

Section H

REAR AXLE

(C - 15)

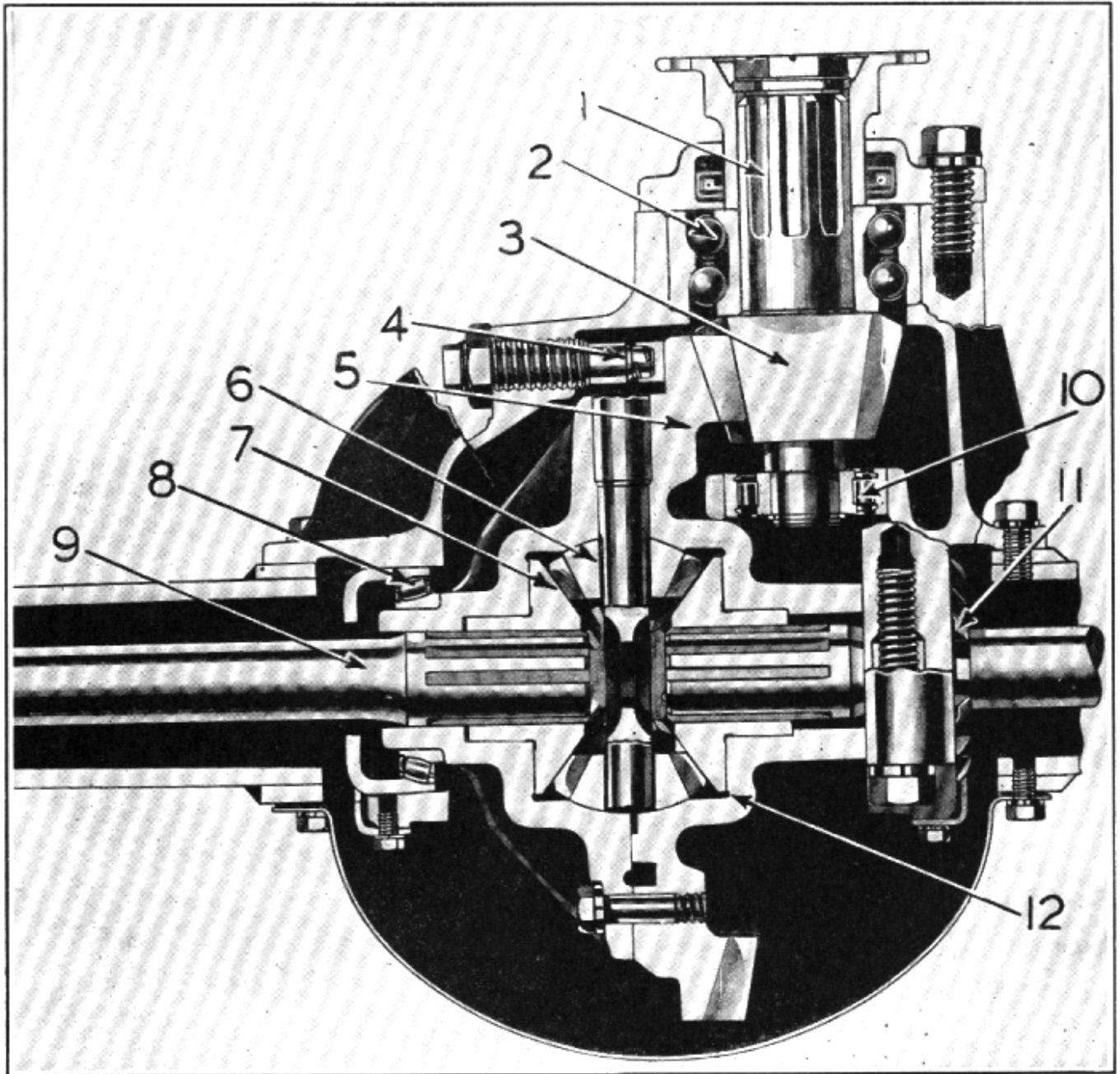


Fig. 1—Rear Axle Assembly—C-15

- 1—Pinion Shaft.
- 2—Double-Row Pinion Bearing.
- 3—Hypoid Pinion Gear.
- 4—Ring Gear Thrust Pad.
- 5—Hypoid Ring Gear.
- 6—Differential Pinion.

- 7—Differential Side Gear.
- 8—Differential Bearing.
- 9—Axle Shaft.
- 10—Hyatt Roller Pinion Bearing.
- 11—Differential Adjusting Nut.
- 12—Differential Case.

REAR AXLE—H - 2

The rear axle is of the full-floating type designed so that the axle shafts can be removed even with the vehicle fully loaded, as it is not necessary to raise the rear axle off the ground. The ring gear and pinion is of the Hypoid type having a ratio of 6.17 to 1 (6-tooth pinion, 37 tooth ring gear). Fig. 1 shows a view of the differential assembly in cross-section.

A high traction type differential is used in this rear axle in place of the conventional type normally used. The feature of this design is that when road conditions are encountered whereby one wheel starts to spin due to decreased friction, a greater amount of engine torque is applied to the opposite wheel. With the conventional differential, no more torque can be applied to one wheel than is applied to the other wheel. Consequently, very little torque is applied to a wheel on solid ground if the other wheel is spinning.

The advantage of this differential is that the application of increased torque to the wheel having more friction enables the vehicle to extricate itself from many difficulties that normally would require assistance on a unit equipped with the conventional differential.

This increased torque to one wheel is made possible by the design of the teeth on the two differential side gears and the four spider gears. If any one of the spider gears or side gears becomes damaged, the complete set should be replaced.

A list of the special tools required in connection with minor and major repairs will be found at the end of this section.

MINOR SERVICE OPERATION

AXLE SHAFT

Removal

1. Remove the eight axle retaining nuts and tapered dowels.
2. Install two $7/16"$ x $14"$ cap screws in the threaded holes provided in the axle shaft flange. Turning these cap screws alternately, the axle shaft may easily be removed. Remove the axle shaft and aluminum gasket, Fig. 2.

Replacement

Place a new aluminum axle shaft flange gasket on the axle shaft and push the shaft into the housing. Install the tapered dowels, lockwashers and nuts, making sure that the dowels are correctly seated while tightening the nuts.

REAR WHEEL BEARINGS

Removal

1. Jack up the Rear Axle and remove the Wheel and Axle Shaft.

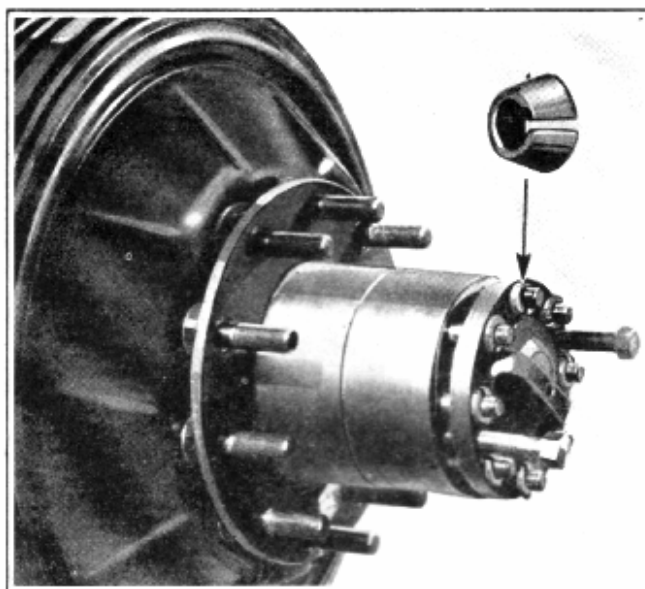


Fig. 2—Removing Axle Shaft

NOTE—Removal of the Wheel is important: it prevents damage to the Oil Seal and permits more accurate adjustments of the Bearings.

2. Raise the lip of the Special Lock from the notch in the Lock Nut. Remove Lock Nut with Special Wrench J-870, and remove the Lock, Inner Adjusting Nut, and Thrust Washer.
3. Remove the Hub and Drum Assembly.
4. Install Brake Wheel Cylinder Clamp to prevent the brake fluid from leaking should the Brake Pedal be accidentally depressed.
5. To remove the Inner Bearing and Oil Seal, use Puller J-918A.



Fig. 3—Removing Inner Bearing and Oil Seal

The Puller is installed by tilting the Plate with the chain attached, so that it may be slipped through the Bearing and engage the Outer Race of the Bearing. The Plate is then held in this position by the chain while threading the Puller Shaft into the tapped hole. The Puller body is then located against the Housing and the Bearing Assembly and Oil Seal are removed by turning the Puller handle, Fig. 3.

6. To remove the Outer Bearing, first tap the Outer Race to relieve the tension at the Snap Ring; then remove the Snap Ring on the inside of the Hub, Fig. 4. Remove the Bearing by

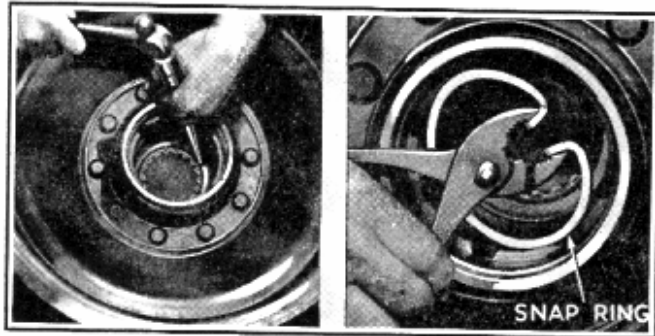


Fig. 4—Removing Outer Bearing Snap Ring

driving on the Outer Race of the Bearing by using a long $\frac{1}{8}$ " punch through the Cap Screw holes in the end of the Hub. This will also bring out the Inner Race and Roller Assembly.

NOTE—Care must be taken to engage the edge of the Race and not damage the Bearing Seat in the Housing; the Race must also be driven out evenly.

Replacement

1. Check the fit of the Inner Races on Housing; these Races should be free to turn, but not loose.
2. Wash the Bearings in clean gasoline and pack the Roller Assembly with Rear Wheel Bearing Lubricant.
3. To replace the Outer Bearing, place the Inner-Race-and-Roller Assembly, and the Outer Race in the Wheel Hub with the thin edge of the Outer Race downward. Use Outer Wheel Bearing Replacer, J-872-1, to press the Bearing in the Hub.

CAUTION—Press the Race only far enough to install the Snap Ring; this operation should be done in an arbor press.

Install the Snap Ring in the groove on the inside of the Hub. Use Special Driver J-872-3A through the Cap Screw holes in the end of the Hub to force the Outer Race back in positive contact with the Snap Ring, Fig. 5

4. To replace the Inner Bearing, place Outer Race of the Bearing in the Wheel Hub with the wide side of the Race down. Use Special Driver J-872-4 to press the Race against its seat. Install the Inner Race and Roller Assembly. In-

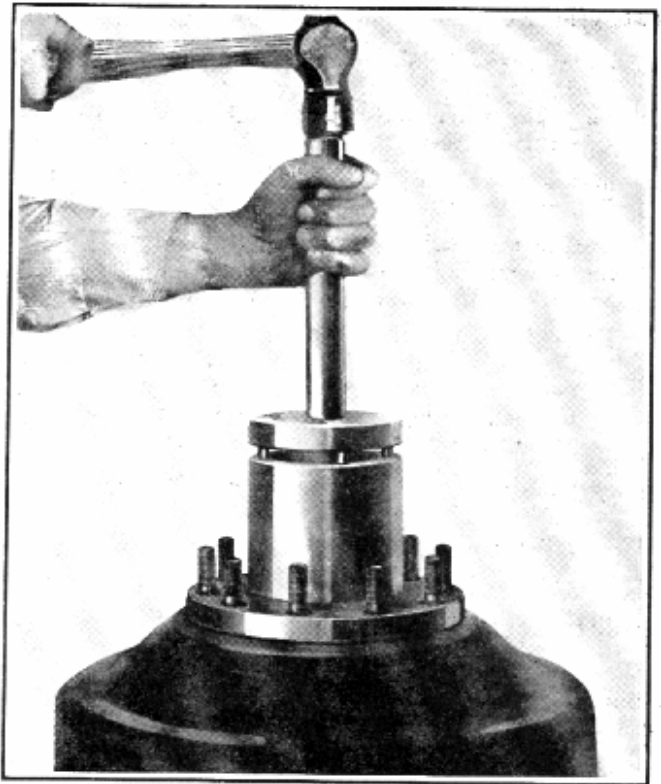


Fig. 5—Driving Outer Race into Contact with Snap Ring

stall the Oil Seal, using the Wheel Bearing Oil Seal Replacer J-872-2, with an arbor press. Lock the Seal in place by prick punching at three equally spaced places. This seal should be inspected and if any damage is indicated the seal should be replaced.

5. Install the Wheel Hub and Drum Assembly, turning the Hub to properly line up the Bearings.
6. Install the Thrust Washer and Adjusting Nut, Fig. 6.

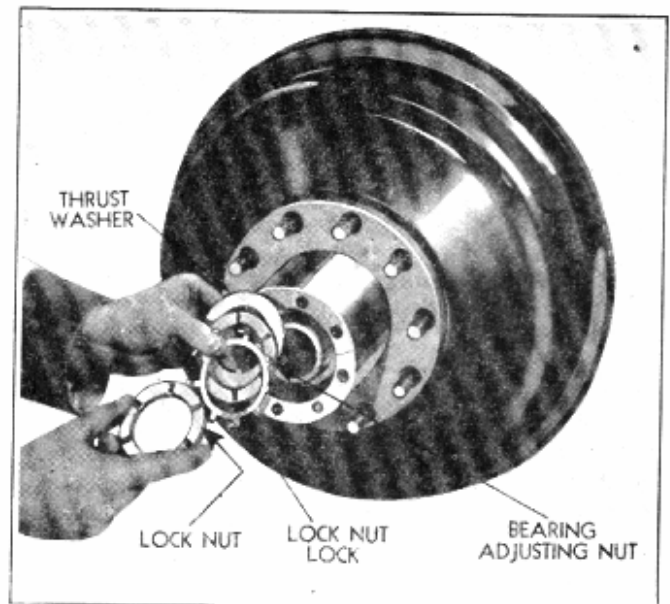


Fig. 6—Installing Thrust Washer, Adjusting Nut, Lock Nut and Lock Nut Lock

Adjustment

1. Using Special Wrench J-870, tighten the Adjusting Nut tight, then back it off 45 degrees. Turn the wheel hub by hand to make sure the hub turns freely.
2. Install the Adjusting Nut Lock and check the alignment of the tangs with the slots in the Nut.
3. Rotate the Hub by hand, grasping the Hub at the Wheel Bolts, to see that the Bearings are properly seated and that the Hub turns freely.
4. Bend down the tang on the Lock in the notch of the Adjusting Nut. Install the Outer Lock Nut and pull up tight to prevent any loosening of the Adjusting Nut. Bend the tang of the Lock into the notch of the Lock Nut.
5. Install the Axle Shaft, and a new Aluminum Gasket.
6. Install the Lock Plate.
7. Install the Axle Shaft Bolts and tighten securely.

Replacement of Oil Slinger

The location of the Oil Slinger requires that it be driven on the Rear Axle Housing. If for any reason the Oil Slinger is removed, it must be replaced with a new one.

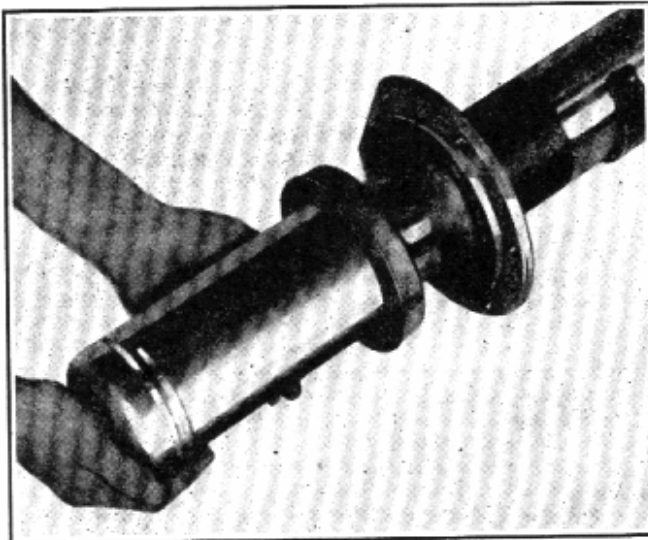


Fig. 7—Replacing Oil Slinger

A special tool is necessary for this purpose because the Slinger must be located with relation to the Bearings. The Oil Slinger Replacer J-973 is designed so it will pilot on the Housing and drive the Slinger into proper position so it will mate with the Oil Slinger in the Wheel Hub, Fig. 7.

MAJOR SERVICE OPERATION

DIFFERENTIAL CARRIER (Third Member Assembly)

Removal

1. Drain differential, remove differential cover and axle shafts.

2. Split the rear universal joint by removing the two trunnion bearing "U" bolts from the rear yoke. The bearings can be left on the trunnion and held in place with tape. This will prevent dirt from getting in the bearings as well as saving considerable time in reassembly. Sufficient clearance can be obtained for dropping the propeller shaft by sliding the entire assembly forward at the splines on the propeller shaft.
3. Remove the bolts and lockwashers which retain the differential carrier assembly to the banjo housing and remove the differential carrier.

Carrier Disassembly

1. Mount the assembly in a bench vise and remove the ring gear thrust pad. Remove differential adjusting nut locks. Remove the bearing cap bolts and lockwashers. The bearing caps may now be removed. Then remove the differential case and ring gear assembly from the carrier.
2. Remove the bolts from the pinion oil seal and bearing retainer and remove the pinion and shaft assembly from the carrier.

Pinion Disassembly

1. Clamp the rear yoke of the universal joint in a bench vise and remove the cotter pin, nut and washer from the end of the pinion shaft. The universal joint yoke as well as the oil seal and bearing retainer may then be removed from the pinion shaft.
2. To remove the straddle mounted pinion bearing, take off the lock ring and then using a press plate, press the pinion and shaft out of the bearing, Fig. 8.

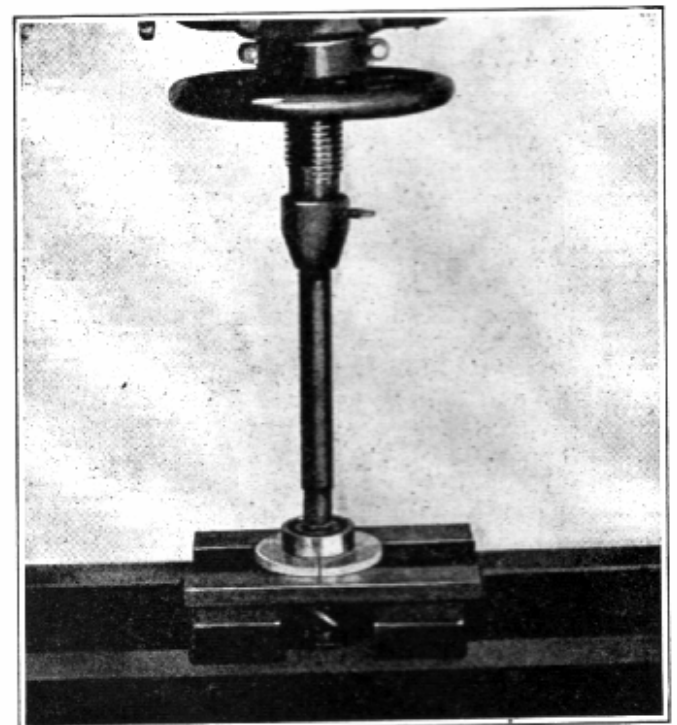


Fig. 8—Removing Straddle Mounted Pinion Bearing

NOTE—The raised portion of the press plate must be against the inner race, otherwise the bearing will be damaged.

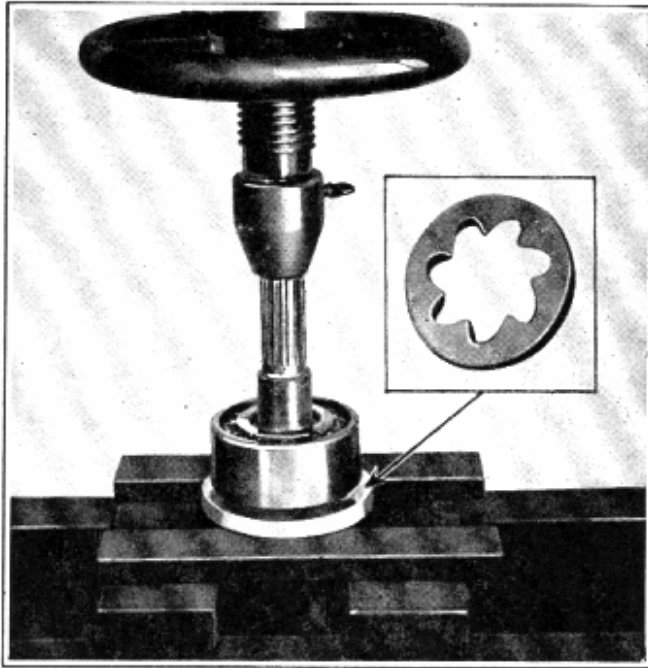


Fig. 9—Removing Double Row Pinion Bearing

3. Install the double row pinion bearing remover J-1439 over the pinion teeth and against the double row bearing. Then press the bearing off the pinion shaft, Fig. 9.

Inspection

Wash all parts in clean gasoline. Inspect the pinion for worn or chipped teeth. Inspect the splines on the pinion shaft for wear or scoring. Oil the

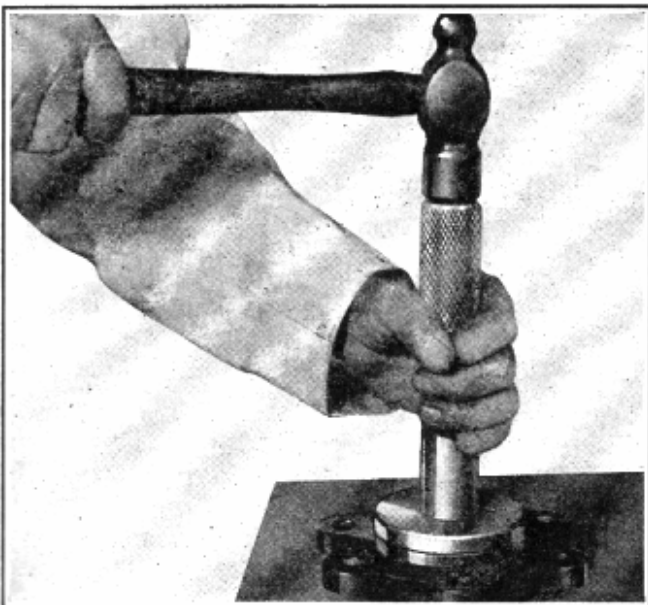


Fig. 10—Installing Oil Seal

bearings and turn them slowly by hand to check for roughness. Check the fit of the bearings in the carrier. These should be a close push fit by hand. Inspect the oil seal in the pinion bearing retainer and if replacement is necessary install the felt packing toward the bottom of the recess and then the oil seal with the open end of the leather out, Fig. 10. The oil seal should be pressed down against the felt packing.

Pinion Reassembly

1. Press the double row bearing onto the pinion shaft with the extended portion of the inner race toward the gear teeth. This part of the inner race seats against the back face of the gear.

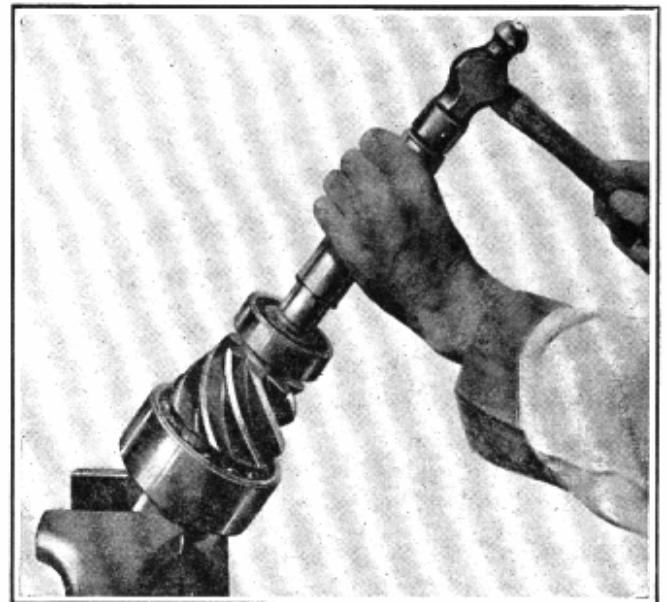


Fig. 11—Installing Lock Ring

2. Press the Hyatt roller bearing on the end of the shaft with the chamfered side of the inner race toward the pinion. Install the lock ring, using the lock ring installer J-1364, Fig. 11.
3. Slide the pinion oil seal and bearing retainer over the universal joint yoke.
4. Install the pinion bearing retainer gasket and then slide the universal joint yoke over the splines on the pinion shaft until it contacts the inner race of the bearing
5. Install the flat washer onto the end of the pinion shaft and tighten the nut down to a torque load of 160 to 280 ft. lbs. Lock cotter pin in place.

DIFFERENTIAL CASE

Disassembly

The differential side bearings are a press fit on each side of the differential. To remove these bearings, the special puller shown in Fig. 12 should be assembled to the case with the two fingers of the puller in the two notches of the case. This allows the fingers to pull in against the inner race of the bearing which will prevent damage to the bearing. These bearings should never be removed in an arbor press because removing them in this way will damage the bearings so that they will be unusable.

To disassemble the differential, check and make sure the case halves are marked so it may be assembled in the same position. Remove the twelve 1/2" bolts from the case. Lift off the case cover and remove the differential gears and pinions.

The ring gear may be removed from the right-hand side of the case by tapping it with a soft-faced hammer.

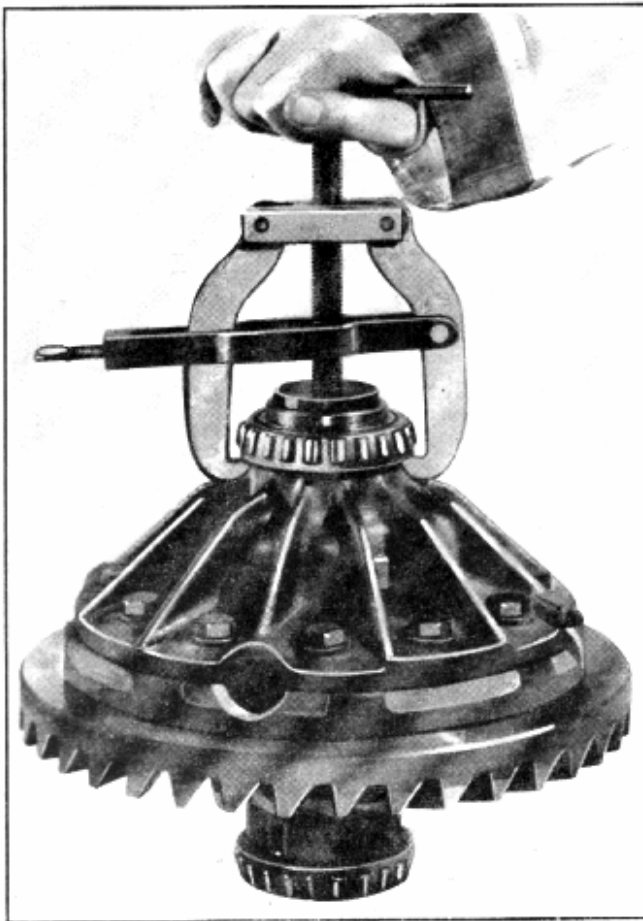


Fig. 12—Differential Bearing Puller

Inspection

Wash all parts thoroughly in clean gasoline. Check all gears for chipped, cracked or scored teeth. In-

spect the thrust surfaces in the housing halves for wear or score marks. Check the fit of the side gear hubs in the differential case halves. Worn side gear and differential pinion thrust washers should be replaced. The fit of the spider gears should be checked on the spider. The differential side bearings should be carefully inspected for worn, checked, scored or broken rollers. They should then be oiled and rotated by hand, to check for roughness.

Any damaged or worn parts should be replaced.

NOTE—If any one of the six differential gears is damaged or scored, all six should be replaced.

Reassembly

When reassembling the differential, the flanges of the case, ring gear pilot and the back of the ring gear must be clean and free from burrs.

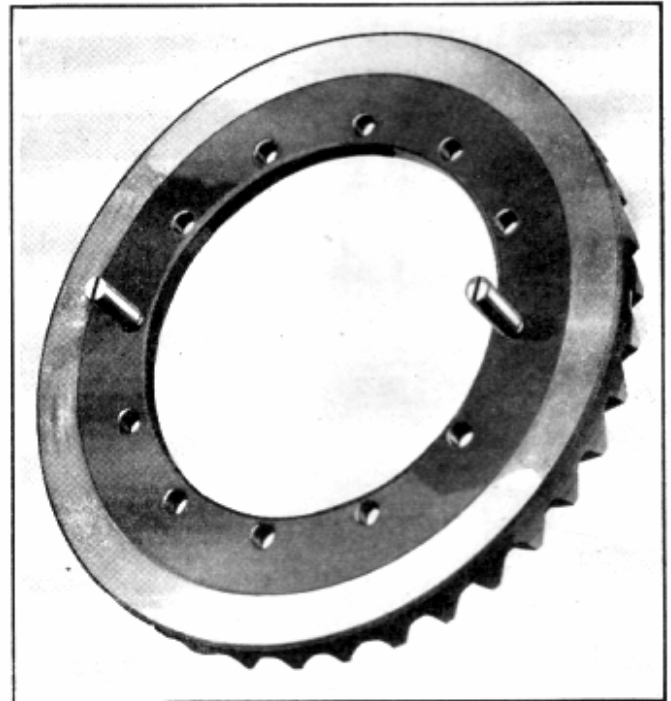


Fig. 13—Ring Gear Guide Pins

When replacing the ring gear, it is good practice to use two guide pins made from differential and ring gear screw, Part No. 3652253. Their ends should be slightly tapered and screwdriver slots cut so they may be easily removed, Fig. 13.

1. Lubricate the differential side gears and pinions and install them in the left half of the differential case, with a thrust washer between each gear and the differential case.

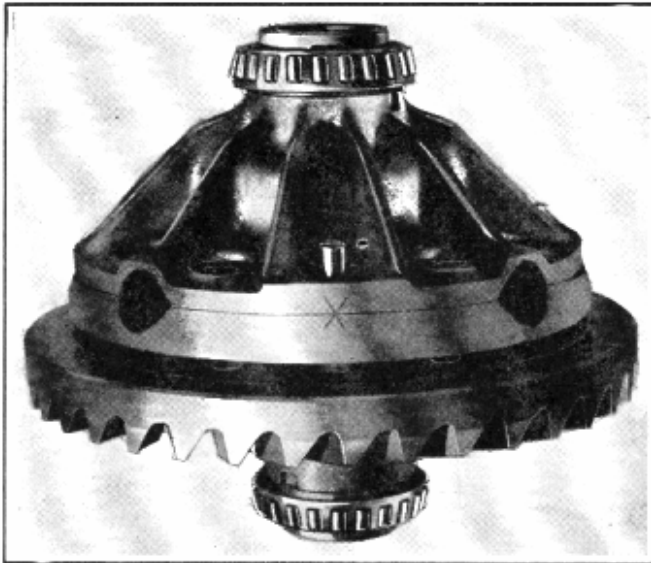


Fig. 14—Differential Case Marking

2. Assemble the right side of the case to the left side, being sure to line up the marks on the case halves, Fig. 14.
3. Install the guide pins. Slip the ring gear over the pilot diameter of the right-hand half of the differential case.
4. Install ten differential to ring gear cap screws and lockwashers, tightening them evenly one turn at a time until the ring gear face is flush with the case flange. Remove the guide pins and install the two remaining bolts and lockwashers. Then pull up all twelve bolts tight.
5. Assemble the differential side bearings to the case, using the special driver J-1703.

NOTE—The wide side of the inner race must be towards the case.

Differential Carrier Reassembly

1. Place the differential carrier in a vise and install the bearing cap dowels in the carrier or caps.
2. Assemble pinion assembly to the carrier using a new gasket and tighten cap bolts securely.
3. Install the Differential Assembly into the carrier. Install the bearing caps, making sure the marks on the caps line up with marks in the carrier. Install the cap screws and tighten them until the lockwashers just flatten out. Screw the adjust-

ing nuts into the carrier, making sure they turn freely. Tighten them snugly to straighten up the bearing outer races.

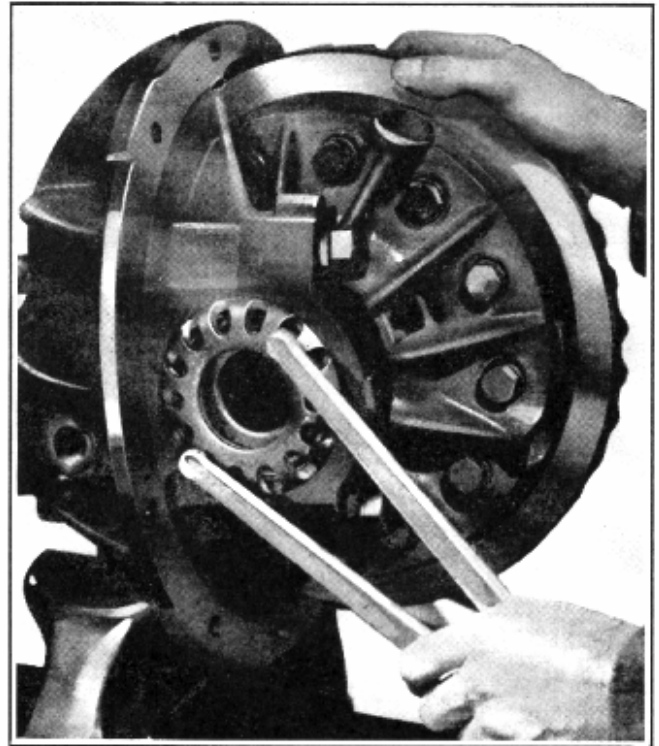


Fig. 15—Adjusting Ring Gear and Pinion Backlash

4. Back off the right adjusting nut and tighten left-hand adjusting nut just to a point where all lash between the ring gear and pinion is removed. Then back off the left-hand nut ap-

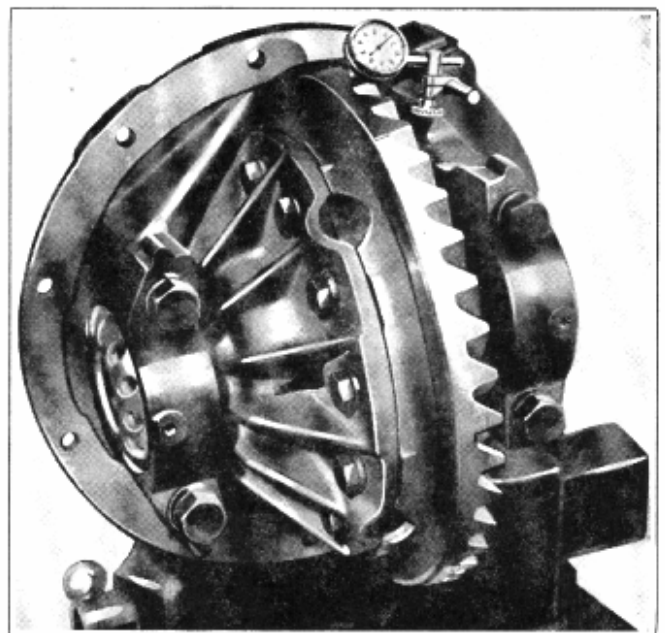


Fig. 16—Checking Ring Gear and Pinion Backlash

REAR AXLE—H - 8

proximately two notches and to locking position. Tighten right-hand nut to solid position. Back off right-hand nut free of bearing, then tighten up right-hand nut until all play in bearing is removed and then one to two notches more to a locking position, Fig. 15.

5. Check ring gear and pinion back lash, Fig. 16. This should be from .005"—.008". If it is more than this, loosen the right-hand adjusting nut one notch and tighten left-hand nut one notch. If less than .005"—.008", loosen the left-hand nut one notch and tighten the right-hand nut one notch. Tighten down the cap screws and recheck the ring gear and pinion back lash. Assemble and tighten the adjusting nut locks.

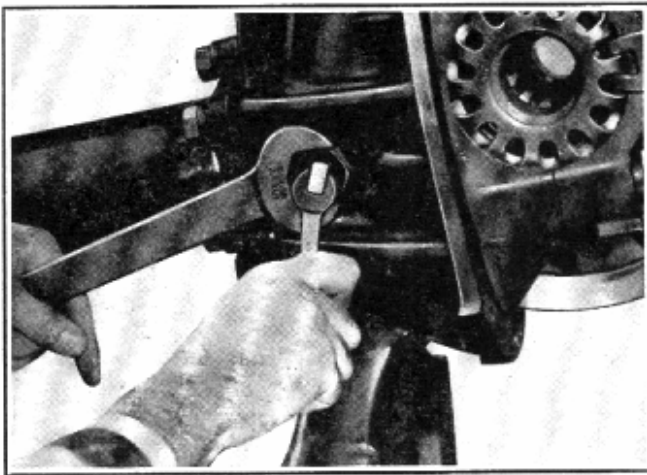


Fig. 17—Adjusting Thrust Pad

6. Examine the bronze tip of the ring gear thrust pad and, if worn, install a new one.

Install the thrust pad and tighten the screw until the bronze tip lightly engages the back of the ring gear while rotating gear. Back off the screw one-twelfth (1/12) of a turn and then tighten the lock nut, making sure the screw does not turn during the locking process, Fig. 17. This will provide .005" to .007" clearance.

Reassembly of Rear Axle

1. Clean out axle housing and cover. Install the differential carrier assembly in the axle housing, with a new gasket between the carrier and the housing. Draw all cap screws down loosely and tighten them on opposite sides until all are secure.
2. Assemble the axle shafts, using a new aluminum gasket between the axle shaft flange and wheel hub. Install tapered dowels and lock washers over axle retaining studs. Install retaining nuts and tighten securely.
3. Assemble the rear universal joint.
4. Replace axle housing cover and gasket. Fill the rear axle with $9\frac{1}{4}$ pints of lubricant as recommended in the Lubrication Section.

DRIVE SHAFT AND UNIVERSAL JOINTS
(C - 15)

The drive line from the transmission to the rear axle on the above vehicles is comprised of a tubular propellor shaft and two needle bearing universal joints.

Lubricant for each trunnion on the universal joint is fed from a central lubrication fitting through drilled passages, Fig. 18. On the side opposite the lubrication fitting is mounted a relief valve to prevent over lubrication or possible damage to the trunnion bearing seals. A lubrication fitting is also provided on the rear yoke of the slip joint (front universal) to assure free movement between the splines in the joint and those on the propellor

shaft. A plug is staked into the forward end of the splined opening to retain the lubricant. A small hole is drilled in the centre of this plug to relieve trapped air. The rear end of the splined opening is sealed by a cork packing which is mounted in a retainer cap which screws on the end of the yoke, as shown in Fig. 19.

Disassembly

The drive line may be disconnected at the universal joints on either end of the propellor shaft assembly by removing the nuts from the trunnion bearing "U" clamps and removing the clamps.

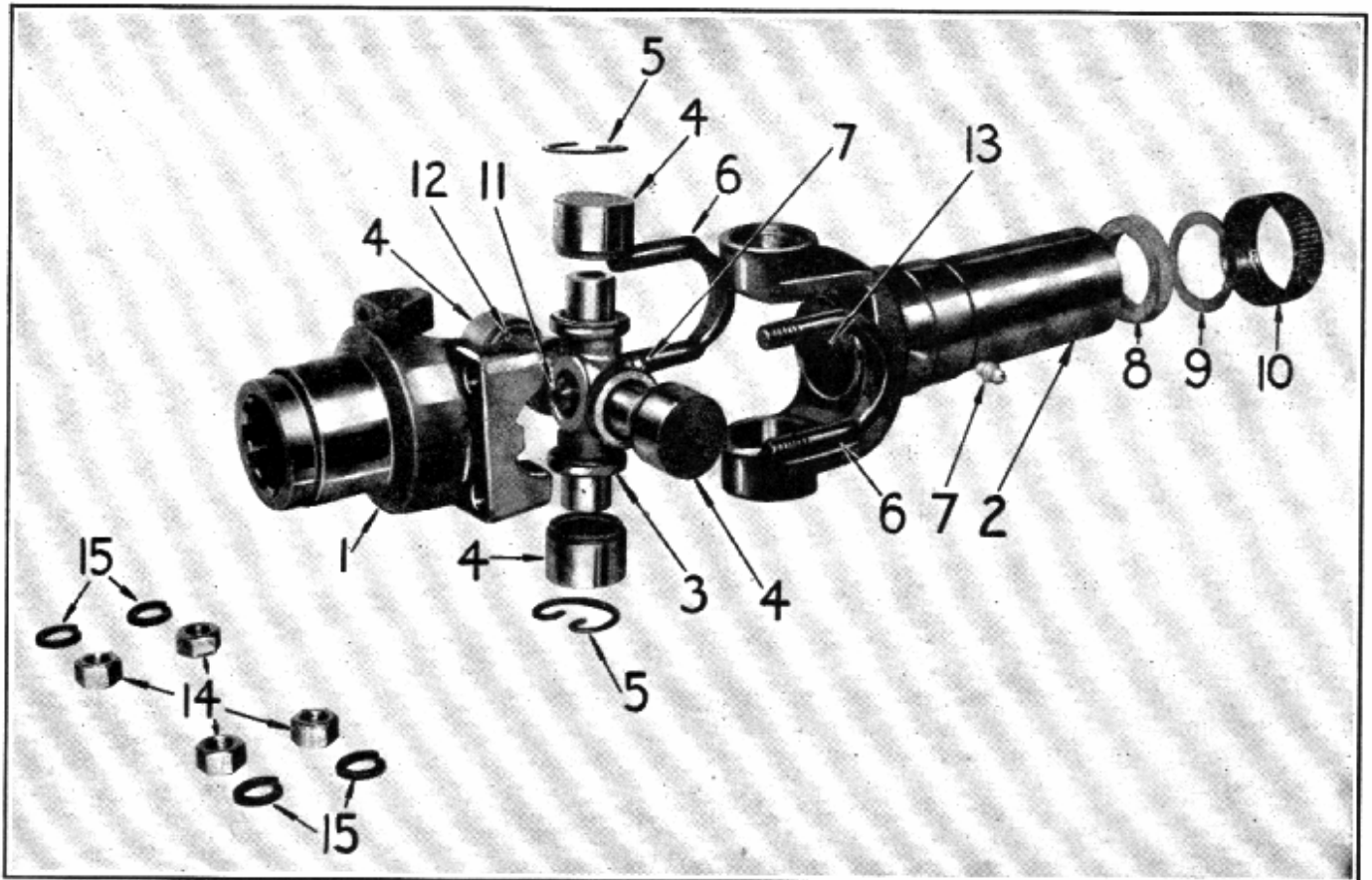


Fig. 18—Layout of Universal Joint

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|--------------------------------|-------------------------------|-----------------------|-----------------------------|
| 1—Universal Joint Yoke. | 5—Trunnion Bearing Lock Ring. | 8—Sleeve Yoke Gasket. | 12—Trunnion Bearing Rollers |
| 2—Universal Joint Sleeve Yoke. | 6—"U" Bolt. | 9—Sleeve Yoke Washer. | 13—Air Vent. |
| 3—Yoke Trunnion. | 7—Lubrication Fitting. | 10—Sleeve Yoke Cap. | 14—"U" Bolt Retaining Nut. |
| 4—Trunnion Bearing. | | | 15—Lockwasher. |

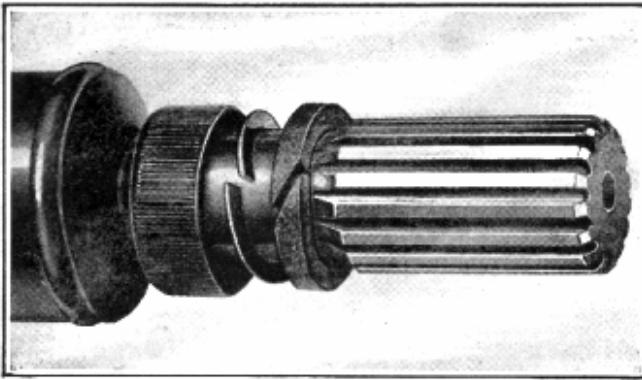


Fig. 19—Slip Joint Seal

Sufficient clearance for dropping either end of the propellor shaft can be obtained by sliding the shaft further onto the splines of the slip joint.

When "breaking" the universal joints, the bearing trunnion should be held in place with tape to prevent loss or damage of bearings while removing the propellor shaft from the vehicle.

The slip joint may be disassembled from the propellor shaft by unscrewing the seal retainer from the rear yoke and pulling the universal joint assembly off the splines on the propellor shaft. When necessary to replace a cork seal in the grease retainer, press it out of the retainer and, as it is "split", Fig. 19, it may be removed from the propellor shaft.

The trunnion and needle bearings held in place by the tape placed over them when "breaking" the universal joints, may easily be removed for inspection or replacement. However, if it becomes necessary to remove the remaining two trunnions and bearings, it may be done as follows:—

Remove the snap rings and lubrication fittings. Support the yoke on a bench vise, then using a soft drift, drive on the end of one of the trunnion bearings. This will drive the opposite trunnion bearing out of the yoke, see Fig. 20. Care should be exercised when driving through the trunnion not to drive it into the side of the yoke. After one bearing has been removed, support the other side of the yoke on the vise and drive the other bearing out by using a brass drift on the end of the trunnion pin.

Reassembly

After inspection of all parts, the twenty-seven (27) needle bearings may be reassembled to each trunnion and the trunnion bearing assemblies installed into the yoke.

When reassembling the bearings, they should be pressed into the yokes just far enough to install the snap rings. Then, while holding the trunnion in one hand, strike the yoke a few light blows with

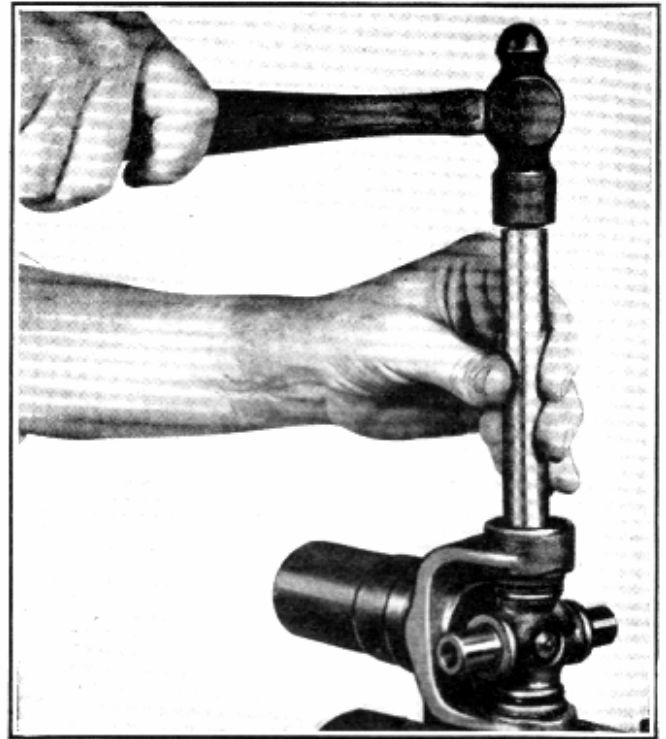


Fig. 20—Removing Trunnion Bearing

a hammer to firmly seat the bearings against the lock rings.

Install the slip joint onto the splines of the propellor shaft with the yoke in the same plane as the yoke welded to the opposite end of the shaft. As a guide to make certain these yokes are lined up properly, arrows are stamped on the hub of the slip joint and also on the face of the propellor shaft. These arrows should be in line, as shown in Fig. 21.

Reassembly of the propellor shaft to the vehicle should be made opposite to disassembly.

Lubrication of the universal joints should be made with S.A.E. 90 Gear Lubricant.

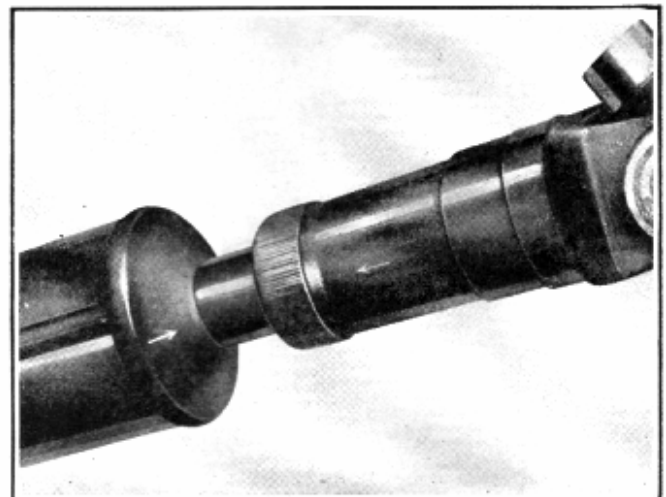


Fig. 21—Lining Up Arrows

REAR AXLE

(C-8A, C-15A, C-30, C-60S, C-60L, C-GT)

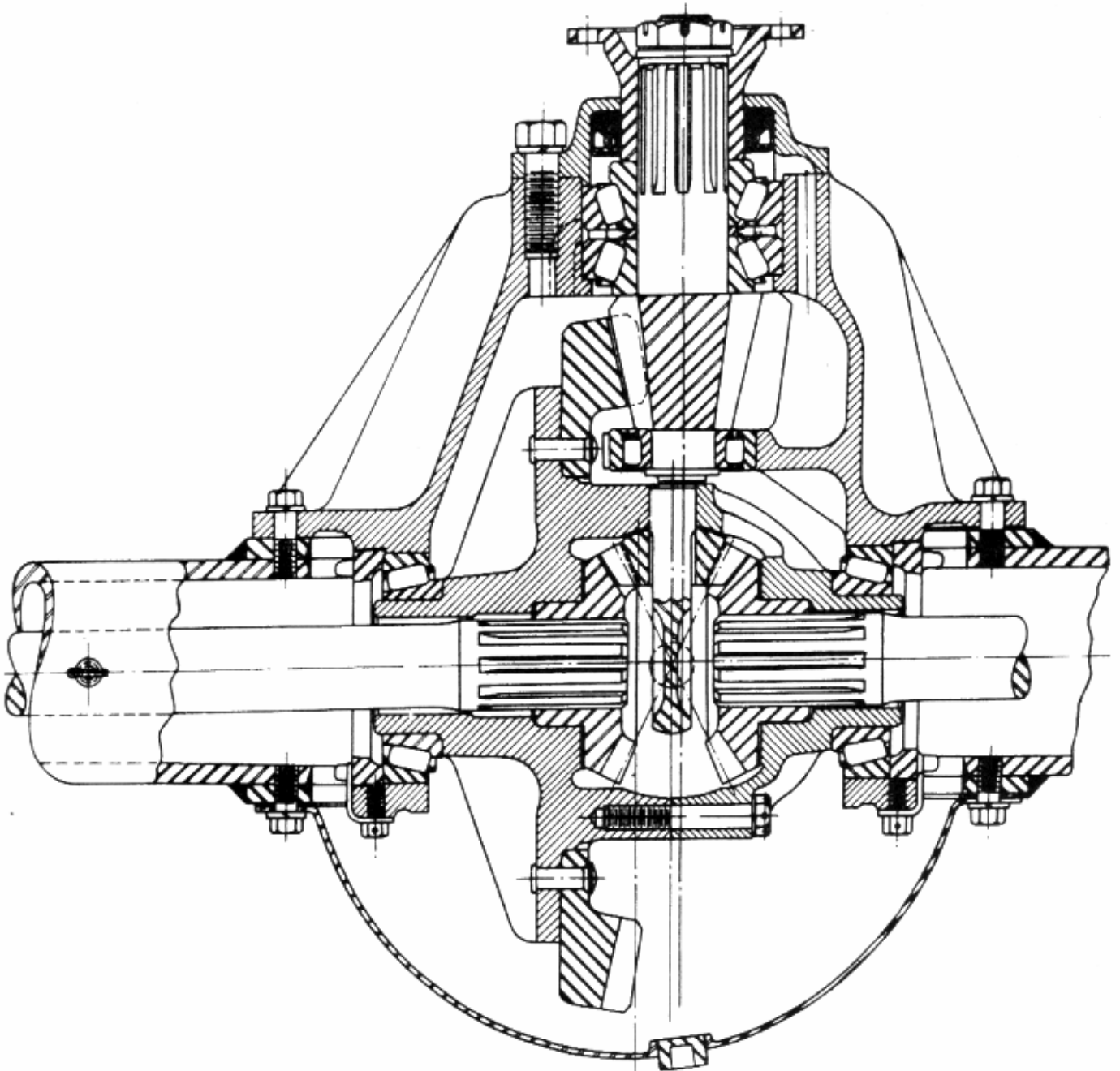


Fig. 22—Cross Section of the Front and Rear Axle Differentials

The rear axle on these models is of the full-floating type designed so that the axle shafts can be removed even with the vehicle fully loaded, as it is not necessary to raise the rear axle off the ground. The ring gear and pinion is of the Spiral Bevel type having ratios as shown in the specifications at the end of this section. Fig. 22 shows a view of the differential assembly in cross-section.

Fig. 23 shows an exploded view of the Rear Axle Assembly and will assist in identifying the various parts.

The axle is of the Hotchkiss drive type, the spring seat being solidly mounted on the axle housing, resulting in the torque and drive being taken through the springs. This allows for the use of a short pinion shaft and an open drive line.

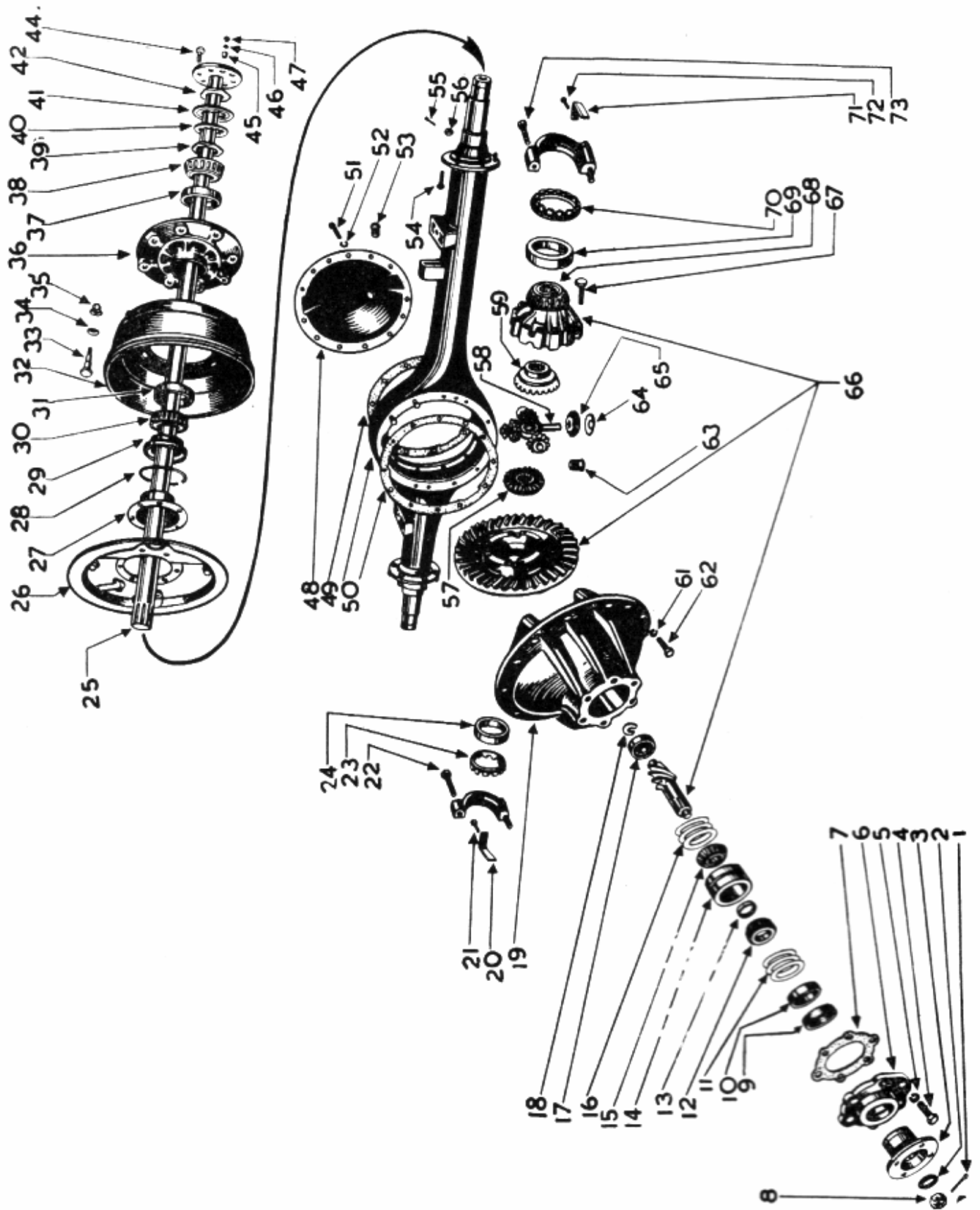


Fig. 23—Exploded View of the Rear Axle
(C-8A, C-15A, C-30, C-60S, C-60L, C-GT)

CAPTIONS FOR FIGURE 23

- 1—Cotter Pin, Drive Pinion Flange.
- 2—Nut.
- 3—Flange, Propellor Shaft Pinion.
- 4—Bolt, Pinion Oil Seal and Bearing Retainer.
- 5—Lock Washer.
- 6—Retainer, Pinion Bearing and Oil Seal.
- 7—Gasket, Pinion Bearing Retainer to Carrier.
- 8—Nut, Drive Pinion Flange.
- 9—Packing, Pinion Flange Oil.
- 10—Seal, Pinion Flange Oil.
- 11—Shims, Pinion Bearing Cup to Carrier.
- 12—Bearing, Pinion Front Cone and.
- 13—Spacer, Pinion Bearing.
- 14—Cup, Pinion Bearing.
- 15—Bearing, Pinion Rear Cone and.
- 16—Shims, Pinion Bearing Cup to Carrier.
- 17—Bearing, Pinion Rear (Outboard).
- 18—Washer, Horseshoe Lock.
- 19—Carrier and Cap Assembly, Differential.
- 20—Lock, Differential Adjusting.
- 21—Bolt, Differential Adjusting Lock.
- 22—Bolt, Differential Carrier Cap.
- 23—Nut, Differential Adjusting.
- 24—Cup, Differential Side Bearing.
- 25—Axle Shaft, Rear Axle.
- 26—Backing Plate, Rear Brake.
- 27—Retainer, Hub Inner Grease.
- 28—Lock Ring, Inner Grease Retainer.
- 29—Seal Assy. Rear Wheel Hub Inner.
- 30—Cone Assy. Rear Hub Inner Bearing.
- 31—Cup, Rear Hub Inner Bearing.
- 32—Drum, Rear Brake.
- 33—Bolt, Rear Wheel Hub.
- 34—Spacer, Rear Wheel Hub Bolt.
- 35—Nut, Rear Wheel Hub.
- 36—Hub, Rear Wheel.
- 37—Cup, Rear Hub Outer Bearing.
- 38—Cone Assy. Rear Hub Outer Bearing.
- 39—Nut, Rear Wheel Bearing Adjusting.
- 40—Washer, Rear Wheel Bearing Adjusting Nut Lock.
- 41—Seal, Rear Hub Outer Grease.
- 42—Nut, Rear Wheel Bearing Lock.
- 44—Stud, Rear Axle Shaft Flange.
- 45—Dowel, Rear Axle Shaft Flange Stud.
- 46—Washer, Rear Axle Shaft Flange Stud Lock.
- 47—Nut, Rear Axle Shaft Flange.
- 48—Cover, Rear Axle Differential Housing.
- 49—Housing, Rear Axle.
- 50—Gasket, Differential.
- 51—Bolt, Differential Cover.
- 52—Washer, Differential Cover Lock.
- 53—Plug, Rear Axle Housing Filler.
- 54—Bolt, Rear Axle Housing Flange.
- 55—Cotter Pin.
- 56—Nut, Rear Axle Housing Flange.
- 57—Gear, Differential Side.
- 58—Spider, Differential Pinion.
- 59—Gear, Differential Side.
- 61—Lock Washer.
- 62—Bolt, Differential Case to Housing.
- 63—Plug, Axle Housing Drain.
- 64—Washer, Differential Pinion Gear.
- 65—Gear, Differential Pinion Gear.
- 66—Case, Differential.
- 67—Bolt, Differential Case.
- 68—Cone, Differential Side Bearing and.
- 69—Cup, Differential Side Bearing.
- 70—Nut, Differential Adjusting.
- 71—Lock, Differential Adjusting Nut.
- 72—Bolt. Differential Adjusting Lock.
- 73—Bolt, Differential Carrier Cap.

MINOR SERVICE OPERATIONS

AXLE SHAFT

Removal

1. Remove the eight $\frac{1}{2}$ " nuts and lock washers at the end of the axle shaft flange.
2. By tapping the axle flange with a hammer, the tapered dowels can be loosened so that they will slide off the axle flange bolts.
3. Install two $7-7/16$ " x 14 cap screws in the threaded holes provided in the axle shaft flange. Turning these cap screws alternately, the axle shaft may easily be removed. See Fig. 24. Remove the axle shaft and flange gasket.

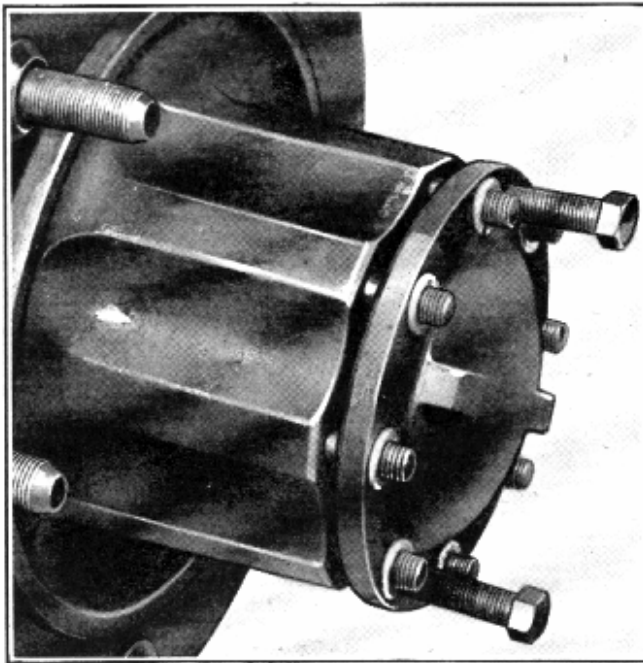


Fig. 24—Removing Rear Axle Shaft

Replacement

Place a new axle shaft flange gasket on the axle shaft studs in the hub, and push the shaft into the housing, being careful when guiding the axle shaft spline into the differential side gear. Insert the tapered dowels and lock washers, then tighten the axle shaft nuts alternately, making sure they are pulled up right.

REAR WHEEL BEARINGS

Adjustment

1. Remove the wheel, axle shaft, lock nut, grease retainer, and spacer according to the instructions given under the heading "Rear Wheel Bearings—Removal."
2. With special wrench BB-17033 and handle, tighten the adjusting nut tight, turning

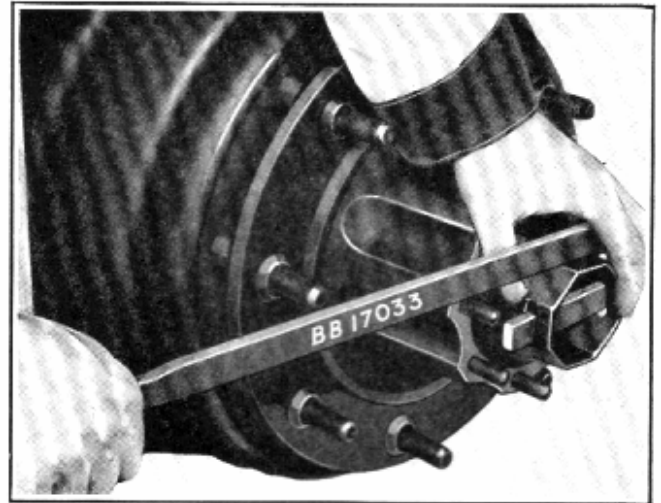


Fig. 25—Adjusting Rear Axle Bearings

the hub at the same time to be sure of freeness in the moving parts. See Fig. 25.

3. After the adjusting nut is tight back it off 60° ($1/6$ turn), and again check for play or bind in the bearings.

NOTE—In an operation where the bearings or races have been replaced, the adjusting nut should be drawn up comparatively tight while turning the hub to seat the bearings and races, backed off, then tightened according to the regular procedure.

4. Replace the spacer washer so that the pin on the adjusting nut fits into one of the grooves in the washer. This acts as a lock for the adjusting nut.
5. Install the grease seal with the lip on the seal pointing out, and so that two of the four holes in the metal part of the retainer line up with the two tapped holes in the spacer washer.
6. Tighten the lock nut and replace the axle shaft according to the foregoing instructions.

Removal

1. Jack up the rear axle and remove the wheel and axle shaft.

NOTE—It is important that the wheel be removed as the weight of the wheel and tire is so great, damage to the oil seal might occur if an attempt is made to remove it with the hub. Also a more accurate adjustment of the bearings can be made with the wheel off.

2. Using special wrench BB-17033, remove the wheel bearing lock nut.
3. To remove the outer grease retainer and spacer washer, thread two $\frac{1}{4}$ " - 28 bolts through the two opposite holes in the retainer, into the

tapped holes in the washer. By alternately turning these bolts the retainer and washer will be pushed away from the bearing adjusting nut so that the grease retainer can be removed. See Fig. 26.

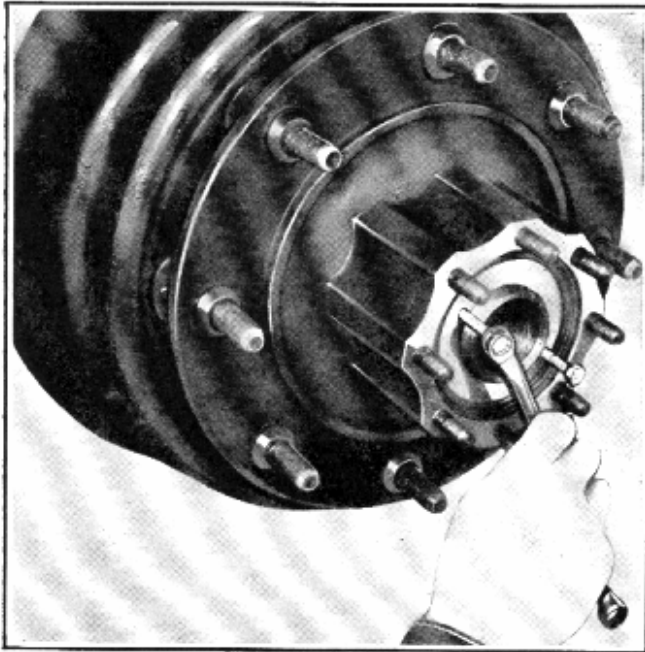


Fig. 26—Removing Outer Grease Retainer

4. Remove the adjusting nut; then carefully slide the hub and bearing assembly from the axle housing.
5. The outer bearing inner race and rollers can then be lifted from the hub, washed in a cleaning fluid and inspected.
6. If it is necessary to remove the outer bearing outer race, use the bearing race puller X-1239-A as shown in Fig. 27. When placing the legs of the puller behind the bearing race, care should be taken to position them in the slots that are provided in the inner hub flange immediately behind the race.



Fig. 27—Removing Outer Bearing Race Using Tool No. X-1239-A

7. To remove the inner bearing, grease retainer, and oil slinger, the lock ring must first be

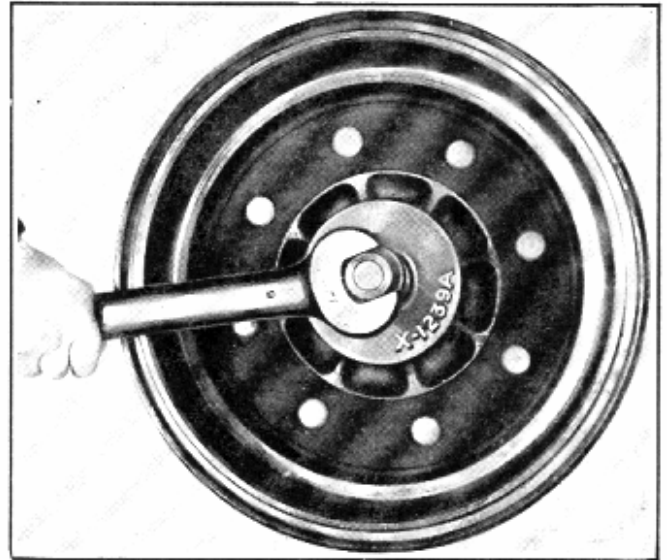


Fig. 28—Using Tool X-1239-A to Remove the Inner Bearing, Grease Retainer and Oil Slinger

- ried out with a screw driver, then by installing special tool X1239-A as shown in Fig. 28, the bearing and retainer can be removed.
8. All parts should be washed in a cleaning fluid and inspected for worn or pitted parts. If there is any doubt as to the condition of the parts they should be replaced with new ones.

Replacement

1. To replace the outer races of the inner (and, or) outer wheel bearings, use special tool

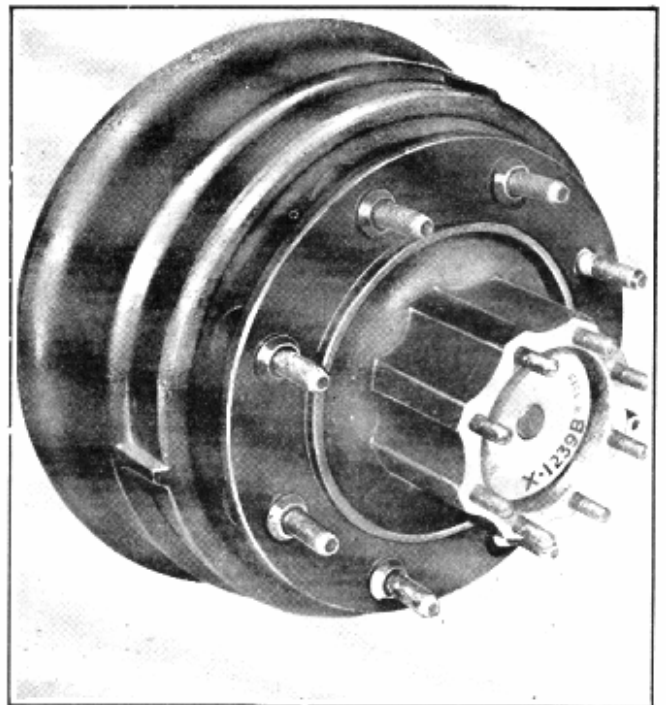


Fig. 29—Installing the Outer Bearing Race Using Tool No. X-1239-B

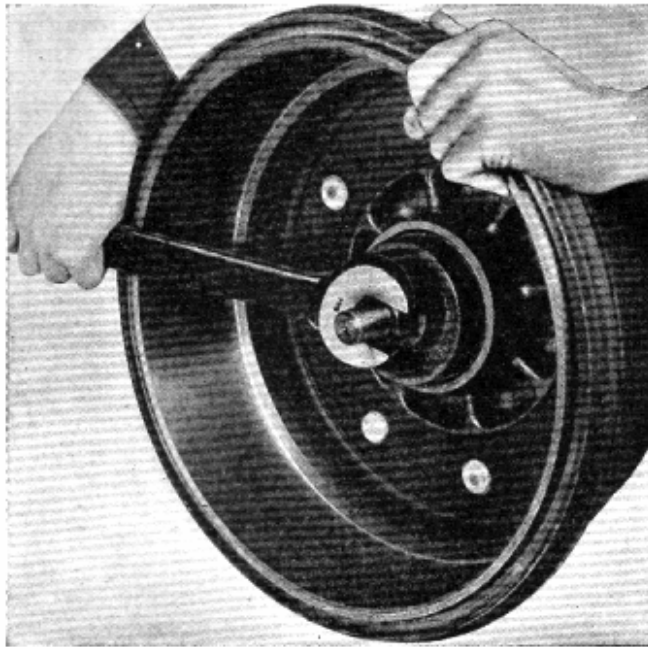


Fig. 30—Installing the Inner Bearing Race Using Tool No. X-1239-B

X-1239-B, as shown in Fig. 29 and 30. It is important that the races are solidly pressed into their seats.

2. Pack the inner bearing roller and race with wheel bearing lubricant and place them in position in the hub.
3. With special tool X-1239-B install the inner grease retainer and oil slinger as shown in Fig. 31.
4. With the aid of a screw driver, install the locking ring in its groove at the inner side of the hub.
5. Pack the outer bearing and race with wheel bearing lubricant, and install the hub and

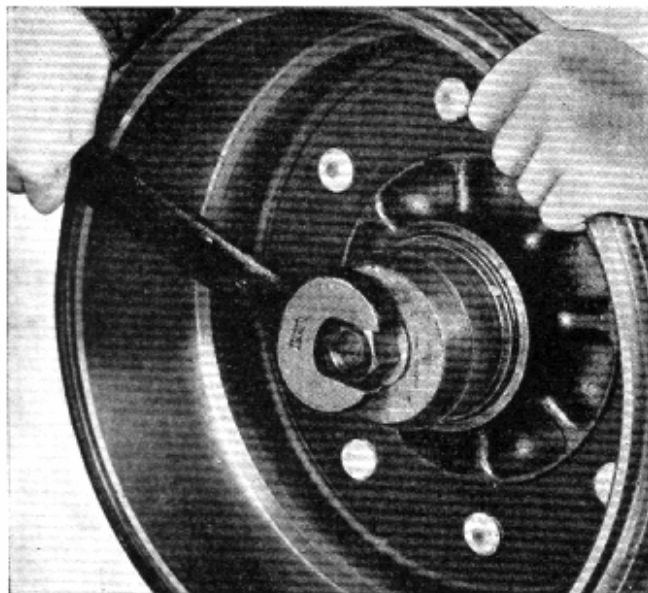


Fig. 31—Using Tool No. X-1239-B Inverted to Install the Grease Slinger and Oil Seal

bearings onto the end of the axle housing. Care should be taken not to damage the oil seal when placing the hub on the axle housing.

6. Install the bearing adjusting nut and adjust the rear wheel bearings and outer grease retainer according to the instructions given under the heading "Rear Wheel Bearing Adjustment."
7. Replace the axle shaft according to the foregoing instructions.

NOTE—Do not pack excessive grease in the hub between the two bearings, as it might work out to the brake drum and affect the brake operation.

MAJOR SERVICE OPERATIONS

DIFFERENTIAL CARRIER (Third Member Assembly)

Removal

1. Drain differential, remove the differential cover (12 bolts) and remove axle shafts according to instructions given under the heading "Axle Shaft Removal."
2. Disconnect the rear universal joint by removing the four bolts from the propellor shaft pinion flange. This will allow the propellor shaft to drop free of the third member assembly.
3. Remove the 12 bolts and lockwashers which retain the third member assembly to the banjo housing then remove the third member assembly.

NOTE—Care should be taken to support the weight of the third member assembly when the bolts are removed.

Disassembly of Third Member Assembly

1. Mount the assembly in a bench vise and remove the differential bearing adjusting lock bolts. (Refer to Fig. 23 for part identifications.)
2. Remove the bearing cap bolts and lockwashers. The bearing caps may now be removed.
3. Remove the differential case and ring gear assembly from the carrier.
4. Remove the propellor shaft pinion flange by removing the cotter pin, nut and washer from the splined end of the pinion shaft and carefully tapping it off with a hammer.
5. Remove the 6 bolts from the pinion oil seal and bearing retainer. The oil seal and bearing retainer may now be removed.
6. Drive out the pinion shaft assembly from the carrier housing by using a long brass drift and heavy hammer as shown in Fig. 32.

NOTE—Check the number and thickness of shims on both sides of the double row thrust bearing so that the same thickness may be used at reassembly. There should be a total shim thickness of .050".

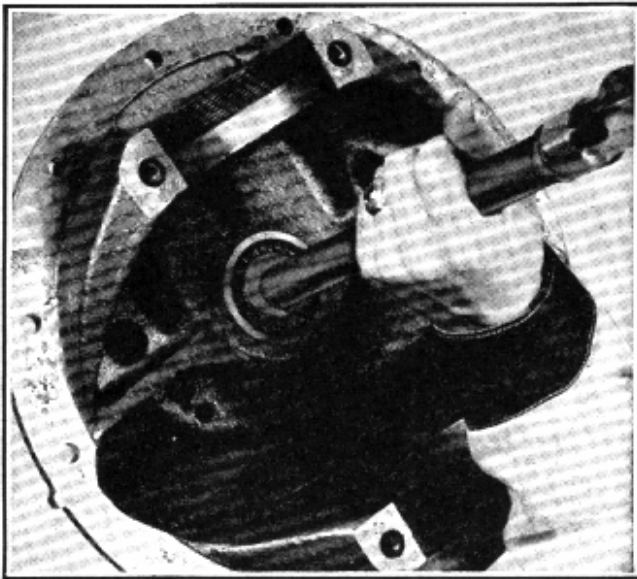


Fig. 32—Driving Out the Pinion Cage Assembly

Disassembly of Pinion Shaft

Wash all parts in a suitable cleaning fluid, then check the pinion bearings and pinion gear for wear or roughness. Oil the bearings and turn them slowly by hand to check for roughness. If it is

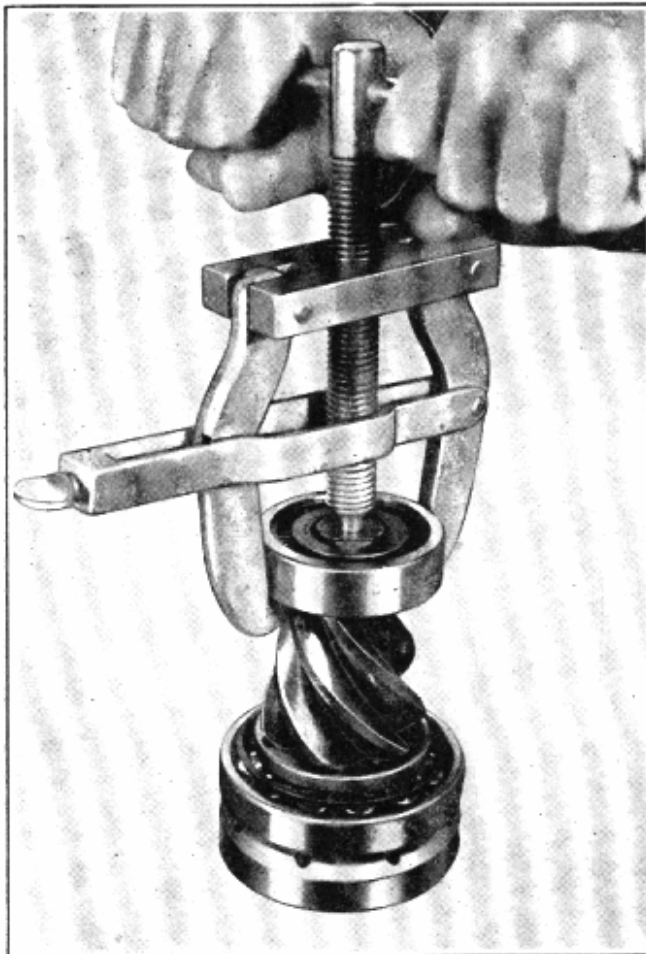


Fig. 33—Removing the Single Row "Outboard" Bearing Using Puller No. TR278R

found necessary to replace either of the pinion bearings or the pinion gear, proceed as follows:—

1. The single row "outboard" bearing (to the rear of the pinion) may be removed from the end of pinion shaft, after the horseshoe lock washer has been taken off, by using a bearing puller such as tool No. TR-278R as shown in Fig. 33.
2. Press the double row pinion bearing from the pinion shaft, supporting the bearing at the inner race and using the pinion bearing remover J-1439 with an arbor press as shown in Fig. 34.

When the bearing is removed, the races may be separated from the rollers.

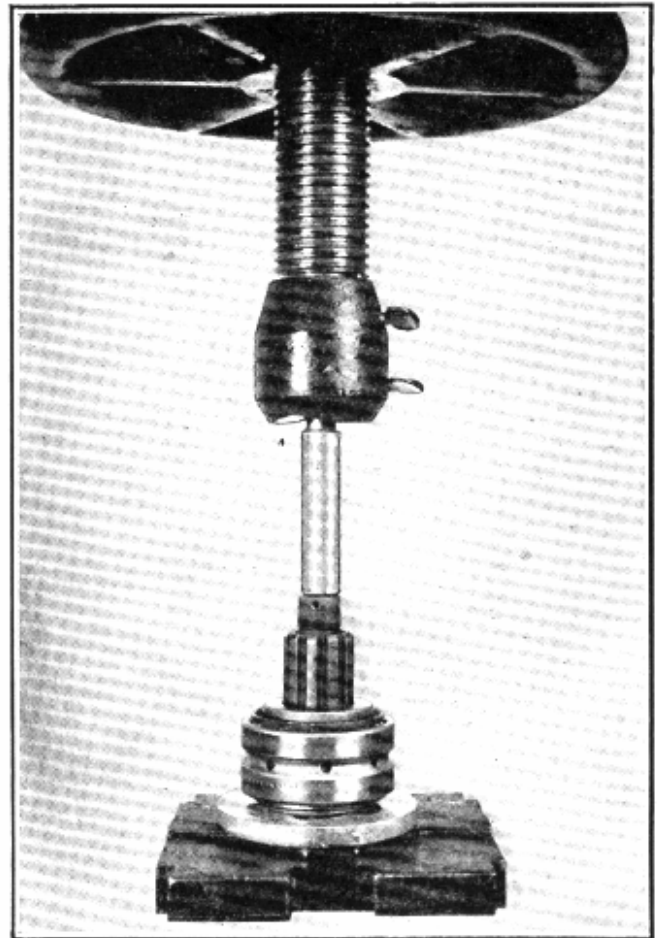


Fig. 34—Removing the Double Row Pinion Bearing
Reassembly of Pinion Shaft

Before replacing the pinion bearings, it is essential that it be determined if the double row bearing is under the correct tension. The spacer used in production between the two cones is selected at the time of original assembly in order to obtain the correct bearing tension. For service however, the smallest sized spacer is used and shims .003" and .010" thick are made available to enable the mechanic to obtain the correct adjustment. To determine the correct adjustment, proceed as follows:

1. Assemble the cones to the race, omitting the spacer and shims between the cones. Make sure that the bearing rollers seat in the races.

2. Apply pressure to the cones in a press or vise and with micrometers measure the distance between the outside surface of the inner races of the cones and make a notation of this dimension. Next add the spacer and go through the same procedure of measurement. If the addition of this spacer does not increase this dimension, install shims as required until it is increased. The correct thickness of spacer and shims is that which will increase the dimension by .002" to .003".
3. Press the single row thrust bearing on the gear end of the pinion shaft with the pressure applied to the inner race. Install a new lock ring and bend the end of it around the groove in the shaft with a pair of pliers.
4. Press the rear bearing cone on the pinion shaft, so that it is up tight against the pinion gear.
5. Install the spacer and shims, previously determined, and the outer race.

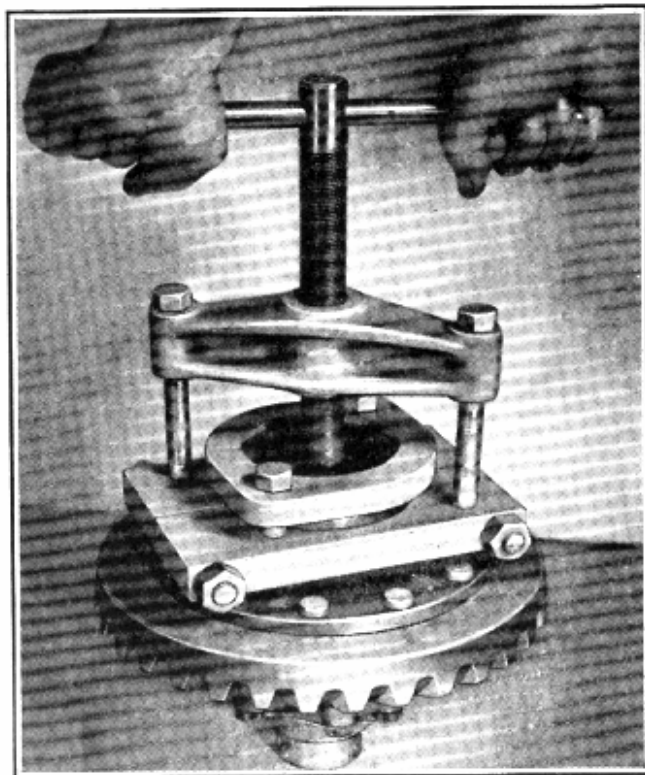


Fig. 35—Removing the Differential Side Bearings With Puller No. CS-1047

6. Press the front bearing cone onto the shaft, making sure that the cone bottoms solidly against the spacer washer and shims.

Disassembly of the Differential Case

1. Place the differential assembly on a bench and examine the differential side bearings. If the bearings need to be replaced, use puller No. CS-1047 and remove both side bearings as illustrated in Fig. 35.

2. Cut the lock wire that is threaded through the cap screw heads and remove the cap screws.
3. Before separating the halves of the differential case, make sure the halves are marked so they can be properly assembled in respect to each other (see Fig. 36).
4. After removing half of the case, the differential gears, thrust washers and spider gears can be removed.
5. Clean all parts thoroughly and examine for wear. Any parts which show excessive wear or scoring should be replaced.

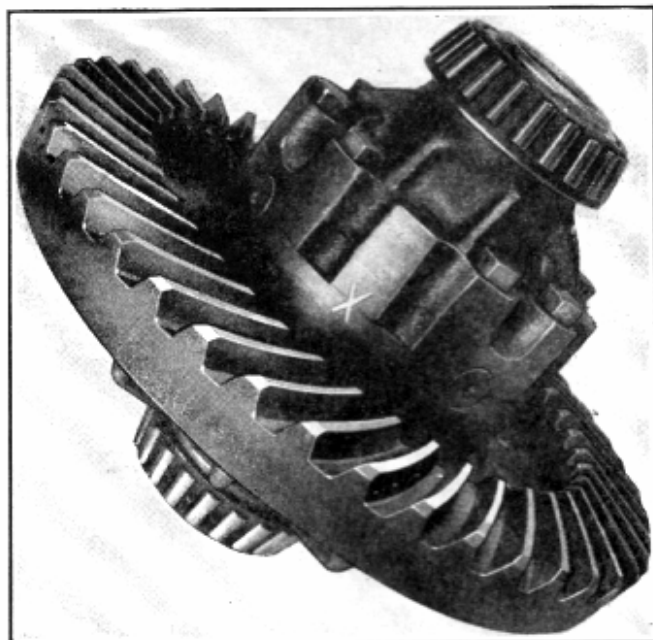


Fig. 36—Mark Differential Halves as Shown

Inspection

Wash all parts thoroughly in a suitable cleaning fluid. Check all gears for chipped, cracked or scored teeth. Inspect the thrust surfaces in the housing halves for wear or score marks. Check the fit of the side gear hubs in the differential case halves. Worn side gear and differential pinion thrust washers should be replaced. The fit of the spider gears should be checked on the spider. The differential side bearings should be carefully inspected for worn, chipped, scored or broken rollers and races. They should then be oiled and rotated by hand to check for roughness.

Any damaged or worn parts should be replaced.

NOTE—If any one of the six differential gears is damaged or scored all six should be replaced. If either the ring gear or the pinion gear are worn or scored, they both must be replaced as they are made in matched sets.

Rear Axle Grease Seals (C-8A)

Two spring loaded, leather type oil seals are installed in the rear axle housing, close to the inner

end of the axle shafts, in the above vehicle. These seals should be inspected and if damaged or worn should be replaced. To replace the seals it is necessary to remove the differential assembly and rear axle shafts, the seals may then be driven towards the center of the housing. Installation is made from the center of the differential housing.

Before installing a new oil seal, it should be thoroughly soaked in engine oil (it is advisable to always keep a small stock of these seals in oil, so that they will be ready for instant use).

Replacing the Ring Gear

If the ring gear is found to be in such condition that it is of no future use, (see paragraph titled "Inspection"), and the necessary equipment is available, cold rivet a new ring gear to the differential case. However, if the equipment is not available, install a new ring gear and differential case as a unit.

If a 20 ton press and a special ring gear rivetting jig and set K-394 are available, proceed as follows:

1. Drill out the rivets, using a drill smaller in diameter than the rivets ($3/8$ " drill).
2. Drive out the remainder of the rivets with a punch.
3. Tap off the ring gear from the differential case using a soft-faced hammer.
4. Wipe surfaces clean of all dirt and foreign matter and check run out of the surface on which the ring gear sits by bolting the differential halves together, setting up the case in its bearings in the differential housing and attaching a dial indicator as shown in Fig. 37.
5. If the run-out exceeds $.002$ ", the case should be replaced or the surface refaced in a lathe.

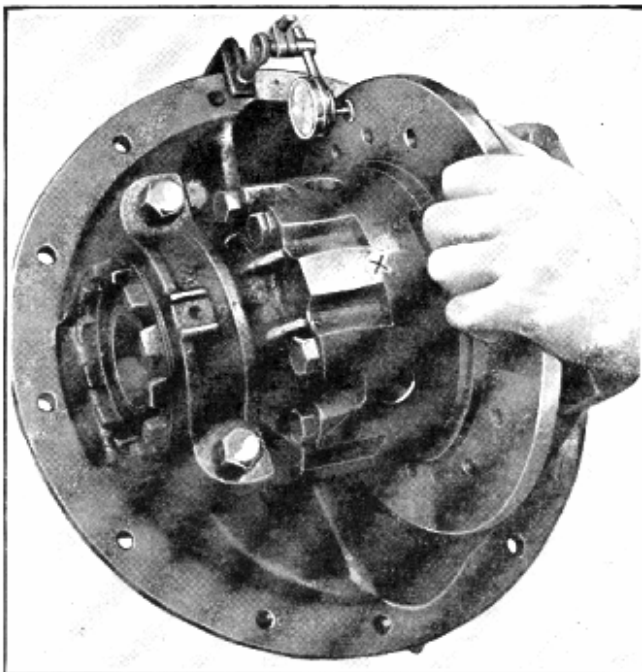


Fig. 37—Checking Run-Out of the Differential Case

6. When replacing the ring gear, install two 2" bolts $3/8$ ", (the same diameter as the rivet) to act as guides. By tightening these bolts alternately, and tapping the ring gear with a soft hammer at the same time, it may be brought up flush with the surface of the differential case. Tighten the two guide bolts securely.
7. Set the differential case and gear on the riveting jig K-394, with teeth side of the ring gear facing upward.
8. Using the correct size rivets (as specified in the Parts Book) apply 20 tons pressure working on opposite rivets until all are pressed securely. Remove guide bolts and install rivets in their place.
9. Check the run-out of the back surface of the ring gear which should not exceed $.005$ " as shown in Fig. 38. If the run out does exceed $.005$ ", the ring gear should be removed and the operation repeated with more care.

NOTE—The ring and pinion gears should only be replaced in pairs, since they are made in matched sets.

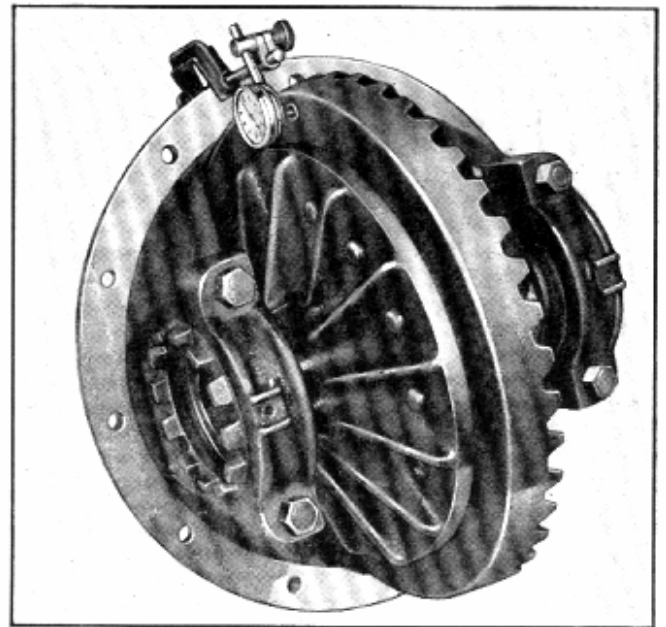


Fig. 38—Checking Run-Out of the Back Surface of the Ring Gear

Reassembly of Pinion Shaft to Carrier

1. Pinion Shimming:

The adjustment of the pinion is made by means of shims. These shims are placed each side of the pinion bearing outer race and adjustment is made by moving the shims from one side of the bearing to the other. A total of $.050$ " of shims are used and the standard position for these is $.025$ " on each side of the bearings.

To determine the correct pinion shimming, examine the marking to be found on the back

face of the ring gear and also on the flange of the carrier. The marking on the ring gear is made by an electric pencil and follows the production number of the gear. This will be marked plus or minus. For example N243+5. The +5 is the only mark which refers to the shimming. The other numbers are used for production purposes only. The mark on the carrier flange, (the face which contacts the banjo housing) will be marked plus or minus. The addition of the ring gear and the carrier flange marks, determines the amount to add to or subtract from the "pinion side" of the pinion bearing. Any shims added or subtracted at this point will have to be added or subtracted at the universal side of the pinion bearing.

Example: Using the marking +5, as shown above, remove .005 shims from the universal joint side of the pinion bearings and add the same amount to the pinion side of the bearings. This will make .030" at the pinion side (.025" + .005") and .020" at the universal side (.025" - .005").

2. Install the shims to go on the pinion side of the bearings by placing them into the differential carrier housing.
3. Install the pinion shaft assembly being careful to make sure that the "outboard" pinion bearing is not damaged as it enters its bore. Make sure that the bearing race seats firmly against the shoulder at the bottom of the bearing bore in the housing, and that the shims are not "cocked."
4. Place the required number of shims at the universal side of the pinion bearing outer race.
5. Inspect the bearing retainer oil seal. If there is any doubt as to its fitness for further use, it should be replaced.
6. Smear a thin coat of grease over the seal, then place the propeller shaft pinion flange in the bearing retainer and oil seal.
7. Slide the bearing retainer and propeller shaft pinion flange over the splined end of the pinion shaft.
8. Install the six bolts holding the bearing retainer to the third member housing. Then install the propeller shaft pinion flange spacer and nut on the pinion shaft and tighten. Insert a new cotter pin and bend the ends over firmly with a pair of pliers.

Assembling Differential

1. Before the differential case is assembled, the side gears, pinions, and spider should be dipped in gear oil to assure proper lubrication of all bearing surfaces when the unit is first put into service.
2. Install the spider and side gears with their thrust washers in their proper position.
3. Install the case cap screws and tighten securely.
4. Install a locking wire, threading it through the head of the screws in such a manner that the

wire will be drawn still tighter if the screws start to loosen and back out.

5. Dip differential side bearings in gear oil, turning the rollers to be sure they are thoroughly lubricated, and place the bearings in their proper position on the differential case. The bearings should be firmly seated in place by special tool No. J-1703 as illustrated in Fig. 39.

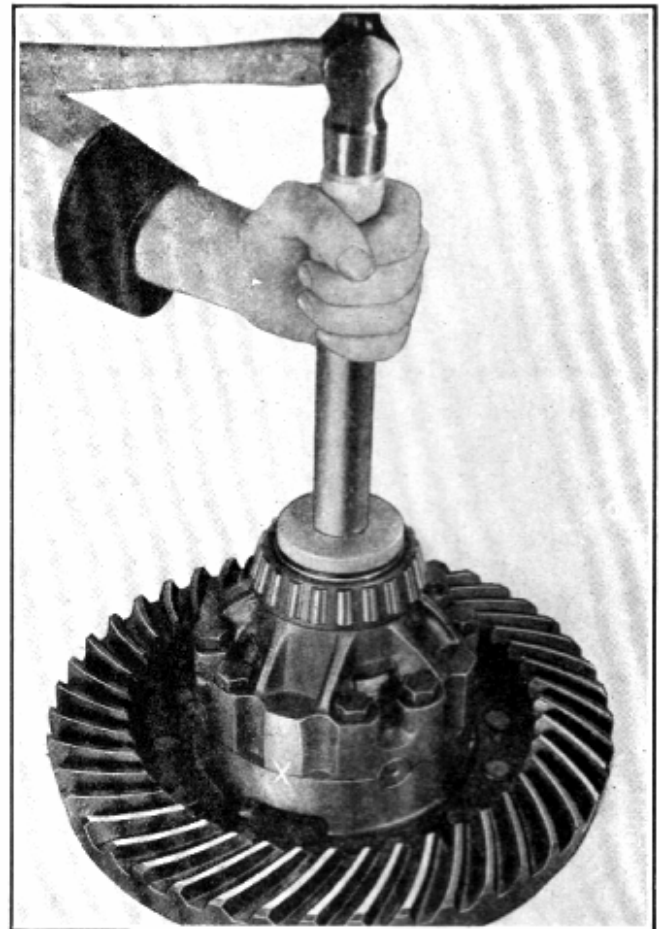


Fig. 39—Replacing Differential Side Bearings

Differential Carrier Reassembly and Adjustment

1. Place the differential carrier housing in a vise.
2. Assemble the pinion assembly to the carrier according to the instructions given under the title of "Reassembly of the Pinion Shaft to the Carrier." Install a new gasket at the pinion bearing retainer and tighten the bolts securely.
3. Install the ring gear and differential assembly to the carrier.
4. Install the bearing caps making sure that they are put on the same side as they were taken off.
5. Install the cap screws and tighten them until the lockwashers just flatten out. Screw the adjusting nuts into the carrier, making sure that they turn freely. Tighten them snugly to straighten up the bearing outer races.

- Back off the right hand adjusting nut and tighten the left hand adjusting nut just to a point where all lash between the ring gear and pinion is removed. Then back off the left hand nut approximately two notches and to a locking position. Tighten up the right hand nut as tight as possible, then back it off until it is free of the bearing. Retighten the nut until all the play in the bearing is removed and then one or two notches more to a locking position. (See Fig. 40).

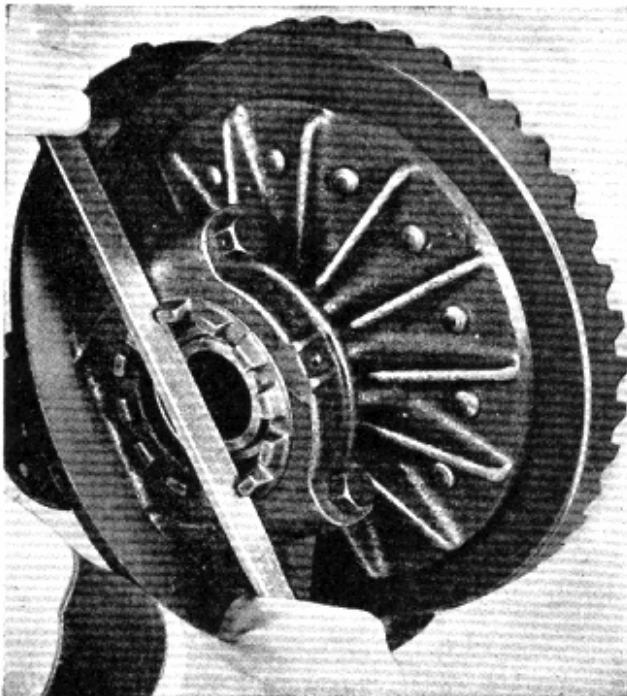


Fig. 40—Adjusting Differential Side Bearings

- Tighten the differential side bearing cap bolts securely.
- Check the ring gear and pinion back lash (see Fig. 41). This should be from .008" to .010". If it is more than this, loosen the right hand adjusting nut one notch and tighten the left hand nut one notch. If it is less than .008" to .010" loosen the left hand nut one notch and tighten the right hand nut one notch. Tighten down the cap screws and recheck the ring gear and pinion back lash with a dial gauge as illustrated in Fig. 41. Assemble and tighten the adjusting nut locks.
- As a further check for the correct ring gear and pinion adjustment the following procedure should be used.

Red Lead Test

- Mix a small amount of red lead and engine oil to obtain a paste.
- Brush a thin coat on both the drive and the coast side of the ring gears at four places around the gear.

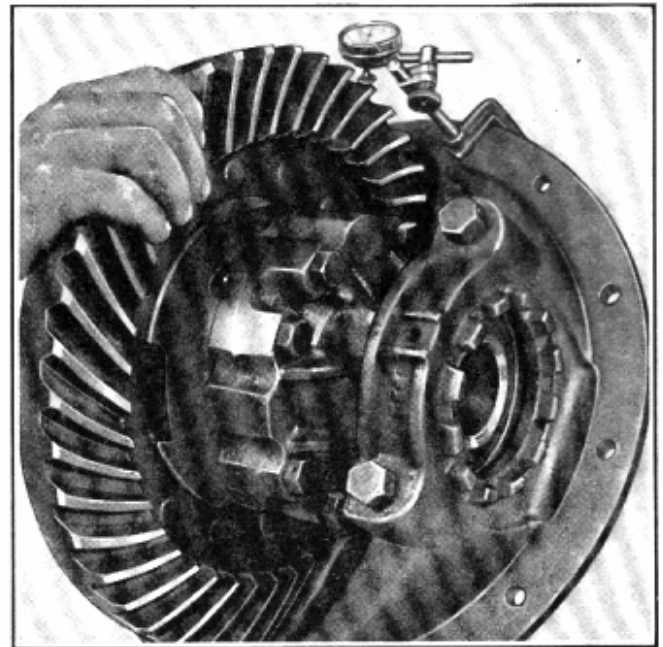


Fig. 41—Checking Ring Gear Backlash

- Place a load on the differential by holding it with one hand and with the other turn the pinion gear until the ring gear has made a complete revolution, first forward, then backward.
- Examine the markings on each gear tooth.

The markings in figure 42 shows that the adjustment has been correctly performed.

Figure 43 indicates insufficient backlash. The ring gear should be moved "out" to correct this condition

Figure 44 shows a condition of too much backlash. In this case the ring gear should be moved "in."

Figure 45 indicates that the pinion is too deep and should be moved towards the universal joint.

Figure 46 shows the opposite condition, that is the pinion is not "in" deep enough. Therefore the pinion shimming should be altered to move the pinion towards the ring gear.

When satisfied with the tooth markings, complete the assembly and road test the vehicle.

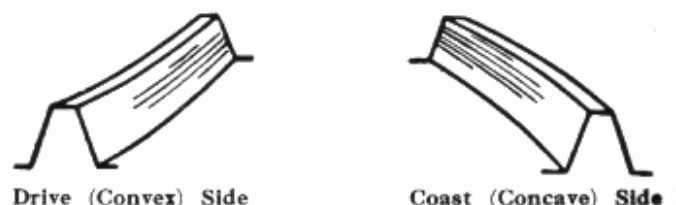


Fig. 42—Correct Adjustment

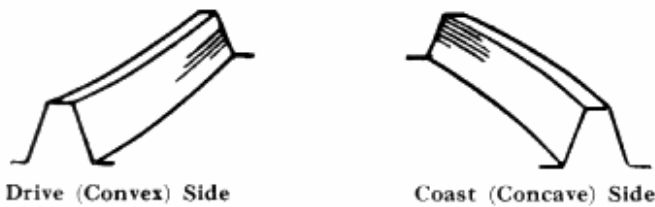


Fig. 43—Insufficient Back Lash
Tooth Bearing at Small End

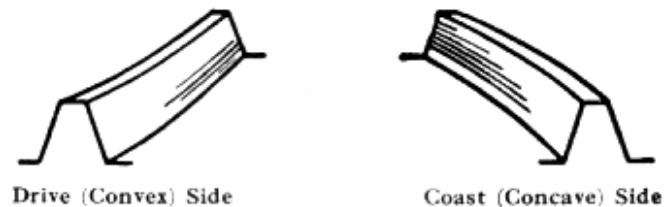


Fig. 45—Pinion Set Too Deep—Tooth Bearing
Too Low—Serious Danger of Scoring

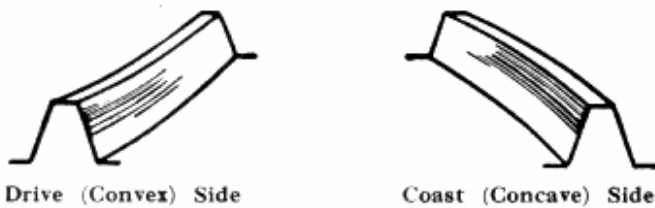


Fig. 44—Excessive Back Lash
Tooth Bearing at Large End

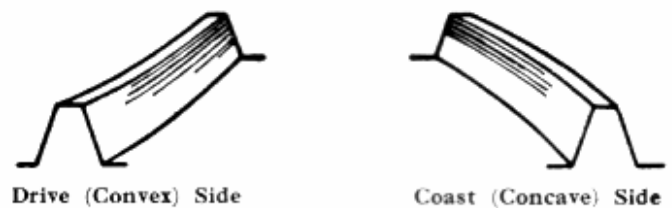


Fig. 46—Pinion Not Set Deep Enough
Tooth Bearing at Top of Teeth and Narrow

DRIVE SHAFTS AND UNIVERSAL JOINTS

(C-8A, C-15A, C-30, C-60S, C-GT)

The drive line from the transmission to the front and rear axles comprises three tubular propeller shafts and six needle bearing universal joints.

From the transmission a short propeller shaft transmits power backward to the transfer case and thence to propeller shafts leading to the front and rear axles.

The propeller shafts from the transfer case to the rear axle and from the transfer case to the front axle are not the same dimensionally and are therefore not interchangeable.

All universal joints are of the needle bearing type. Lubricant for each trunnion is fed from a central lubrication fitting through drilled passages. On the side opposite the lubrication fitting is mounted a relief valve to prevent over-lubrication or possible damage to the trunnion bearing seals. A lubrication fitting is also provided on the rear yoke of each of the three slip joints to assure free movement between the splines in the joint and those on the propeller shaft. A plug is staked into the forward end of the splined opening to retain the lubricant. A small hole is drilled in the center of this plug to relieve trapped air. The rear end of the splined opening is sealed by a cork packing which is mounted in a retainer cap which screws on the end of the yoke.

Drive Shafts (C-60L)

The drive line from the transfer case to the rear axle comprises two tubular propeller shafts and three needle bearing universal joints. On the front propeller shaft the rear yoke of the front universal joint is an integral part of the propeller shaft. The rear end of this shaft is machined to receive the support bearing, and it is also splined and threaded

to mount the front yoke of the intermediate universal joint. Fig. 47.

The support bearing is mounted in the support bracket by means of a rubber cushion which fits over the outer race of the bearing and inside a sleeve in the support bracket. This bearing is of the permanently lubricated and sealed type.

On the rear propeller shaft the front yoke of the rear universal joint is an integral part of the propeller shaft. The front end of this shaft is splined to fit the splines in the rear yoke of the intermediate universal joint.

Disassembly (C-8A, C-15A, C-30, C-60S, C-GT)

The drive line may be disconnected at the universal joints on either end of the three propeller shaft assemblies by removing the bolts holding the universal joint flange to its unit.

Sufficient clearance for dropping either end of any of the three propeller shafts can be obtained by sliding the shaft further onto the splines of the slip joint.

The slip joint may be disassembled from the propeller shaft by unscrewing the seal retainer from the rear yoke and pulling the universal joint assembly off the splines on the propeller shaft. When necessary to replace a cork seal in the grease retainer, press it out of the retainer and, as it is split, Fig. 19, it may be removed from the propeller shaft.

To overhaul a universal joint remove the snap rings and lubrication fittings. Support the yoke on a bench vise, then using a soft drift, drive on the end of one of the trunnion bearings. This will drive the opposite trunnion bearing out of the yoke, Fig. 20. Care should be exercised when driving through the trunnion not to drive it into the side of the yoke. After one bearing has been removed,

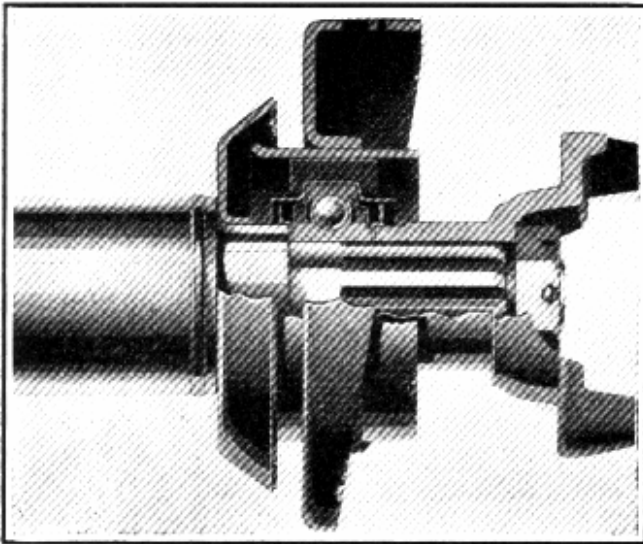


Fig. 47—Drive Shaft Support Bearing C-60L

support the other side of the yoke on the vise and drive the other bearing out by using a brass drift on the end of the trunnion pin.

Reassembly (C-8A, C-15A, C-30, C-60S, C-GT)

After inspection of all parts, the twenty-seven (27) needle bearings may be reassembled to each trunnion and the trunnion bearing assemblies re-installed into the yoke.

When reassembling the bearings, they should be pressed into the yokes just far enough to install the snap rings. Then, while holding the trunnion in one hand, strike the yoke a few light blows with a hammer to firmly seat the bearings against the lock rings.

Install the slip joint onto the splines of the propeller shaft with the yoke in the same plane as the yoke welded to the opposite end of the shaft. As a guide to make certain these yokes are lined up properly, arrows are stamped on the hubs of the slip joints and also on the face of the propeller shaft. These arrows should be in line as shown in Fig. 21.

Reassembly of the propeller shaft to the vehicle should be made in reverse order to disassembly.

Lubrication of the universal joints should be made with S.A.E. 90 gear lubricant.

Removal of Propeller Shafts (C-60L)

Dropping the propeller shaft permits removal of the transfer case without disturbing the rear axle. Propeller shafts may be removed, disassembled and inspected in the following manner:

1. Remove the bolts from the flanges of the front and rear joints.
2. Remove the nuts from the bolts holding the center bearing in position.

3. The entire drive line can now be removed as an assembly for inspection and repair.

Propeller Shaft Disassembly (C-60L)

1. Remove the nuts from the trunnion bearing "U" clamps and remove the clamps. (This may be done at either or both the transmission end and/or the rear axle end depending upon the amount of disassembly desired.)
2. Unscrew the oil seal retainer from the rear yoke of the intermediate, or center, universal joint.
3. Remove the rear propeller shaft from the front propeller shaft by slipping it out of the universal joint splines.
4. Split the front universal joint at the transmission end of the front propeller shaft.
5. Remove the two bolts which mount the intermediate universal joint support bracket to the frame cross member.
6. Disconnect the intermediate universal joint by removing the two trunnion bearing "U" clamps.

NOTE—To hold the trunnion bearings in place as well as to prevent dirt entering and save time in reassembling, leave the bearings in the trunnion and tape them in place.

7. Clamp one side of the front yoke of the intermediate universal in a bench vise and remove the retaining nut.
8. Using a soft hammer for the purpose, tap the yoke from the propeller shaft.
9. Wet the rubber cushion located in the support bracket with water to soften the soap used on the rubber when assembled. Mount the support bracket in a bench vise and move the propeller shaft from side to side to work the rubber cushion out of the support.
10. After the support bracket has been removed the rubber cushion can be removed from the bearing with the hands as shown in Fig. 48.

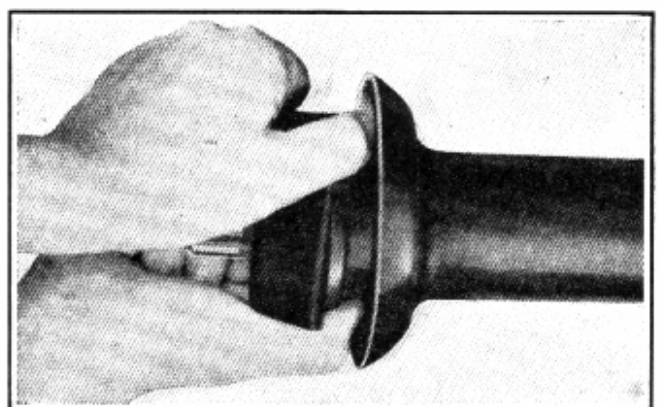


Fig. 48—Removing or Replacing Bearing Rubber Cushion

11. Mount the special puller, J-1619, in a bench vise and fit the jaws of the puller in behind the bearing outer race. Turning the screw of the puller will remove the bearing from the shaft, Fig. 49.
12. Tap the dust shields off the outer race of the bearing. Fig. 50 shows a layout of the parts making up the intermediate support bearing assembly.

Inspection

Thoroughly wash all parts, EXCEPT THE SUPPORT BEARING, in clean gasoline. Inspect the shaft for worn splines and replace shafts if necessary. Check the bearing for roughness or excessive play by holding the inner race with one hand while slowly turning the outer race with the other. If either condition is present, replace the bearing.

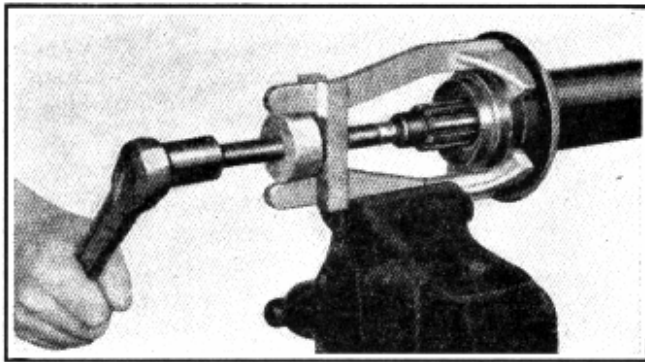


Fig. 49—Removing Propeller Shaft Intermediate Bearing

NOTE—The intermediate support bearing is of the permanently lubricated and sealed type therefore no attempt should be made to wash it out with gasoline or to re-lubricate it.

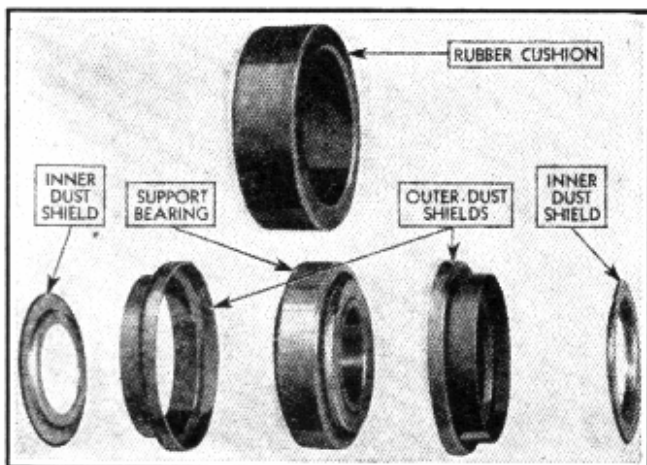


Fig. 50—Layout of Intermediate Support Bearing Parts

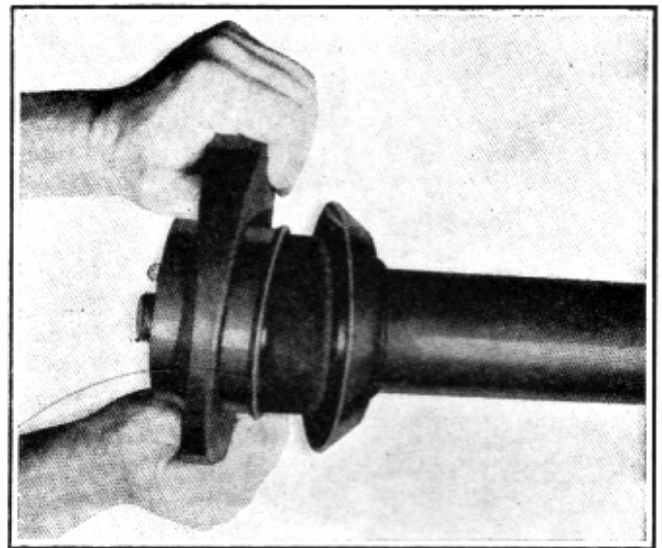


Fig. 51—Installing Bearing Support Bracket

Propeller Shaft Reassembly (C-60L)

1. Press the outer dust shields on the outer race of the support bearing.
2. Place one of the inner dust shields on the shaft with the offset in the shield away from the bearing as shown in Fig. 50. Drive the bearing on the shaft using the universal joint yoke as a driver. Then install the other inner dust shield on the shaft with the offset away from the bearing.
3. Install the rubber cushion over the bearing as shown in Fig. 48.
4. Coat the outside surface of the rubber cushion lightly with soft soap and slide the support bracket over the rubber cushion as in Fig. 51.
5. Install the front yoke of the intermediate universal joint, making sure that the yoke is turned 90 degrees, in relation to the rear yoke of the front universal joint which is a part of the propeller shaft.

Then by installing the rear yoke of the intermediate universal onto the rear propeller shaft so that it is in the same plane (line) with the front yoke of the rear propeller shaft rear universal joint, it will correctly align all three universal joints.
6. Reassemble the front universal joint and then bolt the intermediate support bracket to the frame cross member.
7. Assemble the rear propeller shaft and adjust the packing retainer on the rear sleeve yoke of the intermediate joint.

SERVICE DIAGNOSIS AND CORRECTIVE METHODS

SYMPTOM AND PROBABLE CAUSE	REMEDY
Axle Noisy on Drive	
1. Ring gear and pinion adjustment too tight.	1. Readjust ring gear and pinion (see Instructions).
2. Rear side of double row pinion bearing rough.	2. Replace bearing and readjust ring gear and pinion.
Axle Noisy on Coast	
1. Excessive lash between ring gear and pinion.	1. Readjust ring gear and pinion (see Instructions).
2. Front side of double row bearing rough.	2. Replace bearing and readjust ring gear and pinion.
3. End play in double row bearing.	3. Replace bearing and readjust ring gear and pinion.
Axle Noisy on Both Drive and Coast	
1. Pinion too deep in ring gear.	1. Double row bearing installed backward (see Instructions—Pinion Reassembly). C-15
2. Ring and pinion adjustment too tight.	2. Readjust ring gear and pinion (see Instructions).
3. Worn or damaged pinion or differential bearings.	3. Replace damaged bearing or bearings.
4. Loose or worn wheel bearings.	4. Adjust or replace bearings as necessary.
Backlash	
1. Axle shaft flange loose.	1. Replace aluminum gasket, retighten and lock axle shaft flange bolts.
2. Worn differential and side gear spacers.	2. Replace any worn spacers.
3. Worn universal joints.	3. Replace worn universal joint parts.

**SPECIFICATIONS
(C-15)**

Housing.....Banjo	Clearance Between—
Drive.....Through Springs	Pinion and Spider......004"—.008"
DIFFERENTIAL	Side Gear and Case......002"—.006"
Gear Ratio.....6.17 to 1	Side Gear Thrust Washer Thickness—
Drive.....Hypoid	New Limits......058"—.062"
Bearings.....Hyatt—Barrel Roller	Worn Limits......048"
PINION SHAFT	PINION SHAFT
Ratio.....See Differential	Bearing Adjustment—Bearing
Bearings—	Must Turn with No Per-
Inner.....Straight Roller	ceptible End Play.....Tighten Nut to 160-
Outer.....Double Row Ball	280 ft. lbs. Torque
AXLE SHAFT	HYPOID DRIVE GEAR THRUST PAD
Diameter—Differential End.....1.6445"—1.6345"	Clearance—Pad to Gear......005"—.007"
Number of Splines.....10	Pad Thickness—
	New Limits......1865"—.1885"
	Worn Limits......125"
SERVICE DATA	PROPELLOR SHAFT.....1
DIFFERENTIAL	Shaft Diameter.....3"
Bearing Adjustment.....Non Adjustable	Shaft Length.....45½"
Gear to Pinion Backlash......005"—.008"	UNIVERSAL JOINT
Gear Run Out—Not Over......005"	Type.....Needle Bearing
Case Run Out—Not Over......002"	Number "U" Joints.....2

REAR AXLE—H - 26

(C-15A, C-30, C-60S, C-60L, C-GT)

Make	*
Housing.....	G.M.
Drive.....	Through Springs

Differential

Gear Ratio—	
C-15A.....	6.5 to 1
C-GT, C-30, C-60S, C-60L.....	7.16 to 1
Drive.....	Spiral Bevel
Bearings.....	Tapered Roller
Gear to Pinion Backlash.....	.008" to .010"
Gear Run-Out—Not over.....	.005"
Case Run-out—Not over.....	.002"

Pinion Shaft

Ratio—	
C-15A.....	6.5 to 1
C-GT, C-30, C-60S, C-60L.....	7.16 to 1
Bearings—	
Inner.....	Straight Roller
Outer.....	Double Tapered Roller
Adjustment.....	Bearing must turn with no perceptible end play
Pinion Cage Adjustment.....	Shims
Shim Thickness.....	.005"

Clearance Between

Pinion and Spider.....	.003"—.007"
Side Gear and Case.....	.005"—.009"

Axle Shaft

Run Out—Not Over.....	.005"
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(C-8A)

Make

Housing.....	Clark
Drive.....	Through Springs

Differential

Gear Ratio.....	6.16 to 1
Drive.....	Spiral Bevel
Bearings.....	Tapered Roller
Gear to Pinion Backlash.....	.008" to .012"
Gear Run-out—Not over.....	.005"
Case Run-out—Not over.....	.003"

Pinion Shaft

Ratio.....	6.16 to 1
Bearings—	
Inner.....	Single Row Ball
Outer.....	Double Tapered Roller
Adjustment.....	Load on Pinion Bearings .003"
Pinion Cage Adjustment.....	Shims
Shim Thickness.....	.005"

Clearance Between

Pinion and Spider.....	.003"—.007"
Side Gear and Case.....	.005"—.009"

Axle Shaft

Run-out—Not over.....	.005"
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SPECIAL TOOLS

Tool No.	Description	Tool No.	Description
*BB-17033	Differential Side Bearing Adjusting Tool.	J-1439	Pinion Double Row Bearing Removing Tool (6 tooth Pinion).
J-972	Differential Side Bearing Adjusting Tool.	KMO-30B-F-G-K	Dial Indicator and Attachments.
*BB-17033	Rear Wheel Bearing Nut Wrench.	J-872-1	Outer Wheel Bearing Race Replacer.
J-870	Rear Wheel Bearing Nut Wrench.	J-872-2	Wheel Bearing Oil Seal Replacer.
K-344	Rear Wheel Outer Bearing Remover.	J-872-3A	Outer Wheel Bearing Race Setting Tool.
X-1239-A	Rear Wheel Outer or Inner Bearing Outer Race & Inner Grease Retainer Remover.	J-872-4	Inner Wheel Bearing Race Replacer.
X-1239-B	Rear Wheel Outer or Inner Bearing Outer Race & Inner Grease Retainer Replacer.	J-872-5	Handle for use with above J-872 Tools.
*TR-278-R	Pinion Single "Outboard" Bearing Puller.	J-918-A	Inner Bearing Oil Seal and Bearing Puller.
*TR-278-R	Differential Side Bearing Puller.	J-1364	Pinion Bearing Lock Ring Installer.
*CS-1047	Differential Side Bearing Puller.	J-1658	Pinion Bearing Oil Seal Replacer.
J-994	Differential Side Bearing Replacer.	*J-987	Chain Grip Wrench.
J-1703	Differential Side Bearing Replacer.	J-973	Oil Slinger Replacer.
		K-466-A	Axle Bearing and Retainer Driver Set.
		J-1619	Propellor Shaft Bearing Puller.

* Shown in front of a tool number denotes the tool is applicable to other sections.