The Manual of the

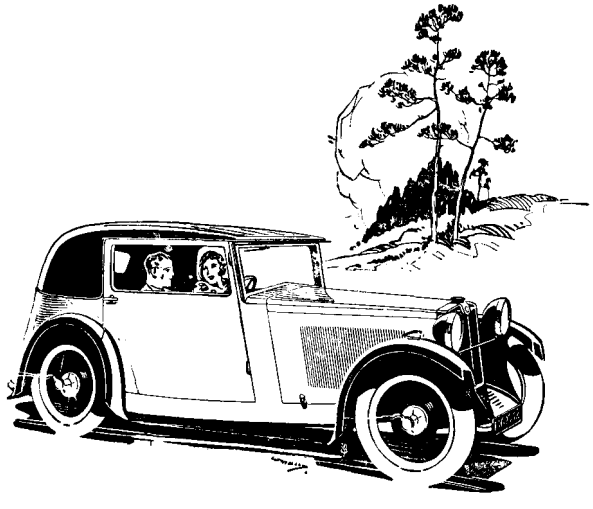
Magna

Price 10/- net

Instruction Manual

for the

Magna



The M.G. Car Company, Ltd.

Telephone 251 — *Telegrams "Emgee"*

Abingdon-on-Thames

MG

CAR NO. _____

ENGINE NO. _____

TELEGRAMS: EMCEE ABINGDON.
PHONE: ABINGDON 251.

ANY QUESTION AFFECTING THE GUARANTEE ATTACHED TO THIS CAR TO BE REFERRED (VIA THE AGENT FROM WHOM THE CAR WAS PURCHASED) TO THE MANUFACTURERS

The M.G. Car Company LTD.
Abingdon-on-Thames

CHANGE OIL COMPLETELY EVERY 1500 MILES.
GUARANTEE CEASES ON REMOVAL OF THIS PLATE.

Identification Plate.

This plate is to be found on the Engine side of the dashboard, and bears the official chassis and engine numbers, which should always be quoted in any correspondence relating to the car.

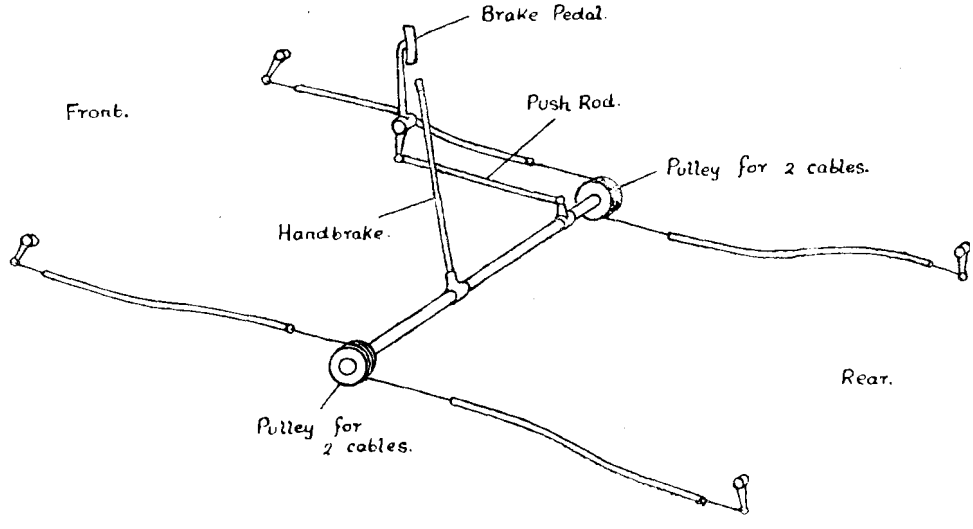


Diagram Of Brake Gear.

Referred to on Page 16.

INDEX

PAGE

ELECTRICAL

The lists of M.G. Agents, Radiator Repair Service Depots, Lucas Agents, are to be found at the end of the Manual.

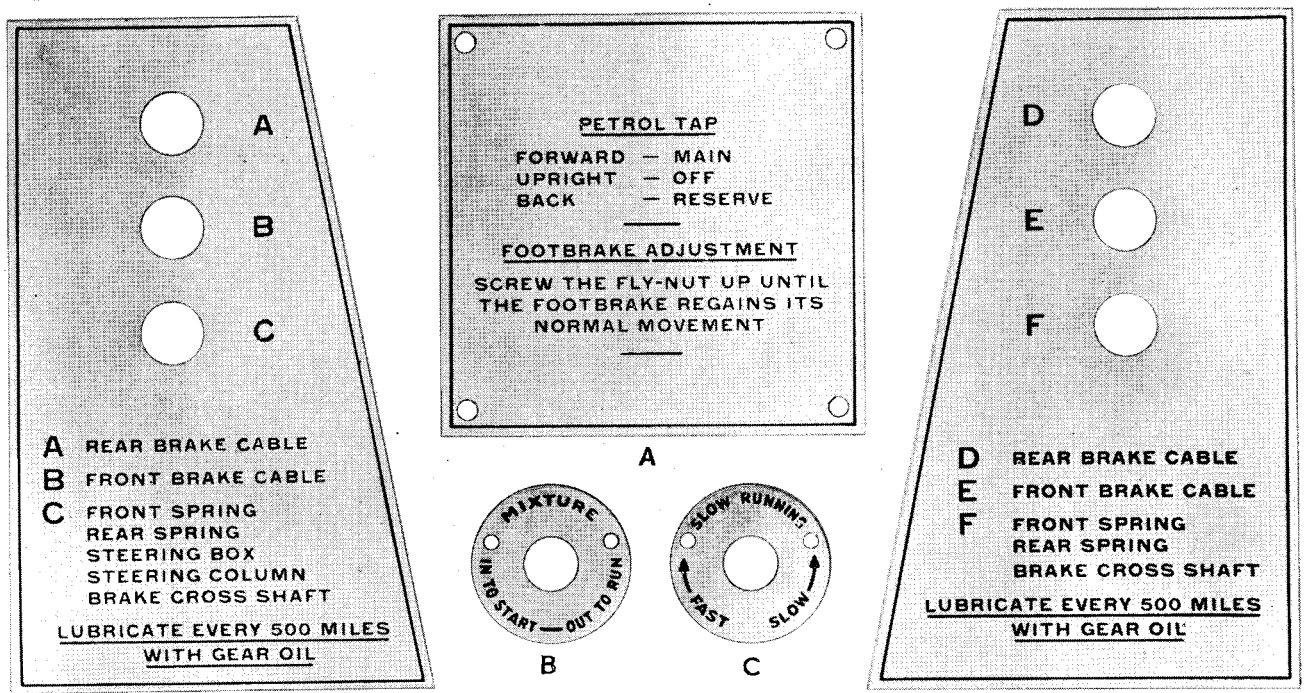
FOREWORD.

The object of this Instruction Book is to place the owner in possession of as much detailed information as is possible concerning the 12/70 h.p. M.G. Magna. It is intended first of all in the early chapters to afford a pictorial survey of the Chassis generally, and the Book is so arranged that all the essential information and instructions necessary to maintain the car in efficient condition are contained in the early part. The remaining chapters contain more detailed information which it is hoped will prove of interest to most owners.

The time arises when a car has to be dismantled, and it is then that the reference to the Instruction Book can be of considerable value as it points out both to the owner and Repair Shops, unacquainted with the construction of the car, the correct method of procedure.

There are a number of adjustments that have to be carried out from time to time such as adjusting the valves, brakes, and more detailed information is given upon these points separately. The Book is provided with a comprehensive index, to which reference should be made, as it is quite possible that either illustrations or reading matter concerning the same parts may come under different headings. Should at any time the owner fail to find the particular instruction he requires in the Instruction Book, it is hoped he will not hesitate to communicate with the Service Department at Abingdon, who will always be only too ready to afford any assistance they can at any time.

H. P. McC.



The 12/70

Magna Six Engine No.

The M.G. Car Company Ltd., Abingdon-on-Thames.

IGN. TIMING: RETARDED AT T.D.C.
VALVE DO.: INLET OPENS T.D.C.
TAPPET CLEARANCE: .003 IN.
SPARK PLUG GAP: .025 IN.
DISTRIBUTOR POINT GAPS: .020 IN.
BORE 57 M/M STROKE 83 M/M
CUBIC CAPACITY 1250 C.C.
R.A.C. RATING 12 H.P.
FIRING ORDER 1, 4, 2, 6, 3, 5.

GEAR BOX RATIOS: TOP 4.78-1
3RD 6.3-1 2ND 9.56-1 1ST 19.2-1
REVERSE 19.2-1 BACK AXLE RATIO 4.78-1
BATTERY: 12 VOLT 51 AMP. HRS.
TRACK 3FT. 6IN.
WHEEL BASE 7FT. 10IN.
TYRE PRESSURE 30 Lbs.

MAIN PETROL TANK: 6 GALLONS.
OIL SUMP: 1½ GALLONS.
BULBS: ALL 12 VOLT
HEAD LAMPS SP 24W
SIDE LAMPS SP 6W
TAIL LAMP SP 6W
DASH LAMP SP 6W
IGN. TELL TALE SP 6W

CONSTRUCTED UNDER BRITISH PATENT NUMBERS 264273 — 269713

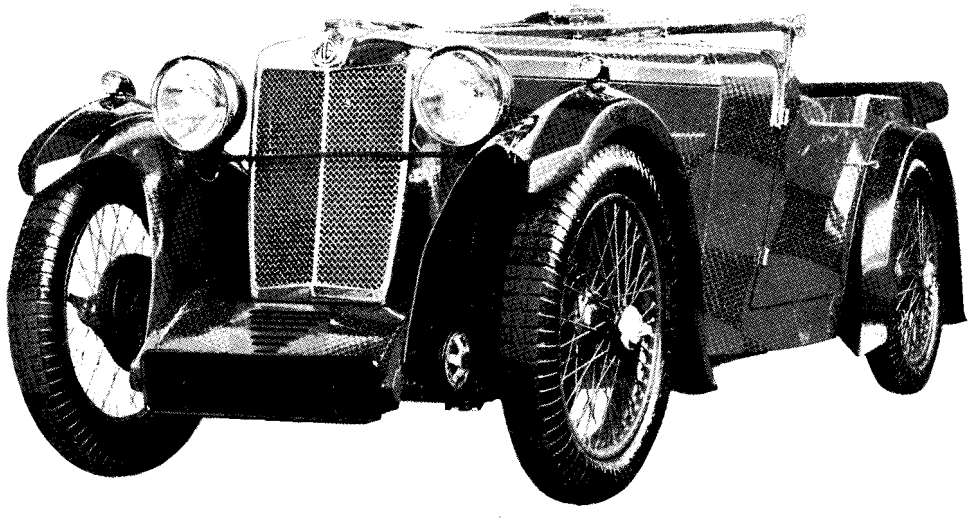
IMPORTANT

DO NOT ATTEMPT TO REMOVE OR ADJUST CYLINDER HEAD WITHOUT REFERENCE TO INSTRUCTION BOOK.

F

Various Instruction Plates to be found on the Car.

The Manual of the M.G. Magna



The first thing that the owner will want to know concerning his Car will be the various lubricants that are recommended by the makers and the points of the chassis that require attention. The engine oil filler is situated on the off side of the engine alongside which there is a dip stick. **Under no circumstances should the Car be driven fast on the lower gears or exceeding 40 miles an hour on top gear during the first 500 miles.** At the end of this period the engine oil should be drained and the base chamber refilled with new oil. The oil filter which will be referred to later should be removed and washed out with petrol.

It is inadvisable to run a cold engine fast until the oil has had an opportunity of circulating and warming up sufficiently in order to circulate freely through the oil passage ways throughout the engine. The pump is called upon to suck from the base chamber or sump oil which has become thick with standing, particularly in cold weather. It may be noticed that

the oil gauge will show that the pressure drops as the speed increases if the engine is driven at all fast when cold. This is an indication that the oil has not become sufficiently thin to pass into the pump in sufficient quantity. The pump lubricates the whole of the engine including the valve gear.

The gear box and rear axle are provided with hexagon shape caps situated in such a manner that they automatically indicate the height level to which oil should be filled, and prevent the possibility of over filling. It should be remembered that the Car should not be moved in any way when the gear box and back axle are filled, otherwise additional lubricant may be carried round by the teeth of the gears thus causing the housing to contain more oil than they need and above the proper level.

Chassis fittings are conveniently lubricated from 6 oil nipples, 3 on either side of the Car, which are to be found on the brackets supporting the dash-board. The bonnet has to be lifted and the nipples fed by the oil gun provided with the Car. Reference to the plates attached to the dash-board show that on the off side of the Car there are nipples marked A, B and C and on the near side of the Car nipples D, E and F. The points lubricated by these various nipples are the brake cables, the spring shackles, the steering box and column and the brake cross shaft. The brake operating spindles which pass through the brake drums are separately lubricated as also are the steering head pins and the track rod and other steering ball socket joints. **Only use Shell gear oil in the oil gun.**

A lubricating chart is provided at the end of the book indicating the lubrication that is carried out from the central dash-board nipples and is shown in black and the other points on the Chassis that have to be individually lubricated are shown with a red circle surrounding them, and if there is any doubt in any owner's mind as to the exact location of the nipples, they can be seen in one or more of the illustrations of the parts contained in this manual. The only point that cannot be normally seen is the clutch thrust lubricator, but this will be dealt with on page 51, from which it follows that the clutch inspection cover has to be removed before the thrust can be lubricated which only requires attention every 2,000 miles.

The following lubricants are recommended by the Company :

Approved Engine Oils.—Every M.G. Magna is tested on AeroShell and the sump and spare container are filled with the same brand when the car is issued new. We very strongly recommend the use of this oil, as we have found it most satisfactory under the most arduous racing conditions.

On the rare occasions when AeroShell cannot be obtained the following is the list of Oils approved for use :—

Shell Triple (summer and winter).
Castrol XL (winter), XXL (summer).
Duckham's Adcol NP2 (winter), NP3 (summer).
Filtrate Medium (winter), Extra Heavy (summer).
Mobiloil AF (winter), BB (summer).
Morrisol (summer and winter).
Pratts' Heavy (summer and winter).
Price's Motorine " C " de Luxe (summer and winter).
Speedolene " B " (summer and winter).

Gearbox and Back Axle.—As in the case of engine oils, we also append the following list as approved for use in the gearbox and back axle :—

Gearbox.

AeroShell. *(Or any of the oils mentioned above.)*

Back Axle.

Shell Gear Oil.
Castrol Gear Oil.
Duckham's Gear Oil " N."
Mobiloil " C,"
Pratts' Gear Oil.
Price's Motorine Amber " B."
Speedolene " H."

and under no circumstances are a mineral and vegetable base oil to be mixed in the engine.

Great care should be exercised in mixing oils at all, and it is far preferable if anybody wishes to run on a particular oil or is so forced by circumstances, that the old oil should be drained out first and a complete replenishment made.

Under no circumstances should paraffin be used to wash out the lubricating system unless the engine is being dismantled. More detailed instruction of the lubricating system of the engine will be found on pages 43 and 44 which deals with the complete travel of the oil from the sump to the pump, thence

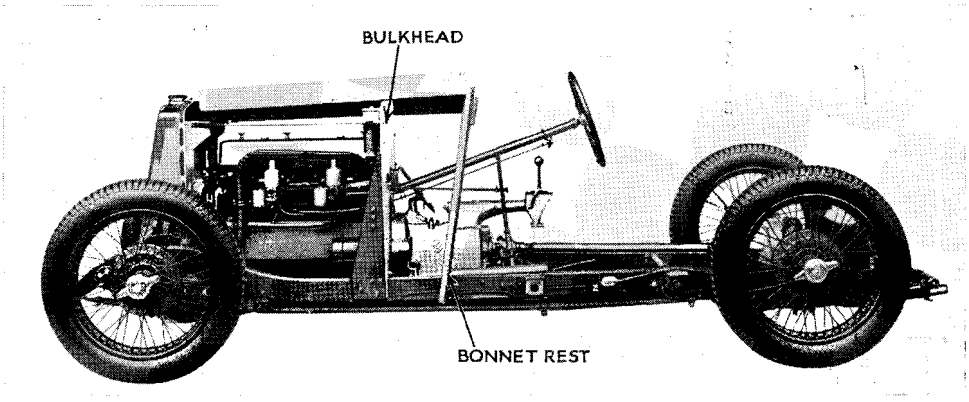


Figure 1.—Side view of the Magna chassis, showing underslung chassis at the rear and bulkhead of dashboard.

through the various pipes and passages in the engine to the main and big end bearings and to the overhead valve gear. The oil pump is provided with a relief valve of very simple construction consisting of a spring and dash-pot enclosed in a cover plug. The details of this will also be found on page 43.

We will now leave the general lubrication summary with the advice to **only use recommended oils whenever obtainable.** Five gallon drums can always be supplied by accredited Agents, and this is by far the cheapest way of buying oil. Keep the receptacle that is used for filling clean and covered, and also wash around back axle and gear box filler caps before these are unscrewed. **The gear box and back axle should be refilled for preference after the Car has been running some time, so that the lubricant has had a chance to become fluid.**

General Survey. As soon as the owner receives his Car it is advisable to make himself familiar with its general mechanical details, and in order to assist in this as much as possible, it has been thought advisable to take a general pictorial survey of the Chassis, in particular those parts that cannot be seen after the body has been fitted.

Illustration No. 1 is a general near side view of the chassis showing how it has been kept as low as possible. Semi-elliptic springs are fitted fore and aft. The engine is mounted in such a way that there is actually a seal between it and the dash-board thus preventing fumes entering the driving compartment. The bonnet in point of fact not only covers the engine, but also the space between the dash-board and the instrument board. This affords marked accessibility to points that would otherwise be hidden.

By bringing the change speed lever back in the small gate through the gear box extension, a low rake steering column is possible. The body is mounted on extension brackets attached outside the frame, thus adding to the stability of the former.

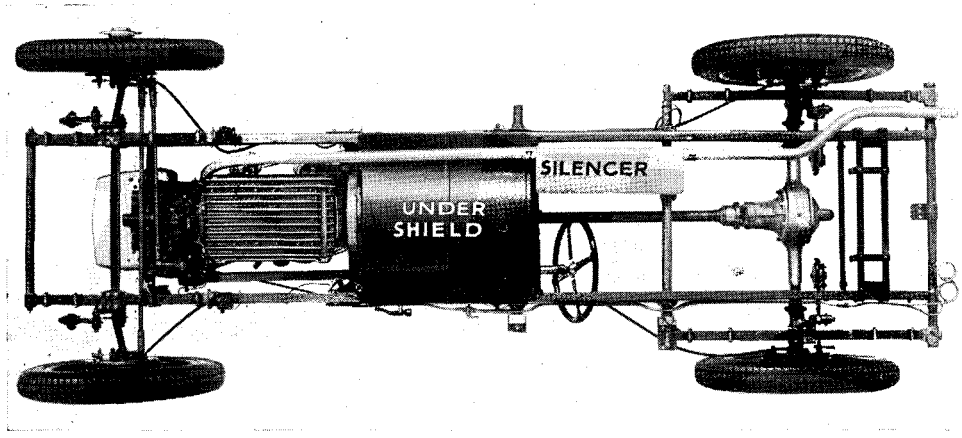


Figure 2.—Underneath view of the Magna chassis.

The view shown in Illustration No. 2 is perhaps a little unconventional to some people, but it is the view obtained by looking at a chassis from underneath. The batteries and petrol tank are not in position, but the under shield beneath the gear box and front passenger's compartment can be seen. Certain views taken from below will be described later, more particularly the front and rear axles.

In order to obtain a better view of the Car, it has been found desirable to remove unnecessary fittings such as wings, wheels, &c.

Illustrations 3 and 4 are two separate views of the near side of the engine. No. 3 particularly shows the upsweep of the frame over the front axle, the mounting of the radiator and the two water connections to the engine. Cooling is by thermo-syphon principle, being assisted by a belt driven fan. It will be seen from this illustration that the dynamo, which is placed vertically and driven from the front end of the engine, has a coupling at its upper extremity which in turn operates the overhead camshaft contained in the top cover.

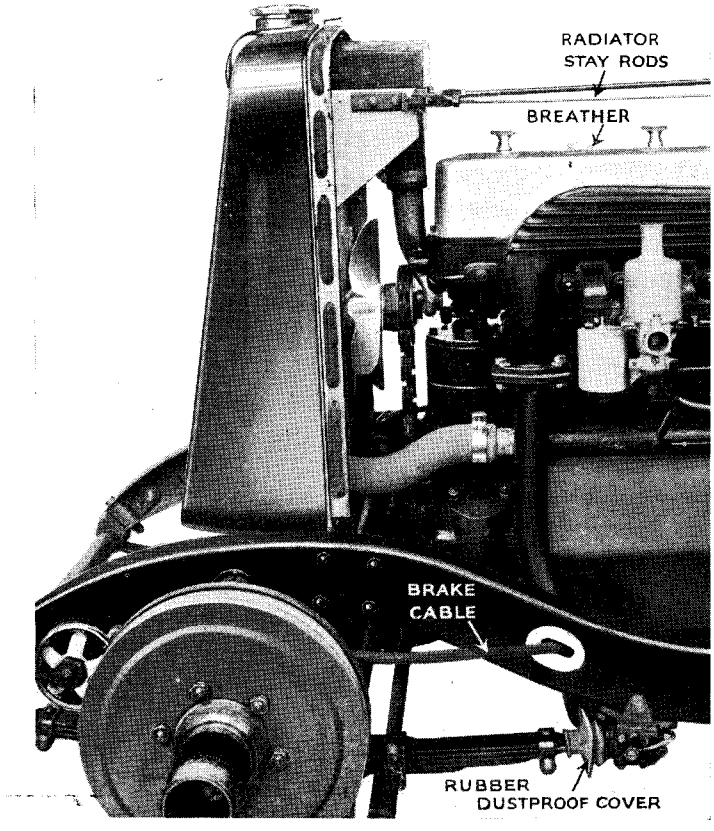


Figure 3.—View of Magna chassis with wing and wheel removed, showing near side of engine.

Illustration No. 4 shows the complete combined inlet and exhaust manifold, and the pair of " S.U." carburetters attached thereto. These carburetters are in couple, so that the throttle control operates them simultaneously, and the " jet control " enriches the mixture for starting of both carburetters at the same time. This illustration further shows the position of the self-starter, the connections to the " S.U." petrol pump, which is electrically operated, at the base of which a petrol filler will be seen.

One small pipe in front of the engine should be noted. This is the oil

delivery pipe from the oil pump to the overhead valve gear. This particular unit will be dealt with separately. On the lower left hand corner of the illustration the method of spring anchorage will be seen, and the cable passing through an oval slot in the frame is for operating the near side front wheel brake.

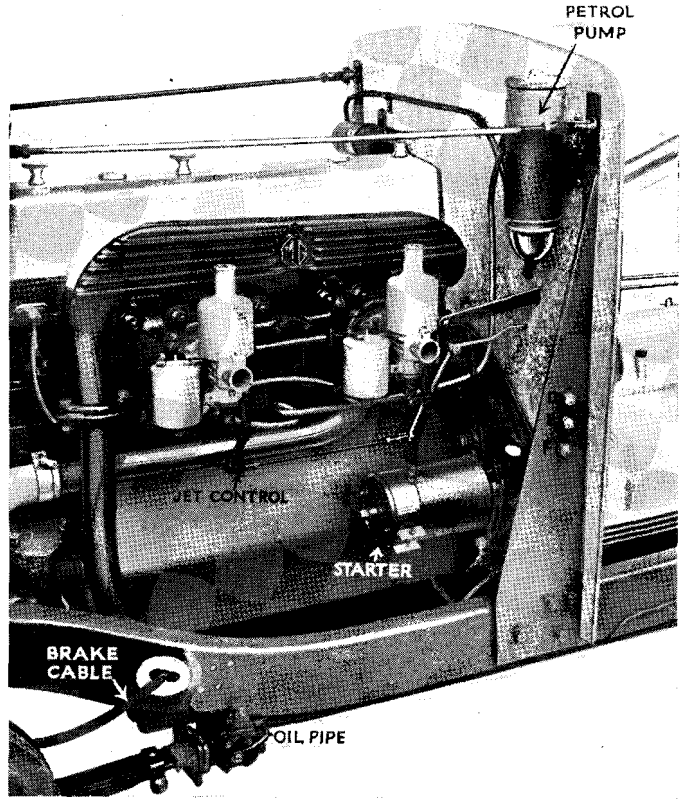


Figure 4.—Near side of engine, showing exhaust manifold, carburetter, position of petrol pump, and self starter.

We will now pass to Illustration No. 5 which is a three-quarter front view of the engine after the radiator has been removed. The radiator is mounted on fibre washers on a bracket in front of the tubular cross member. Next to it is the fan driven by a belt. In front of the dynamo there is a pipe which conducts surplus oil from the overhead camshaft housing back to the engine sump. Behind this will be seen the dynamo, and next to it the high tension distributor for the coil ignition, the coil being situated on the dash-board.

The engine oil filler will be seen in the middle of the cylinder block alongside which there is a dip stick which has indicated on it the correct level of the oil. Whenever the dip stick is removed it should be first of all wiped clean, inserted, and a reading taken after removal.

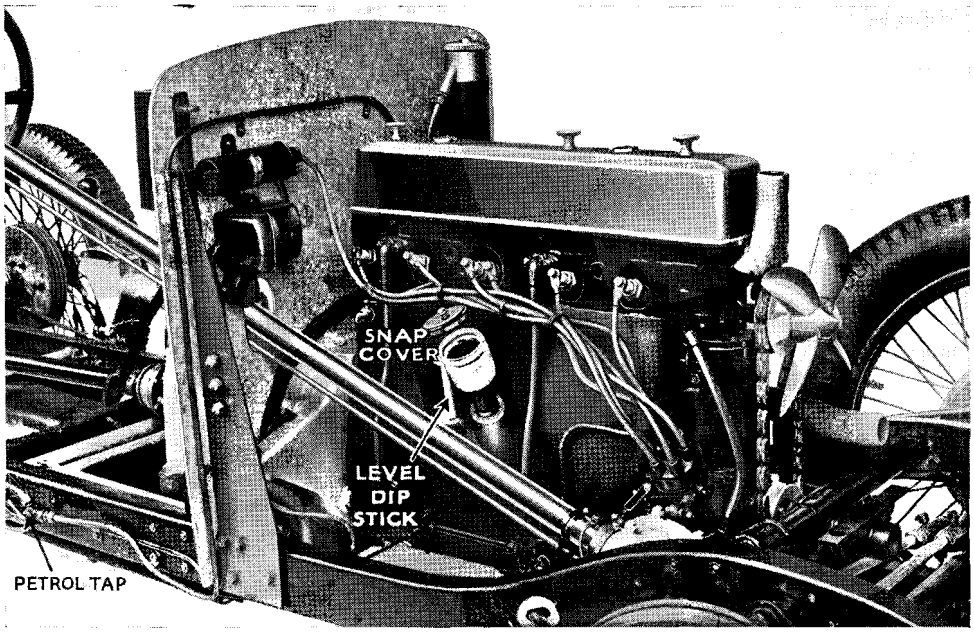


Figure 5.—Off side general view of the engine, with radiator removed.

The next Illustration No. 6 deals particularly with the rear off side view of the dash-board, steering column, clutch, brake and accelerator pedals, gear box and its filler and the general controls of the car, including ignition

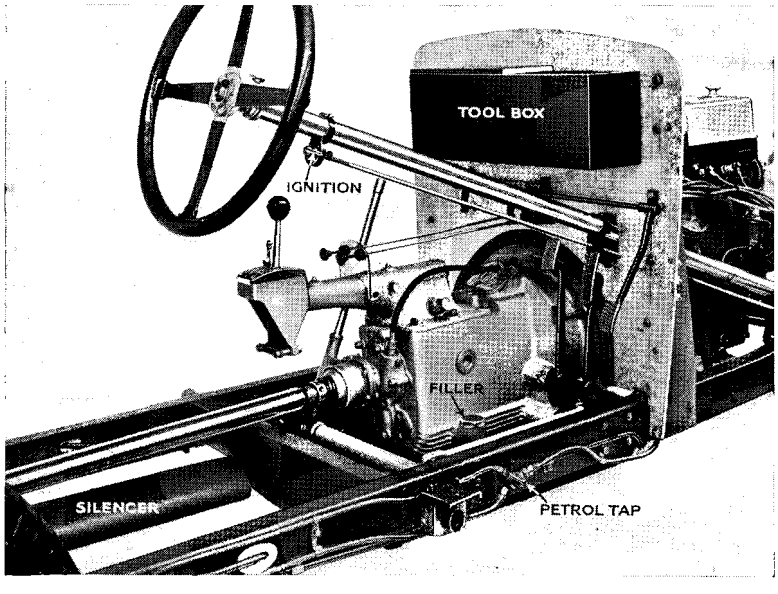


Figure 6.—Three-quarter of side view of chassis, showing position of gearbox, gearbox filler, and dashboard. The petrol tap will also be noted.

control, which is alongside of the steering column. The slow running throttle setting and jets controls are operated by two small rods situated in front of the change speed lever. The hand brake lever is on the opposite side of the gear box.

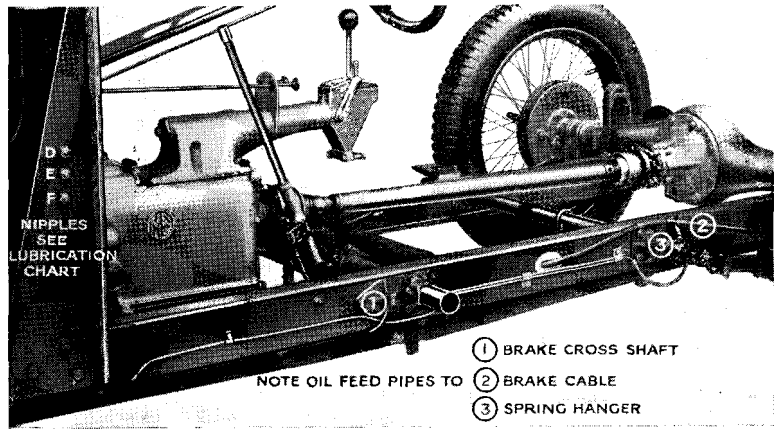


Figure 7.—Near side view of chassis, showing gearbox, axle shaft, and rear axle.

The speedometer is driven from the rear of the gear box immediately in front of the universal joint. The latter is coupled to the front end of the propeller shaft by means of a splined telescopic joint. The petrol pipe system can be seen along the outside edge of the off side of the frame. A 3-way tap is installed, access to which is obtained through a trap in the floor boards, providing the main supply, shut off and reserve supply. Running parallel with the petrol pipe, one sees two other pipes which conduct the lubricant from the dash-board nipples to the rear end of the chassis. The position of the Tool Box will also be noted in this illustration.

Continuing the general survey of the portion of the rear end of the chassis which is entirely covered by the Body, reference should be made to Illustration No. 7, looking first of all at the left hand corner, the oil nipples for the centralised lubrication of the near side of the chassis units will be seen; one pipe passes to the brake cross shaft, another pipe passes to the brake outer cable by means of a flexible pipe, and another pipe can be seen entering the top of the front spring anchorage pin. The body brackets have been removed in this illustration in order more clearly to show the oil pipes. A separate illustration No. 8 has been prepared to cover the lubrication points more clearly as well as the petrol feed line in the off side of the frame.

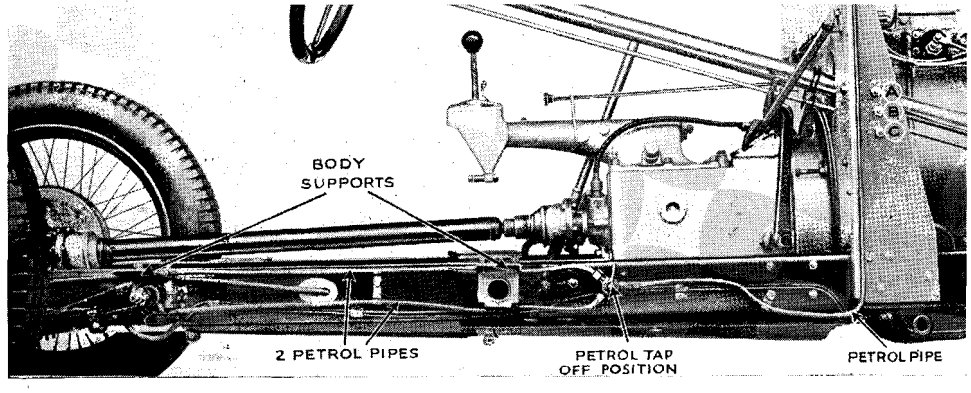


Figure 8.—Off side view of chassis, showing petrol pipe lines and other details.

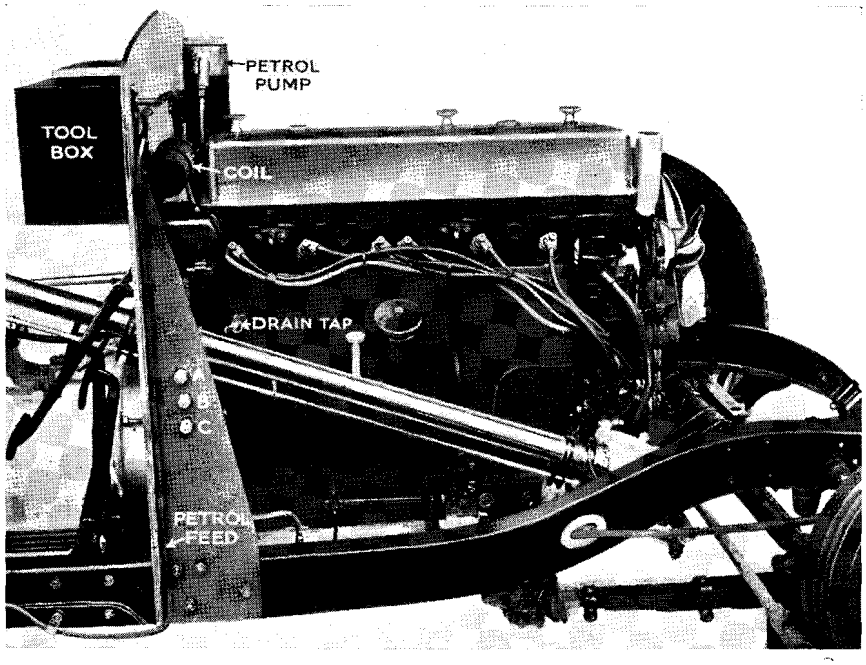


Figure 8a.—Off side view of engine and dashboard, showing position of cylinder drain tap, and method of attaching rear front spring.

Figure 9 is a rear end view of the chassis and shows the back axle attached to the springs by long " U " bolts and a spacer, the mounting of the shock absorbers, the rear cover to the back axle with its filler cap, and the cradle for the battery. The rear cross member has extensions on either side in which the rear end of the rear springs are located. The Petrol tank is, in point of fact, actually supported in the Body. The two petrol feed pipes coupling up to the main and reserve supplies are shown.

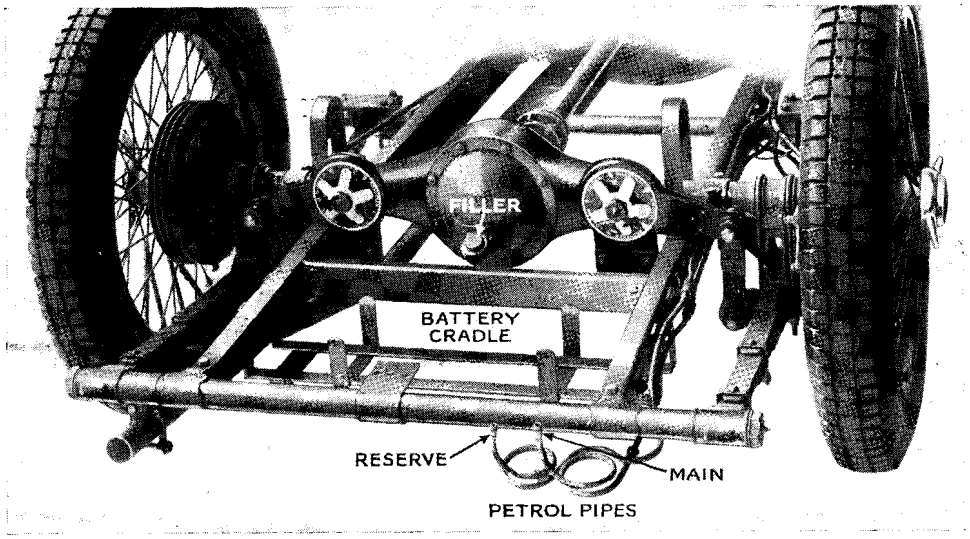


Figure 9.—Rear view of chassis with batteries removed from cradle, showing position of shock absorbers and petrol feed pipes.

Illustration No. 10 shows the location of the petrol tank in relation to the pipe lines, but as before mentioned the petrol tank is actually mounted in the Body itself.

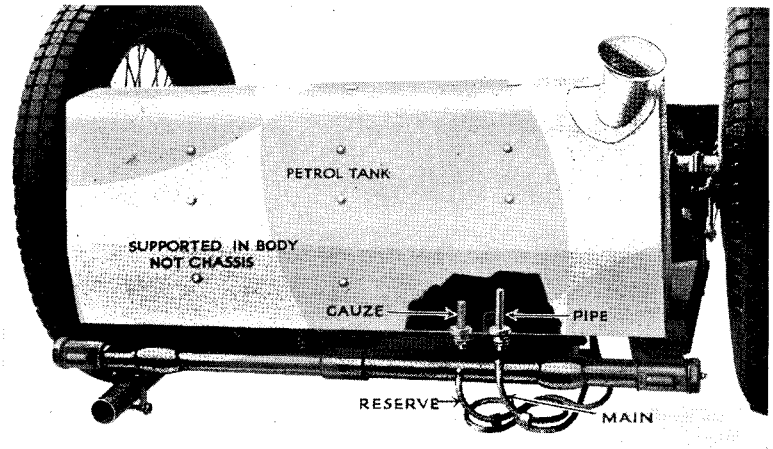
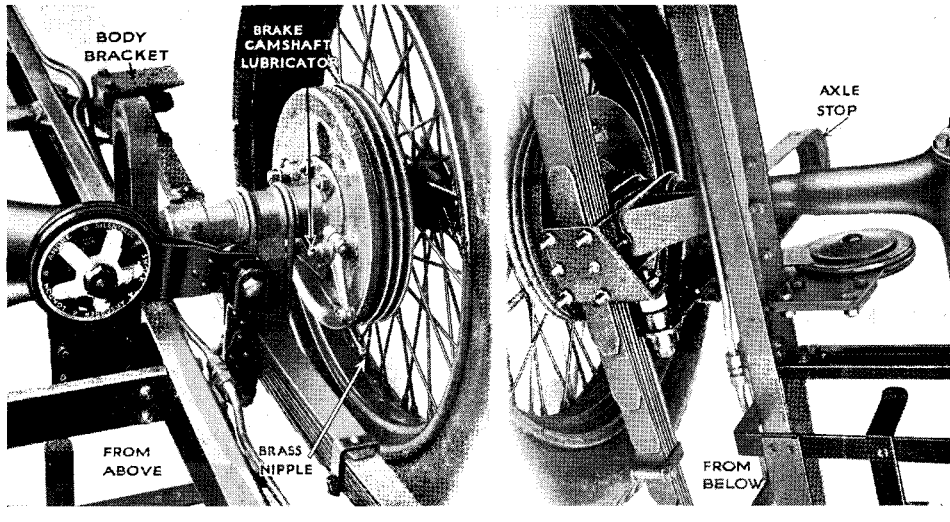


Figure 10.—Sectional view of petrol tank, showing main and reserve feed pipes, leaving one gallon for reserve.

Figure 11 may need a little explanation. It contains a close up view of the rear of the chassis as well as a view taken of the spring anchorage and shock absorber bracket as seen from beneath the Car. The springs are held in position by two " U " bolts. It is obvious that these will require tightening from time to time, and therefore the illustration shows exactly how they are mounted Shock absorbers need no lubrication whatever, being mounted on " silent blocs." To tighten the shock absorber turn the nut in a clockwise direction.

Illustration 11A is a close up view of the shock absorber mounting assembly from above, the rebound axle clip being situated alongside this.



Figures 11 and 11a.—View of the off side of the rear axle, as seen from above and below. The shock absorber adjustment and mounting are visible.

The rear brake cable has been purposely drawn through the yoke in order to show how this terminates in a brass stop into which the cable is swaged. Carefully note the position of the brake cam shaft lubrication nipple.

Steering. As the majority of the parts of the steering lay-out are normally out of view, it is as well that the owner should become familiar with

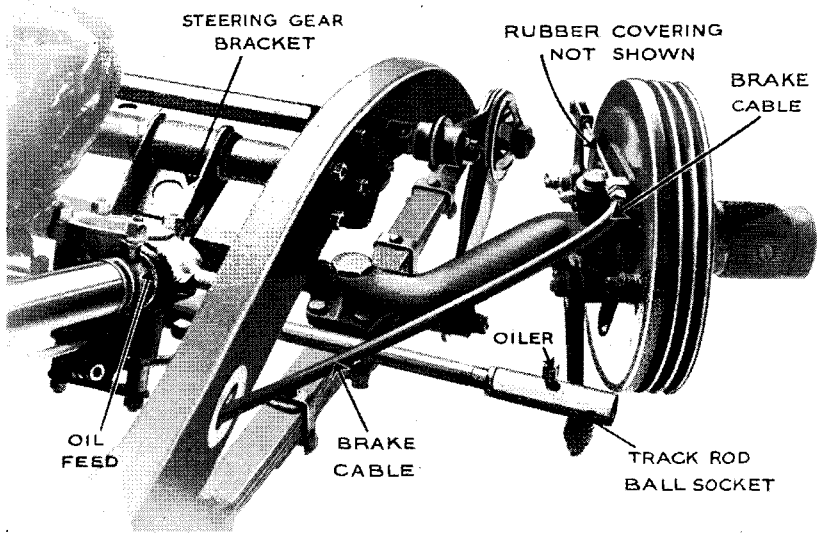


Figure 12.—General view of the steering layout and front wheel track actuating mechanism.

the design and principle, so as to be able to carry out his part of lubrication, and in the event of any accidental damage occurring to see exactly how the

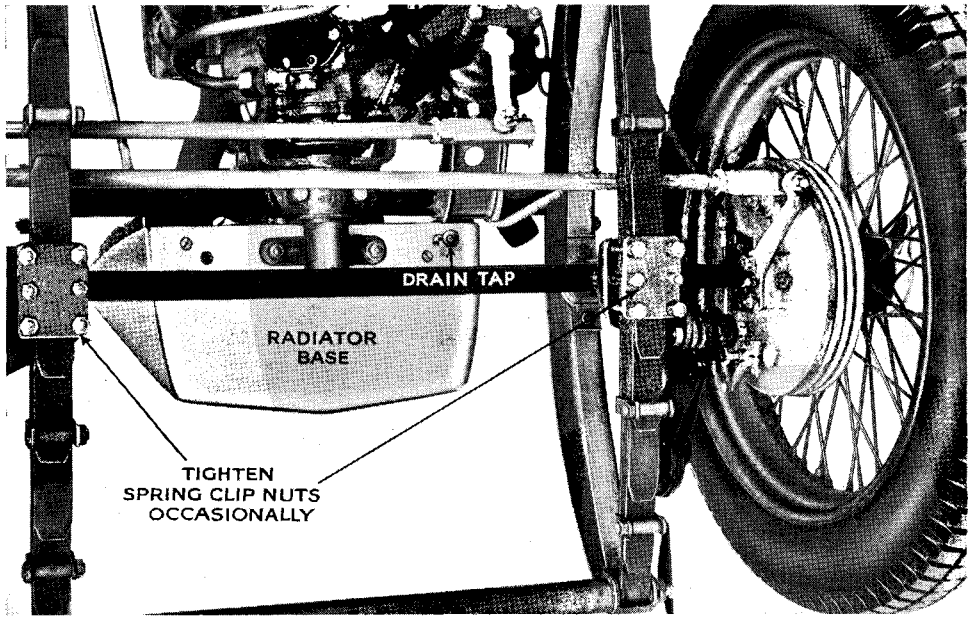


Figure 13.—View of the front end of the chassis as seen from below. The drain tap should be particularly noted for draining the radiator.

parts are mounted. The steering box proper is attached to a bracket on a cross member of the frame and is fitted with a drop arm which is coupled to a transverse pull and push rod. This will be seen in subsequent illustrations, but the view shown in Illustration No. 12 is of the Steering Gear Box and the off side steering arm which is in turn coupled to the steering head and the track rod. Every articulating joint of the Steering is fitted with an oil nipple. The track rod is threaded at either end. In fact, all the Steering Rod, or, to be more exact, Tubes, are threaded. This permits of accurate adjustment, and to take care of any irregularities in the tracking of the wheels.

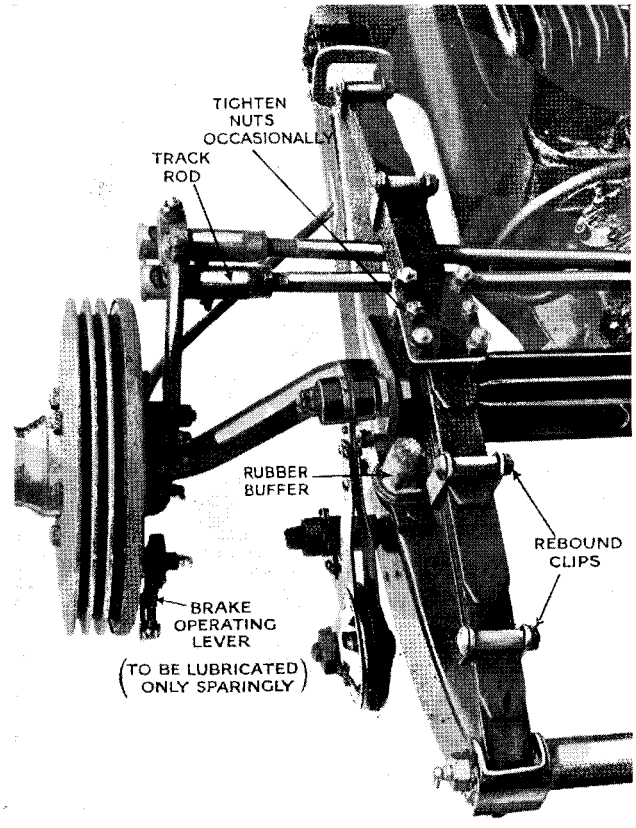


Figure 14.—Underneath view of the off side of the frame, showing steering connections on the track rod and filler push rod. Six spring clip bolts require tightening occasionally.

Illustration No. 13 is a view taken from beneath the Car. While it is primarily intended to show the underneath side of the Steering Box, the Pull and Push Rod, Track Rod, and Steering Arms, yet at the same time it affords an excellent opportunity to examine the underneath side of the Engine, Timing Case, Oil Pump, Extension Bracket which supports the Radiator and the attachment of the Front Axle to the spring by means of four bolts and two studs at each side.

Illustration No. 14 is also an underneath view of the front end of the frame showing the near side steering arm to which are attached two ball

sockets of the Steering Rods. This illustration shows clearly the shock absorber mounting, the rubber buffer between the frame and the spring and the various lubricators on the near side front axle assembly.

Illustration No. 15 is the same view as Illustration No. 14, but taken from above, and after it has served its purpose to illustrate the lubricating points of the steering Head Pin, Steering Rod Joints, and Brake Camshaft Spindle, it is proposed to pass on to the most important part, namely the Brakes.

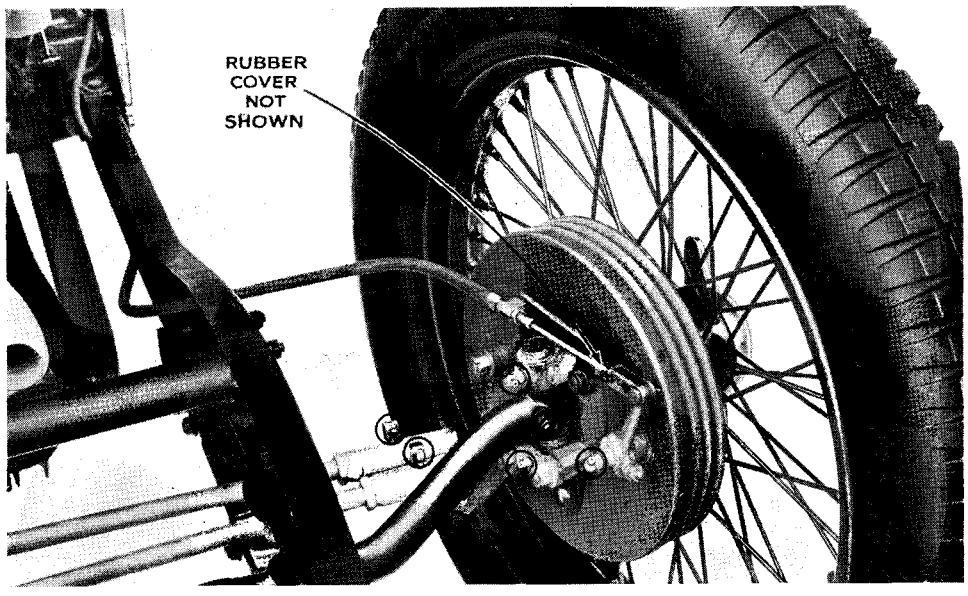


Figure 15.—Lubrication points of steering head are marked with circles, and the method of actuating the brakes can also be seen.

Brakes. No useful purpose will be served by including redundant illustrations in the book, and it will already have become apparent from the examination of Illustrations Nos. 3, 7, 11, 12 and 15 that the brakes are applied through the agency of steel cables which pass through rubber covered outer cables from either side of the centre of the chassis to the brake drums, the final application being shown in Illustration No. 15. *A sketch is provided on the back of the title page showing diagramatically how the brakes are applied.* A cross shaft is placed in the middle of the chassis anchored at either end and supported in the centre to a tubular cross member of the frame. This can be seen by referring to Illustration No. 16 which more particularly illustrates the hand brake. The lever is situated on the near side of the gear box, and towards the base an extension will be found on which there is a thumb nut. The foot brake adjustment is on the off side of the Car. The brake cross shaft removed from the Car is shown in Illustration No. 17.

The foot brake pedal is coupled to the brake actuating cross shaft by a rod and either extremity of the brake cross shaft is provided with a pulley having holes drilled through it top and bottom to receive the end adaptors of the brake cables. As either brake is applied, the brake cross shaft is rotated pulling the rear brake cables forward, and the front brake cables backward.

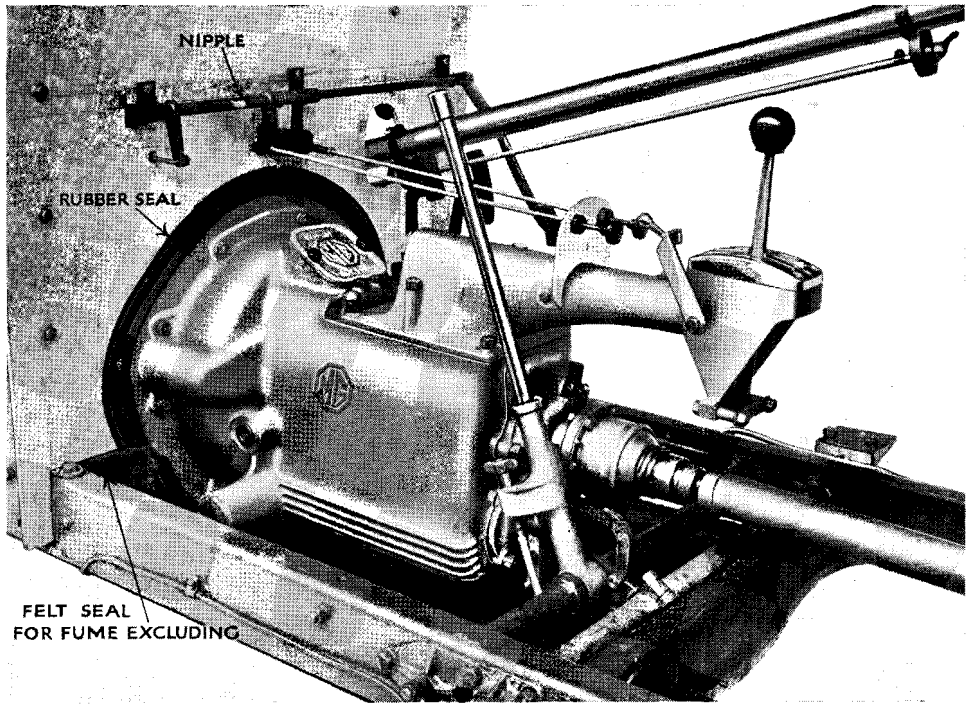


Figure 16.—Near side of centre of the chassis, showing the hand brake, the engine controls, and the rubber and felt fume seals.

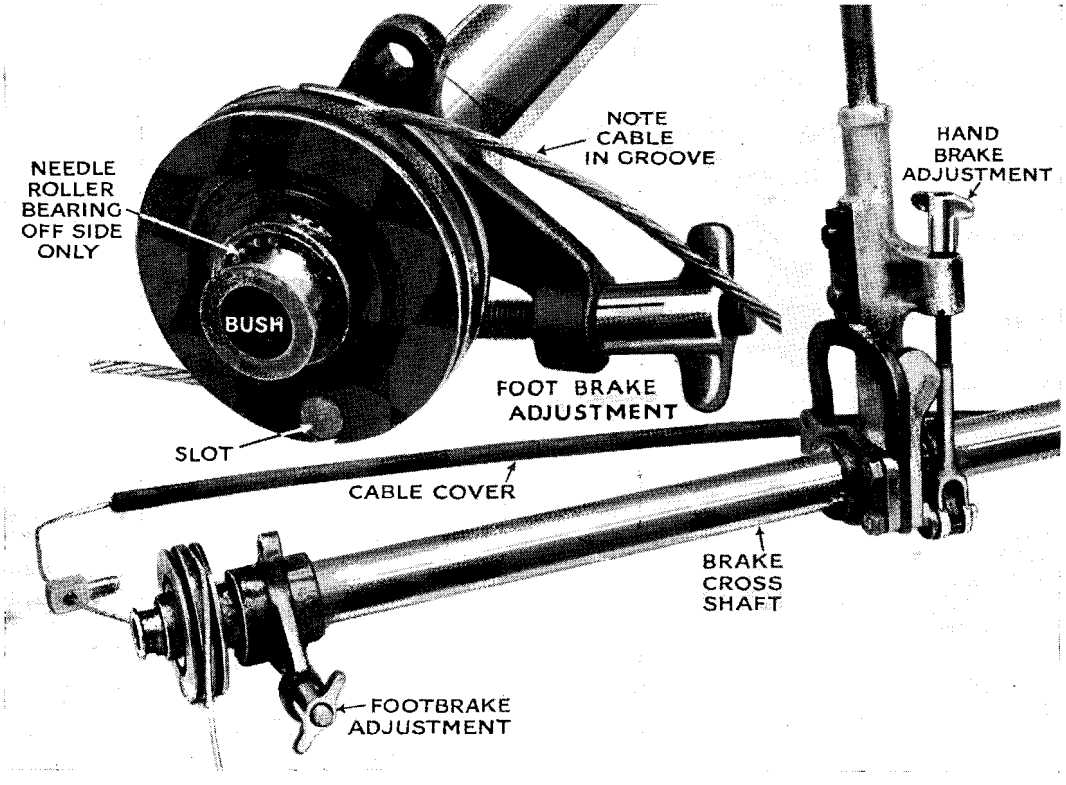


Figure 17.—Views of the brake cross shaft, showing the hand and foot brake adjustments, and the manner in which the cross shaft is supported at one end on a needle bearing.

Independent adjustment. Should it be necessary to adjust the Brakes independently this can be done by means of adjusting screws fitted to the cable stops on the axle back plates. At this point on the cables a rubber dirt excluder is fitted in the form of a rubber tube, and this tube is mounted on what is actually the locknut for this adjustment.

By undoing this locknut the cable stop can be adjusted on its thread by the amount required and the locknut re-tightened.

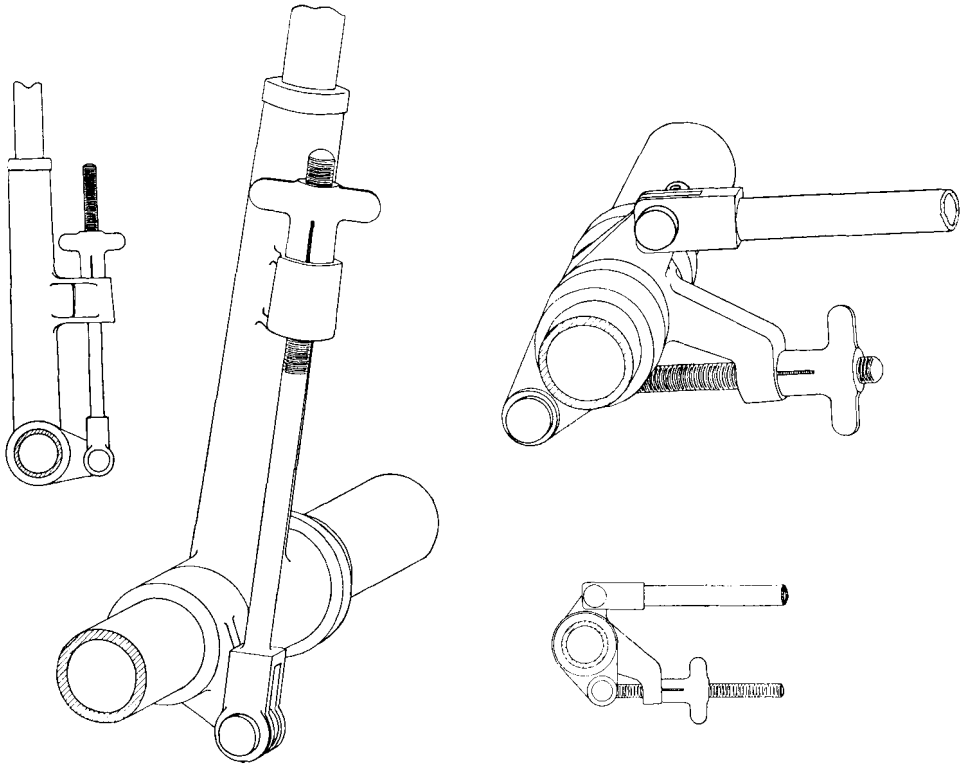


Figure 17a.—Details of the foot and hand brake major adjustments. To tighten the brakes the thumb nuts should be turned in a clockwise direction.

The whole of the brake cross shaft is lubricated from the dash-board nipples, and in order to give perfect freedom for the rotation of the cross shaft, it is mounted at one end on what are termed needle bearings. These are shown in Illustration No. 17. Should it ever become necessary to remove the cross shaft, if care is exercised the entire bush of the needle bearings need not be removed. To re-assemble the needle bearing the inner shaft should be covered with grease and the bearings imbedded in it when it will be found that they will stop in position in order that they can be inserted inside the cable operating pulley.

The front and rear brake drums of the Car are identical in design. It is necessary from time to time to remove the brake drums in order to clean out the brakes or have them re-lined. The procedure is very simple. When

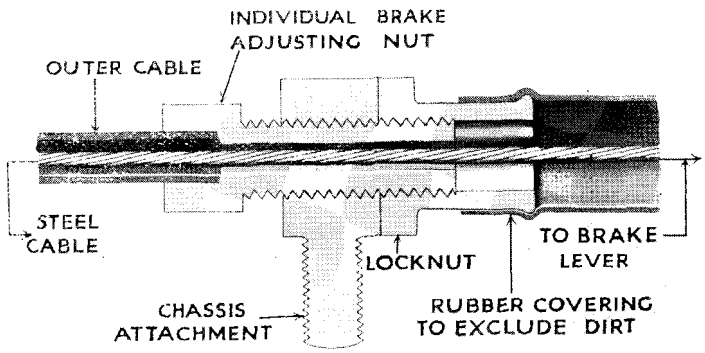


Figure 17b.—Independent brake adjustment for each wheel, see text on page 18.

the wheel is removed as shown in Illustration No. 18, take off the nuts with a $\frac{5}{16}$" spanner, and after releasing the brake, the drum can be withdrawn by a slight tapping on the ribs with a wooden mallet or a piece of wood and a hammer. The brake drum and its components are shown in the centre of Illustration No. 18, and in the off side of the illustration the brake shoes with the two pull off springs can be seen.

The counter sunk screw in the fluted portion of the hub is intended to permit the split pin of the hub nut being easily removed and replaced through the hole in the hub.

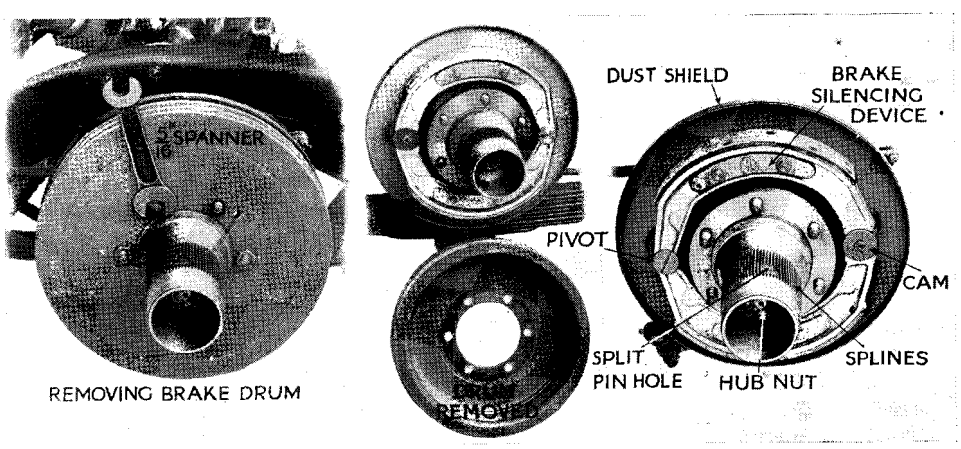


Figure 18.—Three views of a brake being dismantled, first showing the drums being removed, the centre view of the hub with drum removed, and on the right the brake shoes and brake silencing device.

Brake Anti-sqeak Device. The brake shoes are fitted with an anti-squeak device, which consists of lead alloy blocks fitted into the channel section of the brake shoes and held in position by means of clevis pins and little coil springs. When vibrations take place in the brake drum, they are

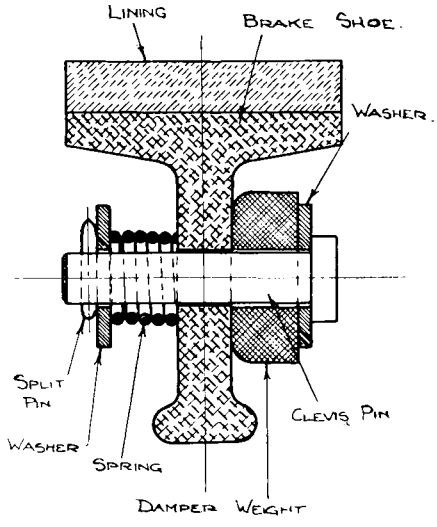


Figure 17c.—Sectional view through a brake shoe, showing the lead weight attached to the brake shoe, and the various component parts for same.

communicated to the brake shoes and the shoes vibrate, the lead weights however are in effect ' left behind ' by the vibrating shoes and energy is wasted in friction between the weights and the shoes. The conditions under which the weights are mounted can in practice be made such that they can always waste more energy than the squeaking forces can generate and the squeak is prevented.

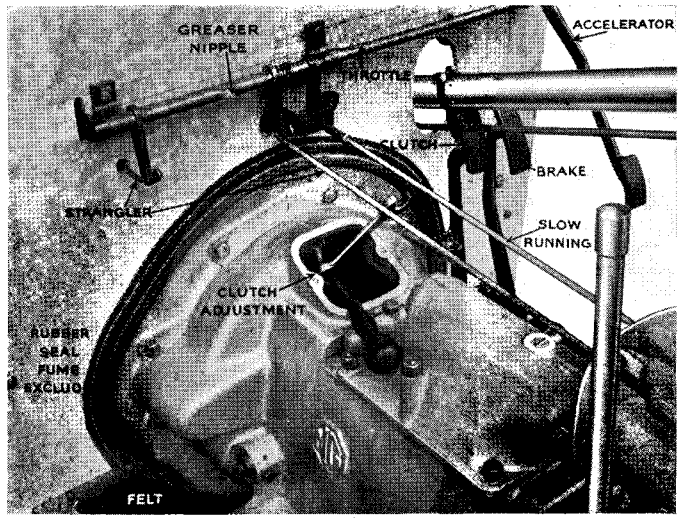


Figure 19.—View of the clutch housing with cover removed, showing method of adjusting clutch.

Running Adjustments. Before dealing with the detailed description and dismantlement of the various units of the chassis, the owner may require to know the particular adjustment which he can carry out with the aid of a spanner and a screw driver, namely, adjusting the clutch. Reference to Illustration No. 19 shows the rear of the dash-board and the location of the clutch inspection cover. After removing this, it will be found that there are three clutch withdrawal arms towards the outer extremity of which are situated three set screws and locking nuts. When the clutch is pushed out by the pedal the three withdrawal arms are forced forward sufficient to disengage the clutch plates. The proper working of the clutch is dependent upon the adjustment of the set screws of the withdrawal arms. It will be better to refer to the section dealing with the clutch before attempting to adjust it. There should always be at least 1″ free travel before the clutch disengages. The free motion can be felt with the hand by pressing on the clutch pedal.

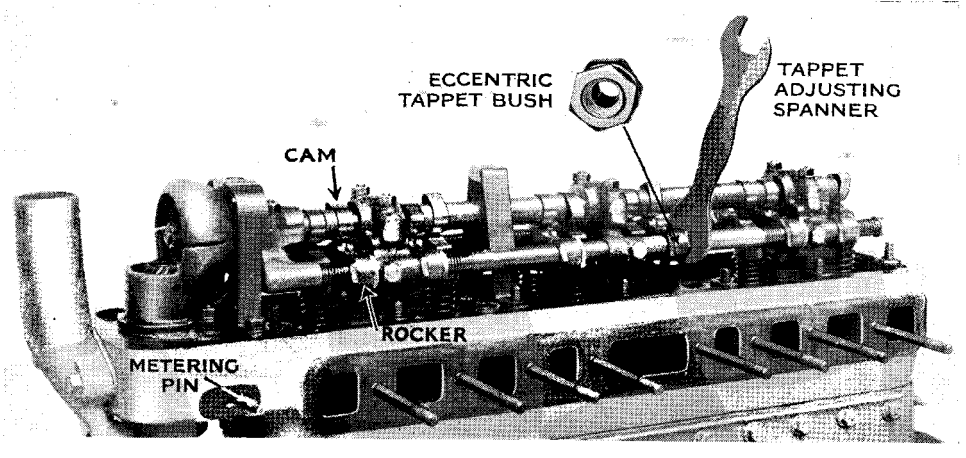


Figure 20.—View of valve gear with cover removed showing method of adjusting a tappet, by rotating an eccentric Bush, seen above the engine.

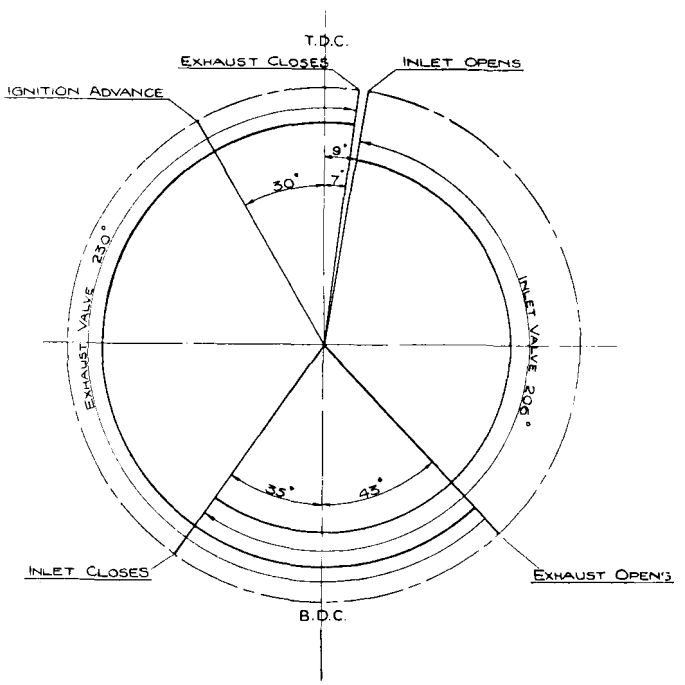
Tappet Adjustment. Before the owner has had an opportunity of reading through the whole manual he may require to adjust his valves, and in order that he should know what is taking place, a careful examination of Illustration No. 20 will make the matter clear. He will probably be aware that there is a necessity to have a definite clearance between the cam and the valve rocker. the various parts are distinctly marked in the illustration. It is of course important to see that the valve is properly seating when any adjustment is attempted, and this can easily be seen in position of the cam in relation to the rocker. There is a single camshaft operating both the inlet and the exhaust valves. These are easily distinguished, from the fact that all the exhaust valves are on the *near* side of the engine and the inlet valves on the *off* side of the engine. The valve rockers are attached to separate shafts at their outer extremity, and are provided with eccentric bushes. The opposite extremity of the rocker is wedge shaped so that if the nut which forms part of the eccentric bush is rotated, the wedge end of the rocker will either advance or recede from beneath the cam, and present a thicker or thinner section to the face of the cam when this rotates. The eccentric bush is provided with a

locking nut and in Illustration No. 20 a spanner is shown in position ready to slack off the locking nut. The eccentric bush with locking nut is shown above the engine. See that the bush does not rotate while the locking nut is being tightened.

Correct clearance between the valve rocker and the face of the cylindrical portion of the cam should be .004 when the engine is hot.

Ignition. Little instruction need be given on this subject.

The High Tension distributor is very accessible. It is provided with a greaser to lubricate the spindle, and only high melting point grease should be employed, one turn every thousand miles being sufficient.



Valve and ignition timing diagram.

The contacts can be inspected by unclipping the two springs when the cover carrying the High Tension Leads can be removed. The ignition timing should be set so that when a piston is on top dead centre the points of the make and break just start to open with the distributor at full retard. The points may require adjustment from time to time, and a spanner is provided with the Tool Kit for this purpose. The clearance between the points should be 20/1000 of an inch.

Illustration No. 21 shows the distributor with the cover removed, and a spanner in position for adjusting the contact points. The centre spindle of the High Tension distributor carries a " Bakelite " Arm called the " Rotor " in the illustration. It can only fit on the spindle one way. If this part is removed, it affords an excellent thief proof device, but care should be exercised to see that it does not become chipped or in any way damaged, not to mention lost after it has been removed. The ends of the High Tension Wires are soldered to brass discs in order to make good contact with the terminals inside the cover. See that the terminal screws are always tight.

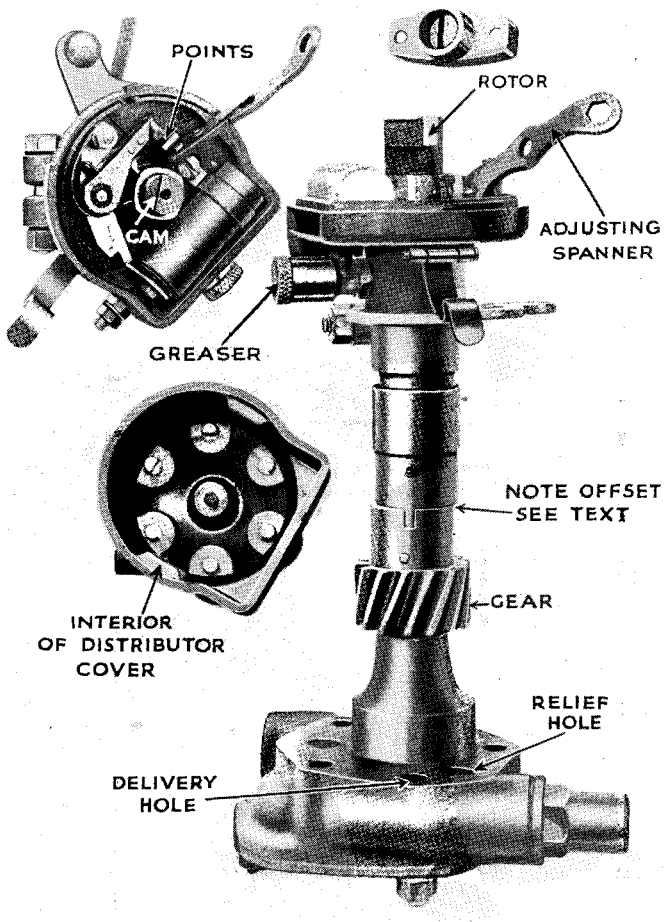


Figure 21.—Back and side view of the Distributor, showing spanner for adjusting in position, internal view of Distributor cover, and assembly of the oil pump and Distributor removed from the engine. It will be noted that the joints between the pump shaft and the shaft driving the Distributor are offset. They cannot be assembled in the engine in this manner, so that care should be exercised. If ever the Distributor is removed, no force must be used in replacing same.

Misfiring may be caused by any of the following :—

1. Dirty sparking plug.
2. Cracked porcelain.
3. Bad connection to High Tension Leads.
4. Bad connection from High Tension Distributor to Coil.
5. Improper adjustment of make and break points.
6. Dirt between make and break points.
7. Defective Coil.

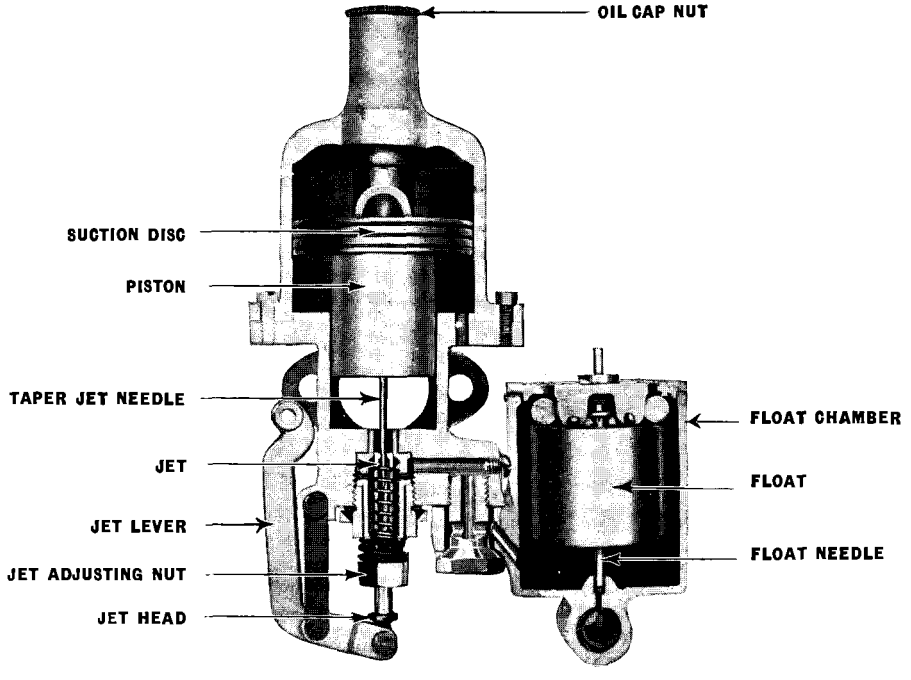
These causes exclusively deal with the electrical side. There is one other remote cause of electrical failure, namely, bad earth contacts from the battery to the frame. Other causes of misfiring can be attributed to Carburetter and

improper valve adjustment. The latter point will be dealt with in connection with the engine dismantlement, but so as not to interfere with the proper sequence, Illustration No. 21 should be examined.

Carburetter. A separate Instruction Book concerning the S.U. is provided with the Car, but the following particulars specifically apply in the case of the 12/70 M.G. In normal use the needle No. is M5.

To afford a richer mixture for slow running, the jet control nut should be unscrewed.

By screwing the jet control nuts upwards the petrol consumption can be cut down if the owner is satisfied with a lesser degree of acceleration and speed, and sometimes in hot weather general all round better carburation can be obtained by thus cutting down the petrol supply.



A little oil should be injected into the dash pot brass cover screw every thousand miles, to lubricate the piston guide rod; three drops of " Three-in-One " Oil is advised for this purpose.

Under no circumstances should the body of the piston be lubricated.

By inserting the finger through the air inlet to the carburetters, the pistons can be lifted inside the body of the carburetter, and these should rise and fall freely.

The use of the strangler, or as it is correctly called, the jet control, is intended only for starting when the engine is cold, and should be employed as little as possible. The effect of using the jet control is to enrich the mixture when starting. If it is left in operation longer than is necessary the cylinder walls will be bathed with surplus petrol which will soon have a damaging effect on the pistons, and other parts of the engine as well.

General description of the 12/70 M.G. Magna Engine. In order that the owner may become familiar with all the details of the power unit illustrations have been prepared showing the complete engine, clutch and gear box removed from the chassis.

Illustration No. 22 is a view of the off side of the engine suitably lettered to indicate the various parts. More detailed instruction will be subsequently given concerning the items of distributor and dynamo. The principal points of interest in this illustration are the location of the oil filter and the sump.

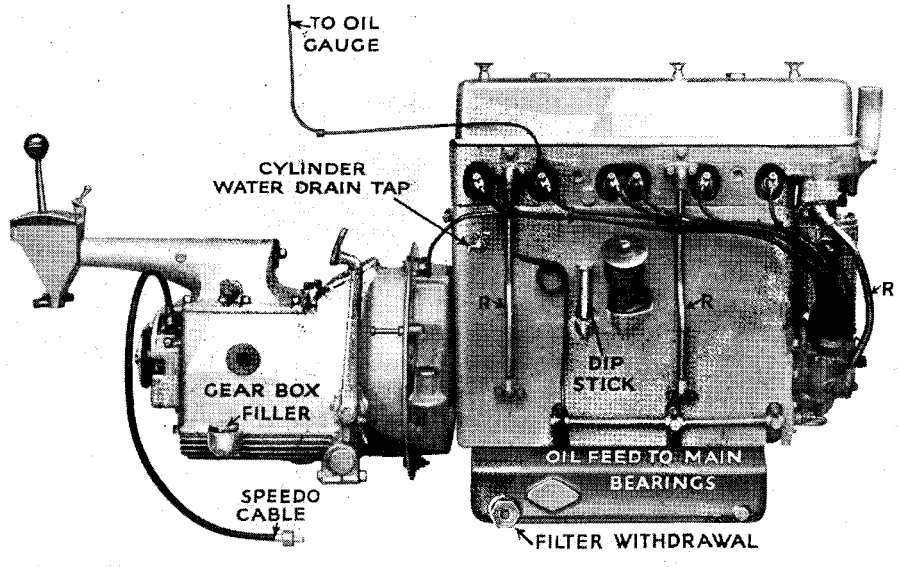


Figure 22.—General off side view of the engine and gearbox unit removed from the frame. The chief points to be noted are the position of the oil filter and drain in the sump, and the gearbox filler. The small pipes marked " R " are for the return oil feed from the overhead valve mechanism to the sump. The cylinder drain tap must be opened when the water is drained from the system as well as the tap under the radiator, shown in Illustration No. 13.

The oil delivery pipe from the pump to the main bearings is situated at the bottom of the base chamber, and another pipe is shown leading from the rear delivery branch up to the Oil gauge. There are three pipes on this side of the engine which conduct surplus oil by gravity from the overhead valve gear back to the sump. The engine oil filler will be seen in the centre of the cylinder block, and alongside it the dip stick.

The gear box portion of the illustration need only receive a cursory inspection as this will be dealt with later. Other points however may be noted, namely, the gear box filler, the position of the speedometer drive, and the forward stop to limit the travel of the clutch pedal.

The near side of the engine, Illustration No. 23, shows a good deal more than can be seen when the engine is in the chassis.

There is a front extension on the extreme left of the illustration, which acts for the dual purpose of starting handle bracket and radiator support as well as front engine bearer.

The fan, which is supported in an extension on the water outlet pipe, is driven by a belt. The water inlet pipe from the radiator to the cylinder block

is also visible. It will have become obvious that the front end of the crank shaft is fitted with gearing which in turn drives the Oil pump. A small pipe will be seen in this illustration leading from the pump to the cylinder head to lubricate the overhead rocker gear.

The inlet and exhaust manifolds are cast in one piece, while the position of the Carburetters and the jet control are shown. The remaining points in this illustration are the position of the self-starter and the gear box drain plug. In this and subsequent illustrations it will be seen how the engine is mounted in the frame on a Three Point Suspension, one point at the front marked No. 1, and two points at the rear, one on either side, the one on the near side at the rear being marked No. 2. It will be seen from this illustration that the gear box is fitted with an extension to the lid in order to bring the change speed lever back to a convenient operating position.

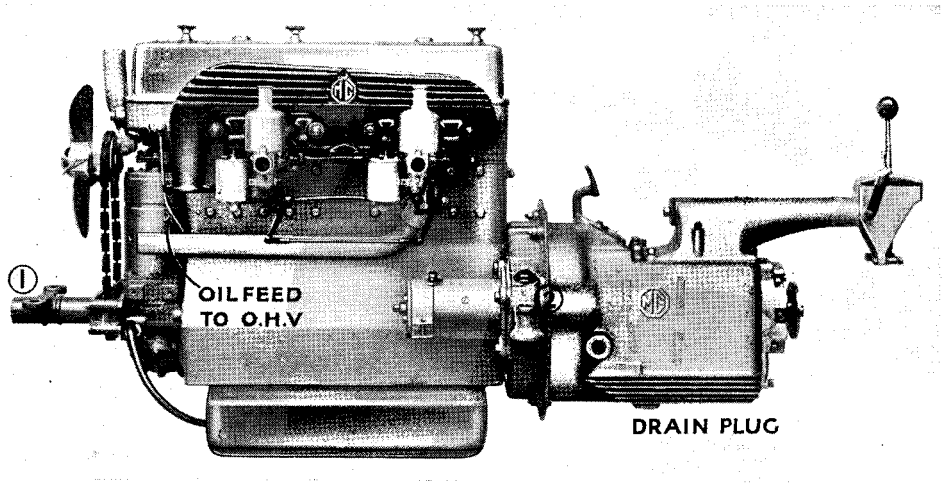


Figure 23.—Near side view of engine and gearbox unit which is attached to the frame at points 1 and 2. The drain plug for the gearbox will be noticed.

Illustration No. 24 is a front view of the engine showing more detailed position of the fan and the nipple lubricating its bearing, the location of the High Tension distributor and the oil pump. It also shows the three points, 1, 2 and 3 at which the engine is mounted in the frame. The combined starting handle and radiator bracket can be more clearly seen.

Illustration No. 25 shows what the Inlet and Exhaust Manifold looks like after it has been removed and the copper and asbestos washers which are fitted between it and the cylinder head. If ever the Manifold is removed the washers should be inspected and cleaned, and the studs by which the manifold is held to the cylinder head should also be cleaned. When the manifold is re-fitted, the nuts holding it to the studs should all be gradually tightened so as to get a uniform pressure and prevent any possible chance of leakage through distortion.

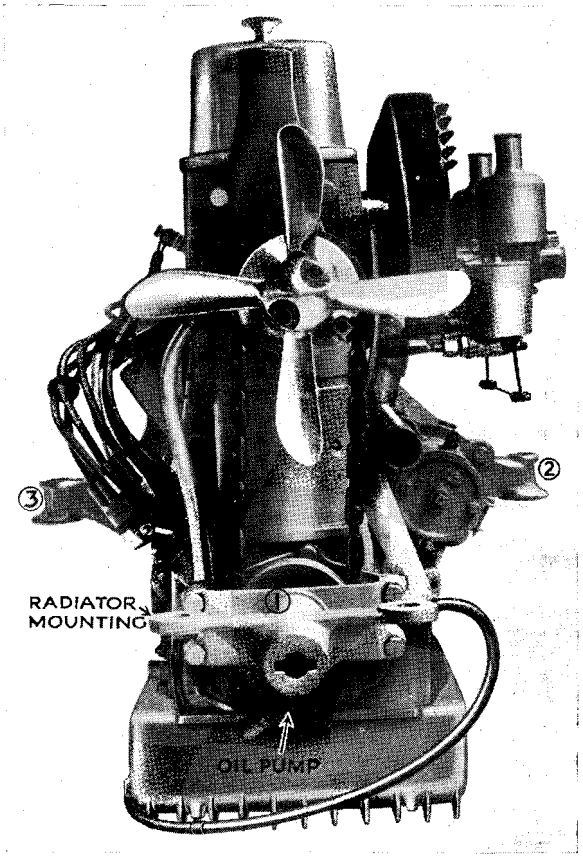


Figure 24.—Front view of the engine removed from the frame, showing radiator mounting on the front end extension, and the position of the fan.

Illustration No. 25 below also shows the valve operating gear after the cover has been removed.

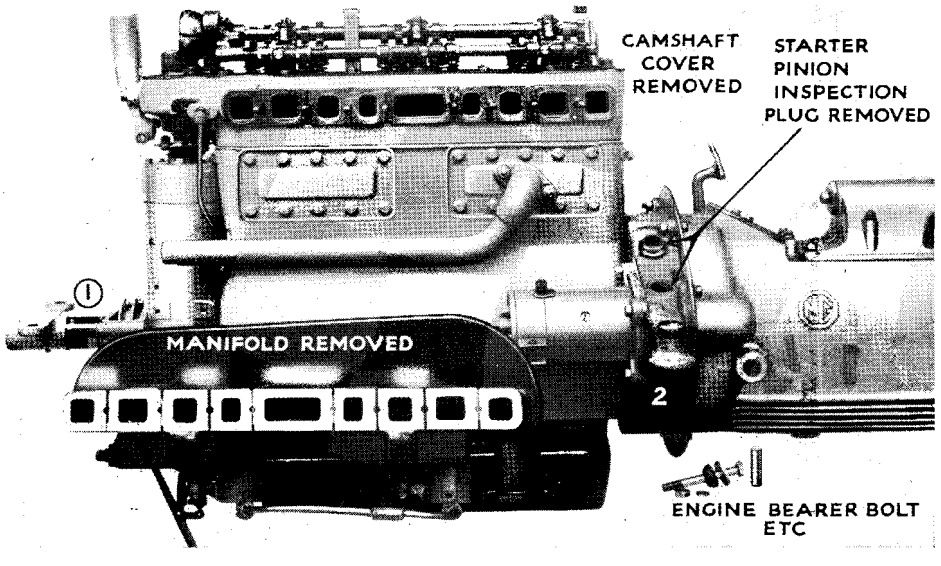


Figure 25.—Near side view of engine with camshaft cover removed. The rear engine bearer bolt assembly is shown in detail, and the position of the removable plug. The whole manifold has been removed, and is shown beneath the engine.

Action of the Electric Starter. A plug is provided above the clutch housing immediately over the self-starter spindle, the removal of which permits an inspection of the starter drive. This consists of a coarse threaded shaft on which a pinion is fitted. When the starter button is pressed the starter motor rotates quickly causing the pinion to be rotated, but owing to the form of this pinion it has a tendency to travel along the starter extension shaft, and thus engage with the teeth of the fly wheel, the shock being taken up by a recoil spring.

The moment the engine starts up and the self-starter button is released the flywheel rotation causes the pinion to travel back along the starter shaft out of engagement. The hole in the clutch housing permits the introduction of a bar to engage with the starting pinion should this become jammed in the flywheel and for cleaning purposes.

The front end of the self-starter shaft is provided with a square end, and it is possible in the case of only a slight jam to rotate this spindle with a spanner and thus disengage the starter pinion from the flywheel. The above explanation will be made clearer on examining Illustration No. 26, which shows the starter removed from the engine. It is held in position by two studs and one bolt, and there is a distance plate between the starter housing and the crankcase or clutch housing. The flywheel teeth can be seen and also the spiral thread on the extension of the starter shaft along which the engaging pinion travels to and fro; the recoil or buffer spring is clearly visible.

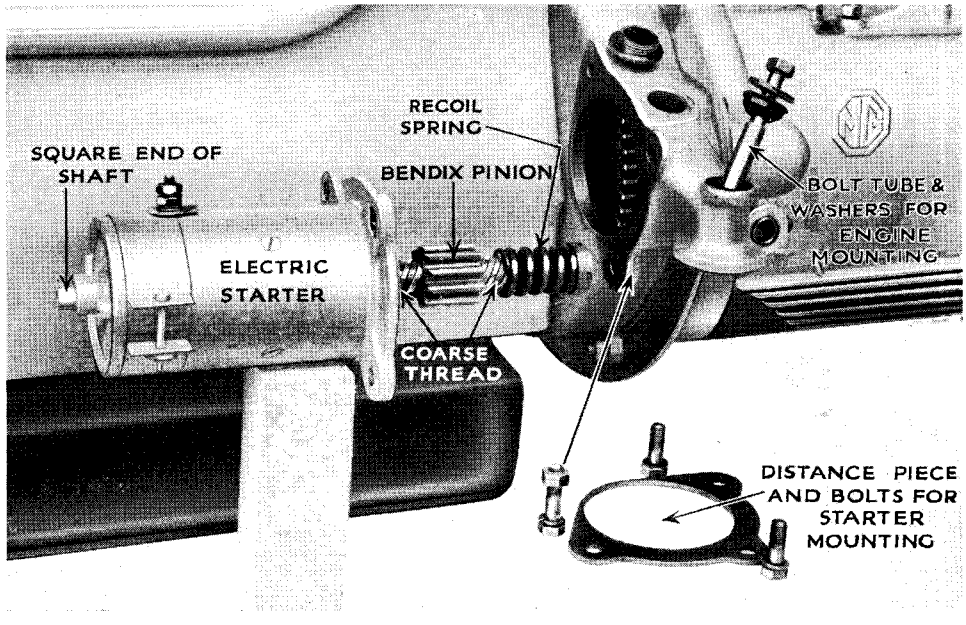


Figure 26.—View of the self starter removed from the engine and the steel distance washer. The starter is held in position by two studs and one bolt. In the case of a starter jamming, this can sometimes be cured by using a spanner on the square end of the starter shaft, and turning in a clockwise direction.

Engine Mounting. The near side rear engine bearer is shown in this illustration with a bolt resting in it. The bolt is provided with a flat steel and conical shaped rubber washer which fits into a recess in the engine arm, and in order that there shall be no internal movement in the arm between it and the bolt, the latter is enclosed in a short length of tube capable of affording a certain amount of movement through frame distortion.

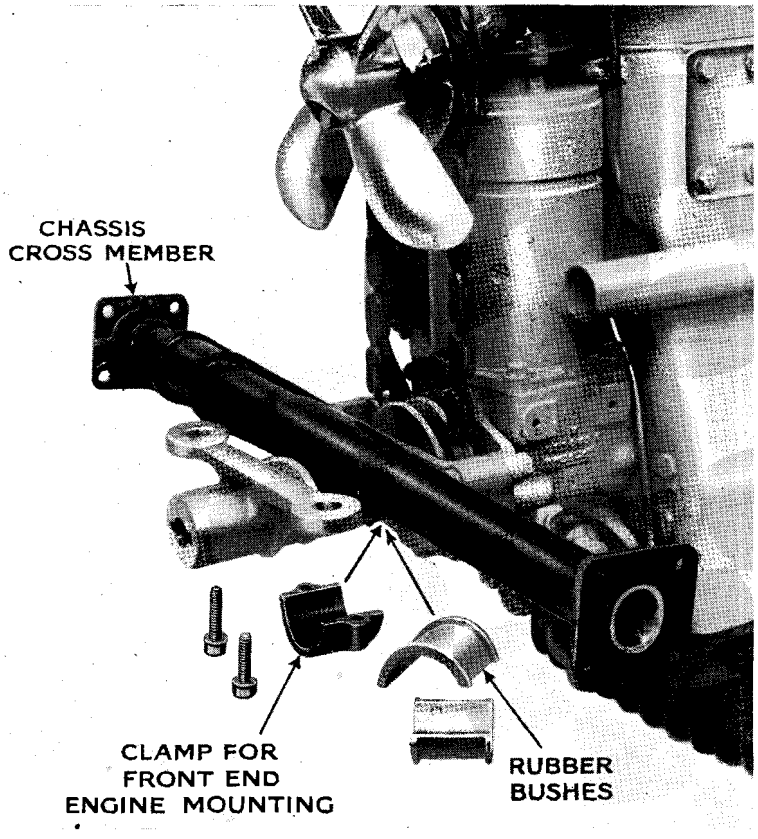


Figure 27.—This illustration is intended to describe the method employed for mounting the front end of the engine to the tubular cross member. The cross member has been removed from the frame and the front end engine bracket is attached to it by a half clamp, rubber bushes being interposed, as can be seen from the details in the illustration.

Having dealt with the rear end, the natural sequence is to study the front end suspension of the engine.

The frame is provided with a front tubular cross member, which is shown in Illustration No. 27 in its relationship to the engine. A central bracket is attached to the cross member, and by means of a bridge piece the front end of the engine extension bracket is attached to the cross member, rubber bushes being interposed to afford a certain amount of resiliency to the mounting, and isolate the engine from road shocks. Reference back to Illustration No. 13 shows the front cross member in the frame, and the means whereby the radiator is attached thereto. This illustration is particularly instructive in case it is necessary at any time to remove the Radiator. The radiator proper is mounted on the front extension engine bracket by means of two bolts and interposed fibre washers

Fan. This view of the engine shown in Illustration No. 27 is particularly interesting. and the fan is the next detail that will be dealt with. It will be seen in Illustration No. 27 that it is driven by a leather belt made up into sections, and the boss of the fan which carries the bearings is provided with an oil nipple that needs only occasional lubrication. Over lubrication will cause the grease to exude, and probably get on the fan belt which is undesirable. The Fan belt is made up of 28 links.

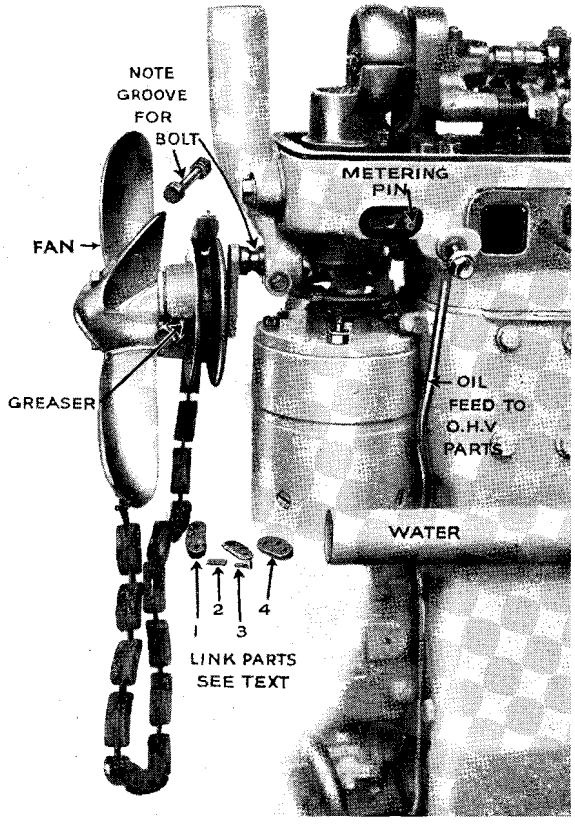


Figure 28.—Details of the fan, showing the type of belt employed and detachable link. The fan is held in position by a bolt, slackening of which permits the body of the fan being pivoted eccentrically to tighten the belt.

The fan mounting is shown in Illustration No. 28. The fan spindle is attached to a bracket which is held in position by a bolt and nut in the extension of the water outlet pipe. By slackening the nut the bracket is free to rotate in its housing in order to increase the tension on the belt. The time may arise when it will be necessary to take a link out of the belt. The method employed should therefore be studied. It is necessary to take a fine pointed screwdriver and separate the link by removing the screw that holds the two halves together. Before doing this slacken off the adjustment.

Engine Dismantlement. The principal external components of the engine having been dealt with, it is now proposed to describe (in dismantling the engine pictorially) the construction of the engine and the method for dismantlement.

The first feature in dismantlement is obviously the cylinder head. This comprises the timing of the valves, the dismantlement of the valve gear, the relationship of the cylinder head to the cylinder block, the grinding of the valves, and the method of driving the camshaft.

The first thing that should be borne in mind is that considerable care has been exercised in the design of the engine to render the operation of valve timing as simple as possible. It must be taken for granted that the drive from

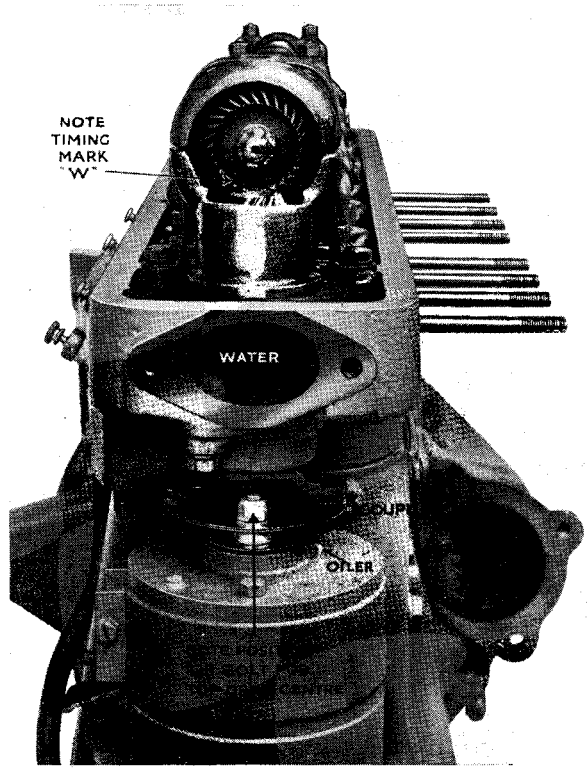


Figure 29.—This illustration should be particularly noted as it shows the dynamo and timing gears, and the correct relationship between the position of the dynamo and top dead centre of No. 1 piston. The wording on the illustration should be carefully read.

the crankshaft through the dynamo is correct, and it follows therefore that when the dynamo is in a certain position there is a definite relationship between the arms of the coupling on the top of the dynamo and the position of the piston in the cylinder.

The firing order is 1, 4, 2, 6, 3, 5.

When the cross head of the dynamo coupling is in the position shown in Illustration No. 29, that is to say with the bolt through the coupling towards the front of the Car, then No. 1 piston is on dead centre.

The cross head coupling attached to the dynamo is connected to the coupling driving the vertical spindle by means of laminated steel discs, and when the overhead valve camshaft cover is removed it will be seen that there is a mark on the driving bevel gear wheel which meshes with the camshaft gear wheel, and if ever the camshaft is removed, provided nothing else has been disturbed, these marks only have to coincide for the timing to be correct.

It also follows that if one wants to find the top dead centre to check the ignition, or set the High Tension distributor, that top dead centre can be found by turning the dynamo coupling as shown in the above illustration

The form of coupling employed permits the cylinder head being removed without disturbing the timing in any way.

It is only necessary to undo two bolts when the coupling between the dynamo and the cylinder head is disengaged.

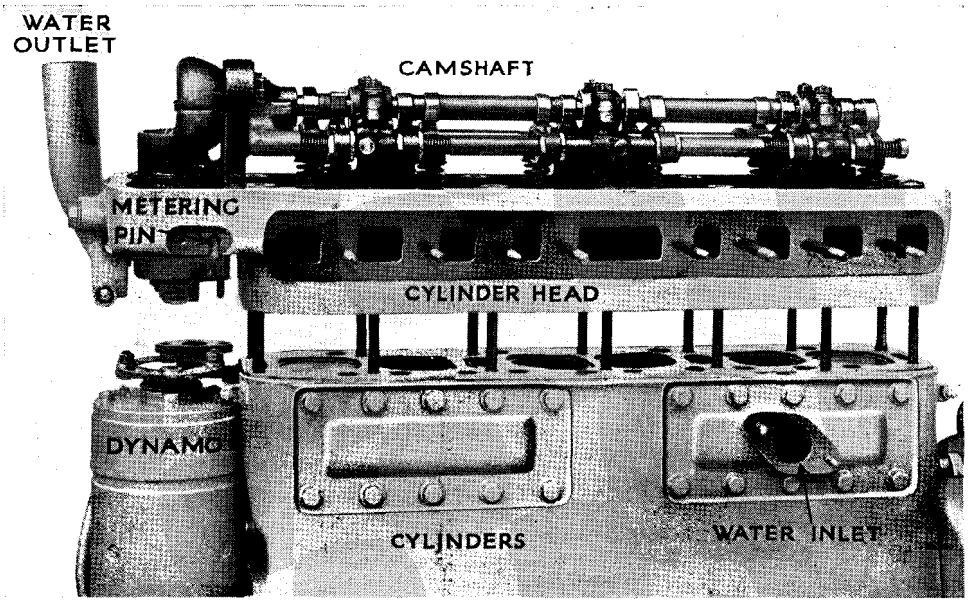


Figure 30.—View of the cylinder with the head partially removed. Care should be exercised to see that the oil return feed pipes are disconnected, and the feed pipe upper end removed, so that the metering pin which it contains is not damaged.

Cylinder Head Removal. Whenever the cylinder head has to be removed it is obvious that the oil delivery pipe and return pipes will have to be disconnected. There are 14 cylinder head holding down bolts, and Illustration No. 30 shows the cylinder head partially removed. A copper and asbestos gasket is fitted between the cylinder head and the cylinder block, and if ordinary care is employed, there is no reason why this should be damaged in

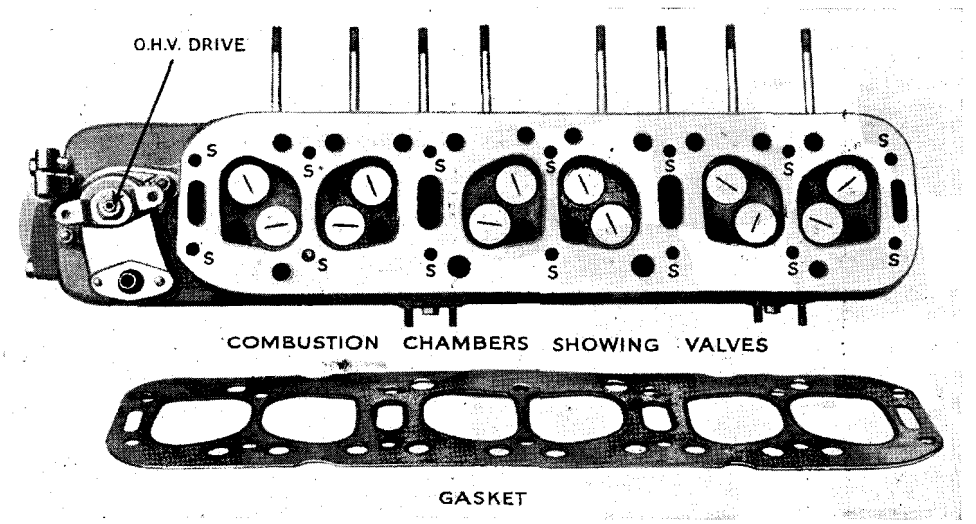


Figure 31.—View looking into the combustion chambers, showing the valves in position. The cylinder head studs pass through the holes marked " S." The remaining holes are for the extra passages from the cylinder to the head.

removal. There is one point in this illustration that should be made clear. On the left hand side of the cylinder head, there is the connection for the oil pipe from the oil pump. In order to regulate the flow of oil from the pump to the cylinder head, the orifice into the cylinder is obstructed by what is known as a metering pin. This is a permanent form of adjustment enabling the correct flow of oil to the head. Whenever this metering pin is removed, it should be placed aside carefully so that there is no fear of it being damaged.

After the cylinder head has been removed, the combustion chamber side presents the view seen in Illustration No. 31, alongside which the cylinder head gasket will be seen. Each valve is numbered in relation to the number on the face of the cylinder head and valve grinding can be effected either by

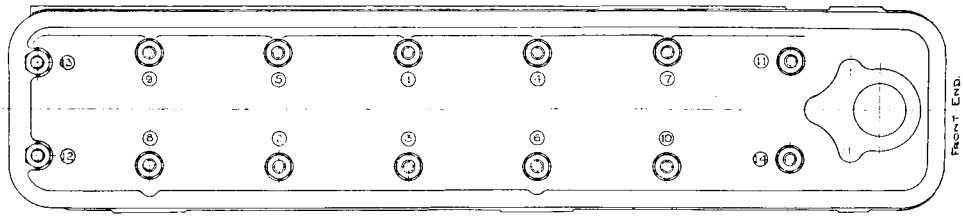
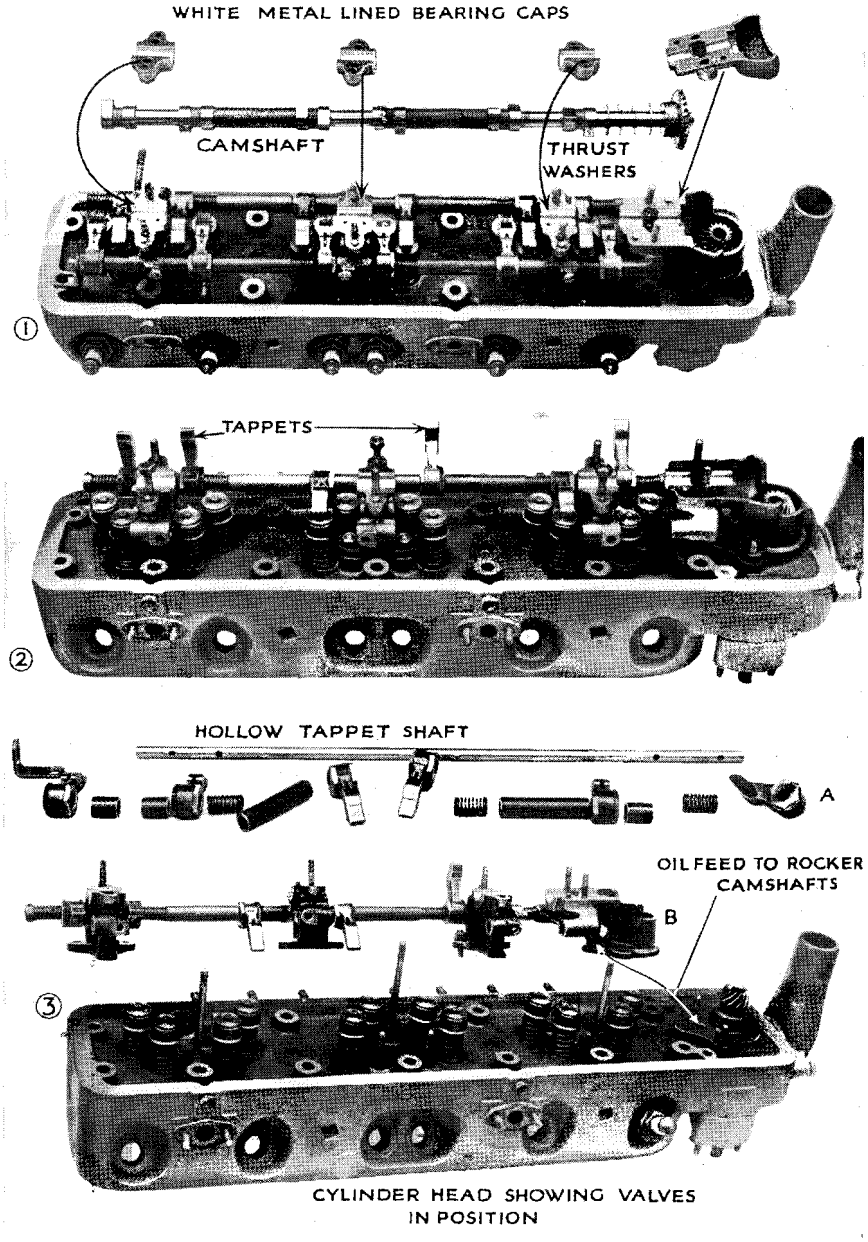


DIAGRAM SHOWING THE ORDER IN WHICH THE CYLINDER HEAD NUTS SHOULD BE SCREWED DOWN ON M.G. MAGNA ENGINES

holding the valve in a suitable clamp from above, or by means of the screw driver from the combustion chamber side. It is as well to study this illustration from another point, namely, the possible necessity of changing a valve spring. In a case of emergency a rod can be inserted after the sparking plug has been removed through the sparking plug hole which will prevent a valve dropping into the cylinder, but should a valve spring break, it is preferable to remove the head in order to change the spring. As has been previously stated, there are 14 cylinder head studs, and Illustration No. 31 has been lettered to indicate by a letter " S " the holes through which the studs pass. The remaining holes in the head are for the free travel of water from the cylinder body through the gasket to the cylinder head. The left hand side illustration shows the coupling attached to the spindle which operates the overhead gears.



Figures 32 and 33.

(1) This a plan view of the cylinder head with the camshaft removed, and the top half of the bearings shown above it. There is no necessity to remove the camshaft when simply removing the cylinder head.

(2) View of the cylinder head with one of the rocker or tappet shafts removed, disclosing the location of the valves and showing the type of tappets employed. The view below this, marked " A," shows the components on the tappet shaft, i.e. tappets, springs and distance tubes. It will be noted that the tappet shaft is hollow so that the parts can be suitably lubricated.

(3) Cylinder head with camshaft and rocker shaft brackets removed, and a point where the oil feeds from just behind the bevel gear into the bracket " B," should be particularly noted.

Illustration No. 33 needs very little explanation as it affords to those interested a detailed view of the cylinder head as seen from above with the valves in position. In the upper illustration the camshaft is removed and the articulating rockers, and the rocker shaft dismantled, and in the lower portion of the picture the cylinder head with the complete rocker shaft brackets removed.

Before leaving the cylinder head, the details of the overhead valve gear drive can be seen by reference to Illustration No. 34. The complete camshaft drive assembly on the left hand side of the illustration is bolted to the cylinder head by four studs and nuts, and in order to ensure correct meshing of the driving pinion with the camshaft gear wheel a number of shims are employed between the face of the cylinder head and the assembly housing. These are in point of fact a Factory fitting, but care should be exercised if ever a unit is removed to see that the shims are neither damaged nor omitted. The caption beneath the illustration suffices to describe it.

In case it is ever necessary to remove the camshaft, Illustration No. 32 has been prepared, showing the camshaft removed from its four white metal bearings.

The number of washers will be seen on the camshaft, consisting of two steel discs, and two spring steel washers. These fit on the front side of the front bearing next to the bevelled gear, and take the thrust of the drive of the shaft. It will be noticed that the interior of the front camshaft bracket is hollow, and oil is forced through this bracket to the camshaft bearings, and the valve rockers themselves. Every part is suitably drilled, so that adequate lubrication reaches the bearings, rocker faces and cams.

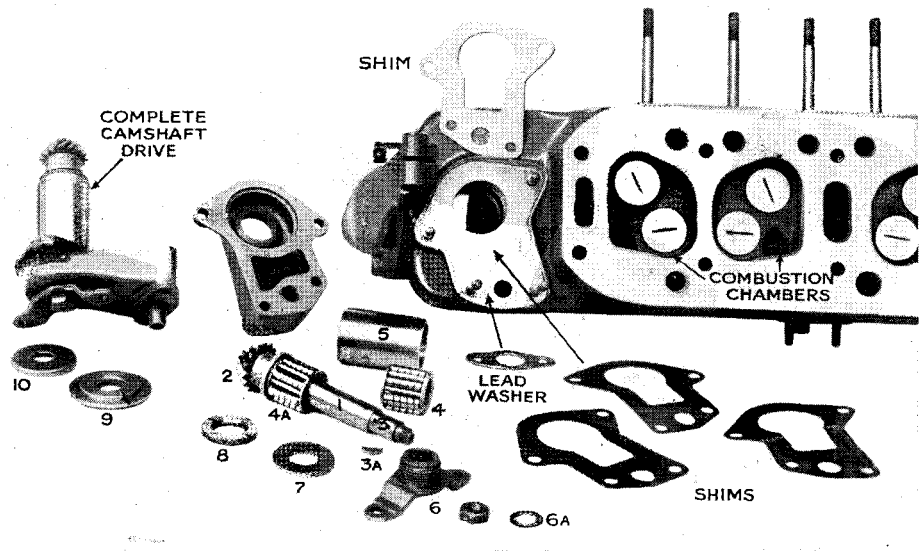


Figure 34.—View of the underneath side of the cylinder head, with complete camshaft drive removed. A separate unit has been dismantled, the parts being as follows :—

A number of shims are employed in the original assembly. These should never be dismantled.

1. Camshaft Driving Shaft.
2. Camshaft Driving Bevel Pinion.
3. Key Way.
3A. Camshaft Driving Bevel Pinion Key.
4. Hyatt Roller Bearing.
4A. Hyatt Roller Bearing.
5. Bevel Pinion Bearing Sleeve.
6. Universal Joint Fork for Bevel Pinion.
7. Bevel Pinion Washer.
8. Bevel Pinion Thrust Washer.
9. Bearing Retainer Plate.
10. Bevel Pinion Oil Thrower.

Part not numbered :—
Oil Drain Housing (Front).

Timing Dismantlement. The following operations will deal with a number of parts, such as Oil Pump, High Tension Distributor, Brackets, and dismantlement of Timing Gears, prior to dealing with the most important subject of engine knowledge, namely lubrication. All the various parts are so co-related in the case of the 12/70 M.G. Magna Engine that the description may appear to be somewhat disjointed, but it will be found that the illustrations will materially assist and are in fact more informative than any amount of text.

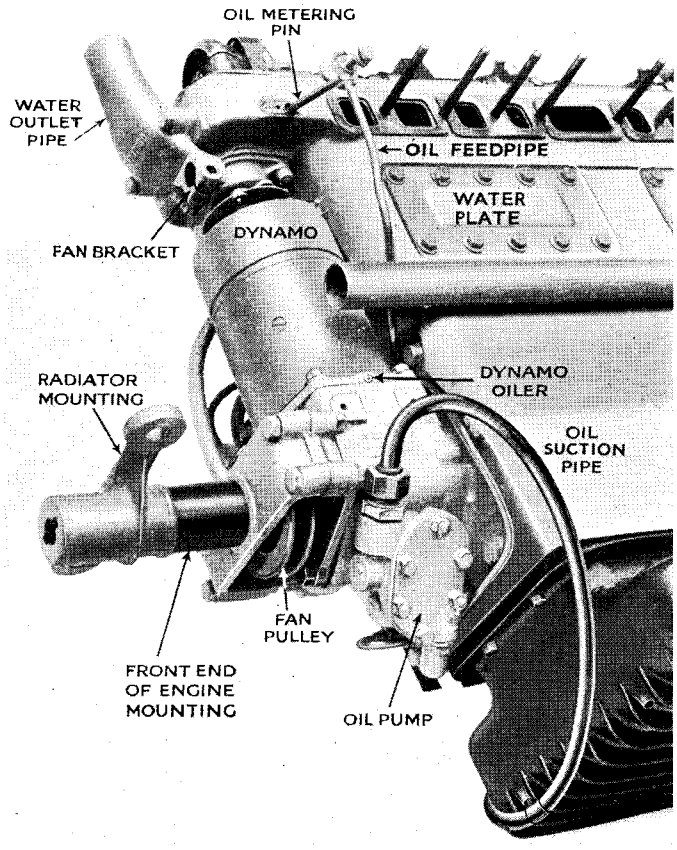


Figure 35.—General view of the front of the Magna engine, showing oil suction pipe, and the position of the oil pump. A number of other details are indicated on the illustration.

Take illustration No. 35, this shows a view of the Engine as seen from below. There is the sump, the oil pump, the front engine bracket, the fan pulley, dynamo, overhead valve drive, and the oil supply pipe to the cylinder head showing the metering pin partially withdrawn. It is obvious that it is a comparatively easy matter to withdraw the oil pump at any time. However, when the pump is removed it is as well also to remove the H.T. distributor. The slots in the drive sleeve have to register with the tongue on the distributor shaft. They will " go " one way only. See Illustration No. 21 showing the offset if any attempt is made to assemble them wrongly.

Reference to Illustration No. 36 shows the pump actually removed. It will be seen that the upper end of the pump spindle is fitted with a gear wheel pinned on to the driven shaft. The pump is attached by means of three studs and is driven by a gear wheel fitted to the crankshaft.

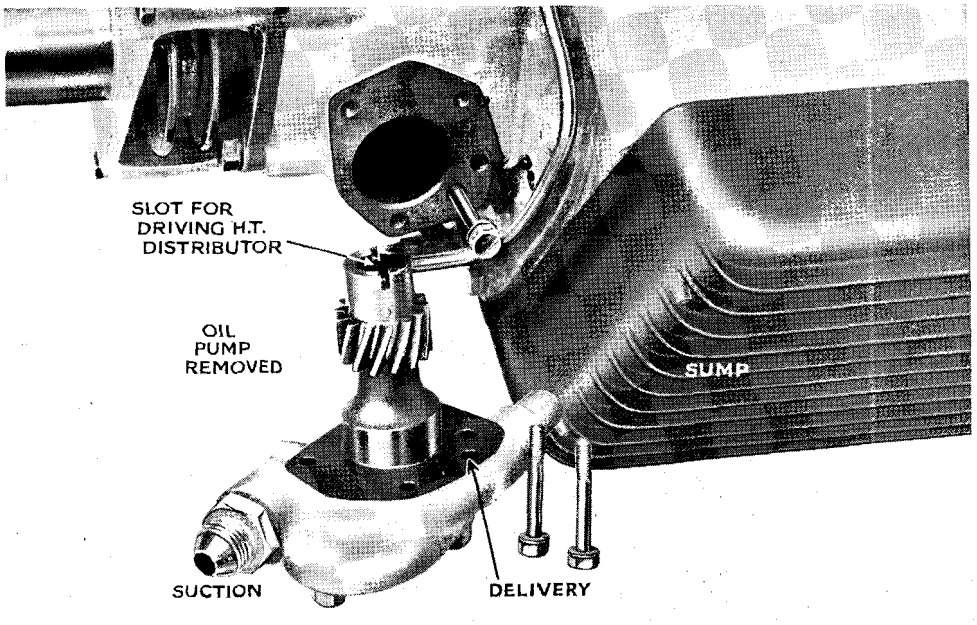


Figure 36.—View of the oil pump removed from the engine. The pump is held in position by three bolts, and care should be exercised whenever the pump is removed and refitted, to make a good joint so as to prevent any joining compound finding its way into the delivery or release holes. The underneath side of the sump can be seen in this illustration, showing the manner in which it is ribbed for cooling.

Illustration No. 37 shows how the front end engine bearer has first of all been removed from the front end engine coyer. The fan pulley is removed by using $\frac{1}{4}$" B.S.F. bolts which act as drawers, and then the front end engine housing can be withdrawn by the removal of four bolts disclosing the front end of the crankshaft as seen in Illustration 37. The front end thrust of the crankshaft is taken through a hardened steel washer butting up against the

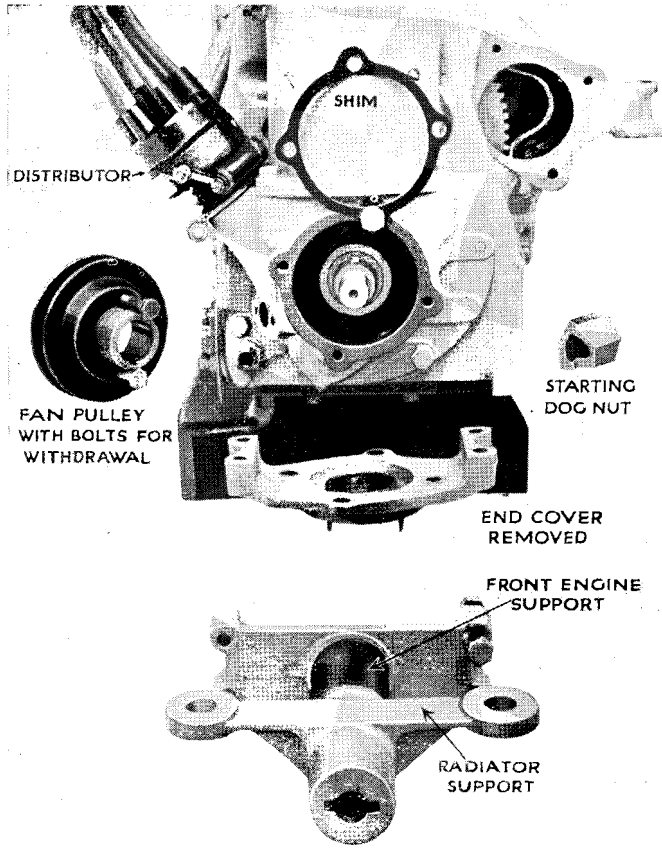


Figure 37.—This illustration is only intended for workshop use, in case it is ever necessary to dismantle the timing gears or crankshaft. It will be noted that a shim is employed between the timing case and the end cover. The thickness of these shims is of great importance as it governs the front end thrust of the crankshaft. To remove the fan pulley, two $\frac{1}{4}$" B.S.F. bolts are used, but they are shown in the illustration on the wrong side of the pulley, which is held on the crankshaft by means of a key and nut.

bronze washer which in turn butts against the front end housing and the correct assembly of the crankshaft in the housing is obtained by interposing a number of shims (shown vertically above the hole in the crank case) between the housing cover and the cast iron case.

It stands to reason that before the fan pulley can be removed the nut on the front end of the crankshaft which acts as a starting handle dog, and shown on the right hand side of Illustration No. 37, must first of all be removed.

The thrust washers on the front end of the crank shaft previously referred to are shown in Illustration No. 38.

It is a comparatively easy matter to remove the Distributor complete by slacking off the nut on the plate that locks the unit in position.

This nut must not be confused with the nut which locks the distributor to the advance plate and is shown in Illustration 38 with a spanner resting upon it. It is always possible to increase the amount of the advance by slackening the nut referred to and rotating the distributor slightly and then tightening the nut, but as it is set when it leaves the Works is best for all round running.

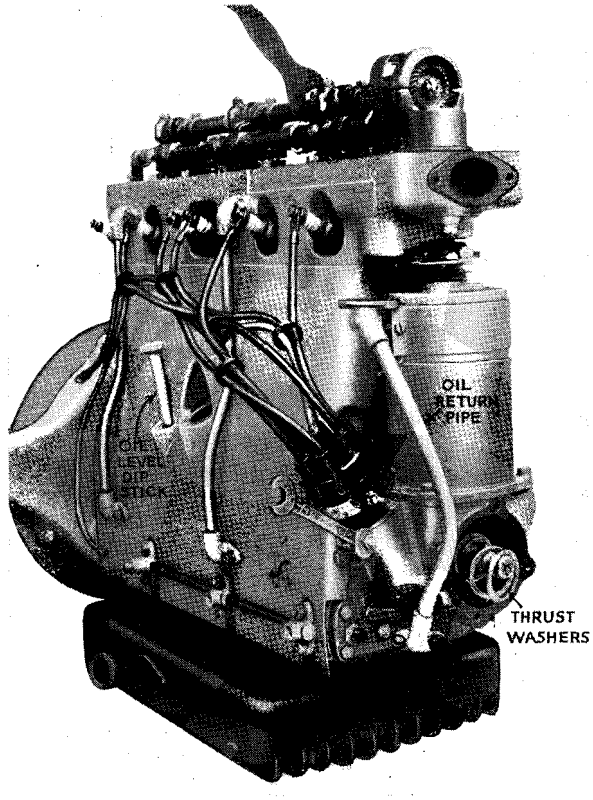


Figure 38.—Front end cover and bearer removed and oil return pipe from timing gears shown detached.

In order to obtain a correct idea of how the oil pump and the Distributor are related to one another, both these components are shown in Illustration No. 39 after having been removed from the engine. The crankshaft drives the oil pump. There is a slot in the extension to the oil pump driving gear wheel which receives a tongue attached to the spindle driving the High Tension Distributor. It follows therefore that if the Distributor is removed at any time it can only be put back in two ways, one of which is right. This can be tested by the position of the dynamo coupling in relation to top dead centre of No. 1 cylinder.

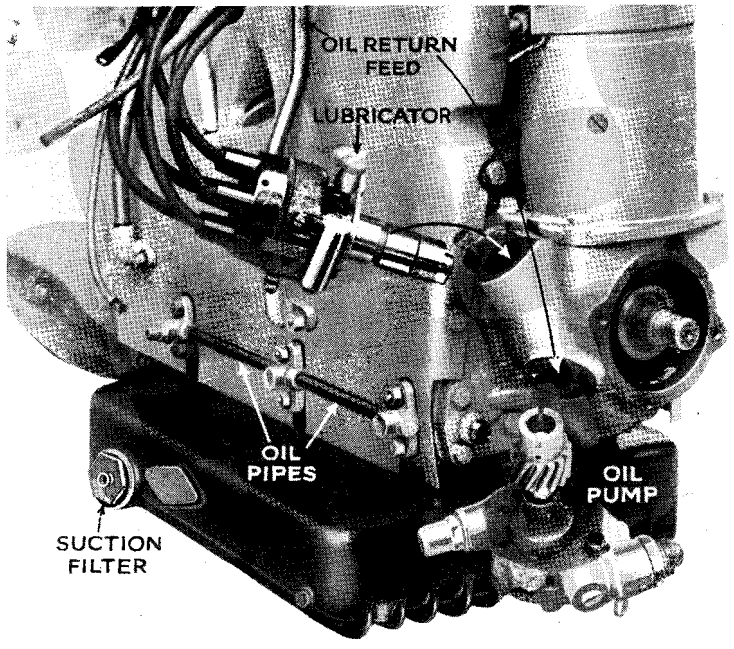


Figure 39.—This illustration shows how the oil pump can be removed and the high tension Distributor removed from above.

It may be necessary at some time to remove the dynamo. This is a comparatively simple matter if reference is made to Illustration No. 40. The front end extension of the crankshaft is fitted with two gears, a helical bevel and a worm. The helical bevel drives the dynamo, and here again we find that the necessity for correctly meshing gears, which is taken care of by a

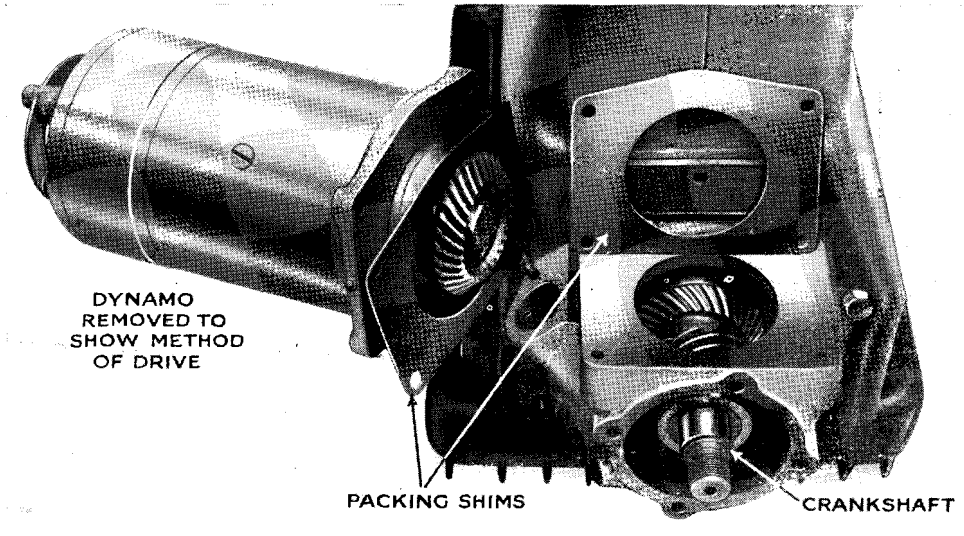


Figure 40.—Front end of the engine, showing the dynamo removed from the engine. The dynamo drive can be seen quite clearly and also the worm wheel which is fitted to the crankshaft for driving the oil pump and high tension Distributor.

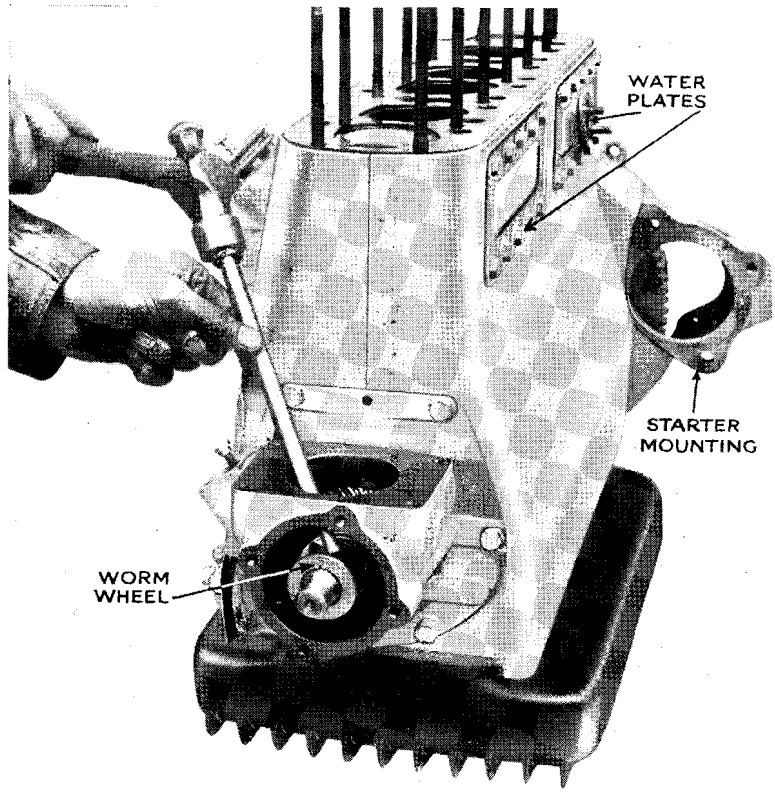


Figure 41.—The worm wheel can be removed from the crankshaft after the dynamo has been unshipped. The worm wheel is a parallel fit on the crankshaft, and is held in position by means of a key.

number of interposed thin metal shims. The dynamo gear is attached to the spindle by means of a bolt and tab washer, the gear being held in position on the shaft by means of a key. The gears are suitably marked for re-meshing, but the dynamo cannot be put back wrong if No. 1 piston is put on top dead centre and the coupling on the top of the dynamo placed on so that it points accurately fore and aft as indicated in Illustration No. 29. The object of the shims is to allow the gears being correctly in mesh.

There are three small items which really only concern the Repair Shop. They relate to the removal of the gear wheels from the crankshaft and the front end housing of the base chamber. After the dynamo has been removed it is possible to withdraw the worm drive from the crankshaft by tapping it with a suitably soft tool such as a piece of brass through the dynamo housing in the manner shown in Illustration No. 41. It is a parallel fit on the crankshaft and is held in position by a key.

Illustration No. 42 shows the necessity of employing a puller to remove the helical bevel pinion from the crankshaft. The holes in the pinion are tapped $\frac{1}{4}$" B.S.F.

To remove the front end housing it is also necessary to use a means of withdrawal in the form of two $\frac{5}{16}$" B.S.F. bolts. These are shown in Illustration No. 42.

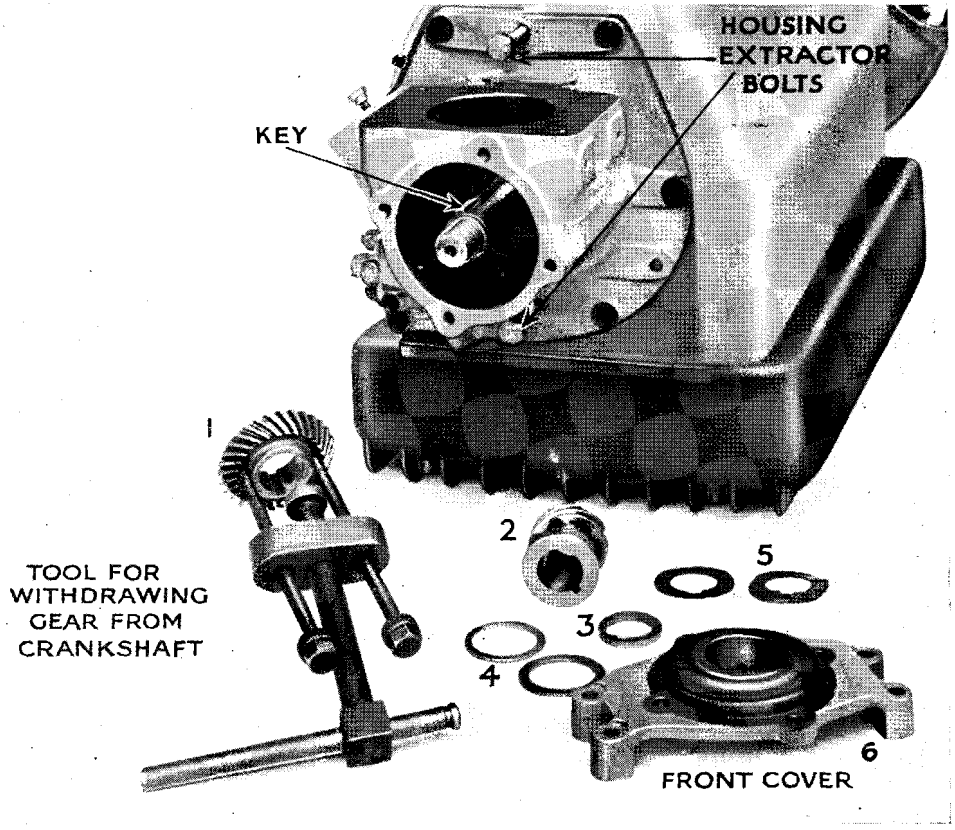


Figure 42.—View of the component attached to the front end of the crankshaft. The helical bevel wheel is a tight fit on the shaft, held in position by a key, and it is necessary to utilise a wheel removal tool, similar to that shown, in order to extract this. The principal parts are as follows :—

1. Helical bevel wheel .
2. Worm wheel for driving oil pump.
3. Distance column.
4. Thrust washers.
5. Shims.
6. Cover with thrust face.

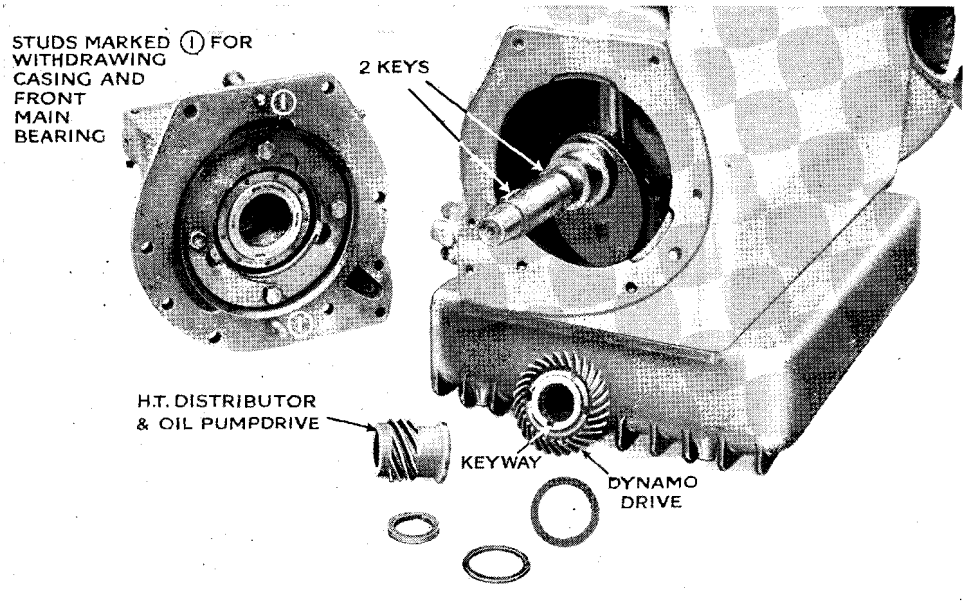


Figure 43.—The front end of the crankshaft after the front end housing has been removed, and the manner in which the shaft is supported in a ball bearing. Note the two keys on the crankshaft on to which the gear wheel and worm wheel fit.

We then see in Illustration No. 43 the front end of the crankshaft after the front end housing has been removed and the manner in which the shaft is supported in a ball bearing. This illustration also shows the two keys on the crankshaft on to which the two gear wheels fit.

Engine Lubrication. The actual lubrication of the engine is very simple. Six quarts of oil are contained in the sump when filled to its proper level, and the Oil Pump shown in Illustration No. 44 in complete and dismantled form causes the Oil in the sump to be sucked through the gauze strainer into the Pump Body and delivered to the Main Bearing by external piping, as well as to the overhead valve gear. The Pump is of the gear type, fitted with a cover plate and having a bye-pass relief valve incorporated in the Body of the Pump. The relief valve as can be seen consists of a cover which encloses a spring and maintains the small piston up against a seating in the pump body until such time as either the force of the Oil through pressure or cold non-fluidity forces the piston off its seating. Whenever this occurs there will be either the corresponding drop in Oil pressure, or the release of excess oil will maintain the oil pressure at a point pre-determined by the Makers dependent upon the resistence of the spring. It is obviously possible to increase the tension of the spring by introducing washers in the cap, or obtaining a stronger spring, but no such alterations should be effected without first obtaining the advice from the Works.

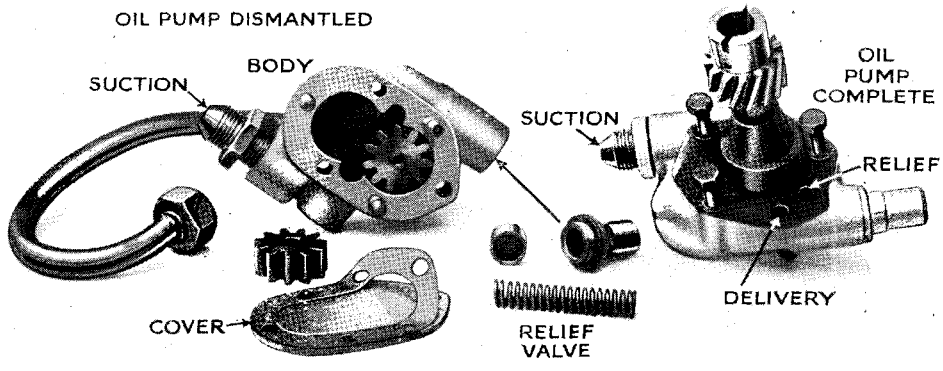


Figure 44.—View of a complete oil pump removed from the engine, showing the point where the suction pipe is attached, and the delivery and relief holes in the face of the body of the pump. A relief valve is shown in the centre of the illustration in detail, consisting of a plunger, spring and dash pot. On the near side of the illustration the plate is removed, showing the gears employed.

The pump then delivers oil through the front end housing to the external pipes on the off side of the engine, and by suitably drilling the crank case, oil is forced to the main bearings, and as the crank shaft is hollow drilled, the oil finds its way under pressure to the big end bearings whence in the usual course it is thrown out by centrifugal force finding its way upwards to lubricate the pistons and gudgeon pins. The path of the oil can better be followed if the dismantlement of the engine in now continued

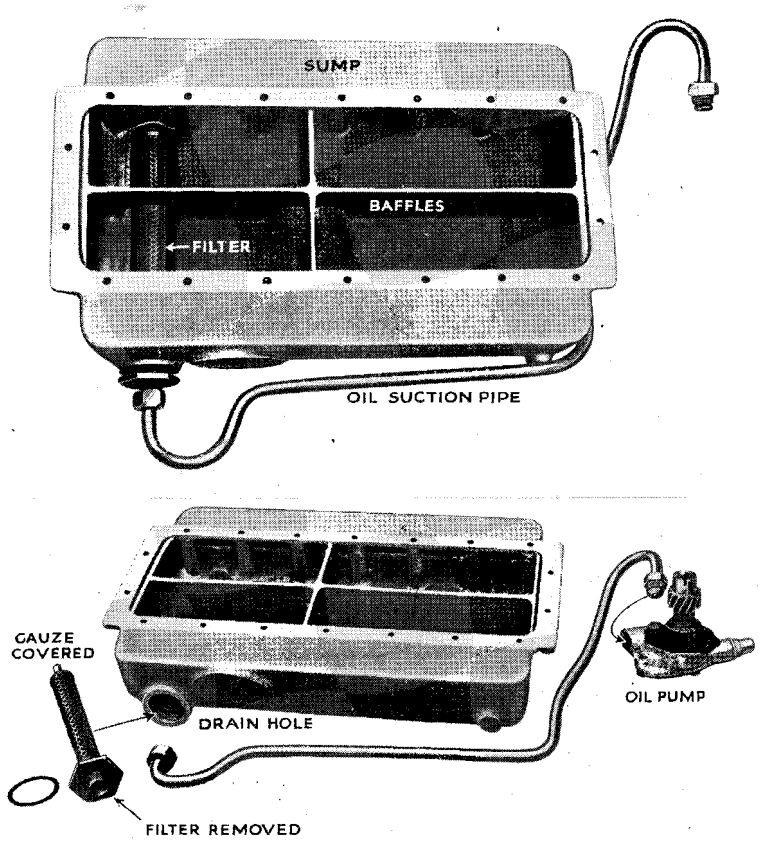


Figure 44a.—Two views of the sump removed from the engine. When draining the sump, remove the filter and clean it in petrol.

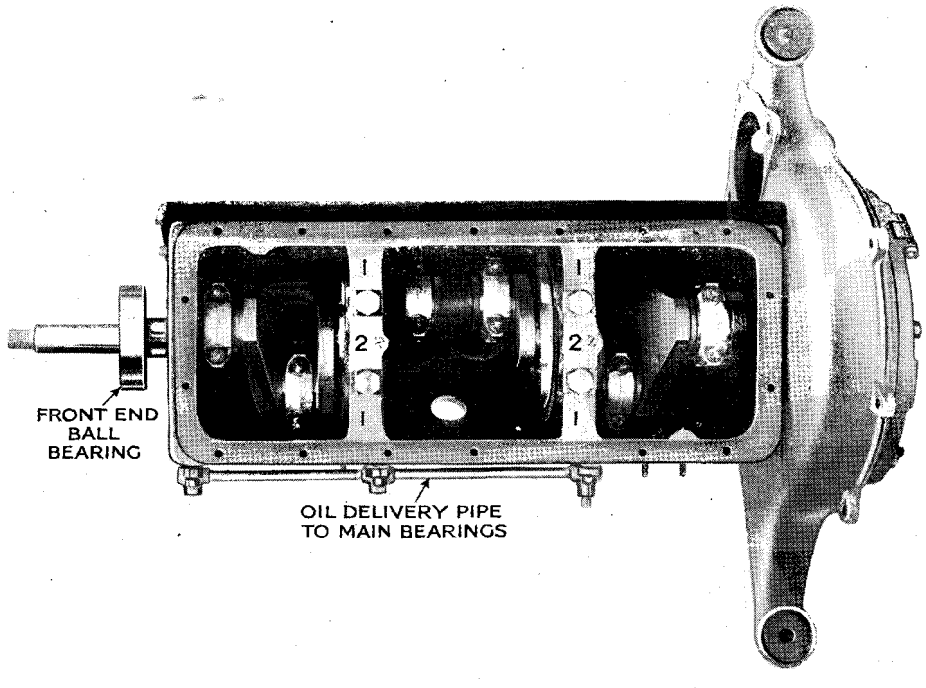


Figure 45.—Underneath view of the engine with sump removed. The four bolts marked " 1 " hold the centre main bearing housings in position, and the two screws marked " 2 " blank off the oil feeds to these bearings.

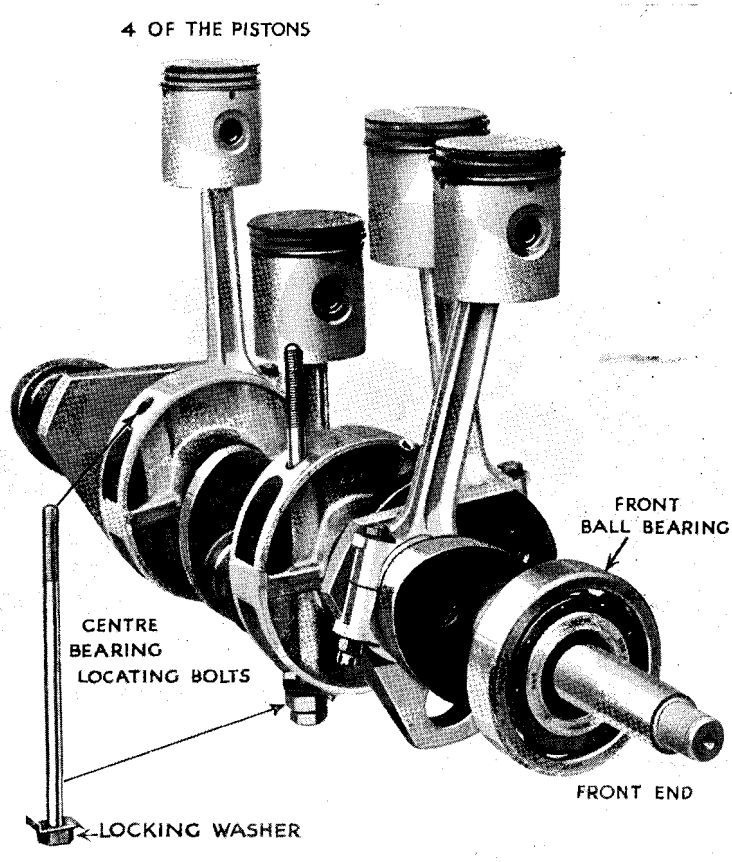


Figure 46.—Crankshaft removed from the engine showing that it is supported on the front end by a ball bearing, and the two centre bearings are held in the crankcase by means of large aluminium split housings.

Illustration No. 45 shows a view of the crankshaft in position after the sump has been removed. The crankshaft runs in four main bearings, the front main being a ball bearing, the two centre and rear bearings being of white metal in brass liners. Examine for a moment the crankshaft after removal. Owing to the size of the balance webbs of the crankshaft it is necessary to employ split aluminium housings to accommodate the two centre main bearings and to register these in the barrel type crank case. These aluminium housings are held in position by long bolts which pass through them, and a view of the crankcase after the crankshaft has been removed is shown in Illustration No. 47. So much for the front and centre main bearings.

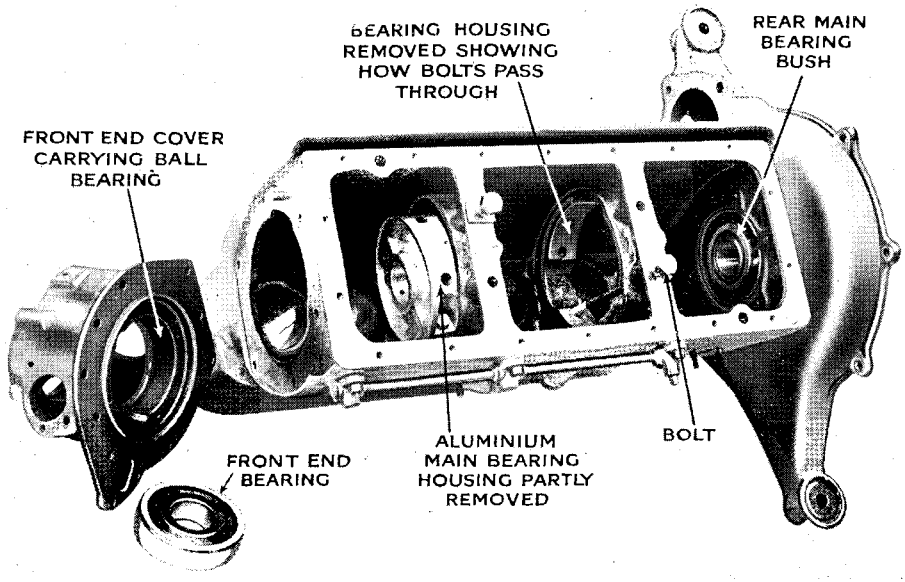


Figure 47.—Underneath view of the crankcase, after the crankshaft has been removed, showing front end housing with ball bearing, the aluminium main bearing housing partly removed from No. 2 main bearing ; and the manner in which the bolt passes through No. 3 main bearing housing. The rear main bearing is in the form of a bush.

The rear main bearing is however differently designed. An examination of the rear end of the crankshaft as shown in Illustration No. 48 will disclose the fact that the crankshaft has a tapered rear end, and is fitted with a key. A flange is fitted on to this with an extension. The object of the boss is to act as a mounting for the flywheel. A white metal lined bush is fitted over this extension and registers inside the rear end of the flywheel housing.

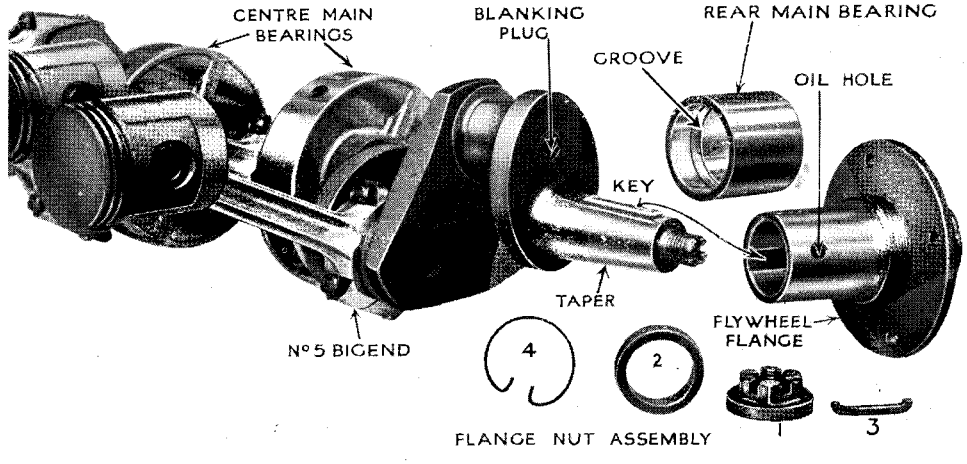


Figure 48.—Another view of the crankshaft, particularly showing the rear end and the manner in which the flywheel flange is attached to the crankshaft, and runs in the rear main bearing which, in turn, is a press fit in the flywheel bell housing. Flywheel flange is held in position by a castellated nut " 1," a specially shaped cotter " 3," a locking ring " 2," and a spring steel locking ring " 4."

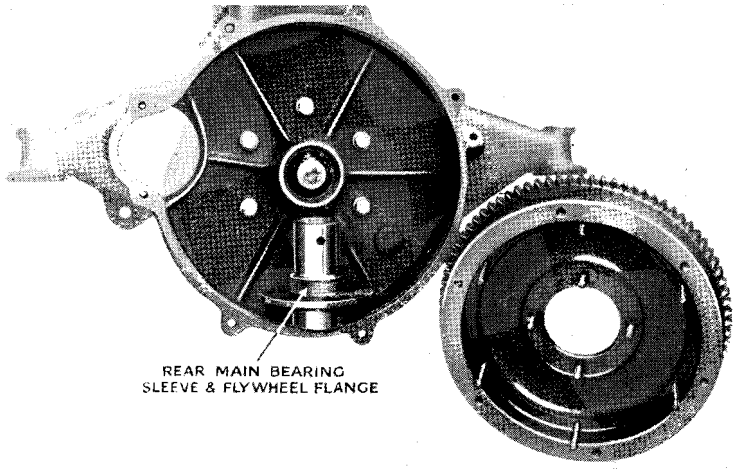


Figure 49.—Rear of the flywheel bell housing, showing rear main bearing sleeve and flywheel flange removed as well as flywheel itself.

Illlustration No. 49 shows the flywheel removed and the flywheel boss and bearing sleeve removed from the crankshaft. The flywheel boss is held on the crankshaft by means of a castellated nut, and a special shaped cotter, which latter is held in position by a collar and spring steel clip which registers into a groove inside the boss. These parts are shown in Illustration No 48, marked 1, 2, 3, 4.

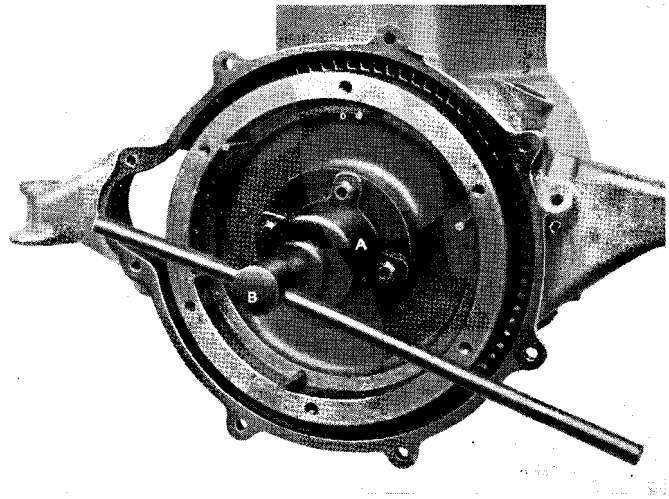


Figure 50.—In order to remove the crankshaft flange it is necessary to employ a tool similar to that shown in illustration.

In order to remove the crankshaft flange, it is necessary to employ a tool similar to that shown in Illustration No. 50.

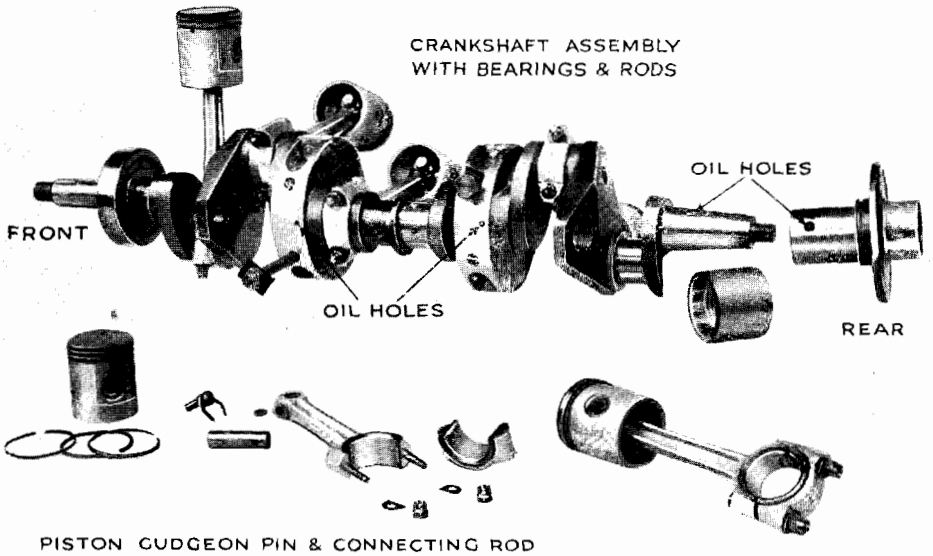


Figure 51.—A complete view of a crankshaft with bearings attached and below this will be seen connecting rod complete and dismantled. Carefully read the text below.

The detailed construction of the crankshaft is shown in Illustration No. 51, showing the main bearings in position and the type of connecting rod employed. The pistons are of aluminium alloy fitted with three rings (the lower one being a scraper ring). The gudgeon pin is free to rotate in the piston boss, but is held in the split top end of the connecting rod by means of a bolt locked by a tab washer. It is not actually the bolt that prevents the gudgeon pin rotating, but a small washer having circular contour with the flat base The washer, gudgeon pin and locking screw being shown separately in this illustration.

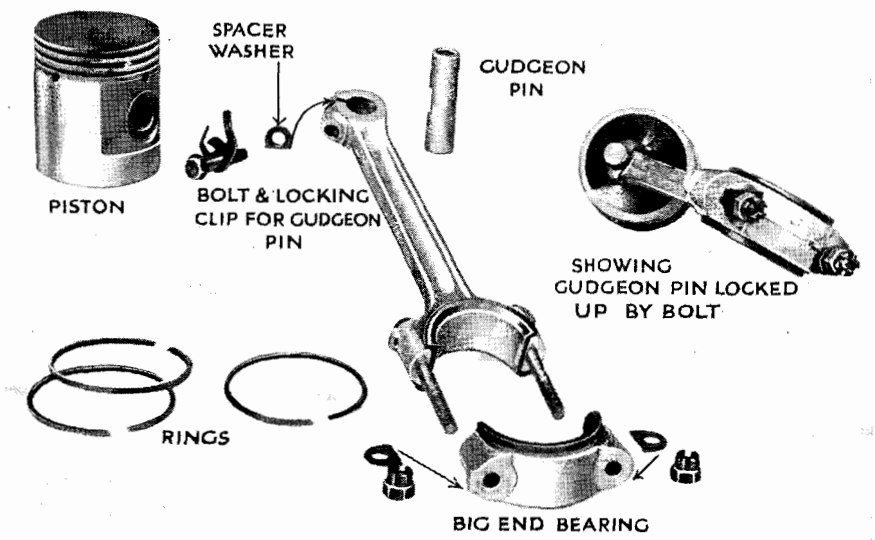
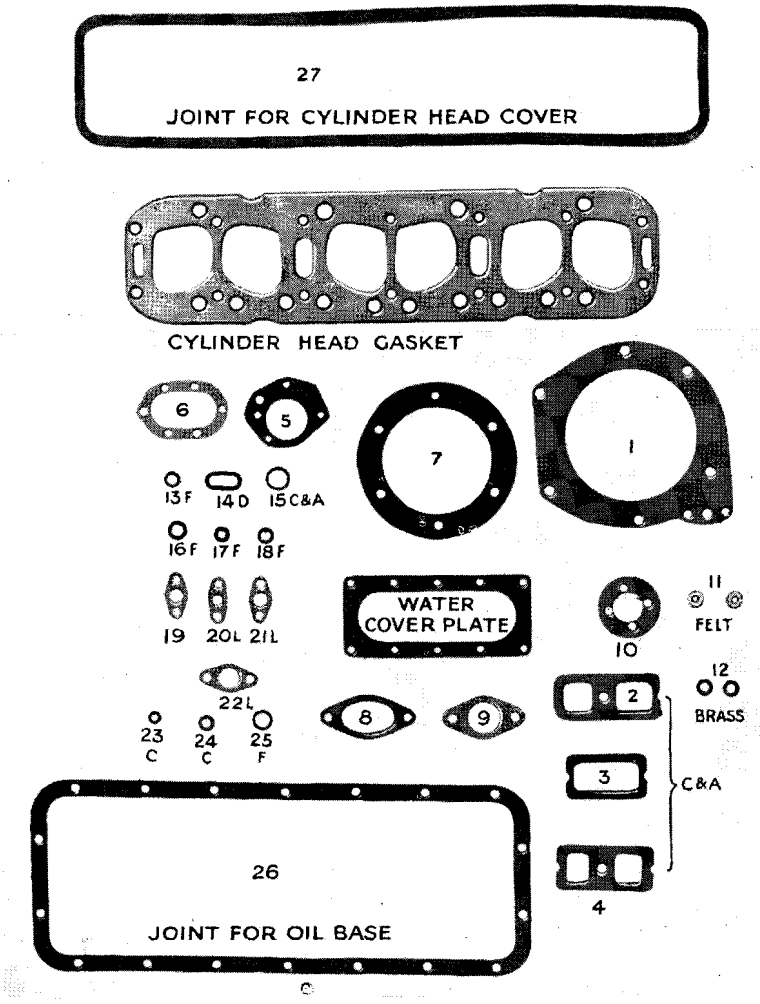


Figure 51a.—Close-up view of connecting rod complete and dismantled, showing the method of locking the gudgeon pin in the rod by means of a bolt, spacer washer and special clip. The gudgeon pin takes its bearing in the piston bosses. One of the three piston rings is a scraper ring.

When dealing with the question of lubrication earlier, it was stated that the path of oil could better be followed after the dismantlement of the engine had been completed. Reference to Illustration No. 51 shows that the aluminium housing supporting the centre main bearings have two small holes drilled in them which register with the feed holes cross drilled in the base chamber. The journal of the back main bearing shows how the crank shaft is drilled. Momentary reference back to Illustration No. 48 shows that the webbs in the crankshaft have been drilled, and the holes blanked up by plugs after the shaft is cross drilled to the journals. It follows therefore that oil will be forced through the hollow crankshaft, and it eventually finds its way to the back main journal bearing through a hole that can be seen in the flywheel boss extension on the right hand side of Illustration No. 51. There is a large groove inside the bearing which forms an oil pocket, and this groove registers with the hole in the crankshaft. In order to prevent any leakage of lubrication from the rear main bearing housing it will be noticed that there is an oil slinger with a form of return thread cut on to the flywheel boss extension.

NOTE.—Should the owner have the misfortune to run a bearing, in other words—through insufficient lubrication, the bearings become molten, it will be found that part of the white metal will actually run into the oil channel ways and block these. Cases have been known where the bearing has been refitted and omission to clear the crankshaft has only resulted in the bearing running immediately after reassembly. If ever a bearing runs, it is necessary to see that all the ducts through the crankshaft are cleaned out, and it may even be necessary to remove the blanking plugs and pass drills of correct size through the holes. It may be found, however, that only a small flange of white metal has run into the oil ways, and if a syringe of thin oil is squirted through these oil ways, it is possible to see if they are clear.



Figrue 51 b.—Various types of washers used.

1. Joint for front bearing housing.
2. Joint (Inlet and Exhaust rear end).
3. Joint (Exhaust inter port).
4. Manifold joint and (Exhaust inter port).
5. Joint for oil pump body.
6. Oil pump body and cover joint.
7. Joint for bell housing.
8. Joint for water outlet pipe.
9. Joint for inlet water pipe flange.
10. Joint for fan centre.
11. Felt washers for clutch levers.
12. Brass washer for clutch levers.
13. Fibre washer for union cock (oil pressure pipe).
14. Joint for oil feed pipe to cylinder head.
15. Washer for relief valve plug.
16. Washer for cylinder head feed pipe union.
17. Washer for cylinder head feed pipe flange bolt.
18. Washer for drain cock.
19. Joint for drain pipe.
20. Joint for main oil feed pipe.
21. Joint for cylinder head drain pipe (front).
22. Joint for front cylinder head drain pipe (top).
23. Copper washer for cylinder head set screws.
24. Washer for cylinder head cover strap.
25. Washer for inlet pipe.
26. Joint for oil base.
27. Joint for cylinder head cover.

Clutch. The operation of the clutch on the modern motor car is comparatively speaking fool-proof, that is to say when the clutch pedal is pushed down the power from the engine in disconnected, but when the pressure on the pedal is released the clutch engages. From a point of view of actual maintenance there are only two items in connection with the clutch that the owner need trouble about—one is periodical lubrication of the clutch withdrawal ball race or thrust, secondly, adjustment of the set screws attached to the withdrawal arms in order to give the necessary clearance between the clutch plates when the clutch is disengaged and equally to prevent slipping when engaged.

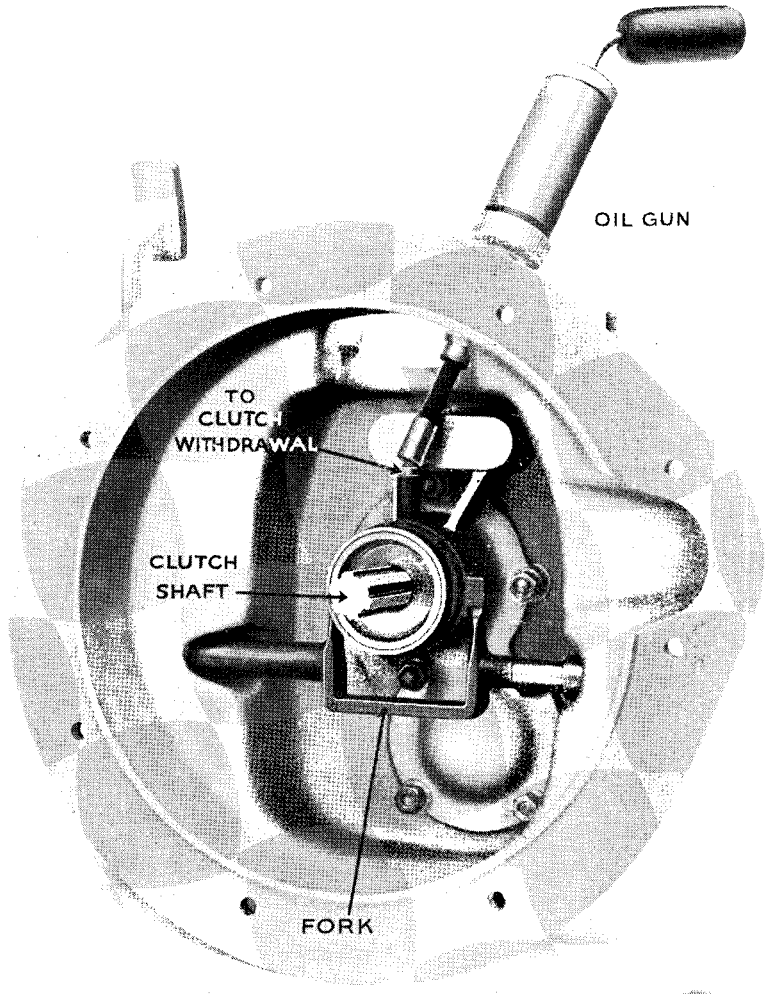


Figure 52.—View inside the clutch housing showing the withdrawal mechanism and point of lubrication.

The oil gun will be seen in Illustration No. 52 resting on the nipple of the clutch withdrawal collar, access to which is obtained by removing the clutch cover plate. The withdrawal only needs a little lubricant, too much is worse than none at all. Excess will be flung on to the clutch plates which will cause slipping. Do not put more work on the withdrawal bearing than is necessary by pressing the foot on the clutch pedal when driving. To do so will overheat the withdrawal and induce clutch slip.

Before proceeding with a description of the clutch, it is as well for a moment to study the details shown in Illustration No. 52, which is the clutch housing as seen when removed from the flywheel housing. In the first place there is a withdrawal shaft consisting of a " U " shaped member attached to a shaft which finds a bearing in either side of the housing. This shaft is attached to the clutch pedal, so that when the latter is pushed forward the " U " shaped bracket will force the clutch withdrawal sleeve forward; this clutch withdrawal sleeve comes into contact with the three withdrawal arms numbered 3 in Illustration No. 53, which has the effect of separating the clutch plates and compressing the springs which cause the centre plates to be gripped between the Ferodo faces attached to the pressure plate and clutch cover plate. It will be noticed in Illustration No. 52 that there is a splined shaft passing through the clutch withdrawal collar, and this shaft enters into the centre plate of the clutch marked No. 2 in Illustration No. 53, the centre being also splined as shown at No. 8.

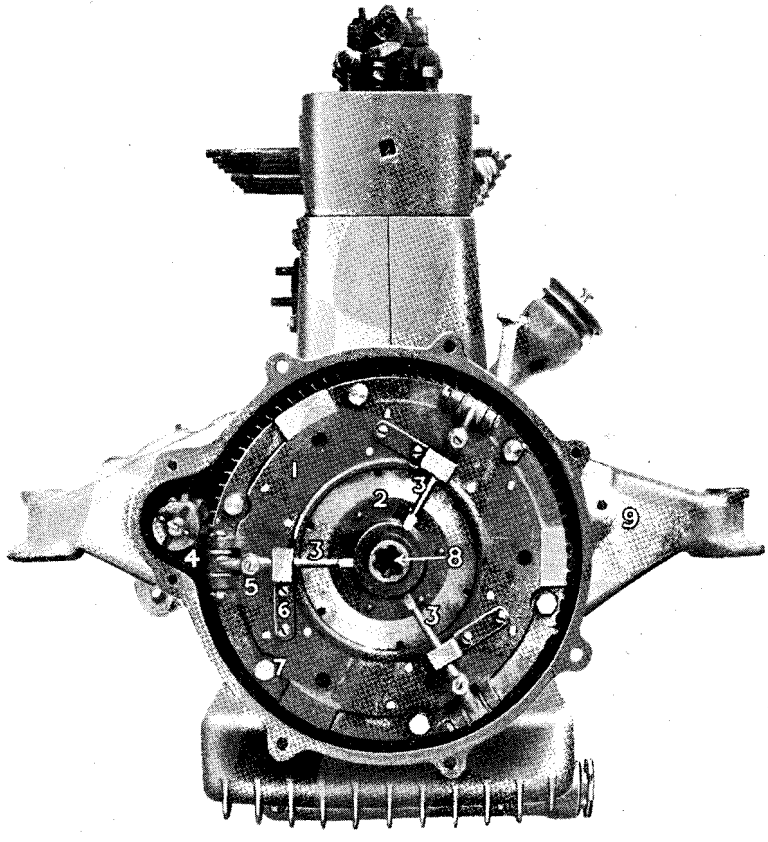


Figure 53.—Rear view of the engine with the clutch housing removed showing clutch in position. The parts numbered are as follows :—

1. Clutch cover plate.
2. Floating plate.
3. Withdrawal levers.
4. Fulcrum pin.
5. Adjusting screw.
6. Stop spring.
7. Cover plate bolt.
8. Splined hub of floating plate.
9. Stop for clutch pedal.

Illustration No. 53 is a view of the rear of the engine showing the complete caption placed beneath this illustration describes the numerals indicated thereon.

Clutch Operation. In order that the owner may understand the relationship of the various parts, he is referred to Illustration No. 54, for each part has been photographed in its correct relationship. The parts are also shown in Illustration No. 55, in this case each one on its own. Various terms are employed to describe the Clutch parts by different people, but in our Works they are described as follows :—

First there is the flywheel; next to it the clutch floating plate; next to that the pressure plate, and behind this the clutch cover plate.

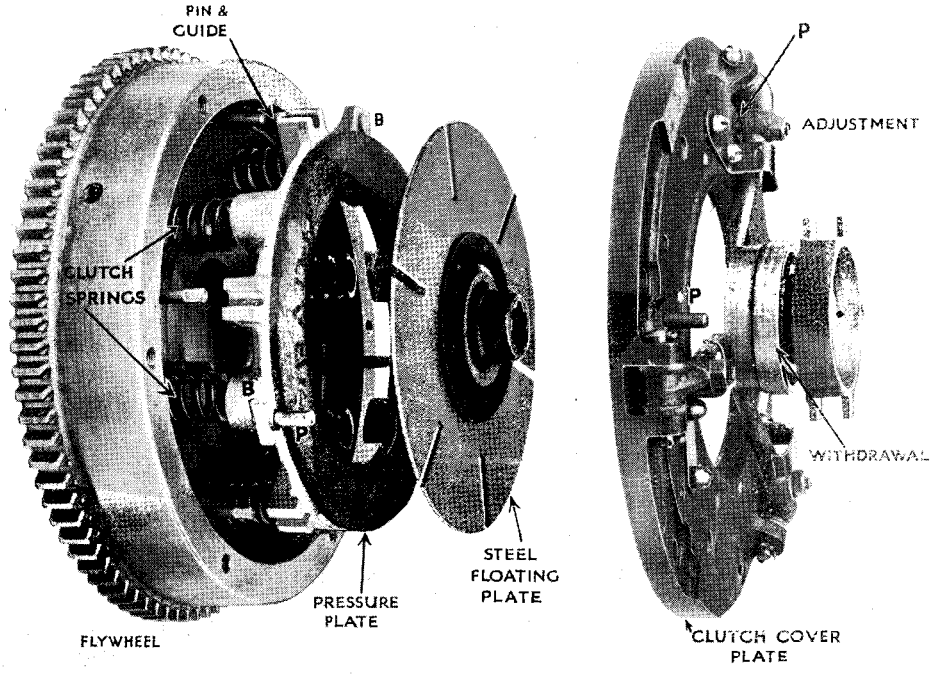


Figure 54.—Various components of the clutch after dismantlement. You will see that the springs cause the pressure plate to grip the floating plate against the clutch cover plate. Withdrawal is effected by forcing the pin against the buttons B, which has the effect of compressing the springs, thus releasing the floating plate from engagement.

The driving plate is made of steel, and as has been previously explained, is a sliding fit to the front end extension of the Gear Box shaft. The clutch cover plate and the pressure plate are each fitted with Ferodo discs, the ferodo being attached by means of rivets suitably countersunk. There are six clutch springs which fit into recessed cups on the flywheel side of the pressure plate, and the flywheel is fitted with six register pins that pass through slots in the pressure plate, and when the whole clutch is bolted up register through holes in the clutch cover plate. These pins are shown in Illustrations Nos. 54 and 55.

It stands to reason that when the clutch is bolted up solid as shown in Illustration No. 56 that the pressure of the springs will force the pressure plate into contact with the driving plate, and grip the latter between the pressure plate and the clutch cover plate. It is essential that the ferodo rings must be free from any lubricant so that they can work effectively, and one can visualise that letting in the clutch with a jerk may rough up the Ferodo faces. Alternatively, by letting the clutch continually slip, the centre plate will become overheated, which will in turn have a detrimental effect on the clutch surfaces.

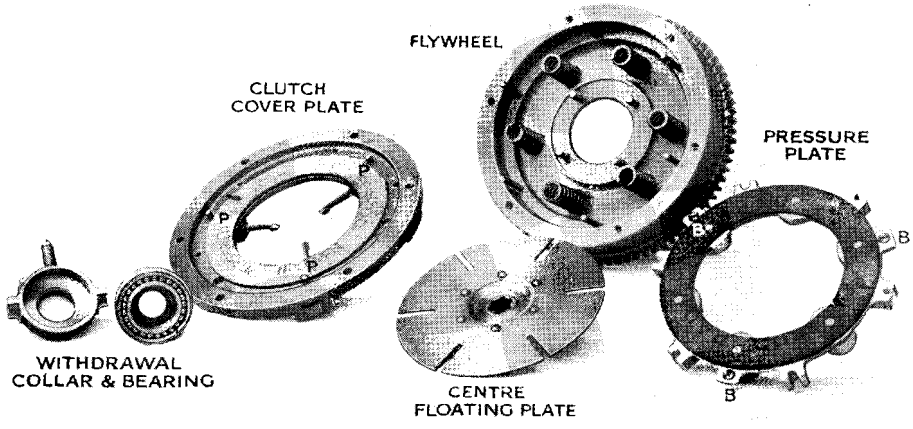


Figure 55.—The various parts of the clutch which are suitably lettered to indentify each one. It will be seen that the pressure plate and the clutch cover plate are faced with Ferodo. The pins which pass through the clutch cover plate will be fitted, and the three buttons on the pressure plate which contact with the withdrawal pins. The withdrawal collar and bearings are also noticed. The flywheel has six guide pins which register with slots machined in the pressure plate and eventually pass through the clutch cover plate, the clutch cover plate thus being carried to the flywheel by means of long bolts shown in Illustration No. 56.

Clutch Withdrawal. In order to effect the disengagement of the clutch, it is necessary to force the pressure plate out of engagement with the floating plate by compressing the clutch springs. It will be seen on reference to Illustration 55 that on the inner side of the clutch cover plate there are three short plungers, which, when the clutch is assembled, come in contact with the three hardened steel abutments marked B in Illustration No. 55. The Plungers are marked " P " in the same illustration. These plungers are controlled by the adjusting screws carried in the withdrawal arms, which can be clearly seen in Illustrations Nos. 52, 54 and 56. Pressure on the clutch pedal forces the withdrawal arms forward, and in turn these force the adjusting screws against the plungers " P " which in turn force the clutch pressure plate towards the flywheel, thus compressing the clutch springs. It will be seen that the pressure and cover plates are fitted with Ferodo discs or plates which are riveted in position. It is essential that the aluminium rivets be well countersunk in the Ferodo if ever the clutch is relined.

The action of the clutch thus having been described, it simply remains to show how adjustment is effected, and the reason for the three small clips shown in Illustration No. 56. The clips are only intended to prevent the clutch withdrawal arms going too far back, or floating outwards against the

withdrawal collar. It is also necessary to limit the travel of the clutch pedal so as to avoid the clutch being pushed out too far. As the clutch gradually wears, the thickness of the ferodo rings will decrease, which will cause the floating plate to come nearer to the clutch cover plates. This necessitates the clutch withdrawal set screws being adjusted to give a clearance between them and the withdrawal plungers. The correct clearance between the set screws and the plunger is .010" (ten thousandths of an inch) when the clutch pedal is out of engagement.

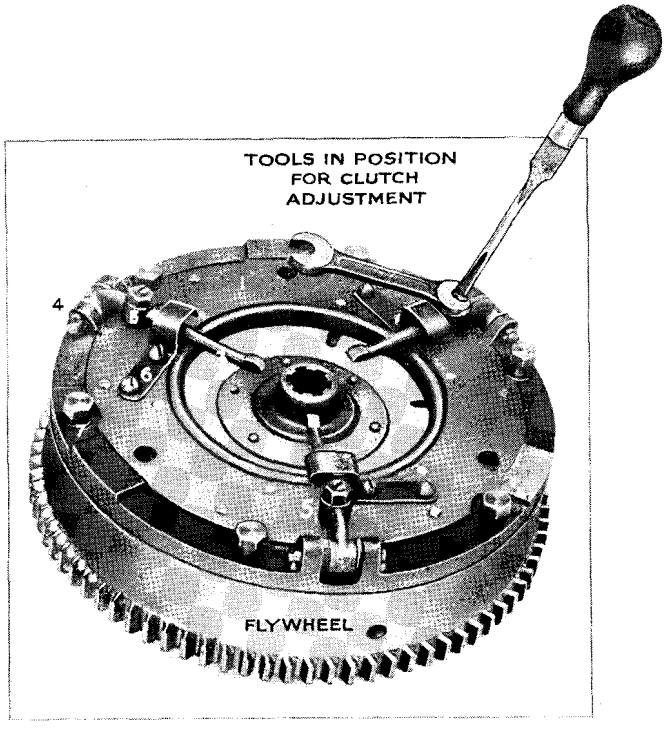


Figure 56.—This illustration should be studied because it shows the complete clutch removed from the engine, and the manner in which a spanner and screwdriver are employed to adjust the amount of travel on the withdrawal pins. The parts are numbered and are as follows :

1. Clutch cover plate.
2. Centre floating plate.
3. Withdrawal lever.
4. Fitting for withdrawal lever.
5. Adjusting set screw.
6. Spring steel clip to prevent withdrawal lever movement.
7. One of the bolts holding the clutch cover plate to flywheel. Whenever the clutch is taken to pieces two long bolts should be procured otherwise when undoing the bolts the springs may cause the clutch cover plate to fly back and damage the threads of the remaining bolts.

In Illustration No. 56 a spanner and screw driver are shown on the adjusting set screws, and in Illustration No. 57 the same parts are shown actually in the position one would see them in the Car. In this illustration which is primarily intended to show the gear box, another spanner will be noticed immediately behind the clutch pedal. This operates the forward stop to prevent the clutch pedal being pushed out too far.

Gear Box. A number of external views of the gear box have already been illustrated, and in view of the refinements obtained in the 12/70 M.G. Magna Chassis it is thought desirable to deal with the gear box at some length as it differs in many respects from the orthodox type of box. It has been seen that the change speed lever is fitted to an extension to the gear box lid, and this is shown removed in Illustration No. 57. The gear box affords four speeds and reverse. The gate is marked so that it is easy for anyone to see where the 1st, 2nd, 3rd and top speed gears are. In order that the reverse gears shall not be inadvertently engaged, the gate is provided with a stop clearly visible in Illustration No. 7. The gears are operated by a series of forks coupled to selector rods. These are shown in Illustrations Nos. 57 and 58.

It will be noted that each Gear Box is numbered, thus " No. 89 " in this case.

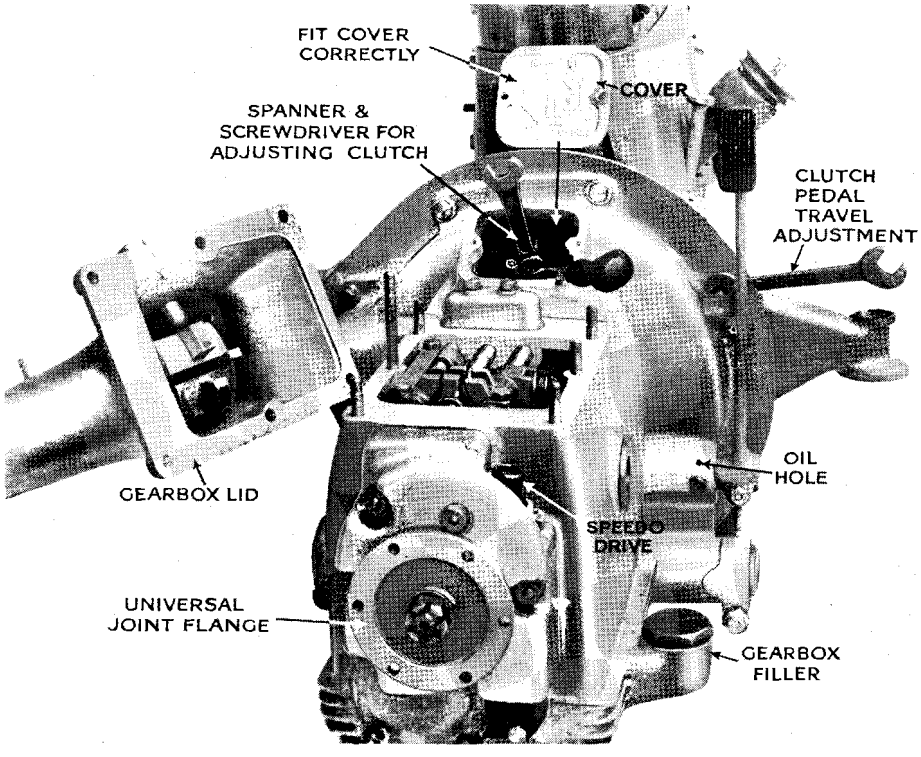


Figure 57.—General view of the gearbox and clutch housing showing the clutch cover removed and the spanner and screwdriver position for adjustment. The spanner will be seen on the right hand side of the illustration for adjusting the correct amount of travel for the clutch pedal. The oil hole will be noticed in this illustration for lubricating the clutch pedal shaft. The gearbox filler is on the right hand side of the gearbox, access to which is obtained through trap door in the floorboards. The rear end of the gearbox main shaft is fitted with a flange for attachment of the universal joint.

Illustration No. 58 also gives the owner an excellent idea of the manner in which the selector rods are locked in position, when the gear lever is placed

in any of the forward or backward positions. A small aluminium cover, situated between the gear box lid and the clutch inspection cover plate, is held on to the top of the gear box by two bolts and contains three springs which contact with three steel balls. The steel balls register in slots in the selector rods and as the gear lever is moved to and fro, the balls ride out of one slot and re-engage in another according to the position of the lever. Looking at Illustration No. 58, the right hand selector operates the reverse, the centre selector operates the 1st and 2nd gears, and the left hand selector which it will be seen has two forks upon it operates the 3rd and 4th gears.

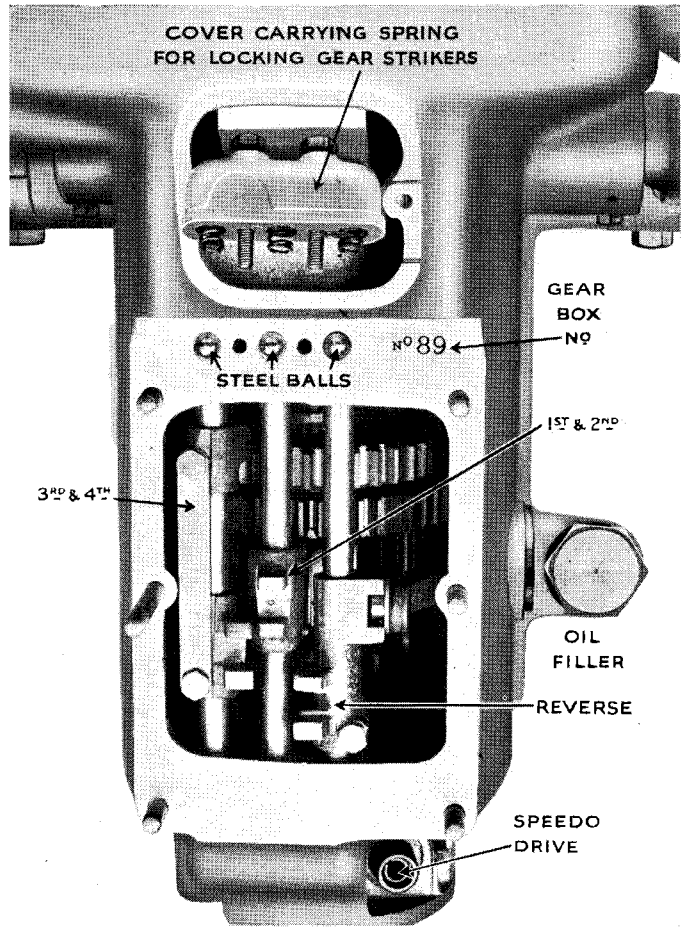
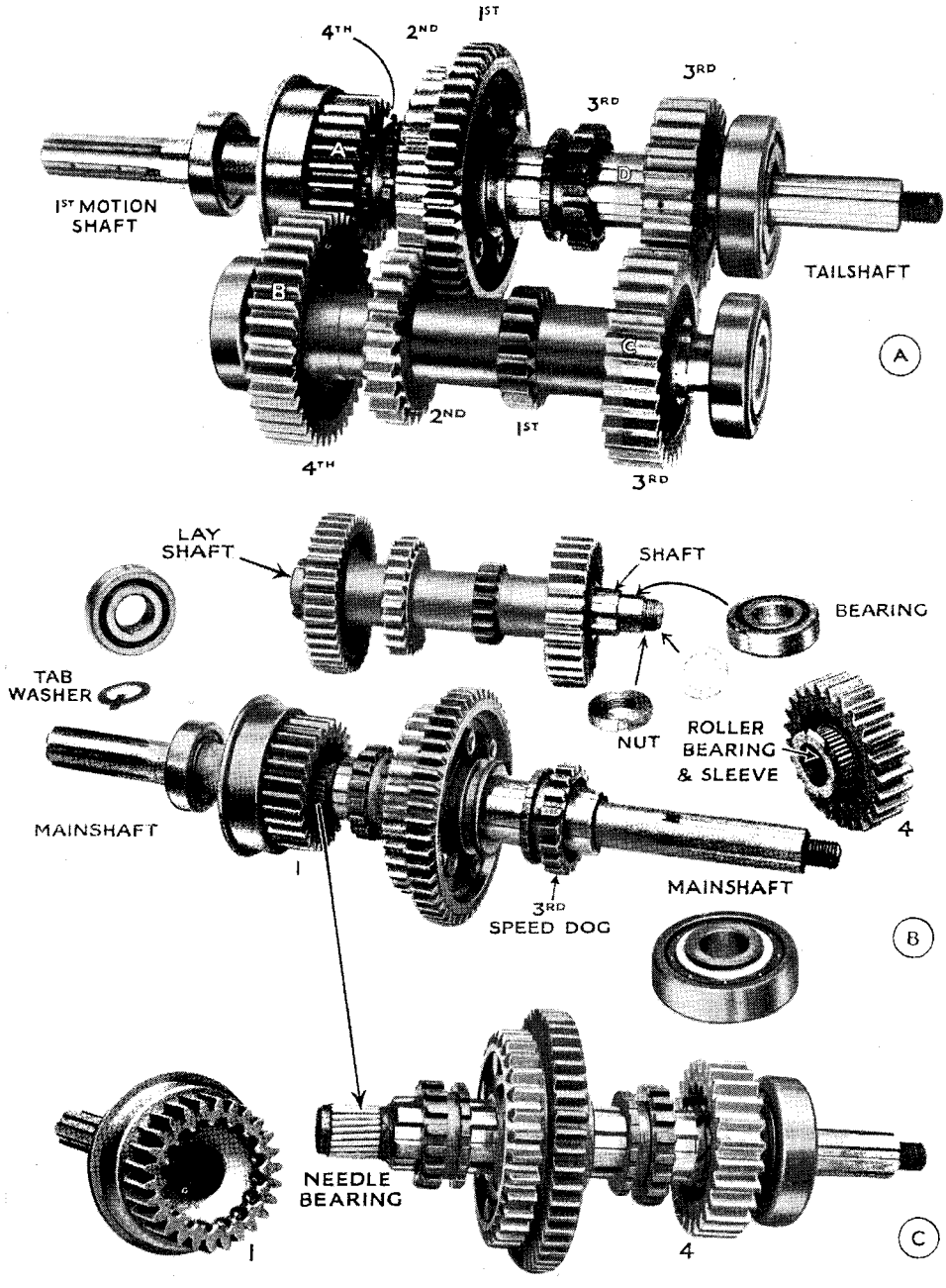


Figure 58.—This shows the view of the gear box after the lid has been removed, disclosing the striker gear, which are lettered. It will be seen that the third and fourth gears are operated by separate striker forks coupled together by a length of flat steel. The shafts on which the forks are fitted are maintained in correct position by means of three steel balls which engage in recesses drilled into the shafts and the balls being loaded by means of springs carried in the cover. The gearboxes are numbered, as shown. The gearbox should never be filled through the cover but through the filler provided at the side of the box.



MAINSHAFT SHOWING ROLLER BEARING – INTERNAL TEETH IN CONSTANT MESH GEARS AND SLIDING GEARS ON CASTELLATED SHAFT

Figure 59.—The three illustrations A, B, and C afford an excellent opportunity of examining the details of the gearbox.

A. Shows the two shafts removed from the box with the gears in second speed engagements.

B. Shows two shafts dismantled. It will be seen that third speed pinion on the main shaft is fitted with a roller bearing. A similar type of bearing is fitted at the front end of the main shaft, where this spigots inside the constant mesh gear. The engagement of the 3rd and 4th gears is by means of internal meshing gears. These are clearly shown at 1 and 4 C.

The owner or Service Station may require to know two points concerning the gear box, namely :—

1. How the third speed is obtained, and
2. How the gear box is dismantled.

Dealing with the third speed gear first, the composite Illustration No. 59 should be examined—the upper portion of the illustration shows the complete set of gears with the exception of the reverse as they would be seen taken out of the gear box. The clutch shaft extension is on the left and on the right there is the splined extension to which the front universal joint of the propeller shaft is attached. The gears at the moment are in second speed engagements. It will be seen that the pair of gears at the front and rear end of the shafts are also in engagement.

In order to realise the action of the gear box it is necessary to refer to Illustration No. 59B. This shows first of all the lay shaft which is a chain of four gears fitted on to a castellated shaft, the gears being separated by three spacing tubes. The whole of the shaft is locked up solid by ring nuts which hold the ball bearings in position.

The main shaft, taken as a unit, is built in two sections, namely, the forward end carrying the constant mesh gear 1 or 1st motion shaft, and the tail shaft which fits inside it in the manner shown in Illustration Nos. 59B and 59C. This is what is known as a spigot bearing, and the actual bearing surface is formed by a number of small steel rollers known as a needle bearing.

It follows that the first constant gear No. 1 can rotate leaving the remainder of the shaft stationary but of course always driving the lay shaft being in constant mesh. At the rear end of the main shaft, there is another constant mesh gear No. 4, but this is not fitted on to the splines of the shaft, but on the cylindrical portion of the shaft between the large set of splines and the small set at the rear. It is also fitted with a needle bearing.

It will be noticed that there are two large gears on the main shaft in 59C and two sets of small gears with short teeth, which, when moved laterally, will engage with the internal gears on the ends of the main shaft in the ordinary manner of a top direct drive.

This is what happens when the gears are engaged. It is necessary to refer to Illustration 59A. The gears are marked 1st, 2nd, 3rd and 4th, both main and layshaft, which means that when the 1st gear on the mainshaft is engaged with the 1st gear of the layshaft, the gear wheels operating then are A and B, 1st layshaft drives 1st mainshaft, which in turn drives the propeller shaft. For the second speed the same applies, except that the 2nd speed gear on the layshaft drives the 2nd speed gear on the mainshaft.

It will be remembered that momentary reference back to Illustration No. 58 will disclose the fact that the selector rod on the left hand side of the gear box carries two separate forks. These forks engage with the stub tooth gears on the mainshaft, and when the gear lever is pulled back, the rear 3rd speed engaging pinion registers inside the interior of the free running constant mesh gear at the rear end of the mainshaft. The drive then takes place through the front constant mesh gear on the mainshaft to its mate on the layshaft through C gear of the layshaft, and on to D gear of the mainshaft. The actual coupling between this last free running gear and the mainshaft being through the agency of the internal tooth gear. During this time the small internal gear at the front end of the mainshaft is out of engagement with the A constant mesh at the front end of the mainshaft.

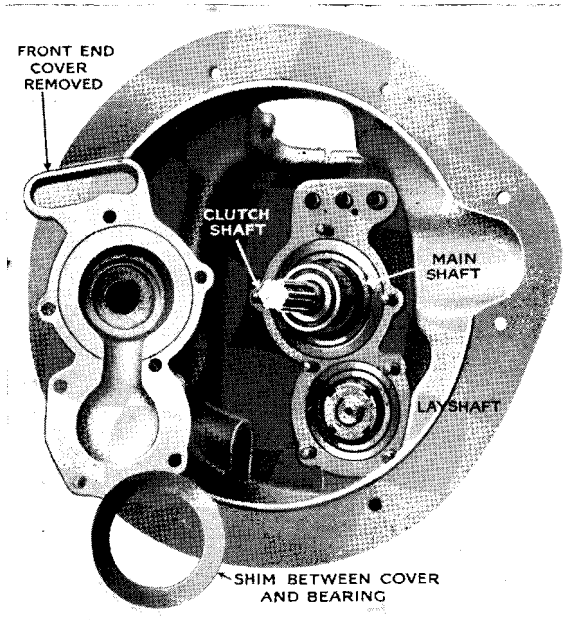


Figure 60.—The clutch housing showing the front end cover of the gear shafts removed and it will be noted that shims are employed in the course of original manufacture.

When top speed is about to be engaged, the gear lever is pushed into neutral which will disengage the 3rd speed pinion from D constant mesh wheel, and when pushed home the front internal gear or direct drive will be engaged. Then we have the mainshaft locked up solid, and a direct drive from engine to propeller shaft provided. It follows of course that the layshaft will continue to rotate when all the gears are running idle, the layshaft on its ball bearings, and D gear on the needle bearing previously described.

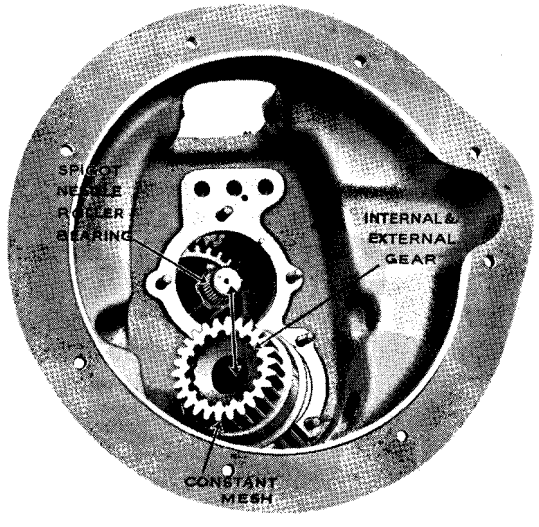


Figure 61.—After the front end of the cover has been removed it is possible to withdraw the front end main shaft, the ball bearing and front end housing. The rest of the gears are removed by extracting the shafts and lifting the gears out through the top opening of the gearbox.

Illustrations Nos. 60 and 61 show the commencement of the dismantlement of the gear box. After removing the front end cover the ends of the main and layshafts are disclosed. The clutch shaft with the ball bearings and the constant mesh gear can then be withdrawn, and in all probability the small needles on the bearing may drop out unless a piece of string is tied round these before the clutch shaft is completely withdrawn. It does not really matter very much if they do drop out because the gear box cannot be dismantled without being taken completely out of the Car, in which case the needles can easily be retrieved, the principal point to note is that there is a given number of needles in both end bearings on the mainshaft. In reassembling the gear box, if the end of the shaft is smeared with grease the needles can be embedded into this which will hold them in position until the shafts are built up.

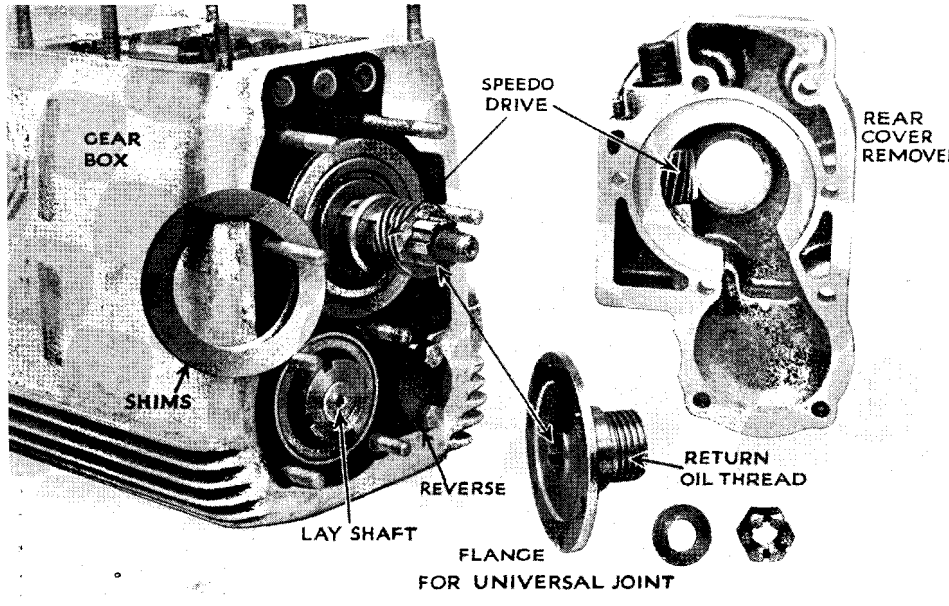


Figure 62.—Rear end of gearbox with cover removed, showing speedometer drive flange for universal joint removed, the ends of the layshaft and reverse shaft and the packing shims between the rear of the gearbox and the rear cover.

The rear end of the gear box with the cover removed is shown in Illustration No. 62. Here the speedometer drive is to be seen and the flange coupling for the Propeller shaft. It will be noticed that when the gear box is being dismantled there are a number of shims employed which should be carefully put on one side and marked with a label where they belong. The only point concerning the assembly of the gear box that might cause any difficulty from lack of the proper understanding is the manner in which the gear wheel and the needle bearing is fitted to the rear end of the box. In point of fact the needles do not run between the gear wheel on to the shaft direct, there is actually a sleeve bush between the needles and the shaft, and while withdrawing the mainshaft through the front end of the gear box, it is advisable to tap the needle bearing centre sleeve backwards with the gear until it is disengaged from the shaft.

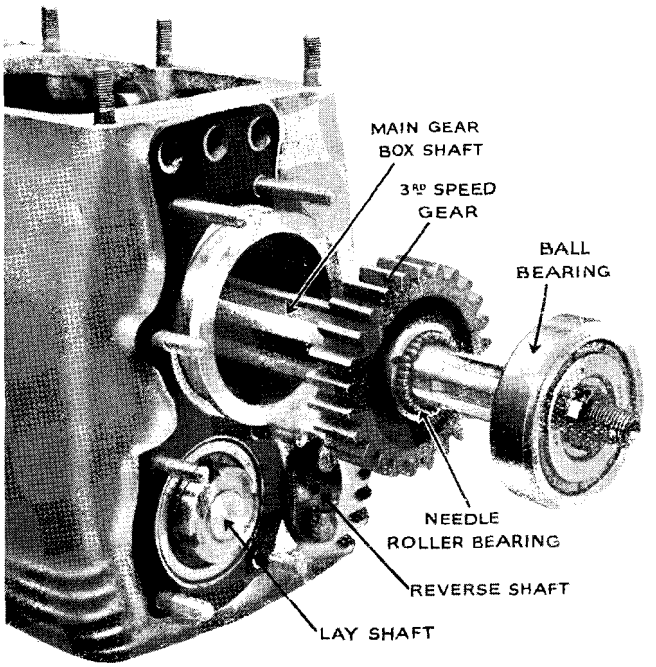


Figure 63.—This illustration is intended to show how the roller bearing fits inside the third speed gear on the main shaft. The gear cannot be withdrawn through the rear housing and the illustration must therefore be taken as being purely to illustrate the method of construction.

Illustration No. 63 has been taken in order to show the needle bearing of the shaft and the rear end of the barrel type of gear box employed. Below this shaft the lay and reverse shaft ends will be seen, the lay shaft being, as has been previously described, locked up by means of tab washers shown in

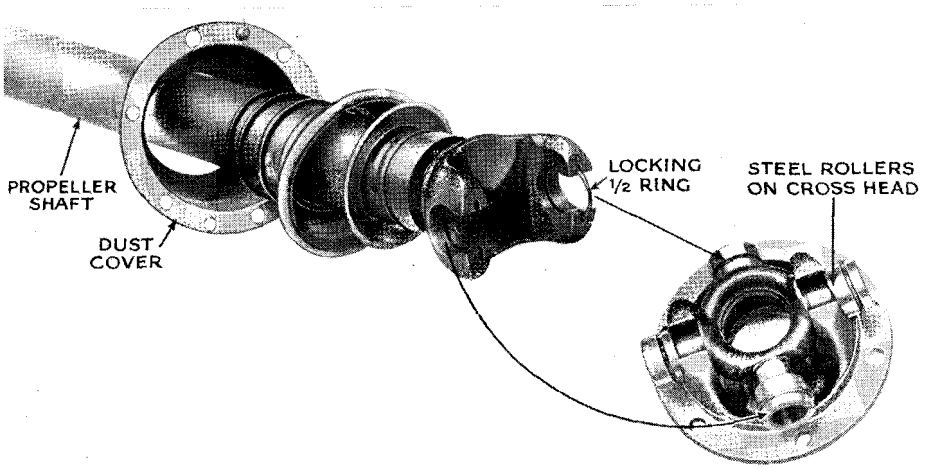


Figure 65.—Various components of the Hardy Spicer Universal Joint. On the right hand side is the flange having two jaws, and carrying the cross head of the universal joint on steel rollers, the other two pins of the cross head being supported in the jaws of that portion of the joint which is attached to the propeller shaft. To prevent the steel rollers from being flung outwards the jaws are supplied with half rings which fit into the grooves on the rollers. The whole of the universal joint is entirely enclosed by covers held in position by a spring.

Illustration No. 59B. When one of the end nuts has been removed, it is possible to drive the shaft out through the gears from either end. It follows of course that the assembly of the gears on the shafts is carried out by putting the gears into the gear box through the top, and putting the shafts through the gears from the ends.

Universal Joint and Propeller Shaft. The tubular propeller shaft is fitted at either end with Hardy Spicer Universal Joints. The front end of the propeller shaft is castellated as shown in Illustration No. 64 and this fits inside the castellated end of the Universal Joint. The object of this is to allow for the end movement of the propeller shaft due to the flexion of the rear springs and the rise and fall of the axle.

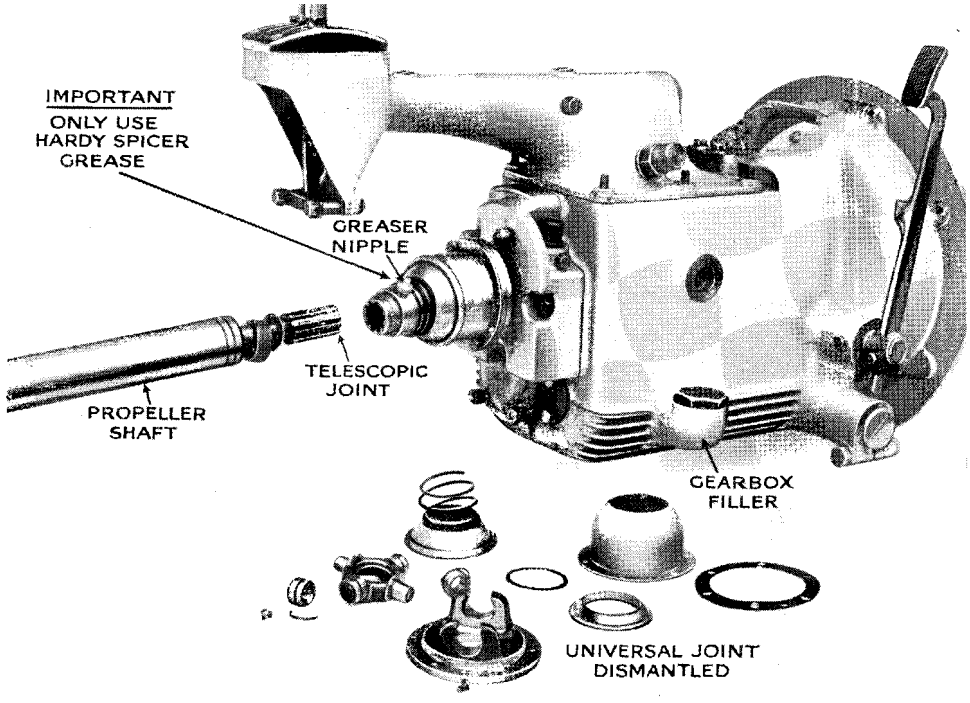


Figure 64.—Rear end of the gearbox and front end of the propeller shaft. It will be seen that the front end of the propeller shaft is splined and fits inside the rear end of the universal joint, and which permits of the end play of the propeller shaft. The universal joint is shown dismantled below. It is essential only to use the recommended lubricant in the universal joint.

It is necessary to keep this sliding coupling joint lubricated, and in Illustration No. 64 the nipple for this purpose is shown. The universal joint proper consists of a plate carrying two jaws, a cross head with hardened steel roller bushes, and the opposite set of jaws attached to the propeller shaft. The entire universal joint is enclosed by a pressed steel cover and a spring loaded dust excluder cover. The hardened steel rollers are grooved to receive semi-circular wire rings which prevents them floating outwards. It is essential that this joint should be packed with Hardy Spicer grease and a one pound tin would last a very considerable time.

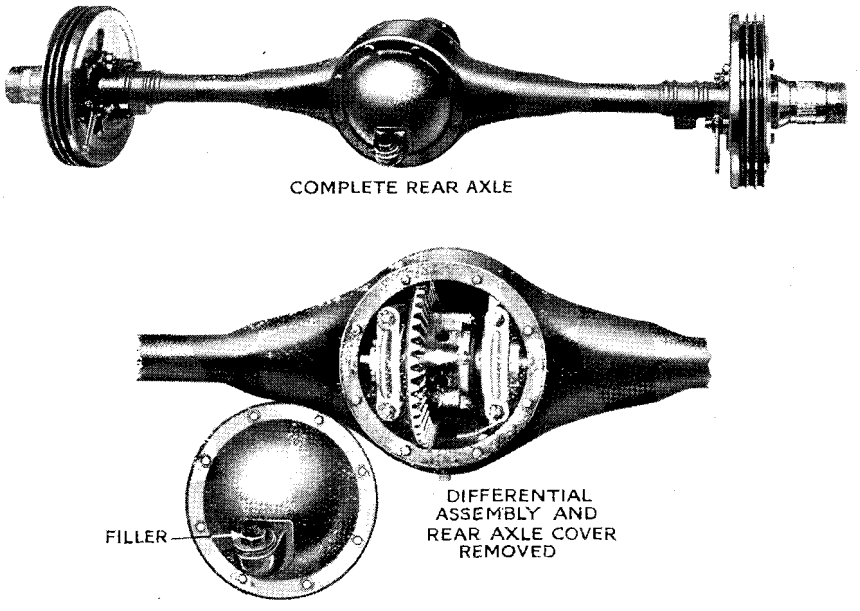


Figure 66.—General view of the rear axle, and below this is a view of the rear cover removed showing the differential assembly and crown wheel bolted in position.

Rear Axle. The external appearance of the rear axle can be seen from Illustration Nos. 7 and 9. The casing consists of a steel stamping forming what is known as the " Banjo." The complete differential assembly including the driving bevel and crown wheel are mounted on the front cover plate. The rear cover plate carries the oil filler extension. A drain plug is provided beneath the axle for draining this from time to time.

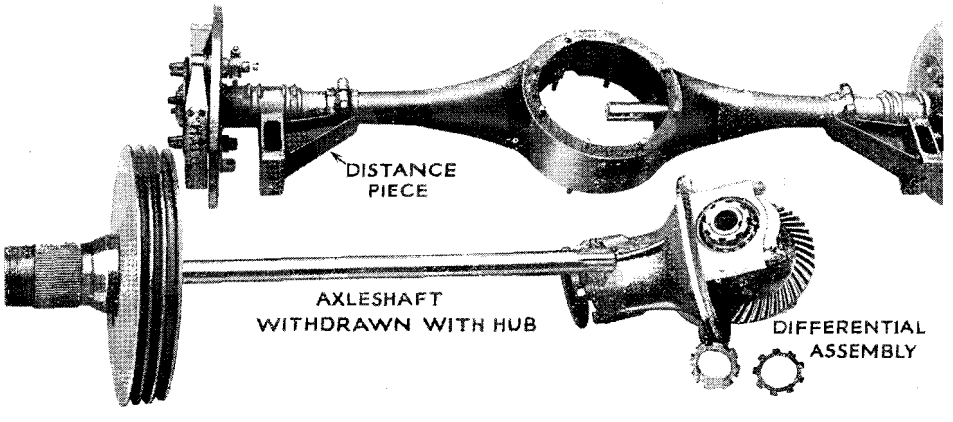


Figure 67.—Entire view of the back axle removed from the frame showing the complete differential assembly removed and the axle shaft withdrawn, complete with hub. The castellated nut beneath the differential assembly is intended to show how the latetral adjustment of the differential is effected and located in position by means of a tab washer.

Illustration No. 66 shows the interior of the axle with the gears in position after the rear cover has been removed. It will be seen that the complete differential assembly is clamped in position by two bridge pieces, having nuts of the " ring " type on either side; the object of these nuts is to permit of lateral movement of the unit in order to obtain correct meshing of the bevel gears. Once these have been set at the Works there is practically no necessity ever to remove them, but in the case of an accident it may be found necessary to re-adjust the mesh for the bevel gears. Of course there must be two adjustments for the meshing of the bevel gears, namely, the lateral adjustment of the crown wheel and the end adjustment of the driving bevel, permitting it to mesh correctly with the crown wheel.

Illustration No. 67 is a picture of the rear axle casing with the complete differential assembly removed, and one axle shaft and hub removed as well. Before the differential can be withdrawn, it is necessary to withdraw the axle shafts.

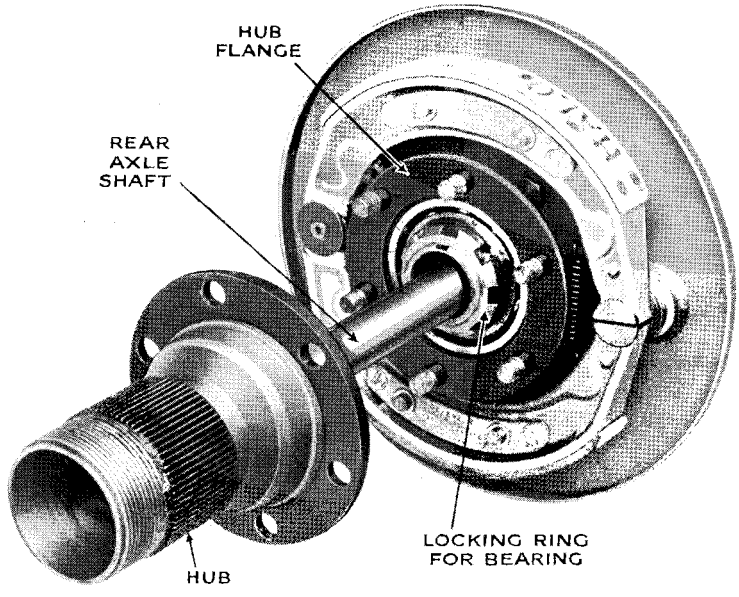


Figure 69.—General view of the rear hub partially withdrawn from the axle. The hub runs on a ball bearing and is locked in position in the hub flange by means of a castellated nut and tab washer. The brake pull-off springs will be noticed.

Axle Dismantlement. First remove the wheels and brake drums. The hub and ½ shaft can be withdrawn by refitting a wheel and pulling outwards and the view obtained in Illustration No. 69 will be visible. This shows that the axle shaft passes through the hollow axle casing, and the inner hub flange runs on a large ball bearing. This bearing has to be periodically lubricated which is effected by forcing a little grease through a nipple on the inside of the hub recess. Under no circumstances should Gear Oil be used for this bearing, but on the other hand a grease of the nature of vaseline is essential, as for example Shell R.B. This grease will remain in the bearing and not be flung out and find its way on to the brakes. The ball bearing is locked on the axle tube by means of a ring nut and tab washer. If ever the ring nuts have to be slackened they can be driven off by a brass drift and hammer. Steel punches should never be used, except in absolute emergency.

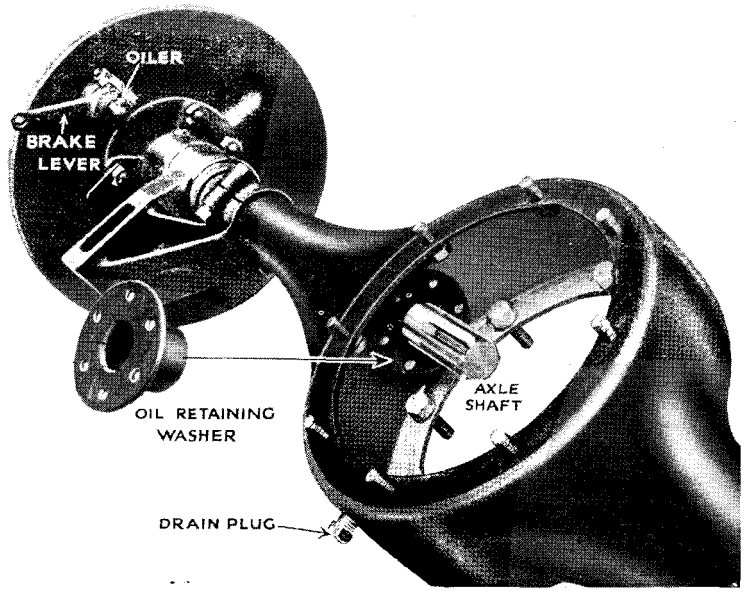


Figure 70.—A view of the rear axle showing two points, first the oil retaining washer and second, the drain plug.

A means has to be found to prevent the grease in the back axle creeping along the axle shafts, and it is as well to know that the outer ball bearings are provided with felt washers or glands. An additional gland is provided and is situated near the differential. It consists of a steel bush fitted with a leather washer and pressed into the axle tubes in the manner shown in Illustration No. 70.

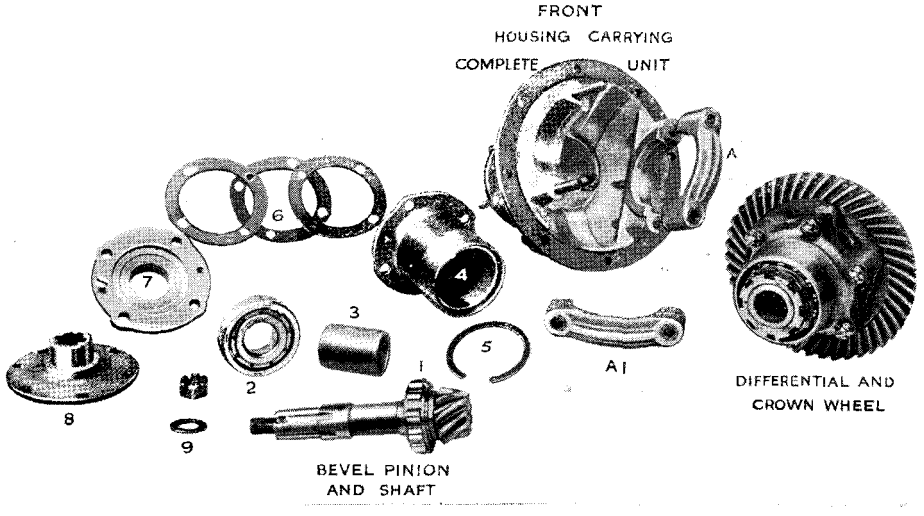
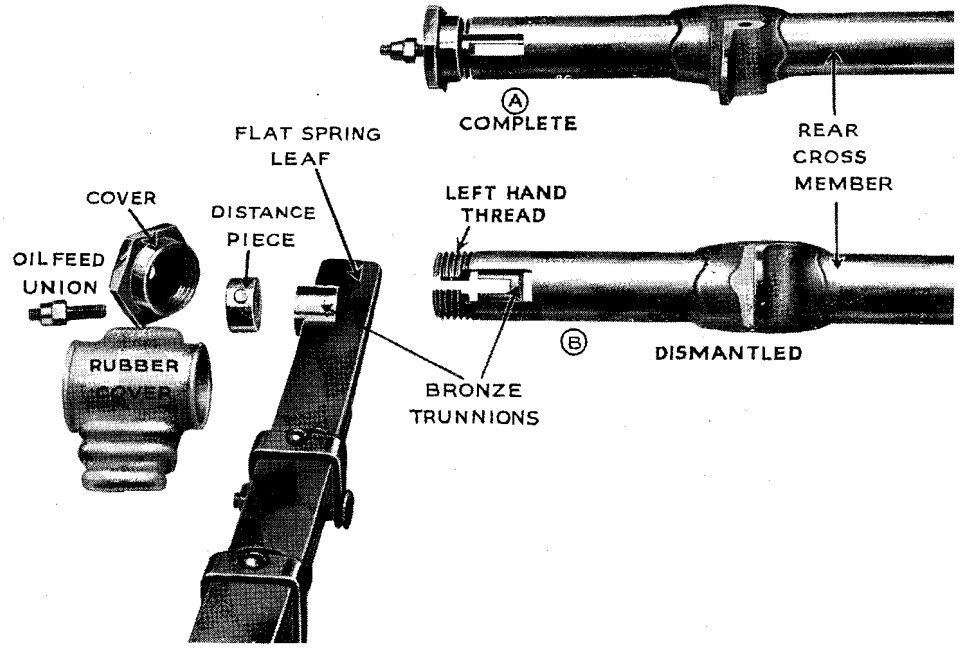


Figure 71.—The components of the differential showing the latter removed from the housing and the driving bevel pinion and shaft dismantled from its housing. The numbered parts are :—

1. Bevel Pinion Roller Bearing and Shaft.
2. Bevel Pinion Bearing (Hoffman).
3. Distance Piece for Bevel Pinion Bearing.
4. Bevel Pinion Housing.
5. Spring Ring.
6. Bevel Pinion Housing Shims.
7. Cap for Bevel Pinion Housing.
8. Propeller Shaft Flange.
9. Propeller Shaft Flange Slotted Nut and Washer.

A. Diff. Bearing Cap.
A1. Diff. Bearing Cap.

Differential. After the axle shafts have been withdrawn it is possible to remove the complete differential. The helical cut crown wheel is shown on the right hand side of the illustration, after being removed from the aluminium housing and the bridge pieces which hold it in position. The driving bevel assembly has also been dismantled; this runs on one roller and one ball bearing, the bearings being spaced apart by a distance collar. A number of shims are provided to take care of the correct meshing of the driving bevel with the crown wheel. The rear end plate enclosing the whole assembly is provided with tapped holes $\frac{1}{4}$" B.S.F. to act as means of with-



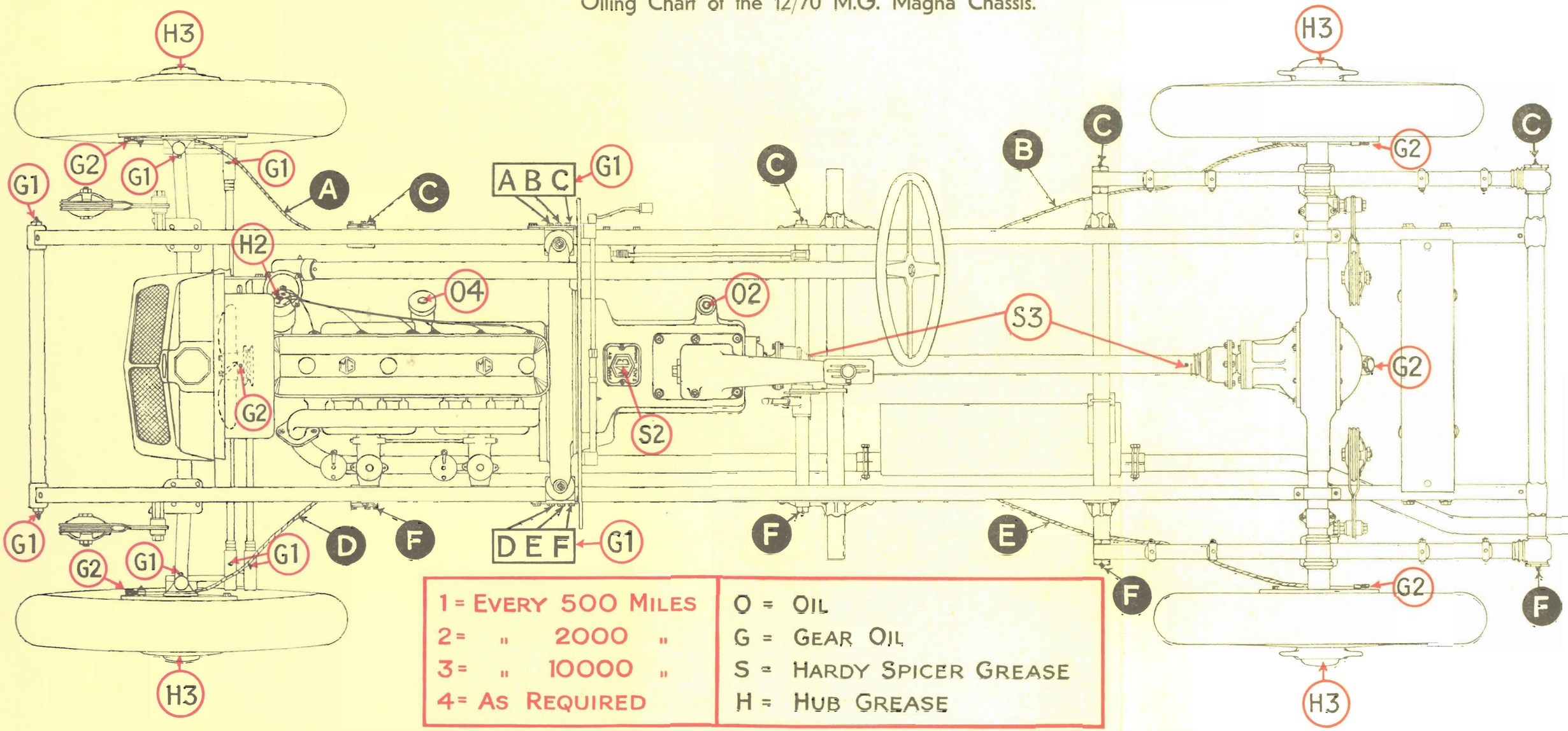
drawal. A circular steel ring will be noticed having a gap in it which registers in the front of the driving bevel housing thus preventing any forward motion of the roller bearing should subsequent wear take place. If ever the differential assembly needs attention the whole unit should be returned to the Factory where it can be properly looked over and correct adjustment of the gears be effected.

Suspension. As was mentioned in the opening chapters, no useful purpose could be served by repeating illustrations, and in consequence it was necessary occasionally to refer readers back to an illustration to make the point clearer.

Refer for a moment to Illustration No. 3 which shows the rear end of the front spring, and to Illustration No. 7 which shows the front end of the rear spring. Illustration No. 9 shows that there are no shackles employed in the 12/70 M.G. Magna.

The rear end of the front and rear springs slide in phosphor bronze blocks in the spring anchorages. The front end of both front and rear springs are pivotted upon fixed points. As a spring compresses or expands due to load or riding over inequalities, the rear end of the springs slide to and fro. The top leaf of the spring is accommodated in split phosphor bronze blocks capable of rotating in their housings. The manner in which this is effected is shown in Illustration No. 72 which shows a rear tubular frame cross member with the phosphor bronze slotted bushes in position. These are held in place by a distance piece and the whole assembly locked up by a large nut. A greaser nipple is provided which screws into the distance piece and finally the whole assembly is enclosed by means of a moulded rubber cover as seen in the illustration. The bronze bushes are capable of rotating inside the tube and the spring is also capable of end movement in the slots of the bushes.

Oiling Chart of the 12/70 M.G. Magna Chassis.



1 = Every 500 Miles	O = Oil
2 = " 2000 "	G = Gear Oil
3 = " 10000 "	S = Hardy Spicer Grease
4 = As Required	H = Hub Grease

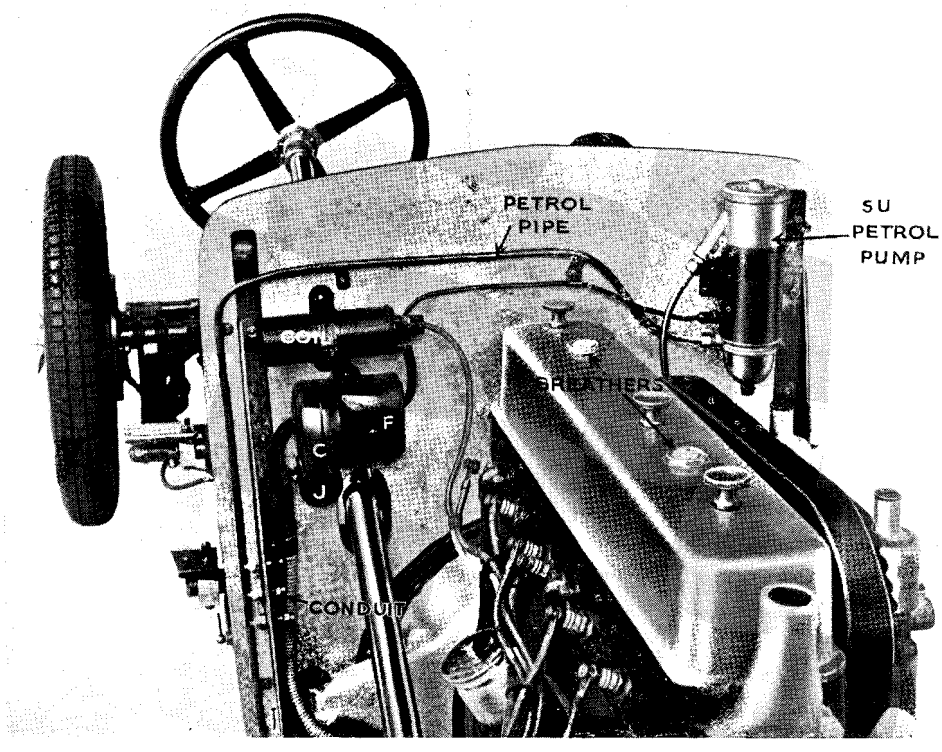


Figure 73.—General view of the dashboard from the engine side showing the electrical equipment consisting of the junction fuse box F, cut-out C, accessory junction box J, the ignition coil, and the S.U. electrical petrol pump. It will be noticed that all the electrical wires are carried in a metal conduit.

The accompanying wiring diagram may appear a little complicated to the average car user, and is really only intended to act as a guide in the case of dismantlement of all the wiring system. It shows, nevertheless, the run of the wires from the contact breaker to the coil, and from the coil to the junction box. It will also be seen from this illustration that the wiring is carried out on the earth return system, that the negative terminal of the battery is earthed, and there is an automatic earth from the lamps, starter and dynamo. There are, however, two separate earths that have to be made, namely from the horn and the junction box.

The principal points connected with the electrical equipment on which the owner will require instruction are the instrument board, the fuses and the wiring.

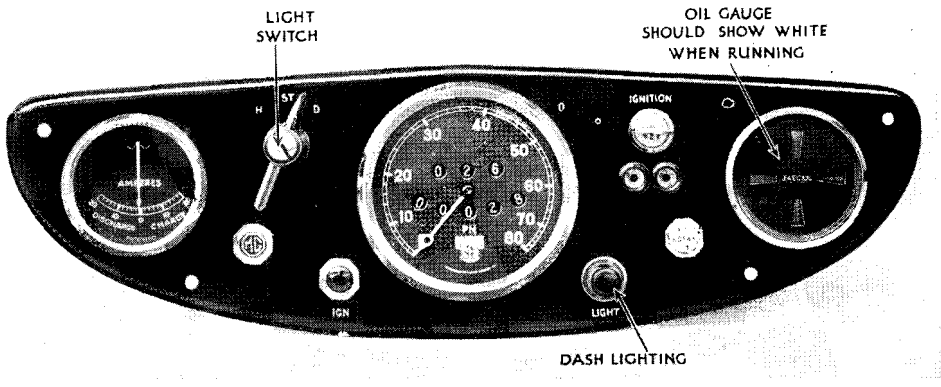


Figure 74.—View of the instrument board with the parts suitably lettered.

A front and rear view of the instrument board are as shown in Illustrations Nos. 74, 74A. The instrument board contains, reading from left to right, an ammeter, a switch controlling the dynamo charge, side and tail and head lamp illumination. The speedometer (which is driven by the gear box) is placed in the centre of the instrument panel on the right of which will be seen towards the upper edge of the panel, the red ignition tell-tale light and beneath this a socket for inspection lamp, and on the extreme right an oil circulation indicator. This indicator has four slots which when the oil is not circulating show red, but as soon as the oil pressure reaches a predetermined pressure the four slots show white through them. On the lower side of the panel there is the ignition switch and on the right hand side a switch to illuminate the panel from behind. The rear view of the panel shows the central speedometer which has a small arm attached to it for resetting the trip. There are a number of connections that, of course, have to be made on the junction box to the switchboard and these are indicated by colour and description on the wiring diagram. It will be noticed that the two lamps that illuminate the dials and also the ignition tell-tale lamp are fitted at the back of the panel into clips, each having its own individual socket holder. By this means a bulb could easily be changed and should ever the ignition tell-tale bulb prove

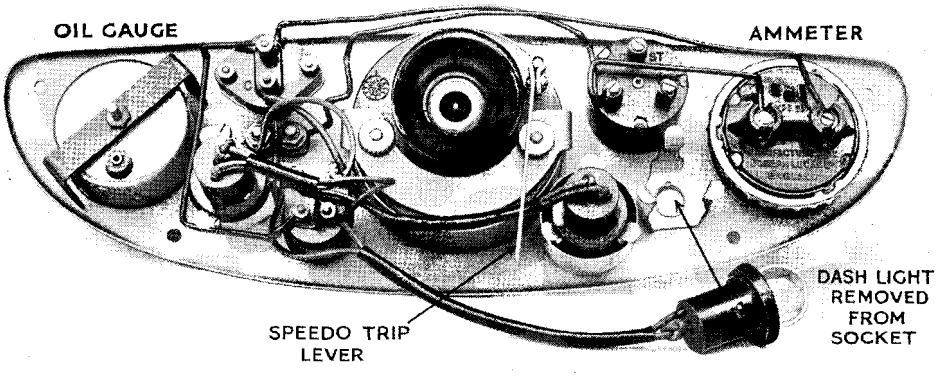


Figure 74a.—Rear view of the instrument board, particular points to be noticed being the lever for setting the speedometer trip and the manner in which the lights to illuminate the board are held in position in spring holders.

defective one of the other bulbs can be temporarily used in place of it. The wiring of the car is carried in armoured tubing at all essential points and the connections are made behind the combined junction and cut-out. This will be seen on reference to Illustration No. 75 of the engine side of the dash-board.

A better view of this is shown in Illustration No. 76. The junction box is fitted with a number of glass barrel fuses, and holes are provided in the body of the box to carry spares. The fuses control the side and tail lamps, separate fuses for the head lamps, another fuse for auxiliaries such as the

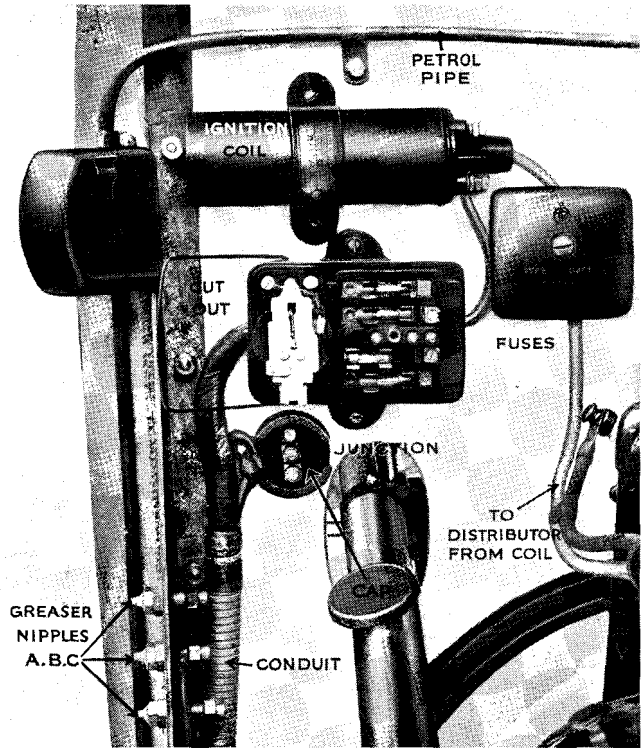


Figure 75.—Close-up view of the dashboard fitting showing the fuse box and cut-out covers removed. When the car is delivered to the owner the cut-out cover is sealed and except in exceptional circumstances this part requires no attention. A small junction box for the accessories is fitted with a cover ; to remove this cover, press the cap in the middle with the thumb and it will come off if the edge is held between the first and second fingers. The wiring is all attached to the back of the junction board or fuse box and will be seen in another illustration.

horn and a further fuse marked " B " which is for the dynamo field. The cut-out which is mounted on the same base as the fuses, is provided with a cover and under normal circumstances need never be touched, its operations being entirely automatic.

A small circular junction box is placed beneath the cut-out which forms a convenient connection point for wires to the horn and off side head lamp, in order to be able to control the latter through the dipper switch. It will be seen on referring to the wiring diagram that the lower terminal of the junction box is coupled to the horn and switch, and the upper terminal to the dipper switch and off side head lamp.

Dynamo. The dynamo is mounted on a platform at the front end of the engine and forms part of the overhead camshaft drive. Reference to Illustrations Nos. 27 and 39 show its actual application and Illustration No. 40 shows how it is driven and removed. Two views of the dynamo can be seen in Illustration No. 77. On the left hand side it will be seen that the pinion is held on to a shaft by a bolt having a very wide head and also a tab washer which registers into the key way in the armature spindle. The two holes in the pinion are drilled and tapped $\frac{1}{4}$" B.S.F. in order to facilitate removal at any time with the aid of two bolts, one of which is shown in the illustration. The dynamo requires but little attention, the brush gear can be examined by slackening off the screw holding the cover in position. The cover is shown in the illustration above the dynamo.

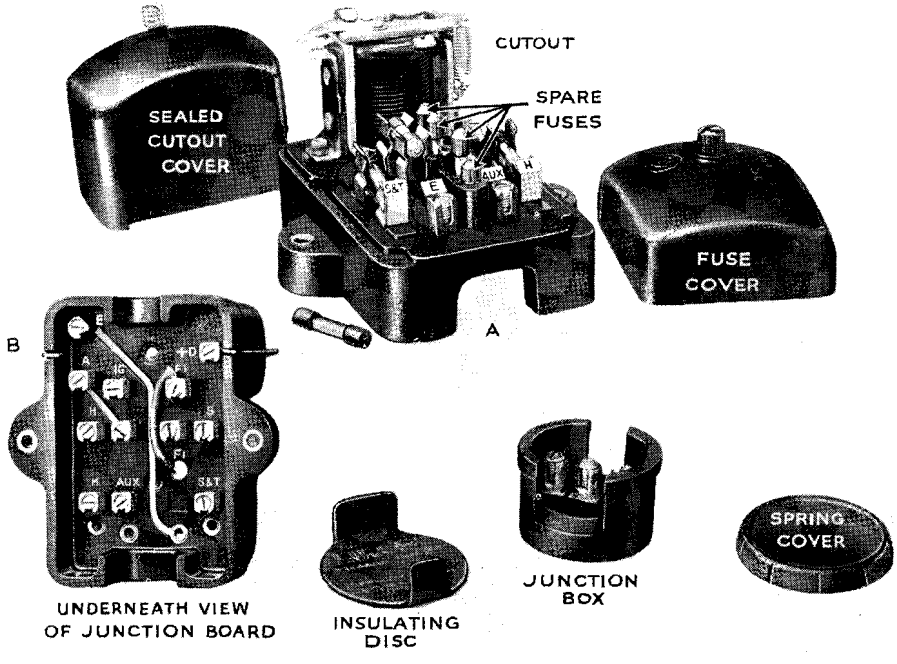


Figure 76.—Details of the electrical fitting A and the junction board seen from above, the underneath of which is shown at B. Reference to the wiring diagram shows, it will be noticed, the the earth terminal is covered up by a strip for convenience. Spare glass fuses are carried in the special holder, the value of the fuses being indicated on the wiring diagram. These are of 25 amperes with the exception of the field fuse, which is 5 amperes.

Brushes. It is very important to make sure that the three brushes work freely in their holders. This can easily be ascertained by holding back the spring and gently pulling each flexible lead, when the brush should move without the slightest suggestion of sluggishness. The brushes should be clean and should " bed " over the whole of their working surface; that is to say, the face in contact with the commutator should appear uniformly polished. Dirty brushes may be cleaned with a cloth moistened with petrol.

If any of the brushes become so badly worn that it is necessary to replace them, this is accomplished by releasing the brush lead eyelet by removal of

of the screw then, while holding the spring lever back out of the way, withdrawing the brush from its holder. The new brush can then be fitted by reversing the operation.

When ordering new brush replacements state whether they are main or control brushes, and for what type of machine they are required.

The brush springs should be inspected occasionally to see that they have sufficient tension to keep the brushes firmly pressed against the commutator when the machine is running. It is particularly necessary to keep this in mind when the brushes have been in use for a long time and are very much worn down.

Readers are cautioned that it is unwise to insert brushes of a grade other than that supplied with the machine, or to change the tension springs. The arrangement provided has been made only after many years' experience, and will be found to give the best results.

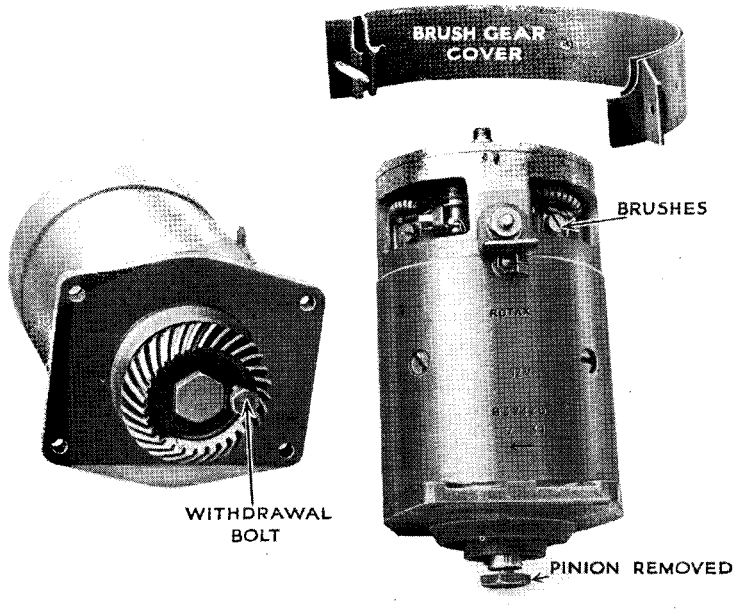


Figure 77.—Two views of the dynamo showing the Brush cover removed, and the method of withdrawing the gear from the shaft by two ¼" B.S.F. bolts.

Commutator. The surface of the commutator should be kept clean and free from oil and brush dust, etc.; neglect of this precaution will result in the commutator becoming blackened, causing sparking to occur at the brushes, and consequent shortening of the life of the machine. The best way to clean the commutator is to insert a fine duster, held by means of a suitably shaped piece of wood against the commutator surface, slowly rotating the armature by the starting handle at the same time.

If the commutator has been neglected for long periods, it may need cleaning with fine glass paper, but this is more difficult to do, and should not be necessary if it has received regular attention. The grooves between the commutator segments should be examined occasionally and any deposit of copper or carbon dust may be cleaned out by means of a thin saw blade or similar article.

Lubrication. As the bearings are packed with grease before leaving the Works, very little attention is needed. A few drops of oil, however, may be added through the lubricators provided, say, every 1,000 miles. The reader is cautioned that far more trouble has been caused by excessive oiling than by too little. (After the car has run about 10,000 miles the dynamo should be removed, cleaned and adjusted and the bearings re-packed with grease. This should be entrusted to the nearest Lucas/Rotax Service Depot.)

Dynamo Field Fuse. A fuse is provided in the dynamo field circuit to protect the machine in the event of anything being wrong in the charging circuit, e.g., a loose or broken battery connection. If the dynamo fails to charge the battery at any time (indicated by the ammeter giving a discharge reading during daytime running), inspect the fuse and if it has blown, replace it. If the new fuse blows after starting up, the cause of the trouble must be found, and we advise that the equipment is examined by a Lucas/Rotax service Station. Replacement fuses must be of the same size as those originally fitted.

In the case of the 12/70 M.G. Magna model, the fuse is one of the four cartridge type fitted in the junction box on the engine side of the dash (see page 72), and is marked " F." The size of the fuse is marked on a coloured paper slip which can be seen inside the fuse.

Removing the Dynamo. In order to obtain easy access to the dynamo for removal it is necessary to take off the radiator. Remove the two bolts fastening the radiator to the chassis frame, slacken the nuts at the rear end of the bonnet rod and release it from its bracket. Remove water return pipe from cylinder head together with fan, and loosen clips holding bottom water hose.

N.B.—It is unnecessary to interfere with any of the oiling system to remove dynamo.

Between the projecting portion of the cylinder head and the top of the dynamo will be found a circular flexible coupling. Remove the nuts on each of the four coupling bolts in turn, leaving the bolts in position, so that the coupling can be rotated by use of the starting handle to bring each bolt into a position where the nut may easily be reached.

Having removed all four nuts, take off the valve gear cover and turn the engine by the starting handle until the timing marks on the spiral bevel gears coincide. These will bring the driving yoke on the cylinder head across the engine, and the driving yoke on the dynamo parallel to the engine centre line. The bolts themselves may now be withdrawn, care being taken not to lose the distance washers, which must be replaced in the same position. Removal of the bolts enables the flexible coupling to be withdrawn.

Detach the two cables on the distributor side of the dynamo noting from which terminal they are removed.

Now unscrew the four set screws which attach the dynamo to its platform at the front of the engine thus releasing the dynamo. Lift the dynamo approximately a quarter of an inch and tilt it towards the near side of the car

until the driving yoke on the dynamo is just clear of that on the cylinder head. The dynamo can then be tilted forwards and easily withdrawn.

Replacement of the dynamo is effected in the reverse way, but it is necessary to make sure that the engine timing has not been disturbed while the dynamo was removed. Removal of the rectangular cover plate in the clutch housing should reveal the timing mark on the flywheel for Nos. 1 and 6 cylinders, exactly in the centre of the opening. Place the brass packing pieces which fit under the dynamo base in position on the dynamo platform, making sure that you replace the same number that you took off. If for any reason the dynamo is replaced by another, it may be necessary to re-adjust the mesh of the driving gears to obtain silent running by suitable selection of the packing shims used. Turn the dynamo spindle until the timing mark on the dynamo drive gear coincides with the centre line of the dynamo and is at the rear, that is, ready for engagement with the correspondingly marked teeth of the drive gear on the crankshaft. The holes in the dynamo coupling yoke will then be parallel with the engine centre line. Tilting the dynamo towards the near side of the car and holding the dynamo coupling yoke in this position, insert the drive gear into the opening of the dynamo platform and swing the dynamo backwards and downwards into position. The gears can be felt to be meshing properly if the coupling is slightly oscillated as the dynamo is replaced, but do not overdo the oscillations or you may engage the wrong teeth.

See that the bolts in the dynamo base are coinciding with the holes in the dynamo platform, and then observe if the dynamo coupling yoke is exactly parallel to the engine centre line. If it is not, withdraw the dynamo, reset the coupling yoke and re-insert the dynamo. No difficulty should be experienced in getting the dynamo in position with the correct teeth in mesh, as the distance between one tooth and the next is sufficient to make an appreciable difference to the position of the dynamo coupling yoke, a difference which is immediately discernible.

Having satisfied yourself that the correct gear teeth are in mesh, replace the screws in the dynamo base, taking particular care to tighten them up evenly a partial turn at a time until all are quite tight. Now make a final test. The flywheel mark 1-6 should show exactly in the centre of the inspection cover opening with the distributor rotating arm pointing towards No. 1 cylinder. (This can be easily be found by tracing the high tension lead from No. 1 sparking plug to its junction on the distributor. Removal of the distributor cover should show the distributor arm directly beneath it.) The dynamo coupling bolt holes should be exactly fore and aft and at right angles to the coupling yoke on the cylinder head, and the timing marks on the camshaft driving gears should be coinciding.

If all the foregoing are correct, replace the flexible coupling and coupling bolts, taking care to replace the distance washers in exactly the same position as they were originally. Tighten up the nuts firmly and rotate the engine slowly by hand. If the distance washers are in the correct position, the flexible coupling should run absolutely true. If it does not do so, note where the error is and adjust the distance washers accordingly. Then replace the valve cover and attach the dynamo cables on to their correct terminals.

Third Bush Regulator. The output of the dynamo, that is to say, its rate of charge, is controlled by a Third Brush which is shown quite clearly in Illustration No. 78. It is inadvisable for anybody who is not an electrician to tamper with this, but in case the Amp. Meter reads more than 2 amps. when all the head lamps are on, or in the event of its reading less than 8 amps. when no lights are alight, the Third Brush can be moved relative to the armature by slackening off the nut marked " locking nut " and turning the brush gear either towards the direction of rotation of the armature to increase the rate of charge or in the opposite direction to decrease the charge rate.

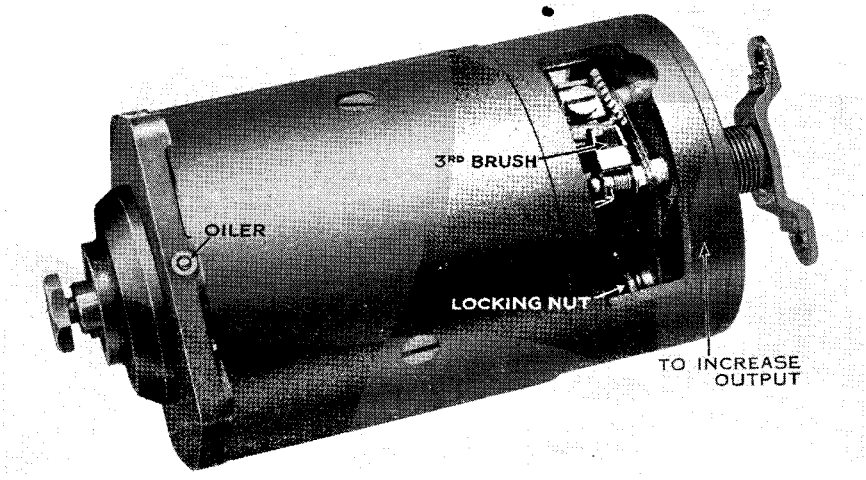


Figure 78.—A view of the dynamo showing the position of one of the lubricating holes, the third regulating brush and its locking nut, and the upper coupling for driving the overhead valve gear. The instructions should be read carefully concerning the care of the commutator and brushes and the regulation of the dynamo oil pipe, and the average conversion with electricity should not be tampered with.

The Third Brush is to be found on the near side of the car and on the same side as the small ball covered lubricator. Never omit to tighten up the lock screw after any adjustment has been effected.

Self Starter. This has already been described in some detail on page 28 which has more particular reference to the dismantlement of this unit, but the following instructions may be of some assistance in case the Starter is not functioning properly.

Starter Motor. The armature spindles of these machines are fitted with a pinion which, on rotation, runs into engagement with the geared ring on the flywheel. Immediately the engine begins to fire, the pinion is automatically thrown out of mesh.

If, for any reason, the pinion wheel on the motor does not engage with the flywheel teeth, examine the screwed sleeve on the armature spindle to see that it is free from dust; if necessary wash over with paraffin. Occasionally, give it a few drops of thin machine oil.

As in the case of the dynamo, the surface of the commutator must be kept clean and free from oil, brush dust, etc.

The starter is designed for starting the engine under normal conditions, but any unnecessary or additional loading will considerably diminish the life of the machine and battery. In order to facilitate starting in cold weather, it is advisable to flood the carburetter, and, before using the electric starter, crank the engine over slowly by the starting handle for two or three revolutions; this will break the oil film and considerably diminish the load for starting.

In the event of the engine refusing to fire after being turned by the starter, make sure that the ignition switch is " on."

It is not advisable to use the self starter with the Ignition Lever in the full advance position. It is better to put the Ignition Lever half advance and if necessary increase the amount of advance while the Starter Motor is spinning the engine. With coil ignition this is not usually necessary.

Battery. It is of the utmost importance that the battery should receive regular attention, as upon its good condition depends the satisfactory functioning of the ignition, starting motor, and the lamps.

At least once a fortnight the vent plugs in the top of the battery should be removed, and the level of the acid solution examined. If necessary, distilled water (which can be obtained at all chemists and most garages) should be added to bring the level well above the plates. If, however, acid solution has been spilled, it should be replaced by a diluted sulphuric acid solution of specific gravity 1.320. It is important, when examining the cells, that naked lights should not be held near the vents, on account of the possible danger of igniting the gas which is generated by the plates. It is advisable to complete the inspection by measuring the specific gravity of the acid, as this gives a very good indication of the state of charge of the battery. An instrument known as a hydrometer is employed for this purpose; these can be bought from your Dealer or from any of the Lucas/Rotax Service Stations.

For the battery fitted to the 12/70 M.G. Magna the specific gravity readings will be 1.285—1.300 for a fully charged battery, about 1.210 when half discharged and about 1.150 when fully discharged.

If one cell gives a reading very different from the rest, it may be that electrolyte has been spilled or has leaked from this cell, or there may be a " short " between the plates. In the latter case, the battery should be examined as soon as possible by a Lucas/Rotax Service Station.

Finally, see that the tops of the cells are clean and dry, and that the terminals are tight and smeared with vaseline.

If the equipment is laid by for several months, the battery must be given a small charge from a separate source of electrical energy about once a fortnight, in order to obviate any permanent injury to the plates.

Under no circumstances must the acid be removed from the battery and the plates allowed to dry, as certain changes take place which result in loss of efficiency.

The battery must never be left in a fully discharged condition, and, unless some long runs are to be taken, it is advisable to have the battery removed from the car periodically and charged up from an independent electrical supply.

Ammeter. The centre-zero ammeter which is incorporated in the instrument panel indicates the actual current flowing into or out of the battery. For instance, suppose two amperes are consumed when the side and tail lamps are switched on, and the ignition coil takes one ampere, then if the dynamo is generating at seven amperes the meter will show four amps. on the charge side of the scale. This is the current in excess of the lamp and ignition load which is available for battery charging purposes.

Fuses. The separate fusing of the various circuits ensures that a short in any one does not affect the rest of the electrical equipment. This is particularly important when coil ignition is fitted. It will be noticed that the fusing of the lamps is such that there is no risk of the driver being plunged into total darkness. If both the headlamps, or the side and tail lamps, or all the units connected to the auxiliary accessory terminal fail to function, examine the particular fuse protecting them.

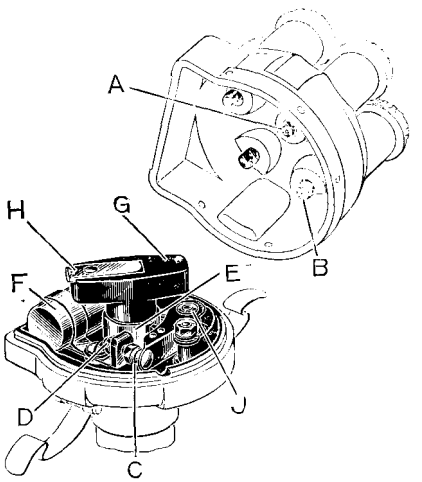
Remove the fuse from its holder and see whether there is a break in the fuse wire. Before replacing the fuse, inspect the units that have failed, for evidence of short circuits or other faults that may have caused the fuse to blow.

If a fuse blows repeatedly, and the cause cannot be traced we advise that the equipment is examined by a Lucas/Rotax Service Station.

The Cut-out. The function of the cut-out is to close the charging circuit, as the increased engine speed when the car is starting causes the dynamo voltage to rise above that of the battery. When the engine slows down, the dynamo voltage falls below that of the battery, and the reverse action takes place, i.e. the cut-out opens and thereby prevents the battery from discharging itself through the dynamo.

The question is sometimes asked whether the operation of the cut-out in any way depends upon the state of charge of the battery. There is no such relation between the two; the sole function of the cut-out is to switch on the dynamo with rising engine speed and to disconnect it when the engine slows down to below a certain speed. The cut-out is accurately set before leaving the Works and does not need any adjustment, and therefore the cover protecting it is sealed.

Very little attention is needed to keep the ignition equipment in first class condition. We advise that it is inspected occasionally, and the following instructions on lubrication, cleaning and adjustment should be carried out.



Distributor and Contact Breaker Type DJ6.

A—Carbon brush.
B—Electrodes.
C—Contacts.
D—Locking nut.
E—Rotating cam.
F—Condenser.
G—Rotating distributor arm.
H—Metal electrode.
J—Contact breaker pivot.

Distributor.—Occasionally remove the distributor moulding by pushing aside its two securing springs. See that the electrodes are clean and free from deposit. If necessary, wipe out the distributor with a dry duster and clean the electrodes with a cloth moistened with petrol. See that the carbon brush " A " is clean and moves freely in its holder. Clean the outside of the moulding, particularly the spaces between the terminals. Next examine the contact breaker; it is important that the contacts " C " are kept free from any grease or oil. If they are burned or blackened, they may be cleaned with very fine emery cloth and afterwards with a cloth moistened with petrol. Care must be taken that all particles of dirt and metal dust are wiped away. Misfiring may be caused if the contacts are not kept clean.

The contact breaker gap is carefully set before leaving the Works, and a gauge is provided on the spanner despatched with each distributor. Provided that the cam is kept clean and that the instructions on cam lubrication are carried out, the contact breaker gap will only need adjustment at very long intervals. It is not advisable to alter the setting unless the gap varies considerably from the gauge. If adjustment is necessary, proceed as follows :— When the contacts are fully opened, slacken the locking nut " D " on the stationary contact screw, and rotate it by its hexagon head until the gap is set to the thickness of the gauge. After making the adjustment, care must be taken to tighten the locking nut.

Lubrication.—(1) **Distributor Shaft.** The greaser on distributor shaft should be given one turn about every 500 miles.

Repack the greaser with a good quality high melting point grease when necessary.

(2) **Cam.** About every 3,000 miles, give the cam the slightest smear of vaseline.

(3) **Contact Breaker Pivot.** Every 5,000 miles, place a single drop of oil on the pivot " J " (Illustration No. ?) on which the contact breaker works.

Coil.—The coil unit is not adjustable in any way, and requires no attention beyond seeing that the terminal connections are kept tight, and the moulded coil top is kept clean.

Warning Lamp.—A warning lamp is provided in the instrument panel, which gives a red light when the ignition is " ON " and the car is stationary. The warning lamp will also light when the engine is running very slowly, due to the fact that the dynamo is not running at sufficient speed to generate a high enough voltage to actuate the cut-out.

The Detection and Remedy of Ignition Faults.—If a failure of ignition or misfiring occurs, unless the cause is at once apparent the owner is strongly recommended to proceed in accordance with the following routine which should quickly enable him to locate the trouble.

Before proceeding with the examination, make sure that the trouble is not due to defects in the engine, carburetter, petrol supply, sparking plugs, etc.

Engine will not Fire.—Switch on the ignition, turn the engine and observe the ammeter reading. The engine should be turned by hand if it is known that the battery is in a low state of charge.

If an ammeter reading is given which rises and falls with the closing and opening of the contacts, then the low tension wiring is in order. If the reading does not fluctuate in this way, a short in the low tension wiring is indicated, or the contacts are remaining closed. When no reading is given, a broken or loose connection in the low tension wiring is indicated, or the battery may be exhausted.

Examine the high tension cables, *i.e.*, cables from the coil to the distributor, and from the distributor to the plugs. If the rubber shows signs of deterioration or cracking, the cable should be renewed. Remove the distributor moulding and examine the contacts; if necessary, clean them as described on page 79. Turn the engine over by hand, and see that the contacts come together.

If a fault is indicated in the low tension wiring, examine the cables from the switch or junction box to coil, and from coil to distributor. See that the battery terminals are tight and that the cables from the switch-box to the battery are secure. The battery may be dismissed as the cause of the trouble if the lamps will light.

Test the coil independently of the distributor as follows :—Remove the cable from the centre distributor terminal, and hold it about $\frac{1}{4}$in. from some metal part of the chassis and turn the engine. The sparking should be strong and regular if the coil is functioning correctly.

Misfiring and Bad Starting.—Examine the high tension cables and the plugs. If necessary, adjust the gaps to the correct setting (about 20 thousandths of an inch). Sooty or oiled plugs may be dismantled and washed out with petrol.

The plugs and high tension cables may be tested by removing the plugs in turn and allowing them to rest on the cylinder head and observing whether

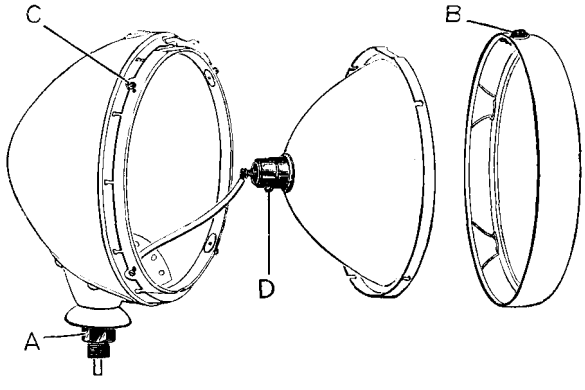
a spark occurs at the points when the engine is turned by hand. It should, however, be noted that this is only a rough test, since it is possible that a spark may not take place when the plug is under compression.

Remove the distributor moulding and see that the electrodes and contacts are clean. If necessary, clean them as described on page 79. See that the contact gap setting is correct.

If after carrying out the examination suggested, the trouble cannot be found, we advise that the equipment should be examined by the nearest Lucas/Rotax Service Depot, the addresses of which are given later.

Headlamps.—The headlamps are provided with a patented universally adjustable mounting which allows the beam of light to be set to the best advantage. This adjustment is obtained by slacking the hexagon locking nut " A " (Illustration below), turning the lamp to the desired position and then locking it by tightening up the nut.

The near side headlamp is set to throw its beam to the near side of the road and the off side (set straight) can be turned off or on independently.



Headlamp Dismantled.

A—Locking nut for adjustable mounting.
B—Screw head.
C—Reflector fixing screw.
D—Clamping screw.

Removing the Front and Reflector.—The headlamps are constructed with detachable fronts, parobolic reflectors and focussing devices. To remove a lamp front, give the screw head at the top of the lamp about a quarter of a turn—a coin will serve as a screw driver. This movement presses a cam against the body and pushes the front away from the body, enabling it to be removed. To replace, turn back the screw head and locate the cam between the two lugs on the body, then push the front into place. The reflector is secured by means of four fixing screws " C." Lamps are correctly focussed when sent out from the Works, but if a bulb is replaced it may be necessary to adjust the focus of the lamp. Accurate focussing is imperative if the maximum results are to be attained. The method of focussing is as follows :—

Remove the front as above, remove the screws holding reflector and then carefully draw forward the reflector until the lamp holder is exposed. This holder is fixed by the screw " D " and may be moved backwards or forwards when the screw is loosened. Each lamp must be focussed separately, care being taken that lamps are properly set in line, not pointing up or down. Correct focussing adjustment is obtained by reflecting lamps on to a wall or, preferably, a white object at a distance of about 100 yards,

sliding the holder backwards or forwards until the light reaches its highest point of brilliancy with total absence of shadows. Then tighten screw and replace the reflector and front.

Wiring Headlamps.—Remove the front and reflector as described in a previous paragraph. Then depress the insulating washer on the bulb holder terminal against the spring until the cable hole is exposed. Thread the cable end through the hole, release the pressure on washer, when the cable will be securely held in position and good contact made. Cables should not be pushed too far through the terminal, as there is a danger of shorting on to the reflector or body of the lamp.

Side-lamps.—The fronts of the wing lamps are secured by small grub screws; when these are removed the fronts can be withdrawn by first pulling the top forward.

Tail-lamp.—The tail-lamp is fixed on to the car by means of a flanged base. To replace a bulb turn the front portion of the lamp to the left and withdraw it from its base.

When replacing see that the studs locate with the slots in the lamp front, then push it home to lock it in position. Should it be necessary to re-wire the tail-lamp, unscrew the coupling nut " B," when the cable covering shell " C " and the cable plug " D " can be withdrawn from the lamp; pass the cable through the shell and the rubber washer " E." Thread the bared end of the lead into the terminal socket and secure by the screw " G." Replace the cable plug in its holder and secure by tightening the coupling nut " B."

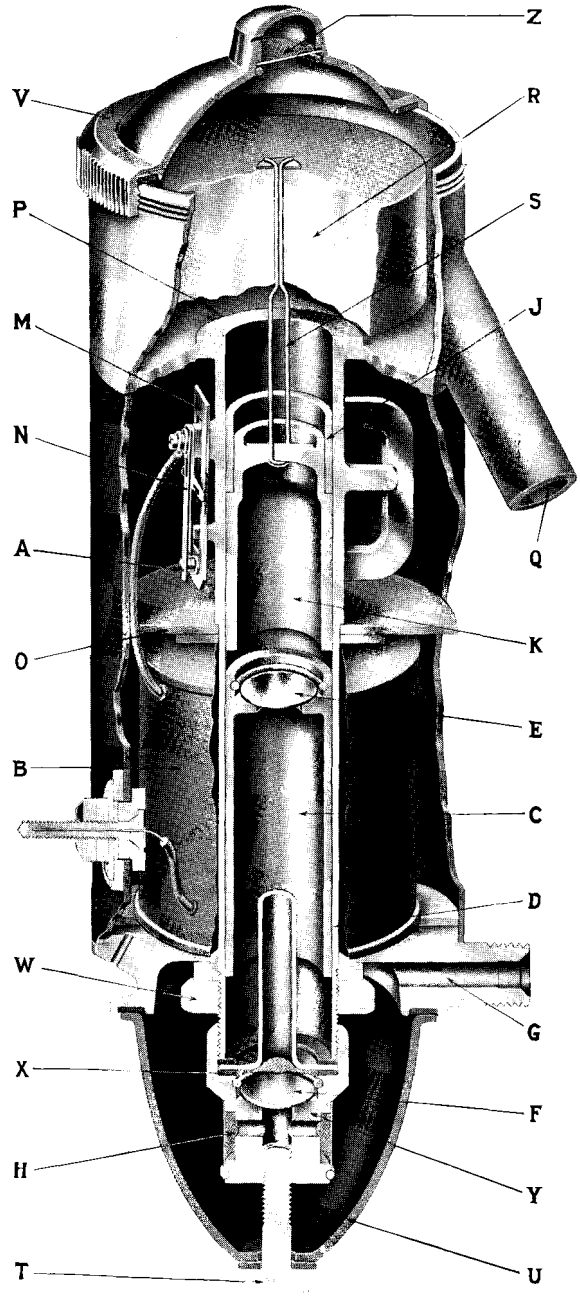
Replacement of Bulbs.—When the replacement of any bulb is necessary we strongly advise that Lucas/Rotax bulbs are used. The filaments are arranged to be in focus and give the best results with the lamps fitted. The following are the correct bulbs to use:—Head lamps, B.A.S. No. 35; Side and tail lamps, B.A.S. No. 10S.

Cleaning Lamps.—The reflectors are protected by a transparent and colourless covering, which enables any accidental finger marks to be removed with chamois leather or a soft cloth without affecting the surface of the reflector. Do not use metal polishes on Lucas Reflectors. Ebony black lamps can be cleaned with a good car polish. Chromium plated lamps will not tarnish and only need wiping over with a damp cloth to remove dust or dirt.

Lucas Altette Horn (Type HF318).—All electric horns, before being passed out of the Works, are adjusted to give the best performance, and they will give long periods of service without any attention; no subsequent adjustment is required.

If the horn becomes uncertain in its action, giving only a choking sound, or does not vibrate, it does not follow that the horn has broken down. First ascertain that the trouble is not due to some outside source, e.g. a discharged battery, a loose connection or short circuit in the wiring of the horn, or a blown fuse. It is also possible that the performance of a horn may be upset by the horn becoming loose on its mounting. If the cause of the trouble cannot be located, do not attempt to dismantle the horn, but return it to a Lucas/Rotax Service Depot for examination.

The S.U. Petrol Pump. This instrument is constructionally very simple and it is very improbable that it will give any trouble at all. Should it, however, cease to function, the trouble will probably be due to



1. The pump plungers (C or K) sticking, due to dirt or grit getting between the pump plungers and the body. Often a blow on the pump with the fist is sufficient to get it working, when the dirt will pass right through. Should it not do so, the remedy is to remove the filter bowl (U) and foot valve (Y), also the top cap of the pump and the cork float, when it will be possible to push the plunger (C)

through the bottom, after which a clean rag can be drawn through the bore of the pump. Note when assembling the plunger of the pump that the valve (E) is on top.

If the above is found to be in order

2. First of all remove the top cap (V) from the pump to see if the float chamber contains petrol. If it does then the trouble is not due to the pump.

3. If the pump continues to make a pumping noise without delivering petrol, it is due to one of the following causes :—

   (a) Lack of petrol in the tank.

   (b) Air leak, which may be due to
   (1) a bad joint between the filter bowl (U) and the casing, in which event tightening up will generally correct. If it does not do so a new washer will have to be fitted

   or

   (2) a loose petrol union in the suction pipe, that is to say any point between the bottom union of the pump and the petrol tank. The washer between the filter bowl and its bolt (T) should also be inspected.

   (c) Foot Valve (F) held up. This is a very rare source of trouble. To rectify remove the filter bowl (U), Filter (H) and foot valve (Y) by means of a tommy bar through one of the holes. The foot valve can then be cleaned. A second filter (X) will be found in the foot valve underneath the priming tube.

4. If the pump works very slowly without delivering petrol, it is due to

   (a) Blocked petrol pipe or filters, in which case the filters or pipe must be cleaned out.

   (b) Batteries run down, in which case fill the float chamber of the pump with petrol. This will probably enable the engine to be started up by hand, and as the dynamo comes into action it will boost up the batteries sufficiently to run the pump.

5. Should the pump not work at all, providing the plunger has not stuck, the trouble will be due to

   (a) A bad electrical connection. To test this remove the terminal from the pump and flash the wire across the pump body. If there is a bright flash this is in order. If not, the trouble is due to the batteries being run down or bad connections somewhere in the system.

The electrical apparatus is to all intents and purposes absolutely fool proof. Practically the only thing that can cause this to cease to function is a broken wire. If reference is made to the diagram the connections will be seen exactly. To gain access to the electrical part of the pump it will be necessary to remove Filter Bowl (U), foot valve (Y), unscrew the large hexagon nut (W) holding the inlet ring, when the casing can be drawn off and the internal parts of the electrical equipment and connections inspected. Care must be taken to see that the cork gland washer which makes a petrol tight joint between the inlet ring and electrical equipment is in perfect condition. A new cork gland washer is advisable.

When the casing is removed care must be taken to see that the wires are not broken, and particularly that the top wire does not come across the rocking contact plate (M). A simple test for the contacts being in working order, providing the bottom plunger has not stuck, is to remove the cap (V) from the top of the pump and lift the float (R) up and down its full stroke. If listened for intently the rocker plate can be heard to click as it breaks the contact.

If after being re-assembled the pump works, but does not deliver petrol, it should be primed by pouring a small quantity of petrol into the top chamber. If petrol is not available a few squirts of thin oil down the tube of the pump after removing the Float (R) and top plunger (K) will have the same effect. Please note the oil must be thin.

The Petrol Pump is unconditionally guaranteed (except for obvious mishandling) by the makers, The S.U. Carburetter Co. Ltd., East Works, Bordsley Green Road, Adderley Park, Birmingham, to whom all queries should be addressed.

Body Hints. The body of the M.G. Magna is attached to the frame on the special body brackets which can be seen in Illustration No. 8. It is advisable after the car has run a few thousand miles to see that these body bolts are tight and they should be kept tightened from time to time. The hinges and the striking plates of the doors should be oiled occasionally with a little " Three in One " oil. This will prevent rattles and squeaky closing of the door. It may be found that the doors may require adjustments which will soon cure any rattles that may develop. The body floorboards are provided with a trap door on the driver's side as shown in Illustration No. 79, giving access to the foot brake adjustment, the gearbox filler and petrol tap, and the " stop light " switch.

As soon as the owner obtains his car he should lift the back seat cushion and the rear seat pan and see for himself where the batteries are located, the position of the rear axle filler cap, the points for rear shock absorber adjustment and the two small lubricators on the rear axle brake camshafts.

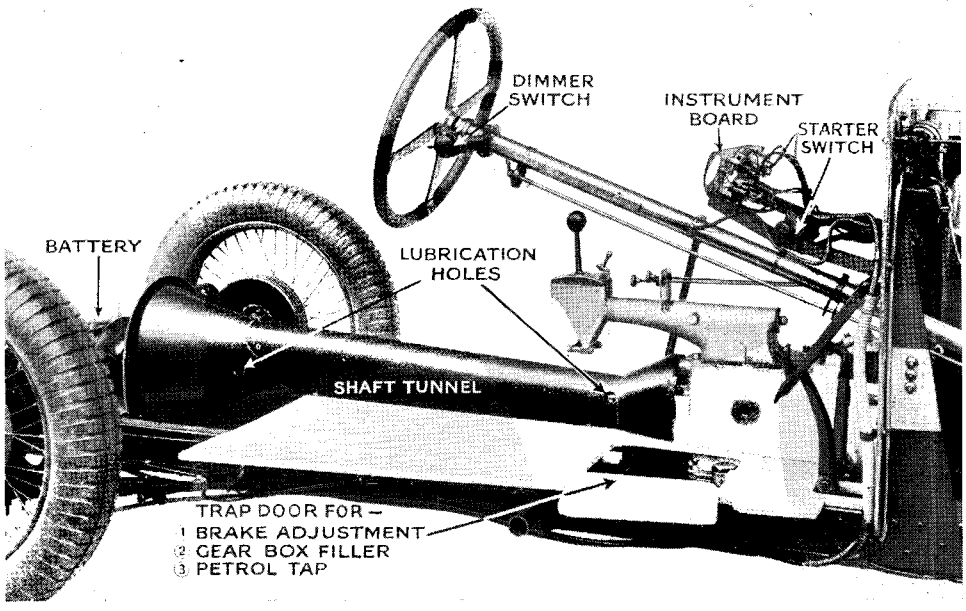


Figure 79.—General view of the chassis showing shaft tunnel and floorboard in position. Note the holes in the shaft tunnel for greasing the two universal joints and the trap door for access below the floorboards.

It is essential that only Hardy Spicer grease should be used for the universal joint, and in this connection a special small gun is provided for the purpose.

Petrol Tank. This is housed inside the body and in the case of the open four-seaters there is a little locker in the right hand rear corner, and in the case of the Saloons the luggage platform must be undone with a luggage key and lowered, when access is obtained to the filler cap. It is obvious therefore to keep the luggage key handy.

Luggage Platform. This is a very neat fitting consisting of a portion of the rear panel of the body provided with two supporting arms which when folded outwards and downwards register into brackets and are held in position by thumb nuts.

The Spare Wheel on Saloon cars is carried on the near side with pan and clip. In the case of the open four-seaters the spare wheel is carried on the rear of the body on a dummy hub having a lug, which, when the wheel is in position must rest between two of the spokes, the object for which is to prevent the wheel turning when the locking nut is being tightened. The locking nut is provided with a long thread so that the spare wheel can easily be removed without fouling the rear number plate.

Hood on Four-seaters. It is essential that the hood is folded to refit in the envelope which is held in position by five lift the dot fasteners and straps, otherwise the folds of the hood might obscure the rear number plate. When folding the hood the material should be folded outwards from between the sticks, except of course, the one with the window in it, and then the hood bag will go on easily.

Bonnet Fasteners. To undo the bonnet fasteners these should simply be turned in an anti-clockwise direction, which is sufficient to overcome the spring tension; when the bonnet is being fastened the bonnet fasteners should simply be pushed downwards when they will engage with the brackets provided for same.

Sliding Roof on Saloons. It will be noticed that this is held in position by two knurled nuts and if these have been undone it is necessary to lift the roof heading out of engagement before it can be taken backwards. It is advisable to supply a little lubricant to the slide occasionally and if the car is used in dusty districts the channels should also be cleaned out from time to time. The car should never be driven with the nuts holding the sliding portion of the roof slack.

Front Fairing for Dumb Irons. This is held in position by two spring clips and the electric horn is attached on the underneath side of this. To remove the fairing it should be lifted from the front underneath the number plate and drawn forward. To replace, register the rear end slide back and then general pressure downwards will replace it in position.

Tool Locker. This is provided beneath the bonnet; tool equipment can be fitted in this with the exception of the starting handle, which is clipped on the *outside*.

Tyres. The Tyres being one of the most expensive items in the upkeep of a Car, should receive special attention in order that you may receive the utmost service from them.

The most important factor is the maintenance of the correct air pressure, and this should be checked regularly in all five tyres with a reliable pressure gauge once every week, whether the car is used or not. Remember that it is the air that carries the load.

Dunlop Tyres, 4.00″ for 19″ rims are fitted to the M.G. Magna, and the makers recommended pressures are as follows :—

Front Wheels, 27 lbs. per square inch.
Rear Wheels, 27 lbs. per square inch.

These pressures relate to a car with the two front seats occupied. When rear seats are occupied pressure should be increased in the rear tyres to about 30 lbs.

Oil and Grease. Tyres should never be allowed to stand in a pool of oil, grease or petrol, as these substances are detrimental in their effects on rubber. Any oil or grease should be removed from the tyre as soon as it is noticed, by the use of a rag.

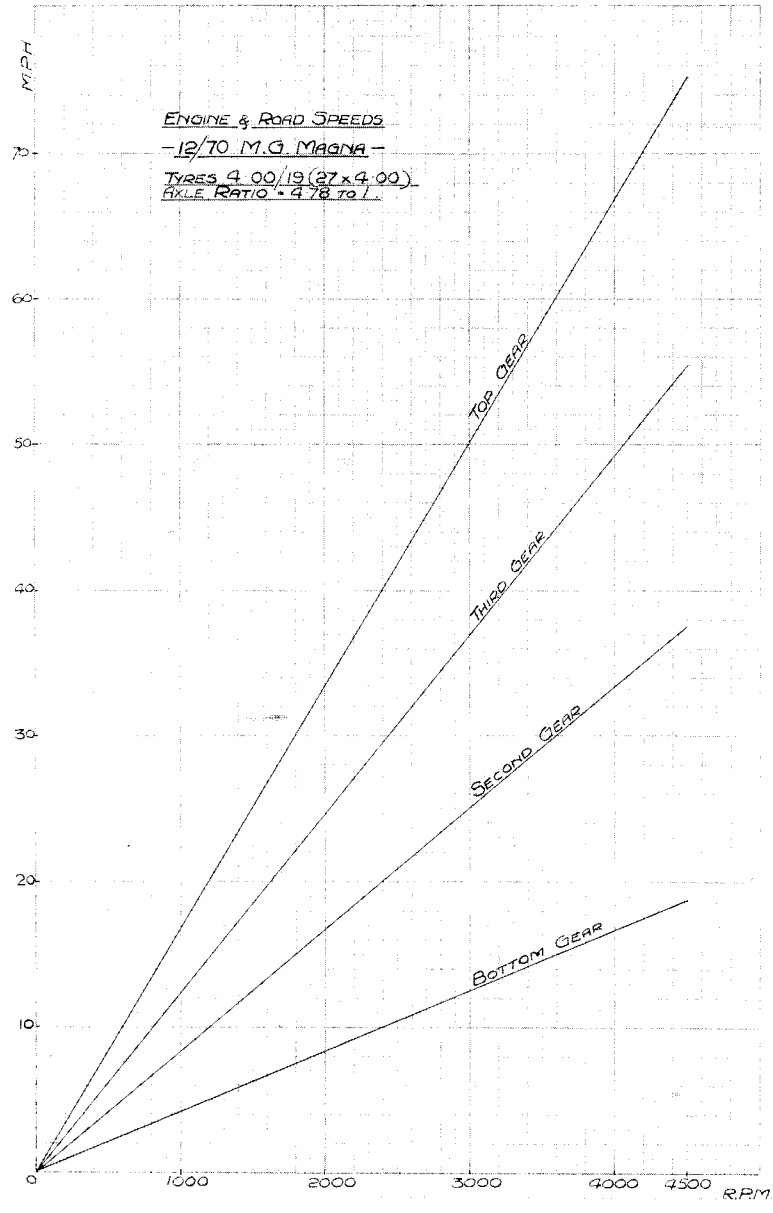
To Remove Tyre. First deflate by removing all the valve parts and push both cover edges into the well of the rim at the part diamethically opposite the valve, then lever the cover edges near the valve over the rim edge. No force is required to do this, but the edges of the cover opposite the valve must be in the well of the rim.

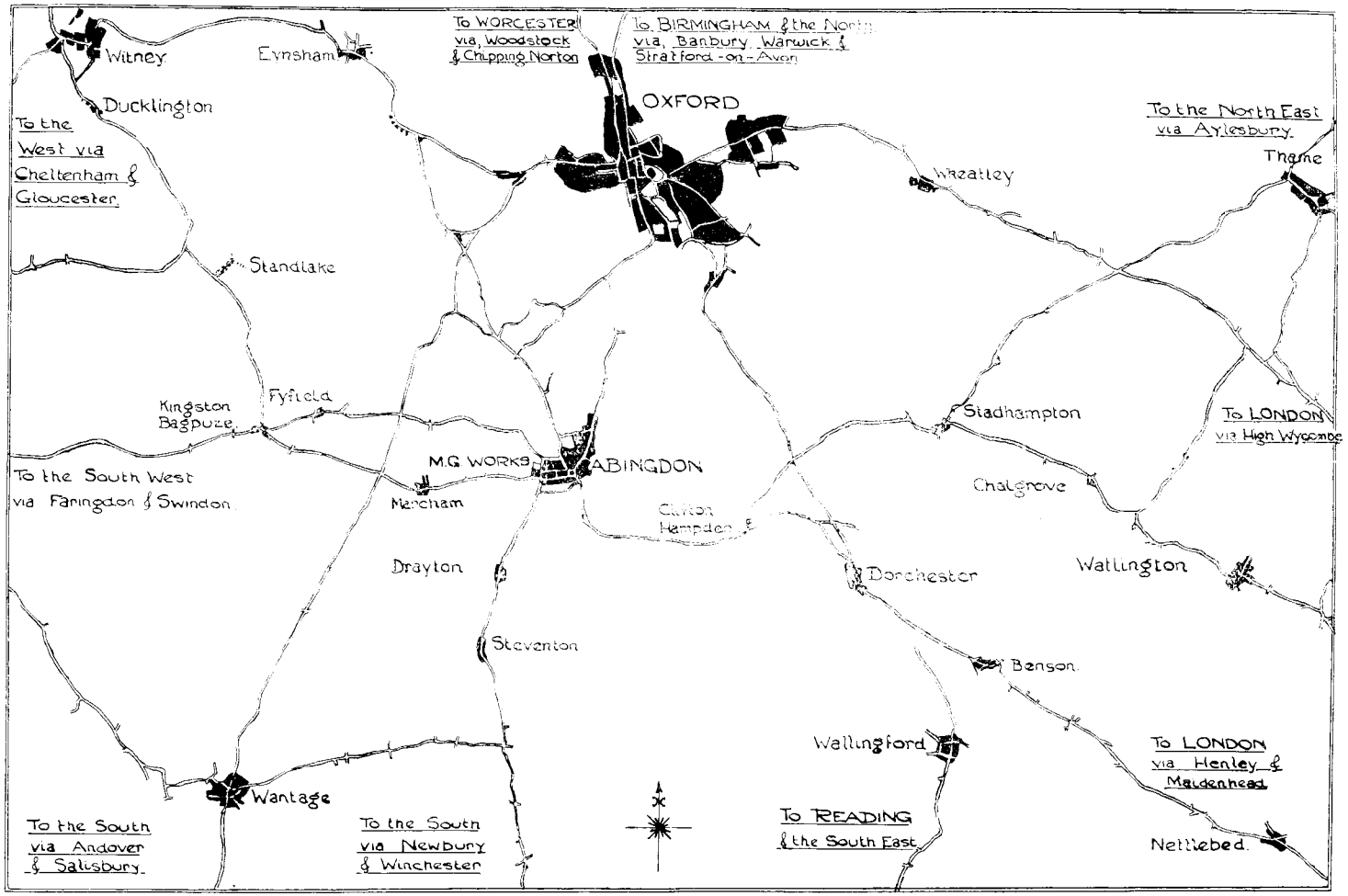
To Fit Tyre. Push one edge of the cover over the edge of the rim. It will go quite easily if the part first put on is pushed right down into the well of the rim.

Very slightly inflate the inner tube, do not distend it, place it in the cover with the valve through the hole in the rim. Fit the second edge of the cover, starting at a point diametrically opposite the valve and pushing the edge dotwn into the well of the rim. If this is done the last few inches can be fitted without using levers.

If levers are used do not use force, as this may damage the beads of the tyre.

When inflating see that the edges of the cover are seated evenly round the rim. This can be checked by the line provided on the cover.


ENGINE & ROAD SPEEDS
-12/70 M.G. MAGNA-
TYRES 4.00/19 (27 x 4.00)
AXLE RATIO - 4.78 TO 1
M.P.H
70
60
50
40
30
20
10
0
TOP GEAR
THIRD GEAR
SECOND GEAR
BOTTOM GEAR
1000
2000
3000
4000
4500
R.P.M


Witney
Eynsham
To WORCESTER via Woodstock & Chipping Norton
To BIRMINGHAM & the North via Banbury, Warwick & Stratford-on-Avon
Ducklington
OXFORD
To the North East via Aylesbury
Thame
To the West via Cheltenham & Gloucester
Wheatley
Standlake
Kingston Bagpuize
Fyfield
Stadhampton
To LONDON via High Wycombe
M.G. WORKS
ABINGDON
To the South West via Faringdon & Swindon
Chalgrove
Marcham
Clifton Hampden
Drayton
Dorchester
Wallington
Steventon
Benson
Wallingford
To LONDON via Henley & Maidenhead
Wantage
To READING & the South East
Nettlebed
To the South via Andover & Salisbury
To the South via Newbury & Winchester

Miscellaneous Driving Hints.

Do use the gears freely, particularly on hills and when accelerating after corners, in traffic, etc.

Do free the engine by hand when cold before using the starter.

Do avoid " harsh " driving, particularly when braking; the M.G. brakes are smooth and powerful and need never be " stamped on."

Do retard the ignition before starting the engine.

Do read this Manual thoroughly and carefully and follow out the instructions laid down.

Do write to us or come and see us (by appointment, please) when in any difficulty.

Do always quote model, year, engine and chassis numbers when writing. **This is very important.**

Do not allow the engine to " pink."

Do not slip the clutch except when actually starting off or changing gear; change down in traffic, to bottom gear if necessary.

Do not subject the tyres to glancing blows from the kerb when drawing up beside the pavement; this may interfere with wheel alignment and have a serious effect on steering and tyre life.

Do not lean on open doors.

Do not under any circumstances allow the oil level to fall below half full; it is best to keep it always up to three-quarters at least.

Do not mix different brands of oil in the sump.

Do not race the engine when it is cold; this will shorten considerably the life of pistons and bearings, and may even result in piston seizure. At the same time do not allow it to idle, this is equally injurious. The best warming up speed is 1,000 r.p.m.

Do not allow the engine to labour.

Do not forget to top up the battery regularly.

Do not forget to turn the petrol tap back to the main position after refilling the tank.

Do not run the engine with the mixture control in the rich position longer than necessary.

Do not leave the headlamps alight when the car is stationary at night; this drains the battery unnecessarily and is very discourteous to other road users.

Do not try to improve your car's performance by altering the ignition timing or interfering in any way with standard settings and adjustments. The makers know best.

Do not forget to lubricate clutch thrust.

LUCAS—C.A.V.—ROTAX
SERVICE DEPOTS

In the event of any difficulty with any part of the equipment, no matter how trivial, we shall be only too pleased to give every assistance possible. The best course to adopt is to call at the nearest Lucas Service Depot, the addresses of which are given below, when the equipment can be examined as a whole. The depots are not only at your disposal for repairs, overhauls and adjustments, but to give free advice. If it is necessary, however, to communicate, or when ordering spare parts, always give the type and number of the unit in question, the make and, if possible, the date of the car on which it is fitted.

BELFAST ... ... **3-5 Calvin Street, Mount Pottinger**
Telephone: Belfast 7017 *Telegrams:* " Servdep, Belfast "

BIRMINGHAM ... ... **Great Hampton Street**
Telephone: Central 8401 (10 lines) *Telegrams:* " Lucas, Birmingham "

BRIGHTON ... ... **Old Shoreham Road, Hove**
Telephone: Preston 3001 (4 lines) *Telegrams:* " Luserv, Brighton "

BRISTOL ... ... **345 Bath Road**
Telephone: Bristol 76001 (4 lines) *Telegrams:* " Kingly, Bristol "

CARDIFF ... ... **54a Penarth Road**
Telephone: Cardiff 4603 (4 lines) *Telegrams:* " Lucas, Cardiff "

COVENTRY ... ... **Priory Street**
Telephone: Coventry 3068 & 3841 *Telegrams:* " Lucas, Coventry "

DUBLIN ... ... **Portland St. North, North Circular Road**
Telephone: Drumcondra 434 (6 lines) *Telegrams:* " Luserv, Dublin "

EDINBURGH ... ... **32 Stevenson Road, Gorgie**
Telephone: Edinburgh 62921 (4 lines) *Telegrams:* " Luserv, Edinburgh "

GLASGOW ... ... **227-229 St. George's Road**
Telephone: Douglas 3075 (5 lines) *Telegrams:* " Lucas, Glasgow "

LEEDS ... ... **64 Roseville Road**
Telephone: Leeds 28591 (5 lines) *Telegrams:* " Luserdep, Leeds "

LIVERPOOL ... ... **450-456 Edge Lane**
Telephone: Old Swan 1408 (3 lines) *Telegrams:* " Luserv, Liverpool "

LONDON (Offices and Showrooms) ... ... **319 Regent Street, W.1.**
Telephone: Langham 4311 (6 lines)
Telegrams: " Guidepost, Wesdo, London."

LONDON ... ... **Dordrecht Road, Acton Vale, W.3**
Telephone: Shepherd's Bush 3160 (10 lines)
Telegrams: " Dynomagna, Act, London"

LONDON ... ... **759 High Road, Leyton, E.10**
Telephone: Leytonstone 3361 (4 lines) *Telegrams:* "Luserdep, Walt, London"

LONDON ... ... **155 Merton Road, Wandsworth, S.W.18**
Telephone: Putney 5131 (6 lines) & 5501 *Telegrams:* "Luserv, Wands, London"

MANCHESTER ... ... **Talbot Road, Stretford**
Telephone: Longford 1101 (5 lines) *Telegrams:* " Lucas, Stretford "

NEWCASTLE-ON-TYNE ... ... **64-66 St. Mary's Place**
Telephone: Newcastle 25571 (3 lines)
Telegrams: " Motolite, Newcastle-on-Tyne "

In addition there are official Battery Service Agents in important centres throughout the country.

Main and Sub-Agents.

ASHFORD (Kent).—Stanhay (Ashford) Ltd., Elwick Works.
BARNSLEY.—H. N. Booker Ltd., Wellington Garage.
BARROW-IN-FURNESS.—Simpsons Ltd., 91-93 Duke Street.
BATLEY.—Geo. Box Ltd., Bradford Road.
BEDFORD.—Arthur Gell, 6a St. Loyes.
BEXHILL.—P. G. Page, 68 Sackville Road.
BICESTER.—Layton & Son, London Road.
BIDEFORD.—Heard Bros. Ltd., Westcombe Works.
BILLINGHAM-ON-TEES.—Efficiency Garage Ltd.
BIRMINGHAM.—P. J. Evans Ltd., John Bright Street.
BLACKPOOL.—Brown & Mallalieu, The Promenade.
BOLTON.—Parkers Ltd., Bradshawgate.
BOURNEMOUTH.—Knott Bros. Ltd., 214 Charminster Road.
,, Moores (Modern Cars) Ltd., Holdenhurst Road.
,, Westover Garage, Westover Road.
BRADFORD.—Waterhouse & Sons, 75 Manningham Lane.
BRIGHTON.—Mansfields Ltd., Kingsway, West Hove.
BRISTOL.—Welch & Co. Ltd., Redcliffe Garage.
,, H. F. Williams, Eastville Terminus.
BROADWAY.—Chas. H. Whitaker.
BROMLEY.—Bromley Motor Works (Kent) Ltd., Masons Hill.
BURTON-ON-TRENT.—Craner's Garage Ltd., Derby Turn.
BYFLEET.—Thomson & Taylor Ltd., Brooklands Track.
CAMBRIDGE.—King & Harper Ltd., 6-7 Bridge Street.
CARDIFF.—City Motor Co. Ltd., 99-101 City Road.
CARLISLE.—Graham & Roberts, 63 Botchergate.
CASTLETON (Rochdale).—Castleton Motor Supply Co., Trows Lane.
CHEAM.—Cheam Motor Co., Ewell Road.
CHELMSFORD.—Eastern Garages Ltd., Market Road
CHELTENHAM.—Imperial Motor Mart.
CHESTER.—Grosvenor Motor Co., 43 Foregate Street.
COLWYN BAY.—Rhos County Garage, Rhos-on-Sea.
COVENTRY.—S. H. Newsome & Co. Ltd., Corporation Street
CROYDON.—Smiths Auto Co. Ltd., 145 London Road.
DEVONPORT.—Kimber's Garage, Albert Road.
DONCASTER.—E. W. Jackson & Son, Morris House.
DORCHESTER.—Merchants Garage, High West Street
DORKING.—Dorking Motor Co. Ltd., Myrtle Road.
EASTBOURNE.—Parkinson, Polson & Co. Ltd., 16 Cornfield Road.
EPSOM.—Woodcote Motor Co., High Street.
EXETER.—Abbott & Mundy, Clifton Road.
FALMOUTH.—Taylor's Garage.
FAREHAM.—Bennett & Righton, 2 West Street.
FOLKESTONE.—Auto Pilots Ltd., The Harbour Garage.
GILLINGHAM.—Stricklands Garage.
GLOUCESTER.—Hough & Whitmore Ltd.
GUERNSEY.—Motor House Ltd., St. Julians Avenue.
GUILDFORD.—Haslemere Motor Co. Ltd., Woodbridge Road.
GRIMSBY.—Roland C. Bellamy Ltd., 5 St. Mary's Place.
HALIFAX.—Woodhall, Nicholson Ltd., Horton Street.
HANLEY, Stoke-on-Trent.—J. Ridgeway & Co., Broad Street.
HARROGATE.—B. M. Stuttard, Ripon Road Garage.
HARROW WEALD.—Ray Abbott Ltd., High Road.
HEREFORD.—J. Fryer Ltd., Dragon Garage.
HIGH WYCOMBE.—R. Pugh.

Heavy type denotes Main Agents.
Revised to the end of February 1932.

Main and Sub-Agents—*continued.*

HORSHAM.—Tanfield Ltd.

HUDDERSFIELD.—Newton of Huddersfield, Viaduct Street.

HULL.—Crosland Motor Co. (Hull) Ltd., 77-79 Anlaby Road.

IPSWICH.—Egertons (Ipswich) Ltd., Northgate Street.

JERSEY.—A. F. Gallichan, Morris House, 31 Commercial Buildings.

KIDDERMINSTER.—Laughton Goodwin & Co., Castle Motor Works.

KINGSTON-ON-THAMES.—R. W. H. Marris Ltd., 57 Eden Street.

LANCASTER.—Loxham's Garages Ltd., Penny Street.

LEDBURY.—Geo. Hopkins & Sons, New Street.

LEEDS.—Appleyard of Leeds Ltd., North Street.
,, Adams Motor Services, Stoney Rock Lane.

LEICESTER.—The Park Garage, 146 London Road.

LEWES.—Mansfields Ltd., High Street.

LIVERPOOL.—Colmore Depot, 24 Paradise Street.
,, J. Blake & Co. Ltd., Bold Street.

LLANGOLLEN.—Jones Bros. Ltd., The Garage.

LONDON.—University Motors Ltd., 1-4 Brick Street, Park Lane, W.1.
,, Jack Barclay Ltd., George Street, W.1.
,, Balls Vernon, 95 High Street, W.C.1.
,, Bellevue Garage Service Station, 18 Bellevue Street, Wandsworth Common, S.W.17.
,, B.M.T. (Plaistow) Ltd., 480 Barking Road, Plaistow, E.13.
,, Central Motor Institute, Finchley Road, N.W.3.
,, Cleverlys Ltd., Cleveland Street.
,, Howard Godfrey Ltd., 45 Stratton Street, W.1.
,, Henlys Ltd., Henly House, Euston Road, N.W.1.
,, Highfield Garage, Green Lanes, Winchmore Hill, N.21.
,, Kevill-Davies & March Ltd., 9 Bruton Street, W.1.
,, Geo. Kitson, 78 Charlotte Street, W.1.
,, Lamb's Ltd., Walthamstow, E.17.
,, Mann, Egerton & Co. Ltd., 156 New Bond Street, W.1.
,, Fitch McGillivray & Co. Ltd., 167 Shaftesbury Avenue.
,, E. L. Mendel Ltd., Great Portland Street, W.1.
,, H. C. Nelson, Ltd., 107 Jermyn Street, W.1.
,, Geo. Newman & Co., 369 Euston Road, N.W.1.
,, Guy Newman & Co., 378-380 Euston Road, N.W.1.
,, Newnham Motor Co., 237 Hammersmith Road, W.6.
,, C. J. Norman & Co., 46-50 Vauxhall Bridge Road, S.W.1.
,, Norwood Autos Ltd., 413-415 Beulah Hill, Upper Norwood, S.E.19.
,, Jack Olding & Co. Ltd., 8 North Audley Street, W.1.
,, Pass & Joyce Ltd., 373-375 Euston Road, N.W.1.
,, C. A. Paul & Co., 18 The Mall, Ealing, W.5.
,, J. H. Plater & Co. Ltd., 376 Streatham High Road, S.W.14.
,, Rowland Smith Motors Ltd., 78-81 High Street, Hampstead, N.W.3.
,, Short & Glass Ltd., 56 Fitzroy Street, W.1.
,, Shrimptons Motors Ltd., 5 Halkin Street, S.W.1.
,, E. C. Stearns & Co., 16 Fulham Road, S.W.3.
,, Steel Griffiths Ltd., 30 Camberwell New Road, S.E.5.
,, Stiles Ltd., 3 Baker Street, Portman Square, W.1.
,, Taylor & Askew Ltd., 13 Weymouth Mews, W.1.
,, The Car Mart Ltd., 46-50 Park Lane, W.1.
,, **Jarvis & Sons Ltd., Victoria Crescent, Wimbledon, S.W.19**

LUTON.—D. Millward & Co., Beech Hill.

MAIDENHEAD.—Hewens Garages Ltd.

MALVERN.—Bowman & Acock, Newton Road.

MANCHESTER.—J. Cockshoot & Co. Ltd., Great Ducie Street.
,, Colmore Depot, 200 Deansgate.
,, Grosvenor Garage, Burnage Lane, Levenshulme.

MIDDLESBOROUGH.—Danby's Ayresome Garage Ltd., 370 Linthorpe Rd.
,, J. Dixon, Grange Road Garage.

NEWBURY.—Stradlings Ltd.

NEWCASTLE.—Adams & Gibbon Ltd., 2a St. Thomas Street.
,, Motordrome Auto Garages Ltd., Northumberland Street.
,, **Frank Scott Ltd., Central Garage, Carliol Square.**

NORWICH.—Maudes Motor Mart, 108 Prince of Wales Road.

Heavy type denotes Main Agents.

Revised to the end of February 1932.

Main and Sub-Agents—*continued.*

NOTTINGHAM.—C. H. Truman & Co. Ltd., 61a Mansfield Road.
OXFORD.—The Morris Garages Ltd., Queen Street.
PAIGNTON.—Sansoms Central Garages, 3 Hyde Road.
PRESTON.—Merigold Bros. Ltd., 147-8 Church Street.
RAWTENSTALL.—J. R. Myerscough & Sons Ltd., Holly Mount Motors.
READING.—Hewens Garages Ltd., 87 Castle Street.
REDCAR.—Coatham Garage & Eng. Co., High Street.
REIGATE.—Wray Park Garages, Birkheads Road.
SALISBURY.—Speedwell Garage, Southampton Road.
SCARBOROUGH.—Thompsons Scarborough Garages, Vernon Road.
SHEFFIELD.—Hydes & Ison Ltd., Lescar Lane, Sharrow Vale Road.
,, **Pointings Ltd., Moore Street, Eccleshall.**
SIDCUP.—Crips Bros., Main Road.
SOUTHPORT.—R. Bamber & Co. Ltd., 33 Liverpool Road, Birkdale.
SPALDING.—Spalding Motor Co. Ltd., Pinchbeck Street.
STAFFORD.—Attwoods Garages Ltd., Automobile Engineers.
ST. ALBANS.—Clarke's Motor Depot, London Road.
STOCKPORT.—G. W. Smith & Co. Ltd., Wellington Road South.
STOURBRIDGE.—North Worcestershire Garage, Oldswinford.
STROOD.—Strood Motor and Engineering Co., Strood Hill.
STROUD (Glos.).—Wicliffe Motor Co. Ltd., Russell Street.
SWANSEA.—C. K. Andrews Ltd., Uplands Garage.
SWINDON.—Skurrays Ltd., The Square.
TANKERTON.—Geo. Fitt Motors Ltd.
TONBRIDGE.—Tonbridge Motor Services, Waterloo Road.
TWICKENHAM.—Spikins (Twickenham) Ltd., Heath Road.
WATERLOOVILLE.—Wadham Bros. Ltd.
WELLINGBOROUGH.—York, Ward & Rowlatt Ltd., Oxford Street Garage.
WEYBRIDGE.—Weybridge Automobiles Ltd., York Road.
WHITCHURCH.—Joseph Hopley & Sons, Doddington.
WHITHAVEN—T. S. Bell & Co., 35 Tangier Street.
WIGAN.—H. H. Timberlake Ltd., Automobile Engineers.
WINDSOR.—A. A. Clark, 2 King's Road.
WOLVERHAMPTON.—Chas. Attwood & Son Ltd., 75-77 Lichfield Street.
WORCESTER.—A. F. Tansell Ltd., Bath Road.
YEOVIL.—Seaton Douglas Ltd.

SCOTLAND.

AYR.—A. & D. Fraser, 77 Sandgate.
ABERDEEN.—T. C. Smith & Co. Ltd., 21-25 Bon Accord Street.
DUMFRIES.—Dumfries Motor Co.
DUNDEE.—St. Roques Auto Co. Ltd., 64 Ward Street.
EDINBURGH.—The Scottish Motor Traction Co. Ltd., Haymarket Terrace.
,, H. & D. Clelland, Belford Bridge
GLASGOW.—A. & D. Fraser, 65 Springkell Avenue, Maxwell Park.
,, E. F. Christie, 147 Landside Road.
,, H. Prosser & Son, 89 West Campbell Street.
INVERNESS.—Macrea & Dick Ltd., Academy Street.
KIRKINTILLOCK.—McLays Garage Ltd.
PERTH.—Valentines Motors Ltd., City Hall Square.

IRELAND.

BELFAST.—Victor Ltd., 17-19 Queen Street.
,, Belfast Car Laundry Ltd., Victoria Square.
DUBLIN—Express Garage Ltd., 19-20 Pearse Street.
LONDONDERRY.—S. McFarlane & Sons, Kingsgate Street, Coleraine.
MAYNOOTH.—M. & J. Dawson.

Heavy type denotes Main Agents.
Revised to the end of February 1932.

Recognised M.G. Radiator Repairers.

1. **BIRMINGHAM. Serck Radiators Ltd., Warwick Road.**
   Telephone: Victoria 531 (5 Lines). *Telegrams:* Serckrad

2. **BRIGHTON. J. Lancaster Radiators Ltd., 25a Henry Street.**
   Telephone: Brighton 1256.

3. **BRISTOL. Perry & Fudge, Globe Works, Horsefair.**
   Telephone: 2345. *Telegrams:* Ventilator, Bristol.

4. **CHESTER. Serck Radiators Ltd., Kaleyards, Frodsham Street.**
   Telephone: 878. *Telegrams:* Serckrad.

5. **CROYDON. J. Richards & Sons, Ltd., Wellesley Road.**
   Telephone: 0456. *Telegrams:* Richards, 0456, Croydon.

6. **LINCOLN. W. Hindle, 70 Kesteven Street.**

LONDON, W.1. J. Lancaster Radiators Ltd., 151 Wardour Street.
Telephone: Gerrard 4404-5.

8. **MANCHESTER. C. W. Scrouther & Co., 19 East Street.**
   Telephone: 7394 City.

9. **PRESTON. E. Ashwell & Son, 12 Walker Street.**
   Telephone: 5139 Preston.

10. **SOUTHAMPTON. J. Lancaster Radiators Ltd., 71 Lyon Street.**
    Telephone: Southampton 3372.

11. **SWANSEA. B. T. Rees, 53a Oxford Street.**
    ,, Imperial Motors, 103 Whiteladies' Road.

M.G. Radiator Main Service Stations.

1. **BELFAST. Serck Radiators Ltd., 59 May Street.**
   Telephone: 6938. *Telegrams:* "Serckrad," Belfast.

2. **BIRMINGHAM. Coventry Radiator & Presswork Co. Ltd., 167 Pritchett Street.**
   Telephone: Aston Cross 1623. *Telegrams:* Covradco, Birmingham.

3. **BRISTOL. Alfred J. Rees & Son, Bishop Street, Moorfields.**
   Telephone: 5174 (2 Lines).

4. **CARDIFF. Serck Radiators Ltd., 60a Clive Road, Canton.**
   Telephone: 6124 (Central). *Telegrams:* Serckrad.

5. **COVENTRY. Coventry Radiator & Presswork Co. Ltd., Raglan Works, Lower Ford Street.**
   Telephone: 3071 (3 Lines). *Telegrams:* Covradco, Coventry.

6. **DUBLIN, I.F.S. George Pappin & Sons, 25 Whitefriar Street.**
   Telephone: 51607.

7. **LEEDS. Excelsior Motor Radiator Co. Ltd., Oldfield Lane.**
   Telephone: Armley 38041-2. *Telegrams:* Cooling, Phone, Leeds.

8. **LIVERPOOL. Liverpool Radiator Co. Ltd., Fontenoy Street.**
   Telephone: Central 382-3. *Telegrams:* Liveradco, Liverpool.

9. **LONDON, N.W.10. Serck Radiators Ltd., Park Royal Road.**
   Telephone: 5441-2. *Telegrams:* Serckrad.

10. **MAIDSTONE. Serck Radiators Ltd., Palace Avenue.**
    Telephone: 1035. *Telegrams:* Serckrad.

11. **NEWCASTLE-ON-TYNE. Serck Radiators Ltd., Skinnerburn Road.**
    Telephone: Central 5863. *Telegrams:* Serckrad.

12. **NOTTINGHAM. Minerva Motor Radiator Co., Boulevard Works, Radford.**
    Telephone: 75631. *Telegrams:* Motorad, Nottingham.

13. **SHEFFIELD. The Excelsior Motor Radiator Co. Ltd., Jessop Street.**
    Telephone: 2263. *Telegrams:* Cooling, Phone Sheffield.

14. **STOKE-ON-TRENT. Coventry Radiator & Presswork Co. Ltd., 56a Ashford Street.**

15. **SOUTHAMPTON. Serck Radiators Ltd., Ryde Terrace, Floating Bridge.**
    Telephone: 3560. *Telegrams:* Serckrad.

16. **SUFFOLK. Serck Radiators Ltd., Cornard Works, Sudbury.**
    Telephone: 3599. *Telegrams:* Radiators, Aberdeen.

M.G. Radiator Sub Service Stations.

1. **ABERDEEN. Francis Craigmile & Son, 56 Gordon Street.**
   Telephone: 3599.

2. **BOURNEMOUTH. Hants & Dorset Sheet Metal Co., 154 Ashley Road.**
   Telephone: 2840.

3. **BRIGHTON. Brighton Motor Sheet Metal Works, 50a St. James Street.**
   Telephone: 2191-2.

4. **CARLISLE. Serck Radiators Ltd., Hardwick Circus, Lowther Street.**
   Telephone: 1119. *Telegrams:* Serckrad.

5. **EDINBURGH. Alder & Mackay Ltd., Stewart Terrace.**
   Telephone: 61151-2. *Telegrams:* Alder, Edinburgh.

6. **EXETER. Saunders & Biss Ltd., 172 Sidwell Street.**
   Telephone: 3813. *Telegrams:* Radiators, Exeter.

7. **GLASGOW, C.4. Serck Radiators Ltd., 399 Parliamentary Road.**
   Telephone: Douglas 3062. *Telegrams:* Serckrad.

8. **HULL. Paragon (Hull) Motor Co. Ltd., Boothferry Road.**
   Telephone: Central 36842-2. *Telegrams:* "Benzina."

9. **LEICESTER. Victory Radiator & Welding Works, Woodgate.**
   Telephone: 20180, 20189.

10. **LEIGH-ON-SEA. J. Keeling & Son, Scarborough Drive, London Road.**
    Telephone: 75229.

11. **LIVERPOOL. W. Watson & Co. (Liverpool) Ltd., 7 Mount Pleasant.**
    Telephone: 5480 Royal (4 lines). *Telegrams:* Berliet, Liverpool.

12. **MANCHESTER. H. O. Serck Ltd., Lyon Street, Garratt Street, Oldham Road.**
    Telephone: Gollyhurst 1541 (2 lines). *Telegrams:* "Serckrad."

13. **MANCHESTER. Pendleton Radiator Co., 72a Broad Street,**

14. **NORTHAMPTON. Central Sheet Metal Co., 12a St. Michael's Road.**
    Telephone: 676.

15. **NORWICH. W. F. Smith & Sons, 90 King Street.**
    Telephone: Norwich 30.

16. **PERTH. Leslie & Murray, St. Catherine's Road.**
    Telephone: 770.

17. **PLYMOUTH. Edmund Metal Works, Sutton Road.**
    Telephone: 2181. *Telegrams:* Edmund Metal Works, Plymouth.

18. **WOLVERHAMPTON. Baggott's Motor Fittings, Steelhouse Lane.**
    Telephone: 110

Wiring Diagram of the 12/70 M.G. Magna Chassis.