FRAME

REAR SHOCK DAMPERS

ROAD SPRINGS

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THE REAR HYDRAULIC SHOCK DAMPERS.

DESCRIPTION.

The rear hydraulic shock dampers are of Bentley design and manufacture. They are double acting and effectively damp excessive spring action. The shock damper consists of a piston assembly operating in a cylinder which is maintained full of oil, the latter being displaced from one end of the cylinder to the other, past spring-loaded valves. The loading of these valves, and hence the degree of damping is controllable through the "Ride Control" lever.

SERVICE.

The level of the oil in the shock dampers should be inspected every 10,000 miles (16,000 Kms.) running and more oil added if necessary.

For recommended oils see Sub-Section BD.2.

It is most important that only perfectly clean oil of the correct brand should be used. The following precautions must be observed:-

(a) Before attempting to remove the filling plug (13, Fig.1), both the plug and the shock damper casing adjacent to it must be cleaned very carefully with a brush dipped in paraffin, in order to avoid the possibility of dirt entering the hole when the plug is removed.

(b) Before topping-up the dampers, the oil should be strained through a fine gauze. Straining is greatly facilitated if the oil is first warmed from 50° to 75°C. especially during cold weather.

The importance of such cleanliness cannot be over-emphasised. A very small particle of foreign matter in the oil may lodge under a valve and impair the effectiveness of the shock damper.

Remove the plug and top up if necessary, until the oil level reaches the bottom of the filler plug orifice. The oil should be poured in very slowly to avoid entrapping bubbles of air. It will be found most convenient to add oil by means of the small syringe provided in the tool kit. When replacing the plug care must be taken that the joint washer is in position.

TO REMOVE A REAR SHOCK DAMPER.

(i) Disconnect oil pressure pipe at front end of damper.

(ii) Remove split pin, nut and bearing bolt from Silentbloc bearing, where the main lever forms the joint at the top of the connecting link.

(iii) Remove the two nuts and spring washers securing damper to the frame, and then remove the damper.

TO DISMANTLE A REAR SHOCK DAMPER.

Although the following describes the complete dismantling of a rear shock damper, together with the control unit as fitted to the front of the damper, it should be seldom necessary to completely dismantle a rear damper. Partial dismantling, however, would be necessary should an oil leak occur past the gland packing - see later.

(i) The shock damper must not be held directly in a vice. A convenient method of holding it is to bolt it to a flat plate measuring approximately 7" x 7" x ⅜" thick in which two .500" dia. holes at 4.875" centres have been drilled. This plate when suitably drilled can also be used for holding a front shock damper.

(ii) Remove the top cover (19, Fig.1) and the joint washer. Turn the damper upside down and drain the oil from the casing.

(iii) Leaving the cap nut (49) of the end cover in position, (so as not to disturb the adjusting washer 47) remove the four nuts and spring washers (48) and then remove the end cover (46) together with the bellows (45), taking care not to damage the two joint washers (5 and 6). Collect the spring (43). It may be found that there is a small steel adjusting washer inside the bellows against which the end of the spring (43) rests. If one is fitted then it should be removed to prevent loss. Remove the pressure valve assembly (42) and collect the adjusting washer (40). Remove the valve cylinder (7) and then remove the four nuts and spring washers (9) and withdraw the valve chamber (10) from the main casing (36).

NOTE: Should the main lever (31) be moved at this stage, then oil, under considerable pressure, will be squirted through the bottom hole in the front of the main casing, it is therefore not advisable to stand in front of the damper until the main lever has been removed.

(iv) Remove the bolt (20) from the intermediate lever, the two nuts and washers (30) from the gland cover and then withdraw the main lever from the casing together with the various parts which form the gland. Do not remove the gland assembly from the shaft unless it is desired to renew the gland packing due to an oil leak.

(v) Remove the intermediate lever (15), the adjusting washer (14) and then slide out the piston assembly (38).

(vi) All dismantled parts should now be thoroughly cleaned.

TO FIT NEW GLAND PACKING TO SHAFT OF MAIN LEVER.

The moulded asbestos and tallow gland (33, Fig.1) should give long service before it requires renewing; however, should there be evidence of an oil leak past the gland then it will be necessary to fit a new one. Fig.3 shows a section through the rear damper and gland.

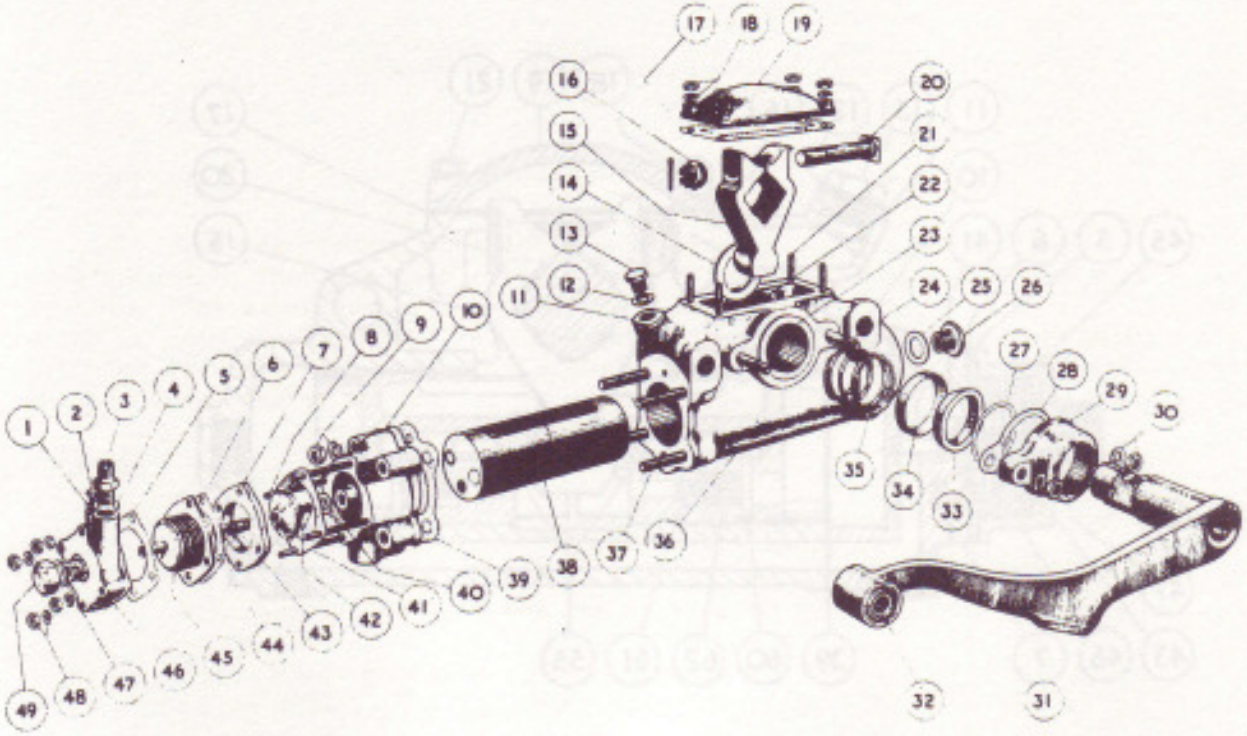

FIG. 1. "EXPLODED" VIEW OF REAR SHOCK DAMPER.

1. Washer (Alum) - Air Release Plug.
2. Air Release Plug - End Cover.
3. Connection - Pressure Control.
4. Washer (Alum) - Connection.
5. Joint Washer.
6. Joint Washer.
7. Valve Cylinder.
8. Stud - Valve Chamber.
9. Spring Washer and Nut.
10. Valve Chamber.
11. Insert - Filler Plug.
12. Washer (Alum) - Filler Plug.
13. Filler Plug.
14. Adjusting Washer - Intermediate Lever.
15. Intermediate Lever.
16. Spherical Nut.
17. Washer - Top Casing.
18. Spring Washer and Nut.
19. Top Cover.
20. Spherical Headed Bolt.
21. Stud - Top Cover.
22. Bush - Main Shaft.
23. Bush - Main Shaft.
24. Stud- Gland Cover.
25. Washer (Alum).
26. Plug - Main Casing.
27. Retaining Ring - Gland Packing.
28. Joint Washer - Gland Cover.
29. Gland Cover.
30. Spring Washer and Nut.
31. Main Lever and Shaft.
32. Silentbloc Bush.
33. Gland - Main Shaft.
34. Pressure Ring - Gland.
35. Gland Spring.
36. Main Casing.
37. Stud.
38. Piston Assembly.
39. Joint Washer.
40. Adjusting Washer - Pressure Valves.
41. Joint Washer.
42. Pressure Valves, (Assembly).
43. Spring - Pressure Valves.
44. Adjusting Washer - Bellows.
45. Bellows - Valve.
46. End Cover.
47. Adjusting Washer - Cap Nut.
48. Spring Washer and Nut.
49. Cap Nut - End Cover.

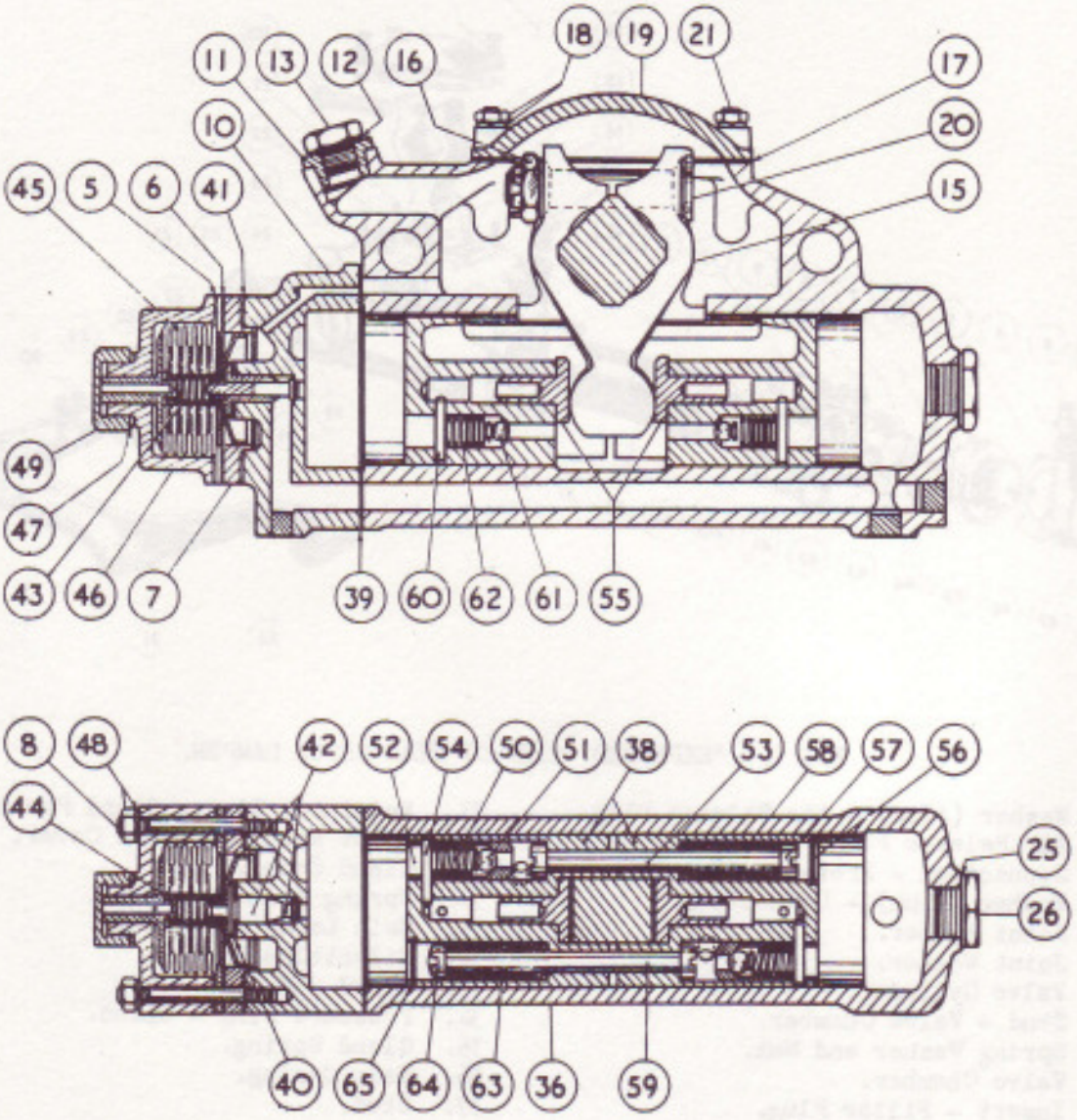

FIG. 2. TRANSVERSE AND PLAN SECTIONAL VIEW OF THE REAR SHOCK DAMPER.

50. Spring - Replenishing Valve.
51. Replenishing Valve.
52. Housing - Replenishing Valve.
53. Bolt - Piston.
54. Taper Pin.
55. Wearing Pad.
56. Expanding Disc - Piston.
57. Nut - Piston Bolt.
58. Spring - Piston Bolt.
59. Bolt - Piston.
60. Taper Pin.
61. Replenishing Valve.
62. Spring - Replenishing Valve.
63. Spring - Piston Bolt.
64. Nut - Piston Bolt.
65. Expanding Disc - Piston.

(i) With the shock damper removed from the chassis, remove top cover (19) and then invert to drain oil. Remove the bolt (20), the nuts and spring washers (30) and then withdraw the main lever from the casing together with gland assembly.

(ii) Clean the gland assembly parts and the main lever.

(iii) Place the gland cover (29) on to the shaft of the main lever followed by the retaining ring (27), the new gland packing (33) which must be very carefully fitted over the shaft, the pressure ring (34) and the gland spring. Place the joint washer (28) on to the casing and then fit the main lever, taking care not to damage the adjusting washer (14). Fit the spring washers and nuts (30) on the gland cover studs, press the gland cover towards the casing as far as it will go, then tighten up nuts finger tight only at this stage.

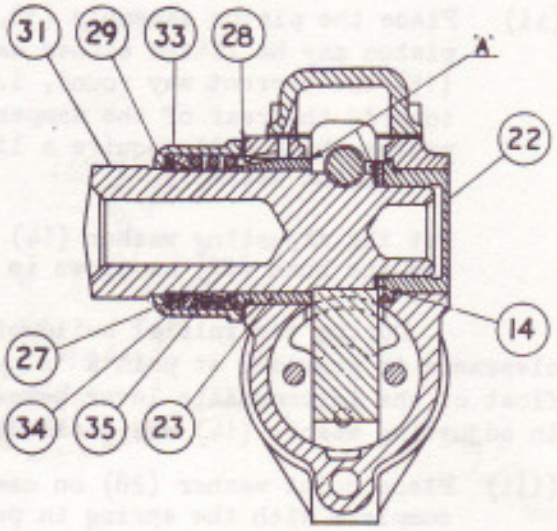

FIG. 3. SECTION THROUGH REAR DAMPER AND GLAND.

(iv) The next operation is to tighten the gland, but this must be done only when the gland has been warmed up sufficiently to soften the tallow with which the packing is impregnated. To warm up a gland, apply heat gently to the end of the shaft and the end of the gland cover by means of a blow-lamp or gas flame. An oxy-acetylene flame must not be used for this purpose as the heat is too intense and too localised. The temperature is approximately correct when it is only just possible to bear ones hand on the end of the shaft. The two gland cover nuts should then be progressively tightened up. This operation will cause excess tallow to be exuded and all space in the gland to be filled up.

(v) Refit the bolt (20), and nut (16), tighten up and secure with a new split pin.

(vi) Fill with oil and expel air from damper and fit the top cover as described below.

TO RE-ASSEMBLE A REAR SHOCK DAMPER.

It is very important that all parts are assembled in a thoroughly clean condition, as even a very small particle of foreign matter lodging under one of the valves would impair the effectiveness of the shock damper, therefore the parts should be laid on a piece of clean paper prior to re-assembling. New Vellumoid joint washers should be fitted where considered necessary.

(i) Mount damper on holding plate and fix plate in vice.

(ii) Place the piston assembly (38, Fig.1) in the main casing (36). The piston may be fitted either way round. Holding the intermediate lever (15) the correct way round, i.e. with the slot for the bolt head facing towards the rear of the damper as shown in Fig.1, insert it into the piston which will require a little effort due to the spring-loading of the piston assembly.

Fit the adjusting washer (14) in position between the intermediate lever and the bush (22) as shown in Fig.1 and line up the washer.

During the initial build of a new rear shock damper .002" to .004" clearance is provided at points 'A' - Fig.3, i.e. .004" to .008" total end float of the intermediate lever between the outer bush and the adjusting washer. An adjusting washer (14) was chosen to obtain these clearances.

(iii) Place joint washer (28) on casing, and then with the gland assembly complete with the spring in position on the shaft of the lever, fit the lever to the casing taking care not to damage the adjusting washer (14). Fit spring washers and nuts (30) on the gland cover studs and progressively tighten up.

(iv) Fit bolt (20) to the intermediate lever, tighten up nut and secure with a new split pin.

(v) With the small oil passage hole in the joint washer (39) and the valve chamber (10) at the top, place the joint washer and valve chamber on to the main casing and secure with the spring washers and nuts (9). Place the joint washer (41) followed by the valve cylinder (7) on to the valve chamber. Place the adjusting washer (40) on to the inner end of the pressure valve assembly (42) and then fit the latter into position in the valve cylinder (7). Fit the joint washer (6).

Place the spring (43) on to the end of the pressure valve assembly. If it was found when dismantling the damper that a small steel adjusting washer was fitted to the inside of the bellows (45), then replace it on to the spigot inside the bellows, fit bellows in position making sure that the end of the spring (43), is located over the spigot in the bellows. Fit joint washer (5), end cover (46) and secure with the spring washers and nuts (48).

(vi) Refill the damper with the correct oil.

While pouring in the oil the main lever should be worked up and down so as to expel all traces of air from the damper, i.e. until all free movement has been eliminated from the lever.

Fill the damper with oil until level with the bottom of the thread in the filler orifice. With the joint washer in position refit the top cover.

TO REFIT A REAR SHOCK DAMPER.

(i) Jack up the rear of the car - jack under, and in the centre of the rear axle casing. Place suitable wood blocks under the centre of each of the rear springs, care being taken not to damage the spring gaiters. Remove the rear wheels.

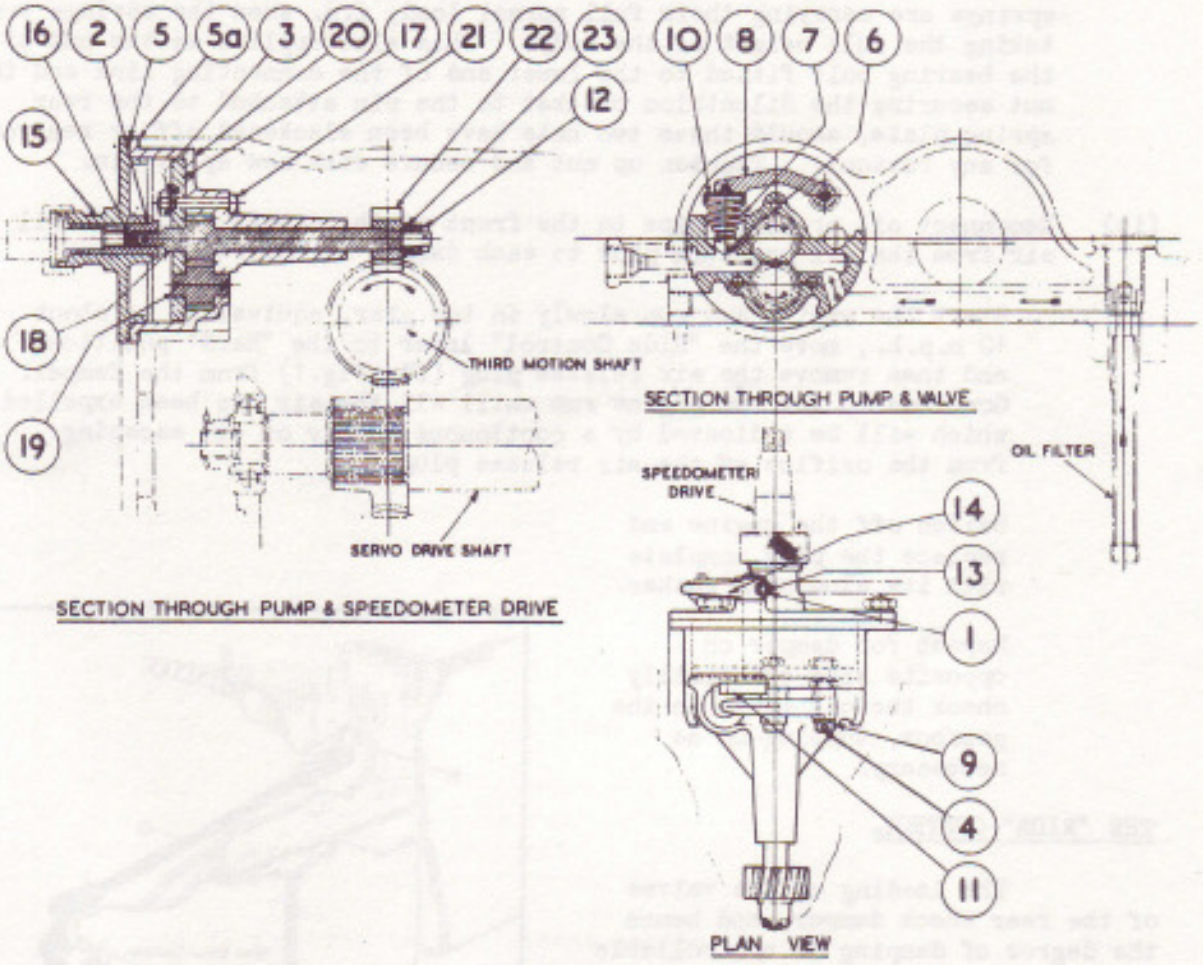

FIG.4. PUMP AND SPEEDOMETER DRIVE - SECTIONAL VIEWS.

1. Nut and Flat Spring Washer.
2. Bush - Driving Shaft.
3. Nut and Lockwasher.
4. Pivot - Valve Lever.
5. Vellumoid Joint.
5A. Vellumoid Joint.
6. Steel Ball (Valve).
7. Valve Spring - Hand Control.
8. Valve Lever.
9. Collar - Pivot.
10. Valve Spring Cover.
11. Operating Pin.
12. Castellated Nut.
13. Bolt - Operating Lever.
14. Operating Lever (Hand Control).
15. Cover and Bearing.
16. Felt Plug - Bush - Driving Shaft.
17. Disc, bearing - Damper Control Pump.
18. Shaft (gear) - Speedometer Drive.
19. Driven Gear - Damper Control Pump.
20. Casing - Damper Control Pump.
21. Bolt - Pump Casing.
22. Gear - Pump & Speedometer Drive.
23. Plain Washer.

(ii) Place the damper on to the frame and with the spring washers in position securely tighten up the two nuts.

(iii) Refit the bearing bolt to the top of the connecting link and the main lever of the damper. (The nut must only be tightened when the rear springs are carrying their full normal load, i.e. when the springs are taking the full weight of the body. This also applies to the nut of the bearing bolt fitted to the lower end of the connecting link and the nut securing the Silentbloc bracket to the pin attached to the rear spring plate, should these two nuts have been slackened off or removed for any reason). Tighten up nut and secure with new split pin.

(iv) Reconnect oil pressure pipe to the front of the damper and expel all air from the oil pressure pipe to each damper as follows:-

Start the engine and run slowly in top gear, equivalent to about 10 m.p.h., move the "Ride Control" lever to the "Hard" position and then remove the air release plug (21, Fig.1) from the damper. Continue to let the engine run until all the air has been expelled, which will be indicated by a continuous supply of oil escaping from the orifice of the air release plug.

Switch off the engine and replace the plug complete with its aluminium washer.

Repeat for damper on opposite side and finally check the oil level in the gearbox, topping-up as necessary.

THE "RIDE" CONTROL.

The loading of the valves of the rear shock damper, and hence the degree of damping is controllable through the "Ride" Control Hand Lever, mounted on the Steering Wheel. A Normal or Hard ride can therefore be obtained at the will of the driver by means of this lever.

A small gear type oil pump, carried in a casing, bolted to, and driven from the gearbox, maintains a pressure of oil in a system of piping connected to each rear shock damper. This pressure is variable and is controlled by a spring loaded ball relief valve (6, Fig.4) operated by the hand control lever through rods.

The pump draws its supply of oil from the gearbox, though that oil is not actually pumped into the dampers. There should be no wastage of oil, as such wastage or leakage will

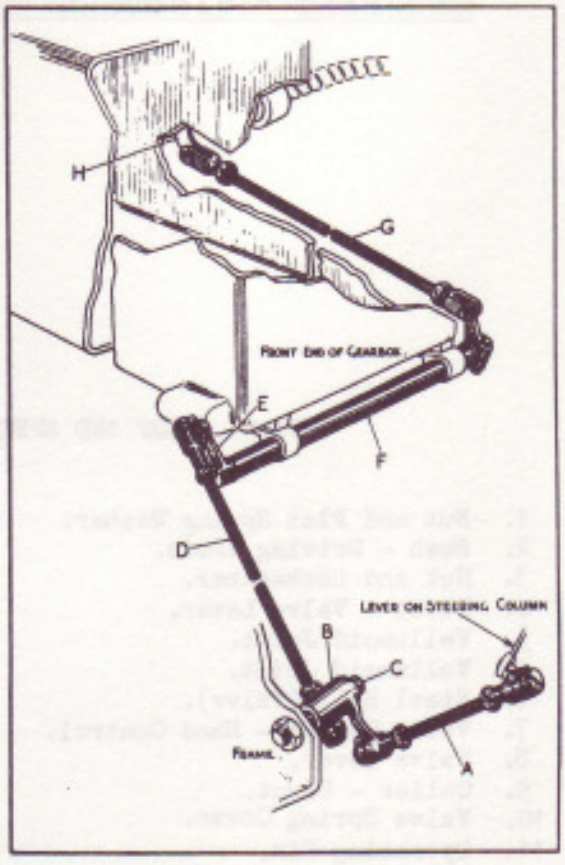

FIG. 5. CONNECTIONS "RIDE" CONTROL.

impair the functioning of the control.

An oil filter is provided in the gearbox (See Fig.4) to filter the oil on the way to the pump and is situated adjacent to the oil level dipstick. The filter assembly which is removable for cleaning purposes is provided with a hexagon head for spannering.

Adjustment of "Ride" Control Rods & Checking the Oil Pressure to the Rear Shock Dampers.

Under normal conditions there should be no necessity to make any adjustments to the "Ride" (Damper) Control Rods, which were correctly set before the car left the factory.

The controls are adjusted as follows:-

(i) The length of the rod (A, Fig.5, Steering Column to bellcrank lever, B, of the frame countershaft) is adjusted so that the longer arm of the bellcrank lever, B, swings equally either side of the perpendicular from the rod through the bellcrank pivot, C, when the hand control lever on the steering column is moved from the normal to the hard ride position.

(ii) The length of the rod, D (from bellcrank lever B, to lever E of the gearbox countershaft, F) is adjusted so that the lever E swings equally either side of the vertical when the hand control lever on the steering column is moved from the normal to the hard ride position.

(iii) With the hand lever on the steering column in the hard ride position, the length of the rod, G (From gearbox countershaft F, to the curved lever H on side of gearbox) is adjusted so that an oil pressure of 29 to 31 lbs/per sq. inch is obtained from the oil damper pump. The oil pressure should also be checked with the hand lever in the normal ride position which should be less than $2\frac{1}{2}$ lbs/per sq.inch. For checking the oil pressure a pressure gauge should be connected to the 4-way connection on the frame cruciform - just behind the gearbox. There is a suitable blank plug in this connection which can be removed for the purpose. Prior to checking the oil pressure, jack up one rear wheel and with the top gear engaged run the engine to give from 10 to 15 m.p.h. on the speedometer.
