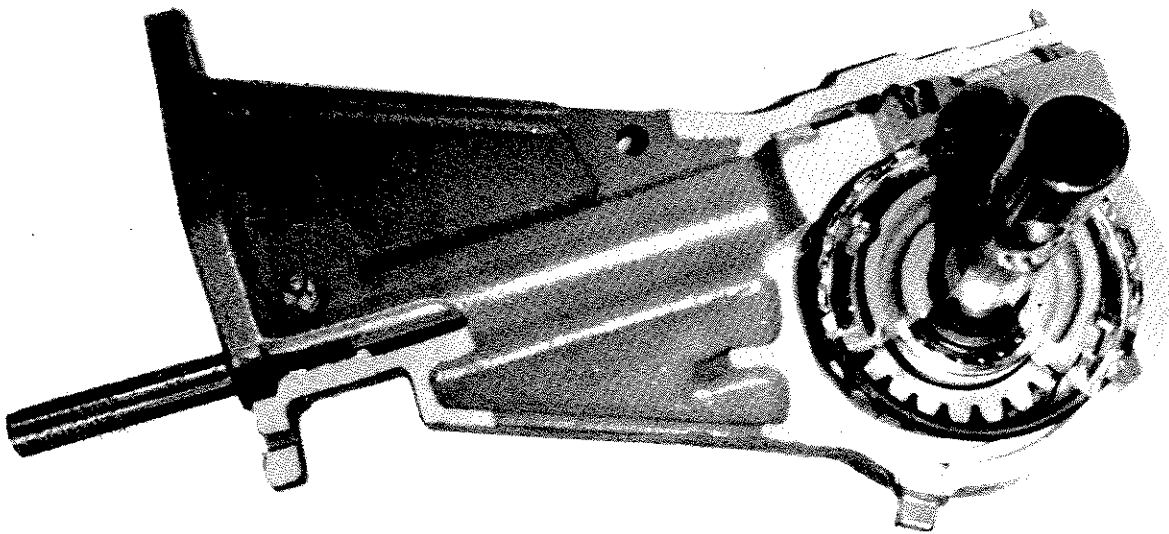


50¢

Gilson[®]

TILLER GEAR CASE



GILSON BROTHERS COMPANY, BOX 152, PLYMOUTH, WISCONSIN 53073

Printed in U.S.A.

C

C

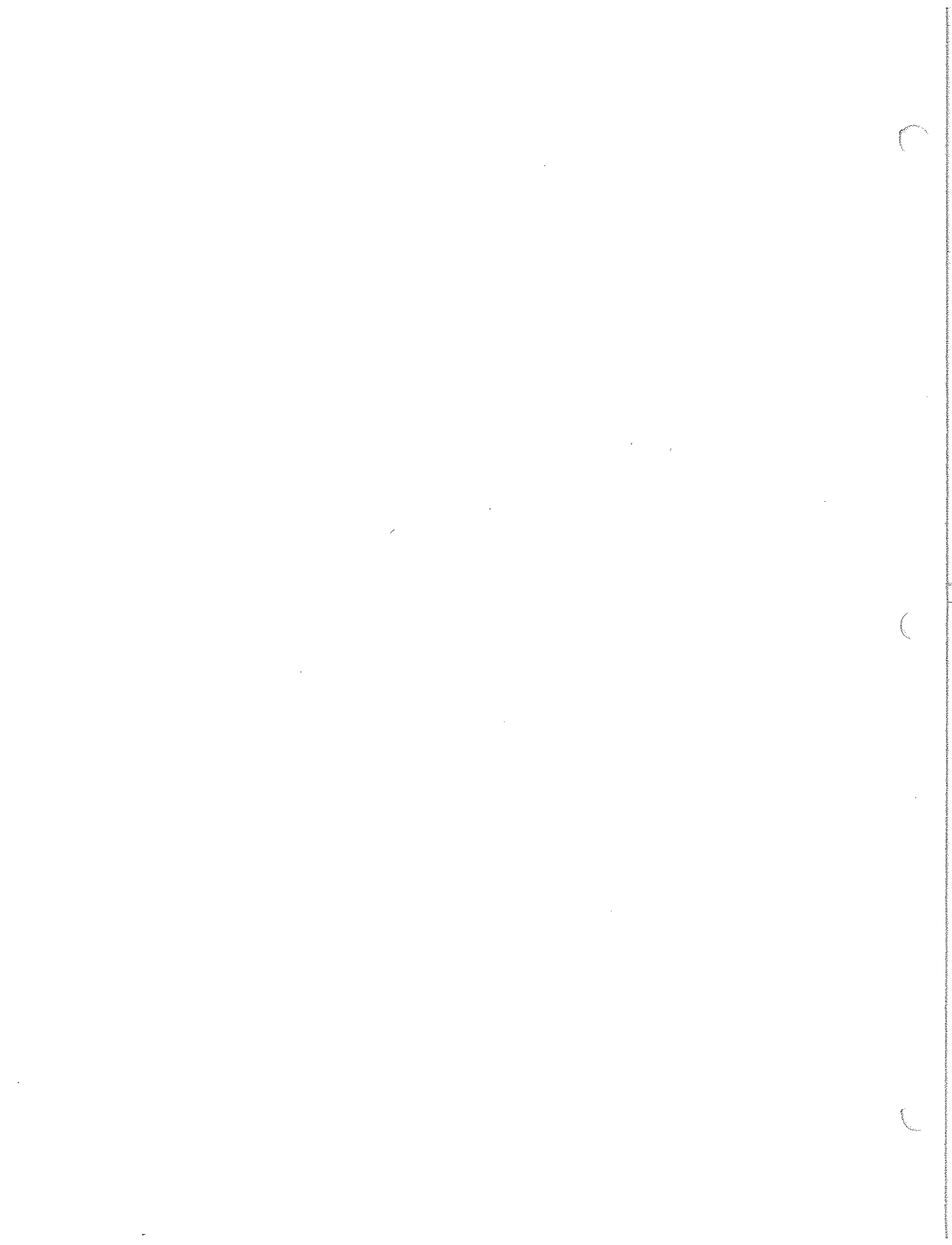
C

.....

INDEX

	<u>Page</u>
Tiller Gear Case Trouble Shooting Guide	5.3.1
Complete Tiller Gear Case Rebuild Procedure	5.4.1
(Lock Cover Type)	
Complete Tiller Gear Case Rebuild Procedure	5.5.1
(Bolt on Cover Type)	

Refer Service Bulletins for additional information



TILLER GEAR CASE TROUBLE SHOOTING GUIDE

Problem or Failure	Probable Cause	Corrective Action
1-Oil leak at tine shaft.	1A-Faulty seals--dried out, old or damaged.	1A-Replace seals. NOTE: After standing for awhile, seals on a new tiller may take a preset. With tines off ground operate unit, tines engaged, for 15 minutes. If leak per- sists replace seals.
	1B-Incorrect gear lube.	1B-Change oil. Be sure to use Gilson <u>lead base</u> SAE 140 EP oil only; Part #4890--½ Pt. can. Part #26405 Gal. can.
	1C-Excess oil in gear case.	1C-With tiller on level surface remove level plug. Oil should appear at hole. (see Fig. 1 & 2)
	1D-Breather hole in fill plug is blocked caus- ing pressure build up.	1D-Remove plug from gear case. Clean out with wire, air gun, etc. Do not clean while in gear case.
	1E-Excessive end play on tine shaft.	1E-Adjust bearings or tine shaft bushings to obtain no notice- able shaft end play but turn freely. Refer to rebuild procedure.
	1F-Tine shaft worn or scored in seal area.	1F-Replace seals and shaft.
	1G-Locking ring "O" ring faulty--dam- aged or dry.	1G-Replace "O" ring. Apply a liberal coat of grease or oil during installation.
2-Gear case over heats and turns black.	2A-Improper oil level.	2A-Refer to 1C.
	2B-Incorrect gear lube.	2B-Refer to 1B.
	2C-Improper bearing adjustment.	2C-Refer to 1E.
3-Tines do not turn.	3A-Belts broken or stretched.	3A-Replace when needed. Use shims on engine for slight- ly stretched belts. NOTE: Be sure to remove shims when installing a new belt. Align pulleys to be in line with- in 1/16 inch. Determine cause of failure and correct.

Problem or Failure	Probable Cause	Corrective Action
	3B-Tine hub bolts broken.	3B-Replace using heat treated bolts.
	3C-Drive key in pulley missing.	3C-Install new key. Align pulleys to be in line within 1/16 inch.
	3D-Idler not engaging.	3D-Check for faulty linkage or adjustment. Check for broken or disconnected idler spring. Repair as necessary.
	3E-Internal gear case damage.	3E-Disassemble gear case and inspect for broken or worn parts.
	3F-Obstruction between tine and gear case.	3F-With engine off and spark plug wire disconnected, clean obstruction.
4-Worm shaft bearing adjustment plug has hole.	4A-Incorrect bearing adjustment.	4A-Replace plug and adjust bearing for no end play and free turning worm shaft.
	4B-Worm shaft snap ring broke or missing.	4B-Refer to 3E.
5-Worm and/or worm wheel worn prematurely.	5A-Incorrect gear lube and/or level.	5A-Refer to 1B & 1C.
	5B-Excessive end play on tine shaft.	5B-Refer to 1E.
	5C-Idler spring mounted on wrong side.	5C-Must be mounted on left hand side of frame (right side for 4 speed only). If mounted on wrong side, extreme strain on internal parts will cause excessive wear.
6-Input shaft side play.	6A-Input shaft bronze bushing excessively worn.	6A-Replace bushing. NOTE: Be sure to drill grease hole through bushing after installation on vertical case tiller.

NOTE: Always replace worn or damaged parts when repairing tiller gear case. The only time a complete gear case assembly is to be installed is if all internal parts and the gear case housing is defective or damaged. The failure of all internal parts only does not warrant complete assembly replacement. Whenever inner tine hubs are removed, be sure to install the proper felt seals between tine hub and gear case. These seals are designed to prevent dirt from entering rubber seal area.

SPECIAL TOOL KIT #31752
SHOULD BE USED FOR TILLER REPAIRS

Kit consists of:

- 1 31355 Bushing Driver
- 1 31356 Seal Driver
- 1 31357 Seal & Bushing Remover
- 1 31358 Spanner Wrench

FIG. 1

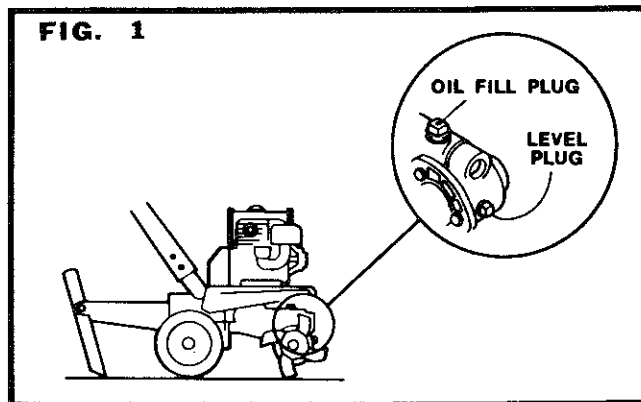
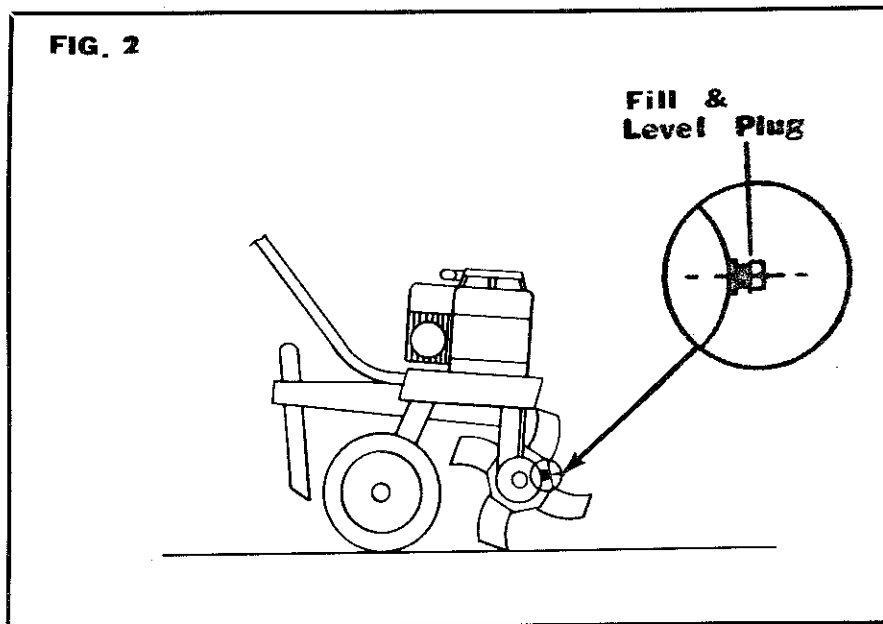


FIG. 2



Handwritten text in a rectangular box, possibly a list or notes.

Handwritten text below the first box, possibly a continuation of the list or notes.

Handwritten text below the second box, possibly a continuation of the list or notes.

Handwritten text below the third box, possibly a continuation of the list or notes.

Handwritten text below the fourth box, possibly a continuation of the list or notes.

Complete Tiller Gear Case Rebuild Procedure

(Lock Cover Type)

1. Separate engine base portion of tiller from rear section. Remove tine hub assemblies from tine shaft and remove gear case from engine base. Clean outside of case, especially in tine shaft lock ring area with solvent.
2. Remove cotter pins (Ref. W) from gear case. Using spanner wrench (tool part #31358) turn out front adjustment plug (Ref. E) and drain oil. (Fig. 1 & Fig. 6)
3. Using spanner wrench, turn out lock ring (Ref. T). Remove "O" ring (Ref. R) then turn out bearing cover (Ref. S) by using other side of wrench. (Fig. 1 & Fig. 7)

NOTE: This case has a double set of threads in this area because of the "O" ring groove. When removing the bearing cover, be careful so as not to cross thread it in the outer set of threads.

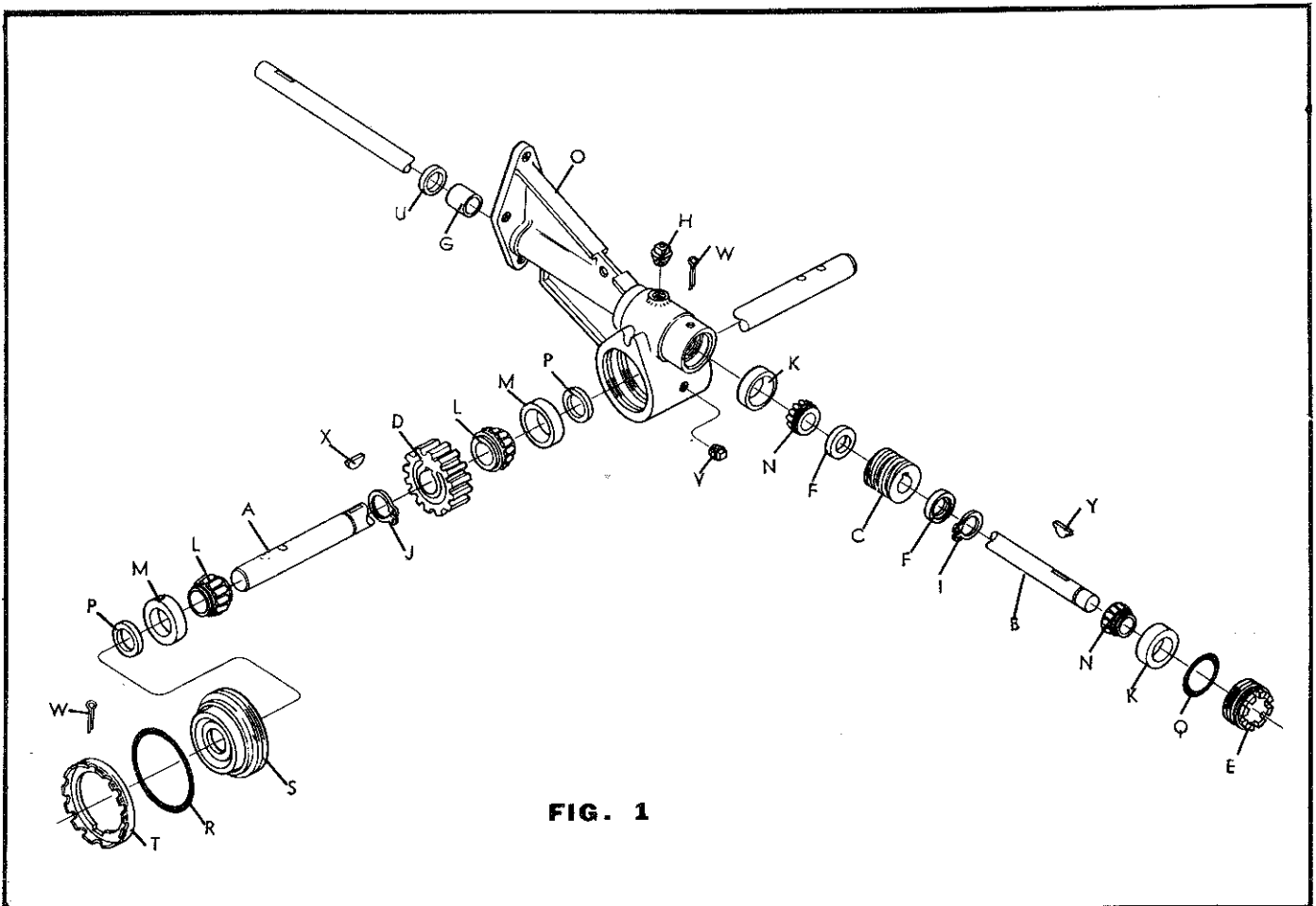


FIG. 1

4. Slide out tine shaft and worm wheel as an assembly (Ref. A & D) and inspect for wear. (Fig. 1)
 - A. Bronze worm wheel--(Ref. D) Inspect for excessive wear on teeth. They should not be worn to a sharp edge. Check for nicks, chips, cracks, etc. Inspect shaft hole and key-way for wear, cracks, etc.
 - B. Tine Shaft--(Ref. A) Inspect for wear and rough spots at seal area. Check for loose fit and/or wear at worm gear area. Replace shaft only if wear is apparent and cannot be corrected with emory cloth.
 - C. Bearings--(Ref. N & O) Thoroughly clean and inspect bearing cups and cones. Replace if rough or scored.
5. Remove input shaft and worm (Ref. B & C) by pushing assembly out through front of gear case. Inspect for wear.
 - A. Worm--Inspect for excessive wear, chips, cracks, etc. Replace if necessary.
 - B. Spacer--Inspect spacers (Ref. F) for excess wear.
 - C. Bearings--Thoroughly clean and inspect bearings. Replace if rough or scored.
6. Using solvent, thoroughly flush out internal portion of gear case. Be sure breather hole in fill plug is open. Inspect bushing at input end and replace if wear is apparent. To remove, force a small chisel between the case and bushing until bushing breaks. Re-install by tapping new bushing into case with a plastic hammer.

NOTE: On vertical style gear cases with a grease fitting, be sure to remove the fitting after bushing installation and drill a small hole through bushing. This allows for greasing bushing and shaft with hand grease gun.
(See Fig. 2)

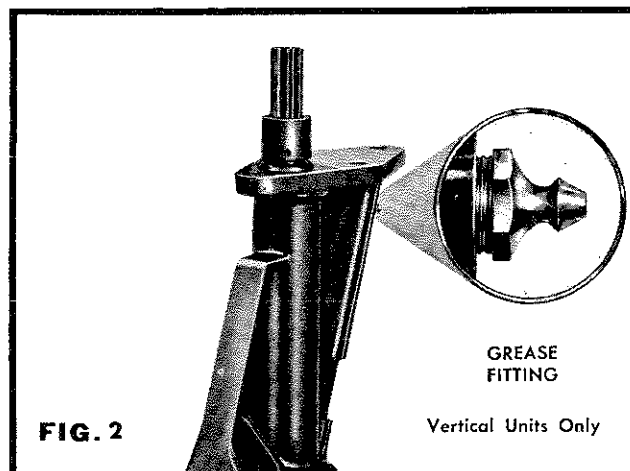
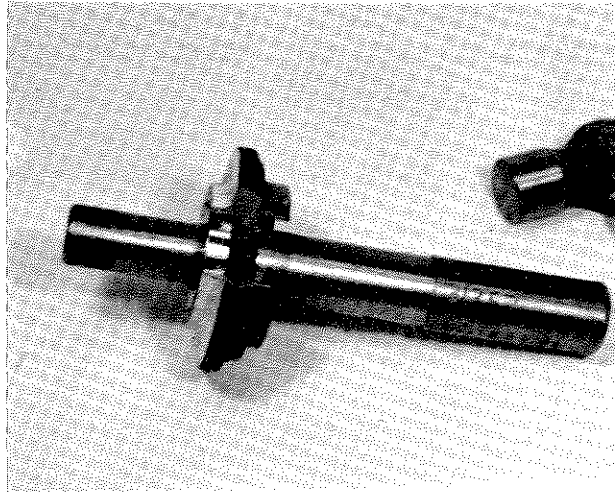


FIG. 3



**31357
SEAL and BUSHING
REMOVER**

7. Remove tine shaft seals (Ref. K) using special seal remover tool #31357. (See Fig. 3.)
8. Coat new seals with oil and install (lip to inside) in cover (Ref. P) and gear case (Ref. Q) with special seal driver tool #31356. (See Fig. 4 & 5)

31356 SEAL DRIVER

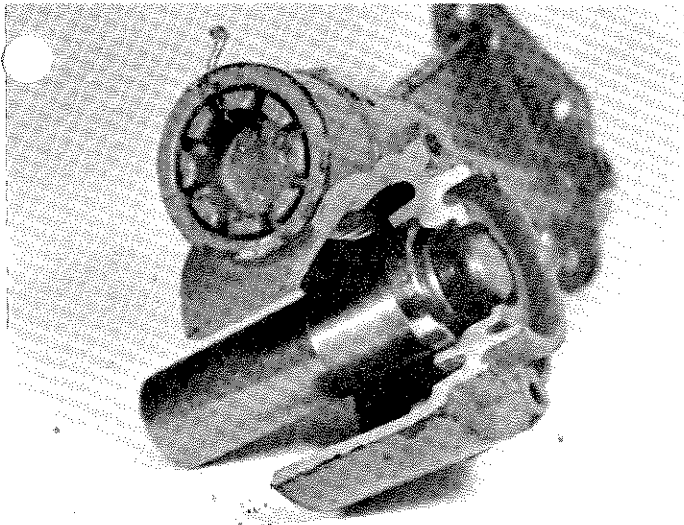


FIG. 4

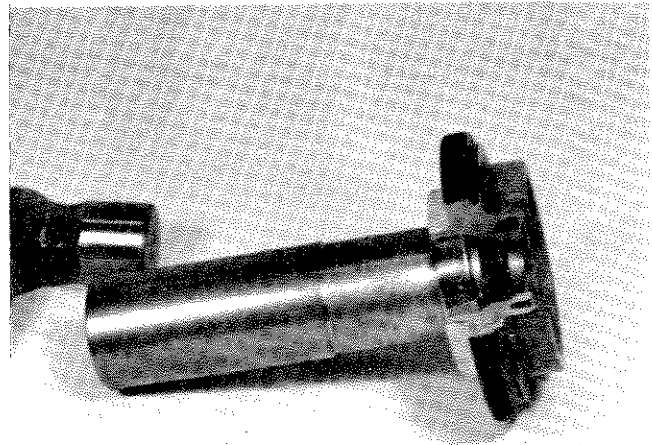


FIG. 5

9. Use file and/or emory cloth and polish rough edges off keyway on input shaft and holes on the tine shaft. Place a strip of cellophane tape over these areas to eliminate seal damage during re-assembly.

10. Replace necessary worn or broken parts and reassemble by reversing above procedure. Always install new seals, "O" rings and felt washers when repairing gear case assembly. Coat bearing cones and "O" rings with oil or grease when reassembling.

ADJUSTMENT NOTE:

Worm Shaft Bearings--Tighten adjustment plug carefully to avoid damage to "O" ring, rap the side of gear case with a hammer, retighten adjustment plug, then back plug out one notch. Turn worm shaft by hand and inspect for end play by moving shaft in and out. No noticeable end play should be found. Install cotter pin. (Fig. 6)

31358 SPANNER WRENCH

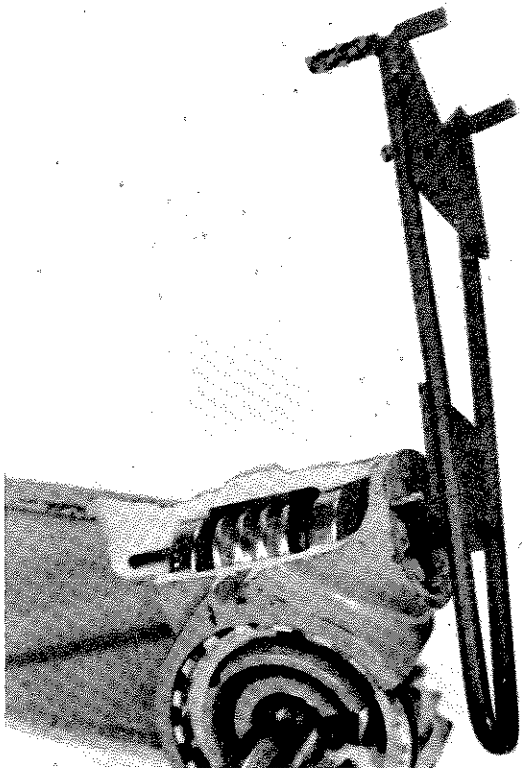


FIG. 6

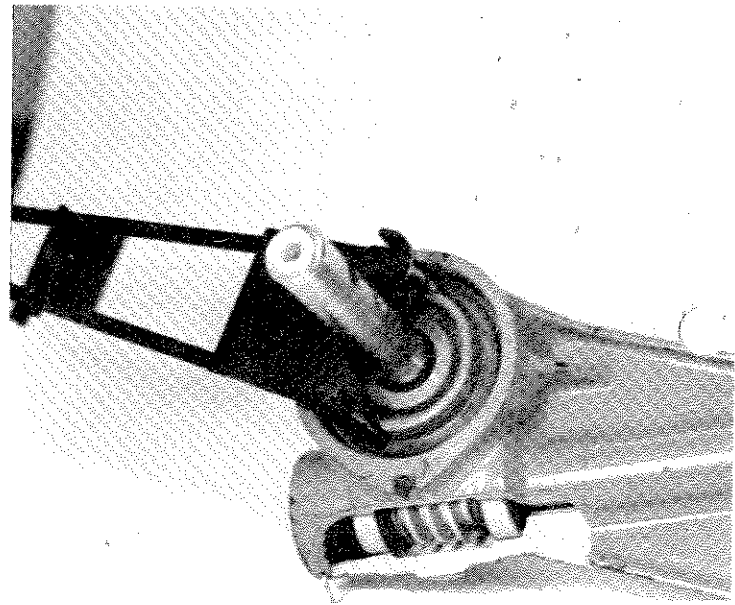


FIG. 7

Tine Shaft Bearings--Tighten the bearing cover, rap the bottom of case with hammer and retighten cover. Back off cover approximately $\frac{1}{4}$ of an inch. Push tine shaft in and out and turn input shaft by hand. If input shaft turns freely and tine shaft has no noticeable end play, bearings are correctly adjusted. Install lock ring very carefully to avoid damaging "O" ring. (Fig. 7)

11. Assemble gear case to tiller frame. Place pulley on input shaft and by using a straight edge, align it with engine pulley. Pulleys should be aligned within 1/16 inch of each other. Replace belt fingers and guides and adjust to 1/16 inch from belt with idler engaged. (See Fig. 8)

NOTE: When installing reverse belt, be sure to place belt on bottom pulley first then give belt one right hand or clockwise twist to form a figure 8, then place on engine pulley. (See Fig. 8)

12. Fill gear case to bottom of level plug hole with special SAE EP 140 weight lead base gear lube. Part number 4890 in 1/2 pint cans or #26405 in gallon cans.

Place tiller on level surface. (See Fig 9 & 10)

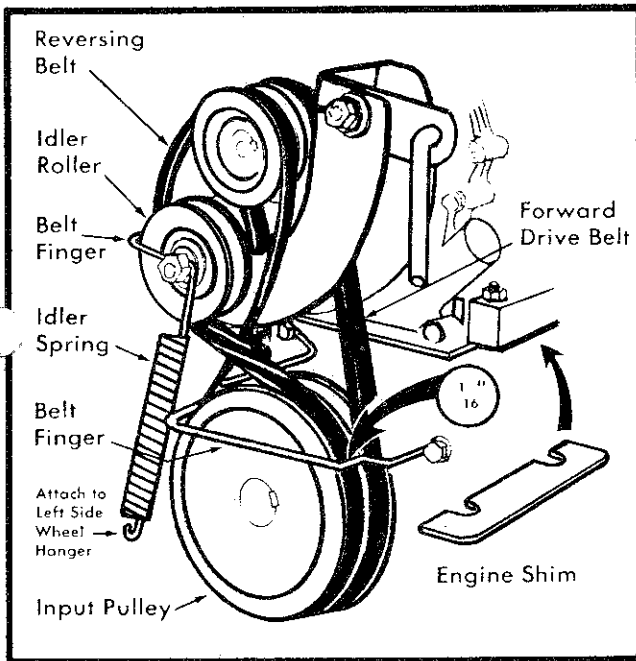


FIG. 8

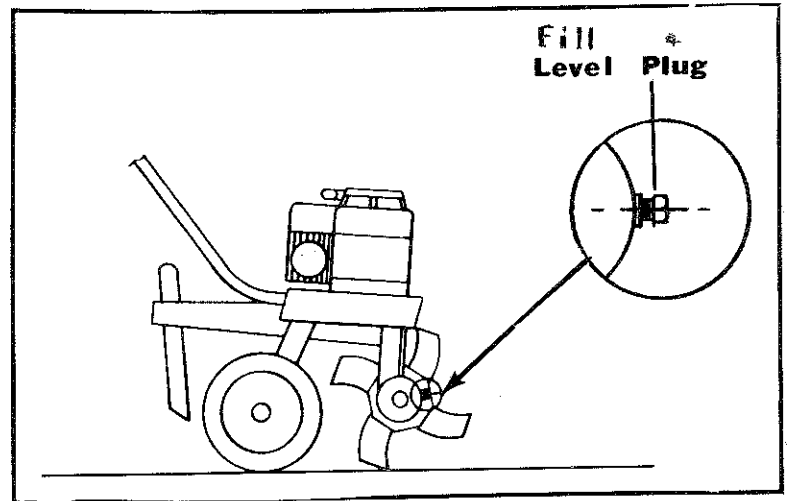


FIG. 9

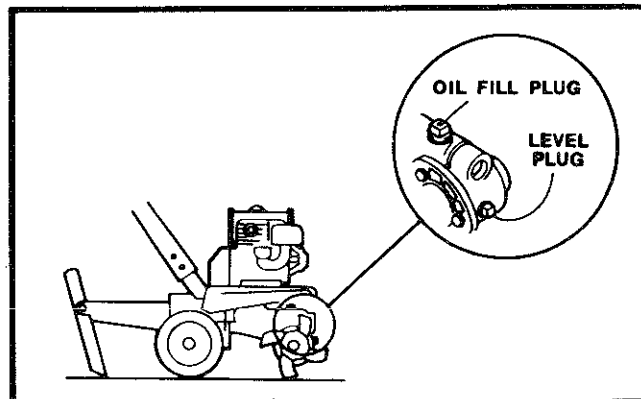
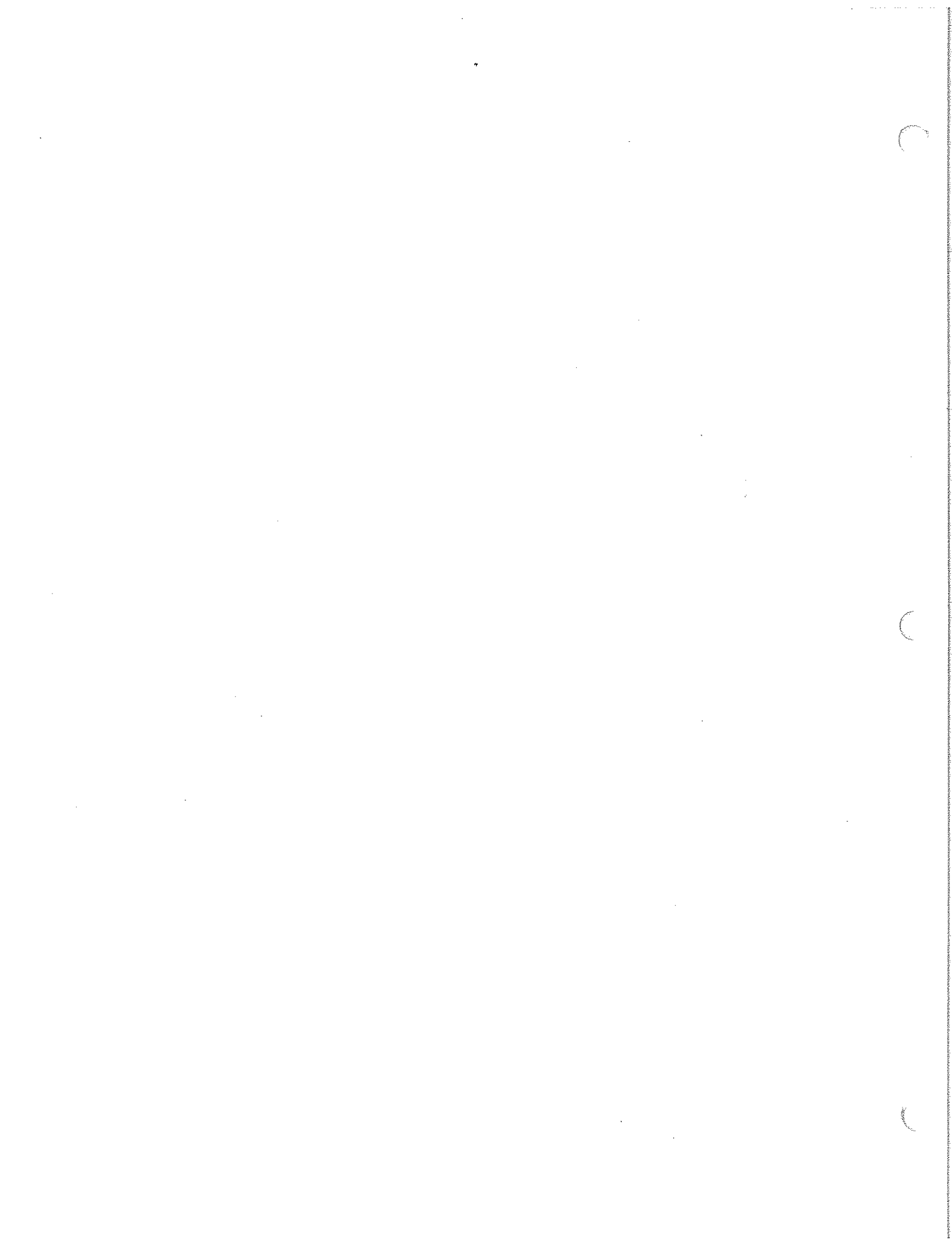


FIG. 10



Complete Tiller Gear Case Rebuild Procedure
(Bolt on Cover Type)

1. Separate front portion of tiller from rear. Remove tine & hub assemblies from tine shaft and remove gear case from tiller. Clean outside of case.
2. Remove cotter pin (Ref. Z) from end of gear case. Using spanner wrench (tool part number 31358), turn out adjustment plug (Ref.R) and drain oil.
3. Remove capscrews (Ref. X) and cover (Ref. F) from gear case.
NOTE: Since the gaskets between the case and cover are used to adjust tine shaft end play, be sure to always replace as many as are taken out. Reference "T" is .03125 thick (one used) and reference "U" is .006 thick. (1 to 3 used)
4. Slide out tine shaft and worm wheel as an assembly (Ref. A and D).

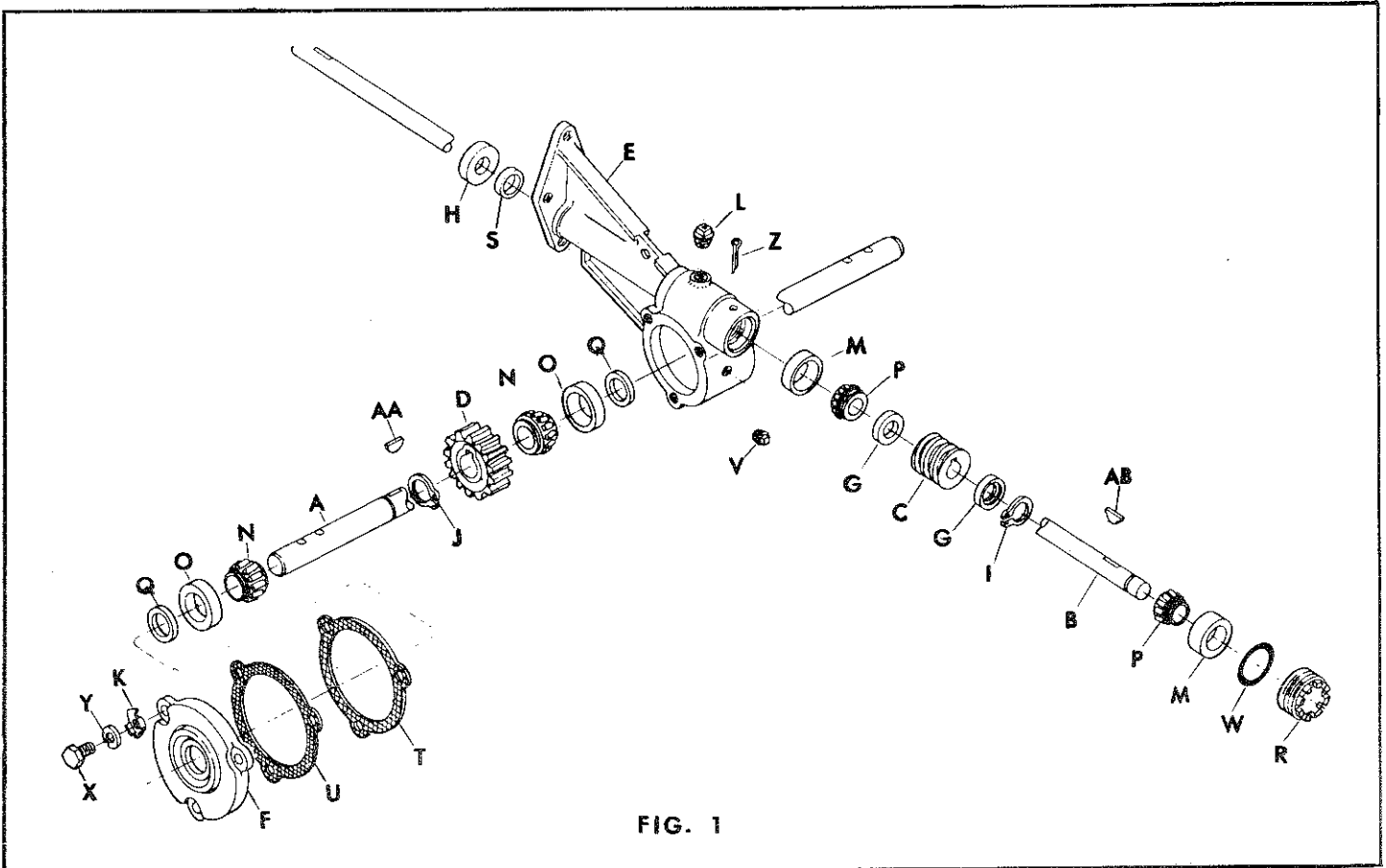


FIG. 1

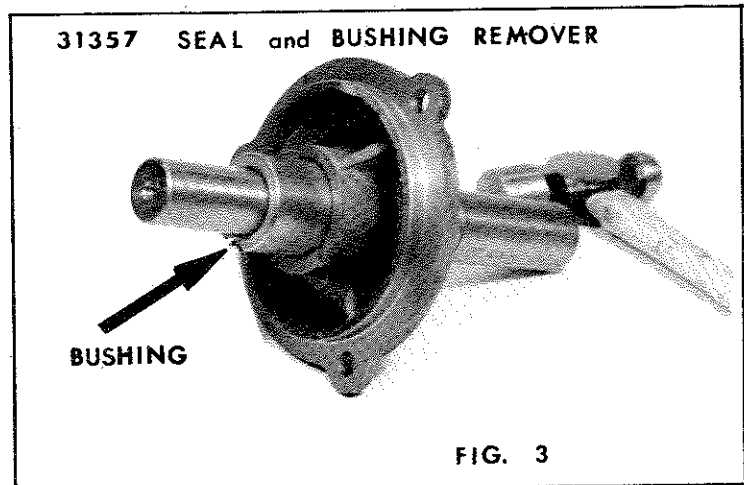
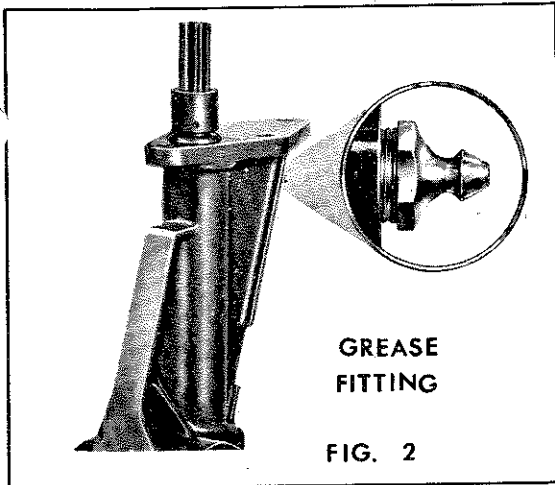
5. Inspect for wear:

- A. Bronze worm wheel - (Ref. D) Inspect for excessive wear on teeth. They should not be worn to a sharp edge. Check for nicks, chips, cracks, etc. Inspect shaft hole and keyway for wear, cracks, etc.
- B. Tine shaft - (Ref. A) Inspect for wear and rough spots at seal area. Check for loose fit and/or wear at worm gear area. Replace shaft only if wear is apparent and cannot be corrected with emory cloth.

6. Remove input shaft and worm (Ref. B & C) by pushing assembly out through front of gear case. Inspect for wear.

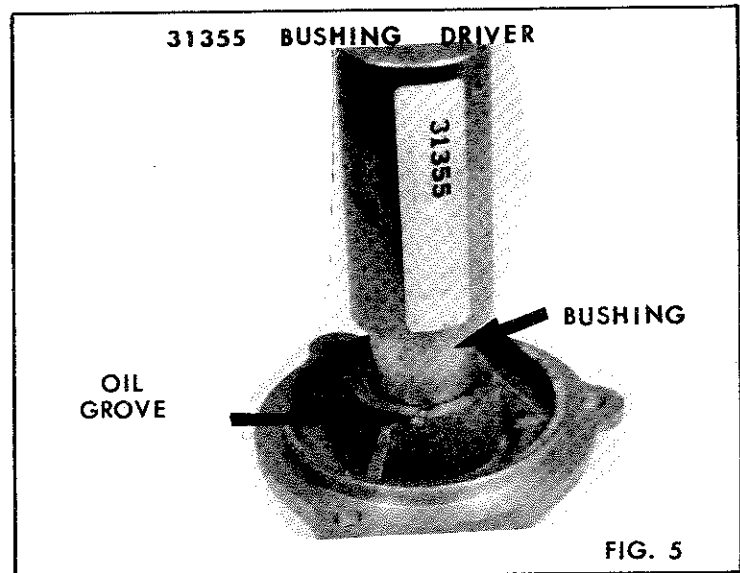
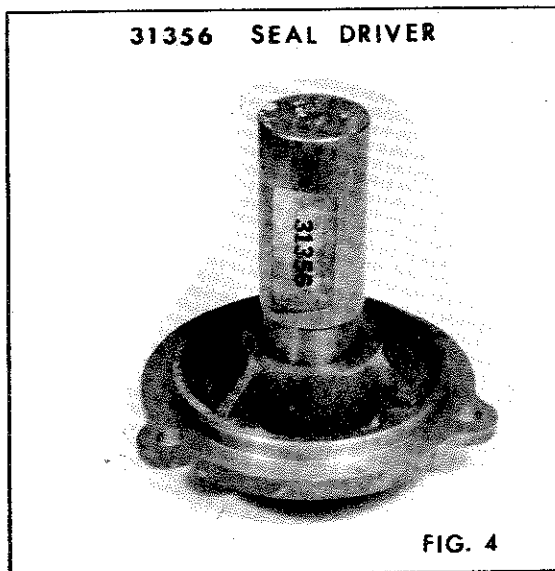
- A. Worm - Inspect for excessive wear, chips, cracks, etc. Replace if necessary.
- B. Spacer - Inspect spacer (Ref. G) for excess wear.
- C. Bearings - Thoroughly clean and inspect bearings. Replace if rough or scored.

7. Using solvent, thoroughly flush out internal portion of gear case. Be sure breather hole in fill plug is open. Inspect bushing at input end and replace if wear is apparent. To remove, force a small chisel between the case and bushing until bushing breaks. Reinstall by tapping new bushing into case with a plastic hammer.
- NOTE: On vertical style gear cases with a grease fitting, be sure to remove the fitting after bushing installation and drill a small hole through bushing. This allows for greasing bushing and shaft with hand grease gun. See Fig. 2.



8. Using special seal remover tool, part #31357, remove tine shaft seals (and bushing if bearings not used) from cover and gear case. See Fig. 3.

9. Coat new seals with oil and install in cover (Ref. F) and gear case (Ref. E) with special seal driver tool #31356. See Fig. 4.



10. Install bushings (if bearings not used) into cover and case with special bushing driver part #31355. This is a special driver that countersinks bushing to allow for proper lubrication. NOTE: Be sure bushing is replaced with oil slot to inside of case and cover. (FIG. 5)

11. Use file and/or emory cloth and polish rough edges off keyway on input shaft and holes on the tine shaft. Place a strip of cell-

ophane tape over these areas to eliminate seal damage during re-assembly.

12. Reassemble input shaft assembly and tine shaft assembly by reversing above procedures. Always install new seals, "O" rings and felt washers when repairing a gear case. Be sure to lubricate bearings, "O" rings, all moving parts, etc. when reassembling. ADJUSTMENT NOTE: Worm shaft bearings -- Tighten adjustment plug carefully to avoid damage to "O" ring, rap the side of gear case with a hammer, retighten adjustment plug, then back plug out one notch. Turn worm shaft by hand and inspect for end play by moving shaft in and out. No noticeable end play should be found. Install cotter pin. Tine Shaft Bearings -- Tighten the bearing cover, rap the bottom of case and retighten cover. Push tine shaft in and out and turn input shaft by hand. If input shaft turns freely and tine shaft has no noticeable end play, bearings are correctly adjusted. Adjust tine shaft to have no noticeable end play by removing or installing additional gaskets. (Ref. U or T)
13. Assemble gear case to tiller frame. Place pulley on input shaft and by using a straight edge, align it with engine pulley. Pulleys should be aligned within 1/16 inch of each other. Replace belt fingers and guides and adjust to 1/16 inch from belt with idler engaged. (See Fig. 6)
NOTE: When installing reverse belt, be sure to place belt on bottom pulley first then give belt one right hand or clockwise twist to form a figure 8, then place on engine pulley. (See Fig. 6)
14. Fill gear case to bottom of level plug hole with special SAE EP 140 weight lead base gear lube. Part number 4890 in 1/2 pint cans or 26405 in gallon cans. Place tiller on level surface. (See Fig. 7 & 8)

