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This instruction manual is for—

Customer _____

Machine _____

Serial No. _____

Lot No. _____

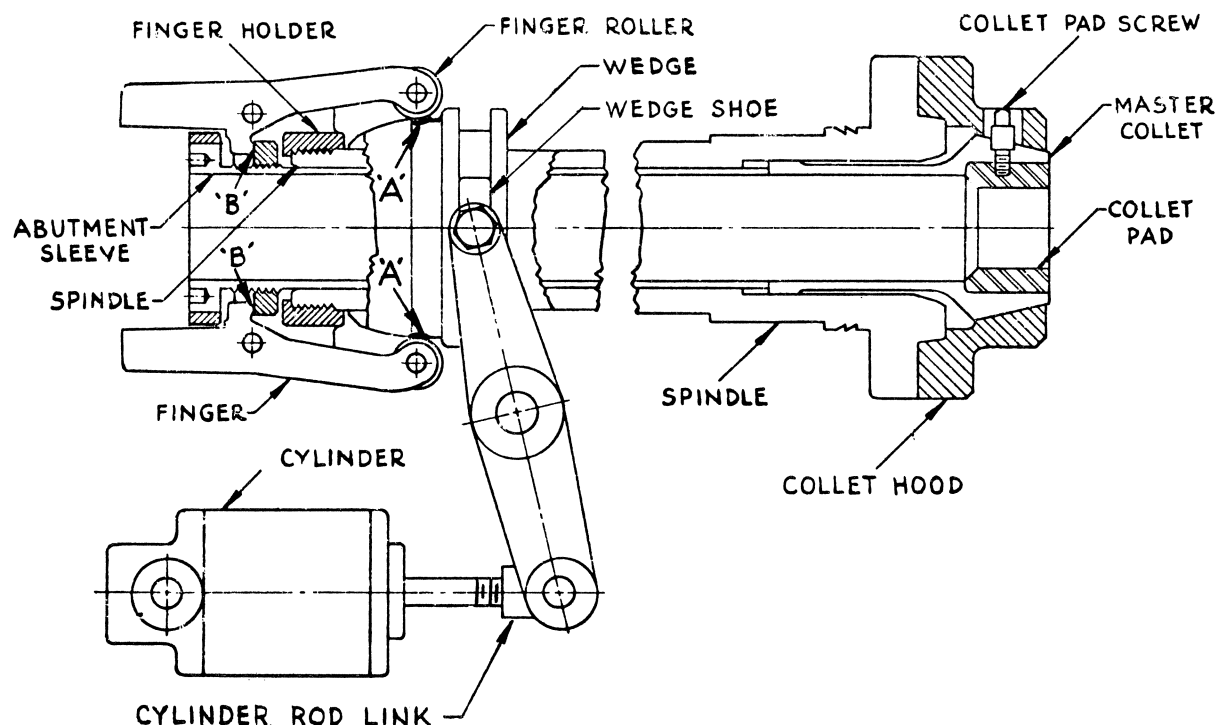
Date Mfg. _____

Note: When ordering tooling, repair parts or requesting information please refer to the above machine, serial number and lot number.

BARDONS & OLIVER

INSTALLATION OF COLLET CHUCK FINGERS

IMPORTANT



The force necessary to close the collet is transmitted from the wedge to each collet chuck finger at the rollers "A". These fingers in turn multiply this force and transmit it at surface "B" to the adjusting sleeve and nut or abutment sleeve depending on the design. Unless the force at the wedge is divided equally between the fingers, one finger will carry an undue proportion of the load resulting in excessive wear and possible finger breakage.

The correct relation between the fingers is very easy to check and correct if necessary. With stock in collet and collet in the closed position, adjust abutment sleeve for a very light grip. Check whether all finger rollers "A" remain in tight contact with the wedge. If this is not true, remove the tight finger and carefully file at surface "B". Repeat this procedure until all fingers become tight.

This should be done whenever a new finger is installed for any reason.

MACHINES WITH AIR OPERATED COLLET CHUCK

The finger holder should at all times abut tightly against the end of the spindle. With stock in the collet, the grip is adjusted by use of the spanner wrench for which holes are provided in the end of the abutment sleeve. The wedge should not hesitate too long in closing the collet before the rollers snap into the groove. If the cylinder hesitates while closing the collet, this causes excessive wear and premature failure of the wedge shoes. The wedge shoes should be free in the closed position, if not, adjust the cylinder rod link as necessary to free the shoes. If the wedge shoes are not free in the closed position, this definitely will cause premature failure.

Normal operating air pressure is 45 PSI with a maximum setting of 60 PSI.

Do not operate at higher pressure than necessary.

UNIVERSAL TURRET LATHE

INSTALLATION—SECTION 1

The Bardons & Oliver Universal Turret Lathe was designed and built to produce accurate work over a long period under conditions of hard usage. In order that the inherent accuracy be retained, extreme care must be given to the installation of the machine. Thorough inspection of the machine should be made at regular intervals, the frequency depending on the type of work handled and the accuracy desired.

IMPORTANT

Do not attempt to run the machine until all of the following instructions for Unpacking, Installing, Lubrication, Electrical Connections, Leveling, and Safety have been carefully and completely followed.

UNPACKING

Turret Lathes for domestic customers are shipped in individual crates: those for foreign customers are shipped in individual boxes. While the machine is being unpacked, particular care should be taken not to mar the finish or damage the working parts.

Whenever possible, tools, chucks, and fixtures are attached directly to the machine. Wrenches and other items which cannot be attached, together with a data envelope, will be found in a separate box fastened to the platform or skids.

Contained in the data envelope are the instruction manual, electrical diagram, parts catalogue, and packing list. Be sure this data is preserved and delivered to the proper departments.

Check and account for each item on the packing list before disposing of any crating or boxing material.

These plates should be grouted in concrete flush with the floor. If it is impossible to set these plates in or on concrete, they may be bolted down to a wooden floor. Here it is advisable to use plates affording a much larger bearing area on the floor. Drill and tap for the hold down screws after the bearing plates are firmly fastened to the floor.

On machines equipped with an air collet chuck and bar feed unit, assemble the bar feed unit according to the foundation drawing in the manual and place the unit in its approximate position with respect to the machine. The bar feed unit should be located on bearing plates the same thickness as used under the machine.

Connect the two air lines to the collet chuck cylinder underneath the end of the spindle. Each hose is suitably marked.

FOUNDATIONS

The machine is mounted on heavy wooden skids to prevent bed warpage in shipping. Locate the machine approximately in its final position before removing the skids. In removing the skids care must be taken to prevent undue twisting which might cause permanent distortion of the bed.

If possible, the legs should rest on a concrete foundation. A wooden floor lacks rigidity and its surface swells or shrinks according to climatic conditions.

To maintain accuracy, place steel bearing plates under each leg, as shown on the outline drawing of the machine.

ELECTRICAL CONNECTIONS

The machine is shipped from the factory with all electrical equipment wired. It is only necessary to connect the main power lines to the terminals on the disconnect switch in the upper right hand corner of the electric control cabinet. When the headstock oil reservoir is filled as outlined in the "LUBRICATION" instruction, close the disconnect switch and press the "START" button located on the push button control panel. If the power lines have been connected to give the proper rotation of the motors the spindle will rotate in a counter clockwise direction with the start lever in forward.

LEVELING

CAUTION—Before leveling, allow the machine to reach normal operating temperature.

To start machine, read operating instructions first.

The accuracy originally built into the machine will be lost unless the machine is properly leveled. To maintain this accuracy the level of the machine should be checked at least twice a year.

To level, raise the machine by turning the leveling screws so that a 1/8 inch thickness gage may be slipped between the bottom of each leg and the bearing plate. Use a precision level about fifteen inches long. Starting at the head end, place the level lengthwise on the bed ways, and level by turning the adjusting screws. Then place the level across the bed ways and level. Repeat the two operations at the tail end of the machine. After leveling at each end, repeat the leveling process until all readings are equal. After proper alignment, bolt down the legs and recheck the level.

If extremely accurate work is to be done on the machine, the leveling can be further checked by chucking a round bar and taking a turning cut with the carriage or hexagon turret. Any remaining misalignment will be indicated by the amount of taper in the turned diameter. This can be corrected by slight adjustment of the leveling screws.

On machines equipped with the air collet chuck

and bar feed unit, this unit should be bolted to the floor only after it is leveled and aligned with the spindle. To level and align the unit (Figure 1), do as follows: Place the unit in approximately the proper position with respect to the machine, and make necessary electrical and air connections. Insert a test bar (equal to the maximum capacity of the collet) through the revolving scroll chuck and just through the collet. The bar should be straight, of a uniform diameter and about 12 feet long. Close the collet. Place a parallel between the support bars and the test bar. Using a 2 inch parallel, raise the second stand until the test bar is level. Check alignment of support bars by placing level lengthwise on top of the bars and then crosswise on the bars adjacent to the parallel. Adjust by leveling the second stand. Level the first stand lengthwise and at right angle to the support bars. Using the test bar as a guide, align the stands with the center line of the spindle. Recheck level of test bar and support bars. As a check of alignment, the test bar should be concentric with the hole in the abutment sleeve. Recheck the levels throughout the bar feed unit.

To insure proper installation of the bar feed unit, tighten the chuck until it grips the test bar. Loosen the chuck just enough so that it can be moved back and forth over the test bar. It must slide freely over the whole length. After lining up and leveling the bar feed stands, bolt them securely to the floor.

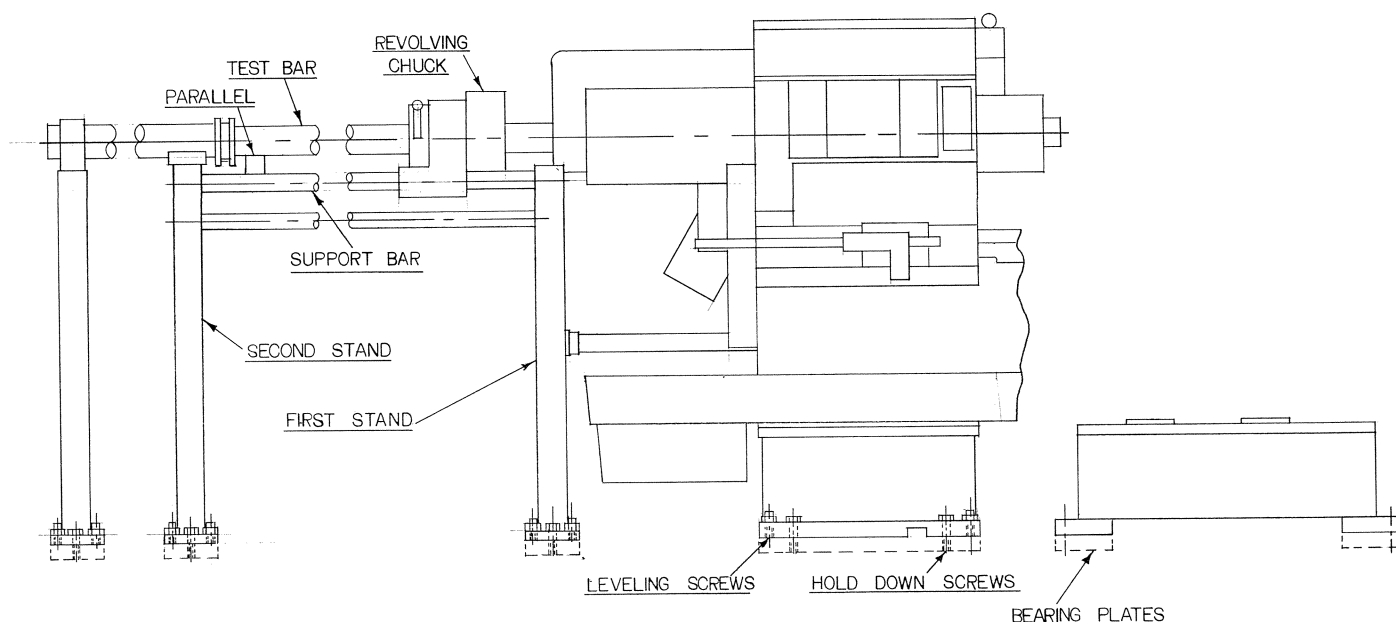


FIG. 1

LUBRICATION

The headstock is fully enclosed and spray lubricated. With the main drive motor on circulating oil should be visible in the sight gauge directly below the forward-reverse lever near the spindle face.

The aprons and head end bracket are splash lubricated. The plunger pumps on the aprons lubricate the bearing surfaces of the turret slide, the cross slide, carriage, feed screw, and nut, as well as bearing surfaces in each apron not reached by the splash system. Since the plunger pumps take oil from the aprons, it may be necessary to add oil to the aprons more often than to the headstock or head end bracket.

The apron oil reservoirs are filled to the proper level before shipment. Fill the headstock and check the aprons and head end bracket. Make sure that the oil level in each reservoir is at approximately the center of the gage glass. Check the oil levels before starting the machine, as the level drops somewhat after the machine is started. Raising the oil level above the center line on the gage will cause oil leakage at various points and excessive oxidation or gumming of the oil.

The instructions on the lubrication chart (Figure 2) must be followed. If the machine is operated on a multi shift basis, the headstock and aprons should be drained, flushed and refilled two or three times as often as called for on the chart.



Site Gage

Apron
Plunger Pump

LUBRICATION CHART

INSTRUCTIONS

- Before Starting — Fill all oil reservoirs to the center line on the gages. Fill oil cups. Depress apron pump plungers 3 or 4 times.
- Every 4 hours — Fill oil cups. Depress apron pump plungers 3 or 4 times.
- Every 3 months — Drain apron and head end bracket oil reservoirs. Flush with solvent type flushing oil. Refill reservoirs.
- Every 6 months — Drain headstock oil reservoirs. Flush thoroughly with solvent type flushing oil. *Clean oil filter on inside of reservoir cover.* Refill headstock.

OIL SPECIFICATIONS

- Headstock and Head End Bracket — High grade mineral oil, Mobil DTE 25 or equivalent.
- Aprons — Mobilgear #626
- Oil Cups — Mobil Vactra oil #2

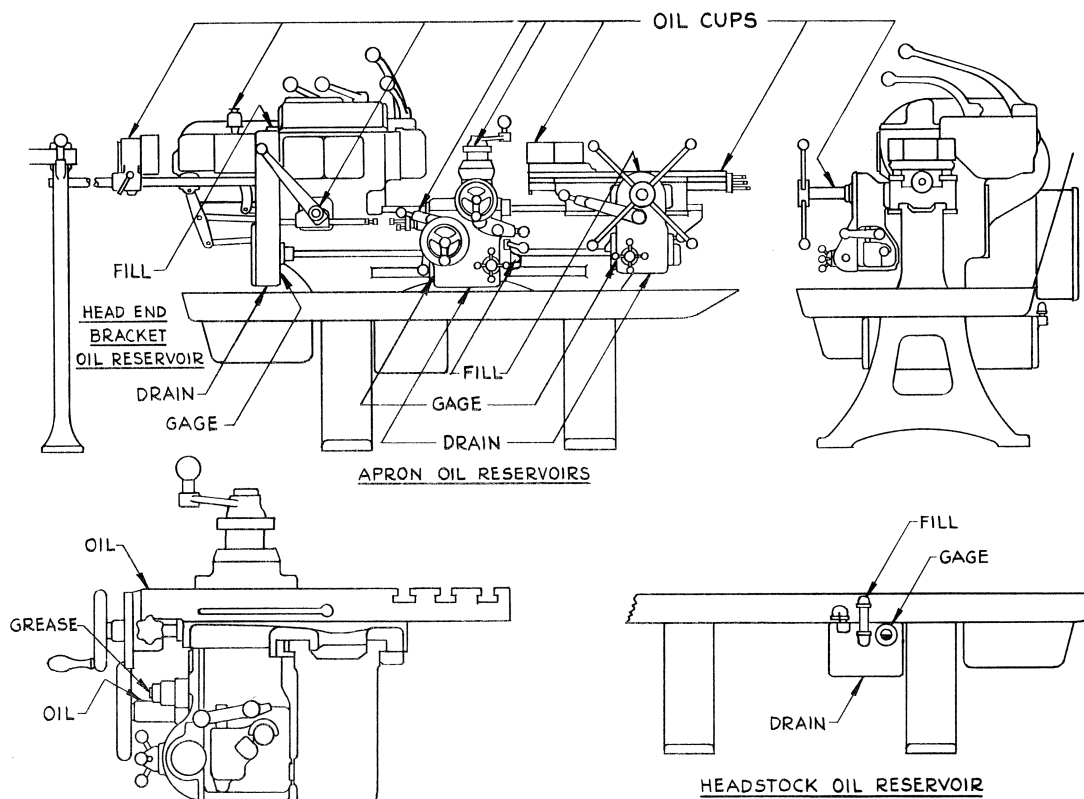


FIG. 2

NOTE: Mobil Products are listed above to indicate the proper type of lubricant. Many manufacturers of high quality lubricants have equivalents, and it is recommended that you consult the company which has best served your past needs.

OPERATING INSTRUCTIONS

SECTION 2

Safety First

Before you turn on the machine—

- Protect your eyes. Wear safety glasses.
- Wear appropriate clothing—No long sleeves, neckties, or jewelry.
- Make sure floor is clean and free of obstructions in work area. Clean up chips, oil spills, and remove parts or tote boxes to a safe area.
- Before turning on power, put the spindle in neutral.
- Make sure work part and tooling are securely fastened in proper holders or fixtures.
- When main power is on and before spindle is rotated check that hydraulic and air pressure gages show proper operating pressure.

HEADSTOCK OPERATION

The No. 6 Universal Turret Lathe features a 12 speed, preselect headstock with instant automatic spindle speed changing and simplified controls (Figure 3).

1. Main Drive Motor—The “start” button starts the headstock hydraulic pump. When pressure is sufficient to insure lubrication of all headstock components, a pressure switch closes, starting the main drive motor. The “stop” button stops both the hydraulic pump and main drive motors.

2. Coolant Pump—A selector switch turns on and off the separate motor driven coolant pump.

3. Preselector—The preselector drum with large convenient handwheel indicates the 12 spindle speeds and corresponding surface or cutting speeds for various work diameters. Spindle

speeds may be preselected at any time. Speed change occurs when “shift” button is depressed.

4. Spindle Control Lever—This lever controls the following spindle functions—BRAKE, NEUTRAL, JOG, RUN, FOR. AND REV.

The center detent position actuates the spindle brake.

Moving the lever to the left (away from the operator) disengages the brake to provide a “free spindle” or neutral position. Further movement gradually engages the spindle in forward. This movement can be used for jogging, soft starting, or positioning the spindle.

At the extreme left position, the lever detents into the “forward Run” position.

Moving the lever to the right provides the same functions for the spindle reverse.

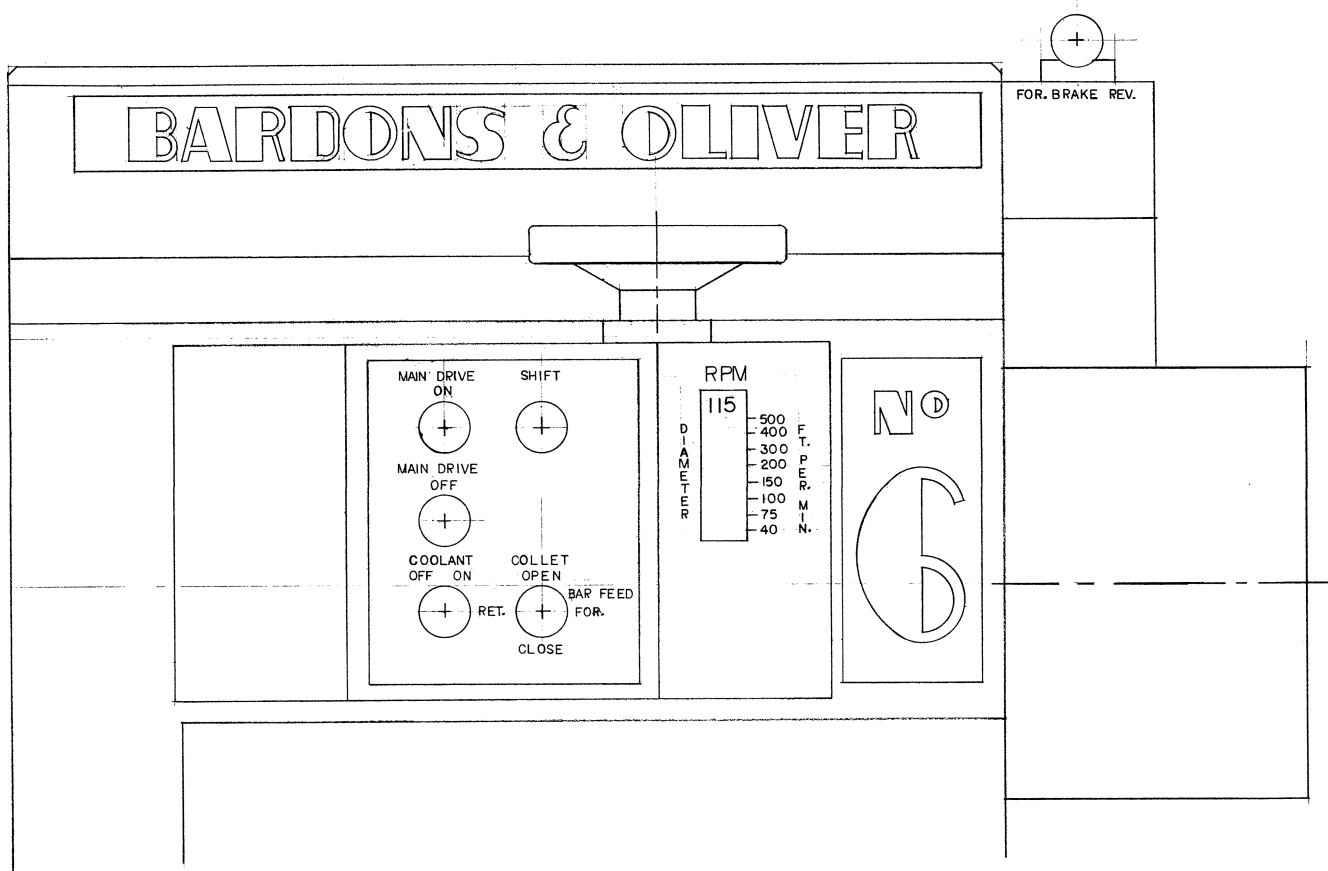


FIG. 3

CARRIAGE AND CROSS SLIDE OPERATION

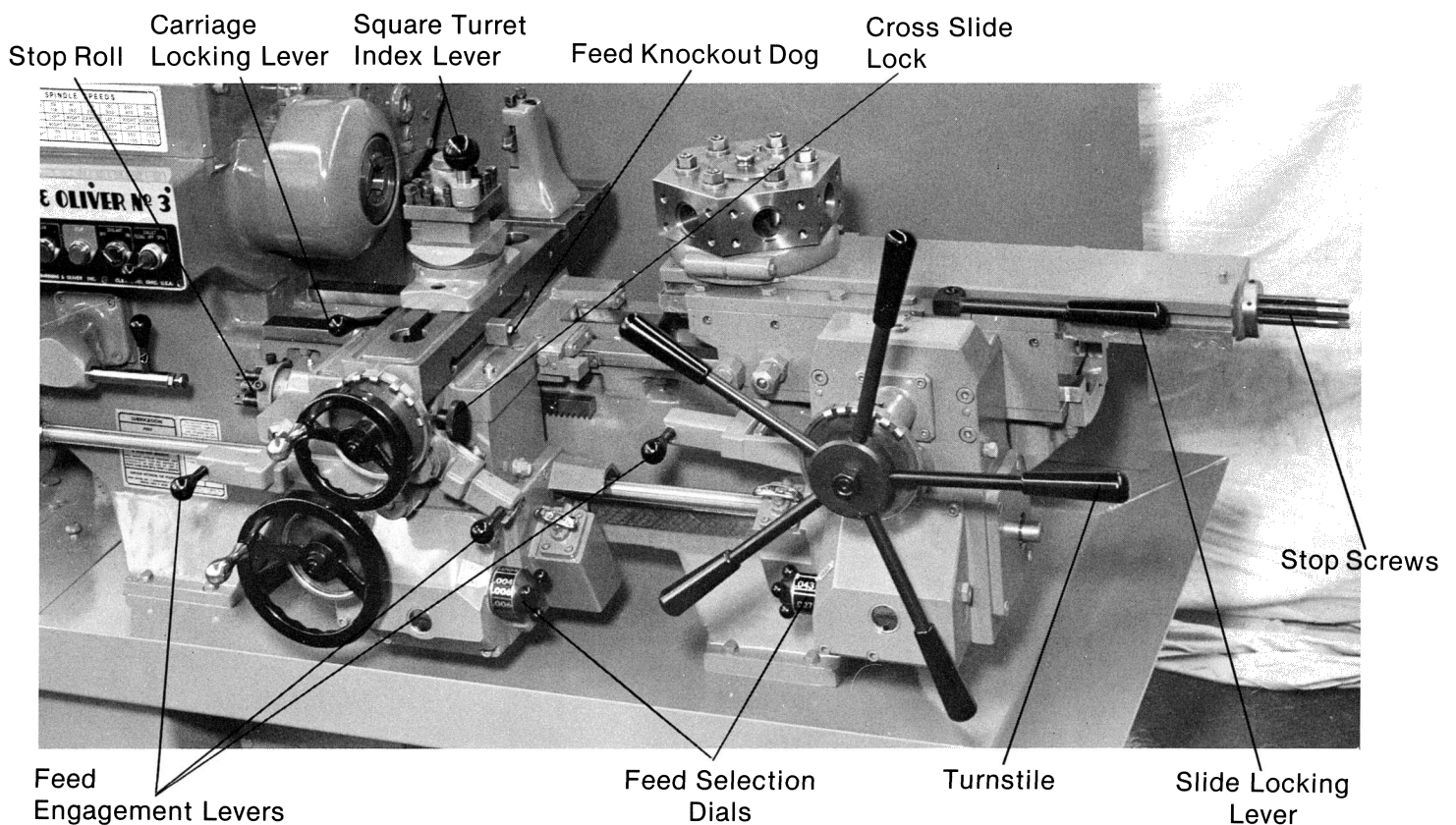
The carriage and the cross slide can be adjusted manually by turning the hand wheels. Power feeds are engaged by lifting the new "easy action" levers and are disengaged by the same levers or by adjustable stop screws or dogs. Positive tooth clutches in each apron assure easy engagement and long life.

Feed selections in each apron are made by means

of a single dial and are easily read on large rotating drums.

The carriage locking lever can be used to lock the carriage into position for facing, grooving or cut-off. The cross slide lock can be used to lock the cross slide in position.

The six position stop screw roll may be set to disengage the feed on longitudinal cuts.



SLIDE AND HEXAGON TURRET OPERATION

The turnstile handles advance, retract and index the hexagon turret.

Power feed is engaged by lifting the new "easy action" lever and may be disengaged by the same

lever or by a stop screw.

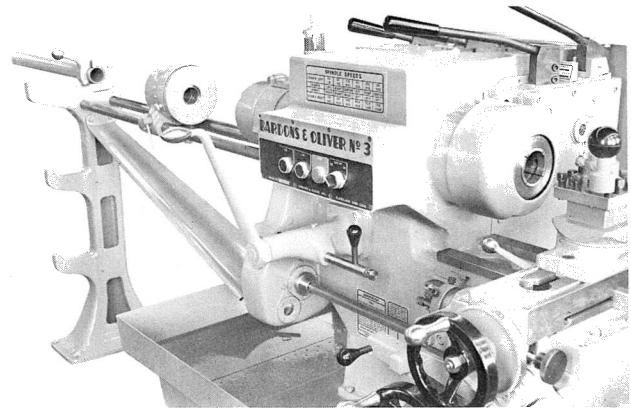
Stop screws are set by adjusting the screw in the bottom position on the roll which corresponds to the working face of the hexagon turret.

HAND OPERATED COLLET CHUCK AND BAR FEED

The hand operated collet chuck and bar feed are shown below. The bar to be fed into the machine is held in a two jaw revolving chuck located on the two rigid support bars.

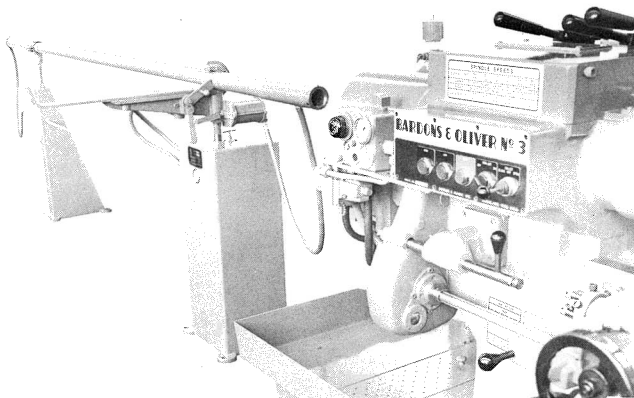
A single lever, located at the front of the headstock, operates both the collet chuck and bar feed. Moving the lever away from the operator closes the collet. Moving the lever toward the operator opens the collet and actuates the bar feed through a ratchet mechanism.

When loading a bar, open the collet, swing the support tube forward, and insert the bar. Then, bring the bar forward through the revolving chuck and through the collet. Close the collet and move the revolving chuck back as far as possible. A lever located on the base of the revolving chuck releases the chuck from the ratchet mechanism and allows the chuck to slide on the support bars. Tighten the chuck jaws firmly on the bar.



As the collet is opened and closed the revolving chuck will travel forward until it reaches a stop near the end of the spindle. The chuck jaws must then be released, and the chuck must be moved to the far end of the support bars again.

AIR OPERATED COLLET CHUCK AND BAR FEED



The bar feed will handle solid bars up to the maximum capacity of the machine provided that the unit is properly aligned with the machine and that the bars are reasonably straight. A bent or crooked bar may have to be cut in two.

The simple air operated plunger type bar feed constantly exerts pressure against the end of the bar. Whenever the collet opens, stock is immediately fed out. A toggle lever on the headstock control panel opens and closes the collet.

The bar feed is powered to feed stock when the tube is in line with the spindle and lever "A" is down. This is a safety feature. DO NOT open the collet when the bar feed is powered UNLESS the turret station has a stock stop. To cut off the power to the bar feed, swing lever "A" up.

To load the bar feed move the plunger—Lever "A" air disconnect handle toward you, lift tube latch up and swing tube out. When changing stock sizes replace tube end bushing with the proper size bushing for the new stock diameter.

Bar feed pressure should be adjusted until plunger just moves bar through the machine spindle. Required pressure will be only a few pounds. Keep bar feed pressure to a minimum.

COLLET CHUCK

To change collet pads, remove the pad screws from the master collet. These can be reached through holes in the collet hood. (Figure 4) To avoid runout of stock, clean the master collet and pads carefully before putting in the new pads.

The grip of the collet is adjusted at the rear of the spindle by use of the spanner wrench for which holes are provided in the end of the abutment sleeve. (Figure 4) The finger holder should at all times abut tightly against the end of the spindle. The collet grip should be adjusted so that the finger rollers snap into the groove in the wedge when the collet is closed.

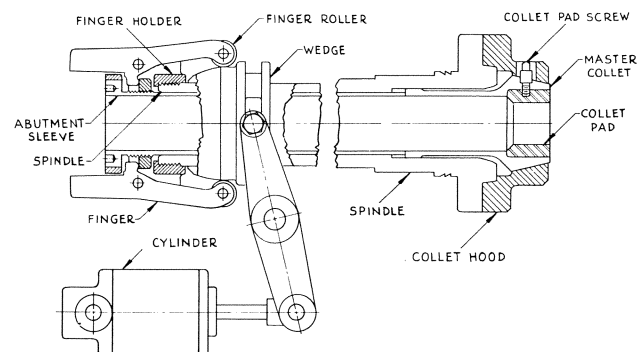


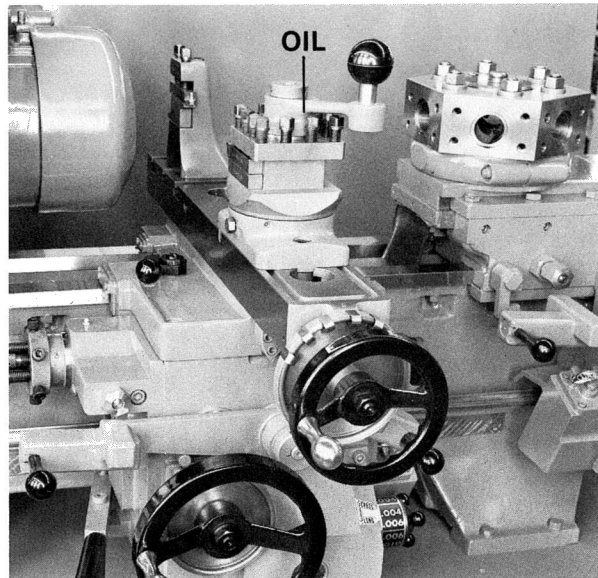
FIG. 4

SQUARE TURRET

The Bardons & Oliver Square Turret features rugged construction and accuracy, assuring repetitive indexing within a few ten thousandths of an inch. A protective skirt around the bottom of the turret effectively keeps chips from the bearing surfaces. Daily maintenance of the square turret consists of oiling at the point indicated.

Rotate the **Turret Index Lever** counter clockwise to index the square turret.

Four cutters can be held in the square turret and each cutter indexed to the cutting position in sequence, according to the job requirements.



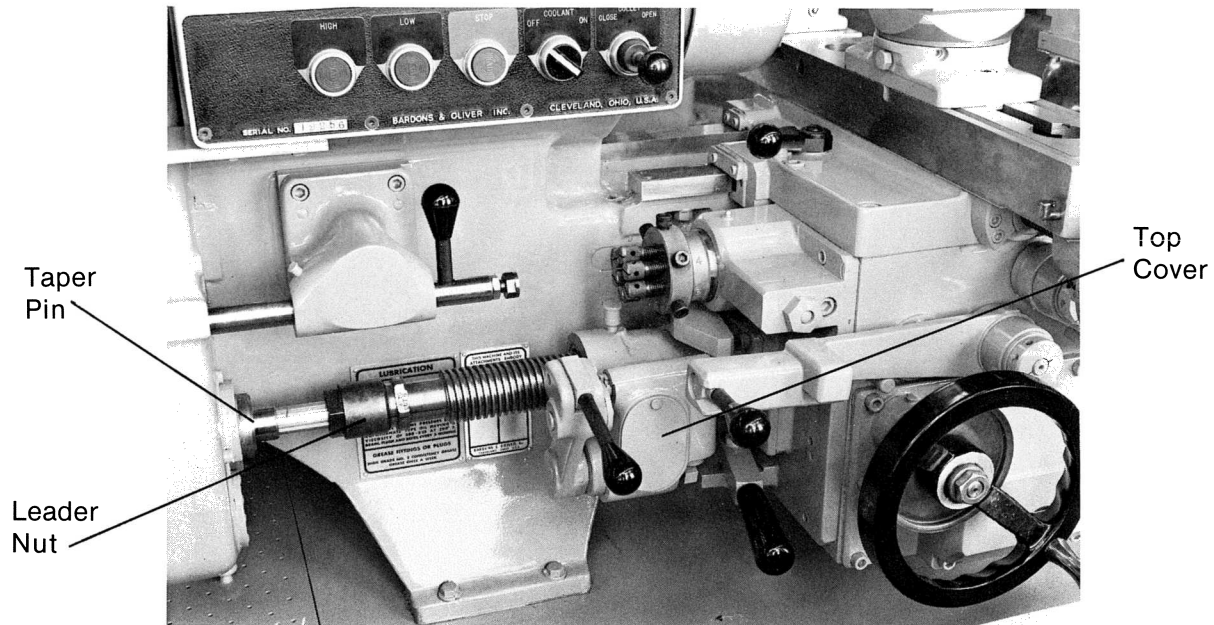
COOLANT SYSTEM

An impeller type pump with integral motor drive is mounted directly over the coolant sump, and is controlled by an independent push button switch mounted on the control panel at the front of the headstock.

The coolant sump, located at the head end of the machine, is divided into two compartments by a baffle. Metal particles settle in the first compartment, and thus the pump located in the second compartment is protected. The sump should be cleaned frequently.



CARRIAGE THREAD CHASING ATTACHMENT



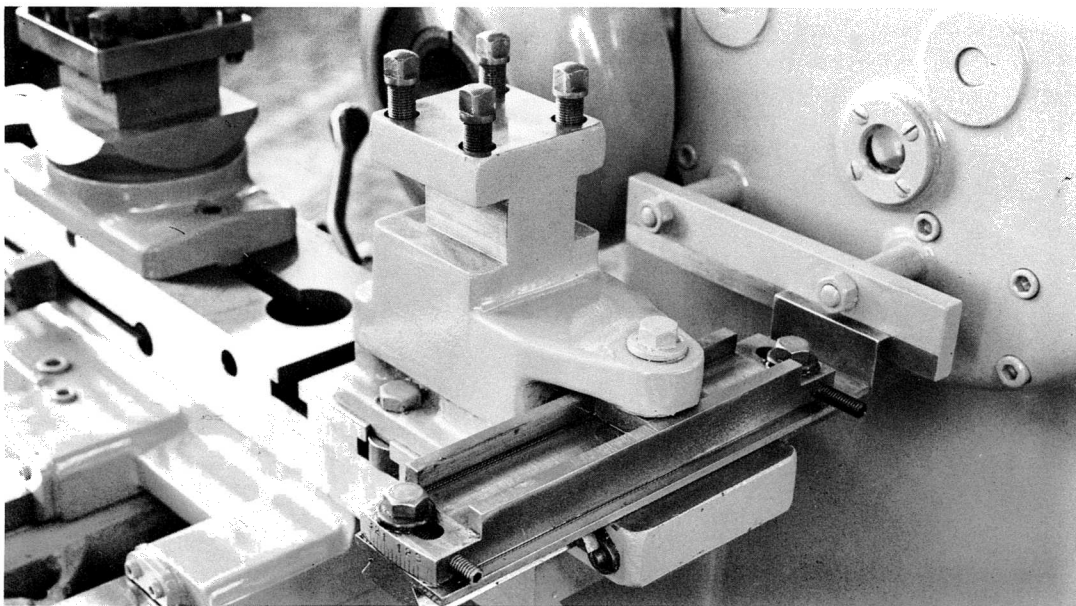
The carriage thread chasing attachment, bolted to the carriage apron and driven by the feed shaft, is simply designed and easy to operate. Lifting the engagement lever meshes the follower with the leader. The quick acting automatic knockout controlled by the carriage stop screws facilitates threading close to a shoulder or blind hole.

When changing leaders disconnect the feed shaft driving coupling by removing taper pin, see above.

Slide the shaft to the right to allow for removal of leader. When tightening leader nut use one wrench on the leader and one on the nut to avoid shearing the pin in the coupling.

To change the follower, remove the top cover on the chasing attachment bracket. After the new follower is inserted, it may be adjusted to the leader by the screw located at the bottom of the chasing attachment.

CROSS SLIDE TAPER ATTACHMENT



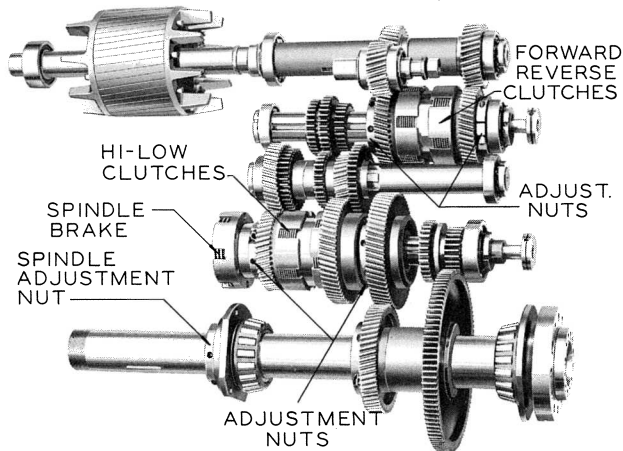
The cross slide taper attachment is mounted on the rear of the cross slide in place of the rear tool post. The lower member of the taper guide carries

a yoke which engages a guide plate held by two studs on the head lever bracket.

MAINTENANCE AND ADJUSTMENTS

SECTION 3 HEADSTOCK ADJUSTMENTS

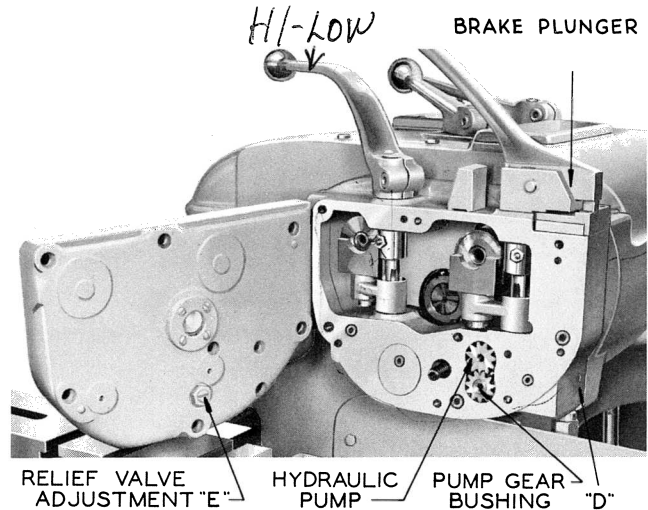
1. There are two double multiple disc clutches, one to obtain forward and reverse spindle rotation and one to provide quick high-low speed changes (Below).



The clutches have split adjusting nuts at each end which may be easily reached by removing the small covers on the top of the headstock. These clutches should not require adjustment more often than once or twice a year. When adjusting the clutches, keep trying the clutch levers in each direction while turning each nut a little at a time. After the right "feel" has been obtained in each clutch, be sure to tighten the locking screws in the split nuts before replacing the covers.

2. The spindle is mounted in two single row precision tapered roller bearings. A split adjustment nut, located on the rear end of the spindle outside the headstock, may be easily reached with a pin wrench after removing the small plate on the top of the head end bracket. In adjusting, all end play should be eliminated but no pre-loading should be introduced.

3. The headstock hydraulic system provides oil to operate the spindle brake and to spray lubricate



all moving parts in the headstock. The hydraulic pump is located in the clutch lever bracket directly in back of the spindle and supplies 50 to 60 lbs pressure to operate the spindle brake.

If the breaking action is slow, insert a pressure gage in place of the pipe plug fitting "D" on the back of the clutch lever bracket. The brake will not operate properly at a pressure below 50 lbs. (See Above)

The pressure may be regulated by adjusting the relief valve at point "E". If oil pressure is still too low, check for the following conditions.

1. Not enough oil in the headstock oil reservoir.
2. Clogged oil filter, located on the inside of the headstock oil reservoir cover.
3. Worn pump gear bushing which allows air to enter the hydraulic system.

If the pressure is correct and the breaking action is still slow, the brake should be disassembled, cleaned, and wire brushed. However, it should not be necessary to do this until the machine has been in use several years.

CARRIAGE AND SADDLE APRON ADJUSTMENTS

Each feed lever contains a safety spring which allows the tooth clutches to slip only under conditions which would be injurious to the machine. Since the feed engagement clutches are of the

positive multi-tooth type, it is not necessary to adjust them to prevent slippage. The clutch teeth should be fully meshed when the feed lever plunger is engaged.

TURRET AND SLIDE ADJUSTMENTS

The hexagon turret revolves on and is located centrally by a large diameter tapered roller bearing. A double bevel circumference clamp ring tightens the turret against the slide and preloads the bearing for accurate centering and vertical alignment.

The turret slide travels on hardened and ground replaceable alloy steel ways in the saddle. It is guided between double, hardened, ground and lapped alloy steel gibs on each side, and held by sturdy hardened and ground steel top caps.

To move the saddle on the bedways, loosen the eight screws beneath the lower saddle caps. Do not loosen the adjustment screws on the back side of the saddle. A latch is provided for attaching to the cross slide carriage for easy movement of the saddle along the bedways.

A neoprene apron is attached to the front end of the slide just below the turret to keep chips and dirt out of the indexing mechanism. However, the slide should be occasionally removed so that the saddle may be thoroughly cleaned. To remove the slide, place a board across the bedways beneath the front of the slide, remove the saddle caps and raise the rear end of the slide until the front end rests on the board.

The front top cap consists of three separate pieces, the middle portion serving as a slide clamp. The binder handle has a serrated hole for easy positioning.

1. The clamping action of the turret clamp ring is controlled by a toggle arrangement (Figure 5). The clamp bolt should fit freely in both halves of the clamp ring and its nut should be adjusted so that when the turret is in the clamped position, a .005" to .010" feeler can be inserted between a section of the clamp ring and the spacer.

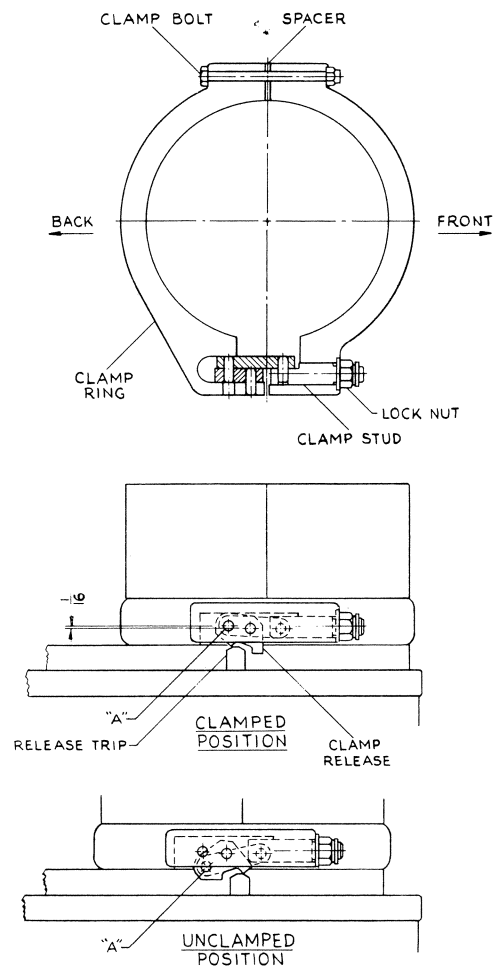


FIG. 5

The height of the trip release should be such that pin "A" lines up with the hole in the back section of the clamp ring (Figure 5) when the turret is in the clamped position. This locates the clamp release 1/16" over center and keeps the clamp ring from releasing. After some period of time the clamp release may become worn. To align pin "A" with the clamp ring hole, raise the threaded, four sided trip release the required amount.

The lock nut on the clamp stud should be tightened until sufficient clamping action results. As the turret slide is moved back and forth by rotating the turnstile and the clamp release rides over the release trip, a slight drag, but no binding should be felt.

To check the clamping action, index the turret half way and then bring the slide forward. In this position the clamp ring is closed, but the lock bolt is not engaged in the turret. Raise two of the turret binder bolts about two inches above the top of the turret. Place a bar between them and try to turn the turret.

2. If, after adjusting the clamp ring, the turret is still inaccurate, proceed as follows: move the slide to the rear, thus opening the clamp ring and indexing the turret. Bring the slide forward about half an inch. Insert a 2 inch bar in one of the turret holes. While applying pressure on the bar back and forth with one hand, place one finger of the other hand so it rests against both the turret and the back of the clamp ring. If movement is felt at this point between the turret and clamp ring, the outer race of the tapered bearing is set too low in the slide. Then place finger against the turret and front of the clamp ring and apply pressure as above. If movement is felt at the front of the turret the lock bolt and lock bolt bushings are worn.

Bring the slide forward until the leading edge protrudes about one inch from the saddle. Locate an indicator on the top surface of the turret. Tap the front of the clamp ring. If the indicator reading drops, either the outer race of the tapered bearing is set too high in the slide, or the flat bearing between turret and slide has become excessively worn.

The conditions outlined here should not occur for several years, even under hard usage. Correcting these troubles will entail one or more of the following operations:—relocating the tapered

bearing outer race, rescraping the bearing surfaces of the turret and slide, replacing the lock bolt sleeve and bushings, and rescraping the clamp ring. Because of the skill and experience necessary to properly perform these operations, we suggest that you contact the factory Service Department before proceeding.

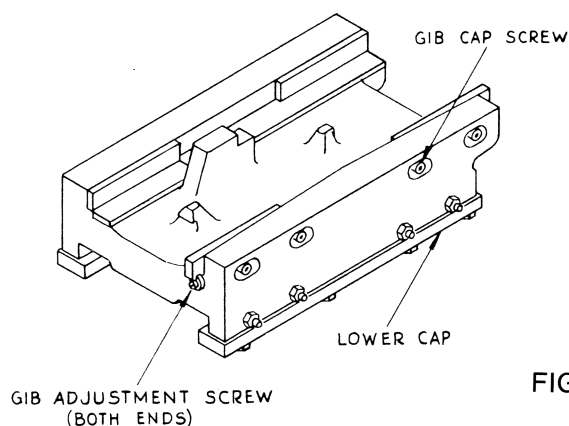
3. After the machine has been in operation a few months it may be necessary to adjust the slide gibs. (Figure 6) The front gibs are not adjustable. There are two adjustable rear gibs. Loosen the cap screws for each gib on the back face of the saddle. The gib adjustment screws are set into each end of the saddle.

CROSS SLIDE AND CARRIAGE

Pairs of adjustable tapered gibs are provided at the outside of the front bedway, the bottom of the rear bedway and the lower or third bedway. One long tapered gib provides adjustment for the cross slide.

The cross feed screw is mounted in two opposed radial thrust ball bearings which are slightly preloaded and do not require adjustment. An adjustable double bronze nut, located in the front face of the carriage, is provided so that backlash can be eliminated from the feed screw.

A binder handle is provided for clamping the carriage to the bedways. The handle has a serrated hole for easy positioning.



(VIEW OF SADDLE LOOKING FROM REAR OF THE MACHINE)

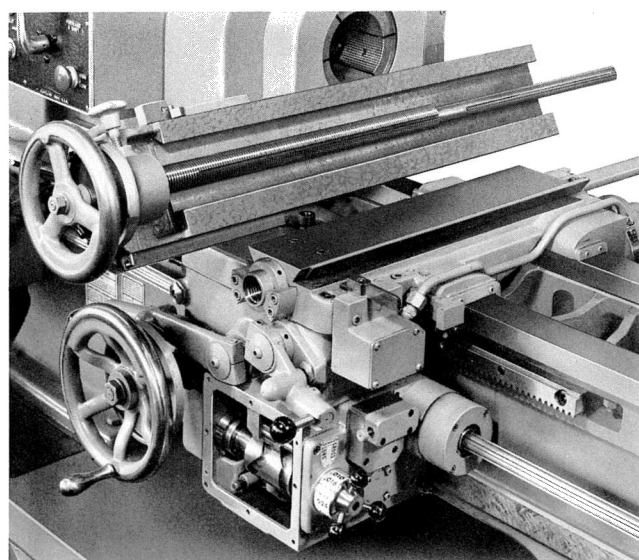


FIG. 7

CROSS SLIDE AND CARRIAGE ADJUSTMENTS

1. After the machine has been run for a few weeks check the adjustment of the gibs. Check these adjustments about twice a year thereafter. To adjust, back off the gibs between the apron and lower bedway. Tighten the gibs between the carriage and the front bedway until the carriage just begins to bind when the handwheel is turned. Then back the gibs off slightly and make sure there is equal tension on each gib screw. After releasing the set screws on the back face of the carriage, adjust the rear gibs in the same manner as indicated for the front gibs. Adjust the gibs between the apron and lower front way last. Tighten the cross slide gib until the slide just begins to bind. Then, back the gib off slightly. Make sure all gibs are held securely in the adjusted positions.

2. To eliminate backlash between the cross slide screw and nut, loosen the locking screws holding the bronze adjustment nut. (Figure 7) Turn the adjustment nut until the backlash is eliminated, and then retighten the locking screws.

SQUARE TURRET

The Bardons & Oliver Square Turret features rugged construction and accuracy, assuring repetitive indexing within a few ten thousandths of an inch. A protective skirt around the bottom of the turret effectively keeps chips from the bearing surfaces. Daily maintenance of the square turret consists of oiling at the point indicated on the figure.

When the indexing lever (1) is in the extreme clockwise position as shown in the figure, the lockbolt (2) is seated in the turret bushing (3) and the turret is clamped to the base. Tapered pins position the lockbolt cam (4) and stud collar (5) on the center stud (6) in the proper timed relationship. The indexing sequence is as follows:—The indexing lever is moved counter-clockwise. The tapered pin (7) in the indexing lever engages the stud collar, causing the center stud to move with the indexing lever. The lockbolt cam engages the tumbler (8), depressing the lockbolt lever (9), which in turn disengages the lockbolt. The second tapered pin (10) in the indexing lever then engages the indexing plate (11) causing the turret to turn. The lockbolt rides on a recess in the turret until the next position is reached. Moving the indexing lever clockwise returns the lockbolt cam against the lockbolt sleeve (12). The indexing lever then disengages the stud collar and moves on the double acme threads causing the turret to be clamped to the base.

To properly maintain the square turret it should be completely disassembled and cleaned at least every six months. To completely disassemble, remove the bottom plate (13), stud collar (5), indexing lever (1), turret, center stud (6), tumbler pivot screw (14), tumbler (8), lockbolt lever (9), tumbler plunger (15), screw plug (16), lockbolt spring, and lockbolt (3) in that order. Reassemble in the reverse order, taking care that each part is placed in its original position, particularly the tumbler and lockbolt lever. Double acme threads locate the indexing lever on the center stud. It is possible to assemble this unit with the lever 180 degrees from the proper position. If the tapered pin which locates the stud collar on the center stud fits flush with both sides of the collar, the lever is properly positioned. If the pin goes in only half way, remove the indexing lever and reengage it opposite to the prior point of engagement. In adjusting the tumbler plunger the set screw should be tightened just enough to keep the tumbler in the proper indexing position. Tightening the set screw too much may cause the plunger to bind and shear.

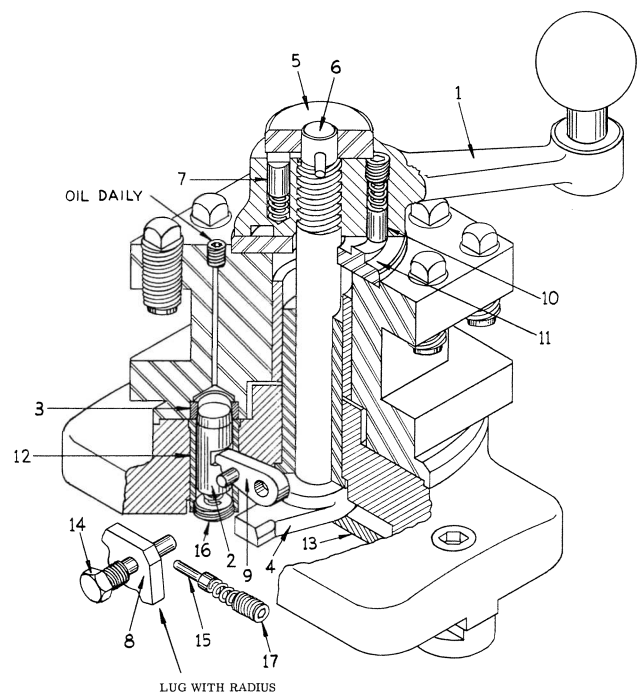


FIG. 8

DIAGNOSIS OF IMPROPER SQUARE TURRET OPERATION

The following chart lists difficulties which may be experienced with the square turret operation, and indicates the cause and remedy for each trouble. See Figure 8.

TROUBLE	CAUSE	REMEDY
Turret remains stationary although indexing handle is turned one half revolution.	Indexing lever does not engage the indexing plate.	Remove the hardened pin in the indexing lever, clean, and on reassembly be sure the pin works freely.
Indexing lever moves only one quarter revolution and turret will not index.	Lockbolt does not disengage.	
	a) Set screw (17) holding tumbler plunger loosens.	Tighten set screw slowly until turret properly indexes.
	b) Tumbler plunger sticks.	Remove set screw, spring and plunger, clean, and be sure on reassembly that plunger works freely.
	c) Tumbler plunger broken.	Replace plunger. Plunger must work freely.
	d) Tumbler broken or excessively worn.	Replace tumbler.
	e) Lockbolt lever broken.	Replace lever.
Turret "Skips" or fails to stop at the next position on indexing.	Lockbolt spring worn.	Replace with about a quarter inch longer spring.
Repetitive indexing is inaccurate.	Lockbolt spring worn and lockbolt does not fully engage in turret.	Replace with about a one quarter inch longer spring.
	Lockbolt and lockbolt bushing excessively worn.	Recommend the square turret be sent back to the factory for rebuilding.
Turret drags or binds on indexing.	Tools in the turret held too tightly.	Tighten tools only as much as possible with wrench provided. Do not use pipe on wrench handle.
	Bottom plate does not clear the cross slide.	Remove bottom plate, clean, and file nicks which may cause loss of clearance between the bottom plate and the base bottom.

COLLET CHUCK

To change the collet pads, remove the pad screws from the master collet. These can be reached through holes in the collet hood. To avoid stock runout, clean the master collet and pads carefully before assembly.

Dirt and fine chips working into the collet and spindle recess may cause the collet to stick and not release. To avoid this condition, remove the collet hood and clean the collet and spindle recess frequently.

MASTER COLLET & PADS

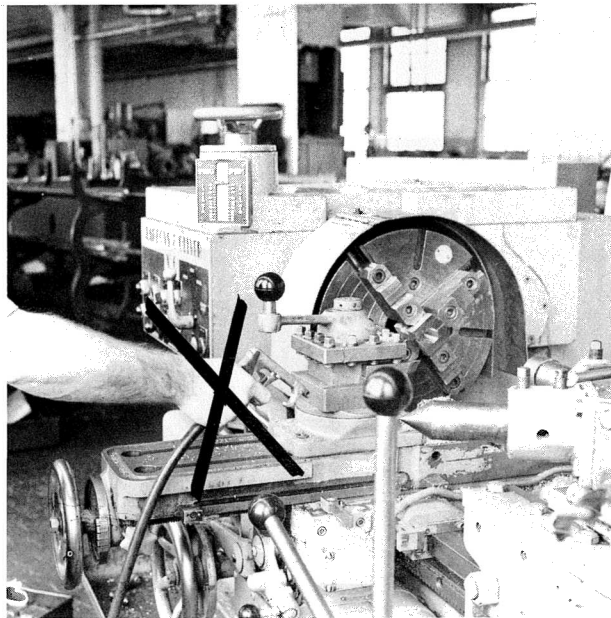


GENERAL SAFETY

SECTION 4

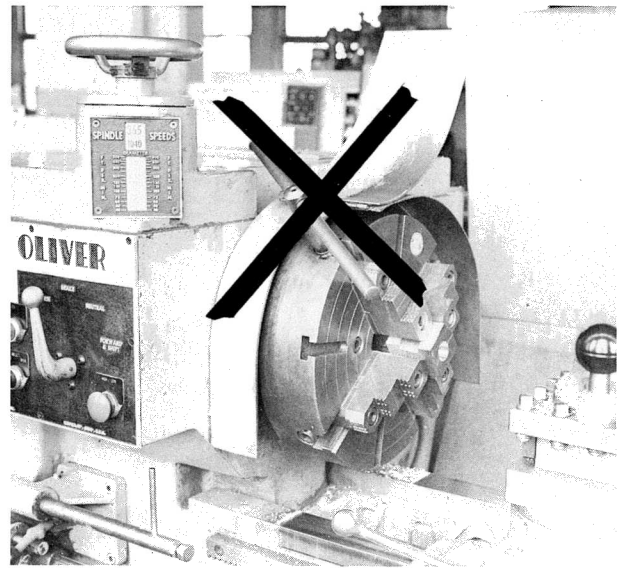
- Before you turn on machine observe all safety rules in Section 2—Operating Instructions.
- Do not leave your machine running unattended.
- Do not attempt to remove or bypass any safety device on your machine.
- Use the proper size wrenches for tool change or adjustments. Discard worn or broken tools and wrenches. A wrench that slips may cause injury.
- Do not overload machine and stall motor.
- Always stop the spindle to check finish or dimensions.
- Do not use an air hose to blow away chips. Air will force dirt into ways and bearing surfaces. Air may blow chips into your eyes.
- After taking a cut be careful not to touch hot chips or parts. Do not remove chips while the spindle is running.

Do not use an air hose to blow away chips.

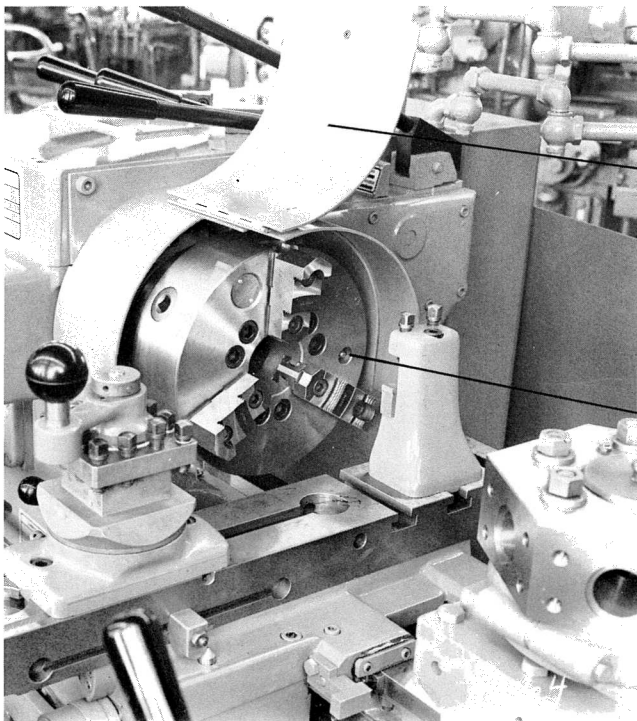


CHUCK SAFETY

- When loading or unloading parts, remove chuck wrench immediately. Do not leave the wrench in the chuck.
- Wait until the spindle comes to a complete stop before loading or unloading.
- Do not run the spindle with the chuck empty—centrifugal force may cause the jaws to come loose.
- Clean and inspect your chuck regularly—do not overload it. Know its limitations.
- Use the correct jaws for the job.
- Always use the chuck guard to direct chips and coolant down.
- Lubricate chuck as recommended.

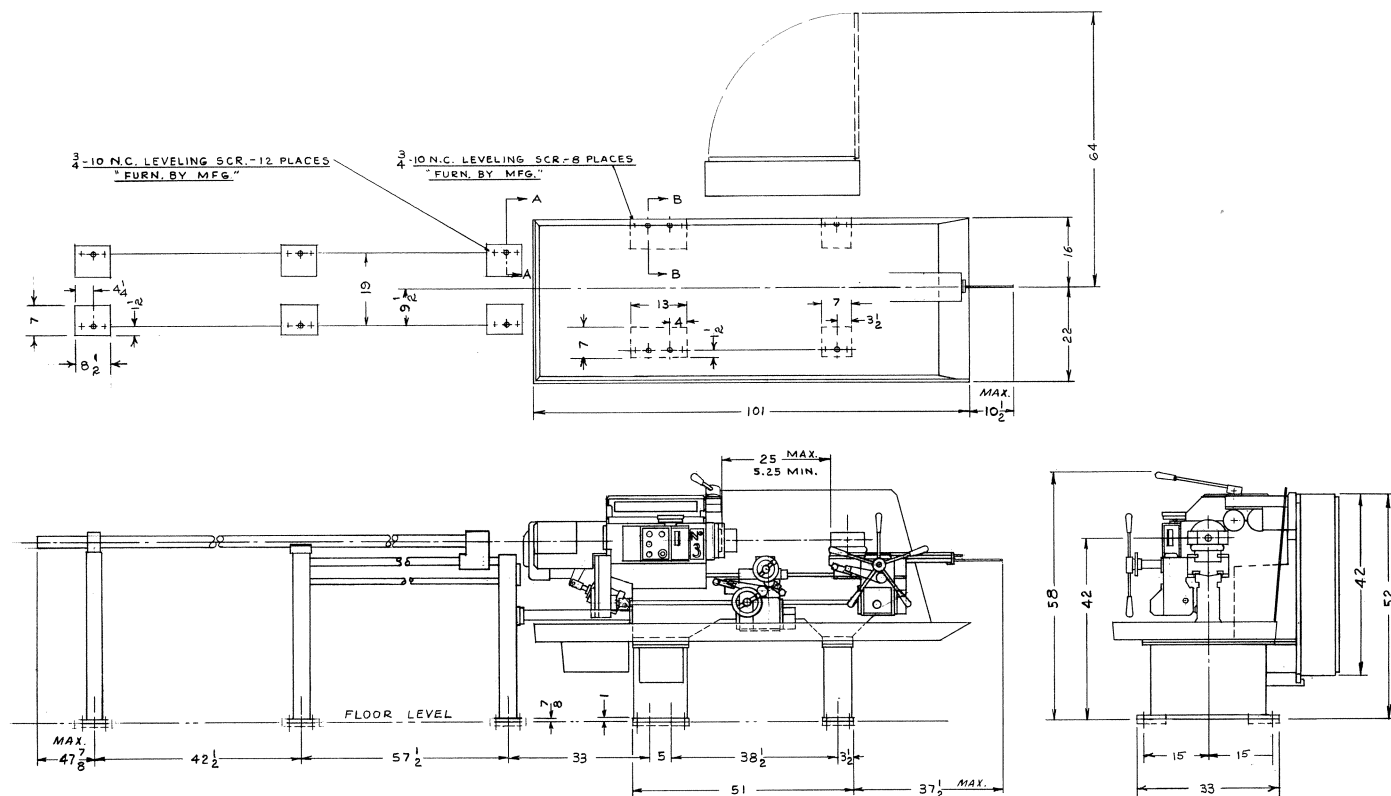


Do not leave wrench in chuck for any reason.



Adjustable
Chuck Guard

Lubricate as
recommended by
chuck manufacturer



Specifications

BARDONS & OLIVER No. 3 Ram Type UNIVERSAL TURRET LATHE

Swing over bedways	2"	Hexagon turret power feeds
Swing over carriage guides	16"	.005, .008, .012, .018, .029, .047,
Swing over cross slide	14"	.0025, .004, .006, .009, .0145, .0235
Bar capacity round	7 5/8"	Cross slide power feeds
Bar capacity hexagon	2"	.003, .005, .008, .012, .020, .032,
Bar capacity square	1 3/4"	.0015, .0025, .004, .006, .010, .016
Hole in collet chuck plunger	1 7/16"	Carriage power feeds
Chuck size medium duty steel body	2 1/16"	.005, .008, .013, .019, .031, .050,
Spindle nose	8"	.0025, .004, .0065, .0095, .0155, .025
Spindle hole diameter	8"-A1	OPTIONAL CARRIAGE THREAD
Spindle speeds, number	2 3/8"	CHASING ATTACHMENT
Spindle speed range	12	Pitches available—4 to 56 T.P.I.
	30-1600	Effective length—5"
	39-2000	OPTIONAL CROSS SLIDE
Maximum distance end of spindle to		TAPER ATTACHMENT
face of turret	25"	Maximum taper—3" per foot
Bed width across ways	7"	Effective length—6"
Width of bedways	1 1/2"	Motor horsepower—10/5
Hexagon turret effective travel at one setting	10"	Approximate shipping weight with motor—
Hexagon turret size across flats	8 1/4"	no tooling—5500 lbs.
Diameter of tool holes	1 1/2"	Additional shipping weight collet chuck
Center of tool holes to top of slide	2 7/8"	and bar feed—1000 lbs.
Cross slide cross travel	9"	
Carriage longitudinal travel	18 1/2"	

