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SERVICE & PARTS MANUAL

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Service Manual
for

CLAUSING
HORIZONTAL
MILLING MACHINES

CLAUSING

DIVISION OF ATLAS PRESS COMPANY

1915-2023 N. PITCHER ST., KALAMAZOO, MICHIGAN — U. S. A.



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BELT TENSION

POWER FEED BELTS

Power feed belts have been properly tensioned at factory and seldom require adjustment. When adjustment is necessary, follow these instructions:

To tension vertical power feed belt:

1. Remove lower guard.

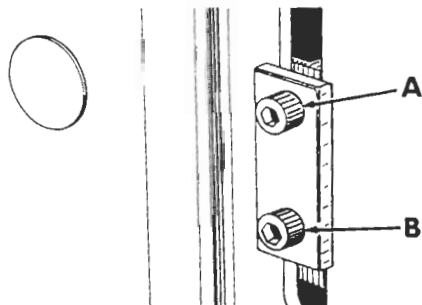


Figure 1

2. Loosen screws (A and B, fig. 1).

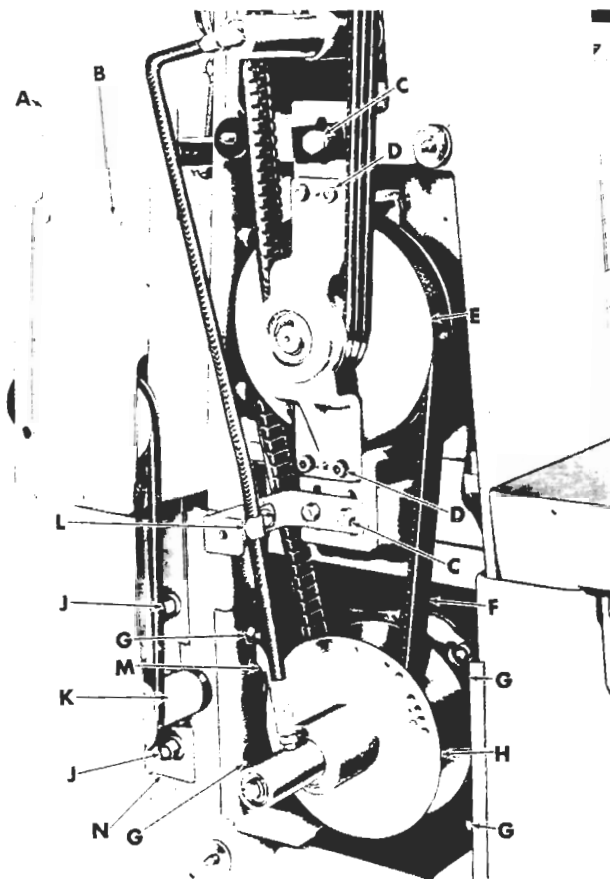


Figure 2

3. Move power feed pulley assembly (K, fig. 2) until belt is properly tensioned.

4. Tighten screws (A and B, fig. 1).

NOTE: Properly tensioned power feed belts should depress approximately $\frac{1}{2}$ " with light finger pressure -- too much tension causes excessive wear.

5. Replace lower guard.

To tension horizontal power feed belt:

1. Remove lower guard.
2. Loosen two lock nuts (J, fig. 2).
3. Slide bracket assembly (N) until belt is properly tensioned.
4. Tighten lock nuts (J).
5. Replace lower guard.

SPINDLE BELTS

1. Remove upper and lower guards.
2. Loosen clamp holding hydraulic line (L, fig. 2).
3. Loosen the three screws (C) holding countershaft assembly to column.
4. With a small lever (screw driver) force countershaft assembly downward, and retighten three screws (C).
5. Tighten clamp that holds hydraulic line (L).

NOTE: Properly tensioned spindle belts should depress approximately $\frac{1}{2}$ " with light finger pressure -- too much tension causes excessive wear.

IMPORTANT: Whenever spindle belts are replaced or tensioned, variable drive belts must be readjusted.

6. Start motor.
7. Check adjustment of variable drive belt -- refer to ADJUSTING VARIABLE SPEED BELT.

VARIABLE SPEED BELT

1. With guards removed and motor on, turn variable control to *lowest speed* -- variable speed belt (F) should be flush with outside of countershaft pulley (E).
2. Turn variable control to *highest speed* -- variable speed belt should be flush with outside of motor pulley (H).

If variable belt is not flush with pulley:

3. Turn motor off.
4. Adjust motor belt by loosening four nuts (G) and moving motor assembly until belt is properly adjusted -- steps 1 and 2 above.
5. When properly tensioned, belts should be slightly convex -- refer to fig. 3.
6. Replace guards.

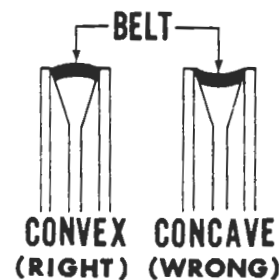


Figure 3

VARIABLE SPEED BELT

TO REPLACE

1. With mill running, turn variable speed dial to highest speed -- 2000 rpm in open belt drive or 280 rpm in back gear. Then turn motor off.
2. Remove upper and lower guards.
3. Turn variable dial back to low speed, stop and hold there for 30 seconds to permit hydraulic by-pass valve to open.

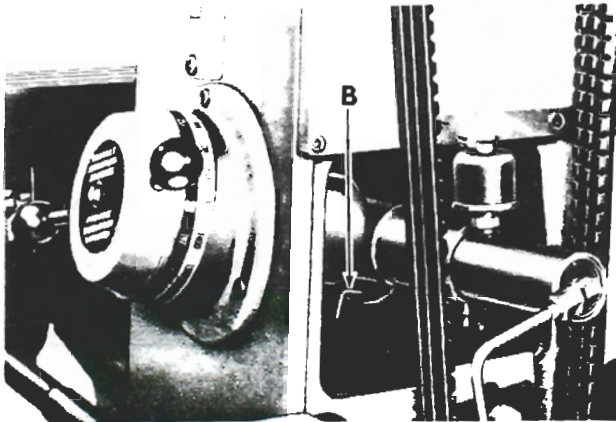


Figure 4

4. Lock dial in low speed position with pin (B, fig. 4).

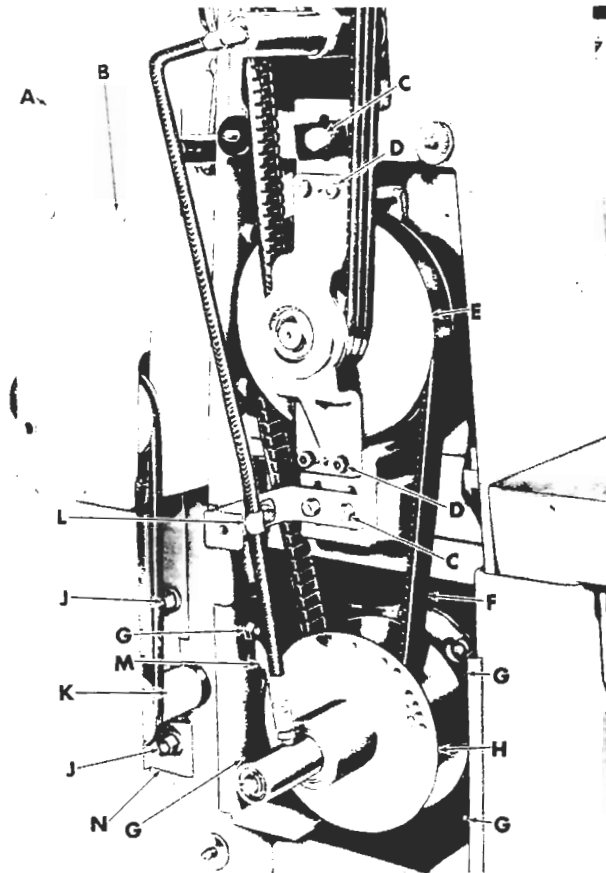


Figure 5

5. Remove clamp holding hydraulic line (L, fig. 5).

6. Loosen the three screws (C) holding countershaft assembly to column.
7. Slip spindle belts off spindle pulley, then slide countershaft assembly down until variable belt is loose.
8. Remove belt (F) from motor pulley (H).
9. Loosen four socket cap screws (D) in front countershaft bracket, and pull complete countershaft pulley assembly out of rear countershaft bracket.
10. Remove spindle belts and variable belt (F) from countershaft pulley (E). CAUTION: Variable pulley is spring-loaded and will snap closed when belt is removed.

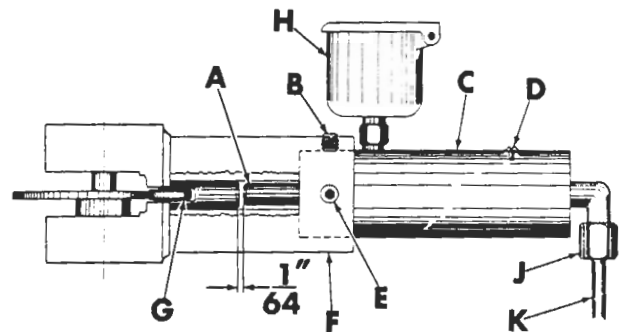


Figure 6

11. Loosen two set screws (B and E, fig. 6) in variable cam housing (F) and slide cylinder (C) out of housing.
12. Slide variable belt up and off end of hydraulic control line.
13. Install new variable belt -- slide it down control line.
14. Line up set screw mark on variable control cylinder with set screw hole (E) in cam housing -- tighten set screws.
15. Place variable belt and spindle belts on countershaft pulley. Install countershaft pulley assembly into rear countershaft bracket, and tighten the four cap screws.
16. Place variable belt on motor pulley.
17. Install belts on spindle pulley.
18. Check tension of spindle belts -- refer to BELT TENSION-SPINDLE BELTS steps 3, 4 and 5.

POWER FEED BELTS

TO REPLACE

To replace vertical power feed belt:

1. Remove lower guard.

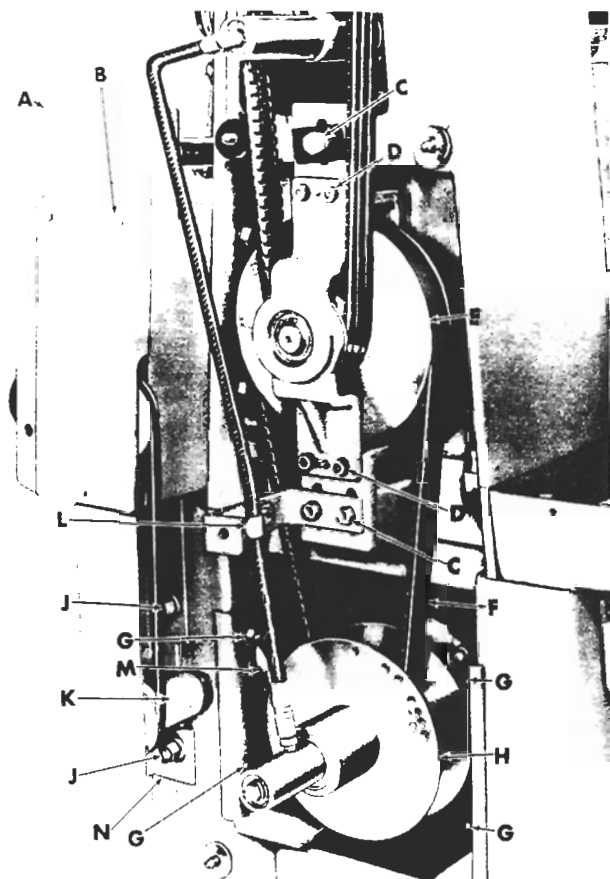


Figure 7

2. Remove three screws (B, fig. 7) and power feed cover (A).
3. Loosen two screws on back of power feed pulley guard (N).
4. Move power feed pulley assembly up and remove old belt.
5. Place new belt over pulleys.
6. Tension belt -- refer to BELT TENSION-POWER FEED BELTS steps 3, 4 and 5.

To replace horizontal power feed belt:

1. With mill running, turn variable speed dial to highest speed -- 2000 rpm in open belt drive or 280 in back gear. Then turn motor off.
2. Remove upper and lower guards.
3. Turn variable dial to lowest speed and lock in place with pin.

4. Loosen two screws (J) and bracket (N).
5. Remove power feed belt from power feed pulley (M).
6. Remove clamp holding hydraulic line (L).
7. Loosen four screws (G) holding motor base and remove variable belt (F) from motor pulley (H).
8. Slide power feed belt over motor pulley and up hydraulic line.

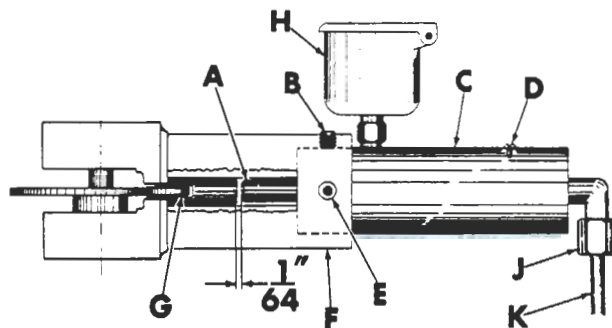


Figure 8

9. Loosen two screws (B and E, fig. 8) in variable cam housing (F) and slide control cylinder (C) out of housing.
10. Remove power feed belt and replace with new belt.
11. Line up set screw mark on variable cylinder with set screw hole (E) in cam housing -- tighten set screws.
12. Slide power feed belt over variable motor pulley and on power feed motor pulley.
13. Place variable belt (F, fig. 7) on variable motor pulley (H).
14. For proper belt tension refer to BELT TENSION-VARIABLE SPEED BELTS steps 1 - 5.
15. After variable belts have been properly adjusted and tensioned --- place power feed belt on power feed pulley assembly (K).
16. Move power feed pulley assembly (K) until belt is properly tensioned.
17. Tighten two screws on back of power feed pulley guard (N).

NOTE: Properly tensioned power feed belts should depress approximately $\frac{1}{2}$ " with light finger pressure -- too much tension causes excessive wear.

18. Replace guards.

LOWER VARIABLE CONTROL CYLINDER

VARIABLE CONTROL CYLINDER CAN NOT BE SERVICED IN THE FIELD - - ORDER REPLACEMENT ASSEMBLY NO. 5900-79.

TO REMOVE

1. With mill running, turn variable speed dial to highest speed -- 2000 rpm in open belt drive or 280 in back gear. Then turn motor off.
2. Remove motor guard.

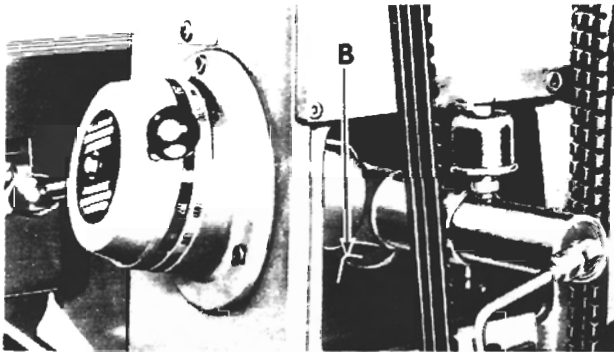


Figure 9

3. Turn variable dial to lowest range and lock in place with pin (B, fig. 9).

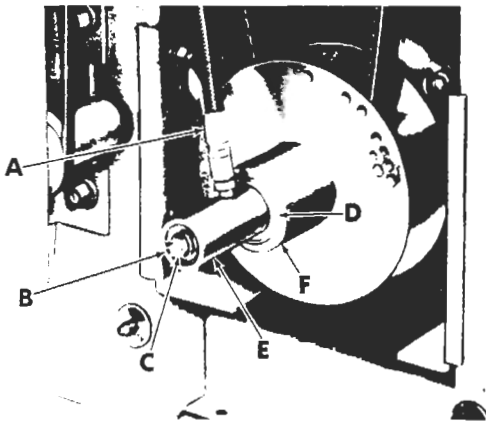


Figure 10

4. Measure distance from end of shaft (B, fig. 10) to nut (C). NOTE: Record this dimension.
5. Disconnect fitting (A) and drain oil from unit.
6. While holding shaft (B) with a socket set screw wrench, remove nut (C).
7. Remove sleeve from hydraulic cylinder.
8. Pull hydraulic cylinder (E) and outer half of variable pulley (F) off the shaft (B).
9. Press hydraulic cylinder (E) with bearing (D) from variable pulley (F).

TO INSTALL

1. Replace the two "O" rings on shaft (B).
2. Press new hydraulic cylinder (E) with bearing into variable pulley hub (F), then slide the assembly onto shaft (B) and pulley hub.
3. Install sleeve on shaft (B).
4. Start nut (C) on shaft (B).
5. Hold the shaft in place with a socket set screw wrench and then turn nut onto rod until distance from the end shaft (B) to nut (C) is the same as step 4.
6. Start fitting (A) onto hydraulic cylinder (E).
7. Fill oil reservoir.
8. Keeping oil reservoir filled, hold variable dial against low speed stop until oil runs out around fitting (A) -- it takes a few minutes for oil to run down.
9. Tighten fitting (A).
10. Remove lock pin (B, fig. 9).
11. Start mill motor. Hold variable control against low speed stop for 30 seconds -- turn variable dial to highest speed -- then back to lowest speed a few times. Control should stay at 52 rpm.

NOTE: Watch dial for a few seconds. If it doesn't remain at 52 rpm, the hydraulic system must be bled to remove trapped air.

To remove air from hydraulic system:

- A. Run variable to highest speed.

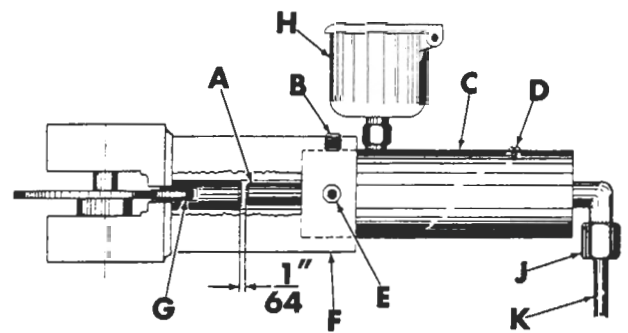


Figure 11

- B. Loosen bleeder screw (D, fig. 11) a few turns until oil starts coming out around the screw.
- C. Retighten bleeder screw.
- D. Turn variable dial to low speed, stop and release -- pointer should remain at 52 rpm.

NOTE: If dial moves, repeat steps A, B, and C.

12. Replace motor guard.

UPPER VARIABLE CONTROL CYLINDER

VARIABLE CONTROL CYLINDER CAN NOT BE SERVICED IN THE FIELD -- ORDER REPLACEMENT ASSEMBLY NO. 5900-73.

TO REMOVE

1. With mill running, turn variable speed dial to highest speed -- 2000 rpm in open belt drive or 280 rpm in back gear. Then turn motor off.
2. Remove motor guard.

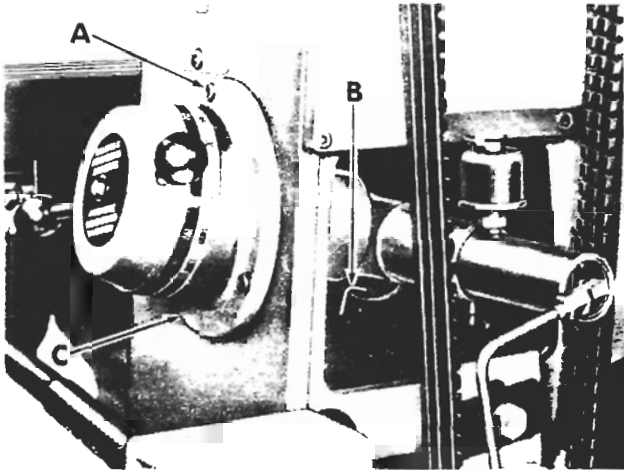


Figure 12

3. Turn variable dial to lowest range and lock in place with pin (B, fig. 12).

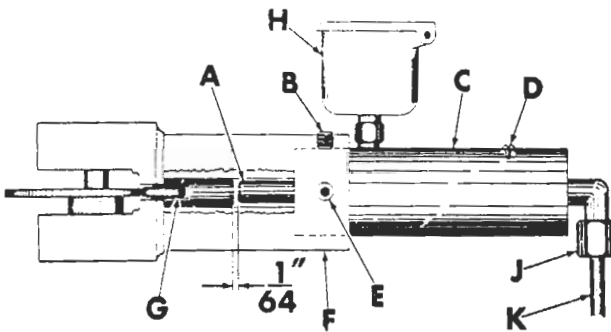


Figure 13

4. Remove nut (J, fig. 13) on end of variable control cylinder -- catching oil in pan.
5. Remove three screws (A, fig. 12) and remove variable control assembly (C) from column.
6. Remove set screws (B) and (E, fig. 13) in variable cam housing (F).
7. Pull out upper variable control cylinder (C).
8. Remove oil reservoir (H) and drain oil from old variable control cylinder.

TO INSTALL

1. Install oil reservoir (H) on new variable control cylinder.
2. While holding variable speed dial against low speed stop, slide control cylinder (C) into variable housing (F) until variable plunger (A) is about 1/64" from cam roller plunger (G). Lock in place with set screws (B) and (E).
3. Install variable control assembly in column and tighten three screws (A, fig. 12).
4. Install hydraulic line (K, fig. 13) and tighten nut (J).
5. Remove bleeder screw (D) and fill oil reservoir.
6. Keeping oil reservoir filled, hold variable dial against low speed stop until oil runs out bleeder hole -- it takes a few minutes for oil to run down.
7. Install bleeder screw (D).
8. Remove lock pin (B, fig. 12).
9. Start mill motor. Hold variable control against low speed stop for 30 seconds -- turn variable dial to highest speed -- then back to lowest speed. Control should stay at 52 rpm.

NOTE: Watch dial for a few seconds. If it doesn't remain at 52 rpm, the hydraulic system must be bled to remove trapped air.

To remove air from hydraulic system:

- A. Run variable to highest speed.
- B. Loosen bleeder screw (D, fig. 13) a few turns until oil starts coming out around the screw.
- C. Tighten bleeder screw.
- D. Turn variable dial to low speed stop and release -- pointer should remain at 52 rpm.

NOTE: If dial moves, repeat steps A, B and C.

10. Permanently mark variable control cylinder location:
 - A. Remove set screw (E).
 - B. With a 1/4-inch drill, spot the cylinder for the 5/16" set screw (E).
 - C. Replace set screw (E).
11. Replace motor guard.

SPINDLE BEARINGS

ADJUSTING PRELOAD

Spindle bearings have been preloaded at factory and seldom require adjustment. When spindle end play develops, follow these instructions to correct:

1. Make adjustment only when spindle is at operating temperature -- run spindle at medium speed for one-half hour.

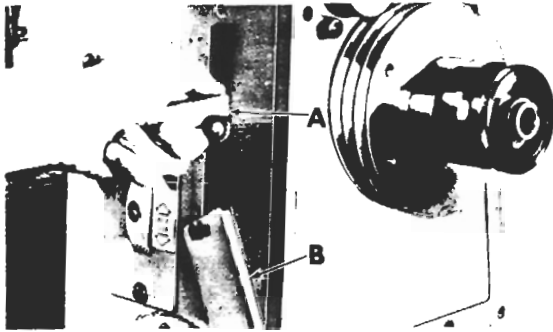


Figure 14

2. Remove cover (B, fig. 14).
3. Remove upper and lower guards.

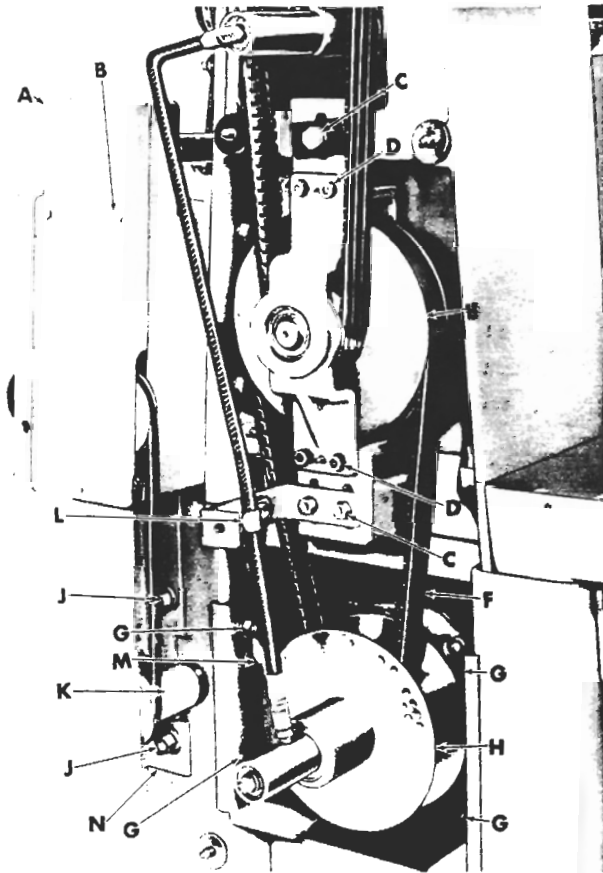


Figure 15

4. Remove clamp holding hydraulic line (L, fig. 15).

5. Loosen three screws (C) holding countershaft assembly to column and remove spindle belts from spindle pulley. Spindle must turn freely.
6. Disengage back gears -- turn wheel to "Out" position.
7. Loosen set screw in bearing adjusting nut and tighten nut with spanner wrench (A, fig. 14) until spindle end play has been eliminated.
8. To determine correct bearing preload, give spindle a sharp spin with your hand -- spindle should rotate about one turn. If it doesn't, adjust nut and recheck.
9. Tighten set screw in bearing adjusting nut.
10. Install spindle belts.
11. With a small lever (screw driver) force countershaft assembly downward, and tighten three screws (C).

12. Install clamp that holds hydraulic line (L).

NOTE: Properly tensioned spindle belts should depress approximately $\frac{1}{2}$ " with light finger pressure -- too much tension causes excessive wear.

IMPORTANT: Whenever spindle belts are replaced or tensioned, variable drive belts must be adjusted.

13. Start motor. Turn variable control to *lowest speed* -- variable speed belt (F) should be flush with outside of countershaft pulley (E).
14. Turn variable control to *highest speed* -- variable speed belt should be flush with outside of motor pulley (H).

If variable belt is not flush with pulley:

15. Turn motor off.
16. Adjust motor belt by loosening four nuts (G) and moving motor assembly until belt is properly adjusted -- steps 13 and 14 above.

17. When properly tensioned, belts should be slightly convex -- refer to figure 16.

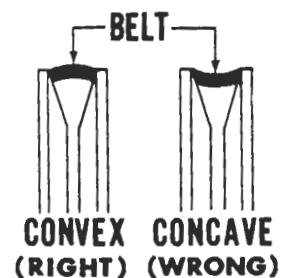


Figure 16

18. Replace guards.

SPINDLE — SPINDLE BEARINGS

TO REMOVE

1. Remove upper and lower guards, arbors, overarm brace and overarm bracket.
2. With mill running, turn variable speed dial to highest speed -- 2000 rpm in open belt drive or 280 rpm in back gear. Turn motor off.

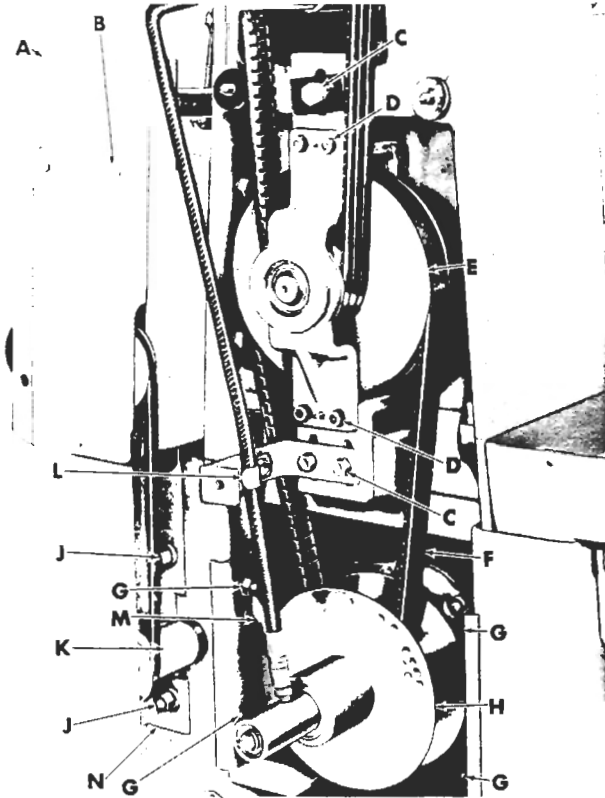


Figure 17

3. Turn variable dial back to lowest speed. Hold there, and pull on outer sheave of lower variable pulley (H, fig. 17) until variable belt (F) is loose.
4. Loosen three screws (C) that hold countershaft assembly to column.

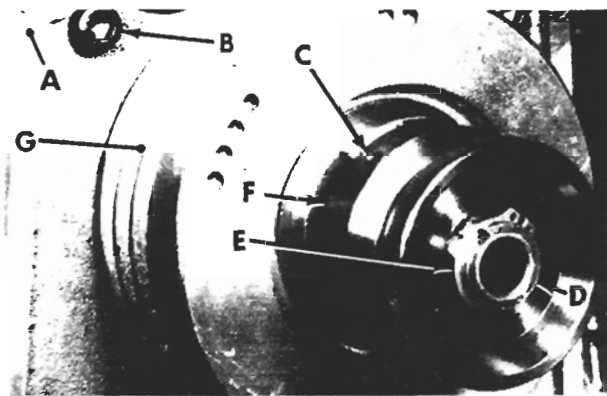


Figure 18

5. Slip spindle belts off pulley (G, fig. 18).

6. Unlock overarms and slide flush with back of column.
7. Remove retainer ring (E) from rear of spindle (D).
8. Take out two set screws (C), ball and spring. Remove drive coupling (F).

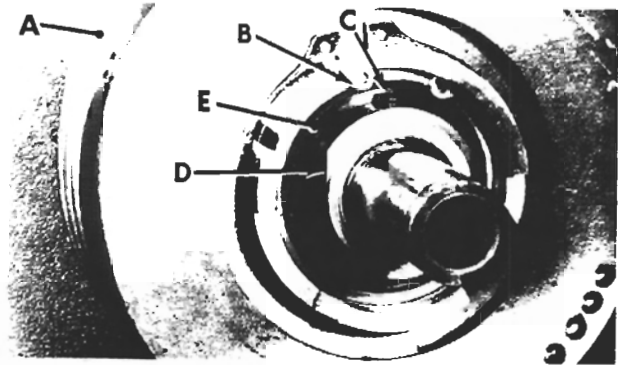


Figure 19

9. Loosen set screw (C, fig. 19). Remove collar (D) and brass plug.
10. Remove drive gear housing pulley assembly (A) from spindle.

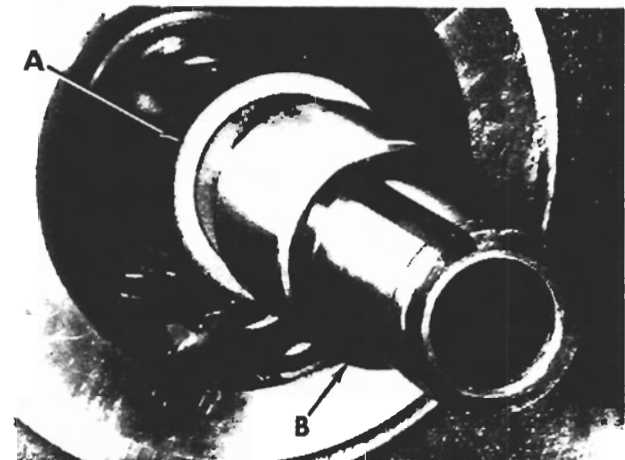


Figure 20

11. Remove spacer (B, fig. 20) and gasket (A) from spindle.

NOTE: If it is necessary to disassemble drive gear housing pulley assembly:

- A. Remove retainer (B, fig. 19).
 - B. Press bearings (E) and spacer out rear of assembly.
12. Drain oil from head by removing lower plug.
 13. Remove eight cap screws (B) from back plate (A, fig. 18).

SPINDLE — SPINDLE BEARINGS - continued

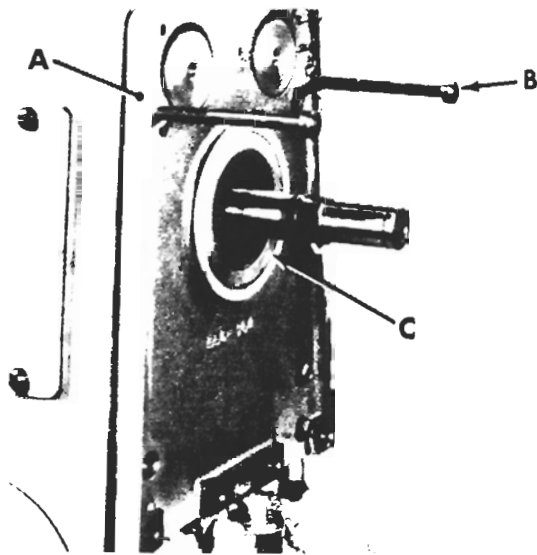


Figure 21

14. Turn top guard bolts (B, fig. 21) into back plate (A) until guard is pushed away from column. Carefully remove back plate and oil cover (C). **IMPORTANT:** Do not allow oil to drain on pulleys or belts.

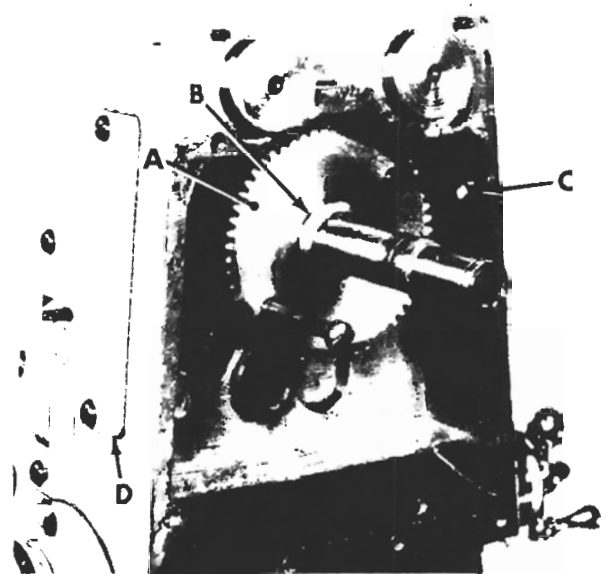


Figure 24

19. Remove collar (B, fig. 24) from spindle.
20. Insert top guard screws (C) in holes in spindle gear (A) and turn them until gear is removed. Remove cover (D).

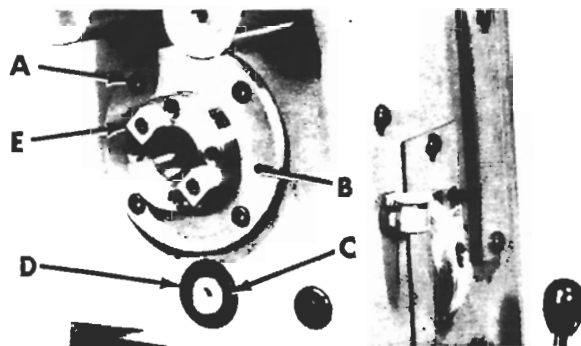


Figure 22

15. Loosen set screw (C, fig. 22), remove back gear nut (D).
16. Remove screws (A) and ring (B) from spindle nose.
17. Remove spindle keys (E) from spindle.

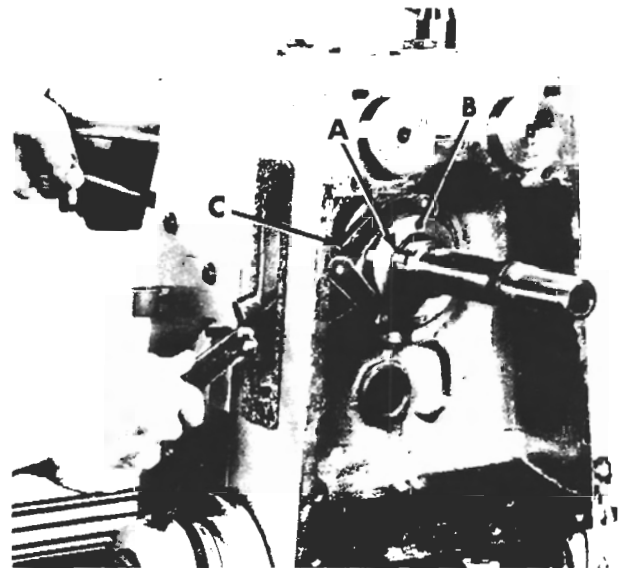


Figure 25

21. Remove spindle gear key (A, fig. 25).
22. Loosen set screw in thrust collar (B).
23. Holding spindle nose, use spanner wrench (C) to remove thrust collar. Remove brass plug from collar.

NOTE: To remove spindle, use special puller available on loan from Technical Service Department.

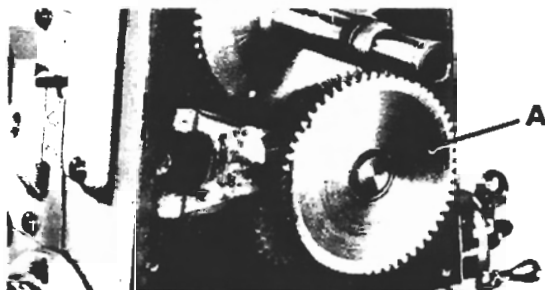


Figure 23

18. Pull back gear assembly (A, fig. 23) from column.

SPINDLE — SPINDLE BEARINGS - continued

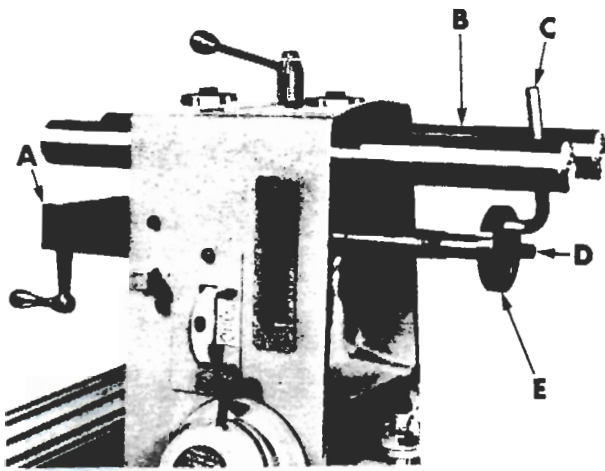


Figure 26

24. Insert puller crank screw (D, fig. 26) thru bracket (A) and spindle.
25. Screw puller collar (E) on crank screw (D) and lock in place with wrench (C) -- move overarms (B) until they engage wrench.
26. Turn crank screw (D) until spindle is pulled from rear bearing.
27. Remove puller collar and puller crank from spindle.
28. Remove spindle and front bearing from column.
29. Use hardwood block and mallet to tap rear bearing and bearing cover out back of column.
30. Press front bearing and slinger ring from spindle.
31. Remove bearing cups from column -- when replacing bearing -- use brass punch and hammer.

SPINDLE — SPINDLE BEARINGS - continued

TO INSTALL

IMPORTANT: All parts must be clean and oiled before assembly.

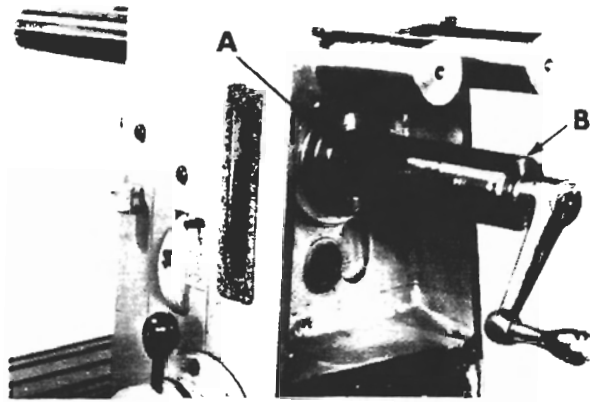


Figure 27

1. Use special puller sleeve (B, fig. 27) to draw bearing cups (A) into column.
2. Press slinger ring chamfered edge towards front and front bearing on spindle.

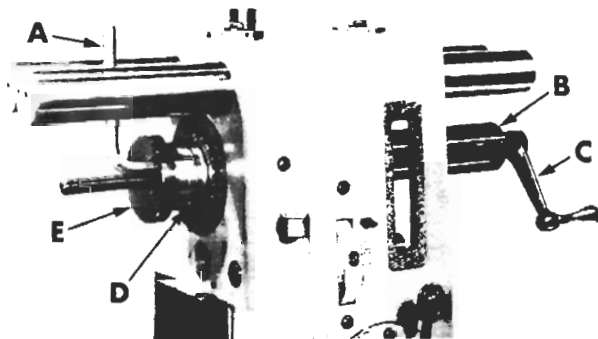


Figure 28

3. Insert spindle (D, fig. 28) into front of column. Slide rear bearing on spindle over threaded diameter.
4. Slide puller sleeve (B) on puller crank screw (C).
5. Slide crank screw (C) thru back of spindle.
6. Screw puller collar (E) on crank screw and lock in place with wrench (A).
7. Turn crank screw until bearing is pulled in place.
8. Remove puller collar and puller sleeve.
9. Slide bearing cover on spindle and install puller sleeve and puller collar on crank screw.
10. Turn crank screw until bearing cover is pulled in place -- be sure notch (cut out) in cover is in line with oil groove in bearing seat.



Figure 29

11. Thread thrust collar (B, fig. 29) on spindle -- make sure piston ring seats in cover. Press piston ring toward center (with split at top) with thin screw driver.
12. To remove all end play from spindle, tap front and rear of spindle with fibre mallet while tightening thrust collar with spanner wrench.
13. To determine correct bearing preload, spin the spindle with your hand. Spindle should rotate about one turn -- if it doesn't, adjust thrust collar and recheck.
14. Install brass plug and tighten screw securely.
15. Insert spindle gear key (A).

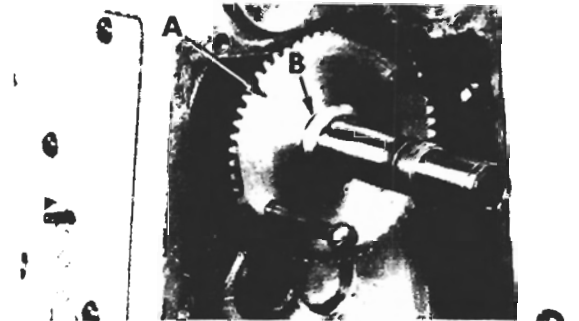


Figure 30

16. Install spindle back gear (A, fig. 30).
17. Slide collar (B) with "O" ring on spindle and against the back gear.

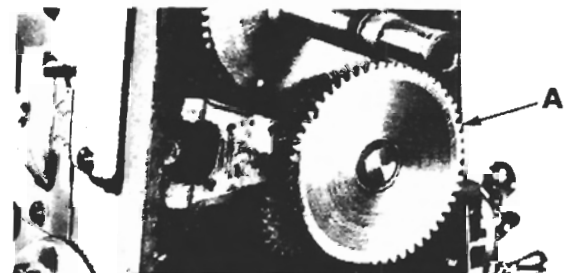


Figure 31

18. Install back gear assembly (A, fig. 31) in rear of column.

SPINDLE — SPINDLE BEARINGS - continued

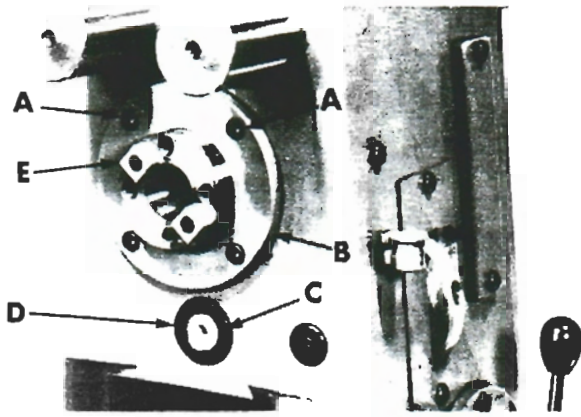


Figure 32

19. Screw on back gear nut (D, fig. 32), tighten set screw (C).
20. Install ring (B) and screws (A) on spindle nose.
21. Install spindle keys (E).

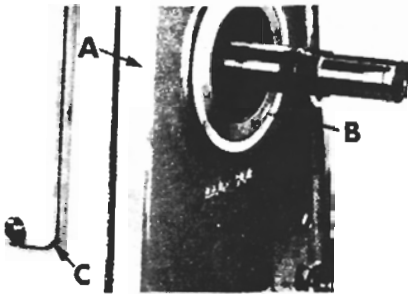


Figure 33

22. Install back plate (A, fig. 33) and oil cover (B) on column with cap screws -- use roll pins as alignment guide.
23. Install drain plug, refill with oil, install cover (C).



Figure 34

24. Install gasket (A fig. 34) and spacer (B) on spindle.

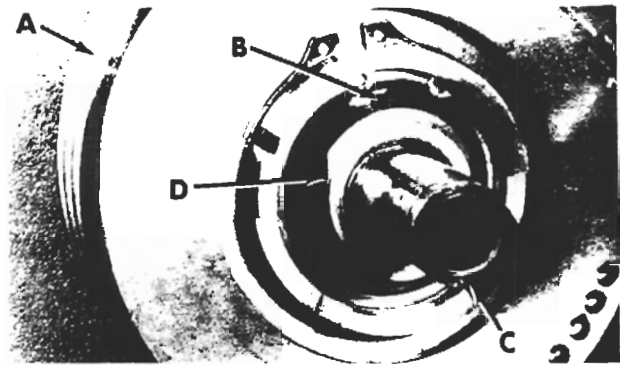


Figure 35

25. Install drive gear housing pulley assembly (A fig. 35) and tighten collar (D) against bearing.
26. Insert brass plug and set screw (B) in collar, tighten securely.
27. Install key (C).

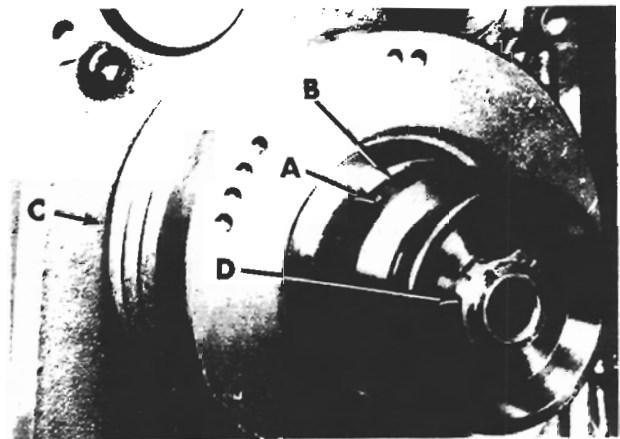


Figure 36

28. Install drive coupling (B, fig. 36).
29. Install ball, spring and two set screws (A) in drive coupling.
30. Install retainer (D).
31. Place spindle belts over spindle pulley (C).
32. With a small lever (screw driver) force counter-shaft assembly downward, and retighten three screws.

NOTE: Properly tensioned spindle belts should depress approximately $\frac{1}{2}$ " with light finger pressure -- too much tension causes excessive wear.

33. Replace upper and lower belt guards.

REVERSE FEED GEAR BOX

TO REMOVE

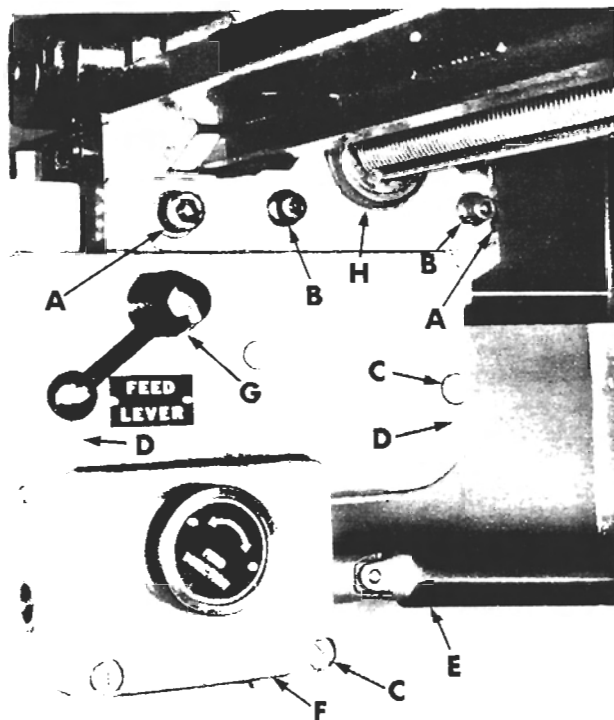


Figure 37

1. Remove two cap screws (B, fig. 37) holding table feed screw drive gear (H).
2. Remove two screws (A) holding the reverse feed box to table.
3. Move feed box to left to disengage from telescoping drive (E).

TO DISASSEMBLE

Remove reverse lever hub (G, fig. 37), four screws (C) and pry cover (F) off dowel pins (D).

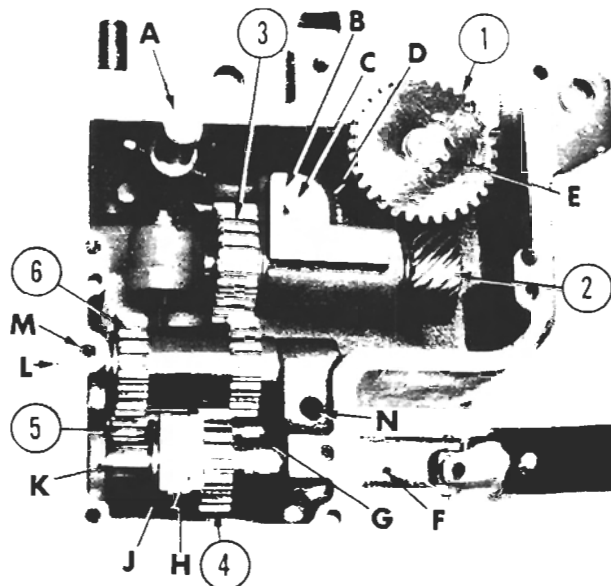


Figure 38

TO REMOVE:

- NO. 1 GEAR, remove retainer ring (E, fig. 38) next to gear and pull off. If gear is tight on shaft, remove shaft, and drive shaft thru gear.
- NO. 2 GEAR or NO. 3 GEAR, lift out feed-engage shaft assembly (A) and lift tumbler assembly (B) off hinge pin (C) -- CAUTION: Do not lose spring (D). Remove retainer and pull out either gear. Do not drive shaft back -- there are Woodruff keys under gears.
- NO. 4 GEAR, remove roll pin (F) from universal and pull universal off selector gear shaft (K). Drive shaft (K) to left to remove.
- NO. 5 GEAR, remove No. 4 GEAR. Then loosen set screw (N) in gear case and set screw in collar (G). Drive shaft to left to remove.
- NO. 6 GEAR, remove screw (L) from end of compound shaft and loosen set screw (M). Screw $\frac{1}{4}$ " - 20 cap screw in place of set screw (L) and pull out compound shaft.

NOTE: When reassembling, use heavy cup grease to hold shoe (H) in place while locating shoe in shifter block (J).

POWER FEED GEAR BOX

TO SERVICE

It is not necessary to remove gear box to service. However, if you wish to remove box, follow instructions on page 15.

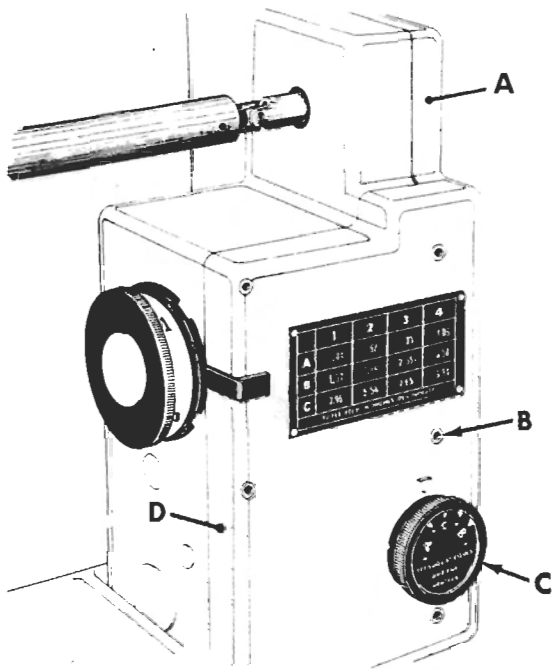


Figure 41

Loosen screws (B, fig. 41) and remove front cover (D) and side cover (A).

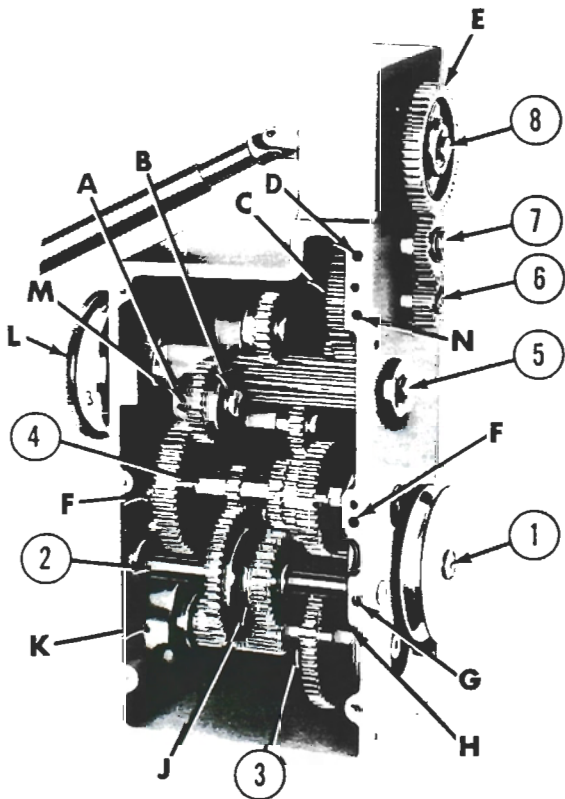


Figure 42

TO REMOVE:

NO. 1 SHAFT (fig. 42), loosen set screw (H), and pull shaft out right side of gear box.

NO. 2 SHAFT, loosen set screws (G) and drive shaft to left.

NOTE: NO. 2 SHAFT must be removed before NO. 3 SHAFT or NO. 4 SHAFT.

NO. 3 SHAFT, loosen set screw (K) -- drive shaft left to knock out the plug. Shaft can be removed assembled, or retainer on right end can be removed and shaft disassembled.

NO. 4 SHAFT, loosen two set screws (F). Slide assembly and pull bushings off ends. The shaft can then be removed, or disassembled in gear box after removing retainer on right end.

NO. 5 SHAFT, remove plug in tumbler gear turret shifter knob (L) and nut under plug. Pull shaft out from right hand side. Each tumbler gear can be removed by loosening set screw (A) and pulling shaft (B).

NO. 6 SHAFT, loosen set screw (N), remove retainer on right end and drive shaft to inside of gear box. If gear (C) must be removed, first take out tumbler gear assembly (M).

NO. 7 SHAFT, loosen set screw (D) and pull out.

NO. 8 SHAFT, remove retainer from shaft and pull off rack pinion gear assembly (E). Remove Woodruff key, and pull shaft out left side.

NOTE: When replacing front cover, be sure to place yoke in double gear (J) assembly. If, for any reason, shifter knob (C, fig. 41) gets out of time, turn counter-clockwise until gears mesh, then loosen set screw in knob. Continue turning counter-clockwise until "B" is in line. Then tighten set screw.

POWER FEED GEAR BOX

TO REMOVE

1. Remove lower belt guard.

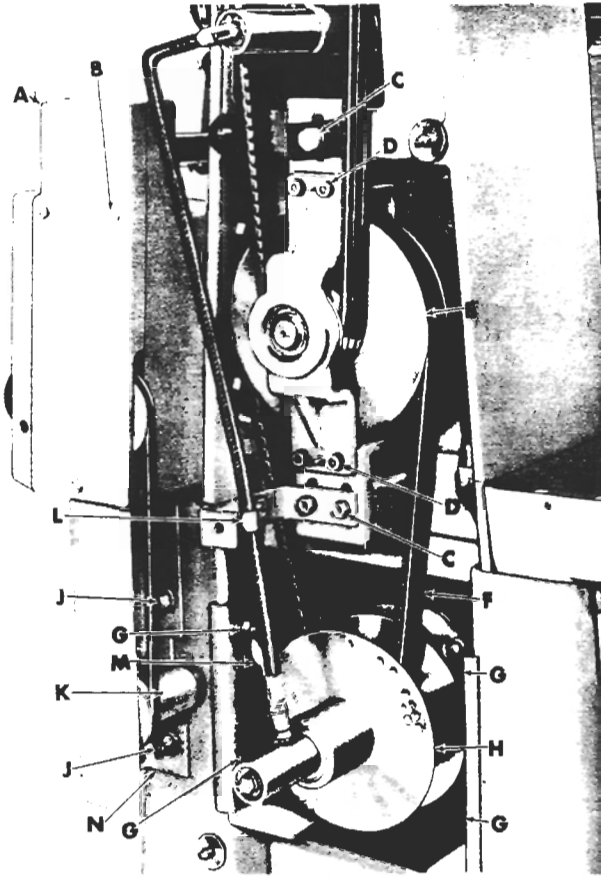


Figure 39

2. Loosen screws (B, fig. 39) and remove rear cover plate (A).

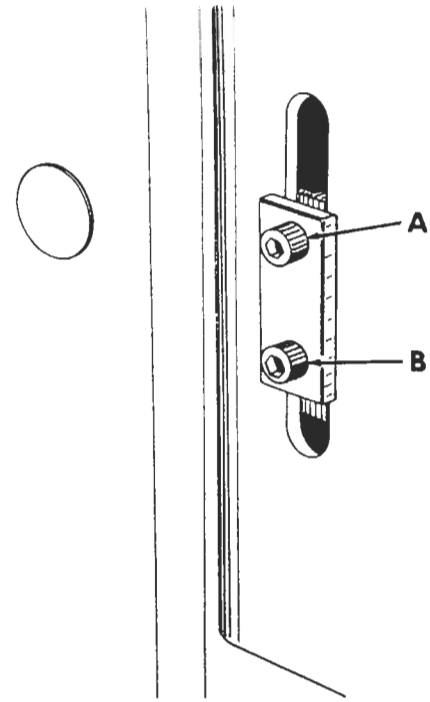


Figure 40

3. Loosen two cap screws (A and B, fig. 40) on power feed pulley assembly (K, fig. 39) and take belt off pulley.
4. Remove two bolts (inside column) that anchor gear box in place.

CAUTION: Hold gear box so it doesn't drop.

5. Pull box toward rear -- telescoping drive shaft will pull apart.

RAPID HAND FEED ASSEMBLY

TO REMOVE

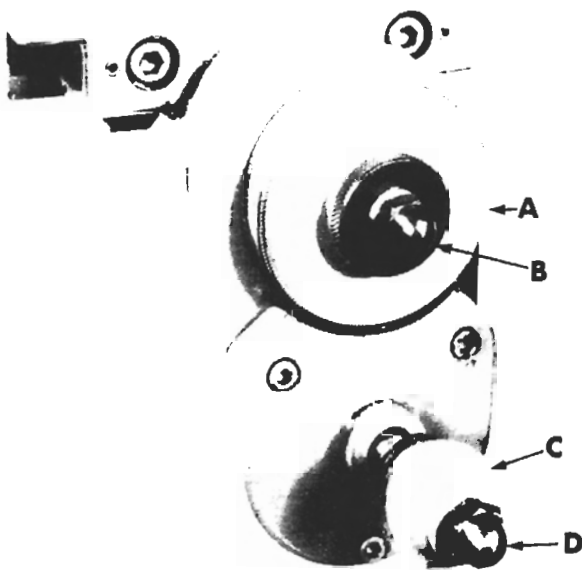


Figure 43

1. Remove acorn nut (B, fig. 43) and pull off dial (A) and bushing.

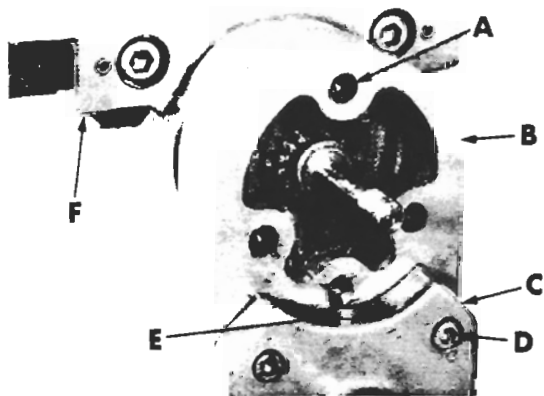


Figure 44

2. Remove three screws (A, fig. 44) and pull assembly (B) from dial housing (F).

TO DISASSEMBLE

1. Remove acorn nut (D, fig. 43), crank (C), washer and key from shaft.
2. Remove three screws (D, fig. 44).
3. Remove set screw (E).
4. Pull cover assembly (C) off shaft, remove spring and ball.



Figure 45

5. Loosen set screw (A, fig. 45) and drive the shaft (B) out of the gear (F).
6. Pull shaft (D) from housing. Remove retainer ring (E) from shaft and slide off rapid feed gear (C).

TABLE LEAD SCREW AND TABLE

TO REMOVE LEAD SCREW

1. Remove REVERSE FEED GEAR BOX -- refer to instructions page 13.
2. Remove RAPID HAND FEED ASSEMBLY -- refer to instructions page 16.

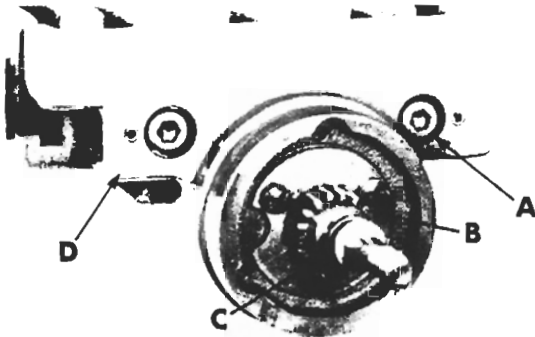


Figure 46

3. Remove two screws (A, fig. 46) from dial housing (D).
4. Remove washer (C), gear (B) and key from lead screw.
5. Place wood block on under side of table between dial housing and saddle.
6. Turn crank on left end of table counterclockwise until lead screw and bearings are pulled out of housing at right end of table.
7. Remove dial housing from end of lead screw.
8. Slide table feed screw gear assembly off lead screw.

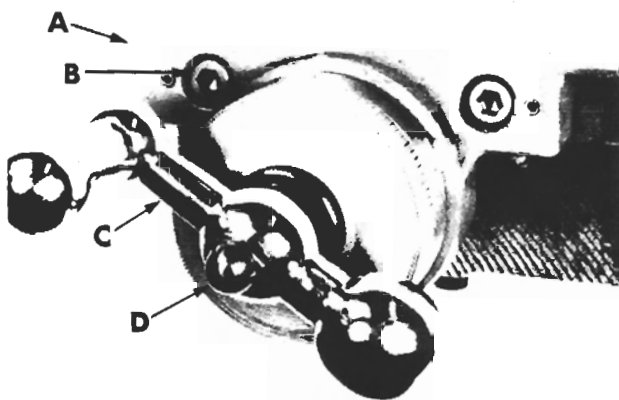


Figure 47

9. Remove acorn nut (D, fig. 47), crank (C), dial, bushing and key from left end of lead screw.

10. Remove two screws (B) holding dial housing (A) and pry dial housing off roll pins.

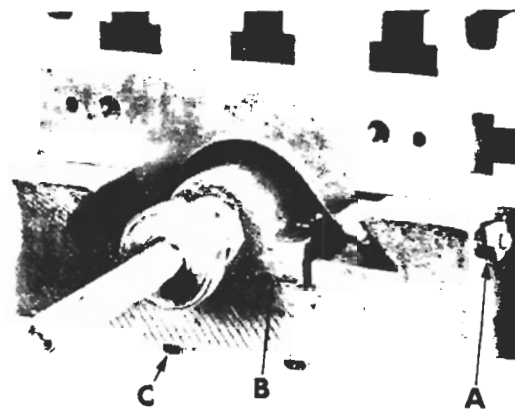


Figure 48

11. Remove two screws (C, fig. 48) from table feed nut (B). Drive dowel pins from feed nut and remove.

IMPORTANT: A new table feed nut must be installed whenever lead screw is replaced. However, replacing a nut does not require using a new lead screw.

TO REMOVE TABLE

1. Remove, FEED REVERSE GEAR BOX, RAPID HAND ASSEMBLY, and TABLE LEAD SCREW, refer to previous instructions.
2. Loosen gib screws (A).
3. Slide table off saddle.

NOTE: When installing table and lead screw, be sure all parts are clean and oiled. Adjust gib screws evenly until table moves with a slight drag. Tighten the gib screw lock nuts -- hold gib screw with screw driver while tightening lock nuts.

SADDLE

TO REMOVE

1. Remove REVERSE FEED GEAR BOX -- refer to instructions page 13.
2. Remove RAPID HAND FEED ASSEMBLY -- refer to instructions page 16
3. Remove TABLE LEAD SCREW and TABLE -- refer to instructions page 17.
4. Loosen gib screws.

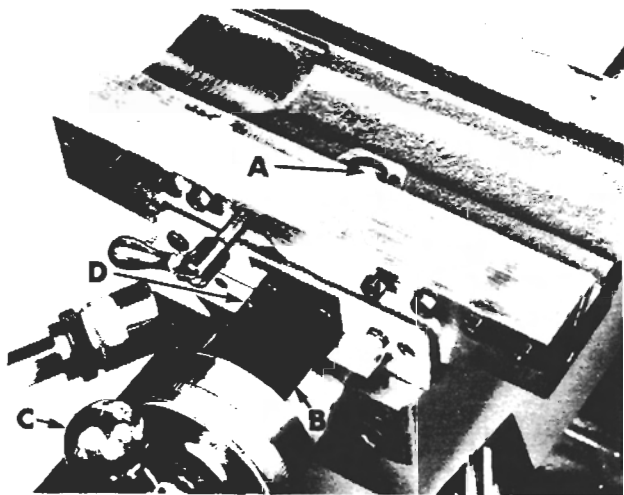


Figure 49

5. Remove acorn nut from saddle lead screw and pull off crank (C, fig. 49), key, dial and bushing.

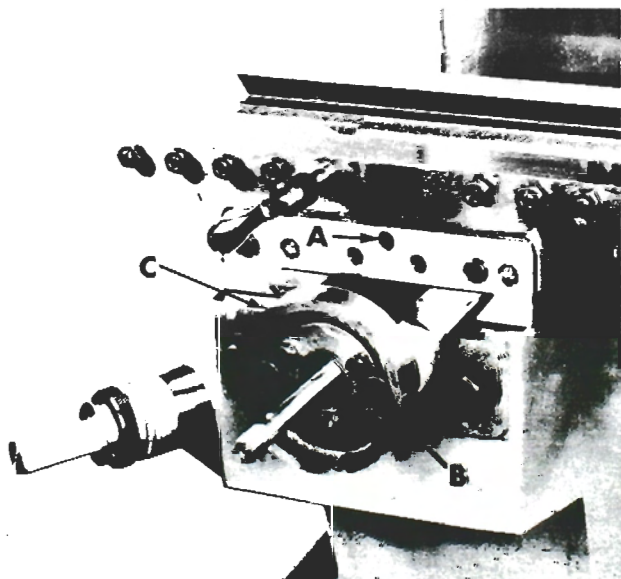


Figure 50

6. Remove two socket cap screws (B, fig. 50) holding dial housing (C) to saddle and drive housing off roll pin.

7. Turn lead screw out of nut.
8. Remove front cover (D, fig. 49).
9. With socket screw wrench, loosen screw (A, fig. 50) holding cross slide feed nut (A, fig. 49). Push nut down, remove from under knee, and remove saddle -- remove dust cover (B).

Before assembling, clean and oil all parts.

To tighten gib screws, follow same procedure as for table.

NOTE: When installing lead screw nut, run lead screw in all the way before tightening lock screw. This will allow nut to align with screw.

KNEE

TO REMOVE

1. Remove REVERSE FEED GEAR BOX -- refer to instructions page 13.
2. Remove RAPID HAND FEED ASSEMBLY -- refer to instructions page 16.
3. Remove TABLE LEAD SCREW and TABLE -- refer to instructions page 17.
4. Remove SADDLE -- refer to instructions page 18.

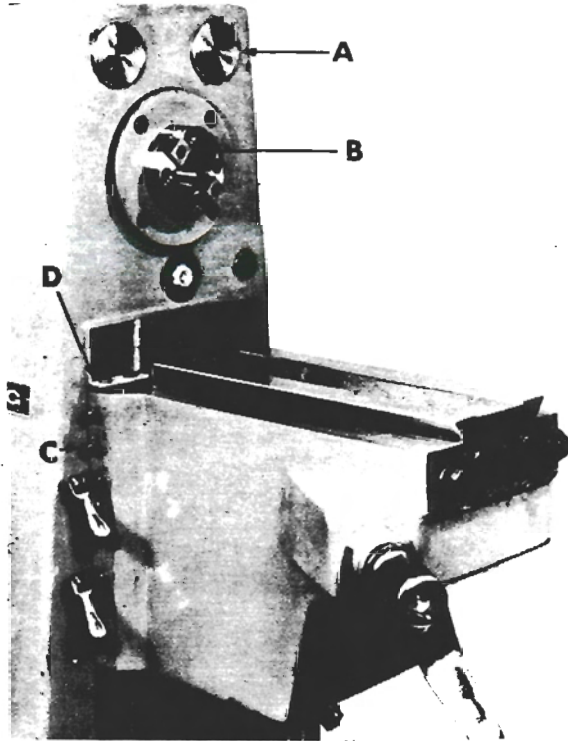


Figure 51

5. Push back over arms (A, fig. 51), remove driving keys (B) from spindle nose.
6. Take wiper off gib (D) side of knee and run knee up near top of dovetail.

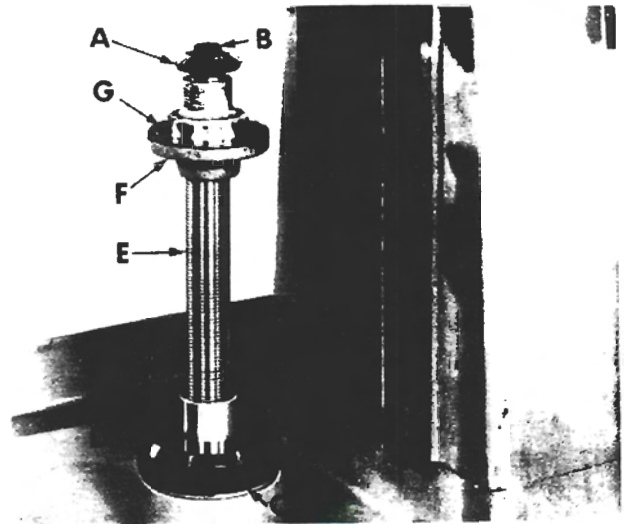


Figure 52

7. Remove screws in knee lift screw flange (F, fig. 52).
8. Loosen gib screws (C, fig. 51) far enough to remove gib, from bottom of knee, then lift knee off top of dovetail

NOTE: Clean and oil parts thoroughly before assembly.

When putting knee back on dovetail, be careful not to damage bevel gear.

Adjust gib screws evenly until table moves with a slight drag. Tighten gib screw lock nuts.

9. To remove knee lift assembly (E, fig. 52), remove screws (D) from knee lift screw plate (C) and lift out assembly.
10. To remove bevel gear (A), remove hex jam nut (B) and lift gear off shaft. To replace bearing, remove key, knee lift screw and shims (G) and flange will lift off shaft.

KNEE LIFT SHAFT ASSEMBLY

TO REMOVE

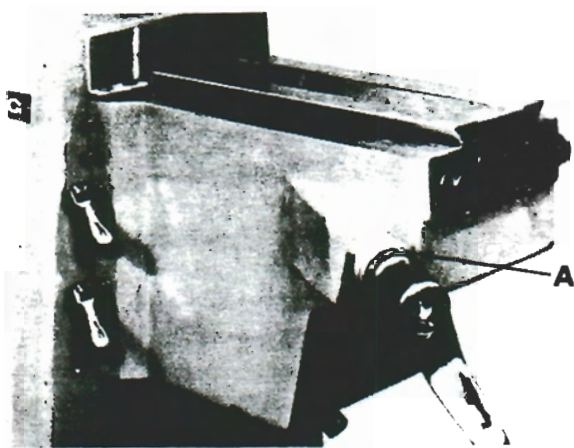


Figure 53

1. Loosen screw and drive out roll-pin from underside of knee, and pull out assembly (A, fig. 53).

TO DISASSEMBLE

To replace pinion gear:

1. Drive out 1/8" roll-pin.
2. Pull pinion gear off shaft.
3. Put on new gear and pin in place.

To remove shaft and bearings:

1. Drive roll-pin out of crank hub.
2. Pull hub off shaft.
3. Remove lock nut and remove washer and dial.
4. Drive roll-pin out of bushing and pull off shaft.

5. Remove retainer ring from shaft, drive shaft thru front bearing towards gear end.
6. Remove shaft with back bearing.
7. Remove retainer rings and back bearing from shaft.
8. Remove retainer ring in sleeve, drive out bearing.

TO REASSEMBLE

1. Install the two inside bearing retainer rings on shaft.
2. Press bearing on dial end of shaft against retainer.
3. Insert retainer on shaft against bearing.
4. Start shaft in dial end of sleeve and press bearing against sleeve shoulder.
5. Install retainer ring in sleeve.
6. Press bearing against retainer ring on other end of shaft.
7. Install retainer against bearing.
8. Slide pinion gear on shaft and pin in place with roll-pin.
9. Install bushing and pin in place with roll-pin.
10. Install dial, washer and lock nut on shaft.
11. Install crank hub and pin in place with roll-pin.
12. Slide assembly back in knee until it engages with bevel gear on knee lift screw. Lock with set screw and pin in place with roll-pin.

MOTOR

TO REMOVE

1. With mill running, turn variable speed dial to highest speed -- 2000 rpm in open belt or 280 in back gear. Then turn motor off.
2. Remove upper and lower belt guards.
3. IMPORTANT: Disconnect power supply.
4. Disconnect wiring in junction box, and remove connector nut that secures motor conduit to box.

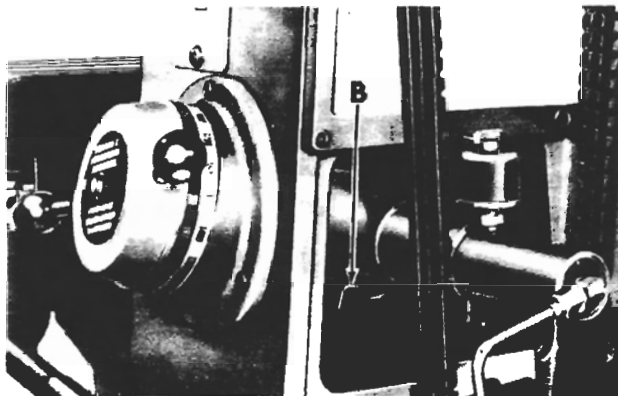


Figure 54

5. Turn variable dial to lowest speed and lock in place with pin (B, fig. 54).

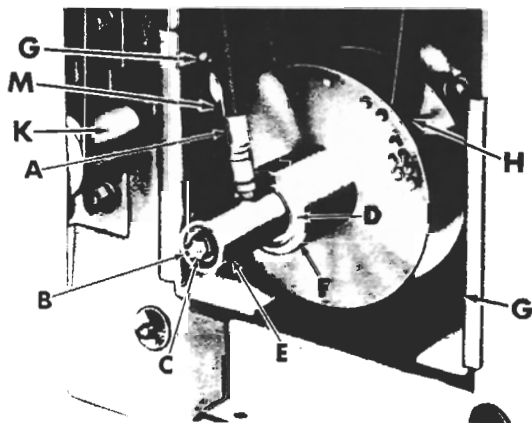


Figure 55

6. While holding variable dial against low speed stop, pull out pulley (F, fig. 55) until variable belt (H) is loose.
7. Measure distance from end of shaft (B) to nut (C). NOTE: Record this dimension.
Dimension _____
8. Disconnect fitting (A) and drain oil from unit.
9. While holding shaft (B) with a socket set screw wrench, remove nut (C).

10. Remove sleeve from hydraulic cylinder.
11. Pull hydraulic cylinder (E) and outer half of variable pulley off shaft (B).
12. Slip variable belt off motor pulley only.
13. Measure distance from cabinet to inner pulley of variable -- record the measurement.

Dimension _____

14. Remove four nuts from underside of motor hangers.
15. Mark on cabinet the location of motor hangers as a guide for relocation.
16. Loosen four nuts (G, fig. 55) until motor hangers are at bottom of slots.

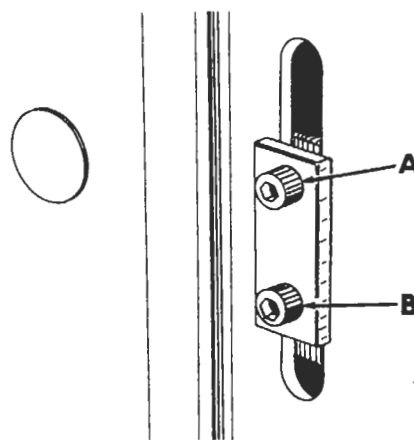


Figure 56

17. Remove screws (A and B, fig. 56).
18. Shift power feed pulley assembly (K, fig. 55) until belt can be taken off pulley (M).
19. Remove power feed belt from motor pulley.
20. Remove motor from cabinet.
21. Loosen set screw in hub before pulling motor pulley assembly from shaft.
22. NOTE: If motor is single phase, remove the four hex cap screws from motor.
If motor is three phase, remove four nuts and rubber motor mounts from motor.
23. Remove motor junction box cover and disconnect wiring.
24. Remove connector nut and remove conduit from motor.

MOTOR

TO INSTALL

1. Press inner half of motor pulley assembly on motor shaft, tighten set screw.
2. NOTE: If motor is three phase -- put rubber mounts and nuts on motor before installing motor in cabinet.
If motor is single phase -- start hex cap screws thru motor base before installing in cabinet.
3. Remove motor junction box cover.
4. Install conduit in junction box and lock in place with connector nut.
5. Wire motor -- see WIRING INSTRUCTIONS.
6. Slide motor and conduit in cabinet and start nuts on mounting bolts.
7. Raise motor hangers until aligned with marks previously made.

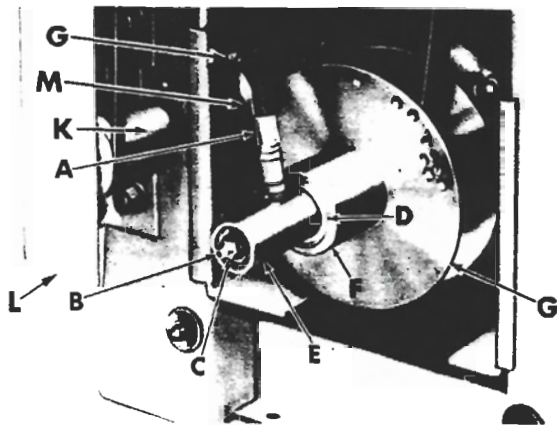


Figure 57

8. Tighten four nuts (G, fig. 57).
9. Slide motor until inner pulley is at position previously recorded. IMPORTANT: Variable motor pulley must align with countershaft pulley.
10. After motor pulley is aligned, tighten motor base nuts securely.
11. Place power feed belt on motor pulley, and then on pulley (M).
12. Position power feed pulley assembly (K) until both belts are properly tensioned, then tighten screws on back of guard (L).
NOTE: Properly tensioned belts should depress approximately $\frac{1}{2}$ " with light finger pressure -- too much tension causes excessive wear.
13. Slip variable belt on variable motor hub.
14. Replace two "O" rings on shaft (B).

15. Slide hydraulic cylinder (E) and outer half of variable pulley onto shaft (D) and pulley hub.
16. Install sleeve and start nut (C) on shaft (B).
17. Hold shaft in place with a socket set screw wrench, turn nut onto rod until distance from end of shaft (B) to nut (C) is the same as previously recorded.
18. Start fitting (A) onto hydraulic cylinder (E).
19. Fill oil reservoir.
20. Keep oil reservoir filled, hold variable dial against low speed stop until oil runs out around fitting (A) -- it takes a few minutes for oil to run down.
21. Tighten fitting (A).

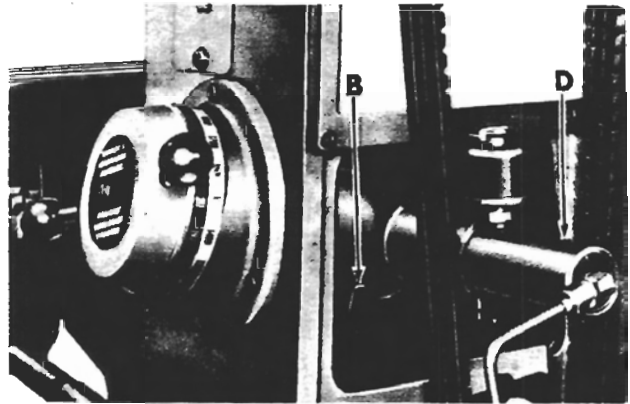


Figure 58

22. Remove lock pin (B, fig. 58).
23. Start mill motor. Hold variable control against low speed stop for 30 seconds -- turn variable dial to highest speed -- then back to lowest speed a few times. Control should stay at 52 rpm.
NOTE: Watch dial for a few seconds. If it doesn't remain at 52 rpm, the hydraulic system must be bled to remove trapped air.
To remove air from hydraulic system:
 - A. Run variable to highest speed.
 - B. Loosen bleeder screw (D) a few turns until oil starts coming out around the screw.
 - C. Tighten bleeder screw.
 - D. Turn variable dial to low speed, stop and release -- pointer should remain at 52 rpm.NOTE: If dial moves, repeat steps A, B, and C.
24. Install upper and lower belt guards.



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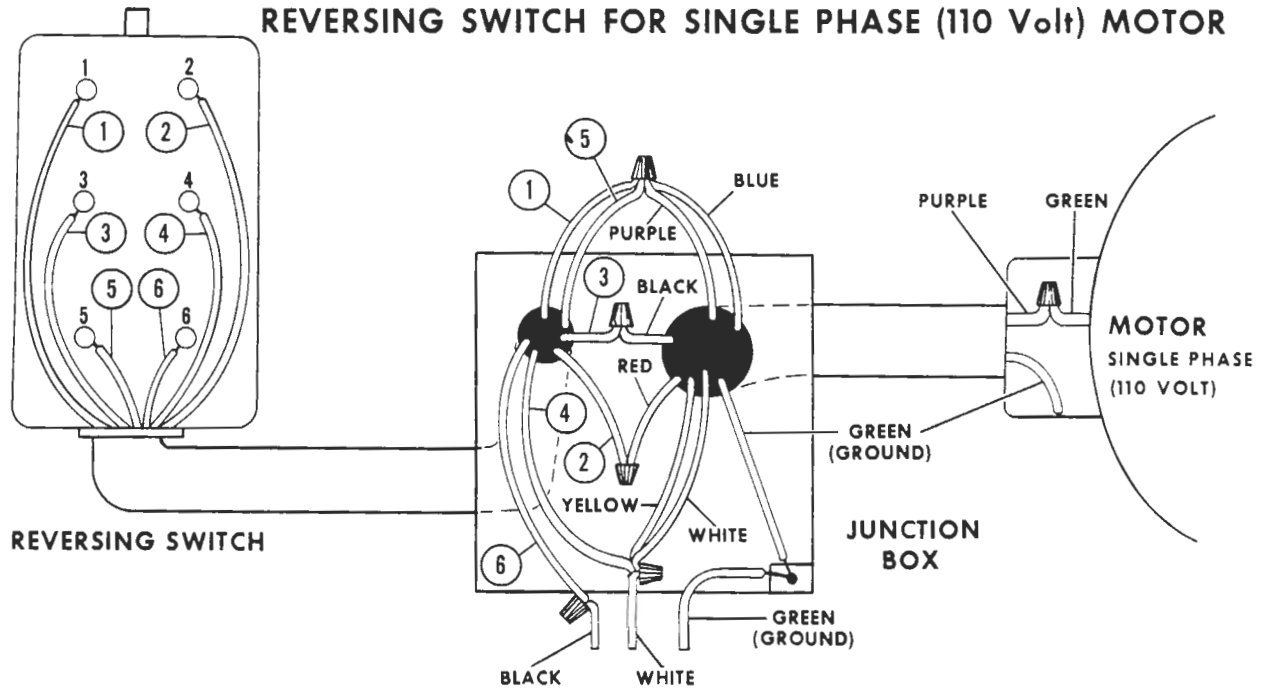
WIRING INSTRUCTIONS

for
8540 SERIES
CLAUSING HORIZONTAL
MILLING MACHINE

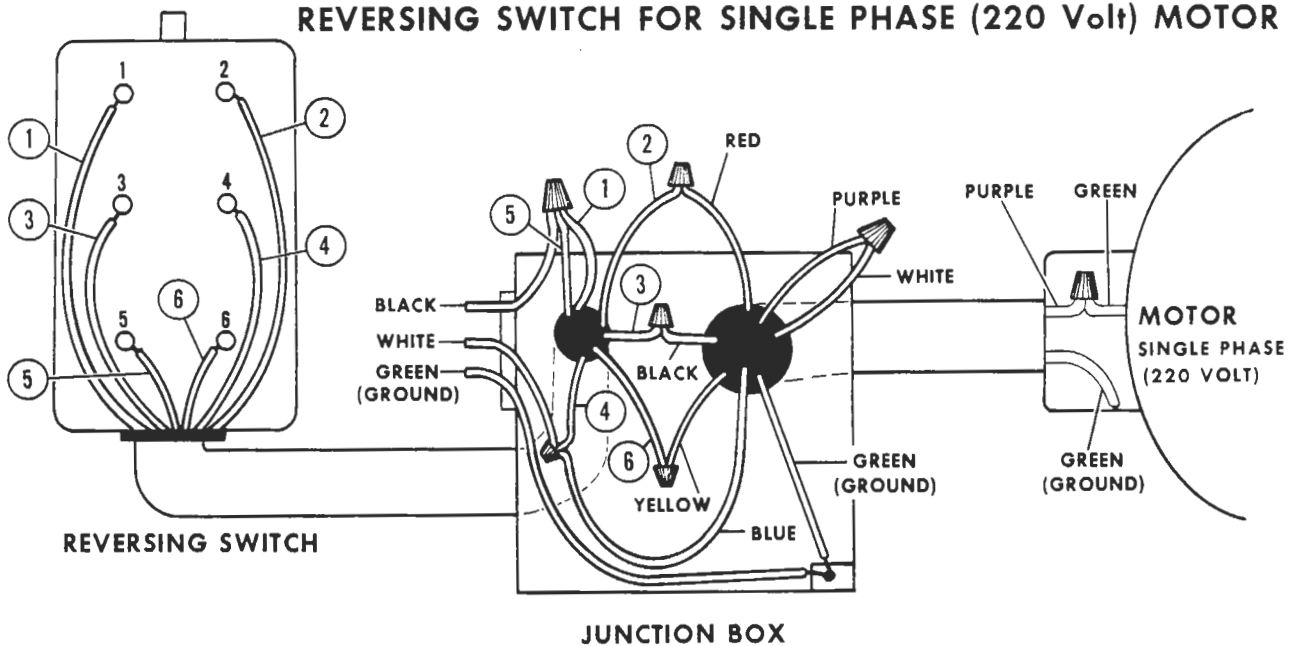
JANUARY 1964

FILE NO. 8540W-1

REVERSING SWITCH FOR SINGLE PHASE (110 Volt) MOTOR

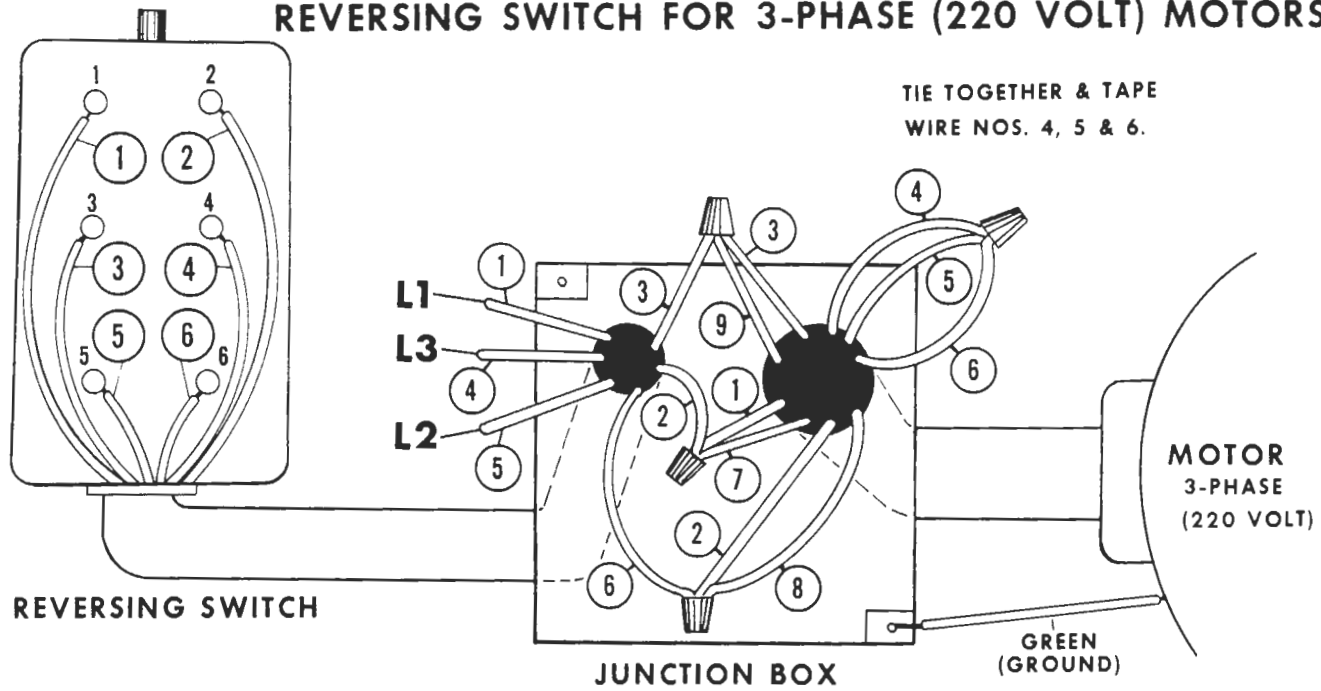


REVERSING SWITCH FOR SINGLE PHASE (220 Volt) MOTOR

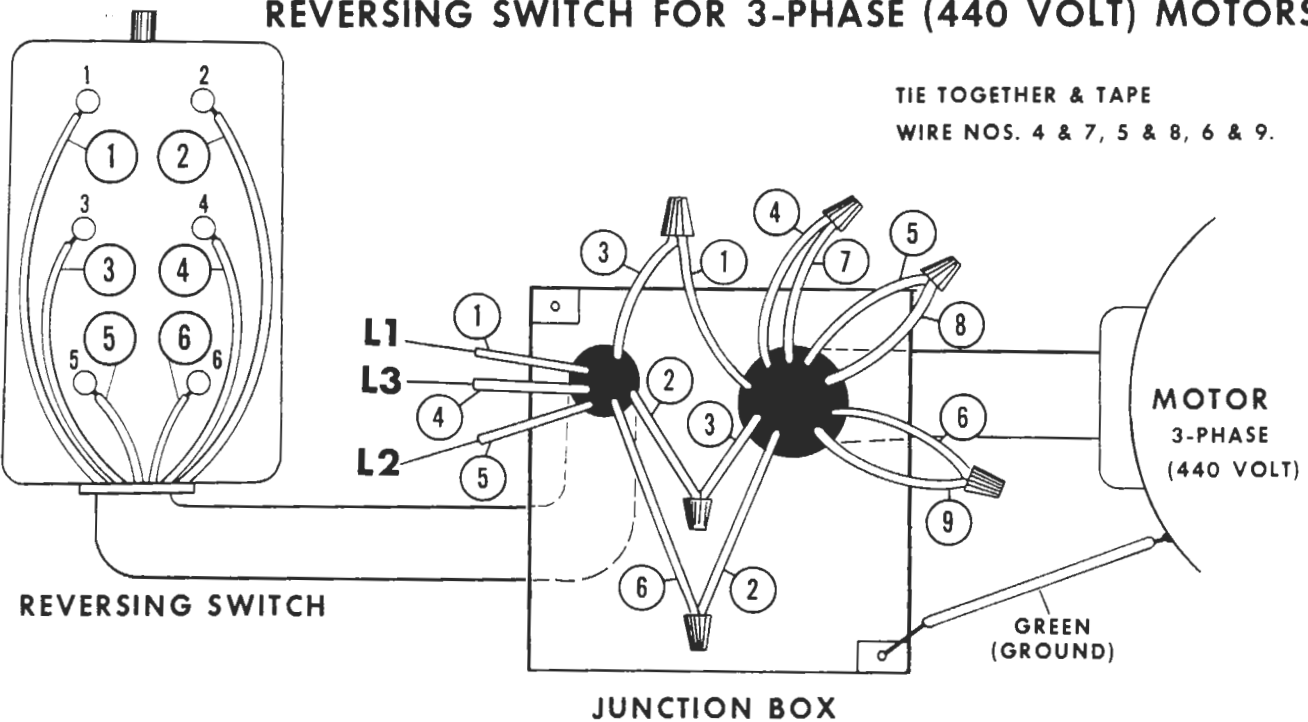


NOTE: TO REVERSE ROTATION INTERCHANGE WIRES 2 & 3 IN JUNCTION BOX.

REVERSING SWITCH FOR 3-PHASE (220 VOLT) MOTORS



REVERSING SWITCH FOR 3-PHASE (440 VOLT) MOTORS



NOTE: TO REVERSE ROTATION OF MOTOR INTERCHANGE ANY TWO LINE LEADS L1, L2 OR L3.

