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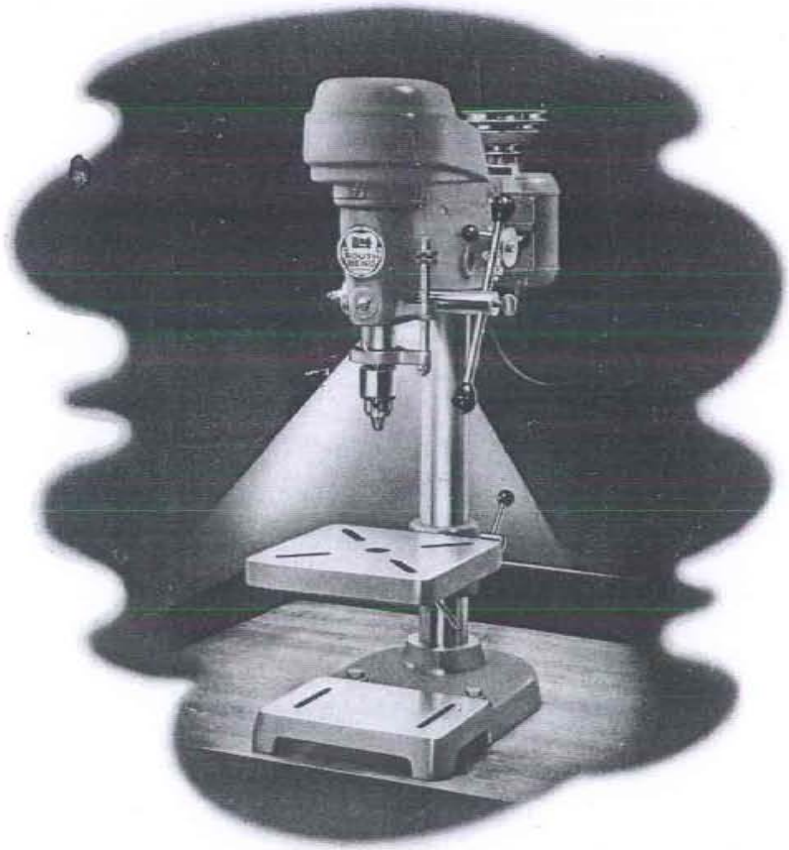
HOW TO RUN A DRILL PRESS



SOUTH BEND LATHE WORKS
SOUTH BEND 22, INDIANA, U.S.A.

HOW TO RUN A DRILL PRESS

EDITION No. 1

OPERATING MANUAL with PARTS LIST for 14" SOUTH BEND DRILL PRESS

Edited by ED HAMILTON

INTRODUCTION

The South Bend 14" Precision Model Drill Press introduces several original features which add to its convenience and ease of operation. A built-in light with independent switch provides shadowless illumination on the work area, eliminating the necessity of installing a separate lighting fixture. A quick-acting belt tension release lever simplifies speed changes and returns the vertical mounted motor to its original position after each change, thus maintaining the same belt tension for each of the four cone pulley steps.

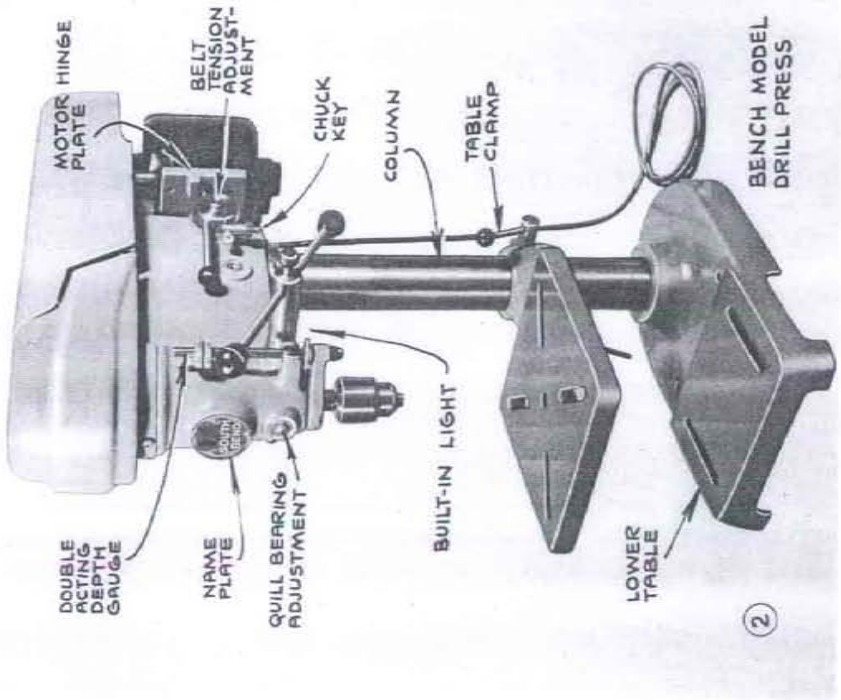
The free-floating spindle design prevents misalignment, side thrust, and whip. Two precision ball bearings carry the drive sleeve and two additional ball bearings carry the spindle, which is spline driven. All ball bearings, being pre-lubricated and sealed, require no oiling. Quill bearing adjustment provides feather-touch tension and secure locking. The depth gauge is graduated in 16ths of an inch and has adjustable collars to control both the depth of feed and the length of the return stroke.

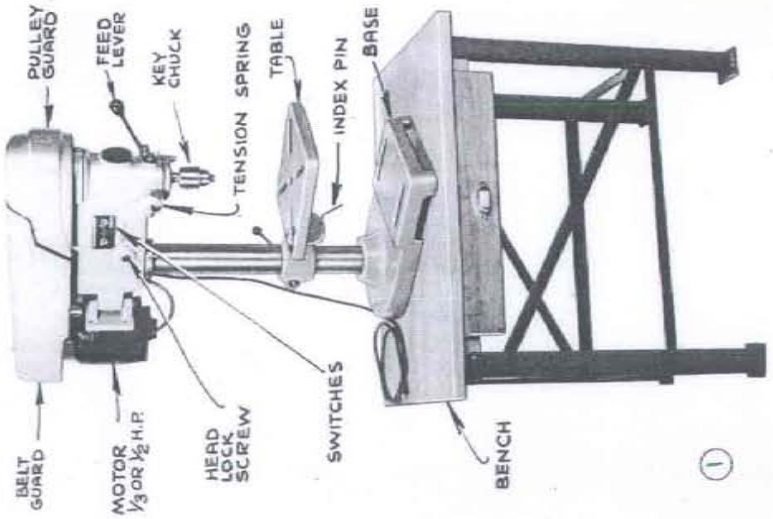
The full tilt type table, with 10" x 10" precision ground top surface, has slots for clamping fixtures or work. An improved type of double plug binder is provided for locking the table quickly in any position on the column. The edge of the table has a heavy flange with a ¾" flat underneath for clamping. The base also has a precision ground slotted work surface.

SPECIFICATIONS

Description	Bench Model	Floor Model
Maximum drill size in iron or steel	1/2"	1/2"
Drills to center of	14-1/4" Circle	14-1/4" Circle
Chuck capacity	0 to 1/2"	0 to 1/2"
Spindle speeds, four (with 1725 r.p.m. motor)	710 to 4470 r.p.m.	710 to 4470 r.p.m.
Spindle travel, maximum	4"	4"
Chuck to base, maximum	17"	46-1/2"
Chuck to table, maximum	11-1/4"	40-1/2"
Base, work surface	7" x 10"	8" x 12"

Description	Bench Model	Floor Model
Table, work surface	10" x 10"	10" x 10"
Table tilt	Any angle	Any angle
Column diameter	2-3/4"	2-3/4"
Over-all height	35-1/2"	65-1/2"
Over-all width	12-1/4"	15"
Over-all depth	27-3/4"	27-3/4"
Shipping weight, crated for domestic shipment (approx.)	170 lbs.	213 lbs.
Motor, size recommended	1/3 or 1/2 h.p.	1/3 or 1/2 h.p.
Motor, speed recommended	1725 r.p.m.	1725 r.p.m.

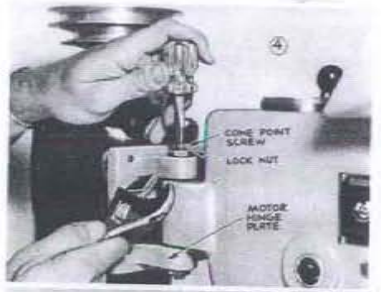




DESCRIPTION

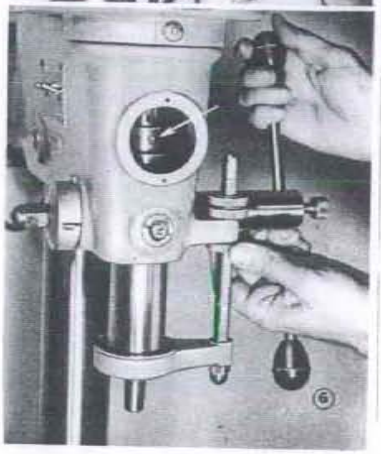
The drill press consists of four basic parts, namely, the BASE, COLUMN, TABLE, and HEAD. The head is the term used to designate the entire working mechanism attached to the upper end of the column. The central part of the head is the SPINDLE. The spindle revolves in a vertical position, and is housed in ball bearings at either end of a movable sleeve which is called the QUILL. The quill and the spindle which it carries, is moved downward by means of a rack-and-pinion gearing, actuated by the FEED LEVER. When the feed lever is released, the quill and spindle is returned to its natural position by means of a coil spring. Adjustments are provided for locking the quill in any desired position by means of the double-acting depth gauge. The same depth gauge allows the operator to pre-set the depth to which he wishes the quill to travel.

The 14" drill press is so named, since the diameter of the largest circular piece of work which can be drilled through the center on the drill press table is 14 inches. In other words the distance from the center of the spindle to the front of the drill press column is 7 inches. Another indication of the size of a drill press is the distance between the end of the spindle and the table. As can be readily seen this distance is much greater on floor models than on bench model drill presses. In either case, the depth of the hole that can be drilled with one stroke of the feed lever, is approximately 4 inches.



POWER AND SPEED

The drill press is usually fitted with cone pulleys so that a variety of selective speeds can be obtained. With a 1725 r. p. m. motor and four step pulleys the speed will range from 710 to 4470 revolutions per minute. Since the shaft stands vertical, only a motor designed for vertical mounting, should be used as a power unit. A one-third horsepower motor is sufficient for average work since this is approximately the power required to drill a one-half inch hole through steel.

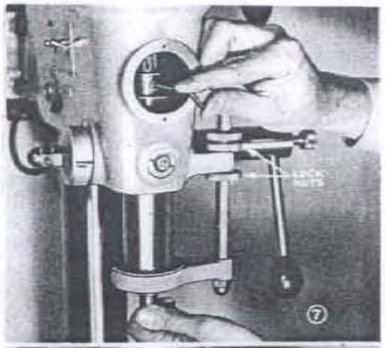


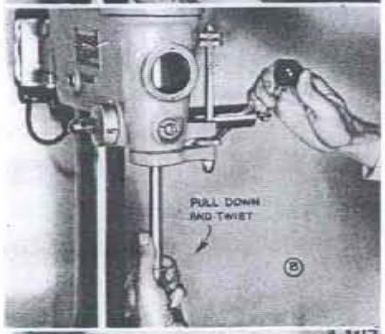
SPINDLES

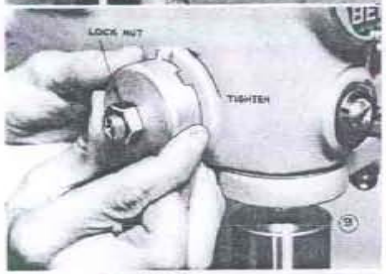
Interchangeable spindles are supplied for most drill presses, thus adapting the machine for a wide variety of work. The standard spindle has a taper which holds a one-half inch capacity JACOBS key chuck (see figure 3). Other common types of spindles are also shown in the illustration.

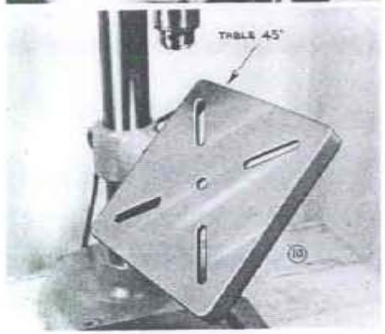
UNPACKING THE DRILL PRESS

The South Bend drill press is a precision tool which should be handled with care at all times. It should be carefully unpacked and installed so that all of the fine accuracy built into it by the manufacturer will be retained. The crate is easily removed from the drill press. Pull out all the nails driven through the sides of the crate into the top and bottom panels. Pull out the nails driven through the side panels into the cross member near the center of the crate. Unhook the looped ends of the binding wires, and lift off the top panel. Unwrap the side panels from the crate. Remove the protective paper, and









the bolts which hold the drill press base to the bottom of the crate.

CLEANING THE DRILL PRESS

A cloth soaked in kerosene will remove the heavy grease used to prevent the drill press from rusting in transit. After cleaning, all parts should be wiped thoroughly, and the unpainted surfaces coated with a coat of good machine oil.

INSTALLATION
MOUNTING THE MOTOR

The motor should be unpacked and mounted on the motor hinge plate (see figure 2) with the cap screws furnished. The hinge plate with motor attached is then mounted on the drill press head between the two cone pivot screws. The screws are then tightened with a screw driver until play is eliminated, but should be loose enough to allow the bracket to swing freely. The lock nuts on the pivot screws should then be tightened (see figure 4). Avoid excessive pressure when tightening pivot screws, or the motor base casting may be damaged.

Mount the motor pulley (packed with motor base) on the motor shaft with the small step next to the motor (figure 4). Align the motor pulley with the pulley on the drill press spindle, using a good straight edge. Then insert the brass plug and set screw (packed in an envelope with the motor pulley), and tighten set screw to hold the pulley securely.

Next attach the lead wires to the motor. Remove the plate covering the terminals and attach the wires according to the diagram found on the inside of the terminal cover. Replace the cover.

ADJUSTING BELT TENSION

Place the belt on corresponding steps on both the motor and spindle pulleys. Loosen the belt tightener lock screw (figure 5). With the lever in position as shown in figure 5, exert enough backward pressure against the motor base until the desired belt tension is obtained. Lock in position by tightening the set screw. The belt should run with a small amount of slack. Adjusting the belt too tight will cause excessive wear on the belt, and also on the motor and spindle bearings. The added friction will absorb power unnecessarily.

CHANGING SPINDLE SPEEDS

Four direct drive spindle speeds are available, 710 to 4470 r. p. m. being obtained with a 1725 r. p. m. motor. By raising the belt tightener lever (figure 5), the motor is allowed to swing forward, releasing the tension on the belt so that it may be shifted to any one of the four pulley steps. Lowering the lever retightens the belt to exactly the same tension on any of the four pulley steps.

LUBRICATION

The ball bearings on both quill and spindle are of the sealed type, lubricated for life and will require no further attention. The outer shell of the quill should be lubricated occasionally when in the fully lowered position. The splined end of the spindle shaft should also have a few drops of oil at regular intervals depending on use.

CHANGING SPINDLES

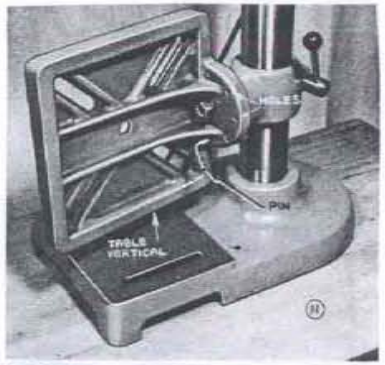
The first step in removing the drill press spindle is to take off the nameplate on the front of the head (see figure 2). Lower the quill until the top is exposed through the opening as shown in figure 6. Tighten the lock nuts on the depth gauge at either side of the head casting lug to hold the quill in this position. With the allen wrench, remove the small set screw in the spindle lock collar as shown in figure 7. Loosen the depth gauge lock nuts and return the quill assembly to its normal position. Gently tap the splined end of the spindle which projects through the upper pulley with a wooden mallet to loosen it from the quill. When the spindle begins to move grasp the lower end (see figure 8) pulling downward and twisting back and forth until the spindle is completely out of the assembly.

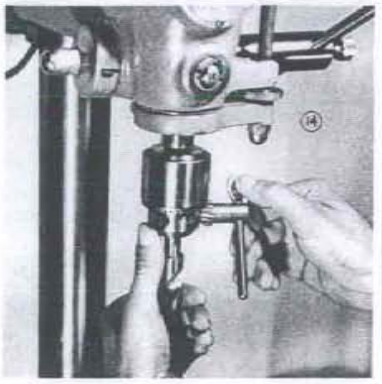
REPLACING SPINDLE

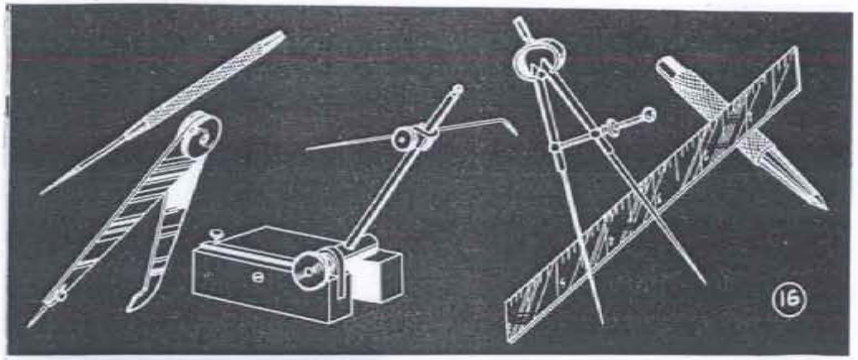
To replace a spindle the above process is reversed. Lower and lock the quill in position with the top of the quill exposed through the nameplate opening. Slip the spindle locking collar over the spindle-lock-collar sleeve. Place locking collar and sleeve through the nameplate hole on top of the quill assembly in a vertical position. Insert the spindle in the bottom of the quill and firmly push or lightly tap the spindle in place with "to and fro" twisting motion to aid passage of the spindle through the quill assembly, the locking sleeve and collar, and the splined pulley assembly. With the spindle in place, lower the locking device and firmly seat the spindle locked-collar sleeve against the inner race of the ball bearing in the top of the quill assembly. Make sure the set screw in the spindle collar is 180° from the slot in the spindle lock collar sleeve. With the Allen wrench tighten the set screw (figure 7), until firmly seated. Test the spindle with the power "off." There should be no "vertical play," or up and down movement, and the spindle should rotate freely. Unlock the depth gauge lock-nuts and return the spindle assembly to its normal position. Replace the nameplate.

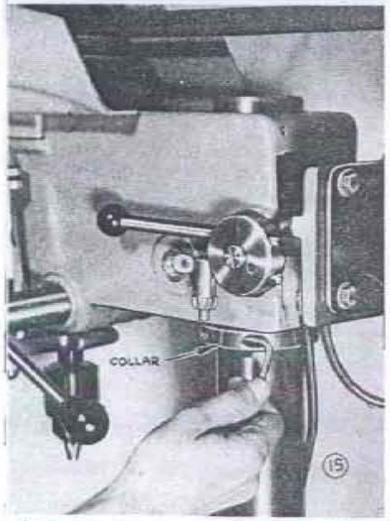
ADJUSTING SPINDLE RETURN SPRING

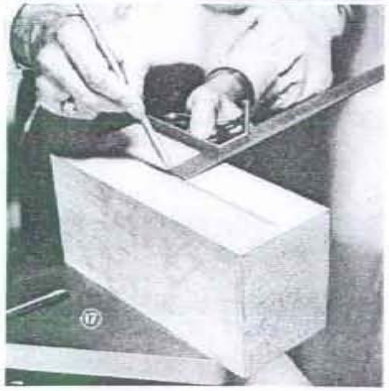
To adjust the return spring, first remove the outer or cap nut entirely, and then loosen the second or retaining nut several turns. Grasp the spring housing (figure 9) and lift away from the drill press head to disengage the housing notch from the lug on the head casting. Be sure to hold the spring housing firmly to prevent it from unwinding when released from this notch. To increase the tension, turn the housing counterclockwise one-half turn at a time, pushing the housing in at the end of each half turn so that the notch engages the lug. To release the tension, turn the housing by half turns in a clockwise direction, pushing the housing in at the end of each half turn to engage the notch. When proper tension has been obtained, retighten the retaining nut and lock with the cap nut which was removed first.











ADJUSTING

In average drilling operations, the hole in the center of the table should be directly under the drill so that the drill, after going through the work, will enter the hole in the table. Where it is necessary to drill through the stock on which you are working, the feed lever should always be pressed without the work in place to see that the drill enters the table opening. The drill press table may be tilted and locked at any angle, right or left, (see figures 10 and 11). Holes are drilled in the swivel head for the insertion of the knurled index pin when the table is in the horizontal, vertical, or 45° angle position. When it is necessary to adjust the table to any intermediate angle, the nut on the swivel screw is tightened to lock the table in the desired position. When average work requires the setting of the table to a variety of angles, it is advisable to set a scale and adjustable pointer to the under side of the table to locate these positions.

MOUNTING CHUCK

Mount the Jacobs key chuck to the taper spindle as shown in figure 12. Do not strike the chuck jaws. Note that they have been withdrawn into the body of the chuck before it is tapped in place with a wooden mallet or rawhide hammer.

REMOVING CHUCK

To remove the chuck from the drill press spindle, insert the slotted steel wedge (see figure 3), between the shoulder on the spindle, and the top of the chuck, as shown in figure 13, and strike the wedge a sharp blow with a hammer. At the same time, hold the chuck with one hand to prevent its falling onto the drill press table when driven off.

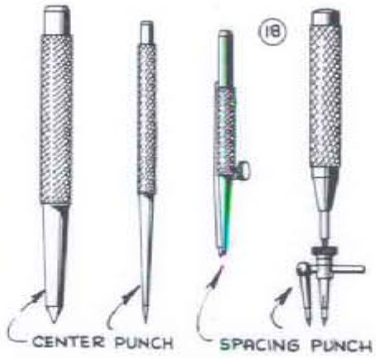
DOUBLE ACTING DEPTH GAUGE

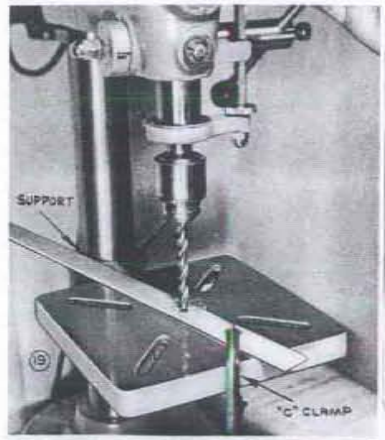
By adjusting and locking the two knurled stop nuts (figure 2), depth of the spindle travel can be accurately controlled. By adjusting the lower knurled stop nut, the length of return stroke can be controlled. By tightening both the bottom and top stop nuts, spindle can be securely anchored at any height for routing, shaping,

surface grinding or other similar operations which require the vertical movement of the quill to be locked.

CHUCKING DRILLS

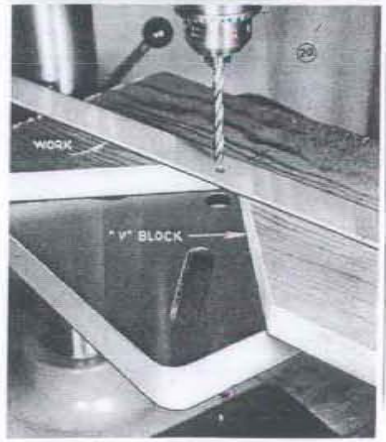
Chucking a drill with a key chuck is easily accomplished as shown in figure 14. The drill is usually held in the left hand, while the key is inserted and the jaws tightened with the right. Drills are removed in the same manner, except that the twist on the key is reversed. On no account should the drill be loosened from the chuck unless the hand is in position to prevent it from falling. The insertion of drills and other tools in a spindle which has a hole in the end to receive the shank of the drill is quite simple, the drill being pressed into the hole and the set screws being tightened to hold it. Where taper shank drills are used, the drill is fitted by pressing it into the tapered hole at the end of the spindle, engaging the tang of the drill in the corresponding slot of the spindle. During use the drill becomes tightly wedged in the tapered hole, and must be driven out by the means of a drift key (figure 3). One edge of the drift key is flat and the other round. The round edge fits against the upper round part of the slot in the spindle while the flat edge fits against the end of the drill being removed.





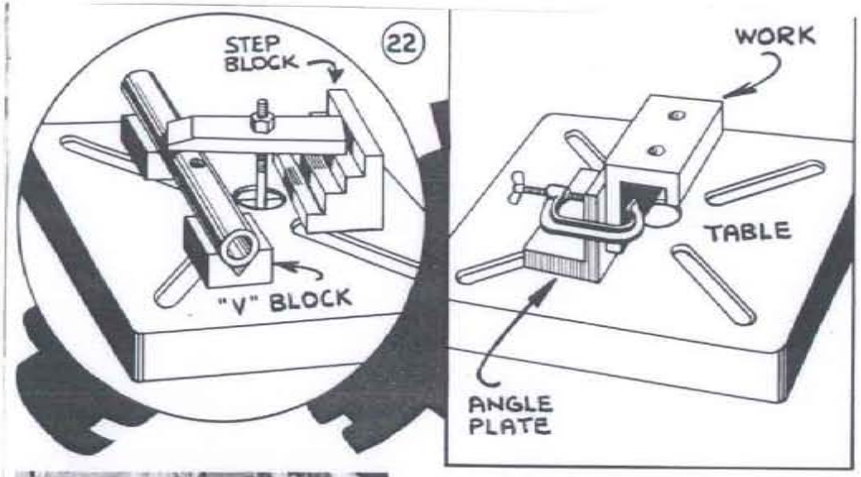
OPERATION

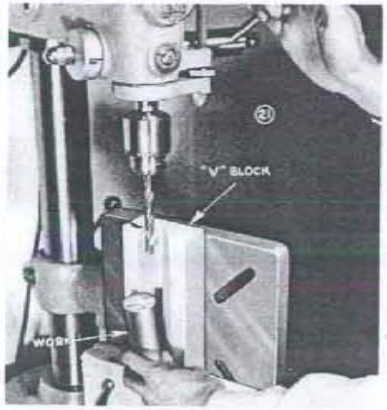
The drill press head and work table can be adjusted to various positions on the column. Both are clamped securely in place by double plug binders. The position of the work table, being readjusted more frequently than the head, is provided with a quick acting hand lever which will instantly release or tighten the binder, with a quarter turn of the clamp handle (figure 2). The double plug binder in the head is released or tightened by a heavy Allen screw wrench. Great care should be used in adjusting the position of the head on the column. It should be well supported when the binder is released to prevent it from dropping and striking the table, and possibly injuring the chuck, the spindle, or other parts of the head. A column collar (available as an accessory) as shown in figure 15, should be mounted below the casting of the drill press head. With this collar in place, the head binder may be released and the drill press head swung from side to side with safety. By placing the collar a few inches below the head it will act as a safety stop when raising, lowering, or changing the position of the head.

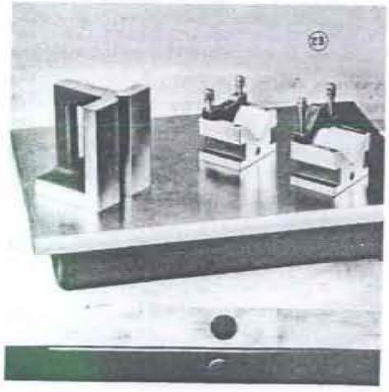


LAYING OUT THE WORK

Practically every hole that is drilled requires that first of all, a layout mark be made which will locate either its approximate or exact position. Various tools are used in making the layout, ranging from square, hammer, and punch, to expensive instruments essential for very exacting work. A few of the layout tools commonly used are shown in figure 16. One of the most useful tools for average work is the combination square. This can be used for center lining, as shown in figure 17, in case the work is being done on wood. If the layout work was required on metal, a scriber or punch would







be substituted for the pencil shown in the photograph. Various substances and devices are used to mark on a variety of materials. Rough cast iron for instance, may be given a coating of white chalk so that layout marks will be plainly visible. Polished steel may receive a strong solution of copper sulphate which will show scriber marks to advantage. A 20% solution of silver nitrate is preferred by some workers for copper or brass.

After the scriber or pencil has been used to locate the hole position, it is further necessary to indent this point. This is done with a center punch, a few of which are shown in figure 18. There are various sizes of center punches, and the size selection will depend upon the work, and the accuracy which is required. Center punching should be done carefully so that the punch mark comes at the exact intersection of the layout lines. Despite the care of laying out and clamping, it will sometimes be found that after the drill has cut a few revolutions into the work, the hole is found to be off center. The drill may be led back to the proper position by cutting from one to three or more grooves with a small round nosed chisel, the grooves being on the side toward which it is desired to draw the hole. When the drill is again started, it should drift over to the correct position. This must be done before the drill starts to cut its full diameter.

DRILLING PRACTICE IN METAL

CLAMPING

Metal work should never be held on the drill press table by means of the hand alone. For small holes, this is very often sufficient, but the operator never knows when the lips of the drill are going to seize the work, especially when the point of the drill is about to break through the under side of the stock. When this happens, the stock is snatched out of the operator's hand, often cutting or injuring the hand, and also invariably results in breaking the drill. This can be avoided, and much more accurate work accomplished if the work is clamped to the drill press table.

One of the simplest methods of clamping long flat stock is shown in figure 19. In this case the stock to be drilled is clamped in front to the table with a "C" clamp. The other end of the stock is supported against the drill press column. Note that as the drill turns it forces the unclamped end of the work tightly against the drill press column.

There is always one condition which must be avoided when clamping and drilling thin stock, and that is, the springing of the work. If a light piece of steel or other material is supported at points that are too far apart, it will spring under the pressure of the drill. The result is often a broken drill, since the work springs back and binds the drill, just as it breaks through. Always support the work sufficiently close to the hole being drilled so that it cannot spring. For example — that the "V" support shown in figure 20 makes a good base since the work can be spanned across the opening to suit the strength of the material being drilled.

Where end drilling is being done, the work usually does not possess sufficient base to stand alone with any degree of accuracy, and should be clamped in place with the table vertical. In addition to the vertical table, a "V" block is sometimes used to hold the work in position as shown in figure 21.

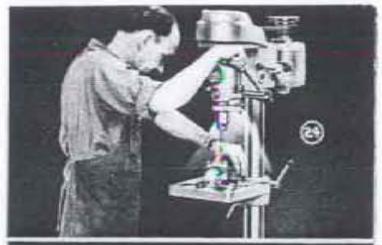
Various other standard fixtures are used in clamping and drilling metal work such as is shown in figure 22. These standard fixtures include parallel bars, strap clamps, step and "V" blocks in various sizes, U-bolts, plate clamps, etc.

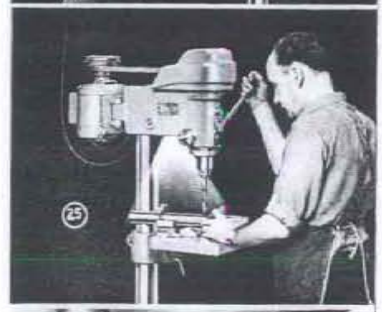
The equipment shown in figure 23 is useful in layout, machining, and clamping work. The surface plate is of heavy cast iron, close-grained for resistance to wear, and heat-treated to prevent distortion. The top surface is precision ground and all edges are machined, including the under side of the edge to facilitate clamping gauges and fixtures into position.

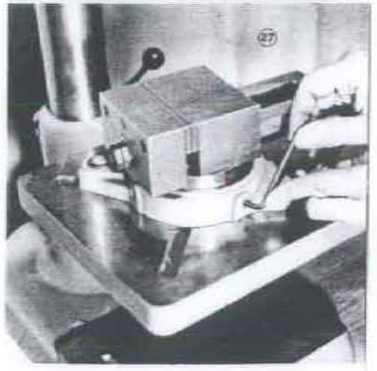
The "V" blocks provide a rigid support for holding cylindrical parts and shafts for laying out and machining. They are made of hardened steel, all surfaces are precision ground, and each pair is matched by finishing together in such a way that the V grooves are in perfect alignment. The clamps shown on the blocks have knurled screws and are cross-drilled for tightening with a rod.

The angle plate shown is precision ground on six sides, and serves many uses both in layout and setting up of work. It is ideal for checking and finishing right angle surfaces.

Figures 24 and 25 show the "V" blocks being used to support a piece of cylindrical work.

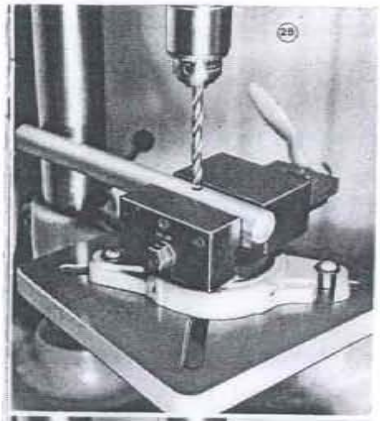


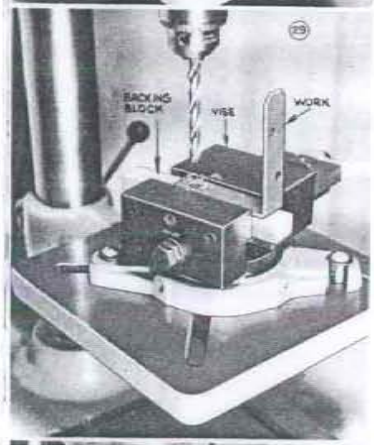




DRILL PRESS VISE

The drill press vise offers the most practical method of holding small work while being drilled. The base of the vise, figure 26, can be clamped to the slotted work table enabling the vise to hold the work rigidly for drilling or reaming. The center tapered pivot on the upper part of the vise fits into the hole in the base and is clamped in place with the set screws as shown in figure 27. These set screws, when turned in part way, allow the upper part of the vise to turn freely. When the set screws





are tightened, they securely lock the vise at any desired point in the circle. Figure 28 shows a round metal rod clamped in the drill press vise for drilling. The long end of the rod is turned over against the drill press column for added support. In this case it would be unnecessary to tighten the set screw securely. Figure 29 shows an angle plate clamped in the drill press vise. A block of hard wood or metal is placed under the work so that the pressure of the drill will not loosen or force the work out of line. Figure 30 shows a hollow pipe clamped in the drill press vise. For such drilling operations a good center punch mark is essential to keep the drill point from drifting off of the rounded surface. If the hole in this case is to go completely through the pipe it is advisable to drill first through one side, then turn the work over and drill through the other. This will avoid going through the bottom and drilling into your vise.

The various equipment shown in figures 31, 32, and 33 show the surface plate, "V" blocks, and angle plate being used in conjunction with surface gauges for layout and checking of final work.

MISCELLANEOUS OPERATIONS

GRINDING

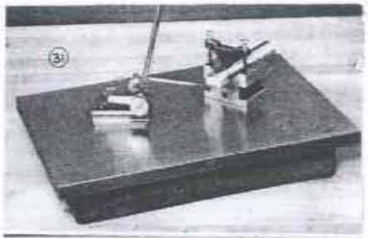
Light surface grinding can be done perfectly on the drill press, using a cup wheel which is mounted on a special spindle. The grit and bond of the wheel should be selected to suit the work, as with any other type of grinding. The speed of the drill press should be about 5000 r. p. m. The work is projected along the drill press table and under the cup wheel, which has been set to take a suitable bite and the quill locked in position. Heavy cuts should be avoided. Good use can be made of a column collar under the drill press head. The work is clamped in place in the vise, figure 34, and the drill press head is swung back and forth across the work.

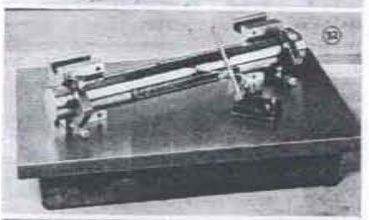
COUNTERSINKING

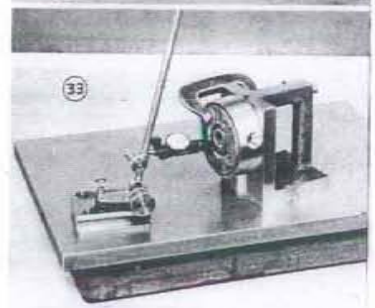
The various types of wood and machine screws are set so that their heads come either flush or below the surface of the work. To make holes for these heads, an ordinary drill of suitable size can be used for average work. For more accurate work, however, regular countersink drills should be used as shown in figure 35.

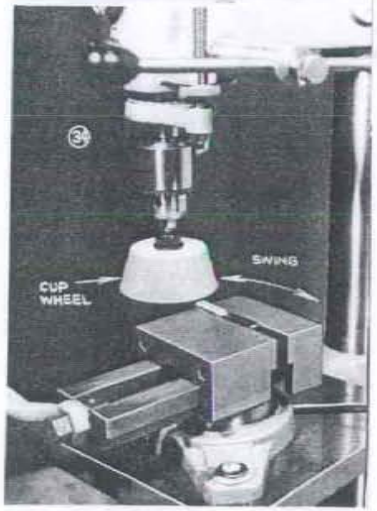
TAPPING

One of the simplest methods of doing tapping on the drill press is shown in figure 36. In this case the drill press is used only in holding the tap and in aligning it with the hole. Apply a little pressure with the feed handle to start the tap. No power is applied in the operation. The chuck key is inserted as shown









in the photograph and the tap is turned into the work with the hand as shown. Once the threads of the tap have taken hold, it is no longer necessary to apply pressure on the feed lever.

Standard production tapping attachments such as shown in figure 37, are easily attached to your drill presses, transforming them into high speed, highly accurate tapping machines. A battery of two or more drill presses may be mounted on production tables making a low cost highly efficient set-up.

Figure 38 shows the drill press equipped with a torque indicating stud driver. This is another example of the high versatility of your drill press equipment.

POLISHING

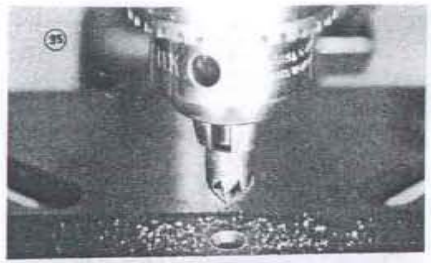
The spot finish, sometimes called an engine finish, is an attractive finish for metal and one that can easily be done on the drill press. All that is needed is a rod of hard rubber or even a hardwood dowel will do. The drill press should run about 1200 r. p. m. A paste can be made, consisting of abrasive grains such as emery, aluminum oxide, or silicon carbide, of about 150 — grit mixed with oil, or a commercial valve grinding compound, mixed with either oil or water can be used. The paste is spread lightly and evenly over the surface of the metal, after which the revolving rod is fed onto the work. The rod tip grinds the abrasive grains into the metal, producing a circular spot. Repeat the operation overlapping the rings a trifle, until the whole surface is covered. The line of spots should be kept even, by means of a fence, and regularly spaced. A uniform feed pressure and duration of contact must be practiced to get best results. Many effective patterns can be worked out (see figures 39 and 40).

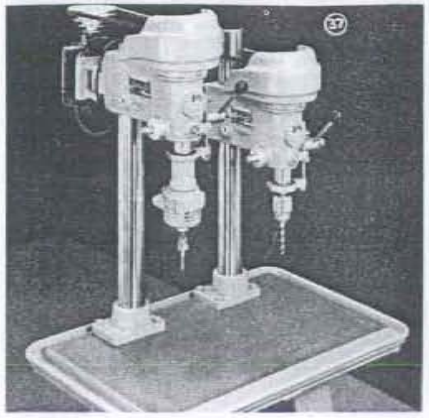
DRILLING IN GLASS

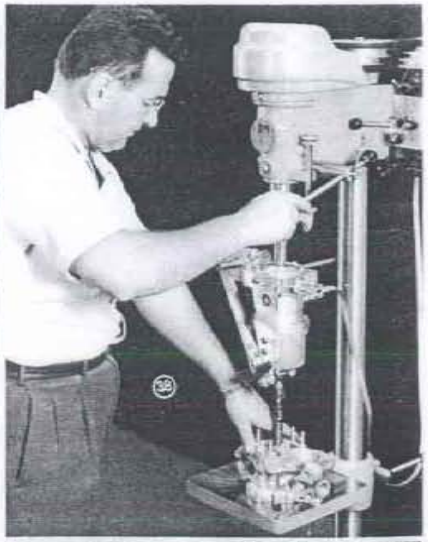
Glass is drilled with the use of a steel or brass tube, of the diameter desired for the hole. The tube is slotted at the working end with a saw cut. Mark the glass with a grease pencil and build a dam of putty around the spot where the hole is to be drilled, see figure 41. The tube drill is fed with a mixture of 80 — grit silicon carbide abrasive grains combined with turpentine. The drill speed should be about 500 r. p. m. Spear point carbide tipped tools are also available for drilling in glass.

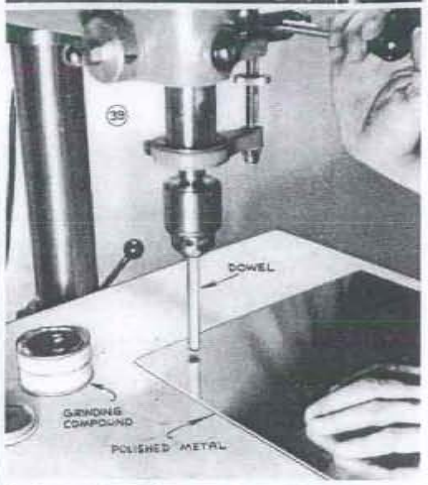
BUFFING

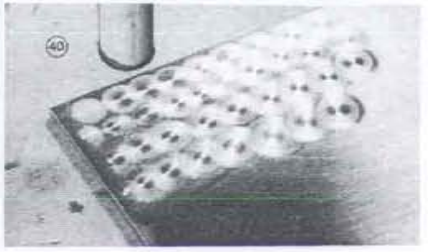
When other equipment is not available, polishing and buffing with cloth wheels can be done on the drill press. An inexpensive arbor held in the chuck as shown in figure 42 will hold a canvas buffing wheel. Buffing compound is applied as shown and a good job of polishing can be obtained on a variety of materials, see figure 43.







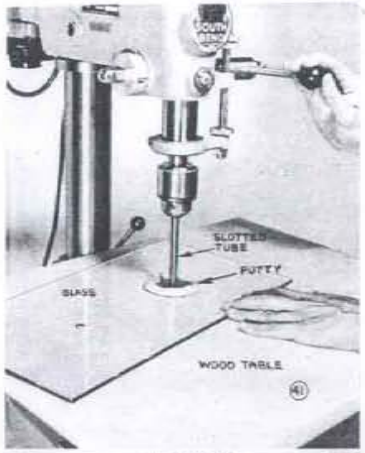




DRILLING PRACTICE IN WOOD

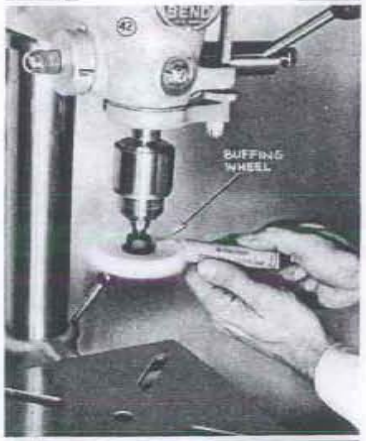
SPEED

Spur bits in sizes up to approximately ¾" should be worked at speeds between 1800 and 3000 r. p. m.'s No exact speeds may be given, since this depends to a great extent on the wood, grain, depth of hole, style of bit, etc. Generally speaking, smaller bits can turn faster than larger ones, more speed can be used on soft woods, less speed should be used for deep holes, and more speed can be used for end drilling. Large bits must always be run at slow speed. Multi-spur and expansive bits will burn if worked at greater than 500 r. p. m.



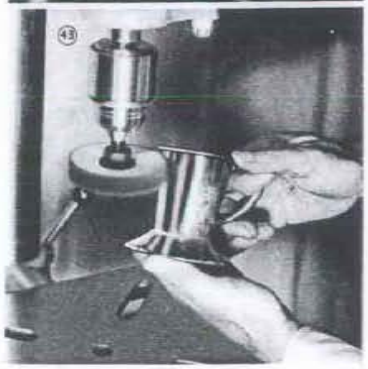
DRILLING

The work is properly laid out and the position of the hole marked. The bit is mounted in the chuck. The table should be located so that the bit will pass through the table opening after the hole has been drilled. The drill is forced into the work by pulling on the feed lever. The feed should be slowed down when the operator judges the drill to be almost through the work. The feed should be very slow from this point on to avoid splintering the work as the drill projects through the under side. Most operators prefer to place a scrap block of wood under the work so that as the drill passes through it meets a solid foundation and by thus drilling part way into the scrap stock a clean neat hole is left on the under side of the work. In many instances a larger auxiliary wood table is mounted on the regular drill press table to give added support for larger work (see figure 44).



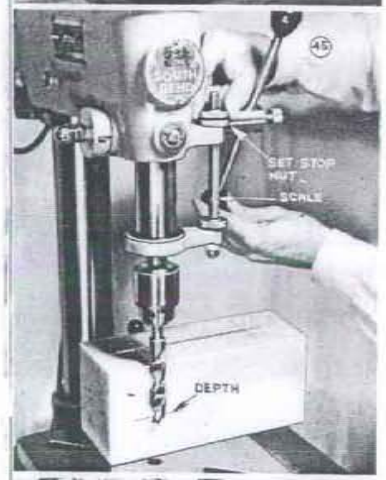
DRILLING TO DEPTH

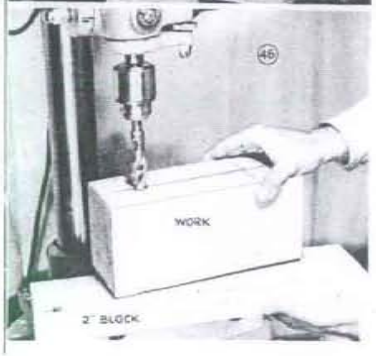
One method of drilling to a specified depth is shown in figure 45. The depth of the hole to be drilled is marked on the side of the work. The quill assembly is then lowered with the drill along side the work until it reaches the proper depth, holding it in this position, set the stop nut as shown in the photograph. The quill assembly is then returned to its normal position, the drill is centered on the cross lines of your layout marks and the feed lever is pressed until it is stopped by the lock nuts on the depth gauge. One other method is to bring the point of the drill down against the work and then read the scale on the depth gauge. Then proceed to feed the drill into the work, adding the required depth to the first reading.



DRILLING DEEP HOLES

One method of increasing the depth over the normal spindle travel is shown in figure 46. The first full stroke is made, sinking the drill to a depth of 4" in the work. The feed handle is then released, and the work lifted with the drill inserted in the hole and a base block is slipped under the work as shown





in the photograph. The feed handle can now be pressed again and an additional two inches may be drilled with the same quill travel. In all deep hole drilling, cutting should not continue after the flutes of the bit have passed below the work surface. After this point has been reached, the chips cannot get out, and burning starts immediately. Where it is necessary to go beyond this depth — the bit should be lifted frequently in order to permit clearing the hole of chips.

DRILLING LARGE HOLES

Holes over 1½" diameter can be classified as large holes. The removal of comparatively large amounts of wood causes considerable strain on the work and it is therefore advisable to use clamps. This applies especially to any kind of bit which has but one cutting edge. Other style cutters of the multi-spur or continuous rim pattern can be operated without clamping. Figure 47 shows a multi-spur bit being used.

DRILLING IN ROUND WORK

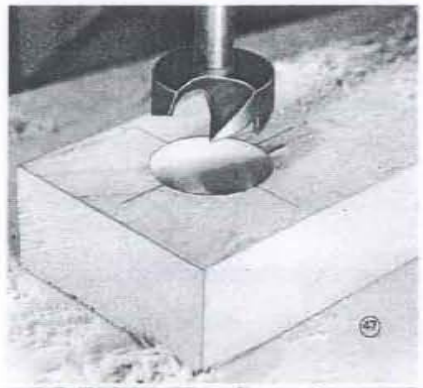
Various methods are in use for drilling in round stock, however, one of the most common is the use of the "V" block. Figure 48 shows a round metal bar being drilled. If the hole is not too large and the feed is relatively slow, clamps will not be found necessary for a drilling operation of this kind. The pressure of the drill securely seats the bar in the "V" block and little pressure will be found necessary to hold it in position.

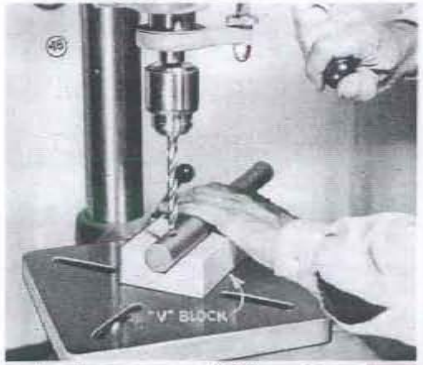
Figure 49 shows a circular disc of wood being drilled around its edge by means of the "V" block method. In this case the table has been locked in a vertical position and a "V" block clamped to the surface and also resting on the lower surface. The wood disc may be held against the surface easily with one hand while the feed lever is operated with the other.

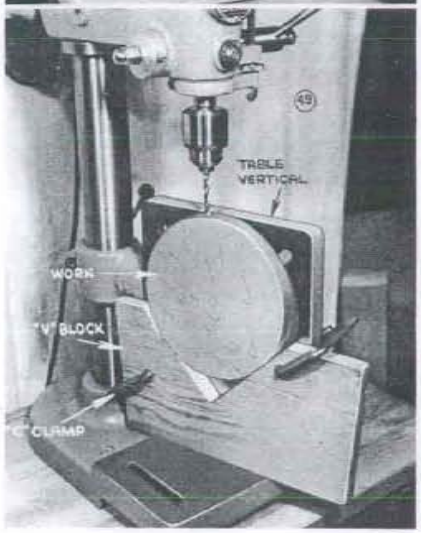
Another method of drilling round work is shown in figure 50. In this case, the table is tilted to 45° and a block of wood is clamped to the table as shown in the photograph. The work is laid in the "V" formed by the table surface and the block. The table may be pivoted back and forth in order to center the drill on the surface of the round work.

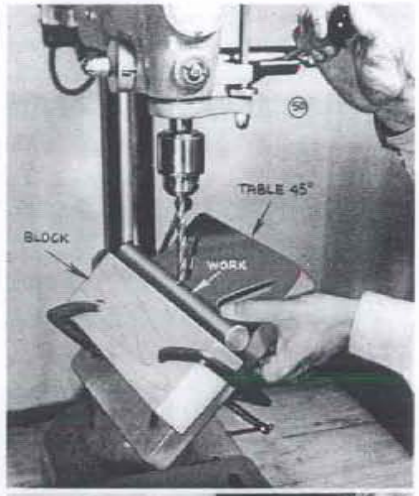
PIVOT POINTS

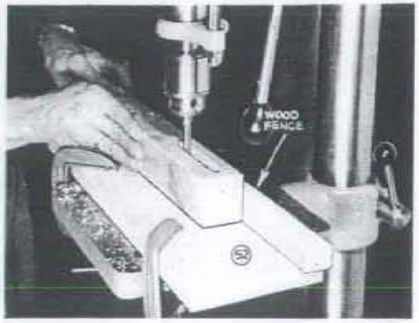
Where the holes are to be drilled around the edge of a circular piece of work as shown in figure 51, the work is pivoted on a wood or metal pin which may extend completely through or merely part way from the under side. The use of a pivot pin locates the holes accurately in relation to the center, but does not space

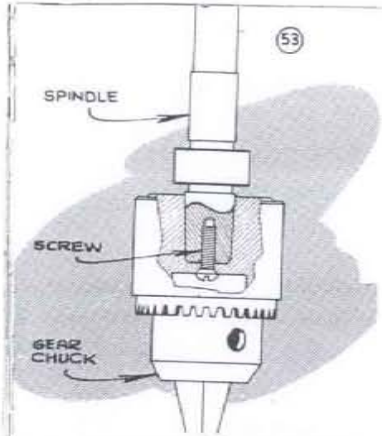


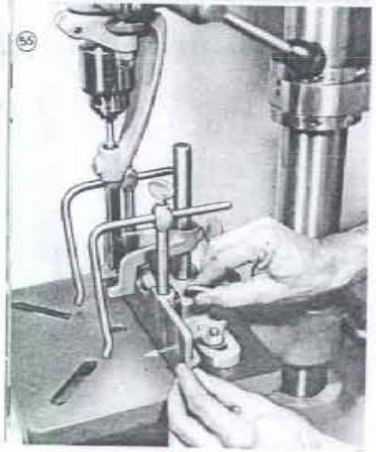












them equally around the circle. A jig with a locating pin or indexing head will regulate this part of the work.

ROUTING

Routing is done with the use of suitable router bits, the bits being held in the ½" hole spindle. At all times the work must be supported against a suitable fence lest it be caught by the deep flutes of the bit and twisted out of the operator's hands. The speed of the drill press should be 5000 r. p. m.

The guide or fence is usually behind the router bit, and when in this position, the work should always be fed from left to right. The point to be remembered is that the work must be advanced so that the pressure formed by the cutting action of the bit is against the feed direction. It will be noted also that the pressure formed by the cutting action presses the work against the fence (see figure 52). Grooves wider than the router bit are cut by simply setting the fence over for successive cuts until the required width is reached. While the width of the cut is being adjusted by means of the fence, the depth of the cut is set by locking the quill to limit the depth of cut. A deep cut is best made by a succession of shallow cuts. Routing may be done over entire regulated surfaces by means of a pattern. For example — a dowel of the same diameter as the router bit is set into the wood table and in line with the router bit. This dowel projects about 3/16" above the surface of the table. A scroll saw pattern cut from ¼" plywood is then tacked to the bottom surface of the work. As the dowel projecting from the table follows the pattern on the under side the router bit cuts the work on the upper surface.

Whenever any side pressure is used as in routing or grinding, the gear chuck should be secured to the taper spindle by some means other than the taper alone. Side pressure will tend to loosen the chuck from the spindle, therefore it should be secured, as shown in figure 53. Some spindles are already bored and tapped for this specific purpose. If this has not been done, bore and tap the spindle for a machine screw, bore the chuck, as shown in the drawing, and secure the chuck to the spindle with a screw. Remember — this method must always be used whenever side pressure is exerted as described above.

MORTISING

Round-end mortises may be cut on the drill press with a router bit or they may be made by overlapping a series of bored holes and then cleaning out the points in between with either a router bit or a wood chisel. When making mortises with a router bit it is helpful to have stop blocks clamped to the guide fence in order to limit the length of the cut. Mortising chisels are available for most drill presses making it possible to machine square end mortises quickly and accurately.

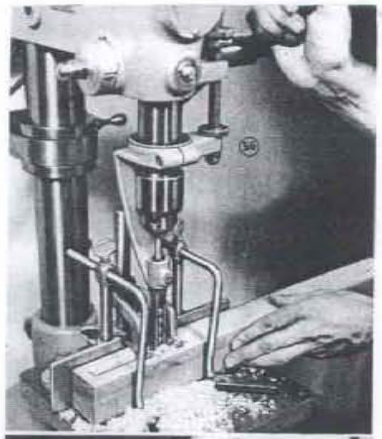
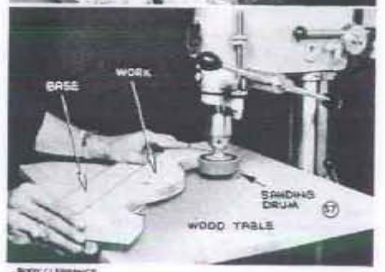
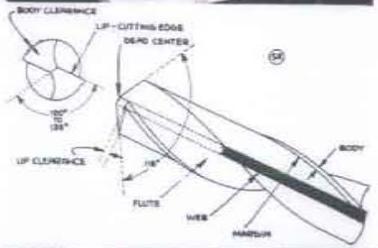


Figure 54 shows a typical mortising attachment consisting of the fence assembly, mortising chisel holder, and three sizes of mortising chisels and bits. The fence assembly adjusts quickly and accurately for different thickness stock, see figure 55. The base clamps to the table and the fence adjusts on two steel posts. The forked work hold-down adjusts on a vertical steel post mounted on the base. This hold-down should always be brought down onto the surface of the work, as shown in figure 56. The two guide arms mounted on the fence, may be adjusted separately and should be brought back against the face of the work, thus holding it securely against the fence. Make sure that you set the stop-nuts on the depth gauge, so that you will not force the chisel through the work and into the drill press table.

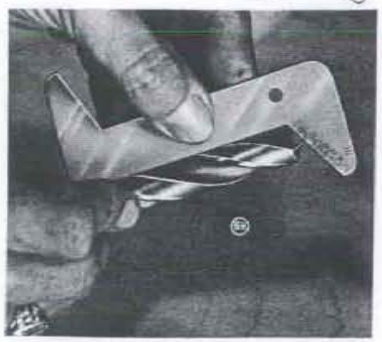


SANDING

Another useful drill press operation is sanding. Sanding drums of various shapes and sizes are available at most machine tool dealers, which will take much of the time consuming work out of hand sanding many of the curved surfaces of your shop projects. A 3" sanding drum should run at from 1200 to 1500 r. p. m.'s. Smaller sizes should run faster. Drums are used mostly for edge operations, and good use can be made of fences, pivot pins, and other simple jigs to guide the work. Irregular curves are simply fed free hand with a uniform feed and pressure to obtain good work and prevent burning. Figure 57 shows a typical example of free hand edge sanding. The work is supported on a base block in order to center the edge of the sanding drum on the edge of the work.



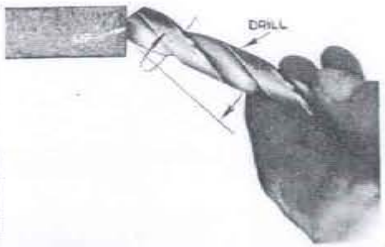
The main difficulty with free hand edge sanding is that the work must be kept moving at an even pressure against the drum, otherwise a deep cut is made into the work at any place where the operator pauses too long. One way to avoid this fault is to sand with a pattern or against a wood disc exactly the same diameter as the sanding drum, set below the drum and fastened to the table. The pattern is then fastened to the under side of the work and while the pattern rides against the wood disc the work rides against the sanding drum. The same pattern may thus be used to duplicate the first piece as many times as necessary.

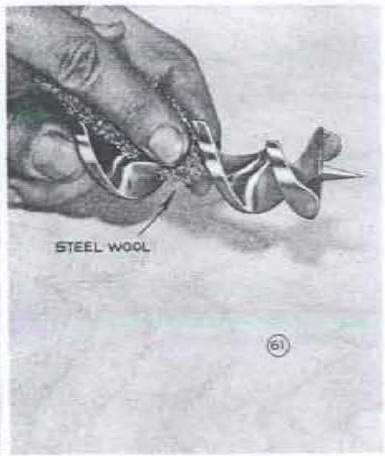


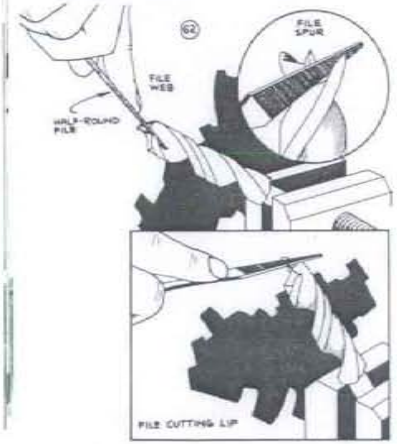
TWIST DRILLS

Twist drills, in the sizes generally used on the small drill press, are formed by milling grooves or "flutes" in a cylinder of tool steel. The flutes aid in forming the proper shape of cutting edges or "lips", and also help to curl the chip in such a way that it will readily clear itself from the tool. They serve as channels of escape for the chips and as leads for lubricants. Figure 58 shows the parts of a twist drill.

The two most important features of drill grinding are first, the point angle, and second, the lip clearance. The point angle has been established at 59°







for general work, and this angle should be maintained. It is easily checked with a drill gauge (see figure 59). This gauge may be purchased from your local dealer and in addition to checking the point angle it is used to determine whether the cutting lips are of equal length. Figure 58 indicates the proper lip clearance in grinding a twist drill. A drill without lip clearance will not cut since the heel of the point is on the same plane as the lip, consequently the whole surface of the point merely drags on the surface of the metal.

GRINDING A DRILL

Most workers understand the theory of drill grinding, but have some trouble in getting the desired angles. A simple method of working is to scribe lines on the tool rest of your grinder for the starting angle and the finishing angle. Thus as shown in figure 60 the cutting lip is placed face upward against the flat side of the grinding wheel at the starting angle. With a twisting motion of the drill point the shank of the drill is dropped down and pulled toward the operator, as shown by the arrows in the illustration. A little practice preferably on a larger drill will enable the operator to become sufficiently skilled to grind drills efficiently. As shown in figure 58, the web of the drill becomes thicker as it approaches the shank. As the point, therefore, after repeated grindings, becomes thicker it requires more power to force it through the work. To partly eliminate this, the web of the drill should be thinned by grinding the flutes against a round edged wheel.

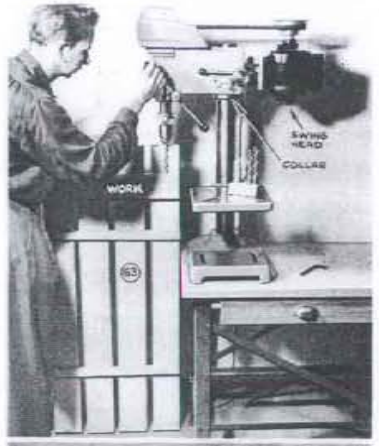
WOOD BITS

All cutters intended for working in wood are given the general name of "bits", as different from the metal cutting tool, which is known as a "drill". There are many types of wood bits, the most common being the spur, the solid center bit, the hollow spiral bit, the expansive bit, the multi-spur bit, the double spur bit (solid center), the center bit, and the countersink bit.

One of the first essentials of keeping wood bits in good condition is to keep them well polished. When the flutes are clean and smooth, the chips are easily ejected instead of clogging and burning in deep holes. Bits are easily kept clean by rubbing them with steel wool, as is shown being done with the double spur bit in figure 61. A thin film of oil should be placed on all bits which are not in steady use.

Wood bits are sharpened by filing. The equipment for this should include a small half-round file, an auger bit file with safe edges, and a small triangular file. This will take care of almost any bit in the small workshop. All bits have the same general features and are sharpened by using the same method. The two points which must be sharpened are the cutting lips and the outlining spurs. On common styles of wood bits and also on wood bits of the twist drill pattern, touch-up filing is done through the throat, as shown in figure 62. Spurs are always sharpened on the inside, never on the outside. An auger bit file should be used, as shown in the illustration. The uncut edges of this file insures the operator against accidentally cutting into the lip surface. For more complete sharpening when the bit is quite dull, the top of the cutting edge is filed. It is important here that the original bevel should be maintained, and that the cutting surface should be filed FLAT completely across.

There are many other styles and shapes of cutters and bits often used in the drill press. Many of them take special handling both for use and conditioning.



FLOOR MODEL DRILL PRESS

Your bench model drill press will serve double duty as a floor model by swinging the head out over the end of the work bench as shown in figure 63.

OTHER OPERATIONS

The addition of a stub spindle similar to the one shown in figure 64 will enable you to use your drill press as a shaper, making use of many three wing shaper cutters, available at your machine tool dealer.

Your drill press with the use of other special cutters may be used to drill paper, carve in wood and plastic and do such other jobs as riveting, mixing paint, etc.

MULTI-SPEED ATTACHMENT

When a wide range of spindle speeds is needed, the multi-speed attachment is used. With it, twelve spindle speeds, ranging from 380 to 8010 r. p. m. are provided with a 1725 r. p. m. motor.

The low spindle speeds are obtained with the motor belt placed on the smaller steps of the motor pulley and the larger steps of the auxiliary pulley. With the motor belt on the larger steps of the motor pulley, driving the smaller steps of the auxiliary pulley, the high speed range is provided.

To mount the multi-speed attachment on the column, first lower the drill press head far enough to allow the multi-speed attachment to be placed over the column top. When it has been set down firmly in place, adjust the position of the drill press head by raising to within 1/16" of the lower edge of the collar on the multi-speed attachment and lock the head in place. This should bring the auxiliary pulley and the spindle pulley in accurate alignment. Check the alignment with a good straight edge. Invert the motor pulley from its regular position and adjust on the motor shaft until the three pulleys are in accurate alignment.

Place the two belts on the pulleys and adjust the front belt to proper tension by twisting the multi-speed eccentric in clockwise direction. Tighten the set screws in the collar. Adjust the belt tightener lever on the drill press to retain proper belt tension on both belts. Avoid tightening belts too tight—see figures 65 and 66.

BELT GUARD

Figures 67 and 68 show the belt guard which is available as an accessory. The belt guard is held in place by means of two pivot screws through the sides of the two pulley guards. The belt guard is supported at the back by a metal rod which fastens across the back of the head casting.

POSITIONING ATTACHMENT

Positioning attachments are available as shown in figures 69 and 70 for the drill press table and the drill press head. This provides a precision adjustment and consists of a vertical screw, operated by a steel ball crank through worm gearing. It is fastened to the drill press column between two lock rings as shown, and provides four inches of adjustment without resetting. Before raising or lowering either the head or table with this attachment, release the clamping mechanism of the head or table. After raising or lowering, reclamp the table or head to the column before operating the drill press.

ROTARY AND CROSS-FEED TABLES

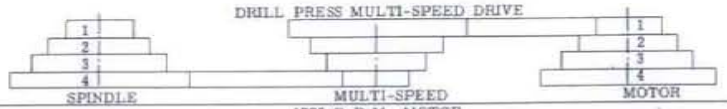
Various other accessories are available for the handling and clamping of work for precision machining, drilling, etc., on your drill press. Two of these accessories are shown in figures 71 and 72. The rotary feed table, shown in figure 71, features an accurately machined table surface with clamping slots. Figure 72, shows a cross-feed arrangement, both members of which are provided with center pivots and clamping slots.

PUSH BUTTON CONTROL

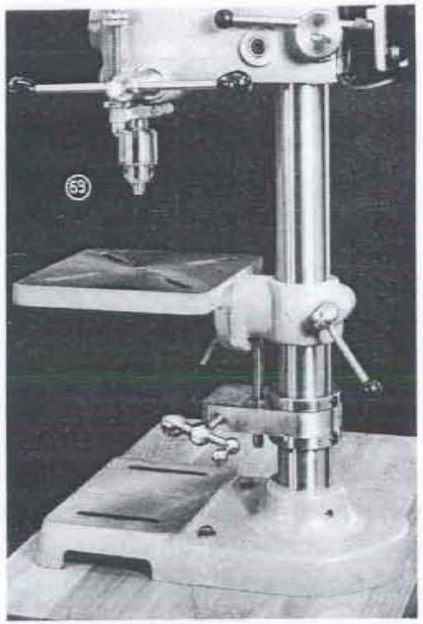
Figure 73 shows a push button control switch mounted on the side of the 14 inch precision drill press. This provides instant fingertip control for starting and stopping.

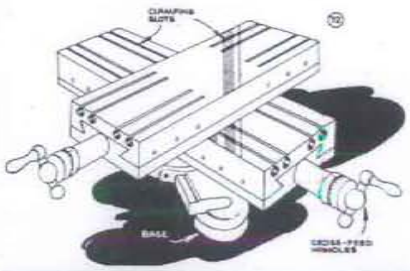
ECONOMY MODEL DRILL PRESS

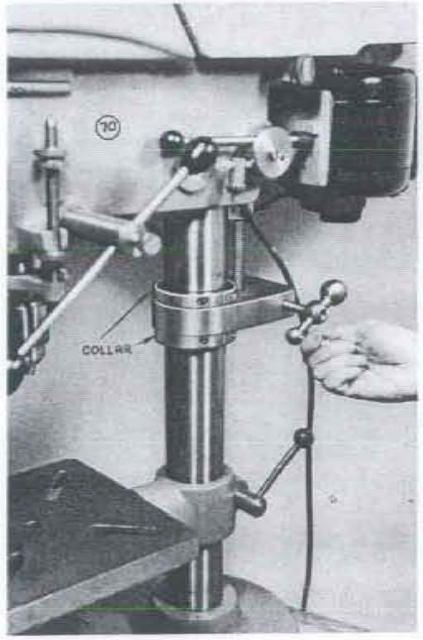
The economy model drill press shown in figures 74 and 75 is basically the same machine as the one which has been previously described. The major adjustments for its operation are the same. Some of the refinements found on the precision model, such as the interior wiring, built in switches, locking handles, belt tension adjustment, are missing. Many of these refinements may be purchased, such as the wiring kit (figure 76) and attached to your economy model drill press.

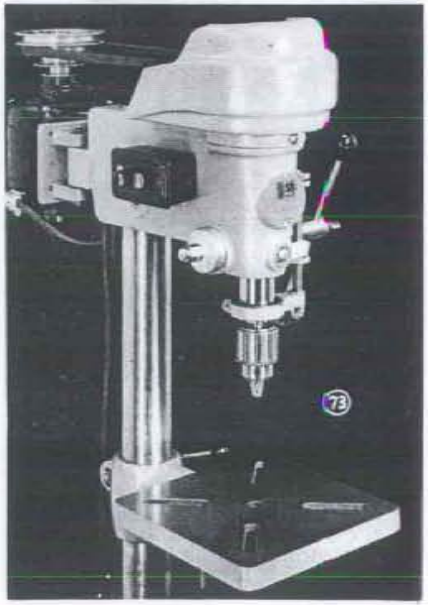


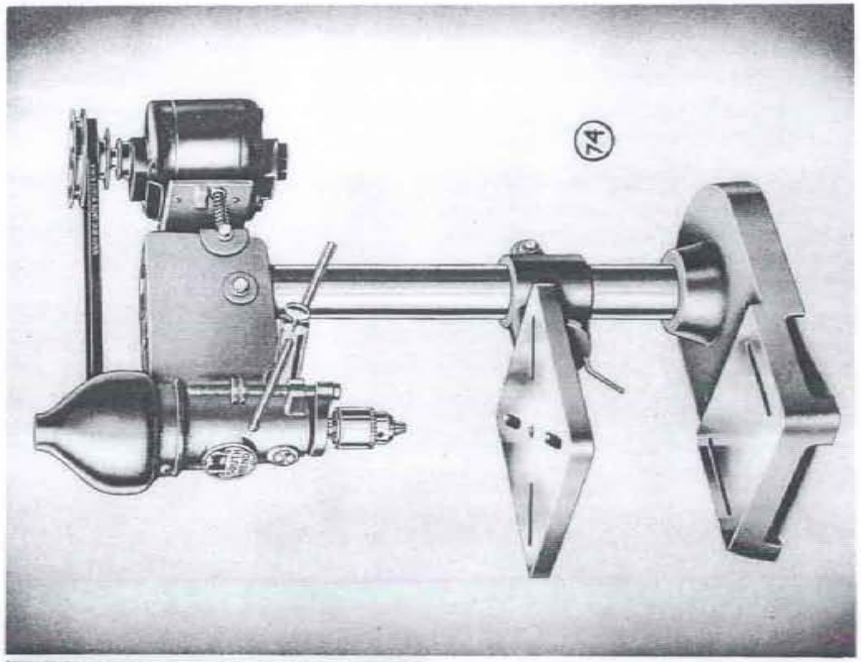
1725 R.P.M. MOTOR						
MOTOR STEP	SPINDLE STEP	SPINDLE SPEED	SPINDLE STEP	SPINDLE SPEED	SPINDLE STEP	SPINDLE SPEED
1	4	380	3	605	2	1040
2	4	650	3	1040	1	3025
3	4	1120	2	3070	1	5170
4	3	2870	2	4900	1	8010

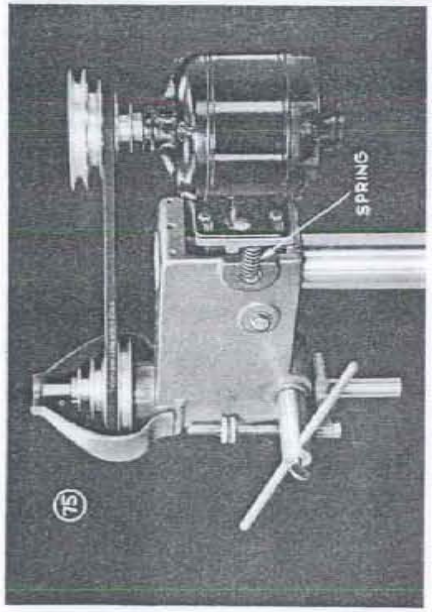


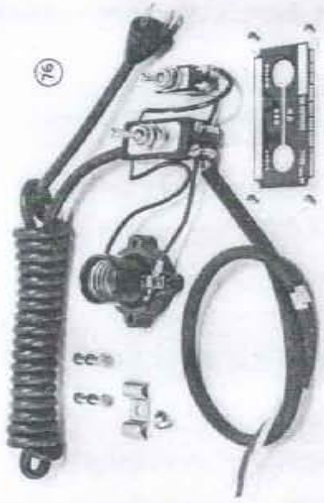












TAP DRILL SIZES

Recommended for
AMERICAN NATIONAL SCREW THREAD PITCHES

COARSE STANDARD THREAD (N. C.)
Formerly U. S. Standard Thread

Sizes	Threads Per Inch	Outside Diameter of Screw	Tap Drill Sizes	Decimal Equivalent of Drill
1	64	.073	53	0.0595
2	56	.086	50	0.0700
3	48	.099	47	0.0785
4	40	.112	43	0.0890
5	40	.125	38	0.1015
6	32	.138	36	0.1065
8	32	.164	29	0.1360
10	24	.190	25	0.1495
12	24	.216	16	0.1770
1/4	20	.250	7	0.2010
5/16	18	.3125	F	0.2570
3/8	16	.375	5/16	0.3125
7/16	14	.4375	U	0.3680
1/2	13	.500	27/64	0.4219
9/16	12	.5625	31/64	0.4843
5/8	11	.625	17/32	0.5312
3/4	10	.750	21/32	0.6562
7/8	9	.875	49/64	0.7656
1	8	1.000	7/8	0.875
1-1/8	7	1.125	63/64	0.9843
1-1/4	7	1.250	1-7/64	1.1093

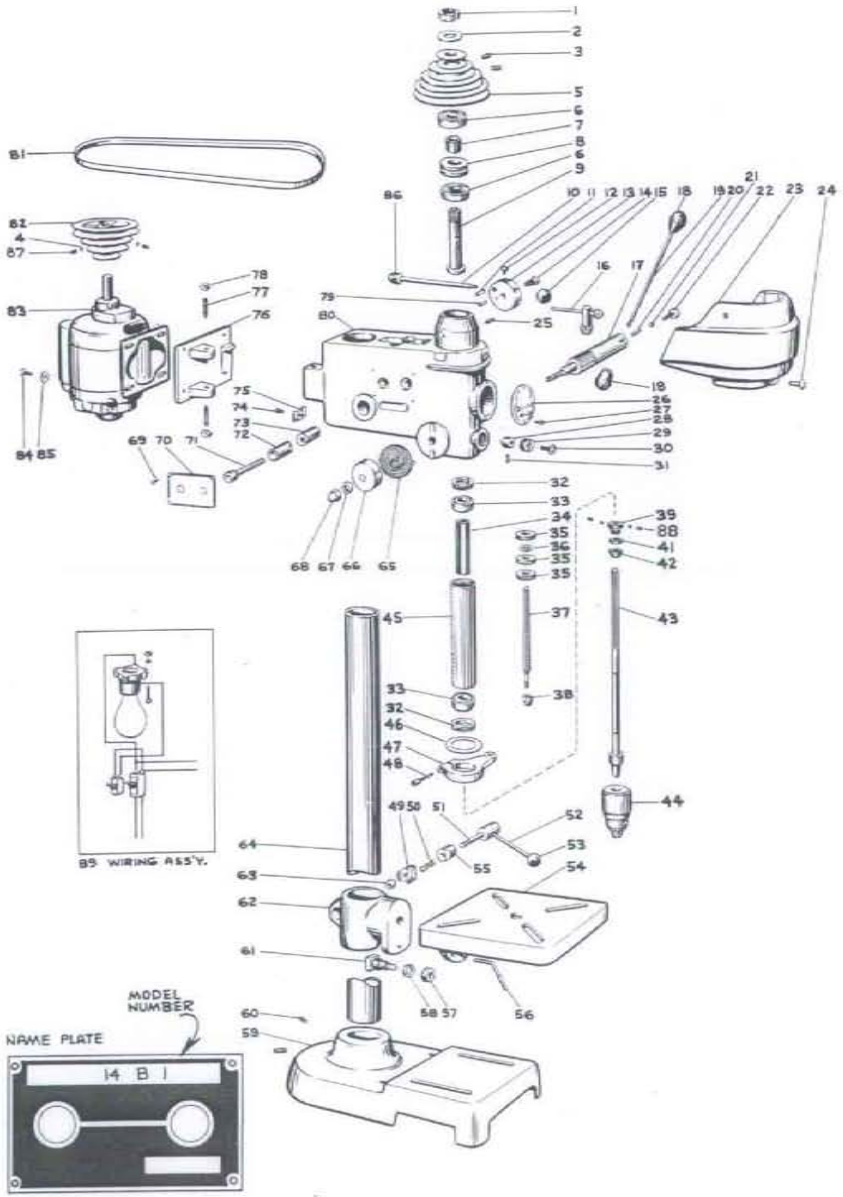
FINE STANDARD THREAD (N. F.)
Formerly S.A.E. Thread

Sizes	Threads Per Inch	Outside Diameter of Screw	Tap Drill Sizes	Decimal Equivalent of Drill
0	80	.060	3/64	0.0469
1	72	.073	53	0.0595
2	64	.086	50	0.0700
3	56	.099	45	0.0820
4	48	.112	42	0.0935
5	44	.125	37	0.1040
6	40	.138	33	0.1130
8	36	.164	29	0.1360
10	32	.190	21	0.1590
12	28	.216	14	0.1820
1/4	28	.250	3	0.2130
5/16	24	.3125	I	0.2720
3/8	24	.375	Q	0.3320
7/16	20	.4375	25/64	0.3906
1/2	20	.500	29/64	0.4531
9/16	18	.5625	0.5062	0.5062
5/8	18	.625	0.5687	0.5687
3/4	16	.750	11/16	0.6875
7/8	14	.875	0.8020	0.8020
1	14	1.000	0.9274	0.9274
1-1/8	12	1.125	1-3/64	1.0468
1-1/4	12	1.250	1-11/64	1.1718

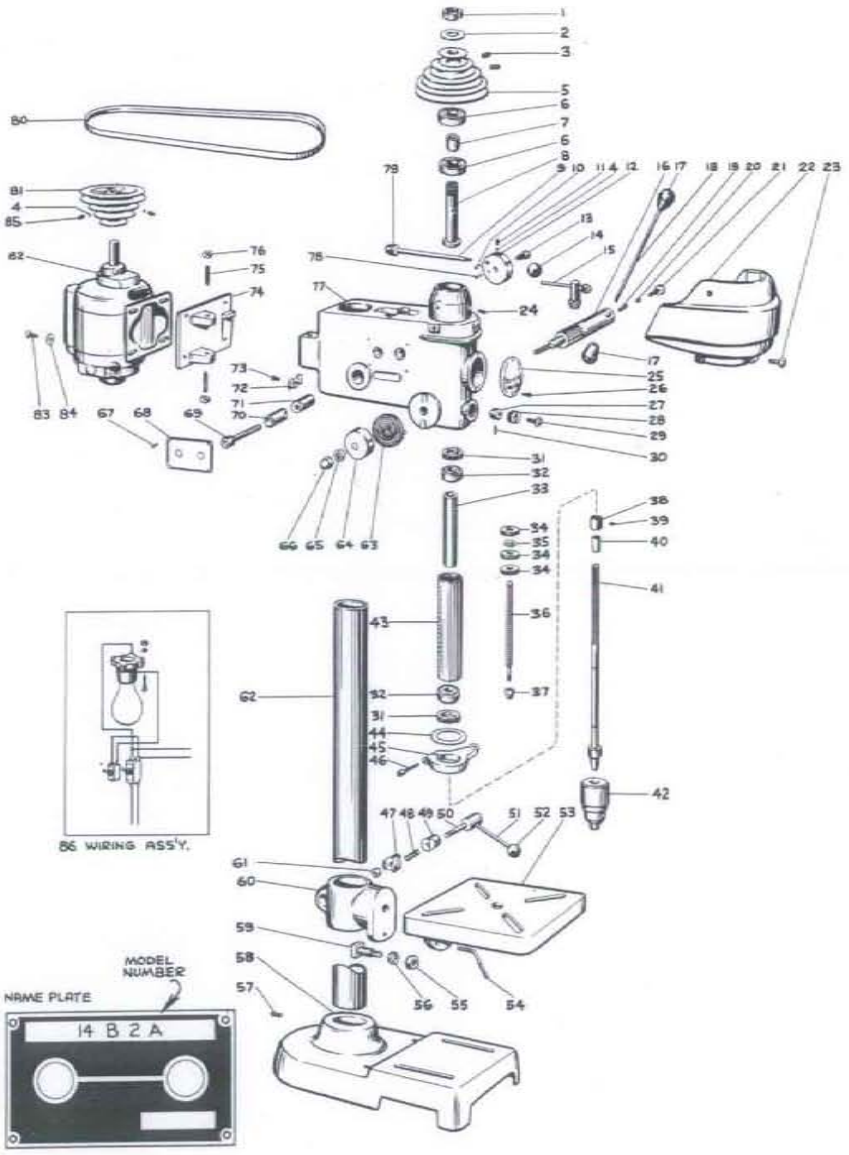
SPECIAL THREAD (N. S.)

Sizes	Threads Per Inch	Outside Diameter of Screw	Tap Drill Sizes	Decimal Equivalent of Drill
1	56	.0730	54	0.0550
4	32	.1120	45	0.0820
4	36	.1120	44	0.0860
6	36	.1380	34	0.1110
8	40	.1640	28	0.1405
10	30	.1900	22	0.1570
12	32	.2160	13	0.1850
14	20	.2420	10	0.1935
14	24	.2420	7	0.2010
1/16	64	.0625	3/64	0.0469
3/32	48	.0938	49	0.0730
1/8	40	.1250	38	0.1015
5/32	32	.1563	1/8	0.1250
5/32	36	.1563	30	0.1285
3/16	24	.1875	26	0.1470
3/16	32	.1875	22	0.1570
7/32	24	.2188	16	0.1770
7/32	32	.2188	12	0.1890
1/4	24	.250	4	0.2090
1/4	27	.250	3	0.2130
1/4	32	.250	7/32	0.2187
5/16	20	.3125	17/64	0.2656
5/16	27	.3125	J	0.2770
5/16	32	.3125	9/32	0.2812
3/8	20	.375	21/64	0.3281
3/8	27	.375	R	0.3390
7/16	24	.4375	X	0.3970
7/16	27	.4375	Y	0.4040
1/2	12	.500	27/64	0.4219
1/2	24	.500	29/64	0.4531
1/2	27	.500	15/32	0.4687
9/16	27	.5625	17/32	0.5312
5/8	12	.625	35/64	0.5469
5/8	27	.625	19/32	0.5937
11/16	11	.6875	19/32	0.5937
11/16	16	.6875	5/8	0.6250
3/4	12	.750	43/64	0.6719
3/4	27	.750	23/32	0.7187
7/8	12	.875	51/64	0.7969
7/8	18	.875	53/64	0.8281
7/8	27	.875	27/32	0.8437
1	12	1.000	59/64	0.9219
1	27	1.000	31/32	0.9687

SOUTH BEND LATHE WORKS
SOUTH BEND 22, INDIANA, U.S.A.
Drawing No. C-139
Printed in U.S.A.



PRECISION MODEL BENCH DRILL PRESS 14B1



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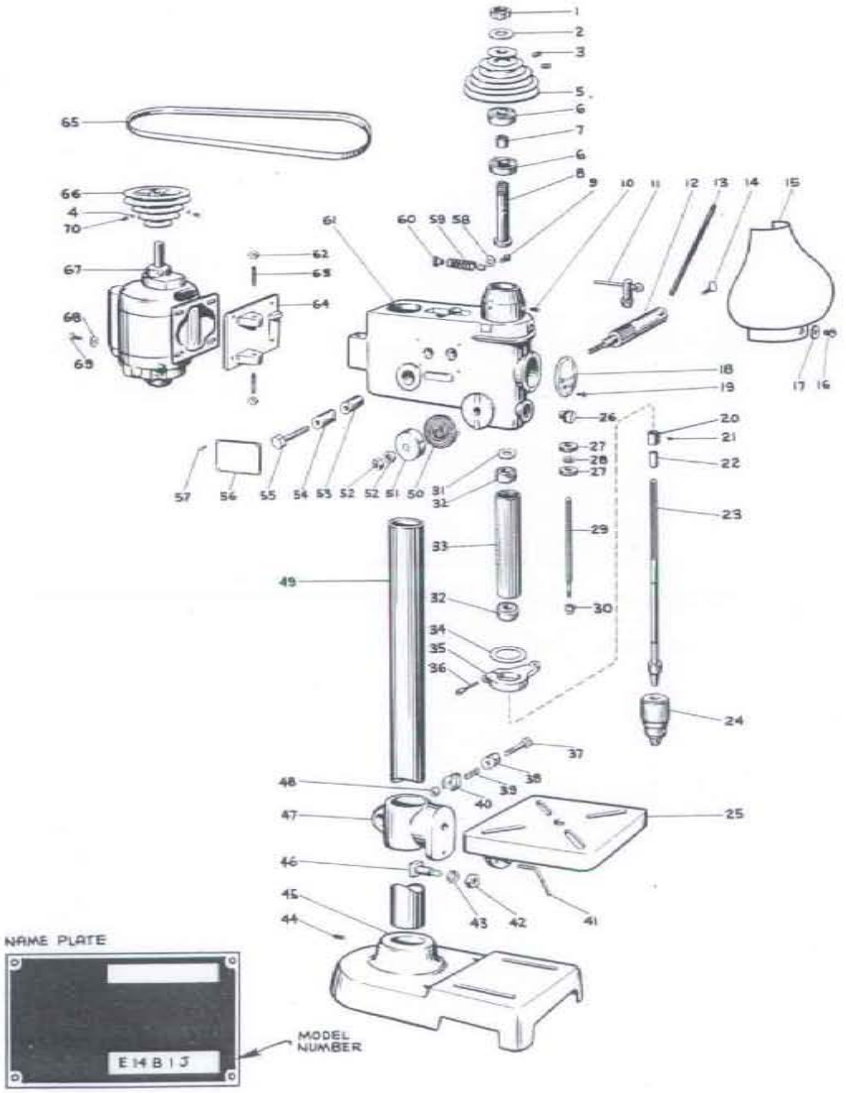

PRECISION MODEL BENCH DRILL PRESS E14B1J

HOW TO ORDER REPLACEMENT PARTS

HOW TO ORDER REPLACEMENT PARTS

If it is inconvenient to return the old part to the factory, be sure to give the following information when ordering repair parts:

1. Correct number of part (taken from parts list).

2. Name of part (taken from parts list).

3. Model number of drill press (taken from switch plate on left side of drill press head).

4. Code number of major unit containing desired part (found stamped on Head, Table, and Base).

5. Quantity.

If part needed cannot be located in this parts list and it is inconvenient to return the old part, send a sketch of the part showing all principal dimensions.

COMMERCIAL PARTS

Standard bolts, nuts, washers, straight and taper pins, wiring, conduit and fittings, wicking and gasket material, and similar items usually available from local sources of supply are not listed or numbered. If it is necessary to order such items from us be sure to give complete description and specifications. Specify size and length of wire, conduit, wicking, or hose.

MOTORS AND CONTROLS

Repair parts for motors and controls cannot be supplied by us, but can be ordered direct from the manufacturer whose address appears on the name plate attached to the motor or control. A complete replacement motor or control can be ordered from us if needed. Be sure to give complete specifications as they appear on the name plate of the old motor or control.

CHUCKS

Repair parts for chucks cannot be supplied by us, but can be ordered direct from the manufacturer whose name appears on the chuck. Complete replacement chucks can be ordered from our latest catalog

TERMS

All orders for the replacement parts will be shipped c. o. d. unless order is placed through a South Bend Lathe distributor or remittance in full is sent with order.

PRICES

Prices, f. o. b. South Bend, Indiana, will be quoted on request. Be sure to state number and name of part when requesting price quotation.

When prices or other additional information is required about replacement parts or parts order, direct your inquiry:

SOUTH BEND LATHE WORKS,
Service Parts Department
425 East Madison Street,
South Bend 22, Indiana, U.S.A.

PARTS LIST

FOR PRECISION MODEL BENCH DRILL PRESS 14 B 1

REFERENCE NO.	PART NUMBER	DESCRIPTION	PRICE EACH	NO. REQ'D.
1	PT4039DP1	Lock Nut	$ .80	1
2	161x78	Finished Washer	.05	1
3	121x10	Holl. Hd. Full Dog Pt. Set Screw	.20	2
4	PT1078RH1	Brass Shoe	.05	2
5	PT4010DP1	Spindle Pulley	5.15	1
6	PT4051DP1	Order Ref. No. 9		2
7	PT4021DP1	Order Ref. No. 9		1
8	PT4018DP1	Order Ref. No. 9		1
9	*AS4025DP1	Spindle Sleeve (6-7-8)	5.25	1
10	PT4023DP1	Bumper Rod	.40	1
11	160x72	Straight Pin	.05	1
12	131x20	Thumb Screw	.05	1
13	*AS4017DP1	Cam (11-12-79)	1.10	1
14	PT4032DP1	Shoulder Bolt	.25	1
15	PT406NT1	Bakelite	.45	1
16		Jacobs Chuck Key	.50	1
17	PT4009DP1	Quill Feed Shaft	3.65	1
18	PT4048DP1	Feed Rod Knob	.35	2
19	PT4044DP1	Quill Feed Handle	.55	1
20	131x32	Coil Spring	.15	1
21	172x20	Steel Ball	.05	1
22	PT1852	Thumb Screw	.25	1

* Available only as sub-assembly. Parts included are indicated by the item numbers appearing in parenthesis after part name.

REFERENCE NO.	PART NUMBER	DESCRIPTION	PRICE EACH	NO. REQ'D.
23	*AS4005DP1	Cone Cover (24)	$ 6.10	1
24	PT4074DP1	Phillips Head Machine Screw	.10	1
25	121x10	Holl. Hd. Full Dog Pt. Set Screw	.20	2
26	PT3303	Cover Plate	.35	1
27	132x1103	Phillips Head Self Tapping Screw	.05	2
28	PT4022DP1	Clamp Shoe	.65	1
29	PT4041DP1	Quill Adjusting Screw	.45	1
30	PT4074DP1	Phillips Rd. Hd. Machine Screw	.10	1
31	160x52	Straight Pin	.05	1
32	PT4035DP1	Bearing Lock Nut	.60	2
33	PT4050DP1	N. D. Seal Bearing #88016	2.25	2
34	PT4020DP1	Quill Spacer	1.00	1
35	PT4028DP1	Depth Gage Nut	.30	3
36	161x26	Finished Washer	.05	1
37	PT4027DP1	Depth Gage Shaft	.60	1
38	PT4066DP1	Acorn Nut (Regular)	.25	1
39	*AS4029DP1	Lock Collar (40-41-42-89)	.80	1
40	126x503	Holl. Hd. Flat Pt. Set Screw	.20	1
41	PT4030DP1	Order Ref. No. 39		1
42	PT4031DP1	Order Ref. No. 39		1
43	PT4007DP1	Drill Press Spindle	3.85	1
44	CE1201	Jacobs Chuck No. 34	6.84	1
45	PT4008DP1	Quill	6.25	1
46	PT4033DP1	Neoprene Bumper	.20	1
47	*AS4042DP1	Depth Gage Collar (48)	1.40	1
48	114x124	Socket Head Cap Screw	.35	1
49	*AS4014DP1	Table Binding Plug (Left) (55)	.55	1
50	162x28	Coil Spring	.10	1
51	*AS4037DP1	Binder Screw (52-53)	1.80	1
52	PT4038DP1	Binder Handle	.40	1
53	PT406NT1	Bakelite Ball	.45	1
54	*AS4001DP1	Table (56-57-58-61-62)	19.00	1
55	PT4013DP1	Order Ref. No. 49		1
56	PT4036DP1	Table Tilt Pin	.25	1
57	138x31	Hex. Full Nut	.10	1
58	182x304	Lock Washer	.05	1
59	*AS4004DP1	Column Base (60)	14.50	1
60	120x212	Holl. Hd. Cup Pt. Set Screw	.25	2
61	PT4026DP1	Table Swivel Stud	.90	1
62	PT4002DP1	Order Ref. No. 54		1
63	PT4057DP1	L. H. Hex. Nut - Regular	.20	1
64	PT4003DP1	Column	8.25	1
65	*PA4068DP1	Spiral Spring (66)	.60	1
66	PT4043DP1	Order Ref. No. 65		1
67	PT4075DP1	Lock Nut	.25	1
68	PT4054DP1	Acorn Nut	.30	1
69	130x103	Drive Screw	.05	4
70	*AS4052DP1	Switch Plate "Off - On" (69)	.35	1
71	114x456	Socket Head Cap Screw	.40	1
72	*AS4015DP1	Column Binding Plug (R.) (73)	1.10	1
73	PT4016DP1	Order Ref. No. 72		1
74	101x506	Rd. Hd. Machine Screw	.05	1
75	PT4058DP1	Double Clip	.25	1
76	*AS4046DP1	Motor Base Hinge (77-78-84-85)	4.55	1
77	PT704DP1	Headless Cone Point Set Screw	.20	2
78	137x27	Hex. Jam Nut	.40	2
79	PT4073DP1	Rubber Snubber	.05	1
80	PT4000DP1	Head	Price on Request	1
81	CE4546B	"V" Belt (Vibrationless)	2.20	1
82	*PA4061DP1	Motor Pulley (4-87) (Specify Bore)	5.60	1
83		Motor	Price on Request	1
84	112x110	Hex. Head Cap Screw	.05	4
85	161x12	Finished Washer	.05	4
86	PT4024DP1	Bumper	.10	1
87	120x8	Holl. Hd. Cup Pt. Set Screw	.20	2

* Available only as sub-assembly. Parts included are indicated by the item numbers appearing in parenthesis after part name.

REFERENCE NO.	PART NUMBER	DESCRIPTION	PRICE EACH	NO. REQ'D.
88	PT4069DP1	Cone Pt. Set Screw	$ .15	2
89	*PA1126DP1	Wiring Assembly	6.30	
	PT4063DP1	Toggle Switch (For Light)	.40	1
	PT4055DP1	Toggle Switch (For Motor)	.90	1
	PT4056DP1	Surface Receptacle	.35	1
	PT1120DP1	Terminaled Wire	.15	2
	PT1121DP1	Terminaled Wire	.15	1
	PT1126DP1	Terminaled Cable	.60	1
	CE3659	Cord Set	1.00	1
	PT1145	Wire Terminal	.05	2

PARTS LIST

FOR PRECISION MODEL BENCH DRILL PRESS 14 B 2 A

REFERENCE NO.	PART NUMBER	DESCRIPTION	PRICE EACH	NO. REQ'D.
1	PT4039DP1	Lock Nut	$ .80	1
2	161x78	Finished Washer	.05	1
3	121x10	Holl. Hd. Full Dog Pt. Set Screw	.20	2
4	PT1078RH1	Brass Shoe	.05	3
5	PT4010DP2	Spindle Pulley	5.15	1
6	PT4051DP1	Order Ref. No. 8		2
7	PT4021DP1	Order Ref. No. 8		1
8	*AS4025DP1	Spindle Sleeve (6-7)	5.25	1
9	PT4023DP1	Bumper Rod	.40	1
10	160x72	Straight Pin	.05	1
11	126x505	Holl. Hd. Flat Pt. Set Screw	.15	1
12	*AS4017DP1	Cam (4-10-11-78)	1.10	1
13	PT4032DP1	Shoulder Bolt	.25	1
14	PT406NT1	Bakelite	.45	1
15		Jacobs Chuck Key	.50	1
16	PT4009DP1	Quill Feed Shaft	3.65	1
17	PT4048DP1	Feed Rod Knob	.35	2
18	PT4044DP1	Quill Feed Handle	.55	1
19	162x25	Coil Spring	.10	1
20	172x20	Steel Ball	.05	1
21	PT1852	Thumb Screw	.25	1
22	*AS4005DP3	Cone Cover (23)	6.10	1
23	101x612	Round Head Machine Screw	.05	3
24	109x12	Holl. Hd. Cone Pt. Set Screw	.20	1
25	PT3303	Cover Plate	.35	1
26	132x1103	Phillips Hd. Self Tapping Screw	.05	2
27	PT4022DP1	Clamp Shoe	.65	1
28	PT4041DP1	Quill Adjusting Screw	.45	1
29	PT4074DP1	Phillips Rd. Hd. Machine Screw	.10	1
30	160x52	Straight Pin	.05	1
31	PT4035DP1	Bearing Lock Nut	.60	2
32	PT4050DP1	N. D. Seal Bearing #88016	2.25	2
33	PT4020DP1	Quill Spacer	1.00	1
34	PT4028DP1	Depth Gage Nut	.30	3
35	161x26	Finished Washer	.05	1
36	PT4027DP1	Depth Gage Shaft	.60	1
37	PT4066DP1	Acorn Nut (Regular)	.25	1
38	*AS4115DP1	Spindle Lock Collar (39-40)	.35	1
39	126x503	Hollow Head Flat Pt. Set Screw	.20	1
40	PT4116DP1	Order Ref. No. 38		1
41	PT4007DP1	Drill Press Spindle	3.85	1
42	CE1201	Jacobs Chuck No. 34	6.84	1
43	PT4008DP1	Quill	6.25	1
44	PT4033DP1	Neoprene Bumper	.20	1
45	*AS4042DP1	Depth Gage Collar (46)	1.40	1
46	114x124	Socket Head Cap Screw	.35	1
47	*AS4014DP1	Table Binding Plug (Left) (49)	.55	1

* Available only as sub-assembly. Parts included are indicated by the item numbers appearing in parenthesis after part name.

REFERENCE NO.	PART NUMBER	DESCRIPTION	PRICE EACH	NO. REQ'D.
48	162x28	Coil Spring	$ .10	1
49	PT4013DP1	Order Ref. No. 47		1
50	*AS4037DP1	Binder Screw (51-52)	1.80	1
51	PT4038DP1	Binder Handle	.40	1
52	PT406NT1	Bakelite Ball	.45	1
53	*AS4001DP2	Table (54-55-56-59-60)	19.00	1
54	PT4036DP1	Table Tilt Pin	.25	1
55	138x31	Hex. Full Nut	.10	1
56	182x304	Lock Washer	.05	1
57	120x212	Holl. Head Cup Pt. Set Screw	.25	1
58	*AS4004DP2	Column Base (57)	14.50	1
59	PT4026DP2	Table Swivel Stud	.90	1
60	PT4002DP3	Order Ref. No. 53		1
61	PT4057DP1	L.H. Hex. Nut - Regular	.20	1
62	PT4003DP2	Column	8.25	1
63	*PA4068DP1	Spiral Spring (64)	.60	1
64	PT4043DP1	Order Ref. No. 63		1
65	PT4075DP1	Lock Nut	.25	1
66	PT4054DP1	Acorn Nut	.30	1
67	130x103	Drive Screw	.05	4
68	*AS3960DP1	Switch Plate "Off - On" (67)	.45	1
69	114x456	Socket Head Cap Screw	.40	1
70	*AS4015DP1	Column Binding Plug (R.) (71)	1.10	1
71	PT4016DP1	Order Ref. No. 70		1
72	PT4058DP1	Double Clip	.25	1
73	101x606	Rd. Hd. Machine Screw	.05	1
74	*AS4049DP2	Motor Base Hinge (75-76-83-84)	4.55	1
75	PT704DP1	Headless Cone Point Set Screw	.20	2
76	137x27	Hex. Jam Nut	.40	2
77	PT4000DP2	Head	Price on Request	1
78	PT4073DP1	Rubber Snubber	.05	1
79	PT4024DP1	Bumper	.10	1
80	CE4546B	"V" Belt (Vibrationless)	2.20	1
81	*PA4061DP1	Motor Pulley (4-85) (Specify Bore)	5.60	1
82		Motor	Price on Request	1
83	112x110	Hex. Head Cap Screw	.05	4
84	161x12	Finished Washer	.05	4
85	120x8	Holl. Hd. Cup Pt. Set Screw	.20	2
86	PA1126DP1	Wiring Assembly	6.30	
87	PT4063DP1	Toggle Switch	.40	1
88	PT4055DP1	Toggle Switch	.90	1
	PT4056DP1	Surface Receptacle	.35	1
	PT1120DP1	Terminaled Wire	.15	2
	PT1121DP1	Terminaled Wire	.15	1
	PT1126DP1	Terminaled Cable	.60	1
	CE3659	Cord Set	1.00	1
	PT1145	Wire Terminal	.05	2

PARTS LIST

FOR ECONOMY MODEL BENCH DRILL PRESS E 14 B I J

REFERENCE NO.	PART NUMBER	DESCRIPTION	PRICE EACH	NO. REQ'D.
1	PT4039DP1	Lock Nut	$ .80	1
2	161x78	Finished Washer	.05	1
3	121x10	Holl. Hd. Full Dog Pt. Set Screw	.20	2
4	PT1078RH1	Brass Shoe	.05	2
5	*AS4167DP1	Spindle Pulley (3)	4.90	1
6	PT4051DP1	Order Ref. No. 8		2
7	PT4021DP1	Order Ref. No. 8		1
8	*AS4025DP1	Spindle Sleeve (6-7)	5.25	1
9	101x814	Round Head Machine Screw	.15	1
10	109x12	Holl. Hd. Cone Pt. Set Screw	.20	1

* Available only as sub-assembly. Parts included are indicated by the item numbers appearing in parenthesis after part name.

REFERENCE NO.	PART NUMBER	DESCRIPTION	PRICE EACH	NO. REQ'D.
11		Jacobs Chuck Key	$ .50	1
12	PT4009DP1	Quill Feed Shaft	3.65	1
13	PT4148DP1	Quill Feed Handle	.25	1
14	131x32	Thumb Screw	.15	1
15	*AS4117DP1	Cone Cover (16-17)	3.00	1
16	101x612	Round Head Machine Screw	.05	1
17	167x3	Wrought Iron Washer	.05	1
18	PT3303	Cover Plate	.35	1
19	132x1103	Phillips Hd. Self Tapping Screw	.05	2
20	*AS4115DP1	Spindle Lock Collar (21-22)	.35	1
21	126x503	Hollow Hd. Flat Pt. Set Screw	.20	1
22	PT4116DP1	Order Ref. No. 20		1
23	PT4007DP4	Drill Press Spindle	3.85	1
24	CE1201	Jacobs Chuck No. 34	6.84	1
25	*AS4165DP1	Table (41-42-43-46-47)	14.75	1
26	PT4147DP1	Plug	.75	1
27	PT4028DP1	Depth Gage Nut	.30	2
28	161x26	Finished Washer	.05	1
29	PT4027DP1	Depth Gage Shaft	.60	1
30	138x27	Hex. Nut	.05	1
31	PT4144DP1	Neoprene Bumper	.10	1
32	PT4050DP1	N. D. Seal Bearing #88016	2.25	2
33	PT4141DP1	Quill	3.50	1
34	PT4033DP1	Neoprene Bumper	.20	1
35	*AS4178DP1	Depth Gage Collar (36)	1.00	1
36	114x124	Socket Hd. Cap Screw	.35	1
37	112x244	Hex. Head Cap Screw	.15	1
38	*AS4013DP1	Table Binding Plug (Right) (40)	1.00	1
39	162x28	Coil Spring	.10	1
40	PT4014DP1	Order Ref. No. 38		1
41	PT4036DP1	Table Tilt Pin	.25	1
42	138x31	Hex. Full Nut	.10	1
43	182x304	Lock Washer	.05	1
44	120x212	Holl. Head Cup Pt. Set Screw	.25	1
45	*AS4172DP1	Column Base (44)	12.00	1
46	PT4026DP2	Table Swivel Stud	.90	1
47	PT4166DP1	Order Ref. No. 25		1
48	PT1061DP1	Hex. Full Nut	.05	1
49	PT4003DP2	Column	8.25	1
50-51	PA4068DP1	Spring and Case	.60	1
52	139x32	Hex. Jam Nut	.05	2
53	*AS4016DP1	Column Binding Plug (L.) (54)	1.00	1
54	PT4175DP1	Order Ref. No. 53		1
55	112x464	Hex. Hd. Cap Screw	.55	1
56	PT4176DP1	Switch Hole Cover Plate	.35	1
57	142x200	Escutcheon Pin	.05	4
58	167x4	Washer	.05	1
59	PT4146DP1	Spring	.15	1
60	PT4145DP1	Bumper	.30	1
61	PT4149DP1	Main Casting (Head)	Price on Request	1
62	137x27	Hex. Jam Nut	.40	2
63	PT704DP1	Headless Cone Pt. Set Screw	.20	2
64	*AS4171DP1	Motor Base Hinge (62-63-68-69)	3.45	1
65	CE4546B	"V" Belt (Vibrationless)	2.20	1
66	*PA4169DP1	Motor Pulley (4-70)	4.50	1
67		Motor	Price on Request	1
68	161x12	Finished Washer	.05	4
69	112x110	Hex. Head Cap Screw	.05	4
70	120x8	Holl. Hd. Cup Pt. Set Screw	.20	2

* Available only as sub-assembly. Parts included are indicated by the item numbers appearing in parenthesis after part name.

REFERENCE NO.	PART NUMBER	DESCRIPTION	PRICE EACH	NO. REQ'D.
		FLOOR MODEL DRILL PRESSES		
		With the exception of the Base and Column listed below all parts for Floor Model Drill Presses are identical with corresponding parts for Bench Model Drill Presses.		
	PT4047DP1	Base, Precision Model 14B1	$ 21.00	1
	PT4047DP2	Base, Precision Model 14B2A	21.00	1
	PT4173DP1	Base, Economy Model 14B1J	16.00	1
	PT4046DP1	Column, Precision Model 14B1	14.50	1
	PT4046DP2	Column, Precision Model 14B2A	14.50	1
	PT4046DP2	Column, Economy Model 14B1J	14.50	1

SOUTH BEND LATHE WORKS
SOUTH BEND 22, INDIANA, U.S.A.

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