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MAINTENANCE & REPLACEMENT PARTS MANUAL

GORTON 0-16A MILL & DUPLICATOR

Vertical and Universal Models
OPERATION--LUBRICATION--ADJUSTMENT
INCLUDING PARTS CATALOG

IMPORTANT

The machine to which this manual applies has been carefully assembled, inspected and test-run under maximum load at the Gorton factory. It is in satisfactory operating condition. Routine operations and adjustments are explained herein, but the manufacturer will not be held responsible for satisfactory operation if unauthorized modifications, alterations or major repairs are attempted without specific instructions from the factory. One of these manuals is furnished with each machine. Additional copies may be purchased direct from the George Gorton Machine Co. at \$2.50 each.

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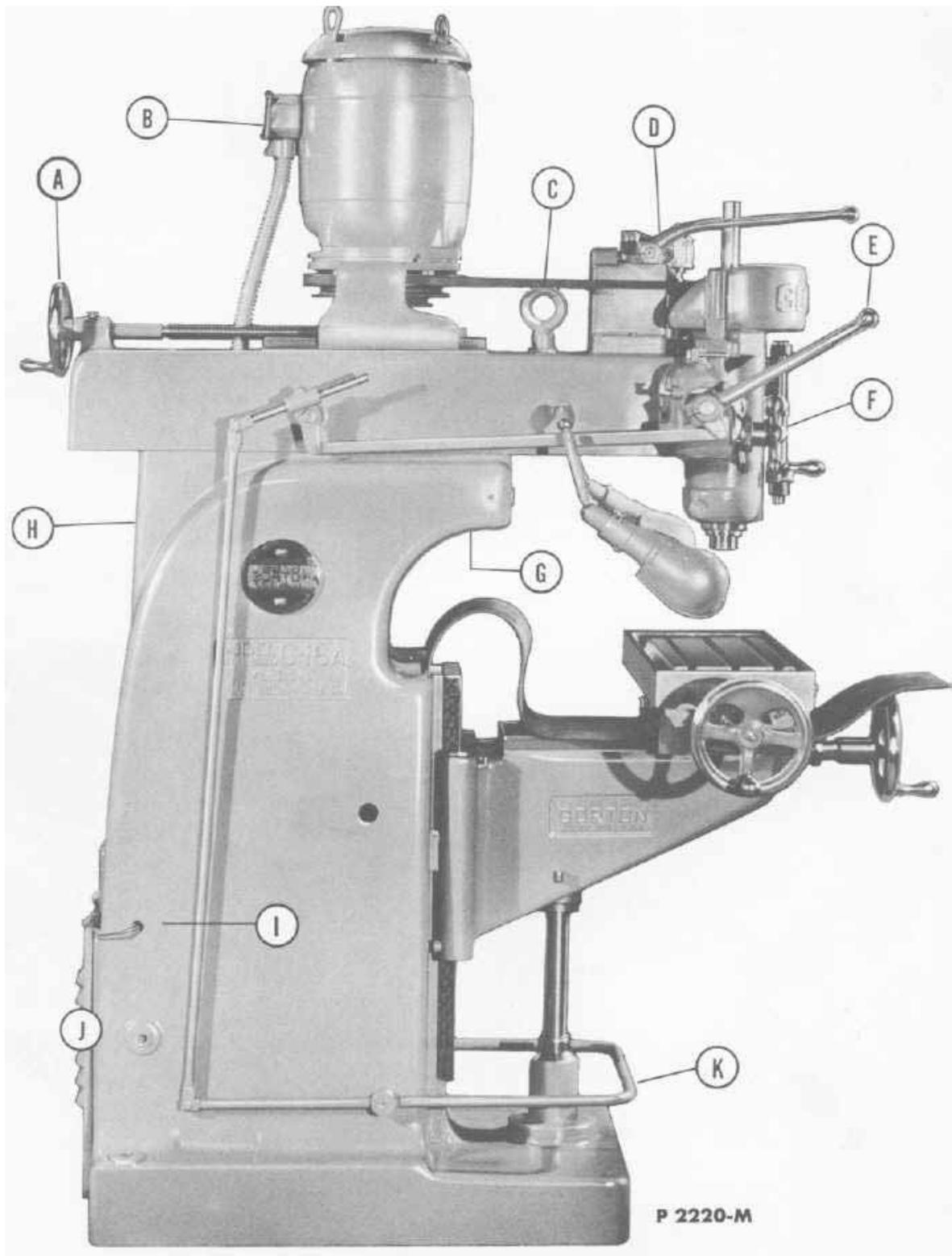


Figure 1

- | | |
|--|---|
| A. Belt Adjustment Hand Wheel | G. Front Ram Clamping Bolt |
| B. Terminal Housing Box on Motor and Power Line to Motor (Disconnected for Shipment) | H. Rear Ram Clamping Bolt |
| C. Eye Bolt for Lifting | I. Main Power Line Leads |
| D. Spindle Start-Stop-Brake (land Lever) | J. Coolant Compartment Cover and Hole for Coolant Return Line |
| E. Left-hand Spindle Feed Lever | K. Spindle Feed Foot Treadle |
| F. Micrometer Spindle Feed Crank | |

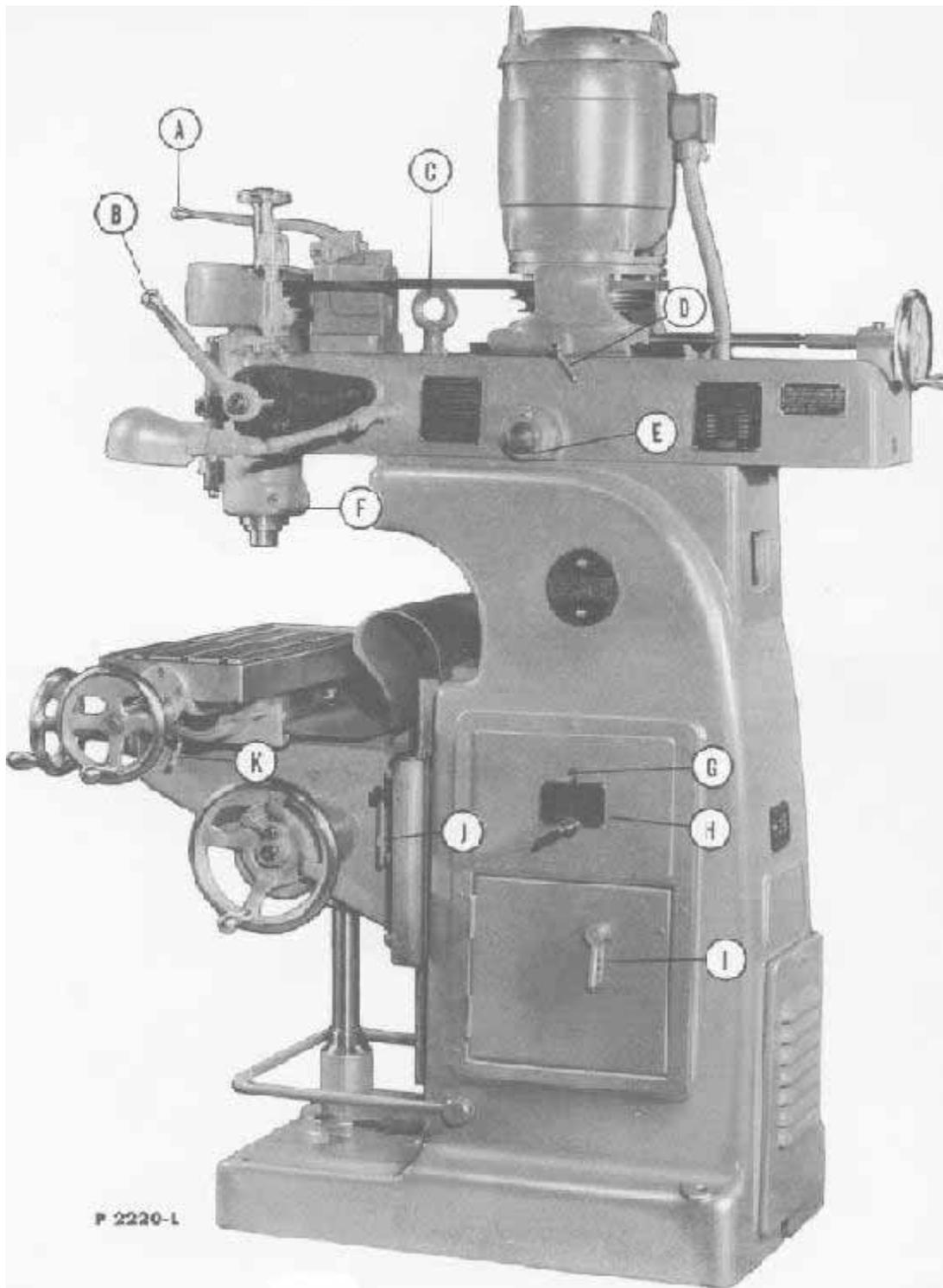
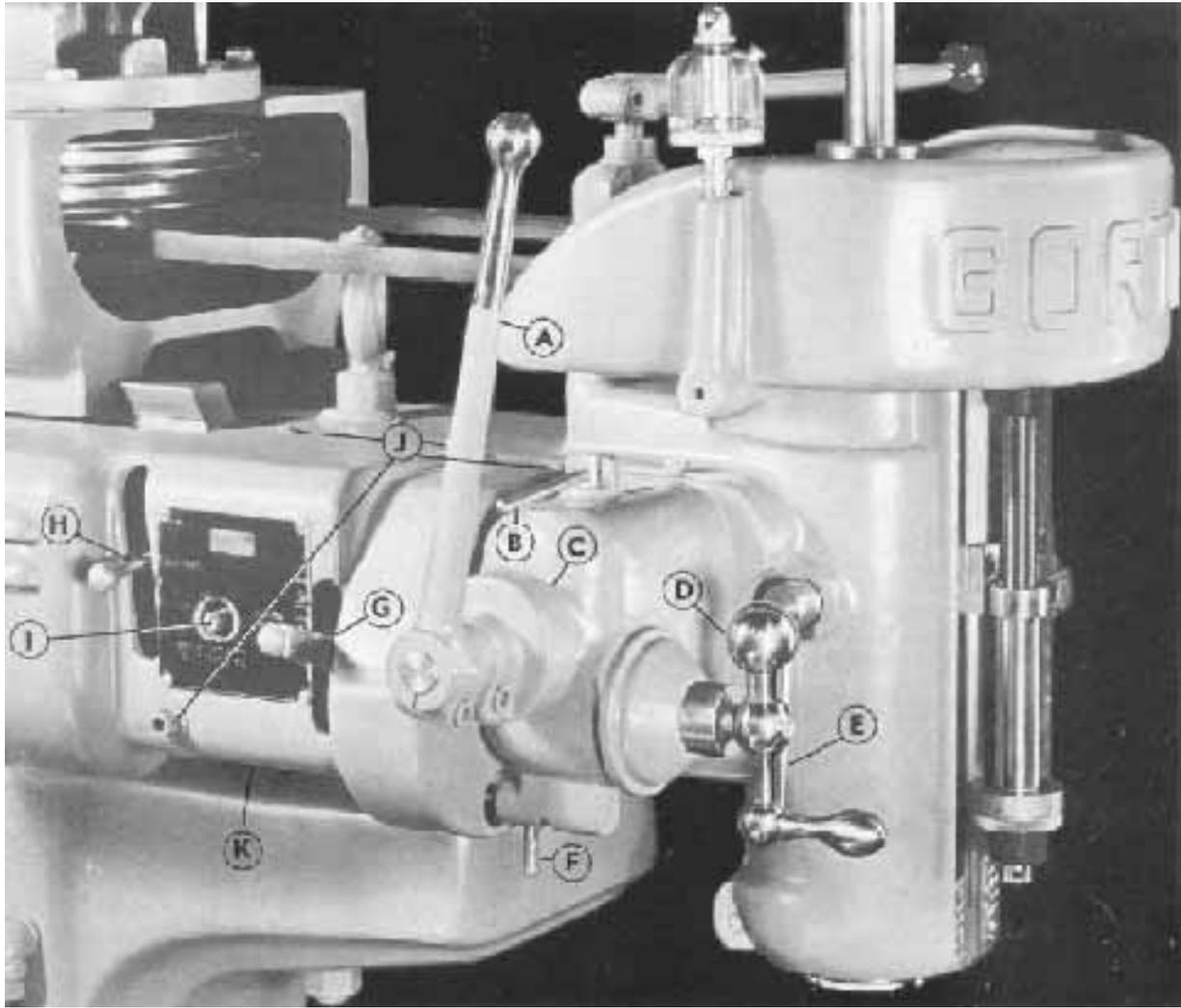


Figure 2

- | | |
|--|--------------------------|
| A. Spindle Start-Stop-Brake Hand Lever | G. Coolant On-Off Switch |
| B. Righthand Spindle Feed Lever | H. Two-Speed Switch |
| C. Eye Bolt for Lifting | I. Main Control |
| D. Motor Bracket Locking Lever | J. Knee Clamping Lever |
| E. Ram Adjusting Nut | K. Saddle Clamping Lever |
| F. Clamp Ring Adjusting Screw | |



NEW SPINDLE POWER DOWN FEED UNIT 1194-1

If your machine is equipped with this new unit, information and instructions for operation and maintenance are contained on the front and back of this page only.

- | | |
|---|---|
| A. Left-Hand Spindle Feed Lever | G. Feed Regulator Lever |
| B. Micrometer Spindle Feed Engagement Lever | H. Directional Feed Lever |
| C. Spindle Refraction Adjustment Collar | I. Oil Filler Plug |
| D. Micrometer Spindle Feed Crank | J. 3 Buttonhead Cap Screws and Sockethead Cap Screw |
| E. Spindle Locking Lever | K. Oil Drainout (inside housing) |
| F. Spindle Power Feed Engagement Lever | |

SPINDLE - POWER FEED

The following instructions apply to the 1194-1 Power Down Feed Unit with which (when ordered as original equipment) Gorton O-16A, 8½-D and 9-J Vertical Mills and Duplicators are now equipped.

OPERATION

With spindle motor on, set the micrometer depth stop for correct depth of cut. Now move the micrometer spindle feed engagement lever to rear. Move spindle power feed engagement lever to right and release it- Set feed rate with feed regulator lever and move directional feed lever u, the down position. Spindle will now feed down at the rate previously set.

If it is desired to retract spindle by power, move directional feed lever to the "up" Position. When down feed unit is not in use, set the directional feed lever in the neutral position. Caution: Never release the spindle power down feed

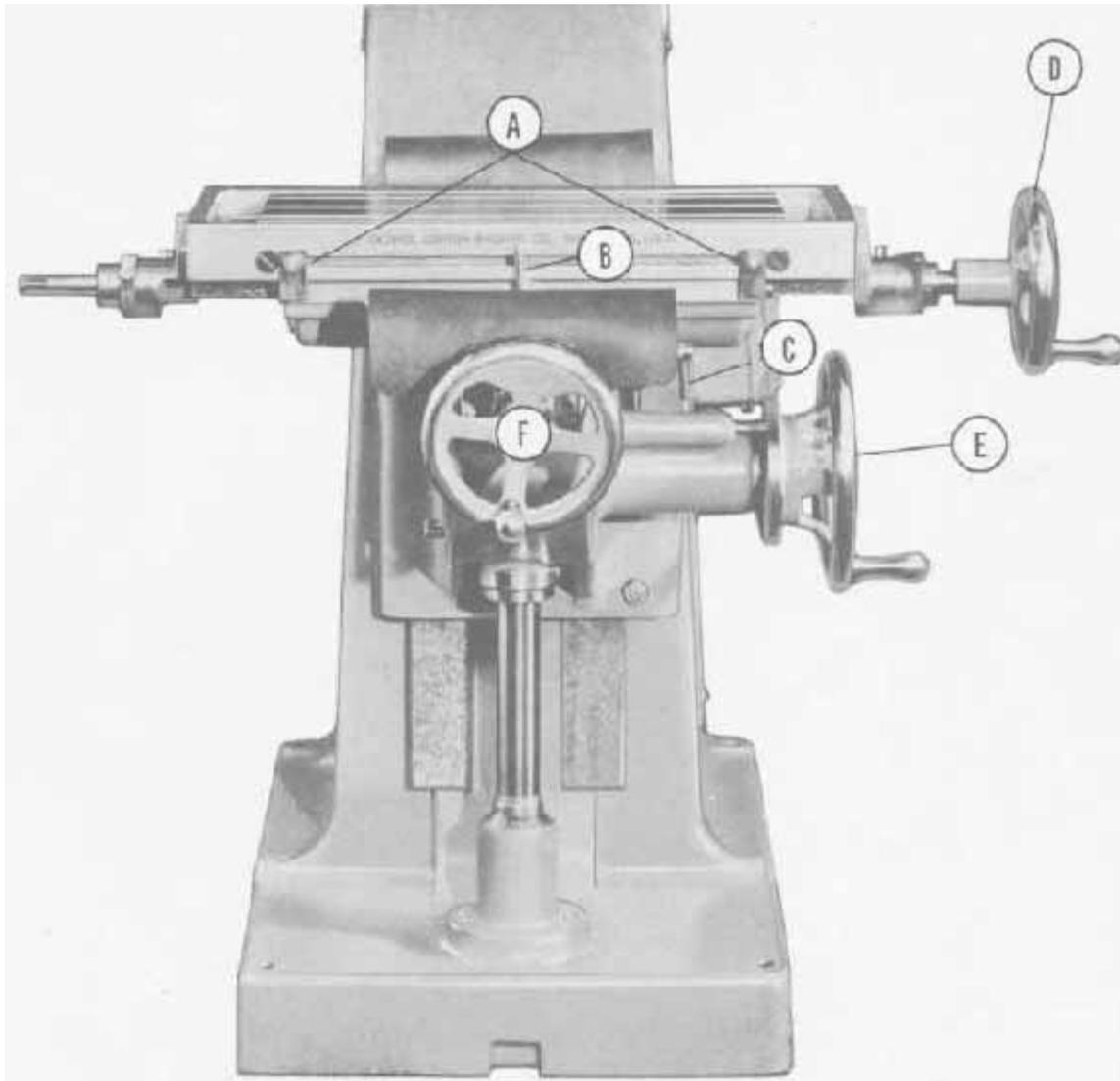
engagement lever while spindle is down against micrometer depth stop.

LUBRICATION

Directions for lubricating this unit are on the feed rate plate- Oil filler plug is slotted screw a. shown- To drain out oil, remove 3 buttonhead cap screws and sockethead cap screw identified in photo on the other side of this page. Remove housing and the drainout plug will be exposed on the underside of the unit.

ADJUSTMENT

With housing removed as explained under "Lubrication" an adjustable friction clutch will be exposed at the rear of micrometer feed shaft. Loosen Allen head setscrew in outer rim of clutch. With spanner wrench loosen by turning counter-clockwise or tighten by turning clockwise the required amount. Be sure to engage and tighten setscrew in mating notch.



P 2220-Q

Figure 4

- | | |
|---|---------------------------------|
| A. Longitudinal Feed Adjustable Stop Dogs | D. Longitudinal Feed Hand Wheel |
| B. Table Clamping Lever | E. Knee Elevate Hand Wheel |
| C. Saddle Clamping Lever | F. Cross Feed Hand Wheel |

SWIVEL-UNIVERSAL HEAD AND RAM ASSEMBLY

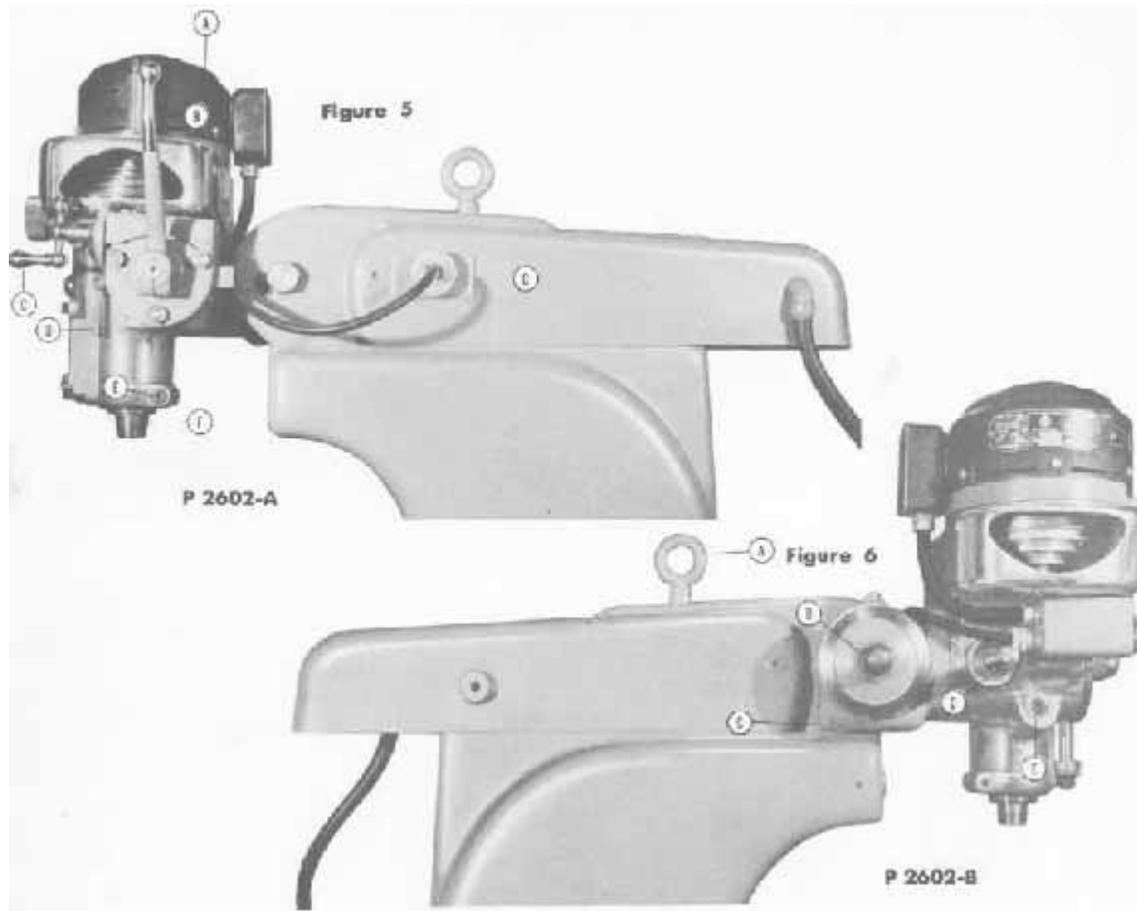


Figure 5

- A. Spindle Motor
- B. Spindle Feed Lever
- C. Micrometer Spindle Feed Crank
- D. Spindle Locking Lever
- E. Clamp Ring Adjusting Screw
- F. Spindle Nose
- G. Swivel-Universal Head Ram

Figure 6

- A. Eye Bolt for Lifting
- B. Universal Locking Hex Nut
- C. Universal Anti-Creep
- D. Spindle Feed Shaft
- E. Swivel Anti-Creep Locking

**SWIVEL-UNIVERSAL HEAD
AND RAM ASSEMBLY**

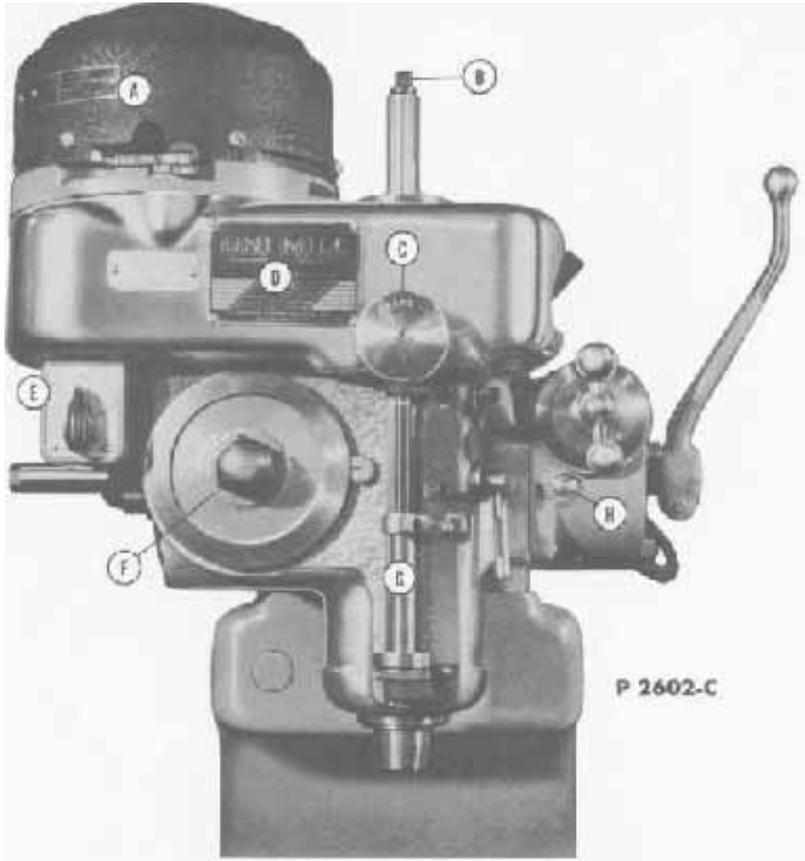


Figure 7

- A. Motor Mounting
- B. Spindle Top
- C. Spindle Brake Knob
- D. Spindle Speed Plate
- E. Spindle Forward-Reverse Lever
- F. Swivel Locking Hex
- G. Micrometer Depth Stop
- H. Micrometer Feed

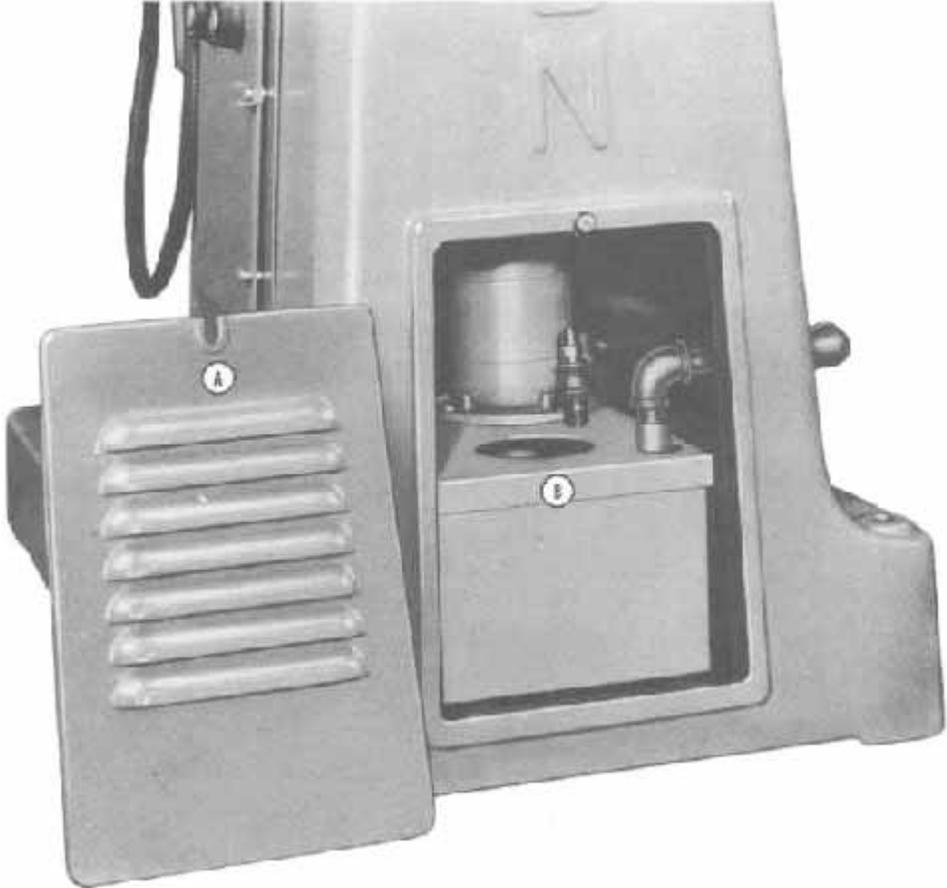


Figure 8

- A. Coolant Compartment Cover
- B. Removable Self-Contained Coolant System

GORTON TRACER HEAD ASSEMBLY

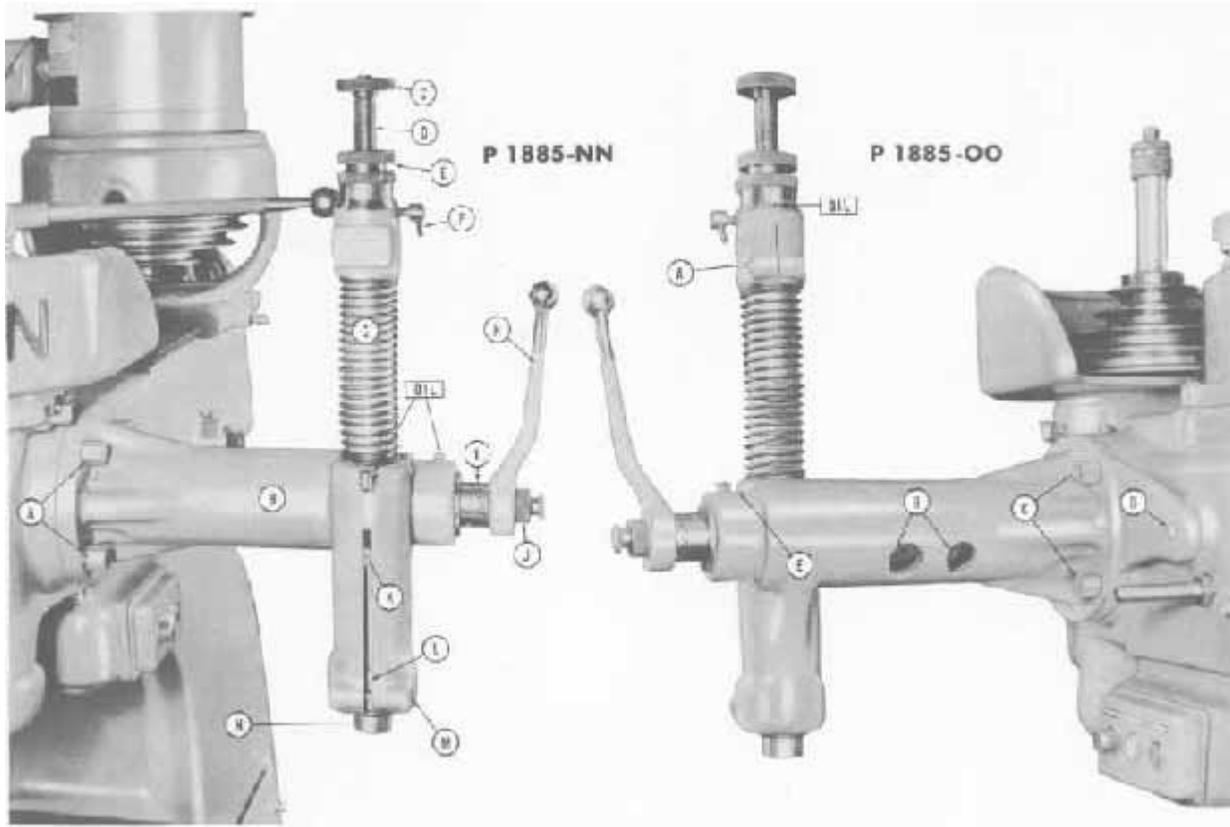


Figure 9

Figure 10

- A. Two of Four Hex Head Tracer Head Bolts
- B. Tracer Head Assembly
- C. Tracer Draw Bar
- D. Tracer Spindle
- E. Micrometer Vertical Adjustment
- F. Micrometer Vertical Adjustment Locking Lever
- G. Tracer Head Tension Spring
- H. Right-hand Spindle and Tracer Feed Lever
- I. Serrated Feed Lever Coupling-Adjustable
- J. Tracer Feed Shaft Thrust Nut
- K. Tracer Spindle Guide Key
- L. Spindle Nose Retaining Ring
- M. Retaining Ring Locking Bolt
- N. Spindle Nose

- A. Micrometer Vertical Adjustment Housing Clamping Bolt
- B. Clamping Bolts Coupling Tracer and Cutter Spindle Speed Shafts
- C. Two of Four Hex Head Tracer Head Bolts
- D. Locating Dowel for Tracer Head
- E. Outer Bearing Set Screw

Note: For Explanation of "Oil" see Lubrication Chart B-2

Note: For Explanation of "Oil" see Lubrication Chart B-2

GORTON DUPLICATOR TABLE

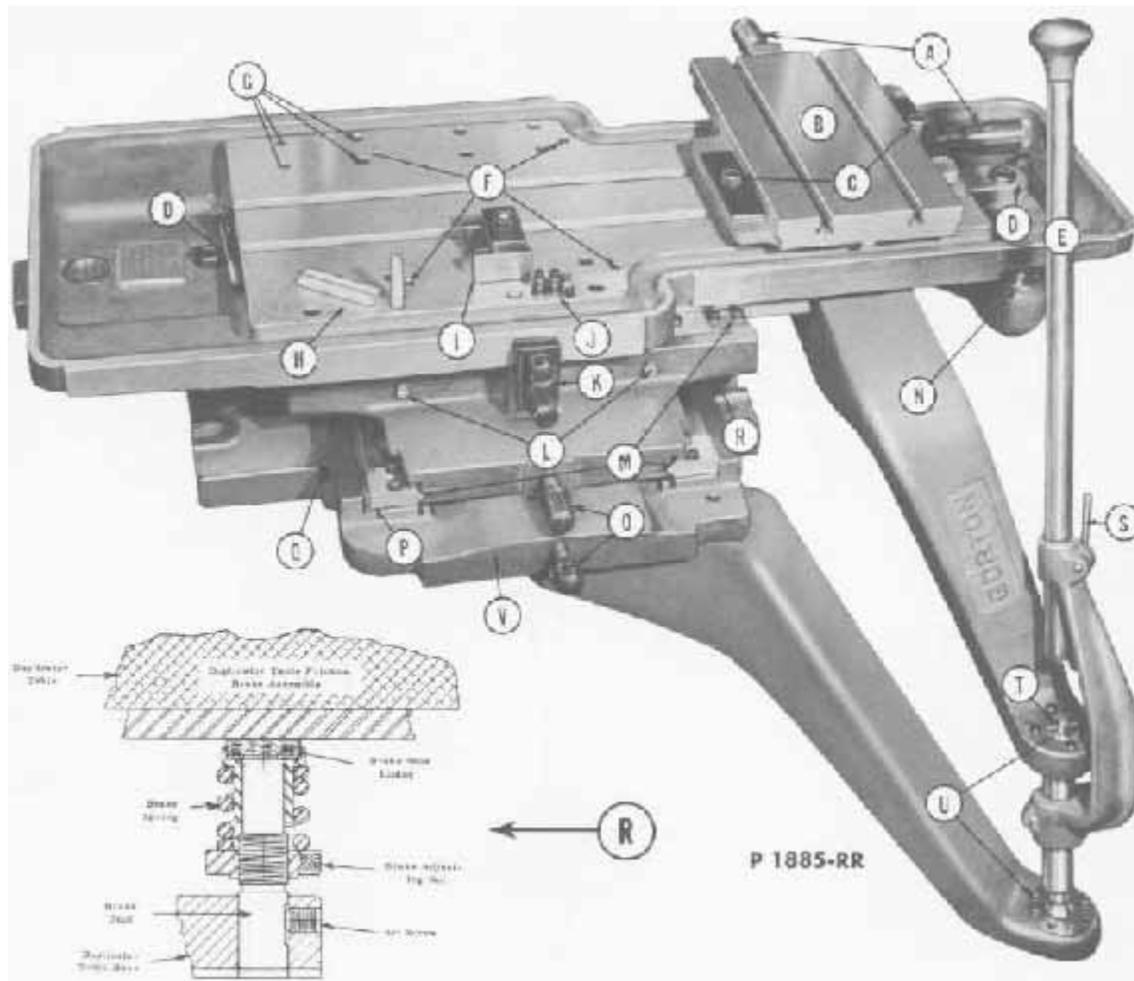


Figure 11

- | | |
|---|--|
| <p>A. Master Table Micrometer Adjusting Screws</p> <p>B. Master Table and Base-Removable</p> <p>C. Master Table Clamping Bolts</p> <p>D. Table and Saddle Locking Bolts and Seats</p> <p>E. Manual Duplicating Control Lever</p> <p>F. Four Oil Pipe Plugs for Table Ball Bearings</p> <p>G. Four of Twelve Tapped Holes for Hold-Down Studs</p> <p>H. Three Hold-Down Studs - One in Place (extra)</p> <p>I. Hold-Down Stud in Use (extra)</p> <p>J. Slotted Screw Plugs for Tapped Hold-Down Stud Holes</p> <p>K. Longitudinal Clamping Studs and "U" Strap</p> | <p>L. Two Oil Cups-Two Additional Ones at Rear</p> <p>M. Ball Bearing Return Blocks-Longitudinal and Cross</p> <p>N. One of Two Clamping Pads for Table and Saddle Locking Bolts</p> <p>O. Cross Feed Clamping Studs</p> <p>P. Adjustable Saddle Gib</p> <p>Q. One of Four Gib Adjusting Screws</p> <p>R. Table Friction Brake - See Accompanying Drawing</p> <p>S. Duplicating Control Lever Lock</p> <p>T. Oil Cup</p> <p>U. Adjustable Ball and Socket Joints</p> <p>V. Duplicator Table Base</p> |
|---|--|

REMOVING THE SPINDLE

Figure 12

- A. Remove Depth Stop Bracket and Key
- B. Quill or Spindle Sleeve
- C. Lower Bearing Retaining Nut
- D. Spindle Tension Spring
- E. Spindle Sleeve Bushing
- F. Spindle
- G. Supporting Parallels
- H. Wood Block
- I. Clamp Ring Adjusting Screw
- J. Depth Stop Bracket and Key

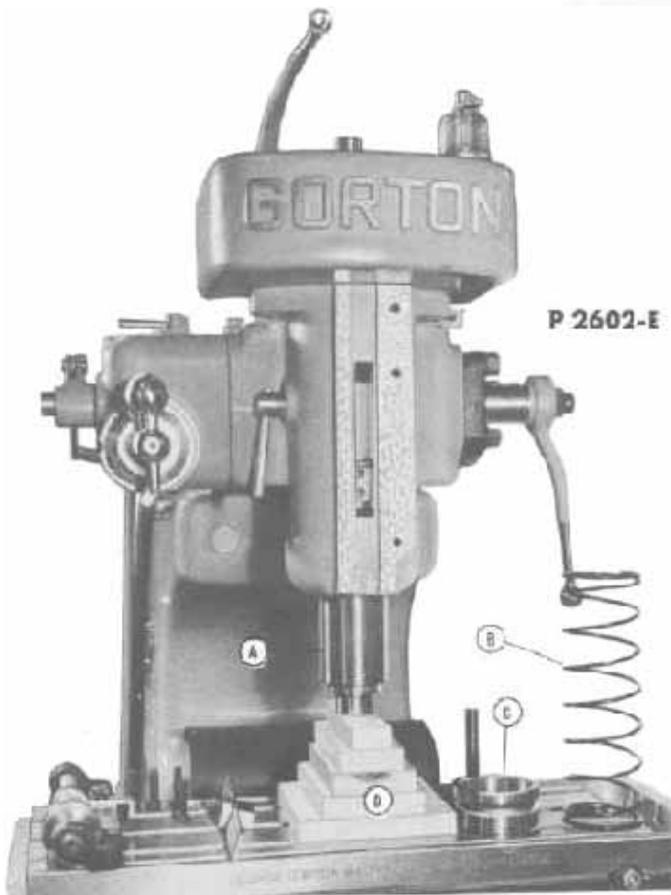
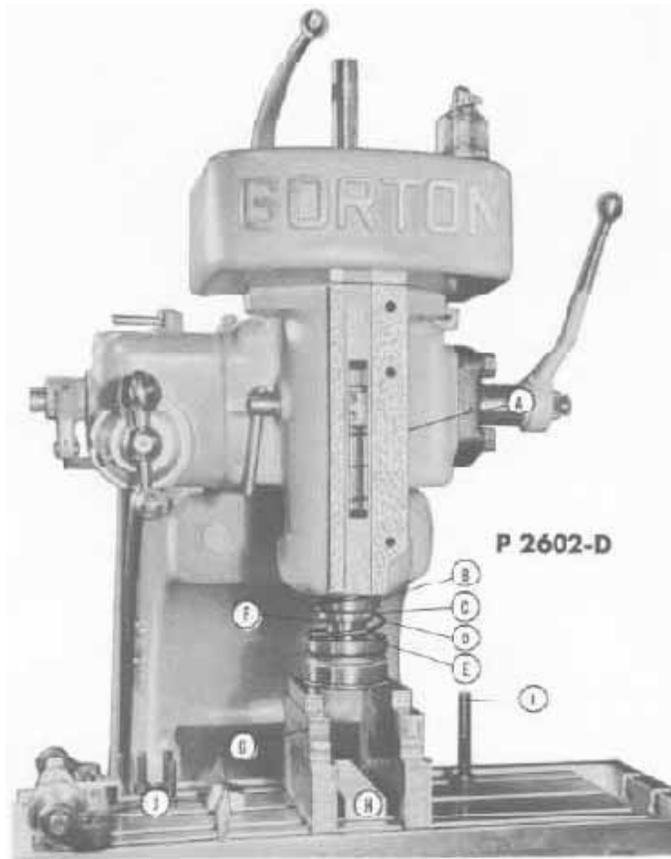
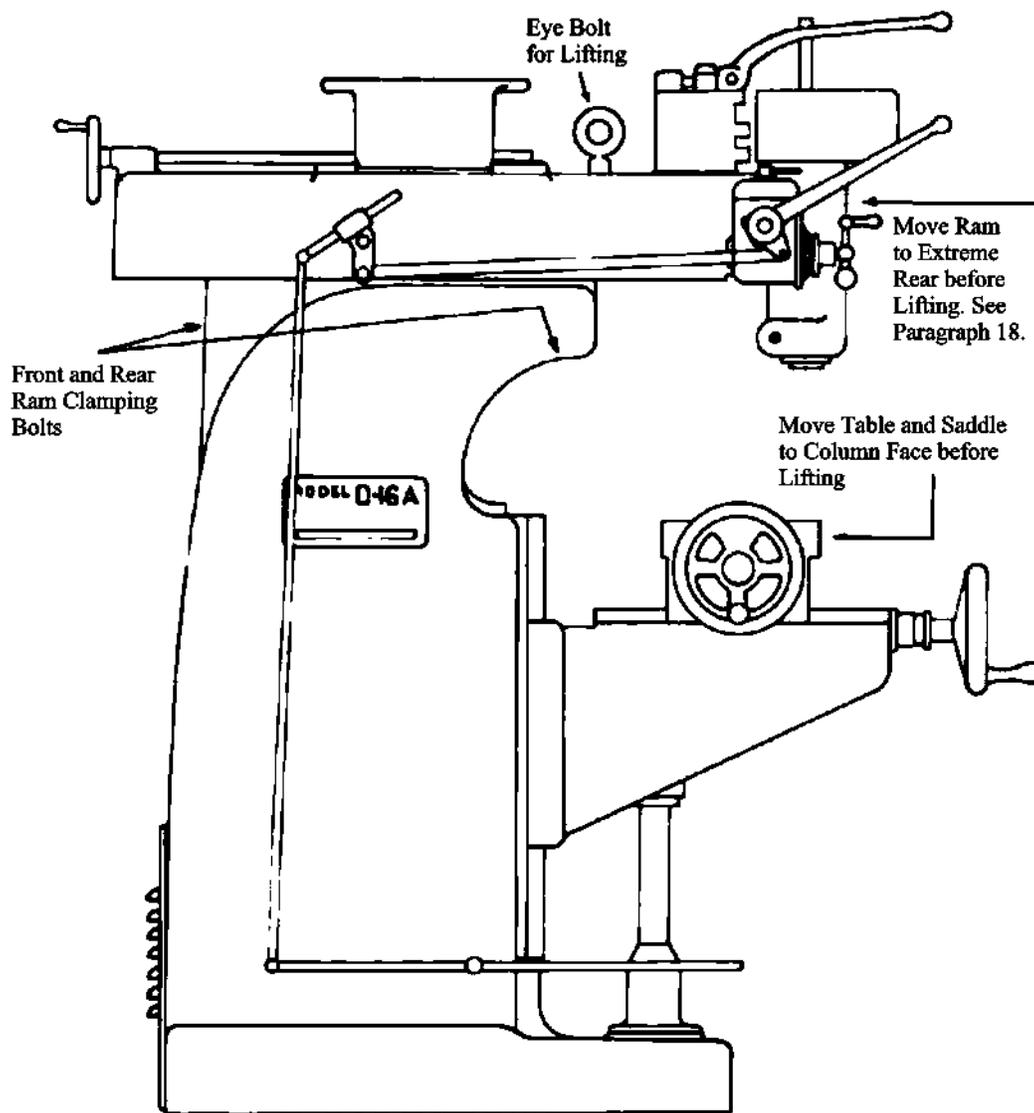


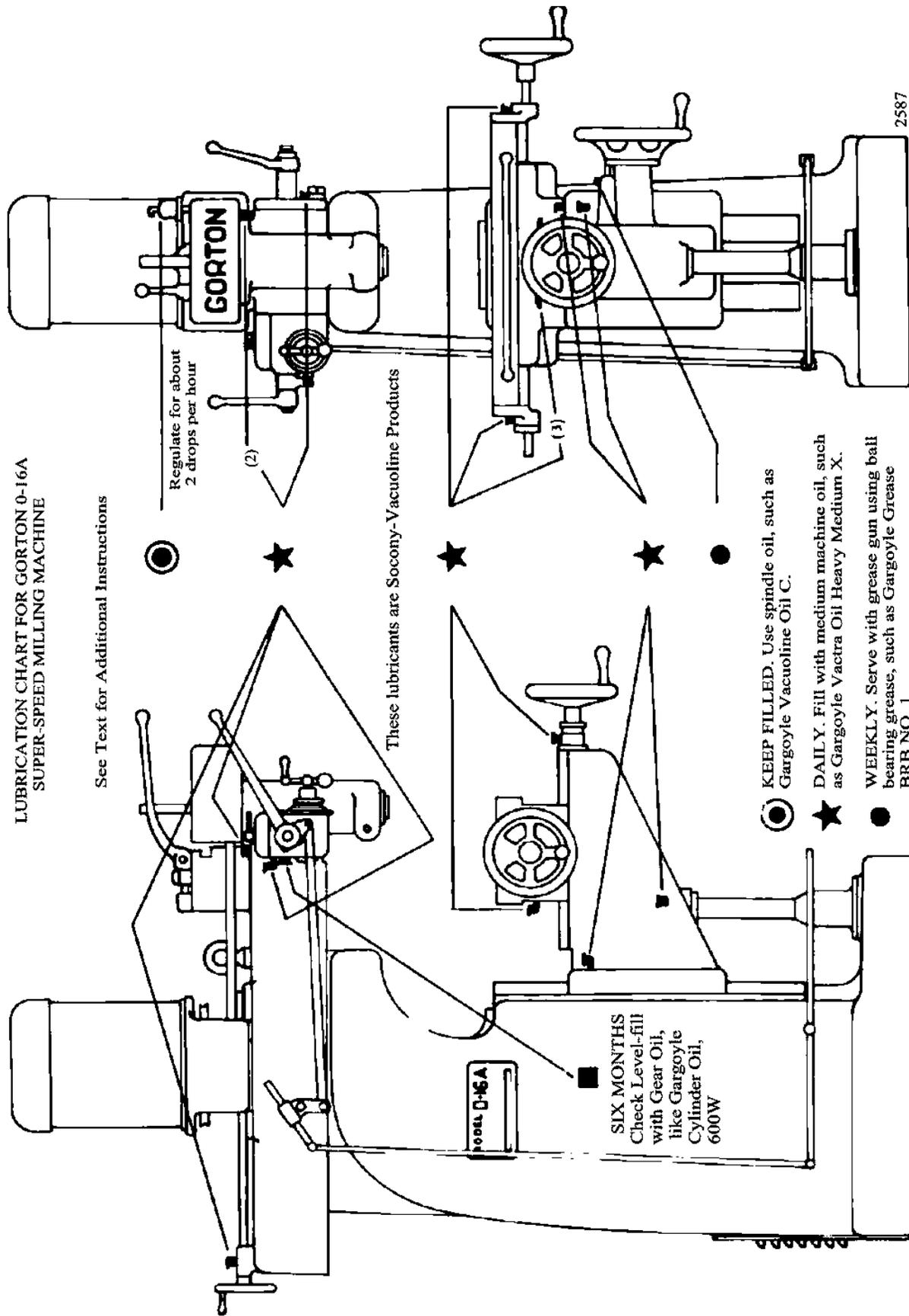
Figure 13

- A. Spindle and Spindle Sleeve Partially Removed
- B. Spindle Tension Spring Removed
- C. Spindle Sleeve Bushing Removed
- D. Wood Blocks



DRAWING B

LUBRICATION CHART FOR GORTON 0-16A
SUPER-SPEED MILLING MACHINE



See Text for Additional Instructions

Regulate for about
2 drops per hour

These lubricants are Socony-Vacuoline Products

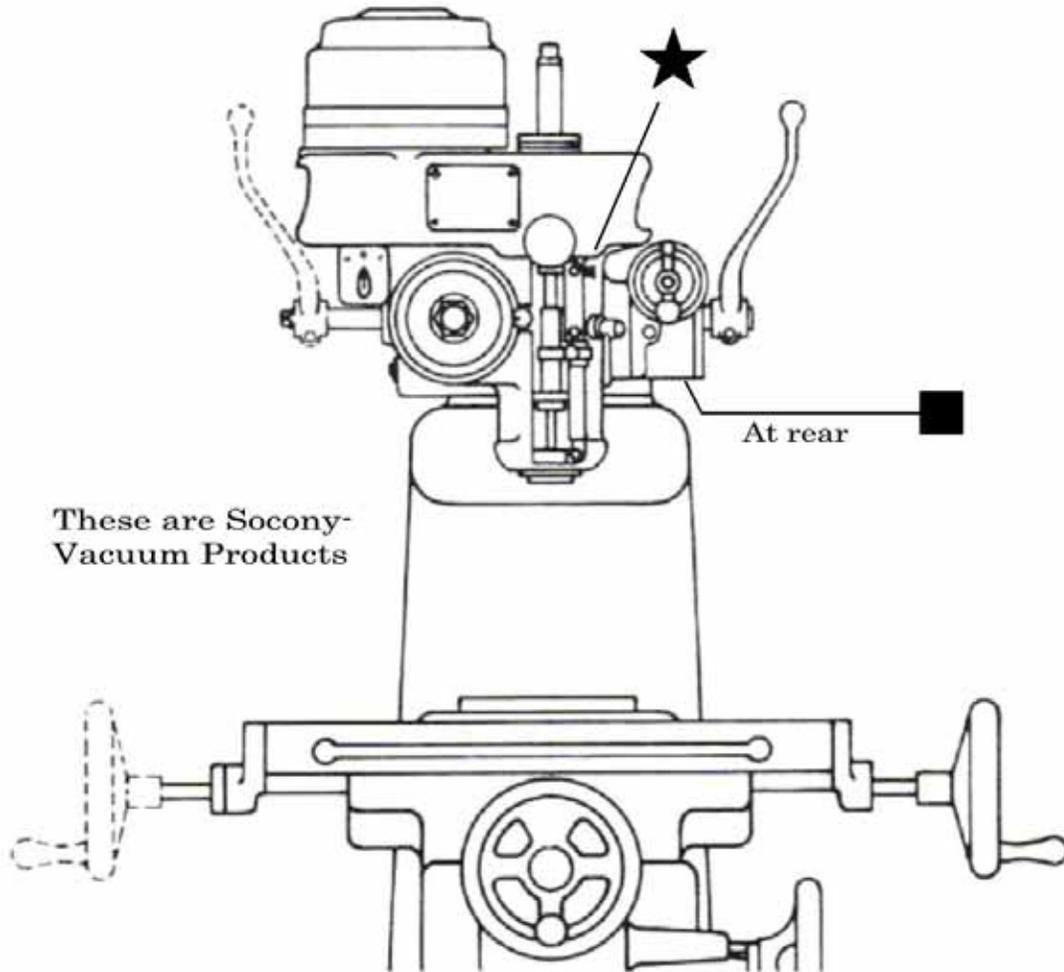
SIX MONTHS
Check Level—fill
with Gear Oil,
like Gargoyte
Cylinder Oil,
600W

- KEEP FILLED. Use spindle oil, such as Gargoyte Vacuoline Oil C.
- ★ DAILY. Fill with medium machine oil, such as Gargoyte Vactra Oil Heavy Medium X.
- WEEKLY. Serve with grease gun using ball bearing grease, such as Gargoyte Grease BRB NO. 1.

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DRAWING B-1

LUBRICATION CHART FOR GORTON 0-16A
SWIVEL AND UNIVERSAL HEAD



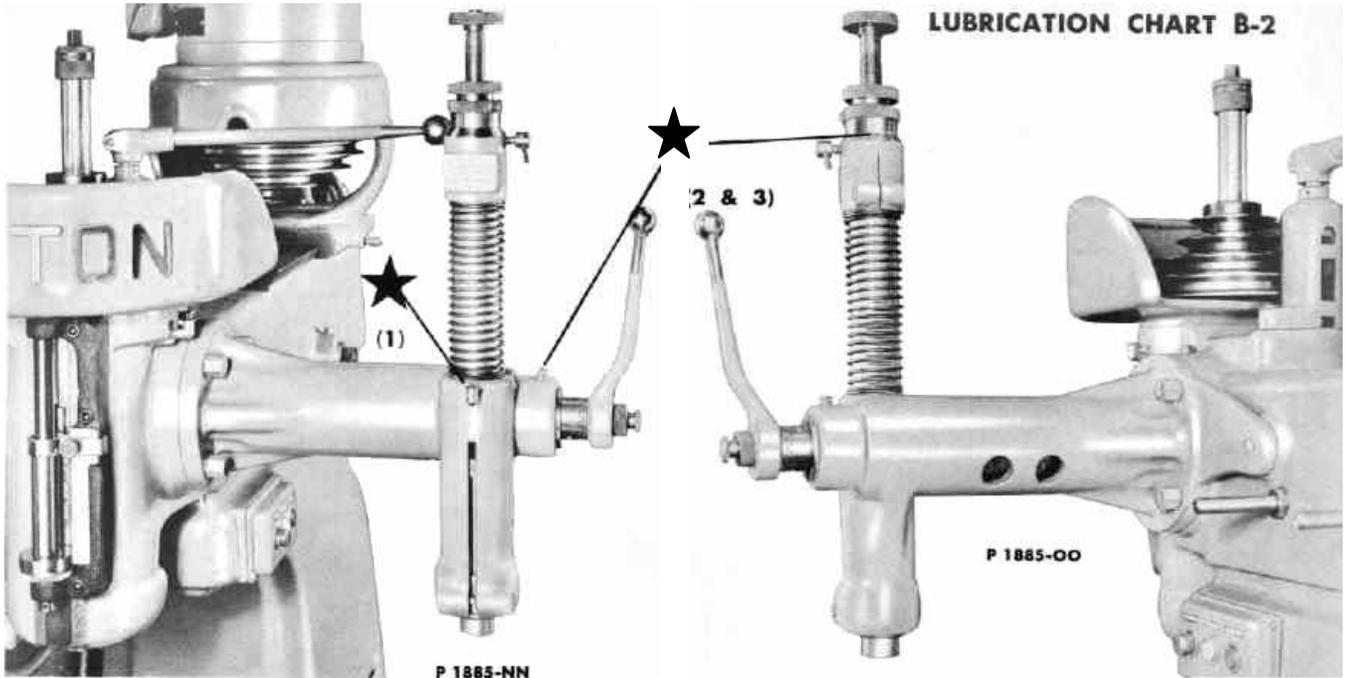
DAILY. Apply a small amount of Spindle Oil, such as Gargoyle Vacuoline Oil C.



SIX MONTHS. Check Level--fill with gear oil, such as Gargoyle Cylinder Oil 600W

DUPLICATOR TRACER HEADS

LUBRICATION CHART B-2

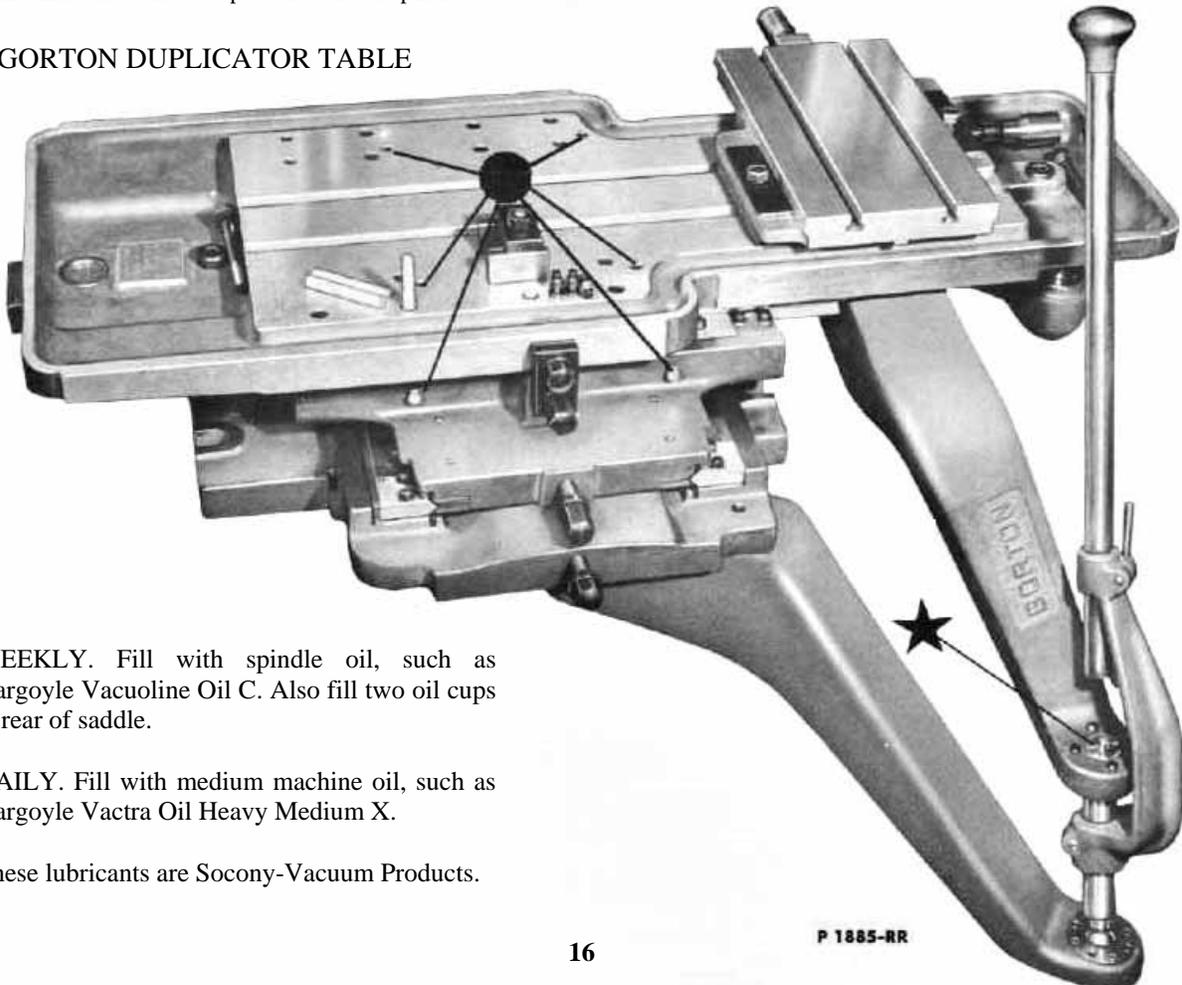


★ DAILY. Fill with spindle oil, such as Gargoyle Vacuoline Oil C.
(1)

★ DAILY. Fill with medium machine oil such as Gargoyle Vactra Oil, Heavy Medium X.
(2 & 3)

NOTE. Occasionally apply a few drops of medium machine oil to threaded portion of tracer spindle.

GORTON DUPLICATOR TABLE



● WEEKLY. Fill with spindle oil, such as Gargoyle Vacuoline Oil C. Also fill two oil cups at rear of saddle.

★ DAILY. Fill with medium machine oil, such as Gargoyle Vactra Oil Heavy Medium X.

These lubricants are Socony-Vacuum Products.

PRELIMINARY OPERATIONS

UNCRATING

1. Remove crating with care so that machine and parts are not marred, scratched or damaged. Examine carefully for evidence of shipping damage. Report at once to transportation company and to Gorton representative any evidence of such damage. Check shipment carefully against itemized packing list for possible shortages.

LOCATING THE MACHINE

2. This machine is easily moved by hoist or shop crane. Put head in normal operating position as shown in drawing A. (If head is too far extended, the machine will not balance properly when lifted.) CAUTION Make sure that head is securely clamped to column with front and rear ram clamping bolts shown in drawing A. (See paragraph 18.) Place lifting hook in eye bolt on top of ram and move machine to its permanent location.

MOUNTING MOTOR

3. Machine is shipped with motor and motor pulleys dismounted. Motor should be mounted so that junction box on motor is on left-hand side of machine, from the front.

Important: Do not remove pulleys from motor shaft. A slot is provided at rear of motor bracket so that motor and pulleys can be slid into place. Attach motor to motor bracket with four hex head bolts provided.

- a. Next, install belt and adjust tension with belt adjustment handwheel. Now lock motor bracket in place with motor bracket locking lever located on right side of motor bracket.

CLEANING

4. Do not operate any moving part of this machine until it is thoroughly clean and has been given a coating of oil. Remove shipping grease with clean oilum spirits or other grease solvent. Use lintless rags, not cotton waste. Never use an air hose. When machine is clean, give it a light coat of a good grade clean machine oil to prevent rust spots and other corrosion.

FOUNDATION

5. A solid foundation for this machine is advisable for satisfactory operation when running at high speeds. The following suggestions should be followed within the limitations of the building.

a. A concrete foundation or floor is an ideal supporting base. When locating machine on a ground level floor of timber or composition, it is best to cut a hole and build a concrete foundation from the ground up to floor level. On upper floors, place machine directly over a supporting beam or upright pillar, if possible. Otherwise, locate machine as close as practicable to a retaining wall. If concrete base is exceptionally rough or uneven, it should be smoothed out by whatever method is most practical.

b. CAUTION: All locking levers are in locked position when machine leaves factory. They must be released before any attempt is made to move table, saddle or knee.

LEVELING MACHINE

6. After machine has been installed and cleaned, it must be carefully leveled. Make sure it is at room temperature before beginning to level. Use a sensitive, graduated spirit level (10 seconds per graduation) for best results. Level machine by placing spirit level first lengthwise, then crosswise on the table, and change the position of the table several times during the process.

LUBRICATION

7. Refer to drawing B. Fill spindle oil cup with the type of oil specified, using oil can. Unscrew metering unit at top of oil cup and allow one cup of oil to flow down the oil line. Tighten metering unit and adjust according to instructions in paragraph 9. NOTE: If your machine is a swivel head or universal head model, refer to paragraph 28.

8. GENERAL -- The machine should be thoroughly cleaned at least once a week -- and the scraped ways wiped clean, and oiled. The Gargoyle lubricants recommended are manufactured by Socony-Vacuum Oil Company, Inc., and are universally obtainable in all parts of the world

CUTTER SPINDLE AND DRIVE PULLEY

9. All bearings of the cutter spindle and drive pulley are lubricated by one sight feed oil cup located at top of drive pulley housing. See

drawing B. Use a spindle oil having approximately 125 seconds S. U. Viscosity at 100° F., such as Gargoyle Vacuoline Oil C. A good grade of medium machine oil, such as recommended for other bearings on the machine, may be used if spindle oil is not available but will not give as good results as the latter due to the high speeds at which the cutter spindle turns.

a. Note: Machine is shipped with this sight feed oil cup removed, therefore, it will be necessary to install it before following above instructions.

b. The sight feed cup should be kept well supplied with oil and refilled at least once weekly. Before starting up it is important that the shut-off at the top of the cup be turned up vertically to permit oil to flow, otherwise the spindle will receive no lubrication. The feed may be stopped when machine is not in use by turning the shut-off to one side. The cup should be set to feed from one to three drops per hour (no more) as service requires. Too fast a feed will cause oil leakage down onto the work, which is sometimes annoying.

c. All lubrication points in drawing B marked with a star should be lubricated once daily with a good grade of medium machine oil having a viscosity of 275 to 300 seconds S. U. at 1000° F., such as Gargoyle Vactra Oil Heavy Medium X is recommended for this purpose.

d. IMPORTANT: Once each week, while spindle is all the way up, wipe clean the spindle splines above drive pulley and apply a few drops of oil in each spline. The micrometer depth stop threads should also be lightly oiled.

e. The oil level in the cutter spindle feed box should be checked about once every six months by removing the inspection plug at the rear of the hand feed box. Keep box filled to level of this hole using a heavy viscous lubricant such as Gargoyle Cylinder Oil 600W. See point marked by a square for oil cup on feed box. At intervals of one to two years it is good practice to drain this compartment of old lubricant, flush and refill with new oil. This will act to remove any water or impurities which may have gained entrance.

f. The alemite grease fitting which serves the knee elevate hand wheel shaft should be serviced once each week with high grade ball bearing grease such as Gargoyle Grease B.R.B. No. 1.

TABLE, SADDLE, KNEE ASSEMBLY

10. All hinge lid oilers should be oiled after approximately 8 hours of operation with a good grade of medium machine oil having a viscosity

of 275 to 300 seconds S. U. at 100° F., such as Gargoyle Vactra Oil Heavy Medium X. Locations of these oilers are indicated by stars.

a. Once weekly, with knee all the way up, raise elevating screw cover and squirt a few drops of oil on screw, as high as possible. Also saturate the felt wiper on knee with oil. The table and saddle screws should be oiled daily, by running out the table to extreme positions so as to get at screws. Lubricate through oil holes at front of saddle, indicated by a star, taking care to replace plugs.

ELECTRIC MOTORS

11. After mounting, examine spindle motor for lubrication fittings. The motor on your machine may or may not require lubrication. If motor is of the permanent grease-sealed type, no lubrication fittings will be found. If motor does have lubrication fittings, they should be serviced every 1000 hours of operation with a high grade ball bearing grease such as Gargoyle Grease B.R.B. No. 1. Never use ordinary cup grease. Use grease tube or low pressure gun--do not force grease into bearings under heavy pressure. For further instructions, see tag issued by motor manufacturer and furnished with the machine. The same instructions apply to the coolant motor, if coolant system is supplied with machine.

POWER CONNECTION CONNECTING POWER LEADS

12. This machine was completely wired and test run at the factory. Wires running to motor have been cut approximately one-half inch from motor lead wires. When making electrical connections, merely match colors of wires in cable with motor leads and before connecting, remove half-inch "tattle tails". Connect and secure the cable. When connecting leads extending from column to your power source, make temporary connections until you are sure spindle rotates in the right direction. Looking down at top of spindle, it should rotate clockwise under power.

a. Before making any adjustments in control box, be sure that incoming voltage to machine is absolutely correct. This machine and all others on the same line should be in operation at this time. To correct variations, see instructions inside of control box.

MACHINE OPERATION SPINDLE

Caution: Before starting spindle, be sure that draw bar is removed or that it is firmly engaged in adapter, collet or cutter to prevent serious accident.

13. Spindle is started, stopped and braked by one hand lever mounted on top of ram at left of spindle and extending forward. To start spindle, lift lever straight up; if lever is in braked position, it must be moved to the right and then up. To stop and brake spindle, move lever to extreme left.

a. If machine is equipped with a two-speed motor, the high-low speed range switch is mounted on the outside of control panel.

SPINDLE SPEEDS AND BELT

14. Spindle speeds at various belt positions are shown on the speed plate mounted on right side of ram. To change belt position, loosen motor bracket locking lever and release belt tension by turning belt adjustment handwheel to left. Change belt position, re-tighten tension with handwheel and re-tighten motor bracket locking lever.

MOUNTING COLLETS AND ADAPTERS

15. The 0-16A is provided with standard spindle, having either the Gorton taper, the No. 2 Morse, or No. 7 Brown and Sharpe. The spindle proper, being tubular in design, allows draw bar to draw in collets or adapters from the upper end. Be sure the inside of the spindle nose is clean and dry. Insert collet and cutter in spindle nose. By using the knurled handwheel drawbar, tighten collet by turning drawbar handwheel clockwise with spanner wrench furnished. To remove cutter and collet, reverse this procedure.

SPINDLE FEED

16. The machine is equipped with vertical feed levers on left and right side of head and micrometer spindle feed box. This unit is equipped with a micrometer spindle feed engagement lever. When this lever is at left, the micrometer feed mechanism is inoperative. To engage micrometer spindle feed, move lever to right. The micrometer feed crank is equipped with an adjustable micrometer dial.

a. A precision micrometer depth stop is mounted on front of spindle housing. It has graduated scale and micrometer dial. This micrometer dial can be locked in any position by tightening the knurled micrometer depth stop lock in the center of depth stop bracket.

TABLE, SADDLE AND KNEE

17. On the standard machine, the table, saddle and knee are all hand fed by handwheels or cranks, in conjunction with adjustable micrometer dials. The table locking lever is located on the front of saddle; the saddle locking lever is located on the right side of the saddle under the table. The knee locking lever is located at the rear of the knee on right-hand knee gib.

MACHINE ADJUSTMENTS

RAM

18. Refer to drawing A. With socket wrench furnished with the machine, loosen front and rear ram clamping bolts. Apply same wrench to ram adjusting nut and position ram as required. Be sure to retighten front and rear ram clamping bolts.

CUTTER SPINDLE

19. The cutter spindle is non-adjustable: it requires no attention other than correct lubrication. If an irregular pattern develops during face milling, or if play should develop after a long period of service, the super-precision ball bearings should be replaced by bearings of the same type from the George Gorton Machine Co., which will put the spindle in a "like new" condition.

a. The cutter spindle is mounted on two sets of pre-loaded super-precision ball bearings, forming a complete unit which may be removed.

b. IMPORTANT: Instructions in paragraphs 19b through 20f apply to the standard Gorton vertical mill. If spindle of a Gorton duplicator is to be removed, refer to paragraph 21 before reading further.

c. NOTE: It is strongly recommended that spindles requiring service be returned to the factory for expert attention. However, if it is necessary to replace bearings in the field, the following instructions will apply.

d. Refer to figures 12 and 13. Bring spindle down approximately 2-1/2 inches. Lock spindle in place with spindle locking lever. Move table to approximately 4 inches below spindle nose. Place wood board on table to protect top. Dismount micrometer depth stop bracket complete by removing 3 socket head cap screws. Next, remove depth stop attached to front of spindle.

e. At top of spindle pulley housing there is a round cover or plate. Remove four screws and take this plate off. Mark spline shaft and housing for correct mating during re-assembly. Secure two wood blocks or parallels of exactly the same height. Place one on each side of the extended spindle nose and under the spindle sleeve bushing which is under spring tension. Now, raise table until the two parallels are in contact with the lower edge of the spindle sleeve bushing.

f. Put match marks on bottom edge of spindle sleeve bushing and tower edge of spindle housing for locating during re-assembly. Remove the clamp ring adjusting screw and drive soft metal wedge in slot at rear of spindle housing thereby releasing the spindle sleeve bushing. The spindle sleeve bushing and retaining spring are now ready for removal by lowering the machine table slowly. Make sure the spindle sleeve bushing follows table movement. Continue lowering table until spindle sleeve bushing and spring are completely free. Remove blocks, spindle sleeve bushing and spring. Place another block of wood under spindle nose; raise table until block comes in contact with spindle nose. Release spindle locking lever and again lower table. As spindle sleeve comes down, spindle feed levers will also come down. Note the approximate angle of spindle feed levers when spindle rack and pinion let go. (When re-assembling spindle, the spindle feed levers should be held at the same approximate angle when re-engaging the rack and pinion.) Continue lowering table until the spindle sleeve is completely free of housing.

SPINDLE BEARINGS

20. To replace ball bearings, remove ball bearing nut inside the top of spindle quill or sleeve and large slotted ring nut which is in the lower end of spindle sleeve (left-hand thread). Take off old bearings and replace.

a. **IMPORTANT.** Before removing or moving the spacer which separates upper and lower bearings, be sure to inscribe match lines on both spacer end and spindle. When re-assembling, make doubly sure that these lines are rematched accurately.

b. When installing new bearings, place the stamped faces of the two outer rings together; also match the "balance" marks on both inner and outer races. Slide bearings down spindle shaft to nose. They should slide with a light "push" fit. When bearings are in place, tap spindle nose gently on wood to seat both bearings.

c. Insert spindle shaft in spindle sleeve and mount spacer ring. Now install upper set of ball bearings in the same manner as for those at spindle nose. Install locking collar and nut. Tighten this nut, then reverse position of spindle and sleeve and re-install the large slotted ring nut (left-hand thread).

d. Lay spindle assembly on its side in a V-block. Check the runout on the O. D. of the spline shaft at its end with a dial indicator. This shaft must be concentric within .001" of total indicator reading. If run-out is greater, find the low spot on spline shaft and mark the exposed face of the nut in line with the low spot on the spline shaft. Remove nut and file or scrape at the spot marked, but on the opposite face of the nut until the spline shaft runs within the .001" tolerance.

e. To re-install spindle, reverse above procedure. Make sure that the brass plug at the end of the spindle locking lever shaft is seated so that it does not protrude into the spindle bore. Be sure to refer to paragraph 19e above and match mating marks on spline shaft and housing. Also make sure that spindle feed levers are at approximately the same angle as described in paragraph 19f above.

f. When tightening the clamp ring adjusting screw, be sure that the spindle sleeve bushing is all the way up in spindle housing nose. With spindle feed hand lever, bring quill down 2 or 3 inches. Tighten screw so that quill stays in place. Now tap Allen wrench lightly until screw loosens just enough to permit quill to retract freely. If this clamp ring adjusting screw is too tight, the quill will bind. If too loose, heavy cutting will cause chatter and perhaps "cocking" of spindle sleeve bushing.

21. SPINDLE REMOVAL FROM DUPLICATOR. Before acting on the instructions contained in paragraphs 19b through 20f, it will be necessary to disconnect the coupling between the spindle feed shaft and tracer head feed shaft by loosening the two clamping bolts identified by the letter "B" in figure 10.

GIBS

22. Correct adjustments depend almost entirely upon judgment and "feel". If adjustment is too loose, loss of machine accuracy results. Too tight an adjustment squeezes out all lubricant and sliding ways are then subject to excessive wear and scoring.

TABLE GIB

23. This gib is located under the front table bearing slide with the large end at right. There is an adjusting screw here and another at the small end. To adjust, when table gib is loose, back off adjusting screw at small end of gib one-half turn. Tighten screw at large end of gib one-quarter turn.

Next, tighten screw at the small end of gib until snug. Try table movement. Repeat to get desired adjustment. To adjust when table gib is too tight, reverse this procedure.

SADDLE GIB

24. The saddle gib is located on the right-hand side of saddle directly below the knee bearing. The large end of gib is at front. Adjust this gib as described in paragraph 23 above.

KNEE GIB

25. The knee gib is located on the right-hand side of the knee directly behind the column dovetail. Tighten or loosen all hexagon nuts uniformly to secure proper operation of this gib.

TABLE SCREW

26. To adjust end play, loosen set screw securing the end thrust nut at the left end of table screw and turn nut right or left to tighten or loosen as required. Retighten set screw. Brass plug should always be in place between set screw and table screw.

a. If too much play eventually develops between the table screw and table nut, it will be necessary to replace the table screw and nut assembly. This is necessary to provide perfect factory fit between the nut and the screw. To remove this assembly, first remove the thrust nut at the left end of the table screw. Now drive out taper pin at right end of screw. Next, remove the two end brackets on right and left ends of table. Remove all four dowel pins. Then, unscrew the screw from the right end of table, counter-clockwise. Now remove the table gib by unscrewing the gib screw in the large end of the gib. Do not tamper with the other screw.

b. ALTERNATE METHOD. These instructions are to be followed when table must be removed. However, it is entirely possible to replace table screw nut by sliding table to the left far enough to expose the nut. In this case the table gib remains in place, and care should be taken to support the left end of the table to prevent damage to dovetails from overhang.

c. NOTE: The first step to take is to examine new screw and nut for burrs. Remove them carefully.

d. Remove the table by sliding off of saddle, either to the right or left. Shop hoist or crane may be used for this. Remove the screws which hold the table nut to the saddle, remove old nut and replace with the new one. Remount table on saddle and re-install table gib, making sure that all surfaces are clean.

e. Now mount right end table bracket to table, leaving cap screws lightly snug. Install new collar and taper pin on right end of screw. Re-install the left end table bracket in the same way. Replace the thrust nut assembly on left end of screw and adjust as explained in paragraph 26 above. Using the handwheel, run the table to its extreme end (right or left) and tighten the cap screws in the bracket closest to the table nut. Now move table to the other extreme position and tighten the other end bracket. To check table performance, run it left and right, making sure that movement is free. It may be necessary to tap the end brackets lightly to secure required freedom of movement. The final operation is to redowel the end brackets using dowels of slightly larger diameter than the original ones if necessary.

SADDLE SCREW

27. To adjust end play, loosen the set screw securing the end thrust nut at the front of cross feed screw and turn nut to right or left to tighten or loosen as required. Retighten set screw.

a. If too much play eventually develops between the saddle screw and saddle nut, it will be necessary to replace the saddle screw and nut assembly. This is necessary to provide perfect factory fit between the nut and the screw.

b. Where shop hoist is available, the following instructions will apply.

c. Remove the two cap screws in front knee bracket. Lock saddle with saddle locking lever. Using hand wheel, turn the saddle screw back and out of nut. Now unlock the saddle and remove the gib screw at front of saddle at large end of gib. Take out the gib. Table and saddle may now be supported by shop hoist and slid forward free of knee as one unit.

d. Remove saddle nut located directly under the middle of the saddle, replace with new nut, taking same precautions as described in previous paragraphs. Remount table and saddle and replace gib. Adjust gib according to description in paragraph 24 above. Remove old saddle screw from front knee bracket. Install new screw in bracket, leaving the two cap screws in a lightly snug position. Remount the thrust nut and adjust for end play. Using handwheel, run the saddle to its extreme forward position. Tighten the two cap screws and run the saddle back and forth to see if screw runs free. It may be necessary to tap the front knee bracket lightly to secure perfect alignment. Redowel as explained in paragraph 26e above.

UNIVERSAL-SWIVEL HEAD MODEL
HEAD AND RAM ASSEMBLY

28. Instructions contained in paragraphs 1 to 13 also apply in a general way to this universal head assembly. The following instructions will cover only those features about this universal head which differ from the fixed vertical head assembly.

Refer to figures 5, 6 and 7. Belt adjustment is the same as for the vertical head model, except that single motor mounting locking bolt is loosened. Then belt tension is released by sliding motor to right.

MICROMETER FEED BOX

29. This universal head assembly also has a micrometer feed box mounted on right side of spindle housing. To engage, pull down on handwheel handle and turn until gears mesh. To release, press release button directly under dial. Under no circumstances attempt adjustment of locked screw on top of micrometer feed box cover.

MICROMETER DEPTH STOP

30. A micrometer depth stop, graduated in thousandths, is located on front of head. It can be used in connection with either hand feed lever or micrometer dial feed crank. This consists of a scale reading in inches attached in a vertical position with a micrometer dial at left and a knurled locking screw above.

SPINDLE LOCKING LEVER

31. A spindle locking lever is located at right of micrometer depth stop and below pulley housing. To lock spindle in any position, pull lever forward.

SPINDLE BRAKE

32. Machine is normally shipped with spindle brake set. This is the knurled knob directly in front of the spindle proper. To release brake, turn to left. To set brake, push in and turn to right.

a. IMPORTANT. Brake should always be released before starting motor.

33. SEE LUBRICATION INSTRUCTIONS IN DRAWING B-1.

SWIVEL AND UNIVERSAL ADJUSTMENT

34. NOTE: The swivel and universal head has a shaft extending from the left-hand side. If left-hand spindle feed is desired, the spindle feed hand lever at right can be transposed to this shaft. Before this head can be swiveled to left or right, this shaft must be removed. Loosen hex head bolt in end of shaft and pull shaft and bolt straight out. In a swiveled position, hand feed lever must be used in the right-hand position.

a. Locate front swivel locking hex nut in center of graduated dial. Next locate swivel anti-creep locking bolt on left-hand side of head, and the universal locking hex nut in center of universal graduated dial. The universal anti-creep locking bolt is in back of the universal graduated dial.

b. To adjust swivel head, first loosen the swivel anti-creep locking bolt. Then, loosen front swivel locking hex nut just enough so that head can be swiveled with slight pressure. When proper setting is reached, tighten the swivel locking hex nut and then tighten the swivel anti-creep locking bolt.

c. When adjusting head for universal work, follow same procedure with the universal locking hex nut and universal anti-creep locking bolt.

d. IMPORTANT. In making these adjustments, be sure to loosen the anticreep locking bolts first. After adjustment, tighten these same bolts last.

VERTICAL HEAD DUPLICATOR

TRACER HEAD

35. If this machine is a standard Gorton Die and Mold Duplicator, the tracer head has already been properly installed at the factory. If, however, this machine is a standard Gorton vertical mill, the following instructions will explain how to install, operate and adjust a tracer head.

a. With cover plate removed from tracer head mounting pad on right-hand side of spindle housing, notice that pad has been scraped in at the factory to be parallel to the cutter spindle. It may be necessary to scrape in the mounting face of the tracer head to assure an accurate "sweep" of tracer spindle nose above table.

b. Refer to figures 9 and 10. Remove tracer spindle guide key. This permits drawing out the entire tracer spindle assembly from the tracer spindle housing. Remove tension spring. Next, loosen outer bearing set screw and remove hand feed lever shaft complete.

c. Examine surfaces of mounting faces--wipe clean and remove any burrs. Mount tracer head shaft housing on scraped pad on ram with four hex head tracer head bolts furnished with tracer head assembly. Replace tracer spindle assembly in tracer spindle housing without tension spring. Allow this assembly to seat itself in its lowest position. Clamp dial indicator to tracer spindle nose for 10" sweep of table. Sweep the machine table. Tolerance should be from .0005" to .001" depending upon individual requirements.

d. After noting deviations from required tolerances, the top or bottom of the tracer head mounting face should be scraped to bring tracer spindle to the position required. To compensate for any "front-to-back" error, rotate the tracer head casting either clockwise or counter-clockwise. When correct position has been achieved, tighten four hex head tracer head bolts firmly.

e. Line ream locating dowel holes for 5/8" dowel while head casting is in place. Note--holes should be finished for a press fit in ram and a push fit in tracer head bracket. Now press dowel home in the ram. Re-assemble tracer spindle assembly with tension spring. Insert in tracer spindle housing and replace tracer spindle guide key. Remount tracer head to ram, engaging dowel in hole in tracer head bracket. Tighten four hex head tracer head bolts firmly.

f. Make sure that clamping bolts in coupling at end of hand feed lever shaft are loose. Remove coupling and mount on end of cutter spindle feed shaft. Now remount tracer spindle hand feed lever shaft and tighten outer bearing set screw. Lock the cutter spindle in the up position.

g. It is now necessary to connect the tracer spindle to the cutter spindle through its feed shaft in such a way that the positive upper cutter spindle stop will also act as a stop for the tracer spindle. The tracer spindle guide key should never be used as a stop.

h. Position the tracer spindle with the tracer spindle guide key approximately 1/4" below its upper limit. With the tracer spindle in this position, center the two clamping bolts coupling tracer and cutter feed shafts in the cored holes at back of tracer head housing. Tighten these bolts firmly. Release spindle locking lever. The tracer spindle is now ready to use.

SPINDLE RETRACTION ADJUSTMENT COLLAR

36. If machine is delivered from the factory as a duplicator, this collar is mounted on spindle feed shaft at left of micrometer spindle feed box and consists of a coil spring fitting around shaft, connected to feed box housing and with an outer casting with a split hub clamped to feed shaft. By loosening the clamp screw and turning collar to left or right, the pressure required to lower the spindle by means of feed lever can be lightened or increased to exactly the desired amount. Before loosening, have spindle in extreme up position.

a. If, on the other hand, a vertical mill is being converted for duplicating, follow these directions. Remove left-hand spindle feed lever. (Refer to parts list page titled "Tracer Head Feed Clutch and Shaft", and to parts shown at top of page numbered from 1 to 15.) Assemble these parts together with the new left-hand feed lever as shown. The micrometer feed box is drilled with two holes to take adapter washer pins which anchor adapter washer to feed box.

LUBRICATION

37. See Lubrication Chart B-2.

ADJUSTMENTS

38. There are two vertical adjustments which can be made to compensate for differences between the work piece and master. The first or rough vertical adjustment is made by first locking the cutter spindle and loosening the outer clamping bolt coupling tracer and cutter spindle feed shafts. Use tracer hand feed lever to position tracer spindle nose. Retighten clamping bolt. Fine adjustments are made with the micrometer vertical adjustment.

UNIVERSAL HEAD DUPLICATOR

TRACER HEAD

39. Tracer head 1158-1 which fits only this universal head is essentially the same as tracer heads for the fixed vertical model. Therefore, instructions below cover only those operations which specifically apply to this tracer head as contrasted with tracer heads fitting fixed vertical head mills.

40. **IMPORTANT:** Before reading further, be sure to use dial indicator at spindle nose to make certain that spindle head is in true vertical position.

41. Remove the side cover plate of the micrometer feed box. The same three hex head cap screws will be used to attach tracer head arm.

a. Make sure that the two socket set screws at rear of tracer arm are loose enough to clear the locating boss on rear of micrometer feed box. Feed shaft coupling should now be mounted on spindle feed shaft and left loose. Mount tracer arm to micrometer feed box. Tighten three hex head cap screws to loosely snug fit.

b. Bring tracer spindle down all the way and lock in place by tightening socket cap screw at bottom of spindle sleeve housing. Use a master square to assure true vertical position of tracer spindle. If tracer tilts left or right, it will be necessary to scrape in the mounting face of tracer arm to obtain correct alignment with cutter spindle. If tracer spindle tilts forward or back, adjust the two opposed socket set screws at rear of tracer arm to obtain true vertical position.

c. Now, release socket cap screw at bottom of spindle sleeve housing and allow spindle to raise to the up position.

d. Refer to paragraph 35g and h for instructions on how to connect the tracer spindle feed shaft to the cutter spindle feed shaft.

LUBRICATION

42. See paragraph 37.

ADJUSTMENTS

43. See paragraph 38.

DUPLICATOR TABLE

44. If this machine is a standard Gorton Die and Mold Duplicator, the duplicator table was mounted on the machine table at the factory. If, however, this machine is a standard Gorton vertical mill, the following instructions will apply.

MOUNTING TABLE

a. Be sure to remove right-hand adjustable stop dog on machine table and lay it aside or park it next to the left-hand adjustable stop dog at the extreme left end of table slot.

b. When mounting or dismounting the duplicator on or off of machine table, a shop hoist or crane should be used. Use heavy rope, not chain or wire cable. Locate duplicator table with the "U" slots at either end over machine table "T" slots. Lower gently and clamp in place, being sure that keys on the underside of duplicator table base are engaged in the center "T" slot of machine table. Mount on center of machine table.

c. Refer to figure 11. The duplicator table assembly is made up of: 1, the duplicator table proper (heat-treated aluminum alloy); 2, the master table and base with micrometer adjusting screws and clamping bolts; 3, saddle which, with the duplicator table, makes possible longitudinal motion; 4, duplicator table base which, with the saddle, makes possible the cross or transverse motion; 5, manual duplicating control lever attached to the two drop arms.

d. Locate work piece on the duplicator table with its center under the center of the cutter spindle. Two methods of clamping the work piece are available. Two 1/2" "T" slots running longitudinally 1-5/8" either side of center may be used or any of the twelve tapped holes for 7/16" hold-down studs. If "T" slots are used, Gorton type (elongated) nuts should be used to prevent distortion of table top.

e. Mount the master, pattern or template on the master table and clamp in place. Next, loosen the two master table clamping bolts and position master table so that center of master is under the center of the tracer spindle. Tighten the master table clamping bolts. For final positioning, the two master table micrometer adjusting screws may be used.

f. To provide free movement of the duplicator table in all directions, remove table and saddle locking bolts and plug the holes. Loosen longitudinal clamping studs and remove "U" strap. If cross movement only is desired, leave this "U" strap clamped tightly in place. If longitudinal movement only is desired, remove "U" strap and insert from below on the cross feed clamping studs, then tighten the studs.

g. For operator convenience, the manual duplicating control lever is adjust able for height by loosening duplicating control lever lock.

LUBRICATION

45. When a duplicator table is received from the factory, whether installed on the machine table or when shipped separately, there is likely to be some preservative grease or oil accumulated on ball bearings or in bearing races. See Lubrication Chart B-2. Be sure to remove the four oil pipe plugs marked "Oil" in the top of the table and flush thoroughly

with kerosene. Move table left and right while flushing. This flushing procedure should be repeated approximately every two weeks while machine is in use.

a. On the front and back of the saddle are two oil cups which serve the endless stream of ball bearings on which the saddle moves. Clean as described in paragraph 45 above. CAUTION. It is extremely important that no grit or foreign matter is permitted to get into the oil pipe plugs in table top or into the oil cups on front and rear of saddle.

b. Once each week and after flushing, fill oil pipe plugs and the two oil cups at front and back of saddle with spindle oil.

c. The oil cup on the upper ball and socket joint at the bottom of the right-hand drop arm should be lubricated with medium machine oil daily. In addition a few drops of oil should be applied to the master table micrometer adjusting screw threads.

ADJUSTMENTS

46. DUPLICATOR FRICTION BRAKE. This is located as indicated by the letter "R" in figure 11. A cross section drawing is also shown. If less braking action is desired, the brake adjusting nut is turned down. If more braking action is required, turn it up.

a. When play or looseness develops in the adjustable ball and socket joints, back off four set screws equally in cup of lower ball joint. Tighten the four cap screws equally. Continue until looseness is taken up. To adjust upper ball and socket joint, follow the same procedure. In this case the set screws are in the cup underneath joint.

b. To adjust for looseness in table, loosen the two screws in the two ball bearing return blocks at back of table. Loosen the five hold-down bolts on top of ball track. Loosen two jamb nuts on adjustable table gib and take up on the two gib adjusting screws. All loosening and tightening in this operation should be uniform. Now tighten jamb nuts and retighten the five hold-down bolts on top of ball track together with the two screws in the top of both ball bearing return blocks. Check for continued looseness with dial indicator. Looseness is indicated by "snap" movement of needle. Slow needle movement indicates distortion, not looseness.

c. To adjust for looseness between saddle and base, follow the same procedure as described immediately above with the ball tracks running crosswise between saddle and base.

- a. after gib adjustments, check the joints between ball bearing return blocks and the ends of the ball races to see that they are tight so that no foreign matter can get into ball races.

- e. Refer to Figure 11. Letter "N" shows one of two clamping pads. There is a similar one at the other end of table. After extensive use, the table may settle sufficiently to cause interference between these pads and two clamping bosses on the under side of table. If this happens, move table so that pads and bosses are free and loosen clamping pads on the base; remove horseshoe washer which is laminated shim stock. Remove sufficient stock to allow approximately .002" clearance between pads and bosses.

AUXILIARY EQUIPMENT COOLANT SYSTEM

47. If machine includes a coolant system, access to the coolant pump, motor and tank is through coolant compartment cover at rear of column. See figure 8. To put into operation, fill coolant tank up to fill mark on pump casting. Press coolant motor starting button so marked on control panel on right-hand side of column. Coolant should flow when nozzle is turned on.

a. When installing a coolant system in a standard Gorton mill or duplicator, refer to figure 1 and figure 8. In figure 1 you will see a plugged hole to the right of the letter "J". This is for the coolant return line coming from the back edge of machine table at the extreme left end. Note the other hole in front of column below letter "H" in figure 3. This is for the coolant feed line coming from the coolant pump through a hose to the coolant nozzle.

b. Install coolant tank and pump assembly through opening at rear of column base with pump unit entering first. Attach coolant feed line after dropping connection end through upper hole in column casting. Make connection to vertical feed pipe of pump. Unscrew plug from tapped bushing in hole at right of "J" in figure 1. Screw in street "L" on the outside of column. Adjust so that this fitting is in horizontal position and pointing to front of machine.

c. Screw short nipple into tapped bushing inside coolant compartment. Screw on elbow so that it points down and then screw threaded pipe into lower part of elbow so that pipe extends into coolant tank.

d. Attach return hose to table by threaded fitting. Install two part union in street "L" on the outside of column and join hex head hose fitting and tighten.

e. Have electrician hook pump motor to power supply and have him check for correct rotation of pump motor. This is indicated by arrow on housing.

LUBRICATION

48. See paragraph 1 1.

ADJUSTMENTS

49. None.

FOOT TREADLE

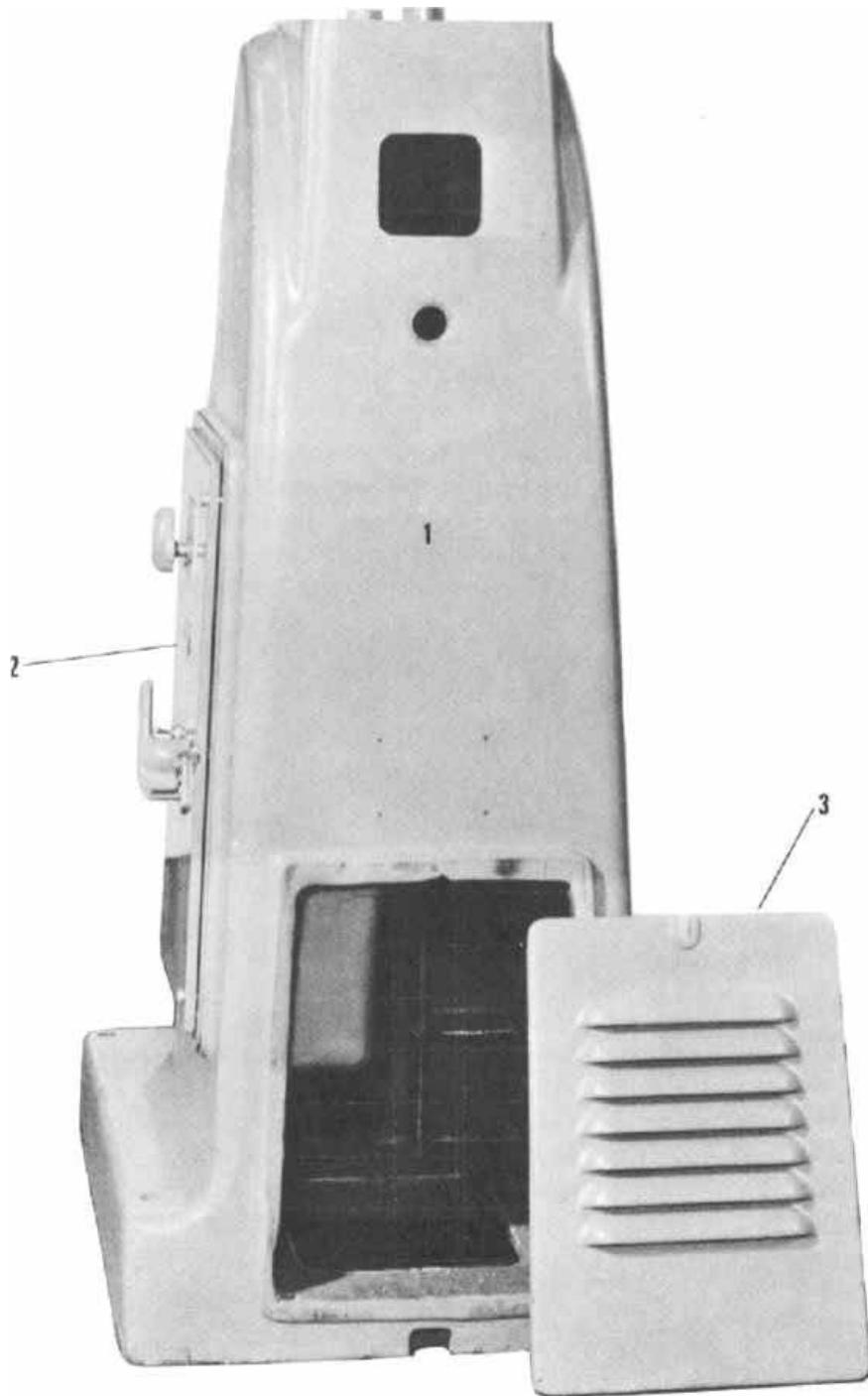
50. When the 0-16A is provided with foot treadle, adjustment may be required in the field, according to the operator's personal requirements. Adjustment is accomplished by adjustable block on rear foot treadle lever connecting rod. Foot treadle can be quickly disconnected by removing the horizontal tie rod connecting to spindle feed shaft.

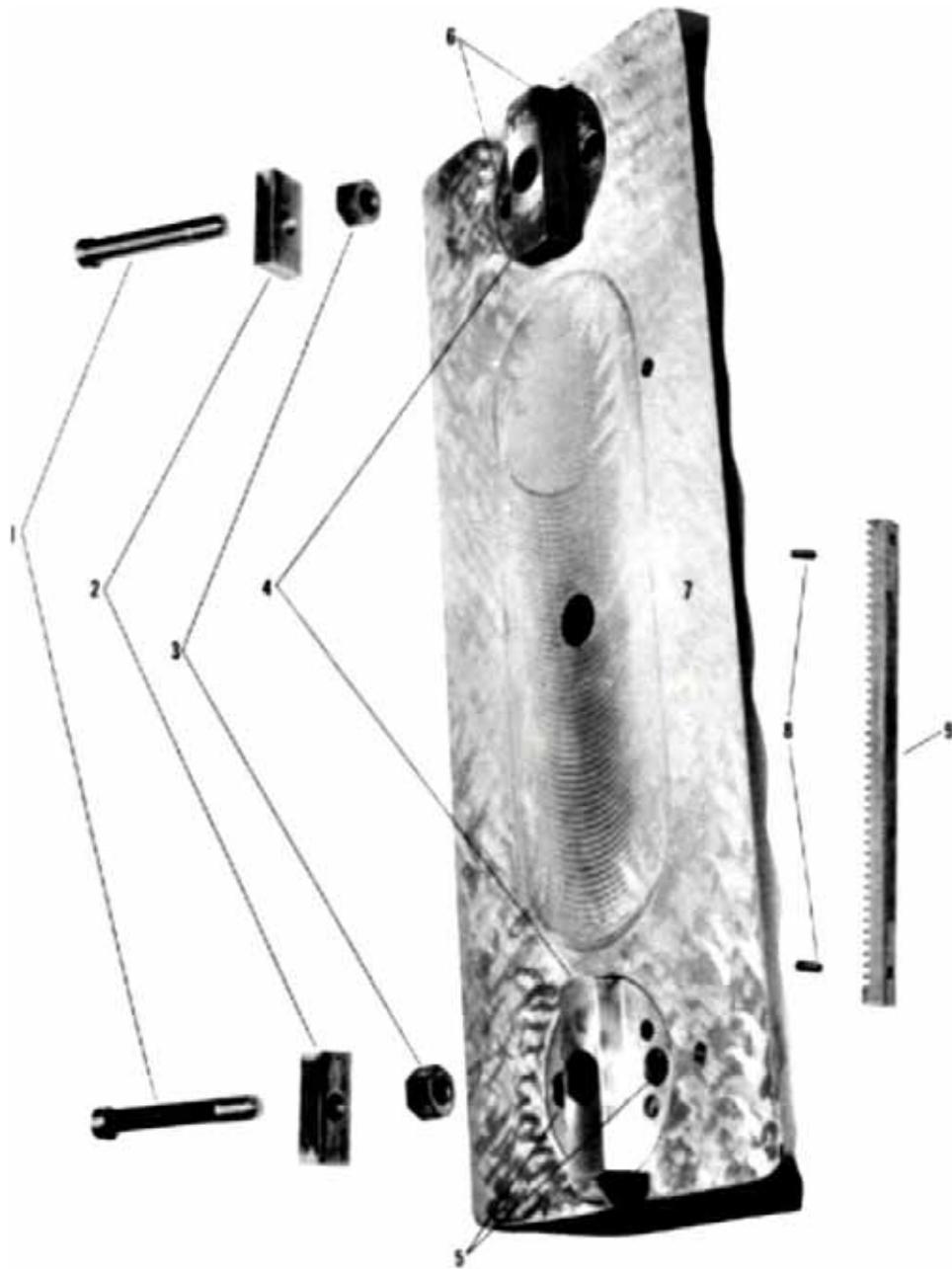
PARTS LIST

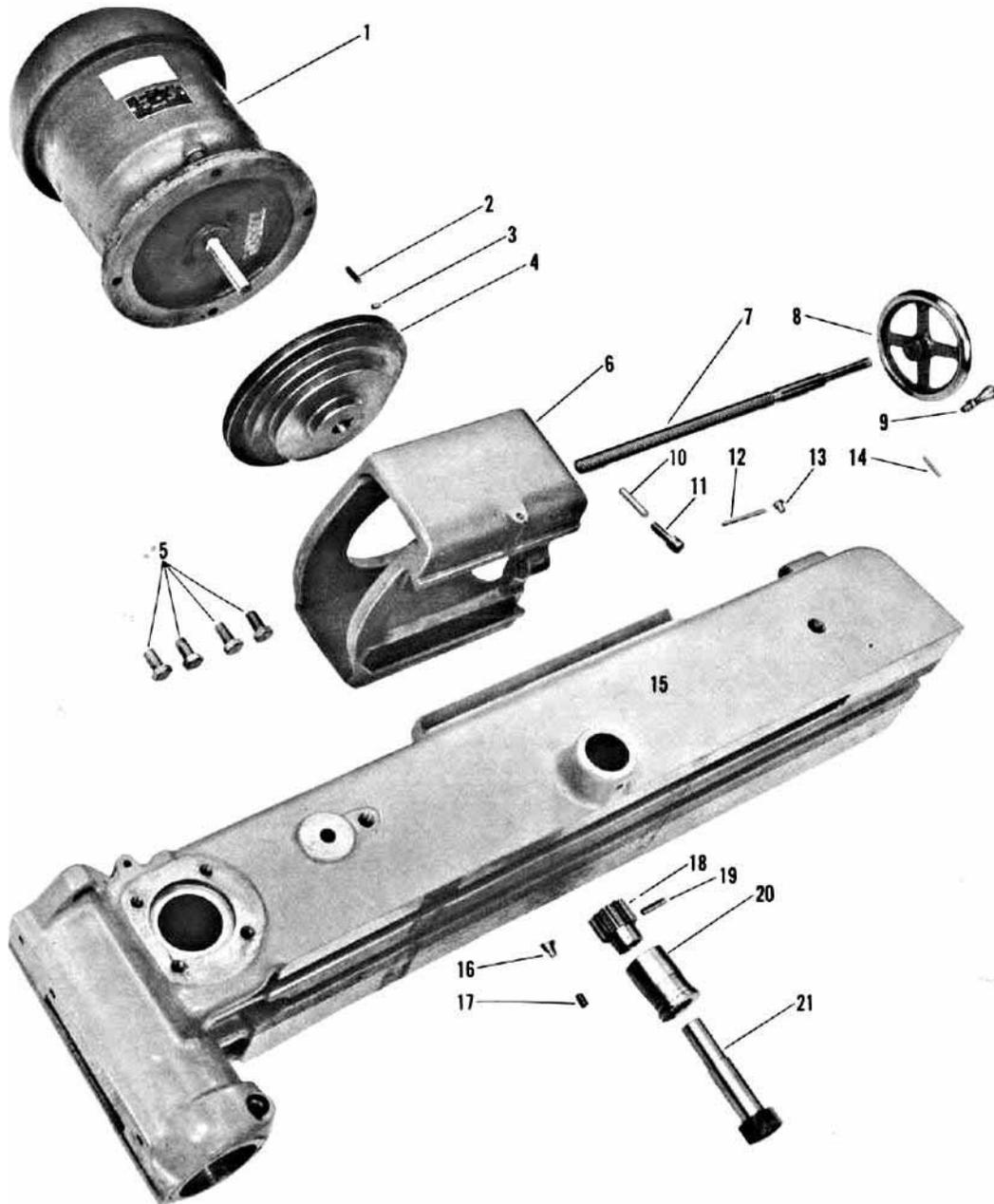
The following pages are furnished for ready identification of all parts in the various assemblies. This section is arranged in the same order as on the preceding pages.

IMPORTANT

Always furnish the serial number and/or model number of machine, duplicator table or tracer head when ordering replacement parts. Serial numbers on Gorton 0-16A mills and duplicators are located on a small pad as part of the model number panel on the left side of the machine column. Serial numbers on duplicator tables are located on front edge of table base at left end. Model numbers for tracer heads are located on top of the feed shaft housing.







PARTS LIST -- GORTON 0-16A VERTICAL – SWIVEL - UNIVERSAL MILL & DUPLICATOR

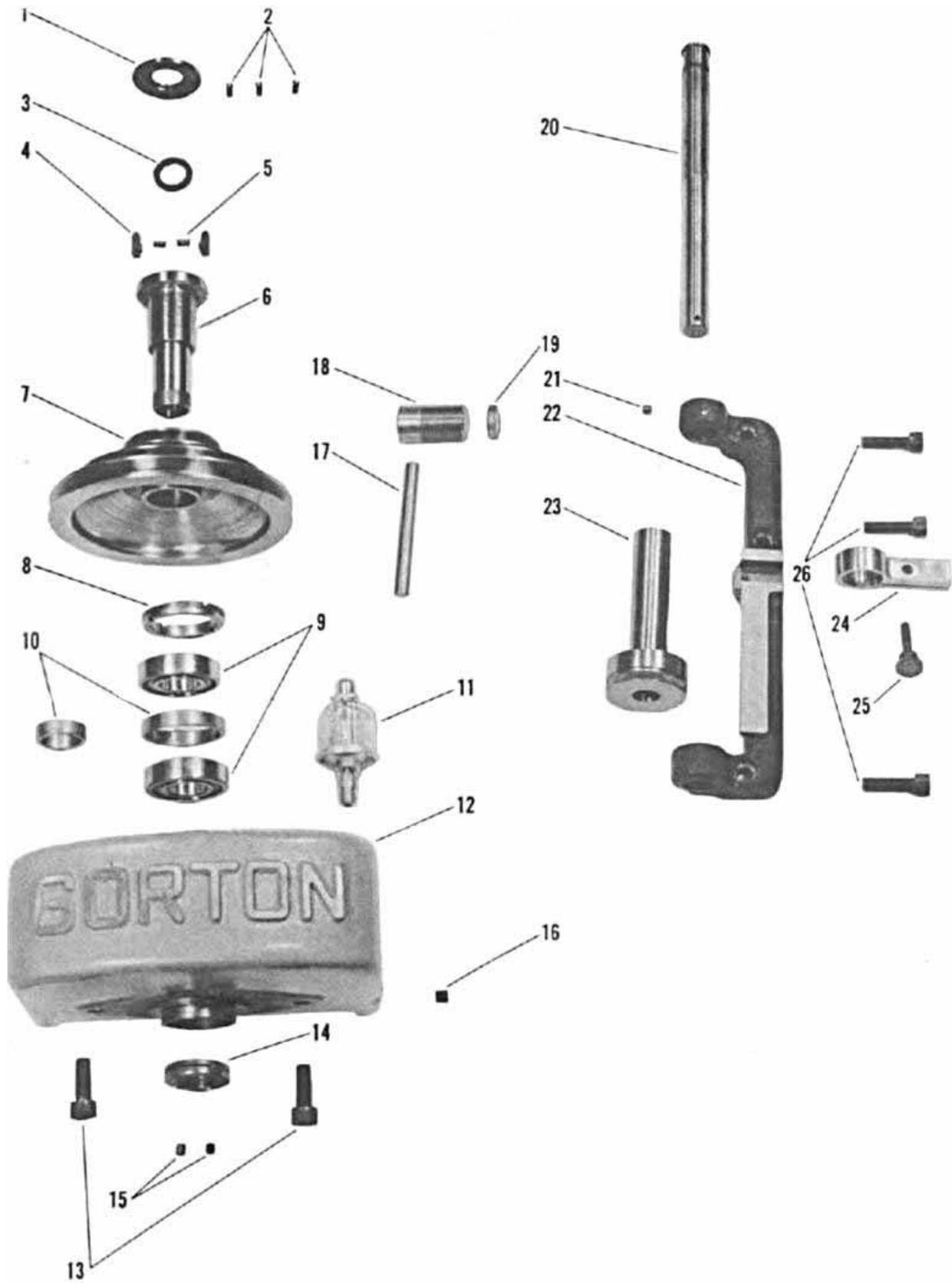
Order by Gorton Part Number and Name. Always Use Genuine Gorton Parts.

VERTICAL RAM ASSEMBLY

Always Give Machine Model Number and SERIAL NUMBER

Fig No.	Part Name	Part No.	Fig. No.	Part Name	Part No.
1	Spindle Motor	E-1034			
2	Motor Shaft Key (Furnished with motor)				
3	Socket Set Screw	K-218			
4	Motor Pulleys	18020			
4a	Motor Drive "V" Belt (not shown)	K-689			
5	Hex Head Cap Screws (4)	K-4932			
6	Motor Mounting Bracket	18016			
7	Belt Adjusting Screw	16325			
8	Belt Adjusting Hand Wheel	7004			
9	Hand Wheel Handle	K-540			
10	Motor Bracket Plug	18037			
11	Lock Screw	5707			
12	Lock Screw Handle	9821			
13	Oil Cup	K-515			
14	Taper Pin	K-471			
15	Ram	17180			
15a	Lifting Eye Bolt (not shown)	11511			
15b	Lifting Eye Bolt Collar (not shown)	9797			
15c	Ram Adjustment Limit Stop (not shown)	17185			
15d	Socket Cap Screw for above (not shown)	K-152			
16	Oil Cup	K-515			
17	Socket Set Screw	K-215			
18	Rack Pinion	7857			
19	Taper Pin	K-491			
20	Rack Pinion Shaft Bushing	17177			
21	Rack Pinion Shaft	17178			

() Figures in parentheses indicate quantities of identical parts



PARTS LIST -- GORTON 0-16A VERTICAL – SWIVEL - UNIVERSAL MILL & DUPLICATOR

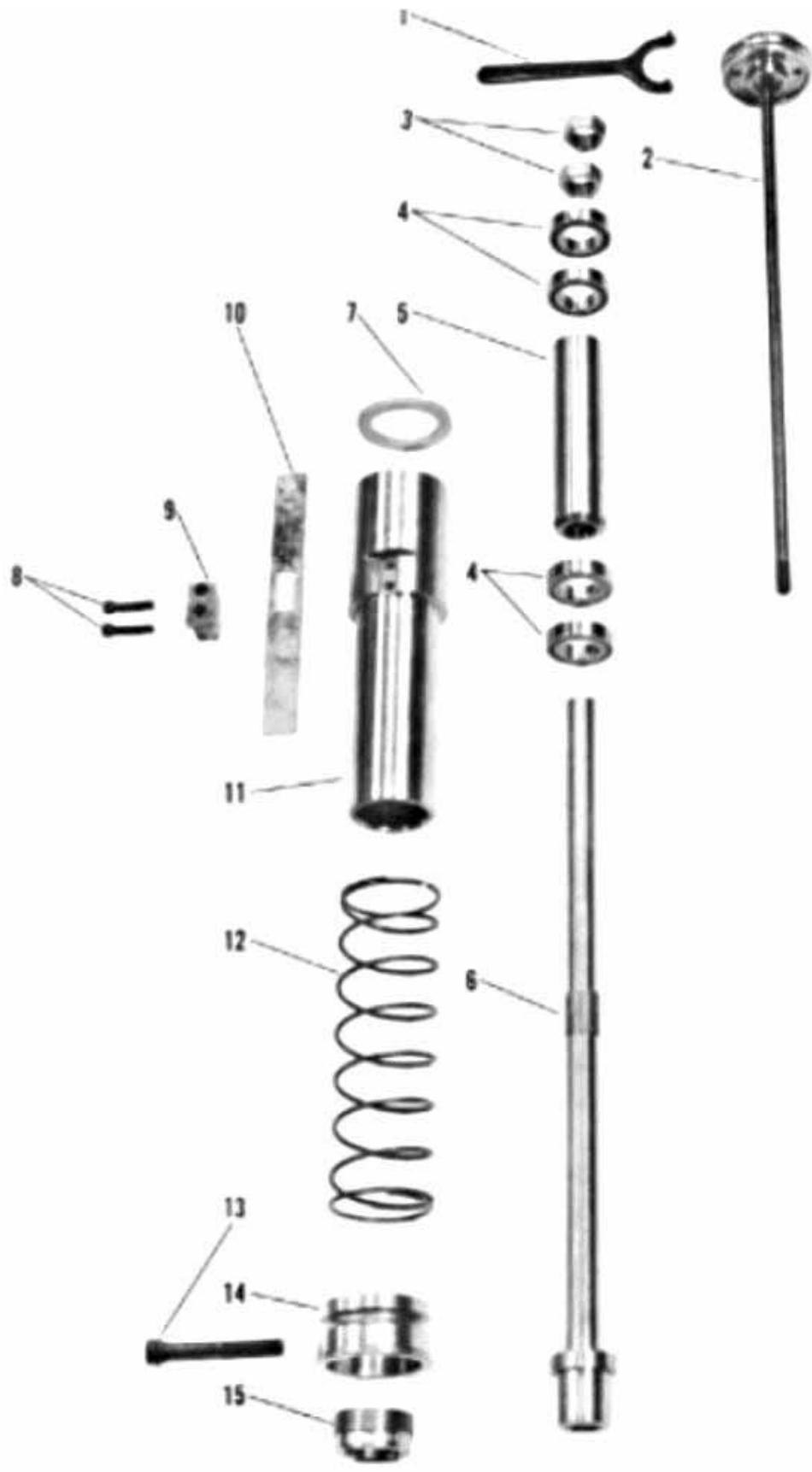
Order by Gorton Part Number and Name. Always Use Genuine Gorton Parts.

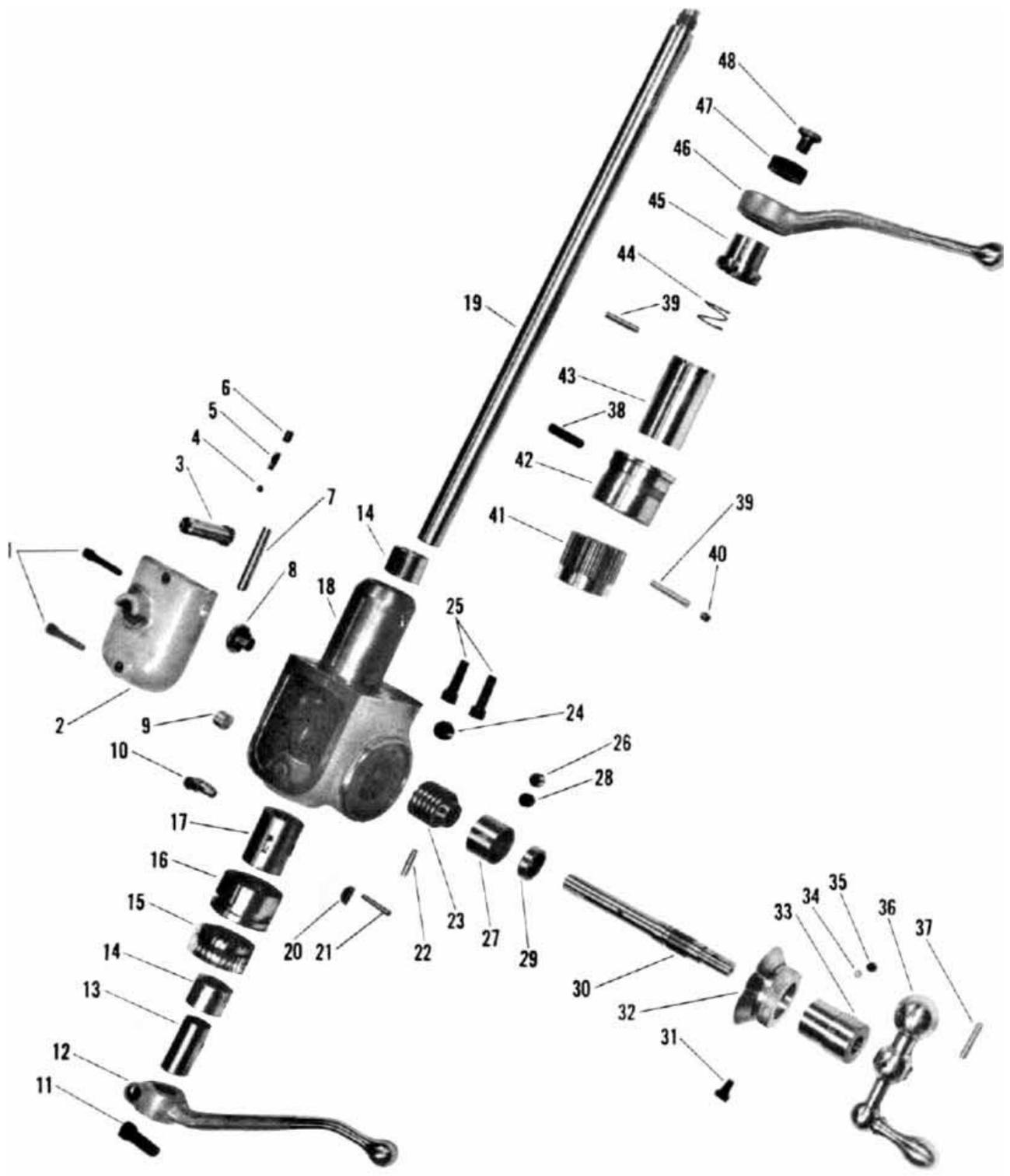
SPINDLE PULLEY ASSEMBLY
AND MICROMETER DEPTH STOP

Always Give Machine Model Number and SERIAL NUMBER

Fig No.	Part Name	Part No.	Fig. No.	Part Name	Part No.
1	Spindle Pulley Cover	7668			
2	Screws (3)	17928			
3	Felt Washer	6988			
4	Spindle Pulley Dogs (2)	7669			
5	Spindle Pulley Dog Springs (2)	7718			
6	Spindle Drive Pulley Hub	9034			
7	Spindle Pulley	9033			
8	Lock Nut	9036			
9	Ball Bearings (1 pair)	K-34			
10	Ball Bearing Spacer	CP-333			
11	Oil Cup	K-4666			
12	Spindle Pulley Shield	18035			
13	Socket Cap Screws (2)	K-160			
14	Ball Bearing Lock Nut	9005			
15	Socket Set Screws (2)	K-2290			
16	Pipe Plug	K-406			
17	Lock Screw Handle	11976			
18	Spindle Barrel Lock Screw	7017			
19	Brass Screw for Lock Screw	7018			
20	Feed Stop Micrometer Screw	11212			
21	Socket Set Screw	K-187			
22	Feed Stop Bracket	11199			
23	Feed Stop Micrometer Collar	11211			
24	Feed Stop Clamp	7012			
25	Feed Stop Clamp Screw	7013			
26	Socket Cap Screws (3)	K-152			

() Figures in parentheses indicate quantities of identical parts





PARTS LIST -- GORTON 0-16A VERTICAL – SWIVEL - UNIVERSAL MILL & DUPLICATOR

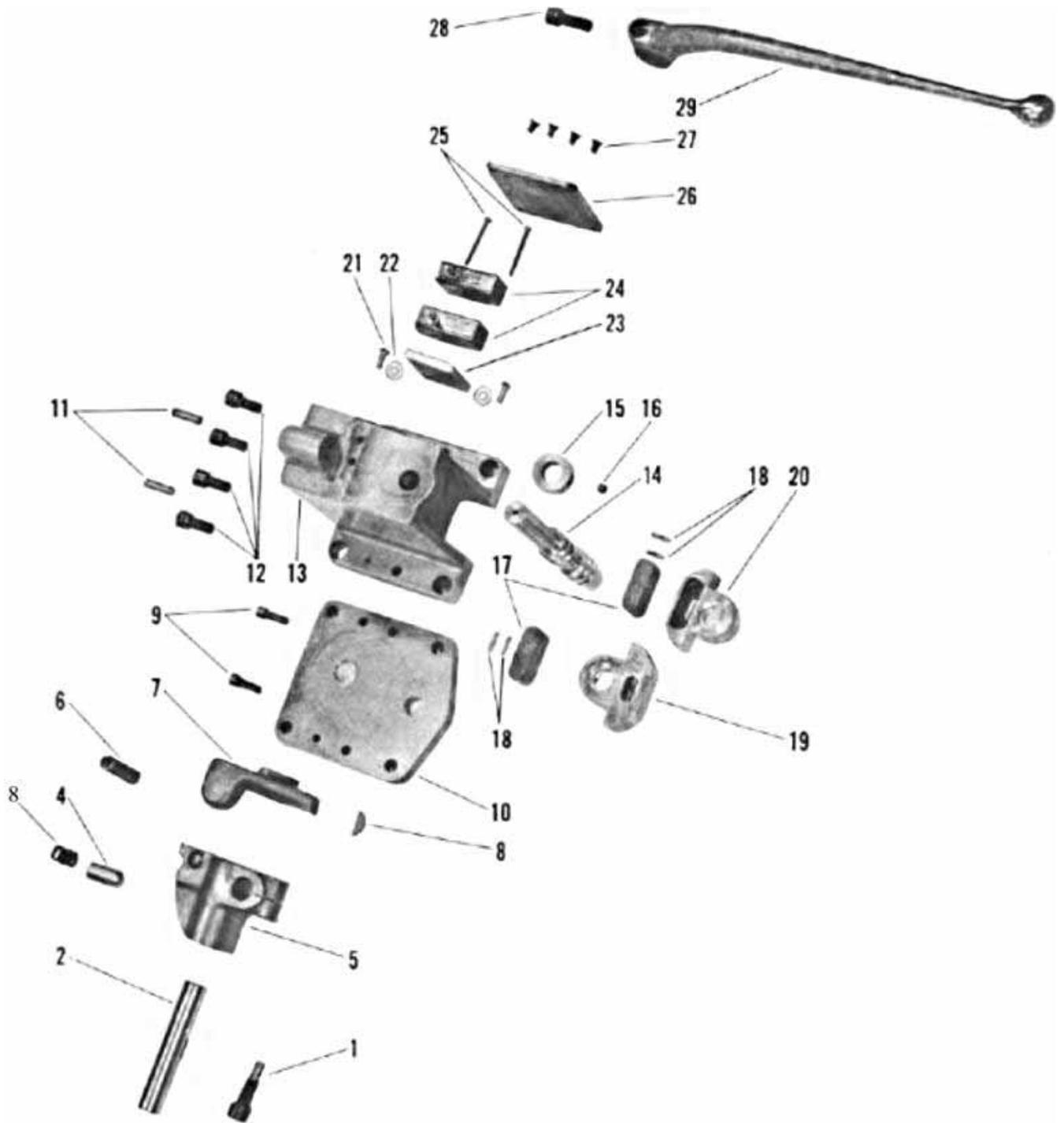
Order by Gorton Part Number and Name. Always Use Genuine Gorton Parts.

SPINDLE FEED WORKS

Always Give Machine Model Number and SERIAL NUMBER

Fig No.	Part Name	Part No.	Fig. No.	Part Name	Part No.
1	Socket Cap Screws (2)	K-1568	30	Worm Shaft	11207
2	Gear Box Cover	11225	31	Adjusting Screw	4987
3	Clutch Skitter	7968	32	Micrometer Dial	7912
4	Steel Ball	K-76	33	Worm Shaft Thrust Nut	7834
5	Spring	9567	34	Brass Plug	11996
6	Socket Set Screw	K-2266	35	Socket Set Screw	K-2009
7	Handle	12875	36	Hand Crank	6656
8	Oil Plug,	9445	37	Taper Pin	K-477
9	Plug	9963	38	Cone Point Socket Set Screw	K-1512
10	Oil Cup	K-519	39	Taper Pin	K-486
11	Socket Cap Screw	K-152	40	Socket Set Screw	K-187
12	Left-Hand Spindle Feed Lever	8659	41	Spindle Feed Pinion	7961
13	Spindle Feed Shaft Spacer	17214	42	Spindle Feed Shaft Bearing	11169
14	Needle Bearing (2)	K-1602	42a	Needle Bearing for above (not shown)	K-1602
15	Worm Wheel and Clutch	CP-1095	43	Spindle Feed Shaft Clutch	8681
16	Sliding Clutch Wheel	13564	44	Spindle Lever Spring	7875
17	Spacer	7959	45	Spindle Feed Lever Clutch	7009
18	Spindle Feed Gear Box	17186	46	Right-Hand Spindle Feed Lever	7010
19	Spindle Feed Shaft	17182	47	Spindle Feed Shaft Nut	7011
20	Woodruff Key	K-555		Spindle Fred Shaft Screw	8742
21	Taper Pin	K-471			
22	Taper Pin	K-477			
23	Spindle Feed Worm	11206			
24	Pipe Plug	K-687			
25	Socket Cap Screws (2)	K-152			
26	Flat Point Socket Set Screw	K-4016			
27	Worm Shaft Bushing	11205			
28	Cone Point Socket Set Screw	K2341			
29	Oil Seal	K-5362			

() Figures in parentheses indicate quantities of identical parts



PARTS LIST -- GORTON 0-16A VERTICAL – SWIVEL - UNIVERSAL MILL & DUPLICATOR

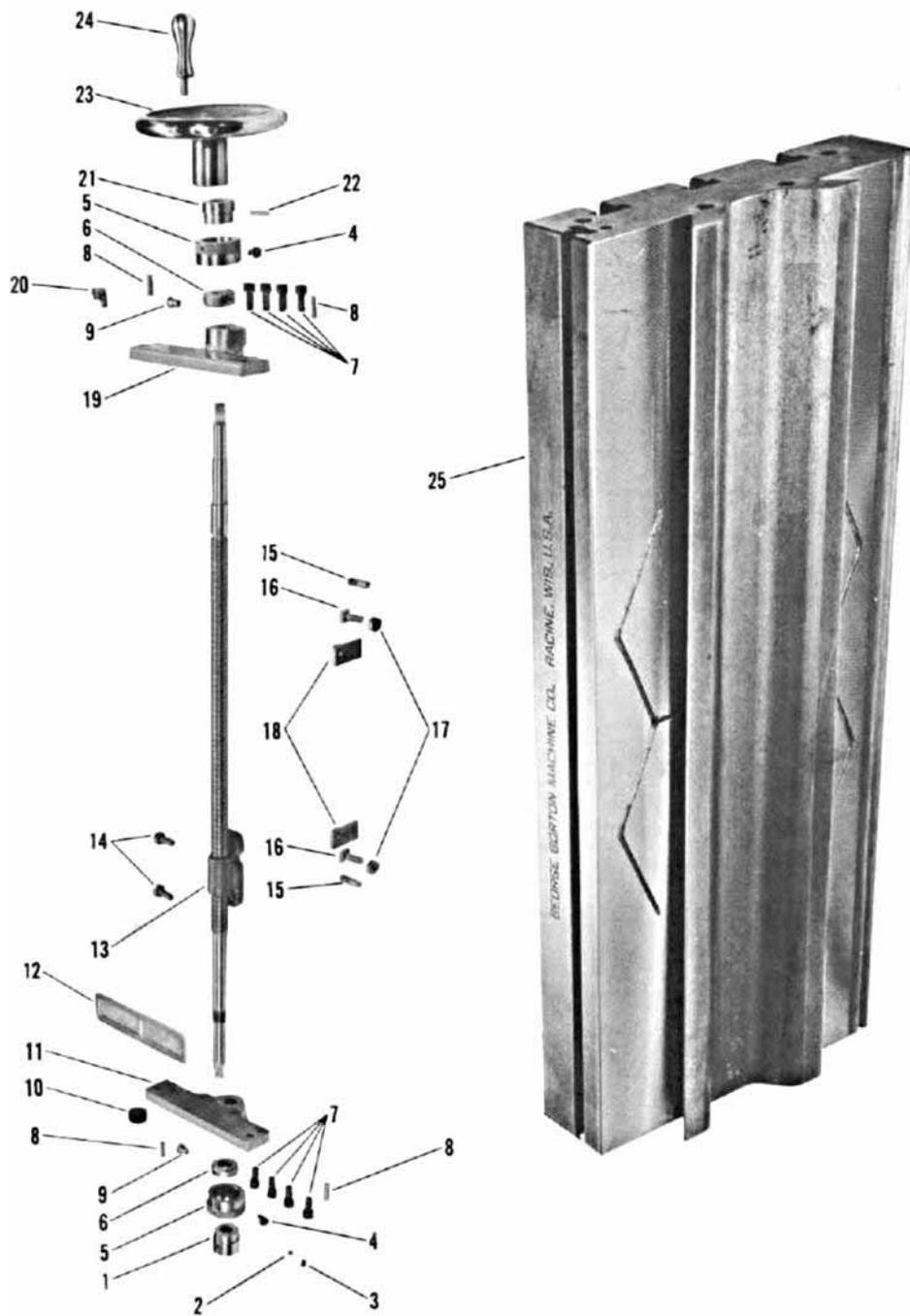
Order by Gorton Part Number and Name. Always Use Genuine Gorton Parts.

SPINDLE SWITCH AND BRAKE ASSEMBLY

Always Give Machine Model Number and SERIAL NUMBER

Fig No.	Part Name	Part No.	Fig. No.	Part Name	Part No.
1	Cam Clamp Screw	16224			
2	Brake Lever Shaft	16225			
3	Spindle Start Lever Spring	9156			
4	Cam Stop Pin	16227			
5	Spindle Stop Cam	16222			
6	Spring	16226			
7	Spindle Start Lever	16223			
8	Hi-Pro Key	K-3928			
9	Socket Set Screws (2)	K-135			
10	Brake Bracket Cover	16218			
11	Dowel Pins (2)	K-3934			
12	Socket Cap Screws (4)	K-151			
13	Spindle Brake Bracket	17187			
14	Brake Screw	17189			
15	Brake Screw Collar	7027			
16	Socket Set Screw	K-187			
17	Brake Shoe inserts (2)	8995			
18	Drive Pins (4)	K-424			
19	Brake Shoe-Left Hand Thread	16220			
20	Brake Shoe-Right Hand Thread	16221			
21	Round Head Machine Screws (2)	K-396			
22	Washers (2)	K-459			
23	Micro-Switch Bracket	17118			
24	Micro-Switches (2)	K-4054			
25	Round Head Machine Screws (2)	K-4942			
26	Switch Cover Plate	16218			
27	Flat Head Machine Screws (4)	K-3596			
28	Socket Cap Screw	K-135			
29	Brake Lever	16229			

() Figures in parentheses indicate quantities of identical parts



PARTS LIST -- GORTON 0-16A VERTICAL – SWIVEL - UNIVERSAL MILL & DUPLICATOR

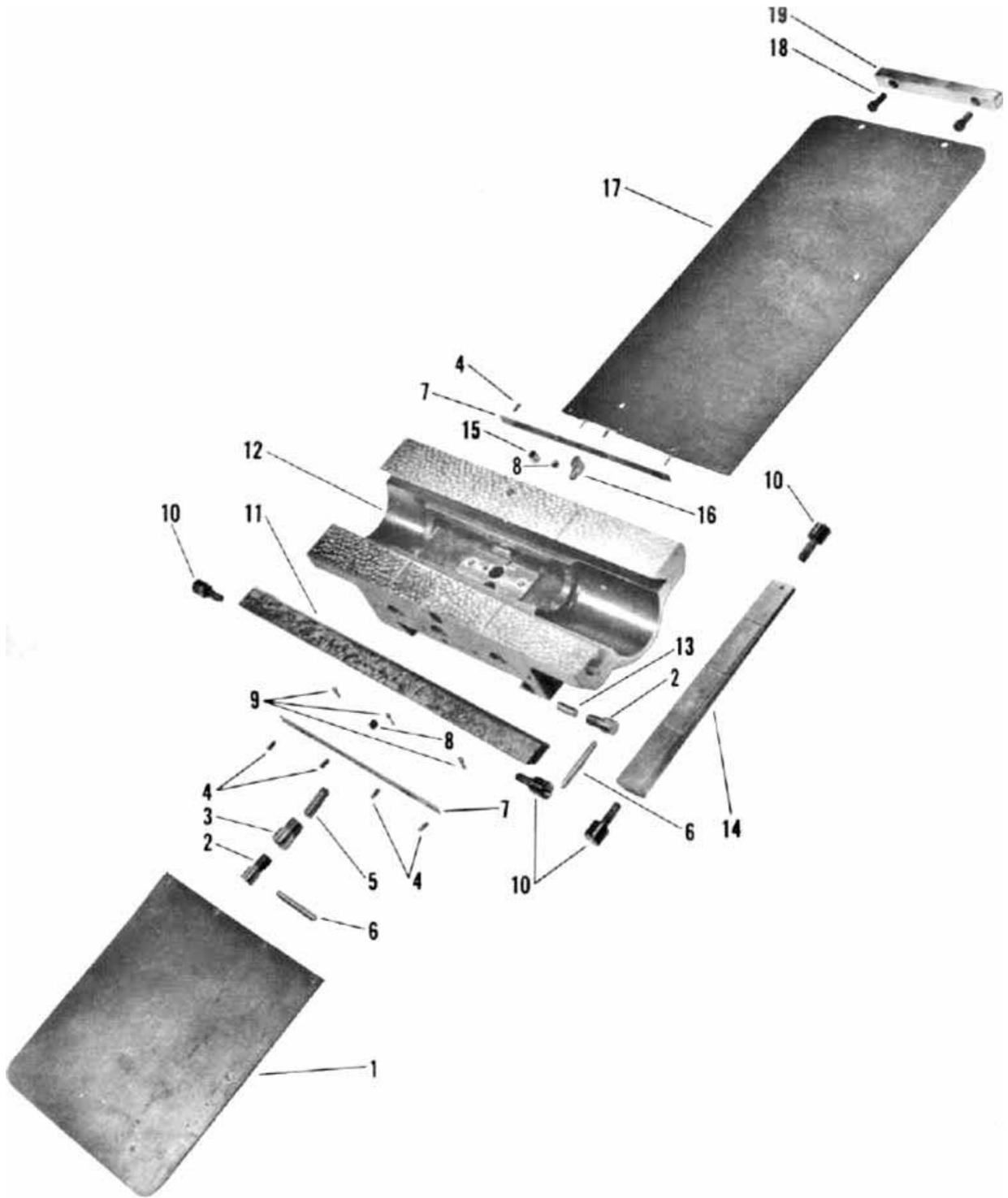
Order by Gorton Part Number and Name. Always Use Genuine Gorton Parts.

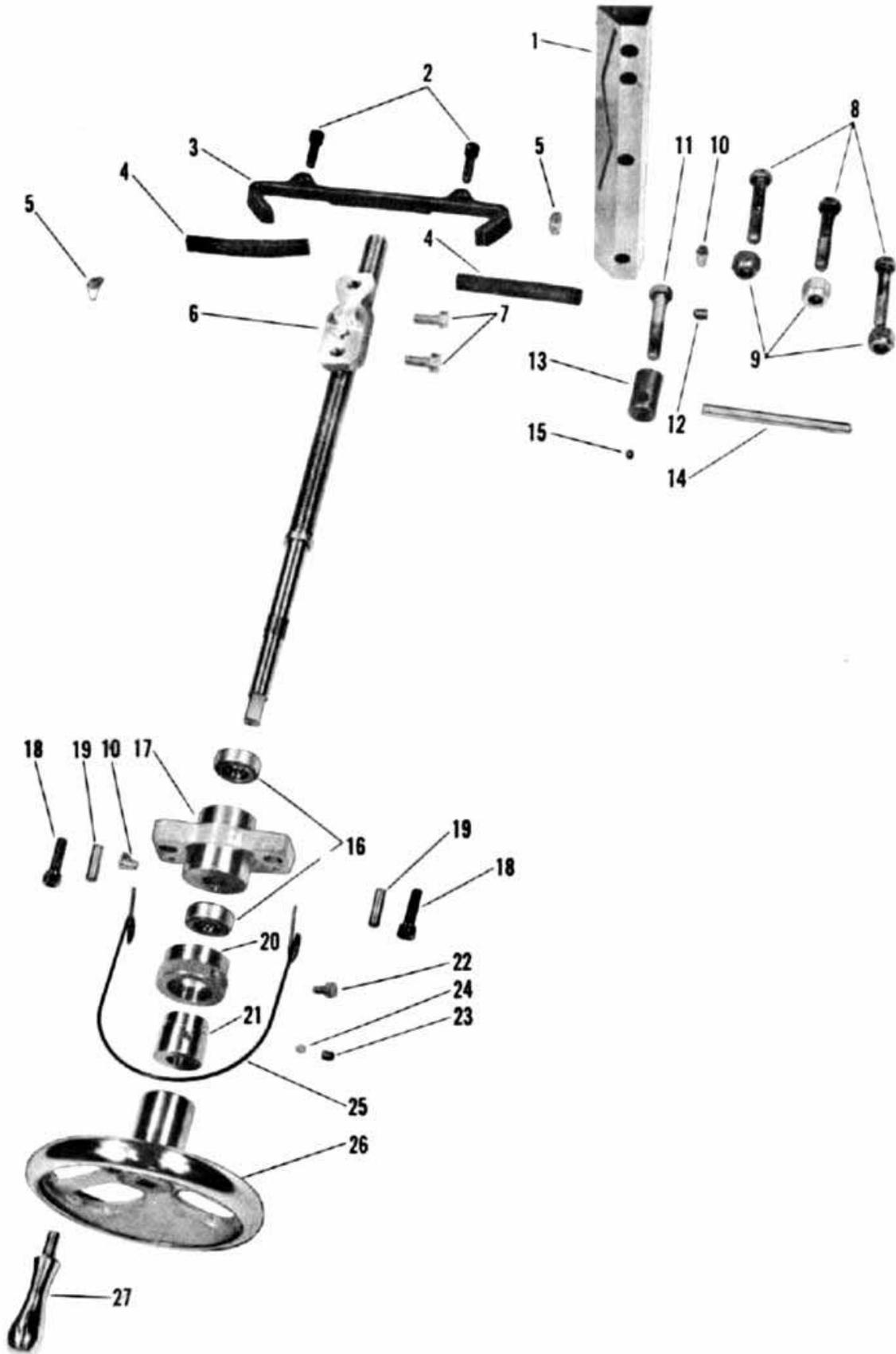
MACHINE TABLE AND SCREW ASSEMBLY

Always Give Machine Model Number and SERIAL NUMBER

Fig No.	Part Name	Part No.	Fig. No.	Part Name	Part No.
1	Table Screw Thrust Nut	6594			
2	Brass Plug	11996			
3	Socket Set Screw	K-2009			
4	Adjusting Screws (2)	4987			
5	Micrometer Dials (2)	6291			
6	Thrust Bearings (2)	K-44			
7	Socket Cap Screws (8)	K-2029			
8	Dowel Pins (4)	12611			
9	Oil Cups (2)	K-515			
10	Pipe Plug	K-411			
11	Table End Bracket-Left Hand	17926			
12	Strainer Frame and Screen	CP-341			
13	Table Screw and Nut	CP-459			
14	Cap Screws (2)	6968			
15	Table Dog Tee Blot Screws (2)	18083			
16	Tee Slot Bolts (2)	14813			
17	Tee Slot Bolt Nuts (2)	K-297			
18	Table Stop Dogs (2)	7060			
19	Table End Bracket-Right Hand	17925			
20	Oil Cup	K-519			
21	Thrust Collar	6592			
22	Taper Pin	K-485			
23	Hand Wheel	7869			
24	Handle	K-542			
25	Machine Table	17919			

() Figures in parentheses indicate quantities of identical parts





PARTS LIST -- GORTON 0-16A VERTICAL – SWIVEL - UNIVERSAL MILL & DUPLICATOR

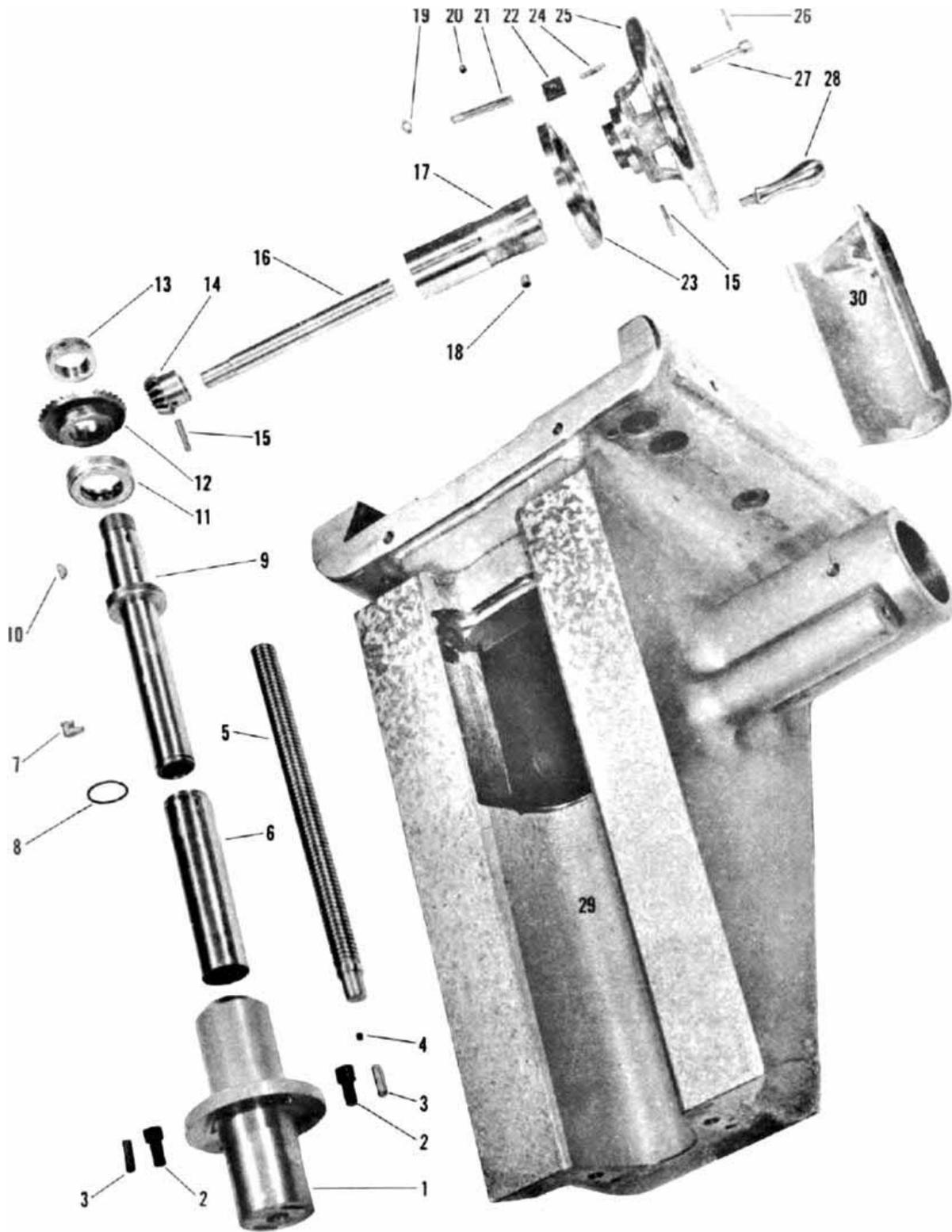
Order by Gorton Part Number and Name. Always Use Genuine Gorton Parts.

CROSS FEED ASSEMBLY
AND KNEE PARTS

Always Give Machine Model Number and SERIAL NUMBER

Fig No.	Part Name	Part No.	Fig. No.	Part Name	Part No.
1	Knee Gib	7040			
2	Socket Cap Screws (2)	K-143			
3	Felt Retainer Bracket	6227			
4	Felt Strips (2)	K-566			
5	Elbow Oil Cups (2)	K-519			
6	Cross Feed Screw and Nut	CP-358			
7	Feed Nut Cap Screws (2)	6968			
8	Knee Gib Screws (3)	17002			
9	Self-Locking Hex Nuts (3)	K-301			
10	Oil Cups (2)	K-515			
11	Knee Gib Screw (Left-Hand Thread)	17003			
12	Socket Set Screw	K-228			
13	Clamp Nut	17004			
14	Clamp Nut Handle	6589			
15	Socket Set Screw	K-199			
16	Thrust Bearings (2)	K-44			
17	Cross Feed Screw Bracket	6225			
18	Socket Cap Screws (2)	K-152			
19	Dowel Pins (2)	12611			
20	Micrometer Dial	6291			
21	Thrust Nut	6594			
22	Adjusting Screw	4987			
23	Socket Set Screw	K-2009			
24	Brass Plug	11996			
25	Apron Support	7137			
26	Cross Feed Hand Wheel	7869			
27	Machine Handle	K-542			

() Figures in parentheses indicate quantities of identical parts



PARTS LIST -- GORTON 0-16A VERTICAL – SWIVEL - UNIVERSAL MILL & DUPLICATOR

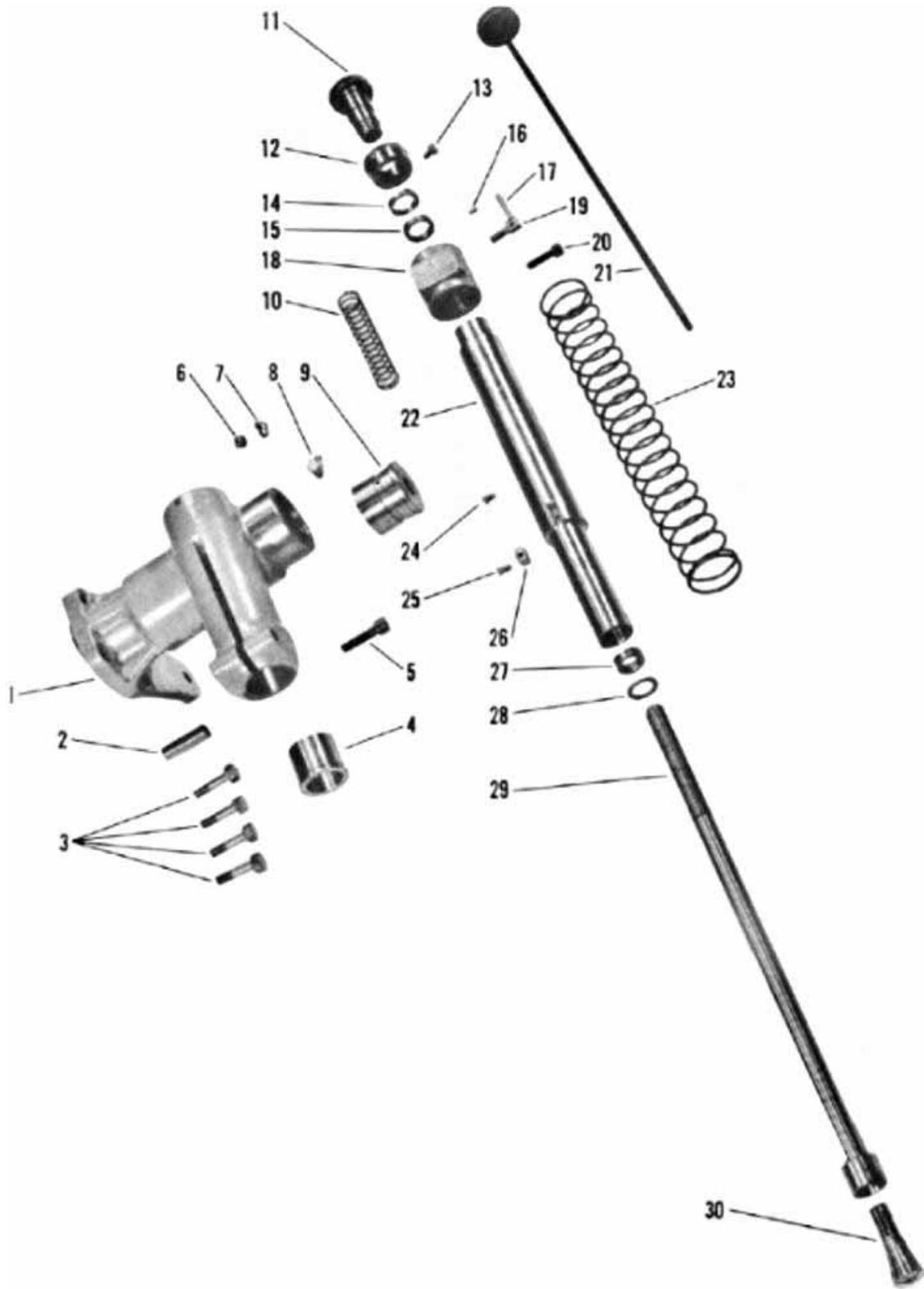
Order by Gorton Part Number and Name. Always Use Genuine Gorton Parts.

KNEE ELEVATE ASSEMBLY

Always Give Machine Model Number and SERIAL NUMBER

Fig No.	Part Name	Part No.	Fig. No.	Part Name	Part No.
1	Elevate Screw Support	10726	30	Knee Cover Plate	6225
2	Socket Cap Screws (2)	K-2313			
3	Dowel Pins (2)	12612			
4	Socket Set Screw	K-199			
5	Knee Elevate Screw	7955			
6	Elevate Screw Shield	8119			
7	Elbow Oil Cup	K-519			
8	Snap Ring	10757			
9	Elevate Screw Nut	8804			
10	Woodruff Key	K-556			
11	Thrust Bearing	K-58			
12	Elevate Gear	8127			
13	Elevate Gear Lock Nut	8120			
14	Elevate Gear Pinion	6579			
15	Taper Pins (2)	K-500			
16	Elevate Shaft	7657			
17	Elevate Shaft Bushing	7658			
18	Socket Set Screw	K-234			
19	Alemite Grease Fitting	K-2023			
20	Socket Set Screw	K-188			
21	Dial Indicator	7070			
22	Dial Clamp Nut	7071			
23	Micrometer Dial	7069			
24	Spring	6748			
25	Elevate Hand Wheel	8940			
26	Clamp Screw Handle	12910			
27	Dial Clamp Screw	7072			
28	Machine Handle	K-543			
29	Knee	17207			

() Figures in parentheses indicate quantities of identical parts



PARTS LIST -- GORTON 0-16A VERTICAL – SWIVEL - UNIVERSAL MILL & DUPLICATOR

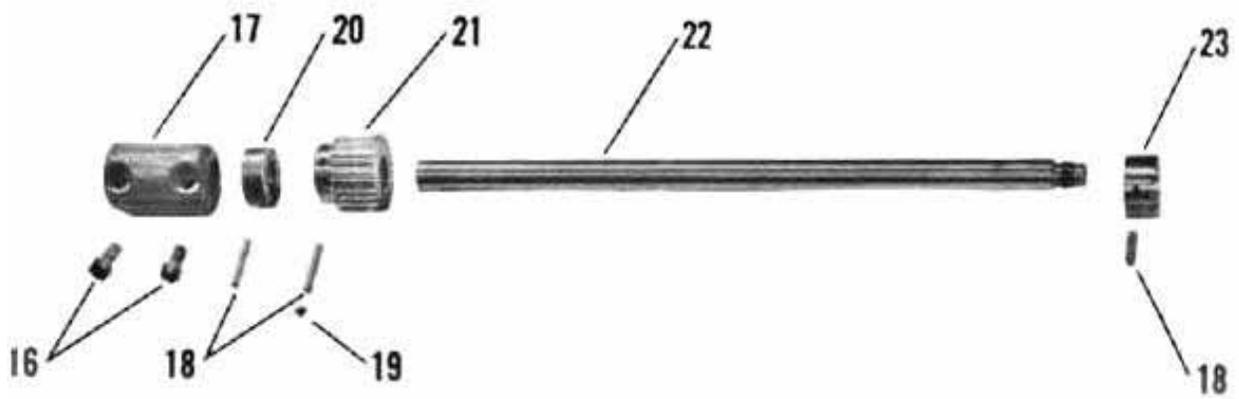
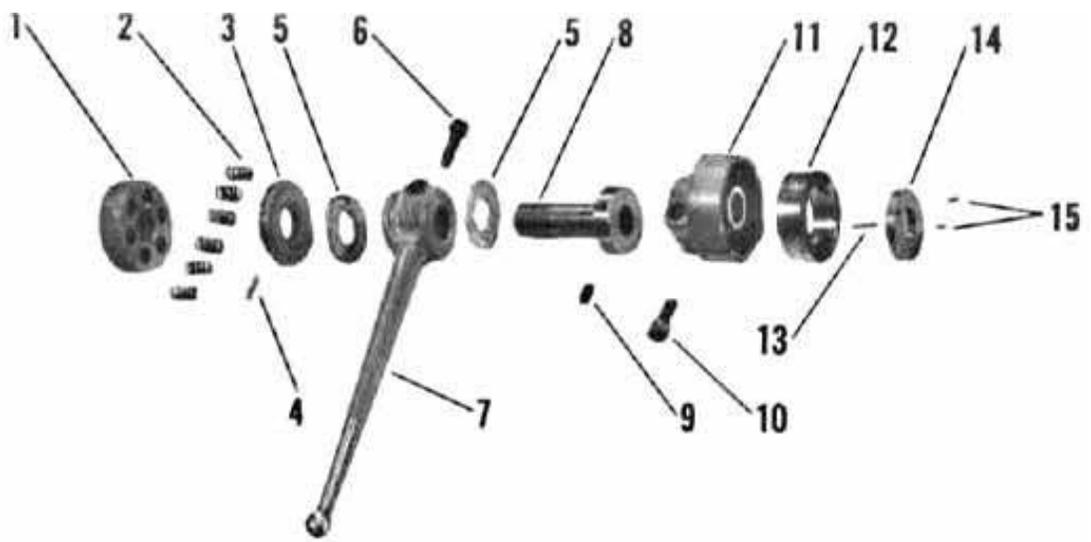
Order by Gorton Part Number and Name. Always Use Genuine Gorton Parts.

TRACER HEAD ASSEMBLY

Always Give Machine Model Number and SERIAL NUMBER

Fig No.	Part Name	Part No.	Fig. No.	Part Name	Part No.
1	Tracer Spindle Head	12920	30	Tracer Spindle Collet	14877
2	Dowel Pin	9605			
3	Hex Head Cap Screws (4) Furnished with Machine	1730			
4	Tracer Spindle Sleeve Bushing	9211			
5	Socket Cap Screw	K-157			
6	Socket Set Screw	K-4016			
7	Oil Cup	K-515			
8	Elbow Oil Cup	K-519			
9	Spindle Feed Shaft Bearing	7007			
10	Spindle Thrust Spring	8816			
11	Spindle Adjusting Nut	8806			
12	Micrometer Dial	8812			
13	Adjusting Screw	4987			
14	Thrust Collar	8813			
15	Thrust Nut	8814			
16	Socket Set Screw	K-201			
17	Lock Screw Handle	12926			
18	Spindle Adjusting Nut Bearing	8805			
19	Lock Screw	8807			
20	Socket Cap Screw	K-152			
21	Spindle Draw Bar and Hand Wheel	CP-195			
22	Tracer Spindle Sleeve	17612			
23	Spindle Sleeve Spring	9212			
24	Spindle Sleeve Screw	8809			
25	Spindle Sleeve Key Retaining Screw	3271			
26	Spindle Sleeve Key	8745			
27	Spring Retainer Nut	8815			
28	Tracer Spindle Sleeve Washer	9213			
29	Tracer Spindle	9209			

() Figures in parentheses indicate quantities of identical parts



PARTS LIST -- GORTON 0-16A VERTICAL – SWIVEL - UNIVERSAL MILL & DUPLICATOR

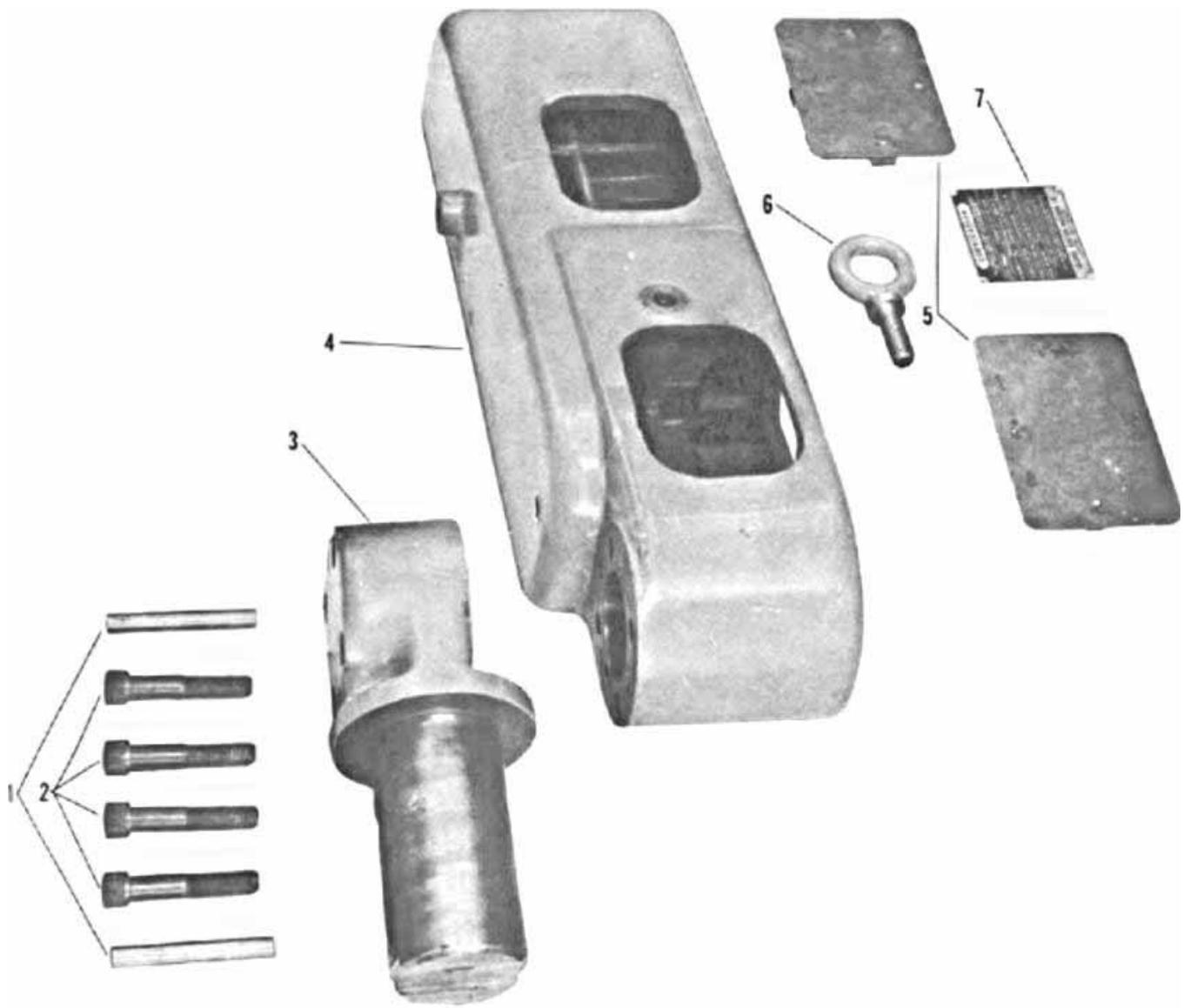
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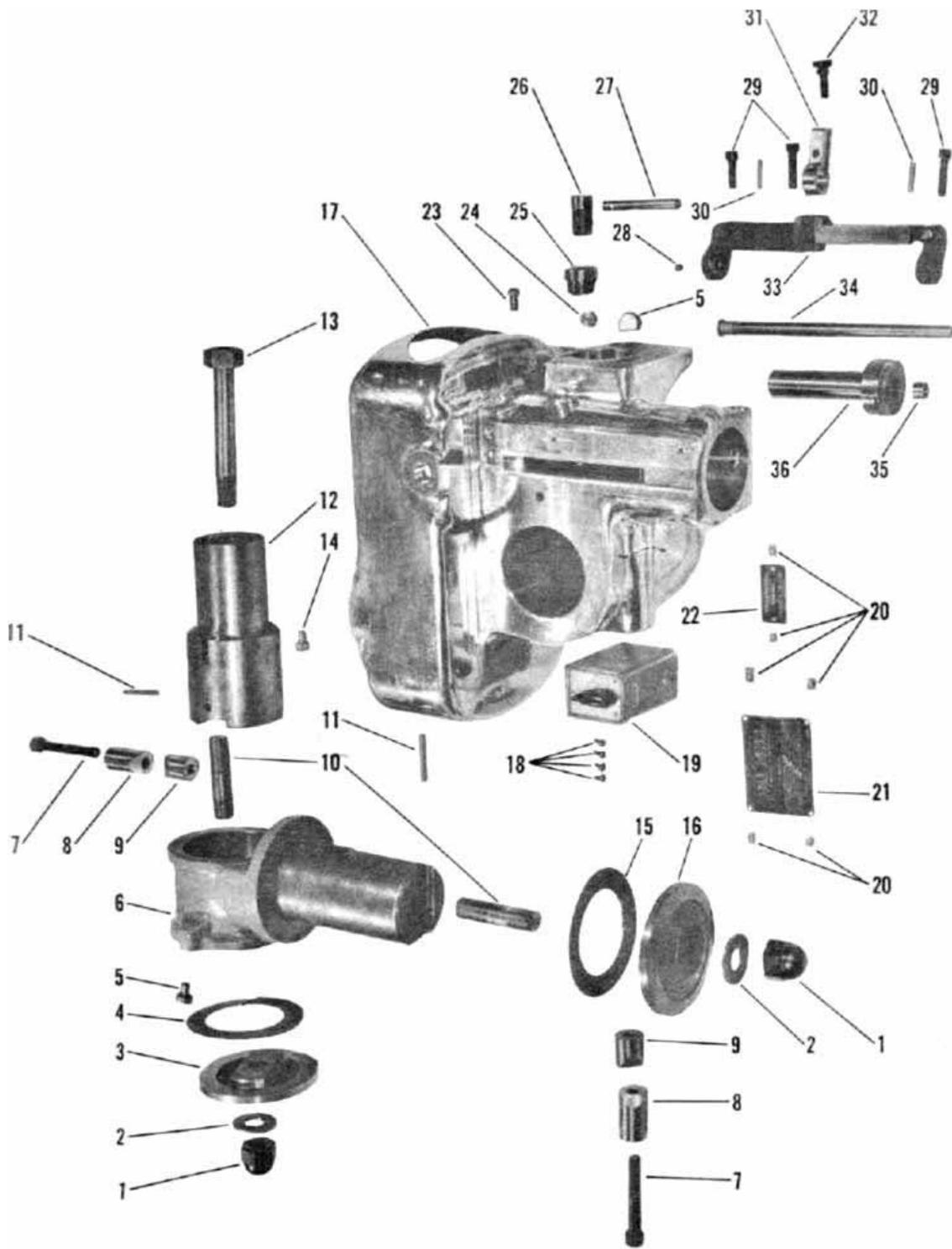
TRACER HEAD FEED CLUTCH AND SHAFT

Always Give Machine Model Number and SERIAL NUMBER

Fig No.	Part Name	Part No.	Fig. No.	Part Name	Part No.
1	Friction Nut	4249			
2	Friction Nut Springs (6)	3892			
3	Friction Washer-Outer	4250			
4	Pin	11395			
5	Fabric Washers (2)	9950			
6	Socket Cap Screw	K-152			
7	Friction Feed Lever	9948			
8	Friction Feed Lever Shaft	9949			
9	Socket Set Screw	K-203			
10	Socket Cap Screw	K-152			
11	Counter-Balance Spring Collar	8741			
12	Counter-Balance Spring	8740			
13	Spring Retaining Pin	12636			
14	Adapter Washer	13011			
15	Adapter Washer Pins (2)	12728			
16	Socket Cap Screws (2)	K-151			
17	Feed Shaft Coupling	8737			
18	Taper Pins (3)	K-486			
19	Socket Set Screw	K-187			
20	Feed Shaft Collar	9219			
21	Spindle Feed Pinion	7961			
22	Feed Shaft	12929			
23	Spindle Feed Pinion Clutch	7008			

() Figures in parentheses indicate quantities of identical parts





PARTS LIST -- GORTON 0-16A VERTICAL – SWIVEL - UNIVERSAL MILL & DUPLICATOR

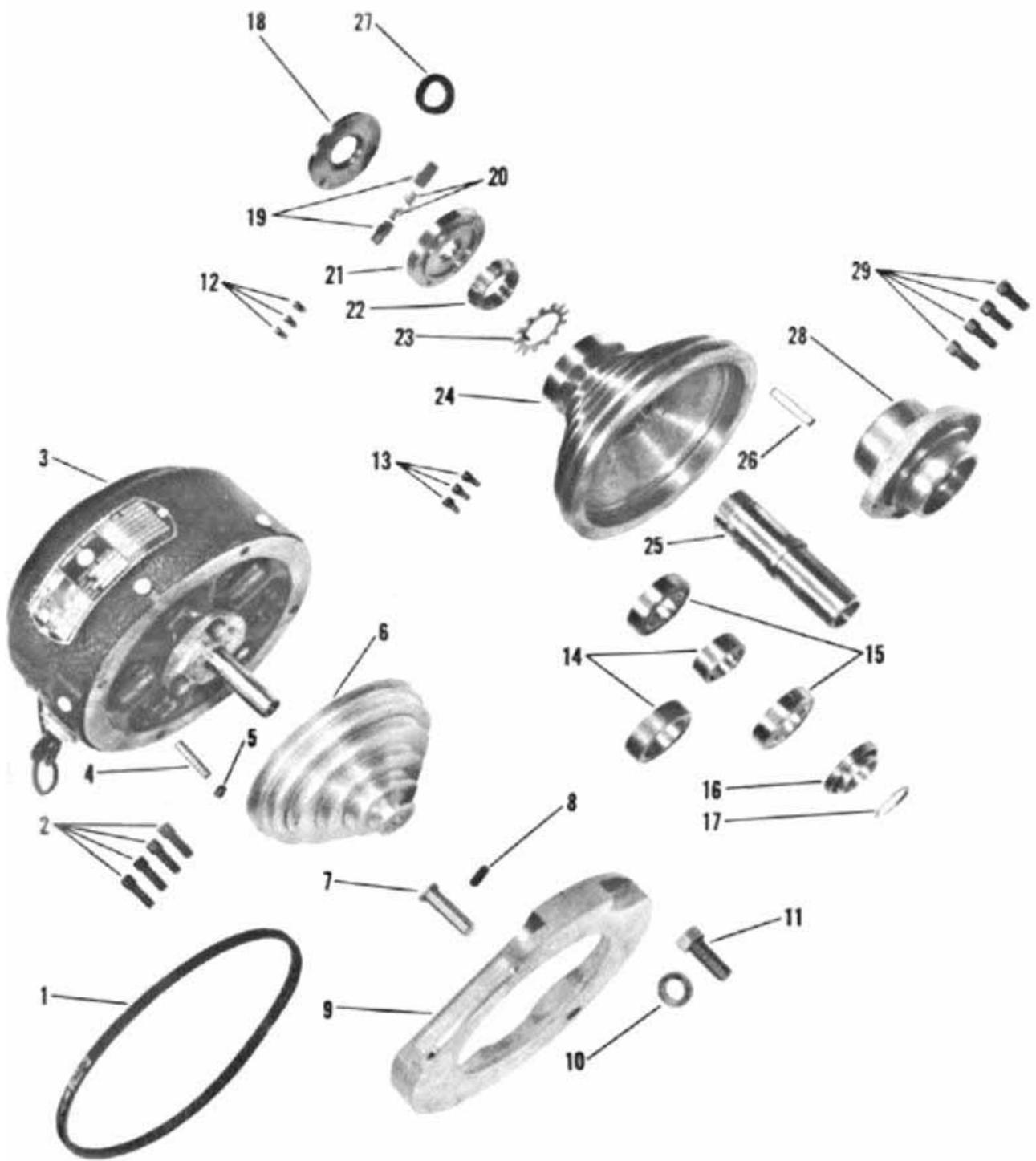
Order by Gorton Part Number and Name. Always Use Genuine Gorton Parts.

UNIVERSAL HEAD & FITTINGS

Always Give Machine Model Number and SERIAL NUMBER

Fig No.	Part Name	Part No.	Fig. No.	Part Name	Part No.
1	Clamp Nuts (2)	17063	30	Taper Pins (2)	K-470
2	Clamp Washers (2)	17062	31	Depth Stop Dial Clamp	17547
3	Swivel Head Dial Plate	17150	32	Depth Stop Clamp Screw	17560
4	Swivel Head Dial Plate	17123	33	Depth Stop Bracket	17544
5	Dial Indicators (2)	17064	34	Depth Stop Screw	17545
6	Universal Swivel Arm	17676	35	Depth Stop Dial Bushing	17964
7	Socket Cap Screw (2)	K-2665	36	Depth Stop Dial	17546
8	Outer Lock Shoe (2)	17564			
9	Inner Lock Shoe (2)	17565			
10	Clamp Stud (2)	17065			
11	Taper Pin (2)	K-488			
12	Universal Swivel Post	17092			
13	Universal Swivel Post Draw Bolt	17095			
14	Dowel for Universal Post	17093			
15	Dial Plate Washer	17562			
16	Spindle Head Dial Plate	17561			
17	Unimill Head	17510			
18	Round Head Machine Screws (4)	K-292			
19	Reversing Switch	K-5273			
20	Drive Pins (6)	K-423			
21	Speed Plate	K-5094			
22	Instruction Plate	17509			
23	Oil Cup	K-526			
24	Brass Plug	17528			
25	Quill Lock Screw Bushing	17563			
26	Quill Lock Screw	17529			
27	Lock Screw Handle	K-3414			
28	Socket Set Screw	K-185			
29	Socket Cap Screws (3)	K-143			

() Figures in parentheses indicate quantities of identical parts



PARTS LIST -- GORTON 0-16A VERTICAL – SWIVEL - UNIVERSAL MILL & DUPLICATOR

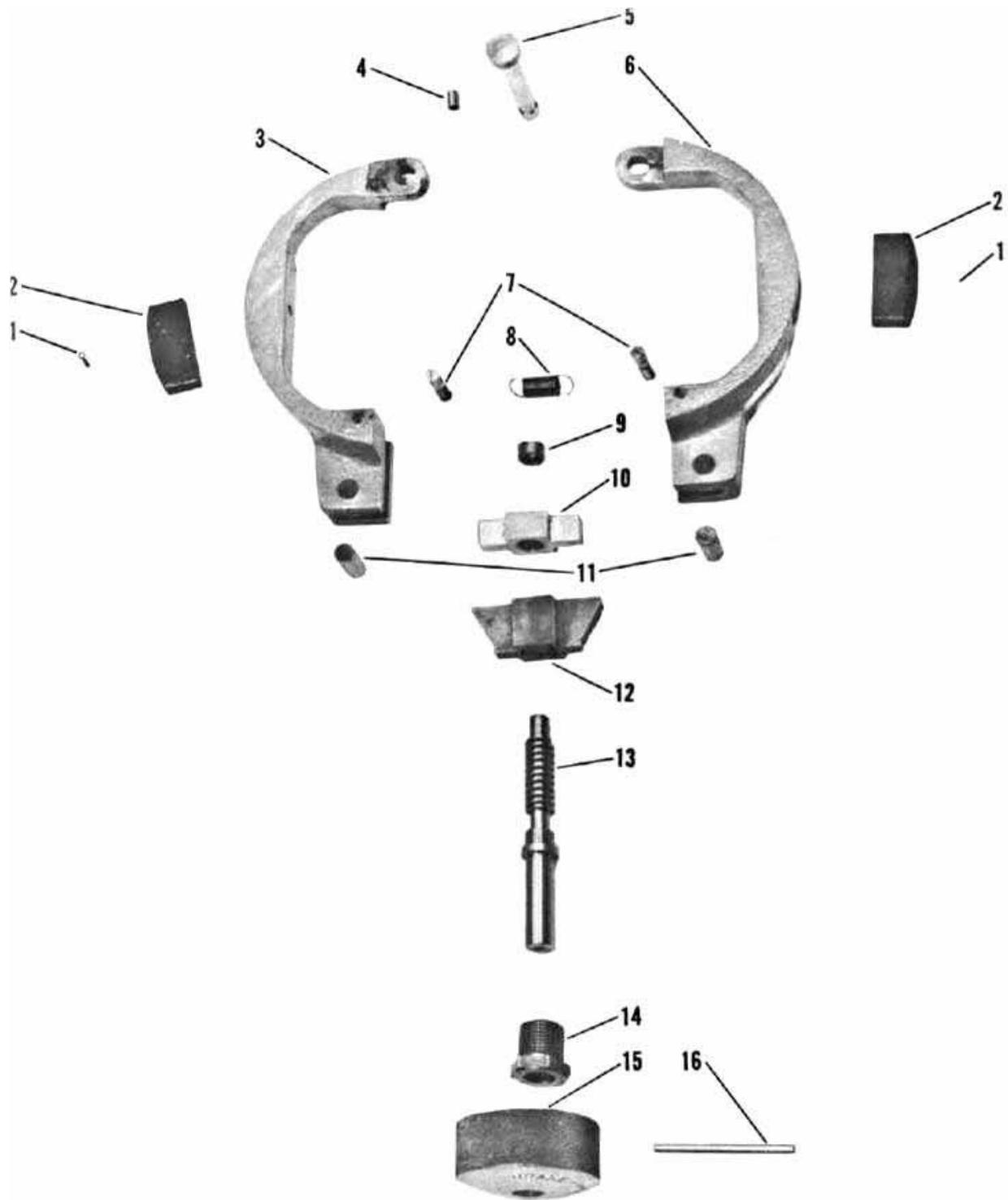
Order by Gorton Part Number and Name. Always Use Genuine Gorton Parts.

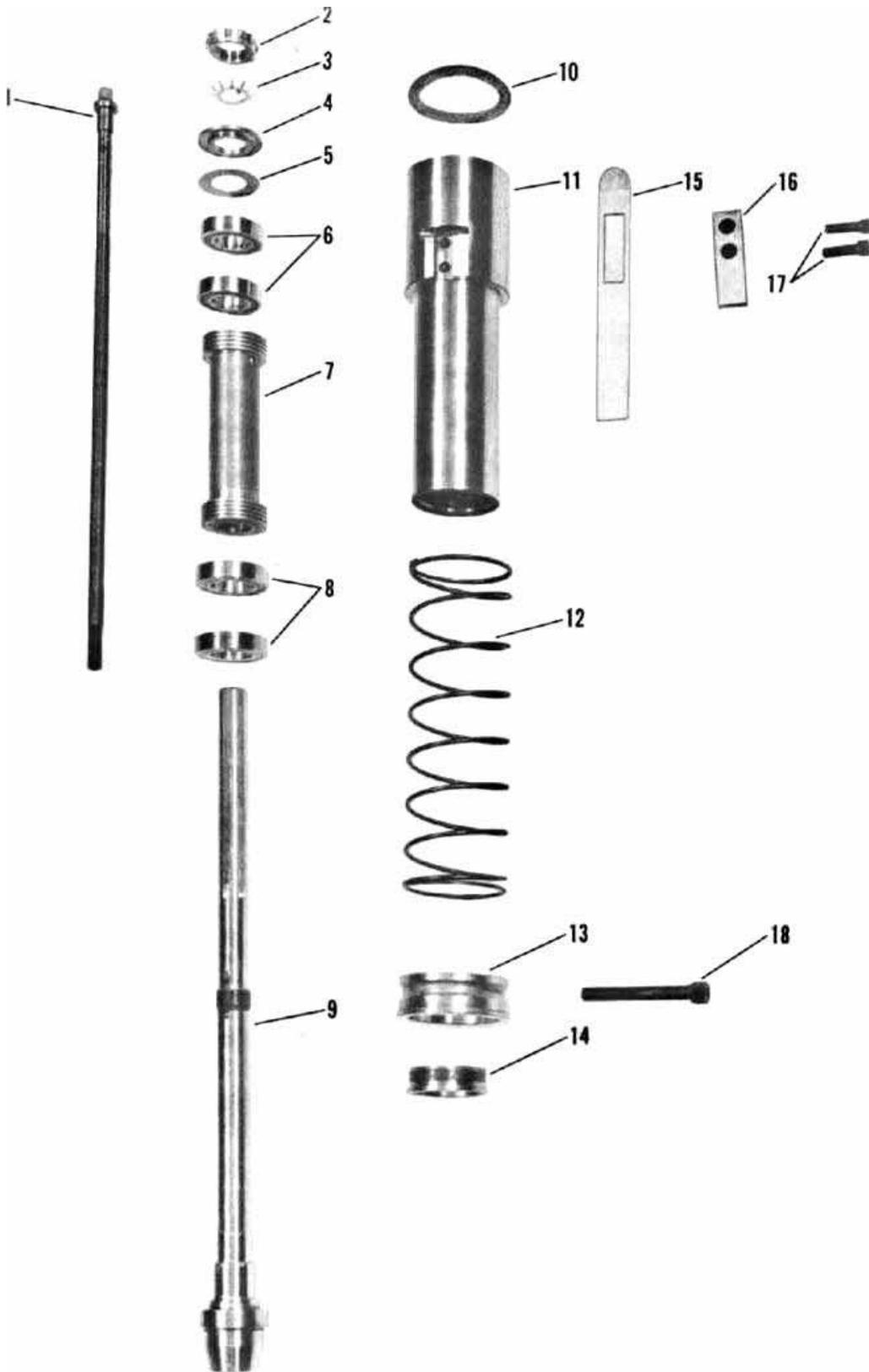
UNIVERSAL SPINDLE MOTOR
AND PULLEY ASSEMBLY

Always Give Machine Model Number and SERIAL NUMBER

Fig No.	Part Name	Part No.	Fig. No.	Part Name	Part No.
1	Spindle Drive Belt	K-4586			
2	Socket Cap Screws (4)	K-141			
3	Spindle Drive Motor	K-4219			
4	Motor Shaft Key (furnished with motor)				
5	Socket Set Screw	K-198			
6	Motor Pulley	17515			
7	Hinge Pin	17558			
8	Socket Set Screw	K-2009			
9	Motor Bracket	17511			
10	Washer	K-2176			
11	Hexagon Head Cap Screw	K-5232			
12	Screws (3)	17928			
13	Socket Cap Screws (3)	K-3258			
14	Ball Bearing Spacers (1 set)	CP-23530			
15	Pulley Shaft Ball Bearings (1 set)	K-3904			
16	Pulley Bearing Fitting Washer	17519			
17	Truarc Retaining Ring	K-5151			
18	Spindle Pulley Cover	17539			
19	Spindle Pulley Dogs (2)	7669			
20	Spindle Pulley Dog Springs (2)	7718			
21	Spindle Pulley Dog Retainer	17540			
22	Ball Bearing Lock Nut	K-2668			
23	Ball Bearing Lock Washer	K-2669			
24	Spindle Pulley	17537			
25	Spindle Drive Pulley Hub	17538			
26	Pulley Hub Key	16882			
27	Spindle Wiper	17541			
28	Spindle Pulley Bracket	17512			
29	Socket Cap Screws (4)	K-143			

() Figures in parentheses indicate quantities of identical parts





PARTS LIST -- GORTON 0-16A VERTICAL – SWIVEL - UNIVERSAL MILL & DUPLICATOR

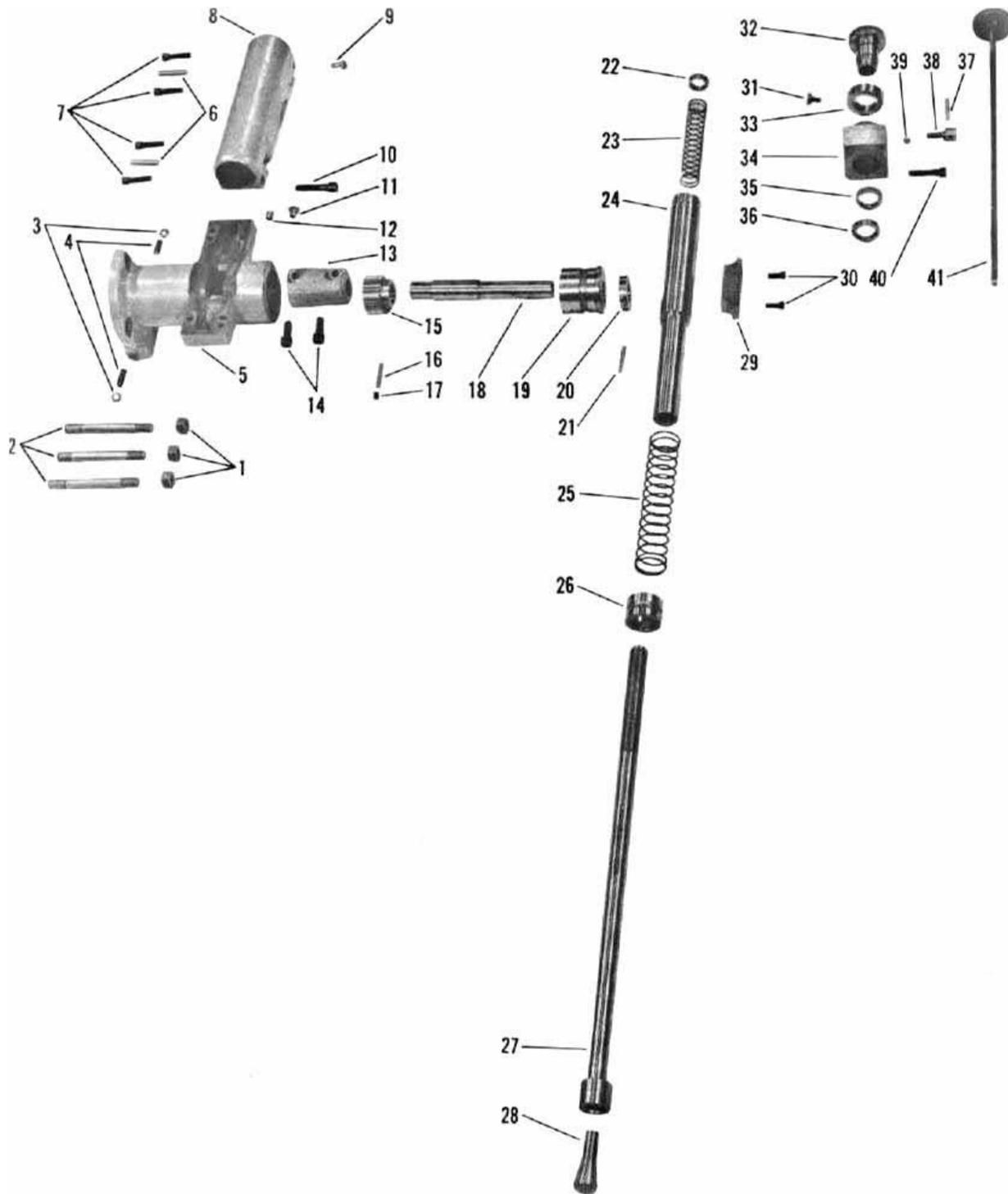
Order by Gorton Part Number and Name. Always Use Genuine Gorton Parts.

UNIVERSAL SPINDLE
FEED WORKS

Always Give Machine Model Number and SERIAL NUMBER

Fig No.	Part Name	Part No.	Fig. No.	Part Name	Part No.
1	Draw Bar	CP-23537	30	Hexagon Nut	K-303
2	Ball Bearing	K-5154	31	Worm Bracket Lock Screw	16245
3	Quill Feed Lever Shaft	17568	32	Dowel Pin	15763
4	Spindle Feed Pinion	17553	33	Oilite Flanged Bearing	K-4004
5	Taper Pin	K-474	34	Quill Feed Worm	16242
6	Needle Bearings (2)	K-4093	35	Feed Worm Fitting Washer	16233
7	Feed Box Bearing Spacer	17557	36	Quill Feed Worm Rearing	16244
8	Plunger Spring	7175	37	Quill Feed Dial	16246
9	Micrometer Feed Box	17551	38	Adjusting Screw	16278
10	Spring	16289	39	Taper Pin	3982
11	Pipe Plugs (2)	K-407	40	Hand Crank	16247
12	Feed Box Buttons (Z)	17530			
13	Studs (3)	17555			
14	Nuts (3)	K-4110			
15	Dowel Pins (2)	K-4059			
16	Worm Gear	16234			
17	Taper Pin	K-485			
18	Washer	16235			
19	Quill Feed Shaft	17533			
20	Feed Box Cover	17552			
21	Socket Cap Screw	K-152			
22	Spindle Feed Lever	8659			
23	Worm Bracket Lock	16239			
24	Lock Pivot Pin	16240			
25	Cotter Pin	K-2353			
Z6	Lock Release Plunger	16241			
27	Socket Set Screw	K-3927			
28	Worm Bracket Pivot Pin	16243			
29	Worm Bracket	16237			

() Figures in parentheses indicate quantities of identical parts



PARTS LIST -- GORTON 0-16A VERTICAL – SWIVEL - UNIVERSAL MILL & DUPLICATOR

Order by Gorton Part Number and Name. Always Use Genuine Gorton Parts.

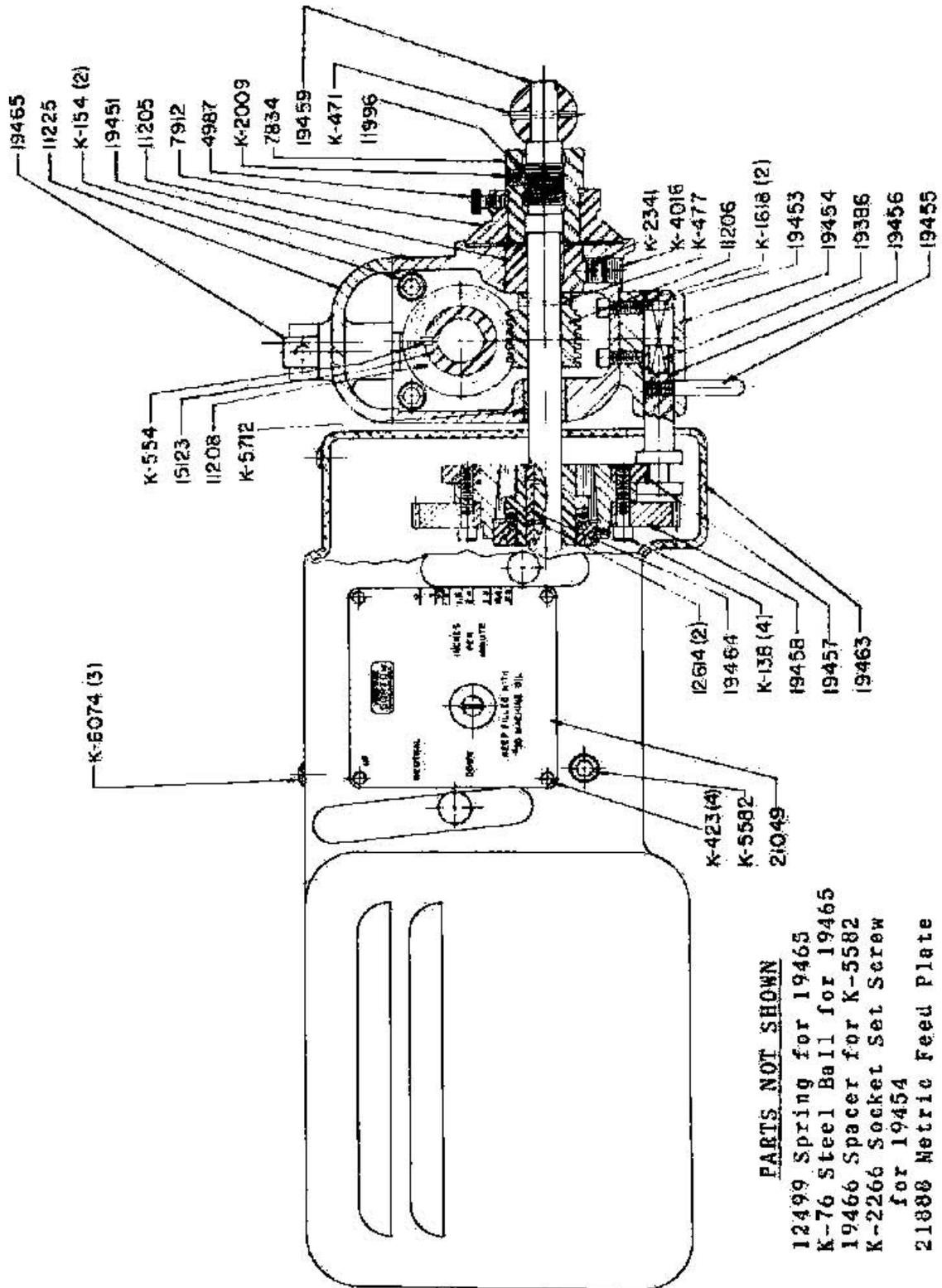
UNIVERSAL TRACER HEAD
ASSEMBLY

Always Give Machine Model Number and SERIAL NUMBER

Fig No.	Part Name	Part No.	Fig. No.	Part Name	Part No.
1	Nuts (3)	K-4110	30	Socket Cap Screws (2)	K-1618
2	Studs (3)	17555	31	Adjusting Screw	16278
3	Special Hex Nuts (2)	1492	32	Spindle Adjusting Nut	17688
4	Socket Set Screws (2)	K-3222	33	Micrometer Dial	17689
5	Tracer Arm	17678	34	Spindle Adjusting Nut Bearing	17680
6	Dowel Pins (2)	12849	35	Thrust Collar	8813
7	Socket Cap Screws (4)	K-146	36	Thrust Nut	8814
8	Spindle Sleeve Housing	17679	37	Lock Screw Handle	12926
9	Elbow Oil Cup	K-526	38	Lock Screw	8807
10	Socket Cap Screw	K-154	39	Socket Set Screw	K-201
11	Oil Cup	K-515	40	Socket Cap Screw	K-152
12	Socket Set Screw	K-218	41	Spindle Draw Bar and Hand Wheel	CP-1814
13	Feed Shaft Coupling	8737			
14	Socket Cap Screws (2)	K-151			
15	Feed Shaft Pinion	17553			
16	Taper Pin	K-474			
17	Socket Set Screw	K-187			
18	Feed Shaft	17681			
19	Spindle Feed Shaft Bearing	7007			
20	Feed Shaft Collar	17682			
21	Taper Pin	K-2717			
22	Spindle Retainer Nut	8815			
23	Spindle Thrust Spring	8816			
24	Spindle Sleeve	17685			
25	Spindle Sleeve Spring	9375			
26	Spindle Sleeve Bushing	17686			
27	Tracer Spindle	17690			
28	Tracer Spindle Collet	14877			
29	Tracer Quill Feed Rack	17683			

() Figures in parentheses indicate quantities of identical parts

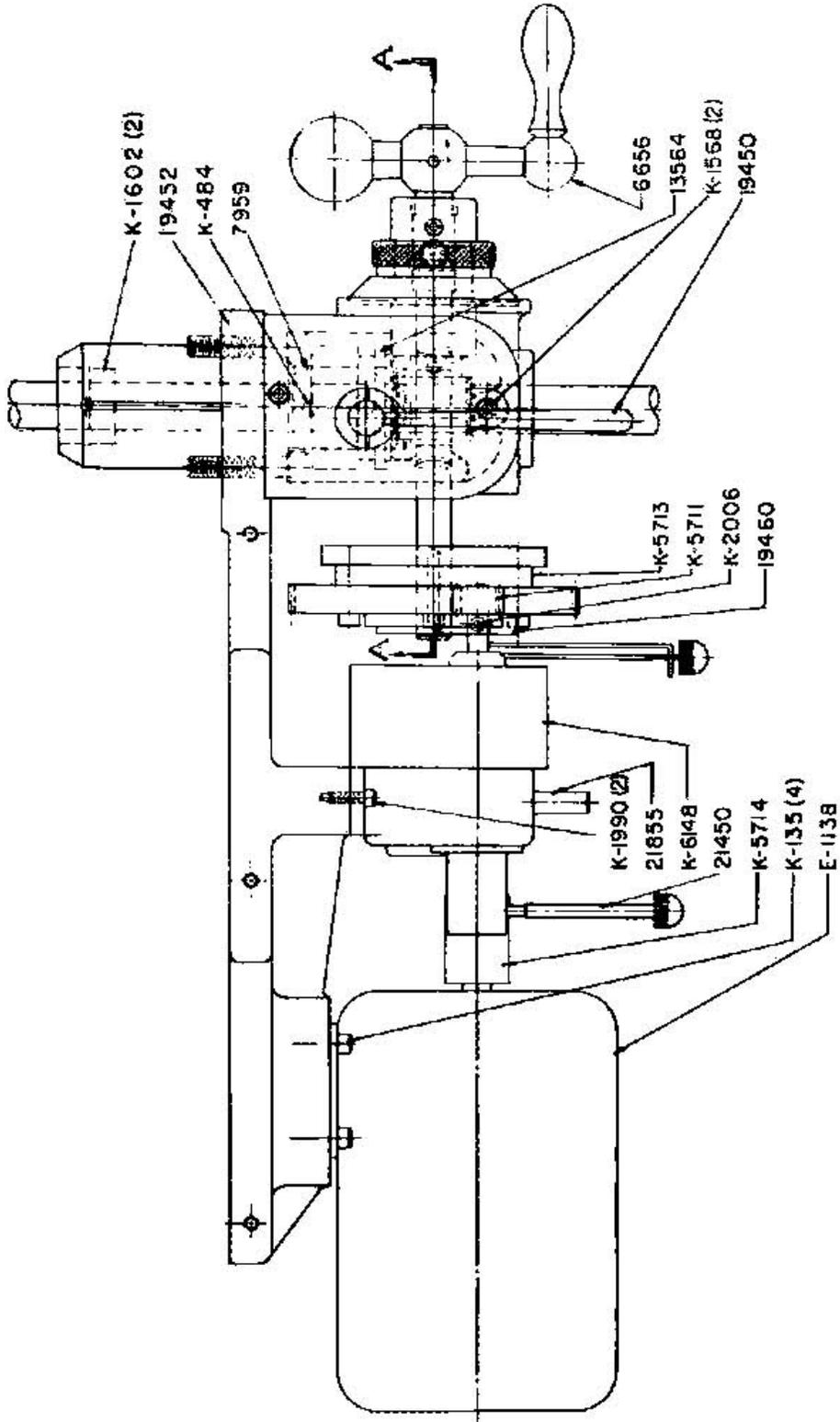
1194-1 SPINDLE POWER DOWN FEED UNIT



PARTS NOT SHOWN

- 12499 Spring for 19465
- K-76 Steel Ball for 19465
- 19466 Spacer for K-5582
- K-2266 Socket Set Screw for 19454
- 21888 Metric Feed Plate

1194-1 SPINDLE POWER DOWN FEED UNIT



1194-1 SPINDLE POWER DOWN FEED UNIT

