

Installation, Care and Operation of

“Oliver”  
Circular Saw  
Benches



**Oliver Machinery Company**  
Grand Rapids, Michigan, U.S.A.  
HIGH GRADE MACHINERY

## PART I—INSTALLATION

### Testing and Packing

All "Oliver" Saw Benches are given actual running and cutting tests with very minutely detailed test specifications for careful checking by the inspector. Each machine is tested on a machined metal floor plate—the saw bench not bolted down. The gauge pin holes for positive setting of the miter gauge at the prominent angles are taper reamed only after actual cutting of stock on the machine to determine the exact location of the holes. Finally, for the convenience of the customer the under side of the saw bench table is painted white so as to give better light for adjustments and lubrication inside the frame. The inspection is thorough and exacting, after which the machine is packed as ordered for domestic or foreign shipment.

### Installation

Several of the heavier types of "Oliver" Saw Benches are shipped "knocked down", that is, with the table removed. This is for protection in shipping and incidentally secures lower freight rates. The table should be mounted and carefully located in position by means of the taper pins provided for the purpose. The table should then be checked for squareness and parallelism with the saw. The next step is to see that the table is level in both directions, when the indicator is set at 90 degrees—it should be if the floor is level.

All "Oliver" Saw Benches are of heavy construction and properly balanced, so that on a level floor they may be operated without bolting to the floor. The frame or column is machined on the bottom of the pads where they rest on the floor and consequently all subsequent machining is square with the base. If, however, the floor is not level, or for other reasons it is desired to bolt the machine in place, then proceed as follows:

1. Determine exact location of the machine and set it in place.

2. Through the bolt holes in base of the machine mark floor with pencil or drill.
3. Remove the machine and drill or bore the holes.
4. Set machine in place and insert bolts or lag screws, but do not tighten.
5. Set table in square position as shown by the indicator on the machine.
6. By using pinch bar, insert long tapered wedges under the base where needed until table is level in all directions.
7. Tighten bolts or lag screws until machine is firmly set in place. The bolts should be just tight enough to prevent shifting *and no tighter*. It is highly important that no strains be set up in the column and table by bolting too tightly to an uneven floor. Use thin wedges of metal or hardwood under each foot of the base as required to level. Or if installation is being made on concrete floor, wet the floor thoroughly and force concrete mixture under every part of the base that is not resting on the floor.
8. Machine should be thoroughly cleaned of slushing grease used to protect bright parts against rust in shipment. Especially see that tapered and tapped holes in table top are cleaned out. Unpack gauges and other parts packed in separate box and mount on machine.
9. Correct adjustments of all working parts are made at the factory; however, one should become familiar with these before operating the saw.
10. On "Oliver" Saw Benches with Universal Table, the sliding table section is mounted on a series of ball bearings held in a steel retainer strip which roll on grooved steel tracks. When setting up machine, the grooved track and the ball retainers should be carefully examined to see that they are clean and free from grit or dirt. Do not use grease on these tracks as it collects sawdust, becomes gummy and interferes with easy and accurate operation of sliding table. Adjust hold-down lug on inside edge of sliding table which slides in machined groove on table edge and prevents table from tipping.

## Lubrication

All "Oliver" Saw Benches are equipped with high grade ball bearings lubricated with grease or oil, depending on the type and design of machine. It is necessary to oil or grease these bearings sparingly—once in two to three weeks being sufficient under ordinary conditions.

It is very important that high grade non-acid oil or grease be employed, and we call attention to the recommendation in our Lubrication Bulletin in this matter. Where grease cups are used, the grease should be of medium consistency, and the caps should be tightened with one or two turns once or twice a week under average use.

At long intervals, say once a year, it is well to clean out the ball bearings, flushing with a light oil or kerosene, and then immediately re-lubricate with the regular oil or grease.

On the Universal Saw Benches Nos. 60 and 90, having a belted drive from a single motor, there is a ball bearing idler jack which has two pulleys to maintain constant belt tension as the arbor yoke is rotated to change saws. These idler pulleys, being out of sight, are sometimes neglected, but should be oiled as often as the main bearings.

## Motor Drive

Modern woodworking practice places the motive power of a machine as near the cutting tool as possible. Standard polyphase alternating current is now available in most sections and for this type of current we furnish the "Oliver" Saw Benches with direct motor-on-arbor drive, eliminating belts and pulleys. The

standard motor speed for saws from 10" to 16" diameter is 3,600 R.P.M. at no load.

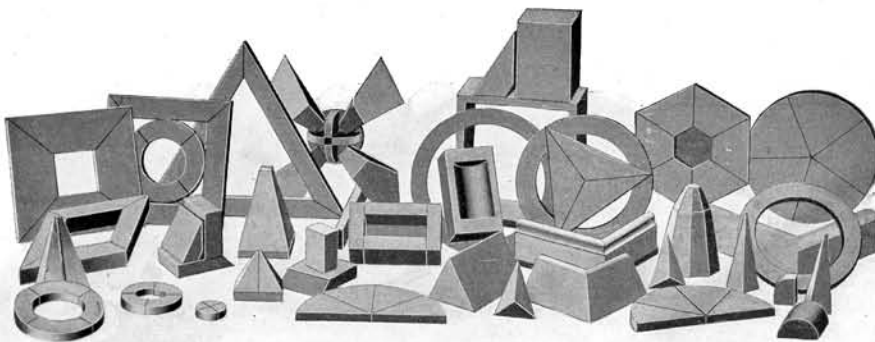
The one exception is our junior or portable bench saw using a 7" or 8" diameter saw which should run at approximately 5,000 R.P.M. to obtain the proper cutting speed. Direct motor drive cannot be used in this case, since the proper speed motor is unobtainable.

The motors employed on the direct motor driven machines are of the high temperature type and will run efficiently at very high temperatures. All such motors are provided with internal fans, and sometimes with auxiliary fans, to supply a large volume of cooling air to keep the temperature within reasonable limits.

**IMPORTANT:** These motors should be blown out frequently, at least once a week, to prevent an accumulation of sawdust from closing up the ventilating openings. If compressed air is not available, we suggest a portable electric blower which can be had at moderate cost.

Lubrication of motors by grease or oil as provided for is necessary, but is often overdone to the detriment of the motor windings. Too much oil is as bad as too little. Lubricate regularly, at stated intervals not oftener than once a week unless under heavy or excessive use.

Where grease is used, once each year the bearings should be disassembled and all parts cleaned with light oil or kerosene to remove the old grease. Bearings should then be repacked with a good grade of medium consistency ball bearing grease, about one-third to one-half full. The use of too much grease will cause excessive bearing temperatures and leakage into the windings. Oil or grease should never be allowed to come in contact with motor windings.



Samples of Useful Cuts in Pattern Making Easily Done on "Oliver" Saw Benches.

## PART II—NOMENCLATURE

### Types of Circular Saw Benches

1. Cut-off Saws. Used for crosscutting only. Made in two general types: (a) overhead swing type for attaching to ceiling, post or sidewall, such as "Oliver" No. 136-D; or (b) self-contained pedestal type, such as "Oliver" No. 94-D.
2. Ripsaws. Used for ripping only. Made in three general types: (a) hand feed, such as "Oliver" No. 45; (b) roll feed, such as "Oliver" No. 65; or chain feed. Latter also known as straight line ripsaws and also used for edging and jointing, mostly in production plants.
3. Universal Double Arbor Saw Benches, such as "Oliver" No. 260-D (Fig. 1). Ideal for school shops, pattern shops, etc., without space or production enough for separate rip and cut-off saws, because equipped with quick adjustments for changing from one class of work to another, also because of



FIG. 1

"Oliver" No. 260 Double Arbor Universal Saw—Motor-on-Arbor Type.  
Note the New Swinging Door and the New Ripping Fence with Micrometer Adjustment.

their extreme accuracy on fine cabinet and pattern work.

4. Single Arbor Variety Saw Benches. So-called because adapted to a wide variety of work, such as, ripping, crosscutting, mitering, beveling, grooving, tenoning, etc. On this type it is necessary to change saw blades for ripping or crosscutting, or else use a combination or miter saw such as comes with the machines. These may be had in different types, or with different attachments:

- (a) With tilting table, such as "Oliver" No. 80-D (Fig. 2), "Oliver" No. 32-D (Fig. 4).
- (b) With tilting saw arbor, such as "Oliver" No. 88-D (Fig. 5-A), or "Oliver" No. 191 Junior (Fig. 5).
- (c) With plain tilting table (Fig. 3) with removable throat plate for using dado heads; or
- (d) With universal tilting table, such as "Oliver" No. 80-D (Figs. 2 and 6), which has sliding table section for extra wide cutting-off, also lateral adjustment for using dado heads.
- (e) With mortising and boring attachment, as shown with "Oliver" No. 80-D Saw Bench (Fig. 2).
- (f) Junior or portable type variety saw, such as "Oliver" No. 191 (Fig. 5) with tilting saw arbor.

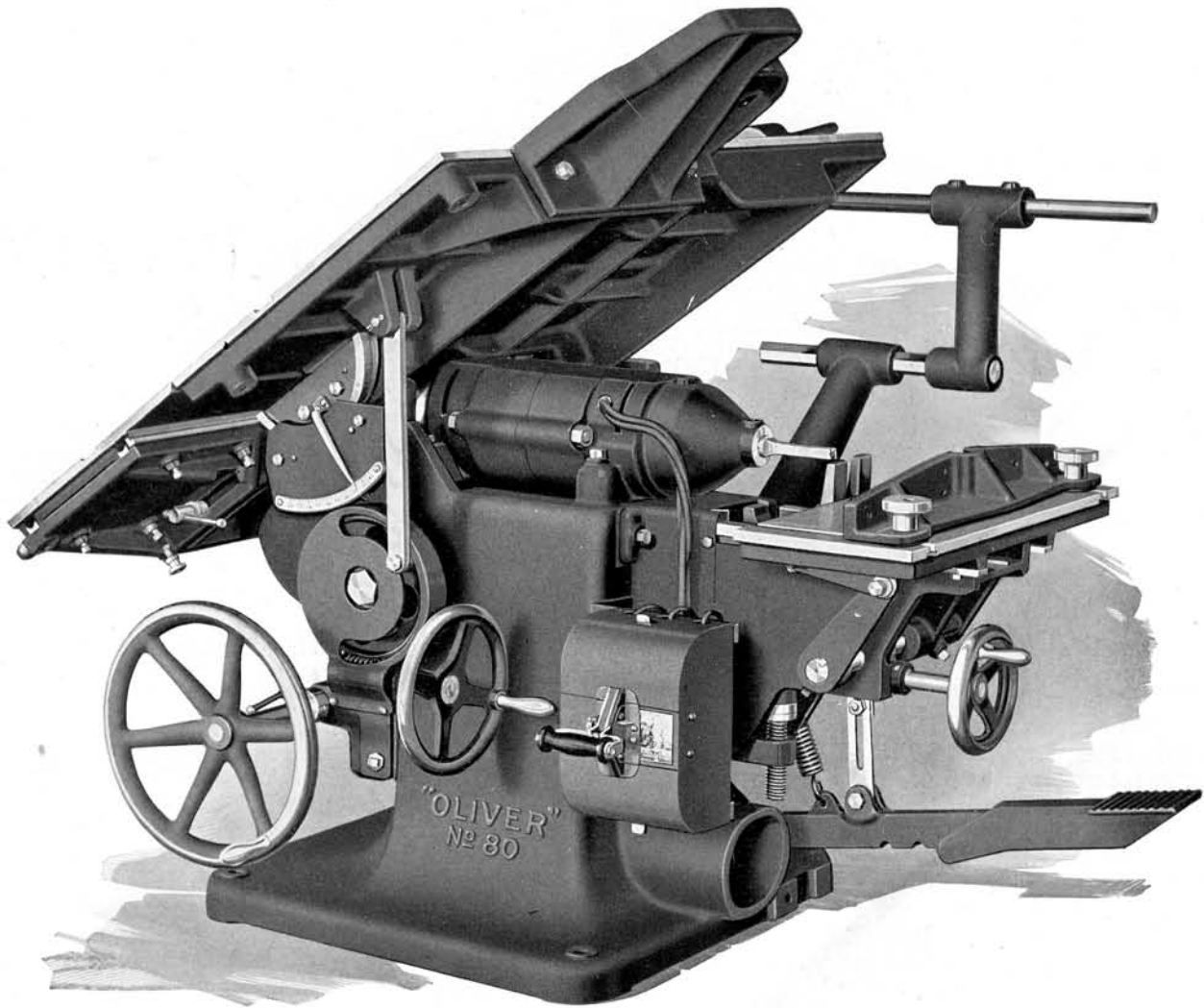


FIG. 2

"Oliver" No. 80-D Variety Saw Bench, with Universal Table in tilted position, showing Direct Motor-on-Arbor Drive and Mortising and Boring Attachment

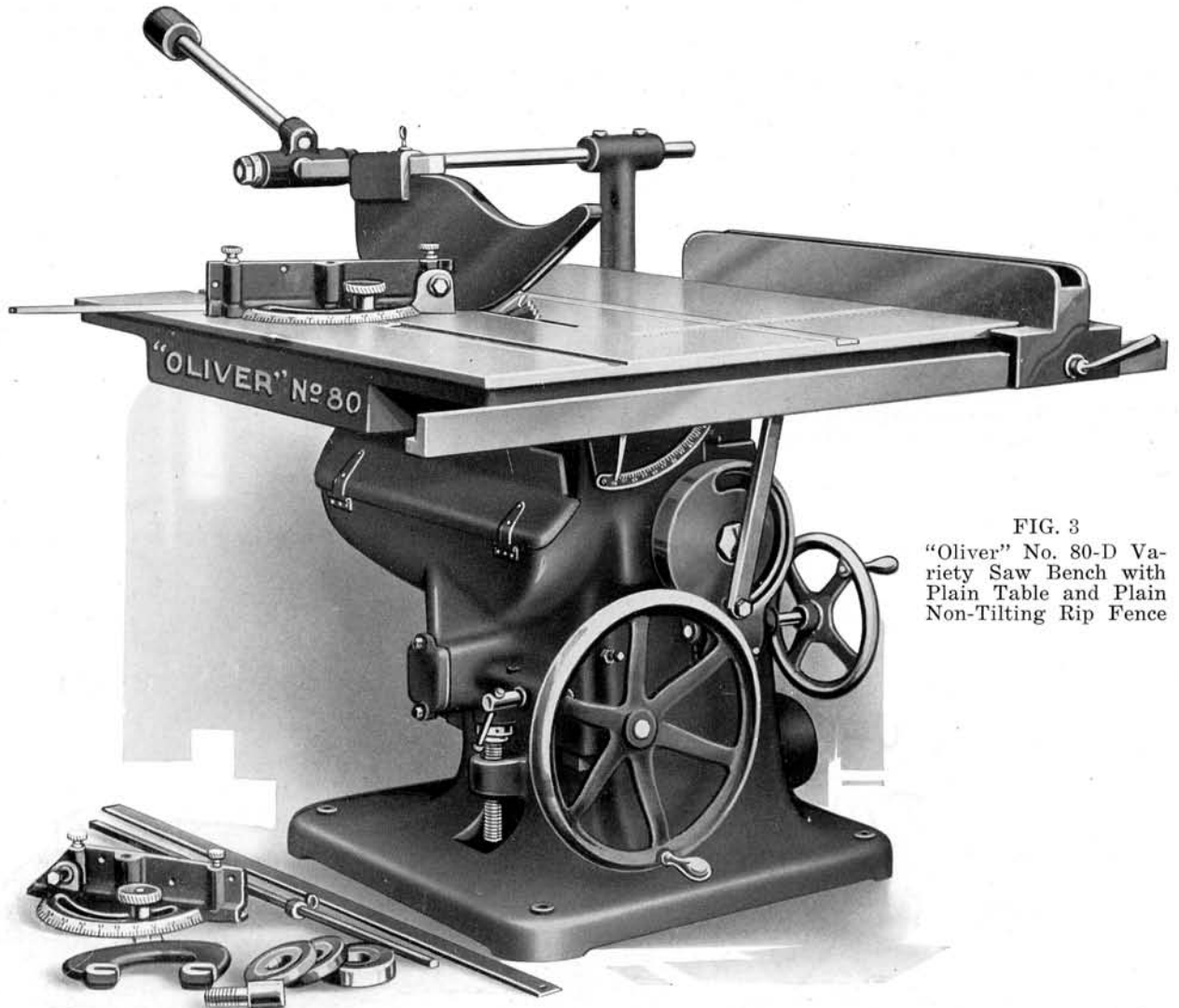


FIG. 3  
"Oliver" No. 80-D Variety Saw Bench with Plain Table and Plain Non-Tilting Rip Fence

### Principal Parts and Attachments

*Table.* On all saw benches with tilting table the table can be tilted to 45 degrees when adjusted to approximate lowest position, thus giving maximum depth of cut. On the "Oliver" tilting arbor saw benches, the saw will tilt to 45 degrees when the saw is approximately at its highest position. Conveniently placed handwheels with worm and gear mechanism and scale reading in degrees are employed for tilting. On machines having universal table with sliding table section, a stationary miter cut-off gauge is furnished and fastened to the sliding table by taper pins and screw clamp, and the stock is held against this gauge as the table is moved forward and backward parallel with the saw. Stops are provided to prevent the sliding

table from coming off inadvertently at either end. There is a vertical plunger pin easily accessible on the under side of sliding table for locking this table in place when desiring to use the table as a solid unit. A lateral adjustment is provided with locking clamps underneath the table slide, which permits drawing the slide table away from the stationary table section to aid in changing saws, or to insert dado or grooving heads.

*Tilting Saw Arbor.* In many instances it is highly desirable to employ a machine wherein the table remains stationary and the saw tilts to desired angle. The same rules of operation apply to both types of machines, either with tilting table or tilting saw arbor, although each is adapted to its own field of operation. The same gauges, saws and miscellaneous equipment

are employed, and the same attention to lubrication is required on each type.

*Universal Ripping Fence* (Fig. 6). Is usually supplied with the universal table machines, and is usable on either side of the saw blade, but is ordinarily used on the right-hand side in connection with a scale etched on the table top. Like all "Oliver" ripping fences, it has a clearance of about .015" at the rear end to prevent stock pinching between the saw and the fence. It may be quickly adjusted to a second set of

holes on the table extension bracket for ripping very wide stock. The gauge part can be tilted to 45 degrees, moved forward and backward to parallel the saw, or the entire fence may be swung around at an angle to the saw for special operations such as roughing out core boxes, mouldings, etc. It is equipped with micrometer screw for fine adjustment. It is also provided with clearance block (Fig. 6) to serve as a stop when crosscutting to finished length. With its universal adjustments for rapid set-up, this



FIG. 4  
"Oliver" No. 32-D Variety Saw—a medium sized machine with 2 H.P. Motor and Plain Table

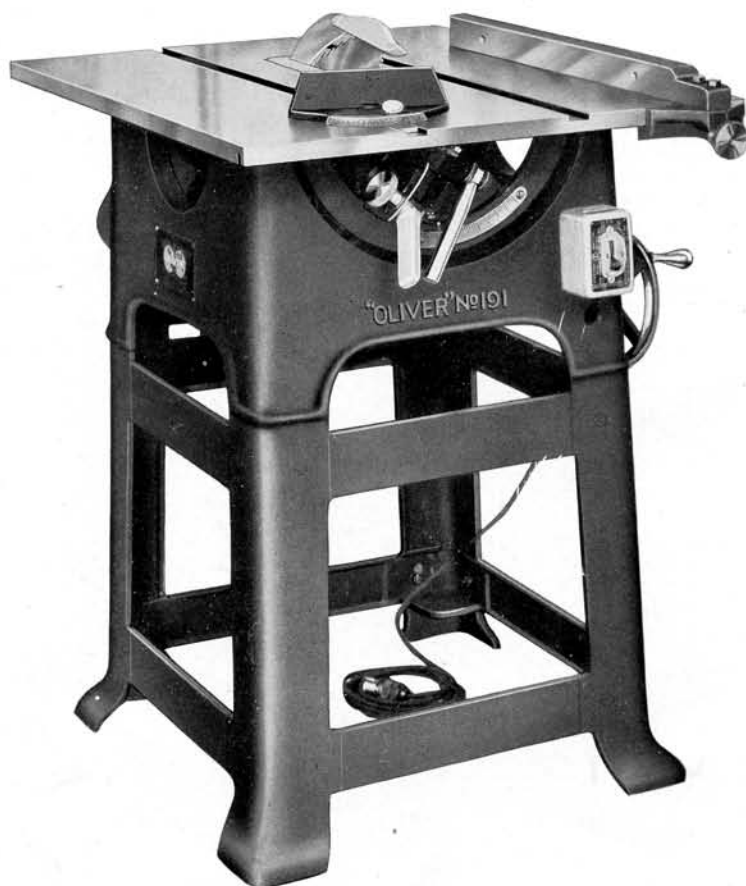


FIG. 5  
"Oliver" No. 191 Junior Saw Bench  
with Tilting Saw Arbor,  $\frac{1}{2}$  or 1  
H.P. Motor

fence is adapted for both production and precision work.

*Stationary Miter Gauge* (Fig. 6). Is furnished with the sliding table on universal table machines, being fastened to the table with a knob screw clamp. It may be adjusted to any angle in connection with a protractor scale laid out on the table surface, and is positively located at the prominent angles—45, 60, 90 degrees, etc., by means of taper pins fitting taper holes accurately reamed in the table top. It is equipped with long and short stop rods with pins and adjustable set collars for cutting multiple pieces to length.

*Universal Cut-Off Gauges* (Fig. 6). Two of these universal sliding gauges are furnished with each of the "Oliver" Saw Benches, one for each side of the saw, except the No. 191 Portable Saw, which has only one. They are graduated in degrees on the bevel face of the gauge and clamp to steel strips which operate in slots

in the table top. As these slots are always planed exactly square with the front edge of the table, the gauge can be set exactly square with the saw by inverting it and bringing it up against the front edge of the table with the sliding strip in the table, then locking the clamp screw before returning the gauge to its normal position on the table. A connecting yoke is provided so that these two gauges may be operated in unison where necessary on special work. The two stop rods furnished with the miter gauge may also be used on these cut-off gauges, and steel strips are furnished to fill up the table slots when the cut-off gauges are not in use.

*Dado Attachment* (Fig. 6). On "Oliver" Saw Benches using 14" or larger saws, a dado sleeve or spindle extension with filling-in collars is furnished to permit the use of dado or grooving heads up to 2" wide. This sleeve is screwed onto the end of the arbor, the dado head is then

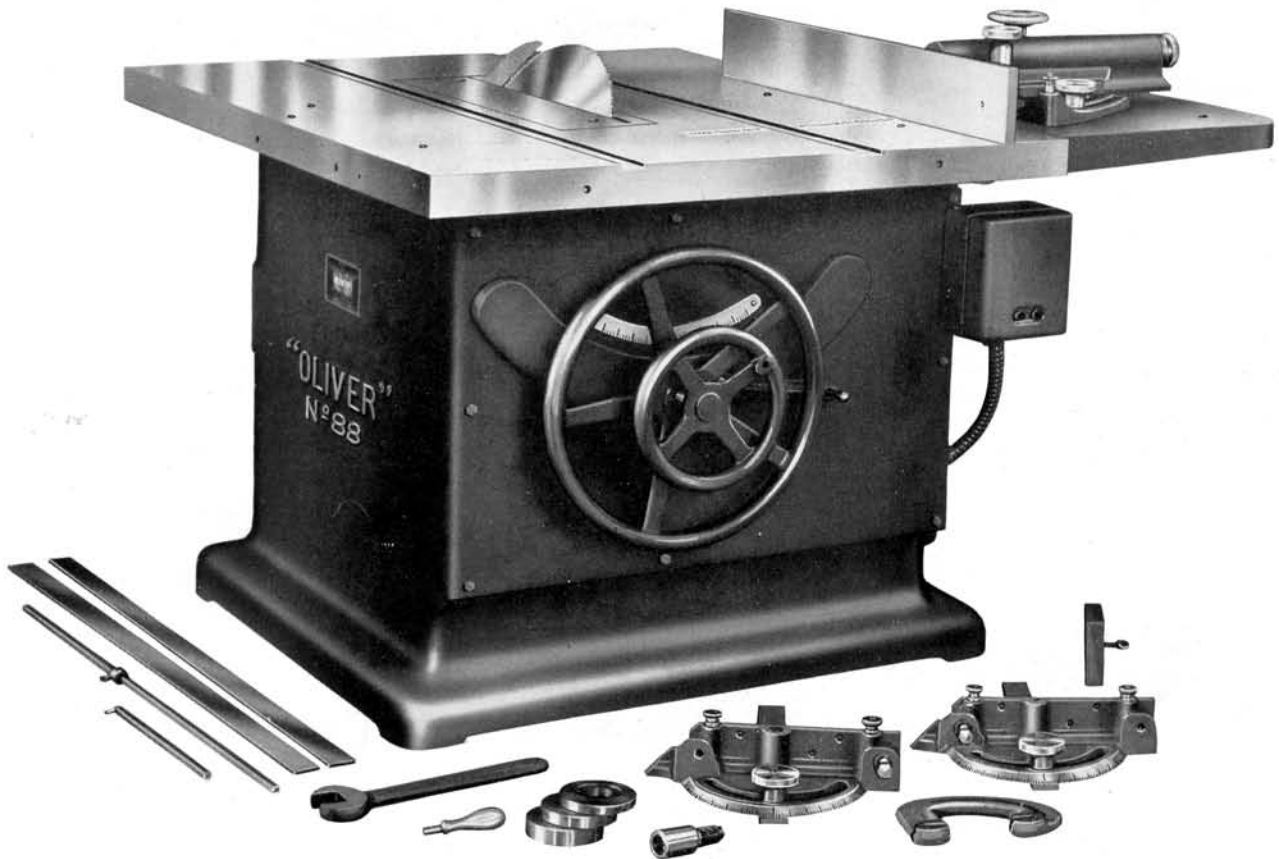


FIG. 5-A

"Oliver" No. 88-D Tilting Arbor Miter Saw—Front View—Saw Tilted

**CAPACITY:**

Saws up to 18 inches diameter may be carried. 18-inch saw will project through the table  $4\frac{3}{4}$  inches. The standard machine will rip work up to 30 inches wide and do any practical miter or dado work, either in the square or in the angular position up to 45 degrees.

mounted on same together with necessary filling collars to fill in the 2" width, and then the standard saw arbor nut is used to tighten the dado in the same manner as tightening the saw. NOTE: Sometimes a light burr or bit of grit on the threads will make the dado sleeve seem too tight a fit. In this case remove the burr with a file or emery stone and clean and oil the dado sleeve; then screw on as far as possible, after which a light tap with a hammer on the end of sleeve will correct minute burrs and allow the dado to go on all the way easily.

*Mortising and Boring Attachment* (Fig. 2). The "Oliver" No. 80-D Variety Saw Bench may be equipped with a mortising and boring attachment, and work up to a depth of 4" can

easily be handled. This is a handy attachment for shops not having sufficient work to warrant separate mortising and boring machines.

*Segment Gauge* (Fig. 12). On special order any of the "Oliver" Saw Benches with universal table may be equipped with our No. 135 Improved Segment Gauge, especially desirable for pattern work, for cutting multiple segments of circles of various diameters. This consists of a universal gauge with a long removable arm with locating points against which to place the segments, and a special scale is etched on the table top to show the exact location for the gauge for the different size segments, eliminating guesswork and inaccuracies.

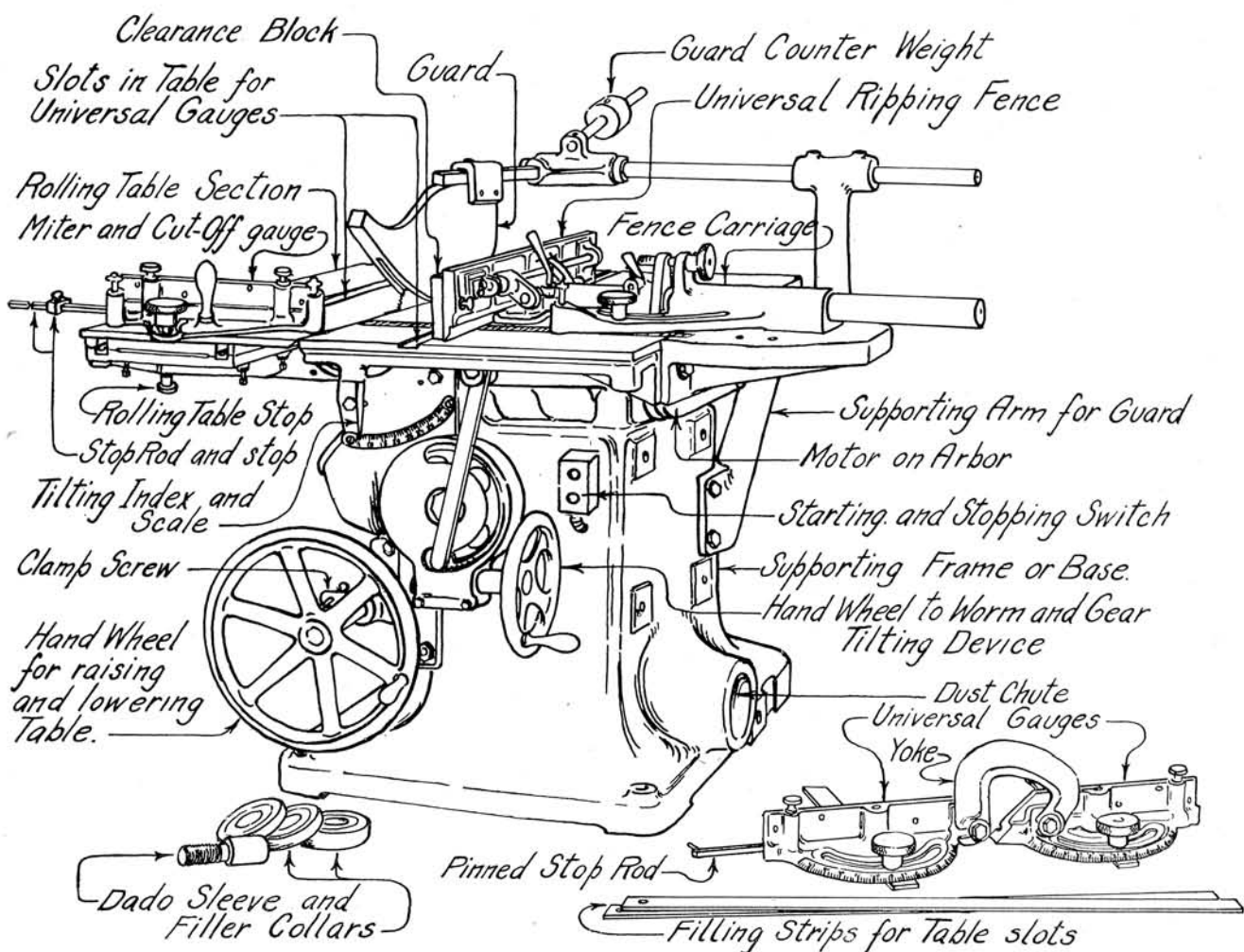


FIG. 6 Drawing of "Oliver" No. 80-D Variety Saw Bench with Universal Table—giving names of principal parts and attachments

**GUARANTY WITH EVERY "OLIVER" SAW BENCH**

We guarantee our machines to be commercially perfect both as to material and workmanship and to perform up to full capacity as represented by our literature, when properly operated, or no sale. We further guarantee to replace free of charge to purchaser any part of any machine that may develop inherent defects during one year after shipment.

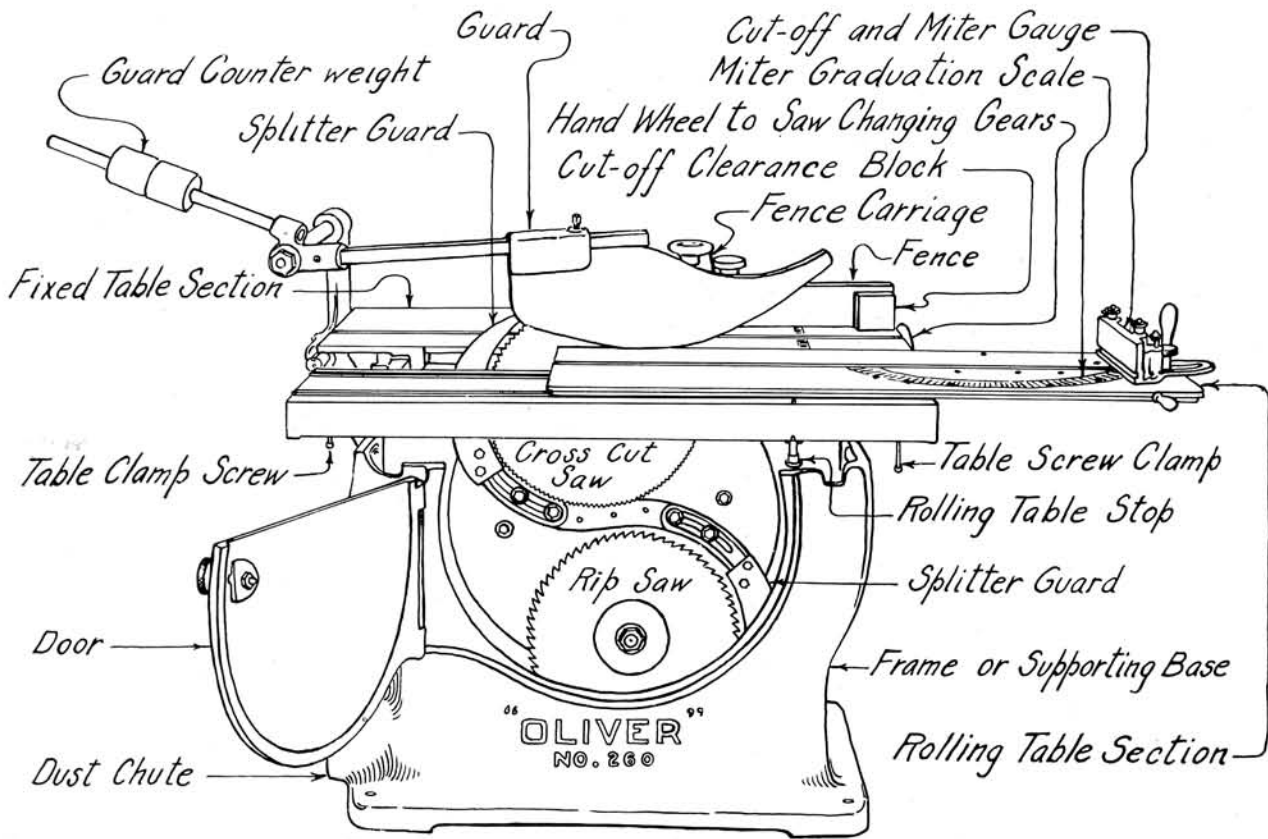
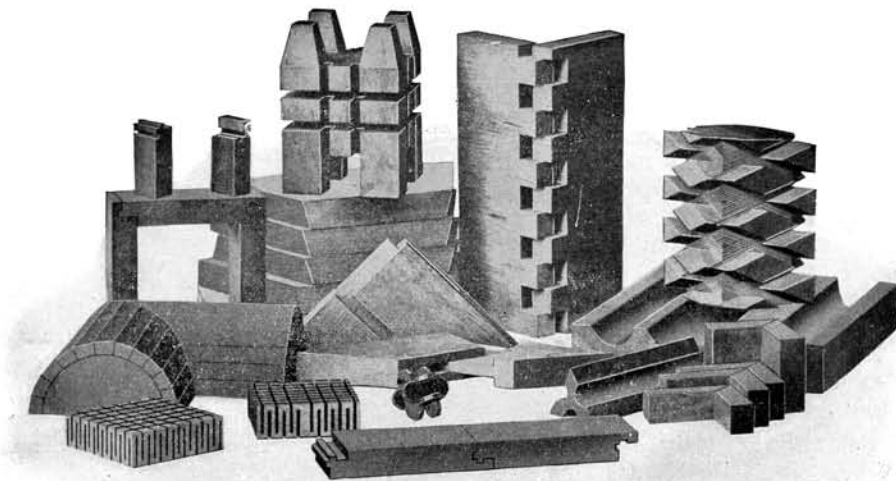


FIG. 7 Drawing of “Oliver” No. 260 Universal Double Arbor Saw Bench, giving names of principal parts and attachments



Samples of Special Work done on “Oliver” Circular Universal Saw Bench

## PART III—SAW BLADES AND THEIR UPKEEP

### Saw Blades

There are three distinct types of saw blades employed on circular saw benches, each having a distinctive shape of tooth and gullet and each particularly suitable for certain uses. These are usually classified as:

1. Circular Ripsaw, as shown by Fig. 13A and 15A. Experience has shown that the standard tooth illustrated by Fig. 15A is best for general purpose ripping of miscellaneous woods, both hard and soft. The shape of the tooth, the gullet space and the clearance on the back of the tooth are all

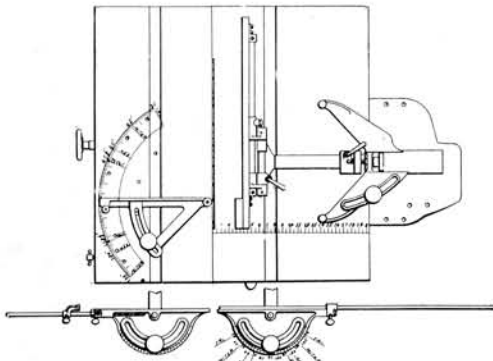


FIG. 9

Etching of Universal Table as furnished on "Oliver" Nos. 260, 90, 88 or 80 Saw Benches—showing graduations etched into table top, assuring positive accuracy

important. This standard shape affords a series of chisels, with plenty of back clearance, so that the side of the tooth back of the point has no drag, nor has the back of the tooth in the rear of the point. Tests have shown that a tooth space of  $1\frac{1}{4}$ " point to point is approximately ideal for lumber up to 2" thick. However, for coarse ripping on heavy work a wider spacing between teeth may be employed, or for fine ripping finer spaced teeth are desirable. The spacing range for average requirements is about  $\frac{3}{4}$ " to  $1\frac{3}{4}$ " point to point.

2. Circular Crosscut Saw (Fig. 13B). The tooth and gullet shape illustrated by Fig. 15B is best for general purpose crosscutting. The spacing on cut-off saws in sizes 12" to 16" ranges from  $\frac{7}{16}$ " to  $\frac{7}{8}$ " from point to point, depending on whether the saw is desired for fine or coarse. For all-around

use we usually recommend a cut-off saw with approximately 100 teeth in the 14" size.

3. Hollow Ground Miter Saw with Cleaner Teeth (Figs. 13C and 15C). Is also desig-

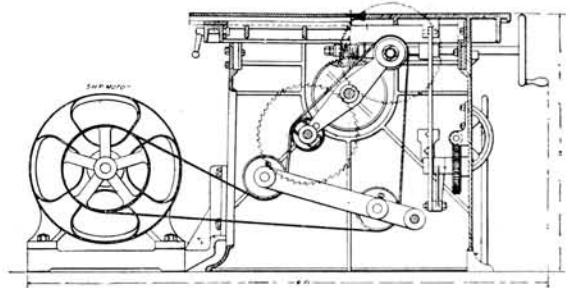


FIG. 10

Etching of Universal Double Arbor Saw Bench with Belted Drive from motor on bracket—shows rotating saw arbor yoke with hand wheel and worm-gear mechanism for rapidly changing from rip to crosscut saw or vice versa

nated as a combination saw, planer saw, etc. On this saw the cutting teeth are shaped and sharpened much the same as the standard crosscut saw, but every seventh tooth or so is a ripping tooth with a large throat opening for cleaning out the chips and providing the smooth finish of a rip saw. These miter saws are usually employed on single arbor variety saw benches, and serve for both ripping and crosscutting. This hollow ground saw is also a precision saw, giving an equally fine cut on either ripping or cutting off, but the saw has limited clearance and *must not be crowded*. Miter saws are not usually furnished with any set to the teeth, but depend on hollow grinding for clearance. Ordinarily they are

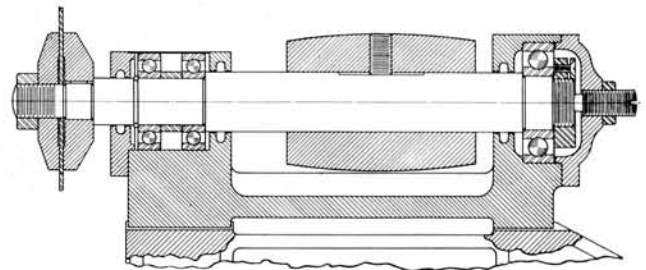


FIG. 11

Etching showing one of saw arbor units on Double Arbor Saw Bench with Belt Drive—also shows ball bearings with saw mounted close to main bearing

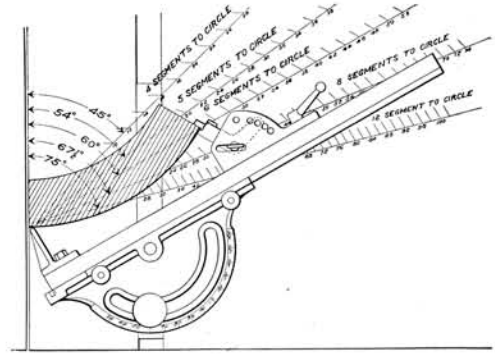
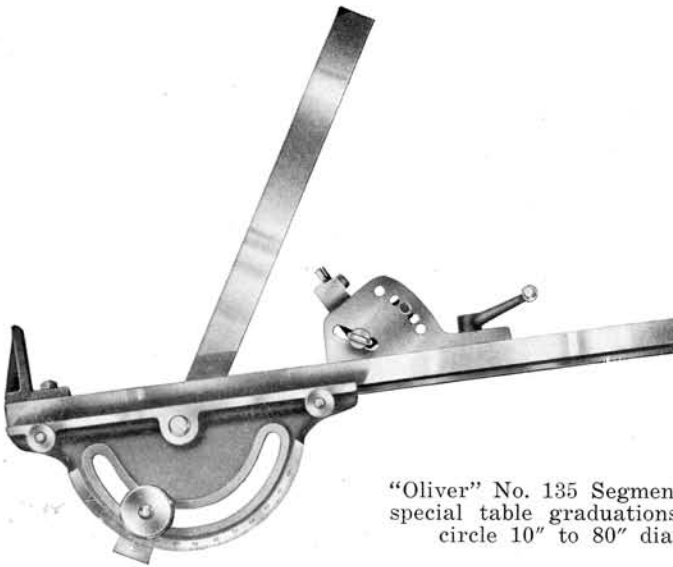


FIG. 12

"Oliver" No. 135 Segment Gauge, furnished special, if desired, with special table graduations for accurately cutting segments of any circle 10" to 80" diameter, using 4, 5, 6, 8 or 12 segments

ground about 4 gauges thinner at the collar than at the rim. Miter saws should be filed frequently and the teeth kept perfectly sharp and jointed, with the cleaner teeth filed just a trifle lower than the crosscut tooth sections. If this is not done, or if the miter saw is "crowded" or fed into the wood too fast, it will heat or "burn", lose its tension, causing it to wobble or wave on the rim. In such a case, the saw will have to be rehammered or retensioned by an expert.

### Upkeep of Saws

A circular saw with teeth in perfect round or jointed, uniformly spaced and uniformly shaped, with gullet outline affording the proper hook for the particular type of wood, and with

the teeth evenly set, will eat its way through wood several inches thick as easily as if passing through cardboard. On the other hand, if the teeth are dull they will merely scrape their way through, leaving a rough, ragged, sawed surface. If some teeth are longer or shorter than the average, there will be marks or scratches and the roughness may be such as to require excessive planing for the final finishing.

The direct motor drive saws run at 3,600 R.P.M., which is faster than the speed of the old style belt driven saws, hence the saws supplied with the latest type machines should be especially hammered for this high speed. Ordinary commercial saw blades do not always perform satisfactorily on the modern high



FIG. 13

(b)  
Solid Tooth Circular  
Crosscut Saw

(a)  
Solid Tooth Circular  
Ripsaw

(c)  
Hollow Ground Miter Saw  
with Cleaner Teeth  
(Also known as combina-  
tion or "planer" saw)

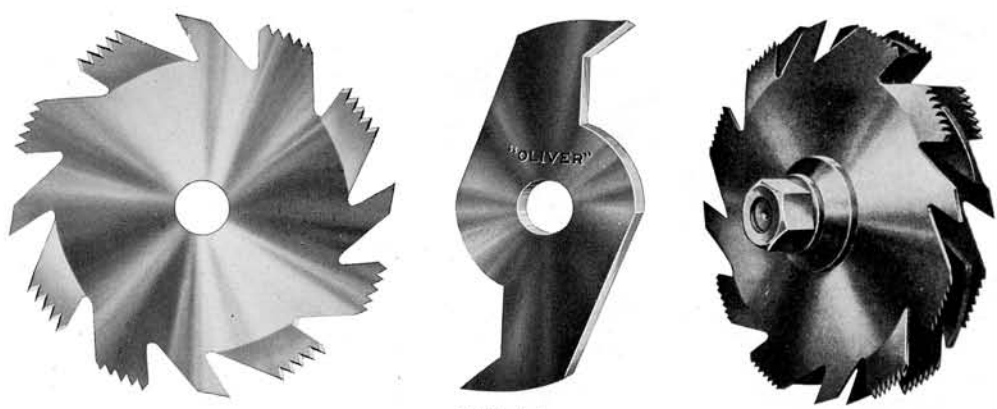
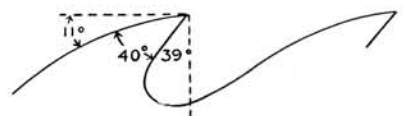


FIG. 14  
 Patented Dado or Grooving Head

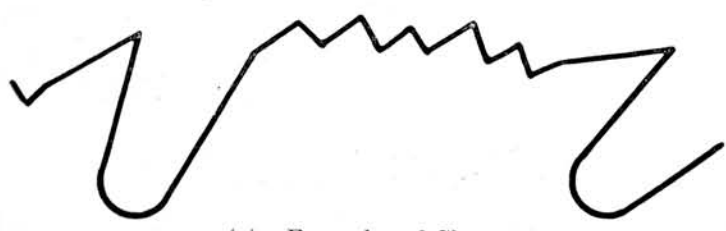
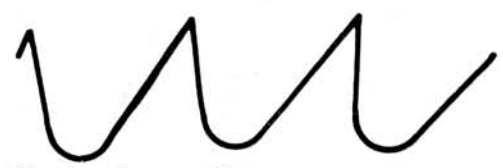
- (a) Outside Dado Saw  
 (Two usually needed)
- (b) Inside Cutter
- (c) Complete Dado Head  
 ready for use



(a) Examples of Shape of Tooth and Gullet on Circular Rip saws



(b) Examples of Shape of Tooth and Gullet on Circular Crosscut Saws



(c) Examples of Shape of Teeth and Gullets on Combination Miter Saws

FIG. 15

speed saw bench. Unless the saw is properly tensioned for this speed it will not stand straight, but will run "snaky" and vibrate. Again, if the saw contains lumps, ridges, bends or twists, there will result heating and increased distortion of the blade, burning in spots, with impairment of the temper, some portions of the saw will show black on one side, while on the opposite side the lump will stand out, brightly polished by frictional contact in the cut.

### Saw Fitting Tools

A dull saw can never produce a clean, smooth sawed surface and it is therefore of great im-

portance that suitable fitting tools be available. A blade properly sharpened on an automatic circular saw sharpener will last longer, cut faster and use less power than when sharpened by any other method. It is now possible to procure an automatic sharpener that will not only handle circular saws, but band saws and hand saws as well, (Fig. 16), making it a good investment for almost any shop.

While the teeth of rip saws are preferably swaged for production work, in most shops where only a few small circular saws are employed, spring set is usually employed for both rip and cut-off saws. For such use we recommend a circular saw setter of the automatic

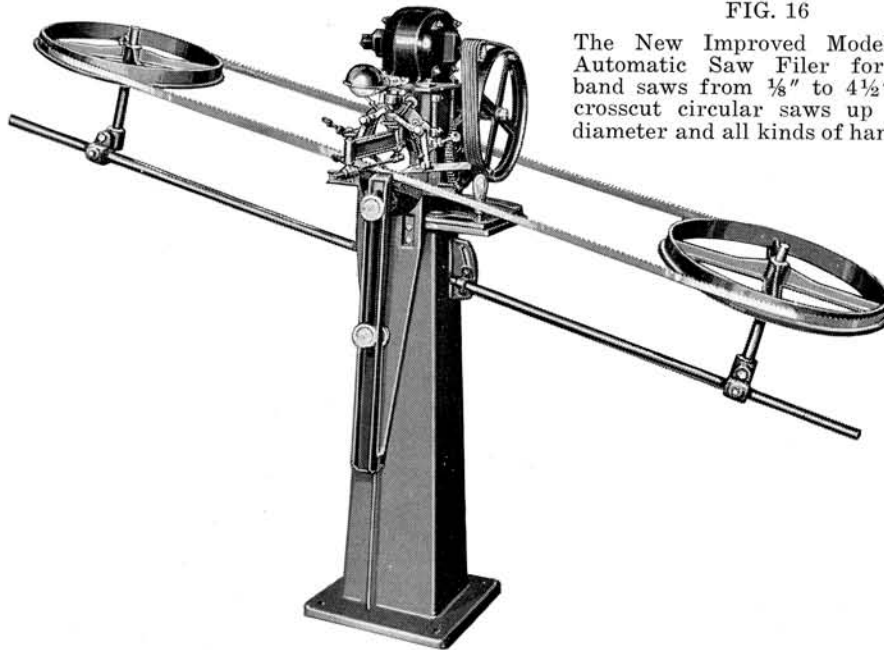


FIG. 16

The New Improved Model F-24 Automatic Saw Filer for filing band saws from 1/8" to 4 1/2" wide, crosscut circular saws up to 24" diameter and all kinds of hand saws

trip hammer type, (Fig. 17B), or a plain type saw setter (Fig. 17A).

If it is desired to hand sharpen your own circular saws, procure a circular saw filing vise



FIG. 16-A  
No. 409 Adjustable Circular Saw Filing Vise

(Fig. 16A) and some "round edge" saw files, then observe the following "DON'TS":

1. Don't use square edged or triangular shaped

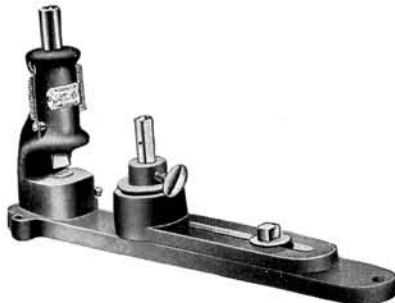


FIG. 17-A  
Plain Circular Saw Set for use with hand hammer

files except on fine tooth crosscut saws, and then the edges of the triangular file should be round. Nine cracks out of ten in a circular saw start from using a sharp cornered file.

2. Don't let the saws get too dull—sharpen often.
3. Don't let the original set of the saw teeth



FIG. 17-B  
Trip Hammer Circular Saw Set

be worn or filed away—use a saw setting tool and reset the teeth.

4. Don't let your saw get filed out of round—a saw out of round is out of balance and gets worse with each period of use.
5. Don't expect a hollow ground miter saw to do production work.
6. Don't allow a saw to become coated with pitch or gum—this will cause a saw to heat in spots and ruin the blade. Clean with kerosene.
7. Don't overfeed the saw. Crowding a saw blade beyond capacity is productive of bad work—a strain on the blade and also on the motor.

## PART IV—SAFETY RULES

### Guards

Undoubtedly no machine is so useful in the woodshop as a circular saw, because of the great variety of operations that it makes possible. Like all machines with high speed revolving cutters, however, it is very dangerous, unless properly guarded and judiciously used. Every precaution should be taken to avoid accidents.

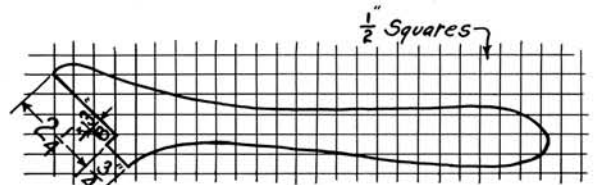
All of the "Oliver" Saw Benches are of the fully enclosed type, that is, have cabinet type frame that encloses the saw and other operating mechanism under the table, and the larger machines are provided with a splitter or spreader and an automatic saw guard for guarding the saw above the table. (See Fig. 1). "Oliver" machines are safeguarded to the limit. However, the operator should do his part and use the guards.

Always use a splitter or spreader guard in connection with a rip saw, to prevent the stock from pinching the saw blade, climbing the up-going teeth and being thrown. The splitter also guards the hand of an operator reaching back of the saw, protects an off-bearer and prevents edgings being caught and thrown.

The "Oliver" Automatic Saw Guard (Figs. 1 and 6) is mounted on a bracket set cornerwise with the table to permit full use of table, and is purposely made flexible in adjustment so that it can be set to suit the ideas of the individual operator and as wide a variety of work as possible, thus giving as little excuse as possible for not using the guard. The hood that covers the saw is balanced by weights and can be adjusted to ride heavily or lightly on the work being sawed. If necessary on dadoing or special work, where the guard may not readily be used, it can quickly be tilted back out of the way, or by loosening one or two screws it may be removed entirely.

### Safety Rules

1. Don't hang the saw guard on the wall—use it. Use some type of guard to protect the worker from the saw whenever the nature of the work will permit.
2. Don't take the splitter off—off the rip saw in any event. It is the most important guard on the saw bench.
3. Don't allow the saw to project more than  $\frac{1}{8}$ " above the stock to be cut. More than this invites unnecessary danger.
4. Don't stand directly behind or in line with a circular saw when in operation, but rather to the left or right, because the force of a piece thrown back could cause serious injury.
5. Avoid reaching over a revolving saw for anything. Have an assistant to "tail" the machine when necessary.
6. Avoid wearing loose clothing and have the sleeves rolled above the elbows and the necktie off or tucked securely within the shirt.
7. Use a push stick (Fig. 18) for all narrow ripping between the fence and the saw. Short length stock should be carefully drawn, after sawing slightly more than halfway through from one end, and the cut completed by reversing the piece end for end, keeping the same edge against the fence.
8. At no time do either ripping or crosscutting without holding the stock either against a ripping fence or a cut-off gauge.
9. Rip no stock unless at least one edge is straight and quite free from roughness or projections and place that edge against the ripping fence. In fact, it is best to joint one edge before ripping. Curved or irregular edges may cause binding and possible accidents.
10. Do no crosscutting of narrow stock using ripping fence as right hand stop unless you use clearance block (Fig. 7) attached to face of fence at front end.
11. See that all adjustments on machine are tightened and gauges and attachments fastened in position by means of the pins



PUSH STICK

FIG. 18

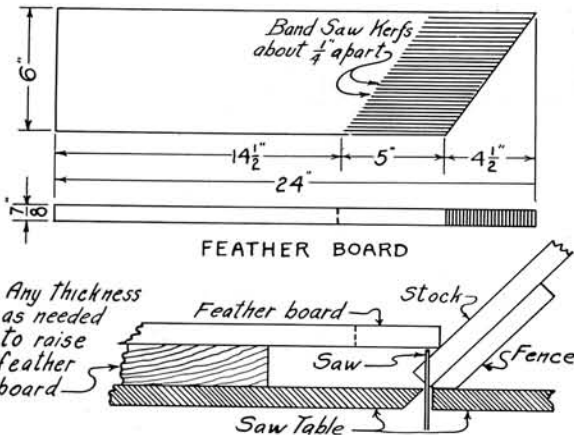


FIG. 19

and clamping screws provided for that purpose.

12. Don't change the saws without first opening the switch or starter. Better yet, remove the fuses on that particular circuit back in the cut-out cabinet or wall panel, especially when the machine is down for repairs.

13. Avoid using a dull saw or one that does not have proper set. Both are causes of overheating a saw and may result in damage to the machine and operator. Overheated saws will warp and wobble, causing the saw teeth to become injured as well as the table, and may often frighten an operator, especially a novice, resulting in an accident. When a saw wobbles, do not shut off the power, but remove the stock quickly and permit the saw to straighten out by centrifugal force and cool off. Generally, burned or wobbly saws had best be returned to the factory for hammering or retempering.

14. Don't clean saw tables off with your hands—use a stick.
15. Don't let dirt or scraps accumulate around the machine. Keep it clean at all times. Otherwise some one may slip when stepping on sawdust, grease, etc., and get hurt.
16. Last, but not least—*don't look around while operating the machine.* Keep your eyes on your job and your fingers on your hand!

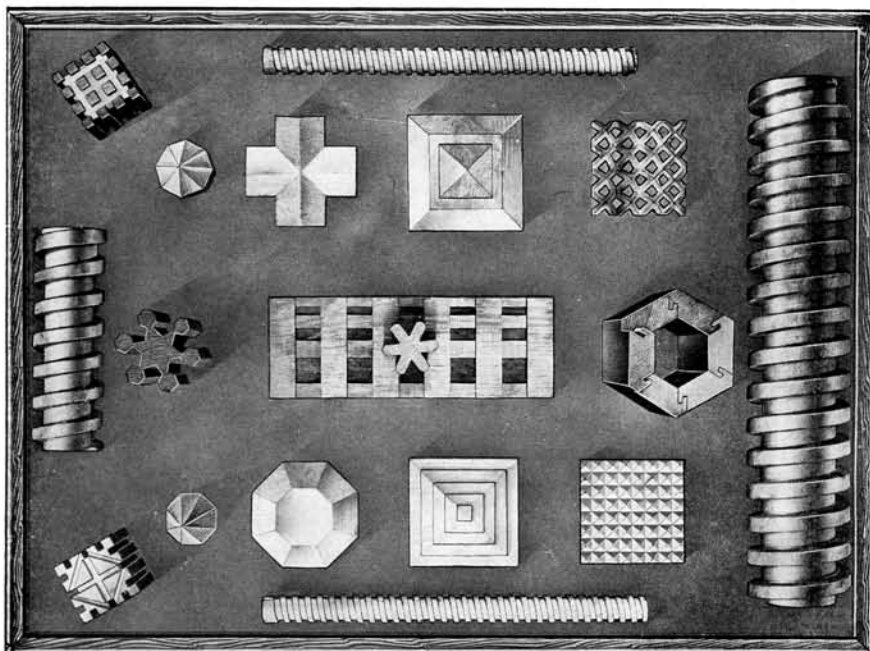


Illustration of "Trick Cuts" on Oliver Saw Benches

## PART V—OPERATIONS

### Simple Ripping

The easiest operation at the circular saw is simple ripping:

1. The ripping fence is set according to the scale on the table, away from the saw, a distance slightly greater than the desired width of the finished stock, and locked. The slight extra width,  $\frac{1}{16}$  to  $\frac{1}{8}$ ", is to allow for finishing the edge at the jointer.
2. For accurate settings the micrometer adjustment may be used.
3. Make sure that the taper pins of the fence carriage are seated in the holes and that it is securely fastened to the table.
4. Observe that the thumb screws for holding the fence in position are set and that the fence is in a position at right angles with the table.
5. Check the table to be sure that it is in a level position, or 90 degrees with the saw.
6. Use a rip saw on the arbor. If a Universal Saw Bench is used, bring the rip saw into position.
7. On Plain Table Saw Bench, raise or lower the saw table or saw as necessary and set the clamp so the table or arbor cannot move.
8. Be sure the guard is in position over the saw and the machine is ready for the power.



FIG. 20  
Simple ripping—ripping stock to width

9. Stand at the left of the work.
10. Place the straight or jointed edge of the stock against the fence and feed the stock against the saw, (See Fig. 20).
11. When stock is ripped into narrow strips it is advisable to use a push stick similar to that shown in Fig. 18. It should be of sufficient length and notched at such an angle that the handle part will extend well above the fence. The notched end which comes in contact with the end of the stock should be cut deep enough to hold it securely down on the table without danger of a "kick-back". (See Fig. 21).



FIG. 21  
Ripping narrow stock—use of push stick

12. A guard would be in the way when ripping narrow strips, so see that the saw does not project more than is necessary above the stock.
13. When ripping stock wider than the capacity of the first setting of the ripping fence, the fence carriage may be moved away from the saw to a second or third set of locating holes, and will immediately adjust itself by means of the tapered pins.
14. Clamp the fence carriage to the table and any desired width to the capacity of the saw table may be ripped.
15. When ripping wide stock, have the body against the end of the stock supported by the hands as the work is fed to the saw. Keep to the right side of the machine and



FIG. 22

Ripping wide stock to width—fence moved to second set of holes in table

force the stock steadily ahead while keeping it firmly against the ripping fence. (See Fig. 22).

16. It may be well to have an assistant "tail" the machine.

### Rabbetting

Rabbetting may be accomplished by two simple ripping cuts at right angles to each other:

1. Set the ripping fence to locate the face kerf from the edge of the piece and adjust the saw for depth of cut.
2. With the edge against the fence make the first kerf.
3. Reset the saw and fence and with the stock resting on edge, keep a face against the fence and remove the desired waste strip to form the rabbetted edge.
4. By rabbetting both sides on the same edge of a board a tongue may be formed as used on flooring. (See also paragraph regarding use of dado head.)

### Grooving

Grooving and grooved joints may be made by adjusting everything as for ripping. The saw, however, must not cut entirely through the stock:

1. Set the saw for the depth of cut for the required groove.
2. Adjust the fence for locating the groove and saw the first kerf. By adjusting the fence for each cut by  $\frac{1}{8}$ ", or the thickness of the saw, the groove may be enlarged to any width desired.

3. Where the groove is not needed the entire length of the stock, a stop may be used. (See also paragraph regarding use of dado head.)

### Ripping at an Angle

#### Fence Tilted

1. When ripping narrow stock at an angle, or when chamfering or beveling, see that all adjustments are made as for simple ripping, except that the fence is tilted at the proper angle and securely locked in place. Narrow stock will lay against the fence quite easily and may be handled as when simple ripping. When wide stock such as tops for small stands, etc., are chamfered, the overhanging weight may cause the lower end to swing away from the fence, changing the angle of cut. There are two methods of overcoming this:
2. The first method is to keep the pressure against the fence with the left hand well down while the upper hand helps to hold the piece from tilting to any angle other than the proper angle as set for the fence. (See Fig. 23).



FIG. 23

Ripping narrow stock at an angle—fence tilted

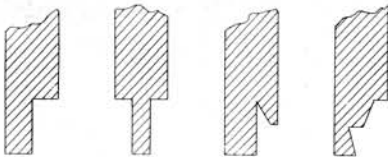
3. The second method for holding the stock at the correct angle is to use a feather board, (Fig. 19). This device serves two purposes. It acts as a guard, protecting the operator from the saw, a very important point since the saw guard cannot be in place for this operation. Secondly, when properly clamped to the table, it helps also to hold the stock against the fence while being cut. It may be raised or lowered according to the height of the saw above the table, by clamping various thicknesses of stock underneath it.

4. A feather board can easily be constructed at the band saw from a piece of stock 6" or 8" wide and 24" long, as shown in Fig. 19. In Fig. 24 is shown an operation using a feather board. Notice how the device guards the worker from the saw and supports the stock against the fence.
5. When chamfering all the way around a piece of stock, that is crosscutting as well as ripping, it is best to use a miter or combination saw.
6. When chamfering the ends of narrow stock that might have a tendency to tip toward or away from the worker, while held on end, a push stick, cut square on the end and held against the stock to be cut, will be of assistance. The face of the push stick should rest against the fence similar to the push stick used when cutting tenon cheeks. (See Figs. 37 and 38).



FIG. 24

Panel raising—bevel or chamfer cutting edges for tops—fence at an angle. Note feather board guard to protect operator from saw



### Ripping Stock at an Angle

Table Tilted

A second method of ripping stock at an angle is by the use of a tilting table:

1. With the table at an angle, the fence, if left on the right side of the table, would be elevated above the saw. Any stock sawn would have a tendency to slide away from the fence and crowd against the saw with the possibility of a "kick-back". Besides,

there would be the necessary effort of the worker to keep the stock against the face of the fence. Therefore with the table tilted, the fence carriage should be on the left side of the saw so that the stock will lay in a trough so to speak, formed by the table and the fence.



FIG. 25

Ripping stock at an angle—chamfering or beveling at the circular saw. Fence moved to left side of saw. Table tilted to proper angle

2. The waste stock will be at the right or side above the saw. Stand at the left side of the saw table as the waste wood lying free will drop against the saw and be carried to the front of the machine. (See Fig. 25).

### Simple Crosscutting

#### Squaring First End

1. When crosscutting stock, the marked or jointed surface rests on the table, while the jointed edge is held firmly against a miter or universal cut-off gauge.
2. To cut off or square the first end of the stock, see that the ripping fence is moved well to the right away from the saw.
3. Check the universal gauge for squareness by placing the gauge upside down and against the front edge of the table, while the slide is in the slot or groove of the saw table. Clamp the parts securely together while in this position. Turn the gauge over and replace it in the groove.
4. The gauge is generally used in the slot or groove in the left half of the table.
5. For all simple cut-off sawing, the guard should be in place over the saw.
6. An engraved line on the table shows the exact location of the saw with relation to the stock to be cut.

7. Before applying power, see that all moveable parts are securely clamped and that the table is not tilted, but is in a position at right angles to the saw.
8. Hold the wood securely as shown in Fig. 26, so that it will not move lengthwise along the universal gauge.



FIG. 26  
Simple crosscutting—  
squaring first end

9. The stop rod is not necessary when squaring the first end, but may be used if desired, and has the added advantage of securing the stock, preventing other than a square cut.
10. Push the piece against the saw, allowing enough stock to project beyond the line of the saw to square the entire end. Several pieces may be cut at one time up to the capacity of the saw.

### Squaring Second End Cutting to Length

1. To square the second end of the stock, which has been cut to approximate length, rough size, adjust the proper length stop rod securely in the slot of the miter or universal gauge and clamp the stop to the desired finished length.
2. The distance is measured from the left cutting edge of the saw to the stop. (See Fig. 27).
3. Length gauges or stops may be constructed from strips of wood clamped to the miter or cut-off gauge, especially when the rods furnished are too short.
4. When handling long stock it is advisable to remove the ripping fence clear from the table top.



FIG. 27  
Crosscutting—stop rod on cut-off gauge  
adjusted for length to square second end

5. Where duplicate short length stock is required, and the short rod with the pin stop is used, observe that one end of the stop rod does not extend in the path of the saw. Reverse the rod end for end if necessary, or use a stop block of wood clamped to the gauge with a "C" clamp, or small hand screw. (See Fig. 28).
6. To cut long lengths of stock into duplicate shorter lengths, the ripping fence in combination with a clearance block is used for a stop. The end of one or several long pieces is squared up and abutted against the clearance block which is attached to the fence by a thumb screw. The length of the stock will be the distance between the face of the clearance block and the right cutting edge or teeth of the saw and may be cut to any length by adjusting the fence to within the limits of the saw table. (See Fig. 29).



FIG. 28  
Simple crosscutting—using block of  
wood clamped to gauge for stop

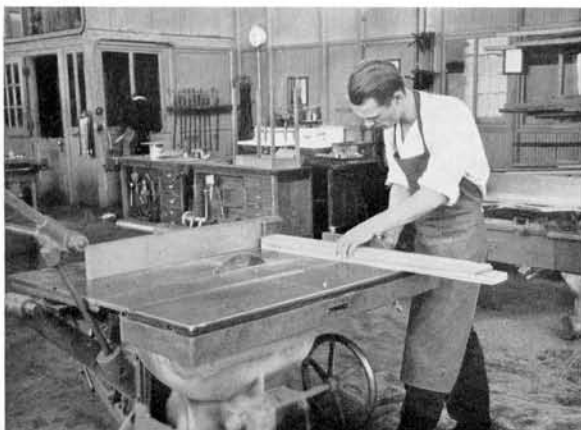


FIG. 29

Crosscutting long pieces to short duplicate lengths, using clearance block on ripping fence

### Crosscutting Wide Stock

When the stock is wider than can be conveniently handled between the saw and the universal gauge for crosscut work, the sliding table is used:

1. The universal gauge is replaced by the miter cut-off gauge, which is pinned in the locating holes and securely clamped to the sliding table.
2. The ripping fence is moved well out of the way. The locking pin located under the table at the left edge is withdrawn to release the table so that it is free to move on the rollers.
3. The sliding table is drawn towards the operator far enough to allow the stock to be placed against the miter gauge and clear of the saw teeth.



FIG. 30

Another view of same operation

4. Hold the stock as shown in Fig. 31, the left hand hooked over the farther edge of the stock, while the right hand is placed on the handle of the miter gauge.
5. It is well to use a stop rod and to butt an end securely against the stop to prevent any creep in the stock.
6. Reverse the piece, end for end, keeping the working edge against the gauge.
7. Reset the stop and, with the finished end against it, cut the piece to exact length.



FIG. 31

Crosscutting wide stock or glued-up work—using sliding table section and stationary miter gauge furnished on universal table

### Dadoes and Gains, or Stopped Dadoes

1. Dadoes and gains may be cut with a cross-cut saw set as for simple crosscut work, except that the saw projects above the table only an amount equal to the depth of the dado or gain.
2. The width of the dado may be determined by the number of cuts made, moving the stock each time the thickness of the saw.
3. Stock may be abutted either against the fence or against a stop which is adjusted for each cut.
4. If the limits of the dado are laid out with a knife and try square, the first two cuts may be made just inside and adjacent to these lines. The intervening stock is removed next by a series of cuts.
5. Where corresponding dadoes are to be made as, for example, on opposite ends or sides of a cabinet, both dadoes should be cut with the same set-up.



FIG. 32

Cutting tenons on circular saw. (a) Making shoulder cuts on first end, using stop rod on cut-off gauge

- Gain joints or stop dadoes are cut only part way across the stock, after which the end of the cut is finished with sharp chisels. (See also paragraph regarding Grooves, Rabbits, and Dadoes.)

### Cutting Tenons

The ideal method for cutting tenons on a production basis, of course, is by the use of a single or double end tenoner. When a circular saw is used there are several methods of procedure:

- The important factor about tenons is to have the length between the shoulders correct, to have the shoulders meet at the correct angle all the way around, and to have the tenon fit the mortise snugly.



FIG. 33

Cutting tenons—making shoulder cuts on second end—piece reversed using same stop setting

### (A) Square Shouldered Tenons

#### First Method

- One of the simplest methods for making tenons, when all work is accurately done, is to cut all pieces to finished width and thickness and to exact length, including the length of the tenons.
- A crosscut or combination saw is used.
- Raise or lower the saw or table for the proper depth of cut and clamp securely.
- Fasten the miter cut-off gauge to the sliding table at an angle of 90 degrees with the plane of the saw.
- Withdraw the pin so the table may slide.
- Move the ripping fence toward the saw so that the distance from the left cutting edge to the fence will be the length of the tenon, and clamp securely. All tenons of the same

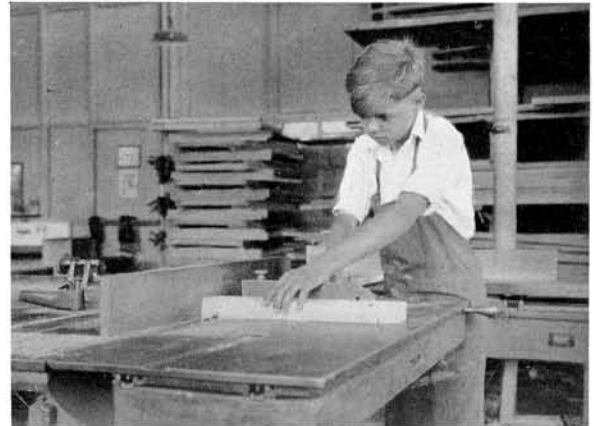


FIG. 34

Cutting tenons—making shoulder cuts, using rip fence as stop

length for duplicate members may now be cut on either end, provided the stock is uniform in length, width, and thickness.

- For all face shoulder cuts, keep an edge of the stock against the gauge and an end tight against the fence.
- Keep a face against the gauge for edge shoulder cuts. Change the depth of cut if necessary, but the fence remains in the same position. (See Fig. 34).

#### Second Method

- A second method of shoulder cutting for duplication of parts is to use, in place of the fence, a stop rod for measuring off the tenon length. Either a universal gauge, or a miter cut-off gauge is used.

2. With all pieces cut to proper length, set the stop so the stock will project beyond the saw, measuring from the left cutting edge or teeth of the saw, the required length of the tenon. With the stop properly set, all shoulder cuts for the same length tenon on similar dimensions may be cut. (See Figs. 32 and 33).
3. To make face or edge shoulder cuts, proceed as for the first method, changing depth of cut if necessary.
4. A stop block may be clamped to the gauge and used in place of a stop rod. (See Fig. 28).

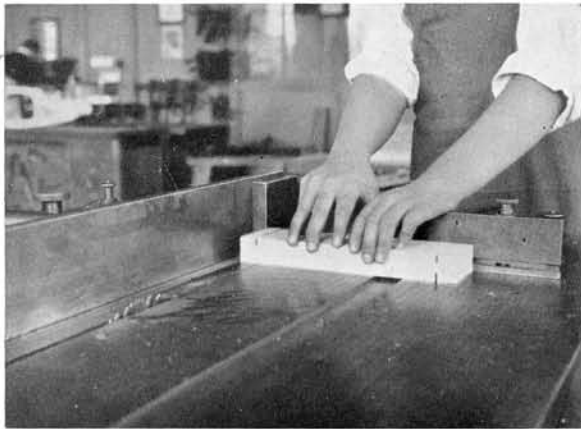


FIG. 35  
Cutting tenons—shoulder cuts on second end using clearance block on rip fence to give finished length

#### Third Method

Shoulders on tenons also may be cut by using the clearance block secured to the fence as a stop, (see Fig. 35). There is a possible chance for error from stock creeping or sliding along the gauge, as after the stock passes the clearance block it is more or less free to move in either direction, depending on the worker's grip upon the gauge and stock. NOTE: If there should be any variation in the length of the pieces to receive tenons on both sides, the length between the shoulders should be carefully measured off for each piece of stock.

#### Fourth Method

1. Be sure that all pieces are accurately thickened.
2. Use a dado head which has been properly jointed so as to leave a smooth bottom to the cut. Be sure that the outside saw blade or a scoring saw is used next to the shoulder to be cut.
3. Proceed same as in the first method as if you were to make face shoulder cuts. The

width of the dado being equal to or greater than the length of the tenon, one slide across will at once remove all the undesired stock from one face; then, by turning the piece upside down and taking another cut, the tenon is produced. If the tenon desired is longer than the width of the available dado head, successive cuts taken on each side will produce the tenon.

### (B) Angular Shoulder Cuts

1. Frequently face shoulder cuts on tenons are made at an angle. For this work both universal gauges are necessary, one used on each side of the saw.
2. They should be set to the same angle with reference to the cutting line of the saw, but so that the angle cut on the stock, between the fence and the saw, will be obtuse.
3. It is very important that the shoulder kerfs coincide with each other on opposite sides of each tenon. A stop rod should be used on each gauge with both stops set for the same distance from the cutting edge of the saw. After one tenon has been properly cut, all similar tenons on the same dimensioned stock may be duplicated.
4. Reset the stops and cut the tenons on the second end if necessary.
5. Keep the same working edge against the gauge at all times.
6. Edge shoulder cuts, at an angle, should be cut on the band saw.

### (C) Tenon Cheek Cuts

1. The cheek cuts on tenons are made after the shoulder cuts have been completed. Remove the universal or miter cut-off gauge and secure the table if necessary. A rip saw or combination saw is used.
2. Tenons are usually one-half the thickness of the stock and are laid out on the center of the ends. Lay out the cheek lines of one tenon carefully with a marking gauge.
3. Adjust the fence so that the saw will just cut to the cheek line. Generally all measuring and work is done from the marked or working surface or edge, but if all stock is uniformly and accurately brought to finished dimensions, either face or edge may be held against the ripping fence when cutting the cheeks. After one tenon has been properly cut, all cheek cuts for the same size tenons on similar dimensioned stock may be cut at this setting.

- If there is any doubt as to the uniformity in the thickness of the stock, all work should be cut with the working face against the fence. This will necessitate moving the fence for the second cheek cuts.

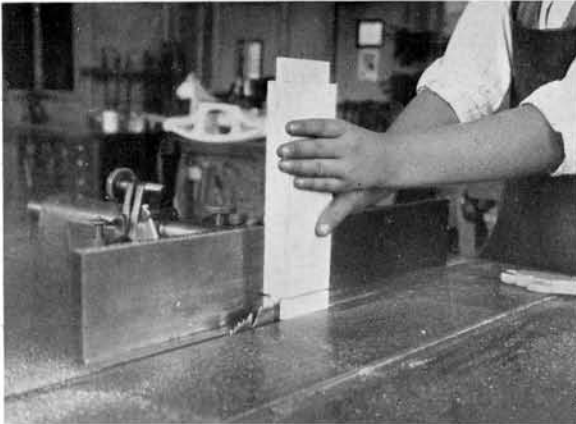


FIG. 36  
 Cutting tenons—making cheek cut by free hand method

- The free hand method of holding the stock while cutting cheeks is shown in Fig. 36. The right hand hooks the stock with the thumb as it rests on and holds it firmly against the fence. The left hand above the other helps to support the piece and aids in keeping the end flat on the table. It will be noted that no saw guard can be used for this operation, and that there is a chance for the stock to rock to or from the worker as well as away from the fence.



FIG. 37  
 Cutting tenons—cheek cut made with aid of push stick, forward end of which is cut to proper angle—stock held in correct position

- A push stick five inches or so in width, cut square with the edge to rest on the table, may be used as shown in Fig. 37, and

helps to prevent rocking as it keeps the tenon stock in a perpendicular position.

- When the face shoulders of tenons are at an angle the push stick should be cut at such an angle as to brace the tenon stock in the proper position while cutting cheeks.
- To serve as a guard, protecting the operator from possible accident, and also to assist in holding the stock to be cut, securely against the fence, a feather board, previously described and illustrated in Fig. 19, may be used. (See Fig. 38.)



FIG. 38  
 Cutting tenons—cheek cut with aid of push stick and feather board which holds stock against fence and serves as guard over the saw

- Both cheek cuts on the tenons may be made in one operation by inserting two saws on the arbor with the proper space filler between. Remember to allow for the set in the saw, which, if not compensated for, will make the tenon smaller than the thickness of the filler collar by an amount equal to the combined set of the inside teeth on the saws. Paper or cardboard fillers may be used on the saw arbor to make fine adjustments.
- Tenons on curved stock, such as chair backs, etc., may be held in proper position with relation to the saw, by means of jigs, bandsawed to the curved contours.

## Simple Mitering

### Miter or Universal Gauge at an Angle

- Miter saw work requires a very smooth cut which necessitates the use of a special saw, called a miter or combination saw. The cutting edge is composed of groups of several crosscut teeth followed by a rip-saw tooth, hence the name "Combination

Saw". To obtain clearance, instead of a "set" in the teeth, the body of the saw is hollow ground.

2. To cut a simple miter from edge to edge of a piece of stock, as for picture frames, set everything as for simple crosscutting, except that the miter cut-off gauge, or universal gauge, is set at the desired angle of cut.
3. When using the miter cut-off gauge in conjunction with the sliding table, for standard cuts, as for square, hexagonal or octagonal work, no great danger will be encountered in obtaining the correct angle as tapered locating holes for the taper pins on the gauges will accurately place the gauge.
4. Great care should be taken to check the universal or sliding gauges, however, to see that the angles do not change when the knob is screwed tight. These gauges may be used on either the right or the left side of the saw as the nature of the miter may demand.
5. The use of a stop is advisable to prevent possible creeping of the stock along the gauge.



FIG. 39

Simple miter—miter gauge set at proper angle

6. It is important that all miters be cut from the same working face or edge to obtain accurate fitting of joints. (See Fig. 39).

### Simple Mitering Table Tilted

1. When the nature of the work demands a miter cut from face to face of the stock, as on wide boards forming the sides of a box, the saw could not be raised sufficiently to handle the cut. In this case the table is tilted to the proper angle, while

the miter or universal gauge is set for 90 degrees, or at right angles to the plane of the saw.

2. See that the fence is clear of the work and securely clamped.
3. Check the universal gauge for squareness.
4. If the sliding table is used with the miter-cut-off gauge, clamp it securely in position.



FIG. 40

Simple miter or bevel; table tilted to proper angle—stock held at end by adjusting stop rod in miter gauge

5. Since the work rests on the slanting table, it is advisable to use a stop rod or stop block clamped to the gauge, to prevent slipping along the gauge.
6. Stand to the left of the table as shown in Fig. 40. The same operation is shown in Fig. 41. Here a facing of wood has been screwed to the gauge face, thus covering the stop rod slot and so a stop block is clamped to the gauge.



FIG. 41

Simple miter; table tilted to proper angle—wood face screwed to miter gauge—wood block clamped to wood face to gauge proper length



FIG. 42

Cutting compound miter—tilting table and miter gauge set at desired angles—on "Oliver" Saw Benches with universal sliding tables. Hopper shaped boxes with 4, 6 or 8 sides (see Chart) may be made reading directly from graduations on machine with positive assurance pieces will fit together perfectly

## Compound Miters

Table Tilted and Gauge at an Angle

1. When the angle of cut slants from face to face as well as from edge to edge, such as would be necessary for cutting miters on a box with slanting sides, the cut is called a compound miter or hopper cut.
2. A special chart or graph is shown with Fig. 42, from which may be obtained the correct angle of inclination for the table and the corresponding angle for setting the miter gauge to cut square, hexagonal, or octagonal box sides which incline at any angle from perpendicular to 45 degrees.

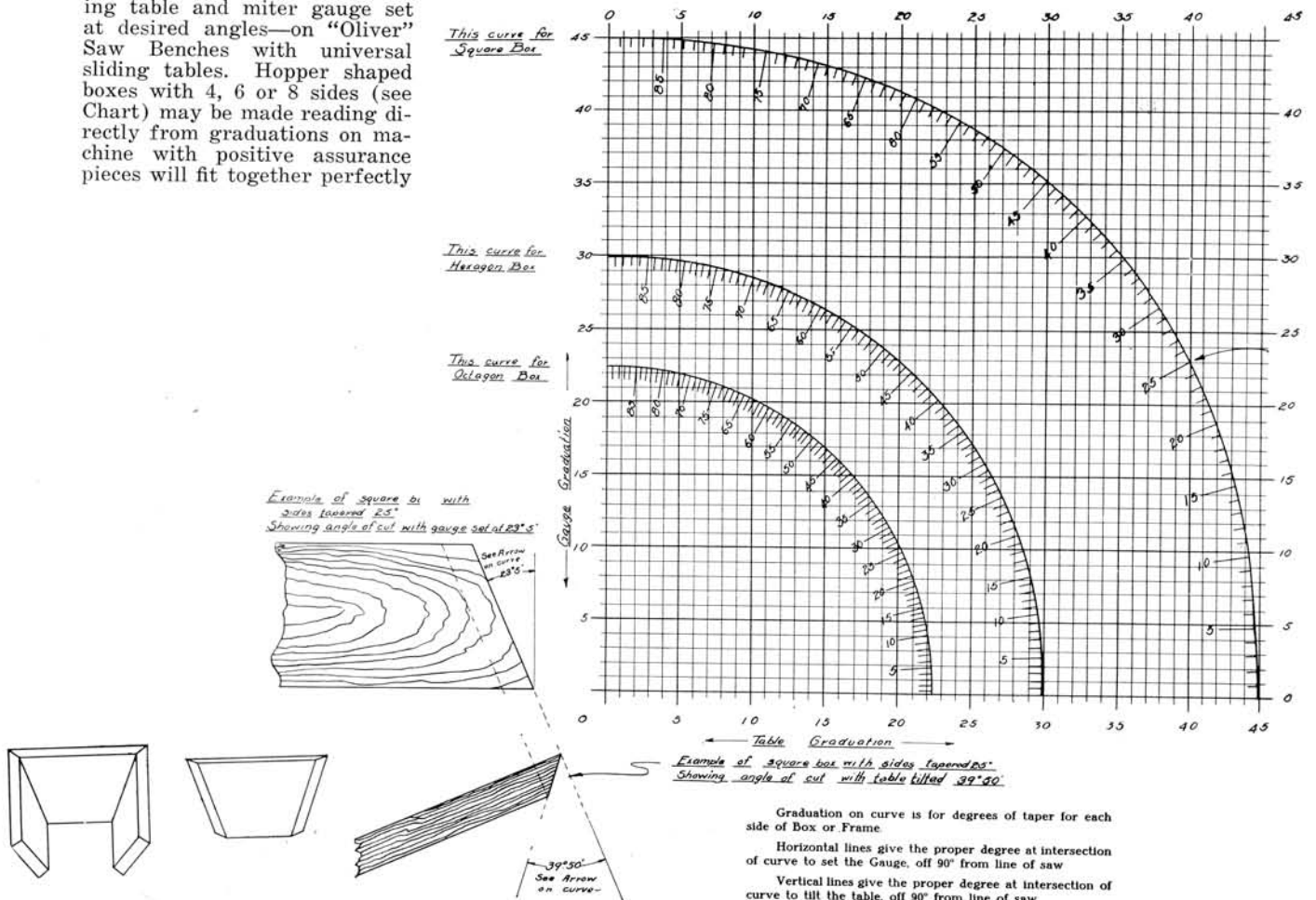


Diagram illustrates method of setting saw gauge and table top to obtain necessary compound angles required in building a pyramid shaped column or hopper box having 4, 6 or 8 sides. Example illustrates a four sided box with sides flaring 25 degrees. First, determine degree of flare. For 25 degrees as illustrated, set miter gauge on left hand side of the saw to 23 degrees 5 min., as illustrated by arrow on curve. Second, tilt table to 39 degrees 50 min., as illustrated by arrow on curve. Graduations on curves represent flare of box. Table graduations represent number of degrees from normal horizontal position. Gauge graduations represent number of degrees from normal position, viz.: 90 degrees from line of saw. Horizontal lines represent gauge graduations. Vertical lines represent table tilting graduations.

The horizontal lines from 0 degrees at the bottom, to 45 degrees at the top, represent the graduations on the miter gauge. The vertical lines starting from the left at 0 degrees to 45 degrees at the right represent the graduations on the scale indicating the inclination of the saw table.

3. To use the graph, locate the point on the curve representing the particular type box desired, four, six, or eight sides, representing the angle of inclination of the sides.
4. Note its position with reference to the vertical lines of the graph and interpolate the degrees and minutes the table is to be tilted.
5. Observe the point of intersection with reference to the horizontal lines and estimate the setting in degrees and minutes for the cut-off gauge. With the table and gauge set as estimated, the proper miter will be cut. (See Fig. 42).

### Grooving for Splined Miter Joint

#### Fence Tilted

1. Box sides put together with a miter joint, unless reinforced, are not very strong. By cutting saw kerfs parallel with and at equal distances from the inside edges of both bevels and inserting a spline, a very strong joint is the result. NOTE: For strength the grain of a spline should run crosswise of a joint.
2. To cut the grooves or kerfs in the bevels, tilt the ripping fence at the proper angle so that the bevel, on the end of the stock, will rest on the saw table.
3. Move the fence toward the saw and lock in position so that the cut will be made very close to the inside edge of the bevel where the stock is thick. Fine adjustment can be made by the use of the micrometer knob. This permits a greater depth of cut and the use of a long spline.
4. Set the saw for the desired depth of cut and clamp securely. (See Fig. 43).
5. A push stick, cut square on the end, or at the proper angles for use on compound miters, will prevent tilting of the stock and help keep the bevel on the table, especially when narrow stock is used.
6. A feather board will help to keep the work at the desired angle against the fence. NOTE: The use of a push stick and feather board is similar to that described for use when cutting tenon cheeks. (See Figs. 37 and 38).



FIG. 43  
 Grooving—making splined miter joint with dado or grooving saw—fence at an angle

### Grooves, Rabbets and Dadoes

#### Use of the Dado Head

1. As stated under the use of rip and cross-cut saws, grooves, rabbets, and dadoes may be made with the above named saws, but it is a slow method. For production work the use of a dado head is preferable. It consists of two outside cutters similar to combination saws which do the slitting for the outside limits of the work, and several inside cutters of various widths which act very much as a chisel to remove the stock between the two saw kerfs, forming the desired width of cut. A dado head will cut from  $\frac{1}{8}$ " using only one outside cutter, up to 2" using all the cutters together. They function equally well with or across the grain of the wood. A special sleeve which screws on over the regular arbor screw is furnished with the saw table. (See Fig. 6).
2. To set up the machine for use with a dado head, proceed as follows: (a) Remove the circular saw. Remember, the nut has a left hand thread. (b) Screw the sleeve on the saw arbor, (turn sleeve to the right). (c) Place the outside cutter on the sleeve arbor so the cutting edge of the teeth revolve toward the front. Only one outside cutter is used for a  $\frac{1}{8}$ " kerf. Both outside cutters are used where a  $\frac{1}{4}$ " cut is desired. See that the two cutters fit snugly with similar groups of teeth placed together or the saws will cut wider than  $\frac{1}{4}$ ". (d) If a wider cut than  $\frac{1}{4}$ " is required, use the necessary inside cutters between the outside cutters. Have the cutting edges revolve toward the front. (e) Slip the proper filler collars or washers on the arbor and replace the nut. (f) Close the table

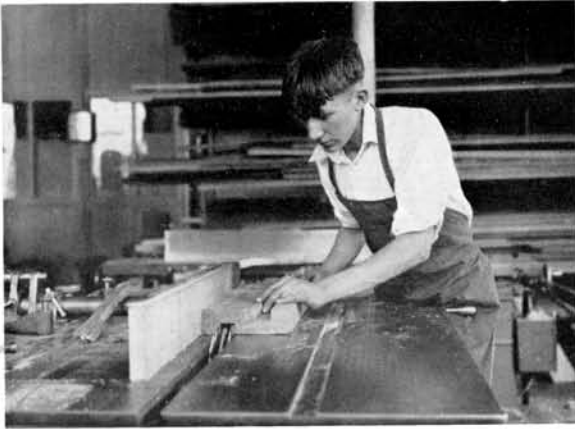


FIG. 44

Grooving—cutting groove with grain of board with dado head—width of groove determined by number inside cutters used in conjunction with outside dado saws

by sliding it laterally toward the dado head. Allow about  $\frac{1}{16}$ " clearance and clamp securely in place.

3. To cut grooves and rabbets. (a) Set up the dado head for width of cut and raise or lower the table to cut the desired depth. (b) Adjust the ripping fence to locate the groove or rabbet and proceed as for simple ripping, (see Fig. 44). (c) The edges should be parallel on stock to be rabbetted unless a wood face has been screwed to the fence so adjustments can be made up to the cutters.
4. Dados or gains are made with the same set up as for grooves and rabbets, except that the cuts are made across the grain. The miter cut-off gauge with the sliding table, or a universal gauge checked for squareness, is used for right angle cuts, (see Fig. 45). Dados or gains may also



FIG. 45

Grooving—cutting across grain with dado head

be cut at an angle by placing the gauges at an angle. (See Fig. 54).

5. Special grooving and moulding heads may be used on the saw arbor. These consist of cast iron heads, round or square, to which specially shaped knives and spurs are attached. The spurs slit the wood ahead of the cutters so that the sides of the cuts are smooth.

### Core Boxes and Mouldings

Saw kerf method. Core boxes and mouldings may be cut to approximate inside contour by cutting a series of kerfs, changing the depth of cut and the interval between the fence and the saw to approach the desired curve.

1. To shape the inside of a core box. (a) Cut the stock to finished width and thickness with both edges parallel. (b) Draw a center line on the end of the stock. (c) With a compass or dividers, lay out the contour of the core box. (d) Adjust the saw for the deepest kerf and cut on the center line of the core box stock, (see Fig. 48A). (e) Shift the fence away from the saw and decrease the depth of the kerf to follow the contour line and cut on each side adjacent to the first cut, holding each edge in turn against the ripping fence, (see Fig. 48B). (f) Continue making the adjustments of the fence and necessary difference in the depth of cut to follow the contour until the core shape is roughed out, (see Fig. 48C). (g) Finish the inside surface of the core box with sharp gouges or a core box plane. (h) Smooth the curved surface with moulding scrapers and with sandpaper held over a stick or block of wood 4 or 5" long, shaped to fit the contour of the core box. Coarse sandpaper may be used first, followed by finer grades.
2. Mouldings may also be shaped by the saw kerf method or in combination with miter cuts, using the ripping fence at an angle. (a) Draw the contour on the end of the piece. (b) All square shoulder cuts should be made first, (see Figs. 52A and 52B). (c) Approximate convex surfaces can be made by tilting the stock against the ripping fence adjusted at an angle. Vary the angle of the fence and move it as necessary for a series of cuts tangent to the convex contour lines, (see Figs. 52C and 52D). (d) Contour lines that cannot be reached by the above saw cuts are approximated by means of the saw kerf method as used for the core box, (see Fig. 52E). Like the core box, all work may be done by the saw

kerf method. (e) Smooth up the moulding with moulding scrapers, ground to shape, and by the use of sandpaper on blocks formed to fit the contour desired.

### Core Boxes and Mouldings

Oblique sawing method. A second method of shaping core boxes and mouldings is to push the stock at an angle across the saw, instead of in a line parallel with its plane, as for simple ripping. A rip saw or combination saw is used.

(A) To rough out a core box using parallel rules to obtain the angle. When a large number of core boxes are to be made on the circular saw it is advantageous to construct a parallel rule. A serviceable one can be constructed in a few minutes as described in No. 3 below:

1. Draw the curve or contour full size on the end of the stock.

inside edges of the rule, front and back. (See Fig. 50).

6. Set the ripping fence if adjustable, or clamp straight edges to the table, at the angle determined. Allow for the thickness of the core box stock, "S", Fig. 46A, when clamping the straight edges. (See Fig. 47).
7. Starting with the saw set for a  $\frac{1}{16}$ " cut, take consecutive cuts raising the saw about  $\frac{1}{16}$ " at a time until the desired depth of cut is attained, as shown in Fig. 48B. Use a push stick as pictured in Fig. 47, and move the stock steadily, but not too rapidly, over the saw. The core box will be cut to a parabolic curve as shown in Fig. 46B.
8. Finish the contour to the line by the use of sharp gouges, or a core box plane and with scrapers and sandpaper.

(B) To Rough Out a Core Box—Sighting Method. (Continued on page 31)

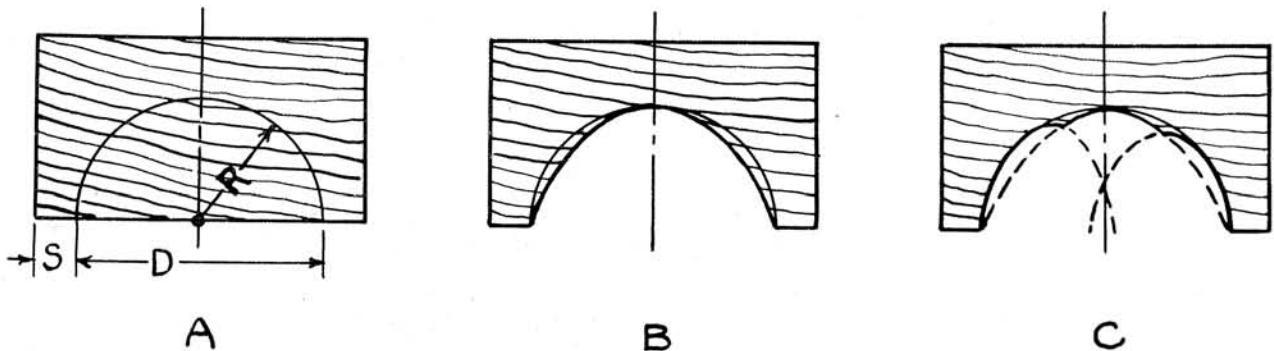


FIG. 46

Core box cutting—oblique method

2. Set the saw for the greatest depth of cut, the radius "R" of the core. (See Fig. 46A).
3. Construct an adjustable light frame to be used as a parallel rule, the distance between the two long sides adjustable to any width from nothing to the limits of the ends. Fasten the frame together with four short flat head screws countersunk flush in the long sides. The parts should be held together tight enough so that when moved to any position they will be held by friction. (See Figs. 49A and 49B).
4. Set the parallel rule so that the distance between the long sides is equal to the diameter ("D") of the core. (Fig. 46A).
5. Lay the parallel rule on the saw table with the circular saw, as set for depth of cut, inside the frame of the rule. Move it to such an angle that the teeth, where they project above the table, will just touch the



FIG. 47

Cutting core boxes on circular saw—oblique method—wood passes over saw at an angle, guided by two strips of wood (straight edges) clamped to saw table

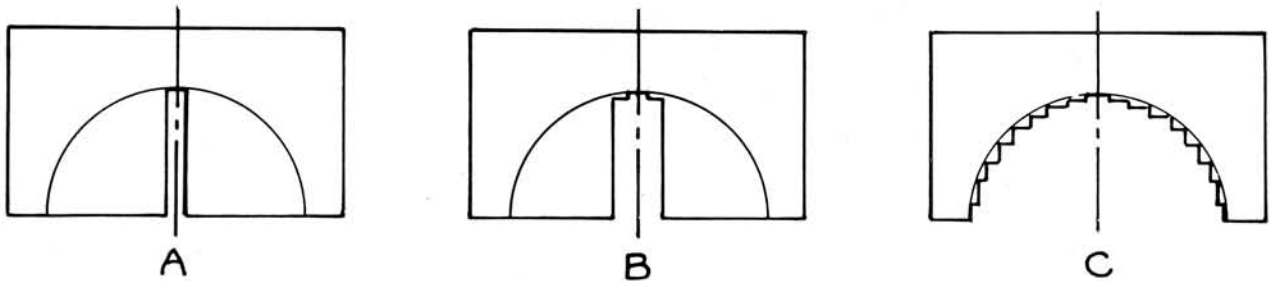
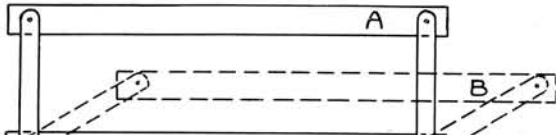


FIG. 48

Core box cutting—kerf method

1. A core box may be cut more closely to the curve drawn on the end of the box stock by combining the parallel rule method with the sighting method. The straight edges are moved to a position at a slightly more acute angle than was used in the parallel



Use Maple or Gumwood. All stock  $\frac{3}{16}$ " thick. Rules 16" long and  $\frac{1}{4}$ " wide. Arms 6" long and  $\frac{3}{4}$ " wide.

FIG. 49

rule method. This angle is determined by placing the core box behind the saw and sighting from the front, approximately on a level with the table. Move the core box until the silhouette of the saw will coincide with the curve of one side of the core box. The core box stock may be moved along with a straight edge if the two are

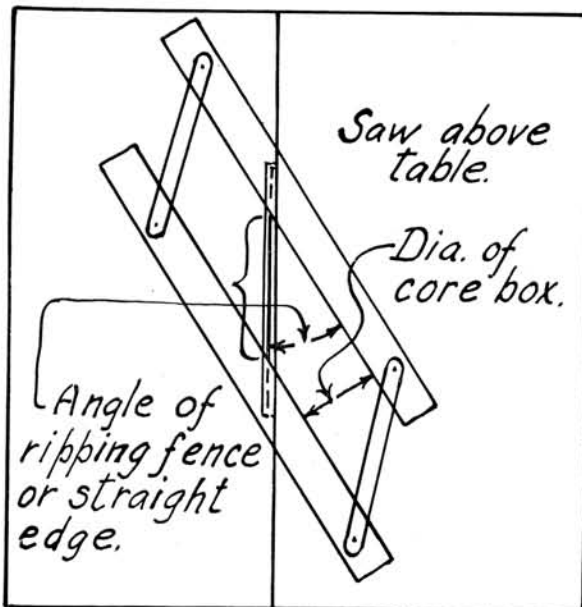


FIG. 50

held together with a small cleat paralleling the two pieces.

2. Clamp the straight edges in the correct position.
3. The depth of cut is also determined by the sighting method.
4. Cut one side of the box, after which reverse the core box stock end for end and cut the other side.



FIG 51

Cutting mouldings on the circular saw—operation is similar to core box cutting

5. Start with a  $\frac{1}{16}$ " cut, increasing the depth of cut  $\frac{1}{16}$ " each time as in the parallel rule method. (See Fig. 48C).
6. Finish as stated under A-8 above.
7. The entire core box may be roughed out by the sighting method. The center should be cut out last.

(C) To Rough Cut Mouldings:

1. Draw the contour of the mouldings on the end of the stock.
2. Adjust the straight edges by the sighting method.
3. Clamp the straight edges to the table.
4. Take  $\frac{1}{16}$ " cuts as for the core box work.
5. Under-cuts may be made by tilting the table. The beautiful scotia curve is cut by

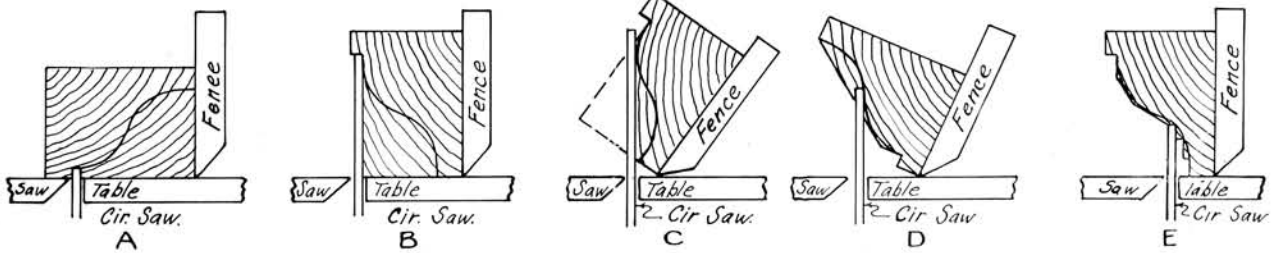


FIG. 52

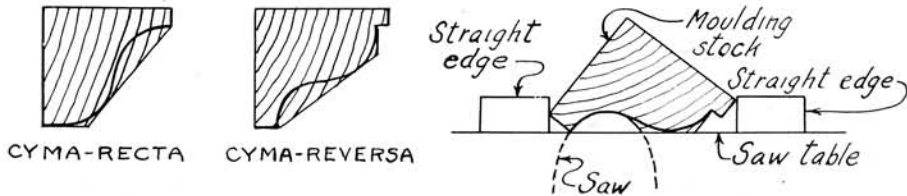


FIG. 53

this method. The straight cut at "A" is done last. (See Fig. 55).

6. Very often much waste material can be removed by miter rip sawing first, after which the curved contour may be cut. The



FIG. 54

Grooving—cutting at an angle with dado head

moulding stock is then laid on the mitered face as shown for cutting cyma-recta and cyma-reversa curves in Fig. 53.

7. Cove mouldings are cut as shown in Fig. 52, after the waste stock has been mitered off.

### Cutting Wedges

Any number of similar shaped wedges may be cut by the use of a templet as shown in Fig. 56.

1. The shape of the wedge is cut into the edge of the templet stock.

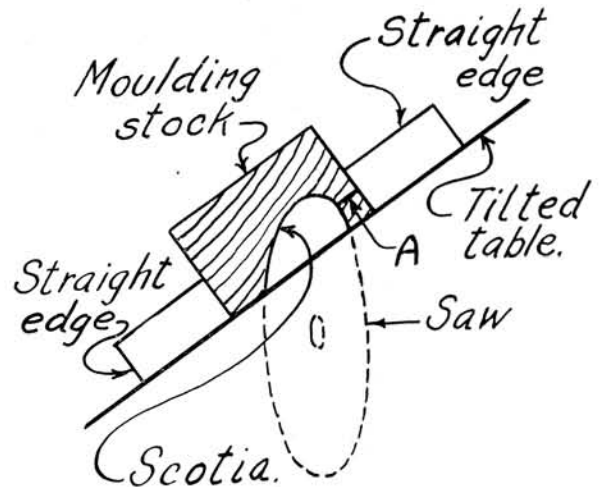


FIG. 55

Cutting scotia moulding

2. The ripping fence is moved so the templet will just pass between the circular saw and the fence and is made secure.
3. Use a rip, or combination saw.
4. Stock for the wedges is fitted in the notched wedge space and the two pieces are moved, as one, past the saw.
5. Reverse the stock end for end for each new wedge.

### To Taper Square Legs at the Circular Saw

Square legs may be tapered by cutting a wedge shaped piece of proper length and thickness from each side of previously squared stock. For this work a templet is made as shown in Fig. 56.

1. A piece of 1" thick stock about 2" wide throughout is cut 2" longer than the desired length of the taper for the legs.
2. On one end of this piece is nailed a stop block of the same thickness constructed as shown at "A." Fig. 57.



FIG. 56

Cutting wedges—shape of wedge is cut in cut-out portion of a convenient sized piece of wood used as a templet

3. Adjust the ripping fence a distance from the saw equal to the combined width of the long templet member and the leg stock, or, so that when the leg stock is placed parallel against the long member, the saw will just clear the leg. (See Fig. 57X).
4. Cut the taper on the first two adjacent sides with the end of the stock to be tapered in notch No. 1. (See Fig. 57Y).

5. Cut the remaining tapers on the other two sides with the end of the stock to be tapered in notch No. 2.
6. There will be a very slight difference in the length of the last two tapers as compared with the first ones cut, but the sides can be finished alike with a smoothing plane, and sandpapered.

### Use of Special Jigs and Fixtures

There are many pieces too awkward to be handled in the regular way, which can be very readily handled by use of a special jig or fixture that is mounted on the sliding table. For example, for tipping kid chair rockers which are first swept out on a band saw and require trimming on two ends at different angles, a jig can be made with locating pins to position the rocker for each cut, and any average operator can tip or cut-off at the proper angle many rockers or similar work in the shortest possible time. It must be borne in mind in arranging jigs and fixtures that whenever possible the miter or other angular crosscuts should be made from the short side towards the long side. This method will leave all the fuzz on the waste block. The cut-off saw is fitted with fine needles which sever the fiber on the stock before the center of the kerf is removed. With an angular cut the fibers are severed first and when the other side is to be severed there is nothing to support those fibers—they just shove back in the form of whiskers, which can be eliminated by cutting from the short towards the long side.

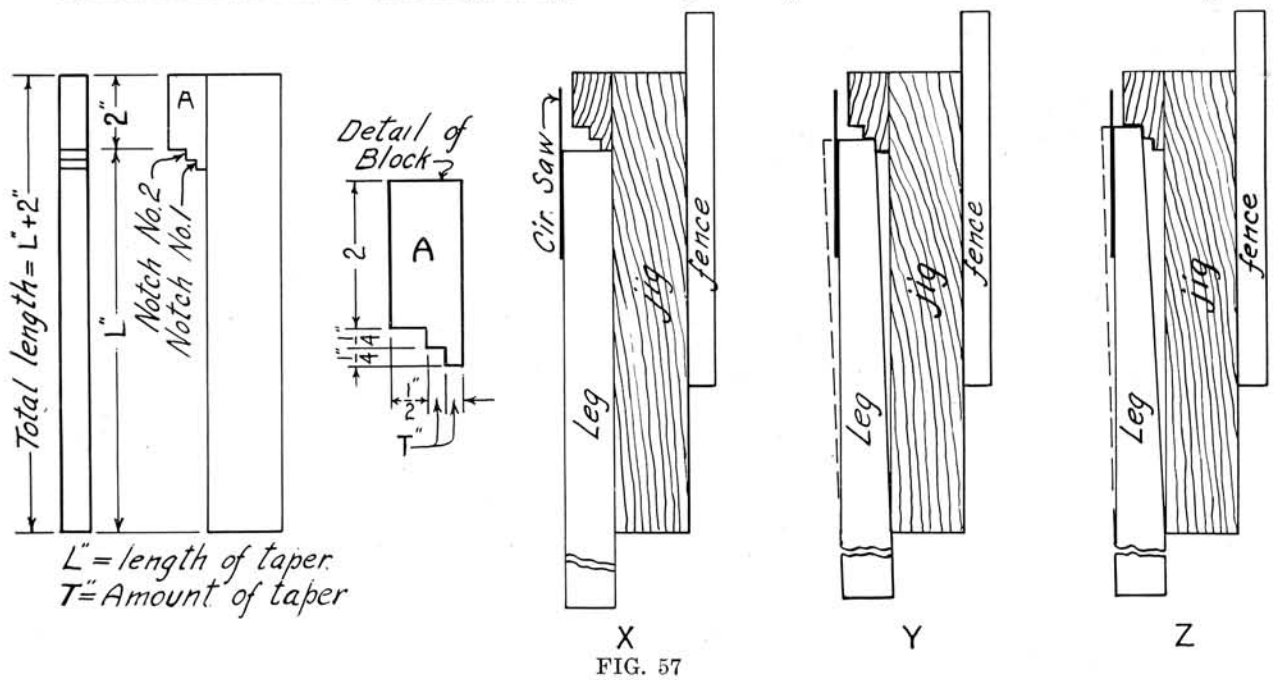


FIG. 57

## HOW TO MAKE CIRCULAR SAW ACCESSORY RACK

Construction of This Stand Will Save Many Steps in Hunting for Cut-Off Blocks or Other Pieces Which Should Be in Definite Place

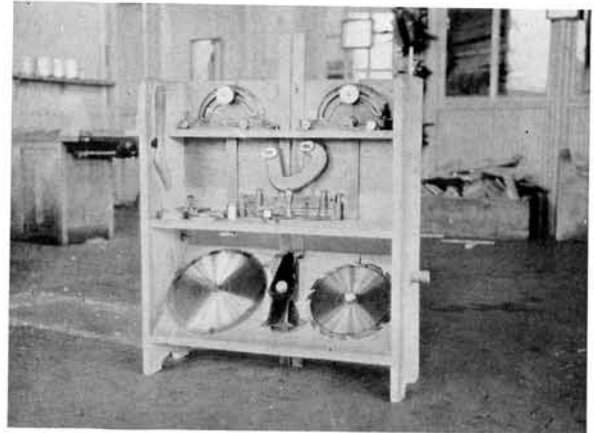
By C. ANTHONY VAN KAMMEN  
 Harrison Park Junior High School, Grand Rapids, Mich.

If you have suffered the inconvenience of hunting for some circular saw accessory such as the cut-off block or the stop from the stop rod or even some larger piece, because it did not have a definite place or because its proper location on the side wall was so far away from the machine that it seldom was put where it belonged, but on the floor, you will appreciate the saw accessory rack. As illustrated in the photographs and working drawings the stand was designed for the "Oliver" No. 80 saw table. It may, however, with very little changes as to measurements for the layout of holes, serve any saw table.

The top shelf "A" is fitted with a  $1\frac{5}{8}$ " slot, at the back, on each side of the center for the slide bars of the universal cut-off gauges. Near the center are two other slots of the same size for the table filler strips used in the slide grooves of the table. In the further right corner near the back two  $\frac{7}{16}$ " square holes are cut for the cut-off stop rods.

From shelf "A" to "B" on each side of the filler strip holes  $\frac{5}{16}$ " thick by  $11\frac{1}{2}$ " wide pieces of wood are placed to keep the miter gauge which has a place near the center at the back, clear of the filler strips. Holes "M" and "N" are bored for the locating pins and hole "Q" for the hand knob screw. The universal gauge link hangs on dowel pins near the center just under shelf "A". Shelf "B" is slotted out like "A" for the filler strips and the long stop rod.

The short stop rod and the ends of the universal gauge slides have places cut just deep enough to receive them. Points X, Y, and Z on shelf "B" have  $\frac{7}{8}$ " holes. These are to receive the small end of pins turned to size so that the three filler collars used with the dado heads



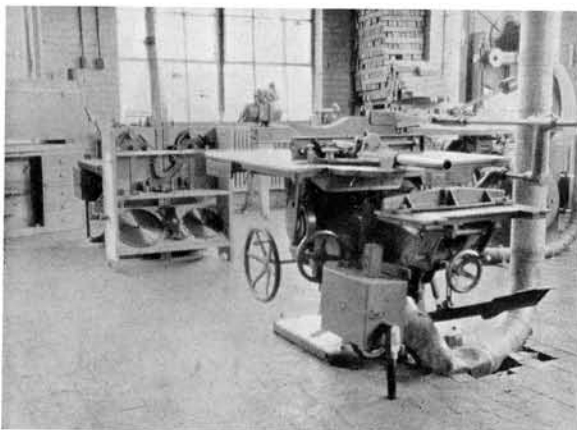
Saw Rack showing position of parts

may have a fixed place. In the left rear corner two  $\frac{1}{2}$ " strips are mitered and nailed to form a  $4\frac{1}{16}$ " square for the cut-off block. A good sized space at the right gives ample room for hollow chisels and bits if a mortising attachment is on the saw.

The lower shelf, which is on a slant, takes care of the saws, inside dadoes and outside dadoes. Pegs of the proper size, as shown, are turned and the small ends glued in the holes. See drawing of shelf "C". It is necessary to make slots at the back in line with the slots above to receive the filler strips, which extend to the floor. If the rack is to be moved about much it is suggested that a narrow board  $\frac{7}{8}$ " thick be set in as a fourth shelf for the lower ends of the filler strips to rest upon. A back the width of the case extends from the top to the bottom edge of shelf "C". Handles may be turned and placed on each end to assist in moving the rack when necessary.

### STOCK BILL FOR SAW ACCESSORY RACK

Use	No. Pcs.	Finished Size
Ends . . . . .	2	$38\frac{1}{2}$ " x $10\frac{3}{4}$ " x $\frac{7}{8}$ "
Top Shelf . . . . .	1	$32\frac{3}{4}$ " x 5 " x $\frac{7}{8}$ "
Mid. Shelf . . . . .	1	$32\frac{3}{4}$ " x 10 " x $\frac{7}{8}$ "
Bottom Shelf . . . . .	1	$32\frac{3}{4}$ " x 16 " x $\frac{7}{8}$ "
Back . . . . .	1	$32\frac{3}{4}$ " x $18\frac{7}{8}$ " x $\frac{3}{4}$ "
Filler strip guides . . . . .	2	$10\frac{5}{8}$ " x $11\frac{1}{2}$ " x $\frac{5}{16}$ "
Turned pin "X" . . . . .	1	$1\frac{3}{4}$ " x $17\frac{1}{16}$ " x $17\frac{1}{16}$ "
Turned pin "Y" . . . . .	1	$1\frac{1}{2}$ " x $17\frac{1}{16}$ " x $17\frac{1}{16}$ "
Turned pin "Z" . . . . .	1	$1\frac{5}{8}$ " x $17\frac{1}{16}$ " x $17\frac{1}{16}$ "
Turned pin "E" . . . . .	1	$3\frac{3}{8}$ " x $17\frac{1}{16}$ " x $17\frac{1}{16}$ "
Turned pin "F" . . . . .	1	$1\frac{7}{8}$ " x $17\frac{1}{16}$ " x $17\frac{1}{16}$ "
Turned pin "D" . . . . .	1	$2\frac{1}{8}$ " x $15\frac{1}{16}$ " x $15\frac{1}{16}$ "
Turned handles . . . . .	2	$3\frac{1}{8}$ " x $11\frac{1}{4}$ " x $1\frac{1}{4}$ "
Cut-off block enclosure . . . . .	2	$4\frac{9}{16}$ " x $\frac{1}{2}$ " x $\frac{1}{2}$ "
Dowel pins . . . . .	4	2 " x $\frac{3}{8}$ " x $\frac{3}{8}$ "
Sub shelf . . . . .	1	$23\frac{3}{4}$ " x $2\frac{3}{4}$ " x $\frac{7}{8}$ "



Saw Rack in position for use

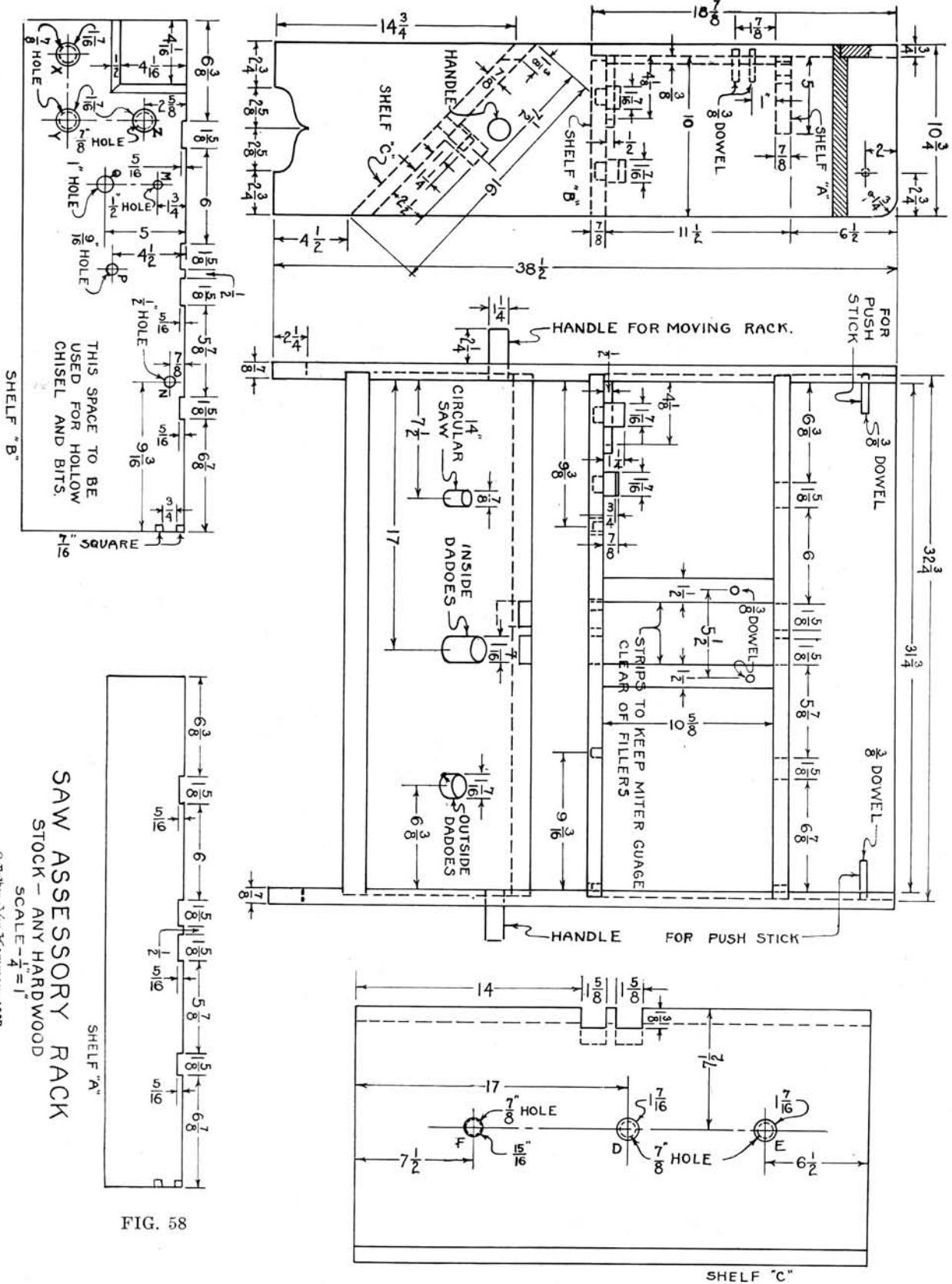
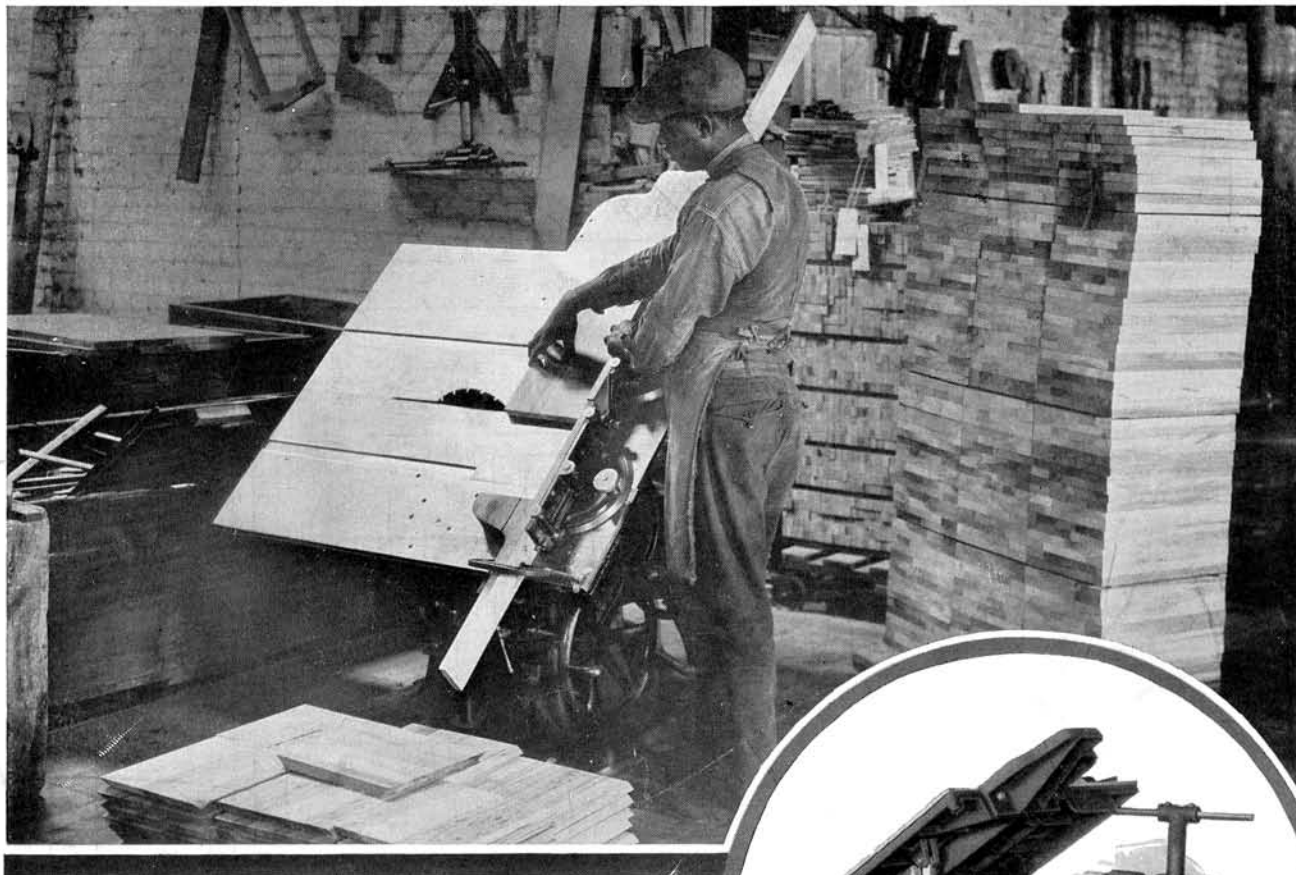
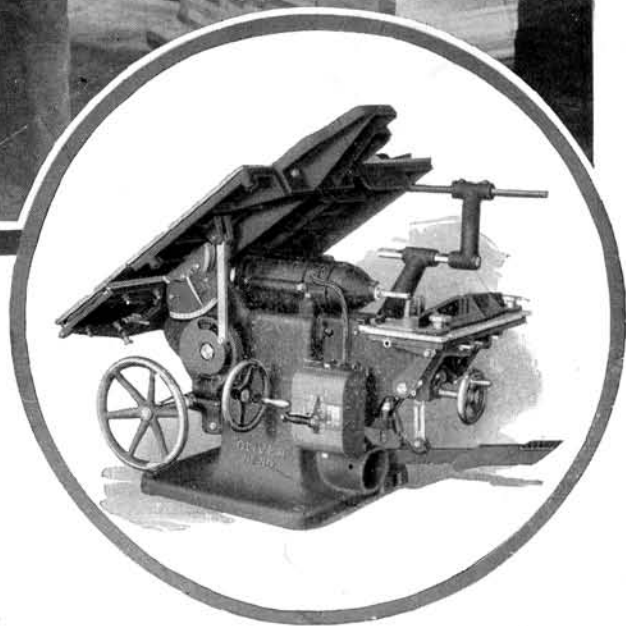


FIG. 58



An "Oliver" No. 80 Variety Saw Bench  
in the plant of the Davis Birely Table  
Co., Shelbyville, Ind.



Accepted—  
by Industry and  
by Scores of Schools  
Throughout America

In voicing its approval of the "Oliver" No. 80 Variety Saw Bench, the Davis Birely Table Co., of Shelbyville, Ind., merely repeats what scores of other satisfied users have said. In this unanimous industrial approval can also be found the reason for the wide acceptance of this Variety Saw Bench by the school shops of America. School shops want tools most commonly found in industry. They are thus enabled to familiarize their pupils with the tools which they will encounter after

leaving school. The "Oliver" Circular Saw Benches will do ripping, crosscutting and dadoing in an efficient manner. They will cut a perfect miter and will measure any angle instantly and accurately; they will cut-off to length or rip to width—all without the operator having to do any previous calculating or even referring to a rule. It will pay you to investigate our complete line of Circular Saw Benches before ordering any new equipment. Write for Catalog.

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