

Baum Family Maker Space
Standard Operating Procedure
Hardinge Model HLH-V Tool Room Lathe

OPERATING INSTRUCTIONS

SPINDLE CONTROL LEVER — Figure 3

CONTROL LEVER "A", Figure 3, is the main control lever for the spindle. When moved to the extreme left the brake is released and the main drive motor is on the "LOW" side. When moved to the extreme right the brake is released and the main motor is on the "HIGH" side. The center or "STOP" position stops the motor and applies the brake.

Direction Control Lever For Carriage — Figure 3

Control lever "B", Figure 3, reverses direction of carriage for threading only. Always place this lever in center position before starting machine.

SEE PAGE 30 FOR COMPLETE INSTRUCTIONS ON THREADING

Disconnect For Gearbox — Figure 3

Knob "C" is used to connect or disconnect the gearbox from the headstock spindle by means of a sliding gear. **ALWAYS SHUT OFF MACHINE BEFORE ENGAGING OR DISENGAGING.** Turn knob clockwise to "FEED" position to disconnect gearbox. See Page 30 for instructions on positioning for threading.

Spindle Lock Pin — Figure 3

The spindle lock pin "D", Figure 3 is located at the front of the headstock. The pin is held in the "OUT" or released position by a spring and ball plunger. The spindle lock pin is used to hold the headstock spindle stationary when applying or removing spindle nose attachments, adjusting collet closer, tightening draw spindle or when applying and removing work from fixtures. To engage lock pin turn spindle by hand and hold lock pin "in" until it engages in one of the notches of the spindle assembly. **RELEASE BRAKE** by setting switch "A", Figure 4, Page 13, to "OFF" position. The spindle lock pin is interlocked electrically with the main drive motor and must be withdrawn before machine will start.



Figure 3

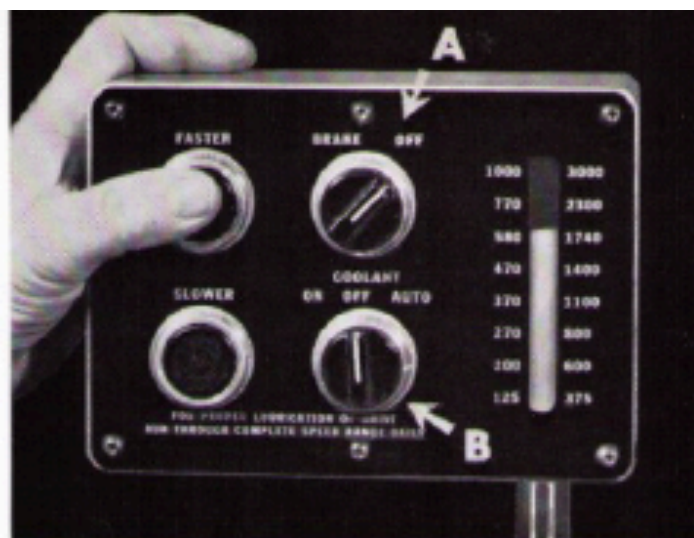


Figure 4

To Turn Spindle By Hand

FREE SPINDLE. To obtain a "free spindle" for easy turning of the spindle by hand, place operating lever "A", Figure 3, in "STOP" position and turn brake switch "A", Figure 4, to "OFF" position.

To Start and Stop Spindle — Figure 3

Pull out spindle lock pin "D", Figure 3, Page 12. Lever "A" and lever "B", Figure 3, must be in center position. Place knob "C", in "FEED" position. Set switch "B", Figure 5, Page 14, at "FORWARD". Put collet in spindle with correct size stock in place or use headstock center and tighten with collet closer. Press "START" button "A" on front of control panel, Figure 5, Page 14, which energizes panel and is indicated by pilot light "E", Figure 5, Page 14. The machine is now ready to start. Use main control lever "A", Figure 3, to start and stop the spindle. Move to extreme left to start spindle on "LOW" side of motor. Move to extreme right to start spindle on "HIGH" side of motor. Center position shuts off the main motor and applies the brake.

To make the spindle go "FASTER" push the top button as shown in Figure 4, above, until the speed indicator shows desired speed and then remove finger from button. To make spindle go "SLOWER" push lower button as shown in Figure 4, above.

The speed indicator moves up or down to indicate in the left column speed figures for the "LOW" side of the motor and in the right column for the "HIGH" side of the motor.

Spindle Driveshaft Brake

Figure 7

The spindle driveshaft brake is designed for rapid but gradual stopping of the precision headstock spindle. The brake is "tied in" with the control lever "A", Page 12, and is released when the machine is turned on and applied when the machine is turned off.

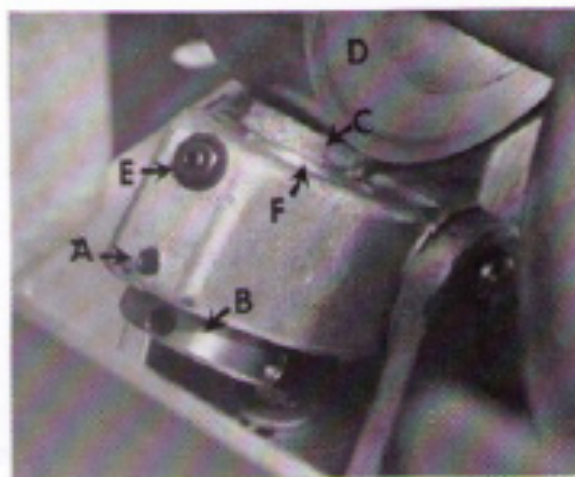


Figure 7

TO RELEASE BRAKE for a "FREE SPINDLE" turn brake switch to "OFF" as shown on Page 13. The brake drum "D", Figure 7, is located directly on the main motor drive shaft. The brake is actuated by a solenoid located under cover "A", Figure 8, Page 17 and is accessible from rear of machine by removing motor ventilator screen.

The brake shoe insert "C", Figure 7, is forced against the brake drum by means of a powerful spring. The spring automatically compensates for brake wear. However, after considerable use it may be necessary to adjust.

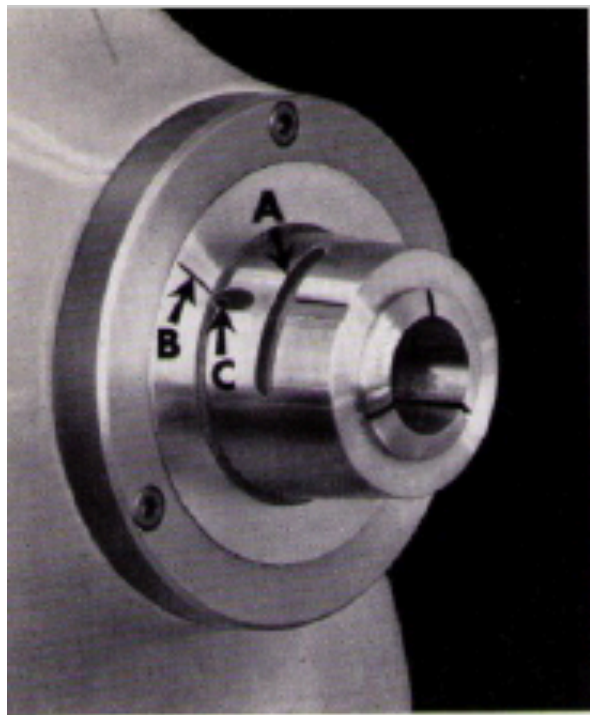


Figure 9

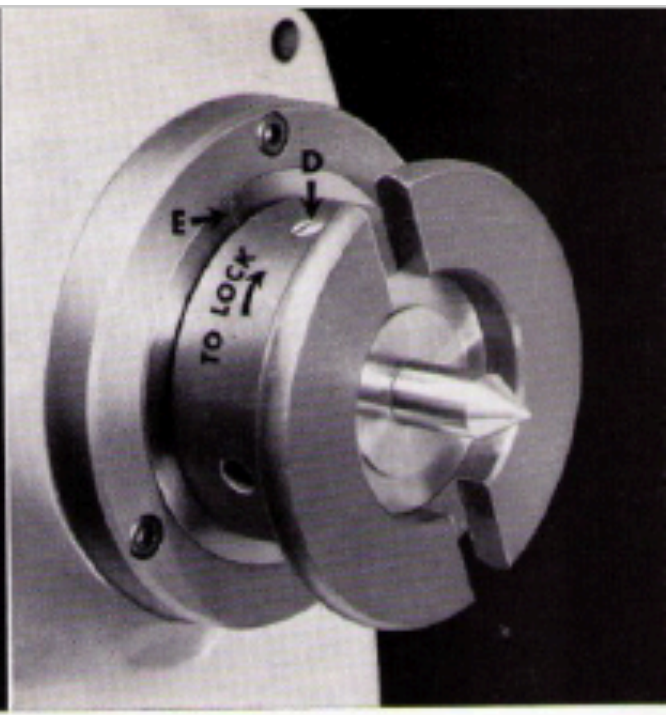


Figure 10

HOW TO APPLY AND REMOVE SPINDLE NOSE TOOLING

Figures 9 and 10

The Hardinge Taper Nose spindle construction is time-proven for accuracy, durability and for fast, easy application and removal of spindle nose tooling. The precision ground slow taper holds and aligns all tooling. The pin in all headstock spindle nose tooling engages the bayonet slot "A", to draw the attachment securely on the taper. Once securely drawn up, the spindle nose attachment is actually driven by the locking action of the tapered surface.

BEFORE APPLYING ANY ITEM OF TOOLING TO THE SPINDLE NOSE WIPE THE SPINDLE NOSE AND ATTACHMENT MATING SECTION CLEAN.

TO APPLY the drive plate for driving dog, for example, align key "D", Figure 10, with bayonet slot and slide drive plate on spindle nose. When it is back as far as it will go turn the drive plate clockwise to lock in place. This is determined by the relation of the key "D" and spindle reference line "E". Final tightening should be done with a standard pin type spanner wrench. (Use Williams or Armstrong spanner wrench No. 460. Do not use hammer and punch.)

TO REMOVE the drive plate, turn counterclockwise with spanner wrench to loosen. Continue to turn until key **"D"** is in line with reference mark **"E"**, then remove from spindle by sliding to right off end of spindle.

IMPORTANT — to obtain accurate results from precision spindle nose attachment always be sure the spindle nose and mating section in attachment are **CLEAN BEFORE THEY ARE ASSEMBLED TOGETHER.**

DO NOT REMOVE KEY "D" TO REMOVE SPINDLE NOSE TOOLING. IT IS THE SLOW WAY AND WILL INTERFERE WITH FUTURE ACCURATE OPERATION OF THE ATTACHMENT.

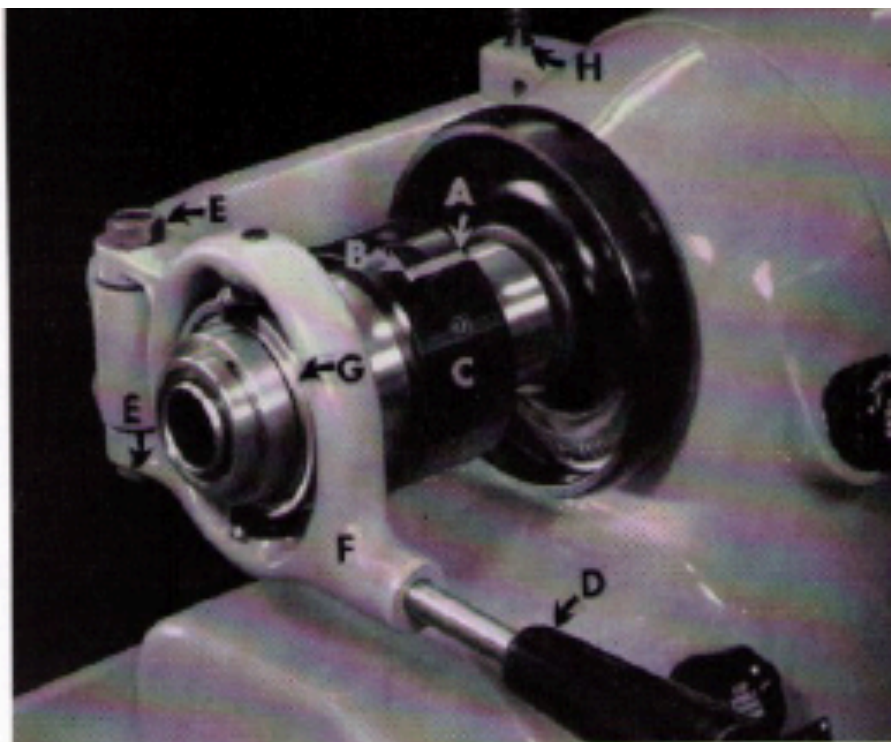


Figure 11

ADJUSTING COLLET CLOSER — Figure 11

1. Apply the desired size collet or step chuck to the machine spindle. Be sure the collet or step chuck and spindle are clean.
2. Open collet closer latch "A", Figure 11, 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 11, 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. Move lever "D", Figure 11, to the extreme left or closed position and then turn shell guard "C" toward the operator until it is drawn up as far as it will go by hand. If headstock spindle should turn, lock spindle by pressing in spindle lock pin "D", Figure 3, Page 12. To engage lock pin into notches provided, turn the spindle by hand until pin enters notch to lock.
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.

The two adjusting screws and lock nuts located at "E", Figure 11, are set at the factory. By adjustment of lock nuts "E", lever yoke "F" is raised or lowered so there is no pressure on bearing "G".

HOW TO REMOVE COLLET CLOSER — Figures 11 and 12

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 "H", Figure 11. This pin is easily removed by the use of a mallet and brass punch, striking pin at bottom.

CAUTION: DO NOT REMOVE COLLET CLOSER BY REMOVING SCREW "E", Figure 11. This screw is adjusted properly at the factory for proper operation of collet closer. Remove link pin "H", Figure 11, only. After removing pin "H" remove collet closer as shown in Figure 12. It is then necessary to remove adjusting nut "A", Figure 12. This is done by pulling nut straight off end of spindle. **DO NOT TURN ADJUSTING NUT — IT IS NOT THREADED TO SPINDLE.**

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

APPLYING COLLET CLOSER — Figure 12

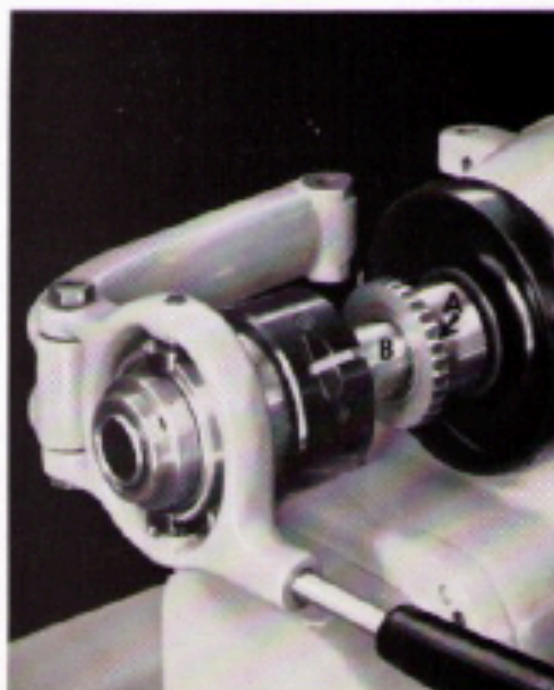
Clean the inside of the headstock spindle before applying collet closer. Also, clean outside diameter at rear of spindle where adjusting nut locates. Clean collet closer tube inside and out.

Apply a film of light oil on rear of headstock spindle and apply adjusting nut "A", Figure 12. Apply a film of light oil on bearing section "B", Figure 12, of collet closer tube and slide closer on machine and insert link pin "H", Figure 11.

SLIDE COLLET CLOSER TUBE INTO HEADSTOCK SPINDLE CAREFULLY. DO NOT FORCE. If it does not go in easily, remove and check for dirt, chips or burrs.

CAUTION: When threading draw tube onto collet and it does not turn freely by hand, remove it at once and check collet threads and draw tube threads, looking for dirt, chips or damaged threads. Also check inside diameter at rear end of headstock spindle and outside rear bearing diameter of draw tube.

Figure 12



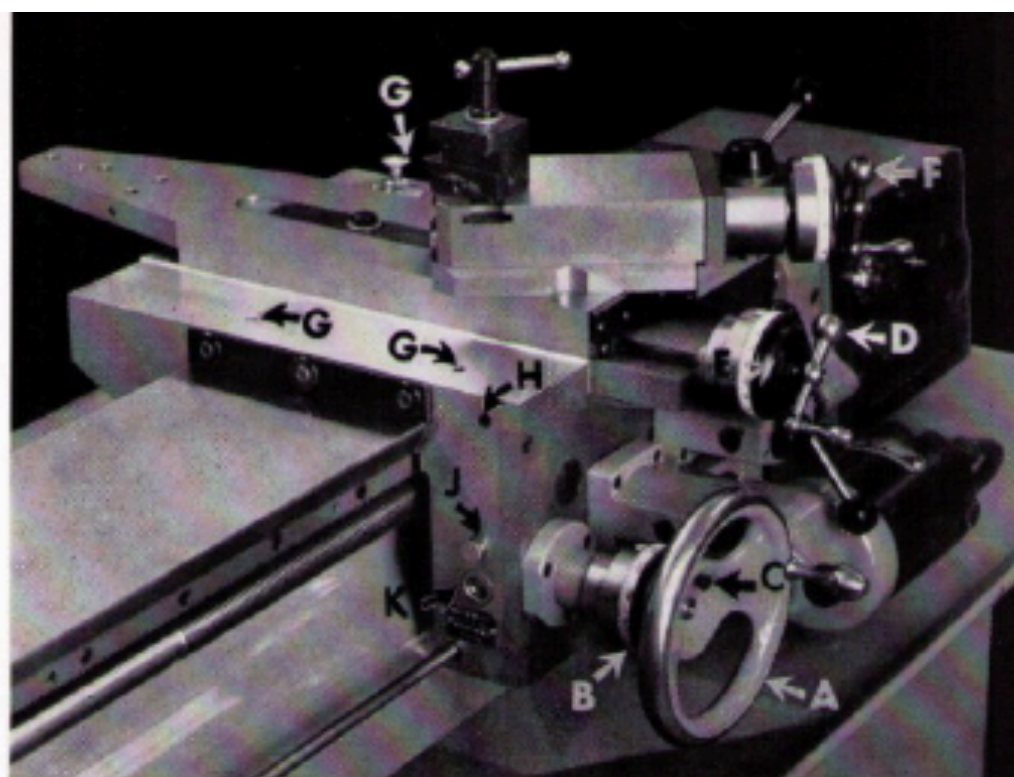


Figure 13

CARRIAGE AND APRON — Figure 13

Carriage handwheel "**A**" is used to move carriage along bed — longitudinal movement. The adjustable white dial "**B**" is divided in increments of .010" and has a positive lock "**C**".

Cross Feed Screw Ball Crank Handle "**D**" is used for hand feeding cross slide. The black and white dial is adjustable and has positive lock "**E**". The dial is divided in increments of .001" and is **DIRECT READING**. Direct reading means that when cross slide is moved one graduation or .001" the cutting tool will remove .001" from diameter of work.

Compound Slide (tool post slide) Ball Crank Handle "**F**" is used to feed the compound slide. The adjustable black and white dial is divided in increments of .001" and has a positive lock.

CARRIAGE AND APRON — Continued

Three follower rest mounting holes "G", Figure 13 are plugged with a screw to keep clean until used.

Tapped hole "H", Figure 13, is for mounting carriage indicator stop. The hole is plugged with a screw to keep it clean until used. The micrometer portion of the stop is clamped to the dovetail bed. See Page 58. Power Feed Clutch for carriage (longitudinal feed) "A", Figure 14, controls feed of the carriage along the bed. To release clutch, press lever down to position shown.

Power Feed Clutch for cross slide "B", Figure 14, controls power cross feed. Raise ball handled lever to engage and push down to release.

Lead screw nut handle "C", Figure 14, is to engage lead screw nut for threading only. Handle is shown in released position. To engage move to right to horizontal position. See Page 30 for complete instructions on threading.

Carriage lock "D", Figure 14, is used to lock carriage in a fixed position on the bed when doing heavy facing operations. Handle is shown in released position — to lock pull forward.

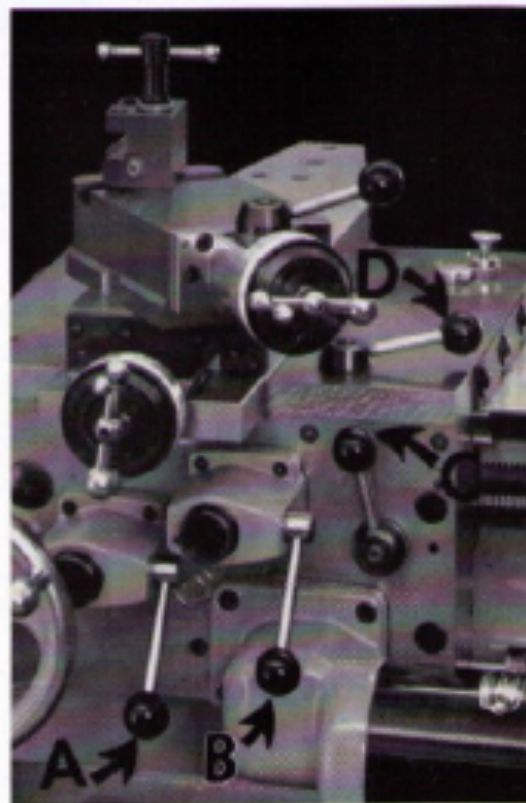


Figure 14

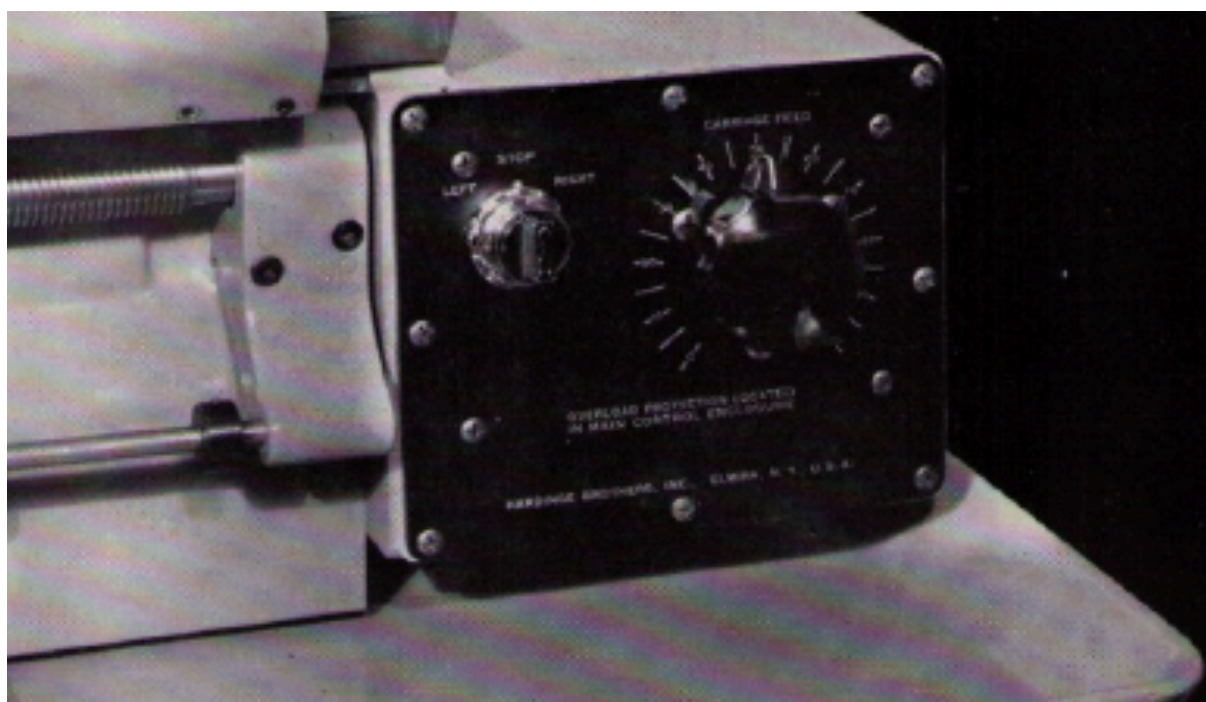


Figure 18

POWER FEED FOR CARRIAGE

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 a worm gear.

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 selenium rectifiers to direct current for the power feed motor. The electric cable from control panel to power feed motor is of oil resistant neoprene.

To start the power feed, position the **"SELECTOR"** switch 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.

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 on 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. They do not represent either thousandths per revolution or inches per minute.

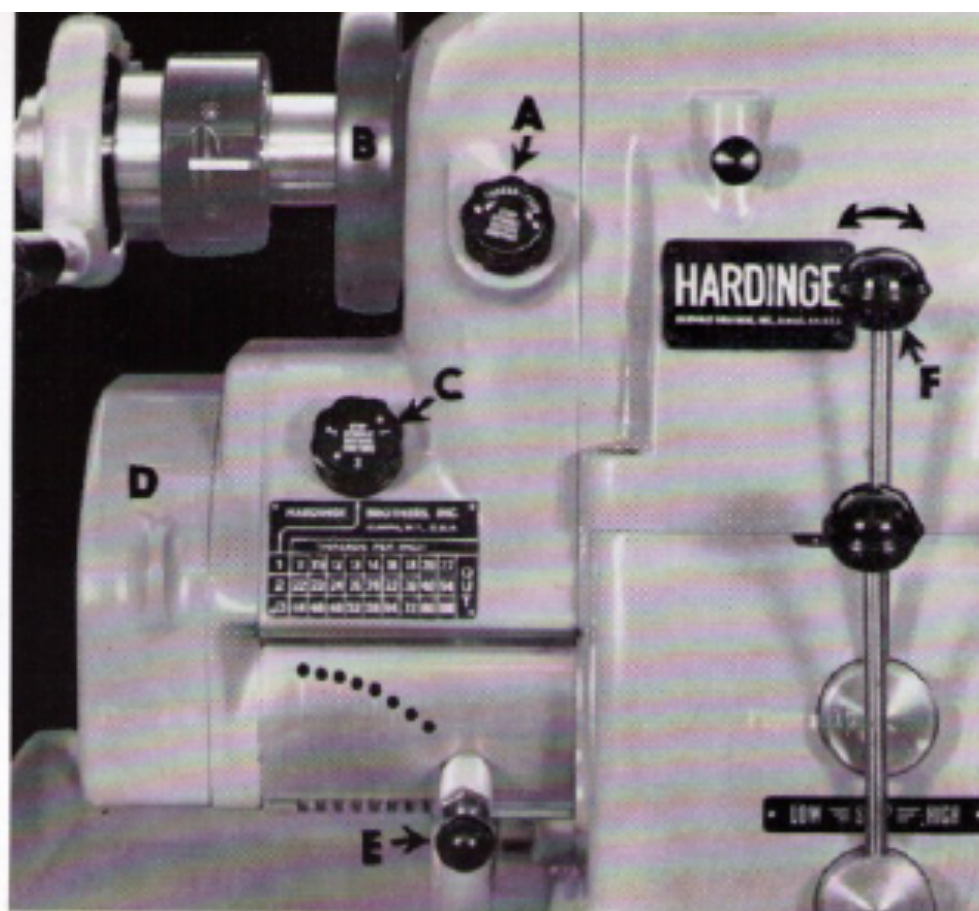


Figure 19

GEAR BOX FOR THREADING ONLY — Figure 19

Precision threading is an outstanding feature on the Hardinge HLV-H lathe. The logical separation of the power feed and lead screw gear box reserves the precision gear box for threading only, assuring maximum precision for the lead screw drive.

The all steel gears within the gear box run on shafts mounted on ball bearings. These bearings are grease packed and sealed, requiring no further attention.

TO ENGAGE GEAR BOX

To engage the gear box turn knob "A", Figure 19, counterclockwise in the direction of arrow marked "THREAD". When turning knob "A" the teeth of the sliding gear within the gear box may not mesh with the headstock spindle gear teeth. If so, turn the headstock spindle by means of spindle handwheel "B", Figure 19.

IMPORTANT: Before turning spindle, release spindle brake to obtain free spindle — see instructions on Page 13. While turning spindle also turn knob "A", Figure 19, to left until a definite click is heard.

IMPORTANT: Knob "A", Figure 19, should always be set in the "Feed" position except when threading, thus disconnecting gear box from headstock spindle.

The Hardinge HLV-H Lathe quick change gear box permits instant selection of 27 different threads by shifting a lever and turning a knob.

Knob "C", or three change knob, Figure 19, has three numbered positions — 1, 2 and 3. These numbers correspond with the 1, 2 and 3 given at the extreme left side of the gear box thread chart plate. To select the proper thread, numbers 1, 2 or 3 on knob "C" must be set at the bottom position to line up with the pointing arrow. The knob is shown in the number 3 position in Figure 19. The tumbler or nine change handle "E" has nine positions — each lining up with gear box thread chart plate. Combining the three positions of the three change knob and nine positions of the tumbler handle, 27 changes are obtained.

THREE CHANGE KNOB — Figure 19

When number one of knob "C", Figure 19, is in line with the arrow, any thread in row one of thread chart can be selected by changing the tumbler handle or nine change handle "E", Figure 19, to the desired thread in that row.

The three change knob "C", Figure 19, controls a sliding gear cluster. Number three on the knob, when lined up with the arrow on gear box chart, is in the center position. To place knob "C" in the number one position, turn to "RIGHT". Turn to "LEFT" to place number two position in line with arrow.

In the event the sliding gear cluster does not engage the other gears in the gear box properly to bring the desired number on three change knob "C" in line with arrow, open the change gear cover "D", Figure 19, and turn shaft "A", Figure 20, Page 33, by hand until the gears mesh properly.

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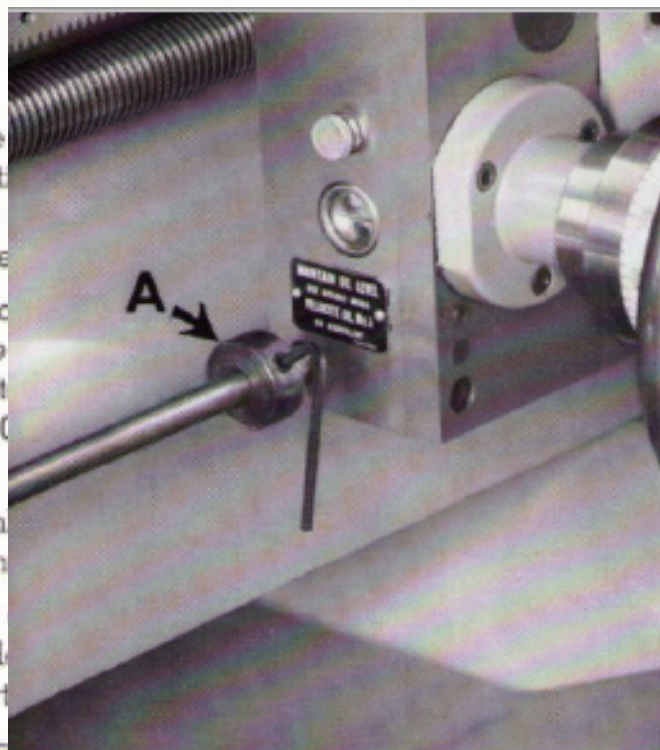
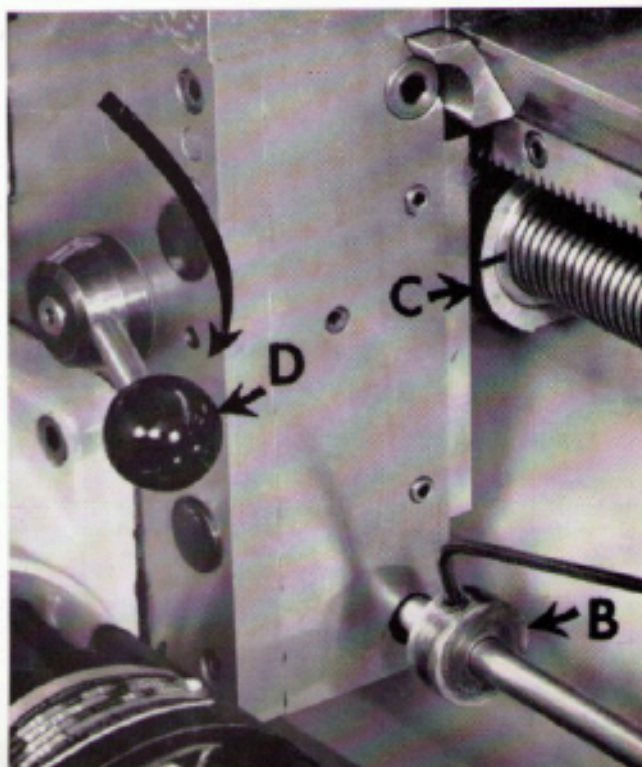


Figure 22

Figure 23



LEF

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stock toward the tailstock. Carriage control stops are used for left hand threads as well as right hand threads.

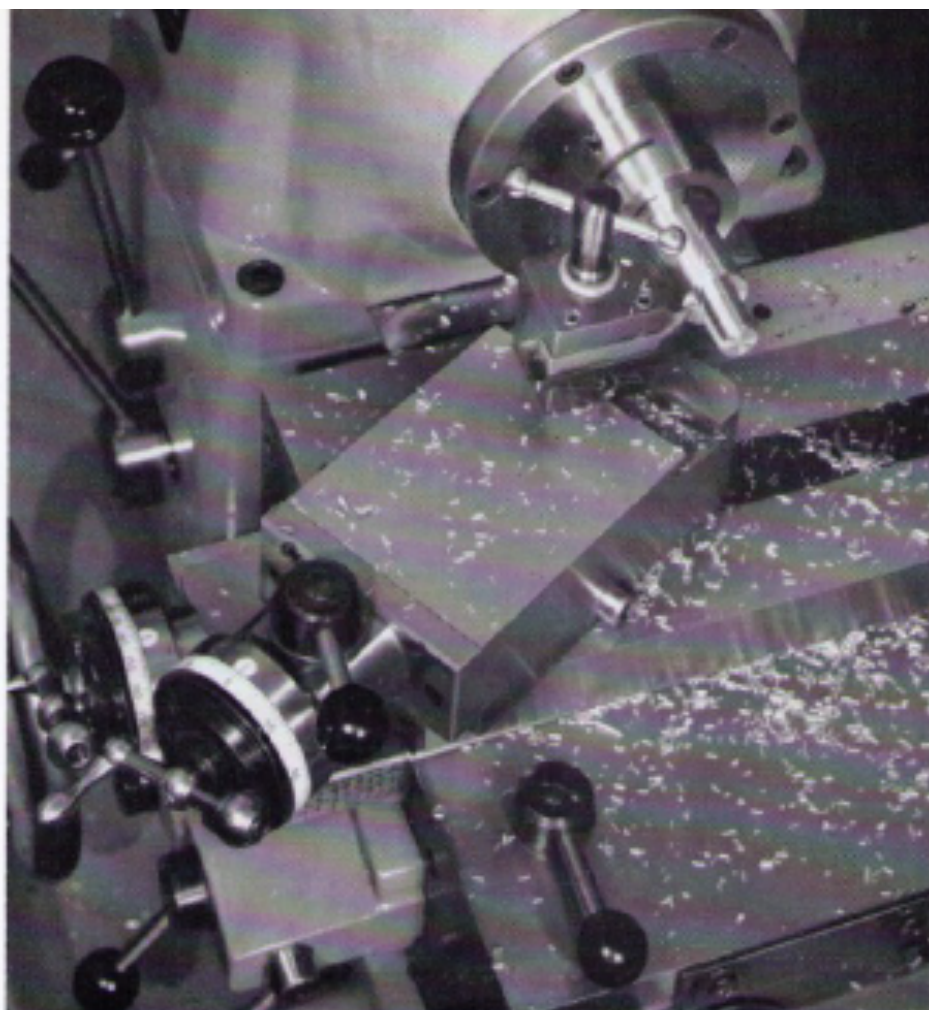


Figure 25

THREAD CUTTING — continued

This illustration shows the cutter and carriage at the end of the threading pass. Notice that the threading tool is close to the shoulder — the carriage was stopped in this position by the carriage stop which controls the lead screw. Headstock spindle continues to run in the forward direction. Carriage stops cause only the gear box, lead screw and carriage to stop running.

When cutting left-hand threads, start the threading pass next to the shoulder and with the spindle running forward, make the threading pass toward the tailstock.

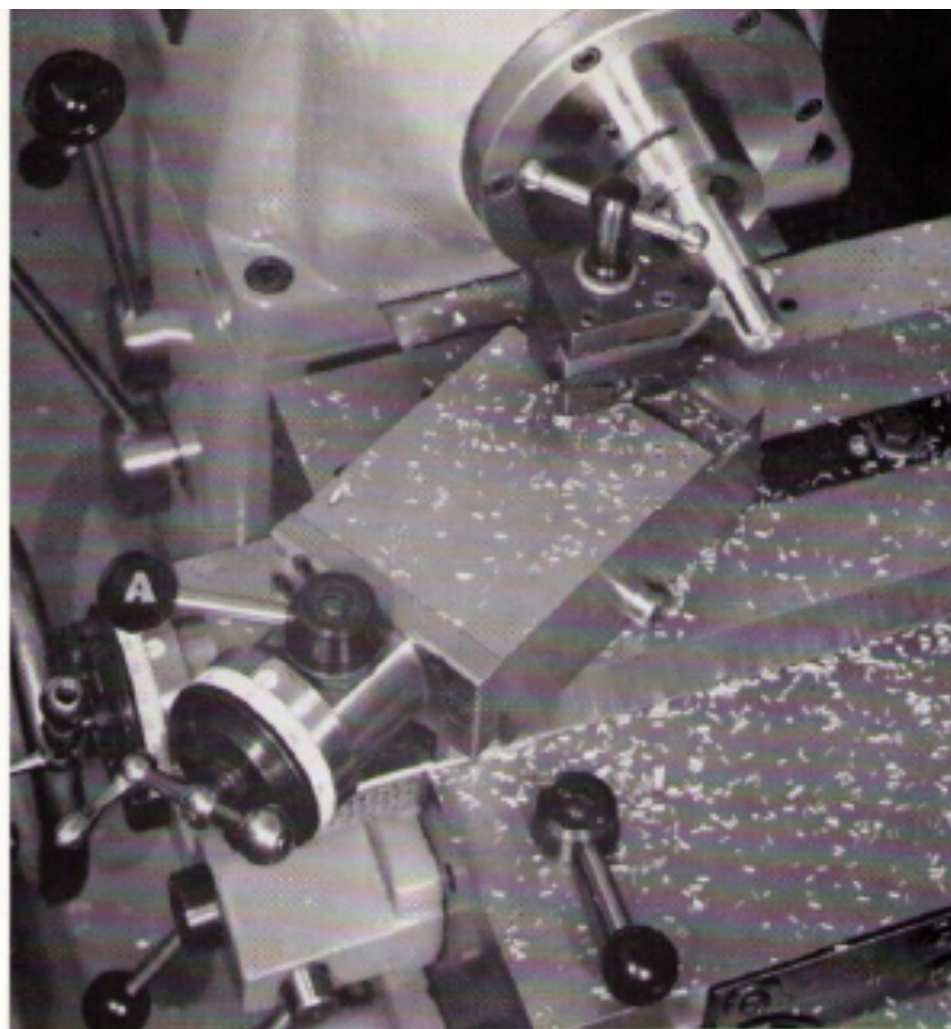


Figure 26

THREAD CUTTING — continued

Illustrated above is the carriage in the same position on the bed as in Figure 25 only that quick acting handle "A" on the compound slide has been moved to the left withdrawing tool from work. After withdrawing tool with quick acting handle, the carriage is reversed or moved to the right to the starting position by moving carriage control lever "F", Figure 19, Page 30, to the right.

SAFETY

To prevent serious bodily injury, you should observe the following basic safety precautions when installing, operating or servicing the milling machine.

1. Follow all instructions in the manual.
2. Wear approved industrial safety glasses and proper shoes.
3. Do not wear gloves, long sleeves, long hair, rings, watches, jewelry or other items that could become caught in moving parts.
4. Keep all parts of your body away from moving parts (belts, cutters, gears, etc.)
5. Use proper point of operation safeguarding.

SAFETY RECOMMENDATIONS

DO NOT OPERATE EQUIPMENT until you have read and understood the appropriate operator and safety maintenance manuals.

DO NOT OPERATE EQUIPMENT until you have read and understood all machine and control key signs.

DO NOT OPERATE EQUIPMENT for the first time without a qualified instructor. Consult your supervisor when in doubt as to the correct way to perform an operation.

DO NOT OPERATE EQUIPMENT unless proper maintenance has been regularly performed and the equipment is known to be in good working order.

DO NOT ALLOW the operation or repair of equipment by untrained personnel.

WARNING or **INSTRUCTION TAGS** are mounted on the equipment for your safety and information. Do not remove them.

DO NOT OPERATE EQUIPMENT if any unusual or excessive heat, noise, smoke, or vibration occurs. Report any excessive or unusual vibration, sounds, smoke, or heat as well as any damaged parts.

WEAR SAFETY GLASSES with side shields and proper shoes at all times. When necessary, wear respirator, helmet, and ear muffs or plugs.

DO NOT OPERATE ANY MACHINE while wearing rings, watches, jewelry, loose clothing, neckties, or long hair not contained by a net or shop cap.

DO NOT WEAR GLOVES while operating equipment. Gloves are easily caught in moving parts.

REMOVE ANY LOOSE PARTS OR TOOLS left on machine or in the work area before operating the machine. Always check the machine and work area for loose tools and parts, especially after work has been completed by maintenance personnel.

REMOVE CHUCK WRENCHES before starting the machine.

NEVER OPERATE A MACHINE after taking strong medication, using non-prescription drugs or consuming alcoholic beverages.

SAFEGUARD THE CUTTING ZONE (“point of operation”). Use standard, general purpose safeguards when possible. Use special safeguards when required.

PROTECT YOUR HANDS. Stop the spindle completely before changing tools.

DO NOT REMOVE CHIPS with hands. Use a hook or similar device and make certain that all machine movements have ceased.

DO NOT ADJUST tooling, workpieces or coolant hoses while the machine is running.

NEVER REACH around a safeguard.

PROTECT YOUR HANDS. Stop the machine before changing or adjusting belts, pulleys or gears.

PROTECT YOUR HANDS. Keep hands and arms clear of spindle start switch when changing tools.

PROTECT YOUR EYES AND THE MACHINE. Never use a compressed air hose to remove chips.

KEEP WORK AREA WELL LIGHTED. ask for additional light if needed.

DON'T SLIP. Keep your work area clean and dry. Remove chips, oil and obstacles.

NEVER LEAN ON your machine. Stand away when the machine is running.

MAKE CERTAIN that you are clear of any “pinch points” created by moving slides before starting the machine.

PREVENT OBJECTS from flying loose. Securely clamp and locate workpiece. Use stop blocks where necessary. Keep clamps clear of cutter path.

PREVENT CUTTER BREAKAGE. Use correct table feed and spindle speed for the job. Reduce feed and speed if you notice unusual noise or vibration.

PREVENT CUTTER BREAKAGE. Rotate spindle in clockwise direction for right-hand tools, counterclockwise for left-hand tools. Use the correct tool for the job.

PREVENT WORKPIECE and cutter damage. Never start the machine when the cutter is in contact with the workpiece.

DO NOT USE worn or defective tools. Use the proper size and type of tool for the task at hand.

KEEP ROTATING CRANKS AND HANDWHEELS well lubricated and maintained. Do not remove safety springs.

CERTAIN MATERIALS, such as magnesium, are highly flammable in dust and chip form. See your supervisor before working with these materials.

PREVENT FIRE. Keep flammable liquids and materials away from work area and hot chips.

PREVENT MACHINE from moving unexpectedly. Disengage power feed when not being used (manual machines only).

PREVENT MACHINE from moving unexpectedly. Always start machine in manual mode.

UNLESS OTHERWISE NOTED, all operating and maintenance procedures are to be performed by one person. To avoid injury to yourself and others, be sure that all personnel are clear of the machine when opening or closing the coolant guard door and any access covers.