

INSTRUCTIONS  
FOR THE  
ERECTION, OPERATION  
and MAINTENANCE  
OF  
**BARDONS & OLIVER**  
Nos. 3, 5 & 7 UNIVERSAL  
TURRET LATHE

**BARDONS & OLIVER, INC.**

BARDONS & OLIVER, INC.  
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440-498-5800 FAX 440-498-2001

THE BARDONS & OLIVER NOS. 3, 5 & 7 UNIVERSAL TURRET LATHES are accurate machines, well built and thoroughly inspected at the factory before being sent out into service. To preserve the original efficiency and accuracy it will be necessary to follow certain rules of maintenance, here set forth. All of the mechanisms are designed to operate under conditions of hard usage; however, neglect or abuse may cause permanent damage or the necessity of replacing certain parts. Thorough inspections are advisable at intervals depending on the type of work handled and the accuracy desired.

#### UNPACKING

Turret Lathes for domestic customers are shipped in individual crates while those for foreign customers are shipped in individual boxes. After machine is unloaded, particular care should be taken not to mar the lacquer finish or damage the working parts.

Wherever possible, tools, chucks, and fixtures are attached directly to the machine. Wrenches and miscellaneous parts which cannot be directly attached, together with a complete packing list, will be found in a separate box which is fastened to the platform or skids.

Be sure to check and account for each item on the packing list before disposing of any crating or boxing material.

#### ERECTING

Machines are mounted on very heavy wooden skids to prevent any possibility of bed warpage in shipping. Do not remove these skids until machine has been placed in the approximate position where it is to be erected. In removing skids care must be taken to prevent undue twisting or warping which might cause permanent distortion of the bed and thus ruin the accuracy originally built into the machine.

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 after leveling, steel bearing plates should be placed under each leg, as shown on the outline drawing of the machine. When possible, these plates should be grouted in concrete, flush with the floor. In cases where 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. In extreme cases, a single plate may be used with success.

Drilling and tapping for the holding down screws should not be done until the bearing plates are firmly fastened to the floor. Regardless of the foundation or location, turret lathes must be bolted down in order to maintain accuracy.

#### CLEANING

Do not attempt to operate the machine until it is thoroughly cleaned. Wipe slushing compound from all finished parts with clean rags soaked in gasoline or kerosene. Do not use an air hose when cleaning.

When in actual use, machines should be thoroughly cleaned at least once a week to insure long life and satisfactory performance.

Bardons & Oliver turret lathes are finished with highest grade lacquer, sprayed on. The cutting coolants ordinarily used will soon deposit a film or stain on this finish, which should be polished out at least once a week with a kerosene soaked rag. To further maintain the original fine appearance, all the lacquered surfaces should be cleaned about twice a year with "Glidden #75-C Rubbing Compound" or its equivalent.

#### LEVELING

To produce accurate work, the bed must be accurately leveled. Then, periodic checks should be made to see that original alignment is maintained. To aid in the ease and accuracy of leveling, our turret lathes are provided with two leveling screws in each leg, located as closely as possible to the holding down screw holes.

For proper leveling, a high grade adjustable spirit level is essential. No satisfactory results can be expected if an ordinary carpenter's level is used. Place the level across the bed ways and at right angles to them, first at one end of the bed, then at the other. After leveling at each end, it will be necessary to repeat this operation at least once more to eliminate additional errors set up. After proper alignment has been obtained, the legs should be solidly bolted down, and then the leveling once more rechecked.

If extremely accurate work is to be done on the machine, the above leveling may 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 and can be corrected by a slight adjustment of the leveling screws.

## ELECTRICAL CONNECTIONS

The turret lathe is shipped from the factory with all electrical equipment wired. It is only necessary to connect the main power lines to the proper terminals at the magnetic starting switch. All electric circuits are carried from this one set of main line terminals regardless of the auxiliary equipment installed. Make sure that when the spindle is rotating in the forward direction as indicated by the forward and reverse lever, the motor is running in the direction indicated by the small arrow mounted on top of the motor. If this is not the case, the main line connections to the magnetic starter should be reversed.

## LUBRICATION

The headstock and the two apron gear boxes are fully enclosed and splash lubricated. For the customer's protection, we fill the apron reservoirs to the proper level before shipping the machine. It is advisable, however, to be sure before starting the machine, that the oil level in each of these three reservoirs stands at the center of the gauge glass. Oil levels should always be checked when the machine is not running since the level drops somewhat after the machine is started. Raising the level above the center of the gauge glass will cause oil leakage at various points, also excessive oxidation or gumming of the oil.

Use only the highest grade oil as called for by lubrication chart. The hand plunger pumps on the aprons lubricate the bearing areas between the turret slide and the saddle and between cross slide and carriage as well as certain places in the aprons not reached by the splash system. Two or three strokes of the pump handle about every two or three hours operating time will provide sufficient lubrication. Since the plunger pumps take oil from the aprons it will be necessary to add oil to these more often than to the headstock.

After 200 to 250 hours of operating time the oil in the headstock should be drained completely, and refilled to the correct level with fresh oil. Under average operating conditions, the aprons should likewise be drained and refilled about twice a year. If the machine is running more than one shift per day, this oil change should be made more frequently.

All oil holes should be filled before starting the machine, and about twice during each eight hours operating time thereafter.

If the machine is equipped with automatic chuck, the chuck wedge bearing on the rear end of the spindle should be lubricated with

heavy oil at frequent intervals during the first few days of operation and should be lubricated about once a day thereafter.

## SPINDLE SPEED CHANGES

The Nos. 3, 5 and 7 Turret Lathes are equipped with 12 speed selective geared head stocks. On machines having CONVENTIONAL THREE LEVER SPEED CONTROL, the speeds and corresponding lever positions are clearly shown on a chart. The gear shifting levers are operated in the usual manner.

The forward and reverse lever, within convenient reach of the operator, applies automatically a spindle brake when in the neutral position. Between the forward and the neutral lever positions is a coasting zone which greatly facilitates the ease of gear shifting. The automatic lever lock prevents unintentional starting of machine.

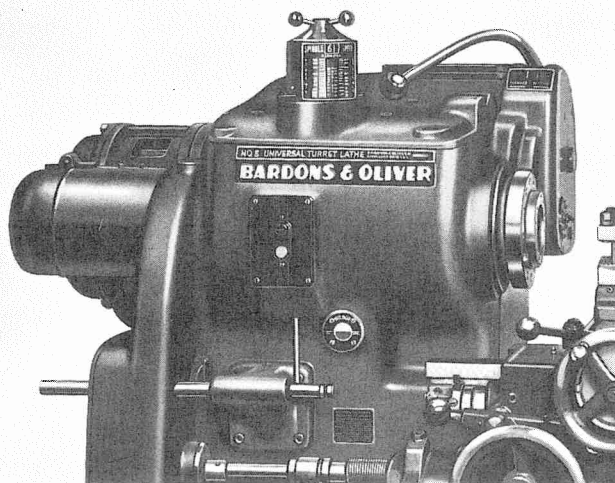


Fig. 1

THE SINGLE LEVER SPINDLE SPEED PRE-SELECTOR (on No. 5 and 7 only) adds greatly to the ease and rapidity of the spindle speed control. This is shown in Fig. 1.

The hydraulically controlled speed changes are pre-selected by means of a cylindrical pre-selector valve on front of the headstock. A direct reading chart functioning in conjunction with this valve indicates progressively the 12 spindle speeds and also the corresponding surface or cutting speeds for various diameters of work.

The single headstock lever serves the multiple purpose of starting, stopping, reversing and speed changing. In addition, it automatically applies a powerful spindle brake and a lever lock when in neutral position.

OIL HOLE



GREASE PLUG  
OR  
FITTING



HAND  
LUBRICATING  
PUMP



OIL  
RESERVOIR



Use highest grade oil of about SAE 10 viscosity. FOR AVERAGE CONDITIONS - Fill before starting machine and about every four hours thereafter.

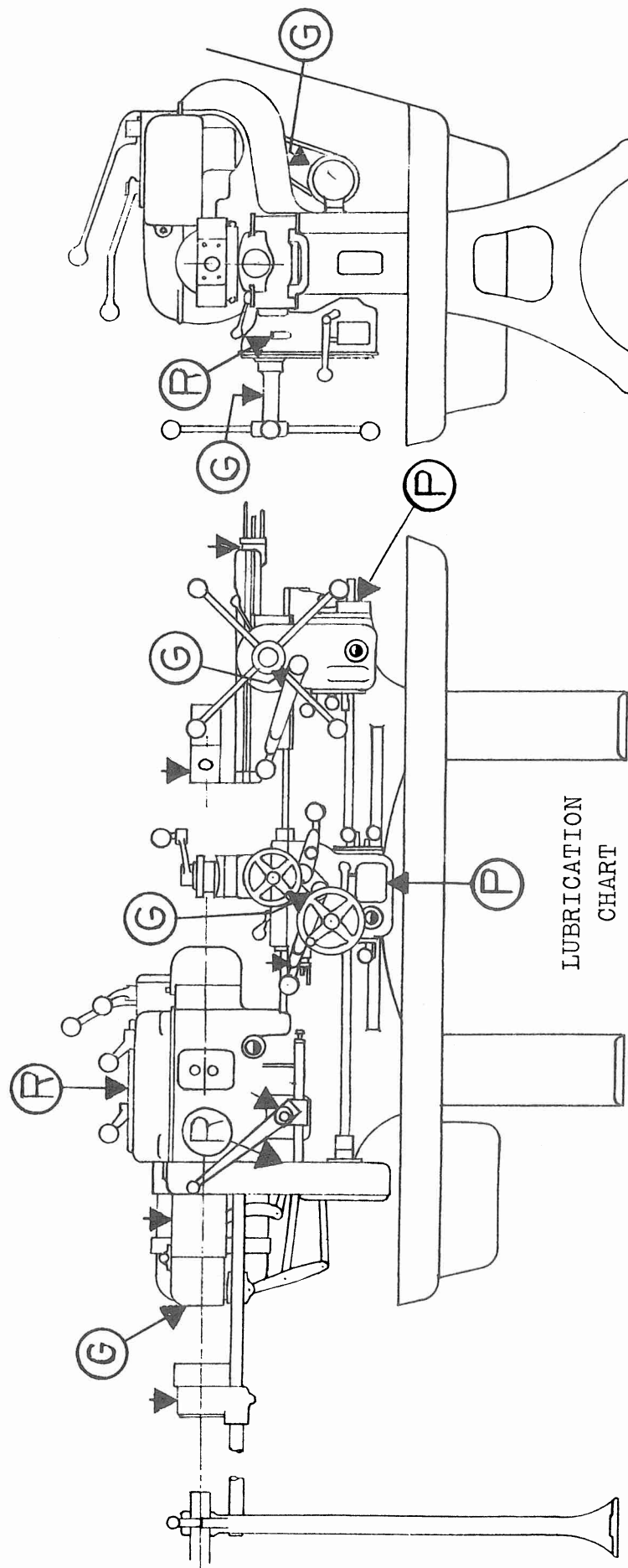
MOTOR - Use highest grade of high temperature ball bearing grease of No. 3 consistency and made with a soda soap base and mineral oil.

OTHER GREASING POINTS - Use high grade Alemite Gun Grease of No. 2 consistency, made with lime soap base and mineral oil.

FOR AVERAGE CONDITIONS - Two or three strokes every two or three hours operating time.

HEAD - Highly refined straight mineral oil of turbine oil grade with permissible additive for stability and lubricity. S.U.V. at 100°F-145-165 seconds. Change every 250 hours.

APRONS, HEAD END BRACKET, MISC.- Gargyle Compound No. 1. S.U.V. at 100°F-310-320 seconds. Change every 500 hours.



LUBRICATION  
CHART

**BARDONS & OLIVER**

No. 3 UNIVERSAL TURRET LATHE

BARDONS & OLIVER INC.  
CLEVELAND, OHIO, U. S. A.

AUG. 1945

OIL HOLE



GREASE PLUG  
OR  
FITTING



HAND  
LUBRICATING  
PUMP



OIL  
RESERVOIR



Use highest grade oil of about SAE 10 viscosity. FOR AVERAGE CONDITIONS - Fill before starting machine and about every four hours thereafter.

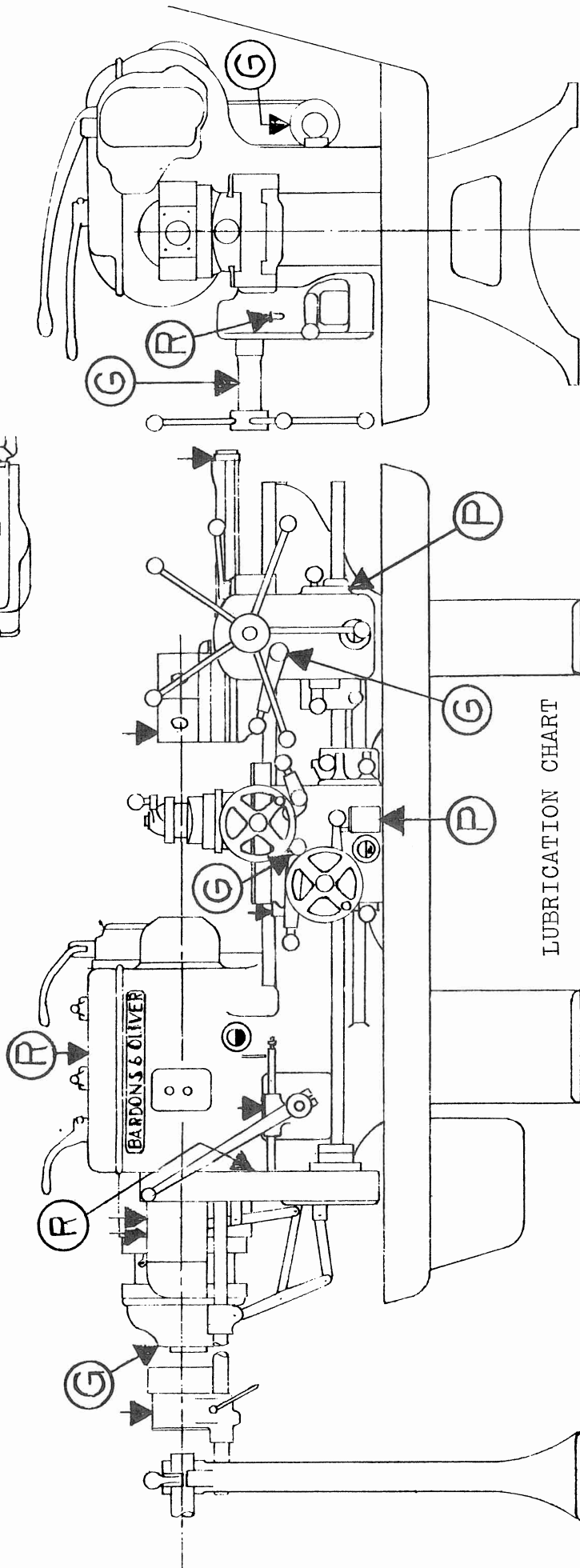
MOTOR - Use highest grade of high temperature ball bearing grease of No. 3 consistency and made with a soda soap base and mineral oil.

OTHER GREASING POINTS - Use high grade Alemite Gun grease of No. 2 consistency, made with lime soap base and mineral oil.

FOR AVERAGE CONDITIONS - Two or three strokes every two or three hours operating time.

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APRONS, HEAD END BRACKET, MISC.- Gargoyle Compound No. 1. S.U.V. at 100°F- 310-320 seconds. Change every 500 hours.



LUBRICATION CHART

**BARDONS & OLIVER**

No. 5 UNIVERSAL TURRET LATHE

No. 7 UNIVERSAL TURRET LATHE

BARDONS & OLIVER INC.  
CLEVELAND, OHIO, U. S. A.

AUG. 1945

The procedure of changing spindle speeds is as follows:

Set the pre-selector dial to the desired RPM spindle speed. This may be done while taking the preceding cut. When ready to change speeds, pull the lever towards neutral into the coasting position and allow to dwell until spindle has slowed down to below about 100 rpm. At this moment quickly depress the lever as far as it will go. This motion opens a hydraulic valve causing the gears to be shifted to positions corresponding to the

When a turret lathe has been run for the first few weeks, spindle bearings and clutches should be given an initial check. Thereafter, adjustments should not be required oftener than once or twice a year unless the machine is subjected to unusually severe service or is in operation two or three shifts a day.

The spindle is mounted on two opposed single row tapered roller bearings. A split adjusting nut located on the rear end of the

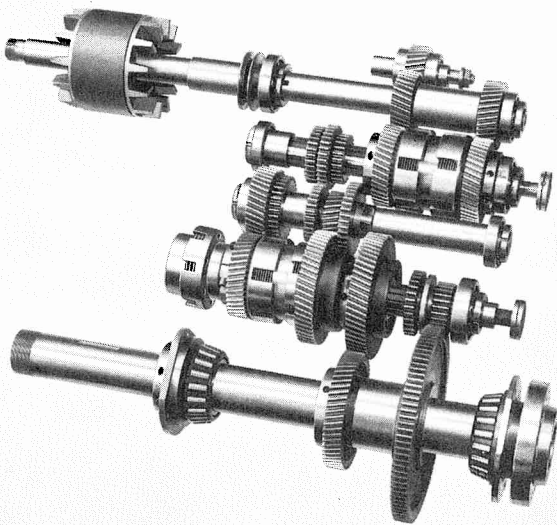


Fig. 2

speed indicated by the dial. Hold the lever thus for about a second allowing time for the gears to slide into their new positions, and then shift the lever back into forward. With a little practice this speed changing can be done very rapidly.

#### HEAD ADJUSTMENTS

The headstock for the No. 3 Universal Turret Lathe is shown in Fig. 2. There are two double multiple disc clutches -- one to obtain forward and reverse spindle rotation, and the other to provide a quick high - low speed change. The No. 5 Universal Turret Lathe headstock is shown in Fig. 3. There is one double multiple disc clutch - to obtain forward and reverse spindle rotation. The No. 7 Universal Turret Lathe headstock is of a similar design.

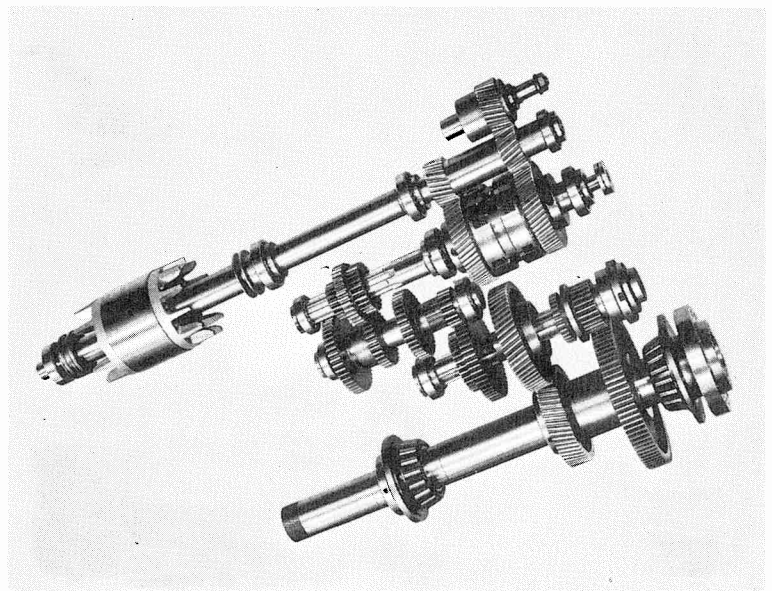


Fig. 3

spindle outside the headstock may be easily reached with a pin wrench by removing a small plate from the top of the head end gear train bracket. In adjusting the spindle bearings, all end play should be removed but no pre-loading should be introduced.

All gear shafts are mounted on ball bearings which require no adjustment.

The double multiple disc clutches in the head have a split adjusting nut at each end which may be easily reached by removing the small hand hole covers on top of the head. When adjusting these clutches, keep trying the clutch lever 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 hand hole covers.

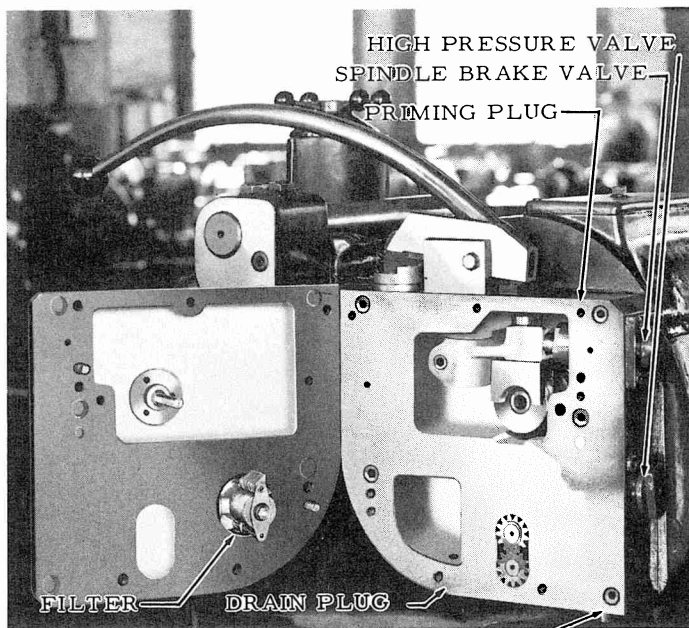


Fig. 4 LOW PRESSURE VALVE

#### LUBRICATION, HYDRAULIC SPINDLE BRAKE

Before starting the machine it is necessary to fill the head cavity up to the center of the gage glass with lubricating oil. See chart.

All gears and bearings in the head are lubricated by spray from three overhead nozzles and one nozzle inside the clutch plunger supplying oil to the clutch discs from the center. A geared pump shown in figure 4 takes oil from the head cavity and sends it through a filter before delivering it to the spray nozzles. To prevent the filter from becoming clogged it should be given a turn or two at reasonably frequent intervals. By means of a pipe plug at bottom of the filter cavity the sludge filled oil should be

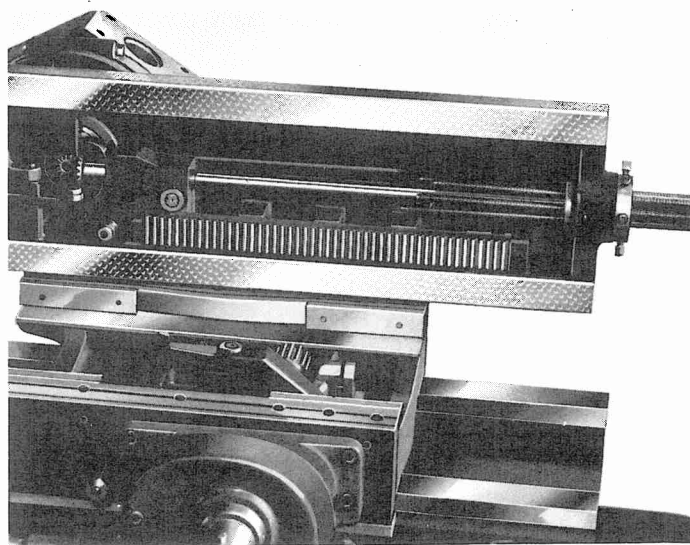


Fig. 5

drained off periodically. The pump is built to be self priming. If for some reason the pump fails to start it can readily be primed through a plugged hole shown in figure 1.

The hydraulic brake valve is actuated by the clutch operating lever. If this valve should become clogged dismantle and clean same carefully in gasoline. The high pressure relief valve which regulates the hydraulic pressure for the brake and the gear shifting mechanism is built and adjusted to maintain between 80 and 90 pounds, and the low pressure relief valve for the lubricating system is set for 15 to 20 pounds per square inch. Should the gear shifting mechanism show sluggishness in action there is a probability of the high pressure relief valve being clogged up. To remedy this unscrew valve body, remove valve, clean carefully and reassemble.

Sluggishness in operation of gear shift or brake after a period of idleness of machine is sometime caused by air in the hydraulic system. This condition can be relieved by moving the control lever slowly back and forth a few times past the brake position while the motor is running.

Care should always be taken when changing or replenishing the lubricating oil in the head that no foreign substances of any kind are allowed to enter.

#### TURRET SLIDE AND SADDLE

When the turret lathe has been in operation a few months, it may become necessary to adjust the two taper gibs for the turret slide. These are shown in Fig. 5. In adjusting these gibs, it is important that each nut is turned an equal amount, in order not to throw the turret holes out of lateral alignment with the spindle. The slide should not be adjusted sideways unless an indicator test has proven definitely that the tool holes in the turret have become out of line with the spindle. Under usual conditions, gib adjustments are not required more than once or twice a year.

The hexagon turret is clamped to its seat on the slide by a powerful double bevel circumference clamp ring. The clamping action is supplied by heavy springs and may be adjusted in tension to suit the nature of the work. To adjust, dismount the turret clamp guard, remove the cotter pin from the castellated nut, and holding the nut with a wrench, turn the screw to increase or decrease clamping action. Fig. 6 shows these parts.

To remove the turret, take off the turret clamp bolts, the clamp itself, and lift the turret from the slide. This is illustrated in Fig. 7.



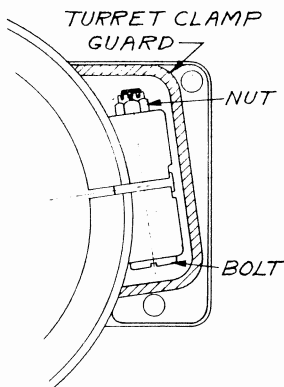


Fig. 6

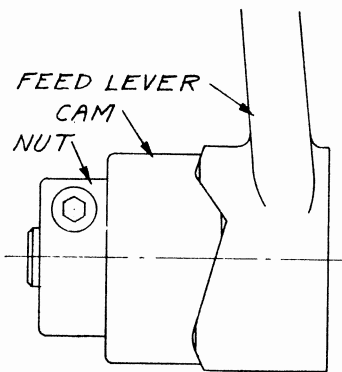


Fig. 8

The turret revolves on and is located centrally by a large taper roller bearing, whose outer race is threaded into the slide and held in place by a detent engaging one of a series of vertical slots around the outside of the outer race. The clamp ring tightens the turret against the slide and preloads the bearing for accurate centering and vertical alignment.

Adjustment for wear will not become necessary for many years even under the most severe operating conditions. Do not adjust the turret center bearing unless an indicator test proves conclusively that it has become necessary.

The front end of the turret slide directly below the turret is fitted with a neoprene apron to keep chips and dirt out of the indexing mechanism. Under certain conditions, foreign matter may still work in. Therefore we recommend that the slide be removed from the saddle and both be cleaned

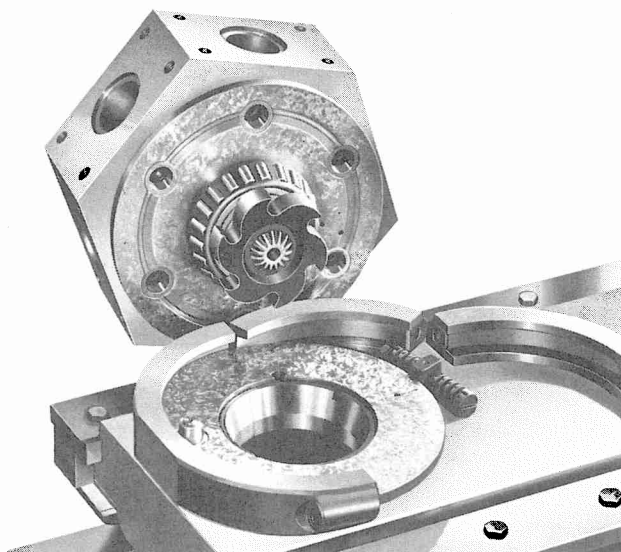


Fig. 7

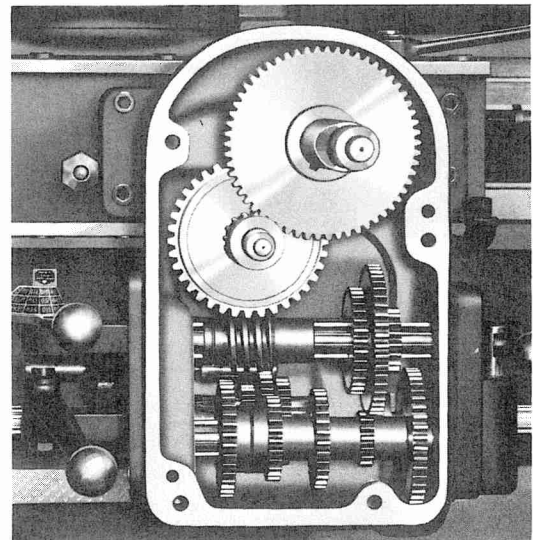


Fig. 9

periodically. When taking the turret slide out of the saddle, place a board across the bed ways beneath the front end of the slide. After removing the saddle caps, raise the slide at the rear until it rests on the board. From here it can be easily removed from the machine, if desired.

#### SADDLE APRON

The power feed to the turret slide is controlled by a friction clutch located in the apron. This clutch should be kept in proper adjustment, since slippage will cause

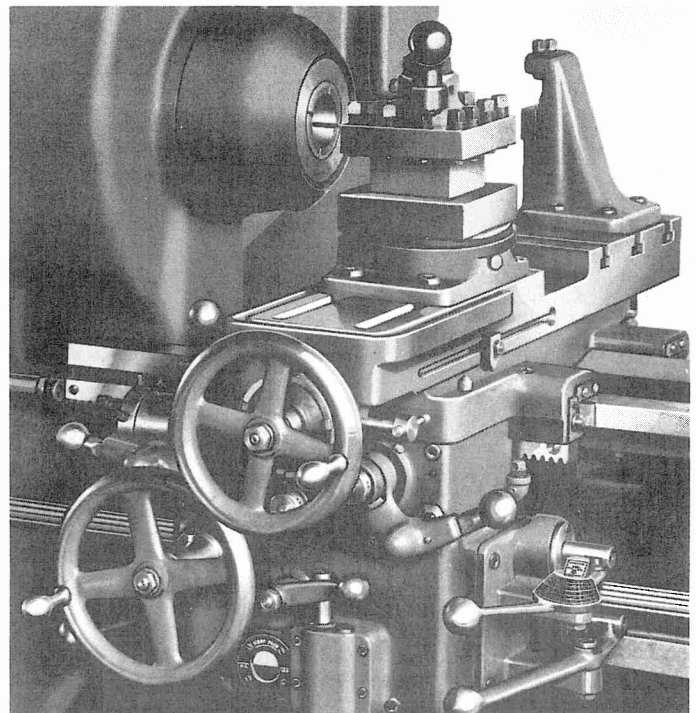


Fig. 10



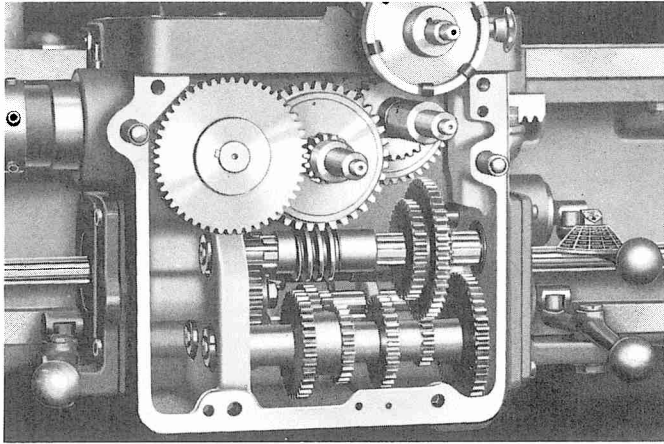


Fig. 11

The stop screws on the left hand side of apron serve to automatically gage shoulder lengths and to disengage the longitudinal power feed. See Figs. 10 and 11.

#### HEAD END BRACKET

Power from the spindle is transmitted to the feed shaft by means of a gear train located in the head end bracket. The gears in this train are mounted on ball bearings. The speed ratio between spindle and feed shaft for standard feed range is 2:1. The fine feed range gear, see Fig. 12, changes this ratio to 4:1 for the use on wide forming and heavy drilling in hard machining materials.

#### AUTOMATIC CHUCK

To change collet false jaws remove the jaw screws from master collet. These can be reached through holes in the chuck hood, see Figs. 13 and 14. To avoid runout of stock and spoiled work, clean false jaws and master collet carefully and tighten jaw screw securely.

The grip of the collet is adjusted at the rear end of the spindle by means of the spanner wrench holes in the end of the abutment sleeve. The finger holder should at all times abut tight against the end of the

undue wear to the clutch faces and result in failure to release properly. A split adjusting nut is provided at the end of the feed lever shaft, as shown in Fig. 8. To adjust the clutch, loosen the split closing screw and tighten the nut. The lever should be worked up and down constantly while the nut is being tightened in order to obtain the correct setting. If the feed clutch becomes frozen due to slippage and will not release, it will be necessary to take off the apron cover, dismantle the clutch and thoroughly lubricate the same.

#### CROSS SLIDE, CARRIAGE, AND

#### CARRIAGE APRON

The carriage is gibbed to the bed at three places, the forward side of the front bed way, underneath the rear bed way, and to the lower front way. After a few months of operation it is advisable to check the adjustment of the three taper gibs and if necessary tighten same slightly to compensate for initial wear. When adjusting—move carriage longitudinally back and forth to obtain proper degree of tightness without binding.

The cross slide is adjusted by means of a taper gib from the rear. The cross feed screw is mounted in two opposed radial-thrust ball bearings. These are slightly pre-loaded and no adjustment is required.

The cross feed dial is equipped with observation clips for the quick and easy duplication of diameters.

The power cross and longitudinal feeds are engaged and disengaged by taper friction clutches inside the apron. For the proper method of adjusting these clutches, when necessary, see instructions under "SADDLE APRON".

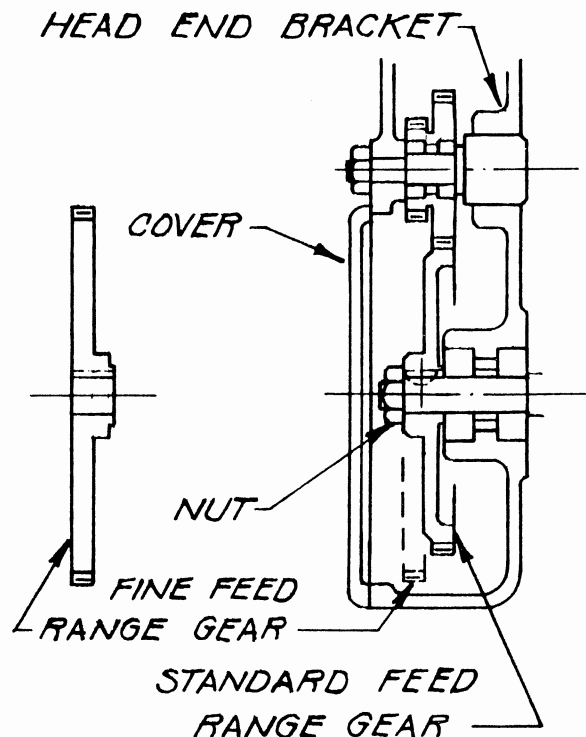


Fig. 12

spindle. A detent in the finger holder serves to keep the abutment sleeve from becoming loose. The rear end of the spindle guard cap is hinged and can easily be swung out of the way so as to afford free access to the finger holder.

To change wedge shoes, entire rear end spindle guard must be removed. Raise spindle guard cap to reach screws holding guard to head end bracket. By unscrewing the wedge shoe studs, one on each side of the yoke lever, the old shoes can be removed and new ones inserted.

When changing collet hoods or chucks special care should be exercised to keep the pilot and the face of the flanged spindle end free from dirt, which, if permitted to enter, will quickly destroy the accuracy of this vital part of the machine.

#### RATCHET BAR FEED

The automatic chuck and the bar feed are both operated by a single lever. The bar is held by a two jaw revolving chuck mounted on ball bearings in a sliding head and movable along the support bars by a ratchet. The chuck jaws are opened and closed by a double socket adjusting screw reached by raising the hinged portion of the guard. See Fig. 15.

To facilitate loading, the front end of the bar support tube can be swung out to allow bar to clear machine.

#### COOLANT PUMP AND CLUTCH

The coolant pump is driven by an endless vee belt from a sheave on the motor shaft through the oil pump clutch. To avoid dismantling the motor and motor shaft replacement belts may be of the adjustable length, non-endless type.

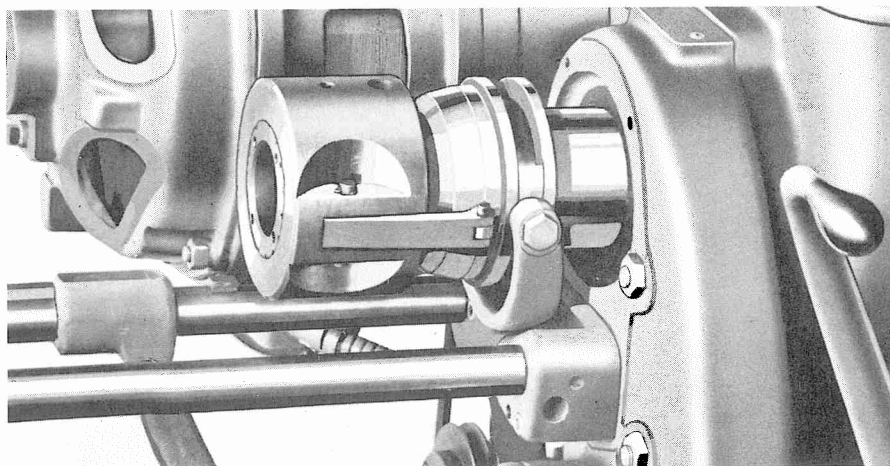


Fig. 14

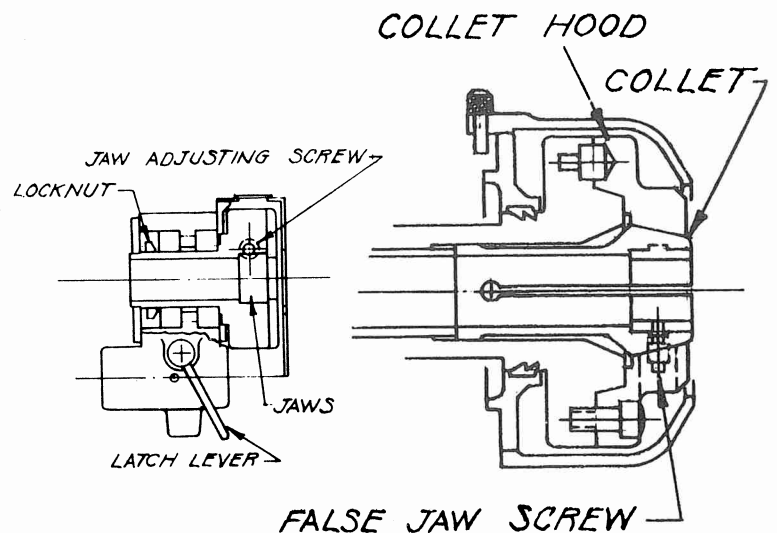


Fig. 15

Fig. 13

To engage the oil pump clutch, shown in Fig. 16, move the outermost member on the shaft toward the sheave until the jaws become fully engaged.

The coolant sump is divided into two compartments by means of a baffle. This causes the grit and dirt to settle in the first compartment, which should be cleaned out periodically. The strainer near the bottom of the second compartment also needs occasional attention and cleaning.

#### THREAD CHASING ATTACHMENT

The thread chasing attachment bracket is fastened to the carriage apron. The screw and dowel holes in both bracket and apron are jig drilled making the mounting easy.

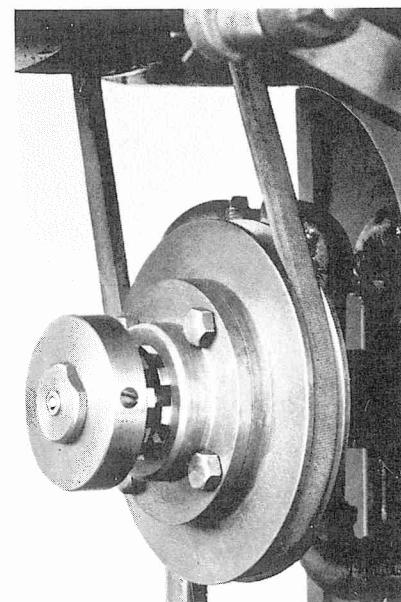


Fig. 16

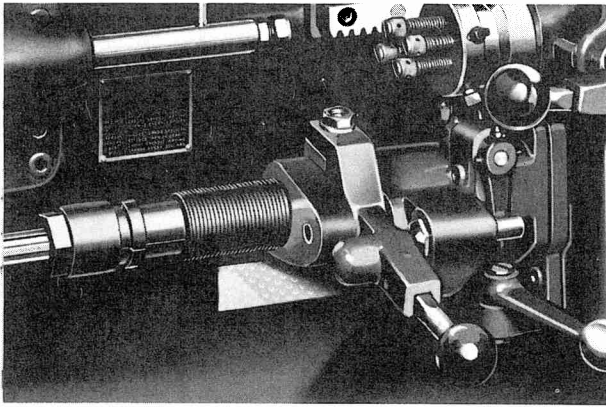


Fig. 17

When changing leaders disconnect the feed shaft driving coupling at the head end bracket and slide the shaft backward to allow room to take off the old leader and put on the new. When tightening leader nut use one wrench on the leader and one on the nut to avoid shearing the pin in drive coupling. The follower on the operating lever can be changed easily. See Fig. 17.

#### THE CROSS SLIDE TAPER ATTACHMENT

This is mounted on the rear of cross slide in place of rear tool post. The lower member of the taper guide carries a yoke which

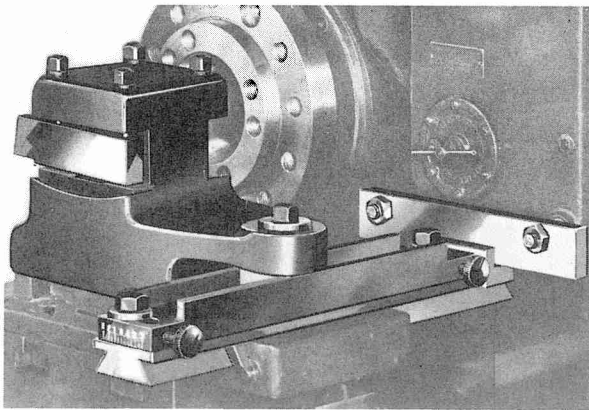


Fig. 18

engages a guide plate held by two studs on the head lever bracket. The holes in both guide plate and lever bracket are jig drilled

and a taper attachment can, therefore, be mounted on a turret lathe after it has left our factory. See Fig. 18.

#### OVERHEAD PILOT BRACKET AND BAR

The mounting of the overhead pilot bracket on a turret lathe after same has left our factory requires the exercising of skill and care. The best procedure is as follows: Mount a multiple turning head with pilot bushing in place on turret. Line up pilot bar and bracket by scraping pad on head using the pilot bar in bushing as guide. Drill holes in pad on head by having bracket serve as a jig. Exercise care so as not to drill through into side of head. Tap

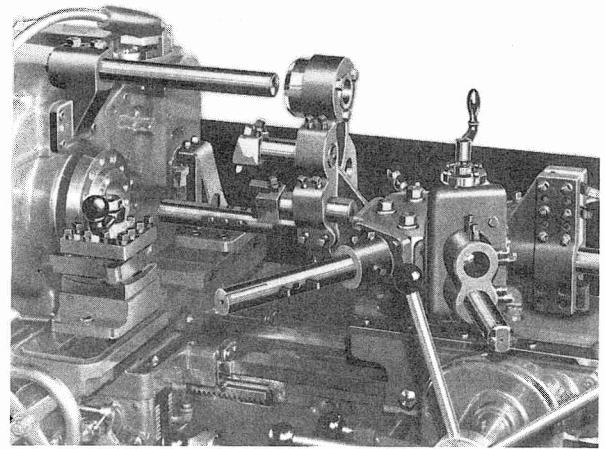


Fig. 19

holes and screw bracket in place. Test alignment of bar in pilot bracket by a dial indicator mounted in square turret and moving longitudinally on bed. Make close and final adjustment of alignment then drill and ream dowel pin holes and insert dowel pins. See Fig. 19.

#### REPLACEMENTS

In ordering replacement parts, always give the serial number of the machine, and, if possible, return the worn or damaged parts as a sample. If no sample is available, make an accurate sketch of the part and attach to the order.

## SUPPLEMENTARY OPERATING INSTRUCTIONS

Certain design changes have been made that modify or change the preceding instructions. These design changes are herein described and the operating instructions given.

On machines after serial No.17600, filtered oil to lubricate the gears in the headstock, to operate the hydraulic spindle brake and hydraulic gear shift, if furnished, is contained in the sump below the pan. The oil is drawn from the sump up to the pump in the bracket directly behind the spindle. This bracket also carries the two clutch levers. The oil is then pumped into the spray system for the headstock, and to the brake.

When the machine is running there are streams of oil spraying in the headstock and running down the walls and flowing back to the sump through a drain line at the bottom of the head cavity. The oil level in the sump should be maintained to the level as shown on the gage glass at the sump when the head is warmed up and running. The sight glass at the front of the head indicates that oil is being sprayed. A small stream of oil will flow from the top.

The pump is self priming. If for some reason the oil does not flow, remove the pipe plug to the right of the fitting that brings oil from the sump on the #3 UTL or above the fitting that brings oil from the sump on the #5 UTL or #7 UTL. This is on the pressure side of the pump and may also be used to check the pressure setting. Rotate the motor shaft manually in the direction indicated by the arrow, by means of the coolant pump belt, until there is a satisfactory flow of oil without any trapped air bubbles. Replace the plug tightly.

The pressure regulating valve on the #3 UTL is located in the pump bracket and is accessible by removing the bracket cover. It is factory set to 60 pounds pressure and is not adjustable.

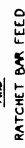
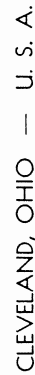
On the #5 UTL and #7 UTL there is a valve located close to the clutch operating lever that is called the Direct-Preselect Valve.

When the valve handle is horizontal the gear shifting is preselective. The gears will shift only when the clutch lever is in the shift position and the lever is depressed as described above. When the valve handle points up the hydraulic shift operating valve is bypassed and the oil pressure is applied directly to the shifting cylinders through the speed selector valve. The oil pressure is maintained continuously to hold the gears in the position shown on the selector dial. Under certain conditions when taking a very heavy cut it may prove desirable to hold the gears in position by turning this valve to "Direct". DO NOT MOVE THE SPEED SELECTOR VALVE WHEN THIS VALVE IS AT "DIRECT". When shifting gears always move this valve to "Preselect" and shift in the regular manner.

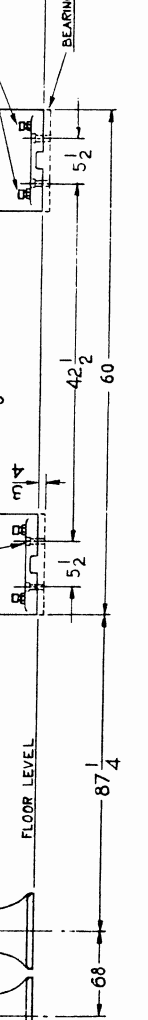
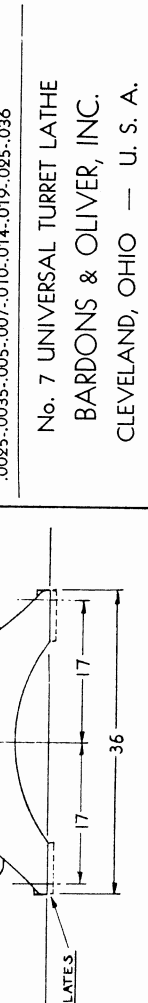
The #7 UTL may be furnished with a hydraulic collet chuck and bar feed. The adjustment for the grip of the collet is the same as described above. The wedge and yoke lever are actuated by a toggle mechanism and a hydraulic cylinder which receives fluid from the oil pump in the head. The wedge travel must allow the finger roller to pass the highest point on the wedge and continue on the flat about 1/32 inch. At this time the operating toggle is past center, thus relieving the pressure on the wedge shoes. A turnbuckle type of link, preset at assembly determines the end relation between roller and wedge.

The ratchet sliding head type bar feed is actuated by a second hydraulic cylinder working in timed relation with the collet chuck cylinder. The control valve on front of the head is manipulated by a small hand lever. An instruction plate gives directions for operation. A spring and plunger type detent indicates the operating positions by "feel." The valve can be disassembled for cleaning by removing four socket head screws in front.









Technical drawing of a turret lathe bed. The drawing shows a side view of the bed with a curved top surface. Dimensions are indicated: a total length of 36, and two segments of 17 each. A label 'LATE 3' is present near the bottom left corner of the bed.

[illegible]

