

The tension of the horn blowing ring, or load required on the ring to blow the horn, may be adjusted by removing the ornamental cap in the center of the steering wheel, and turning the screws shown in Fig. 13, as necessary.

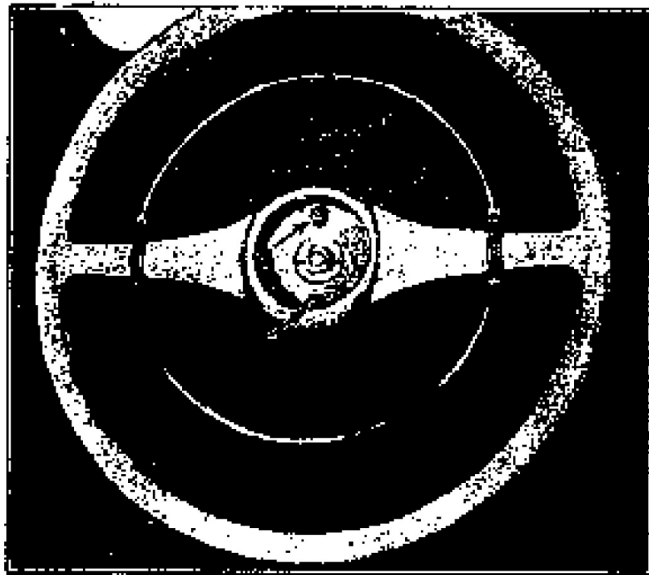


Fig. 13—Horn Blowing Ring Tension Adjustment

Turning the screws clockwise increases the tension, and counterclockwise reduces it.

STEERING GEAR ASSEMBLY CONSTRUCTION ALL CONVENTIONAL TRUCKS

The truck steering gear, Fig. 14, is of the recirculating ball type. Steering gear ratio on all conventional truck models is 19.8 to 1.

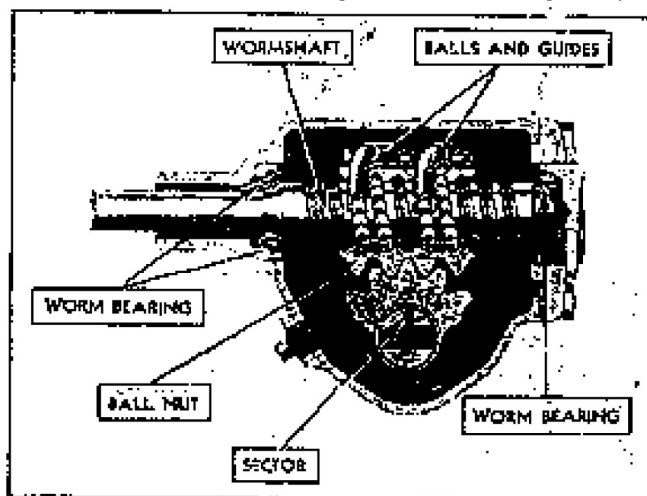


Fig. 14—Truck Steering Gear Worm, Nut and Ball Circuits

The principle working parts are the steering worm, the ball nut and the sector and shaft. Each of these parts is of heat-treated alloy steel. The

worm is welded integral to the wormshaft as shown in Fig. 14. The steering wheel is attached to the upper end of the wormshaft. The worm is mounted between two barrel type roller bearings, the lower one of which is adjustable toward the upper, for removing end-play in the wormshaft. Between the roller bearings, the worm is threaded with a precision-finished helical groove.

The ball nut is bored to clear the outside diameter of the worm as shown in Fig. 15, and the bore is threaded with a precision-finished helical groove corresponding to that in the worm. Within the length of the nut the helical grooves are filled with special steel balls of $\frac{3}{32}$ " diameter (made to specifications specially drawn up for this steering gear). There are two complete ball circuits in the nut. To complete each circuit and keep the balls from running out at the ends, the nut is fitted with two tubular ball guides, each of which deflects the balls from their helical path when they reach the end of the nut, returning them to the helical path in the nut at the start of the circuit.

The two ball guides, together with the helical grooves in the worm and nut, thus confine the balls within two distinct closed circuits, one in each end of the nut. The balls within the helical path, 30 in each circuit, constitute a thread between the worm and nut, so that when the worm is turned, the nut moves along the worm, as with an ordinary screw thread. At the same time the balls roll freely between the worm and nut, circulating within their closed circuits, so that screw motion is obtained with rolling instead of sliding contact between the parts.

Rugged rack teeth are cut in that portion of the nut which faces the sector as shown in Fig. 14.

The sector shaft is mounted in anti-friction bronze bushings. A grease seal is provided near the outer end of the sector shaft. The sector is provided with rugged teeth which mesh with the rack teeth of the nut. These teeth are not ordinary spur gear teeth, but are produced by a special process to provide true gear action between the rack and sector when the nut is located at a slight angle. With this construction, the adjustment for back-lash between the rack and sector teeth is very simple—all that is required is to shift the sector shaft slightly along its own axis by means of a convenient thrust screw, known as a lash adjuster.

The sector teeth are purposely cut in such a way that, when the sector is adjusted to remove all back-lash at the straight-ahead position of the front wheels, there will be a slight back-lash at each end of the sector travel, or when the wheels are turned far to the right or left of straight-ahead. In this way snugness of the sector in the rack teeth can be maintained with the wheels in

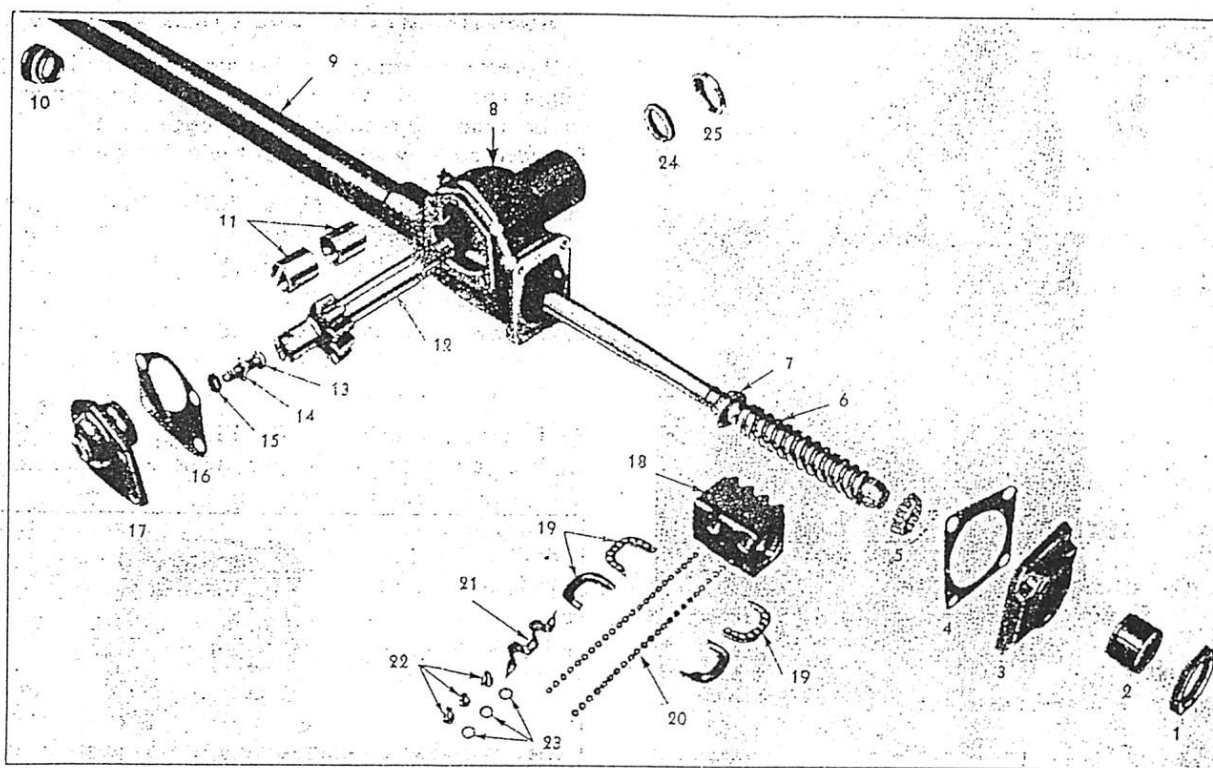


Fig. 15—Layout of Truck Steering Gear Parts

- | | |
|----------------------------------|--|
| 1 Worm Bearing Adjuster Lock Nut | 14 Lash Adjuster Shim |
| 2 Worm Bearing Adjuster | 15 Check Nut $\frac{1}{8}$ -20 |
| 3 Housing End Cover | 16 Housing Side Cover Gasket |
| 4 End Cover Gasket | 17 Housing Side Cover and Bushing Assembly |
| 5 Lower Wormshaft Roller Bearing | 18 Ball Nut |
| 6 Wormshaft Assembly | 19 Ball Guides |
| 7 Upper Wormshaft Roller Bearing | 20 Balls |
| 8 Housing | 21 Ball Guide Clamp |
| 9 Mast Jacket | 22 Bolt $\frac{1}{4}$ -20 |
| 10 Mast Jacket Bearing Assembly | 23 Lockwasher $\frac{1}{4}$ (Internal) |
| 11 Sector Shaft Bushings | 24 Sector Shaft Packing |
| 12 Sector and Shaft | 25 Sector Shaft Packing Retainer |
| 13 Lash Adjuster | |

the straight-ahead position, and still maintain perfect freedom at extreme right or left positions of the wheels.

Through the design of the teeth on this sector, the slight wearing-in of the teeth in the straight-ahead position, which may occur during the long life of the sector teeth, can be taken up by adjustment without causing a "binding" condition in the less-used portion of the sector teeth toward either end from the straight ahead position.

CAB-OVER-ENGINE TRUCKS

Cab-Over-Engine trucks are equipped with a heavier steering gear for greater strength and durability. The ratio is 23.6 to 1. The general design of this steering gear is the same as that used on the conventional trucks, recirculating ball type, except that 106 balls of $\frac{3}{16}$ " diameter (53 in each circuit) are used instead of 60 as on the other models. The greater number of balls in this model

steering gear results in more of them in working contact at all times. All parts affected by this greater number of balls, the worm, nut, worm bearings, etc., are correspondingly larger than on the conventional trucks.

This steering gear is mounted in a frame bracket at the front end of the left side rail, Fig. 16. The pitman arm is forward of the steering arm, making it necessary that the steering connecting rod be assembled with the offset to the front of the truck, with the lubrication fitting on top, to provide proper tire clearance on turns.

The wormshaft is tubular on this model and the horn wire is soldered to a contact ring pressed onto and insulated from the wormshaft as shown in Fig. 17. The wire passes through the tubular shaft and is soldered to a contact sleeve insulated from the shaft by three fiber washers at the top end of the wormshaft. A spring loaded contact brush is

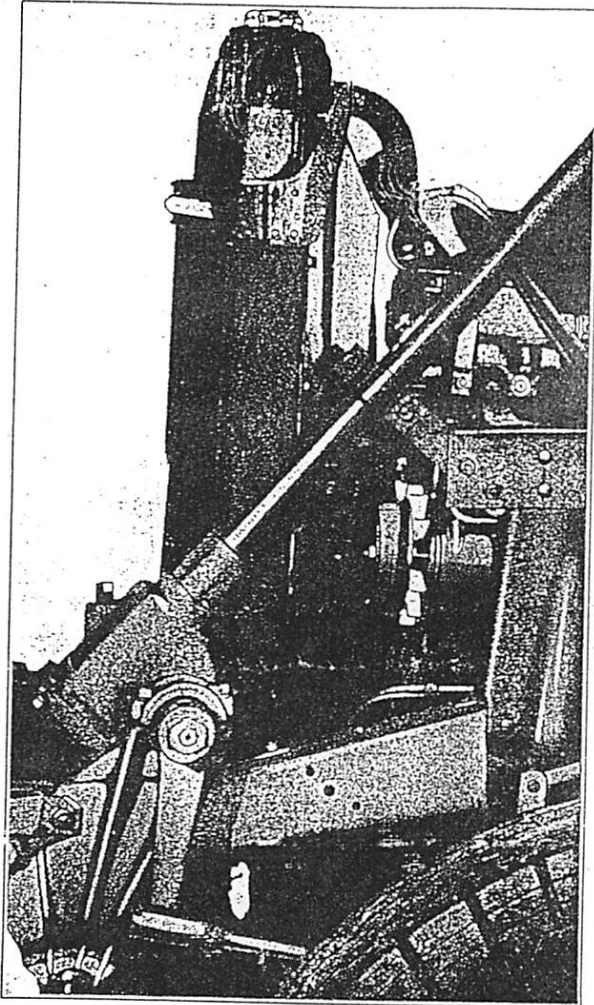


Fig. 16—Cab-Over-Engine Steering Gear Mounting

mounted in an oblong plate which covers the opening in the mast jacket just above the steering gear housing.

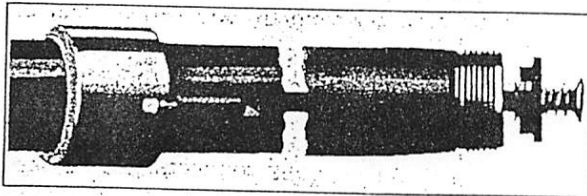


Fig. 17—Cab-Over-Engine Steering Gear Wormshaft

When this assembly is installed on the mast jacket the brush makes contact with the contact sleeve on the wormshaft. The wire from the horn is attached to a terminal on the cover plate.

All steering gear adjustments and the overhaul procedure are the same as for the conventional trucks.

ADJUSTMENTS IN TRUCK (ALL MODELS)

Correct adjustment of this steering gear is very important. While there are but two adjustments to be made, the following procedure **MUST** be followed step by step and in the order given:

1. Disconnect the steering connecting rod from the pitman arm, taking care to note relative positions of steering connecting rod parts before disturbing them.
2. Loosen the mast jacket to instrument panel bracket, making sure there is no "bind" due to the mounting.
3. Loosen the lock nut "B," Fig. 18, and turn the lash adjuster "A" a few turns in a counter-

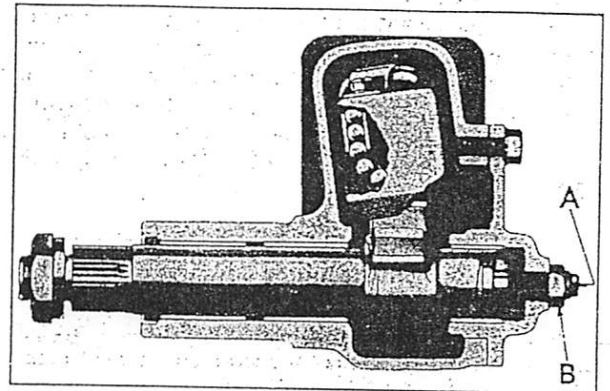


Fig. 18—Sector Adjustment Points

clockwise direction. This removes from the worm bearings the load imposed by close meshing of rack and sector teeth. Turn the steering wheel gently in one direction as far as it will go, then back away about one turn.

CAUTION—Do not turn steering wheel hard against stops when steering connecting rod is disconnected as damage to ball guides may result.

4. Using J-544 steering gear checking scale measure the pull at the rim of the steering wheel required to keep the wheel in motion. This should be between 1 and 1½ pounds.

NOTE—A line through the length of the scale should be kept at right angle to a spoke of the steering wheel while making this check.

When the pull necessary to keep the wheel moving does not lie between the limits given above, adjustment of worm bearings is necessary.

5. To adjust the worm bearings, loosen locknut "C," Fig. 19, and turn worm bearing thrust screw "D" until there is no noticeable end-

play in wormshaft. Check pull at wheel rim as outlined above, readjusting, if necessary, to obtain proper pull. Tighten locknut "C" and recheck pull, as it must lie between the limits specified after the locknut is tightened.

If the gear feels "lumpy" in turning the wheel after adjustment of worm bearings, this indicates damage in the bearings due to severe impact or to improper adjustment, and the assembly must be disassembled for replacement of damaged parts. Instructions for disassembly follow under the heading "Repair Operations."

6. Make sure that it will not be necessary to spring the steering column in attaching it to the instrument panel. It may be necessary to loosen the steering gear mounting bolts and shift the steering gear slightly. Tighten mounting bolts and the nuts on the mast jacket clamp. Then recheck the pull at the steering wheel rim. If this has increased very much, this indicates there is still a sprung condition in the column, which must be corrected before proceeding with the adjustment.
7. After proper adjustment of the wormshaft end-play is obtained, and all mounting bolts securely tightened, adjust lash adjuster "A," Fig. 18. First turn the steering wheel gently from one stop all the way to the other, carefully counting the total number of turns. Then turn wheel back exactly half way to center position. Mark wheel at top or bottom center with a piece of tape. Turn lash adjuster "A" clockwise to take out all lash in gear teeth, and tighten lock nut "B." Check pull at wheel rim with checking scale as before, taking the highest reading of the checking scale as the wheel is pulled through center or straight ahead position. This should be between 2 and 2½ pounds. Readjust, if necessary, to obtain proper pull. Tighten lock nut "B" and recheck pull as it must lie between the specified limits after the lock nut is tightened.
8. Reassemble steering connecting rod to pitman arm.

REPAIR OPERATIONS

Steering Gear Removal (Conventional Trucks)

Repair operations on the steering gear require that it be removed from the truck. To remove the steering gear from the truck, proceed as follows:

1. Remove the floor and toe boards.
2. Remove the clevis pin from the brake lever pull rod at the idler lever.

3. Remove the steering wheel, using the steering wheel puller, J-1618. Remove mast jacket to instrument panel bracket and disconnect the horn wire.
4. Remove the steering connecting rod and pitman arm, using puller J-1025 for the pitman arm.
5. Remove the housing mounting bolts.
6. Remove the two rear bolts and one side bolt which attach the left engine side pan.

The steering gear assembly can now be pulled up over the pedals and out the left door.

STEERING GEAR REMOVAL (CAB-OVER-ENGINE TRUCKS)

To remove the steering gear from the Cab-Over-Engine truck, proceed as follows:

1. Open hood, remove grille.
2. Remove the floor and toe pans on left side of driver compartment. Remove horn button and steering wheel using puller J-1618 and special centering adapter. Remove the wormshaft key and the spring which contacts the lower hub of the steering wheel and mast jacket bearing. Remove the mast jacket to instrument panel clamp.
3. Disconnect the steering connecting rod from the pitman arm. Remove the pitman arm nut and the pitman arm using puller J-871.
4. Remove the two screws attaching the horn wire terminal plate to the mast jacket just above the steering gear housing. Remove the two bolts from the mast jacket to sub-frame brace.
5. Remove the two cap bolts at the steering gear housing mounting bracket. Remove the steering gear assembly from the front of the truck.

Steering Gear Disassembly

As with any ball or roller bearing unit, the steering gear parts must be kept free of dirt. Clean paper or rags should be spread on the bench before starting disassembly of the steering gear.

1. Loosen the lock nut on the end of the sector shaft, "B" Fig. 18. Then turn the lash adjuster "A" a few turns counterclockwise. This will remove the load from the bearings caused by the close meshing of the rack and sector teeth.
2. Loosen the lock nut "C," Fig. 19, on the worm bearing thrust screw "D" and turn the thrust screw counterclockwise a few turns.

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3. Place a pan under the assembly to catch the lubricant and remove the bolts attaching the side cover to the housing.

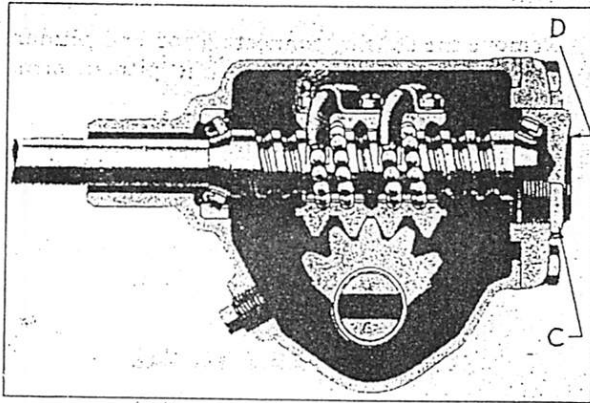


Fig. 19—Worm Bearing Adjustment Points

4. Pull the side cover, with the sector and shaft, from the housing.

NOTE—If the sector does not clear the opening in the housing easily, turn the wormshaft by hand until the sector will pass through the opening in the housing.

5. Place the housing in a bench vice and remove the lower end cover and lower worm bearing.

NOTE—Do not clamp the housing too tightly in the vice as damage may result from excessive pressure.

6. Draw the wormshaft and nut assembly from the housing. Lay this assembly flat on the bench so that the nut will not thread off either end of the worm. Damage will be done to the ends of the ball guides if the nut is allowed to rotate until stopped at the end of the worm.
7. Remove the lock nut from the lash adjuster and unscrew the lash adjuster from the side cover. Slide the lash adjuster out of the slot in the end of the sector shaft.

Disassembly of Ball Bearing Nut

As a rule, disassembly of the ball bearing nut will not be necessary—if it is perfectly free with no indication of “binding” or tightness when rotated on the worm. However, if there is any indication of “binding” or tightness, the unit should be disassembled and inspected.

1. Remove the screws and clamp retaining the ball guides in the nut. Draw the guides out of the nut.
2. Turn the nut upside down and rotate the wormshaft back and forth until all the balls have

dropped out of the nut into a clean pan. With the balls removed the nut can be pulled end-wise off the worm.

Inspection

Wash all parts in clean gasoline or other cleaning fluid. Dry them thoroughly with clean rags. With a magnifying glass, inspect the roller bearing cones, worm and nut grooves and the surfaces of all balls for signs of indentation. Also check for any signs of chipping or breakdown of the surfaces.

Any parts which show signs of damage should be replaced. Balls must be replaced with Genuine Chevrolet Parts made according to special specifications for this steering gear. No non-genuine balls should be used regardless of grade or quality.

Inspect the sector shaft for wear and check the fit of the shaft in the housing bushings.

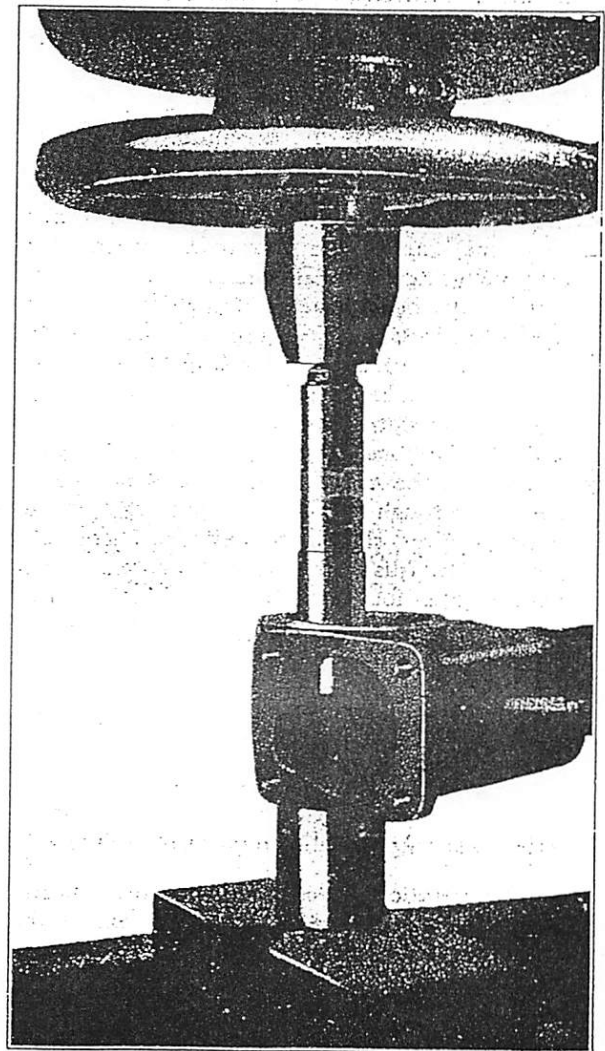


Fig. 20—Replacing Sector Shaft Bushings

Worn sector shaft bushings may be removed and replaced with special driver J-1614 on conventional models, and with J-1615 on Cab-Over-Engine models, Fig. 20. The bushings are machined to permit pressing them into the housing without reaming.

Inspect the fit of the pilot on the end of the sector shaft in its bushing in the side cover. If this bushing is worn, a new side cover and bushing assembly should be installed as it is not practical to replace this bushing in the Service Department.

Check the ball guides for any damage at the ends where they deflect or pick the balls from their helical path. Any damaged guides should be replaced.

Reassembly of Ball Nut

1. Place the wormshaft flat on the bench and slip the nut over the worm with the ball guide holes UP, Fig. 21. Align the grooves in the worm and nut by sighting through the bottom of the ball guide holes.

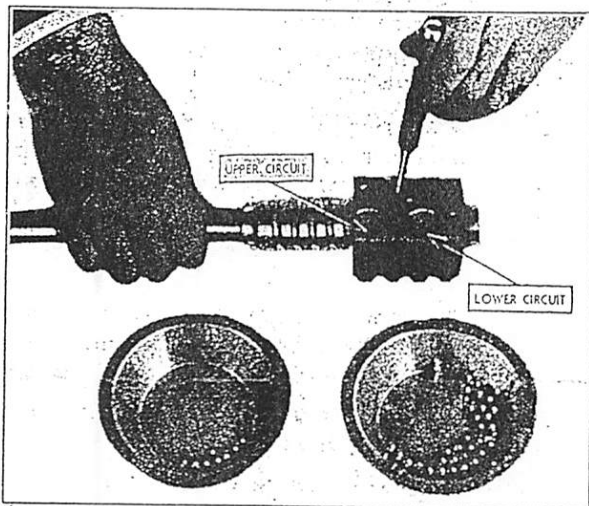


Fig. 21—Filling Ball Circuits in Nut

2. Count 30 balls (.53 on C.O.E. models) into a suitable container. This is the proper number of balls for one circuit. Drop the counted balls from the container into one of the guide holes while turning the worm gradually away from that hole. Continue until the ball circuit is full from the bottom of one guide hole to the bottom of the other—or until stopped by reaching the end of the worm.

NOTE—In cases where the balls are stopped by the end of the worm, hold down those balls already dropped into the nut with the blunt end of a clean rod or punch, Fig. 21, and turn the worm in the reverse direction a

few turns. The filling of the circuit can then be continued. It may be necessary to work the worm back and forth, holding the balls down first in one hole then the other, to close up the spaces between the balls and fill the circuit completely and solidly.

3. Lay one half of a guide, groove UP, on the bench and place the remaining balls from the count container in it, Fig. 22. The number of balls remaining should just fill the guide.

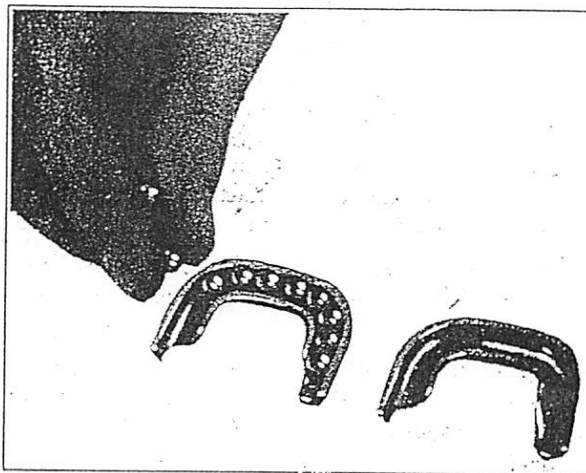


Fig. 22—Filling Ball Guides

4. Close this half of the guide with the other half. Hold the two halves together and plug each open end with clear vaseline or heavy grease so the balls will drop out.
5. Push the guide into the guide holes of the nut as shown in Fig. 23. This completes one circuit of balls. If the guide does not push all the way down easily, tap it lightly into place with the wooden handle of a screw driver.

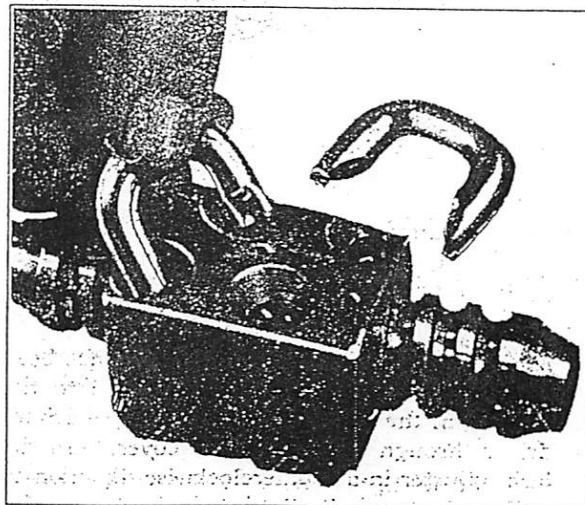


Fig. 23—Removing or Replacing Ball Guides

6. Fill the second ball circuit in the same manner as the first.
7. Assemble the ball guide clamp to the nut, being sure to use lock washers under the clamp screws and set the screws up TIGHT.

Check the assembly by rotating the nut on the worm to see that it moves freely. Do not rotate the nut to the end of the worm threads and thereby damage the ball guides. If there is any "stickiness" in the motion of the nut, some slight damage to the ends of the ball guides may have been overlooked.

Assembling Steering Gear

1. Lay the wormshaft and nut assembly flat on the bench to make sure that the nut does not run to the end of the worm.
2. Place the upper roller bearing over the wormshaft. Then thread the wormshaft into the housing.
3. Back the worm bearing thrust screw out of the lower end cover a few turns. Install the lower bearing. Assemble the end cover to the housing, using a new gasket.
4. Assemble the lash adjuster with shim in the slot in end of sector shaft. Check the end clearance which should not be greater than .002", Fig. 24. For the purpose of adjusting this

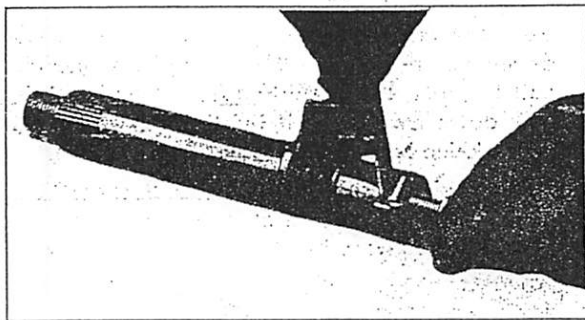


Fig. 24—Checking Sector Shaft Lash Adjuster End Clearance

end clearance, a steering gear lash adjuster shim unit, Part No. 605142, is available. It contains four shims: .063", .065", .067", and .069" thick.

5. After the lash adjuster end clearance has been adjusted start the sector shaft pilot into the bushing in the side cover. Then, using a screwdriver through the hole in the cover, turn the lash adjuster in a counterclockwise direction to pull the sector shaft pilot into its bushing as far as it will go.

6. Rotate the wormshaft by hand until the ball nut is about in the center of travel. This is to make sure that the rack and sector will engage properly, with the center tooth of the sector entering the center tooth space of the nut.
7. Push the side cover assembly, including the sector shaft and side cover gasket, into place. After making sure there is some lash between the rack and sector teeth, assemble and tighten the side cover bolts.

Adjustment of Steering Gear on Bench

1. Tighten the worm bearing thrust screw until all wormshaft end-play has been removed. Then tighten the lock nut.
2. Install the steering wheel on the wormshaft temporarily. Carefully turn the steering wheel all the way in one direction and then back about one turn.
3. Using a J-544 steering gear checking scale, at right angle to one spoke at wheel rim, measure the pull required to keep the wheel in motion. This should be between 1 and 1½ pounds. If necessary, adjust the worm thrust screw until the proper pull is obtained.
4. Turn the steering wheel from one stop all the way to the other, counting the number of turns. Then turn the wheel back exactly half the number of turns to the center position and mark the wheel at the top or bottom with a piece of tape.
5. Turn the sector lash adjuster screw clockwise to remove all lash between rack and sector teeth. Tighten the lock nut.

NOTE—Be sure adjustment is not changed while tightening the lock nut.

6. Using the J-544 steering gear checking scale, check the pull at the rim of the steering wheel. Take the highest reading on the scale as the wheel is pulled through the center position. This should be between 2 and 2½ pounds.
7. If necessary, readjust the lash adjuster screw to obtain the proper pull. Tighten the lock nut and again check for proper pull.
8. Fill the assembly with Steering Gear, "All Purpose," or "Universal" gear lubricant to the level of the filler plug hole and replace the filler plug.

When the proper adjustments have been made and the steering gear lubricated, the assembly is ready to be replaced in the truck. In doing this make sure that no "bind" is set up when tightening the mounting bolts and mast jacket to instrument panel clamp.