BULLETIN No. 117-A

INSTRUCTION Book

"AMERICAN" LATHES

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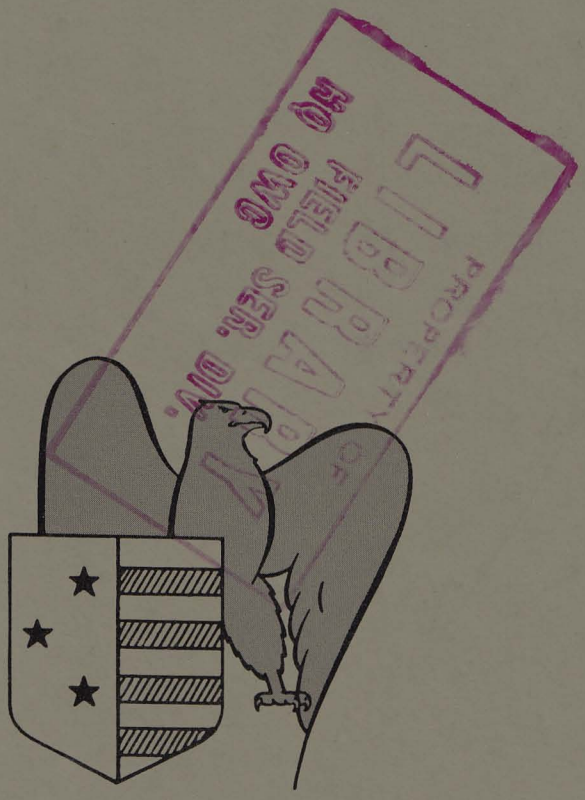
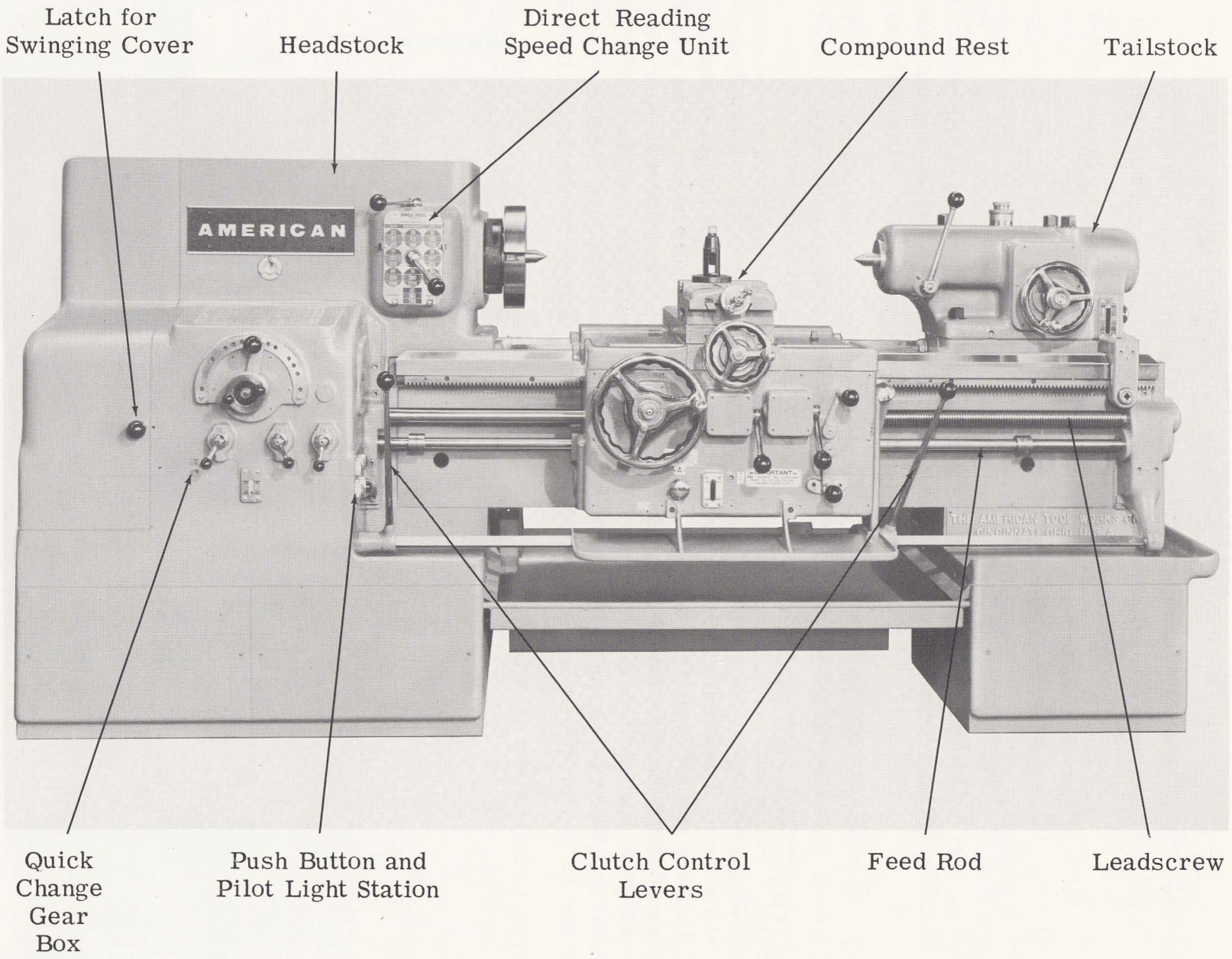
SIZES . . .

14" B
16" C
20" D
20" E
25" F



THE AMERICAN TOOL WORKS CO.
LATHES AND RADIAL DRILLS
CINCINNATI, OHIO U.S.A.


Latch for Swinging Cover
Headstock
Direct Reading Speed Change Unit
Compound Rest
Tailstock
AMERICAN
Quick Change Gear Box
Push Button and Pilot Light Station
Clutch Control Levers
Feed Rod
Leadscrew

ERECTING

UNLOADING. Hoisting weights are as follows:

14″ x 30″ between centers style "B"	7900 lbs.
For each additional 24″ between centers, add	525 lbs.
16″ x 30″ between centers style "C"	8200 lbs.
For each additional 24″ between centers, add	525 lbs.
20″ x 30″ between centers style "D"	8500 lbs.
For each additional 24″ between centers, add	525 lbs.
20″ x 48″ between centers style "E"	14000 lbs.
For each additional 24″ between centers, add	775 lbs.
25″ x 48″ between centers style "F"	14600 lbs.
For each additional 24″ between centers, add	775 lbs.

CAUTION—When Hoisting.

For safety and convenience, two holes extend from front to rear of bed to allow use of hoisting bars. These bars should be of heat-treated alloy steel, $1\frac{3}{8}$″ in diameter and 33″ long for the 14″ Style "B" through the 20″ Style "D" Pacemaker Lathes and 2″ in diameter and 36″ long for the 20″ Style "E" and 25″ Style "F" Pacemaker Lathes. The two hoisting slings should be of $\frac{3}{8}$″ chain of 11,400 lbs. capacity per sling for the 14″ Style "B" through the 20″ Style "E" Lathe, and of $\frac{1}{2}$″ chain of 19,000 lbs. capacity per sling for the 25″ Style "F" Lathe. Use wood blocks at the four points between chain and

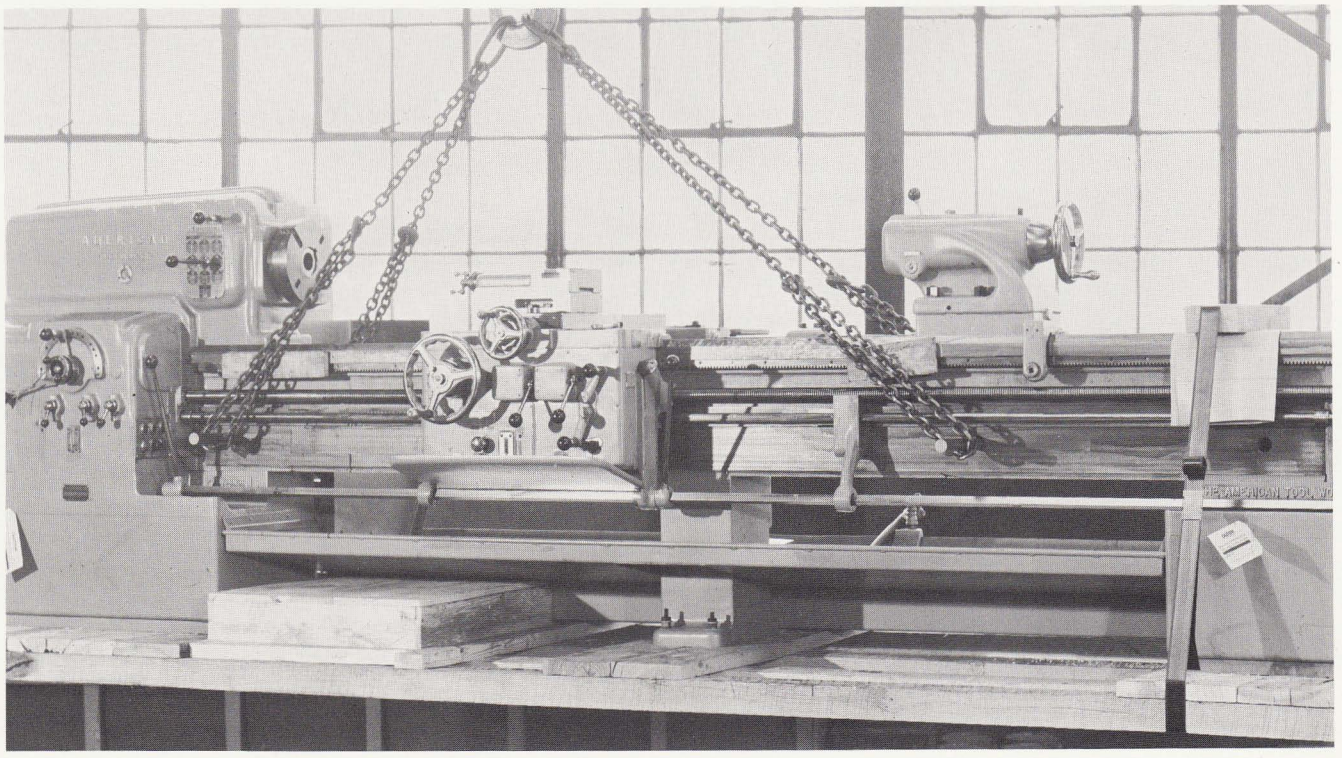


Figure No. 1—Hoisting 16″ x 102″ Pacemaker

bedway. Figure No. 1 illustrates this hoisting technique. Take a slight strain with the crane before hoisting to make sure all is secure and in balance.

"NOTE"—When moving lathe do not use SLING or PINCH BAR under the covers at the head end.

SETTING UP. Study foundation sent with machine.

FOUNDATION. A concrete foundation or floor is preferred, but a solid wood floor is satisfactory. When preparing footing for setting up lathe, allow one inch (1″) in either direction around the hold-down bolts to allow for variations or slight errors in locating these bolts. Hold-down bolts pass through the center of the leveling screw bushings. A steel plate should be placed between the leg and the foundation for supporting the leveling screw bushings.

Figure No 2 shows two different methods of using hold-down bolts in concrete. The right-hand diagram illustrates the method by which bell bottom holes are drilled in the concrete floor, then the lathe, with hold-down bolts already fastened loosely through legs, is positioned correctly on its foundation and finally molten lead is poured into the holes around hold-down bolts. Channels should be chipped into concrete to guide lead into holes.

The left-hand diagram shows method wherein new concrete foundation has been prepared for lathe and hold-down bolts are permanently sealed into foundation. Hold-down bolts, washer plates and vertical pipes are all in place when concrete is poured.

Note: Be sure that screw bracket for adjustably mounted motor is anchored to the foundation with hold-down bolts.

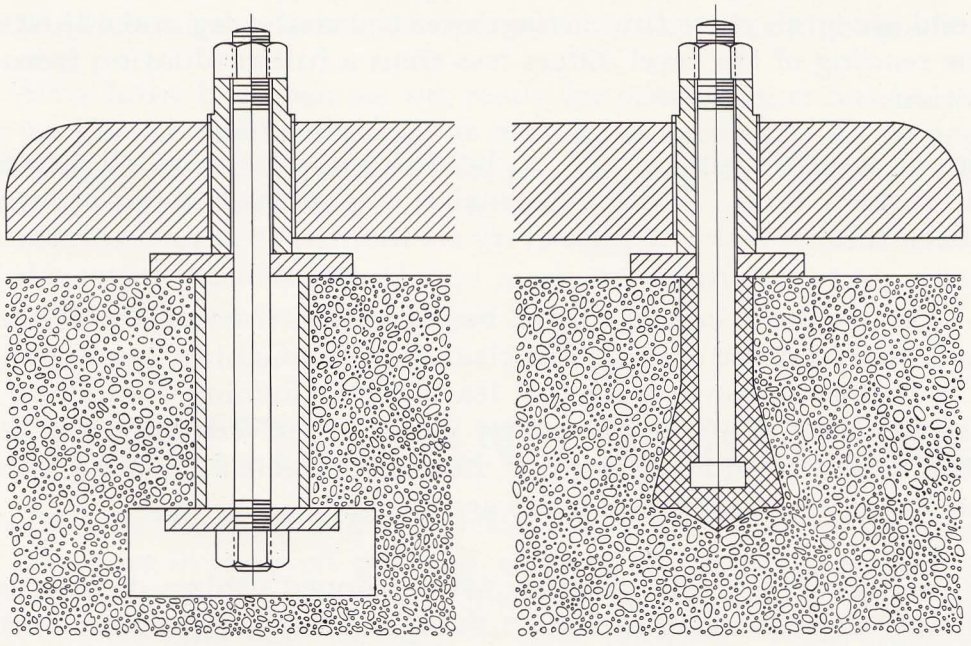


Figure No. 2—Two different applications of hold-down bolts in concrete

LEVELING. Use a good PRECISION level about 18″ long and graduated to no more than .001″ per foot. (A common carpenter's or machinist's level is not accurate enough.)

Place level longitudinally on front carriage wings, figure No. 3, and adjust leveling screws in headstock and tailstock legs until bed is level lengthwise at head-end, center and tail-end positions, as shown. Then, with carriage close to headstock, place the level across the carriage wings with level squared against the side of the compound rest. Adjust head-end leg leveling screws until level reading is obtained. With carriage close to tailstock, place level across the carriage wings with level parallel to the side of the compound rest. Adjust tail-end leg leveling screws until level reading is obtained. When moving level from one position to another, do not turn it end for end. Retest at head-end position and then again at tail-end until readings differ by less than a full graduation.

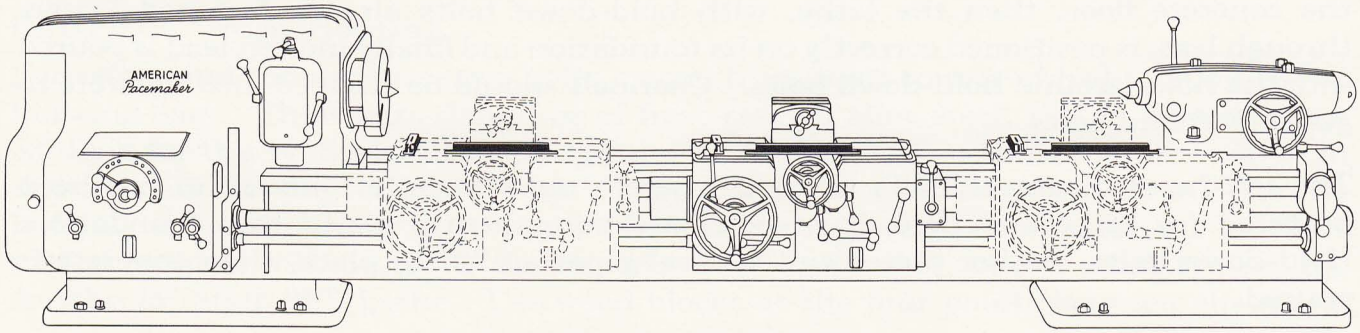


Figure No. 3—Leveling Diagram

When lathe has a center leg, follow the same operations, and when the headstock end and the tail end are level, place the carriage over the center leg and adjust screw bushings until the reading of the level differs less than a full graduation from that of the first two positions.

After machine is leveled tighten nuts on hold-down bolts until slight tension is secured. Again recheck level. Too much tension will spring bed out of level. It is important to check level of lathe at least every six months to insure accurate work.

CLEANING. Do not move carriage until bed has been thoroughly cleaned and oiled by the manual pump on the apron. For cleaning the machine, kerosene is preferable to gasoline, as it does not evaporate and leave dried slushing compound on finished surfaces. The kerosene must be absolutely clean. It is very important to clean the ways of the bed carefully and thoroughly. Lubricate freely all bearing surfaces before operating machine. See that no oil holes are clogged.

OILING INSTRUCTIONS. The machine when shipped (unless dismantled) is lubricated according to directions appearing on the oiling instruction plate attached to the outside of the electrical control panel at the rear of the headstock.

TO LUBRICATE OBSERVE THE FOLLOWING:

Head, Gear Box and Change Gearing—The head, gear box and change gearing are provided with automatic pump lubrication. This pump located in the bottom of the head unit provides the lubrication for all three of these units. Oil passing through the flow gauge in front of the head shows that the pump is working. Fill reservoir through plug in gear box with a high grade machine oil, viscosity 275-290 seconds Saybolt at 100 degrees F. Drain and refill every six months thereafter. Keep oil at such a level so that it will be between the high and low limits on the gauge in the gear box while the head is at rest.

Follow instructions on the oil filter at rear of head. Caution—If oil filter handle becomes too tight to turn by hand, remove filter and cleanse with kerosene and compressed air. DO NOT FORCE HANDLE.

Carriage and Apron—The carriage, apron, cross slide, cross feed nut and half nuts are provided with automatic pump lubrication for longitudinal feeding, cross feeding, and chasing. Before starting each day, operate the auxiliary pump at the bottom of the apron freely. Keep apron oil reservoir filled between the high and low limits on the gauge with "SUNOCO" Way Lubricant S. A. E. 80 or equivalent.

Tailend Bushing—Leadscrew bearing is an oilite bushing which requires oiling about twice a year. The feed rod and power rapid traverse rod anti-friction bearings are grease packed and should be checked once a year.

Taper Attachment—The anti-friction taper attachment is provided with permanent oil-sealed ball bearings. When attachment is in use the dove-tail slide bearing should be oiled daily. The dove-tail slide bearing of the plain taper attachment should also be oiled daily when in use.

Hand Operated Mechanism—Lubricate once every week with a high-grade machine oil.

Important—After lathe has been set up, ready for operation, or has been idle for two or three weeks, the auxiliary pump at bottom of apron should be operated freely to thoroughly lubricate the carriage vees. Also, the spindle should be run at slow speed at first to give the oil a chance to circulate.

Note—The lubricating periods mentioned apply to normal working service. In extreme conditions lubricate more often.

OPERATING AND ADJUSTING

STARTING—Observe the following instructions carefully: Before starting make sure that control levers are in their off position, close to the lathe bed: that the two feed "drop" levers on the apron are in their lowered, or disengaged, positions: and that the top speed change lever is in its blue, or slow, position. Press starting button on the gear box to secure current thru the main line.

MOTOR DRIVE—All "Pacemaker" lathes are motor driven, with motor adjustably mounted at rear of head-end leg. The motor is mounted on a hinged plate that is provided with a screw for adjusting the belt tension.

STARTING CLUTCH AND BRAKE UNIT—The starting clutch and brake unit is a self-contained trouble-free unit bolted and doweled to the headstock and under the swinging cover. It is automatically oiled by the circulating system of the head and mounted 100% on anti-friction bearings, thus requiring absolutely no attention from the operator.

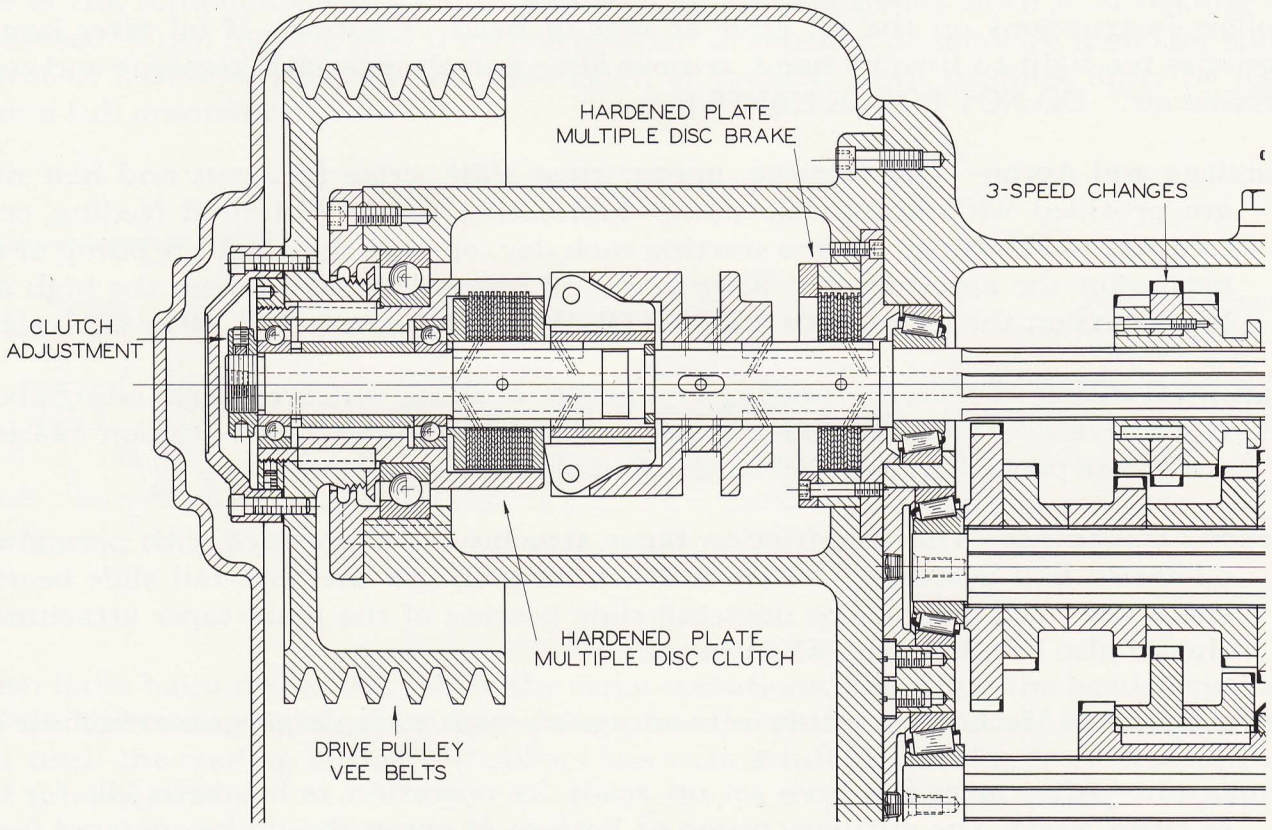


Figure No. 4—Diagram of Clutch and Brake Unit

To adjust multiple disc clutch, swing open cover at head-end of Lathe, remove six bolts from pulley hub cover and remove cover, loosen set-screw in nut designated by clutch adjustment in Figure No. 4 and turn nut until the toggle fingers can be felt to have ridden over the taper onto the flat, into engagement. Do not adjust clutch so tightly that snap cannot be felt. When adjustment has been completed, make sure that the set-screw has been tightened.

The multiple disc brake is self-adjusting for wear.

HEADSTOCK—The headstock is automatically oiled by a pump circulating system and all bearings are 100% anti-friction: therefore, no attention is necessary except following the previously outlined oiling instructions.

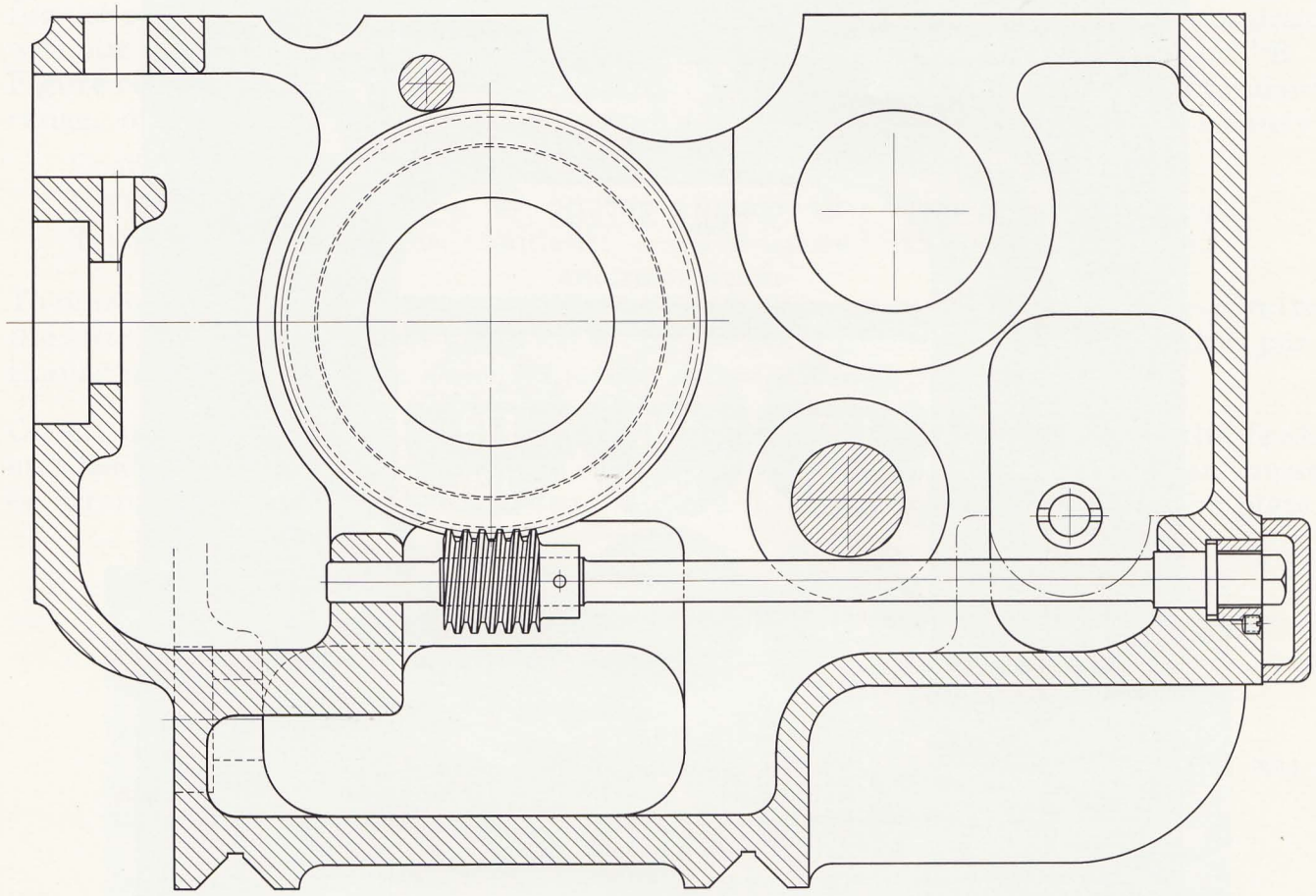


Figure No. 5—Diagram showing means for adjusting Spindle Bearings

To adjust spindle bearings remove small cover marked "A" on rear of headstock and follow instructions on instruction plate located above oil filter. This unit is self-locking because of the worm and worm wheel used to actuate the adjusting nut. Attach the small face plate to nose of spindle. Put spindle in neutral by means of lever on top of speed selector housing. While making the adjustment hit end of spindle solidly with babbitt hammer. Rock spindle by means of the face plate while making the adjustment. Tighten the bearings until a slight drag is felt on the face plate.

SPINDLE SPEED SELECTOR—All speeds are procured through the action of two levers whose positions clearly and directly indicate on the speed plate the R. P. M. of spindle at any setting, Figure No. 6. The top lever has three positions, one for the slow range, indicated in blue, one for the intermediate range, indicated in red, and one for the fast range, indicated in black. The bottom lever has nine positions, each of which is designated on the speed plate by a circle which in turn contains three speed rates, indicated in corresponding colors. To select a desired speed, place the lower lever at the circle containing that rate, then place the upper lever in the blue, red or black position to correspond to the color indicated in the circle.

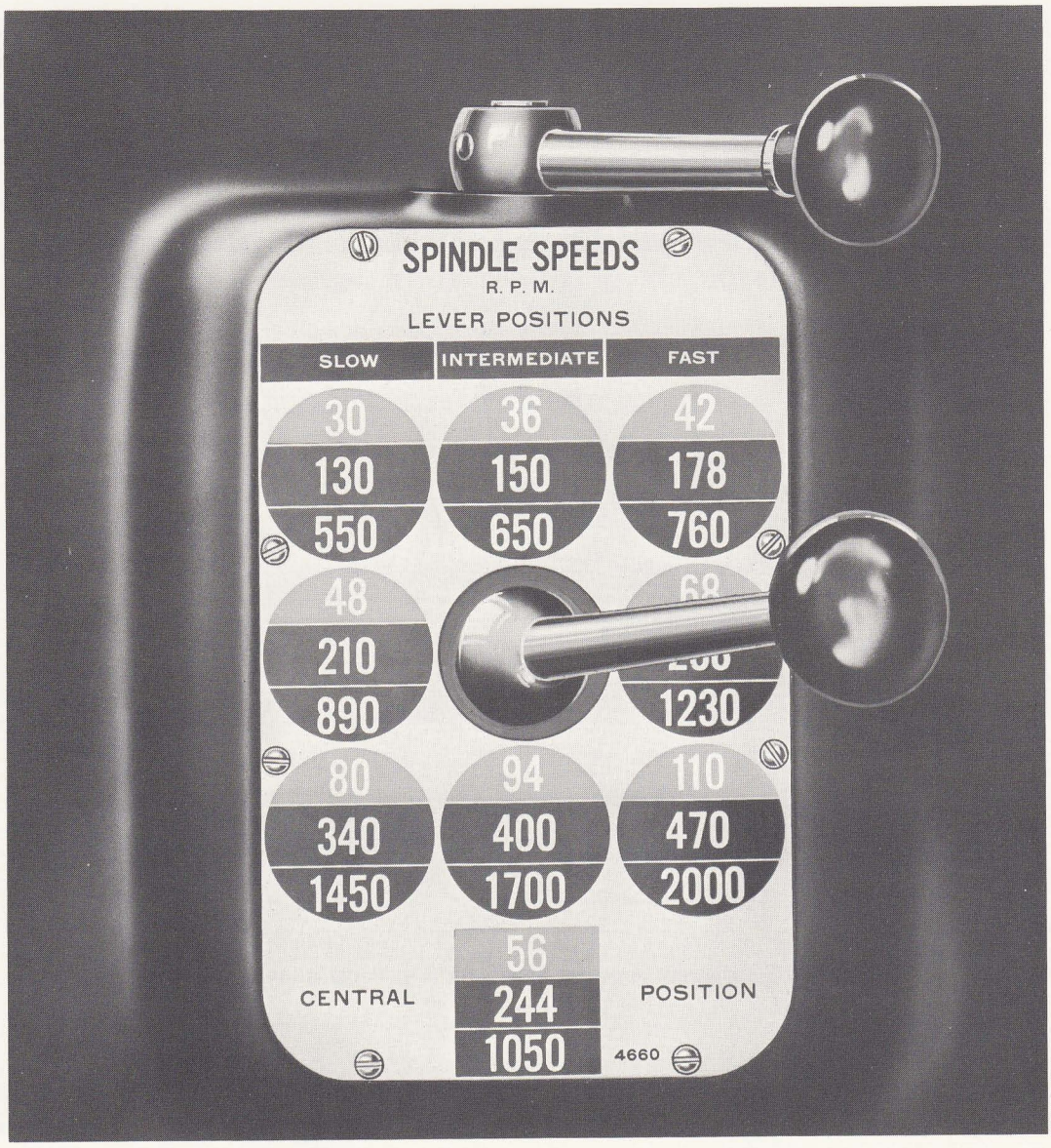


Figure No. 6—Direct Reading Speed Control, 27-Speed Head

THE NEUTRAL POINT for the spindle to be completely disengaged from the headstock gears is the top lever position between the red and the black. At this point the notch on the lever hub coincides with the neutral line on the small plate attached to the top of the speed change unit.

SPINDLE SPEED CHANGE—Speed changes should be made only after the clutch has been disengaged, and preferably just before the spindle stops. Sometimes when shifting gears after spindle has come to a complete stop it is necessary to jog the spindle a bit with the head end control lever to allow gears to mesh.

REVERSE FOR LEADSCREW AND FEED ROD—Except when the leadscrew reverse from apron is supplied, the leadscrew and feed rod are reversed by operating the pull-rod at the end of the headstock inside the swinging cover. The direction plate on the pull-rod states that for left-hand threads the pull-rod should be pushed in, and for right-hand threads, pulled out: there is a center neutral position which completely disengages the change gears and the gear box from the spindle.

CHANGE GEARS AND GEAR BOX—On all English lathes a standard English range is furnished and every change on the index plate on the front of the box is obtained without changing any of the head end gears. The two outside gears, "A" and "B", Figure No. 7, should never be removed on English lathes. In addition to the standard range, other ranges may be secured by the addition of suitable gearing, namely:

Coarse leads.
Diametral pitch leads.
Transposed metric leads, standard.
Transposed metric leads, coarse.
Transposed module leads, standard.
Transposed module leads, coarse.

To obtain these additional ranges, the change gears must be arranged to correspond to the stud, quadrant, and box gears shown on the plate which is furnished for that particular range and which is attached to the inside of the swinging cover.

On all metric lathes a standard metric range is furnished, but to obtain the feeds and leads shown on the index plate on the front of the box, the change gears must be arranged to correspond to the stud, quadrant, and box gears shown on the plate.

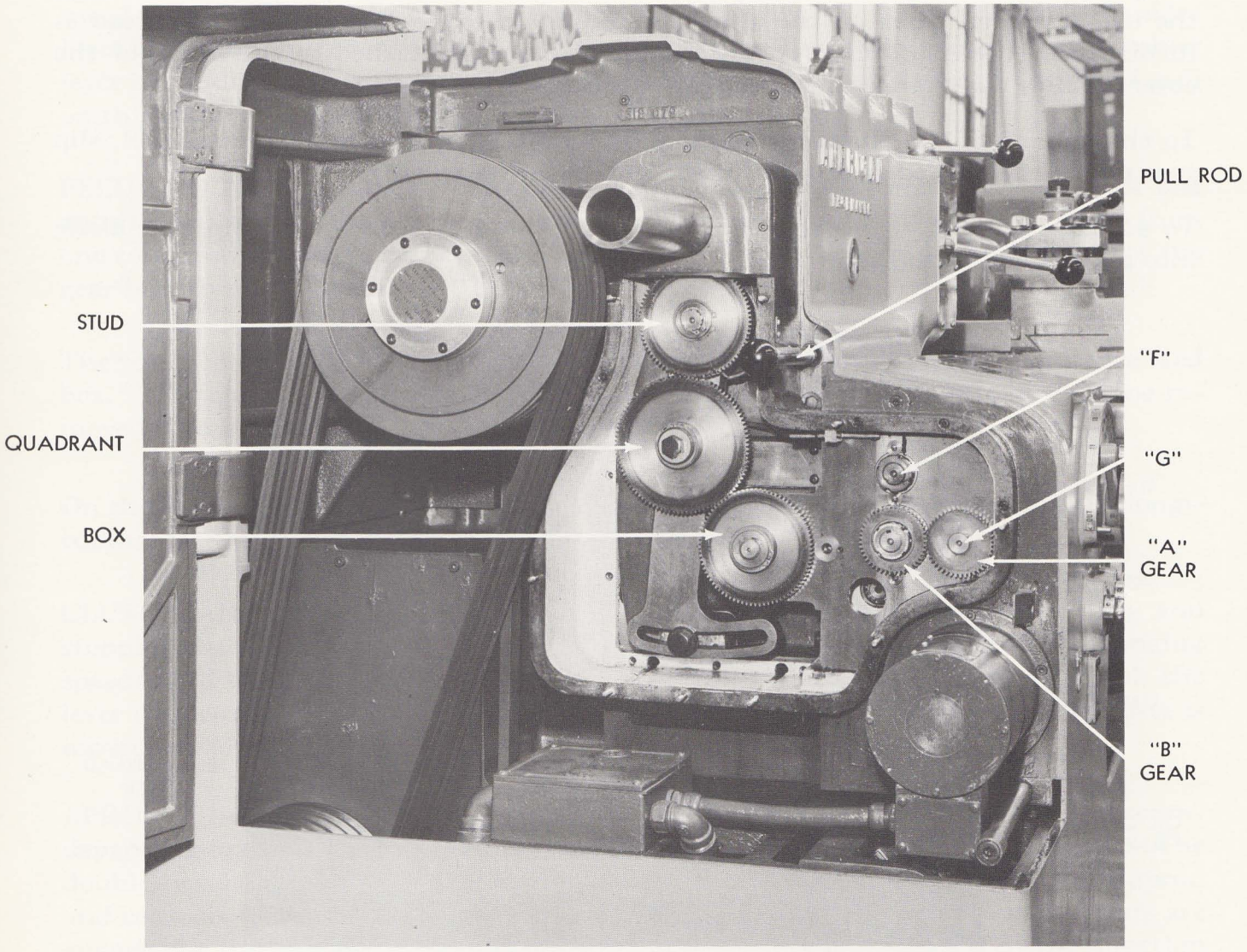


Figure No. 7—Head-End, showing Swinging Cover open and oil tight aluminum cover removed.

In addition to the standard metric range, other ranges may be secured by the use of special gearing, namely:

Coarse leads.
Module leads, standard.
Module leads, coarse
Transposed diametral pitch leads.
Transposed English leads, standard.
Transposed English leads, coarse.

To obtain these additional ranges, first arrange the change gears to correspond to the stud, quadrant, and box gears shown on the plate which is furnished for that particular range and which is attached to the inside of the swinging cover. Second, make sure that for all metric leads and feeds the "A" gear, Figure No. 7, is on the cone shaft "F" and the small conversion lever on the opposite side of the box, is at position No. 1: and make sure that for transposed English leads and feeds the "A" gear is on the tumbler shaft "G" and the small conversion lever on the opposite side of the box is at position No. 2.

All special threads and leads for any of the fore-mentioned ranges are obtained through the use of special gears on the stud, quadrant, and box. When a special thread is furnished by the manufacturer, an additional plate is attached to the inside of the cover to show the change gears used and the correct lever positions.

To change any of the change gears, simply remove snap-ring with proper tool, slip gear off, fit the desired gear onto sleeve, and replace snap-ring.

To adjust quadrant gear along the slot, loosen the hex-head screw, slip gear along into place, and tighten screw.

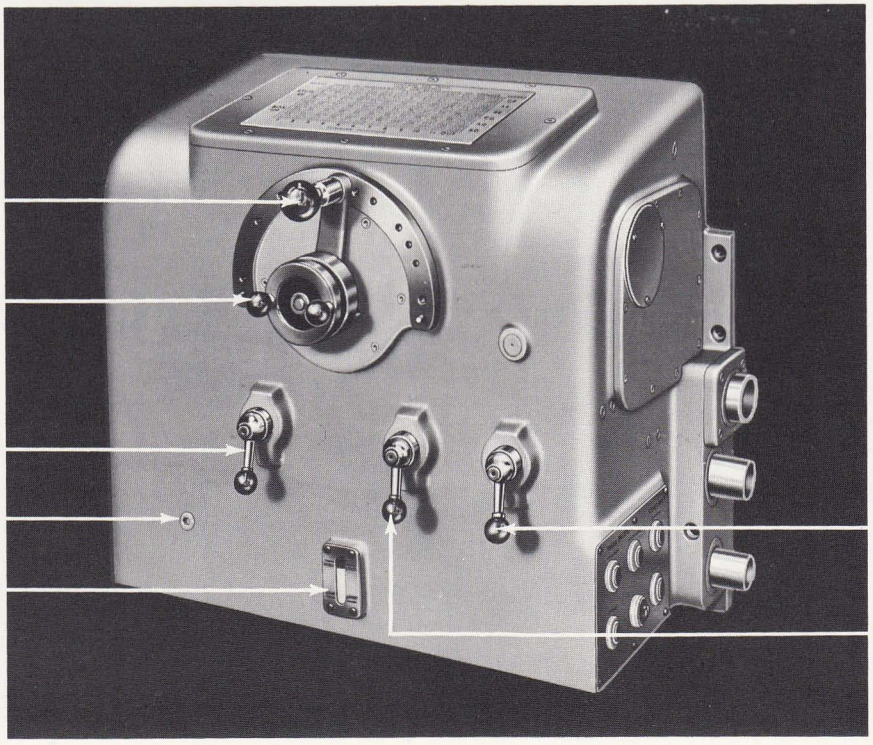


Figure No. 8—English Quick Change totally enclosed gear box

Thread, lead and feed selections of any range are made through the gear box by manipulating the tumbler lever and selector dial in combination with the two shifter levers. The tumbler lever and the selector dial working together select any one of eleven different changes representing the eleven columns on index plate. The two shifter levers give six different two letter combinations representing the six rows on the index plate. Any desired thread, lead or feed can be quickly selected by setting tumbler lever to the number corresponding to the column number in which the desired thread, lead or feed is found and by setting both shifter levers to give the two letter combination indicated by the row in which the desired thread, lead or feed is located. The tumbler lever and selector dial shifting is accomplished by shifting the tumbler lever into the "OUT" position, by rotating the selector dial until desired tumbler position number is opposite top center line and finally by shifting the tumbler lever from "OUT" position to the same number position as that indicated by selector dial.

Thread, lead and feed changes may best be made when spindle is running at moderate speed as this permits the gears to engage more readily. Make certain that tumbler lever is already shifted into its "OUT" position before selector dial is rotated; tumbler lever has plunger latch for self locking in each position necessitating an outward pull on this handle before shifting.

FEED ROD AND LEADSCREW—The feed rod and leadscrew are independent of one another and when one is running the other is stationary. To change the drive from one to the other merely position the small lever, Figure No. 8 on the right side of the gear box, to read "FEED" or "THREAD".

The feed rod is provided with a ball spring safety clutch immediately inside the feed box. This clutch will not need adjustment. The condition of overload must be removed before it will automatically reset.

On the feed rod there are two adjustable collars for automatically stopping the longitudinal feeding of the carriage in either direction.

CLUTCH AND BRAKE CONTROL LEVERS—There are two levers for starting and stopping the spindle. One is positioned close to the headstock for use when changing speeds, and the other is on the right-hand side of the apron. To engage clutch the lever is moved toward operator, and to disengage clutch and engage brake the lever is moved away.

APRON—The apron, Figure No. 9, is driven by either the feed rod or the leadscrew, depending upon whether the double-bevel pinion or the half-nuts are engaged. The double-bevel pinion is actuated by the forward-reverse lever on the front of the apron and controls the direction of feeding, both longitudinal and cross. The half-nuts are engaged by the half-nut lever, but the direction of travel is controlled by the direction of rotation of the leadscrew. These two levers are interlocking and one must be in its

neutral or disengaged position before the other can be moved. The neutral position for the forward-reverse lever is the center hole, and the disengaged position for the half-nut lever is at the top of its arc.

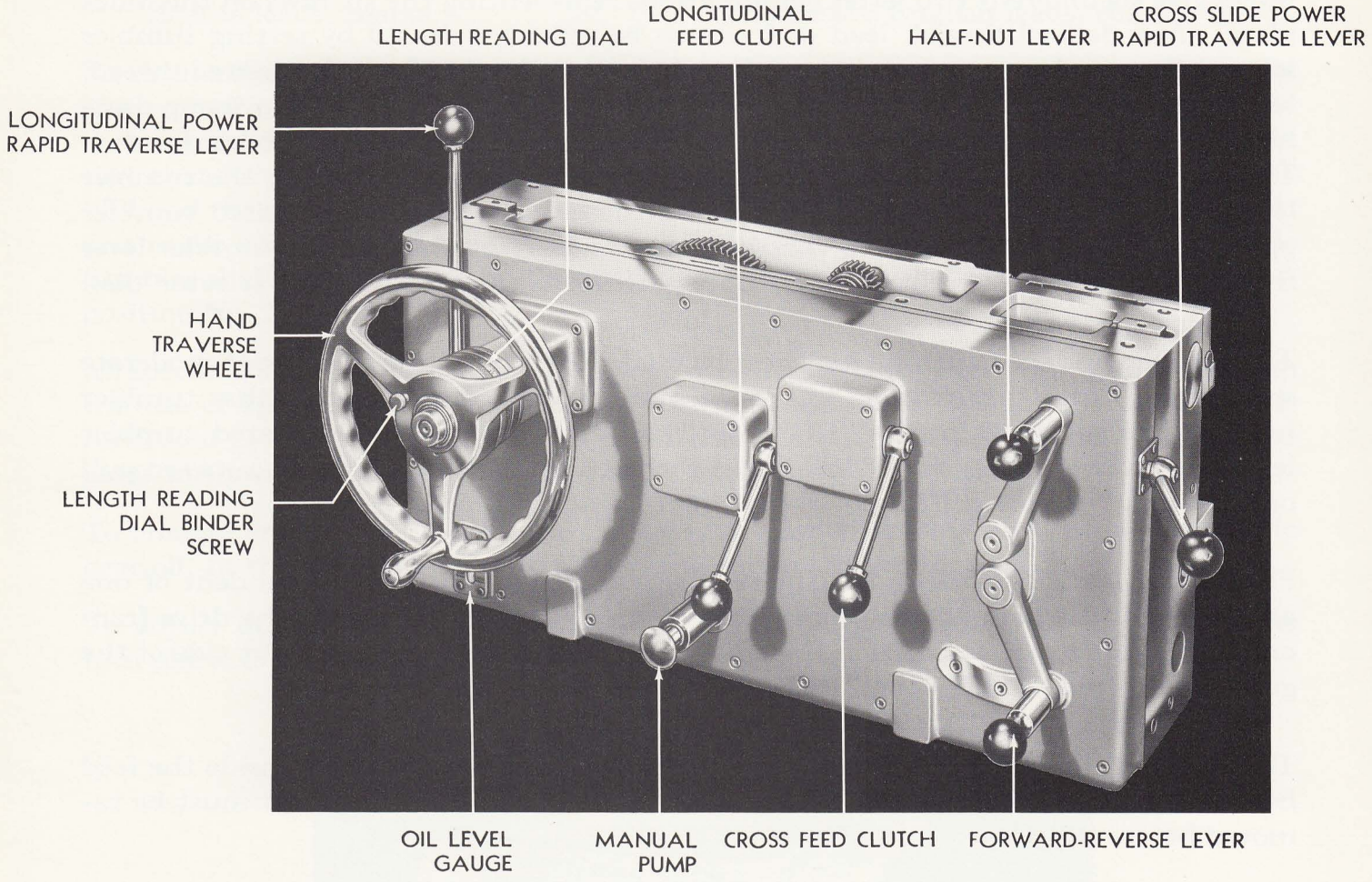


Figure No. 9—Front View of Apron

The instruction plate over the chasing dial on the extreme right of the apron clearly states the correct procedure for engaging the half-nuts. (There is no chasing dial furnished on metric lathes. Half-nuts remain engaged and carriage is returned by either leadscrew reverse or reversing motor).

FEED CLUTCH LEVERS—The two drop levers on the front of the apron actuate clutches which control the longitudinal feed of the carriage and the cross feed of the tool slide. The left-hand lever controls the longitudinal and the right the cross feeding. When the control levers are in the raised position the clutches are engaged, and in the dropped position, disengaged.

Both the longitudinal feed and cross feed are provided with safeties so that no damage will occur should the carriage or cross slide be fed into an obstruction

or allowed to feed to its limit of travel.

To adjust clutch stop spindle, raise lever to engaged position, remove four screws holding housing and remove housing completely.

Make sure that the anti-friction thrust washer inside adjusting nut "A", Figure No. 10 has not fallen off shaft. Adjust nut "A" for desired tension and then replace housing.

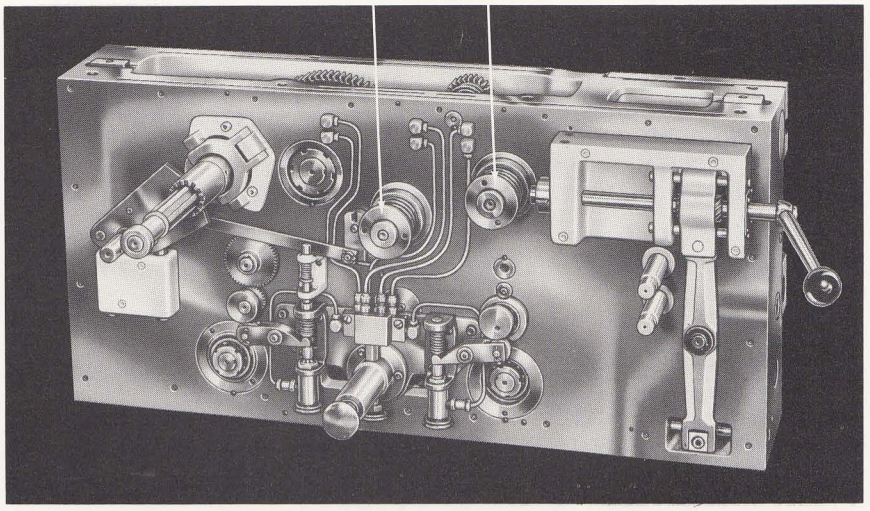


Figure No. 10—Front View of Apron with front cover plate removed exposing all adjusting members

LEADSCREW REVERSE FROM APRON—When the direction of the leadscrew is reversed from the apron, a small lever is employed at the top right-hand side of the apron. This lever has three positions: up, when cutting left-hand threads; center, or neutral: and down when cutting right-hand threads. With this attachment adjustable stops are provided for chasing in both directions.

Use this reverse only for the leadscrew when chasing threads. The forward-reverse lever on the apron should always be used for reversing the direction of feeding.

Do not attempt to reverse leadscrew when spindle speed is over 200 R. P. M. When over this speed, disengage clutch then brake spindle to a moderate speed before reversing.

4-WAY POWER RAPID TRAVERSE—When the 4-way power rapid traverse is furnished two independently operated directional levers are used. The carriage longitudinal traverse is actuated by a convenient control lever at the left side of the apron, while the control lever for the tool rest cross travel is located at the right side of the apron, figure No. 9. These levers are separated to eliminate the possibility of engaging the wrong traverse and also to permit both traverses being operated simultaneously. A further safety feature is provided by spring actuated safety clutches which control the traverses. These disc clutches are engaged and disengaged by spring action applied by the actuation of the control levers, as a result the traverses operate only while the operator holds the levers in operating positions. Should the carriage or tool rest be accidentally run into an obstruction the clutches will simply slip. See Figure No. 11.

If either the longitudinal or the cross slide power rapid traverse is furnished alone, the principle of operation is the same as described above.

CARRIAGE—The carriage is rigidly secured to the bed by taper gibs under the front and rear outer vees. The taper gibs are adjusted by means of their adjusting screws. Turning screws to the right tightens the gibs, and to the left loosens them.

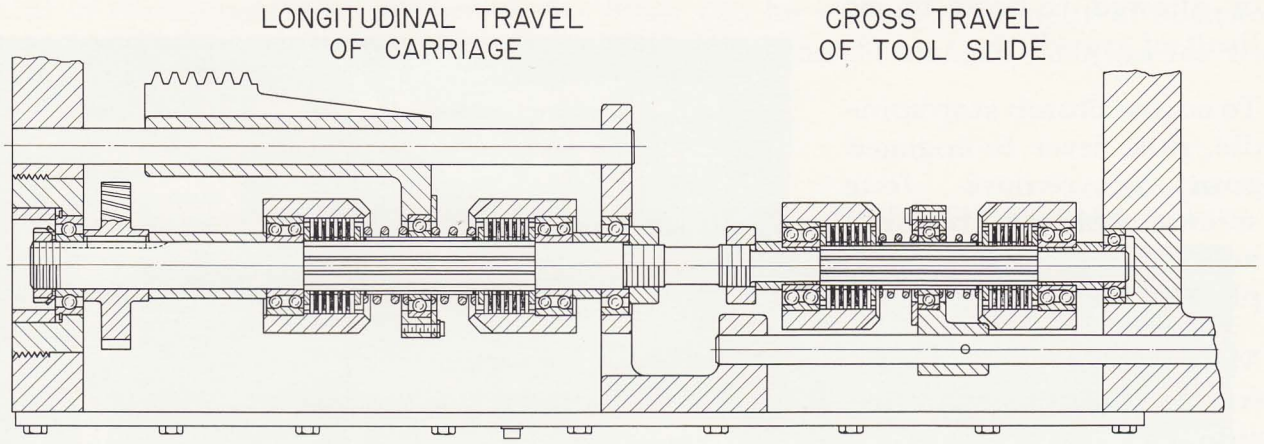


Figure No. 11—Diagram of Power Traverse Safety Clutch Unit

The bottom slide is secured to the carriage bridge and the top slide to the swivel also by means of adjustable taper gibs, located on the left-hand sides. In the slot on each side of the swivel are four clamp nuts for tightening the swivel to the bottom slide. The swivel can be swung in a 360° arc.

The carriage is clamped to the bed by means of the square-head screw located on the front, right-hand carriage wing. Directly behind both micrometer dials is found a knurled nut for binding the graduated dials to the screws. The knurled collar on the dial is merely for convenience in setting.

MICROMETER BALL THREADING STOP—A micrometer ball threading stop is provided on standard engine lathes to facilitate threading operations. This stop permits the withdrawal of the tool from the cut up to 3 revolutions of the cross feed screw without disturbing the tool setting. This permits withdrawal of tool at the end of each cut and the return of the tool to the original depth of cut. Additional depth may be secured by further adjustment of the compound rest top slide screw. If this is not convenient the stop may be loosely set and used as a "slip stop" whereby the handwheel is turned past the stopping point by the amount required for the next depth of cut.

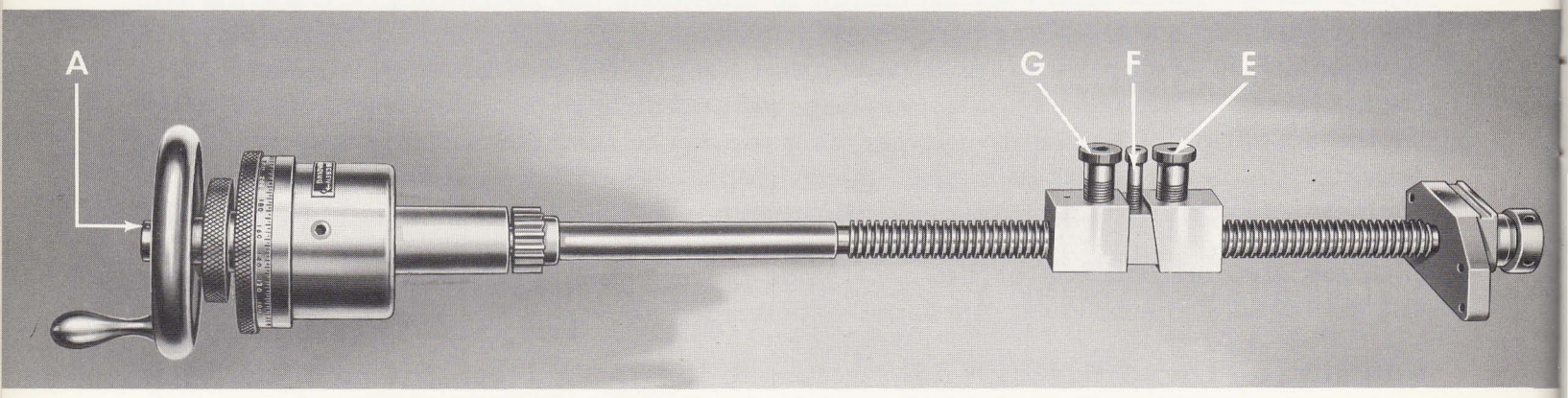


Figure No. 12—Hardened cross feed screw with large direct reading micrometer dial, automatically oiled, bronze compensating nut and Micrometer Ball Threading Stop

To adjust the cross feed nut for wear and accompanying backlash, loosen the hex-head screw "E" in the center of the carriage bridge just behind the swivel about a quarter turn and turn small hollow-head screw "F" to the right to draw up the adjusting wedge, figure No. 12. The correct procedure is to adjust the small screw a quarter turn and then to tap the hex-head screw with a babbitt or wood block, at the same time turning the cross feed hand wheel to the right and left to feel for the correct adjustment. When the wedge has been drawn up a sufficient amount tighten the hex-head screw. Do not loosen the large hollow-head screw "G" at any time. The hardened cross feed screw confines all the wear to the nut, and for this reason the nut may be adjusted at any point along the screw.

On carriages without taper attachment, when backlash develops because of end play in the anti-friction thrust bearings on the screw, tighten the round nut "A" at the front end of the screw. On carriages with the taper attachment, unscrew the square plate "M", figure No. 13, directly over the back end of the screw, loosen two small set-screws in round nut, and adjust nut until end play is removed.

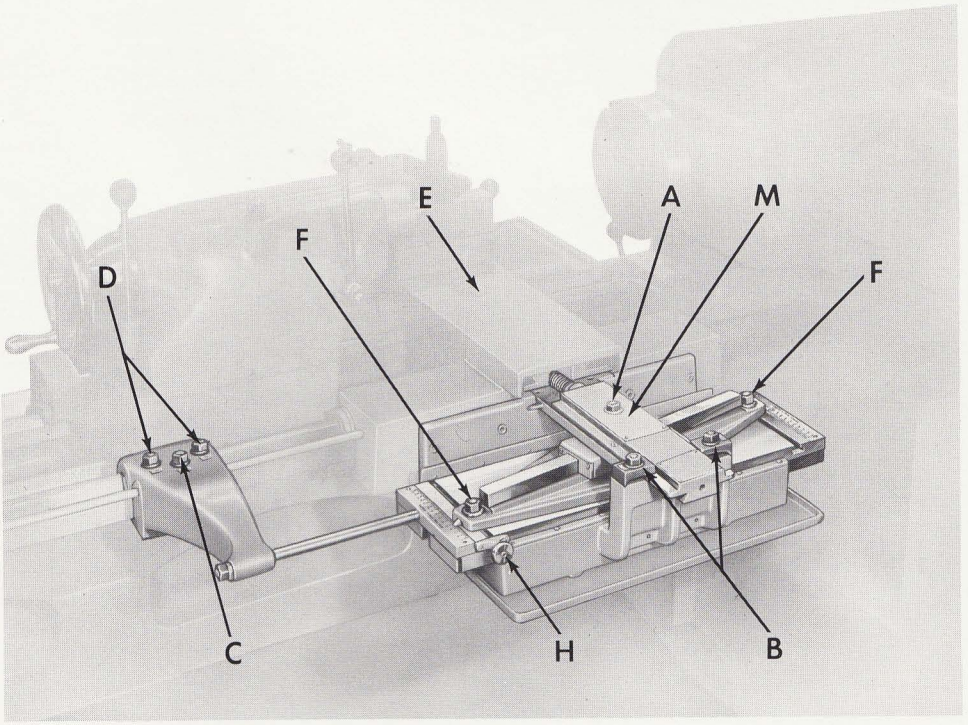


Figure No. 13—View of Plain Bearing Taper Attachment with guards removed

TAPER ATTACHMENT — Either the plain bearing or the ball bearing taper attachment, Figure No. 13 is easily and quickly set up for action. For chasing tapered threads set up for adjustable cross feed control (telescopic type). Loosen draw bar binder nut "C", the two swivel nuts "F" and screw "A", and nuts "B". By means of the knurled knob "H" set swivel to desired taper, either inches per foot at one end or degrees of angle at the opposite end of swivel base, then tighten nuts "F" and screw "A". Also tighten dog clamp nuts "D". To change from taper to straight turning loosen screw "A" and nuts "F", then set swivel straight. Next, tighten screw "A", the two nuts "B" and the two nuts "F". Now tighten nut "C" and loosen the two nuts "D". Make sure that nut "C" is tight and the two nuts "D" are loose when turning straight work.

For turning taper, set up for locked cross feed control (rigid type). Loosen screw "A" and nuts "B". Set swivel to required angle. Tighten screw "A", loosen nut "C", tighten nuts "D" and screw plug in center of hex screw "E". See Figures No. 12 and 13.

TAILSTOCK—The tailstock, figure No. 14, is provided with four clamping bolts for binding it securely to the bed. The spindle is clamped and unclamped in the barrel by raising or lowering the clamping lever at the front of the tailstock.

Both the stationary and combination stationary/live center spindles are provided with tang slots for easy removal of the center and ordinary drilling operations. To remove either spindle, run it all of the way out until the pinion is disengaged from the rack and then carefully pull remainder of distance by hand. A key at the front end of the combination spindle locks the center for stationary operation. Be sure key is always locked tightly in place.

The tailstock has its own plunger pump lubrication and the reservoir should be kept filled between the high and low limits on the gauge with "SUNOCO" Way Lubricant S.A.E. 80 or equivalent.

The tailstock micrometer dial reads spindle advance in 1/32" increments and is adjustable to zero at any position of the spindle.

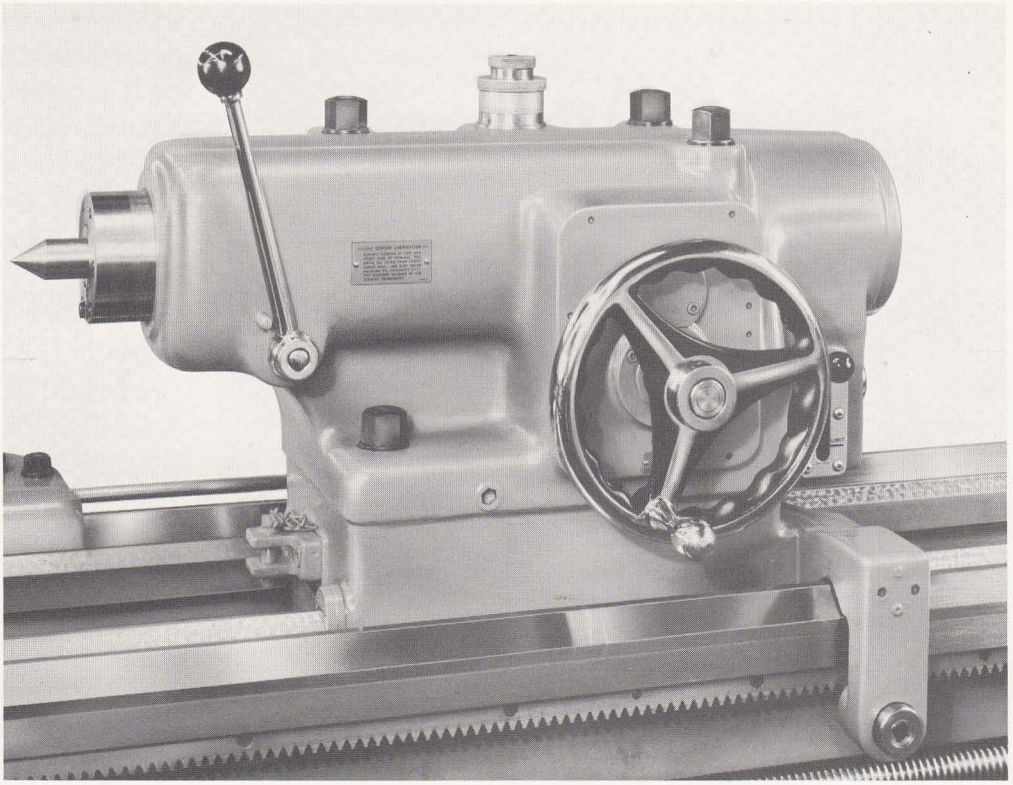


Figure No. 14—Tailstock

There is a 1/8" set-over adjustment possible. To adjust the center alignment from the front to the rear, loosen the hollow hex screw on the rear side two or three turns, adjust the hollow hex screw on the front side to the right until the desired position is obtained, and then tighten the screw on the rear side.

To adjust the center alignment from the rear to the front, loosen the hollow hex screw on the front side two or three turns, adjust the hollow hex screw on the rear

side to the right until the desired position is obtained and then tighten the screw at the front.

These same operations hold true for the built-in anti-friction center tailstock except that of removing the center. The anti-friction mounted center, by itself, is non-removable, and must be removed along with its complete anti-friction unit. To do this, remove the plate on the front end of the spindle and draw out the complete anti-friction unit by the center. If the unit is too tight to draw out, remove the spindle and then tap it out. However, it will be rare, if ever, that this center unit must be removed. Even when regrinding the center is left in position and rotated by means of a thin belt placed around the cylindrical portion.

EXTRA EQUIPMENT—Various types of useful attachments can be furnished with all Pacemakers. For information covering any extra equipment, consult the dealer in your territory or write the factory direct.

SERIAL NUMBER AND REPAIR PARTS. Should it be necessary to order repair parts, always give the serial number of the machine and the key number of the part. This serial number is stamped on the front of the tailstock end of the bed. It is very important as it enables us to give prompt service, something we positively cannot do unless we know the exact machine on which the new parts are to be used. The key number of the part will be found in the parts catalog. It is seldom advisable to make your own repair parts; this is particularly true with regards to numerous parts where the correctness of shape is extremely important. The manufacturer has an accurate record of all the parts of your "American" Pacemaker Lathe and can supply them on short notice.

In conclusion, remember there is no finer or better built lathe than the "Pacemaker". Remember, too, that no machine tool, regardless of how well it is designed and built, will stand up for a long period under abuse, neglect or indifferent treatment. Read and study this book carefully. If this is done and the instructions carried out in detail you should get years of uninterrupted service.

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