SERVICING THE STARTER CLUTCH

1. The starter clutch may need servicing for various reasons:
   A. Too much or improper lubrication on the roller cams.
   B. Roller cams dry (no lubrication).
   C. Worn or broken components.
   D. Improper assembly.

REMOVAL

Note: All threads are right hand.

2. Remove the engine cylinder head and shroud. Discard the used head gasket.
3. Place something soft (a piece of wood or facsimile) into the cylinder. The "plug" should be 1 3/4" long to limit piston travel half way up the cylinder. When the head is back on, the plug keeps the crankshaft from turning. A 1 3/4" length of 1 x 1 works well.
4. Put the head back on (no gasket) and snug up 2 head bolts; one front and one rear. Don't mash the spark plug.
5. Remove any rear attachment. Remove any front attachment and put on the advance casting cover plate. Tilt the tractor on its nose without spilling fluid from the battery.
6. Loosen the starter mounting bolts and remove the chain.
7. Unscrew the starter bolt from the crankshaft drive nut. The crankshaft should not turn with the "plug" in the cylinder.
8. Unscrew the drive nut from the crankshaft. The entire clutch assemble comes off the crankshaft and is ready for disassembly.

DISASSEMBLY

Note: The 2 sides of the clutch assembly are referred to as engine side and operator side. The operators side is the big hub side of the sprocket plate.

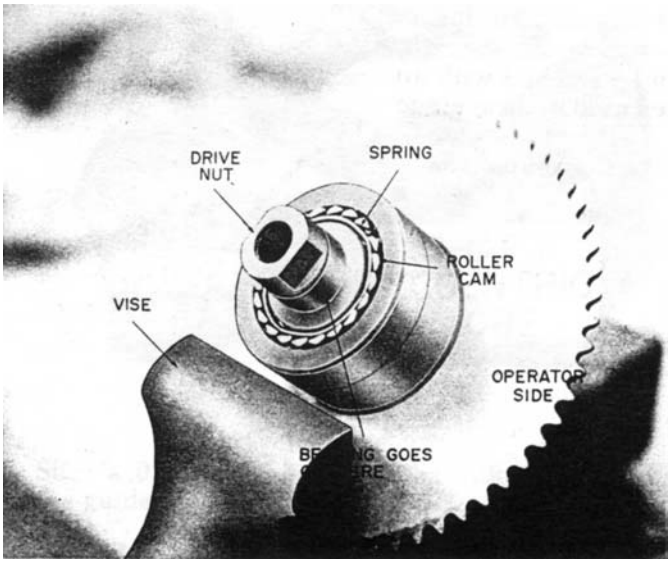

Fig. 38

9. Remove the bearing retainer and any spacer shimming from the operators side of the hub.
   Note: Read paragraphs, 11, 12 and 13 before performing paragraph 10.
10. Push out the inside assembly from the engine side. This can be done best with a press; the hammer and punch method can be used.
11. The assembly should be pushed out by the inner race of the engine side bearing. It is unlikely but the drive nut could be pushed out leaving the engine side bearing in the hub. Do not damage the threads of the drive nut.
12. As the assembly comes out, the roller cams will fall free of the hub and drive nut. There are 21 roller cams.
13. This is a good time to study the position of the roller cams. When the drive nut is about 3/4 of the way out, the ends of the roller cams can be lifted away from the bearing. Observe the ends of the roller cams. Notice how the pointed corners of all the roller cams point in a clockwise direction and also, the half round portion of each cam is next to the drive nut and the endless spring is in the notches of the cams. The unit must be reassembled in this manner. Note: This is true only if the clutch has been previously assembled properly.
14. When the assembly is fully removed from the hub, the cams will fall away from the drive nut. Remove the 2 clutch springs. Do not damage or permanently distort the springs in any way.
15. Remove the operators side bearing from the drive nut. Leave the engine side bearing on the drive nut.
16. Clean all the parts (except bearings) in solvent. Wipe the bearings clean with a cloth. Dry all the parts.

INSPECTION

17. Rotate the bearings on the fingers. If any roughness or drag spots are felt, discard the bearing and replace it with a new one. The bearing must turn free and smooth.
18. Inspect the areas of the hub and the drive nut (where the roller cams make contact) for scoring and/or corrosion. If these conditions cannot be polished off with light buffing, discard the part and replace it with a new one. Honing or "turning" of these parts will most likely take off more metal than operating tolerance will allow, leaving the part inoperative.
19. Inspect the springs for damage or distortion. The endless springs should be free of kinks or breaks. Replace any damaged springs.
20. Worn roller cams are most often the suspected cause of a failure. There are 3 normal wear points on each roller cam: 2 flat spots (end to end) on the half round portion of the cam; 1 flat spot (end to end) on the peaked ridge area of the cam. When the cams show wear of 3/32" wide or wider at the normal wear points, the cams are most likely worn out and must be replaced with new ones.

REASSEMBLY

21. Push the nut shaft (with the engine side bearing on it) into the sprocket hub until the engine side bearing has one inch distance yet to go before it

stops at the engine side bearing retainer, fig. 39.

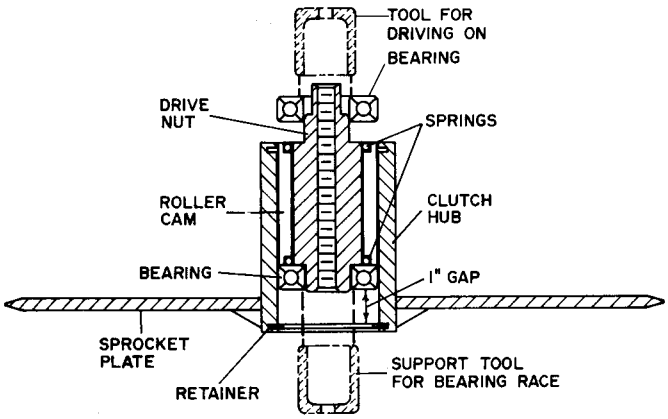

Fig. 39

22. Set the sprocket hub on a bench (operators end up) and set one spring in the roller cam cavity.
23. Lubricate the roller cam race surfaces with high quality Lithium base grease. Do not fill the cavity with grease; spread the grease around to put on a heavy coat but leave enough room for the cams. General purpose chassis grease does not meet this application.
24. Set the 21 roller cams (one at a time) into position in the hub. The half round portion goes next to the drive nut and the pointed, machined corner points in a clockwise rotation. Use a thin shanked screw driver or ice pick to guide the spring into the notch of each roller cam. Don't damage the spring.

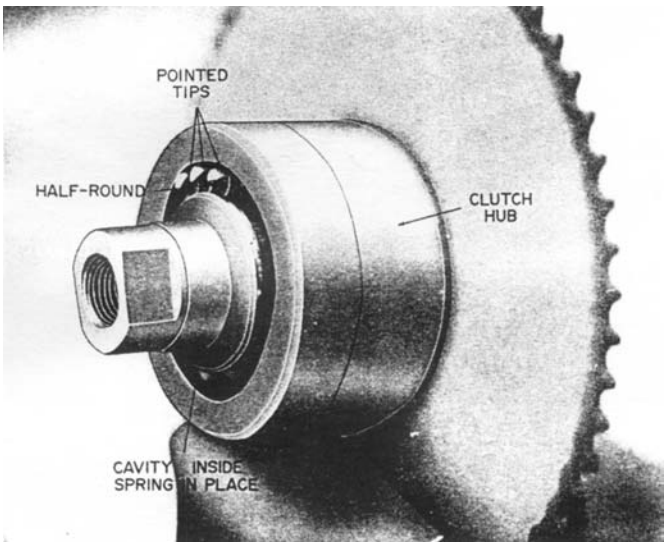

Fig. 40

25. When all 21 roller cams are set in the hub, position the second spring in the notches of the cams. Check to see that all the cams are pointing in a clockwise direction and that the spring tries to push the cams away from the drive nut, fig. 3.
26. Push the operators side bearing on the drive nut. Support the engine side of the drive nut (not the sprocket hub) so as not to move the drive nut in the hub when putting the bearing on. When the bearing is going on the drive nut, be sure that the spring is still seated in the notches of the roller cams, fig. 39.
27. Push the drive assembly into the hub. Use the inner race of the operators side bearing to drive it. Push the assembly in until it stops on the engine side bearing retainer. Do not push with the drive nut.
28. Put the shimming back on the drive nut and lock the assembly with the bearing retainer.

TESTING

29. Put the sprocket plate in a vise with the operators side toward the technician. Make the vise tight on the sprocket.
30. With a wrench, turn the drive nut in a clockwise rotation; the drive nut should turn free and smooth.
31. Attempt to turn the nut in a counter clockwise rotation; the drive nut should not turn in the hub. If enough counter clockwise torque is applied the clutch will "click" and then snap back when torque is relieved. This is the normal condition of the clutch. No slippage is permissible in the counter clockwise rotation.

INSTALLATION

32. Remove the "plug" from the cylinder. Be sure that no debris is left in the cylinder or on the head. Replace the head with a new head gasket according to standard service practice. Do not reconnect the spark plug wire at this time.
33. Clean and oil the crankshaft threads. Screw on the clutch assembly until tightening it turns the crankshaft.
34. Put the starter chain back on and adjust the starter for one inch chain deflection at the mid point of the chain, Tighten the starter bolts.

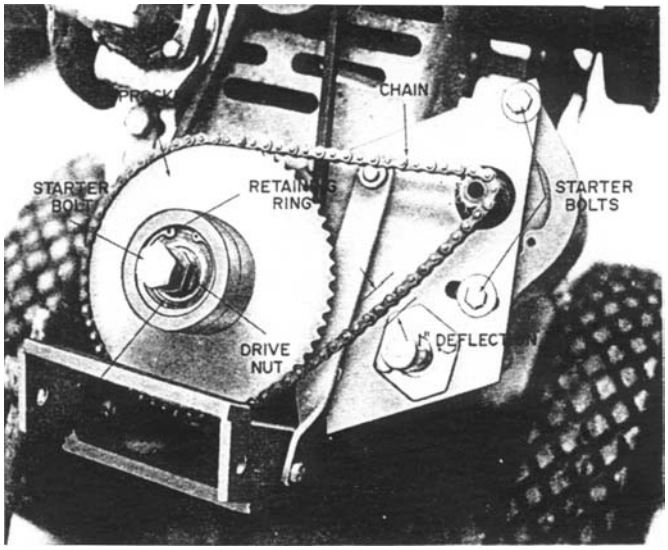

Fig. 41

35. Operate (bump) the starter in brief intervals to create initial starting torque. This sudden starting condition tightens the drive nut to the crankshaft. Continuous running of the starter does not tighten the drive nut to the crankshaft and is not necessary. The condition from off to on is the only contributing factor to tightening the drive nut. Do this 8 to 10 times to set the tightness of the drive nut to the crankshaft.
36. Screw the starter bolt in the drive nut. Hold the drive nut with a wrench and tighten the starter bolt into the drive nut.
37. Put the spark plug wire back on the spark plug. The starter clutch is now ready for full service.