

No. 645 TRIPLE-DUTY 11" DRILL PRESS

Operating and Maintenance Instructions

ONLY a sealed ball-bearing motor should be used on this drill press, because the shaft stands vertically. If a plain-bearing motor is used it will be impossible to keep it lubricated, and the bearings will wear out in a short time. Use only a constant-speed motor, as motors of the universal type are not satisfactory.

For ordinary work in the small shop our one-third H. P. motors Nos. 6300 and 6400 will be found very satisfactory. No. 6300 is a split-phase type and No. 6400 a repulsion-induction type. Both have ball bearings, double shafts and built-in switch.

The motor should turn in a clockwise direction (see Fig. 4), viewed from the top of the motor when installed. Our motors should be bolted to the bracket so that the switch is at the top, on the left-hand side as you face the drill press. See Fig. 1. If you use another motor and it runs the wrong way, either turn it around or reverse its rotation.

The four-step motor pulley is installed with the largest step at the top. Align it with the pulley on the drill-press spindle by means of a straightedge placed across both pulley edges, before tightening the setscrews. The slots in the motor bracket enable the motor to be raised or lowered to align the pulleys perfectly, which is important for smooth, vibrationless operation of the machine.

Operating Drill Presses in Gangs

When a number of drill presses are to be used in a gang, as for production work, they should be provided with $\frac{1}{2}$ H. P.

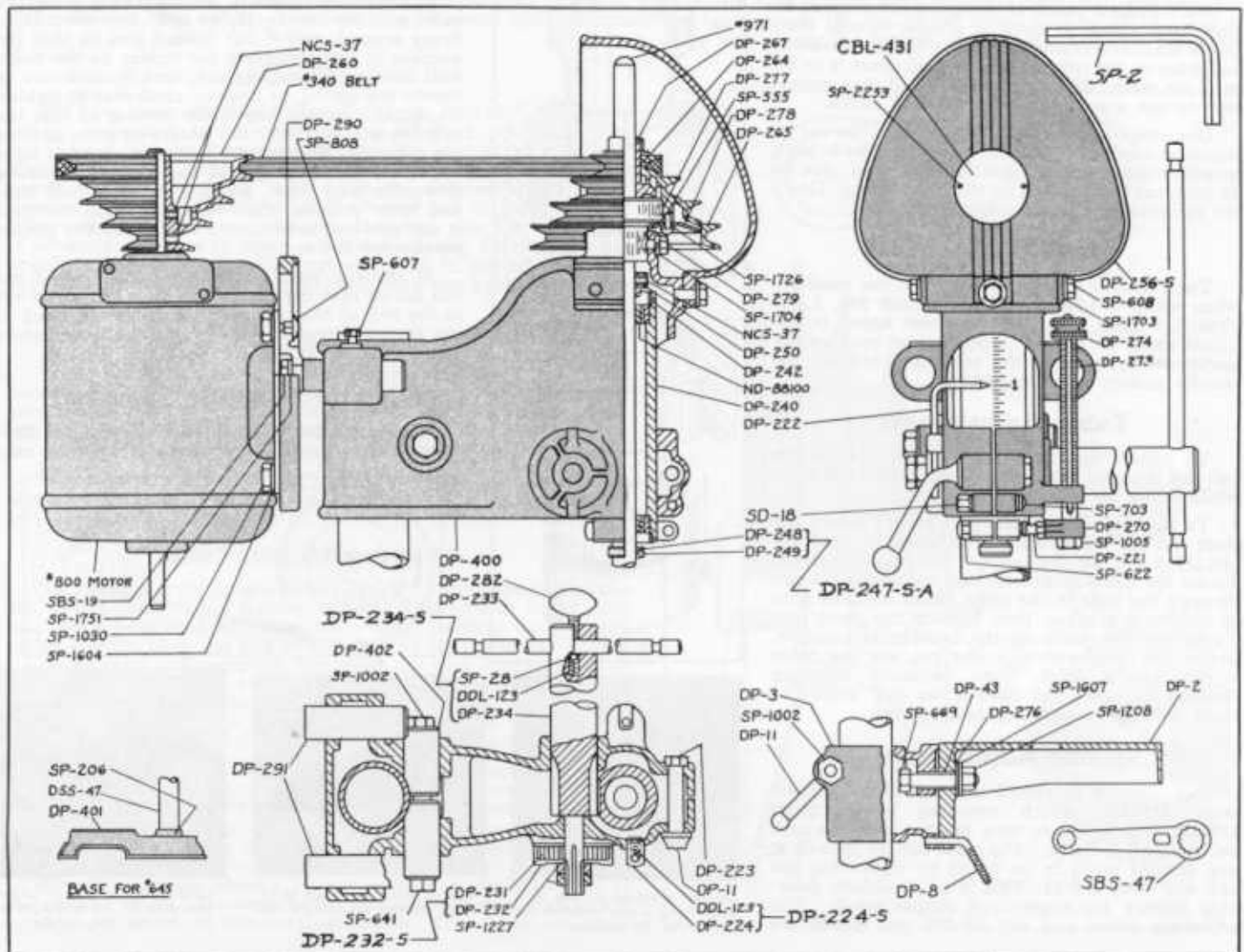
three-phase motors, for the following reasons: Three-phase motors will save from 30 to 40 per cent of the power consumed by ordinary split-phase motors, besides delivering much more power. Since they have no brushes, commutators, delicate starting switches or starting windings, they are practically trouble-free, and this reduces upkeep cost. They are installed on a power line, and will not flicker the lights. They are particularly adapted for high-speed work.

A large gang of drill presses should never be operated with split-phase motors, taking their current from the lighting circuit. In many localities the lighting companies prohibit this, as the use of a large number of motors of this type unbalances the phase and overheats the transformer.

Three-Phase Motors

Three-phase motors cannot be operated from the lighting circuit. They are usually built for 220 volts, and this is the voltage of the ordinary power line, which is stepped down to 110 for lighting purposes. Three-phase motors should be wired by a regular electrician and provided with a regular switch, as they have no built-in switches.

Our Three-Phase $\frac{1}{2}$ H. P. Motor No. 6600 is particularly well suited to the No. 645 Drill Press, as it is interchangeable with the regular No. 6300 motor. It is a ball-bearing, double shaft motor. Note that the speed of this motor is 1725 r.p.m. Do not confuse it with high-speed Motor No. 6530.



Occasional High-Speed Work

The amateur and the small-shop man who has only occasional use for high speeds will find that the standard high speed of 5,000 r.p.m. is quite satisfactory for the largest majority of routing, shaping and similar work. On the few occasions where it is necessary to use a higher speed we recommend the method of obtaining this shown in Fig. 4.

In this, the regular cone pulley is removed from the motor shaft, and a standard 8-inch V-pulley used instead. A No. 387 V-belt is used from this pulley to the smallest step on the drill-press cone pulley. The motor is moved up to align the pulleys and back to tighten the belt, but note that the belt must not be too tight; there must be a certain amount of slack in it, so that it will "bow out" on the slack side as indicated in Fig. 4. A belt that is too tight will cause excessive heating and vibration.

This arrangement gives a speed of 8,000 r.p.m., which is fast enough for all operations in the small shop. It should be remembered that the higher the speed the more power is required to operate the machine. Practically nothing is gained by attempting to use speeds above 8,000 r.p.m., and although the No. 645 drill press is designed for higher speeds than this, it is done as a factor of safety, and not because these higher speeds are recommended for ordinary work.

Caution

No standard chuck is designed for a speed of over 5,000 r.p.m. If used at greater speeds than this a standard chuck will cause undue vibration and wear in the spindle. If the drill press is to be used for metal drilling at high speed it is necessary to use a specially balanced drill chuck.

Our special spindle No. 974 permits the use of standard machine bits with 1/2 inch shanks at high speeds without undue vibration and wear, due to its inherent balance and its short overhang. Don't use machine bits in an ordinary chuck.

Standard Speeds

The standard speeds obtained on this machine when using a 1,750 r.p.m. motor are 590, 1,275, 2,450 and 5,000 r.p.m. The highest speed is obtained when the belt is on the largest cone on the motor pulley and on the smallest cone on the spindle pulley, and vice versa.

Table Adjustments

To adjust the table up or down, loosen the ball-end lever on the table bracket. Hold the table while doing so.

To tilt the table to the right or left loosen the pivot nut (SP-1208) under the table, remove the pin DP-8 and tilt the table to the required angle. To set the table accurately vertical, insert the pin through the hole in the table flange into the hole in the table bracket, then tighten the pivot nut. To return the table to the horizontal position, loosen the nut, withdraw the pin, set the table approximately level, then re-insert the pin through its holes and tighten the nut, when the table will be located accurately level.

Spindle Adjustments

The spindle is raised and lowered by hand lever DP-233, which operates pinion shaft DP-234-S, and this, in turn, meshes with the rack on the quill DP-240. The quill can be locked at any desired point in its travel by tightening the ball-end lever DP-11. This is an especially desirable feature for router and shaper work. The adjusting screw and nut SP-703 and SD-18 are

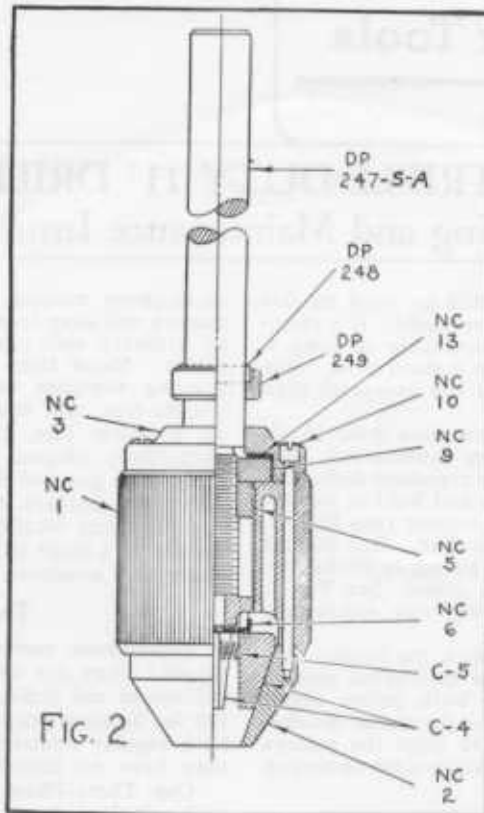


FIG. 2

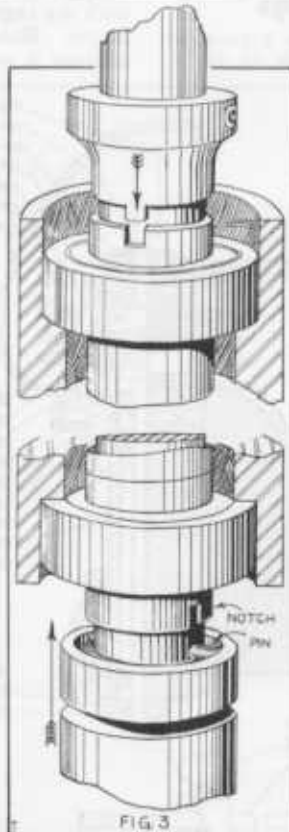
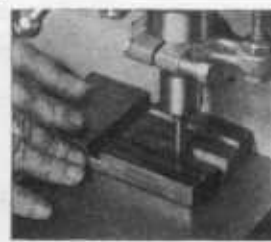


FIG. 3



Surface grinding on the drill press, using a cup wheel on the No. 991 spindle.



Routing against a guide fence, using the No. 974 spindle with 1/2-inch hole.



Sanding the edge of curved work with No. 840 sanding drum in No. 974 spindle.

set at the factory to give the quill the proper clearance and this adjustment should not be disturbed.

Drilling Holes to Depth

The depth pointer on the head is a very convenient feature when drilling to exact depths is done. To use this, run the drill down until it just touches the surface of the work. Then set the pointer to an even graduation on the quill and feed the drill into the work. The pointer will indicate when the proper depth has been reached.

Where a number of holes are to be drilled to exactly the same depth the stop nuts DP-274 on the threaded stop rod DP-273 are used instead of the pointer. After the first hole has been drilled to depth by means of the scale and pointer, the lower stop nut is set against the lug on the head through which the stop rod passes. It is then locked with the upper nut, and all subsequent holes will be drilled to exactly the same depth without reference to the scale.

Adjusting Spindle-Return Spring

For the purpose of automatically returning the spindle upward after a hole has been drilled, a coil spring, DP-231, is enclosed in the case DP-232. This spring is properly adjusted at the factory, and this adjustment should not be disturbed unless absolutely necessary. If at any time it is necessary to readjust it, proceed as follows:

Loosen the locknuts SP-1227 only about 1/4 inch; grip the cap tightly so as to prevent it from flying around, pull it out toward you so that the notches in the case clear the bosses on the head. Still holding the cap tightly, turn it clockwise to loosen the spring, or counter-clockwise to tighten it. Push it on the cap while turning so that the notches will slip over the bosses as soon as they are opposite. Tighten the locknuts—not too tight—and test the strength of the spring by pulling down the feed lever. Be sure the quill-lock ball-end lever is loose while testing. When the quill is up, one-half turn of the case gives the proper tension on the spring.

If the cap should accidentally be pulled out too far so that the spring end slips out of its slit in the rim of the cap, see that the hooked end of the spring is properly set in this slit again before attempting to adjust the spring.

How to Change Spindles

One of the unique features of the No. 645 Drill Press is the ease with which special spindles may

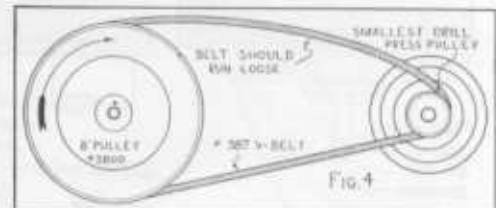


FIG. 4

be used. The operation of changing the spindle is a simple one if instructions are followed closely.

To remove the spindle that is in the machine, simply move the quill downward to expose the Allen Screw NCS-37 in collar DP-250, tighten the quill lock, loosen this setscrew and pull the spindle right out from the bottom, swinging the table out of the way before doing so.

To insert the new spindle, insert it at the bottom of the quill and push it up through the collar DP-250 and through the drive pulley. Turn the spindle while doing this so that the keys in the drive pulley will enter the keyways in the spindle. Tighten Allen Screw NCS-37 to hold the spindle temporarily. Now swing the table under the spindle again and run it up until the lower end of the chuck rests on the table. Loosen the Allen setscrew again and turn the spindle, pushing up on it at the same time, until you are sure that the pin DP-248 in the spindle collar has entered the notches in the lower bearing, Fig. 3. **This is very important.** As soon as the pin has entered the notches, pull down on the lever so as to hold the chuck end of the spindle tightly against the table, then lock the quill to hold the spindle in this position. Push down collar DP-250 against its bearing, making sure that the lugs on the end of the collar enter the notches in the inner race of the bearing, then tighten the Allen setscrew again. Do not tighten the setscrew too much, or you will mar the spindle and make withdrawal difficult.

Caution

We have gone into this matter of changing spindles very thoroughly because it is important that it be done properly. The job is much simpler than it seems from the description, but there are two things to bear in mind. First, the pin in the collar just above the spindle chuck **must enter the notches in the lower bearing.** Similarly, the lugs on the lower end of collar DP-250 must enter the notches of the upper bearing. See Fig. 3. If this is properly attended to there will be absolutely no shake in the spindle. If there is the slightest end play in the spindle after installation then the above directions have not been followed.

Routing Work

While router bits and standard machine bits may, if absolutely necessary, be used in the Keyless and Jacobs chucks, we strongly recommend the use of spindle No. 974 for all work where wood-working bits with $\frac{1}{2}$ inch shanks are used. This may be used for bits with $\frac{1}{2}$ inch shanks only.

When using router bits, with a guide fence fastened on the rear of the table as shown in Fig. 5, always feel the work from the left to right.

Mortising Attachment

To attach mortising attachment No. 976, insert special spindle No. 974 in place of the regular spindle. This spindle is the only one that can be used with this attachment. Remove the stop-rod collar DP-270 from the end of the quill by loosening the nut on its clamp stud, and removing the lower nut that fastens the stop rod to the collar. Now attach the hollow chisel holder DP-300-S in place of the stop collar, slipping the rod end through the hole in the lug, replacing the lower nut and tighten the chisel holder with the clamp nut DP-221. Do not clamp too tightly.

To install the chisel and bit, insert the bit through the hole in the chisel from the cutting end, place the proper bushing over the end of the bit; then insert the whole assembly through the hollow-chisel holder. Push up until the shoulder of the chisel butts against the holder, then tighten the setscrews to hold the chisel. Push the bushing into place in the spindle chuck, and adjust the bit so that the spurs are about $\frac{1}{16}$ inch away from the lower end of the chisel. **This is very important.** Tighten the setscrews in the spindle chuck to hold the bushing and bit. The chuck setscrews

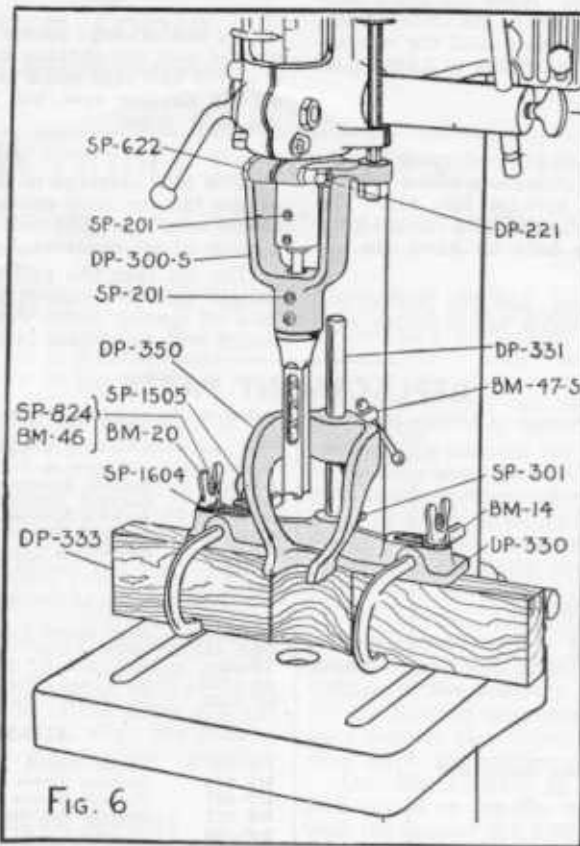


FIG. 6

should bear on the flat on the bushing.

Turn the spindle by hand to see that the bit runs clear and without undue noise in the chisel. Do not make the mistake of setting the bit spurs too close to the end of the chisel, or else they will rub, and ruin both bit and chisel in a short time. On the other hand, do not let the bit extend too far, as the chips may then clog in the chisel and break the bit.

Adjusting Guide Fence

Fasten the guide fence to the table with the bolts provided for the purpose, with the wing nuts on top of the fence. See that the hold-down arms are attached as shown in Fig. 6.

If very long pieces are to be bored or mortised, a long guide fence may be made from a piece of hard-regular fence, and the hold-downs transferred to it. Two short boards may be screwed to the under-side of wood of the same dimensions as the this extension fence to support the ends of the work.

Operating Hollow-Chisel Mortiser

Place the stock in position on the table so the cut will start at the end of the mortise. Start the machine and pull down on the feed lever. On the first cut all four sides of the chisel are cutting and this cut will naturally take a trifle more pressure than the following cuts. On hard woods lift the chisel frequently so as to clear the chips and permit the tool to cool. Neglect of this precaution

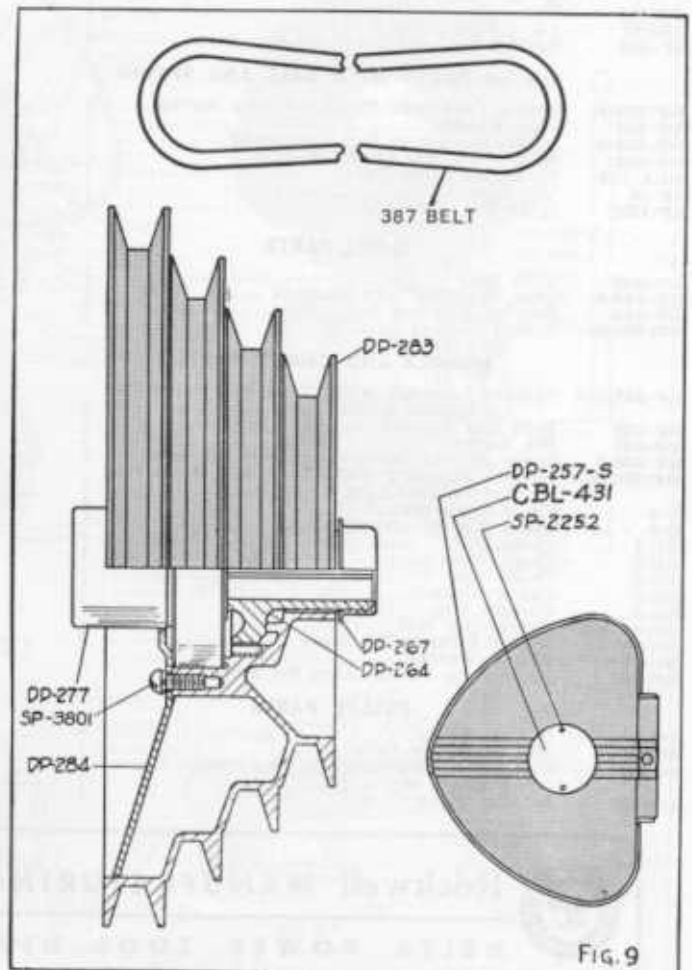


FIG. 9

will take the temper out of bit and chisel. Move the stock side-wise a distance equal to about three-quarters of the chisel width, press it down again and repeat this operation until the mortise is completed. Speed recommended for mortising is 2,250 r.p.m.

Shaping

A full line of shaper cutters, fences and other shaping attachments is available for this drill press. Cutters are of the formed type, fitting over the end of shaper spindle No. 977. The threaded end of this spindle will take cutters with a $\frac{1}{8}$ inch hole. Users who have cutters with this size hole on hand can use them on the No. 645 Drill Press.

For complete directions for shaping, ask for instruction sheet, "Shaping on the Drill Press," which accompanies each set of shaper cutters.

Caution

Do not attempt to use the No. 249 Moulding Cutter or any similar tool, for shaping on the drill press. The moulding cutter is a very safe tool when used in the way for which it is designed, on the circular saw, but a very dangerous one when used on the drill press.

Lubrication

The ball bearings in the quill and spindle pulley are packed at the factory with enough lubricant to last for the entire life of the bearings. The pinion shaft and quill rack should be given a drop of oil occasionally. No further attention is required.

Do not take the pulley or quill assembly apart, as there is danger that you cannot put it together again properly, due to lack of special tools. Also, you may get dirt in the bearings, which will ruin them in a short time.

REPLACEMENT PARTS

IMPORTANT: To avoid possible errors, be sure to include the serial number of the machine when ordering parts for repair or replacement.

No.	Name of Part	No. Reqd.
DP-11	Ball End Lever	1
DP-222	Index Pointer	1
DP-223	$\frac{7}{8}$ "-14 Special Hex. Nut	1
DP-224-S	Index Pointer Housing with Spring	1
DP-400	Head Casting only	1
DP-402	Clamp Sleeve	2
SD-18	$\frac{1}{4}$ "-20 Special Nut	1
SP-2	$\frac{7}{8}$ " Allen Wrench	1
SP-607	$\frac{7}{8}$ "-18 x $\frac{3}{4}$ " Hex. Hd. Cap. Screw	2
SP-641	$\frac{7}{8}$ "-14 x $3\frac{1}{2}$ " Hex. Hd. Cap. Screw	1
SP-703	$\frac{1}{4}$ "-20 x $1\frac{1}{2}$ " Fill. Hd. Cap. Screw	1
SP-1002	$\frac{7}{8}$ "-14 Hex. Nut	1
#1526	Wrench	1

TABLE PARTS

DP-2	Table 8" x 8"	1
DP-3-R	Table Clamp with Sleeve, Clamp Screw and Nut	1
DP-3-S	Table Assembly	1
DP-8	Index Pin	1
DP-11	Ball Crank Clamp Screw	1
DP-43	Table Clamp Sleeve	1
DP-276	Table Clamp Spring Washer	1
SP-669	$\frac{1}{2}$ "-20 x $2\frac{1}{4}$ " Hex. Hd. Cap. Screw	1
SP-1002	Hex. Jam Nut	1
SP-1208	$\frac{1}{2}$ "-20 Hex Nut	1
SP-1607	$1\frac{1}{4}$ " O. D. x $\frac{1}{2}$ " Hole 15/64 Thk. Washer	1

BASE PARTS

DP-401	Base	1
D88-47	$1\frac{1}{2}$ " x $25\frac{1}{2}$ " Column	1
SP-206	$\frac{5}{16}$ "-18 x $\frac{5}{16}$ " Allen Set Screw Cup Point	2

PINION PARTS WITH BALL AND SPRING

DP-232-S	Spring Case with Spindle Return Spring	1
DP-233	Feed Handle	1
DP-234-S	Pinion Shaft with Ball and Spring	1
DP-282	$\frac{3}{8}$ "-24 x $1\frac{1}{2}$ " Thumb Screw	1
DDL-123	Spring for Index Pin	1
SP-25	$\frac{1}{4}$ " Steel Ball	1
SP-1227	$\frac{1}{2}$ "-20 Hex. Jam Nut	1

QUILL PARTS

DP-240	Quill Only	1
DP-240-S	Quill Assembly with Bearings	1
DP-242	Bearing Retainer Nut	1
ND-88100	Special Bearing	2

SPINDLE AND CHUCK PARTS

DP-247-S-A	Spindle Assembly with Collar and Drive Pin for Keyless Chuck	1
DP-248	Drill Rod Pin	1
DP-249	Pin Cover	1
DP-250-S	Upper Bearing Drive Collar with Set Screw	1
DP-255-S-A	Spindle Assembly with Collar and Drive Pin for Jacobs Chuck	1
C-4	Chuck Jaws (Set of 3)	3
C-5	Chuck Springs (Set of 3)	3
NC-1	Chuck Body	1
NC-2	Chuck Nose	1
NC-3	Chuck Cap	1
NC-5	Chuck Plunger	1
NC-6	Plunger Cap	1
NC-9	Chuck Cap Nut	1
NC-10	Special Fillister Hd. Screw	4
NC-13	Bronze Washer	4
SP-201	$\frac{5}{16}$ "-18 x $\frac{5}{16}$ " Fl. Pt. Allen Set Screw	1

PULLEY PARTS

DP-264	Spindle Sleeve	1
DP-265	Spindle Pulley Only	1
DP-265-S	Pulley Assembly Complete with Spindle Sleeve, Bearing, etc.	1
DP-267	Spindle Sleeve Cover	1

No.	Name of Part	No. Reqd.
DP-277	Spindle Bearing, ND-88106	1
DP-278	Bearing Retainer	1
DP-279	$\frac{3}{8}$ "-24 x $\frac{5}{8}$ " Spec. Hex. Hd. Screw	1
SP-1700	$\frac{3}{16}$ " Lock Washer	1
SP-3801	#8-32x $\frac{3}{4}$ " Sem Lock Screw	1
#340	V-Belt Cir. In. $34\frac{1}{2}$ ", Out. $36\frac{1}{2}$ "	1

GUARD PARTS

DP-256-S	High Speed Pulley Guard	1
CBL-431	Name Plate	1
SP-608	$\frac{7}{8}$ "-18 x $\frac{7}{8}$ " Hex. Hd. Cap. Screw	3
SP-1703	$\frac{5}{16}$ " Lock Washer	3
SP-2252	No. 2 x $\frac{1}{8}$ " Parker Kalon	2

SLO-SPEED PULLEY PARTS

DP-257-S	Large Guard	1
DP-264	Spindle Sleeve	1
DP-267	Spindle Sleeve Cover	1
DP-277	Special Bearing ND-88106	1
DP-283	Spindle Pulley Only	1
DP-283-S	Pulley Assembly Complete with Spindle Sleeve, Bearing, etc.	1
DP-284	Bearing Retainer	1
SP-3801	#8-32x $\frac{3}{4}$ " Sem Lock Screw	1
#387	V-Belt Cir.: In. $37\frac{1}{2}$ ", Out. $39\frac{1}{2}$ "	1

STOP ROD PARTS

DP-221	Spec. $\frac{1}{4}$ "-20 Hex. Nut	1
DP-270	Stop Collar Casting Only	1
DP-273	$\frac{1}{2}$ "-16 x $6\frac{3}{4}$ " Threaded Stop Rod only	1
DP-274	$\frac{1}{2}$ "-16 Knurled Stop Nut	2
DP-318	Stop Nut Washer	1
SP-622	$\frac{1}{4}$ "-20 x 2 Hex. Hd. Cap. Screw	1
SP-1005	$\frac{1}{8}$ "-16 Hex. Jam Nut	1

MOTOR-BRACKET PARTS

DP-290	Motor Plate	1
DP-290-S	Motor Plate Assembly	1
DP-291	Sliding Stud	2
SBS-19	$\frac{5}{16}$ "-18 Spec. Hex. Nut	2
SP-808	$\frac{1}{2}$ "-18 x 1 Carriage Bolt	4
SP-1030	$\frac{1}{2}$ "-18 Hex. Nut	4
SP-1604	$\frac{1}{2}$ " Wrought Washer	4
SP-1751	$\frac{3}{8}$ " Shake Proof Washer	2

MORTISING ATTACHMENT PARTS

DP-221	Special $\frac{1}{4}$ "-20 Hex. Nut	1
DP-300	Chisel Holder Casting Only	1
DP-300-S	Chisel Holder Casting Complete with Clamp Screw Nut and Set Screws	1
DP-330	Hold-Down Casting only	1
DP-331	Hold-Down Support Rod	1
DP-333	Mortising Fence Only	1
DP-350	Hold Down Arm Only	1
BM-14	Curved Hold Down	2
BM-20	Special Wing Nut	2
BM-46	Washer	2
BM-47-S	Lock Bolt	1
SP-201	$\frac{5}{16}$ "-18 x $\frac{5}{16}$ " Allen Set Screw	4
SP-301	$\frac{1}{4}$ "-20 x $\frac{1}{2}$ " Sq. Hd. Set Screw	1
SP-622	$\frac{1}{4}$ "-20 x 2 Hex. Hd. Cap. Screw	1
SP-824	$\frac{1}{2}$ " x $4\frac{1}{4}$ " Carriage Bolt	2
SP-1505	$\frac{1}{4}$ "-20 x $\frac{1}{2}$ " Thumb Screw	2
SP-1604	$\frac{1}{2}$ " Washer	2

MISCELLANEOUS

#971	Standard Spindle with Keyless Chuck	1
#972	Special Spindle with Jacob's Chuck	1
#973	Special Spindle with No. 1 Morse Taper Hole	1
#974	Special Spindle with $\frac{1}{4}$ " Hole for Mach. Bits	1
#977	Special Spindle for $\frac{1}{8}$ " Hole Shaper Cutter	1
#985	4-Step Motor Pulley ($\frac{1}{2}$ " Bore)	1
#991	Special Spindle for Cup Wheel	1



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