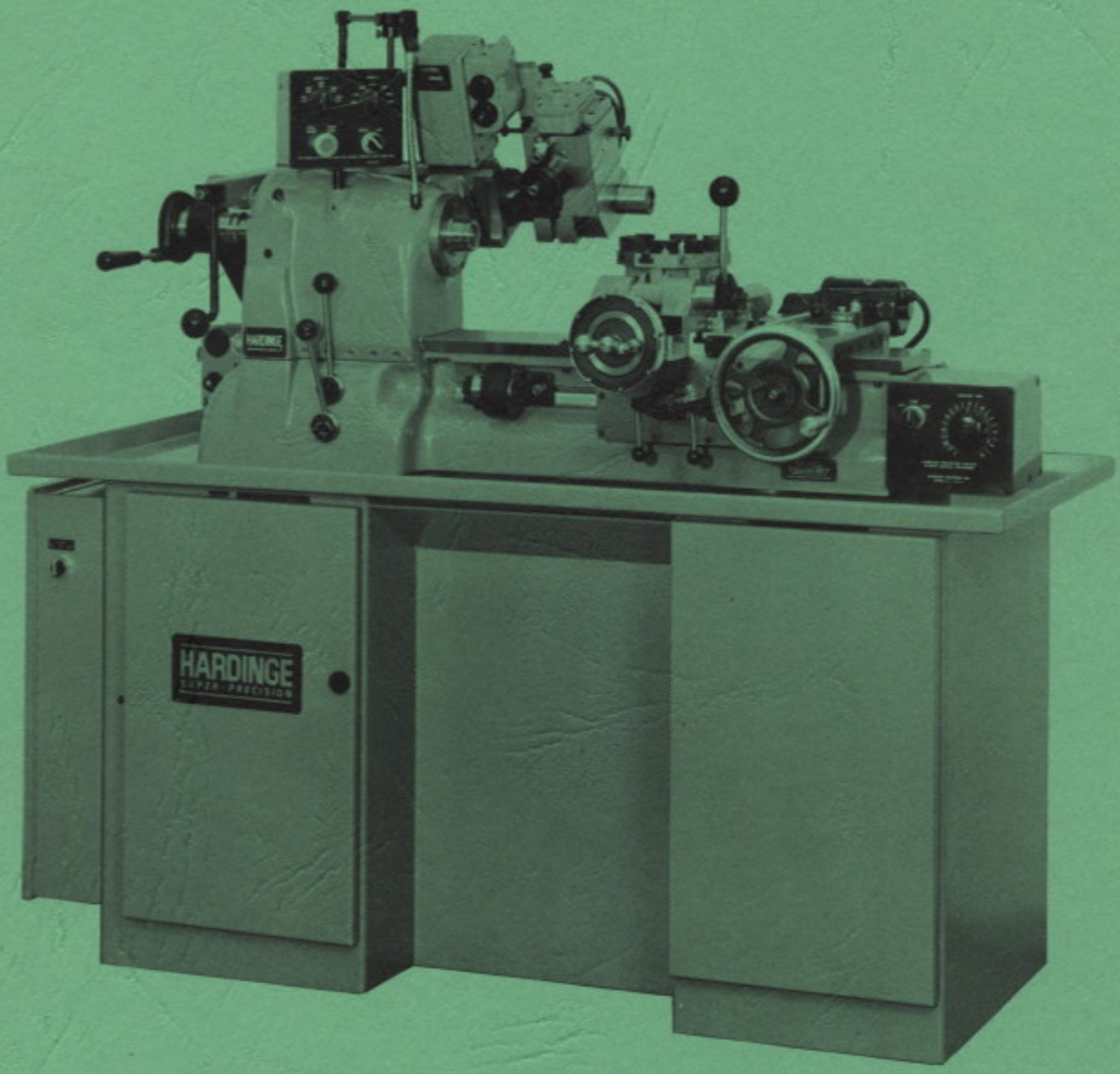
HARDINGE®

OPERATOR'S MANUAL



HARDINGE HIGH SPEED SUPER-PRECISION® HC CHUCKING MACHINE

CONTENTS

NOTE: For complete schedule of preventive maintenance, see Maintenance Manual for HC Chucking Machine.

LUBRICANTS
(Use Recommended Product or Equivalent)

Product	Vendor
Spindle Oil (Velocite No. 6)	Mobil Oil Corporation
Cosmolube #2	Houghton, E. F. and Company
Molylube (Anti-seize)	Bel Ray Company, Inc.
Vactra Oil No. 2	Mobil Oil Corporation
Automatic Transmission Fluid Mobilfluid 350	Mobil Oil Corporation

INSTALLATION

DO NOT REMOVE MACHINE FROM SKID before moving machine to the location where it is to be used.

Remove crating. Remove four bolts which hold machine to the shipping skid. There are two bolts at the extreme left-hand end inside pedestal and two at the right-hand end.

The machine may be removed from the skid by either a crane or fork lift truck. Lifting with a crane, the rope or cable sling should be arranged as shown, Figure 1. NEVER LIFT MACHINE WITH ROPE OR CABLE AROUND SPINDLE, BED OR ATTACHMENTS. The rope or cable must be capable of withstanding a weight of 2,000 pounds.

When using a lift truck, adjust forks to go in between top planks of skid and bottom of pedestal base. Lift machine slowly, checking to see that the correct balance is obtained. **Use caution, as machine has somewhat more weight at the front and is more easily tipped using the lift truck method than the crane and sling method.**

After skid has been removed, place machine directly on location where it is to be used.

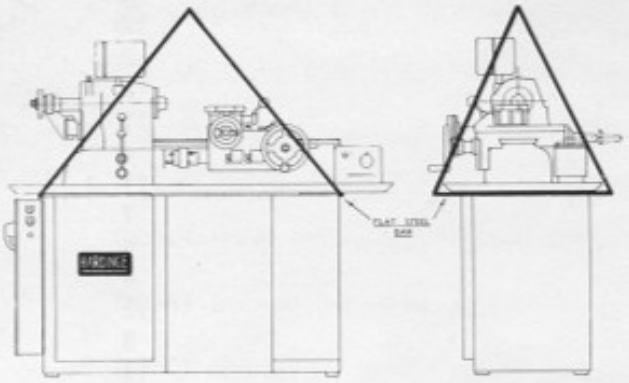


Figure 1 - Lifting Machine With Sling

MACHINE FOUNDATION

The HC Chucking Machine will operate without the need of special foundations. A substantial wood or concrete floor, fairly flat and of sufficient strength to support machine properly, is satisfactory. Do not locate machine near equipment that causes vibration which will transmit to the machine, as poor work finish may result.

LEVELING MACHINE

The HC Chucking Machine has a three-point arrangement between bed and pedestal base which makes accurate leveling unnecessary. Leveling should be such as to be reasonable and so that, when coolant is used, it will drain back into sump from ends of pan.

There is an adjustable foot at the right rear corner of the pedestal to compensate for uneven floor conditions. To adjust foot, loosen socket set screw and raise or lower foot with a pin wrench so that all four feet rest firmly on the floor. Tighten socket set screw to retain setting.

Should floor conditions be such that adjustable foot is inadequate for leveling, it may be necessary to use shims under pedestal feet.

REMOVE THE RED CLAMP which is located inside the motor compartment under the headstock. The clamp was installed to make a rigid connection between the bed and pedestal base FOR SHIPPING ONLY. Remove cloth wrap and rust-proof paper from variable speed drive assembly. Remove two styrofoam blocks from pulley assembly.

CLEANING MACHINE

USE A CLOTH OR BRUSH TO CLEAN THE HC CHUCKING MACHINE. DO NOT CLEAN MACHINE WITH COMPRESSED AIR. The use of compressed air for cleaning reduces the life of the machine as small particles of dirt and other foreign matter may be forced past seals and wipers into slides and bearings.

After machine has been properly located, leveled, AND SHIPPING CLAMP REMOVED, wash off all shipping grease, oil and dirt accumulated in transit with a good grade of grease solvent.

Clean motor compartment. Remove all grease from pulleys and brake drum and wipe dry. Rotate pulleys by hand to see that all grease has been removed. DO NOT REMOVE LUBRICANT FROM COUNTERSHAFT.

Remove all shipping grease from variable speed vertical screw "A", Figure 2. **Lubricate nut at grease fitting "B" with Houghton Cosmolube #2** and oil vertical screw with light oil for first "Run-In" only. **Lubricate grease fitting "B" monthly or more often if necessary.** Add a few drops of light oil to brake cork "C", Figure 3. Clean tool storage compartment. Put bottom tool shelf in place. See pages 7 and 8 for additional lubrication points.

ELECTRICAL CONNECTIONS

The Hardinge HC Chucking Machine is shipped completely wired and assembled. Toggle Switch "E", Figure 4, is in the "Off" position and must be left "Off" until machine has been checked for direction of spindle rotation. This is to prevent speed change motor from being run in reverse.

Entrance to switch case is made at any convenient place. Remove fibre board cover on disconnect switch "D" and make electrical connections on line side of disconnect switch. Ground connection is

made at point "F".

To check rotation of spindle, apply a collet to the machine spindle to anchor collet closer. Close and secure switch case and turn disconnect switch "A", Figure 5, to "On".

Place lever "J", Figure 6, in range 1 position. Pull "Master Start-Stop" button "L", Figure 6, and pull out stop pin "G". Place lever "H" in forward position. Spindle should rotate counterclockwise when viewed from turret end of machine. Push "Master Start-Stop" button "L" to stop machine.

If the spindle does not turn in the correct direction, **disconnect electric power source,** and interchange any two leads at line side of disconnect switch "D", Figure 4. When spindle is rotating correctly, turn toggle switch "E" to "On" position. Secure switch case door. Turn disconnect switch at "A", Figure 5, to "On".

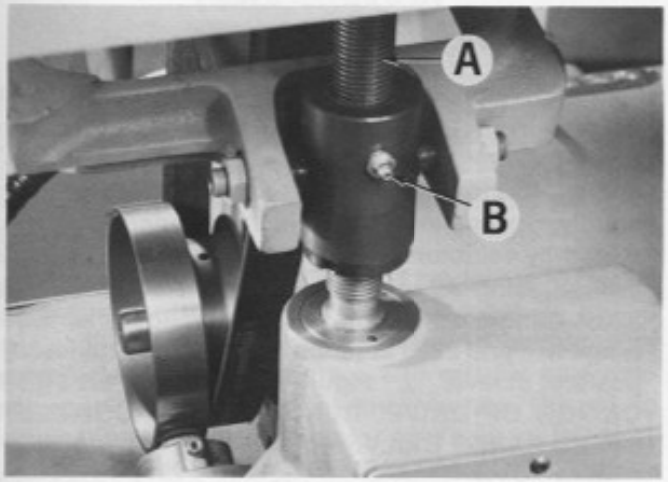
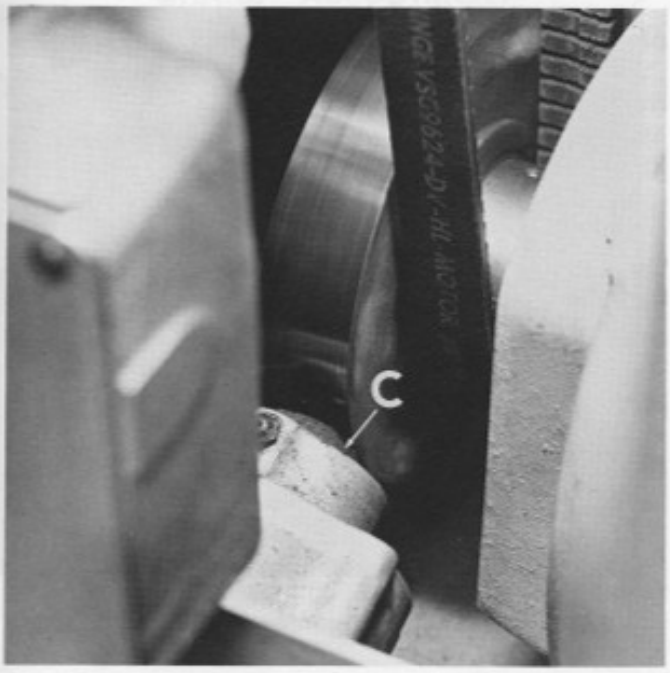


Figure 2—Speed Change Mechanism

Figure 3—Spindle Brake



If the power is connected incorrectly and the speed change mechanism operated, the drive will run all the way to the top or bottom, and trip a safety limit switch. To back the drive off the safety limit switch, push "Master Start-Stop" button "L", Figure 6. Turn the variable speed operating screw "A", Figure 2, by hand five full turns to raise or lower driving unit off the safety limit switch.

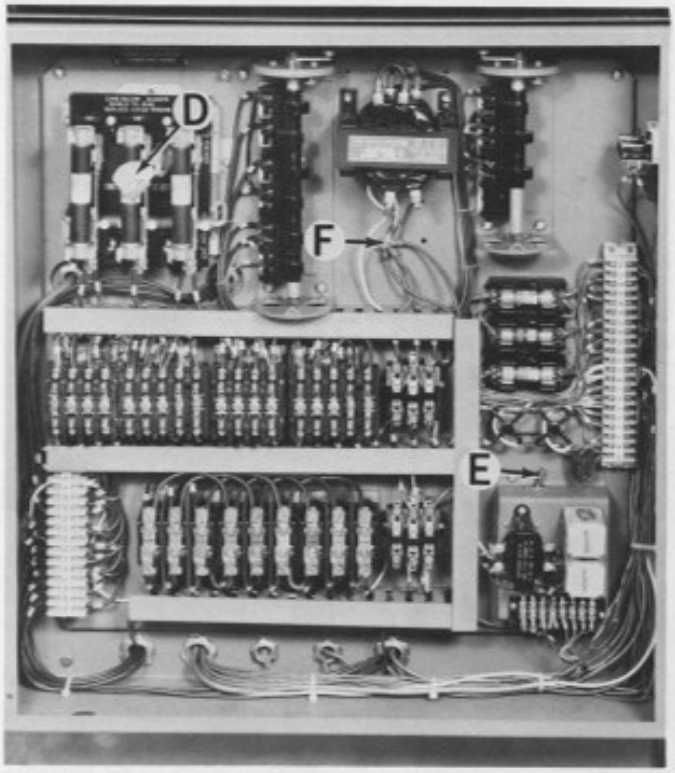


Figure 4—Electric Switch Case

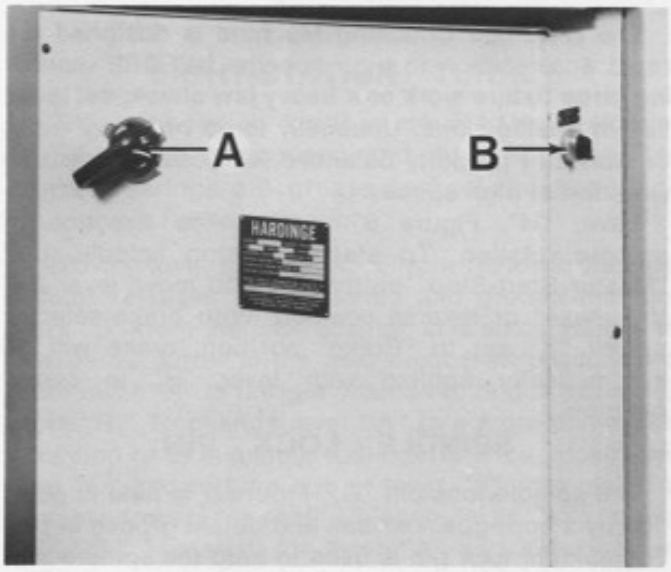


Figure 5—Switch Case Controls

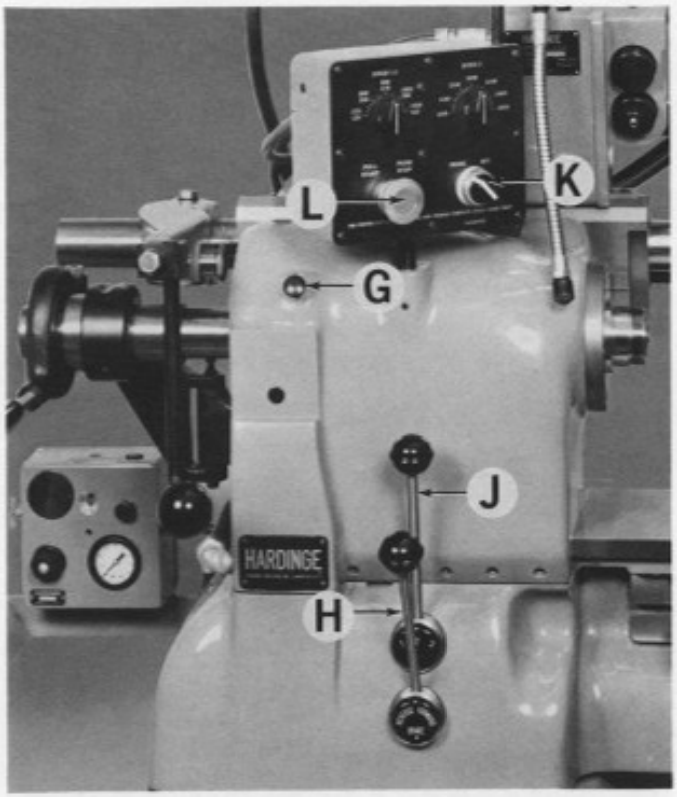


Figure 6—Control Head And Bed Levers

— OPERATING INSTRUCTIONS —

SPINDLE CONTROL LEVERS

Control lever "J," Figure 6 is connected to a cam switch in the electric control panel which, in the case of speeds two and three, operates the speed change motor causing the vertical screw to raise or lower the countershaft pulley assembly which changes the spindle speed.

Speeds in the number one range are obtained through the use of low speed of the 3:1 ratio motor.

The Hardinge Chucking Machine is designed for rapid acceleration to high speeds. **BEFORE mounting large fixture work or a heavy jaw chuck, set lever "J" in position one.** Unusually large or heavy work, or work not properly balanced, will cause excessive vibration at high speeds.

Lever "H", Figure 6, controls the direction of spindle rotation. To start and stop spindle, pull "Master Start-Stop" button "L" and move lever "H" to forward or reverse position. With brake selector switch "K" set to "Brake" position, brake will be automatically applied with lever "H" in center position.

SPINDLE LOCK PIN

The spindle lock pin "G," Figure 6, is held in position by a springbacked ball and detent groove in pin. The spindle lock pin is used to hold the spindle stationary when applying or removing spindle nose attachments, adjusting collet closer, or when applying and removing work from box type fixtures or threaded arbors.

To engage lock pin, turn spindle by hand (see instructions below) and hold lock pin "In" until it engages in drive pulley of spindle. Pull out lock pin "G," before starting machine as **LOCK PIN IS ELECTRICALLY INTERLOCKED WITH THE MAIN DRIVE MOTOR** and must be withdrawn before machine will start.

FREE SPINDLE

To permit turning of spindle by hand, pull "Master Start-Stop button "L", Figure 6, and place lever "H" in the "Brake" position. Turn brake selector switch "K" to "Off" position. Pull spindle lock pin "G" out. The spindle will rotate by hand more freely after machine has been run at any speed over 1100 RPM.

SPINDLE DRIVING UNIT

The driving unit provides infinitely variable spindle speeds from 125 to 3000 RPM both forward and reverse. The selector lever "J," Figure 6, will give a choice of three pre-determined spindle speeds instantly. Speeds in each of the three ranges are determined by selectors "A" and "B," Figure 7. Example: With selector "A" set at 200/600 and selector "B" set at 2200, spindle speed will be 200 in range one, 600 in range two and 2200 in range three in accordance with position of lever "J," Figure 6. **FOR PROPER LUBRICATION OF DRIVE, RUN THROUGH COMPLETE SPEED RANGE DAILY.**

The spindle speeds should be pre-selected to suit each particular job depending on material, diameter, type of cut and tool to be used.

Figure 7—Control Head

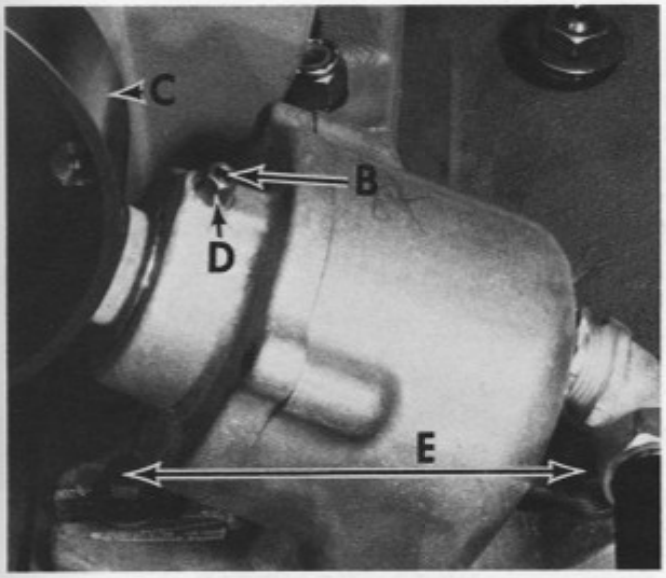


Figure 8—Spindle Brake

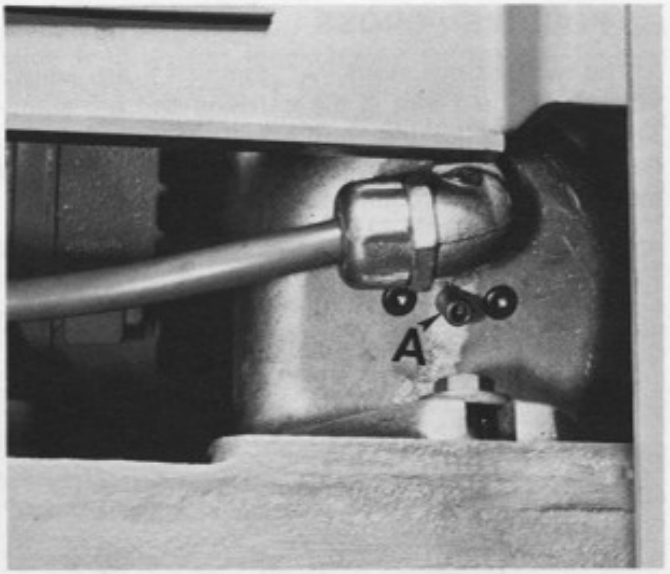


Figure 9—Spindle Brake Adjustment

SPINDLE BRAKE

The spindle brake is built for rapid but gradual stopping of the precision headstock spindle at all speeds. The brake is automatically applied when lever "H", Figure 6, is placed in center position and selector switch "K", Figure 7, is in "Brake" position.

The brake drum "C", Figure 8, is located directly on the main drive shaft. The brake insert is forced against the brake drum by spring action and solenoid released. **Spindle brake will be automatically applied in the event of power failure.** The spring automatically compensates for brake wear. DO NOT ALLOW CORK INSERT TO BECOME DRY. Oil occasionally with a few drops of spindle oil. Allowing cork to become dry will reduce belt life excessively.

BRAKE ADJUSTMENT

After considerable use, it may be necessary to adjust brake. Pull "Master Start-Stop" button "L", Figure 7, and turn switch "K" to "Off". Turn adjusting screw "A", Figure 9, counterclockwise until there is .010 to .013" clearance between cork insert and brake drum.

BRAKE CORK REPLACEMENT

Loosen two bolts "E," Figure 8, and remove brake for easy access to cork. Loosen locknut "D," Figure 8, and loosen keyway guide screw "B". Turn adjusting screw "A," Figure 9, counterclockwise until cork housing is free from brake. Push cork out by means of threaded hole in bottom of housing. Insert new cork, making sure it bottoms in housing. Replace housing in brake. Bottom screw "B," Figure 8, in keyway of brake housing. Back screw "B" out 1/4 turn and lock nut "D". When brake is securely bolted in place, follow instructions under "Brake Adjustment", above.

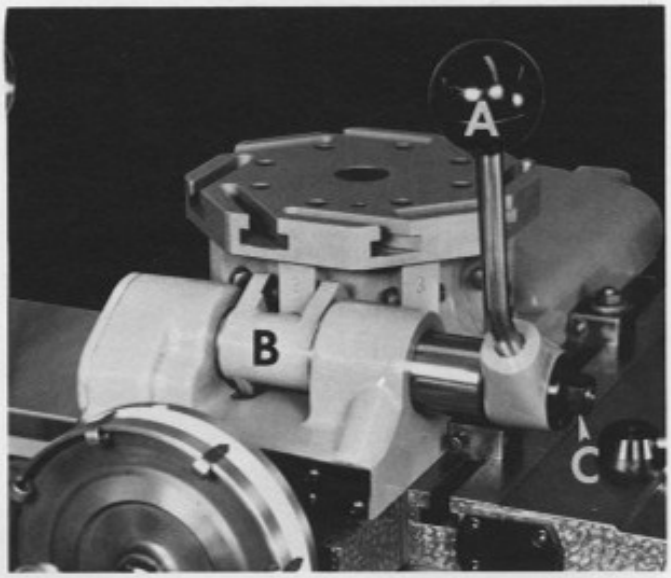


Figure 10—Turret

EIGHT-STATION TURRET

The eight-station turret is mounted on preloaded ball bearings for accuracy and absolute rigidity. The turret bearings are grease-packed and sealed, requiring no further attention.

Moving lever handle "A," Figure 10, toward the operator releases the hardened and ground indexing fork "B" from the lock position and automatically indexes the turret to the next numbered position. Return lever "A" to upright position to relock turret with fork "B." To change lever "A" to a more convenient position or to eliminate tool interference, loosen hex nut "C" and rap the hub of lever "A" with mallet to release from taper shaft. Relocate lever "A" and lock nut "C." The shaft for lever "A" and indexing fork "B" is mounted on ball bearings which are grease packed and sealed for life.

POSITIVE CROSS SLIDE STOPS

The two positive stops "A," Figure 11, are adjustable along the T-slot in the carriage and are standard equipment for the Hardinge Chucking Machine. Each stop has an adjustable stop screw "B" with a lock screw "C" to retain its setting.

The hardened stop block "D" is a slip-fit on dowel pin "F" and is held to the cross slide with screw "E". When changing to an indicator stop, remove screw "E" and pull block straight off dowel pin "F". A four position barrel stop or a single position stop with .0001" indicator is available as extra equipment. See Page 23.

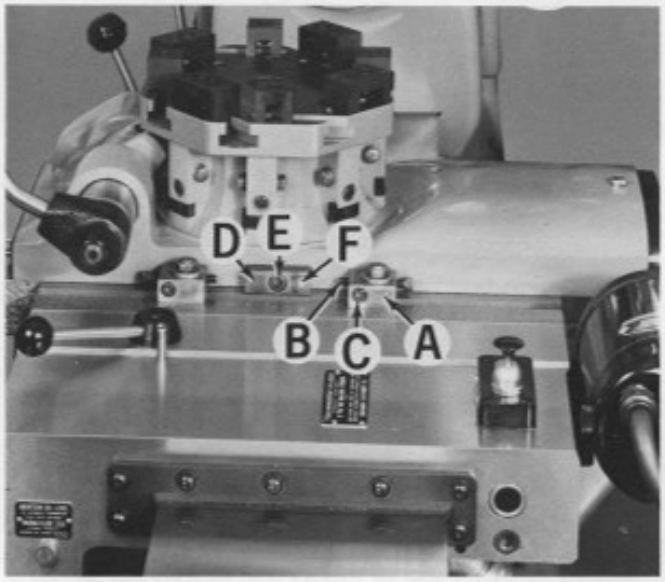


Figure 11—Cross Slide Stops

CROSS FEED DIAL AND REFERENCE SCALE

Each graduation of the Hardinge easy reading black and white cross feed dial indicates a change of .001" on diameter, Figure 13. The cross feed dial has eight movable reference clips as an aid to the operator in rapidly returning to predetermined machining locations.

The reference scale "B," Figure 12, with its eight movable clips is a further aid in providing a ready reference to machining positions when cross slide travel requires multiple turns of the cross feed dial.

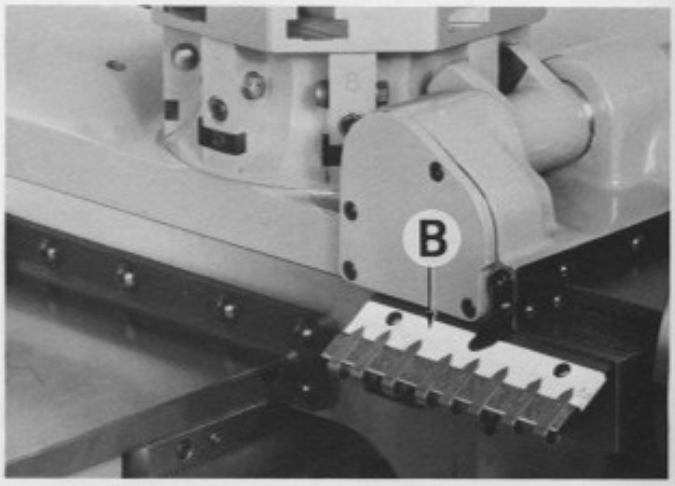


Figure 12—Cross Feed Reference Scale

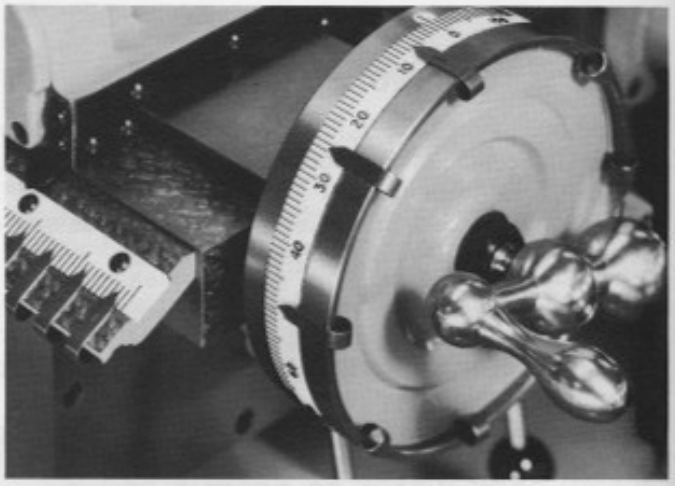


Figure 13—Cross Feed Dial

CARRIAGE STOP DRUM

The carriage stop drum "A," Figure 14, is used to position the carriage along the bed. The entire stop assembly is adjustable along T-slot in the machine bed by loosening nut "B." Lock nut "B" tight after moving to retain stop settings. There are eight adjustable stop screws "C," one for each turret station. The settings of the carriage stop screws "C" are retained by lock screws "D." In operation, most setups can be made by using only one, two or three of the stop drum positions. Length differences of work steps can be made by moving turret tools. By limited use of the number of stop screws, it is easier to set up as well as speed up operations.

CARRIAGE HANDWHEEL DIAL

Carriage handwheel dial "A," Figure 15, may be positioned for operator's convenience by loosening thumb screw "B." Turn dial by hand to desired location and tighten screw "B." Each graduation of this Hardinge easy reading black and white dial indicates a carriage movement of 1/64".

CARRIAGE LUBRICATION

Keep oil reservoir "A," Figure 16, full with Mobil Vactra Oil No. 2 or equivalent. Maintain oil level in sight window "B." To lubricate carriage and bed ways, lift plunger, hold briefly and release, allowing plunger to return of its own accord. Operate pressure oiler as often as required to keep bed ways wet with oil or a minimum of once daily.

CLUTCH AND GEAR BOX LUBRICATION

Keep oil in apron assembly in sight window "C," Figure 17. Add oil by removing cap "D," Figure 16. Use automatic transmission fluid Mobilfluid 350 or equivalent. Change oil every 60 days. To drain oil, remove magnetic drain plug "E," Figure 17.

CARRIAGE LOCK

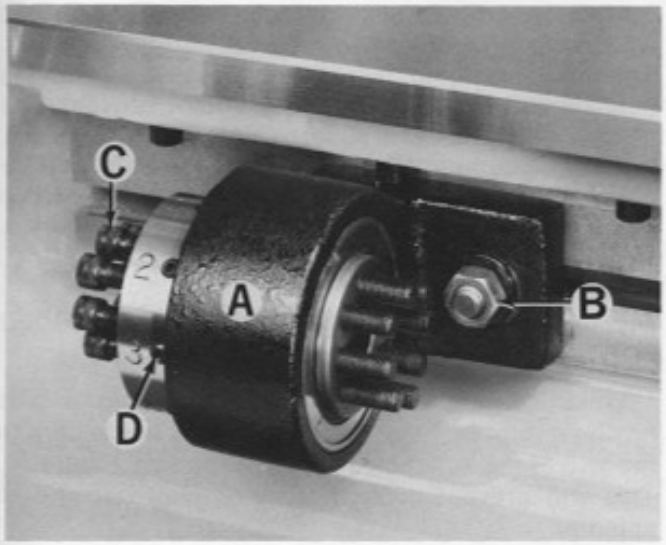
The carriage lock is used to hold the carriage in a fixed position on the bed when heavy facing operations are involved. The carriage lock handle "F," Figure 16, is shown in the released or unlocked position. Moving the ball lever toward the operator locks the carriage in position.

CARRIAGE CLUTCHES

The carriage power feed clutches are of the friction type designed to slip when carriage or cross slide engages stops.

The friction clutches have sufficient power to handle all work for which machine is intended yet slip when contact is made with a stop. This slipping of the clutches is a feature of the machine and does not affect performance. If the clutch slips under cut it is a sign of improper or dull tool or excessive feed. **THE CLUTCHES ARE A SPRING-LOADED ARRANGEMENT AND CANNOT BE ADJUSTED FOR MORE PULLING POWER.**

Figure 14—Carriage Stop Drum



Power feed clutch "F," Figure 17, controls cross slide feed. Power feed clutch "G" for longitudinal feed controls feed of the carriage along the bed. Raise ball-handled lever to engage clutches and push down to release. See Page 8 "Power Feed."

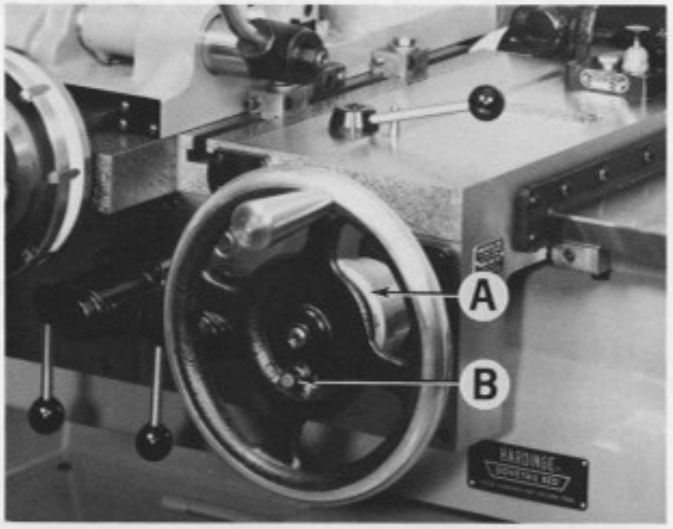


Figure 15—Carriage Handwheel Dial

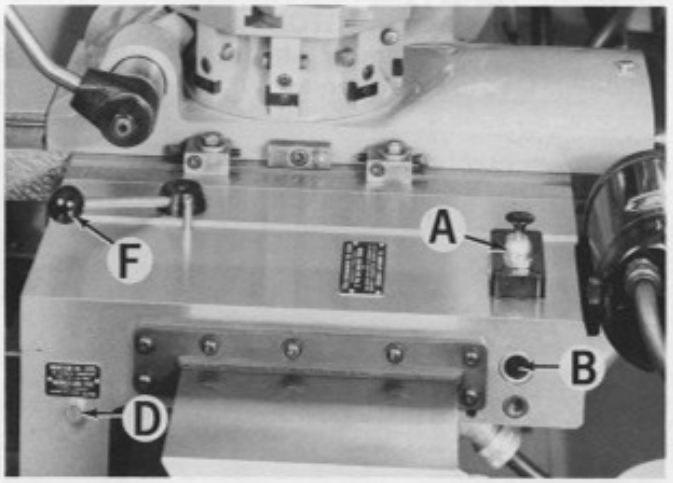
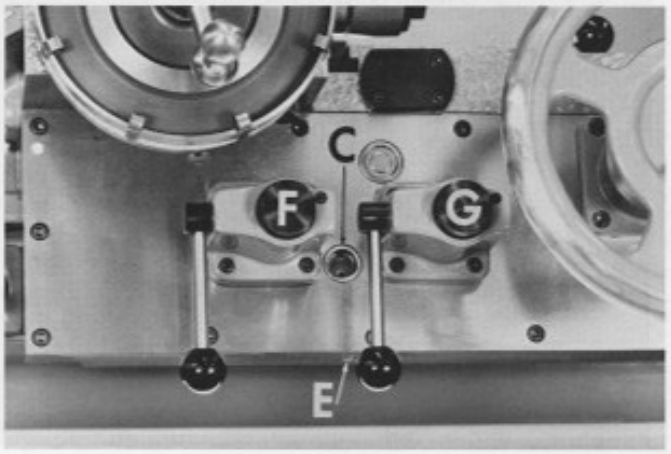


Figure 16—Carriage Lubrication

Figure 17—Carriage Clutches



POWER FEED

The carriage feed is powered by a direct current, totally enclosed, ball bearing motor mounted on the carriage. The motor is connected to the clutch assembly by drive shaft and gears.

110 volt alternating current is fed from the main electric control panel at the left-hand end of the pedestal base to the power feed control panel at the right-hand end of the machine. Here it is converted by silicon rectifiers to direct current for the power feed motor.

To start the power feed, position **"SELECTOR"** switch "A," Figure 18, to the **"LEFT"** position. **MACHINE MUST BE RUNNING BEFORE POWER FEED WILL OPERATE.**

The **"LEFT-RIGHT"** switch is used to reverse the power feed motor. Select the direction of feed required by positioning the **"LEFT-RIGHT"** selector switch accordingly. When placed in **"LEFT"** position, carriage will feed toward left or toward headstock. When in **"RIGHT"** position, carriage will feed toward right. When placed in **"STOP"** position, power feed motor is off. When selector is in **"LEFT"** position, cross slide will feed toward operator. When in **"RIGHT"** position, cross slide will feed away from operator.

In operation, the carriage is advanced with the handwheel until the turning or boring tool is next to the work. Then the carriage clutch is engaged. The rate of carriage feed can then be increased or decreased by turning the feed control knob "B" on

Figure 18—Power Feed Control Box

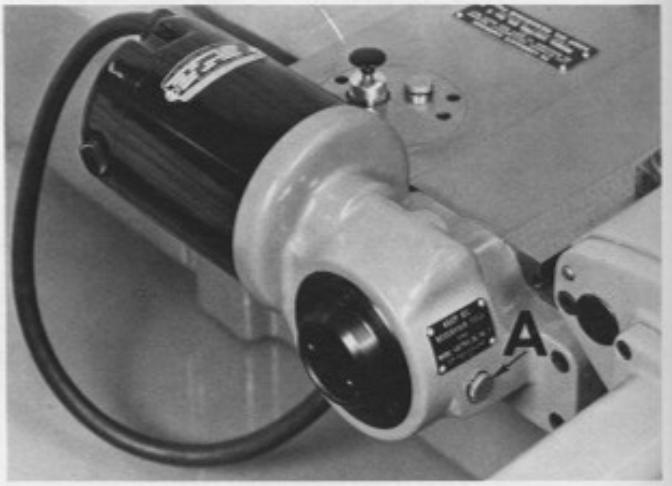


Figure 19—Power Feed Assembly

the electric control panel. The rate of feed is determined by material being cut and the finish required. The rate of feed may be changed while the tool is under cut. Experience has shown that it is best to make a few sample pieces to determine the spindle speed and rate of feed that is best suited to give desired surface finish and production rate. When making the test run, record the number at which the power feed control knob was set when best results were obtained. Then, on the production run, the operator can set the control knob to the reference numbers on the face of the control panel and obtain the same results as the test run. Numbers do not represent either thousandths per revolution or inches per minute. Lubricate power feed drive at "A," Figure 19, with Mobil Vactra Oil No. 2 or equivalent. Keep oil reservoir full.

COOLANT FACILITIES

All Hardinge Chucking Machines are provided with coolant facilities required for high speed work. The coolant pump is located directly behind the headstock and is individually motor driven. The coolant pump is controlled by switch "B", Figure 5. In "On" position, coolant pump will run continuously. In "Auto" position, pump will run only when machine is running. When coolant is not required, selector switch is set in "Off" position.

OIL BASE CUTTING FLUIDS ARE RECOMMENDED FOR MAXIMUM MACHINE LIFE.

When coolant is used while machining a part having a through hole, apply a thermos bottle cork to the end of the collet closer tube as shown, Figure 22. This will prevent coolant from running out end of spindle.

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

MACHINE SERIAL NUMBER

The serial number for the HC Chucking Machine is located at the rear of the bed at the turret end. The machine serial number should be included in all correspondence regarding this machine.

TO REMOVE COLLET CLOSER

The collet closer should be removed from the machine when using jaw chucks, face plates, fixture plates or other nose type fixtures.

Running the machine with the collet closer in place without a collet will cause damage to the collet closer.

To remove the collet closer, remove link pin "A," Figure 20, only. This pin is easily removed by pulling up and out with fingers.

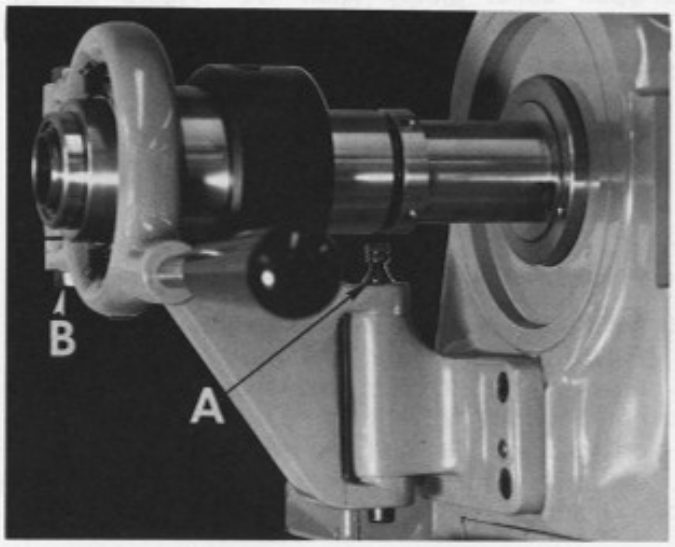
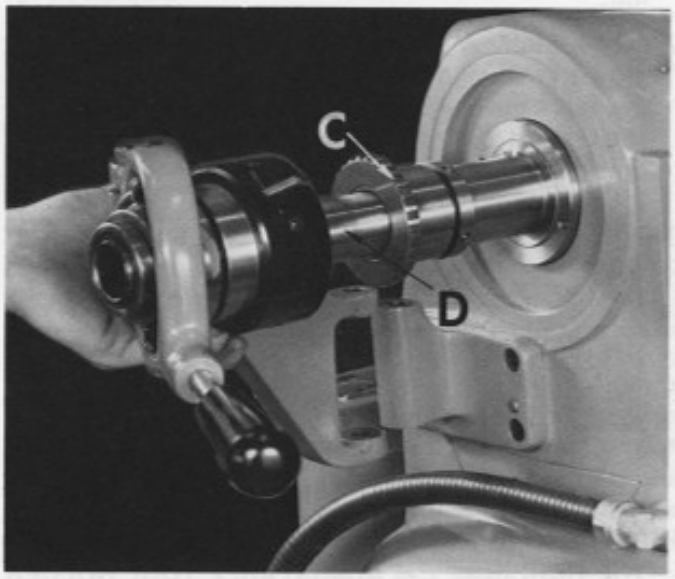


Figure 20—Collet Closer Link Pin

DO NOT REMOVE COLLET CLOSER BY REMOVING SCREWS "B," FIGURE 20. These screws are adjusted at the factory for proper operation of the collet closer. Remove collet closer as shown in Figure 21. To remove adjusting nut "C," pull straight off end of spindle. **DO NOT TURN ADJUSTING NUT — IT IS NOT THREADED TO SPINDLE.**

Figure 21—Collet Closer Removal



The collet closer should be removed periodically for cleaning to prevent loading of chips between collet closer tube and inside of spindle and collet threads.

TO REPLACE COLLET CLOSER

Clean the inside of the headstock spindle before applying collet closer. Also, clean outside diameter at rear of spindle where adjusting nut locates. Clean collet closer tube inside and out.

DO NOT FORCE ADJUSTING NUT ON SPINDLE. If adjusting nut goes on tight, remove and examine for burrs or scratches.

Apply a film of light oil on rear of headstock spindle and replace adjusting nut "C," Figure 21.

Apply a film of light oil on bearing, section "D," of collet closer tube, replace closer and insert link pin "A," Figure 20.

TO ADJUST COLLET CLOSER

1. Apply the desired size collet or step chuck to the machine spindle. Collet or step chuck and spindle must be clean. **Examine collet or other workholding device for signs of wear or fatigue.**

   Note: When using a step chuck, a closer must be used.

2. Open collet closer latch "A," Figure 22, by pressing down at point "B."

3. Engage the collet closer tube on the collet or step chuck and thread about two turns only. To turn the collet closer tube, the operator, using his left hand, turns the black shell guard "C," Figure 22, forward while he holds the collet or step chuck in place with his right hand.

4. Place a work piece in the collet or step chuck.

5. Lock spindle by pressing in spindle lock pin "E," Figure 22. To engage lock pin "E" into notches provided, turn the spindle by hand until pin enters notch to lock. Move lever "D," to the extreme left or closed position and turn shell guard "C" toward the operator until it is drawn up as far as it will go by hand.

6. Move lever "D" forward to the released position and turn shell guard "C" toward operator so that latch "A" advances two notches on the adjusting nut.

7. Close latch "A" and test collet closer for tension on work. Should additional gripping pressure on the work be required, open latch "A" and turn shell guard "C" toward operator. For less gripping pressure, turn shell guard "C" away from operator.

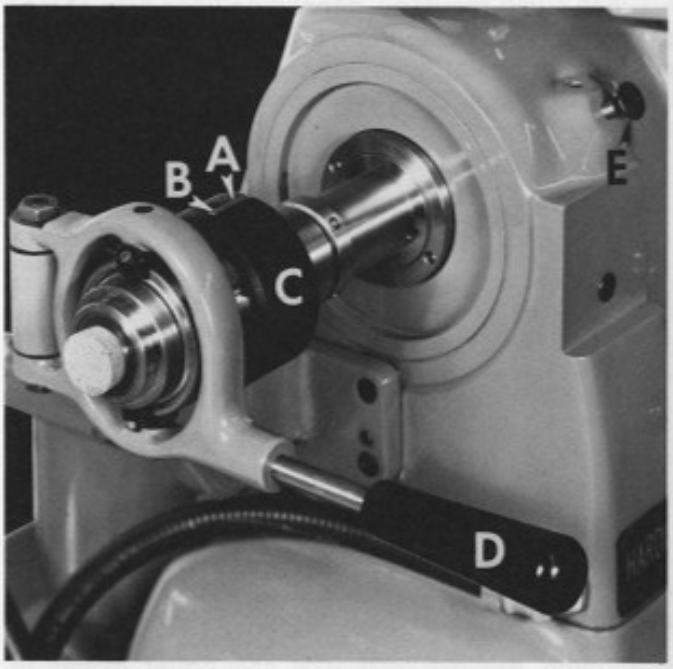


Figure 22—Collet Closer Adjustment

TOOLING

The following items require special instructions.

THE DRILL AND SHANK TYPE TOOL HOLDER fits directly to the eight-station turret. It is used for holding drills directly or by bushings or for holding releasing tap holders, adjustable holders or any other turret tooling with $^{5}/_{8}$" diameter shank. To locate tool holder on spingle centerline, use setup gage bar mounted in 1" round collet as shown Figure 23.

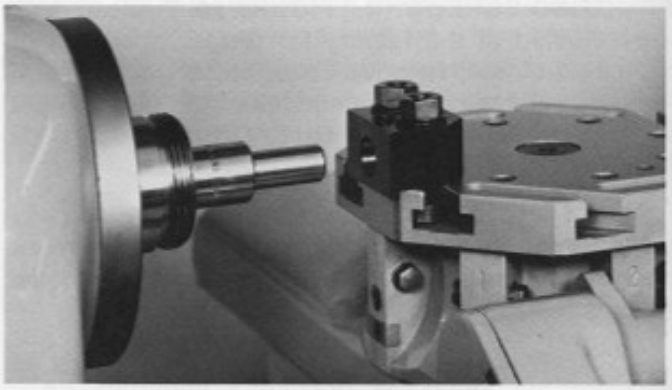
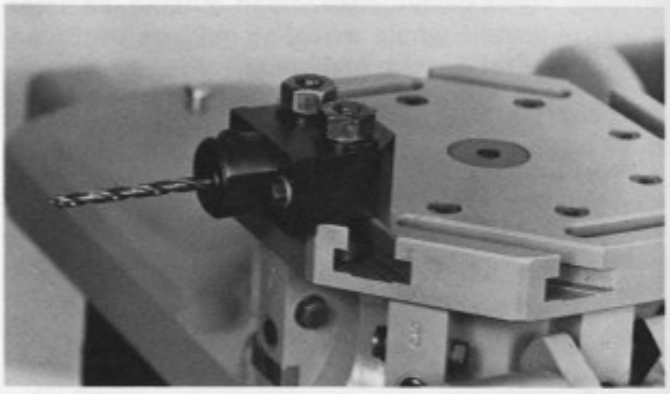


Figure 23—Drill and Shank Tool Holder

THE HARDINGE C-4 ADJUSTABLE TOOL HOLDER permits the setting of center drills, drills, reamers and other end-working tools to the exact center of work piece.

Adjustment is accomplished by loosening two face bolts which will allow movement of tool holder face block for correct alignment of tool. The C-4 holder, Figure 24, holds $^{5}/_{8}$" diameter tool shanks or bushings in a ground-finish hole. To locate tool holder on spindle centerline, use setup gage bar mounted in 1" round collet as shown for drill and shank type tool holder.

Figure 24—Adjustable Tool Holder



— Specifications —

Spindle Construction		Hardinge Preloaded Ball Bearing
SPINDLE CAPACITY	With Round 5C Hardinge Collets	$1^{1}/_{16}$"
	With Hexagon 5C Hardinge Collets	$^{7}/_{8}$"
	With Square 5C Hardinge Collets	$^{3}/_{4}$"
	With 5C Hardinge Step Chucks	$1^{1}/_{16}$" to 6"
	With Jaw Chucks	6"
	With Jaw Chucks (Through Spindle)	$1^{5}/_{32}$"
Spindle Nose Diameter		2.189"
Spindle Nose Thread		$2^{3}/_{16}$" - 10 R.H.
Maximum Fixture Diameter		9"
Maximum Diameter for Threading*		6" External, 5" Internal
Maximum Length for Threading*		1¾"
Maximum Distance from Face of Turret to Spindle		14"
Travel of Cross Slide		4½"
Cross Slide Power Feed Range		$^{11}/_{32}$" to 6¼" per min.
Carriage Power Feed Range		¼" to 10" per min.
Spindle Speeds	Low Speeds	125 to 1100 RPM
	High Speeds	1100 to 3000 RPM
Weight of Machine with Regular Equipment		1750 lbs.

*When equipped with Optional Threading Unit

— Regular Equipment —

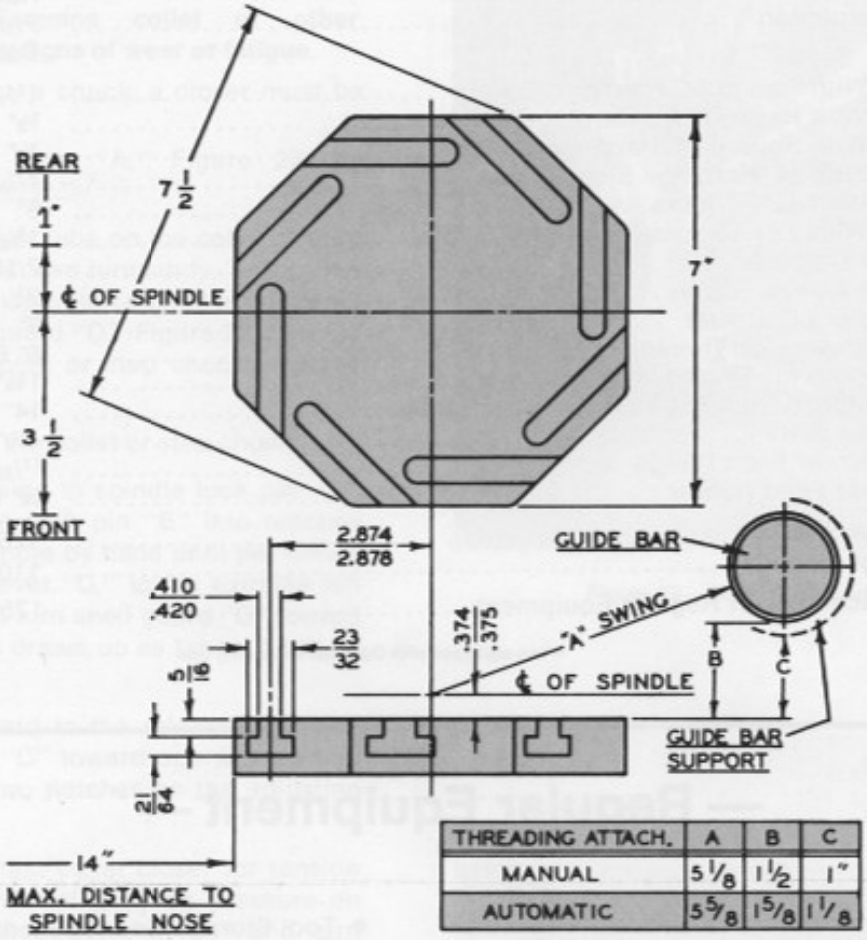
- Fully Enclosed Preloaded Ball Bearing Headstock with coolant shield for spindle
- HARDINGE Dovetail Bed with hardened and ground steel ways
- Ball Bearing Lever Collet Closer
- Power Cross Slide Feed
- Screw Feed for Cross-Slide
- Eight station Cross-Feeding Turret with adjustable stations
- Four Single and Four Double Tool Holders
- Independent Electrical Variable Power Feed for Turning, Facing and Boring
- Welded Steel Pedestal
- Tool Storage Compartment with collet tray
- Automatic Spindle Driveshaft Brake
- Built-in Coolant Facilities with integral sump, self-draining oil pan, and individual motorized pump
- 3 Selector Variable Speed Driving Unit complete with single voltage, 2 speed, reversing motor—125 to 3000 RPM—and lever operated controls for operation on 230 or 460 volt, 60 cycle, 3 phase.
- Magnetic Electric Control Panel with transformer providing 110 volts for push button control circuit; time lag thermal overload relays provide overload protection; low voltage protection is also provided; cam operated, quick make and quick break forward and reverse switches; coolant pump switch; terminal block for direct application of power line—panel is a self-contained unit.

Machine is painted 7B Gray, completely wired and assembled when delivered for operation on (specify electrical voltage)

230 volt, 60 cycle, 3 phase
460 volt, 60 cycle, 3 phase
208 volt, 60 cycle, 3 phase
575 volt, 60 cycle, 3 phase

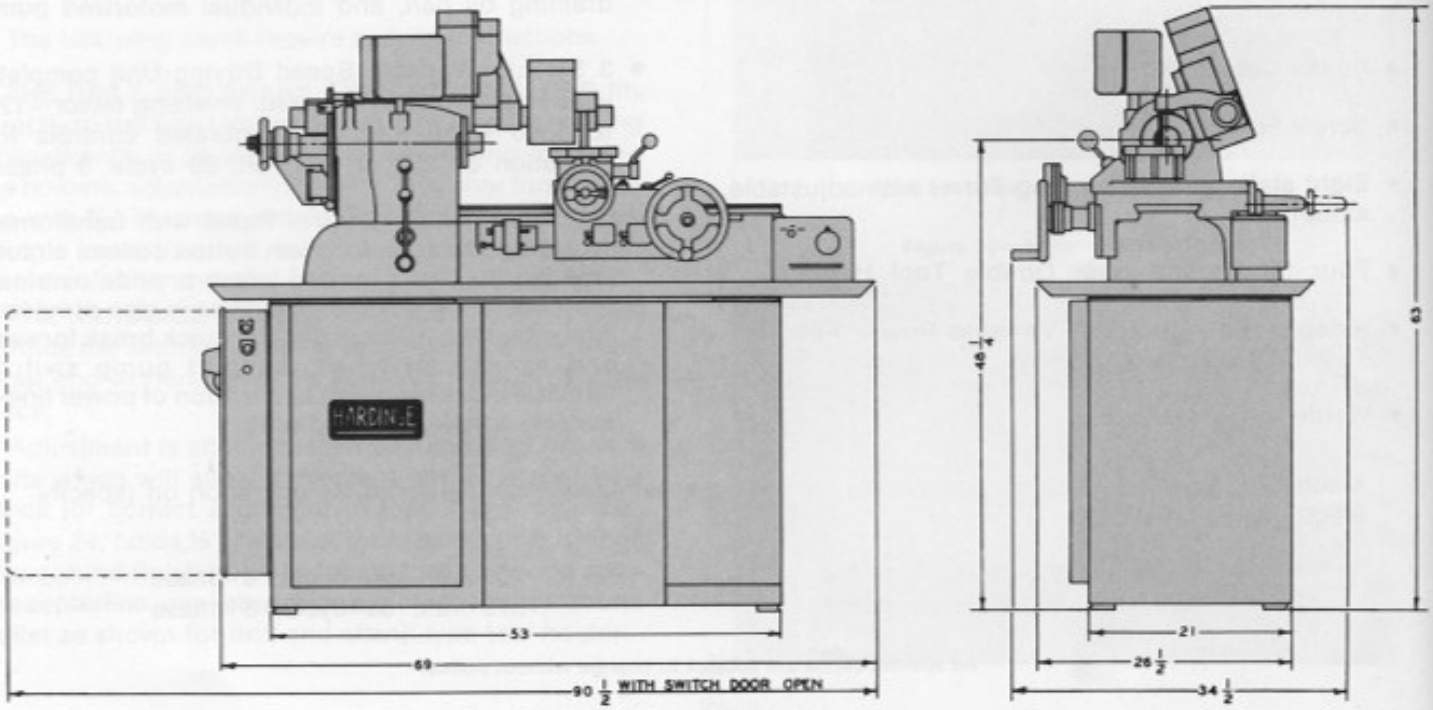
All specifications are subject to change without notice.

— Tooling Dimensions —

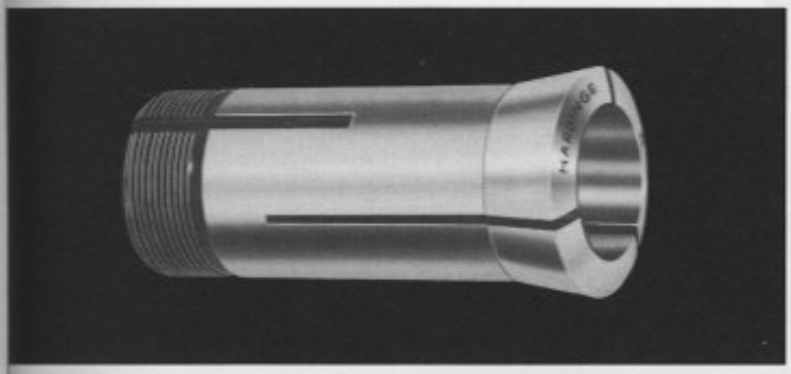


THREADING ATTACH.	A	B	C
MANUAL	5 1/8	1 1/2	1"
AUTOMATIC	5 5/8	1 5/8	1 1/8

— Floor Plan —

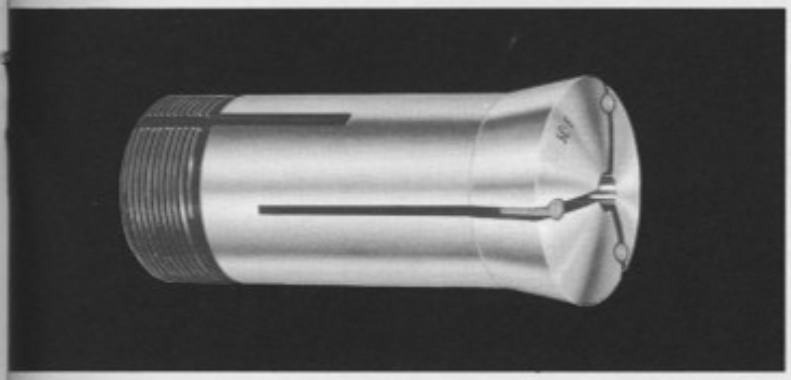


Headstock Tooling



5C HARDINGE COLLETS

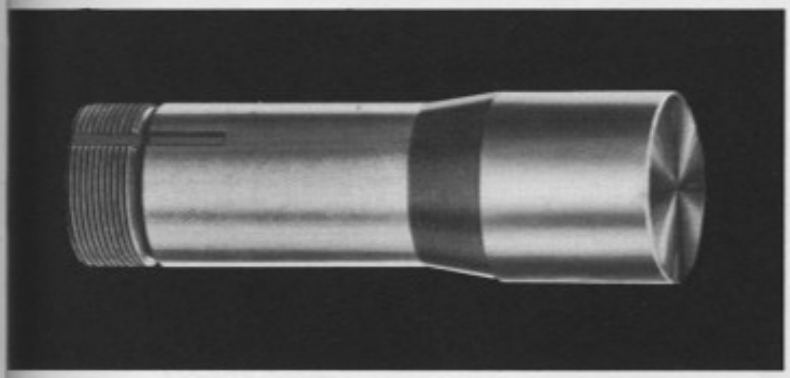
The Hardinge HC takes 5C Hardinge Collets with a capacity of $1^{1}/_{16}$" round, ⅞" hexagon and ¾" square. Extra Capacity 5C-SC Hardinge Collets are available in round sizes to 1⅛", stepped 1½" from face of collet. 5C collets are stocked in .001" increments from .016" to 1.030".



5C-E EMERGENCY COLLETS

For that rush job requiring a step type, odd size or special shape collet, the 5C-E with its soft face and pilot hole permits rapid drilling and boring to exact size.

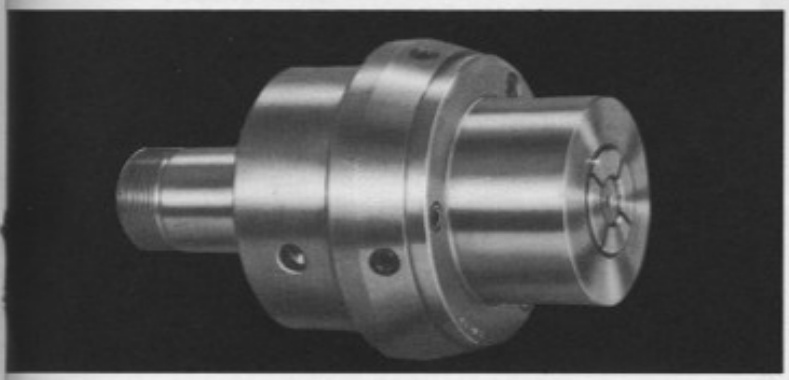
5C-E Emergency Collets are available with ¼", ⅛" or $^{1}/_{16}$" pilot hole or less pilot hole and, in addition, are available with ½" or 1" extended nose.



5C HARDINGE PLUG CHUCK

The collet shank section is finished for direct application to your machine spindle. The nose section is $1^{15}/_{32}$" in diameter and 1¾" long. It can be machined in place for the greatest degree of accuracy to suit your particular requirements for special arbors.

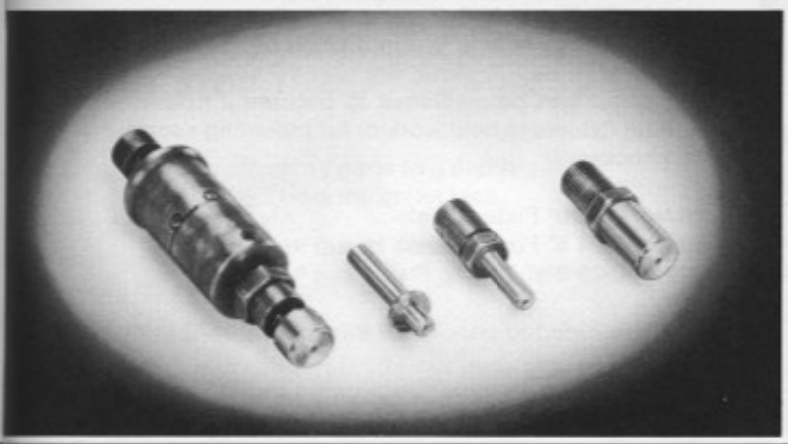
Tool No. L-17



EXPANDING COLLETS

Hardinge Expanding Collets for internal chucking permit many machining operations to be completed in one chucking, assuring precision results. Exact lengths are easily obtained since both the expanding collet and work locating stop have NO END MOVEMENT.

FOR COMPLETE DETAILS REQUEST BULLETIN HA-40

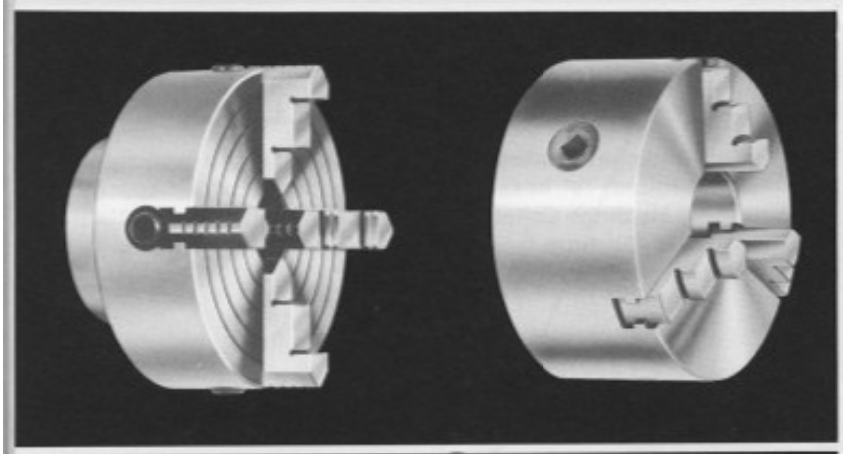


UNIVERSAL COLLET STOP

This stop converts 5C Hardinge collets into solid stop or spring ejector stop collets, without alteration of the standard collets. The application of this stop to the collet requires no machining. In other words, all collets up to and including 1" capacity can be used in the regular manner or as solid stop collets or as spring ejector stop collets.

Tool No. G-10

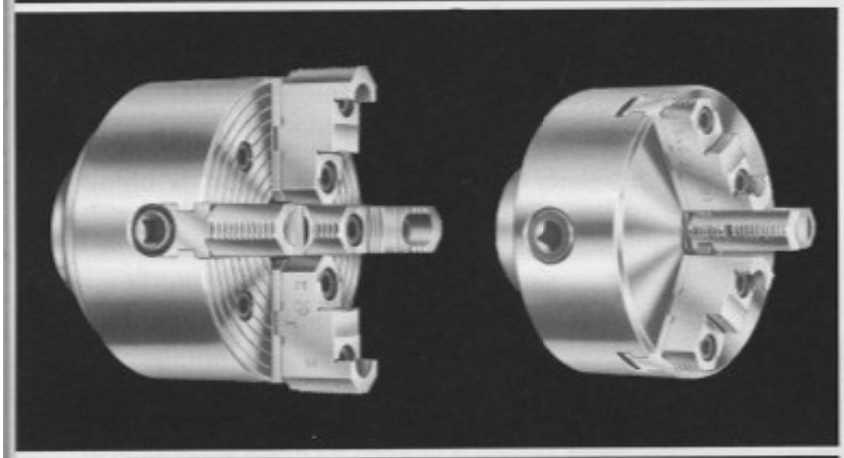
Headstock Tooling



INTEGRAL MOUNT JAW CHUCKS*

5" 3 Jaw Universal Chuck is furnished with inside and outside jaws providing a gripping range of $^{1}/_{16}$" to 5" outside, 1⅛" to 5" inside and $1^{5}/_{32}$" through the spindle.

5" 4 Jaw Independent Chuck has reversible jaws providing a gripping range of $^{3}/_{16}$" to 5" outside, 1¼" to 5" inside and $1^{5}/_{32}$" through the spindle.



INTEGRAL MOUNT JAW CHUCKS*

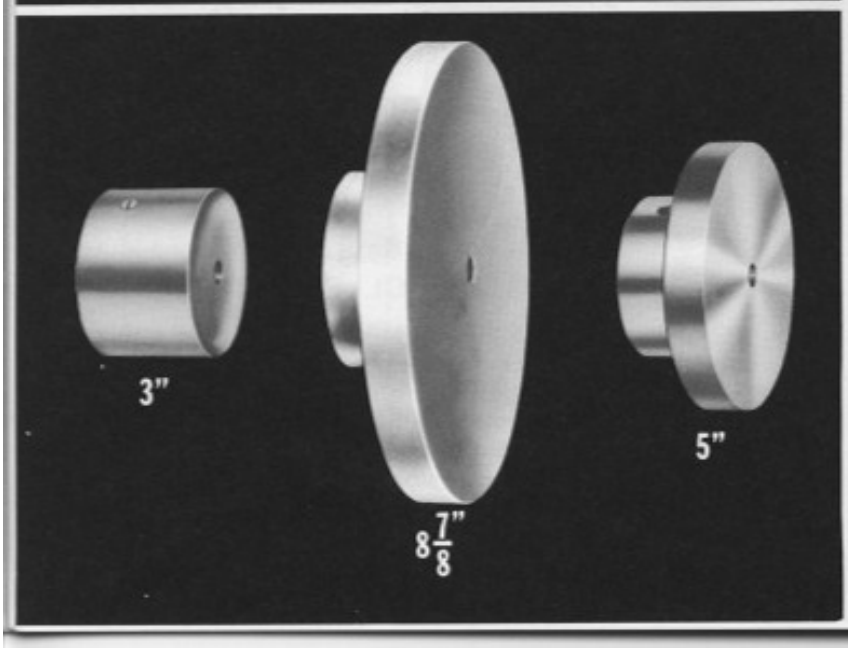
The 6" 3 and 4 Jaw Chucks are supplied with two-piece American Standard master jaws and hardened steel reversible top jaws. Soft top jaws are available for each. Chucks are integrally mounted for threaded nose spindle.

Model No. 6" 3 Jaw Chuck
Tool No. SJ-6 Soft Jaws (3 per set)
Model No. 6" 4 Jaw Chuck
Tool No. SJ-6 Soft Jaws (4 per set)

INTEGRAL MOUNT JAW CHUCK*

The 6" 2 Jaw Chuck is supplied with two-piece jaws and comes complete with one set of two soft jaws. The chuck is integrally mounted for direct application to the threaded nose spindle. Soft top jaws are available from stock.

Model No. 6" 2 Jaw Chuck
Tool No. SJ6-2 Soft Jaws (2 per set)



FIXTURE PLATES*

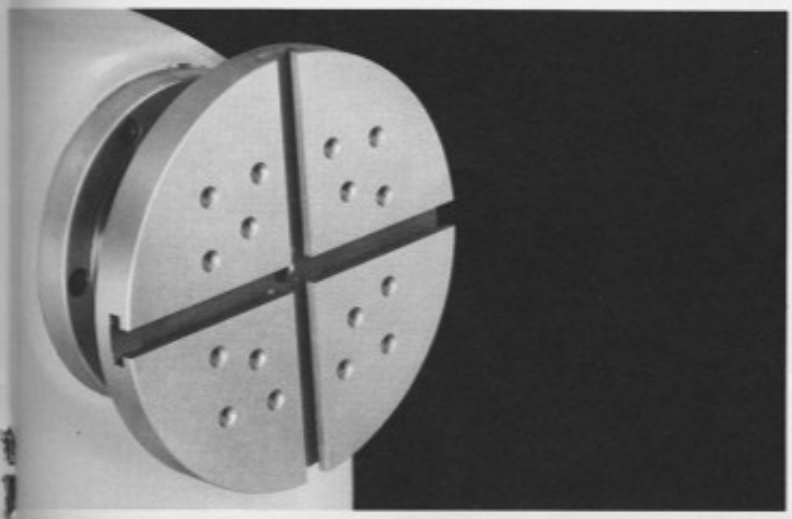
The Fixture Plates are machined all over for direct application to the threaded nose headstock spindle. Three sizes are available: 3", 5" and 8⅞" diameter. The flange section is ¾" thick. The center hole is $^{7}/_{16}$" in diameter.

These plates can be machined to become a fixture or for mounting fixtures to hold work or for mounting special purpose chucks.

Tool No. C-23 3" Fixture Plate
Tool No. C-24 5" Fixture Plate
Tool No. C-25 8⅞" Fixture Plate

** When ordering specify for threaded nose spindle.*

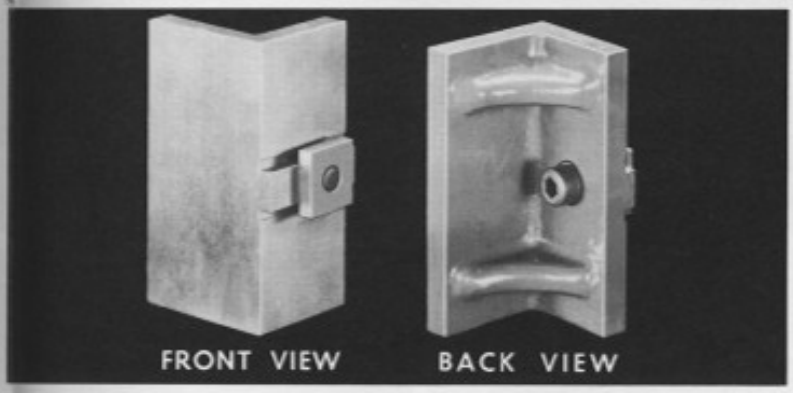
Headstock Tooling



FACE PLATE

7" or 9" diameter Face Plates are used for holding irregular shaped pieces. Holes are drilled and tapped to permit the use of standard $^{5}/_{16}$" x 18 bolts.

Tool No. C-26 7" Face Plate
Tool No. C-27 9" Face Plate



ANGLE PLATE

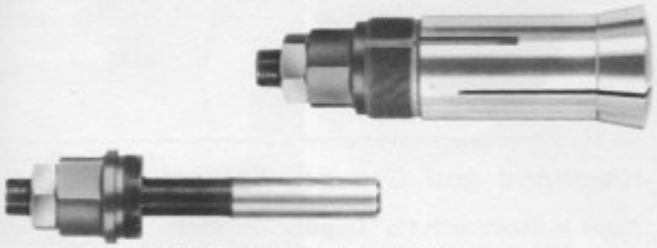
The Angle Plate fastens directly to the T-slot of the face plate and is used to support work at right angle to the face plate. Work clamping surface is 1½" x 3".

Tool No. G-11

THREADED POSITIVE STOPS

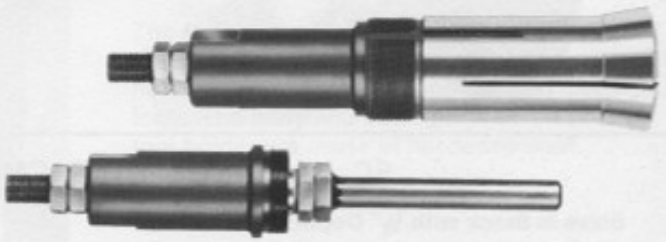
The Hardinge 5C Solid, Ejector and Long Stops are threaded into and **positively shoulder locked** against the end of 5C Hardinge Collets. Once locked in place, the stop cannot move even under heavy drilling or other end working pressures. The three types of stops permit a wide variety of chucking work since all are adjustable to the desired part length to the maximum depths indicated. Keep production moving at lower cost. Use 5C Hardinge **Positive** Stops.

SOLID STOP



Model SS-5C For Chucking parts to a depth of 3⅛" from the collet face.

EJECTOR STOP



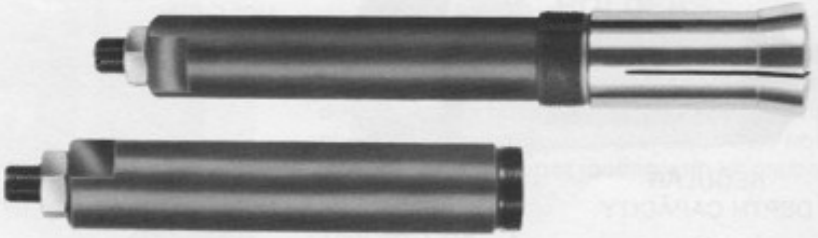
Model ES-5C For chucking parts to a depth of 2¾" from the collet face.

LONG STOP

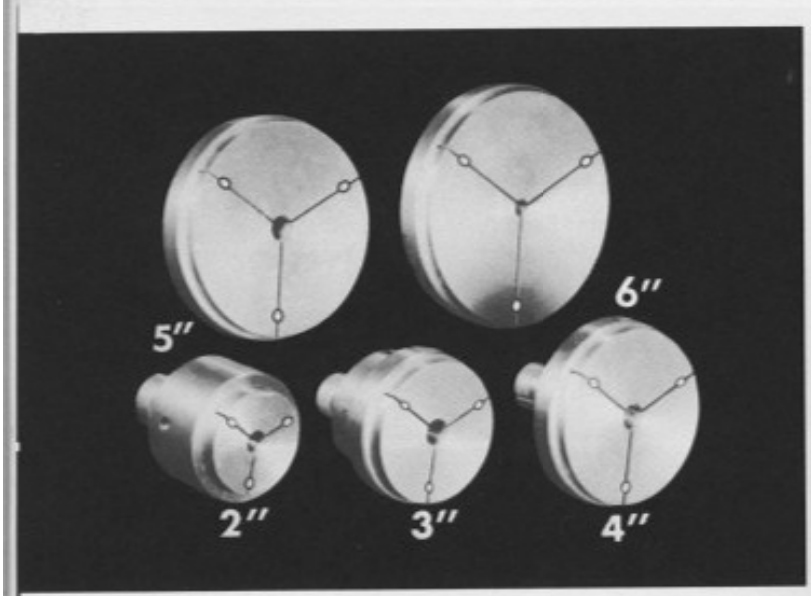
For chucking parts to a depth of 7½" from the collet face.

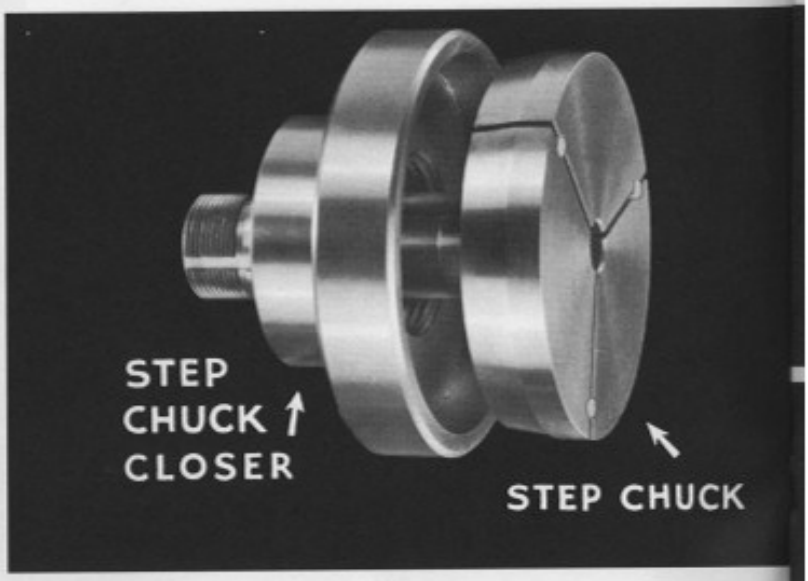
For work to and including ⅞" round, ¾" hex and $^{19}/_{32}$" square.

Model LS-5C



Headstock Tooling





5C HARDINGE STEP CHUCKS AND CLOSERS

HARDINGE STEP CHUCKS are exceptionally useful for accurately holding work up to 6" in diameter. Castings, moldings, stampings and machined parts are held rigidly and accurately. Tubing can be held without crushing or distorting.

HARDINGE STEP CHUCK CLOSERS fit directly to the machine spindle. A taper corresponding to that on the periphery of the step chuck places the closing pressure over the stepped area of the chuck, resulting in greater gripping power and accuracy.

HARDINGE STEP CHUCKS AND CLOSERS are carried in stock in 2", 3", 4", 5" and 6" rated sizes. All Hardinge step chucks are supplied with pin holes and pins in place for precision machining.

REGULAR DEPTH CAPACITY step chucks are $\frac{3}{8}$" larger in diameter than the rated size so the full capacity may be readily applied to a depth of $\frac{1}{2}$". A regular depth step chuck closer is required for each rated size.

EXTRA DEPTH CAPACITY step chucks are made so the full rated capacity may be applied to a depth of $1\frac{1}{4}$". An extra depth step chuck closer is required for each rated size.

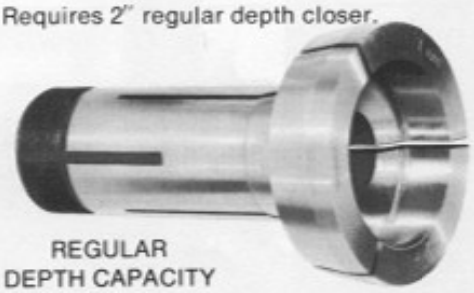
REGULAR DEPTH CAPACITY

EXTRA DEPTH CAPACITY

5C HARDINGE STEP CHUCKS—Hardened and Ground to Size

Sizes in Stock with $\frac{1}{2}$" Depth:
$1\frac{1}{16}$", $1\frac{1}{8}$", $1\frac{3}{16}$", $1\frac{1}{4}$", $1\frac{5}{16}$", $1\frac{3}{8}$", $1\frac{7}{16}$", $1\frac{1}{2}$", $1\frac{9}{16}$", $1\frac{5}{8}$", $1\frac{11}{16}$", $1\frac{3}{4}$", $1\frac{13}{16}$", $1\frac{7}{8}$", $1\frac{15}{16}$", 2" round.

Requires 2" regular depth closer.

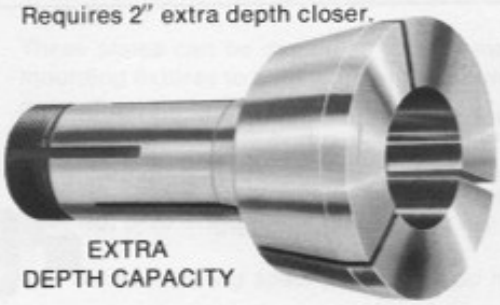


HOLE SIZE
DEPTH $\frac{1}{2}$"

REGULAR
DEPTH CAPACITY

Sizes in Stock with $1\frac{1}{4}$" Depth:
$1\frac{1}{8}$", $1\frac{3}{16}$", $1\frac{1}{4}$", $1\frac{5}{16}$", $1\frac{3}{8}$", $1\frac{7}{16}$", $1\frac{1}{2}$", $1\frac{9}{16}$", $1\frac{5}{8}$", $1\frac{11}{16}$", $1\frac{3}{4}$", $1\frac{13}{16}$", $1\frac{7}{8}$", $1\frac{15}{16}$", 2" round.

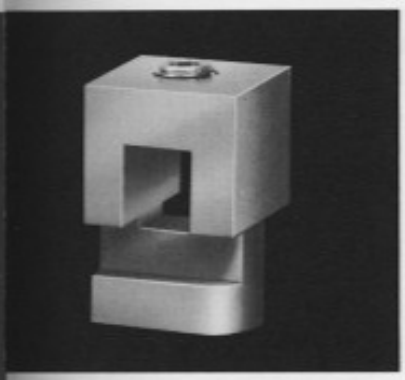
Requires 2" extra depth closer.

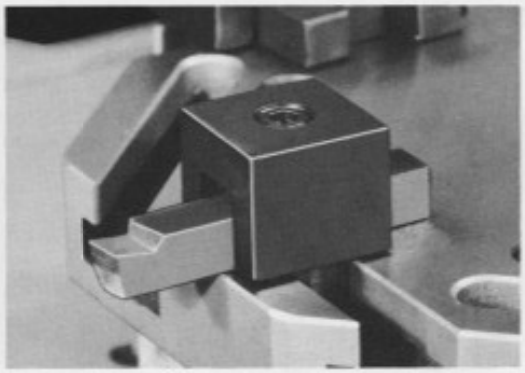


HOLE SIZE
DEPTH $1\frac{1}{4}$"

EXTRA
DEPTH CAPACITY

Turret Tooling

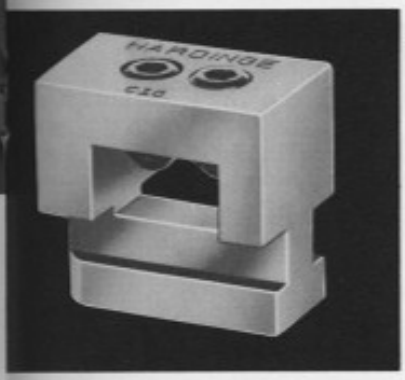


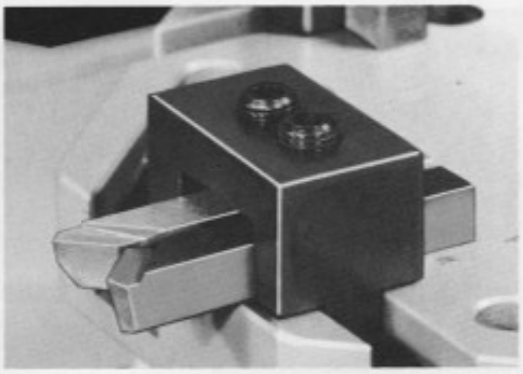


SINGLE TOOL HOLDER

The Single Tool Holder is mounted directly to the HC Turret. The single tool holder takes one standard ⅜" square tool bit.

Tool No. C-9

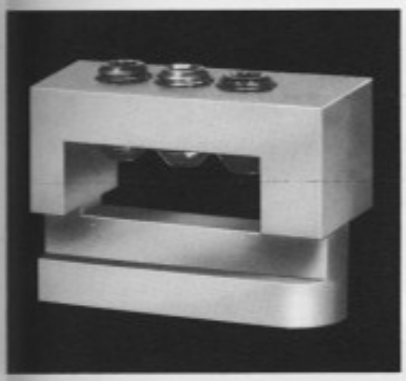


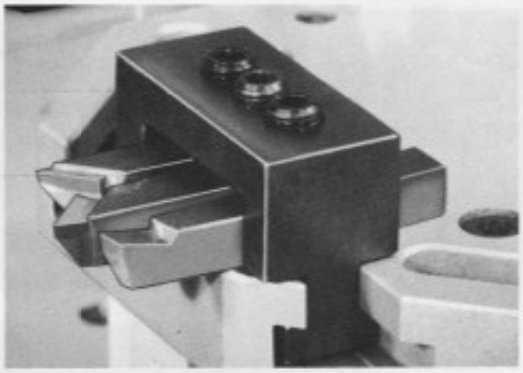


DOUBLE TOOL HOLDER

The Double Tool Holder is mounted directly to the HC Turret. The double tool holder takes two standard ⅜" square tool bits.

Tool No. C-10

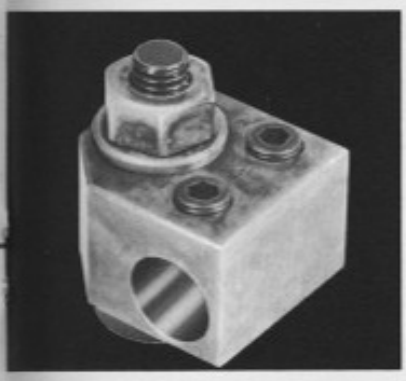


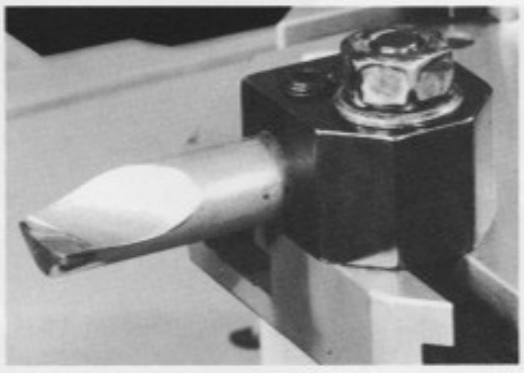


TRIPLE TOOL HOLDER

The Triple Tool Holder is mounted directly to the HC Turret. The Triple Tool Holder takes three standard ⅜" square tool bits. The tool holder is used for multiple forming or turning.

Tool No. C-20

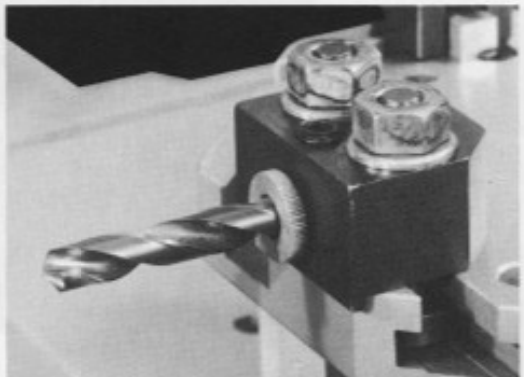




BORING TOOL HOLDER

The Boring Tool Holder is for direct application to the eight station turret. It is used for holding ⅝" diameter boring bars or boring tools. The body and other parts of the boring tool holder are made of hardened steel.

Tool No. C-19

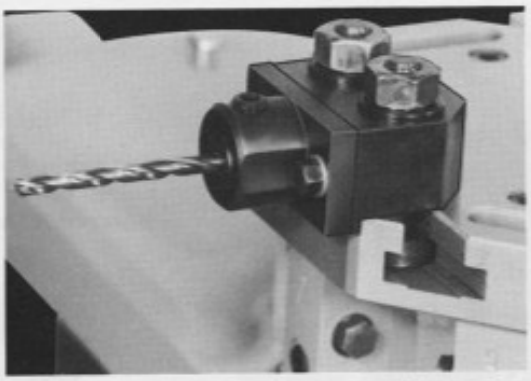


DRILL AND SHANK TYPE TOOL HOLDERS

This hardened steel holder fits directly to the eight-station turret. It is used for holding drills directly or by bushings, or for holding drill chucks, releasing tap holders, adjustable holders or any other turret tooling with ⅝" diameter shank.

Tool No. C-18

Turret Tooling

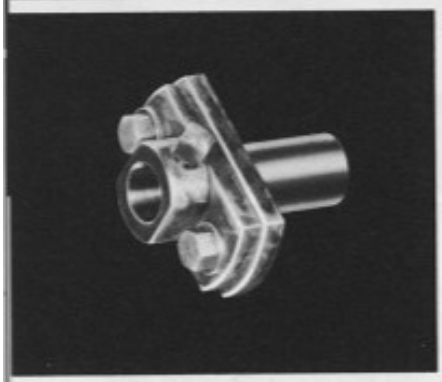


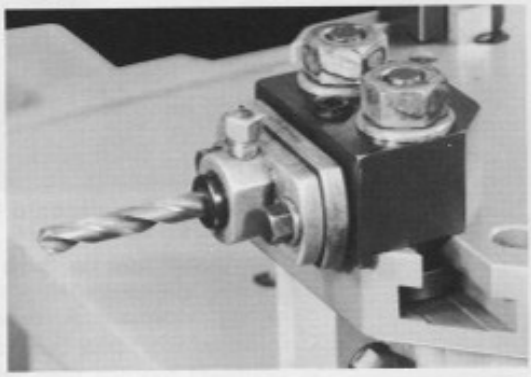
ADJUSTABLE TOOL HOLDER

The Hardinge C-4 Adjustable Tool Holder permits the seting of center drills, drills, reamers and other end-working tools to the exact center of work piece.

The C-4 Holder, which is mounted directly to the Hardinge Chucking Machine eight-station turret, holds ⅝" diameter tool shanks or bushings in a ground-finish hole.

Tool No. C-4

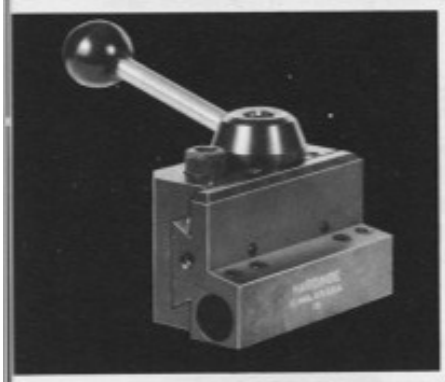


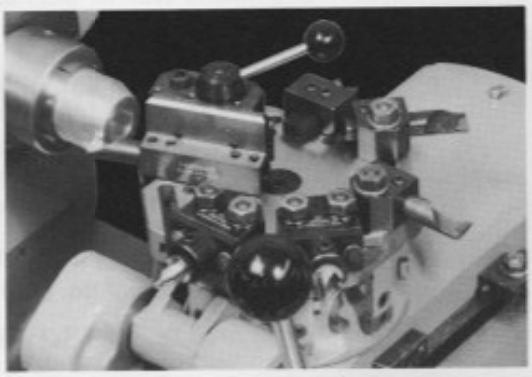


ADJUSTABLE HOLDER

The Adjustable Holder is used for holding end-working tools in the turret, such as drills and reamers. The holder provides means for adjusting the cutting edge of the tool to its proper center relation with the work. ½" diameter bore.

Tool No. 00-D

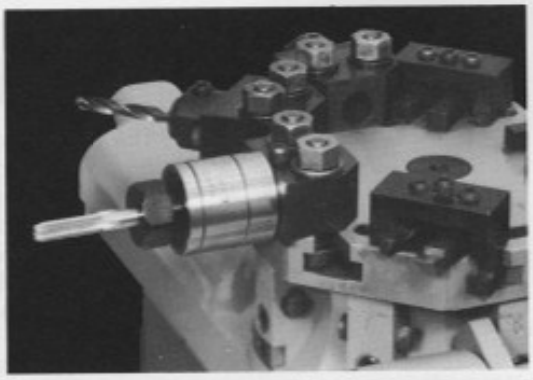




TAPER SLIDE

The C-6B Taper Slide is for turning and boring tapers and can be set for any desired angle. This unit has a hardened and precision ground dovetail slide for sustained accuracy and ease of operation. The C-6B Taper Slide has ⅞" travel and accommodates standard ⅝" round shank carbide tool bits. These tools are described in Hardinge Bulletin C-195.

Tool No. C-6B

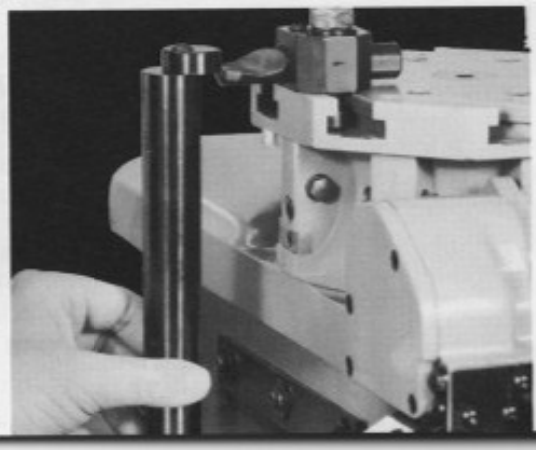


RELEASING TAP HOLDER
(COLLET TYPE)

The releasing tap holder uses collets for accurately holding and centering of taps. The unit can be used for either right or left-hand tapping. Tap cannot turn in collet and collet cannot slip in holder.

Ten collet sizes are available: 141" (0 to 6 tap), .168" (7 to 8 tap), .194" (9 to 10 tap), 220" (12 tap), .255" (1/4" tap), 318" (5/16" tap), .323" (7/16" tap), .367" (1/2" tap), .381" (3/8" tap) and .312" (1/8" pipe tap).

Tool No. TT-⅝ (Tap Holder only).
Tool No. TT (Specify Size) Collet

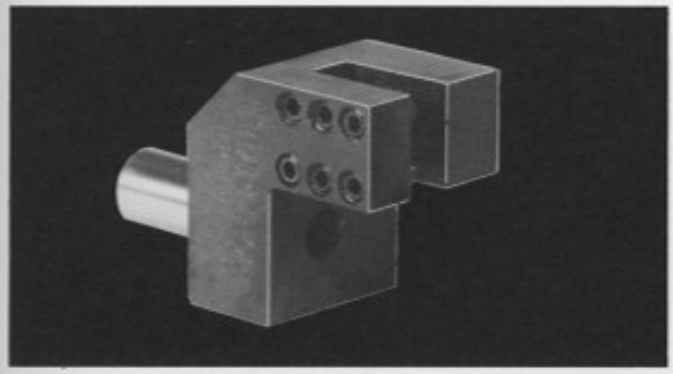


TOOL-SETTING GAGE

The Hardinge Tool-Setting Gage is an essential aid for fast, accurate setting of tool bits and boring bars to the spindle certerline of your Hardinge machine. With the Hardinge Tool-Setting Gage, slow scale measurement for setting tools on center is eliminated.

Tool No. C-2A

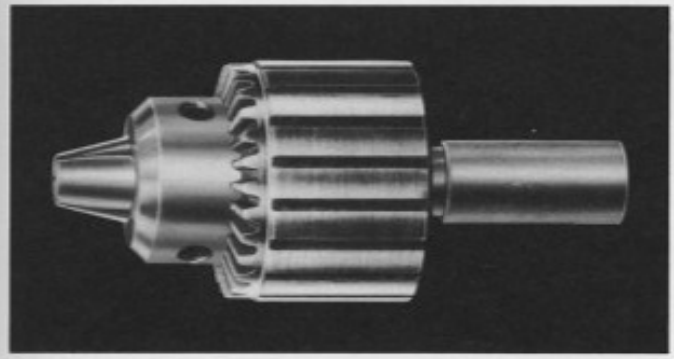
Turret Tooling



KNEE TOOL

The Hardinge Knee Tool is of one piece, heat treated alloy steel construction. Used for turning from the turret, the knee tool can turn a single diameter with one tool, two diameters with two tools or a single diameter and chamfer. Takes ¼" tool bits.

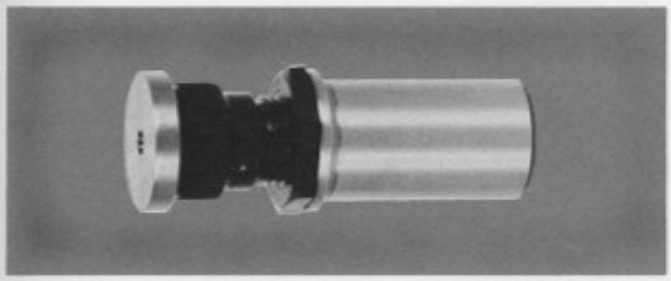
Tool No. TK-⅜



DRILL CHUCKS

These chucks are the improved type drill chuck. Each chuck is furnished complete with key and ⅜" diameter shank.

Tool No. T9-1 ⅛" Capacity
Tool No. T9-3 ⅜" Capacity
Tool No. T9-4 ½" Capacity

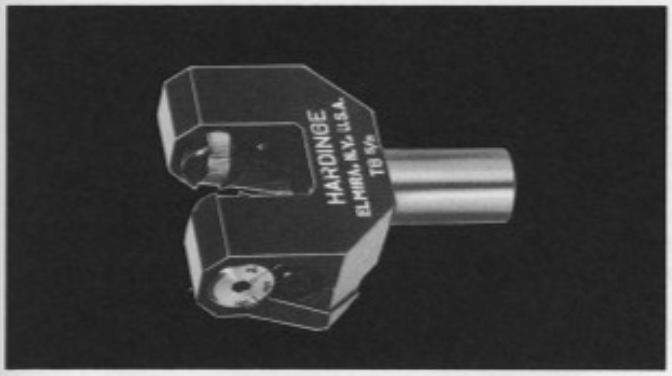


ADJUSTABLE REVOLVING STOCK STOP

(5/8" SHANK ONLY)

The HARDINGE Adjustable Revolving Stock Stop is used to position bar stock or to locate work in the collet from the turret. The adjustment feature permits fine tuning for exact length control. In addition to the locking adjustment, the T-20 offers improved thrust support with a Teflon bearing for free turning. Overall maximum length is 2¾".

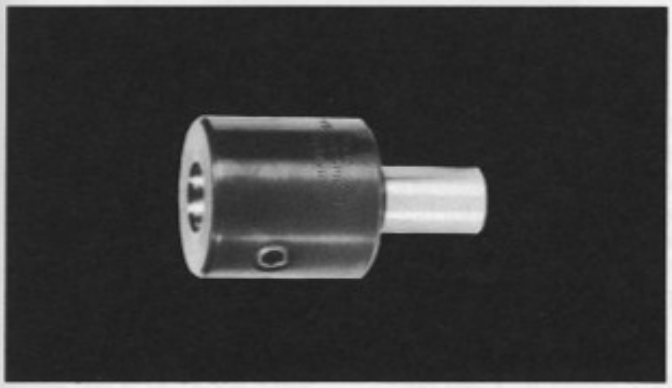
Tool No. T-20



KNURLING HOLDER

The Knurling Tool is used for knurling work from the turret. Knurls are mounted in swivel holders that can be set at any angle for the type knurl desired. A pair of knurls is furnished with each tool. Maximum capacity is ½".

Tool No. T-8

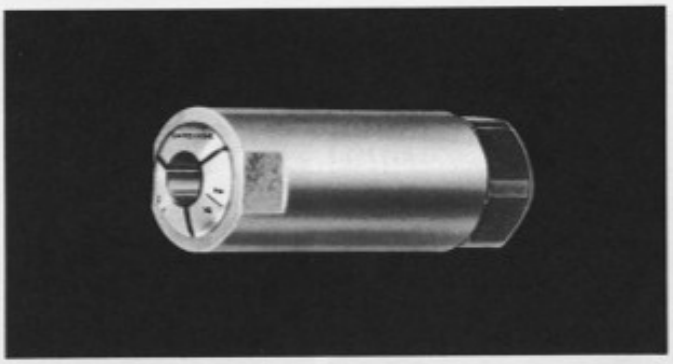


TOOL HOLDER EXTENSION

The Hardinge tool holder extension provides a means for balancing a turret setup. It will extend short tooling to balance with the length of longer tooling. For example, it makes up the difference in length between a tap holder and a standard drill. Extension body is 1⅝" long.

Tool No. TE-⅝.

Turret Tooling

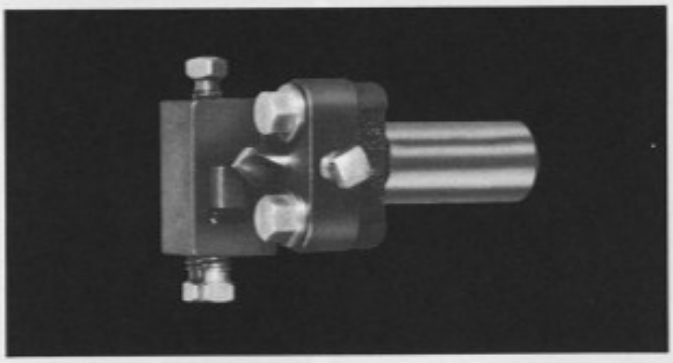


COLLET TYPE HOLDER

The collet holder is 5/8" in diameter, hardened and ground, adapting standard 1C Hardinge Collets with a maximum capacity of 1/4" round for holding small drills and reamers.

Tool No. T-17 Holder only

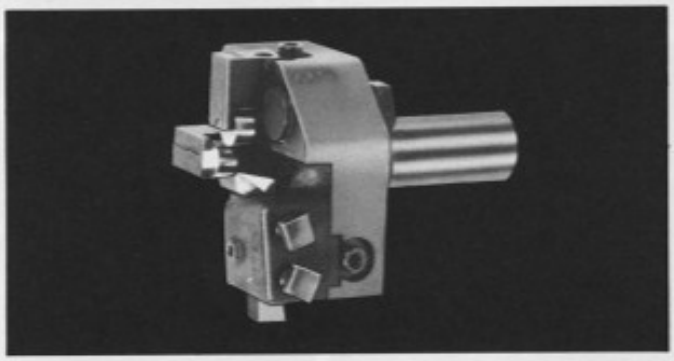
1C HARDINGE COLLETS Specify Size



CENTERING AND FACING TOOL

The Centering and Facing Tool is used in the turret. It faces the stock to the required length and, at the same time, centers the work for subsequent drill operations. Maximum drill capacity is 5/16". Maximum diameter is 1/2".

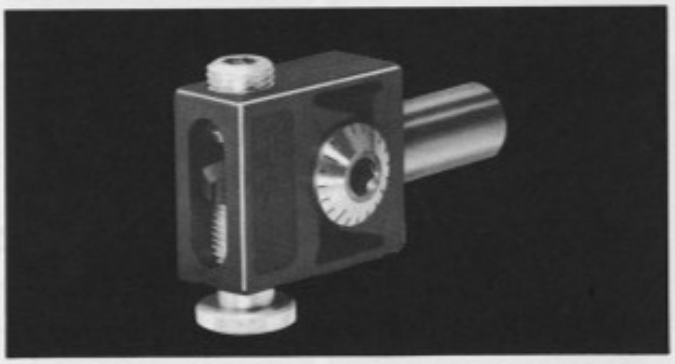
Tool No. T-14



BOX TOOL

The Box Tool is used for turning a single diameter. The tool holder is furnished with one 1/4" square high speed steel tool bit. Maximum capacity is 3/8" diameter.

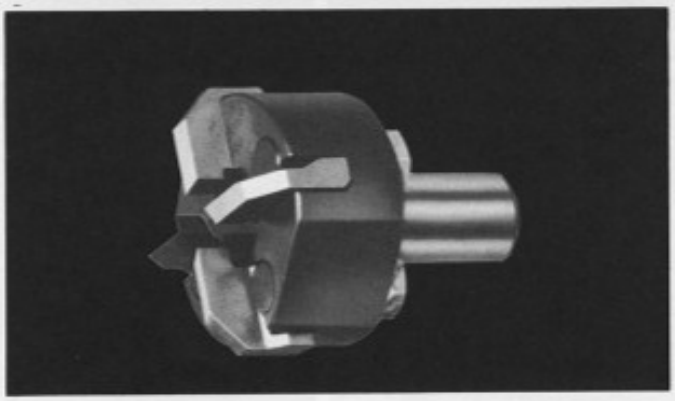
Tool No. T-12



MICROFLEX TOOL HOLDER

The Microflex Tool Holder will take 1/8" to 3/8" round shank cutting and boring tools without the use of bushings. The ease and exactness of tool adjustment makes it possible to readily compensate for tool wear and hold parts in the middle range of the tolerance. Boring capacity is approx. 1 1/4". Each division on the dial indicates a movement of fifty millionths of an inch.

Tool No. T-15

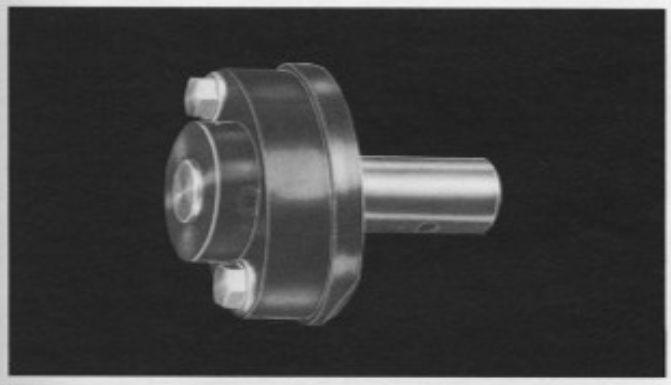


HOLLOW MILL

The adjustable Hollow Mill is a combination for roughing and finishing. Four blades and two back rests are furnished with each mill. Four blades are used for roughing and two blades and two back rests for finishing. The maximum capacity is 1/2" round.

Tool No. T-11

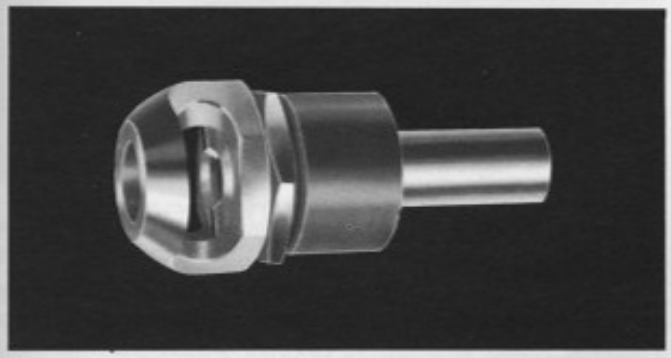
Turret Tooling



RELEASING TAP HOLDER

The Releasing Tap Holder has a completely enclosed releasing mechanism. Holders are furnished for right-hand tapping and are easily converted for left-hand tapping. Taps are held in the holder with bushings. The capacity is ½".

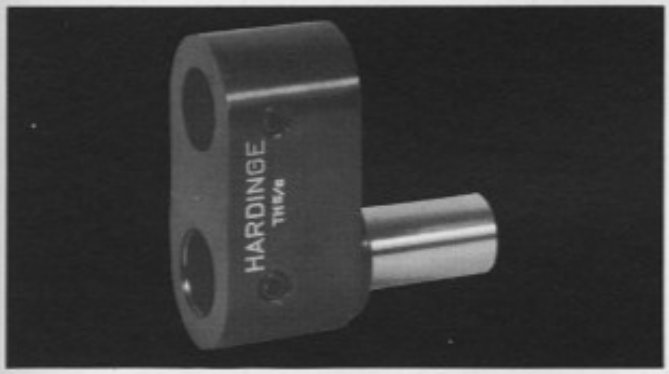
Tool No. RT-⅝



RELEASING ACORN DIE HOLDER

The Releasing Acorn Die Holder is used for production threading. The holder is made for releasing quickly at the end of the turret travel. Uses No. 2 die. The capacity is 5/16".

Tool No. T-10

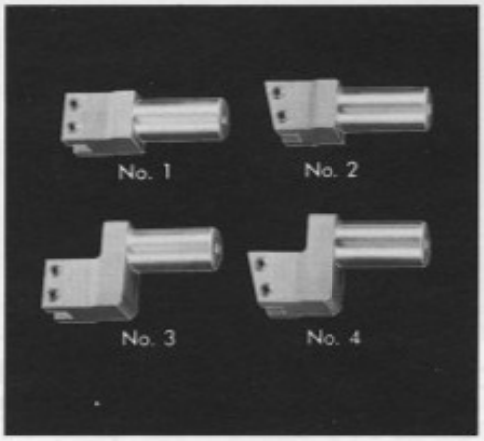


DRILL AND TURN TOOL

Combine your turning and drilling operations to speed production and save turret stations.

The Drill and Turn Tool Holder has ⅝" bore for mounting No.'s 1, 2, 3 and 4 tool holders, below. The center bore takes standard Hardinge ⅝" diameter split type bushings for holding drills and other end-working tools.

Tool No. TH-⅝



TOOL HOLDERS

Straight and 15' angle tool holders for the drill and turn tool, above, are available in either plain or knee type. The holders take standard ¼" tool bits.

Tool No. 1 Straight Type
Tool No. 2 15° Angle Type
Tool No. 3 Straight Type
Tool No. 4 15° Angle Type

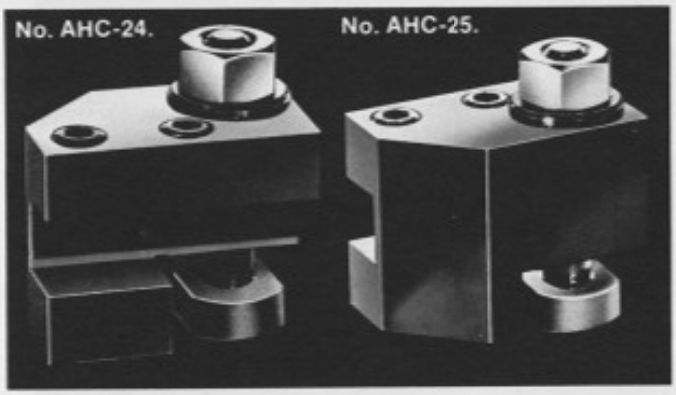
PRECISION BUSHINGS FOR STANDARD TOOL HOLDERS

Hardinge precision bushings are the answer to holding the many size drills, center drills, reamers, boring tools, etc. which must be mounted in ½" and ⅝" bores of standard tool holders.

Bushings are available in fractional, letter, number and tap sizes.

SEE BULLETIN C-210 FOR COMPLETE DETAILS.

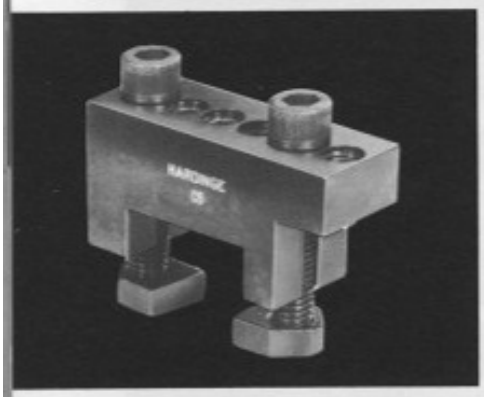
Turret Tooling

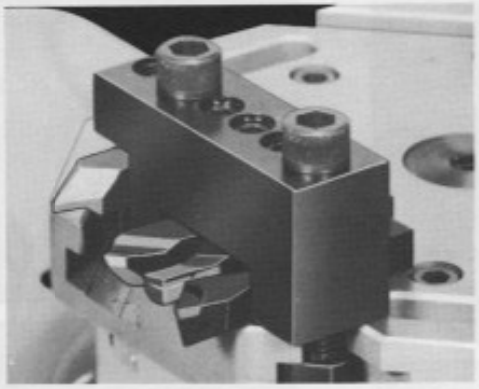


EXTENSION TOOL BIT HOLDERS

The left extension tool holder shown at the far left and the right extension shown at the immediate left are valuable aids in balancing tool length in a turret setup. Both holders mount directly to the turret and hold standard ⅜" square tools.

Tool No. AHC-24. Left tool holder
Tool No. AHC-25. Right tool holder



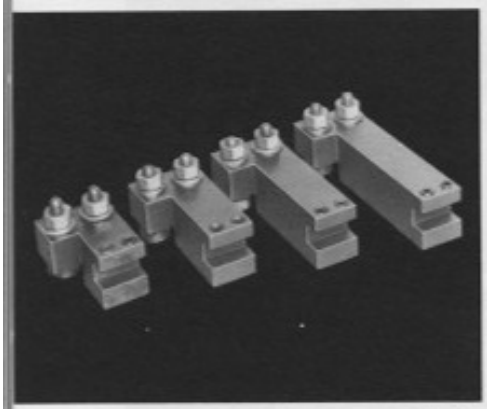


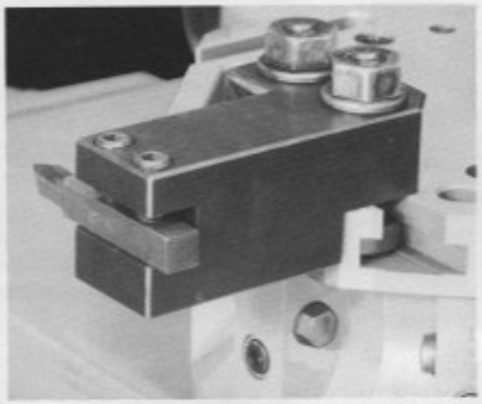
QUADRUPLE TOOL HOLDER

Multiple tooling increases production, reduces machine handling time and permits more operations to be performed in one chucking.

The Hardinge C-5 Quadruple Tool Holder will hold four standard ⅜" square tools and mounts directly to the turret.

Tool No. C-5

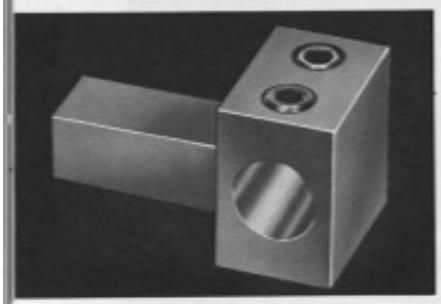




EXTENSION TOOL HOLDERS

The extension tool holder is used for turning. This tool holder is available in four sizes: 2", 3", 4" and 5" lengths (measured from centerline of T-bolts to extension end of holder). Holder takes standard ⅜" square tool bits.

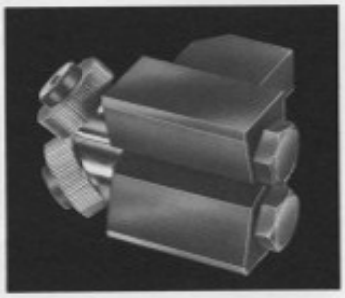
Tool No's. C-14 (2"), C-15 (3"), C-16 (4"), C-17 (5").



BORING TOOL ADAPTER

The Boring Tool adapter, which mounts in the tool slot of the turning tool holders shown above, permits use of extended tooling designed for ⅜" square tools to be converted to mount ⅝" diameter boring tools.

Tool No. AHC-22

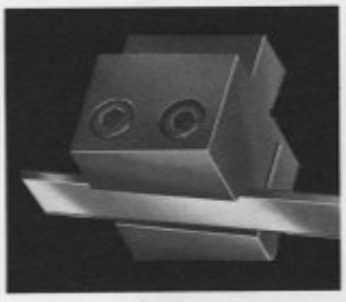


KNURLING TOOL

This tool permits diamond knurling operations on diameters from ¼" to 6".

The knurling tool mounts in extension tool holders shown above. Two "cutting" knurl wheels are supplied.

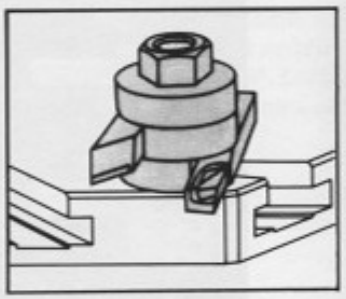
Tool No. C-30



CUTOFF TOOL

The cutoff tool provides cutoff from the turret. The tool is complete with a 1/16" wide blade and mounts in extension tool holders shown above.

Tool No. C-31

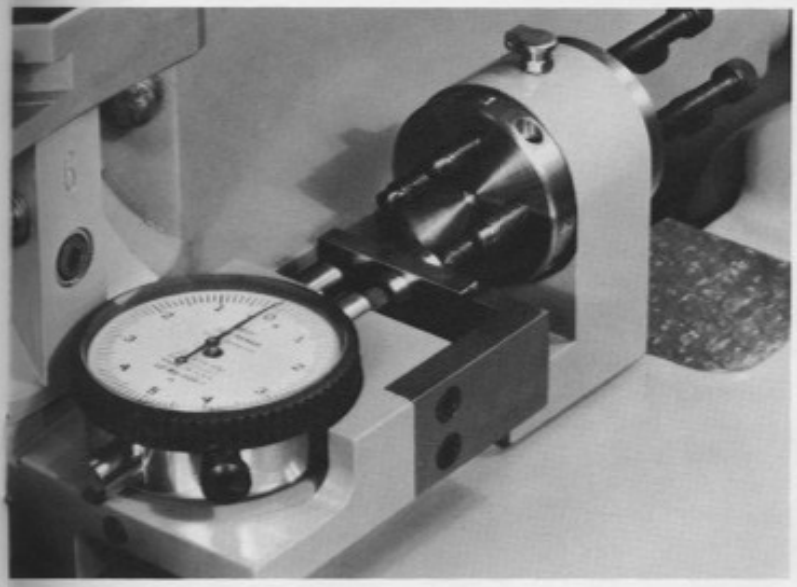


UNIVERSAL TOOL POST

The universal tool post, which mounts directly to the turret, permits many possible arrangements for mounting tool bits, depending on job application. Holder takes ⅜" square tool bits.

Tool No. C-28

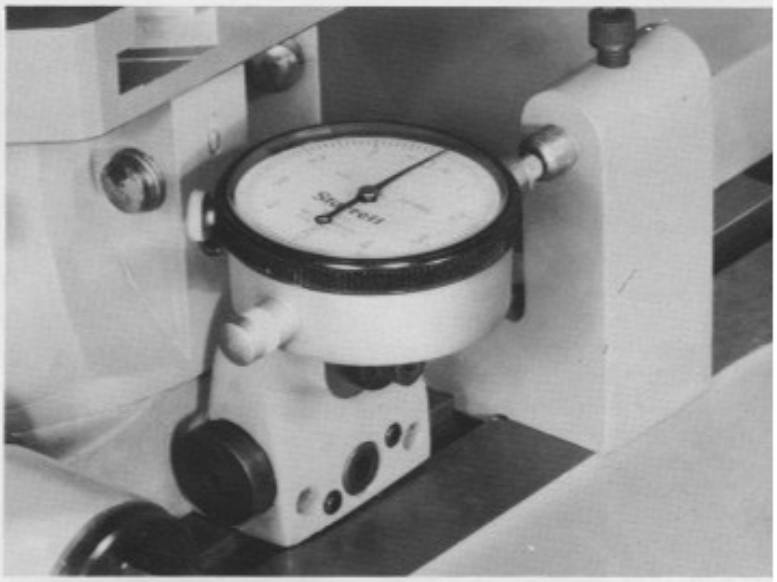
Tooling



FOUR-POSITION INDICATOR STOP

The Four-Position Indicator Stop is useful when machining work having one or more close tolerance diameters. The unit for direct application as shown above has four-station stop drum with adjustable screws. Indicator is .0001" jeweled bearing type. Built-in feature protects indicator against over-travel.

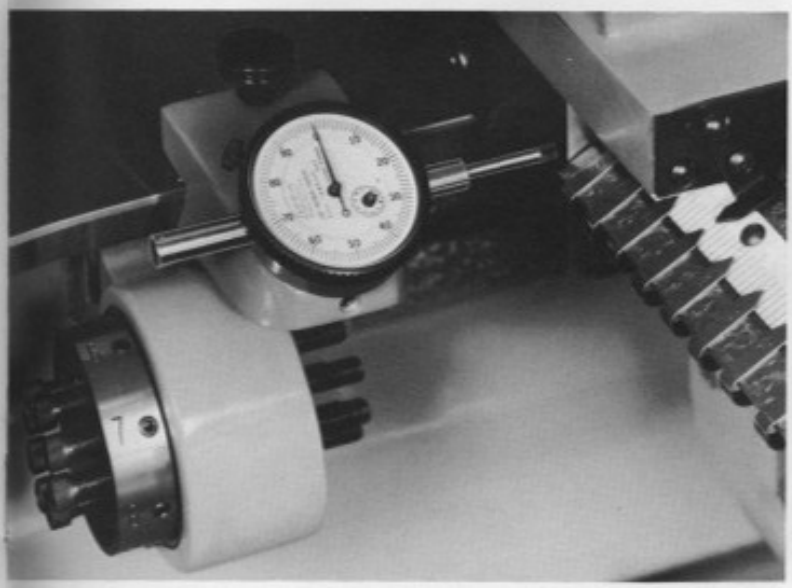
Tool No. C-7



SINGLE POSITION INDICATOR STOP

A precision indicator stop is used when turning and/or boring parts to exceedingly close tolerances. Unit mounts directly as shown above. A .0001" jeweled bearing indicator is furnished.

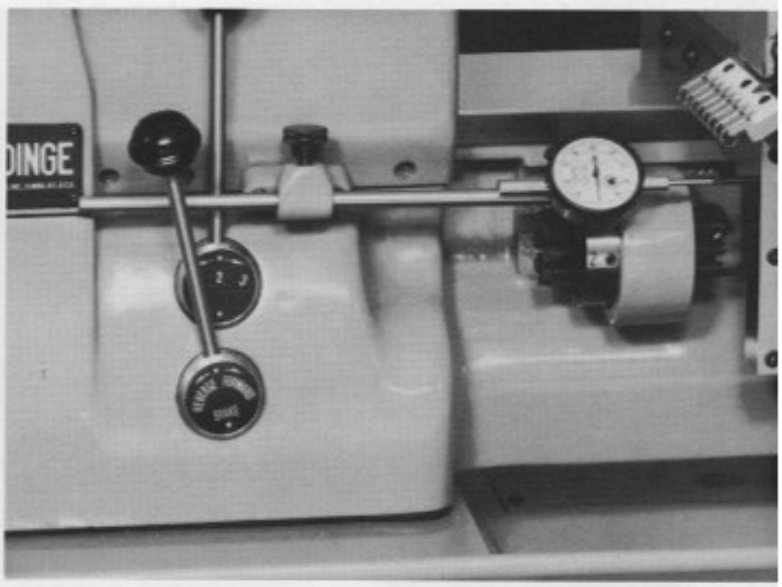
Tool No. HC



BED LENGTH INDICATOR

The jeweled bearing length indicator is used for accurate positioning of the carriage when setting the carriage stops during initial set-up. Carriage travel can be measured in .001" for a range of 1". The indicator is complete with bracket and thumb locking screw.

Tool No. HC-BD1



CARRIAGE LENGTH INDICATOR

The Carriage Length Indicator permits full carriage travel, thus allowing for "close to spindle machining."

The length indicator is a needed accessory when producing parts to exact shoulder lengths or when facing to close tolerances.

The 1" travel dial indicator has jewel bearings and reads directly in .001" increments with the small reference dial showing the accumulated travel. The long rod allows the indicator to be extended to a distance of 9½".

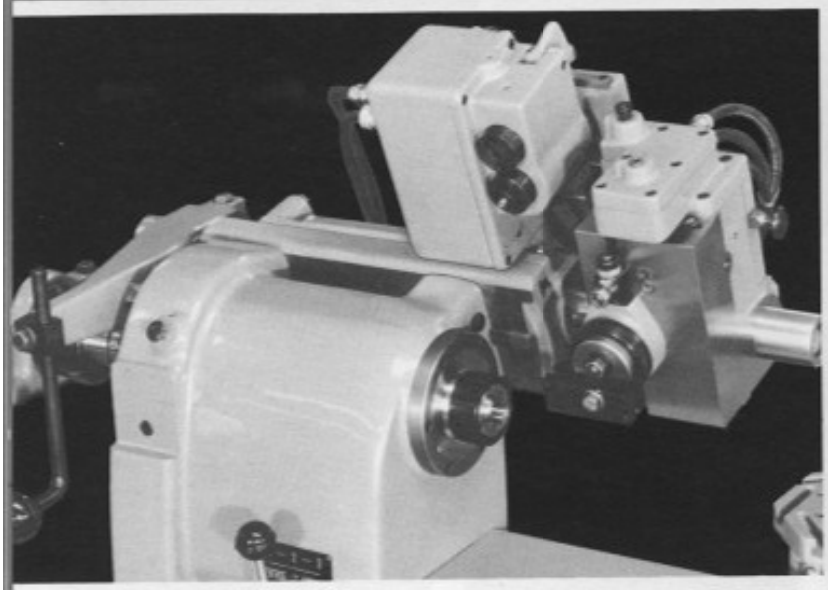
Tool No. HC-HD1

Cross Slide Tooling

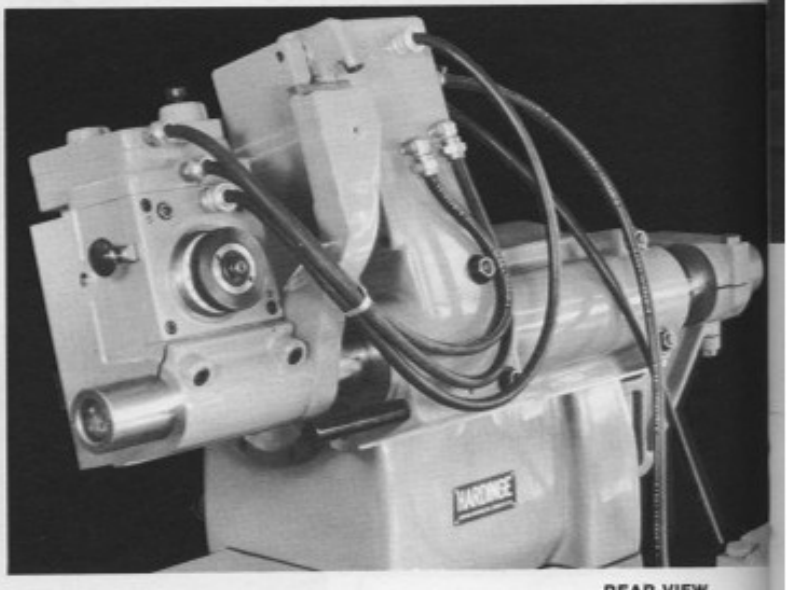
BED ADAPTER FOR DOUBLE TOOL CROSS SLIDE

Additional tooling positions are available on all Hardinge Chucking Machines with the use of the bed adapter shown at the left. The bed adapter is used for mounting the standard double tool cross slide normally used on Hardinge Second Operation Machines. This permits the use of all double tool cross slide accessory tooling such as standard tool holders, multiple tool holders, the straight and taper turning slide and any combination of this tooling applicable to the job being run. See Bulletin C-10 for complete specifications on the wide range of tooling available for use with the double tool cross slide.

Tooling



FRONT VIEW



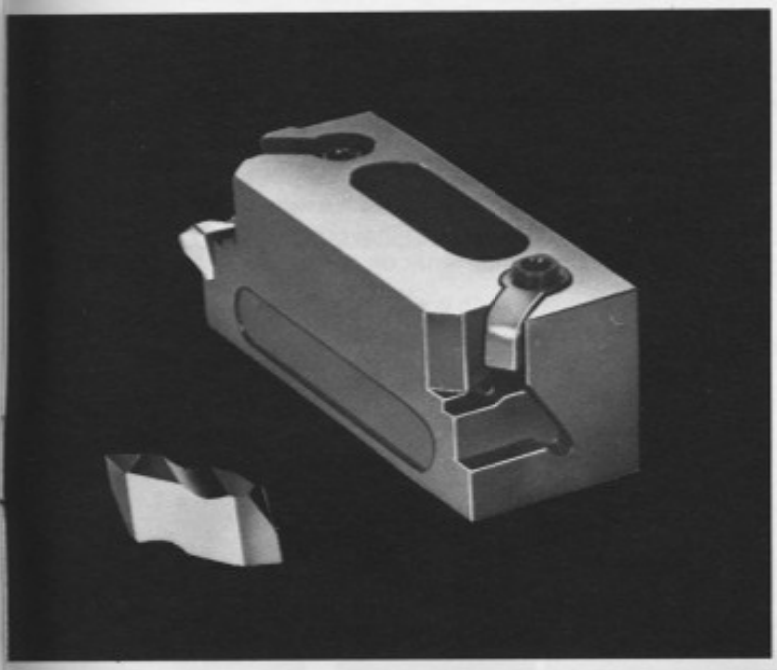
REAR VIEW

AUTOMATIC PRODUCTION THREADING UNIT

The **Fully Automatic** production threading unit will assure you consistent high precision threaded parts at lower cost.

The unit is air-actuated (70 pounds line pressure required) and is electrically controlled. The main guide bar is mounted on preloaded ball bearings for maximum accuracy and rigidity. The unit will handle all threads, right hand, left hand, internal and external from 12 to and including 64 pitch.

After the work has been turned, faced, bored and other operations completed, the operator moves the carriage to the right hand end of the bed and swings the automatic production threading head into cutting position. The operator then pulls the starting knob on the threading head and from that point on, the threading unit operation is **Fully Automatic.** Upon completion of the threading operation, the threading tool slide withdraws to zero position, ready for the next complete threading cycle. The automatic threading unit then returns to its starting position and stops.



CARBIDE THREADING INSERTS

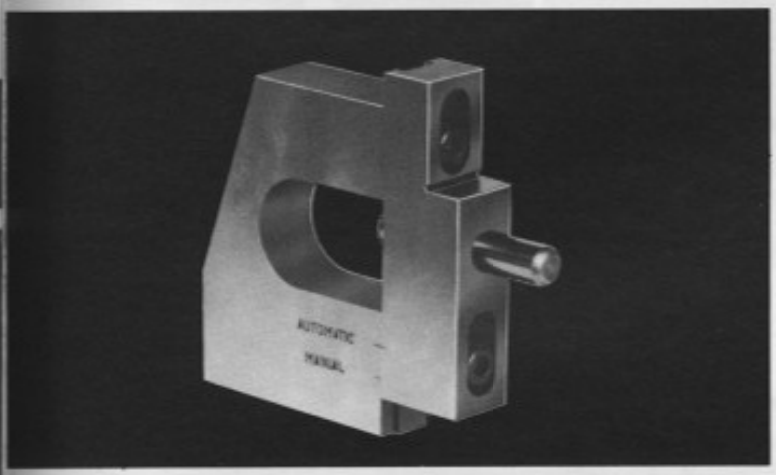
All new automatic threading units for Hardinge Chuckers are equipped with the new threading insert tool holder and one two-point insert for right-hand threading. The insert threading holder is also available for use on existing machines.

The precision ground inserts have a low micro inch finish, a positive top rake and a controlled nose radius.

The threading tool holder incorporates a highly effective clamping system which reduces costly tool changing down time required for changing conventional tools. By simply inverting the holder, it can be used for left-hand threading.

The Hardinge Insert Holder is recommended for external threading and it can also be used for large, short internal threading where clearance permits.

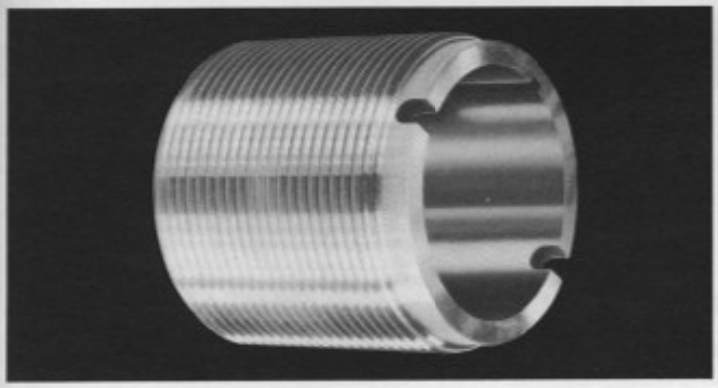
Request Bulletin C-234



THREADING TOOL GAGE

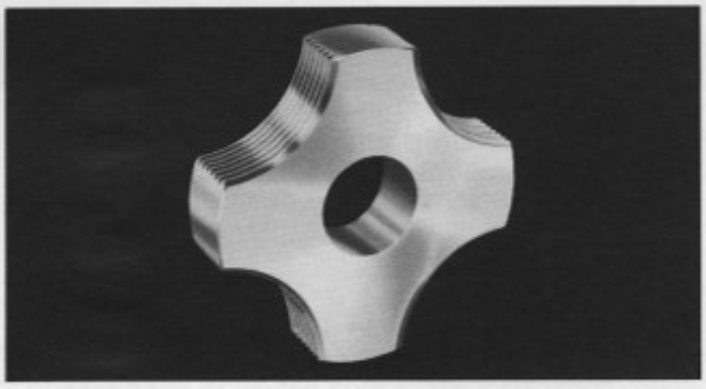
The Hardinge adjustable Tool-Setting Gage is a valuable aid in reducing time required for complete setups and for the replacement of threading tools during production runs. Gage is supplied standard with threading units.

Tool No. C-3



LEAD SCREWS

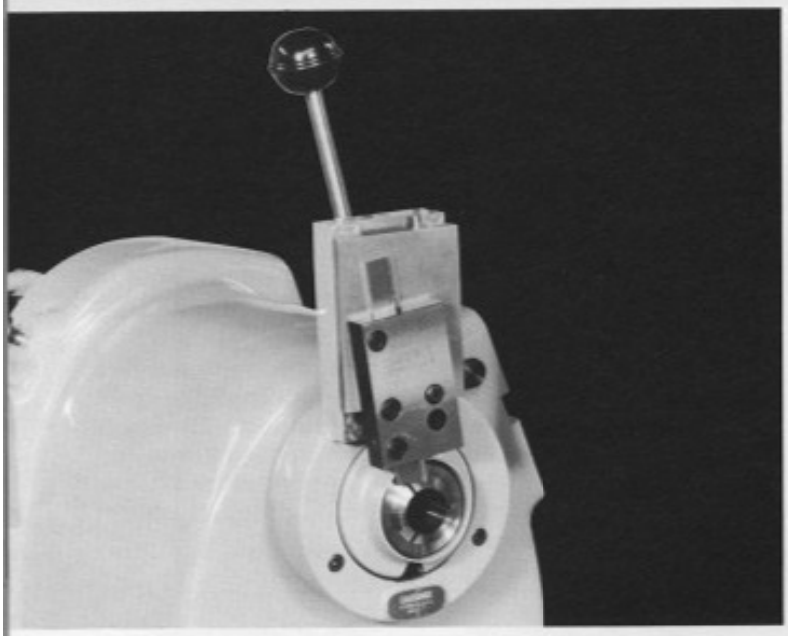
Hardened and ground precision lead screws are available in 12, 13, 14, 16, 18, 20, 24, 28, 32, 36, 40, 48, 50, 56 or 64 pitch with right-hand lead. Left-hand lead screws or other pitches are special and made to order. **Blank lead screws** are also available, finished ground to fit directly to the machine spindle, for users desiring to grind a special lead or leads to suit particular requirements.



LEAD SCREW FOLLOWERS

A bronze follower threaded to match the thread of the lead screw is required for each pitch of lead screw. The followers are available in the same standard pitches as lead screws. Left-hand and other pitches are special and made to order. **Blank lead screw followers** are also available for threading by customer to suit particular requirements.

Tooling

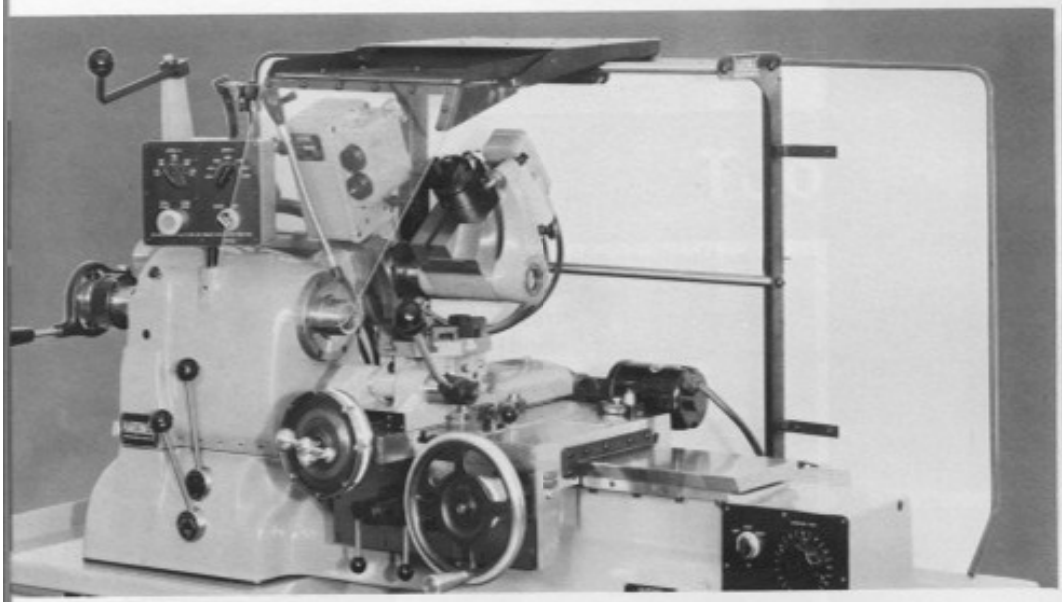


Vertical Cutoff Slide

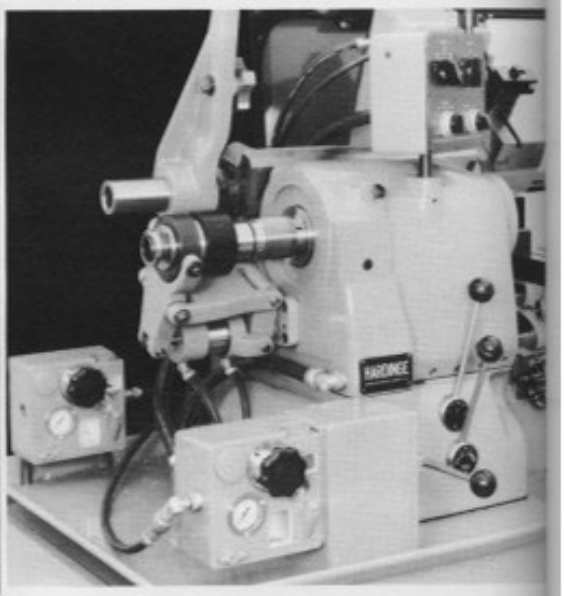
The HARDINGE Vertical Cutoff Slide will speed production and reduce part costs. Do not waste a valuable turret position for a simple cutoff operation that produces only chips. Tool the turret for precision work on the actual part.

The vertical cutoff slide is available for direct application to any Hardinge Super-Precision® Chucking Machine. The unit is furnished complete with a standard 3/32" wide cutoff blade. The slide is fastened to the front of the headstock by cap screws which are provided with each unit.

Extra Blade - Tool No. P-3N

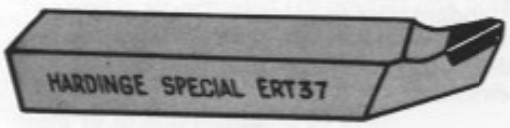


Chip and Coolant Shield



Power Collet Closer

Carbide Cutting and Threading Tools

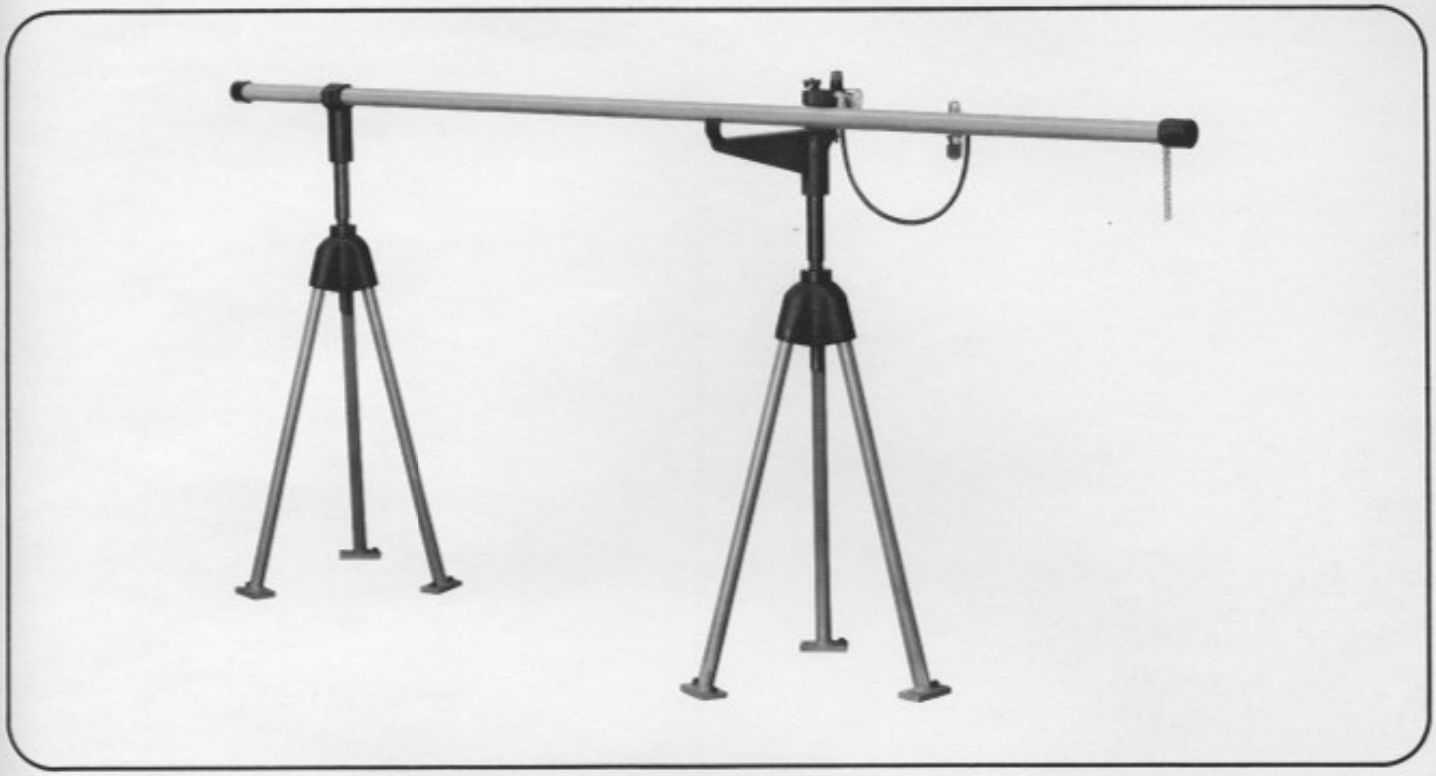


HARDINGE Carbide Cutting Tools are designed to "**CUT**" rather than "**PUSH**" the material being machined. The clean, free-cutting action of Hardinge tools is due to the incorporation of proper **TOP-RAKE** to the cutting edge. Proper rake angles allow the material to flow freely from the cutting edge—this reduces cutting pressure and heat and permits lighter chucking of the work with correspondingly less distortion. Also, with a free-cutting tool, higher spindle speeds and faster feeds can be used to obtain a better finish on the work at a lower cost.

Hardinge Carbide Tools have cutting edges that, in addition to being precision-ground, are diamond-lapped to a fine surface finish and keen, sharp cutting edges.

See Bulletin C-195.

HARDINGE BAR FEEDS



HF®-6 and HF®-12 Spindle Bar Feeds

The new Hardinge-designed and manufactured Bar Feed provides quiet operation, economy and efficient performance. By equipping your Hardinge production machine with the low-cost pneumatic bar feed, you can easily change over from chucking to bar work. Two lengths are available. The HF-6 will accomodate a six-foot bar and the HF-12 will take bars up to twelve feet in length.

Request Bulletin C-240 for complete details.

HF®-1 Spindle Bar Feed

The **HF-1 Spindle Bar Feed** at the left is ideal for the small shop or limited floor space installation.

The range of the air-operated HF-1 is 1/32" round to and including 3/4" round and it will handle bars up to two feet in length. This unit rotates with the spindle, eliminating whip and bar rattle commonly associated with bar feed units.

HARDINGE®

M-4B

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