The Navy’s Bobtailed Fireball
—Page 121

TUBELESS TIRES—What Drivers Think of Them
How to Measure Physical Fitness
For the Craftsman
BUILD YOUR OWN TELESCOPE
Lesson number one: a new set of ACs can save three times their cost in gasoline

First solo! Great day for any driver... and it's a great day when a new set of AC Hot Tip Spark Plugs goes into your car. Here's why: the long, thin, recessed "Hot Tip" insulator heats faster to burn away carbon, oil and combustion deposits. This exclusive AC anti-fouling action assures efficient fuel combustion—saves as much as one gallon of gasoline in ten. In an average year's driving this would pay for a new set of AC Hot Tip Spark Plugs three times over.

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Today and Tomorrow you’re better off in the U.S. AIR FORCE
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Next Month...

BOLD ARCHITECTURE will dominate the 1958 International Exhibition at Brussels. One of the startling structures, a symbol of the atom age, will be the Atomium—a 334-foot high model of an iron crystal. In the January issue you’ll see a dramatic preview of the 1958 World’s Fair.
The car that uses more aircraft principles than any other land-bound vehicle yet built

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

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

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

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

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

1. Flight Pitch Dynaflow® Has First True, Infinitely Variable Stator — As you raise or lower your foot on the gas pedal, you automatically change the angle of the blades in this stator. You literally switch the pitch a million ways, just like today’s airplane propeller. Oil, pouring through these vanes against the pump at 180 m.p.h., is redirected to suit every driving situation. You can have maximum power ratio for starting, hills, emergencies. You can have maximum economy ratio for effortless cruising. You’re always in perfect pitch.

2. B-12000 Engine Develops Thrust of 12,000 Pounds Behind Each Piston Stroke — This is the most modern, the most efficient engine it is possible to build for today’s fuels. Vertical-valved for compactness, this great power plant exerts a 10 to 1 compression — releases a thrust of 6 tons at each piston’s power stroke. Combined with Flight Pitch Dynaflow, that results in superbly smooth and instantaneous response — a sense of control utterly different from any other car of similar size and weight. Here is the first big car that’s light on its feet.

3. Air-Cooled Aluminum Brakes® Run Cooler, Make More Quick Stops Without "Fade" — Aluminum absorbs and dissipates heat quickly — so Buick engineers built the front...
brake drums of aluminum. On each drum, they designed 45 fins, which hurl cooling air inside the brake. Still not content, they made all brake linings wider and thicker. The result: Straighter, surer, smoother braking — especially on downgrades. Longer lining-life, even in worst traffic areas.

4. Miracle Ride plus Buick Air-Poise Suspension* Is Automatically Self-Levelizing — Buick’s new ride begins with these traditional basics: X-member frame; full-length torque tube, soft coil springs at all four wheels. These, together with new ride improvements such as longer stabilizers and outrigger shock absorbers, produce a thrilling new experience that well deserves the name, "The Miracle Ride." This same basic Buick ride engineering was made to order for air suspension — makes Buick’s new Air-Poise Suspension the world’s finest. Four columns of compressed air (in place of the four coil springs) give you an infinitely variable spring rate — same smoothness, same “come-back,” same ideal height regardless of road or passenger weight or placement. No other ride approaches it.

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

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The Air Born B-58 Buick

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ACROSS THE DESK

Model Motorcycle

Our German correspondent, Hans F. Kutschbach, has sent along this photograph of Gunther Gad of Nuremberg with the tiny motorcycle he built. It is a model of the Zuendapp KS 601. Gad is an apprentice in the Zuendapp shop and it took him several months to build the model.

To the Editor:

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

William P. Lawson, Boswell, Ind.

To the Editor:

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

(Continued to page 10)
WHAT HAPPENS WHEN A MAN DECADES TO DO SOMETHING ABOUT HIS FUTURE!

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

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

M.E.F. took a proved road to success—and his letter is typical of the thousands we have in our files from men and women in all walks of life.

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DECEMBER 1957
Which of these two plans has the greatest call? My husband and I have a little bet on. I say Traditional. Thank you.

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

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

To the Editor:

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

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

Gudni Hermansen, Herjólfsgotu 7, Vestmannaeyjar, Iceland.

To the Editor:

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

Joe Galvin, Melvindale, Mich.

To the Editor:

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

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

(Continued to page 12)
I WILL TRAIN YOU AT HOME FOR GOOD PAY JOBS IN TELEVISION-RADIO

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"Before finishing the NRI course I was employed at Studio Engineer at KMII. I am now announcing."—Bill Delkell, Grand Island, Nebraska.

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DECEMBER 1957

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

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

To the Editor:

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

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

Henry Miller,
Winnipeg 5, Man., Can.

To the Editor:

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

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

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

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Industry is looking for the kind of men who will become leaders in our advancing technology—men who will offer creative thinking, skilled hands and technically trained minds. If you would accept this role of leadership, prepare now by taking advantage of the educational opportunities at your disposal. Examine the facilities provided by the Technical, Trade and Vocational Schools who are training today the technicians, engineers and skilled craftsmen for tomorrow’s industry.

THE ENGINEERING TECHNICIAN

By Karl O. Werwath
Chairman, Working Group on Supporting Technical Personnel of the President’s Committee on Scientists and Engineers

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

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

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

But who is this engineering technician? What does he do and what is his preparation for his work? He is broadly defined as one who is engaged in certain vital, fundamental technical functions of product development, production, distribution, installation, operation and maintenance. While the engineer plans,
the technician makes and does; while the engineer creates, the technician applies. The technician is often the liaison between the professional man and the craftsman.

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

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

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

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

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EXCLUSIVE Distributorship available in most desirable territory. Minimum of $100.00 investment for merchant only. Free franchise. Cadmium Battery Corporation Dept. 10, 1130 E. Carson St., Los Angeles 15, Calif.

SELL By mail. Experts give tested methods. Alfie, 13 Pine, Closter, New Jersey.

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MAKE Strong, sawdust, or earthen boards. Build attractive, fireproof houses. $100.00 investment. Good opportunity. Say Laboratory, Oklahoma City 9.

LET Me sell your products nationally. I will send you an outline on how to establish a sparetime-full time Cascaroid business. Cascaroid is the only code everybody wants supplied. Abrasi, 807-E SE Sunset, Los Angeles 12, Calif.

MAKE profitable home business by mail. B. Mann, Woodcliff Lake, New Jersey.

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MAKE Money by mail. Send 50c for manu-

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WASHINGTON, 202, N. Seymour, Fond Du Lac, Wisconsin.

OPERATE Mail order printing bro-


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MAKE $25.00 Or More. For more information send 50c to Roy M., 1601 Young St., Santa Fe, N. Mex.

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MAKE most current business unheard of. Send for free facts and revealing plan. National Herb Exchange, Dept. Dr., Gardena, Calif.

GROW A living micro forest or orch-

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MAKE Money—and send checks free. Send for free information. Union Institute, Hoboken 2, N. J.

BUY AT wholesale prices! Resell at big pro-

START Your own business on credit. Your own boss. 1257 N. 23rd Street sold $5,000 to $22,000 in 1956. We supply stocks, equipment and other necessities. Experience sales unnecessary. Pleas ant profitable business opens to honest people. Write Raleigh's, Dept. L-7.

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FREE Lesson, Repair your TV set, or friends. Achieve radio-phonograph skills trains you to handle any TV service job in one short business course. Send blueprint of your business. Save up to $200 on schooling. Write: Electronic Engineering, Dept. AC-170C, 1168 S. LaBrea, Los Angeles 19, Calif.

DECEMBER 1957
LEARN Real estate by listening to recordings. Lex, Institute, Brookline 46, Mass. F R E E. FUNDAMENTAL HOME BUSINESSES. Service, Box 636PM, Newport, R.I.

BUY Wholesale! Appliances, tools, watches, auto accessories, etc. Huge discounts. Fully illustrated. 1263-F Broadway, New York 1, N. Y.

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SELL Books by mail. Details free. Berryman, 153 Victoria, Northfield, Ill.


SELL Merlin electronic garage door operators. Make from $50 to $150 on every sale. Operation catalog free. P. O. Box 142, Pittsburgh Co., 2815 West Vliet Street, Milwaukee 27, Wis.

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DECEMBER 1957 63
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NOTICE—It is the intention of this magazine to provide its readers with information regarding the latest developments in the mechanical arts. Except where otherwise indicated, this magazine has no information as to any unexpired patents in respect of the developments reported herein. In the event that a companion use is to be made of any idea as indicated, it is the intention of this magazine to report on the latest developments in the mechanical arts.
Tie Clasp Is Replica of Slide Rule

Novelty item designed for engineers and other technological people is a realistic slide-rule tie clasp. The replica has numbers printed on a white-acetate background covered by clear plastic. It looks like it will actually work, but it doesn’t.

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(Continued from Page 16)

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Contour-scaper kit
Portable arc welder
Push-pull tapping attachment
Radial saw has controls at front
Saw blade cuts sheet metal
Screwdriver has built-in wire stripper
Socket wrench has hinged handle
Step ladder locks in the open position
Clean holes in aluminum alloys require special drill bits

WORKSHOP HINTS

Special push stick aids sawing
Miter box nailed to fence and clamped to workbench
Retaining groove in bench top keeps screws from rolling off
Tubing protects tap threads
Checking shaper-cutter profile
Screw secures chisel handle
"Drill bit" for pilot holes
Small-parts soldering iron
Stovepipe used as small-parts wall rack
Screwdriver drives lag screws
Adjustable jig permits accurate marking of blind holes
Improved bottle confines torch flame
Pliers altered to hold wire
Restoring grip of lever wrench
Groove in center of wheel speeds grinding
Nonspill pouring spout
Pencil shading aids cope cut
Pocket-type tire gauge actuates compressor switch
Set screw tips
Cross-feed stop for lathe
New abrasive cuts fast and clean
Chucking round work in vise
Masking tape prevents chipping of plastic when sawing
Oil carried to boring tool
Retaining lathe tailstock
Drilling angular holes accurately in dual-vise setup
Shop-made indicator centers work in four-jaw chuck
Soldering hints
Centerless work support
Damaged screwdrivers adapted to other practical uses
Drill bits stored in handle
Pressure-sensitive tape holds blocks on faceplate for turning

Laminated Common Lumber Makes Inexpensive Lap Siding

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

Mauri Rose — experimental test driver and automotive engineer.

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

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

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

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

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

Make sure you're taking advantage of the many ways to improve your gas mileage. See your Rochester Carburetor Specialist. He can properly diagnose your engine and make the necessary adjustments to give you the best possible performance and economy. And he's factory-trained to keep your precision-built Rochester Carburetor in top condition to deliver maximum mileage.

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'58's real eye-opener is CHEVY!

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

- LEVEL AIR RIDE—100% air springs, front and rear.*
- TURBO-THRUST V8 with combustion chambers in the block!*
- NEW BODY-FRAME design has double-wall cowl for added rigidity.
- NEW FRAME—has new X-design for extra lowness.
- 3 CARBURETORS on Super Turbo-Thrust V8 . . . and 280 h.p.!!
- CLOSE-RATIO Synchro-Mesh transmissions on all V8's.**
- 4 COIL SPRINGS with advanced Four-Link rear suspension.
- NEW WHEELBASE—2½ inches longer for extra room and comfort.
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- 348-CUBIC-INCH Turbo-Thrust V8's with "gable-roofed" pistons.
- TURBOGlide, the super-smooth, triple-turbine transmission.*
I DROVE THROUGH RUSSIA

PART I

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

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

The ambulance led the way into Brest, four miles away, whose busy railway sta-
Russian interpreter buys tickets on glass-enclosed bus that moves through Agricultural and Industrial exhibits.

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

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

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

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

Our passports were quickly stamped and we bought some gasoline coupons at 50...
cents a gallon. We then bolted a hearty midafternoon meal at the station restaurant, and 22-year-old Vladimir, assigned to us for the duration, said “Let’s go.”

**Brest Is First Stop**

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

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

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

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

**Cut Speed for Safety**

But, as darkness fell, this sparse traffic became a real hazard. The first hazy form caught in our headlights suddenly became an unlit wagon, and the scream of our tires
Farmers spread their grain across the highway so the wake of passing vehicles will blow away the chaff woke the peasant asleep at the reins. After this near escape we cut the speed to about 45 and flicked on the piercing spotlight.

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

Road Markings Inadequate

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

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

Main roads of Minsk are stately boulevards, but author's car took a beating on cobbles of the side roads
tense relief when the lights of Minsk finally appeared.

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

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

Country of Paradoxes

Example: Russia leads America in hurling a manmade satellite into space, but runs the inefficient side-valve engines that power most of its vehicles on 66-octane gas. With the Tu-104 it is the only country to have jet airliners in regular service, but (Continued to page 244)
MATS' FLYING WAREHOUSE TAKES TO THE AIR

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

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

POPULAR MECHANICS
CAMERA DOUBLES AS PROJECTOR

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

Lifting feed spindle moves shutter back, letting light from small bulb glance off angled mirror and through projection lens.
De Soto looks for the answer—

WHAT MAKES A

EVERYBODY TESTS cars. De Soto Division says it’s time to test people, particularly people in cars—the drivers.

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

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

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

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

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

By Arthur R. Railton

Coordination, reading accuracy, finger dexterity and reasoning abilities. Blood samples were taken from the drivers every night to discover any physiological effects. I watched the drivers as they took these nightly tests. I rode with them occasionally (the rest of the time they were alone in the car so there would be no additional fatigue-affecting factors besides driving). I talked at length with the test psychologist, Dr. Joe Motto of Detroit, Mich. and with the project psychiatrist, Dr. A. S. Church, also of Detroit. I drove along behind the cars for hours to see how the drivers responded to traffic conditions.

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

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

(Continued to page 240)
A CAR THAT NEVER NEEDS a grease job? It's on the way, say Ford engineers. It could be here today, they think, but buyers might be suspicious of a car without grease fittings.

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

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

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

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

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

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

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

(Continued to page 266)

STUDEBAKER HARTTOP

Studebaker and Packard have a new body style out this month. It's this two-door hardtop, a model that has the room of a two-door sedan, the roof of a hardtop. Previously, the only hardtop offered was the Hawk.
Fender tips, front and rear, were extended to make the Coupe de Ville look several feet longer than it is.

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

Cadillac

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

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

Cadillac's air suspension has a high-lift feature so you can raise the body five inches to clear steep ramps.
New front-end styling and reworked side trim give these Fords a fresh look despite use of the 1957 shell.

Ford

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

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

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

Above, Ford replaced its wagon-wheel taillights with four bold ovals. No bumper guards are used in rear.
Above, Star Chief four-door Safari station wagon. Below, the Bonneville sport coupe has special side trim

**Pontiac**

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

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

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

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

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

DECEMBER 1957
"Big Mac" Links Michigan With Michigan

On November 1 the world's longest suspension bridge was opened to traffic, and motorists for the first time could drive across the Straits of Mackinac. The bridge (See Popular Mechanics, January 1957), under construction for 3½ years, links the southern and northern peninsulas of Michigan. The towers of the majestic five-mile span rise more than 750 feet from bedrock. The suspended section is 8614 feet long. The "Magnificent Mackinac" has a capacity of 6000 cars per hour.

Recommended Reading for Satellite Background

  A roundup of all U. S. missiles from the smallest to the IRBM (intermediate-range ballistic missile) and the ICBM (intercontinental ballistic missile) designed for intercontinental warfare and to lift satellites beyond the earth's atmosphere.

  The problems of our astronautical engineers as they head into spaceship business.

  Details on U. S. satellite, how it will cruise through space and its scientific function.


- "Space Travel and Our Technological Revolution," by Dr. Wernher von Braun, Missiles and Rockets, July 1957.

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

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

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

In size the two satellites are almost identical (the Russian is slightly larger) but there is a tremendous difference in weight. The Russian satellite weighs 184 pounds to only 21 1/2 pounds for the proposed American satellite. The Russians launched theirs on a generally north-south orbit while the announced orbit of the U.S. satellite will be generally west to east to take advantage of the earth's rotation during launching. The first Russian satellite simply broadcast its position and possibly the temperature. The American moon is designed to transmit a wide variety of scientific information. The altitudes and rotation times probably will be roughly comparable, but this can't be determined until the U.S. satellite takes its place in the sky.

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

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DECEMBER 1957
"Approaching Anchorage . . . a typical fiord with mountains on each side, Portage Glacier at its end"

Report From a Roving Editor

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

Dear Boss:

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

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

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

Tom Stimson (circle) with another correspondent and Eskimo employees of DEW Line at Point Barrow, Alaska
a C-54 (slow four-engine unpressurized DC-4) that would carry all of us north.

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

"After leaving the Eskimo village we got back in the plane, headed for Elmendorf"
through the hole. Hailstones smashed the copilot's windshield, dented the leading edges of the engine cowlings, and ripped off the upper surfaces of the elevators. I would not have enjoyed any part of this.

Sunday night the Air Force people in charge of the press tour tried via Washington to get another plane. None was available, so the maintenance group at McChord replaced the windshield, bolted a metal cover across the astrodome hatch and resurfaced the elevators. These repairs took most of the morning. We started north at lunchtime, ran the length of Vancouver Island, passed over the Queen Charlotte group, and cut across the Pacific at 9000 feet for Anchorage, flying mostly between cloud layers. At Anchorage we turned north for Fairbanks, passing within 30 miles or so of 20,220-foot Mount McKinley and getting some good views of it.

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

Next morning we were airborne at six, went up to 9000 feet, and headed for the radio beacon at Bettles, en route to Point Barrow. The plane crossed the winding (Continued to page 250)

“We 'climbed' the glacier by airplane, looking down at the blue-green ice a couple of hundred feet below”
Fangio and Behra Test Drive Vespas

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

Karmann-Ghia Adds Convertible Model to Stable of VW Bodies

For Volkswagen fans who also like the sleek styling of sports cars, this Karmann-Ghia convertible body is now available on a VW chassis. The design reportedly is based on a law of aeronautics. A cruising and maximum speed of 72 miles per hour is listed for this model and road-holding ability is said to be good. The Karmann-Ghia coupe body, previously introduced, now has a velvet-lined rear luggage compartment which can be doubled in size by moving the foam-rubber rear seat forward.

Korean Sibal Makes Debut

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

By John G. Hubbell

BRAIN OF A SATELLITE
NOT LONG AGO, at Minneapolis-Honeywell’s General Research Laboratories in Hopkins, Minn., I gave a lot of information about our house to Dr. Finn Larsen, Honeywell’s Director of Research. I told him the number and approximate sizes of all the rooms, doors and windows, and the type of construction and insulation materials used throughout. To this, Dr. Larsen added some notes about our Minnesota climate, then relayed all the information to a machine five feet tall and two feet wide. In five minutes and 44 seconds, the machine had calculated precisely the amount of heat our house, an eight-room frame dwelling, would lose during the next 50 years, and handed me a heating bill for nearly $12,000!

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

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

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

They’ve been doing things about the weather since a raw March night in 1883 when a young Minneapolis inventor named Alfred M. Butz became exasperated because he had to go down to the cellar to open or close the damper doors on his coal furnace every time the house grew too chilly or overly warm. He began tinkering, and within a few days he found a way to do the job automatically.
Honeywell engineer predicts that by A.D. 2000 cars will zip through network of crashproof pneumatic tubes

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

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

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

This is probably the first heating regulator ever produced, putting the company in business
M-H engineers, even with help of their hands, had trouble discussing three-dimensional gyro problems

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

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

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

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

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

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

Until a few years ago bearing friction posed a major problem for gyroscope makers. The less bearing friction a gyroscope has to work against, the more sensitive it is and the more accurately it can perform.

Dr. Charles Draper of the Massachusetts Institute of Technology developed a gyro rotor sealed inside a container where it floated in a highly viscous fluid. The floating action removes bearing friction, and the viscosity serves to average out disturbing effects. Draper's gyro had incalculable military and industrial potential, but several major gyroscope manufacturers said that mass-production techniques could not be geared to such perfection. Honeywell
Another Honeywell engineer predicts that in A.D. 2000 the dining table will swallow, wash and stack dishes.

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

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

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

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

But car doors open and close every few minutes, and the number of passengers continually changes. Honeywell's comfort specialists conquered this imposing challenge with two electronic thermostats, each containing a highly sensitive strand of wire 25/10,000 inch in diameter. One thermostat checks temperatures outside the car; the other monitors the interior. At each change in temperature, the wire signals an electronic system which instantly heats or cools the car as required for maximum comfort.

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

(Continued to page 256)
WE MAY NOT like it. Europeans may not like it, but it's happening anyhow. European cars are becoming more American. I attended two great international auto shows, one in Frankfort (Germany), the other in Paris (France) and came away convinced.

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

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

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

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

Meanwhile America still borrows from Europe. At Paris a Pinin Farina two-door hardtop on a 1957 Buick chassis was much admired. When a door is opened, the roof raises itself several inches so you can get into it without knocking your hat off.

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

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

**What About the Shows?**

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

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

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

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

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

**Cars Are Enough**

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

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

(Continued to page 264)
Vast is the word for the Grand Palais, scene of the Paris auto show, but as you can see by the jammed floor, it was too small for the crowd on Sunday.

Cutaways of engines and chassis are of great interest to Europeans—even to women. These Germans at Frankfort are giving a Fiat display careful study.

Below, the 2CV (left) is 11 years old, the DS19 (right) is 3 years old, yet crowds like this were still interested in them at the Citroen exhibit at Paris.
Above, pretty models are rare in Europe's auto shows but at Frankfort a tire company had these two.

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

Continued from preceding page

American cars got little attention at Paris. Edsel, because of its newness, was the most popular design.
Despite his handicap, Bill Frank operates a one-man business turning out objects of art in his workshop

Artist With a Lathe

He never worked with power tools until he lost his sight

BILL FRANK OF Chicago cannot see. Yet Bill Frank, working from “mental blueprints,” can turn out beautiful wood projects on his lathe. Recently he turned out a real object of art—an attractive mahogany dish weighing only an ounce. The dish is only 1/16 inch thick, and he turned it to this paper thinness on a lathe after first cutting the disk on a bandsaw and drilling it for mounting on the faceplate.

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

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

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

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

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

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

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

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

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

Flipping a switch, Frank starts the saw. Its ¼-inch blade whines through the pine as Frank slowly rotates the slab on its metal pivot. His sensitive ear is tuned to the cutting tone of the blade, and at any given moment he has an accurate idea of the position of the blade in its path around the disk.

Frank next places a metal bar ¾ inch thick on the drill table, lowers the drill until it touches the bar, then locks the depth stop on the drill. Thus the drill will penetrate no farther than the preset depth. "This leaves me enough thickness at the base of the disk to fasten it to the lathe faceplate," explains Frank.

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

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

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

After putting on a respirator, he selects one of his carbide-tipped chisels and places it on the tool rest with his fingertips just behind the cutting edge. First he shapes the outside contour of the bowl. Then, stopping the lathe, he swings the tool rest into position for cutting the recess. His first step here is to turn a small groove about an inch from the edge.
“Although I gauge thickness with my fingertips,” Frank reports, “the groove keeps me from going astray as I rough out the interior.” He also keeps his ears tuned for the characteristic hum which tells him when the bowl has been turned to the proper thickness.

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

They are objects of art, created to please the eye by a man who has no eyes to help him.
Aluminum Mold Cures Big Tires

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

Propeller at Bow Maneuvers Ferry

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

Heat-Beating Steel For Fast Aircraft

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

"RAINBOWS" FROM BOUNCING ATOMS

By Richard F. Dempewolff

LIGHT NO HUMAN EYE CAN SEE is illuminating secrets hidden in the structure of the elements. A darkened room in an old Bayside factory, across the East River from New York's skyline, doesn't light up when Bill Cooper flicks a switch and floods the darkness with invisible rays. But, instantly, countless excited molecules plunge the room into rainbows of blazing color.

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

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

On a boat in New York Harbor, sanitation experts next spring hope to aim a similar ray at samples of water. Some, containing minute quantities of invisible dye, will glow an unearthly green and, if all goes as planned, may finally lead investigators to sources of pollution that have been fouling the city's beaches. Not long ago, the beam trapped a ring of check passers on the West Coast by causing a set of invisible fingerprints to glow green. It saved the life of an Air Force pilot by producing light in a smear of oil seeping from an invisible crack in the plane's engine block.

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

Ultraviolet, the invisible ray performing these jobs, is not new. Early in World War II it set airplane instruments aglow so pilots could read them in the dark. The ray was tried as a sterilizing agent, crime
When viewed under natural light, the nondescript rock above looks like what it is: willemite-calcite

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

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

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

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

**Ultraviolet Is Invisible**

What is ultraviolet? “First of all,” explains Cooper, “it’s light. It is invisible because its wavelength is shorter than the human eye can detect—just as ultrasonic frequency in sound is beyond the capability of the human ear.”

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

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

What modern science has done is to reproduce certain sectors of the ultraviolet spectrum with electric lamps. Usually these are sealed glass tubes containing a gas such as argon, plus a drop of mercury. When energized with electric current, this combination will produce ultraviolet rays.

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

3000 Substances Fluoresce

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

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

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

New York’s Fluorescent Aquarium

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

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

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

Textile worker inspects invisible patterns stamped with fluorescent ink—used as guide for stitching
due to various mineral salts in solution. The effect is spectacular.

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

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

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

Many Minerals Fluoresce

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

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

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

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

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

Transmission or crankcase oil leak? Mechanic, below, tests samples of oil which fluoresce differently
CD Kitchen Serves 25,000

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

“Igloos” Provide Cool Comfort in the Tropics

Igloos in the Tropics? The igloo, ideally suited to the low temperatures of the far north, now has been adapted to the high temperatures of the Tropics. Seven buildings patterned after the Eskimo’s traditional abode have been built in Balboa, Canal Zone, Panama. The domes of the buildings have been painted white to reflect the sun’s rays. Roof lines extend to form visors over the windows to keep out the tropical sun and to provide protection from rain. In addition, each “igloo” is air-conditioned. The buildings are connected by covered passageways, also painted white to reflect the heat. The igloos were built for rental as business offices.
By Joseph Stocker

In any amphibious attack during wartime, one of the major requirements (along with sturdy foot soldiers who don't mind getting wet) is offshore fire support.

In the Pacific fighting of World War II, this role was largely filled by destroyers and cruisers. But they couldn't get in close enough to suit the Navy—or the Army either, for that matter. With the development of rockets after the war, the Navy converted some of its LSMs (Landing Ship Modes) to carry them.
Medium) into rocket launchers for off-shore bombardment. But the LSMRs, as they became known, didn't have the speed or maneuverability that was needed, or an adequate fire-control system.

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

The Carronade, first of what the Navy anticipates will be a long and distinguished line of vessels, is known technically as an “inshore fire-support ship.” She derives her name from a naval gun developed in Scotland and first used by the British against the American colonists in the Revolutionary War. She can clip off 17 knots (to the LSMR's 10 knots). She packs eight twin rocket launchers—stubby little weapons scarcely higher than a man's head. And she has controllable variable-pitch propellers which, according to the Navy, make her “nearly the most maneuverable ship afloat.”

The Carronade's launchers are capable of firing rockets at far greater speed than the old LSMR. Her fire-control system, built around a new-type computer, makes possible a shore bombardment of unprecedented accuracy.
The Carronade's five-inch rockets pack the same punch as shells from a five-inch gun. They are spin-stabilized for accuracy and have an effective range of up to six miles. Several salvos can be fired per minute.

In action, the ship launches its rockets by remote control. No one is on deck. Down in the magazines the handlers load two rockets into a hoist and press the compressed-air button that shoots them up into position in their launcher. In the computer room, meanwhile, an electronic brain is digesting such information as speed, course, roll of the ship, and distance and direction to the target. Then it automatically turns the launchers and points them at the correct angle. A single rocket or a
Carronade's nerve center is bridge. She can attain the high speed of 17 knots, is extremely maneuverable

complete salvo can be fired by pressing the proper button.

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

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

But the Carronade has still another

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

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

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

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

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

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

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

Five-Ton Roller Made From Culvert

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

Tractor Moves German Farmer

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

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

This view is from lounging area at end of swimming pool and looking across the upper patio into living room. Glass doors are pushed back.
THE OUTDOORS comes indoors in a house owned by John E. Turner of Miami, Fla., and the key to the structure's unusual design is an upstairs swimming pool.

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

It was quite a design problem which Turner handed to his architect, Ralph A. Anderson. He wanted to build on a 70 by 80-foot lot. He wanted a good-size home, but he also wanted a swimming pool and a patio for relaxation. Because the lot is just a stone’s throw from Biscayne Bay, there was the problem of minimizing the remote but possible danger of damage from high water swept in by a hurricane.

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

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

The house is 47 feet wide and 41 feet

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

**House Is Compact**

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

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

**Stairs Lead to Pool**

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

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

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**POPULAR MECHANICS**
This sunny enclosure is on the first floor behind the swimming pool. Here Turner gives “outdoor” barbecues.

Windows along interior wall of dining area provide view across well of lower patio to the swimming pool.
Bar-Graph Oscilloscope Does Job of 40 Meters

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

Safety Link on Hoist Prevents Electric Shock

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

Quick Radioactive Test For Moisture or Density

Operating on the principle that different amounts of moisture and density cause a varying degree of radioactivity “scatter,” a new field instrument can measure moisture content or density of materials in two minutes. Moisture is measured with a radium-beryllium probe, while density is tested with a cesium-137 probe.
Jet Interceptor for U. S. Air Force Flies 1500 M.P.H.

Newest and fastest all-weather jet interceptor in the U. S. Air Force is the F-106A. Called the Delta Dart, the plane can fly about 1500 miles per hour. It resembles the F-102A, except it is larger and the vertical stabilizer has been squared off. Both planes are used by the Air Defense Command. The Delta Dart is equipped with the most advanced electronic fire-control system ever developed.

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

For the first time in this country, a man has been ejected from an airplane at ground level and parachuted to the ground uninjured. It was a demonstration of a new ejection seat. A young flyer was ejected from a two-seat Grumman Navy jet fighter during take-off. Three stages of parachutes opened for his descent to the ground in five seconds. Nearly two thirds of jet aircraft fatalities occur either on take-off or landing, when pilots do not have time to bail out, and 94 percent of the resulting crash landings cause fatalities. The ejection seat was designed by a British firm.
British "Bloodhound" Tracks Enemy by Radar

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

Electric Eye Adjusts Lens For Automatic Camera

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

Metal Measuring

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

Four-Passenger Isetta Has One Rear Door

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

First there was piggyback, now there's a new one—"truckyback," one complete tractor-trailer hauling another. The equipment was designed by a Portland, Ore., trucking firm to avoid "deadheading" rigs, which costs time and money. It was made possible with the use of aluminum in fabricating the lighter, sturdier auto-hauling trailers. Total weight of the tractor and trailer is 16,000 pounds. The unit can carry a gross weight of 40,000 pounds or a duplicate of itself.

Surprise!

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

Portable Electric Bomb Hoist Developed for Navy Planes

Weighing considerably less than manual bomb-hoisting gear now in use is a 47-pound portable electric hoist developed for the Navy by the Douglas Aircraft Company. The new rig will lift a 2500-pound load at a rate of 15 feet per minute. For loads up to 5000 pounds, the hoists can be used in pairs. The electric hoist permits safe bomb lifting with \( \frac{3}{8} \)-inch accuracy. The unit requires a single electric cable connected to a deck-edge receptacle or a portable power supply. A hand crank on the cable drum operates the hoist when electric power is not available.
Stamp collectors who travel can give their albums an increased personal interest by taking their own photos to match the designs on their stamps.

By Ernest A. Kehr, F.R.P.S.L.
Stamp News Editor, New York Herald Tribune

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

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

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

Virtually anybody with a camera and a rudimentary
understanding of its use can expect remarkable results with a minimum of practice.

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

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

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

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

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

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

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

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

But working with a glass, which most often covers only a fraction
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TYPE IV
A. Cleopatra's Needle, is too far to left and is smaller than other types.
B. The three dots in Arabic inscription are equidistant and on same line level.
C. The second Arabic character in upper panel touches inner frame line.
D. Base of the pyramid does not touch the frame at right.

With a photographic record of each album page, the philatelist has identification in case of theft or loss of the stamp area anyway, is a tedious, eyestraining task. Making a photograph of the stamp and then studying the enlarged print, on the other hand, eliminates this inconvenience.

For all ordinary examination, the philatelic-photographer requires only a regular picture of a stamp, block or cover, the print of which should be enlarged to either a 5 by 7 or 8 by 10-inch size.

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

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

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

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

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

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

Very frequently a postmark is as interesting and as important as the stamp itself yet, equally often, it is impossible to clearly read the text of the obliteration, because the color of the stamp happens to be strong and dark.

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

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

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

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

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

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

Electronic Brain With a “Heart”
Helps Assign Navy Personnel
Because the Navy's new electronic equipment for assigning personnel gives consideration to personal duty preferences, it's called the "brain with the human heart." The equipment is used to process 40,000 Pacific Fleet orders each month.

Electronic Organ Built From Kit of Semiaassembled Parts
Now you can build an electronic organ, with a pitch range duplicating many of the great pipe organs of the world, from units of semiaassembled parts. The units include a preassembled keyboard, foot pedals and electron-tube tone generators. The organ has a separate electronic oscillator for each note. An accessory percussion unit can be added to the organ for drum, bell, tambourine, whistle and other effects.
Loaded Truck Trailers Ride Ship Across Ocean

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

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

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

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

HERE'S WHAT THE REPAIRMEN SAY:

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

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

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

"I very definitely feel tubeless tires can be improved by the manufacturers."
TUBELESS TIRES: MOST OWNERS LIKE THEM

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

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

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

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

Decision for Tubeless

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

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

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

Two Major Likes

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

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

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

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

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

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

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


"Trouble-free!"—Alabama jeweler.

Less Heat Build-up

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Complaints, Too!

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

“Can’t find a station attendant that knows how to fix them.”—Washington broker.

“Can’t repair and mount them without going to a garage.”—Ohio engineer’s assistant.

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

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

“Continual thumping of tire.”—Georgia housewife.

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

“Can’t keep the pressure up.”—Missouri minister.

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

“Won’t hold air if wheel develops dent from accident or rough handling.”—Connecticut photographer.

“The manufacturer charges the same whether he supplies a tube or saves that cost. The tubeless tire is one of many small gimmicks for skimming the consumer.”—Delaware college professor.

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

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

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

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

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

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

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

“One of my tires is ‘leaking rubber’ around the rim, paper-thin, shredded.”—South Carolina student.

“They don’t seem to seal tight if the rim is rough.”—Oregon lift-truck operator.

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

Causes of Blowouts

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

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“Assembly Line” For Tomatoes

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

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

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

Thorium Promises Cheaper A-Power

Viewed as the solution to cheaper atomic power, an extraction process has been developed to make thorium serve as a substitute for uranium-235. Scientists at Battelle Memorial Institute, Columbus, Ohio, report a recovery of 99.89 percent purified thorium—good enough for reactor uses.
Honolulu Roof Top Will Rotate
Patrons of a refreshment lounge atop a 17-story office building planned in Honolulu will be able to view most of the city without leaving their chairs. The slowly rotating lounge will make a complete revolution every hour. Windows of the building will have permanent vertical sunshades that rotate electronically with the passage of the sun. Tinted window walls of the lounge will slant outward.

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

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

POPULAR MECHANICS
In this highly mechanized era, most people know more about their automobile engines than the "engines" that run their own bodies. Yet the study of these chemical power plants we call muscles has fascinated scientists for centuries.

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

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

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

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

A College Lab Tells

How to Measure Physical Fitness

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

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

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

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

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

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

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

Grip strength is shown by manuometer, part of Rogers Index widely used by schools to tell physical-fitness level
Ankle muscles are among the most powerful in the body. Tests indicate they exert nearly 400 pounds of force.

Next Month

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

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

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

(Continued to page 232)

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

Spirometer tells lung air capacity. Hard exercise will correct run-down condition, toughen muscles
One-Man Hay Rig Picks up Bales and Builds a Stack

AUTOMATIC HANDLING of baled hay from the pickup in the field to the stacking of bales in the storage area can now be accomplished by one man seated at the controls of the power unit. The photograph at the top of the page shows a pickup device starting to scoop a bale of hay from the field. It goes onto a lifting rack which holds either six large or eight small bales. The next picture shows what happens when the last bale of a group is moved into position by the rack. The lower bales are pushed against a bar that triggers a hydraulic ram. The ram lifts the rack and places the bales on the hauling bed. The hauling bed holds 54 large or 64 small bales, unloads them in a single stack.
PLASTIC DOOR for the family dog has ingenious overlapping vanes that automatically snap back into place to keep out insects and bad weather. The door is easy to install, and is available in different models for home, doghouse, garage or kennel. One style permits milk and other deliveries inside the house. The doorways can be opened by the gentle nudge of a puppy, or a kitten, and even old dogs can be taught this new trick with a little training.

Turren, Inc., Beaver Park, Danvers, Mass.

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

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

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

Practical Products, P. O. Box 107, Martinsville, Va.

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

Pass and Seymour, Inc., Syracuse 9, N. Y.
FINGER-PULL HANDLE on wall plug soon will be available in matching colors on lamps and electric appliances. The wire comes out the side of the plug. The handle makes it easier to pull the plug out and is safer than the old method of grasping the plug or jerking the wire. Excess wire can be stored off the floor by inserting loops through the plastic handle.

Miller Electric Co., 120 Main St., Pawtucket, R. I.

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

Tennessee Stove Works, Chattanooga 1, Tenn.

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

Stifel Co., 525 W. Superior St., Chicago 10

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

Silk Seal Co., 1750 California Ave., Long Beach 12, Calif.

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

E. F. Britten Co., Crandall, N. J.
They Measure Water in Snow for Hydroelectric Plants

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

It Takes a Bug To Catch a Bug

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

Because he didn't like the work of chopping through the thick ice at Lake Winnebago, Wis., winter-fishing enthusiast R. Kocian decided to build his own ice drill. He fashioned an auger blade of steel and welded it to a shaft. The shaft was attached to the gasoline engine that operates his power saw. The result, above, is a drill that will cut an eight-inch hole through two feet of ice in less than a minute.

Midget Electric Car Built for Handicapped Boy

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

“Long-Pole Sled” Circles at 60 M.P.H. for Thrill Ride

Here's a new winter sport enjoyed by a group of men living near Holy Name Lake, Minn. Known as the “long-pole sled,” the contraption consists of a sled on the end of a pole which is turned by the rear end of a car. A gasoline engine furnishes the power. The sled travels over the ice at speeds up to 60 miles per hour.
Removing the "lost" logs from the Texas Long Leaf millpond was termed by workmen the world's dirtiest job.

Timber Harvest in the Mud

By C. C. Springfield

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

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

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

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

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

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

"You didn't look deep enough," said the old man. "Me, I wouldn't have thought so myself, if I hadn't seen a pond drained in Louisiana, maybe 50 years ago. The bottom was covered with logs—'sickers'—hundreds of them. They snaked them out and I'll bet they got a million feet out."

"Was it rotten?" asked Walker.

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

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

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

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

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

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

All in all, Walker reclaimed about 500,000 board feet of top logs. * * *

J. C. Walker, who reclaimed the logs, shows some of the sawed yellow timber which "cut like cake"

Logs Were 40 Feet Long

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

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

DECEMBER 1957

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Shutterbug Shopping Center

WANT TO TAKE underwater photographs, but can’t afford the expensive equipment? Could you use a pocket-size flash reflector? A hand viewer with slide magazine? Here is a selection of these and other new and unique items for the photography enthusiast.

1. PANORAMIC 35-MILLIMETER camera takes 355-degree photographs—almost a complete circle. Photo across the pages was taken inside an automobile, starting at left looking out the rear window and ending at right showing the other corner of the rear window. It's done with mirrors. The lens points straight up, at right angles to the scene being photographed. A mirror covers the lens at a 45-degree angle, and spins in a circle to reflect the scene. Below the lens inside the camera, another 45-degree mirror turns at the same time and flashes the lens-formed image onto the film. The film is held stationary, while the interior section of the camera turns and exposes it through a narrow slit. The camera, which was invented in Japan, can't take a full-circle photo because it loses five degrees at the point where the film enters and leaves the picture chamber.

Panoramic Kogaku Kogyo K.K. 106 Araki 2-chome, Chiyoda, Tokyo, Japan

2. WATERPROOF CASE enables the owners of all but the largest still or motion-picture cameras to take underwater photographs. It is molded in one piece, and made of flexible and transparent plastic to permit operation of the camera’s controls underwater. The nine by seven-inch case is sealed with a glass cover. Has been successfully used at depths of 100 ft.

W. J. Voit Rubber Corp., 2945 E. 12th St., Los Angeles 25, Calif.
3. EIGHTY SECONDS of continuous filming at 16 frames per second is a feature of this motion-picture camera. It is available in single-lens and two and three-lens versions. The 16-millimeter camera has an automatic film-threading mechanism, a 100-foot film capacity, five running speeds, a constant-speed motor, and two of the models have a "zoom" view finder to show the exact field covered by the lenses.

Bell & Howell Co., 1100 McCormick Rd., Chicago 45

4. TELEPHOTO LENS at a speed of f:3.5 and a focal length of 200 millimeters is made from a newly discovered rare-earth optical glass. It has a reflex housing with double-cable release and a lever that automatically cocks the shutter, lifts the viewing mirror and exposes the film in a single operation. The lens is designed for precision performance and all elements are coated for natural color correction.

Canon Camera Co., Inc., 550 Fifth Ave., New York City

5. HAND VIEWER with slide magazine operates automatically with a push-pull plunger. Enlarging the slides seven times, it is offered either with a battery-powered light source or by plugging it into an electrical outlet. The magazine holds 20 standard two by two-inch cardboard slides. Single slides can be viewed without the magazine. A system of double diffusion provides even image illumination.

Airequip, 20 James St., New Rochelle, N. T.
6. CAMERA-LIGHTER is an actual windproof lighter with a built-in eight-millimeter camera. The metal case is slightly larger than a standard pocket lighter and it weighs 3½ ounces. The camera has a view finder, an f:3.5 lens, fixed focus, shutter speed of 1/30 second, and bulb, an automatic film advance and stop. Its special daylight-loading magazine contains film for 20 exposures in black and white or color. 

7. FLASH PHOTOGRAPHS are exposed perfectly every time with a patented device on this 35-millimeter camera. It is a diaphragm control that calculates the correct exposure for indoor flash shots with any film or bayonet-base bulb. When the control is set to the type of film and bulb, it is linked with the built-in range finder and any change of focus automatically computes and sets aperture opening.

8. HOME PROJECTOR shows regular 2¼ by 2¼-inch slides, and easily converts with an adapter to take both 35-millimeter and the new 38-millimeter super slides. It is all-metal in construction, weights nine pounds and includes the recently developed horizontal-burning 300-watt lamp. The overlapping fan blades not only cool the lamp, but also send air between the condenser lenses and against the film.

9. MINIATURE FLASH unit unfolds 11 metal blades like a fan to become a reflector only four inches in diameter. The case is made of ivory plastic, it attaches to any standard camera, uses bayonet-base bulbs and is powered by a hearing-aid-type 22½-volt battery. The blades are opened by turning a knob in one direction, while bulbs are ejected by turning the same knob in the opposite direction.
10. TELEPHOTO COMBINATION took the sharp close-up picture, upper right, from the far-distant location at left. The system includes a telescope with a wide selection of orthoscopic eyepieces. They match in perfect alignment with a platform that mounts most makes of 35-millimeter and 2¼ by 2¼ still cameras and 8 and 16-millimeter movie cameras. Effective focal lengths range from 750 to 2000 millimeters.

D. P. Bushnell & Co., Inc.,
316 Bushnell Building, Pasadena, Calif.

11. TWO PHOTOGRAPHS per second can be snapped with an attachment to the Praktina FX camera. It is a heavy-duty spring motor built to precision tolerances and simple in mechanical design to provide reliable, trouble-free operation. The device weighs 20 ounces and can be connected either before or after the film is loaded. It can be used in all types of rapid-sequence photography.

Standard Camera Corp., 500 Fifth Ave., New York City

12. FAST FILM makes it possible to snap a picture and project it on a screen several minutes later. The 1000-speed panchromatic film is used in a Polaroid Land camera. The transparency is removed from the camera and placed in a solution to harden the emulsion. It is then mounted in special slides of different sizes. The process is about one third the cost of conventional slides.

Pusher-Prop Plane Converts to Car

Changing this vehicle from an airplane to a car, or vice versa, takes approximately 10 minutes. The pilot, above, simply folds the wings over fuselage and attaches license plates.

Within 10 minutes after landing his auto-plane, Leland Bryan, a Highland, Mich., mechanic, can convert it to a highway vehicle. Inventor Bryan simply folds up the wings. Built at a cost of about $1000, the “hop rod” has a top speed of 95 miles per hour in the air and 60 miles per hour on the road. It carries a car license plate (under the nose in bottom photo) for highway travel and has Civil Aeronautics Authority permission to fly within a 25-mile radius of Bryan’s home. He can make longer flights by making special application to the CAA. Bryan constructed the single-seat craft from parts of a standard Ercoupe. The same pusher propeller that drives the auto-plane through the air powers it on the road.
Television Today

1. As an indication of things to come, General Electric Co. here demonstrates the world's first three-dimensional color-TV system, developed for remote servicing of nuclear reactors. Young lady in photo lines up toy trucks by watching televised image on special receiver through Polaroid glasses. Though currently not feasible for the living room, system can be adapted for numerous industrial applications requiring lifelike closed-circuit TV reproduction.

2. One man can install and operate this TV studio which contains all equipment necessary for "live," film or remote broadcasts. Included at less than $15,000 are film and slide projectors, audio facilities, cameras and transmitting circuitry. All items can be controlled from a single master console. Designed for closed-circuit or wireless broadcasts, system can be used industrially, or by small communities for augmenting national programs with local broadcasts.

3. Keeping your eye on things is easy and relatively inexpensive with this new television camera designed for closed-circuit applications in homes, schools and industry. Camera, which requires no special lighting, can be monitored by a number of ordinary TV sets connected to it with cables. Or, a number of cameras may be monitored by a single receiver for complete coverage of a large area. Complete camera costs less than $500, but unit is also available in kit form at a substantial saving. Five preassembled modules included with basic components, shown below, and simplified circuitry make kit construction easy.
Hi-Fi KITS have been around for many years. Amplifiers and preamp kits are available literally "by the dozens," and almost any commercially built speaker enclosure can also be purchased in knockdown form by the hobbyist who wants to save money or who takes particular pride in building his own equipment. But when it comes to hi-fi tuner kits, the choice has been severely limited. It isn't that hi-fi tuners are particularly difficult to design—the large selection of really good commercial units proves otherwise—nor that there is a lack of interest on the part of the kit builder in a high-quality radio tuner. It's just that many manufacturers have been reluctant to package a kit for a component whose ultimate performance depends as much on individual wiring and final adjustment as it does on the choice and design of the circuit. And that's why Allied Radio's new Knight FM-AM tuner kit is of special interest.

Circuitwise, this 9-tube tuner is not very different from many high-quality commercially assembled units. For FM reception there's a tuned r.f. amplifier (for low noise and good image rejection), followed by a mixer and separate, drift-compensated oscillator which provides excellent stability during warm-up and under widely varying line-voltage conditions. Further insurance against oscillator drift is provided by an a.f.c. (automatic frequency control) circuit which can be disabled by the front-panel selector switch for the reception of weak or distant stations.

Two i.f. amplifiers, a ratio detector and an audio-amplifier stage follow in that order. Finally, a cathode-follower output stage permits the use of relatively long cables between the tuner and subsequent amplifier without the loss of signal quality.

On AM, there is a tuned r.f. amplifier, a converter and an i.f. amplifier. This is followed by a detector, using a separate 1N34 diode, an audio amplifier and, again, a cathode-follower output stage. The specifications for the completed tuner are given in the table.

Specifications (shown below) for perfectly aligned tuner. Due to carefully prealigned components, these specifications are approached without the complicated post-construction adjustments formerly required.
For the potential builder, however, the big feature of this kit is not the circuitry, but the ease with which the tuner can be constructed. Almost the entire tuner is built on an etched and drilled board comprising over 90 percent of the tuner wiring. The top of the board is screened to show the exact location of the various resistors, capacitors and other parts so that, with reasonable care, it is virtually impossible to make a wiring error. The little actual wiring which must be done by the builder is clearly shown in the illustrated step-by-step manual.

The printed board not only speeds up construction but it permits the use of carefully pre-aligned i.f. transformers and r.f. coils so that the need for final alignment is almost entirely eliminated. With conventionally wired sets, individual wiring methods cause such variations of stray lead inductance and capacity that precise prealignment of associated components is impossible. With printed circuits, however, only the variations in interelectrode capacities between vacuum tubes, even tubes of the same type, can upset the original alignment. But these variations are relatively small and their effects are minimized by the broad-band design of the tuner circuits. As a result, post-construction alignment is required only in extreme fringe areas where the last measure of performance must be gleaned from the tuner. The adjustments which are necessary require no test instruments or special tools.

Designed as a basic tuner, the Knight kit has only a tuning control and a function switch (Off, AM, FM without a.f.c. and FM with a.f.c.). The job of controlling tone and volume is left to the amplifier or preamp with which the tuner must be used.

Hi-fi hobbyists planning to take advantage of the many fine musical programs on the air today will welcome the addition of the Knight FM-AM tuner to the long list of hi-fi kits. Its price is low enough to be within reach of even a modest budget; its construction simple enough even for a beginner; its performance good enough to complement associated equipment of highest quality.

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For Experimenters and Hobbyists

The new Heath Radio Direction Finder Kit seems to be just what the doctor ordered for small-boat owners, pilots and other outdoor-sports enthusiasts who sometimes find themselves out of sight of land or familiar landmarks. It consists of (and can be used as) a sensitive portable radio with a highly directional ferrite antenna. Antenna is adjustable from front panel to obtain a rapid bearing on any station in standard-broadcast band.

Discriminating hi-fi-ers can banish annoying “snap, crackle and pop,” caused by dust and static electricity on a record surface, with the new ESL Dust Bug which attaches to any record player by means of suction-cup base. Unit loosens and collects dust and eliminates static before it can reach the reproducing stylus.

A new “breadboarding” technique permits experimental assembly of electronic circuits without solder or mechanical connectors. Breadboard consists of 130 conductive cells covered with elastic material. Component leads and wires are connected by inserting them in the cells and can be removed quickly without damage to leads or loosening the contacts.

Prospective “hams” can learn code the easy way with a new code teacher consisting of a printed-circuit board and “electric” pencil. As pencil is drawn down each slot, the “dits” and “dahs” of the corresponding letters are reproduced by a buzzer. Board also mounts a telegraph key for code practice in the conventional manner. Built-in lamp permits visual transmission.
DUST-FREE RECORD CABINET

Designed by John Bergen

YOUR FAVORITE albums and single phonograph records will retain their original playing qualities longer if they are provided proper storage in a dustproof record cabinet like this one. In addition, the cabinet serves as a stand for a record player. This conserves floor space and permits the most convenient access to records when selecting them for playing.

The construction of the cabinet is simple. Fir plywood combined with hardboard, or hardwood stock and plywood, may be used, depending upon the decor of the room in which the cabinet is to be located and the furniture it is to complement. Four tapered wooden legs with brass tips support it at a convenient height and provide a modern appearance, as shown in the photo. Sliding doors have wedge-shaped strips of wood glued to them so that the overlapping ends become self-sealing when the doors are closed, as shown in the sectional view of the door.

To make the cabinet, first cut and finish all the framing members as shown in the drawing and details. For a first-class professional-appearing job, special care must be taken in marking and cutting the mitered joints, grooves and rabbets in the framing members for the front of the cabinet. Slight inaccuracies in cutting the other framing members will not be apparent after the cover material is in place.

The framework is assembled first, beginning with the bottom. Nails or screws and glue should be used wherever possible for a strong assembly. After fastening the ⅜-in. plywood bottom to the two ½ x 3 x 11¼-in. members that receive the legs, the lower grooved member at the front is nailed to it as in detail E. Then, the three mitered members are assembled and joined to the bottom, and the framework for the back and top completed and attached to the bottom and front assemblies. Short lengths of dowels glued in holes drilled in the ends of the upper front framing members as in detail C, provide doweled joints that
adequately strengthen those corners.

Next, the hardboard back is nailed in position, details A and E, and the two plywood sides added. After rabbiting the edges of the top panel as indicated in detail C, it is glued in place. The ¼-in. holes drilled in the corner framing members, as shown in the drawing and detail D, accept steel shelf supports that permit adjusting the shelf. These holes should be drilled before assembling the framework at the front of the cabinet. The positions and spacing of the holes may be altered and one or more shelves used if desired.

Notice that the grooves for the sliding doors are cut ¾ in. deeper in the upper horizontal framing member, detail B, than in the lower one, detail E. This permits installing the doors after the cabinet is completed. To do this, first insert the upper end of the inner door in its appropriate groove and then drop the door in the lower groove opposite the upper one. The same procedure is used for installing the outer door in the outer pair of grooves. Before installing the doors, brass finger pulls are fitted in them as shown, and the upper and lower edges of each door are beveled on the back side for easy sliding.

If hardboard is used for the doors, it can be painted black to contrast with an ivory-colored outer framework at the front. You may prefer to leave the entire cabinet in the natural finish of the woods used, or apply stain and varnish, especially when hardwood stock and plywood have been used for all exterior members. ★★★

Special Push Stick Aids Sawing

When ripping long stock on a table saw, one craftsman uses a special push stick he designed for the purpose. It's made with a length of sponge rubber cemented to an angled surface cut adjacent to one leg of the V-notch. This permits him to hold the work against the fence and safely push it into the saw. The V-notch is used in the usual manner when the end of the work reaches the edge of the saw table.

Calcimined walls should be washed thoroughly with a sponge and warm water before painting. All traces of calcimine must be completely removed in order for the paint to adhere properly.

Prevent Pipes From Freezing

You can prevent water pipes from freezing by painting the exposed pipes with a mixture of equal parts of glycerin and melted paraffin. This precaution can save you an expensive repair bill.

Shade Ink Drawing With Brush

You can produce a variety of shading effects on ink drawings with a hand brush or piece of sponge rubber. Simply rub them over the surface of a stamp pad and apply the ink as shown in the drawing. Since the edges of sponge rubber tend to produce lines, use only the flat surface.
Miter Box Nailed to Flange and Clamped to Workbench

If you have experienced difficulty in keeping a wooden miter box steady while sawing, try nailing the box to a wide piece of stock. Allow the stock to project at the front of the box so that the flange thus formed can be clamped to the workbench with a couple of C-clamps. Position the clamps so they don’t interfere with sawing.

Horse-Collar House Number

Two old workhorse collars and a lantern of the same period—the latter wired for electricity—have been combined by one homeowner to assemble this unusual name and address sign that is located in the yard.—F. Leland Elam, Sacramento, Calif.

Gate Made of Salvaged Items

Scrap odds and ends of various materials were combined to make this unusual gate. A length of pipe provides a column on which the gate hinges pivot. The hinges themselves consist of lengths of discarded wooden columns bored to accommodate the pipe column. The “mallet” effect is gained by wrapping the column sections with strips of flat steel, and nailing lengths of split dowels to the gate to appear to be handles. The chain and singletree were salvaged from an old farm wagon.

Weather Stripping Silenced

You can stop that annoying howl of a spring-type metal weather stripping on an outside door when it is subjected to wind pressure by providing a resilient cushion under the weather stripping as shown. For the cushion, use a strip of self-adhering sponge rubber. Usually a ⅛-in. thickness of rubber provides a satisfactory cushion without making the door too difficult to open or close.
Tray on Folding Stand
Ideal for Snacks

Serving snacks to a few guests or the family is much easier for the hostess when the serving tray can be placed on a folding stand such as the one illustrated. The stand will take a tray of any shape with a radius of 9 in. or more and folds flat for compact storage. Rubber suction cups glued in holes drilled in the upper ends of the legs hold the tray securely once it is pressed in position on them, making the unit very adaptable for use as a TV table, tea table, snack table or end table as desired. If no suitable tray is available, the one shown can be made by making a full-size pattern from the squared drawing and cutting the members from ¼-in. hardwood plywood and assembling them with glue and nails. The legs of the stand are 1-in.-dia. hardwood dowels, cut to length and drilled to accept the crossrails. The latter are cut from ½-in.-dia. hardwood dowels. A hole, drilled vertically through the diameter of each crossrail, accommodates a ⅛ x 1⅛-in. stove bolt at each pivot as shown in the drawing above. Before gluing the crossrails, ⅛-in.-wide strips of polished sheet brass are wrapped around the legs at two elevations and secured with brass escutcheon pins as indicated in one of the details. The holes for the suction cups, also, are drilled at this time. The legs and crossrails are painted black to contrast with the decorative brass trim on the legs for a smart appearance.

Bertram Brownold, Cedarhurst, N. Y.

Cooling Photo Developer

When cooling or warming a bottle of photo developer under a faucet, try inverting a drinking glass over the open neck so that the water can flow down all sides of the bottle. This will permit the water to envelop the entire bottle without entering it.—J. Comstock, Wellsboro, Pa.

Repair Tackle With Nail Polish

Clear fingernail polish is ideal for quick repairs to chipped plugs, loose rod windings and damaged windings on flies and other fishing tackle. Also, a drop of polish on a mosquito bite will stop the itching almost immediately.

Harry J. Miller, Sarasota, Fla.
CERAMIC-TOP

By F. Leland Elam

Color combinations and arrangements of the tile are limited only by individual taste and ability and by the availability of tiles in the desired colors. The 2\(\frac{1}{4}\) x 30-in. plywood top used for the table illustrated accommodates an even number of glazed tile 4\(\frac{1}{4}\) in. sq., while the edges are faced evenly with 1-in. wide unglazed tile in 1 and 2\(\frac{9}{16}\)-in. lengths. Other sizes of tiles can be used for the top and edges simply by cutting the plywood top to the required size. Also, designs as well as figures can be painted on the tiles selected for that purpose, Fig. 1.

Before obtaining the tile, it is a good idea to sketch several layouts, simulating the colors of available tile and drawing figures and designs and locating them for the most pleasing effect. Then, obtain the required tile and place the large ones on the plywood base according to the color plan of the selected layout. Next, remove the tiles that are to be painted. When two or more tiles serve as a background for a single figure, they must be taped together for proper alignment of the segments.

Paints for the illustrations are made up by mixing a small amount of liquid furniture polish (wax base) with a colored oxide that is appropriate for each of the required paint colors. The wax serves as a good vehicle for flowing on the colored oxides.

1. Figures and designs painted with color-oxide mixtures become part of tile after firing them in kiln

2. Painting figures on tile is easy with paint made from colored oxide mixed with liquid furniture wax

3. Grout is worked into tile joints by moving palm of hand with circular motion over surface of table
COFFEE TABLE

in that it dries quickly, preventing the colors from intermixing. A small brush is used to apply the paint as in Fig. 2.

After the tiles are painted, they are placed in an electric kiln for firing at a temperature of 1750 deg. F. At the moment the glaze on the tile melts, the heat is turned off and the tile is allowed to cool with the kiln door closed. When cooled, the glaze hardens again and the figure or design fuses with it in permanent colors.

The next step is to return the painted tiles to their respective places on the table and begin cementing the tiles, starting at one corner, and being careful to align the outside tiles with the edges of the table. When all large tiles are set, the small ones are cemented on the edges of the table as shown. Ceramic-tile cement is used for both types of tile.

About 8 hr. after the tiles have been cemented, the tile joints are filled with grout as in Fig. 3. For this, portland cement is dry-mixed with powdered brick-red cement chrome oxide. Then, water is added until it attains a consistency of light cream. After the grout has dried for 15 min., the excess is wiped from the tile with a damp sponge, Fig. 4. About 24 hr. are required for complete hardening of the grout, after which a 10 percent solution of muriatic acid is applied to the entire tiled surface, Fig. 5, to dissolve any remaining grout particles. The acid is then removed by rinsing with water. Wear rubber gloves when rinsing off the acid and be careful it does not get on the clothes.

4. After grout sets, excess is removed with wet sponge, being careful not to dislodge it from joints

5. Muriatic-acid solution brushed on tile, dissolves hardened grout particles for removal with wet sponge

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Retaining Groove in Bench Top Keeps Screws From Rolling Off

Screws, nuts and other small parts of an assembly that are placed on a workbench can be kept from rolling off the top by cutting a $\frac{3}{8}$-in. groove in it near the outer edges as shown. A groove is better for this purpose than a raised border of wood or metal because the groove will not interfere with work that must be placed over the edges of the bench and it permits easy cleaning of the bench top.

Wrap Gift With Paper Tablecloth

When you have a large package to wrap as a gift, try using a paper tablecloth of the required size for wrapping material. This makes a neater and more attractively wrapped package than is possible when several sheets of gift-wrapping paper are joined together to cover the package.

Jackknife-Style Scribing Tool

Here is a handy scribing tool that you can carry in a trouser pocket, since the sharply pointed scriber can be closed safely in the same manner as a jackknife blade. The tool is made by forming a loop at the end of a length of stiff wire and pointing the other end. The wire is then mounted on a hardwood handle with a deep groove cut in it.

Improvised Bunsen Burner

When you need a Bunsen-type gas burner for shopwork or for heating household repairwork, this improvised burner can be made in a few minutes. Simply form a length of soft-copper tubing as shown in the detail and drill several small holes in the upper end of the spiral to admit air. A length of rubber tubing connects the burner to an outlet.

Luminous Tape in Darkroom

Luminous paint or tape applied on the edges of darkroom shelves make film, holders and film hangers easier to locate in the dark. Select spots for the tape carefully to prevent fogging the film when loading or developing it.

Marshall Lincoln, Fort Wayne, Ind.

Notch Ship’s Margin Planks

For authentic reproduction of model ships made to scale, the ends of deck planks at the bow should be squared and let into notches in the margin planks, as shown, rather than ending them in sharp points. The squared end of each plank should equal one third of its width.
When building a breakfast nook it should be noted that dimensions and clearances have been fairly well standardized as given in the above drawing. The most common arrangement for accommodating four persons is to have two benches, one on either side of the table as shown in the illustration. In some cases a single L-shaped or U-shaped seat may be preferable. The table can be supported at the outboard end by means of single wooden or wrought-iron leg and a cleat under the opposite end for attachment to the wall. A crutch tip on the leg prevents damage to the floor covering and deadens sound when dishes contact the table surface. Exposed corners on the table and seats should be rounded at about a 2-in. radius and are then less likely to cause painful bruises. Seats of plywood or lumber, ¾ in. thick, are the simplest to build and the easiest to keep clean. The seats may be supported in the same manner as the table, or they may form tops of storage bins or cabinets. For increased comfort, seats should be cushioned. However, the thickness of the cushioning material must be calculated before constructing the seats so that their over-all height does not exceed 18 in. The material used for covering the cushions should have a smooth finish since a person sitting on the inside of the table must slide across the seat when entering or leaving.—E. R. Haan, Evanston, Ill.

**Eraser Is Recipe-Card Holder**

For handy reference when cooking, one housewife inserts the recipe card being used between the felt plies of a blackboard eraser as shown in the detail. One eraser can accommodate several cards when used in this manner.

**Tubing Protects Tap Threads**

Protect the threads on the taps of your tap-and-die set by cutting sheaths for them from rubber tubing as shown in the photo. The sheaths also will prevent the cutting edges of the taps from damaging other tools stored with them.
Aquarium Heater Keeps Developer At Right Temperature in Winter

During the winter months the temperature in most basement darkrooms is below that required to maintain the developer at 68 deg. F. If the developer is too cold, it will be difficult to get full-toned prints and full-scale negatives. To avoid this difficulty, submerge an electric tropical-fish aquarium heater in the developer and set the control so that a constant temperature of about 68 deg. F. is maintained. A 25-watt heater is adequate for use in a developing tray, while a 50 or 100-watt heater would be more suitable for a deep developing tank.

Checking Shaper-Cutter Profile

Being a reverse of the actual cut, sometimes it is difficult to tell in looking at a shaper cutter the exact profile it will cut. A quick way to make a positive pattern is to hold a piece of paper against the flat face of one blade and tear forward.

DANCING NEON LIGHTS will turn your Christmas tree into a conversation piece when wired to this special flasher. It controls the rate of flash of the bulbs by varying either the resistance or the capacity, or both, of a relaxation oscillator, thus making the lights blink individually and intermittently.

The basic circuit is shown in Fig. 2. A simple selenium-rectifier power supply furnishes d.c. power at about 150 volts to the lamp line. Each neon bulb has its own resistor and capacitor, R-2 and C-2, Fig. 5, which determines the flash rate of the bulb. The power supply will operate as many as 20 lamps without reducing noticeably the flash rate.

Flash rate is determined primarily by the values of R and C (resistor and capacitor) for each lamp of the circuit. The lamp size may be anywhere from 5/8 to 2 watts. The smaller lamps will give a brighter flash, with the ¼-watt NE-7 bulb, Fig. 4, being preferred. The bulb simply acts as a switch when the capacitor charges to its striking voltage. The lamp then partially discharges the capacitor and the cycle repeats. The size of the lamp has very little to do with the flash rate.

For a 150-volt supply, a combination of a 0.2 capacitor and a 22-meg. resistor, such as R-2 and C-2 for lamp No. 1 (L-1), yields a flash rate of about one flash per sec. With a 22 meg. and 0.1 mfd., the rate is roughly two flashes per sec. Dropping the resistor to 10 meg. and the capacitor to 0.1 mfd. gives about four flashes per sec. If the capacity is raised to 0.5 mfd. and two 22-meg. resistors are used, the rate will be one flash every five sec.

How power supply is housed in hinged plastic box. Black cord is power line, white cord is lamp feed.
A small plastic case is used to house the power supply which contains the selenium rectifier, surge resistor and the capacitor, Fig. 1. The terminal strip keeps the parts in place, and knots tied in the power and lamp wires prevent tension on the components. The common lead of the lines and the capacitor is simply taped after being soldered.

Fig. 5 shows the method of wiring each flash unit in the string, C-2 being a capacitor and R-2 being a resistor. The leads are soldered and taped and the completed unit looks like Fig. 3. Be careful to tape the connections well since one side of the power line is connected straight through. Also, watch that you do not break the fragile wires of the neon leads. Bulbs with bases may be used, too, such as the NE-17 in place of the NE-7. In using the 1-watt NE-30-type bulb, the wires are soldered directly to its screw base or to a socket to which the capacitor and resistor are attached. Tolerances of the resistors, capacitors and lamps usually allow slightly different flash rates for the same nominal values. Thus, a staggered effect is provided even with the same components.

Some of the various neon bulbs available. Smaller lamps give brighter flash. NE-7 type is preferred.

Here's what each lamp will look like in your string of lights after connections and components are taped.
Preventing Accidental Erasures On Tape Recordings

The sad misfortune of accidentally erasing a tape recording can be avoided in the future on some recorders by keeping a short piece of rubber tubing over the erasing button. In this way, the button cannot be depressed without first removing the tubing.—J. G. Forbes, Los Angeles, Calif.

When figuring the amount of wallpaper needed for a room, make exact measurements of the walls and then deduct total area of doors and windows.

Ground Wire on Darkroom Brush Removes Static Electricity

A paintbrush used for dusting film negatives, plateholders, etc., should be fitted with a ground to remove any static electrical charge which attracts more dust. To do this, solder one end of a length of wire to the metal ferrule of the brush and fit the other end of the wire with an alligator clamp. When the brush is used, simply clamp the wire to a convenient cold-water pipe.—Ken Murray, Colon, Mich.

When "music box" is assembled, strikers are adjusted in length to assure the proper operation of hammers.
ous parts of the hen’s body and assemble it around the music box. Glue the rear wheels to the axle and attach the front wheels with wood screws. Wings are pivoted to the body by drilling clearance holes in the wings and driving wood screws into the body. The legs are pivoted to the wings and rear wheels by the same method. Position the pivot of one leg 180 deg. away from the other, so the wings and legs will move alternately. Drive a screw eye into the front of the toy to permit attaching a towing string, paint it in bright colors and the hen will appear as in Fig. 2, ready to be towed about.

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**Solving HOME PROBLEMS**

**TO FREE A FROZEN DOOR**, caused by moisture running to the bottom edge of the door and freezing to the sill, apply salt water, using an oil can as applicator.

**DOILIES “STRETCHED” ON GLASS PLATE** are as neat as when pin-type stretcher is used. Dip doily in starch, spread on glass or mirror and allow to dry.

**THREADING A NEEDLE IS MUCH EASIER** when the end of very heavy thread is first flattened with pliers so it passes easily through oval needle eye.

**ASSURE GOOD FLOWERPOT DRAINAGE** without loss of soil by fitting bottle cap over drain hole. It holds in soil, lets water seep out under irregularities in crimped edge of cap.

**WASHING-INSTRUCTION** tags in envelope on inside of medicine-cabinet door are handy when hand-washing delicate items.

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POPULAR MECHANICS
WHEN TROUSER HANGER LOSES GRIP, slip heavy rubber bands over ends. Added thickness and resistance of rubber compensate for loss of spring tension.

GET 100 PERCENT USE FROM CANDLES by dropping one stub into dessert glass to provide wick, melting others and pouring wax into glass around first stub.

PAPER CLAMP IS "THIRD HAND" when folding bed sheets and other large items. Slip clamp onto shower-curtain ring, fit ring over large cup hook on wall.

KEEP SIZE MARKS IN SHOES LEGIBLE until shoes wear out by painting over the numbers with clear nail polish when shoes are new, numbers readable.

ROLLED CALENDAR WILL LIE FLAT if tube in which it is mailed is held over steam to moisten paper before removing.

REFUSE PAILS EASILY RUSTPROOFED by polishing the inside with hard wax. Heavy coating of wax also makes the pails easier to clean by preventing food from sticking to the sides.
Self-Setting Target for Air-Rifle Shooting Practice

Air-rifle target practice is fun when you have a target, such as the one shown, that swings into shooting position immediately after it is struck by a pellet. To make the target assembly, a length of wire is slipped through the spring coil of a clamp-type clothespin and the wire bent as indicated. One end of a metal food can serves as a target when it is gripped by the clothespin as shown in the detail.

Cedar-Shingle Coverage
Calculating cedar-shingle coverage is made easy for both builder and do-it-yourselfer by the rule-of-eighth method which can be applied to any amount of shingles at any weather exposure. Here's how it is done: Count the layers of shingles in a bundle and multiply the amount by the number of inches of weather exposure desired. Then divide the result by the number 8 to determine the square-foot coverage per bundle. For example, a bundle usually contains 36 shingles or 18 layers at each end. Suppose the weather exposure desired is 7 in. Thirty-six multiplied by 7 is 252. This divided by 8 gives $31\frac{1}{2}$, or the square feet of area that a bundle will cover.

Red Cedar Shingle Bureau

Improvised Diffusing Screen
Two alligator clips soldered together as shown in the photo provide a handy means of attaching a diffusing screen to a photo-flood reflector. The diffusing screen shown here is an embroidery hoop on which a dampened cloth is stretched. The clips used should not be so small as to hold the diffuser too close to the reflector as heat from the bulb may cause the diffuser to burn. The length of the clips can be extended easily enough by soldering them to a flat link. Spring clothespins also can be used.

John J. Rea, Urbana, Ill.
Wooden Base Keeps Washer and Drier off Floor

Many homeowners are faced with the problem of preventing rust from damaging the bottoms of their automatic washers and driers, especially when the units are kept in the basement. Keeping the units in place when in operation and preventing dirt from collecting under them also presents a problem. All you have to do to solve these problems is mount the units on a simple wooden base made from three 24-in. lengths of 2 x 4 to which two 1 x 4-in. stringers are attached as shown in the photo and drawing. The over-all lengths of the stringers should equal the combined widths of your units plus 1/2 in. to accommodate two lengths of weather stripping placed between the units. The center 2 x 4 is located directly under the two facing sides of the units for proper support. Before assembling the base, coat all members with a wood preservative to prevent rot. Use zinc-coated nails or brass screws to assemble it. To mount the laundry units on the base, remove the leveling screws from each machine and drill holes in the wooden frame for fastening them later as shown. Then, glue rubber weather stripping to all surfaces on the wooden base that will come in contact with the units. Also, glue two lengths of the same type of weather stripping on the side panels of one of the machines, as shown, to prevent them from rubbing each other when operating. With the units in position on the base, use the leveling screws to bolt the units to the base. Integrating both units on one base tends to absorb much of the vibration that causes "travel." Adequate clearance under the units permits sufficient ventilation to prevent condensation of moisture and provides ample space for easy cleaning under them. Also, the work level is improved at this increased height.—R. E. Clark, Aurora, Ill.

Tool Saves Milk-Can Lids

Milk-can lids can be loosened for removal without battering them if a tool, such as the one shown, is used instead of a hammer. To make it, simply slip a length of rubber hose over a 1-ft. length of pipe.

Next time you want to shine your shoes, and find that there is no polish, try a little paste floor wax. The wax has a neutral color and may be used on either dark or light shoes.

Screw Secures Chisel Handle

To prevent the wooden handle of a chisel from working loose, one homemaker cements the handle in the ferrule. Then, a hole is drilled in the ferrule and countersunk to accept a screw as shown in the detail.

Use a cloth moistened with denatured alcohol to clean ivory piano keys, and expose them to the light during the day as darkness may cause true ivory keys to yellow with age.
LIVING INDOOR GREENERY can be yours the year 'round with a little careful planning. And by using these planting boxes you can change room decor, plants can be moved about to create attractive color effects. As an example, a live evergreen can serve as a room divider in summer and as a living Christmas tree during the holiday season. The secret of this changeability is the use of the planting boxes and balled specimens rather than making permanent plantings indoors. Balled evergreens in the medium and narrow pyramidal forms, also many other low-growing shrubs, can be made to thrive indoors wherever light, temperature and humidity can be closely controlled. Usually it is possible to meet these conditions in both old and new homes. During the warmer months the larger plants and shrubs can be moved outdoors and utilized as portable decorative features of the permanent outdoor-garden plantings.

To assure long life, use redwood or cy-press for planting boxes. Coat the interior with hot asphalt, or line with sheet copper, all joints being soldered. Drain holes in the bottom of the box are protected by extending short lengths of tubing through them, and soldering to the liner.

On these two pages are shown detailed drawings of a planting box that is suitable for a living Christmas tree. Stock for the sides is 1½-in. material, the bottom is 1-in. stock. The bottom is drawn by scribing a hexagon inside a circle. The radius of the circle is 63/4 in., which is within a fraction of an inch of being equal to the side of the inscribed hexagon. A slight adjustment of a compass will produce six equal divisions on the circle, to provide six sides for a hexagon. The stars for the planting box are cut from ¾-in. stock and are attached after the box is assembled with glue and screws. This particular container may be painted in bright colors in keeping with the holiday spirit, as it is used generally for a decorated Christmas tree.
All plant boxes should be raised slightly by the addition of feet so air can circulate beneath and keep bottom dry. Also, all should have drainage holes bored in the bottom to allow excess water to escape. Pieces of broken pottery may be placed over the holes. Copper liners can be fitted to all boxes if you wish.
On this page are shown the details of a rectangular planting box of more modern design. Despite its modernity, no nails or screws are used in its assembly. Instead, the ancient method of using wedge-shaped pegs is employed. A mortising bit and a drill press are handy in making the cutouts in the construction of this planting box, but a careful craftsman can use a regular wood bit and a wood chisel to obtain excellent fits between the various components. The sides of this box are cut from 1 3/4-in. stock, the bottom from 7/8-in. material.

Feet for this planting box are strips of wood. Some sort of feet or spacers are needed under all planting boxes that are portable, to allow for drainage and to assure circulation of air under a box. This will prevent any moisture that collects on the outside of the box from remaining long, and causing rot or mildew. A situation that might cause water to collect on the bottom of a planting box would be an overwatering which would cause water to run out the drain holes in the bottom of the box, and collect on the bottom. Such moisture might encourage the growth of harmful bacteria or fungi, that would produce a root-destroying disease in the soil.

On page 185 is shown a square planting box that is ideal for small evergreens and ornamental shrubs. If you have ever
wished you could occasionally change the character or appearance of your terrace by moving the planting to different locations, this container will permit you to satisfy that whim. Some plants that die out in the fall can be kept in bloom almost all year 'round if they are moved indoors before frost occurs. Planting boxes of varying sizes built in the same proportions and design as the one on this page will permit various kinds of shrubs and plants to be moved indoors to beautify your home during the long winter months.

Miniature rosebushes that bloom all year 'round, as well as dwarf fruit trees now are available, and would fit easily into any of the several planting boxes described in this article. Also, you might have a spot in your living room that would require a planting box of a special shape to fit properly. Build it in that space and bring summertime outdoor beauty into your home. It will be easier to forget the cold and blowing snow outside with green, blossoming shrubs inside your living room.
Stovepipe Used as Small-Parts Wall Rack

Ideal for small parts is this wall rack, consisting of a length of stovepipe divided into compartments by wooden disks from which a quarter-circle segment is cut. Circumference of the disks should be about one fourth larger than that of the pipe. For example: A 6-in. pipe has about an 18-in. circumference. The disks should be about 6½-in. dia. Any projecting metal can be bent to form a right-angle flange.

"Drill Bit" for Pilot Holes

Accurately dimensioned pilot holes for wood screws are bored by one craftsman who uses a "drill bit" that is a wood screw of the proper size from which the head is removed. The straight shank of the screw then is chucked in a hand drill, and the holes bored.


Tree Ornament Hangers Bent From Pipe Cleaners

Lost hangers for Christmas-tree ornaments can be replaced with hangers bent from pipe cleaners. Bend one end of the cleaner as indicated and insert it in the ornament so it will spring open a little. Form hook at other end.

Rounding Glass Edges

After you have cut a sheet of glass to fit on a table top or other piece of furniture, the sharp edges should be smoothed. An efficient tool that will round the top and bottom edges simultaneously can be made by wrapping a piece of sandpaper over the groove edge of a short length of tongue-and-groove flooring as shown.

Pen Modified With Paper Clip To Prevent Blots Under Ruler

To prevent blots that are caused when ink creeps under a ruler along which a pen is drawn, tape a paper clip to the end of the pen. The clip should extend just short of the penpoint so the point contacts the paper first.

Small-Parts Soldering Iron

Ideal for soldering in restricted locations, and on small, delicate parts, such as transistors, is this soldering iron improvised from a propane-gas torch and a length of copper wire. Several turns of the wire are wrapped around the torch nozzle, then the wire is bent to pass through the flame and extend 3 or 4 in.
Ramps and Platforms Elevate Car for Easier Access

Occasional jobs that require you to get under your car, such as draining the crankcase oil or installing a new muffler or tailpipe, can be performed in your garage or on a driveway if you have these strongly built wheel ramps and platforms at hand. Two sets should be sufficient, as there seldom is need for all four wheels of a car to be raised at the same time. In use, the ramps and platforms are arranged end-to-end as shown, and the car is driven or backed up the ramps onto the platforms. The ramps then can be removed until the job is completed to provide more working space under the car. Both ramps and platforms are made of 2 x 12 and 2 x 6 stock. Height of the units should not be more than the 7\(\frac{3}{4}\) in., which is gained when 2-in. stock is placed on top of a 2 x 6. This height provides ample working space under the car, while keeping it steady. To assure maximum strength, use wood screws of a suitable size, rather than nails, to assemble the ramps and platforms. A cleat nailed to one end of each platform serves as a stop to prevent the car wheel from running off. For additional safety, when the car is on the platforms, fit chocks under both the front and rear of one of the wheels that is on the ground to prevent rolling.

Photos Vignetted on Enlarger With Cardboard Cutout

To vignette a photo with an enlarger, first make a mask by tracing the projected image on a piece of cardboard, then cut it out with scissors. The width of the shaded border around the image in the photo is determined by the distance the cutout is held above the enlarger easel.

Screwdriver Drives Lag Screws

When no socket wrench is available to fit the head of a lag screw that is to be countersunk, a screwdriver can be used instead by modifying the screwhead. Saw a slot in the head of the screw wide enough to accept the blade of a heavy screwdriver. To apply sufficient turning force, it may be necessary to use a wrench on the driver.
4½" REFLECTING TELESCOPE

By Sam Brown

Here is a powerful reflecting telescope any amateur astronomer or would-be stargazer would be proud to own. The clarity and brilliance of astronomical and daytime views at 60 to 180 times magnification will amaze you. To build the telescope, simply purchase a 4½-in.-dia. concave mirror and an eyepiece assembly with a ¼, ½ or 1-in. eyepiece and assemble these components on a cardboard tube, mount and tripod as shown in the photos and drawings. Also, the eyepiece mount and eyepiece can be made as shown in Fig. 12 if you have access to the necessary power tools. When the telescope is fitted with a 1-in. eyepiece, it has a field of view of about 1 deg. which is equivalent in coverage to two moons, or 52 ft. at 1000 yd. (See Fig. 6 for more performance data.) The principal advantages of the reflector over the refractor type of telescope with a lens objective are: (1) The reflector is much less expensive inch for inch of the objective, and (2) the reflector works by reflecting light rays instead of bending (refracting) them and consequently is not affected by color faults usually present to some degree when light passes through a glass lens.
4 1/2"-DIA., 45"-FOCAL-LENGTH CONCAVE MIRROR

45" (FOCAL LENGTH OF MIRROR)

OPTICAL LAYOUT

4 SIDE VIEW

DIAGONAL MIRROR, 1/8" x 1 3/4"

1" No. 6 SHEET METAL SCREW

SHEET METAL CLIPS

1/8" ALUMINUM FACING STRIP

8-32 THREAD SCREW

EYEPiece-HOLDER BASE

TELESCOPE ASSEMBLY

PERFORMANCE DATA

<table>
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FIELD OF VIEW

ABOUT 1" WITH 1" EYEPiece—COVERS 2 MOONS, OR 52 FT AT 1000 YD

STAR MAGNITUDE

YOU CAN SEE STARS TO 12½ MAGNITUDE

RESOLVING POWER

1 1/2 SECONDS. (YOU CAN SEE AS SEPARATE POINTS TWO STARS AS CLOSE AS 1 1/2" OF ARC)

MIRROR CELL

END VIEW

1/2" x 2" CARRIAGE BOLT

1/4" O.D. x 1" SPRING

CORRUGATED CARDBOARD

4 1/4" -DIA. MIRROR

1/8" PLYWOOD

MIRROR CLIP

1/4" No. 6 SHEET METAL SCREW

DECEMBER 1957
You can get a good idea of how a reflecting telescope works from Figs. 3 and 4. Light from a distant object is reflected and focused by the mirror objective. Without a diagonal mirror that is in a fixed position at 45 deg. from the axis of the concave mirror, the image would form at the forward point as in Fig. 3. The diagonal catches the concentrated light rays and deflects them to a point above and outside the tube where the image can be brought into sharp focus and viewed with any type of magnifying glass. It will be noted that the diagonal is positioned directly in the path of the incoming light. This obstruction blocks some of the light (the center of the concave mirror is "blind"), but the
interference is not otherwise disadvantageous nor does it interfere with viewing.

**General Construction**

Most of the construction details are shown in the drawings and photos and need little explanation. The mirror cell is made first as shown in Fig. 7 and mounted at one end of a 46-in. length of a cardboard tube as shown in Figs. 4 and 6. Four screws driven through the cardboard tube and into the outer member of the cell, Fig. 7, end view and detail A, hold the cell unit in a fixed position in the tube, subject to slight adjustment. The latter can be done by tightening or loosening the three wing nuts at the back of the cell. This adjustment is necessary to position the mirror so that its axis intersects exactly the center of the diagonal, Fig. 4.

The unit incorporating the eyepiece holder, diagonal support and mirror is made next. This unit can be purchased ready for installation for about $10 if you prefer to buy it. The base of the eyepiece holder is a bandsaw and drill-press job as shown in Figs. 8, 9, 10 and 11. The bottom piece of the cutout, Fig. 11, is used for
a clamping block when drilling the holes for screwing the base to the tube and then is discarded. After the base is screwed to the tube, the hole that accepts the eyepiece tube is cut with a hole cutter, Fig. 10, that cuts wood and main tube in one operation.

**Alt.-Azimuth Mount and Tripod**

The mount and tripod shown in Figs. 13, 14, 15 and 16 are rugged units with friction adjustments for any latitude, declination and ascension. The assembly includes a cradle made of wood to which the telescope is held by means of two straps. The other parts are stock pipe fittings that require some machining as indicated. The horizontal pipe shaft on which the cradle is mounted, is slotted to receive the end of a dog-point screw as shown in Fig. 13. This permits the pipe cap at the end to be screwed on the shaft to apply tension on the plywood collar on each side of the cradle without the tendency for the cap to unscrew when the cradle is tilted.

The vertical axis of the mount is a \( \frac{3}{4} \)-in. pipe nipple with the outside diameter reduced to fit inside the 1-in. pipe column, the upper end of which is reamed to provide adequate clearance, Fig. 13. The alternate assembly, Fig. 14, should be used, if a long length of pipe cannot be reamed in your lathe.

Detailed construction of the base of the tripod part of the mount is shown in Figs. 15 and 16. The pipe column of the mount is screwed into a pipe cap that is tapped to take a \( \frac{3}{8} \)-in. bolt. The latter clamps the tripod assembly securely to the mount by means of two plywood rings as shown. Accurate drilling of the carriage-bolt holes in the legs is done with the fence setup shown in Fig. 15.

**Collimation**

Collimation is the optical term indicating alignment of optical elements. The collimation of any reflecting telescope is simplified by inking a center dot on the concave mirror, using a cardboard mask for proper positioning of the dot as in Fig. 18.

The test board, Fig. 17, is used to align the main mirror in the tube. To do this, light from a flashlight is beamed at the board and the position on the mirror of the reflected hole in relation to the inked dot is noted. What you are likely to see may be similar to the off-center positions of dot and hole as in Fig. 19, detail A. To correct this, simply tighten or loosen the wing nuts on the mirror cell until the reflected image of the hole is superimposed over the dot as in detail B.

After the concave mirror is adjusted, drop the diagonal into position so that it is in the approximate center of the tube. Then look through the eyepiece tube without the eyepiece and note if the reflected image of the concave mirror is centered on the diagonal mirror. A slight turn to the left will correct the misalignment shown in detail C, to bring both mirrors into alignment as in detail D. Now you are ready to use the telescope.
Method of Enlarging Drawings Eliminates Need of Erasing

Here is an improvement on the usual method of copying pictures to a larger size with the aid of guiding squares drawn on the picture. With this method, neither picture nor drawing sheet is marked, thus eliminating subsequent erasing. First, prepare a "master guide" of celluloid by scratching squares on it. This guide is placed on the picture to be copied and taped to prevent it from slipping. Squares now are inked on a sheet of paper as large as the sheet on which the enlarged drawing is to be made. Place the drawing paper over the squared paper and tape both to a pane of glass set above a lamp so the squares will show through the paper clearly, and proceed with the drawing.

Record on Bottle Assures That Developer Is Replenished

Replenisher must be added to frequently used photo developer to prevent it from deteriorating. To avoid forgetting about the replenisher, each time the developer is used mark the date on a label on the bottle. Later, if there is doubt as to whether or not the developer has been replenished, it is a simple matter to compare the number of rolls of film developed with the data on the bottle.

Adjustable Jig Permits Accurate Marking of Blind Holes

Aligning blind holes to be drilled for dowels in adjacent members, always a problem, becomes a simple operation when this adjustable marking jig is used. Marking points project from each side of the jig, permitting both pieces of stock to be marked simultaneously. A scale marked on the cross members of the jig permits the points to be centered on the work. Both the slotted and scaled members of the jig are strips of 3/8 x 1-in. steel flat. The scaled members are drilled together to assure that the holes are aligned accurately. A rule is used to mark the scales on these members, which are clamped side by side during this operation to assure further accuracy. One scaled member is riveted to the slotted pieces; the other is attached with carriage bolts and wing nuts so it can be moved to adjust the spacing between the holes. In use, the jig is tapped into one member, then the other is placed on top and tapped onto the marking points.

If you need an overnight case, and none is available, simply remove a portable typewriter from its case and use the latter as a substitute.

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Self-Closing Photo-Paper Box

Exposure of an entire package of photographic paper accidentally left open can be avoided if the paper is kept in a self-closing light-tight box, such as the one shown. The hinged lid is designed so that it cannot be raised to a vertical position and left open, but automatically closes when it is released. A catch at the front must be released before the lid can be raised. Triple side walls and flat black paint on the inside surfaces prevent light leakage and reflection. Capacity of the box is 100 sheets of 8 x 10-in. paper.

E. R. Haan, Evanston, Ill.

Level Held on Camera Tripod

To level the head of a camera tripod quickly and accurately, fit a pencil-sized level in a bracket slipped over the tripod screw as shown. The bracket is bent from sheet aluminum. To assure that the level is parallel with the tripod top, use a full-size level on the top to align it exactly. Then check it against the small level in the bracket. Adjustments to the small level are made by bending the bracket, into which the level must fit snugly.

Protecting Mailed Photographs

When sending photographs by mail, protect them against damage by sandwiching them between two pieces of stiff cardboard that are held together by a rubber band slipped over diagonally opposite corners, as indicated. Cementing or taping together the edges of the protective sheets is not only unnecessary, but causes added work and inconvenience for the receiver of the photos. On the other hand, the rubber band simply is slipped off the cardboard.
1. **DECORATIVE ENAMEL** in a pressurized can is made specially for outdoor use on wrought-iron furniture, outdoor grilles, railings and lamp posts. Dries in a few minutes to a weather-resistant flat black, especially attractive on all types of ornamental iron. Use on old or new surfaces. Can contains 18 oz.

Sapotin Paints, Inc., 205 E. 42nd St., New York City 17

2. **LIQUID WEATHER STRIP** comes in a squeeze bottle. Weatherseals and waterproofs as it dries. Adheres permanently, but can be stripped off. Comes in black, gray, green, pink and white to match most paints. Special applicator tip on bottle is designed to apply a continuous strip of uniform width.

Meridian Products Co., 366 Madison Ave., New York City 17

3. **AUTOMATIC SASH LOCK** is spring-actuated, locks when the sash is closed. It's regular sash-lock size and fits any standard wooden sash. Photo shows unit in closed position while details below show how striker releases latch as the sash is lowered to the closed position. Each unit is chrome-finished.

Skill Sales Corp., 415 S. Keedie Ave., Chicago 12

4. **LIGHTWEIGHT INSULATING MATERIAL** is poured directly from the bag into the hollow cores of concrete-block walls. Its use is said to cut heat loss through concrete-block walls as much as 50 percent. One 4-cu.-ft.-capacity bag contains sufficient insulating material to fill 16 standard concrete blocks.

Perlite Institute, 45 W. 45th St., New York City 36

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**DECEMBER 1957**
Improvised Stand Accommodates Any Size Christmas Tree

If you are putting up the tree on Christmas Eve and the stand that was all right last year now is broken, or just cannot be found, there is no need to panic if you have a couple of lengths of lumber in your workshop. The improvised stand shown in the detail can be made from stock of any size, and of dimensions that will accommodate almost any size tree. If the trunk of a tree is fairly large at the bottom, longer bolts are used in the clamping portion of the stand. If a pan of water is to be used under the tree, use wider stock for the two end pieces so that the clamping members are raised above the floor to clear the pan and let the trunk rest in the water.—A. V. Malone, Pasadena, Calif.

Holiday Window Decoration For Night or Day

With slight modifications this holiday-decoration idea used by one homeowner can be adapted to any size window. A cutout of a simple drawing is pasted to the glass. Draperies form a background during the day, light shines through the draperies at night to silhouette the drawing. For an added effect, a Christmas-tree light in a foil star shines down on the scene.—Albert C. Speckman, Racine, Wis.

Modified Cake Pan Is Bird Feeder

You can make a practical bird feeder in a matter of minutes by cutting slits in opposite edges of a cake tin, bending the bottom at right angles and riveting as indicated. Holes punched in the vertical portion of the feeder will permit it to be hung on projecting nails or screws. Accumulation of rainwater in the pan is prevented by the open slits which will permit it to drain away.
Shadow-Box Display Frame for Dolls

If there is a young lady in your home who is proud of her doll collection, she will be delighted with this shadow-box picture frame that will permit her to display her dolls as "three-dimensional pictures." Large picture frames, such as were fashionable several decades ago, may be found in many attics, and are ideal for the frame for the shadow box. If such a frame is not available, picture-frame stock can be purchased at a lumberyard and made into a frame of any desired size. Dimensions given in the detail are those of the original picture box, which was made from a picture frame found in an attic, so the dimensions should be considered only representative. The size of the dolls to be displayed in a particular picture box will determine the size of the frame, the number and type of partitions—whether vertical or horizontal—and the depth of the frame. Unless a doll is extremely large, the 4-in. dimension shown for the depth of the frame is sufficient. A greater depth will cause the frame to project too far from the wall on which it is hung. Top, bottom, sides and partitions of the picture box are cut from ½-in. stock. The back can be ¼-in. plywood or hardboard. For a novel effect, use hardwood-faced plywood of a grain and color that will complement room decor. Wallpaper to match that used in the little girl's room also can be used as a background. For an illusion of depth, install a mirror at the frame back.

Mrs. Jean Lyon, Cedar Rapids, Iowa.

Auxiliary Frame on Pickup Truck Supports Long Loads

Long, but light items, such as pipe and lumber, can be carried in the short bed of a pickup truck by adding a U-shaped frame made of ¾ x 2-in. flat steel. It is pivoted to the inner surfaces of the truck-bed sides on ¼-in. steel plates as indicated. For easier loading and unloading, a roller consisting of a length of 3-in. pipe is installed near the end of the frame. To make sure that most of the weight of a load is supported on the truck bed, the frame should be pivoted so that the roller is level with, or slightly above, the truck bed when the tail gate is lowered and the frame swung to the rear. When not in use, the frame is swung forward to be out of the way. Although the roller is handy, it can be omitted if desired.

DECEMBER 1957
OUTSIDE CHRISTMAS DISPLAYS

By Hi Sibley

Whether it's Santa and his reindeer charging across the top of your roof, or a fireplace on the front lawn, flanked by red-flamed candles, an outside decoration gives your home a special holiday look. Santa, his sleigh and reindeer are jigsawed from ¼-in. exterior-grade plywood. At least three pairs of reindeer should be used. Santa's toys are carried in a large laundry bag filled with dummy packages and hooked to the back of the sleigh. Steel angles are used to attach the sleigh and deer to the roof. Harness can be painted on the deer, reins are lengths of white plastic clothesline which contrasts with the brown deer. Use a spotlight for night-time illumination.

Except for the mantel, ¼-in. exterior
plywood also is used to make the fireplace which is built around a 1 x 2 framework. Paint the fireplace brick-red, then stripe with white lines for mortar. Paint the inside of the fireplace black. The candles are made from 24-in. lengths of 6-in. stovepipe. One length is cut in half and the sections fitted on full lengths to provide two 36-in. candles. Wooden disks at the top and bottom of each candle keep them in shape and provide a means of attaching receptacles and sockets for the bulbs. The candles are painted a bright red.

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Salt Box Is Handy Container for Carrying Sand in Car

Every motorist should carry a little sand in his car during the winter just in case he may get stuck on a slick spot next to a curb. One of the handiest ways of carrying sand without spilling is to pour some in a salt box. The pouring spout makes it easy to spread the sand where needed.

Varicolored Candlestick Melted From Contrasting Inlay

A varicolored candle can be obtained for a table decoration by drilling two or more holes in the top of the candle and inserting small cake candles of contrasting colors. Light the wick on the large candle only and a very pleasing effect will result when the small ones melt and the colored wax flows together.

E. M. Wooden, Franklin Lakes, N. J.

(A rubber spatula is handy when mixing and pouring paint from one can to another. Besides being a good mixing paddle, it is useful for scraping out the final drop.

Reels Stored on Dowel Racks

Developing reels can be stored neatly in the darkroom on a rack consisting of dowels inserted in blind holes drilled in a shelf. Most reels can be fitted on dowels of ½ or ¾-in. dia. Dowels should be long enough to hold three 120 reels. Drill the holes to provide a snug fit, so glue is not needed to keep the dowels in place. This permits them to be removed easily for cleaning the shelf.

Extending Life of Chamois

Before putting a chamois away to dry, rinse it in lukewarm water to which a small amount of acetic acid or household ammonia has been added. Use just enough acid so that the slippery feeling of the chamois disappears, and the chamois will dry soft and flexible. If the chamois is soiled, first wash it in a lukewarm soap-and-water solution, then rinse it in the water-acid mixture. Do not use hot water.
A NIFTY CHRISTMAS GIFT

**Hobbyhorse**

AND CART

HERE'S A HOBBYHORSE that will not only accommodate a young rider but permit him to carry a load as well in the attached cart. To make it, first draw a full-size pattern of the horse head and trace it on 1 1/8-in. pine for sawing. The eyes, mouth and nose can be carved or just painted on. The eyes can be carved by drilling part way with a 3/4-in. bit held at an angle. All sharp edges are chamfered and then a 7/8-in. hole is bored for a dowel or broomstick neck. A screw eye with a ring attached is turned into each side of the mouth to form a bridle bit. Old shoes will provide the leather for the ears, and a narrow belt will make the bridle. The cart is attached to the dowel with a flat-steel bracket.

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![Diagram of Hobbyhorse and Cart](image-url)

- **LEATHER EARS**
- **FOLD**
- **UPHOLSTERING NAILS**
- **DRILL 5/16" HOLE**
- **CUT HEAD FROM 1 1/8" PINE LUMBER**
- **1/4" MAPLE, 4/5" DIA.**
- **STOVE BOLTS 5/16" x 1 1/4"**
- **5/16" STEEL AXLE, 11 1/2" LONG**
- **FLAT STEEL 1/4" x 5/8"**
- **5/16" DIA. MAPLE DOWEL, 29" LONG**

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Decorations for Your Xmas Tree
"Glitter" sprinkled on plastic-foam ornaments will adhere well if foam first has been immersed in water.

CHRISTMAS-TREE ornaments made of plastic foam are snow-white and crisp-looking, but they do lack the festive glitter of other types of ornaments. However, it takes only a little work to add color and sparkle to the foam. Sequins, which are available in a variety of shapes, sizes and colors can be pinned to the foam with common pins. The ends of the pins are bent over to keep the sequins in place. "Glitter," either the type on sale in art stores, or the edible type used for cake decorating, may be "cemented" to the ornaments by first dipping the foam in water, then sprinkling the glitter on it. Shake off the excess particles and let the foam dry. On the opposite page are shown a number of plastic-foam ornaments.

One ornament with sequins, and one without show the difference in appearance of decorated plastic foam.

Above, pin holding each sequin is bent with pliers. Below, pattern of sequins is placed before pinning.

Below, no matter what the shape of a plastic-foam ornament, it can be given a new look and sparkle.
Giant Oilcloth Poinsettias
Are Unique Outside Decoration

Vivid red poinsettias cut from oilcloth and supported on wire frames decorate the front of this motel in Whitehall, Mont. A cluster of Christmas-tree lights is placed at the center of each flower, and evergreen-covered pipes provide stems. Giant candles are made from cardboard tubes that have been painted red, then splattered white to simulate candle drippings. Outdoor receptacles hold flame-shaped bulbs.

Baking-Soda "Fire Extinguisher"

Small fires on a kitchen range, caused when grease or oils blaze up, can be smothered quickly by throwing on a handful of baking soda. Keep a box of this "fire extinguisher" handy to the range.

Three Methods of Cleaning and Refinishing Old Brass

Depending on the type of finish desired, bright, dull or antique, one of three methods of polishing brass is used. For a bright finish, clean the object with a good-quality metal polish, using a soft cloth and brush for carved designs. When the polish is dry, buff to a shine with a flannel cloth. For a dull finish, mix enough linseed oil with rottenstone to make a mixture the consistency of heavy cream. Rub the object until tarnish disappears, then wipe away rottenstone mixture with a soft cloth dipped in linseed oil. For an antique finish, rub the object with furniture polish, then remove excess oil with a soft cloth. Polish with a flannel cloth.

ADD THOUSANDS OF DOLLARS TO THE VALUE OF YOUR HOME...

New PM Book tells and shows how to handle power tools like an expert—and make valuable property improvements

A thorough knowledge of power tools and how to use them will enable you to perform hundreds of major and small projects around your home at tremendous savings, and increase its value significantly. Now, with the aid of a new Popular Mechanics book, "Getting Started with Power Tools", it's easy, fun, safe...and with no previous experience you'll be able to do more home remodeling and repair jobs, make beautiful furniture, toys and boats, or execute many other projects you may have wanted to do, but never could.

This remarkable book, in 160 pages of easy-to-understand text and scores of illustrations, shows you all about the interesting and profitable avocation of working with power tools. Special attention is given to the type of learning problems encountered by the novice, and each major type of power tool is clearly illustrated with captions showing all of its components. But this book is written for the skilled craftsman as well. It contains many helpful hints that will save time and money. It tells what you should look for in planning a power tool shop, and how to lay it out for greatest efficiency. It stresses safety procedures that will benefit even the practiced workman. And various attachments are shown that will convert one tool to multiple duty, thus saving on the total investment. Never before has a book on power tools been written for the home craftsman that provides as much basic information for the novice, and as many down-to-earth work hints for the expert, as "Getting Started with Power Tools". Order your copy today, with a money-back guarantee if not pleased. Send your check or money order to the address below in the amount of only $2.50

POPULAR MECHANICS PRESS, Dept. 1257
200 EAST ONTARIO ST. CHICAGO 11, ILLINOIS
DRILL-PRESS WORK SUPPORT
has interchangeable inserts

By Walter E. Burton

WORK-HOLDING PROBLEMS are not always solved advantageously by use of a drill-press vise. Final repetitive operations on semifinished parts, holding dissimilar parts for center drilling, blind drilling or tapping can often be done faster and with greater accuracy by using a table fixture having interchangeable work supports. These usually are made up to suit the job at hand, those detailed, A, B, C, D, Fig. 6, being intended only as suggestions. Also, a drill chuck, Fig. 1, or a small lathe scroll chuck can be used to advantage on some types of work. Such chucks must be fitted with a special shouldered spindle to fit the center hole in the fixture.

Two types of work, two work positions and two uses of the stop are shown in Figs. 4 and 5. Where fine accuracy is not involved, the stop permits the work to be held in the hand without danger of injury which sometimes occurs when the drill bit grabs suddenly and spins the work. The stop rod eliminates this hazard. The fixture, detailed in Fig. 6, and shown in Figs. 1 to 5 inclusive, consists of a 4½-in. length of 1½ x 1½-in. mild steel (tool steel also can be used) screwed to a slotted baseplate which is bolted to the drill-press table. Holes in the fixture are drilled ¾ in. and reamed to ½-in. dia. Of course, these holes should be drilled with a drill bit in perfect condition and with the fixture assembled and bolted on the drill-press table in the position in which it will be used. This procedure will assure accuracy.

To align the fixture, Fig. 2, a centering insert, or locator, is used. This can be made
A stop prevents work from spinning with drill should latter grab unexpectedly. Inserts are held in place by thumbscrew which tightens against spindle from round or hex stock as in detail B, Fig. 6. This insert also can be used as a work support. The latter is drilled $\frac{3}{8}$ in. and reamed to $\frac{5}{8}$ in. Use a short length of $\frac{3}{8}$-in. drill rod in the chuck when aligning the parts as in Fig. 2. Use $\frac{1}{8}$-in. drill rod for the stop, Figs. 4 and 5.

The platen, Fig. 5, can be fitted with a $\frac{3}{8}$ or $\frac{1}{2}$-in. spindle for use with inserts A or B, or can be turned with a recess for use with insert D, Fig. 6. If used as in Fig. 6, detail D, the parts should be turned to a light drive fit. Spindles for all the inserts can be formed simply by turning down from the 1-in. dia., or by drilling the stock and inserting spindles made from $\frac{1}{8}$-in. drill rod. The $\frac{3}{8} \times \frac{1}{4}$-in. groove takes the point of the setscrew when the spindle is locked in position in the fixture. This prevents the slight burring, caused by tightening of the setscrew, from interfering with insertion and withdrawal of the insert. The crotchet-centering insert, detail C, Fig. 6, can be made with a 45-deg. countersink for centering a ball, or with a 45-deg. (90-deg. including angle) V-groove for supporting round stock, Fig. 4. It also can be made by using round stock or hex stock as shown. The dimensions of the fixture and inserts can, of course, be varied to suit individual requirements. For ordinary work it is not necessary to harden the inserts or the block, but for repetitive jobs hardening will help to maintain accuracy.
Improvised Holder Confines Torch Flame

This holder will save you the time re-quired to extinguish and relight the flame when welding a job that requires intermittent use of a gas torch. The holder keeps the torch in place and eliminates fire hazard. Just cut a 2-in. hole in a 5-qt. can about 5 in. from the top. Fill the can half full with water. While rearranging the work, insert the torch tip in the hole.

Stanley Clark, East Bradenton, Fla.

Heavy-Bodied Lubricants
For Spinning Aluminum

Commercially pure aluminum which has been annealed generally requires the use of a heavy-bodied lubricant to prevent scoring under heavy pressure of spinning tools. Blanks 3 to 12 in. in diameter spin easily when coated with tallow or petroleum jelly. On somewhat larger blanks ordinary beeswax provides both adequate lubrication and protection against scoring.

Pliers Altered to Hold Wire

When the corrugations on the inner meeting faces of fence-plier handles become worn they will not grip barbed wire firmly for stretching. If the wire slips, it will be scored and may break later on. To prevent this, file a half-round groove in each handle, using a 1/8-in. round file. The grooves should register so that they form an opening of about 1/4-in. dia. when the handles are closed. This simple alteration permits the wire to be gripped firmly.

Cold-Weather Starting Aid

On a severely cold morning when your car won't start it's helpful to remember this trick. Wrap a cloth several turns around the manifold just below the carburetor and soak with boiling water. This warms the manifold and vaporizes fuel for a quick start.

Restoring Grip Of Lever Wrench

Lever wrenches, or clamping pliers, often wear to the point where the clamping screw will no longer adjust the jaws to grip tightly. When this occurs, remove the screw and grind off the end of the fixed handle. This will restore the original grip of the wrench jaws.—R. Moore, Wellsville, Ohio.
1. PORTABLE ROUTER is controlled by a trigger switch mounted in a specially designed "saw grip" handle which permits one-hand operation of the machine. A 1½-h.p. motor spins bits and cutters at 22,000 r.p.m. Accessories include dovetail and hinge templates, an interchangeable planing attachment and shaper table.

Porter-Cable Machine Co.,
106 Exchange St., Syracuse 3, N. Y.

2. HAND SCREW is made with soft-metal inserts, or pads, which prevent marring work and also make it easier to remove residual glue which may adhere to the jaws. Otherwise, hand screw is of conventional type with hardwood jaws, threaded steel spindles and wooden handles. Comes in 3 sizes, 4½, 6 and 8½-in. jaw openings.

Wetzel Clamp Co.,
49-15 11th St., Long Island City 1, N. Y.

3. SAW-JOINTER COMBINATION has several new features. Rip fence aligns automatically and locks at both ends with a turn of the locking handle. Raising and tilting units are operated with one-hand wheel and screws are self-cleaning. Will not clog with sawdust. Miter-gauge clamp grips stock firmly, prevents creeping.

Montgomery Ward, 618 W. Chicago Ave., Chicago

4. ORBITAL-SANDER KIT includes the sander, steel carryin case and all the necessary accessories for finish sanding, buffing and polishing. High-speed orbital motion of pad puts an extra-fine finish on both hard and soft wood without scratching or ridging surface. Brings a waxed surface to a high polish with lamb's-wool pad.

Speedway Mfg. Co., Div. of Thor Power Tool Co.,
1843 S. Laramie Ave., Cicero 50, Ill.

5. BENCH GRINDER has been designed for home-shop and light industrial applications such as sharpening hand tools, buffing and scratch-brush work. Comes equipped with 6-in. grinding wheel, 6-in. wire wheel, tool rests and wheel guards. Unit is mounted on rubber pads for quiet operation on workbench. Speed is 3450 r.p.m.

The Stanley Works, 111 Elm St., New Britain, Conn.
6. GLASS DRILL cuts clean holes in glass up to 1 in. in dia. Edges of holes are sharp, no chipping on either side of glass. Made in two types, one driven by portable drill, the other being motor-driven
Ju-Go Glass Drilling Machines,
Dec 1951, Journal of Home, Jersey City 6, N. J.

7. PORTABLE-ELECTRIC-DRILL KIT includes ¾-in. drill, 5 twist-drill bits, 4 wing, or spade-type, bits for wood, screwdriving attachment and a set of 5 countersinks for screws, the latter for 5 sizes of screws
Skil Corp., 5033 N. Elston, Chicago 30

8. SMALL BOLTS AND SCREWS come in special plastic containers which are designed to fit into individual compartments in a sheet-metal rack. Screws, bolts are packed one size in each plastic container
Rockford Screw Products Co., Rockford 46, Ill.

9. 12-PIECE SET OF CARVING TOOLS includes all those commonly needed for wood carving and making linoleum-block printing cuts. Over-all length of each tool is 5¼ in. Each is fitted with 4½-in. handle
A. S. Trading Co.,
69 Lexington Ave., New York City 10

10. UTILITY TRAY for drill press clamps to the column to hold drills or a number of finished and unfinished parts in production work. May be positioned as pictured or reversed to clear machine table
The Western Tool and Mfg. Co., Springfield, Ohio
(Continued to page 210)
11. **CONTOUR-SCRAPER KIT** consists of 5 shaped blades and a special plastic handle to which the blades can be attached individually. Used to remove paint and varnish from flat and molded surfaces such as picture frames, reeded and fluted columns.

Meridian Products Co., 268 Madison Ave., New York City

12. **COMPLETE BELT SANDER** comes in a build-it-yourself kit. All metal parts are completely machined ready for assembly. Kit comes complete with plans and full-size patterns for cutting the wooden parts which you make yourself from plywood as specified.

Gilliom Power Tools, P.O. Box 6157, Lambert Field, St. Louis 21, Mo.

13. **CONCENTRIC GROOVES** in the upset head of such hand-held tools as cold chisels, stone chisels, star drills and coking irons add a safety factor and also improve balance. Grooves tend to prevent mushrooming of head of tool under heavy blows.

Damasco Steel Products Corp., Rockford, Ill.

14. **PUSH-PULL TAPPING ATTACHMENT** designed to be driven by a portable electric drill features an unusual instant reverse which enables the operator to back out the tap by power rather than by hand. Drives any standard tap up to 5/16 in. in dia.

Scott-Mitchell House, Inc., 611 Broadway, New York City 12

15. **PORTABLE ARC WELDER** has a new-type tris-oidal transformer having a 90 percent power factor at rated output. Welds steel up to 1½ in., cuts ¼-in. steel plate. Operates on 115 or 230-volt a.c. Handles electrodes from 3/32 up to and including 5/32 in.

Brennen, Bagli and Weber, Inc., 202 Mott St., New York City 12
16. STEPLADDER lacks in the open position so that it cannot accidentally fold while in use. Also is fitted with a sliding bench, or shelf, and handrail unit which can be raised to a convenient working position to hold tools, paint pails, brushes and other accessories within handy reach while standing on any of the steps. Shelf locks firmly in place when raised.

The Safe-T-Ladder Co., Huntsville, Ohio

17. SCREWDRIVER has a built-in wire stripper in the handle which strips any wire up to No. 1 ga., including stranded wire. Handle is conventional shape except that it has a transverse opening through which the wire to be stripped is inserted. The U-shaped cutter which does the stripping is molded into the plastic. The screwdrivers are available in 4 sizes.

Wire Stripper Tools, Inc., Glen Head, N. Y.

18. RADIAL SAW has all controls located at the front of the machine for easy accessibility, safety and convenient operation. Special motor develops over 2 h.p., drives 10-in. blade. Switch is fitted with safety keylock, cannot be closed until key is inserted and turned. Warp-resistant table is built up of laminated wood and is of exceptionally large size.

Sears, Roebuck and Co., 925 S. Homan Ave., Chicago 7

19. SOCKET WRENCH has a hinged handle which gives greater leverage and permits operation in exceptionally close quarters. When socket is engaged, pressing down slightly on the wrench head disengages handle and permits it to swing freely in either direction. Releasing wrench head allows it to engage at any point. Meets regular specifications for torque.

P & C Tool Co., P.O. Box 5926, Portland 22, Ore.

20. SAW BLADE of unusual design cuts thin sheet metals, corrugated roofing, heating ducts, gutters and downspouts. At conventional saw speeds the blade heats the metal to the melting point, slicing its way through stock rather than sawing. Deep slots in edge of blade act as cooling vanes, or fins, preventing overheating of blade at the cutting edge.

Sears, Roebuck and Co., 925 S. Homan Ave., Chicago 7
Groove in Center of Wheel Speeds Grinding

Fine grinding wheels of small diameter often tend to glaze and heat abnormally when grinding the softer metals. This tendency generally can be minimized by cutting a shallow groove at the center of the wheel with a diamond dresser. The groove should be 1/8 in. deep, and about 1/8 in. wide. The groove reduces the area in contact with the work and dissipates heat.

Frank LaSaracina, New York City.

Pocket-Type Tire Gauge Actuates Compressor Switch

Here's the pressure switch for that air compressor you're building. It consists of a sensitive switch and a pocket-type tire gauge mounted on an adjustable two-piece bracket, the latter providing pressure control over a considerable range. A short length of 1/4-in. threaded pipe is soldered to the end of the tire gauge, passed through a hole drilled in the lower leg of the bracket and screwed into a tapped hole in the pressure tank. Adjust the bracket so that the plunger of the gauge actuates the switch when desired pressure is reached.

Thomas N. Park, Woodland Hills, Calif.

Clean Holes in Aluminum Alloys Require Special Drill Bits

Drilling holes in aluminum alloys up to 1/2 in. in diameter calls for high-spiral drill bits and high-spindle speeds. A cutting speed of 600 r.p.m. at the periphery of the drill bit gives average good results.

Using this figure as a basis of reckoning spindle speeds, a 1/4-in. drill would require a speed of 1800 r.p.m. while a 1/2-in. drill would call for a speed of 4584 r.p.m.

Robert A. Ridout, Glenview, Ill.

Pencil Shading Aids Cope Cut

A cope cut on the second piece of molding is made easily and accurately if you first miter the stock. Then shade the molding profile with a soft-lead pencil. This gives you a clean, sharp line which is easily followed with the coping blade. Use a narrow, fine-toothed blade.—Leonard S. Knox, Chicago.

Nonspill Pouring Spout

Force a section of curved radiator hose over the spout of a 5-gal. fuel can and you eliminate the waste of a lot of gasoline or fuel oil. The extra length of the spout enables you to drop the end into the fuel-tank opening before the fuel begins to pour from the spout.—E. V. Reyner, Townsend, Mont.
SETSCEW TIPS

PARTS HELD IN PLACE with setscrews are found on all types of power equipment, both in home and industrial shops. On newer power units, setscrews usually are of the socket type of a length which will turn in flush with the surface of the part being held in place. On older equipment you often find headless slotted setscrews of the flush type and also setscrews with projecting square heads. If the latter are used on moving parts, such as pulley or gear hubs, they should be replaced with socket setscrews as a safety measure. Also, socket setscrews that project should be replaced with a screw of the correct length. See the upper left-hand detail in Fig. 2. If the screw projects, it may catch clothing and cause a serious injury.

When you loosen a socket setscrew from a pulley hub, use the long leg of the socket-setscrew wrench as in Fig. 1. Be sure that the hex end of the wrench is pressed into the screw socket as far as it will go. If the screw cannot be loosened with the wrench in this position, use the short leg, but be careful not to apply too much pressure.

If you place a pulley or gear on a round shaft, file a flat on the shaft as in the upper right-hand detail, Fig. 2. Otherwise the pulley may be extremely difficult, if not impossible, to remove.

Be sure to turn the setscrew out far enough to clear before turning a pulley to remove it from a shaft, upper detail, Fig. 3. If the shaft is already scored, tap the pulley back and remove scores with a file. In an emergency you can use a file tang as a socket-setscrew wrench, upper detail, Fig. 4. A short handle of pipe or tubing, Fig. 4, makes it easier to turn the regular setscrew wrench.

Louis Martin Reitz, Bourbon, Mo.
Cross-Feed Stop for Lathe

When duplicating metal turnings, especially small parts, a cross-feed stop assures consistent accuracy and a saving in time. A $\frac{3}{16}$-18 threaded stop rod, a hex nut and a steel block are all the parts you need to make one suitable for the purpose. The block is drilled and tapped for the rod and also is drilled for a setscrew by means of which it is attached to the back slide of the lathe carriage as pictured. The hex nut holds the rod in the desired position. The guard usually will have to be removed from the cross-feed slide so the end of the slide can contact the rod.

Carleton A. Phillips, Corning, N. Y.

Calculating Roof Areas

When you need to calculate shingle requirements for reroofing an ordinary gable roof without dormers, you will remember that to figure the area of a rectangle you simply multiply the dimensions of two adjacent sides. But a hip roof usually consists of two triangles and two trapezoids. Figure as in the details. Measuring the roof periphery at the eaves and then multiplying by one half the rafter length gives you the area of a conical roof.

This New Abrasive Cuts Fast and Clean

This ABRASIVE is really new. The abrasive grains are of tungsten carbide and these are fused to steel by a process developed by Skil Corp. It's now available as a rasp for handwork, a shoe for orbital sanders and hand-sanding blocks, a sleeve for sanding drums and a grit wheel, or disk, for use on a circular saw. Photos below and on the opposite page show what it will do in the shop. Cuts wood, metal and plastic faster than any abrasive you ever used. Won't clog or burn the work. The secret of its fast-cutting properties is that the abrasive grains are not brittle—they stay needle sharp. The disk and rasp are faced with two grit sizes. With the disk you can rip and crosscut wood, rough sand and finish, remove waste to the line, run grooves and cope cuts with the speed of a dado head.

Above, new carbide abrasive is presently available in the accessories pictured. Below, an orbital sander with shoe does a real job on plasterboard joints.
It's a fast, smooth-cutting rasp for expert work on wood. Needle-sharp abrasive severs the wood fibers. Comes with two grit sizes for roughing and finishing.

Rough shaping stock to an irregular pattern line as in spiling, can be done by making adjacent cuts and then cleaning out the waste to pattern lines.

A smooth ready-to-finish edge on curved work is a sure thing with this carbide-grit drum. It's free-cutting, no burning or discoloration of the wood.

One side of the disk is faced with a coarse, open grit, the other with fine grit. Does a sharp, clean job of rounding corners without chipping or scoring.

Disk makes grooves any width from ¼ in. up. You'll be surprised at how fast it cuts. Disk will load somewhat in resinous wood. Clean with turpentine.

Disk makes cope cuts of average depth in two passes. Cuts as cleanly as a dado head or molding cutter. Feed the stock against the coarse side of the disk.
Masking Tape Prevents Chipping of Plastic When Sawing

Before cutting a sheet of plastic on the circular saw, apply a length of masking tape to the top face of the sheet, the edge of the tape flush with the pattern line. The tape will prevent chipping of the cut edges. Use a crosscutting blade with a light set to the teeth.

Chucking Round Work in Vise

Here's one way to overcome the difficulty of holding round work in a vise. Thread the end of a short length of steel rod to take a screw-on-type drill chuck. File or grind two flats on the opposite end. Then set up as detailed. — Frank Shore, New York City.

Resetting Lathe Tailstock

After turning a taper with the tailstock offset it's a rather tedious chore to reset it for turning a straight shaft. Bring the tailstock back to the witness marks on the base, run a light cut on the work and check for taper with a dial indicator. Suppose, for example, the shaft still shows a taper of .004. Zero the indicator at the end of the shaft and move the tailstock (toward operator) until the indicator shows .002. Tighten the tailstock clamp nut and re-check the reading. If the reading holds, the centers are very closely aligned.

J. C. Magee, Schenectady, N. Y.

Oil Carried to Boring Tool

A constant supply of coolant to the boring tool is necessary in production work. In deep bores the problem is to supply oil to the tool in a uniform flow. Large boring bars usually are sufficiently rigid to permit drilling small transverse and longitudinal blind holes in a position to form a continuous passage as detailed. One transverse hole must be drilled directly into the longitudinal hole, entering at a point directly over the cutting tool. The second hole is drilled into the longitudinal hole at right angles to the first. Then the hole system is plugged. By improvising a nozzle, a steady flow of coolant can be brought directly from the pump.

Frank L. Rush, Columbus, Ohio
Shop-Made Indicator Centers Work in Four-Jaw Chuck

When dial-indicator accuracy is not required, this improvised indicator, or wiggler, speeds up the rather tedious job of centering work in a four-jaw chuck. The unit is built up on a discarded drill shank having a No. 2 Morse taper. The large end of the tapered shank is squared, shouldered and threaded to take a knurled locking sleeve as shown in the sectional view. The locking sleeve seats a ball-tipped pointer against a spring-loaded plunger housed in the tapered shank. Drill the hole for the spring and plunger immediately after shouldering and threading the tapered shank without removing the latter from the lathe spindle. This procedure will assure concentricity. Make sure that the plunger, which is cut from ¼-in. drill rod, is a free fit in the hole in the shank. Run a long taper on one end of the pointer and then machine the end to a 60-deg. included angle. Should the opposite end of the pointer to a force fit in a hole drilled in a ⅝-in. dia. steel ball. In use, the work is placed in the four-jaw chuck and centered as closely as possible by eye alone. Then the indicator is placed in the tailstock and the latter is run up until the pointer enters the center hole in the work. Turn the lathe by hand and adjust the chuck jaws until the pointer runs dead true.

C. W. Woodson, Chicago.

Drilling Angular Holes Accurately in Dual-Vise Setup

Where the angle is not critical, reasonably accurate angular drilling can be done with the setup pictured. It's useful when angular drilling is called for and there's no angle vise at hand. Nearly all drill vises will serve as the second vise in the setup as the fixed jaw usually is squared on the outer face. Set the second vise with a protractor to the required angle with both vises in the position shown. Then clamp the larger vise in position on the table. Don't move the setup after the angle has been determined. Then grind the drill bit to the recommended angle and start the drill with very light pressure. In some cases it is best to put through a pilot hole first, especially if the finished hole is more than ¼ in. in dia.

H. J. Gerber, Stillwater, Okla.
Soldering Hints

By Ken Murray

A NEAT AND SOUND JOB of hand soldering calls for chemically clean joining surfaces, heated uniformly to the correct temperature. From there on, the procedures are determined largely by the type of work, its size and the number of separate soldering operations necessary to complete the job. Surfaces are made chemically clean by fluxing and manual use of an abrasive to loosen grime and corrosion. Often the nature of the work will permit abrading and fluxing the surface in one operation. The iron used must be of a size to heat the work quickly to soldering temperature. The flame from a torch is adjusted to concentrate heat at the desired point.

CLEAN AND FLUX work in one operation. One of the main reasons for failure of a soldering job is lack of care in cleaning the joining surfaces. After cleaning, surface of metal begins to oxidize quickly. This can be prevented by combining cleaning and fluxing. Dip fine steel wool in paste flux, or saturate with liquid flux, and go over surface thoroughly.

CUT WIRE SOLDER into three or more fine strands with tin snips before applying to delicate work involving joining of small parts. By touching one of the strands to heated work only minimum quantity of solder will flow, resulting in a neat, smooth joint. On some types of work it is helpful to cut wire solder into short pieces, each about 1/2 in. long.

BURNING OF INSULATION can be prevented by gripping insulation close to bared portion of the wire with pliers. Jaws of pliers absorb heat and prevent charring. On some types of work it is possible to grip bared portion of wire just beyond the insulation. This is more effective where nature of work will permit. Avoid gripping insulation too tightly.
HEAT-RADIATING STAND lengthens life of the heating element of your soldering iron where the nature of the work requires that the iron be maintained at full heat for intermittent use. Photo pictures the stand complete and in use. Fins dissipate heat when iron is placed inside while not in use. Also eliminates fire hazard from bench-top soldering.

SAVE SOLDER SCRAPs by placing pieces in a creased strip cut from sheet asbestos. Apply heat, either with a small torch or large soldering iron, until solder melts and flows in a continuous strip. If asbestos strip is creased sharply at the center solder will harden into a triangular strip which is usable as bar solder when work is coated with paste flux.

RED WARNING MARK identifies acid-core solder, so that it will not be used by mistake when soldering electrical connections. Mark spool of acid-core wire solder with a red crayon in the manner pictured, then spread the color by rubbing it lightly with thumb. This will leave a thin red film of color on each coil of solder which is easily seen.

WHEN APPEARANCE OF SOLDER JOINTS is a factor, as on certain models and in instrument work, joints are sometimes coated with aluminum paint after the solder has cooled. This prevents a slow darkening of solder due to oxidation. Pour a small quantity of the paint into a fingernail polish bottle and use the applicator to apply paint to the joint.

SPRING-TYPE CLOTHESPIN makes a good clamp for holding small parts in place while soldering. Cover the jaws with two thicknesses of sheet asbestos cemented in place to prevent wood from being charred by heat from iron. Use sodium silicate (water glass) as a cement. For clamping heavier work, pads of an ordinary C-clamp are covered this way.

DECEMBER 1957
Damaged Screwdrivers Adapted to Other Practical Uses

Several useful hand tools can be made by re-working discarded or damaged screwdrivers. Anneal (heat) the point and bend the blade at right angles, harden and you have a handy offset driver. Make a tack lifter in the same way, only hammer the blade out while hot to make it wider. A handy cotter-key puller can be made by a similar procedure except that you draw the blade to a point. Bend and harden. Or, cut off the blade, grind square and weld on a section of hex rod to make a socket-screw wrench. —Charles H. Willey, Concord, N. H.

Drill Bits Stored in Handle

Ever think of storing drill bits in the top handle of your ½-in. portable electric drill? This handle is, of course, removable and usually consists of steel tubing or pipe having one end threaded. Just press a piece of tissue into the threaded end, screw in place and cap with a crutch tip.


Centerless Work Support

Here's a solution to one of those special machine-shop problems, that of supporting the centerless end of a rod on which a long knurl was to be run. A live lathe center (soft) was squared off at the big end and counterbored for a bushing which carries the free end of the rod.

Frank L. Rush, Columbus, Ohio

Pressure-Sensitive Tape Holds Blocks on Faceplate for Turning

Small hardwood blocks, for turning rosettes, pulls and other small parts, are easily attached to the lathe faceplate or to a wooden backing disk by means of pressure-sensitive tape. Use of the tape as a fastener instead of the center screw eliminates the need for a screw hole in the work. Several strips of the tape attached to a wooden backing disk screwed to the faceplate will hold a disk up to 2 in. in dia.

—D. C. Marshall, Manhattan, Kans.
These men chose before enlistment—so can you!

Pvt. Floyd E. Van Briseen
Brookings, South Dakota
Graduate, School of Agriculture

"I picked my own Army job training, and it was guaranteed for me before I enlisted. I chose a fine Diesel Repair course. My instructors were really good, and the training equipment was the best you could find. Now I'm an expert in diesels. I found only the Army offers a deal like this."

Pfc. Allen M. Voellz
Bouler, Wisconsin
Graduate, Bouler Union Free high school

"If you want an education, there's no plan like the one the Army offers graduates. I was surprised at how many courses are offered—practically everything. I chose the Guided Missile course I wanted—trained in an exciting new field. This guaranteed training is great. Why not find out about it?"

Seniors—get all the details on how high school graduates can choose their technical training before enlistment from 127 modern courses. Mail this coupon for your free booklet today. Or for immediate counseling visit your local Army Recruiter. He's listed in the phone book and will give you all the facts—at no obligation!

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8mm MOVIES—FINEST FAMILY GIFT OF ALL...

Brownie Movie Camera f/2.7 takes color movies with snapshot ease. Complete with Brownie 2-Lamp Movie Light and flood lamps for indoor use. Brownie Movie Camera Kit, f/2.7, $38.40 (Camera, $29.95)

Brownie Movie Camera, Turret f/1.9 takes normal, wide-angle, telephoto movies; Cine-Kodak Showtime 8 Projector shows 8mm movies extra bright. Kodak Super 8 Movie Outfit, $214 (Camera, $84.75)

Complete movie outfit—Brownie Movie Camera, f/2.3; Brownie 300 Movie Projector shows movies 3 feet wide. Brownie 300 Movie Outfit complete, $104.70 (Camera, $39.75. Projector, $64.95)

Titles and close-ups are easy with this tilter for Brownie Movie Cameras. Includes camera platform, close-up lens, light bar, easel, title cards, “special effect” masks. Brownie Movie Tilter Outfit, $15.95

Take and show movies up to 4 feet wide! Brownie Movie Camera f/1.9, case, 4-lamp light bar, Brownie 500 Movie Projector. Brownie 500 Movie Outfit complete, $144.95 (Camera alone, $49.75)

Take panoramic wide-angle or close-up telephoto views with your single-lens Brownie Movie Camera. Converters slip over regular lens. Kodak Wide-Angle and Telephoto Converters, $18.50 each.
Kodak Retina Camera outfits include telephoto and wide-angle lens components, case, carry-all bag. Kodak Retina III C Camera Outfit, $394 (Camera, $175). Kodak Retina IIC Camera Outfit, $351 (Camera, $132).

Kodak 300 Projector is ultra-portable, shows color slides big and bright. Quiet; cool; has finger-tip controls. Kodak 300 Projector with Readymatic Changer, $64.50 (with Magazine Changer, $74.50).

Complete color-slide outfit. Includes Kodak Pony IV Camera, Kodak 300 Projector. Kodak Pony Color-Slide Outfit, $104.50 (Kodak Signet 40 Color-Slide Outfit with same projector, $138.50).

**say**

[Image of a sign that says "Open me first!"

FOR 'ROUNDTHE-CLOCK SNAPS IN BLACK-AND-WHITE OR COLOR...


Brownie Starflex Camera "previews" your shot, takes color slides and snapshots. Complete with camera, flashholder, batteries, film. Brownie Starflex Outfit, $16.50 (Camera alone, $10.75).

World's most popular snapshot camera in a gift outfit complete with Brownie Hawkeye Camera, flashholder, batteries, bulbs, film. Brownie Hawkeye Flash Outfit, $15.25 (Camera alone, $7.95).

Preview-finder of Kodak Duaflex IV Camera shows picture big! Complete with camera, flashholder, batteries, bulbs, film. Kodak Duaflex IV Flash Outfit, $25.25 (Deluxe Flash Outfit, $38.75).

New Kodak Rotary Flashholder permits you to shoot six flash-bulbs without reloading. Two models to fit most cameras. Kodak Rotary Flashholders, from $10.95 (Batteries not included.)

Kodak Photo-Hobby Outfits for developing negatives, printing snapshots at home. From $10.75.

Prices are list, include Federal Tax wherever applicable, and are subject to change without notice.

DECEMBER 1957
Shelling out for oil too often?

YOU STAY OUT of this expensive danger zone when you re-ring with Sealed Power!

Does your oil stick read low when you pull in for gas? Notice bluish exhaust fumes when you slow down? Miss the old pep and surge your car once had? Stop right now throwing oil money away! It's high time for you to get a Sealed Power ring job and go from drain to drain without buying oil.

IMMEDIATE OIL SAVINGS
Sealed Power's KromeX Ring Sets are engineered to start you saving on oil bills at once. And Sealed Power's revolutionary new stainless steel oil ring will keep giving you maximum oil control with no smoking...will go on resisting corrosion and sludge...will assure top performance for double the ring life you expect from ordinary rings.

FREE! BOOK ON AUTO CARE
Want to know more about proper car maintenance? This free 34-page booklet is packed with information which will make you expert at understanding and caring for your engine. Called "Care and Feeding of Engines," it's yours for the asking. The tips you'll find in it could save you hundreds of dollars. For your free copy, write Sealed Power, Dept. G-12, Muskegon, Michigan.

Clinic for Homemakers

As a service to our readers in solving the hundreds of problems pertaining to a home—inside or out—the editors of Popular Mechanics invite you to present your problems to The Clinic Editor for help and advice. Address your questions to The Clinic Editor, Popular Mechanics Magazine, 200 East Ontario Street, Chicago 11, Ill.

Fence to Drift Snow Over Garden

Q—I'm told that a low fence erected on the side of the garden plot from which winter winds blow will cause snow to drift over the plot, which will be beneficial. Is this true? And can I build a fence near a strawberry bed?

M.B.—Madison, Wis.

A—It's true that a board or picket fence placed as you suggest will cause snow to drift over the garden plot if the plot is in the open where the prevailing winds sweep across it. The only direct benefit from the drifted snow is derived from the moisture which seeps slowly into the soil when the drift melts away in the spring. Also, under certain conditions, this additional moisture may tend to stimulate the activity of nitrifying bacteria and thus increase the available nitrates in the topsoil. The drift also will prevent the blowing of dry soil during the winter months. Drifting snow over a strawberry bed by means of a fence could, perhaps, be recommended for the same reasons, but it is advisable to mulch the bed after the ground freezes with coarse straw or other material. The mulch should be removed from the plants in the spring.

Stopping Floor Squeaks

Q—I have oak floors in my living and dining rooms. The floors in both rooms squeak when walked on, not just in certain areas, but all over the floor. In many places the top floor seems to be springy but the floor boards are in good condition and all joints are tight. How can I remedy this trouble?

H.B., Rochester, N.Y.

A—You do not say whether the house is old or new, nor do you give the thickness of the flooring. If the floor has been laid a number of years, it is probable that the nails holding the bridging between the joists have loosened, permitting the floor to spring irregularly as you walk through the room. This has the effect of loosening the nails holding the top floor to the subfloor. Slight movements between the two floors produce most of the squeaks. Raise the floor slightly with screw jacks and wooden extensions placed under the joists.

(Continued to page 226)
Drop a hint for a
NEW THOR SPEEDSHOP
Christmas will last all year long!

When you do your Christmas hinting, make it for something special—a new Thor SpeedShop. It’s really three tools in one—a drill, a jig saw and a reciprocating sander, plus seven drill bits, four abrasive sheets, buffing bonnet and a steel carrying case. And you get it all for the Christmas special price of just $37.50. Quality built—you bet! The basic power unit of Thor’s SpeedShop is the ¾” SpeedDrill model 20 (¾” in wood). This drill is super-powered with a full 2.5 amperes. Power aplenty for the custom-made accessories. The drill and the accessories were made for each other and for long productive life. Look for the bright Christmas display at your dealers. Ask to see the complete SpeedTool line. SpeedWay Manufacturing Company, division of Thor Power Tool Company, Prudential Plaza, Chicago 1, Illinois.

$37.50 buys 3 tools in 1

See the dealer with the bright Thor display

JIG SAW
DRILL
SANDER

Includes lambswool buffing pad, 7 drill bits, 4 abrasive sheets, steel carrying case.

THOR POWER TOOL COMPANY
CHICAGO
Branches in all principal cities
World’s largest exclusive manufacturer of portable air and electric tools

DECEMBER 1957
(Continued from page 224)

Tighten the bridging, driving in additional nails if necessary. Then drill a line of small holes mid-way between each pair of floor joists, spacing the holes about 6 in. apart and taking care not to drill through the top floor. Select flat-headed screws of a size to fit these holes and of a length that will enter the floor board but will not go entirely through.

Garage Doors of Knotty Pine

Q—I would like my garage doors to be built of knotty pine in board-and-loom construction and finished in the natural color like interior woodwork. However, my carpenter does not recommend this; he says doors of this type and finish will soon warp and be difficult to open and close. Is he right? Or is there some finish that will prevent this? M.E., St. Paul, Minn.

A—We are inclined to agree with your carpenter, although it is true that natural-finished garage doors of knotty pine are now quite widely used. If sound, well-seasoned stock is obtained and if the doors can be built and the finish applied immediately to protect the wood from undue moisture absorption, then it is probable that doors of this construction would be satisfactory.

Open Joints in Downspouts

Q—What causes the joints in downspouts to open? I recently noticed that two downspouts on the north side of my house have open joints. O.L., Ind.

A—Perhaps the most common cause is a partial clogging of the downspout by entrapped leaves or other trash which may build up to the point where the obstruction will collect water which freezes in cold weather. Normally the corrugations in downspout sections allow sufficient expansion to prevent opening of the seam, but if the spout is clogged, the pressure may be sufficient to open the seam. Sometimes it is possible to force the seamed edges back in place and crimp with pliers. Otherwise the section should be replaced.

Removing Ceiling Beams

Q—Our older home has a beamed ceiling in the living room. I think the trim and the ceiling beams are of oak and it has been stained a dark color which undoubtedly has darkened the heartwood. We have planned to remove the beams and refinish the remaining woodwork in this one room. We hesitate, however, because of the possibility of weakening the structure in some way by removal of the beams. Without breaking out some of the plaster it apparently is not possible to tell whether the beams are solid or are built up of three or more pieces. What do you think of the advisability of the procedure?—S.T., N.Y.

A—in older homes, especially those more than 50 years old, it is quite possible that the beams are of solid stock. However, you do not give the size or the beams or describe their appearance. Neither did you say whether the house is of masonry or frame construction. In older homes the type of construction often determines how the ends of the beams are set into the walls. If, for example, the walls are of solid masonry such as brick or stone, the ends of the beams are sometimes housed in the masonry. This would make removal of the beams somewhat difficult and perhaps not advisable. If, on the other hand, the beams are of hollow, or false, construction and are in a frame structure the chances are good that the ends are supported on a ribband nailed to the studs. If this is the case, then removal would be comparatively simple. Perhaps the best procedure would be to remove plaster at one end of one of the beams. This should reveal not only the type of beam which was used, but also how the ends are anchored in the walls.

THE REACH IS RIGHT AND TIGHT

with KRAEUTER

LONG NOSE PLIERS

You can depend on reachability and cutting power with Kraeuter’s #1781 Long Chain Nose Pliers. And your reach will be tight and sure for those hard-to-get-at jobs with the extra long milled jaws of these pliers.

Buy the right line. It’s the Kraeuter line. Kraeuter tools are unreservedly guaranteed. Send for catalog #25 illustrating complete Kraeuter line.

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BUY KRAEUTER
BUY AMERICAN

MODERN AS TOMORROW

KRAEUTER & CO., INC

FOR 100 YEARS THE FINEST IN HAND TOOLS 1840-1940—NEWARK, N.J.

POPULAR MECHANICS

226
NEVER NEEDS NEW BATTERIES!

NEW REMINGTON
CHARGE-A-LITE

The secret of Charge-A-Lite's revolutionary new storage battery is the newly invented Nickel Cadmium storage cell. Unlike any other battery, it's non-corrosive... holds a charge indefinitely when not in use. Charge-A-Lite is simple, rugged. It's hermetically sealed, can't leak, recharges overnight.

To recharge, just plug into any AC socket. The compact, ivory plastic case is 4 1/2" x 2", weighs 3.5 ounces.

Charge-A-Lite comes with spare bulb and unbreakable lens. One year warranty on sealed unit. At better stores and Remington Shaver Service Centers, or write for name of dealer.

Bright Idea for Christmas!

Here's a real lifetime gift! You'll all find plenty of uses for it at home and in the car.

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Remington Rand. Electric Shaver
Division of Sperry Rand Corporation, 60 Main St., Bridgeport 2, Conn.

DECEMBER 1957
Rainbows From Bouncing Atoms

(valuable ore in the seams of the old granite mountain. Mineralight will activate green or greenish-yellow response in nearly all secondary uranium ores.

Some prospectors use ultraviolet to identify or pinpoint radioactive ores that they've located in general by geiger counters and scintillometers. In Pennsylvania recently, a rock-hound got a suspicious reading with his geiger counter on a cliff wall. But where to dig? He wired Cooper to fly in a mineralight, lowered it over the cliff side at night, found his fluorescent ore in an outcrop and went to work on a commercial deposit.

Prowling the wilderness in the dark adds spice to prospecting. Cooper loves to tell about a friend, hot on the trail of yellow-glowing autunite in the New Hampshire forests last summer. A rustle in the leaves brought him up short. As he fanned his invisible light in the direction of the sound, a pair of widely spaced fluorescent eyes glowed at him out of the blackness. Slowly the eyes rose to a height of seven feet. A three-inch row of blue fluorescing teeth grinned under the eyes. "That's when he realized there was a bear out there," says Bill. "You can't see past a mineralight. The bear saw only a faint violet light that hurt his eyes. He finally ambled off."

Lamps Test Food

Because of ultraviolet's unique ability to make certain things fluoresce in certain colors, it is a supersleuth in many fields of science and industry. On the West Coast black light is detecting spoilage in citrus fruit before it happens. Oranges and grapefruit pass on belts beneath lamps which cause invisible bruise spots to fluoresce a bright purple. Dairies are handling eggs the same way. Pseudomonas, the tiny organisms in egg white that make a bad egg bad, will cause the whole egg to fluoresce a ghastly green under black light. "If you ever saw one," says Cooper, "you'd never eat another egg before checking it first."

Sanitary engineers, toting portable black lights around dairies, are able to detect invisible traces of bacteria-breeding milkstone deposits which glow blue or white in otherwise clean equipment. They are also able to trace rodents by the characteristic fluorescent trail they leave behind them, and thus the engineers discover and clean out the nests.

As a sleuth for solving actual crimes, black light has hung up quite a record in the past few years. In FBI laboratories, as

(Continued from page 119)
Newest in the LIONEL yards

Look at these locomotives, cars and accessories. Then see them and the newest and longest freight and passenger train sets in action at your Lionel dealer.

Lionel Super “O” Track with its two realistic flat-top “T” shaped running rails and inconspicuous third rail is authentic even to the molded ties, accurately detailed tie plates and rail spikes.

No. 345 Culvert Unloading Station. Crane travels by remote control to car, lowers magnetic lift, picks up culvert section, transports it to station, returns for more. Car included.

No. 334 Operating Dispatching Board. At remote control command, man moves across catwalk, changes information in the illuminated slots. Train names can be chalked in.

No. 55 “Tie-Jector” Car. Car moves under its own power, throwing ties alongside track. Railside trips control the action.

No. 128 Animated Newsstand. Fun-packed! Push remote control button and newsdealer moves to front of stand...newsboy turns and offers paper while pup (believe it or not!) chases his tail around hydrant.

No. 746LTS Norfolk & Western Loco. The most powerful steam loco in the Lionel line. A scale-detailed model of the N&W's 16-wheel 250-ton giant. With MAGNE-TRACTION, headlight, smoke...and whistle in the matching tender.

Free New 52-Page Catalog in Full Color. Get your copy at your Lionel dealer.

THE LIONEL CORPORATION, 15 East 26th Street, New York 10, N. Y.

DECEMBER 1957
well as homicide and detective bureaus in New York and the West Coast cities, police have found all manner of things that fluoresce, helping them to track down and identify criminals. Burn and X-ray scars glow vivid pearly white; many kinds of stains have a distinctive fluorescent color under black light. Old tattoo marks that were removed chemically leave a special fluorescence in the skin forever. Bits of dust indiscernible to human eyes often fluoresce like diamond glitter. Invisible traces of lipstick will glow fiery red under the lamp. Irradiated ink will show up, too, and many an altered will or document has trapped a villain when the original writing — which he thought was gone forever — leaped vividly from the page when sprayed with black light.

**Detectives Use Black Light**

The use of invisible tracer pastes, inks, dyes and powders that glow brightly when exposed to ultraviolet, is one of the most fascinating phases of black-light sleuthing. The paste was used to trace thieves who stole valuable copper wire used in government rural electrification installations. Fluorescent paste has also been used on firebox handles to trap people who turn in false alarms. The South Pasadena police have caught burglars who have crawled over a window sill covered with fluorescent powder. Stealing from gasoline tanks at a New Jersey tank farm was stopped when fluorescent dye was added to the tanks. Carburetors of guilty employees fluoresced under black light.

Some store owners are now protecting themselves from phony-check passers by insisting on invisible fingerprints on the check. These prints show up only under black light. If a check bounces, the culprit's fingerprints are turned over to the police.

A race track in New England protects itself from phony tickets by printing the official ones with fluorescent ink.

A bee specialist in the San Joaquin Valley uses fluorescent tracer powder at hive entrances to check the trails of his working bees through an orchard. The blossoms visited glow under black light. This helps work out artificial pollination systems for citrus orchards.

Mechanics are now using the natural fluorescence of oils to trace leaks in motors. Each type of oil fluoresces with a different intensity. Art collectors use black light to reveal "doctored" paintings, patched porcelain or fake quartz crystal. Genuine quartz crystal will pass ultraviolet short waves, but glass will not.

It takes a pretty slick fake to fool invisible light.
This New Stanley Sabre Saw makes all kinds of cuts in all kinds of places

A heavy-duty precision tool
Introductory price ... only $54.50

This portable jig saw cuts 2" lumber, plywood, plastics, sheet metal, etc. And the blades you use have 25% longer life because they have a 25% longer stroke. It's a fast cutting, smooth-working power saw that makes all kinds of cuts in all kinds of places. Try it and see for yourself.

- 3300 strokes per minute
- Chip blower keeps cutting line clear
- Quick, easy blade change
- Stanley-built heavy-duty motor
- Anti-vibration mechanism
- Cool, comfortable, easy grip handle

FREE RIPPING GUIDE!

Buy your H75 Sabre Saw now and get a handy ripping guide free from Stanley.

Write for free Catalog 400E to Stanley Electric Tools, Division of The Stanley Works, 62D Myrtle St., New Britain, Connecticut.

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This famous trademark distinguishes over 20,000 quality products of The Stanley Works—hand and electric tools · drapery, industrial and builders hardware · door controls · aluminum windows · stampings · springs · coatings · strip steel · steel strapping—made in 24 plants in the United States, Canada, England and Germany.
How to Measure Physical Fitness

(Continued from page 148)

dainty things of our women. But they just can’t carry on with life when they’re that fragile.” Many Oregon high-school girls showed that they could hold their own. A pretty, 104-pound sophomore girl lifted 330 pounds on the back-lift test, 1250 pounds on the leg-lift—better than a lot of boys.

Happy With Results

Oregon’s physical educators were so happy with the results of the pilot study that they plan to make “Operation Fitness” an annual program. The study dramatically illustrated what physical educators have long tried to point out—that the best way to toughen up our kids is to improve the fitness of the sub-par youngsters. Sports programs, so often proposed as a panacea for these ills, won’t accomplish this, simply because poorly conditioned youngsters lack the skill and stamina to participate.

There’s nothing wrong with the muscles of most youngsters—adults, too—that hard exercise can’t correct in time. It opens up thousands of previously collapsed capillaries, tiny “pipelines” that nourish the muscles. It toughens and thickens the walls of muscle fibers, increases the amount of connective tissue in the fibers and enlarges individual fibers. Previously unused fibers develop healthily as repeated demands are made of them.

Fatigue Not in Muscles

Though muscles become worn-out after hard exercise, much of the fatigue is in the nervous system rather than the muscle itself. Hard-working muscles consume tremendous energy. This is illustrated in “energy cost” experiments—analyzing the expired air of subjects doing rigorous exercise. A treadmill study indicates the oxygen requirement of muscles increases eight times when the pace is increased from 140 to 180 steps per minute.

But muscles recover quickly. This is shown in fatigue studies directed by Clarke at the University of Oregon. In a machine called an ergograph, subjects lifted weights repeatedly with the forearm to the point of exhaustion. When measured 30 seconds later, muscles controlling this movement had lost one third of their strength. But 12 minutes later they were back to 90 percent of normal.

Muscle-fatigue studies have many applications. A few years ago a new insulated rubber boot was designed for soldiers in

(Continued to page 234)
Announcing...

the third limited edition of one of the world’s great motor cars

Fury
by Plymouth

It's definitely not made for you if you're just looking for "basic transportation"... not this jewel in Buckskin Beige and Gold... the fabulous new FURY that actually outclasses even the FURY of other years.

That's hard to do! But this gem does it! Introducing the new GOLDEN COMMANDO V-8 engine*... 350 cubic inch, 10 to 1 compression, dual quads—a mill giving the greatest performance in Plymouth history.

*Optional, at low extra cost.

With famous Torsion-Aire Ride, featuring torsion bar front suspension, this new FURY really hugs the pavement, corners flat and stops level — without nose-dive. You don't just drive a FURY... you virtually wear it!

Don't wait until a new FURY pulls alongside at a stop light to look one over... let your Plymouth dealer show you the terrific things that happen when the builders of great motor cars set out to surpass themselves—and succeed!

Star of the Forward Look... • Fury by Plymouth

DECEMBER 1957
Korea. How, the Army wondered, did this boot compare in muscle fatigue to the regular combat boot?

Clarke, then at Springfield College, Mass., sent groups of men marching over a rough 7½-mile route with different types of footgear. He measured the strength of ankle muscles before and after the marches. The Army soon had its answer: The insulated boot was twice as hard on marchers as the combat boot (5.82 percent average strength-loss as compared to 2.87 percent for the combat boot). Both were vastly superior to the low-cut shoe which caused a 7.53 percent loss.

Army-Pack Fatigue Studied

Another study explored the muscle fatigue in carrying different types of Army packs. Groups of college students carried various kinds of 41-pound packs over 7½ miles of countryside. A new experimental pack, which distributes most of the weight around the waist, caused one-third-less muscle fatigue than the combat pack and only one half that of the rucksack. The combat pack affected marchers most in the neck muscles (11 ¼ percent loss of strength). The rucksack affected the neck and trunk muscles most. But the experimental pack affected no muscle groups significantly greater than the others.

Continuing Effects

An interesting adjunct to this study probed into the conditioning effects of these marches. The 30 participating college students began with an average physical-fitness index of 104 and emerged after seven marches (52 ½ miles) with a PFI of 113. They increased their average Army physical-efficiency test score from 253 to 281; the Air Force fitness-test score from 56 to 59.

Through 30 years of such work, Clarke has concluded that anyone without serious organic, structural or nutritional defects can develop sufficient strength to be physically fit—to keep up with the physical demands of living with sufficient reserve for emergencies. Hard exercise is the only means. It must be in ways that offer sufficient resistance to the muscles, whether it’s calisthenics, weight-lifting or “combat sports” (such as Indian wrestling).

Persons who have been inactive for long periods should work into severe exercise gradually, giving the muscles a chance to adjust to new loads. But at the same time, no one should shirk hard exercise. As a physiologist once said wryly, “If you must play tiddlywinks, do it with manhole covers!”

Change an idle corner to a home office with low-cost Western Pines

Snug, attractive, useful—gives you a handy spot to write or ‘phone or file things.

And so simple to build in. The Western Pines are straight-grained, carefully-dried, soft-textured, economical. They take any finish beautifully, look lovely just left natural and waxed.

Whatever your building or remodeling plans, check the Western Pines. Your lumber dealer will be glad to give you details.

FREE! "FRIENDLY HOME IDEAS"—85 photographs, many in color, feature traditional and contemporary ideas for building, decorating and remodeling using cheerful Western Pines. Write for your FREE copy to WESTERN PINE ASSOCIATION, Dept. 211-N, Yeon Bldg., Portland 4, Oregon.

The Western Pines

Idaho White Pine
Ponderosa Pine
Sugar Pine

are manufactured to high standards of seasoning, grading, measurement

TODAY'S WESTERN PINE TREE FARMING GUARANTEES LUMBER TOMORROW
Porter-Cable gives you this popular professional quality saw for only $59.50

Big saw performance! Porter-Cable's Model 160 Saw gives you exclusive features found only in Porter-Cable quality Saws — at a sensational, new low price!

It makes every professional cut, including compound miters, in full 2" dressed lumber. It provides all the power, speed and cutting capacity you'll need in a saw.

Model 160 Saw is precision-built throughout for years of trouble-free service. You get the famous Porter-Cable Kick-Proof Clutch, telescoping guard, precision ball bearings and instant depth and bevel adjustments, for accuracy and ease of use.

For real saw value, you can't beat this low price anywhere. It's at your dealer's now — be sure to see and try it. Write for free literature.

Model 160 Saw, Only $59.50
In handy kit form, $69.50

Kit Includes:
Model 160 6½" Saw
Rip Guide for fast, accurate ripping all dressed 2" lumber up to 45°
Carrying Case . . . constructed of strong, welded steel for full protection and durability

SEE YOUR DEALER — OR MAIL COUPON TODAY!

PORTER-CABLE MACHINE CO.
7414 N. Salina St., Syracuse 8, N. Y.

Please send complete information on Model 160 Saw, and the name of my nearest dealer.

Name: __________________________
Address: __________________________
City_______________________Zone State______________________

In Canada: write Porter-Cable Ltd., Box 5019, London, Ont. Canadian prices slightly higher.

DECEMBER 1957
The Navy's Bobtailed Fireball

(Continued from page 124)

advantage that endears her to the gobs and officers who sail her. That's living quarters which are more sumptuous than anything else in the fleet.

The Navy called in Raymond Loewy, the famed industrial designer, to lay out the quarters. He turned the Carronade in to a reasonable approximation of a floating summer resort. Bunks are separated from each other by lightweight panels. There are individual bed lights. The mess hall is outfitted with four-place tables and upholstered chairs instead of long tables and benches. The galley has electric ovens, a deep fryer, a dishwasher and garbage grinder—in short, everything a housewife (or a Navy cook) could long for. There's an all-in-one entertainment system, with a radio, phonograph, tape recorder-player and individual-volume-control speakers in every living compartment.

All in all, the Carronade is the Navy's luxury counterpart of the Queen Mary. But, more important, she's a devastating weapon. As one high-ranking Navy official put it: "When I see this fine vessel designed for the specific purpose of pulverizing enemy-held beachheads, I realize how many lives could have been saved had this kind of ship been available to us during the war."

Infrared Rays Cook "Red Hots"

Using the heat of infrared rays, this table unit will cook six wiener in 60 seconds, according to the manufacturer. The ends of the wiener are placed in two troughs of salt water. If subjected to too much cooking, the wiener break, which turns off the electricity. A mercury switch stops the current when the lid is open.
CHRISTMAS HINTS

from the
Weldwood Wizard


Weldwood® Wizards
Adhesives, Firzite®, Satinsil®, Flexible Wood-Trim®
On Sale at
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DECEMBER 1957

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Photo Tips for Philatelists
(Continued from page 137)

stamp's soundness. Even the slightest tear which has been cleverly repaired will be revealed by photographing the stamp.

There isn’t a more efficient accessory known to stampdom with which to rapidly detect counterfeits, than the camera and enlarger.

By making an 8 by 10 enlargement of a stamp known to be genuine, and then making one of similar size of a questionable item, the photographer-philatelist can immediately spot the tell-tale differences, no matter how small they may be.

One of the most practical and valuable uses to which the camera can be put, is that of recording a collection. By making photocopies of every page, one has a permanent reference catalogue of his treasured possessions. Should the collection ever be lost or stolen, such a reference is of inestimable value in assisting its recovery, or settling an insurance claim.

Recently a number of famous collectors have made 35-millimeter slides of their stamps for use when addressing a gathering of collectors on some specialty subject. In such talks the display of the actual stamps satisfied only a few of the audience right in front of the speaker. By using slides and projecting them on a screen, the entire audience can see.

(The current Illustrations Law of the United States Secret Service allows the photography in black and white of any stamp in existence, including United States issues. Color photographs may be taken only of foreign issues which no longer are valid for the prepayment of postage.)

There is no end to the versatility of a camera in philatelic work. Each individual gradually will develop techniques of his own, to suit and meet personal requirements. But whether he confines himself to ordinary methods or experiments with new ones of his own, he is certain to find unlimited pleasure, satisfaction and utility in the combination of his photographic and philatelic activities.

Chemists Make New Products From Sugar and Petroleum

Two of the most abundant and inexpensive chemicals, sugars and petroleum products, can now be combined to produce a whole range of promising compounds. Dr. Carl B. Linn told the American Chemical Society that hydrogen fluoride is used as an agent to convert sugars and petroleum derivatives into detergents, germicides, pharmaceuticals and plastics materials.
Something NEW for your Christmas List!

5
POWER TOOLS IN ONE
NEW Dremel Deluxe MOTO-SHOP

COMPLETE POWER WORKSHOP IN ONE COMPACT, PORTABLE UNIT
The amazing new Dremel Moto-Shop is the most versatile multi-purpose tool ever invented. Has 1,001 home and shop uses. Basically, it's a 15" Jig Saw with a unique power take-off to which you simply connect other attachments. It then converts to a disc sander, bench grinder, buffing wheel, and a flexible-shaft machine—all powered by a ball-bearing rotary motor. And this professional-quality, portable power shop can be set up practically anywhere—basement workshop, kitchen counter, or card table. Weighs only 12 lbs. As a Jig Saw, it will cut 1/4" wood, 18 gauge copper, 1/8" steel—all with the same blade. Foolproof blade guard makes it absolutely safe—even for children. Handles everything from birdhouses to full-size furniture.

The flexible-shaft is a complete machine shop in itself. Use it for sharpening, grinding, polishing, carving. Collet capacity 1/64" to 1/4".

Moto-Shop is the perfect "ALL FAMILY" workshop—safe for even mom and the children. Helps build a close father-son relationship.

Model 57 Moto-Shop. Includes Jig Saw with disc sander attachment only. Other attachments can be added later. $33.95

Deluxe Model 57 Moto-Shop, with all attachments shown. $49.95

Price of attachments only, if purchased separately. $19.95

DREMEL POWER SANDERS
. . . Featuring Straight-Line Action
Dremel Straight-Line Action Sanders sand with the grain of the wood. Quickly produce a velvet smooth finish, free from cross-grain scratches and orbital swirl marks. Save a lot of elbow grease, too.
Three popular models to choose from:

$14.85 to $37.50

DREMEL MOTO-TOOL
The Pocket Size Machine Shop

Most versatile and useful tool you can own. Grinds, drills, polishes, carves, sharpens, engraved. Handle easily as a pencil. Saves time, eliminates tedious hand work. Produces 27,000 RPM. Ideal for craftsmen, hobbyists, model builders, home owners, etc. Four prices to choose from:

$12.85 to $27.50

DREMEL MOTO-SAW
The Famous Electric Scroll Saw

Cuts the most intricate designs like magic. Saws wood up to 1/4", also plastics, light metals, floor and wall tile. Saws to the center of a 16" circle. 7,200 cutting strokes per minute. Unique FOUR-WAY BLADE HOLDER permits cutting in any direction.

Model 203 . . . $6.85

Buy your Dremel Gift at Your Nearby Power-Tool Dealer Today!

WRITE FOR FREE CATALOG
Quality Power Tools since 1934 DREMEL MFG. CO. Dept. 117M, Racine, Wisconsin

DECEMBER 1957

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What Makes a Driver Tired?  
(Continued from page 89)

car. However, and this you may not have expected, the 1929 De Soto also rolled along for 2300 miles without skipping a beat. Except for one flat tire and momentary overheating as it crawled in second gear on hot Daytona Beach, the old car performed beautifully.

There was one side trip in the run, a diversion of about 100 miles so the cars could climb Mount Washington in New Hampshire’s White Mountains—a favorite test road for all carmakers.

Old Car Scoots

The tiny old roadster scooted up to the 6300-foot-high, cloud-shrouded peak without even breathing hard. And coming down, its short wheelbase, excellent weight-brake ratio and fast steering permitted it to skitter down the winding road faster than the 1958 model.

Incidentally, although not important to the test, gasoline mileage was measured. The old car averaged 15.5 miles per gallon over the 2300 miles, while the 1958 model averaged 14.5 miles per gallon. This gives a small advantage to the 1929 model, much smaller, however, than many would have expected.

Most people feel that the old cars were much more economical than today’s big-engined, big-bodied models. Apparently they were not. The much smaller 1929 roadster with its six-cylinder engine averaged only one mile per gallon more than the big 1958 V8 De Soto.

Sure, the new car went faster and did it more easily on the highways. (It averaged 44.8 miles per hour, the old car averaged 38.7 miles per hour.) Sure, it accelerated better in town. It was more comfortable, warmer, quieter and roomier (in fact, the 1929 roadster with its top up became downright unpleasant to one driver who confessed to a mild case of claustrophobia in it).

The new car had a radio, a cigarette lighter, a windshield washer, a power seat that could be adjusted up and down, forward and backward to change the seating position after hours of driving. It had power windows, automatic transmission with push buttons, power steering and power brakes. It had just about everything necessary to make a driver’s job relaxing and free from fatigue.

The old car had none of these. It had a three-speed hand-shift transmission, vacuum windshield wipers that stopped altogether during a hard pull, nonadjustable seat, cloudy isinglass side curtains, a narrow slit of a windshield with no hint of a wrap-around, poor headlights and a hard ride. It had a solid front axle—no front-wheel independent suspension to absorb road shock. Steering was stiff but accurate.

What Was Result?

And what happened? How did the fatigue study turn out? What did it prove?

Strangely enough, the tests failed to show that the old car made the driver any more tired than the new car. Occasionally, a driver would report that he felt more tired in the old car, but the nightly tests did not confirm it. Apparently what tires the driver most is not the physical activity. The driver of the old car did eight times as much physical work as the new-car driver. (Counters on the pedals and steering gear of each car measured the actual work done.) Yet, at the end of the day he was no more fatigued than the other driver.

Both drivers tired, but they tired the (Continued to page 262)
NOW, A VERSATILE, 5¼ POUND TOOL THAT CUTS WOOD, METAL, PLASTIC

DISSTON

D-23 ELECTRIC HAND SAW

HERE’S A GREAT NEW DISSTON tool for both professionals and hobbyists with a name famous for good saws for more than 100 years. The DISSTON D-23 has proved itself 15% to 50% faster than any competitive electric saw. It has extra easy-to-change blades for cutting plywood, 2 x 4's, plank lumber, sheet metal, pipe, tubing and plastics. It saws straight lines, circles, scrolls or bevels with a true, fray-less cut. Only $98.50

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Piston Rings, Caste, Wear Reducer, Oil Filters, Spark Plugs

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**Tubeless Tires: Most Owners Like Them**

(Continued from page 142)

circumstances. Surprisingly, in more than half the cases—54 percent—temperature was not a factor. These blowouts occurred either at night or on cool days. Speed, however, apparently was a factor. Almost half the blowouts occurred at speeds of 60 miles per hour or higher.

Tire repairmen are not sold on tubeless tires as the owners themselves. For example, 53 percent feel that tubeless tires give motorists more trouble than tires with tubes. What kind of trouble? Seventy percent of the repairmen list slow leaks as the most frequent cause of trouble. The same percentage states that they have more complaints of tire thump with tubeless tires than with tires with tubes. And 91 percent say they have recommended, at one time or another, that the motorist install tubes in tubeless tires for reasons ranging from leaks that can't be found to peace of mind for the customer.

And significantly, almost every repairman recommends two to six pounds higher pressure for both front and rear tires than the manufacturer's recommendation.

Here are some typical comments from repairmen:

"We can balance a thump out of both tubeless and tube tires. But you find more tube tires out of round or with a heavy side."—Colorado.

"The major causes of complaint can be attributed to inadequate or careless repairs. Various tire manufacturers can contribute materially by eliminating the ridges on the liner, as these ridges have to be completely removed in the affected area before a patch can be properly applied."—Florida.

"A boot will not hold on any sizable cut."—Louisiana.

"Tube-type tires can be inspected 100 percent better for breaks and nail holes."—Indiana.

"On the whole, tubeless tires were not good enough to put on the market when they were."—Missouri.

"Lots of accidents are due to the car sliding sideways, causing air to leave the tubeless tire."—Oklahoma.

"If for any reason a rim is cut or bent it means a new wheel."—Colorado.

"Tire leaks air through liner but comes out of tire at another spot. It is impossible to locate true leak."—Nevada.

These are the opinions of the men who know tires best—the owners themselves and the tire-repair specialists.  

---

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Next time you cut plywood or other well-seasoned woods, use a 10-, 11- or 12-point Disston Hand Saw. Note how easily it cuts... what a beautifully smooth finished edge it leaves! That's because these fine-toothed saws are specifically designed for finishing work. Made of fine tool steel, with perfectly tempered and double taper ground blade, Disston Saws give years and years of service, too.

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Choose a 5½-point Disston Hand Saw for cutting with the grain. Choose a 7-, 8- or 9-point Disston Hand Saw for cutting across the grain.

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METAL MASTER M-3
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WISS...always a cut above competition

Minsk-Moscow highway is well surfaced, but side roads are muddy lanes used by horse-drawn wagons

I Drove Through Russia
(Continued from page 85)

relies on creaking wagons for much of its rural transport. Russia's production and variety of machine tools rivals that of America, but it gave up making ballpoint pens as a bad job, and consumer goods are generally shoddy, expensive and scarce.

More contrasts were seen in Minsk the next morning. This war-devastated city of 412,000 people has been rebuilt with imposing apartment houses and office blocks lining the broad avenues. But when we drove off the main street in a two-hour hunt for a gas pump that both worked and delivered the "high test" fuel, we bounced over bone-rattling cobbles in a road booby-trapped with flooded potholes, with manhole covers sticking two inches above the surface.

Late Start for Moscow

After a late start we dawdled along in the bright sunshine with photogenic clouds, and gave up all hope of reaching Moscow that night. The Minsk-Moscow highway stretches for 450 flat miles with scarcely a bend. It was possible to wind the Victor up to an effortless 75 miles per hour—safe, we thought, until an unexpected wavy spot tossed us against the roof. At first glance this road with no speed limit looks a natural for sports cars, but hard suspension here would be murder, and about 65 is top for steady cruising.

Driving through this vastness, so like the American great plains, we saw many places where grain was spread out across half

(Continued to page 246)
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the width of the road to dry in the sun. The wake of passing traffic blows away the chaff. Sometimes even small threshing machines were parked and running on the asphalt. Trucks were used to crush flax by driving them back and forth across it.

Our companions of the road were long-distance coaches that seat 32 people in comfort, and use a 180-horsepower supercharged diesel mounted at the rear to thunder along at close to 70. Few passenger cars were seen, and the traffic consisted mostly of gas-engined four-ton trucks. These are the stalwarts of Russian transport, and carry everything from timber and cows to mountainous loads of hay and up to 30 farm workers packed in like sardines.

**Trucks Take Beating**

They take a terrific beating from both overloading and tortuous roads, and we saw several trucks with dislocated axles rolling with a crablike movement. Once a four-tonner with recapped tires shed a large hunk of loose tread right in our path. Garages are widely spaced in Russia, and every truck driver is both trained and equipped to make major repairs on the spot. More than once we saw a roadside replacement of a broken spring or half shaft. These trucks are really run into the ground. I was told that they normally do 120,000 miles before a major overhaul, and are kept going for up to 500,000.

**Gas Stations Are Scarce**

Truck drivers take a break at the rare gas stations along the highway, and the bright red Victor always attracted a crowd when it pulled in to refuel. They were tough, roughly dressed men, but always ready to talk and be helpful. At one place where no air was available, a gruff driver brought his truck over, attached a hose to his compressor and inflated our tires.

Their questions were always the same. "Americanski?" eyeing the Victor’s panoramic windshield and tailfins. I told them it was made in England. "What's the top speed and fuel consumption?" They nodded approvingly when I gave the metric equivalent of the 75 miles per hour and 24 miles per gallon that we had done with the low-compression head and a diet of the local "liquid asbestos." Then: "What does it cost? Does it belong to you? How long would you have to work to buy one?"

Finally the inevitable: "Can we look at the engine?" As a dozen heads peered under the hood, someone always crawled underneath the car to see the suspension. The usual verdict was: "A fine machine, but too low for our roads."

(Continued next month)
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Report From a Roving Editor

(Continued from page 93)

Yukon River in its brown hills, and over the brown, barren, arid Brooks Range. There was no snow north of Fairbanks and it turns out this whole region gets very little precipitation. As much as 120 feet of snow falls in the glacier area down south; at Point Barrow the average annual snowfall is only seven inches.

Leaving the Brooks Range, the pilot began his letdown, for now we were over the Polar Shelf, a flat expanse not much above sea level and filled with ponds, lakes, and winding rivers that loop back and forth. Approaching Barrow we could see the ice pack five miles offshore, with strings of floes reaching out into the open water.

It was cold, windy and showering at Point Barrow and we needed the parkas.

First thing I saw at Point Barrow after getting off the plane was a sign reading "No Parking" in front of the tiny control building at the airstrip. Only 1200 miles from the Pole, and they had traffic rules.

The group toured the overheated buildings of the DEW Line radar installation, then stood through an hour-long ceremony out-of-doors where the weather was bitter. The ceremony marked the acceptance of DEW Line by the Air Force from the construction contractors.

There was then a reception in the large library room of the Arctic Institute, attended by the contractors, the Air Force officers who had flown up for the acceptance ceremony, and officers of the Navy supply ships anchored offshore. The admiral of the supply force introduced me to an artist who turned out to be Arthur Beaumont from Los Angeles, a marine painter I had known 20 years or so ago. He was making the cruise with the supply ships.

On one wall of the library was the pelt of a huge polar bear that had been shot 20 feet from the cookhouse last January. Outside, in cages, the institute has a small zoo of arctic animals that had been trapped for behaviorism studies. They included large foxes, a couple of wolverines and some young, large, brown arctic owls.

After lunch the correspondents visited the Eskimo village a few miles down the beach, using a big amphibious tractor as a taxi. The roads are gravel, raised above the tundra, but still muddy. There are a few trucks and Jeeps but most of the vehicles are tracked types suitable for mud, snow and ice. The Eskimo village is mostly tar-paper shacks and wooden houses, with muddy lanes and standing water. Some of the houses have a pole at each end of

(Continued to page 252)
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- Jig Saw attachment - cuts wood, metal; smooth, speedy. No. 2140: $11.95
- Orbital Sander attachment - for fine finish sanding. No. 2160: $15.95

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the roof with a few slabs of unappetizing meat strung out on a line between, curing in the weather. The Eskimos who were visible, mostly children, wore summer parkas of cloth with fur around their faces. Winter parkas are all fur. There were some skin umiaks pulled up on the gravelly beach.

We spent a hurried 10 minutes in a store. Curio shops at Fairbanks and Anchorage are full of Eskimo-made, but nevertheless commercial, ivory bracelets, pins, earrings and so on, with prices mainly starting at $5. The same shops are all stocked with good-looking ash trays and other dishes depicting Eskimos and dogs and Arctic scenes, all signed "Sascha B," which is the trade name of the Brstoff pottery located near my home in Santa Monica.

After leaving the Eskimo village we got back in the plane and headed for Elmendorf Air Force Base, Anchorage. The pilot's windshield was iced up for much of the trip but there was nothing for him to see anyway. We were in the clouds and could barely see the wing tips. We flew at 11,500 feet to clear any mountains on the route.

A Visit to "White Alice"

Wednesday the plane took us to a White Alice installation at Naknek at the root of the Aleutian Peninsula. White Alice is the code name for the new tropospheric scatter type of radio communications system just being completed in Alaska. Here the "no-see-ums" were a pest; actually they are very visible indeed. We were past the black-fly and mosquito season; these were the only pests encountered.

After lunch in a super-steam-heated dining room and a tour of Naknek, the pilot took us on a little sight-seeing trip on the way back to Anchorage. Until now the C-54 had been handled like the big transport it is—flying straight and level at high altitudes. On this afternoon the pilot gave us the bush-pilot treatment, close-ups of the scenery. He stayed under the lowest level of broken clouds and cruised up valleys and then canyons to the famed Valley of 10,000 Smokes. This scenic spot has been reading Reader's Digest lately and no more than a dozen smokes are left. We saw none of them, even at low level.

By now there was the wide base of a big mountain in front of us, most of it lost in the clouds overhead, and with glaciers on its sides. We cruised around the shoulders of the mountain at a couple of hundred feet above the steep slopes, and hunted for mountain passes to avoid going up into the clouds. I am a very timid air passenger and along in here I was mentally helping

(Continued to page 254)

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Does more jobs than any other hand tool—EASIER than ever!

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the pilot at his controls. I didn’t know then that there was a lot more coming. After crossing the peninsula we flew across the strait and cruised along the low northern shore of the Kenai Peninsula. We were still sight-seeing, and currently looking for moose. This is best done at about 100 feet above the trees. No moose, so the pilot got down on the water just offshore, at an altitude of 50 feet. We were scaring the sea gulls (and me).

Approaching Anchorage, the pilot cruised up Turnagain Arm, a typical fiord, narrow, with tall mountains on each side, and with Portage Glacier at its end. We “climbed” the glacier by airplane, looking down at the blue-green ice a couple of hundred feet below, went over the top into the peaks, and almost skied down a glacier.

I was alarmed. I made my way up to the cockpit to see what it looked like from there, and we were headed for a black peak sticking out of the ice, maybe two blocks ahead. Most of the crew were taking snapshots out of the side windows. They were having a big time and so was I, but not in the same way. We snaked in and out of the peaks, saw a lot more glaciers, and returned to Elmendorf mightily impressed with the plane and the pilot.

Party Returns South

On Thursday the C-54 and press party returned south. I decided to RON (hot dog!) at Anchorage to visit another, more typical White Alice site adjacent to Matanuska Valley. The Elmendorf people took me out there by car. The road cuts through Fort Richardson on the outskirts of Anchorage and there is a big sign at each end of the reservation reading “No Big Game Hunting on This Fort.” Moose are more than plentiful; the problem is not shooting one, but hauling the 1000-pound carcass to a truck after the kill.

Friday morning I visited some of the officials of the Alaska Railroad. One of their big problems is moose. They kill 200 to 300 of them every year, running them down on curves.

Friday afternoon I returned to McChord, via MATS, in a C-118, which is a plush Douglas DC-6 with the seats facing the rear for safety. Got to McChord about midnight, took a taxi with two other people to the Seattle-Tacoma airport to sign in.

I returned south the next day by United in a DC-6 that required only 3½ hours from Sea-Tac to L.A., overflying Reno, Lake Tahoe and part of Yosemite. Recognized a lot of lakes I have fished. The trip was pretty, but not at all comparable to Alaska. Thanks for a nice trip.

Tom Stimson

POPULAR MECHANICS
Honeywell's House of Magic

object. The screen shows its depth, distance, course, size and speed.

The U. S. Steel Corporation complained that when temperature-measuring instruments were placed inside open-hearth furnaces, they melted in the 3000-degree F. heat. Honeywell's industrial-instrumentation engineers came up with a gadget that looks through a window into the furnace, studies the intensity of the light inside and instantly translates it into temperature.

For the harried dairymen, Honeywell has developed an electronic process which not only increases butter production by 50 percent, but also gets more butter out of less cream, makes it taste better and stay fresh longer, and at reduced cost. Similar robots keep sharp electronic reflexes at work in bakeries and bubble-gum plants, monitoring ingredients for quality, precisely timing mixing processes, measuring consistencies, and baking and cooking.

Dr. James A. Oliver, curator of reptiles at the Bronx Zoo in New York, complained that when people visited the Zoo, many of his snakes slithered behind rocks, and his alligators and crocodiles submerged in their ponds. Honeywell engineers learned from Dr. Oliver exactly which temperature each reptile preferred most. Now rattlers bask in an 80-degree temperature over radiant-heating panels in the front of their cages, cobras glide contentedly in an

(Continued to page 258)
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DECEMBER 1954

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Company President Paul B. Wishart likes to keep raising the sights of his men. Recently he asked several of his key scientists to set forth in memos what they thought life would be like in A.D. 2000. Here are some of their answers—not "blue-sky stuff," I am told, but rather conservative predictions from highly regarded members of a conservative profession.

- Machines will diagnose and, in many cases, treat human illness. Since sickness usually produces chemical changes in the body before severe onset, frequent, periodic checkups by

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(Continued to page 260)

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- Roads and streets will be replaced by a network of pneumatic tubes. Family vehicles will need only a small amount of mobile power, since they will only have to get from the owner’s home to a nearby tube. Then they will be pneumatically powered to any desired destination. Pneumatic pockets will completely eliminate the possibility of crashes.

- Recreation will be the world’s biggest industry. Football stadiums, baseball parks and race tracks will be heated or cooled for maximum spectator comfort in any climate. The work week will be about 20 hours long, but work as we now know it will no longer exist—it will be more of a social philosophy.

- Contents of the world’s greatest libraries and schools will be available to anyone over special television services. From an armchair, it will be possible to call for any information by coded request.

- Ways will be found to transmit information to the brain in such a way that loss of sight and hearing will not restrict one’s activities in any way. And the senses of people with normally good vision and hearing will be strengthened; for instance, it will be possible to see in total darkness.

If these possibilities stagger the imagination, consider the case of Sanford Shaleen, a young Honeywell engineer, who four years ago came out of a bout with bulbar polio completely paralyzed from his neck to his ankles. His career seemed ended until his Honeywell colleagues devised a way to put his brain, still as strong as ever, to valuable use for the company.

They arrived at his bedside with a pulpit-like stand, put a dictating machine next to it and a microphone close to his head. Then they brought in piles of engineering reports. Shaleen’s job they explained, would be to read the reports and dictate short, sharp condensations into the machine.

Shaleen brightened, but said it didn’t seem practical—someone would have to stay with him and turn each page as he finished reading it. The engineers placed a report on the stand and told him to get busy—pages would turn automatically when he turned his head in the desired direction!

How far will automation go? “In 10 or 15 years,” says president Wishart, “industry will be using entirely different types of controls from those in use today. They will be more sophisticated. They will control whole processes, not just isolated production operations.”

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December 1957

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same amount whether in the new car or the old car. The doctors did not attempt to pinpoint what made the drivers tired, except to hint that it may be due to the anxieties of driving. The new car, apparently as much as the old car, requires the constant attention of the driver in traffic situations. Although he may not have to work physically, he works mentally and perhaps this is why he is just as tired at the end of the day as the old-car driver.

When asked which car they preferred, the two drivers, of course, said the 1958 model. It is, as all agree, much more pleasant and comfortable to drive. It provides a warm, secure haven in which to cover the miles quickly and without anxiety. There is little reason for concern about tires, about engine failure, about not reaching the destination. And, as a result, it is more pleasant to drive. The driver feels that it is easier and less tiring, but apparently it is not, if the tests are reliable.

Future Meaning

What does all this mean to the automobile of the future? It certainly is not the final study on this subject. There will be, and should be, others. But it does provide evidence that the industry (De Soto Division, at least) senses that there is more to improving a car than merely eliminating physical effort.

As the tests drivers themselves state, the only fault with the 1958 model was a tendency to monotony because so much of the work is done for them. With today's straight, stop-free toll roads and through ways, this is a problem that the industry must face. And, if De Soto is any example, the industry is beginning to face it.

More work should be done on monotony, the researchers feel. Some experts feel that monotony causes fatigue. Dr. Church of the De Soto test does not, he feels it is anxiety that tires the driver.

Perhaps there is something to be said for the old cars after all. At least, they did keep the driver occupied. He listened to the tires because he expected a flat at any moment, he listened to the engine because a rod might burn out, he listened for sounds of overheating.

Today's cars make it unnecessary to listen, to be concerned and, the test drivers feel, perhaps this is what leads to boredom and monotony. Whether monotony results in fatigue is a question yet unanswered.

In any case, the De Soto test opens a new field for study—a field that will interest all of us until that future day when we simply dial a destination on the dashboard and our car takes us there while we sleep.
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POWER TOOLS, INC. 102 Yates Avenue
Beloit, Wisconsin
European Listening Post
(Continued from page 108)

may be because their cars are simple, more easily understood. They study cutaway models of engines and transmissions arduously. Even women seem interested.

At Frankfort, the tiny DKW 600 was the big hit. It is not yet in production and was displayed to test public reaction. The public reacted. Hundreds stood as if transfixed.

At Paris, the new Vespa 400 was just as big an attraction. No styling tricks here though, just a small elemental machine. The crowd was so big on Sunday you couldn't get within 50 feet of it. No design short of an atomic car would create that much interest in America.

Europe is in transition. People who now own scooters are moving up into baby cars. At Frankfort, one entire building was filled with baby cars of 600-cubic-centimeter displacement or less (about one tenth the size of the 1958 Ford V8 engine).

American Cars

For the most part American cars were looked at only casually. The mood seemed to be more idle curiosity than true interest. There were no cutaways or operating exhibits, just cars—and the cars were kept locked. Most European cars were unlocked and people could climb in and jiggle the steering wheel. American cars were marked "hands off please." They are off limits outside the show as well. Few Europeans can afford to buy them or to run them and those who can, soon find them inconvenient on Europe's streets.

Edsel attracted more attention than any other American production car, perhaps because it was the newest (an old Oldsmobile Rocket "dream" car was the biggest spectator attraction at Paris among American cars, but of course it is not a production model). Five Edsels were sold during the Frankfort show.

Most European comments overhead at the American exhibits referred to bigness, expensive operating and licensing costs. Frequent criticisms were heard about poor paint jobs and slipshod trim fits.

Despite such criticism, there's no doubt that European cars are going American. As one German sales manager said, "The next five years belong to the American stylists. Even such conservatives as Mercedes-Benz and BMW will have to go along. People like American styling."

Could be. The next question is: What does this do to the imported-car market here in the States where much of the business is in protest against American design?

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A Report on Three Cars

(Continued from page 90)

A Report on Three Cars

slowly to prevent a constant up-and-down adjustment as the car goes over bumps or rounds corners.

Pontiac and Cadillac rely solely on the slow-leveling system.

Both GM cars have a control knob so the driver can elevate the car body to full lift, enabling it to avoid rear-end drag.

Unlike the GM cars, Ford retains leaf springs in the rear when air bags are not installed. Such an arrangement makes it necessary for Ford to add a trailing-arm suspension link to absorb drive and braking thrust when air suspension is used.

Also big news at Ford is the new V8 which is designed for top efficiency in both operation and manufacture. Despite its greatly increased power and displacement (300 horsepower and 352 cubic inches) it is smaller than the engine it replaces.

It has fully machined combustion chambers that provide more accurate control of compressions among the various cylinders. This results in a smoother operating engine. The big new V8 weighs less than the 292-inch V8 and is said to use less gas.

Machined combustion chambers have shiny surfaces that make it hard for carbon to build up. The new design has no Siamese manifold porting, a frequent cause of engine hot spots. There’s more room between the two heads and manifolding is simplified to make the engine breathe easier and more evenly. This aids economy as you don’t overload some cylinders in order to satisfy those that are more remote.

Of major importance to the manufacturer (of less interest to the owner) is the fact that the cylinder-head design has its machined sides at right angles to each other, simplifying production-line setups. This cuts costs and assures precision fits.

There’s no water jacket around the exhaust manifold on Ford’s new V8 which helps thermal efficiency (the more heat you remove in the radiator, the less energy you get at the rear wheels), but also may decrease heater efficiency. It probably will take longer for the heater to warm.

Cadillac’s V8 engine has been reworked. Valves are larger and the combustion chamber reshaped to increase compression to 10.25 to 1 (from 10.0 to 1). A new camshaft provides improved fuel economy and smoother idling.

Of less importance mechanically (but of much importance saleswise) is the fact that Cadillac extended its rear-end overhang about nine inches on one model to appease those who say a Cadillac should look like the longest car.

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SPECIFICATIONS

Swing—13½" over bed and saddle wings,
8" over cross slide.
Distance Between Centers—26", 40", 52"
maximum.
Collet Capacity—1" maximum (Collets inter-
changeable with South Bend 10"-1" Collet,
14½", 16" and 16-24" lathes).
Spindle Speeds—Six to Sixteen 40 to 940
r.p.m. or 20 to 940 r.p.m. approximately.
Power Longitudinal Feeds—48 R.H. or L.H.,
.0015" to .0841".
Power Cross-Feeds—48, .0006" to .0315".
Thread Cutting—48 R.H. or L.H. pitches, 4 to
224 per inch.

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Hardened and precision ground bed
ways can be supplied in lieu of regular
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MOTORS • AUTOMOBILES • TV TUBES

As an electrical trouble shooter the Model 70:

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