

DE LA GE

EIGHT CYLINDER D8

DESCRIPTION

AND

MAINTENANCE

Important Notice

We beg to draw the attention of our clients to the fact that any repairs they wish to have carried out at our Works should, if possible, be arranged for during the winter months in which case these repairs are always effected in a minimum of time.

INSTITUTE



Important Notice

If you have no time to read this booklet throughout, please give this summary your close attention.

A new engine should be treated carefully.

The engine should not be run at full throttle during the first three hundred miles. During this period we recommend a maximum speed of 35 to 40 miles an hour. This precaution, which is not sufficiently observed, determines the life of the engine. If a new engine is run at full power very serious damage can result.

THE ENGINE

If, after a certain length of time, the engine does not develop its full power, the recommendations on pages 44 to 50, should be read, relating to :

Tappet adjustment,

Decarbonizing,

Adjustment and cleaning of carburetter,

Adjustment of ignition appliances and examination of piping and vacuum appliance.

Should the engine be unsatisfactory after these points have been attended to, the valves should be ground. It is preferable that this work be done in a garage, by a skilled mechanic, for if the work is not well done there is danger of it being entirely useless.

In addition, verify the dynamo brushes. The amperemeter ought to show 8 amperes at a road speed of 35 miles an hour.

Examine the condition of the battery every month, making use of the " Monoplaque " service vouchers.

Clients are advised not to continuously drive with the speedometer needle beyond the red mark. The gear ratio adopted on our car provides for very rapid acceleration on direct drive with the result that on long straightaways or on switch-back roads the engine may revolve much beyond the point of maximum power. Even under these conditions it remains silent, but the consumption of oil and petrol becomes excessive and mechanical troubles are likely to develop.

LUBRICATION

Very careful attention should be paid to lubrication, and only the oils recommended by us should be used.

Never drive with less than 4 litres of oil showing on the dip stick.

The oil should be changed at the periods indicated in this notice.

A saving in the quantity or quality of the oil will certainly be followed by a high bill for repairs and by premature wear of the engine.

It is possible to make use of the oil emptied out of the base chamber in the following manner, thus effecting a recuperation :

If you have a factory of any kind, the oil can be filtered centrifugally and mixed with fresh oil for lubricating machinery. It can be used for machine tools after allowing the dirt to settle to the bottom and draining off.

Used engine oil can also be mixed with crude oil for burners.

If you have no means of utilizing the oil drained out of the engine, it can be sold for use in factories.

THE CHASSIS

To ascertain if the brakes are properly adjusted drive for a few hundred yards with the brakes on, then feel the drums. They should have exactly the same degree of temperature.

Examine the shock absorbers, and keep them adjusted sufficiently tight.

From time to time the spring clips should be examined and the nuts tightened up if they have slackened off.

TYRES

Tyre pressure should be checked every fortnight; the pressure recommended by the tyre manufacturer should always be maintained.

To get long tyre life, it is recommended that the speed never be beyond the red line shown on the speed indicator. This is particularly important in hot weather.

The following facts should be noted :

1. At 70 miles an hour tyre wear is twice as rapid as at 50 miles an hour.
2. Tyre wear is three times more rapid at a temperature of 95 degrees than at a temperature of 60 degrees.

Verify the clutch pedal clearance from time to time (See page 18).

In manufacturing this car we have sought to increase the average speed without raising the maximum speed. We have obtained this result owing to very quick acceleration, good brakes, steering and springing, with the result that on a give and take road an average speed of 44 miles an hour can be maintained without at any time exceeding 56 miles an hour.

To maintain the excellent qualities embodied into this car, it is recommended not to drive beyond 60 miles an hour more often than necessary, and particularly to accelerate progressively and use the brakes moderately.

By following this advice you will maintain the car in good condition; you will also act in your own interest saving petrol and oil, and particularly tyres.

DE LA GE

EIGHT CYLINDER D8

DESCRIPTION AND MAINTENANCE

TELEPHONE :

Wagram 70-96, 87-55, 87-10

Défense 2-50, 5-39

Inter-Wagram 24

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TABLE OF CONTENTS

	Pages
General Specifications	V

PART I

MECHANICAL DESCRIPTION

CHAPTER I

ENGINE

1. General Description.	1
2. Lubrication	5
3. Cooling	8
4. Petrol Feed system and Carburation.	10
5. Ignition and Starting.	14
6. Removing the Engine out of the Chassis.	15

CHAPTER II

TRANSMISSION GEARS

1. Clutch	16
2. Gear Box	18
3. Drive Shaft	21
4. Rear Axle.	22

CHAPTER III

FRONT AXLE - STEERING - CHASSIS

1. Front Axle.	23
2. Steering	24
3. Chassis and Springing.	27
4. Driving controls and accessories	28

— IV —
CHAPTER IV

ELECTRICAL EQUIPMENT	Pages 30
--------------------------------	-------------

CHAPTER V

BRAKES	32
------------------	----

PART II

DRIVING- ADJUSTMENT- MAINTENANCE

CHAPTER I

DRIVING

1. Getting the car ready for the road.	36
2. Driving the Car	39

CHAPTER II

ADJUSTMENTS

1. Engine Timing.	44
2. Carburetter Setting.	47
3. Ignition Adjustments.	48
4. Servo Brake and Brake Adjustments	50
5. Springing Adjustments	52

CHAPTER III

Lubrication and general care.	53
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GENERAL SPECIFICATIONS

Engine

	D-S N	D-S L	D-S S
R.A.C. rating	29.4 h.p.	29.4 h.p.	29.4 h.p.
Bore	77 mm.	77 mm.	77 mm.
Stroke	109 mm.	109 mm.	109 mm.
Number of cylinders	8	8	8
The engine number is on the timing gear housing.			

Chassis

Track	4'8"	4'8"	4'8"
Wheelbase.	11'3"	11'11"	10'10"
Wheels, wheel base rims, for tyres of	30 x 6.75	32 x 6.75	30 x 6.75
Weight of chassis, complete with one spare wheel	25 cwt	27 cwt	24 cwt
Body Space (dashboard to rear-cross member).	8'4"	9'1"	7'10"
Body Space (pedal to front tangent of rear tyre).	5'7"	6'2"	5'1"
The number of the chassis is on the dash, under the bonnet.			

Clutch :

Single dry plate.

Gear box :

Four speeds and reverse.

Rear Axle :

Banjo type. Fixed spring seats. Drive and torque taken through springs.

Front Axle :

Strengthened to provide for violent brake reaction.

Steering gear :

Screw and nut. Right Hand. Position adjustable.

Brakes :

On four wheels, applied through a servo mechanism operated by the pedal, or direct by hand lever.

Springing :

Semi-elliptics front and rear, with pivots and shackles bushed with Silentbloc, Shock absorbers.

PART I

MECHANICAL DESCRIPTION

CHAPTER I

ENGINE

§1. — GENERAL DESCRIPTION

The upper half of the crankcase is a very rigid iron casting and is equipped with five bearings carrying the crankshaft.

At the front, the crankcase has two hangers by which it is attached to the chassis on Silentbloc ; at the rear there is a sheet steel cross member by which it is strongly attached to the chassis.

The oil pump and all the oil piping form an integral part of the upper crankcase.

The lower half of the crankcase forms oil sump.

The cylinders are of chromed cast iron and are in one casting ; there is liberal water space between the cylinders. The water pump (*d*, fig. 2) is at the front.

The cylinder head is attached to the cylinder casting by a large number of studs and gas and water tightness is ensured by a gasket. The combustion chamber has been designed to ensure a high degree of turbulence and complete and rapid combustion.

The valves are mounted vertically in line, and are operated by pushrods and rockers.

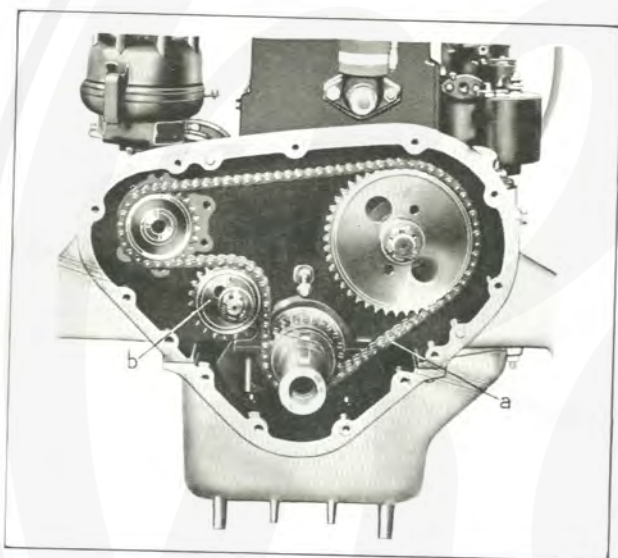


Fig. 1.

The crankshaft is mounted in five white metal bearings which receive oil under pressure by pipes from the main oil line.

The pistons are a composite type of aluminium and cast iron, consisting of a light aluminium body carrying the compression rings with a very light cast iron skirt which acts as a guide in the cylinder.

The gudgeon pins are hollow and of big diameter ;

they revolve freely in the connecting rod and are fixed in the piston.

The timing gear (fig. 1) consists of pinions and a silent roller chain (a), provided with a special jockey pulley (b).

The chain receives a direct supply of oil, thus making it silent in operation and ensuring long life.

The camshaft is carried in five bearings and is provided with an oil bath.

This camshaft operates the valves mounted in the head of the cylinder by means of flat headed tappets, push rods and rockers, all working parts of which are thoroughly lubricated.

GENERAL OUTLAY OF ENGINE COMPONENTS AND EQUIPMENT

The carburettor is on the left hand side of the cylinders (fig. 2).

The intake manifold (a) which carries the carburettor (b), is in aluminium and is heated by water circulation.



Fig. 2.

The exhaust manifold (c) is on the right hand side; it is of cast iron (fig. 3).

The dynamo (a) (fig. 3), is mounted on a support on the right hand side of the engine, just behind the ignition distributor (b).

The fan (e) (fig. 2), is driven by belt and its support (d) which is mounted on the cylinder, forms the body of the water pump. The fan pulley is extensible to allow of correct stretching of the belt.

Oil drain (e),

Oil dip stick (f),

Oil filler (g),

Oil pressure adjustment (h),

Oil filter (i),

are all at the front left of the base chamber.

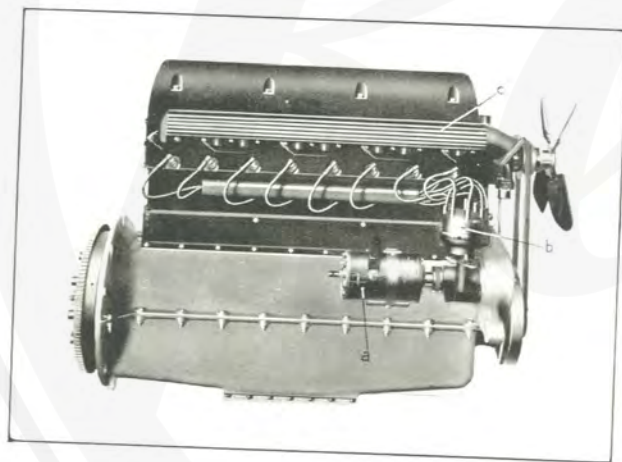


Fig. 3.

§ II. — LUBRICATION

The lubrication of the engine is by means of a gear type pump driven by skew gears off the camshaft.

The pump is secured to the upper half of the crankcase. The pump cover can be removed through an inspection plate in the base of the sump. The entire pump and its piping can be taken down after removing the oil sump. This work can be done while the engine is in the chassis.

The oil is delivered through attached piping as shown on the diagram, Plate I.

From this it will be seen that the oil contained in the sump is delivered in the following manner :

1. The oil passes through the pump ;
2. A large pressure relief valve ensures a constant pressure in the main feed pipe ;
3. A lead to the oil pressure indicator is mounted on the main oil line, after the filter.

Hereafter are the meanings of the different colours shown on the oil pressure indicator.

Red section : the needle should not be on this section at a speed of more than 18 miles an hour.

Blue section : the needle should be on this section at a speed of more than 18 miles an hour.



Fig. 4.

4. The main feed pipe supplies oil :

(a) to the five crankshaft bearings, from which it is carried to the connecting rod bearings by means of oil ways in the shaft ; the oil is then delivered to the gudgeon pins by means of an oil pipe in the connecting rod.

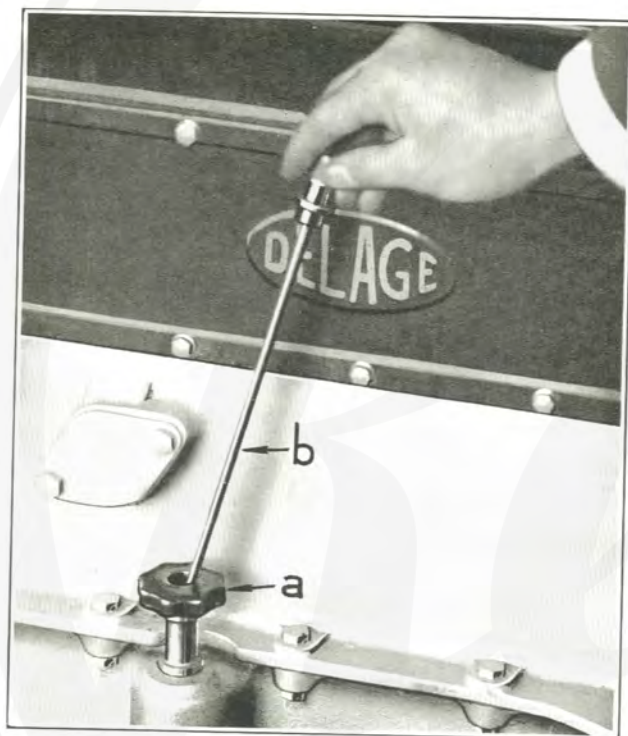


Fig. 5.

(b) By means of a by-pass the oil is led to a second pressure relief valve, which supplies a low pressure feed to the valve rockers. The over-flow from this by-pass supplies the camshaft.

The size of all the oil pipes has been carefully calibrated to allow a correct and constant supply.

The oil pump has been designed so that under normal conditions of wear the pressure of hot oil will never drop

below 28 lbs. per square inch at a road speed of 62 miles an hour.

The essential parts of the lubrication system can be reached as follows.

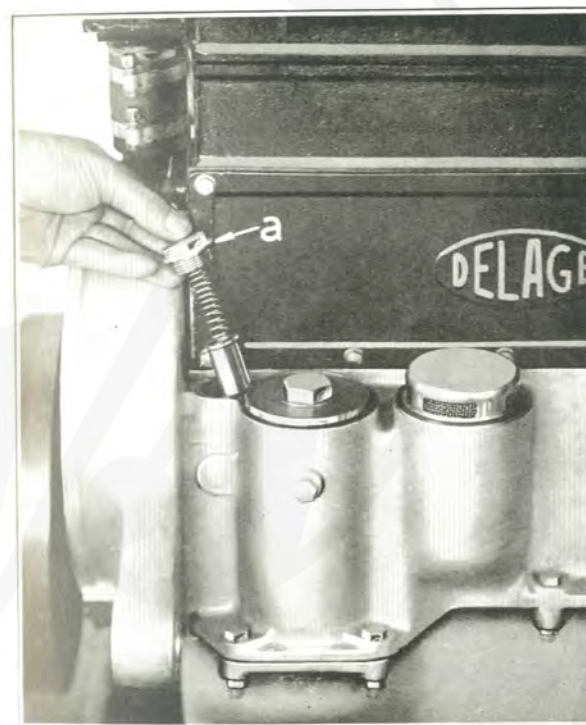


Fig. 6

1. The oil filler cap is not screwed ; it merely has to be pulled upwards to withdraw it. When replacing it, push it down until the spring has come into engagement (see fig. 4).

2. The dip stick (b) is drawn out vertically (fig. 5). It is held in position by its flexible extremity.

3. The base chamber is emptied by unscrewing the nut (a) (fig. 5).

4. The oil pressure valve can be removed by unscrewing its top plug (a) (fig. 6).

5. The oil filter can be withdrawn by unscrewing the nut (a) (fig. 7) and by pulling out the part carrying the filter.

Detailed instructions concerning engine lubrication will be found on page 53.

§ III. — COOLING

The engine is cooled by water circulated by a centrifugal pump (d) (fig. 2), placed at the front of the cylinder block, in the axis of the crankshaft. The cooling water is drawn from the bottom of the radiator by means of a pipe with a rubber joint connected to the pump.

The water is driven through the cylinders, by means of a pipe forming a part of the casting, and is distributed equally throughout the length of the block.

From the cylinder jacket the water passes to the cylinder head and is returned to the radiator by a tube at the front of the head.

The radiator is of the vertical tube type. A special device is fitted to prevent water being lost through the overflow when the brakes are suddenly applied.



Fig. 7.

Shutters which are automatically controlled by means of a thermostat are mounted on the front of the radiator ;

these shutters open and close so as to allow a greater or lesser volume of air to pass through, so that in cold weather the engine very quickly attains a temperature of about 150 degrees.

The radiator is mounted on the front chassis cross frame member by means of two bolts and is attached to the dashboard by two rods forming a V, thus ensuring great rigidity.

DISMOUNTING THE RADIATOR

After having taken off the headlights and drained the radiator, the water outlet pipe should be removed, then the two nuts holding the radiator to the chassis member should be unscrewed ; following this the stay to the dashboard should be disconnected, when the radiator can be lifted up vertically.

The radiator is mounted by carrying out the above operations in reverse order. Care should be taken to tighten up the nuts and to fasten them with cotter pins.

DISMOUNTING THE WATER PUMP

1. Drain off the water ;
2. Disconnect the two upper radiator stays ;
3. Remove the water inlet pipe ;
4. Slacken off the water pipe clips on the two lower pipes ;
5. Unscrew the nut holding the pump and after having pulled the radiator forward, draw the pump out to one side by lifting it up sufficiently to disengage the rubber hose.

The radiator and the water jackets are drained by means of a needle valve which is unscrewed from inside the bonnet.

§ IV. — PETROL FEED SYSTEM AND CARBURATION

Petrol is drawn from the rear tank by means of a vacuum device placed on the dashboard, and having a feed tank of 1 2/5 gallon capacity. A cock on the driver's side of the dash allows the petrol to be shut off.

The carburettor, shown on Plate 2 and fig. 8 is a **Delage** instrument built under **Smith-Barriquand** licence.

It is composed of the usual type of constant level float chamber (*a*) into which the petrol flows through a needle valve (*b*) placed in its base.

The petrol then flows through a series of pipes (*c*) to the four main jets (*d*) and to the slow running jet.

The five jets have the same level, this being 5 millimetres above the level of the petrol in the float chamber.

The part of the carburettor comprizing the float chamber and the jets is known as the jet carrier (*e*).

The body of the carburettor is an aluminium casting (*k*) having a water jacket for heating purposes.

Water reaches the carburettor by means of a collar attached to the water inlet pipe and leaves it by a connection at the back of the carburettor connected up to the pump.

Within the body of the carburettor is a bronze sleeve (*g*) permanently fixed. The jet carrier is attached to the body of the carburettor by a single nut (*o*).

Inside this sleeve there is a cylindrical slide (*h*) having ports of different heights.

A screw (*i*) passing through a longitudinal slot in the slide prevents this latter rotating.

The upper face of the slide is under the influence of the vacuum in the inlet pipe, while the lower face is under atmospheric pressure and communicates with the atmosphere by a small plug drilled with a calibrated hole (*l*).

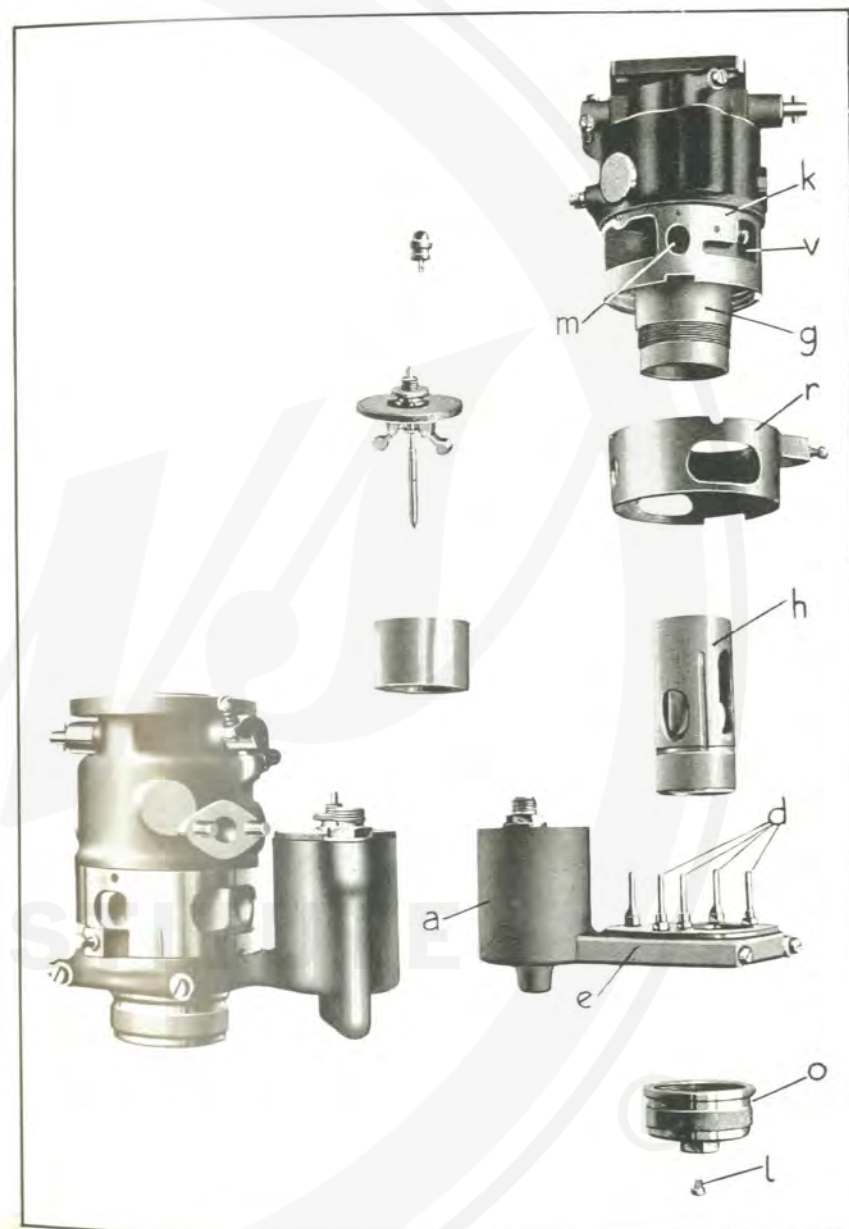


Fig. 8.

The body of the carburetter is drilled with oblique cylindrical holes (*m*) into each of which the main jets pass.

The slow running jet enters into a cylindrical sleeve communicating with the piping by a small hole (*l*) before the throttle valve (*p*).

An additional air valve (*r*) gives the adjustment for slow running.

The quantity of mixture admitted to the engine is determined by the stop on the throttle valve.

There is a correcting ring (*r*) operated from the driver's seat which by reason of its rotation enables :

1. To close hole No. 1 in order to facilitate starting ;
2. To open this hole, for normal running ;
3. To gradually open a series of holes which send air into each of the ports 2, 3, 4, this corresponding to running with an economical mixture.

Heating by water circulation is adjustable according to the season by means of the screw (*v*) (fig. 2), this operating on a needle valve and giving greater or less opening for the water flow.

HOW THE CARBURETTER WORKS

The operation is as follows :

1^o Starting.

The slide is at its lowest position. In this position it closes the holes 2, 3 and 4, and opens the hole No. 1. The correcting ring is in the starting position, that is to say, partly covering the opening 1. The throttle is slightly opened, so as to uncover the slow running jet.

By operating the electric starter the engine should start and run on the slow running jet.

The throttle should be kept slightly open for a few seconds, by means of the accelerator pedal, and as soon as the engine accelerates freely, the correcting lever should be placed in the normal position.

2^o Acceleration.

When the throttle is opened, and with whatever rapidity this opening is made, the orifice No. 1 is the only one in action. As the diameter of this hole is relatively small, it gives a sufficient velocity to the gas to obtain a good mixture.

As the speed of the engine increases the flow through hole No. 1 becomes insufficient : the vacuum around the slide increases, causing this latter to rise gradually, and by so doing to uncover all the holes.

3^o Pick up.

When the throttle is closed, thus cutting off the flow of the mixture, the depression around the slide is reduced and this latter drops to its lowest or to an intermediate position, according to the degree of decrease. When the throttle is opened again, the slide begins to rise, thus feeding the engine through a section which is at first small but which increases progressively.

It will thus be seen that whatever the manner in which the accelerator pedal is used, there is no danger of stalling the engine with too rich a mixture, nor of causing backfiring in the carburetter, which are so common with other carburetters handled in an unskilled manner.

On the other hand, as the engine always runs with a choke tube the diameter of which is appropriate to the speed at any particular moment, there is a remarkable degree of regularity in the petrol consumption, this being the same whether the car is running over city streets at 12 miles an hour or is on the open road at an average of 40 miles an hour.

DISMOUNTING THE CARBURETTER

1. **To dismantle the carburetter from the engine.** Partly drain off the water (about 1 1/2 gallon), close the flow of petrol, disconnect the petrol pipe as well as the throttle and starting rods. The four nuts on the carburetter

flange are taken off and the carburetter can be removed by drawing it forward. When on the road there is no necessity to dismount the entire carburetter. The jet carrier and the slide are the only parts that need to be dismounted for cleaning.

2. **The jet carrier.** — Close the petrol flow, disconnect the petrol pipe at the carburetter end, unscrew the lower nut, and the jet carrier can be removed by lowering it.

Note. — The jets carry numbers which do not indicate the diameter of the hole but the flow of petrol in cubic centimetres per minute.

3. **The slide** is dismounted after removing the jet carrier, the correcting ring (*r*) and the screw (*v*) (fig. 8). Before completely removing the screw, place the hand under the carburetter so as to catch the slide, which will fall by its own weight. When fitting again, care should be taken to see that the screw enters the groove before it is tightened up, otherwise a roughness will be formed along the edge of the slide, which will prevent it moving freely.

§ V. — IGNITION AND STARTING

Ignition is ensured by battery and distributor.

Lighting and starting are ensured by a separate dynamo and an electric motor.

A description of these apparatus will be found in the manufacturers' notices attached to this general description.

The switch key (*a*) on the instrument board (fig. 9) cuts off the current.

All the ignition wires have an external protection by means of insulating casing. Each wire carries a number at each end.

The starter operates on the flywheel by means of a toothed ring.

The starting device is provided with an "Eclipse" arrangement i.e. pinion engages the toothed wheel in the

same manner as the striker of the gear box, before the starter rotates it.

The small pinion is free wheel mounted on its shaft, thus when engine is started and flywheel is driving the

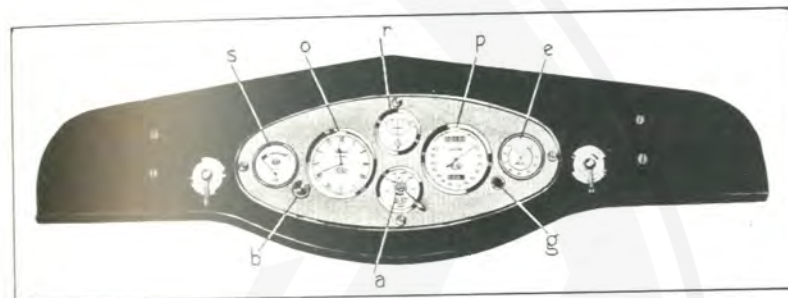


Fig. 9

pinion, the free wheel turns, and the pinion teeth are not submitted to any abnormal stress. This ensures noiseless running and no wear of teeth.

§ VI. REMOVING THE ENGINE OUT OF THE CHASSIS

Turn off the main ignition switch.

Remove the bonnet, the radiator, the metal shield under the damper, the damper, and the cover on the cylinder head.

Disconnect all the piping, all the flexible cables, and all the ignition wires connecting the engine to the chassis (the lateral sheet metal guards need to be disconnected on the engine side only).

Then disconnect the cardan shaft, the gearbox and the clutch (see pages 17 to 21).

Connect up to an overhead crane, remove the two front bolts and the rear bolts.

Lift the engine up and bring it out in an inclined position, above the front cross frame member.

CHAPTER II

TRANSMISSION GEARS

Fig. 1. — **CLUTCH** (Figs. 10 and 11).



Fig. 10.

A dry disc type clutch is used. The clutch levers are considerably geared down, and although the springs are of ample strength, the effort on the clutch pedal is very light. A special ball thrust bearing takes the reaction of the effort on the clutch pedal when the clutch is withdrawn.

This bearing is fixed on a sleeve sliding on a part integral

with the gearbox. The sleeve carries with it, as it slides backwards and forwards, three levers which are in contact with a plate and which draw on a steel disc having external teeth. These teeth engage with corresponding interior teeth on flywheel. The steel disc, as well as the interior face of

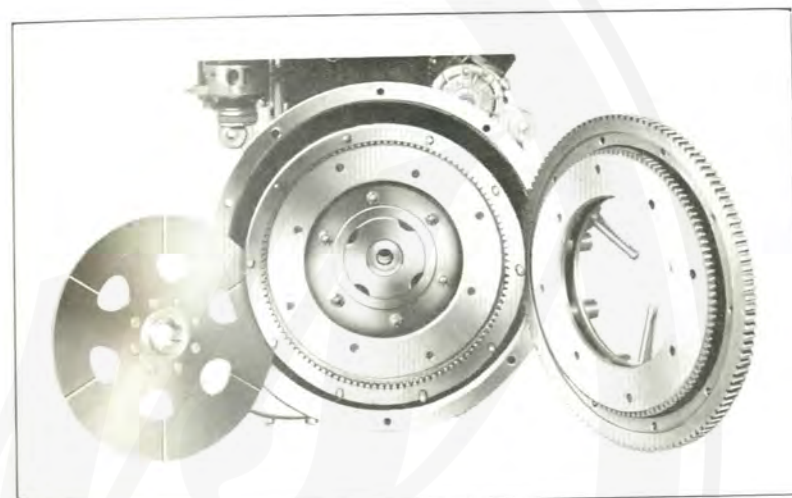


Fig. 11.

the flywheel, are fitted with incombustible and unwearable friction material. It transmits the pressure of the springs to the two faces of the special sheet steel clutch disc which, by friction, drives the gearbox through its central shaft.

An easily dismantlable inspection plate gives access to the clutch and allows a spring to be changed.

DISMOUNTING THE CLUTCH

To dismount the clutch it is necessary to first remove the gearbox (page 20), then remove the screw holding the clutch plate.

The whole of the levers, the plate and the clutch disc can be removed by drawing rearwards (fig. 11).

The sheet steel disc can then be easily dismounted.

When remounting, care should be taken to see that the punch marks on flywheel and plate correspond, and to center the plate with a false shaft.

When the clutch has been fitted up, it should be seen that the three levers are approximately on same level as the clutch is about to be withdrawn and that the three nuts are equally adjusted.

Adjustment is secured by means of the nuts on the ball and socket connections of the rods.

These nuts are made to be turned by hand, so that it is possible to ascertain by feel when the lever comes in contact with the thrust member.

The nuts should be cotter pinned after an adjustment has been made.

When the levers have been properly adjusted, there should be a clearance of one half to one inch between the clutch pedal and the floor boards.

This clearance can be obtained by means of a rod with left and right hand threads, which is on the outside of the gearbox and connects the pedal to the clutch fork.

§ II. — GEAR BOX (Fig. 12)

The gear box is of the double sliding gear type, giving four forward speeds and reverse, the fourth being direct drive.

The third gear pinion is a helical type and is in constant mesh.

The pinion of the sliding gear shaft is free to revolve on this shaft in all positions except third.

It is connected up to the sliding gear shaft by a coupling having dog teeth, which are also made use of for direct drive.

The lateral thrust resulting from the helical gears is provided for by bearings.

Three bearings carry each shaft, these being placed in such a manner that on first, second and third speed the pair of pinions in engagement is flush with a bearing.

This arrangement avoids all whip of the shaft, and with the helical gears gives a third speed which is absolutely silent.



Fig. 12.

The special shape of the dog clutches putting the third gear into engagement, allows the change from third to fourth and from fourth to third to be made with the greatest ease.

The speed indicator is driven from the rear of the sliding gear shaft by means of worm and wheel (a) (fig. 12).

An oil filler is fitted (b) (fig. 12).

A drain plug is fitted at (c) (fig. 12).

The oil level plug is shown at (d) (fig. 12).

The change speed lever (l) (fig. 15), is mounted on the top of the gearbox.

The brake hand lever (m) (fig. 15), is on the passenger's side.

The gearbox housing carries the pedals (g) and the De-wandre servo brake cylinder (h) (fig. 13), details of which are given in Chapter V, page 32.

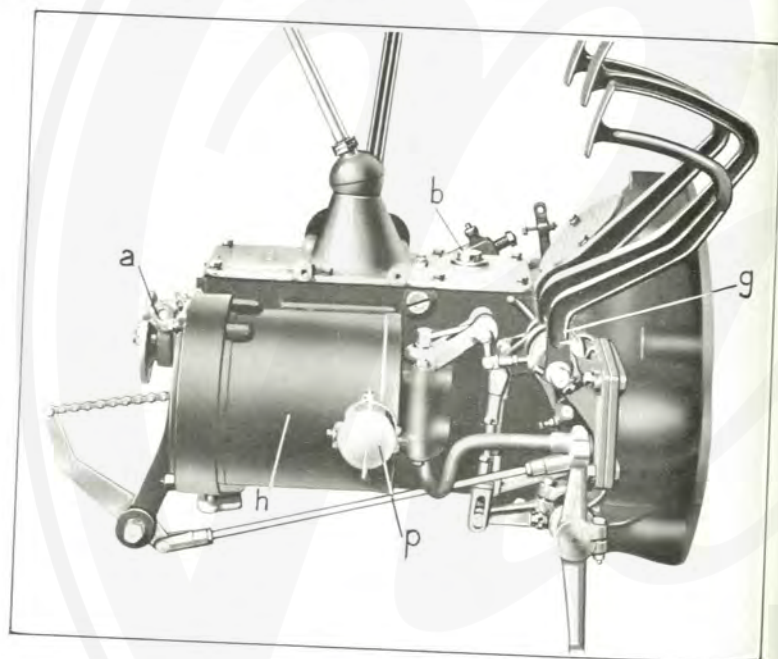


Fig. 13.

DISMOUNTING THE GEARBOX

Cut off the main switch ;

Remove the front floor boards, with the exception of the upper one ;

Disconnect cables, wires and flexible shafts connecting the gearbox to the rest of the chassis.

Dismount the metal shield, the servo brakes, and the cardan shaft (both ends) ;

Remove the bolts holding the gearbox to the engine with the exception of the upper bolt ;

Connect up to an overhead crane, or run a small truck under the gearbox, the chassis in this case being horizontal.

Remove the last bolt and pull the gearbox backwards in the axis of the chassis.

REMOUNTING THE GEARBOX IN THE CHASSIS

Carry out the above operations in the reverse order, with the following precautions :

The gearbox should be raised exactly to the height of the engine, the two surfaces to be connected together should be quite parallel and one of the gears should be put into engagement in order to guide the castellated shafts.

Stretch the cables and straighten them out ;

Leave sufficient play to the accelerator pedal ;

Lubricate all the working parts.

§ III. — DRIVE SHAFT

Power is transmitted from the gearbox to the rear axle by means of a shaft with two universal joints, this shaft consisting of a very big diameter tube, tapered at the two extremities, and accurately centered and balanced.

The only function of this shaft is to transmit the power, the driving and the braking reactions, as well as the driving thrust, being taken by the springs.

Two oil plugs are provided on each universal.

In order to fill the universal joints with oil the special syringe supplied with the tool equipment should be used.

The plugs should be tightly screwed up after oiling. They should not be replaced by greasers of any kind, for these are never sufficiently oil-tight to keep the lubricant in the universal joint.

§ IV. — REAR AXLE

The rear axle is of the banjo type with fixed spring pads, having differential shafts carried in a single bearing.

The whole of the rear axle mechanism is carried on a malleable iron casting and is closed at the rear by a pressed steel cover fitted with an oil groove which very efficiently carries lubricant to the crown wheel.

The adjustment of the crown wheel can be carried out after the rear cover has been removed.

The adjustment of the driving pinion is made by means of a threaded member located at the end of the differential support.

The rear hubs carry special cast iron brake drums fitted with fins to assist cooling.

The effort transmitted to the rear axle mechanism by the pinion and the crown wheel is supported by annular ball and thrust bearings of big diameter.

DISMOUNTING THE REAR AXLE AND THE REAR SPRINGS

1. Disconnect the brake cables and the shock absorbers ;
dismount the exhaust pipe ; take out the bolts on the rear plate of the cardan shaft ; attach the rear end of the chassis to an overhead crane ;
2. Withdraw the spring shackle pins ;
3. Raise the rear of the chassis to a sufficient height and remove the axle together with its springs.

FITTING THE REAR AXLE

Follow the above operations in the reverse way, taking the following precautions :

1. If necessary, use a lever on the springs in order to prevent the shackles being turned upside down ;
2. Do not lighten up the shock absorbers and their pivots until the car springs are flat, that is after the car has been loaded.

CHAPTER III

FRONT AXLE- STEERING- CHASSIS

§ I. — FRONT AXLE

The front axle is a heavy H shaped drop forging with inclined pivots and two stub axles with plain bushings, which carry the wheels.

The two stub axles are connected together with two levers and a ball and socket transverse connecting rod, with a shock absorbing device.

One of the stub axles is controlled from the steering wheel by means of a lever.

The stub axles carry the supports for the front brakes the mechanism of which is described in Chapter V, page 34.

The body of the axle carries two pads to receive the springs.

DISMOUNTING THE FRONT AXLE

1. Disconnect the longitudinal connecting rod and the brake cables ;
2. Disconnect the front wheel brake control rods from their supports on the chassis ;
3. Unscrew the eight nuts on the clips holding the springs to the chassis.
4. By means of an overhead crane raise the front of the chassis and pull the axle away.

REMountING THE FRONT AXLE

Proceed the reverse way with the following precautions :

1. See that the central assembly bolt on the springs fits into the hole provided for it in the axle.
2. Reassemble all the parts of the connecting rod exactly in the same order and in the same position.
3. Lubricate all moving parts.

§ II. — STEERING

Steering is by means of screw and nut with an oscillating column. This system gives very big surfaces in contact, and as a consequence wear is reduced to a minimum.

The steering nut is formed of a steel body with white metal lining. It operates the main steering lever shaft through a fork fitted with a cylindrical axis.

The screw has a trapezoidal thread and is brazed on to a column with a double ball thrust bearing to absorb reactions.

The steering column and the screw are hollow to allow the ignition advance mechanism to be passed through.

The steering lever is connecting up to the stub axle by means of a longitudinal rod with ball and socket connection and shock absorbing springs, having sufficient flexibility to damp out all shocks before they can be transmitted to the steering wheel.

The entire steering gear is mounted on a bearing which allows for setting at suitable angle for all requirements.

Rigidity in the steering column is secured by means of an adjustable support fixed to the instrument board.

On the upper end of the steering column there is an ignition advance lever.

Below the steering wheel there are two levers, which can be moved up and down by finger tip control, without having

to leave hold of the wheel. One of these levers operates the horns, the town horn being sounded in one direction and the road horn in the other direction.

The other lever operates the headlight dimmer in one direction and the headlights in the other direction.

This group of two levers together with its support is called the "combination".

DISMOUNTING THE STEERING GEAR

Cut off the main switch.

Remove the cover of the ignition lever, paying attention to the stud and the spring ; take off the lever, the steering wheel nut, and the steering wheel.

Detach the collar fixed to the instrument board and the "combination".

Under the bonnet, dismount the cap on the chassis support and the rod to the ignition apparatus :

Mark the position of the steering lever. Remove the bolt and the lever by lifting up the whole unit slightly to facilitate the work.

It only remains to withdraw the steering gear from the engine side.

FITTING THE STEERING GEAR

Proceed the reverse way, first of all fixing the steering gear to the chassis.

Precautions to be taken :

1. Verify the operation of the ignition lever, particularly with the steering wheels over at full left-hand lock ;
2. Do not force the steering column laterally in order to fix it to the instrument board.

§ III. CHASSIS AND SPRINGING

The chassis is of pressed steel, with side members of deep section.

A very rigid X-cross frame member is placed at the middle of the chassis and adds considerably to its rigidity.

In addition, the following parts are attached to the chassis.

The engine, which is bolted to hangers, forming a part of the side members (these are rigid at the rear and on Silentbloc at the front) ;

The radiator is fixed on the front cross frame member ;

The accumulators (a) are wedged in a metal box which is secured to one of the chassis side members and to a cross member ;

The exhaust box (b) is on two metal supports bolted to the chassis ;

The rear petrol tank (d) is fixed to the chassis by two points on the front cross member, and by one point on the rear cross member ;

The sheet metal dash is bolted directly to the chassis ;

The wheel carriers (f) are of pressed steel ;

The rear of the chassis is designed to receive a trunk.

FRONT SPRINGING

The front springs are pivoted to the chassis by their rear ends and are attached at the front by means of a shackle. All the pivots and shackles have Silentbloc bushings. The Hartford shock absorbers are on the outside of the chassis.

REAR SPRINGING

The rear springs are fixed to the chassis by shackles at the rear and by a pivot at the front. The pivots and shackles have Silentbloc bushings. The Hartford shock absorbers are mounted transversally, in front of the axle.



Fig. 14

§ IV.—DRIVING CONTROLS AND ACCESSORIES

The foot operated controls are as follows (fig. 15) :

Brake pedal (*b*) ;

Clutch pedal (*c*) ;

Accelerator pedal (*d*) ;

These three pedals are placed to left and right of the steering column and always in the same position in relation to the steering.

The starting button (*e*) is mounted on the centre of the instrument board.

The hand operated controls are as follows (fig. 15) :

The big diameter flexible steering wheel (*f*) ;

The ignition advance lever (*n*) mounted on the steering wheel ;

The town and road horn levers (*o*) ;

The lever for operating the headlights and the dimmer (*p*) ;

These two levers are placed under the steering wheel, in such an accessible position that the driver can reach them without taking his hand off the wheel ;

The slow running adjustment (*k*) and the carburettor adjustment (*i*) are mounted on the instrument board.

The change speed lever (*l*) ;

The hand brake lever (*m*) ;

are mounted on the top of the gearbox.

The instruments are as follows (fig. 9) :

A clock (*q*) ;

A speed indicator, distance indicator, and trip indicator (*r*) ;

The petrol indicator (*e*) ;

The Amperemeter (*r*) ;

The oil pressure indicator (*s*) ;

The ignition switch (*a*) ;

The red disc for ignition (*g*) ;

These instruments are mounted in a casing on the fascia board and are illuminated at night in such a way that the driver is not dazzled.

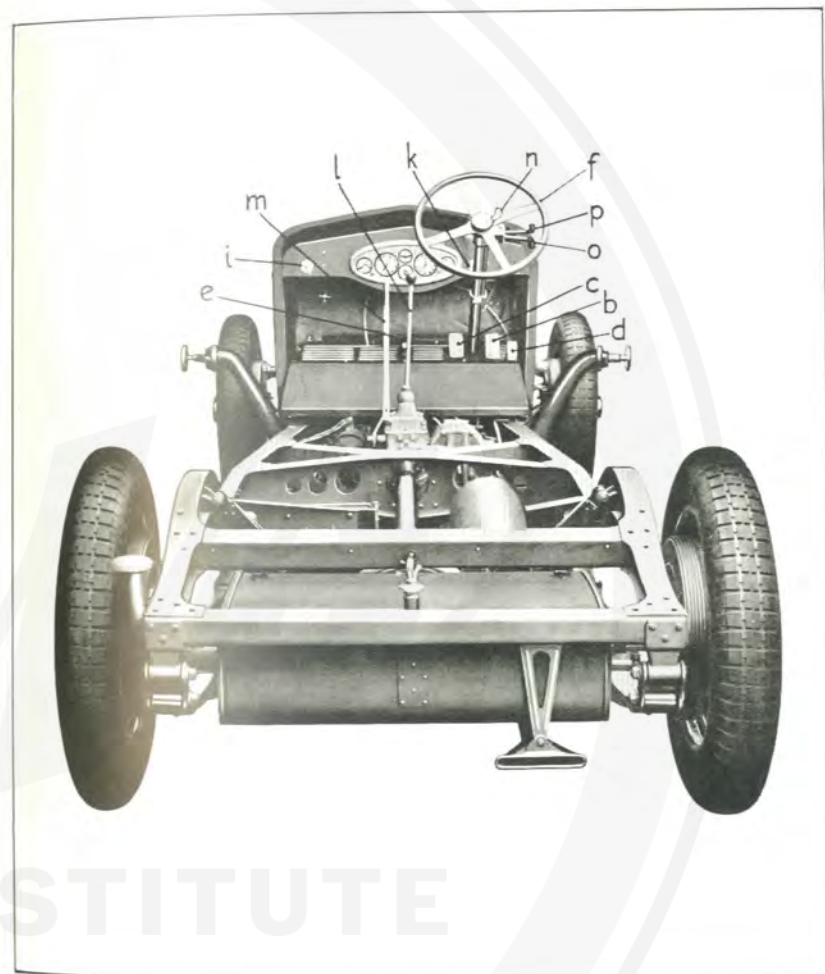


Fig. 15.

By means of a button (*b*), conveniently placed to the driver's hand, the instruments can be illuminated intermittently or continuously.

The button must be pushed in to secure intermittent lighting and the milled nut is turned to provide continuous lighting.

CHAPTER IV

ELECTRICAL EQUIPMENT

For further information concerning the electrical equipment, lighting and starting, see the special notice prepared by the maker of these appliances.

MAIN SWITCH (Fig. 16 and 17)

A main switch is placed on the right hand frame member, opposite the accumulators. When the body is fitted the switch handle can be seen through the valance in the angle formed by the right hand mud guard and the running board.

By means of a quarter turn, this switch allows the electric current to be cut off at the battery; in other words it cuts all the circuits for ignition, lighting, starting and all accessories. A box with special connections and a fuse is placed in the frame member, near the battery,



Fig. 16.

and allows the roof lights and the side lamps to be lit, even if the current is cut at the main switch.

Among the advantages of this appliance are the following :

1. If the car is not to be used for a long time, it makes it



Fig. 17.

absolutely impossible to use the battery ; it prevents mechanics starting the engine at the garage without authority ;

2. In case of a short circuit, it enables the current to be cut immediately thus making it possible to look for and repair the short, and to avoid all risks of fire.

CHAPTER V

B R A K E S

The brakes operate on all four wheels. They are applied by pedal through a servo mechanism, or by hand through a lever on the side of the gearbox.

The Dewandre type servo mechanism is shown in Plate 3.

This mechanism is composed of an empty cylinder (A) in which a piston (B) operates, the piston being made air tight by a rubber plunger and being maintained in its normal position by the coil spring (Z).

The cylinder can be put into communication with the intake manifold or with the outer air by means of a distributor, which consists of a slide (C) moving in a sleeve which has two sets of ports (D) and (E). The slide is operated by the lever (F).

This lever receives its movement from the rod (G) attached to the collar (H) which can turn on the hub of the lever (I). The lever (I) is pivoted at (J) on the shaft (K) and receives its movement from the pedal (L) by means of the shaft (M). This shaft (M) is integral with the forked lever (N) forming a continuation of the pedal (L).

The operation is as follows :

When the pedal (L) is depressed, the lever (I), which bears on the shaft (K) is put into movement by the shaft (M). The movement of the hub of the lever (I) on the shaft (O) allows the connecting rod (G) to move a sufficient distance to

permit the slide to occupy the position shown in the First Stage. By this movement the interior of the cylinder is put into communication with the intake manifold of the engine. By reason of the vacuum created in the cylinder, the piston moves and draws with it the lever (B) to which it is connected by chain. This tractive effort is transmitted to the lever (S) mounted on the shaft (M), this reacting proportionally on the pedal. The whole of the levers pivot around the shaft (O), applying the brakes.

At this point the slide occupies the position shown in the Second Stage. The equilibrium is then assured, for the cylinder is isolated both from the intake manifold and from the outer air.

If further pressure is applied to the brake pedal, the same movements will take place and the brakes will be applied with greater effort.

It will be seen that the braking is always progressive and that the reaction in the pedal is always proportionate to the effort applied.

In other words it is possible to feel the brakes.

When the foot is taken off the pedal (L) the spring returns it to its normal position and by reason of this, the lever (I) is displaced, by the intermediary of the shaft (M), thus bringing the slide into the position shown in the third Stage.

The cylinder is then in communication with the outer air, and under the influence of the spring the piston moves backwards. The brakes are thereby released.

If the servo mechanism should not operate (by reason of the stoppage of the engine, for instance), the lever (N) is directly operated by the shaft (M) forming one piece with the pedal (L). The chain slackens off and there is no effort on the piston.

N. B. - A pneumatic appliance is fitted to the servo mechanism (p) (fig. 13), so that when the cylinder is in communication with the intake manifold, an electric circuit is closed, and the " Stop " signal at the rear is illuminated.

FRONT WHEEL BRAKES

The construction of the front wheel brakes is as follows :

The brake consists of two internal shoes, each one on a pivot, and opened by means of a cam specially designed to assure equal pressure and equal wear of the two shoes.

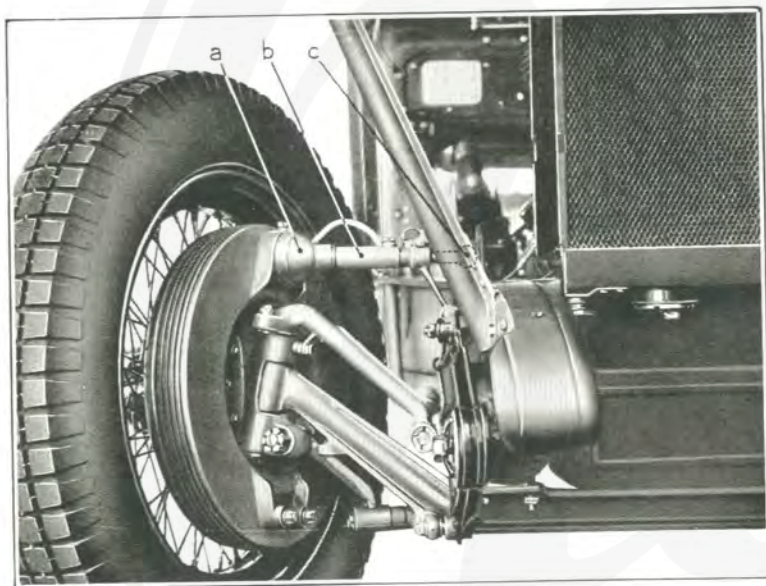


Fig. 18.

The brake cam has a universal joint (*a*) (fig. 18), which is operated by a telescopic shaft (*b*) supported at the chassis end by the ball and socket (*c*). All these connections are protected against water and dust by means of leather gaiters.

The brake levers are returned to their neutral position by means of springs independent of the springs between the shoes.

REAR WHEEL BRAKES

The rear wheel brakes are of the same design as those at the front, with the exception that the cam is rigid, instead of being operated through an universal joint.

BRAKE DRUMS

The four brake drums are alike and are iron castings with external fins which ensure quick cooling, they are exceedingly rigid.

INSTITUTE



PART II

DRIVING- ADJUSTMENT- MAINTENANCE

CHAPTER I

DRIVING

1. — GETTING THE CAR READY FOR THE ROAD

PUTTING INTO SERVICE

Before the car is put into service for the first time the following points should be carefully attended to.

Electrical connections. — See that the wires are connected to the battery and that all connections are tight (1).

Pedal Clearance. — Be certain that the pedals and particularly the brake clutch pedal, does not touch the floor board. In the normal position there should be a clearance of half an inch to one inch between the pedal and the board.

Priming the vacuum tank. — Unscrew the cap and

(1) If the car has been delivered with the battery dry and uncharged, it should first be filled and recharged, according to the indications given by the manufacturer.

PRECAUTIONS BEFORE STARTING THE ENGINE

Water level. — Completely fill the radiator with water.

Oil level. — Verify the oil level in the sump.

Petrol. — See that there is sufficient petrol in the tank.

Position of the levers. — See that the change speed lever is at neutral point and that the hand brake is on.

Contact. — Turn the switch key on the instrument board so as to light the red lamp.

STARTING THE ENGINE

Give maximum ignition advance and place the correcting lever at the bottom, in the position "DÉPART". Then press on the starter pedal, releasing the foot as soon as the engine starts firing.

Let the engine run at about 700 revolutions a minute for approximately thirty seconds, then bring the correcting lever to the position marked "NORMAL"; this movement being made progressively in order to prevent back firing into the carburetter.

IMPORTANT. — When the engine has been started it is most important that the corrector is not left on the "DÉPART" position. The corrector should only be used to facilitate starting when engine cold.

ELECTRIC STARTING

The electric starting motor does not drive the engine. — If the electric starting motor does not drive the engine, it is an indication that the accumulators are insufficiently charged. In this case they should be recharged (see notice supplied by the accumulator manufacturer). In the meantime the engine can be started by cranking. It is also possible that a connection might be loose, or that there is a short circuit. See that all connections are clean, properly tightened up, and that all the wiring is completely insulated.

The Starter drives the Engine, but the latter does not fire. — If the engine does not start after fifteen or twenty seconds, the starting motor should not be kept in action, but the cause of the defect should be looked for. Hereafter are some of the reasons why the engine does not start.

The ignition is not switched on ;

The petrol tap is closed ;

There is no petrol in the vacuum tank ;

The carburettor slide is wedged in its upper position.

The make and break contacts are oxidised or badly adjusted.

The breaker arm is seized on its shaft and does not operate.

The spark plug points are badly adjusted, or the plugs are out of use.

Ignition wires broken.

Position of the corrector. — As soon as the engine is running place the correcting lever on the position marked "NORMAL" (intermediate position).

Starting an Engine which has not been running for a long time. — When starting an engine which has been run for a long time, as for instance after coming out of the body works, it is very important that it be allowed to run for a few minutes at 600 revolutions a minute, thus

allowing the oil to become warm, before the accelerator is used. Starting up rapidly can cause damage to the engine, but on the other hand running too slow with a cold engine may cause damage. Do not start away until the engine is warm.

With certain oils oxidation takes place in the cylinders after the engine has not been run for a few months.

In this case it is advisable, before starting up, to inject fluid oil through the spark plug holes and to turn the engine by hand for a short time, in order to lubricate the cylinder walls and the pistons.

§ 11. — DRIVING THE CAR

A new engine should be treated carefully. — A new engine should never be driven at full power for the first 300 miles, and during this period we recommend a maximum speed of 35 to 40 miles an hour. This precaution is not sufficiently observed, and yet the duration of the engine largely depends on it. If a new engine is driven at full throttle very serious damage can result.

The gear ratio adopted on this car allows of very rapid acceleration and as a consequence it is possible on long straightaways or on slightly switch-back roads for the engine to run considerably beyond the number of revolutions corresponding to maximum power. Even under these conditions the engine remains silent and free from vibration, but the oil and petrol consumption is greatly increased per horsepower-hour.

Our clients are therefore strongly recommended not to constantly exceed the speed indicated by the red zone on the speed indicator.

By reason of the rapid acceleration, this maximum speed allows of very high averages being set up.

Another important reason for observing this maximum

limit is that tyres are destroyed by high speed, particularly during hot weather.

As an indication, we might mention : 1st- That at a speed of 70 miles an hour tyre wear is twice as great as at a speed of 46 miles an hour; 2nd- That at a temperature of 95 degrees tyre wear is three times greater than at a temperature of 60 degrees.

Use of the Corrector. The object of the carburettor corrector is to alter the mixture to suit the following cases :

1. Rich mixture for starting ;
2. Normal mixture for ordinary running ;
3. Weak mixture for economy.

The adjustment giving the best results is the one corresponding to the position "NORMAL". This position is used by our chassis testing department, and gives a slightly rich mixture. The two other positions are only corrections and should be used occasionally.

It should be noted that the weak mixture position cannot be used constantly, but only under suitable conditions of temperature, for its only object is to correct a rich mixture during very hot weather. It is in the interests of the driver to make use of the weak mixture position, marked "Pauvre" whenever that is possible, but he should not attempt to run constantly in this position. In town always run with the lever in the position "NORMAL" thus assuring rapid acceleration. Never run the car with the lever in the position "DEPART".

Position of Change Speed Lever. The positions of the lever for the different speeds are as follows :

First Speed : Push the lever left forward, as far as the first stop.

Second Speed : Pull the lever left rear as far as it will go.

Third Speed : Push the lever right forward as far as it will go.

Fourth Speed (direct drive) : Pull the lever to right rear, as far as it will go.

Reverse : Place the lever in first position and push completely forward.

Clutch and Change Speed Operation. Always start away on first gear and let the clutch in gradually.

Avoid slipping the clutch when changing gears. **The engine must not be accelerated before the clutch is thoroughly engaged.**

Advice on Gear Changing. — In order to change gears silently the following points should be observed :

When passing from first to second, hold the lever in neutral for a short time before engaging the gears.

When passing from second to third or from third to fourth, the change should be made without any pause.

When changing from fourth to third, from third to second and from second to first, the usual practice is to change quickly as soon as the clutch has been withdrawn. The following double clutching method is much to be recommended :

Declutch, bring the lever to neutral, let the clutch in and at the same time accelerate the engine to a rather higher speed than it was running at before changing ; declutch again and at the same time engage the lower gear.

This method of changing is very quickly acquired, and it is one which enables noiseless changes to be made.

Do not let the clutch slip. The clutch should not be allowed to slip for any length of time, under any circumstances. The practice, indeed is quite useless, in view of the flexibility of the engine and the sweetness of the drive.

Use of the Foot Brake. — Never use the foot brake violently, particularly at high speeds on a smooth surfaced and wet road. The car cannot be stopped any quicker by this practice, and there is danger of skidding.

Always use the brakes gradually ; sufficient reaction is

transmitted to the brake pedal for the braking effort to be felt and for the driver to keep complete control of his car.

Use of the Hand Brake. — The same advice is given with regard to the hand brake. This brake is really only used to hold the car after it has been brought to a standstill.

Braking on long hills. — On mountain roads we recommend making use of the engine as an aid in braking, in order to avoid overheating of the brake drums. The throttle should be closed, but the car can be kept either in fourth or on any of the intermediary gears.

In no case should the engine be allowed to turn at a higher speed than that at which it would revolve if pulling the car. These speeds are :

- 40 miles an hour on third,
- 30 miles an hour on second,
- 17 miles an hour on first.

Anti-freezing Solution. — To prevent freezing of the cooling water, the following solution can be added to the water in the radiator : half a gallon of alcohol for half a gallon of glycerine. This will prevent the water freezing at temperature of 18 degrees below zero Centigrade. The total volume of water in circulation is nearly five gallons.

Emptying the Radiator. — In case of frost, it is necessary to drain the radiator unless an anti-freezing solution is used. For this purpose the radiator is fitted with a drain tap at its base, by means of which the whole of the water can be drained off. In order to avoid lime deposits in the water jackets, we recommend continuous use of the same water in winter. Or, alternatively, the radiator can be filled with rain water.

Cleaning out the radiator and water jackets. — We recommend the following method for cleaning out the radiator and the cylinder jackets if they have become coated with

lime. This condition is noticed by an unusual overheating of the engine. In addition, the coating can be seen in the cylinders through the holes communicating between cylinder head and jacket.

1. Drain off all the water.
2. Fill the radiator again with a mixture of 50 per cent water and 50 per cent muriatic acid. Do not run the engine. Leave this mixture until it ceases to bubble ; then drain it off. The frothing of the mixture indicates the length of the operation, which may last half a day or more.
3. In exceptional cases, and when the coating is very thick, it may be necessary to empty the mixture and fill up a second time. This is generally necessary when the thickness of the coating is one millimetre.
4. Rinse with clean water, using a hose pipe for preference, and let the rinsing water drain off.
5. Leave a 20 per cent solution of washing soda (carbonate of soda) and water in the radiator for a period of ten minutes, and drain off again.
6. Rinse the radiator with clean water allow the engine to run for ten minutes, then drain off.
7. Fill up in the usual way.

A simple method of preventing the formation of lime within the radiator and cylinder jackets of a new car is as follows :

Use a solution of William's Mixture, in the proportion of one glass full for 3-4-2 gallons of water. This mixture is made use of in our factory for the boilers of the steam heating. Drain off every 1200 miles and add a fresh solution, after having flushed out the radiator with a hose pipe.

This solution prevents salts from adhering to the cylinder walls and the radiator tubes, by keeping them in a soft condition. It does not dissolve the salts and can have no influence on them when they have become formed.

CHAPTER II

ADJUSTMENTS

§ I. — ENGINE TIMING

The various adjustments of the engine are as follows :
clearance between valve stem and tappet, $5 \frac{10}{m}$.

Opening of intake valve : 5 degrees before upper dead centre, or $0.4 \frac{m}{m}$ on the piston stroke.

Closing of intake valve : 35 degrees after lower dead centre, or 7 degrees on the piston stroke.

Opening of exhaust valve : 45 degrees before lower dead centre, or $13.5 \frac{m}{m}$ on the piston stroke.

Closing of exhaust valve : 5 degrees after upper dead centre, or $0.25 \frac{m}{m}$ on the piston stroke.

The valve timing having been made correct with a clearance of $5 \frac{10}{m}$ between tappet and valve stem, reset the tappet clearance so as to obtain silent operation between $4 \frac{10}{m}$ and $5 \frac{10}{m}$ clearance, without paying any attention to the fact that the running of the engine may be slightly upset by this change. This clearance is obtained by means of the adjusting screw on the rockers.

Never give a less clearance than $4 \frac{10}{m}$, for this will interfere with slow running.

N.-B. — As our timing gear is perfectly silent, by reason of the special profile cams we use, it is most important that the tappet clearance be measured under the following conditions.

To measure the clearance of the tappets, it is necessary to act as follows :

For No. 1 tappet, that No. 16 be completely raised.

— 2 —	— 15 —
— 3 —	— 14 —
— 4 —	— 13 —
— 5 —	— 12 —
— 6 —	— 11 —
— 7 —	— 10 —
— 8 —	— 9 —
— 9 —	— 8 —
— 10 —	— 7 —
— 11 —	— 6 —
— 12 —	— 5 —
— 13 —	— 4 —
— 14 —	— 3 —
— 15 —	— 2 —
— 16 —	— 1 —

DECARBONIZING THE ENGINE

The combustion chambers should be decarbonized at intervals of about six thousand miles. The following precautions should be taken :

The cylinder head joint should be coated with " Hermetic " on the engine side and coated with graphited grease on the cylinder head side, so that when the head is raised again the joint will adhere to the cylinder.

The entire surface of the combustion chamber and the piston head must be cleared of carbon, and the metal should be polished. The more thoroughly this work is done the less the tendency for fresh carbon deposit to form. The presence of carbon in the combustion chamber interferes with acceleration and causes the engine to knock. The threads of the cylinder head holding down studs must be well cleaned and coated with graphited grease before the head is replaced.

After putting the head back the screws should all be put in place, and after having been tightened by hand should

all be tightened up completely in the order indicated on the sketch, going alternatively from the centre to the extremities. The engine should then be started up and tested, after which the nuts should be further tightened while the engine is hot.

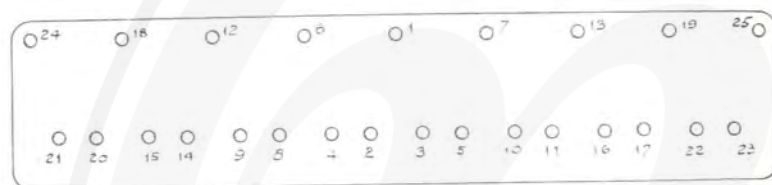


Fig. 19.

CARBURETTER VERIFICATION

The vacuum tank should be drained from time to time, the filter under the tank should be cleaned and the carburetter slide should be carefully washed in petrol.

Be sure that the five jets are all free. By dismounting the jet carrier and inclining it while the float chamber is full of petrol, the level of petrol should rise to practically the same height in each of the jets.

IGNITION VERIFICATION

The platinum points should be given the degree of opening of the gauge supplied with the tool kit, and which is about 5.10 of a millimetre. The platinum points should be kept perfectly clean. If they are allowed to become pitted or oxidized, misfiring will take place, and acceleration will be poor.

If it is noted that the part forming contact is covered with a white powder, the platinum point should be dismounted and carefully rubbed down on an oil stone, so as to remove all traces of oxidising and to leave the head slightly rounded.

The gap of the **spark plugs** should be exactly $4/10 \text{ mm}$. See that the ignition wires are completely pushed into the

distributor, and that the connections of the primary wire are tight.

VACUUM TANK PIPING

Be sure that there are no leaks on the vacuum tank piping going from :

1. The vacuum tank to the cap on the intake manifold :
2. From the servo brake to the intake manifold.

Air leaks at these points will cause difficulty in starting and will interfere with the correct running of the engine.

§ 11. — CARBURETTER SETTING

With present day petrol the carburetter corrector lever should be placed in the position "NORMAL," as soon as the engine has been started up, but after a few minutes and as soon as the engine is hot the lever can be pushed to the position "PAUVRE", without any inconvenience.

The standard carburetter adjustment is as follows :

Slow running	10
First jet	25
Second jet	35
Third jet	35
Fourth jet	45

If other qualities of petrol are used, it may become necessary to change the carburetter adjustment.

In changing the jets the following indications should be followed :

First give attention to acceleration and change only the first and the second jets ; then seek to get maximum power by changing third and fourth jets.

Always operate with the corrector in position "NORMAL" in order to be able to weak down the mixture when the engine becomes hot.

It should be noted that the jets are calibrated in flow per cubic centimetre per minute and not by diameter of the hole.

For dismantling the jet carrier see page 14.

When the car is stopped on a hill, or on a road with considerable camber, or if it is to stand for a considerable time, the precaution should be taken of shutting off the petrol.

To close the petrol, turn to the right as far as possible.

To open the petrol turn to the left as far as possible.

The petrol filter under the vacuum tank should be cleaned every 600 miles in order to prevent it becoming choked with very fine dirt in suspension in the petrol.

When completely run out of petrol the trouble of priming the fuel tank can be avoided by pouring petrol directly into the tank through the plug provided for this purpose.

In addition to obstructions in the petrol filter and the pipes, which are easy to detect, care should be taken that there are no air leaks on the vacuum tank piping, which would prevent this latter working properly.

§ III. — IGNITION ADJUSTMENTS

CARE OF THE DISTRIBUTOR

For advice on oiling the distributor see the chapter re Lubrication.

From time to time the distributor plate should be cleaned with a dry rag and the opening of the platinum points should be verified by means of the special key supplied with the tool kit. The surface of the contact points should be perfectly clean; if there is any trace of wear they should be trued up with a fine file and all metal dust removed.

Neither the make and break nor the distributor of secondary current should be oiled.

The firing order is 1, 3, 7, 4, 8, 6, 2, 5, cylinder No. 1 being the one nearest the radiator.

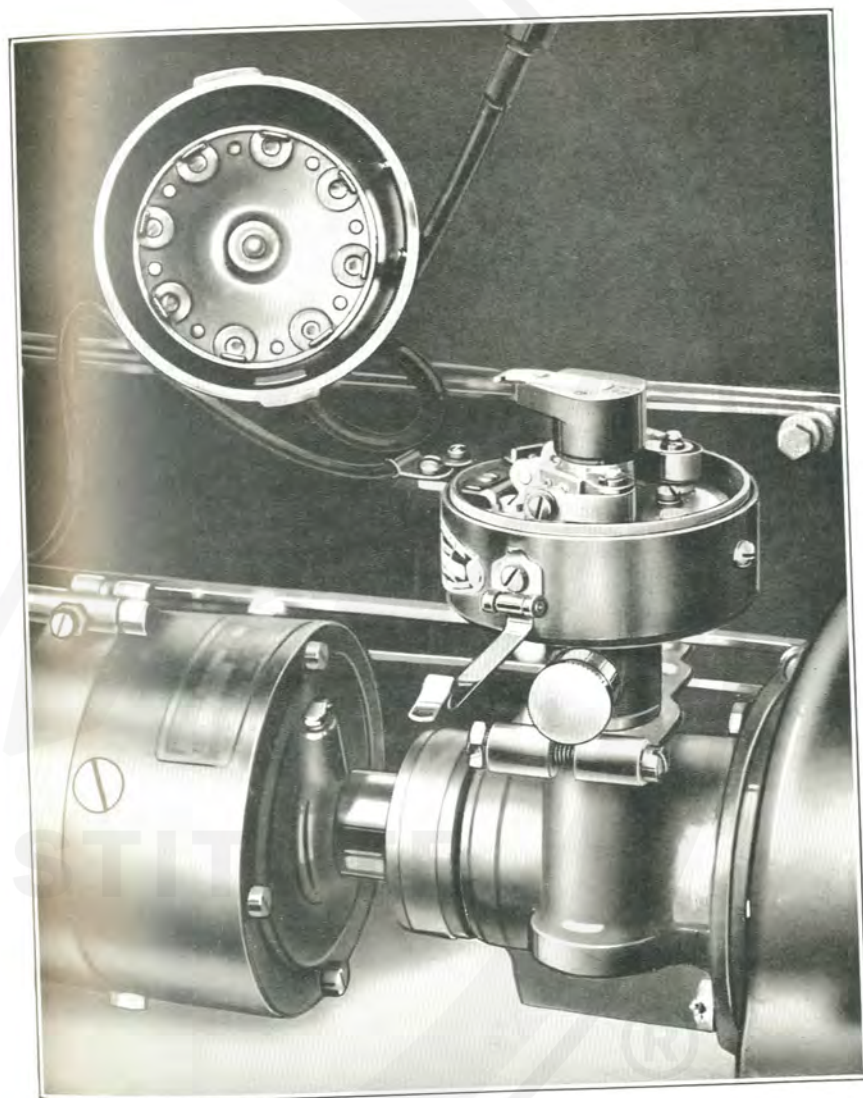


Fig. 20.

SETTING THE DISTRIBUTOR

In order to set the distributor, bring the ignition advance lever to the middle of its stroke and bring the piston in No. 1 cylinder to upper dead centre (End of compression).

Remove the distributor cover; slacken off the advance collar on the distributor head; turn the distributor by hand until the make and break is just opening on distributor position No. 1.

Tighten up the collar and put the distributor cover in place, taking care to see that it is in its locked position.

Each ignition wire is numbered at its ends. To attach them to the distributor, they should be placed in the order indicated above, 1, 3, 7, 4, 8, 6, 2, 5, starting from No. 1 punched on the distributor.

The spark gap on the plugs should be $4 \frac{1}{10}$ mm.

Keep the exterior porcelain of the plugs in a clean condition, so as to retain their insulating efficiency.

§ IV. SERVO BRAKE AND BRAKE ADJUSTMENTS

The servo brake is not subject to wear, and as a consequence no special adjustments have to be carried out.

If the servo brake cylinder is taken down, care should be taken when reassembling it to see that the length of the rod connecting up to the slide is not changed, so that the same adjustment will be maintained.

In case the length of this rod is changed, it should be put back in such a manner that the slide is operated on before the pedal stop comes in contact with the balance arm, and before the chain is tightened, the piston being against its stop. In order to provide for this about 2 millimetres stroke at the end of the pedal should be provided for. Care should be taken, when making this adjustment, that the $4 \frac{1}{10}$ mm. clearance between the shaft (M) and the bolts of the lever (N), Plate 3, should be entirely towards the front of the car.

BRAKE ADJUSTMENT

The brake are adjusted by means of the nuts on the ends of the brake cables.

The four brakes can be equally adjusted in the following manner:

Testing the Brake Adjustment. In order to test the brake adjustment and see that it has been carried out correctly, the car should be driven five minutes with the brakes slightly on. The four brake drums should have exactly the same temperature. Any difference of temperature will indicate that there is uneven adjustment, or that there is oil in the drums, by reason of too much grease having been put in the front hubs, or by too high a level in the differential housing.

Keeping the Brakes Dry. — In order to secure efficient braking the shoes should be dry. If, by reason of too much grease in the front hubs, or too high oil level in the rear axle, grease should reach the shoes, these should be washed with petrol. The drain holes in the drums should not be allowed to become choked with mud.

To properly adjust the brakes the car should be raised off the ground by blocks of wood, so that the four wheels can be felt at the same time.

The brakes and servo-brake being correctly adjusted, the four wheels should be locked by depressing the pedal of about 2" 2 on a good road.

Device for taking up wear on front and rear wheel brakes. — After a certain length of time, when it becomes impossible to take up wear on the front and rear brakes by means of the winged nuts on the end of the cables it becomes necessary to change the angle of the levers on which these cables operate or, as an alternative, to shorten the cables, the extremities of which pass through an eye and are held by two bolts.

§ V. — SPRINGING ADJUSTMENTS

TYRE INFLATION

To secure the weight of the car, first place it on the draw-bridge empty, securing the weight of the front and the rear.

Add one third of the carried load to the front (passengers and baggage) :

Add two thirds of the useful load to the rear (passengers and baggage).

The total weight having been obtained in this manner, inflate the tyres to the pressures recommended by the tyre maker.

32-6.75 TYRES		30-6.75 TYRES	
Axle load	Tyre pressure	Axle load	Tyre pressure
3100 lbs	40 lbs per square inch	2800 lbs	35 lbs per square inch
3400 -	42 -	3100 -	40 -
3700 -	46 -	3300 -	42 -

SHOCK ABSORBER ADJUSTMENT

The Hartford shock absorbers should be moderately tight, and should be equally adjusted.

In order to get this result we recommend tightening the shock absorbers very progressively, making use of a spanner about 6 inches long.

When driving at a moderate speed, over ordinary roads, it is advantageous from the standpoint of comfort, to tighten the front shock absorbers as little as possible, and only just enough to prevent back lash in the steering wheel.

For fast driving the shock absorbers, both front and rear, should be set very tight.

Note. - From time to time attention should be paid to the nuts on the front spring clips.

CHAPTER III

LUBRICATION AND GENERAL CARE

ENGINE LUBRICATION

Lubrication system. — The lubrication system is described on page 5.

Oil Level. — The oil level in the engine should be verified daily. The engine is fitted with a dip stick which allows the quantity of oil in the sump to be ascertained.

The dip stick is graduated from 0 to 8 litres.

We wish to point out that our dip stick is marked in such a manner that 2 litres of oil remain in the sump when the stick shows 0. These two litres constitute an absolutely indispensable reserve. In reality the quantity of oil in circulation is 10 litres (2 1/5 gallons).

In view of the big surface of the engine base chamber, it is quite normal to find that the height of the oil level is higher after the car has stood a few hours than when the engine was first stopped. This difference may be as much as 2 litres.

Drain and level Cocks. — Each engine is fitted with a screw down cock.

By screwing from left to right and locking the cock, the flow of oil is stopped.

Level for Normal Running. - We recommend that the oil level never be allowed to drop below 4 litres on the dip stick.

Draining the Oil Sump. — In the case of a new engine it is advisable to drain the sump and fill up with fresh oil after 500 miles running.

After this the sump should be drained at intervals of 600 miles in winter and 1200 miles in summer.

Oil Filter. — Every 600 miles the oil filter mounted on the side of the engine should be taken out and cleaned. Instructions for dismounting it will be found on page 8; when the car is new the filter should be cleaned after 200 miles.

Grade of oil to be used. — In summer "Antar medium heavy" or if not obtainable "Gargoyle Mobiloil B.B.". In winter "Antar medium light" or if not obtainable "Gargoyle Mobiloil A".

GENERAL LUBRICATION

Engine. — Test the oil level in the engine every day (see paragraph above).

Chassis. — The pressure gun provided with the car allows all parts of the chassis to be lubricated with rapidity and with cleanliness.

Grade of Oil for the Chassis.

For : Cardan shaft Use "Antar Special oil".
Back Axle } Special oil or if not obtainable :
Steering box } "Gargoyle Mobiloil C.W.".

For gear box use a mixture of :

One third of engine oil,

Two thirds of "Antar special oil" or if not obtainable "Gargoyle Mobiloil C.W.".

For the front wheel hubs use "Antar grease" or if not obtainable "Mobilubricant S".

For the grease gun use "Antar grease" or if not obtainable "Mobilubricant S".

For lubricating all the small parts i.e. ball joints etc., use engine oil.

Parts to be greased every 300 miles (1).

From outside the chassis (Plate 4)

1. The lubricator communicating with the group for each front stub axle 2 greasers
2. The lubricator communicating with the greaser for each rear wheel 1 greaser

Under the Bonnet (Plate 4)

3. Fan spindle 1 greaser

Points to be lubricated every 600 miles.

Under the bonnet (Plate 4)

4. Lubricator on ignition distributor.
5. Ball and socket connections of carburettor control rods (a few drops of thin oil).
6. The lubricator communicating with the gear box and steering gear group 1 greaser

N. B. Care should be taken to pour distilled water into the accumulators every 600 miles, so as to just cover the top of the plates.

It is important that the engine sump be drained at intervals of 600 miles in winter and 1200 miles in summer.

Points to be lubricated every 3,000 miles.

From outside (Plate 4)

7. Front wheels hubs use "Antar grease" or if not obtainable "Mobilubricant S".
8. Steering gear box Fill to half level with thick oil, using "Antar special" or if not obtainable "Gargoyle Mobiloil C.W." and pouring it through the hole in the top of the housing.

(1) The numbers of the points to be greased refer to the lubrication chart.

9. Gear Box. Fill with above mentioned mixture by means of the filler hole on the upper part of the gear box until the level shows on the level plug on the side of the gear box.

10. Rear Axle. There is a big plug on the top in the front of the differential housing. Use "Antar special" or if not obtainable "Gargoyle Mobiloil C.W." until the level is reached at the mouth of the hole on the rear of the differential housing.

The level in the rear axle should be made when the axle is warm, after having run for some time.

Under the Rear Floor Boards :

11. Fill the front and rear Universal joints with "Antar special" or if not obtainable "Gargoyle Mobiloil C.W." by means of the lubricators and the special syringe supplied with the tool kit.

Points to be lubricated every 10.000 miles :

Dismount the car springs, clean their surfaces, and coat them with graphited grease. After this has been done the nuts on the spring clips should be tightened after a certain length of time, when the grease has been forced out from the space between the leaves.

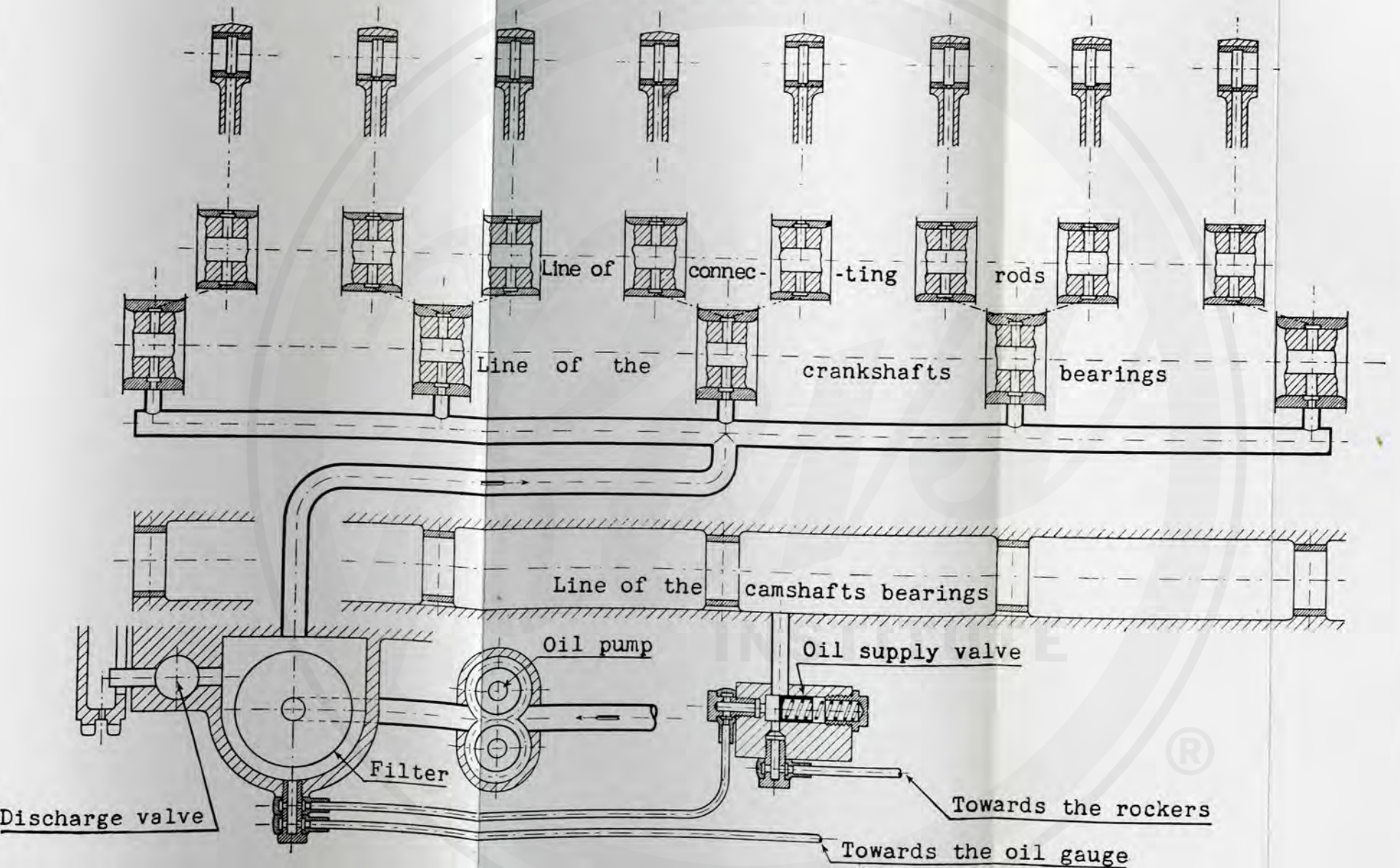
We again remind our clients to tighten the nuts on the front spring clips at intervals of about 6000 miles.

I M P
MARECHAL
P A R I S

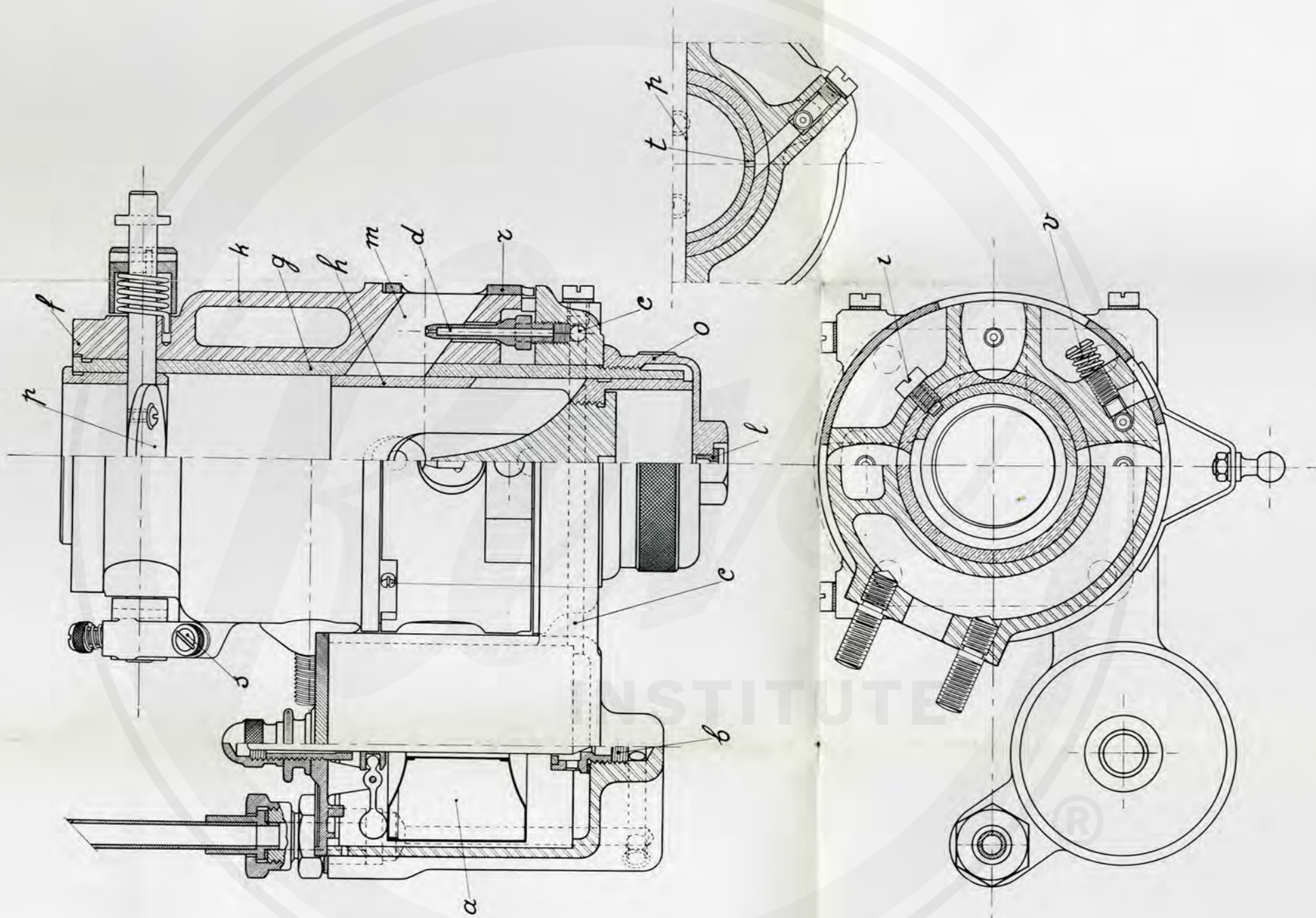
INSTITUTE



LUBRICATION CHART

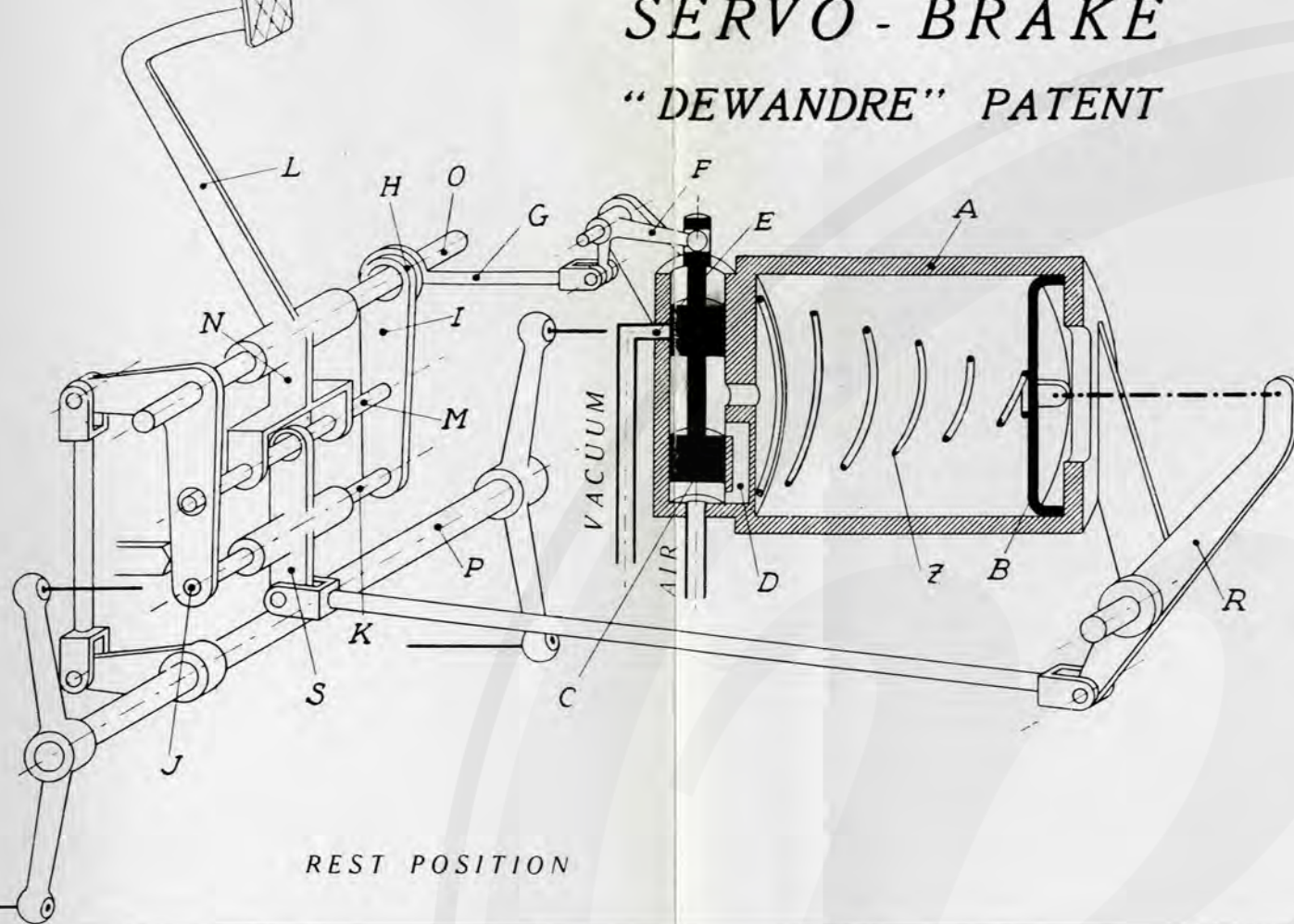


CARBURETTER - C.5

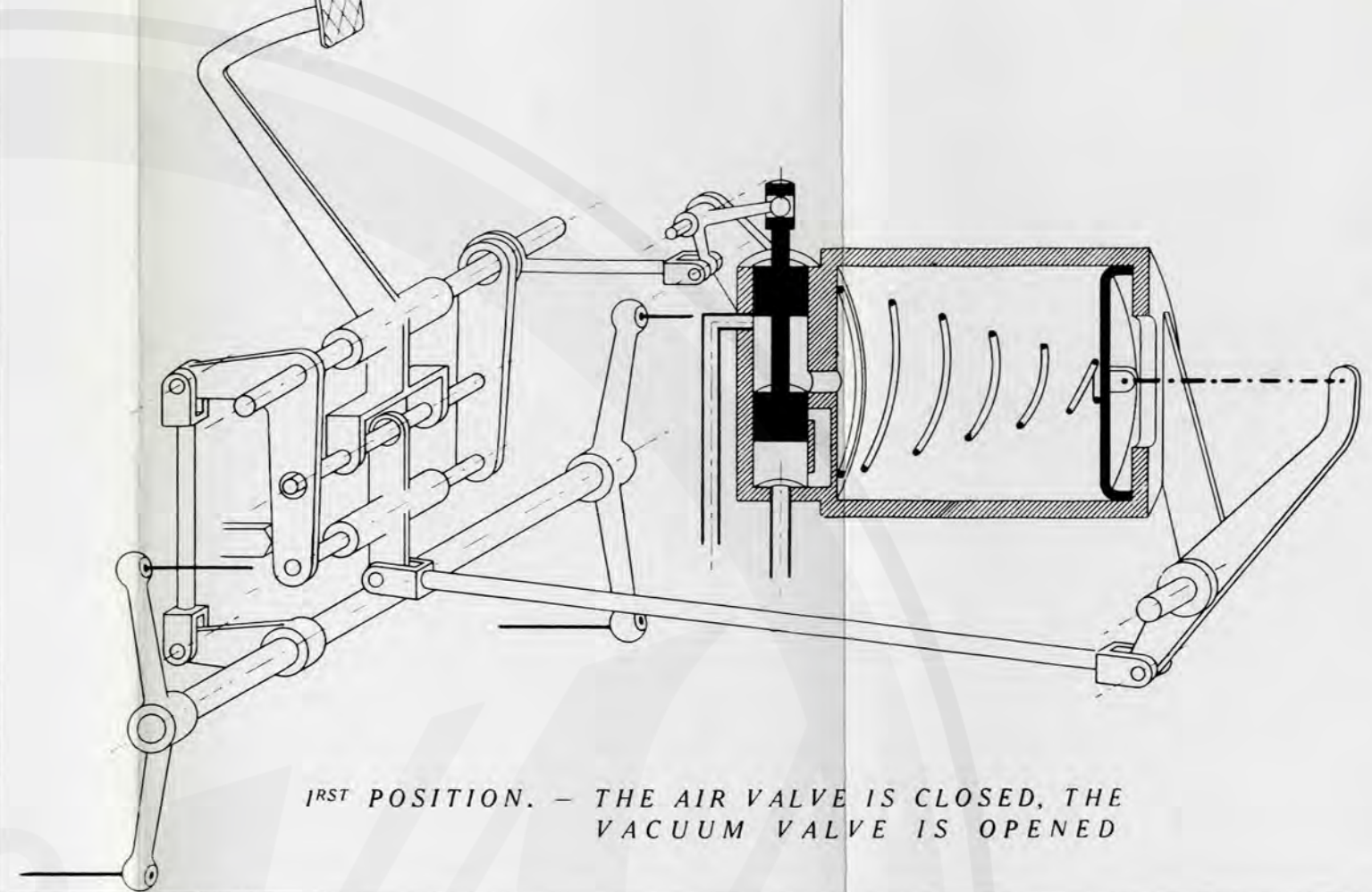


SERVO - BRAKE

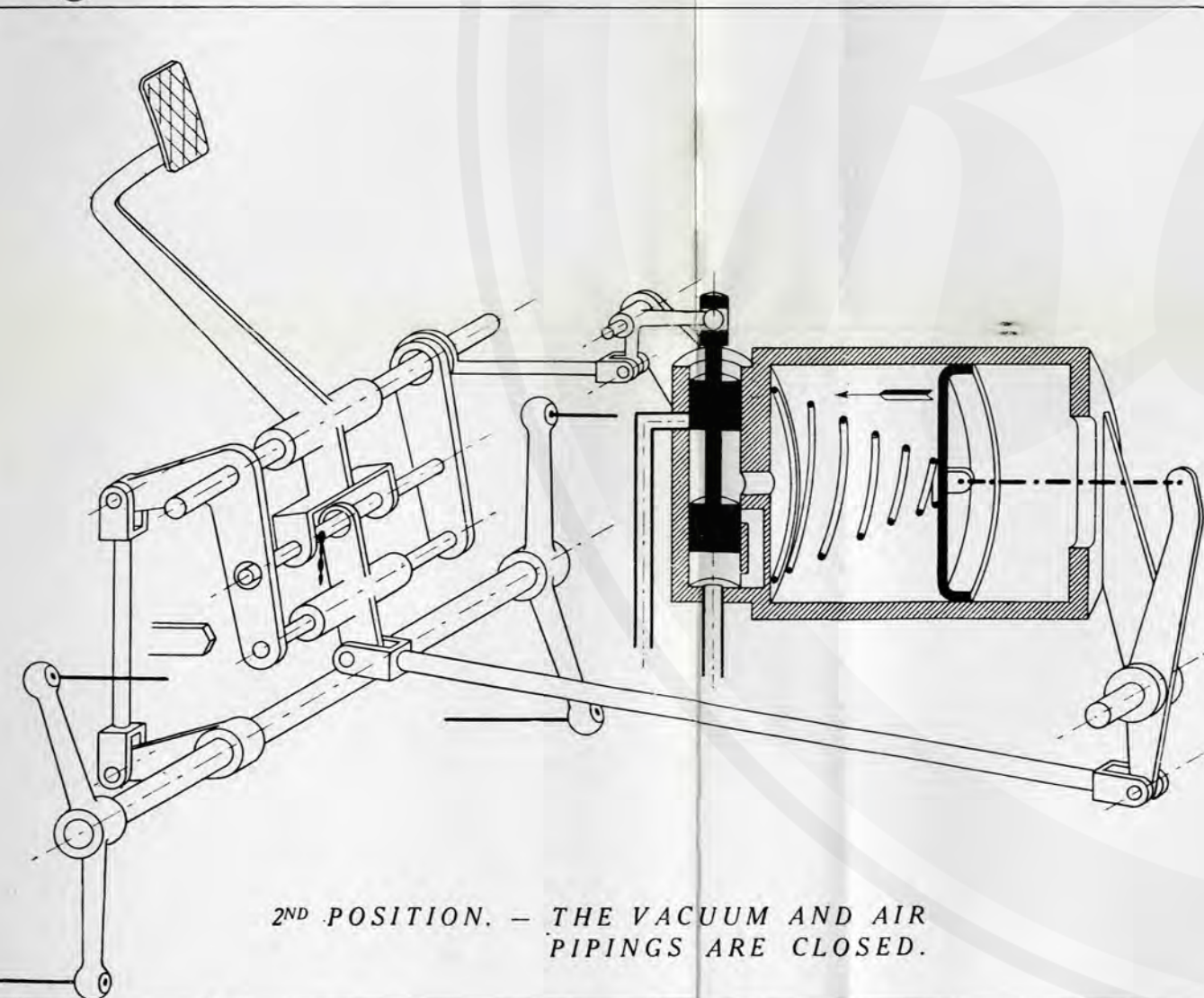
"DEWANDRE" PATENT



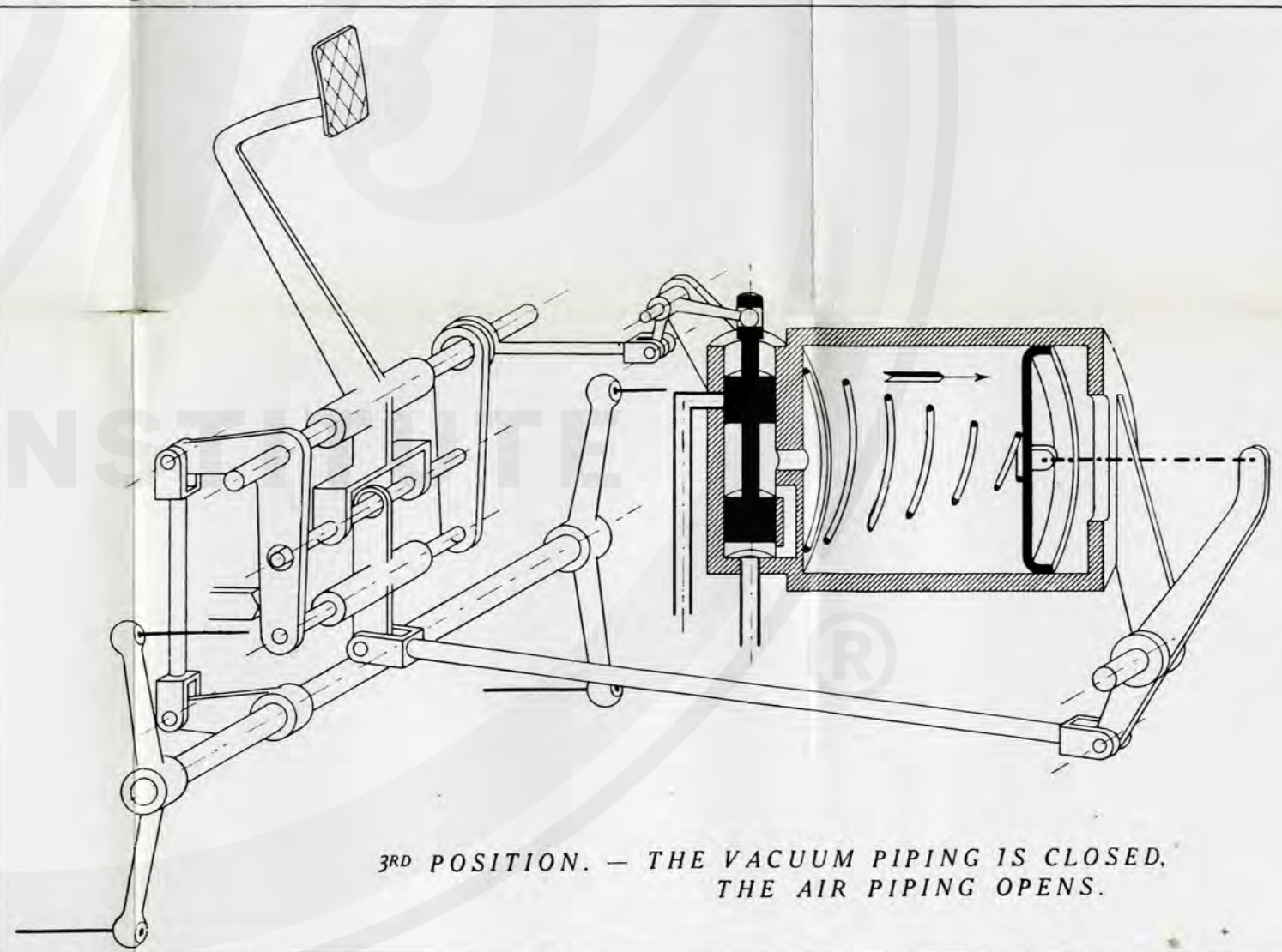
REST POSITION



1ST POSITION. — THE AIR VALVE IS CLOSED, THE VACUUM VALVE IS OPENED



2ND POSITION. — THE VACUUM AND AIR PIPINGS ARE CLOSED.



3RD POSITION. — THE VACUUM PIPING IS CLOSED, THE AIR PIPING OPENS.

