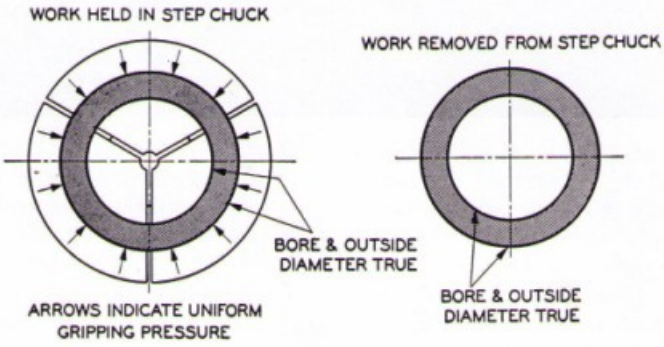
ADVANTAGES OF USING STEP CHUCKS

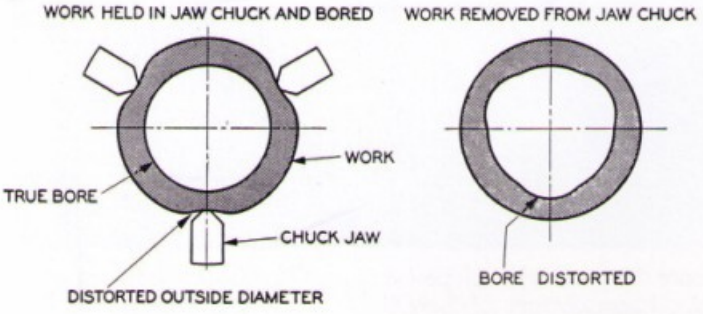
Step chucks, developed by precision instrument makers, are a time proven method of holding work, rigidly and accurately. Step chucks take over on sizes above the regular collet capacity, providing collet-like accuracy, convenience, and precision results as with collets.

WHEN USING STEP CHUCKS: Analytical consideration of the gripping pressure applied on the work by a step chuck clearly shows one of the advantages of using step chucks. Note how



the gripping pressure is uniformly distributed over the entire circumference of the work. The large gripping area prevents distortion and eliminates marking of the work.

WHEN USING JAW CHUCKS: Studied consideration of the gripping pressure applied on the work by a jaw chuck clearly shows the disadvantage of using jaw chucks for precision work.



Note how the localized gripping pressure of the jaws distorts the work. The small area of the gripping surface of the chuck jaws will also mark the surface of the work.

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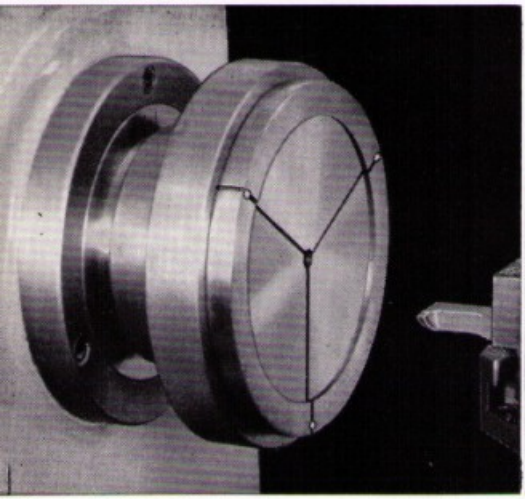
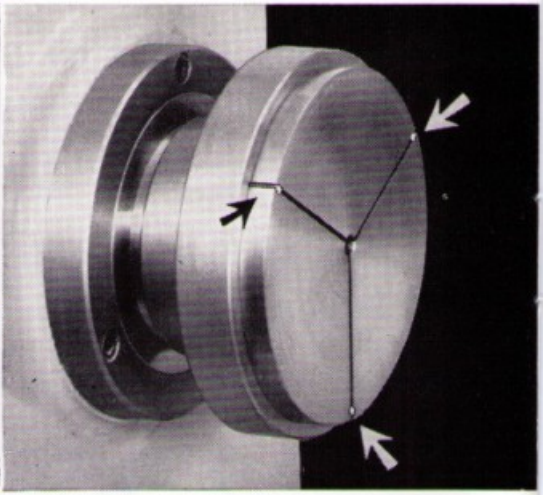
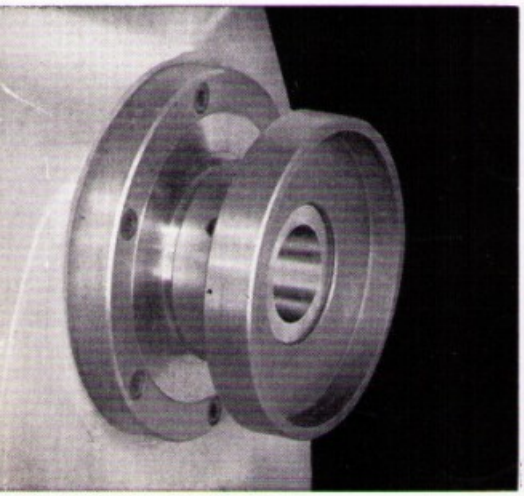
INSTRUCTIONS FOR "STEP



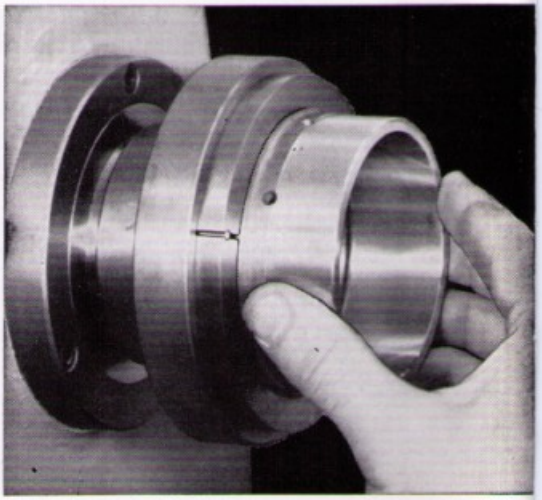
1. Clean nose of spindle. Apply a few drops of oil to outside of spindle. Clean spindle bore of step chuck closer. Apply closer to headstock spindle and tighten closer with spanner wrench. (Use Williams or Armstrong spanner wrench No. 460). **Do not use punch and hammer.**



2. Clean inside of headstock spindle and outside of step chuck. Apply step chuck to spindle and collet closer. Be sure pins are in place. Adjust collet closer and close step chuck.

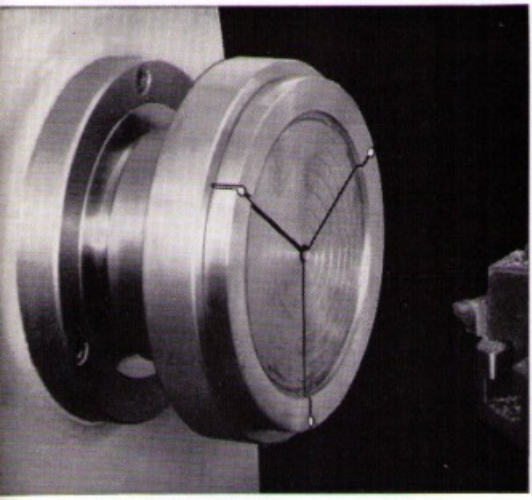


5. Finish bore to exact size of part to be held. Face bottom of bore in step chuck. If section of part to be held has a sharp corner, undercut corner of bore in step chuck.

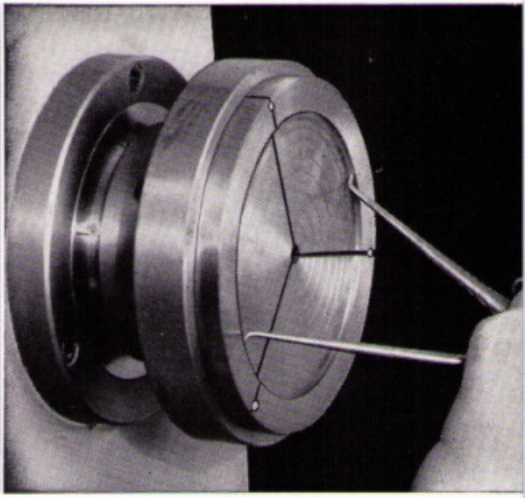


6. Clean bore of step chuck and use part as gage. Part should fit into step chuck like a good precision plug gage fit.

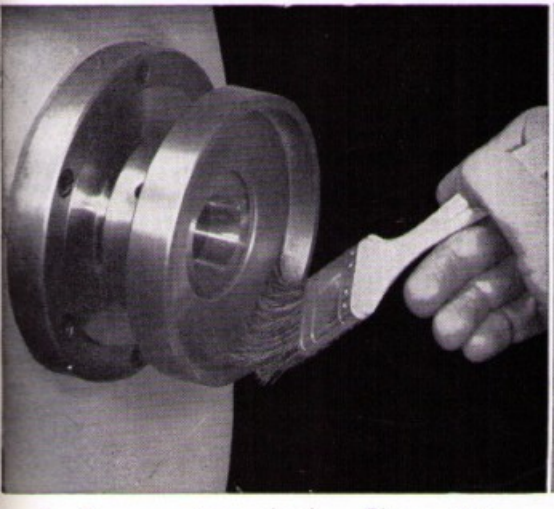
PING OUT" STEP CHUCKS



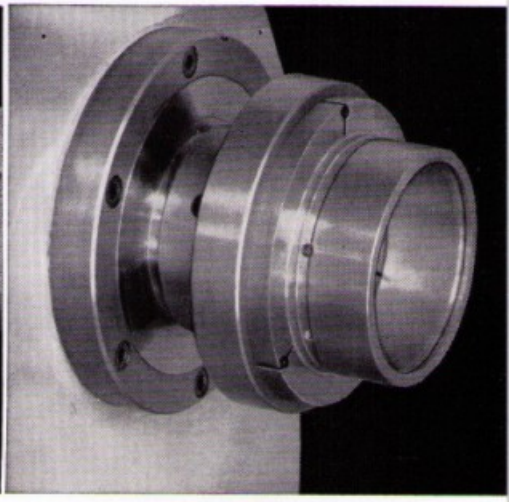
3. With sharp carbide boring tool, rough bore step chuck to approximate size. The step chuck may be rapidly bored by using the plunge cut stepping method.



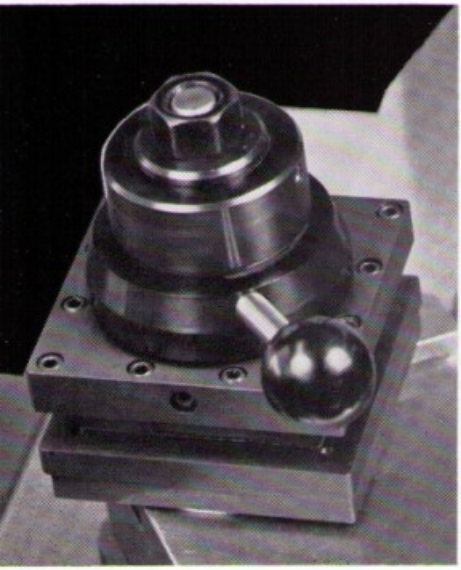
4. "Stepping out" of a step chuck requires care that bore is not oversize. When "roughing-out" use calipers, set slightly smaller than required size, to check bore diameter.



7. Remove step chuck. Clean step chuck closer and spindle. Wipe a few drops of oil on angle of step chuck closer and inside spindle. Perform this operation occasionally during a production run to assure accuracy of step chucks.

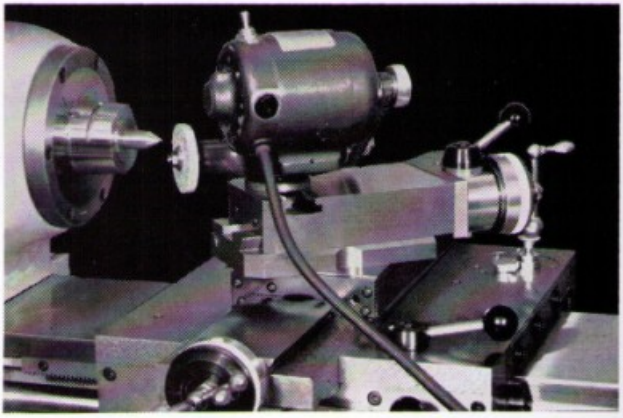


8. Remove pins from slots of step chuck. Clean each slot of step chuck of all chips and apply step chuck to machine spindle. Adjust collet closer for tension and you are ready to run production.



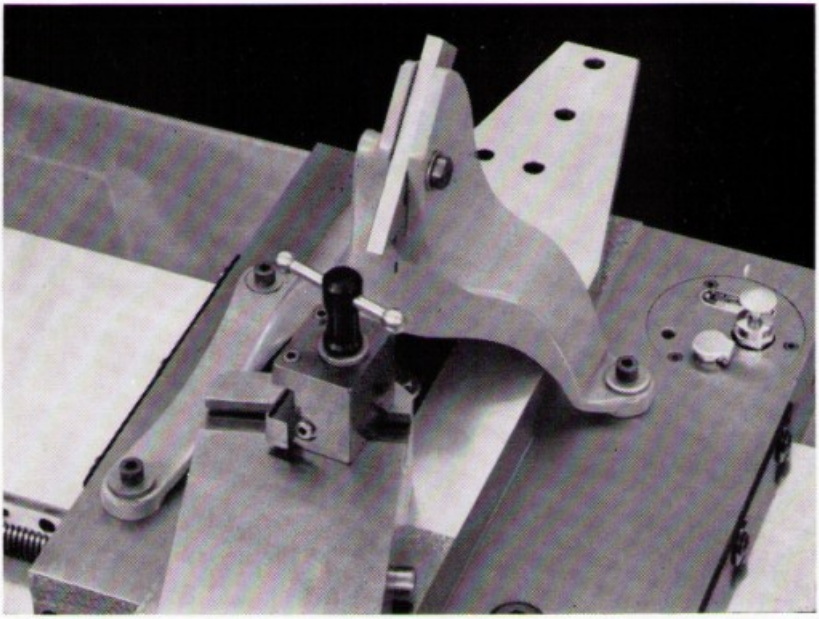
AUTOMATIC SQUARE INDEXING TURRET

The square turret is applied directly to the tool post T-slot of the compound slide. The turret takes standard 3/8" square tool bits. By a simple movement of the ball-handled lever, the turret is automatically unlocked, indexed to the next tool position and automatically relocked, ready for the next machining operation. Accurate indexing is accomplished through a hardened and precision ground tapered index pin.



MOTOR GRINDER

The motor grinder unit mounts directly to the compound slide T-slot. It can be used for both external and internal grinding. Motor operates on 110 volt, single phase current. When grinding, keep as much of the bed, carriage and apron as possible covered with oil-soaked cloths to prevent abrasive material from causing injury to machine.

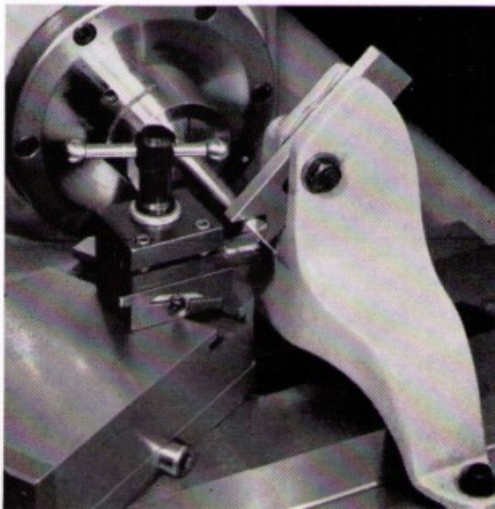


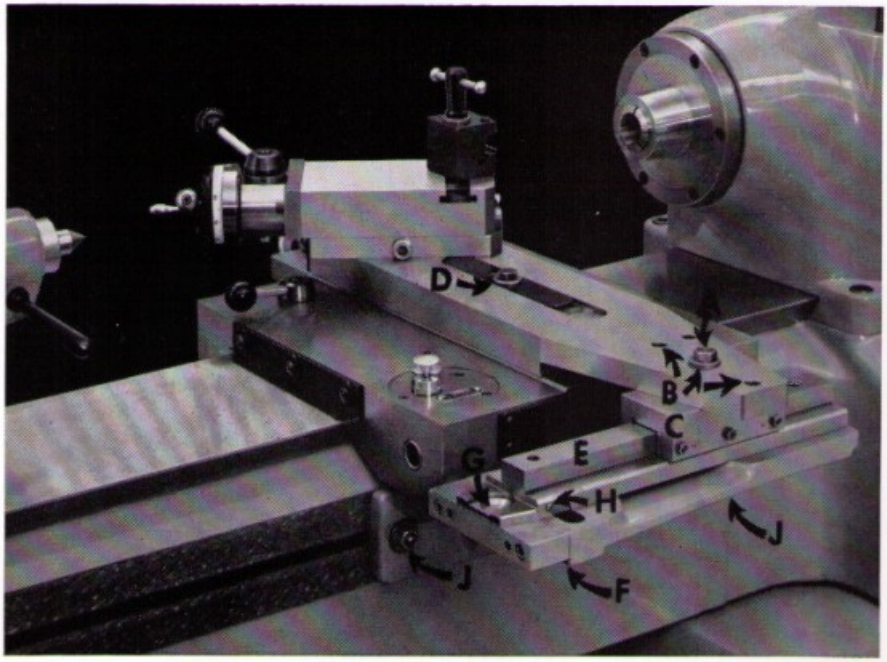
FOLLOWER REST

The follower rest is mounted directly to the carriage and is used to support work which, because of its small diameter in relation to length, may spring away from the cutting tool.

To apply the follower rest to the carriage remove three plug screws indicated as **"G"**, Figure 13, Page 24. Be sure to replace the screws after using follower rest as they keep holes free of chips and will make it easier to mount follower rest the next time it is required.

The jaw of the follower rest is adjustable to suit the work diameter.



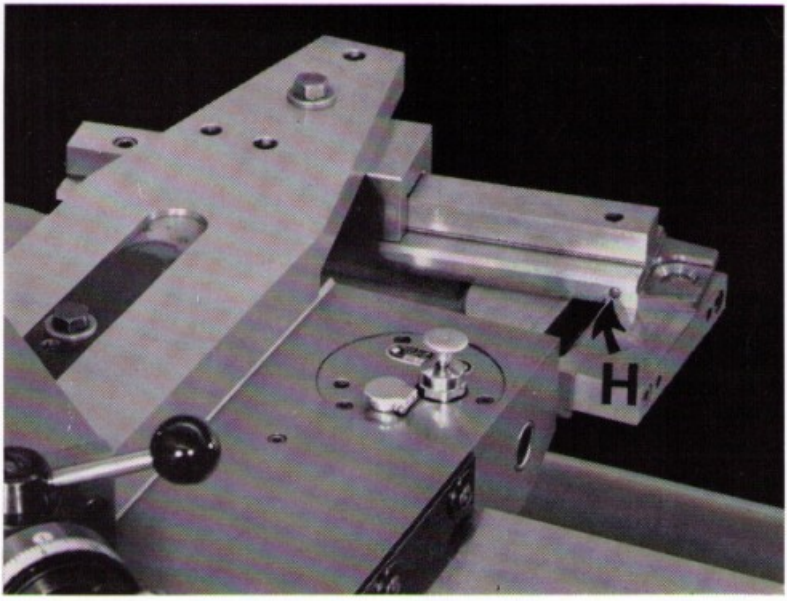


TAPER TURNING ATTACHMENT

The turning or boring of precision tapers is readily accomplished on the Hardinge HLV-H Lathe by the use of a taper turning attachment. The Hardinge taper turning attachment is based on the sine bar principle — swiveling the guide bar from one end. See Page 3 for a typical taper turning setup.

The taper turning attachment mounts directly on the back of the lathe bed and is adjustable along the bed to suit the work.

In operation, the taper turning attachment is moved into position to suit the work by loosening two nuts **"J"**. Clean attachment of all chips and foreign matter. Then place the cross slide in position so that bolt **"A"**, shown in illustration above, can be placed through any one of the three holes **"B"** in the cross slide to engage shoe **"C"**. With the cutting tool in position and taper attachment secured to cross slide, release 9/16" hexagon cap screw **"D"** two turns — **DO NOT REMOVE CAP SCREW.** All adjustments of taper attachment are made with 9/16" wrench.



TAPER TURNING ATTACHMENT — Continued

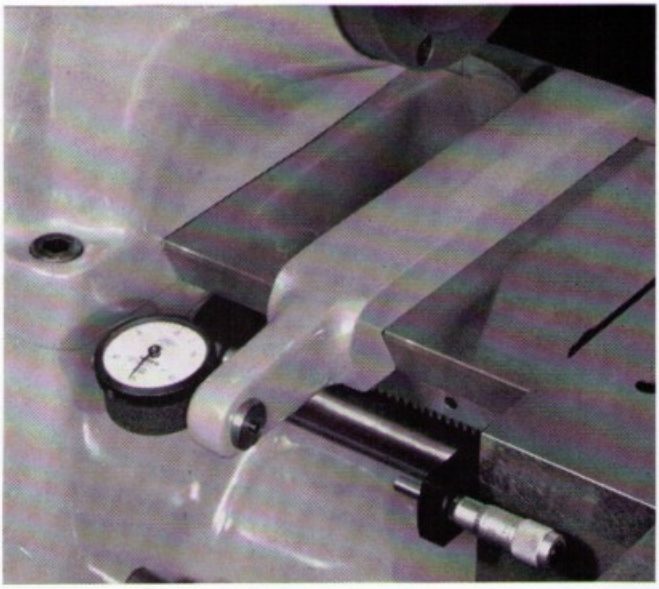
To set guide bar **"E"** to the desired angle, loosen cap screw **"F"**. Cap screw **"F"** is located on the under side of the taper attachment body. Swing guide bar **"E"** to desired angle or taper per foot according to graduation viewed through zero plate **"G"**.

Lock guide bar in place with cap screw **"F"** and tighten cap screw **"A"**. Make a test cut. It may be necessary to move guide bar a very small amount to obtain the exact taper for a blued fit to the taper gage. Loosen cap screw **"F"** and **"A"** a very small amount and tap guide bar lightly to move it into position to give exact taper. Then lock cap screws **"F"** and **"A" tight.** When tapping guide bar **"E"** strike it on hardened pins **"H"** protruding from the surface at the sides of the guide bar.

Lubricate guide bar with spindle oil.

IMPORTANT: When turning or boring a taper be sure the cutting tool is exactly on center; otherwise a true taper will not be produced.

When the taper attachment is not in use keep at tailstock end of the bed.

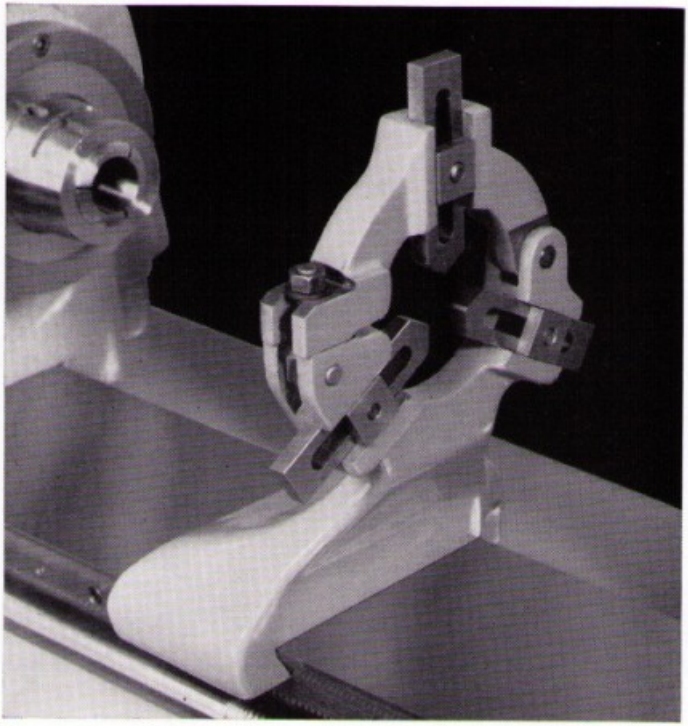


MICROMETER CARRIAGE STOP WITH DIAL INDICATOR

The micrometer carriage stop is a useful accessory when producing parts having exact shoulder lengths.

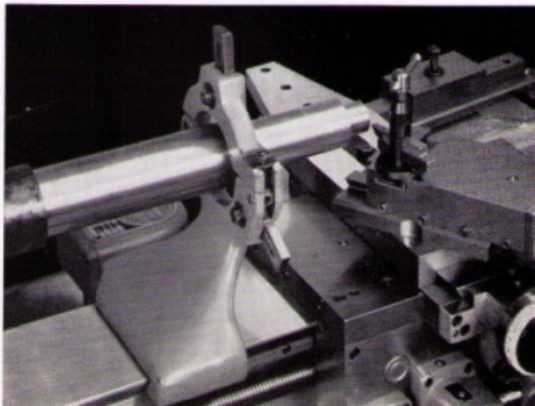
All Hardinge HLV-H Lathes are now equipped with a tapped hole in the carriage for fastening the micrometer to the carriage. The bracket carrying the indicator mounts directly to the hardened and ground dovetail bed ways.

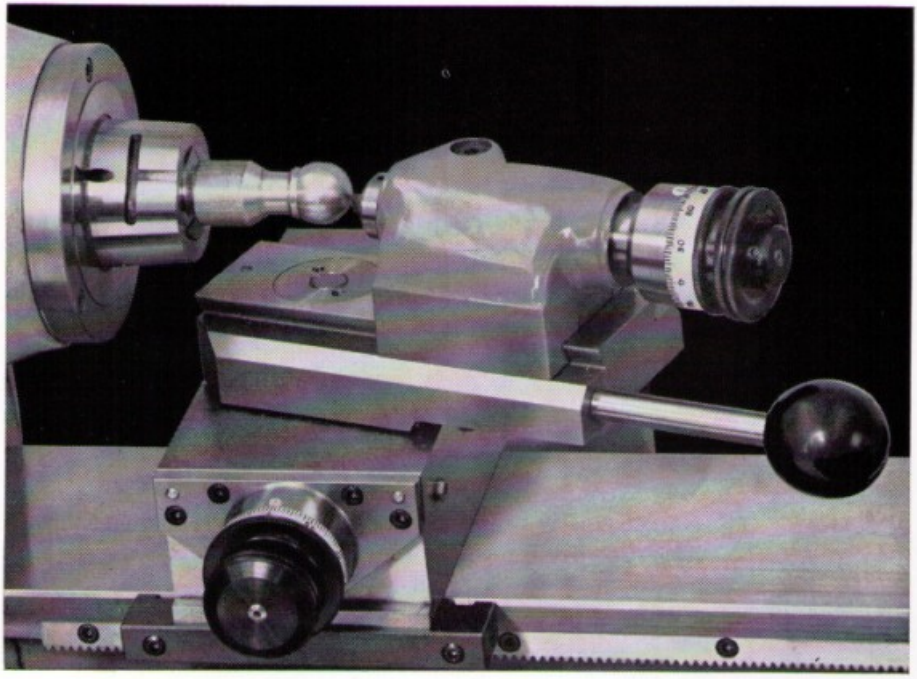
The indicator reads in .0005" increments. The micrometer reads in .001". Measurements are made with the micrometer. Carriage is moved until the indicator reads zero.



STEADY REST

Long cylindrical work held between centers requires a steady rest to prevent such work from springing away from a cutting tool. A steady rest is also used when there are machining operations to be performed on the end of work which prohibits the use of the tailstock center. The three jaws are adjustable and have an accurate fit in the machined guides of the body. The top section is hinged to provide ease in loading shoulder work without disturbing the setting of the jaws. The steady rest has a maximum capacity of 3″.

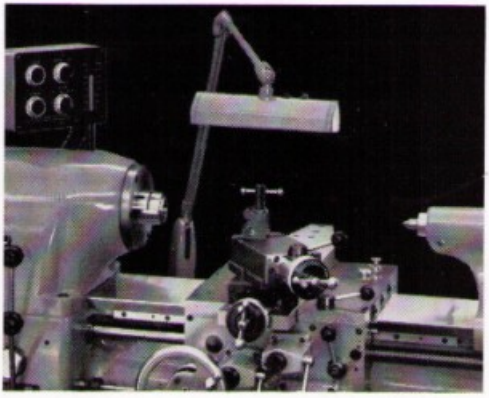




RADIUS TURNING ATTACHMENT

This attachment fastens directly to the dovetail bed, as shown above, and is used for precision turning concave or convex surfaces up to 1-1/2" radius. Useful for turning punches, dies, ball shaped valve seats and special spherical cutting tools.

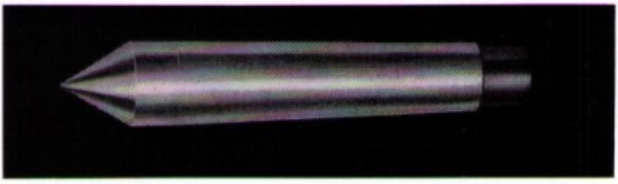
The swivel slide is mounted on precision preloaded ball bearings for accuracy and rigidity. The swivel slide moves through 360°. Hardened feed screws are mounted on preloaded ball bearings and have adjustable dials graduated in thousandths of an inch.



LAMP

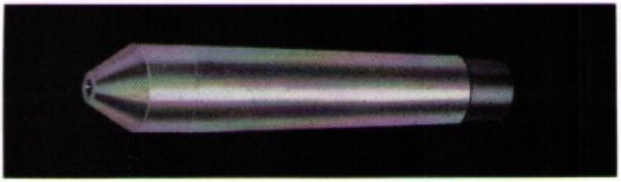
This fluorescent lamp is available for use with the Hardinge HLV-H Lathe. The lamp fastens to the back of the lathe bed and operates from the regular 110 volt light line.

TAILSTOCK TOOLING*



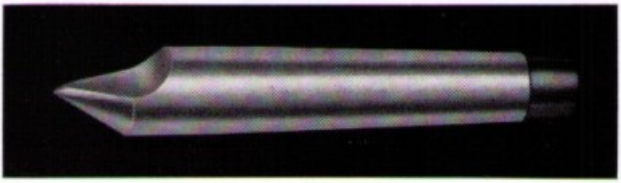
MALE CENTER

This male center has a 11/16" head diameter and is furnished with all Hardinge tailstocks. All centers are hardened and ground.



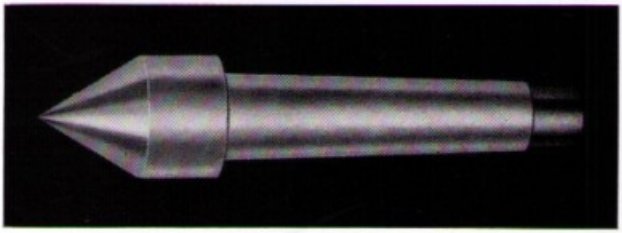
FEMALE CENTER

A female center is used for work that cannot have the usual center hole. The 11/16" head has a 60° conical hole 1/8" in diameter at the large end.



HALF CENTER

A half center is used if tool clearance is desired when turning the full length of a part supported by the tailstock. The head diameter is 11/16".

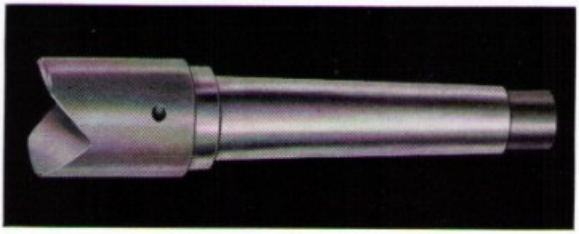


LARGE CENTER

This center has a head diameter of 1". It is indispensable for supporting tubing or recessed work too large for the standard male center.

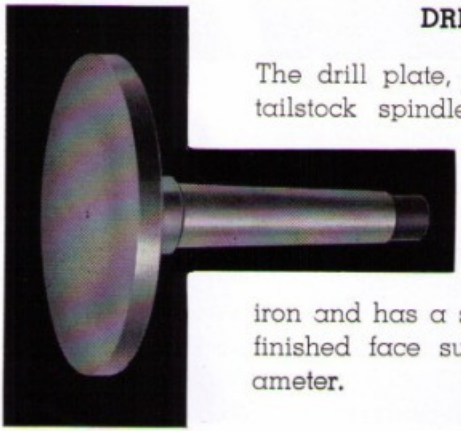
* When ordering, specify No. 2 Morse Taper Shank.

TAILSTOCK TOOLING*



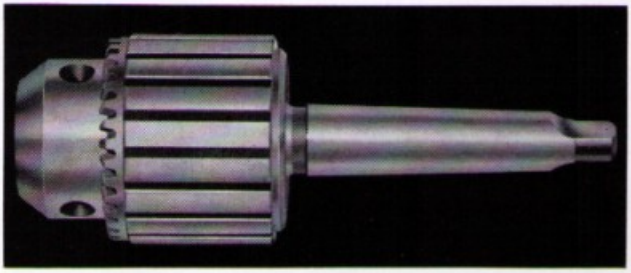
V CENTER

The swivel V center is constructed so the V block rotates on the shank.



DRILL PLATE

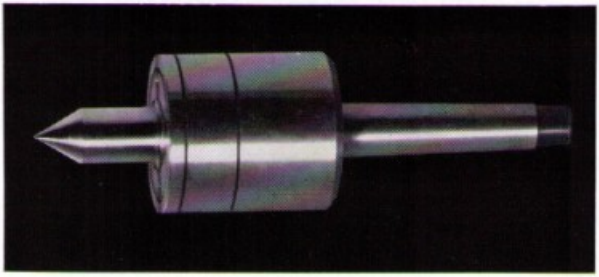
The drill plate, when in place in the tailstock spindle, is used to support work at right angles to the machine spindle center line. The plate is made of close-grained cast iron and has a steel taper shank. The finished face surface is 3-1/2" in diameter.



DRILL CHUCK

We recommend the improved type drill chucks with our tailstocks. We carry 0-1/8", 0-3/8" and 0-1/2" sizes in stock mounted ready for use.

* When ordering, specify No. 2 Morse Taper Shank.



ANTI-FRICTION CENTER FOR TAILSTOCK

This heavy duty anti-friction center has a No. 2 Morse Taper shank for direct application to the tailstock spindle. Work can be done between centers at high speed when the anti-friction center is used.

ADJUSTABLE HEIGHT CHAIR

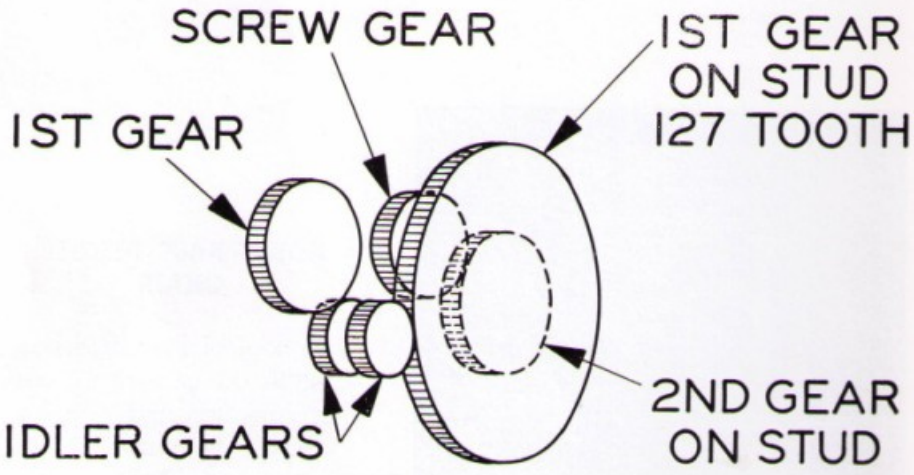
The seat of the chair has infinite adjustment to suit the operator and can be adjusted without the use of tools. Unlocking and locking, after adjustment of the chair to correct height position, is automatic through the use of a special ball bearing device. The back rest is also adjustable.

TO CUT METRIC THREADS

By the application of a metric attachment to the gear box, in place of the English bracket for the outside change gears, metric threads can be cut. For threading, follow the same procedure as when setting up English threads as described on Page 33.

Gears supplied for the English outside gear can also be used in the gear setup for metric threads.

When metric attachment is supplied with machine, a large gear cover is shipped as standard equipment. When the metric attachment is supplied later, the large cover is supplied to replace the standard cover.



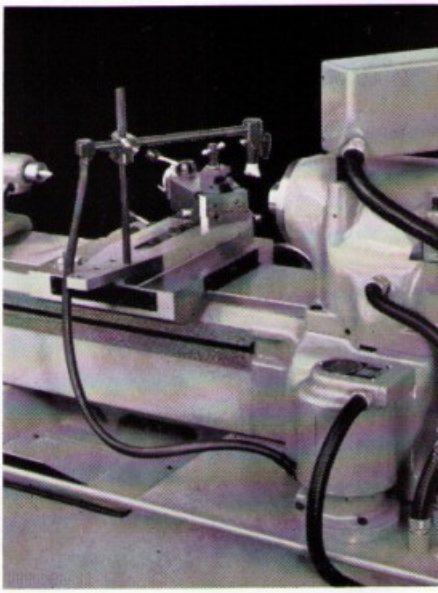
See Gear Chart on Opposite Page

PITCH IN MM	KNOB	FIRST GEAR	SECOND GEAR ON STUD	IDLER GEAR	SCREW GEAR
.1	3	25	40	50	50
.2	2	25	40	50	50
.25	2	25	50	40	50
.30	2	25	60	40	50
.35	3	50	70	30	50
.40	1	25	40	50	50
.45	3	50	54	30	30
.50*	3	50	60	30	30
.55	1	25	55	40	50
.60	1	25	60	40	50
.65	2	50	65	30	50
.70	2	50	70	30	50
.75	3	50	66	30	22
.80	2	50	56	30	35
.85	2	50	68	50	40
.90	2	50	54	30	30
.95	2	50	76	30	40
1.00*	2	50	60	30	30
1.10	1	50	55	30	50
1.20	1	50	60	30	50
1.25	2	50	60	30	24
1.30	1	50	65	30	50
1.40	1	50	70	30	50
1.50	2	50	66	30	22
1.60	1	50	56	30	35
1.70	1	50	68	30	40
1.75	2	50	77	30	22
1.80	1	50	54	30	30
1.90	1	50	76	30	40
2.00*	1	50	60	30	30
2.25	1	60	60	30	32
2.50	1	50	60	30	24
2.75	1	50	66	30	24
3.00	1	50	66	55	22

* Pitches that can be cut with standard gears supplied with machine and metric attachment.

COOLANT FACILITIES

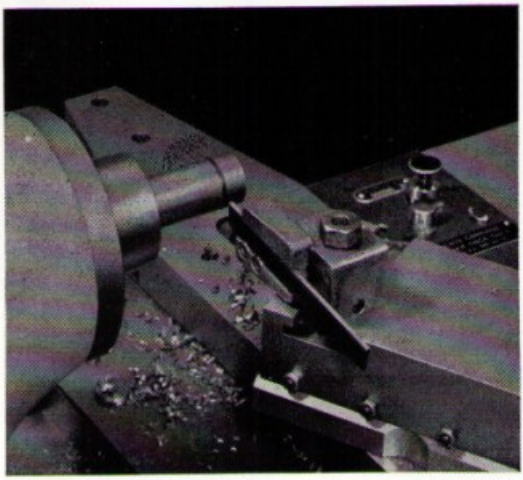
All Hardinge HLV-H Lathes are provided with the coolant facilities required for high speed work. The coolant pump is conveniently located at the rear of the machine and above the sump level, thus eliminating troublesome check valves. The centrifugal type pump needs no priming and is controlled by a switch conveniently located in the control box on the headstock of the machine. Refer to page 11 for coolant pump switch instructions.



Clean sump regularly, depending upon type of material being run. When machining cast iron or other powdery material without coolant, close sump screen cover to prevent powdery material from mixing with coolant.

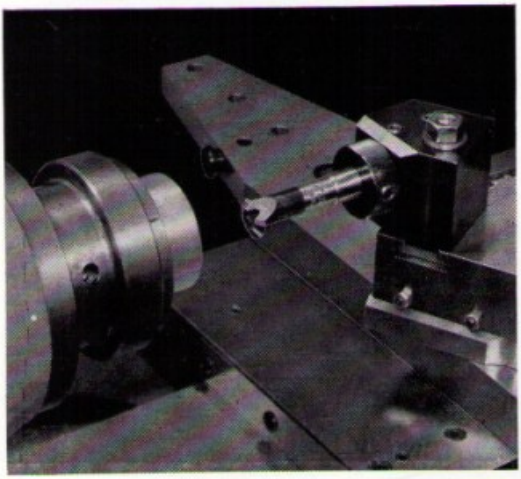
OIL BASE CUTTING FLUIDS ARE RECOMMENDED FOR MAXIMUM MACHINE LIFE.

To clean sump remove the four screws, one in each corner of the screen cover for sump. Lift screen cover from sump. Clean sump. Rinse out and drain sump by removing pipe plug from bottom of sump. This plug is easily accessible from the back of the machine.



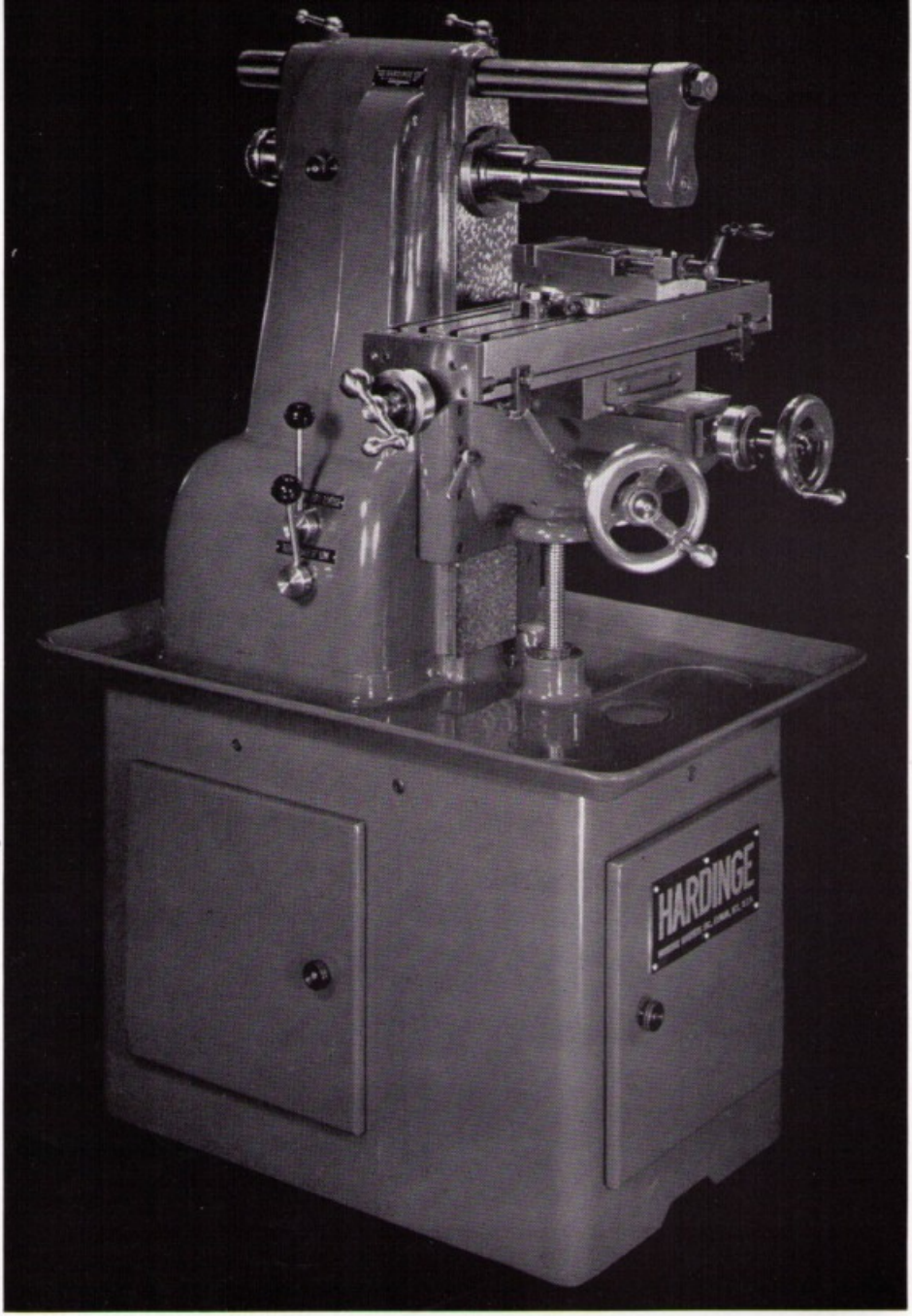
CUT-OFF TOOL HOLDER

This patented cut-off tool holder fits directly to the compound slide. The blade and serrated blade holder are adjustable. The holder is furnished with a wrench for locking the blade in place — less blade. Blades are available in 1/16", 3/32" or 1/8" sizes. When ordering, specify desired blade thickness.



BORING TOOL HOLDER

This boring tool holder is available for use with the Hardinge HLV-H Lathe. The holder mounts directly to the T-slot of the compound slide and adapts standard 5/8" diameter boring bars. An eccentric bushing permits height adjustment of the tool. Holder is supplied less boring tool.



HARDINGE HIGH SPEED PRECISION MILLING MACHINE

Hardinge HLV-H Lathe and the Hardinge Milling Machine are companion units with interchangeable attachments, abundance of power, speed and accuracy.

The Hardinge Milling Machine is available in both plain and universal models. Descriptive Bulletin TM-UM will be furnished upon request.