TRIPLE DUTY
FURNITURE
PIECE

How To: Build A Brick Incinerator • Put Your
Garden Tools On Wheels • Construct A
Picnic Box • Make Hose Connections
That Won't Leak • Make Aluminum
Window Screens • Panel
A Room With
Plywood
they all got vaccine except dad...

This actually happened to the man in the iron lung... James Wood, 36, of Charlotte, Mich. He was the only member of his family not vaccinated against polio and the only one to come down with the disease. Wood and his wife both planned to be vaccinated. One night last April they were about to go out for their Salk shots when friends dropped in and the trip was postponed. Later, an extra-money night job kept Wood from going to a vaccine clinic with his wife.

The children, of course, had been vaccinated. Robert, 13, Norman, 11, Nancy, 10, James, 6, and Sarah Jane, 3, had all three shots; Edgar, 2, had two. Baby John was born after dad was stricken. "Jim just didn't get to it," Mrs. Wood says of the ill fortune that befell her husband.

"Now, the only good will be if what happened to us helps somebody else."

don't take a chance... take your polio shots!

THE NATIONAL FOUNDATION FOR INFANTILE PARALYSIS

301 EAST 42nd STREET, NEW YORK 17, N. Y.
Contents for July - August, 1958

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### Double Action Sander

NOW IT's no longer necessary to own two sanding machines to handle finishing projects. An exclusive new sanding machine, the first to provide both sanding motions in one piece of equipment, has been introduced by Cummins Power Tools.

Equally at home giving a fast "cleaning" action for preliminary and standard sanding or for perfect final finishing, the new sander can be switched to both orbital and straight-line action.

Key to the unique two-way sanding motion is an actual directional "key," which switches from one action to the other with a simple turn. Comes with coarse, medium and fine abrasive paper, easy to change. Changeable three-position auxiliary knob provides easy grip for flush sanding.

The sander is priced at $49.95, the price the user would expect to pay for a single-action sander. Made by Cummins Portable Tools, power tool division of the John Oster Mfg. Co., of Milwaukee, Wisconsin.

### Simple Home Fuse Tester

A COMPLETELY safe, battery-operated fuse tester is now available that tells you positively whether your fuses are good or burned out. The Home Fuse Tester tests all kinds and sizes of fuses: 1 to 1,000 amps; plug fuses; Fusestats; cartridge fuses; car fuses; TV fuses; etc.

Believed to be the first of its kind ever manufactured, the Home Fuse Tester operates on a single flashlight battery and makes it possible for every homeowner—even a child—to test a fuse in seconds. There is no possibility of shock.

An added advantage is that the fuse tester may also be used to test electric cords for short circuits or intermittent operation.

Invented by a power company lineman, the Home Fuse Tester is a simple and foolproof way to eliminate possible sources of electric shock and fires caused by defective fuses and electrical connections.

A patented item, it is available at a cost of $2.95, postpaid, from Home Products Company, 616 Builders Exchange, Minneapolis 2, Minnesota.

### Multi-Duty Power Tool

A MULTI-DUTY power tool that produces lumber to desired width, thickness and pattern in one continuous power-feed operation has been developed by engineers of the Belsaw Machinery Co., 315 Westport Road, Kansas City, Missouri.

Although this new Belsaw Power Tool sells for under $300, it provides the essential functions of three separate power tools costing many times as much. It can be operated efficiently with a 1-horsepower motor but also has the capacity to give commercial operators high-speed production with 5-horsepower motor.

A 10-inch rip saw can be locked at any desired position along the 12-inch arbor.

Three high-speed steel knives give cabinet finish on stock up to 12¼ inches wide and up to 6 inches thick. Low cost molding cutter bits, quickly changeable, are available for all popular patterns—tongue and groove, quarter round, base molding, 3-bead, V joint ceiling, etc. The pattern cutters, 3 per set, fit directly into the planer cutterhead. All moving parts are safety-shielded and the power feed design prevents kickback.

Rough lumber can be fed to the saw to rip it to desired width and right on through the planing and molding knives to produce finished stock in one continuous pass. The new power tool also provides for performance of each operation separately so that it serves as a power-feed rip saw, a power-feed thickness planer, a power-feed molder—or a combination of all three.
NOW, HOMEOWNERS can have safe, convenient, outdoor electrical outlets at any distance from the house, at small cost. Electric lawn mowers, hedge trimmers, power tools, portable barbecues, Christmas trees, patio and garden lighting can be plugged in wherever they are used, without fear of shock or "shorts." A new weatherproof unit by Bell Electric Co., Chicago, is "just what the homeowner ordered" for versatile, long-life service.

Called the Bell Portable Weatherproof Outlet Box and Cord Set, it has a heavy-duty duplex receptacle with either parallel-slot or grounding type outlets. Either receptacle is protected by a single large Saf-T-Lok one-piece snap-cover plate with rubber gasket to seal out weather. This exclusive Bell cover snaps open, stays open to allow free use of both hands and to prevent damage to cord or insulation if cord is accidentally jerked out. It snaps shut easily when receptacle is not in use. The box itself is rustproof aluminum with special molded grommet on No. 16SJT heavy-duty wire to make a moistureproof seal for parallel slot receptacles; also available with 3-conductor wires for grounding-type polarized units. If desired, a weatherproof lamp holder screws into a threaded opening at top of the box, to add decorative and useful lighting for patio and garden. The unit can be bought with or without the lamp holder (minus bulb). Triangular design reinforces the cast aluminum spike's hold in the ground.

Weatherproof cords 15, 20 and 25 feet long are available on both types of receptacles, and in 15 or 25 foot lengths on units complete with lamp holder. All types are available from neighborhood hardware, electrical, garden supply, and department stores. If your area has not yet re-

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Outdoor Grill Lighter

Outdoor Grill Lighter

NO BARBECUE or fireplace setting will be complete without the brand new Baby-Q Lighter just introduced by Eagle Manufacturing Company, Wellsburg, West Virginia, for dispensing fuel to light coke, charcoal and wood fires. Colorful in gold, black, and silver, the new Baby-Q holds ten ounces, is conveniently designed with a 6-inch angle spout of seamless tubing. The spout has an open-close control valve in the brass tip. It will effectively seal the brass nozzle when not in use. A full stream or one drop of fuel can be dispensed, depending on pressure applied to the finger lever.

The Baby-Q Lighter is now available in leading hardware, garden, and department stores. The price is low, too: suggested retail less than $2 each.

Sparkling Switch Plate Covers

Sparkling Switch Plate Covers

A NEW idea in self-decoration is offered with gleaming switch plate covers. Made to fit all standard single switches, these metalized DuPont Mylar covers are available in gold, copper or chrome.

The covers can be cleaned with a damp cloth and keep walls and switch plates smudge-free. They are self-adhesive. Simply peel the backing and affix the cover for permanent beauty.

These practical covers can be ordered from DSC Machine Co., Inc., 21 Bertel Avenue, Mount Vernon, New York, and retail for 20 cents each or a package of six for $1, postpaid.

Cushion-Grip Screwdriver

Cushion-Grip Screwdriver

THE BRIDGEPORT Hardware Manufacturing Corporation, Bridgeport, Connecticut, has introduced a line of revolutionary top quality screwdrivers featuring a neoprene rubber grip permanently bonded to a tough amberlite handle. The resilient cushion grip is unaffected by water, oil and gasoline. It never hurts the hand, no matter how hard you grip it. Tests prove the Cushion-Grip screwdriver has 50 per cent greater torque than ordinary plastic or wood handled screwdrivers. The screwdriver was tested by mechanics under actual working conditions in factories and garages and found to be superior in turning power and comfort. The handle would not slip in the hand even when wet or oily. It is completely shockproof.

Other outstanding features are: Polished high grade hardened alloy tool steel blade; solid, bolstered winged shank for maximum strength; precision cross-ground point.

The Cushion-Grip screwdriver is now available in four styles, including round blade mechanic's, square blade mechanic's, electrician's, and genuine superior hard Phillips. In all, there are sixteen sizes from 3/16" to 12". List prices range from $1 to $2.70 each. Fully guaranteed.

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A REVOLUTIONARY new silicone-base lubricant, designed for a multitude of household uses, is being produced by the Glidden Company, Cleveland, Ohio.

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Mr. Hunt is that he has brought a lot of widely scattered information all together within the covers of one book for easy and quick reference.

THE AUTHOR of this book points out that there are three factors involved in the effective completion of any task involving the use of tools and machines. The worker must have the knowledge to enable him to select the proper tool or machine for the job involved. He must have a reasonable amount of skill in its use. Finally, he must know when the tool is in proper working condition for efficient production and if it isn't in such condition, he must be able to recondition it. It is with this last factor that DeWitt Hunt's book is concerned.

For many years Mr. Hunt has taught a course entitled "Care of Shop Equipment" at Oklahoma State University. He writes with authority on his subject and covers it in complete fashion. His descriptions of maintenance and repair processes are supplemented by 333 illustrations, more than 200 of them showing actual work tasks.

The book begins with instructions for maintaining hand tools, including details on the various sharpening processes involved. There is a section explaining various ways of marking tools for easy identification and others on the selection, use, and care of abrasive equipment, problems of electrical maintenance, general machine maintenance and lubrication as a factor in maintenance. Separate sections are devoted to the band saw, the circular saw, the jointer and surfacers and shapers.

Under the heading of "Miscellaneous Maintenance Tasks" Mr. Hunt deals with such matters as repainting shop rooms and equipment with modern color treatment, preventive maintenance on shop lighting, selection and care of various vises, sharpening the mortiser bit and chisel, care of sheet metal squaring shears, fastening equipment to concrete floors and tool cases and tool racks.

A bibliography lists many pieces of supplemental literature on tool maintenance, including manuals, pamphlets, booklets, etc., put out by manufacturers of hand tools and machines. One of the achievements of Mr. Hunt is that he has brought a lot of widely scattered information all together within the covers of one book for easy and quick reference.

This is the sixth edition, completely revised, of a book which since its original publication has sold more than 100,000 copies. It was originally titled "House Carpentry and Joinery" but has been retitled because as the author, Nelson Burbank, explains, the word joinery, while valid, has gradually declined in usage over the years.

"House Carpentry Simplified" describes fully each step or operation of dwelling construction from the selection of tools to the completion of the structure, with the exception of such subsidiary functions as those of the plumber, the electrician and the painter.

Notable additions to this edition of Mr. Burbank's book are a chapter on tools which has been amplified from 6 to 15 pages in order to present a complete and modern assortment of more than 150 hand and power tools; a revised glossary of more than 1,000 building terms; two completely new chapters — "Structural Parts of a House," delineated on a drawing of a modern structure, and "Heating Installations and Air Conditioning," and two new appendices, one on prefabrication and one on safety for the carpenter.

Mr. Burbank's book includes a complete and fully detailed set of plans for a modern split-level house by an outstanding architect. With it is a list of materials and specifications—the same sort of presentation you would get if you went to an architect yourself and asked him to draw plans and specifications for a house. These plans act as a focal point for study of the various steps in house carpentry as they are presented in succeeding chapters.

Those succeeding chapters deal with such matters as laying out the building site and doing the excavating, foundation forms and foundations, sills and girders, floor and ceiling joists, subflooring, outside and inside framed walls, roof framing, sheathing of walls and roof, cornices and gutters, roofing, porch and bay framing, exterior wall covering, interior wall and ceiling covering, stairs, trim, windows and window walls, doors, builders' hardware and fasteners, closets, shelving and built-ins, finish flooring, garages and thermal insulation and moisture barriers. The book is copiously illustrated with more than 1,100 photographs and drawings.

It should be pointed out that while previous editions of this book have been used as a guide to the building of many fine houses, the volume is also of value to those who are not ambitious enough to want to tackle the job of building a complete house. The homeowner who wants to build an addition to his existing house, or merely make minor alterations or repairs will also find "House Carpentry Simplified" a virtually indispensable guide.

Fun with Metalwork
by J. W. Bollinger
184 pages; illustrated; The Bruce Publishing Co., Milwaukee, Wisconsin; $4.75.

A LIBERAL use of silhouettes is the outstanding feature of many of the various metal projects which make up the bulk of this book by J. W. Bollinger, a Tulsa, Oklahoma, industrial arts teacher.

Most of us are familiar with the use of silhouettes of dogs, cats, horses, etc., on house number markers and Mr. Bollinger offers a number of these. But he makes much wider use of silhouettes as adornments, presenting projects that call for their use in such articles as lamps, fireplace screens, chimney irons, front door decorations, candle-holders, decorations for electric light switch covers, sandwich trays, coasters, bracelets, tie racks, and shelves.

Mr. Bollinger offers numerous other metal projects not making use of silhouettes—such things as kitchen stools, various benches, a Christmas tree stand, a glass topped fern stand, closet accessories of various sorts, and magazine rack. In all, there are well over 100 projects. Each is illustrated and includes a materials list.

Before presenting the projects, Mr. Bollinger offers a chapter covering the various techniques necessary to carry out the projects, including the making of silhouettes, transferring them to metal, making bends and scrolls, use of paints, enamels, lacquers and bronzing powders.

In writing this book, Mr. Bollinger has primarily in mind the needs and interests of junior high school students. Most of the projects are quite...
simple and only a few require welding. If your son had been after you to let him join you in your home workshop, this book would be a good way to get him started on a useful and pleasant activity. Or if you yourself are inexperienced in metalwork and want to introduce to this craft, with all its many possibilities, this book will get you started.

The Complete Outboard Boating Manual by Ernest Venik
281 pages; illustrated; American Marine Society, Chicago, Illinois; $4.95.

There was a time when a book such as this would have been of practical interest to such a limited number of readers that a review of it would hardly have been justified. But that was before the big boating boom, brought on partly by the construction of hundreds of new lakes all over America. It is estimated that last year alone American boaters took part in some form of recreational boating. They made use of more than 7 million boats, of which nearly 3,300,000 were built expressly for use with outboard motors.

Ernest Venik has written a comprehensive guide to outboard boating. He tells you first how to select your boat, if you are just joining the boating fun, keeping in mind what your particular needs are. Then he tells you how to select the outboard motor that will go best with your boat. There are, Mr. Venik says, no all-purpose boats and no all-purpose motors. The two must be properly mated if you are to receive the kind of performance you want. Such factors as what fundamental use you plan to make of your boat, what kind of water you plan to use it on, how fast you want to go, whether you will leave the boat in one place or haul it about on a trailer, and how much money you want to spend—all of these must be taken into consideration.

Mr. Venik tells you how to handle your boat under various conditions and he includes water traffic rules. He explains the operating principles of outboard motors and their construction. Then he proceeds into one of the important sections of the book—that devoted to the repair and maintenance of your motor and boat. He goes into detail on the various aspects—including the lower unit of the motor, fuel systems and carburetors and the electrical system. In a chapter on trouble shooting he offers speedy systems for locating and correcting motor troubles—the kind that always seem to arise when you are twenty miles from home and a storm is coming up. Chapters on accessories and outboard racing complete the volume. Appendices include Coast Guard regulations, state regulations for motor boats, associations of boating enthusiasts, American Power Boat Association contest rules and a list of specialized equipment dealers.

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Few realize that the great bulk of commercial writing is done by so-called "unknowns." Not only do these thousands of men and women produce most of the fiction published, but countless articles on business, current events, sports, hobbies, travel, local, club, church, etc., activities, and as well.

Such material is in constant demand. Every week thousands of checks for $25, $30 and $100 go out to writers whose latent ability was perhaps no greater than yours.

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Each week your work is analyzed constructively by practical writers. Gradually they help to clarify your own distinctive style. Writing soon becomes easy, absorbing. Profitable, too, as you gain the "professional" touch that gets your material accepted by editors. Above all, you can see your own progress week by week, as your faults are corrected and your writing ability grows.

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JULY-AUGUST 7 7
Tote Case for Guns and Tackle

Hugh F. Williamson

You can safely transport your sporting gear all over the world in this sturdy and portable case.

A growing number of modern American sportsmen are frequently moved about the country by their employer. These men are plagued with the problem of providing functional and safe storage for their sporting gear both at home and in transit.

This gun and tackle case will accommodate the usual gear (Photograph A) and is inexpensive, easily constructed, rugged, can be doubly locked and stored in any position. The guns are securely held for safety and to prevent any damage to their finish, mechanism or sights.

The measurements given can be readily altered to suit individual requirements. If there is any question carefully measure your guns, being sure to allow for future chokes or scopes.

The most accurate way to measure a gun is on a table to determine the case size you will need (Figure 1). The length of the bolt action or a side mounted scope will determine the spacing between guns.

The sides and one partition are constructed of 1/4" exterior grade plywood. The remaining wooden parts are made of 3/8" plywood or pine shelving. The case is constructed first as a closed shell without internal partitions and then cut apart to form the lid and bottom for a perfect fit.

First step is to cut the two ends; then the top and bottom are cut and all of the dado cuts are made (Figure 2). The eight corner joints (Joint A) are a simple 3/4" x 3/4" rabbet joint to receive the end pieces (Figure 3). A 3/4" x 3/8" rabbet is also cut to receive the 3/4" plywood sides on the top, bottom and ends.

Assemble the top, bottom and two ends using glue and No. 4 finishing nails. The two sides are then attached using glue and 5/8" 18 ga. brads. The case should be held by glue clamps during this procedure to obtain snug smooth joints (Photograph B).

After adequate drying time, the 1 1/2" lid is cut from the bottom on a circular saw. In the event the two end cuts are limited by the height of your shop ceiling make these cuts last by a handsaw with thickness equal to your circular saw blade.
A—Edge, table side.
B—Edge, table end.
C—Length of gun; minimum inside measurement of gun compartment.
D—Minimum clearance for sights; increase for scopes.
E—Length of forestock; to determine position of barrel rest.
F—Minimum depth of gun compartment.

The necessary partitions are then cut and secured in their respective dado slots in the bottom of the case with glue and finishing nails.

Now cut the butt rest (Figure 4) as required to accommodate your guns (Photograph C) and temporarily nail in place. Place the gun with the longest forestock in position with the butt lying flush in the butt rest. With a square locate the point on the bottom of the gun compartment equal to the end of the forestock. Mark a new point exactly ½" above this mark; this is the point at which the undersurface of the barrel rest should be located to provide a proper fit.

Cut a piece of ¼" stock to 7½" x 12" for the barrel rest and draw center lines (Figure 4). Place each gun, one at a time, in its proper butt rest. With the butt resting flush, measure the height of each barrel from the bottom of the gun compartment (Photograph D) with a square at the location of the barrel rest. These measurements should then be located on the board on the proper center line to determine the depth of each barrel slot. The diameter of the barrel should be measured and marked, allowing just enough space for padding. After double checking your figures drill proper size holes for barrels and make the necessary cutouts. Drill a ¼" hole as shown (Figure 4) exactly ½" in from front and side edges for the pivot bolt.

The barrel and butt rest are now secured in position with glue and flathead wood screws.

The locking bar of the barrel rest is cut from ¾" stock and measures 11½" in length. The width will vary with the different model guns. Place the locking bar beneath the barrel rest with the two front edges in perfect alignment. Scribe the corresponding pivot and barrel holes on the bar. Make the necessary cutouts (Figure 4) to accommodate the pivot swing (Photograph E); this may be determined by making gradual cuts until the bar just clears the barrel when open (Photograph F) and yet holds the barrel securely when closed.

The undersurface of the locking bar should be built up of the required layers of wood with the proper cutouts to make a snug fit to the forestocks of each gun when the locking bar is in the closed position (Photograph G). It may be necessary to carve the edges with a pocketknife to obtain a perfect fit. By this construction you prevent any longitudinal shifting of the gun when the locking bar is closed. When the bar is open it then allows the ¾" space required to lift the gun and slip it over the stop strip fastened to the butt rest.

A ¾" carriage bolt is used as a
FIGURE 3 JOINTS

Joist A: A dado or rabbet ¾" wide and ⅜" deep is cut in top and bottom piece at each end to receive ⅛" end pieces. A dado or rabbet ⅜" wide and ⅜" deep is cut on each inside longitudinal edge of top, bottom and both end pieces to receive the ⅛" plywood sides.

Joint B: Dado cut ⅜" wide and ⅜" deep.
Joint C: Dado cut ⅛" wide and ⅜" deep.
Joint D: Butt joint of ⅛" plywood; secured with glue and small brads.
Joint E: Butt joint of ⅛" stock to ⅛" plywood; secured with glue and wood screws.
Joint F: Butt joint of ⅛" stock; secured with glue and wood screws.

MATERIAL LIST

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 pieces</td>
<td>3/4&quot; x 10½&quot; x 56⅔&quot;, Top and bottom.</td>
</tr>
<tr>
<td>2 &quot;</td>
<td>3/4&quot; x 10⅜&quot; x 19⅝&quot;, Ends.</td>
</tr>
<tr>
<td>1 &quot;</td>
<td>3/4&quot; x 8½&quot; x 19⅝&quot;, Partition.</td>
</tr>
<tr>
<td>1 &quot;</td>
<td>3/4&quot; x 7⅝&quot; x 12&quot;, Barrel Rest.</td>
</tr>
<tr>
<td>1 &quot;</td>
<td>3/4&quot; x 8½&quot; x 12&quot;, Butt Rest.</td>
</tr>
<tr>
<td>1 &quot;</td>
<td>3/4&quot; x 3&quot; x 11⅔&quot;, Locking Bar (approx.).</td>
</tr>
<tr>
<td>2 &quot;</td>
<td>3/4&quot; x 19&quot; x 55½&quot;, Sides.</td>
</tr>
<tr>
<td>1 &quot;</td>
<td>3/4&quot; x 8½&quot; x 48⅝&quot;, Partition.</td>
</tr>
<tr>
<td>1 pair</td>
<td>2&quot; plain tip brass hinges.</td>
</tr>
<tr>
<td>1 pair</td>
<td>Surface mount suitcase lock and key.</td>
</tr>
<tr>
<td>1 pair</td>
<td>Suitcase bolts.</td>
</tr>
<tr>
<td>8 only</td>
<td>Brass corners.</td>
</tr>
<tr>
<td>8 only</td>
<td>Rubber bumper screw feet.</td>
</tr>
<tr>
<td>1 only</td>
<td>Folding suitcase handle.</td>
</tr>
<tr>
<td>1 pair</td>
<td>Strap handles or folding chest handles (optional).</td>
</tr>
</tbody>
</table>

Brass hinge hasp and padlock.
⅛" carriage bolt, nut, two washers and tension spring.
Brass lid support (optional).
1" x 24" web strap with buckle.
Green felt or ⅛" foam rubber.
4 penny finishing nails.
⅛" 18 gauge brads.
No. 6—⅛" flathead wood screws.
No. 8—⅛½" flathead wood screws.
Shellac, white.
Varnish.
Wood glue.
pivot with a small tension spring. A small brass hinge hasp and padlock is used to secure the swinging end of the locking bar.

A simple box drawer may be constructed to fit the ammunition compartment if desired.

ALL NAILHEADS should now be countersunk and the defects filled with plastic wood. All edges and surfaces should be sanded smooth. A coat of shellac is followed by two coats of a good varnish before final assembly.

A pair of brass hinges are used to...
PHOTOGRAPH F—Barrel just slips out of barrel rest by making necessary taper on pivot side of the locking bar.

PHOTOGRAPH G—Locking bar closed. Note how this bar prevents any forward or upward shifting by building-up the undersurface to fit each gun snugly.

FIGURE 5

A 8½" piece of 2 x 4 cut on diagonal to form two wooden legs.

End or base of gun case

End

Handle optional

Fo ur rubber feet

Sketch 1—Optional wooden legs.

Rubber foot

Wood screws (RH) and washers.

Wood screw

Web strap

Sketch 2—Web straps for rods.

Sketch 3—Brass corners (8 required).

secure the lid to the bottom. A locking surface mount suitcase or trunk lock is mounted on the top in the center and flanked by two suitcase bolts (Photograph Hi). A folding suitcase handle should also be mounted on the top at the loaded balance point. A strap handle or hinged chest handle may be fastened to each end if desired. Two or three buckled web straps can be mounted by washers and wood screws to the back of the rod compartment to hold rods in place (Figure 5).

Eight brass box corners are fastened to protect all corners (Figure 5). Four rubber screw bumpers are mounted in the corners of the bottom to provide feet. If the case is to be stood on one end make a diagonal rip in a 8½" length of two by four (Figure 5) to form two legs.

All areas of contact with guns should be padded with glued strips of green felt or thin layers of foam rubber.

THE END
Making Hose Connections that won't Leak

E. HOFFMAN

The use of lacquer is the secret of this simple, fast method of installing new garden hose connections.

USUALLY THE simplest tasks are the most difficult if not approached in the proper manner. An example is the installing of new connections on the garden hose, either to replace worn out connections, worn out hose or to add a new section.

With lightweight plastic and rubber hoses replacing the old heavy and bulky rubber ones, more care must be exercised when installing a new fitting to keep from splitting or perforating the hose.

There are many types of connections on the market and all present the same problem, no matter if they are the type shown here, the tighten and cinch fit type or the insert and hammer down type. First the connection must be inserted into the hose and seated properly.

In all cases it appears that the fitting is larger in diameter than the hose it is to go into. That is the case and for good reason. Inasmuch as water is to flow through the hose, under heavy pressure, especially when the hose is kinked or the flow is restricted by a nozzle, the connection fitting must be extremely tight to prevent leaking or blowing the fitting loose under pressure.

It is possible, in some cases, to heat and expand the hose before inserting the connection. This doesn't always work, as some hoses won't expand and some that will expand will not return to their original size and will leave a loose and leaking connection.

Practically all plastic as well as the newer lightweight rubber hoses are soluble in some form of lacquer thinner. This fact is what we are going to use to aid us in our task of making a proper connection.

FIRST, ONE needs the proper length of hose and a complete fitting, of whatever type is available or that you select. Next, some form of quick drying lacquer is needed. It can be any type from your wife's nail polish to a touch-up kit for your car. It's advisable not to get caught using your wife's best nail polish so reach for the car touch-up kit. Very little is needed. If you don't have any on hand, small quantities of quick drying lacquers are available in cans at most hardware stores or in the hobby shop under the guise of airplane dope.

As you will probably be using new fittings and hose, no cleaning is necessary. If you do use an old fitting, polish it up with a piece of steel wool to remove the accumulated tarnish as well as any bits of old hose that may still remain and cause leaks. If you are using a used section of hose be sure there are no breaks or punctures in it.

Brush the quick drying lacquer onto the shaft of the connection that is to be inserted, being sure that all sides are covered (Photograph 1).

With the tightening device loosened, slide it down the hose. Then, push the fitting into the hose as far as it will go (Photograph 2). It will go in quite easily because the lacquer will not only lubricate it but the thinner in the lacquer will slightly dissolve the inside surface of the hose to allow easier insertion. In a few moments the solvent action of the thinner will stop and the lacquer will harden and secure the fitting inside the hose.

Tighten the screw in the clamp around the hose and your job is completed (Photograph 3).

If you ever need to replace the fitting because the hose wears out, you will not be able to slide it out of the hose as you normally would expect. By cutting off the end of the hose at the end of the connection and slitting this small section of hose lengthwise, it can be peeled off. Using steel wool, with a little lacquer thinner on it, if available, clean the fitting and you are ready to go again.

This method of inserting a hose connection is fast and produces secure fitting. The only tools needed are a screwdriver, or a pair of pliers for the turn-cinch type fitting. Leakproof connections are the end result from this type of installation.

PHOTOGRAPH 1—Spread the lacquer over the shaft of the hose fitting that is to be inserted into the hose. Be sure that all sides of the shaft are coated.

PHOTOGRAPH 2—After sliding the loosened locking device over the end of the hose, insert the shaft of the fitting that has been coated with the lacquer.

PHOTOGRAPH 3—Tighten the fitting and in a few moments, when the lacquer dries, your leakproof hose connection is ready for use.
Picnic Box with built-in light

**HOWARD E. MOODY**

While almost all of us enjoy a picnic, I have found that they can be twice as much fun (especially for the ladies) if you have a simple picnic box. Such a box will keep the necessary equipment at hand and ready for instant use without the usual hunting and packing and then hoping that something hasn't been forgotten. It also saves a lot of dirt and muss in the car for all the dirty pans, etc., can remain in the box and the entire unit stored in the trunk or on the rear floor of the auto.

I built my box from ½-inch thick CreZon fused plywood, but almost any common lumber could be used. I chose the CreZon fused plywood, which is actually exterior-grade Douglas fir plywood faced with a smooth plastic overlay, because I have found it easy to work with, (it doesn't splinter or split with sawing, drilling and nailing) and it takes paint much better than regular wood. The size can be made to suit your own needs, but I built mine 3 feet long, 18 inches deep and 15 inches high at the back coming straight front for 8 inches and then tapering the two side pieces to give a front height of 10 inches.

The top is made up of two sections. The back section is 6 inches wide and 36 inches long. This is secured to the two ends and the back with glue and 1 ½ coated nails. The front section of the cover is 14 ½ inches wide and 36 inches long. This piece is fastened to the back section with five common “butterfly” style cabinet hinges mounted on the outside. This allows it to be opened and folded back onto the rear section out of the way when the box is in use. The front of the box is also hinged to the bottom with two 3 inch “T” type hinges. This allows the front to be opened out, forming a work area or table. Two lengths of chain are used to hold this front in the open position. One end of the chain is fastened to the inside end of the box and the other end is secured to the front door, close to the upper outside edge (Photograph 1).

The box is fitted with two shelves. The upper one also has a 1-inch band fitted over the front edge to prevent the cups, etc., from falling off. The lower shelf holds the silverware box, paper towels, etc. There is room enough between the lower shelf and the bottom of the box to store the frying pans, etc.

**THE BOX** is also equipped with an electric light for greater convenience. All that is needed is about 3 feet of standard rubber covered lamp cord, a 6-volt electric lantern battery, one SPST toggle switch, 6-volt electric lantern bulb and a single contact socket to accept the bulb. All of these parts can be easily obtained from any radio or electric shop. The socket and switch are mounted on one of the end pieces and the wire run down the end and through a hole in the lower shelf, then on to the battery which is located in one of the bottom back corners of the box. The negative wire goes directly from the outside battery terminal to one terminal of the lamp socket. The other wire passes from the remaining center battery terminal to one side of the switch—then it continues from the other switch terminal on to the remaining terminal of the lamp socket. (See wiring detail diagram.)

The box is finished with a couple of coats of good enamel in any desired color. I finished mine with black enamel and then hand decorated it in gold. Of course, the decorations can be omitted or the box can be decorated with decals if desired.

After painting, I mounted a brass handle, of the screen door type, on each end of the box for greater ease in handling. I also fitted a hasp to the front section of the main top and to the front of the box itself. The staple section of the hasp is mounted on the front of the box so that when the box is completely closed (Photograph 2) it can be held so by hooking the hasp together with a small snap or “S” hook, chained to the front cover.

PHOTOGRAPH 1—When you have this easily made picnic box you will not have to spend valuable hours before each picnic trying to gather up necessary equipment and then continue to wonder if you still didn’t forget something. Fits easily in any auto trunk or on the rear floor.

PHOTOGRAPH 2—Picnic box with lid closed.
PICNIC BOX CONSTRUCTION—All ½" CreZon Fused Plywood.

6V. ELECTRIC LANTERN BATTERY LIES ON SIDE UNDER BOTTOM SHELF

RUBBER COVERED LAMP CORD

6V FLASLIGHT BULB SIMPLE CONTACT SOCKET

S.P.S.T. TOGGLE SWITCH

SOCKET

+ WIRE

- WIRE (NEGATIVE WIRE)

SWITCH

PICNIC BOX WIRING DETAIL—All wiring with standard rubber covered lamp cord.

THE END

JULY-AUGUST » 15
Here’s a basic furniture unit that can serve as ottoman, sectional or individual table.

**TRIPLE DUTY**

**furniture piece**

ROBERTA L. FAIRALL

If you would like a decorators' ottoman, need a sectional coffee table, or small chairside table, here is a way to get them all at little expense. The one-size, easy-to-build piece is adaptable to all three uses. Only one standard size solid stock, 1" x 10", builds the entire project. White pine works easily and finishes well.

To begin, cut a cardboard template for legs using the squared drawing as a guide. Trace around it and lay out the remaining members directly on the lumber. Dimensions are shown both in the illustrations and materials list. Saw out pieces and bore shank and countersink holes for all screws. Assemble in the following steps using white liquid resin glue on all joints. A couple of finishing nails will hold pieces from slipping while screws are turned in and work may proceed without clamping. First, put the legs, A, together with mitered joints, glue and finishing nails; then attach them to the cleats, B, flush at the top. Next, edge-glue top boards, D, and screw cleats down to hold them together. If the piece is to have a tile or mosaic top, this is done now; then the edging strips put on so the recessed parts are flush with the tile top.

Finish the frame by any of the well-known methods to complement existing furnishings.
Transfer the design for the mosaic to the table top and fill the areas with tiles glued down to the wood. Pieces are broken to shape with nippers by applying pressure over about ¾” at the edge. Be sure to wear goggles, thus shielding the eyes while cutting glass or tile pieces. This method gives an interesting but slightly uneven top surface. When all pieces have been set, and glue dried, fill the spaces between tiles with grout worked in between the cracks. Bounce the table several times to remove bubbles; wipe away excess, and after about 20 minutes clean the surface with a moist sponge. Grout may be made from 2 parts white cement mixed with 1 part silica sand and water to bring it to a thin-cake-batter consistency. All materials for mosaics may be purchased at hobby or craft shops.

The cushion is foam rubber covered with a muslin pillow form, then slipped into the upholstery-material covering. Make a wrapping-paper pattern 20¼” x 20¼” for top and bottom — measurements include ¾” seam allowance — and the boxing strip cut the desired width, about 3”, plus seam allowances. To make the matching cording, cut bias strips 2” wide from the same material as the cushion and stitch ends to make a continuous strip long enough to edge the cushion twice around. This covers No. 100 cable cord and is machine stitched. Pin the cording to the right sides of cushion pieces, clip at the corners and stitch. Next, fasten square cushion sections and boxing strip with right sides together, cording between the two and machine-stitch. Leave half of one side open and baste the seam back; slip the pillow in here and close the opening by blind stitching.

### MATERIALS LIST

One ottoman or table cuts from 10 lineal feet of 1” x 10” surfaced pine as follows:

<table>
<thead>
<tr>
<th>Item</th>
<th>No. Rqd.</th>
<th>Description</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>8</td>
<td>Legs</td>
<td>¾” x 4” x 12¾”</td>
</tr>
<tr>
<td>B</td>
<td>2</td>
<td>Cleats</td>
<td>¾” x 3¼” x 17½”</td>
</tr>
<tr>
<td>C</td>
<td>2</td>
<td>Top</td>
<td>¾” x 9¼” x 19”</td>
</tr>
<tr>
<td>D</td>
<td>4</td>
<td>Edging strips</td>
<td>¾” x 2¼” x 20½”</td>
</tr>
</tbody>
</table>

Miscellaneous:
- White liquid resin glue
- No. 8 flathead wood screws 1¼” (8)
- No. 8 flathead wood screws 1¼” (2 doz.)
- 8d finishing nails
- Wood filler

**GLUE ALL JOINTS**

**COUNTERSINK No. 8 - 1-¼” SCREWS**

**MITERED LEGS joined to cleats which hold top members together.**

**MITERED EDGING STRIPS cover screws and help brace legs.**

**DESIGN for mosaic-top table drawn on the wood.**

*No. 100 CABLE CORD*

**METHOD of placing cording in cushion.**
Plywood panels which you can install yourself will give any room a brand new appearance that lasts.

Paneling Works Wonders with old rooms

HILLIS PENN

OF THE various ways to make an old room new, one of the simplest for the do-it-yourself man is the use of 1/4-inch plywood panels, especially since these became available in a variety of prefinished woods. And it is not expensive, unless you insist on oak or one of the other more costly varieties.

Take our most recent experience. We selected Philippine mahogany, or lauan as it is more properly called. This has been one of the better buys on the plywood market, little more expensive than fir. Our total cost for material, including trim, was about $150 for a room 9 by 14 feet, and we have virtually a new room.

The place to begin this type of overhaul is, naturally, the ceiling. Since the prefinished panels come only in random-width plank design, and we preferred a plain ceiling, we bought unfinished lauan panels in the standard size, 4 by 8 feet, and finished them ourselves. This is easy, but it is important to apply the finish before putting the panels in place. Our plywood distributor had stain to match the prefinished panels, and a sealer and finisher of the same type used on them. The stain contained wood filler. So it was simply a matter of laying out the panels on the floor, applying the stain with a brush or cloth, and rubbing it dry after a few minutes. The next day the sealer was applied; and as soon as it dried, the panels were ready to install. The finished panels can be rubbed down with fine steel wool to give a dull, hand-rubbed luster; we found the finish satisfactory without that.

GETTING THE big panels in place on the ceiling is not as difficult as it might seem. The first step is to find the studding behind the old plaster, so you will have something solid to nail to. Usually the studs are 16 inches apart, on center; after finding the first one, the others are simple to locate.

Tapping the plaster with a hammer, the handyman should be able to find the approximate location of a stud by the sound. Between studs there is the hollow thump of a ripe watermelon; on the stud, a more solid sound. Experience helps in this, but even the most experienced tapper may be wrong. So it is wise to double check, by driving a nail through the plaster to make sure it hits something solid.

Having found the studs, or joists, these should all be marked with a line on the old plaster extending beyond the width of the first panel to be installed; and at the edges, down the side wall far enough to be seen easily. You can now plan the layout and cutting of the panels so that joints will come, as far as possible, on the studs. Another point: If you are the average handyman, you will find it much better to fit the panels together on the factory-cut edges. You are sure to get a good fit this way. With a little planning, the hand-cut edges can be placed at the edges of the room, where they will be covered by the trim.

NOW to get the prepared panel on the ceiling. Take a pole about 2 by 2...
BECAUSE THE DOORS in the room were old and unsightly, Penn carried the paneling over them, omitted all trim but painted the door edges and jambs with flat enamel matching the tone of the plywood.

inches, and cut it just the length required to reach from floor to ceiling. Take another piece of the 2 by 2, preferably a softwood with a smooth surface; cut it about 3 feet long, and nail it crosswise to the end of the pole, making sure the nailheads are sunk below the surface of the wood. This will support the plywood against the ceiling while you nail it.

Lay the first piece of plywood approximately under the place where it is to be installed. Lift one end of it, and place the crosspiece of the implement described above against the bottom side of the panel, toward the center. Now straightening the pole will lift the panel; and pulling the pole as nearly upright as possible will press the panel tightly against the ceiling.

With the panel thus supported, tap it into place, then nail it to the joists with 6-penny finish nails. Not many nails are needed; placing them 9 to 12 inches apart along each joist will be ample. They should be countersunk carefully; as much of the quarter-inch material as possible needs to remain below the nailhead. Then the hole is sealed with a colored putty-stick to match the plywood finish—your plywood supplier has it—and the holes are almost invisible.

ON THE side walls, the first step is to remove window and door facings, and baseboard. It would be possible to fit the plywood around these, of course; but we found it more satisfactory to carry the paneling under the facings.

There is the problem that the new wall stands out ¼ inch. We cut the paneling to fit well away from the window jambs, then rabbeded the trim to fit over it. In our case, we decided to trim the windows with 1¾-inch doorstop; in a small room a minimum of trim increases the apparent size. So we carried the plywood almost to the outside edges of the window jambs and sills. If wider and heavier trim is used, the plywood should be kept farther back from the windows, to reduce the amount of rabteting work. But the trim should extend well over the paneling—perhaps ¼ of an inch or so—to make a good joint and compensate for errors.

The same procedure can be followed around the doors. In our case, though, we had unsightly old doors and decided to carry the paneling over them, omitting all trim. It was not difficult to cut the panels to fit the door openings, then put the cut-out sections on the doors. The edges of the paneling were then sanded down smooth with the door edges and the door jambs. We bought flat enamel matching in tone the prefinished plywood—with today's multi-tint paints, that is not difficult—and painted the door edges and jambs with that.

There are minor problems of cutting openings for heat registers and electric outlets. This should be done before the panel is attached to the wall. It requires some care, especially in regard to the electric outlets and switches; and it is wise, for the sake of safety, to pull out the switch boxes so the metal shields the cut edges of the plywood.

On the walls, as on the ceiling, it is wise to find the studs and nail to them. Nails should be driven in the grooves of the panels, where possible. On solid surfaces, such as doors and door facings, we found 4-penny finish nails or even 1-inch brads more satisfactory than 6-penny. Because our room has a 9-foot ceiling, we ran the grooving in the panels horizontally—both to give a lowering effect, and to simplify the necessary joints. With an 8-foot ceiling, one 8-foot panel will reach the entire height, and perpendicular installation is simpler than horizontal.

WITH THE paneling in place, it is time to install the molding. We used 1¾-inch doorstop where the walls meet the ceiling—you may prefer cove mold here—and doorstop around the windows, as mentioned above, rabteting the molding ¼ inch on the outer side to fit over the plywood. In the corners we used ¾-inch cove mold. If the molding is to be stained to match the paneling, this should be done before it is put in place. We used oak molding, which is available in standard shapes and sizes from plywood distributors and other sources at much lower cost than special-run jobs.

Baseboard? We used none, since we were applying all-over carpeting, and it would be thick enough to seal the irregular edges of the panels at the floor. If some trim is desired, doorstop is quite satisfactory. Or regular baseboard can be used, of course.

Now it is simply a matter of checking and filling all nailholes, smoothinng and painting the door edges, and the job is done.

THE END
Oriental folding screens usually stand on the floor but it's easy to fasten them to various sorts of walls if you don't want to decorate with framed pictures.

PHOTOGRAPH 1—Do you have large areas of wall in your living room, dining room or family room that look too bare? The Edwin Hoffmans did.

PHOTOGRAPH 2—The Hoffman's solution was a new application for a free-standing Oriental screen like the one shown here in conventional use.

Try Oriental Screens On A Bare Wall

EDWIN HOFFMAN

Do you have large areas of wall in your living room, dining room or family room that look too bare? Have you found that the area is too great to decorate with ordinary pictures or have you perhaps just tired of using pictures for all of your wall decorations?

Such was our problem in regard to one wall of our family room (Photograph 1). For awhile we tried to break up this blank space with a series of three oversized pictures. This was not altogether pleasing and we soon removed the pictures and started looking around for a more suitable decoration.

One day while shopping in one of the local department stores we found the solution to our particular problem—free-standing Oriental screens (Photograph 2). At first we were afraid that the price would be prohibitive but we were pleasantly surprised. They may be purchased for prices ranging from $10 up through $60. They are found in department stores, stores that specialize in materials for decorating as well as in Oriental art stores.

One decided advantage of these screens is their simple beauty. They are not garish—their colors usually being pastels, gold or silver—all of which can be made to blend with practically any color scheme or type or color of furniture.

These screens come in sizes ranging from 33 to 70 inches high. Most are four-fold and are 70 inches long. They are of very light wood frame construction, with cardboard and covered with a form of rice paper. Some of the extremely modern ones, especially those made in this country, are covered with a plastic which simulates the rice paper but is washable and more durable.

The domestic screens are more expensive than the foreign ones which are imported chiefly from Japan. A few come from Hongkong.

In our case a 35-inch screen was chosen. Because it is extremely light in weight, it was no more problem mounting than a picture.

As our walls are sheet rock, we decided to be on the safe side and use Molly fasteners for our installation. These fasteners are inserted in 3/4-inch holes drilled in the sheet rock in the proper location. As the screw in the fastener is tightened the fastener is expanded on the far side of the sheet rock and is firmly fixed in the wall. The center screw is removed and used to affix the screen.

If your walls are made of lath and plaster, wood screws will be suitable for the installation.

Next, drill two holes through the top frame of the screen, centered on the outer panels, to accommodate the screws for mounting (Photograph 3). If you are using Molly fasteners, these must be lined up with the screw holes in the fasteners to allow for mounting. Again, because of the lightness of the screen, two screws at the top are adequate for a secure mounting.

If the bottom of the screen tends
to pull away from the wall, one or two more screws may be put through the bottom frame, as was done in the top. We did not find this necessary.

Now the wall that was too bare has a very pleasing appearance (Photograph 4) and is a bit unusual. If you tire of the screen that you have mounted, it may be removed in a matter of minutes by removing the screws and another screen substituted.

The screen that was removed may be used in another section of the house as a free-standing screen. The two holes in the top are so small as not to be noticeable.

ANOTHER GOOD application of this type of screen decoration is above the fireplace. In modern homes there are few mantel pieces and the walls extending above the fireplace often need some sort of ornamentation to break up their bareness. A screen is just the thing to solve this problem.

Here the mounting is handled in a manner fitting the material of the wall. If it is of sheet rock or lath and plaster, the previously described methods of mounting may be used. Also if it is of wood.

If the wall is a continuation of the bricks of the fireplace (Photograph 4), different but simple mounting procedures must be used. The simplest is to obtain two concrete nails. These are hardened steel nails that may be hammered into the mortar between the bricks. Select the proper location and hammer the nails in, being careful to keep them perpendicular to the wall. Drive them far enough into the mortar to be secure.

Measure the thickness of the screen frame and then cut off the concrete nails an eighth of an inch shorter than the thickness of the screen frame. Use a hacksaw or file to cut them with. Drill matching holes into the frame to line up with the nails you have driven into the mortar. Do not drill any deeper than the nails protrude from the wall, when you make these matching holes in the rear of the frame. This way you can mount your screen without having the nails protrude through the face of the screen frame. Use a drill that is about 1/32nd of an inch smaller than nails.

Matching the holes in the screen frame with the nails in the wall, firmly push the screen frame onto the nails until the screen is flush with the wall of bricks. If the frame does not go readily onto the nails, take a strip of wood at least twice as wide as the screen frame and about six inches long and lay it on the frame over the nail position, but on the face of the screen. With a hammer tap lightly on this strip of wood until the screen frame has been forced onto the nails. This will prevent marring the screen frame. As most screens and their frames are about three-quarters of an inch thick, this system of mounting is quite secure especially considering the lightness of the screens.

A second method of mounting on a brick wall is by the use of lead or wooden plugs. With a star drill make a hole in the mortar between the bricks, in the proper location. Plug these holes with wooden dowels or lead plugs made especially for this use. The screws that are put through holes in the screen frame are inserted into these plugs. It is not suggested that holes be made in the actual bricks. This takes extreme care to do the job without cracking the bricks and the mortar gives more than enough support.

Now that you have hung the screen, not only have you solved a decorating problem but have added another thing of beauty to your home in this simplest of do-it-yourself projects. The cost of the screen depends upon how much you want to spend but can be very little. The cost of the other materials for the project is a matter of pennies and time involved is but minutes. The tools needed are few.

THE END
The use of cream colored firebrick makes this back yard incinerator heat resistant as well as easy on the eye.

PHOTOGRAPH of completed incinerator shows arrangement of bricks in alternating layers of five and six.

How to Build a Brick Incinerator

HERBERT SANGER

MANY a householder has often felt that he needed a good incinerator, but because a good one was expensive, he postponed building it. Usually there was doubt as to what materials to use, and various bits of advice given by friends and neighbors were even more confusing.

In the first place, an incinerator should be so built that it contains its own fire and does not allow pieces of flaming paper to soar away and set a fire somewhere else. Incinerators built like tall wire cages are definitely dangerous, even though they may be low-priced.

The incinerator should have walls high enough to contain several bushels of leaves or brush at a time. If placed in a lawn, its walls and base should not convey excessive heat to the surrounding grass, thereby killing it. Metal incinerators may do this, even though some are mounted on legs that hold the barrel or container off the ground.

After having had several kinds of trash burners, I have built one that is ornamental as well as practical. Provided one can afford the cost of the material and take the time to build it, an incinerator constructed of firebricks makes a solid and rather permanent trash burner.

My incinerator was made out of 194 cream-colored firebricks held together with 300 pounds of Cast-Set, which is a special kind of prepared mortar used where high temperatures may be prevailing. Firebricks themselves are fireproof also, and they will not crumble from even the terrific heat of blast furnaces. The total cost of all the materials came to about $80.

After selecting a site for the incinerator which was far enough away from trees so that any rising column of heat would not burn their foliage, I dug out a square area of soil 52" x 52" and 7" deep. Inside this bed I built a square form of boards which was 7" high and 50" x 50" on the inside. Into this form I poured the concrete mix composed of four sacks of Portland cement, six sacks of coarse sand, and sufficient water to make a mushy concrete mix. I used a straight two-by-four as a leveler for the base before it set, and at the same time finished the job with a trowel and a two-foot level for greater accuracy. Then I waited a few days for the base to dry and cure before I began to lay the firebricks. When I removed the board form I had a square slab of concrete 50" x 50".

The firebricks were of such size as not to require breaking in order to make neat joints at the corners of the incinerator. Each brick was 9" x 4½" x 2½". My plan called for a base consisting of 32 bricks as a floor, with the bricks laid broad side down. Surrounding these 32 bricks were 18 other bricks laid broad side down to form the first layer of the
Because the incinerator's outside measurements were to be 47" x 47", the total thickness of the mortar used on any one side between the ends of the bricks had to be 2 inches. (A look at the photograph will show how the sides of the incinerator were formed by alternating layers of five and six bricks.)

In order that I might have the bricks evenly spaced from each other on any one side, I made two gauges out of a piece of pine board. One gauge was 1/2" thick; the other was 4/10" thick. I labeled them Gauge A and Gauge B, respectively.

After thoroughly soaking the concrete base with water so that the Cast-Set mortar would firmly adhere to it when dried, I mixed a bucketful of the Cast-Set according to the instructions on the bag and set to work laying the firebricks. Each brick was soaked in a bucket of water immediately prior to placing it on the mortar.

The shaded bricks (10 of them) in Figure 2 were laid first. For spacing I used Gauge A, and since the total length of 5 bricks was 45 inches and the number of end-seams was only 4, there was a mortar thickness of 2 inches between the five bricks, thereby making the total of 47" necessary to form one side of the incinerator. The concrete base protruded 1 1/2 inches beyond all four sides of the incinerator and hooking the bricks, even though the bricks themselves might be unharmed.

Because I built my incinerator in the month of August, I learned that great heat and evaporation dried out the mortar too fast and forced me to add small quantities of water to the mix before it would adhere satisfactorily to the bricks. Cast-Set is a coarse granular material upon which a trowel has little influence. If the mixture is too wet, the ugly gray cement will dribble down your walls and necessitate washing with a wet rag and wiping with a dry one as you build each layer of the wall. If it is too dry, the mortar will not stick to the bricks and it will be hard for you to force it down compactly between the ends of the bricks.

If you count the layers of bricks used in the walls you will find that there are nine layers. It took me several days to build this incinerator because I allowed every three layers about two days to dry before I went ahead with the project. I think that this probably kept the joints from cracking, a thing which might have happened if the entire job had been done hurriedly.

There are, of course, some people who will wonder why I made the base seven inches thick, rather than only four or five. The reason is that freez ing and thawing are offset by the incinerator so that cracking, and further expansion and contraction might also crack the brick walls.

Other critics may wonder why ordinary bricks and Portland cement would not do just as well for the walls. My answer to that is that they would be satisfactory only if leaves and dry papers were burned. In those cases where heavy brush, small logs, tires and other highly volatile materials are consumed, the intense heat might crack the mortar between the bricks, even though the bricks themselves might be unharmed.

Although I have not yet become a charcoal-burning barbecue cook, I think it would be fairly easy to use this incinerator for roasting wieners or frying fish or steaks. In Figure 5 I have shown a frame made of light iron rods welded to an oven tray taken from a cookstove. If you planned on using charcoal as a source of fuel, you should have the oven tray about eight inches above the charcoal bed. If small logs or corn cobs are to be used as fuel, the tray should be about a foot above the coals. You can raise the height of the grill by placing loose bricks on top of the incinerator and hooking the frame over them. The hook-over shape of the heavier rods permits removal of the cooking grate when you want to burn rubbish.

The buff-colored firebricks of this incinerator will make a back yard piece of architecture that will be admired by your neighbors. It is high enough to be fairly safe where tiny children are concerned, and even without an iron grill, wieners or marshmallows may be conveniently roasted and toasted for lawn parties.
This Desk Suits a Boy’s Room

JACK CORNISH

STURDY CONSTRUCTION is a feature of this desk, but it also adds an attractive touch to a room.

RUGGED ENOUGH for a workbench, yet handsome enough for the finest home, this desk for a boy’s room features strong plywood construction.

To make the desk, start by cutting out the two 20” x 40” end pieces from %4" fir plywood. Cut the two inside pieces 20” x 23”. Use a dado cutter in your circular saw to rabbet these four pieces. They should be rabbeted %8” deep at locations for the %4” x 6” shelf near the top, for the drawer slides and at the bottom for the bottom panels.

Cut the two bottom panels that go below the drawers from %4” plywood 13%4” x 20”. Build up the three drawer slides from %4” x 2” white pine stock with glue and corrugated fasteners. Hold the outside dimensions of these drawer slides to 13½” x 20” to match the bottom panels.

You are now ready to begin the assembly by building up the two sections or piers of the desk. Use a quick setting type white glue and finish nails for assembly. Countersink all nailheads with a nail set and fill the holes with plastic wood. Cut out the 21” x 48” desk top from ¾” plywood and assemble it to the piers with glue and finish nails. Cut a piece of %8” hardboard the same size and glue it to the desk top for a smooth, hard writing surface. The upper shelf should be installed now and the 40” x 48” pegboard is glued and nailed to the back.

Make the five drawers per the sketch and fasten the drawer pulls to the center of each with a wood screw. These drawer pulls are a
stock hardware item but if you prefer to do everything yourself you can easily turn them out on a lathe by mounting them on a faceplate.

Tip the desk over on its back now and install the 2" x 4" bases with glue and No. 12 x 2" wood screws through the bottom panel.

Sand all of the wooden parts good and smooth now and give them a coat of plastic sealer such as Firzite to hide the grain pattern of the plywood.

Follow with two coats of enamel in a color of your choice. The hardboard top and the pegboard back need nothing more than a coat of wax but if you prefer a gloss you can give it a coat of shellac and finish with clear varnish.

VERSATILITY OF THE DESK is shown in these two photographs. At left, its owner uses it in the conventional way. At the right it serves him as a workbench.

DRAFTER DETAILS

5 5/8" FOR 2 DRAWERS
10 5/8" FOR 3 DRAWERS
Aluminum screens have obvious advantages even if they cost more. You can cut that cost by making them yourself.

Make your own

Aluminum Window Screens

ELMA WALTNER

SCREENS NEED replacing? Why not make your own using aluminum framing and screen, materials which can be quickly assembled into windows of any size right in your own workshop with either hand or power tools, the same kind that are used for woodworking.

These aluminum screens are lightweight, and easy to handle. They will never need repainting nor will they rust, two distinct advantages over wood screens fitted with common screening. About two hours are needed to assemble a screen. The cost varies with the size of the window but generally is under $10. The initial cost may be a bit higher than for conventional low-cost screens but this is offset by the fact that there is no upkeep.

Measure the height and width of the window opening. Cut the framing material ¼" shorter than the width and height of the opening, cutting two strips of each length. Miter the ends of the four pieces at a 45-degree angle with the point of the miter on the edge of the stripping opposite the groove. If you have a power saw with miter gage, this job is simple. Just set the gage at a 45-degree angle setting, clamp in the framing and cut (Photograph 1). If you use a hand hack saw or coping saw, fit it with a fine toothed blade. Mark the miter on the framing and clamp the piece into a vice and saw accurately. Smooth all the cut edges with sandpaper or very fine file.

Begin the assembly by driving a corner clip into one end of one of the long strips using a wood mallet, rubber faced hammer or just a piece of wood (Photograph 2). Fit the free leg of the clip into the adjoining short frame strip and tap into place. Next, add the second long frame strip to the other end of the short piece, using the same assembly method. Tap the two remaining clips
into the ends of the second short piece. Fit the free legs of the clips into the open ends of the two long pieces (Photograph 3), and tap into place, driving each one just a bit at a time, then driving in the other to the same depth until both are driven all the way in. Working them in evenly in this manner will assure a tight square fit and prevent warping.

When frames are larger than 6 square feet in surface area, a cross brace must be applied before fitting the screening. Cut the cross brace strip ½" shorter than the width of the completed frame. Notch the cross brace strip by sawing off the portion that is bent, to leave a tongue of metal at each end. The cross brace piece should fit snugly between the frame strips with the tongue of metal lapping part way across the frame. Lay the brace strip into position and drill holes through the tongue and the back side of the frame strip on

PHOTOGRAPH 2—Smooth all cut edges with a fine file or sandpaper. Drive a corner clip into the end of one of the long frame strips, using a wood mallet or rubber faced hammer. Fit the other leg of the clip into the adjoining short frame strip and drive in place. Next, attach the second long strip to the other end of the short piece in the same manner.

PHOTOGRAPH 3—Drive the two remaining corner clips into the two corners of the other short frame strip. Fit the free legs of the clips into the open ends of the long framing strips and drive into place, tapping first one corner, then the other to drive them down evenly and avoid warping. On frames that are smaller than 6 square feet, screening may be applied after assembling the four strips. Larger screens, however, should have a cross brace applied midway to make for more rigidity.

PHOTOGRAPH 4—Cut a cross brace strip ½" shorter than the width of the screen. Notch the ends of the cross brace strip so it will fit between the frame with a tongue of metal lapping part way across the frame. Place the brace in position across the inside of the frame and mark hole positions. Drill holes through the cross brace tongue and through the framing strip against which the tongue rests. Snip ¼" off the ends of No. 6 x ½" aluminum sheet metal screws and screw cross brace to frame.

Materials List (One Screen)

- Channel strip material for frame—screen type.
- Cross brace material (if window area is over 6 sq. ft.)
- Aluminum sheet metal screws No. 6 x ½".
- Aluminum screening.
- One set corner clips.
- Spline material.

Tools

- Saw—power saw or hand coping or hack saw.
- Wood mallet or rubber faced hammer.
- Screw driver.
- Hardwood strip (for grooving) or forming tool.
PHOTOGRAPH 5—Cut aluminum screening as large as the outside dimensions of the frame. Lay the screening on the frame and weight it to hold it squarely in position on the frame. Cut off the corners diagonally, to the corner of the groove in the frame. Use a strip of hardwood just a bit thinner than the width of the groove to drive the screening down into the frame groove. Begin at one corner and proceed down the length of the frame, tapping the hardwood strip fitted over the screening, into the groove. Be careful not to knock down the vertical edge of screening that will rise up as the screen is formed into the groove.

PHOTOGRAPH 6—After forming the screen into the groove the entire length of the first long side, begin at the top corner and fit the spline material into the groove to hold the screen in place. Lay the spline against the groove and use the forming tool to drive it into place into the groove, wedging the screening securely in place. Form groove in the adjoining side of the frame and work in the spline, then along the third side. On the fourth side, form the screen into the groove for about 6", then tap in the spline, groove another length, then fit in the spline. Working in the spline as you form the groove will assure a good taut fit of the screening to the frame.

PHOTOGRAPH 7—Trim off the excess screening with a knife or old razor blade (Photograph 7) and your screen is ready for installation. THE END
Lazy Man's Fruit Picker

VICTOR SMITH

For the man with two or three fruit trees in his back yard, this fruit picker-catcher is a handy gadget to have during the harvest season. Besides cutting down on tree-climbing, it has the added advantage of helping you to select the ripe fruit from the fruit not quite ripe enough for picking. If the fruit is ripe, it will fall into the can with the first little nudge of the picker-catcher. If you have to "worry" the fruit off—forget it, that fruit is not quite ripe.

It's easy to make. Anyone can do it. The following is all you need in the way of material:

One pole, 1" in diameter and between 7' and 9' long (depending on how long a picker-catcher you want). One can (mine was a large tomato juice can). The can should have approximately these measurements: 4½" diameter and 7" deep. Other size cans might work, but I found this the ideal size—large enough for the fruit to go in, and small enough to get into the "hard to get into" places.

Two round headed ½" bolts (like rivets), 1" long, and two nuts to fit the two bolts.

Draw a straight line on the outside of the can from the top to the bottom (any place but on the seam). Then mark off 1½" from the top of the line and 1½" from the bottom of the line. On these two points punch two holes large enough for the two ¼" round headed bolts to go through.

Next, take your pole (or handle) and mark off 7" from the end. (If you're using a can 7" deep.) At that point saw the pole ¼" in, then on the end of the pole (same end) mark ¼" in and carve out that ¼" as far as the ¼" cut you made with the saw. When you're finished, it should look like Figure A.

The next step is to bore two ¼" holes, 1½" from the top of the pole and 1½" up from your ¼" cut in the center of your flat surface. The holes in your pole should coincide with the holes in your can.

The last step is to put the bolts from the inside of the can through the pole, screw the nuts on the outside and you've got a fruit picker-catcher (Figure B). Happy Harvesting!
Why lug them laboriously all over the place when you can put your garden tools on wheels.

Tool-toting troubles are a thing of the past with this easily built garden tool caddie. Designed of nonrusting Do-It-Yourself aluminum and fittings, it is ideal for your outdoor needs. Follow these simple step-by-step instructions to build your own garden caddie. These plans were originated by the Reynolds Metals Company.

**Aluminum Frame**

1. Start with the frame of the garden caddie. First, cut the 1” aluminum tubing into various lengths for the side and cross members. Then cut 30-inch length of ⅜” x 1” aluminum bar for the top brace (Figure B).

2. Fit and tighten the elbows in the 1” tubing that forms the handle. Then slide the side pieces onto the elbows and twist clockwise until the serrated washers securely grip the side pieces (Figure C).

3. Drill all of the holes in the tubing for ⅛” bolts using a T-butt connector as a guide. Fit T-butt connectors to sides and into cross brace. You will have to spring sides apart slightly to fit connectors into brace (Figure F).

4. Bend the ⅛” x 1” bar as shown for the top brace. Drill holes for ⅛” bolts in cross brace and bolt brace in place (Figure D).
Peg Board Body and Tool Basket

5. Cut a 30" x 57" panel from the perforated hardboard, plus three smaller panels (Figure G).

6. The 1 x 8 board is cut 30 inches long and beveled along the front edge as shown.

7. Use 3/4 aluminum wood screws to attach the three smaller panels to the 1 x 8 wood base. Fasten the 1" corner angles to the front corners with 10-24 x 1 1/2" bolts and nuts.

8. Drill two 1/4" holes in the top of the large perforated hardboard to clear the heads of bolts holding the top brace to side tubes.

9. Clamp large panel and long corner angles in position on the aluminum frame. Drill 1/4" holes through the hardboard and long 1" corner angles from the back of the unit, using the 1/4" holes in the tubing for guides. Then secure the angles, hardboard and tubing with 1/4" bolts 1 1/2" long.

10. The bolts that hold the wheel brackets also hold the side perforated hardboard panels of the basket unit, so temporarily clamp the basket unit in place against the long corner angles and screw the bottom of the large panel to the 1 x 8 board with 3/4" aluminum wood screws (Figure A).

Wheel Brackets

11. Make up the wheel brackets to suit your set of wheels and axle from the 1/4" x 1" aluminum bar (Figure J).

12. Fit each set of wheel brackets to the frame by drilling a hole for each lower bracket in the 1" angle and bolting it in place. Clamp the upper brackets in place, including wheels and axle, and test out the unit.

13. Adjust the top bracket up or down until the wheels are about 1/4" above ground when the unit is upright. Then drill and bolt it in place to both the side tube and side angles.

Materials List

2 pcs. 1" O.D. aluminum tubing, 8 feet long or 3 pcs., 6 feet long.
2 pcs. 1/16" x 1" x 1" aluminum angle, 6 feet long.
1 pc. 1/4" x 1" aluminum bar, 6 feet long.
2 pcs. 1" 90-degree elbows.
2 pcs. 1" T-butt connectors.
1 pc. 1/4" perforated tempered hardboard panel, 48" x 60".
1 pc. stock lumber, 1 x 8 x 30".
2 pcs. wheels, 8 1/2" dia.
2 axles to fit wheels, 34" to 36" long.
6 washers to fit axle.
4 pkgs. 1/4"-20 x 1 1/2" aluminum bolts.
2 pkgs. No. 8 x 1/4" aluminum wood screws.
2 pkgs. 10-24 x 1/2 aluminum bolts.
2 pcs. 1" aluminum end plugs.
Double-Duty Lamp

R. J. DE CRISTOFORO

Photographs by Gene's Studio and William Eymann

The addition of a planter and an interesting two-tone finish makes this more than just another lamp.

**Materials Needed**

<table>
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<th>Part No.</th>
<th>Pcs. Req.</th>
<th>Size</th>
<th>Material</th>
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<td>&quot;</td>
</tr>
<tr>
<td>6</td>
<td>1</td>
<td>1&quot; $\times$ 4&quot; $\times$ 6&quot;</td>
<td>Copper or galvanized sheet metal</td>
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</table>
| 7        | 1         | 14" $\times$ 28" | Miscellaneous—Lamp wiring, 1$\frac{1}{2}$" length of externally threaded tube ($\frac{3}{4}$") and thin nut to fit, bulb socket, harp, finial, and shade of approximate dimensions shown in drawing.

*Redwood is good since it works easily and wire brushes readily, but lacking this, work with fir plywood which has grain characteristics that will give similar results.

The beauty of this lamp is enhanced by soft light falling on plantings. Wire-brushed wood gives dramatic 3-D effect and is ideal for two-toning. Lamp shade is plastic.

See materials list for exact size of all parts.

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**Shade Dim. Should Be Close To This**

**Flat Pattern of Liner**

**Hole for $\frac{3}{8}$" Thredder Tube**

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32 e WORKBENCH
HEY FELLA! Here's a way to let your wife or girl friend join in the workshop fun. You do the woodwork on this planter-lamp; ask her to provide the shade and the plantings. This will do much to erase the feeling she may have of being a workshop "widow."

The project is an easy one and the results are most gratifying. The 3-D effect created by wire-brushing the wood is interesting and provides an ideal base for a different two-tone finish. Redwood or fir plywood will take this treatment which is just a matter of holding the wood against a turning wire brush. The brush removes soft grain from between hard grain areas. This leaves the hard grain "raised" so that the wood looks sculptured. This is most easily done with a brush on a power shaft or on a portable drill, but a little elbow grease and a wire file-cleaning brush will accomplish the same thing.

Start the project by cutting all parts to the size called for in the drawing and bill-of-materials. Put the base and the pedestal together as separate assemblies. Drill the holes for the lamp cord as shown in the drawing detail. Drill the 1/4" hole through the base first; then drill the 5/8" hole so it meets the first one. If you wish, you can avoid the 1/4" hole by forming a channel in the bottom of the lamp to take the lamp cord. In either case, the cord emerges from the back. After this is accomplished you can do the wire brushing.

The pedestal is attached by nailing up through the base. It might be wise to thread some string through the holes before you assemble so you can use it later to pull the wire through.

Forming the metal liner is just a matter of making the flat layout on a piece of sheet metal, then bending it up as shown. It's a good idea to
check the actual size of your own project before cutting the metal. Then you can change the dimensions slightly to take care of any discrepancies, if they exist.

The hole in the skylight top should be a tight fit for the ¾” threaded sleeve (this is a standard part you can buy in any store selling lamps or lamp parts). This can be forced in place and a nut placed on the underside before the part is nailed in place. The bulb socket threads on to the end of the sleeve which protrudes through the top.

To finish, decide first on what colors you want (we used black and green). Then apply a full coat of the base color over the wood. Let this dry. Then dip a cloth in the contrasting color and stroke it lightly over the base color so that only the raised areas pick up the paint. Let this dry thoroughly, then put on one or two coats of a satin-finish varnish. When this is dry, thread through the wiring and attach the socket and lamp shade harp.

Now you can carry the project into the house and add the shade and plantings — which your gal should have ready by now.

THE END

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Attention, Painters

KEN MURRAY

Use Plastic Bag When Cleaning Brushes

Professional painters clean their brushes well, separating the bristles so the solvent can be worked well up into the heel. This can be done without wetting the hands with solvent if the cleaning is done inside a plastic bag. Less solvent is required and the bristles can be worked thoroughly through the bag.

Paper Rim Catches Paint Drips

If the outside of a paper plate is used to extend the rim of a paint can, it will prevent dripping down the side and also provide a rest for the brush. Center the paint can on a paper plate, draw around it with a pencil and cut with scissors well inside the line. Force the plate over the can rim to assure a tight fit.

A father describes the happy results of giving his 4-year-old son tools of his own.

As any parent of a lively lad of three years or more knows, it is difficult to be a home craftsman or even a plain part-time do-it-yourself man and a good father at the same time.

The child psychologists all tell us we must be "pals" to our sons, but sometimes the lesson is forgotten when Daddy's all-too-willing helper gets busy with the saw on the leg of the table that is almost ready for the last coat of varnish, or when Junior decides that a coat of green paint would look good on the cabinet we had intended to do in mahogany stain.

Eventually there comes a time when father must either put double locks on his workshop and bar the windows, or else try to direct his offspring's energy and creativeness into harmless, yet interesting, channels. I chose the second approach because good padlocks are too expensive, and Junior could probably pick them anyway. The results were so good that I pass them on to the readers of WORKBENCH with a few suggestions:

I bought my 4-year-old an inexpensive kit of small tools ready boxed for children in a metal tool box. You can, of course, make up your own set, but you should be careful to select tools that are authentic enough actually to work, but not dangerous. Avoid sharp-edged instruments such as chisels, knives, etc. The main items should be the handsaw, small enough for little hands, and the junior-size hammer. The metal box is a good idea, because it is relatively indestructible, and because it encourages the "everything in its place" habit which our sons should learn even if we (our wives say) did not.

Once the junior carpenter has his tools, you have only to give him a place to work where a bit of sawdust won't be too difficult to clean up, and supply him with some scrap lumber and a few large size nails and screws. As shown in the illustrations, a bit of basic instruction does no harm, and a few holes drilled in the wood blocks assure success in driving the first few nails and screws. After that he is on his own, and he'll love it.

My experience has been that the boy with his own tools will leave Daddy's tools alone, and he learns the basic carpentry skills surprisingly fast.

And who knows? Maybe he will get good enough in a few years that Dad can boss the job while Junior crawls up on the roof to put a new guy wire on the TV antenna or fix that leaky shingle.

A FEW predrilled holes for nail starters save thumbs while he's learning. Be sure to supply large size nails.

A FEW months later, the proud father will be treated to a sight that will last a lifetime. Of course, it will be a headache to clean up a bit of sawdust, but...

A PRESENT. Or is it a bribe?

AT THIS POINT it is important to head him off gently before he goes looking for the nearest chair leg that needs shortening.

SAVING takes a bit of instruction and a lot of concentration.

EVEN MOTHER agrees that this look of satisfied accomplishment is worth the bother of cleaning up a bit of sawdust.

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PHOTOGRAPH 1—Fasten the cross strips to the mirror with glue and screws. Be sure the screws do not penetrate the mirror backing and mar the mirror surface.

PHOTOGRAPH 2—Fasten the fixture mounting strips to the cross strips. Screws should be short enough so the points do not penetrate the finished side of the fixture mounting strips.

Build Light into your Mirror

ELMA WALTNER

This illuminated mirror will make shaving easier—if you can get the feminine members of the family away from it.

PHOTOGRAPH 3—Pass the wires of the fixtures through the holes drilled to accommodate them in the fixture mounting strips.

If you are tired of not having your shaving mirror properly lighted to enable you to do a good job, this quickly assembled illuminated mirror will help you improve the quality and ease of your shaves.

An 18" x 18" mirror was used for the project illustrated. This is a good size but a different size could be substituted and the length of the back cross strips adjusted accordingly. An unmounted mirror cannot be used so check to be sure the one you are buying has a backing (usually ½" Presdwood).

Cut the two cross strips (A on the diagram) of hardwood to the size specified on the diagram. Fasten the strips across the back of the mirror using glue and ¼" screws (Photograph 1). Be sure to nip the points off the screws so they do not penetrate through the Presdwood backing and mar the mirror. With the glue to help hold the pieces which take very little strain, even the shortened screw will have sufficient holding strength.

Cut the fixture mounting strips (B on the diagram) of ¾" thick hardwood. Walnut was used but birch or other preferred wood would do equally well. Drill a hole, centrally located, ¼" in diameter, to accommodate the fixture mounting bolt, through each fixture mounting strip. Sand the two fixture mounting strips thoroughly and apply three coats of shellac, allowing each coat to dry before applying the next. After the third coat has dried, rub lightly with fine steel wool and apply a coat of wax.

Fasten the fixture mounting strip to the cross strips with flathead screws passed through countersunk holes in the cross strips and driven into the fixture mounting strips from the back (Photograph 2). Screw points should not penetrate the finished side of the fixture mounting strips.
THE FIXTURES used are 40-watt Lumiline brackets with adjustable shades. One has a plug-in outlet to accommodate the electric shaver or other appliances. The other fixture has no plug-in. The fixture that has the plug-in will require four holes to be drilled through the fixture mounting strip, located below the hole for the mounting bolt. Refer to the diagram and to Photograph 3, which shows the wires being passed through the holes. Note that two of the wires are white and two are black. Pass the wires through the holes and fit the fixture in place against the fixture mounting strip. Fasten the fixture to the fixture mounting strip by passing the chrome plated, flathead stove bolt through the hole in the fixture and the hole in the fixture mounting strip (Photograph 4). Attach nut on the under side and draw tight to hold the fixture firmly in place.

Attach the second fixture in the same way. Note that this one, without the plug-in, has only two wires, one white and one black, so only two holes will need to be drilled through the fixture mounting strip to accommodate them. Strip the insulation from about 1" of the end of each of the four wires of the first fixture, and the two wires of the second fixture. Cut two pieces of single strand lamp cord wire long enough to connect the wires of the two fixtures. Strip the insulation off 1" of each end. Now, on the fixture that has the four wires, twist the ends of the two white wires together then twist the connected strands to the end of one of the lamp cord wires. Solder the connection. Twist the two black wires together and twist to the other length of lamp cord wire. Solder. Bring the lamp cord that is fastened to the two white wires across the back of the mirror and twist the free end to the single white wire of the second fixture. Similarly, fasten the other length of lamp cord to the single black wire. At this end, attach

PHOTOGRAPH 4—Fasten the fixture in place by passing the chrome plated, flathead stove bolt through the mounting hole at the center of the fixture and the corresponding hole in the fixture mounting board. Screw on the nut to hold the fixture firmly in place.

PHOTOGRAPH 5—Make the wire connections as explained in the text. Be sure that the white wires of one fixture are connected to the white wire of the other by the strand of lamp cord, and the black wires of one fixture to the black wire of the other.
a length of double strand lamp cord to lead to the outlet. Split the cord for several inches and strip the insulation from about 1" of the end of each wire. Twist the end of one wire around the connection of the cross lamp cord and white wire. Twist the end of the other wire around the cross lamp cord and black wire connection. Solder both connections (Photograph 5). Attach a plug to the free end of the double strand lamp cord. Wrap all soldered connections with electrician’s tape.

Carry the double strand lamp cord along the single strand lamp cord to the center of the mirror, wrapping the three with tape at several points to hold them together. Cut a groove in the lower wood cross strip (A) at about the center, deep enough to allow the cord to fit into it. Lay the cord in place and cover with a small metal shield (Photograph 6). Screw the shield to the wood strip to hold the cord in place. This will prevent the cord from becoming worn by being chafed between the mirror and the wall on which it hangs.

Hang the mirror in the desired location—and stand aside for the stampede, for all the members of the family, feminine (Photograph 7) as well as masculine, will just naturally gravitate to the well-lighted mirror for all “mirror jobs.”

PHOTOGRAPH 6—Bring the lamp cord to the center, then drop it down, fitting it along a groove cut in the lower cross strip. Cover with a metal plate screwed to the cross strip.

PHOTOGRAPH 7—If you had any illusions that this illuminated mirror would be your property exclusively for shaving, you had best put them aside peacefully. The female members of the family will quickly discover how handy it is for all mirror jobs.

MATERIALS LIST
Mirror with Presdwood backing—18" x 18".
Two hardwood cross strips.
Two hardwood fixture mounting strips.
One 40-watt Lumiline fixture with adjustable shade, with plug-in outlet.
One 40-watt Lumiline fixture with adjustable shade, without plug-in outlet.
3 ft. single wire lamp cord.
6 ft. (or desired length to reach outlet) double wire lamp cord and plug.
Two chrome finish flathead stove bolts, ¼" x 1½".
Metal plate, ½" x 1½" (may be aluminum or tin can stock).
Screws.
Glue, shellac, wax.

TOOLS LIST
Saw—hand or power.
Screwdriver.
Soldering iron.
Cutting pliers.
Solder.
Electrician’s tape.

THE END
A New Use for an Old French Door

GROVER BRINKMAN

What to do with an unsightly French door that is no longer needed is a problem faced by many householders. Many of the older houses have them, and sometimes they are an eyesore. You can wall them up—or you might try turning the door into an attractive "showcase," for small bric-a-brac, novelties, plants, as Mrs. Leila Cox of Lebanon, Illinois, did with a door of this type.

To transform the door into the showcase you need but three things: plywood, double-strength glass, and some quarter-round.

The plywood is used to "box" the door, its entire height and width, to the floor level. On this door, plywood was cut into 12-inch-wide strips, and scalloped plywood border was added to give it a shadow box effect. When the box was assembled it was tacked to the door facing, and protrudes out into the room. In other words, you simply make a hollow box-like frame of plywood and attach it to the door facing. To mount the glass shelving, simply nail quarter-round stripping to the door facing, and slide the glass on top. This makes the glass shelving easily removable for cleaning. Width of the shelves, and number used, is up to the individual. This door contains five shelves, eight inches in width. You can buy new glass for this, or if you want to scout around an auto junkyard, the old-style flat windshield glass is admirable. Or broken plate glass windows can also be cut down into stripping of this nature.

If you have a band saw, scalloping the bordering plywood paneling is easy; if not, let a local carpenter cut it out for you—the work of a few moments.

You can substitute wooden shelving for the glass, if you so desire. But glass has several advantages—it is more attractive, easier to keep clean, and can be removed at will.

Before turning the door into a showcase, it is always a good idea to either putty the cracks, or make it weatherproof in any conventional way.

This door has a two-way attractiveness—both from the outside, as you come up to the house—and from the inside as well. Light, diffusing through the door, adds a sparkle to its bric-a-brac and potted plants, and it is an ideal spot to grow and exhibit violets and other small plants. Mrs. Cox uses the bottom shelf for a heavier planter, and the other shelves for potted plants and novelties.

Paint the "box" of the door in some light, pastel shade to make it more eye-compelling. A two-tone paint job, with the box in one color, and the scalloping border in another, adds to its attractiveness.

Using plywood and small brads for the box, this type of showcase can be dismounted easily, if the door is ever put back into service.
This Back Yard Table folds up

WHEN SUMMER DAYS like this are over, table can be folded up, carried inside for storage or indoor use.
MATERIALS NEEDED
(All measurements in inches)

<table>
<thead>
<tr>
<th>Table</th>
<th>Benches (Two)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3— 1 x 12 x 60 Top boards</td>
<td>2— 1 x 12 x 60 Seat board</td>
</tr>
<tr>
<td>2— 2 x 4 x 30 Crosspieces</td>
<td>4— 2 x 4 x 11 Crosspieces</td>
</tr>
<tr>
<td>1— 2 x 4 x 19 Center block</td>
<td>3— 2 x 4 x 22 Legs</td>
</tr>
<tr>
<td>4— 2 x 4 x 40 Legs</td>
<td>2— 2 x 2 x 47 Support</td>
</tr>
<tr>
<td>2— 1½ x 28 Thin wall conduit</td>
<td>4— ½ x 16 Thin wall conduit</td>
</tr>
<tr>
<td>2— ¼ x 2 Carriage head bolts</td>
<td>4— ¼ x 2 Carriage head bolts</td>
</tr>
<tr>
<td>1— ¼ x 3 Carriage head bolts</td>
<td>4— ¼ x 3 Carriage head bolts</td>
</tr>
</tbody>
</table>

BOTTOM VIEW of table showing arrangement of legs and braces.

BOTTOM VIEW of bench showing arrangement of legs and center support rail.

Table TOP BOARDS 1" X 12" X 60"

THE END

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Built-in Vanity Corner

PAUL COREY

PHOTOGRAPH 1—A router made it easy to cut this free-form vanity table top out of ¾” plywood. The ¼” bit made an excessive kerf but left the edge of the plywood smooth and solid.

PHOTOGRAPH 2—To make the drawer frame, cut a 24” length of 1 x 4 for the front. Cut two 12” lengths and rip off ¾”. Fasten each of these ¾” strips to one side of each 12” board to make an “L”. Cut a 22½” length of 1 x 4 and rip off ¾” strip. In the center of one edge notch out ¾” x ¾”. Keep the 22½” ¾” x ¾” strip for later use and assemble the other parts as shown here with glue and nails.

This dressing table and winged mirror are sure to be used daily by the feminine members of the household.

This built-in corner dressing table (Photograph 11) makes a welcome and out of the ordinary birthday present for your teenage daughter or for the daughter of friends. Of course your wife might like something like this too, you never know.

The shape of the table depends upon the space you have to put it in and the tools you have to work with. You need from 36” to 48” in length and from 16” to 20” in depth. You can make it semi-free-form if you have a router, band saw, jigsaw, saber saw or just a standard compass saw. An irregular shape will give the table variety, but it’ll make just as big a hit if you have to leave it a rectangle.

Hang an ample drawer beneath it and make a winged mirror for the top and just see what an appreciated guy you become.

The accompanying drawings and photographs show you how a vanity corner table was made for a 20” x 48” space.
Materials Needed:

Table
- ¾" fir plywood 20" x 48"
- Linoleum 20" x 48" (Or a plastic laminate)
- 6' of ¾" alluminum counter edging
- 7' of 2 x 4 to support table on wall

Drawer
- 8' of 1 x 4 redwood
- ¼" Masonite 12¼" x 22½"

Wing Mirror
- ¼" redwood plywood 18" x 30"
- 16" of 1 x 4 redwood
- Two ½" dowels 36" long

Two pair of 1" surface mounted hinges

Two mirrors 6" x 15¾".
One mirror 12" x 15¾".
(Scraps of wood to make ½" x ½" "L" shaped stop for center mirror and ¼" x ¼" pieces to hold in wing mirrors.)

FIGURE A—Shows dimensions and shaping of vanity table top and the parts and assembly of the drawer frame. Detail of drawer glide and drawer stop given.
PHOTOGRAPH 3—Channels for the drawer glides to slide in are made by cutting the $22\frac{1}{2}\text{"} \times \frac{1}{2}\text{"} \times \frac{1}{2}\text{"}$ strip you saved into two equal parts and gluing and nailing these to lengths of $1 \times 4$ that have been ripped down the middle. Turn the table top over and glue and nail one of these $12\frac{1}{2}\text{"}$ from the center as shown. Then slide the glide of the drawer frame into this channel and add the second channel.

PHOTOGRAPH 4—To make a drawer stop and guide use the $\frac{3}{4}\text{"} \times \frac{3}{4}\text{"}$ scraps to make a "T." Fasten the bar of the "T" to the stem with a screw so that it can be removed and the drawer allowed to slide out. Glue and nail the stem of the "T" to the underside of the table top as shown.

PHOTOGRAPH 5—After gluing and nailing the $12\frac{1}{2}\text{"} \times 22\frac{1}{2}\text{"}$ panel of $\frac{1}{4}\text{"}$ Masonite to the bottom of the drawer, the whole assembly was let down on to a $2 \times 4$ supporting frame. This frame consisted of a $2 \times 4$ fastened flat against the wall at the back and across one end with $3\text{"}$ flathead No. 12 screws driven into the studding. Screw heads were countersunk and filled. A tapered $2 \times 4$ brace was placed $10\text{"}$ in from the unsupported end to strengthen it.

PHOTOGRAPH 6—The linoleum was cut to fit the shape of the top and fastened down with adhesive. Then the edge was trimmed with aluminum counter edging.

FIGURE B—Dimensions and position of $\frac{1}{4}\text{"}$ plywood panels for the mirrors. Dimensions of wing shelves and detail of channels for center mirror.
PHOTOGRAPH 7—Bevel the two long edges of the 14" x 18" panel of plywood and one long edge on each of the two 8" x 18" panels. Lay the panels on your bench with the beveled edges together and down and ¼" apart and hinge them together with flat surface hinges. Place each hinge 1½" in from the ends.

PHOTOGRAPH 8—Glue and nail the 7½" 1 x 4 blocks to the beveled side of the 8" x 18" panels. Place the 45 degree end toward the bevel on the plywood. Set one of these flush with the end of the panel and the other ¾" in.

PHOTOGRAPH 9—Cut the two 36" lengths of ½" dowel into 18" pieces and insert them in the holes in the shelves. Sand all the edges smooth and finish with varnish or water-clear lacquer.

PHOTOGRAPH 10—Place the 6" x 15½" mirrors in the narrow wings and hold them in place with ¼" x ¼" blocks 6" long bradded to the shelves. Line up the mirror on the center panel and glue and nail the "L" shaped strips over each end. Plastic mirror mounts can be used here in place of the strips if you wish.

PHOTOGRAPH 11—The completed dressing table with ample drawer space and a winged mirror got this teenager's hearty approval.

THE END
Some Ways to use
LATEX BASE PAINTS

TED MORGAN

A surface assumes many of the qualities of rubber when you apply latex emulsion paint to it.

Thanks to the availability of latex base paint the do-it-yourself home decorator can take on almost any interior paint job around the house with confidence that he will do a good job, particularly if he follows certain practices, several of which will be explained here.

Latex emulsion paints have rubber as their base. Spreading these paints over a surface produces a surface film possessing most of the familiar qualities of rubber. A motor car tire traveling over a rough or gravel road displays great abrasion resistance. The film of a latex surface has similar qualities and like the rubber gloves worn by surgeons, chemists and housewives it is waterproof and resists the corrosive action of acids and alkalis. And, like the chemist's rubber apron, latex surfaces are easily cleaned.

In latex emulsion paints, rubber latex as a binder replaces oils, resins and solvents of conventional type paints. Latex base paints can be used over any type of interior surface providing the surface preparation is the same as for conventional coatings. When applied over plaster or cement surfaces they are highly resistant to "lime burning." They are well adapted to application over porous surfaces such as wallpaper and wallboard.
A single coat of latex emulsion paint usually does a good job. A gallon covers approximately 500 square feet and the paint is manufactured ready for use and requires no thinning. The paint dries enough to touch in 15 to 20 minutes. It can be applied in about half the time required for solvent or resin based paints. It is exceptionally dirt resistant. Pencil and crayon marks can be washed or scrubbed off with comparative ease. Most dirt spots, except those that have been produced by stains of grease, can be washed off with clear water. Surfaces can also be spot cleaned with a damp cloth leaving no trace where spots have been removed.

One of the tremendous advantages of latex base paint is that it is a recognized vapor barrier, which retards the movement of water vapor from the interior of a structure through an outside wall surface. This provides a distinct economy in helping to prevent the blistering of outside stucco exteriors.

Even though you have never painted before, painting with latex base paints can be a pleasure. Paint experts of the Glidden Co., Cleveland, Ohio, have provided the information on which the following hints to painters are based.

To assure yourself of the best results on walls and woodwork be sure that the surface you plan to paint is perfectly clean—free of all dust and grime.

In addition to the amount of paint necessary to cover the surface you are painting, you should have on hand: four-inch brushes for walls and ceiling and one-, or two-inch brushes for woodwork and narrow areas which may be encountered when cutting in around windows. If you have had some experience you can handle six- or eight-inch brushes for wall surfaces. Should you decide to apply the paint by roller you will, of course, need a roller pan. Other essentials are a mixing pail, latex spackling compound for filling cracks, nail holes and the like, a step-ladder, small putty knife, sandpaper, wiping rags and dropcloths.

While latex base paints don't drip, splash and splatter as much as ordinary paints precautions are necessary. Move furniture to one side away from area where paint is being applied and cover it with dropcloths and newspapers. If by mischance rugs and upholstery do become splattered, rub the spot immediately with a wet bar of mild soap and keep the spot wet. Then remove the residue with a wet cloth and clean the spot with dry cleaning naphtha.

THE FOLLOWING suggestions apply to the indicated surfaces:

PLASTER—Bare plaster should be clean and dry before you paint it. Wash off all glue where wall paper has been removed; rinse well with water. Patch all cracks with latex spackling compound, then spot prime with latex base paint. Apply two coats of paint; thin the first coat 25 per cent with water. If plaster appears loosely bound, shows sanding scratches or has plaster dust or newly scratched areas, it should be wiped down with clear water. Let dry overnight and apply prime and finish coats as already described.

WALLPAPER—Usually one coat of latex base paint on wallpaper is sufficient. But first test wallpaper for water-soluble dyes by painting a water-soluble dye on a small spot in an inconspicuous area. If wallpaper designs or colors bleed through, best procedure is to remove the paper. To avoid such removal, however, you may apply a thin sealer coat of shellac to the entire surface in an effort to seal in the stains prior to painting. Wallpaper may be applied over latex base paints in the usual manner. Also, wallpaper painted over with such paints may be repainted with a latex base paint with a coarse rasp file, hack-saw blade, wire brush or very coarse abrasive paper; then soak with water or steam and remove the paper.

OLD PAINT AND GLOSSY SURFACES—Enamel and varnished surfaces should be rubbed with fine sandpaper to dull the old finish to provide better adhesion for new painting. In many cases a solvent surface conditioner may be used. Follow the directions on the label. Painted surfaces that wash off on a wet soap cloth become soft after several minutes of soaking with water should be completely removed before painting.

UNPAINTED WOODWORK—All nail holes should be filled with a good latex spackling compound; don't use putty or patching "sticks." Sand smooth when dry. You can prime most wood surfaces with a full-bodied coat of latex base paint, then finish with a second coat, full body. Always feather out with a very fine sandpaper between coats. For maximum filling of wood grain, prime woodwork with a good enamel undercoater.

BASEMENTS—With a putty knife or similar tool scrape concrete, unglazed tile, masonry walls, etc., and then wire brush them to remove all loose particles. Scrub off thoroughly all water-soluble paints. Apply first coat of latex base paint full body, although if surface is extremely porous, thin first coat 25 per cent with water. Work in a minimum temperature of 65 degrees and provide good ventilation. Don't paint around the shower and laundry areas remove every particle of soap and greasy residue. Latex base paints must be allowed to cure thoroughly before subjecting them to heavy water splashings.

METAL—Bare metal should first be primed with a conventional good grade interior base coat. When dry, latex base paint may be applied, although such paints are not recommended for application to surfaces which are subjected to extreme heat.

WALLBOARD—Latex base paints seal every type of wallboard quickly and easily after usual surface preparation. Prime all joints and spackled nailheads with latex base paint thinned 25 per cent with water. After overnight drying, the surface will then be ready for finish coats. Always sand lightly between coats.

TO APPLY latex base paint, first stir it thoroughly, then pour it back and forth several times from one can to another. Always start a new can of paint from the center of the middle of a wall or ceiling where slight variations might be noticeable. Keep your brush well filled with paint. The average four-inch brush full of paint should be spread over an area no larger than 6 by 24 inches. Apply uniformly with minimum brushing and make light finishing strokes toward the painted area. You can touch up missed spots after the film has dried to the point where any variations in color have disappeared. Be sure to use paint from the same can, brushing it out uniformly with a small brush.

Latex base paints lend themselves well to the use of a paint roller. First, use a small brush to paint around trim and all ceiling edges and corners. Then pour paint into special pan made for use with a roller until half the sloping bottom is covered. Before using the roller, wet it with clean water. Then spin off excess. Roll the roller into the paint until it is covered uniformly, then roll off excess paint by running roller slowly on ridges on upper slope of pan. Start rolling paint on the wall surface with slight, even strokes. Do not spin the roller or use heavy pressure or it. Begin each new rollerful away from the previously painted area and roll toward the completed work. Overlap strokes 50 per cent. Paint areas about two square feet per rollerful. To remove bubbles and heavy edges, make light finishing strokes, using the roller in the one direction which causes the bubbles to disappear.

To remove soiling, use latex base paint with full body or reduce with water if necessary for proper atomization. Strain through fine cloth.

You can easily clean brushes and equipment with soap and water after use. Just follow the usual instructions thoroughly to keep metal parts from rusting. Do not clean brushes or equipment with turpentine or oils paint solvents.
Tile Topped Coffee Table

RALPH G. SMITH, JR.

An easy way to give distinction to a coffee table is to surface it with tiles arranged in your own pattern.

PHOTOGRAPH 1—This photo illustrates the abstract design of the original table made by Ralph Smith. Colors here are yellow, wheat, tan and deep brown. A solid color design or regular pattern could be used with equally good effect.

PHOTOGRAPH 2—The mastic is spread with a serrated spreader. The spreader used here was made from a scrap of tin.

PHOTOGRAPH 3—Grout is mixed to a creamy consistency and applied with a rag or brush.

PHOTOGRAPH 4—Do-it-yourself furniture legs are spaced with centers approximately 3½ inches from sides and ends of table.
HERE IS a coffee table (Photograph 1) that looks expensive and modern, is extremely practical, easy to clean, and is surprisingly simple to build.

A piece of 3/4-inch plywood, 36 standard 4 1/4-inch square tiles available at any tile company, a length of standard 1-inch outside-corner molding, and a set of 12-inch do-it-yourself wooden or wrought-iron legs are all you need, and you are ready to begin. More elaborate designs can be made by using smaller tiles.

Since tiles vary slightly in size according to manufacturer, buy your tiles first, selecting several harmonizing colors, and having in mind a pattern at the time...
NOW CAST YOUR OWN TILES WITH CASTOGLAS

The photo above illustrates the simple method of casting your own colorful tiles. A few drops of household cement with Castoglas converts it into a hard tile within 30 minutes... without heat! No tools are needed. No previous experience. There is no limit to the color combinations you can create by merely mixing color pastes with the liquid Castoglas.

Truly distinctive table tiles can be made for as little as 25¢ in colors of your choice, any color, including gold, silver, copper and various marbled combinations. Natural leaves and butterflies may be permanently preserved in Castoglas and individual pieces assembled to form trims, table tops, wall tiles. These are different from anything you have ever seen.

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Add a coat of stain of the desired shade to the exposed wood and then a coat of varnish or plastic finish applied according to the directions on the can. Do not put a finish of any kind on the tiles themselves, for they can be kept sparkling clean with nothing more than a damp cloth.

That’s all there is to it! Coffee, anyone?

THE END
A vise is one of the sturdiest looking of workshop tools but like any other tool it works better and lasts longer with proper care.

Treat your Vise Right and it won't Lose its Grip

MORTON J. SCHULTZ

WHETHER YOU use a utility vise, a machinist vise, a pipe vise or a blacksmith vise, it has only one purpose—to hold an object firmly while you work.

The vise most suitable for home workshop use is the utility (or bench) vise. To keep this vise, or any other type, free of rust, and to keep its jaws from being worn or nicked by dirt particles and metal slivers it should be cleaned after you use it a few times.

LUBRICATE the slide and worm lightly with preservative oil or SAE 10 engine oil. Only use a few drops and wipe away the excess.

Avoiding certain "taboos" can save you money for a new vise. Here are some of the pitfalls to watch out for when working with a vise:

THE ONLY WAY to tighten a vise is by hand.

To protect a finished piece of work from being marred by the vise's jaws, or to keep delicate material like wrought iron or plastic from cracking, make two rubber inserts for your vise.

WASH GREASE and dirt from all parts of the vise with a dry cleaning solvent. Wipe it dry with a clean cloth. Clean the jaw serrations with a wire brush.

NEVER USE your vise's jaws for an anvil—you could break them or batter the inserts.

AFTER FASHIONING the rubber to the right size, unscrew the vise's metal inserts. Place the rubber inserts on top of the metal and screw both back into the vise's jaws.

Most utility vises come equipped with two pipe holders which you can place in your vise when working with round stock. They are available at any hardware store, if you don't have them.
A TOP VIEW of a common household fan is shown in Photograph A, the servicing of which depends upon understanding the motor in Photograph B and its parts shown in Photograph C. All of this proves that it pays to know your A, B, C's—the details of which will be covered in this article.

THE AVERAGE Workbencher derives considerable pleasure from knowing the "how" and "why" of the many things that make up his home and workshop world. For this reason, mainly, synchronous motors will be discussed in relation to appliances. Again, we are concerned here only with the small motors used in portable appliances—which will also somewhat limit our study of induction motors. Understanding synchronous motors will contribute to your over-all fund of knowledge but such motors will probably not create any repair problems for you—as will be explained later.

In Part VII (May-June, 1958, Workbench) it was stated that the motors commonly used in household appliances could generally be classified as universal, synchronous, and induction. The subject of electric motors is so vast that this could be both an understatement and also an overstatement. Except for wishing to present the theory of the synchronous motor we could have placed the categories as universal and induction. Actually there are so many types of induction motors that they are given separate names according to their individuality. Electric motors could also be classified as DC (direct current), AC (alternating current) and AC-DC (alternating current and direct current); all of which refers to the type current required by the motor. DC only motors would automatically be ruled out of appliance discussions because AC is the usual type of current supplied to homes. Another means of classifying motors, which is probably more suited to our needs is: commutator and noncommutator. The universal motor is a commutator type motor. It was discussed in Part VII and will be heard of again in the next issue and others when we discuss specific appliances once more.

The universal motor is not only a commutator motor it is also AC-DC. The synchronous and induction motors that we will discuss are noncommutator motors and are AC only. We shall begin with the synchronous motor.

THERE ARE large commercially successful synchronous motors in which the rotor magnetism is obtained through rotor coils separately excited by a DC source. The simple synchronous motor we will use for illustrative purposes uses a permanent magnet for its rotor—or rotating part. The stationary essential portion of such motors is referred to as the stator.

A synchronous motor operates in step with the frequency of the alternating current. This principle makes it extremely useful in clocks and timers because the frequency of the household current is accurately regulated by the power company. This, of course, explains the reliability of these devices. Improvements have been made upon the simple synchronous motor in recent years. One disadvantage had been that electric clocks were not self-starting. Some Workbenchers may still have clocks of this type faithfully serving in their homes. In the event current to the clock is interrupted it must be manually restarted. The actual motor mechanism of modern clocks and timers is sealed and usually in such a way that it would be improbable that you would be able to take it apart and reassemble it—in working condition. The disassembly of an already defunct unit may prove interesting. It may also prove challenging and is recommended only if you have nothing better to do. The reason for this statement is the fact that some of the variations use principles not discussed here—or as a matter of fact not discussed in any readily available reference.

Figure 1 represents, graphically, one cycle of 60-cycle alternating current. It is called alternating current because it flows in first one direction then in another. Normal household current is 60-cycle alternating current. This means, for example, that in one cycle the current rises to a maximum positive value, falls to zero, reverses direction then rises to a maximum negative value and falls to zero again before starting a new cycle; this is repeated 60 times per second. Because it happens so rapidly this constant rise and fall is not observable in the operation of electrical devices and exhibits itself as a steady effective value. While direct current may vary in intensity it maintains directional flow rather than constant reversal.

Figure 2 is a diagram of a simple synchronous motor. The rotor is a permanent magnet. The stator (horseshoe-shaped field assembly) is an electromagnet that derives its magnetism from the coil which we will assume is connected to a source.
of 110-volt, 60-cycle, alternating current. Thus, while the polarity of the rotor remains constant the polarity of the stator changes at a constant rate because its coil is connected to a 60-cycle AC.

Let us assume that at a given instant the coil causes the polarity of the stator to be as indicated in Figure 3. Since like poles attract and unlike poles repel the rotor would attempt to line up as shown in Figure 3. The polarity of the stator, however, is undergoing constant change and as may be seen in Figure 4 has no effective polarity when the rotor is in this position. As inertia carries the rotor past this point it is assisted by the repelling action of the newly formed stator polarity as shown in Figure 5. This repelling action is followed by attraction as continued rotation causes unlike poles to again approach as shown in Figure 6. The rotor will continue to turn seeking a position as in Figure 7, only to be foiled by the everchanging polarity of the stator, which forces it into a never ending search.

For each time a rotor pole passes a stator pole the stator pole experiences a change in polarity. This means that in one revolution of the rotor the stator coil has been subject to both a positive and a negative surge of current—or one complete cycle. It may be seen, then, that the motor shown makes: ½ revolution during ½ cycle (1/120 second); 1 revolution during 1 cycle (1/60 second); or 60 revolutions during 60 cycles (1 second). This proportional relationship between the frequency of the applied current and the number of revolutions of the rotor is a characteristic of a synchronous motor. This exactness is a virtue in clocks and timing devices but a drawback in other ways. A synchronous motor cannot be overloaded to any degree. Once its rotor speed lags behind the rate at which the stator is changing polarity it must of necessity stop operating. Therefore its use in appliances is limited to very light duty such as clocks and similar devices.

FRACTIONAL horsepower induction motors are in common use around the house. In connection with these we hear such terms as: split phase motor, shaded pole motor, repulsion start motor, capacitor motor, etc. There are many different types of small induction motors but the basic principle of operation is the same. Their main variation, for our purposes, lies in the method used to start them. No single phase induction motor is inherently self-starting; it has to be altered to achieve this result. Polyphase motors (two or more phases) are self-starting because they are able by their very nature to produce a rotating magnetic field for the rotor to follow. Single phase current, such as regular house current, refers to the rise, fall, and reversal of a single stream of electricity—so to speak. Polyphase current refers to the independent rise, fall, and reversal of two or more streams of electricity which may be used, for example, to operate a single large commercial motor.

In being informative and practical we shall explore the workings of induction motors in general and the
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shaded pole motor in particular. Among portable appliances the shaded pole motor is commonly found in electric fans. The shaded pole principle, however, is also currently being used to make electric clocks self-starting.

In the synchronous motor previously discussed, we have an example of two kinds of magnets. The stator is an electromagnet and therefore of a temporary nature since it is entirely dependent upon the current flow through the coil for its properties. The rotor, however, is a permanent magnet. Regardless of the type, magnetism is thought to be the result of the alignment of the molecules (minute particles of the substance). In an unmagnetized bar such as Figure 8 the molecules are thought to be arranged in no particular order. A magnetized bar or object having magnetic properties is thought to have its molecules arranged in an orderly fashion as shown in Figure 9. Actually, of course, molecules are much too small to be seen with the naked eye and we must assume this to be true.

In some substances such as steel and special alloys the molecules will maintain this alignment once magnetized and therefore the product is known as a permanent magnet. Iron, on the other hand, is very good for electromagnet cores because it maintains the aligned structure of the molecules only when forced to by some other influence. These are handy facts to keep in mind when pondering the mysteries of magnetism and in our future discussions.

We must also assume the existence of magnetic lines of force as was explained previously in Part VII.

Any current carrying conductor is surrounded by magnetic lines of force. If the magnetic lines of force from one conductor cut across another conductor a current can be caused to flow in the second conductor without the two conductors being physically connected in any way. They will be connected by what is known as "flux linkage," i.e., by the magnetic lines of force from one conductor cutting through the second conductor. When these conductors are each wound into a coil, the effect is increased because of the greater intensity and concentration of the flux linkage.

This is the principle upon which a transformer operates. Figure 10 is a schematic diagram of a transformer. The winding that the original voltage is applied to is called the primary and the output winding is called the secondary. The ratio of input voltage to output voltage varies directly with the ratio of the number of turns of wire on the primary compared to the number of turns of wire on the secondary. Disregarding more technical considerations, then, if 110 volts is applied to the primary and the secondary have twice the windings of the primary, the secondary voltage will be doubled. This is a step-up transformer. If one wished to change 330 volts to 110 volts he would need a step-down transformer with three times as many windings in the primary as in the secondary. Most transformers, that we shall be concerned with use a laminated iron core upon which the windings are wound. The iron makes the transformer more efficient as it is a very good conductor of magnetic lines of force.
Figure 11 is a drawing of a rotor similar to that shown in the fan motor photographs. If the laminated iron core and the shaft are removed we have heavy windings which take the form of a squirrel's rotating exercise cage and hence give rise to the name "squirrel cage rotor." This is shown in Figure 12. It should be explained that these single turn windings are described as being "heavy" windings because they are heavy or thick in a comparative sense. Regardless of the size of the squirrel cage rotor these conductors will be heavy in comparison to the wire used in the rest of the motor. This type of construction gives highly inductive windings with little resistance to current flow, a quality that is needed in the induction motor.

**FIGURE 11—Squirrel cage rotor for an induction motor.**

**FIGURE 12—When it is stripped of its laminated core this rotor does indeed resemble a squirrel's exercising cage.**

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PHOTOGRAPH E - Top view of the fan motor. Two of its shading coils may be seen bonding the pole piece on the left side.

PHOTOGRAPH D - Assembled shaded pole motor such as is used to power small household fans.

PHOTOGRAPH C - Simple shaded pole motor.

PHOTOGRAPH B - Rotor of the motor shown in Figure 13 with shading coils added to make it self-starting.

PHOTOGRAPH A - Shaft and conductor.

PHOTOGRAPH E - Top view of the fan motor.

FIGURE 14—Stator of the motor shown in Figure 13 with shading coils added to make it self-starting.

FIGURE 13—A simple single phase induction motor with a squirrel cage rotor.

Figure 13 is a sketch of a simple single phase, induction motor. Because the coil is connected to a 60-cycle alternating current the polarity of the stator pole pieces would be constantly changing. The current induced in the rotor by transformer action causes it to have magnetic properties. In trying to keep up with the changing polarity of the stator the rotor is caused to keep turning. It is not nearly this simple, of course, if considered in detail— which is beyond our scope here. In a polyphase induction motor with many stator and rotor poles it may be shown that the magnetic field of the stator constantly rotates and is followed by the rotor. In single phase motors the stator polarity alternates, it does not rotate. For this reason the induction motor will operate as explained only after some outside force has caused it to begin rotating (such as starting it by hand). Obviously this would be a serious handicap in many electrical devices so some means had to be devised to overcome this objection.

One of the simplest answers was the shaded pole motor. Photograph D shows a shaded pole motor as may be used in a small fan. It may be seen that the magnetic field of the stator is supplied by a single coil.

It may also be seen that the stator core is made up of laminations. The purpose of these laminations, which are insulated from each other, is to cut down on heat and power losses produced by currents that would circulate in a solid stator. Figure 14 illustrates a simple induction motor stator with shading coils added. In normal operation magnetic lines of force cut the shading coils and cause a current to flow. This current causes a magnetic field of its own which becomes effective as the main magnetic field is on the wane and gives the effect of a moving magnetic field at the stator. This effect is sufficient to make such induction motors self-starting. Inasmuch as the shading coil area reaches its peak magnetic strength after the main field, the magnetic field shifts from the unshaded to the shaded portion of the pole piece. This restricts the operation of the rotor to rotation in that direction. Changing the direction of rotation of these motors is not practical because it means shifting of the shading coils. While there are means for doing this on much larger motors it is not applicable to common small household appliances. In other words you can't make a mistake in hooking up this shaded pole induction motor and thereby
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FIGURE 15—Continuity tester using a neon bulb. While there are several means that may be used to achieve this, a very handy unit may be made by soldering in a pocket-type of neon tester.

FIGURE 16—If touched as above, the neon bulb will glow although the experimenter feels nothing. The result will be for a short if the uninterrupted wire is connected to the "hot" side of the circuit and grounded through the human body.
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FIGURE 17—The electrical circuit of the fan being checked for an open, progressively. The open will be located between the point where the bulb does not glow and the last point at which it did.

PIN POINTING a short is always one of the harder things to do in trouble shooting. Overheating and poor operation or no operation at all may be symptoms of a partial short. A full short, of course, will blow a fuse. Switch contacts sometimes become welded together making it impossible to turn off an appliance in the normal manner. While this is termed a shorted switch it is not a short as we ordinarily think of it and, as may be easily seen from the drawings, would give no reason for a fuse to be blown.

The neon bulb continuity tester is especially good for indicating a ground because it will detect even the slightest electrical leakage. As shown in Figure 18 the proper procedure in checking for a ground is to place one test prod on a metal portion of the motor (making sure that there is good electrical contact) and the other prod at some point in the electrical circuit. Try this at several different locations to be sure you have made no mistake. The neon light may actually detect a ground too slight to interfere noticeably with operation or give a shock.

Some fan troubles are undeniably of mechanical origin. Lack of oil may in itself initiate trouble by causing the fan to operate sluggishly, overheat, etc. Poor lubrication also allows excess wear that in time causes noise, vibration and other aggravating manifestations. Too much oil of course is never good, but the proper amount at regular intervals can go a long way toward proper fan operation. This is especially true since fans may operate at fairly high speeds.

A fall or other accident may cause bending of the fan blade or rotor shaft. This, even in slight cases, may cause vibration. The fan blade should ordinarily be mounted on the shaft back toward the motor as far as possible as long as it allows proper clearance. If the shaft is not quite true the error will be greater towards the outer end of the shaft. A constant check should also be made to make sure the set screw or screws holding the blade assembly to the shaft do not become loose.

There is a simple way to check whether or not the blades of the fan track. If the blades all track, this means that they all lie in the same plane and follow each other in rotation in exactly the same path and are not bent or out of alignment. Photograph I is a side view of a fan. If a pencil or other object is inserted through the guard from the front till it barely touches one of the blades it may be used as a reference point. If the blades are revolved slowly past the reference point it may be established whether or not they track. Blades not in alignment may be bent to conform.

Photograph I—Side view of the fan. Blade alignment is checked by slowly turning the blades past a given reference point.

FIGURE 18—To check for a ground put one test prod at a connecting point in the electrical circuit and the other to a metal part not intended to be a part of the electrical circuit. If the bulb glows a ground is indicated.

FIGURE 17—The electrical circuit of the fan being checked for an open, progressively. The open will be located between the point where the bulb does not glow and the last point at which it did.
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This Might Help

Stepladder Step Saver

As shown in the accompanying sketch, a stepladder can be made more efficient by fitting the top with a holding slot or with several holes or devices for safely holding the tools you use most while at the top of the ladder. It is a good plan, also, to attach a box to the top of the ladder containing small brads, nails, screws, etc., also as indicated in the sketch. The box should have a cover that can be fastened securely so that when the ladder is carried to any position the contents of the box will not spill out. Climbing up and down a ladder to get a forgotten or needed tool or appliance is tiring and time-consuming. Little improvements like this can therefore save considerable time and money in the course of a year. It is easy and in the end well worthwhile to improve a ladder in this manner.—W. F. Schaphorst

Handy Drill Stop

An electrical test-clip available at a few cents from most electrical or hardware stores, makes a handy depth stop for use when drilling. The clips come in several sizes, so it's possible to select one to fit almost any size twist drill or auger bit. The strong grip of each clip will hold the clip securely in place even when you are using an electric drill.—John A. Comstock

Rubber Bands Aid Glass Cutting

A sheet of glass is easily cut to the wrong dimensions if the straight edge should slip while guiding the cutter along it. To be safe against slippage, always lay two or three small rubber bands under the straight edge and it will not budge from the measured position.—Ken Murray

Nails Tighten File Handle

After being used for awhile, some file handles begin to get loose on the tang of the file. This can be overcome if two finish nails are driven into the file. This will prevent wobbling of the handle and make the file's use much better.—Walter M. Shutok

Chairs Make Sawhorse

Apartment dwellers or others cramped for space will find that two kitchen chairs will serve as an emergency sawhorse. Simply place both chairs back to back at your desired distance and slip the board through the opening in the back of both the chairs. To prevent board from moving while sawing, a knee is placed on top of the board to hold in position.—Donald Spichuk

Rubber Ball Makes Easier Painting

I have found that a hollow rubber ball can be a real aid in painting ceilings. I cut the ball in half, cut a small slit in the bottom of one half of the ball and slip this onto the paintbrush handle. The half ball forms a cup and catches all of the little paint drippings that seem to go with ceiling painting.—Howard E. Moody

Get the Right White Paint

When buying white paint for window frames, sash and shutters be sure to tell the salesman you want trim white if the rest of your house is painted another color. Otherwise, you might go home with self-washing white, which is fine for an all-white house because you can't see the oxidized paint as it is washed away. But the white streaks will stick out like a sore thumb on a house of another color.—Ralph J. Ahrens

Vinegar Eases Painting

That everyday household condiment, vinegar, can help you make a good job of repainting a metal porch chair. Before applying your primer, go over the chair with a cloth dipped in vinegar. Allow the vinegar to dry and then use your primer. You'll find the paint flows on freely and it will stick to the surface and not flake off when dry.—Mrs. Ernest Miller
Nail Keeps Hammer on Roof

When applying shingles or making repairs on a roof, the attachment shown above will prevent your hammer from sliding off to the ground each time you lay it down. Just open a lawn hose clamp until it can be slipped over the hammer handle. Pass a shingle nail through the open slot in the clamp and tighten the latter in place with the bolt and nut that is provided. When you lay the hammer down with slight pressure the nail point will press into the roof enough to prevent it from sliding. **Ken Murray**

Don't Trip Over Junior's Roller Skates

The storage of roller skates has long been a safety problem in many homes. They will no longer be a hazard if they are kept handy for future use on their own storage rack. This rack resembles a towel rack but the bar must be at least six inches away from the wall. Two shelf brackets connected by a ¼" rod will do very nicely. The brackets are mounted facing each other as shown in the photograph. The bar is run through the screw holes and is threaded on each end to take nuts in order to keep the rod in place. It is a good idea to hang the skate key from the bar in order to have it handy with the skates. **Arthur R. Tanner, Jr.**

### Construction Directions

1. Construct frame jamb from 2 x 4 material.
2. Drill ¼" holes through frame and jamb to match.
3. Cover frame with lath or plastic as desired.
4. Cut 3½" sections of heavy ¾" O.D. spring.
5. Insert springs in matching holes and drive a single nail through frame and jamb near extremities of springs to hold in place.

FOR LATH houses and partially enclosed patios it is a bother to open and close gates and doors when food trays, extra chairs and the like must be carried in and out. This problem can be solved conveniently by hanging light single or double swinging doors. It is easy to cover a light frame with lath or plastic and then hang them on common springs. For the door in the drawings three ¾-inch O.D. springs were used for each door. Although a set of these doors has long been in use in the author's lath house with the original springs, in case of failure it is an easy matter to withdraw the nails holding the springs in place and to insert new springs.—Paul Shoaff

Tip to Painters

One of the easiest ways to keep the light fixtures when repainting a room is to tie paper bags, the kind you get at the grocery store, over each light fixture on which paint might drip. This is much easier than doing the cleaning usually required after a paint job.—Blanche Campbell
To Avoid Splits in Nailed Siding

If nails are driven in ends of siding, the wood usually splits. This is true especially in fir and yellow pine and several others. This is not very pleasing if ends are joined together where they will show. However, these ends will not split if holes are predrilled with hand drill or power drill using drill of same diameter as nail which is going to be used. Then when nails are placed in holes and fastened to stubbing or subsiding no splitting will occur.

Walter M. Shutox

Stepladder Supports Paint Job

In order to simplify the hand painting of storm windows and screens, one painter uses a stepladder to support his work. With ladder opened and standing, wood strips are rested upon the lowest step and nailed to the uprights of the ladder parallel to the floor and extending back to the brace legs of the ladder. As seen in the photograph, this provides a two-point base for the frames to rest on. Just below the small platform, at top of ladder, a 2" x 4" is nailed. The length of this piece is determined by the width of windows to be painted, being sufficient in length to provide a full width rest for the largest framework.

With the window resting on the two strips at its base, the outer side is painted, then turned and completed. Matchsticks or nails may be tucked in behind the painted side of the window at the top, to prevent marring or smearing of surface where it would touch the 2" x 4". Small windows do not require the use of the stabilizer crosspiece at the top.

Users of this method will find their work easier to get at since it is up off the floor and away from any walls and therefore less chance is present for dirt to accumulate while doing the painting.—Rem Hadenfeldt

Washers Tighten Door Lock

If the latch bolt on your door lock doesn’t quite reach the strike plate, as is the case with many older homes that have settled, or even some of the newer homes, a tighter fit may be acquired by removing the strike plate from the door jamb and placing two small washers behind it. Replace the screws, one through each washer, and tighten. If the screws don’t seem to anchor properly, drive wooden pegs into the old screw holes and redrive the screws into the pegs.

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