

TECHNICAL MANUAL

ORDNANCE MAINTENANCE
AXLES, PROPELLER SHAFTS, AND WHEELS FOR
BOMB SERVICE TRUCK M6 AND 1½-TON 4 X 4 TRUCKS
(CHEVROLET), INCLUDING TELEPHONE EARTH
BORER (K-44)

CHANGES }
No. 1 }

WAR DEPARTMENT,
WASHINGTON 25, D. C., 2 March 1945

TM 9-1765A, 15 December 1942, is changed as follows:

Change title of manual to read: AXLES, PROPELLER SHAFTS,
AND WHEELS FOR BOMB SERVICE TRUCK M6 AND 1½-TON
4 X 4 TRUCKS (CHEVROLET), INCLUDING TELEPHONE
EARTH BORER (K-44).

Chapter 6 is added as new material; present chapter 6 is changed
to Appendix.

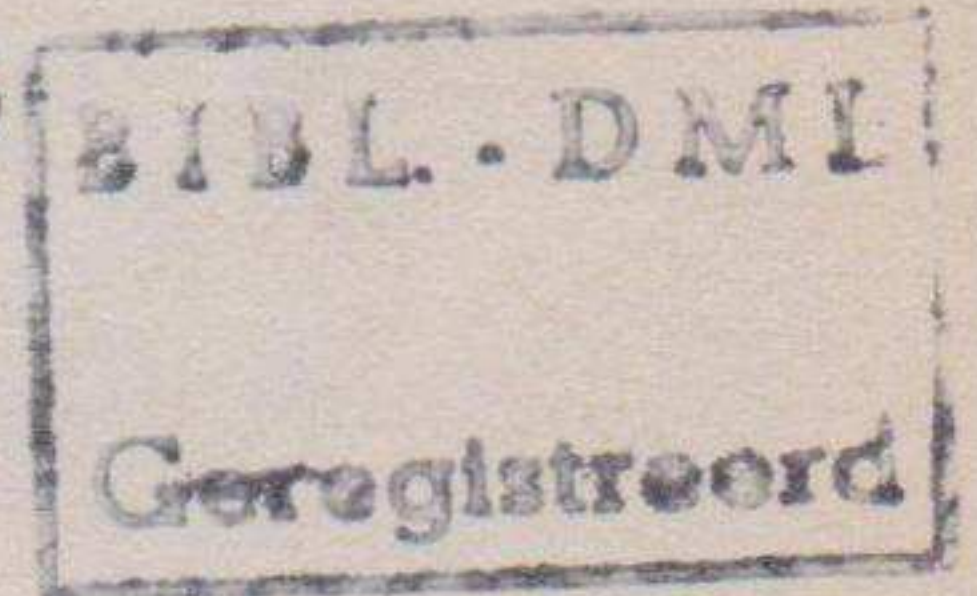
Chapter 6 (Added)

EARTH BORER EQUIPMENT HD

SGV TD

Section I

GENERAL



Paragraph
80

Description and operation-----

80. DESCRIPTION AND OPERATION.

a. **Description** (figs. 57 and 58). The earth borer equipment HD is a machine designed for digging holes in various types of soil, by power, for setting telephone poles and placing guy anchors. The machine is equipped with an integral derrick for setting telephone poles after the hole has been dug. The equipment includes the main supporting case tube, which is a steel shell attached to two mounting bases with cap screws. This steel shell supports the clutch case, which houses the feed and driving clutches, and brakes at one end, and supports the intermediate and boring cases at the other end. These latter cases project to the rear of and overhang the last body platform cross bearer. The main supporting case tube also houses the main drive and feed shafts. The intermediate case contains the intermediate drive and feed gear trains and has mounted on it the two leveling worms and wheel drives which serve when the main boring case is shifted into position. The boring case contains the final feed and drive gears, and the rack shaft boring head. The rack shaft, on which the earth auger

*These changes, together with C 1 (when published), TM 9-805, supersede TM 11-364, 24 September 1942.

is mounted, is turned by the boring head and is driven up and down through the boring head by the rack pinion. The control levers (on new models) are in front of the intermediate case on brackets mounted on the supporting tube. On old models the control levers overhang the last body platform cross bearer. The power leveler control lever is on top of the intermediate case. A large diameter tube is mounted on top of the boring case and is equipped with a guarded sheave at the upper end. The tube is used as a derrick, and is so mounted on the boring case as to form a guard over the rack shaft. An 8-inch eye snatch block is attached to the derrick tube base casting for use when pulling with the winch rope at various angles from the truck.

b. Operation. The operation of the earth borer is handled by the two control levers which control the operation of the clutch and brake assembly. The power is supplied by the truck engine through the truck transmission, transfer case, power take-off, and a propeller shaft which is connected to a pillow block. The power is transmitted by a drive chain between the pillow block sprocket and the earth borer clutch drive sprocket.

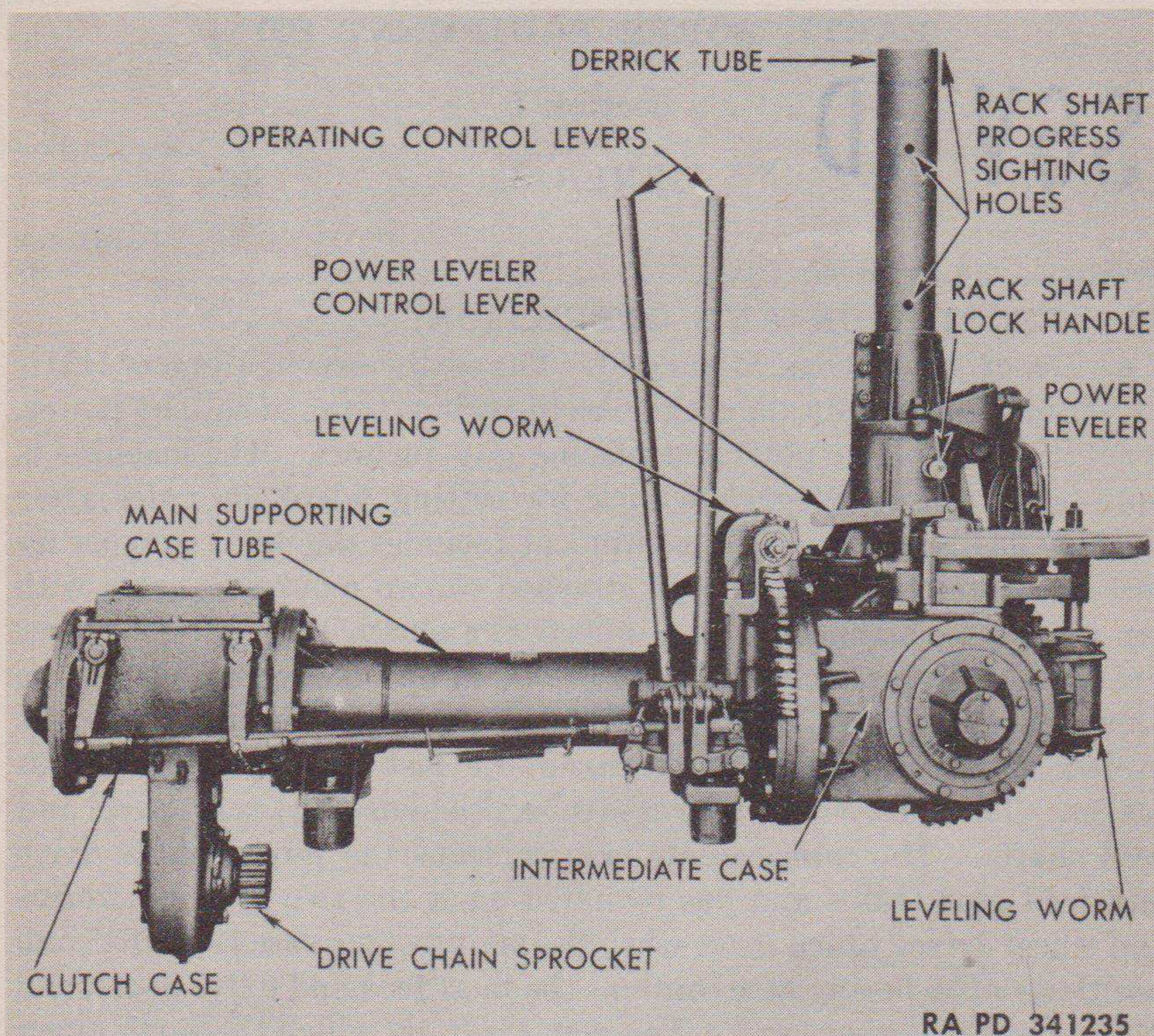


Figure 57—Earth Borer HD—Front View

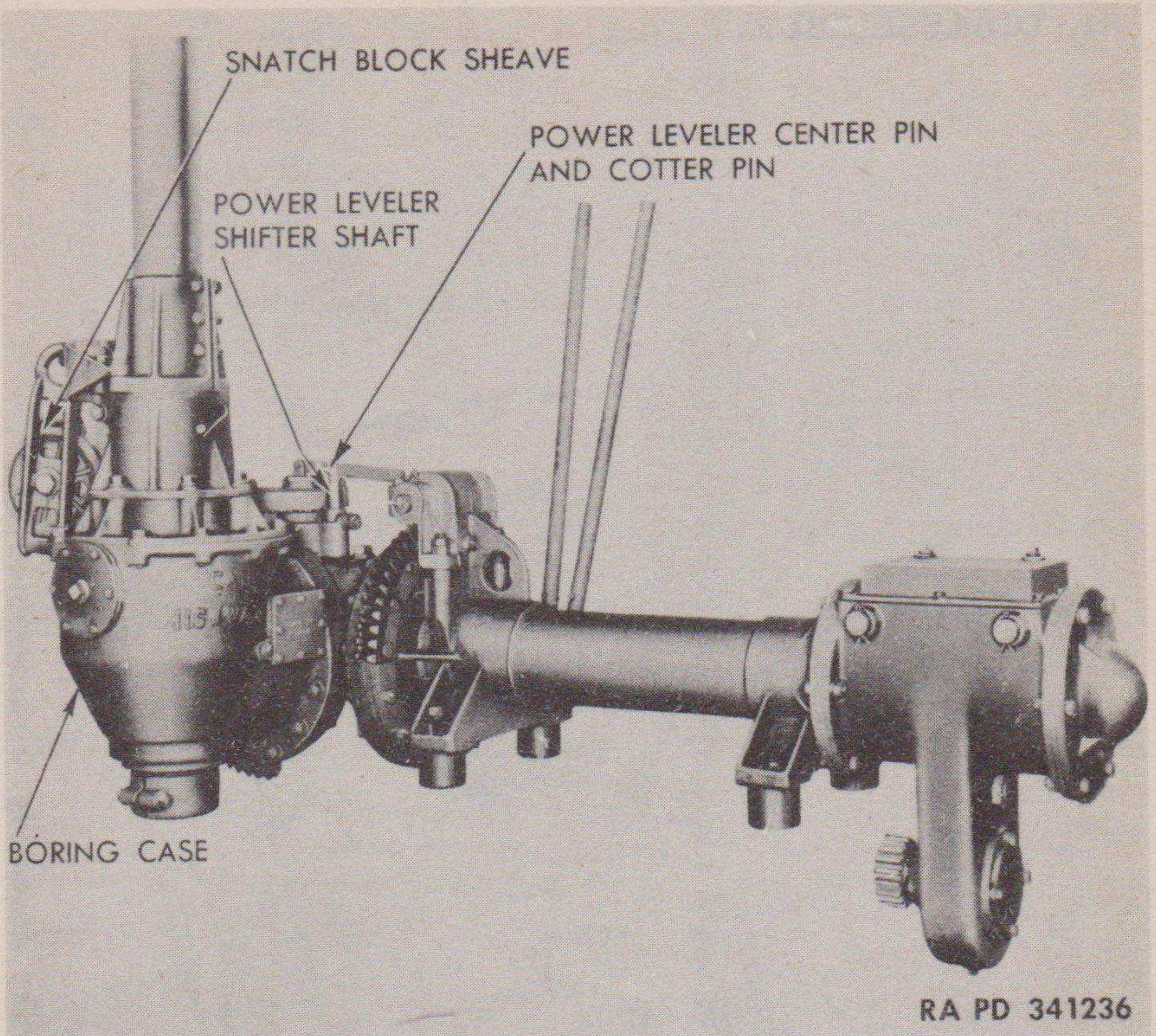


Figure 58—Earth Borer HD—Rear View

Section II

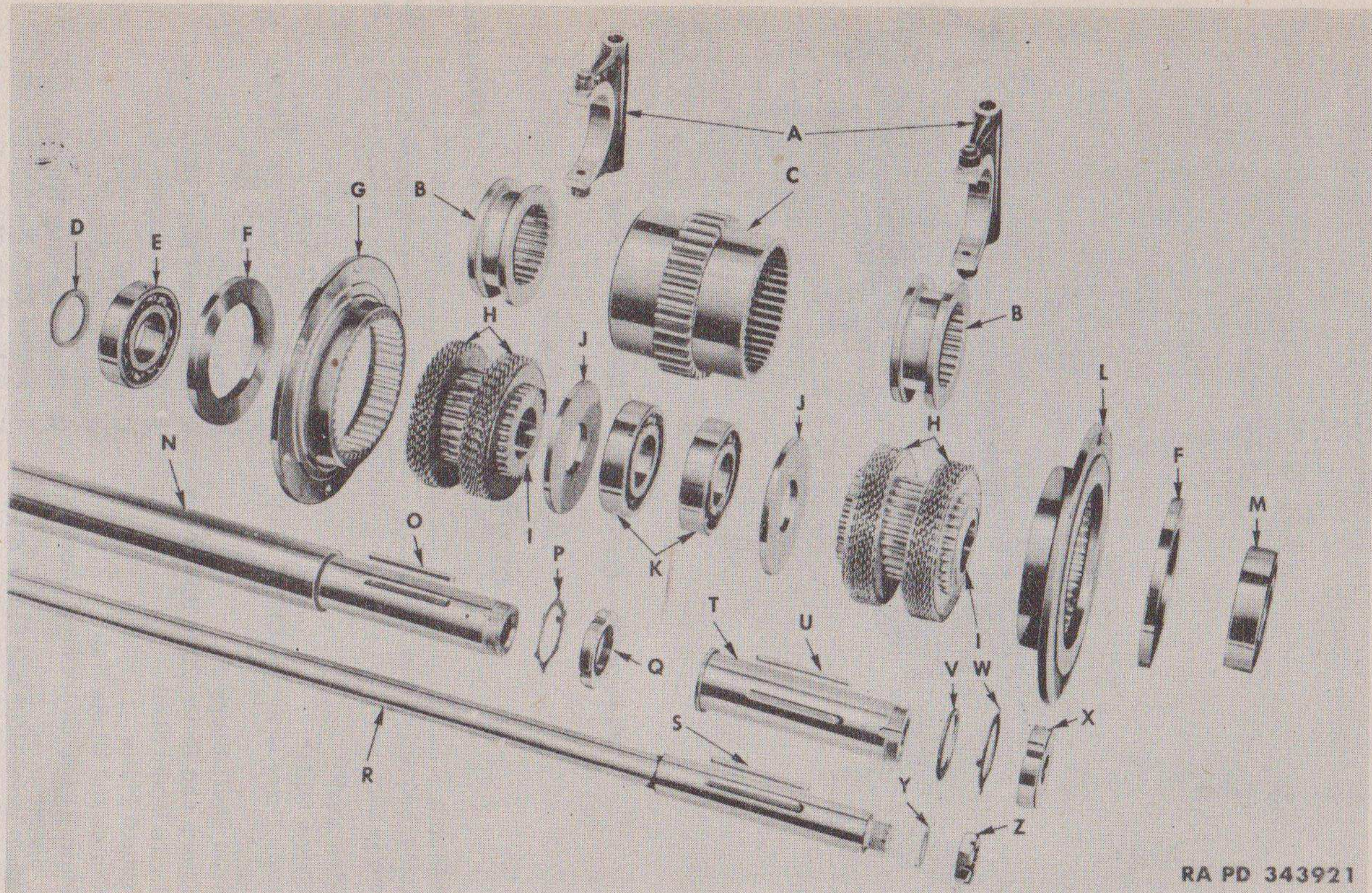
CLUTCH CASE

Paragraph

Disassembly -----	81
Cleaning, inspection, and repair -----	82
Assembly -----	83

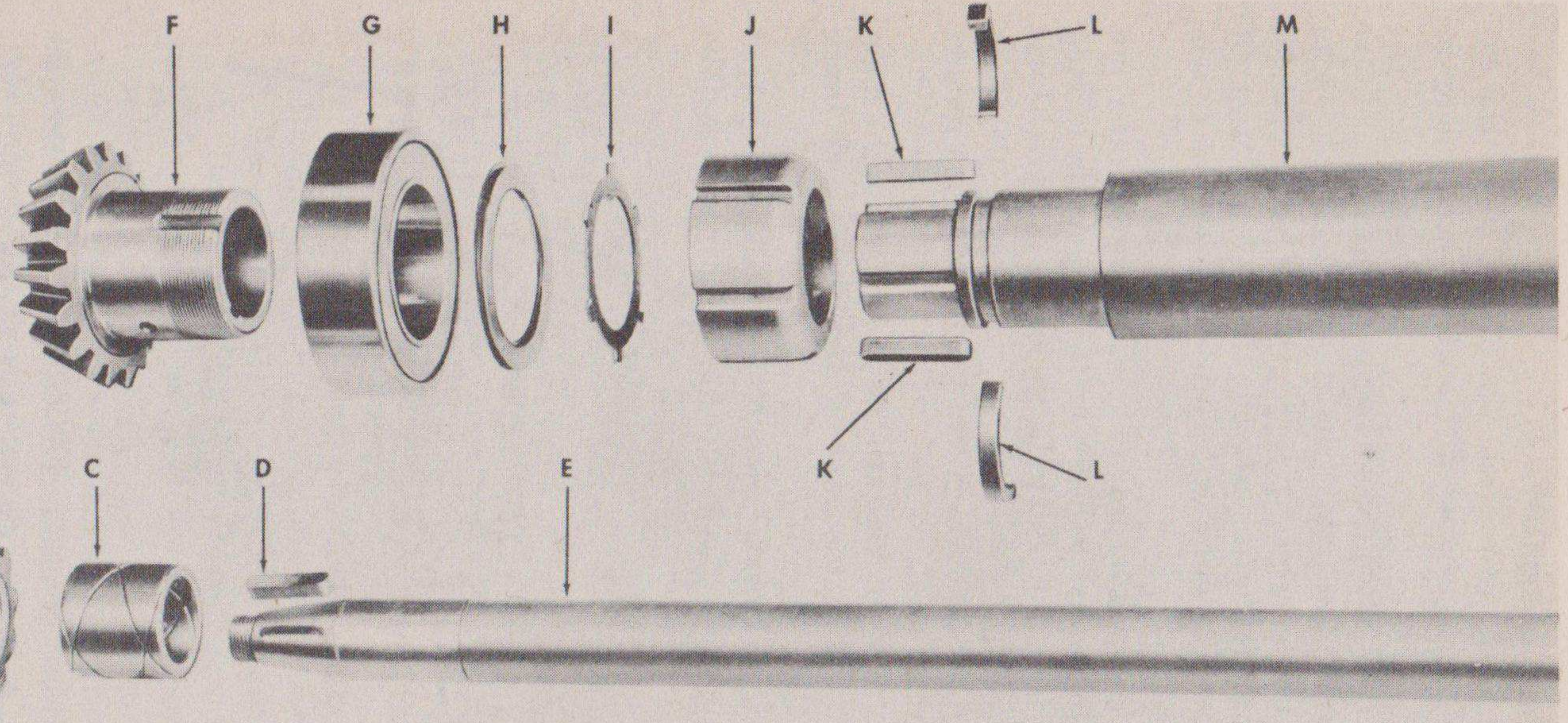
- | | |
|---|-----------------------------|
| A Shift Fork | N Feed Shaft |
| B Throw Collar | O Feed Shaft Key |
| C Main Drive Gear and Clutch Shell | P Feed Shaft Locking Washer |
| D Shim | Q Feed Shaft Lock Nut |
| E Feed Shaft Bearing | R Drive Shaft |
| F Clutch and Brake Plate Spacer | S Drive Shaft Key |
| G Drive Brake Shell | T Drive Shaft Sleeve |
| H Clutch Plates | U Sleeve Key |
| I Clutch and Brake Hub | V Sleeve Shim |
| J Main Drive Gear Shell Bearing
Spacer | W Sleeve Locking Washer |
| K Main Drive Gear and Clutch Shell
Bearing | X Sleeve Lock Nut |
| L Feed Brake Shell | Y Drive Shaft Shim |
| M Drive Shaft Bearing | Z Drive Shaft Nut |

81. DISASSEMBLY.



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Figure 59—Clutch and Brake Assembly, Disassembled



- A—DRIVE SHAFT NUT
- B—DRIVE SHAFT PINION
- C—DRIVE SHAFT BUSHING
- D—DRIVE SHAFT PINION KEY

- E—DRIVE SHAFT
- F—FEED SHAFT PINION
- G—FEED SHAFT PINION BEARING
- H—PINION BEARING SHIM
- I—COUPLING LOCK

- J—FEED SHAFT COUPLING
- K—FEED SHAFT PINION KEY
- L—FEED SHAFT COUPLING COLLAR
- M—FEED SHAFT

AXLES, PROPELLER SHAFTS, AND WHEELS

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Figure 60—First Reduction Drive and Feed Shaft Assemblies, Disassembled

a. Remove Clutch Case Assembly.

(1) Before removing mechanism from clutch case, clean the exterior of case to insure that dust and dirt will not accumulate on interior mechanism.

(2) Drain lubricant from clutch case. Remove clutch cover from case. Remove collars from clutch shift shafts, and drive the shafts out of the case and shift forks. (See fig. 61.) During this operation, the Woodruff keys in the shift shafts will force the shaft bushings out of the case. Lift out the shift fork with clutch throw shoes as one assembly. (See fig. 62.)

(3) Remove clutch case cap from rear of case. Remove cotter pin and nut from the drive clutch shaft; then raise the tang of the locking washer, and remove nut from the clutch drive sleeve. Remove shims from end of drive clutch shaft.

(4) Remove the bearing from drive clutch sleeve, and then remove brake spacer and drive brake shell.

(5) Remove the cap screws which attach the clutch case to the main supporting case tube, and slip the case off the clutch and brake assembly.

(6) Remove the clutch and brake assembly with drive and feed shafts out of the main supporting case tube for further disassembly.

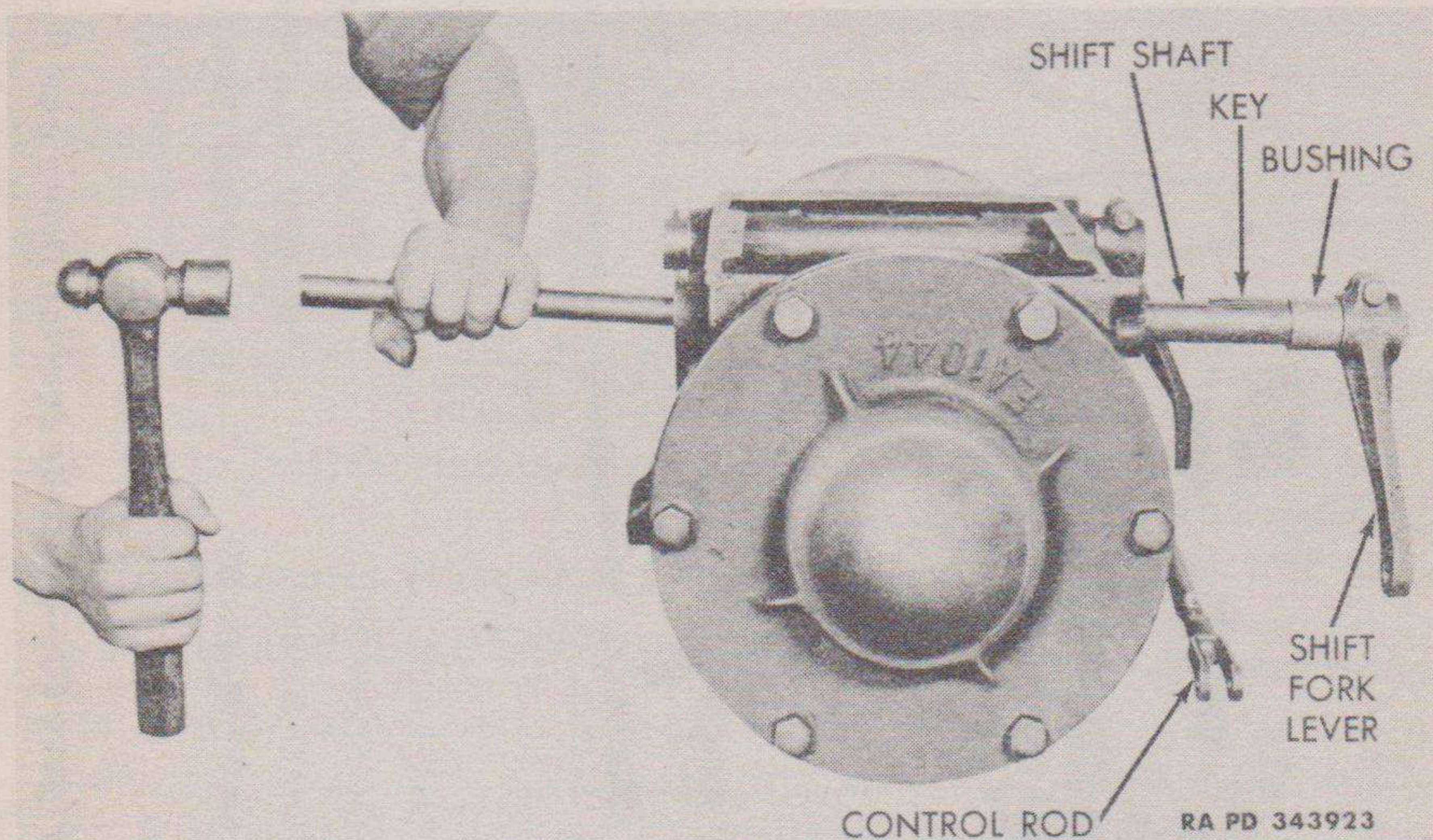


Figure 61—Removing Clutch Shift Shafts

b. Remove Clutch Sprocket Intermediate Gear Assembly (fig. 63).

(1) With clutch case removed as explained in a (5) above, remove clutch sprocket intermediate gear shaft cotter pin and nut.

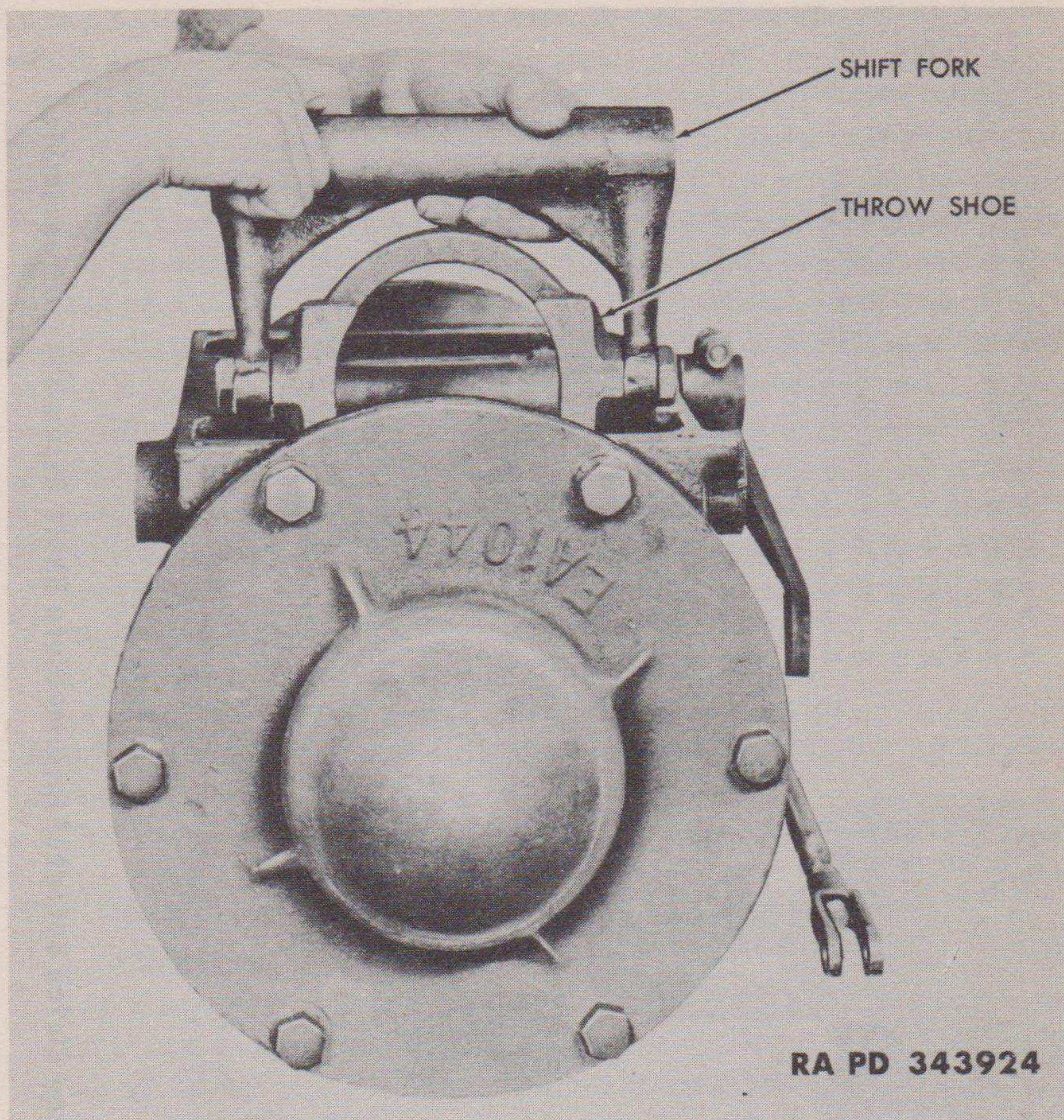


Figure 62—Removing Shift Fork and Throw Shoe Assembly

- (2) Remove clutch sprocket intermediate gear shaft.
- (3) Lift clutch sprocket intermediate gear out of case.

c. Remove Clutch Sprocket Gear Assembly (fig. 63).

(1) Before the clutch sprocket shaft gear can be removed, it will be necessary to remove the clutch sprocket intermediate gear as described in b above.

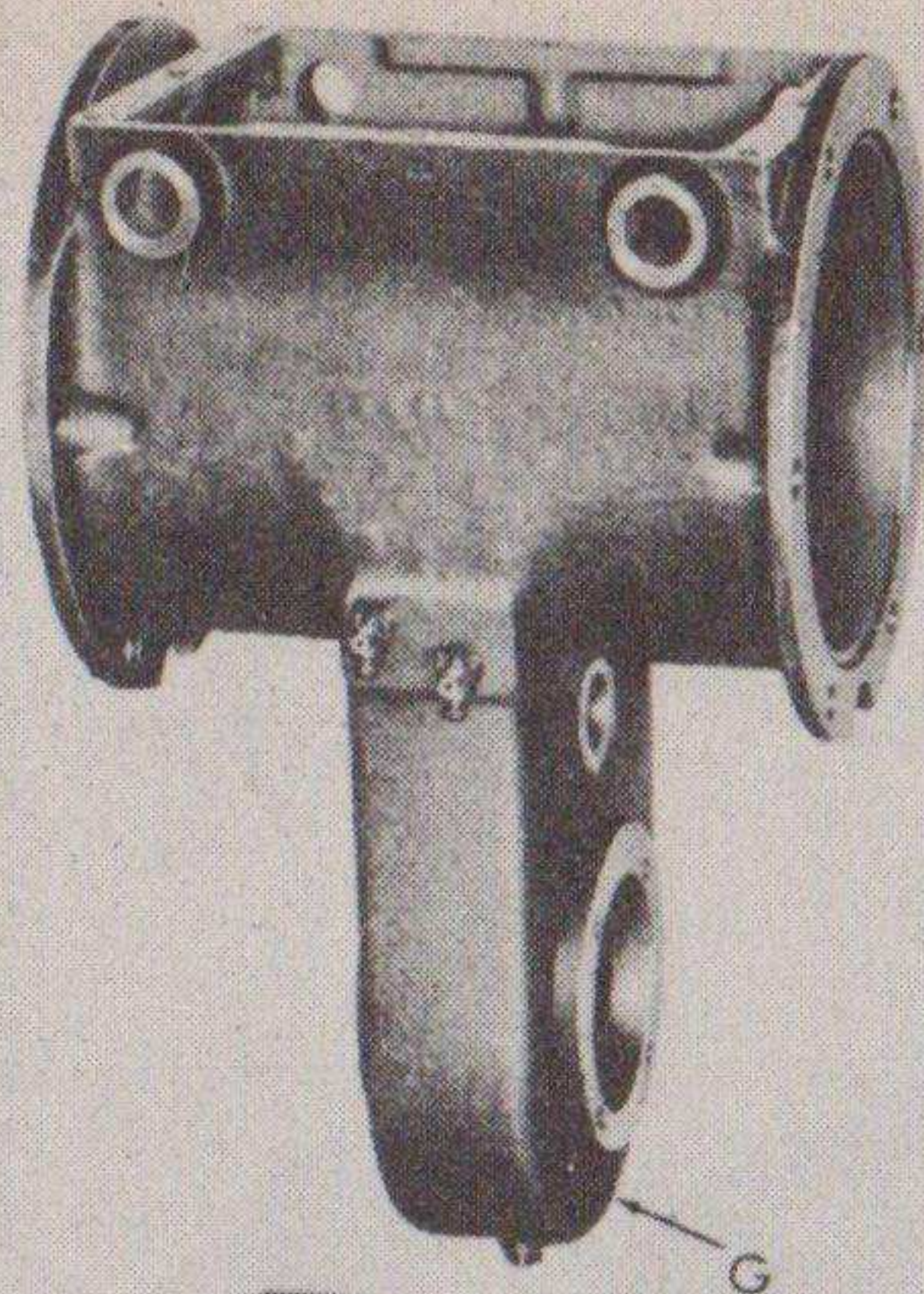
(2) With clutch case removed as explained in a (5) above, remove cap screws from both bearing retainers and remove the retainer on the side opposite the drive sprocket.

- (3) Drive shaft out of gear and lift drive gear out of case.
- (4) Drive oil seal out of bearing retainer.

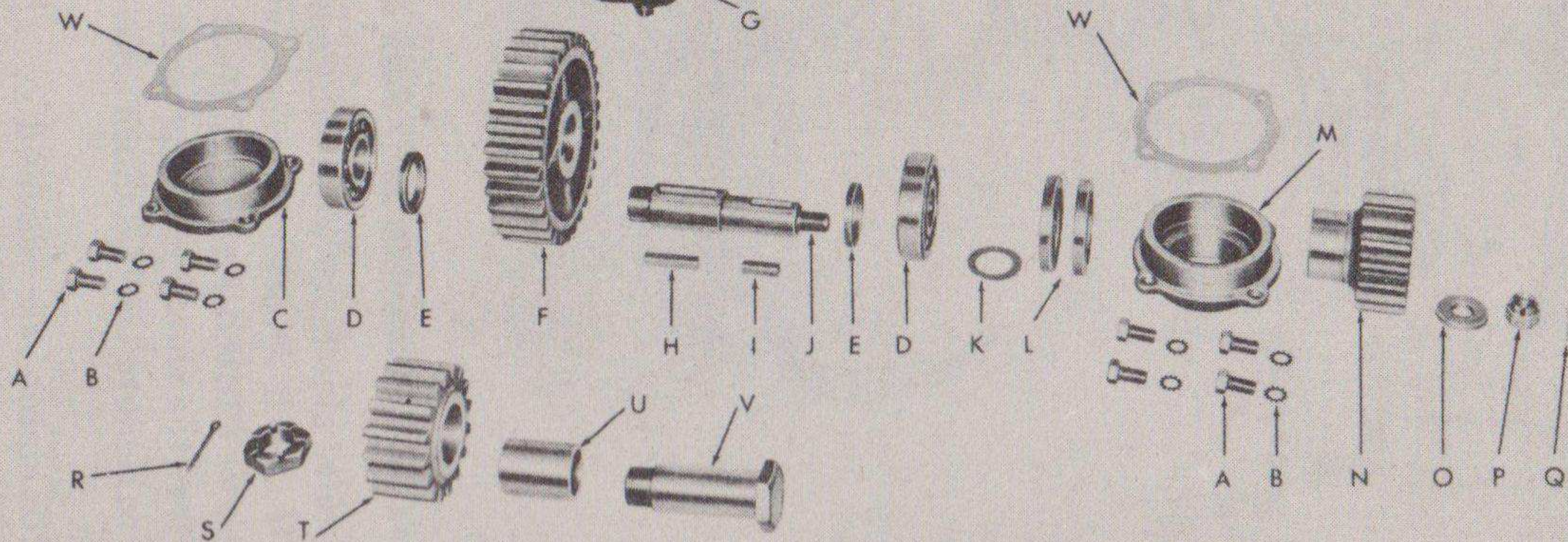
d. Disassemble Clutch and Brake Assembly (fig. 59).

(1) To remove the clutch and brake assembly from the clutch case assembly, replace drive sleeve lock nut on drive sleeve; using a puller

- A—CAP SCREW
- B—TOOTHED LOCK WASHER
- C—SPROCKET SHAFT BEARING CAP (CLOSED END)
- D—SPROCKET SHAFT BEARING
- E—SPROCKET SHAFT GEAR SPACER
- F—SPROCKET SHAFT GEAR
- G—CLUTCH CASE
- H—SPROCKET SHAFT GEAR KEY
- I—DRIVE SPROCKET KEY
- J—SPROCKET SHAFT
- K—SPROCKET SHAFT BEARING AND SEAL SPACER



- L—SPROCKET SHAFT ASSEMBLY OIL SEALS
- M—SPROCKET SHAFT BEARING CAP (OPEN END)
- N—DRIVE SPROCKET
- O—SPROCKET WASHER
- P—SPROCKET NUT
- Q—SPROCKET COTTER PIN
- R—SPROCKET INTERMEDIATE SHAFT COTTER PIN
- S—SPROCKET INTERMEDIATE SHAFT NUT
- T—SPROCKET INTERMEDIATE GEAR (16 TEETH)
- U—SPROCKET INTERMEDIATE GEAR BUSHING
- V—SPROCKET INTERMEDIATE SHAFT
- W—SPROCKET SHAFT BEARING CAP GASKET



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Figure 63.—Clutch Sprocket Shaft and Clutch Sprocket Intermediate Shaft Assemblies, Disassembled

against the nut, remove the drive sleeve and clutch and brake assembly with it.

(2) Remove clutch and brake plates (internal and external teeth), throw collar, and press drive sleeve out of clutch and brake hub. Remove clutch spacer and clutch shell bearing.

(3) Tap with a soft hammer against the side of the gear teeth on the main drive gear and clutch shell, and remove same from the other clutch shell bearing.

(4) Remove feed shaft lock nut, bearing, clutch plates, throw collar, and other parts of the drive clutch and brake assembly.

e. Disassemble First Reduction Drive and Feed Shaft Assemblies (fig. 60).

(1) Remove cotter pin and nut from first reduction drive pinion, and remove pinion from shaft.

(2) Raise lip of coupling nut lock ring, and unscrew coupling nut from hub of pinion using spanner wrench.

(3) Drive first reduction feed pinion off its shaft.

(4) Remove double row of bearing from hub of pinion. Check number of shims located between bearing and back of gear for reference when reassembling.

(5) Remove first reduction drive pinion key from shaft.

82. CLEANING, INSPECTION, AND REPAIR.

a. Cleaning.

(1) **BEARINGS.** Allow bearings to soak in dry-cleaning solvent to soften and loosen heavy grease particles. Slush bearings up and down in dry-cleaning solvent, while rotating bearings, to cause loosened particles to fall out. Jar against a wood block and repeat slushing process until bearings are clean. Coat bearings with light oil, and wrap in paper to await inspection.

(2) **ALL PARTS EXCEPT BEARINGS.** Wash all other parts in dry-cleaning solvent, scrubbing to expedite process. Remove all grease, dirt, and oil.

b. Inspection and Repair.

(1) **MEASUREMENTS.** No measurements are given in this subparagraph as complete details are given in paragraph 102.

(2) **BEARINGS.** Inspect all bearings for nicks or clips on balls or rollers, and inspect races. Spin bearings by hand, and if unusual sounds are noticed, investigate cause. Replace any bearings showing defects.

(3) **PINIONS, SHELLS, AND SPROCKETS.** Inspect for signs of tooth chipping or cracking, and inspect teeth for wear. If wear can be felt (see Par. 102 for limits), or if cracks or pits are evident, replace.

(4) **SHAFTS.** Inspect shafts for wear, and replace if wear can be felt. (See par. 102.)

(5) **HOUSING.** Inspect housing for cracks, and for damaged machined surfaces which would cause oil leakage; if encountered, replace housing.

(6) **CLUTCH AND BRAKE PLATES.** Inspect for wear or damage and if necessary, replace or add plates.

(7) **CLUTCH THROW SHOES, PINS, AND COLLARS.** Inspect for wear and replace if necessary.

(8) **BUSHINGS.** Inspect for wear or damage and replace if necessary.

(9) **OIL SEALS AND GASKETS.** All gaskets and oil seals must be replaced at each major repair or overhaul. Before installing new oil seals, soak in light engine oil.

83. ASSEMBLY.

a. Assembly and Adjustment of First Reduction Drive and Feed Shaft Assemblies.

(1) In replacing first reduction feed pinion, be sure that the same numbers of shims and bearings are in place, and then put pinion on shaft up to shoulder. Tighten clutch feed pinion shaft coupling, and lock securely with coupling lock ring.

(2) Replace drive clutch shaft in feed clutch shaft. Return this much of the clutch and brake assembly to the machine, and install bearing and spacer in the main supporting clutch case end. Before continuing the installation, check the first reduction feed pinion with the first reduction feed gear for proper mesh and backlash. When making this check be sure that bearing is tight against its seat in the main supporting clutch case end.

(3) Adjustment lengthwise is secured by adding to or removing some of the shims located between bearing and shoulder of large diameter of clutch feed shaft. (See paragraph 102 for limits.)

b. Assemble Clutch Sprocket Gear Assembly (fig. 63).

(1) With clutch case removed as explained in paragraph 81a (5), proceed with assembly.

(2) Install oil seals in bearing retainer.

(3) Place drive gear in position inside of case, and drive shaft with key onto gear.

(4) On the side opposite the drive sprocket install gear spacer, bearing, gasket and bearing retainer, and fasten retainer to case with cap screws and lock washers.

(5) Install spacer, bearing, spacer, gasket, and retainer with oil seals on shaft and secure retainer to drive sprocket side of case with four cap screws and lock washers.

(6) Install drive sprocket key on shaft and install sprocket with washer, nut, and cotter pin.

Note. When replacing bearing retainer oil seals, press in new seals so edge of leather will be toward sprocket shaft gear.

c. Install Clutch Sprocket Intermediate Gear Assembly.

(1) With clutch case removed as explained in paragraph 81a (5), and with clutch sprocket gear previously installed proceed with assembly.

(2) If bushing has been removed from gear, press bushing into gear.

(3) Place clutch sprocket intermediate gear into position inside clutch case, install shaft, and lock with nut and cotter pin.

d. Assemble Clutch and Brake Assembly and Install in Main Supporting Clutch Case.

(1) Before beginning assembly of clutch and brake assembly, install first reduction drive and feed shaft assemblies in machines as described in a above.

(2) When assembling the feed clutch and brake assembly on feed shaft, start by slipping the brake spacer and feed brake shell over the clutch and brake hub; then install an internal-toothed clutch plate against spacer; next install external-toothed clutch plate. Continue to install clutch plates alternately until a total of nine external-toothed plates have been installed. Complete this assembly with two internal-toothed plates.

(3) Install throw collar and commence assembly of plates with two internal-toothed plates; next install external-toothed plate. Continue assembly of clutch plates until a total of nine external-toothed plates have been assembled. Complete assembly with one internal-toothed plate.

(4) Install clutch spacer with the flat side against the plates; then install main drive gear and clutch shell bearing, locking washer and feed shaft nut. Tighten nut securely and bend over tang of locking washer to lock the nut.

(5) Assemble main drive gear and clutch shell over shell bearing. Install drive sleeve on drive shaft, and seat clutch shell bearing in the main drive gear and clutch shell.

(6) Install spacer and then install internal-toothed clutch plate against spacer, then assemble an external-toothed plate. Continue the assembly of plates alternately until a total of nine external-toothed plates have been installed. Complete assembly with two internal-toothed plates.

(7) Install throw collar and commence assembly of plates with two internal-toothed plates, then install an external-toothed plate. Continue assembly of plates until a total of nine external-toothed plates

have been installed. Complete assembly of plates with one internal-toothed plate.

Note. If it is necessary to add clutch or brake plates in either feed or drive assemblies to compensate for wear, it is important that two of each internal-toothed plates be next to throw collars.

(8) Assemble clutch case over partially assembled clutch and brake assembly, and bolt it to the main supporting case tube.

(9) Line up external teeth on clutch plates and install feed brake shell. Bolt brake shell to clutch case.

(10) Install brake spacer, bearing, and lock washer on drive sleeve. Install the same number of shims over end of drive shaft that were removed when disassembling. Install locking washer and sleeve nut and tighten securely.

(11) Install drive shift nut and tighten it securely. Check backlash between first reduction drive pinion and first reduction drive gear. If backlash is incorrect, make adjustment according to instructions given in *c* (2) above. (See fig. 70.)

(12) Lock sleeve nut by bending one tang of the locking washer into slot in nut. Lock drive shaft nut with cotter pin. Install bearing cap.

e. Install Control Mechanism. Assemble shift fork assemblies in grooves of throw collars. Assemble shafts, bushings, shaft collar, and control levers.

Section III

INTERMEDIATE CASE ASSEMBLY

	Paragraph
Removal and disassembly-----	84
Cleaning, inspection, and repair-----	85
Assembly and installation-----	86
Replacement of first reduction drive pinion without removing clutch case assembly-----	87

84. REMOVAL AND DISASSEMBLY

a. Removing Intermediate Gear Assembly.

(1) It is not necessary to entirely dismantle the boring head assembly in order to remove gears from intermediate case. It is necessary, however, to raise the boring assembly approximately 1/2 inch so that auger drive gear and feed idler gear will clear second reduction drive pinion and second reduction feed pinion.

AXLES, PROPELLER SHAFTS, AND WHEELS

(2) To remove the intermediate gear assembly from the intermediate case without entirely dismantling the boring assembly, the procedure is as follows: Remove cap screws from boring case cap. Leave cap in place (loose) and by means of a jack placed against the lower rack shaft clamp nut, raise boring assembly approximately $\frac{1}{2}$ inch.

(3) After raising boring assembly as described above, remove cap screws holding intermediate case bearing retainer flange. Turn two of the cap screws into the two tapped holes, using same as a puller to free flange from its seat. Then remove entire intermediate gear assembly.

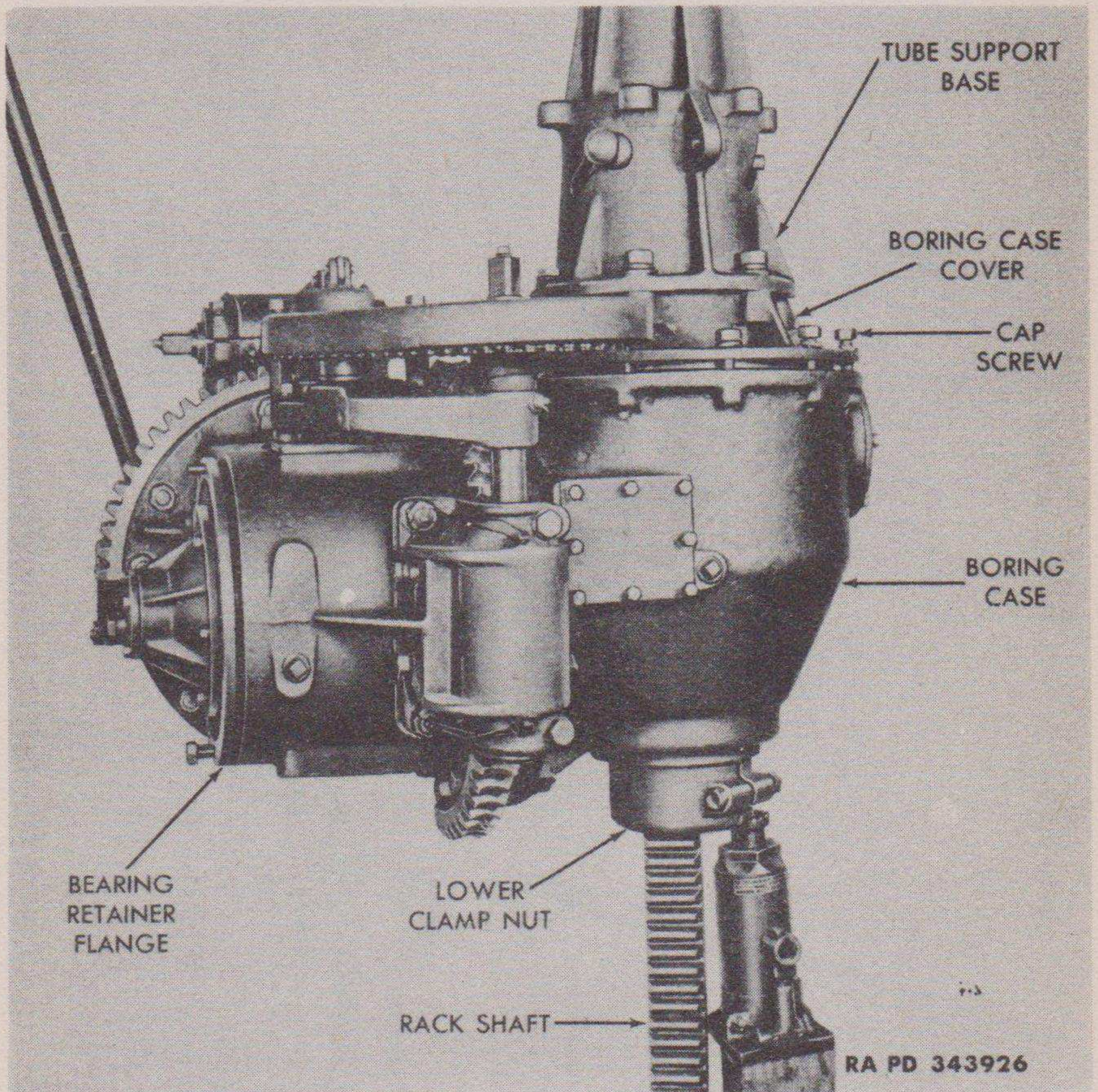
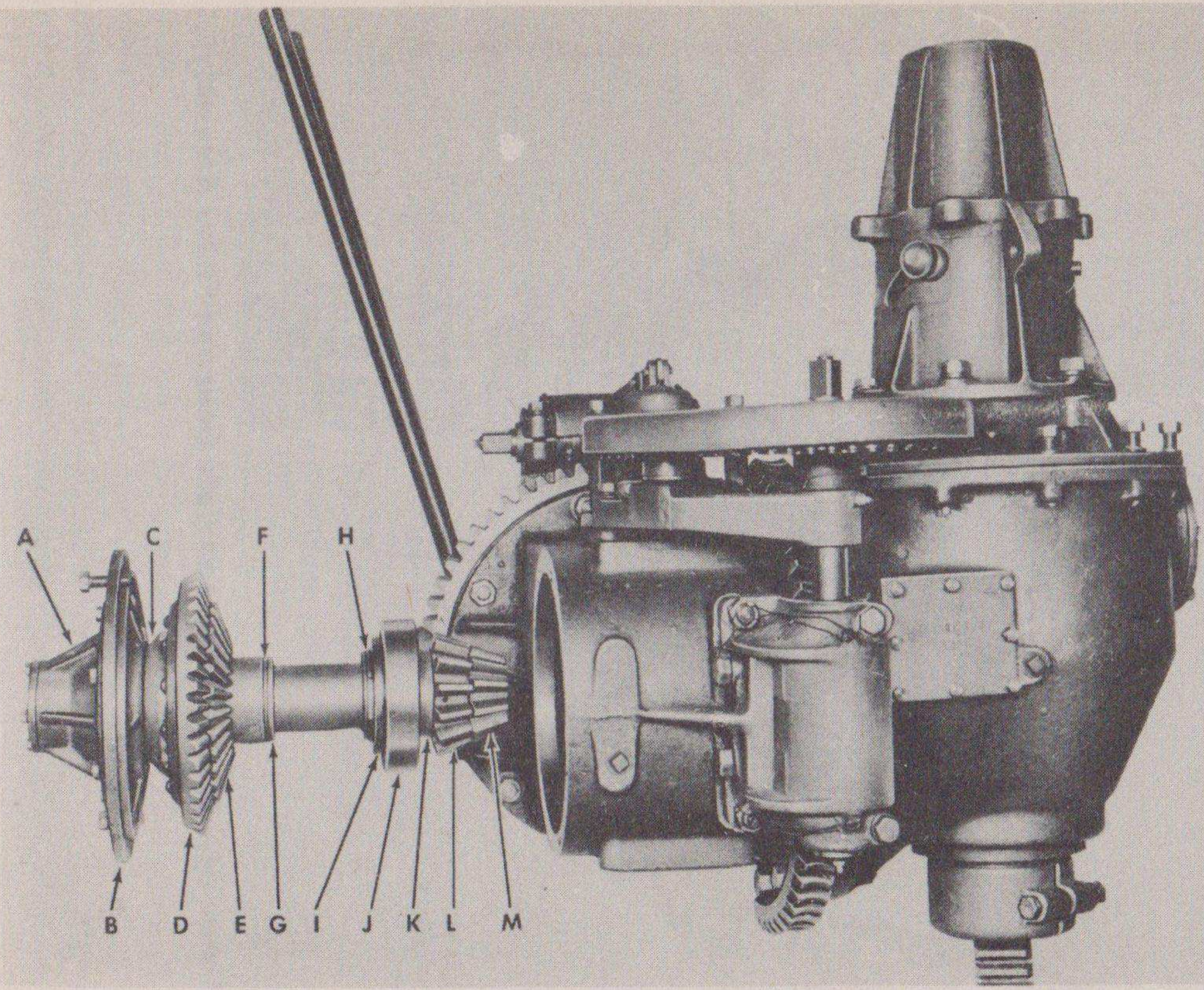


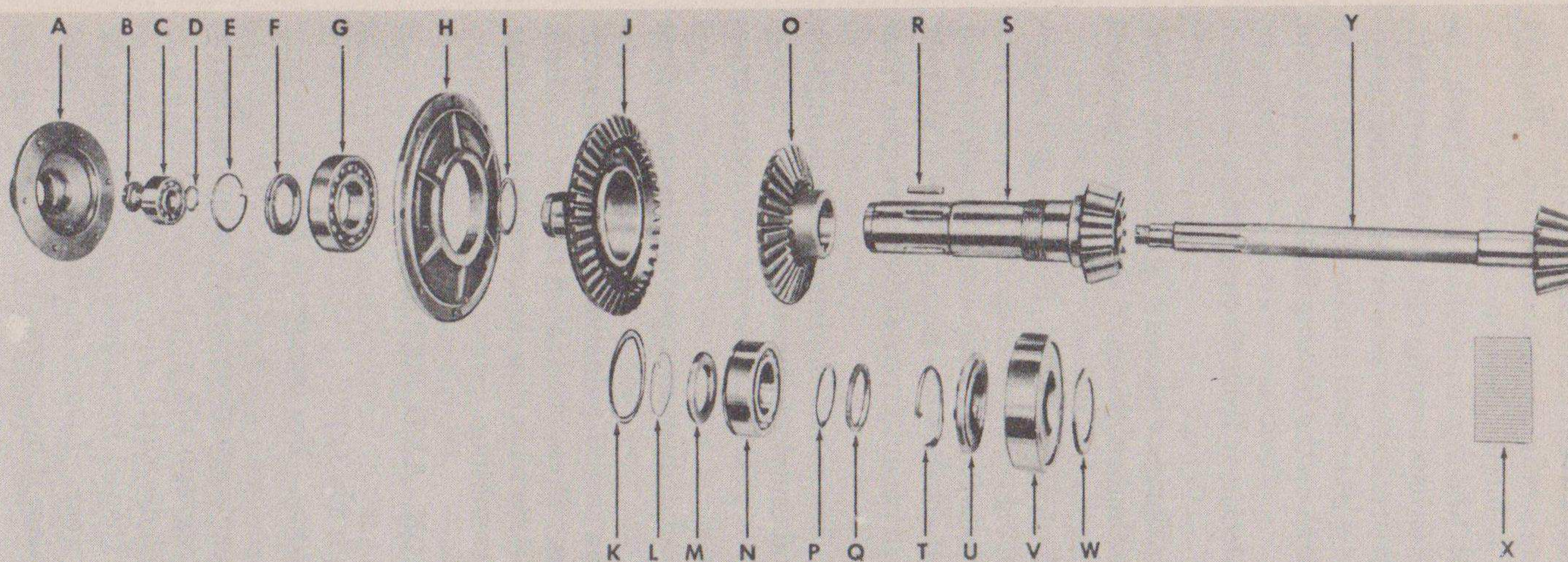
Figure 64—Removing Intermediate Gear and Pinion Assembly

- A—BEARING CAP
- B—BEARING RETAINER FLANGE
- C—FEED GEAR HUB
- D—FEED GEAR
- E—DRIVE GEAR
- F—SPACER
- G—SHIMS
- H—LOCK NUT
- I—LOCK WIRE
- J—BALL BEARING
- K—SHIMS
- L—DRIVE PINION
- M—FEED PINION



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Figure 65—Intermediate Gear and Pinion Assembly Removed



- A—BEARING CAP
- B—SHAFT NUT
- C—FIRST REDUCTION FEED GEAR BEARING
- D—FEED PINION SHIM
- E—BEARING NUT LOCK RING
- F—BEARING LOCK NUT
- G—FEED GEAR HUB BEARING
- H—BEARING RETAINER FLANGE
- I—FEED GEAR SHIM

- J—FIRST REDUCTION FEED GEAR
- K—BEARING SHIM
- L—BEARING NUT LOCK RING
- M—BEARING LOCK NUT
- N—DRIVE GEAR DOUBLE ROW BEARING
- O—FIRST REDUCTION DRIVE GEAR
- P—DRIVE GEAR SHIM

- Q—DRIVE GEAR SPACER
- R—KEY
- S—SECOND REDUCTION DRIVE PINION
- T—LOCK SPRING
- U—DRIVE PINION BEARING LOCK NUT
- V—DRIVE PINION BEARING
- W—BEARING SHIM
- X—FEED PINION ROLLER BEARING
- Y—SECOND REDUCTION FEED PINION

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Figure 66—Intermediate Gear and Pinion Assembly, Disassembled

b. Disassemble Intermediate Gear Assembly (fig. 66).

(1) Remove bearing cap from bearing retainer flange. Remove cotter pin and nut from second reduction feed pinion shaft.

(2) Remove double-row ball bearing from shaft, and check the number and thickness of shims between bearing and shoulder on shaft.

(3) Remove pinion and shaft from the inside of the second reduction drive pinion. When removing the feed pinion, be careful not to lose any of the 24 rollers that make up the bearing located just back of the pinion teeth.

(4) Remove lock spring and lock nut from first reduction feed gear hub.

(5) Remove bearing retainer flange with bearing. Remove shims from hub, and check the number and thickness of shims for reference when reassembling.

(6) Remove first reduction feed gear and hub from the first reduction drive gear double-row bearing. If hub does not separate from bearing readily, tap gear with a soft-faced hammer. Check number and thickness of shims found in the double-row bearing bore in the hub.

(7) Cut off rivet heads, then drive out rivets and remove gear from hub.

(8) Remove lock spring from first reduction drive gear bearing lock nut, and remove the lock nut and double-row bearing.

(9) Press first reduction drive gear from second reduction drive pinion shaft, using an arbor press.

(10) Remove keys from second reduction drive pinion shaft, then remove shims and spacer.

(11) Remove lock spring from second reduction drive pinion bearing lock nut, and remove the nut. Press bearing off the shaft. Check number and thickness of shims between bearing inner race and shoulder on shaft for reference when reassembling.

86. CLEANING, INSPECTION, AND REPAIR.

a. Cleaning.

(1) BEARINGS. See paragraph 82a (1).

(2) ALL PARTS EXCEPT BEARINGS. See paragraph 82a (2).

b. Inspection and Repair.

MEASUREMENTS. No measurements are given in this subparagraph as complete details are given in paragraph 102.

(2) BEARINGS. See paragraph 82a (2).

(3) PINIONS WITH SHAFTS. Inspect for signs of tooth chipping or cracking, and inspect teeth for wear. Inspect shafts for wear. (See paragraph 102 for limits.) Replace if necessary.

(4) **GEARS.** Inspect for signs of tooth chipping or cracking, and inspect teeth for wear. Replace if necessary.

86. ASSEMBLY AND INSTALLATION.

a. Assembly of Intermediate Gear Assembly (fig. 66).

(1) Install shims on second reduction drive shaft. Install bearing on the shaft with the oil seal side toward the gear. Assemble lock nut and tighten it securely; then install lock spring, making sure tang on spring enters slot in shaft.

(2) Assemble spacer, shims, and key; and press first reduction drive gear onto second reduction drive pinion shaft.

(3) Assemble double-row bearing and lock nut. Tighten lock nut and lock spring, making sure tang on spring enters slot in shaft.

(4) Assemble first reduction feed gear to hub, and rivet gear to hub.

Note. When riveting new or old gear to hub, be sure that rivet heads do not extend more than $\frac{1}{16}$ inch beyond inside flange of gear.

(5) Assemble the same number and thickness of shims which were removed in the double-row bearing bore in the hub. Assemble the first reduction feed gear and hub on the first reduction drive gear double-row bearing.

(6) Assemble the same number and thickness shims which were removed on the first reduction feed gear hub. Install bearing and bearing retainer flange. **CAUTION:** If shims are added between the feed gear hub and double-row bearing, the same thickness of shims must be removed from between the bearing mounted in the bearing retainer flange and the feed gear hub. On the other hand, if shims are removed from between gear hub and double-row bearing, the same thickness must be added between flange bearing and hub. Install lock nut and tighten it securely. Install lock spring, making sure tang on spring enters slot in shaft.

(7) To install second reduction feed pinion, lubricate bearing area just back of pinion with general-purpose grease and assemble the 24 bearing rollers, holding them in place with rubber bands. (See fig. 67.)

(8) Start the shaft with roller bearings into second reduction drive pinion. When bearings are about halfway in place, cut the rubber bands. Then push shaft into place, making sure to line up the splines on the shaft with those in the first reduction feed gear. There should be approximately $\frac{1}{8}$ -inch clearance between the pinions.

b. Installation of Intermediate Gear Assembly (fig. 68).

(1) Install intermediate gear assembly in case and attach intermediate case bearing retainer flange with three cap screws equally spaced.

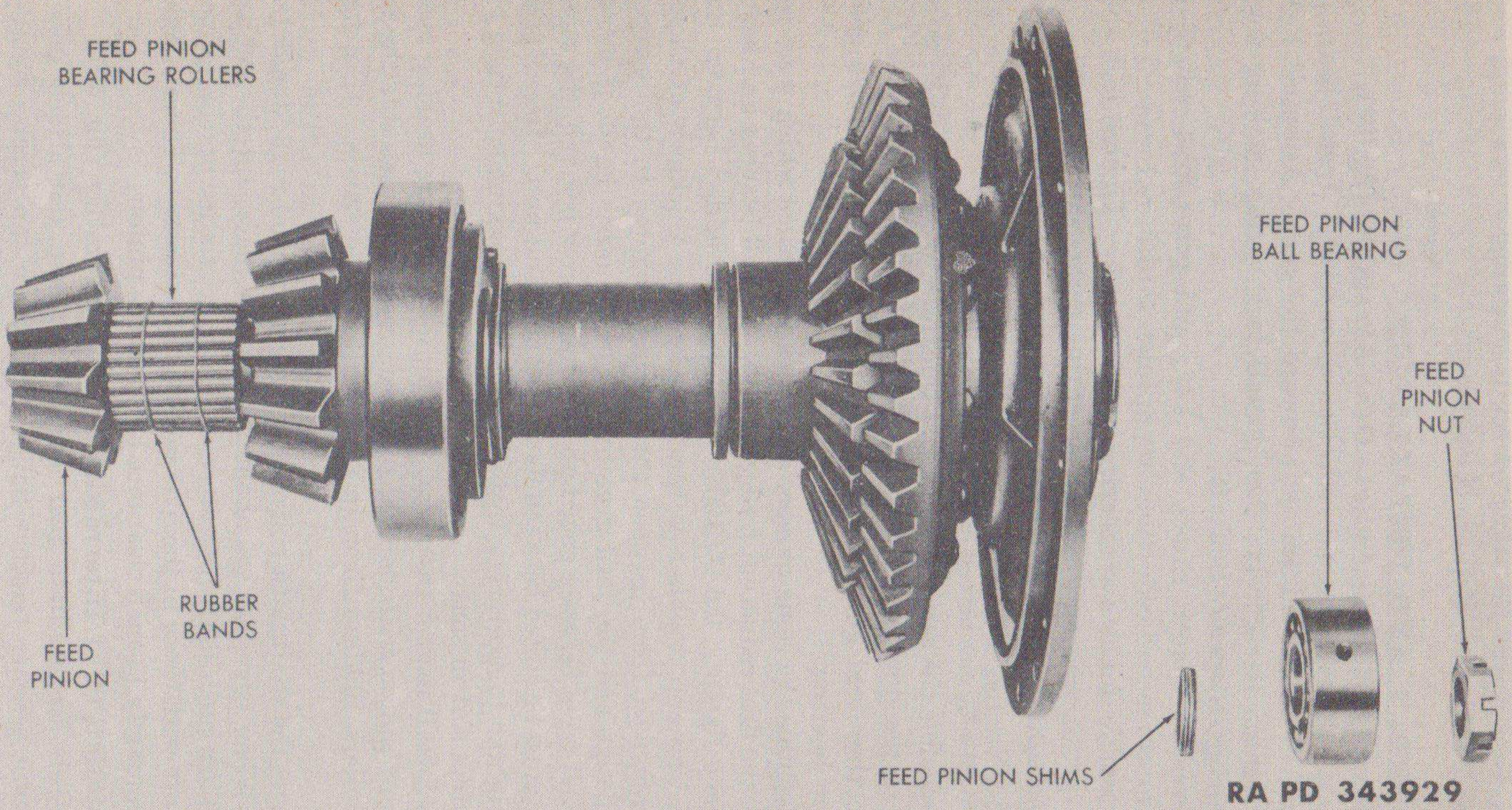


Figure 67—Second Reduction Feed Pinion Installation.

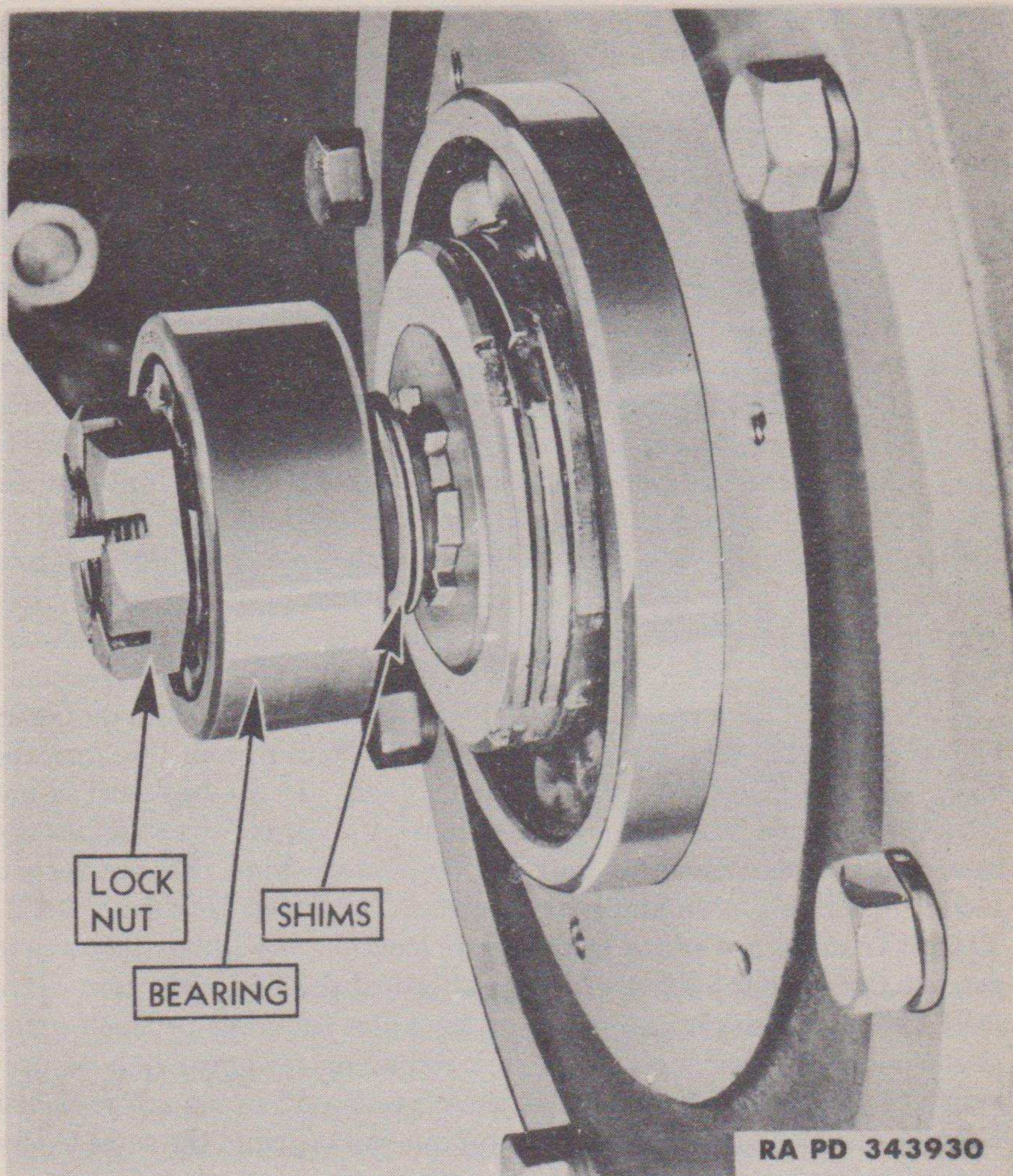


Figure 68—Second Reduction Feed Pinion Shim Adjustment

(2) Lower jack to drop boring head into place. Attach the boring case cover with three cap screws equally spaced.

(3) Install the same number and thickness of shims over end of pinion shaft found when disassembling. Install double-row bearing and nut, tightening the nut securely.

(4) Install bearing cap and attach it with three cap screws equally spaced. Make sure the bearing is firmly seated by tapping on end of second reduction feed pinion.

c. Adjustments.

(1) **SECOND REDUCTION FEED PINION AND FEED IDLER GEAR.** Check backlash between second reduction feed pinion and gear; this backlash should be from 0.010 to 0.015 inch. If the backlash is not within the above limits, it may be adjusted by adding or removing shims between shoulder on pinion shaft and double-row bearing. (See fig. 68.)

(2) **FIRST REDUCTION DRIVE GEAR AND FIRST REDUCTION DRIVE PINION.** Check backlash which should be from 0.010 to 0.015 inch. If the backlash is not within these limits, it will be necessary to again disassemble the drive gear from the second reduction drive pinion shaft and add or remove shims between shoulder on shaft and drive gear hub to secure proper adjustment. **CAUTION:** If shims are removed between drive gear hub and shoulder on shaft, the same thickness of shims must be added between double-row bearing and first reduction feed gear hub. On the other hand, if shims are added, remove the same thickness of shims between feed gear hub and double-row bearing.

(3) **SECOND REDUCTION DRIVE PINION AND AUGER DRIVE GEAR.** Check backlash. The back edges of gears should be in line and the backlash should be from 0.010 to 0.015 inch. If the backlash is not within the above limits, it will be necessary to again disassemble the intermediate gear assembly and add or remove shims between second reduction drive pinion and bearing to secure proper backlash. **CAUTION:** If shims are added at the above location, it will be necessary to remove the same thickness of shims ahead of the first reduction drive gear hub, and also remove the same thickness of shims between drive gear double-row bearing and the first reduction feed gear hub, to prevent upsetting the adjustment of these gears. If shims are removed between the second reduction drive pinion and bearing, the same thickness of shims must be added at the two locations mentioned above.

87. REPLACEMENT OF FIRST REDUCTION DRIVE PINION WITHOUT REMOVING CLUTCH CASE ASSEMBLY.

a. Removal (fig. 69).

(1) Remove intermediate gear assembly from intermediate gear case according to instructions given in paragraph 84a.

(2) Reach in through opening in intermediate case and remove cotter pin and nut from clutch drive shaft.

(3) Force pinion off shaft with a pinch bar or other similar tool.

b. Installation. Install pinion and shaft nut. Tighten nut securely and install cotter pin. **CAUTION:** Do not back up on nut to line up cotter pin holes (pinion must be tight on shaft taper).

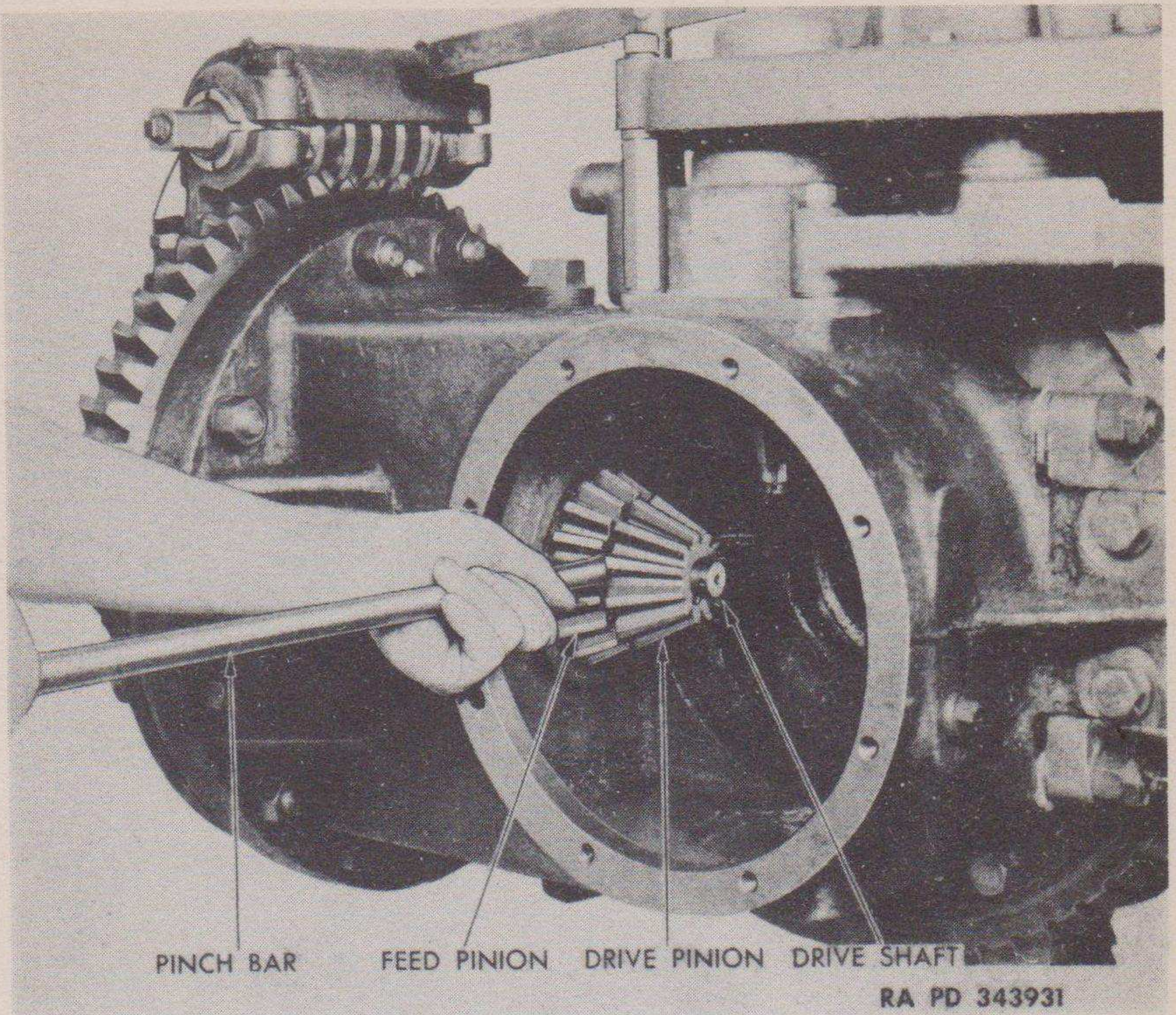


Figure 69—Removing First Reduction Drive Pinion

c. Adjustment.

(1) Install intermediate gear assembly and check backlash between first reduction drive pinion and first reduction drive gear. The backlash should be from 0.010 to 0.015 inch.

(2) To adjust the backlash, remove the clutch case cap from rear of the clutch case. Remove cotter pin and nut from the drive clutch shaft, then raise the tang of the locking washer and remove the nut from the clutch drive sleeve. Adjust the backlash as follows:

(3) If the backlash is too great, add shims between the shoulder on the drive shaft and the inside of the clutch drive sleeve nut. (See fig. 70.)

(4) If the backlash is too tight and there are shims on the drive shaft, remove the number of shims necessary to secure proper backlash.

(5) If the backlash is too tight and the drive shaft extends beyond the clutch drive sleeve as shown in figure 71, install the necessary shims between the clutch drive sleeve bearing locking washer and nut to secure proper backlash.

(6) Replace shaft nut, cotter pin, and clutch case cap.

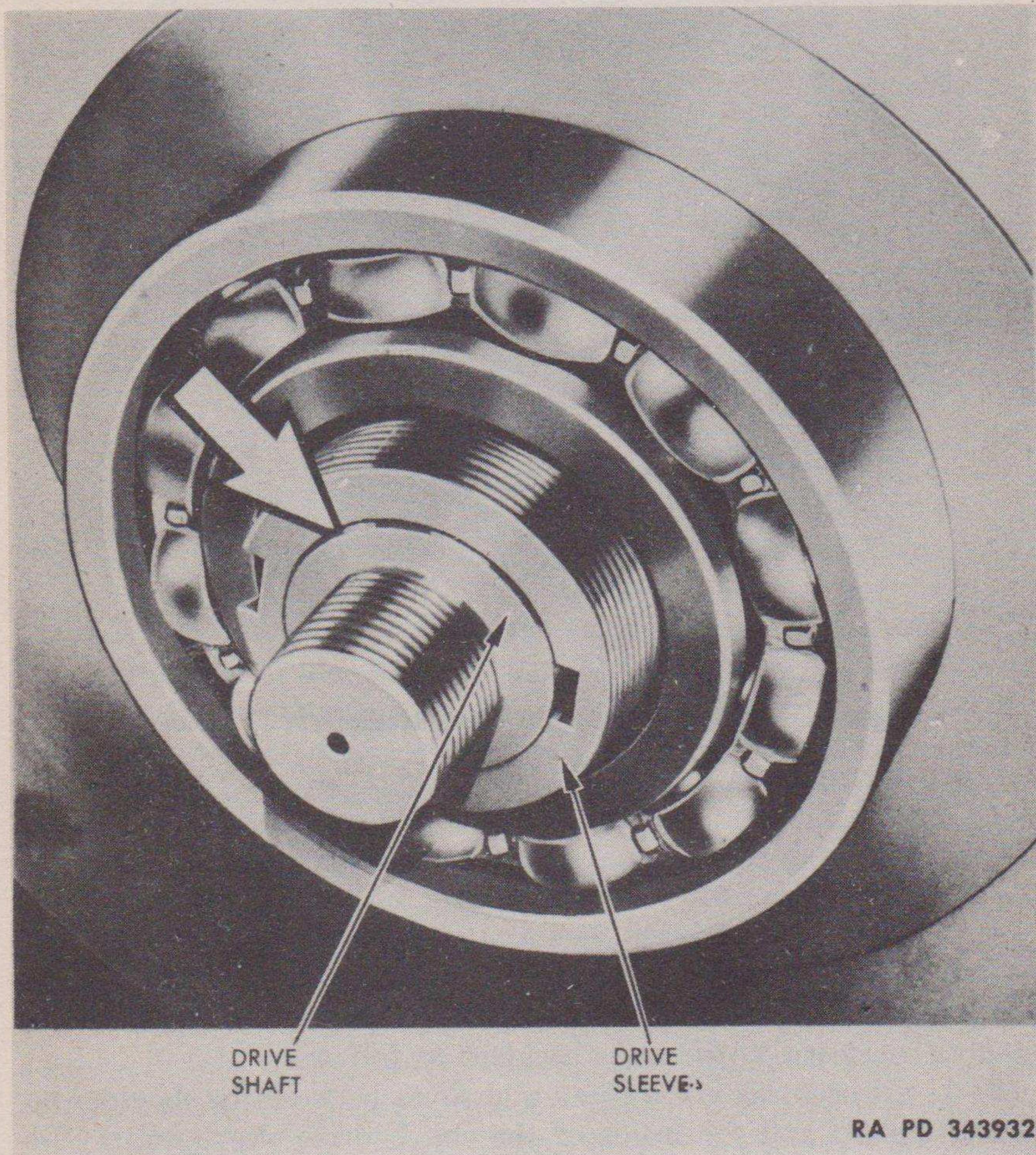


Figure 70—Location for First Reduction Drive Pinion Adjusting Shims

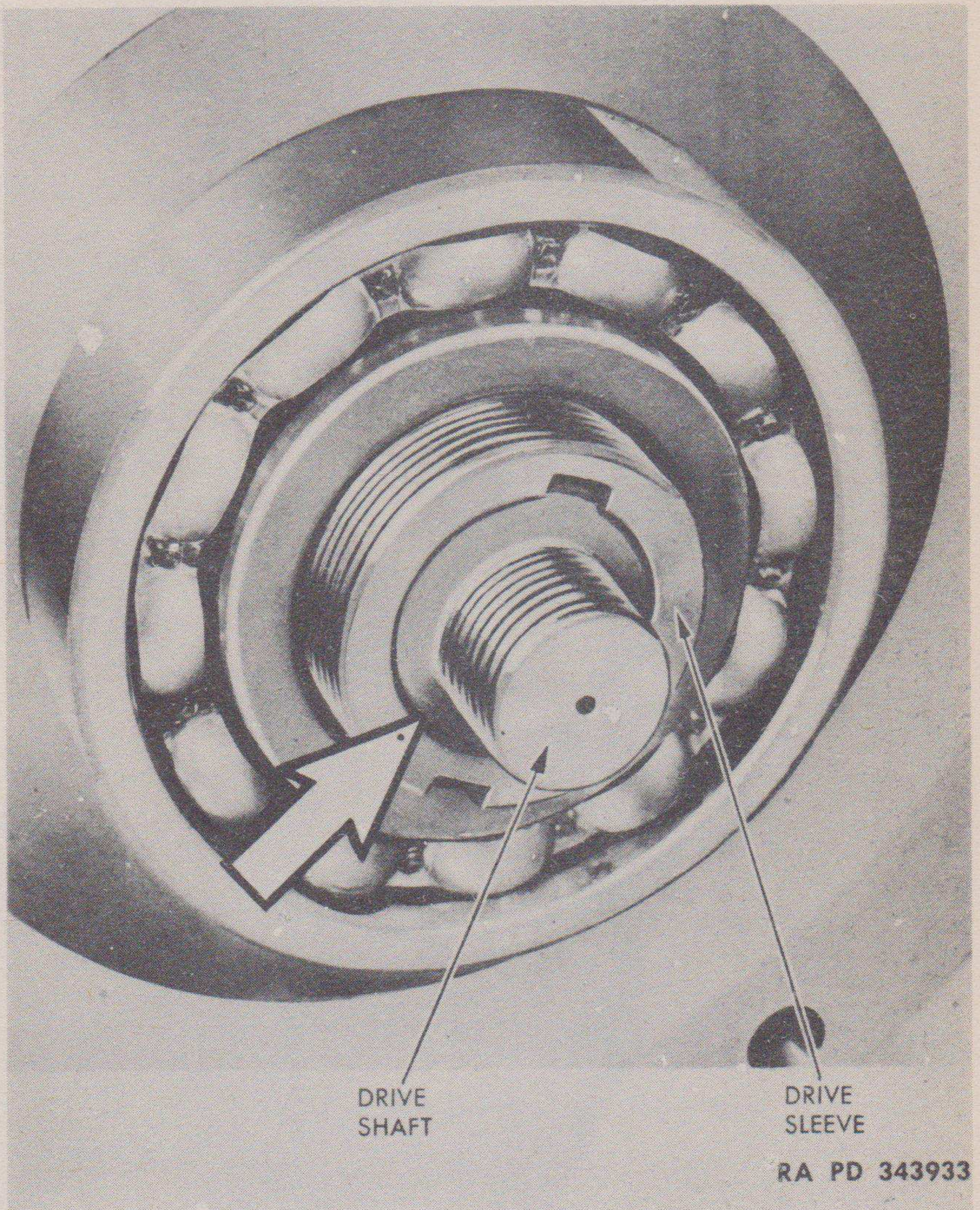


Figure 71—Extension of Clutch Drive Shaft Beyond Clutch Drive Sleeve

Section IV

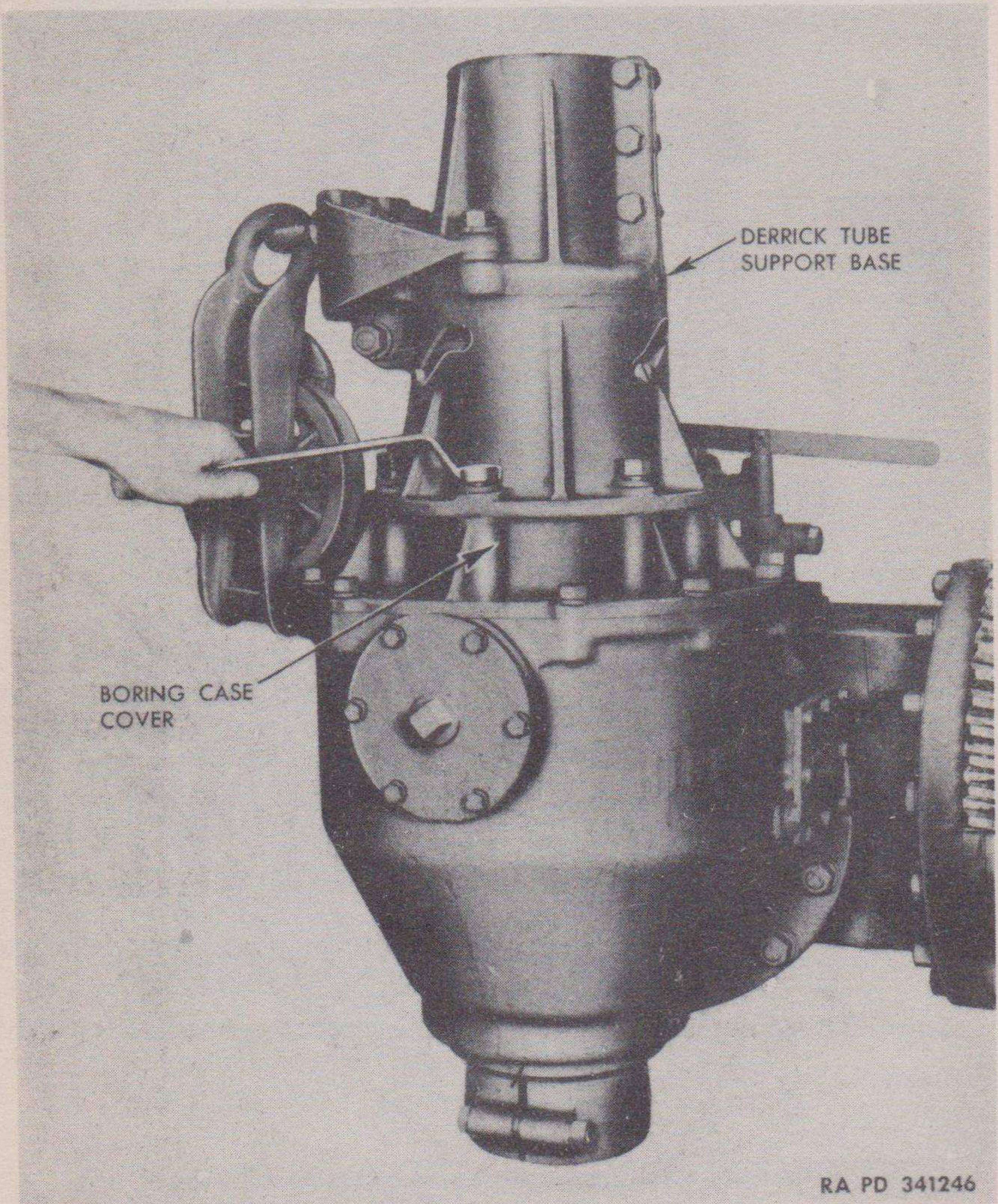
BORING CASE

	Paragraph
Disassembly.....	88
Cleaning, inspection, and repair.....	89
Assembly and installation.....	90

88. DISASSEMBLY.

a. Removal of Boring Head Assembly.

(1) If necessary to remove derrick tube, rack shaft guide, and rack shaft, see C 1 (when published), TM 9-805.



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Figure 72—Removing Derrick Tube Support Base

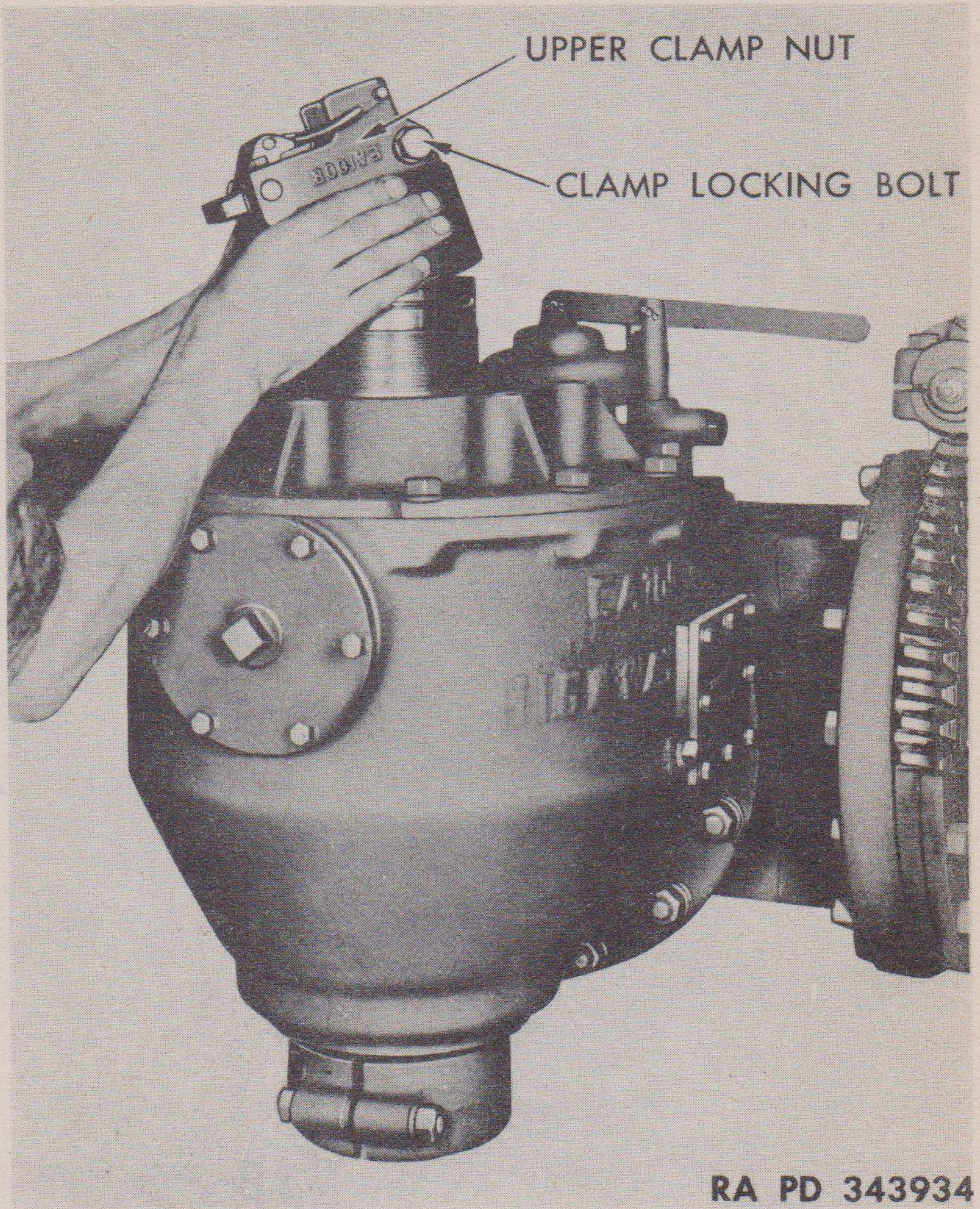


Figure 73—Removing Upper Clamp Nut

(2) **DERRICK TUBE SUPPORT BASE** (fig. 72). Remove cap screws and washers securing derrick tube support base to boring head cover and remove base.

(3) **UPPER CLAMP NUT** (fig. 73). Loosen nut on clamp locking bolt, and unscrew upper clamp nut from end of boring head.

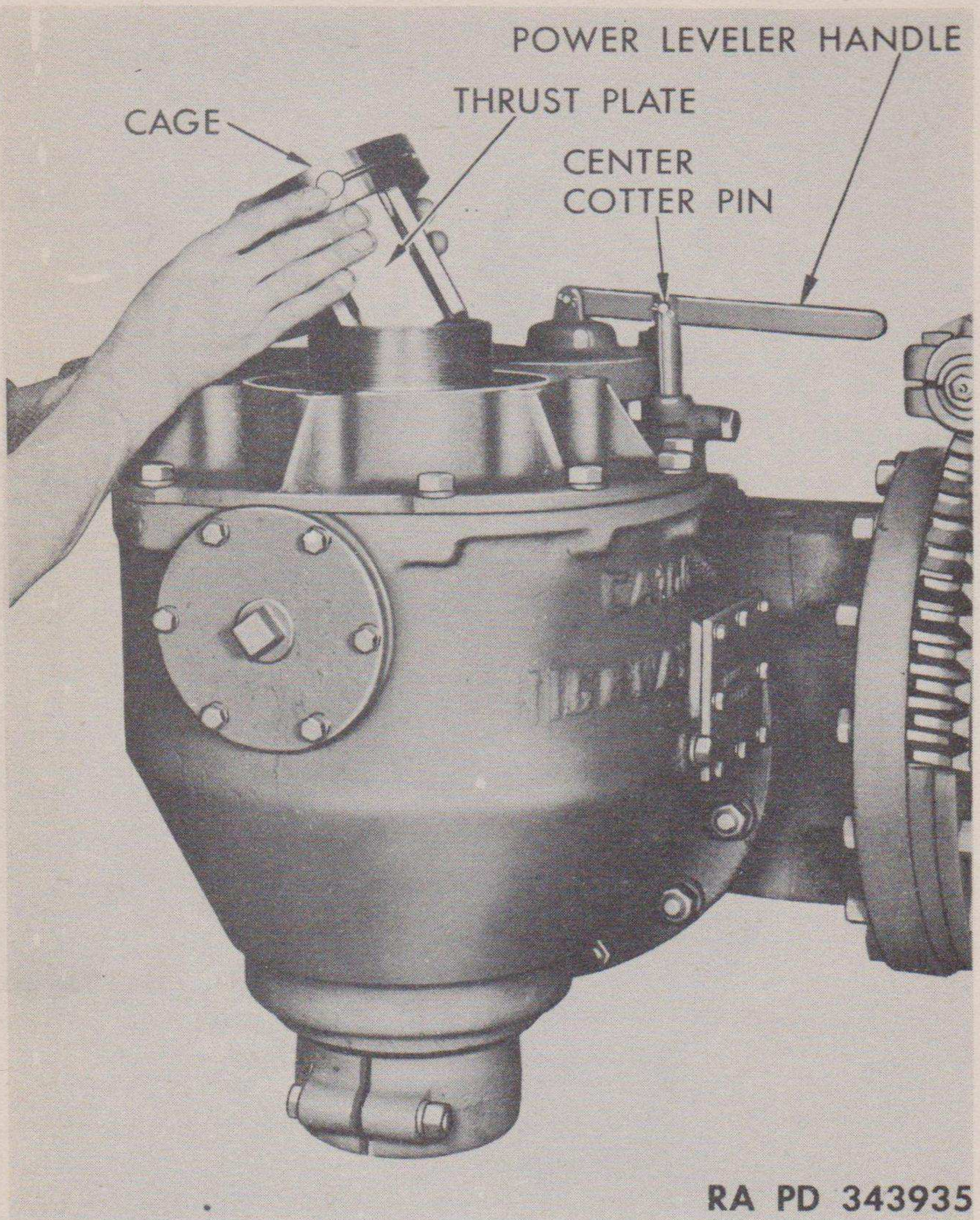


Figure 74—Removing Upper Thrust Plates and Cage

(4) UPPER THRUST PLATES AND CAGE (fig. 74). Lift cage and plates from end of boring head.

Note. Plates may have dropped through boring head when rack shaft was removed.

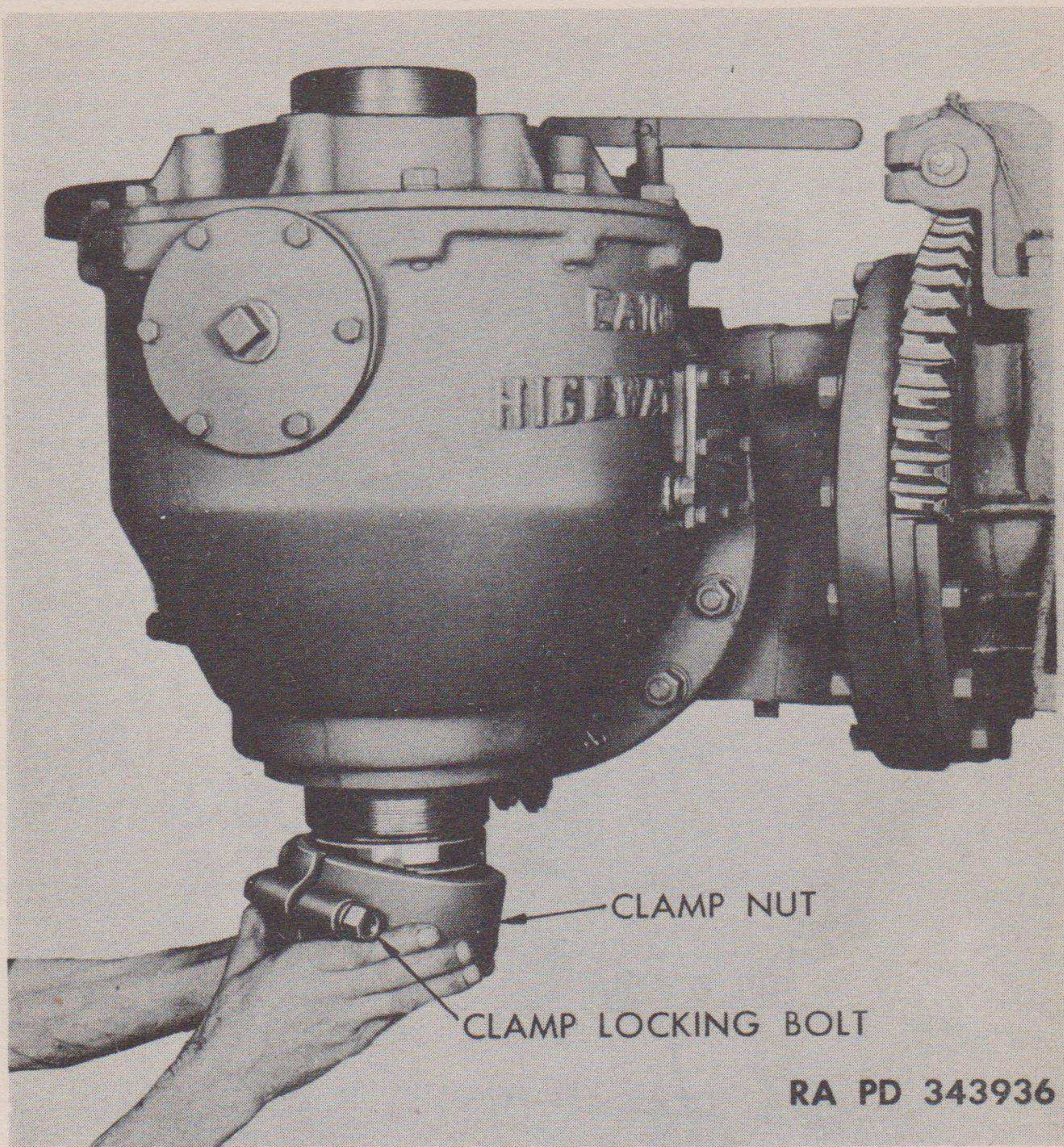


Figure 75—Removing lower clamp nut

(5) **LOWER CLAMP NUT** (fig. 75). Loosen nut on lower clamp locking bolt, and unscrew lower clamp nut from end of boring head.

(6) **LOWER THRUST PLATES AND CAGE** (fig. 76). Drop cage and plates from end of boring head.

Note. Plates may have dropped out of boring head when rack shaft was removed.

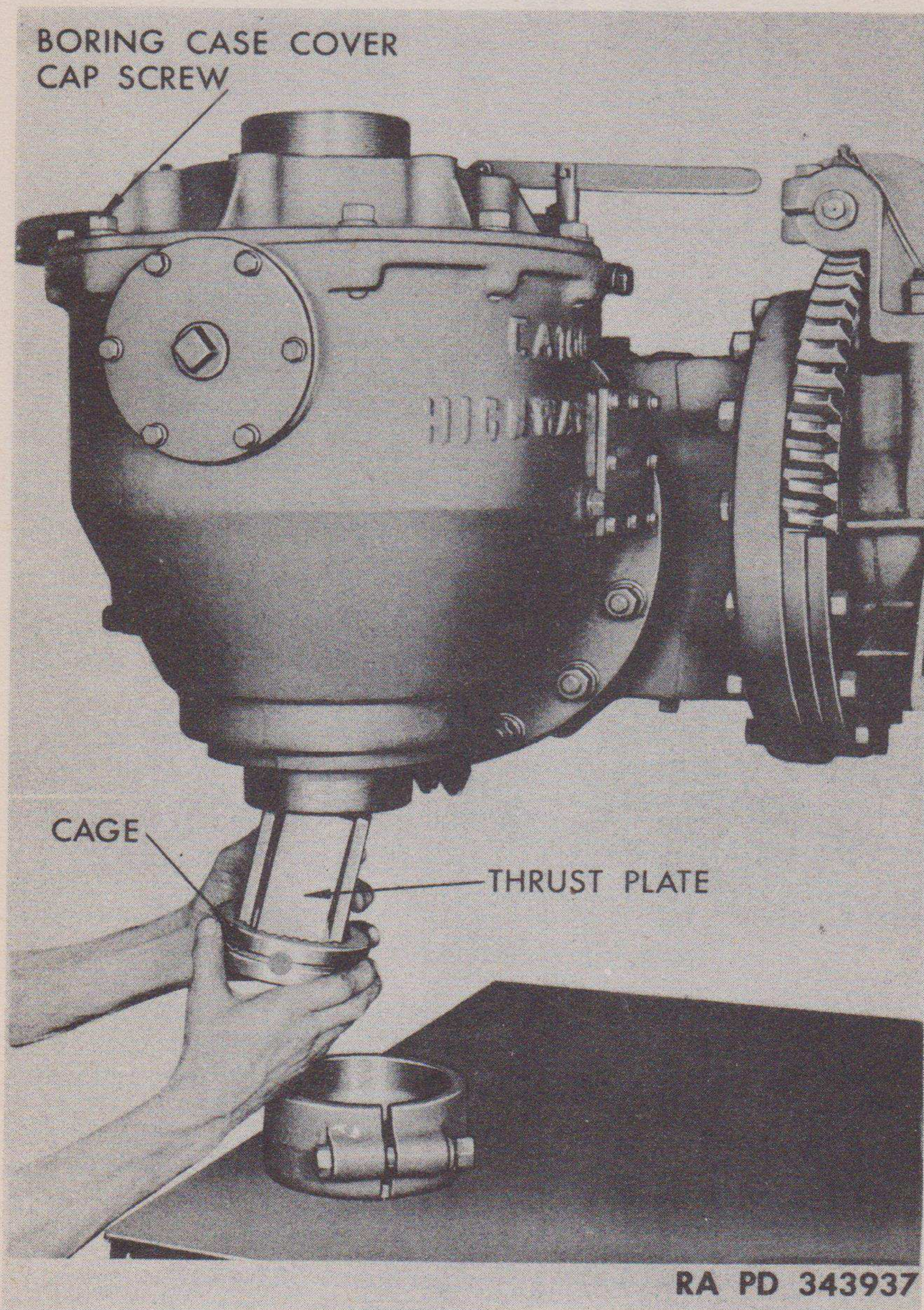


Figure 76—Removing Lower Thrust Plates and Cage

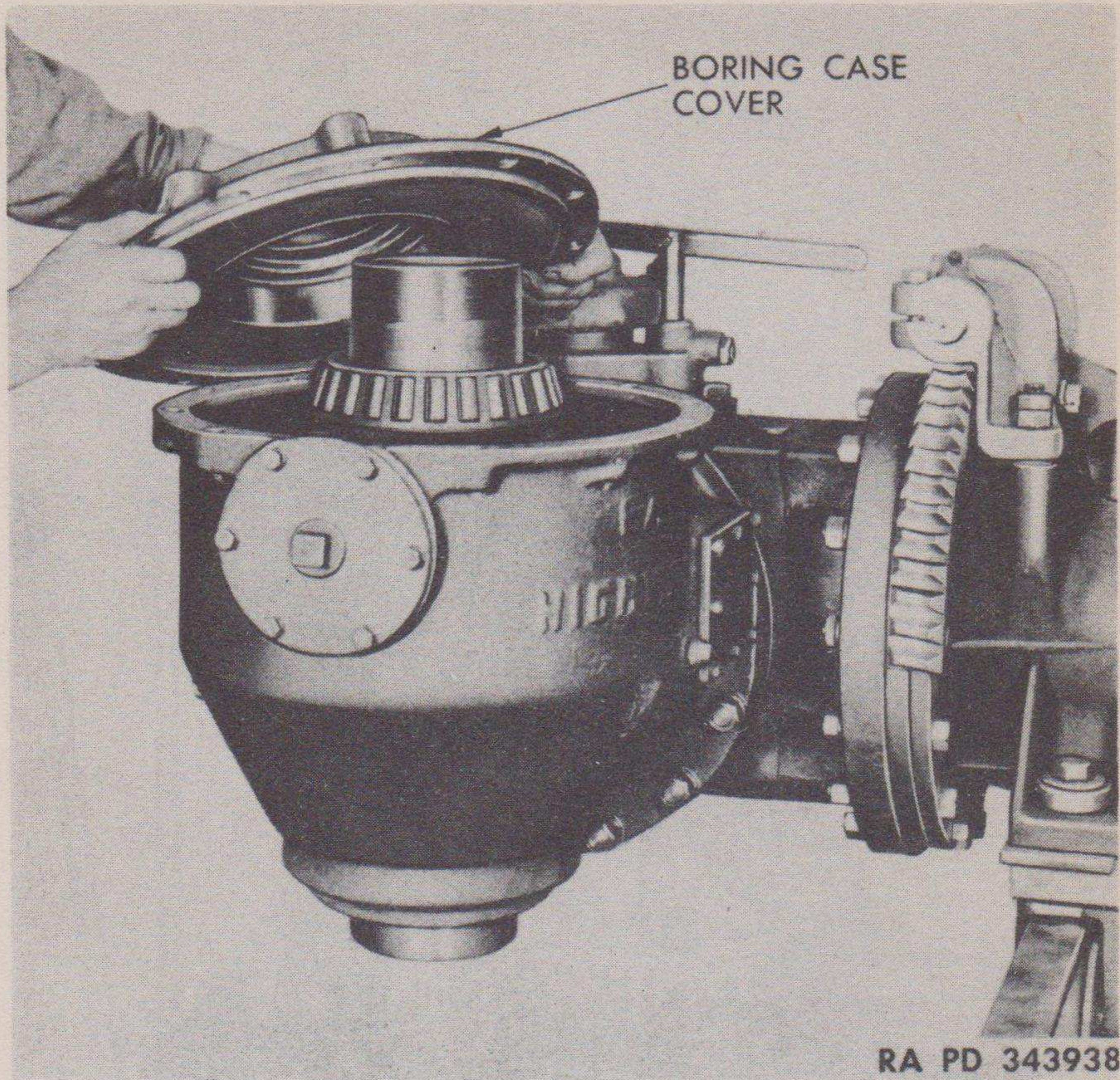


Figure 77—Removing Boring Case Cover

(7) **BORING CASE COVER** (fig. 77). Remove boring case cover cap screws (fig. 76), and lift cover off boring case.

(8) **BORING HEAD ASSEMBLY** (fig. 78). Install upper clamp nut on boring head assembly to serve as an attaching point in lifting boring head assembly out of case.

Note. Before lifting boring head from case, place container under opening at bottom of boring case to receive the lubricant when boring head is lifted out of case.

Lift boring head out of case.

(9) **OIL SEAL.** Remove oil seal from bottom of boring case, as it is usually damaged by the threads on the boring head when removed from case.

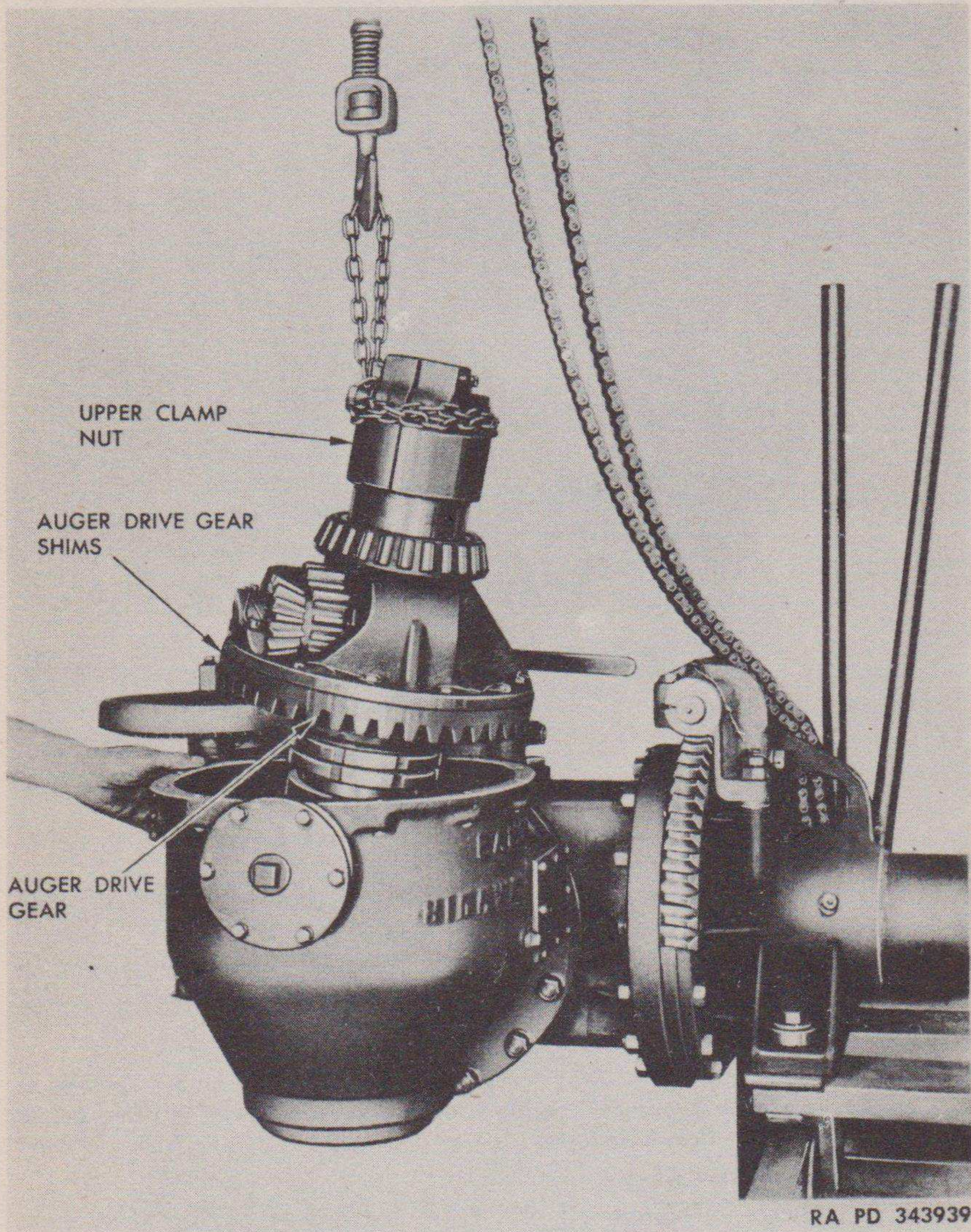
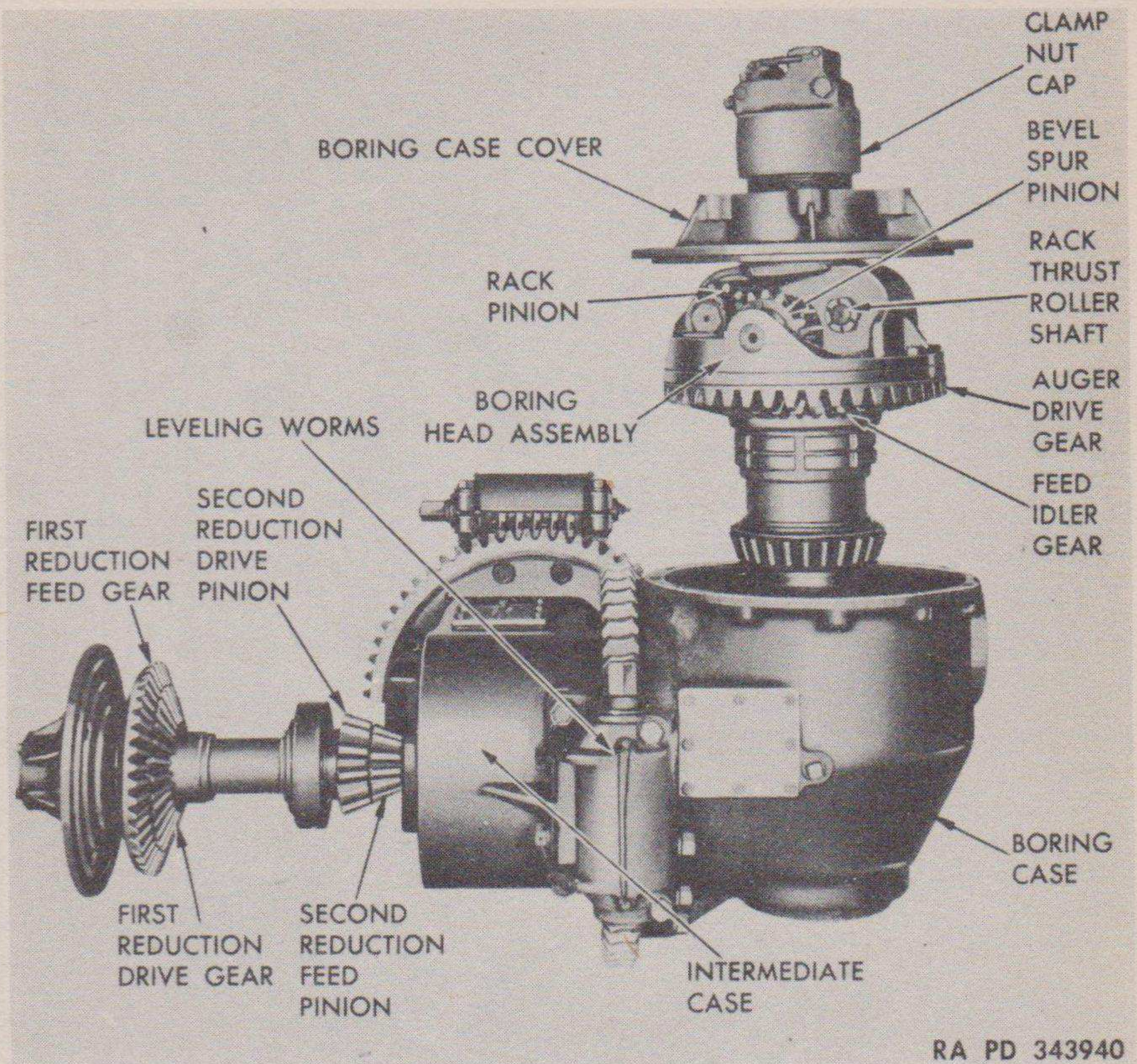


Figure 78—Removing Boring Head Assembly



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Figure 79—Boring Case and Intermediate Case, Disassembled

b. Disassembly of Boring Head Assembly (fig. 79).

(1) When disassembling boring head assembly, it is good practice to bolt the boring head securely to a bench with a through bolt passing through the boring head to hold it rigidly in place. Remove nut from thrust roller shaft (fig. 79), and remove bearing cap. Remove thrust roller and its roller bearings through the opening created by the removal of the cap. Drive the shaft out with a brass drift.

(2) After rack thrust roller has been removed as described in (1) above, remove cone point lock screw and drive shaft out through thrust roller bearing cap opening. Lift out bevel spur pinion (fig. 79) with roller bearings.

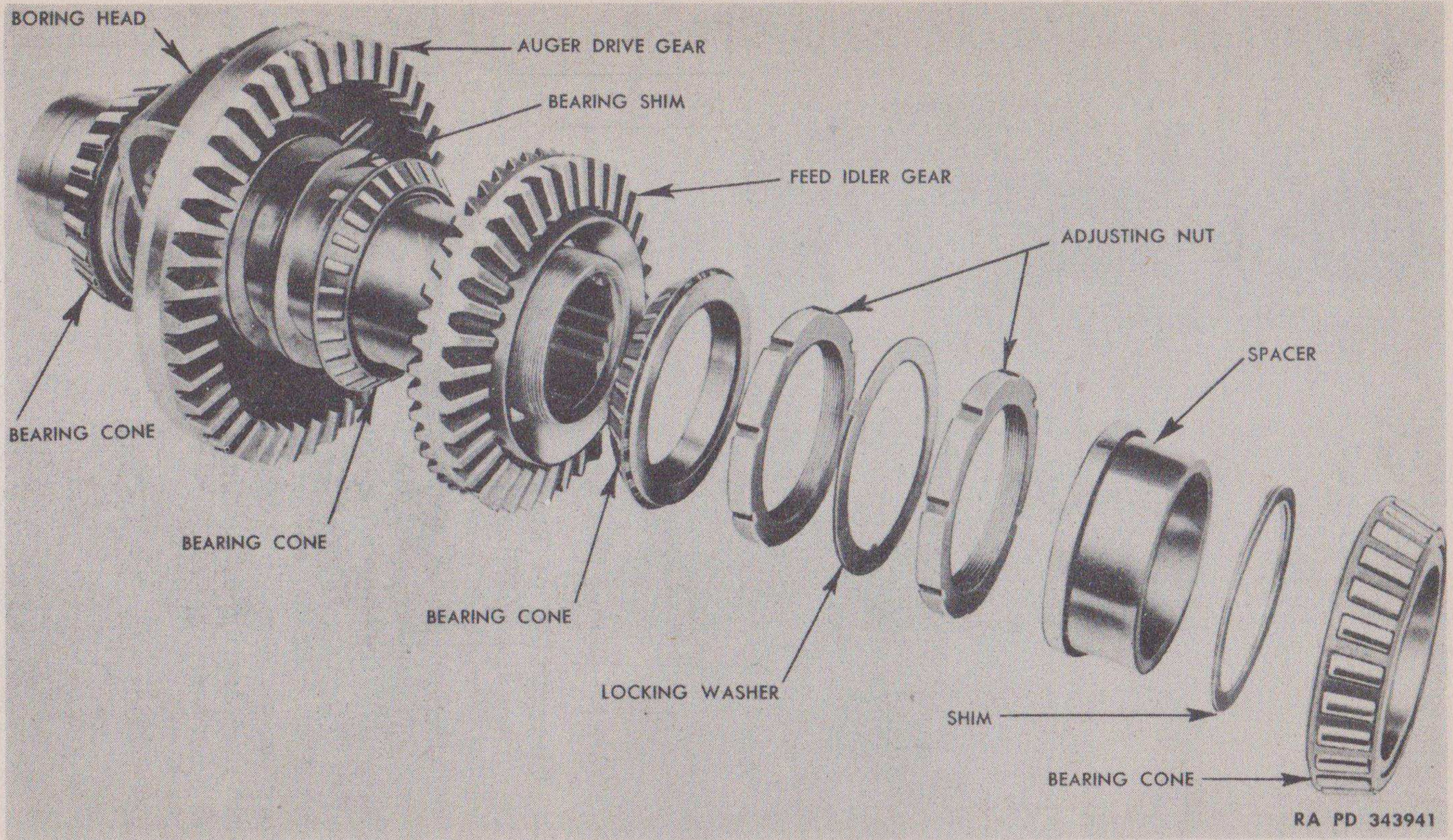


Figure 80—Boring Head Assembly, Disassembled

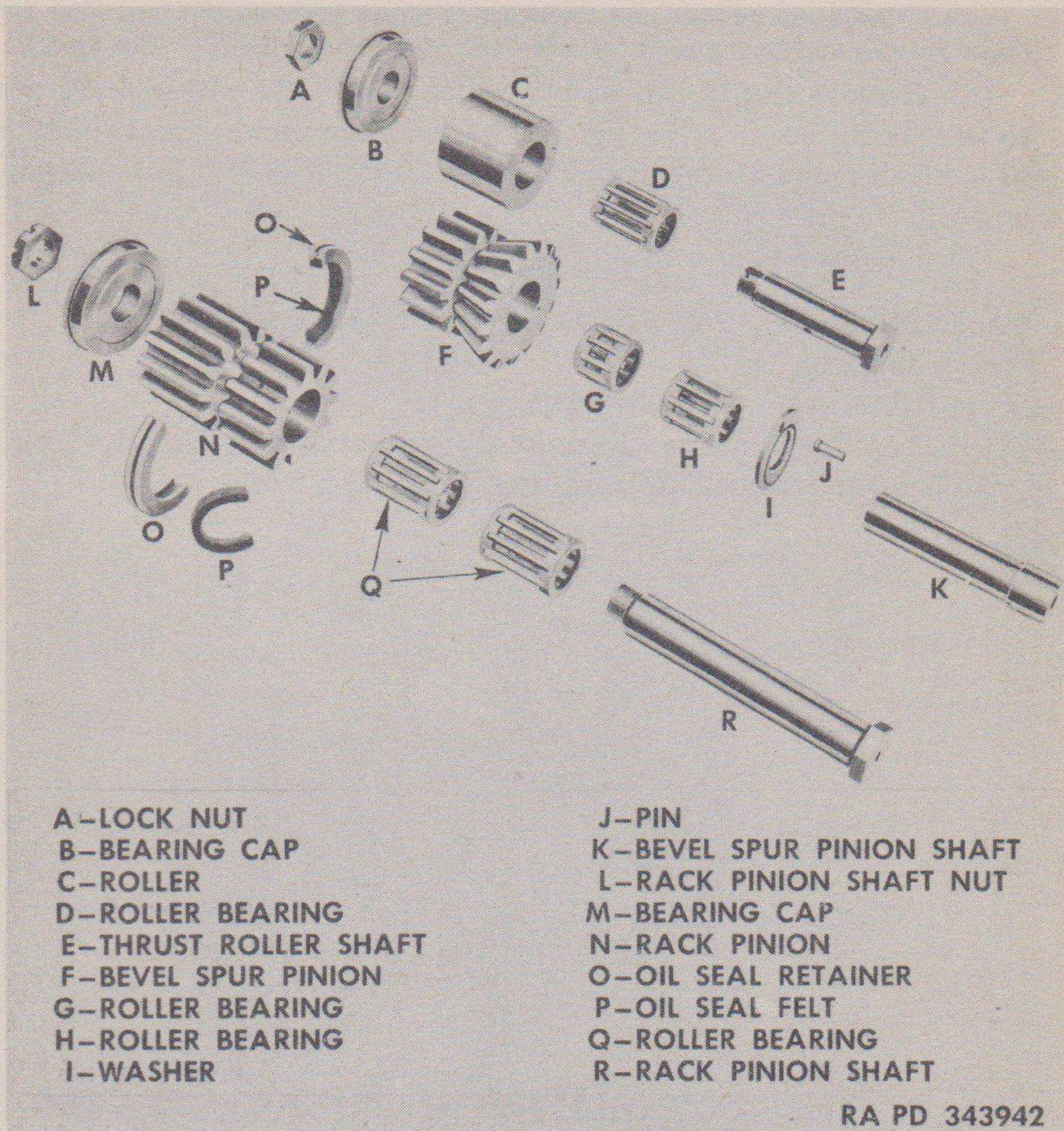


Figure 81—Rack Pinion Assemblies

(3) To remove rack pinion loosen felt retainer set screw. Remove rack pinion shaft nut. Turn a $\frac{3}{8}$ -24 thread screw into tapped hole in bearing cap and remove the bearing cap. Using a drift or bar, drive the pinion from the end opposite the bearing cap until rack pinion felt retainer (fig. 81) is clear of the housing, and remove retainer. Remove pinion shaft, rack pinion, and bearings.

(4) Remove lower bearing, shims, and bearing spacer (fig. 80) from boring head. Check the number and thickness of shims for reference when reassembling.

(5) Raise lips of feed idler gear adjusting nut locking washer. (See fig. 80.) Using a large spanner wrench, remove the adjusting nuts. Remove the feed idler gear and its bearings from the boring head.

AXLES, PROPELLER SHAFTS, AND WHEELS

Note. Check the number and thickness of shims between the feed idler gear upper bearing and boring head for reference when reassembling. (See fig. 80.)

(6) Remove the 15 cap screws which attach the auger drive gear to the boring head. (See fig. 79.) Check the number and thickness of shims between the gear and boring head. (See fig. 78.) Remove auger drive gear.

(7) Remove upper bearing from boring head.

89. CLEANING, INSPECTION, AND REPAIR.

a. Cleaning.

(1) BEARINGS. See paragraph 82a(1).

(2) ALL PARTS EXCEPT BEARINGS. See paragraph 82a(2).

b. Inspection and Repair. See paragraph 82b.

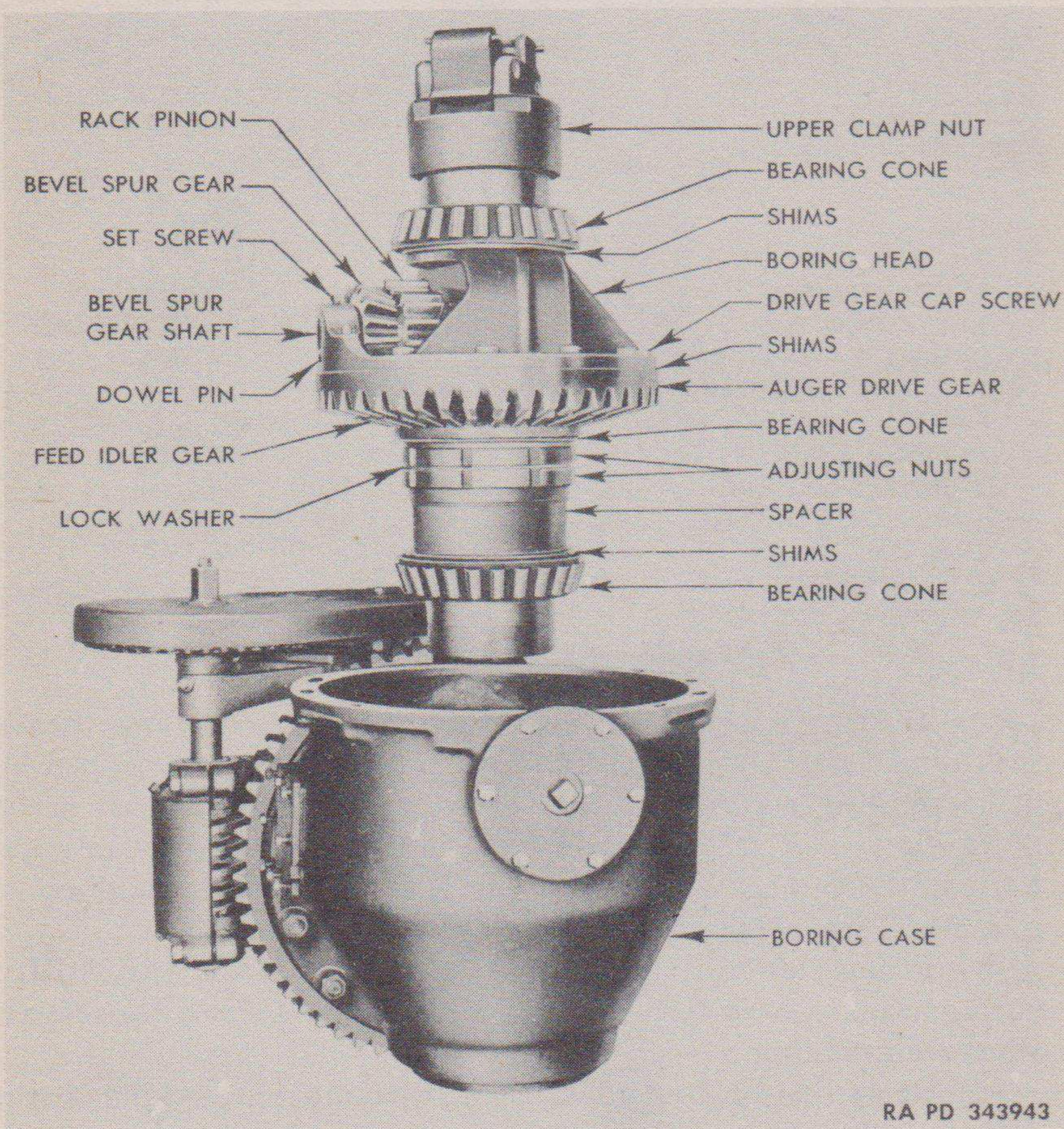


Figure 82—Boring Head Assembly Removed From Case

90. ASSEMBLY AND INSTALLATION.**a. Assembly of Boring Head Assembly (fig. 80).**

(1) Assemble the same number and thickness of shims ahead of the upper feed idler gear bearing cone. (See fig. 80.) Install upper bearing cone, feed idler gear, and lower bearing cone, using one of the adjusting nuts to hold bearing cones and gear in place. Turn the nut snugly against the lower bearing cone, but not tightly enough to injure it. Before continuing with the reassembly, check the mesh and backlash between the teeth on the feed idler gear, and the feed bevel spur pinion. There should be just a slight amount of backlash or play between the teeth, and the feed idler gear should be rotated to be sure that the backlash is equal at all points. To adjust the feed idler gear for backlash with pinion, add or remove feed idler gear bearing shims as necessary. When satisfactory adjustment is accomplished, replace feed idler gear bearing adjusting nut locking washer, and lower feed idler gear adjusting nut. Tighten nut securely, and bend over tangs of locking washer to lock the bearing nuts. Install spacer, lower bearing shim, and lower bearing cone; replace complete assembly in the boring case.

(2) Check the mesh and backlash between the feed idler gear and the second reduction feed pinion. (See fig. 79.) Vertical adjustment of the feed idler gear relative to the second reduction feed pinion is accomplished by adding or removing shims between the lower bearing cone and spacer. This clearance should be between 0.010 and 0.015 inch.

(3) To install auger drive gear, remove boring head assembly from boring case. Assemble auger drive gear to the boring head with three cap screws equally spaced, using the same number and thickness of shims found when disassembling.

(4) Place boring head assembly back in case, and check the backlash between the auger drive gear and second reduction drive pinion. The back edge of both gears should be flush, and the backlash should be between 0.010 and 0.015 inch. If necessary, the auger drive gear can be adjusted by removing or adding auger drive gear shims. (See fig. 78.) **CAUTION:** If the adjustment of the feed idler gear is disturbed when adjusting the auger drive gear, it will be necessary to also add or remove shims between the lower bearing and spacer so that both gears will be in proper adjustment with their respective pinions.

(5) When proper mesh has been obtained, remove assembly from case and install the balance of the gear attaching screws. Tighten cap screws securely and lock them with tie wire.

(6) Install shims and upper bearing cone in boring head. (See fig. 82.) Reinstall boring head in case, and assemble boring case cover (fig. 77) with three cap screws equally spaced to determine the adjustment of upper boring head bearing cone. There should be no end play of the boring head assembly in the boring case. However, do not adjust so snugly as to cause injury to the bearing cones. If necessary to make adjustments, add or remove upper bearing shims (fig. 81) to eliminate end play. Remove boring head from case for further subassembly.

(7) Assemble rack pinion shaft on boring head, and install rack pinion bearings and rack pinion in position to assemble felt retainers, then drive rack pinion into its operating position. Install bearing cap on end of rack pinion shaft; assemble rack pinion shaft nut and secure with cotter pin. Tighten felt retainer set screw.

(8) Assemble bevel spur pinion, bearings, washer, and pin in position (fig. 81) and through thrust roller bearing cap opening drive shaft into position, securing bevel spur pinion. Assemble cone point lock screw to secure shaft.

(9) Assemble thrust roller and bearing into position (fig. 80) through bearing cap opening, and drive thrust roller shaft through thrust roller bearing. Assemble bearing cap and nut, and secure with cotter pin.

(10) In installing new oil seals either in the boring case cover or in the bottom of the boring case, soak the seal in light engine oil for initial lubrication of the seal. Wrap a piece of shim stock around the threads on the boring head as shown in figure 83 to prevent damaging seal. Assemble seal over shim stock with the free end of the leather toward inside of case, then drive seal into place using a block of wood and a hammer. Then remove shim stock.

b. Assemble Boring Head in Case.

(1) **BORING HEAD ASSEMBLY.** Install upper clamp nut on boring head assembly to serve as an attaching point in lifting boring head assembly into boring case. (See fig. 78.) Lower boring head into case, and remove upper clamp nut.

(2) **BORING CASE COVER.** Install boring case cover (fig. 77) and secure with cap screws.

(3) **UPPER OIL SEAL.** Install oil seal in upper end of boring case as outlined in a (10) above.

(4) **LOWER OIL SEAL.** Install oil seal in lower end of boring case as outlined in a (10) above.

(5) **LOWER THRUST PLATES AND CAGE.** Install lower thrust plates and cage. (See fig. 76.)



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Figure 83—Installing Boring Head Oil Seal

(6) **LOWER CLAMP NUT.** Assemble lower clamp nut on end of boring head, and tighten nut on clamp locking bolt. (See fig. 75.)

(7) **UPPER THRUST PLATES AND CAGE.** Insert plates and cage in upper end of boring head. (See fig. 74.)

(8) **UPPER CLAMP NUT.** Assemble upper clamp nut on boring head, and tighten nut on clamp locking bolt. (See fig. 73.)

(9) **DERRICK TUBE SUPPORT BASE** (fig. 72). Install derrick tube support base, and secure with lock washers and cap screws.

Section V

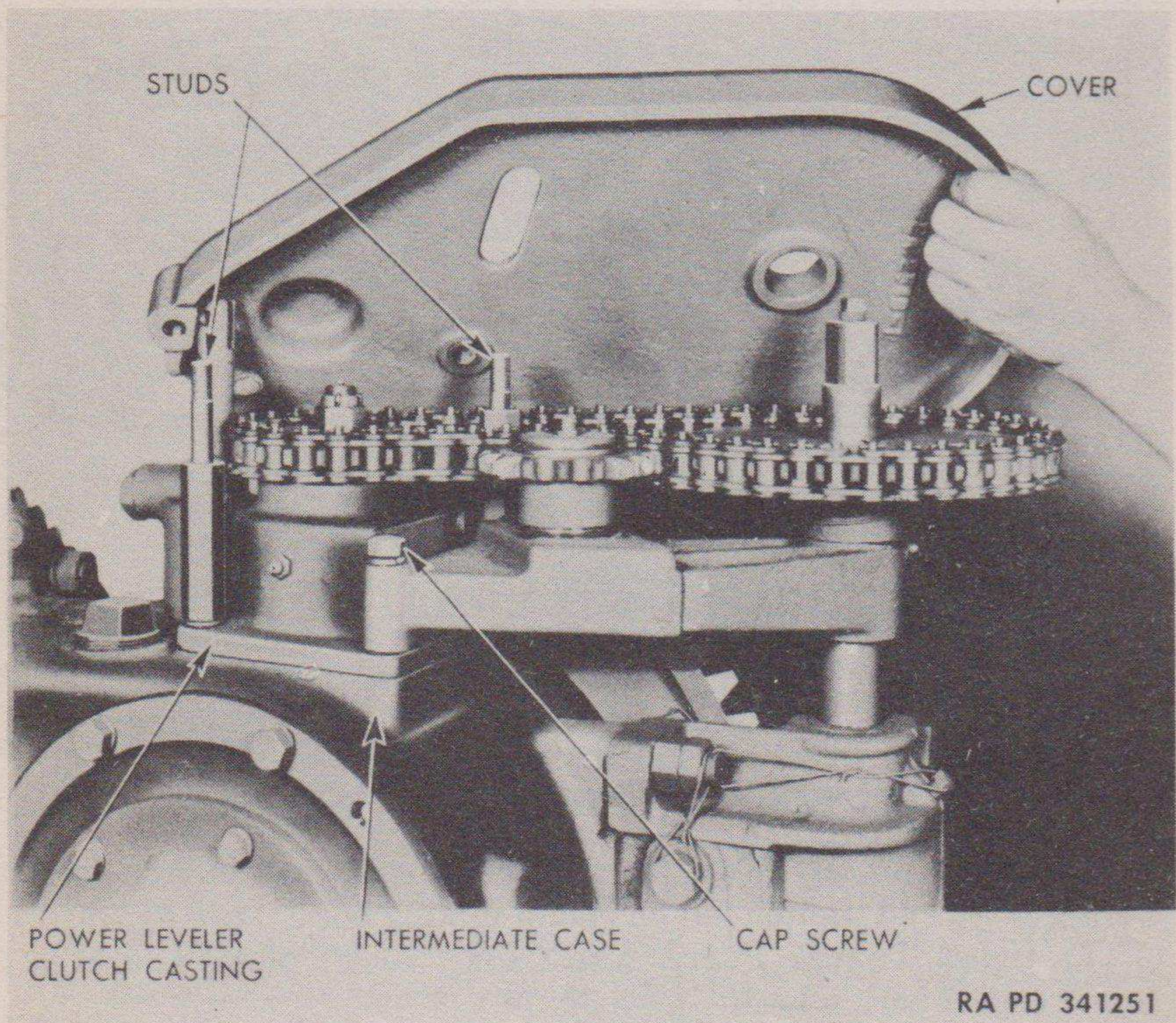
POWER LEVELING MECHANISM

	Paragraph
Removal -----	91
Disassembly of power leveler clutch assembly -----	92
Cleaning, inspection, and repair -----	93
Assembly of power leveler clutch assembly -----	94
Installation -----	95
Leveling worm adjustments -----	96

91. REMOVAL.

a. **Power Leveler Shift Lever.** Remove cotter pins from lever pins, and remove pins and shift lever. (See fig. 58.)

b. **Power Leveler Cover.** Remove nuts from two studs holding cover in place, and lift off cover. (See fig. 84.)



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Figure 84—Removing Power Leveler Cover

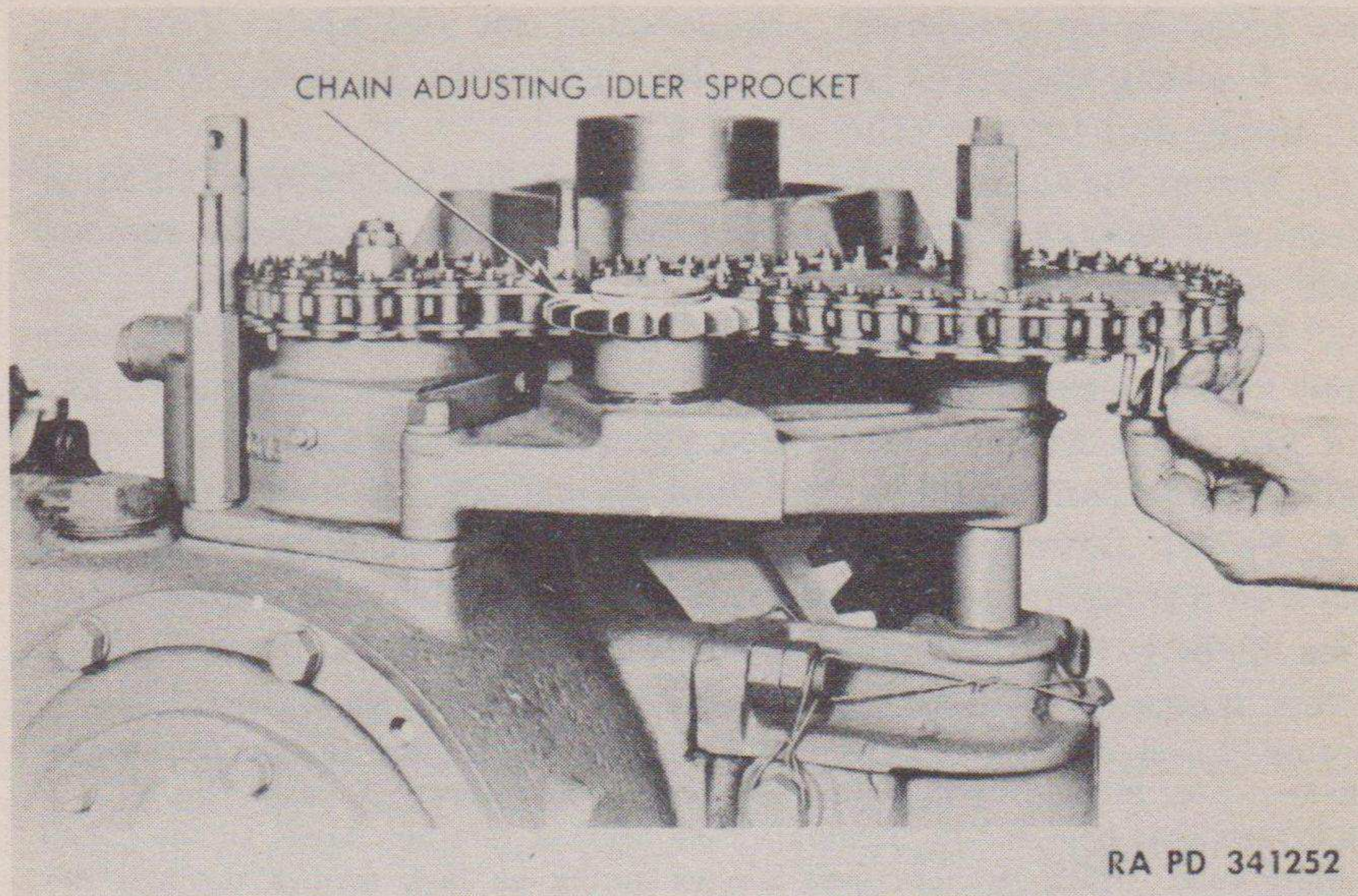


Figure 85—Removing Power Leveler Chain

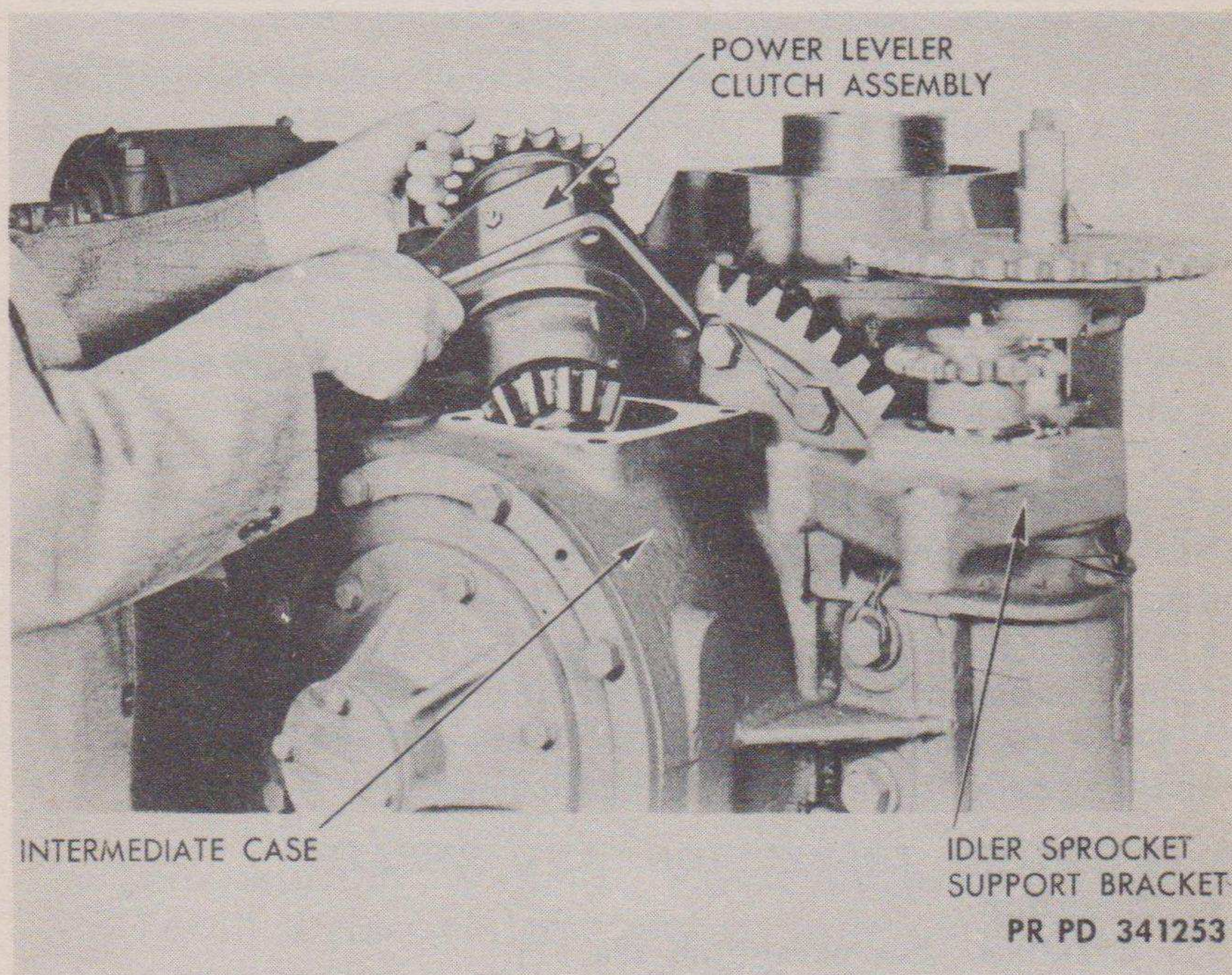


Figure 86—Removing Power Leveler Clutch Assembly

c. **Idler Sprocket Shaft.** Remove the nut and washer from the idler sprocket shaft and remove the shaft with bushing, sprocket, and upper and lower washers.

d. **Power Leveler Chain** (fig. 85). Loosen chain adjusting idler sprocket. Remove cotter pins from any link on chain, and remove link. Remove chain.

e. **Idler Sprocket Bracket** (fig. 85). Remove the stud and cap screw which secures idler sprocket bracket. Remove large sprocket and key from worm shaft. (See fig. 87.) Remove idler sprocket and bracket as an assembly.

f. **Power Leveler Clutch Assembly.** Remove other cap screw and a stud securing power leveler clutch assembly to intermediate case. (See fig. 84.) Lift assembly out of intermediate case.

Note. If difficulty is encountered in removing the power leveler clutch assembly, because of lack of clearance between the power leveler pinion and the first reduction feed gear in the intermediate case, proceed as follows: Remove the ½-inch cap screws that hold the intermediate case bearing retainer flange to the intermediate case. With two of these screws acting as jack screws through the tapped holes in the retainer flange, the intermediate gear assembly can be withdrawn the required distance of ¼ inch to allow the easy removal of the power leveler clutch assembly.

92. DISASSEMBLY OF POWER LEVELER CLUTCH ASSEMBLY (fig. 88).

a. Loosen the detent retainer nut and then remove the retainer, detent spring, and detent. Unscrew the shifter shaft from shifter fork. Remove the housing cover plate retaining screws, and remove the cover plate.

b. Remove cotter pins from castle nuts on both ends of the drive shaft. Remove the clutch sprocket retainer washer and sprocket.

c. Press the drive shaft pinion off the shaft, and remove the pinion key and pinion shims.

d. Press the drive shaft up through the ball bearing. As the drive shaft passes through the sliding clutch, the drive shaft collar will be forced off. Through the cover plate opening remove the sliding clutch, shifter fork, and collar from the housing.

e. Remove the cotter pin which locks the bearing retainer in the housing. Remove the retainer by unscrewing it from the housing.

f. Drive the ball bearing out of the lower end of the housing and the bushing out of the upper end of the housing.

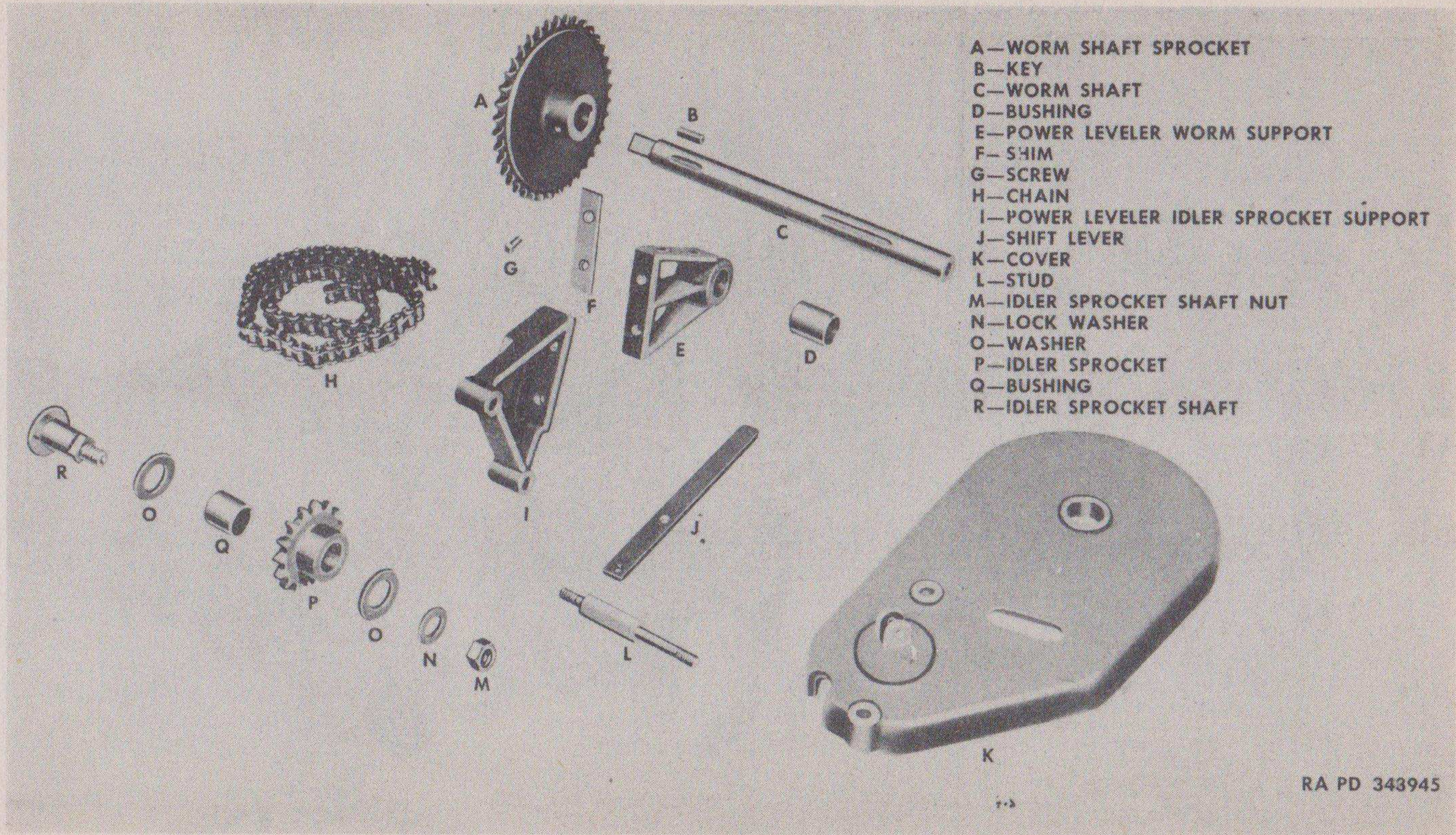
93. CLEANING, INSPECTION, AND REPAIR.

a. Cleaning.

(1) BEARINGS. See paragraph 82a (1).

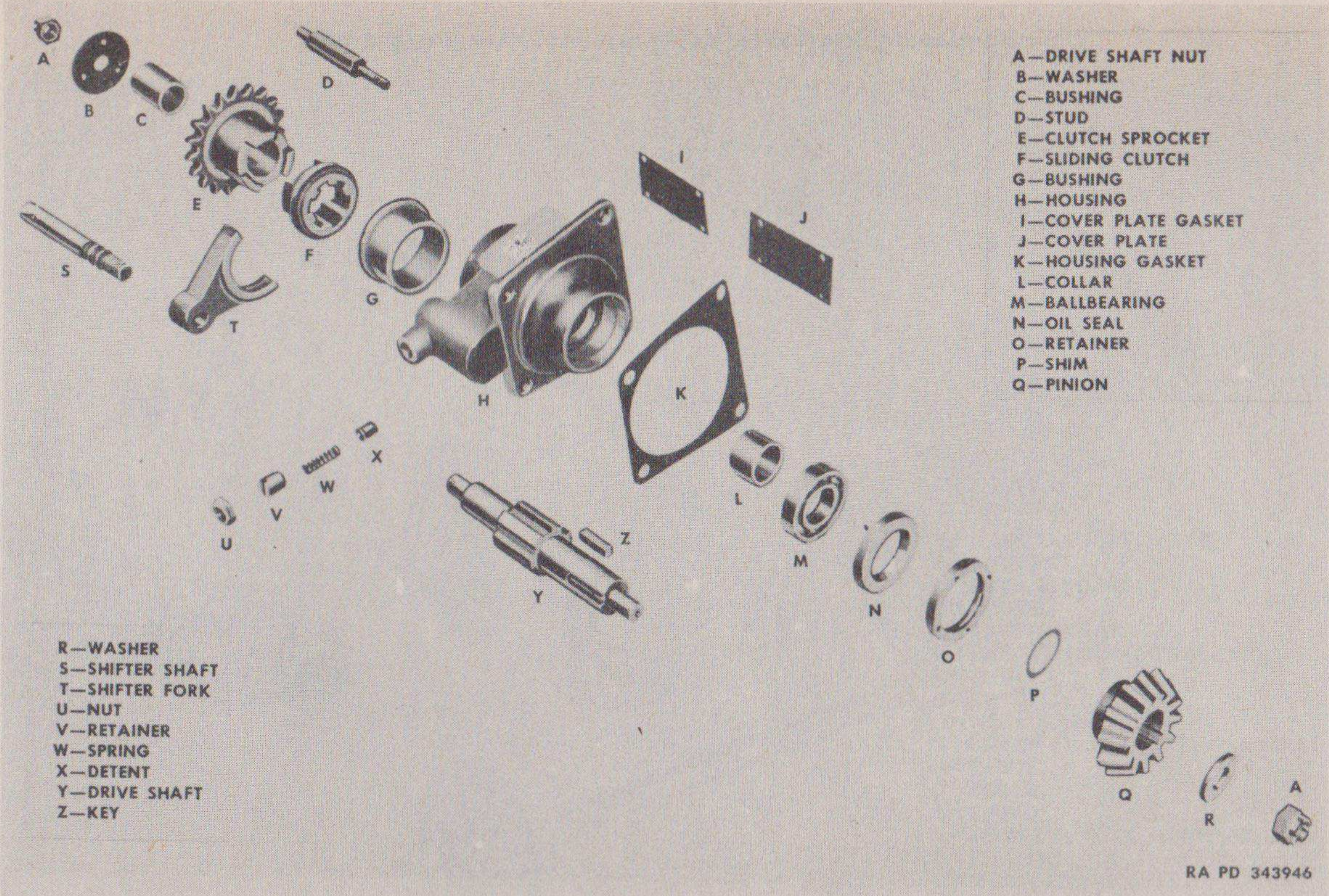
(2) ALL PARTS EXCEPT BEARINGS. See paragraph 82a (2).

b. **Inspection and Repair.** See paragraph 82b.



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Figure 87—Power Leveler Drive Assembly, Disassembled



- A—DRIVE SHAFT NUT
- B—WASHER
- C—BUSHING
- D—STUD
- E—CLUTCH SPROCKET
- F—SLIDING CLUTCH
- G—BUSHING
- H—HOUSING
- I—COVER PLATE GASKET
- J—COVER PLATE
- K—HOUSING GASKET
- L—COLLAR
- M—BALLBEARING
- N—OIL SEAL
- O—RETAINER
- P—SHIM
- Q—PINION

- R—WASHER
- S—SHIFTER SHAFT
- T—SHIFTER FORK
- U—NUT
- V—RETAINER
- W—SPRING
- X—DETENT
- Y—DRIVE SHAFT
- Z—KEY

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94. ASSEMBLY OF POWER LEVELER CLUTCH ASSEMBLY (fig. 88).

a. Lubricate the ball bearing with general-purpose grease No. 1 above +32° F., or No. 0 below +32° F., and install it in the lower end of the housing. Screw bearing retainer into the housing and tighten it firmly against the bearing; install cotter pin to lock retainer. Press bushing into upper end of housing.

b. Install bushing on upper end of drive shaft. Lubricate the clutch sprocket and install on bushing. Assemble flat washer and nut, tighten nut on drive shaft, and install cotter pin.

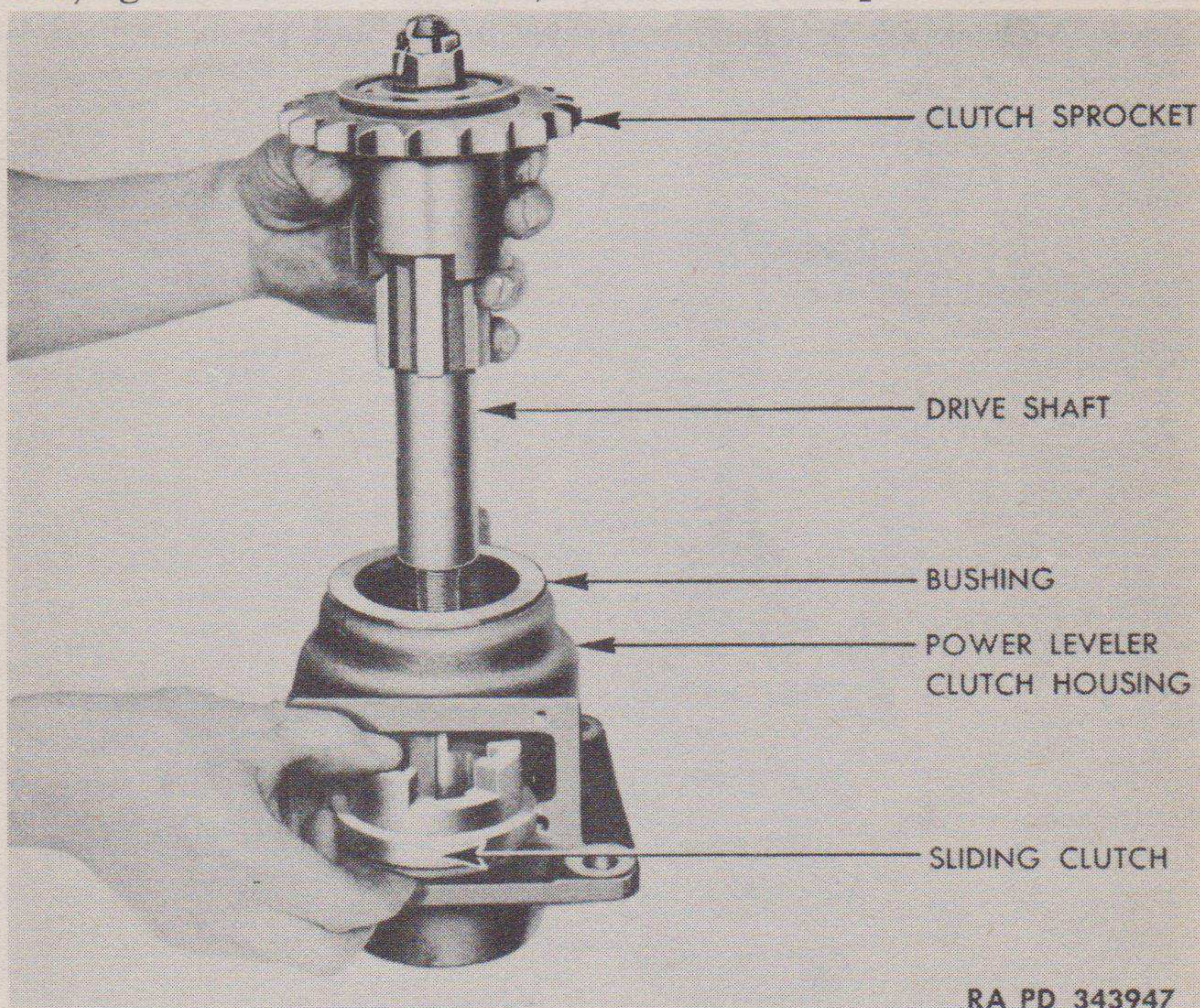


Figure 89—Installing Power Leveler Sliding Clutch

c. Place drive shaft collar, shifter fork, and sliding clutch in housing; then thread the drive shaft in through the clutch (fig. 89), drive shaft collar, and ball bearing. Press shaft into housing until it bottoms against the collar.

d. Install the same number of pinion bearing shims removed when disassembling; install key, then press pinion on shaft. Install flat washer and nut, and secure with cotter pin.

e. Thread the shifter shaft into the housing (fig. 90) and into the shifter fork which was previously assembled in the housing (c above). Assemble the detent assembly (detent, spring, retainer, and nut) (fig. 88) in the housing. Thread the shifter shaft into the shifter fork so there is about $\frac{1}{8}$ -inch clearance between the end of the jaws on the sliding clutch and the clutch sprocket when the detent is in the upper groove of the shifter shaft.

Note. This clearance can be observed through the cover plate opening.

f. Assemble leveler housing with gasket to intermediate case (fig. 86), and install two cap screws diagonally opposite each other. Then check the backlash between the leveler pinion and the boring inter-

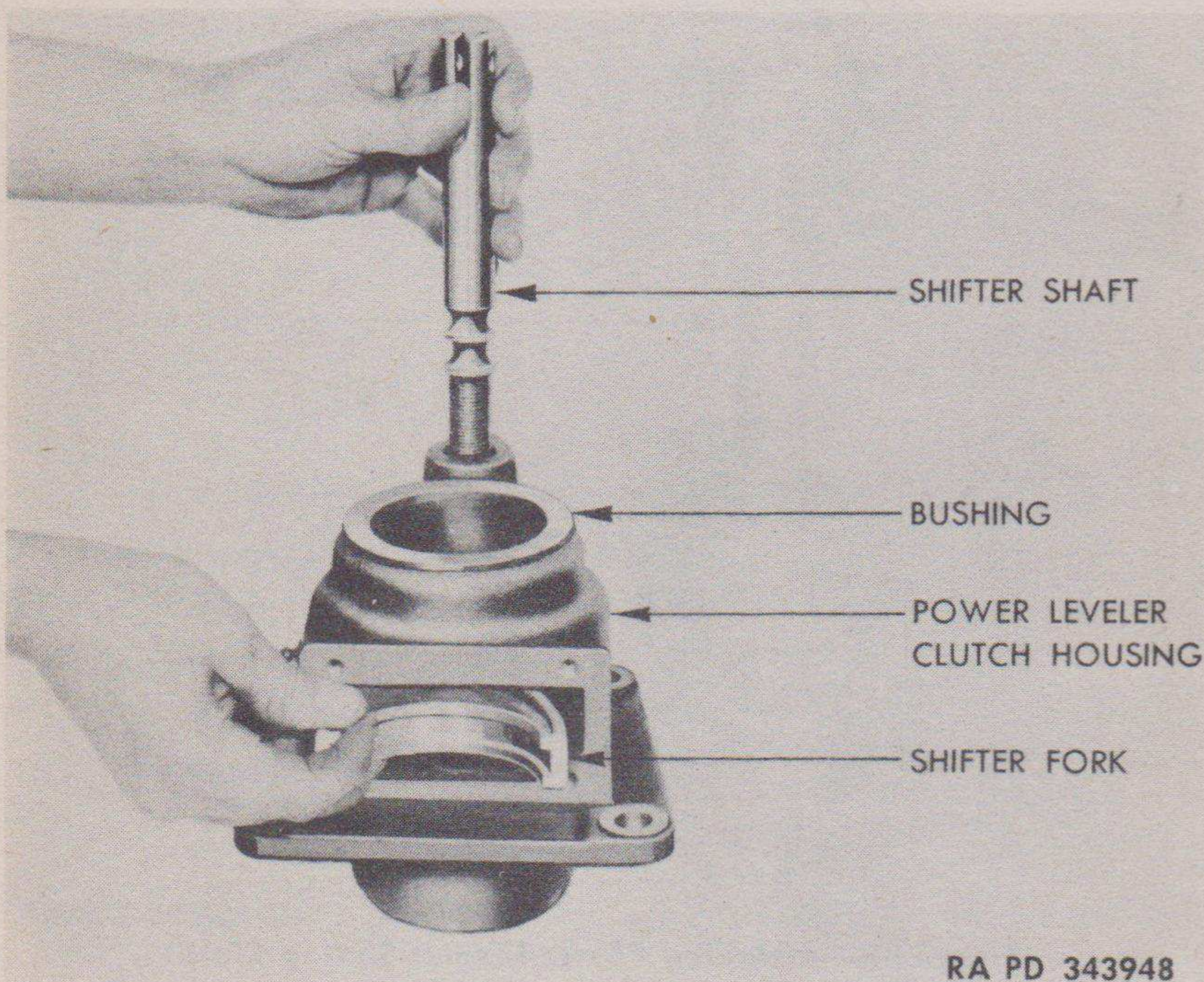


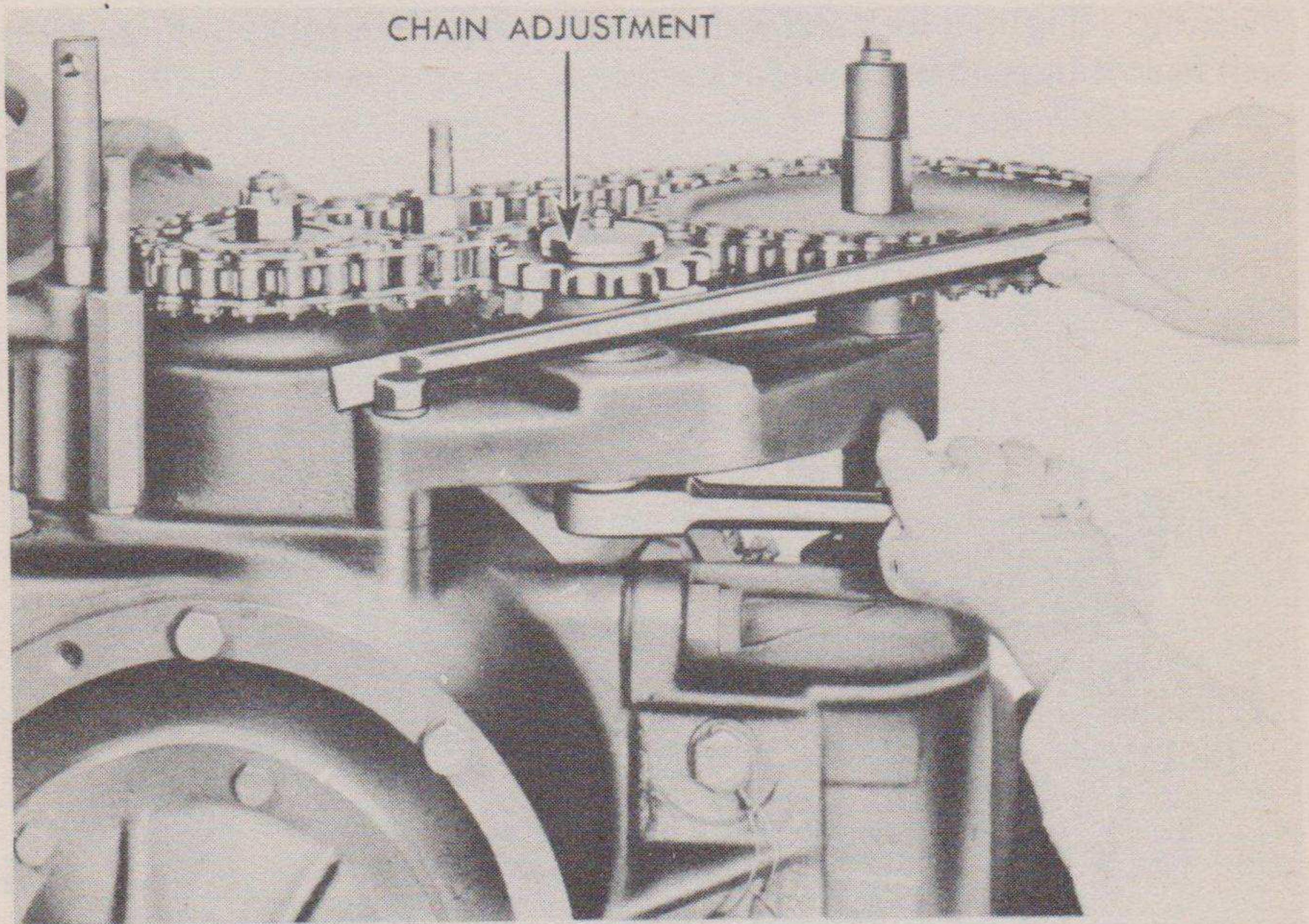
Figure 90—Installing Power Leveler Shift Fork

mediate gear, which should be from 0.010 to 0.015 inch. If the backlash is not within limits, remove the leveler housing from the intermediate case, and add or remove shims between the ball bearing and the pinion hub. If the backlash is too great, add a shim; if it is too little, remove a shim. Again install leveler housing and gasket to intermediate case, rechecking backlash; if correct, pack with grease, and install cover gasket and cover to housing. Secure to intermediate case

with the cap screws and the cover mounting stud furthest removed from the worm shaft.

95. INSTALLATION.

a. **Idler Sprocket Bracket** (fig. 85). Assemble the worm shaft and idler sprocket support, and tighten securely with cover mounting stud and cap screw. Install key on worm shaft, install sprocket on worm shaft, and drive it down on shaft until set screw hole in sprocket hub lines up with hole in shaft. Install set screw and tighten it securely; then lock it in place with the wire. Lubricate the idler sprocket bushing after installing same on shaft. Assemble washer, sprocket, and the other washer on shaft and install the assembly on support bracket; secure in place with washer and nut, but do not tighten until chain is installed and adjusted.



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Figure 91—Power Leveler Chain Adjustment

b. **Power Leveler Chain.** Thread chain around sprockets and install the link removed when disassembling. Adjust chain tension by bearing against idler hub with a short bar.

Note. Tension should be enough to remove all slack but not so tight as to cause damage to sprockets or chain.

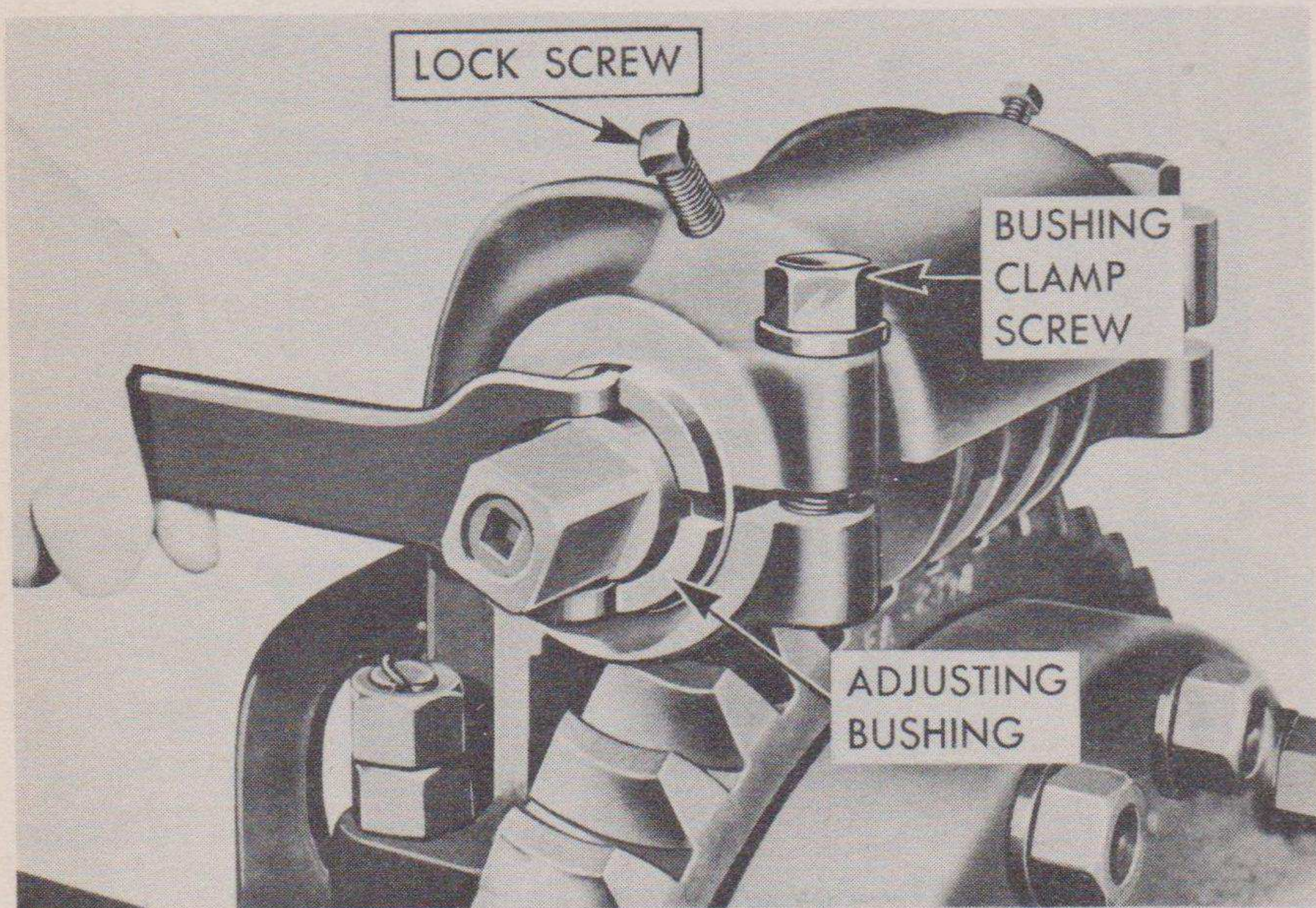
While idler is held in this position, tighten the idler shaft nut securely as shown in figure 91.

c. **Power Leveler Cover** (fig. 84). Assemble cover over support studs. Check alignment of cover, and install flat washers on support studs if necessary to secure alignment. Install lock washers and nuts on support studs and tighten them securely.

d. **Power Leveler Shift Lever** (fig. 58). Assemble shift lever in place, and secure with pins and cotter pins.

96. LEVELING WORM ADJUSTMENTS.

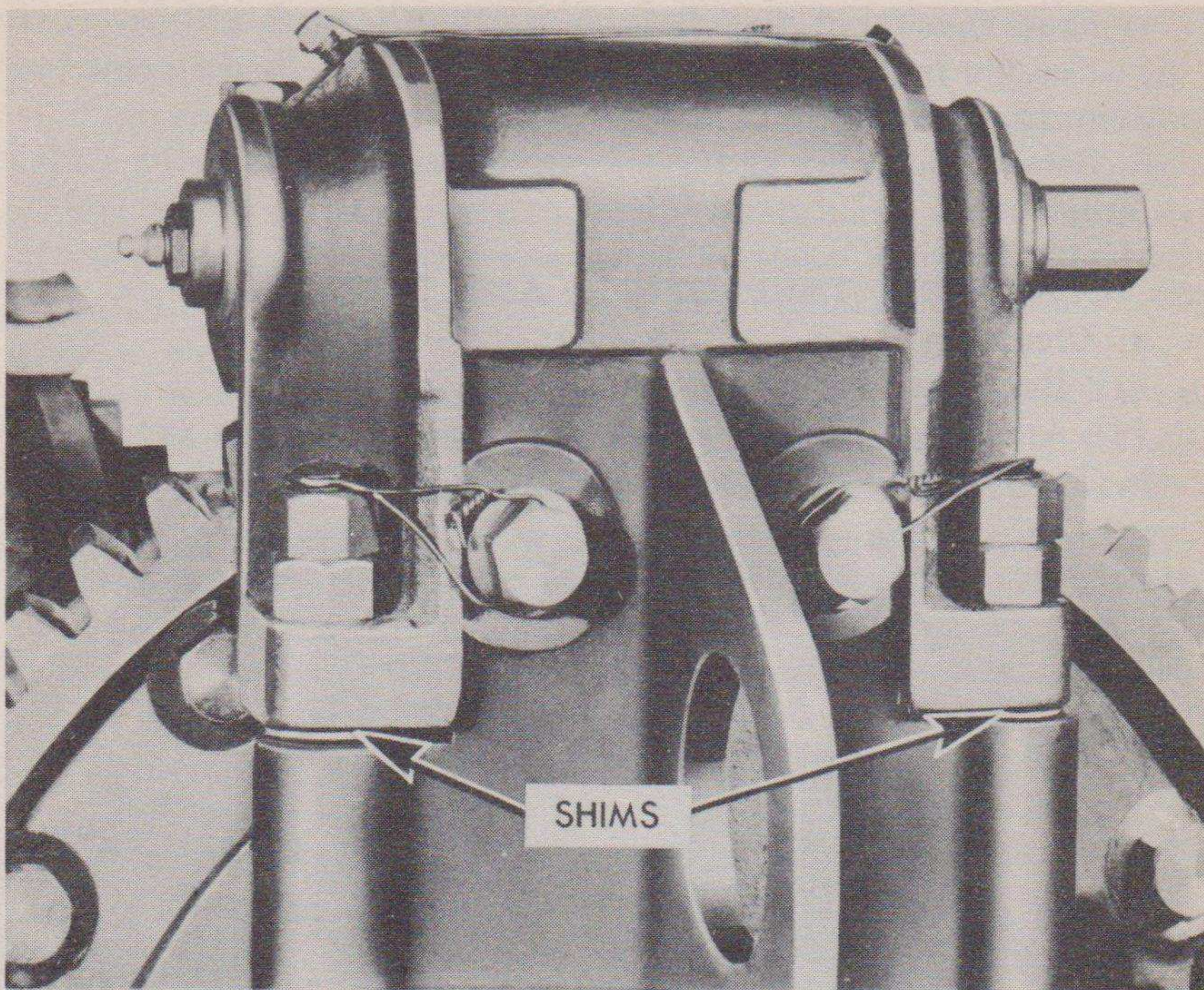
a. To adjust for end play in either leveling worm, proceed as follows: Remove lock wire from worm adjusting bushing lock screw, and back lock screw out approximately $\frac{1}{2}$ inch to withdraw point of lock screw from locking hole in flange of bushing. Loosen clamp bolt, and turn adjusting bushing with spanner wrench (fig. 92) until bushing is tight against shoulder of leveling worm. Back off adjusting bushing until lock screw will enter nearest hole in flange of worm adjusting bushing. Tighten lock screw until it bottoms, then back it off one turn and lock it in position with lock wire.



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Figure 92—Adjusting Leveling Worm End Play

b. To adjust leveling worm with relation to leveling worm wheel, remove the lock wire, and remove the bolts and nuts which mount the leveling worm assembly. Add or remove shims (fig. 93) as necessary, between housing and worm assembly, until there is a minimum amount



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Figure 93—Leveling Worm to Worm Wheel Adjusting Shims

of play between the leveling worm and leveling worm wheel. Tighten mounting bolts and nuts securely, and install lock wire.

Section VI

PILLOW BLOCK ASSEMBLY

	Paragraph
Disassembly -----	97
Cleaning, inspection, and repair -----	98
Assembly -----	99

97. DISASSEMBLY.

a. Place yoke of universal joint in bench vise, and remove the cotter pin and nut from the pillow block shaft.

b. Remove the yoke and sprocket by tapping them with a soft-faced hammer.

c. Remove the sprocket key from the shaft.

d. Remove the lock wire and cap screws from bearing retainers at both ends of pillow block housing, and remove retainers and shims from housing.

e. From the rear of the pillow block drive the shaft with both bearing cones and front bearing cup from the housing. Remove rear bearing cup from housing.

f. Remove the roller and cone bearing assemblies from the shaft in an arbor press.

98. CLEANING, INSPECTION, AND REPAIR.

a. **Cleaning.**

(1) **BEARINGS.** See paragraph 82a (1).

(2) **ALL PARTS EXCEPT BEARINGS.** See paragraph 82a (2).

b. **Inspection and Repair.** See paragraph 82b.

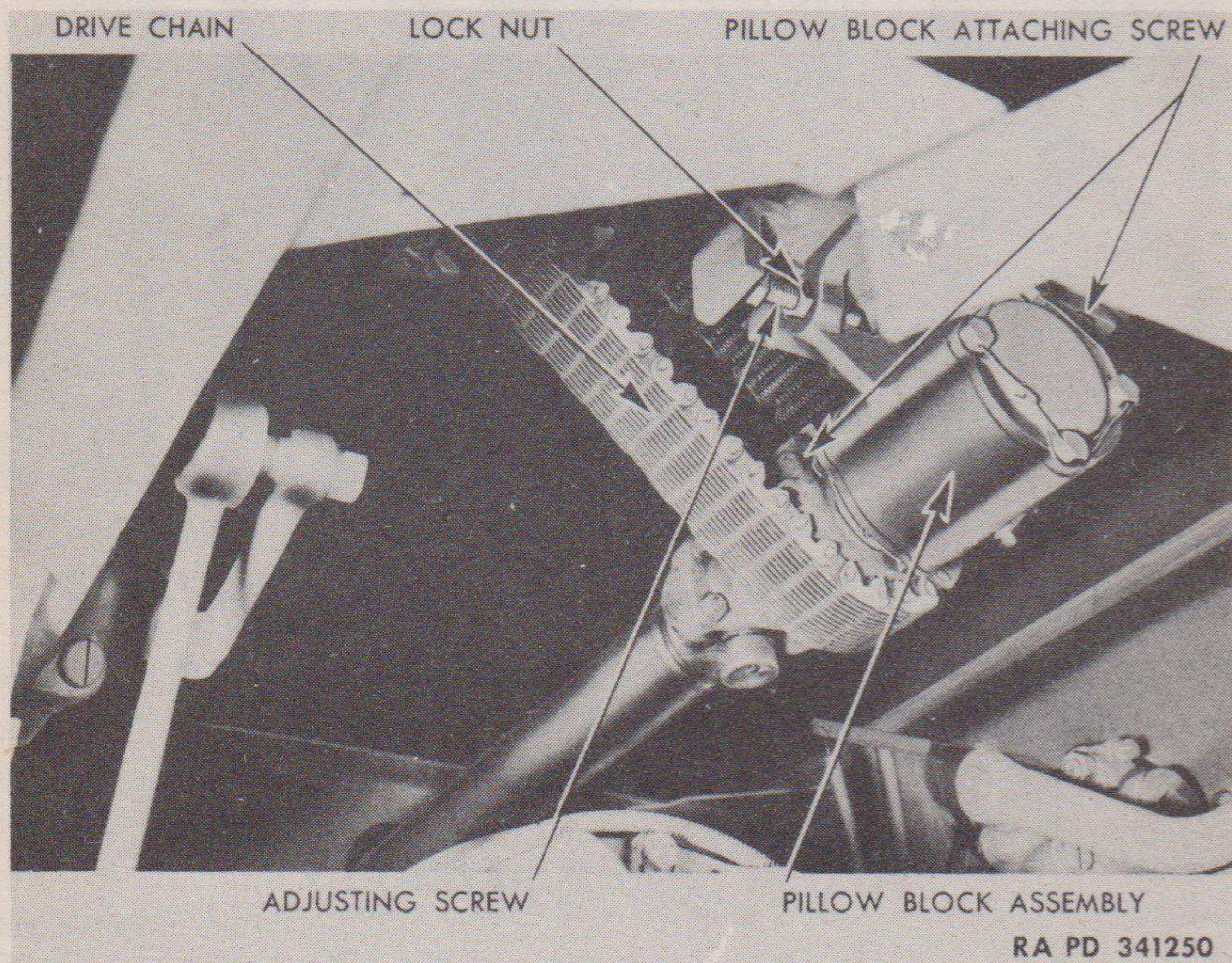


Figure 94—Drive Chain and Pillow Block

99. ASSEMBLY.

a. Install the rear bearing cup in the housing; then install the bearing retainer and shim, and tighten securely with the cap screws.

b. Install bearings on shaft, and lubricate bearings with universal gear lubricant.

c. Install shafts with bearings in housing, and install the front bearing cup.

d. Install front bearing retainer with the necessary shims to properly adjust the bearings. When the bearings are properly adjusted the shaft will turn freely without any end play.

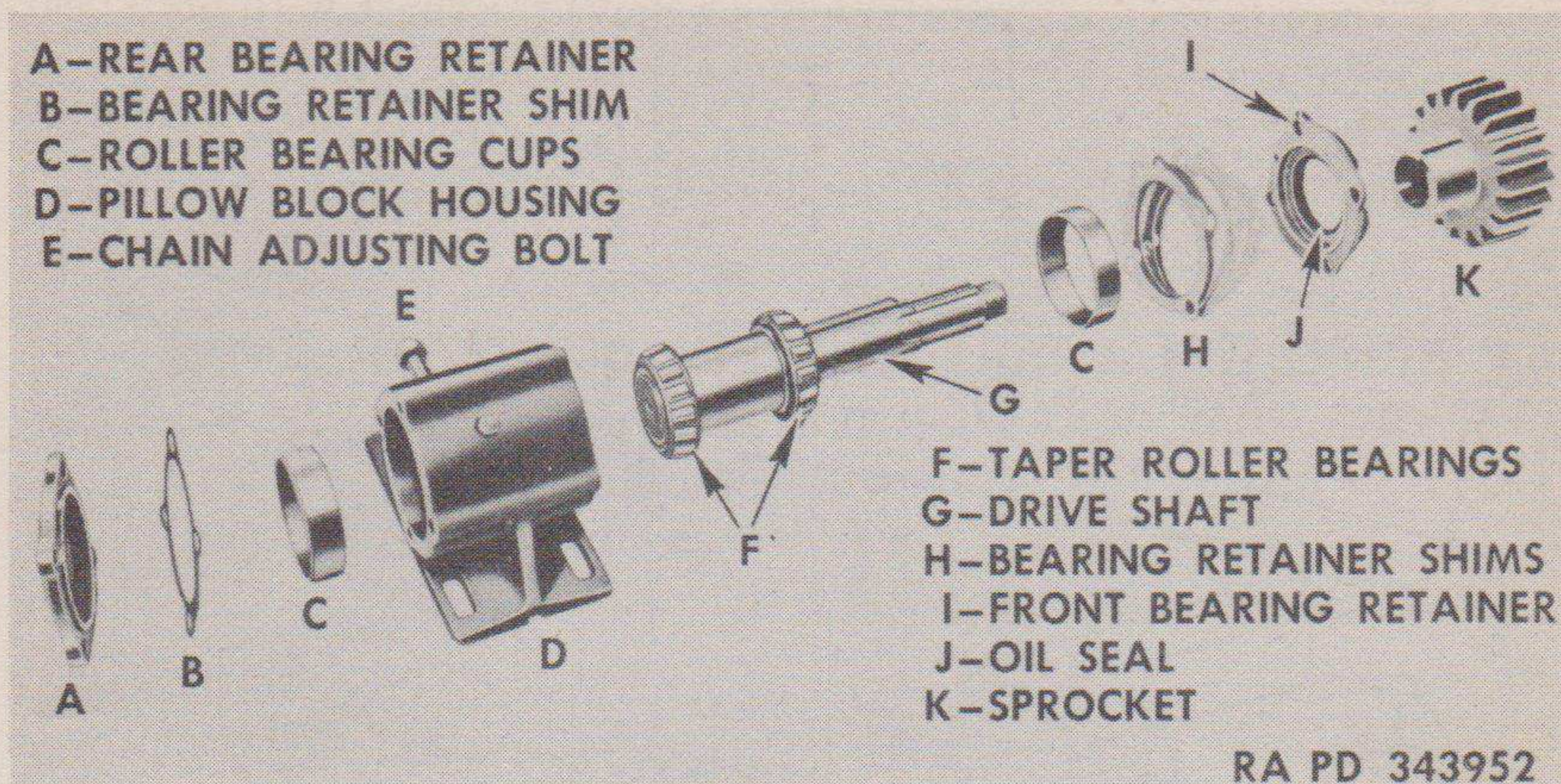


Figure 95—Pillow Block Assembly, Disassembled

e. Install the sprocket key in shaft and slide sprocket on shaft. Install universal joint yoke and nut. Tighten nut securely and lock with cotter pin.

Section VII

AUGER ASSEMBLIES

	Paragraph
Description-----	100
Maintenance and repair of auger thrust plates-----	101

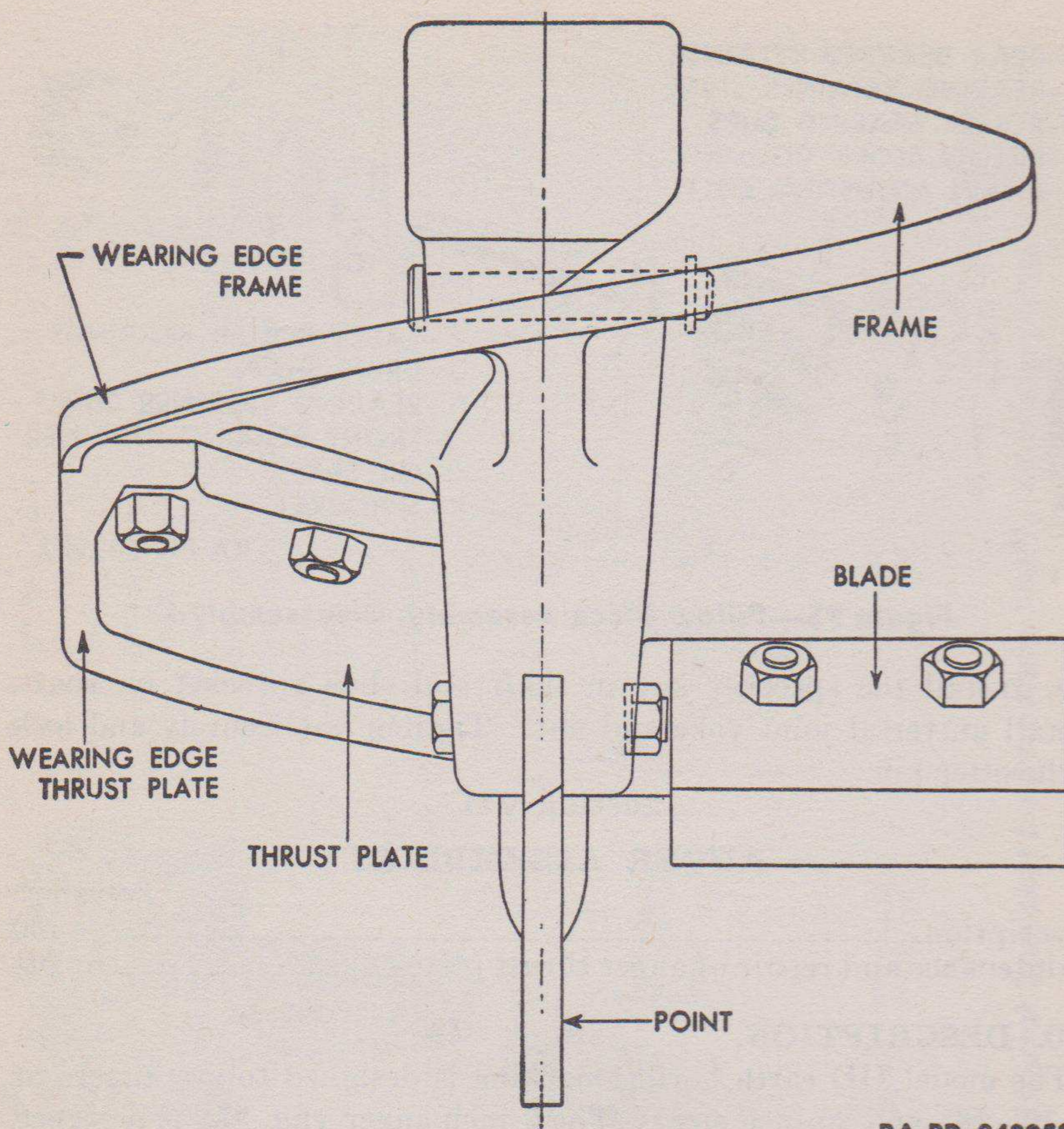
100. DESCRIPTION.

The model HD earth boring machine is designed to use augers of 9-, 12-, 16-, and 20-inch sizes. The 9-inch auger (fig. 97) is designed without a thrust plate. The point and blade are also designed as one piece. The 12-, 16-, and 20-inch augers have the same design, the only difference being in size. In these three sizes a detachable thrust plate (fig. 96) is employed, and both the blade and point are separate detachable units. When auger blades become worn, they can be reversed. When auger points become worn, they must be replaced.

101. MAINTENANCE AND REPAIR OF AUGER THRUST PLATES (fig. 96).

a. On 12-, 16-, and 20-inch auger assemblies (when new), the thrust plate is approximately flush with the outer edge of the auger frame. When these augers are placed in service the resulting wear occurs on both the thrust plate and the frame. When a new thrust plate is attached, it will extend beyond the outer edge of the worn auger frame.

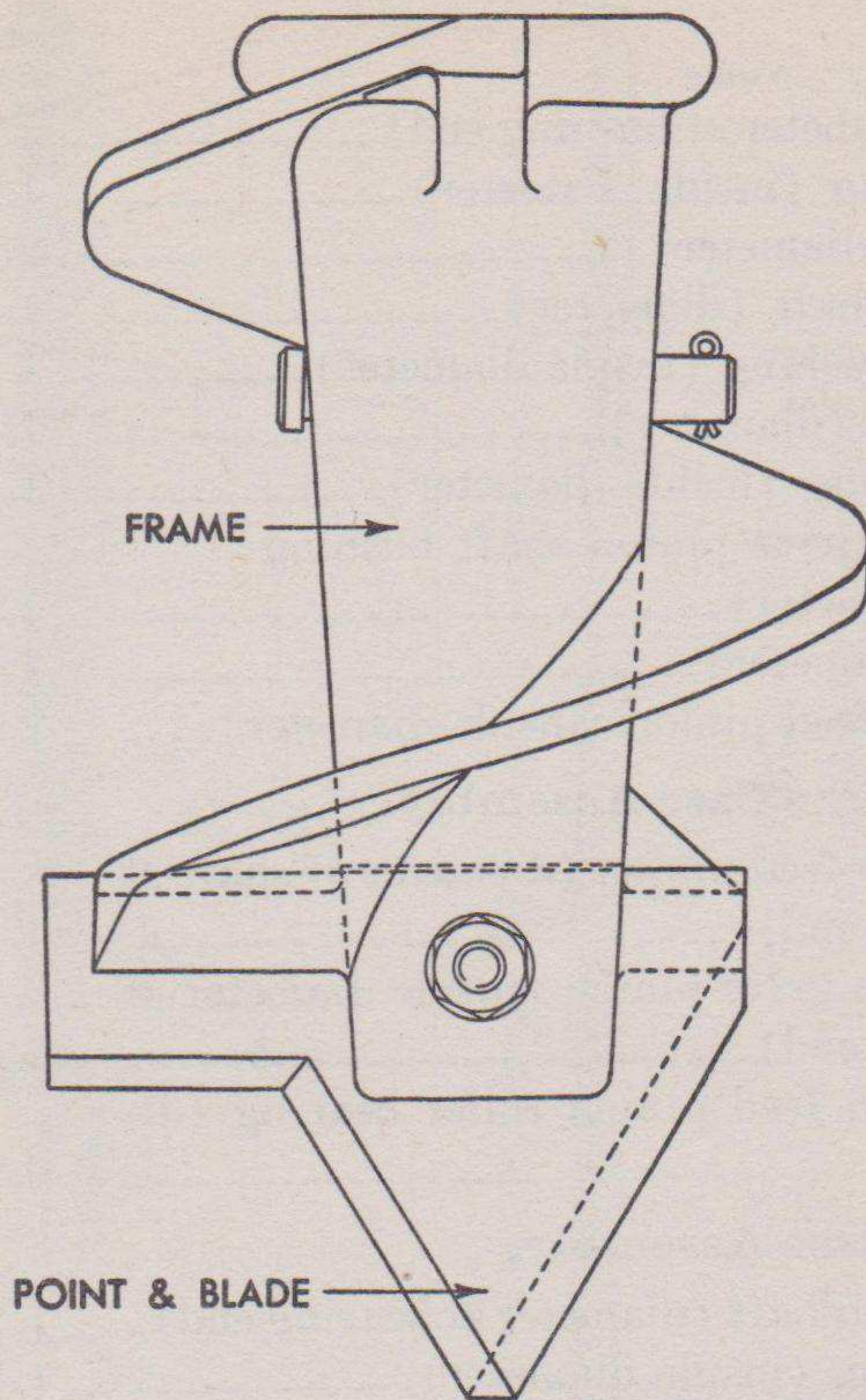
b. After attaching a new thrust plate to the worn auger frame, do not allow this thrust plate to wear beyond 1/8 inch of the worn auger frame.



RA PD 343953

Figure 96—Auger Assembly, Sizes 12-, 16-, and 20-inch

c. Either replace the thrust plate, or if desired, build it up with welding rod metal to the original size of the thrust plate. In applying the metal, place the beads of weld lengthwise of the plate made up of one or more layers as desired. **Caution:** Do not build up the weld on the worn thrust plate beyond its original size.



RA PD 343954

Figure 97—Auger Assembly, Size 9-inch

Section VIII

FITS AND TOLERANCES

Paragraph

Service information----- 102

102. SERVICE INFORMATION.

a. **General.** The table which follows gives the dimension of new parts as manufactured. The dimensions shown are the maximum and minimum limits allowed in manufacture.

b. **Clutch Case Assembly.**

<i>Name</i>	<i>Maximum inches</i>	<i>Minimum inches</i>
Plates (thickness)-----	$\frac{1}{16}$	$\frac{1}{16}$
Throw shoe (width across wear surfaces)-----	1.380	1.370
Throw shoe pin (diameter)-----	0.625	0.623
Throw collar (width between wear surfaces)-----	$1\frac{25}{64}$	$1\frac{25}{64}$
Shift shaft (diameter)-----	1.001	0.997
Shift shaft bushing (inside diameter)-----	1.001	0.999

AXLES, PROPELLER SHAFTS, AND WHEELS

<i>Name</i>	<i>Maximum inches</i>	<i>Minimum inches</i>
Drive shaft (diameter at bushing end) -----	1.500	1.498
Sprocket bushing (inside diameter) -----	1.189	1.187
Sprocket (hub diameter) -----	2.745	2.743
Idler sprocket shaft (diameter) -----	1.249	1.248
Idler sprocket bushing (inside diameter) -----	1.255	1.250
Idler gear shaft (diameter) -----	1.500	1.499
Idler gear bushing (inside diameter) -----	1.506	1.503
First reduction drive pinion shaft bushing (inside diameter) -----	1.505	1.503
(outside diameter) -----	2.123	2.121
First reduction feed pinion (inside diameter) ----	2.127	2.125
c. Intermediate Case Assembly.		
Second reduction feed pinion (diameter of shaft at roller bearing end) -----	1.666	1.665
Second reduction drive pinion (inside diameter at roller bearing end) -----	2.168	2.167
Second reduction feed pinion roller bearing (di- ameter) -----	0.2500	0.2498
d. Bearing Case Assembly.		
Bevel spur pinion shaft (diameter at bearing end) _	1.2505	1.2500
Bevel spur pinion (inside diameter) -----	1.753	1.751
Bevel spur pinion thrust washer (thickness) -----	0.145	0.140
Rack pinion shaft (diameter) -----	1.250	1.248
Rack pinion (inside diameter) -----	1.753	1.750
Rack thrust roller shaft (diameter) -----	1.250	1.248
Rack thrust roller (inside diameter) -----	1.753	1.750
(outside diameter) -----	3.330	3.328
Rack shaft (widths) -----	2.500	2.448
	2.937	2.925
Rack thrust plates (thickness) -----	0.376	0.370
e. Power and Hand Leveler Mechanism.		
Power leveler drive shaft (diameter at bushing end) -----	1.184	1.183
Power leveler housing bushing (inside diameter) --	2.752	2.750
Worm shafts (diameter) -----	1.372	1.370
Worm shaft bearings (inside diameter) -----	1.378	1.376
Worm shaft bushing (inside diameter) -----	1.375	1.374

f. General Service Information.

(1) Lock all ball bearings securely in place and allow end play from 0.000 to 0.005 inch. Tighten adjusting bearing in leveling worm housing until no end play is present, then loosen until the locking screw will enter the nearest hole in bearing flange.

(2) Adjust bevel gears and pinions to permit backlash between teeth, from 0.005 to 0.015 inch.

(3) Tighten clamp bolt on leveling worm housing sufficient to prevent movement during leveling operation.

(4) Adjust yokes on control rods so that levers will stand perpendicular and parallel to each other when not in use.

Appendix

REFERENCES

	Paragraph
Standard nomenclature lists	1
Explanatory publications	2

1. STANDARD NOMENCLATURE LISTS.

- a. **Cleaning, preserving, and lubricating materials.** SNL K-1
- b. **Truck, bomb service, M6, recoil fluids, special oils, and similar items of issue.** SNL G-85, Vol. IV

Current Standard Nomenclature Lists are as tabulated here. An up-to-date list of SNL's is maintained as the "Ordnance Publications for Supply Index." OPSI

2. EXPLANATORY PUBLICATIONS.

a. **Automotive Matériel.**

- Automotive power transmission units TM 10-585
- Bomb service truck M6 (Chevrolet) TM 9-765

b. **Maintenance and Inspection.**

- Lubrication instructions for matériel WDLO 56
WDLO 519
- Echelon system of maintenance TM 37-250
- Hand, measuring and power tools TM 10-590
- Motor vehicle inspections and preventive maintenance services. TM 37-2810

c. **Miscellaneous.**

- List of publications for training FM 21-6
- Training films and film strips FM 21-7
- Military motor vehicles AR 850-15

- d. **Storage of motor vehicle equipment.** AR 850-18

[AG 300.7 (2 Dec 44)]

BY ORDER OF THE SECRETARY OF WAR:

OFFICIAL:

J. A. ULIO

Major General

The Adjutant General

G. C. MARSHALL

Chief of Staff

AXLES, PROPELLER SHAFTS, AND WHEELS

DISTRIBUTION:

AAF (10); AGF (10); ASF (2); Dept (10); AAF Comd (2);
Arm & Sv Bd (2); S Div ASF (1); Tech Sv (2); Sv C (10);
PC&S (1); PE (Ord O) (5); Dist O, 9 (5); Dist Br O, 9 (3);
Reg O, 9 (3); Establishment, 9 (5); Decentralized Sub O, 9
(3); Gen & Sp Sv Sch (10); USMA (2); A (10); CHQ (10);
D (2); AF (2); T/O & E 9-7 (3); 9-9 (3); 9-37 (3); 9-57 (3);
9-65 (2); 9-67 (3); 9-76 (2); 9-127 (3); 9-197 (3); 9-317 (3);
9-325 (2); 9-327 (3); 9-328 (3); 9-377 (3).

Refer to FM 21-6 for explanation of distribution formula.

GEREG

17 MEI 1955

16K

TECHNICAL MANUAL
ORDNANCE MAINTENANCE

AXLES, PROPELLER SHAFTS, AND WHEELS FOR BOMB
SERVICE TRUCK M6 AND 1½-TON 4 X 4 TRUCKS (CHEV-
ROLET), INCLUDING TELEPHONE EARTH BORER (K-44)

CHANGES
No. 2

WAR DEPARTMENT
WASHINGTON 25, D. C., 2 April 1945

TM 9-1765A, 15 December 1942, is changed as follows:

Chapter 5.1 (Added)

SERVICEABILITY STANDARDS

79.1. FRONT AXLE.

a. Differential.

*New part fits and
tolerances*

Ring gear to pinion backlash.....	0.005 to 0.007 in.
Ring gear run-out.....	Not over 0.001 in.
Ring gear case run-out.....	Not over 0.002 in.
Clearance between spider and pinion ..	0.004 to 0.008 in.
Clearance between side gear and case..	0.002 to 0.006 in.
Differential side gear thrust washer thickness (new).....	0.058 to 0.062 in.
Differential side gear thrust washer thickness (worn).....	Not less than 0.048 in.
Differential bearing adjustment.....	Tighten snugly and then one or two notches more
Outer pinion bearing adjustment.....	Bearing must turn with no perceptible end play. Tighten nut to 180 to 280 ft-lb torque

b. Ring gear thrust pad.

Clearance.....	0.005 to 0.007 in.
Pad thickness (new).....	0.1865 to 0.1885 in.
Pad thickness (worn).....	Not less than 0.125 in.

c. Trunnion knuckle bearings.

Adjustment.....	Shim both ends as required to obtain 4½- to 6-lb pull at steering knuckle support tie rod bolt hole, with equal shims on top and bottom
-----------------	--



c. Trunnion knuckle bearing.—Continued.

Shim thickness----- 0.002 in., 0.005 in.,
0.010 in., 0.030 in.

d. Steering knuckle bushing.

Inside diameter----- 1.7025 to 1.7045 in.
Clearance, bushing to shaft----- 0.015 to 0.0175 in.

e. Turning radius stop screw.

Maximum angle of inner wheel----- 28° , $+1^{\circ}-0^{\circ}$

f. Tie rod yoke.

Bushing, inside diameter----- 0.7495 to 0.7505 in.
Clearance, bolt to bushing----- 0.0005 to 0.00025 in.

g. Steering geometry.

Front wheel camber----- $\frac{1}{2}^{\circ}$ to 1°
Front wheel caster----- 1° to 2°
Front wheel toe-in----- 0 to $\frac{1}{8}$ in.
Center line of steering arm to center
line of spring----- $4\frac{1}{8}$ in.
Backing plate to center line of tie rod
bolt----- $3\frac{19}{64}$ in.
Bottom of steering arms to top of axle
housing----- $1\frac{3}{4}$ in.

h. Universal joint.

Front axle shaft and universal joint:

Diameter at splines (outer end) _ 1.6435 to 1.6445 in.
Diameter at splines (inner end) _ 1.6305 to 1.6385 in.
Diameter at bushing contacts _ 1.6865 to 1.6875 in.
Thrust washer thickness (new) _ 0.155 to 0.157 in.

79.2 REAR AXLE.

a. Differential.

Ring gear to pinion backlash----- 0.005 to 0.008 in.
Ring gear run-out----- 0.001 in.
Case run-out----- 0.002 in.
Clearance between pinion and spider _ 0.004 to 0.008 in.
Clearance between side gear and case _ 0.002 to 0.006 in.
Side gear thrust washer thickness (new) _ 0.058 to 0.062 in.
Side gear thrust washer limits (worn) _ 0.048 in.

b. Ring gear thrust pad.

Clearance, pad to gear----- 0.005 to 0.007 in.
Pad thickness limits (new)----- 0.1865 to 0.1885 in.
Pad thickness limits (worn)----- 0.125 in.

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Refer to FM 21-6 for explanation of distribution formula.