

## SECTION XIV — FINAL DRIVES

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### 1. DESCRIPTION

Each final drive is of the double reduction type and is made up of a pinion shaft, intermediate

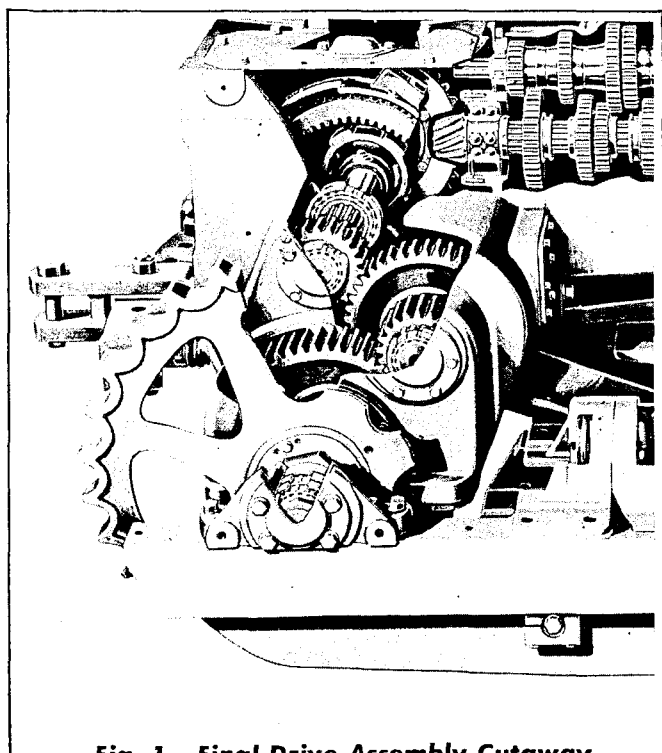


Fig. 1 — Final Drive Assembly Cutaway

shaft, sprocket shaft, and their component parts. The final drives are assembled in a combination "one piece" steering clutch and final drive housing. Since the final drive housings are an integral part of the steering clutch housing, they are line bored, thus eliminating misalignment.

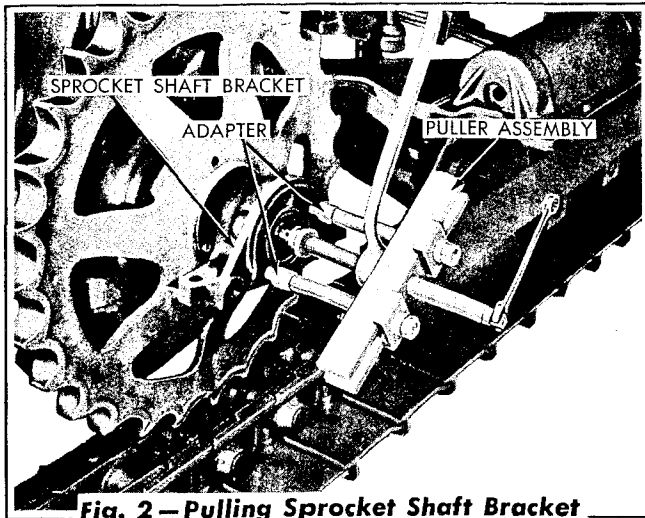
The final drive pinion shafts are mounted on roller bearings (straight rollers) and the final drive intermediate and the sprocket shafts on tapered roller bearings. The pinion shaft bearings and the intermediate shaft bearings are lubricated by oil carried and thrown by the gears. The sprocket shaft outboard bearings are located in brackets which attach the truck frames, and absorb thrust in both directions. The two (2) seal assemblies (inner and outer) in each final drive are of the positive type.

The final drive pinion shafts are driven by the bevel gear and steering clutches. The final drive pinions drive the intermediate shaft gears, the intermediate shaft pinions drive the sprocket shaft gears which in turn drive the track driving sprockets.

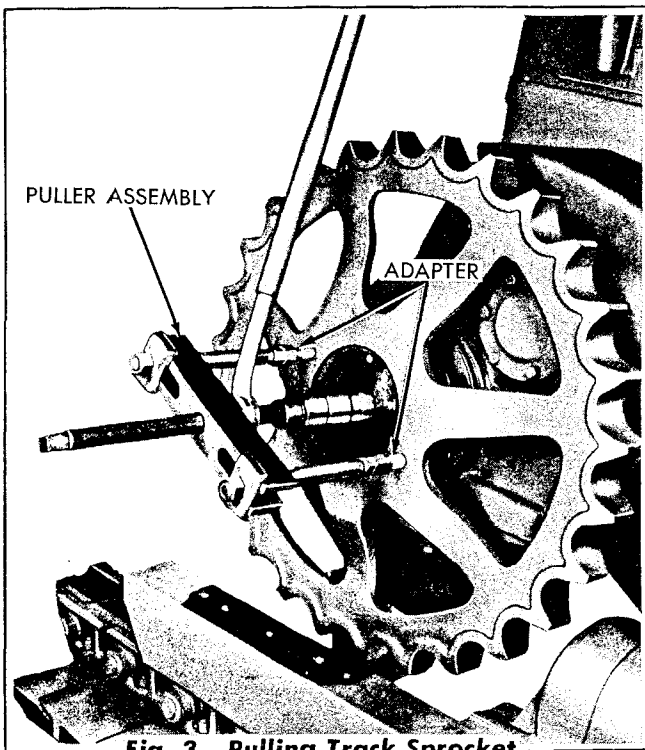
### 2. DISASSEMBLY

#### A. Removal of Sprocket Shaft.

1. Uncouple the track by driving out the master pin, then move the tractor backward until the top of the track is off the track driving sprocket (refer to "TRACK REMOVAL" in Section XVII).
2. Drain the oil from the final drive.
3. Remove the sprocket guard, truck frame pivot shaft caps, the four (4) capscrews attaching the sprocket shaft bracket to the truck frame, and the capscrews attaching the equalizer spring pad to the truck frame.
4. Place a suitable jack under the drawbar and one under the equalizer spring and raise the tractor off the truck frame. Using a pry bar, tip the truck frame out far enough so that the track support roller bracket will clear the end of the equalizer spring, then roll the truck frame forward on the track so that the track sprocket can be removed. *NOTE:* On Models HD-5F and HD-5G, having a rigid beam instead of the equalizer spring, the construction of the rigid beam will not allow



**Fig. 2 - Pulling Sprocket Shaft Bracket**



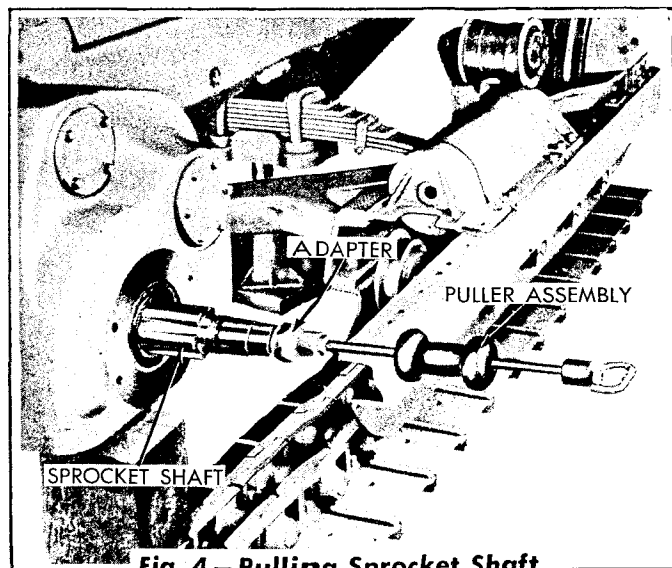
**Fig. 3 - Pulling Track Sprocket**

the truck frame to be rolled forward after it is unbolted from the tractor. It will be necessary to raise the tractor high enough so that the track sprocket can be tipped and will clear the truck frame when removing.

5. Remove the sprocket shaft outer bearing cap and adjusting shims. Tie the adjusting shims to the cover so that they will not be lost. Unlock and remove the outer bearing retaining nut.
6. Using a puller similar to the one shown in Figure No. 2, pull the sprocket shaft outer bearing and bracket from the shaft. Use care in handling so that the oil seal rings are

not damaged or scratched.

7. Remove the two (2) capscrews attaching the track sprocket retaining nut lock, then remove the lock and sprocket retaining nut. Use care when removing the retaining nut so that the oil seal ring cemented to the nut is not damaged or scratched. Using a puller similar to the one shown in Figure No. 3, pull the track sprocket and remove it from the shaft.
8. Remove the capscrews attaching the final drive compartment bottom cover and remove the cover. Unlock and remove the capscrews attaching sprocket shaft gear lock, then remove the capscrew lock and the gear lock. **NOTE:** If the lock for the sprocket shaft gear is not turned in the proper location for removal of the lock, pull the corresponding steering clutch lever back in the disengaged position and turn the sprocket shaft gear to the desired position.



**Fig. 4 - Pulling Sprocket Shaft**

9. Remove the capscrews attaching the sprocket shaft bearing retainer and the dirt guard to the housing and remove the dirt guard, bearing retainer, and bearing adjusting shims. Tie the adjusting shims to the retainer so that they will not be lost. Place suitable blocks under the sprocket shaft gear so that the gear will not fall when the sprocket shaft is removed.
10. Using a sliding hammer type puller similar to the one shown in Figure No. 4, pull the

sprocket shaft and bearing. **IMPORTANT:** Avoid damaging the bearing by holding the shaft out as far as possible so that the bearing is tight against the bearing cup. Remove the sprocket shaft gear.

11. If it is necessary to remove the sprocket shaft inner bearing cup, the bearing cup may be removed by driving out (towards the final drive gears) on the sprocket shaft inner cover. Remove the bearing cup, inner cover, and cover seal.

## B. Removal of Final Drive Intermediate Shaft.

1. Unlock and remove the capscrews attaching the two (2) intermediate shaft gear locks, then remove the capscrew locks and the gear locks. To remove these locks, it will be necessary to turn the intermediate shaft assembly to a position where the attaching capscrews and locks can be removed. Pull the corresponding steering clutch lever back in the disengaged position and turn the intermediate shaft gear to the desired position.
2. Remove the intermediate shaft bearing cover and adjusting shims. Tie the shims to the cover so that they will not get lost. Hold or block the intermediate shaft gears in position, then pull the intermediate shaft and bearing using a sliding hammer type puller similar to the one shown in Figure No. 5. Remove the intermediate shaft gear and the pinion.

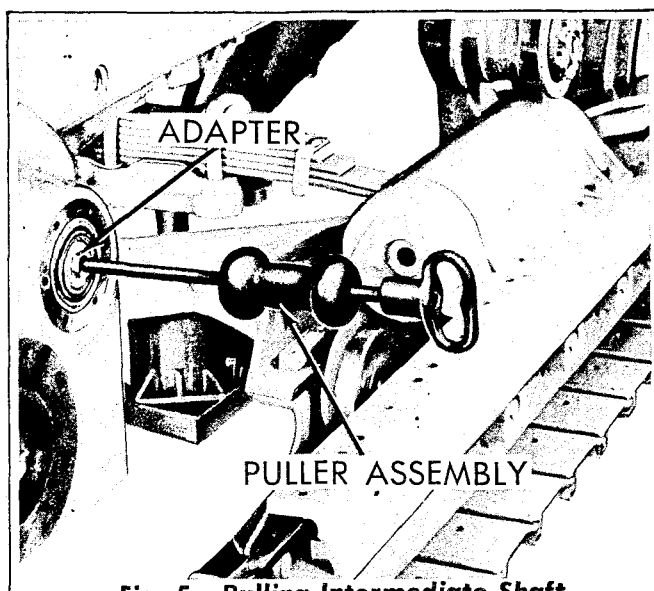


Fig. 5—Pulling Intermediate Shaft

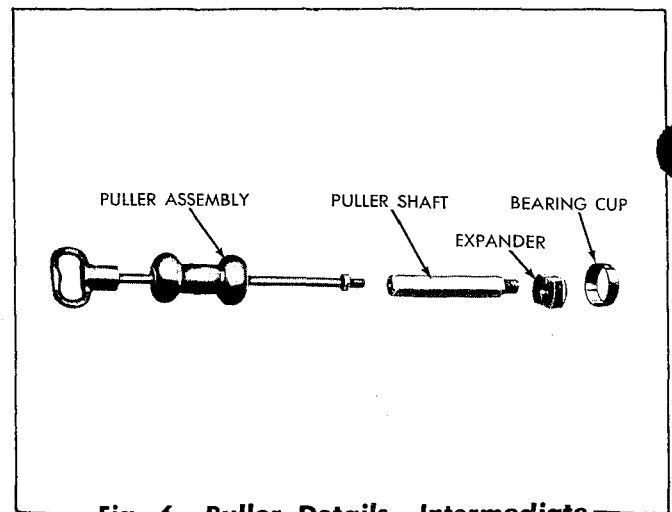


Fig. 6—Puller Details—Intermediate Shaft Inner Bearing Cup

3. If it is necessary to remove the intermediate shaft inner bearing cup, use a special puller as shown in Figure No. 6. Insert the puller expander in the cup so that the shoulder of the expander will lock against the back side of the cup. Turn the puller shaft into the expander, then install the sliding hammer assembly in the puller shaft and pull the bearing cup.

## C. Removal of Final Drive Pinion Shaft.

With the final drive sprocket shaft and the intermediate shaft removed, the pinion shaft may be removed as follows:

1. Remove the steering clutch (side on which the final drive is being disassembled). Refer to "CLUTCH REMOVAL" in Section XII.
2. Remove the final drive pinion shaft:

### 60" Tread Model.

- a. Unlock and remove the brake drum hub retaining screw, then remove the screw lock and retaining washer. Turn the retaining screw back into the hole in the pinion shaft, then install the special puller (brake drum hub and steering clutch driving hub puller) and remove the brake drum hub.
- b. Remove the capscrews attaching the pinion shaft inner bearing cage to the housing. Remove the final drive pinion shaft out bearing cover and gasket. Hold or block the pinion in place, then drive in on the pinion shaft to remove it from the housing.

When removing the pinion shaft, the inner bearing cage, inner bearing, inner race of the center bearing, and shaft snap ring will be removed with the shaft; the center bearing and outer bearing will remain in the housing.

- c. Remove the final drive pinion. Using a driving bar or punch, drive the center and the outer bearings out of the housing.

#### **44" Tread Model.**

- a. Remove the capscrews attaching the pinion shaft inner bearing cage to the housing. *NOTE:* Two (2) holes are provided

in the brake drum hub for removal of these capscrews.

- b. Remove the pinion shaft outer bearing cover and gasket. Hold or block the pinion in place, then drive in on the pinion shaft to remove it from the housing. When removing the shaft, the inner bearing cage, inner bearing, and shaft snap ring will be removed with the shaft; the outer bearing will remain in the housing.
- c. Remove the final drive pinion. Using a driving bar or punch, drive the outer bearing out of the housing.

### **3. CLEANING AND INSPECTION**

Clean and inspect all the parts thoroughly as described in "GENERAL MAINTENANCE IN-

STRUCTIONS" in Section XXI. Replace or recondition any damaged parts when assembling.

### **4. ASSEMBLY**

Before assembling the final drive, the sprocket and the intermediate shaft bearings should be adjusted correctly without the gears in place on the shafts. Proceed as follows:

#### **A. Intermediate Shaft Bearing Adjustment.**

1. Install the intermediate shaft inner bearing cup in the housing and install the bearings on the intermediate shaft if they were removed.
2. Lubricate the bearings and insert the intermediate shaft (without the gears) in position in the housing, then install the outer bearing cup. Install the outer bearing cover using the original amount of bearing adjusting shims.
3. The intermediate shaft bearings are correctly adjusted when they have 10 to 20 inch pounds pre-load or when they are adjusted .003" to .004" tight.

If an inch pound torque wrench is available, it may be used to determine the bearing pre-load. To use the torque wrench, it is necessary to have an extra outer bearing cover with a 1" hole drilled in the center. By using

this cover, a 5/8" NC capscrew may be installed in the shaft for turning. Add or remove bearing adjusting shims as necessary to obtain the correct 10 to 20 inch pounds pre-load.

If a torque wrench is not available, add or remove bearing adjusting shims until a very slight pre-load (start of pre-load) is noted when turning the shaft, then install the proper combination of shims to obtain .003" to .004" pre-load.

4. Remove the outer bearing cover and adjusting shims. Keep the adjusting shim pack with the cover. Pull the intermediate shaft and bearing using a sliding hammer type puller as shown in Figure No. 5.

#### **B. Sprocket Shaft Bearing Adjustment.**

1. Insert the sprocket shaft cover seal (neoprene) in place in the housing, then install the sprocket shaft inner cover and the inner bearing cup if they were removed.
2. Install the inner bearing and the intermediate bearing on the sprocket shaft if they were removed. Lubricate the bearings and insert

the sprocket shaft (without the gear) in position in the housing, then install the outer bearing cup. Install the bearing retainer using the original amount of bearing adjusting shims.

3. The sprocket shaft bearings (inner and center) are correctly adjusted when they have 10 to 20 inch pounds pre-load or when they are adjusted .002" to .003" tight.

If an inch pound torque wrench is available, it may be used to determine the bearing pre-load. It is necessary to have an extra sprocket shaft outer bearing nut with a smaller hex nut welded to it, so that a socket can be used for turning the shaft with the torque wrench.

If a torque wrench is not available, add or remove bearing adjusting shims until a very slight pre-load (start of pre-load) is noted when turning the shaft, then install the proper combination of shims to obtain .002" to .003" pre-load.

4. Remove the sprocket shaft bearing retainer and adjusting shims. Keep the adjusting shim pack with the cover. Pull the sprocket shaft and bearing using a sliding hammer type puller as shown in Figure No. 4.

### C. Installation of Sprocket Shaft Seal Assembly.

If the seal assemblies for the sprocket shaft were removed, the seals should be installed at this time so that the neoprene cement, used for cementing the assemblies in place, will have sufficient time to dry.

#### To Install the Inner Seal Assembly:

1. Place the sprocket shaft bearing retainer on a clean bench with the flat face of the retainer up.
2. Make certain the spring follower assembly, rubber boot, and the inner seal ring (stationary ring) are clean and dry. Install the rubber boot on the spring follower, lining up the holes in the boot with the protruding pins in the follower assembly. Hold each lip of the boot out and coat the inside of the lips and the sides of the spring follower assembly

with neoprene cement. Press the lips back in place against the spring follower assembly.

3. Coat the outer face of one lip of the rubber boot and the machined face of the bearing retainer with neoprene cement. Immediately place the boot and spring follower assembly on the bearing retainer, inserting the ends of the pins into the corresponding holes in the retainer.
4. Coat the face of the outer lip of the boot and the back face of the inner seal ring with neoprene cement. Immediately place the seal ring on the boot and follower assembly inserting the ends of the pins into the corresponding holes in the seal ring.
5. Place a weight on the seal ring, using a clean cloth between the weight and the seal ring and allow the neoprene cement to dry and set thoroughly.

*NOTE:* When coating the above parts with neoprene cement, do not use an excessive amount. The neoprene cement and solvent for thinning can be purchased from your nearest Allis-Chalmers Dealer.

6. Install the seal ring packing (rubber) in place in the seal ring, then install the outer seal ring on the sprocket hub with the chamfered side of the ring next to the sprocket.

#### To Install the Outer Seal Assembly:

1. Place the sprocket shaft bracket on a clean bench with the cover attaching side of the bracket down.
2. Make certain the spring assembly, rubber boot, and seal ring are clean and dry. Install the rubber boot on the spring assembly, lining up the holes in the boot with the protruding pins in the spring assembly. Hold each lip of the boot out and coat the inside of the lips and the sides of the spring assembly with neoprene cement. Press the lips back in place against the spring assembly.
3. Coat the outer face of one lip of the rubber boot and coat the machined face in the bottom of the counterbore in the sprocket shaft bracket with neoprene cement. Immediately

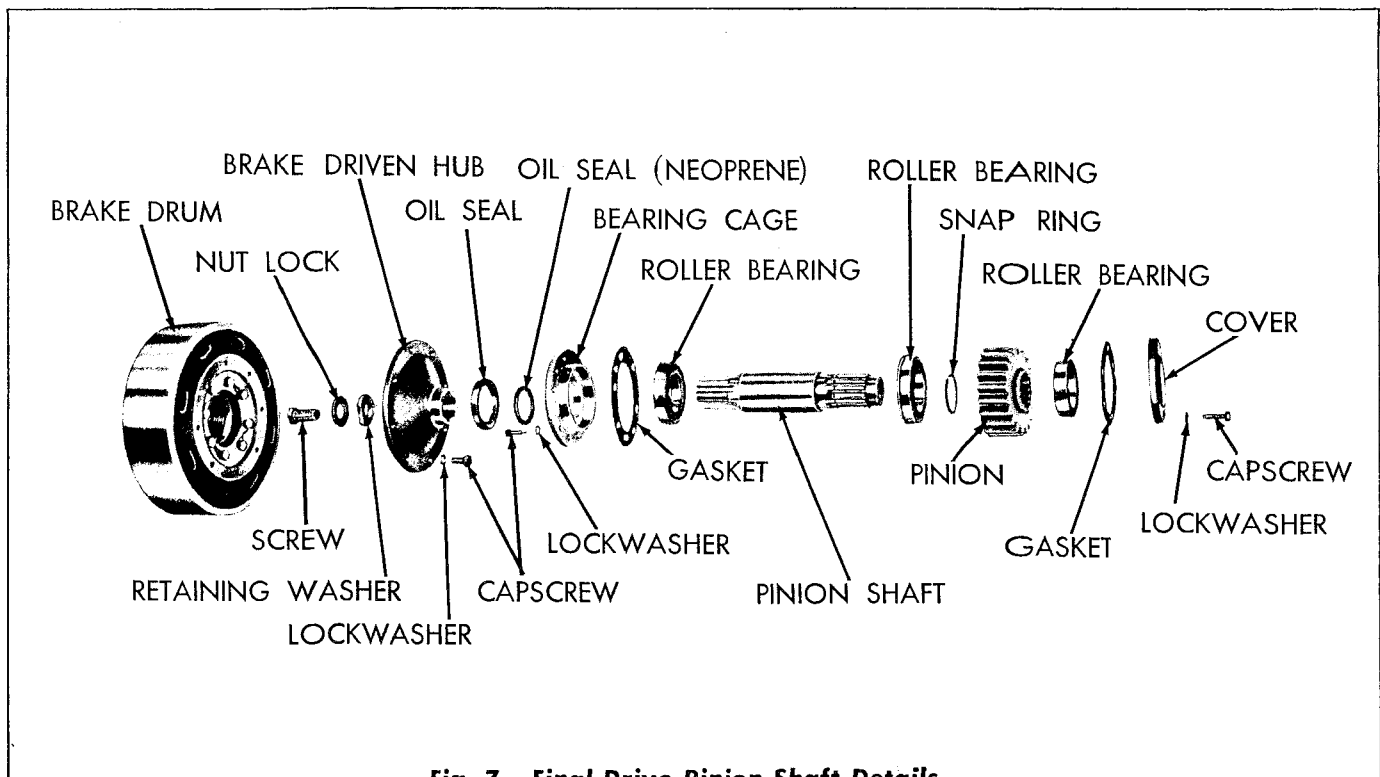


Fig. 7 - Final Drive Pinion Shaft Details

place the boot and spring assembly in the bracket inserting the ends of the pins into the corresponding holes in the bracket.

4. Coat the face of the outer lip of the boot and the back face of the seal ring with neoprene cement. Immediately place the seal ring on the boot assembly inserting the ends of the pins into the corresponding holes in the seal ring.
5. Place a weight on the seal ring using a clean cloth between the weight and the seal ring and allow the neoprene cement to dry and set thoroughly.
6. Coat one side of seal ring gasket with neoprene cement and place the gasket on the track sprocket retaining nut. Coat the other side of the gasket and the back face of the seal ring with neoprene cement and place the ring on the nut and gasket immediately.
7. Place a weight on the seal ring using a clean cloth between the weight and the seal ring and allow the neoprene cement to dry and set thoroughly.

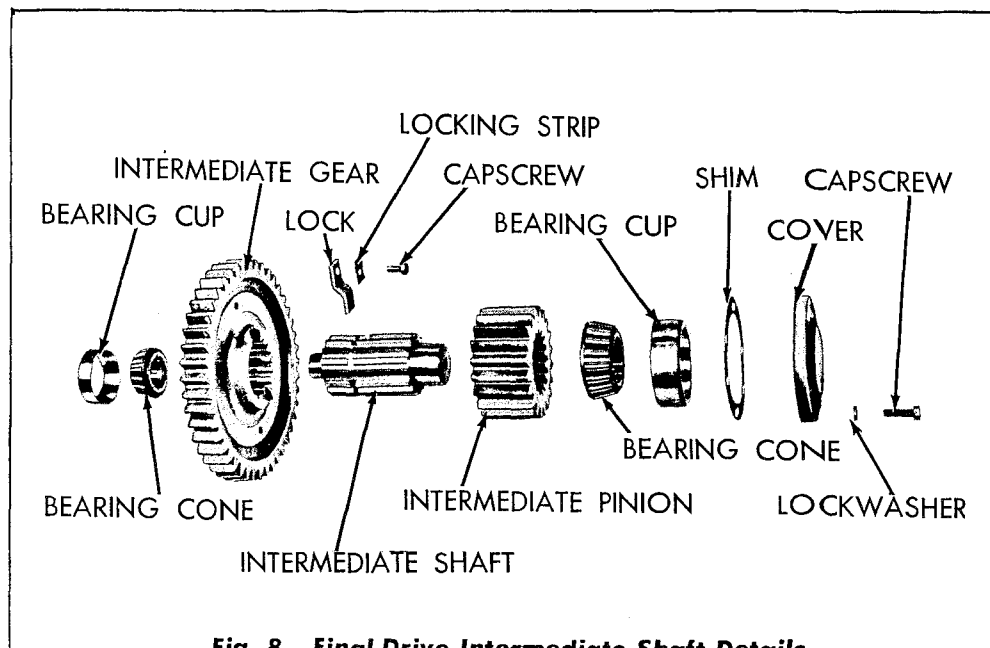
**NOTE:** When coating the above part with neoprene cement, do not use an excessive amount. The neoprene cement and solvent for thinning can be purchased from your

nearest Allis-Chalmers Dealer.

#### D. Installation of Pinion Shaft.

##### 60" Tread Model

1. Install the inner race of the center roller bearing and the inner race of the inner roller bearing in place on the shaft, if they were removed. Install these bearing races so that the shoulders of the races are next to the shoulders on the shaft. Install the snap ring on the shaft.
2. Lubricate and install the center roller bearing in position in the final drive housing.
3. Hold or block the final drive pinion (with hub side towards the outside) in position in the final drive housing, then insert the pinion shaft (from the inside of the housing) into position in the center roller bearing and the pinion.
4. Install the inner roller bearing and the pinion shaft oil seal (lip type) in the inner bearing cage. **NOTE:** Install the oil seal in the cage so that the lip is towards the roller bearing.
5. Lubricate the inner roller bearing and oil seal and install the bearing cage, with bearing cage gasket, in position in the housing. **IMPORTANT:** Make certain that the oil hole in



**Fig. 8 — Final Drive Intermediate Shaft Details**

the bearing cage and in the gasket are positioned in line with the oil hole in the housing. Tighten the attaching capscrews securely.

6. Install the neoprene oil seal (rubber seal) on the inner end of the pinion shaft and push the seal in position. Install the brake drum hub on the shaft, then install the brake drum retaining washer, lock, and capscrew. Tighten the capscrew to 300 foot pounds torque, then lock the capscrew in position.
7. Drive the inner race of the pinion shaft outer roller bearing on the shaft (shoulder of the race next to the shaft splines), then drive the outer bearing in the housing. Lubricate the outer bearing and install the outer bearing cover and gasket.

#### **44" Tread Model**

1. Install the inner roller bearing and the pinion shaft oil seal in the inner bearing cage. *NOTE:* Install the oil seal in the cage so that the lip is towards the roller bearing.
2. Lubricate the inner roller bearing and oil seal, then install the bearing cage in position on the pinion shaft. Place the inner race of the inner roller bearing on the shaft with the shoulder of race towards the outer end of the shaft. Drive or press the race into the roller bearing. Install the snap ring on the shaft. Place the bearing cage gasket in position on the cage.

3. Hold or block the final drive pinion (with hub side towards the outside) in position in the final drive housing, then insert the pinion shaft, with the bearing cage assembly, into the position in the housing and final drive pinion. Install the bearing cage attaching capscrews and tighten securely.
4. Drive the inner race of the outer roller bearing on the shaft (shoulder of race next to pinion), then drive the outer bearing in the housing. Lubricate the outer bearing and install the outer bearing cover and gasket.

#### **E. Installation of Intermediate Shaft.**

1. Hold the intermediate shaft pinion in position in the housing, then insert the shaft into the bore in the housing and start it into the pinion.
2. Hold the intermediate shaft gear in position (hub side of gear next to pinion) in the housing, then start the shaft into the gear. Hold the gears and shaft in so that the inner bearing is in position in the bearing cup.
3. Drive the intermediate shaft outer bearing cup in position in the housing. Install the bearing cover and the correct amount of bearing adjusting shims as determined in Step 3 of "INTERMEDIATE SHAFT BEARING ADJUSTMENT." Tighten the attaching capscrew securely.
4. Position the intermediate shaft gear on the

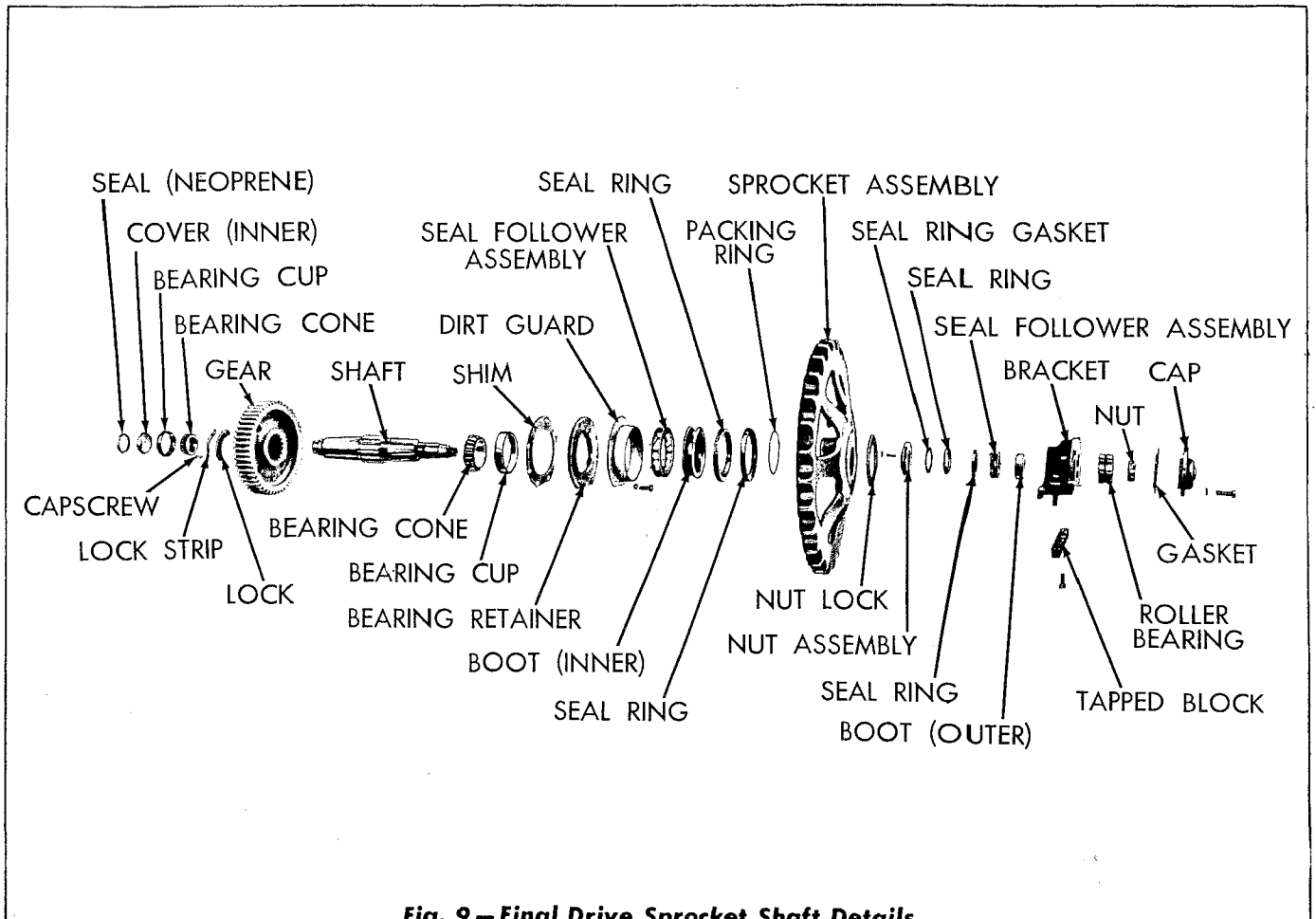


Fig. 9 — Final Drive Sprocket Shaft Details

shaft so that the gear locks may be installed on the gear and into the machined groove in the shaft. Install the two (2) gear locks, attaching capscrews, and capscrew locks. Tighten the capscrews securely and lock in position with the capscrew locks.

#### F. Installation of Sprocket Shaft.

1. Install the sprocket shaft gear (with the tapped holes for the lock capscrews towards the inner bearing cup) in the housing and block the gear in position.
2. Insert the sprocket shaft into the bore in the housing and start it into the gear. Push the shaft in so that the inner bearing is in position in the bearing cup, then drive the sprocket shaft outer bearing cup in position in the housing.
3. Install the bearing retainer, with the seal assembly attached, and the seal dirt guard in place on the housing, using the correct amount of bearing adjusting shims as deter-

mined in Step 3 of "SPROCKET SHAFT BEARING ADJUSTMENT." Tighten the attaching capscrews securely.

4. Position the sprocket shaft gear so that the gear lock may be installed on the gear and into the machined groove in the shaft. Install the gear lock, attaching capscrews, and capscrew locks. Tighten the capscrews securely and lock in position with the capscrew locks. Install the final drive compartment bottom cover and gasket. Tighten the attaching capscrews securely.
5. Lubricate the mating surfaces of the inner seal rings, then install the track sprocket (with the seal and seal ring packing in place) on the sprocket shaft. Coat the back face of the sprocket retaining nut (face which contacts the sprocket) with No. 1 Permátex or its equivalent, then install the nut. Tighten the nut to 1500 foot pounds torque. Install the sprocket retaining nut lock.

## G. Install Sprocket Shaft Bracket and Outer Bearings.

1. With the seal assembly and the outer bearing in place in the bracket, install the bracket on the sprocket shaft to a position allowing .050" to .060" clearance between the sealing surfaces of the outer seal rings. Lubricate the outer bearing with light engine oil. **IMPORTANT:** Do not allow the two (2) seal rings to contact, as this will cause a drag between the rings, thus a false reading will be obtained when checking the adjustment of the outer bearing.
2. Install the sprocket shaft outer bearing cap using the original amount of bearing adjusting shims.
3. The outer bearing is correctly adjusted when it has 5 to 9 inch pounds pre-load. A spring scale, sometimes called a fish scale, may be used to weigh the bearing pre-load. With the bracket in a horizontal position, fasten the hook of the scale to the bearing bracket and measure the distance from the point of pull to the center of the sprocket shaft. This distance must be considered when checking the bearing pre-load.

For example, if the distance from the point of pull to the center of the sprocket shaft is 5", the pull required on the spring scale should be from 1 pound to slightly under 2 pounds to obtain a bearing pre-load of 5 to 9 inch pounds.  $1 \text{ pound} \times 5'' = 5 \text{ inch pounds}$ ,  $2 \text{ pounds} \times 5'' = 10 \text{ inch pounds}$ . Add or remove bearing adjusting shims to obtain the correct bearing pre-load.

4. After the correct amount of adjusting shims has been determined, remove the sprocket shaft outer bearing cap and adjusting shims. Lubricate the sealing surfaces of the seal rings, then install the outer bearing retaining nut and tighten it securely. When tightening the nut, the bracket assembly will be pressed on the remaining distance. Install the pin to lock the retaining nut.
5. Re-install the sprocket shaft outer bearing cap and the correct amount of adjusting shims. Tighten the attaching capscrews securely.

**NOTE:** The sprocket shaft outer bearings on tractors prior to Serial Number 4126, received lubrication from the final drive compartments through rifle drilled sprocket shafts. Tractors Serial Number 4126 and above, do not have rifle drilled sprocket shafts, consequently, it is necessary to pack the sprocket shaft outer bearings with an approved grease (same grease as used for truck wheels) after repairing and assembling.

## H. Lubricate Outer Bearing After Repairing and Assembly.

1. Remove the 3/8" pipe plug from the sprocket shaft outer bearing cap.
2. Using the same lubricating gun and grease as used for lubricating the truck wheels, track idlers, and support rollers, insert the nozzle of the gun into the hole of the sprocket shaft as far as it will go (approximately 3").
3. Pump the lubricating gun until the bearing cavity is filled with grease which will be indicated when grease flows back out around the lubricating nozzle.
4. Replace the pipe plug in the bearing cap. **CAUTION:** Use the lubricating gun supplied with the tractor. **DO NOT USE A HIGH PRESSURE LUBRICATING SYSTEM AS TO DO SO MAY DAMAGE THE SEAL BOOT.**
5. Install the steering clutch and steering brake. Refer to "CLUTCH INSTALLATION" in Section XII.
6. Install the fuel tank and connect the fuel lines.
7. Using a pry bar, tip the truck frame out far enough so that the track support roller bracket will clear the end of the equalizer spring, then roll the truck frame back into position under the tractor. Lower the tractor onto the truck frame, making certain that the truck frame is positioned correctly under the tractor so that the dowel pin for the truck frame pivot shaft enters the hole in the pivot shaft pin.
8. Start the capscrews which attach the sprocket shaft bracket to the truck frame.
9. The truck frame pivot shaft caps are center punched one (1), two (2), three (3), and four

(4) so that they may be reinstalled in their original positions to match the center punch marks in the case itself. Install the caps, making certain that they are installed in their original positions. Tighten the attaching capscrews to 137 to 147 foot pounds torque.

10. Tighten the capscrews attaching the sprocket shaft bracket to the truck frame.
11. Install the capscrews which attach the equal-

izer spring pad to the truck frame. Tighten the capscrews securely.

12. Install the oil drain plug in the final drive compartment cover, then fill the final drive compartment to the proper level using the specified lubricant.
13. Couple the track. Refer to "TRACK INSTALLATION" in Section XVII.