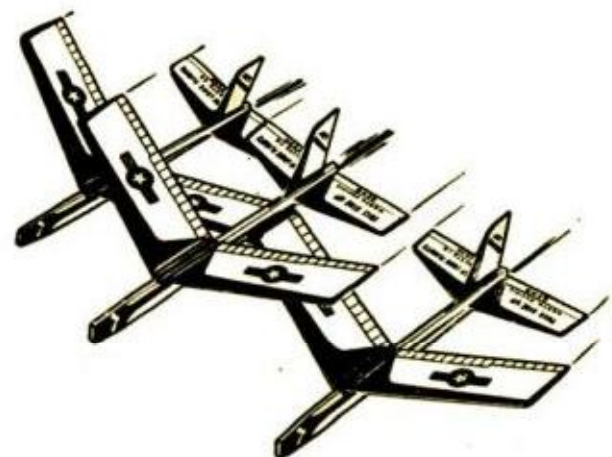
Scored Dowels Lock Joint

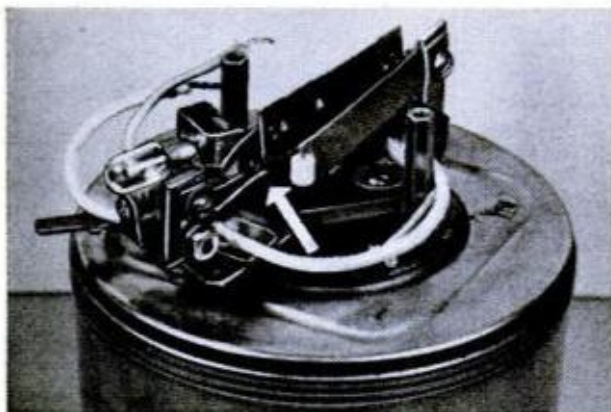
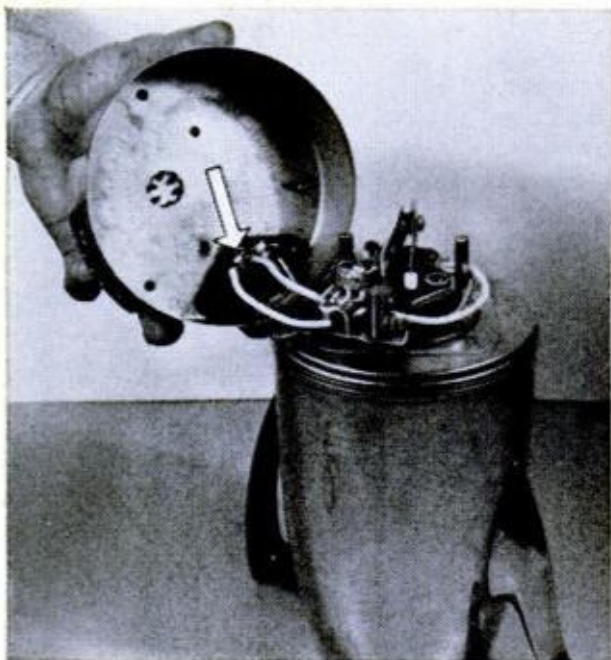
Don't use smooth dowels in edge-glued joints. Rather for maximum holding power, cut the dowels to required length and then score each one deeply along the entire length with the alligator teeth of your slip-joint pliers. The deep scores give the glue an extra bite in each dowel hole, greatly strengthening the joint.—*R. J. DeCristoforo*



Models Fly in Formation

A small patented plastic clip makes it possible to lock three stick-model gliders together for formation flying. The clip, devised by North Pacific Products Co., Bend, Ore. as a wing mounting for their regular balsa models, simplifies both manufacture and assembly. It attaches to the top of the fuselage and sets the correct dihedral for the wings which are made in two pieces. An extra clip can be used on the underside of the fuselage to hold the wing tips of two other planes, thus permitting formation flying.





FEW HOME appliances get more hours of service in any given period of time than your electric coffeemaker. Not only hours of service, but it gets a lot of handling as well, for it must be cleaned regularly, wiped dry inside and out, placed in a cabinet or on a shelf between use periods, plugged in and unplugged at least once every day. Most good coffeemakers can take this for years but sooner or later wear will take its toll and some morning the maker will flatly refuse to work. It's then you can save a few dollars by fixing it yourself.

First, you clean the unit thoroughly and then remove the base. Generally you'll need a Phillips screwdriver for this job. Take it easy on any screws that seem to stick so that you don't damage the screws or parts.

With the base off, you'll probably see something like that pictured in the upper left-hand photo. Check the terminals, indicated by the arrow, carefully for looseness. Both the nut and the terminal post itself may be loose, a condition that can result in arcing. This can damage the terminal post or the terminal base, or both. In some instances it may be necessary to replace the terminal block.

In the center photo, the points and thermostat are indicated by the arrow. Often a tiny tip of carbon will form on one or both the points and prevent good contact. Usually it can be removed by passing a strip of cardboard between the points but you may have to use a strip of fine (8-0) sand-

Appliance Fix-It File

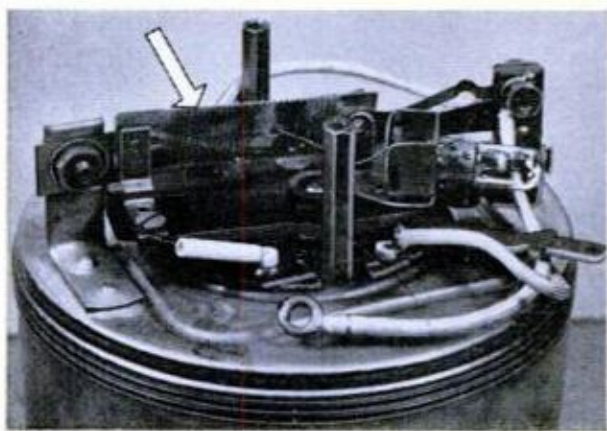
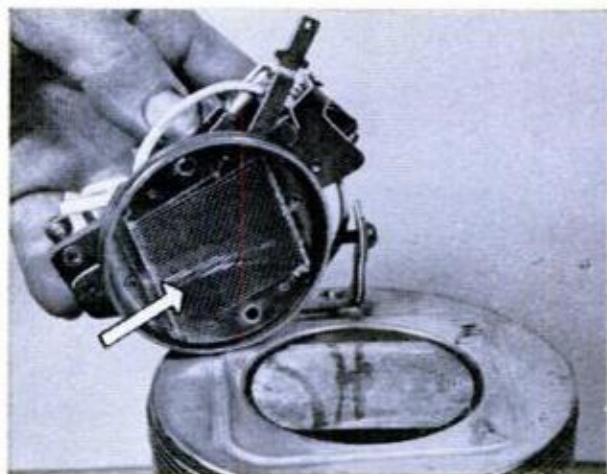
paper to clean the points thoroughly and remove any fine pits. Work carefully as otherwise you may damage the entire unit. If the points are badly pitted, then they should be replaced.

If all the parts you have examined so far appear to be in good order and the maker still fails to work properly, or not at all, then you should probe farther. Usually there are two tapped studs taking the screws which hold the base in place. Unscrewing these, lower photo, opposite page, allows you to lift off the control unit and have a look at the heating element, indicated by the arrow in the upper photo at the right. Check the element, which is of the plate type, for breaks and the lead-in wires for frayed or burned insulation. If you discover a break or if the wires are badly corroded, or if insulation is in doubtful condition, then replacements are advisable. You'll get more reliable service from the coffeemaker and save the bother and time of making the inevitable repair later on.

When you replace the control unit you will notice a small resistance winding, or coil, indicated by the arrow in the lower photo at the right. This serves as a warming element which keeps the coffee hot after the regular heating element shuts off. Examine this coil closely for breaks and worn insulation. It is easily replaced as a unit if defective.

Remember when dismantling any household electrical appliance to work carefully. Don't permit the wrench, screwdriver or pliers to slip and damage delicate parts.

—John Pennington







5-MINUTE CAR WASH

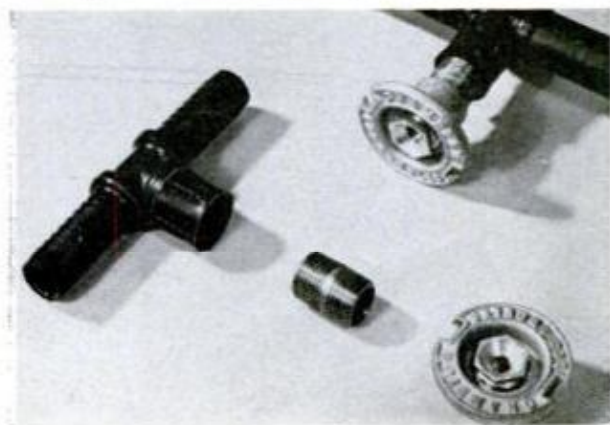
By Manly Banister

ENTERPRISING TEEN-AGERS who have outgrown the paper route, also the car owner who likes a quick wash to keep his car sparkling new will go for this speedy portable car washer. Its sprinkler heads, from a lawn sprinkler system, form a dirt-removing spray ring that hits every exposed inch of the car as it is driven slowly through the arch. The whole affair can be disassembled and bundled in minutes for moving to a new location or for storing.

To assemble this washer you'll need one 8-ft. and two 6-ft. lengths of 1 1/4-in. aluminum tubing, two aluminum elbows, two aluminum T-butt connectors, four end caps, one 8-ft. length of 1/4 x 1-in. bar aluminum, six 1/4 x 2-in. plated stove bolts with lock washers, two 1/4-in. wing nuts, 18 ft. of 3/4-in. plastic pipe, five 3/4-in. plastic-pipe tees with five 1/2-in. close nipples, five sprinkler heads, eight tool or broom clamps, a male hose coupling with cap and a female hose coupling for connecting a garden hose. You should be able to buy all the parts for about \$25.00. If you wish, you can salvage the soap dispenser from a car-washing brush and connect to the plastic hose just below the first sprinkler head.

The aluminum tubing and the fittings that go with it can be obtained at any hardware store selling Do-It-Yourself aluminum. You also can use pipe and slip-on fittings for the hose supporting framework, and it's possible to adapt the assembly to standard threaded pipe and fittings. The

STRONG JET SPRAY is provided by five sprinkler heads of the type used in underground lawn sprinkler system. Plastic pipe joins sprinkler heads

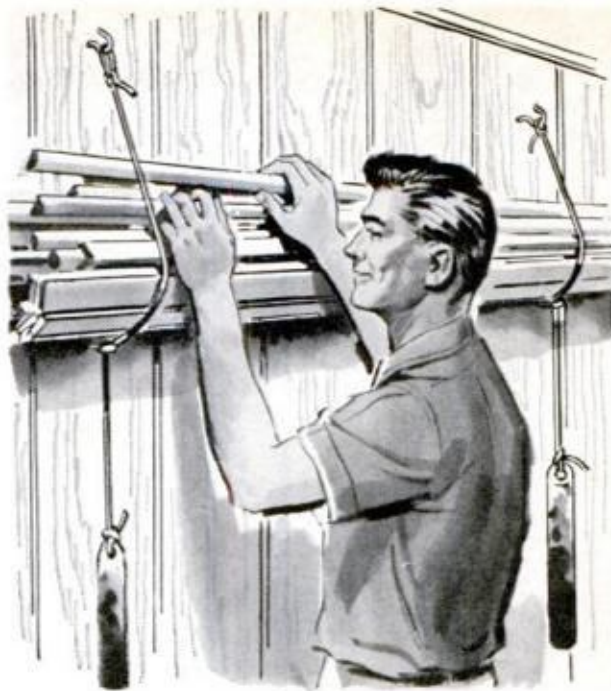


SHOP SHORT CUTS

Expanding Stock Sling

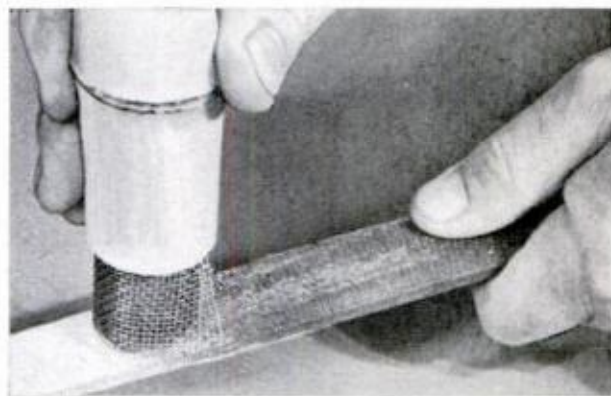
Rather than stand lengths of molding and other narrow strips of stock on end in a corner, store them on the shop wall in this expanding sling. It's made from two screw hooks, two screw eyes, two lengths of clothesline and a pair of sash weights. Turn the hooks into the wall at a convenient height, turn the screw eyes into the wall about a foot or so below the hooks. Tie the sash weights to the clotheslines, pass the free ends of the lines through the screw eyes and tie to the hooks. Then slide the lengths of stock back of the lines as pictured. The sling will hold one piece, a dozen or even more pieces securely, always out of the way, yet always visible and easily removed when needed.

—G. E. Hendrickson



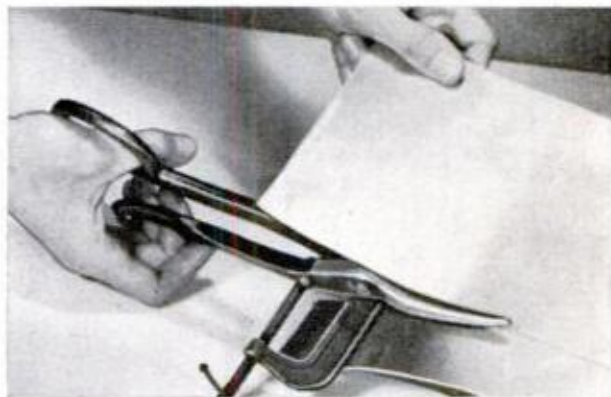
Improvised File Card

Everyone knows that a clean file will get the job done faster, and you can keep your files clean with an inexpensive file card made from a scrap of copper window screening about 3 in. wide. Simply roll the screening up tightly and either bind it with tape or insert it into a short section of bamboo. Since copper is a soft metal it won't harm the file, but it will be stiff enough to clean out any material which is clogging the teeth.—Bil Toman



C-Clamp Deflector

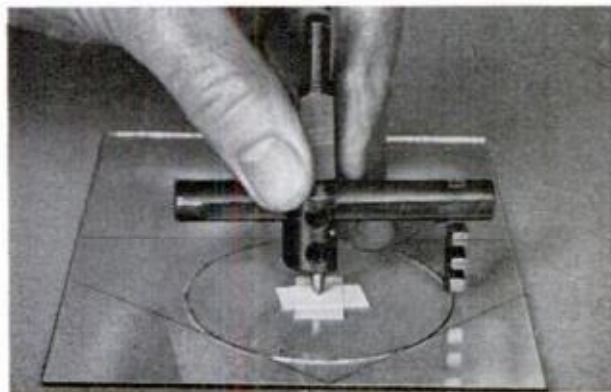
Cutting a strip from heavy sheet metal with tin snips will be much easier if you use a small C-clamp as a deflector. Attached to the snips just back of the jaw the clamp turns the cut strip downward, making it easier to guide the snips straight in the cut and also opening the cut so that the snips slide forward to get a fresh bite without binding. This trick works equally well with the hawk's-bill snips pictured or with snips having straight cutters.—R. Hanscom



Circle Cutter Adapted for Glass

An ordinary circle cutter can easily be adapted to cut small glass disks. Cut off the handle of a regular glass cutter and square off the remaining portion of the handle to fit the hole for the regular cutter. Remove the pilot drill, substitute a short nail for it and stick a double patch of surgical tape to the glass to serve as a nonslip center or pivot point. Rotate the cutter by hand.

—O. A. Nelson



Solving HOME PROBLEMS

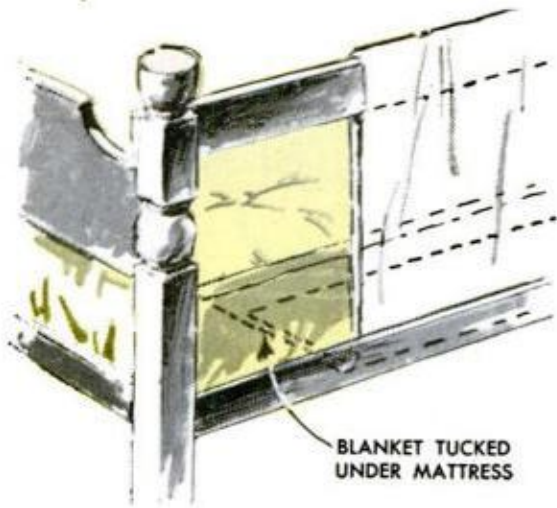
PLOW SNOW with a washtub? Try it. You'll be very much surprised at how efficient a snowplow the tub makes for clearing sidewalks. It will handle a new snowfall up to 4 or 5 in. Just tie a rope to one of the handles and weight the tub with a concrete block



USE OF ALUMINUM FOIL prevents rabbits and other rodents from damaging trees and shrubs during the winter. Simply wrap a piece of household aluminum foil around tree trunk at a height that will prevent the bunny from reaching the bark. He won't bother to chew through the aluminum barrier

DISCARDED CHILDREN'S sand box may be pressed into service as a mortar-mixing box. Later it can be cleaned out and returned to its original use. A bonus tip is shown in the illustration. The man is using a rake instead of a hoe for mixing the mortar. After a trial you may prefer this tool





BLANKET TUCKED UNDER MATTRESS

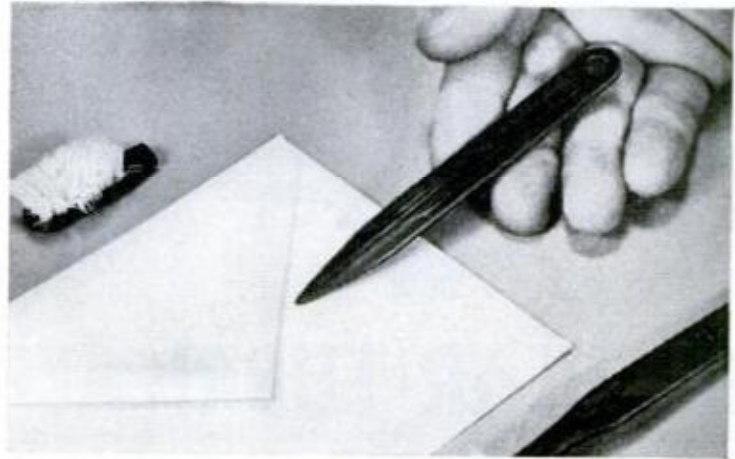
TO PREVENT A SMALL CHILD from accidentally rolling out under the guard rail on the upper berth of a bunk bed, one mother "fenced in" the open rail with a blanket and tucked the ends under the mattress as shown

DISCARDED MAIL-ORDER CATALOG makes a high chair out of any ordinary chair for tykes or moppets who want to sit up to the table like grownup folks. Bind all the edges and the back of the catalog with strips of adhesive tape so that it won't come apart or twist out of shape

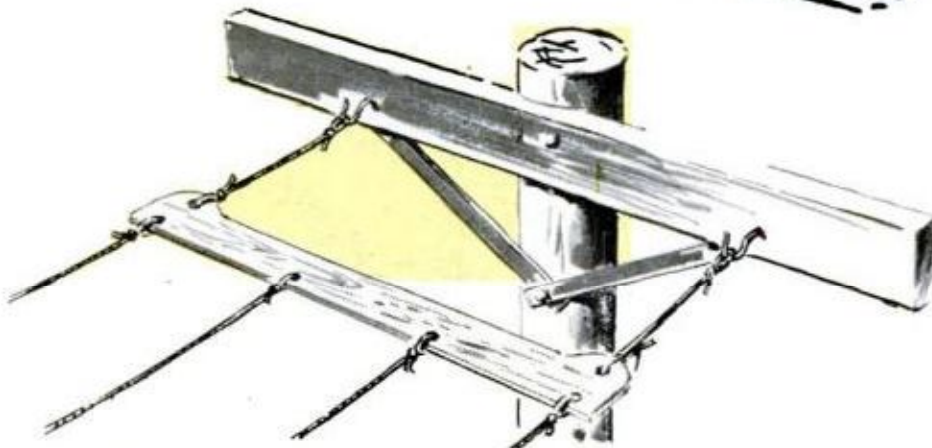


ADHESIVE TAPE BIND PAGES TOGETHER

COLORFUL LETTER OPENER can be made quickly from a toothbrush handle. Cut the bristle end from a discarded toothbrush, then file handle to a point. Sand filed section to an oval shape to produce two cutting edges, one on each side of the oval



NEXT TIME YOU PAINT inside wear a pair of boot socks over your regular shoes. Then it's an easy matter to wipe up any spatters on the floor without stooping. Saves a lot of time and energy. You won't damage the socks as they are easily cleaned in a paint solvent for further use



CLOTHESLINE stretchers, or gambrels, (left) are made of $\frac{1}{4}$ -in. plywood and drilled at 12-in. intervals to space the clotheslines. When not in use, the lines may be wound onto one stretcher and stored away



REGULAR LUBRICATION PAYS OFF

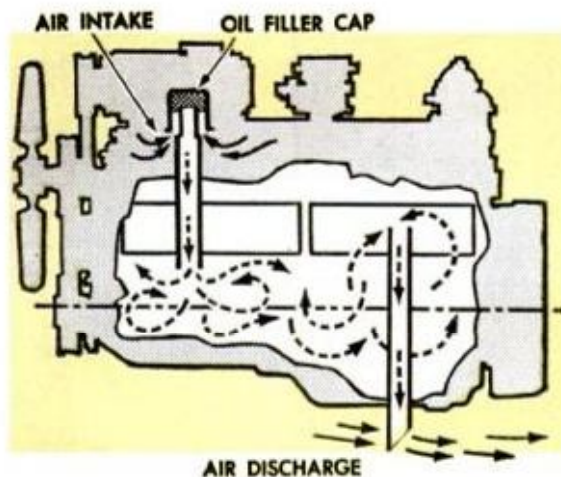
By Will Hector

LUBRICATING YOUR CAR periodically assures longer life for wear parts, smoother operation and measurable fuel economy. But miss one grease fitting, one oil cup, one oil change and you may reduce the life expectancy of at least one part and

possibly of the car itself. Unless, of course, you have a 1961 car with a sealed chassis which is lubricated for a guarantee period. Then you don't worry about grease jobs until you and the car are perhaps a year or two older.

1. AIR that circulates through crankcase and out discharge comes in through breather cap. Keep it clean

2. EQUIPMENT YOU NEED for a lube job is simple to use and inexpensive. Below are the essential items

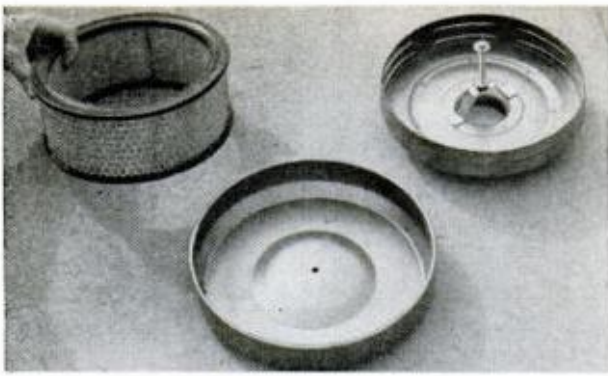


LUBRICATION CALENDAR

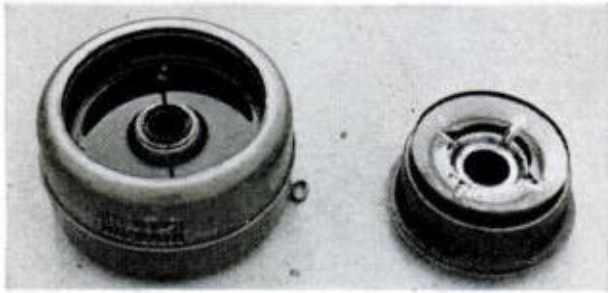
Every 1000 miles*

WHERE TO LUBRICATE	TYPE OF LUBRICANT	DATE	MILEAGE
Front suspension arms	All-purpose gun grease		
Steering linkage	All-purpose gun grease		
King pin	All-purpose gun grease		
Steering gear	SAE 90 oil to visibility		
Clutch release fittings	All-purpose gun grease		
Gearshift levers	All-purpose gun grease		
Transmission, clutch, and brake linkage	Dripless penetrating oil		
Rear axle	Multipurpose SAE 90		
Transmission, std. or OD	Multipurpose SAE 90		
Transmission, automatic	Special auto trans. fluid		
Deck lid, door, hood hinges	Dripless penetrating oil		
Door latches, striker plates	Wax stick		
Exhaust manifold valve	Liquid graphite		
Air cleaner (dry type)	Wash in solvent and dip in light engine oil		
Every 2000 miles*			
Breather cap	Wash in solvent, dry, dip in light engine oil		
Air cleaner (oil bath type)	Wash filter element in solvent, drain. Refill base with clean oil as recomm. Drain oil when hot. Refill with correct grade and type		
Crankcase			
Every 4000 miles*			
Oil filter	Replace cartridge and oil when oil is dirty		
Distributor	Oil rotor wick with light machine oil, also oil point on breaker plate, if any. Clean cam and grease lightly. Varies		
Generator	Add a few drops of engine oil. <i>Warning!</i> Don't over-lubricate		
Brake master cylinder	Add HD brake fluid to within 1/2" from top		
Convertibles, campers, etc.	Dripless penetrating oil to all moving metal parts		
Brake cables	Dripless penetrating oil or graphite liquid		
Parking brake handle	Lubriplate or dripless grease to shaft. Unscrew cable from rear of meter. Wipe clean. Then apply graphite lubrication or light grease from a point 6" from speedometer to end of cable.		
Speedometer cable			
Every 15,000 miles*			
Rear axle, transmission, standard and automatic transmission	Drain and refill with correct type and grade lube		
Front wheel bearings	Clean and repack with wheel bearing grease		
Every 25,000 miles*			
Universal joints	Clean, inspect. Repack with wheel bearing grease and replace grease seals at same time		

*At periodic lubrication all operations to that time must be done at the same time, i.e. at 4000 miles, operations for 1000 and 2000 must be performed as well as the 4000 mile operation.



3. PAPER-FILTER AIR CLEANERS should be cleaned every 1000 miles or less under dusty conditions



4. OIL-BATH CLEANERS should be serviced regularly. Follow instructions for your car when servicing



5. BREATHER CAPS get too little attention. They're really filters and should be serviced regularly. It takes a thorough cleaning to remove dust and sludge

6. HEAT VALVE on exhaust manifold is another lube point that is easily overlooked. It should get regular attention. Use special oil to withstand heat



7. DON'T WAIT for door hinges to squeak before oiling. Use pressure oil can and lubricate sparingly

Of course it's easier to take the car to your serviceman and leave oil changes and grease jobs to him. But if you'd like to give it a try just for kicks and the car know-how you can pick up, then here's how you go about it: You'll need the sludge pump, grease gun, pressure oil can and lubricants pictured in Fig. 2. These are the essentials. You'll also need to clip the lubrication calendar on the opposite page. It charts just about everything on the average car that needs oiling or greasing periodically and lists the type of lubricants to be used. You keep the dates and the mileage, of course, in the two righthand columns. It's a good idea to check the calendar with your mileage readings periodically. Obtain a chassis lubrication chart with diagram for your make of car.

If you're new at the greasing and oiling job, take the car to a service station and have the chassis steam-cleaned. This makes location of all lubrication points easier and more certain. Next, locate the car on the driveway or the garage approach—anywhere it's level and there is solid support for the stands. Then jack up the car and drop it on the stands. Make sure that the car cannot move once it is on the stands. Never get under a car until you are certain it is solidly supported.

Locate and hit all the pressure grease fittings first. Then do the oil holes, if any, and the oil cups. Note the warning in the 4000-mile division of the calendar in connection with lubrication of the generator bearings. The generator, distributor rotor and breaker plate are about the only points on a car where you can overlubricate and cause damage. Check each of the lubrication points off on the chart under the proper heading as you proceed.

Note in the 2000-mile division of the calendar that the breather cap, Fig. 3, is listed.

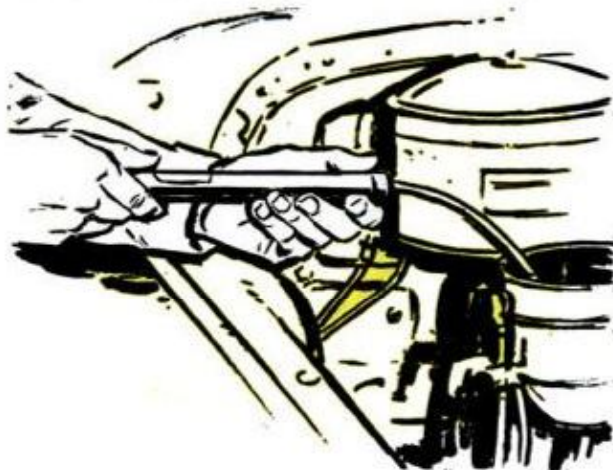


8. OPEN UNIVERSAL JOINTS on drive shaft need lubricating at 25,000 miles, or less. Before you loosen nuts have rubber bands at hand to hold parts in place. It's a good idea to have instruction sheet for your car

The diagram in Fig. 1 shows how important it is to keep it clean. It should be thoroughly cleaned at least every 2000 miles and every 1000 miles or less if your driving is in dusty conditions. The same is true of the air cleaners, the paper-filter type pictured in Fig. 3 and the oil-bath type in Fig. 4. Note that the paper-filter type cleaner is listed in the 1000-mile division of the calendar. This should be taken to mean "every 1000 miles or less," depending on driving conditions. When servicing both types of cleaners, always follow instructions given by the manufacturer.

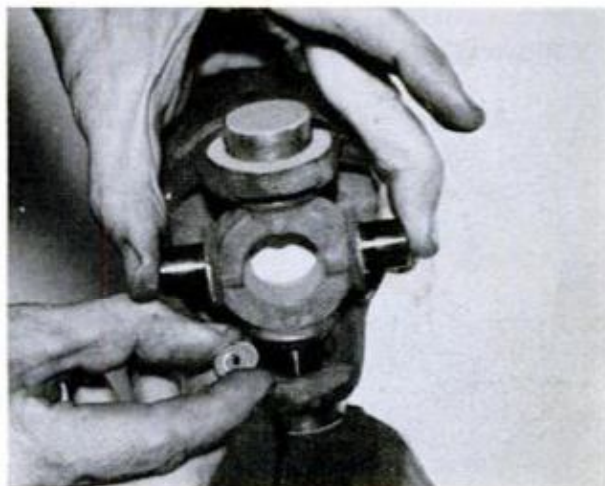
Also in the 1000-mile division of the calendar you will note that the exhaust-manifold valve, or heat-riser valve, is listed. This valve, Fig. 6, is sometimes missed in lubrication schedules. If not properly lubricated at regular intervals, it may stick and
(Continued to page 218)

10. SLUDGE PUMP comes in handy when changing filter cartridge or relubricating rear end. It picks up the goo easily, keeping hands and clothing clean



9. DRIVE UNIVERSAL JOINT apart with a short length of pipe. Take it easy with the hammer as otherwise you may damage parts. Note position of rubber bands that hold the bearing cages in place

11. FINAL STEP in removing bearing cages from universal is to lift the spider and slip small washers between spindle and bearing. Then tap bearing out

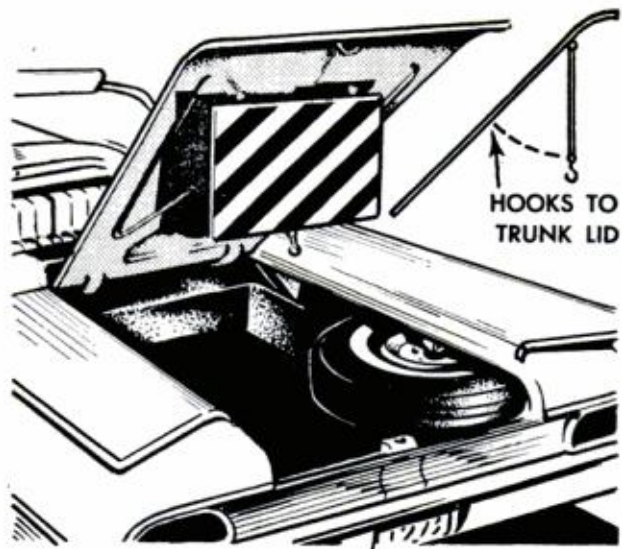
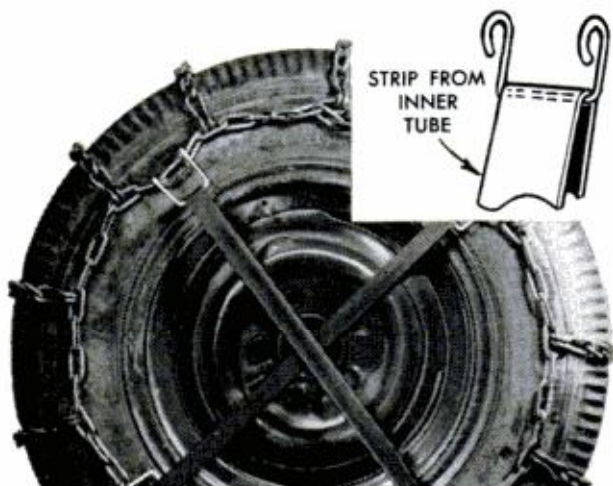


Better CARKEEPING



INFLATED TUBES are difficult to hold submerged in a testing tank while a close check is made to catch the telltale bubbles indicating a pinpoint leak. One way is to drill small holes through the tank near the top and insert a small-diameter rod after the tube is placed in the tank. The rod keeps the tube submerged, makes it easier to keep it under control

LOOSE SKID CHAINS can do a lot of damage to the under sides of fenders to say nothing of the distracting clatter. To quiet the chains, make two pairs of double hooks from heavy wire, bending them as in the inset detail. Then cut two 1-in.-wide rubber bands from an inner tube, insert a double hook at each and attach to the chains as in the photo

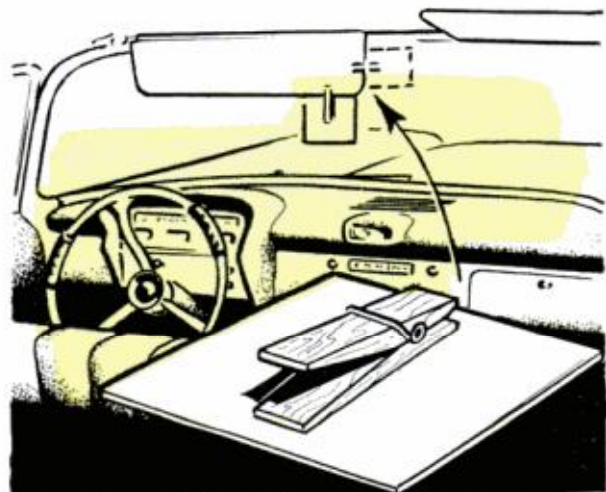


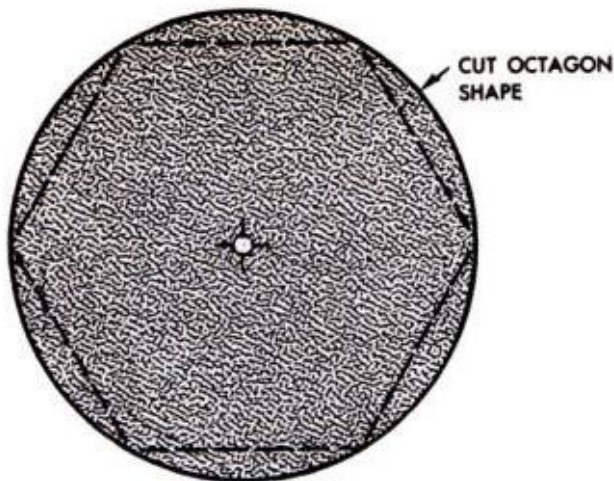
WHEN CHANGING A TIRE on a busy highway after dark with cars streaking past only a few feet away you'll feel easier if you install this warning reflector which shows when the trunk lid, or deck, is raised. Cut a piece of 1/4-in. hardboard about 12 x 16 in. and apply spaced strips of reflective tape to one face. Then hinge under lid, using rings of wire and a hook



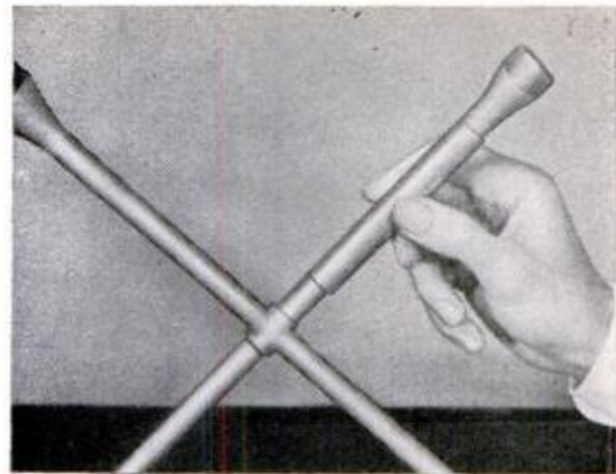
GRIND A BEVEL on the end of your ignition-point file so that it will slip between the points without bending the arms or damaging the points. Don't grind to a sharp edge; leave a flat about 1/64 in. wide

EYE SHIELD that clips to the sun visor blocks out glare that gets past visor when driving directly into the sun. Glue a spring clothespin to a square of 1/8-in. hardboard or opaque plastic to make shield





ABRASIVE DISKS used by auto-body repairmen won't leave scores in the metal surface if the disk is cut to an octagonal shape as indicated by the dotted lines in the detail. Octagonal disks cut more freely and work shallow reverse curves without digging in



SPINNER HANDLE for a lug wrench eliminates that tiresome hand-over-hand job of tightening lug bolts. The job can be done a lot faster and with half the labor if you take time to fit one arm of the wrench with a sleeve which permits it to be used as a spinner. Simply form a sleeve of heavy sheet metal, using the wrench arm as a forming mandrel. Solder at the butted joint and then file off any burrs at ends of sleeve

PUNCTURES IN LARGE INNER TUBES usually are difficult to locate and more difficult to keep track of once they have been located, especially when there are several widely separated. If a round toothpick is inserted in each puncture as soon as it has been located in the testing tank you won't miss any when ready to make repairs. Care should be taken not to press the toothpicks in more than half their length

COMING UP NEXT...

3-in-1 Game Table. Like to play pool, table tennis or have fun with a train layout? Now you can enjoy all three pastimes on the same table. Turn the HO-gauge layout over and there's the tennis table; lift it off and there's a pool table, regulation size. Designed and built in PM's own shop. How-To begins next month.

Sugar-Plum House. Cardboard, candy and store cookies are the materials you use to build this novel Christmas centerpiece in Swiss chalet styling. You'll be surprised at its realism when you get it put together. Details and pictures in next month's PM show how it's made.

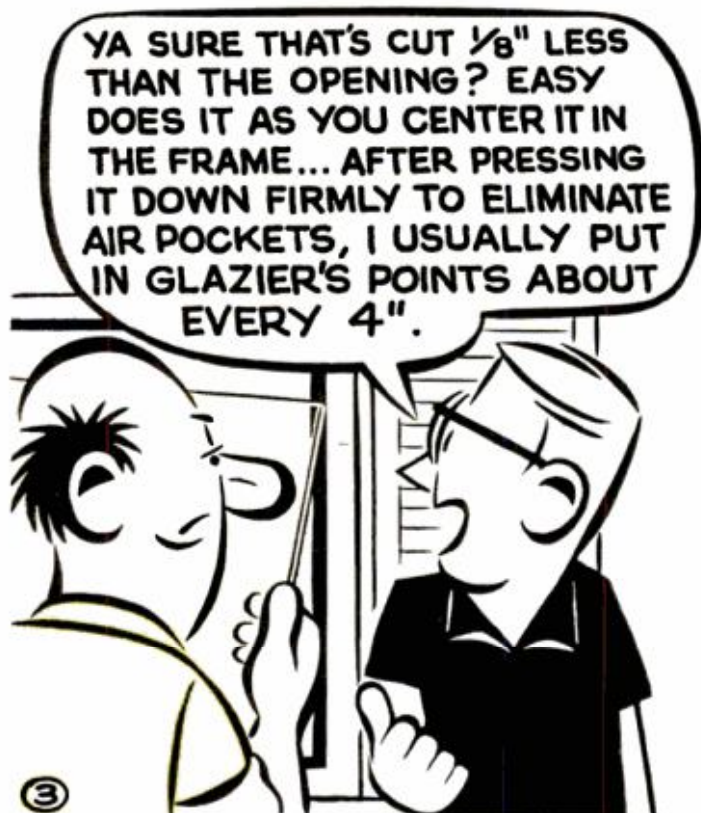
Vacuum Forming. Almost any small object, baby's shoes for example, can be enveloped in a plastic cocoon with this new kit. Suction from your vacuum cleaner causes a heated plastic sheet to snap down over the object, reproducing every detail of the surface. From this you can make a plaster cast, or use the vacuum-formed relief itself as a decoration. See next month's PM.

Spray With Air. You get a factory finish every time when you apply finishing materials with a spray gun or a pressurized spray container. Just aim the gun and pull the trigger, it's almost as simple as that. But there are tricks to know and that's what you'll find in an article on it next month.

MR. DO-IT AND BUNGLE



This month Bungle learns how to replace a broken window pane and plays a transparent trick on Mr. Do-It, his know-it-all neighbor



Toe-Touch Air System for Shop

By *Walter E. Burton*

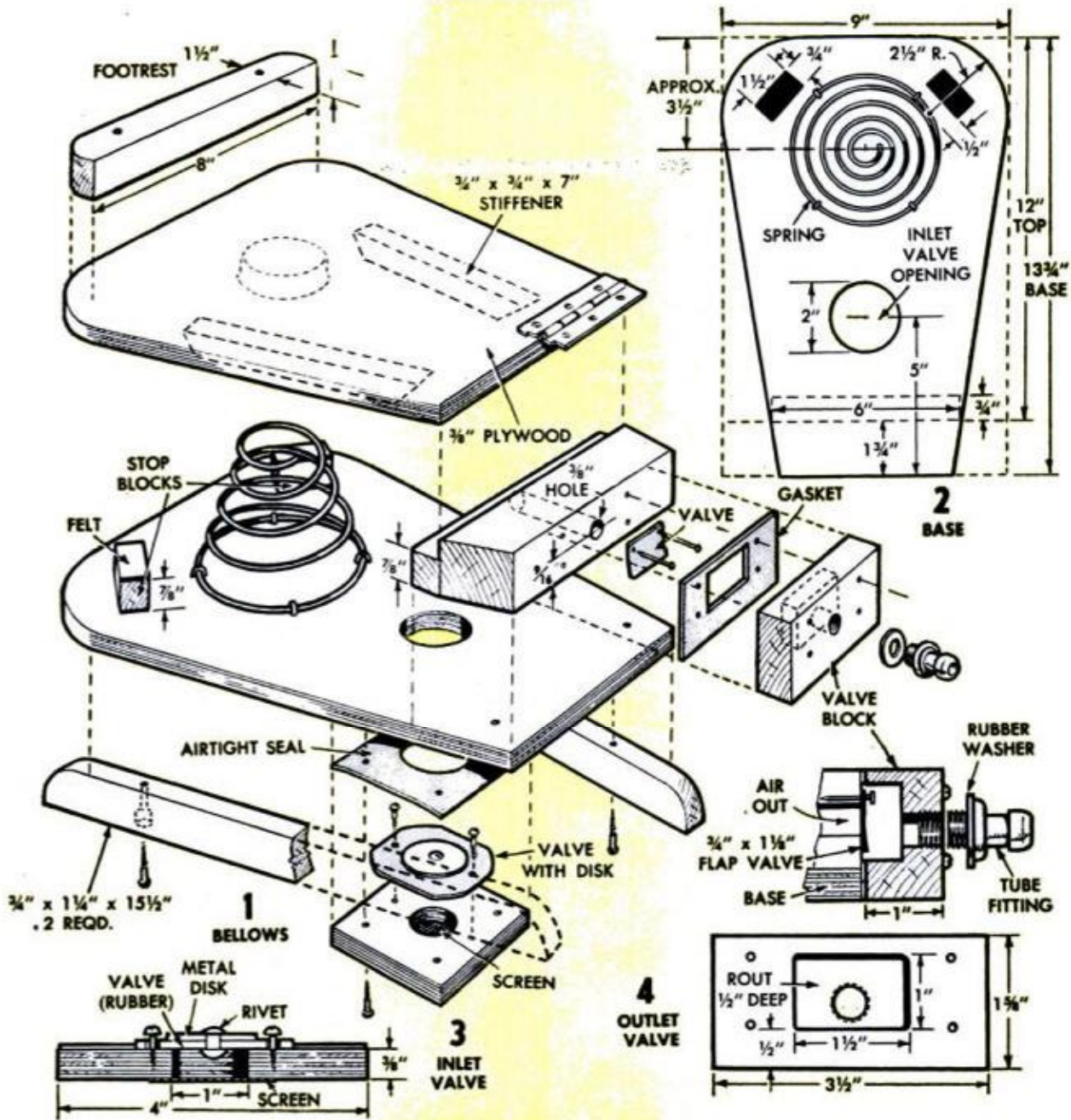
YOU'LL WONDER how you ever got along without this foot-bellows air system in your shop. It can be used to blow out mortises and clear chips while routing to pattern lines as in the photo at the left, to provide an air supply for a small forge, a blow-pipe, Bunsen burner, or any other job where comparatively low air pressure is required.

The bellows unit, Figs. 1 and 2, consists of two plywood panels hinged together with the space between them enclosed by a diaphragm. A coil spring holds the panels apart until they are forced together. The inlet valve, Fig. 3, is located in the bottom panel and allows air to enter the bellows chamber. The compression stroke closes this valve, forcing air through the outlet valve, Fig. 4, and carrying it to the expansion air chamber, Fig. 11.

After cutting and drilling the $\frac{3}{8}$ -in. plywood bellows panels, Figs. 5 and 6, and attaching the end piece, stop blocks, base strips or runners, spring pocket (a fruit jar lid) and spring, Fig. 7, the hinge can be installed. Use a length of piano hinge with a thin leather gasket underneath to prevent leakage of air.

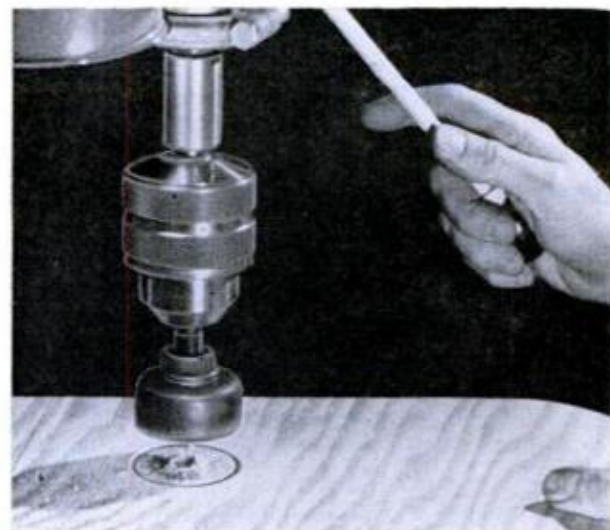
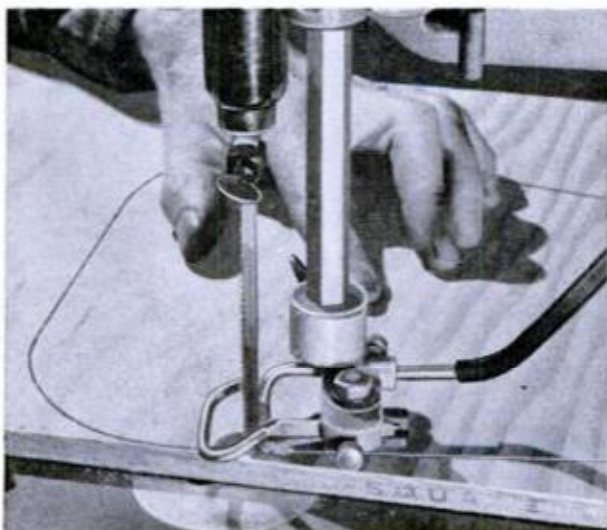
Cut the diaphragm from cloth-backed vinyl upholstery material or thin, pliable leather. It should enclose the bellows chamber completely with the spring slightly compressed, and is fastened in place with a double row of tacks and glue. Where there are

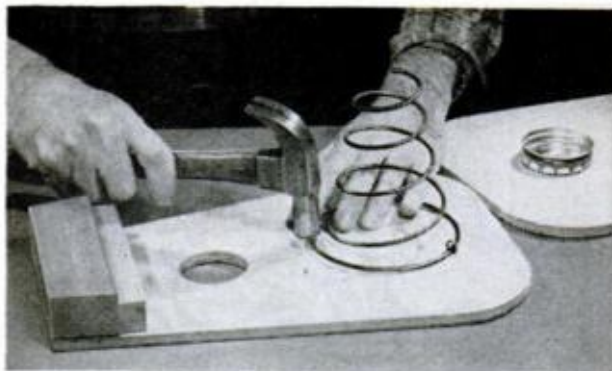




5. TOP AND BOTTOM panels are cut from $\frac{3}{8}$ -in. plywood with the top $1\frac{1}{4}$ in. shorter than the base

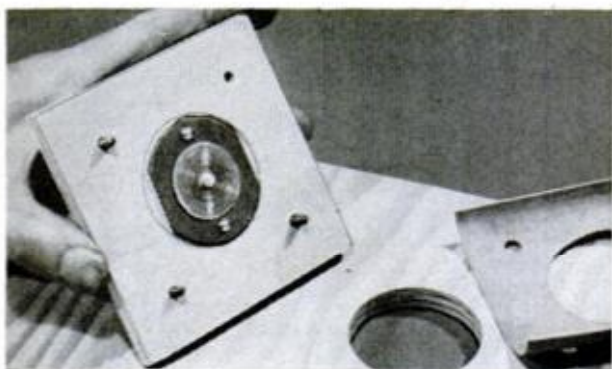
6. INLET VALVE OPENING drilled in bottom panel is only $\frac{1}{8}$ in. larger than the inlet valve itself





7. COIL SPRING which holds the two panels apart is fastened to the bottom panel with three staples. Jar lid at right serves as a pocket for this spring

8. INLET VALVE is mounted on a plywood block and can be removed. To make an airtight seal between the panel and valve block, a rubber gasket is used



9. WIRE SCREEN over the inlet valve opening will catch small objects which might otherwise be sucked up through the valve and into the bellows chamber

10. TEE CONNECTOR on the rubber air chamber is made from a valve cap and a piece of copper tubing. Syringe tubing connects the chamber to the bellows



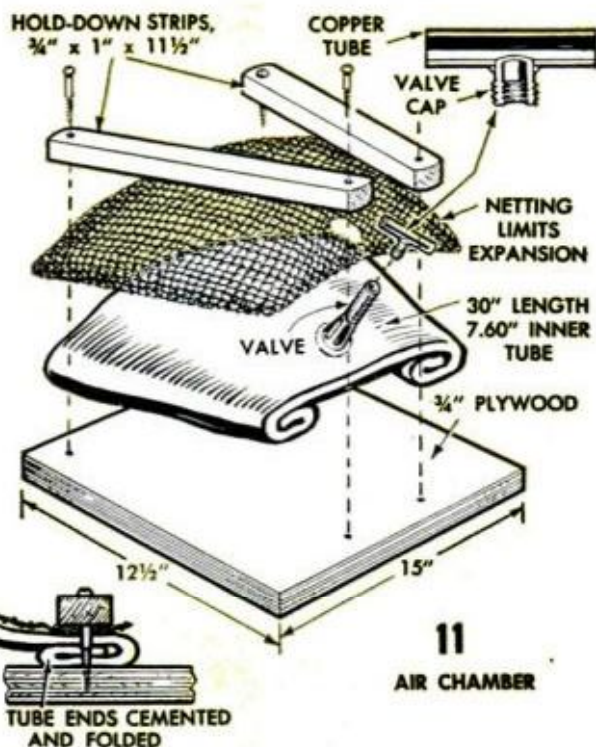
pleats at corners, split them and overlap.

The inlet valve is mounted on a 4 x 4-in. square plywood block, Figs. 8 and 9, so it can be removed if necessary. Cut a 1 7/8-in. disk from a leftover piece of inner tube. Punch two holes in this disk for 3/8-in. No. 4 round-headed wood screws, making the holes slightly oversize but smaller than the screw heads. Let the screw heads project about 1/16 in. above the rubber. Rivet an aluminum disk in the center to prevent the rubber piece from being forced into the valve opening.

The outlet valve is simply a flap of the same rubber fitted over the 3/8-in. hole in the end piece. Install a metal or plastic fitting for syringe tubing in the valve block, and attach the block to the end piece, using a rubber gasket.

The air chamber, Figs. 10 and 11, is made from a section of inner tube which is sound for about 15 in. each way from the valve, measured along the outer circumference. Seal the ends with the cement used in repairing inner tubes, position it with the valve uppermost on the inner edge and fold each end under twice so that the length at the outer edge is about 14 1/2 in. Cover with netting (that cut from an open-mesh sack will do) and clamp the chamber to the base board with two wooden strips. Netting should allow about 1/2 to 1 in. upward movement of the top of the tube with the chamber fully inflated.

To make the tee connector, cut the top off a tire-valve cap, file it concave to fit against a 5/16-in. brass or copper tube, drill a 3/16-in. hole in a 2-in. piece of this tube and solder the cap over the hole. ★ ★ ★





Roofed Bunks Shelter Feed and Livestock

Wide overhangs of this flat roof provide shelter for cattle and prevent feed losses during stormy weather. In summer the flat roof provides full shade and the open construction permits air circulation and admits a cooling breeze from any direction. The advantages of the flat-roofed structure are economy of construction over any conventional gable-roofed shelter, a new look in feedlot architecture and high wind resistance.

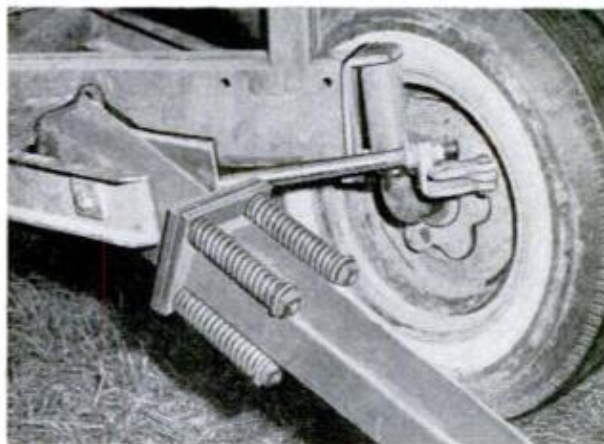
Notice that the feed bunks are integral with the structure itself, are not separate

units. The roof is supported solely by posts of uniform size which are set at an angle of about 15 degrees from the vertical. Each pair of posts supports a beam which carries the horizontal rafters. Stretchers carrying the feed bunks are attached to the posts near the lower ends. Additional bunk supports are spaced halfway between the posts. When available, used telephone poles are just the thing for the supporting posts. They are already pressure treated. Conventional materials are used for the balance of the construction.—C. F. Marley

Drawbar Stabilizer

This compression-spring stabilizer prevents springing a trailer drawbar when making a sharp turn; it also eases out the slack when starting heavily loaded trailers hooked in tandem. The drawbar is flamecut at the point indicated and two ½-in. steel plates are welded to the ends. The plates are then drilled near the corners for ½-in. bolts which join the plates and also serve as carriers for the heavy compression coil springs which take starting shocks and prevent springing of the drawbar.

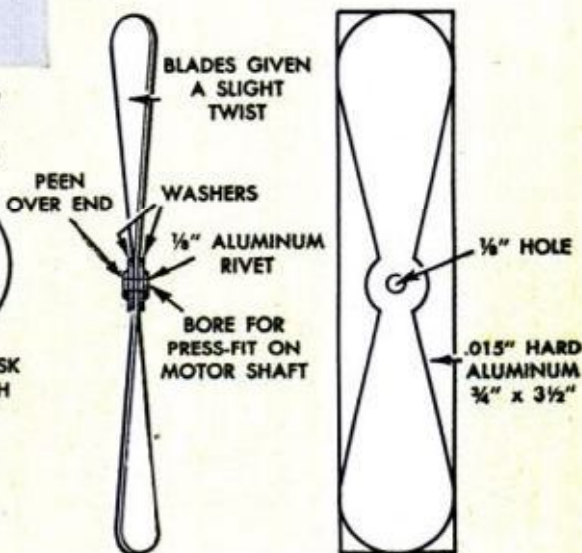
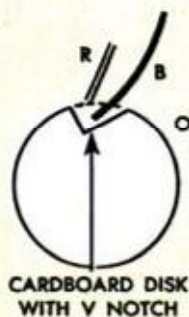
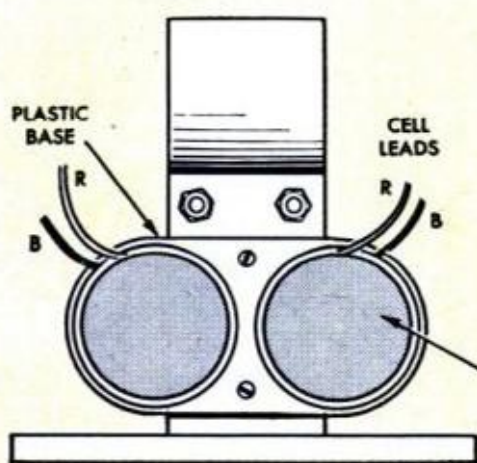
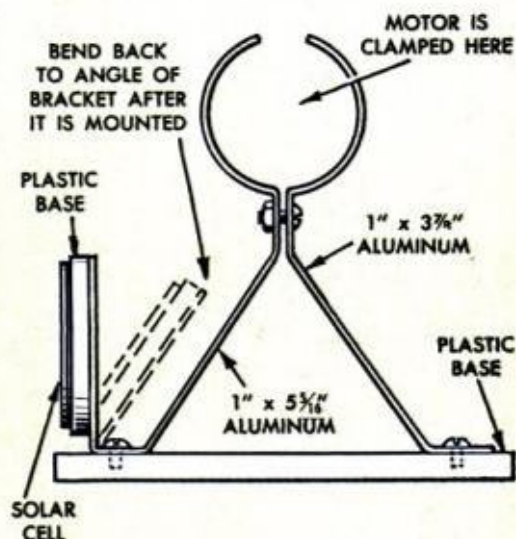
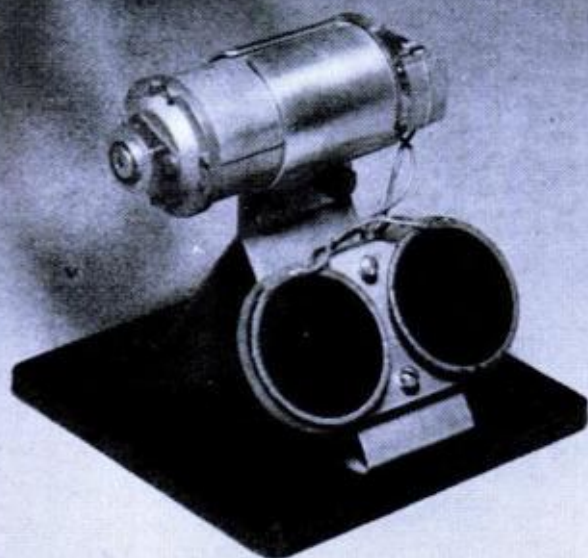
—A. M. Wettach



Self-Feeder Gets Lift

Conventional hog feeders can be utilized as cattle feeders for special rations and supplements by raising the feeder on an angle-steel stand as pictured. If it is necessary to move the feeder at any time during its period of service, then the stand should be fitted with hardwood skids. Steel feeders of the type pictured are waterproof, keep feeds and rations dry in all kinds of weather. Cattle quickly learn to lift the hinged lids.—Paul D. Andre





Light Powers This Electric Motor

By Harold P. Strand

JUST SET this tiny motor in direct sunlight or under your reading lamp and away it goes. Powered by two series-connected silicon solar cells as a light battery, the motor drives a propeller attached to its shaft at high speed when placed either in bright sunlight or artificial light. The solar battery which is the power source develops a maximum of about 1 volt and around 100 milliamperes. This is sufficient to operate the motor. Since the solar cells last indefinitely there is no power loss from continued use as there is with batteries. The motor is ball-bearing and is equipped with special low-resistance, low-friction brushes which are replaceable if required.

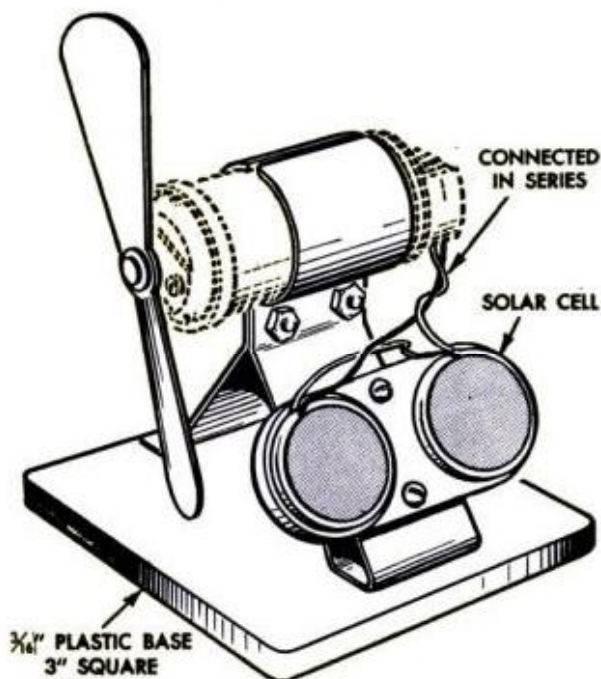
It can be built easily from a kit and will interest schools, teachers, students and

electrical experimenters since it teaches the principles of the direct conversion of light to electricity. When you experiment with this motor and kit, you will be working with the same type of solar energy that is used with our satellites to power their transmitters and other vital instruments. In addition to its educational value it makes a most interesting conversation piece on a desk where visitors are sure to marvel at the operating motor powered solely by light.

The base consists of a piece of black 3/16-in. plastic for good appearance, but, of course, a base of hard wood can be substituted if desired. Two aluminum bracket pieces are bent as detailed to form a support for the motor. An extended tab on one of the brackets supports the solar battery.

The latter consist of two No. 2-A Hoffman silicon cells mounted on a piece of $\frac{1}{8}$ -in. plastic as a base. The cells are connected in series or the black lead of one cell is connected to the red of the next one, see R and B leads in detail, the splice soldered and a small piece of spaghetti tubing slipped over the splice to insulate it. The base is attached to the support with two 2-56 screws. The remaining cell leads are then connected to the motor leads in a similar manner and the insulated splices turned down back of the cells. The notched disk detailed serves as a spacer for the back lead from each cell.

The motor is secured in the cradle type



brackets with two 4-40 screws and nuts to hold it firmly in place, placing the motor in position so that the propeller will clear the cells when turning. The propeller is made from a piece of thin aluminum with a short aluminum rivet and two washers headed over in a center hole as a hub. A center hole is made in the hub to be a tight press fit on the motor shaft. Twist the blades slightly in opposite directions.

MATERIALS LIST

- 1 piece black Lucite plastic $\frac{3}{16}$ " x 3" x 3", (base)
- 1 piece half-hard sheet aluminum about .032"-.033" x 1" x $3\frac{3}{8}$ ", (bracket)
- 1 piece same stock 5-5/16" long, (bracket)
- 1 piece half hard or $\frac{3}{4}$ " hard sheet aluminum about .015"-.016" x $\frac{3}{4}$ " x $3\frac{1}{2}$ ", (fan)
- 1 aluminum low-head rivet $\frac{1}{8}$ " diameter, $\frac{1}{8}$ " long, (fan)
- 2 washers about $\frac{5}{16}$ " O.D., $\frac{1}{8}$ " hole, about .030"-.032" thick.
- 2 Hoffman 2-A silicon solar cells with attached leads.
- 1 piece Lucite clear plastic $\frac{1}{4}$ " x $1\text{-}5/32$ " x $2\text{-}5/16$ ", (cell base)
- 1 Aristo-Rev #2 ball bearing motor.
- 4 4-40 round head screws $\frac{3}{16}$ " long. 2 4-40 nuts.
- 2 2-56 round head screws $\frac{3}{16}$ " long.

Complete kit or parts can be purchased from Linwood Products Co., Pox 186, Wollaston 70, Mass. for \$27.50 postpaid.

SHOP SHORT CUTS



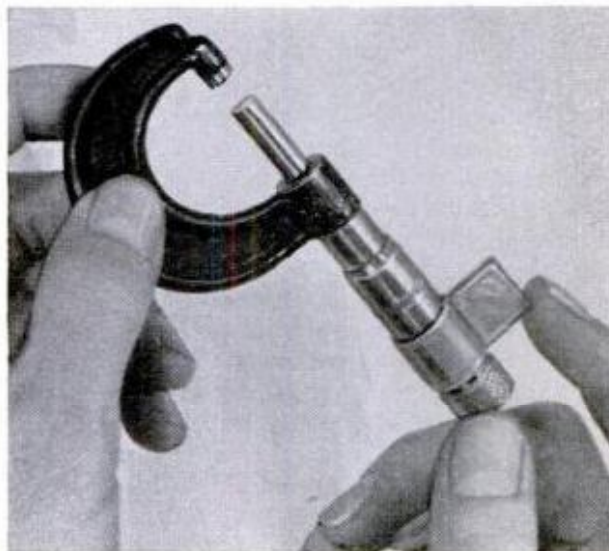
Low-Cost Pipe Centers

Small shops can save money by making this substitute for lathe pipe centers. Turn down a 60-degree center from cold-rolled steel then bore a 60-degree recess on the opposite face to take the point of the tailstock center in a snug fit.—Arthur Shults

Friction Ratchet for "Mike"

A sheet-metal collar with the ends forming a finger grip will give a delicate ratchet action to nonratchet mikes. Bend the strip around the knurled thimble. Bend the ends out to form a grip. In use, apply finger pressure until the collar slips.

—Richard Hanscom



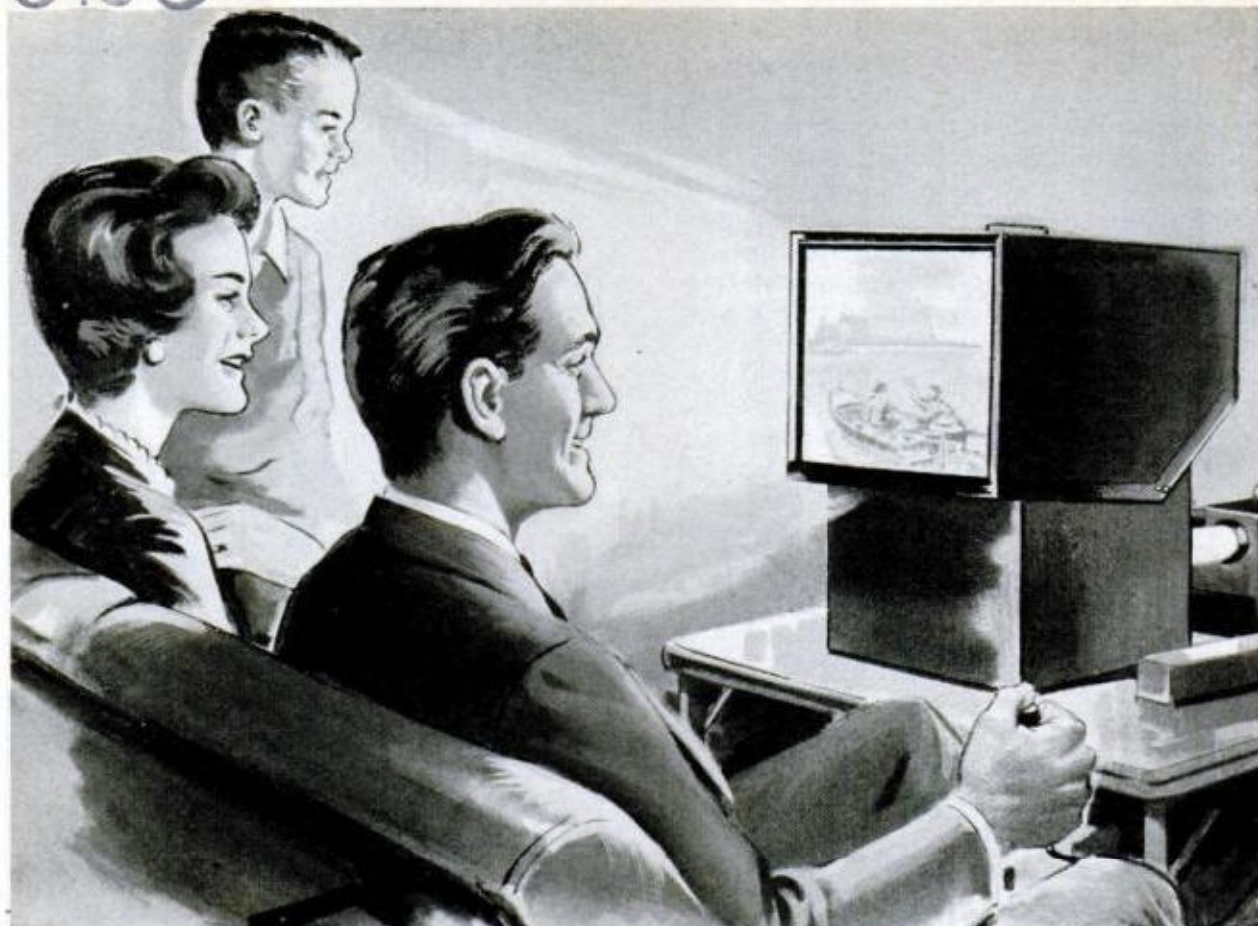
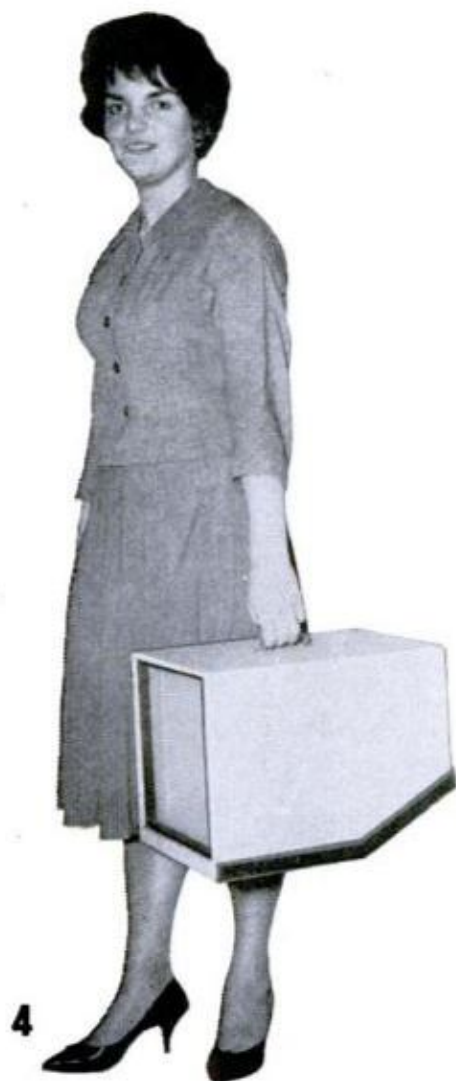
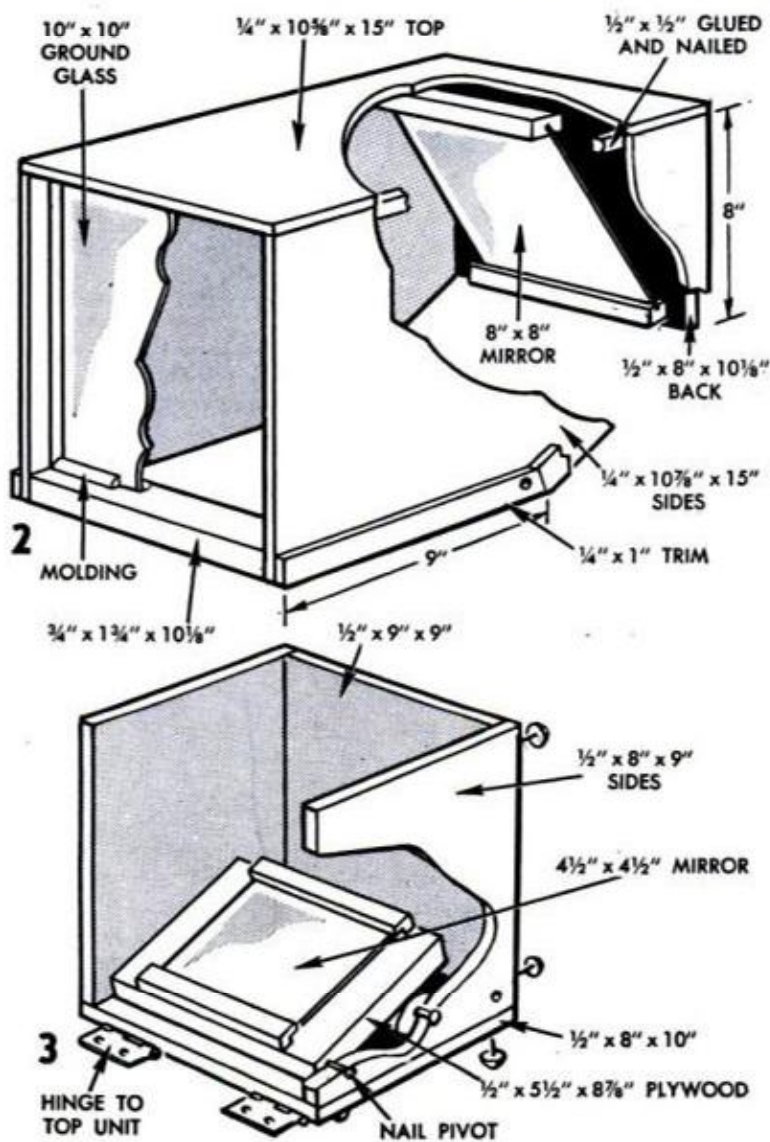
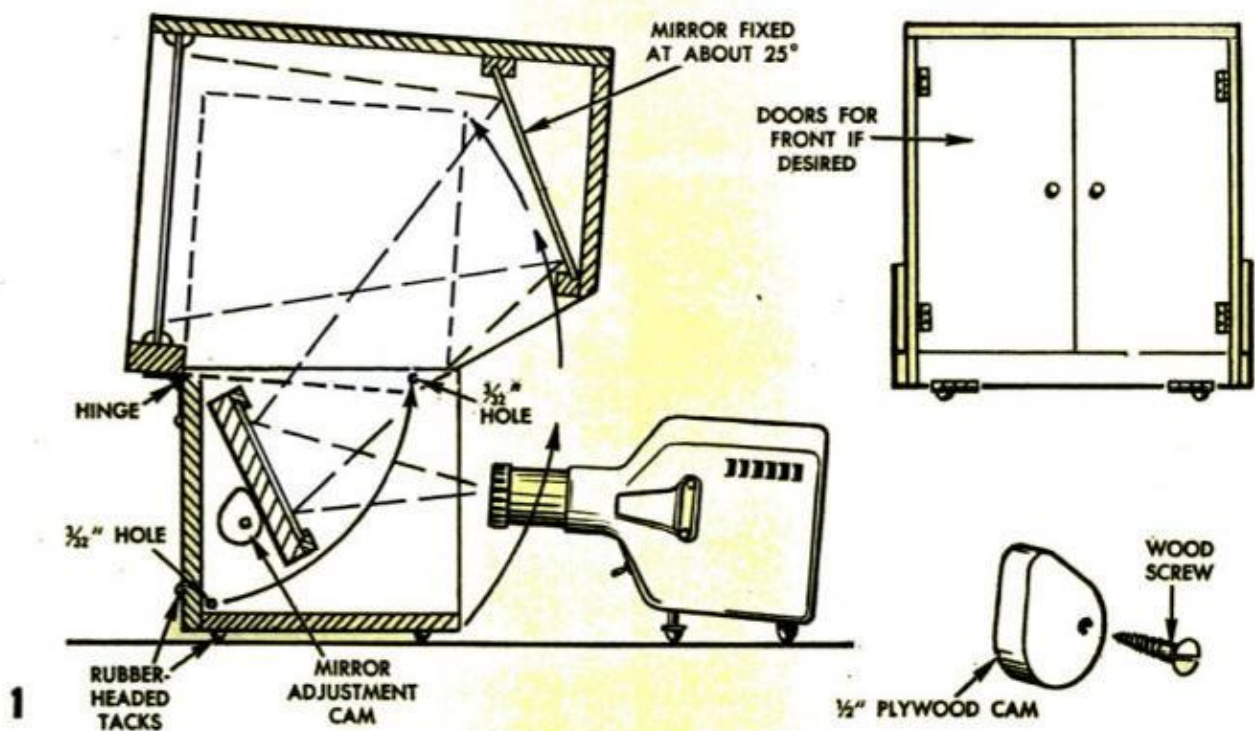


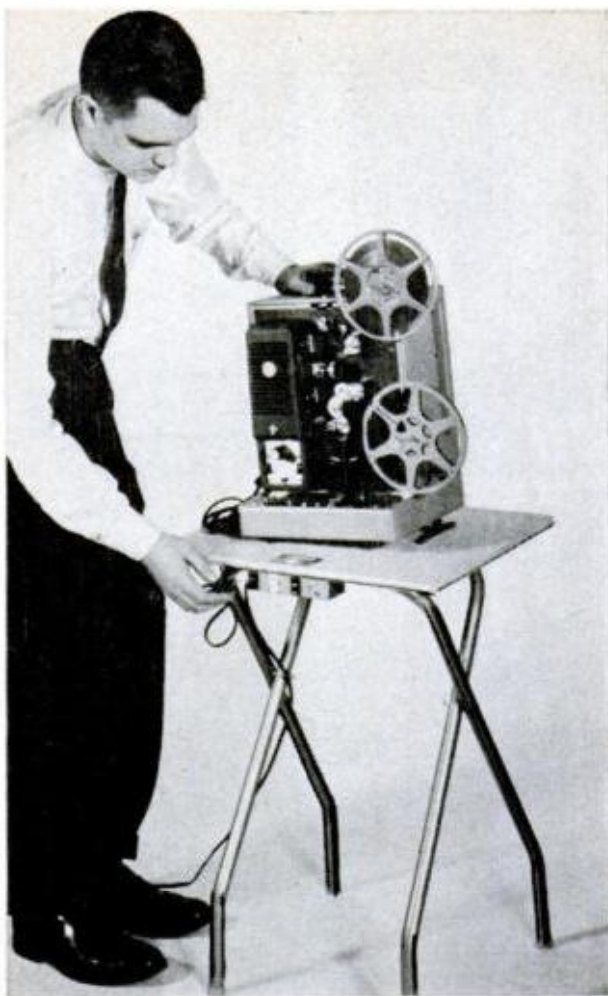
Table-Top Slide Viewer

WITH THIS VIEWER you watch slides projected on a screen which gives a TV-like image in daytime brightness without the bother of drawing the shades and setting up a conventional viewing screen. The viewer is a simple tote box with storage room for the projector. When the show is over, place the projector inside, fold the box and carry the whole thing just as you would a suitcase or a portable typewriter. The main reason for its compactness is that directional reflections of the image by mirrors reduces the distance between the projector lens and the screen to inches.

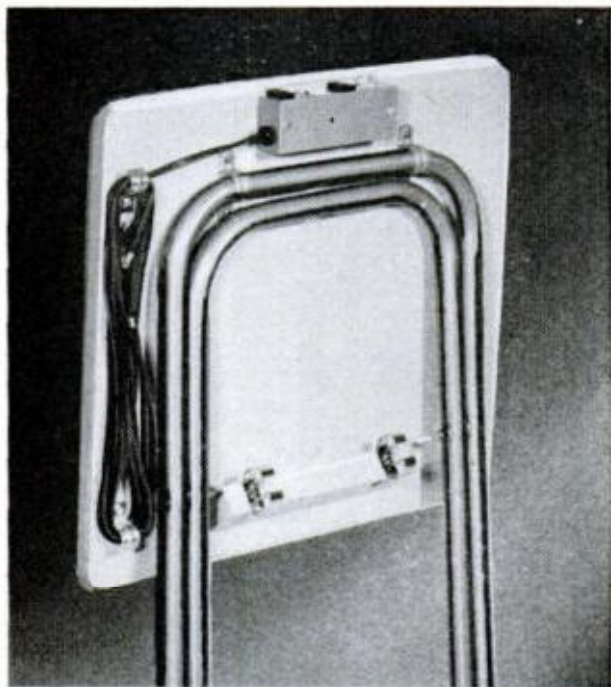
Top and sides of the upper section are made of plywood reinforced at the corners with $\frac{1}{2}$ -in. square strips. The mirror in this unit is fixed in grooved strips after the angle is determined through trial and error. Then the case is covered with a plastic material which is cemented on. Attach trim to the sides with cement and brads, clinching the points if they protrude. Screen can be opal or ground glass held in place matte side out with $\frac{1}{4}$ -in. molding on each side and placed 1 in. in from the front.

Lower box is all plywood construction with the mirror cleated to a tilting base which pivots on 1-in. brads through each side. A mirror-adjustment cam is screwed to one side. It also supports the mirror at the desired angle after the picture is located on the screen. The mirror is swung away from the cam when packing the projector, wire cord and slides for travel. The two boxes are hinged together with $1\frac{1}{2}$ -in. butt hinges and then placed on a table. Then, using a slide and projector, it's easy to determine the best angle for viewing the screen image. Drill a $\frac{3}{16}$ -in. hole through one side of both boxes about $\frac{3}{4}$ in. from the lower edge of the trim. You insert a snug-fitting nail in the hole to hold the viewer in the open position. Now close the viewer so the lower box is inside the upper one. Insert the drill through the same hole in the outer box and drill a new hole into the side of the inner one. By inserting the nail while in this position the viewer is held closed for carrying. Coat the inside of both boxes with flat-black paint, and attach a carrying handle.—*Ralph S. Wilkes*





FOR SHUTTERBUGS



PREMIER FOLD-AWAY projection stand is easy to carry and stores compactly. Besides built-in outlet for projector, plus two additional switch-controlled outlets for room lights or accessories, there's a light for indentifying slides. Cord stores on underside as shown above. Legs come in gray enamel, chrome or brass finish, wood top has black-and-gray fleck finish. The projection table retails at \$21.50 from Premier Materials Co., 3717 N. Halsted St., Chicago 13



EXPOSURE METER package combines the Golden Crown meter, PR-3, with incident-type attachment. With attachment in place, meter gives incident light readings. Many photographers prefer reflected-light method for outdoor work and incident-light method for indoor work. This attachment gives them a choice. Made by General Electric Co., Schenectady 5, N.Y.



KODAK AUTOMATIC 8 movie camera is fully automatic in operation. Turn the cover latch to "open" and the cover pops up. When cover is locked, the footage indicator is reset. Light indicator, visible in viewfinder, tells when there's insufficient light for shooting. A built-in filter permits the rapid shifting from indoor to outdoor use; arrow in viewfinder indicates filter position. There's even a light-bar receptacle on top of the camera to hold floodlights. Camera is priced at less than \$50. Made by the Eastman Kodak Co., Rochester 4, N.Y.

Spares in Hand

Remember that time when a second flash exposure could have been the clincher but you weren't quite fast enough because there was no spare bulb handy? Next time, insert the bases of one or two extra midget bulbs between the fingers of your left hand when you're getting ready to shoot an action shot. Then you'll be ready for a quick second try just in case.—*H. J. Kennard*

Using a changing bag for reloading film holders is an awkward job, especially when it must be done on a car seat. You can make this a lot easier by inserting a long, narrow cardboard box with an open side in the bag. Have the opening facing the sleeves and it will serve as a form to give you an unobstructed working area.

Ribbed-Bottom Stand-Ins

When you're planning a temporary dark-room or when you need a quick replacement developing tray keep in mind that the ribbed-bottom glass trays supplied with refrigerators are a substitute for the regular thing. The deeply ribbed bottom is a definite advantage in uniform processing and more especially so when working with cut film or film packs.

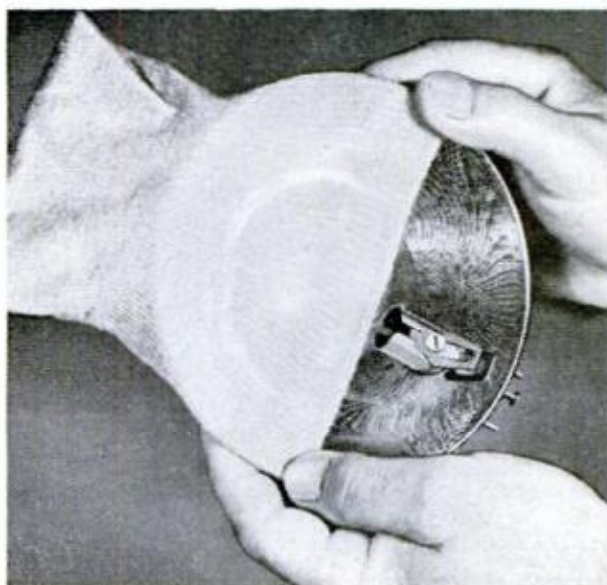
Floating photo thermometer gives instant temperature readings. Use one of the glass-encased type and insert it through a snug-fitting hole of a cork fishing float available in bait shops. This is easily fitted by reaming the hole with a rat-tail file.

Reflector Protector

You've had it happen—a good reflector almost ruined by the scratches and scores on the polished surface that can result when reflectors are placed in the camera case along with other gear. Cut the top from a discarded man's stretchie sock, stitch across the cut end to close it, turn inside out and pull over the reflector.

—*Bil Toman*

Shock-absorbing pad for a tripod head made of $\frac{1}{8}$ -in. polyester urethane foam is not as likely to shred as foam rubber. Cut it to the pattern of the head and it will cushion vibration for sharper pictures. Available at most rubber product stores.



RADIO TV HI-FI

~~~~~ ELECTRONICS ~~~~~

## Stereo



## Super-Sorter

WHILE THE front switch on your amplifier is used to single out the various inputs, all inputs are either high level (tuner, ceramic, TV) or low level (mag. phono, tape, dynamic mike). The avid hi-fi fan soon finds all his jacks filled with plugs and the convenience outlet at the floor a rat's nest of a.c. wires.

To add new equipment, even temporarily, you must unplug something to plug in something else. With this super-sorter, however, you can effectively add six additional inputs to your amplifier and yet, much to the satisfaction of the vacuum cleaning hausfrau, only one wire—the one

from the sorter — connects to the outlet.

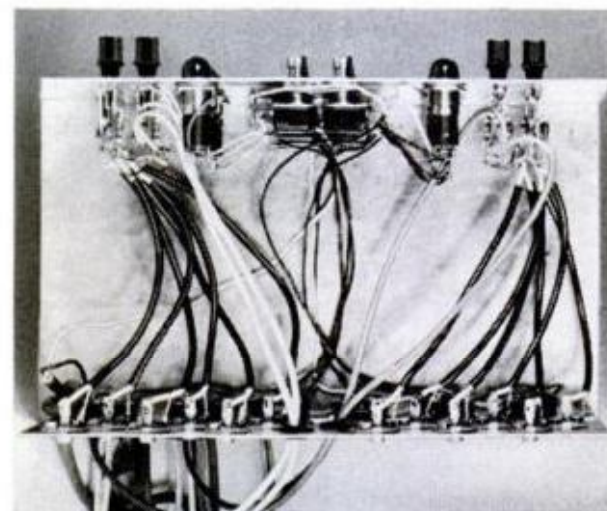
If, for example, you want the amplifier turned on, press the AMP button on the sorter. Power is delivered to the amplifier and a neon lamp on the front of the sorter confirms the fact. The FM tuner has its own switch and pilot lamp, as do the other major components of your system.

The Sorter provides stereo inputs for three more high-level and three low-level inputs, selected by the toggles on the sorter's panel. You can phase these to stereo, stereo reverse or mono. Another switch permits you to use reverb either for playback or for recording too!—Byron G. Wells

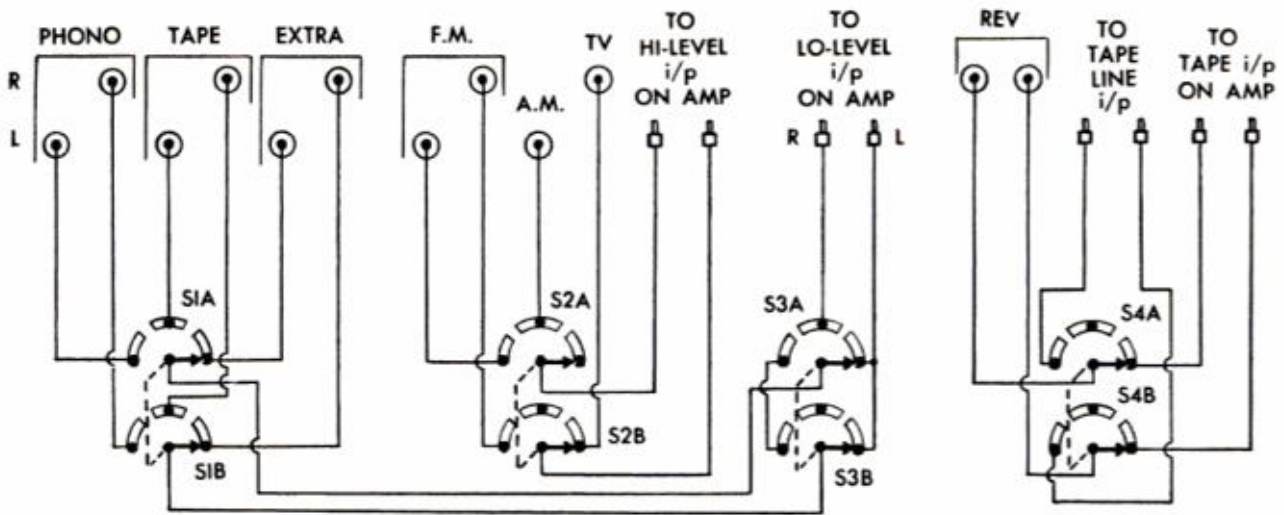
**PLUGS AND CABLES** appear at rear of unit. Jacks provide various inputs, cables high and low outputs



**POWER WIRING** is placed first, audio wiring added afterwards to avoid possible pickup of a.c. hum

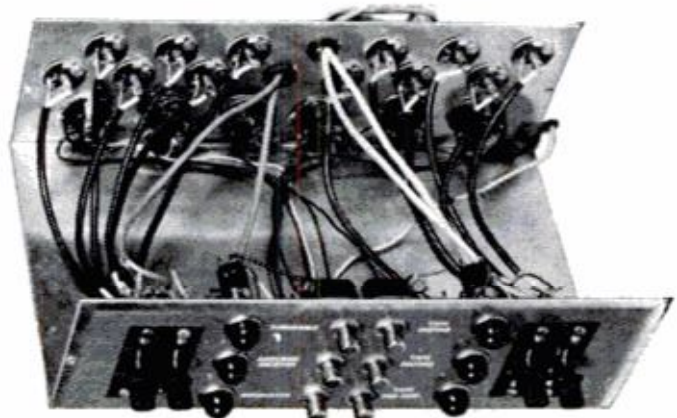




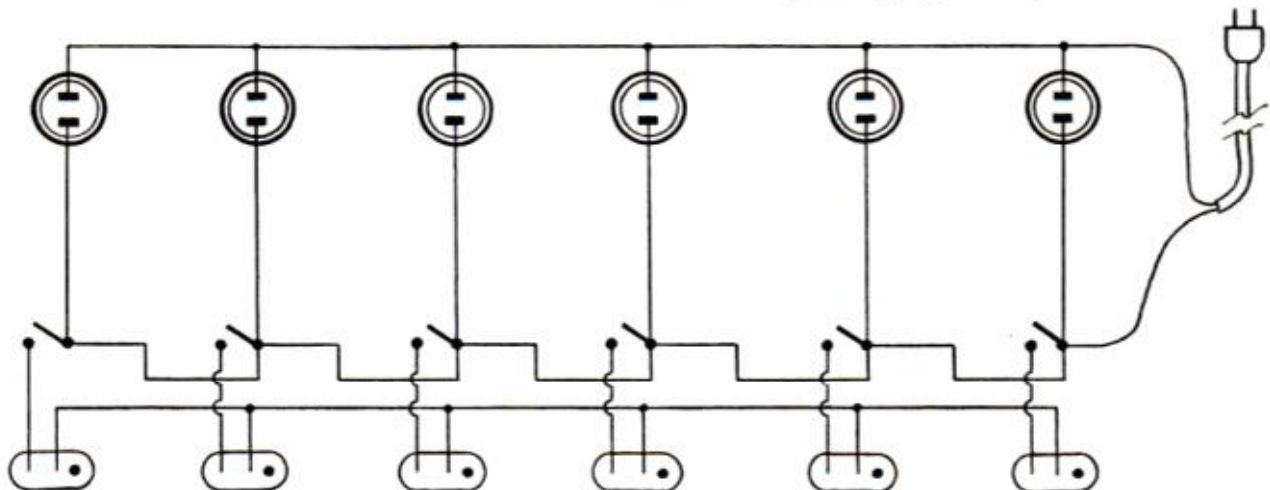
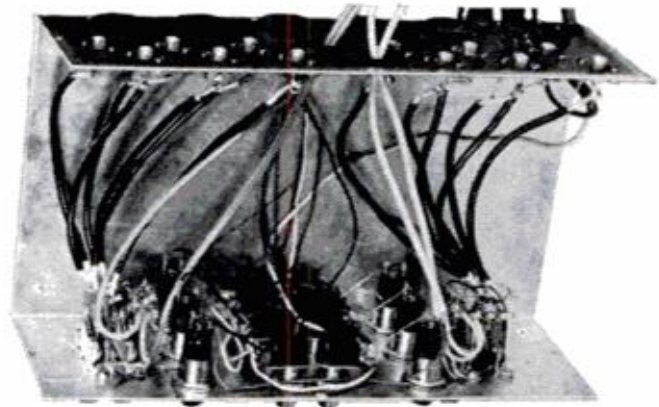


STEREO HI FI SUPER SORTER — SIGNAL WIRING SCHEMATIC

**SIGNAL WIRING DIAGRAM** is shown above. A group of 3 position lever switches are used on each side, one to select the desired input, another to provide single channel reverse or stereo outputs. The third switch selects one of three low level inputs and the last lever switch permits you to use reverberation either on record OR playback. System permits you to change components that require similar inputs with no connecting and disconnecting of rear plugs



**POWER WIRING DIAGRAM** below illustrates the method for wiring the power circuits. Flush-mounted a.c. receptacles are connected to push-button switches on the front panel. These are also wired to NE-51-H neon lamps which indicate which outlets are activated. All component line cords can now be plugged into super-sorter and only one cord (from the sorter) goes to outlet. This eliminates the objectionable (and dangerous) rat's-nest/cube-tap mess

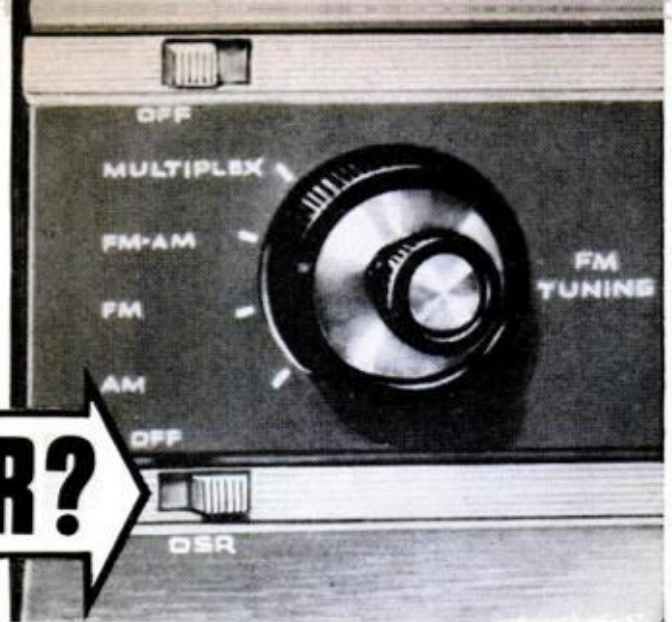


STEREO HI FI SUPER SORTER — A.C. SWITCHING



# For Better FM Reception

## Do You Need DSR?



LET'S SAY you've been looking at FM tuners or receivers with an eye to buying one. On some, you see a switch marked DSR. Other units don't show this. What is the DSR switch for and how important is it to you as an FM listener? Also, does it make the tuner or receiver more costly?

DSR allows an FM receiver to compensate for that nemesis of studio engineers, called "overmodulation distortion." FM receivers have an intermediate frequency range of 150 kc. The transmitter is not supposed to pass a signal which spreads more than 150 kc. However, loud passages in transmitted music sometimes cause the signal to spread beyond the 150 kc. limit with the result that the receiver is unable to pass them and distortion results. To compensate for this, it would at first appear that the solution would lie in wider i.f. circuits for the receivers. However, this would create more problems than it solves, as such receivers are more costly to build, and a sacrifice of selectivity would also be made.

**STREAM OF WATER** pouring into neck of bottle simulates an FM signal in i.f. section. Increased pressure causes stream to widen, water splashes out of bottle and stream is distorted, like overmodulated signal "squeezing" through i.f. section of receiver



With the addition of DSR, the i.f. strip is made to "widen" only when overmodulated signals appear. This benefit is obtained with no appreciable cost increase, and no sacrifice of selectivity. A unit with DSR will cost no more than a unit without it.

Another problem that DSR helps to solve is the depreciation of fringe area reception. To combat this evil, many attempts have been made in the general direction of super fringe area antennas and electronic pre-amplifiers, called boosters.

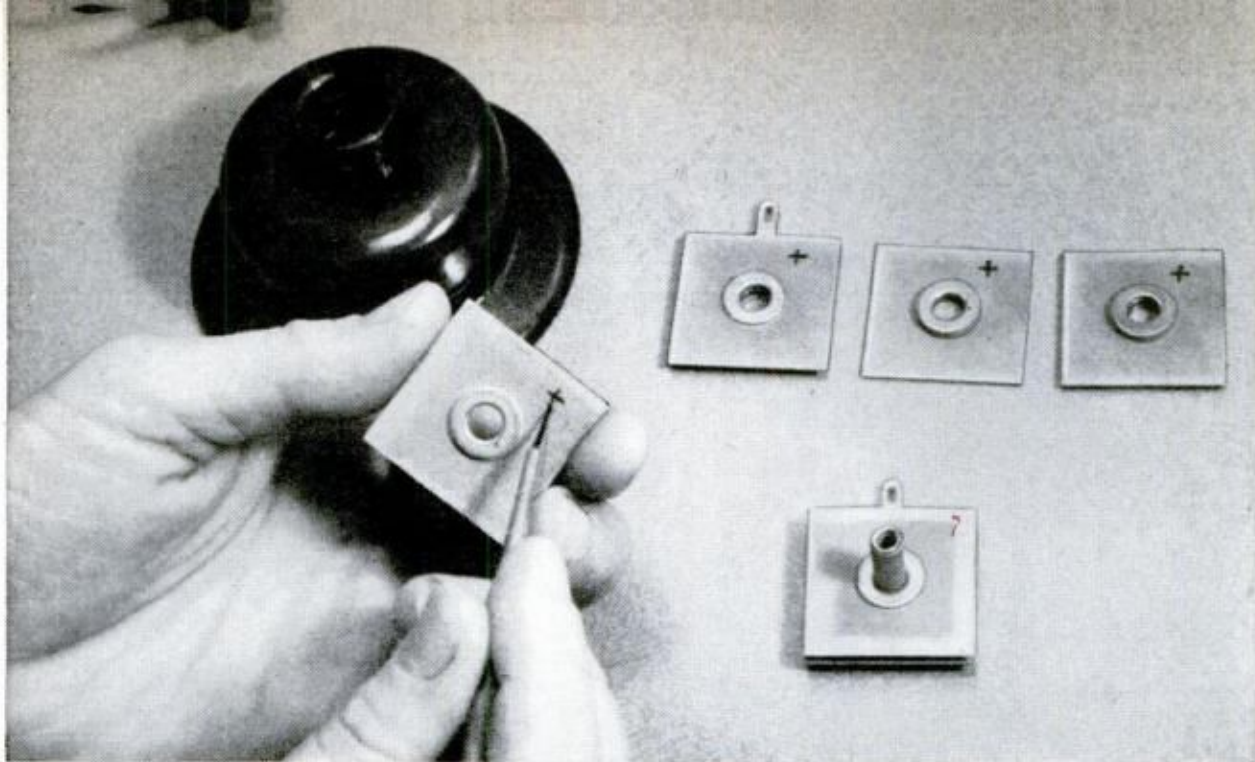
By reducing the frequency shift of the station signal, the music is passed cleanly through the i.f. section of the receiver. DSR extends the useful range of the receiver as it "cleans up" many signals which would be too weak to hear without distortion.

While DSR is relatively new, there are several sets available on the market which do feature DSR. With the advent of multiplex, stability in FM receivers will be even more important, and DSR should provide all that is needed.—D. F. Harvey

**IMAGINARY FUNNEL** inserted into neck of bottle represents DSR action. When stream widens momentarily funnel expands to accommodate entire stream. Funnel returns to normal size when stream returns to normal. DSR expands i.f. section on wide signals







**WHEN DISASSEMBLING** rectifier plates first mark the positive side of each plate lightly with ink or paint so as to avoid error when reassembling. Be careful not to remove the washer attached to the positive

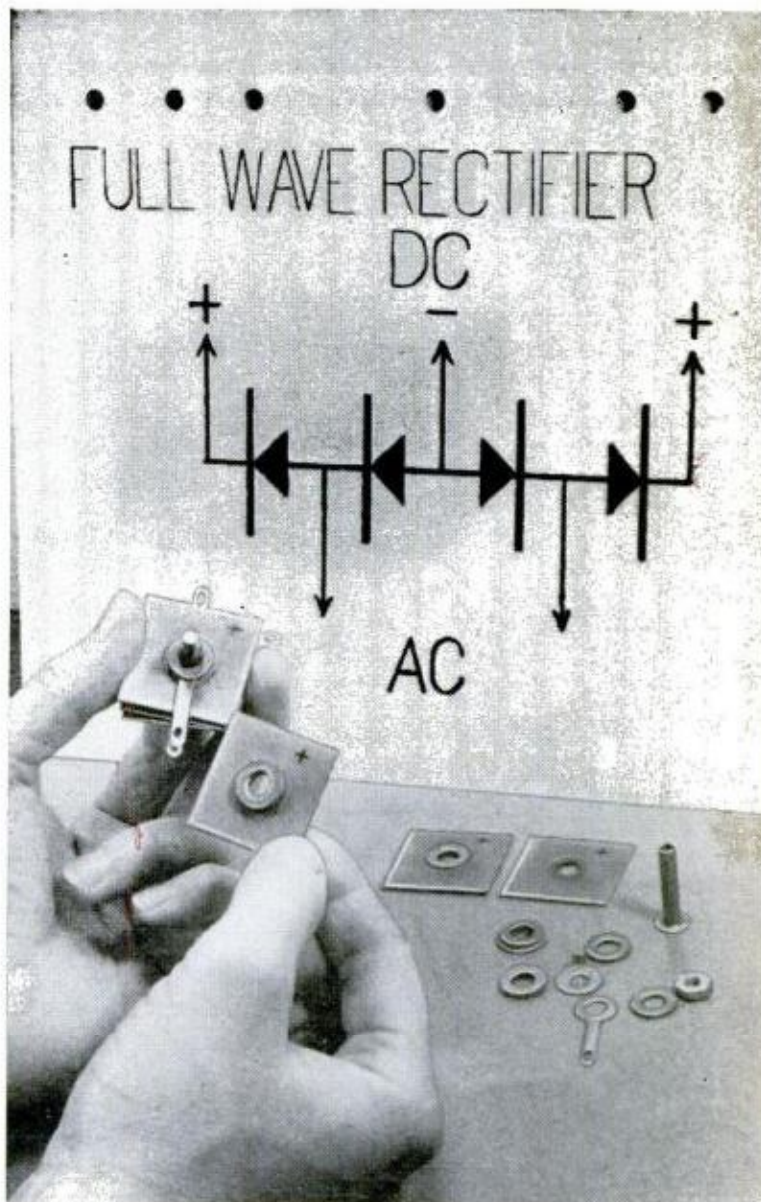
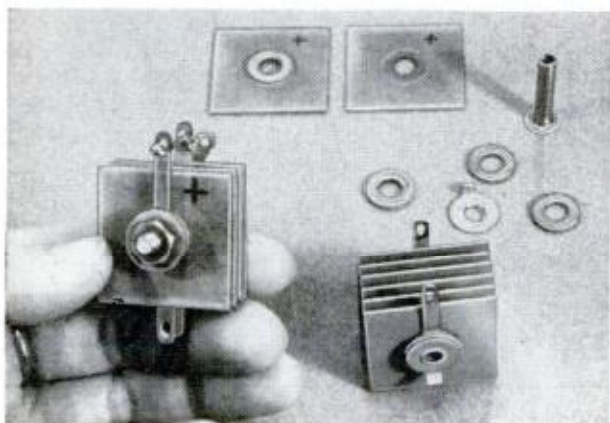
## Converting a Half-Wave Rectifier to Full-Wave

If you need a full-wave rectifier for an experimental circuit (say a battery charger or power pack) and have only half-wave units in the catch-all box, these can be converted to full-wave easily.

Remove the plates from the hollow brass rivet by drilling one end off the rivet. Avoid scratching the positive surfaces.

Insert a screw in the fiber tube on which the plates were mounted and reassemble the plates as in the diagram. Add three additional solder lugs between the plates ( $\frac{1}{4}$ -inch washer  $1\frac{1}{2}$ -inch tongue). Use a lock washer and nut on the screw after the plates are in place. You can double the current capacity by using two plates between taps.—*Robert Micals*

**ASSEMBLE ACCORDING TO DIAGRAM** (right). Be sure plates face right direction. New rectifier (below) shown on left. Note jumper soldered to two positives

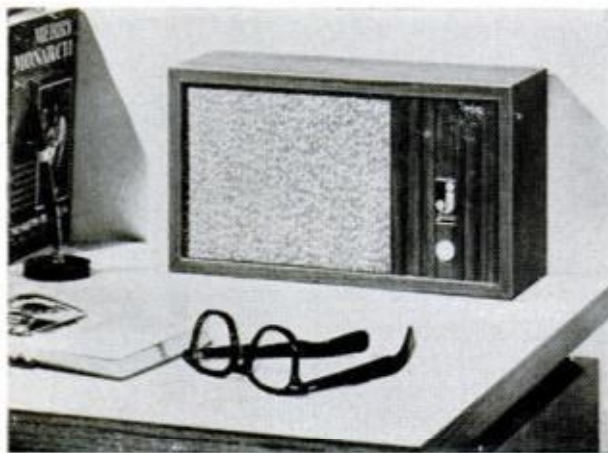






## Battery Charger-Eliminator

When the nine-volt battery in your transistor radio runs down, connect the battery to the matching terminals on this unit and plug the cord into a wall outlet. In a short time, the battery is recharged and ready for use again. If you prefer to do away with the bother of batteries, connect the terminals to the radio, and use the unit as a battery eliminator. \$4, P. A. Brown, 54 Ruxton Road, Great Neck, New York



## Hi-Fi In Miniature

New ultra-compact two-way loudspeaker system boasts less than one-sixth the bulk of regular bookshelf speaker system. Utilizes miniature long-travel woofer, mass loaded and precisely matched to enclosure for improved bass response. Three-inch direct radiator tweeter provides excellent high-frequency response. Unit can be used as extension speakers through house, adjusting remote volume with small front panel volume control. System matches 4, 8 or 16-ohm amplifiers, provides six watts. Measures  $4\frac{5}{8} \times 7\frac{1}{4} \times 13$ . \$29.75, Jensen Mfg. Co., 6601 S. Laramie, Chicago.



## FM-AM Hi-Fi Portable

All-American manufactured transistor portable tunes both AM and FM bands. Unit has five-inch alnico speaker mounted with front-loaded bass port for good low-frequency reproduction. Has nine transistors plus five diodes, operates on six flashlight cells which provide over 300 hours of operation. Antenna collapses into case when not in use, extends a full 33 inches for reception of weak or distant stations. On-Off switch also selects either FM or AM, is independent of tone and volume controls, eliminating need to reset these each time set is turned on. \$79.95, Kinematix, Inc., 1616 N. Damen, Chicago, Ill.



## All-Band Receiver

Whether your taste runs to FM, AM or the novelty of short wave, this table-top receiver pulls the stations in and keeps the noise out. Built-in antennas, exact tuning indicators and "voice" or "music" switch to aid the tone control make for a versatile instrument. The versatility of this radio is increased by the rear panel jacks which allow for plugging in phono or tape. A front panel switch then allows you to select these accessories, eliminating the need for unplugging when they are not used. Short wave bands cover police, foreign and amateur as well. \$149.95, Majestic International, 743 N. LaSalle, Chicago, Ill.



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Special Retail Price: **\$49.50**

Most powerful 6½" saw you can buy. Fast, effortless cutting—rated at 10 amps. Has 1½ hp motor. Diss-chrome blade makes 2⅜" cut at 90°; 1⅜" cut at 45°. Has "Life Saver" detachable plug.

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and plastic. Handsaw-type handle, "Life Saver" detachable lock-in plug; "Orbite" blade action prevents drag and back-cut. 2.75 amps, 3600 strokes per minute. Depth of cut: 3".

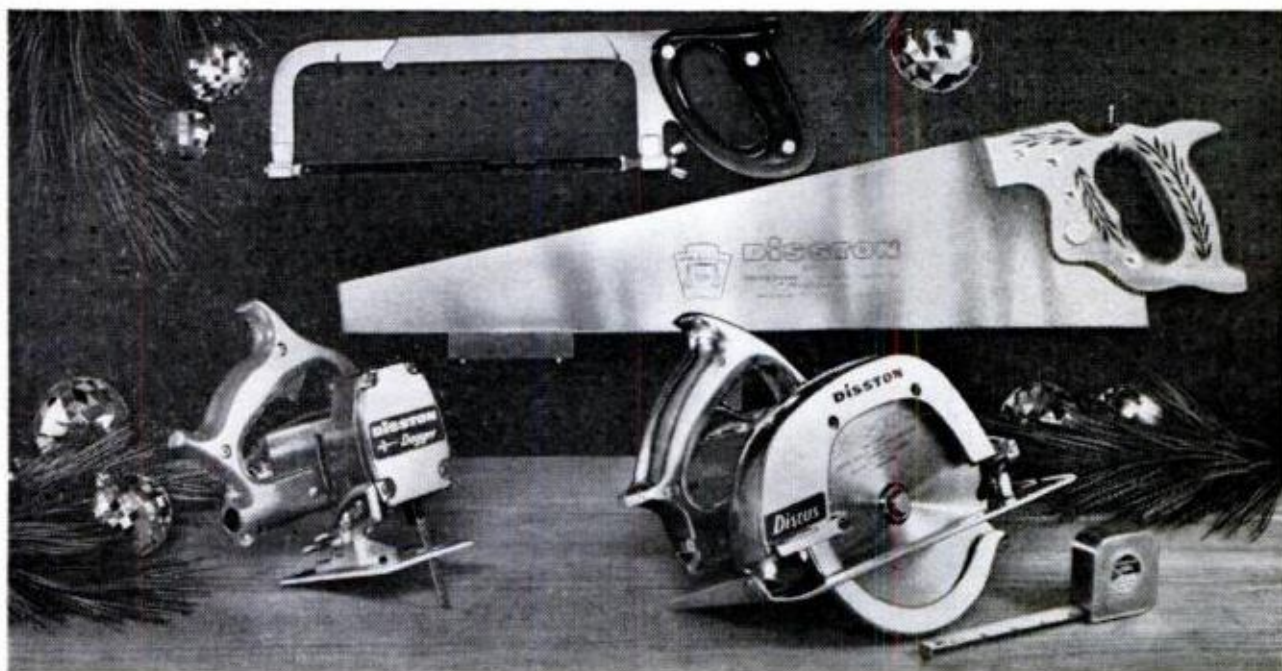
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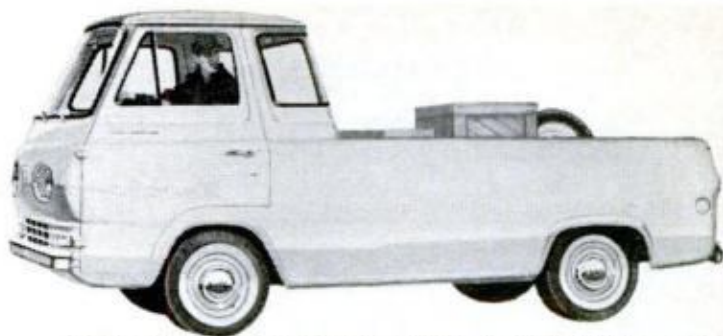
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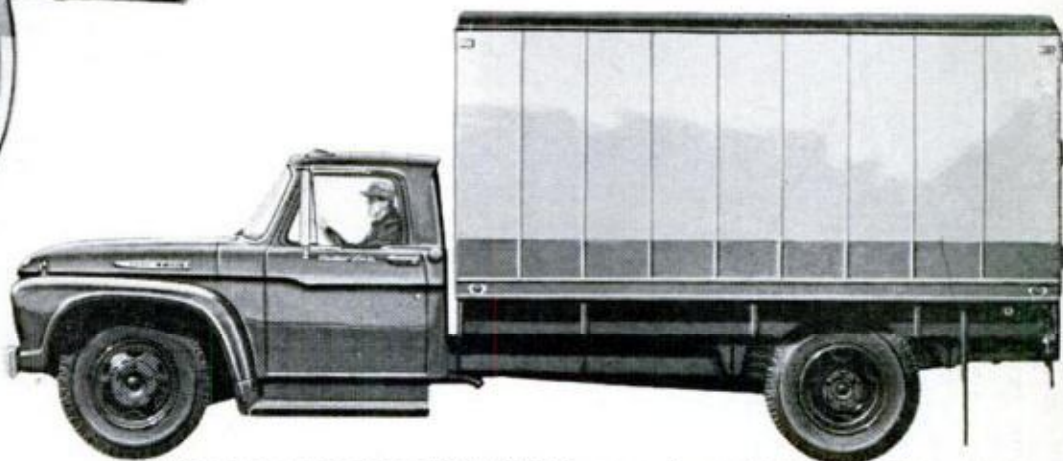


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**ECONOLINE—ALL-AROUND ECONOMY LEADER**—can cut operating costs \$100 yearly! Carries  $\frac{3}{4}$  ton with up to 23% more loadspace than conventional 6½-footers. And the loadspace is all usable—the floor is flat, there's no rear-engine hump!



**NEW BIG SIX FOR FORD MEDIUMS** has more heavy-duty engine features than any other Six of its size! Never before such long-term reliability and economy!

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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—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.

## Poinsettias Fail to Bloom

*Q—I have been trying to raise poinsettias for the past two years. Plants leaf out, but I've never been able to get them to blossom. What am I doing wrong?* —H. K., Penn.

**A**—Poinsettias are native to the tropical regions of Central America, so in colder climates they require special attention. While blossoming, poinsettias should be in strong sunlight and given plenty of water. Temperatures should be 65 degrees or higher, with no rapid changes.

Once the leaves drop, plants become dormant and water should be withheld. Pots are then placed in basement where temperature should not drop below 50 degrees. Water is withheld unless stems shrivel.

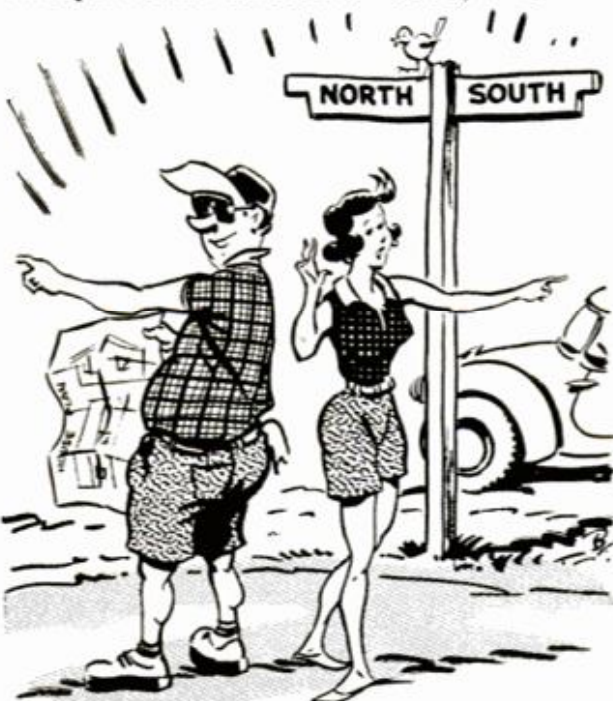
In June, when outside temperatures are normal for that season, repot plants and sink in a sunny garden location. Cut them back to about six inches, leaving two or three shoots to develop. Water and feed them well.



Before cool weather, lift the pots and bring them inside. This is the critical period: Buds must set if plants are to bloom. They require short days and long nights for Christmas flowering. Poinsettias need about 13 hours of uninterrupted darkness every day during this period. Once buds are well developed you can leave plants in a sunny location.

## Orienting the House

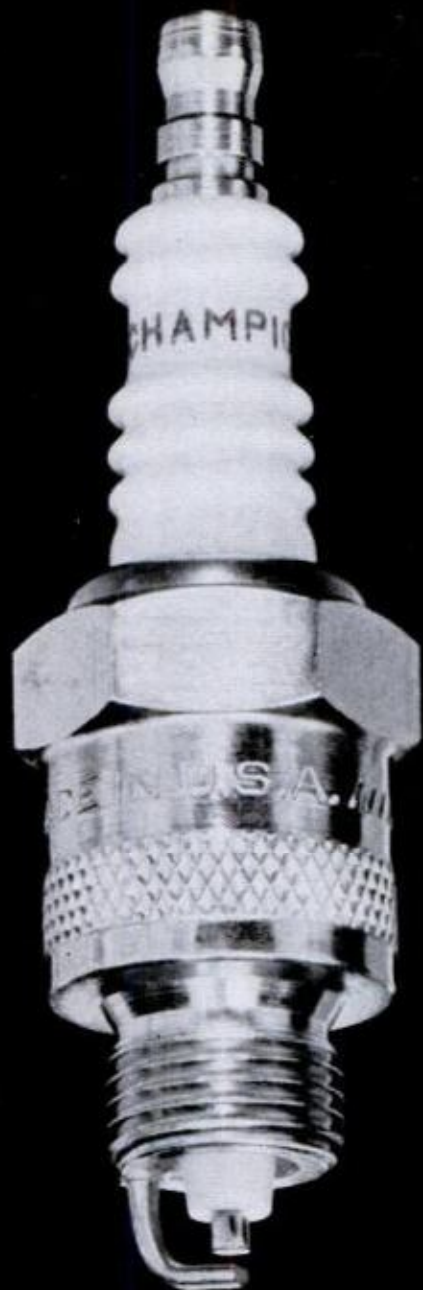
*Q—We're planning on building a new house next spring, and I recall reading somewhere about the best direction to face a house on the lot. Now I can't remember just what the article said. Wish you'd tell us the advantages, if any, of facing a house in a particular direction.*—S. B., Ohio



**A**—You don't say whether you own a lot on which you intend building or are planning to buy one. Property restrictions usually require setting house back a minimum distance from lot line, and may require locating house parallel with street.

In general it is best to orient rooms used most frequently during the day to take advantage of sunlight and summer breezes. Large glass areas, especially, should be located to receive sunlight, but they need shading from the outside by overhangs, trees and every practical means available to prevent heat radiating in towards you. If you value privacy most, living areas should face a garden view with a southern or southeastern exposure. Garage and service areas can be used to best advantage if they face the least desirable exposure, forming buffer zone (usually on west and north) against winter storms and late afternoon summer heat.





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## Regular Lubrication Pays Off

(Continued from page 193)

cause lowered gas mileage, sluggish pickup, and even stalling. If you find it frozen, tap it lightly with a rubber mallet or a block of soft wood, then lubricate with a special heat-resistant lubricant containing graphite. And be sure not to forget it the next time around.

All other exposed metal-to-metal parts that move, such as the carburetor and accelerator linkages, the clutch and brake linkages, including the parking brake, should be lubricated regularly with a dripless penetrating oil. And while you're at this don't forget the door hinges, Fig. 7. Each hinge needs a few drops of dripless oil at regular intervals. This eliminates squeaks and keeps the doors from sagging due to excessive hinge wear. The same is true of door locks, luggage-compartment latch, front-seat shifting mechanism, the hood latch and hinges. Before you lubricate these points it's a good idea to consult the lubrication chart for your make of car and note the manufacturer's recommendations. Remember also that some recommendations for these and other lubrication points on your car may differ from those you see in the calendar on page 191. In such instances always follow the manufacturer's instructions in detail.

### 15,000 and 25,000-Mile Checks

Down near the end of the calendar there's a 15,000 and even a 25,000-mile-check listing several points that should never be neglected when that time comes around. Transmissions and rear ends seldom need lubricating under 15,000 miles unless there is a leak or an oil seal lets go. Even so, it's always a good idea to give these parts a close check while you're doing a general lube job. And, of course, the units should be drained, cleaned, and re-lubricated when (or even before) 15,000 miles have unrolled under the car. Some rear ends don't have a drain plug, so, to do a thorough job of removing the old lubricant you'll need the sludge pump shown at the left of the grease gun in the photo on page 190. The pump also may be used to force new lubricant into the rear-end housing and to clean an oil-filter housing as in Fig. 10. It pulls out all the heavy oils and sludges that tend to collect in such housings, keeps your hands and clothing clean, too.

Ordinarily, stick-shift transmissions and even the automatic transmissions should get the same servicing, but before you do this consult the manufacturer's manual

(Continued to page 220)



beautiful outdoor protection  
... colored aluminum roof coating  
made with pigments

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## Sipes Luma-Tint improved this fine suburban home

The attractive Gregg Mockenhaupt residence in suburban North Hills, Pittsburgh, is the envy of its neighborhood. One year ago, Mr. Mockenhaupt applied Sipes Luma-Tint, a colored aluminum roof coating made with Alcoa® Pigments by James B. Sipe & Co. There was nothing wrong with the roof. Mr. Mockenhaupt just wanted color—a soft green to blend with the landscape. All his neighbors admired the striking new appearance—and a Pittsburgh newspaper took photographs for its Roto section.

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**Turner Corporation**

839 Park Ave., Sycamore, Ill.

which will describe in detail the recommended procedures. In any case, always use the lubricants called for by each part and be sure that these are of the viscosities recommended.

Universal joints on the drive shaft usually need cleaning and lubricating at 25,000 miles or less. Figs. 8, 9 and 11 show how to disassemble one type not provided with grease fittings. On others having grease fittings it may become necessary to disassemble the units in order to fit new grease seals. When you loosen the bolts in the joint have rubber bands handy to hold the bearing cages in place, Fig. 8. And to force the members apart cut a short length of pipe and use it as a driver as in Fig. 9, the joint being held in a vise. You'll need small washers to place under the spider spindles as in Fig. 11 in order to push the bearing cages all the way out. Be careful not to misplace any parts, clean the whole thing thoroughly and lubricate as recommended. Replace in the reverse order. ★ ★ ★

**WINTER'S ON THE WAY.** Prepare for bad weather now with Booklet 17, "How to Winterize Your Home." Only 25c from Popular Mechanics Service Bureau, Room 527, 200 E. Ontario, Chicago 11, Ill.

**Old-Timer Dated**

A newly developed potassium-argon dating method, which measures the radioactive decay of these materials in nature, shows that primitive man lived on Earth 1,750,000 years ago. Two University of California geologists—Drs. J. F. Evernden and Garniss H. Curtiss—found, by testing rock samples in which he was embedded, that this was the age of *Zinjanthropus boisei*, an early East African man found two years ago.

**Pianos on a New Scale—They've Gone Compact**

Pianos have joined the trend to compact styling. There's a new 73-note instrument that is just 50 inches long, 24 inches deep and 35 inches high.

Manufactured by the Wurlitzer Company, the compact piano has a grand piano type pin block to provide longer strings in the bass and middle registers than are available in pianos of comparable size. A pentagonal sounding board also provides more reverberation than standard design would allow in a piano of this size.

The piano is available in a number of hardwoods and styles. Prices start at \$595. for contemporary styling in mahogany.

POPULAR MECHANICS





## *Pontiac '62* *off the line with a* *contagious new "Cat"*

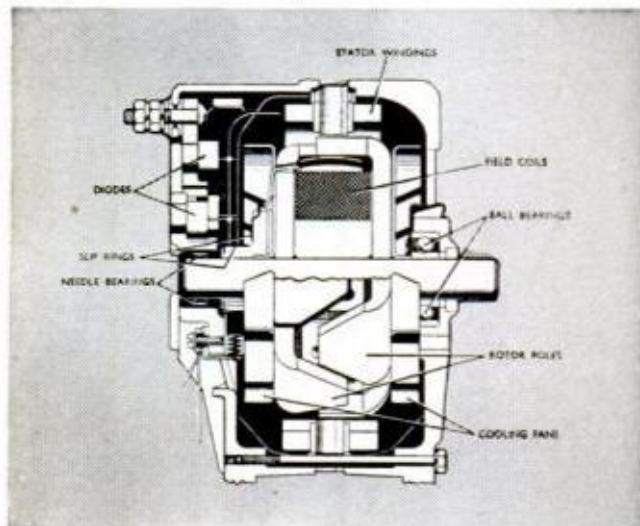
The '62 breed of 'Cat' is all you know Pontiac to be, and more. Pours it on with horsepower rated from 215 to 348. Transmissions include a 4-speed floor stick (option\*) and a heavy-duty 3-speed stick (floor conversion available from your dealer). Or, take it the easy way with Pontiac's Hydra-Matic\*. The Trophy V-8 A\* winds right up over 5000 r.p.m. There's nothing bogus about this 'Cat'. Clean, low and long. Take your choice of optional\* Tri-Power, Safe-T-Track rear end, aluminum wheels and Custom Ventura trim (full carpet, vinyl headliner and color-matched interior). Why follow the Wide-Tracks? Make your own in a '62 Catalina. Pontiac Motor Division • General Motors Corp.

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2. What does this symbol stand for?

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ANSWERS: 1. Alternator, now on all 1961 Chrysler Corp. cars.  
2. World's finest motor oil.



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QUAKER STATE OIL REFINING CORP., OIL CITY, PA.

## Nativity in Paper

(Continued from page 158)

shortening as indicated. Cut two pieces for the shawl using pattern G, making one shorter than the other by removing about 1 in. at the top. The figure is mounted on a base, pattern M, made from the same paper as the body cone.

The kings' body cones, pattern A, should be deep rich colors—reds, purples or blues—trimmed with snips of gold or silver doily and gummed stars. Use pattern B to make the capes but round off the bottom front edges. Make their heads in the same way as you did Joseph's, remembering to use brown paper for one of them. Instead of headdresses, the kings wear crowns of gold lace-paper doily glued to construction paper. The gifts are small boxes and cylinders covered with colorful wrapping paper.

### To Make the Shepherds

When cutting the shepherds' body cones, pattern A, trim one cone about 1 in. shorter than the rest to make the shepherd boy. They wear shawls like Joseph's, pattern G, but the section on the right side is glued over the arm instead of under. When cutting arms for the shepherd boy, make them somewhat smaller than pattern D. The shepherds' headdresses, pattern J, are made by gluing the "x" edges together overlapping each other and then gluing the slashed portions in place to make the top. The shepherd boy is bareheaded, and his hair is curled under in a page-boy bob. The top of his head is covered with a paper disk cut to fit. The shepherds' crooks are made from soda straws with a short section of pipe cleaner slipped into the top end and bent into a crook. Posterboard is used to make the lamb carried by the shepherd boy, pattern K. Cover it with tiny balls of cotton and use snips of black felt to make the nose, eyes and hooves.

Infant Jesus consists of a tube of oak tag-board wrapped in white paper to simulate swaddling clothes. Individual curls of yellow construction paper are glued to the head, and the halo is made from the center of a gold lace-paper doily. His manger is a box made from patterns N and O filled with short strips of gold crepe paper for straw.

Like the other figures, the body, head and arms of the angel are from patterns A, C and D.

Make the stable from the side of a corrugated grocery carton using pattern T. For an interesting texture, cover the stable walls with gold crepe paper which has been crumpled and then flattened again. The roof is covered with overlapping strips of fringed gold crepe paper.—Elma Waltner



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Today's  
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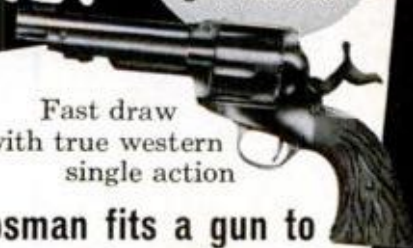
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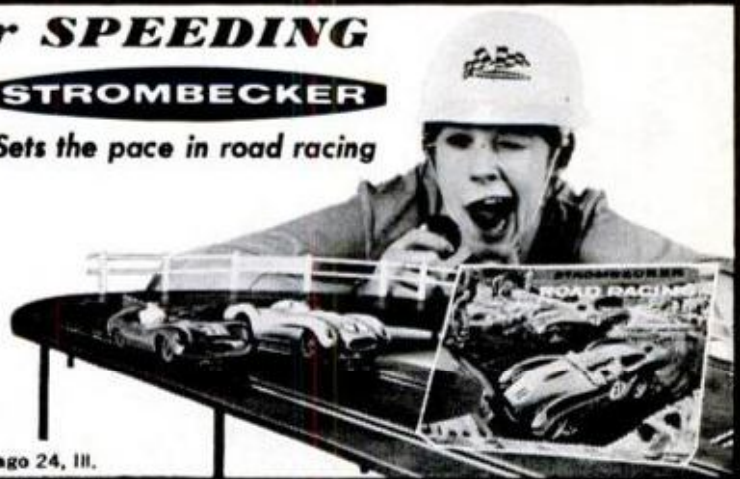
Information not listed on articles in this issue often is given in the WHERE-TO-FIND-IT list, available at no cost from the SERVICE BUREAU, POPULAR MECHANICS, 200 E. Ontario, Chicago 11, Ill.

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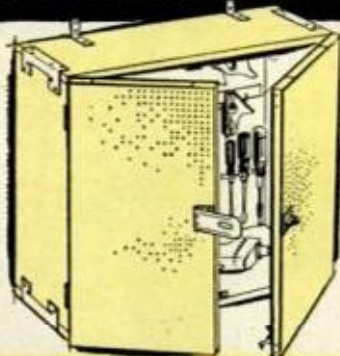
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**MODEL MY10 10-FOOT "LIFE-GUARD" Rule:** Black on yellow background for fast, easy, accurate readings. Blade has unique coating;

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## We'll Be in a Tight Squeeze On Friday, November 13, 2026

Three University of Illinois mathematicians calculate the human population will grow so large that—if conditions stay the same—it will squeeze itself to death on Friday, November 13, 2026.

Their calculations are based on paradise-like conditions; they considered no environmental hazards, no detrimental action between elements, and gave the expanding population an unlimited food supply. The date is accurate within 10 years, they believe.

The studies by Heinz von Foerster, Patricia M. Mora and Lawrence W. Amiot were partly supported by a grant from the National Institutes of Health, Bethesda, Md.

"Our great-great-grandchildren will not starve to death," they say. "They'll be squeezed."

## "Living Fossils" Aid Science

Man's oldest living relative, the goggle-eyed, big-eared little lemur, promises to be of help in the cause of science. Yale anthropologists have acquired several lemurs from the jungles of Madagascar and are studying them. The most important finding so far concerns the amazing speed with which the lemur's blood clots. There is hardly time to draw the blood off into a hypodermic needle before it coagulates. Researchers believe that whatever agent causes this extraordinary clotting action may be of value in fighting human circulatory and heart diseases. As one scientist put it, study of the lemur, a "living fossil," may well prove a boon to mankind.

## Men Go to Antarctic to Flee Women But Have Problems Just the Same

Half the men who go to the Antarctic do so to get away from women. Twenty percent know this, says Capt. E. E. Hedblom, the medical adviser to the Commander, Naval Support Force. The remaining 30 percent are motivated subconsciously.

"Too much of this much-touted togetherness gets sticky," he says, while agreeing that getting away from it all has penalties, too: Men serving on the ice have seven times more neuropsychiatric difficulties than other Navy men. Hazardous environment and isolation are the explanation, says Captain Hedblom.

The captain, incidentally, says there is a psychological advantage to be gained from occasional separation of the sexes, even among married couples.



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3001-11 Kirkwood, Burlington, Iowa

## Football's Fabulous Foremen

(Continued from page 129)

“trap,” how the hole is to be blocked open; and “3” the snap count.

Now if all this begins to suggest that pro players, especially quarterbacks, must be fairly alert and intelligent, rest assured you are correct. The Minnesota Vikings have more than 200 separate plays in the play-book—only we call it a workbook.

Once a play begins, is there any sure way for spectators to follow the ball? It won't be easy, if the quarterback is doing his job. He'll fake handoffs, runs, passes, send decoys into and around the line, call trap plays and screen passes (letting the defense through, then lobbing the ball over their heads to a waiting back); even keep the ball and run himself now and then.

Despite all the deception, however, there are several indicators as to where a play is going. If the quarterback still has the ball as he clears the backfield while fading back, he probably will pass.

Pro quarterbacks seldom run. They're too slow, and their passing arm too valuable. As quarterback my motto was, “Run only out of sheer fright.”

Also, as the quarterback gets the ball, watch the action of the offensive guards. About half the time, if at least one pulls out of the line and moves in the same direction as one or more backs, this means a running play in that direction.

A backfield flanker (a man stationed wide to one side) or a split end also merits watching. He's often a decoy, but much of the time he's a key downfield blocker or a target for a quick pass.

When the quarterback plans to pass, he usually drifts straight back after fakes to the backs. Then, as a pocket of blockers forms, he steps into it for protection.

In high school or college, quarterbacks may rear back, cock an arm, follow a receiver with their eyes and head, and fire. Pro quarterbacks are more subtle. Before passing, they may fake throws in various directions—Unitas, for one, excels at this.

You'll also note that if a team has a dangerous passer (and all pro clubs do), linemen will put tremendous pressure on him. Keeping him off balance or unable to get the ball away is the best pass defense.

Watch rushers such as Andy Robustelli of the Giants, Gino Marchetti of the Colts, or Gene Brito of the Rams. When they are in overdrive, the quarterback is in for a rough afternoon. In the Colts-Giants championship game two years ago, Marchetti

(Continued to page 232)



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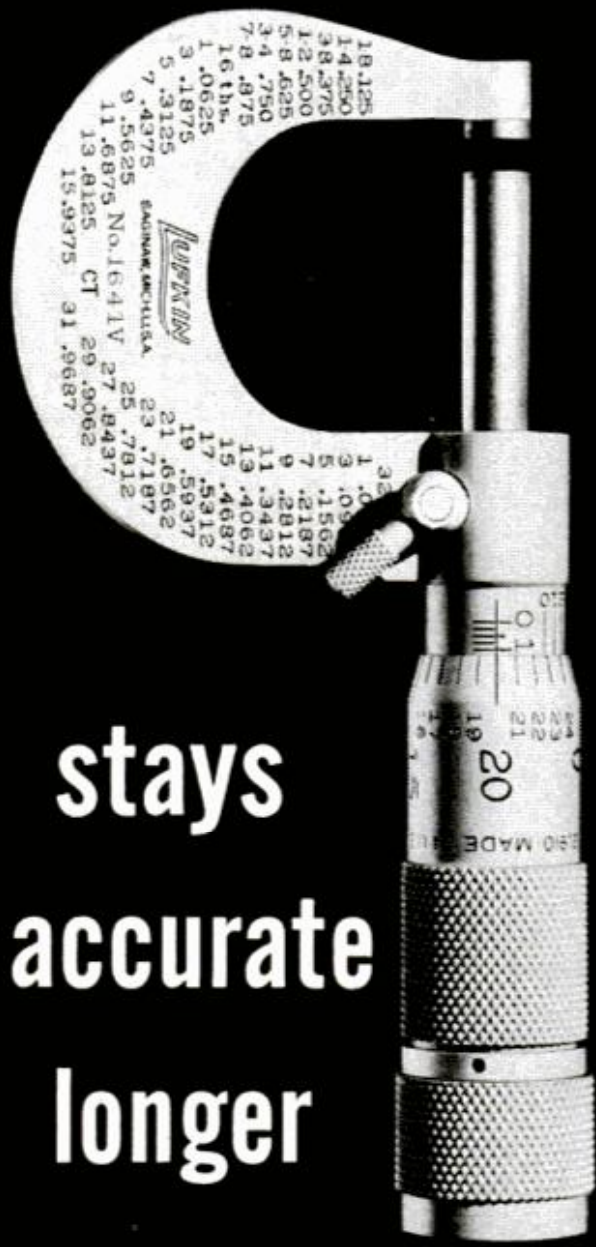
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almost singlehandedly set up the Colts' romp—Conerly either was flat on his back, or so hurried and off-balance he was tagged with several costly interceptions.

Watch the line play and maneuvering of potential pass receivers. Both determine to a large degree how good the quarterback will look by sundown that day. Linemen may charge diagonally either right or left, or straight ahead. They may come in high or low. They may put everything into a charge, or hold and drift with a play to "read" how it develops. The quarterback will make a point of steering plays away from some individuals. Watch the Steelers' 288-pound Gene "Big Daddy" Lipscomb sort out opponents with his big hands sometime. You'll see why we must know what to expect at each point on the line, and why, when possible, we run plays away from such strongmen.

Follow an end or halfback as he breaks and tries to shake free to receive a quarterback's pass. There'll be head-bumping at the line as defensive men try to delay his getaway, more struggles in the secondary as linebackers also slow him down, then high-speed zigzagging, starts, stops, and head, shoulder, and body fakes in the deeper secondary as he tries to make his last break. On the Vikings we have 19 different patterns a receiver can run, from slants, arcs, buttonhooks, zigzags, sidelines, and stop-and-go maneuvers to running straight up the middle.

Because passes are dramatic, and remain in memory when they click, it may be easy to assume most pro plays will be passes. But, in recent years nearly 60 percent of all NFL plays each season have been rushes—only a little more than 40 percent have been passes. A good quarterback uses one to set up the other.

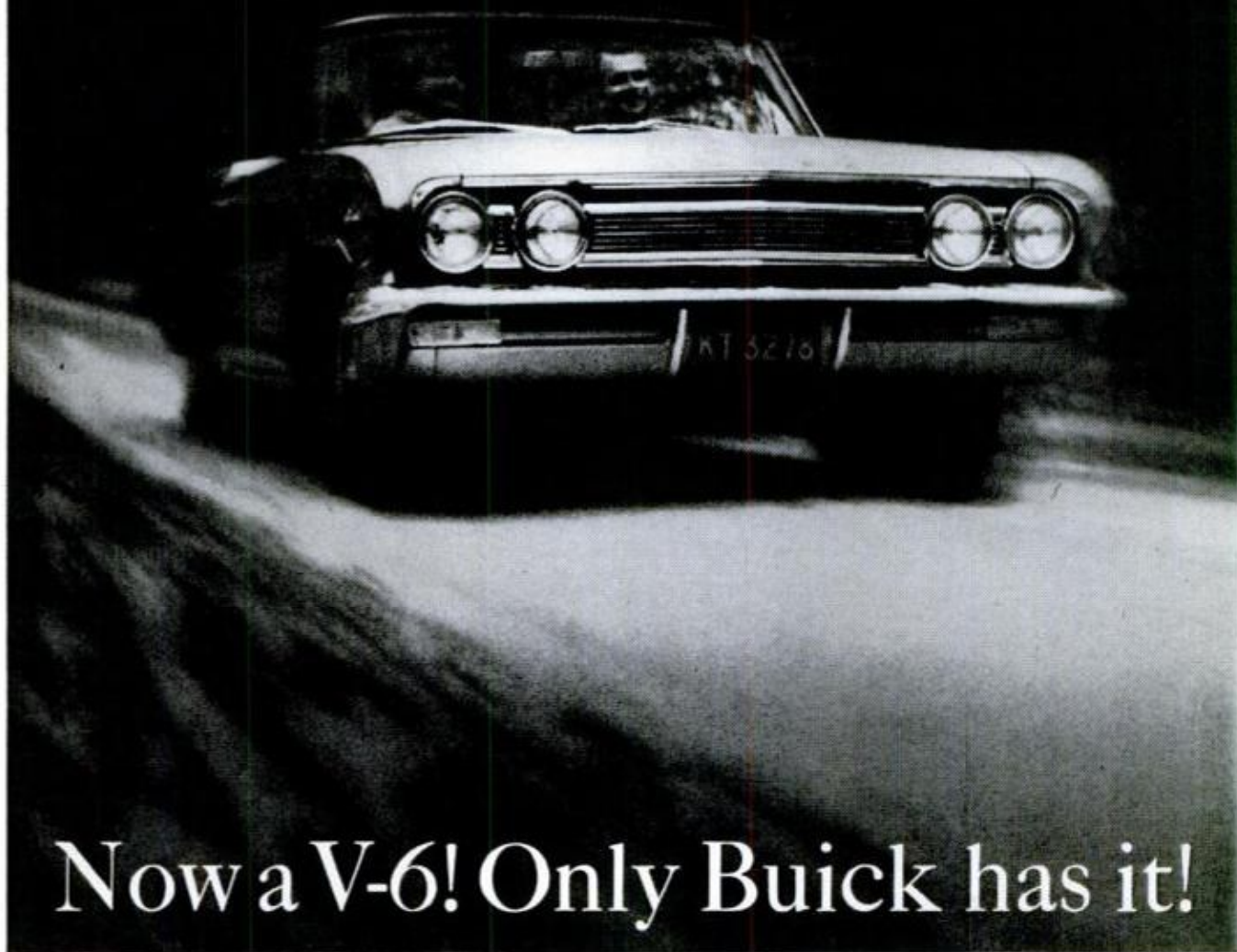
You can try to predict what play a quarterback will call. But don't be dismayed if you miss often. Unlike high school or college ball, there's no "automatic" passing or running down—in pro ball we'll pass on any down and for any yardage. We'll pass from our own goal line. We'll pass in any weather. Two years ago, when Pittsburgh's Bobby Layne set a league passing record against the Cardinals, it wasn't in the sunshine. It was in the mud.

Few games are as simple as they appear, and pro football is no exception. It's a magic show, a guessing game, an endurance test, and the department of higher athletic learning all rolled into one, with the quarterback right in the middle.

Try to understand his moves, and you'll be well repaid in thrills. ★ ★ ★



*a great new power mate for the Special's aluminum V-8*



## Now a V-6! Only Buick has it!

Six for Savings—V for Voom. It was natural that it came from Buick. Natural that Buick developed the successor to the in-line six-cylinder engine...the V-6! A V-6 you can now get in the new 1962 Buick Special (in convertible, sedan or station wagon models). A V-6 that has 140 to 179 pounds less weight than in-line sixes of comparable power. A V-6 that gives you the V-smooth, V-lively *Voom* of big cars *plus* gas economy that challenges the compacts. A V-6 with the shortest, most rigid block and crankshaft in any American 6-cylinder car.

Why is it natural that this great engine should

come from Buick? Because it was Buick which also developed an *aluminum V-8* which you can also get in the Buick Special. This is the V-8 that gives you sizzling go, yet swept its class in 1961's Mobilgas Economy Run against the country's top drivers. It's natural that it should come from Buick, too, because so many other great automotive advances *have* . . . such as today's safe, simple directional signals . . . fin-cooled aluminum brakes . . . the first no-shift transmission . . . the first hardtop. So here again you have exciting proof that when better automobiles are built, Buick will build them. Buick Motor Division—General Motors Corporation.

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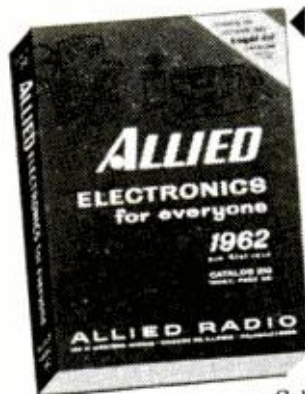


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**WORLD'S  
BIGGEST**

**Must Appliance Repairs Cost  
You So Much?**

(Continued from page 118)

of problems uncovered by housewives goes from nails and coins in washer pumps to refrigerator door handles that automatically bump elbows, tricky shelves that dump loads, range controls that tear fingernails or the discovery by some women that too much detergent would thoroughly clog a certain washer's plumbing.

One at a time, as problems brought by these conditions have popped up, the manufacturer has had to deal with them. As you will see, there is hope that they will cope with some of them before they arrive in your home.

Which brings us to the other half of the situation: They don't sell them like they used to.

Time was you paid a dealer, say, \$200 for a washer. On that sale, he made about \$75 gross profit. Today, a \$200 washer gets the dealer maybe \$25-\$28. And for \$25, the dealer doesn't feel as responsible as he did for \$75. There has been a revolution in appliance selling, and it's called discounting, knocking off some of the dealer profit. The idea is to make money on the volume. The trouble is that volume means more units and more units automatically mean more service problems, but there isn't enough money in this new deal to continue servicing each unit at the old rate. Since it was discount and cut service, or die on the vine, most dealers went the discount route.

**Five-Year Confusion**

As a result there have been five years of confusion about who—dealer or manufacturer—was going to fill the service gap. But the customer, who was getting shuffled around while the wrangle raged, is finally getting some attention.

He got it the way everybody gets attention—he called for it loud, long and hard.

Here's what's happened since the screams of the consumers hit the factories where they hurt—the pocketbook:

First: Service was made a high-level responsibility. For example, one big manufacturer's service manager meets once a week with plant managers in their own plants; he also meets once a week with advance product engineers. He goes to these meetings armed with blue prints, with field reports, and other information that is not furnished by the product engineers.

Second: The factories took more of the service responsibility into their own hands—to the point where some factories figure

(Continued to page 236)





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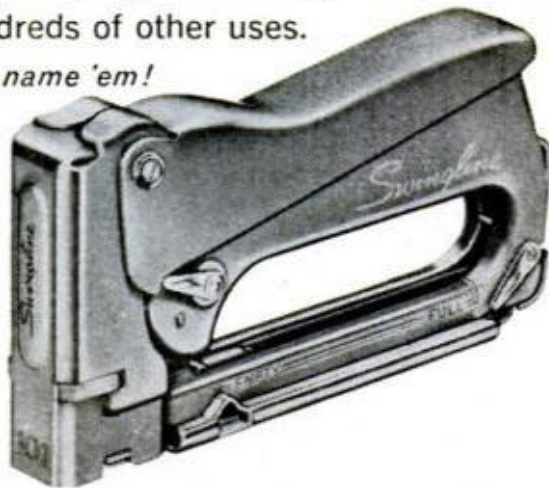




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they handle the service on 80 percent of the units they sell.

Third: Service training was stepped up considerably, both at national and regional levels, to get more knowledgeable people in contact with the customer.

### Independent Control Wiring

Manufacturers have all taken certain steps with the appliances themselves. Control unit wiring is, for example, on its way toward independence from the rest of the machine, allowing quicker repair. Easily-accessible service "from the front" is beginning to be an important feature of all makes. And pretesting in the field and laboratory is increasing.

Such testing prevents "disasters" from being sold. As an example, one prominent company had a new washer design in the works. The new idea was a feature that would automatically feed the various detergents, fabric softeners, bleaches into the wash. This was done by running water through a series of bins at the right time.

Early test models drew bin water from the nearest inside pipe—which happened to be a cold-water line. As testing proceeded, an additive, supposed to be water-soluble, clogged things up by forming a hard insoluble mass inside the feed channels. It was then that testers found that this particular water-soluble material liked hot—not cold—water.

The solution was simple—pipe in the hot water instead of the cold. They did. However, without enough testing, or with testing with a compound that took longer to clog the works, the design might very well have gone on the market and become a disaster.

There has been a considerable trend toward simpler mechanical components, notably transmissions. One make of washer has an almost-never-failing transmission that has fewer working parts. It is simplicity itself. However, there is one possible problem that can be expensive in servicing it. Servicemen report that if the Neoprene seals fail, the whole machine has to be taken into the shop to be torn down.

Every advance apparently carries a penalty. The typical early automatic washer had 300-350 separate parts; the typical machine today has 450-500 parts. The price of automatic convenience automatically means more things to go wrong as well as easier washdays.

Service management is beginning to function better in many ways. And there have been basic improvements in the approach to the problem of satisfying the

(Continued to page 238)



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World's Largest Manufacturer of Shears, Scissors, Pinking Shears, Skalloping Shears, Metal Cutting Snips and Garden Shears



new  
Sony



for portable use\*

**STERECORDER 464-D**



for custom installation

only  
**\$199.50**

### **both stereo recording & stereo playback!**

An unprecedented price for the famed Sony quality! The long-awaited Sony Sterecorder 464-D—dual purpose, dual performance! Dual performance means both 4 track stereo **recording** and 4 track stereo **playback**. Dual purpose means custom component installation **and** portable use. Recording and playback pre-amps are **built-in**, and such features as sound on sound, language and music training, two speeds, push button track selection and Sony precision engineering make this the most outstanding tape recorder value at \$199.50. ■ **All Sony Sterecorders are Multiplex-ready!**

\*Carrying case optional

For literature or name of nearest dealer, write Superscope, Inc., Dept. 9, Sun Valley, California

**SUPERSCOPE**

The Tapeway to Stereo

housewife. For example, one thing about service that never fails to irritate is cost. Particularly the uncertainty of it all. Typically, the appliance man comes out to the house, makes some alarming noises for perhaps an hour, then says, "That will be \$36, ma'am. Had to put in a new frammis." That, at least, is how many housewives think of service calls.

#### **Flat-Rate Service Charges**

One way to get around this irritation is to get the bad news in advance. That's why some firms have set up flat-rate service charges. Armed with a book the housewife can look at, the serviceman can forecast precisely how much a job or combination of jobs will cost.

Other firms are jazzing up the service. A washer manufacturer has brought out what's called "Red Carpet Service," a tightly supervised repair program that requires its sellers to meet stiff requirements in performance with the privilege of advertising the service taken away if the service gets slipshod.

Still other manufacturers are taking steps to increase their responsibilities. Some are increasing the warranty period, making it include both parts and labor where, in some cases, it did not include both before.

All these efforts help, of course, but there is going to continue to be service expense connected with owning a new appliance. We are paying the price of convenience. In the old days, the wringer washer didn't cost much to buy and didn't need much servicing. But it didn't take care of all the hard labor the modern washer does.

#### **Housewives Don't Buy Simplicity**

Manufacturers still make the good old simple appliances. Every appliance store in the country carries the wringer washer, the simple small refrigerator—they are called "strippers"—and they are better than they used to be. But housewives don't buy many of them—wringer washer sales went down about 15 percent last year, 15 percent **more** than other appliances.

Since we've decided to buy more complex modern appliances, we're going to have to learn to live with them. Eventually, perhaps, we will learn that preventive maintenance, while an annual cost, will be cheaper than running the machine until something breaks and then fixing it. Here and there, appliance dealers are now advertising "Spring Tune-Ups," just like the automobile service stations.

And the records show that they pay in reducing major appliance repair costs. ★★★



# Why '62 Rambler stops when others can't



Ordinary car crashes barrier. '62 Rambler stops safely. A hydraulic line on each car was cut. Both started together, braked together. Rambler stopped, the other crashed through the barrier.

## NEW RAMBLER DOUBLE-SAFETY BRAKE SYSTEM STANDARD ON ALL MODELS

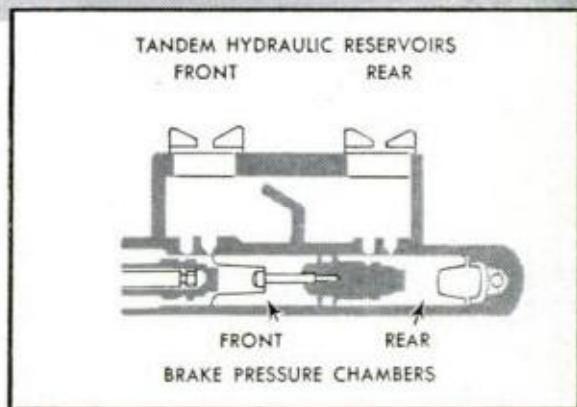
See '62's freshest new styling. Then see Rambler's "under-the-skin" improvements.

Biggest advance since hydraulic brakes is the new Double-Safety Brake System. Tandem master cylinders, one for front brakes, one for rear. If one system is damaged, the other still works. Self-adjusting brakes also standard.

New Road Command Suspension on Classic and Ambassador allows remarkable new precision control. New single lower control arm with outer ball joints. Newly calibrated Deep-Coil front springs. Widest track of any compact—new for '62.

Tires and wheels precision balanced at factory. Up to 27% more road clearance.

33,000-mile chassis lubrication, most models. Oil filters standard—normal oil



Simplified diagram of cross section of Rambler's new Double-Safety Brake System. Tandem master cylinder, separate systems.

change every 4,000 miles. Many components lubricated for life.

Now, besides Deep-Dip rustproofing of entire body up to roof, rocker panels are armor-plated with rustproof zinc.

Ambassador V-8 now has an even better power-to-weight ratio, best of any compact. 250 HP, standard, 270 HP, optional.

New E-Stick No-Clutch-Pedal Transmission optional on American. Most of the ease of automatic drive at about  $\frac{1}{3}$  the cost—with stick-shift economy.

Now, take a Discovery Drive at your Rambler dealer's and see how Rambler gives you more car value for your money.

**RAMBLER—WORLD STANDARD  
OF COMPACT CAR EXCELLENCE**



# Starrett TOOL CHESTS

for professional and amateur craftsmen



Designed for you by the

## "World's Greatest Toolmakers"

These professional quality tool chests are built to rigid Starrett specifications in hand-rubbed Honduras mahogany or rugged, wrinkled-finished steel. Available as chest only or with choice of three different assortments of Starrett tools to provide basic equipment for students, apprentices, home craftsmen, mechanics, machinists or tool and die makers.

**WOOD CHEST NO. 200 WC** (illustrated). Size 9½" x 20" x 13". Top storage and nine drawers with Starrett red lining plus outside panel to completely lock. Shown as furnished with 21 basic tools.

**METAL CHEST NO. 200 MC** (not shown). Size 8½" x 20" x 13¾". Top storage and seven drawers with Starrett red lining plus outside panel to completely lock — available with or without tools.

### BIG NEW CATALOG — FREE

Describes and illustrates over 3500 Starrett tools. Send the coupon.



STARRETT TOOLS are carried by leading Industrial Supply Distributors and Hardware Tool Stores.

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Dept. AP, Athol, Massachusetts, U. S. A.  
Please send complete information on Starrett Tool Chests and free copy of Starrett Catalog No. 27.

Name.....  
Occupation.....  
Address.....  
City..... Zone..... State.....

## Say It With Silk

(Continued from page 178)

wetting both the reverse and face sides in accordance with instruction with the film until some bubbling appears in the open areas of the film. At this point the backing sheet can be removed, Fig. 11. Continue wetting and at the same time lift one edge, stripping the backing off slowly. Then place in a dryer or before a fan and dry as before.

The final work on the screen is blocking all areas which are not to print. Apply the water-soluble blackout to all the screen areas where you do not want ink to transfer, (Fig. 13). Apply blackout to both sides of the screen with a brush, as shown, to eliminate any drops that would interfere with operation of the squeegee later on.

Now you place the screen back in the dryer again, or before the fan and allow it to dry. After drying thoroughly it's ready for use. To determine workability of the ink, make a trial impression as in Fig. 16. Silk-screen inks usually work well from the can, but they may require thinning slightly for best workability. Use only thinner recommended by the manufacturer of the ink and only in the amounts recommended should thinning be necessary. Set up as in Fig. 14 placing the screen frame in the clamps and line up the work for the first impression, using 1-in. masking tape as register points. Pour in your ink as in Fig. 15. When working with the squeegee in the actual printing, or screening, process, always use a firm, steady stroke all the way across the image area. Pressure should be uniform, Fig. 18, and ordinarily the squeegee is tilted at approximately the angle pictured throughout the stroke. The blade of a new squeegee is regularly square across the bottom. Don't use a squeegee with rounded edges for silk-screen printing.

After the work has been squeegeed properly, you have completed the first printing operation of the first color, which in the sample card, is gold. To print the second color (red), it is necessary that you clean up the excess ink in the frame and then wash all the ink out of the screen with the mineral spirits. Use water about as hot as it normally comes from the hot-water faucet to wash the Ektagraph-film emulsion and block-out dope from the screen. Also, in the Ektagraph instruction sheet you'll find a formula for bleaching out the stain in the screen. Then the steps from Fig. 9 on are repeated, using your second contact positive. Finally, after repeating these steps a third time (in a three-color card) you will complete the printing as in Fig. 19.

—D. A. Williamson



## All Chemical Elements Become Lighter

All of the 103 known chemical elements, the building blocks of the universe, will in the future weigh a tiny bit less.

After years of controversy, the Council of the International Union of Pure and Applied Chemistry decided that the new standard of weights should be figured from the carbon atom weight 12.

Oxygen atom 16 is dethroned as the standard. In fact, two oxygen standards are displaced. The chemists have, in the past, taken natural oxygen as 16 and the physi-

cists have taken the isotope of oxygen 16 as base. As there are three kinds of oxygen, isotopes 16, 17 and 18, in the natural oxygen in the air, there was a difference.

Oxygen, in the new system, is now 15 followed by decimal 9994 with plus or minus one in the fourth decimal place.

☪ Ocean waves have incredible power. They can hurl rocks weighing many tons onto the top of cliffs more than 100 feet high and wash out steel breakwaters.

*The proof is in the puffing!*

**PRINCE ALBERT** has the flavor  
most favored in the U.S.A.



- always tastes fresh
- mild, mellow flavor
- cool 'n' steady burning

**PRINCE ALBERT**

NOVEMBER 1961

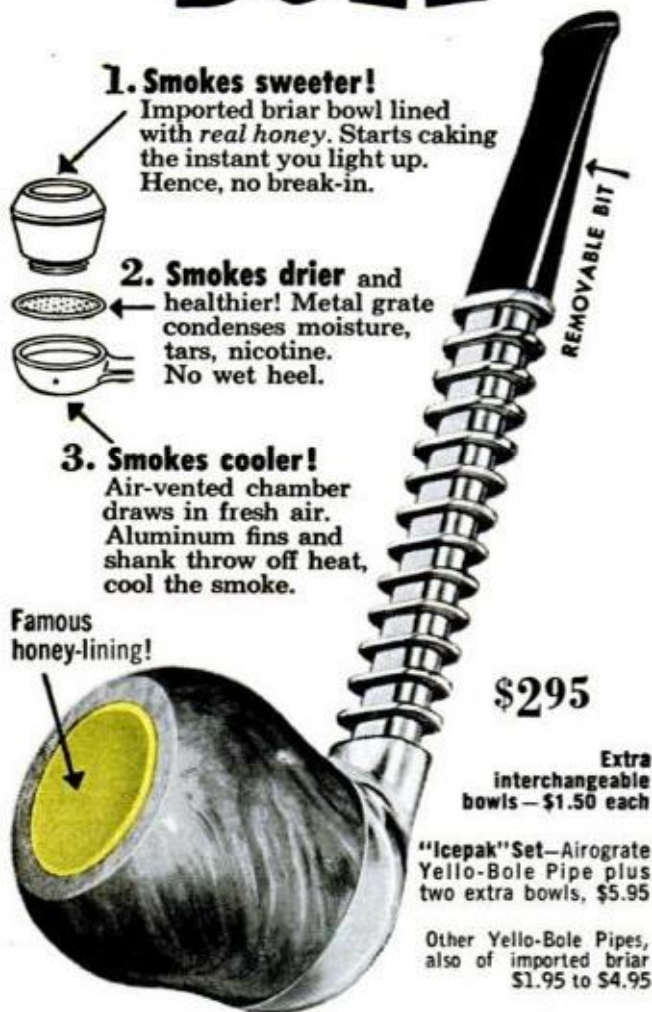
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241



Any man will enjoy new

# AIRGRATE YELLO-BOLE



**1. Smokes sweeter!**  
Imported briar bowl lined with real honey. Starts caking the instant you light up. Hence, no break-in.

**2. Smokes drier and healthier!** Metal grate condenses moisture, tars, nicotine. No wet heel.

**3. Smokes cooler!**  
Air-vented chamber draws in fresh air. Aluminum fins and shank throw off heat, cool the smoke.

Famous honey-lining!

\$295

Extra interchangeable bowls—\$1.50 each

"Icepak" Set—Airograte Yello-Bole Pipe plus two extra bowls, \$5.95

Other Yello-Bole Pipes, also of imported briar \$1.95 to \$4.95

Send for FREE FOLDER, YELLO-BOLE PIPES, Inc., Dept. Y35, N.Y. 22

IDEAL CHRISTMAS GIFT FOR ANY MAN

**4-WAY WELDER \$14.95**  
WELD - BRAZE - SOLDER - CUT Complete

**NO OTHER WELDER AT THIS PRICE**  
Complete with SAFETY FOOT SWITCH, FULL FACE SHIELD, twin carbon arc torch, welding rod holder, clamp, carbons, welding & brazing rods, flux, fuses, instruction book. **FULL YEAR GUARANTEE.**

More than a quarter million in use in homes, garages, farms, shops, factories. NOW anyone can weld, braze, solder, cut, heat, without experience. Does 1001 jobs on all metals. Save & earn money. Make & repair auto bodies, parts, fenders, trailers, boats, metal furniture, fixtures, ornamental iron, farm equipment, garden tools, bicycles, toys, etc. Operate on any properly wired 110 V AC line. **SEND ONLY \$2.** Pay postman \$12.95 plus C.O.D. charges. Ideal lifetime gift for hobbyist, mechanic, hot rodder, homeowner. Order on 10-day money-back guarantee.

**FOUR WAY WELDER CO. DEPT. F2-M, 1810 S. FEDERAL ST. CHICAGO 16, ILL.**

## The Gas Turbine Goes to Sea

(Continued from page 132)

a bonus for the turbine drive. Costwise, on an hourly basis, gasoline figured \$4.50 per hour or 28 cents per mile vs. diesel oil at \$4.20 per hour or 15 cents per mile.

Comparative fuel costs can vary all over the map, of course. Other engine-boat combinations would undoubtedly show different results, but the fuel-consumption bogey has been pretty well licked for turbine boat power. During the past 12 years specific fuel consumption has dropped from 1.8 to .72 pounds per horsepower hour on Boeing gas turbines.

Gas turbine power opens up a whole new field for boat designers. Boeing used the 26-foot cruiser hull for tests because it was readily available—like other boats in its class, its hull was designed for use with a broad range of relatively heavy marine engines burning either gasoline or diesel oil. Hulls specially designed for the high horsepower and low weight of the gas turbine could increase both cruising and top speeds. With hulls of this class, fuel costs would decrease still further in gallons or dollars per mile.

### The Noise Problem

How about noise? Gas turbine engines are known for their noise level—just ask anyone living near an airport these days. But on a boat an inlet air silencer, insulated exhaust ducts and glass fiber matting around the gear box have reduced noise to levels below competitive gas or diesel engine installations. On the Turbo-Mariner, exhaust gas velocity draws cooling air over the engine to further reduce noise. Use of these exhaust eductors saves on the power normally extracted to drive a fan. Exhaust is vented through the side or stern of the boat and is scarcely noticed. Nozzles spray water into the exhaust outlets to protect dock areas and as a further noise depressant during cruise.

Early turbine engines, particularly those designed for aircraft, suffered the twin troubles of poor part-throttle performance and control difficulties. Need for precise balancing, short-life bearings, and lubrication problems also limited turbines to military uses where top performance was everything and the other problems secondary. Advancing technology has solved nearly all of these old problems. Turbojet airliners today have taken over nearly all routes. And despite their relatively high cost and fuel consumption, they are actually cheaper to operate per seat mile because their productivity is high. This same ad-

(Continued to page 244)



## Germ-Free Man on the Moon

Germ-free men may explore the moon.

Such sterile explorers, who would not contaminate extra-terrestrial areas, can be available in 25 years, according to Dr. Charles Phillips of the U.S. Army Chemical Corps Biological Laboratories, Ft. Detrick, Md.

"The same methods used to obtain sterile guinea pigs, chicken and rats, will produce a sterile man. All we have to do is keep him in a germ-free cabinet for some 25 years following birth, meanwhile teaching him how to fly spacecraft," says Dr. Phillips.

The airless, barren moon, believed to be the repository of dust and debris of outer space, holds important data that may tell scientists about the origin of the solar system. Contamination might obscure these data, resulting in loss of opportunity to get to the basis of life's origins.

## Intense Light Beam "Spot Welds" Eye Defect

Eye operations which once required hours of complicated surgery are now performed in minutes with a light coagulator. A coagulator at the University of Michigan produces a needle-sharp beam of xenon light several times greater in heat intensity than the light of the sun. The beam directed at a small hole in the retina, causes a light burn which forms scar tissue and, in effect, "spot welds" the hole. Left unattended, the hole could result in retinal separation and eventual blindness. The apparatus has also proven useful in removing small eye tumors and can be used to create a new pupil in cases where the eye opening has been closed through injury.

## Ultrasonic Agitation Aids Film Development

Vibrating liquid film developer with ultrasonic waves produces better negatives, a professional photographer claims. Martin P. Ostergaard Jr. of Woodbridge, N. J., agitates the developer (for five seconds during each minute the film is in the developing tank) with extremely fast vibrators. Most film-developer combinations require this periodic agitation, but it is usually done manually—either by agitating the whole tank or just the film. Ostergaard claims his method increases film speed up to 10 times its normal rating, reduces oxidation of the developer and, most important, provides uniform agitation of the developer over the film surface. Ostergaard obtained a patent for his process and assigned it to Gulton Industries, Inc., Metuchen, N. J.



U.S. Pat. No. 2,789,872

## THIS IS THE RING the experts pick to do a ring job right!

It's Sealed Power's KromeX ring set with the years-ahead Stainless Steel oil ring. This ring controls oil better and longer than any other, bar none. Here's why:

To start with, Stainless Steel is a superior metal. It doesn't corrode, it resists pitting and etching of gases caused by internal combustion. This means carbon doesn't cling, return oil vents don't plug, there's better lubrication with less friction and less wear. Rings last longer.

Stainless Steel retains its tension at operating temperatures, gives you lasting side-sealing, lasting oil control.

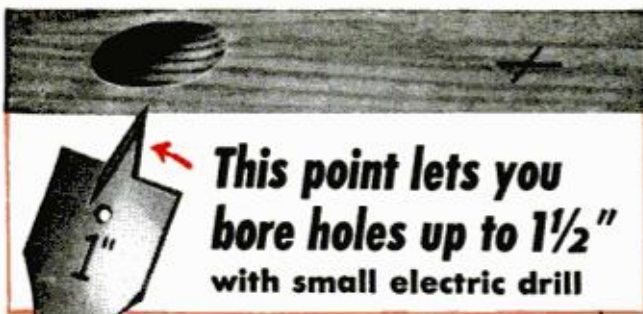
And Sealed Power's patented, proven end-abutment design always produces proper tension, regardless of contact with bottom of the groove. No groove depth problems. Chrome-plated side rails seat instantly.

Installation is simple as A-B-C. No gauges, no shims, no springs. No troubles. Period. Sealed Power Corporation, Muskegon, Michigan.



**Sealed Power** Stainless Steel  
oil rings stop oil pumping





**This point lets you bore holes up to 1 1/2" with small electric drill**

**It's hollow ground to bore cleaner, faster at any angle**

**NOW YOU CAN** increase the boring range of your small electric drill or drill press. New Irwin Speedbor "88" bits bore faster, cleaner holes up to 1 1/2" in any wood. 1/4" shank chucks perfectly. No wobble, no run-out. Sharp cutting edges on Irwin exclusive hollow ground point start holes faster, permit spade-type cutters to bore up to 5 times faster. All Irwin Speedbor "88" wood bits are forged from single bar of special bit steel, tempered full length and machine-sharpened for extra accuracy, longest life. 17 sizes, 1/4" to 1 1/2". Buy individually or in sets from your Irwin hardware or building supply dealer.

**Only 75c each, sizes 1/4" to 1"**  
**Only \$1.25 each, sizes 1 1/8" to 1 1/2"**

**IRWIN SPEEDBOR "88" WOOD BITS**  
 at Wilmington, Ohio, since 1885

**There's a Delta Lantern RIGHT for You!**



**POWERlite** The all-time favorite! Modern new lens, rotary switch. Wide floodlight from top. Brilliant spotlight. . . . . **\$6.15**

**STARFIRE** Rotary switch operates powerful spot beam and flashing red light. Hang it or set on the handle—point the light where it's needed. . . . . **\$7.95**

**ASTROLite** Flashing red light pivots on arm. Piercing spotlight. Adjustable head. Dual fingertip switches. Mounts on twin-pack battery. From. . . . . **\$7.95**

Only Delta has sixteen beautiful electric lanterns—each with advantages for different uses. There's a lantern with features and design suited to your needs. Prices begin as low as \$1.79. See the Deltas at your dealer's, or write for literature and Free Fishin' Calendar.

*Prices list, less 6-volt batteries.*

**Delta LIGHTS THE WAY**

DELTA ELECTRIC COMPANY, 323 W. 33rd Street, Marion, Ind.

vancing technology makes the modern Turbo-Mariner drive for boats as totally different from early turbines as the Boeing 707 is from the DC-3.

The gas turbine engine is simplicity itself. It develops power in three steps: 1) Air is compressed. 2) Fuel is added to the compressed air and burned. 3) The resulting hot gases spin one or more turbine wheels. The Boeing Turbo-Mariner engine features two output turbines. The first turbine drives the compressor. The second turbine drives the output shaft through reduction gearing. Since the two turbine shafts are not connected, the engine operates much like an automatic torque-converter transmission. This free-turbine design turns a propeller at near constant speed under varying loads and prevents engine overspeeding if the propeller should spin free of the water. The engine also puts nearly full power on the prop over a wide range of prop speeds due to the free-turbine drive.

Control of speed is simple. By controlling fuel to the gas producer, that is, the compressor-burner section, and compressor turbine, the temperature and volume of gas available for driving the output turbine varies. One handle controls power output from idle to full speed. A secondary linkage automatically limits the speed of the output shaft to a preset maximum. Part-throttle fuel consumption varies roughly with output shaft speed. No warm-up is needed. Just press a button and the turbine starts in any temperature as long as fuel is not frozen. Twenty-five seconds after pushing the button, you're off.

The small size of the Turbo-Mariner package simplifies installation. Complete with reverse-reduction gear, the engine is 5 1/2 feet long, 2 feet high and 2 feet wide. Because its light weight affects balance and stability much less than heavier piston power plants, the turbine can be installed near the transom to leave a larger area of the cabin clear. The two profiles on page 132 show how it can be mounted with the output shaft forward or aft.

**Bearing Failures Licked**

Early turbines were troubled with bearing failures and vibration for a number of reasons. A change to floating sleeve-type bearings not only reduced bearing costs but increased their life and allowed a relaxation of rotating component balance requirements. Increased bearing clearances allow the turbine rotor assembly to seek its mass center and operate virtually free of vibration. Rotor assembly balance is no longer required, only component balance. Parts are interchangeable between engines, and

(Continued to page 246)





### Warning Buzzer Checks Speeding

Mounted on the dashboard, a buzzer alarm can be set at any speed and when that speed is exceeded the buzzer goes off.

The Speed-O-Minder is installed by a special bracket and is operated by a flexible cable joined to the original speedometer shaft. It fits any make car.

The warning speed can be the same as the speed limit or any speed selected by the driver or his passengers. It is listed at \$19.75 by the manufacturer, Engler Instrument Co., Jersey City, N.J.

### Exhaust From Spaceship Could Be Radio Antenna

Future spacemen may hold radio conversations by using exhaust gases from their rocket ships as antennas.

Ionized exhaust gases are good electrical conductors and could act as an antenna for communicating in lower frequency radio bands, says Barry Mindes of International Telephone and Telegraph Corp. These bands have not been used because they require a huge antenna.

**The 'All-Purpose' Oil  
For Home Workshops**  
Cleans • Lubricates • Prevents Rust  
**3-IN-ONE® OIL**  
REGULAR—OIL SPRAY—ELECTRIC MOTOR

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TO YOU  
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**RADIO SHACK ELECTRONIC CATALOG**  
Plus **Every New Supplement  
For Next 12 Months!**

- Giant book is 2/3 bigger than last year! Brims with values!
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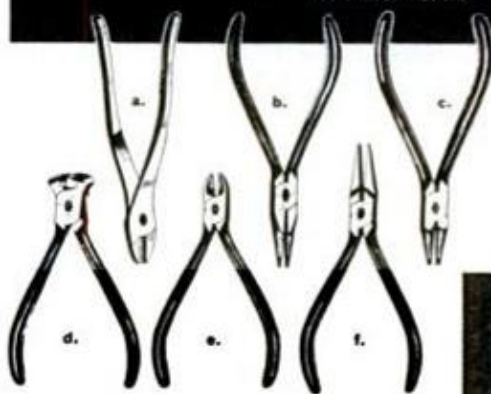
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**CARBORUNDUM®**

**P & C MIDGET PLIERS**  
for fast, easy accurate work



A complete family of precision midget pliers for telephone, electronic, radio, TV repair, assembly and every day use. Hand honed cutting edges, induction hardened. Approximately four inches total length.

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**GRAVELY  
MOVES  
SNOW  
FAST!**



## Conquer Snow With POWER!

Get out and go in spite of snow! Powerful 6.6 HP Gravelly Tractor and its big 26" Snowblower attachment clears your sidewalk and the drive in minutes. No need for hours of hard work—just guide the Gravelly and watch the snow go! All-gear Drive, Power Reverse, optional Electric Starter.

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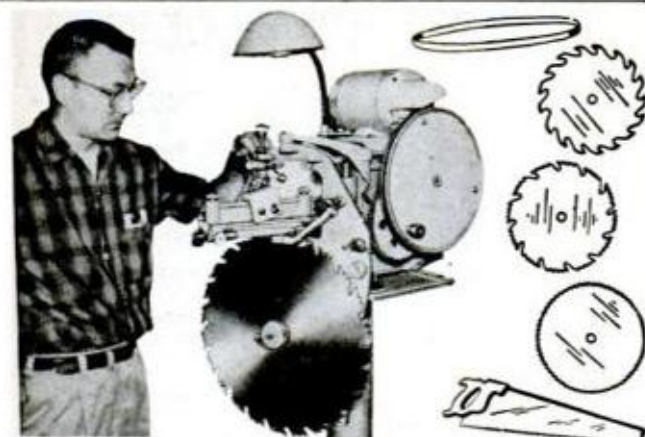
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PERFORMANCE-PROVED SINCE 1922



## CASH FILING SAWS

Here is a steady repeat CASH business you can start at home. No experience needed—no canvassing—every saw you sharpen will bring new customers. You can make up to \$3 or \$6 an hour—\$20 to \$30 a week in your spare time as a starter. "My spare time saw filing business has made me \$952 these first ten months," says R. T. Chapman.

The new model 200 Foley Saw Filer automatically sharpens combination (rip and crosscut) circular saws, hand saws, band saws and crosscut circular saws.

Free Book—"MONEY MAKING FACTS" shows you how to get into this CASH business. Time Payments if desired. Mail coupon now. No salesman will call.

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rotating components can be replaced or intermixed without the necessity for re-balancing the rotor assembly. Engine re-assembly requires only eight man-hours, with a complete overhaul requiring about 40 man-hours. Completion of tests now in progress is expected to increase time between overhaul to 2000 hours of engine operation. Mounted in the test 26-foot cruiser, that would total about 60,000 miles between overhaul. Normal maintenance between overhauls calls for a periodic burner inspection and filter element replacement.

The Boeing turbine is also being tested by Kiekhaefer Corp. with their MerCruiser inboard-outboard drive. Here again, because of its light weight, the turbine can be mounted in the aft section for direct connection to the outboard drive unit without seriously affecting fore-and-aft balance.

Inboard-outboard stern drives coupled with engines in the 150-hp. and up class offer many of the advantages of outboard engines but with more power. A Boeing turbine coupled to a stern drive offers an outboard's flexibility, propeller protection, maneuverability, and hydrodynamic efficiency along with two to four times the power normally available in an outboard drive. Compared to inboards, the stern drive permits operation in shallow water and steers positively by propeller thrust rather than by rudder.

So far the big reason more turbines haven't been used in boats is their first cost. Anyway you look at it, a Turbo-Mariner costing in the neighborhood of \$13,000 causes many boat owners to shy away despite its many other advantages. For years, high fuel consumption kept buyers away. Steady progress has eliminated this problem until today fuel costs *per mile* are definitely competitive. Similar progress is bringing the cost of the turbine power package down every year. In the past two years, turbine costs have dropped 20 percent, more than \$1000 per year. Nearly a thousand engines have been built and sold for use in a variety of powered equipment where light weight and performance offset the turbine's high initial cost. While costs will continue to drop as more engines are built, initial turbine costs will probably never reach the level of the ordinary gasoline and diesel engines. But for the boat owner who wants that extra 30 to 40 percent in performance not available from any other engine-boat combination, turbine power promises a major boost similar in many ways to the giant step forward that resulted when airlines switched from pistons to jets. ★★★



New standard for power and torque in a compact grinder!

**NEW DREMEL NO. 3  
INDUSTRIAL  
MOTO-TOOL**



This new industrial type grinder belongs on your work-bench! The No. 3 is a compact "powerhouse" developing 27,000 rpm — and sustains high torque under load. It's easy to handle (fits your hand), runs cool, lightweight. Weighs only 17 oz.! Just the ticket for precision grinding, polishing, drilling, sharpening, modelmaking — working in tight corners. Powerful 110 Volt AC or DC motor is housed in a heavy-duty, shockproof Bakelite case. Handy hanger hook keeps it within reach.

DREMEL MFG. CO., Dept. 111-K, Racine, Wisconsin

150



**No. 3 Moto-Tool** is complete with 1/8" and 3/32" collets, 3-wire grounding cord with 2-prong adapter, finger grip — in steel case. **Only \$29.95.**

**No. 2 Moto-Tool** — long time favorite with industry, craftsmen, model makers since 1936 —

**No. 2 Moto-Tool** with 3-wire grounding cord, \$19.95.

**No. 2 Moto-Tool** with 23 accessories in steel case, \$29.95.

See Your Dealer or Write for Complete Power Tool Catalog

**Keep Tools in  
Tip-Top Condition**  
Lubricate • Clean • Prevent Rust  
**3-IN-ONE® OIL**  
REGULAR—OIL SPRAY—ELECTRIC MOTOR

**\$47,983.06 ORDERS FROM 12 WORD  
CLASSIFIED AD.** Amazing — Startling — but TRUE. Terrific story sent free. Request must be made on business letterhead. F. W. Johnson, Classified Adv. Manager, 200 E. Ontario St., Chicago 11, Ill.



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Cards, Stationery, Advertising, Circulars, labels, photo and movie titles, church work, tags, etc. Save money. Sold direct from factory only. Raised printing like engraving, too.

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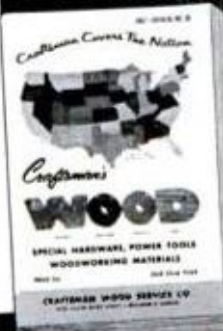
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## This Way, Please!

(Continued from page 97)

rooming crowd causes panic," Andy explains. He never fastens his turnstiles down. They can always be pulled aside at the first sign of trouble.

All Andy's planning in depth would come to nothing if it were not for the care with which he selects and trains the ushers who wear his blue and gold. At least in Chicago he personally picks the youths who work for him. They are mostly tall, well-built college boys, 18 or over, of above average intelligence. They must have good teeth, "not for biting but for smiling" and friendly personalities. They are the sort of young men who can get along well with a crowd and can command its attention in case of trouble.

Their training is intensive and continual. Andy and his lieutenants talk to them before each big event like football coaches. They try to anticipate what the crowd is likely to do, point out the weak spots in their positions. They lecture from charts and blueprints. Sometimes they show movies of crowd flows, pointing out the jams and the bottlenecks. The boys are schooled in how to give quiet commands and are drilled in marching.

### Mexican Firing Squad

The military polish of the ushers ordinarily makes a good impression, but once it almost put a group before a firing squad. En route to handle the crowds at the Agua Caliente races in Mexico, a bus load of ushers was taken for revolutionary troops. Mexican government soldiers threw them into prison until Andy could come to their rescue.

Usually Frain ushers have the muscle to meet any ugly situation that may develop. When the Chicago Blackhawks brawled during a Stanley Cup play-off, Andy's usher son Mike had two teeth knocked out and six stitches in one cheek, but he restored order. On April 1, 1960, Frain's boys rescued a fan who tried to throw a cup of beer at a Montreal Canadian player, splashed the spectators in the first row instead, and started a riot. At the Republican National Convention last summer 1000 Nixon demonstrators got out of hand and showed no intention of responding to the chairman's frantic gavel. Then a 16-year-old usher guided them through a doorway to where they thought they could get closer to their hero. Instead they found out too late that the door opened out onto Halsted Street.

A left-handed testimonial that Andy Frain's boys make up an effective force for order in public gatherings came from the

(Continued to page 250)



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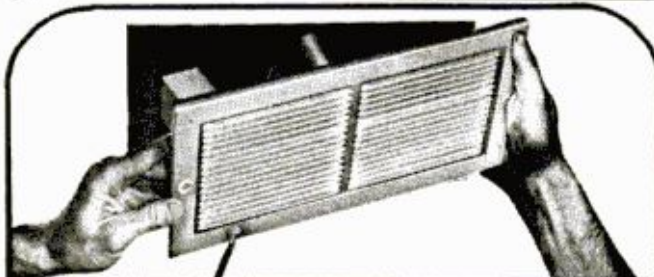
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football fan who admitted, "I feel a thrill when I knock over a set of goal posts, particularly in this challenging age when most goal posts are set in concrete and guarded by Andy Frain ushers."

How does a boy grow up to be a crowd engineer consulted by architects charged with planning new stadiums, the friend of world political figures whose persons he has safeguarded and head of a business with a million-dollar payroll every year? Andy Frain believes it helps to be one of 17 children as he was. He learned early how to move crowds by directing his brothers and sister into the family bathroom of their small Canaryville home in Chicago on busy school mornings. Today he has five bathrooms in his suburban mansion.

At 13, Andy was already supporting himself. He chased pigs in the nearby stockyards and sold seat cushions at ball games in Comiskey Park. Ushers were then paid as little as a dollar a game.

### Bribery Was Commonplace

"Anybody who offered those guys a bribe could get any seat in the house!" Andy remembers. "In a crowd of 33,000 you could be sure that 10,000 got the wrong seats."

He rounded up five other Canaryville boys and persuaded them to join him. They did not have enough money to buy caps or uniforms, but they purchased blue ties which they hoped would set them apart from the seedy ushers of the day. They shined their shoes and pressed their pants.

Major Frederick McLaughlin of the Chicago Blackhawks hockey team gave Frain his first chance. He had been troubled by mysterious shortages in the gate receipts.

The boys from Canaryville proved as honest as they were rugged. Politely and firmly they refused all bribes. The gate receipt shortages disappeared. P. K. Wrigley, owner of the Chicago Cubs, was also weary of dishonest ticket takers. He put Frain in charge of Wrigley Field's 250 ushers.

Within a week Andy had fired all but four men and replaced them with dependable youths. But he cleaned up Wrigley Field. Soon his ushers were protecting the public at World Series games, championship prize fights and horse races.

### Delivering a Baby

Young ushers grew accustomed to quick changes of pace which might find them at a horse race in the afternoon and an opera benefit in the evening. One medical student acted as a pallbearer one day. The next afternoon while he was ushering a ball game, he helped an expectant mother give birth to her baby in the stands. "From the

(Continued to page 252)



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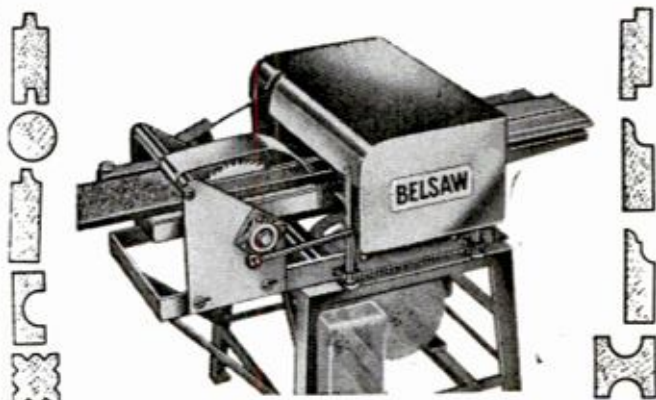
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cradle to the grave with Andy Frain," he quipped.

Whether at a national political convention or at a baseball game, the Frain ushers have most of their trouble with gate crashers. At last summer's Republican convention a hefty shirt-sleeved man strode in on the heels of Nelson Rockefeller.

"I'm going in with my buddy," he told the usher.

### Herbert Hoover's "Buddy"

The usher spun him around in a judo grip and propelled him out the door into the parking lot. In a moment he was marching in on the heels of another "buddy," Herbert Hoover. The usher had no sooner disposed of him for the second time than another gate-crashing artist approached. "Don't you know who I am?" he asked. "Why, I'm Andy Frain."

The usher pointed to Andy, Jr., who was the troubleshooter at the gate. "Mr. Frain," he said. "I'd like you to meet your son."

A Chicago restaurateur who makes gate crashing his hobby put a goat inside a suitcase marked ABC and got inside among the delegates. As red-faced ushers closed in on him, he called for recognition on the floor so that the goat could make a speech.

The all-time king of the art of slipping by Frain ushers was James "One-Eyed" Connelly. Once inside a place he would find Frain, wave jauntily and shout, "Look, Andy!" Then he would run out so he could have the pleasure of crashing the gates again on the same evening.

When the National Biscuit Company opened a new plant on Chicago's southwest side, the public was invited to an open house. Admission was free, and Frain's boys relaxed their defenses against "One-Eyed."

"There he was," remembers Andy, "selling peanuts to the visitors—peanuts that he had no right to sell."

### Connelly Versus Wrigley

Andy finally decided that only way to lick "One-Eyed" was to hire him. In 1944 Connelly put on the blue and gold to usher at Wrigley Field during the Cub-Tiger World Series. He stopped a ticketless man at the gate.

"I'm P. K. Wrigley, Jr., I own this ball park."

"That's for the birds," said "One-Eyed."

The man *was* Wrigley, and he was irate enough to demand that "One-Eyed" be fired. Connelly went back to crashing gates.

In December, 1953, Frain heard his nemesis was sick at an old people's home and went to see him. Soon afterwards "One-Eyed" died.

"He must have crashed the Pearly Gates," said Andy. "I'd like to see St. Peter keep him out."

Andy, who himself has been called a "St. Peter at the earthly gates," admits to a begrudging admiration for the gate-crashing prowess of old "One-Eyed," but for the most part he considers gate-crashers as an evil that besets the public, something to be lumped together with badly located washrooms, poor ventilation, hard seats, staircases where ramps should be and haphazard ticketing. Frain, who has made a science out of crowd engineering, points out that late crowds cause themselves inconvenience too.

"Come on time," is his advice to you whether you are going to a prize fight or a world series ball game. "Get to your seat a good half hour ahead of time. When you get near the stadium, look at the top of your ticket for your gate number. Use that gate and don't waste time trying to go in some other gate."

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## Stars Throw Off Tons of Gas

Red stars, the largest known, send as much as a trillion tons of gases into space each second.

Dr. Armin J. Deutsch of Palomar Observatory, Pasadena, Calif., first found the gases spewing from the giant Alpha Herculis, which is about 186 million miles in diameter. (The sun is 864,000 miles.)

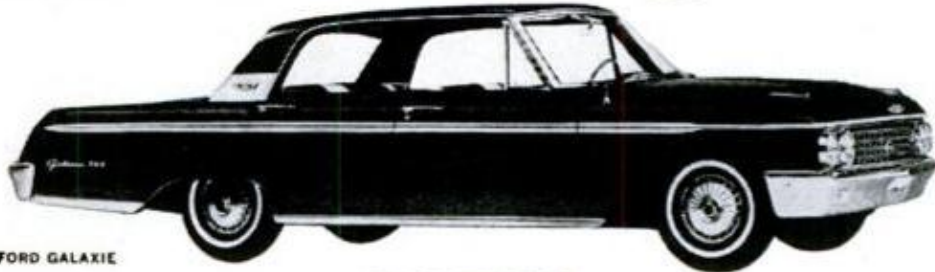
Spectroscopic observation showed Herculis' gases are blowing about a hundred billion miles away from the star. Gas also streams from the sun, but as it is smaller and hotter, gases move from it at a lesser rate.

The red stars gradually shrivel up as they release matter into interstellar winds. But in so dying, says Dr. Deutsch, they probably supply half of the material used to form new stars.





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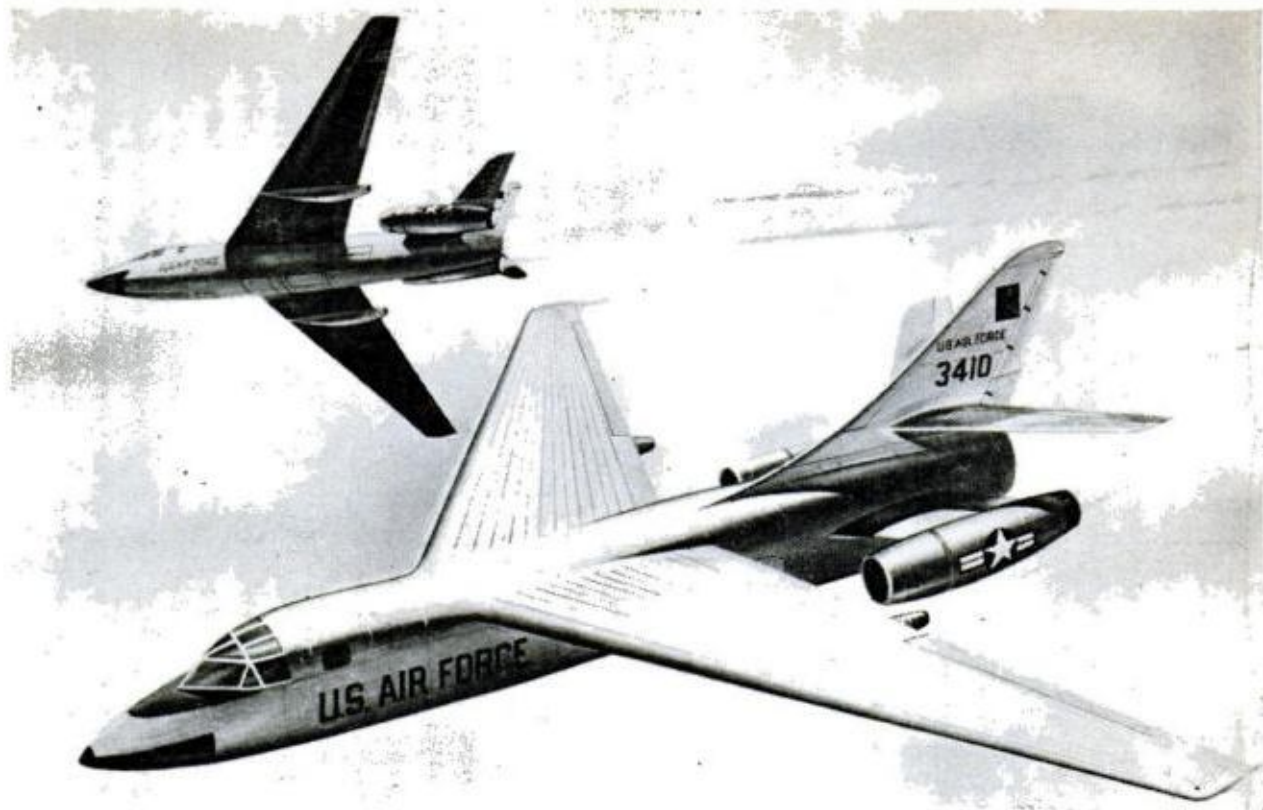
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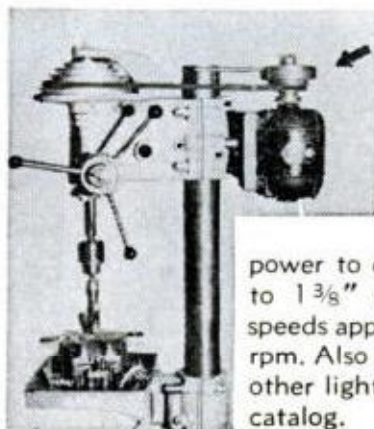
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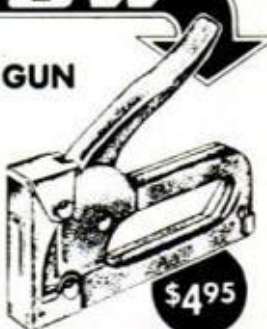
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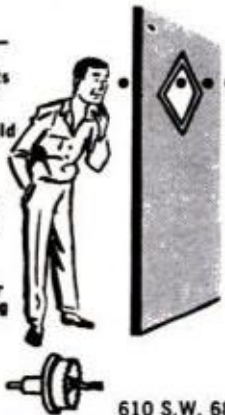
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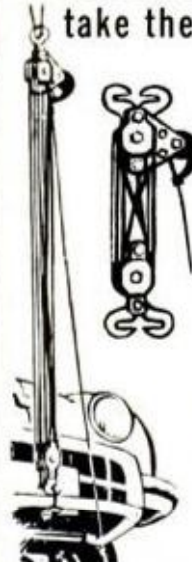
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Resembling a horseshoe, a post puller made of cast iron or steel attached to an ordinary jack can pull posts with diameters to six inches. Price: \$12.95; Post Puller Co., Donahue, Iowa.



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## I Flew the Flex-Wing

(Continued from page 89)

300 feet fully loaded at around 30 miles per hour and cruise at about 75 miles per hour.

This machine could be converted into a road vehicle in a few minutes by unfastening the safety locks and folding the wing's leading edges back alongside its keel. Motive power would continue to be furnished by the propeller.

With a vehicle like this a rancher could do all sorts of odd jobs. He could inspect his fences from the air, carry supplies to water holes, transport machinery and laborers to distant points and do his own crop dusting. He could move calves or sheep from one range to another. With the wing folded back he could travel on the surface into hilly areas far from suitable landing places.

"If he wants to go to town," Craig says, "he could change his cloth wing for a smaller one in about half an hour. The small wing hasn't the carrying capacity of the larger one but it provides more speed. And the rancher could fold it back for street use in town."

What's the price? This hasn't been worked out but it's probable that a sturdy vehicle could sell for well under \$10,000 including the small speed wing for long trips. This craft would be almost foolproof and could be flown with minimum instruction.

### Don't Try a Build-It-Yourself

But don't try to design or build one yourself. Design factors are very precise and even a small change can make a tremendous difference in safety or handling. As an example, we recently scalloped the trailing edge of the wing to try to eliminate the slight flutter that occurs at the back of the cloth. It was a small change and yet it shifted the center of lift so far forward that the plane was too hazardous to fly until we repositioned the hinge point.

The principle of the Flex Wing originated with Francis M. Rogallo of the National Aeronautic and Space Administration who has since been in charge of Flex Wing research at NASA's wind tunnels at Langley Research Center. Models have been tested in free flight in wind tunnels and have been dropped, as gliders, from helicopters. Larger gliders with simulated pay loads have been released from rockets at altitudes of up to 200,000 feet. Powered models controlled by radio have been flown.

From this research several outstanding characteristics of the Flex Wing became apparent. It has twice the lifting capacity of a parachute per unit of surface. It is extremely stable and returns to its normal attitude after any kind of disturbance.

These features make it ideal for "unattended" applications and for use as a glider, either towed or free.

Ryan Aeronautical's interest in the flexible wing comes in part from a NASA contract to evaluate its use as a paraglider for returning Saturn boosters to safe landings. One glider that is being studied has rigid leading edges, another has leading edges that are inflated pneumatically into shape. Either would be folded and stored inside a fairing on the booster and would automatically deploy after burn-out to be steered by radio to a selected landing site. Landing speed would be about 70 miles per hour on extended skids or on a soft inflated runway. North American Aviation has a somewhat similar study contract.

Recovery of the booster would save some \$5,000,000 if it could be used again. Recovery would be even more important if the booster malfunctioned in flight. The physical evidence of what went wrong could then be studied in detail. And recovery of boosters points the way to the safe recovery of future space craft such as the return to Earth of Apollo capsules and their crews from the moon.

### Wing Built of Steel Mesh

We are peering only a little way into the future when we discuss that idea. A heavy space craft would start its plunge through the atmosphere at fairly high Mach numbers even after an initial braking by retro-rockets. The Flex Wing paraglider would then slow the craft so effectively that aerodynamic heating would be minimized. The wing could be built of stainless-steel mesh bonded with thin titanium sheet.

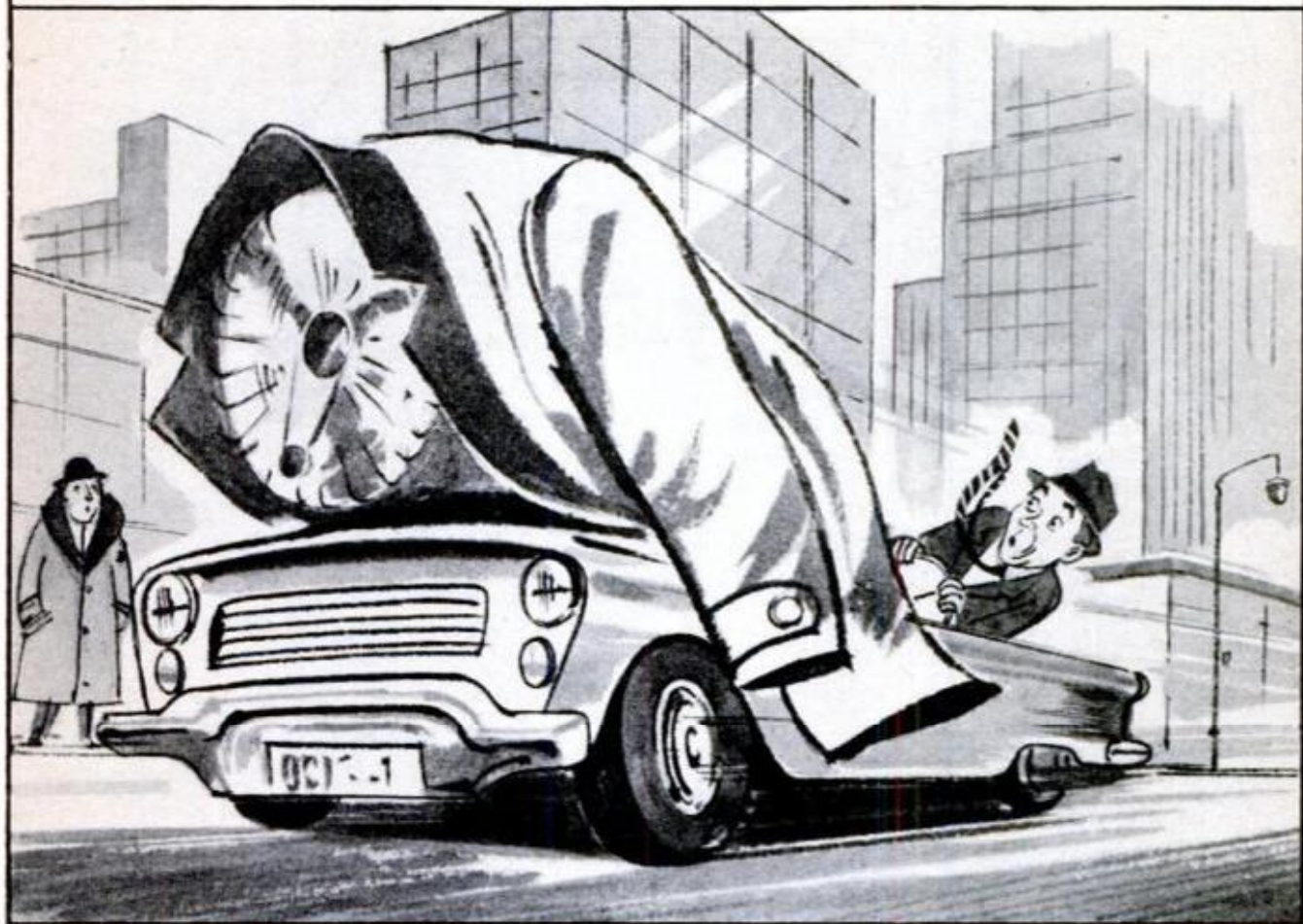
Many other kinds of chores have been suggested for the new wing. Small Flex Wing drones could perform photo or TV reconnaissance missions with less than the usual amount of radio control because of their inherent stability. Steered back to base, they could be landed at slow speed. Larger drones could be used in antisubmarine warfare to carry depth charges or homing torpedoes that would be dropped in the vicinity of hostile subsurface craft.

Under radio guidance, cargo Flex Wings could deliver supplies in ship-to-shore operations and return to the ship for more loads. A different application may be to use helicopters to tow Flex Wing gliders to the area of a drop site and then release them, after which the gliders could be steered to safe landings in response to radio commands.

Other jobs are being suggested all the time. The fact is that we don't yet realize all the possibilities of the brand-new and yet millions-of-years-old flexible wing. ★ ★ ★



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**IDEAL PROTECTION FOR HOME AND CAMPING TRIPS**  
7<sup>3</sup>/<sub>4</sub> ounce Lightweight Model with Satin Chrome Finish, Pearl Grips, Gold Trigger: **'42<sup>50</sup>**. Nickel Plated, Luxuriously Hand-Engraved Model: **'75**.

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**Sugarplum Swiss** chalet is yours for the fun of building it, if you follow the simple plans in the December issue of PM.



### Cold-Morning Companion

This electronic auto brain will start a car's engine and heater automatically, hold the engine at a fast idle until warm, then slow it down. Engine and heater are shut off when inside temperature reaches a pre-set level, then start again when temperature drops 10 degrees.

When car won't start, the electro-mechanical unit—invented by Daniel J. Rutecki of Buffalo, N. Y.—waits and tries again. In case of engine failure, it will crank for about 10 seconds before shutting off completely. As a theftproof feature, if the emergency brake is released or car is put in gear, engine shuts off.

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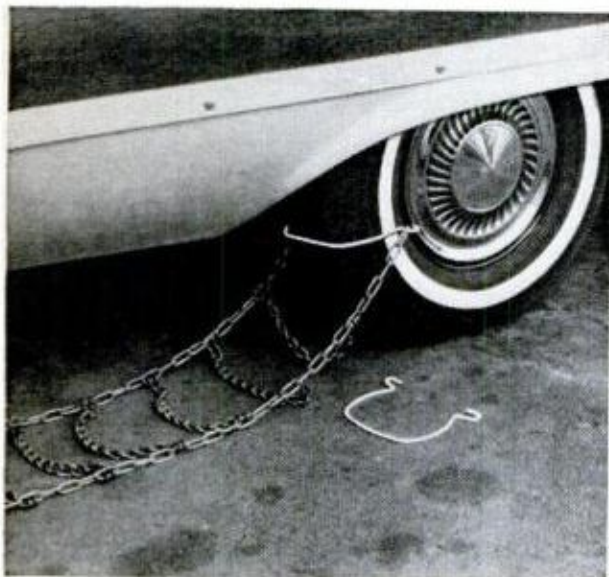
**"Contributions to the United Fund are really investments! Sure, charity takes the edge off hunger and misery. And that's necessary. But the agencies of the United Fund go way beyond that. They give the help that gets people back on their feet, makes them productive members of the community again. So it makes good sense to give the United Way—as an investment in a stronger, more prosperous community. Besides, that's the American way: to take care of our own, right at home. Our company makes a contribution, urges its employees to join in and makes it convenient through payroll payments. This once-a-year appeal cuts down the confusion of separate drives, too. It's more than a charity, George. It's an investment—and a duty—for your business and mine!"** **GIVE THE UNITED WAY**





### Filing Drawer Opens at Side

Opening on the long side, a new file has drawers that are like shelves, too. This feature allows contents of the drawer to be fully exposed when needed; two clerks may work the file at the same time. *Shelv-adrawer* is made by Wheeldex & Simpla-Products, Inc., Peekskill, N. Y.



### It's a Snap

Tire chains go on easier with a new spring clip sold by Easy-On Chain Clips, 8640 W. Third St., Los Angeles 48, Calif. Chain is laid out behind tire and first links hooked into prongs on clip. When spread to surround tire, clip secures itself to wheel rim. Driving forward wraps chain around the tire. Clip is removed and chain is fastened in usual way. One size fits most cars and trucks. \$2 per pair.

NOVEMBER 1961

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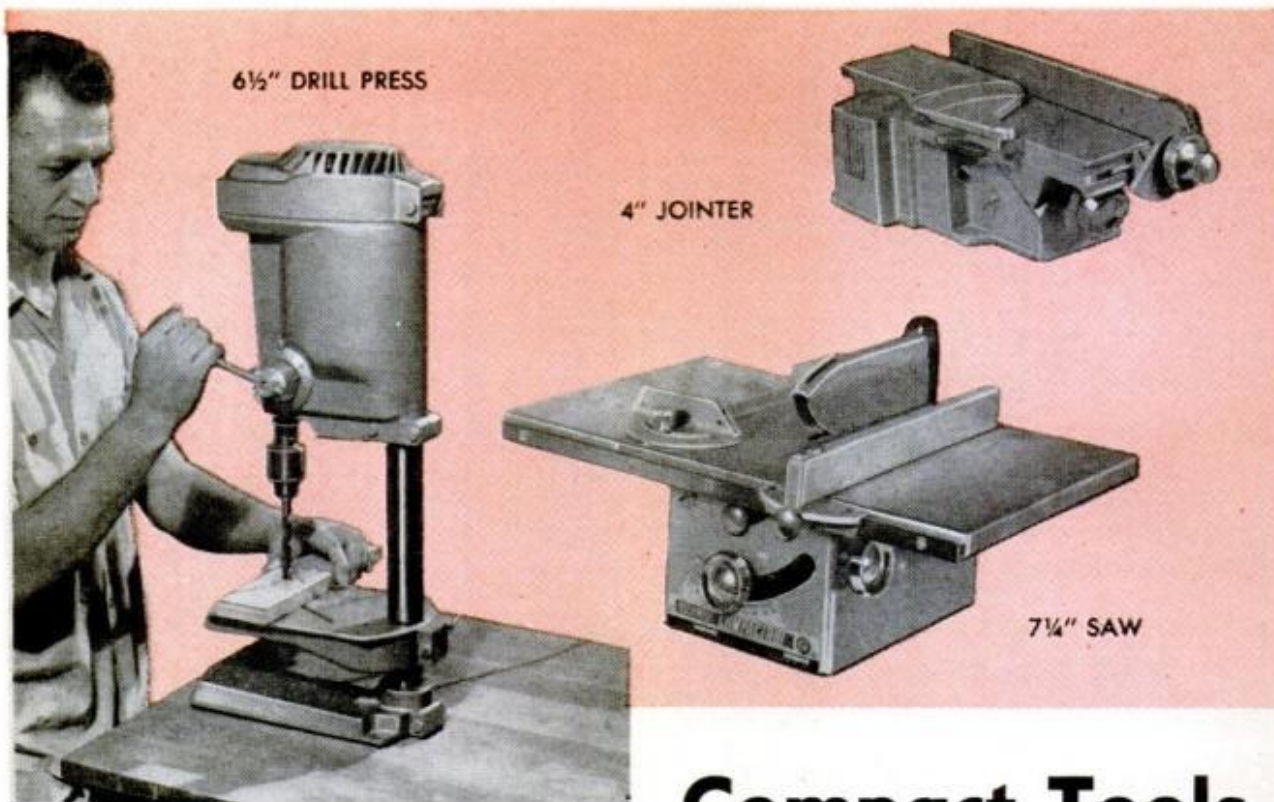
Complete flexible shaft with handpiece ready to attach to your motor priced from \$11.75. Many models available including complete machines. Satisfaction guaranteed. Write for illustrated bulletin #301.



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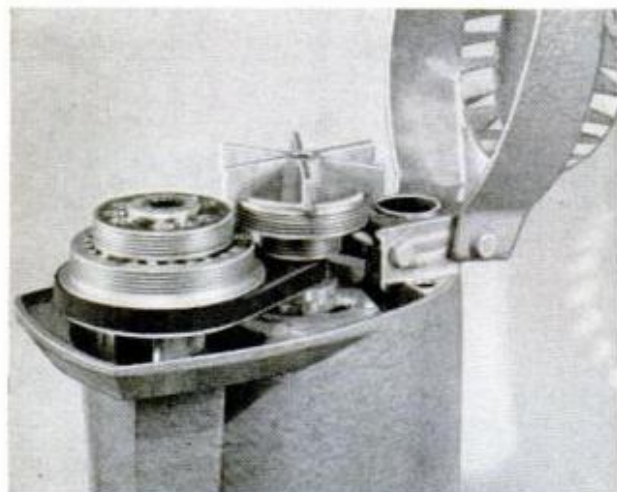
4" JOINTER

7 1/4" SAW

**DRILL PRESS**, also jointer, are belt driven, have new Poly-V-Belt drives which are nonslip, easy to shift

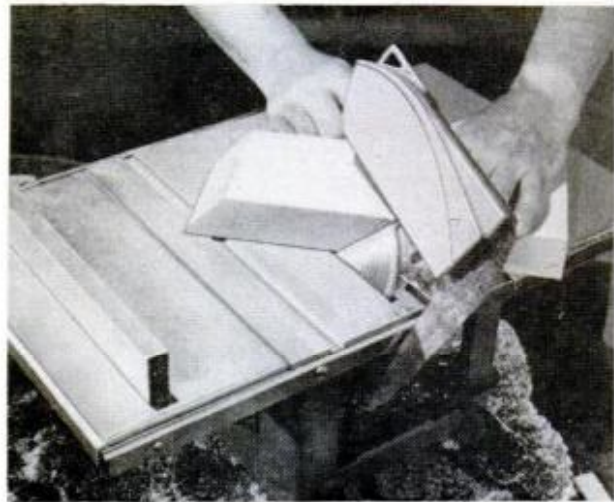
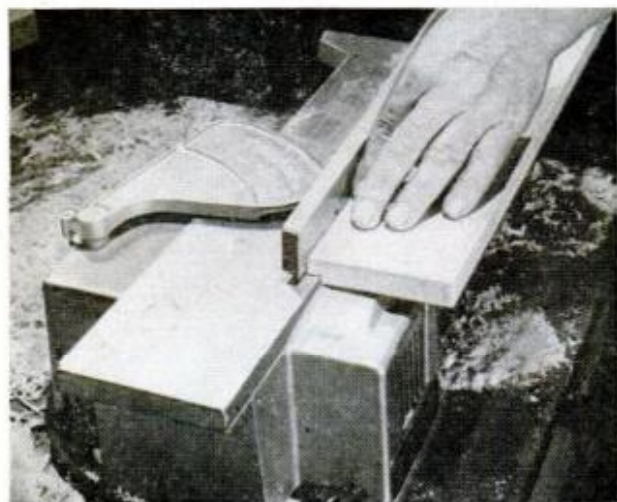
## Compact Tools

These new tools come to you in a cardboard box, under-arm size. Unpack, place on the bench, plug in, flip the switch and they run. Motors and switches are built in. Table saw has 1/2-in. arbor taking 7 1/4-in. blade. Arbor tilts to 45 degrees; drive is direct. Table size is 14 x 24 in. with extensions, which are accessories. The 4-in. jointer has tables 19 1/2 in. overall with a fence that tilts 45 degrees right and left. Has 3-knife cutting head. Drill press has 7 3/4 x 11-in. table, spindle speeds 800, 1750, and 4000 r.p.m. and a drilling capacity in cast iron of 1/2 in. All three are made by Rockwell Mfg. Co., Delta Power Tool Div., 400 N. Lexington Ave., Pittsburgh 8, Pa., Price is \$79.99 each.



**JOINTER** has capacity of 4 in., makes any cut possible on a jointer. Main parts are aluminum for lightness

**SAW** makes compound angle cut on 2 x 4. Motor is direct drive. Motors have overload protection





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Manufactured for govt. antarctic expeditions for jeeps and half-tracks. Heating unit puts out over 20,000 B.T.U.'s. Late recirculating type. Burns any type gas. 12 volt system. Fuel consumption extremely low. 1 gal. per 8 hrs. Terrific for trucks, etc. With service & installation manuals & many components. Approx. GOVT. COST \$550. Shpg. wt. 50 lbs. NEW. \$39.95. Limited quantity. Also available in 6 volts. \$39.95.



**ELECTRIC STORAGE BATTERY WINCH**

New, improved model contains heavy-duty, 2-way drum switch. Fully reversible heavy-duty, two-speed motor, 160 to 1 gear reduction. Ball bearing construction throughout. Drum will handle 70' of 1/4" cable. Can be used on 6, 12, 24 V. battery. Lift cap. 2000 lbs. plus. Ready to install & operate. 19" long x 9" wide x 8" high. For jeeps, trailers, boats, trucks, etc. Complete with mounting flange, safety load locking brake and leads. Shpg. Wt. 60 lbs. Approx. GOVT. COST \$400. NEW. Model E. \$49.50.

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\*G.E. Generator noted above can be purchased separately. Makes deluxe heavy-duty welder comparable to the finest commercial welders available. Wt. 90 lbs. Approx. GOVT. COST \$600. Gen. alone—\$49.50.



**DELUXE ELECTRIC STORAGE BATTERY WINCH**



Handles 250' of 1/4" steel cable. Operates on 6, 12, 24 V. battery. 160-1 gear reduction. Lift cap. 2500 lbs. Contains heavy-duty mounting base with outrigger bearing and spool support. Rugged construction. Heavy-duty dual speed motor with safety load-locking brake. Dim. 24" long x 9" wide x 8" high. Great for jeeps, trailers, boats, trucks & campers. Shpg. Wt. 80 lbs. Approx. GOVT. COST \$490. NEW. Model E-D. \$69.50.



**FRESH WATER SYSTEM PUMP**

For boats, campers & trailers. Output 10 to 200 gal. an hr. Variable rheostat controls output. 1/2" pipe thread into bronze impeller housing. 12 V.D.C. Radio noise filter. 5.2 amp. draw. Explosion-proof const. Shpg. wt. 11 lbs. Complete with mounting instructions & wiring diagram. Approx. GOVT. COST, \$200. NEW. \$10.95.

**225-1 REDUCTION GEAR** For beaching boats, winches, hoists. Ideal motor in golf or boy's electric car. DC motor and clutch. Easily reversible wiring diagram furnished. Hi torque, 105 RPM. Runs on 6-12 or 24-32 V. 65 lbs. gross. Approx. GOVT. COST \$300. \$13.50. Matched splined gear—\$3.00 ea.



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R50 Pulls 50 lbs. (3 x 3 x 2 1/4 in./wt. 38 oz.).....\$3.95  
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For cutting and grinding on wood, metal or plastic. Includes 26 mtd. wheels and points on 3/32" shanks; 24 miniature cutters on 3/32" shanks; 25 short shank min. cutters. 12 Bristle Brushes on 3/32" shank. Will fit all electric drills and hand grinders.

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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.

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One drum, 1" dia. x 1" long on 1/4" arbor with 6 extra sleeves **\$1.00 P.P.**

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Fits in the palm of the hand and has an air-cooled motor that runs at 27,000 rpm AC or DC at 110 volts. Comes complete with both 3/32 and 1/8 inch Collets. **\$19.95 P.P. cord and plug.**

**10 Morse Taper Shank Drills** asstd. sizes up to 1". Brand new. **\$6.75 P.P.** (Add 50c postage.)  
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36 for 7.50 P.P.  
For grinding on plastic, wood, soft & hard metals. Regular Value \$8.40. **12 Mounted points on 3/32" shank \$2.50; 12 mtd. wheels on 1/4" shank \$4.75.**

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**ACon-O-Mizer**

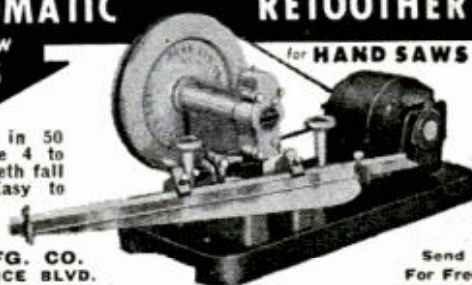
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## Electronic Management System For Supersonic Aircraft

Airliners of the future will have an additional crewman—an electronic management system that will mechanize and automate routine tasks, freeing the flight crew for important tasks of decision making.

A five-year study proved the feasibility of using such systems in supersonic aircraft for preflight checkouts, takeoff monitor and control, flight profile control, propulsion and fuel-system management, navigation and communication, environmental control, minimum-weather landing system and data display systems.

## Volatile Liquid Rocket Fuel Easier to Handle Than Jelly

Experiments have turned highly volatile liquid fuel into easier-to-store, safer-to-handle jelly that can readily be liquefied again. The tests cost the Air Force Flight Test Center \$185, but may save thousands of dollars if put into effect.

Based on what scientists call the thixotropic principle, the jellied fuel lessens the danger of leaks and evaporation losses as well as making it safer to handle.

All equipment used in the experiments was improvised from used or surplus parts. In addition to "jelly-fying" the fuel, the equipment mixes it at the same time it feeds it into the storage tanks. Previously, the fuel had to be mixed elsewhere and hauled to the tanks.

## Gas Envelope Doubles Speed Of Underwater Missiles

Skin-friction drag of hydrodynamic bodies, such as underwater missiles (torpedoes), can be eliminated by enveloping them in a gaseous film.

The envelope has been created in the laboratories of the Convair Division of General Dynamics Corp., San Diego, Calif., by heating the hydrodynamic body as well as by using surfaces which react chemically with water. The effect is to move the missiles through gas instead of through water. The water does not cling to the body.

Convair engineers say the idea could be expanded to include manned underwater vehicles. Under optimum conditions, the skin friction can be reduced by as much as 95 percent, increasing the vehicle's range. And underwater missiles could be speeded up to the point where enemy submarines or surface vessels would be unable to take effective evasive action.

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Apply... Let Dry... Sponge Off... Color's Gone

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# JOB-MATCHED 1962 CHEVROLET TRUCKS

**New job-matched efficiency—more models to handle more kinds of work!**

■ There's a new world of worth in the Chevy truck line for '62—trucks powered and built to work more, save more, *earn* more! Power's *up* in every weight class; big High Torque 261-cubic-inch 6\* is new in light-duty models; new High Torque 327 V8\* powers middleweights; new 409 V8\* puts out more pull in the heavyweight trucks. And there's new medium-duty *diesel* power, too—a sure income booster on high mileage runs! A total of nine great High Torque engines enable you to match truck power to your job precisely for top performance and economy. *In every conventional model you get new Easy-View styling—a design that's as practical as it is good looking with a vision-sloped hood that enables the driver to see as much as 10½ feet more of the road ahead.* Every truck gives you the toughest of work-proved components . . . road-smoothing Independent Front Suspension on conventional models . . . easy-going Comfort-King cabs . . . scores of features that save you time, work or money every trip. If you've got a job for a truck—any kind of job—see your Chevrolet dealer about a 1962 Chevy *Jobmaster!*

## NEW HIGH TORQUE POWER IN EVERY WEIGHT CLASS!



**New wider choice of light-duty power**—Three work-proved Chevy engines for the light-duty line! Famous sure-saving High Torque 235 6 is standard. And, for '62, the rugged High Torque 261 6\* offers extra power plus dollar-saving durability to put you money ahead on tough hauls. And, for the extra punch of V8 power, you may specify Chevy's High Torque 283 V8\*.

**New 327-cubic-inch V8\***—Here's the biggest Chevy medium-duty engine yet, with 185 h.p. and 305 ft.-lbs. of torque to keep big loads moving at minimum cost. With long-lasting components and short-stroke design for efficient performance, it's provided optionally on Series 60 and 60-H models. Heavy-duty 261 6 is standard.



**New 409-cubic-inch V8\***—Gives you 409 cubic inches of high-performance, big-payload power designed to keep going when the going's hard and heavy. You get 252 h.p., a whopping 390 ft.-lbs. of torque, backed by a build that just won't quit. Available on Series 80.

## NEW DIESEL POWER FOR MIDDLEWEIGHTS



**Chevy-GM 4-53 Diesel**—New for '62, this work-proved engine brings diesel's special brand of fuel-saving, low-maintenance performance to Chevy's medium-duty truck line. Compact, rugged, high in torque, it's backed by years of GM Diesel experience. Here's a precision-built engine, designed to pay for itself many times over during its service life. It's tailor-made for 1962 Series D60 and D60-H models.

## NEW EASY-VIEW STYLING!

Practical new truck appearance eliminates front fender blind spots! Newly designed hood slopes neatly down at front and sides for maximum up-front visibility.



**Owner-Proved Corvair 95 efficiency**—Owners everywhere have profited from Corvair 95's kind of cost-cutting efficiency—from quality that's unique, in this truck class. Everything that adds up to stay-on-the-job sturdiness is right here—payload capacities up to 1,900 lbs. . . . short 95-inch wheelbase . . . economical air-cooled rear engine design . . . tough unitized body construction . . . smooth 4-wheel independent suspension.

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New Chevies by the hundreds with  
new highs in hard-working power  
. . . new styling that does more for  
you . . . new *job-matched* models  
and components . . . a new world of  
worth that's out to do more work!



**ORVAIR 95 CORVAN**— Work-proved rear engine efficiency and *quality* construction. Easy handling, good looking, and remarkably roomy inside, the Corvan carries up to 1,700 lbs. of cargo astride an easy-handling 95-inch wheelbase. Low-loading heights, accessible load space ease deliveries.



**TEPSIDE PICKUPS**— These hard-working workhorses, with handy side running board, pave the way to extra earnings with smooth Independent front Suspension, High Torque 6 or V8 power and big payload capacities. Bodies up to 108 inches long provide ample room for bulky loads.



**CHEVROLET MOTOR DIVISION**  
**P. O. Box 7271**  
**Detroit 2, Michigan**

*Please send descriptive literature and specifications data on Chevrolet's 1962 truck line.*

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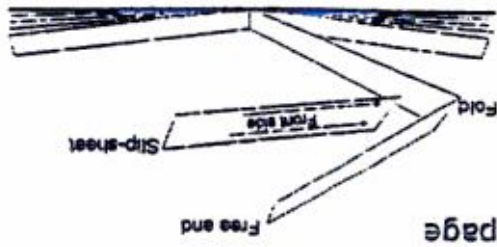
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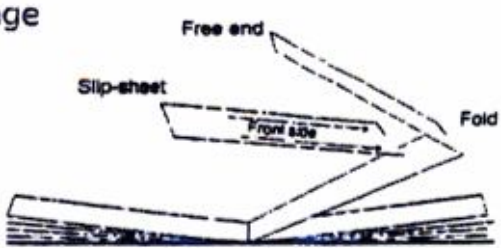
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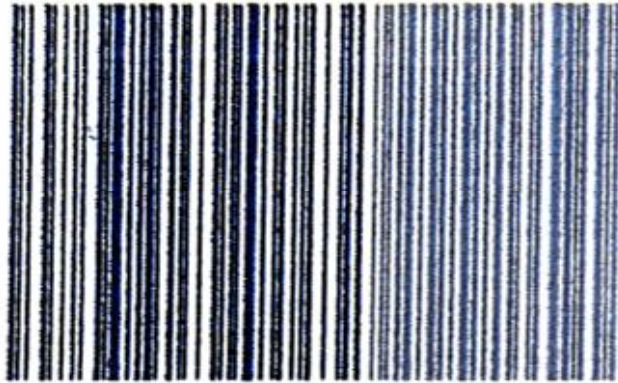
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Back

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**FLEETSIDE PICKUPS:** 6 models; bodies in lengths of 78" or 98"; choice of 6-cylinder or V8 power. **FOUR-WHEEL-DRIVE PICKUPS:** Choice of Fleetside or Stepside Pickups; also Panels, Carryalls and Chassis-Cabs for go-anywhere hauling. **SERIES 80 TANDEMS:** 3 models with 30,000-lb. Eaton-

Hendrickson bogies, 5-speed Spicer transmission and V power standard. **SERIES 50 STAKES:** Select-wood bodies, or 12 ft. long; rugged chassis and driveline. **CORVAIR 95 RAMPSIDE:** Convenient side loading ramp, cost-saving air-cooled rear engine, 4-wheel independent suspension



**PANELS**—Newly styled, they haul big payloads (up to 3,000 lbs.) economically. GVW's up to 7,800 lbs. Smooth Independent Front Suspension. High Torque 6 or V8 engines for low-cost power aplenty.



**SUBURBAN CARRYALL**—Here's station wagon styling combined with truck utility; carries 8 passengers or up to 950 lbs. payload. Available also on go-anywhere 4-wheel-drive chassis.

*Yours for the asking:*

## **FREE INFORMATION**

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A difference  
you can taste—  
a difference  
you can feel!



**Moisturizing is the secret**

It seals in natural freshness and flavor. We call it Flavor-Seal—you'll call it *great!*

L&M's fine tobaccos are always fresher when you smoke them ■ Your *taste* stays fresher . . . L&M's are never drying to your taste ■ L&M's special *moisturizing* seals in the natural freshness and flavor of fine tobaccos ■ So start fresh with L&M today.

Get fresh-tasting best-tasting L&M...*pack or box*