

## SECTION H

### THE REAR AXLE

(1½ and 2½ LITRE)

General Description.

Lubrication.

Section No. H.1	To remove a half-shaft.
Section No. H.2	To strip a hub.
Section No. H.3	To remove a brake back plate.
Section No. H.4	To remove the rear axle from the car.
Section No. H.5	To remove the propeller shaft.
Section No. H.6	To take out the differential unit.
Section No. H.7	To remove the pinion assembly.
Section No. H.8	To dismantle the pinion assembly (2½ litre).
Section No. H.9	To dismantle the pinion assembly (1½ litre).
Section No. H.10	Reassembling the pinion assembly (2½ litre).
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Section No. H.13	Early-type axles.
Section No. H.14	Fitting the trunnion bearings.

#### GENERAL DESCRIPTION

The rear axle is fitted with semi-floating half-shafts and consists of a pressed-steel banjo casing to which the malleable iron centre casting carrying the crown wheel and pinion assembly is attached by twelve bolts on the 2½ litre and ten bolts on the 1½ litre. The torque tube is an interference fit and riveted in the centre casting.

The axle shafts are flanged at their outer ends to form the attachment for the brake-drums and wheels.

The shafts are each carried in a ball bearing which is located in a housing bolted to a flange on the axle casing. There is also an oil seal at this point.

A large hexagon nut retains the inner race against the machined back face of the flanged axle shaft. This also provides the necessary end location. Spiral bevel gears are used for the final drive and pinion adjustment is obtained by the selection of a correct thrust ring which also functions as a spacer.

#### LUBRICATION

The rear axle filler-plug is on the right-hand side of the casing and when refilling or topping up the oil should reach to the bottom of the filler-plug hole.

The level of the oil should be inspected each 1,000 miles (1600 km.) and replenished if necessary with oil to Ref. B, page P.2.

After the first 500 miles (800 km.) and subsequently each 6,000 miles (10000 km.) the old oil should be drained off and the axle filled with new lubricant.

The square-headed drain plug is on the under side of the axle.

The capacity on the 2½ litre car is 4 pints (2.3 litres) and 2¾ pints or 1.6 litres on the 1½ litre car.

Each rear hub is provided with a hexagon plug which should be removed every 6,000 miles (10000 km.) and a grease nipple substituted to permit greasing the rear hub bearings with grease to Ref. C, page P.2.

## Section H.1

### TO REMOVE A HALF-SHAFT

Jack up the axle and take off the hub cover and wheel. Detach the brake pull rod at the balance lever on the rear axle.

Undo the three countersunk screws holding the brake-drum to the axle shaft and lift the drum off.

Remove the eight nuts and spring washers holding the brake back plate, hub, and half-shaft assembly to the flange on the axle casing and then pull the whole assembly away.

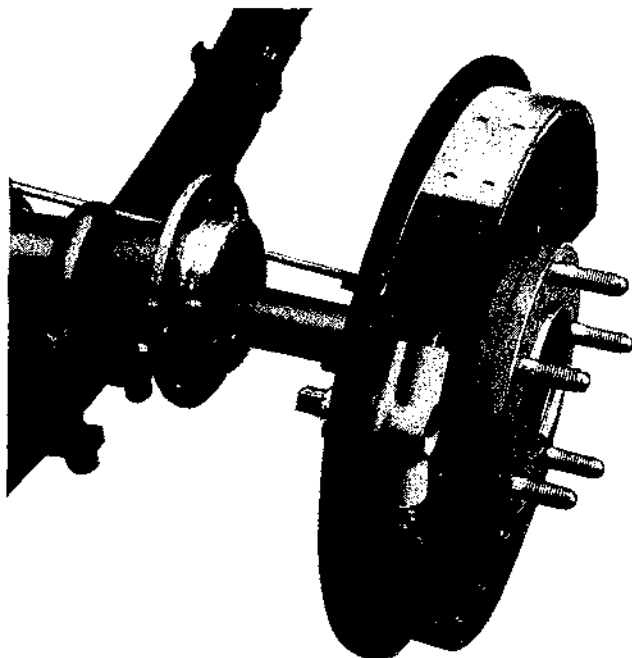


Fig. H.1.

The half-shaft, hub, and brake assembly partially withdrawn.

## Section H.2

### TO STRIP A HUB

Withdraw the half-shaft and hub assembly (Section H.1).

Bend back the locking tab securing the large nut behind the bearing and unscrew the nut.

Knock out the half-shaft, leaving the bearing in the hub.

Undo the set screws holding the brake back plate to the hub bearing housing and lift the brake back plate assembly away.

Knock out the bearing and carefully extract the oil seal.

Reassembly is a reversal of this process, but make quite sure that the oil seal and the part of the shaft upon which it bears are in good condition and free from score marks before refitting. Make sure also that the lip of the seal is not damaged when refitting the half-shaft.

## Section H.3

### TO REMOVE A BRAKE BACK PLATE

Remove the half-shaft and hub assembly (Section H.1).

Undo the large nut on the half-shaft after bending back its locking tab and tap the half-shaft out of the bearing housing.

Undo the screws holding the brake back plate to the bearing housing flange and lift it off.

When refitting make sure that the lip of the oil seal is not damaged.

## Section H.4

### TO REMOVE THE REAR AXLE FROM THE CAR

Take out the front seats and remove the cover over the intermediate shaft.

Undo the forward end of the intermediate shaft by removing the four Simmonds nuts and taking out the bolts.

Then pull the shaft forward, complete with the rear splined coupling, until it is free of the driving shaft.

Detach the trunnion mountings by removing the four bolts and nuts on each side.

Raise the car by means of a suitable jack and place supports under the chassis just forward of the front ends of the rear springs.

Next take off both rear wheels and detach the brake operating rod at the relay lever at the centre of the torque tube. This is done by extracting a clevis pin from the appropriate fork end.

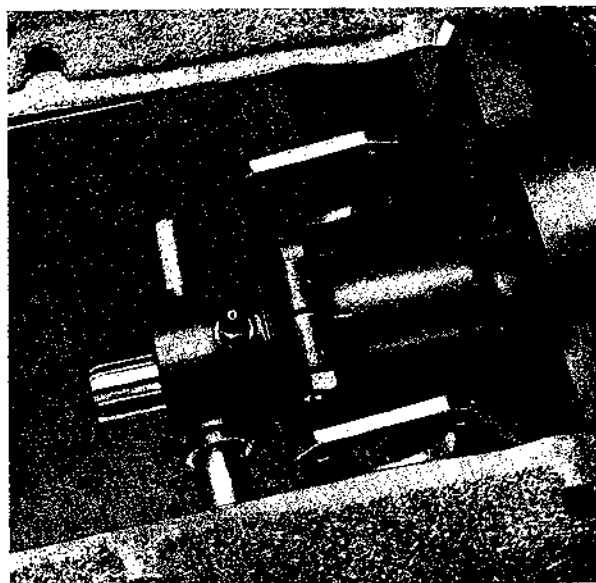


Fig. H.2.

The trunnion housing ready for removal.

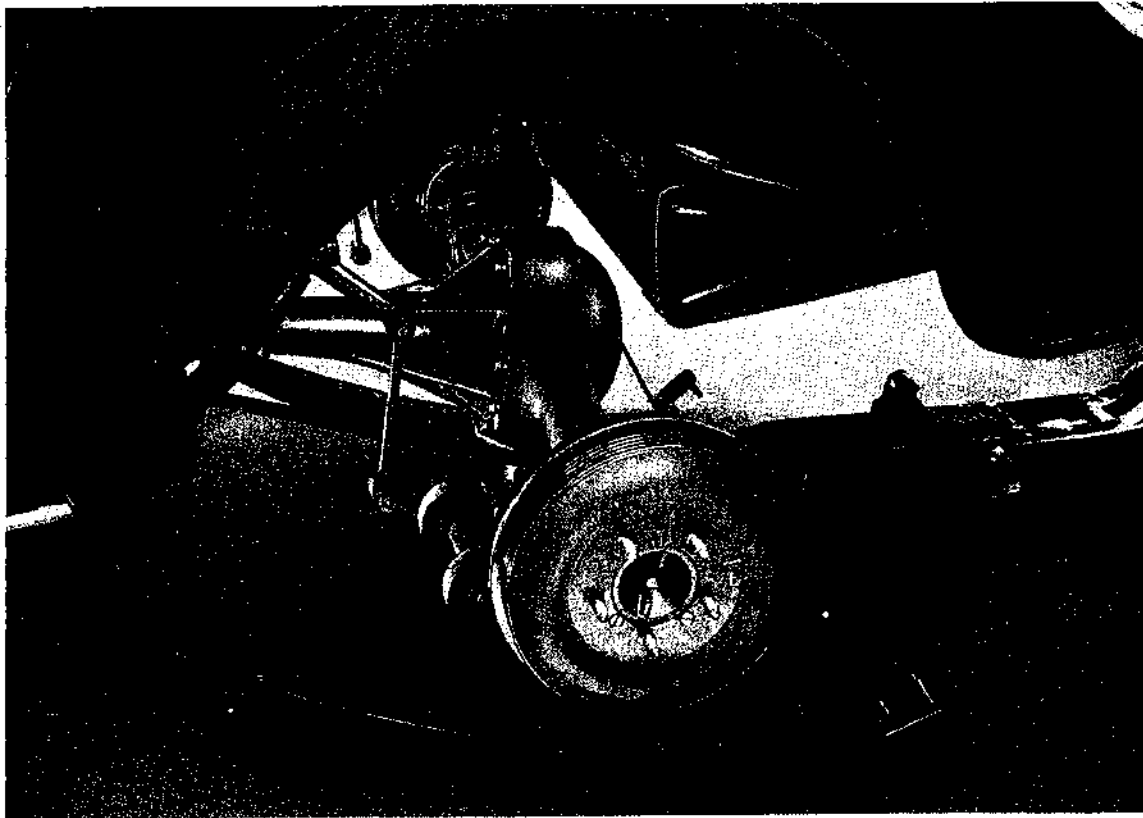


Fig. H.3.  
The rear axle disconnected and ready for removal.

Then disconnect the shock absorbers at their axle attachments, undo the spring "U" bolts on both sides and take off the retaining plates.

Use a hydraulic jack under the banjo casing to support the rear axle and then undo the nuts on the rear shackles and remove the shackles. This will allow the rear ends of the springs to fall to the ground.

Now raise the axle slightly until the brake relay lever pivot is clear of the frame cross-member.

Slacken the pinch bolt contracting the torque tube onto the threads of the trunnion.

Turn the trunnion so that the lugs are clear of the two brackets welded to the chassis and then move the axle forward.

Now unstrew the trunnion.

**Note.**—On no account must the two brackets be bent.

The axle should now be lowered slowly on the hydraulic jack, at the same time pulling it away from the car.

Reassembly is largely a reversal of this process, but make sure the relay lever pivot bolt is high enough to clear the cross-member as the axle is pushed into position. With the axle roughly in position, pack the trunnion thread with grease to Ref. D, page P.2, and screw right in ; then, with the clamp bolt loose, screw the trunnion back until the greaser is vertical. This

generally represents about half a turn and should give the dimension between the trunnion and the rear face of the torque tube assembly indicated in Fig. H.4 for the various axles. This is important, to ensure the correct location for the spring shackles.

It is also important that the pinch bolt should tighten down the threaded end of the torque tube onto the trunnion sufficiently, without actually locking.

CAR	"A"	CAR	"A"
1½ litre up to Chassis No. 38S/15000	52 <sup>7</sup> / <sub>16</sub> in. (133.2 cm.)	Commencing Chassis No. 38S/15001	52 <sup>11</sup> / <sub>16</sub> in. (133.8 cm.)
2½ litre up to Chassis No. 58S/3224	52 <sup>7</sup> / <sub>16</sub> in. (133.2 cm.)	Commencing Chassis No. 58S/3225	52 <sup>11</sup> / <sub>16</sub> in. (133.8 cm.)

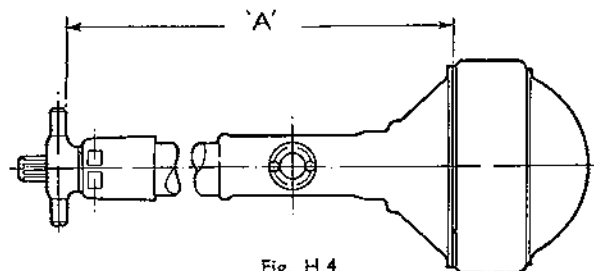
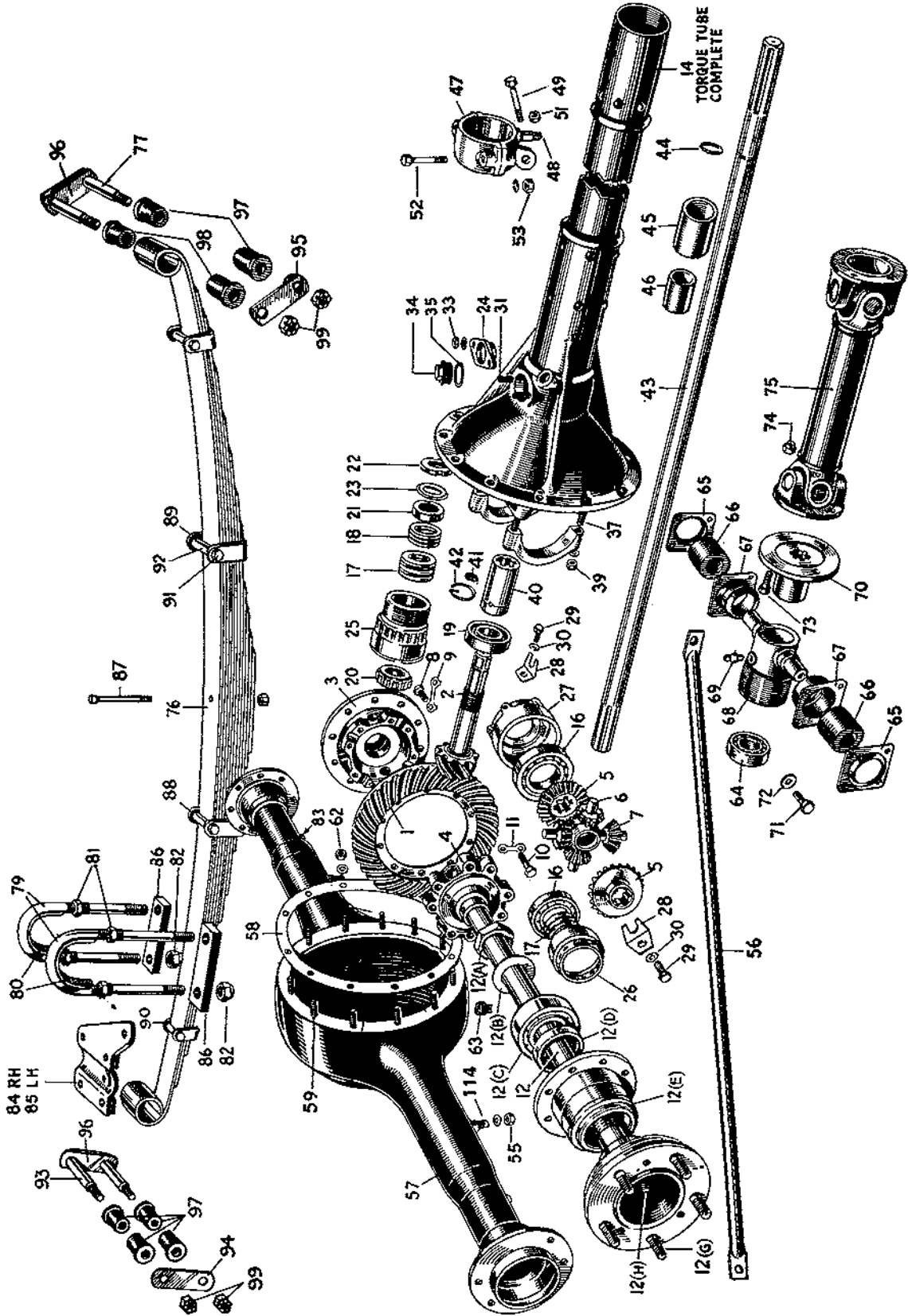


Fig. H.4.  
The correct setting of the trunnion in the torque tube for the different models.

**THE RILEY 2½ LITRE REAR AXLE COMPONENTS (Early Type)**



## KEY TO COMPONENTS OF REAR AXLE (2½ LITRE, EARLY TYPE)

No.	Description	No.	Description	No.	Description
1.	Crown wheel and	27.	Housing—differential bearing L/H.	67.	Cover (long)—trunnion mounting rubber.
2.	Pinion.	28.	Lock plate—differential bearing.	68.	Trunnion (std.)—torque tube.
3.	Case—differential (left-hand).	29.	Bolt—differential bearing lock plate.	69.	Greaser—trunnion.
4.	Case—differential (right-hand).	30.	Washer—differential bearing lock plate bolt.	70.	Flange—torque tube coupling.
5.	Gear—differential.	31.	Lock stud—pinion sleeve.	71.	Set screw—trunnion mounting.
6.	Spider—differential.	33.	Nut—pinion sleeve lock stud.	72.	Washer—trunnion mounting rubber.
7.	Pinion—differential.	34.	Plug assembly—oil filler.	73.	Bolt—torque tube coupling flange.
8.	Bolt—crown wheel to differential case.	35.	Gasket—oil filler plug.	74.	Nut—torque tube coupling flange bolt
9.	Lock plate—crown wheel to differential case bolt.	37.	Stud—differential bearing cap.	75.	Propeller shaft—intermediate.
10.	Bolt—differential case.	39.	Nut—differential bearing cap stud.	76.	Spring (rear).
11.	Lock plate—differential case bolt.	40.	Coupling—muff.	77.	Plate and pins—front shackle.
12.	Axle shaft.	41.	Grub screw—muff coupling.	79.	"U" bolt and lining.
12 (A).	Locknut—axle shaft.	42.	Spring ring—muff coupling.	80.	"U" bolt lining.
12 (B).	Washer—axle shaft locknut.	43.	Propeller shaft.	81.	Special nut—"U" bolt.
12 (C).	Bearing—rear hub.	44.	Spring ring—propeller shaft.	82.	Nut—"U" bolt.
12 (D).	Oil seal—rear hub.	45.	Bearing—propeller shaft centre.	83.	Screw—axle to spring locating.
12 (E).	Housing—rear hub bearing.	46.	Bush—propeller shaft centre bearing.	84.	Platform assembly—rear spring—R/H.
12 (G).	Stud—wheel—rear.	47.	Bracket—torque tube stay.	85.	Platform assembly—rear spring—L/H.
12 (H).	Plug—axle shaft.	48.	Intermediate lever pivot pin.	86.	Clamp plate—rear spring.
14.	Torque tube assembly.	49.	Clamp bolt—torque tube stay bracket.	87.	Centre bolt and nut.
16.	Bearing—differential.	51.	Nut—torque tube stay bracket clamp bolt.	88.	Clip—rear spring leaf (large).
17.	Bearing—pinion thrust (rear) and crown wheel thrust.	52.	Bolt—torque tube stay.	89.	Clip—rear spring leaf (medium).
18.	Bearing—pinion thrust (front).	53.	Nut—torque tube stay bolt.	90.	Clip—rear spring leaf (small).
19.	Bearing—pinion journal (front).	55.	Nut—rear axle (torque tube stay).	91.	Bolt and nut—leaf clip.
20.	Bearing—pinion journal (rear).	56.	Stay—torque tube.	92.	Bush—leaf clip.
21.	Lock ring—pinion (thick).	57.	Casing—rear axle.	93.	Plate and pins—rear shackle.
22.	Lock ring—pinion (thin).	58.	Gasket—rear axle casing.	94.	End plate—rear shackle.
23.	Tab washer—pinion.	59.	Set screw—rear axle casing.	95.	End plate and distance-piece—front shackle.
24.	Lock—pinion sleeve.	62.	Nut—rear axle casing set screw.	96.	End plate (thin)—shackle.
25.	Housing—pinion sleeve.	63.	Plug—rear axle drain.	97.	Bush—shackle.
26.	Housing—differential bearing R/H.	64.	Bearing—torque tube trunnion.	98.	Bush—shackle.
		65.	Cover (short)—trunnion mounting rubber.	99.	Nut—shackle pin.
		66.	Rubber—trunnion mounting.	114.	Stud—rear axle—torque tube stay.

# H THE REAR AXLE

(1½ and 2½ LITRE)

The trunnion should offer a resistance to turning of between 35 to 55 ft./lb. when the pinch bolt is screwed up tight. The spacing washer in the split lug of the torque tube should be suitably modified in thickness if this resistance is not obtained. **This is important.**

With the trunnion set, reassemble the trunnion rubbers, but leave the fixing bolts loose until the rear axle is fitted to the springs. This will facilitate assembly.

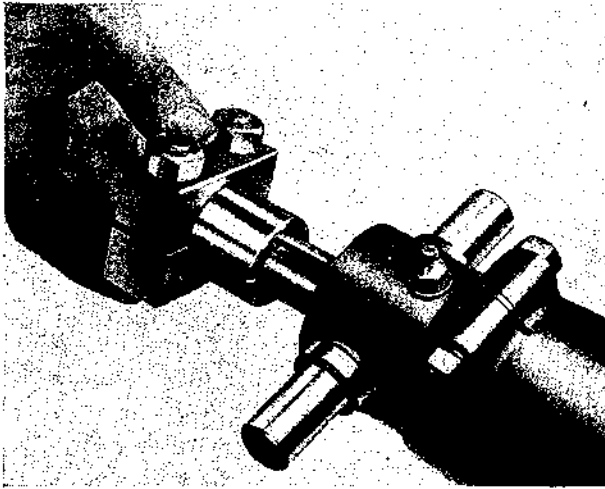


Fig. H.5.

Fitting the special extractor tool to the propeller shaft.

## Section H.5

### TO REMOVE THE PROPELLER SHAFT

Remove the axle from the chassis, as explained in Section H.4.

Refit the trunnion housing and fit the extractor, Special Tool No. ST.55, onto the splined end of the propeller shaft.

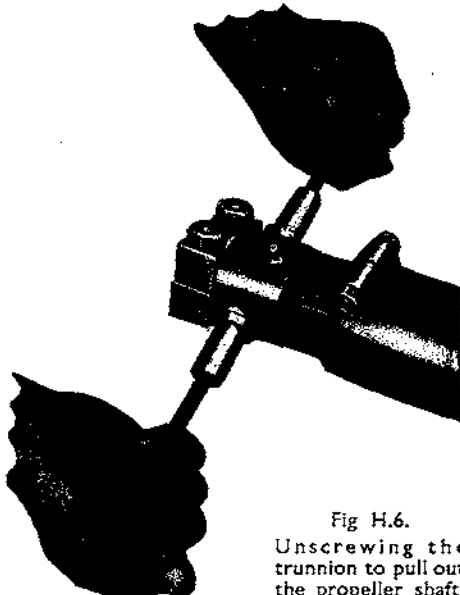


Fig H.6.

Unscrewing the trunnion to pull out the propeller shaft.

Now rotate the trunnion housing anti-clockwise.

**Note.**—This is more easily done if two special studs 6 in. long and threaded  $\frac{3}{8}$  in. B.S.F. are screwed into the lugs.

The shaft will then pull straight out complete with the trunnion bearing.

The bearing is removed from the shaft by detaching the circlips and tapping the shaft through the bearing.

## Section H.6

### TO TAKE OUT THE DIFFERENTIAL UNIT

Remove the axle from the car (Section H.4).

Take out the propeller shaft (Section H.5).

Remove the half-shafts (Section H.1).

Drain the oil.

Remove the ten nuts and washers holding the banjo casing to the differential housing and separate the two parts. Note the paper washer at this point.

Remove the four bolts and lock washers holding the

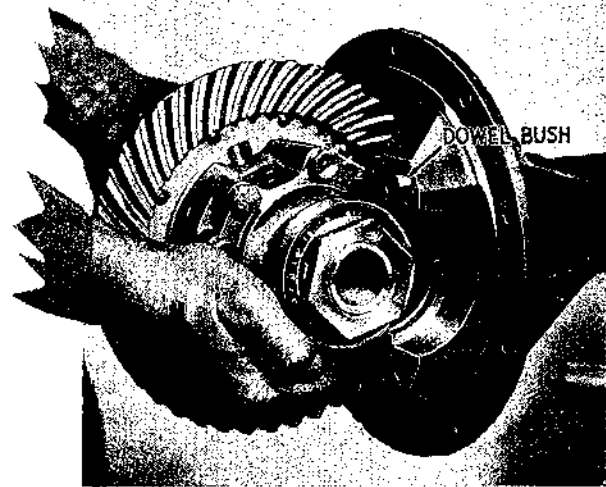


Fig. H.7.

The 1½ litre differential unit in the process of withdrawal from the axle casing.

bearing caps and the unit is ready for withdrawal. The bolts and caps should be marked for reassembly.

**Note.**—The setting is upset on the 2½ litre when the bearing caps are removed and consequently the meshing of the gears must be checked on assembly.

## Section H.7

### TO REMOVE THE PINION ASSEMBLY

Follow the procedure as laid down in Section H.6.

Take out the Allen's screw which is located on the later 1½ litre axle housing (see Fig. H.8). Earlier axles have a lock plate.

On the 2½ litre the pinion sleeve is locked by a lock screw inserted under a plug in the axle.

On the 1½ litre, up to Chassis No. 15000, Special Tool No. ST.95 is needed for unscrewing the pinion assembly.

On the 2½ litre remove the hollow dowels and fit the Special Tool No. ST.68. It is essential that the retaining plate on this tool be bolted firmly to the bearing housings, otherwise the tool will slip out of the slots on the pinion assembly retaining ring.

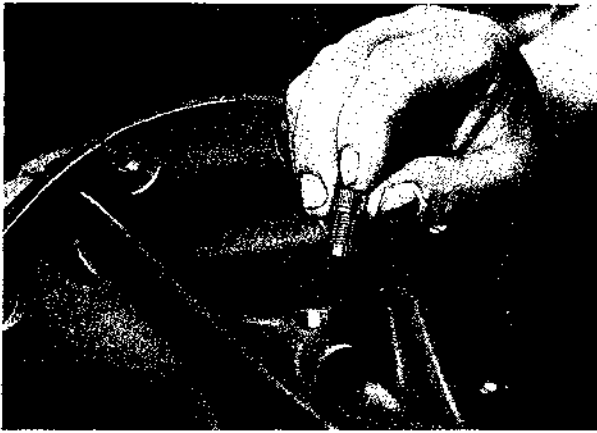


Fig. H.8.

Removing the Allen's screw on the pinion housing which locks the pinion sleeve on the 1½ litre later-type axle.

### Section H.8

#### TO DISMANTLE THE PINION ASSEMBLY (2½ litre)

Remove the pinion assembly as explained in Section H.7.

Prise off the locking ring and unscrew the grub screw holding the muff coupling and pull this coupling off. Pull off the ball race.

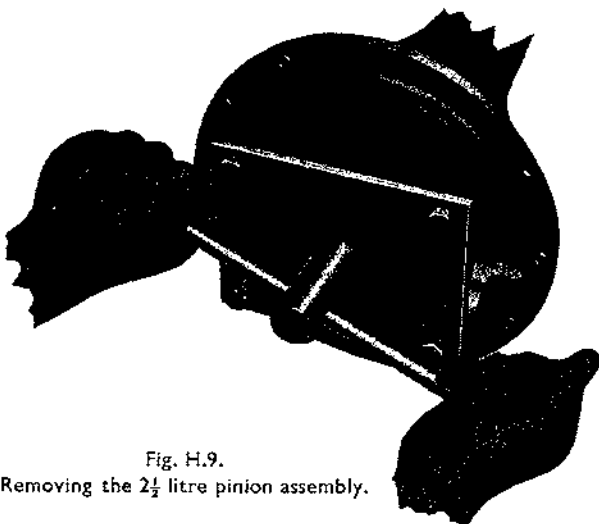


Fig. H.9.

Removing the 2½ litre pinion assembly.

Bend back the locking plate and undo the two ring nuts with "C" spanners.

Take off the locking plate and the two nuts.

**Note.**—On reassembly set these nuts so that slight resistance can just be felt when the pinion is rotated by hand. Also make sure that the chamfered outer edges of the nuts are together. This eases locking.

Next lift off the screwed housing and the ball thrust race.

It will be found that this leaves the outer race of the roller bearing and the forward race of the ball thrust in the housing.

When reassembling, make quite sure that the housing is clean so that the pinion assembly may be pulled up squarely and tightly against the setting thrust washer (Part No. S.1908).

### Section H.9

#### TO DISMANTLE THE PINION ASSEMBLY (1½ litre)

Follow the procedure as laid down in Section H.7.

Take off the circlip on the muff coupling and then take out the set screw holding the coupling in place.

Pull off the coupling, lift off the spacer and remove the lock washer.

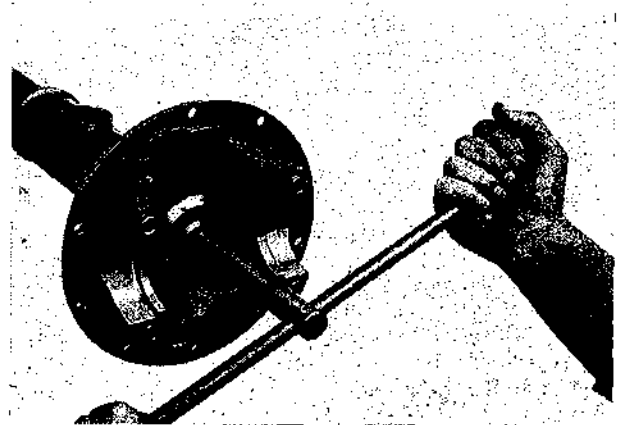


Fig. H.10.

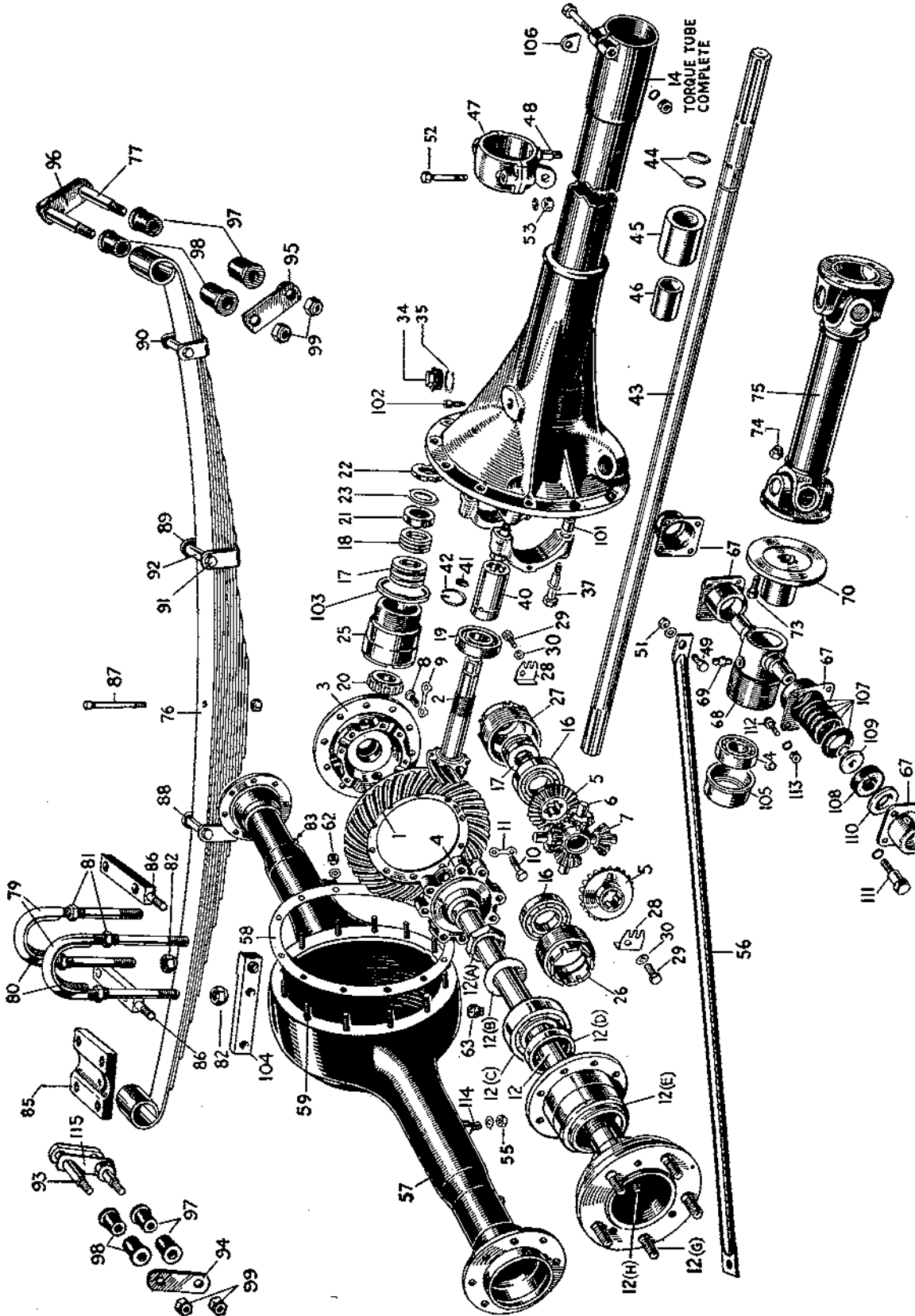
Removing the 1½ litre pinion assembly.

Now undo the ring nut, which should be locked up dead tight on reassembly, and take off the bearing guard.

Take off the next lock washer, which will allow the double ball thrust bearing to come away.

Lift off the outer and inner sleeves, when it will be possible to remove the roller bearing by means of an extractor. Take off the pinion head washer.

**THE RILEY 2½ LITRE REAR AXLE COMPONENTS (Later Type)**





## KEY TO REAR AXLE COMPONENTS (2½ LITRE, LATER TYPE)

No.	Description	No.	Description	No.	Description
1.	Crown wheel and (Pinion).	30.	Washer—differential bearing lock plate bolt.	80.	"U" bolt lining.
2.	Case—differential (left-hand).	34.	Plug assembly—oil filler.	81.	Special nut—"U" bolt.
3.	Case—differential (right-hand).	35.	Gasket—oil filler plug.	82.	Nut—"U" bolt.
4.	Gear—differential.	37.	Set screw—differential bearing cap.	83.	Screw—axle to spring locating.
5.	Spider—differential.	40.	Coupling—muff.	85.	Pinion assembly—rear spring.
6.	Pinion—differential.	41.	Grub screw—muff coupling.	86.	Clamp plate—rear spring.
7.	Bolt—crown wheel to differential case.	42.	Spring ring—muff coupling.	87.	Centre bolt and nut.
8.	Lock plate—crown wheel to differential case bolt.	43.	Propeller shaft.	88.	Clip—rear spring leaf (large).
9.	Bolt—differential case.	44.	Spring ring—propeller shaft.	89.	Clip—rear spring leaf (medium).
10.	Lock nut—axle shaft.	45.	Bearing—propeller shaft centre.	90.	Clip—rear spring leaf (small).
11.	Washer—axle shaft locknut.	46.	Bush—propeller shaft centre bearing.	91.	Bolt and nut—leaf clip.
12.	Bearing—rear hub.	47.	Bracket—torque tube stay.	92.	Bush—leaf clip.
12 (A).	Oil seal—rear hub.	48.	Intermediate lever pivot pin.	93.	Plate and pins—rear shackle.
12 (B).	Housing—rear hub bearing.	49.	Bolt—torque tube stay.	94.	End plate—rear shackle.
12 (C).	Stud—wheel—rear.	51.	Nut—torque tube stay.	95.	End plate and distance-piece—front shackle.
12 (D).	Plug—axle shaft.	52.	Bolt—torque tube stay.	96.	End plate (thin)—shackle.
12 (E).	Torque tube assembly.	53.	Nut—torque tube stay bolt.	97.	Bush—shackle.
12 (F).	Bearing—pinion thrust (rear) and crown wheel thrust.	55.	Nut—rear axle (torque tube stay).	98.	Bush—shackle.
12 (G).	Bearing—pinion thrust (front).	56.	Stay—torque tube.	99.	Nut—shackle pin.
12 (H).	Bearing—pinion journal (front).	57.	Casing—rear axle.	101.	Bush—differential bearing cap dowel.
12 (I).	Bearing—pinion journal (rear).	58.	Gasket—rear axle casing.	102.	Locking screw—pinion sleeve housing.
12 (J).	Lock ring—pinion (thick).	59.	Set screw—rear axle casing.	103.	Thrust ring—pinion sleeve housing.
12 (K).	Lock ring—pinion (thin).	62.	Nut—rear axle casing set screw.	104.	Shock absorber mounting plate.
21.	Tab washer—pinion.	63.	Plug—rear axle drain.	105.	Adaptor—torque tube bearing.
22.	Housing—pinion sleeve.	64.	Bearing—torque tube trunnion.	106.	Spacer washer—torque tube trunnion sleeve.
23.	Housing—differential bearing R/H.	67.	Cover—trunnion mounting rubber.	107.	Rubber ring—trunnion.
24.	Housing—differential bearing L/H.	68.	Trunnion (std.)—torque tube.	108.	Rubber ring—trunnion (side).
25.	Lock plate—differential bearing.	69.	Greaser—trunnion.	109.	Washer (inner)—trunnion mounting.
26.	Bolt—differential bearing lock plate.	70.	Flange—torque tube coupling.	110.	Washer (outer)—trunnion mounting.
27.	Bolt—torque tube coupling flange.	73.	Bolt—torque tube coupling flange.	111.	Set screw—trunnion mounting.
28.	Plate and pins—front shackle.	74.	Nut—torque tube coupling flange bolt.	112.	Bolt—trunnion mounting cover.
29.	"U" bolt and lining.	75.	Propeller shaft—intermediate.	113.	Nut—trunnion mounting cover bolt.
		76.	Spring (rear).	114.	Stud—rear axle—torque tube stay.
		77.	Plate and pins—front shackle.	115.	End plate and distance-piece—rear shackle.

## Section H.10

### REASSEMBLING THE PINION ASSEMBLY (2½ litre)

Make sure all components are perfectly clean before assembly.

Fit the large ball thrust bearing in the pinion sleeve housing, large diameter first, and press it into position.

Fit the roller race in the pinion sleeve housing and press it into contact with the thrust race.

Insert the pinion shaft through the bore of the roller and thrust races.

Fit the small ball thrust race into the forward end of the pinion sleeve housing and screw the thick lock ring into position on the pinion shaft with the "C" spanner ST.77. Place the lock washer in position against the lock ring and thread the thin lock ring into position on the pinion shaft.

Adjust the thick lock ring so that a slight resistance is felt from the bearings when the pinion is rotated by hand when both locking rings are tight. There should be no signs of binding, and when the right setting is obtained the lock washer should be bent into engagement with the slots of both lock rings.

The ball journal bearing may now be pressed into position on the pinion shaft, followed by the coupling muff, which is locked in position with the grub screw and spring locking ring.

The pinion assembly is now ready for assembly in the axle.

## Section H.11

### REASSEMBLING THE PINION ASSEMBLY (1½ litre)

Make sure all components are perfectly clean before assembly.

Fit the pinion spacing ring on the pinion shaft with its chamfered inner bore against the pinion.

Press the roller bearing into position against the spacing ring and place the inner and outer sleeves in position over the pinion shaft.

Press the double ball race in position on the pinion shaft, into contact with the inner sleeve, and place the pinion extractor washer in position against the bearing.

Screw the pinion bearing locknut onto the pinion shaft to lock the bearing assembly firmly, and lock the nut with the lock washer.

Fit the coupling muff onto the splines of the pinion shaft and lock it in position with the grub screw and its retaining ring.

The pinion assembly is now ready for insertion in the axle.

## Section H.12

### PINION SETTING BY THRUST RING

On the later 2½ litre rear axles and later 1½ litre axles the pinion assembly is located in its correct position in the axle relative to the crown wheel by means of thrust rings of varying thicknesses assembled behind the pinion sleeve and forming the abutment for the pinion sleeve assembly in the axle centre casing.

Correct selection of the thrust ring is therefore of the utmost importance and special gauge fixtures are necessary to enable the correct thrust ring to be determined.

For the 2½ litre axles the following gauges are required (see Section Q) :—

ST.121/1	Bush	2 off
ST.121/2	Gauging bar	1 off
ST.121/3	Plug	1 off
ST.121/4	Slip gauge (nominal)	1 off
ST.121/5	Slip gauge (—010 in.)	1 off
ST.112	Pinion spacer gauge	1 off

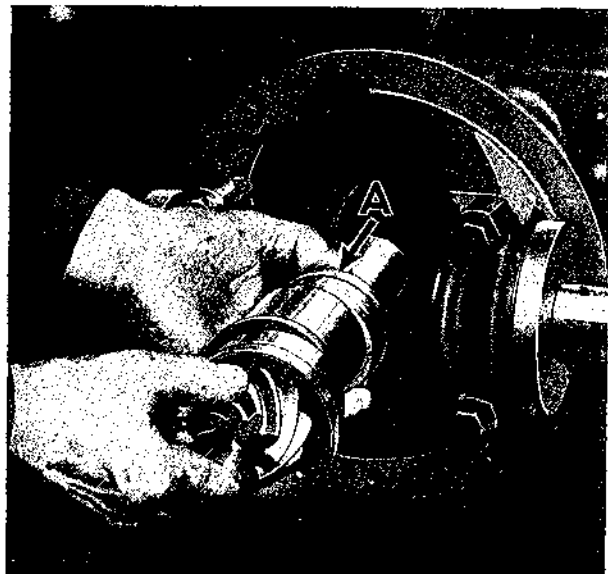


Fig. H.11.

The 1½ litre pinion assembly. "A" is the spacer thrust ring.

For the 1½ litre axle the following are required :—

ST.79/1	Bush	2 off
ST.79/2	Gauging bar	1 off (or S.121/2)
ST.79/3	Slip gauge (—·010 in.)	1 off
ST.79/5	Plug	1 off
ST.104	Pinion spacer gauge	1 off

Illustrations of these tools are to be found in Section Q under their appropriate part numbers, and the *special checking gauge* for the pinion spacer thrust rings is also required to ensure that the correct thrust ring is selected before assembly of the pinion, thus eliminating all "trial and error" in the assembly.

The thrust rings are available in a range of thicknesses to enable the pinion assembly to be correctly located and they are tabulated below with their respective part numbers.

2½ litre	Part Nos.
·215 ±·001 in.	A.1908/5R
·218 ±·001 in.	A.1908/3R
·221 ±·001 in.	A.1908/2R
·224 ±·001 in.	A.1908/1R
·227 ±·001 in.	A.1908/4R

1½ litre	Part Nos.
·245 ±·001 in.	A.1854-1
·242 ±·001 in.	A.1854-2
·239 ±·001 in.	A.1854-3
·236 ±·001 in.	A.1854-4

#### 2½ litre setting

First carefully clean all the bearing surfaces of the axle to make sure they are completely free from dirt as it is essential that the components should bed down perfectly on the seating surfaces.

Insert the plug S.121/3 into the pinion housing in the axle, making sure it is right home on the seating for the pinion assembly.

Place the two bushes S.121/1 in position in the bearings for the crown wheel, making sure that their threads are in proper engagement with those on the axle.

Replace the bearing caps, again taking care that they engage the threads of the gauge bushes correctly and that the bores of the bushes are in line.

Tighten up the bearing cap retaining bolts and insert the gauging bar S.121/2 through the bushes, making sure that it enters freely, then turn it so that the flat, ground in its centre, faces the anvil on the end of the plug.

Insert the slip gauge S.121/5 (·010 in. shorter than "normal") between the flat on the gauging bar and the end of the plug and carefully measure the gap between the slip gauge and the flat on the bar with slip gauges. The difference between the thickness of

the slip gauge and ·010 in. indicates the variation in the location of the seating for the pinion assembly in the axle from "normal" and the adjustment which must be made from "normal" in the selection of the thrust ring to be fitted.

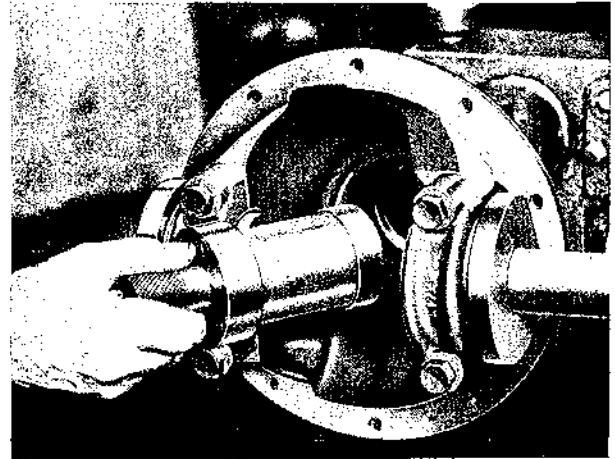


Fig. H.12.

Inserting the gauge plug in the pinion assembly housing. This is the first step in determining the correct spacer thrust ring to employ. A 1½ litre axle is illustrated.

For example :—If a slip gauge or feeler ·007 in. in thickness just slides between the end of the slip gauge S.121/5 and the flat on the gauge bar it indicates that the seating is ·010 in. —·007 in. = ·003 in. closer to the crown wheel axis than "normal." A thrust ring ·003 in. less than normal thickness would therefore be indicated.

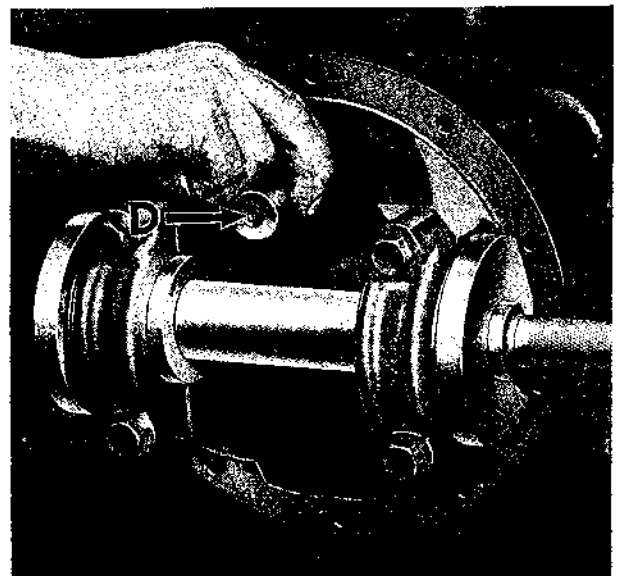
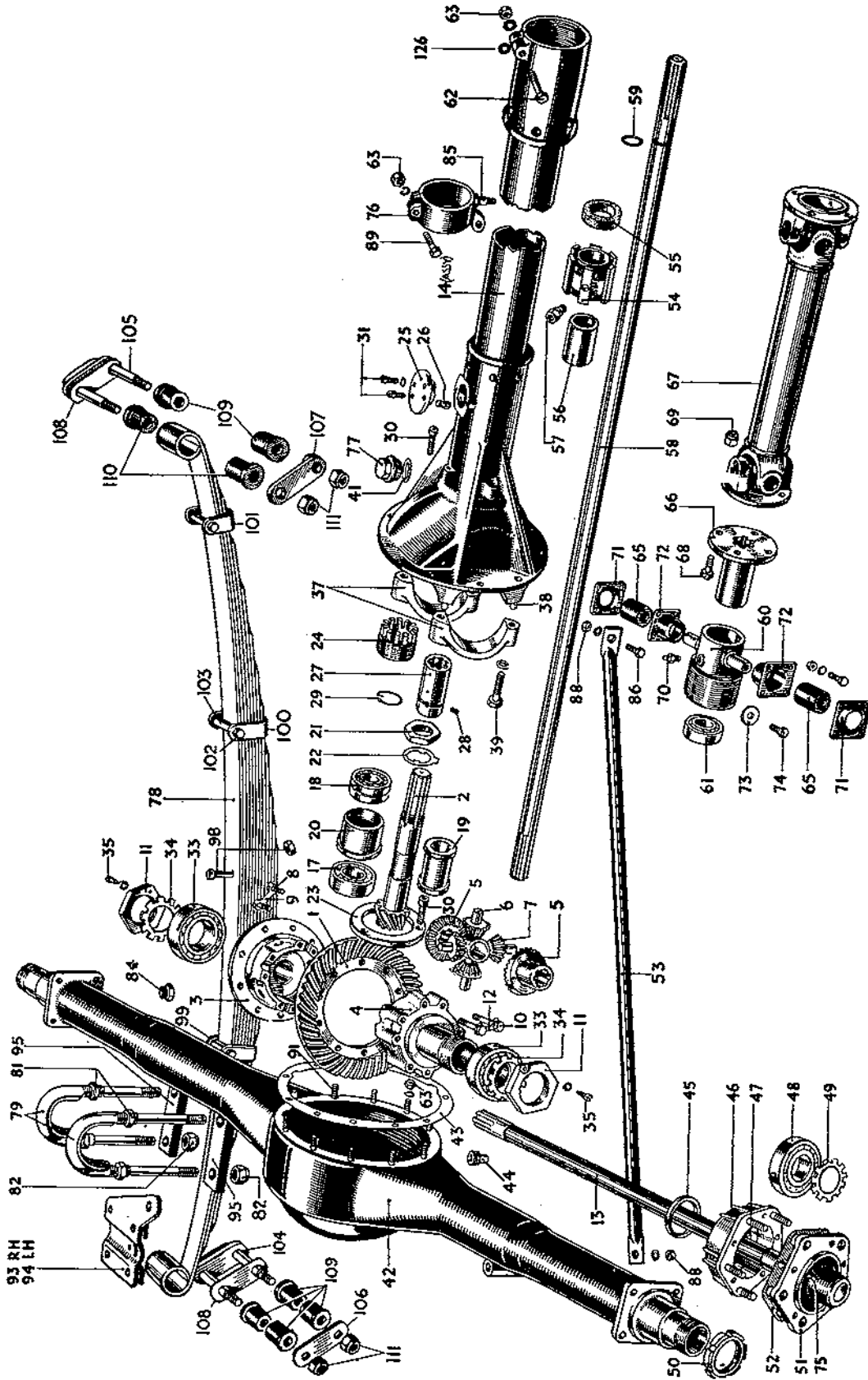


Fig. H.13.

The slip gauge ("D") about to be inserted between the gauge bar and the head of the pinion.

**THE RILEY 1½ LITRE REAR AXLE COMPONENTS (Early Type)**



## KEY TO REAR AXLE COMPONENTS (1½ LITRE, EARLY TYPE)

No.	Description	No.	Description	No.	Description
1.	Crown wheel and	38.	Differential bearing cap dowel bush.	73.	Trunnion mounting rubber washer.
2.	Pinion.	39.	Differential bearing cap bolt.	74.	Trunnion set screw.
3.	Differential case (left-hand).	41.	Oil filler plug gasket.	75.	Rear hub greaser.
4.	Differential case (right-hand).	42.	Rear axle casing.	76.	Torque tube stay bracket.
5.	Differential gear.	43.	Rear axle casing gasket.	77.	Oil filler plug assembly.
6.	Differential spider.	44.	Rear axle taper plug.	78.	Rear spring.
7.	Differential pinion.	45.	Rear hub oil seal.	79.	"U" bolt and lining.
8.	Bolt (crown wheel to differential case).	46.	Rear hub bearing housing.	81.	"U" bolt top nut.
9.	Lock plate—bolt.	47.	Rear hub bearing housing stud.	82.	"U" bolt nut.
10.	Differential case bolt.	48.	Rear hub bearing.	84.	Axle to spring locating screw.
11.	Differential case adjusting nut.	49.	Locknut tab washer.	85.	Brake pivot pin on stay bracket.
12.	Differential case bolt lock plate.	50.	Rear axle end piece locknut.	86.	Stay to bracket bolt.
13.	Axle shaft and hub.	51.	Rear axle shaft and hub.	88.	Stay to bracket bolt nut.
14.	Torque tube assembly.	52.	Rear hub gasket.	89.	Stay bracket clamp bolt.
17.	Pinion roller bearing—rear.	53.	Torque tube stay.	91.	Rear axle casing stud.
18.	Pinion ball bearing—front.	54.	Propeller shaft centre bearing.	93.	Rear spring platform—R/H.
19.	Pinion bearing spacer—inner.	55.	Propeller shaft centre bearing felt.	94.	Rear spring platform—L/H.
20.	Pinion bearing spacer—outer.	56.	Propeller shaft centre bearing bush.	95.	Rear spring clamping plate.
21.	Pinion bearing locknut.	57.	Propeller shaft centre locating screw.	98.	Rear spring centre bolt and nut.
22.	Pinion bearing locknut lock washer.	58.	Propeller shaft.	99.	Rear spring leaf clip—medium.
23.	Pinion adjusting ring.	59.	Propeller shaft spring ring.	100.	Rear spring leaf clip—large.
24.	Pinion adjusting sleeve.	60.	Torque tube trunnion.	101.	Rear spring leaf clip—small.
25.	Pinion adjusting sleeve lock.	61.	Torque tube trunnion bearing.	102.	Rear spring leaf clip bolt and nut.
26.	Adjusting sleeve pin.	62.	Trunnion sleeve bolt.	103.	Rear spring leaf clip bush.
27.	Muff coupling.	63.	Nut.	104.	Shackle plate and pin—rear.
28.	Muff coupling grub screw.	65.	Trunnion mounting rubber.	105.	Shackle plate and pin—front.
29.	Muff coupling spring.	66.	Propeller shaft coupling flange.	106.	Shackle end plate (rear shackle).
30.	Adjusting ring set screw.	67.	Propeller shaft—intermediate.	107.	Shackle end plate and distance-piece—front.
31.	Sleeve lock set screw.	68.	Flange bolt.	108.	Shackle end plate—thin.
33.	Differential bearing.	69.	Flange bolt nut.	109.	Bush for shackle.
34.	Differential bearing lock washer (thin).	70.	Trunnion greaser.	110.	Bush for shackle.
35.	Differential case adjusting nut lock screw.	71.	Trunnion mounting rubber cover—short.	111.	Nut for shackle pin.
37.	Differential bearing cap.	72.	Trunnion mounting rubber cover—long.	126.	Trunnion sleeve spacing washer.

Allowance must however be made for any variation in the pinion assembly and the slight amount of compression which takes place when the pinion assembly is locked in position.

The compression effect is fairly constant and is approximately .002 in. This must be added to the thrust ring thickness, but variations in the pinion assembly cannot be predicted and it is therefore necessary to check the pinion assembly, with the thrust ring in position, on the clock gauge testing fixture ST.112.

The clock on the gauge is first set to zero by placing the plug S.121/3 in position on the shoulder of the fixture so that the ground end of its spindle engages the anvil of the clock gauge which can now be set in the fixture to give a zero reading. The plug is then withdrawn and replaced by the pinion assembly with the thrust ring.

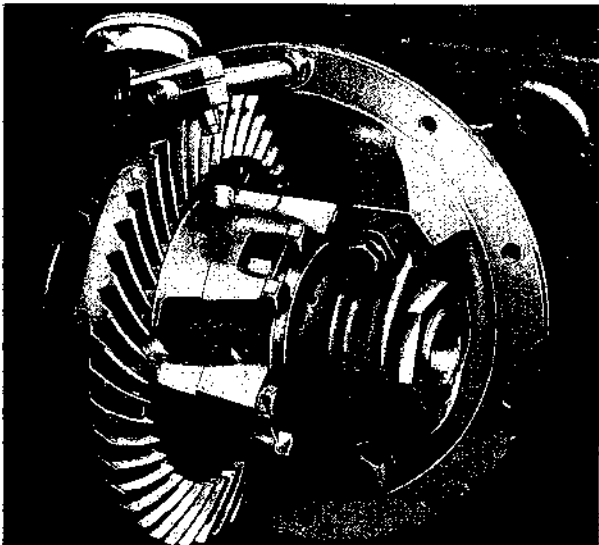


Fig. H.14.

The method of mounting a dial gauge on the axle casing flange with its indicator in contact with the outer end of one tooth of the crown wheel to check the backlash.

If the correct thrust ring has been selected the dial gauge should show a reading of  $+.002$  in. —  $.003$  in. (the difference of the axle from standard) =  $.001$  in. ; if not, the appropriate thrust ring must be selected and fitted to give the desired reading.

Having determined the correct thrust ring the pinion assembly may be assembled in the axle and the sleeve screwed tightly into position with the special spanner ST.68.

The assembly, of crown wheel, differential, and bearings, can now be placed in position in the axle and it is advisable to ensure that the pinion and crown

wheel are engaged with the same teeth in engagement. This is facilitated by two adjacent "marked" teeth on the crown wheel and one "marked" tooth on the pinion. If these three teeth are identified with chalk marks no difficulty will be encountered in meshing the marked tooth of the pinion between the marked teeth on the crown wheel. Make sure that the threads of the differential bearing housing are in correct engagement with the threads of the axle.

The bearing caps can then be placed in position also, taking care that their threads exactly match up with those of the differential bearing housings. Tighten up the bearing cap bolts, then slacken them back two turns to release the bearing housings. Screw the right-hand bearing with spanner ST.113 so that its outer face is flush with the face of the yoke in the axle, and screw up the left-hand bearing housing as far as it will go so that the differential assembly is tight on its bearings. Now slacken back the left-hand bearing housing exactly two notches, which will give the correct setting for the bearings.

Tighten up the bearing cap bolts firmly and check the amount of backlash between the crown wheel and pinion. This should be between  $.005$  in. and  $.008$  in. when measured with a dial gauge on the outer end of the teeth as shown in Fig. H.14.

If not correct, slacken the bearing cap nuts two turns, tap the caps with a lead hammer to free the bearing housings in the threads and unscrew the appropriate bearing housing **two notches only** in the required direction, **following it up by an equal amount with the other bearing housing to maintain the adjustment of the bearings.**

Tighten up the bearing cap bolts and apply the dial gauge check for backlash. Repeat as necessary until the correct backlash figure is obtained, when the bearing housings can be locked by means of new locking tab plates.

As a final check use can be made of the special slip gauge ST.94 which should be a sliding fit between the ground circumference of the differential casing and the head of the pinion if the setting is correct. In addition a check can be made by observing the contact markings on the teeth by using a suitable marking medium and rotating the crown wheel with the special cranked tool ST.75.

A diagrammatic illustration of the tooth markings and their interpretation are given on page H.18.

When it is established that the correct setting has been achieved the pinion bearing sleeve must be locked in position by the dowel grub screw, and since it is unlikely that the previous dowel hole will line up with the grub screw hole it will be necessary to drill

a new hole. Take care to drill it sufficiently deeply without actually breaking through the sleeve.

Insert and tighten down the dowel screw and lock it against rotation by means of three or four punch impressions round its junction with the axle casing.

The later 1½ litre axles employ the same system of setting the pinion position by selection of the appropriate thrust ring thickness and the procedure is the

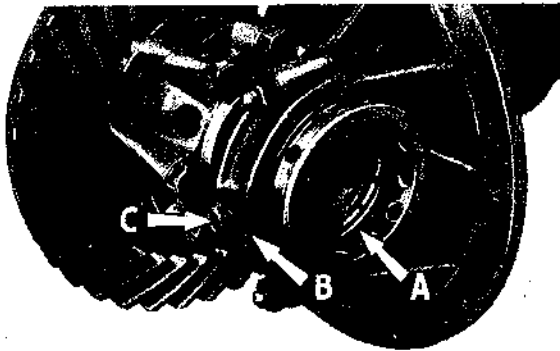


Fig. H.15.

The method of locking the differential bearing adjusting rings on the 2½ litre cars. Holes in the adjusting ring "A" are engaged by the two-pronged locking plate "B" which is located to the bearing cap by the locking bolt "C."

same with the exception that the pinion assembly and differential assembly are somewhat different and the appropriate gauges must be used.

In this case the locking compression allowance is .004 in. and a lock ring is used to retain the pinion assembly in the axle centre casting, which is locked by a screw which engages its perimeter. Since the adjustment of the position of the crown wheel is by nuts screwed on the differential casing spigots the direction of adjustment is the reverse to that for the 2½ litre axle.

In addition the circumference of the differential casing is not ground and it is necessary to use the tooth-marking method of determining the correct meshing of the crown wheel and pinion as indicated on page H.18.

Do not forget to make sure that both adjusting nuts are properly locked before completing the assembly.

The method of locking in the case of 1½ litre cars is different from that used on the 2½ litre cars and consists of locking the hexagon adjusting nuts to the locking washer by inserting the locking screw into the tapped hole in the nut so that its spigoted end engages one of the slots of the washer.

## Section H.13

### EARLY-TYPE AXLES

Prior to Chassis No. 38S/15001 the location of the pinion assembly on 1½ litre cars was carried out by adjusting rings at either end of the pinion assembly which screw into the axle centre casing.

In this type of axle the pinion assembly is located in its correct position by adjusting the position of the adjusting rings in conjunction with the special gauging bar ST.79/2 and special bushes ST.79/1, using the special slip gauge ST.79/3 and a .010 in. feeler gauge to locate the head of the pinion in the right position, so that the combination of slip gauge and feeler just slides between the pinion and the flat in the centre of the gauge bar.

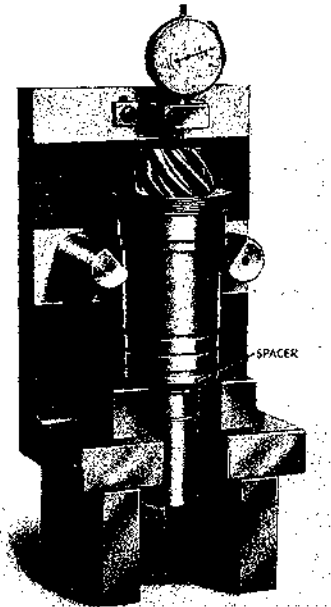
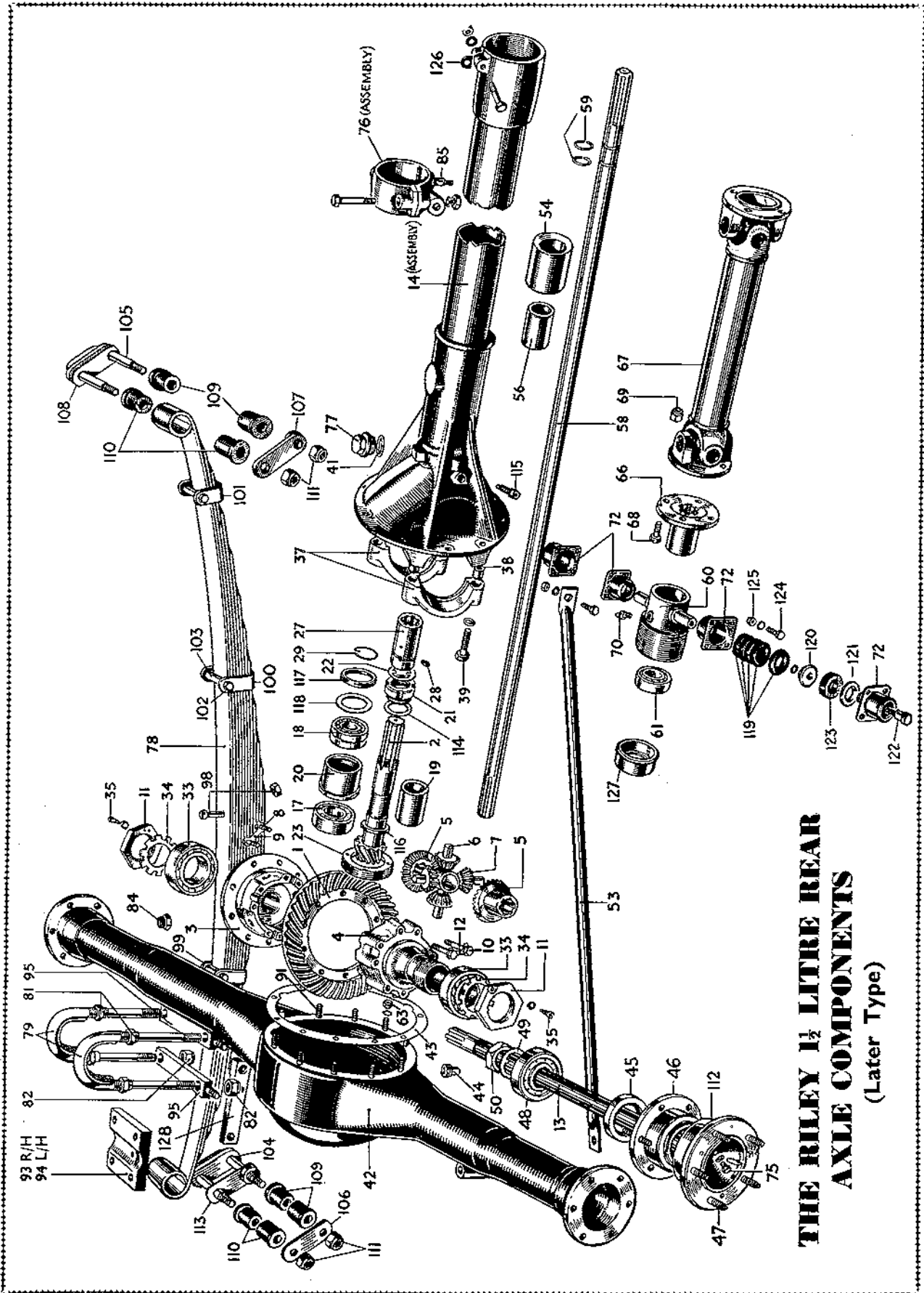


Fig. H.16.

The special pinion spacing thrust ring gauge for the 1½ litre cars, showing a pinion assembly in position on the gauge with the trial spacer in position.

The assembly is then locked in position, taking care that the pinion revolves freely when turned by hand but without backlash, and that the slot machined in the face of the rear locking ring coincides with the location of the crown wheel to give the required crown wheel clearance on very early models.

Final adjustment of the meshing of the crown wheel and pinion is effected by adjusting the position of the crown wheel to give correct tooth markings as indicated on page H.18 when the crown wheel is rotated by means of the special crank handle ST.75.



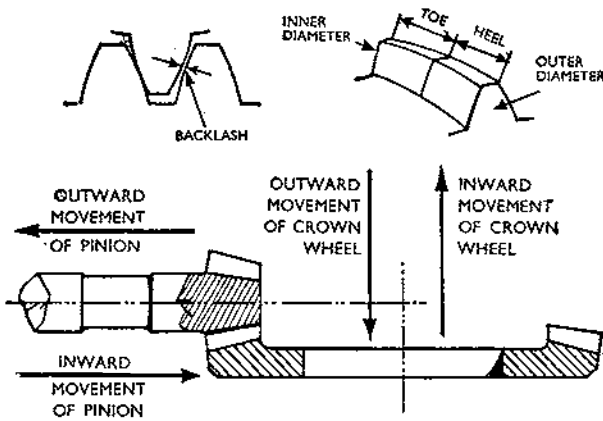
**THE RILEY 1 1/2 LITRE REAR  
AXLE COMPONENTS  
(Later Type)**



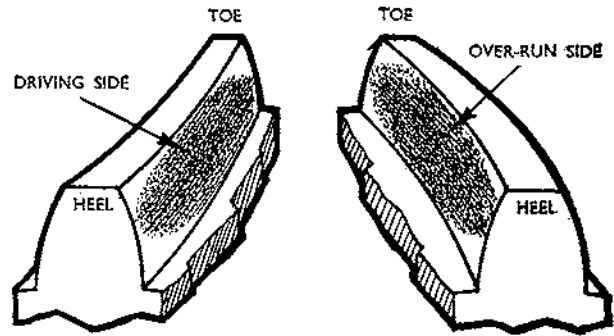
## KEY TO REAR AXLE COMPONENTS (1½ LITRE, LATER TYPE)

No.	Description	No.	Description	No.	Description
1.	Crown wheel and pinion.	44.	Rear axle taper plug.	98.	Rear spring centre bolt and nut.
2.	Pinion.	45.	Rear hub oil seal.	99.	Rear spring leaf clip—medium.
3.	Differential case (left-hand).	46.	Rear hub bearing housing.	100.	Rear spring leaf clip—large.
4.	Differential case (right-hand).	47.	Rear hub bearing housing outside.	101.	Rear spring leaf clip—small.
5.	Differential gear.	48.	Rear hub bearing.	102.	Rear spring leaf clip bolt and nut.
6.	Differential spider.	49.	Locknut tab washer.	103.	Rear spring leaf clip bush.
7.	Differential pinion.	50.	Rear axle end piece locknut.	104.	Shackle plate and pin—rear.
8.	Bolt (crown wheel to differential case).	53.	Torque tube stay.	105.	Shackle plate and pin—front.
9.	Lock plate—bolt.	54.	Propeller shaft centre bearing.	106.	Shackle end plate (rear shackle).
10.	Differential case bolt.	56.	Propeller shaft centre bearing bush.	107.	Shackle end plate and distance-piece—front.
11.	Differential case adjusting nut.	58.	Propeller shaft.	108.	Shackle end plate—thin.
12.	Differential case bolt lock plate.	59.	Propeller shaft spring ring.	109.	Bush for shackle.
13.	Axle shaft and hub.	60.	Torque tube trunnion.	110.	Bush for shackle.
14.	Torque tube assembly.	61.	Torque tube trunnion bearing.	111.	Nut for shackle pin.
17.	Pinion roller bearing—rear.	66.	Propeller shaft coupling flange.	112.	Rear hub oil shield.
18.	Pinion ball bearing—front.	67.	Propeller shaft—incarnadisa.	113.	Shackle end plate and distance-piece—rear.
19.	Pinion bearing spacer—inner.	68.	Flange bolt.	114.	Pinion bearing locknut washer.
20.	Pinion bearing spacer—outer.	69.	Flange bolt nut.	115.	Pinion adjusting ring lock screw.
21.	Pinion bearing locknut.	70.	Trunnion greaser.	116.	Pinion spacing ring.
22.	Pinion bearing locknut lock washer.	72.	Trunnion mounting rubber cover.	117.	Pinion thrust ring.
27.	Muff coupling.	75.	Rear hub greaser.	118.	Pinion extractor washer.
28.	Muff coupling grub screw.	76.	Torque tube stay bracket.	119.	Trunnion rubber ring.
29.	Muff coupling spring.	77.	Oil filler plug assembly.	120.	Trunnion mounting washer—inner.
33.	Differential bearing.	78.	Rear spring.	121.	Trunnion mounting washer—outer.
34.	Differential bearing lock washer (thin).	79.	"U" bolt and lining.	122.	Trunnion mounting set screw.
35.	Differential case adjusting nut lock screw.	81.	"U" bolt top nut.	123.	Trunnion side thrust ring (rubber).
37.	Differential bearing cap.	82.	"U" bolt nut.	124.	Trunnion mounting bolt.
38.	Differential bearing cap dowel bush.	84.	Ads to spring locating screw.	125.	Trunnion mounting bolt nut.
39.	Differential bearing cap bolt.	85.	Brake pivot pin on stay bracket.	126.	Trunnion sleeve spacing washer.
41.	Oil filler plug gasket.	91.	Rear axle casing stud.	127.	Torque tube race adaptor.
42.	Rear axle casing.	93.	Rear spring platform—R/H.	128.	Shock absorber mounting plate.
43.	Rear axle casing gasket.	94.	Rear spring platform—L/H.		
		95.	Rear spring clamping plate.		

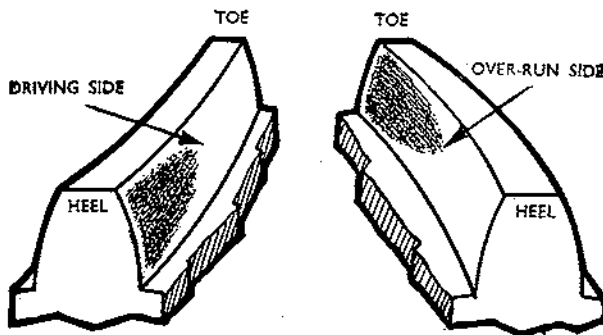
## CROWN WHEEL TOOTH MARKINGS



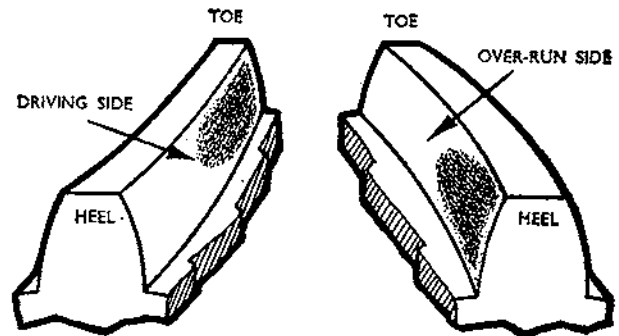
THE NOMENCLATURE USED IN CONNECTION WITH THE GEARS IS HERE CLEARLY SHOWN. OPERATORS SHOULD BE FAMILIAR WITH THE CORRECT MOVEMENTS OF THE GEARS IN PARTICULAR



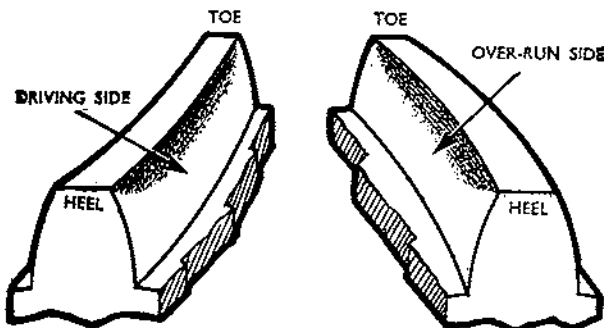
CORRECT GEAR TOOTH MARKINGS WHICH GIVE QUIET OPERATION AND MAXIMUM LIFE. NOTE THAT THESE MARKINGS ARE GIVEN WHEN THE CROWN WHEEL IS ROTATED



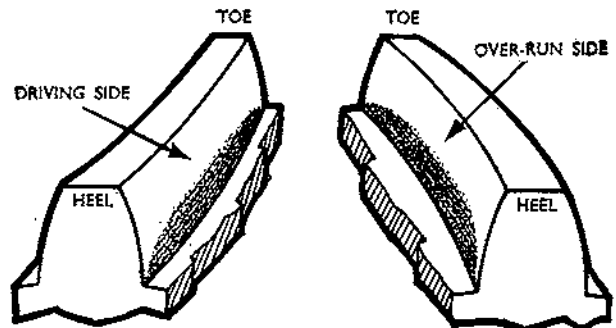
DRIVE TAKING PLACE AT HEEL AND TOE AS SHOWN BY THE ABOVE MARKINGS IS INCORRECT. RECTIFY BY MOVING CROWN WHEEL INWARDS AND PINION OUTWARDS TO MAINTAIN CORRECT BACKLASH



DRIVE TAKING PLACE AT TOE AND HEEL AS SHOWN BY THE ABOVE MARKINGS IS INCORRECT. RECTIFY BY MOVING CROWN WHEEL OUTWARDS AND PINION INWARDS TO MAINTAIN CORRECT BACKLASH



HEAVY CONTACT AT NOSE OF TEETH INDICATES THAT PINION IS TOO FAR OUT OF MESH. MOVE INWARDS TOWARDS CROWN WHEEL AND MOVE CROWN WHEEL OUTWARDS TO MAINTAIN BACKLASH IF NECESSARY



HEAVY CONTACT AT ROOT OF TEETH INDICATES THAT PINION IS TOO FAR IN MESH. MOVE OUTWARDS AWAY FROM CROWN WHEEL AND MOVE CROWN WHEEL INWARDS TO MAINTAIN BACKLASH IF NECESSARY

The references to moving the pinion apply only to the older type 1½ litre cars, and not to the later models where the pinion position is set by gauge. These models should be finally adjusted by movement of the crown wheel only.

Note.—These markings are only produced when the pinion is rotated from the crown wheel and not when the drive is applied from the pinion drive flange. A different set of markings is produced in the latter case, and care must therefore be taken of this point when interpreting from the markings.

### Section H.14

#### FITTING THE TRUNNION BEARINGS

It is of importance that the trunnion bearing assemblies should be correctly fitted when the axle is fitted to the chassis. (See Fig. H.17.)

When the trunnion is correctly positioned in the brackets on the chassis the inner mounting rubber covers A.1737 should be fitted in position, followed by the five rubber bearing rings and stepped washer with its boss facing inwards towards the trunnion. The outer rubber bearing ring A.1901 and the thrust washer A.1910 are then located on the end of the trunnion by the retaining bolt A.1909.

The outer mounting rubber cover is then placed in position, and the complete assembly of covers and mounting is bolted to the frame brackets.

The same process is repeated on the other trunnion.

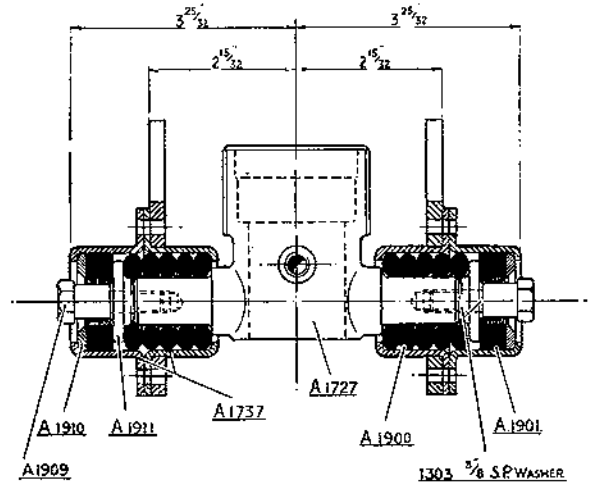


Fig. H.17.

The correct method of assembling the torque tube trunnion bearings.