

*Installation,
Operation and Maintenance*

**INSTRUCTIONS
and
PARTS LIST**

for

Nos. 22L and 22M

**Van Norman Ram Type Milling Machines
Plain, Universal and Special Models**



VAN NORMAN COMPANY

Springfield 7, Massachusetts, U. S. A.

Installation, Operation and Maintenance Instructions for

Nos. 22L and 22M

Van Norman Ram Type Milling Machines Plain, Universal and Special Models

The Van Norman Ram Type Milling Machine is a precision tool, built of the best material obtainable and to the highest degree of accuracy. Each machine and its parts are checked many times during construction for both quality and accuracy. With ordinary care and observance of the suggestions in this booklet your Van Norman Ram Type Milling Machine will give you many years of satisfactory service.

In the general operation of the Nos. 22L or 22M Milling Machine it is important to note that the machine can be used for an exceptionally wide range of milling operations with the minimum of effort on the part of the operator.

In milling operations involved on most jobs where one or a few pieces are required, much time can be saved and the highest degree of accuracy will be assured, by keeping in mind at all times that your Van Norman Ram Type Milling Machine has as an important part of its design, a spindle which can be instantaneously adjusted to any angle between horizontal and vertical. Also, the spindle cutter head is adjustable in or out with respect to the column by means of the ram on which it is mounted; thereby providing added range and adaptability to a wide range of milling operations with the minimum of changes in setups.

Before setting up the piece to be milled it is suggested that the operator carefully analyze the operations to be done in order to position the piece for most advantageous use of the horizontal, vertical and angular adjustments of the cutterhead as well as adjustability of the ram unit.

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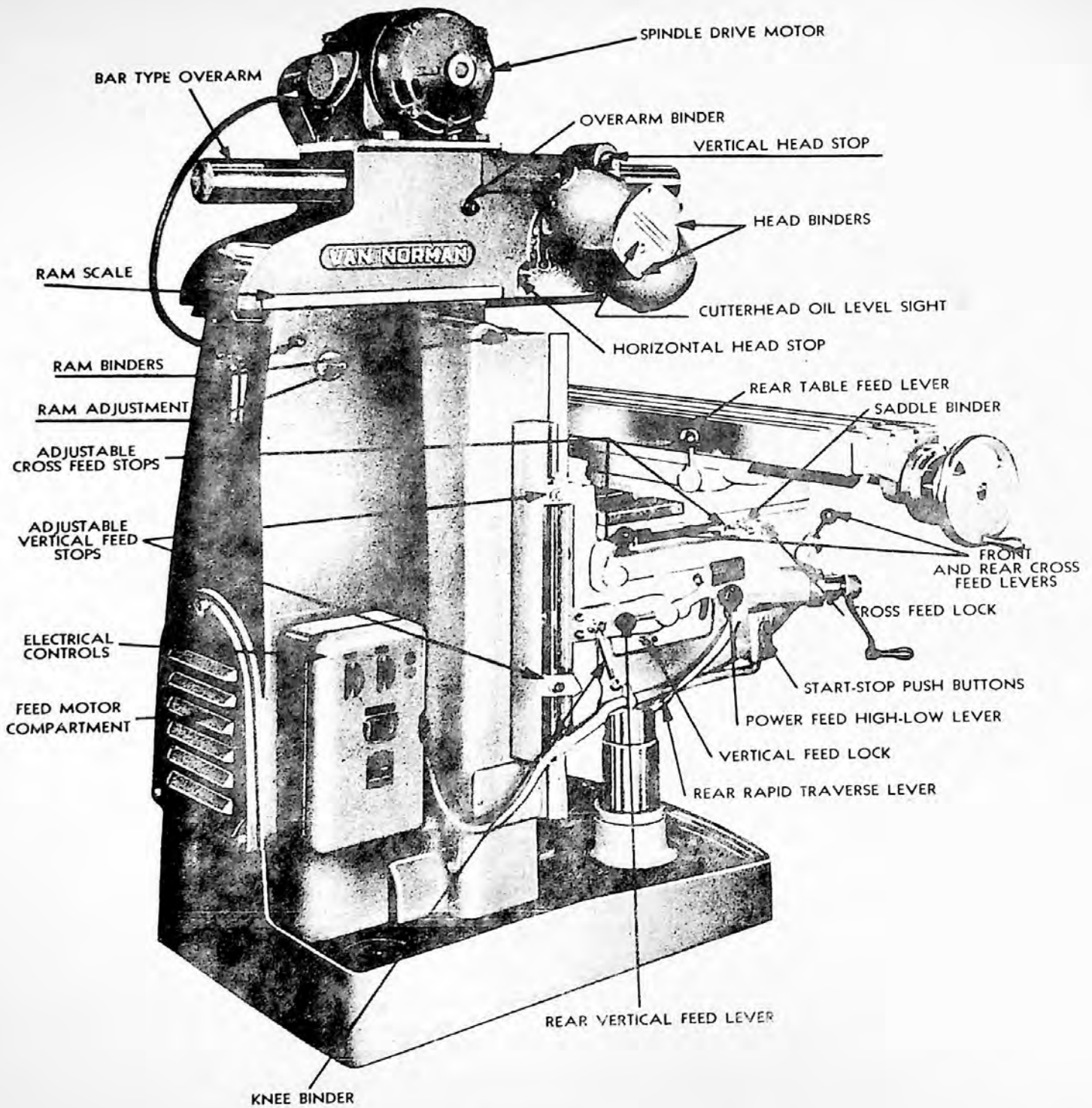


FIGURE 1.

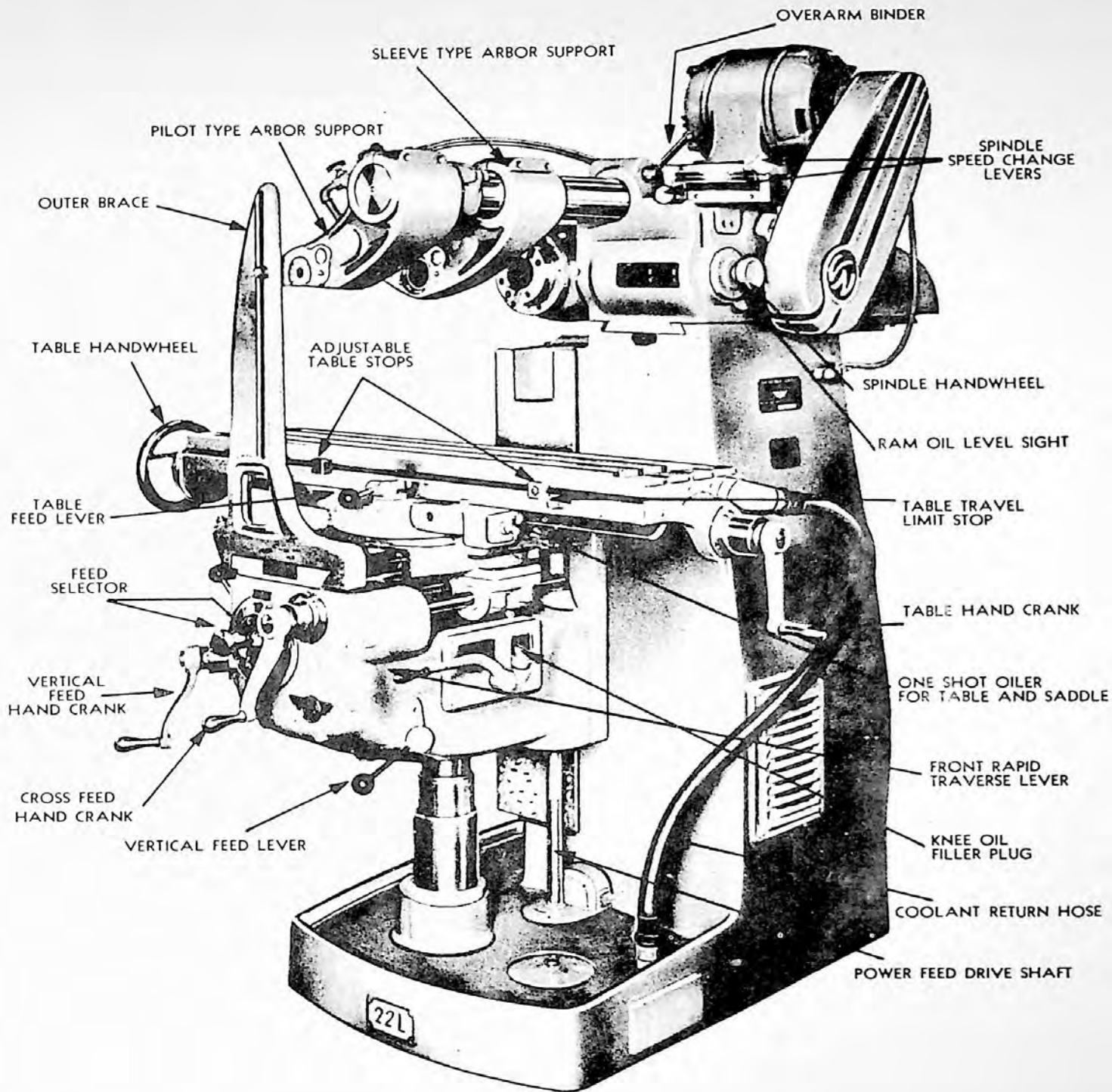


FIGURE 2.

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FOUNDATION PLAN

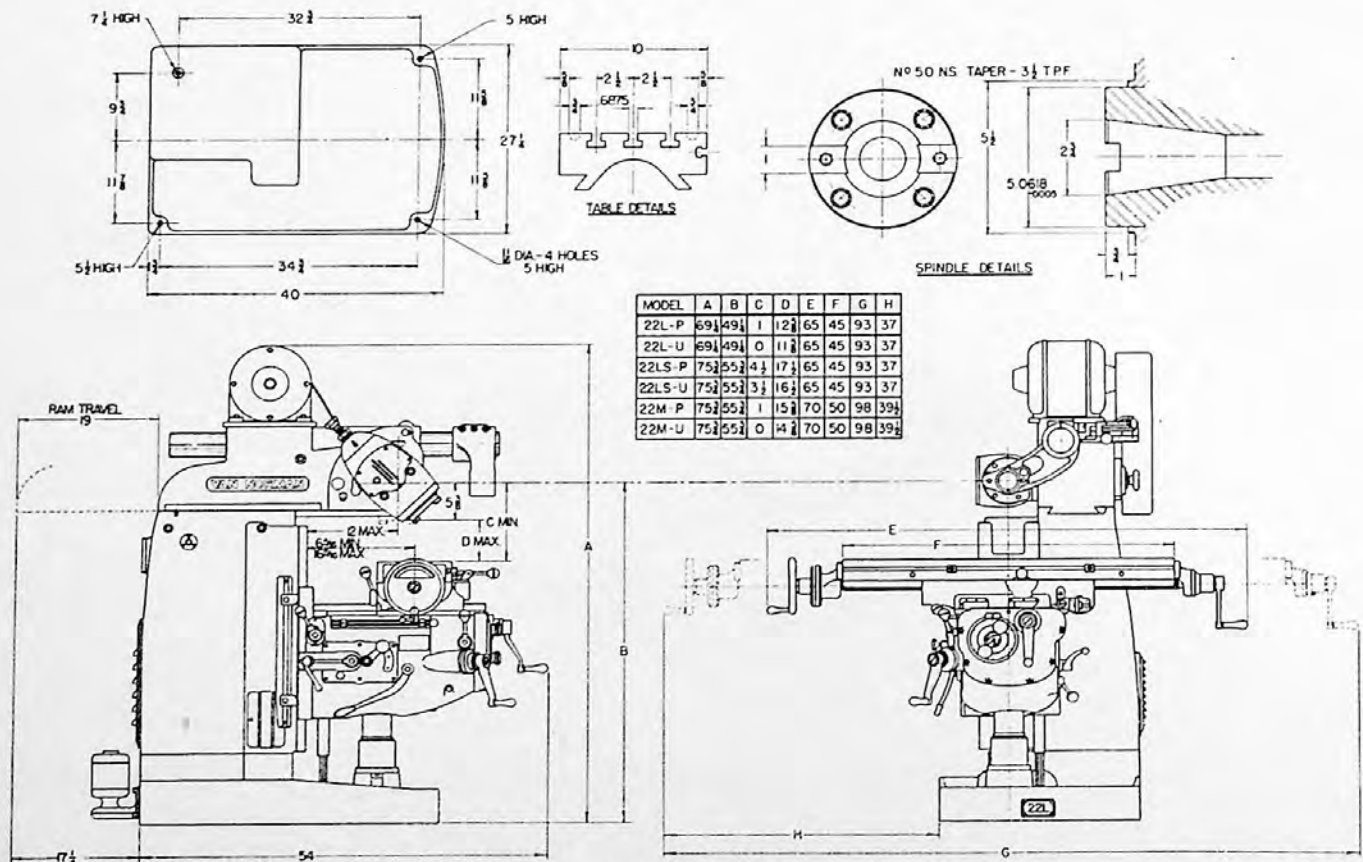


FIGURE 3

INSTALLATION

HANDLING

It is very important that the machine be properly lifted because damage may result with improper handling. The best procedure is to use a two-inch rope sling arranged so that one loop is placed under the knee at the front end and a second loop is located under the back of the ram with the ram projecting about four or five inches to the rear of the column. CAUTION: Be sure that the knee binder (Fig. 1) and saddle binder (Fig. 1) are solidly fastened or clamped before raising the machine. Also, make certain that the rope does not touch any levers or projecting portions of the machine which may become sprung out of shape.

It is also advisable to place a cloth or soft rags under the rope to avoid marring the finish of the machine. With the sling in position the machine should be raised slightly to make certain that the balance is correct. If the machine dips one way or the other when raised, the sling should be adjusted to assure correct balance.

LEVELING

It is very important that the machine is properly leveled. This should be done by the use of a long spirit level mounted on the table, both longitudinally and transversely. If leveling blocks are used, these should be placed at the four corners of the base, as well as one on each side midway between the rear and front edges. If leveling blocks are not used, the concrete floor should be as smooth as possible, and tapered wedges should be inserted in any openings so that the base receives as much foundation as possible. Lag screw holes are provided for securing the machine to floor after leveling.

CLEANING AND PREPARATION FOR OPERATION

The machine is shipped with slushing oil on all ways and machine surfaces to prevent rust during shipment. This slushing oil should be washed off with kerosene or other dissolving agent to make sure that all surfaces are free from residue or dust which might accumulate during shipment. Then all slide ways and flat surfaces should be very carefully covered with lubri-

cating oil, after which it is advisable to move the table, saddle and knee by hand so that this oil will thoroughly work onto all surfaces.

Before operating the machine, check all oil levels, and oil and grease in accordance with instructions under the heading, "Lubrication," on pages 9 and 10 of this booklet.

WIRING AND ELECTRICAL CONTROLS

If the machine is furnished with electrical equipment, the controls are located on the lower left-hand side of the column, and a knockout hole is provided for bringing in the power line. Within the cover of the control box is located a diagram showing where the connecting leads should be made. It is necessary that the feed motor should operate clockwise when looking at the motor from the sprocket at the front of the motor. This can be observed by opening the door at the right side of the column. Another method of checking rotation is by the power feed drive shaft (Fig. 2) which would operate counter-clockwise when looking downward.

The main spindle drive is operated by a reversing motor, and spindle direction is controlled by reversing switch and push button station. It is desirable that duplicate push buttons be installed to provide both front and rear control of spindle starting and stopping.

As an additional safety feature, controls when furnished by Van Norman, are wired so that it is not possible to operate the feed motor unless the spindle motor is in operation. This prevents the possibility of damage to the machine or work, which would result if the feed were operated against a stationary cutter.

A transfer switch is provided for the feed motor control, to disconnect the feed should it be desired to operate the machine for an extended period without power feeds.

It is suggested that controls, if installed by the user, be connected in the above manner. Wiring diagrams for standard makes of controls are available for this method of control connection, as well as for operating the feed motor and spindle motor independently should this latter method be desired.

OPERATION

In the following paragraphs the control, operation and adjustment of the machine is explained. It would be well for the operator to familiarize himself with the various movements by engaging and disengaging the controls for a period of time sufficiently long for him to become thoroughly familiar with the function of each control.

POWER FEEDS

With the motors in operation power feed is available to all six of the directional adjustments of table, saddle and knee.

The table may be power fed to the right or left by moving the front feed lever (Fig. 2) or the rear table feed lever (Fig. 1) correspondingly to the right or left.

The saddle may be power fed in or out by moving the front cross feed lever (Fig. 1) or the rear cross feed lever (Fig. 1) correspondingly in or out.

The knee may be raised or lowered by moving the front vertical feed lever (Fig. 2) or the rear vertical feed lever (Fig. 1) correspondingly up or down.

The directional controls simplify the operation of this machine for all the operator has to do to engage the power feed is push the proper lever in the direction he wishes his work to move. If desired the longitudinal, cross and vertical feeds can all be used at the same time. The operator may engage the desired feed with the front lever and disengage it with the rear controls.

Binders are provided for each of the three movements. The table binder is the hollow hex head screw in the front of the saddle. The cross feed or saddle binder (Fig. 1) is located on the left side and operates by tightening the saddle gib. The vertical feed or knee binder (Fig. 1) is located on the left rear side of the knee and operates by tightening the knee gib against the angle on the face of the column.

Whenever a member is to be moved, either by hand or power feed, the appropriate binder must be loosened. At all other times the binders should be tight. This is important as they help to provide rigidity to the machine.

POWER RAPID TRAVERSE

Power rapid traverse should be operated as follows: If the table is to be rapid traversed to the right, the table feed lever (Fig. 2) should first be moved in the direction desired; then the front or rear rapid traverse levers (Fig. 2) and (Fig. 1) should be pulled upward, causing the table to travel rapidly as long as the rapid traverse lever is held. As soon as the rapid traverse lever is released, it will drop down to the normal position, and the table will resume the normal rate of feed until the feed lever has been disengaged. To dis-

engage the feed it is then necessary to return the feed lever to the neutral position. If desired, however, it is also possible to disengage the power rapid traverse by disengaging the feed control only. The same procedure applies to cross and vertical feeds. The proper feed lever should first be engaged, then the power rapid traverse lever operated for the distance required.

POWER FEED LOCKS

Sometimes it is necessary to lock one or more of the feed levers so that they cannot be engaged. For instance, to lock the table this can easily be done as follows: If the machine is used for boring and it is desired to lock the table feed only, this is done by positioning the adjustable table stops (Fig. 2) so that they touch each side of the trip lever. When locked in this position, it is impossible for the table feed to be engaged.

To lock out the cross feed it is only necessary to lock the knurled screw (Fig. 1) at the left-hand side of the knee behind the front cross feed lever. This screw engages into the cross feed trip rod and secures it so that it cannot be moved in either direction.

The knee or vertical feed lock screw (Fig. 1), located on the left side of the knee just below the rear vertical feed lever, binds against an internal rack shaft, locking the vertical power controls.

POWER FEED STOPS

Since all the feed dogs are adjustable, it is possible to set them for disengaging the various feeds as may be desired. For example, if a part should be set up so that the inward cross feed is applied, it is possible to automatically disengage this feed where desired by positioning the adjustable cross feed stops (Fig. 1). This will assure the saddle stopping at the given position repeatedly.

When it is desired to rapid traverse the table up to a given position for the starting of a cut and then re-engage the feed, the adjustable table stops (Fig. 2) can be positioned to suit. The dog will disengage the feed from power rapid traverse; then to engage, it is merely necessary to raise the table feed lever (Fig. 2) and then position the lever to re-engage the normal feed. If it is then necessary to disengage the feed at a given position, extra dogs should be secured.

POWER SAFETY STOPS

All the moving members are provided with safety stops which are not to be removed or adjusted. These stops are fixed in position at each end of the travel runs to prevent the feed screws running to the end of the thread and damaging the feed mechanism. On the table, the table limit stops are located (Fig. 2) at each end of the front face of the table. For the cross feed the

adjustable stops act as safety stops because they cannot be removed from the trip rod, and likewise their movement is limited so that they cannot be adjusted beyond the feed range of the saddle. For the vertical elevation the adjustable stops cannot be removed beyond the fixed pins. At no time should the vertical trip dogs be removed from the T-slot.

HAND FEEDS

The cross hand adjustment for the saddle is by means of the cross feed hand crank in front of the machine (Fig. 2). The vertical hand adjustment is by means of the hand crank (Fig. 2). The table can be moved longitudinally by means of the hand wheel at the left of the table or the crank at the right-hand end of the table. Large graduated dials are provided for all hand movement adjustments. These dials can be reset by thumb screws provided on each dial. Spring releases are provided for all hand wheels and cranks to prevent turning under power.

SAFETY CLUTCH

The feed drive mechanism in the knee is provided with an automatic type safety clutch which will disengage in the event an excessive load or obstruction is encountered. For example, if something should lodge between the saddle and column while the cross feed was engaged, this clutch will automatically disengage and will make a clicking sound which will continue until the excess load is removed. This clutch, located in the knee, is permanently set and needs no adjustment.

SPINDLE SPEED CHANGES

CAUTION: Stop motors before shifting gears. Do not clash moving gears when changing speeds.

Nine cutter spindle speeds are obtained by positioning the two speed change levers (Fig. 2). There are three positions for each lever as shown by the speed plate at the front of the ram. In addition the lower lever has a fourth position for a neutral. When in this position, the spindle may be freely rotated by the handwheel (Fig. 2) without turning the other shafts.

Each of the levers has a pull-out knob, and to secure the desired speed it is only necessary to position them as indicated on the speed plate, i.e. to select the top speed of 1400 R.P.M. the speed plate shows the lever positions as B-3, so place the top lever in the station over B and the lower lever under the station marked 3. All sliding gears have been chamfered so that the teeth will slide between each other as desired. Occasionally, however, these teeth may line up in such a way so that their edges come on "dead center", in which case it would be necessary to rotate the spindle handwheel (Fig. 2) slightly so that the proper meshing of the gears can be obtained. After the proper

speed selection has been obtained from these levers, the motor is again started. In event that the spindle is to rotate in the opposite direction, this is accomplished electrically by the reversing switch in the control box.

POWER FEED CHANGES

To obtain the table feed rate desired, first place the feed high-low lever (Fig. 1) in the middle or neutral position. This change can be made with the feed motor operating. Next the feed is selected by rotating the tumbler dial (Fig. 2) in the front of the knee. This is accomplished by pulling out the two knobs simultaneously. Turn the dial until the desired feed is in line with the arrow. Then, make sure the knob plungers are definitely seated in their locking holes by pushing knobs firmly inward. Each position of the dial has two rates of feed. The one selected depends upon the position H or L that the high-low lever (Fig. 1) is next positioned.

It should be remembered that the feed rates indicated on the dial are for the table and saddle. The vertical feed rate is 60% of that indicated for the table.

CAUTION: Feed changes may be made with the feed motor running; however, the high-low lever must be in the neutral position when the tumbler dial is rotated.

RAM

The ram is solidly locked to the column by means of two eccentric binders (Fig. 1). To adjust the ram in or out on the column, it is very essential that these eccentric binders be rotated, by the hand crank furnished, to the neutral position, which can very easily be determined by rotation of the binder shafts until the movement is "free", after which the ram can be moved in either direction by rotation of the ram adjustment (Fig. 1). After the ram has been properly positioned, the binders can be rotated in either direction to lock the ram in position.

CUTTERHEAD

To adjust the cutterhead from horizontal to a vertical position or any desired angle in between, the same hand crank is used to loosen the two forward head binders (Fig. 1). A hex nut located behind the head between the spindle and the ram loosens a third binder. The head can then be rotated by hand to the angle desired indicated by the graduations on the flange. The head then is locked by tightening the binder bolts securely.

Positive stops (Fig. 1) accurately set at the factory are provided for vertical and horizontal settings. When adjusting the cutterhead to the vertical or horizontal positions care should be taken to prevent ramming the head against the stops since abrupt stress may destroy their accuracy.

OVERARM

To adjust the bar type overarm (Fig. 1) the same crank handle is used to release the rear binder. The front binder (Fig. 2) is provided with a lever handle for operation. After the overarm has been positioned as desired, these binders should be tightened securely.

ARBOR SUPPORTS

Two arbor supports are provided with the No. 22L and No. 22M Van Norman Milling Machines. One Style "A" support has a bushing with a $23/32$ " hole mounted on needle bearings. This is for supporting Style "A" arbors with $23/32$ " pilots. A Style "B" support is furnished to support arbors by means of standard $2\frac{1}{8}$ " diameter arbor bearings.

In setting up for the use of arbors it is advisable to use the Style "B" support in so far as possible for the reason that the larger diameter bearing will provide more rigid support for the arbor. Also, it should be borne in mind that the closer the arbor support can be placed to the cutter and the closer the cutter can be to the spindle nose, the less deflection there will be in the arbor, resulting in the most satisfactory operating

conditions.

Note, on machines supplied with a No. 13 B.&S. spindle taper, the Style "A" support has a $11/16$ " hole to fit the pilot end of the arbors for these machines.

UNIVERSAL SADDLE

To adjust the table on models equipped with universal saddle, as shown in Figure 2, to desired angular position, loosen hollow-hex head screws on underside of lower saddle unit, one at right front, one at left rear, until they drop entirely clear of the upper swivel unit. Then loosen the three swivel saddle binders, one each on front face, right side and left side of lower saddle unit. The table then can be revolved to the desired angular position and the table locked by means of the swivel binders.

When the table is used in normal operating position (0 degree angularity) the table should be revolved to the normal position, after which the hollow-hex head locking bolts on underside of saddle are engaged in the threads of the upper saddle unit and securely fastened. It is also advisable to secure the swivel saddle binders. For extreme accuracy in setting the table to "O" position, use an indicator.

PERIODIC MACHINE ADJUSTMENTS

SPINDLE BEARINGS

CAUTION Do not attempt to take up spindle bearings without a thorough knowledge of bearing adjustments and operating conditions.

The spindle bearings comprise a taper roller bearing located at the front end of the spindle and a taper roller bearing at the rear. They have been properly adjusted for average conditions before leaving the factory, so should not require readjustment before use.

If desired, the end play in the spindle bearings may be checked after a few months of operation in the following manner: Using a lead or composition hammer, gently tap the face of the spindle until all play is taken up towards the rear of the machine. Place an indicator against the face, and then tap the spindle shaft forward from the rear. If the play exceeds $.001$ ", adjustment may be made as follows:

1. Remove the cutterhead rear cap.
2. Loosen the lock washer, then adjust nut for desired end play.
3. Reset lock washer and reassemble rear cap.

If in doubt about the tension on the bearings, it is far safer to favor looseness, as overtightness can cause overheating and undue wear in the bearings as well as in other operating parts of the ram.

GIBS

CHECKING GIB ADJUSTMENTS: Gib adjustments should only be made by those who are acquainted with the operation. In general, gibs should

be tight enough to eliminate all play, but not so tight that there will be a heavy drag on the working parts. Gibs that are too loose will result in inaccurate work. Gibs that are too tight will cause severe wear and strain on the operating mechanisms.

The gibs are properly adjusted when leaving the factory and should not be readjusted unless absolutely necessary. The table gib is adjusted by means of two shouldered screws located on each end of the saddle. By loosening one and tightening the other, the taper gib may be adjusted as needed.

The taper saddle gib likewise is adjusted by shouldered screws located at the front and rear edges. The knee gib which is of the double angle type is solidly clamped in position, but can be adjusted by means of five spreader screws located in the gib itself. To tighten the gib the holding screws should first be loosened slightly. Next, the spreader screws should be moved a very slight amount, all equally, after which the holding screws should then be solidly locked in position.

TABLE FEED SCREW

The table feed screw has two nuts by which any adjustment is made. To get at these nuts it is necessary to remove the feed screw bearing brackets from each end of the table and slide the table off the machine. The nut on the left is fixed and any adjustment is made by loosening the cap holding the right nut. A pin

may then be inserted in any one of the many holes around the flange of the nut and the nut turned until the end play is from .002" to .005". After completing the adjustment the cap should again be tightened.

SADDLE FEED SCREW

The saddle feed screw is adjusted by means of an adjustable nut in the rear end of the bracket carrying the screw under the saddle. To adjust, the hollow head hex screw locking this nut should first be loosened and then the feed screw nut may be turned until the end play is from .002" to .005". After making the desired adjustment the locking screw should again be tightened.

RAPID TRAVERSE CLUTCH

The rapid traverse clutch is of multiple disc type. Should it be necessary to adjust for any reason, this may be done by removing the cover on right side of the knee to gain access to the clutch. Instructions for adjustment are shown on plate mounted on the cover.

SHEAR PIN

In conjunction with the knee safety clutch there is an added safety feature — a shear pin. This shear pin (Fig. 4) fits through the hub of the drive gear and the drive shaft. Should this pin break the machine will have no power feeds.

To replace this shear pin, drain the oil from the knee and remove the shifter cover from the left side of the knee.

To remove the shifter, place the High-Low feed lever (Fig. 1) in the neutral position, remove all screws and the knee binder (Fig. 1). Draw the shifter cover straight out.

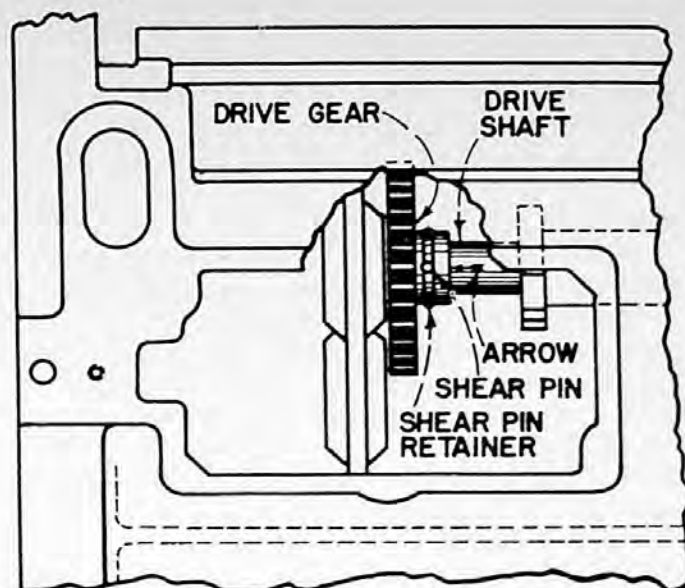


FIGURE 4

Line the arrow (Fig. 4) on the drive shaft with the arrow (Fig. 4) on the hub of the drive gear. If there is no arrow on the hub of the gear, line the arrow on the drive shaft with the shear pin hole as in Figure 4.

Replace this pin with one of equal size made of soft steel and replace the snap ring retainer.

Replace the shifter cover, taking care that the vertical feed lever (Fig. 1) does not become disengaged while this cover is being positioned.

Replace the oil in the knee and test the machine to see if this rectifies the trouble.

LUBRICATION

Lubrication of this machine has been very thoroughly developed so that a minimum of attention is required. However, it is absolutely essential that inspection be made at necessary intervals.

In all units where oil is specified unless otherwise indicated, we recommend a good grade oil with a viscosity of approximately 300 S.U.V. (Seybolt Universal Viscosity) at 100° Fahrenheit.

It is recommended that the oil be drained from the ram, knee and cutterhead every four months. The reservoir should then be cleaned with a light flushing oil. The machine may be run up to five minutes with this flushing oil, after which it should be drained and the reservoir refilled to the proper level with the recommended lubricant.

CUTTERHEAD

The front bearing and spiral bevel gear are lubricated from the supply of oil in the cutterhead. The oil level should be kept up to the oil level sight (Fig. 1)

with the head in a horizontal position and the spindle stationary. A pipe plug is located in the top of the head for replenishing the oil and a drain plug in the bottom. The capacity of the head is one pint.

The rear bearing should be lubricated every four weeks with grease through alemite-zerk fitting provided. A high quality anti-friction bearing grease should be used.

TABLE AND SADDLE

The table and saddle mechanism, as well as saddle and table ways, are lubricated by means of a one-shot oiling device (Fig. 2) located in the front of the saddle. By pulling the plunger the necessary oil is distributed to these surfaces. This plunger should be operated every hour or two depending upon the use of the machine. The oil reservoir holds sufficient oil for several weeks' operation. An oil sight located in the front of the reservoir indicates the oil level and oil should be added as required.

TABLE FEED SCREW BEARING

The grease fitting, located in the bracket at the left end of the table, should be replenished with a good grade anti-friction bearing grease approximately every four weeks. The feed screw bearing at right end of table is of grease seal type and requires no attention.

RAM

An oil level sight glass (Fig. 2) is provided on the right front side of the ram for inspection of the oil level. When the ram gears are stationary, the oil level should be at the center of the sight glass. When necessary, the oil may be replenished through the small cover in the top of the ram immediately behind the speed change levers. Oil can be drained by removing plug located on the underside of ram near front. The capacity of the ram is about 3 quarts.

KNEE

Inspection of the oil level in the knee is made through the sight glass located on the right side of the knee. The oil filler plug is conveniently located right beside the oil sight. A drain plug is located on the underside of the knee. The capacity of the knee is about 8 quarts.

COLUMN

The knee bearing face on the column should be lubricated by means of an oil can at least once a day.

VERTICAL FEED SCREW

Access to the oil reservoir for lubricating the vertical feed screw is gained by removing the pipe plug on the left side of the horn. The reservoir should be filled every 2 weeks.

POWER FEED DRIVE

The bearings and gears for the power feed drive transmission located in the base of the machine at the

front of the column should be greased approximately every four weeks with a good grade anti-friction bearing grease by means of the grease fitting provided.

FEED DRIVE CHAIN

The feed drive chain located in the column is provided with an oil reservoir which may be seen by removing the cover on the right-hand side of the column. Oil should be placed in the reservoir so that the slinger dips in the surface to a depth of approximately $\frac{1}{4}$ " ; care should be taken to see that Sprocket and Chain are ABOVE oil level. This slinger carries oil to the chain guard from where it drips on the chain, thus providing ample lubrication. This oil level should be checked every four to six weeks. Use a good grade oil with an approximate S.U.V. of 85 secs. at 210° F.

MISCELLANEOUS LUBRICATION

A ball oiler is provided for lubricating ram adjustment (Fig. 1) (crank square). A few drops of light oil applied through the provided ball oiler about once every four weeks will be ample.

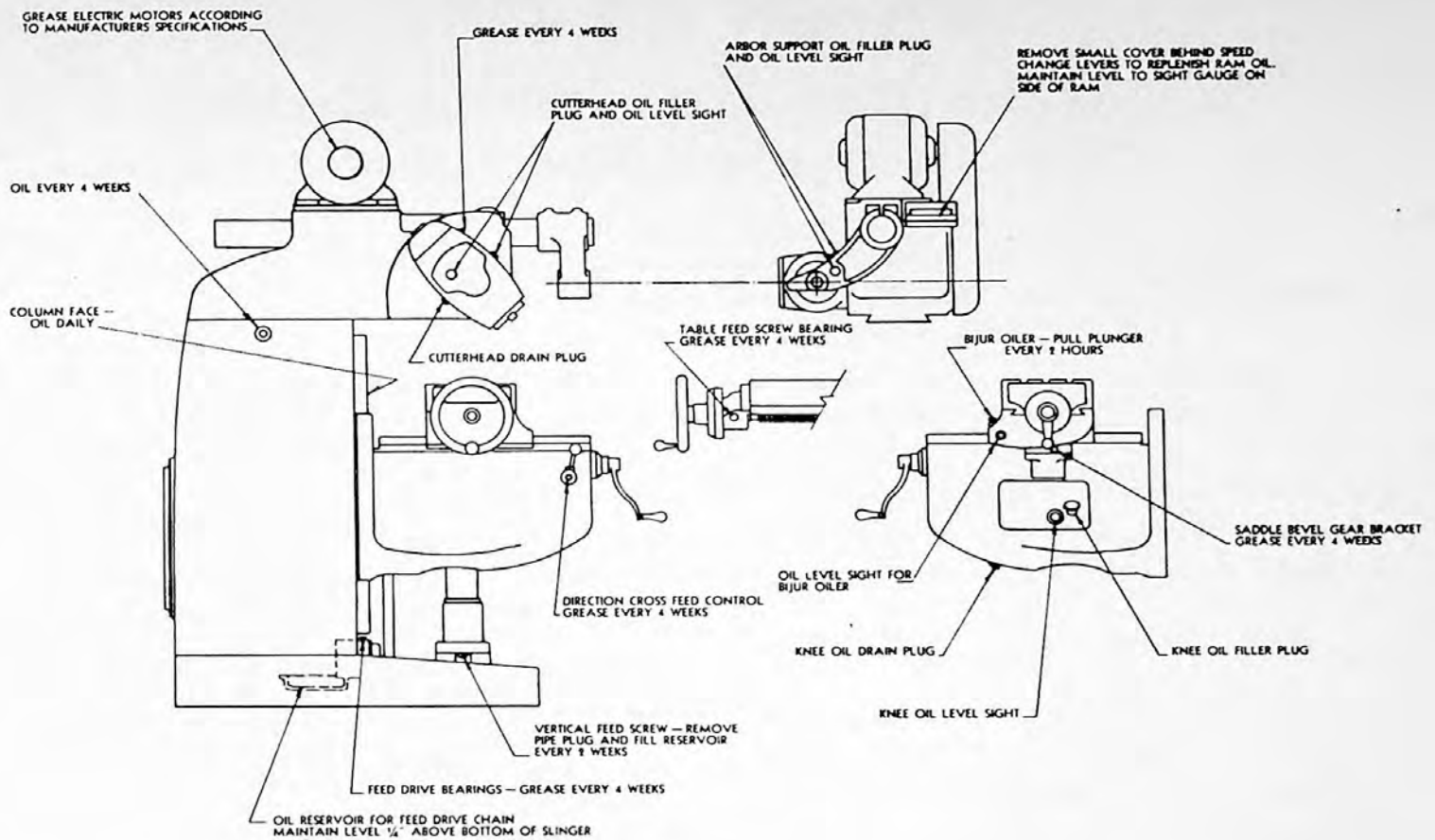
A grease fitting is provided on the front directional cross feed control. This should be greased every four weeks with a good grade anti-friction bearing grease.

The arbor supports are provided with an oil reservoir which holds sufficient oil for several weeks' lubrication. The reservoir is filled by removing plug and filling with oil until the sight gauge is completely covered. To lubricate the arbor bushing it is then merely necessary to occasionally push the pin plunger which permits a drop or two of oil to pass through an oil hole directly to the arbor bushing.

A grease fitting is provided on the right-hand side of the saddle to lubricate the bevel gear bracket. This should be greased every 4 weeks with a good grade anti-friction bearing grease.

Both the feed and spindle drive motors should be lubricated every six months or as specified by the electrical manufacturers.

LUBRICATION



<i>Lubrication Point</i>	<i>Type of Lubricant</i>	<i>Capacity</i>	<i>Frequency</i>
Knee	300 S.U.V. at 100° F. Oil	8 Quarts	As Indicated by Level
Ram	300 S.U.V. at 100° F. Oil	3 Quarts	As Indicated by Level!
Cutterhead — Front Bearing and Bevel Gear	300 S.U.V. at 100° F. Oil	1 Pint	As Indicated by Level
Cutterhead — Rear Bearing	Good Grade Bearing Grease		Every 4 Weeks
Saddle and Table Ways	300 S.U.V. at 100° F. Oil		Bijur Oiler
Feed Drive — Chain	85 S.U.V. at 210° F. Oil		Every 4 Weeks
Feed Drive — Bearings	Good Grade Bearing Grease		Every 4 Weeks
Table Feed Screw Bearing	Good Grade Bearing Grease		Every 4 Weeks
Directional Cross Feed Control	Good Grade Bearing Grease		Every 4 Weeks
Column	300 S.U.V. at 100° F. Oil		Daily
Saddle Bevel Gear Bracket	Good Grade Bearing Grease		Every 4 Weeks
Vertical Feed Screw	300 S.U.V. at 100° F. Oil		Every 2 Weeks
Ram Adjustment Shaft	300 S.U.V. at 100° F. Oil		Every 4 Weeks
Arbor Supports	300 S.U.V. at 100° F. Oil		
Motors	Grease Every 6 Months or as Specified By Manufacturer		

Instructions for Ordering Replacement Parts for Nos. 22L and 22M

Van Norman Ram Type Milling Machines Plain, Universal and Special Models

The following pages contain full information to enable users of No. 22L and No. 22M Ram Type Milling Machines to order replacement parts with the minimum of effort.

We have endeavored to simplify the identification and selection of such parts through the use of sketches of parts for each major unit of the machine. Each part is identified by its part number.

The 22L Special and 22M use the same parts throughout as the No. 22L with the exception of those which are listed below. In ordering any of these parts for the 22L Special or 22M, select the part number shown for the No. 22L Model and refer to the listing below for the corresponding part number.

<i>Name</i>	<i>No. 22L</i>	<i>No. 22L SPECIAL</i>	<i>No. 22M</i>
Column.....	22L-100	22P-100	22P-100
Column Tee Slot Housing.....	22L-114	22P-125	22P-125
Column Hand Hole Cover.....	26 -109	22P-101	22P-101
Model No. Plate.....	22L-108	22L-152	22P-126
Serial No. Plate.....	22L-186	22L-186	22L-185
Feed Drive Vertical Spline Shaft.....	22L-132	22P-105	22P-117
Knee Elevating Horn.....	22L-810	22P-136	22P-137
Knee Elevating Screw (Hollow).....	M-187	22P-103	22P-116
Knee Elevating Screw (Solid).....	2L-411	22P-104	22P-104
Knee Bevel Drive Gear.....	22L-146	22P-120	22P-121
Set of Knee Telescoping Tubes.....	22L-803 thru 22L-808	(129 (130 22P-(131 (132 (134	22P-129 thru 22P-133
Outer Brace.....	22L-310	22L-315	22L-315
Table.....	2L-700	2L-700	M-163
Table Feed Screw.....	2L-703	2L-703	M-166
Table Gib.....	2L-817	2L-817	M-167
Saddle — Plain.....	22L-200	22L-200	22L-225
Universal Saddle Body.....	2L-901	2L-901	M-170

The No. 50 National Standard Taper Spindle is standard with the No. 22L and No. 22M Models; however, these machines are furnished with a No. 40 National Standard Taper or No. 13 B.&S. Taper upon request. Cutterheads with these optional tapers use the same parts as the No. 50 N. S. Taper cutterhead with the exception of those listed below. In ordering any of these parts, select the part shown for the No. 50 N. S. Taper cutterhead, then refer to the table below for the appropriate part number.

<i>Part Name</i>	<i>No. 50 Taper</i>	<i>No. 40 Taper</i>	<i>No. 13 B.&S. Taper</i>
Spindle.....	22L-755	22L-774	22L-769
Cutterhead Front Plate.....	22L-770	22L-771	22L-771
Spindle Oil Slinger.....	None	22L-772	22L-772
Spindle Driving Lug.....	2-126	22-1141	None
Spindle Driving Lug Screw.....	9111	6748	None
Spindle Front Nut.....	None	None	112-446
Spindle Oil Seal (Front).....	14768	14707	14707
Draw-in Bar.....	26-718	22-1143	22L-707
Draw-in Bar Nut.....	26-720	22-1145	26-720
Draw-in Bar Knob.....	2-141	22-1144	2-141
Draw-in Bar Knob Pin.....	5307	None	5307
Draw-in Bar Key.....	None	8057	None
Arbor Support Pilot Sleeve.....	26-475	26-475	26-485

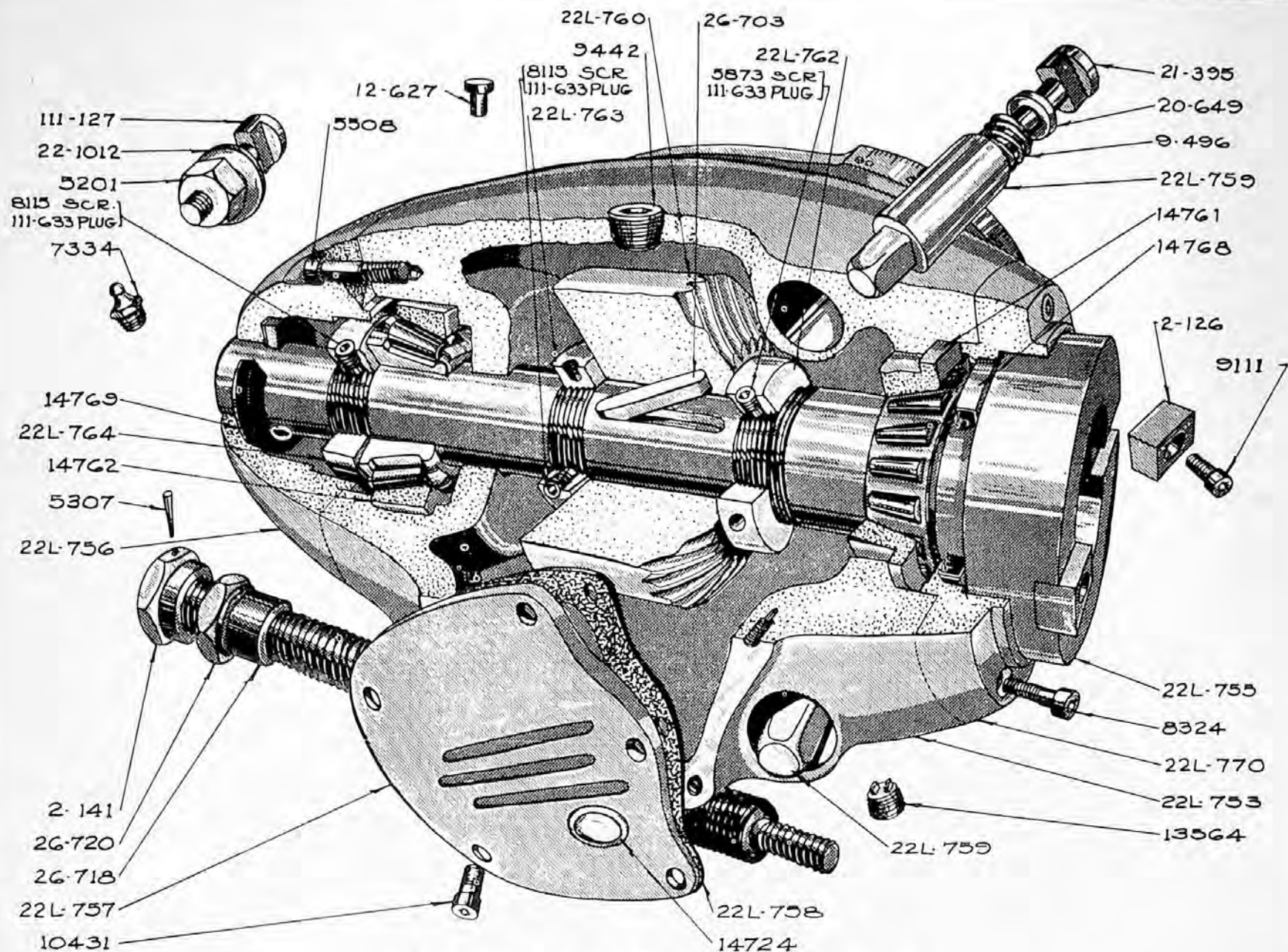
It is important that in any correspondence with the factory regarding parts, the model and serial numbers of machines should be given. The serial number is stamped on the front face of the column near the top of all Van Norman Milling Machines, also all machines manufactured after March, 1947, carry a plate on the right side of the machine giving the model and serial number.

This is the second printing of the Nos. 22L and 22M Parts Lists. At the time of printing it was accurate for machines built after September, 1947, beginning with Serial No. 22L-6943. The machines are continuously being improved and if your machine varies in any respect from this it is only because it has been improved to give you better performance.

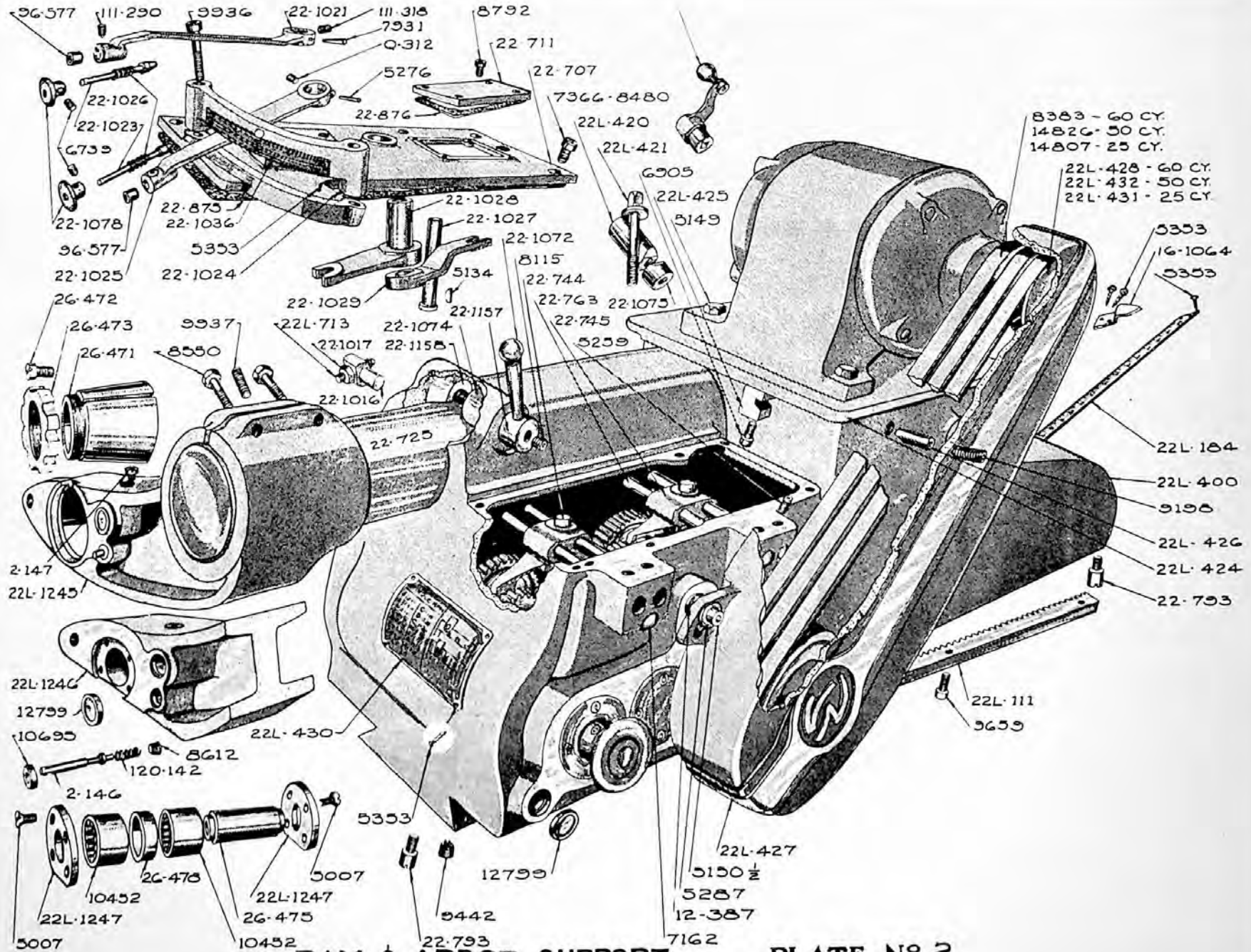
The design and specifications of these machines are subject to change without notice.

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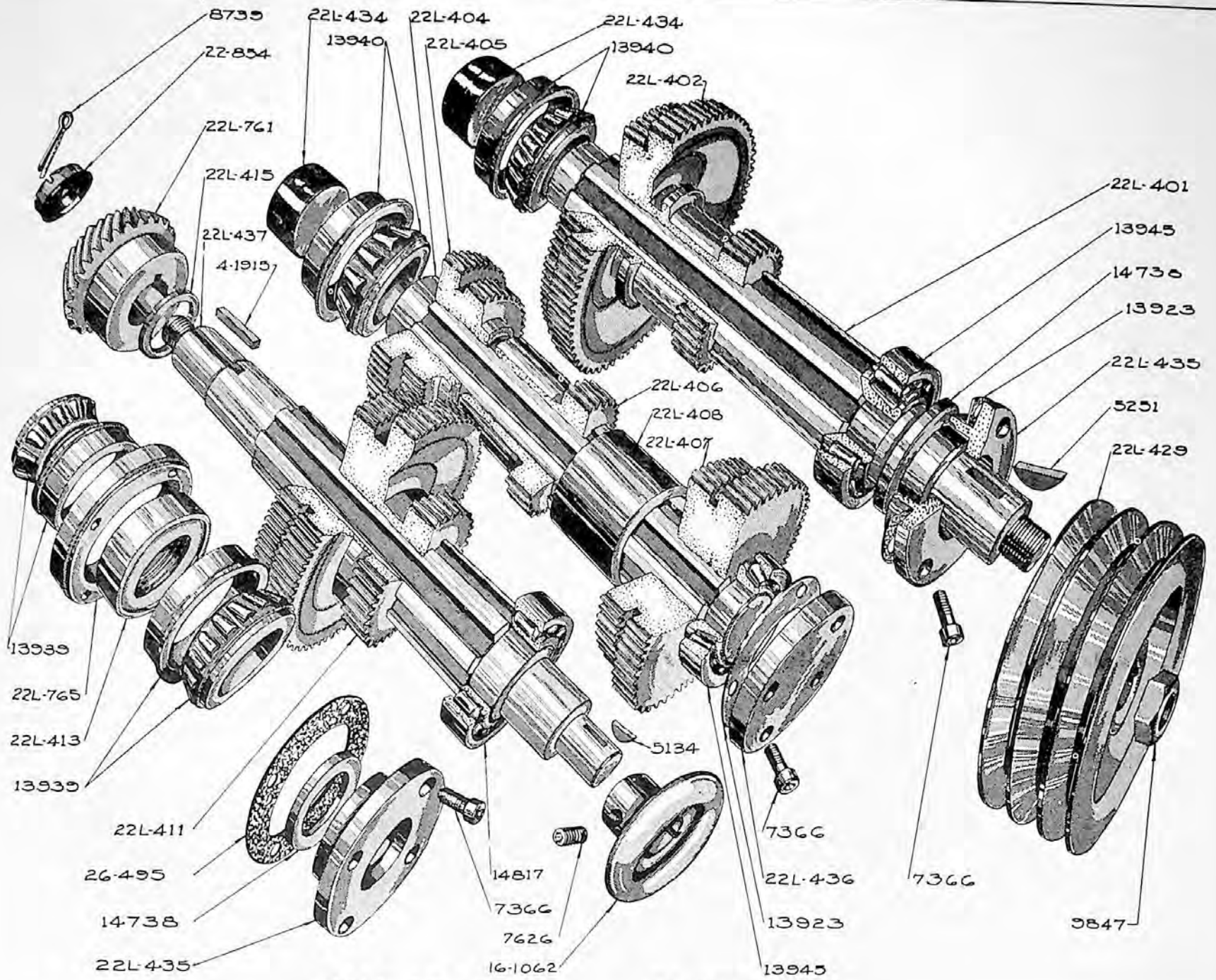


CUTTERHEAD PLATE No. 1



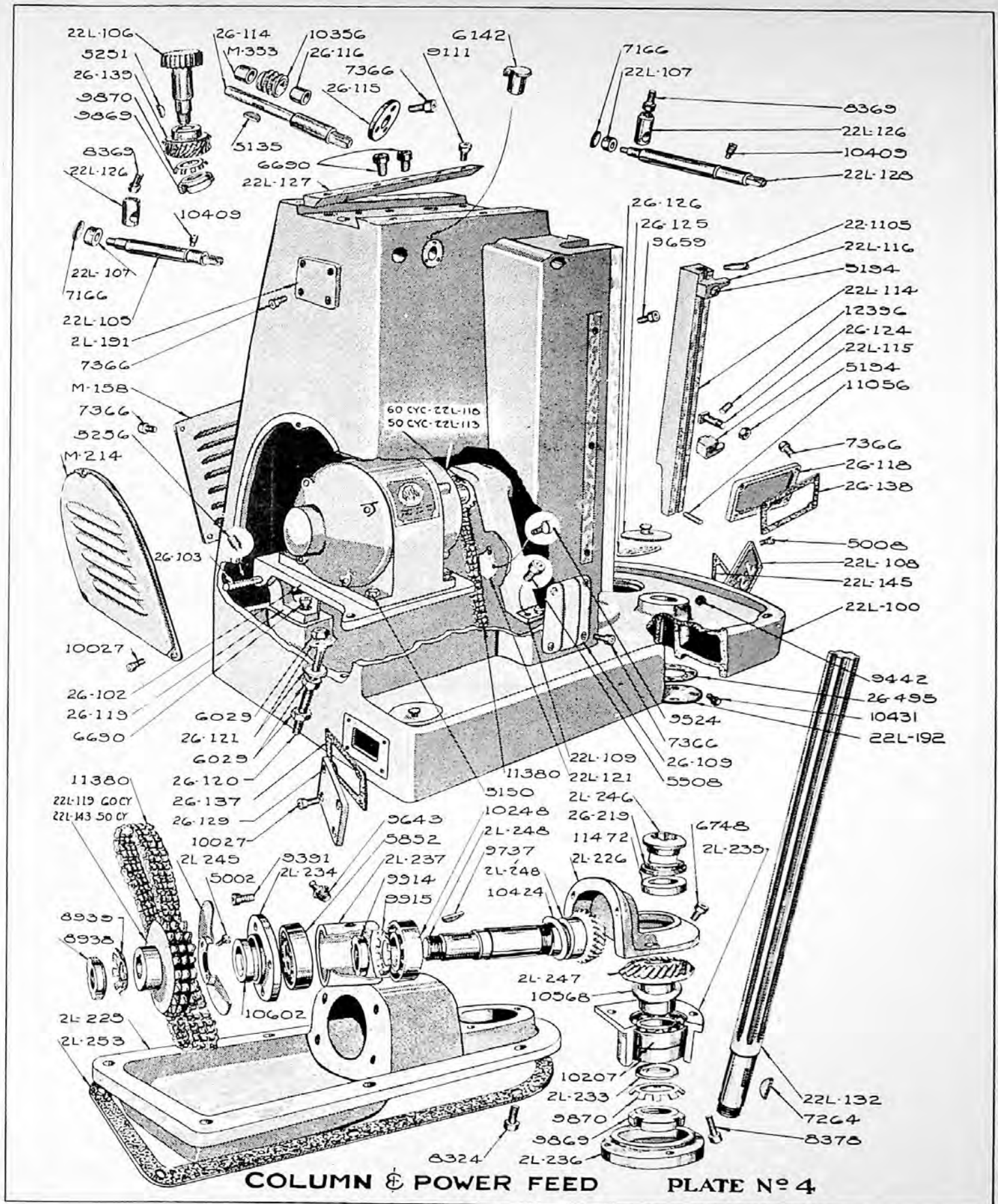
RAM & ARBOR SUPPORT

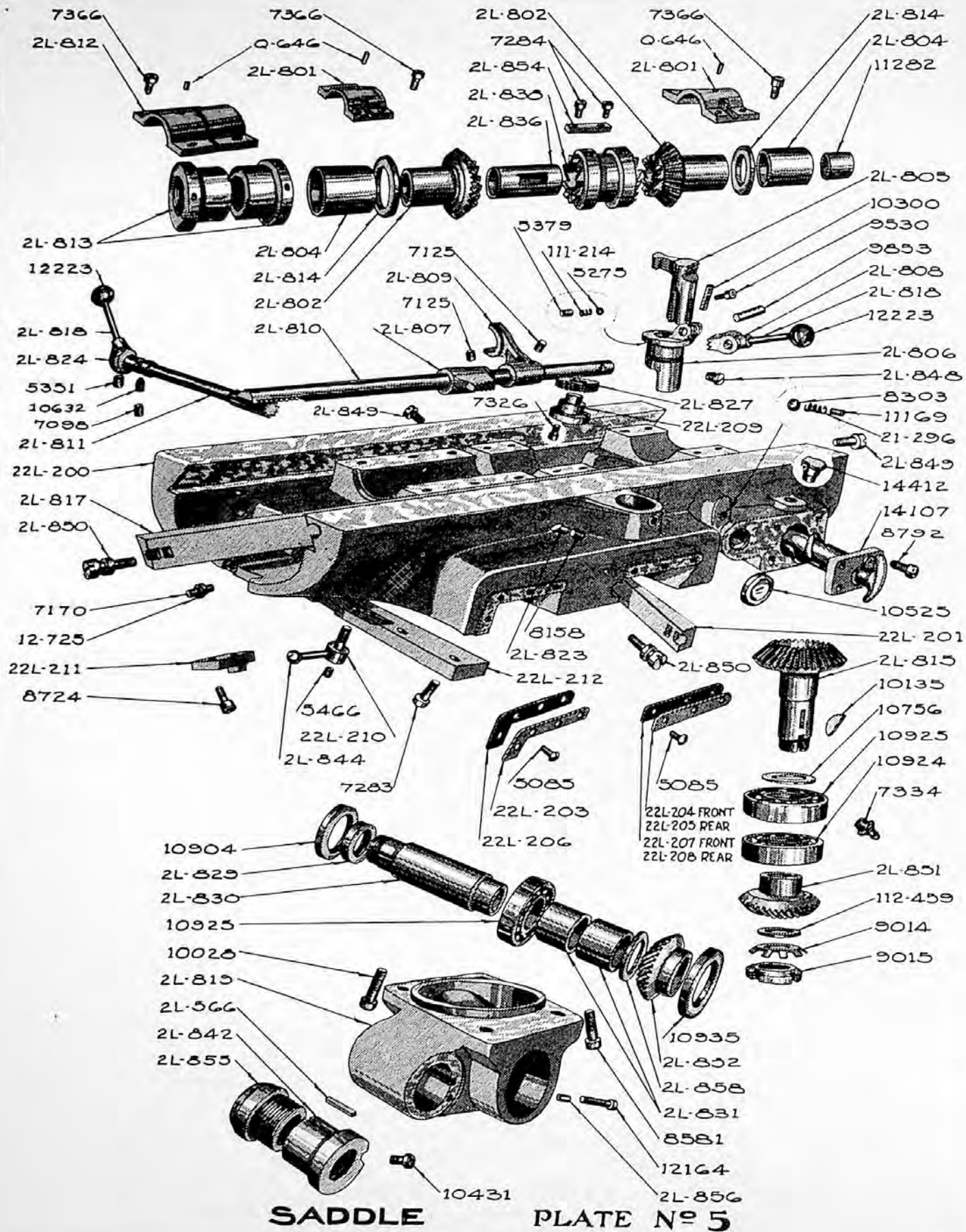
PLATE No 2

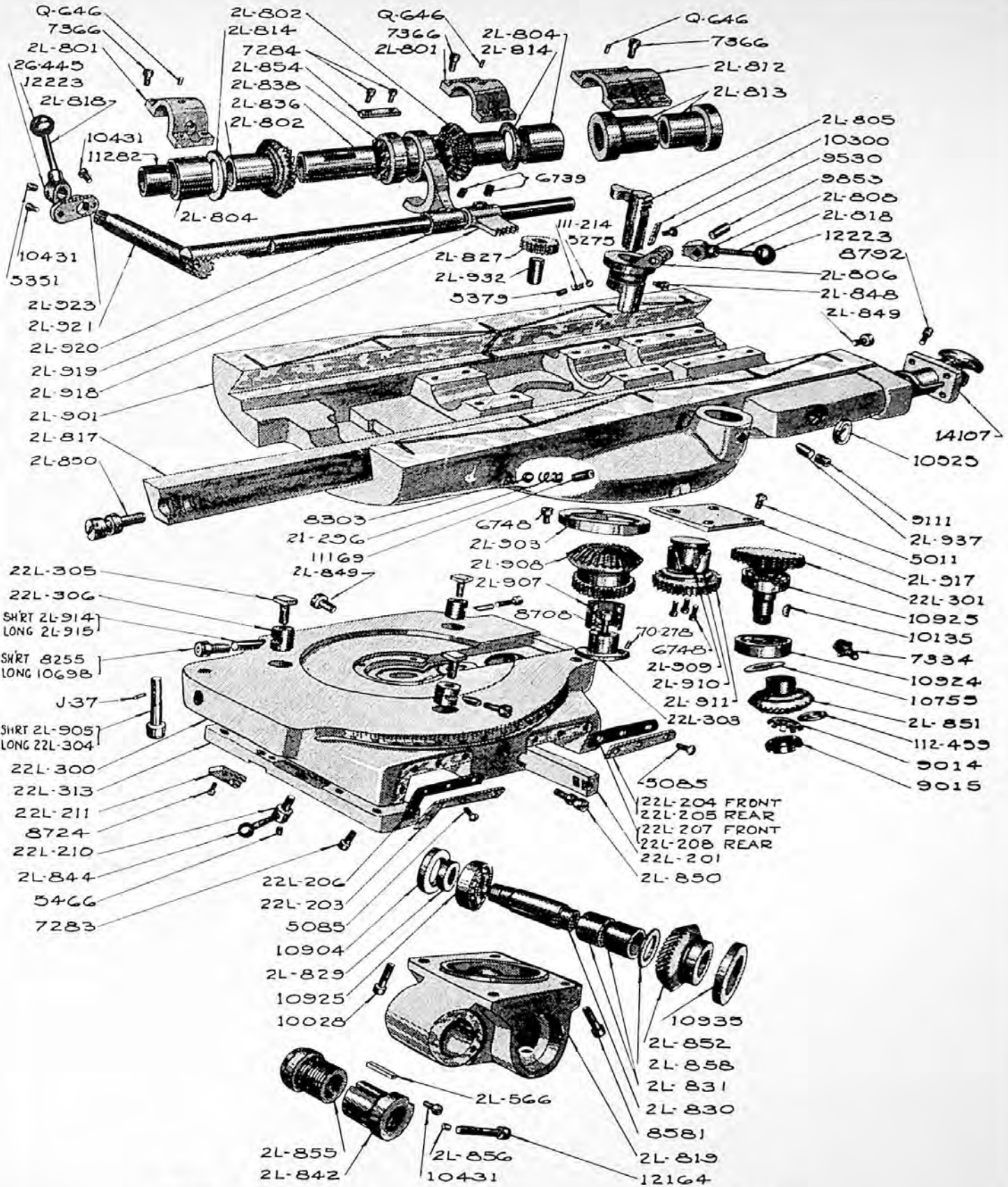


RAM GEARING

PLATE No 3

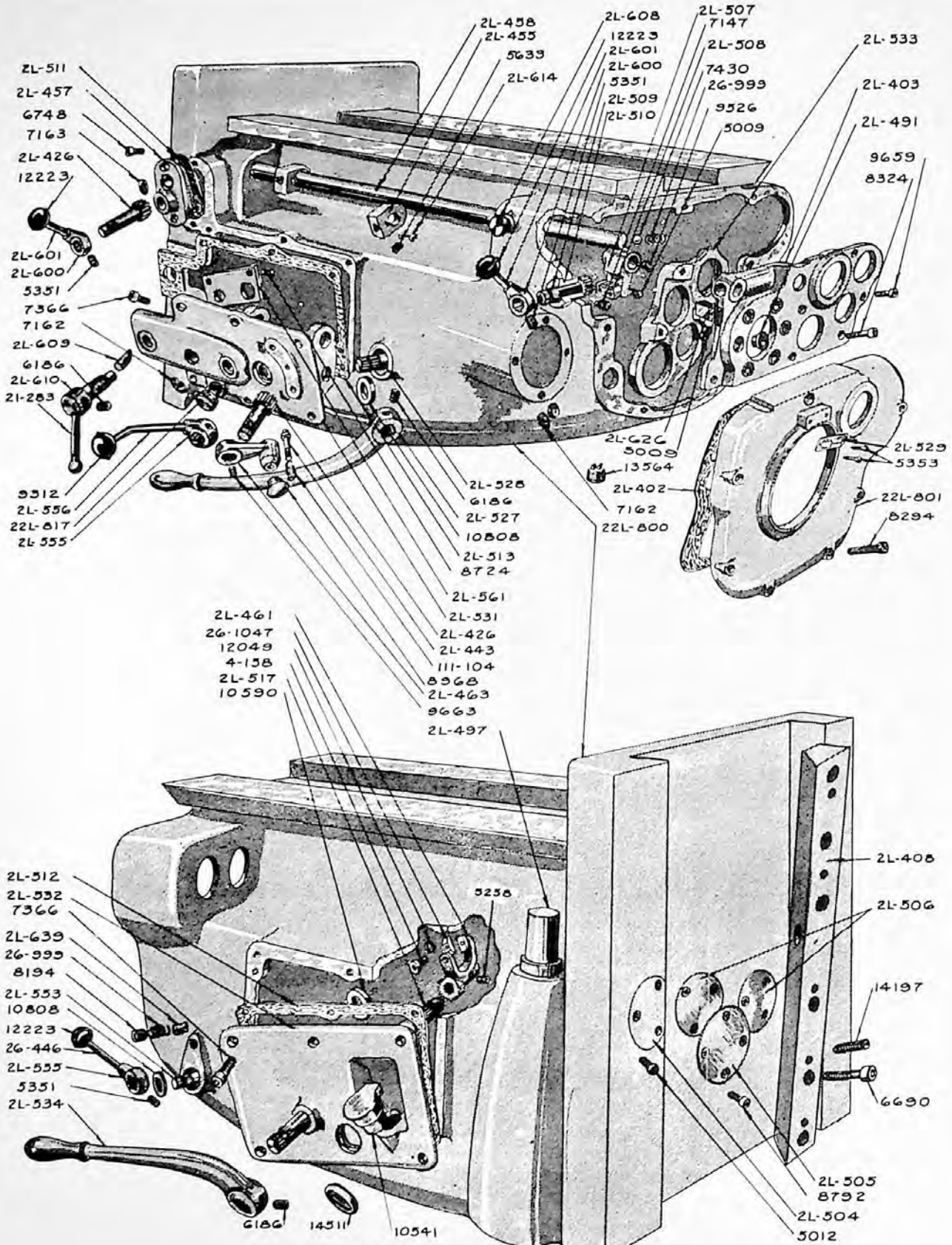




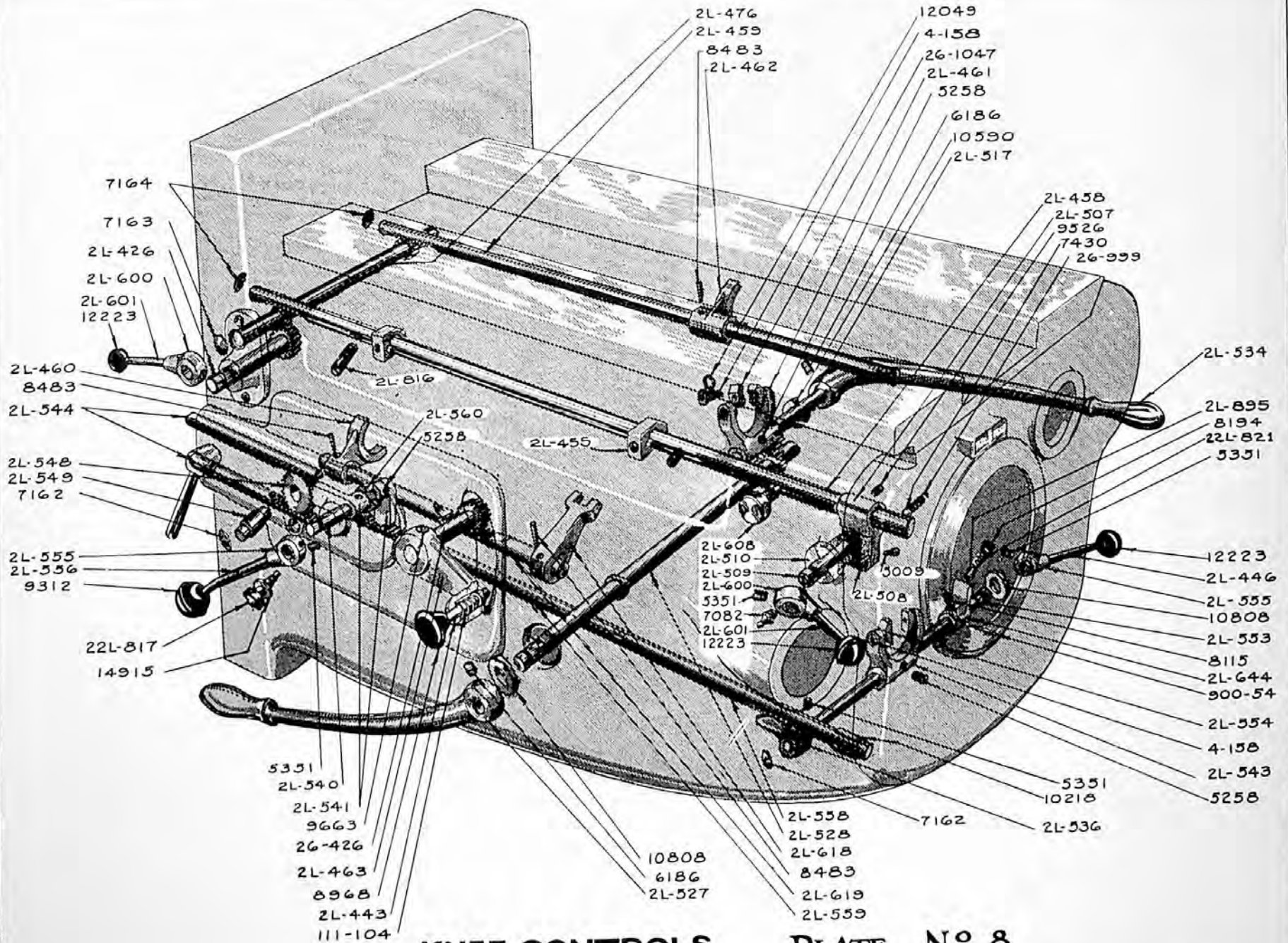


UNIVERSAL SADDLE

PLATE N°6

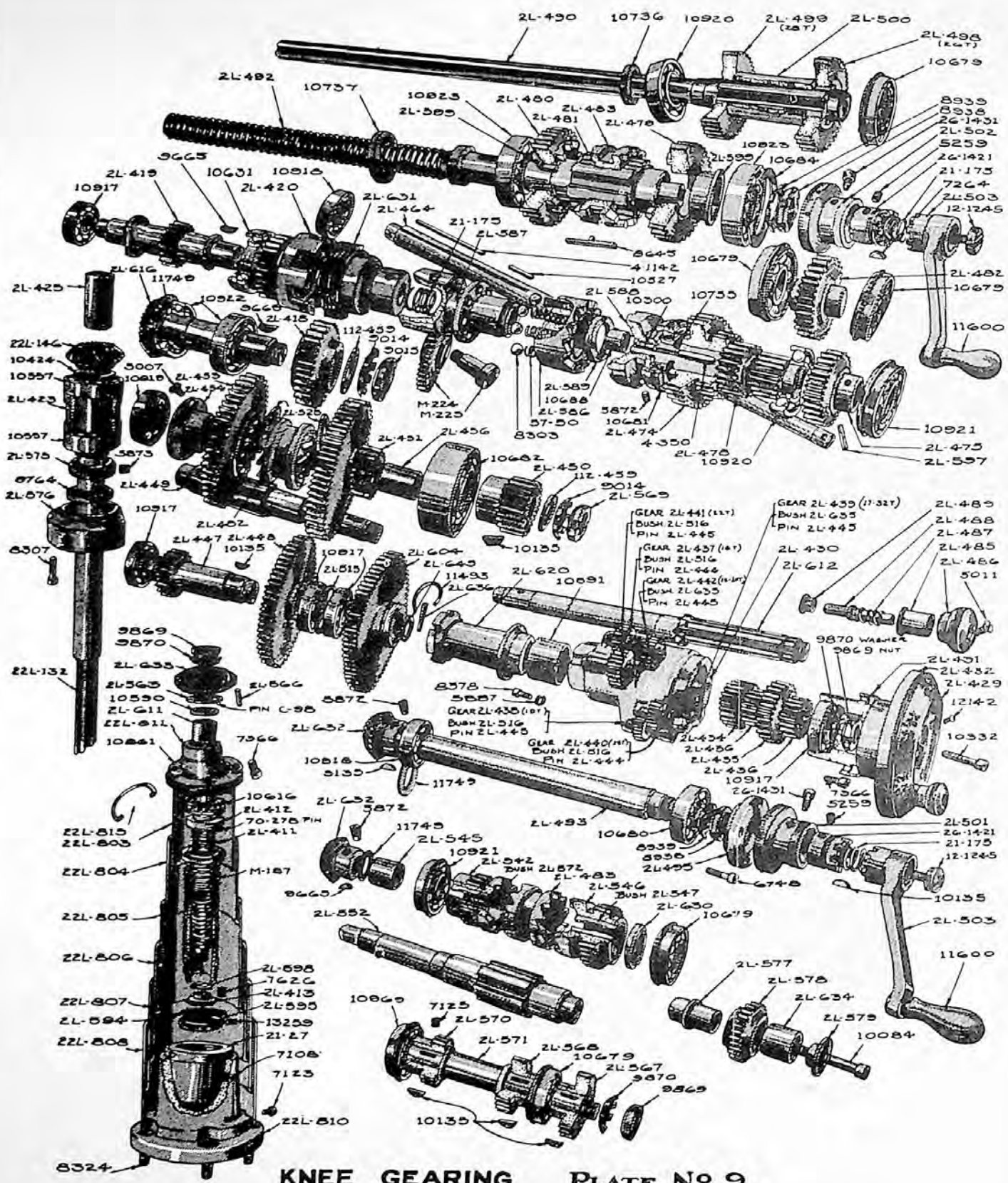


KNEE PLATE N° 7



KNEE CONTROLS

PLATE No 8



KNEE GEARING PLATE No 9

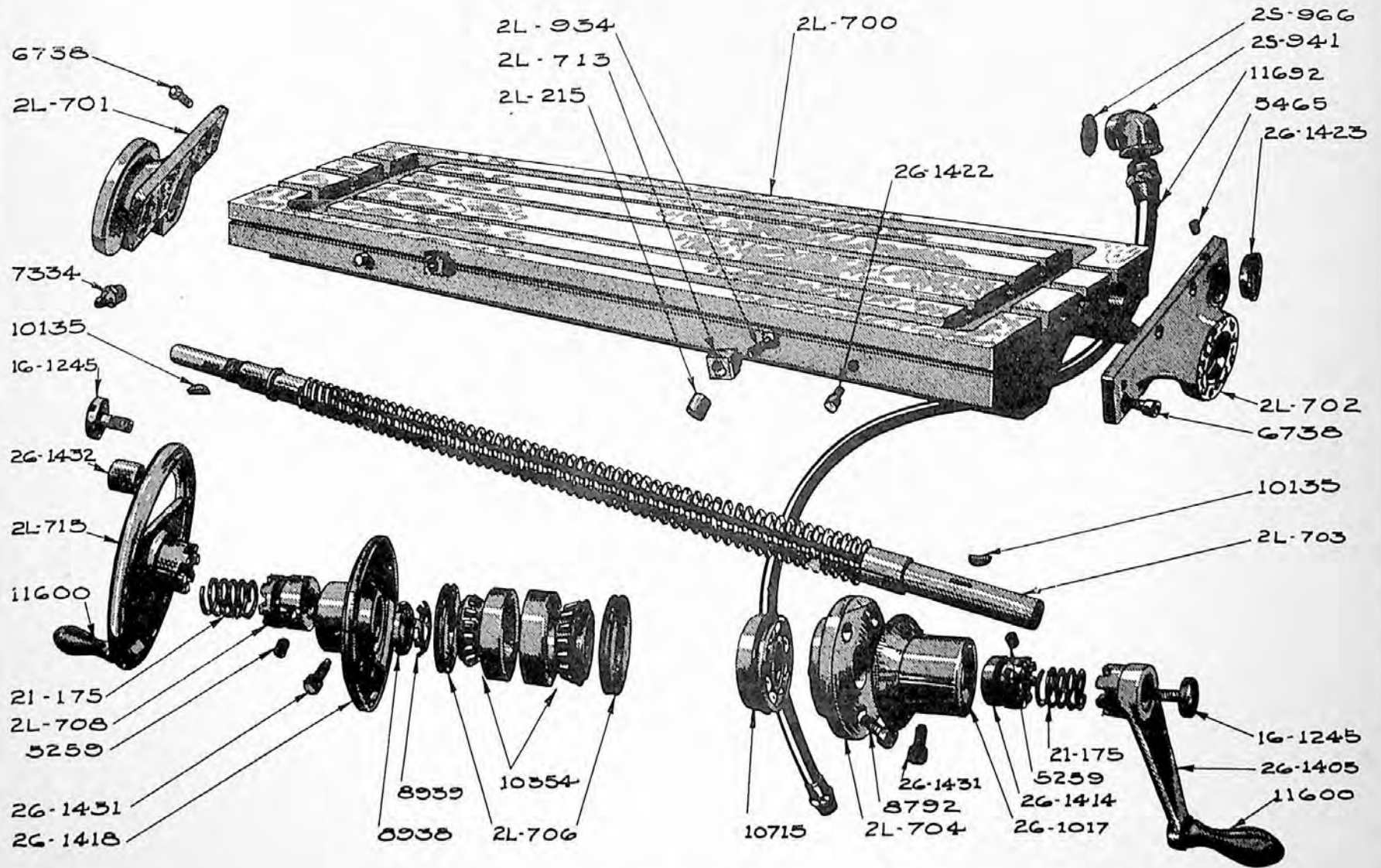


TABLE DETAILS PLATE N° 10