12" WOODWORKING LATHE
Operating and Maintenance Instructions

The Delta 12" Lathe is designed for use in schools, home work shops, cabinet shops, pattern shops and many other uses.

The lathe is one of the most popular, all around, and widely used machine in the Delta line. It is designed for many uses, and with the various attachments and accessories many different jobs can be accomplished. It is one of the most fascinating machines to operate and should be included in every work shop. It is also one of the most important machines in a production wood working shop. Its expert design, rigid construction, and ease of operation make it a prime favorite.

The lathe is packed assembled ready for use. Care should be taken in unpacking so that finished surfaces are not burred or marred. The lathe can be mounted on regular No. 46-927 lathe stand or on a suitable bench; in either case it may be found necessary to shim under the lathe feet in order to make the bed level. Check the bed by putting a level across at the headstock and also across at the tailstock, also along the length of the bed in the center. In this way it is possible to detect a twist which might occur in the bed if clamped to an uneven bench top. This checkup should be made periodically to overcome warpage which might occur in the wood bench top, causing strain in the lathe bed.

The motor may be mounted either below the top of the bench, on the lower shelf, or behind the headstock to suit the user's convenience. If lathe stand is used, the necessary holes for mounting motors either below the top or on the lower shelf are drilled partly through the board. It is merely necessary to determine which holes are needed and they can be drilled through to suit.

HEADSTOCK

The headstock is the most important unit of any lathe, and it is necessary that it be kept in perfect condition. The design and construction of our headstock together with the use of greaseal ball bearings eliminates the most common cause of trouble, that is, lack of lubrication or improper lubrication. With this most common cause of trouble eliminated there is no reason why the lathe cannot be used steadily for years without difficulty.

Due to the fact that we use endless belts which may some time need replacement, or the fact that a customer will require a different length of belt than standard, it may be necessary to remove the spindle and pulley. The bearings on the headstock are preloaded at assembly by shimming behind the outboard bearing in order to insure a rigid yet free-running spindle. IT IS VERY IMPORTANT, THEREFORE, when removing the spindle and pulley not to disturb the outboard bearing. To remove spindle and pulley proceed as follows: Loosen the inboard bearing retaining cap CBL-409 by taking out 4 DDL-105 screws. Then by holding the pulley with a wrench on the flats adjacent to the small step, loosen the outboard bearing nut CBL-410 (this is a left-hand thread). Finally loosen pulley from spindle by unscrewing the two SP-201 Allen set screws with wrench furnished. The spindle will now slide in the direction of the tailstock, taking the inboard bearing with it. The outboard bearing with the shims remains in place. Due to the rigidity required in the spindle it is necessary to hold all bearing fits close and it may be found necessary to tap the outboard end of the spindle LIGHTLY to move the spindle. CAUTION: do not drive with a hammer against the end of the spindle, but use a piece of wood between the spindle and the hammer. (Do not use heavy blows with hammer because this will destroy the smooth surfaces of the ball races or the balls, and ruin the bearings).

To re-assemble reverse the above procedure. Be sure, however, when tightening the pulley on the spindle that the two SP-201 Allen set screws bear against the flat on the spindle to avoid burring the spindle and making future disassembly difficult. The

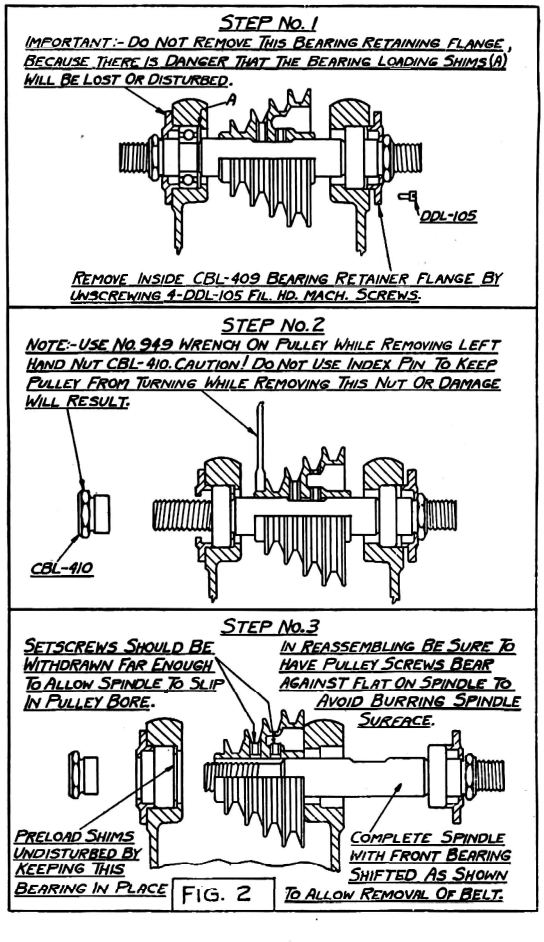


FIG. 2

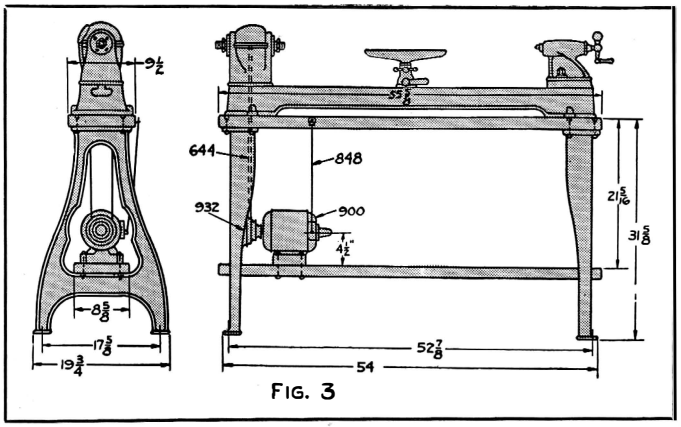


FIG. 3

belt on the lathe must be a good fit in order to drive the headstock at slow speed and yet it must be readily shifted. A tight belt causes excessive wear on the pulleys and belt, and unnecessary load on the motor bearings. If necessary shim up the motor to obtain right tension.

TAILSTOCK

The tailstock is made with a sub-base having the set-over feature for taper turning. Be sure to slide the tailstock close to the headstock and check for alignment using the centers in both headstock and tailstock. If the centers do not line up, loosen the headless set screw CBL-423 in the tailstock sub-base on the side opposite to which the tailstock is offset and turn the other set screw until the centers line up, then tighten both set screws.

The tailstock quill is moved in and out of the tailstock by turning the ball crank handle DDL-160. When the quill has been brought to the right position it is locked with the ball handle DP-11 at the top of the tailstock. The center on the tailstock can be ejected by pulling in the quill to the limit which brings the point of the operating screw against the back of the center; a slight additional turn then forces out the center.

At the bottom of the tailstock on the side toward the headstock will be found a small ground area which overlaps the tailstock and sub-base. This surface is intended for a zero mark to be put on at the time the centers are lined up. Due to the fact that this mark extends over the joint of the tailstock and the sub-base, we suggest that it be made with a square and a scriber. If a fine edged chisel is used, be careful that the mark is not too deep because this may peen the sharp edge at this joint.

TOOL SUPPORT

The Tool Support Base is new in design and operates somewhat differently from the standard type.

The tool support itself has a turned shank which is clamped into a V-groove in the support bracket thus permitting it to be rotated, raised or lowered. This clamping is accomplished by using the ball-pin lock screw CBL-440-S. The base is clamped to the bed by using the clamp lever CBL-433. This lever rotates an eccentric shaft which extends the full length of the bracket. The eccentric shaft engages a forged steel eyebolt which extends down through the slot in the lathe bed, and has a clamp flange and two hexagon nuts inside the bed. In clamping, the eccentric pulls up on the eyebolt and forces the clamp flange up against the machined surface underneath the lathe bed top, in turn pulling down on the eccentric and support bracket.

The eccentric should lock at a point where it approaches dead center which makes it self locking. If for any reason adjustment is required, this is done by tightening or loosening the locknuts SBS-19.

THE INDEXING MECHANISM

The indexing mechanism is useful for fluting or reeding. Two rows of holes are provided in the pulley rim for use with the index pin, the inner row having 60 holes and the outer row 8 holes. With this combination it is possible to get a large number of divisions. The index pin is mounted on a swinging link, the other end of which is fastened to the index-pin body. The in and out movement, together with the swinging movement, makes it possible to engage or disengage the index pin in either row of holes.

Warning: Do not under any circumstances use the index pin as a lock to hold the pulley stationary while unscrewing faceplates or other attachments. If this is done it will ruin the usefulness of the index device.

When the lathe is used for turning, see that the pin is pulled back until the ball catch snaps in place, thus holding the pin and preventing it from sliding forward to catch in the pulley when the latter is moving.

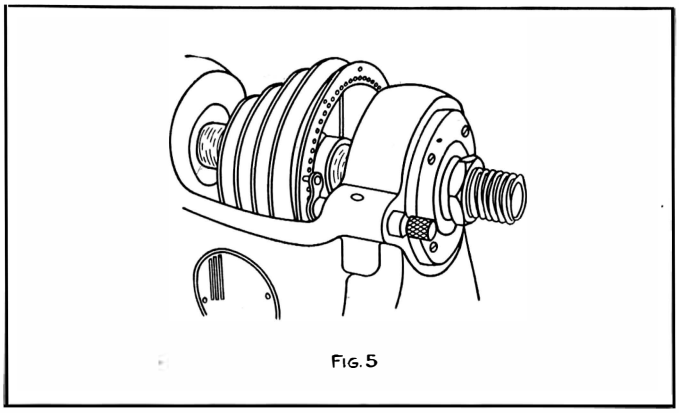


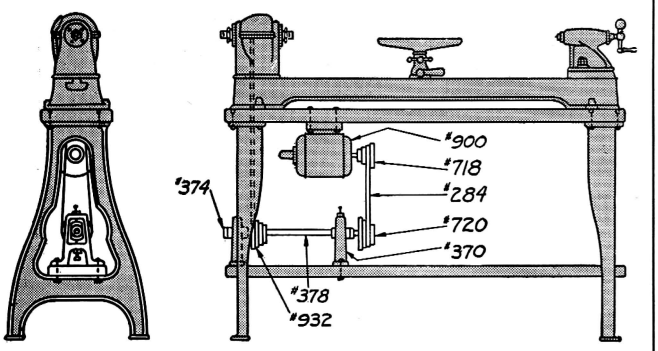
FIG. 5

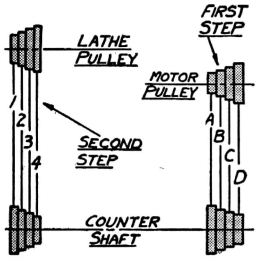
POWER AND SPEED

If the lathe is to be operated directly from a motor ⅓ H.P. will be found suitable for light homeworkshop use, and for medium duty. For heavy duty work a ½ H.P. motor is recommended. Use only a constant-speed motor . . . a universal motor is not satisfactory. If the lathe is to be operated in connection with a counter-shaft as shown in Fig 4 then a motor should be used, as the starting load of this arrangement is too great for a split-phase motor.

The motor should be connected so that the lathe spindle rotates clockwise when looking at the lathe from the headstock end; that is, the top of the work should turn forward, toward the operator. If the motor rotates the wrong way, turn it around, or follow the maker's directions for reversing direction of rotation.

With a 1725 R.P.M. motor, using No. 932 four-step pulley on the motor shaft, the lathe will have speeds of 900, 1400, 2200 and 3400 R.P.M. The smaller the work being turned the higher the speed should be; the larger the work, the slower the speed. If a larger range of speeds is needed, then a countershaft arrangement shown in Fig. 4 is used. This gives 16 speeds ranging from 340 R.P.M. to 3400 R.P.M. The accompanying table shows the arrangement of belts used to obtain all of the sixteen speeds.





R.P.M.	First Step	Second Step	R.P.M.	First Step	Second Step
340	A	4	1125	B	2
475	B	4	1225	A	1
525	A	3	1400	D	3
675	C	4	1575	C	2
750	B	3	1700	B	1
825	A	2	2200	D	2
900	D	4	2500	C	1
1050	C	3	3400	D	1

Fig. 4.

FLOOR STAND

The No. 697 Floor Stand for tool support (Fig. 6) has a tube sufficient in length and with holes added at the bottom for adjustment.

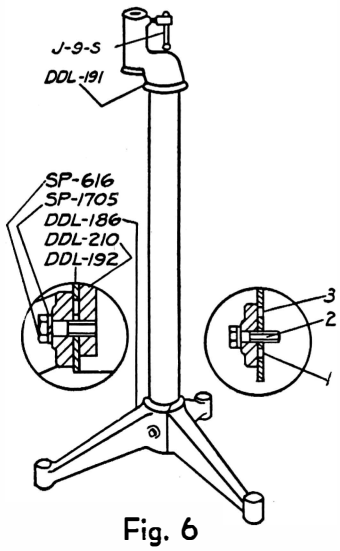


Fig. 6

OPERATING THE LATHE

Never drive the piece to be turned into the drive center while the center is in place in the lathe. If you do this you will eventually stretch the metal of the headstock spindle so that neither the center nor the faceplates will fit, and you will thus ruin the accuracy of your lathe.

Always remove the drive center from the lathe and drive it into the end of the work by tapping the end of the center shank with a mallet to sink the spurs into the wood. If the wood to be turned is very hard, it is well to saw diagonals about ⅛" deep into the end of the wood so that the spurs will drive in easily.

After the spur center has made its impression in the wood, replace it in the lathe, then place the work between the centers. Set and tighten the tailstock to the bed so that when the piece to be turned is held against the drive center there will be about ½" between the end of the turning and the point of the cup center. Still holding the wood between the centers, turn the ball-crank handle on the tailstock spindle so that the point of the cup center enters the wood. Turn the lathe by hand, and see that the wood turns easily, but without shake, then tighten the tailstock sleeve clamp to hold the spindle in this position.

Always adjust the tool rest so that it is from ⅛" to ¼" away from the piece to be turned, and about ⅛" above the center. Never make toolrest adjustments while the machine is running. Before starting the lathe see that all adjustments have been properly made and that all adjusting screws and clamps are tight.

Use a slow speed when roughing off the corners of the work. If a band saw is available, always rough large faceplate work to shape before mounting it on the faceplate.

Do not wear a loose necktie, loose shirt sleeves or any other loose clothing while working on the lathe, as there is great danger that such loose clothing will be caught in the revolving work. Safety glasses should also be worn to protect the eyes.

IMPORTANT

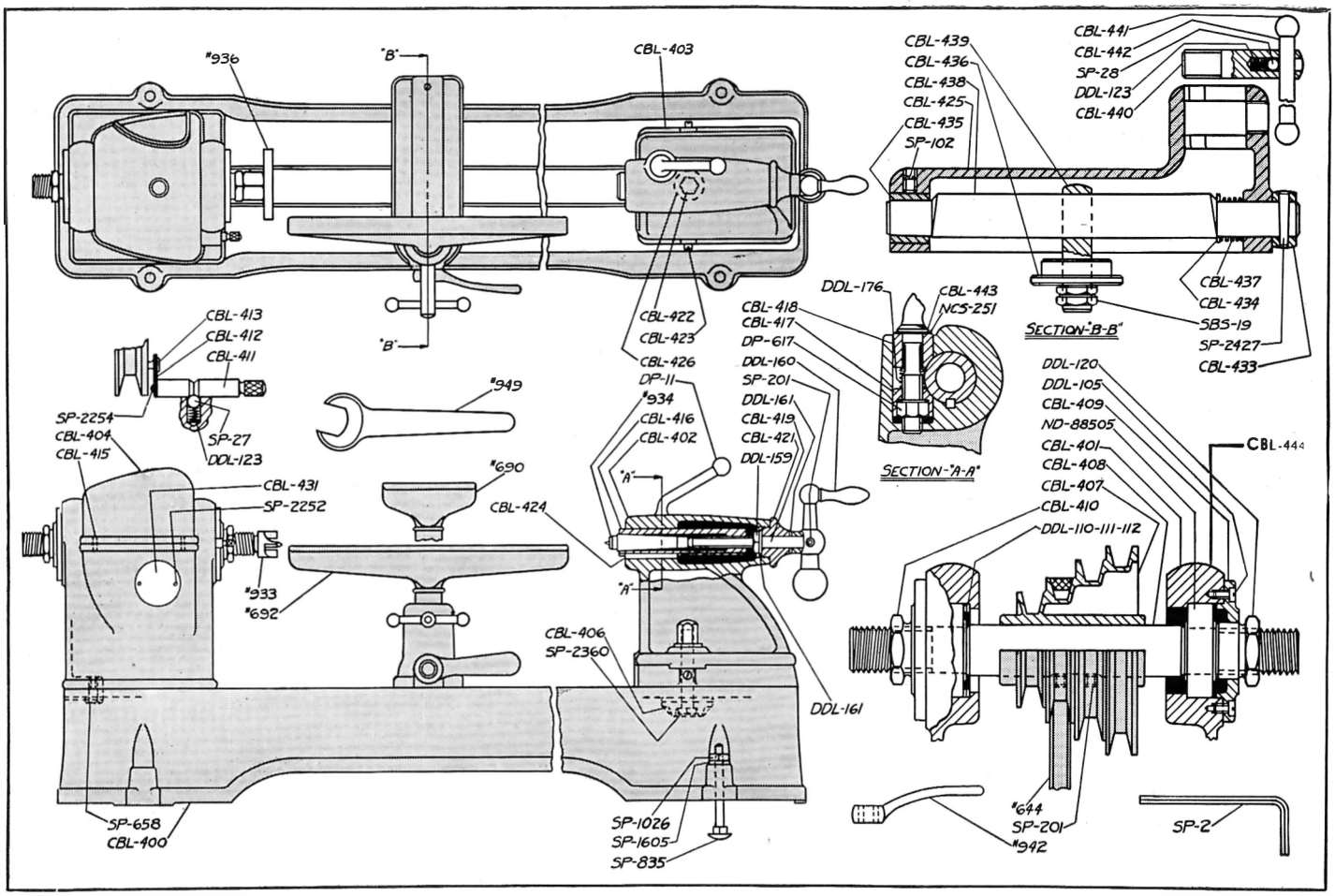
Note that taper shanks are driven by the close fit between shank and socket, and that consequently centers and other attachments with taper shanks must be DRIVEN home into the socket, not merely placed into it. This does not mean that they are to be driven in with a hammer, but that they should be sharply thrust into place with the hand.

Never use an emery-wheel arbor with taper shank without first running the tailstock up to it to prevent it from coming out. With a properly mounted and true emery wheel this will not happen, but many emery wheels are out of balance, and the vibration caused by this lack of balance may cause the shank to loosen and the attachment to fly out. Run the tailstock up and be safe. It is preferable to use No. 939 60-degree center in the tailstock, as when turning metal, and to lubricate the center properly. The No. 144 right hand threaded or the No. 145 left hand threaded emery wheel arbor can also be used.

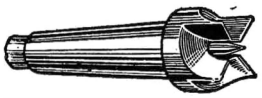
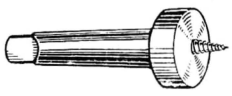
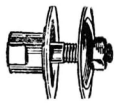
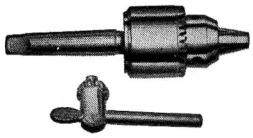
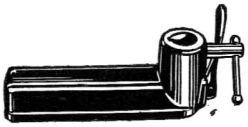
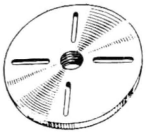
Do not use No. 151 sanding disk on No. 935 adapter in this lathe. The pressure on a sanding disk is usually greatest on the outer circumference, and this tends to loosen the shank. Always use No. 951 threaded sanding disk on this lathe.

USE AND CARE OF LATHE

Woodworking lathes like all other pieces of machinery will not stand overloading or overworking indefinitely. A person about to operate a machine should first acquaint himself with its capacity; then when operating it, do so safely within its capacity. Ordinarily a woodworking lathe will need only nominal care to keep it in good working order. If cap screws, set screws, and nuts are kept properly tightened and revolving parts properly lubricated, little difficulty will be experienced in keeping the machine in good working order. Lack of lubrication is the most frequent cause of wear and vibration in a woodworking lathe.



Accessories For Lathes With No. 2 Morse Taper Spindles

 933 DRIVE CENTER Has replaceable Pin	 934 CUP CENTER Has replaceable Pin.	 940 SCREW CENTER Has replaceable 1½" Screw	 144 R.H. SCREW ON ARBOR 145 L.H. SCREW ON ARBOR	 968 GEARED CHUCK Cap. ½"
 692 12" TOOL REST	 690 4" TOOL REST	 695 RIGHT ANGLE TOOL REST	 694 24" TOOL REST	697 FLOOR STAND For Tool Rests 
 1461 TOOL REST BASE 12" LATHE	No. 1468 STEADY REST for 12" Lathe with Cast Iron Bed 	936 3" FACE PLATE R.H. Threads 	937 6" FACE PLATE  R.H. and L.H. Threads	 No. 939—60° Plain Center. Hardened and Accurately Ground

CONSULT YOUR DELTA DEALER FOR PRICES OF REPLACEMENT PARTS, ACCESSORIES AND TOOLS TO FACILITATE HANDLING WE SUGGEST ORDERING ALL PARTS THROUGH YOUR DELTA DEALER

Table 1. REPLACEMENT PARTS

IMPORTANT: Give both the Part Number and the Description of each item when ordering from this list; also the Serial Number of the machine on which the parts are to be used.

Part No.	Description	No. Req.
	BED	
CBL-400	Lathe Bed	1
	HEADSTOCK PARTS	
CBL-401	Headstock Body only	1
CBL-401-R	Complete Headstock with belt and pulley guard	1
CBL-404	Headstock Guard	1
CBL-407	Spindle Pulley	1
*CBL-408	Spindle	1
CBL-409	Bearing Retainer Flange	2
CBL-410	Spindle Nut (left hand)	1
CBL-411-S	Index Pin (complete)	1
CBL-415	Guard Pin	2
CBL-431	Name Plate	1
CBL-444	Thumb Sc. for Hd. Stock Pulley Gd.	1
DDL-105	No. 10-32 x 7/16" Fill. Hd. Screw	8
DDL-110	.003" Shim Washer	5
DDL-111	Washer—1 31/32" I.D., 2" O.D. x .008" Thick	2
DDL-112	Washer—1 31/32" I.D., 2" O.D. x .010" Thick	4
DDL-120	Spindle Nut (R.H.)	1
DDL-123	Coil Spring	1
SP-27	3/32" Dia., Steel Ball	1
SP-201	5/16-18 x 5/16" Allen Set Screw	2
SP-658	3/8-24 x 1" Hexagon Head Cap Screw	4
SP-2252	#2 x 3/16" Drive Screw	2
ND-88505	Greaseal Ball Bearing	2
#644	V-Belt	1
	TAILSTOCK PARTS	
CBL-402	Tailstock Body only	1
CBL-402-S	Tailstock complete with Sub Base and Clamp	1
CBL-403	Tailstock Sub Base	1
CBL-406	Clamp Plate	1
CBL-416	Tailstock Quill	1
CBL-417	Lower Clamp Sleeve	1
CBL-418	Upper Clamp Sleeve	1
CBL-419	Quill Adjusting Screw	1
CBL-422	Acorn Nut	1
CBL-423	Adj. Screw	2
CBL-424	5/16 sq. x 2" Key	1
CBL-426	Special Washer	1
CBL-443	33/32 x 33/64 x 1/16" Washer	1
DDL-159	Quill Adjustment Screw Nut	1
DDL-160-S	Ball Crank Handle Assbly.	1
DDL-161	Fibre Thrust Washer	2
DDL-176	Coil Spring	1
DP-11	Ball Crank	1
DP-617	7/16-14 x 5/8" Hex. Nut	1
NCS-251	Shim Washer	4
SP-201	5/16-18 x 5/16" Allen Set Screw	1
SP-2360	1/2-13 x 3 1/4" Sq. Hd. Mach. Bolt	1
	TOOL SUPPORT PARTS	
CBL-425	Tool Support Base Cast. only	1
CBL-433	Operating Lever	1
CBL-434	Washer 33/64 x 1/16" Th.	1
CBL-435	Bushing	1
CBL-436	Eyebolt Flange	1
CBL-437	Coil Spring	1
CBL-438	Eccentric Shaft	1
CBL-439	Eyebolt	1
CBL-440	Ball Handle Clamp Bolt	1
CBL-440-S	Clamp Bolt with Handle	1

Part No.	Description	No. Req.
SBS-19	5/8-18 x 1/4" Hex. Nut	2
SP-102	1/4-20 x 3/8" Hd'less Set. Sc.	1
SP-2427	No. 3 x 1 1/4" Taper Pin	1
#1461	Tool Support Base comp. not including Tool Support	1
	#1468 STEADY REST	
CBL-406	Clamp Plate	1
CBL-422	Special Acorn Nut	1
CBL-446	Steady Rest Body	1
CBL-447	Special Washer	1
CBL-448	Coil Spring	1
DDL-202	Guide Bar	3
DP-6	Special Washer	1
SD-18	1/4-20 Special Hex. Nut	3
SP-826	1/4-20 x 1/2" Carriage Bolt	3
SP-2361	1/2-13 x 2-1/4" Sq. Hd. Mach. Bolt	1
	#697—FLOOR STAND PARTS	
DDL-186	Spider Leg Casting	3
DDL-191	Elbow	1
DDL-192	Column	1
DDL-210	Clamp Plate	3
J-9-S	Lock Bolt with Ball Pin	1
SP-408	5/16-18 x 3/4" Fl. Hd. Mach. Sc.	4
SP-616	1/2-13 x 1 1/2" Hex. Hd. Cap. Screw	3
SP-1705	Lock Washer 7/8" O.D. x 1/2" I.D. x 1/8" Thick	3
#1463	Floor Stand	1
	ACCESSORIES	
DDL-206	Steel Center Point	2
DDL-253	1/4-28 x 3/16" Allen Set Screw	2
#144	Screw on Arbor (R.H.)	1
#145	Screw on Arbor (L.H.)	1
#163	3 x 3" Sanding Drum	1
#164	1 3/4 x 2" Sanding Drum	1
#165	Grinding Wheel Arbor	1
#192	Allen Ext. Wrench	1
#194	Plain Allen Wrench	1
#284	V-Belt for Countershaft Arrangement	1
#690	4" Tool Support	1
#692	12" Tool Support	1
#694	24" Tool Support	1
#695	Right Angle Tool Support	1
#697	Floor Stand for Tool Support	1
#932	4 Step Motor Pulley (specify bore)	1
#933	Spur Center	1
#934	Cup Center	1
#935	Taper Shank Adapter	1
#936	3" Dia. Face Plate	1
#937	5" Dia. Face Plate	1
#938	5" Hand Wheel	1
#939	60° Center for Metal Work	1
#940	Screw Center	1
#942	Socket Wrench	1
#949	Arbor Wrench	1
#968	Geared Chuck and Key	1
#1334	Switch Rod for Use with #46-305	1
#1468	Steady Rest for Lathe	1
#1534	1/8" Plain Allen Wrench	1
#3101	Grinding Wheel, 46 Grit	1
#3102	Grinding Wheel, 60 Grit	1
#3113	Wire Wheel, Coarse	1
#3114	Wire Wheel, Fine	1
#3115	Tampico Fibers	1
#4005	Buffing Wheel	1

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***NOTE: The final machining of the No. 2 Morse taper hole in the spindle of the headstock of this lathe is done after installation of the spindle. This is the only method of assuring perfect alignment. If replacement of the spindle of your lathe should ever be necessary, send the entire headstock to us prepaid and insured.**

Be sure to mail a separate letter giving correct name and address and telling what is to be done, any time parts are returned to the factory.

The right is reserved to make changes in design or equipment at any time without incurring any obligation to install these on machines previously sold, and to discontinue models of machines, motors or accessories at any time without notice.

Foreign distribution is through TAUCO EXPORT CORPORATION, 38 Pearl St., New York 4, New York, to Puerto Rico and the Canal Zone and to all foreign countries except Canada and the Philippine Islands.

Distribution in the United States, its possessions except Puerto Rico and the Canal Zone, and in Canada and the Philippine Islands is by authorized Delta Dealers.

DELTA POWER TOOL DIVISION

Rockwell MANUFACTURING COMPANY **PITTSBURGH 8, PA.**

Printed in the United States of America

Setting Up and Operating No. 1460 12-Inch Lathe

The No. 1460 is packed assembled ready for use. Care should be taken in unpacking so that finished surfaces are not burred or marred. The lathe can be mounted on our regular No. 1463 lathe stand or on a suitable bench; in either case it may be found necessary to shim under the lathe feet in order to make the bed level. Check the bed by putting a level across at the headstock and also across at the tailstock, also along the length of the bed in the center. In this way it is possible to detect a twist which might occur in the bed if clamped to an uneven bench top. This checkup should be made periodically to overcome warpage which might occur in the wood bench top, causing strain in the lathe bed.

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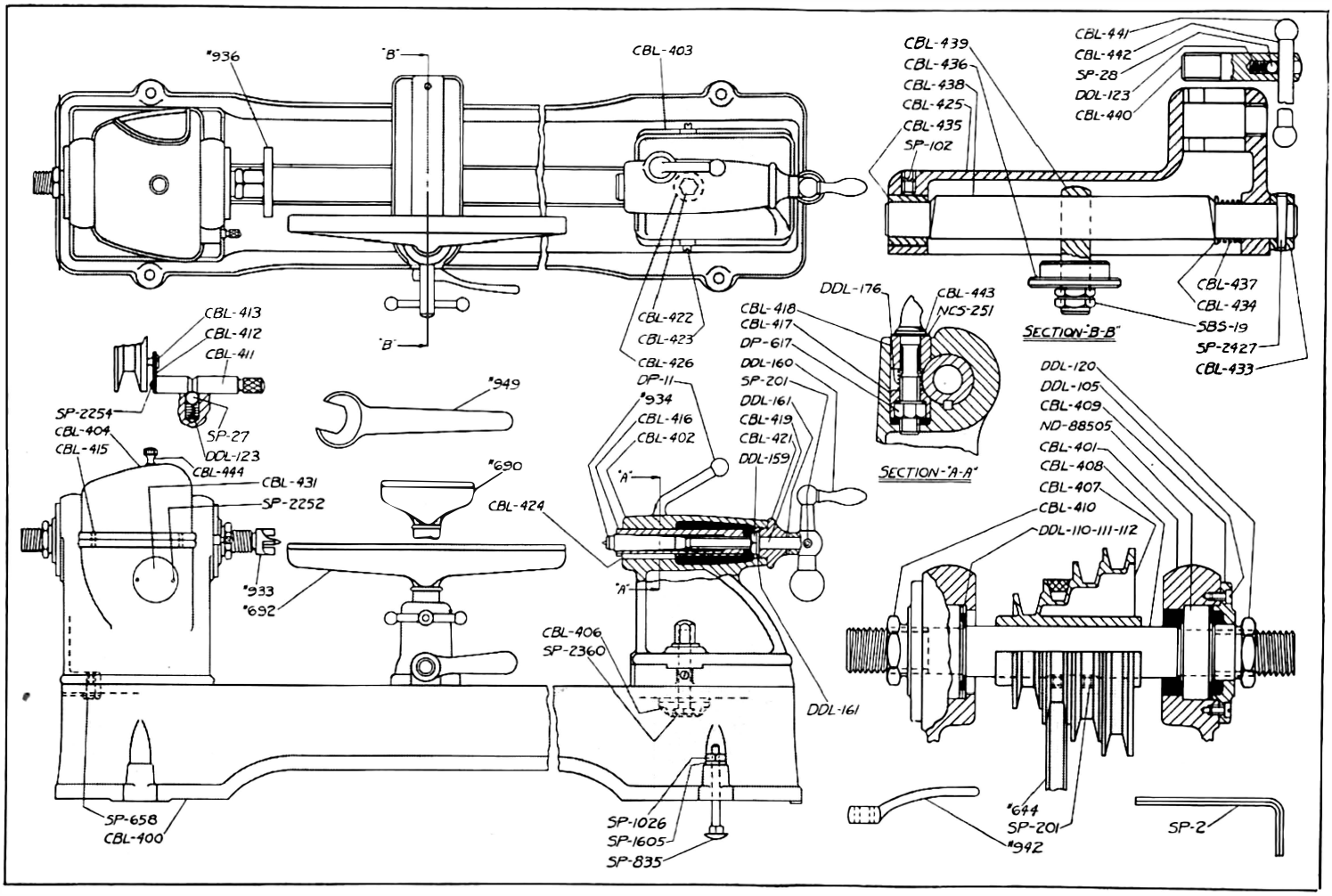


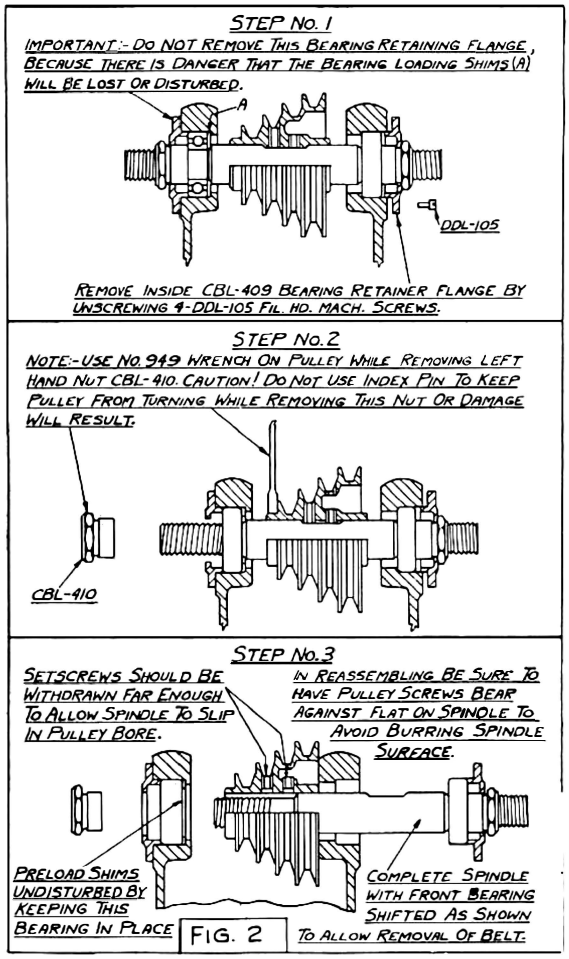


FIG. 2

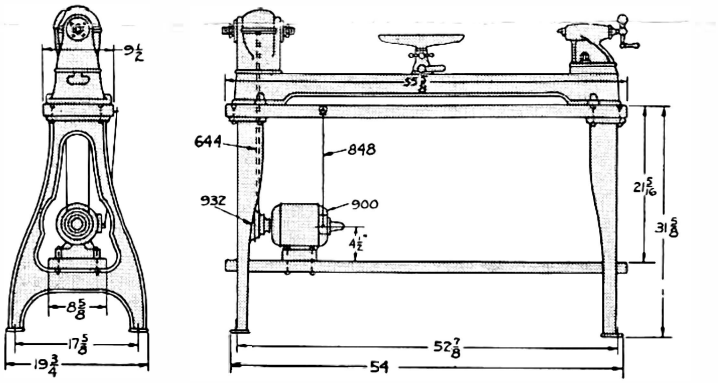


FIG. 3.

bearing fits close and it may be found necessary to tap the outboard end of the spindle **lightly** to move the spindle. **CAUTION**: do not drive with a hammer against the end of the spindle, but use a piece of wood between the spindle and the hammer. (Do not use heavy blows with hammer because this will destroy the smooth surfaces of the ball races or the balls, and ruin the bearings).

To re-assemble reverse the above procedure. Be sure, however, when tightening the pulley on the spindle that the two SP-201 Allen setscrews bear against the flat on the spindle to avoid burring the spindle and making future disassembly difficult. The belt on the lathe must be a good fit in order to drive the headstock at slow speed and yet it must be readily shifted. A tight belt causes excessive wear on the pulleys and belt, and unnecessary load on the motor bearings. If necessary shim up the motor to obtain right tension.

Tailstock

The tailstock is made with a sub-base having the set-over feature for taper turning. Be sure to slide the tailstock close to the headstock and check for alignment using the centers in both headstock and tailstock. If the centers do not line up, loosen the headless set screw CBL-423 in the tailstock sub-base on the side opposite to which the tailstock is offset and turn the other set screw until the centers line up, then tighten both set screws.

The tailstock quill is moved in and out of the tailstock by turning the ball crank handle DDL-160. When the quill has been brought to the right position it is locked with the ball handle DP-11 at the top of the tailstock. The center on the tailstock can be ejected by pulling in the quill to the limit which brings the point of the operating screw against the back of the center; a slight additional turn then forces out the center.

A small oil hole will be found on the rear bearing cap of the tailstock. An occasional drop of oil at this point will take care of the lubrication needs of the tailstock.

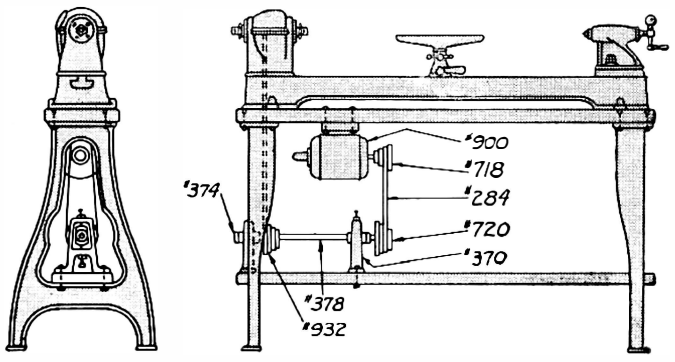
At the bottom of the tailstock on the side toward the headstock will be found a small ground area which overlaps the tailstock and sub-base. This surface is intended for a zero mark to be put on at the time the centers are lined up. Due to the fact that this mark extends over the joint of the tailstock and the sub-base, we suggest that it be made with a square and a scriber. If a fine edged chisel is used, be careful that the mark is not too deep because this may peen the sharp edge at this joint.

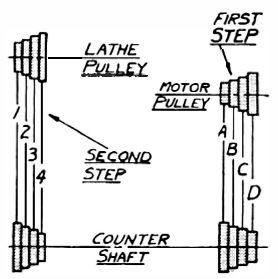
Tool Support

The Tool Support Base is new in design and operates somewhat differently from the standard type.

The tool support itself has a turned shank which is clamped into a V-groove in the support bracket thus permitting it to be rotated, raised or lowered. This clamping is accomplished by using the ball-pin lock screw CBL-440-S. The base is clamped to the bed by using the clamp lever CBL-433. This lever rotates an eccentric shaft which extends the full length of the bracket. The eccentric shaft engages a forged steel eyebolt which extends down through the slot in the lathe bed, and has a clamp flange and two hexagon nuts inside the bed. In clamping the eccentric pulls up on the eyebolt and forces the clamp flange up against the machined surface underneath the lathe bed top, in turn pulling down on the eccentric and support bracket.

The eccentric should lock at a point where it approaches dead center which makes it self locking. If for any reason adjustment is required, this is done by tightening or loosening the locknuts SBS-19.





R P M.	First Step	Second Step	R P M.	First Step	Second Step
340	A	4	1125	B	2
475	B	4	1225	A	1
525	A	3	1400	D	3
675	C	4	1575	C	2
750	B	3	1700	B	1
825	A	2	2200	D	2
900	D	4	2500	C	1
1050	C	3	3400	D	1

FIG. 4.

The Indexing Mechanism

The indexing mechanism is useful for fluting or reeding. Two rows of holes are provided in the pulley rim for use with the index pin, the inner row having 60 holes and the outer row 8 holes. With this combination it is possible to get a large number of divisions. The index pin is mounted on a swinging link, the other end of which is fastened to the index-pin body. The in and out movement, together with the swinging movement, makes it possible to engage or disengage the index pin in either row of holes.

Warning: Do not under any circumstances use the index pin as a lock to hold the pulley stationary while unscrewing faceplates or other attachments. If this is done it will ruin the usefulness of the index device.

When the lathe is used for turning, see that the pin is pulled back until the ball catch snaps in place, thus holding the pin and preventing it from sliding forward to catch in the pulley when the latter is moving.

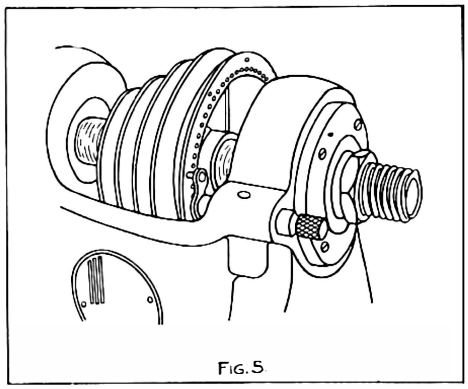


FIG. 5

Power and Speed

If the lathe is to be operated directly from a motor 1/3 H. P. will be found ample, except for very heavy work. Use only a constant-speed motor, however; a universal motor is not satisfactory. If the lathe is to be operated in connection with a counter-shaft as shown in Fig. 4 then a repulsion-induction motor should be used, as the starting load of this arrangement is too great for a split-phase motor.

The motor should be connected so that the lathe spindle rotates clockwise when looking at the lathe from the headstock end; that is, the top of the work should turn forward, toward the operator. If the motor rotates the wrong way, turn it around, or follow the maker's directions for reversing direction of rotation.

With a 1725 R. P. M. motor, using No. 932 four speed pulley on the motor shaft, the lathe will have speeds of 900, 1400, 2200 and 3400 R. P. M. The smaller the work being turned the higher the speed should be; the larger the work, the slower the speed. If a larger range of speeds is needed, then a countershaft arrangement shown in Fig. 4 is used. This gives 16 speeds ranging from 340 R. P. M. to 3400 R. P. M. The accompanying table shows the arrangement of belts used to obtain all of the sixteen speeds.

Floor Stand

The No. 697 Floor Stand for tool support (Fig. 6) has been changed to accommodate the new lathe. The tube has been increased in length and additional holes added at the bottom for adjustment. This makes the floor stand suitable for the No. 930 11" lathe with or without the No. 961 lathe feet and also the new No. 1460 12" Lathe.

Operating the Lathe

Never drive the piece to be turned into the drive center while the center is in place in the lathe. If you do this you will eventually stretch the metal of the headstock spindle so that neither the center nor the faceplates will fit, and you will thus ruin the accuracy of your lathe.

Always remove the drive center from the lathe and drive it into the end of the work by tapping the end of the center shank with a mallet to sink the spurs into the wood. If the wood to be turned is very hard, it is well to saw diagonals about 1/8" deep into the end of the wood so that the spurs will drive in easily. After the spur center has made its impression in the wood, replace it in the lathe, then place the work between the centers. Set and tighten the tailstock to the bed so that when the piece to be turned is held against the drive center there will be about 1/2" between the end of the turning and the point of the cup center. Still holding the wood between the centers, turn the hall-crank handle on the tailstock spindle so that the point of the cup center enters the wood. Turn the lathe by hand, and see that the wood turns easily, but without shake, then tighten the tailstock sleeve clamp to hold the spindle in this position.

Always adjust the tool rest so that it is from 1/8" to 1/4" away from the piece to be turned, and about 1/8" above the center. Never make toolrest adjustments while the machine is running. Before starting the lathe see that all adjustments have been properly made and that all adjusting screws and clamps are tight.

Use a slow speed when roughing off the corners of the work. If a band saw is available, always rough large faceplate work to shape before mounting it on the faceplate.

Do not wear a loose necktie, loose shirt sleeves or any other loose clothing while working on the lathe, as there is great danger that such loose clothing will be caught in the revolving work.

Important

Note that taper shanks are driven by the close fit between shank and socket, and that consequently centers and other attachments with taper shanks must be ***driven*** home into the socket, not merely placed into it. This does not mean that they are to be driven in with a hammer, but that they should be sharply thrust into place with the hand.

Never use No. 165 emery-wheel arbor with taper shank without first running the tailstock up to it to prevent it from coming out. With a properly mounted and true emery wheel this will not happen, but many emery wheels are out of balance, and the vibration caused by this lack of balance may cause the shank to loosen and the attachment to fly out. Run the tailstock up and be safe. It is preferable to use No. 939 60-degree center in the tailstock, as when turning metal, and to lubricate the center properly.

Do not use No. 151 sanding disk on No. 935 adapter in this lathe. The pressure on a sanding disk is usually greatest on the outer circumference, and this tends to loosen the shank. Always use No. 951 threaded sanding disk on this lathe.

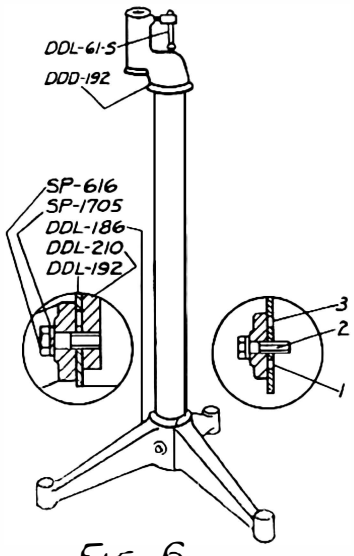


FIG. 6

Note

It is naturally impossible, in the space of an instruction sheet, to give complete instructions in wood-turning.

★

Our handbook "Getting the Most Out of Your Lathe," price $ .25, contains very complete instructions in all kinds of work that can be done on a lathe of this kind, including metal turning and spinning.

Replacement Parts

No.	Name of Part	No. Req.	Price Each	Lot Price Per Doz. Unless Otherwise Specified
CBL-400	Lathe Bed	1	17.50	....
	Headstock Parts			
CBL-401-S	Complete Headstock including belt and pulley guard	1	20.00	....
CBL-401	Headstock Body only	1	4.00	....
CBL-404	Headstock Guard	1	.75	....
CBL-407	Spindle Pulley	1	1.75	....
644	Vee Belt	1	1.25	....
CBL-409	Bearing Retainer Flange	2	.40	....
CBL-410	Spindle Nut (Left Hand)	1	.25	....
DDL-120	Spindle Nut (Right Hand)	1	.25	....
CBL-411-S	Index Pin (Complete)	1	.45	....
ND-88505	Greaseal Ball Bearing	2	2.00	....
DDL-105	#10-32x7/16 Fill. Hd. Screw	8	.25	.25
SP-201	5/16-18x5/16 Allen Set Screw	2	.25	5 for .25
DDL-110	.003 Shim Washer	5	.25	5 for .25
CBL-415	Guard Pin	2	.25	6 for .25
SP-27	7/32 Dia. Steel Ball	1	.25	.25
DDL-123	Coil Spring	1	.25	25
CBL-408	*Spindle	1	3.50	....
	Tailstock Parts			
CBL-402-S	Tailstock complete with Sub Base and Clamp	1	9.50	....
CBL-402	Tailstock Body only	1	3.25	....
CBL-403	Tailstock Sub Base	1	2.00	....
CBL-406	Clamp Plate	1	.25	....
CBL-416	Tailstock Quill	1	1.10	....
CBL-417	Lower Clamp Sleeve	1	.25	....
CBL-418	Upper Clamp Sleeve	1	.25	....
CBL-419	Quill Adjusting Screw	1	.25	....
DDL-159	Quill Adj. Screw Nut	1	.25	6 for .25
DDL-160	Ball Crank Handle	1	.75	....
DP-617	7/16-14x5/8 Hex. Nut	1	.25	6 for .25
SP-2360	1/2-13x3/4 Sq. Hd. Mach. Bolt	1	.25	2 for .25
SP-201	5/16-18x5/16 Allen Set. Sc.	1	.25	5 for .25
DDL-161	Fiber Thrust Washer	2	.25	.25
DDL-176	Coil Spring	1	.25	.25
NCS-251	Shim Washer	4	.25	.25
CBL-443	27/32x29/64x1/16 Washer	1	.25	25

No.	Name of Part	No. Req.	Price Each	Lot Price Per Doz. Unless Otherwise Specified
	Tool Support Parts			
CBL-425-S	Tool Support Base comp. not including Tool Support	1	3.75	....
CBL-425	Tool Support Base Cast. only	1	1.25	....
CBL-433	Operating Lever	1	.30	....
CBL-434	Washer 49/64x1x1/16 Th.	1	.25	.25
CBL-435	Bushing	1	.25	....
CBL-436	Eyebolt Flange	1	.40	....
CBL-437	Coil Spring	1	.25	.25
CBL-438	Eccentric Shaft	1	.75	....
CBL-439	Eyebolt	1	.30	....
CBL-440	Ball Handle Clamp Bolt	1	.40	....
SBS-19	5/8-18x3/4 Hex. Nut	2	.25	.25
SP-102	1/4-20x3/8 Hd'less Set. Sc.	1	.25	.25
SP-2427	#3x1 1/4" Taper Pin	1	.25	6 for .25
	Accessories			
#163	3x3 Sanding Drum	1	2.65	....
#164	1 3/4x2 Sanding Drum	1	1.95	....
#165	Grinding Wheel Arbor	1	1.25	....
#690	4" Tool Support	1	.75	....
#692	12" Tool Support	1	1.10	....
#694	24" Tool Support	1	2.15	....
#695	Right Angle Tool Support	1	1.50	....
#932	4 Step Motor Pulley (specify bore)	1	1.25	....
#933	Spur Center	1	1.00	....
#934	Cup Center	1	.90	....
DDL-206	Steel Center Point	2	.25	6 for .25
DDL-253	1/4-28x3/16 Allen Set Screw	2	.25	6 for .25
#935	Taper Shank Adapter	1	.85	....
#936	3" Dia. Face Plate	1	1.00	....
#937	6" Dia. Face Plate	1	2.25	....
#938	5" Hand Wheel	1	1.95	....
#939	60° Center for Metal Work	1	1.00	....
#940	Screw Center	1	1.25	....
#942	Socket Wrench	1	.25	....
#949	Arbor Wrench	1	.35	....
#697	Floor Stand for Tool Support	1	8.50	....

*NOTE: The final machining of the No. 2 Morse taper hole in the spindle of the headstock of this lathe is done after installation of the spindle. This is the only method of assuring perfect alignment. If replacement of the spindle of your lathe should ever be necessary, send the entire headstock to us prepaid and insured for $20.00. Charges will be $3.50 for the new spindle plus $1.00 labor charge.

Be sure to mail a separate letter giving correct name and address and telling what is to be done, any time parts are returned to the factory.

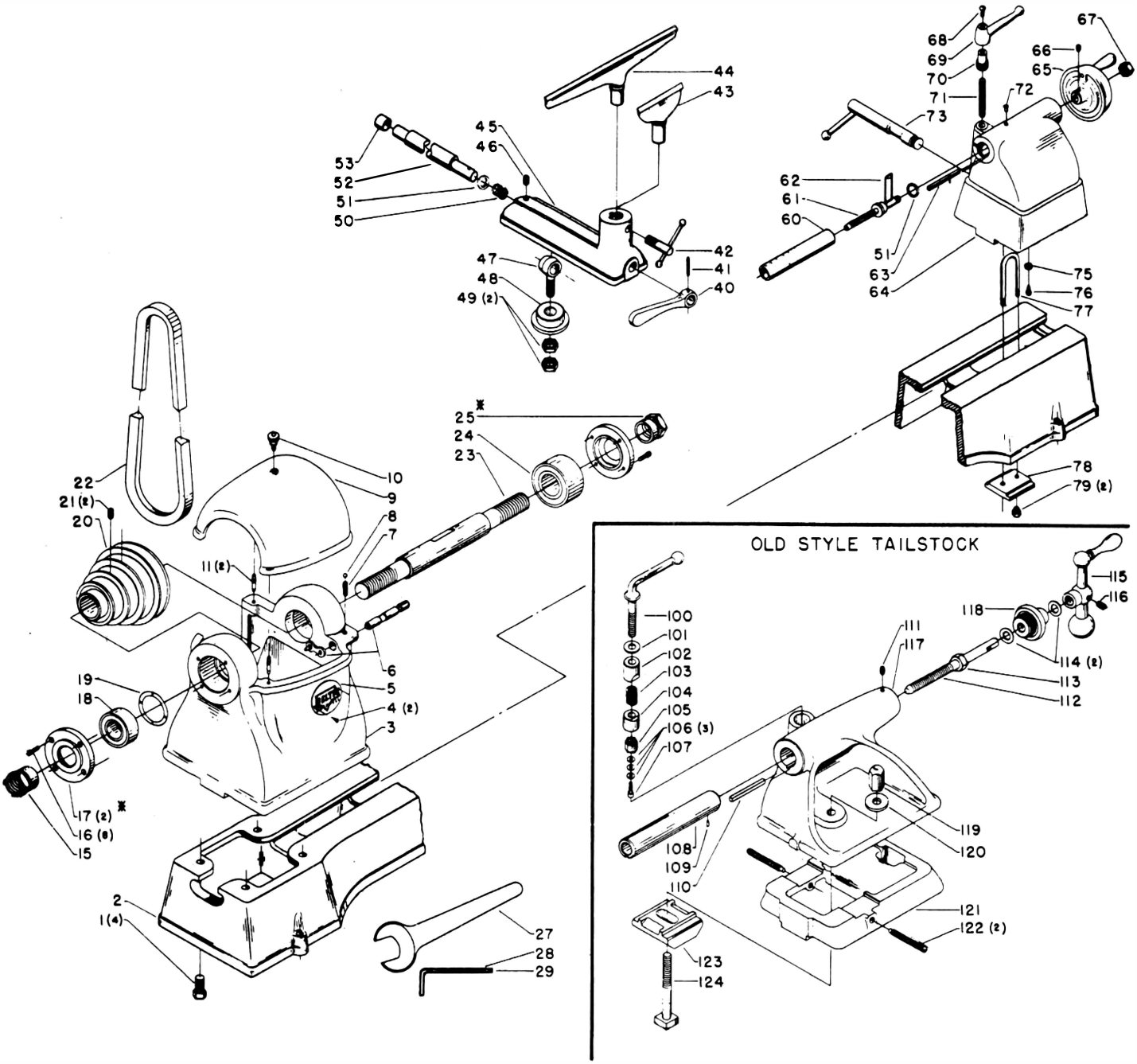
NOTE: Due to the cost of handling individual orders, it is not possible for us to fill orders for small parts for less than a minimum charge of 25 cents. However in many cases it is possible for us to furnish a quantity of parts for the same minimum charge, as listed above, and customers are urged to take advantage of this opportunity of obtaining a quantity of spare parts for the price of one.

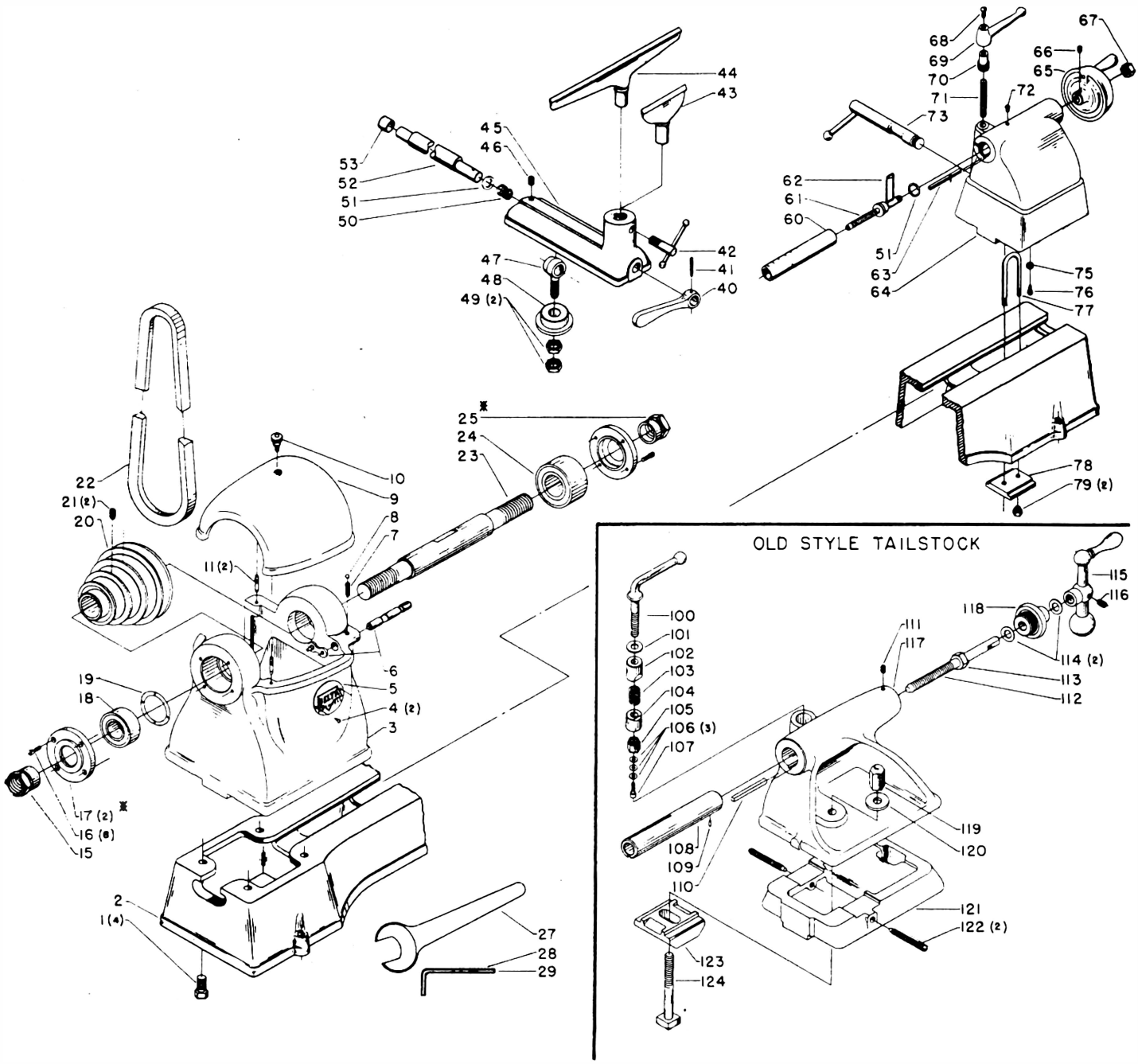
Prices in this list apply only to parts ordered for repair and replacement. They cannot be used for computing allowance values when a machine is ordered "less" certain parts. Ask for quotations on such special machines.

THE DELTA MANUFACTURING COMPANY, 600-634 E. Vienna Avenue, Milwaukee, Wis.

Form CBL—6-39

Printed in the United States of America


OLD STYLE TAILSTOCK


OLD STYLE TAILSTOCK

Replacement Parts

Ref. No.	Part No.	Description
1	SP-658	3/8-24 x 1" Hex. Hd. Screw
2	CBL-400	Lathe Bed
3	CBL-401	Headstock
4	SP-2250	#4 x 3/16 Drive Screw
5	CBL-486	Nameplate
6	CBL-411-S	Index Pin
7	DDL-123	Spring
8	SP-27	7/32" Dia. Steel Ball
9	CBL-404	Guard
10	CBL-444	Thumbscrew
11	CBL-415	Pin
15	CBL-410	Spindle Nut (L. H.)
16	DDL-105	#10-32 x 7/16 Fil. Hd. Scr.
* 17	434-02-079-5002	Retainer
18	SP-5360	Bearing
19	SP-7352	Spring Washer
20	CBL-407-S	Pulley, Including:
21	SP-201	5/16-18 x 5/16"Set Screw
22	Cat. #644	Belt
23	434-02-085-5002	Spindle
24	SP-5334	Bearing
* 25	902-01-201-5462	Spindle Nut (R. H.)
27	Cat. #949	Wrench
28	Cat. #194	5/32" Hex. Wrench
29	Cat. #1534	1/8" Hex. Wrench
40	CBL-433	Lever
41	SP-2708	3/16 x 1 1/4" Roll Pin
42	CBL-440-S	Clamp Bolt
43	Cat. #690	4" Tool Support
44	Cat. #692	12" Tool Support
45	CBL-425	Base
46	SP-102	1/4-20 x 3/8"H'dless Set Scr.
47	CBL-439	Eyebolt
48	CBL-436	Flange
49	SBS-19	5/8-18 x 3/4" Hex. Nut
50	CBL-437	Spring
51	CBL-434	Washer
52	CBL-438	Shaft
53	CBL-435	Bushing
60	CBL-416	Quill
61	CWL-66	Quill Adj. Screw
62	SP-2617	Key
63	MCL-472-S	3/16 Sq. x 2 5/8 Key w/Pin
64	CWL-63	Tailstock
65	CWL-67-S	Handwheel, Including:
66	SP-205	5/16-18 x 1/4"Soc. Set Scr.
67	SP-1227	1/2"-20 Hex. Jam Nut
68	SP-7528	1/4-20 x 1/2"Truss Hd. Scr.
69	SR-217	Clamp Handle
70	NCS-361	Serrated Nut
71	SP-6217	7/16-14 x 2 3/8"Soc. Set Scr.
72	SP-2486	Oiler
73	CWL-65-S	Eccentric Shaft
75	SP-1764	1/4" Lockwasher
76	DDL-154	Special Set Screw
77	DDL-278	"U" Bolt
78	CWL-64	Clamp Plate
79	SP-1212	5/16"-24 Hex. Nut

OLD STYLE TAILSTOCK ASSEMBLY

Ref. No.	Part No.	Description
100	DP-11-R	Handle
101	CBL-443	29/64 x 27/32 x 1/16"Stl. Washer
102	CBL-418	Clamp
103	CBL-489	Spring
104	CBL-417	Clamp
105	DP-617	Special Nut
106	SP-1602	3/16 x 7/16"Stl. Washer
107	SP-224	#10-32 x 1/2 Soc. Hd. Scr.
108	CBL-416-R	Quill, Including:
109	SP-2722	1/16 x 1/4" Roll Pin
110	CBL-424	3/16"Sq. x 2 Key
111	SP-208	1/4-20 x 1/4"Soc. Set Scr.
112	CBL-419	Screw
113	SP-5441	1/2"-13 Hex. Jam Nut
114	DDL-161	Special Washer
115	DDL-160-S	Ball Crank Assembly, Including:
116	SP-206	5/16-18 x 5/16"Soc. Set Scr.
117	CBL-402-A	Tailstock, Including:
118	CBL-421	Cap
119	CBL-422	Special Nut
120	CBL-426	33/64 x 1 1/4 x 1/8"Stl. Washer
121	CBL-403	Support
122	CBL-423	Special Screw
123	CBL-406	Clamp
124	SP-2360	1/2-16 x 3 1/4"Sq. Hd. Bolt

* For replacements of the right hand spindle nut and the bearing retainers on lathes with serial numbers prior to 128-1312 order DDL-120 spindle nut and CBL-409 bearing retainer.

Metal Turning with the Compound Slide Rest

Speed of Lathe

In order to turn metal properly on your woodturning lathe, it is necessary to reduce the speed, since metal cannot be turned at such high speeds as wood. The most convenient way to do this, in the case of the No. 930 11-inch lathe, is to use the countershaft arrangement shown in Fig. 1.

Here a No. 718 pulley is mounted on the motor shaft, with a No. 720 pulley to match on the countershaft. Belt No. 284 is used between the motor and the countershaft. The No. 932 pulley is used on the opposite end of the countershaft. With this arrangement speeds ranging from 340 to 3400 R.P.M. can be obtained. The chart (Fig. 1) shows the various speeds obtainable through the use of different pulley arrangements. The slower speeds are especially useful for large faceplate work to be done on the outer end of the spindle in connection with the floorstand for the tool supports.

Do not attempt to drive the countershaft arrangement with a No. 6300 motor—results will not prove satisfactory. A No. 6400 or a No. 6600 motor must be used.

In addition to this countershaft, it is necessary to have two No. 939 60-degree plain centers for turning work between centers, a driving dog, a faceplate, a toolholder and some bits. For work that cannot be swung between centers, a No. 943-A four-jaw independent chuck or a No. 963 three-jaw chuck should be used.

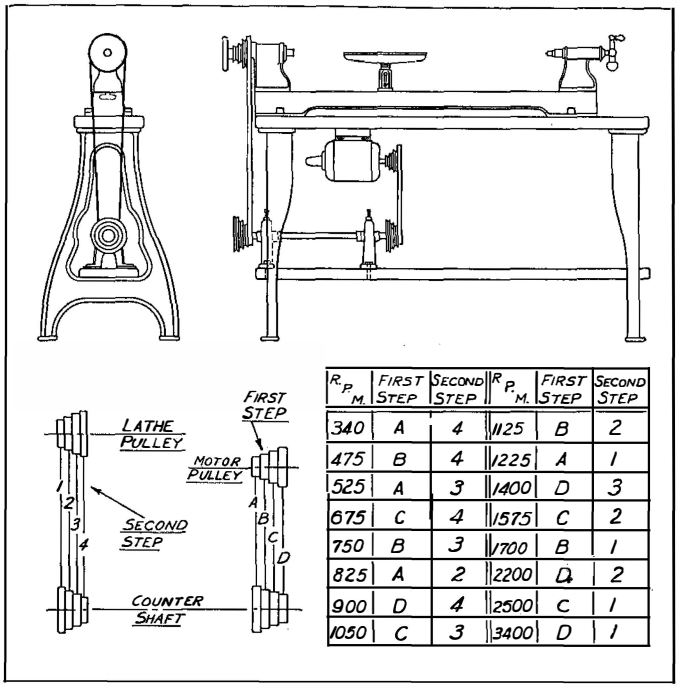
Spindle Turning

Metal work that is to be turned on the lathe may be divided roughly into two classes: Work that may be turned between centers (spindle turning) and work that must be held in a chuck or on a faceplate.

Clean out the taper holes in the headstock and tailstock with a rag and insert the 60-degree centers. Screw the 6" faceplate onto the nose of the spindle. Before the work can be turned it must be provided with center holes on the end, and this is done by drilling with a center drill, which may be obtained from any good tool store. See Fig. 3. These come in various sizes, and the user should have at least two; a No. 1 for work up to about $\frac{5}{16}$" diameter and a No. 2 for work from $\frac{5}{16}$" to 1" diameter. For larger diameters a No. 3 should be used.

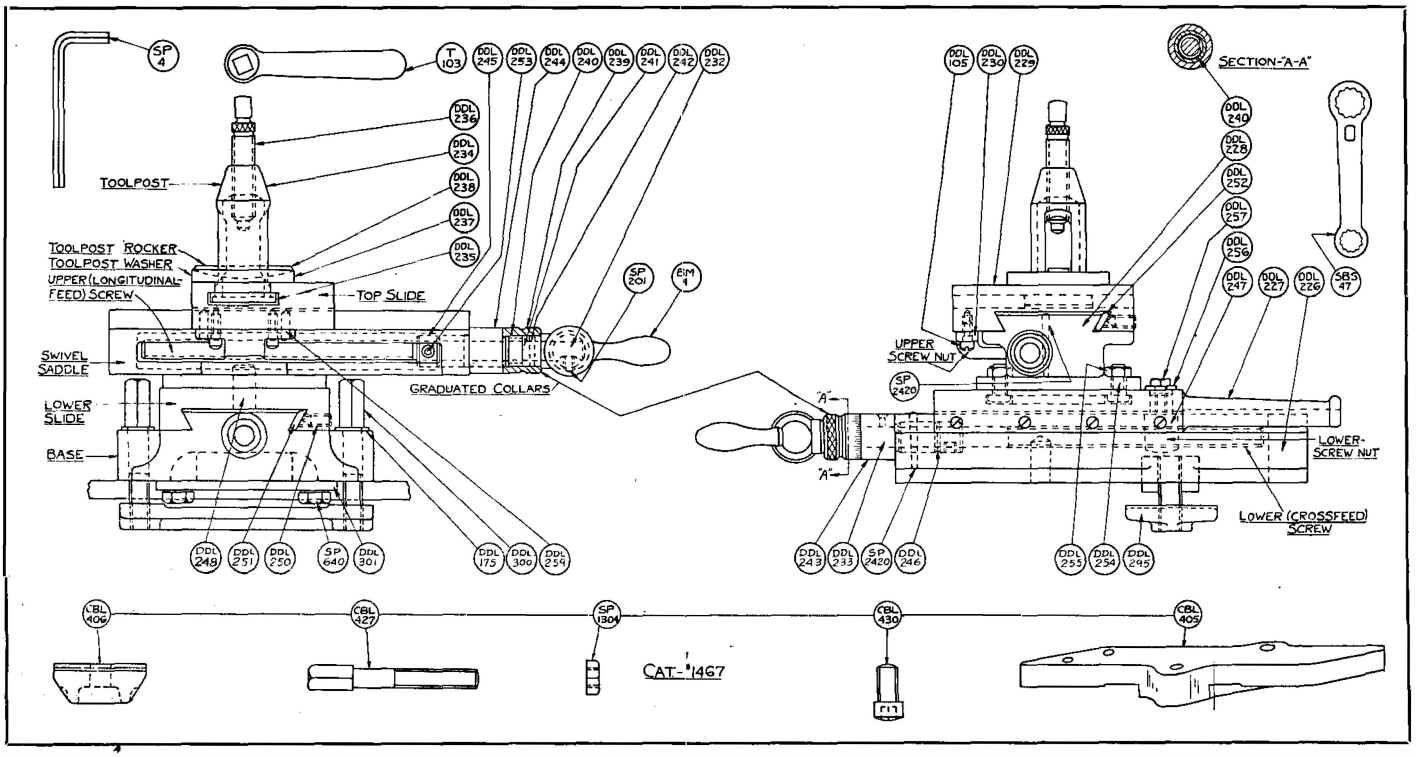
Drilling Center Holes

There are several ways of drilling the center hole. First the center of each end of the stock should be laid out with a center square or in some other convenient manner, and a center-punch mark made. If the ends of the stock are square the center holes may be drilled in the drill press. If not, they are better drilled in the lathe by one or the other of the methods shown in Fig. 3. In the first method, the center drill is held in a chuck in the headstock, the center-punch mark at one end of the stock is set against the tailstock center, and the drill is then fed into the center mark at the other end by feeding the stock forward with the tailstock, the work being held with the hand. When one center is



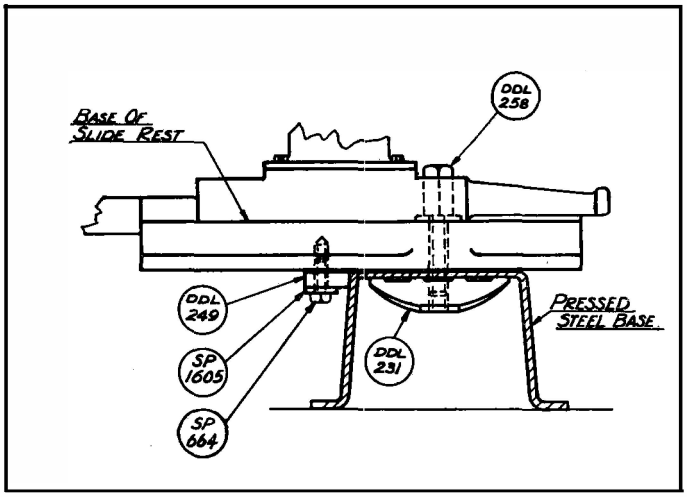
R.P.M.	First Step	Second Step	R.P.M.	First Step	Second Step
340	A	4	1125	B	2
475	B	4	1225	A	1
525	A	3	1400	D	3
675	C	4	1575	C	2
750	B	3	1700	B	1
825	A	2	2200	D	2
900	D	4	2500	C	1
1050	C	3	3400	D	1

FIG. 1—No. 930 lathe with countershaft on No. 1463 stand.



B, loosening the other jaws slightly also to enable the piece to move toward the low side. Rub out the chalk mark and test again. By moving the work with the jaws in this manner it can be made to run true in a few minutes.

Work that cannot be held in the chuck may be clamped to the faceplate by making a few steel clamps of the type shown in Fig. 9. Such work is trued approximately, and then tested with chalk in the same manner as chuck work. The work can be tapped toward the low side with a hammer until it runs true, and then the clamps tightened up for turning.



No. 965 Slide Rest for Steel Bed Lathe

thus making a "crotch center".

Drilling may also be done, of course, by holding the work in the chuck and using the drill chuck in the tailstock sleeve. The end of a spindle may be bored by driving one end with a dog and supporting the other end in the steady rest, while the drill is fed in with the tailstock. In such cases the dog should always be tied firmly to the faceplate, since the only pressure holding the work against the headstock center is that furnished by the drill, and if this precaution is neglected the work will "jump".

Wooden Chucks

Work that cannot be held in the regular chuck can often be turned or bored by attaching a heavy block of pine to the faceplate with screws. The block is then bored out to a tight fit for the work, and the work pressed into the bore, where it will be held securely and centrally for further operations.

Drilling in Lathe

In the absence of a drill press, a drill chuck held in the headstock will do a large variety of drilling jobs. A "drill pad" is necessary, and this is made simply by using the No. 935 adapter and the No. 143 faceplate, with a true block of wood screwed to the faceplate as in Fig. 10. The work is set against the block and fed to the drill with the tailstock. Round work may be drilled in the same manner, substituting a wood V-block for the plain block as shown at the right,

Lubricating Tailstock Center

When work is turned between centers the tailstock center should always be lubricated with a mixture of white lead and oil, although plain machine oil will do. DON'T NEGLECT THIS PRECAUTION.

Disassembling Slide Rest

If for any reason you wish to disassemble the slide rest. drive out the two pins SP-2420 (Marked with double circle) from the under side, then turn the feedscrew handles so that the screw turns itself out. To remove the top slide take out the screws holding the nut (DDL-230) to the underside of the slide. With the nut opposite the cutout in the base of the saddle, pry it downward clear of the slide and then take the slide off **the end** of saddle.

To remove bottom slide loosen screw DDL-257 holding the feed screw nut, remove nut and run slide off the end.

PARTS LIST

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

No.	Name of Part	No. Req.	Each
DDL-105	Spec. Fill. Hd. Screw	2	$ .10
DDL-175	Spec. Steel Washer	2	.10
DDL-226-R	Base with DDL-243 Bearing and SP-2420 Taper Pin	1	3.75
DDL-227	Lower Slide	1	3.50
DDL-228-R	Swivel Saddle with DDL-244 Bearing and SP-2420 Taper Pin	1	4.25
DDL-229	Top Slide	1	2.00
DDL-229-R	Upper Parts Assembly for Slide Rest	1	10.40
DDL-230	Upper Feed-Screw Nut	1	.75
DDL-231	Clamp	1	.65
DDL-232	Upper Feed Screw	1	.60
DDL-232-R	Upper Feed Screw Assembly, with Spacer, Bearing, Collar, etc.	1	1.55
DDL-233	Lower Feed Screw	1	.60
DDL-233-R	Lower Feed Screw Assembly	1	1.60
DDL-234	Toolpost	1	1.25
DDL-235	Square Swivel Washer	1	.20
DDL-236	Tool Post Screw	1	.25
DDL-237	Toolpost Washer	1	.25
DDL-238	Toolpost Rocker	1	.25
DDL-239	Graduated Collar	2	.30
DDL-240	Friction Spring	4	.10
DDL-241	Graduated Collar Spacer	2	.25
DDL-242	Feed-Screw Pin	2	.10
DDL-243	Lower Feed-Screw Bearing	1	.45
DDL-244	Upper Feed-Screw Bearing	1	.45
DDL-245	Feed-Screw Collar	2	.10
DDL-246	Feed-Screw Thrust Washer	2	.10
DDL-247	Lower-Slide Nut	1	.35
DDL-248	Swivel Pin	1	$ .15
DDL-249	Alignment Bar	1	.60
DDL-250	1/4-28 x 1/2 Pointed Gib Screw	7	.10
DDL-251	Lower-Slide Gib	1	.10
DDL-252	Top-Slide Gib	1	.10
DDL-253	1/4-28 x 3/16 Allen Screw	2	.10
DDL-254	7/16-18 x 3/4" Tee Bolt for Saddle	2	.10
DDL-255	Tee-Bolt Nut	2	.10
DDL-256	Special Washer	1	.10
DDL-257	1/4-28 x 1/2 Cap. Screw	1	.10
DDL-258	7/16-14 x 2 Special Clamp Screw	2	.15
DDL-259	Dowel Pin	2	.10
DDL-295	Clamp Plate for Slide Rest	1	.85
DDL-301	Key for Slide Rest	1	.45
BM-4-C-S	Ball Crank Handle	2	.95
CBL-405	Sub Base	1	2.40
CBL-406	Clamp	2	.20
CBL-427	7/16-14 x 2 3/4 Special Hex. Head Cap Screw	2	.20
CBL-430	7/16-20 x 3/4 Special Allen Cap Screw	2	.20
SP-4	7/16" Plain Allen Wrench	1	.25
SP-201	5/16-18 x 5/16 Allen Screw	2	.10
SP-640	3/8-16 x 3/4 Hex. Hd. Cap. Screw	1	.10
SP-664	7/16-20 x 1 Hex. Hd. Cap Screw	2	.10
SP-1304	7/16 Hex. Nut	2	.10
SP-1605	3/8 Std. Steel Washer	2	.10
SP-2420	#2 x 1 1/4 Taper Pin	2	.10
#1526	7/16" and 5/8" Box Wrench	1	
#1527	Wrench (Tool Holder)	1	

NOTE: Prices in this list apply only to parts ordered for repair and replacement. They cannot be used for computing allowance values if a machine is ordered "less" certain parts.

THE DELTA MANUFACTURING CO. DELTA MILWAUKEE **600-634 E. Vienna Ave., Milwaukee, Wis.**

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DELTA MILWAUKEE

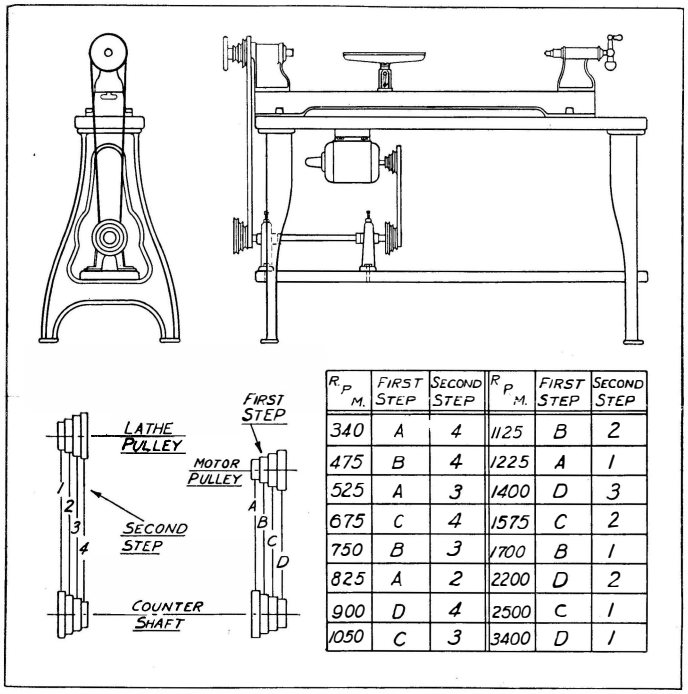
THE DELTA MFG. CO., MILWAUKEE 1, WIS.

SERIES 46 NONE
LATHE

LATHE ACCESSORIES
Metal Turning with the Compound Slide Rest

SPEED OF LATHE

In order to turn metal properly on your woodturning lathe, it is necessary to reduce the speed, since metal cannot be turned at such high speeds as wood. The most convenient way to do this, is to use the countershaft arrangement shown in Fig. 1.



R P M.	First Step	Second Step	R P M.	First Step	Second Step
340	A	4	1125	B	2
475	B	4	1225	A	1
525	A	3	1400	D	3
675	C	4	1575	C	2
750	B	3	1700	B	1
825	A	2	2200	D	2
900	D	4	2500	C	1
1050	C	3	3400	D	1

FIG. 1—Illustrates lathe with countershaft on No. 1463 stand.

Here a No. 718 pulley is mounted on the motor shaft, with a No. 720 pulley to match on the countershaft. Belt No. 284 is used between the motor and the countershaft. The No. 932 pulley is used on the opposite end of the countershaft. With this arrangement speeds ranging from 340 to 3400 R.P.M. can be obtained. The chart (Fig. 1) shows the various speeds obtainable through the use of different pulley arrangements. The slower speeds are especially useful for large faceplate work to be done on the outer end of the spindle in connection with the floorstand for the tool supports.

Do not attempt to drive the countershaft arrangement with a No. 60-310 motor—results will not prove satisfactory. A No. 62-110 or a No. 66-320 motor must be used.

In addition to this countershaft, it is necessary to have two No. 939 60-degree plain centers for turning work between centers, a driving dog, a faceplate, a toolholder and some bits. For work that cannot be swung between centers, a No. 943-A four-jaw independent chuck or a No. 963 three-jaw chuck should be used.

SPINDLE TURNING

Metal work that is to be turned on the lathe may be divided roughly into two classes: Work that may be turned between centers (spindle turning) and work that must be held in a chuck or on a faceplate.

Clean out the taper holes in the headstock and tailstock with a rag and insert the 60-degree centers. Screw the 6" faceplate onto the nose of the spindle. Before the work can be turned it must be provided with center holes on the end, and this is done by drilling with a center drill, which may be obtained from any good tool store. See Fig. 3. These come in various sizes, and the user should have at least two; a No. 1 for work up to about $\frac{5}{16}$" diameter and a No. 2 for work from $\frac{5}{16}$" to 1" diameter. For larger diameters a No. 3 should be used.

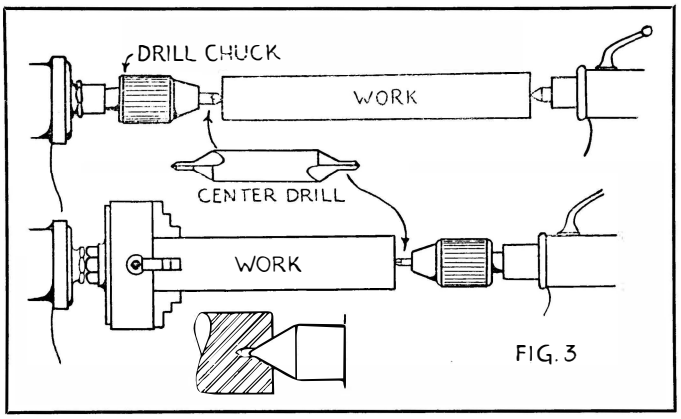


FIG. 3

DRILLING CENTER HOLES

There are several ways of drilling the center hole. First the center of each end of the stock should be laid out with a center square or in some other convenient manner, and a center-punch mark made. If the ends of the stock are square the center holes may be drilled in the drill press. If not, they are better drilled in the lathe by one or the other of the methods shown in Fig. 3. In the first method, the center drill is held in a chuck in the headstock, the center-punch mark at one end of the stock is set against the tailstock center, and the drill is then fed into the center mark at the other end by feeding the stock forward with the tailstock, the work being held with the hand. When one center is drilled the stock is reversed and the other end drilled. In the second method the work is held in the chuck and the drill chuck in the tailstock. Do not attempt to use "any kind" of a countersink for making the center holes; the taper of the center hole must be exactly 60 degrees to fit the centers, and the point of the center must not touch the bottom of the center hole. See the cross-sectional view of the properly centered work, Fig. 3.

DRIVING CENTERED WORK

To drive the work some form of driving "dog" is required, and the most convenient form is shown in Fig. 4; this consists of a clamp that tightens on the work, with a bent tail on one piece which fits into the slot in the faceplate. (Goodell-Pratt No. 127.) A dog of this kind will accommodate a wide variety of diameters.

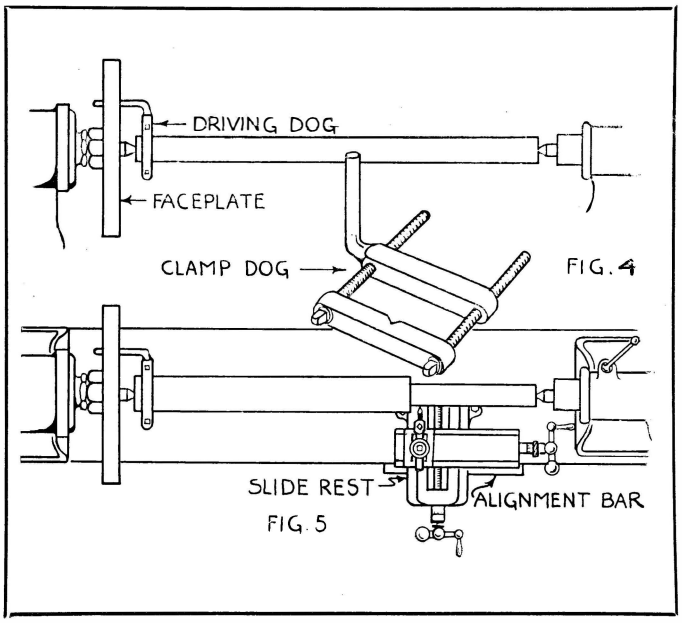


FIG. 4

FIG. 5

ALIGNING SLIDE REST

Clamp the slide rest to the lathe with the cross slide as nearly as possible at right angles to the lathe bed. Put a toolholder and bit in the toolpost, and the 6" faceplate on the headstock of the spindle. Run the point of the tool across the face of the faceplate (with the lathe stopped) and see that the tool point just touches the faceplate all the way from outer rim to center. Adjust the position of the rest on the bed until it will do this, then tighten the clamp nuts firmly, set the alignment bar hard against the front of the lathe bed and tighten the screws that hold it. This sets the rest accurately at right angles to the bed, and it will stay that way regardless of how often it may be removed from the lathe.

To set the rest to turn parallel, place a piece of work between centers and turn a length of the work as in Fig. 5. Caliper both ends of the turned section to see if it is parallel. If both ends are not exactly of the same diameter loosen the nuts that clamp the compound swivel. Rotate the whole upper saddle slightly in the proper direction, tighten the nuts and turn the section again. Caliper it once more and repeat if necessary. When the compound slide has been set to turn the piece absolutely parallel, tighten the clamp nuts securely, then make an index mark on the top surface of the cross slide exactly opposite the zero mark on the compound swivel. Scratch this mark in deeply and accurately with a scratch awl or cut it into the surface. Now, when the alignment key DDL-301 is slid into the machined way along the center of the lathe bed and the zero on the compound swivel is at the index mark the slide rest will always be parallel to the lathe center axis.

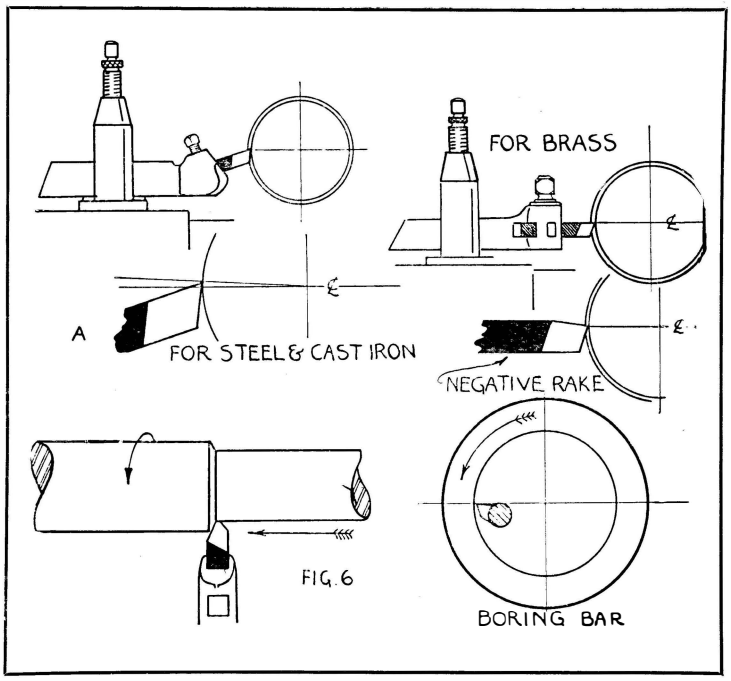


FIG. 6

TOOL BITS AND HOLDERS

The most convenient form of tool for turning is the square tool bit which is held in a holder. The form of tool holder seen at the upper left, Fig. 6, is used for turning steel and iron, as the tilt of the tool in the holder gives the requisite "top rake" for cutting these metals.

When cutting steel the point of the tool should be set slightly above the center line of the work, (Fig. 6) —about 3/64" for each inch diameter of work. For brass and similar work the point of the tool should be set exactly on the center line of the work as shown in Fig. 6, and the tool must have no top rake or it will dig in and chatter. When turning copper and other very soft metals it is often of advantage to give the tool bit "negative" rake, by grinding is as shown, so that it scrapes rather than cuts. Boring bars should be set so that the cutting point is very slightly above the center line. Note the direction of rotation and feed.

SHARPENING TOOLS

Fig. 7 shows how the most useful and most commonly used tool bits should be sharpened for use in the tool holder. The angles of these tools have been very carefully worked out, and should be adhered to for best results. The right corner bit is sharpened in exactly the same manner as the left corner bit illustrated, except that the angles are reversed from left to right, as may be seen in Fig. 11 on following page.

CAUSES OF CHATTER

When tools are properly used a good cut may be taken even in tool steel without any chatter. Certain precautions must be observed, however, if chatter is to be eliminated.

First, the tool bit should not project any more than is necessary from the holder, and the toolholder should not project from the toolrest any more than necessary to reach the work. Keep both the holder and the bit close to the rest to give them the utmost support.

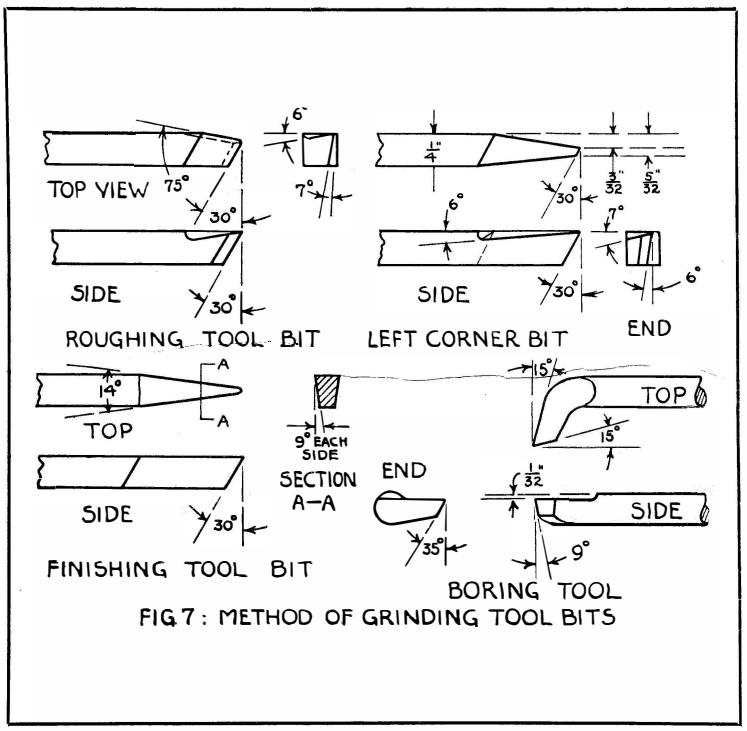


FIG. 7: METHOD OF GRINDING TOOL BITS

Second, a tool sharpened with too broad a nose, or in which too much surface is doing the cutting, will invariably chatter. The surface of the tool in contact with the work should be as small as possible consistent with the work the tool is to do. If an attempt is made to cut with the whole side of a corner bit, for example, chatter is bound to result on any lathe; only the point of the tool—about $\frac{1}{32}$"—should do the cutting.

Another source of chatter, especially with those inexperienced in lathe work, is work that overhangs the chuck too far. A piece of heavy section, say 1½" or 2" in diameter, and 4" or 5" long, might be safely turned when held only in the chuck, while a piece of the same length but only ½" in diameter would be certain to chatter. When pieces are to be turned while held in the chuck, it is safer to center one end and run the tailstock center up to support this end in a similar manner to that used in spindle turning. Slender work should always be supported by the steady rest.

Too great speed is another cause of chatter, so if your tool and holder are set right, the work properly centered and supported and it still chatters, reduce the speed. Otherwise use as high speed as possible without burning the tool bits.

While a substantial cut can be taken with the Compound Slide Rest on the lathe, some materials are more difficult to cut without chatter than others, and it is better to take several light cuts in such materials than to attempt to remove the stock in one deep cut. This slide rest has been very severely tested, and if you find chatter when turning you should look for the cause in your methods of turning, and not in the lathe or slide rest.

USE OF TOOLS

Fig. 11 gives a graphic illustration of the way in which the various tools are used, and little description is necessary.

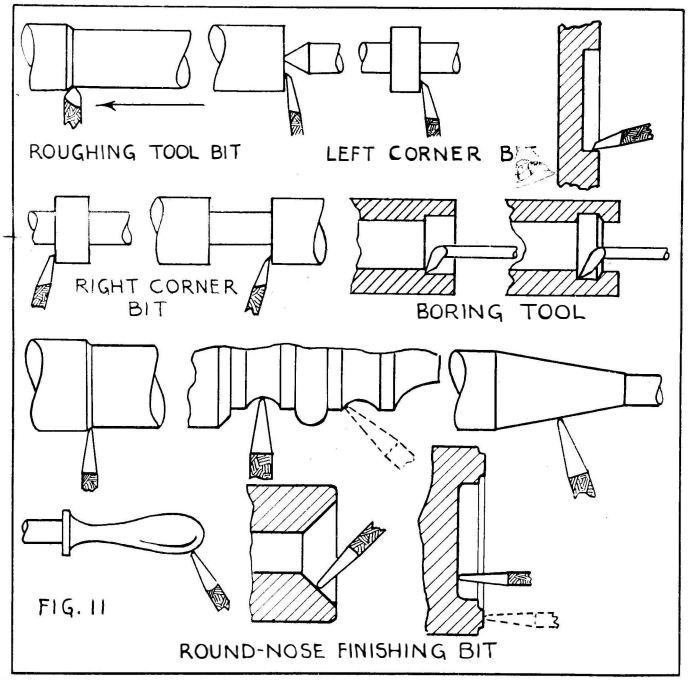


FIG. 11

Above are shown the various uses of the tools illustrated in Fig. 7.

CHUCK AND FACEPLATE WORK

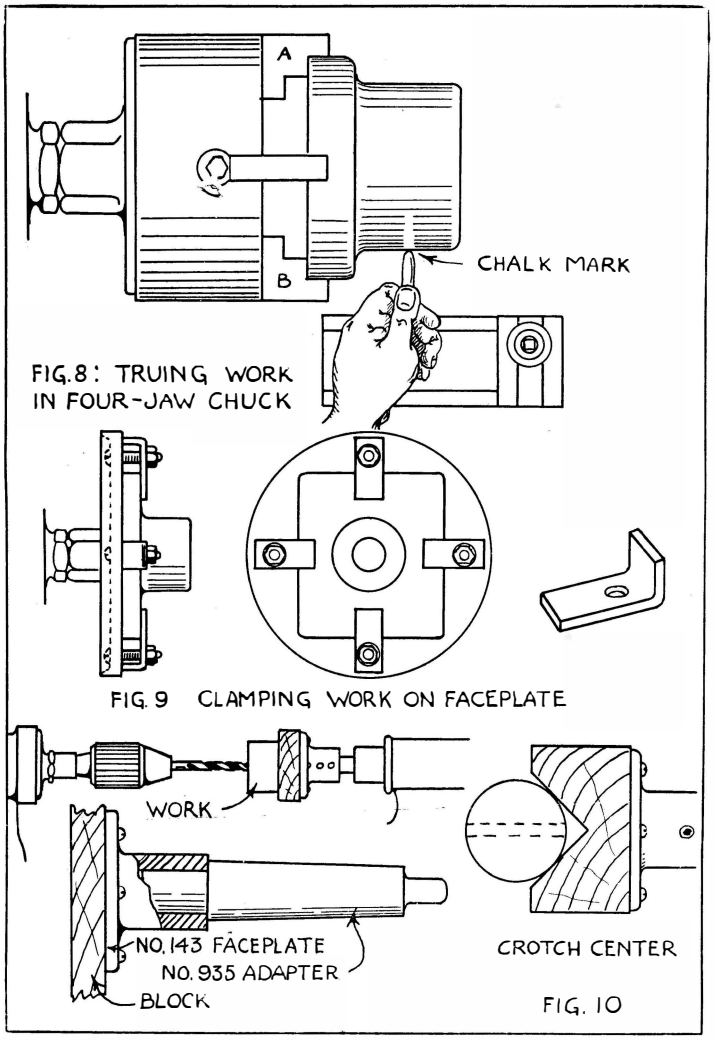
The four-jaw independent chuck is the most useful all-around type of chuck for the lathe, because it will hold work of almost any shape that can be gripped in the jaws. To true up a piece held in the chuck, center the work roughly by observing how the edges of the jaws come with relation to the rings turned on the face of the chuck. Tighten all jaws against the work. Start the lathe, and, resting the hand on the slide rest, hold a piece of chalk lightly against the revolving work. This will mark the "high" side of the work (see Fig. 8). In the case shown, loosen jaw A slightly and tighten jaw B, loosening the other jaws slightly also to enable the piece to move toward the low side. Rub out the chalk mark and test again. By moving the work with the jaws in this manner it can be made to run true in a few minutes.

Work that cannot be held in the chuck may be clamped to the faceplate by making a few steel clamps of the type shown in Fig. 9. Such work is trued approximately, and then tested with chalk in the same manner as chuck work. The work can be tapped toward the low side with a hammer until it runs true, and then the clamps tightened up for turning.

WOODEN CHUCKS

Work that cannot be held in the regular chuck can often be turned or bored by attaching a heavy block of pine to the faceplate with screws. The block is then bored out to a tight fit for the work, and the work pressed into the bore, where it will be held securely and centrally for further operations.

Illustrations below show method of truing work held in four-jaw chuck, how work is clamped to faceplate, and how drill pads may be made from standard parts when drilling in lathe.



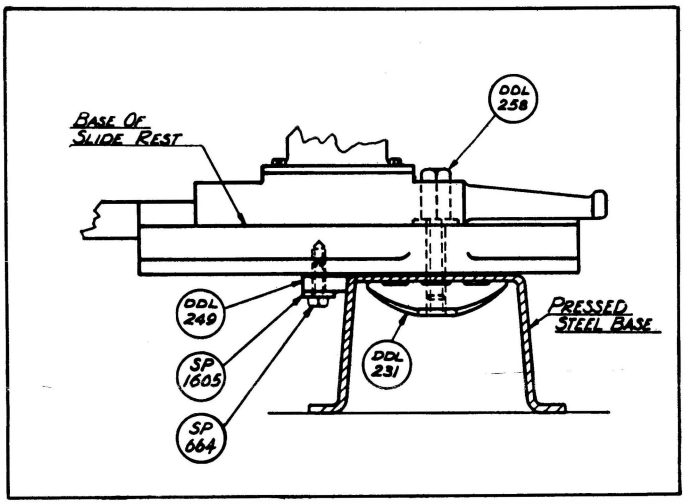
DRILLING IN LATHE

In the absence of a drill press, a drill chuck held in the headstock will do a large variety of drilling jobs. A "drill pad" is necessary, and this is made simply by using a No. 935 adapter and the No. 143 faceplate, with a true block of wood screwed to the faceplate as in Fig. 10. The work is set against the block and fed to the drill with the tailstock. Round work may be drilled in the same manner, substituting a wood V-block for the plain block thus making a "crotch center."

Drilling may also be done, of course, by holding the work in the chuck and using the drill chuck in the tailstock sleeve. The end of a spindle may be bored by driving one end with a dog and supporting the other end in the steady rest, while the drill is fed in with the tailstock. In such cases the dog should always be tied firmly to the faceplate, since the only pressure holding the work against the headstock center is that furnished by the drill, and if this precaution is neglected the work will "jump".

LUBRICATING TAILSTOCK CENTER

When work is turned between centers the tailstock center should always be lubricated with a mixture of white lead and oil, although plain machine oil will do. DON'T NEGLECT THIS PRECAUTION.

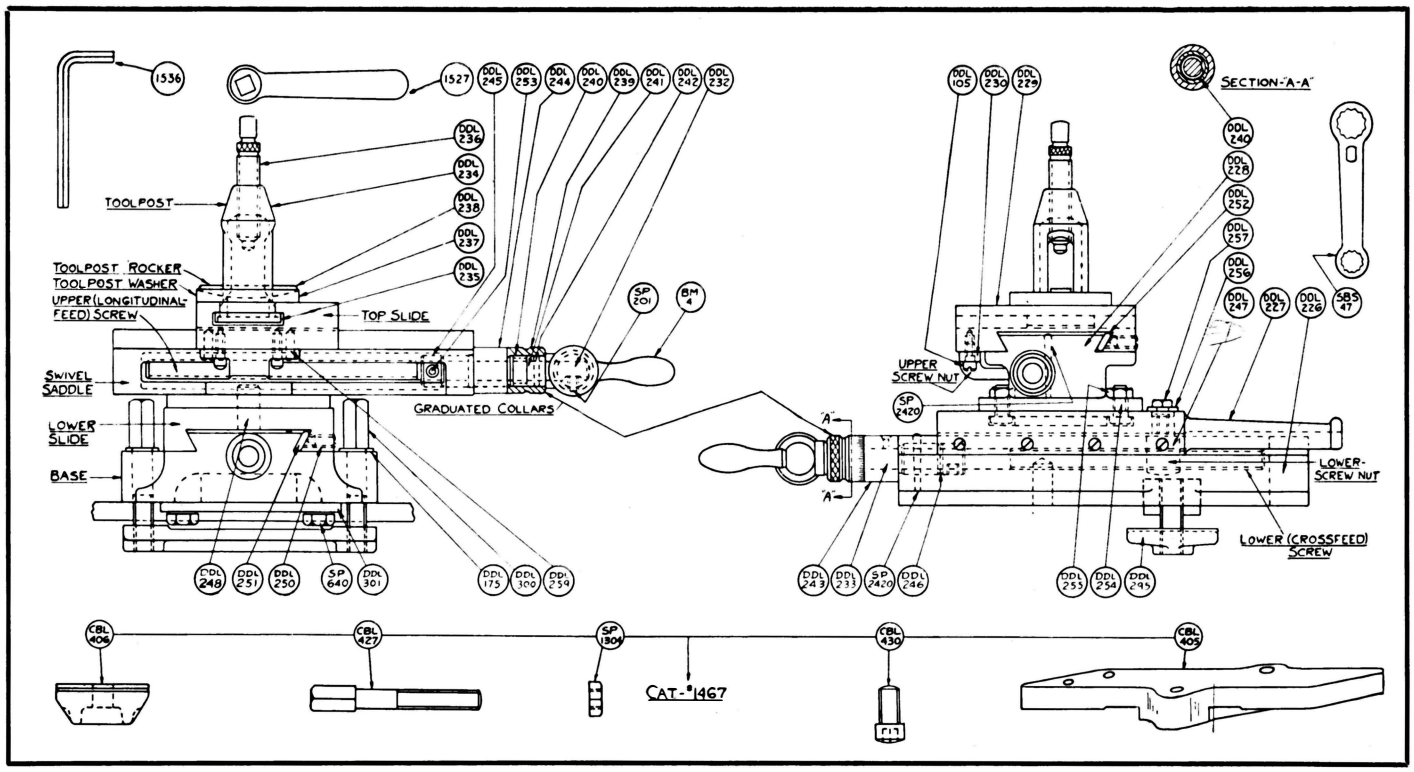


No. 965 Slide Rest for Steel Bed Lathe

DISASSEMBLING SLIDE REST

If for any reason you wish to disassemble the slide rest, drive out the two pins SP-2420 (Marked with double circle) from the under side, then turn the feed-screw handles so that the screw turns itself out. To remove the top slide take out the screws holding the nut (DDL-230) to the underside of the slide. With the nut opposite the cutout in the base of the saddle, pry it downward clear of the slide and then take the slide off the end of saddle.

To remove bottom slide loosen screw DDL-257 holding the feed screw nut, remove nut and run slide off the end.



REPLACEMENT PARTS

Part No.	Description	No. Req.	Price Each
DDL-105	Spec. Fill. Hd. Screw	2	$ .10
DDL-175	Spec. Steel Washer	2	.10
DDL-226-R	Base with DDL-243 Bearing and SP-2420 Taper Pin	1	3.40
DDL-227	Lower Slide	1	2.50
DDL-228-R	Swivel Saddle with DDL-244 Bearing and SP-2420 Taper Pin	1	4.00
DDL-229	Top Slide	1	1.40
DDL-229-R	Upper Parts Ass. for Slide Rest	1	10.00
DDL-230	Upper Feed-Screw Nut	1	.60
DDL-231	Clamp	1	.55
DDL-232	Upper Feed Screw	1	.60
DDL-232-S	Upper Feed Screw Assembly for Slide Rest, with Micro Sleeve, etc.	1	1.95
DDL-233	Lower Feed Screw	1	.60
DDL-233-S	Lower Feed Screw Assembly for Slide Rest, with Micro Sleeve, etc.	1	2.00
DDL-234	Tool Post	1	.70
DDL-235	Square Swivel Washer	1	.20
DDL-236	Tool Post Screw	1	.15
DDL-237	Toolpost Washer	1	.20
DDL-238	Toolpost Rocker	1	.25
DDL-239	Graduated Collar	2	.25
DDL-240	Friction Spring	4	.10
DDL-241	Graduated Collar Spacer	2	.15
DDL-242	Feed-Screw Pin	2	.10
DDL-243	Lower Feed-Screw Bearing	1	.40
DDL-244	Upper Feed-Screw Bearing	1	.40
DDL-245	Feed-Screw Collar	2	.10
DDL-246	Feed-Screw Thrust Washer	2	.10

Part No.	Description	No. Req.	Price Each
DDL-247	Lower-Slide Nut	1	$ .25
DDL-248	Swivel Pin	1	.10
DDL-249	Alignment Bar	1	.50
DDL-250	1/4-28x1/2 Pointed Gib Screw	7	.10
DDL-251	Lower-Slide Gib	1	.10
DDL-252	Top-Slide Gib	1	.10
DDL-253	1/4-28 x 3/8 Allen Screw	2	.10
DDL-254	5/16-18 x 3/4" Tee Bolt for Saddle	2	.10
DDL-255	Tee-Bolt Nut	2	.10
DDL-256	Special Washer	1	.10
DDL-257	1/4-28 x 1/2 Cap Screw	1	.10
DDL-258	3/8-14 x 2 Special Clamp Screw	2	.10
DDL-259	Dowel Pin	2	.10
DDL-295	Clamp Plate for Slide Rest	1	.70
DDL-300	Clamp Screw for Slide Rest	1	.10
DDL-301	Key for Slide Rest	1	.35
BM-4-C-S	Ball Crank Handle	2	.70
CBL-405	Sub Base	1	1.70
CBL-406	Clamp	2	.20
CBL-427	3/8-14 x 2 3/4 Special Hex. Head Cap Screw	2	.20
CBL-430	3/8-20 x 3/4 Special Allen Cap Screw	2	.20
SP-201	5/16-18 x 5/8 Allen Screw	2	.10
SP-640	3/8-16 x 3/4 Hex. Hd. Cap Screw	1	.10
SP-664	3/8-20 x 1 Hex. Hd. Cap Screw	2	.10
SP-1304	3/8 Hex. Nut	2	.10
SP-1605	3/8 Std. Steel Washer	2	.10
SP-2420	#2 x 1 1/4 Taper Pin	2	.10
#1526	3/8" and 5/8" Box Wrench	1	
#1527	Wrench (Tool Holder)	1	
#1536	5/16" Allen Key Wrench	1	

NOTE: Prices in this list apply only to parts ordered for repair and replacement. They cannot be used for computing allowance values if a machine is ordered "less" certain parts.

Nos. 46-961 and 46-965 COMPOUND SLIDE REST For 12″ and 11″ Lathes

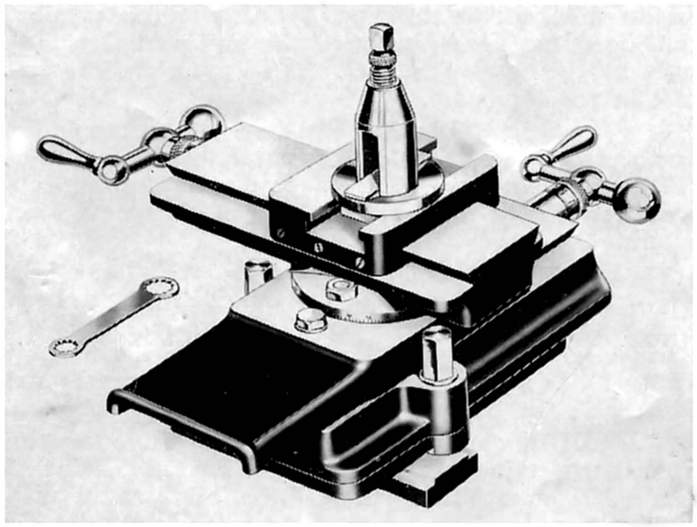


Fig. 1. Compound Slide Rest.

The Compound Slide Rest is a unique attachment with its rugged construction, adjustability and compactness for use on the lathe. Its use is unlimited for taking light cuts in steel, wood, plastics and non-ferrous metals, such as, copper, brass, aluminum, magnesium and similar metals. It is designed for use by furniture and toy manufacturers'; model making, pattern, woodworking, maintenance and home work shops, schools and many other woodworking shops and plants.

The approximate overall dimensions of the attachment are: 16½ inches long, 12 inches wide and 8½ inches high. Its longitudinal feed is 5 inches and its traverse feed is 4½ inches. Each feed has a micrometer sleeve accurately calibrated to .001 of an inch.

Under the unit Nos. 46-961 and 46-965, the customer receives the compound slide rest complete with base, upper slide, lower slide, tool post, clamp arrangement and the necessary wrenches for adjusting the attachment.

Accessories which may be purchased additional are: Set of 4 tool bits, boring bar holder and a set of 3 boring bars.

Complete directions for adjusting and maintaining the attachment and setting up operations are contained in these instructions. The accessories and their uses in special operations are described briefly. More complete information, hints and suggestions are given in our illustrated handbook No. 4570, "Getting the Most Out of Your Lathe." The price is 50 cents.

Refer to the photograph, drawings and Table I to identify the parts mentioned in the following instructions.

MOUNTING No. 46-961 COMPOUND SLIDE REST ON 12″ CAST IRON BED LATHE

Unpack the compound slide rest from its carton and wipe the protective coating thoroughly from its parts.

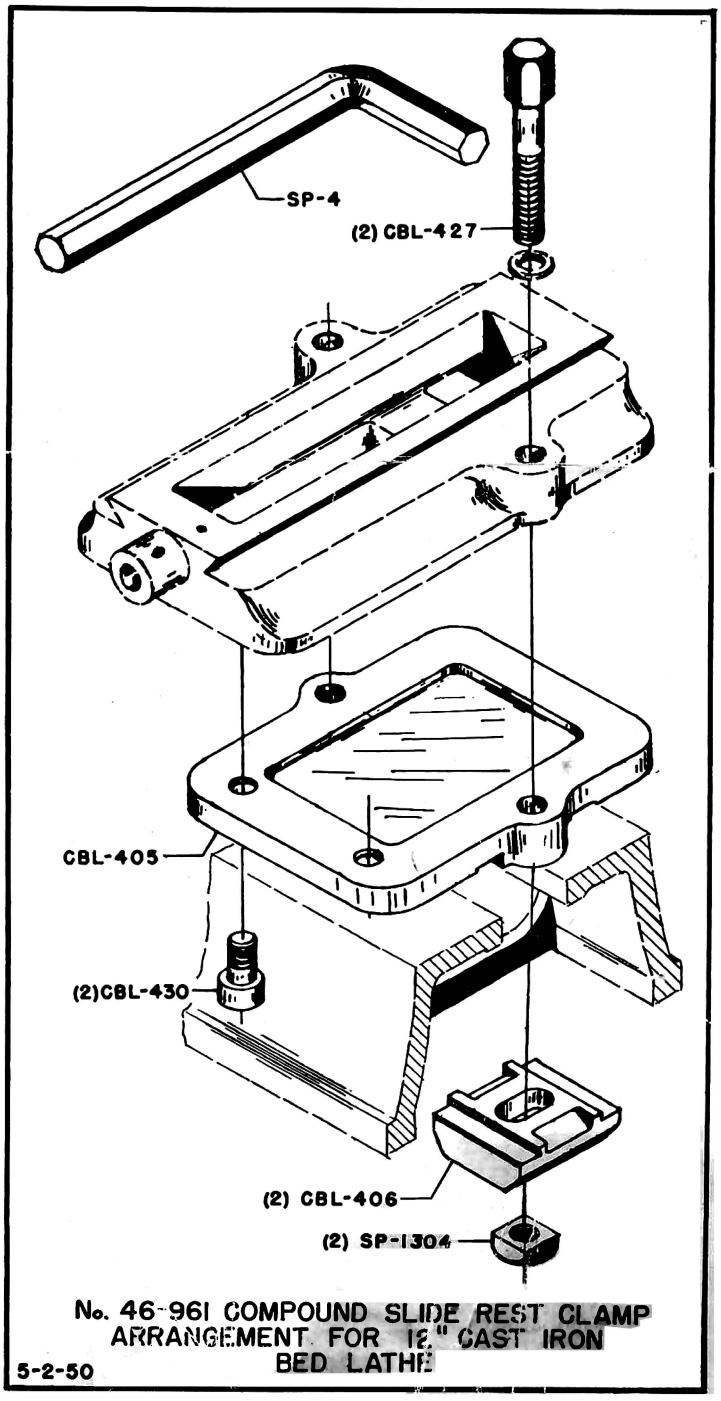


Fig. 2.

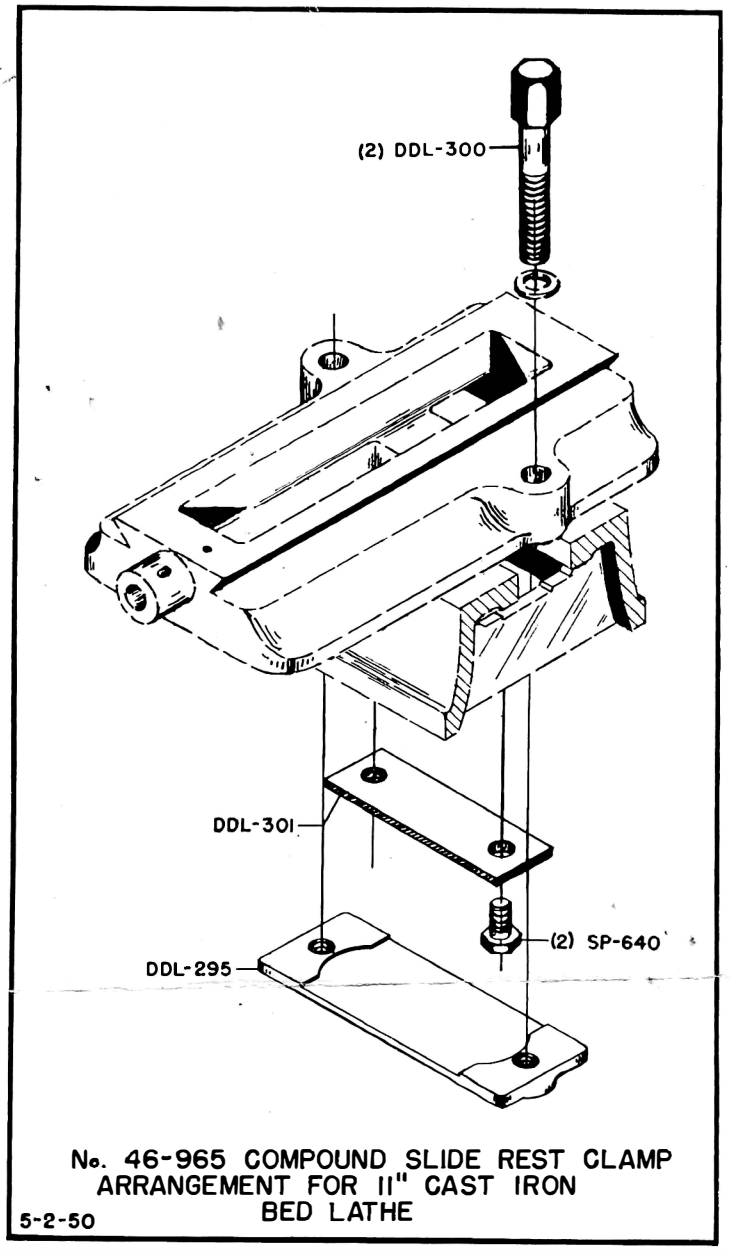


Fig. 3.

Secure the sub-base to the base of the slide rest by inserting the two hexagon socket cap screws through the countersunk holes of the sub-base and into the tapped holes of the base. Place washers on the two hexagon head clamp screws inserting them down through the holes provided in the base casting, the slotted holes of the clamp plates and screw square nuts on the ends of the clamp screws so the unit is held loosely together. Refer to Figs. 2 and 5.

Remove the tailstock from the lathe bed and mount the compound slide rest on its ways. The slide rest can easily be moved along the lathe bed and clamped in any desired position.

MOUNTING No. 46-965 COMPOUND SLIDE REST ON 11" CAST IRON BED LATHE

Unpack the compound slide rest from its carton and wipe the protective coating thoroughly from its parts.

Secure the alignment key to the base of the slide rest by inserting the two hexagon head cap screws through the holes of the alignment key and into the tapped holes of the base. Place steel washers on the two hexagon head clamp screws inserting them down through the holes provided in the base casting and into the tapped holes of the clamp plate so the unit is held loosely together. Refer to Figs. 3 and 5.

Remove the tailstock from the lathe bed and mount the compound slide rest on its ways. The slide rest can easily be moved along the lathe bed and clamped in any desired position.

ALIGNING COMPOUND SLIDE REST ON THE LATHE BED

The base of the compound slide rest must be clamped at right angles or at 90 degrees to the lathe bed. To make this adjustment proceed as follows: Place the swivel washer over the tool post and slip it in position on the slide rest. Set the cupped washer on the tool post and insert the rocker through the tool post slot so it rests on the cupped washer. Clamp a tool holder and tool in the tool post.

Screw a 6 inch faceplate on the headstock spindle, but be sure the threads of the faceplate and the headstock spindle are free of any dust, dirt or chips since a condition of this kind will prevent the faceplate from running true.

Clamp the compound slide rest to the lathe bed, aligning it by eye, by tightening the two hexagon head clamp screws. The compound slide rest should be clamped close enough to the faceplate so the tool bit can easily be advanced to it by turning the longitudinal ball crank feed handle on the upper slide assembly.

The tool bit should just barely touch the outer rim or center portion of the faceplate. Run the point of the tool bit across the surface of the faceplate by turning the traverse ball crank feed handle on the lower slide assembly. The tool bit should make contact across the entire surface of the faceplate from the outer rim to the center or vice versa. If the tool bit does not touch the faceplate as described above, loosen the

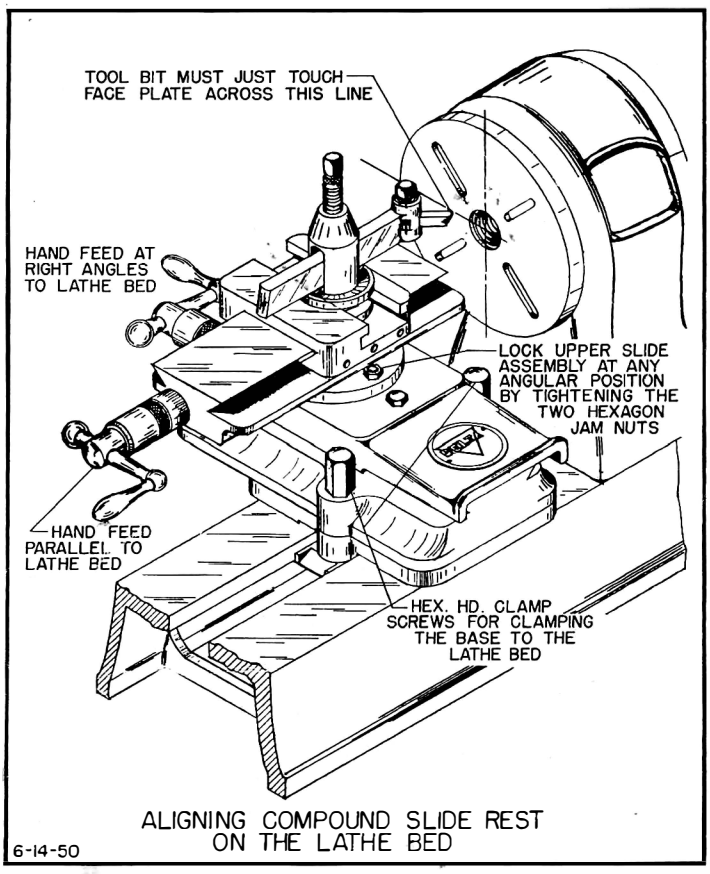


Fig. 4.

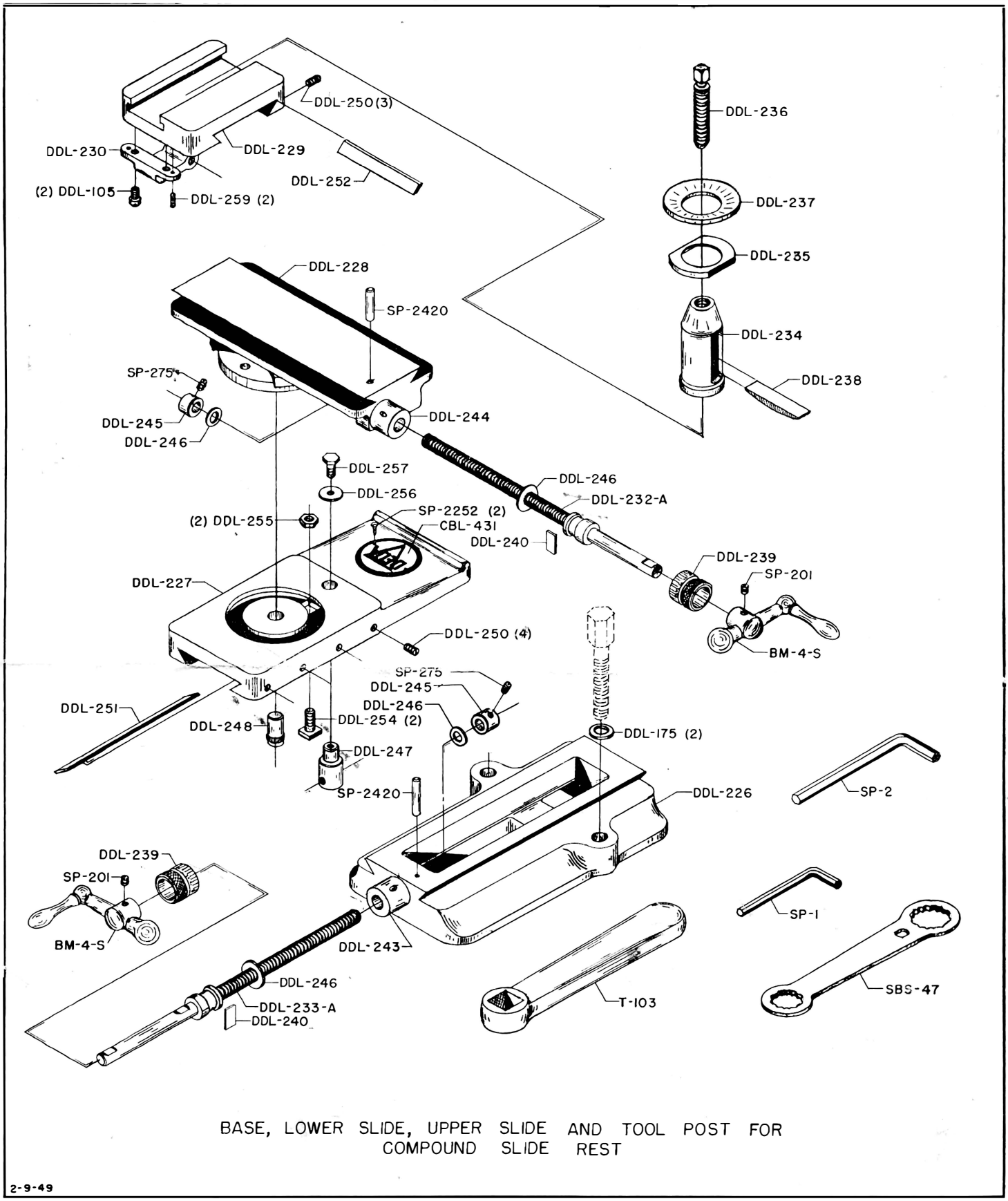


Fig. 5.

hexagon head clamp screws and shift the base slightly in relation to the lathe bed. Re-adjust until the alignment is correct. Refer to Fig. 4.

After the adjustment is made satisfactorily tighten the two hexagon head clamp screws to clamp the alignment bar to the base in the case of the 11 inch cast iron bed lathe or the two hexagon socket cap screws to clamp the sub-base to the base in the case of the cast iron bed 12 inch lathe. This adjustment need only be made once when the compound slide rest is received to align it at right angles to the lathe bed.

The upper slide of the compound slide rest must be

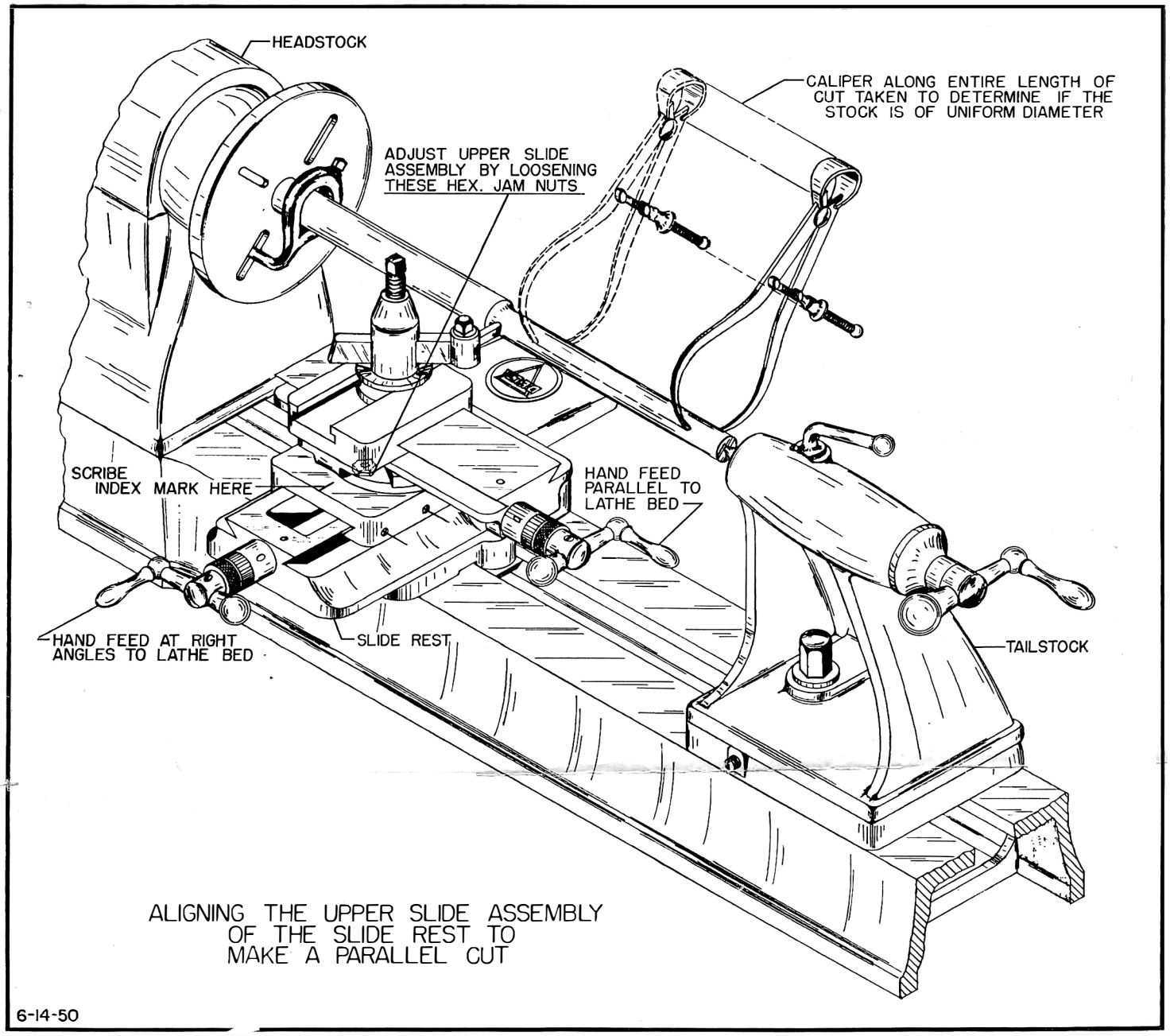


Fig. 6.

adjusted to turn parallel stock mounted between the lathe centers.

Place the tapered 60 degree plain centers in the spindle of the headstock and the quill of the tailstock. Unclamp the tailstock and move it up close to the headstock until the two center points almost touch. If the two center points are out of alignment loosen the tailstock and align its centers with the adjusting screws provided. Refer to Fig. 7.

Mount the stock between the centers of the lathe headstock and tailstock. Turn a section of the stock approximately 4½ inches long. With an outside caliper measure along the entire cut especially at the ends to see if the cut was made parallel. If the stock is not of the same diameter for the entire cut the upper slide must be adjusted. To do this loosen the hexagon jam nuts which clamps it in position. Rotate the upper slide assembly in the direction needed and make another trial cut. Caliper the turned section again as described above. Re-adjust until the tool bit makes a parallel cut and then tighten the hexagon jam nuts to clamp the upper slide assembly.

We suggest the lathe operator scribe or cut an index mark accurately on the machined surface of the lower slide opposite the zero mark on the scale of the swivel saddle. This mark can then be used to accurately set up the upper slide of the compound slide rest to make an accurate parallel cut. In addition this mark can be used to set off the correct number of degrees for taper turning. Refer to Fig. 6.

SPEEDS AND FEEDS

The correct speed and feed is very important for every material turned in a lathe. The surface speed is the same for a certain type of material cut regardless of its diameter, but the rpm will vary directly with its diameter.

To obtain the correct cutting speeds for materials turned in a lathe we suggest the operator install a No. 1464 countershaft attachment in conjunction with the 11 or 12 inch cast iron bed lathes. This attachment will give 16 separate spindle speeds over a wide range from 340 to 3400 rpm.

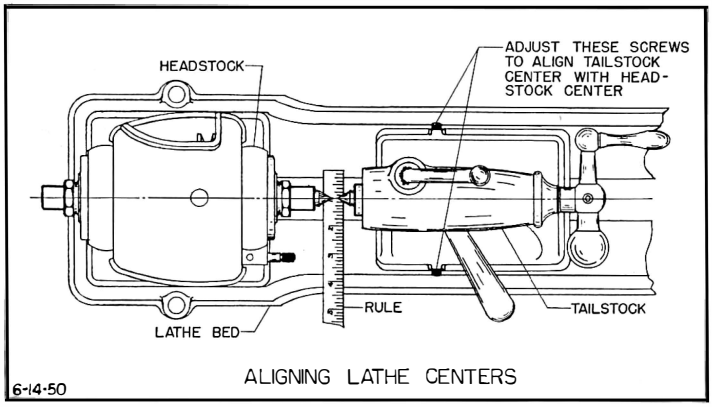


Fig. 7.

When cutting metals the chips produced should be watched very closely. If the chips hang or build-up on the cutter, the speed should be reduced, but if the chips produced flow freely away from the point of the cutting action the speed can be increased.

The color of the chip produced is important. If a chip begins to turn blue in color it is too hot and the speed or feed or both must be reduced. If the chip color or the feel of the cut taken indicates that an increase or decrease is required, the proper adjustment should be made. If the tool chatters or seems to be laboring during the cut or if the tool springs during the cut, it is probably overloaded and the feed should be decr
any apparent effort, usually the feed can be increased.

When cutting steel the point of the tool should be set slightly above the center line of the work, approximately 3/64 inch for each inch diameter of the work. For brass and similar metals the point of the tool should be set exactly on the center line of the work; if "positive rake" is given to the tool, it will dig in and chattering will result. When turning copper and other very soft metals it is often advantageous to give the tool bit "negative rake," by grinding the tool so it scrapes rather than cuts. Refer to Fig. 8.

Generally the cutting speeds for metals are as follows: Machine steel 90 to 150 feet per minute; ordinary gray cast iron 75 to 100 feet per minute; annealed tool steel 50 to 60 feet per minute; soft yellow brass 150 to 225 feet per minute; hard bronze, 50 to 100 feet per minute, the speed of the material depends upon its composition.

When turning thermo setting plastics a scraping action is better than a cutting action and the tool should be sharpened practically the same as for brass work. For thermo plastics a peeling or shearing action or both is best and the tool should be sharpened to perform the type of cut needed. Generally, plastics are turned dry.

Set the tool about 1 or 2 degrees above the center of the work with no rake or a slight negative rake is desirable. Give the tool plenty of clearance of 10 to 20 degrees or even more if necessary.

The cutting edge of the tool should produce a nice smooth chip like a long thin ribbon when plastics are properly cut. We suggest holding the area of contact between the tool and the work to a minimum. To help give a nice smooth chip we also suggest honing the tool after sharpening it.

The speed in turning operations varies over a wide range depending upon the specific work being done and the diameter of the material being cut. The approximate surface speed of cutting plastic work should be around 600 surface feet per minute.

If the material is highly abrasive, the cutter may wear rapidly as the chips leave the work. In such cases, the cutting speed must be reduced or the wearing action will prematurely break down the cutter's edges.

Obtain the correct speed first, then increase the feed as much as the material, device and the cutter will permit. Generally, hard materials are cut at slower speeds and heavier feeds and soft materials at higher speeds and lighter feeds.

LUBRICATION

Occasionally apply a small amount of bar wax or candle tallow to the upper and lower feed screws to produce a nice smooth feed. Wipe all machined parts frequently with a clean oily cloth to prevent rusting.

OPERATING ADJUSTMENTS

The adjustments described below are important for accuracy and convenience when operating. Follow these directions for best results.

Adjusting Upper Feed

The upper feed screw assembly is adjusted at the factory to give a nice smooth feed. A gib is provided to take up all play between the machined female dovetail slide of the upper slide casting and the machined male dovetail slide of the swivel saddle casting.

If the slide is too loosely adjusted or too hard to move an adjustment is needed. To make this adjustment loosen or tighten the three cone pointed headless set screws provided in the upper slide casting. Be sure to loosen or tighten each set screw the same amount to get a good, tight sliding fit. Refer to Figs. 4 and 5.

eased. If the too

Adjusting Lower Feed

The lower feed screw assembly is adjusted at the factory to give a nice smooth feed. A gib is provided to take up all play between the machined female dovetail slide of the lower slide casting and the machined male dovetail slide of the base casting.

If the slide is too loosely adjusted or too hard to move an adjustment is needed. To make this adjustment loosen or tighten the three cone pointed headless

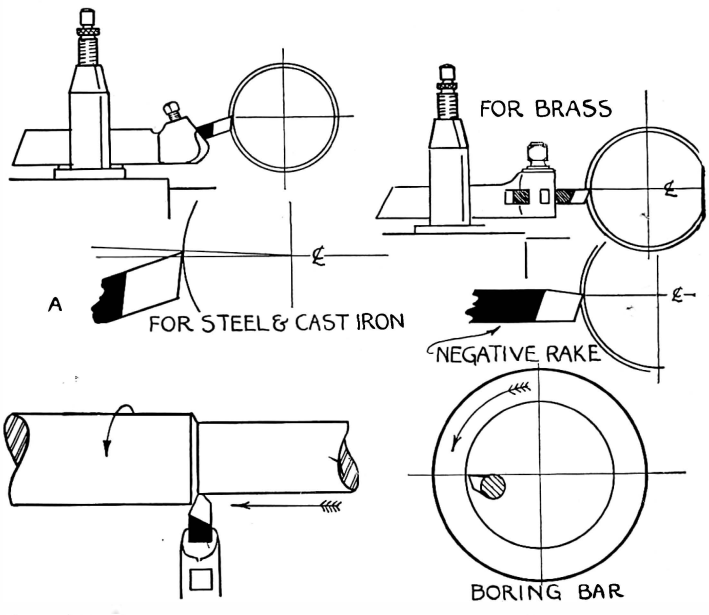


Fig. 8.

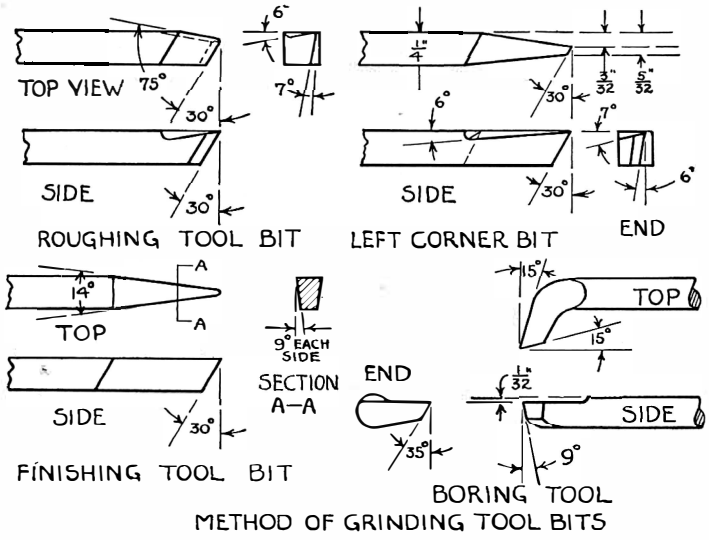


Fig. 9.

set screws provided in the lower slide casting the required amount. Be sure to loosen or tighten each set screw the same amount to get a good, tight sliding fit. Refer to Figs. 4 and 5.

SHARPENING AND USE OF TOOL BITS

The cutting action of a tool bit depends upon the way it is ground or sharpened. The cutting edges of the tool must have the proper clearance, front clearance, side-rake and back-rake. Therefore, the angles for sharpening the high speed tool bits have been carefully worked out and over a long period of time were found to give the best results. Refer to Fig. 9.

Keep all cutting tools sharp with a keen edge to obtain high quality work. After grinding a tool on the emery wheel, improve its wearing qualities by hand honing it using a few drops of oil on a small oil stone.

Remember, the tool does the cutting and the compound slide rest with tool holder merely clamps and supports the tool at the proper angle and allows advancing it to the work.

A few practical applications for which tool bits can be used are illustrated in Fig. 10.

MACHINING OPERATIONS

The following machining operations will give the inexperienced operator a start on the usual compound slide rest operations. Use scrap material for practice, getting the feel of the operation before attempting the job at hand.

Rough Turning

Rough turning with a compound slide rest on a lathe means taking a heavy cut for reducing the work as quickly as possible to almost its required size. When the work is only slightly larger than the finished diameter usually a single cut is sufficient, but if a considerable amount of stock has to be removed from the work several deep roughing cuts should be made. It is important that the proper tool be used for taking a heavy chip or cut.

Oftentimes the depth of the roughing cut has to be reduced considerably because of the flexibility of the part being turned and a heavy cut would only spring the work causing the tool to gouge in rather than cut the material away.

Metals which have a scale on their surface should be rough turned first. Be sure to set the tool deep enough to get beneath the surface scale. If the tool does not get beneath the surface scale in the first cut, the scale on the metal will dull the point of the tool and remove its keen cutting edge. We suggest taking successive cuts until the work is reduced to about 1/32 inch of the required diameter.

Finish Turning

Finish turning with a compound slide rest on a lathe, as the name implies, means taking a light cut to leave the surface of the work smooth and of the desired diameter.

Before removing the work from the lathe caliper it carefully to make sure it is of the exact diameter needed.

Internal Boring

The finishing of internal cylindrical surfaces in a lathe is referred to as boring rather than turning. A boring bar instead of a regular tool bit is used as the cutting tool and it is held in a boring bar holder.

When starting a cut, advance the tool to the work first and then adjust it radially to obtain the desired depth of cut. The first cut should be deep enough to get beneath the scale at every part of the hole. Usually rough cored holes are much smaller than the finished size and several cuts are necessary.

When taking the last finishing cut be sure it is as light as possible to prevent the tool from springing away from the work, so the hole will be as true as possible. Boring tools are not as rigid as roughing or finishing tools used for outside diameter turning, since the tool has to be small enough to enter the cored hole.

Therefore, we suggest using the largest boring tool that will enter a hole without interference to get as rigid a tool as possible. Be sure to carefully adjust the boring tool in the tool holder to obtain the proper rake and clearance.

Taper Turning

Taper turning with a compound slide rest on a lathe is ideal where short or steep tapers are needed.

When turning a taper the cutting edge of the tool must be at the same height as the center line or axis of the work. A good way to set the tool exactly on center with the work is to advance the point of the

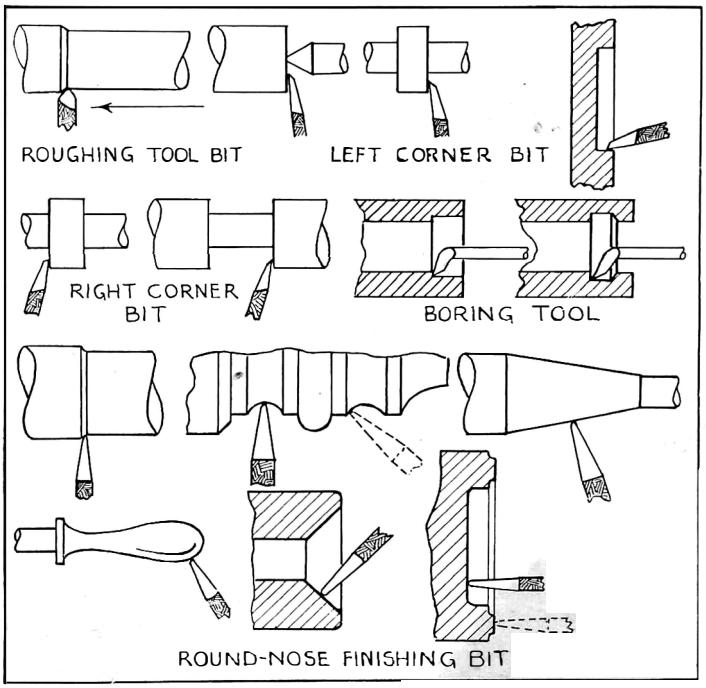


Fig. 10.

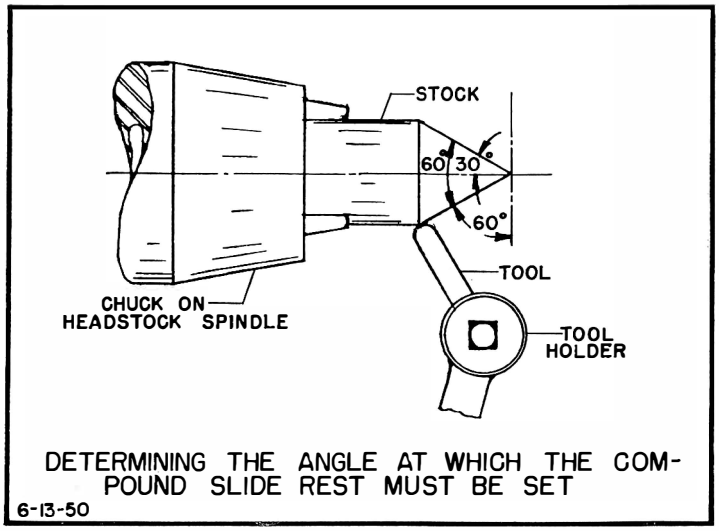


Fig. 11.

cutting edge and adjust it until it is of the same height as the headstock or tailstock center before placing the work in the lathe. If the tool is above or below the center of the work the taper will not be turned accurately and there will be a slight change in the taper between each cut or as the diameter of the stock is reduced.

The scale of the slide rest is accurately graduated in degrees and the position of these graduations show to what angle the upper slide assembly is set. To set the compound rest loosen the hexagon jam nuts which clamp the upper slide in position and rotate it until the desired angle is exactly opposite the index mark scribed on the machined surface of the lower slide.

Sometimes it is difficult to determine at what angle to set the compound slide rest when a specific taper angle is given. For instance, if a 60 degree taper is to be turned on the work the angle at which the compound must be set with respect to the center line of the work is 30 degrees. Refer to Fig. 11.

When facing the work to any desired angle and the work is normally in line with the cross slide, the divisions can be read just as they are graduated, but remember that each degree the compound is set off means 2 degrees total angle for the work.

After a little practice with the graduated divisions of the compound slide rest it becomes easy to turn any desired taper needed.

CAUSES OF CHATTER

Chatter may be due to a number of causes. When tools are properly used a good cut in metals, nonmetals, plastics, wood and other similar materials may be taken without any chatter. Observe the following precautions to eliminate the chatter.

1. The tool bit should not project any more than is necessary from the tool holder, and the tool holder should not project from the tool rest any more than is necessary to reach the work. Keep both the tool holder and the tool as close as possible to the slide rest to give both maximum support.

2. If the stock overhangs the chuck too far, chatter will result. A piece with a cross section about 1½ to 2 inches in diameter and 4 to 5 inches long might be safely turned when held only in the chuck, but a piece of the same length and only ½ inch in diameter would be certain to chatter. When work held in a chuck is turned, it is safer to center one end and run the tailstock center up to support the other end. Small diameter stock should always be supported by the steady rest.

3. If a tool is sharpened with too broad a nose so too much surface is doing the cutting, chatter will result. The surface of the tool in contact with the work should be as small as possible consistent with the work the tool is to perform. If an attempt is made to cut with the whole side of a corner bit, chatter will result; only the point of the tool should do the cutting.

4. Too high a speed will produce chatter even if your tool and tool holder are set correctly. Use the highest possible cutting speed at which the tool bit will cut without chattering.

5. While a large depth of cut can be taken with the compound slide rest some materials are more difficult to turn without chatter than others; therefore, it is better to take several light cuts in such materials than to attempt to remove the stock in one deep cut. The compound slide rest has been thoroughly tested at the factory and if chatter should result while turning the probable cause is in the methods used.

TOOL BITS AND HOLDERS

The standard hardened high speed lathe tools are used for various machining operations on a lathe. These tools are held in a tool holder which is clamped in the tool post of the compound slide rest and are hand fed to the revolving work.

No. 46-962 consists of a standard boring bar holder with a set of three boring bars.

The boring bar holder has a ⅜ x ¾ inch shank and an overall length of 4⅜ inches. Two holes spaced 90 degrees apart with a V-bottom together with a square head set screw provides for conveniently mounting boring bars with a shank up to ¼ inch in diameter. The boring bars ⅛ x 2½ inches long, 3/16 x 3½ inches long and ¼ x 4 inches long are suitable for all types of boring.

No. 46-966 consists of a set of three standard boring bars described above less the boring bar holder.

No. 46-963 consists of a standard boring bar holder described above less the three boring bars.

No. 46-954 consists of a set of four standard tool bits.

The roughing tool bit, ¼ x ¼ x 1⅞ inches long, generally is used for rough turning or taking deep cuts from right to left to reduce the work quickly when a considerable amount of material has to be removed.

The finishing tool bit, ¼ x ¼ x 1⅞ inches long, is used for taking light finishing cuts freely in all directions with a coarse feed for face or straight turning. This type of tool has a straight or flat cutting edge at the end and will leave a smooth finish even though the feed is coarse, provided the cutting edge is parallel with the tool's travel to avoid ridges.

The right corner tool bit, ¼ x ¼ x 1⅞ inches long, is used only for finishing sharp right side corners and ridges in face turning. This tool should never be used for rough turning operations.

The left corner tool bit, ¼ x ¼ x 1⅞ inches long, is used only for finishing sharp left side corners and sharp cornered recesses in face turning. This tool should never be used for rough turning operations.

All of the above tools are sharpened at the factory ready for use.

A standard straight type tool holder for mounting tool bits can be purchased at any tool store or mill supply house. However, the standard Delta boring bar holder No. 46-963 can be used very nicely for mounting either boring bars or tool bits.

Table 1. REPLACEMENT PARTS

IMPORTANT: Give both the Part Number and the Description of each item when ordering from this list; also the Serial Number of the machine on which the parts are to be used.

Part No.	Description	Number Required
	BASE	
DDL-175	Special 29/64" Steel Washer, 3/4" O.D. x 1/16" Thick	2
DDL-226-R	Base, with Lower Feed Screw Bearing	1
	UPPER SLIDE	
BM-4-S	Ball Crank, 7/16" Hole, with Hand Grip and Set Screw	1
DDL-105	Special #10-32 x 7/16" Fillister Head Cap Screw	2
DDL-228-R	Swivel Saddle, with Upper Feed Screw Bearing	1
DDL-229	Upper Slide	1
DDL-229-R	Upper Slide Assembly, Incl. Saddle and Tool Post	1
DDL-230-S	Bracket Nut, with Dowel Pins, for Upper Feed Screw	1
DDL-232-S	Upper Feed Screw, Micrometer Sleeve and Bearing	1
DDL-239	Micrometer Sleeve for Feed Screw	1
DDL-240	Friction Spring, 1/4 x 5/8", #20 Gage, Flat	1
DDL-241	Collar, 7/16" I.D., 9/16" O.D. x 53/64" Thick, Grooved	1
DDL-244	Upper Feed Screw Bearing	1
DDL-245	Set Collar, 7/16" I.D.	1
DDL-246	Special 7/16" Fiber Washer, 21/32" O.D. x 1/32" Thick	2
DDL-250	Special 1/4-28 x 19/32" Headless Set Screw, Cone Point	3
DDL-252	Upper Slide Gib, 1/8 x 7/16 x 3 1/8" Rounded Edges	1
DDL-259	Dowel Pin, 3/16 x 1/2", Tapered Ends	2
SP-201	5/16-18 x 5/16" Hexagon Socket Set Screw, Flat Point	1
SP-275	1/4-28 x 1/4" Hexagon Socket Set Screw, Cone Point	1
SP-2419	1/8 x 5/8" Grooved Pin, Full Length Taper	1
SP-2420	#2 x 1 1/4" Taper Pin	1
	LOWER SLIDE	
BM-4-S	Ball Crank, 7/16" Hole, with Hand Grip and Set Screw	1
CBL-431	Name Plate	1
DDL-227	Lower Slide	1
DDL-233-S	Lower Feed Screw, Micrometer Sleeve and Bearing	1
DDL-239	Micrometer Sleeve for Feed Screw	1
DDL-240	Friction Spring, 1/4 x 5/8", #20 Gage, Flat	1
DDL-241	Collar, 7/16" I.D., 9/16" O.D. x 53/64" Thick, Grooved	1
DDL-243	Lower Feed Screw Bearing	1
DDL-245	Set Collar, 7/16" I.D.	1
DDL-246	Special 7/16" Fiber Washer, 21/32" O.D. x 1/32" Thick	2
DDL-247	Bracket Nut, 7/16"-10 Left Hand Acme Thread, Brass	1
DDL-248	Steel Pin, 1/2 x 1", Knurled One End	1
DDL-250	Special 1/4-28 x 19/32" Headless Set Screw, Cone Point	4
DDL-251	Lower Slide Gib, 1/8 x 7/16 x 5 1/2", Rounded Edges	1
DDL-254	Special 5/16-18 x 1 1/16" T-Bolt, 1/2" Square Head	2
DDL-255	Special 5/16"-18 Hexagon Jam Nut, 17/64" Thick	2
DDL-256	Special 17/64" Steel Washer, 1 1/16" O.D. x 5/64" Thick	1
DDL-257	Special 1/4-28 x 1/2" Hexagon Head Cap Screw	1
SP-201	5/16-18 x 5/16" Hexagon Socket Set Screw, Flat Point	1
SP-275	1/4-28 x 1/4" Hexagon Socket Set Screw, Cone Point	1
SP-2252	#2 x 3/16" Drive Screw	2
SP-2419	1/8 x 5/8" Grooved Pin, Full Length Taper	1
SP-2420	#2 x 1 1/4" Taper Pin	1
	TOOL POST	
DDL-234	Tool Post	1
DDL-235	Swivel Washer, 1 1/4" Hole, 1 1/2" Square x 1/4" Thick	1
DDL-236	Clamp Screw, 2 7/8" Long, 1/2"-13 Thread	1
DDL-237	Cup Washer, 1 1/4" I.D., 2 1/4" O.D. x 17/64" Thick	1
DDL-238	Rocker	1
	WRENCHES	
SBS-47	Double End 7/16 and 9/16" Hexagon Box Wrench	1
T-103	3/8" Square Box Wrench, 4" Long, Forged Steel	1
SP-1	1/8" Hexagon Wrench for Socket Screws	1
SP-2	5/32" Hexagon Wrench for Socket Screws	1
	NO. 46-961 COMPOUND SLIDE REST for Cast Iron Bed 12" Lathe	
CBL-405	Sub Base	1
CBL-406	Clamp Plate	2
CBL-427	Special 7/16-14 x 2 7/8" Hexagon Head Clamp Screw	2
CBL-430	Special 7/16-20 x 3/4" Hexagon Socket Cap Screw	2
SP-4	5/16" Hexagon Wrench for Socket Screws	1
SP-1304	7/16"-14 Square Nut	2
	NO. 46-965 COMPOUND SLIDE REST for Cast Iron Bed 11" Lathe	
DDL-295	Clamp Plate	1
DDL-300	Special 7/16-14 x 2 1/32" Hexagon Head Clamp Screw	2
DDL-301	Alignment Key, 3/16 x 1 1/4 x 4"	1
SP-640	3/8-16 x 3/4" Hexagon Head Cap Screw	2
	ACCESSORIES	
No. 46-954	Set of Four Tool Bits	1
No. 46-962	Boring Tool Holder and Set of Three Boring Bars	1
No. 46-963	Boring Tool Holder	1
No. 46-966	Set of Three Boring Bars	1

CONSULT YOUR DELTA DEALER FOR PRICES OF REPLACEMENT PARTS, ACCESSORIES AND TOOLS
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434-02-6[illegible]5-5007

DATED IM 4-10-60

PM—1913

SPINDLE OR BEARING REPLACEMENT FOR 1460 WOOD LATHES WITH SERIAL NUMBERS BELOW 128—1312

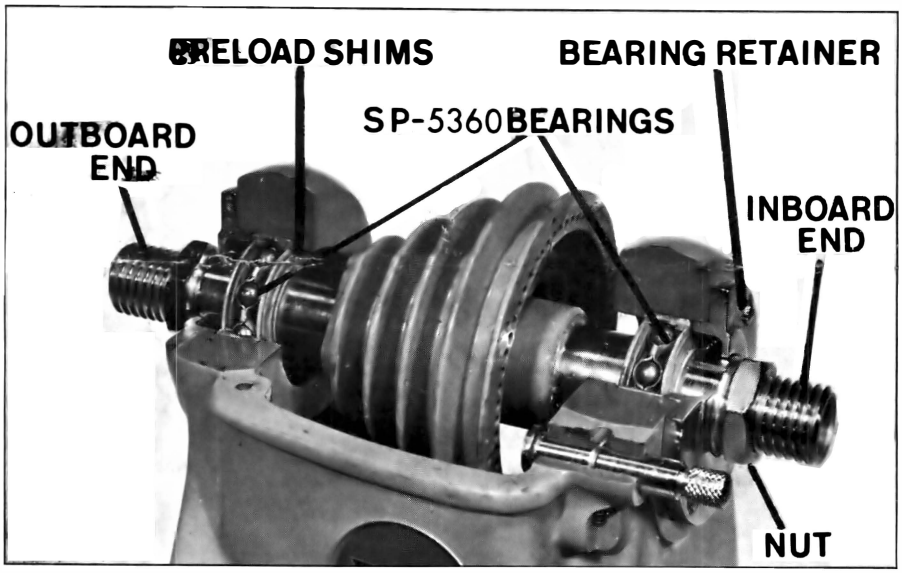


Fig. 1.

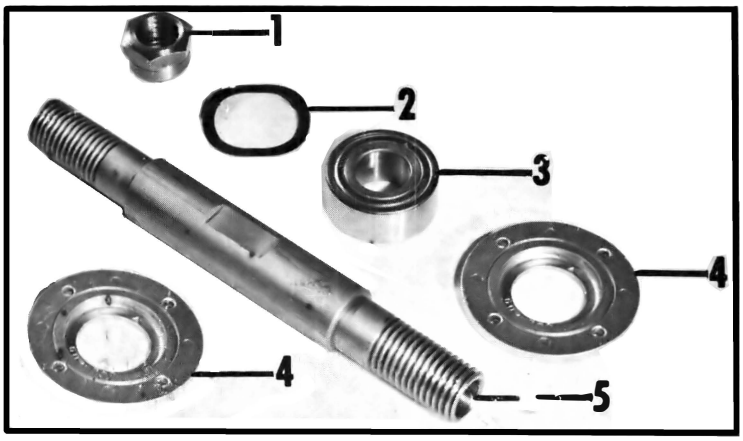
Your original lathe contain
tion, spindle or bearing replacement could not be satisfactorily made unless the entire headstock was returned to o ur factory so that the exa

The design has now been improved and a new double row bearing SP-5334 which has a self contained preload is used. Repairs can be made without even removing the headstock from the lathe. It will be necessary of course to buy a few additional parts but once they are installed any one of them can be individually replaced in the future.

If necessary to replace the original spindle only, condition, ins tall 434-02-3[illegible]

If necessary to replace only one original bearing install 434-02-385-5003 SPINDLE REPLACEMENT KIT. The other original bearing can be utilized on the outboard end.

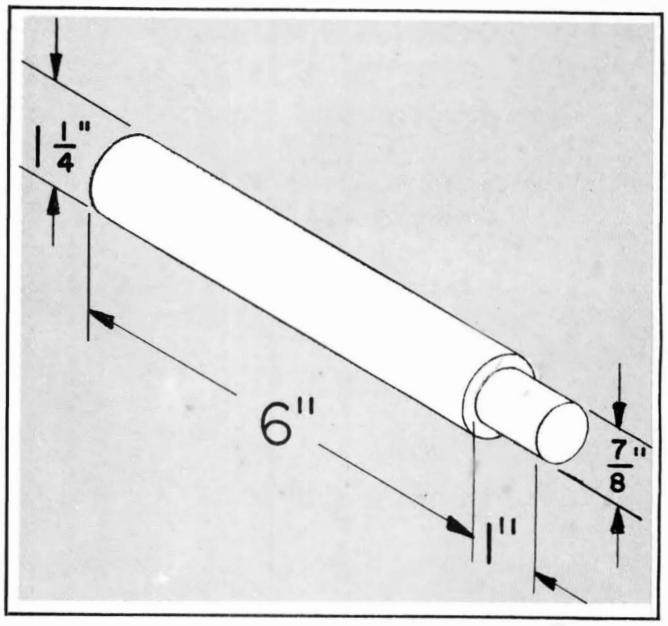
If necessary to replace both original bearings order 434-02-385-5003 SPINDLE REPLACEMENT KIT and outboard bearing SP-5360.



Replacement Parts

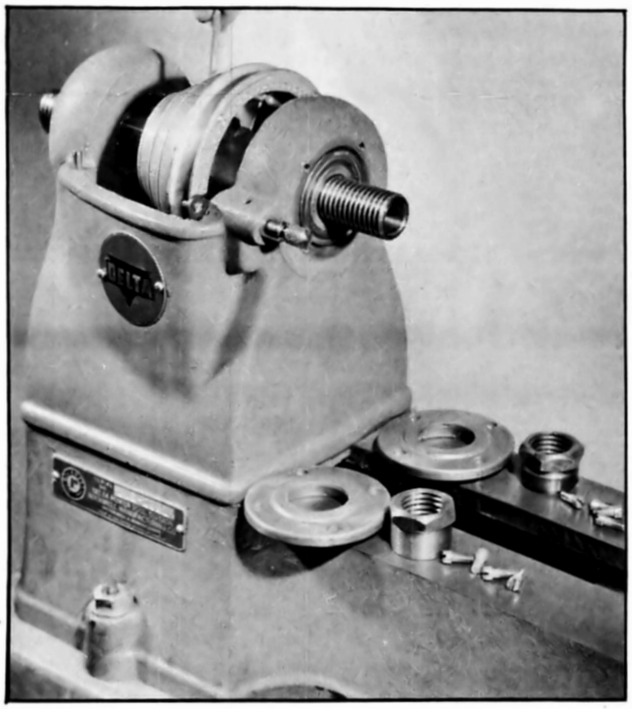
Ref. No.	Part No.	Description
1	902-01-201-5462	Nut
2	SP-7352	Spring Washer
3	SP-5334	Bearing
4	434-02-079-5002	Bearing Retainer
5	434-02-085-5002	Spindle

Before dismantling your lathe, that is if it is still in operating condition, turn up a simple tool of wood to be used later on in Step 4 to remove the outboard bearing. BEARINGS SHOULD NOT BE POUNDED OR HAMMERED BUT GENTLY PRESSED INTO POSITION.



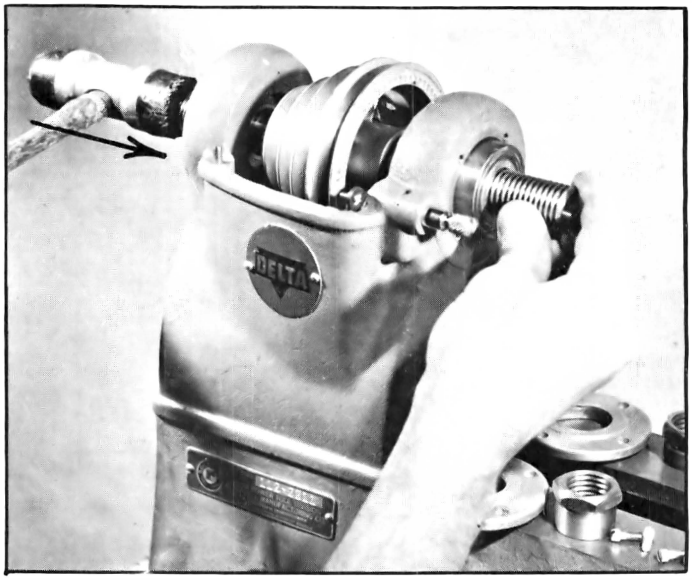
PROCEDURE

1. Unscrew nuts using two wrenches.

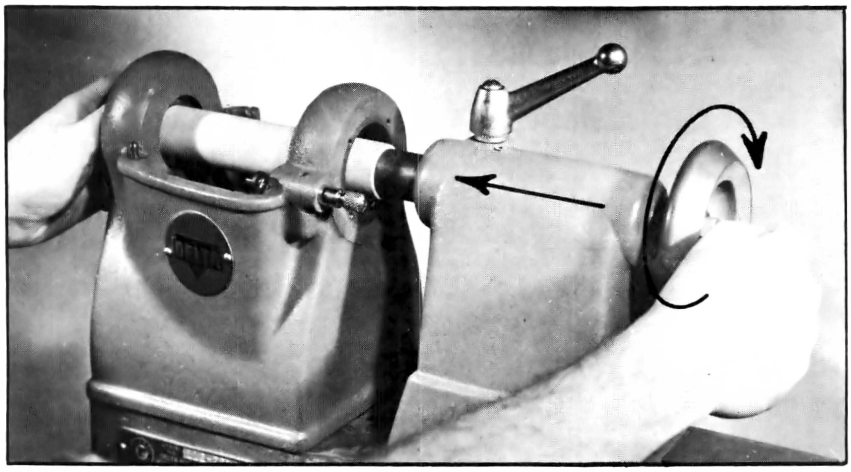


2. Remove bearing retainers and set screws in pulley.

3. Use soft hammer or block of wood and gently tap spindle to remove.

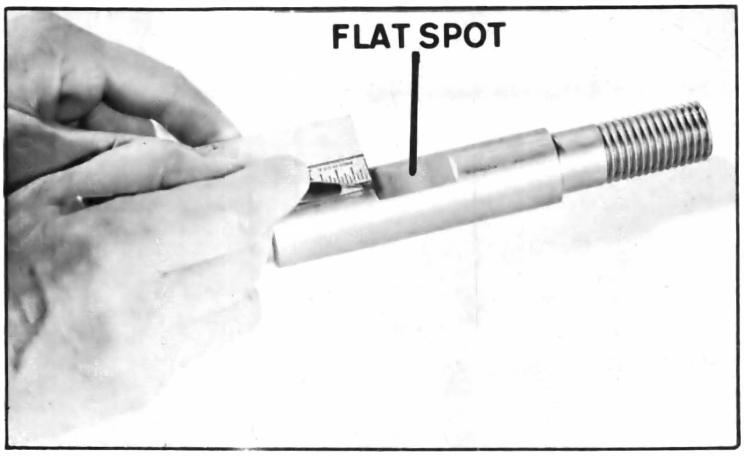


4. Remove original outboard bearing with aid of homemade wooden tool and tailstock. Remove and discard original preload shims behind outboard bearing.

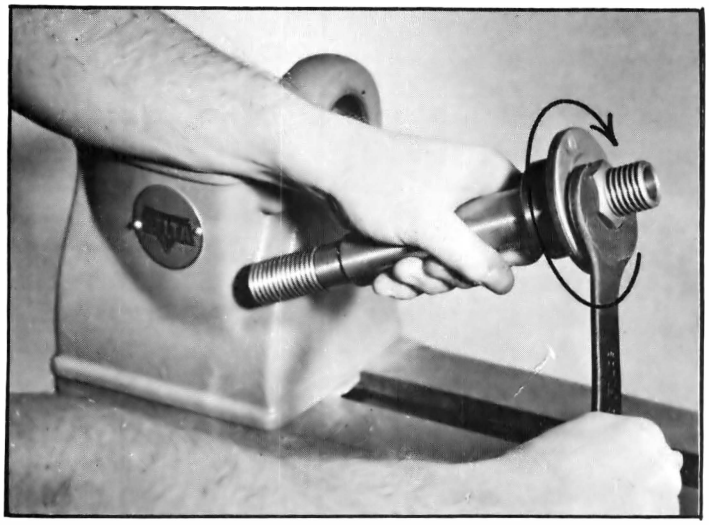


5. Clean bearing seats using kerosene or similar solvent. Make sure there are no burrs, metal or wood particles in the seats.

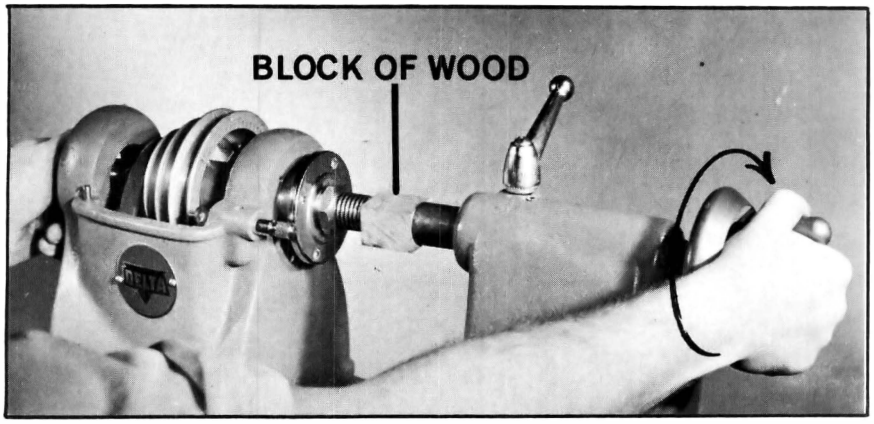
6. Scribe line on spindle to locate flat spot. This will help pulley alignment later on.



7. Assemble the new spindle, new bearing, new bearing retainer and new nut. NOTE: This bearing does not have a right and a left side, and may be installed from either side.

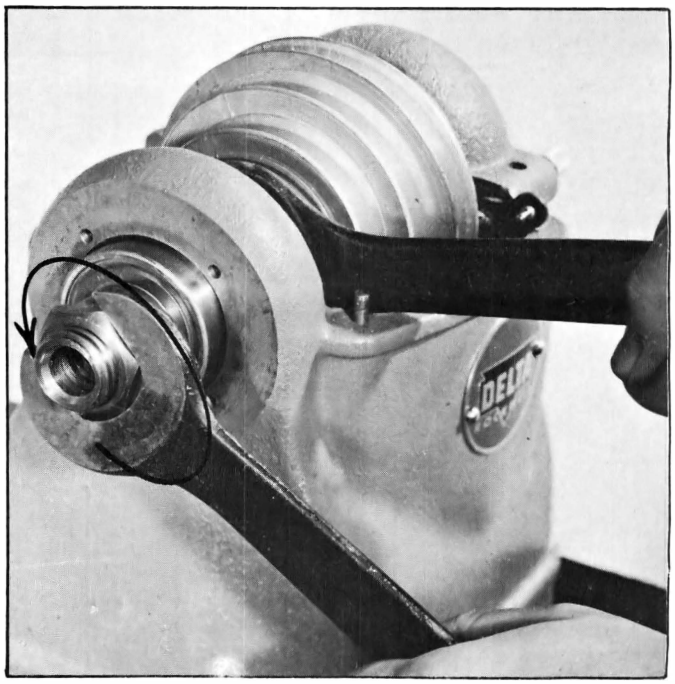


8. Insert spindle in headstock, through spindle pulley, DON'T FORGET TO SLIP ON THE BELT, and carefully enter bearing in seat. Gently press in bearing with aid of tailstock. Be sure to protect spindle with small block of wood. Fasten bearing retainer with original screws.



9. Align spindle pulley and tighten set screws over "flat" on spindle. REMEMBER YOU LOCATED THIS FLAT IN STEP 6.

10. Insert spring washer received with kit in outboard bearing seat and carefully insert bearing SP-5360. (Note: This bearing does not have a right or a left side, and may be installed from either side.) Screw on outboard nut and press in bearing.



11. Remove nut, fasten new bearing retainer and replace nut.

If you are using your lathe for metal work, you may want to take a fine facing cut on the inboard nut to insure maximum accuracy when using chucks or faceplates.

DELTA Machine Tools
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TAILSTOCK MODIFICATION 12" LATHE # 1460

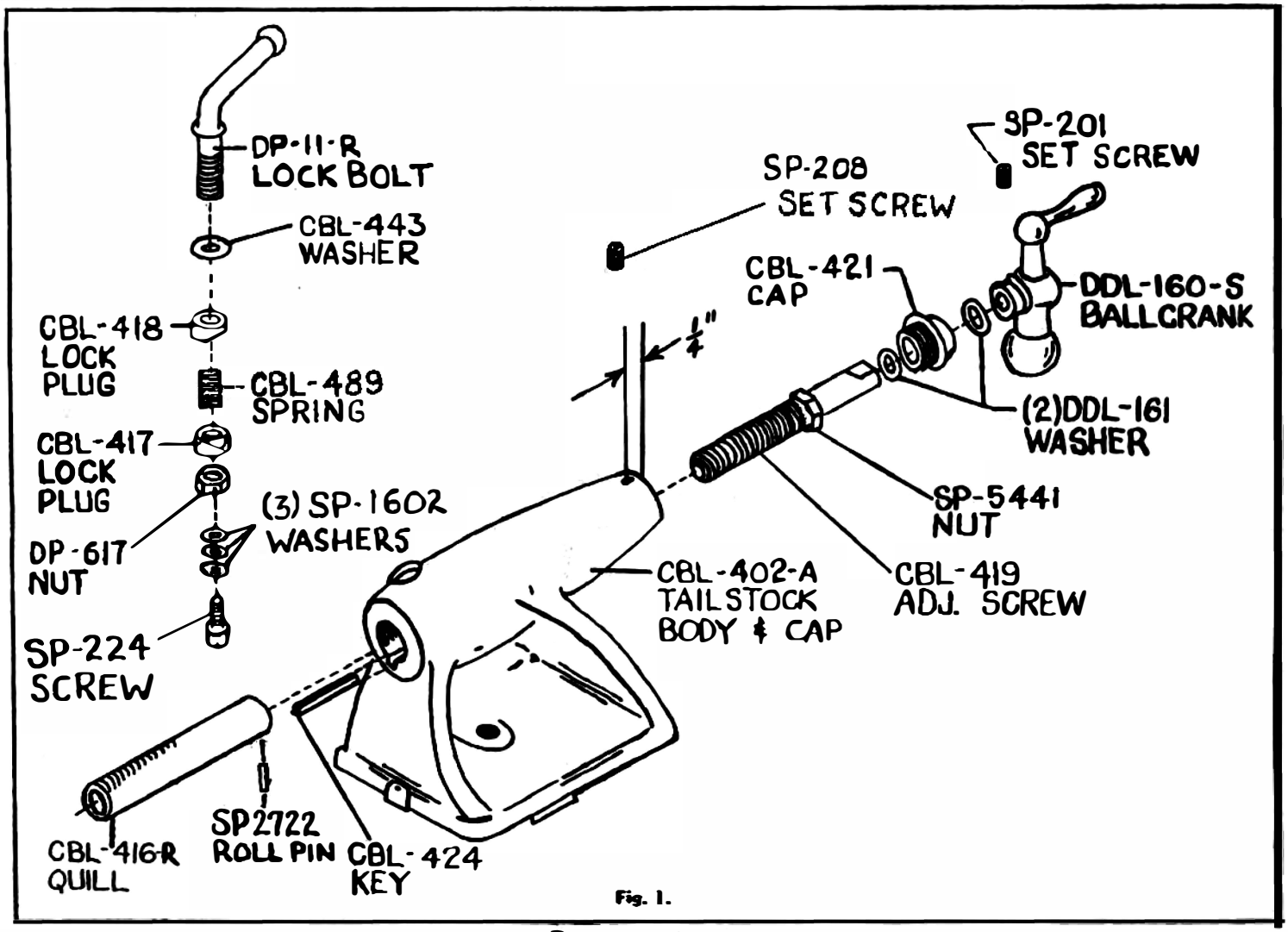


Fig. 1.

Instructions

Occasionally the tailstock quill or ram becomes jammed due to misalignment of the locking plugs. These plugs can come out of alignment if the locking handle is unscrewed completely and removed, or if the quill or ram is rem
instances, the difficulty is usually due to improper replacement of the locking plugs or the quill.

To remedy this condition, the tailstock can be modified at our factory or it can easily be done in the field.

If the work is to be done at our factory, ship the complete tailstock to:

ROCKWELL MANUFACTURING COMPANY
Delta Power Tool Division
Bellefontaine, Ohio
Attention: Delta Service Department

Forward purchase orders and correspondence to:

ROCKWELL MANUPACTURING COMPANY
Delta Power Tool Division
400 North Lexington Avenue
Pittsburgh 8, Pennsylvania
Attention: Delta Service Department

To perform the work in the field, follow the instructions below. We suggest that you read these instructions through referring to the figures, then proceed step by step.

1. Turn DDL-160-S Ball Crank to advance Quill all the way and pull quill out of tailstock.

2. Remove DDL-160-S Ball Crank by loosening Set Screw SP-201.

3. Unscrew DDL-421 Cap (Caution: right hand thread). If it is more than handtight.

   DO NOT USE PIPE WRENCH. Wrap a leather belt around it for a better grip or else use two small blocks of wood in a vise.

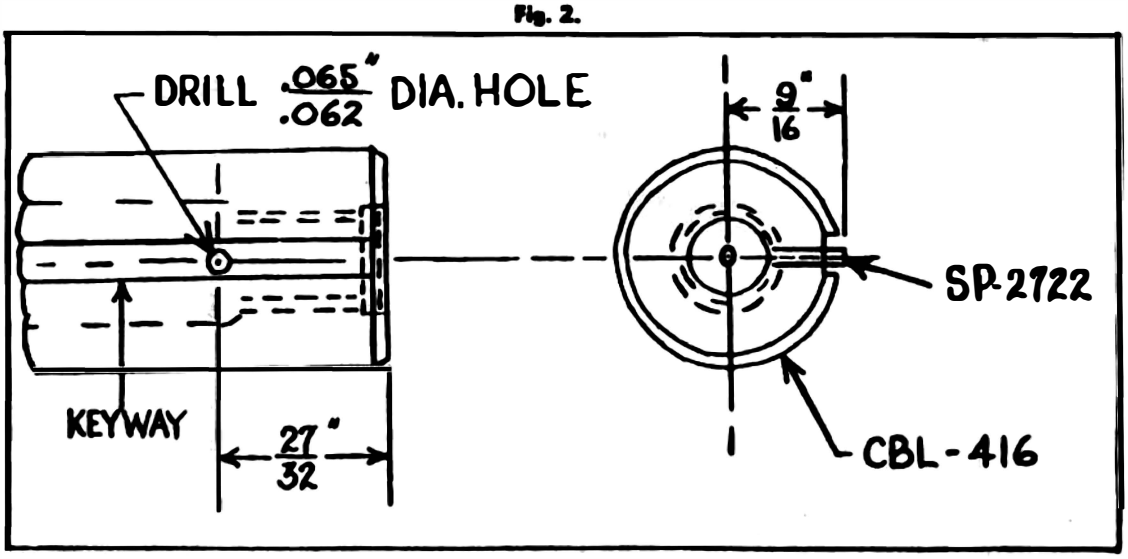
4. Remove CBL-419 Adjusting Screw and check if SP-5441 Nut is on TIGHTLY. If not, tighten securely (Caution: left hand thread).

5. Lift up DP-11 Lock Handle which will contain the locking sleeves, washer, spring and nut.

To prevent easy removal of the DP-11 Lock Handle while it is in use in the tailstock, three washers and a hex. socket cap screw must be installed on the bottom end. The other parts remain unchanged. This entire assembly may be purchased containing these new washers and screw as CBL-417-R sleeve assembly, consisting of:

DP-11-R	Lock Handle	(1)	CBL-489	Spring	(1)
CBL-443	Washer	(1)	DP-617	Nut	(1)
CBL-418	Locking Plug	(1)	SP-1602	Washer 3/16"x7/16"OD	(3)
CBL-417	Locking Plug	(1)	SP-224	#10-32x1/2" Hex. Socket Cap Screw	(1)

Fig. 2.



If you prefer to utilize your present parts, the next step is to provide a tapped hole 10-32 x 1/2" in the bottom of the threaded end of the DP-11-R. Use a #21 drill. The extra washers required are three (3) SP-1602 - 3/16"x7/16" OD. The screw is one (1) SP-224, #10-32x1/2" Hex. Socket Cap Screw.

Assemble the parts as shown in Figure 1 - Page 1. Be certain that the concave surfaces of the locking plugs match each other. Tighten Screw SP-224 securely: After this assembly is in place in the tailstock with the quill installed, the Lock Handle cannot be unscrewed because the three washers, SP-1602, prevent it from doing so when they make contact with the DP-617 Nut.

To prevent removal of the quill, a small roll pin is inserted in the Keyway of the quill as follows:

1. Place quill in "V" block or drill press vise and drill 1/16" through hole 27/32" from threaded end in center of keyway. (See Fig. 2).(Page 2).

2. Drive in roll pin, SP-2722, 1/16" x 1/4" flush with top edge of keyway.

Before installing the quill, make sure that the Key, CBL-424, is secured tightly in the keyway of the tailstock. If it can be removed easily, then it will be necessary to enlarge that portion of the key that will be fitted into the keyway by swaging it out or peaning it and driving it back into the keyway. Make sure the top part of the key which is exposed inside the tailstock is not enlarged so as to prevent the quill from moving freely.

To reassemble tailstock procced as follows:

1. Run DP-617 Nut down on Lock Bolt until it is stopped by SP-1602 Washers.

2. Line up concave surfaces of locking plugs, CBL-417 and CBL-418.

3. Drop this assembly into hole in tailstock and insert quill from back end of tailstock, engaging key and keyway.

4. Tighten Lock Handle and if when tightened, the ball end of the locking handle does not stop in a desirable position, remove quill and Lock Bolt assembly. Remove Screw SP-224 and reposition DP-617 Hex Nut in relation to CBL-417 Locking Plug and reassemble.

5. Replace CBL-419 Adjusting Screw, CBL-421 Cap, DDL-161 Washers and DDL-160-S Ball Crank (see Fig. 1 - Page 1).

To prevent the CBL-421 Cap from being easily removed, a set screw can be installed as follows:

1. Remove CBL-421 Cap.

2. Useing a #8 drill make a hole in the center of, and on top of the tailstock 1/4" in from the threaded end. Tap hole 1/4" - 20.

3. Replace CBL-421 Cap and install SP-208, 1/4" - 20 x 1/4" Set Screw. Although the cup end of the set screw will marr the threads of the CBL-421 Cap slightly, this will not prevent removal of the Cap should it be necessary.

The modified parts can also be supplied from the factory by using the following new numbers.

OLD NUMBER		NEW NUMBER	
DP-11	Lock Handle	DP-11-R	Lock Handle with 10-32 threaded hole.
CBL-416	Quill	CBL-416-R	Quill including SP-2722 Roll Pin - 1/16" x 1/4"

We urge you to retain this instruction sheet which shows the new number of the modified parts. Should replacement of these parts be necessary in the future order from your parts distributor using the new numbers only.

NOTE: The necessary screws, washers, roll pin & instructions are available in kit form Part #034-12-629-5001.

Rockwell MANUFACTURING COMPANY
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