Export Edition

INSTRUCTION BOOK

FOR THE

1½ litre MODEL

SALES TECHNICAL
PUBLICATION No. 52

INSTRUCTION BOOK

FOR THE

1½ litre MODEL

FRONT SUSPENSION

To achieve maximum benefit from Riley "Torsionic" Independent Front Suspension and to ensure the longest possible tyre life, frequent checks, as set out in the Instruction Book on the "Torsionic" Independent Suspension, should be made during the first 5,000 miles or 8000 km. of your car's life.

NUFFIELD EXPORTS LIMITED

Proprietors: Morris Motors Limited

COWLEY • OXFORD • ENGLAND

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TO RILEY OWNERS

THE object in compiling this Instruction Book has been to provide a good working knowledge of the car and instruction for routine maintenance, but not to provide the owner with a complete guide for a major overhaul. Such an overhaul would require a set of special tools and equipment only to be found in garages and service depots, and without these the average private owner would be unable to continue.

The illustrations have been prepared to enable the new owner to obtain an intimate knowledge of the construction of his car.

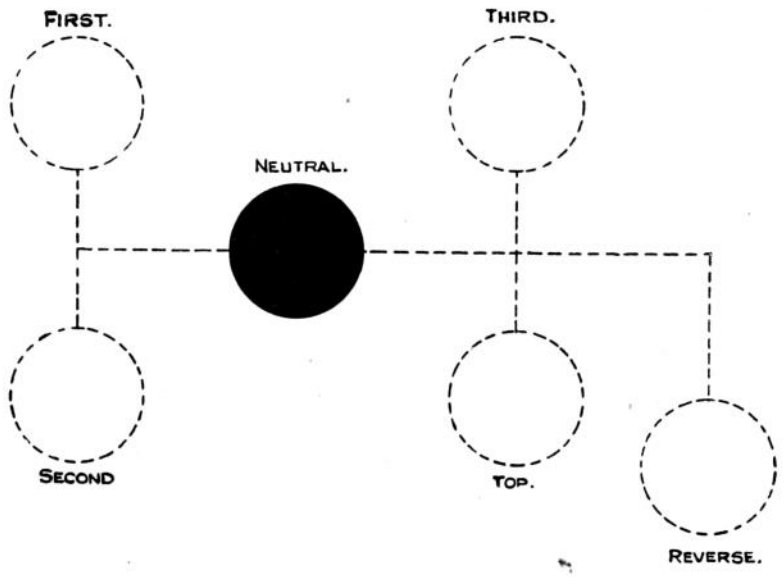
If, after reading this book, you find yourself in difficulty, our Service Department is always at your disposal and will readily answer any questions on points which may be causing you trouble.

General Data

Engine	4-cylinder, O.H.V.
Bore	69 mm.
Stroke	100 mm.
Capacity	1496 c.c.
B.H.P.	55 at 4500 r.p.m.
Sparking plugs	Champion L.10.S
Carburetter	S.U. horizontal H.2, fitted 90 jet and No. 3 needle standard, or V.2 needle weak, or B.7 needle rich.

Gear Ratios :

Top	4.89 to 1
Third	7.23 to 1
Second	11.2 to 1
First	19.42 to 1
Reverse	19.42 to 1
Rear axle ratio	4.89 to 1



The gear positions.

	ROAD SPEED (M.P.H.)							
R.P.M.	*1st Gear*		*2nd Gear*		*3rd Gear*		*Top Gear*	
	m.p.h.	*k.p.h.*	*m.p.h.*	*k.p.h.*	*m.p.h.*	*k.p.h.*	*m.p.h.*	*k.p.h.*
1000	4.0	6.4	8.0	12.9	10.5	16.9	16.0	25.7
1500	6.0	9.7	11.7	18.8	16.0	25.7	24.0	38.6
2000	8.0	12.9	15.6	25.1	21.3	34.3	31.7	51.0
2500	10.0	16.1	19.6	31.5	26.5	42.6	39.5	63.6
3000	11.7	18.8	23.5	37.8	32.0	51.5	47.5	76.4
3500	13.7	22.0	27.5	44.3	37.4	60.2	55.5	89.3
4000	15.7	25.3	31.5	50.7	42.7	68.7	63.8	102.7
4500	18.0	29.0	35.6	57.3	48.3	77.7	72.0	115.9
5000	20.0	32.2	40.0	64.4	54.0	86.9	80.0	128.7

Chart showing the relation between r.p.m. and road speed in m.p.h. and k.p.h.

Tyres ... ... 16·00—5·75

Tyre pressures ... ... Front ... 22 lb. per sq. in. (1.5 kg. per sq. cm.)

Rear ... 24 lb. per sq. in. (1.7 kg. per sq. cm.)

NOTE.—It is essential that these pressures are maintained.

Tyre pressures should be checked each week. Unequal tyre pressures, or tyres inflated to the incorrect pressures, will affect steering and suspension.

Dimensions

Height	4 ft. 11 in.	(1.499 m.)
Width	5 ft. 3½ in.	(1.613 m.)
Length	14 ft. 11 in.	(4.547 m.)
Ground clearance	7½ in.	(19.05 cm.)
Wheelbase	9 ft. 4½ in.	(2.857 m.)
Track	Front ... 4 ft. 4¼ in.	(1.327 m.)
	Rear ... 4 ft. 4¼ in.	(1.327 m.)
Turning circle	30 ft. 0 in.	(9.144 m.)
Weight (dry)	24¼ cwt.	(1232 kg.)

The front wheels are set parallel to each other. There is no " toe-in."

Capacities

Fuel tank	12½ gallons	(59 litres)
Cooling system	13 pints	(7.4 litres)
Engine sump	10 pints	(5.7 litres)
Gearbox	2 pints	(1.1 litres)
Rear axle	2¾ pints	(1.6 litres)

Electrical System

Battery	12-volt, 58 amp./hour
Fuses	Both fuses are 25 amperes
Bulbs	All single pole
Headlamp bulbs	Special design, the near-side being double filament and the off-side single filament on Home models Both are 36 watts and special fitting. Near-side Lucas No. 167. Off-side Lucas No. 162. Overseas models have lighting to suit local regulations
Sidelamps	6 watts. Lucas No. 207
Tail-lamp	6 watts. Lucas No. 207
Stoplamp	6 watts. Lucas No. 207
Reversing lamp	24 watts. Lucas No. 1
Roof-lamps	6 watts. Lucas No. 207

The ignition light, panel light and petrol gauge light are screw-in type, and 2.4 watts.

Special 3-watt festoon type bulbs are fitted in the trafficators.

Tappet Clearance

This is between rocker and top of valve stem.

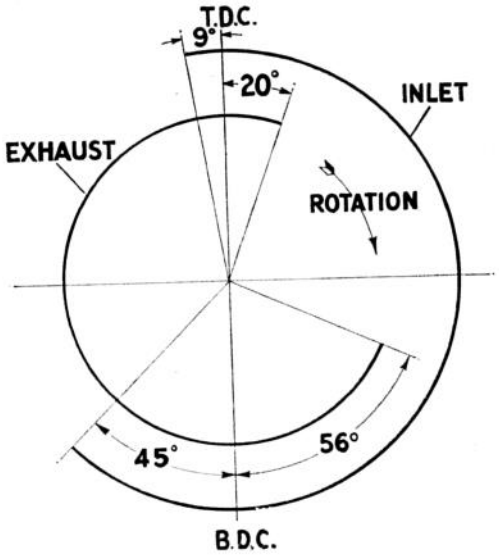
Inlet	.003 in.	(.08 mm.)
Exhaust	.004 in.	(.10 mm.)

These clearances should be set when the engine is hot.

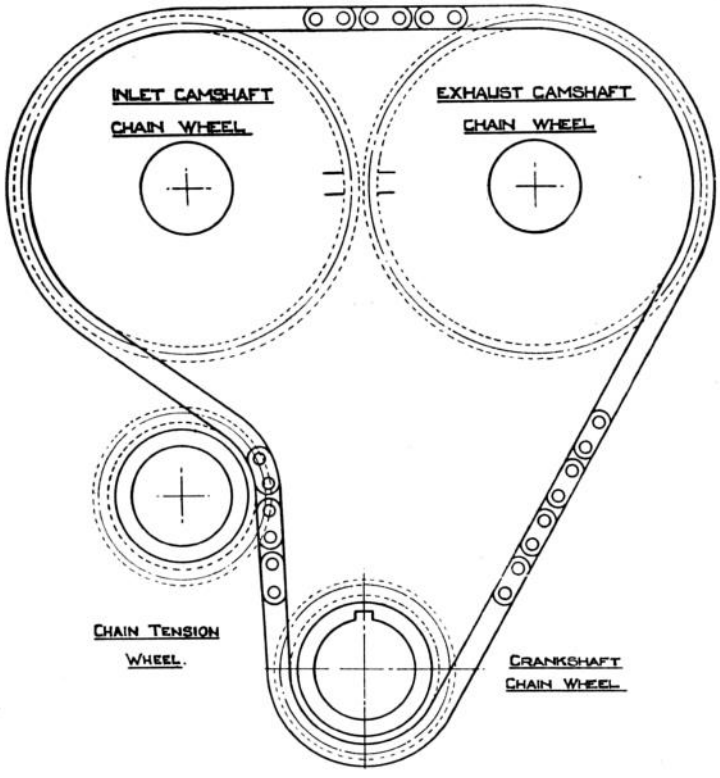
Valve Timing

Inlet opens	9° before T.D.C.
Inlet closes	45° after B.D.C.
Exhaust opens	56° before B.D.C.
Exhaust closes	20° after T.D.C.

The timing wheels are marked and set and should not be altered.



Left.—This is a valve timing diagram and shows the correct opening and closing of exhaust and inlet valves.



Right.—This diagram shows the correct relative positions between the camshafts and crankshaft to ensure perfect valve timing. Note that the keyway on the crankshaft is vertical and the marks on the exhaust and inlet chain wheels are in line with each other.

NOTE:- KEYWAY IN CRANKSHAFT CHAIN WHEEL MUST BE AT T.D.C. POSITION AND CAMSHAFT CHAIN WHEEL MARKS OPPOSITE.

Ignition Timing ...	...	8° before T.D.C., full advance
Firing order ...	... ...	1, 2, 4, 3
Contact breaker gap ...	...	.012 in. to .015 in. (.30 mm. to .38 mm.)
Sparking plug gap ...	...	.030 in. (.76 mm.)

Engine Temperature

The normal running temperature should be 70° C.—80° C. (158.0° F.—176.0° F.)

Starting Handle

This is stowed under the rear seat when not in use.

Chassis Number

This is stamped on a diamond-shaped plate on the left-side of the bulkhead under the bonnet. This number should be quoted in all correspondence.

Engine Number

Is stamped on the crankcase just above the starter motor.

Filler Caps

It is essential that both filler caps should be removed when taking in petrol.

Correct Postal Address

NUFFIELD EXPORTS LIMITED,
COWLEY,
OXFORD,
ENGLAND.

Cables ...	...	"MOREX," OXFORD, ENGLAND.
Telephone ...	... ...	77733 OXFORD, ENGLAND.
Telex ...	... ...	... OXFORD TELEX 7168

The First 1,000 Miles
or 1600 km.

During the early life of your car it is essential that the mechanism be run-in carefully. We suggest that three or four long runs during its early life will be more beneficial than a series of very short runs, during which the engine will hardly have time to attain its normal working temperature.

Whilst it is not our policy to suggest to owners that they should maintain a set speed and never exceed this, until a certain number of miles have been covered, we do suggest that the car be run as lightly and effortlessly as possible during its early life and that the actual running-in should be of a progressive nature.

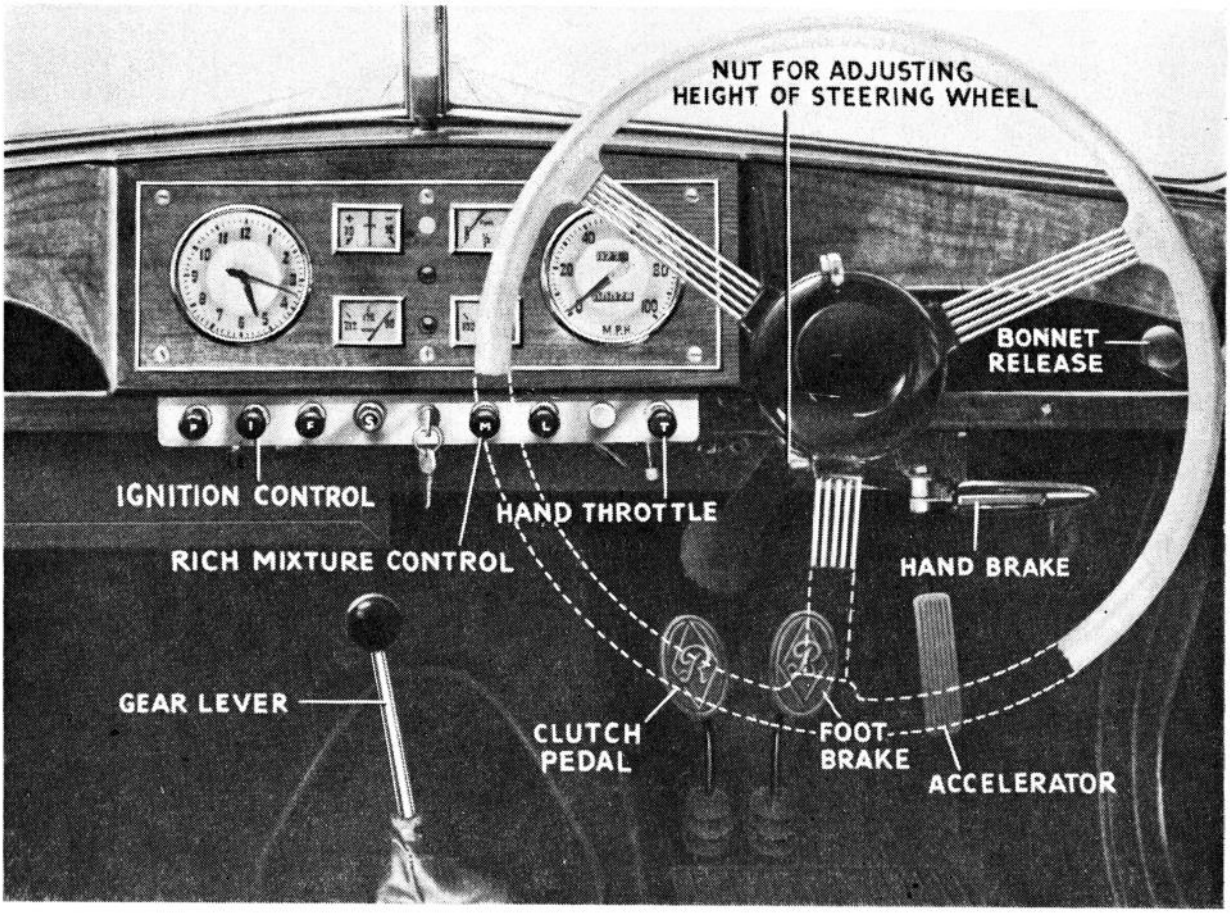
Careful study of the chapter on General Lubrication, with particular reference to the change of oils at 500 miles or 800 km., will amply repay the time you spend on this operation.

If you think it necessary to use one of the many upper cylinder lubricants during the running-in period, be sure to use one of an approved brand.

Nuts and bolts have a habit of settling down slightly after the car has travelled the first few hundred miles of its life, and such things as bumper bar attachments, body attachment bolts and similar points should be carefully checked and adjusted where necessary.

Details of the "Free Service" to which you are entitled after the car has covered 500 miles or 800 km. are given on page 71.

Controls



The engine and driving controls.

The following is a description of the various controls, gauges, and switches which are to be found in the driving compartment of your car. The description is sub-divided into two parts, the Engine and Driving Controls, and the Instruments and Switches.

ENGINE AND DRIVING CONTROLS

The steering wheel is of the sprung type and is fitted with a telescopic adjustment. To adjust the position of the wheel, slacken the nut on the steering column. When the correct setting has been obtained, the nut should be retightened.

The gear lever is situated in a central position, being so arranged that the minimum movement by the driver is necessary when changing gear. Reference to the illustration, under General Data, will show the gear positions.

Clutch, foot brake and accelerator pedals are fitted in that order, starting from the centre of the car. In the case of left-hand drive models, this order is reversed.

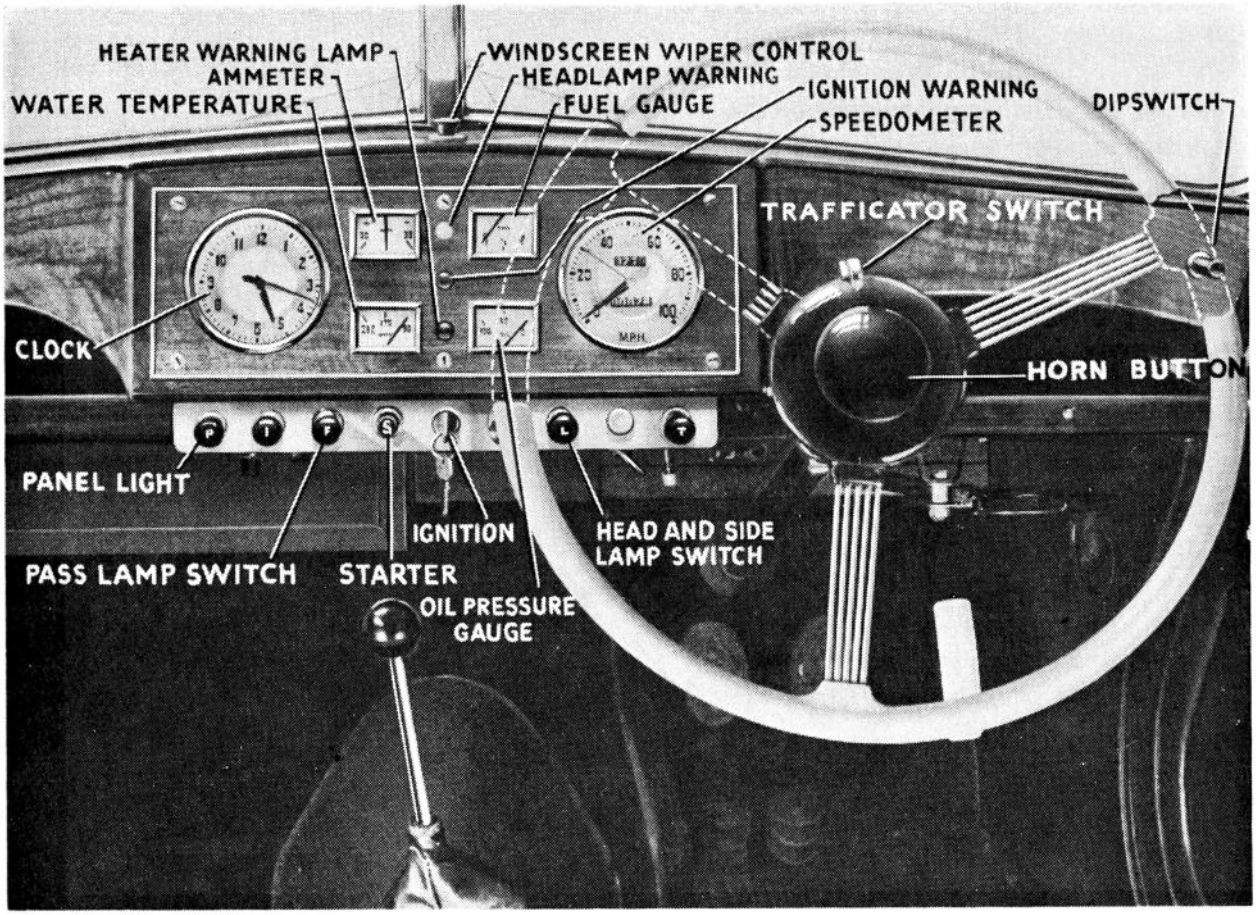
The hand brake will be seen just below the facia board, and to the right of the steering wheel, the ratchet release being incorporated in the pistol-grip handle.

The rich mixture control is on the right-hand side of the ignition switch and marked " M." Its sole function is to provide a rich mixture for starting and it should be closed as soon as the engine is running evenly. Pull out to operate.

The hand throttle is marked " T " and is on the extreme right of the panel. It is used to control the slow-running whilst the engine is warming up. Turn the knob counter-clockwise to increase the engine speed.

The ignition control is the second knob from the left on the panel and is marked " I." It should be pulled out to slightly retard the ignition when the engine shows signs of " pinking."

The bonnet release controls are fitted at either end of the glove-tray. Pull to release whichever side of the bonnet is required to be opened. The catches are spring-loaded, and a downward pressure is all that is required to relock the bonnet top.



The instruments and switches.

INSTRUMENTS AND SWITCHES

The speedometer is situated on the right of the panel and is provided with a total mileage indicator and a trip recorder. The setting control for the latter is below the panel and just behind the hand throttle.

The electric clock is on the left-hand side of the panel and is set by means of the knob below the panel and behind the ignition control.

The oil pressure gauge is the bottom right of the four square-shaped instruments on the panel.

The fuel contents gauge is the instrument on the top right.

The ammeter is the instrument on the top left.

The water temperature gauge is on the bottom left.

The ignition warning light is the centre of three small lights in the middle of the panel and its purpose is to show when the ignition is switched on. This light will be extinguished when the engine is running, thereby indicating that the dynamo is charging the battery.

The headlamp warning light is the upper of the three warning lights and it glows amber when the headlamps are undipped.

The heater warning light is the lower of the three warning lights and it glows red when the heater motor (if fitted) is in operation.

Switches on the panel, reading from left to right, are :—

The panel light, marked with a " P." Turn on by moving in a clockwise direction. Continue to turn in order to decrease the brightness.

The pass lamps, marked with an " F." Pull out to bring one lamp into operation. Turn clockwise and pull out again for both lamps.

The starter button, marked " S." Press to operate.

The ignition switch is controlled by a removable key, which also locks the car door and the boot lid.

The headlamp and sidelamp switch is marked " L " and should be pulled out to bring the sidelamps into operation. Turn clockwise and pull out again to switch on the headlamps.

The dipswitch is close to the steering wheel at the end of the facia near the door. Press inwards to operate.

The horn button is situated in the centre of the steering wheel and is actuated by a downward pressure.

The trafficator switch is located above the horn button and operates by movement of the lever in either direction. The switch is self-cancelling.

The windscreen wipers are brought into use by means of the " push-pull " switch on the top of the facia, above the centre of the panel.

The interior lights are operated by means of individual switches attached to each unit.

Note.—The sidelamps, roof-light and panel lights are wired in the same circuit, and the effect of this is that the panel lights and roof-lights function only when the sidelamps are switched on.

The reversing lamp only operates when the ignition is switched on and when the gear lever is in the reverse gear position.

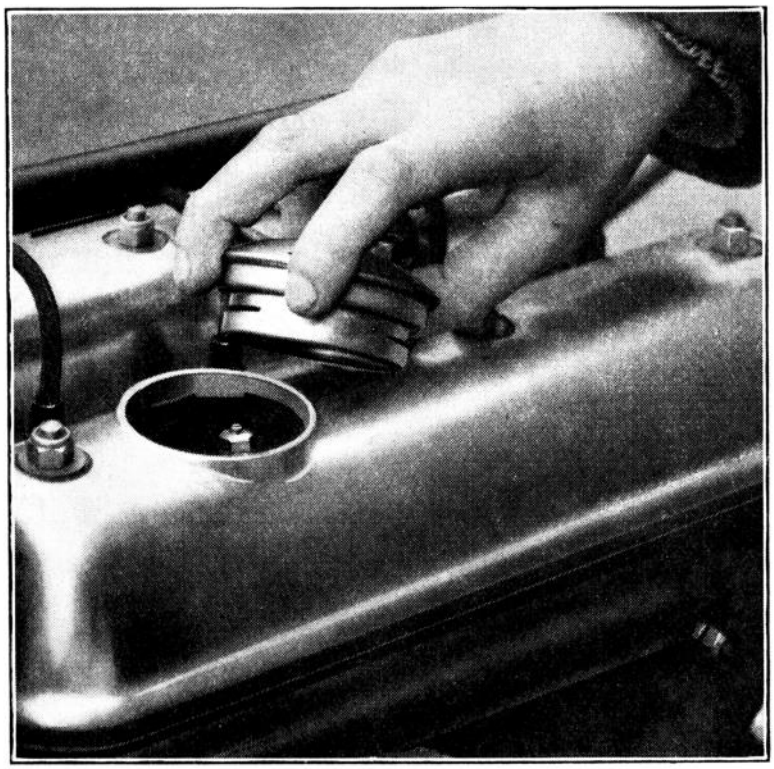
General Lubrication

It can be assumed that the initial lubrication has been undertaken before the car left the factory, but the wise motorist will commence his routine check from the day he takes over.

Lubrication is covered under the following headings :—Engine, Gearbox, Rear Axle, Chassis and the remaining individual parts.

Engine

The lubrication of the engine is maintained by a gear-driven, self-priming pump of high capacity, the oil being passed through a full-flow filter.



Location of the engine oil filler.

All engine bearings are pressure fed.

The oil filler orifice will be found on the near-side rocker cover; from here the oil reaches the sump via passages in the cylinder head and block.

Check the oil level in the sump, and, if necessary, top up each 250 miles or 400 km. rather than wait until the level has become dangerously low.

The oil level dipper rod is situated on the near-side of the engine and just forward of the exhaust pipe. The dipper rod has a mark on it which indicates the oil level when the sump is full, and on no account should the level be allowed to drop so that there is no indication on the dipper rod.

Before checking the oil level, the dipper rod should be wiped on a piece of clean rag, otherwise an incorrect reading may be obtained. When replenishing the oil, wait a short time before checking the level so that the new oil may reach the sump.

It is essential that after the first 500 miles or 800 km. the oil be drained from the engine, and for this purpose an oil drain plug is provided which will be found on the off-side of the sump. When this has been done, the engine should be supplied with the correct amount of the recommended lubricant.

Provided change recommendations are carried out, there should be no need for flushing with any other fluid or oil, but if this latter process is necessary, then the use of one of the oils recommended for extreme conditions should be used.

NOTE.—Paraffin should never be used for flushing purposes.

The sump should be drained and refilled, as described above, at subsequent intervals of 1,500 miles or 2400 km.

Each 10,000 miles or 16000 km. remove the sump and clean its interior.

The oil pressure gauge may indicate 100 lb. per sq. inch (7 kg. per sq. cm.) when the engine and oil are cold. As the oil and engine warm up, this pressure will drop and the following are the **minimum** pressures permissible when running in top gear.

Pressure		*Speed*
19 lb. per sq. in. (1.3 kg. per sq. cm.)	...	15 m.p.h. (24 k.p.h.)
22 lb. per sq. in. (1.5 kg. per sq. cm.)	...	20 m.p.h. (32 k.p.h.)
26 lb. per sq. in. (1.8 kg. per sq. cm.)	...	30 m.p.h. (48 k.p.h.)
35 lb. per sq. in. (2.5 kg. per sq. cm.)	...	50 m.p.h. (80 k.p.h.)

Should it be found necessary to alter the oil pressure, an oil pressure release valve will be found on the left side of the crankcase, just behind, and lower than, the external oil filter. In order to increase the oil pressure, the adjusting screw should be turned clockwise. Make certain that the locknut is re-tightened after any adjustments have taken place.

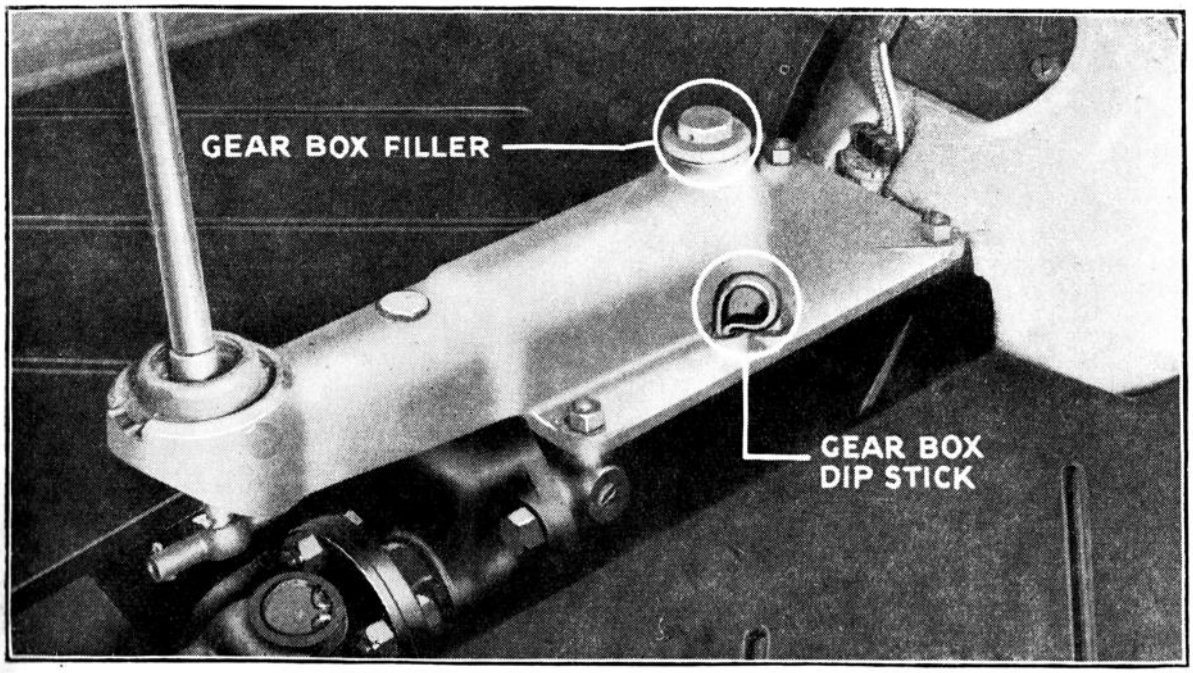
Clutch

This is of the dry plate type and, as a carbon ring is employed in the withdrawal mechanism, no lubrication is necessary other than regular attention from an oilcan to the various pins and toggle levers in the actuating mechanism.

Gearbox

This should be drained after the first 500 miles or 800 km. The gearbox should then be filled with the correct amount of recommended lubricant. The filler-cap and dipstick are located just forward of the gear change lever and are reached by removing the tunnel over the top of the gearbox. The draining and refilling should be carried out at subsequent intervals of 5,000 miles or 8000 km.

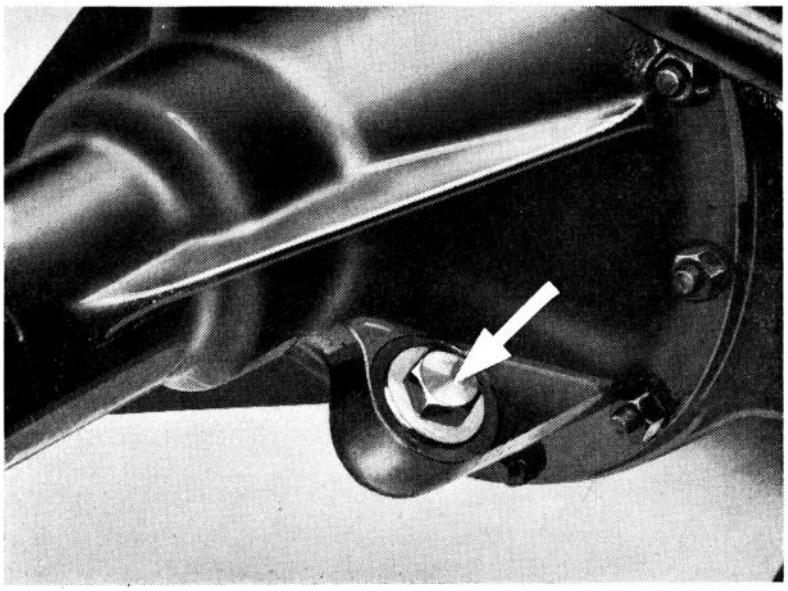
Replenishments or topping-up should take place at intervals of 2,000 miles or 3200 km., great care being taken to ensure that the gearbox is not filled above the mark on the dipper rod.



Position of gearbox filler and dipstick.

Rear Axle

As with the gearbox, this component should be drained and refilled after the first 500 miles or 800 km. Replenishment should be made at subsequent intervals of 2,000 miles or 3200 km.



Combined filler and level plug for rear axle.

The filler-cap will be found on the near-side of the differential casing; this also acts as a level plug, and is reached by lifting up the back of the rear seat and undoing the screws holding the lower portion of the back-rest, the back-rest may then be removed.

Note.—Do not rotate the road wheels during this operation, otherwise overfilling may result.

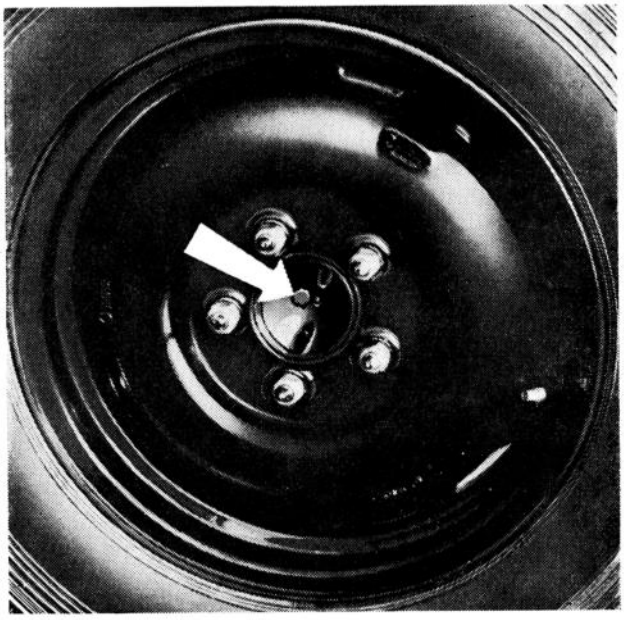
Shock Absorbers

Front : The front shock absorbers, being of the sealed type, do not require replenishing.

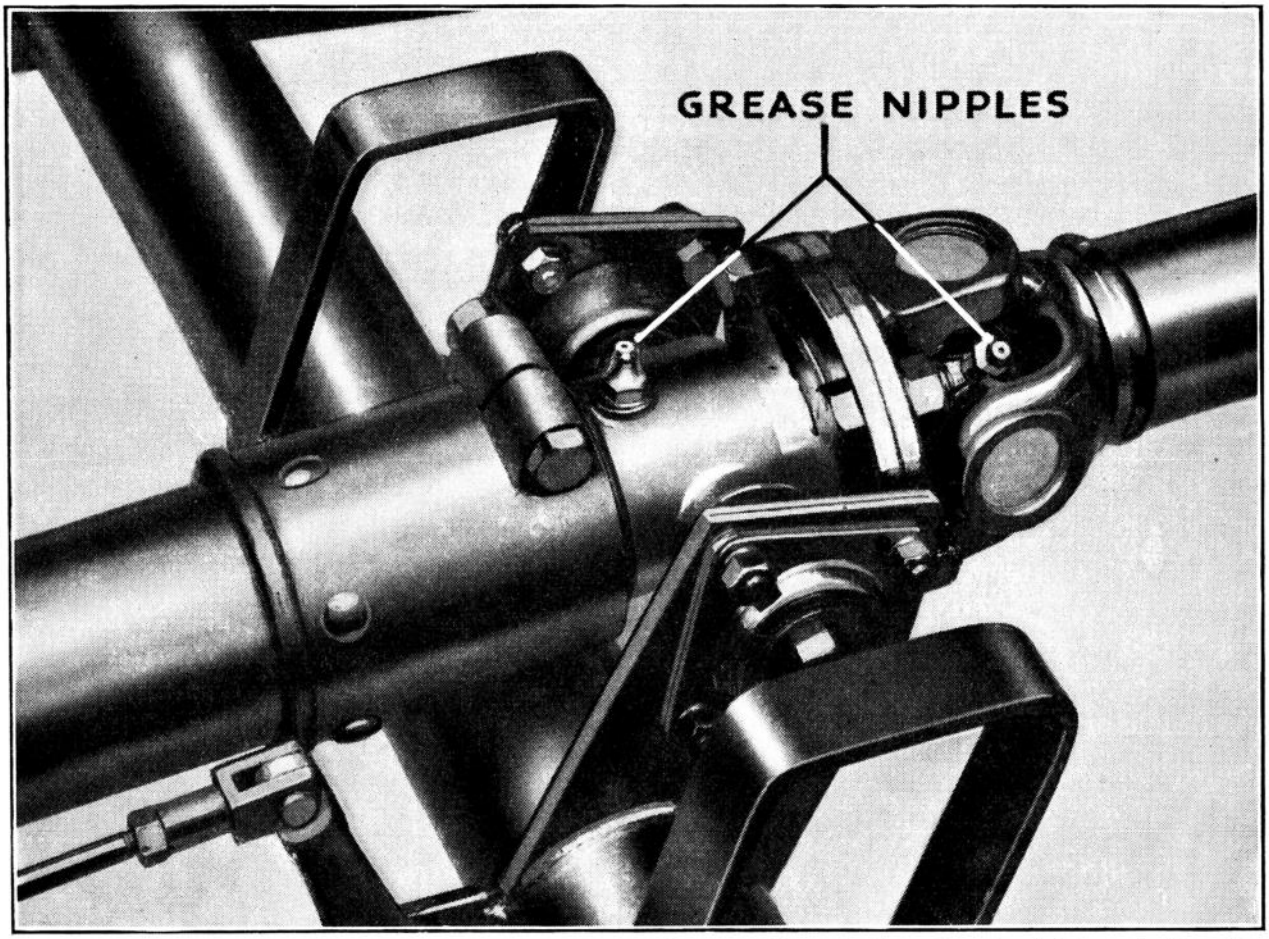
Rear : If necessary, top-up every 10,000 miles or 16000 km. For further information see the general description of the shock absorbers.

Hubs

Remove the plated wheel discs and give two or three strokes with the grease gun every 5,000 miles or 8000 km.

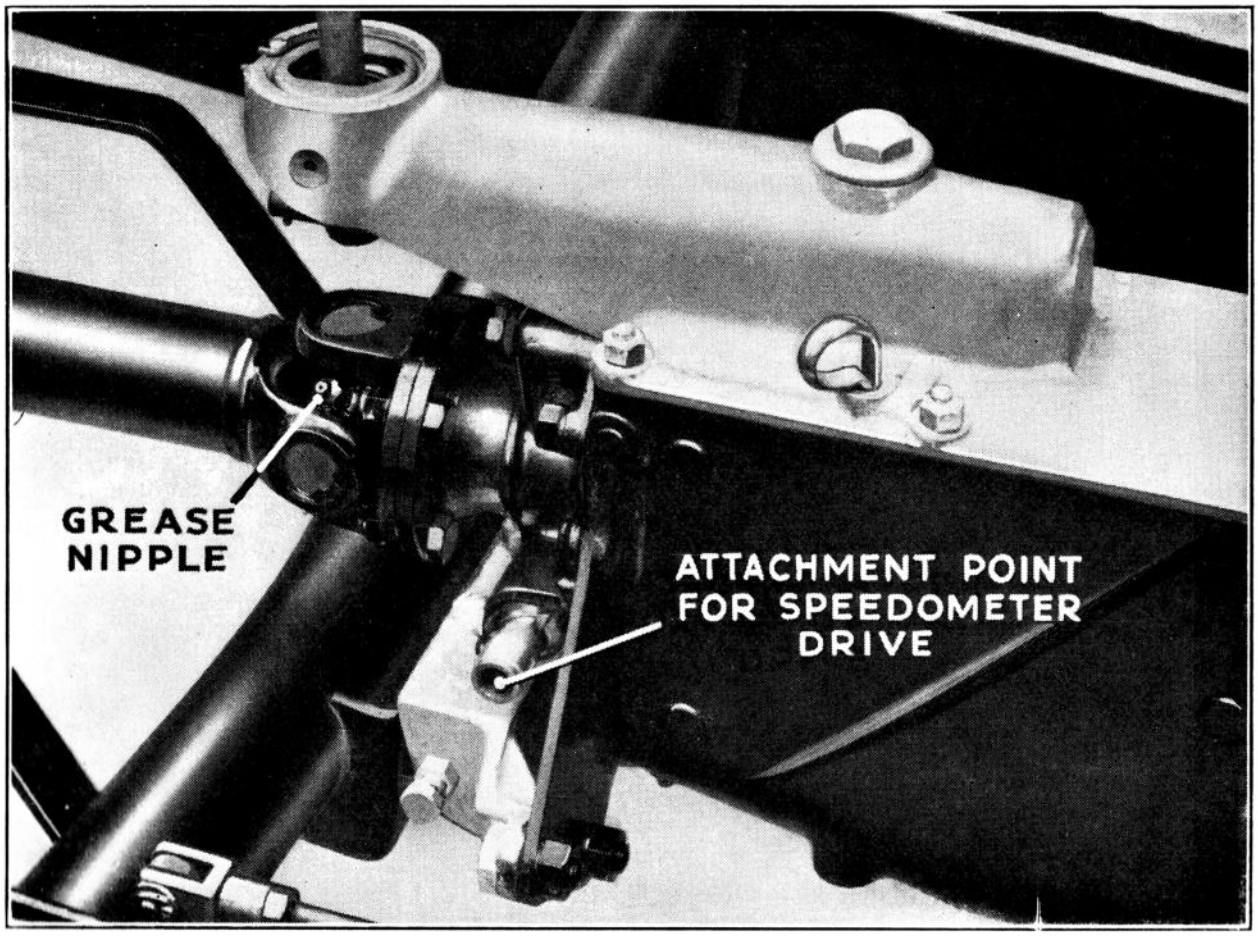


Grease nipple for front hub.



Above.—This is a view of the trunnion between the intermediate shaft and main driving shaft. Note the two grease nipples.

Below.—Rear flexible mounting for the power unit. Note the grease nipple on the intermediate shaft.



Chassis

The following points should receive the attention of a grease gun each 1,000 miles or 1600 km. at their respective grease nipples:

1. Water pump.
2. Ball race at front end of the torque tube.
3. The two universal joints on the intermediate shaft between gearbox and torque tube.

Independent Front Suspension and Steering Gear

On the " Torsionic " front suspension there are eight grease nipples which require three or four strokes from a grease gun each 1,000 miles or 1600 km. These are located as follows:

1. One at the top and one at the bottom of each steering swivel.
2. One at each end of both track rods.

The steering mechanism itself is packed with grease before leaving the factory and does not need any further attention until the car has travelled 30,000 miles or 48000 km.

The inner mountings of the tubular struts are carried on rubber bushes and require no lubrication.

Note: Do not use a pressure system on the swivel pin greasers. **Use a hand gun only.**

Lubrication Notes

1. Oil should be drained from the engine, gearbox and rear axle after the car has been running for some time; the oil being warm is then in a more fluid state and readily drained off.

2. When filling with oil or grease, make sure that there is no dirt around the grease nipples or filling points. If this is not done, dirt and grit may enter the mechanism, thereby causing rapid and unnecessary wear.

3. Make sure that all drain plugs and fillers are replaced and securely tightened.

4. Regular attention with an oilcan to such points as throttle rod fork ends, brake-rod pins and toggles, will be amply repaid by the absence of harsh operation and unnecessary wear.

5. The door hinges are fitted with small grease nipples and should receive occasional attention from the grease gun. The lock catches should also be smeared with grease at the same time.

Recommended Lubricants

The correct lubrication of your car is of exceptional importance and the most vital part of the complete car is the engine. Due to the fact that different motor car engines vary considerably in their characteristics, such as working temperature, clearances between moving parts, and other technical points, it is necessary that the lubrication should not be haphazard, but attended to with great care.

RECOMMENDED LUBRICANTS

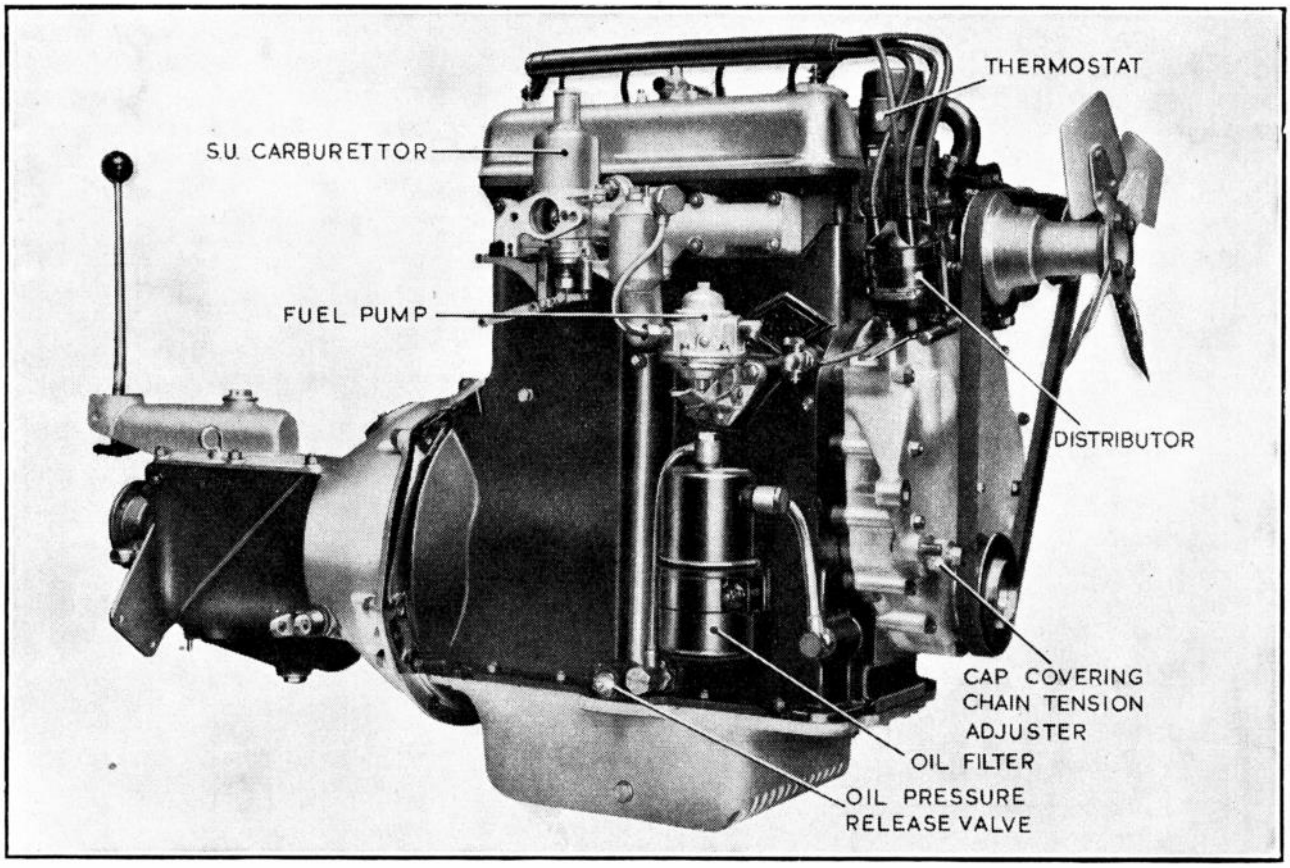
Component	A			B		C	D	E	F
	Engine and Air Cleaner			Gearbox, Steering Gearbox and Rear Axle		Wheel Hubs and Fan Bearings	Chassis Greasing, Nipples etc.	Cables and Control Joints	Oilcan and Carburetter
Climatic Conditions	**Tropical and temperate down to 32° F. (0° C.)**	**Cold and extreme cold down to 0° F. (−18° C.)**	**Arctic below 0° F. (−18° C.)**	**Tropical and temperate down to 10° F. (−12° C.)**	**Extreme cold below 10° F. (−12° C.)**	**All conditions**	**All conditions**	**All conditions**	**All conditions**
"DUCKHAM'S" (Alexander Duckham & Co. Ltd.)	Duckham's N.O.L. "Thirty"	Duckham's N.O.L. "Twenty"	Duckham's N.O.L. "Ten"	Duckham's N.O.L. "E.P." Transmission 140	Duckham's N.O.L. "E.P." Transmission 80	Duckham's H.B.B. Grease	Duckham's H.P.G. Grease	Duckham's "Keenol" K.G. 16 Grease	Duckham's N.O.L. "Twenty"
"CASTROL" (C. C. Wakefield & Co. Ltd.)	"Castrol" X.L.	"Castrolite"	"Castrol" Z	"Castrol" Hi-Press	"Castrol" Hypoy 80	"Castrolease" Heavy	"Castrolease" Medium	"Castrolease" Brake Cable Grease	"Castrolite"
"ESSOLUBE" (Anglo American Oil Co. Ltd.)	"Essolube" 30	"Essolube" 20	"Essolube" 10	"Esso" Expee Compound 140	"Esso" Expee Compound 80	"Esso" Bearing Grease	"Esso" Chassis Lubricant	"Esso" Chassis Lubricant	"Essolube" 20
"MOBILOIL" (Vacuum Oil Co. Ltd.)	Mobiloil "A"	Mobiloil "Arctic"	Mobiloil "Arctic" Special	Mobilube "G.X." 140	Mobilube "G.X." 80	Mobilgrease No. 5	Mobilgrease No. 2 or 4	Mobilgrease No. 2 or 4	Mobiloil "Arctic"
"ENERGOL" (Price's Lubricants Ltd.)	"Energol" Auto 150	"Energol" Auto 125	"Energol" Auto 80	"Energol" Transmission 700 E.P.	"Energol" Transmission 200 E.P.	"Energrease" Chassis Pressure No. 2	"Energrease" Chassis Pressure No. 2	"Energrease" Chassis Pressure No. 2	"Energol" Auto 125
"SHELL" (Shell Mex & B.P. Ltd.)	"Shell" X—100 S.A.E. 30	"Shell" X—100 S.A.E. 20	"Shell" X—100 S.A.E. 10	"Shell" Spirax 140 E.P.	"Shell" Spirax 80 E.P.	"Shell" Retinax H for Hubs Retinax C for Fan	"Shell" Retinax C	"Shell" Retinax C	"Shell" X—100 S.A.E. 20
"FILTRATE" (Edward Joy & Sons Ltd.)	Medium "Filtrate"	Zero "Filtrate"	Sub-Zero "Filtrate"	E.P. "Filtrate"	E.P. "Filtrate" 80	"Filtrate" R.B. Grease	H.P. Solidified "Filtrate"	"Filtrate" A.G. Grease	Zero "Filtrate"
"STERNOL" (Sternol Ltd.)	"Sternol" W.W. 30	"Sternol" W.W. 20	"Sternol" W.W. 10	"Sternol" Liquid Ambroleum E.P. 140	"Sternol" Liquid Ambroleum E.P. 80	"Ambroline" R.B. Grease	"Ambroline" M.M. Grease	"Ambroline" A.F. Grease	"Sternol" W.W. 20

Extreme Cold Conditions

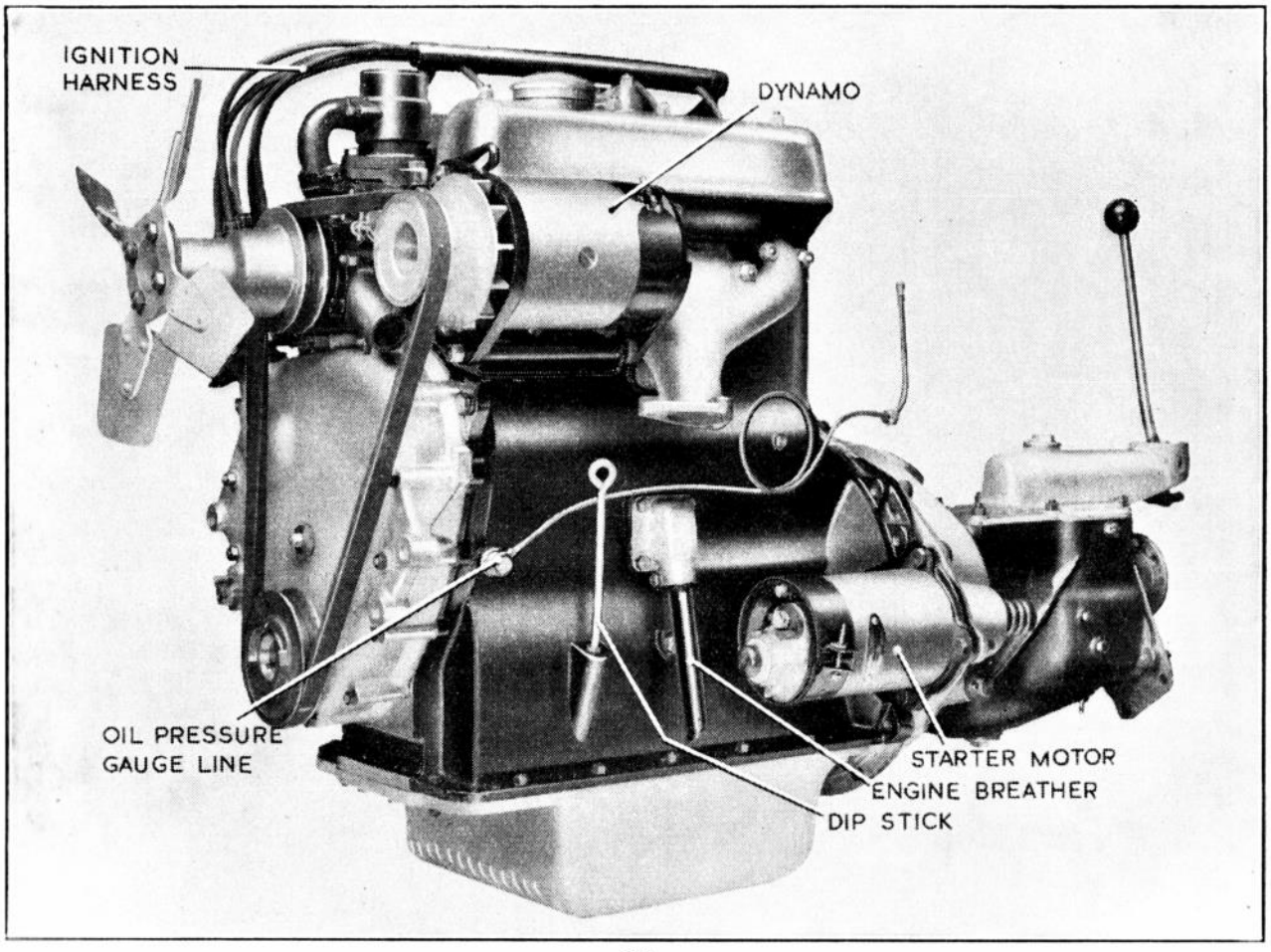
Where a car is operated in temperatures which are consistently below zero Fahrenheit (—17.8° C.) the use of an oil of lower viscosity than that recommended for normal use is desirable, and under such conditions the use of one of the oils indicated for "extreme conditions" is recommended.

Similar considerations apply in the case of the gearbox, rear axle and steering gearbox, where the appropriate oil should be used when temperatures consistently below 20° Fahrenheit (—6.7° C.) are encountered.

Description of Engine



Above.—Right hand side of engine.



Below.—Left-hand side of engine.

Crankcase

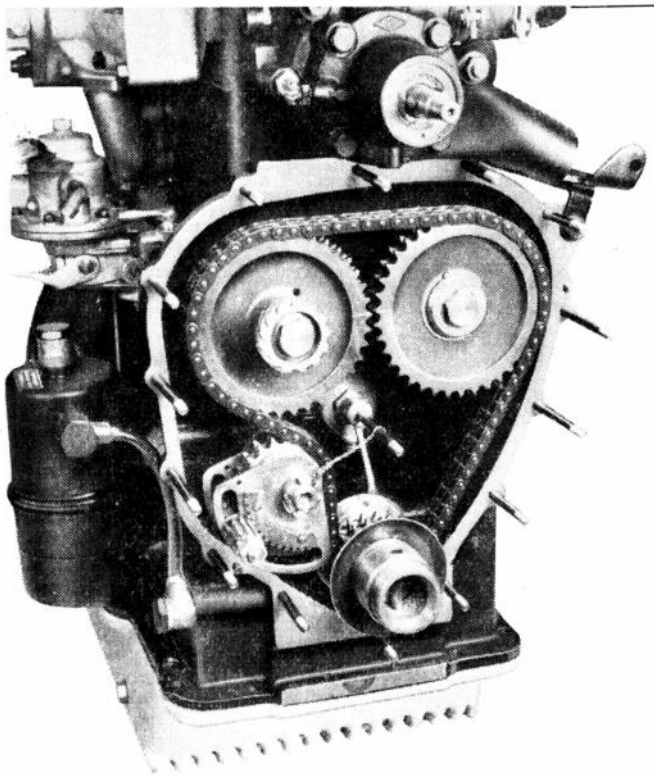
This is cast in one piece with the cylinder block and is made of very high quality cast iron with the various bearing surfaces machined in readiness for the building up of the complete unit.

Tappets

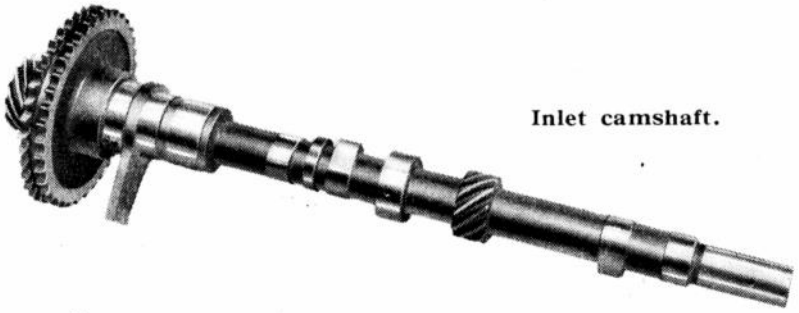
These are of generous diameter with large bearing areas. They are made hollow, the object being to provide maximum strength with a minimum of weight.

Camshafts and Timing Gear

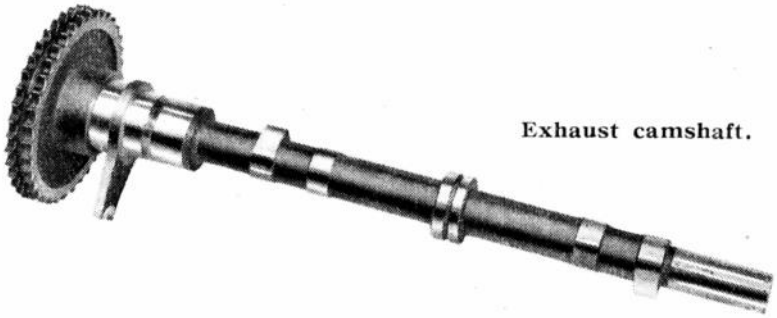
The camshafts run the complete length of the engine and are carried in phosphor bronze bearings at each end. These bearings are pinned in position in the block by



Front of engine with timing cover removed.



Inlet camshaft.

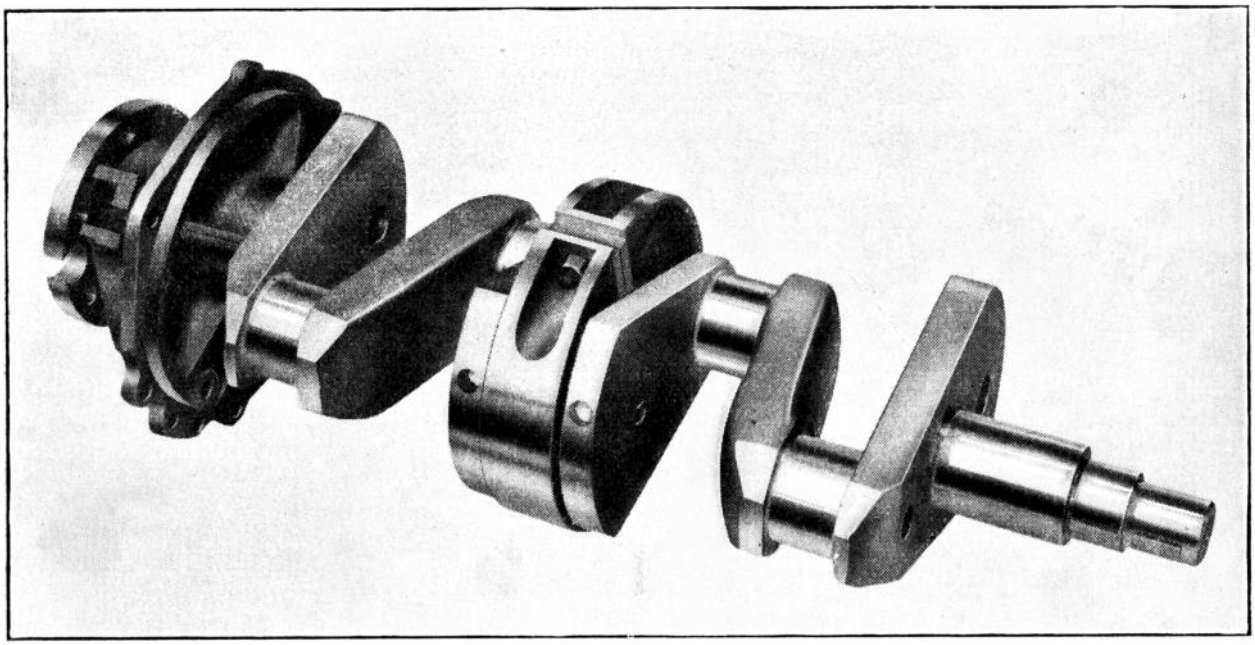


Exhaust camshaft.

means of set screws. The centre bearing is machined in the cylinder block. All bearings are line reamered in order to ensure perfect alignment and accurate rotation of the camshafts. Brass plugs are screwed into the cylinder block casting at the rear end of the camshafts in order to prevent oil leakage and the entry of dirt.

The inlet camshaft has a spiral gear machined in situ at its centre for the oil pump drive. At the front end is a gear drive for the distributor.

The cams themselves, besides being designed to give the requisite valve opening, are also designed for quietness in operation, great care and precision being taken during manufacture. The camshafts are driven from the crankshaft by means of an endless chain running over an intermediate wheel which is readily adjustable for chain tension.



The sturdy crankshaft. Note how the rear and centre bearing housings are attached to the crankshaft for assembly purposes.

Crankshaft

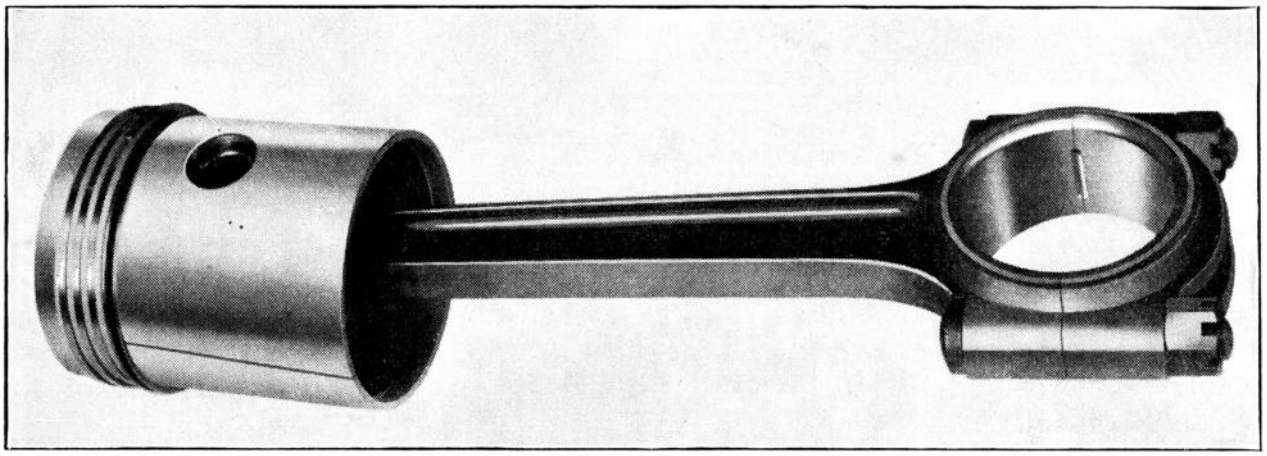
The crankshaft is so designed that the exact balance between lightness and strength has been achieved. The bearing areas are of generous size and are fed by means of oilways, with oil at high pressure.

At the forward end of the crankshaft is the main timing wheel, keyed in position and clamped by the hand starter dog, which is keyed and locked in position by a taper pin. An oil thrower is positioned between the timing wheel and starter dog.

The complete crankshaft is rigidly supported in three bearings, the forward one being held directly in the crankcase casting. The centre and rear bearings are carried in large diameter bearing housings which are in turn bolted to the crankcase.

Both these bearings and housings are of the split type, and should they at any time be removed, it is essential that they be replaced correctly. Marks are stamped on the parts concerned to facilitate this operation.

Prior to the fitting of the crankshaft, all bearings are secured and line reamered in position; after this they are carefully hand fitted to the crankshaft. At its rear end there is a flange to which the flywheel is bolted.



Assembly of piston and connecting rod.

Connecting Rods

Made of H-section high-tensile steel and designed to provide great rigidity. At the upper end is the gudgeon pin bush which is made of phosphor bronze and pressed into position. This bush is provided with an oilway.

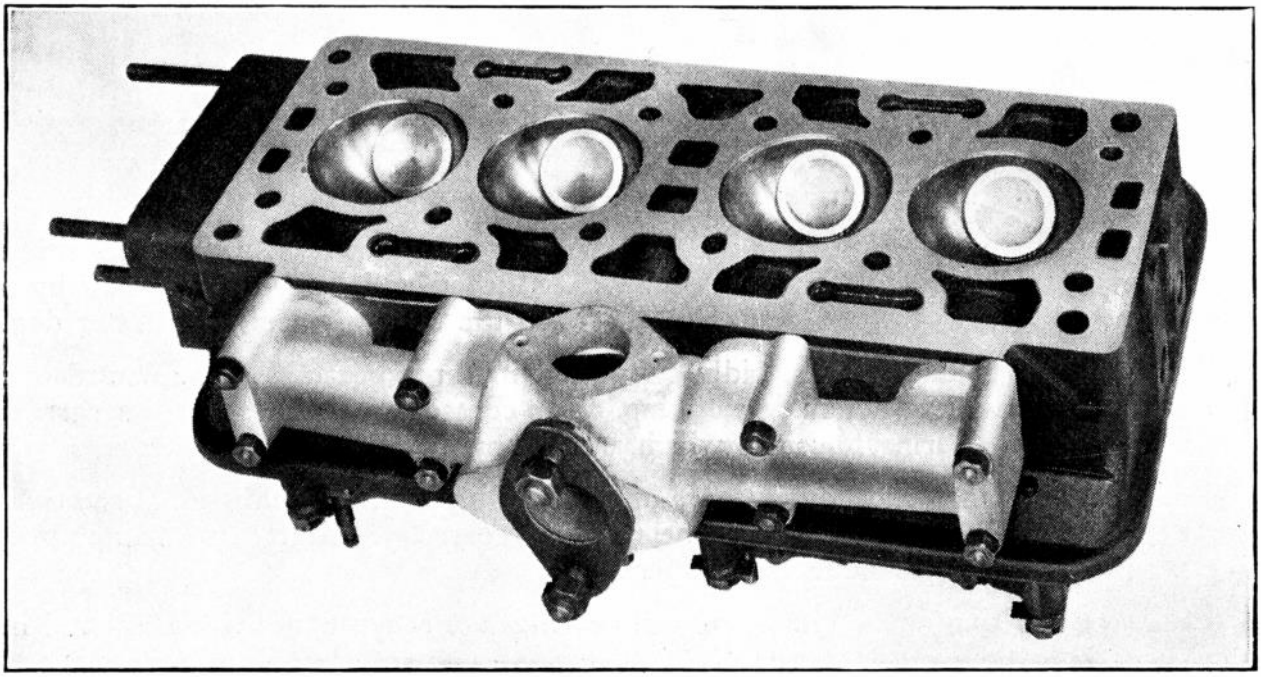
The big-end bearings, which are of white metal and run directly on to the connecting rods and caps, are very carefully hand-fitted to the crankshaft in order to ensure long life and the minimum of frictional losses.

If at any time the connecting rods are removed, it should be noted that they are marked 1, 2, 3, and 4, starting at the front end. The bearing caps are marked in a like manner, and care should be exercised to see that they are replaced in the position from which they were removed.

Pistons

High-compression aluminium alloy pistons are used, the skirt being split on one side only. Four piston rings are fitted, three compression and one oil control.

The gudgeon pin is positioned in the piston by means of spring steel circlips. The pistons are marked with numbers, so that they may be replaced in their correct bores



The cylinder head and inlet manifold.

No. 1 being at the front. It should also be noted that the splits in the skirts of the pistons must always be placed on the exhaust side.

Sump

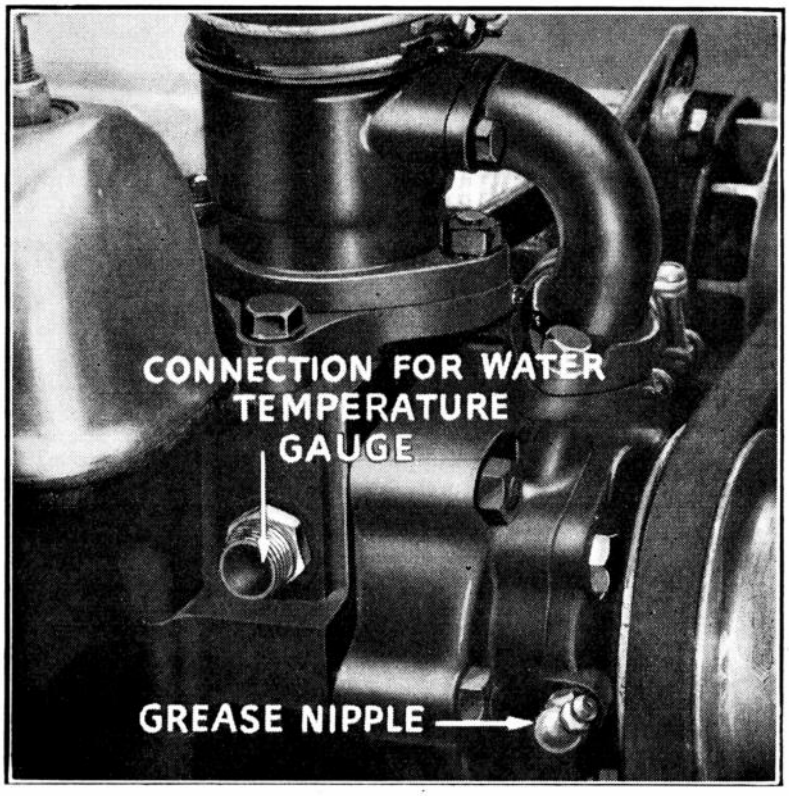
In order to act as an oil reservoir, the sump, which is bolted directly to the crankcase, is made of aluminium and ribbed to assist oil cooling. Incorporated in the sump, and covering its entire area, is a large oil strainer of fine mesh.

Cylinder Head and Valve Gear

The design of the engine is such that the cylinder head and valve gear are incorporated as one complete unit.

The valves are inclined at an angle of 45° to the vertical, with the inlet and exhaust ports so designed that a very free and unimpeded gas flow is obtained. These facts, when coupled with the machined hemispherical combustion chamber, provide efficiency of the highest order. The rockers are short and sturdy and are operated by means of short stiff push rods which are interposed between the base tappets and the rocker ball end. It should be noted that the push rods are concave at one end and convex at the other. The convex end should always be in contact with the base tappet, the concave end locating itself on the adjustable ball end of the rocker.

The adjustable ball end of the rocker is held in position by means of a locknut. A special cooling system is employed whereby a constant flow of cool water is directed around the hottest part of the engine, i.e. the exhaust valve seats. The rocker gear is protected from dirt and rendered oil-tight by means of laminated cork gaskets and aluminium covers, the latter being held in position by suitably placed studs and nuts.



This is a close-up view of the water pump and thermostat.

Water Pump and Thermostat

The water pump is situated at the front of the cylinder head, with the thermostat mounted just above it. The cooling fan is carried on an extension of the water pump shaft, the whole being driven by a V-belt from the crankshaft.

The function of the thermostat is to ensure that the flow of cooling water is restricted until the engine has reached a normal working temperature. Whilst the engine is undergoing its initial warming up, the water is by-passed from the top of the thermostat direct to the suction side of the water pump. As soon as the cooling water has reached a temperature of 72° C. (162° F.), the main valve opens and the by-pass valve shuts. The cooling water then circulates throughout the cooling system in the normal manner.

This ensures a rapid warming up of engine and oil.

Ignition

This is supplied from a 12-volt battery and heavy duty coil, the distributor being fitted at the front of the engine on the inlet side. The drive is taken from the adjacent camshaft.

An automatic advance and retard mechanism is incorporated in the distributor, which works in conjunction with the manual control.

Starter

This is situated on the exhaust side of the engine and is securely mounted to the flywheel housing, the gear on the starter engaging with teeth on the rim of the flywheel as soon as the starter motor is operated.

Generator

The location of the generator is on the exhaust side of the engine, being mounted so that the tension of its driving belt may be readily set. (Further information on the generator, ignition, etc., will be found in the chapter on Electrical Equipment.)

Carburetter

An S.U. H.2 instrument is fitted. This is extremely efficient and remarkably simple in operation; a detailed description will be found on pages 42, 43 and 44. An air silencer is fitted to the intake of the carburetter.

Air Silencer

Bolted directly to the carburetter, this should be cleaned out with petrol every 5000 miles (8000 km.). After cleaning, the filter element should be re-oiled with engine oil.

Oil Filter

Is situated on the inlet side of the engine and receives the full flow of oil direct from the pump before the oil reaches the engine.

The filtering medium briefly consists of a felt strainer supported on a wire cage. The normal life of the filter is 10,000 miles or 16000 km., after which distance a replacement should be obtained from your Riley Dealer. Should the filter at any time become choked, either through lack of care or using a type of oil that is not on our recommendation chart, the oil is permitted to by-pass the filter. Naturally the oil is then in a poor condition and matters should be rectified as soon as possible.

The initial change of oil filter should be made when 5,000 miles or 8000 km. have been covered.

Fuel Pump

The fuel pump is driven from an eccentric on the inlet camshaft and, very briefly, consists of mechanical operation of a diaphragm between the fuel tank and carburetter.

Description of Oiling System

The heart of the oiling system is naturally the pump, and in the Riley engine this is of the gear type and driven from the inlet camshaft. The pump, which is self-priming, works fully submerged in the oil sump and is encased in a strainer. The design of the pump is such that a more than adequate supply of oil is delivered at high pressure to all moving parts at all times.

From the pump, oil is delivered by an external pipe, and via a pressure release valve, to an external full-flow oil filter. From the filter another external pipe leads to the crankcase side and thence through oilways and internal pipe to the three main bearings.

The connecting rod big-end bearings are supplied with oil by means of oilways drilled in the crankshaft. The camshafts, timing chain and rocker shafts are supplied by means of external oilways.

Description of Chassis

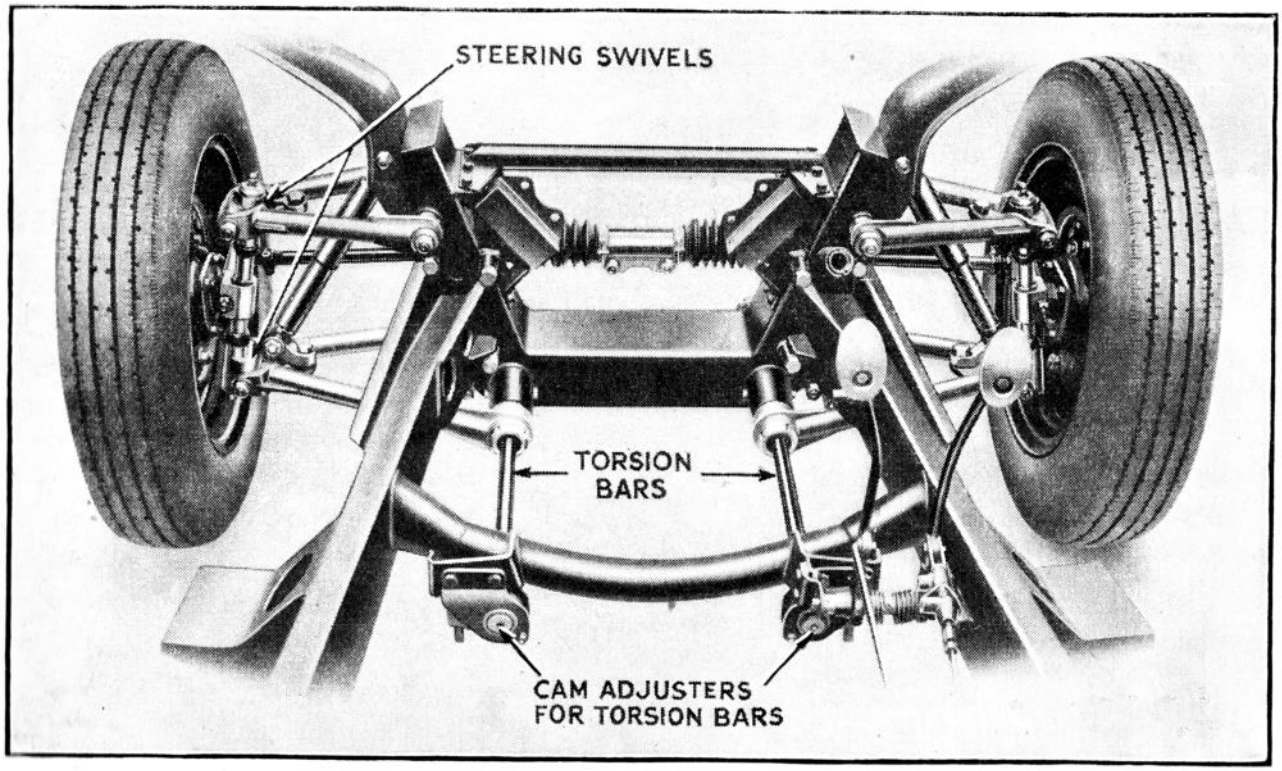
The front of the chassis is specially designed to take the front suspension and steering mechanism. The side members, which are of deep box section and internally strengthened, are of welded construction and are braced by cross members of tubular section.

Such items as floorboard supports, body supports, brake-rod bearing brackets, etc., are attached to the main structure by welding, thus ensuring that these parts will not work loose and set up unwanted rattles.

Thus it will be seen that the chassis is of maximum strength and minimum weight, both factors being the result of long racing experience.

FRONT SUSPENSION

Riley " Torsionic " independent front suspension is designed and produced as a complete unit, incorporating by exceptional arrangement the steering mechanism,



Rear view of the " Torsionic " independent front suspension.

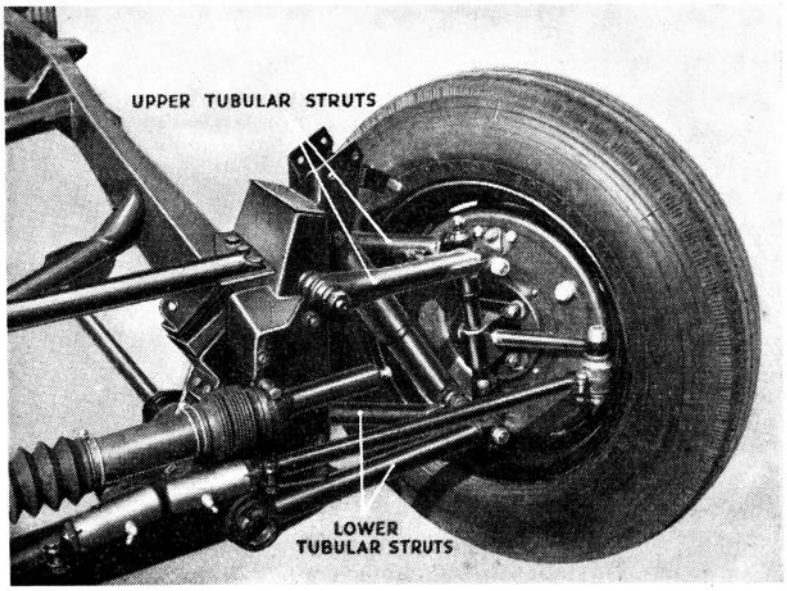
and resulting in an extremely rigid front end, providing accurate steering under all conditions.

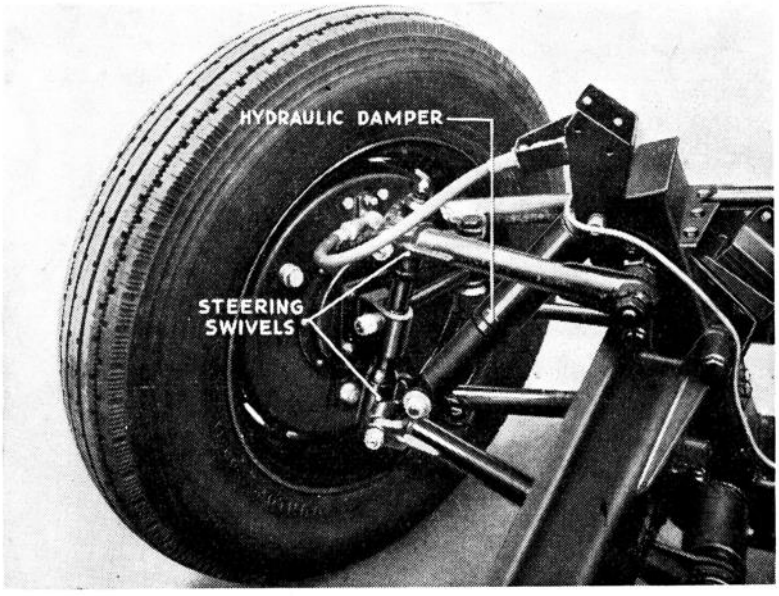
The suspension consists of tubular struts carried on a very robust box section cross member or cradle.

The lower struts are attached to parallel torsion bars, which replace the orthodox road springs. These torsion bars have a cam adjustment at the rear end. The inner mountings of the struts are special rubber bushings, which do not require any lubrication or maintenance.

The steering swivels—or, as they are commonly known, king pins—are of special design, and the top and bottom bearings are 12 in. (30.48 cm.) apart—an exceptional distance—and the bearing area 80 per cent. greater than the orthodox type of king pin and plain bush. This ensures inherent stability and long life. There is a grease nipple at the top and bottom of these swivels which requires attention with the ordinary grease gun, filled with the recommended grease, every 1,000 miles or 1600 km.

Close-up of front suspension.





Close-up of front suspension.

The steering is provided with two track rods, these having the normal steering ball mounting with a greaser at each end, which again requires the recommended grease. The grease nipples are of the hydraulic self-gripping type, and are placed exactly where the lubrication is required.

The total number of greasers at the " front end " is eight, and attention every 1,000 miles or 1600 km. is the only maintenance necessary on the front end suspension and steering.

The steering mechanism itself is packed with grease when it leaves the factory, and does not require any further attention under 30,000 miles or 48000 km.

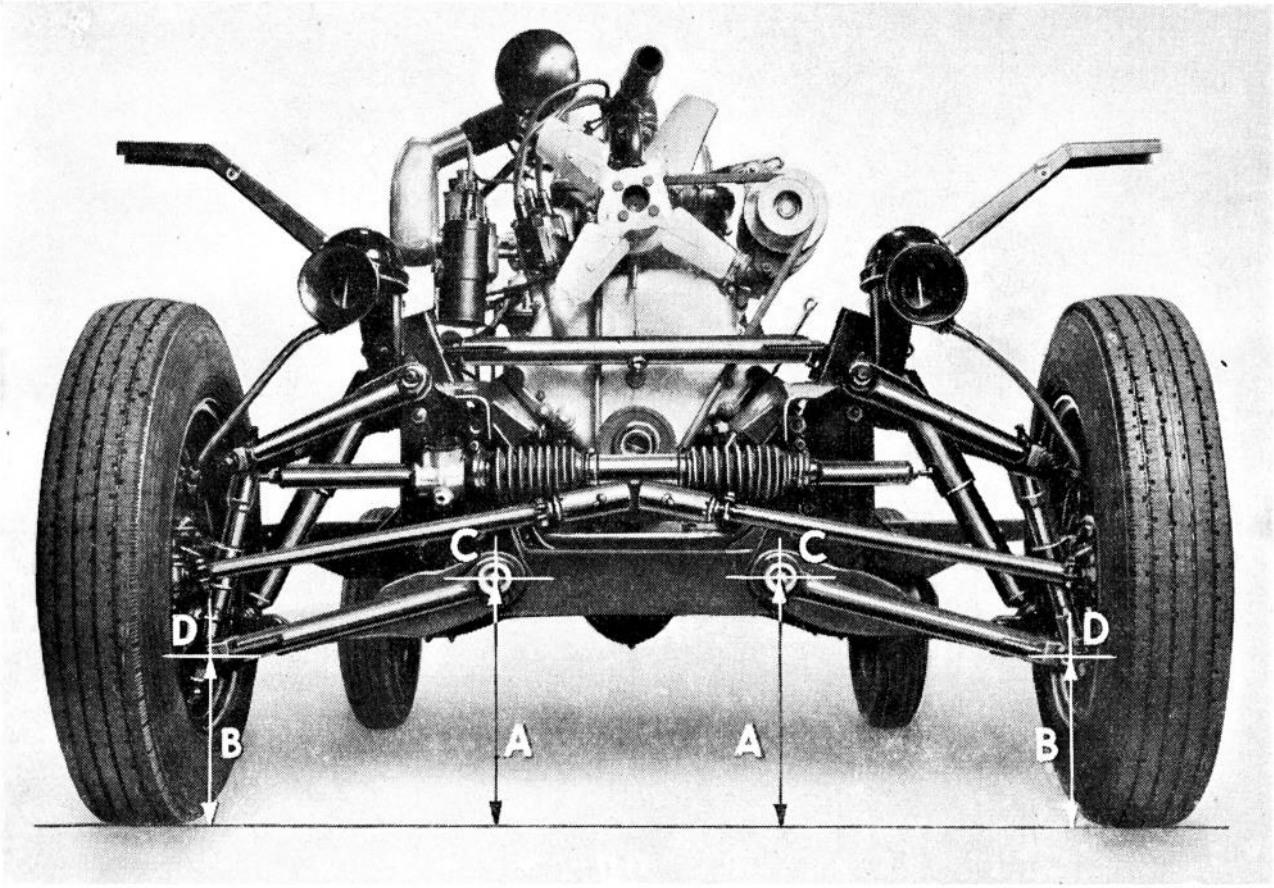
Adjusting the " Torsionic " Front Suspension

The following should receive attention at regular intervals, and particularly during the early stages of the car's life.

With the car resting on its wheels, the tyre pressures should be verified and, if necessary, set to the pressures recommended on page 4. The torsion bars should then be adjusted as indicated below, and the track checked. Checking of the track should be carried out at hub level at three different points on the wheel rims. This will allow for manufacturing limits on the wheels.

Setting the Torsion Bars

Dimensions at " A," in the illustration below, should be 1½ in. (38.1 mm.) more than dimensions at " B," measurements being taken from the centres of attachments " C " and " D " to level ground.



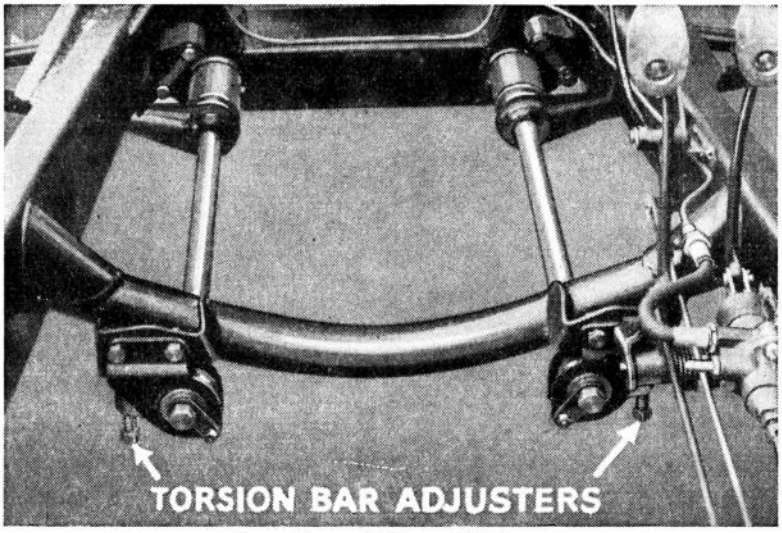
If this difference in height is less than 1½ in. (38.1 mm.) the dimensions must be increased, the procedure being as follows :—

The front of the car must be jacked up until the wheels are completely clear of the ground ; the weight of the car will then be removed from the suspension gear. This point is very important, and on no account must any attempt be made to increase the dimensions at " A " with the weight of the car on its front wheels.

The adjusters at the rear ends of the torsion bars should now be screwed IN to effect the necessary alteration in height between " A " and " B."

The car must now be lowered on to its road wheels again and the springing allowed to settle by rocking the front end up and down a few times. Dimensions " A " and " B " should now be re-checked.

If the difference between " A " and " B " is now greater than 1½ in. (38.1 mm.) there is no need to jack the car up again in order to decrease this dimension. It is only necessary to screw the adjusters OUT until the correct measurement is obtained.



Location of the adjusters.

Important Note

The track should be set parallel (i.e. no " toe-in ") with the struts set with a difference of $1\frac{1}{4}$ in. (31.75 mm.) between dimensions "A" and "B." Then each adjuster should be screwed in until the $1\frac{1}{2}$ in. (38.1 mm.) setting is obtained. This will mean approximately $1\frac{1}{3}$ turns on each adjusting screw. No further adjustment to *track* should be made after setting at the $1\frac{1}{4}$ in. (31.75 mm.) dimension.

Steering Gear

The steering mechanism fitted to the " Torsionic " front suspension is of the horizontal bar gear type.

The inner steering column is positioned by means of splines, circlip and a screwed collar.

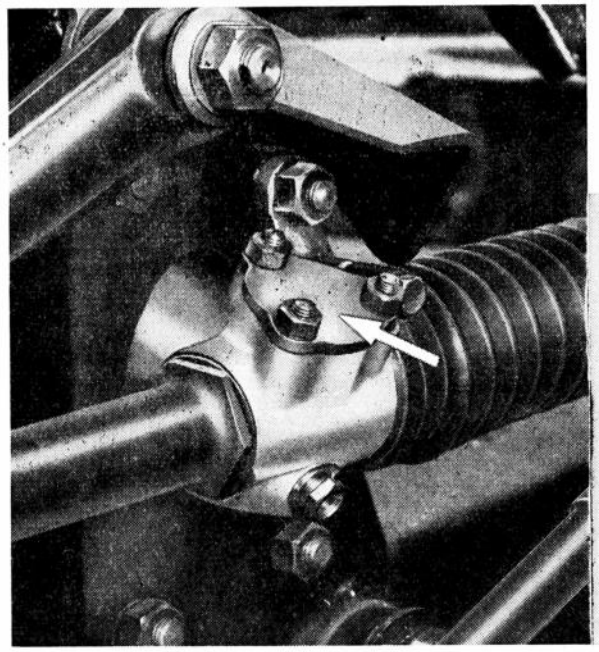
The steering gearbox is made of aluminium and houses a small pinion and integral shaft carried in taper bearings. This pinion is adjusted for position by means of shims of different thickness under the top bearing cap.

Running at right angles to this shaft and pinion is the housing for the horizontal bar gear, the gear itself being held in suitable bearings.

Pressure on the bar gear is applied by a spring-loaded plunger in order to eliminate backlash between the two gears.

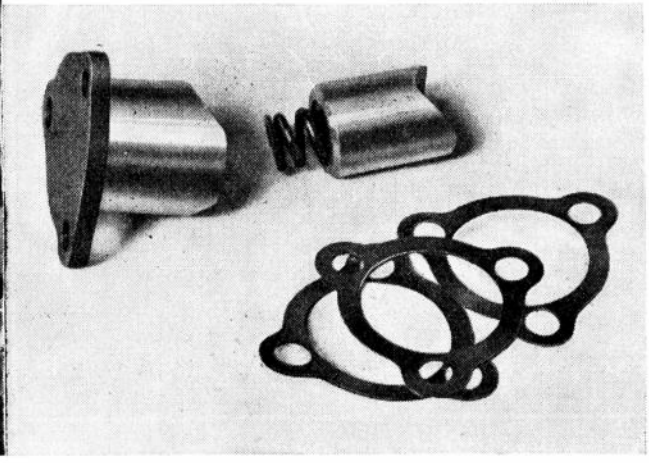
At either end of the steering unit are set screws and locknuts which control the turning circle of the car.

Lubrication of the steering gearbox is effected by removing the cover shown in the illustration and inserting grease as the steering is turned from lock to lock. This greasing should occur each 30,000 miles or 48000 km.



Left.—The arrow indicates the plunger housing, which must be removed prior to greasing the steering gear.

Below.—This photograph shows the plunger housing, spring-loaded plunger and packing shims used on the steering gear.



Jacking System

There are four jacking points on the car. They are located under the over-riders at front and rear. Square-section tubes welded directly to the chassis are used to accommodate the special Riley jack, rubber plugs being inserted in the ends of the tubes when the jack is not in use.

Shock Absorbers

The front absorbers are of the hydraulic ram type and are situated between the outer end of the lower tubular struts of the front suspension and the side of the box section front members. They are of the sealed type and require no maintenance.

Those at the rear are of the new Luvax-Girling hydraulic type, being securely attached to the chassis and connected by means of linked rubber-bushed actuating arms to the rear axle casing.

Occasionally the rear dampers may need topping up, and this should be done with the Luvax-Girling Fluid. To ascertain whether a damper needs topping up, the actuating arm should be disconnected from the rear axle and the arm moved through its full travel; if the resistance is erratic the damper needs topping up, but if a uniform resistance is felt, no attention is necessary.

When adding fluid to the damper, move the arm back and forth so that all air may be expelled, also make perfectly sure that no dirt enters the filler.

Rear Axle

Removing or adjusting the rear axle is an undertaking for your Riley agent, and it is not proposed to give a detailed description in this book. A good general impression of the rear axle will be obtained from the sectional drawing.

The rear axle and its component parts are of sturdy construction, and as a further strengthening medium two tie rods are placed between the torque tube and rear axle casing.

No trouble should be experienced as long as the recommended lubrication is carried out.

Exhaust System

Between the engine manifold and the main silencer a short length of flexible pipe is interposed; this is done to eliminate unnecessary stresses in the manifold and exhaust pipe due to movement of the flexibly-mounted engine.

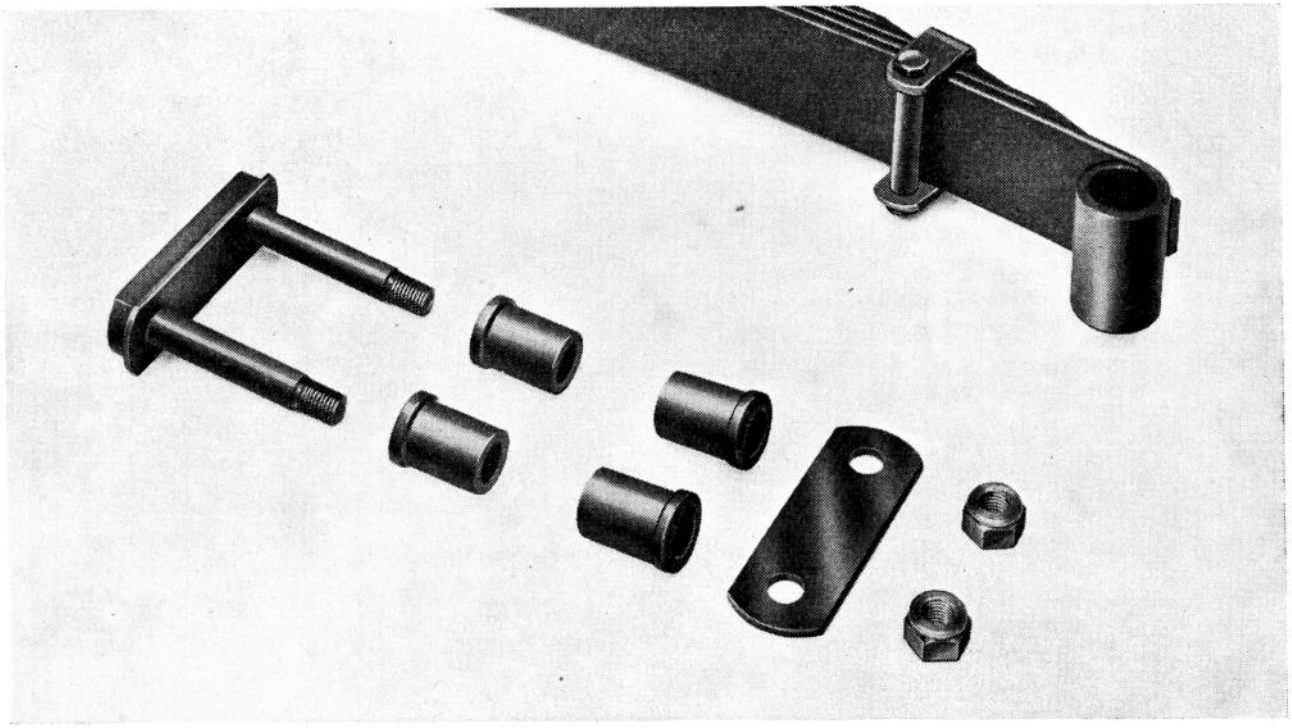
From the engine the pipe leads to the main silencer, which is of large diameter and over 40 in. (101.6 cm.) long, the second silencer is connected by means of a short length of pipe to the first, and finally the exhaust gases escape to the atmosphere at the rear of the car.

Great care is taken to prevent the leakage of exhaust gases, and the complete system is flexibly mounted to eliminate vibration and its attendant rattles and wear.

Rear Springs

The rear springs are of sturdy construction and are attached to the chassis by special shackles. The shackle attachment bolts are provided with a special type of self-locking nut, this consequently eliminates the use of split pins.

The shackle bolts are mounted in special rubber bushings, which require no lubrication. The springs are not clamped absolutely rigidly to the rear axle casing, but a very limited amount of movement between the clamp and axle case is allowed.



Details of a rear shackle. Note rubber bushings which require no lubrication.

Mounting of Power Unit

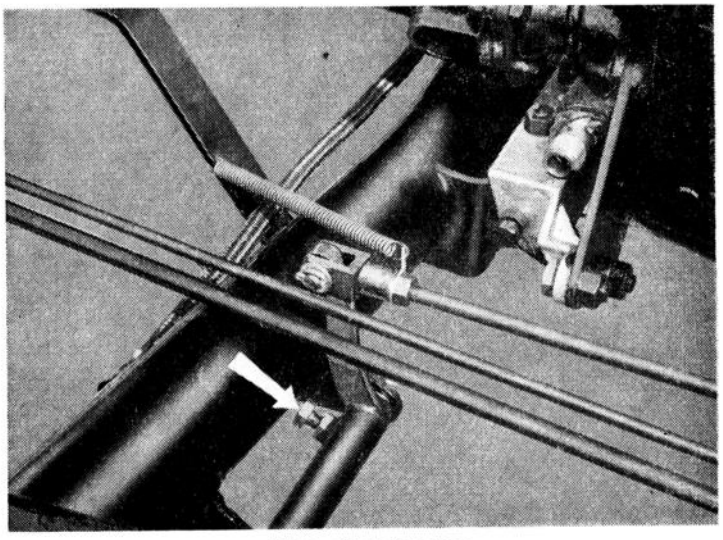
The engine and gearbox are mounted as a complete unit on three points. At the front there are two mountings, one either side of the timing case and securely attached to engine and chassis. At the rear there is a single mounting, attachments being provided on the gearbox and a chassis cross member. Short lengths of steel cable are used at front and rear to prevent excessive movement of the unit.

Clutch Adjustment

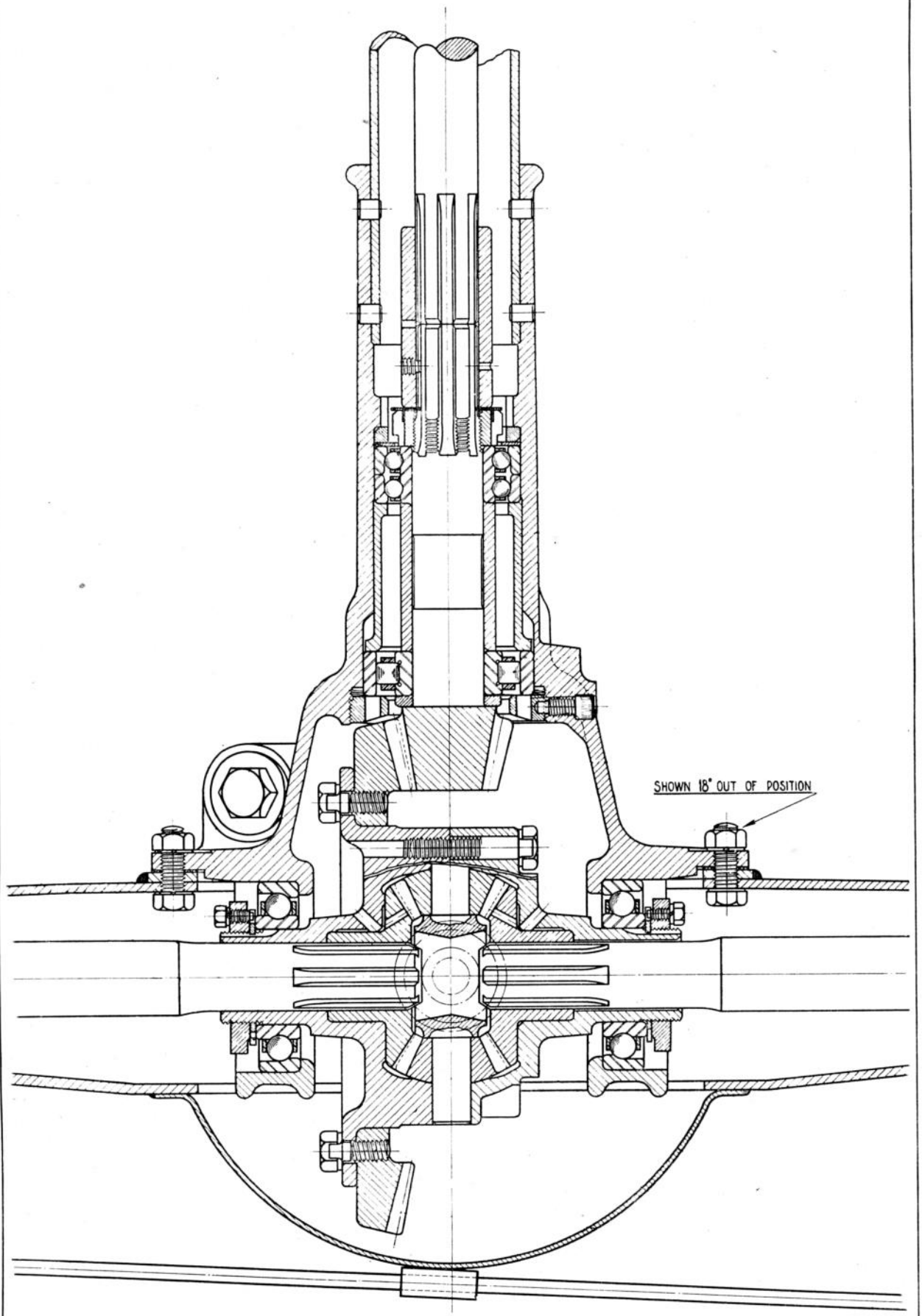
If trouble is experienced due to the clutch spinning after the linings have settled down during the running-in period, the method to obviate this trouble is to obtain the correct working clearance between the clutch release lever plate and the graphite release bearing (parts 7 and 10 on page 39).

This clearance is $\frac{1}{16}$" (1.59 mm.) or $\frac{3}{4}$" (19.05 mm.) of free movement at the pedal.

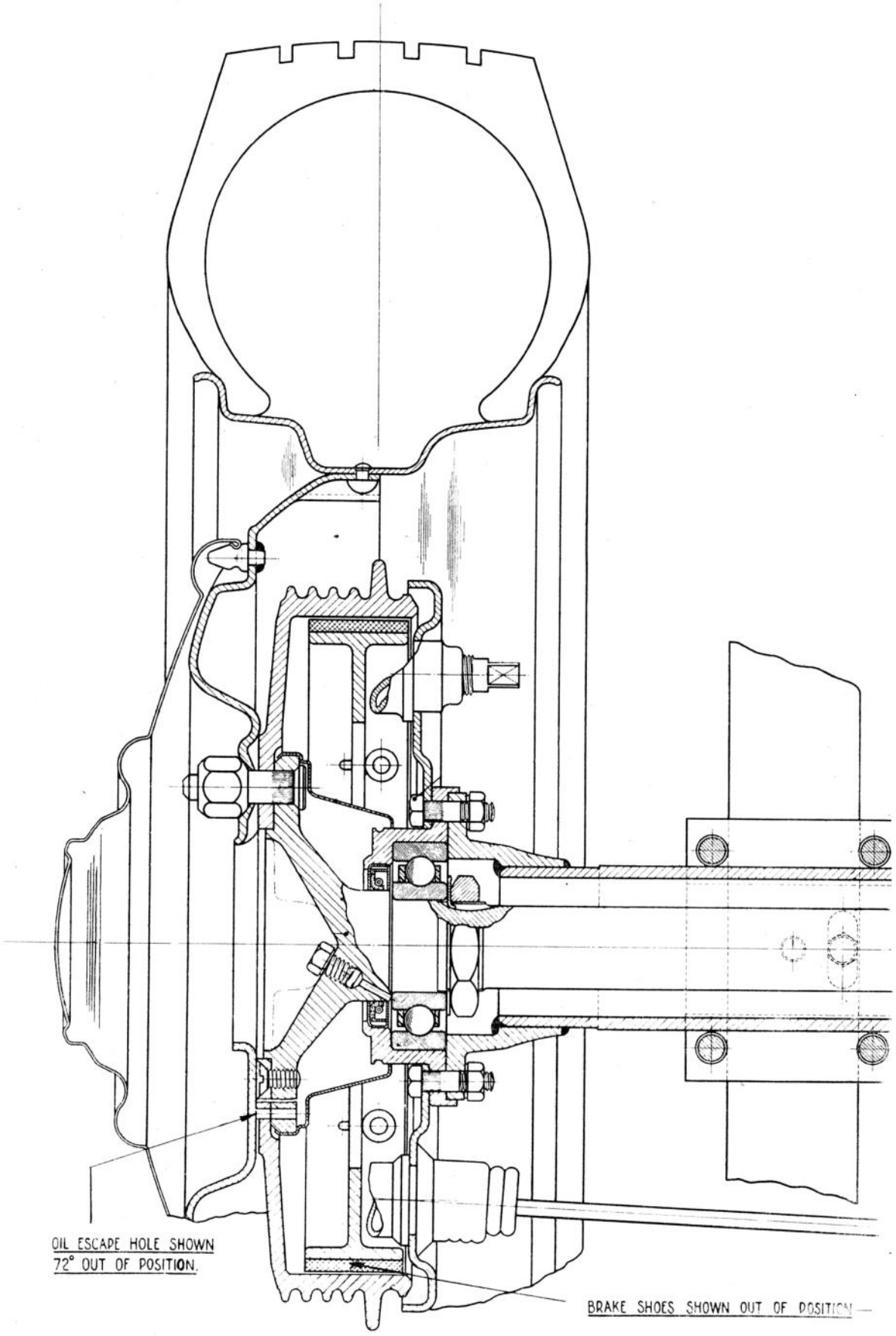
The clutch stop, shown on the right, should then be set so that, after the clutch is completely withdrawn, there is a further movement of $\frac{1}{2}$" (12.70 mm.) at the pedal.



The clutch stop.



Sectional drawing of the differential assembly.



Section of a rear wheel bearing and brake assembly.

Braking System

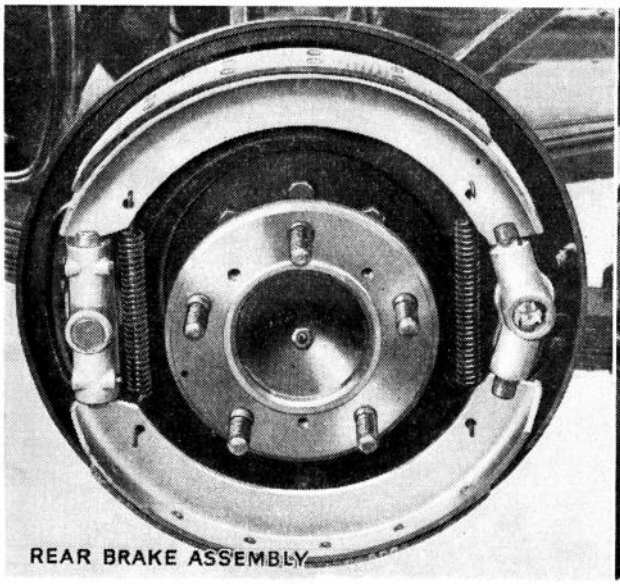
The brakes are of the Girling hydro-mechanical type, being operated by mechanical means at the rear and hydraulic means at the front.

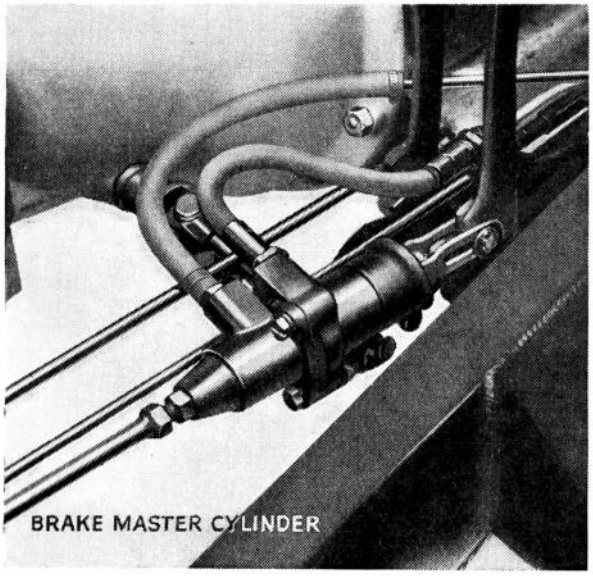
These brakes give a firm progressive action and by reason of their design an even greater degree of safety than on the previous braking systems.

In the master cylinder of the hydraulic system there is an internal stop which is set to permit a full hydraulic travel to the front brake plungers. Should there be an hydraulic failure in the system, the piston in the cylinder contacts an internal stop and the mechanical operation of the rear brakes is maintained.

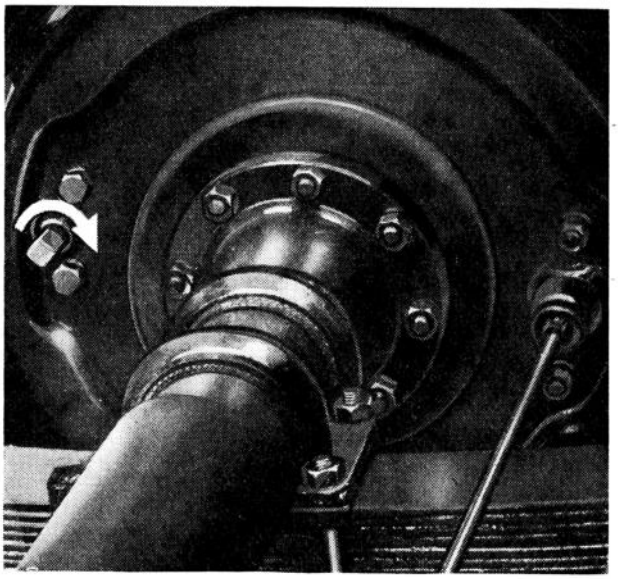
The stop for the rear brake lever is so arranged and set to permit full travel of the rear brake plungers. In the event of a mechanical failure in the system the lever contacts the stop and the hydraulic operation of the front brakes is maintained.

The system is so arranged that when a pressure is applied to the brake pedal the hydraulic part of the system comes into operation immediately, this is followed very rapidly by automatic operation of the mechanical part of the system. The brakes are so designed that a greater amount of braking force is applied to the front wheels than to the rear wheels.





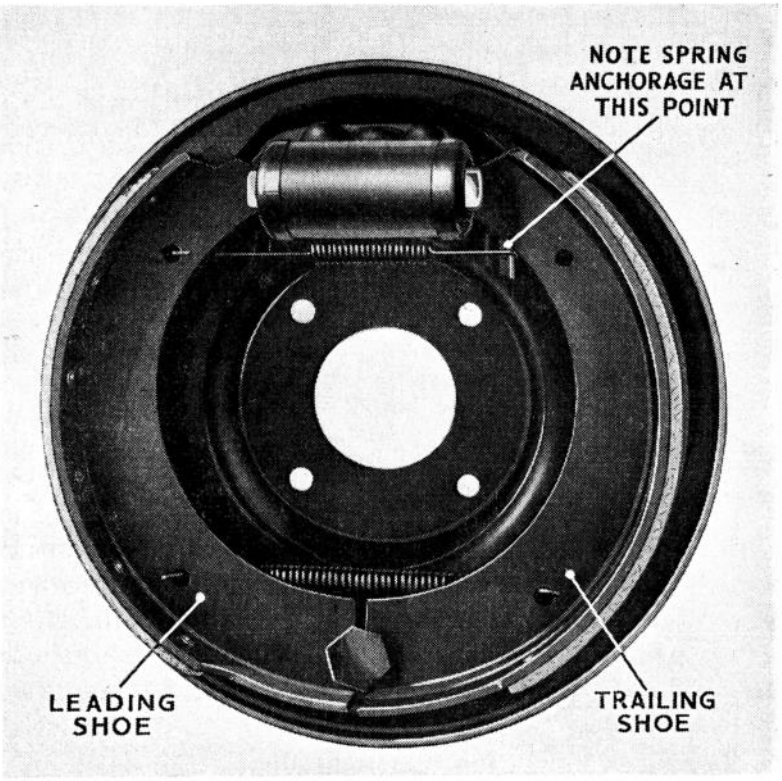
The brake master cylinder.



Rear brake adjuster.

The hand brake operates only on the rear wheels and the operating mechanism by-passes the hydraulic part of the system.

A good general impression of the layout of the braking system will be gained from the illustrations. (Pages 36–37.)

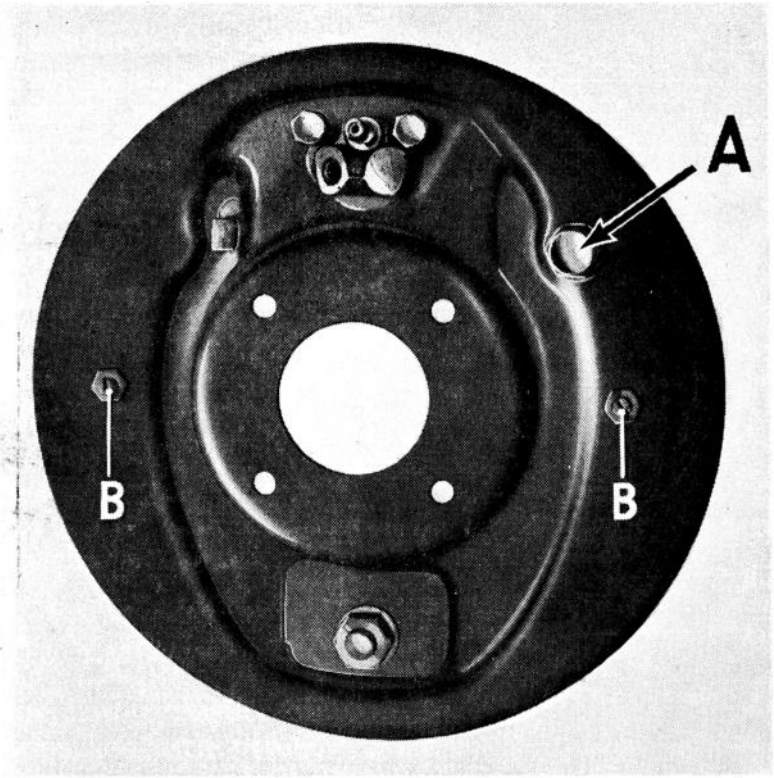


This view shows the two brake-shoes. Note method of spring attachment.

Maintenance of the Brakes

Maintenance has been reduced to the minimum, but the following points should be carefully noted.

1. Check, and if necessary top up, the contents of the hydraulic reservoir which is situated on the engine bulkhead. Only the recommended fluid should be used.
2. Occasionally check unions for tightness and hoses for wear in the hydraulic part of the system.
3. Oil link pins and other joints in the mechanical part of the system.
4. Make sure that the attachment between the master cylinder and the brake pedal is free, because it is essential that no binding should take place at this point, due to the fact that the master cylinder piston, after each application of the brake, must be allowed to return unassisted by the brake pedal return spring. If this is not done the brake operation will be poor.



Brake-shoe adjuster A is shown in this photograph, together with level screws B.

Brake Adjustments

Rear : Starting at the rear wheels, it will be noted that on the inner face of the brake back plate there is a square-headed adjuster which must be screwed in until an

appreciable resistance is felt. This means that the brake-shoes have been expanded against the brake-drums. The adjuster must now be screwed out to the nearest flat and the drum checked for binding. This is the only adjustment that is necessary on the rear brakes, and on no account must any adjustment be made to any of the tie rods or links in the system.

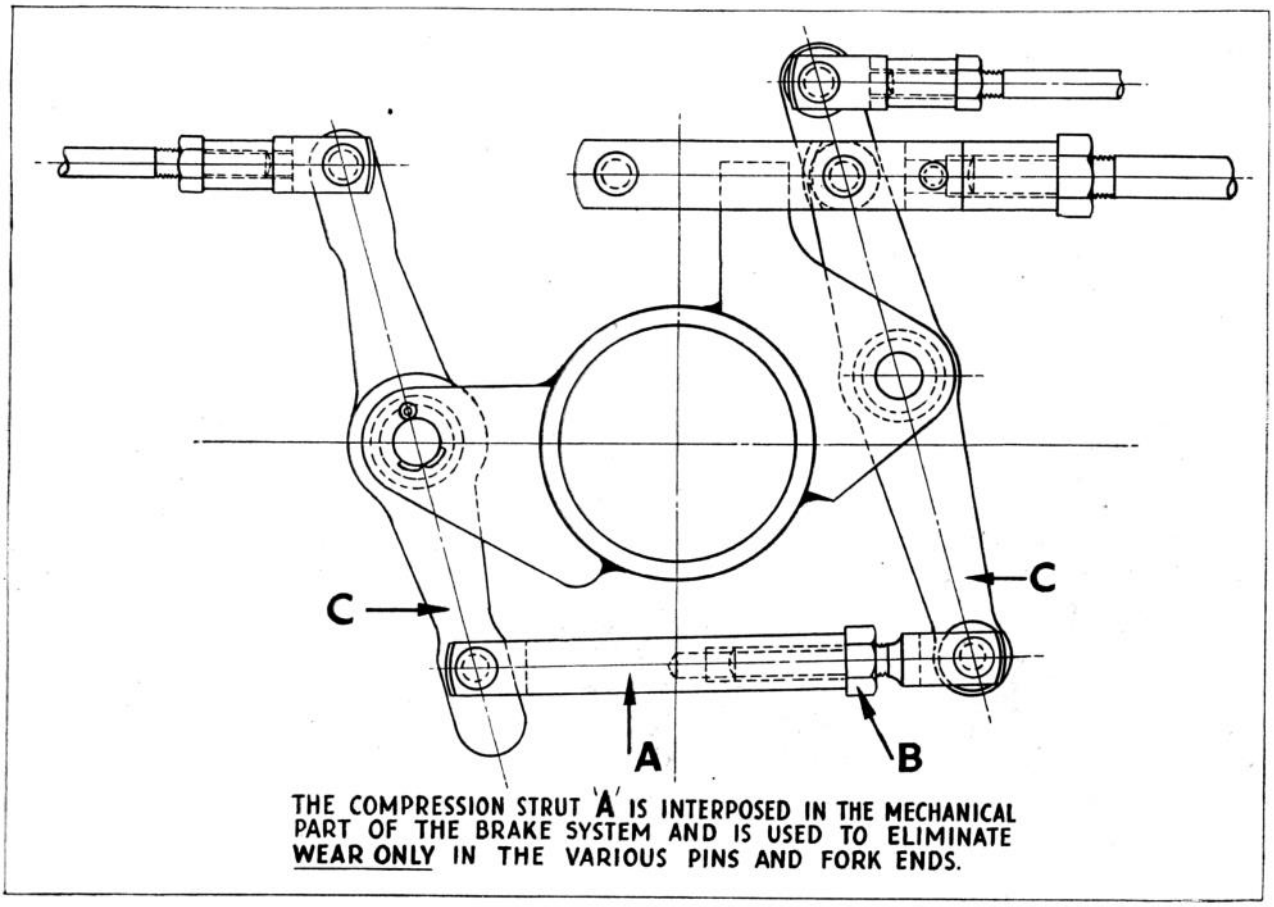
Front : There is only one adjusting screw acting on the leading shoe. Turn the adjuster " A " (page 34) in the direction of wheel rotation until a definite resistance is felt, then turn the screw in the reverse direction until no trace of binding exists.

The two screws " B " (page 34), held by locknuts, are used to prevent slight tilting of the brake-shoes under operating conditions.

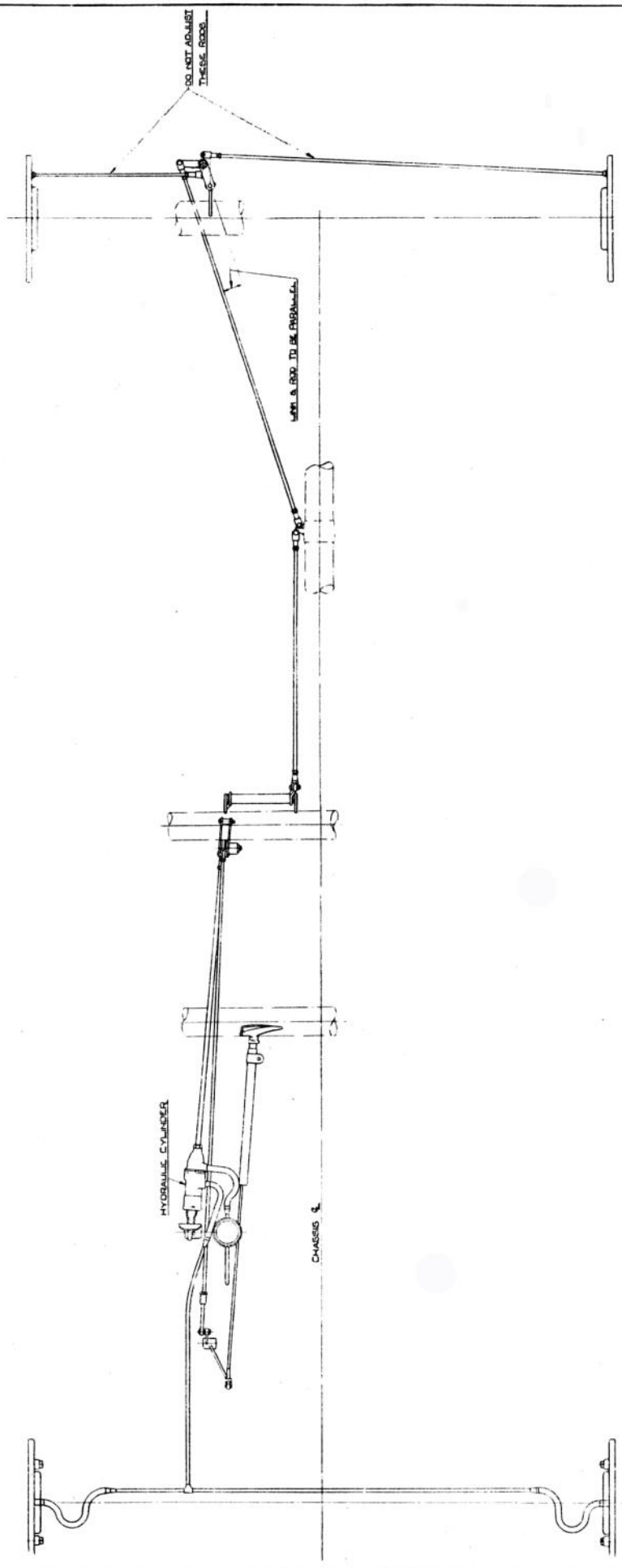
Taking up Wear in the Brake Linkage

A special feature of the Riley braking system is a method whereby the very slight amount of wear that takes place in the brake link pins may be taken up. This is done by means of the small link " A " in the rear brake system (see illustration). It must, however, be stressed that the **only object** of this adjuster is to take up **wear** in the various pins and links in the system. The procedure is as follows :—

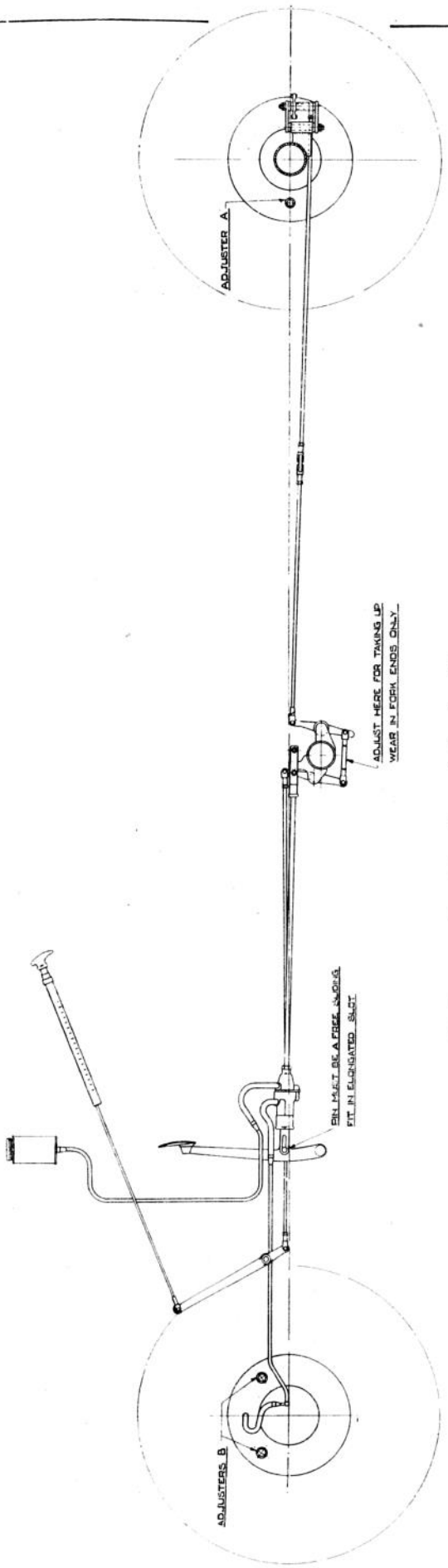
Slacken off the locknut " B " and remove one of the pins at the adjuster ; then, with the fingers only, hold the two lever arms " C " apart, thereby taking up any wear, and adjust the fork end until the holes in the fork end and lever arm are in line. The pin should then be inserted and locked in position. Finally the locknut should be tightened.



The adjuster for taking up wear in the brake linkage.



This is a diagrammatic plan view of the Girling hydro-mechanical braking system. The only method of adjusting the brakes is at the brake-drums. No brake adjustments should be effected at any of the rods in the system.

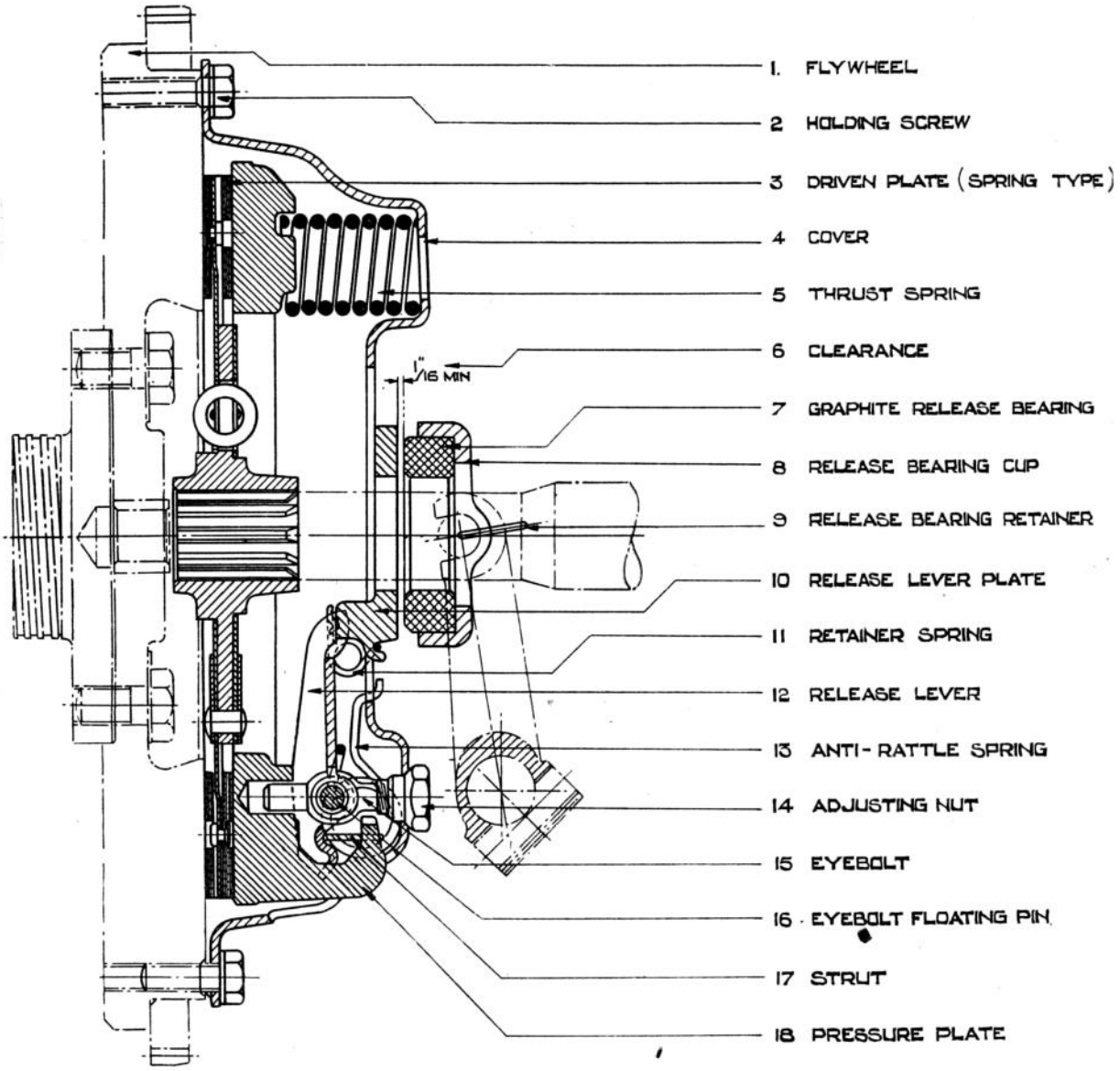


Diagrammatic side view of the braking system.

The Clutch

The drive from the engine is transmitted to the transmission system by a dry plate clutch, the following being details of its construction. The clutch is of the single-plate disc type, no adjustment for wear being provided in the clutch itself.

An individual adjustment is provided for locating each lever in manufacturing, but the adjusting nut is locked in place by means of a split pin and should never be disturbed, unless the clutch is dismantled for replacement of parts.



Section of the clutch.

A graphite release bearing (7) is used, mounted in a cup attached to a throw-out fork, and a release plate (10) is attached to inner ends of release levers (12) and is pivoted on a floating pin (16), which remains stationary in the lever and rolls across a short flat portion of the enlarged hole in the eyebolts (15). The outer ends of the eyebolts extend through holes in the clutch cover and are fitted with adjusting nuts (14) by which each lever is located in correct position. The outer or shorter ends of the release levers engage the pressure plate lugs by means of struts (17) which provide knife-edge contact between the outer ends of the levers and pressure plate lugs, so eliminating friction at this point. Thus the pressure plate (18) is pulled away from

the driven plate (3), compressing the several small coil springs (5) which are assembled between the pressure plate and the clutch cover (4).

When the gear is engaged and the foot pressure is removed from the clutch pedal, the clutch springs force the pressure plate forward against the driven plate, gradually and smoothly applying the power of the engine to the rear wheels.

As the clutch facings wear, the pressure plate moves closer to the flywheel face and the outer or shorter ends of the release levers follow. This causes the inner or longer ends of the levers to travel farther towards the gearbox, and decreases the clearance between the release lever plate and the release bearing. The effect on the clutch pedal is to decrease the clearance or free travel. Some free movement must always be maintained to prevent clutch slip. This free movement is restored by adjusting the clutch pedal, and there should be $\frac{3}{4}$ in. (19.05 mm.) of free or " lost " movement at the pedal before pressure on the release mechanism is felt, this resulting in $\frac{1}{16}$ in. (1.59 mm.) clearance between the release lever plate and the clutch withdrawal thrust bearing.

The Gearbox

From the clutch already described the drive is transmitted to the rear wheels through the gearbox. It is doubtless already known that the box contains four forward gears and a reverse gear.

Neutral position is in the centre, in which position the engine turns the gearbox primary shaft, but no gears are engaged and the car consequently remains stationary.

To move off from stationary after starting the engine, the driver should depress the clutch pedal fully, holding it in this position with the foot whilst moving the gear lever into the first gear position. The gear should engage without force; if any difficulty is experienced, move the lever back into neutral and momentarily lift the foot from the clutch. Then again depress the pedal and select first gear as described previously. The hand brake should then be released and the clutch pedal gradually let up, the engine simultaneously being gently accelerated with the right foot on the accelerator pedal. The car should then move smoothly away from rest.

As soon as the car is properly in motion it is advisable to change up into second gear. The second, third and top gears are all fitted with synchromesh, as a result of which gear changing is rendered perfectly simple.

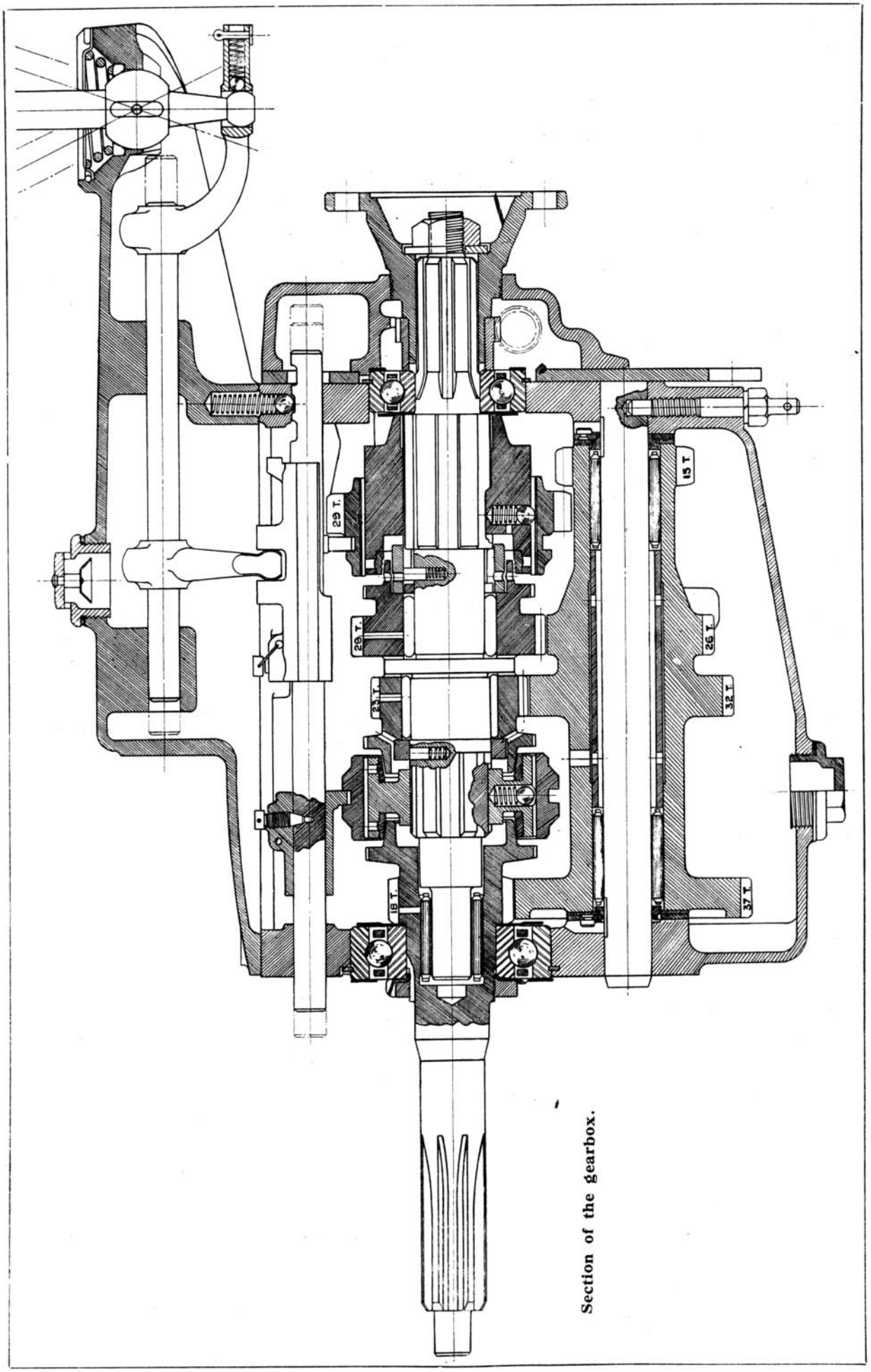
To change up into any of these gears from the next lower gear, just depress the clutch pedal, momentarily ease the accelerator pedal and at the same time move the gear lever into neutral, pausing slightly to enable the synchromesh to balance the speed of the engaging gears before pushing it into the desired gear position, allowing the clutch pedal to rise and again accelerating.

(Actually a slight resistance is felt between neutral and the engaged position in second, third and top gears. This indicates the position at which the synchromesh clutch engages, and the pause should be made against this resistance to ensure that the synchromesh properly engages.)

Reverse gear is to the rear and the extreme right of the box, and care should be taken when changing from third to top to avoid forcing the gear lever into reverse position. This is guarded against by fitting a special spring, the extra tension of which has to be overcome before reverse gear is selected.

Always ensure that the car comes to complete rest before engaging a gear which will change its direction.

When changing down, the order is to some little extent reversed, in that it should be borne in mind that after depressing the clutch pedal the engine should be speeded up a little before the lower gear is engaged.



Section of the gearbox.

On the few occasions when it is desired to change down from second to first, the clutch pedal should be depressed, the engine speed being maintained or slightly increased before moving the lever into first gear position and releasing the clutch.

For this change only should " double declutching " be beneficial. The novice should take an opportunity to have this demonstrated by the Riley Dealer, as it requires a little practice.

When descending a hill that is known to be steep it is advisable to slow down and change into third or even second gear before the descent is commenced. This will result in the impetus of the car driving the engine, the latter thus acting as a brake.

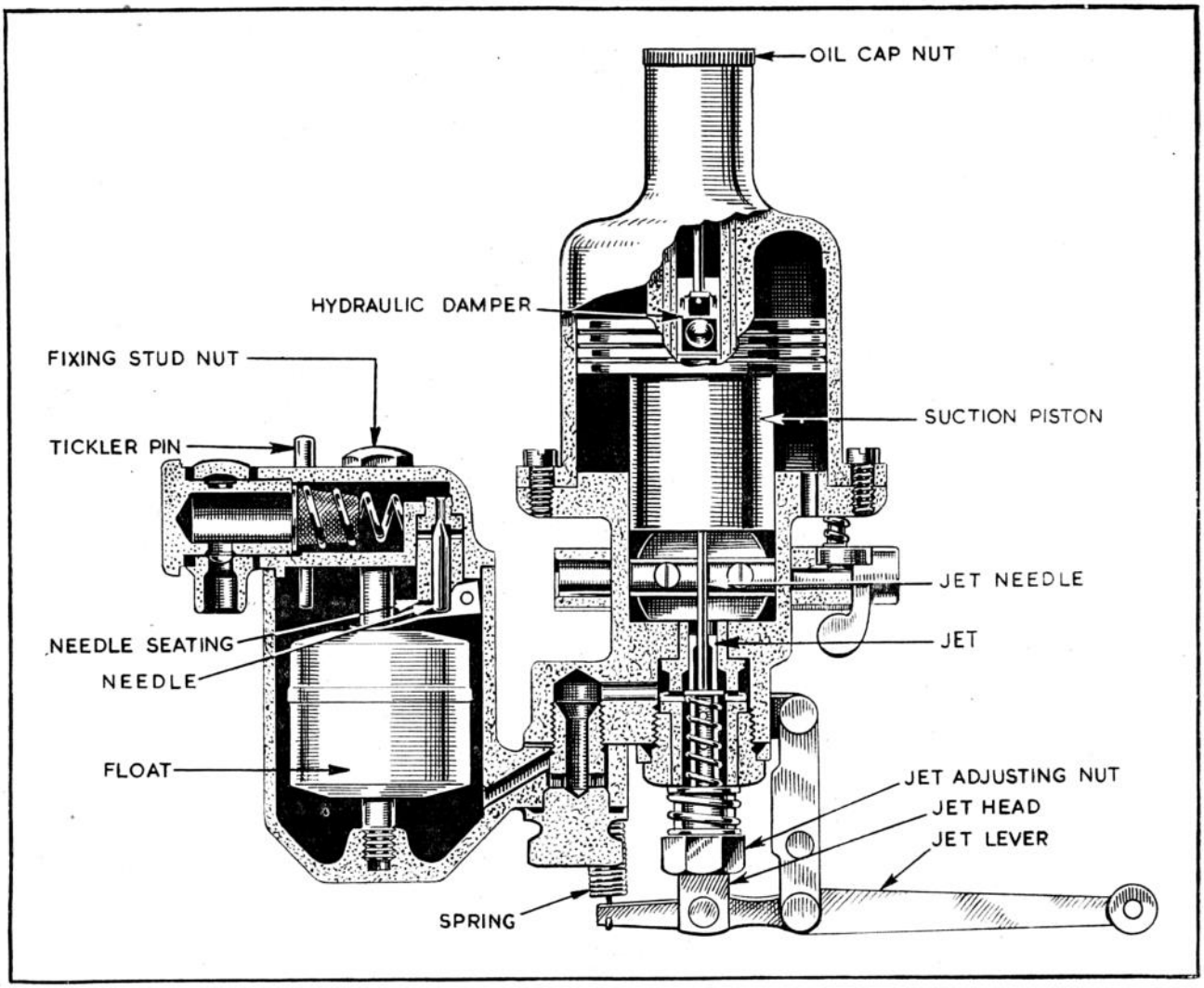
On no account should hills be descended in neutral or with the clutch pedal depressed. Such practices will cause unnecessary wear on the brakes and clutch withdrawal mechanism.

The S.U. Carburetter

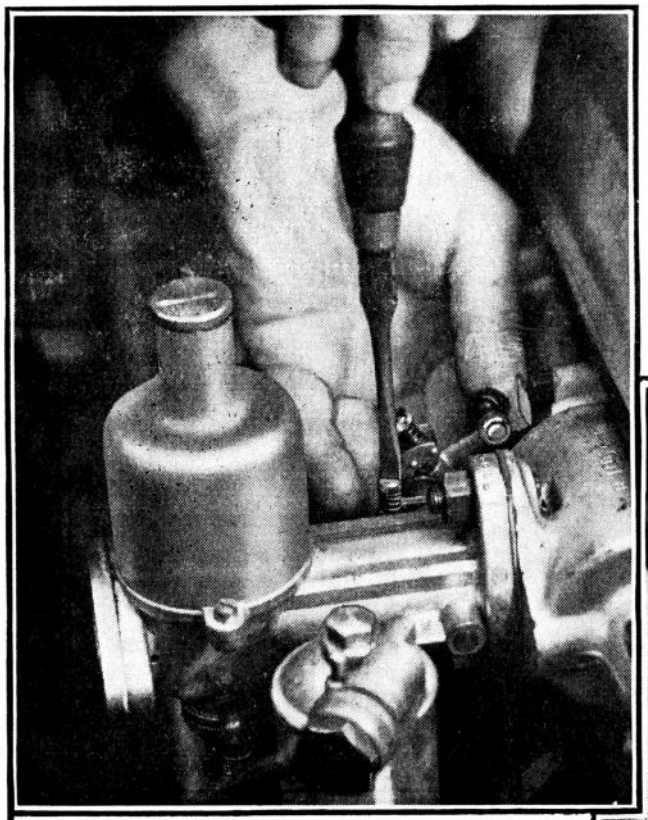
Type H.2

The tuning of the S.U. is very simple if it is understood that the jet is of a standard size. The **only** adjustment possible is fitting the right size needle and the setting for the correct idling speed. **No** other adjustments are provided.

Should you suspect the carburetter of causing trouble, after giving good results, do not change the needle, for this cannot be the cause of the trouble.

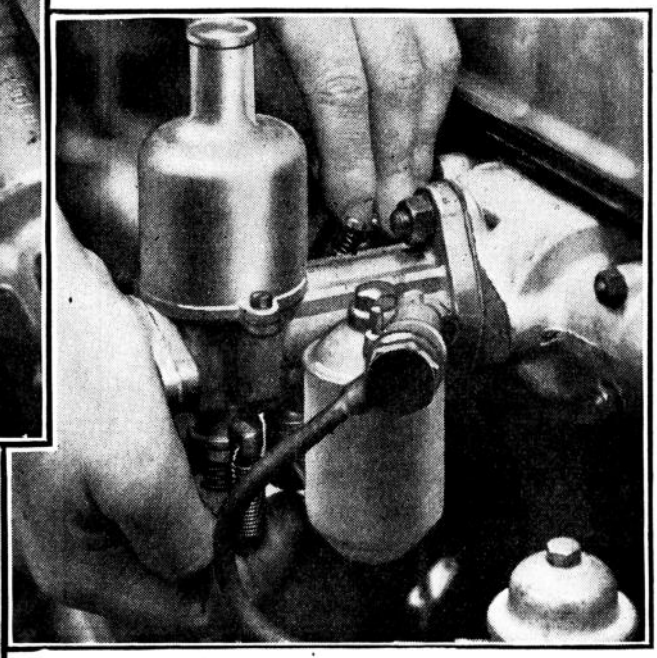


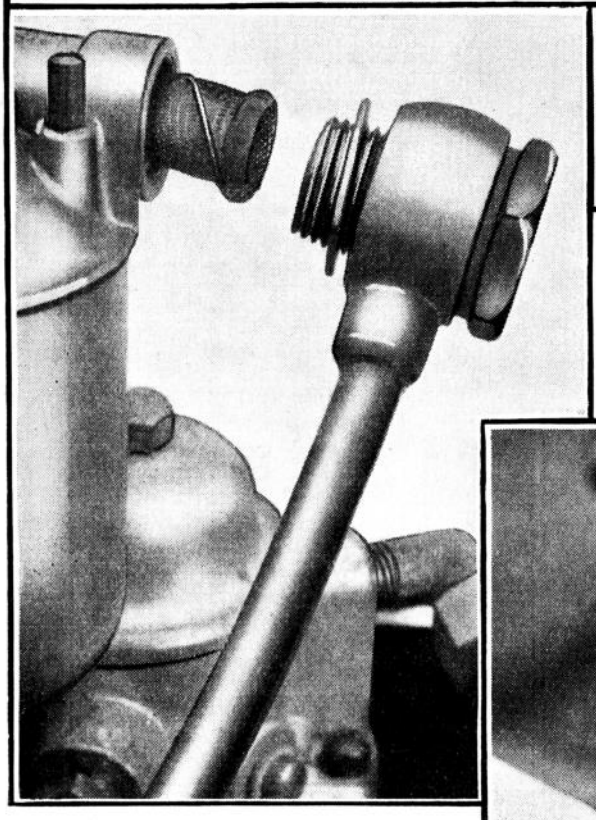
Section of the carburetter.



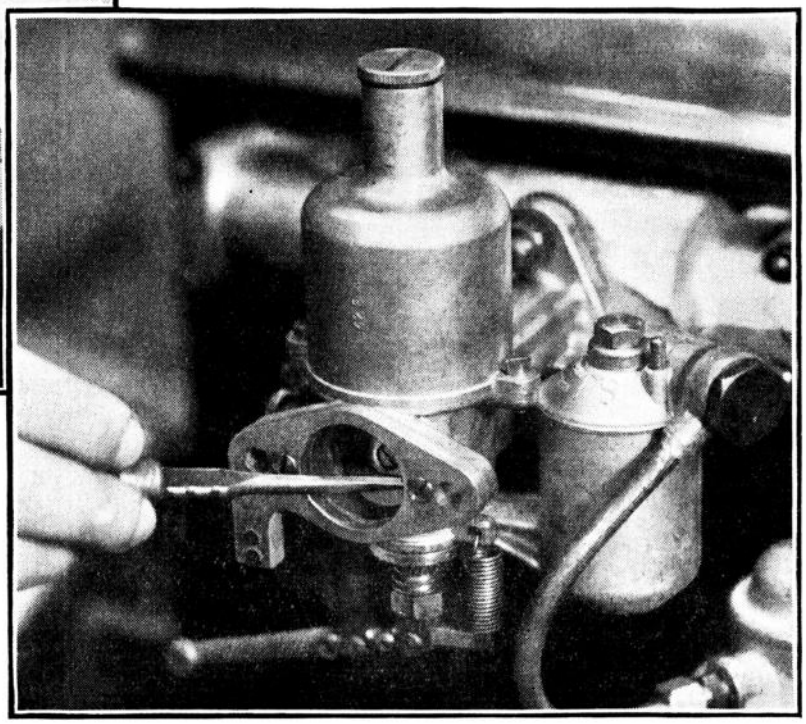
Left.—Setting the slow running by means of the adjusting screw on the throttle control at the carburetter.

Below.—Clearing the main jet by closing the air intake and opening the throttle.





Left.—Shows the carburetter filter assembly. Note the correct positioning of the filter and spring. Make sure that the washers are perfectly clean when reassembling.



Right.—Checking the piston for freedom of movement. If the piston fails to fall by its own weight, adjust the carburetter as explained in the text.

The correct way to adjust the carburetter is to set it correctly at its idling speed. The carburetter is then set throughout its range. This adjustment is made by means of the jet and the jet adjusting nut; in other words, the position of the jet is altered relative to the needle.

The engine should run as evenly as possible, and the exhaust note is a very good indication of this. If the exhaust has a constant uneven note (called " hunting ") a rich mixture is indicated. If the exhaust note is irregular, a weak mixture is indicated.

If this idling adjustment is not made, consumption and performance will not be up to standard.

Adjustment

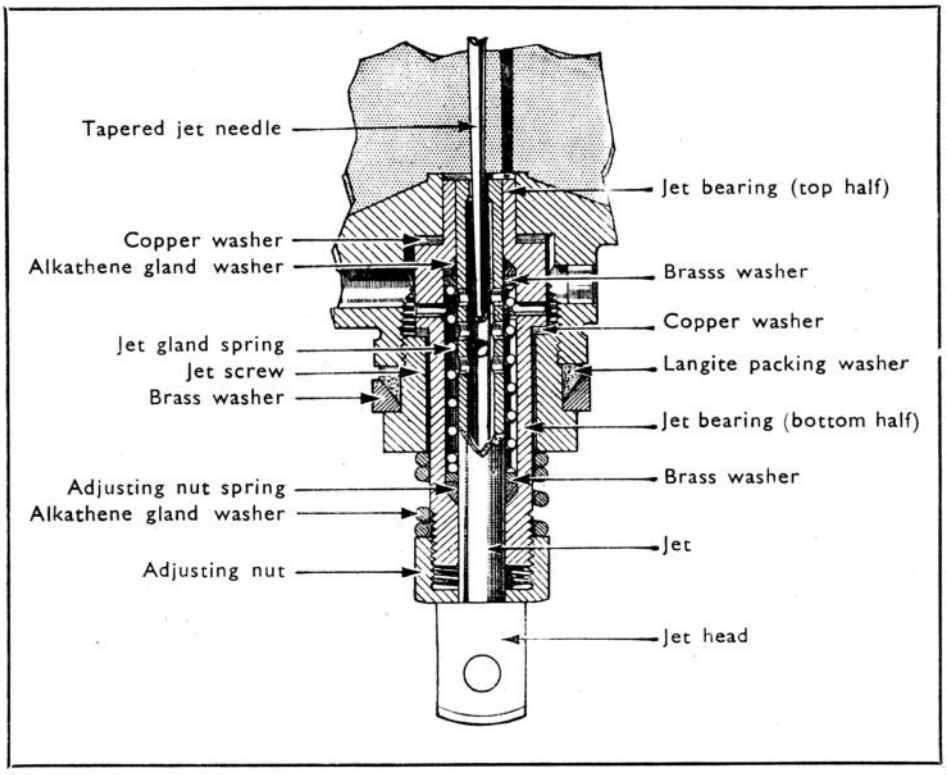
The carburetter should be set when the engine has attained its normal working temperature, and the way to do this is to adjust the jet **up** to a weak mixture position and then screw the jet adjusting nut down until the idling speed is correct.

A simple way to check for a rich mixture is to raise the piston $\frac{1}{32}$ in. or 1 mm. when the engine is idling. If the engine speed increases, the mixture is too rich, and the jet must be screwed **up.**

CARBURETTER TROUBLES

1. Sticking Piston

This should be checked by lifting the piston with a screwdriver and allowing the piston to fall to its original position; if the action is sluggish or erratic, the assembly should be removed and carefully cleaned. A small amount of thin oil should then be applied to the **piston rod only** and the carburetter reassembled.



Section of the S.U. jet assembly.

2. Water or Dirt in Carburetter

When this condition is suspected, the following is the routine to be employed.

(*a*) Lift piston.
(*b*) Depress tickler to flood carburetter.

(*c*) Watch jet.

(*d*) Observe flow of petrol through the jet. If the flow of petrol is poor, the jet is blocked, so :—

(1) Start engine.
(2) Open throttle.
(3) Close air intake.
(4) Keep throttle open until the engine speeds up.

If the above procedure does not cure the trouble, the jet should be removed and cleaned.

Careful consideration of the following notes on the refitting and centring of the jet will ensure that this is carried out correctly. If this is not done, the carburetter will give a poor performance.

The jet can be removed by unscrewing the jet holding screw, and as the jet is only slightly larger than the needle it will be obvious that great care must be taken in replacing the jet, particularly as the jet and needle must be concentric.

The following is the sequence for reassembly :—

(*a*) Screw jet adjusting nut to its top position.
(*b*) Move jet up until jet head is against adjusting nut.
(*c*) Refit complete jet with parts fitted as shown in the illustration.
(*d*) Check the piston for freedom of movement.
(*e*) If the piston is not free, the jet screw must be slackened and the procedure repeated. This may have to be done several times.
(*f*) Bring adjusting nut back to its original position.

3. Flooding of Float-chamber

This is generally due to dirt on the guide of the needle valve and can usually be rectified by depressing the tickler—this allows a flood of petrol to flow through the valve.

4. Float Needle Sticking

This will cause lack of fuel at the carburetter, and the needle should be removed and cleaned, together with the seating.

Tyres

HINTS ON CARE AND MAINTENANCE

Tyre Pressures

The importance of maintaining the correct tyre pressures cannot be too highly stressed, and the tyre pressures of your car should be checked and adjusted weekly. This adjustment of air pressure not only influences the wearing qualities of the tyres, but also vitally affects the running of the car and its behaviour when on the road. For example, an under-inflated tyre induces more friction between tyre and road and increases the rolling resistance. In other words, the car will not move so readily along the road. Thus it will be seen that under these circumstances the engine of your car will have more work to do for a given road speed, and petrol consumption will obviously increase.

Tyre pressures bear a direct relation to brakes, steering and comfort. For instance, if tyres are over-inflated, the springs, wheel bearings and the car generally will be subjected to unnecessary stresses, which will make themselves apparent as rattles, and eventually cause breakages.

Repairing Tubes

Have punctures or injuries vulcanised. Ordinary patches should be used only for emergencies.

Oil and Grease

Tyres should never be allowed to stand in a pool of oil, grease or petrol. Oil or grease may be removed from a tyre by the use of a rag moistened with petrol.

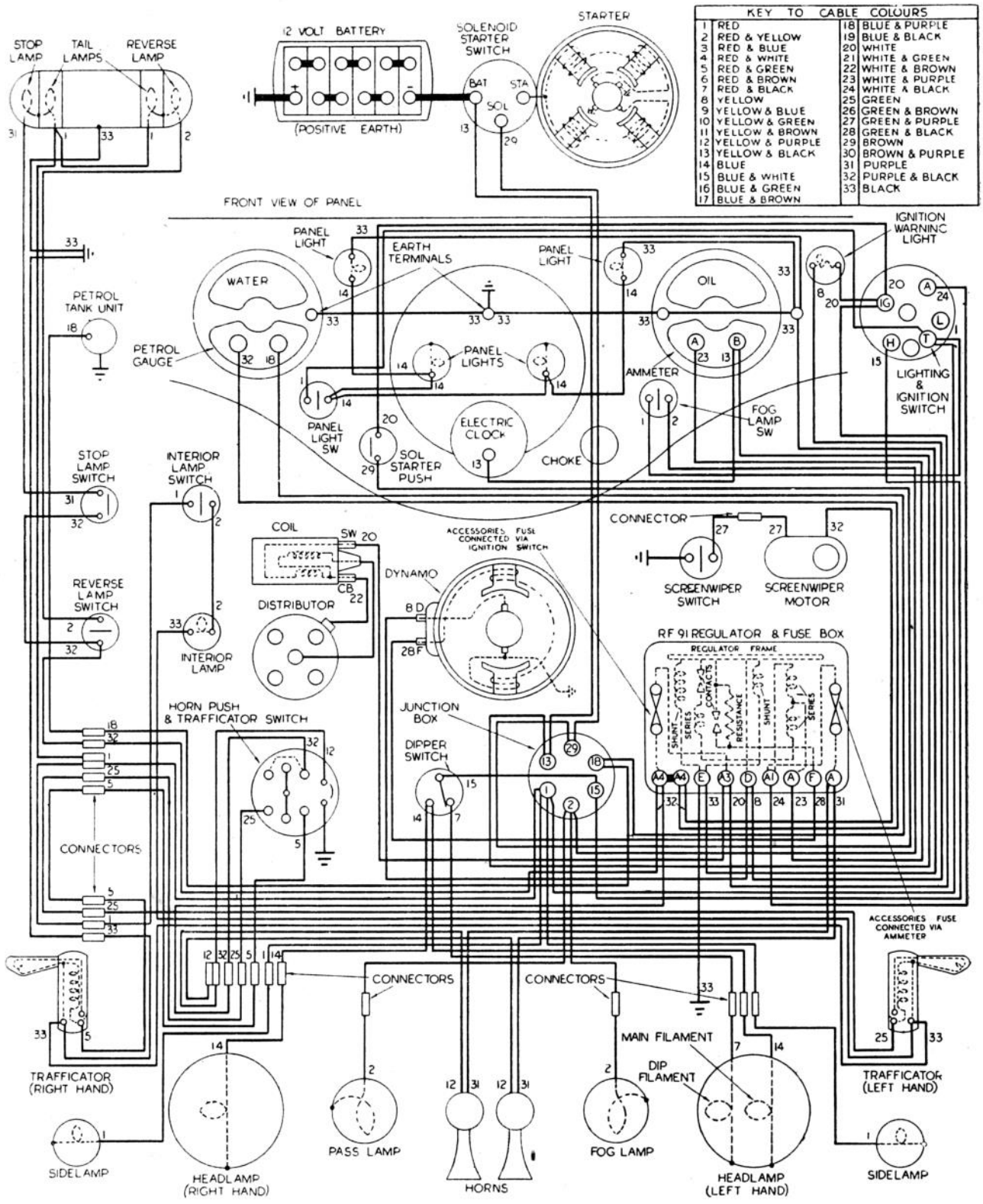
Tyre Wear

For various reasons, the wear of tyres on the four wheels seldom if ever takes place evenly and at the same rate ; the spare, in any case, is likely to deteriorate with age rather than wear. It is therefore a good practice periodically to change the wheels round, including the spare, thus ensuring even distribution of tyre wear and preventing the spare from being out of service too long. Additionally, it must be remembered that if the track of the front wheels is not set correctly, excessive and uneven wear may take place on the front tyres. Particular care is therefore necessary when adjusting the track as indicated on page 28.

Lucas Wiring Diagram

Below is a diagrammatic representation of the 12-volt electrical equipment fitted to your car. The various internal connections—for example, those in the voltage regulator unit—are shown dotted.

The numbers in the chart in the right-hand top corner of the diagram indicate the cable identification colours.



Electrical Equipment

In order that the Riley owner may be assured of service from the electrical equipment equally high in standard to that which he will expect from the remainder of the car, Lucas " Special Equipment " has been standardised.

This " Special Equipment " has been subject to special viewing and individual methods of assembly, and such running gear as the dynamo and starter have been given prolonged tests prior to being passed by the manufacturers.

The alignment of bearings, grade of brushes, and bearings of the brushes themselves, have all received more meticulous attention than in the case of the ordinary bench assembly unit, and the possibility of an electrical or mechanical failure has thus been obviated.

In addition it should be observed that Riley cars fitted with Lucas " Special Equipment " are entitled to receive special attention without charge at any Lucas Service Station during the twelve months following purchase, in accordance with the following summary :—

Examination and topping-up of battery ; checking over of dynamo output and, if necessary, readjustment to suit the individual requirements of the owner ; focusing and adjustment of headlamps and foglamps ; examination of wiring ; adjustment and cleaning of contact breaker points.

MAINTENANCE OF THE ELECTRICAL EQUIPMENT

Battery

A 12-volt, 58 amp./hour battery is fitted, and about once every month the cells should be topped up with distilled water to bring the level of the electrolyte to the top of the separators. Never use tap water, and never inspect with the aid of a naked light.

Terminals should be kept clean, tight and lightly smeared with vaseline. Occasionally the specific gravity should be checked with an hydrometer ; this normally is a job for the Lucas Service Agent, but should the owner desire to take the readings, the following are the indications to be expected, assuming the temperature of the solution to be 60° F. (15.6° C.) :

Specific Gravity	*State of Battery*
1.280 to 1.300	Fully charged.
About 1.210	Half charged.
Below 1.150	Fully discharged.

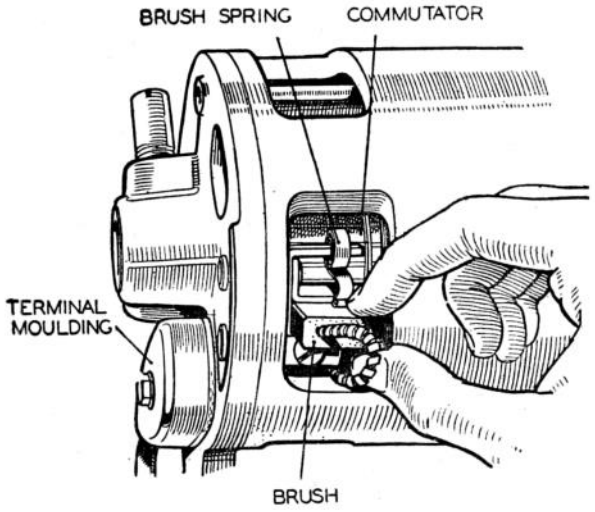
The readings of each cell should be approximately the same, and should they be different this indicates (1) that acid has been spilled, or (2) there is an internal short in the cell in question. In both cases the battery should be examined by the Lucas Service Agent.

The battery should never be allowed to remain in the fully discharged condition, as this leads to rapid deterioration.

Dynamo

This is designed to cope adequately with the charging of the battery under all conditions of load. During manufacture the dynamo bearings are packed with grease, and this is sufficient to last until the engine undergoes its major overhaul.

When this occurs, the dynamo should be inspected and overhauled by a Lucas Service Agent.



Checking the brushes.

About once each 10,000 miles or 16000 km. it is necessary to remove the dirt-excluding band around the brush gear and the commutator, and check the brushes for freedom in their holders—this is done by raising the brush spring and moving the brush up and down. Should the brush be sluggish, its sides should be cleaned and, if necessary, polished on a very smooth file until freedom of movement is obtained. The commutator should be cleaned by pressing a petrol-damped rag against the segments whilst the engine is slowly rotated.

Great care should be taken to see that any brushes that have been removed are replaced in their original positions. If a brush has become so badly worn that poor contact with the commutator is being made, the instrument should be taken to a Lucas Service Depot for rectification.

At this time the dynamo belt should be checked for wear and slackness. Belt tension is increased by moving the dynamo outwards; this is done by slackening off the lower pivot bolt and the top attachment screw. The correct amount of free movement in the belt is $\frac{1}{2}$ in. or 13 mm.

If the driving belt is subject to excessive tightening, a great strain will be placed upon the dynamo bearings, with consequent rapid wear and trouble.

The Starter Motor

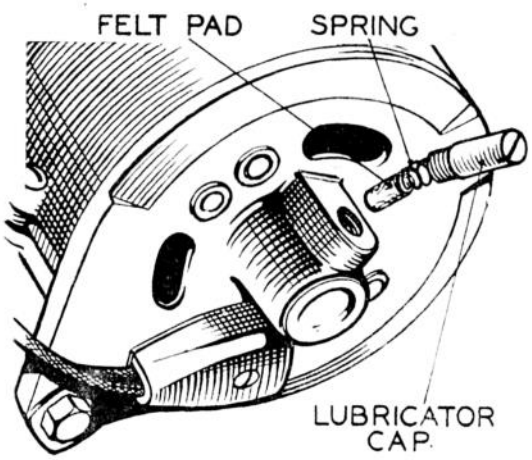
To obtain the best results from the starter motor, it is essential that the following points be observed :—

(*a*) See that controls are correctly set for starting.

(*b*) Operate the starter button firmly and, of course, release it as soon as the engine fires.

(*c*) Never operate the starter whilst the engine is in motion. If the engine does not fire at once, allow it to cease rotating before operating the starter switch.

(*d*) Do not strain the battery by keeping the starter button depressed if the engine does not start. Remember that the starter motor takes a very heavy current.



Shaft lubricator.

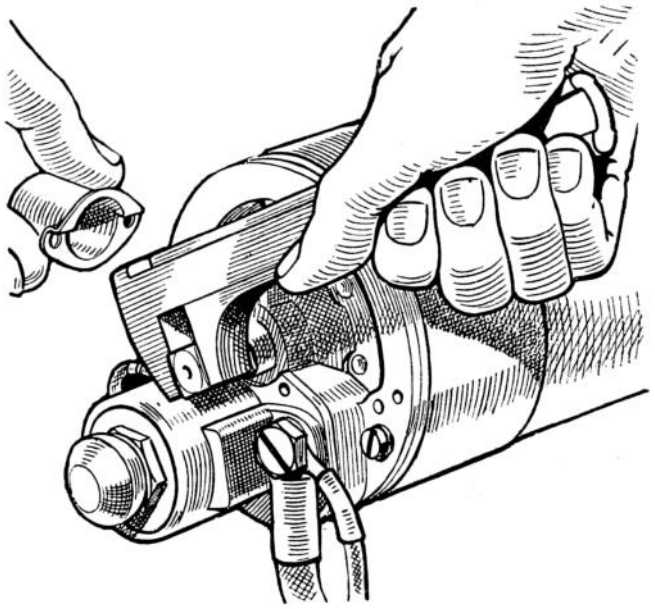
(*e*) In cold weather, depress the clutch whilst operating the starter—this relieves the starter motor of the very considerable drag induced by the gears.

Instructions regarding brush gear, etc., are the same as for the dynamo, and the owner's attention is drawn to the notes on the dynamo.

A square shaft extension is provided for hand rotation of the starter motor for cleaning purposes, the extension being provided with a metal cap.

If the action of the starter motor appears sluggish or erratic, the motor should be removed from its mounting and the screwed sleeve and pinion examined for dirt.

If it is dirty the parts should be cleaned and a very light oil applied.



Shaft extension on the starter motor.

Voltage Control Unit

This is situated on the engine bulkhead, and houses the compensated voltage control unit. It is reached by lifting the near-side of the bonnet.

The object of the voltage control unit is to ensure that the dynamo supplies an adequate charge to the battery under all conditions. For example, when the lights are on, a considerable strain is imposed on the battery and the dynamo charges automatically at a high rate. When the lights are off it will be obvious that the strain on the battery is considerably less, and consequently the charging rate will also have to be less. This state is automatically controlled by the regulator.

Briefly, then, it will be seen that the object of the voltage control regulator is to provide a high charge when the battery is being heavily loaded and a low charge when the battery is lightly loaded.

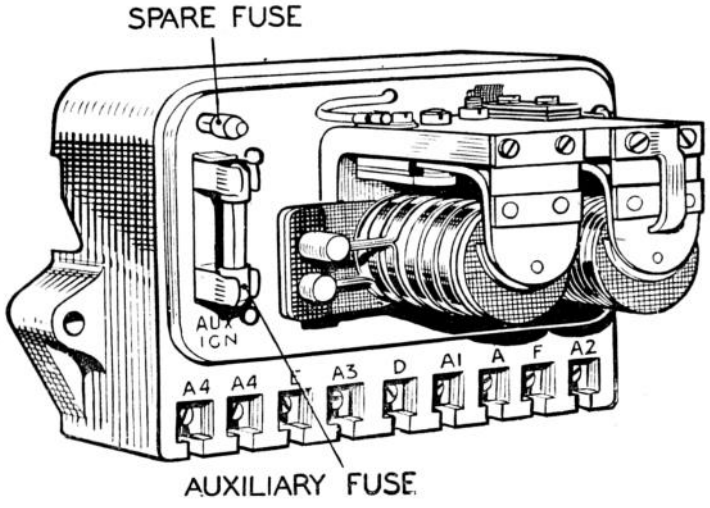
If the cover is removed from the control box, two fuses will be seen, the upper one being indicated by " Aux.—Ign.," and this controls the following circuits:—

Stop-lamp, Trafficators, petrol gauge and wiper motor.

The lower fuse controls the horns.

Both these fuses are 25 amp. Thus, a blown fuse will be indicated by a failure of the circuits which it controls, and by a visual examination of the fuse itself, the broken ends of the wire being clearly visible. If after immediately replacing a fuse it blows again, it is obvious that there is a serious short circuit or other fault in the wiring system and careful examination should be made for anything untoward. If it is not possible to see anything wrong, the Lucas Service Agent should be permitted to examine the car and rectify the trouble.

The voltage control unit.



Note.—The regulator is very carefully and scientifically set by the manufacturers and on no account should any adjustment be made to this instrument.

LAMPS

Headlamps

These are of special design and the procedure for removing a reflector for a change of bulb is as follows:—

(1) Remove the chromium rim by unscrewing the small

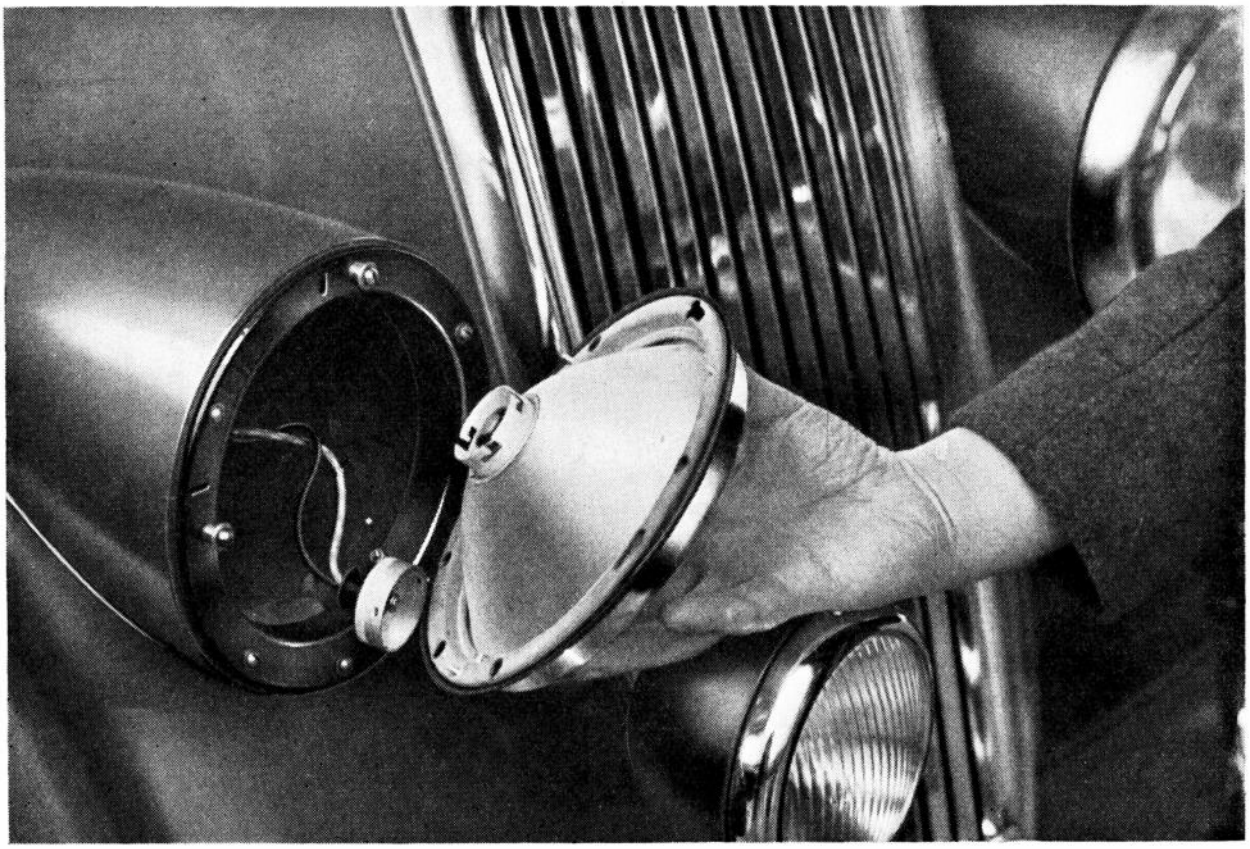
screw on the lower side of the lamps—the rim can then be lifted off.

(2) Twist the complete reflector sideways until the reflector will lift over the screw heads.

(3) Remove socket carrying the leads; this is a bayonet fitting and marked with an arrow for correct replacement.

(4) Remove the bulb.

The procedure is reversed for assembly.



Method of removing the headlamp bulb.

Note.—There is a slot cut in the bulb flange to prevent incorrect fitting.

The screws may be used for the setting of the headlamps in a vertical or horizontal plane.

Sidelamps

If the screw on the top of the lamp is removed, this will permit the removal of the glass. The bulb is a bayonet fitting.

Rear-lamps

The glass is held in place by a screw which, when undone, allows the cover to be opened. The bulbs are bayonet fitting.

Replacement of Bulbs

When replacing a bulb, it is important not only that bulbs of the same size and type are fitted, but also that the bulb has a high efficiency and will focus in the reflector. Cheap and inferior bulbs often have a filament of such a shape that it is impossible to obtain the correct focus, and this will, of course, result in a loss of efficiency.

Windscreen Wiper

The windscreen wiper motor is packed with grease during assembly, and no adjustment is required. The motor should require no attention, the only parts to require renewal after some considerable time being the wiper blades, which can be replaced at small cost when they become inefficient.

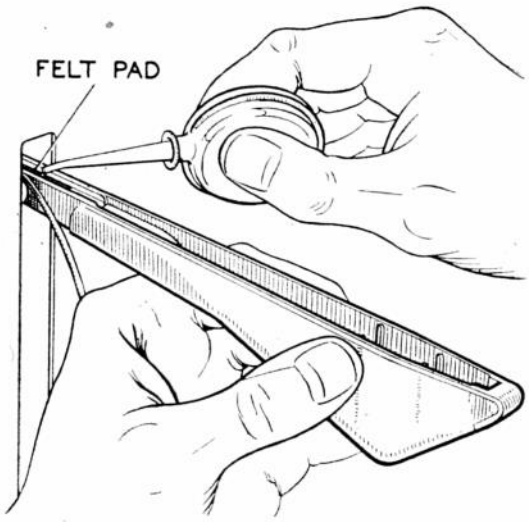
The Ammeter

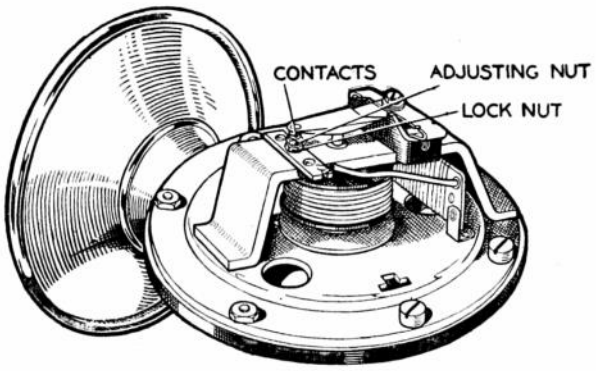
This is mounted on the dash, and its purpose is to indicate the rate of charge to the battery. However, as explained in a previous paragraph, the dynamo is of C.V.C. type and the ammeter readings may vary considerably even at the same road and engine speeds. As already explained, the dynamo charges at a high rate until the battery regains its normal condition; this is shown on the ammeter by a gradual decrease in the charging rate.

Trafficators

These are operated by a small lever at the centre of the steering wheel and are of the self-cancelling type.

To change a bulb the arm should be raised and the small screw at the end removed, the cover-plate can then be removed by lifting the cover upwards and outwards. The festoon bulb holder will then be exposed.





Above.—View of one of the electric horns with cover removed.

Left.—Should the trafficators show signs of stiffness, lubricate them with a light machine oil.

Coil Ignition

This will give satisfactory service for very long periods without need for adjustment. Lubrication should be carried out at the intervals stated, but while the equipment is functioning satisfactorily it is not necessary for any maintenance to take place other than lubrication and an occasional clean.

The following points should be lubricated each 2,500 miles or 4000 km. :—

(1) An oiler is provided on the side of the distributor casing through which a few drops of thin oil should be inserted.

(2) If the rotor arm is lifted off, the spindle will be exposed and a few drops of thin oil should be inserted. It is not necessary to remove the fixing screw, as provision is made for oil to pass between the screw and the inner face of the spindle.

(3) Engine oil or light grease should be applied to the contact breaker pivot.

Note.—During this lubrication process care should be taken to see that no oil or grease is deposited on the contact points.

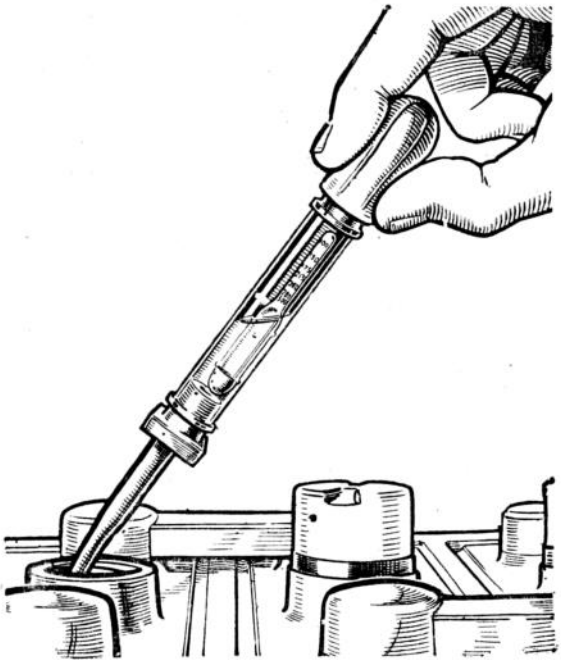
Cleaning

All parts of the distributor should be cleaned occasionally ; if necessary a petrol-moistened rag should be used.

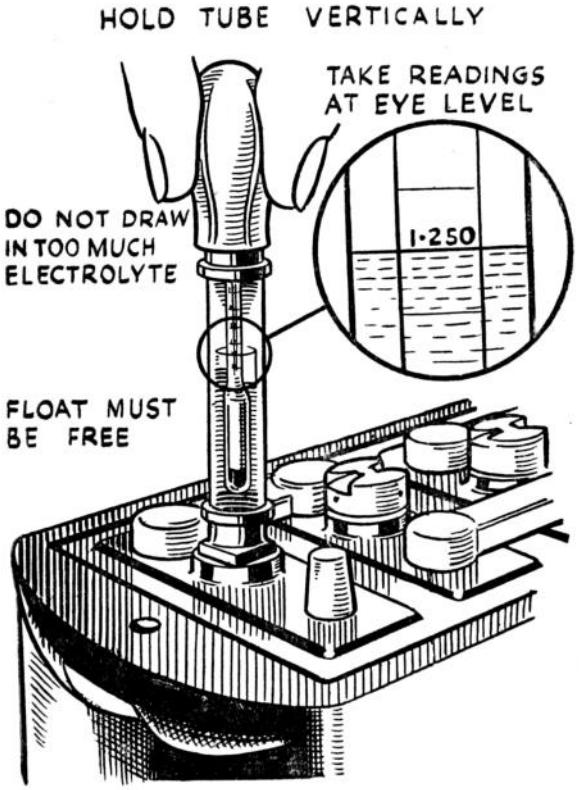
Special attention should be directed to the following points when cleaning.

1. Space between the terminals.
2. The electrodes.
3. Rotor arm.
4. Freedom of carbon brush in its holder.

The contact breaker should be closely examined and the contacts must be kept perfectly free from grease and dirt.



Above.—Top-up the battery with distilled water.



Right.—Check the electrolyte with an hydrometer.

If the points appear dirty or discoloured they should be polished with a piece of fine carborundum stone or fine emery cloth. All trace of dirt and metal dust should be removed.

Checking and Setting the Contact Points

Turn the engine until the contact points are fully open and check the gap, which should be between .010 in. (.25 mm.) and .015 in. (.38 mm.).

To set the gap, the two adjusting screws, as shown in the illustrations, should be slackened off and the points set to the correct gap. Care should be taken to see that the points are securely tightened after the gap has been set.

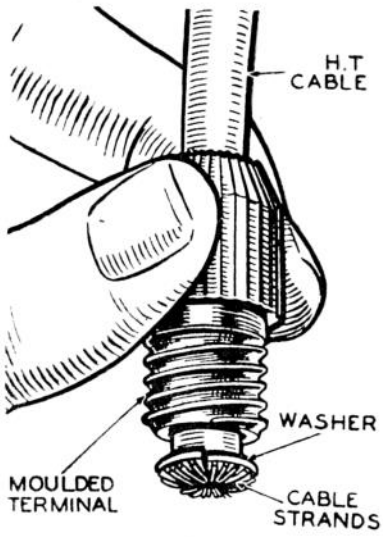
The Coil

The only attention this unit should receive is an occasional check to ensure that the terminals are tight and that the whole unit is clean, particularly between the terminals.

Location and Remedy of Faults

Although every precaution is taken to eliminate all possible causes of trouble, failure may occasionally develop through lack of attention to the equipment or damage to the wiring. The most probable faults are tabulated, according to the symptoms displayed, in the fault-finding tables on the following pages.

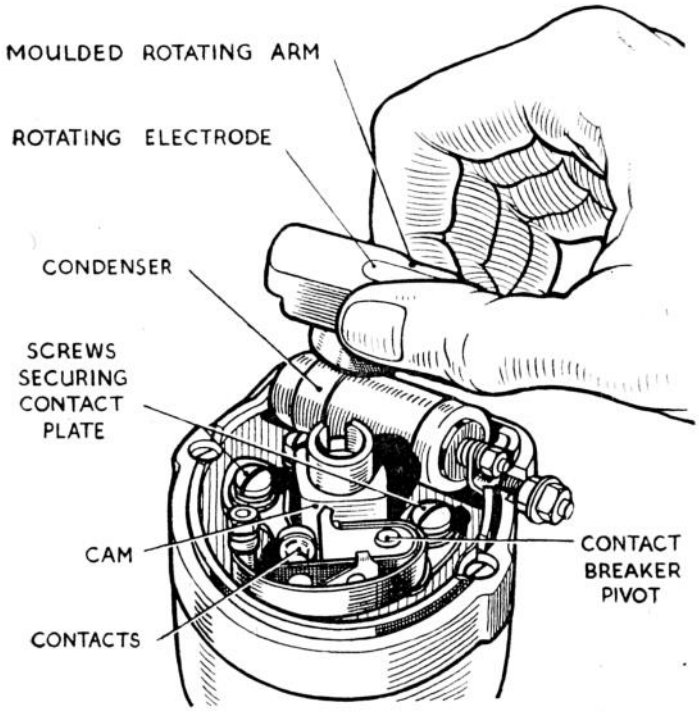
It is recommended that a systematic examination is made by following the suggestions in the fault-finding tables, as the sources of many troubles are by no means obvious. In some cases a considerable amount of deduction from the symptoms is needed before the cause of the trouble is disclosed.



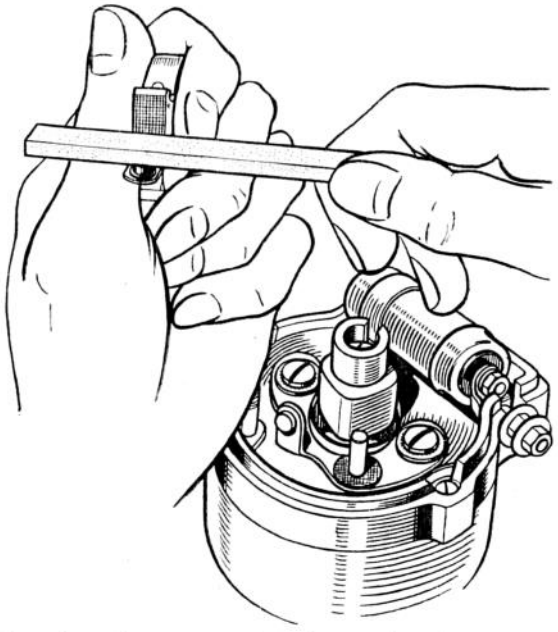
Method of fixing the high-tension cable to the terminal.

For instance, the engine might not respond to the starter switch ; a hasty inference would be that the starter motor is at fault. However, as the motor is dependent on the battery, it may be that the battery is exhausted. This, in turn, may be due to the dynamo failing to charge, and the final cause of the trouble may be, perhaps, a loose terminal nut either at the battery or elsewhere in the charging circuit.

If, after carrying out the examination, the cause of the trouble is not found, get into touch with the nearest Lucas Service Depot.

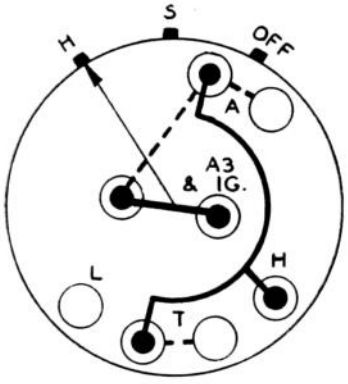


Component parts of the contact breaker assembly.

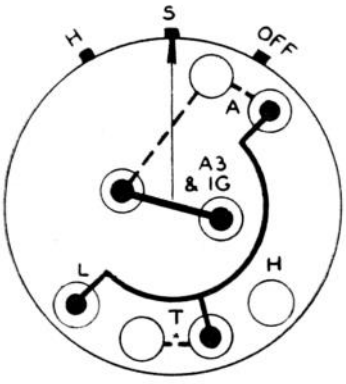


Cleaning the contact breaker points by means of a piece of fine carborundum stone.

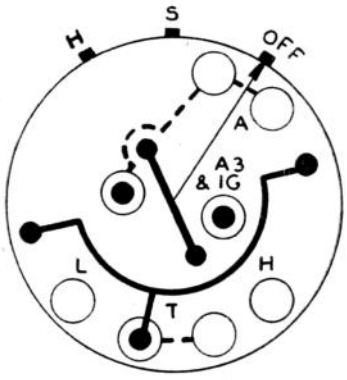
THESE ILLUSTRATIONS SHOW THE INTERNAL CONNECTIONS OF THE LIGHTING AND IGNITION SWITCH



SWITCH IN "H" POSITION
IGN. SWITCH ON



SWITCH IN "S" POSITION
IGN SWITCH ON



SWITCH IN "OFF" POSITION
IGN. SWITCH OFF

SPECIFICATION OF ELECTRICAL EQUIPMENT

	Model	*Service No.*
Dynamo ...	C45YV	228240
Starter ...	M418G	255721
Switch ...	PLC6	34015A
Control Box	RF95	37057B
Battery ...	STXW9A	
Distributor ...	DK4A	404425A
Coil	BR12	45012A

HOW TO LOCATE AND REMEDY COIL IGNITION TROUBLE

Symptoms	*Possible Causes*	*Remedy*
Engine will not fire.	Battery discharged. Starter will not turn engine and lamps do not give good light.	Start engine by hand. Battery should be recharged by running car for a long period during daytime. Alternatively, recharge from an independent electrical supply.
	Controls not set correctly for starting.	See that ignition is switched on, and everything is in order for starting.
	Test if coil sparks by removing lead from centre distributor terminal and holding it about $\frac{1}{4}$ in. (6 mm.) away from some metal part of the chassis while engine is turned over. If sparks jump gap regularly, the coil and distributor are functioning correctly.	Examine the sparking plugs, and if these are clean and the gap correct, the trouble is due to carburetter, petrol supply, etc.
	If the coil does not spark, the trouble may be due to any of the following causes. *Fault in low-tension wiring.* Indicated by (1) No ammeter reading when engine is slowly turned and ignition switch is on; or (2) No spark occurs between the contacts when quickly separated by the fingers when the ignition switch is on.	Examine all cables in ignition circuit and see that all connections are tight. See that battery terminals are secure.
	Dirty or pitted contacts.	Clean contacts with fine carborundum stone or fine emery cloth and afterwards with a cloth moistened with petrol.
	Contact breaker out of adjustment. Turn engine until contacts are fully opened and test gap with gauge.	Adjust gap to gauge.
Engine misfires.	Dirty or pitted contacts.	Clean contacts with fine carborundum stone or fine emery cloth and afterwards with a cloth moistened with petrol.
	Contact breaker out of adjustment. Turn engine until contacts are fully open and test gap with gauge.	Adjust gap to gauge.
	Remove each sparking plug in turn, rest it on the cylinder head, and observe whether a spark occurs at the points when the engine is turned. Irregular sparking may be due to dirty plugs or defective high-tension cables. If sparking is regular at all plugs, the trouble is probably due to engine defects.	Clean plugs and adjust the gaps to correct setting. Replace any lead if the insulation shows signs of deterioration or cracking. Examine carburetter, petrol supply, etc.

HOW TO LOCATE AND REMEDY LIGHTING TROUBLE

Symptoms	*Probable Fault*	*Remedy*
Lamps give insufficient illumination.	Battery discharged.	Charge battery either by a long period of daytime running or from independent electrical supply.
	Lamps out of alignment or bulbs out of focus.	Align lamps and focus bulbs.
	Bulbs discoloured through use, or reflectors dirty.	Fit new bulbs or clean reflectors.
Lamps light when switched on but gradually fade out.	Battery discharged.	As above.
Brilliance varies with speed of car.	Battery discharged.	As above.
	Battery connection loose or broken.	Tighten connections or replace faulty cables.
Lights flicker.	Loose connection.	Locate loose connections and tighten.
Failure of lights.	Faulty cable or connection.	Examine wiring for faulty cables or connections and remedy.
	Battery discharged.	As above.
	Loose or broken connection.	Locate and tighten loose connection, or remake broken connection.

HOW TO LOCATE AND REMEDY TROUBLE WITH VOLTAGE CONTROL DYNAMO EQUIPMENT

Symptoms	*Possible Causes*	*Remedy*
Battery in low state of charge shown by lack of power when starting. (Hydrometer readings less than 1.200.)	Dynamo not charging, indicated by ammeter not showing charge reading when running at about 20 m.p.h. (32 k.p.h.) with no lights in use. Due to :—	
	Broken or loose connection in dynamo circuit, or regulator not functioning correctly.	Examine charging and field circuits wiring. Tighten loose connections or replace broken lead. Particularly examine battery connections.
	Commutator greasy or dirty.	Clean with soft rag moistened in petrol.
	Dynamo giving low or intermittent output, indicated by ammeter giving low or intermittent reading when car is running steadily in top gear. Due to :—	
	Loose or broken connections in dynamo circuit.	Examine charging and field circuits wiring. Tighten loose connections or replace broken lead. Particularly examine battery connections.
	Brushes greasy or dirty.	Clean with soft rag moistened with petrol.
	Brushes worn, not fitted correctly, or wrong type.	Replace worn brushes. See that brushes "bed" correctly. Fit correct type brushes.
	Regulator not functioning correctly.	Have equipment examined by a Lucas Service Depot.
Battery over-charged, shown by burnt-out bulbs and very frequent need for "topping up."	Dynamo giving high output, indicated by ammeter giving high charge reading. Due to :—	
	Regulator not functioning correctly.	Return regulator to Lucas Service Depot for attention.

HOW TO LOCATE AND REMEDY STARTER MOTOR TROUBLE

Symptoms	*Possible Causes*	*Remedy*
Starter motor lacks power or fails to turn engine.	Stiff engine, indicated by inability to turn by hand.	Locate and remedy cause of stiffness.
	If engine can be turned by hand, then trouble may be due to :—	
	Battery discharged.	Start by hand. Charge battery either by a long period of daytime running or from independent electrical supply.
	Broken or loose connection in starter circuit.	See that connections to battery, starter and starter switch are tight, and that cables connecting these units are not damaged.
	Starter commutator or brushes dirty.	Clean.
	Brushes worn, not fitted correctly, or wrong type.	Replace worn brushes. See that brushes " bed " correctly.
	Starter pinion jammed in mesh with flywheel.	Rotate squared end of starter shaft with spanner.
Starter operates, but does not crank engine.	Pinion of starter drive does not engage with flywheel, due to dirt on screwed sleeve.	Clean sleeve with paraffin and add a few drops of machine oil.
Starter pinion will not disengage from flywheel when engine is running.	Starter pinion jammed in mesh with flywheel.	Rotate squared end of starter shaft with spanner.

Decarbonisation

The longest and most complicated operation likely to be undertaken by the average owner is that of decarbonisation. It must be stressed that the initial decarbonisation should take place after 2,500 miles or 4000 km. have been covered. Naturally the frequency of subsequent decarbonisations will be dependent upon the type of country in which the car is being used and the type of running upon which the car is employed. For example, if a car is being used for fast, long, main road runs, the intervals will be greater than if it is being used in hilly country or exclusively for town work. In general, decarbonisation should take place between 5000 miles and 8,000 miles or 8000 to 13000 km. One sure indication that the engine needs decarbonising is when a marked falling off in power is noted.

Before starting to decarbonise it is suggested that a large box or boxes be obtained in which to place the parts that are to be removed. It is a good plan to have two or three small boxes, such as tobacco tins, in which to place nuts, washers and other small parts which otherwise have a habit of getting lost. It is advisable also to have a metal tray, such as a baking dish, in which to wash the various parts. Secondly, make sure that all tools are to hand, and that you have a good supply of clean rag, some paraffin and a clean stiff brush. Having obtained these necessary accessories for a good job, the sequence of operations is as follows :—

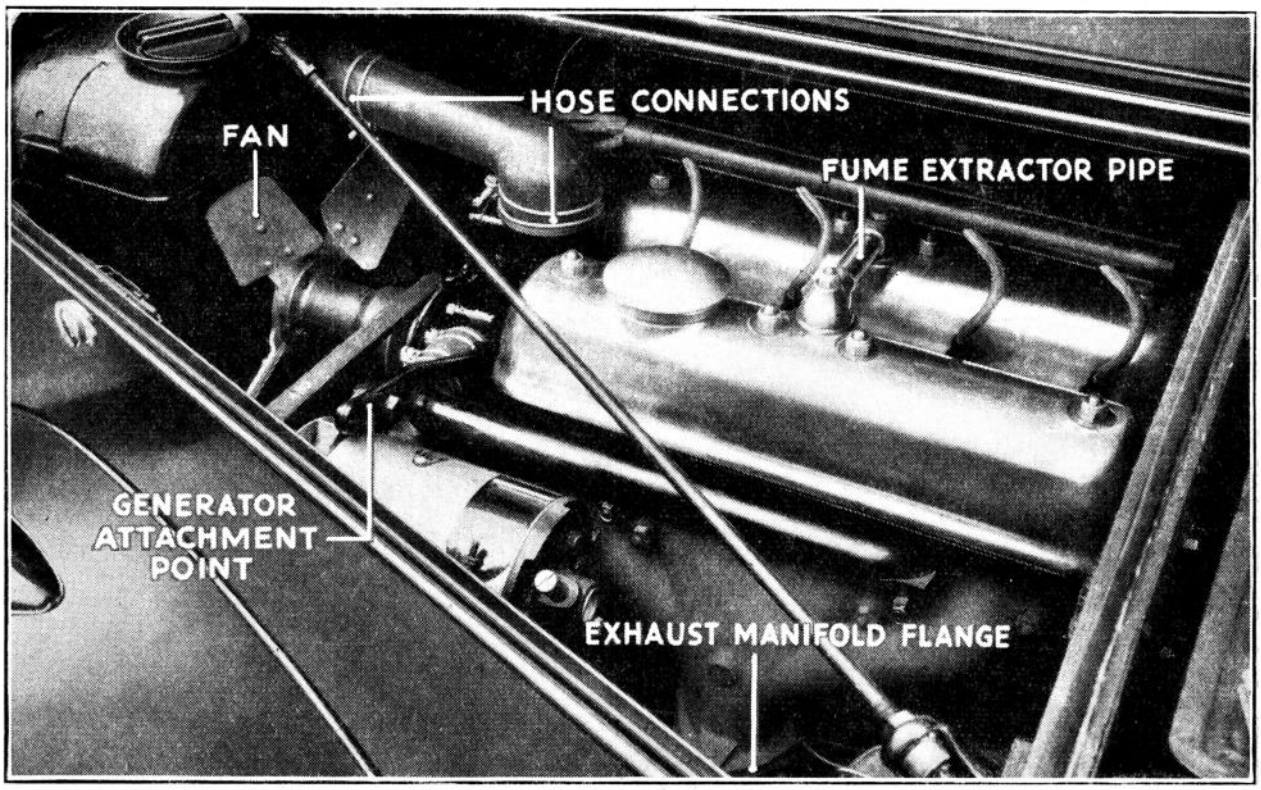
1. Remove the bonnet.
2. Remove the radiator steady rods.
3. Drain the water from the radiator and the cylinder block.
4. With your brush, paraffin and rags, clean the cylinder head and its surrounding parts so that the unit is clean before work is started on the dismantling process.
5. Remove the throttle control rod from the carburetter.
6. Disconnect the mixture control rod.

METHOD OF REMOVING THE BONNET

Below.—At the forward end of, and underneath, the centre panel are two nuts which require slackening off only. The panel is slotted at this point.

Below.—At the rear end of, and underneath, the centre panel are two nuts which must be removed prior to detaching the complete bonnet.

7. Remove the fuel line from carburetter to fuel pump.
8. Remove the carburetter and air filter.
9. Remove the induction manifold and hot spot tubes.
   Difficulty may be experienced at this point in removing the hot spot tubes, due to carbon formation in the exhaust manifold. If a screwdriver is inserted behind the aluminium casting, the casting and hot spot tube should come free with a moderate pressure on the screwdriver. If this fails to move the pipes you should contact your local Distributor for the loan of a special extractor.



Left-hand side of the engine.

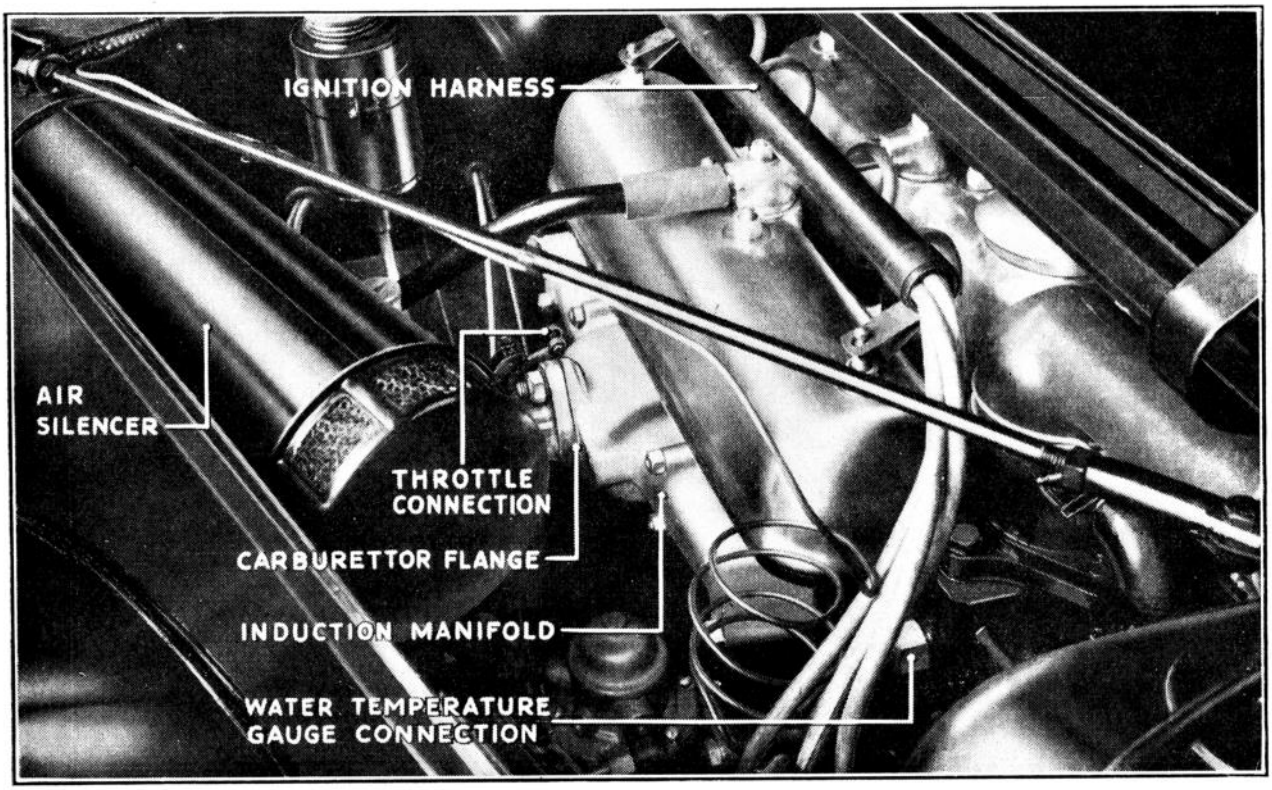
10. Remove the distributor head and ignition harness.
11. Disconnect the two water hose connections :
    (*a*) At the thermostat.
    (*b*) On the underside of the pump.
12. Remove the fan blades ; this is to prevent unnecessary damage when the head is removed.
13. Disconnect the water temperature capillary.
14. Remove the fan belt from the pump pulley.
15. Remove the bolt from the dynamo slotted adjuster, slacken off the dynamo mounting bolt and swing the dynamo clear of the exhaust manifold.
16. Disconnect the exhaust pipe at the manifold.
17. Remove the cross flow water pipe.
18. Remove the exhaust manifold.
19. Remove the rocker covers.
20. Remove the cylinder head holding-down nuts, care being taken to see that each nut is very slightly slackened off before complete removal of any individual nut.

21. Remove the cylinder head.

Note.—The cylinder head should be removed with the push rods in place. The push rods are so designed that the concave end, where contact is made with the rocker, is larger than the tube through which the push rod operates, thus it will be seen that the push rods will not fall beyond the opening. Care should be taken to place the cylinder head on its side when it is removed to the bench, otherwise there is danger of bending the push rods. Push rods may be removed from the cylinder head by moving each rocker, in turn, aside, and withdrawing the rods from the top of the head.

Each rod should be marked so that it may be replaced on the tappet from which it was removed.

When reassembling the head, the push rods should be fitted in the following manner. The rocker should be moved to one side against the spring pressure and the push rod inserted. If a downward pressure is then applied to the valve, the rocker can then be moved into its correct position. During both of these operations great care must be taken to ensure that the push rods are not bent.



Right-hand side of the engine.

22. Remove the cylinder head gasket.

Note.—If, during this dismantling process, any of the packing washers or gaskets become damaged, it is essential that they be renewed, otherwise a poor performance will result.

Operations on the Cylinder Head

Having detached the cylinder head and placed it on the bench, it is necessary to remove the valves. These can be removed by various methods of improvisation, but the whole procedure will be simplified and be more satisfactory if a valve spring compressor be used.

When dealing with valves and springs it is essential that they be segregated so that they may be replaced in the positions from which they were removed.

Having extracted the valves, the stems should, if necessary, be cleaned with very fine emery cloth, an up-and-down motion being employed, with the emery cloth held between the finger and thumb.

Carbon should then be removed from the valve head with a knife or similar instrument, and then the head polished with emery cloth. Having cleaned the valves, the cylinder head should be cleaned in a similar manner; naturally the plugs should be taken out prior to this operation.

When cleaning the head make sure that you do not forget to clean out the exhaust and inlet passages.

With the head perfectly clean, the next thing to do is to grind in the valves, and for this a special tool may be obtained from most Dealers.

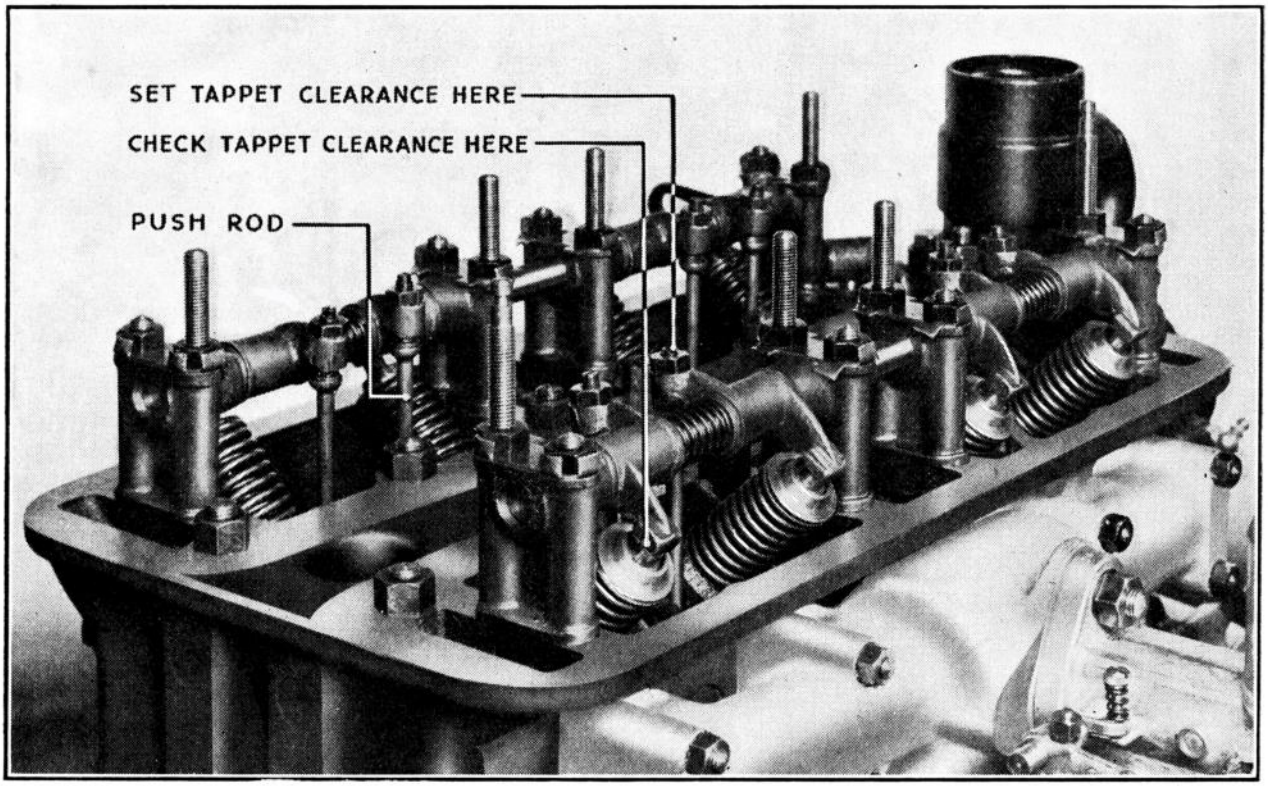
The object of grinding in the valves is to remove all surface imperfections in order to ensure a perfect gas-tight joint between the valve and its seating. To achieve this it is necessary that a grinding paste be used; this paste is obtainable in two grades, coarse and fine, but in general it should only be necessary to use the fine paste.

The bevelled edge of the valve should be lightly smeared with paste, care being taken to see that none gets on the valve stem, and then the valve replaced in its guide.

Next, the special tool should be fitted to the valve and the valve rotated back and forth—that is, with a reciprocating motion—meanwhile keeping a light pressure on the valve head.

The valve should be raised occasionally and moved into a different relative position, and the motion repeated. This procedure is to ensure perfect distribution of the grinding paste and so prevent the formation of grooves in the valve and its seating.

The valve should be ground until a continuous narrow ring is visible; it is not necessary to obtain a broad seating.



General view of the cylinder head, showing the valve gear.

After removing all traces of grinding compound, the valve should be assembled in the head, after a quantity of engine oil has been applied to the stem.

Should difficulty be experienced in keeping the valve collets in place whilst refitting, they may be smeared with grease to act as a retaining medium.

It should be noted that, to ensure a perfect seating, the exhaust valves will need rather more grinding than the inlet valves.

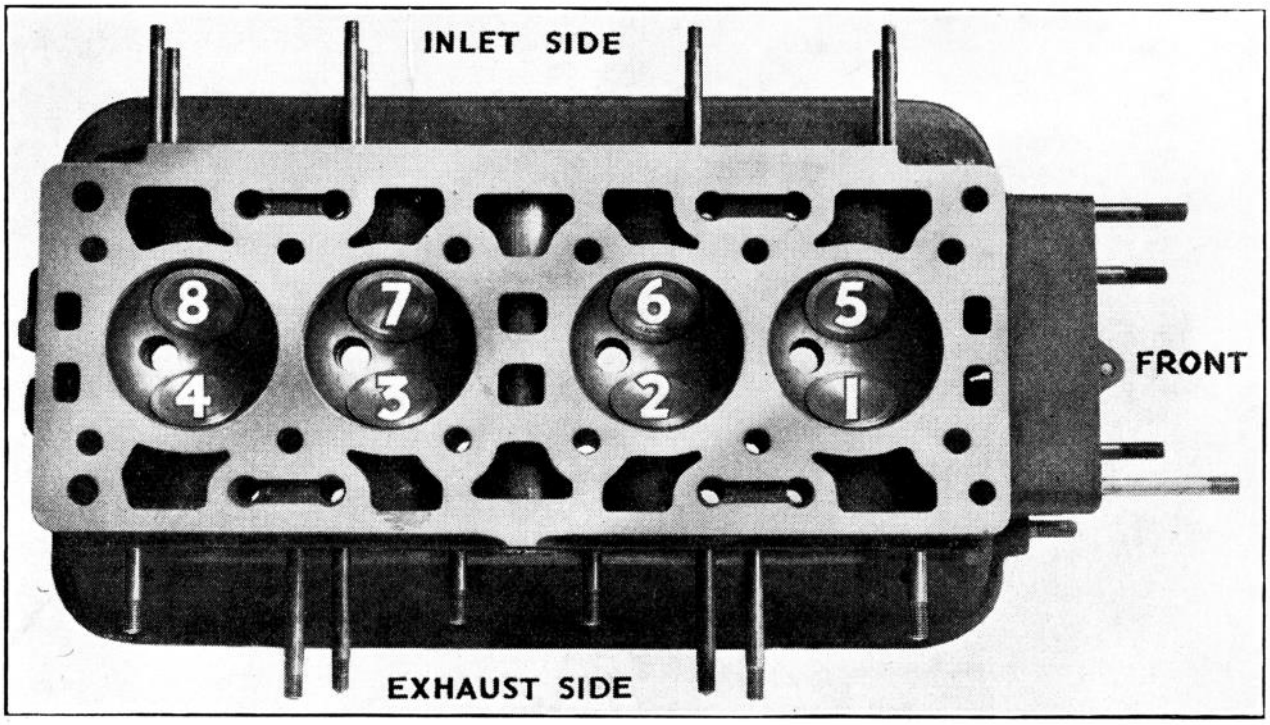
Note.—The valve heads are numbered so that there may be no confusion as to their correct position in the head.

After having finished with the cylinder head, attention should be directed to the piston crowns.

Turn the engine until any two of the pistons are at the top of their strokes, and then block up the remaining cylinders with clean rag so that dirt and carbon do not find their way into the bores.

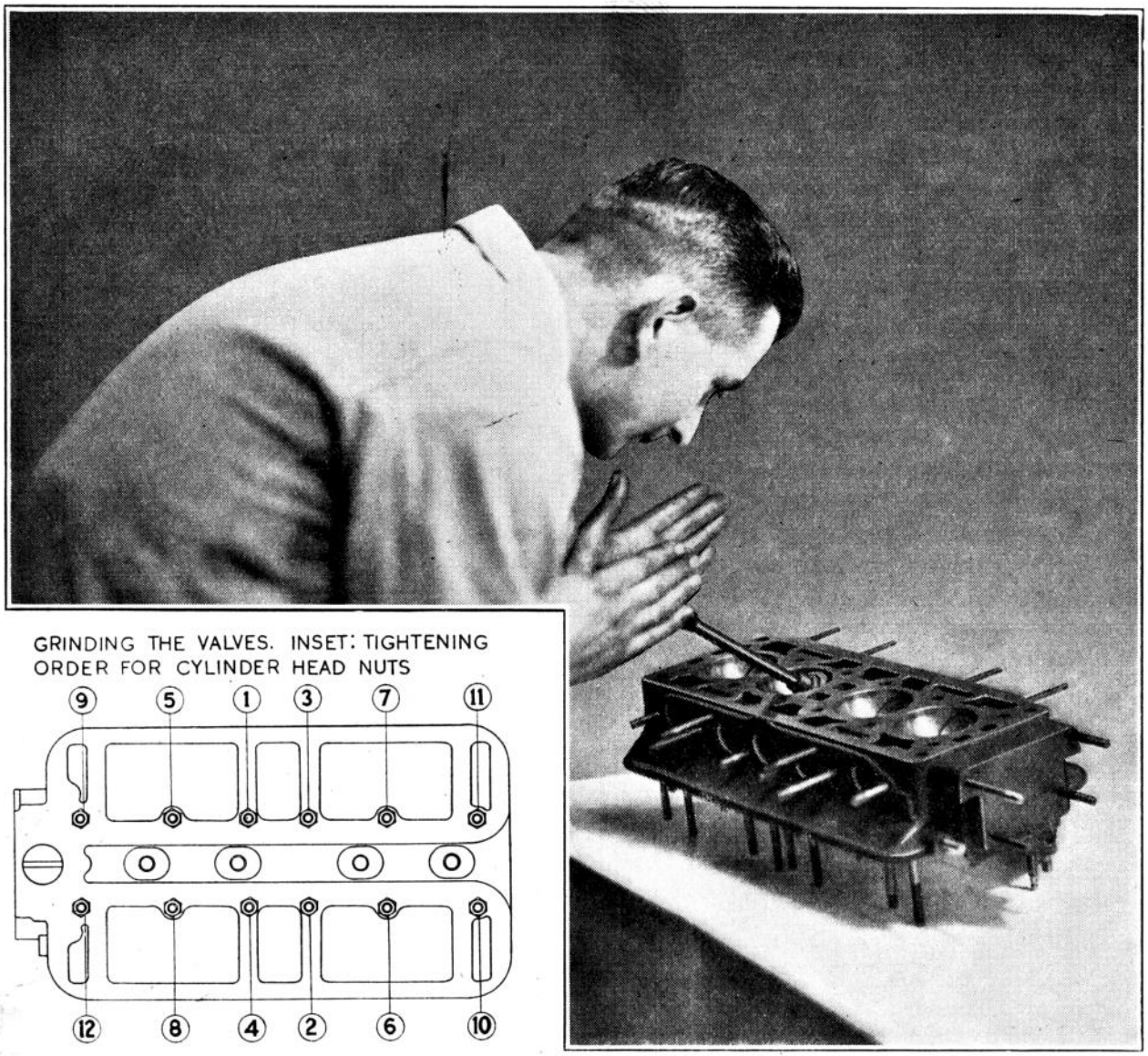
Do not on any account use a sharp tool to remove the carbon from the pistons, because this will cause scratches unless great care is taken. These scratches will cause carbon to adhere more readily and render subsequent decarbonising more difficult.

The tops of the pistons should never be polished with emery cloth because of the danger of fine particles of emery finding their way between the piston and cylinder wall, and causing unnecessary wear between piston and cylinder. When all pistons have been cleaned and all traces of loose carbon removed, a small amount of engine oil should be placed on each cylinder bore.



Cylinder head, showing numbering of the valves.

Having ascertained that the faces of the cylinder head and block are perfectly clean, also that the gasket is undamaged, the next operation is the fitting of the cylinder head. This should be replaced and securely tightened down, great care being taken to ensure that the nuts are tightened in the order shown in the diagram. As soon as the head has been tightened down, the sparking plugs should be replaced, otherwise foreign matter may find its way into the cylinder bores. Assembly is largely a reversal of the dismantling process, and the following points are worthy of attention.



GRINDING THE VALVES. INSET: TIGHTENING ORDER FOR CYLINDER HEAD NUTS

1. Make quite sure that you fit the cylinder head gasket correctly, otherwise vital water passages will be obstructed.
2. If any of the gaskets are damaged, replace them at once.
3. Make sure that the induction manifold gasket is perfectly clean, and lightly coat each face with jointing compound.
4. When refitting the hot spot pipes, leave the exhaust manifold loose—this will facilitate assembly.

Note.—Do not forget to fill the cooling system with the correct amount of water.

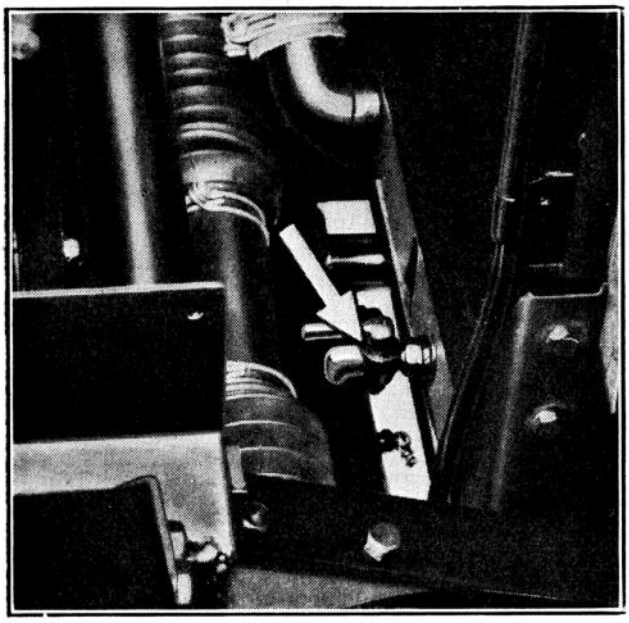
Naturally, as a result of grinding-in the valves, the tappets will need setting. The procedure is to set them roughly with the engine cold and then start up the engine and run it until it has attained its normal working temperature. The tappets should then be set to their correct clearance, which is .003 in. (.08 mm.) on the inlet valves and .004 in. (.10 mm.) on the exhaust valves.

After the car has run approximately 100 miles (160 km.), the rocker covers should be removed and a check made on the tightness of the cylinder head holding-down nuts; the tappets should then be rechecked, and if necessary reset. It is also worth while at this point to check the tightness of both the inlet and exhaust manifolds.

Cooling System

Care of the cooling system is as important as care of all the other systems that go to make up your car.

The more common causes of trouble that are experienced are due to rust, corrosion and the formation of scale. This happens very slowly, and in time small particles of foreign matter will adhere to the inside of the cylinder jackets, thereby preventing the proper transfer of heat from the engine to the cooling water. Occasionally small particles will break away and be carried along in the cooling water; this would not be dangerous but for the fact that they will clog the radiator tubes, the gaps in which are very small.



Left.—The location of the radiator drain tap on the right-hand side of the radiator block.

Right.—The location of the cylinder block drain tap just forward of the fuel pump.

There are two methods of preventing this trouble. The first is to use rain water. If this is not possible, tap water, to which has been added a suitable rust inhibitor, should be used.

It should be noted that the filler-cap for the radiator is under the bonnet, on the left-hand side of the car; the cap on the chromium-plated radiator shell is for appearance only. The system has two draining points located as follows :—

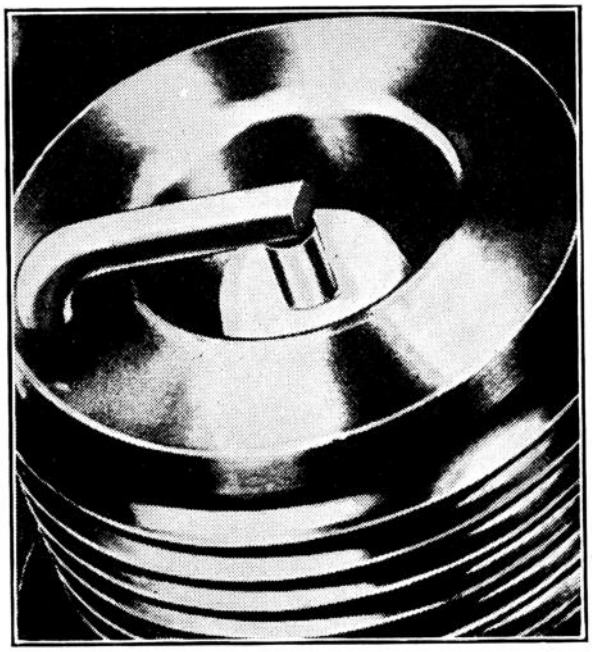
1. *Radiator Drain.* (This is located at the back of the radiator and on the right-hand side).

2. *Cylinder Block Drain.* (This is located on the right-hand side of the engine, at the front of the cylinder block.)

Note.—The drain tap on the radiator does not allow the system to drain completely, due to the position of the water pump, and it is therefore essential that both taps should be used.

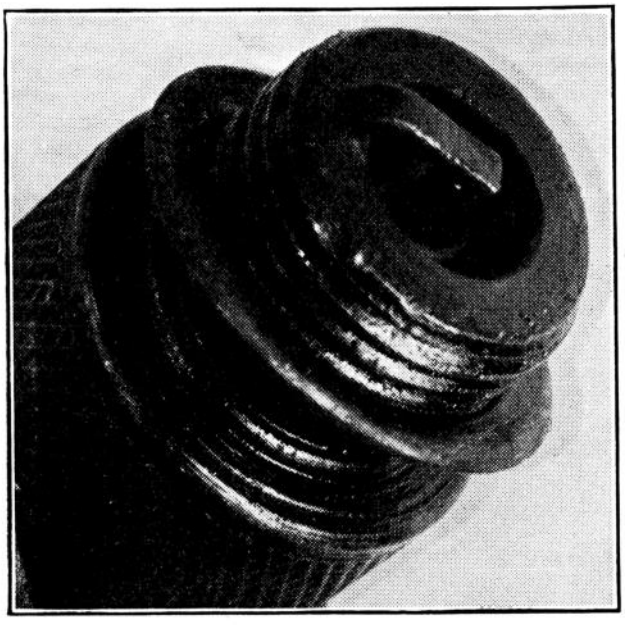
Sparking Plugs

The full importance of periodic sparking plug inspection and cleaning cannot be too strongly stressed, as your sparking plugs play a vital part in the performance of your engine. We suggest that plugs be inspected and cleaned each time you have the engine oil changed, and, in order to maintain your Riley engine at the peak of its performance, that you fit a new set of sparking plugs as soon as the efficiency of the plugs has become lowered, as shown on an electrical tester.

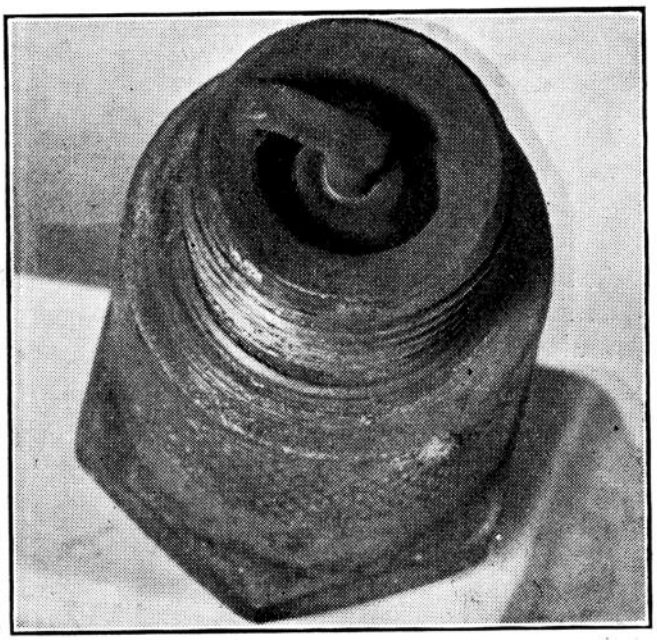


Shows a clean and efficient sparking plug.

A fouled and inefficient plug which will waste power and petrol.



This plug shows signs of oil-fouling, indicated by a wet, shiny black deposit on the insulator. This type of fouling may be caused by worn pistons, cylinders or gummed-up piston rings.



Above is shown a plug which has become fouled by a dry, fluffy black deposit and indicates faulty carburation or a defect in the ignition system.

Tracing Troubles

Engine Will Not Start

1. No petrol at the carburetter. This may be due to one or several of the following causes :—
   (*a*) No petrol in the tank.
   (*b*) Fuel pump damaged or leaking.
   (*c*) An air lock in the fuel system.
   (*d*) Choked fuel line.
   (*e*) Choked filter.
2. Carburetter piston sticking.
3. Sparking plugs fouled with carbon or oiled up.
4. Sticking valves.
5. Damaged ignition leads. Look for :—
   (*a*) Cracks in the rubber casing.
   (*b*) Loose connection between the coil and distributor.
   (*c*) Oil on the leads.
6. Contact breaker points dirty or loose, the remedy being :—
   (*a*) Clean with fine emery cloth.
   (*b*) Wash with petrol.
   (*c*) Reset to correct gap.
7. Defective coil, indicated by lack of sparks at the plugs.
8. Water on the plug leads.
9. Too rich a mixture, caused by too large a throttle opening for starting.
10. Discharged battery.

Engine Misfires

1. High speeds only.
   (*a*) Sparking plugs fouled with carbon or oiled up.
   (*b*) Fuel shortage.
   (*c*) Sticking valves. If inlet, a spitting back through the carburetter will be noted; if exhaust, detonation in the exhaust pipe and silencer will occur.
   (*d*) Contact breaker points loose or dirty.
   (*e*) Loose ignition leads.
   (*f*) Incorrect tappet clearances.
2. Low speeds only.
   (*a*) Tappet clearances incorrect.
   (*b*) Air leaks in the induction system.
   (*c*) Carburetter slow running setting is incorrect.
   (*d*) Battery run down.
3. All speeds.
   (*a*) Plugs fouled with carbon or oiled up.
   (*b*) Tappet clearances incorrect.
   (*c*) Sticking valves.
   (*d*) Warped valve or valves.
   (*e*) Fuel shortage.
   (*f*) Loose ignition leads.
   (*g*) Contact breaker points loose or dirty.
   (*h*) Too rich a mixture.

Engine Runs Hot

1. Insufficient water in the cooling system.
2. Thermostat not operating.
3. Broken fan belt.
4. Radiator blocked.
5. Mixture control in rich position.
6. Incorrect lubrication.
7. Weak mixture.
8. Ignition incorrectly set.
9. Weak valve springs.
10. Pitted and worn valve seats.
11. Worn piston and/or piston rings.
12. Choked exhaust system.

Engine Lacks Power

1. Fouled sparking plugs.
2. Lack of oil.
3. Carburetter incorrectly set.
4. Tappet clearances either too great or too small.
5. Weak valve springs.
6. Sticking valves.
7. Brakes binding.
8. Worn piston and/or piston rings.
9. Excessive carbon deposit.
10. Pitted valve seats.
11. Punctured carburetter float.
12. Choked exhaust system.

Engine Stops Suddenly

1. Lack of fuel.
2. Ignition failure.
   (*a*) Broken lead at switch.
   (*b*) Broken lead from the distributor to coil.
3. Choked jet.

Spitting Back in Carburetter

1. Weak mixture.
2. Sticking inlet valve or valves.
3. Air leaks in the induction system.
4. Inlet tappets set incorrectly.
5. Plug gaps set too wide.

Banging in Silencer

1. Sticking exhaust valve or valves.
2. Leak in the exhaust system.
3. Rich mixture.
4. Throttle not fully shutting.

Lights Fail

1. Loose battery lead.
2. Fuse or fuses blown.
3. Bulb or bulbs blown.
4. Battery discharged.

Excessive Oil Consumption

1. High crankcase pressure, due to :—
   (*a*) Blocked breather.
   (*b*) Broken and/or worn piston rings.
   (*c*) Worn pistons.
2. Oil leaking.

Excessive Fuel Consumption

1. Fuel leaks at the various unions and carburetter.
2. Damaged fuel pump.
3. Ignition set with insufficient advance.

Excessive Tyre Wear

1. Incorrect pressures.
2. Harsh driving methods.
3. Setting of the front wheels and the steering incorrect.

Unusual Noises

Should you hear a noise of an unusual character it is only folly to run the car in the hope that this noise will cure itself. A noise or rattle generally indicates that something is broken or has become worn, and the car should be inspected at once by your Riley Dealer.

Maintenance Summary

After the first 250 miles or 400 km. : Check oil level in engine sump, and top up if necessary (page 12).

After the first 500 miles or 800 km. : Drain oil from engine, gearbox and rear axle, refill with fresh oil (pages 12, 13 and 14).

Every 1,000 miles or 1600 km. : Apply grease gun to grease nipples at (*a*) water pump, (*b*) ball race at front end of torque tube, (*c*) the two universal joints on the intermediate shaft between gearbox and torque tube, (*d*) four points on steering swivels, and (*e*) four points on steering track rods (page 16).

Every 1,500 miles or 2400 km. : Drain oil from engine and refill with fresh oil (page 12).

Every 2,000 miles or 3200 km. : Inspect oil levels in gearbox and rear axle, and replenish if necessary (pages 13 and 14).

After the first 2,500 miles or 4000 km. : Carry out initial decarbonisation (page 59).

Every 2,500 miles or 4000 km. : Apply thin oil to oiler in distributor casing and distributor rotor arm spindle ; apply engine oil or thin grease to contact breaker pivot (page 51).

During the first 5,000 miles or 8000 km. : Check periodically the "Torsionic" independent front suspension (page 26).

Every 5000 miles or 8000 km. : Clean and re-oil the air cleaner (page 24) ; drain oil from gearbox and rear axle and refill with fresh oil ; apply grease gun to wheel hub grease nipples (pages 13 and 14).

Every 5,000–8,000 miles or 8000–13000 km. : Decarbonise the engine (page 59).

Every 10,000 miles or 16000 km. : Remove and clean out the engine sump (page 13) ; change oil filter (page 24) ; top up hydraulic shock absorbers (page 14) ; examine dynamo brushes (page 48).

Every 30,000 miles or 48000 km. : Pack steering mechanism with grease (pages 26 and 28).

In addition to the above, oil and grease regularly the points indicated on page 16.

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NOTES