The Owner Driver's Guide to the "Standard" Light Car

The Standard Motor Co. Limited
COVENTRY.

PRICE
7d.

PREFACE.

THE STANDARD Light Car, originally introduced as a two-seater in 1913 and revised in 1919, has been further modified so as to be suitable for either two- or four-seated bodies. This has been done to meet the wishes of a large number of our customers who require a car capable of carrying four passengers with the same protection from the weather as is afforded by our latest type two-seated cars. The chief differences between the 1919 type and the model dealt with in the following pages comprise a slightly larger engine, a longer frame and larger tyres. Detail improvements have been made throughout the chassis, which retains the same characteristics of light weight, easy control and low running costs which have distinguished STANDARD Light Cars since their introduction.

The first section of this booklet, it will be seen, consists of a full description of the engine and chassis; the information thus afforded should do more than assist the user to obtain a thorough knowledge of the design and construction of the various parts—if carefully read, it will also enable him to follow the subsequent advice and instructions more easily and to realise why they are given.

Under the heading "Hints to Repairers" is a special section devoted to suggestions which, if observed, should enable the adjustments mentioned to be completed with ensured satisfaction and in the minimum of time, whether they be undertaken by the owner or by a garage mechanic. If the services of the latter are requisitioned, the hints should be brought to his notice.

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PART I.

General Description of Chassis.

PART II.

Lubrication.

PART III.

Adjustments and Upkeep.

PART IV.

Hints to Repairers.

PART V.

Spare Parts for Renewals.

PART VI.

Electric Lighting and Engine Starting Equipment.

PART VII.

Bodywork: Description and Advice.

INDEX.

Leading Particulars.

Bore and Stroke	... 2.69×4.3 in. (approx. 68×110 mm.)
Number of Cylinders ...	... Four.
Cubic Capacity	... 1,598 c.c.
Top Speed (back axle) Gear Ratio	... 3.83 to 1.
2nd Speed Gear Ratio ...	... 6.76 to 1.
1st Speed Gear Ratio ...	... 12.95 to 1.
Reverse Speed Gear Ratio ...	... 17.27 to 1.
Wheel Base	... 9 feet.
Track	... 4 feet.
Ground Clearance ...	... 9½ inches.
Tyres	... 710×90 mm.
Approximate Weight of Chassis	... 11 cwts. 3 qrs.
Approximate Weight of Two-Seater	15 cwt.
Approximate Weight of Four-Seater	16 cwt. 1 qr.
Overall Length with Luggage Grid	... 12 ft. 10 in.
Overall Length without Luggage Grid	11 ft. 10 in.
Overall Width	... 5 ft.
Extreme Height with Hood raised	... 6 ft.

SPEEDS IN MILES PER HOUR.

Back Axle Reduction.	At 750 revs. per min.			At 1,000 revs. per min.			At 1,500 revs. per min.		
	1	2	3	1	2	3	1	2	3
3.83 to 1	4.8	9.24	16.3	6.4	12.3	21.75	9.6	18.48	32.6

PART I.

Description of Chassis.

Engine.

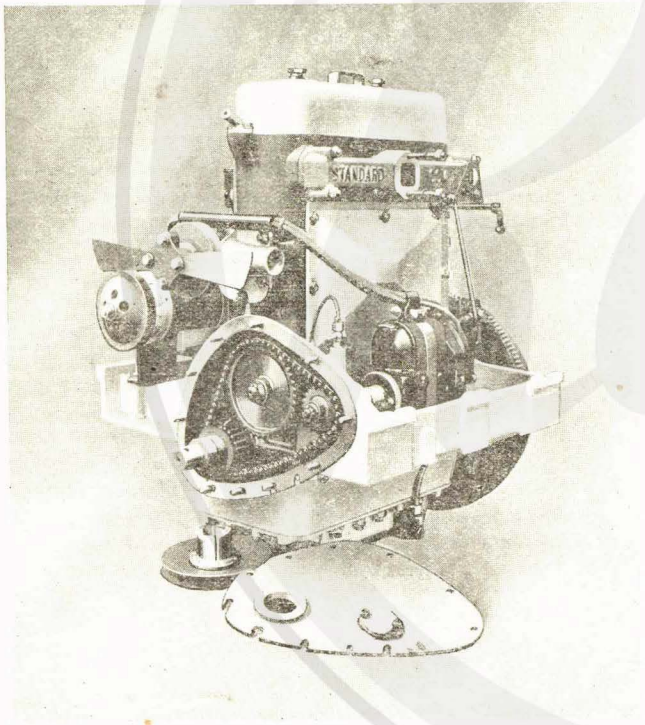
GENERAL. The four cylinder engine has a bore of 2.69 in. and a stroke of 4.3 in. (approximately 68 mm. and 110 mm. respectively). The main cylinder casting—formed as a block, with a one-piece detachable head in which both the inlet and the exhaust valves are located—is secured by six studs and nuts to the top half of the aluminium crankcase. Also of aluminium, the lower half of the crankcase consists of two units, the upper portion serving merely to enclose the crankshaft and other parts within and the lower section forming a well or sump in which the oil supply for the whole of the engine is carried.

The crankshaft, to a flange on which the flywheel at the rear end is secured by four bolts, is carried in three white metal (anti-friction) bearings by the upper half of the crankcase, extensions of the latter forming a tray and dirt shield on each side and serving to support the engine in the frame of the chassis.

By the adoption of the system of construction outlined, it may be realised, there is no need to disturb the engine as a whole when any interior part is to be examined or adjusted. To inspect or clean the combustion chamber, piston heads and valves, only the detachable head need be removed; to bring the pistons into view, the head and cylinder block as a unit can be lifted clear of the crankcase; while to render the crankshaft and connecting rod bearings accessible only the lower half of the crankcase requires removal—in fact, the con-

necting rod bearings can be reached even if merely the oil sump is detached.

CAMSHAFT AND VALVES. The overhead valves are operated by the camshaft through the agency of enclosed tappets, push rods and rockers. Each valve is held up to its seating in the detachable head by a helical spring anchored to the valve stem by a coned washer, and a collet (or key) passing



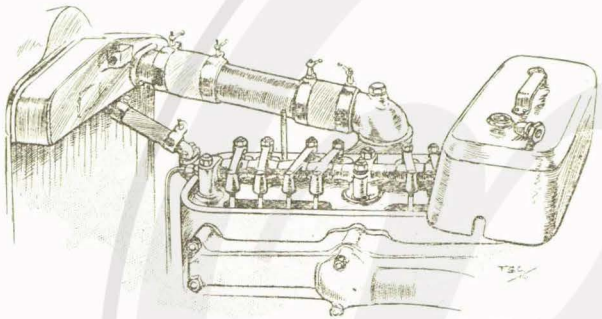
Engine with cover of distribution chain removed. The lowest sprocket is the driving wheel and is fixed to the crankshaft: the two driven wheels are on camshaft and magneto shaft respectively.

through a slot in the stem. The camshaft, running in three bearings within the crankcase, is rotated by means of a silent chain which serves also to drive the magneto shaft by passing over three sprockets or chain wheels, one—the driving sprocket—on the front end of the crankshaft, and the others on camshaft and magneto shaft respectively. Although this "distribution" chain will run without attention for many thousands of miles, an accessible means of adjusting it is provided; further, while it is enclosed and runs constantly and automatically lubricated in a separate compartment at the front of the crankcase, the front cover of this compartment has an inspection hole—normally closed by a flange plate—through which the correctness or otherwise of the chain adjustment can be noted without dismantling the whole of the front of the engine as usual.

The hardened steel tappets are "cupped" to form sockets at their upper ends for the spherically ended push-rods. Detachable and easily renewable bushings or guides are provided for the tappets, which project into a chamber enclosed by a detachable aluminium cover plate on the near side or left of the main cylinder casting. Through this chamber and through slots formed at the side of the cylinder head, the push-rods pass upward to the outer ends of the overhead rockers, a hemispherical joint occuring between each rod and rocker.

As with the tappets and push rods, so with overhead details of the valve gear: all parts are normally enclosed within oil-tight and dustproof casings, the detachable aluminium cover of the cylinder head being easily removable by unscrewing two nuts. Within the overhead chamber thus formed, the valve rockers are pivotted upon a single shaft carried in three brackets. The valve clearance adjustment consists of a set-screw passing

through the inner end of each rocker and locked by a nut, the lower end of this screw making contact with the upper end of the valve stem when the valve is opened.



Sketch of overhead valve gear with cover removed. This view also shows the supplementary water outlet from cylinder head to radiator, a refinement which prevents the occurrence of local overheating or steam locks under strenuous conditions of use.

The means of adjustment is thus in direct view and immediately accessible when the aluminium cover has been detached.

Every part of the valve gear is automatically lubricated as explained hereafter, and being at the same time protected from dust, operates under the most favourable conditions. The advantages of overhead valves are thus attained without the drawbacks at one time associated with them and without the necessity for special or frequent attention to ensure their continued silence in operation.

CARBURETTER AND INDUCTION SYSTEM. Situated on the right of the engine, the carburetter is supported directly from a side extension of the top of the cylinder head casting. It is of the Zenith horizontal type and is provided with an "air strangler"—a means of shutting off the main air

supply to ensure ease of engine starting, especially in cold weather. The side extension of the cylinder head forms both an outlet for the cooling water from the jackets and an inlet passage for the mixture from the carburetter. The inlet passage branches left and right within the cylinder head from this central point and throughout the whole of its length is therefore practically surrounded and thoroughly heated by the water passing at high temperature out of the cylinder jackets to the top of the radiator; thus complete vaporisation of the fuel is ensured, without need for supplementary or external heating systems.

PETROL FEED. Petrol reaches the carburetter from the main supply tank (holding 7 gallons) at the rear end of the chassis by way of the Autovac tank secured to the front face of the dashboard. Particulars and instructions concerning the Autovac tank are given in a separate booklet compiled by the makers, a copy of which is supplied with each car or chassis; but it may here be said that a regular supply of fuel to the carburetter is maintained by the partial vacuum which constantly occurs within the inlet passage while the engine is running. To this end a pipe connects the top of the Autovac tank to a union below the combined gas inlet and water outlet extension of the cylinder head; the petrol feed pipe issues from the bottom of the tank and leads to the carburetter float chamber.

ENGINE LUBRICATION. The whole of the internal parts of the engine are lubricated automatically by the oil contained within the well or sump of the crankcase. From this source the oil is drawn, through a gauze filter immersed in the sump,

by way of an external pipe and through a second filter to the gear type pump driven from the rear end of the camshaft and bolted to the crankcase, between the latter and the flywheel.

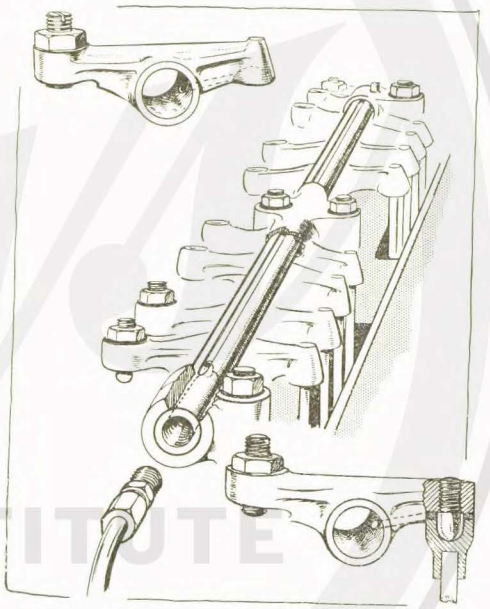
The oil pump delivers the lubricant under high pressure through internal passages and external pipes to every bearing. Leads are taken direct to the camshaft bearings, thence to the main journals of the crankshaft and through oilways drilled in the latter to the crank pins. Some of the oil reaching the bearings of the crank pins passes upward, through a pipe secured to each connecting rod, to the gudgeon pin bushes in the small ends of the connecting rods ; the remainder exudes from the big-ends and is thrown by centrifugal force in all directions, some reaching the cylinder walls and lubricating the aluminium pistons, some the cams and lower ends of the tappets, while the surplus drains back into the sump through a perforated metal sheet forming an oil strainer and a false bottom to the crankcase.

Piston shown in part section.

The distribution chain and the magneto drive shaft bearings are also lubricated automatically; the first by a spray of oil delivered directly upon its toothed (inner) side from a branch pipe led from the front crankshaft bearing, and the magneto shaft bearings by a branch from the main supply pipe running along outside the crankcase on the left.

LUBRICATION OF THE VALVE GEAR.

A branch pipe passes upward at the front of the engine to supply oil to the valve rocker shaft, the latter being stationary, the rockers pivotting upon it. The shaft is hollow for a short portion of its length from the front end, and, by way of a union joint, the oil passes from the feed pipe into the interior, finding exit through a small hole drilled radially at a point where the foremost rocker takes bearing. Thence, the lubricant passes along a groove cut in the shaft and reaches all the other rocker bearings in turn.



Lubrication of overhead valve rockers: view showing the oil feed pipe detached and the oil hole and groove in the stationary shaft. Insets show how oil is fed to the push-rod ends of the rockers.

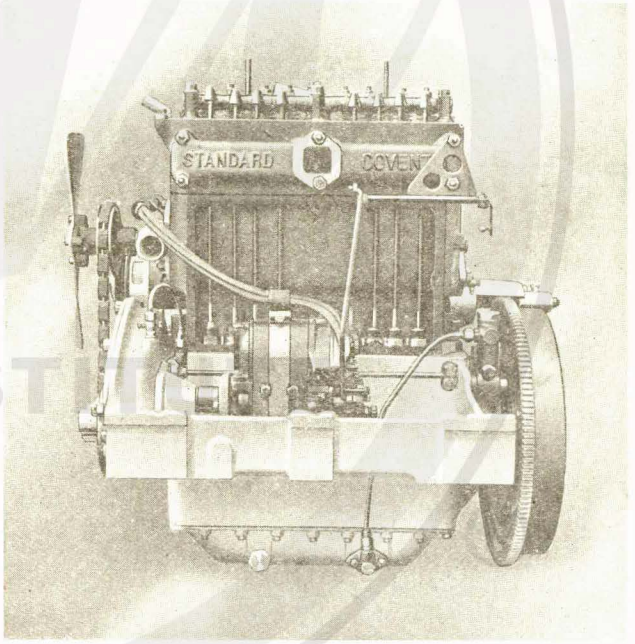
Each rocker has a small hole drilled through its outer arm, oil thus being fed, still under pressure, to the cupped ends to which the push-rods apply. Some of the surplus lubricant exudes at these points, the remainder from between the rockers where their sides make contact, all the excess eventually draining back into the crankcase by way of the passages through which the push-rods pass upward.

OIL CIRCULATION INDICATOR. Immediately above the rear main bearing of the crankshaft a hole is formed in the crankcase which serves as the cylinder for a small plunger or piston. The latter has two purposes. First it constitutes an oil circulation indicator, for, providing there be oil in the sump, the plunger is kept raised by the pressure of the oil below it all the while the engine is running, its movement being communicated to an indicator hand located on the instrument board immediately within view of the driver. The plunger's second function is that of an oil pressure relief valve, for when it is raised to the limit of its movement it uncovers a by-pass hole through which the oil in excess is "short-circuited" back to the crankcase and sump.

This combined oil pressure indicator and relief valve requires no attention in course of maintenance ; it has no spring requiring adjustment or renewal, for its weight causes it to close by gravity either if the oil feed should fail, by the need of replenishment, for instance, or when the engine stops. Any small leakage of oil which may occur past the plunger after prolonged use also drains back into the crank case automatically, thus preventing waste and an oily exterior.

OIL FILTERS. It will have been noted from the foregoing that the oil in circulation is filtered or strained at three points. At the first of these, *viz.*, at the filter tray forming the false bottom of the lower half of the crankcase, any large particles of foreign matter are held up—for example, pieces of cork detached from the bung of an oil drum, introduced when a supply of fresh lubricant is being poured into the crankcase.

The other two filters, formed of comparatively fine mesh metal gauze, are both on the suction side of the



Left side of engine with aluminium cover plate removed from side of cylinders, exposing push-rods. Overhead valve cover also removed.

pump, and intercept small impurities before they can reach the latter. The first gauze filter is of cylindrical shape and lies across the bottom of the sump, being attached to an elbow piece secured by two studs and nuts to the outside of the sump on the left ; the other is enclosed by a hexagon headed brass cap in a chamber formed as part of the pump casing. Both can be easily removed for cleaning at regular intervals (see instructions under this heading in a subsequent page).

OIL LEVEL INDICATORS AND TEST COCK. Two means of ascertaining the amount of oil in the sump are provided. One, the overflow cock, is arranged outside the sump on the right, at such a height as to cause any excess of oil to run out when the control lever—located immediately below the oil filling elbow on the same side of the crankcase—is moved to the "open" position, *i.e.*, at right angles to the frame. The other level indicator, which enables the amount of oil in the sump to be realised at a glance whatever the level may be, consists of a cork float at the bottom of the sump connected to a vertical wire which passes upward and out through the top half of the crankcase. The upper end of this wire rises or falls, as the oil is replenished or used up, alongside a plate marked "Empty," "Half Full," and "Full" at various levels. Thus, there is no excuse for over-filling the sump, and for wastage to ensue by the excess draining out of the overflow cock or being burnt up and carried off in the form of smoke from the exhaust ; it is possible to watch the effect of the rising level upon the indicator all the while fresh oil is being poured in through the filler.

The means for observing whether the oil is being circulated by the pump is also duplicated. As already

mentioned, a plunger above the rear main bearing of the crankshaft is raised by the oil pressure within the circulating system ; its movement is communicated to a pressure indicator on the instrument board, a small hand or pointer being arranged in front of a plate marked "Safe" and "Danger" in view of the driver. In addition, in the run of the branch pipe to the distribution casing at the front end of the engine on the left, is a cock which normally has its lever vertical, the oil then passing to the magneto drive shaft bearings ; if this lever be moved to a horizontal position oil should issue in a stream from a hole at the side of the body of the cock, thus showing that the lubricant is reaching this point and that the pump is operating correctly.

WATER CIRCULATION AND FAN. The circulation of the cooling water in the cylinder jackets and radiator is maintained automatically by thermo-syphonic action, the bulk of that heated in the jackets rising naturally and passing out to the top of the radiator through the main outlet elbow extending from the top of the cylinder head casting on the right-hand side. As a refinement, however, a supplementary outlet is provided at the front end of the head, whence, through a small aluminium elbow and connecting pipe, hot water can issue to the radiator and thus prevent the formation of "pockets" of steam, or water at high temperature, which might cause localised overheating and unsatisfactory running under strenuous conditions.

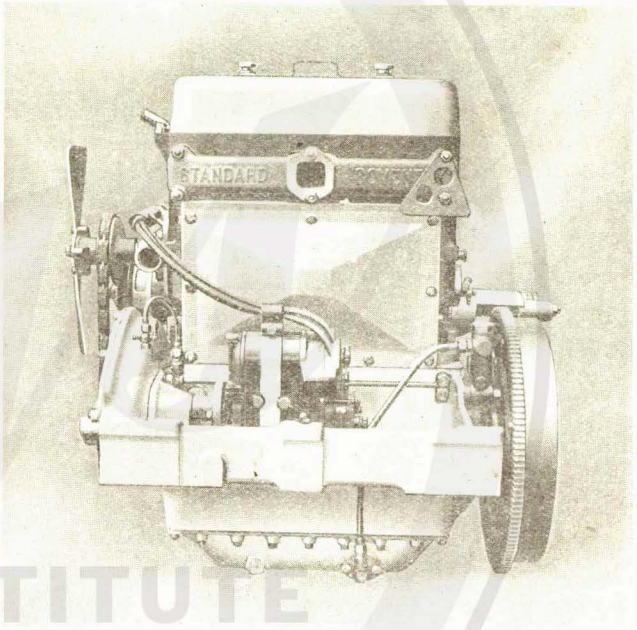
A draught of air is drawn through the radiator, whether the car be moving or not, by a two-bladed fan supported by a combined bracket and water inlet elbow secured to the front of the cylinder casting. The fan spindle runs on ball bearings which require no more than

annual attention, being lubricated by grease packed within the fan hub when the bearings are assembled. A leather link type belt drives the fan from a pulley on the front end of the crankshaft, an extension of this pulley forming one half of the starting handle clutch. The same belt drives the lighting dynamo, and is easily and quickly adjusted by moving the dynamo away from the centre line of the engine, an accessible screw adjustment being provided for this purpose.

To drain off the water when, for example, the cylinder head is to be detached, a screw plug at the front of the lower tank of the radiator can be removed ; but to ensure that every drop of water shall run clear of the cylinder jackets when it is drained off in frosty weather, a small supplementary drain cock is fitted at the rear end of the cylinder casting, immediately over the flywheel.

IGNITION. The magneto is located on the left side of the crankcase, and is immediately accessible for inspecting or adjusting the contact breaker and other parts. It is driven by the silent chain of the distribution gearing and is mounted on an aluminium bracket entirely separate from the crankcase. This bracket at its forward end, which is at a right angle to the magneto base, forms the cover plate of a large diameter hole in the back of the distribution casing and carries the two long bearings of the drive shaft. Two horizontal studs passing through slotted holes secure the bracket at the front end, while a vertical set screw locates the rear. By slackening the nuts on these three studs, the bracket, with the magneto, its drive shaft and chain sprocket, can be moved as a unit either farther away from or closer to the centre of the engine, thus

allowing the silent chain to be adjusted without altering the alignment of the drive shaft or disturbing the magneto or its coupling.



Left side of engine, showing among other items the magneto, exhaust manifold, cover of overhead valves, and oil pump; also the oil suction pipe running from the sump up to the pump filter casing.

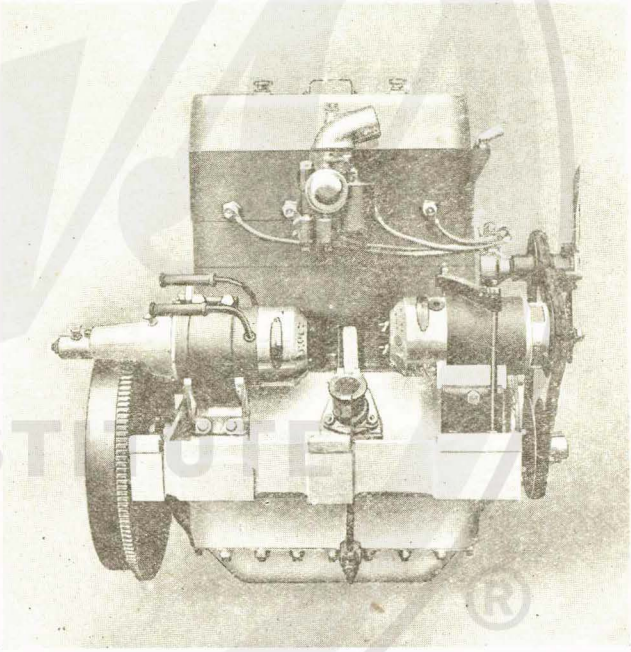
To enable the chain adjustment to be made easily and with precision, a long hexagon-headed screw, with a lock nut, extends from the bracket to an abutment on the side of the crankcase ; when the screw is rotated so as to withdraw it more or less from its threaded hole it pushes the bracket outward and tightens the chain.

The magneto coupling is of the "vernier" type, which implies that it can be adjusted within extremely close limits to ensure the correct setting of the magneto armature in relation to the crankshaft; it is also readily uncoupled or reconnected, enabling the magneto to be removed, if necessary, merely by slackening the locking bolt of the metal strap which secures the machine on its base plate. The high-tension wires are well supported in their run from the distributor to the sparking plugs—the latter horizontally arranged on the right-hand side of the cylinder head—being carried in a loop of the magneto strap and in a tubular bracket where they pass round the front of the engine.

ENGINE CONTROLS. The control of the carburetter throttle can be effected by either hand or foot, the lever on the left of the steering column and the smallest of the three pedals passing up through the floor-boards, both being connected to the throttle lever. On the right of the steering column is the ignition lever—sometimes termed the "spark" lever—by which the timing of the ignition can be regulated to suit the prevailing conditions as to engine speed and load.

As mentioned already, the carburetter is provided with an "air strangler" to facilitate engine starting under adverse conditions by ensuring the provision of a mixture rich in petrol for the time being. The control of this fitting is brought through the instrument board within reach of the driver, enabling it to be used when the switch of the electric starter is operated and also allowing the driver to keep the air strangler closed for awhile, until the engine warms up.

LIGHTING DYNAMO AND STARTING MOTOR. The dynamo, which generates the electric current used by the lamps and the engine starting motor, is located on the right of the engine at the front end, where it is supported by an adjustable bracket and driven by the same belt which serves for the fan. It is held firmly to its bracket by a yoke secured at each end to the top of a long vertical



Right-hand side of engine, showing dynamo, starting motor, carburetter, oil filler and other details.

stud. By slackening the nuts above the yoke ends, the dynamo can be moved relatively to the engine to adjust

the belt by means of a bolt provided for the purpose. The bolt passes through the end of the supporting bracket and engages with a thread in the base of the sliding aluminium bracket.

The starting motor is on the same side of the engine, at the rear end; its shaft extends over the flywheel and carries a small pinion which, when the starting switch is operated, is automatically moved endwise into engagement with the steel gear ring bolted to the outer periphery of the flywheel. The starting motor requires no means for varying its position on the engine and is therefore rigidly secured by a steel band to a bracket extending from the crankcase.

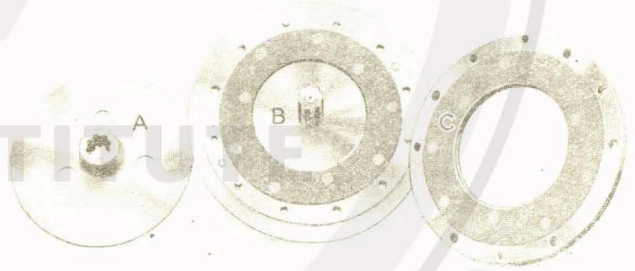
Further particulars of the dynamo and starting motor, together with instructions concerning their care and upkeep, are given in a later section of this book.

PREVENTION OF OIL LEAKAGE AND WASTE. Special provision is made at certain points to prevent oil leakage, and at others to reduce to a minimum the amount of oil consumed. As an example of the first, the crankcase extends beyond the outer end of the rear main bearing and within the extension is a catchpit or trough so formed that any oil which may "creep" out of this end of the bearing is caught and returned to the crankcase interior. An additional fitting having the same object is a felt packing gland at the extreme rear end of the case. Again, at the front end of the crankshaft, where this passes through the distribution coverplate, is an oil return groove and a brass thrower ring, both of which intercept and return to the interior any oil which otherwise might leak out. The magneto drive shaft also has a similar return groove.

Excessive oil consumption—as distinct from leakage—and the formation of an undue amount of carbon in the combustion chamber and on the heads of the piston are obviated (1) by the fitting of aluminium baffle plates at the top of the crankcase to reduce the size of the orifice through which the oil can be thrown upward on to the cylinder walls and (2) by forming a groove on each piston, immediately below the lower ring; the latter thus serves as a scraper ring as well as assisting to retain the compression, the oil collected in the groove being taken to the piston interior by way of six small holes passing inward from the bottom of the groove.

Clutch.

The clutch of the Standard Light Car is of the type known as the "single plate," although actually there are three members or plates which comprise the clutch



Clutch plates dismantled.

A. Driven plate.
B. Driving plate with end of castellated clutch shaft projecting.
C. Clamping plate.
B and **C** have ring facings of fabric, between which the driven plate **A** is held in frictional contact.

as a whole. These three main parts are (1) the face plate, (2) the clamping plate, and (3) the driven plate. When the clutch is engaged, the driven plate is held in firm

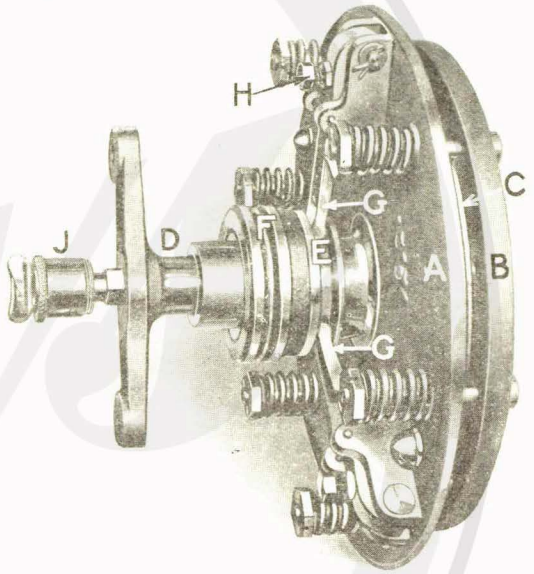
frictional contact between the two other members; it is mounted on the front castellated end of the clutch shaft, the rear end of which is connected to the main shaft of the gear-box through a universally jointed coupling.

The clutch as a unit is secured to the rear of the flywheel, and under all conditions, whether the clutch be engaged or disengaged, the face and clamping plates rotate with the flywheel. The face plate forms the outer member, serving to enclose the clutch and carrying the disengaging levers and clutch springs, its boss or hub containing the bearing for the clutch shaft. It is held rigidly to the flywheel by three equally spaced bolts and nuts.

The clamping plate is prevented from rotating relatively to the face plate and flywheel by means of the three bolts just mentioned, but also passing through it are six bolts which at their rearward (exposed) ends carry the adjustable clutch springs. These six bolts, therefore, serve to draw the clamping plate against the driven plate and the latter against the clamping plate, the contact faces of the first and the latter members being covered with asbestos fabric, which may be renewed if necessary after prolonged use. While the clamping plate cannot rotate independently in relation to the flywheel and face plate, it can move longitudinally, which it does when the clutch pedal is depressed or released. The driven plate is also free to move longitudinally on the clutch shaft, so that when the pedal is depressed this plate can move clear of both the driving members and rotate independently of them.

In order to release (*i.e.*, disengage) the clutch, the three levers pivotted to the face plate take effect upon steel pins, pressing them towards the inside of the clutch, where they bear upon the clamping plate and move the

latter longitudinally. The levers are operated by the clutch pedal through the agency of a ball thrust bearing and sliding grooved sleeve; but they do not make direct contact with the clutch pins, each one having screwed through it, near its pivotted end, a set screw provided



Clutch removed as a unit from the flywheel.

A. Driving or face plate.
B. Clamping plate.
C. Driven plate.
D. Clutch shaft.
E. Grooved sleeve on driving plate extension.
F. Ball bearing thrust race.
G. Clutch operating levers.
H. Set screw and lock nut for adjusting clutch levers.
J. Greaser for clutch shaft.

with a lock nut, the inner end of this screw bearing upon the outer end of its thrust pin. By this means adjustment is provided which enables the three levers to take equal effect upon the clamping plate, so that it is disengaged to the same extent at all points from the driven

plate, and, when the clutch pedal is released, similarly returns into contact with the driven member.

Normally the clutch operates "dry" (*i.e.*, without lubricant), but provision is made for the introduction of a small quantity of oil to the interior if any fierceness or squeaking should occur when it takes up the drive.

Clutch Coupling Shaft.

Between the clutch and gear-box is a universally jointed coupling shaft, and the removal of this allows the clutch to be dismantled with ease ; but it serves primarily to convey the drive to the gear-box and to take up any lack of alignment between the clutch and gear shafts due to pronounced irregularities of road surface having the effect of causing some slight distortion of the frame. The universal joints fitted to this shaft are of the fabric disc pattern; they require no attention in use and last indefinitely without showing signs of wear and without causing noise or rattle.

The Gear-box.

The gear-box provides three speeds forward and one reverse, the gears being operated by a lever working through a "gate" on the right-hand of the driver. The lever shaft is supported by an arm or tubular bracket extending from the top of the gear-box, which, to all intents, is a one-piece aluminium casting, for it has no joint on the centre line of either of the shafts. The two shafts, main shaft above and layshaft below, can be easily removed, if need should arise, by the fact that the ball bearings of both are carried in detachable end covers or bearing housings, secured to the aluminium casing, each by means of six studs and nuts.

The bottom of the box consists of a pressed steel oil retaining plate, while the main portion of the top is a detachable unit, the extension of which forms the lever shaft bracket.

To enable oil to be introduced to the interior, or the amount of oil within ascertained, a steel flange plate covers a hole in the top of the bracket casting, and can be swung to one side by removing one of the set screws which hold it and slackening the other. This plate has a hole at its centre covered with a piece of metal gauze through which can escape any air pressure above that of atmosphere, pressure due to the increase of temperature as the oil within warms up in use.

As already inferred, both the gear shafts run on ball bearings, each end of the main shaft being supported on two of the self-aligning type, the layshaft having one at each end. To provide a direct drive on top gear the main shaft is divided into two portions, the driven member having an extension which projects forward to take bearing within the front half, or driving member, in a long phosphor-bronze bush. The latter is lubricated automatically by oil which passes through holes in the constant-mesh gear wheel on the driving member, the oil being forced through these holes when the teeth come into engagement with the other constant-mesh wheel on the layshaft.

The layshaft runs at approximately one half the speed of the main shaft, and the reverse at a still lower speed. There are two sliding members, both on the main shaft and operated by two forks attached to the sliding selector rods. These rods are held firmly in any position in which they may be placed by the gear lever by means of spring-backed plungers, the points of which engage with the depressions in the rods and prevent any gear in use

from jumping out of mesh. A simple, but effective, interlocking device is also provided to prevent two sets of gears from moving into engagement simultaneously.

The reverse movement of the driven half of the main shaft is secured through an idler pinion which is constantly in mesh with a double-width pinion on the layshaft. When the gear lever is moved into the reverse slot the sliding gear wheel of the first speed engages with this idler pinion.

On top or direct gear, a set of jaw clutches on the face of the constant mesh driving wheel and another set on the face of the second speed pinion are brought into engagement, the drive then being taken directly from the front to the rear half of the main shaft.

On second speed the jaw clutches are disengaged and the second speed wheel on the main shaft is moved into mesh with its fellow on the layshaft, the total reduction then being that of the constant mesh wheels combined with that of the second speed pinions.

When the first speed is brought into use the second speed sliding wheel is held disengaged and the first speed sliding wheel moved forward into engagement with the small driving pinion on the shaft below.

Both shafts are square in section where are carried the sliding gear wheels in the case of the main shaft and the fixed pinions of the layshaft. The latter is formed as a unit with the double-width pinion, but the other gear wheels on this shaft are threaded on to it, with a tubular distance piece between the second speed and constant mesh wheels. Each gear wheel is an entirely separate unit from its fellows, so that in the case of one wheel requiring renewal there is no need to replace any of the others.

The gear-box as a whole is suspended from two cross members of the frame by means of four bolts and nuts and two screwed studs. Special provision is made in the case of the main shaft at each end to prevent oil leakage, while the layshaft ends are enclosed with the same object; adjustable set screws locate the latter shaft and take any slight end thrust which may occur in changing gear.

Brakes.

Two distinct sets of brakes are provided, the first being a contracting shoe type at the back of the gear-box and operated by the right pedal, the other consisting of internal expanding shoes within drums on the rear wheels, these shoes being operated by the side lever.

The brake at the back of the gear-box has its drum mounted on the rear end of the gear-box main shaft, the drum forming the driving member of one of the two disc type universal joints of the propellor shaft. The shoes are of aluminium stiffened by deep flanges and pivotted on a fulcrum pin projecting from the right-hand side of the gear-box; they are lined with renewable asbestos fabric and adjusted by means of an accessible sleeve nut which extends upward from the left-hand side. This sleeve nut has an automatic locking device which holds it in any position in which it may be set.

Alongside the brake shoe, on the left of the gear-box and standing above the rearmost cross member supporting it, is a wing nut screwing on to a short rod which at its lower end is bent over at right angles to pass through the bottom shoe. This constitutes a brake "stop"; it takes the weight of the lower shoe and prevents the upper one from rubbing on the drum when the brake pedal is released, the wing nut providing adjustment for this

purpose and being locked by a short piece of wire when the adjustment is correct.

The brake shoes acting within the rear wheel drums are integral with their friction surfaces of cast iron; each pair pivots about a fulcrum pin at the front and is expanded, when the side lever is pulled towards the driver, by a cam at the end of a horizontal shaft supported within two widely spaced brackets projecting from the rear axle casing.

The main adjustment of the rear wheel brakes is at the front end of the pull-rod coupled to the lower end of the side lever, the rod, after passing through the end of the lever, being secured by a sleeve nut with an automatic locking device. The two rods connecting the levers on the cross-shaft with those on the cam shafts also have accessible and automatically locked adjusting nuts, this provision serving not only as an additional means of adjusting both brake shoes, but also enabling the latter to be adjusted independently. To ensure an equal breaking effect on both wheels a compensating link is provided at the end of the cross-shaft.

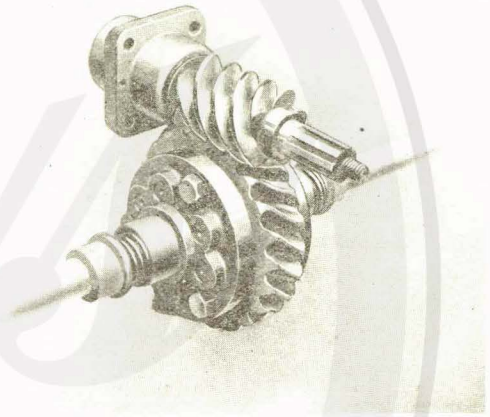
While the brake mechanism within the drums is completely enclosed from dust and stones, the possibility of water finding its way into the interior has not been overlooked; to allow it to run out again easily, a series of small holes is drilled through the outer periphery of each drum.

Grease cups are provided for the cam operating shafts and oil holes in the bearing brackets of the cross shaft.

Back Axle.

The rear axle casing consists of an aluminium centre—which contains the worm gearing of the final

drive—and tapered steel extensions carrying the weight, the extreme ends of these extensions being "cupped" to receive the ball bearings which support the road wheels. The casing of the straight-toothed pinion differential has the worm wheel secured to it by three



Back axle worm gearing; on the worm shaft is the end cap which contains the rear journal bearing and the ball double thrust race.

bolts and is supported at each side on ball bearings with separate ball thrusts. Ball bearings also carry the overhead worm shaft, which has a double thrust ball bearing at its rear end, this and the journal bearings being housed in end caps of steel at front and rear of the aluminium casing.

Two oil filling orifices are provided, one above the worm; the other, at the front of the axle centre, consists of an elbow projecting from an oil well in which a large quantity of lubricant is carried, thus increasing the

efficiency of the worm gear lubrication and the length of the periods between replenishments.

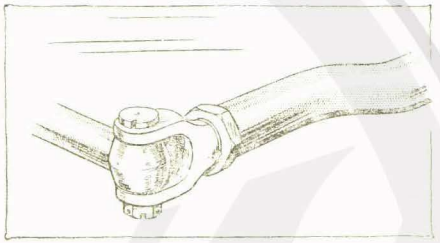
The drive to the road wheels passes from the castellated outer ends of each axle shaft by way of a flanged hub secured by a castle nut and split pin. The flange has screwed into it and fixed permanently the six studs to which the detachable wheel is secured by flange plate and nuts; these studs also pass through the brake drum, the latter being secured against lateral movement by two set screws with counter-sunk heads passing into the driving flange.

Front Axle.

The main portion of the front axle is an H section steel stamping with integral platforms for the springs. The pivot pins for the swivel axles pass through the ends of the main axle, each being prevented from rotating in the latter by means of a taper pin driven in from the front. The jaws of the swivel axle move around the pivot pin upon plain bearings, but the weight is taken by a ball thrust bearing at the top of each pin, adjusted and secured by means of a castle nut. This ball bearing is enclosed from below by a pressed metal cup, and from above by an aluminium cap which screws on to the threaded extension of the pivot pin. The top and bottom bearing bushes of the pivot pin are lubricated by means of grease cups.

The steering coupling rod behind the axle is tubular and is provided with a means of adjustment at each end, so that the alignment of the wheels can be correctly set and maintained to prevent undue tyre wear. This adjustment takes the form of separate jaw ends which screw into the coupling rod and are provided with lock

nuts. The coupling rod pins are prevented from rotating in the jaws by dowel pegs and are drilled to receive oil for the lubrication of the bronze bush in each swivel axle lever. These joints are enclosed by grease-retaining leather covers, as also are the ball joints of the push-and-pull rod. The ball joints have adjustable sockets in the rod ends, enabling any wear that may occur to be taken up.



Steering coupling rod adjustment and lock nut.

Steering.

The steering wheel is mounted at the upper end of a tubular shaft enclosed within the stationary column, and has at its upper end a ball bearing and at its lower end a long plain bush. The worm of the steering gear is secured on the castellated lower end of this wheel shaft and engages with a complete worm wheel on the cross shaft which at its outer end carries the steering lever. Both worm and worm wheel are of steel and can be engaged at any of four segments of the wheel to enable slackness caused by the wear of any one segment to be eliminated.

The steering gear is enclosed within a casing of aluminium having a steel side plate formed in one piece with the supporting bracket ; the latter is bolted to the chassis frame and carries a long bearing for the steering lever shaft. The steering lever is mounted on the end of its shaft on eight castellations and is secured by a

pinch bolt passing through its upper end; a groove with which the pinch bolt engages is formed round the shaft midway in the length of the castellations, this provision serving as an additional means of preventing the lever from moving endwise. To take the side thrust from the worm wheel the latter has at each side of it a conical distance piece within the casing, the thrust of the worm shaft being adjustable by this means so that any slackness may be taken up. The steering wheel is secured to its shaft by means of a cap nut at the top, the hub of the wheel being extended below to enclose and render dust-proof the ball-bearing at this point.

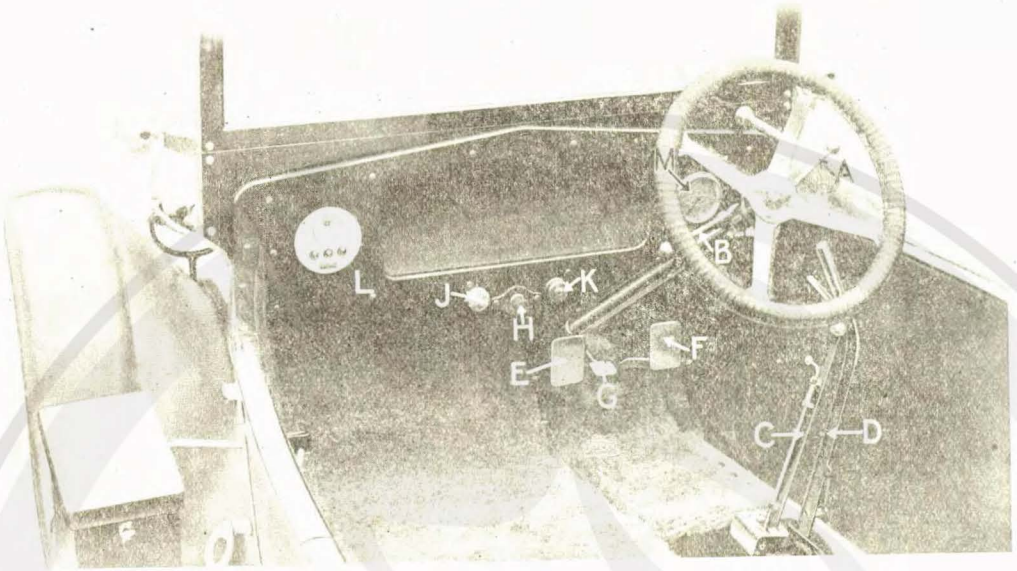
The gearing within the steering box is lubricated by thick oil or grease introduced through a large filling orifice normally closed by a flange plate held in position by two wing nuts. Separate greasers are provided for the lower bearing of the steering wheel shaft and for the lever shaft bearing.

Springs.

Semi-elliptic springs are fitted front and back, the front ones being 30 inches in length and the back ones 36 inches. Each rear spring is supplemented by a pair of helical coil springs at the rear ends; these coil springs displace the usual solid shackle plates and serve to absorb minor road shocks, thus increasing the flexibility and comfort of the spring suspension. A grease or oil cup is provided for each of the spring pins, while an oil reservoir is formed on each upper abutment plate of the rear supplementary springs to supply lubricant for its bearing on the extremities of the tie rod connecting the rear ends of the frame members.

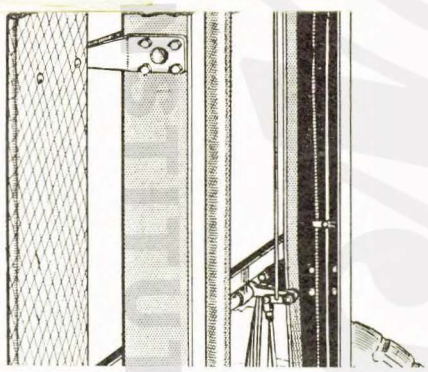
Wheels.

Both back and front wheels are detachable and interchangeable. They are of the hollow spoked pressed steel type and each is secured by the six driving studs and nuts. On both front and back axles the wheels run on ball bearings, a large diameter single bearing with a double row of balls being used for each rear wheel, while the front hubs enclose double row ball bearings on the inside and single row bearings at the outer ends.

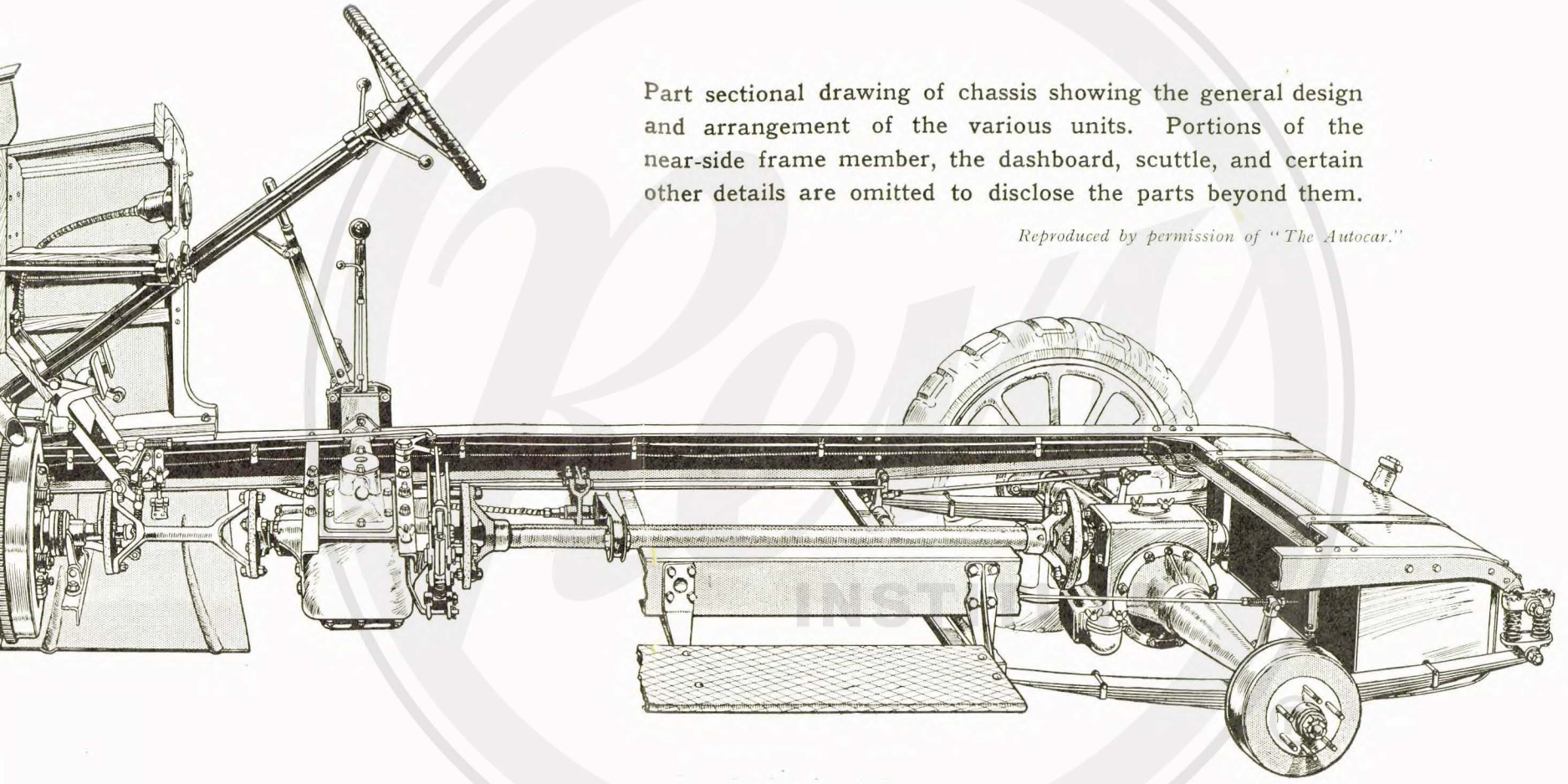


View of driving controls and instrument board, showing shelf in latter for small parcels, etc.

A. Ignition lever.
B. Throttle lever.
C. Gear lever.
D. Hand brake.
E. Clutch pedal.
F. Brake pedal.
G. Throttle pedal or accelerator.
H. Engine starter switch.
J. Oil circulation indicator.
K. Ignition switch.
L. Electric lighting switchboard.
M. Speedometer.



Part sectional drawing of and arrangement of the near-side frame member, other details are omitted



Part sectional drawing of chassis showing the general design and arrangement of the various units. Portions of the near-side frame member, the dashboard, scuttle, and certain other details are omitted to disclose the parts beyond them.

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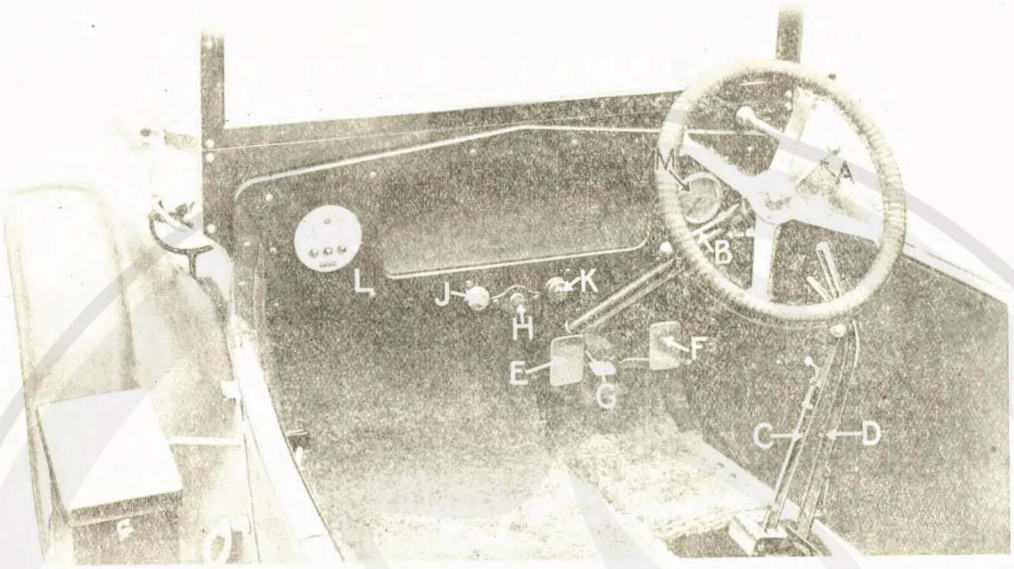

View of driving controls and instrument board, showing shelf in latter for small parcels, etc.

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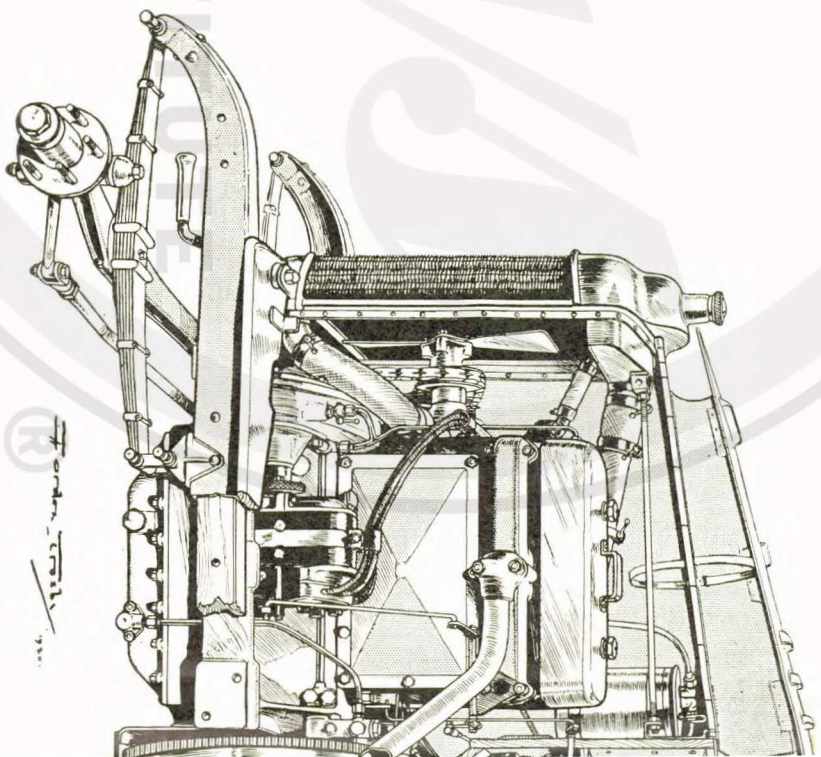


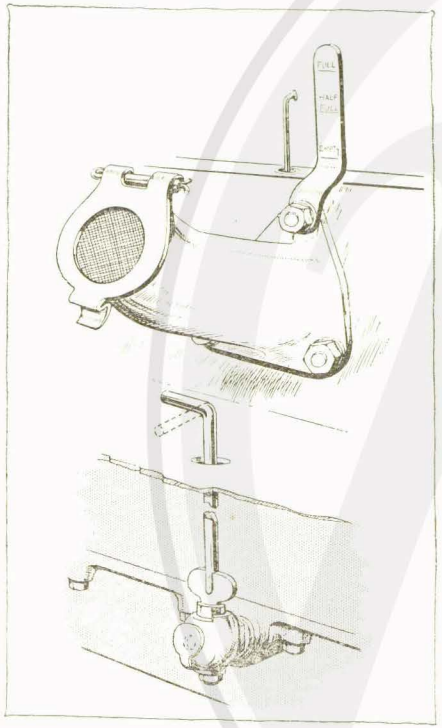
PART II.

Lubrication.

A motor car, like any other piece of machinery, requires regular lubrication, and neglect to pay most careful attention to this matter is likely to have serious results. Everything possible has been done to simplify the lubrication of the Standard Light Car and to reduce to a minimum the amount of attention required. The vital parts of the car must, however, be regularly attended to in this respect if satisfactory running and a long useful life is to be obtained. But besides the vital parts—the engine, gearbox and back axle, for example—are certain minor details, which, if neglected in the matter of lubrication, will wear unnecessarily and excessively, and even although such neglect may not have immediate and obvious effect—an involuntary stop or "breakdown" by the roadside—it will result in repairs or renewals being required long before they should be needed under fair conditions of use. The following advice and instructions should, therefore, be carefully observed.

ENGINE. Although the sump or well below the crankchamber holds, when full, enough oil for 500 miles' running, it should be replenished more frequently than that distance implies. Each morning before the engine is started—or after each 200 miles' running—the oil level indicator wire projecting upward alongside the plate marked "Full," "Half Full," and "Empty," should be examined. This means of ascertaining how much oil the sump contains is on the right

hand side of the crankcase, immediately behind the oil filler elbow, which in turn projects toward the same side of the chassis between the dynamo and the starting motor.



Oil filling elbow, level indicator and overflow cock in closed position.

The object should be never to allow the upper end of the wire—which, at its lower end, is operated upon by a cork float—to fall below the line "Half Full." Not only is it preferable to have plenty of oil in circulation so that there may be no possibility of the oil pump "drawing air" when the car is running on a steeply cambered road, but the more oil there is in the sump the cooler it keeps—and oil is more efficient as a lubricant when it is cool than when it attains a high temperature.

When a fresh supply of oil is to be poured into the engine, the overflow cock should first be opened. This cock is secured to the right hand side of the sump, a vertical control rod leading up to a point above the web

extension of the crank chamber, and terminating in a horizontal handle or lever just below the filler elbow. To open the cock this lever must be moved so that it projects toward the side of the car. It should never be left in this position while the engine is running, as oil will rapidly escape and a risk of lubrication failure ensue.

While the fresh oil is being poured in, the level indicator wire should be watched so that the rising level may be noted and the pouring rate slackened as the end of the wire approaches the line marked "Full" on the adjacent plate. This will save the need for a large excess of lubricant having to be allowed to drain out from the overflow cock.

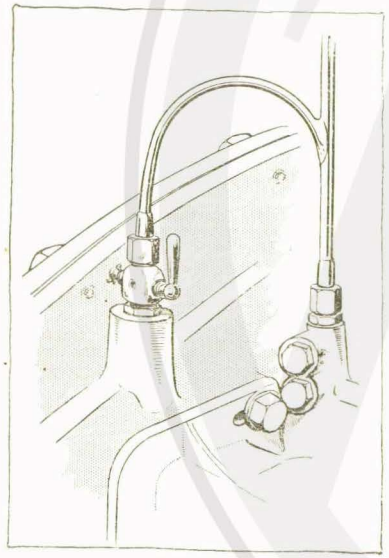
The sump must not be considered completely replenished until the top of the indicator wire is in line with the word "Full." This represents an oil level somewhat above that of the overflow cock; in the ordinary course the oil should be poured in until it runs out of the overflow, the cock should then be closed and approximately another pint of oil put in.

The oil thus provided is, as mentioned in Part I., circulated automatically by the pump to all interior parts of the engine, but occasionally, whilst the car is running, the driver should glance at the circulation indicator arranged in front of him on the instrument board.

The hand of this indicator should always point to the word "Safe" on the plate behind it while the engine is running. If it does not do so—if it points to "Danger"—the cause should be ascertained at once. In all probability the oil sump needs replenishing. If, however, that is clearly not the case—as evidenced by the level indicator wire and confirmed by the overflow cock—the reason is almost certainly a choked oil filter, due to neglect to give occasional attention to either or both of

those arranged in the oil circuit. (See instructions under "Cleaning the Filters.")

USE OF THE TEST COCK. If on any occasion the oil circulation indicator should, while the engine is running at any speed, point to "Danger," despite the oil sump being fully charged, the test cock should be resorted to at once. This cock is screwed into the top of the distribution casing at the front end of the crankcase on the left, and has a short branch pipe coupled to its upper end. The normal position of its lever is vertical; to test whether oil is being circulated, the tap should be turned to a horizontal position when, if all is well, oil will be sprayed out of a small hole in the side of the body of the cock. If oil does not flow out when the engine is running very slowly, accelerate it (open the throttle slightly) for a moment, with the tap handle horizontal and note the effect; if it be negative, the engine should be stopped at once to avoid any possibility of damage.



Oil test cock above distribution casing. Cock is shown in closed position.

If, however, oil issues from the test cock while the indicator hand points to "Danger," the cause of the

latter will be some derangement in the connection between the top of the exterior plunger above the rear main bearing of the crankshaft and the indicator on the instrument board. Probably the connecting wire in front of the dashboard—inside the bonnet space—has been inadvertently bent or disconnected at one end or the other.

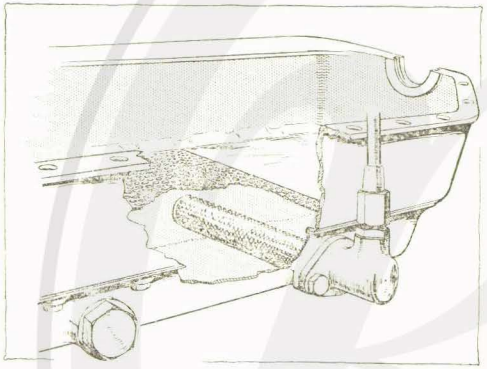
Failure of the oil to circulate, evidenced by no oil issuing from the opened test cock when the engine is running, will almost certainly be due to either a loose or leaking joint at one end or the other of the suction pipe or a choked filter, the latter a derangement which can be avoided if the following advice be heeded.

CLEANING THE FILTERS. The oil in circulation is filtered or strained at three points. Any large particles of foreign matter entering the crankcase with oil poured in during replenishment are immediately held up by the perforated sheet metal strainer which separates the lower half of the crankcase proper from the sump. This strainer will never become choked in course of use, unless gross carelessness occurs in upkeep; unless, for example, almost a handful of cotton waste be allowed to enter through the filling elbow or be left in the engine when it is dismantled at any time.

But the two gauze filters may in time become choked by the minute particles of fluff and dirt in the lubricant if they are not periodically removed and cleaned. This attention should be given after each 1,000 miles running.

The filter within the sump can be removed by first disconnecting the suction pipe, which runs upward from the elbow piece on the left of the sump, and then unscrewing the two nuts on the studs passing through the flange of the elbow. The latter has a cylinder of gauze attached

to it which is, therefore, withdrawn when the elbow is removed. The gauze should be washed thoroughly in paraffin or petrol to remove the impurities which will be found adhering to its outer surface. When it is refitted



Lower part of crankchamber and perforated false bottom broken away to show oil filter in sump. Below, on the left, is the drain plug.

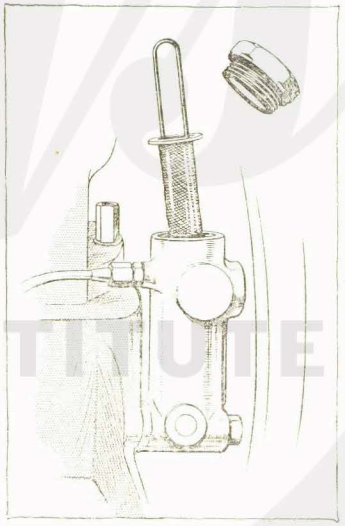
care should be taken to replace the flange washer in good condition, otherwise an oil leak will occur at the joint between flange and sump.

As a preliminary to the removal of the sump filter it is necessary to draw off the oil by unscrewing the hexagon headed drain plug situated a few inches in front of the filter elbow. On alternate occasions—that is, after each 2,000 miles running—the oil thus drained off should be thrown away and the sump refilled with an entirely fresh supply. From several causes the oil loses a certain proportion of its lubricating properties in course of use, and it is false economy to continue to use the oil in the engine indefinitely, merely maintaining the supply at the correct level by replenishments.

If, when the oil is drained off on any occasion, it is very dirty, it is advisable to put two pints of paraffin into

the crankcase and, using this instead of lubricating oil, run the engine for a minute or two, noting that the oil pump is operating and circulating the paraffin so that it issues from the test cock. Then draw off the paraffin, and recharge the crankcase with clean lubricating oil to the correct level.

On those occasions when the old oil is poured back through the filling elbow after the sump filter has been cleaned and replaced, it is necessary to observe carefully whether the level indicator reaches to the height of the line marked "Full"; it may be assumed that some of the oil will be lost in the process and this should be made up with a fresh supply.



Oil filter removed from its chamber in pump casing after hexagon headed cap has been unscrewed.

The second gauze filter can be removed and replaced without draining the sump, being located in a small chamber forming a part of the pump casing. The pump is in clear view and accessible at the rear end of the crankcase on the left, between the top of the latter and the flywheel. A prominent hexagon headed brass cap covers the filter, which has a small wire handle, enabling it to be lifted out for inspection or cleaning purposes at the end of each 1,000 miles.

PRIMING THE PUMP. When the pump filter cap is removed while the sump filter is detached,

or on any occasion after the suction pipe has been uncoupled at both ends, it is advisable, as a precautionary measure to "prime" the pump by pouring half a teacupful or so of oil into the pump filter chamber when the suction pipe has been replaced and finally secured. This plan avoids any possibility of the pump failing, by the presence of air instead of oil within it and the suction pipe, and is one which should be followed whenever the sump filter is removed after the pump has been in use for 10,000 miles or so—that is, when the gears within may naturally be expected to be showing signs of wear, even though their useful life may not be half or quarter completed.

In any event, after the filters have been cleaned and the sump refilled, it is just as well to start up the engine, open the test cock for a few seconds and note whether oil issues from the spray hole in the body of the cock. Thus may one be assured that the oil pump is operating and that all the pipes and passages are charged with lubricant.

MAGNETO AND FAN. Only two details of the engine require occasional and direct lubrication. The first is the magneto, into the oil cups of which not more than three drops of oil should be given after each 500 miles running. Excess of oil in the magneto is harmful, for it may reach the armature and contact breaker, where damage to the insulation may result in the one case and misfiring ensue in the other. The other detail is the fan bearing; this is of the ball cap-and-cone type, and is packed with grease while being assembled. After approximately 2,000 miles running the grease should be replenished through the hole exposed by removing the screw plug in the fan hub behind the pulley. (In the first series of this model this screw

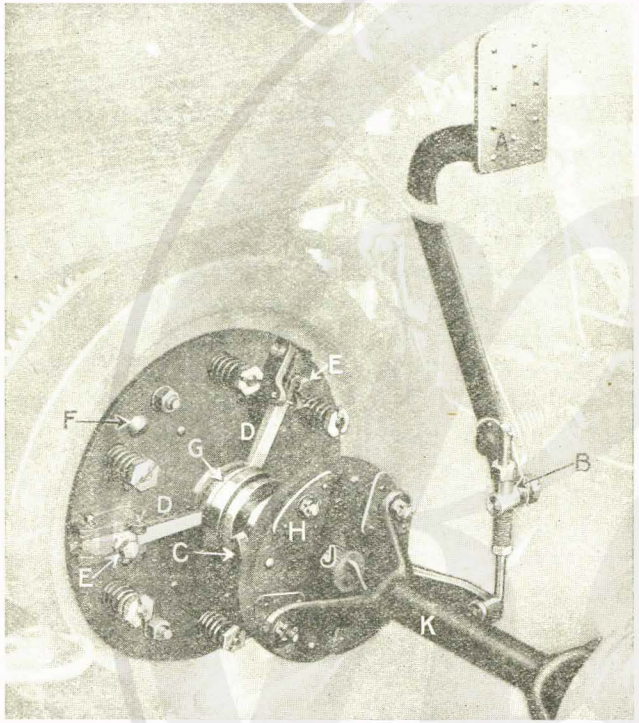
plug is not provided and the bearing should be refilled with grease by removing the fan from its hub; it is held in position by two hexagon headed screws and can be removed without disturbing the radiator. Grease can then be inserted from the front end of the hub).

CLUTCH AND CLUTCH SHAFT. The frictional contact surfaces of the clutch normally require no lubrication, for the steel disc on the clutch shaft is clampted between asbestos fabric surfaces secured tothe plates at each side of it. But if the clutch should show signs of fierceness, taking up the drive with a slight "shudder" or jerk, no matter how carefully the pedal be released, a small quantity of thin oil may be introduced into the interior through the hole exposed in the face plate by removing one or other of two round headed brass screws.

The hole from which the screw has been removed should be brought vertically over the clutch shaft and half an inch or so of the spout of an oil can pushed in; any oil then injected will fall on to the edges of the friction discs, flowing down on to the contact surfaces of the latter if the clutch pedal be depressed immediately and held so for ten or fifteen seconds.

Should the application in this way of approximately a dessertspoonful of oil not have lasting and beneficial effect, the "dose" should be increased and half a teacupful of thin lubricating oil poured in or injected with an oil squirt. Grease or even thick oil should never be put into the clutch casing; either will cause slipping, often to a pronounced extent.

If the clutch should be inclined to slip at any time after oil has been put in, the lubricant may be drained out by removing both of the round headed brass screws



Exterior details of clutch and coupling shaft.

A. Pedal plate.
B. Sleeve nut for clutch fork adjustment.
C. Clutch fork.
D. Operating levers.
E. Set screws for adjusting operating levers.
F. Drain plug.
G. Grooved sleeve on driving plate extension.
H. Fabric disc universal joint.
J. Clutch shaft greaser.
K. Coupling shaft.

and then arranging one hole above and the other below the clutch shaft; the upper hole then allows air to enter while oil runs out of the lower.

There are three bearing surfaces of the clutch which require lubricant, *viz.*, (1) the clutch shaft bearing, (2) the front castellated end of that shaft where the driven

plate moves endwise upon it, and (3) the grooved thrust sleeve. The first two are lubricated by means of the grease cup screwed into the rear end of the clutch shaft and projecting rearwardly within the centre of the front universal joint of the coupling shaft. This greaser should be given two or three turns after 500 miles running in normal use—after every 250 miles if the car is driven mostly in town traffic, which implies frequent use of the clutch.

The same greaser indirectly supplies lubricant to the third item mentioned above, the thrust sleeve. But it is advisable to apply a few drops of oil in addition at the intervals specified; two or three drops should be given from an oil-can at each end of the sleeve, allowing them to fall on the face plate extension which the sleeve encircles, and similar amounts in the lever groove and on the ball race.

While the clutch coupling shaft requires no lubrication, attention may be drawn here to the need for keeping the nuts of the disc joints quite tight; the same applies to the nuts of the propeller shaft joints. Wear will occur in the holes of the discs, necessitating renewal of the latter, if these nuts work loose and are allowed to remain so.

GEAR-BOX. On no account should grease be introduced into the gear-box as a lubricant. Special gear oil must be used. It can be put in through the hole exposed at the top of the gear lever bracket by swinging to one side the flat steel plate which has a gauze covered "breather" hole at its centre. There is no need to remove both the hexagon headed screws which hold this plate; the removal of one and the slackening of the other will suffice.

The oil in the casing should be maintained at such a level that it just covers the smallest pinion on the lower shaft. Filling the box to a high level—so that the upper shaft is immersed, for instance—will merely result in waste and leakage, without compensating benefit.

An inspection should be made of the oil level after each 500 miles running, unless pronounced leakage is observed by the presence of drippings when the car is brought to a standstill. In the latter event it is clearly desirable that the leak should be stopped as soon as possible, but until this can be attended to successive inspections of the oil level should be made frequently.

After each 3,000 miles running the oil in the box should be drained off by removing the under-plate, the box washed out with paraffin—especially the under-plate—and recharged with fresh lubricant.

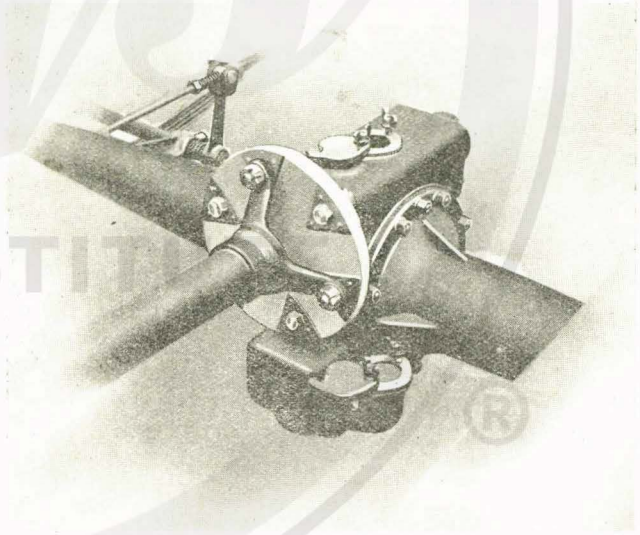
The ball bearings and the plain "spigot" journal are all efficiently lubricated by the oil thrown up by the gears of the lower shaft when the latter rotates, as it does so long as the car is moving with one of the gears engaged. Only when the car is "coasting" (running downhill with the engine stopped and the gear lever in its neutral position) is the layshaft stationary.

While there is no hill in Great Britain of sufficient length to enable coasting to be prolonged sufficiently to cause the spigot bearing to run dry, on long Alpine descents, or during the 5—10 mile runs down mountain passes in certain parts of the world, it is unwise to coast the whole distance possible; every two miles or so the car should be run with the top gear engaged for awhile to disturb the oil and deliver it to the spigot bearing. But although we give this warning, we are most emphatically averse from coasting anywhere and at any time. It necessitates the use of the brakes to a needless extent,

causes the shoes to wear unduly and removes a means of retarding the car which is present when a gear and the clutch are engaged and the engine is running with a closed throttle.

The use of the engine as an additional brake in this way is the correct method of driving downhill. To coast, either by putting the gear lever into "neutral" or by holding the clutch pedal depressed, causes unnecessary and excessive wear of brakes and clutch mechanism, apart from risks in other directions.

REAR AXLE. The worm gearing and differential pinions in the rear axle are lubricated by the oil picked up by the worm wheel from the lubricant stored at the bottom of the case and



Back axle centre, showing the inspection orifice above the worm casing and the oil filling and level testing elbow projecting from below.

in the well formed by the front extension of the aluminium centre. Although two filling orifices are provided, one located at the top of the casing and the other consisting of an elbow pipe at the front, projecting towards the left, the former is not intended for general use, being primarily for inspecting the condition of the worm, though it may be used as a filling orifice if it be more convenient for this purpose than the elbow pipe. Whichever be used, however, the cover plate of the elbow pipe must be removed in order to note the level of the oil within; this level should be maintained at approximately one inch below the cover plate of the filler elbow.

The lubricant used should be preferably one of the special oils supplied by most of the well-known makers for use with worm gear axles; but, failing one of these, a mixture of engine oil and grease, barely liquid, will give good results. It is better to replenish the axle lubricant at the end of a run, as the oil in the casing is then in a more fluid condition, which enables its level to be ascertained more definitely.

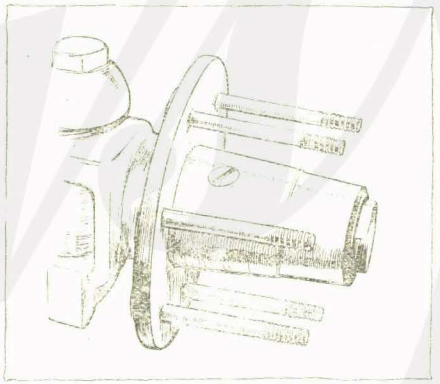
The back axle should never be filled with oil appreciably above the level mentioned, for while special provision is made to prevent oil leaking on to the wheel brakes there is a possibility of this occurring if the axle should be overfilled. The level of the oil should be noted at the end of each 500 miles and the supply replenished if need be. At the end of each 3,000 miles the oil should be drained out by removing the large hexagon headed plug under the oil well in front of the axle casing ; the latter should then be washed out with paraffin introduced through the orifice above the worm shaft and subsequently recharged with oil to the normal level.

The rear wheel bearings are lubricated by grease introduced by means of the grease cups on the axle

casing immediately over the springs. These cups should be given two or three turns daily, or after each 200 miles running, and refilled when required. At the same time the two greasers on each of the brake operating shafts should be screwed down.

FRONT AXLE AND STEERING.

The front wheels are packed with grease when the bearings are assembled and will run without attention for considerable periods. There is, however, a plug in each front hub which is covered by the wheel when the latter is in position. If this plug be removed, grease can be forced into the interior by means of the grease pump supplied with the tool kit. Thus when the wheel is removed the grease can be replenished without detaching the hub. This attention should be given at the end of each 2,000—3,000 miles.

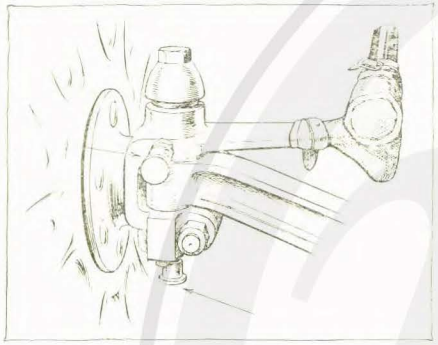


Front hub with wheel detached to show screwed plug removable for charging the hub with grease.

The ball thrust bearings of the steering pivot pins are also lubricated by grease, which can be introduced by removing the aluminium caps. This should be done when the front wheel bearings are attended to.

Two extremely important grease cups, which should receive regular attention and should be screwed down

two or three turns on practically every occasion the car is used, are those respectively in front of and below the axle pivots. These lubricate the pivot pin bearings. The lower one is especially important, and should be screwed up until grease is seen to exude between the swivel arm and the end of the main axle. It is as well to keep grease smeared round this point, as it prevents the ingress of dust and mud to the bearing.



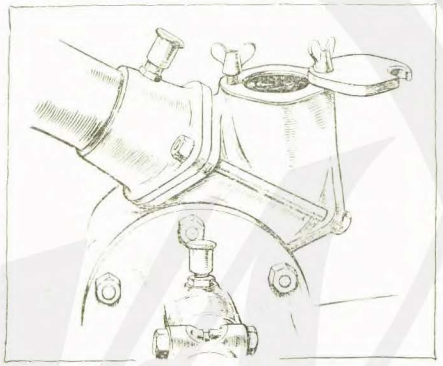
Front axle swivel. Arrows indicate the two greasers supplying lubricant to the swivel pin bushes. The hexagon headed cap contains grease for the ball thrust bearing.

The four steering joints of the coupling rods are packed in grease, and have leather covers. The latter should be removed and the joints cleaned and packed with fresh grease not less frequently than at the end of each thousand miles, while it is advisable occasionally—say after each two or three thousand miles—to remove the pins, clean and oil them; in refitting their nuts the latter should not be tightened unduly, but the split pins must be replaced without fail.

When the leather covers are removed to repack the joints with grease, the old grease should first be moved to one side, so that a teaspoonful or so of engine lubricating oil can be poured over them, the old and the new grease subsequently being packed all round the joints.

The steering gearbox is lubricated with thick oil or a mixture of oil and grease introduced through the hole

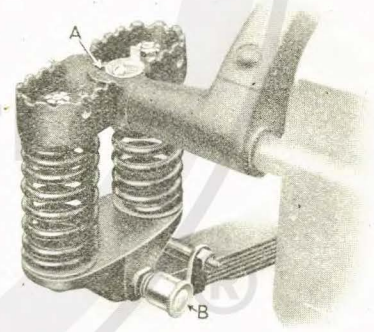
covered by a flange plate secured by two wing nuts on top of the box at the front of the column. The grease should be replenished every 2,000 miles. There are also two greasers in the neighbourhood of the steering gearbox which should receive attention, but more frequently than the box itself. These supply lubricant to the lower bearing of the steering column and that of the lever shaft. They should be given two or three turns after each 500 miles.



Steering gear casing with filling orifice open. The grease cups for the column bearing and lever shaft are shown.

SPRING SHACKLES.

The spring shackle greasers should receive almost daily attention and should be given two or three turns, and replenished if need be, at the end of each 200 miles. Especially should the rear shackles of the front springs have frequent attention,



Supplementary springs of rear suspension; the top plate forms the step to the dickey seat.

A. Oil reservoir for top plate bearing.
B. Greaser for spring pin in lower plate.

otherwise they are liable to wear unduly. The oil well above the uppermost abutment plate of the rear supplementary springs should have its contents replenished at similar periods.

CONTROLS. The small joints of the operating rods of throttle, ignition, brakes, clutch, etc., should be given occasional attention with an oil-can to prevent unnecessary wear. This particularly applies to the joints and the fulcrum pin of the gear shaft brake, which are made accessible by lifting up the rear footboard of the front seat.

GENERAL. In connection with all parts except the engine, gear-box and back axle, a safe rule is "When in doubt, over-lubricate." It is impossible to lay down any definite rule in regard to many of the details, for so much depends upon the nature of the work the car has to do, weather conditions, etc. For example, if the car is driven chiefly in town traffic, the clutch and footbrake will be more frequently used than under touring conditions, and the parts of these items which require lubrication will therefore need more frequent attention to maintain them in satisfactory condition.

Lubrication Summary.

The foregoing detailed instructions in regard to engine and chassis lubrication may be summarised as follows:

EACH DAY OR AFTER 200 MILES.

Replenish engine sump.
Screw up greasers on front axle, rear axle and springs.
Re-fill oil cups over rear supplementary springs.

EACH 500 MILES.

Screw up greaser on clutch shaft.
Oil clutch thrust sleeve.
Oil magneto bearings.
Examine oil level in gear-box and back axle, and replenish if necessary.
Screw up greasers on steering gear-box.

EACH 1,000 MILES.

Clean oil filters of engine.
Remove leather covers from steering joints and repack with grease.

EACH 2,000 MILES.

Drain oil sump of engine, wash out with paraffin and refill with fresh oil.
Replenish steering gear-box with thick oil or thin grease.
Recharge fan bearings with grease.

EACH 3,000 MILES.

Drain off old oil from gear-box and back axle, wash out with paraffin and refill with fresh oil.
Recharge front wheel hubs with grease.
Remove aluminium caps of steering swivels and refill with grease.

PART III.

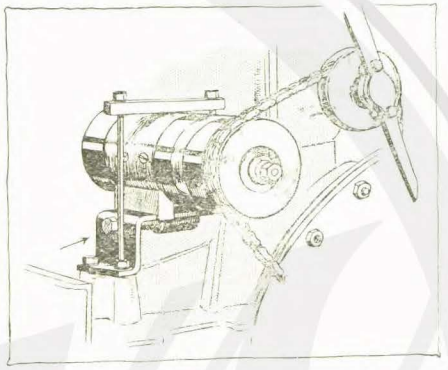
Adjustments and Upkeep.

In the course of normal upkeep certain adjustments become necessary after the car has been in use for some little while. The frequency with which these adjustments are needed depends upon the distance run and upon the nature of the use to which the car is put. The condition of the roads and the nature of the country in which the car is used also affect this question; obviously, for instance, in a hilly district, the brakes will require readjusting more frequently than in a flat country.

The following adjustments are those with which every user should make himself familiar and accustom himself to carry out. Others which require somewhat more experience or care in making are referred to in a later section of this book, entitled "Hints to Repairers." But users should study these additional hints, even although they may not personally find need to take advantage of them.

FAN AND DYNAMO BELT. The tension of the driving belt of the fan and dynamo should be merely sufficient to drive these units without slip. Excessive tension stretches the belt unduly and without compensating advantage, and imposes an unnecessary load upon the fan spindle and dynamo shaft. To adjust the belt tension the nuts holding the dynamo yoke or clamping bar must first be slackened, when the dynamo can be moved away from the centre line of the engine by means of the hexagon headed screw on the

dynamo base. About an inch of lateral movement of the dynamo can be obtained in this manner; when this has been taken up by successive adjustments, the belt must be shortened and the dynamo allowed to approach as near as possible to the side of crankcase again before the belt is fitted. A dressing of Collan oil applied occasionally to the belt will considerably lengthen its life and enable it to be run at a lower tension without slipping.



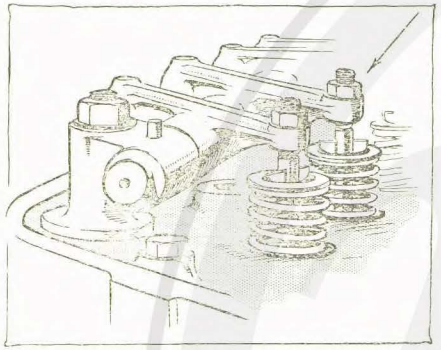
Dynamo and fan belt adjustment. The arrow indicates the head of the adjusting bolt.

VALVE CLEARANCES. To ensure that the valves open to their full extent, and that silence in operation is maintained, the clearances between the rockers and valve stems should occasionally be checked, and adjusted if necessary. The normal clearance is $\frac{5}{1000}$ of an inch, and a gauge of this thickness is provided in the tool kit for use in this connection.

The adjustment takes the form of a set-screw and lock-nut, the screw passing through the inner end of each rocker, its lower end making contact with the valve stem when a valve is opened.

When a valve clearance is to be checked, care should be taken to ensure that the rocker has returned to its normal position. With this in view, when an individual clearance is to be examined the engine should slowly be

turned by hand until the crankshaft has been rotated about half a revolution after the valve in question has closed. Then press the outer end of the rocker on to the top of its push-rod, so as to make certain that the push-rod, tappet and cam are firmly in contact. The clearance gauge should then pass easily but with out slackness between the valve stem and the set-screw.



Clearance adjustment of overhead valves. When the lock-nut is slackened the clearance can be adjusted by turning the screw stud.

When a clearance adjustment has been made and the lock-nut of the set-screw tightened, the result should be checked, as tightening the lock-nut will occasionally move the set-screw slightly, though this movement may be obviated if the screw be held firmly with a screwdriver whilst the nut is tightened.

SPARKING PLUGS. To obtain the best results in running, it is necessary to have the points of the sparking plugs set at an equal distance in each cylinder. This distance—the spark gap—should be $\frac{15}{1000}$ of an inch, and can be gauged by means of the small blade or gauge on the magneto spanner.

The slow-running of the engine is particularly affected if one sparking plug has its points farther apart than the others; erratic running at slow speeds and difficulty in starting from cold are not infrequently due

to the presence of too wide a gap, or gaps of different widths, between the sparking plug points. It is advisable, therefore, to remove the plugs after each thousand miles running to check this adjustment.

MAGNETO. The manufacturers of the magneto supply a book of instructions which should be studied by the user and the advice concerning this instrument carefully followed. The following general hints may, however, be given here.

When washing the car, care should be taken to ensure that water does not get on to the magneto or sparking plugs, for its presence on either will cause short-circuiting and misfiring.

If the car is stored in a badly ventilated garage, moisture in the air will sometimes condense and lodge on the magneto distributor plate, allowing the current to short-circuit. This occurs, however, very infrequently, and usually only when a car is stored under the conditions named and when a "cold snap" is followed by a rapid thaw or sudden rise in atmospheric temperature. If after such a combination of conditions difficulty is experienced in starting from cold, or if misfiring occurs, the magneto distributor plate—from which the four high-tension wires lead—should be carefully wiped with a dry cloth, especially between the cables.

CONTACT BREAKER ADJUSTMENT. Occassionally the platinum points of the contact breaker need adjusting in order to maintain the best clearance between them when the rocking lever is operated by one of the cams. To check this clearance the engine must be rotated slowly by hand, the movement of the rocking lever being watched care-

fully meanwhile. It should be brought to rest with its "heel" or outer end on the summit of one of the cams, *i e.*, when the platinum points are separated to their full extent. With the rocking lever in this position it should be possible to pass the magneto gauge between the points without causing any movement of the lever. If the gap is narrower than this infers, the adjustable point should be reset by first slackening its locking nut and then with the magneto spanner adjusting it to increase the gap width. Subsequently the lock-nut should be tightened.

Failure of the engine to start or run regularly in damp weather may be due to the rocking lever working sluggishly or sticking in its pivot bearing. The rocker can be removed to rectify this fault by swinging to one side the flat steel plate which holds it in position and removing one of the screws which hold in place the ends of the "bow" spring. The fibre bush can be enlarged slightly by means of a small piece of fine emery cloth wrapped round a wooden match, or with a small round file; but the latter should be used with discretion, otherwise the hole will be made too large or of irregular shape, which in turn may result in erratic running.

EFECTS OF OVER-OILING. If an excessive amount of oil has been put into the magneto bearings at any time, some may find its way on to the contact breaker and between the contact points. This will cause misfiring, the remedy being to separate the contact surfaces and clean them with a small brush moistened in petrol.

For the same reason oil will sometimes prevent a good contact occurring between the carbon brush of the contact breaker and the end plate of the machine. This

brush is rendered accessible by removing the hexagon headed central screw holding the contact breaker in position on the armature; with this screw removed the contact breaker as a whole can be withdrawn. When the surplus oil on the end plate and carbon brush have been wiped off, care should be taken in refitting the contact breaker to note that the key on its taper boss engages with the keyway in the end of the armature shaft. If these two parts be brought together incorrectly, the timing will be upset and the key damaged.

Another part which excess of oil may reach, with ill-effect, is the slip-ring and its carbon brush. These parts are found at the driving end of the machine and can be reached by removing the aluminium cover plate. To clean the slip-ring a small piece of wood—a lead pencil will serve—should have a piece of clean rag wrapped round one end and pressed lightly on the brass at the bottom of the groove while the magneto shaft is turned slowly, by hand if the machine is detached or by rotating the crankshaft with the starting handle if the magneto is in position.

HIGH-TENSION DIS-TRIBUTOR. After considerable use a film of carbon from the distributor brush will sometimes be deposited on the face of the distributor block between the metal segments. Any signs of this "tracking," as it is termed, should be removed with a piece of rag moistened with petrol.

TESTING THE SPARK. If the engine should run unsatisfactorily and misfire, or refuse to start, and the magneto be suspected, the latter may be tested as follows. Remove the sparking plugs and

with their wires connected rest them on the top of the valve cover plate in such a way that the terminals are not in contact with any metal part of the engine. Then, by means of the starting handle, rotate the crankshaft and note whether sparks occur across the points of each plug in succession. If no sparks are visible, there is some fault in the magneto, which will probably be traced to one or the other of the possible derangements already mentioned.

CARBURETTER. With each car and chassis is provided an instruction book compiled by the makers of the carburetter; this should be referred to before the device in question is removed or an attempt is made to vary its adjustment.

In connection with the fuel supply it must be pointed out that **it is of the utmost importance that the small air hole in the filler cap of the rear petrol tank should be kept clear,** and free from accummulations of dirt, grease or polishing paste. If this hole should become blocked there is risk not only of fuel failing to reach the Autovac tank and carburetter, but of the tank itself actually collapsing by reason of the almost complete vacuum which then occurs inside it.

CLUTCH. If the clutch should have a tendency to slip, denoted by the engine "racing" without moving the car at a corresponding speed, it will nearly always be due to the adjustment of the coupling rod between pedal and striking fork being incorrect. The adjusting nut on this rod should never be screwed down so far that no clearance or free movement is allowed to the fork; the latter should have an eighth of an inch freedom behind the ball thrust bearing, which

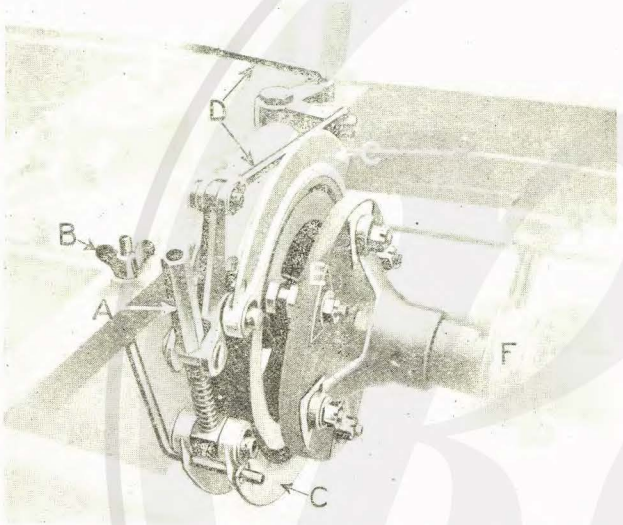
implies that it should be possible to move the clutch pedal forward an inch or two before the resistance of the clutch springs is felt.

If the clutch should slip despite the coupling rod being correctly adjusted—a very infrequent occurrence—the six small springs projecting rearwardly from the clutch face plate should be slightly tightened, a couple of turns being given to each retaining cap. Unless, however, the clutch be maltreated, *e.g.*, by the driver endeavouring to make it slip by pressing slightly on the pedal in order to avoid changing gear at the top of a hill, the springs will rarely require adjustment.

The presence of oil or grease on the clutch plates, introduced at some time or other—with or without good reason—by the driver or by some repairer, may cause the clutch to slip. It can then be stopped by removing one of the two round-headed brass screws in the clutch cover and injecting a tablespoonful or so of paraffin. The latter should, however, be drained out at the end of the next run by again removing one of the brass screws mentioned and bringing the hole vertically under the clutch shaft. (Further references to the clutch appear in "Hints to Repairers.")

PEDAL BRAKE. The adjustment provided for the pedal operated brake consists of a long sleeve nut projecting upward from the left of the brake shoes. It can be immediately reached by lifting the rear footboard of the front seat and is provided with an automatic lock. It will be noticed in turning this nut that at two points in its rotation it appears to drop into a notch; this is the effect of the self-locking device and the conclusion of any adjustment should occur at one

of these points, otherwise the brake will appear to be more tightly adjusted than it really is.



Pedal operated brake and propeller shaft joint at rear of gear-box.

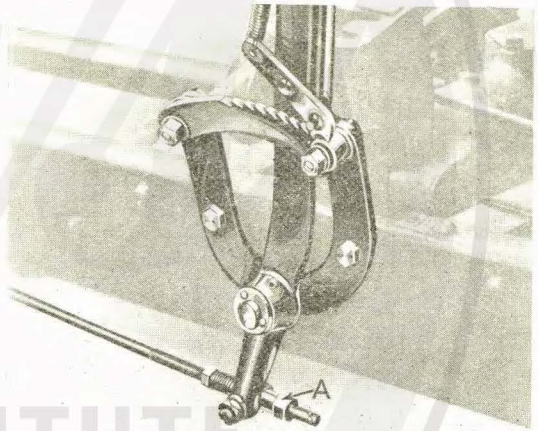
A. Sleeve nut for adjusting brake shoes.
B. Wing nut of brake stop adjustment.
C. Fabric lined aluminium shoes.
D. Operating rods.
E. Fabric disc universal joint.
F. Speedometer drive pulley attached to propeller shaft.

To prevent the shoes rubbing on the drum when the pedal is released a "stop" is provided. The adjustment for this is a wing nut, which will be found above the frame cross-member alongside the brake. After the brake has been adjusted, this wing nut should be screwed further on to its rod, until both shoes are lifted equally clear of the drum.

There is also an adjustment at the front end of the pull-rod at the bottom of the pedal, but this is provided

to adjust the pedal angle in relation to the coupling levers and should not require any alteration in normal use. Do not tighten the brake by this means, but invariably make use of the adjustment at the shoes.

HAND BRAKES. The normal adjustment of the hand brake shoes within the wheel drums is at the front end of the pull-rod which passes through the lower end of the lever. A sleeve nut with an automatic lock occurs here also, as in the case of

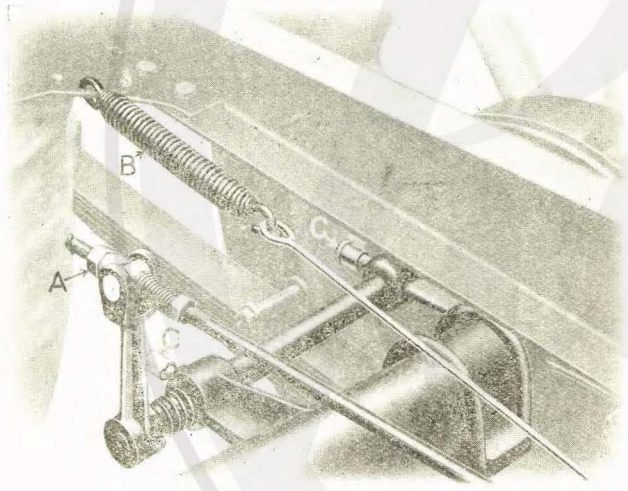


Brake adjustment at bottom end of hand lever. The nut A adjusts both sets of wheel brakes simultaneously.

the foot brake. This adjustment should be slackened off after it has been used on several successive occasions, and the brake shoes directly adjusted by the nuts at the rear ends of the rods projecting over the back axle. Subsequently, on a similar number of occasions, the front adjustment can be used.

A means of resetting the angle of the levers on the cam operating shafts, when the brake shoes have worn considerably after prolonged use, is provided within the wheel drums. This adjustment is, however, referred to in a subsequent section, "Hints to Repairers"; it may not be needed until the car has been in use twelve months or longer.

In making any adjustment to the rear brakes, the nuts should not be tightened to such an extent that, when the hand lever is in its forward position, the wheels



Brake operating camshaft on rear axle.

A. Sleeve nut of left-hand wheel brake adjustment.
B. Recall spring, returning brake shoes to "off" position.
C. Grease cups.

cannot be rotated without evidence in the form of a scraping noise that the shoes are rubbing the drums. Usually the adjustment is correct when the brakes come

into action after the lever has been pulled through one third of its full range of movement.

PETROL FEED. There are two petrol filters adjacent to the Autovac tank on the front face of the dashboard. One of these consists of a small gauze "thimble" within the union joint connecting the feed pipe from the main tank to the top of the Autovac; the other is below the Autovac in a small chamber attached to the outlet pipe. Both of these should be removed and cleaned occasionally, at the end of each 500 miles or so; at the same time, any sediment or water which may have collected at the bottom of the Autovac should be drawn off by opening the drain cock and allowing a tablespoonful of petrol to run out.

Trouble caused by choked filters can be very largely prevented by straining the petrol through a fine mesh gauze while it is being poured into the main tank; obviously it is better to keep grit and foreign matter out of the tanks and pipes rather than depend entirely upon the filters to prevent impurities from reaching the carburetter.

VALVE GRINDING. The valves can be removed for regrinding by lifting off the detachable cylinder head; the grinding process can then be carried through with the head inverted on a bench or table. Before removing the head, the water system must be drained off by unscrewing the plug at the front of the bottom tank of the radiator. Next, the large rubber connecting pipe between head and radiator should be drawn clear of its elbow on the head; the elbow itself should not be removed otherwise some little trouble may be experienced subsequently in making the joint water-

tight. The small elbow of the supplementary outlet can, however, be detached from the head, leaving it connected to its rubber pipe.

Other preliminaries are, removing the carburetter and the triangular plate which supports the magneto adjustment rods on the left, and uncoupling the exhaust pipe, sparking plug wires and oil pipe leading to the valve rocker shaft. The head can then be lifted clear of the cylinder block if the nuts holding it to the latter have been removed.

Care should be taken not to damage the gasket between head and cylinder, otherwise a new one will be required; in fact, a new gasket should always be at hand, ready for use if needed, when the head is to be detached.

There is no need to disturb the rockers or rocker shaft. The push-rods can also remain in position; if they are lifted out they should be replaced below the same rockers as originally; changing them from one position to another may necessitate completely resetting all the valve clearance adjustments, although, in any event, the latter should be checked after valve grinding has been completed and the head refitted and finally tightened down.

In replacing the head, the nuts securing it should be tightened equally; that is to say, one or some of them must not be fully tightened before the others have had a spanner applied to them, otherwise the jointing will not be under equal pressure all over, the head will tip slightly and either a compression or a water leak may occur.

When the head is originally fitted, a short length lead wire is wrapped once around the thread of each stud below the nut and washer; this removes all possibility

of water leaking up the threads, and similar wire should be used when the head is refitted after it has been removed for valve grinding or other purposes.

DECARBONISING. While the cylinder head is detached the carbon deposit within it and on the tops of the pistons should be scraped off. If "pinking" should be noticeable after running 2,000—3,000 miles, either the head should be detached for decarbonising (the opportunity then being taken to examine the valve seatings and regrind them if they show signs of pitting or scaling), or the special scraping tool provided in the tool-kit should be used.

By removing the sparking plugs, decarbonising can be effected with this special tool through the sparking plug holes, though not so thoroughly as by removing the cylinder head. The loose carbon detached with the scraper can be blown out of the cylinder with the tyre pump if the nozzle of the latter be held against the plug holes.

Unless, however, the engine is frequently run with an excessive amount of oil in the crankcase, or an inferior brand of lubricating oil is used, decarbonising will be called for very infrequently—as a rule only after some 5,000 miles have been covered.

SPRINGS. The nuts and lock-nuts on the clips, or U bolts, which hold the springs to the back and front axles should occasionally have a spanner applied to them to ensure that they are kept tight. If these nuts are allowed to work loose and remain so, the central bolt passing through the spring leaves may fail to keep the axle from moving forward or backward relative to the springs. Not only will the steering then

be effected, but the lack of wheel alignment so caused will result in rapid wear of the tyres. The normal position of each central bolt is exactly midway between the clips on each side of it; if at any time its position is seen to have varied, the fault should be corrected without delay by slackening the clip nuts and moving the axle one way or the other in relation to the spring on that side, subsequently tightening the nuts thoroughly.

Locating Faults.

The following summary of suggestions will frequently assist in the locating of derangements when a "diagnosis" might otherwise cause needless loss of time and unnecessary attention to parts that could not possibly be concerned. If the

ENGINE WILL NOT START the fault usually lies in one of two items, *i.e.*, ignition or carburation.

IGNITION. No spark: indicates magneto defect. Clean and if necessary adjust the contact breaker, ensuring that it makes and breaks correctly; make sure that the switch is open (magnetos operate with the switch open, not closed as in coil ignition); take care that no frayed ends of the switch cable are short circuiting the magneto (to be quite sure of this disconnect the switch cable and try to start the engine while the wire is thus uncoupled; if the engine then runs properly a short circuit somewhere in the switch cable is indicated).

Note.—The ignition or spark lever must usually be placed in its advanced position to start the engine.

CARBURATION. Examine carburetter for choked jet, lack of petrol due to a choked filter, stuck needle valve, choked petrol pipe, choked tank vent or failure of Autovac. Ascertain whether there is water, dirt or other foreign matter in the petrol. If the carburetter has been flooded too much the engine may be started by opening the throttle fully, instead of, as usual, starting with it almost closed.

ENGINE STARTS BUT STOPS AGAIN.

Possibly due to a punctured carburetter float, Autovac failure, choked or loose carburetter jet, defective needle valve, or conceivably a broken valve spring or sticking valve. In the case of a sticking valve, squirt paraffin on to the stem until it is free and then apply two or three drops of lubricating oil to it.

ENGINE RUNS BUT MISFIRES.

If the engine misfires regularly the fault is usually due to a defective sparking plug. This can generally be identified by short-circuiting each plug in turn with a wooden handled screw-driver and noting the effect; if the misfiring is no worse when one of the plugs is shorted, that plug is at fault. If irregular misfiring occurs, look for carburation defects as already mentioned.

Further information with regard to the Autovac tank, carburetter and magneto is given in the booklets supplied with each car or chassis.

PART IV.

Hints to Repairers.

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Although the advice tendered in this section is primarily intended for repair shop mechanics, much of the work referred to can be undertaken when necessary by more or less experienced car owners and amateur mechanics. But whether or not the user makes a practice of handing his car over to repairers when other than minor adjustments are required, he will be well advised to read and take careful note of the suggestions given, so that—if for no other reason—he may be in a position to draw the repairer's attention to the points mentioned. By so doing he may, if the mechanic be unfamiliar with the Standard Light Car, not only economise time and thus reduce the repair bill, but also be assured of the work being properly carried out.

Engine.

FIRING ORDER AND FLYWHEEL MARKINGS. The firing order of the cylinders is 1, 3, 4, 2, the cylinder next the dashboard being No. 1. The arrow stamped on the flywheel rim indicates the top dead centre position of pistons 1 and 4 when it is brought to the top in line with the centre of the cylinder bores.

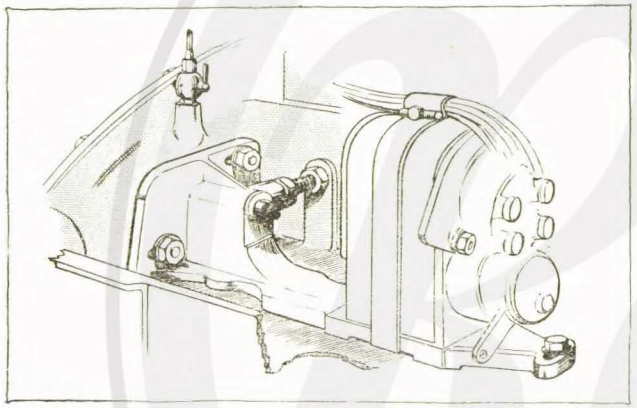
IGNITION AND VALVE TIMING. If the magneto has been removed or uncoupled the normal ignition timing can be reset as follows: Turn the crankshaft until cylinder No. 1 (next dashboard) is in the firing position, *i.e.*, at the end of the compression stroke. Fully retard the contact breaker. Turn the magneto armature until the contact points are just separating with the distributor arm over No. 1 segment. Couple up at this point.

Two types of magneto coupling are used. One is the Simms with a rubber member between the driving plates; the other has its driving plates connected by two bolts which pass through holes unequally spaced in each plate, thus providing a vernier adjustment and allowing very small variations in timing to be made.

If at any time the distribution chain be removed, the normal valve timing can be restored by observing that the exhaust valves open 45° early and close on the top dead centre or that the inlet valves open 10° late and close 45° late.

It is, however, necessary only to retime one of the valves, all the cams being integral with the same shaft, and the setting should be made by timing the closing of an exhaust valve. To effect this, turn the flywheel until the arrow marked on the rim is in the top centre position. Then turn the camshaft until No. 1 exhaust valve opens; continue to turn the shaft slowly until the valve closes and a feeler gauge (supplied in the tool kit) can be introduced between the rocker and the valve stem, taking care that the push-rod and rocker are in firm contact. Should the teeth of the camshaft wheel and timing chain not coincide, the wheel may be assembled at another point on the castellations of the shaft.

CAMSHAFT CHAIN. To adjust the camshaft chain, slacken nuts and set-screw (two in front and one behind the magneto) and move the magneto as a unit with its bracket and driving shaft away from the engine centre line by means of the hexagon headed screw which abuts the side of the crankcase.

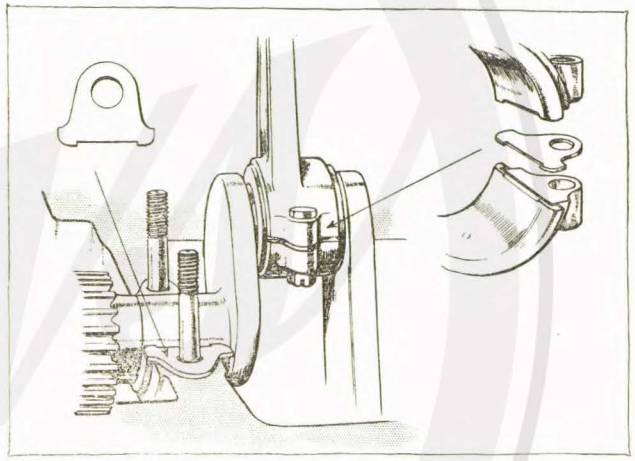


Timing chain adjustment and the bracket supporting the magneto. The drive shaft and coupling of the latter are cut away to disclose the adjusting screw and its lock nut. The two studs and the set screw passing through slotted holes in the bracket are shown.

A very slight amount of back-lash is desirable at the magneto coupling; about $\frac{1}{16}$ in. free movement of the coupling rim may be taken as an indication of correct chain adjustment. The effect of adjusting the chain or the need for adjustment can be observed directly, if desired, through a hole in the front of the distribution cover normally closed by a flange plate.

Tighten the bracket nuts securely after adjusting, and also the lock nut of the adjustment screw.

MAIN AND CONNECTING ROD BEARINGS. The main crankshaft bearing housings and the big ends of the connecting rods have thick "shims" or distance pieces between them and their caps. These shims serve as means of adjusting the bearings and prevent the bearing shells from moving inside the housings or the connecting rod ends. It is very important that, while the bolts are



Portion of crankshaft, showing shims of main and connecting rod bearings.

being tightened during the reassembling of a bearing, the shims should be pressed against the crank journal or pin; if they are allowed clearance from either of the latter oil pressure will be lost by oil escaping from the bearing at each end of the shims.

OIL PUMP. To remove the oil pump after the suction pipe union has been uncoupled, there is no need to do more than slacken back the nuts on the

two studs which hold the pump casing in position. The holes through the pump casing are slotted, so that with the nuts slackened the casing can be lifted away after it has been moved slightly rearward to disengage the dog clutch drive.

There is no loose coupling between the pump shaft and the camshaft, the latter merely having a groove across its end, a "tongue" on the pump shaft engaging with the groove to form the dog clutch drive.

A flange distance piece occurs between the pump and the end of the crankcase. It should be noted that a brown paper gasket is needed at each side of this distance piece to ensure oil-tight joints. Be very careful when fitting new gaskets not to "blank off" or restrict the oil feed holes in distance piece and crankcase respectively.

Clutch.

LEVER ADJUSTMENT. The three external operating levers of the clutch have hexagon headed screws with lock nuts passing through them near their pivots. The ends of these screws take effect upon the small plungers which pass through the clutch cover and push the clamping plate out of engagement with the driving plate. It is advisable to check the adjustment of the lever screws occasionally, and, invariably, after the clutch has been dismantled. In doing this, the pedal should be pressed as if to disengage the clutch, but merely a light pressure imposed upon it with the fingers. With this pressure applied through the levers no one of the latter should be slack in the groove of the clutch sleeve; all three should make firm contact with the rear flange of the groove.

DISMANTLING. To dismantle the clutch after the coupling shaft has been detached and the striking fork disconnected, the nuts on the three bolts which pass through from the front of the flywheel should be removed. The clutch as a unit will then come away from the flywheel.

If the three units of the clutch be separated, care should be taken in reassembling them to note that the outer edges of the clamping and face plates have the figure 1 stamped on them; these figures should be brought into line with one another in reassembling, otherwise the balance of the clutch and flywheel may be affected.

On no account should the clutch pedal be depressed, or the clutch levers moved to have the same effect, if the clutch coupling shaft has been removed while the clutch unit is in position. Disengaging the clamping plate from the driving plate then allows the centre of the latter to fall below the centre line of the clutch shaft; as a result the shaft cannot then be passed back into the castellated hole in the driving plate boss without dismantling the clutch completely.

Gear-box.

REMOVING THE PINIONS. Although it is quite possible to remove both of the gear shafts and all the pinions without detaching the gear-box casing from the frame, if the body is in position the work is simplified by first removing the gear-box as a whole. It is carried by four bolts and nuts and two nutted studs from the frame cross members and can be lowered to the ground if the six nuts be removed after the clutch coupling shaft, brake shoes and propeller shaft have been uncoupled.

Before the gear-box is lowered, the distance pieces or U shaped packing washers between the casing and the cross members should be removed and placed in such positions or so marked as to enable them to be identified subsequently and refitted in their original positions. These distance washers affect the alignment of the engine and gear-box, and may differ in thickness; if they are refitted incorrectly an unnecessary amount of work is subsequently thrown upon the joints of the clutch coupling.

Back Axle.

REMOVING THE WORM. Both journal and ball bearings of the worm shaft are carried in separate end plates or bearing housings, the central ring of the thrust bearing being located in a groove, half of which is in the rear end cap and the other half in the rear face of the central aluminium casting.

In the event of wear of the thrust washers allowing end play of the worm, it is distinctly inadvisable to endeavour to take this up by fitting packing washers behind the races. When the thrust bearing has become worn it is far better to renew it than to endeavour to stop end play by attempting to fit packing washers.

If a new washer is not available and it is desired to use the car until one can be obtained, it is generally possible to do so by reversing the old washer, *viz.*, refitting it with the front race at the back and vice versa. By adopting this plan the race which has been in use for the reverse gear, and which is subjected to very little wear, is made to serve temporarily for the forward drive.

The studs which hold the bearing housings in position on the central casting have lead wire wrapped

round them under the washers to prevent oil leaks. The compressed lead should be removed when the worm shaft is being reassembled and fresh lead wire fitted. When the nuts are tightened, the wire is compressed and forms an oil-tight joint washer.

Rear Brakes.

RESETTING THE LEVERS. If after prolonged wear the brake levers on the cam operating shafts move forward considerably beyond the vertical when the brakes are applied, it does not necessarily follow that new shoes are required; the angle of the levers can probably be reset correctly and the shoes given a new lease of life by fiittng thin packing pieces behind the detachable steel contact plates at the ends of the shoes to which the cams apply. Each of these contact plates is secured to its shoe by two screws with countersunk heads; a set of four new packing pieces is included in the equipment supplied with each car or chassis, but these need not be brought into use unless the shoes show signs of having worn appreciably.

REMOVING THE BRAKE DRUMS. The brake drums on the rear wheels are secured from lateral movement by means of two countersunk screws which pass into the driving flange on the axle shaft. These screws do not take the braking torque, which is borne by the wheel driving studs; their removal enables the drums to be withdrawn to expose the brake shoes.

Front Axle.

TO REMOVE SWIVEL PINS. The swivel pins are located in the ends of the main axle by means of taper pins driven in from the front. To remove the swivel pins, the aluminium cap and the castellated nut within it must first be detached, when the ball bearing can be lifted away. Next, the taper pin should be driven out from the back of the main axle and the grease cup flange at the bottom of the swivel removed. The swivel pin can then be pressed or driven out from above.

In refitting the swivel pins the castellated nut above the thrust bearing should be tightened until, with the jack removed, it is possible to insert a thin feeler gauge between the top and bottom surfaces of the main axle end and the jaws of the stub axle.

REFITTING THE FRONT SPRINGS. If the front springs are removed at any time, particular note should be taken of the fact that they are not designed to be central on the axle. In other words, the leaf bolt which spigots into the axle is not exactly midway in the length of the spring. The shorter portion of the spring must be in front of the axle—a fact which should be carefully noted.

Steering.

ADJUST-MENTS. To take up end play in the steering column the ball bearing at the upper end may be adjusted. The cup of the ball race is threaded on to the stationary casing and can be screwed up or down by first slackening the pinch bolt which passes through it immediately under the steering wheel.

End play of the lever or worm wheel shaft can be taken up by fitting a thin washer at each side of the wheel between the phosphor-bronze thrust rings and the steering housing. Whenever adjustment of this kind is made, two thin washers should be used, one at each side, so as to keep the wheel on the same centre line; the washers should not be placed between the worm wheel and the thrust pieces, but against the casing.

ENGAGING A NEW SEGMENT. To engage a new segment of the worm wheel when the one in use has worn, the steering lever should first be removed by withdrawing, not merely slackening, the pinch bolt at its upper end. The worm wheel shaft should then be rotated one-fourth of a revolution by turning the steering wheel. As there are eight castellations on the lever shaft, it is a simple matter to judge when this partial rotation has been made; it is merely necessary to remount the lever on the shaft two castellations farther back or forward, as the case may be.

CROSS TUBE ADJUST-MENT. The steering cross tube or coupling rod is adjustable at either end. In view of the tendency of steering wheels to "spread" when running, the best completed adjustment is when the wheels are $\frac{1}{8}$ of an inch closer together at the front than at the back.

PART V.

Spare Parts for Renewals.

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Every Standard chassis is numbered on the centre of the steering wheel.

Every part of a Standard chassis is stamped with a reference number.

In ordering spare parts it is always advisable to quote:—

1st, the number of the chassis; 2nd, a description of the part required; 3rd, the reference number of the part required.

Lists of spare parts are supplied by the Standard Motor Co. for the convenience of customers.

PART VI.

Electric Lighting and Engine Starting Equipment.

■

GENERAL PRINCIPLES. The electric lighting and starting system may be said to comprise four main sections, as follows:

(1) The dynamo, which generates the electric current ;

(2) The accumulator or battery, which stores the electricity;

(3) The lamps and the engine starting motor, which use the electricity stored in the battery; and

(4) The wiring and switches, which respectively convey and control the passage of the current from the dynamo to the battery and from the battery to the lamps or starting motor.

DYNAMO. Apart from its bearings and purely mechanical details, the dynamo consists of four essential parts: (a) The armature, a rotating member wound with insulated wire in which the current is generated; (b) The commutator, which is attached to and rotates with the armature and comprises a number of copper segments which are insulated from one another but are connected to the armature windings; (c) The brushes, formed of compressed carbon, which are held in firm contact with the commutator by springs and collect the current, passing it out to the insulated cables; and (d) The field magnet or electro magnet, which forms

the stationary body of the machine and provides a magnetic "field" in which the armature rotates.

STARTING MOTOR. The main constructional features of this unit are similar to those of the dynamo, but its function is quite the reverse—it utilises, to start the engine, the electrical energy stored in the battery. When the starting switch is operated, the current which then passes into the armature causes the latter to rotate, carrying with it the small gear pinion on the end of its shaft; the rotating pinion automatically moves endwise to engage with the gear ring on the flywheel and, continuing to rotate, turns the flywheel at a speeed which causes the engine to start running under its own power.

ACCUMULATORS (BATTERY). These comprise a battery of separate cells, each of which is capable of storing electrical energy, or electricity, at a maximum pressure of nominally 2 volts, though, actually, when the cells are in good condition and fully charged each one will register 2.5 volts. A six volt battery has 3 cells; similarly there are 6 cells in a 12 volt accumulator.

Each cell consists of an uneven number of lead plates or grids coated with a special compound and immersed in an acid solution. There are two distinct sets of plates—positive and negative, one more of the latter than of the former. The units of each set are arranged alternately, and the groups are connected together at the top by bridge pieces to which are attached the terminals outside the cell. The positive terminal is marked + and coloured red, while the negative is marked — and is black.

SWITCHBOARD. The switchboard carries three switches, an ammeter and a detachable fuse. One switch controls the charging of the accumulators and the others the passage of current to the lamps. The function of the ammeter is to record the rate at which the dynamo is charging the accumulators, while the fuse is inserted to protect the lamps from damage in the event of a loose or broken connection in the battery circuit.

AUTOMATIC CUT-OUT. To the front face of the dashboard inside the bonnet is secured an automatic "cut-in" and "cut-out" switch operated by an electro-magnet. This device automatically connects the dynamo to the battery when the engine attains a certain speed, and automatically disconnects the two when the speed falls below that predetermined minimum. It serves to prevent the battery discharging through the dynamo windings when the pressure of current generated in the latter falls below that in the battery. It is an item which should not require attention in course of use, having self-cleaning contacts.

Upkeep and Maintenance.

The electric lighting equipment requires a certain amount of attention periodically to keep it in good condition and to ensure satisfactory results from both lighting and engine starting units, and although neglect may not result in immediate failure it will, in the long run, detract from the reliability of the system and increase the cost of upkeep and renewals. The following instructions and hints should, therefore, be carefully observed.

ACCUMULATORS. It is of the utmost importance that the battery of accumulators—carried in a box on the left-hand running board—should be given regular attention. Their requirements are simple, but they are more frequently neglected than almost any other part of a car and failure to derive satisfaction from the electric equipment is nearly always due to neglect of the accumulators.

The first essential is to ensure that the plates within the various cells shall always be immersed in the acid solution. The water is constantly evaporating, and at least once in a month the normal level should be restored. The acid does not evaporate; therefore, unless some of the liquid contents of a cell have been lost by spilling or obvious leakage, DISTILLED WATER ONLY (not tap water or rain water) should be used to bring the level of the solution to such a height that it is well over the tops of the plates, approximately a quarter of an inch above them. The cells should not, however, be "filled to the brim," otherwise the solution will splash out of the vent plugs and cause the terminals and wires to corrode. The water should be introduced through the holes in the tops of the cells vacated by the vent plugs; while the latter are removed the vent holes in them should be examined and cleared if they are at all choked.

When the acid solution level has fallen by leakage or spilling, it should be made up with diluted brimstone sulphuric acid of a specific gravity of 1.200, preferably obtained from a chemist, mixed ready for use. If the solution level in one cell is much lower than in any of the others, there is cause for suspecting a leak from that cell; but if the levels in all of them has fallen to a similar

extent, and but slightly, evaporation of the water is probably the reason and distilled water only should be added, as previously mentioned.

In order to emphasise the importance of maintaining the correct level of the acid solution, it may be said that the plates of a battery correspond very closely to the lungs of a human being. If part of a lung becomes diseased it soon stops working, dries up, and becomes permanently useless. So with plates of a cell. If any portion of them be exposed to the air for any length of time, that part will no longer serve its intended purpose—even although subsequently it be covered by the solution—and the remaining parts will have extra work put on them, which causes their life to be shorter than it would be normally. Further, if an appreciable area of the plates thus be rendered useless, the capacity of the cells is reduced and the battery may be unable to store sufficient current to start the engine.

During the regular inspections of the acid solution care should be taken to see that all the connections are sound and that the terminal nuts are tight. Loose terminals are not an infrequent cause of trouble, for if a battery connection becomes defective there is a risk of the fuse in switchboard being melted, while, if the lamps happen to be switched on, the lamp bulbs may burn out.

If the terminals and terminal nuts show signs of corrosion, they should be removed, thoroughly cleaned, and a little pure vaseline applied to all their surfaces. If the threads of the terminals and nuts are also corroded, they too should be scraped clean and smeared with vaseline.

In replacing the wires, care should be taken to put them back on their proper terminals (positive or red to the + or red terminal, and negative or black to the — or black terminal). This is most important, as if the wires are incorrectly replaced it is probable that the battery will be ruined and the whole equipment seriously damaged.

While it is possible for the dynamo to generate sufficient current to keep the lamps alight without the assistance of the battery so long as the engine is rotating above a certain speed, the assistance of the accumulators is essential to secure a uniform degree of light. For this reason, and because the engine starting motor depends entirely upon the battery for electrical energy, it is necessary that the accumulators should be kept as fully charged as possible. Further, the battery should never be discharged below a certain voltage. In the 6-volt equipment the set of cells should never be discharged below 5.5 volts, or below 11 volts in the 12-volt set. When the voltage of the batteries is being tested, the side lamps should be switched on, otherwise a "false reading" is obtained, the voltmeter not giving a true reading unless the battery is discharging.

To maintain the batteries in a charged condition, the charging switch should always be "on" whilst the car is running, day or night, for, except in the case of very long runs in daylight, it is practically impossible to overcharge the batteries. It must be remembered that in starting the engine, a very big demand for current is made upon the battery, and for every second that the electrical starter is in use approximately a minute's charging will be needed to restore the amount of current drawn from the cells.

DRIVING BELT. Instructions as to tightening the belt which drives the fan and dynamo are given in a previous section of this booklet. As there mentioned, it is neither necessary nor advisable to have the belt absolutely tight, as this puts an undue load on the dynamo and fan bearings and causes unnecessary wear. As a guide it may be said that it should be possible with one finger to depress the belt slightly, say half an inch, in its length between the dynamo and fan pulley. If the belt should become so slack in use as to slip over the dynamo pulley this will be indicated by more or less violent fluctuations on the part of the indicating hand of the ammeter. This hand should remain steady at any given engine speed, altering its position only when the engine speed is varied.

BEARINGS. The bearings of the dynamo are provided with oil through lubricators, one at each end of the machine. These should be about half-filled with engine oil about every 5,000 miles, that is, at the same time as the magneto bearings are attended to. Excess of oil is undesirable and may be positively harmful. If it reaches the armature windings it may cause the insulation to perish, while if it gets on to the commutator it will resist the passage of the current to the brushes.

Lubricators will also be found at each end of the starting motor and half a dozen drops of oil should be introduced into these once a month, while at the same time oil should be squirted on to the pinion shaft and stiff grease smeared with a brush on to the gear ring attached to the flywheel.

COMMUTATOR. The brushes and commutator of both dynamo and starting motor should be examined once a month to see that they are not wearing unduly. Normally the commutator on both machines will acquire a brown and glossy surface, which should not be interfered with; but if the surface appears to be rough, blackened, or greasy, it should be cleaned carefully with fine glass-paper pressed lightly upon it with one finger whilst the armature shaft is rotated. On no account should emery paper be used for this purpose, and any carbon or copper dust should be cleaned away from the brush gear and the interior of the end cover. With regard to the brushes, it is important that these should be clean and slide freely in their guides. There is no risk of receiving an electric shock whilst making adjustments at any part of the lighting and starting system, even if the dynamo terminals be handled whilst the dynamo is running.

THE DYNAMO FUSE. The purpose of the detachable fuse in the switch box has already been mentioned—it serves to protect the lamps in the event of a loose or broken connection in the battery circuit. The fuse consists of a short length of soft wire which has a low melting point; if the current in the circuit exceeds a certain definite amount, the wire melts and so disconnects the circuit and prevents the lamps and cables from being damaged. In the event of a fuse melting, or "blowing" as it is termed, the fault may lie in the fuse itself, or be due to some dampness in the switchboard and fittings allowing a leakage of current.

Usually, however, the melting of a fuse indicates a loose or disconnected terminal either within the battery box or on the switchboard.

The fuse wire is of a definite thickness and it is advisable only to use that supplied by the makers of the electrical equipment.

EXPORT BATTERIES. Each car sent abroad is fitted with a special export battery, which is supplied without the acid solution and in an uncharged condition. Separate instructions for the first charging of such batteries are issued with each set, and these should be read carefully before commencing the charge. It will also be found that the dynamo fuse has been removed from the switchboard, the object of this being to prevent damage to the lamps in the event of the car being used and the dynamo switched on before the battery has been charged and connected to the system.

Before the lighting set can be put into operation and before the engine starter can be used, the battery must be removed from the car, filled with acid solution and given a thorough charge from some external source. The initial charging must be carried out at a low rate, and the running conditions of a car in ordinary use do not give the steady and continuous charge necessary in the first instance. When the charging is completed, the acid must be emptied out, together with any sediment that may have been deposited at the bottom of the cells, and the latter replenished with fresh solution. The terminal nuts must be well cleaned, so that no dirt or corrosion is left on the contact surfaces, while to the latter and the terminals as a whole, including the threads, should be applied a thin film of vaseline.

The battery is then ready for fitting in position on the car and connecting up. Care should be taken to ensure that the positive or red cable is connected to the

+ or red terminal and the negative or black cable to the — or black terminal. When the nuts have been screwed down tightly with spring washers below them, the dynamo fuse may be fitted, care being taken to see that the fuse wire is pressed well home under the metal clips. Next, the engine should be started, the dynamo switched on and the reading of the ammeter noted ; this reading should correspond with the output of the dynamo, which will be found stamped on the name-plate attached to it.

USING THE STARTER. To start the engine, the plunger of the starting switch should be pushed right home, otherwise a bad contact will occur and cause arcing and damage to the switch contacts.

But before attempting to start the engine, always make sure that the petrol tap is open and the ignition switched on, else the battery may be exhausted uselessly. If the engine does not commence to run under its own power after the first half dozen revolutions or so, do not blame the starter, but find out the cause. In cold weather the air strangler, the control of which passes through the instrument board, should be closed in order to ensure that a rich mixture shall reach the engine cylinders temporarily. Immediately the engine starts, release the strangler control.

Locating Faults.

If any faults should develop in the electrical equipment, do not interfere with the dynamo except to note that the commutator is clean and that the brushes are making good contact with it.

MELTED FUSE. The first thing that should be examined is the switchboard, to see if the fuse has blown. If this be the case, do not merely replace the fuse, but endeavour to find out why it melted, for, as already suggested, it will nearly always be due to loose connections of the battery wires, either at the battery itself or on the switchboard; alternatively one or more of the connecting links which couple up the various cells of the battery may be loose.

DIM LIGHT. If with the battery fully charged and the engine and dynamo running at a fair speed the lamps should give light below the normal, the bulb filaments dropping to a dull red, a short circuit somewhere in the wiring or in the lamps is indicated; it is usually easy to locate this fault by switching on one circuit at a time. First switch on the side and tail lamps only; should these appear to be normal, switch on the headlamps, and if the lights then go down it will be shown that the short circuit is on one of the headlamps, the faulty lamp being identified by disconnecting each one separately. When the lamps go down in this way, do not keep the current switched on for more than two or three seconds at a time, as the large amount of current which is passing through the faulty circuit is liable to burn out the switchboard.

LIGHT TOO BRILLIANT. Should the lamps at any time give too brilliant a light, or vary in intensity with the speed of the engine, this is evidence of an "open circuit" between the dynamo and battery, and if the engine is accelerated under such conditions the lamps will burn out. The battery terminals should be examined for loose connections.

If one of the lamps should be observed to flicker, take out its adapter and clean the contact points. If all the lamps flicker, examine the battery for loose connections.

AMMETER NOT REGISTERING. If the ammeter does not register when the engine is running and the charging switch is "on," this may be due to the fuse in the switchboard having melted or to a bad contact between the fuse wire and its clip. The same symptom will sometimes be observed if the dynamo driving belt is excessively slack, though usually this is evidenced by oscillations on the part of the ammeter hand.

STARTING PINION. If the pinion on the starting motor shaft should jam against or in engagement with the flywheel gear, the floorboard should be lifted and the flywheel partially rotated in the opposite direction to normal. This procedure will usually free the gear pinion. But this trouble can, however, be avoided by keeping the pinion shaft properly lubricated.

RESERVE OF LIGHT. In the event of some derangement of the dynamo, the accumulator when fully charged will supply sufficient current to provide 24 hours' light for the side and tail lamps only, or 12 hours' light for the head and tail lamps.

PART VII.

Bodywork.

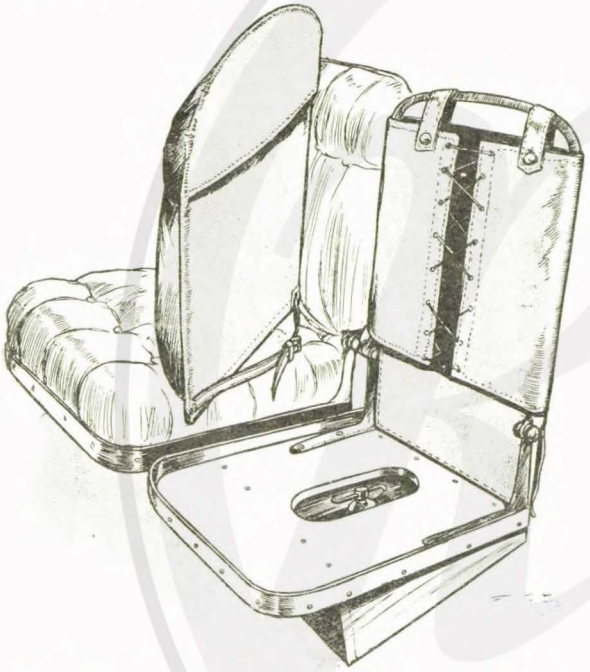
■

The Standard Light Car chassis is designed to accommodate either a two-seated body with a comfortable two-seated dickey seat, or a four-seated body with side doors to back and front seats. These two types are standardised and a special and patented feature included in both is the folding hood with side curtains consisting of detachable transparent panels; these, when in position, open and close with the doors, and when out of use are stored in a special compartment behind the upholstery, where, however, they are immediately accessible.

Another patented feature common to both types is a tray or compartment within the scuttle dash; it has a wide opening at the centre of the instrument board, and provides a means of carrying small parcels, gloves, maps, etc.

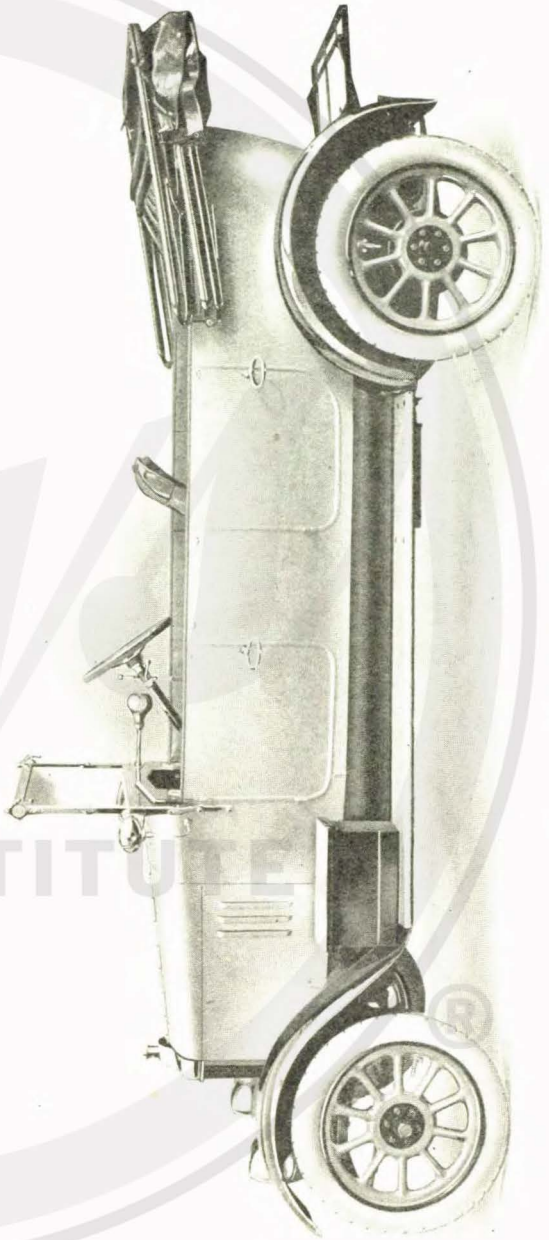
THE FOUR SEATER. Among the special and patented features of Standard bodywork are the front seats of the four-seated body. They are separate units provided with means of adjustment, enabling either seat to be moved backward or forward independently of the other to secure the most comfortable position according to the occupant's personal ideas. Each of the separate cushions is of the same dimensions and thickness on all sides, and can be turned round from time to time and put into the seat frame in a different position in order

to equalise wear and to avoid the springs of one portion being continuously compressed to a greater extent than those of another portion.



The folding and adjustable front seats of the four-seater. The back squab of one seat is shown removed from the frame to disclose the broad band which can be laced tightly or loosely to suit the ideas of the user.

The back of each seat consists of a hinged metal framework, round which a broad band is arranged, the ends being laced together at the front. The framework has a certain amount of natural spring which supplements the padding of the back upholstery, the latter consisting of a detachable "squab" with an inverted



Side view of the four-seater with hood lowered.

pocket formed at the back; the pocket fits over the top of the framework, holding the squab in position at that point, while a strap serves the same purpose at the bottom. By altering the tightness of the band lacing, the user can obtain a degree of adjustment complying with his ideas as to comfort.

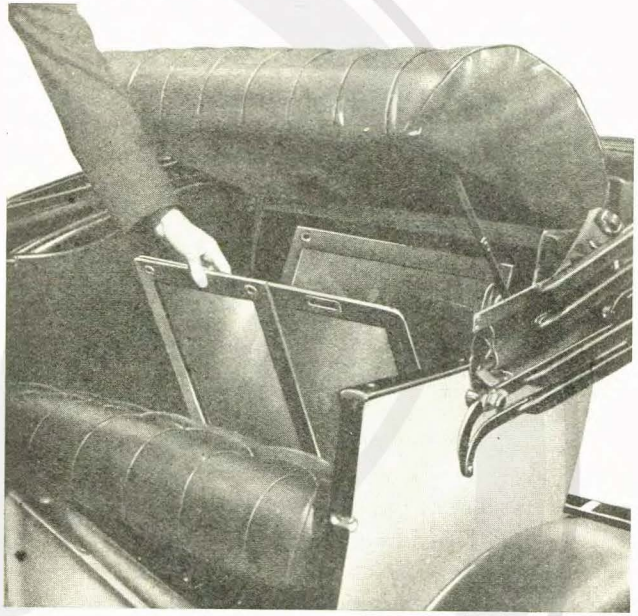
The back framework of each seat is hinged on brackets secured to the moveable base, enabling the top to be pushed slightly forward, clear of the rear door openings when the latter are used.

The fore and aft adjustment of the front seats consists of a T-headed bolt passing through a longitudinal slot in the base board and screwing into one or other of two sockets in the floor of the car. Quite a wide range of adjustments can, however, be obtained without removing the bolt from one socket to another, it being necessary merely to slacken it, slide the seat to the desired position and re-tighten the bolt.

The cushion of the rear seats is also of the same depth and width at front and back, so that it can be similarly turned about from time to time to equalise wear. When removed, it gives access to a detachable panel in the bottom board of the seat through which the back axle can be inspected and replenished with oil when necessary. The back rest or squab in this case is hinged at the top and can be lifted up to disclose a compartment wherein are carried the special transparent side panels of the hood. When raised to its full extent, the squab is held in that position by toggle levers, leaving free both hands of the individual who may be taking out or replacing the side panels.

On the floor board behind the front seats is a combined tool-box and foot-rest, while under each of the

front seats is space for tools; the jack can be carried in one or other of these compartments.



Compartment behind seat back for storing side panels of hood, exposed by lifting the hinged upholstery.

The hood is of the one-man type and can be raised or lowered single-handed with ease. With the Standard patent side panels and other special features it provides peculiar advantages which have for long past been desired by owner-drivers.

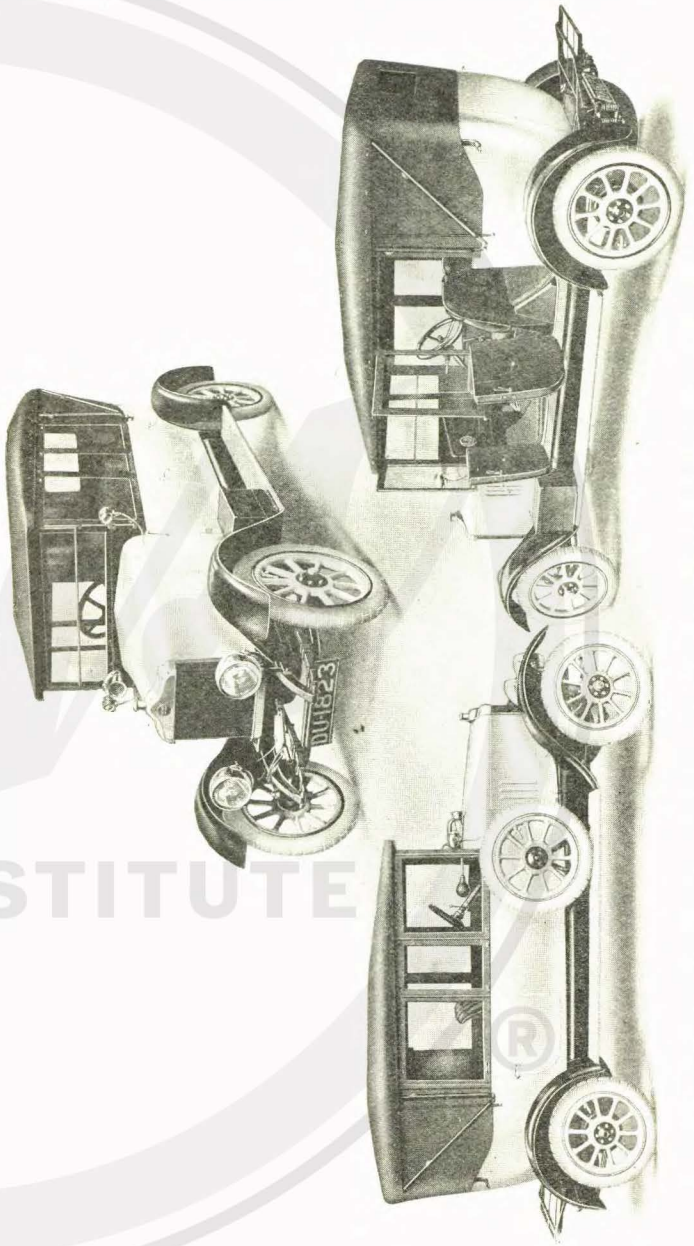
When the hood is brought into use its forward extension is clipped to the top of the two-panel, adjustable windscreen, a shallow valance projecting down in front of the top bar of the screen to prevent draughts from entering on this line.

Side curtains formed as a unit with the hood are provided at each side of the rear seat, and as a means of protection in showery weather the hood with these curtains suffices. When, however, more protection is required, the special side panels can be brought into use without the long delays associated with the fitting of side curtains of the usual type. By their use all the benefits of an entirely enclosed car can be obtained in cold or wet weather, without additional weight as compared with the usual type of collapsible hood.

There are four units comprising the side panelling, two for each side of the car. Those for the front are single transparent panels, each in a metal frame and secured to the screen pillar at the front edge by turn-buttons; the one for the left hand side has a slot at its lower rear end which passes over a special fitting secured to the door, this fitting holding the panel in position automatically and providing a long bearing surface on which panel slides when the door is opened. There is no need to unfasten any of the turn-buttons to open the door, for the panel moves with the latter as a unit, the flexible front edge secured to the screen serving as a hinge.

When driving in cold and windy but dry weather, the front panels can be used without the hood being raised, thus providing the front seat occupants with protection from side winds and draughts arising from them.

The rear unit on each side consists of two transparent panels, also in metal frames, the smaller, when in position, being located alongside the front seats and secured by turn-buttons along the bottom edge and by a couple of straps at the top. The larger panels open with the doors and are provided with an automatic snap

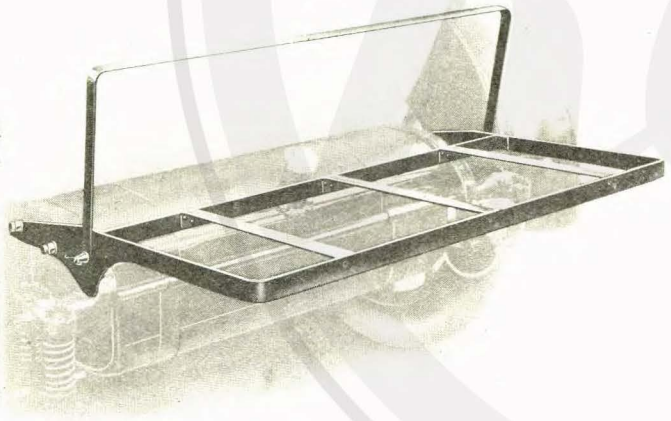


The four-seater from various angles, with hood raised. Lower right-hand view shows the side panels opened with the doors.

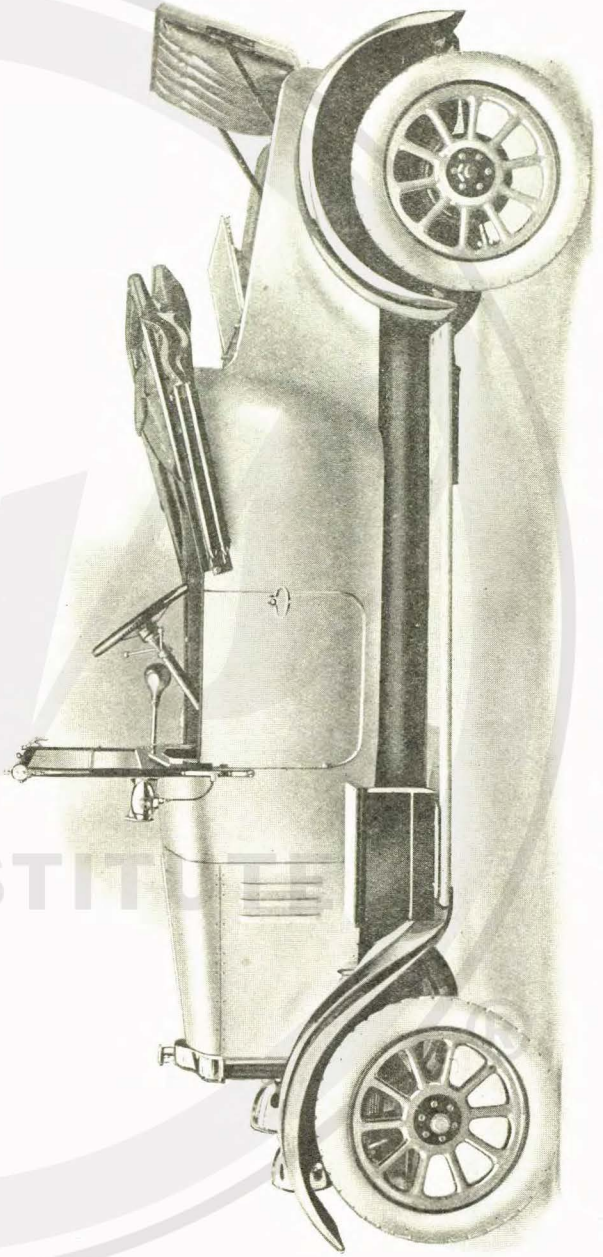
fastening to keep their rear top corners firmly against the top of the hood; the lower corner of each, as in the case of the left-hand front panel, has a slot to pass over the "slide block" on the door.

To prevent draughts or rain from entering between the lower edges of the hood and the top of the side panels, a detachable valance is provided at each side secured by snap fasteners; these valances can be folded back with the hood, but it is preferable to remove them with the side panels and store them with the latter, as the hood then folds more neatly and there is no liability for the valances to be chafed.

When out of use, the hood sticks are secured from relative movement, and rattle is prevented, by rubber spacing blocks and a hinged rod and wing-nut on each side, this rod being hinged to the top hood stick and secured in a spring clip when the hood is raised.



The luggage grid, which can be instantly detached by slackening the two cap nuts on each side.



The two-seater with hood lowered and dickey seat opened.

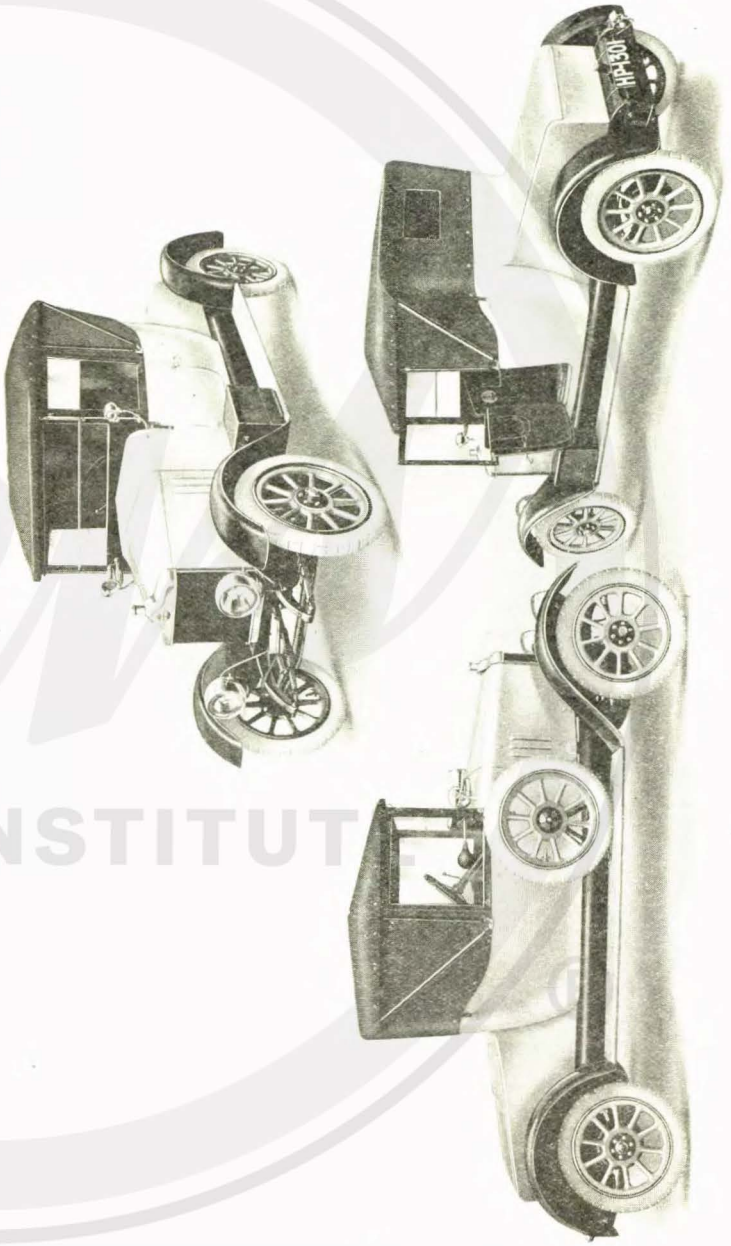
Cocoanut mats are provided for front and rear footboards; the front one consists of two parts, the extension on the driver's side being detachable to enable it to be turned about occasionally to equalise wear, or renewed independently of the main portion after prolonged use.

A luggage carrier is provided at the back of the car as part of the normal equipment; when there is no likelihood of its being used, it can be removed merely by slackening two nuts on each side.

THE TWO SEATER. In providing, when needed, an entirely enclosed body, with the advantages of a coupé, but without the additional weight of the latter, the Standard two-seated body resembles the four-seater. The curtains alongside the seat are integral with the hood, and when these are supplemented by the fitting of the detachable and transparent panels in front, the occupants are completely protected from wind and weather.

The two detachable metal-framed panels are normally stored behind the hinged back upholstery of the seat. When in use the one on the driver's side is secured by turn-buttons, while that on the left opens with the door, the flexible front edge, secured to the windscreen pillar, forming a hinge piece for this purpose. By reason of its shape, and the relative angles of the screen and front hood stick, the topmost rear corner and the upper and rear edges are automatically held securely against the adjacent parts and prevent draughts or rain from entering.

As in the case of the four-seater, these front panels can be used without the hood being raised to shield the occupants from cold winds. The hood stick fasteners



The two-seater from various points of view with the hood raised.

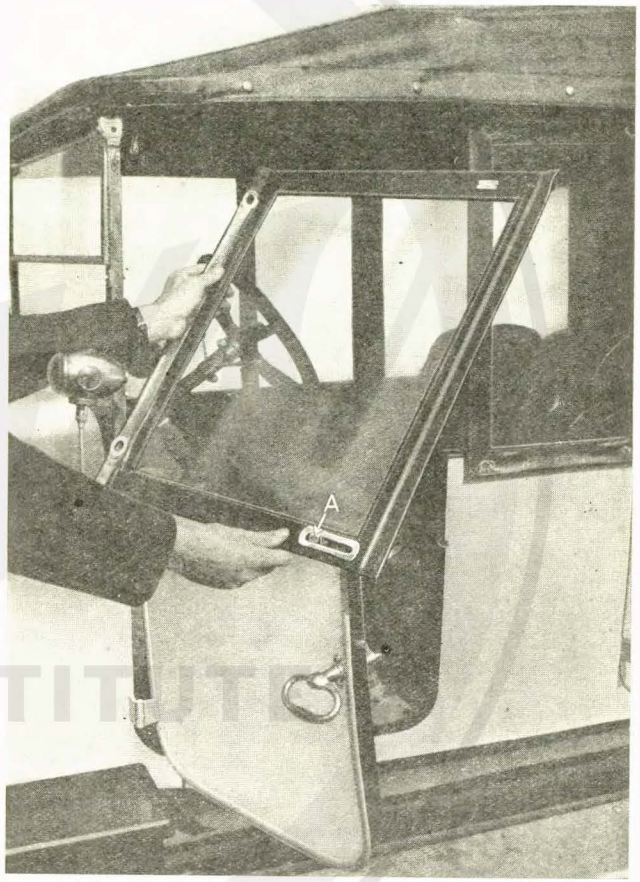
are also of the same type, straps being eliminated and their place taken by hinged metal rods with wing nuts to secure them to the side brackets; spring clips on the extension sticks hold these rods when the hood is in use.

The rear extension of the body, when the double panelled top is closed, conceals the two-seated dickey; the cushion of the latter is well sprung and reversible, the back rest being formed by upholstery attached to the hinged rear panel. The front panel, which has its hinges along its foremost edge, can be secured at any desired angle of opening by means of the slotted rod and wing nut provided; it forms a wind shield for the dickey seat occupants and also protects their legs from rain in wet weather.

The comfort of the occupants of the dickey seat is also increased by the combined foot-rest and tool-box included in the equipment; ample leg room occurs and sufficient space for small bags or parcels in addition.

FITTING THE SIDE CURTAINS. When the hood has been raised and secured to the windscreen pillars by means of the thumbscrews and winged locking nuts, a preliminary to the fitting of the side curtains consists of attaching the valances. These are secured to the bottom edges of the hood by snap buttons and by similar means to the top edges of the hood sides at the rear.

The panel over the front door should then be fitted, first passing the slot in the bottom of the frame over the slide block on the door. For this purpose the door should be opened and the panel inclined towards the rear of the car, so that the slot may be pressed over the fitting with the thumb of one hand while the panel is brought to



Showing method of fitting a side panel of the hood to the slide block A on the door. In removing the panel it should be similarly inclined towards the back of the car.

the vertical with the other hand. Then the holes in the front edge can be threaded over the two turn-buttons on the screen pillar and the fastenings given a quarter turn.

The panel on the right of the driver is similarly secured, except that a turn-button takes the place of the slide block at the lower rear corner.

This completes the fixing of these side curtains on the two-seater. Before attempting to fit the double panel unit on the four-seater, two straps which secure the top edge of the smaller panel should be put in position by passing the front one around the hoodstick and the rear one through the eye of a short bracket depending from the stick, and bringing both ends of each through the holes formed in the valance. The slot in the lower edge of the larger panel should then be passed over the slide block, with the door open and the panel inclined towards the back of the car. If then the straps be threaded through the holes in the top of the smaller panel and the turn-buttons at the bottom secured, the fitting will be complete.

LOWERING THE HOOD. Obviously the side curtains must be removed before the hood is folded back; the valances and small straps should also be detached and stored with the panels in the special compartment behind the hinged back upholstery—of the rear seat in the case of the four-seater.

While the hood frame is being folded back and lowered on to the brackets which support it at each side, care should be taken to prevent the covering from being pinched between the sticks near their hinges; for the sake of appearances and also to lengthen the useful life of the hood, the folds should be neatly arranged, the projecting sides being pulled outward so as to lie flat and

without creases. The bunched sticks can then be secured by the hinged rods and butterfly nuts on each side. It will be observed that spring clips are provided to hold these rods firmly and without rattle to the sticks when the hood is in use.

The flexible portions of the side curtains and the valances should be folded neatly when they are being stowed away in their special compartment, otherwise the creases which will occur may prevent them from serving their purpose so effectually when they are next brought into use. Further, if at any time during the course of a run they are put away whilst still wet, the first opportunity should be taken to remove them, open them out and allow them to dry thoroughly before being replaced. Similarly, it is advisable to allow the hood to dry before it is folded back, if it is to remain folded for any length of time.

Hints concerning Body Upkeep.

If it be desired to preserve the condition of the paintwork, dust and mud on the latter should not be removed with a dry duster; plenty of water should be used, with sponge and chamois leather. Before attempting actually to remove mud, it should first be soaked with water from a hose or can, which enables it to be wiped off—as distinct from being rubbed off—when a thoroughly soaked sponge is brought into use. Thus scratches on the varnished panels are obviated and mud from the insides of the wings is more easily removed.

Do not use a brush for the panels, bonnet or mudguard tops, but a sponge retained specially for these parts, another sponge and the brush being reserved for the

wheels, springs, frame and the other parts on which scratches do not show up so pronouncedly.

If insufficient time be available on any occasion to wash down the whole car, concentrate on the panels, bonnet and wing tops; but after sponging off the mud or dust, always finish off these parts with a damp chamois leather free from grit.

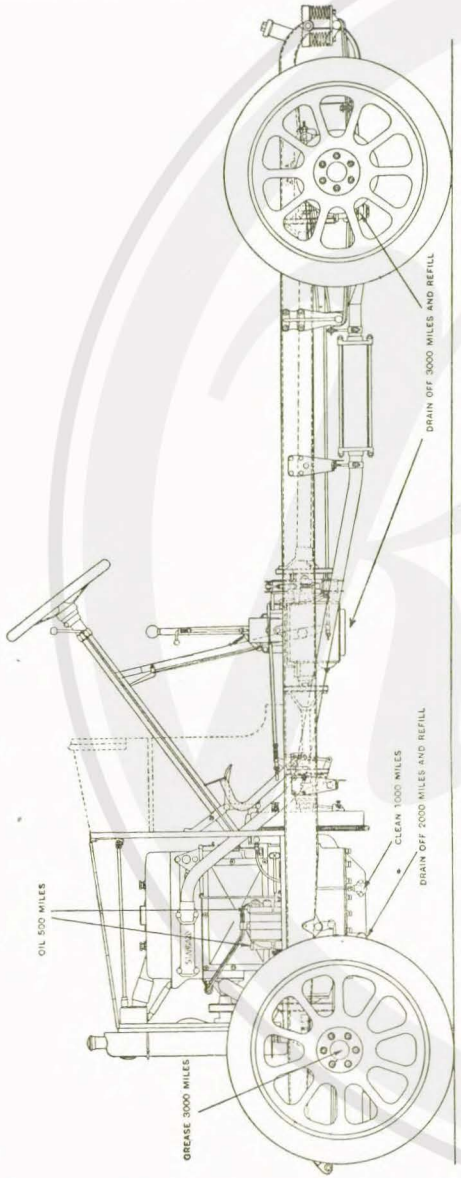
On returning from a run in rain, devote two or three minutes to sponging off the water from the top of the bonnet and finishing off with the damp leather; if the water remains on the top of the bonnet and dries naturally the temperature it attains before evaporating may result in more or less permanent blemishes being apparent.

Do not use paraffin, alone or in the water, when cleaning the exterior panelling; it dulls the finish.

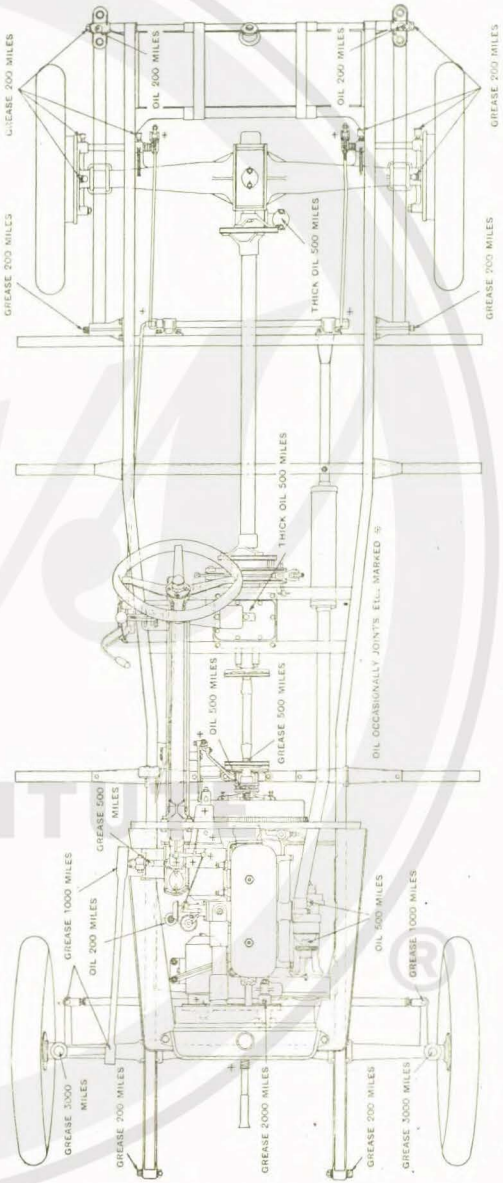
Benzole must on no account be used for removing grease or tar spots. Clean off the former with a clean piece of dry flannel or linen. To remove tar spots, first soften them with butter or other animal fat and then wipe them off with a clean cloth; this treatment should be given as soon as possible, otherwise permanent marks may be caused by the tar. Benzole will certainly remove tar very quickly—but it also removes the enamel or varnish at the same time.

To preserve the plated fittings in wet weather and in winter, apply to them with a brush or a piece of flannel a solution consisting of one inch of tallow candle (or half an ounce of tallow) dissolved in a teacupful of petrol. The tallow takes some little while to dissolve while being stirred continuously in the petrol, but when applied in this way to the plated parts—not too liberally and without splashing the paintwork—it is more lasting in effect than vaseline or grease; the petrol evaporates and leaves a

semi-opaque film of tallow over the metal, protecting the latter from the corrosive effect of rain water and moisture in the air. The coating—which should be renewed occasionally—can be removed instantly at any time with a rag moistened in petrol. Spots of the solution on the paintwork can be removed by the same means—benzole must not be used for this purpose.



Chassis lubrication diagram, side view.



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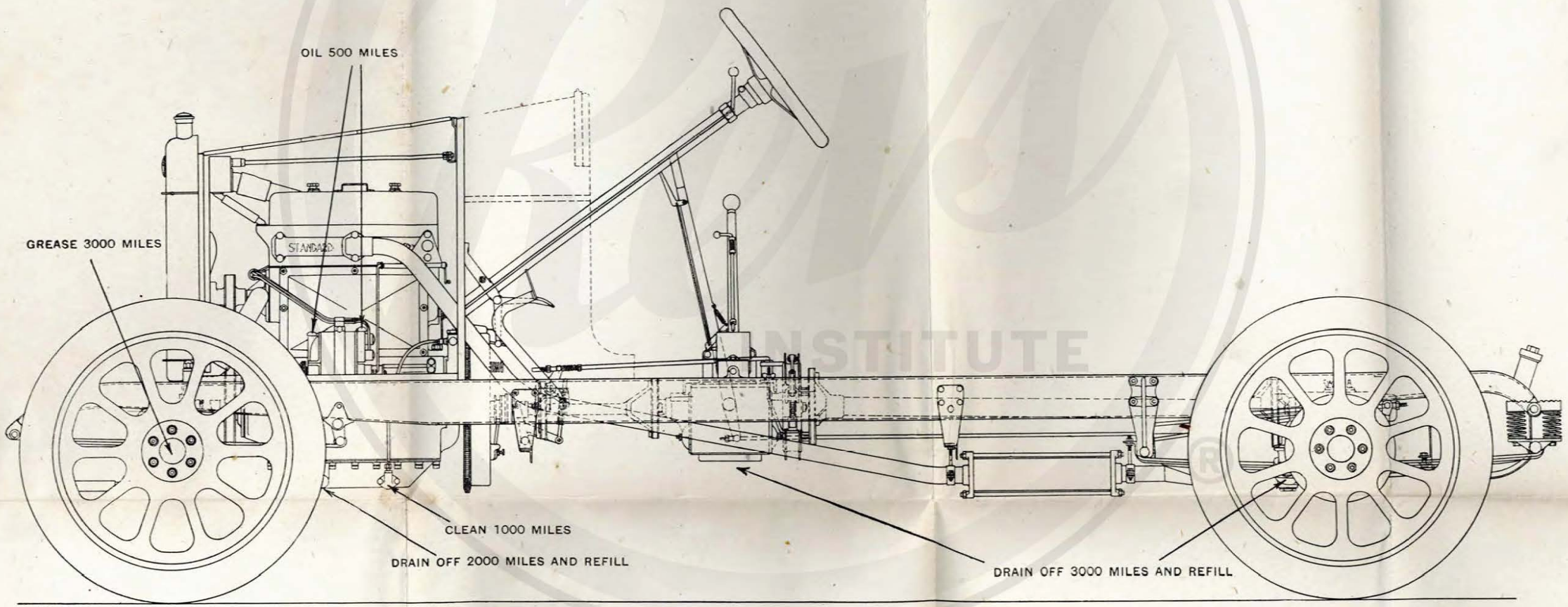
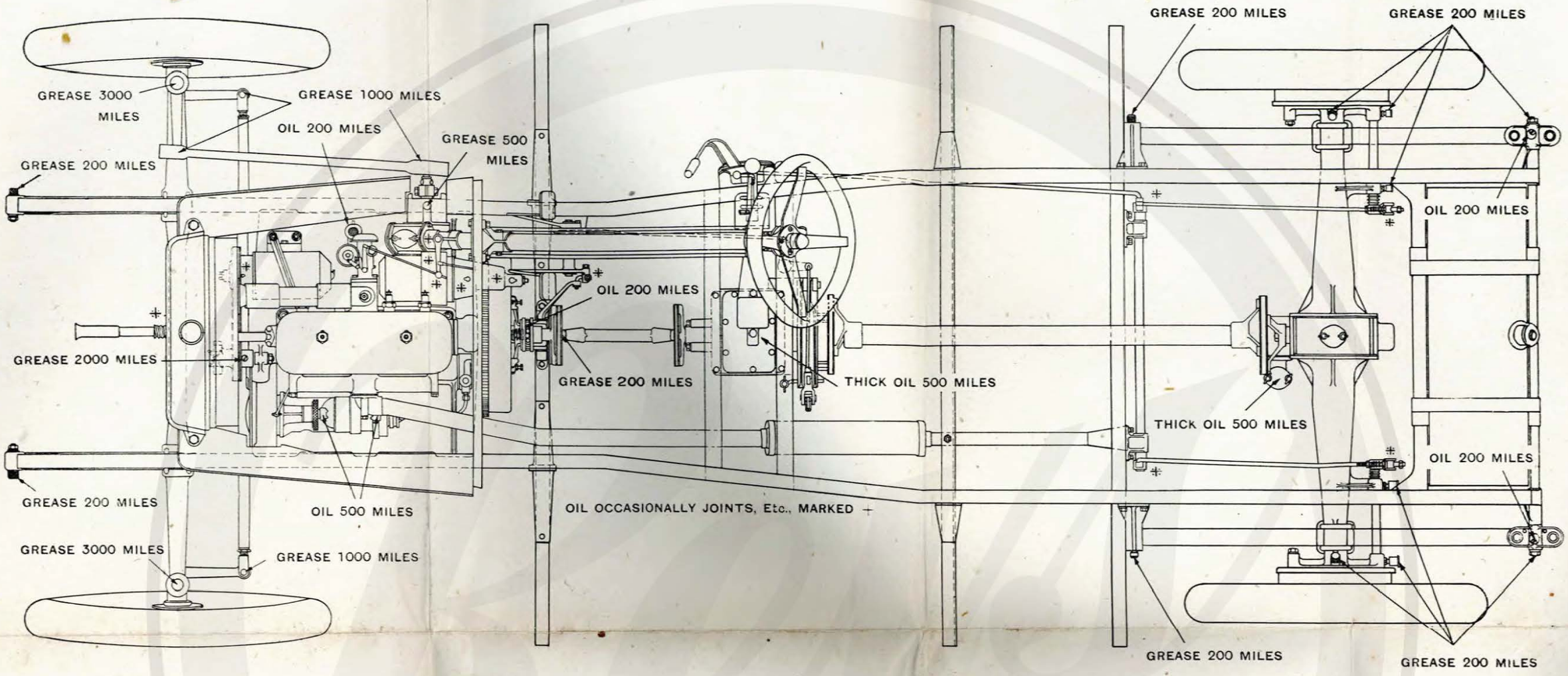
Summary of Chassis Lubrication Instructions.





EACH DAY OR AFTER 200 MILES.

Replenish engine sump.
Screw up greaser on clutch shaft.
Oil clutch thrust sleeve.
Screw up greasers on front axle, rear axle and springs.
Re-fill oil cups over rear supplementary springs.

EACH 500 MILES.

Oil magneto bearings.
Examine oil level in gear-box and back axle, and replenish if necessary.
Screw up greasers on steering gear-box.

EACH 1,000 MILES.

Clean oil filters (1. In sump attached to suction pipe elbow. 2. In pump casing, below hexagon-headed cap).
Remove leather covers from steering joints and re-pack with grease.

EACH 2,000 MILES.

Drain oil sump of engine, wash out with paraffin and re-fill with fresh oil.
Replenish steering gear-box with thick oil, or oil and grease.
Re-charge fan bearings with grease.

EACH 3,000 MILES.

Drain off old oil from gear-box and back axle, wash out with paraffin and re-fill with fresh oil.
Re-charge front wheel hubs with grease.
Remove aluminium caps of steering swivels and re-fill with grease.

OCCASIONALLY.

Oil control rod joints (brakes, throttle, ignition, etc.)

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