HARDINGE
High Speed Precision Open Cone Style
Second Operation Machines

FOR

ACCURACY - FINE FINISH - HIGH SPEEDS - LOW COST

HARDINGE SECOND OPERATION MACHINES may be purchased complete or the various units applied at any time, interchanging between open cone and enclosed head models, regardless of the age. Automatic Collet Closers are interchangeable on headstocks of like collet capacity. Double Tool Cross Slides and Turrets are interchangeable on machines with the same swing.

Hardinge Second Operation Machines are ideal for fast, accurate production of duplicate parts—the set-up time is practically negligible.

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<td>Capacity through Collets and Closer</td>
<td>1&quot;</td>
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<td>Swing over Bed</td>
<td>9&quot;</td>
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<td>Collet used—Dimensions in Collet Bulletin</td>
<td>5C Hardinge</td>
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<td>Distance from Collet to Turret on 32&quot; Bed</td>
<td>12 3/4&quot;</td>
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<td>16 1/2&quot;</td>
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<td>Recommended High Spindle Speed, r.p.m.</td>
<td>3000</td>
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<td>Diameter of Straight Holes in Turret</td>
<td>3/8&quot;</td>
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<td>21 1/2&quot;</td>
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<td>Maximum Travel of Double Tool Cross Slide</td>
<td>3 1/2&quot;</td>
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<tr>
<td>Diameter of Steps on Headstock Cone</td>
<td>2 1/2 3/8 6&quot;</td>
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<td>Width of Belt</td>
<td>1 1/4&quot;</td>
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HARDINGE BROTHERS, INC., ELMIRA, N. Y.

"Performance has established leadership for Hardinge"

www.OzarkToolManuals.com
Automatic Collet Closer: The use of an Automatic Collet Closer permits rapid opening and closing of the collet when the headstock spindle is at speed or stopped.

The Automatic Collet Closer is adjustable so that any desired collet tension may be applied on the bar stock or parts to be machined. Moving the lever to the right or to the left instantly opens or closes the collet, without interrupting constant machine operation.

An Automatic Collet Closer saves time, reduces wear on draw spindle and collet threads, and assures positive and uniform collet or step chuck tension.

Double Tool Cross Slide: This tool was designed after years of practical manufacturing experience. It is amply heavy and rigid. The slide is 11-3/4" long and has a movement of 3-3/4", giving sufficient stroke to clear turret tools. The tool post blocks may be moved to any desired position on the slide and are held rigid with two bolts each. The tool posts are adjustable longitudinally along the T-slot of the blocks. The tool posts take standard 3/8" square tool bits. Adjustable stops are provided for control of slide movements in both directions. Operating lever is adjustable radially for the most convenient operating position.

We recommend the use of a Double Tool Cross Slide for forming, rounding, knurling, cutting off, etc. of duplicate parts.

Tilted Turret: The illustration clearly shows the correctly designed Turret for rapid and accurate machining of duplicate parts, turning, drilling, reaming, counterboring, threading, knurling, etc. Ease and simplicity of operation are the outstanding features. Like our other attachments, all important surfaces are hand scraped.

The hexagon head holds six tools. The tool holes are 5/8" in diameter, 1-7/32" deep, adapting standard Brown & Sharpe turret tools, as well as those having a 5/8" diameter shank as manufactured by other tool organizations.

The tools are held securely in the head by specially designed clamp bolts. The tilting of the head provides clearance for the tools, eliminating difficulty encountered with other types of turrets.

The Turret has six independent adjustable stops to regulate the desired travel of the slide for each tool. The hexagon head and independent stops are automatically indexed to the next tool position, locked and unlocked by operation of the lever. With the lever in a neutral position, the head may be swiveled to the next tool, passing the positions which do not have tools. This is an essential requirement when less than six operations are performed with a turret.

The base is 9-1/2" long and the slide has a travel of 2-1/2". The slide is dovetailed and has long adjustable gibts to compensate for wear.
Spring Lever Tailstock: This attachment is designed for production drilling, reaming, counterboring, tapping, etc. It may also be used as a stock stop. The spring saves time by returning the spindle to its original position. Quite often it can be used to better advantage than the tilted turret.

The spindle is 9" long, .787" in diameter, and has a maximum travel of 1-1/4". The travel may be regulated by the adjusting screw which stops against a hardened pin.

A lock is provided to hold the spindle in any position when it is desired to support work between centers.

**Note:** We can also supply a lever tailstock having a 5-1/2" stroke but without spring action.

Double Tool Cross Slide Swivel Attachment: When used with our 1" collet capacity, 9" swing Precision Second Operation Machine, this attachment can be used instead of either the front or rear block of the Double Tool Cross illustrated and described on page SM-Two. It is for straight or taper turning as it can be swiveled to any angle. The angular setting is accurately maintained by an eccentric locking bolt.

The lever-controlled rack and pinion slide has a maximum travel of 2-1/2" and is provided with an adjustable gib. An adjustable stop controls the movement of the slide in either direction. The tool post takes standard 5/16" square tool bits. When ordering specify whether for use on front or rear of the Double Tool Cross Slide.

Slide Tool with Micrometer Handle: The Slide Tool is designed especially for use in the Turret of the Hardinge Precision Second Operation Machine for boring, rough and finish turning operations. The bore in the slide head is arranged for 5/8" shank tools or bushings which can be locked in position by a set screw. The slide has a travel of 7/8". The dovetail slide is actuated by a fine pitch accurate feed screw with adjustable micrometer dial controlled by a ball crank handle graduated in thousandths. Adjustment of the slide gib is accomplished by means of gib screws and nuts. A locking ring with spanner wrench is provided to lock the slide in the desired position without changing the tool setting. Primarily intended for boring, rough and finish turning operations, the slide tool can also be used as a drill, reamer or counterbore holder when set on center. It is noteworthy that the slide can be locked on center, thus increasing its utility in operations such as drilling and reaming. It can also be locked in the off-center position for boring, etc.

**HEADSTOCK:** The headstock frame is of the finest grade, seasoned and heat-treated alloy iron and has a hand-scraped bearing surface to fit the ways of our amply proportioned lathe bed.

The outstanding feature is the Hardinge preloaded ball bearing spindle construction. The design has been very successful with our enclosed head machines over a number of years. The proven performance assures: First, greater accuracy; Second, heavier cuts; Third, higher spindle speeds.

The bearings require no attention or adjustment for continual carefree operation — this important characteristic overcomes expensive delays previously associated with repair or adjustment of conventional sleeve bearings.

The spindle is hardened and ground, both internally and externally, and is made of the best grade ball bearing steel. With the ball bearing construction, the spindle is mounted in rotating members to eliminate wear on the outside of the spindle — this is a desirable feature. The spindle cone pulley is provided with four holes for locking. The spindle has the Hardinge patent taper nose — threaded nose spindle furnished upon application.

See Bulletin OB for more complete details of the Hardinge preloaded ball bearing spindle construction.
Step Chucks and Closers: A Step Chuck is exceptionally useful for accurately holding large diameter work, tubing, etc. The closer is carried on the nose of the headstock live spindle. A standard draw spindle or Automatic Collet Closer is used to draw the Step Chuck back into the Closer. The Step Chuck is closed by the 10° taper on the outer periphery. With pins placed in the Closer and holes drilled in the Step Chuck to correspond, pieces may be held to predetermined length.

We carry 2", 3", 4", 5" and 6" Step Chucks and Closers for all Hardinge headstocks. They are 3/8" larger in diameter than the rated size, so the full capacity step may be readily applied. Step Chucks may be purchased in a finished form, split only, or split and stepped to specifications. Many users purchase Step Chucks which are split only and then apply the desired steps while the Step Chuck is in place assuring dead accuracy of the steps in relation to the headstock.

There are two reasons why we designed our Step Chucks to be used with a Closer for each size, rather than having an angular dimension on the back to reduce the number of closers required. (1) To have the steps in correct relation to the point of closing contact shown by line A-B on the diagram to the right. (2) To decrease the overhang, which means greater accuracy.

Circular Form Tools: Circular form tools of dependable accuracy are necessary for modern manufacture. Hardinge precision ground circular form tools are the result of many years' experience in the requirements of the screw machine industry. We manufacture circular form tools for all makes of automatic screw machines, chucking machines and turret lathes. The tools are made from selected steel and are heat-treated in keeping with our exclusive methods developed through years of careful investigation and research. Quotations on the particular tools you need will be sent promptly if you will forward us a drawing of the tool or finished part, sample of the part or sample of the tool desired.

You may also purchase standard Hardinge cut-off tools for use on your Hardinge Precision Second Operation Machines, as well as your automatic and hand screw machines.

**PERFORMANCE FEATURES OF HARDINGE SECOND OPERATION MACHINE**

**SPEED**

1. Proper cutting speeds for smallest size to capacity.
2. Perfect finish without polishing.
3. Allows use of tungsten carbide and diamond tools.
4. Absence of vibration.

**ACCURACY**

1. Positively no radial play.
2. Positively no end play.
3. Turns perfectly true piece.

**DESIGN**

1. Super-precision preloaded ball bearings requiring no attention.
2. Ball bearings fully sealed to exclude foreign matter.
3. Well proportioned to give ideal balance, performance and long life.
BRACED BENCH MOUNTING

FOR

HARDINGE HIGH SPEED PRECISION LATHE

DESCRIPTION OF BRACED BENCH

The bench top is manufactured from clear hard northern maple, being made of narrow strip laminations which are glued up with edge grain working surface. It is reinforced with three 3/0" tie bolts running entire width of top to prevent warping or distortion. The bench top dimensions are 60" x 30" x 2-1/4" thick.

The top is supported by 1-3/8" diameter steel legs which are held extremely rigid by 1/2" diameter angular tension rods. Each tension rod has a right hand and a left hand thread to increase or decrease tension as desired—there is no chance for movement of the bench top since the tension rods are at an angle. (This feature eliminates vibration.) The steel legs are provided with a height adjustment to overcome floor irregularities. A swinging collet board, furnished as standard equipment, and the 14" x 20" x 5" steel drawer provide storage space for machine attachments.

The precision lathe, braced bench and drive are shipped completely assembled and wired ready for operation by connection of the motor to the power line.

DESCRIPTION OF DRIVING UNIT

A standard two-speed reversing motor is vee belt connected to a driveshaft. A three step pulley provides six forward and six reverse spindle speeds. The motor is felt mounted on an isolated shelf, eliminating the possibility of vibration.

The driveshaft is supported by self-aligning ball bearings. Individual adjustment is provided to maintain proper tension for the belts. The ball levers operate two electrical motor controls, one for LOW-STOP-HIGH and the other for FORWARD-STOP-REVERSE spindle speeds. Both levers are provided with stops for immediate location of speed positions. The unit provides six forward and six reverse speeds ranging from 265 to 2500 r.p.m.

For Machine Specifications—See Bulletin OB.

Bulletin CM