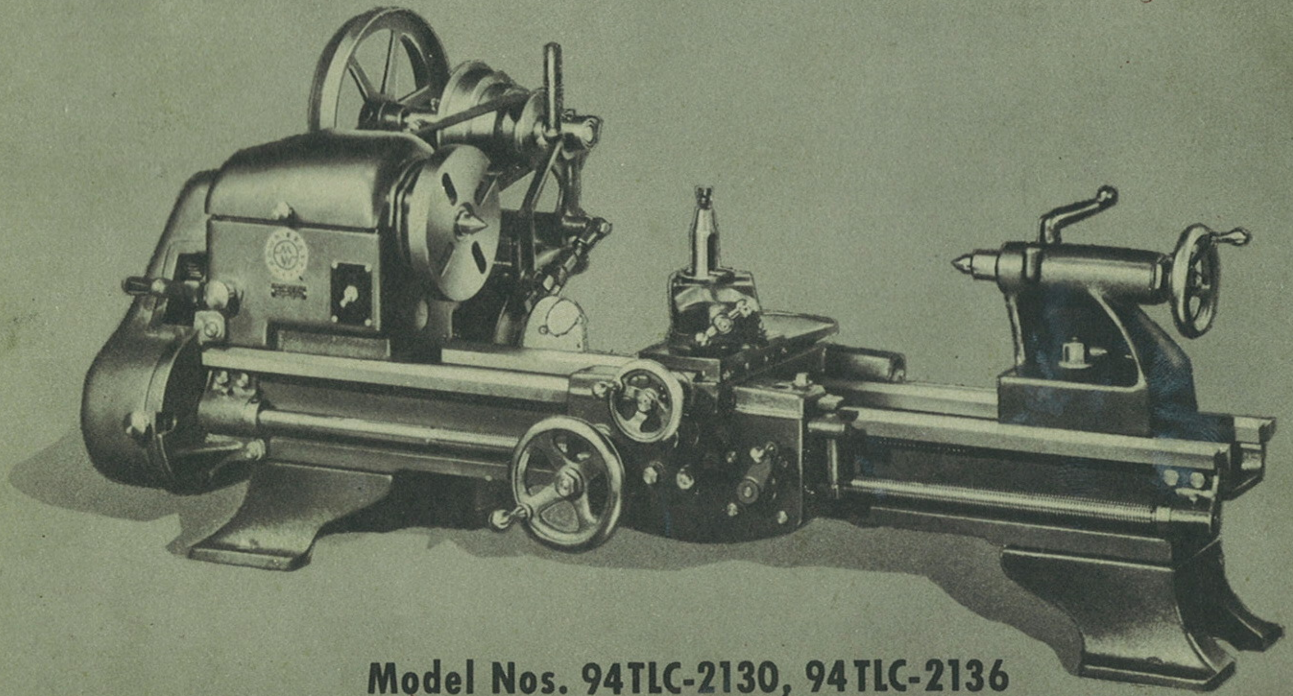
# Owner's Guide

INSTALLATION • OPERATION • MAINTENANCE • REPAIR PARTS LIST

## WARDS

## POWR-KRAFT

# BACK GEARED SCREW-CUTTING LATHE



**Model Nos. 94TLC-2130, 94TLC-2136**

MONTGOMERY WARD

# REPAIR PARTS FOR 94TLC-2136

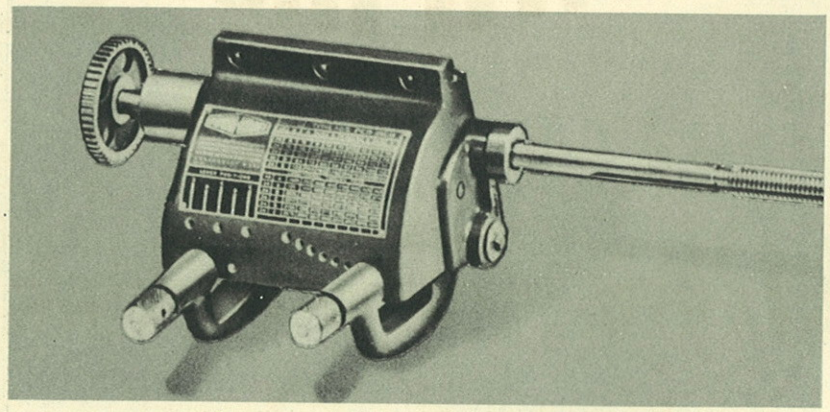
## 31-IN. LATHE

All parts are identical to and interchangeable with parts for 94TLC-2130 24-inch Lathe described in the Owner's Guide.

The only exceptions are the longer Bed, Bed Rack and Lead Screw for the 94TLC-2136 Lathe.

**INFORMATION FOR ORDERING THESE PARTS IS AS FOLLOWS**

| PART NO. | NAME OF PART | SHIPPING WEIGHT | | PRICE EACH |
|---|---|---|---|---|
| | | LBS. | OZ. | |
| LA-951 | Bed | 134 | | $50.40 |
| LA-952 | Bed Rack | 4 | 15 | 5.25 |
| LA-954 | Lead Screw | 9 | 15 | 8.40 |



## POWR-KRAFT QUICK-CHANGE GEAR BOX

Converts Models 2130 and 2136, as well as those in the older 700 Series of Powr-Kraft Lathes, to a modern quick-change lathe.

Holes for this attachment are drilled and tapped in lathes bearing Serial Numbers from 3543-A. Older models will require four holes to be drilled and tapped.

Box provides 48 threads and feeds in either direction. Screw threads 8 to 224 per inch are selected by adjusting the two levers. By substituting the 24-tooth stud gear for the 48-tooth gear, supplied with the lathe, 4 to 7 threads per inch can be cut.

The Quick-Change Gear Box is supplied with a corrected lead screw that corresponds to the model of your lathe. Accordingly, it is important that the serial number of the lathe, as stamped on the right hand corner of the front way be given when ordering.

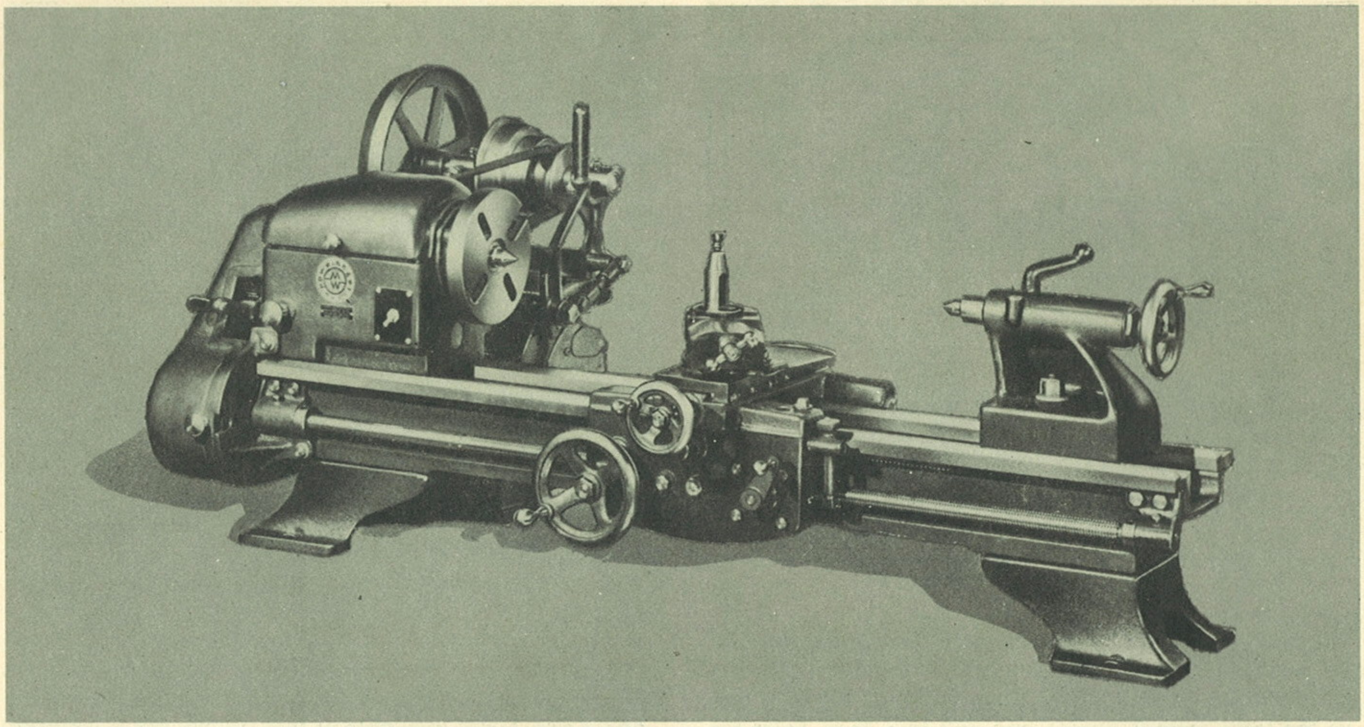


FIG. 1—WARDS POWR-KRAFT BACK GEARED, SCREW-CUTTING LATHE FOR BENCH MOUNTING

# WARDS POWR-KRAFT BACK GEARED, SCREW-CUTTING LATHE

## INSTALLATION

### PACKING LIST

The crate in which your Wards Powr-Kraft Back Geared, Screw-Cutting lathe (Fig. 1) is received contains the following items:

**(a)** Lathe complete with Headstock, Tailstock and Carriage.

**(b)** Countershaft.

**(c)** Lot of 17 Change Gears for thread cutting (six of which are assembled as part of the lathe).

**(d)** Bag containing one each—Toolpost, Toolpost Ring, Toolpost Screw, Toolpost Wedge, Toolpost Block, Toolpost Wrench, Tailstock Wrench, Sleeve, Knob and Quill; and two Centers.

Fastened to the base of the lathe crate is a two-step motor pulley, bored ½, ⅝ or ¾-in., as specified on your order. Unpack carefully and check to be certain you have removed all the pieces.

Before the lathe is crated for shipment at the factory, it is given an all-over coating of moisture and rust-resisting compound. This should be removed by a complete cleaning with a stiff brush and kerosene. Then cover all unpainted surfaces with a light coat of good machine oil to prevent rusting. These surfaces should be kept lightly covered with oil at all times and the lathe should be provided with a canvas or similar cover. The latter is especially recommended when the machine is installed in basement shops.

### SETTING UP THE LATHE

Select a solid, level floor—preferably concrete—in a dry, well-lighted location, as a foundation for the lathe and mount it on a substantial work bench or upon floor legs, using a chip pan. Floor legs are usually preferable because they are compact, provide proper height while holding the machine rigid, and have been designed to hold the countershaft and motor bracket at their proper height.

If possible, arrange your lathe so light will fall over the operator's right shoulder. Allow at least 18-in. space at the back and both ends of the lathe and give the operator a minimum working space 3½-ft. wide at the front.

If the lathe is to be bench-mounted, the bench should be 31 to 33-in. high, strongly built and suitably reinforced for steadiness. The top, of seasoned wood, should be at least two inches thick. The top should be doweled, or five steel rods

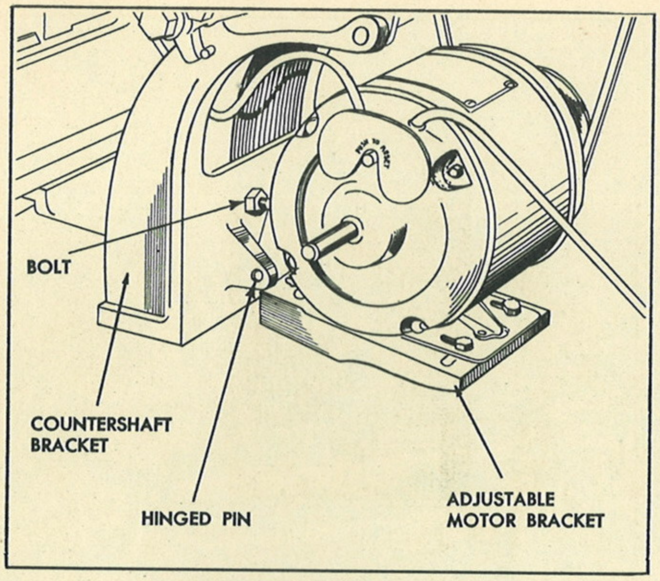



FIG. 2—MOTOR BRACKET

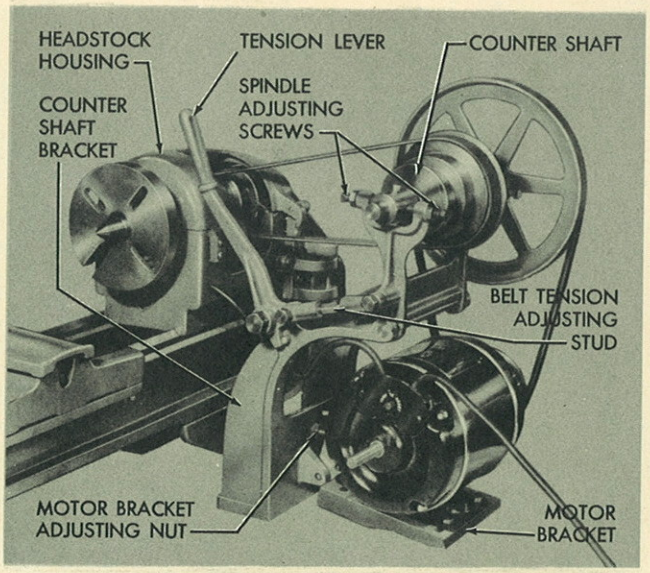



FIG. 3—HEADSTOCK AND COUNTERSHAFT BRACKET

with ends nuts should be run crosswise through the top and the nuts turned tight, pulling the boards together. Countersink bolt holes on both edges. Plane the bench top level and set the lathe upon it. Locate and drill four ⅜-in. holes for the feet. Use four machine bolts to fasten lathe to the bench and to aid in leveling.

## LEVELING THE LATHE

It is very important that the lathe be level; if it is not, its own weight will distort the lathe bed, throwing the headstock out of alignment with the ways, and cause the lathe to turn and bore to "taper." It is impossible to do accurate work on a lathe that is not level and the machine will likely be damaged beyond repair. Place an accurate and sensitive machinist's level (an ordinary level will not do) across the top of the lathe. Note any variations from the true level and adjust by placing thin shims of metal, wood or fiber under the feet. Be certain the lathe is level, both crosswise and longitudinally, at the both headstock and tailstock ends. When the lathe is level, bolt down tightly and check the leveling. It may be necessary to loosen bolts and add more shims. Remember, *the lathe must be level*, if it is to perform accurately. When using floor legs, use lag screws, bolts or expansion bolts to secure them to the floor. If the floor is wood, use lag screws; if concrete, drill holes with a star drill. If the bolts are to be set in melted lead or sulphur, bottoms of the holes should be enlarged slightly. If lead sleeve expansion bolts are used, the sleeves should be seated solidly before bolts are inserted. Shim up the legs as necessary and check the leveling after bolting legs down.

After the lathe is in operation, check it from time to time. If necessary, adjust the shims as a slight sagging of the floor or compression of the shims under pressure may change the level without your knowledge.

## MOUNTING THE MOTOR

Wards Powr-Kraft Back Geared, Screw-Cutting Lathe is designed to be driven by a 1750 R.P.M. ½ HP motor. For best results, use a Repulsion-Induction, Capacitor or three-phase type of motor. Split-phase motors are not recommended for this application. For industrial installations, three-phase motors are particularly recommended, if three-phase circuits are available as they usually are in industrial areas. Outside industrial areas, the user must depend on single-phase circuits and use Repulsion-Induction or Capacitor type motors. Most Repulsion-Induction motors and some Capacitor motors are wound so they can be used on either 110 or 220 volts; the latter is recommended wherever possible for steadiness. On the other hand, some Capacitor motors can be used only on voltages for which they are wound; that is, a motor wound only for 110 volts cannot be used on 220 volts and vice versa. Capacitor motors that can be used on either 110 or 220 volts are provided with a center tap.

Either before or after mounting motor to the Motor bracket, check it for proper rotation. Motor should run clockwise when viewed from the motor pulley end.

Correct rotation can be obtained by moving brush holders on Induction-Repulsion motors to one side or the other of witness mark on brush holder mounting. Capacitor type motors are given reverse rotation by removing cover from terminal box and reversing field-winding wires on binding posts. In the case of three-phase motors, any two leads can be reversed to change direction of rotation. If there is any doubt, consult wiring diagram of connections supplied with motor or information given on name plate.

When lathe is in place, mount motor to motor bracket (Fig. 2) beneath the countershaft, using four machine bolts. Do not tighten the bolts until position of motor has been adjusted.

## MOTOR BRACKET

The motor bracket is attached to the countershaft bracket by a hinged pin and may be raised and lowered by a bolt through the countershaft bracket as shown in Fig. 3. Attach motor pulley to motor shaft—large pulley away from motor. Align motor pulley with the 10-in. pulley on countershaft by moving motor until the two are in line.

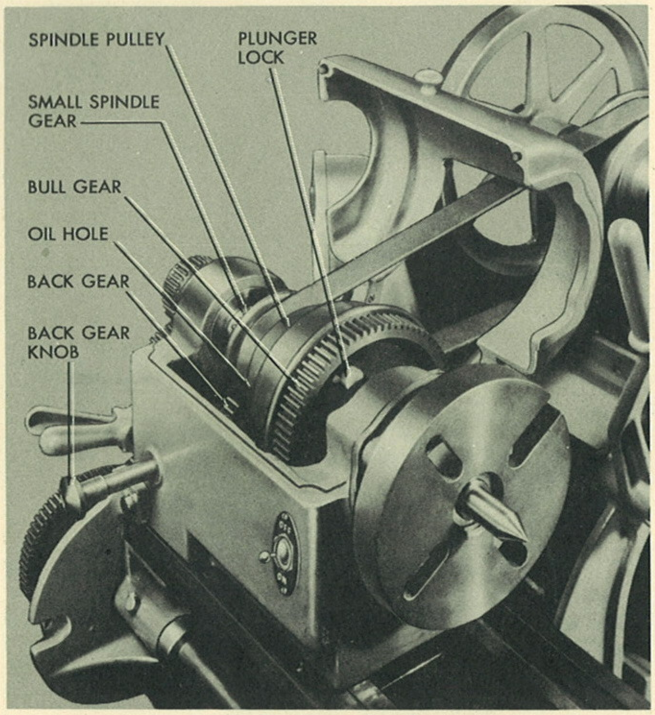



FIG. 4—HEADSTOCK WITH PULLEY ARRANGEMENT

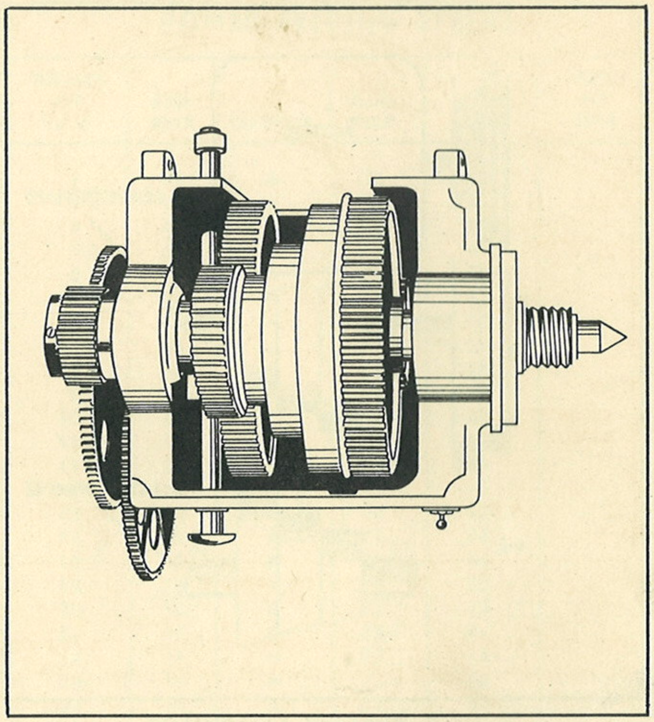


FIG. 5—BACK GEAR DRIVE

Tighten bolts holding motor to bracket, but do not apply belt to pulley until motor wires have been connected and the motor tested for correct rotation as described above.

Connect wires that come from the "On-Off" switch, in front of headstock housing, to motor and current source as shown in Figs. 2 and 3. With rotation of motor correct, apply V-belt.

The combination of flat and V-belt drive used between motor and countershaft has been found most successful in applications where the driven pulley is much larger than its driver, with a consequently large area on the former. The short, center distance between pulleys also makes its use preferable.

## ADJUSTING THE BELTS

The belts are adjusted easily and accurately by means of the four countershaft adjusting screws, the motor bracket adjusting screws, the stud connecting countershaft and the belt tension lever. Make all adjustments with the belt tension lever in its forward position, which will swing the countershaft into a position directly above the motor.

To move the countershaft forward or backward, thereby tightening or loosening the flat belt, turn the stud connecting the belt tension lever and the countershaft frame, and adjust the four countershaft adjusting screws. Tighten screws as much as possible with your fingers and then take an additional quarter turn on one side with the wrench. Neither belt should be too tight. Excessive belt tension not only shortens the life of the belt but places unnecessary strain on bearings so power is lost through excessive friction. When adjusted for normal work, a moderate pressure on either belt should depress it about 1½ inches. Be careful not to get them too tight as excessive pressure can distort the bearings.

# OPERATION

## COUNTERSHAFT

The countershaft (Fig. 3) is located directly above the motor and is controlled by the countershaft tension lever conveniently mounted in front of the operator. The countershaft spindle revolves on four self-lubricating bronze bearings fitted into rugged steel sleeves with oil wells. The type of self-lubricating bronze bearings used insures a smooth-running spindle at all times with a minimum of attention, for they actually absorb oil and give it up as required, rather than simply hold a film of oil between the bearing and spindle.

Bearings in their sleeves are held in the countershaft bracket by adjusting screws so the spindle can be moved back or forward for adjusting belt tension.

The countershaft may be swung forward to release tension on the belt, when lathe is not in operation or when speed is to be changed, by moving the countershaft tension lever backward. This lever is attached to the swinging countershaft bracket by two links connected to each other by a stud having right and left threads. By turning this belt tension adjusting stud, shown in Fig. 3, variations in belt tension can be adjusted. The two-step pulley on the end of the countershaft turns the three-step countershaft pulley which, in turn, drives the headstock spindle pulley through the flat belt.

## POWR-KRAFT HEADSTOCK

The headstock on the Powr-Kraft lathe is made of high grade semi-steel and fitted with a hinged cover that completely encloses the interior mechanism (Fig. 4). Cover swings back out of the way when belt is to be shifted.

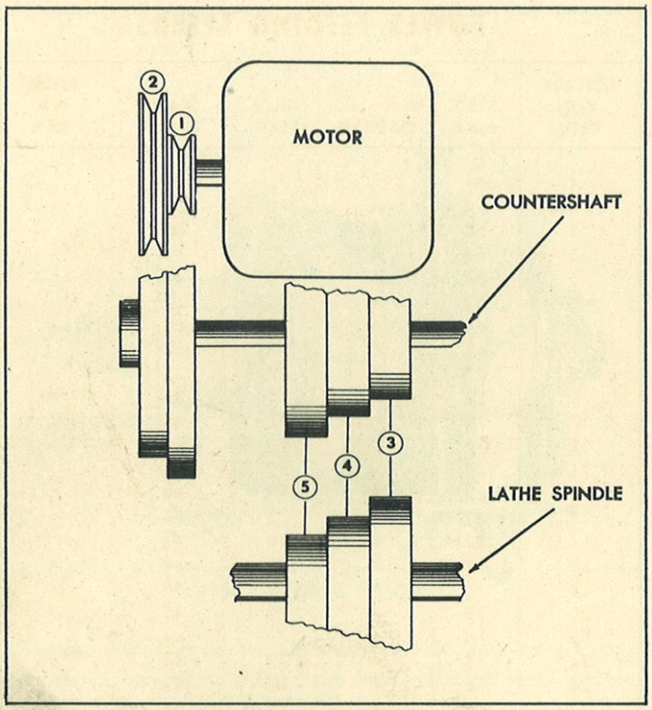


FIG. 6—BELT DRIVE ARRANGEMENT

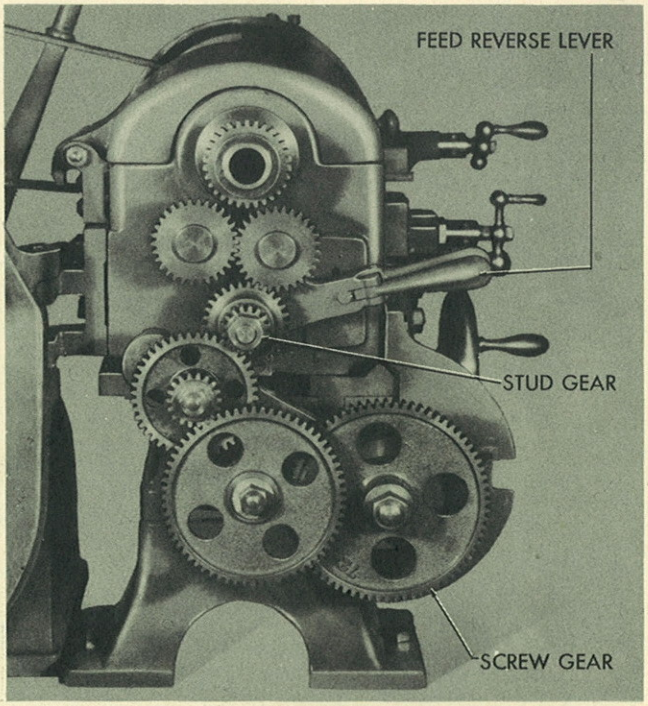


FIG. 7—GEAR TRAIN

When closed, the cover rests on rubber studs that absorb vibration and prevent noise.

The headstock contains the headstock spindle and bearings, the bull gear, spindle pulley and back gears. Power from the belt, through the spindle pulley, turns the bull gear or transmits power through the back gears to the bull gear, if lower speed or greater power are desired.

Alloy steel has been used in making the headstock spindle which has been machined and ground to a super finish. The nose, which has an 8-pitch, National form thread for attaching chucks and face plates, has been accurately finished internally to a No. 3 Morse Taper. A reducing sleeve, furnished with the lathe, permits use of the No. 2 Morse Taper headstock center. The 25/32-in. hole through the headstock spindle permits stock as large as ¾-in. to be fed through the spindle, which will take a ½-in. draw collet attachment.

The headstock spindle of Wards Powr-Kraft Lathe turns on three rows of grease-sealed New Departure ball bearings that require no lubrication for the life of the machine. This eliminates daily care and guarantees smooth, trouble-free running with a minimum of friction.

The three-step spindle pulley and small spindle gear are attached to form a rigid unit and revolve freely on the spindle on self-lubricating bronze bearings. For direct drive, the pulley is locked to the bull gear which is keyed to the spindle. Connection between spindle pulley and bull gear is made through a plunger-type lock located on the side of the bull gear; when this lock is "in," pulley turns bull gear with it; when "out," pulley and small spindle gear run free. Should it ever be necessary to remove the headstock spindle, follow the procedure below:

**First:** remove the take-up nut, the spindle gear, Woodruff key, collar and bearing grease seal, in the order named, from the left end of the spindle.

**Second:** remove the four fillister head screws from the bearing cap, then the bearing cap and next, the grease seal from the right end of the spindle.

**Third:** Loosen the set screws in the bull gear and with a wooden mallet, carefully drive the spindle toward the tailstock end of the lathe, being careful to hold the bull gear and cone pulley so they will not drop as the spindle is removed.

**Important.** Ball bearings can be ruined by improper handling. When pressing a bearing into or out of the seat, pressure should be applied to the outer race only but, when pressed onto or off a shaft, pressure should be applied on the inner race only. Bearings should be carefully kept free of dirt and grit and, except in extreme cases, must not be tapped into place with a hammer.

## BACK GEAR DRIVE

When slower turning speed or greater power is required than could be obtained from a direct drive, the back gears are used. The back gear mechanism on Wards Powr-Kraft Lathe is totally enclosed within the headstock housing instead of exposed as in the usual construction. Also, instead of having to reach over the top of the headstock to throw a back gear lever, the Powr-Kraft design controls the back gear from a knob on front of the headstock housing as shown in Fig. 5.

The back gear is mounted on a quill which turns on self-lubricating bronze bearings on an eccentric shaft. Movement of the back gear knob is transmitted through a rack and pinion which rotates the eccentric shaft that swings the back gears into mesh. When the knob is pulled out, the back gears are engaged and automatically locked in position by a latch on the underside of the shaft where it enters the headstock housing. The lock is released by press-

(A) 8 × Screw Gear / Stud Gear = Thrd's/in (B) 24 × Screw Gear / Stud Gear = Thrd's/in
(C) 48 × Screw Gear / Stud Gear = Thrd's/in Feed/rev. = 1 / Thrd's/in

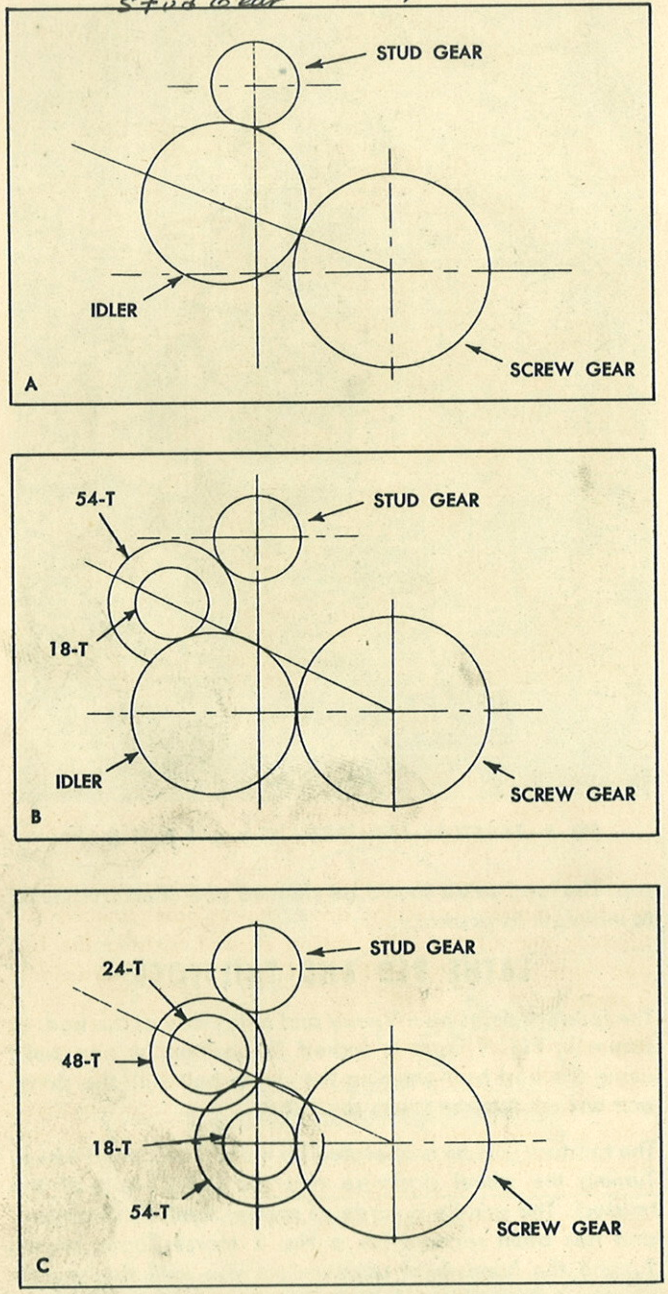



FIG. 8

ing up on the latch with the finger; this latch is on the **underside** of the shaft and cannot be seen and can only be located by "feel." The cone pulley and small gear turn freely on the headstock spindle and are locked to the bull gear, for direct drive, by a lock pin located on the side of the bull gear (see Fig. 4).

To engage the back gear drive, first pull out the direct drive pin on the bull gear so the cone pulley and small gear turn free of the bull gear. Then engage the back gears so the power is transmitted through the cone pulley and small spindle gear to the large back gear, and from the small back gear to the bull gear. The bull gear, being keyed to the headstock spindle, transmits its power to the work on chuck, face-plate or center.

**Never throw the back gears in or out of mesh while lathe spindle is revolving.**

## POWER FEEDING SPEEDS

| THREADS PER INCH | STUD GEAR | DIAGRAM | IDLER GEAR | SCREW GEARS | FEEDS PER INCH |
|---|---|---|---|---|---|
| 4 | 64 | A | 72 | 32 | |
| 4½ | 64 | A | 72 | 36 | |
| 5 | 64 | A | 72 | 40 | |
| 5½ | 64 | A | 72 | 44 | |
| 6 | 64 | A | 72 | 48 | |
| 6½ | 64 | A | 72 | 52 | |
| 7 | 64 | A | 72 | 56 | |
| 7½ | 64 | A | 72 | 60 | |
| 8 | 32 | A | 72 | 32 | |
| 9 | 32 | A | 72 | 36 | |
| 10 | 32 | A | 72 | 40 | |
| 11 | 32 | A | 72 | 44 | |
| 11½ | 32 | A | 72 | 46 | |
| 12 | 32 | A | 72 | 48 | |
| 13 | 32 | A | 72 | 52 | |
| 14 15 | 32 32 | A | 72 72 | 56 60 | |
| 16 | 32 | A | 72 | 64 | |
| 18 | 16 | A | 72 | 36 | |
| 20 | 16 | A | 72 | 40 | |
| 22 | 16 | A | 72 | 44 | |
| 24 | 16 | A | 72 | 48 | |
| 26 | 16 | A | 72 | 52 | |
| 27 | 16 | A | 72 | 54 | |
| 28 | 16 | A | 72 | 56 | |
| 30 | 16 | A | 72 | 60 | |
| 32 | 16 | A | 72 | 64 | |
| 36 | 24 | B | 72 | 36 | |
| 40 | 24 | B | 72 | 40 | |
| 44 | 24 | B | 72 | 44 | |
| 48 | 24 | B | 72 | 48 | |
| 52 | 24 | B | 72 | 52 | |
| 54 | 16 | B | 72 | 36 | |
| 60 | 16 | B | 72 | 40 | |
| 64 | 24 | B | 60 | 64 | 0.0156 |
| | 16 | B | 60 | 44 | 0.0152 |
| | 16 | B | 60 | 46 | 0.0145 |
| | 16 | B | 60 | 48 | 0.0139 |
| | 16 | B | 60 | 52 | 0.0128 |
| | 16 | B | 60 | 56 | 0.0119 |
| | 16 | B | 64 | 60 | 0.0111 |
| | 32 | C | | 64 | 0.0104 |
| | 32 | C | | 72 | 0.0092 |
| | 24 | C | | 64 | 0.0078 |
| | 24 | C | | 72 | 0.0069 |
| | 16 | C | | 64 | 0.0052 |
| | 16 | C | | 72 | 0.0046 |

Gears
16
24
32
36
40
44
46
48
52
54
56
60
64
72

## SPINDLE SPEEDS

The following table gives the spindle speeds that can be obtained by using the various belt positions shown in Fig. 6 both with direct drive and with back gear drive.

| Motor Belt Position | Spindle Belt Position | | | | | |
|---|---|---|---|---|---|---|
| | Back Gear Drive | | | Direct Belt Drive | | |
| | 3 | 4 | 5 | 3 | 4 | 5 |
| 1 | 30 | 56 | 104 | 179 | 334 | 620 |
| 2 | 70 | 131 | 244 | 420 | 780 | 1450 |

## POWER-FEED GEARS

The outboard end of the headstock spindle is provided with a gear (Fig. 7) which transmits power through a gear train to the lead screw for automatic feed and cutting threads. As the rate of feed depends upon the lead screw, it is necessary to establish a definite ratio of the screw rotation to speed of the spindle; this is done by varying change gears in the gear train.

The gears may be arranged on the gear bracket to drive from three positions, the size (and number of teeth) of the gears in these three positions determining the ratio of spindle speed to lead-screw speed. The three positions are shown in diagrams A, B and C in Fig. 8. By referring to the table for the threads per inch or feed per inch wanted and to the diagrams, the correct gear sizes and their positions may be found. Raise or lower the gear bracket to accommodate the different size gears by loosening the nut just behind the lead screw bearing.

The gears are attached to the gear bracket so that when the bolt holding them is loosened, they may be moved along the bracket slot. Each bolt holds two gears, both of which must be mounted whether they mesh in the train or not. If one meshes with two others, it is an "idler" and the unused gear is a "spacer." If both mesh in the train, they form a "compound" gear.

The change gears are machined from semi-steel to insure perfect teeth that will mesh evenly and smoothly with other units of the train. Each gear has a machined keyway and fits over a keyed sleeve that accommodates two gears; the sleeves fit over the bracket bolt and a washer serves as a bearing between the assembly and nut.

When assembling a gear train, care must be taken to allow sufficient clearance between the two meshing gears so they will not bind. A small amount of graphite grease applied to the teeth will make them run smoothly and quietly.

## FEED-REVERSING LEVER

The feed-reversing lever which projects from the gear train housing is provided with a positive latch that locks it in each of its three positions: "Up," "Down" and "Center." When set on "Center" or neutral position, the two gears—attached to the end of the lever and which turn on bronze bearings—are free of the gear train, and all power feeds are disconnected.

When "Up," the lathe carriage is engaged to the lead screw and it will move from left to right, or the compound rest will move from front to back of the lathe bed.

When "Down," the carriage will move from right to left and the compound rest will move from back to front.

**Never change position of the reverse lever in either direction while lathe spindle is revolving.**

## THE LEAD SCREW

Because the thread-cutting accuracy of a lathe depends upon the precision of the lead screw, it naturally follows that it is one of the most important parts of the lathe and that no item of material or workmanship can be slighted. The lead screw in Wards Powr-Kraft Lathe is made from alloy steel with an Acme thread that is accurately cut to a pitch of ⅛-in. (eight threads per inch); it is mounted at each end of the bed in a large, cast-iron bearing fitted with oil cup. The lead screw should be cleaned and oiled frequently to maintain its accuracy.

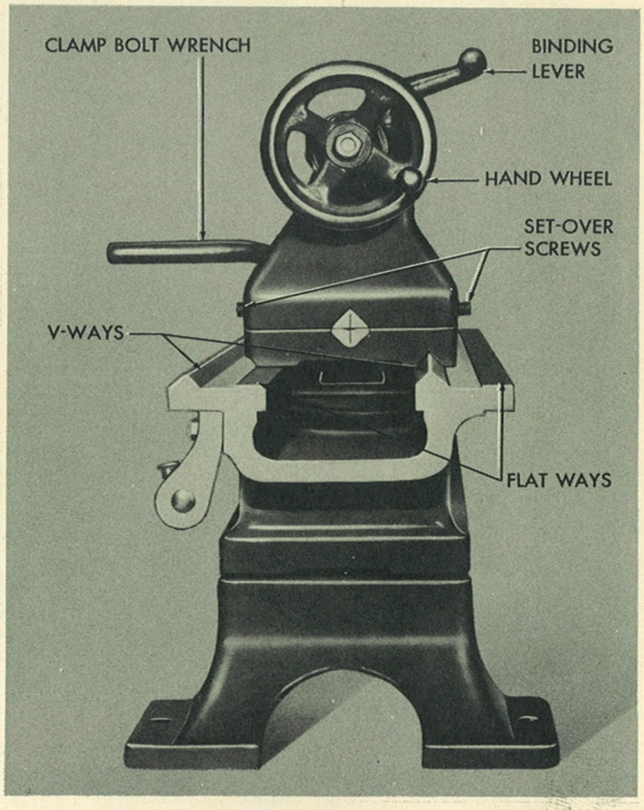



FIG. 9—TAILSTOCK AND PRISMATIC V AND FLAT WAYS

## LATHE BED AND TAILSTOCK

The tailstock slides on a V-way and a flat way of the bed, as shown in Fig. 9, and is locked in position at any point along the bed by tightening the clamp-bolt with the clamp bolt wrench furnished with the lathe.

The tailstock spindle is operated by the tailstock hand wheel. Turning the wheel clockwise runs the spindle out of the tailstock. The spindle is made of special steel, finish-ground. and has been reamed for a No. 2 Morse Taper center. Turning the handwheel counter-clockwise until the spindle reaches its limit of travel, automatically ejects the tail center The spindle is graduated up to 2½-in. in increments of 1/16-in. for accuracy in boring and drilling. Tailstock spindle is locked in place by turning binding lever to the right. A small receptacle is provided on front of the tailstock casting for the white-lead and machine-oil mixture or heavy grease used to lubricate the tail center when work is mounted between centers. The tail center is "dead," that is, does not revolve with the work and lubricant must be applied to the center hole before setting up.

For turning tapers, the tailstock may be "set over" for a total of 11/16-in. by loosening tailstock clamp and adjusting the set-over screws from each side. To align the tailstock again, the witness mark on the tailstock will indicate the approximate position. To obtain the *exact* position, it is necessary to place a 12 or 15-inch. check bar between centers. Take a light cut, then check the diameter at each end of the bar with a micrometer. If there is a variation, adjust the set-over screws and repeat until diameters at each end of the check

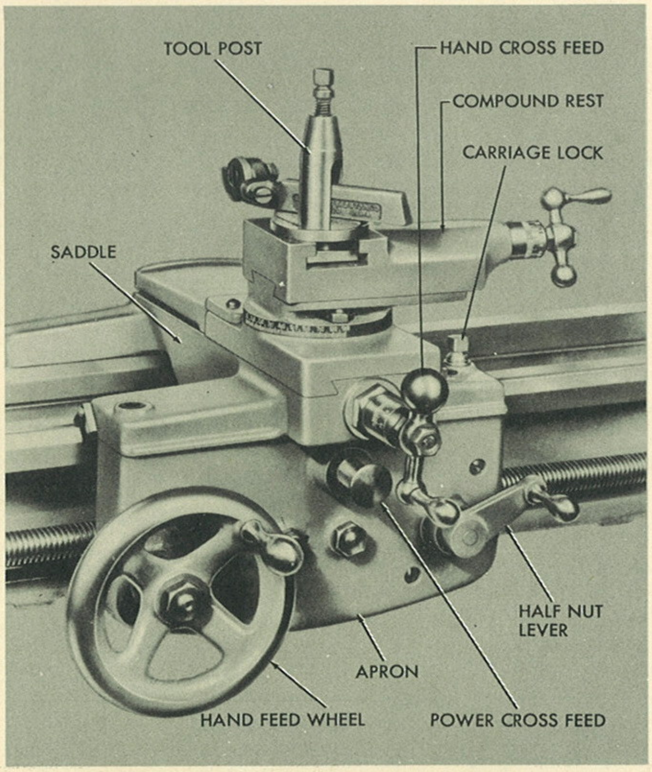



FIG. 10—LATHE CARRIAGE

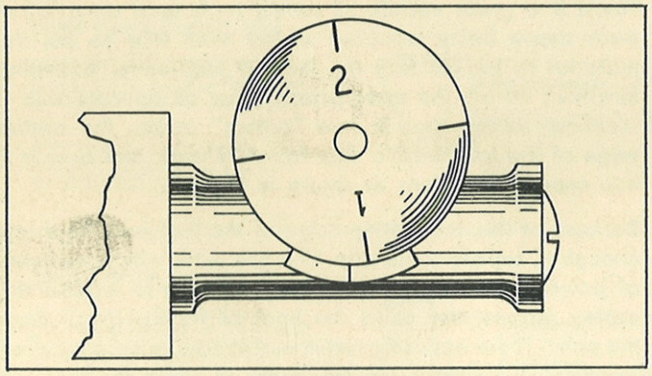



FIG. 11—THREADING DIAL

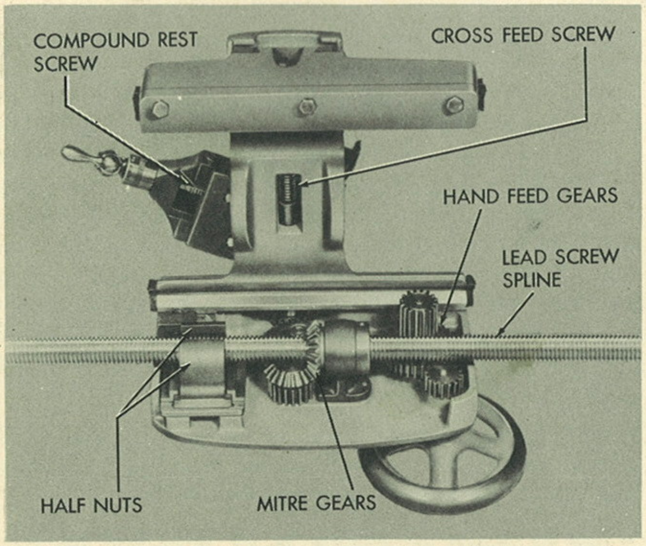



FIG. 12—UNDERSIDE OF COMPOUND REST

bar are the same. The Powr-Kraft lathe bed is an extra-heavy, one-piece hard-iron casting, alloyed to produce maximum wear and strength. Extra-wide (6 $^{15}/_{16}$-in. across the ways), extra-heavy walls, heavier and closer spaced, box-type cross ribs combine to give greatest strength and to make a most solid foundation for the units mounted on it.

The accuracy of the lathe bed and the ways on which the carriage and tailstock are mounted is of primary importance. To insure extreme accuracy in the bed, two prismatic V-ways and two flat ways are used. They have been planed, milled and precision ground to give the accuracy necessary for producing fine work. In order to retain this accuracy, the instructions for leveling the bed, as mentioned earlier in this book, should again be emphasized. With proper care and normal use, there will be no appreciable wear on the bed or ways of a level lathe, but the surface may be damaged by lack of oil or by abrasion. Be careful not to drop tools or work on the ways. Keep ways well oiled when not in use to prevent rusting, wiping them off and re-oiling before continuing work and, if possible, keeping them covered during filing or grinding operations.

## POWR-KRAFT LATHE CARRIAGE

The carriage of a screw-cutting lathe is divided into four parts, refer to Fig. 10: the tool post, compound rest, saddle and apron. Since the carriage supports the cutting tool and controls its action, it is a very important unit and care has been taken accordingly to make it both accurate and strong. The saddle, which moves longitudinally on the front V-way and back flat way, completely eliminating use of horizontal bearing plates, is machined from a semi-steel casting and is held in place vertically by "gibs" that bear on the underside of the front and back ways, the same as on larger and more expensive lathes.

The apron, which is suspended from the front of the saddle, contains the power mechanism for cross and longitudinal feeds, the longitudinal hand feed and threading dial. The large handwheel on the apron provides for manual, longitudinal movement of the carriage through an accurate rack and pinion. Pinion operated by the handwheel is supported on a bronze bearing and meshes with rack on underside of front ways.

## HALF-NUT LEVER

The carriage is moved along the ways for thread cutting and longitudinal power feeding by rotation of the feed screw within the apron. Two half nuts (also called split nuts) are operated by the half nut lever on the right end of the apron. When the half nut lever is in "down" position, the nuts are open and out of contact with the lead screw. When lever is in "up" position, the nuts are clamped on the thread of the lead screw, ready for thread cutting.

## THREADING DIAL

Located on the right end of the apron, the threading dial (Fig. 11) indicates the proper point at which to engage the half nut lever, when cutting threads, so the tool will enter the same groove for each cut. This eliminates the need for reversing the drive at the end of each cut and backing the tool out.

The face of the threading dial is divided into four quarters by markings on the face. When cutting threads of an even number (12, 16, 20, 32, etc., per inch), the half nut lever is engaged when the mark on the stationary part is in line with any of the four points on the dial.

In cutting odd-numbered threads (5, 7, 9, 11, etc. per inch), engage the half nuts when the stationary mark is in line with "1" or "2" on the dial. When cutting half-numbered threads (4½, 5½, 6½, 11½, etc. per inch) engage the half nuts at the **same** point on the dial for each cut.

## POWER CROSS FEED

The power cross feed on Powr-Kraft Lathes is driven by the spline in the lead screw and a set of spur and mitre gears controlled by a plunger-type handle on the apron. When the handle is "out," the cross feed screw and lead screw are engaged. Manual feed is obtained by turning the ball-crank handle at the end of the cross feed slide. This slide is equipped with a gib that may be tightened through three set screws on the outside of slide.

The cross feed gib should fit snugly and be adjusted whenever play develops. The Acme thread, cross feed screw is borne on two self-lubricating bronze bearings. The polished steel, ball crank handle of the cross feed is calibrated in .001-in. for measurement of feed when set to take a definite cut.

## COMPOUND REST

This is mounted on top of the cross slide, on a base graduated from 0 to 90 degrees as shown in Fig. 10. Two bolts, one on each side of rest, hold the base in position. By loosening these bolts, the rest may be moved through any desired angle. The acme-thread screw of the compound rest turns on two self-lubricating bronze bearings.

Movement of the compound rest is controlled by a polished steel, ball crank handle by which the cutting tool may be moved into the work for short tapers. Like the cross-feed handle, the compound-rest handle is graduated into .001-in. Fig. 12 shows arrangement of power feed mechanism.

## LATHE CENTERS

The headstock spindle is machined to take a No. 3 Morse Taper and is furnished with an adapter for a No. 2 Morse Taper center. The tailstock is fitted to take a No. 2 Morse Taper center.

The tailstock center can be removed by turning the spindle back to its limit of travel which will automatically loosen the center. The headstock center and sleeve must be driven out through the outer end of the tailstock spindle. Use a ½-in. rod for this and hold center with a piece of rag to prevent its falling and also to avoid injury from the sharp point.

While the tailstock ram or spindle should be kept oiled on the outside, the interior should be kept dry. Before placing either of the centers in the lathe, they (as well as the tapers into which they fit) should be wiped free of oil and dirt for the presence of a bit of dirt or even a slight film of oil will interfere with the necessary close fit.

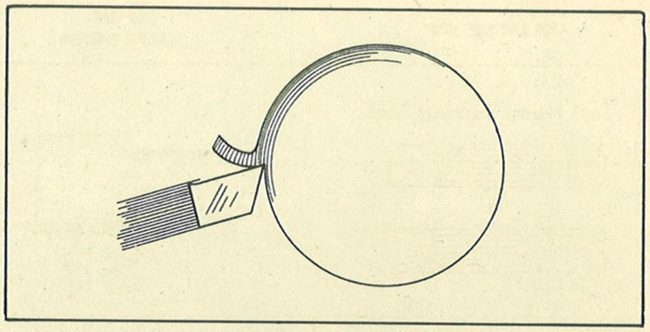


FIG. 13—CUTTING ACTION OF TOOL BIT

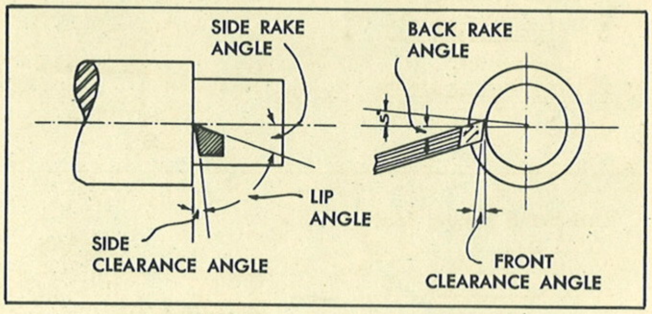



FIG. 14—CUTTING ANGLES

## LATHE CUTTING-TOOLS

There is a great variety of cutting tools used on a lathe, each shape being adapted to the work it is to do, the material to be cut and the finish it will leave. Basically, however, all use the same principle for all operate with a "tearing" rather than a true "cutting" action; the cutting edge of the tool tears a chip from the work and breaks it into separate sections as shown in Fig. 13.

Because of this, the cutting edge of the tool must be sharp enough to separate the chip from the work with a minimum of power, but it must also be large enough to support the cutting surface and carry the heat of friction away from the point. These opposing requirements can be accomplished by carefully working out the angle at which the tool will enter the work and the angles of clearance between tool and work.

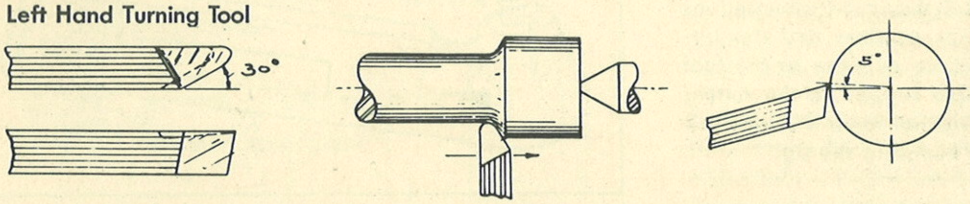
Fig. 14 illustrates a cross-sectional and side view of a tool bit in working position, showing names of the various angles used for grinding and setting the bit. For efficient performance, each of the angles and settings shown should be specially determined for the particular kind of material being worked, material the tool bit is made from, the cutting speed, kind of lubricant or coolant used, if any, and whether roughing, finishing, parting or forming work is being done. Fig. 15 illustrates the seven bit shapes commonly used and the working position of each, with the correct angles for an average cut in mild steel at a cutting speed of 80 feet per minute, using high-speed tool steel bits and machining without coolant.

In shaping the bits, use a good, medium-grit grinding wheel and be careful not to overheat and burn the thin edges. Cool the bit often to prevent drawing the temper.

A tool bit holder for holding ¼ by ¼-in. tool bits (Fig. 16) eliminates the use of large and more expensive high-

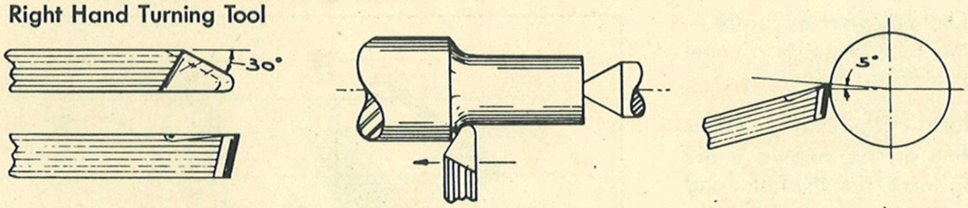
TOP AND SIDE VIEW | TOP VIEW WORKING POSITION | SIDE VIEW WORKING POSITION | GRINDING ANGLES

### Left Hand Turning Tool



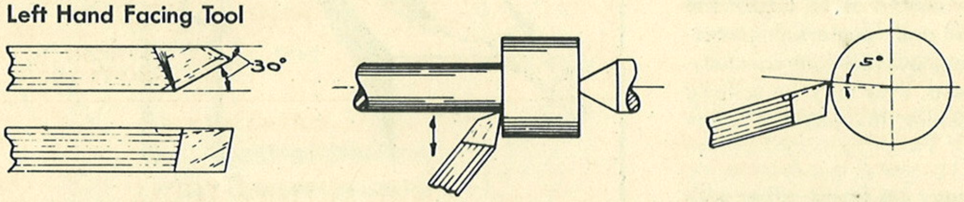

- Back Rake Angle ..... 16½°
- Front Clearance Angle .. 7°
- Side Rake Angle ....... 18°
- Side Clearance Angle ... 8°
- Lip Angle ............ 64°

### Right Hand Turning Tool



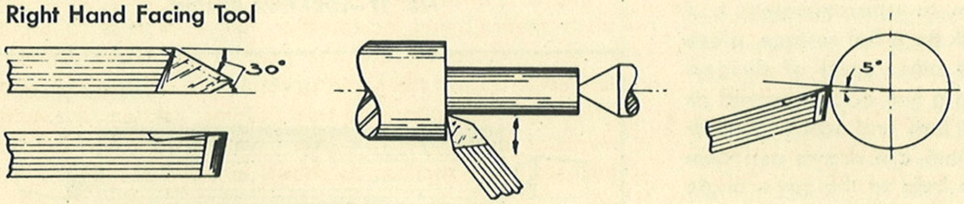

- Back Rake Angle ..... 16½°
- Front Clearance Angle .. 7°
- Side Rake Angle ....... 18°
- Side Clearance Angle ... 8°
- Lip Angle ............ 64°

### Left Hand Facing Tool



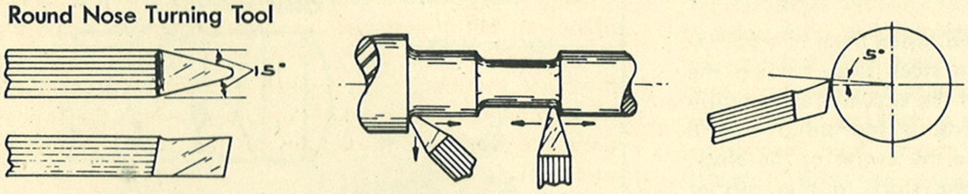

- Back Rake Angle ..... 16½°
- Front Clearance Angle .. 7°
- Side Rake Angle ....... 18°
- Side Clearance Angle ... 8°
- Lip Angle ............ 64°

### Right Hand Facing Tool



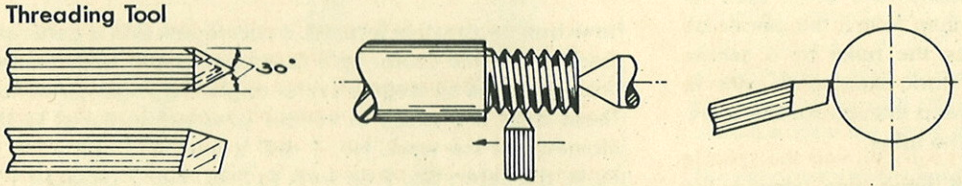

- Back Rake Angle ..... 16½°
- Front Clearance Angle .. 7°
- Side Rake Angle ....... 18°
- Side Clearance Angle ... 8°
- Lip Angle ............ 64°

### Round Nose Turning Tool



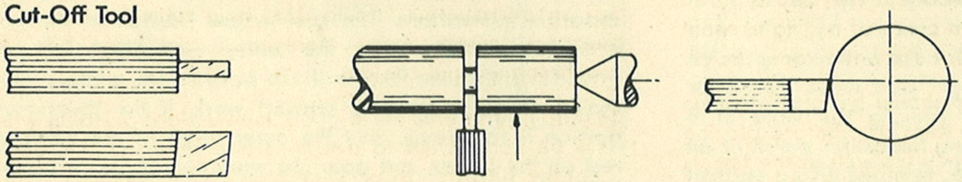

- Back Rake Angle ..... 16½°
- Front Clearance Angle .. 7°
- Side Rake Angle ....... 0°
- Side Clearance Angle ... 8°
- Lip Angle ............ 82°

### Threading Tool




- Back Rake Angle ...... 0°
- Front Clearance Angle .. 5°
- Side Rake Angle ...... 0°
- Side Clearance Angle ... 10°
- Lip Angle ............ 80°

### Cut-Off Tool



- Back Rake Angle ....... 0°
- Front Clearance Angle ... 5°
- Side Rake Angle ....... 0°
- Side Clearance Angle .... 3°

FIG. 15

speed steel tools and also holds the bit at an angle that directs a large portion of the cutting pressure directly toward the base of the tool post. When using the tool holder, the cutting end of the bit should be clamped as close to the end of the holder as possible and the bit-holding end of the holder should be as close to the tool post as possible. This will give rigid support to the cutting edge so that action of the work will not force it downward to cause chattering and possibly breaking the bit.

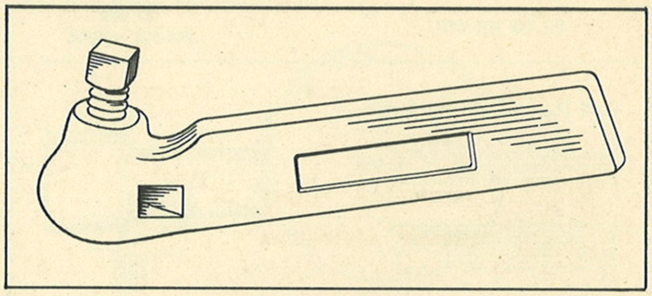


FIG. 16—TOOL HOLDER

## HOLDING THE WORK

There are five common methods of holding work in a lathe—between centers, in a chuck, on the face plate, in a collet and on a mandrel.

**Centering and Mounting the Work**—Wherever possible, the work is turned between centers as this method is the most accurate and allows removing work from the lathe and replacing it without affecting accuracy.

The first step in turning between centers is to locate the center of the ends of the work, drill and countersink center-holes. This operation is important and should be done carefully. If square or hexagonal stock is used, lines may be scribed across the ends from corner to corner, the point of intersection being the center.

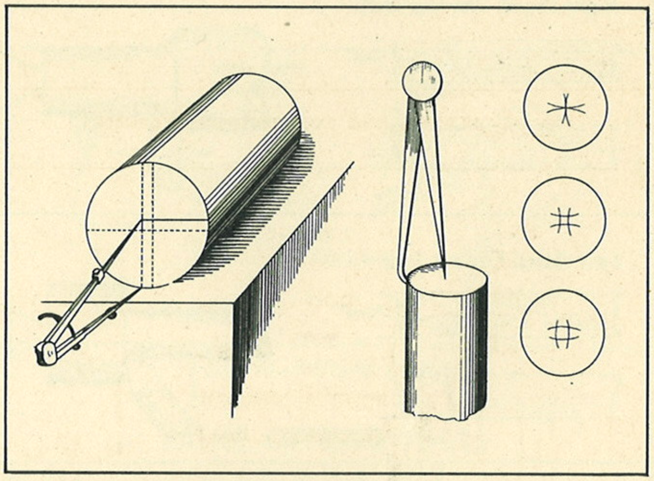


FIG. 17—LOCATING CENTERS

If round stock is used, the center may be found either with regular or hermaphrodite dividers as shown in Fig. 17. When using dividers, open them to approximately half the diameter and, laying the stock on a flat surface, place one point on the work; with the other point of dividers bearing on the flat surface, scribe a line across the end as shown. Give the stock a quarter turn and scribe another line, and continue until the four lines are drawn as shown in the picture. If the dividers are held at the same angle each time, the center of the small square will be the center of the stock.

If hermaphrodite dividers are used, open them to approximately half the diameter of the stock and, holding the bent leg on four quarter-points of the circumference, scribe four arcs across the end, forming a four-sided central figure, the center of which will be the center of the stock. Chalk rubbed on the ends of the stock, a thin copper deposit made by applying a solution of copper sulphate in water, and various lay-out compounds are often used to make the scribing more easily visible. When the center of the work has been located, place the point of a center punch vertically on the center mark, striking it with a hammer to make an indentation deep enough for the work to revolve on the center points of the lathe.

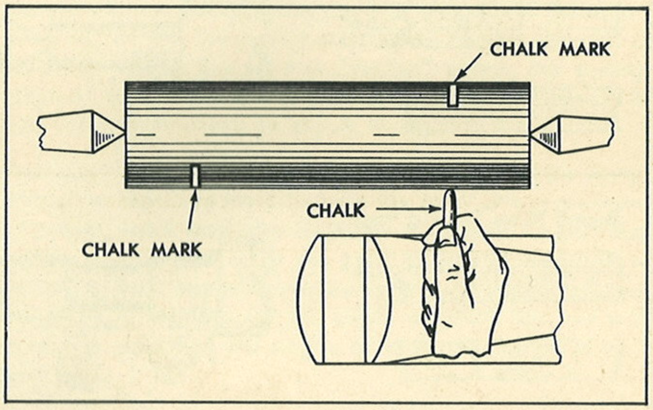



FIG. 18—TESTING CENTERS

The stock, especially if close to finish size, should be tested between centers before drilling and countersinking the center holes. This is done as shown in Fig. 18, by turning the stock, mounted between centers, by hand and holding a piece of chalk so it will touch any high spots on the work. If the chalk shows a "high" side, move the center marks toward the high side by placing the work in a properly padded vise. Then, holding the center punch at an angle, drive it toward the high side, bringing it to a vertical position for marking the final center location.

**Drilling and Countersinking Center Holes.** When centers have been accurately located, a countersink drill is generally used to drill the center hole to proper depth and countersinking it to the 60 degree center angle in a single operation. These drills are made in various sizes proportional to the diameter of the work. No. 1 drill is used on small work to 5/16-in. diameter; No. 2 on work to 1-in.; No. 3 on work 1 1/4 to 2-in.; and No. 4 on work to 4-in. If center drills are not available, the holes can be drilled and countersunk in separate operations. The countersunk portion of the hole provides a solid seat on the centers and the drilled hole provides clearance for the sharp point of the centers which should never be used to support work. If the countersunk portion is too deep, only the outer edge of the work will rest on the center and accurate work cannot be produced. The same thing will be true if the countersink is not deep enough or at an improper angle; the work will then very likely rest on the point of the center and quickly destroy the

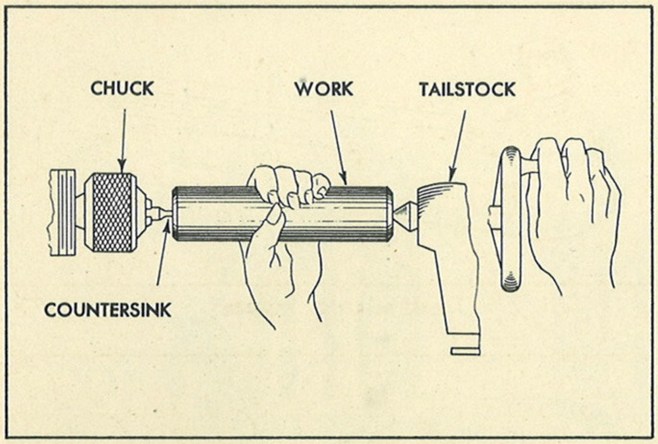



FIG. 19—DRILLING AND COUNTERSINKING CENTERS

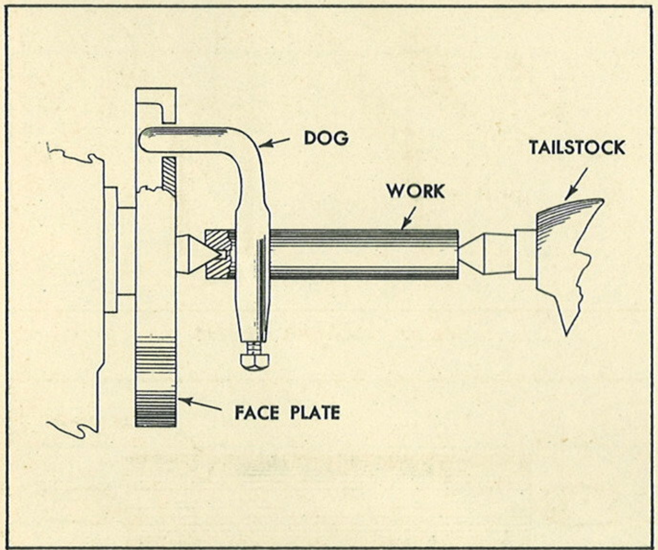



FIG. 20—MOUNTING WORK BETWEEN CENTERS

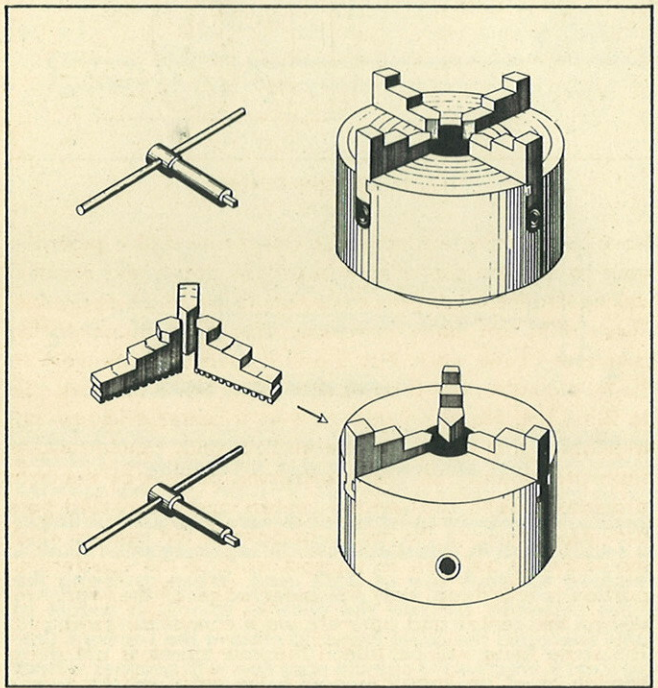


FIG. 21—3 AND 4-JAW LATHE CHUCKS

end and make accurate work impossible. The center drill is mounted in a chuck on the headstock spindle with the work held on the tailstock center. With the spindle turning at about 600 R.P.M., the tailstock ram is then turned out, feeding the work into the drill as shown in Fig. 19. A correctly drilled and countersunk center hole is shown in Fig. 20.

Before placing work between centers for turning, fill the tailstock center hole with heavy grease or white lead thinned with machine oil. No lubricant is needed for the head center because it is "live" and turns with the work. Place end of the work in a lathe dog so the tail extends beyond the end of the work and into a slot on the face plate without interfering with the headstock center. The work should now rest firmly on both centers but should not bind. To test the mounting, place a finger on the tail of the dog and move it back and forth in the face plate slot. You should be able to do this easily but not too easily. Also check to see that the tail of the dog does not bear against the bottom of the slot. When the pressure on both ends has been adjusted, lock the tailpost ram by pulling forward on the binding lever.

## MOUNTING WORK IN CHUCKS

Two types of lathe chucks are commonly used—the three-jaw, universal or "scroll" chuck and the four-jaw, independent chuck pictured in Fig. 21. These are used for turning work that cannot be readily turned between centers. In some cases, the chucks are threaded onto the spindle nose while others are bolted to an adapter plate that fits on the spindle. Before mounting a chuck or face plate, clean the spindle shoulder and back of the chuck, and thoroughly oil threads on spindle head and chuck. **Turn the chuck on by hand,** being careful not to spin it up to the shoulder with a jolt as it may jam, and never use lathe power to screw a chuck on or off the spindle. A "sticky" chuck can be loosened by one of the following methods. (1) Engaging the back gears while the bull gear is connected to the spindle pulley so the spindle will not turn, and turning the chuck by placing the chuck-wrench in its hole and pulling on it. (2) Placing a block of wood between the chuck jaw and lathe bed, engaging the back gears, and turning the spindle by pulling the belt by hand. Be careful when removing the chuck; you can damage the spindle threads or the bed ways, if you let it drop. If you must limit your equipment to a single chuck, the four-jaw independent is recommended as it will hold square, round or irregular-shaped work in either concentric or eccentric position. Each jaw is controlled by a head-screw, and the series of concentric circles scribed on the face permit approximate centering by moving all jaws to the same line or to the same distance from the same line.

The work is then revolved by hand and a piece of chalk held lightly against the work to mark high spots. The jaw opposite the high spot is backed off and the opposite one tightened until the work is centered. The three-jaw universal chuck is self-centering (all jaws working from a single screw) which saves time and trouble when centering round or hexagonal work but which cannot be used for square or irregular shapes.

## HEADSTOCK SPINDLE CHUCK

Fig. 22A is used for small-diameter work that may be passed through the headstock spindle. It is similar to a drill chuck in

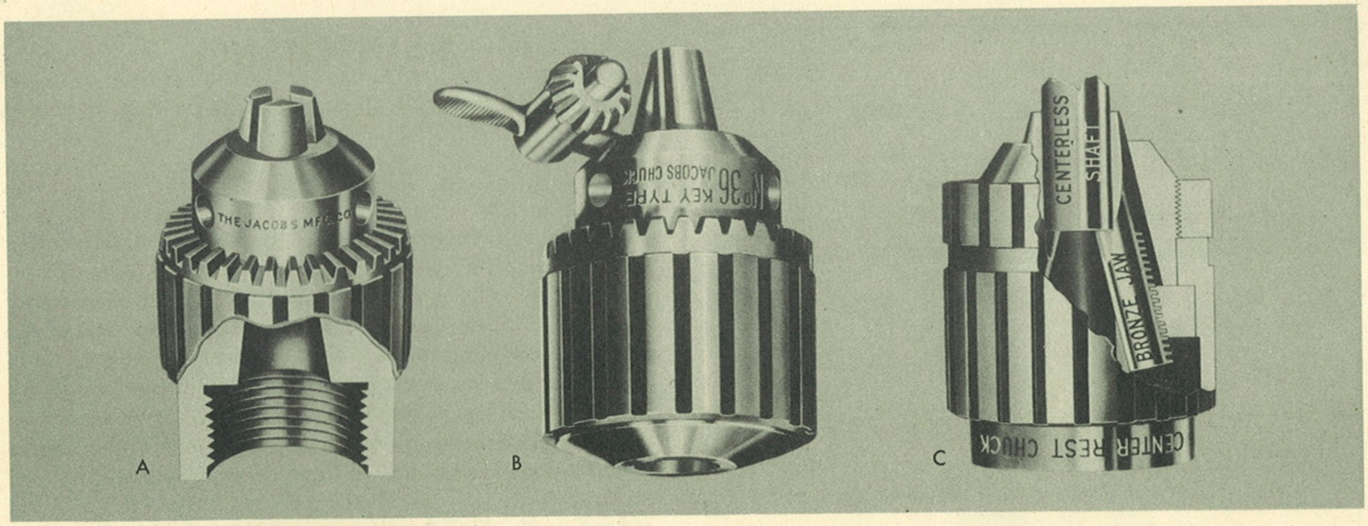



**FIG. 22**

operation except that it screws onto the spindle nose and is hollow. Since it holds much the same type of work as the collet chuck and is less expensive, it is often used in preference to the collet.

**Drill Chucks** (Fig. 22B) are used both on the tailstock of the lathe with the work turning, and on the headstock with the work stationary. Although a drill press is preferred for production drilling and is generally used, there are many small jobs of drilling, reaming and tapping that can be conveniently done with a lathe drill chuck.

**Center Rest Chuck** (Fig. 22C) is mounted in the tailstock by means of a solid tapered shank that replaces the tailstock center. The stationary bronze jaws provide an accurate support for turning round work where a center cannot be used.

## MOUNTING WORK TO A FACE PLATE

Many irregular shapes are mounted for turning by bolting directly to the face plate or by fastening to an angle plate which, in turn, is mounted on the face plate (Fig. 23). Be careful when bolting down, not to spring the work on the plate and use the same care in screwing the face plate on the lathe spindle as described for mounting chucks. Heavy work mounted off center should be counterbalanced with weights on the opposite side of the face plate. To locate work accurately on the face plate, use either a dial indicator or center indicator.

## DRAW-IN COLLET CHUCKS

Small work that must be very accurate is mounted in a draw-in collet placed inside the headstock spindle as pictured in Fig. 24.

The assembly consists of a draw-in spindle (A) that is threaded to the collet; a tapered closing sleeve (B); a split holding collet (C); spindle nose cap (D) and spindle nose cap wrench (E). The tapered closing sleeve fits into the headstock spindle and adapts it to the collet. The work is placed in the split end of the collet and the collet is closed by pressure applied to the handwheel on the outboard end of the draw-in spindle. Headstock-center and taper sleeve must be removed to install the collet chuck. Drive them out separately through the

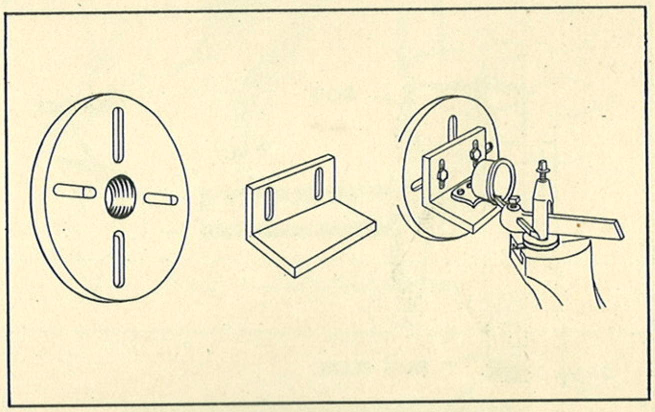


**FIG. 23—FACE PLATE**

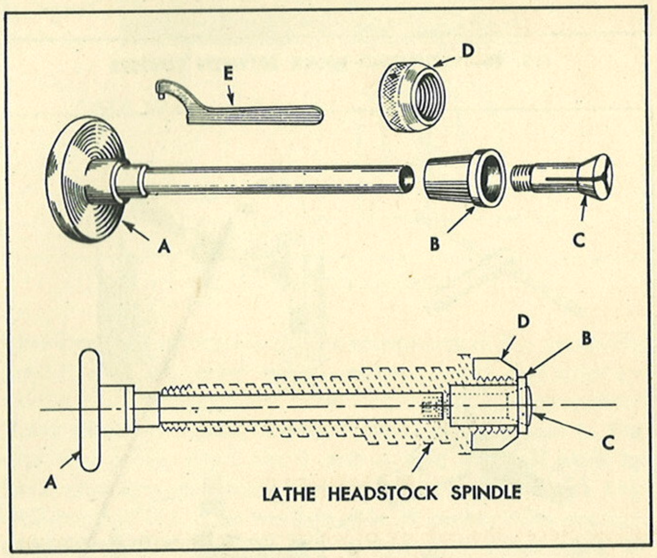



**FIG. 24—DRAW-IN COLLET ATTACHMENT**

spindle. Never use a collet for work more than .005 in. larger or smaller than its rated diameter. A separate collet chuck is required for each size of stock used. When removing the collet assembly, unscrew the draw-in spindle a couple of turns and press the collet loose. To remove the tapered closing sleeve, unscrew the spindle nose cap with spanner wrench which forces the sleeve out of the headstock spindle.

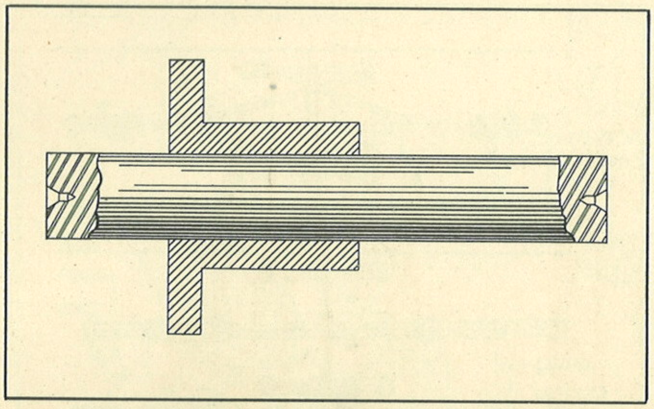


FIG. 25—MANDREL

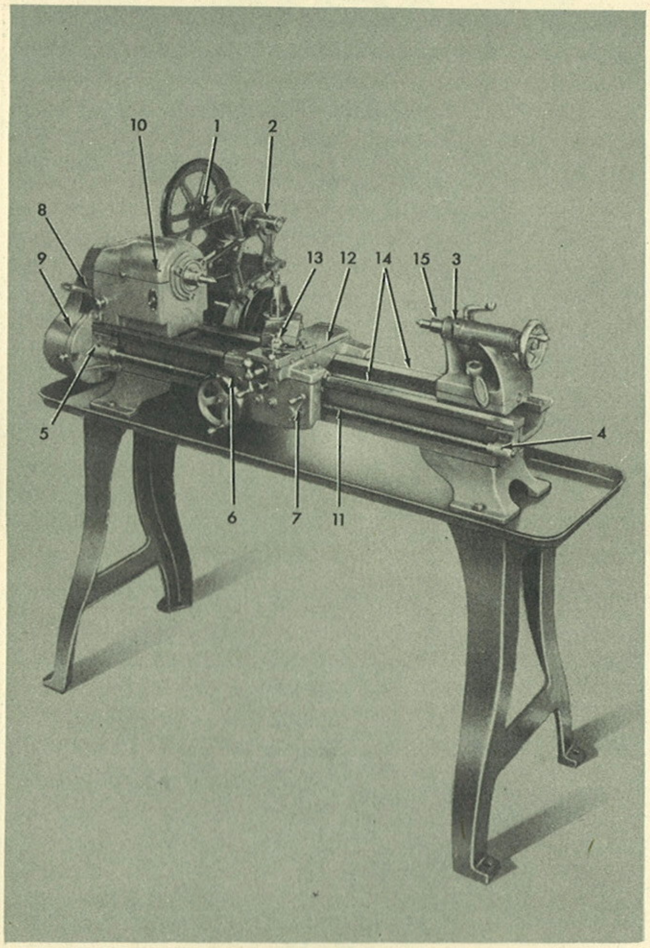



FIG. 26—OILING DIAGRAM

## MANDRELS

Hollow pieces, the outside of which are to be turned, may be mounted on a mandrel (Fig. 25) and the mandrel mounted between centers, allowing the entire outer surface to be machined instead of the limited surface that would be available if the piece were held in a chuck.

Although mandrels are available that may be expanded to fit any size hole by forcing out grips on the sides, a mandrel is usually a simple piece of steel that is turned to a slight taper, the ends flattened for the lathe dog, and the work held to the mandrel by friction alone.

# MAINTENANCE

## LUBRICATION OF THE LATHE

The Powr-Kraft Lathe design provides for correct lubrication with a minimum of attention; the ball bearings in the headstock are sealed in grease and require no further lubrication for the life of the bearings. At 21 separate points in the Powr-Kraft Lathe, there are self-lubricating bronze bearings; in ordinary construction, these would be plain bearings with oil holes. The self-lubricating bearings used have a dense but absorbent texture that has been thoroughly impregnated with lubricant. The correct film of lubricant is constantly maintained at the bearing surface without the necessity of frequent renewal.

Those points on the lathe requiring *regular* lubrication (Fig. 26) should be gone over every day the lathe is in use. Cultivate a definite routine—oiling the parts in a definite, regular order so no parts will be missed. Use a good machine oil no heavier than SAE No. 10, wiping away excess oil that would cause dust and dirt to accumulate. And always follow the basic rule of safety—**Do not attempt to oil the lathe (or any other machine) while it is running.**

**Use a long-spouted can and oil the following points each time the lathe is used:**

**1-2**—Two oil cups on top of countershaft bearings.

**3**—The spring ball well on top of tailstock.

**4-5**—Two oil cups on lead screw bearing brackets.

**6**—Hand-feed wheel. (A spring ball well is located in the apron, behind the wheel, to receive oil for the hand-feed shaft bearings.)

**7**—The half-nut lever. (A spring ball well in the apron, behind the lever, supplies oil to the half nuts.)

**8**—The feed reverse lever. (A hole has been drilled in base of the lever to receive oil.)

**9**—Bearings on each of the change gears.

**10**—The spindle pulley. (Remove headless set screw on the second step of pulley and oil freely before using the back gears.)

**Keep the following surfaces clean, free of chips, and covered with a film of oil at all times.**

**11**—The lead screw.

**12**—The cross slide.

**13**—The compound slide.

**14**—The lathe bed ways (both V and flat).

**15**—The outside of the tailstock ram.

A small amount of graphite grease should be kept on the teeth of all gears in the headstock, the apron and hand feed rack on underside of the front way.

## LATHE BELTS

The Powr-Kraft Lathe comes equipped with an endless flat belt of cotton web and rubber composition. To get maximum belt life, relax tension on it when the lathe is not in use and keep it free of oil; oil not only causes deterioration of the rubber but slippage and power loss as well.

Using a flat belt on the lathe makes it unnecessary to remove the spindle when changing the belt. This arrangement has two distinct advantages: First, the belt may be changed quickly and easily with a minimum of effort; it may be laced, glued or hooked on the spindle, a simple procedure when compared to removing the spindle to install an endless belt over it. Second, there is no risk of losing the alignment that has been so painstakingly and accurately achieved at the factory through the use of precision gauges. Because of the high-grade materials used and the accurate workmanship in assembling the headstock, it need not be taken apart, under ordinary circumstances, during the life of the lathe. However, should it be necessary, for any reason, to remove the spindle, it may be done as explained in the spindle description. Fastening the belting over the spindle pulley is a simple matter and may be done in either of the following ways:

1—The belt, if laced, may be joined by either gut or rawhide laces as follows: Cut belting to length, square ends and punch 10 holes as shown in Fig. 27. Start the laces through holes A and B, pulling both ends through, and working one to the right and one to the left as shown. Do not cross one layer of lacing over another on **pulley side** and do not allow laces to kink or twist, or belt will not run smoothly. Fasten ends as shown. If round gut is used, cut shallow grooves between holes on pulley side.

2—If belt is to be glued, make allowance for overlap and taper or "skive" the overlap at each end so ends will join as shown in Fig. 26A. Two-ply belts should be split and each ply tapered. Full directions are usually furnished with the belt cement; follow them carefully.

3—Simplest and quickest method, and the one now most commonly used, is by means of wire hooks—(Fig. 28). A number of different types are available (see Wards latest General Catalog) which are easily attached by forcing sharpened ends of the hooks through the belting, bending them over and cutting the rawhide pin to length.

It should be kept in mind that the smooth or "grain" side of leather belting should run next to the pulley because the smooth surface of the belt eliminates air pockets between the belt and pulley, and slippage is reduced to a minimum.

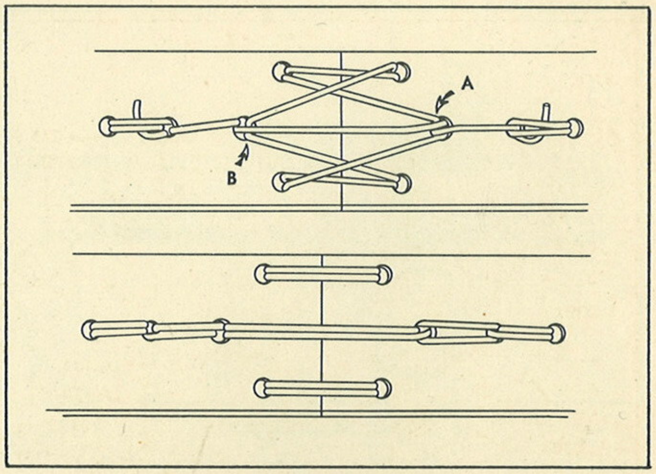


FIG. 27—LACING BELT

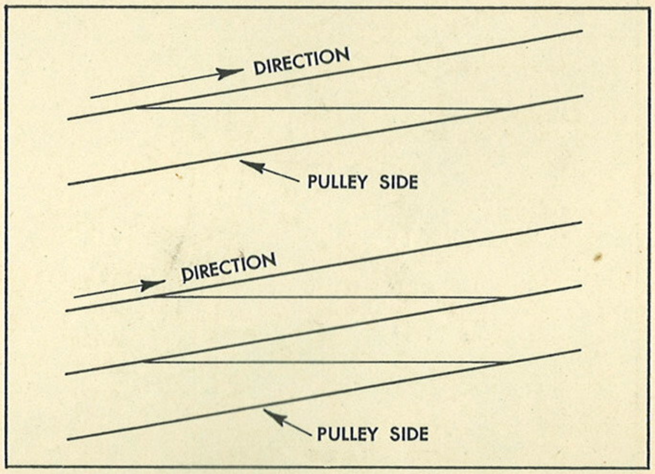


FIG. 27A—GLUING BELT

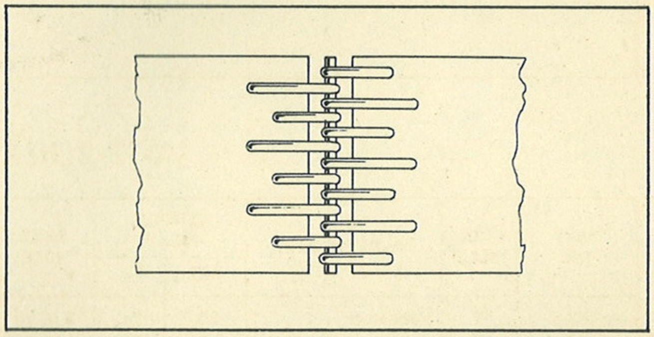


FIG. 28

# HOW TO ORDER REPAIR PARTS

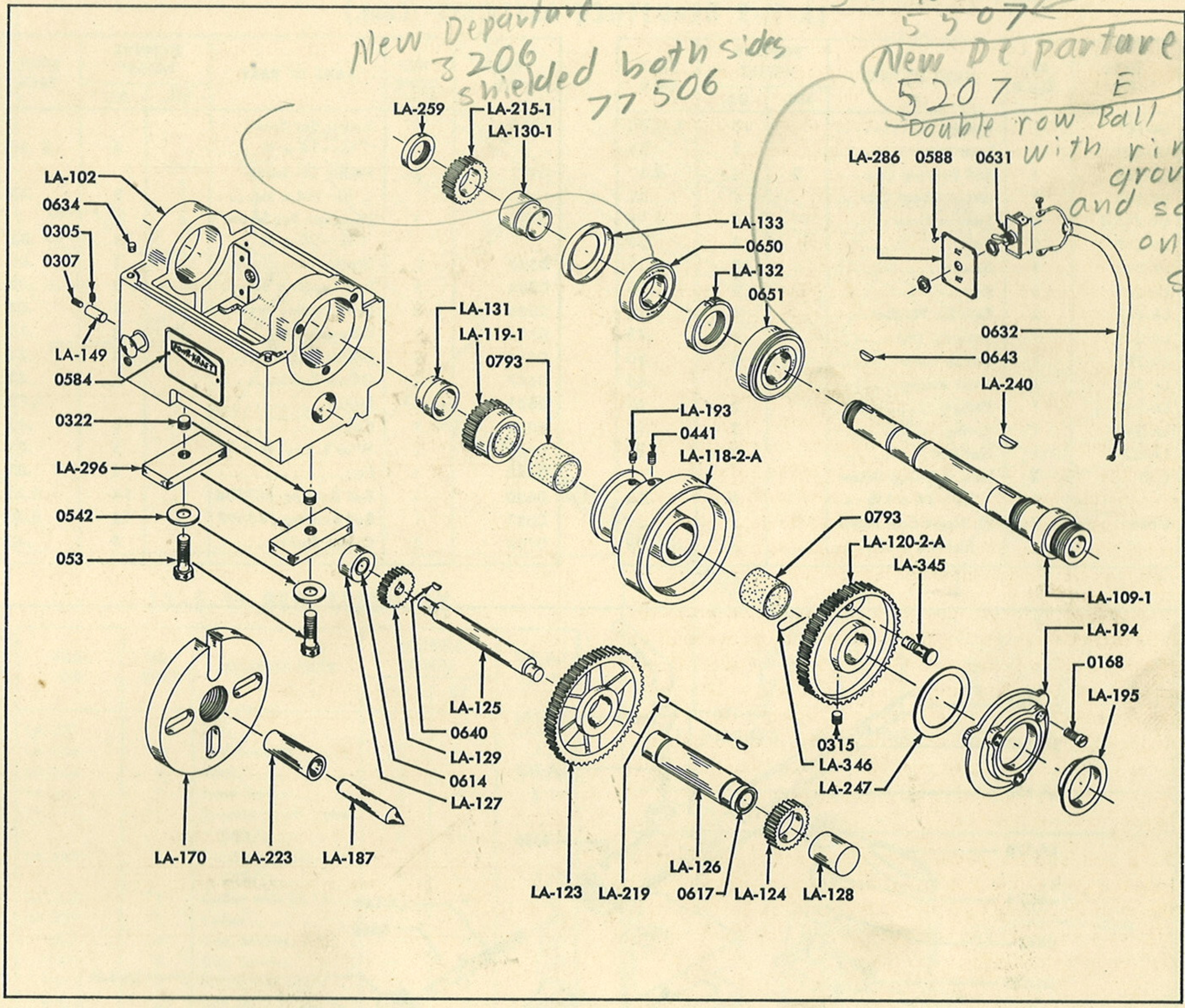
Should you need repair parts for your Lathe we must have **all** of the following information to fill your order correctly: **Complete Name** and **Number of Part** as listed in the parts list, **Complete Name** and **Model Number** of your lathe as shown on name plate attached to the headstock.

**Complete Serial Number** as stamped on top of Lathe Bed at right end.

Wards do not pay transportation charges. You pay shipping charges from Chicago.

When ordering parts for parcel post shipment be sure to include enough extra to cover postage. Any excess over actual charges will be refunded. If there is no agent at your station, do not send money for charges if shipment is to be made by express or freight. Pay agent when goods arrive.

**IMPORTANT**—All prices in this literature are subject to change without notice and are subject to an additional charge to cover any applicable sales tax, use, occupation, or other tax affecting our purchase or sale of merchandise.




## LA-11-2 HEADSTOCK ASSEMBLY

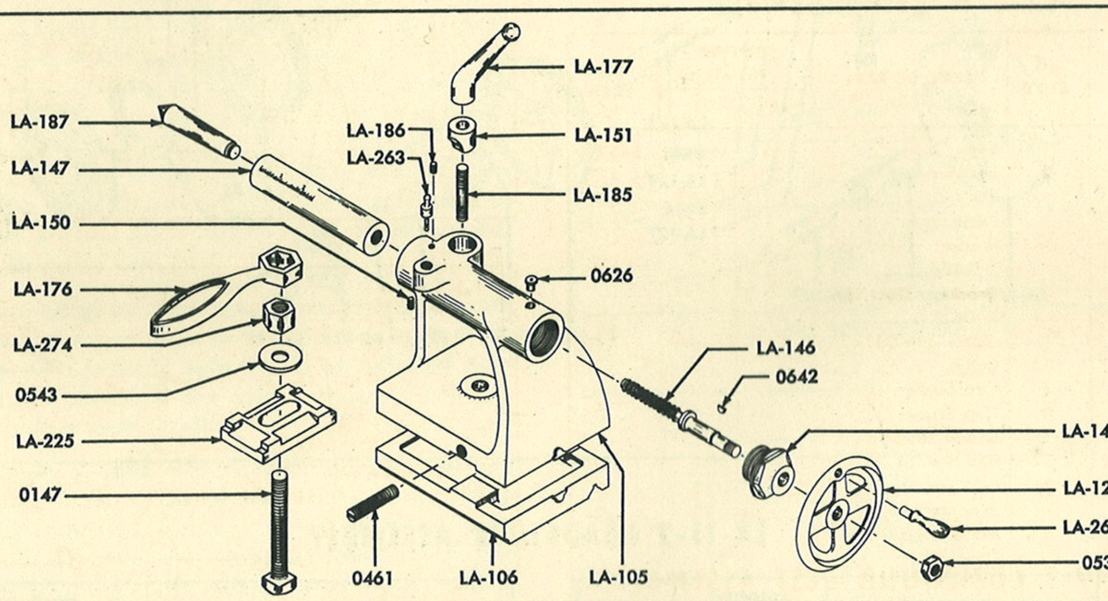
| PART NO. | NO. REQ'D | NAME OF PART | SHIPPING WEIGHT LBS. | SHIPPING WEIGHT OZ. | PRICE EACH |
|---|---|---|---|---|---|
| LA-102 | 1 | Headstock......... | 20 | 14 | $18.00 |
| LA-109-1 | 1 | Spindle........... | 3 | 12 | 13.95 |
| LA-118-2-A | 1 | Cone Pulley & Cone Pinion Assembly, consists of:— LA-118-2, 119-1, 193, 0441, & 2 of 0793........ | 9 | | 11.45 |
| LA-119-1 | 1 | Cone Pinion Gear w/0793........ | 1 | | 3.15 |
| LA-120-2-A | 1 | Bull Gear Assembly, consists of:— LA-120-2, 345, 346, & 0315.... | 3 | 8 | 5.45 |
| LA-123 | 1 | Back Gear 70T.... | 3 | 8 | 3.75 |
| LA-124 | 1 | Back Gear 28T.... | | 8 | 2.75 |
| LA-125 | 1 | Eccentric Shaft..... | 1 | 12 | 1.95 |
| LA-126 | 1 | Quill Sleeve w/2 of 0617........... | 1 | 14 | 3.50 |

| PART NO. | NO. REQ'D | NAME OF PART | SHIPPING WEIGHT LBS. | SHIPPING WEIGHT OZ. | PRICE EACH |
|---|---|---|---|---|---|
| LA-127 | 1 | Bushing w/0614.... | | 8 | $ .45 |
| LA-128 | 1 | Bushing w/0613.... | | 12 | .55 |
| LA-129 | 1 | Shifter Gear....... | | 10 | .75 |
| LA-130-1 | 1 | Retaining Collar.... | | 12 | .85 |
| LA-131 | 1 | Retaining Collar.... | | 8 | .65 |
| LA-132 | 1 | Take-Up Nut....... | | 14 | .95 |
| LA-133 | 2 | Bearing Covers..... | | 4 | .20 |
| LA-149 | 2 | Stop Pin with one of 0305 and 0307 | | 3 | .35 |
| 0305 | 1 | Socket Set Screw 10 32 x 3/16....... | | 3 | .10 |
| 0307 | 1 | Socket Set Screw 10 32 x 3/8 ....... | | 3 | .10 |
| LA-170 | 1 | Face Plate 6" (Not Shown)......... | | 4 | 3.50 |
| 0634 | 2 | Rubber Bumpers... | | 3 | .05 |

## LA-11-2 HEADSTOCK ASSEMBLY (Cont.)

| PART NO. | NO. REQ'D | NAME OF PART | SHIPPING WEIGHT | | PRICE EACH |
|---|---|---|---|---|---|
| | | | LBS. | OZ. | |
| LA-187 | 1 | Center | | 10 | $ 1.95 |
| LA-193 | 1 | Lock Screw | | 3 | .05 |
| LA-194 | 1 | End Bearing Cap | 2 | 4 | 2.50 |
| LA-195 | 1 | Grease Seal Cap | | 4 | .25 |
| LA-215-1 | 1 | Spindle Gear | | 8 | 1.10 |
| LA-219 | 2 | Key | | 3 | .05 |
| LA-223 | 1 | Sleeve | | 12 | 2.35 |
| LA-240 | 1 | Key | | 3 | .05 |
| LA-247 | 1 | Bellville Washer | | 4 | .20 |
| LA-259 | 1 | Take-Up Nut | | 4 | .75 |
| LA-286 | 1 | Switch Plate | | 3 | .20 |
| LA-296 | 2 | Front Clamp | 1 | | .65 |
| LA-345 | 1 | Plunger | | 2 | .40 |
| LA-346 | 1 | Spring | | 2 | .10 |
| LA-329 | 1 | Flat Belt | | 8 | 1.85 |
| 053 | 2 | Hex. Hd. Cap Screw 7/16—14 x 1½ | | 3 | .05 |
| 0168 | 3 | Fil. Head Cap Screw 5/16—18 x 5/8 | | 3 | .05 |

| PART NO. | NO. REQ'D | NAME OF PART | SHIPPING WEIGHT | | PRICE EACH |
|---|---|---|---|---|---|
| | | | LBS. | OZ. | |
| 0315 | 1 | Socket Set Screw 5/16—18 x 3/8 | | 3 | $ .10 |
| 0322 | 2 | Socket Set Screw 7/16—14 x 5/16 | | 3 | .15 |
| 0441 | 1 | Headless Set Screw ¼—20 x 3/8 | | 3 | .05 |
| 0542 | 2 | Washer | | 3 | .05 |
| 0584 | 2 | Self-Tapping Screws | | 3 | .05 |
| 0588 | 4 | Self-Tapping Screws | | 3 | .05 |
| 0613 | 1 | Oilless Bushing | | 3 | .15 |
| 0614 | 1 | Oilless Bushing | | 3 | .20 |
| 0617 | 2 | Oilless Bushing | | 4 | .25 |
| 0631 | 1 | Switch | 1 | | 1.75 |
| 0632 | 1 | Cable | | 8 | .35 |
| 0640 | 1 | W'dr'f. Key 1/8 x ½ | | 3 | .05 |
| 0643 | 1 | Key | | 3 | .05 |
| 0650 | 1 | Ball Bearing #77506 | | 14 | 3.25 |
| 0651 | 1 | Ball Bearing #45507 | 1 | 12 | 8.40 |
| 0793 | 2 | Oilless Bushing | | 5 | .40 |

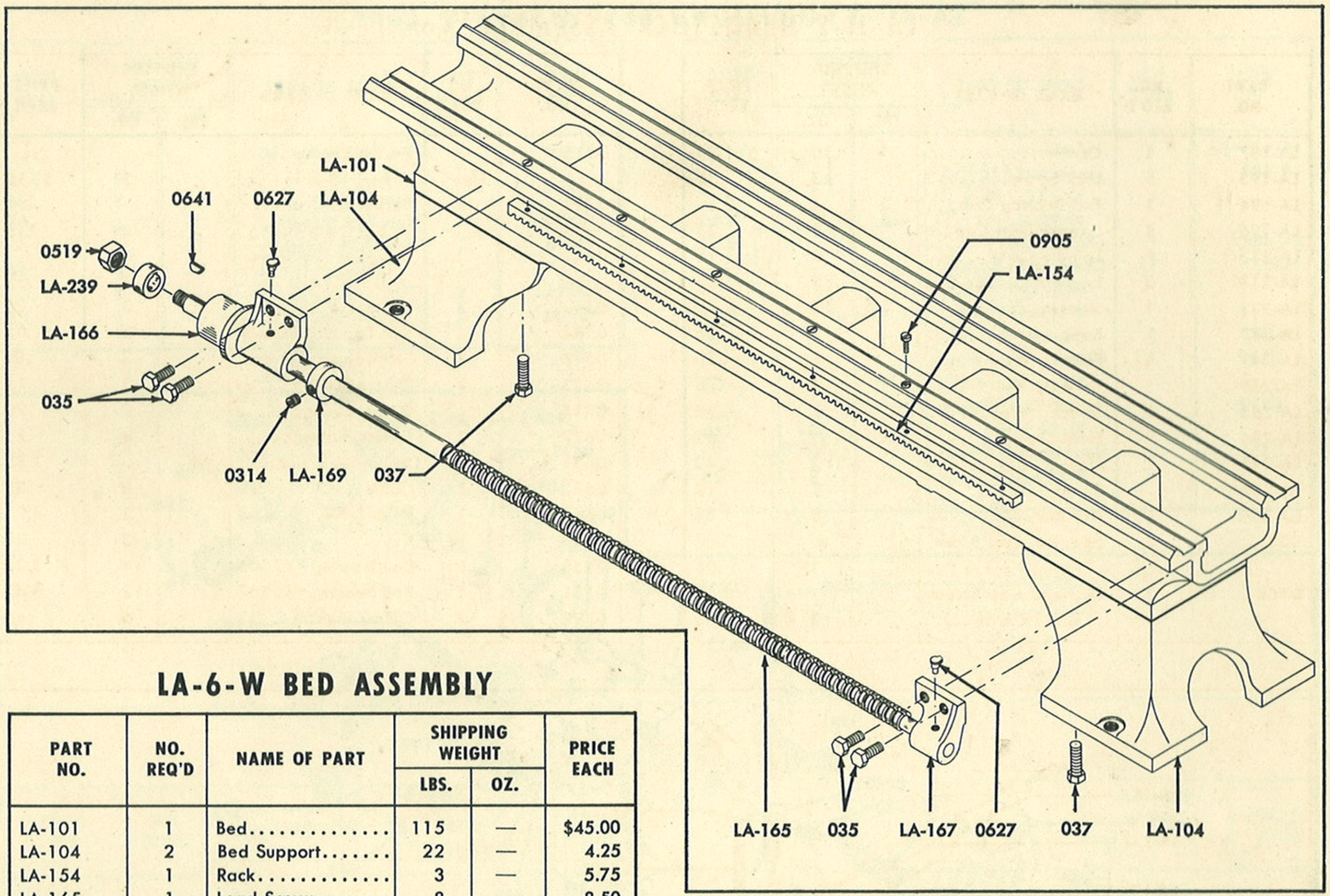



## LA-3 TAILSTOCK ASSEMBLY

| PART NO. | NO. REQ'D | NAME OF PART | SHIPPING WEIGHT | | PRICE EACH |
|---|---|---|---|---|---|
| | | | LBS. | OZ. | |
| LA-105 | 1 | Tailstock (See Note) | 12 | — | $13.50 |
| LA-106 | 1 | Tailstock Base (See Note) | 5 | — | 2.50 |
| LA-121 | 1 | Handwheel with 269 | 2 | 7 | 2.50 |
| LA-146 | 1 | Tailstock Screw | — | 8 | 1.40 |
| LA-147 | 1 | Tailstock Spindle | 1 | 8 | 5.50 |
| LA-148 | 1 | Screw Retainer | — | 12 | 1.60 |
| LA-150 | 1 | Spindle Key | — | 2 | .05 |
| LA-151 | 1 | Binding Plug | — | 6 | .30 |
| LA-176 | 1 | Tailstock Wrench | 1 | | .60 |
| LA-177 | 1 | Binding Lever | — | 12 | .95 |
| LA-185 | 1 | Tailstock Stud | — | 3 | .15 |
| LA-186 | 1 | Tailstock Plug | — | 2 | .05 |
| LA-187 | 1 | Center | — | 10 | 1.95 |

| PART NO. | NO. REQ'D | NAME OF PART | SHIPPING WEIGHT | | PRICE EACH |
|---|---|---|---|---|---|
| | | | LBS. | OZ. | |
| LA-225 | 1 | Tailstock Clamp | 1 | 8 | $ .60 |
| LA-263 | 1 | Knob with 0694 | — | 3 | .20 |
| LA-269 | 1 | Handle | — | 4 | .40 |
| LA-274 | 1 | ½—13 — Hex. Nut. | — | 3 | .15 |
| 0147 | 1 | Sq. Hd. Machine Bolt ½—13 x 4 | — | 12 | .10 |
| 0461 | 2 | Headless Set Screw 3/8—16 x 2 | — | 3 | .10 |
| 0531 | 1 | Jam Nut 3/8—24 | — | 3 | .05 |
| 0543 | 1 | Washer | — | 3 | .05 |
| 0626 | 1 | Oil Cup | — | 3 | .05 |
| 0642 | 1 | Woodruff Key 3/32 x ½ | — | 3 | .05 |

Note! — Tailstock and base are matched and machined as a unit.

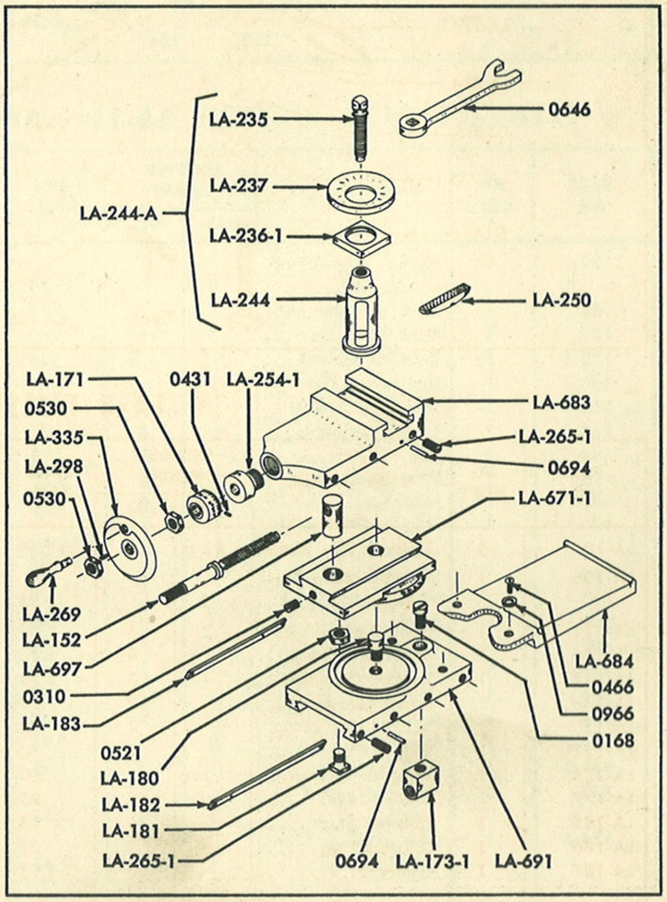



## LA-6-W BED ASSEMBLY

| PART NO. | NO. REQ'D | NAME OF PART | SHIPPING WEIGHT LBS. | SHIPPING WEIGHT OZ. | PRICE EACH |
|---|---|---|---|---|---|
| LA-101 | 1 | Bed.............. | 115 | — | $45.00 |
| LA-104 | 2 | Bed Support....... | 22 | — | 4.25 |
| LA-154 | 1 | Rack............. | 3 | — | 5.75 |
| LA-165 | 1 | Lead Screw........ | 8 | — | 8.50 |
| LA-166 | 1 | Bracket—Left with 0627........... | 3 | — | 3.75 |
| LA-167 | 1 | Bracket—Right with 0627........... | 1 | — | 1.75 |
| LA-169 | 1 | Collar with 0314... | — | 6 | .60 |
| LA-239 | 1 | Collar........... | — | 4 | .30 |
| 035 | 4 | Cap Screws....... | — | 3 | .05 |
| 037 | 8 | Cap Screws....... | — | 3 | .05 |
| 0314 | 1 | Socket Set Screw... | — | 3 | .10 |
| 0519 | 1 | Hex Nut.......... | — | 3 | .05 |
| 0627 | 2 | Oil Cups.......... | — | 3 | .05 |
| 0641 | 1 | Woodruff Key..... | — | 3 | .05 |
| 0905 | 6 | Fillister Head Screw. | — | 3 | .05 |

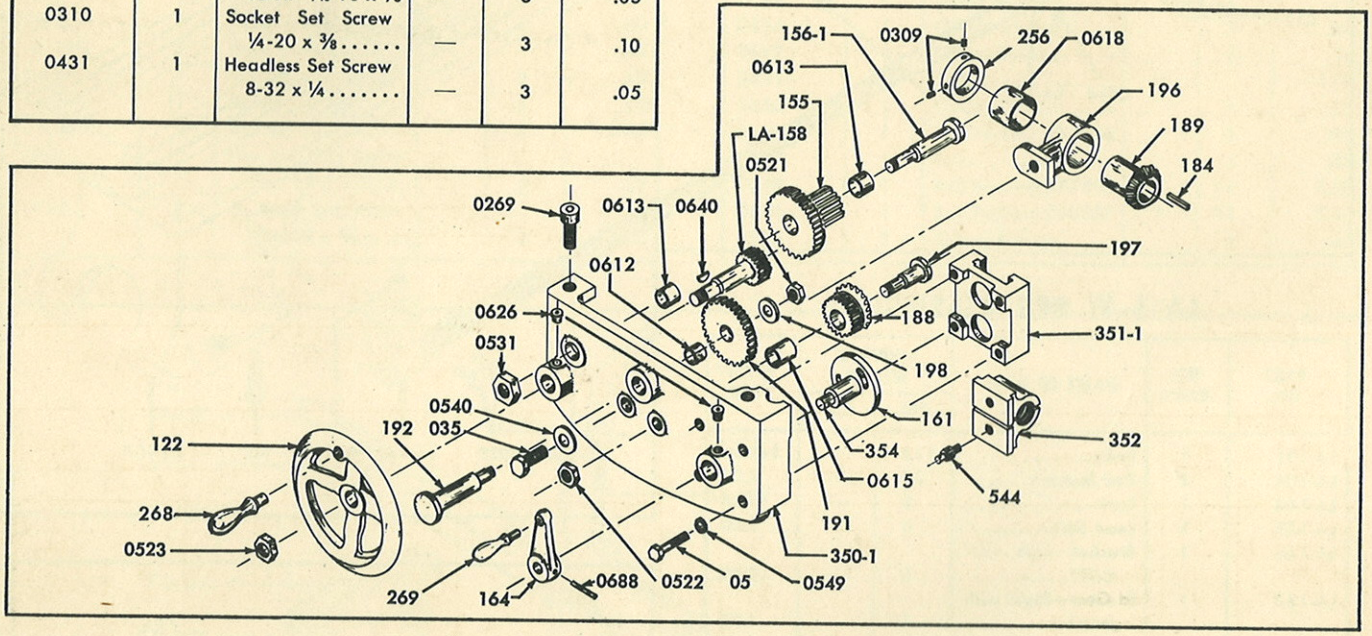
## LA-49-3 COMPOUND REST ASSEMBLY

| PART NO. | NO. REQ'D | NAME OF PART | SHIPPING WEIGHT LBS. | SHIPPING WEIGHT OZ. | PRICE EACH |
|---|---|---|---|---|---|
| LA-152 | 1 | Compound Rest Screw.......... | — | 6 | $ 1.50 |
| LA-171 | 1 | Graduated Collar with 0431....... | — | 8 | .95 |
| LA-173-1 | 1 | Cross Feed Nut..... | — | 6 | .95 |
| LA-180 | 1 | Swivel Pin......... | — | 3 | .20 |
| LA-181 | 2 | Swivel Lock Bolt.... | — | 2 | .15 |
| LA-182 | 1 | Compound Gib (Base).......... | — | 4 | .40 |
| LA-183 | 1 | Compound Gib (Top)........... | — | 4 | .40 |
| LA-235 | 1 | Tool Post Screw.... | — | 4 | .60 |
| LA-236-1 | 1 | Tool Post Block..... | — | 3 | .55 |
| LA-237 | 1 | Tool Post Ring...... | — | 4 | .75 |
| LA-244 | 1 | Tool Post.......... | — | 12 | 2.00 |
| LA-244-A | 1 | Tool Post Complete . | 1 | 6 | 3.95 |
| LA-250 | 1 | Wedge........... | — | 4 | .45 |
| LA-254-1 | 1 | Bushing........... | — | 10 | .50 |
| LA-265-1 | 7 | Gib Screw........ | — | 8 | .05 |
| LA-269 | 1 | Handle........... | — | 4 | .40 |
| LA-298 | 1 | Key.............. | — | 3 | .15 |
| LA-335 | 1 | Handwheel w/269 . | — | 1 | 2.75 |



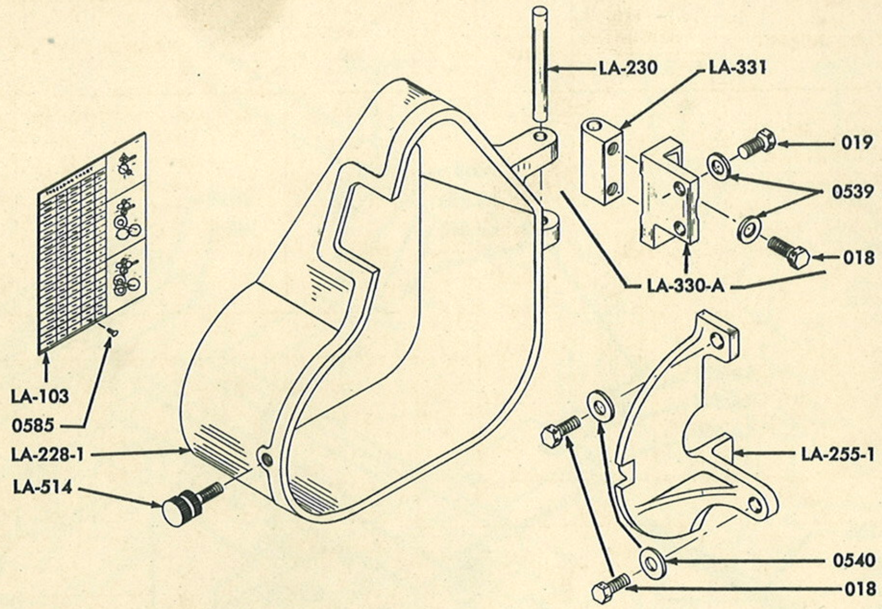
## LA-49-3 COMPOUND REST ASSEMBLY (Cont.)

| PART NO. | NO. REQ'D | NAME OF PART | SHIPPING WEIGHT | | PRICE EACH |
|---|---|---|---|---|---|
| | | | LBS. | OZ. | |
| LA-671-1 | 1 | Swivel | 4 | — | $7.25 |
| LA-683 | 1 | Compound Rest Top w/254, 183 & 2 of 0694 | 4 | — | 7.40 |
| LA-684 | 1 | Chip Guard | 2 | — | 2.15 |
| LA-691 | 1 | Compound Base with 180, 182 & 2 of 0694 | 4 | — | 8.25 |
| LA-697 | 1 | Compound Rest Nut | — | 8 | 1.00 |
| 0168 | 1 | Fillister Hd. Cap Screw 5/16-18 x 5/8 | — | 3 | .05 |
| 0310 | 1 | Socket Set Screw 1/4-20 x 3/8 | — | 3 | .10 |
| 0431 | 1 | Headless Set Screw 8-32 x 1/4 | — | 3 | .05 |
| 0466 | 2 | Rd. Hd. Screw 10-32 x 1/2 | — | 3 | $.05 |
| 0521 | 2 | Jam Nut 5/16 - 18 | — | 3 | .05 |
| 0530 | 2 | Jam Nut 5/16 - 24 | — | 3 | .05 |
| 0646 | 1 | Tool Post Wrench—Comb | — | 8 | .65 |
| 0694 | 2 | Pin | — | 2 | .05 |
| 0966 | 2 | Washer | — | 3 | .05 |



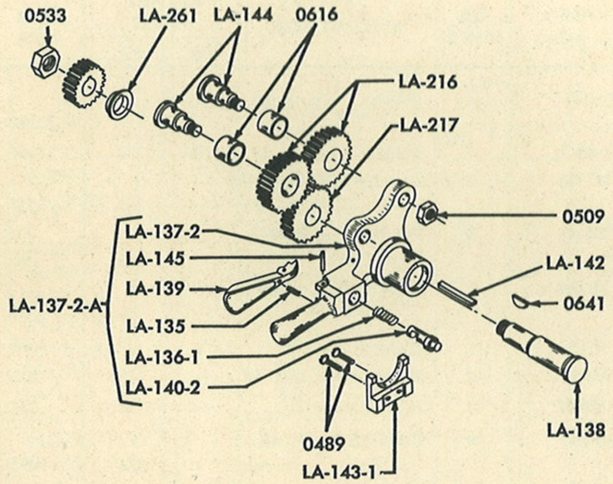

## LA-15-1 APRON ASSEMBLY

| PART NO. | NO. REQ'D | NAME OF PART | SHIPPING WEIGHT | | PRICE EACH |
|---|---|---|---|---|---|
| | | | LBS. | OZ. | |
| 122 | 1 | Apron Handwheel with 268 | 3 | — | $2.75 |
| 154 | 1 | Rack (see lathe bed) | | | 5.75 |
| 155 | 1 | Rack Pinion Gear | 1 | 11 | 5.00 |
| 156-1 | 1 | Rack Pinion Stud | — | 8 | .65 |
| 158 | 1 | Handwheel Pinion | 1 | — | 1.50 |
| 161 | 1 | Cam (See 354-A) | | | 1.10 |
| 164 | 1 | Cam Shaft Lever | — | 8 | .85 |
| 184 | 1 | Key | — | — | .25 |
| 188 | 1 | Miter Gear with 0615 | — | 14 | 3.50 |
| 189 | 1 | Miter Gear with Key | — | 8 | 3.50 |
| 191 | 1 | Idler Shift Gear with 0612 | 1 | — | 2.25 |
| 192 | 1 | Idler Shifter Shaft | — | 8 | .80 |
| 196 | 1 | Bearing with 0618 | 1 | — | 1.75 |
| 197 | 1 | Stud | — | 6 | .60 |
| 198 | 1 | Washer | — | — | .05 |
| 256 | 1 | Collar with 2 of 0309 | — | 5 | .70 |
| 268 | 1 | Handle | — | 6 | .45 |
| 269 | 1 | Handle | — | 4 | .40 |
| 350-1 | 1 | Apron | 8 | — | 9.95 |
| 351-1 | 1 | Half Nut Plate | 1 | — | 1.65 |
| 352 | 1 | Half Nut with 2 of 544 | 1 | 8 | 2.85 |
| 354-A | 1 | Cam shaft & Cam 161 | 1 | — | 1.45 |
| 544 | 2 | Half Nut Pin | — | 3 | $.20 |
| 05 | 4 | Hex. Hd. Cap Screw 1/4-20 x 1 | — | 3 | .05 |
| 035 | 1 | Hex. Hd. Cap Screw 3/8-16 x 7/8 | — | 3 | .05 |
| 0269 | 2 | Socket Hd. Cap Screw 3/8-16 x 1 | — | 3 | .10 |
| 0309 | 1 | Socket Set Screw 1/4-20 x 1/4 | — | 3 | .10 |
| 0521 | 1 | Jam Nut 5/16-18 | — | 3 | .05 |
| 0522 | 1 | Jam Nut 3/8-16 | — | 3 | .05 |
| 0523 | 1 | Jam Nut 7/16-14 | — | 3 | .05 |
| 0531 | 1 | Jam Nut 3/8-24 | — | 3 | .05 |
| 0540 | 1 | Washer | — | 3 | .05 |
| 0549 | 4 | Lockwasher 1/4 x 7/16 | — | 3 | .05 |
| 0612 | 1 | Oilless Bearing | — | 3 | .15 |
| 0613 | 2 | Oilless Bearing | — | 3 | .15 |
| 0615 | 1 | Oilless Bearing | — | 4 | .20 |
| 0618 | 1 | Oilless Bearing | — | 6 | .25 |
| 0626 | 2 | Oil Cup | — | 3 | .05 |
| 0640 | 1 | Woodruff Key 1/8 x 1/2 | — | 3 | .05 |
| 0688 | 1 | Pin 1/8 x 1 | — | 3 | .05 |
| 0905 | 6 | Fil. Head Screw (see lathe Bed) | — | 3 | .05 |



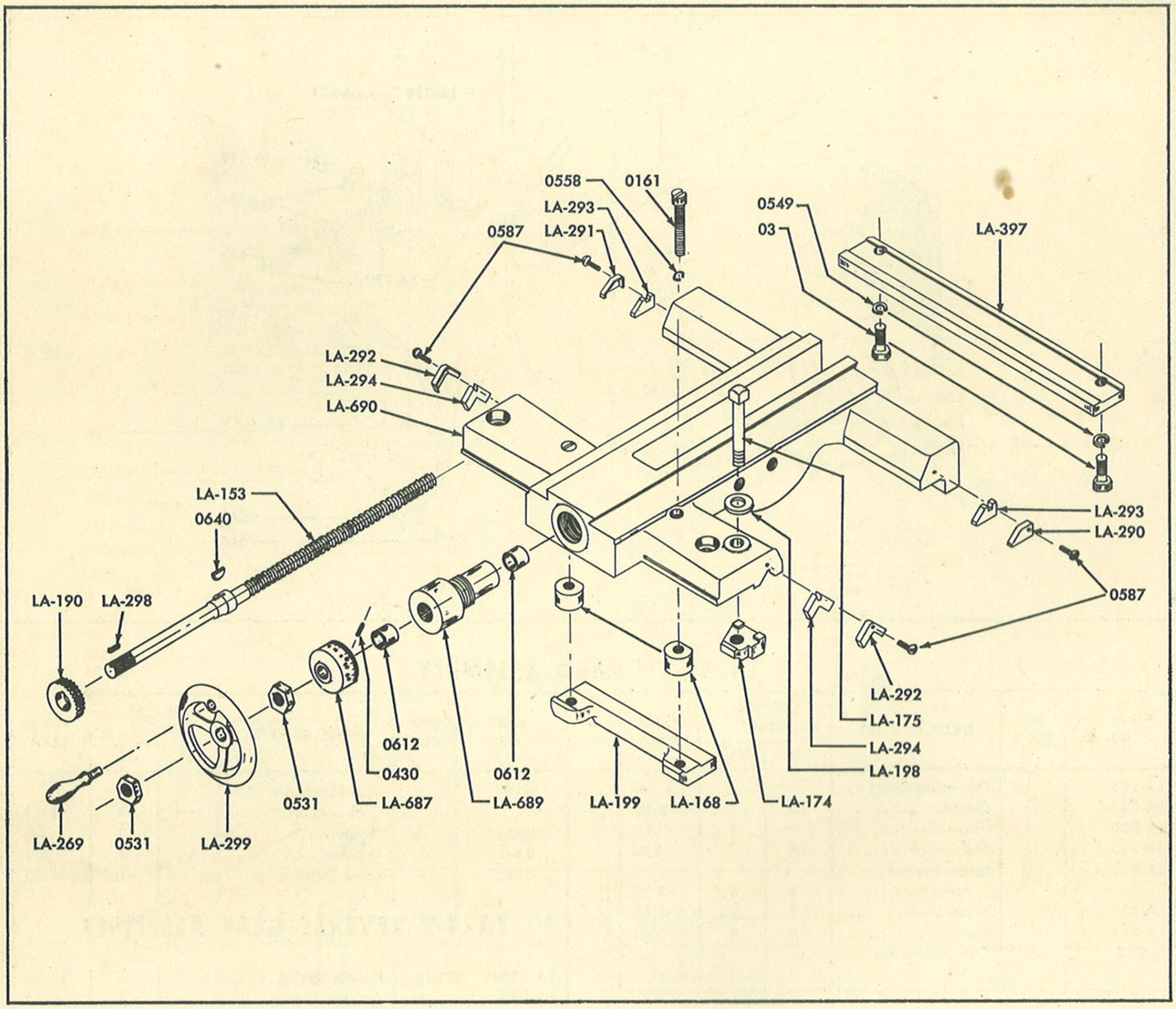

## LA-23-1 GUARD ASSEMBLY

| PART NO. | NO. REQ'D | NAME OF PART | SHIPPING WEIGHT LBS. | SHIPPING WEIGHT OZ. | PRICE EACH |
|---|---|---|---|---|---|
| LA-103 | 1 | Threading Chart.... | — | 6 | $ .65 |
| LA-228-1 | 1 | Guard............ | 15 | 4 | 6.50 |
| LA-230 | 1 | Hinge Pin......... | — | 3 | .10 |
| LA-255-1 | 1 | End Guard........ | 4 | — | 1.25 |
| LA-330-A | 1 | Hinge Bracket Assembly........ | 1 | 8 | 2.35 |
| LA-331 | 1 | Hinge Block....... | 1 | 8 | 1.15 |
| LA-514 | 1 | Knob............. | — | 4 | .45 |
| 018 | 4 | Cap Screws 5/16-18 x 3/4............. | — | 3 | .05 |
| 019 | 2 | Cap Screws 5/16-18 x 7/8............. | — | 3 | $.05 |
| 0539 | 4 | Washer........... | — | 3 | .05 |
| 0540 | 2 | Washer........... | — | 3 | .05 |
| 0585 | 2 | Drive Screw....... | — | 3 | .05 |




## LA-4-2 REVERSE GEAR ASSEMBLY

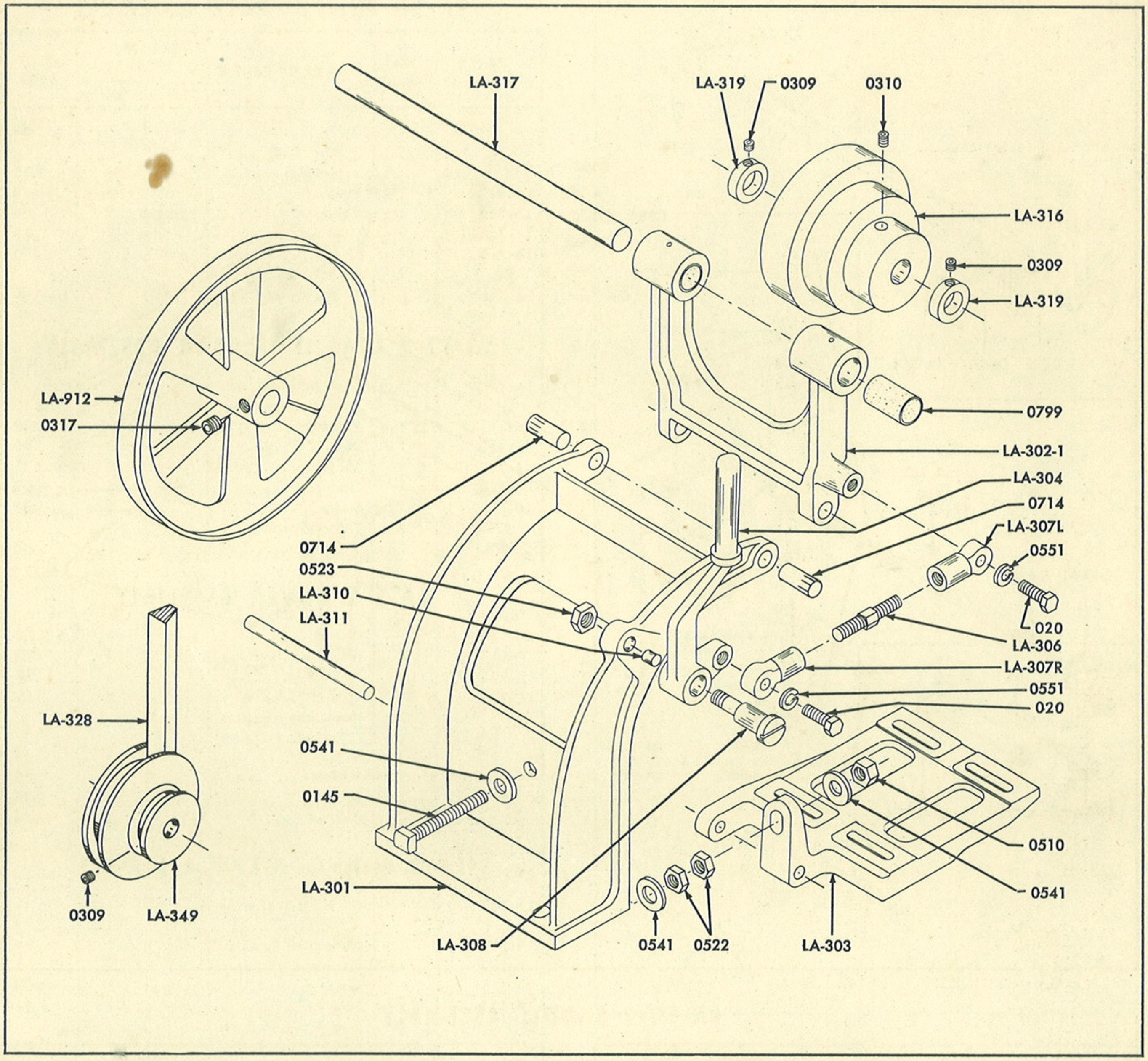
| PART NO. | NO. REQ'D | NAME OF PART | SHIPPING WEIGHT LBS. | SHIPPING WEIGHT OZ. | PRICE EACH |
|---|---|---|---|---|---|
| LA-135 | 1 | Handle Spring..... | — | 3 | $ .05 |
| LA-136-1 | 1 | Plunger Spring..... | — | 3 | .05 |
| LA-137-2 | 1 | Reverse Gear Bracket......... | 3 | 6 | 6.00 |
| LA-137-2-A | | Reverse Gear Bracket Assembly consists of LA-135, LA-136-1, LA-137-2, LA-139, LA-140-2, and LA-145..... | — | — | 7.25 |
| LA-138 | 1 | Reverse Gear Shaft. | — | 14 | .95 |
| LA-139 | 1 | Plunger Lever...... | — | 6 | .75 |
| LA-140-2 | 1 | Plunger........... | — | 3 | .40 |
| LA-142 | 1 | Oiler............. | — | 3 | .10 |
| LA-143-1 | 1 | Lock............. | — | 4 | .50 |
| LA-144 | 2 | Pinion Stud........ | — | 8 | .35 |
| LA-145 | 1 | Handle Pin........ | — | 3 | .05 |
| LA-216 | 2 | Idler Gears with 0616.......... | — | 12 | 1.00 |
| LA-217 | 1 | Reverse Gear...... | — | 12 | 1.00 |
| LA-261 | 1 | Spacer........... | — | 4 | .30 |
| 0489 | 2 | Rd. Hd. Screw 10—24 x 3/4........ | — | 3 | .05 |
| 0509 | 2 | Hex Nut 5/16—18 .. | — | 3 | .05 |
| 0533 | 1 | Jam Nut 1/2—20... | — | 3 | .05 |
| 0616 | 2 | Bearing Oilless..... | — | 4 | .20 |
| 0641 | 1 | Woodruff Key 5/32 x 7/8............ | — | 3 | .05 |




## LA-50-2 SADDLE ASSEMBLY

| PART NO. | NO. REQ'D | NAME OF PART | SHIPPING WEIGHT LBS. | SHIPPING WEIGHT OZ. | PRICE EACH |
|---|---|---|---|---|---|
| LA-153 | 1 | Cross Feed Screw with 0640 | 1 | — | $3.30 |
| LA-168 | 1 | Gib Spacer | — | 8 | .20 |
| LA-174 | 1 | Saddle Lock Nut | — | 5 | .20 |
| LA-175 | 1 | Saddle Lock Screw | — | 3 | .25 |
| LA-190 | 1 | Cross Feed Idler Gear | — | 4 | .60 |
| LA-198 | 1 | Washer | — | 3 | .05 |
| LA-199 | 1 | Front Gib | 1 | 4 | .90 |
| LA-269 | 1 | Handle | — | 4 | .40 |
| LA-290 | 1 | Wiper—Rear Right | — | 2 | .15 |
| LA-291 | 1 | Wiper—Rear Left | — | 2 | .15 |
| LA-292 | 2 | Wiper—Front | — | 2 | .15 |
| LA-293 | 2 | Felt—Rear | — | 2 | .10 |
| LA-294 | 2 | Felt—Front | — | 2 | .10 |
| LA-298 | 1 | Key | — | 3 | .15 |
| LA-299 | 1 | Handwheel with LA-269 | 2 | 7 | 2.90 |
| LA-397 | 1 | Saddle Gib | 1 | 8 | 1.40 |
| LA-687 | 1 | Graduated Collar with 0430 | — | 8 | 1.10 |

| PART NO. | NO. REQ'D | NAME OF PART | SHIPPING WEIGHT LBS. | SHIPPING WEIGHT OZ. | PRICE EACH |
|---|---|---|---|---|---|
| LA-689 | 1 | Bushing with 2 of 0612 | 1 | — | $1.90 |
| LA-690 | 1 | Saddle | 19 | — | 19.60 |
| 03 | 3 | Hex. Hd. Cap Screw ¼—20 x ¾ | — | 3 | .05 |
| 0161 | 2 | Fill. Hd. Cap Screw ¼—20 x 1¾ | — | 3 | .05 |
| 0430 | 1 | Headless Set Screw 8—32 x ⅜ | — | 3 | .05 |
| 0531 | 2 | Jam Nut ⅜—24 | — | 3 | .05 |
| 0549 | 3 | Lock Washer ¼ x 7/16 | — | 3 | .05 |
| 0558 | 2 | Lock Washer ¼ | — | 3 | .05 |
| 0587 | 4 | Drive Screw 6—32 x ½ | — | 3 | .05 |
| 0612 | 2 | Oilless Bearing | — | 3 | .15 |
| 0640 | 1 | Woodruff Key ⅛ x ½ | — | 3 | .05 |

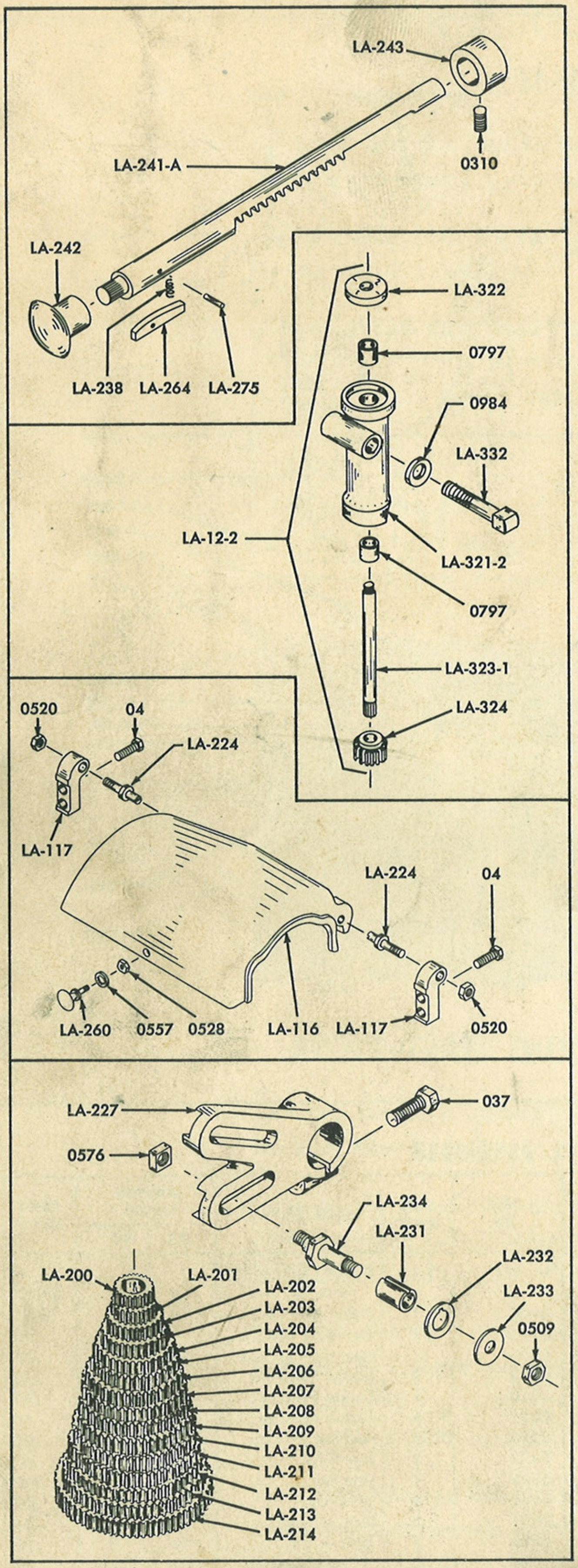



## LA-7-1-W DRIVE ASSEMBLY

| PART NO. | NO. REQ'D | NAME OF PART | SHIPPING WEIGHT | | PRICE EACH |
|---|---|---|---|---|---|
| | | | LBS. | OZ. | |
| LA-301 | 1 | Motor Bracket...... | 13 | 8 | $6.95 |
| LA-302-1 | 1 | Countershaft Bracket......... | 4 | 8 | 4.95 |
| LA-303 | 1 | Hinge Bracket...... | 7 | 8 | 2.95 |
| LA-304 | 1 | Lever............. | 2 | 14 | 1.35 |
| LA-306 | 1 | Adjusting Bolt...... | — | 4 | .30 |
| LA-307-R | 1 | Head, Right....... | — | 6 | .50 |
| LA-307-L | 1 | Head, Left........ | — | 6 | .50 |
| LA-308 | 1 | Stud Pin.......... | — | 8 | .60 |
| LA-310 | 1 | Stop Pin.......... | — | 3 | .15 |
| LA-311 | 1 | Hinge Pin......... | — | 8 | .20 |
| LA-316 | 1 | Cone Pulley....... | 7 | — | 8.35 |
| LA-317 | 1 | Shaft............. | 2 | 3 | .70 |
| LA-319 | 1 | Collar............ | — | 5 | .35 |
| *LA-328 | 1 | V-Belt............ | | | See Wards Catalog |

* Not included in purchase of Drive Assembly only.

| PART NO. | NO. REQ'D | NAME OF PART | SHIPPING WEIGHT | | PRICE EACH |
|---|---|---|---|---|---|
| | | | LBS. | OZ. | |
| *LA-349 | 1 | Motor Pulley ½, ¾ or ⅝" bore... | 3 | — | $4.95 |
| LA-912 | 1 | Pulley with 0317... | 7 | — | 8.95 |
| 0145 | 1 | Sq. Head Bolt...... | — | 8 | .05 |
| 020 | 2 | Hex. Hd. Cap Screw | — | 3 | .05 |
| 0309 | 2 | Socket Setscrews ... | — | 3 | .10 |
| 0310 | 2 | Socket Setscrews ... | — | 3 | .10 |
| 0317 | 1 | Socket Setscrew.... | — | 3 | .10 |
| 0510 | 1 | Hex Nut.......... | — | 3 | .05 |
| 0522 | 2 | Jam Nuts......... | — | 3 | .05 |
| 0523 | 1 | Jam Nut......... | — | 3 | .05 |
| 0541 | 4 | Washers.......... | — | 3 | .05 |
| 0551 | 2 | Lock Washer....... | — | 3 | .05 |
| 0714 | 2 | Groove Pin........ | — | 3 | .10 |
| 0799 | 2 | Oilless Bushing..... | — | 3 | .20 |




## LA-56 SHIFTER RACK ASSEMBLY

| PART NO. | NO. REQ'D | NAME OF PART | SHIPPING WEIGHT LBS. | SHIPPING WEIGHT OZ. | PRICE EACH |
|---|---|---|---|---|---|
| LA-238 | 1 | Spring | — | 6 | $ .05 |
| LA-241-A | 1 | Shifter Rack complete | 1 | 8 | 2.35 |
| LA-242 | 1 | Knob | — | 4 | .25 |
| LA-243 | 1 | Collar | — | 3 | .40 |
| LA-264 | 1 | Latch Key | — | 3 | .15 |
| LA-275 | 1 | Pin | — | 1 | .05 |
| 0310 | 1 | Socket Set Screw ¼—20 x ⅜ | — | 3 | .10 |

## LA-12-2 DIAL INDICATOR ASSEMBLY

| PART NO. | NO. REQ'D | NAME OF PART | LBS. | OZ. | PRICE EACH |
|---|---|---|---|---|---|
| LA-12-2 | 1 | Dial Indicator Assembly Complete | 1 | 8 | $ 3.30 |
| LA-321-2 | 1 | Housing | 1 | — | 2.50 |
| LA-322 | 1 | Dial | — | 3 | .20 |
| LA-323-1 | 1 | Shaft | — | 6 | .15 |
| LA-324 | 1 | Gear | — | 3 | .65 |
| LA-332 | 1 | Screw | — | 4 | .35 |
| 0797 | 2 | Oilless Bearing | — | 3 | .10 |
| 0984 | 1 | Washer | — | 2 | .05 |

## LA-5-2 COVER ASSEMBLY

| PART NO. | NO. REQ'D | NAME OF PART | LBS. | OZ. | PRICE EACH |
|---|---|---|---|---|---|
| LA-116 | 1 | Guard | 6 | — | $ 2.75 |
| LA-117 | 2 | Hinge Brackets | — | 3 | .35 |
| LA-224 | 2 | Hinge Pins | — | 3 | .25 |
| LA-260 | 1 | Knob | — | 2 | .45 |
| 04 | 2 | Hex Head Cap Screws ¼—20 x ⅞ | — | 3 | .05 |
| 0520 | 2 | Jam Nuts | — | 3 | .05 |
| 0528 | 1 | Jam Nut | — | 3 | .05 |
| 0557 | 1 | Washer | — | 3 | .05 |

## LA-8 CHANGE GEAR ASSEMBLY

| PART NO. | NO. REQ'D | NAME OF PART | LBS. | OZ. | PRICE EACH |
|---|---|---|---|---|---|
| LA-227 | 1 | Change Gear Bracket | 3 | 12 | $ 2.95 |
| LA-231 | 2 | Compound Bushing | — | 5 | .70 |
| LA-232 | 2 | Washer | — | 3 | .05 |
| LA-233 | 2 | Washer | — | 3 | .05 |
| LA-234 | 2 | Stud | — | 12 | .80 |
| 037 | 1 | Cap Screw ⅜—16 x 1¼ | — | 3 | .05 |
| 0509 | 2 | Hex Nut 5/16—18 | — | 3 | .05 |
| 0576 | 2 | Square Nut ⅜—16 | — | 3 | .05 |
| | | ***CHANGE GEARS** | | | |
| LA-200 | 1 | Change Gear 16 T. | — | 4 | .70 |
| LA-201 | 1 | Change Gear 18 T. | — | 4 | .90 |
| LA-202 | 2 | Change Gear 24 T. | — | 4 | 1.05 |
| LA-203 | 2 | Change Gear 32 T. | 1 | — | 1.20 |
| LA-204 | 1 | Change Gear 36 T. | 1 | — | 1.35 |
| LA-205 | 1 | Change Gear 40 T. | 1 | — | 1.50 |
| LA-206 | 1 | Change Gear 44 T. | 1 | — | 1.60 |
| LA-207 | 1 | Change Gear 46 T. | 1 | — | 1.70 |
| LA-208 | 1 | Change Gear 48 T. | 1 | — | 1.80 |
| LA-209 | 1 | Change Gear 52 T. | 1 | — | 1.95 |
| LA-210 | 1 | Change Gear 54 T. | 1 | 2 | 2.10 |
| LA-211 | 1 | Change Gear 56 T. | 1 | 4 | 2.25 |
| LA-212 | 1 | Change Gear 60 T. | 1 | 6 | 2.40 |
| LA-213 | 1 | Change Gear 64 T. | 1 | 8 | 2.55 |
| LA-214 | 1 | Change Gear 72 T. | 1 | 12 | 2.75 |

* Six Change Gears are installed on the lathe proper, the balance (11) are shipped as separate items with the lathe.



S# 5127A
M# 84TLC-2130