THE *Lanchester*

21 H.P. & 30 H.P.

Descriptive
Manual

THE LANCHESTER MOTOR CO., LTD.

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T 5-84

Catalpa Indian Bean
Bignonioides

5 9 Cheltenham 4 galls 20/30 15/-

Wey 29753 10 galls

New oil Engine 30694 Aug 9th 1934

Queedle = a see-saw

Boggart = a scarecrow

Mosey = Over ripe

Index.

Introductory.

IN this Manual no attempt has been made to give a description of the functioning of the Engine, Gear Box or other Units: it is assumed that the user has some knowledge of their working principles. The booklet aims at giving the owner of a 21-h.p. 6-cylinder, or 30-h.p. 8-cylinder Lanchester Car a more intimate knowledge of the design and purpose of the various components of his car, and sufficient instruction as to lubrication, adjustment, general care and maintenance, as is necessary with cars of every make.

We regard it as an axiom that the requirements of the Owner-driver and of the Professional Chauffeur are identical. Simplicity and accessibility of lubrication points—petrol and oil fillers of generous size and easy of access—access to mechanism that requires periodic adjustment—are just as desirable to the Chauffeur as to the Owner, and it pays the Owner to study his Chauffeur's requirements as he would his own.

It can be safely stated, and is abundantly proved in the following pages, that Lanchester Cars possess to a greater extent than any other make, the features and qualities desired by the present-day motorist, whether Owner-driver or Chauffeur. The utmost care and consideration has been exercised in their design, and neither labour nor expense spared in their production.

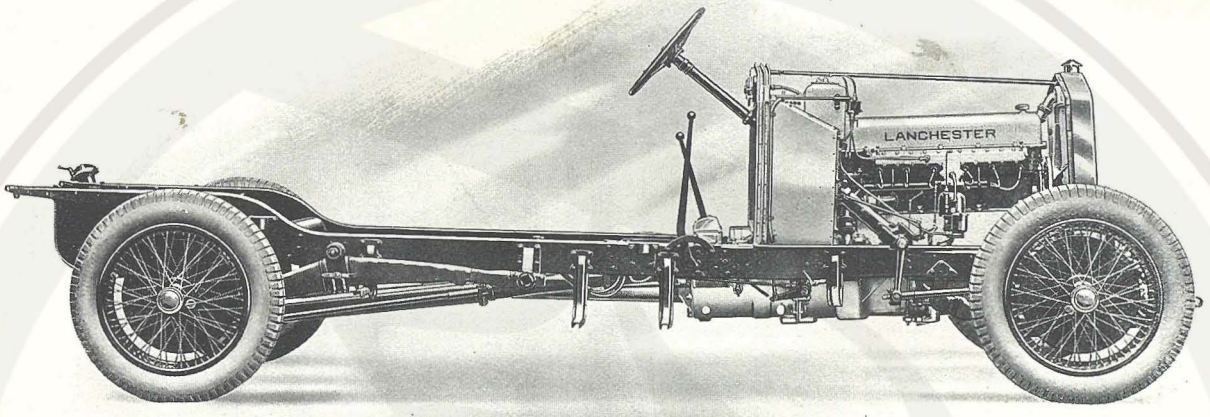


Fig. 1 21-h.p. 6-cylinder Chassis.

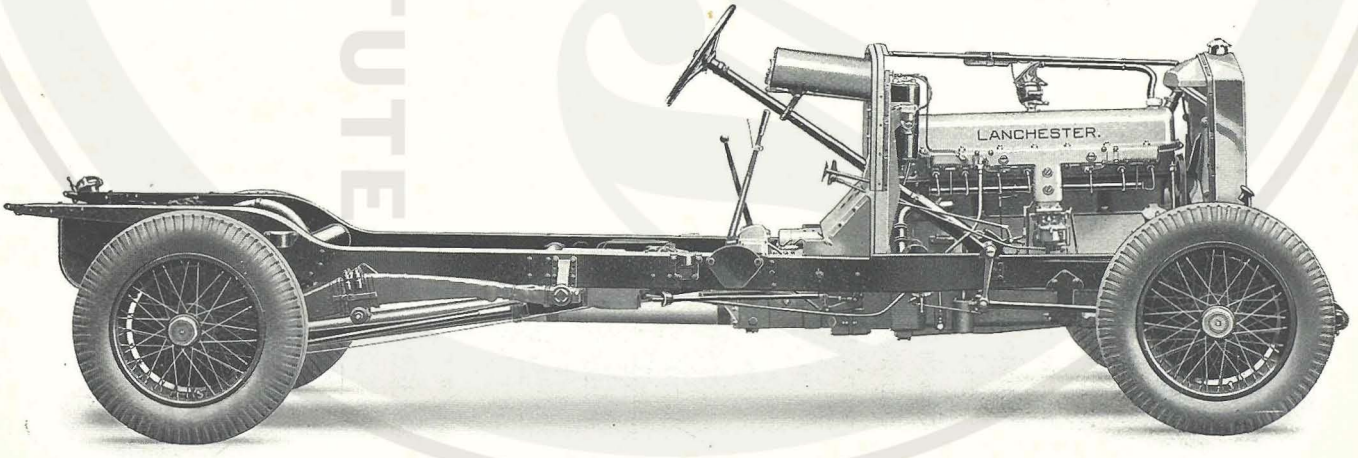


Fig. 2. 30-h.p. 8-cylinder Chassis.

General Description.

The Chassis. The 21-h.p. 6-cylinder Chassis and the 30-h.p. 8-cylinder Chassis are illustrated (Figs. 1 and 2) and it will be apparent that they are designed on similar lines, the main difference being the extra length of the 30-h.p. Engine, due to the addition of the two extra cylinders, and a corresponding increase to the wheel-base of the chassis. The chassis frame members are wide deep channels connected transversely by strong tubular cross members, making an exceptionally rigid structure.

Suspension. The rear suspension is of the well-known Lanchester cantilever type, which has been widely imitated, but remains unequalled, whilst semi-elliptic springs are employed for the front axle, the springs being mounted above the axle.

The final transmission is by the equally well-known Lanchester silent high efficiency worm gear.

Brakes. Brakes controlled by a vacuum servo system are provided on all four wheels.

Front Axle. The front axle is of special design and tubular in construction to resist the torsional loads imposed by front wheel braking.

The difference in the wheelbase of the two chassis is 9½ ins., that of the 21-h.p. being 11 ft. 1 in. and the 30-h.p. 11 ft. 10½ ins. The track width is

4 ft. 8 ins., and the average effective under-clearance of both the 21-h.p. and 30-h.p. Cars fitted with Body, not exceeding 40 cwt. and 42 cwt. respectively, equipped for the road but unladen, is 6¾ ins.

Wheels. Detachable wire wheels are standardised, constructed in such a manner as to enable the brake drums to be disposed within the wheels, and, in the case of the front wheels, bringing the steering pivots approximately in the plane of the wheel track; a precaution which, with the use of front wheel brakes, we consider essential in the interests of safety. Alternatively, detachable steel disc wheels are supplied if desired.

Engine. The Engines of both the 21-h.p. 6-cylinder and 30-h.p. 8-cylinder Chassis are in general design identical. In each case the dimensions are 3.1 ins. (78.8 m.m.) bore × 4½ ins. (114 m.m.) stroke. The cylinders are cast monobloc with detachable head. The overhead valves are operated by an overhead camshaft, worm driven, totally enclosed and automatically lubricated. The water circulation is by centrifugal pump and the water temperature controlled by Thermostat. The magneto is of the Polar Inductor type, it is flange mounted on the crank-case and is chain driven from the transverse shaft. The Electric Generator is flange mounted on the Engine, and is driven from the near side end of the transverse shaft, and at the opposite end is located the water pump. Coil and Battery

Ignition is installed on the 30-h.p. engine, in addition to the Magneto, and may be added to the 21-h.p. engine if desired.

Gear Box. Following the Lanchester practice of twenty-five years standing, the gear box forms an integral part of the Power Unit. It has four forward speeds and employs sliding change, now almost universally accepted, but embodying some marked improvements in stiffness of gear shafts and arrangement of bearings, which, combined with accurately ground gear teeth, renders the gears exceptionally silent. The gear ratios are :—

	21 H.P.		30 H.P.
1st gear	- 4 : 1	1st gear	- 4 : 1
2nd „	- 2.4 : 1	2nd „	- 2.4 : 1
3rd „	- 1.6 : 1	3rd „	- 1.55 : 1

and top gear direct by dog clutch. The reverse ratio is 4 : 1. All gear shafts run on ball bearings, excepting the reverse, which runs on white metal bushes immersed in oil. The reverse shaft is entirely out of engagement when all other gears are in use.

Starter. The Electric Starter is flange mounted on the gear box. The Rotor Spindle carries a Pinion which engages with the toothed ring mounted on the engine flywheel.

Steering Column. The steering column is adjustable for height, three positions being provided for.

The wheel is of large diameter and carries the control levers for ignition, carburettor and air or "strangler."

Pedals. The clutch, brake and accelerator pedals are adjustable to suit the requirements of individual drivers.

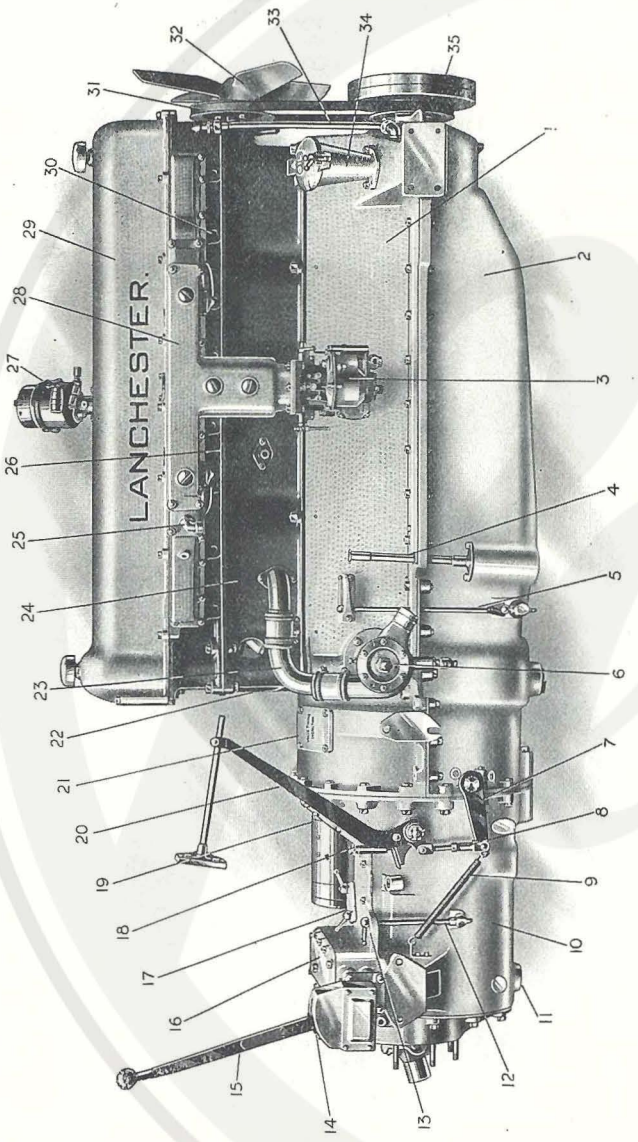


Fig. 3. 30-h.p. 8-Cylinder Engine.

Detail Description.

Engine.—As already mentioned in the General Description, the engines of the 21-h.p. 6-cylinder and 30-h.p. 8-cylinder chassis resemble each other very closely, the main difference being the two extra cylinders and dual ignition to the 8-cylinder model. Each has monobloc cylinders with detachable head, which can be be removed without disturbing the overhead valves and camshaft. The combustion space is partially spherical in form and entirely machined, a process contributing to efficiency and evenness of running. Above the cylinder head is a detachable aluminium cover totally enclosing the valves and camshaft, which, in the case of the 30-h.p. chassis, has a boss supporting the coil ignition distributor, cast at its centre. Two exhaust manifolds of large diameter are provided, each serving three and four cylinders respectively. The water circulation is by centrifugal pump and the water temperature is controlled by a thermostat which comes into operation when the water is raised to a temperature of 160-165° F., and is fully open at 175-180° F. Fig. 3 shows the inlet side of the 30-h.p. engine, Fig. 4 the exhaust side of the 21-h.p. engine, and the following tables provide a key to the numbers.

Description of fig. 3.

1	Crankcase	19	Engine Starter
2	Oil Base	20	Clutch Pedal
3	Carburettor	21	Valve Timing Inspection Lid
4	Crankcase Oil Level Indicator	22	Cylinder Head Oil Return Pipe
5	Crankcase Oil Drain Cock	23	Water Circulation Pipe
6	Water Pump	24	Cylinders
7	Clutch Lever	25	Servo Motor Suction Pipe Union
8	Clutch Adjustment Link	26	Detachable Cylinder Head
9	Clutch Pedal Spring	27	Distributor
10	Gear Box	28	Inlet Manifold
11	Gearbox Oil Drain Plug	29	Valve Cover
12	Gearbox Oil Level Cock	30	Sparking Plug Ports
13	Gearbox Oil Level Cock Handle	31	Fan Pulley
14	Gear Change Gate	32	Fan
15	Gear Change Lever	33	Cylinder Head Oil Return Pipe
16	Gear Change Selector Box	34	Engine Oil Filler
17	Gear Box Oil Filler	35	Crankshaft Vibration Damper
18	Clutch Stop		

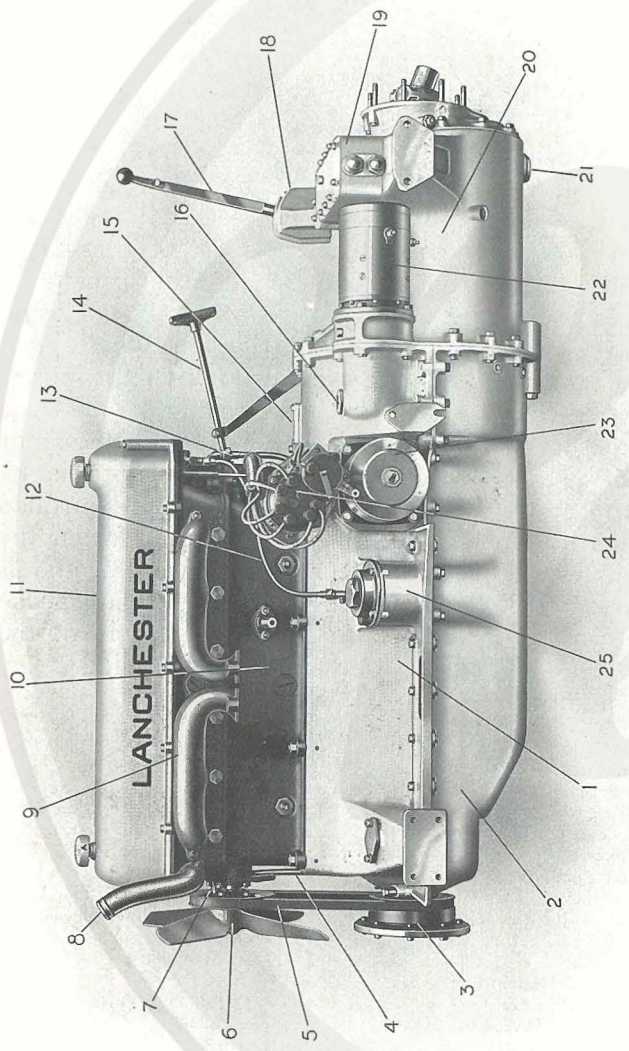


Fig 4. 21 h.p. 6-Cylinder Engine

Crankcase. It will be seen, from Figs. 3 and 4, that both the crankcase and the oil base are of deep section, combining to form an exceedingly stiff construction, the strength of which is greatly increased by employing wide flanged joints and a large number of bolts securing them to each other. The engine is supported in the chassis by bearer brackets cast integral with the crankcase and gear box. Mounted on the offside bracket at the forward end of the crankcase is an oil filler of large diameter (Fig. 3) and towards the rear of the crankcase on the same side is situated an oil level gauge and an oil drain cock. On the nearside of the crankcase is an oil filler (No. 34, Fig. 4), the gauze of which can be removed for cleaning or replacement without loss of oil.

Description of fig. 4.

1 Crankcase
2 Oil Base
3 Crankshaft Vibration Damper
4 Cylinder Head Oil Return Pipe
5 Fan Belt
6 Fan
7 Fan Adjustment Bracket
8 Water Outlet Pipe
9 Exhaust Manifold
10 Cylinders
11 Valve Cover
12 Oil Pressure Pipe
13 Cylinder Head Oil Return Pipe
14 Clutch Pedal
15 Valve Timing Inspection Lid
16 Starter Pinion Inspection Plug
17 Gear Change Lever
18 Gear Change Gate
19 Gear Change Selector Box
20 Gear Box
21 Gear Box Oil Drain Plug
22 Engine Starter
23 Dynamo
24 Magneto
25 Oil Filter

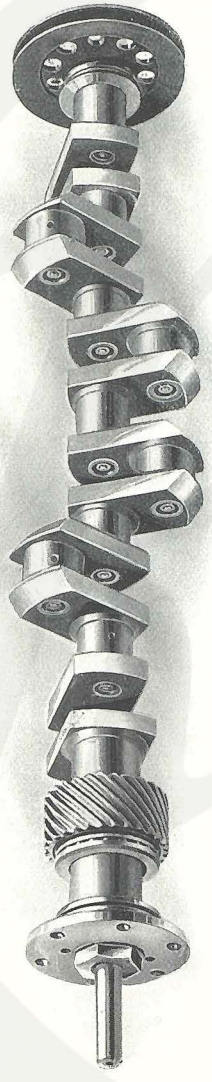


Fig. 5. 21-h.p. Crankshaft.

Crankshafts. The Crankshafts of both the 21-h.p. and 30-h.p. models are of similar design ; that of the 21-h.p. is illustrated (Fig. 5). They are exceptionally robust and are supported by a bearing between each pair of crank throws, eight bearings being employed in the 21-h.p. and ten in the 30-h.p., the main bearing nearest the flywheel in each case being divided to accommodate the cam transmission worm which runs in an oil bath. The eight throws of the 30-h.p. crankshaft are arranged in what is technically termed the 2.4.2. disposition, i.e., the four centre throws are in one plane and the end pairs are at right-angles to the centre. The cranks are of hollow formation, the shaft and crank pins being bored to effect a saving in weight. Suitable conduits are drilled for the distribution of oil, which is pressure fed. The main bearings are of special anti-friction metal.

Pistons. The Pistons (Fig. 6) have die cast

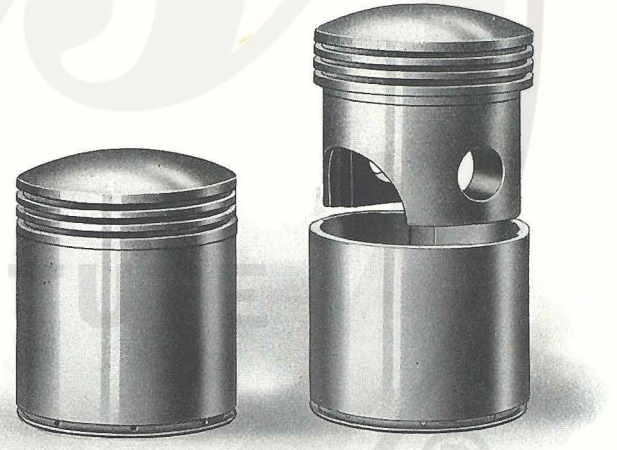


Fig. 6. Pistons.

aluminium crowns in combination with special steel skirts, machined inside and out to accurate limits. Four rings are employed, the lowest one acting as a scraper ring to prevent over lubrication and resultant carbon deposit in the combustion space. The gudgeon pin is floating and is tubular in form to save weight ; the ends are provided with aluminium plugs having a slight curvature on the face conforming to the radius of the piston skirt. A feature of this piston lies in the enclosure of the gudgeon pin within the piston skirt, thus preventing its ends coming into contact with the cylinder walls.

Connecting Rods. The Connecting Rods (Fig. 7) are stampings in high tensile steel machined all over to a uniform weight. The big end is lined with a white-metal bearing, cast under pressure, a process which ensures effective adhesion of the white-metal to the surface of the rod, and a density of structure in the bearing metal giving great durability. The small end is bushed with Duralumin. Oil is conducted from the crank pin bearing to the small end bearing by means of a steel tube which is secured in the rod before the insertion of its bearings.

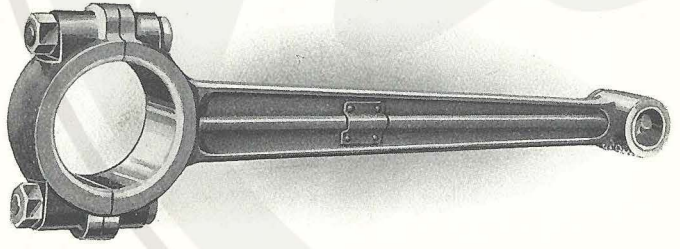


Fig. 7. Connecting Rod.

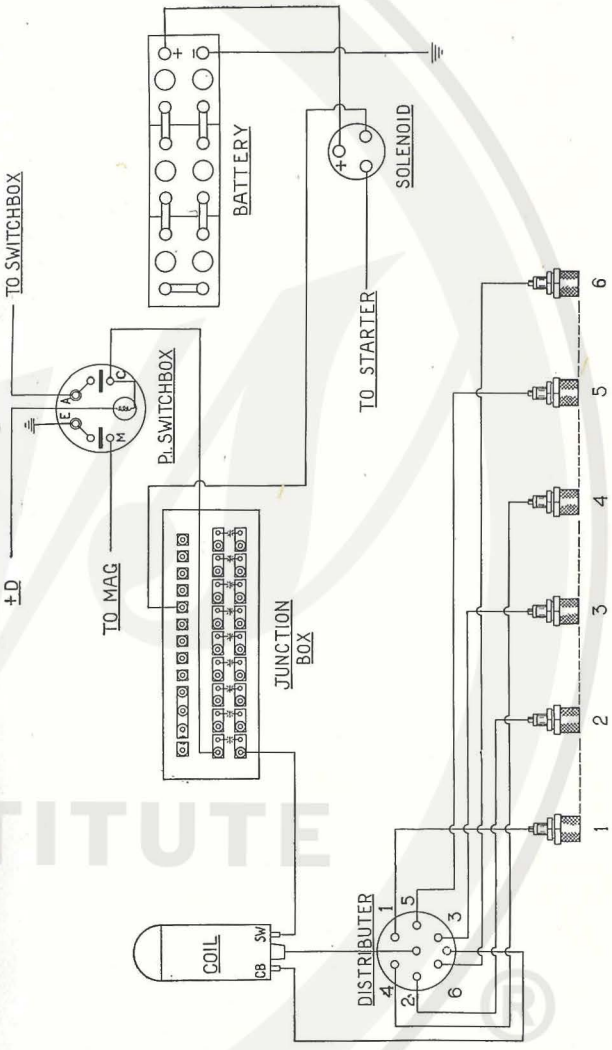
Fig 8. Valve Rocker.

Valves and Camshaft. The valves and camshaft are located overhead. The valves are of special steel, selected for its corrosion resisting properties, and will run upwards of 15,000 miles without it being necessary to re-grind the seats. They are slightly inclined from the vertical and are operated from the centrally placed camshaft by rocker arms (Fig. 8). The rocker arm for each valve has its fulcrum on the side of the cylinder head opposite to the valve. The fulcrum pin is carried on eccentrics, the purpose of which is to raise or lower the fulcrum, thereby adjusting the clearance between the tappet and valve. Approximately central in the rocker arm is carried a roller on which the cam bears ; the roller is sunk in a pocket, which forms an oil bath and ensures continuous lubrication of both the roller and its pin.

The Camshaft, as previously mentioned, is situated centrally, i.e., longitudinally between the feed and exhaust valves. It is supported, in the 21-h.p. model, by four white-metal bearings, and, in the 30-h.p. model, by six bearings, and is worm-driven through a vertical shaft situated at the rear end of the cylinders, from a worm gear on the crankshaft. In addition to the valve rocker operating cams, there is, on the 21-h.p. a six-faced cam and on the 30-h.p. an eight-faced cam, against which a spring loaded plunger abuts. The function of this cam is to counterbalance the torque re-action of the valve cams.

Ignition. On the 21-h.p. model the standard ignition is by magneto, and on the 30-h.p. model by magneto and coil. The magneto is located in an accessible position on the nearside of the engine, and is chain-driven from a sprocket on the cross-shaft, which in turn is driven by worm gear on the crankshaft. The coil ignition distributor of the 30-h.p. model is located above the aluminium valve cover and is immediately accessible by raising the bonnet. It is driven by a screw gear situated mid-way along the camshaft. The order of firing is, on the 21-h.p 1.5.3.6.2.4. and on the 30-h.p. 1.6.2.5.8.3.7.4., counting from the front of the engine. The high tension cables are connected to the sparking plugs by quick detachable insulated terminals, thus enabling the spark to be tested by the naked hand without the use of tools while the engine is running.

Carburettor. The Carburettors fitted to both the 21-h.p. and 30-h.p. cars are the outcome of extensive trials on the test bench and on the road. That selected for the 21-h.p. is the Smith 4-jet carburettor (Fig. 9) a well-known make requiring no introduction. It is a fully automatic carburettor of the simplest kind, and comprises a water-jacketted spray chamber, at the base of which are four choke tubes combined in a cylindrical pedestal which intrudes concentrically into the spray chamber. The choke tubes opening radially communicate with the spray chamber through four rectangular ports, each port being arranged at a different height. The ports are covered by a cylindrical sleeve, which forms the automatic valve for controlling the jets. This sleeve has an enclosed top and functions as a piston operated by the suction in the induction pipe ; the cavity within it forms a dashpot, which prevents irregular motion. The four ports overlap each other ; the piston uncovers each in succession, so that before one is fully



21 H.P. BATTERY IGNITION WIRING DIAGRAM.
Order of Firing, 1, 5, 3, 6, 2, 4, counting from front of Engine.

30 H.P. as above but having an 8-Cylinder Distributer.
Order of Firing, 1, 6, 2, 5, 8, 3, 7, 4, counting from front of Engine.

opened the next commences to open ; this ensures regularity of mixture throughout the entire range. The starting and slow running is provided for by arranging the piston valve so that it chokes the first port but does not entirely close it. It is notable that there is only one moving part—the automatic piston valve the entire surface of which is continually washed by petrol spray, which keeps the surfaces free from dust

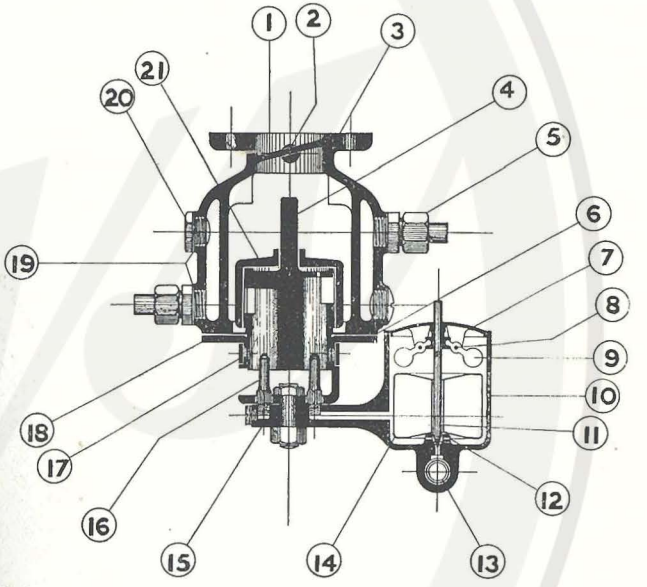


Fig 9. Description of Carburettor

1	Throttle Valve	12	Needle Valve Seat
2	Throttle Valve Spindle	13	Filter
3	Carburettor Body	14	Float
4	Choke Pillar	15	Jet Platform
5	Water Inlet Union	16	Jets
6	Paper Joint	17	Air Slide
7	Float Chamber Cover	18	Body Flange
8	Hinge Pins	19	Fibre Jacket
9	Weights	20	Jacket Plugs
10	Float Chamber	21	Automatic Valve
11	Needle Valve		

and ensures free working of the valve under all conditions. The four jets, within the four choke tubes referred to above, are carried on a platform, which is a part of the float chamber, and the jets and float chamber are readily detachable from the carburettor by removal of one nut and disconnecting the petrol pipe. The normal jet sizes, stated in the order in which they come into action are :—45. 65. 40. 30. The float chamber is of the orthodox type, containing a needle valve which is operated on by the float through the medium of two counterbalanced levers. In order to facilitate starting and to effect economy in running, additional air ports are provided immediately above the jets. These are enclosed by a rotable sleeve controlled from the manette dial on the steering column.

A Zenith Twin Carburettor (Fig. 10) is employed on the 30-h.p. car; a detail description together with maintenance notes, etc., are dealt with in a separate booklet issued with every car.

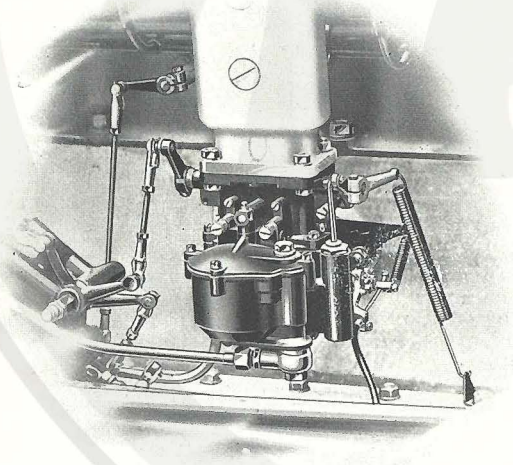


Fig. 10. Zenith Carburettor.

Induction. The Induction Manifolds of both 21-h.p. and 30-h.p. cars are the outcome of very thorough and searching experiment and it can be confidentally stated that each is the best that can be devised to fulfil its functions under the varying conditions of use.

The Manifold consists of an aluminium casting having the intake from the carburettor and Tee branch water jacketed. The distribution branches are of special formation to ensure uniform distribution throughout the wide compass of engine revolutions, varying from 150 r.p.m. to over 3,400 revs. per min.

Petrol Supply. In both cars petrol is fed to the carburettor by gravity from a vessel located on the dash, containing the Autovac, by means of which the fuel is raised from the tank carried at the rear of the chassis to the gravity vessel. The Autovac consists of a chamber having an outlet valve, an air valve, and a vacuum valve, the two latter being actuated by a float within the vacuum chamber, and the outlet valve is automatic. The vacuum valve is connected to the induction manifold by a small bore pipe. The function of the float is to close the air valve and open the vacuum valve when it falls, and to close the vacuum valve and open the air valve when the chamber is full.

A filter is carried on the exterior of the gravity vessel through which the fuel passes before entering the autovac. The filter body is quickly detachable for removal of any foreign substance collected.

The gravity vessel is provided with a cock, which is operated from the instrument board, shutting off the supply to the carburettor when desired ; it is also provided with a drain cock, by which, in the event of water or other foreign matter passing the filter, it

may be drained away. A detail description of the working parts of the Autovac is given in Fig. 11.

Water Pump and Circulation. The centrifugal water pump (Fig. 12) is driven off one end of the cross shaft. The suction on the rotor is balanced by dividing the suction pipe and leading half of the feed water in on each side. By this arrangement the necessity for a packing gland is eliminated. In order to prevent leakage when standing the rotor is maintained against

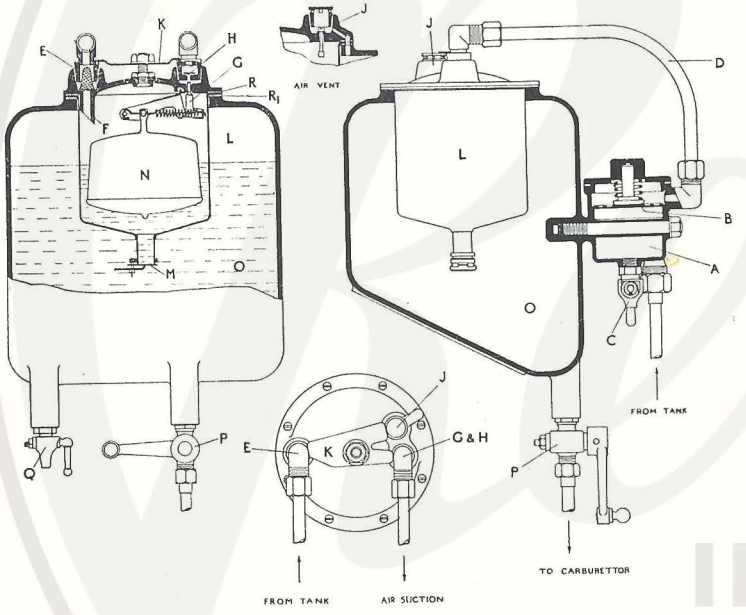


Fig. 11. Description of Autovac.

A Petrol Filter Body
B Petrol Filter Gauze
C Petrol Filter Drain Cock
D Autovac Supply Pipe
E Autovac Petrol Strainer
F Autovac Petrol Inlet
G Vacuum Valve
H Outlet Valve
J Air Vent and Valve
K Clamp Plate
L Vacuum Chamber
M Vacuum Chamber Outlet Valve
N Float
O Petrol Container
P Petrol Feed Cock
Q Petrol Drain Cock
R & RI Cork Joint Gaskets

its seat by means of a spring loaded plunger. The pump spindle bearing is lubricated by oil thrown from the crankshaft, the oil supply being regulated by means of a small screw regulator. Delivery from the pump passes direct into the cylinder jacket and thence through the cylinder head to the radiator. Incorporated in the radiator is a thermostat which automatically controls shutters or louvres in front of the radiator, by means of which the engine attains an efficient temperature a few minutes after starting.

Radiator. The radiator is of honeycomb type, and, following established Lanchester practice, is provided with a glass level gauge.

Drainage of the water service is effected by a cock in the under side of the water pump, which entirely

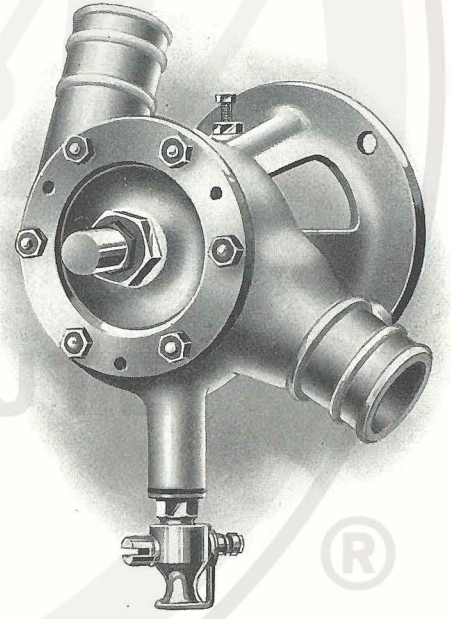


Fig 12. Water Pump.

empties the water jacket and radiator, and also empties the pump rotor chamber. The drain cock handle is readily accessible through a port in the chassis valance. The total water capacity of the 21-h.p. circulation system is $4\frac{1}{2}$ gallons, and that of the 30-h.p. 5 gallons.

The Cooling Fan is driven from a grooved pulley on the front end of the crankshaft by a strong reinforced india-rubber belt. The fan is carried on a quadrant and provided with simple means for adjusting the belt tension.

Lubrication. Lubrication is by gear pump driven from a downward extension of the vertical shaft. Oil is forced under pressure to the main bearings, connecting rod heads and small ends, pistons, camshaft worm drive, and bearings. In the case of the oil sump, on the suction side of the pump, is a copper gauze strainer, and on the pressure side of the pump is the oil filter (No. 25, Fig. 4), which is removable without loss of oil or the necessity of emptying the oil sump. In order to maintain a constant oil pressure a spring loaded relief valve is fitted, which allows excess oil to drain back into the sump. The lubrication of the engine is entirely automatic and requires no attention other than the usual periodic re-filling and removal of the stale oil after 2,000 miles running, for which a drain cock is provided in the base of the oil sump controlled by a lever accessibly placed on the off-side of the engine adjacent to the oil level float. The oil filler (Fig. 3), at the front end of the crankcase, is provided with a detachable copper gauze strainer. The filler also serves as a crankcase vent.

In addition to the oil filter, an oil cleaner is mounted on the engine side of the dash, which filters a portion of the oil continuously during circulation. The lubrication instructions, commencing on page 41, apply to both 21-h.p. and 30-h.p. Chassis.

Dynamo and Starting Motor. These are subject matter of a separate booklet, supplied with the tool kit, and consequently reference to them herein is brief and relates only to mechanical features.

The dynamo (No. 23, Fig. 4), situated at the rear end of the crankcase on the nearside, is driven from the cross-shaft through the medium of a toothed steel coupling.

The Electric Starter (No. 22, Fig. 4), is mounted on the flywheel casing and lies horizontally parallel to the gear box. The commutator cover is divided to make it readily detachable, giving access to the brushes and commutator for cleaning or adjustment. The starter pinion is of the bendix type and automatically engages with a gear ring mounted on the flywheel when the armature is set in motion by operating the push-in switch on the instrument board.

Clutch. The Clutch is of the single disc type, simple in construction and capable of running many thousands of miles without adjustment. The clutch disc is carried on the first motion shaft of the gearbox and is in sliding-splined connection with same. It is housed within the flywheel and when in engagement is gripped between two ferodo discs. The clutch thrust bearing, which is under load only when the clutch is disengaged, is a substantial ball thrust bearing operated by the foot pedal. Mounted on the clutch coupling is a small brake drum ; the clutch pedal operates a ferodo faced lever, which when fully depressed, makes contact with and arrests the clutch brake drum. The clutch stop is adjustable by rotating a wing nut which is self-locking and requires no tools to adjust.

Gear Box. The change speed gear of the 21-h.p. and 30-h.p. cars differs from that of the 40-h.p.

6-cylinder Lanchester, in that four-speed gear of the sliding type is adopted in place of the three-speed epicyclic. The gear wheels are of nickel chrome case-hardening steel, and the teeth are accurately ground to form, after hardening. The change speed gear is simple and easy to operate. The gear ratios are given in the General Description, but for the reader's convenience are repeated here :—

	21-h.p.	30-h.p.
1st speed - -	4 to 1	4 to 1
2nd „ - -	2.4 to 1	2.4 to 1
3rd „ - -	1.6 to 1	1.55 to 1
Top (direct drive) -	1 to 1	1 to 1
Reverse - -	4 to 1	4 to 1

The reverse gears, it should be noted, possess the feature of being entirely disengaged and stationary when the forward gears are in use. The gear box is provided with an oil filler of approximately 2″ diameter aperture, and an oil level cock is situated on the off-side of the gear box. Access to the filler and oil level cock is obtained by removal of the driver's floorboard.

Transmission. The transmission is by cardan shaft enclosed within the torque tube. It is connected at the front end to the driven shaft of the gear box by means of a universal joint and at the rear end to the worm shaft by a splined joint. A ball bearing supports the propeller shaft at its centre, a housing being provided within the torque tube. The "Hook's" or universal joint, at the forward end, is automatically lubricated by leakage from the gear box, which also provides lubrication for the torque tube ball and for the propeller shaft centre bearings.

Rear Axle. The Rear Axle (Fig. 13) is composed of the three principal components ; a central aluminium gear box and steel conical tubular side members. The gear box contains the worm gear (which is of the Lanchester silent high efficiency type) and the differential, the side members carrying the axles, the spring brackets and the brake brackets. The standard ratio of worm gear for the 21-h.p. is 7-34, and for the 30-h.p. 8-35, i.e., 4.68 : 1 and 4.375 : 1 respectively.

The worm gear box is divided horizontally, the top being easily removable for inspection, without disturbing the worm gear or differential bearings. The axles are three-quarter floating and the wheel hubs are secured to them by splines and cones in combination, the conical portions being drawn up tight into the hubs by means of a nut.

The hubs are mounted on the ends of the axle casing on robust ball bearings, which are disposed approximately in line with the wheel track.

The rear axle casing is connected to the chassis by the torque tube, which is permanently bolted to the

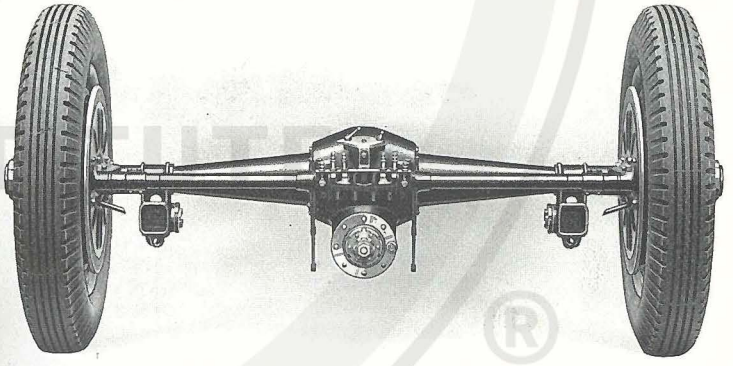


Fig. 13. Rear Axle.

worm gear box at the rear end and articulated to the rear end of the power unit with a large spherical joint.

Front Axle. The Front Axle (Fig. 14) is of stout large diameter tubular construction, specially designed to resist the torsional loads imposed by the action of front wheel brakes. The axle carries the semi-elliptic front springs, which lie above the axle. The stub axles are drop forged, and, incorporated with them, are the upper and lower journal bearings of the swivel head. The ends of the steering lever and steering coupling levers are of taper formation, the tapers fitting into sockets of similar formation in the swivel heads, into which they are also keyed and secured by castle-nuts.

Steering Gear. The steering column is secured to the chassis frame at the lower end by means of a pivot bolt. Passing through the foot-board it is supported at the dashboard by a bracket. In order to vary the rake of the steering column to suit different types of bodies and different driver's requirements, four marks of dashboard brackets are manufactured—high, normal, low and sports.

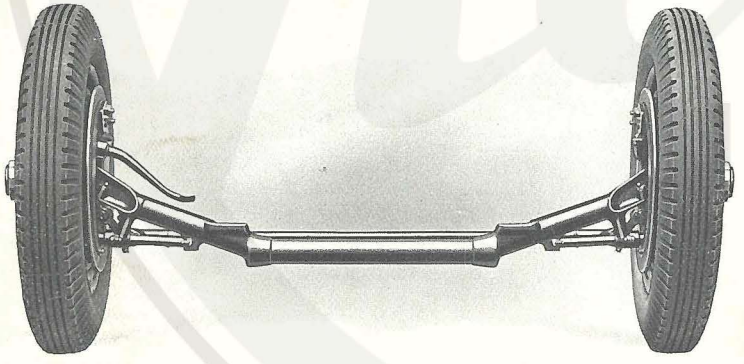


Fig. 14. Front Axle.

The steering shaft consists of a steel tube, on the lower end of which are cut right and left-hand threads, engaging with two half sleeves (Fig. 15), one of which has internally a portion of thread right-hand and the other left-hand, corresponding with the threads on the shaft. The lower ends of the sleeves terminate in hard steel blocks which bear on two hard steel rollers

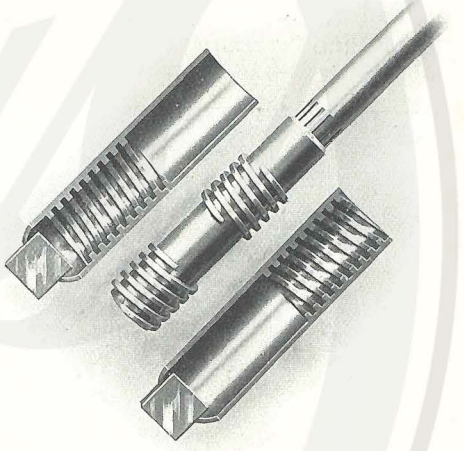


Fig. 15. Steering Shaft.

mounted in sockets provided in the rocking shaft. The trunnions of the rocking shaft are carried on bearings formed in the base of the steering box ; one end of the shaft protrudes through its bearing and carries the steering lever, which is connected by means of combined spline and cone joint. At the head of the steering box

(Fig. 16) a ball thrust bearing is provided, which is adjustable externally. The tubular steering shaft is enclosed within the steering column and is supported at the top close up to the steering wheel by means of a oil-less bearing. The steering wheel (Fig. 17) is of large diameter and carries the control levers for ignition, carburettor and air, mounted in the centre. The manette tubes pass through the steering column ; the outside one, being clamped to the steering base, carries the manette dial. To the inner tubes, at their upper end, are attached the controls for throttle ignition, and carburettor, and at the lower end is the throttle lever, ignition lever and carburrettor control mechanism.

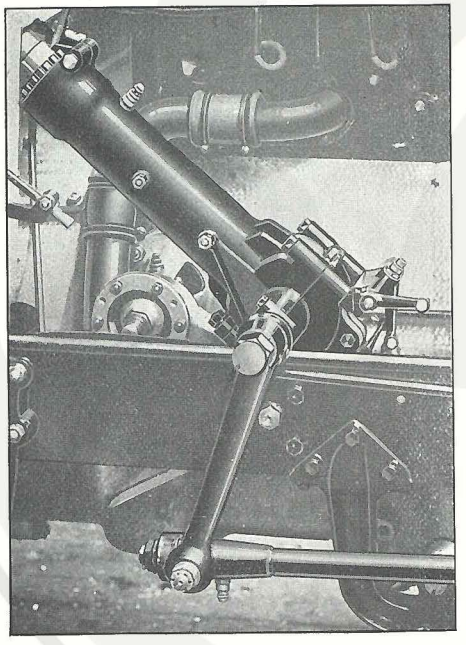


Fig. 16 Steering Box.

The levers and the links connecting them have quick detachment joints of special ball and socket design (Fig. 18).

Brakes. The brakes are of internal expanding type, acting on all four wheels, power being supplied by a vacuum servo motor. The brake drums are aluminium, of large diameter with cast iron liners. The brake shoes are faced with fabric linings and are retained in position by tension springs. The brake pedal operates the vacuum servo motor, which applies the front and rear brakes simultaneously ; the hand brake lever operates the rear wheel brakes only, by independent linkwork. Below the pedal shaft is a compensating bell-crank, from which actuating links are carried forward to a lever on the front brake shaft and rearward to the rear wheels brake

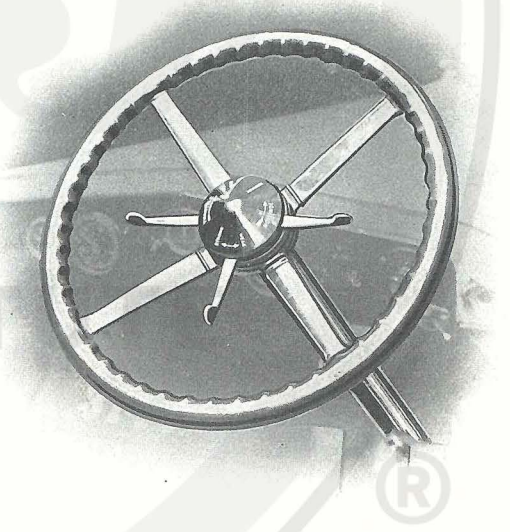


Fig. 17. 21-h.p. Steering Wheel.

shaft. The front brake shaft is mounted forward of the axle in order to harmonise the brake link motion with that of the front axle. At the ends of the cross shaft are levers, which are linked to the brake camshafts, supported in bearings beneath the axle. The brake camshaft terminates with an eye, in which is mounted a rotable cam, so that whilst rotation of the shaft forces the brake shoes apart in the usual manner, the action of the cams is undisturbed by steering movements.

The main operating link of the rear wheel brakes is carried backward from the compensator bell-crank to a lever mounted at the end of a cross-shaft carried in brackets secured to one of the torsional members of the chassis frame. This cross-shaft carries two levers, connected by links to levers on the actuation

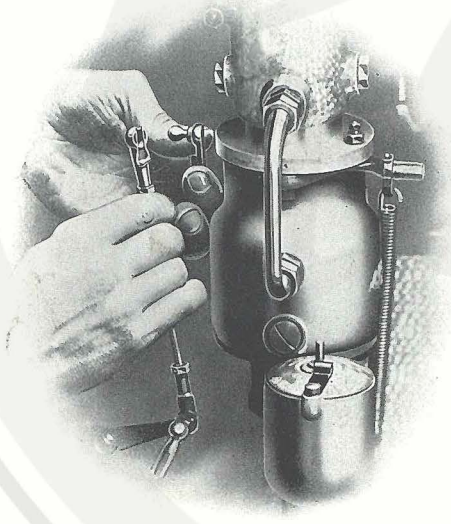


Fig. 18. 21-h.p. Manette Levers Ball Ends.

shafts situated on the rear axle casing, which in turn actuate the rear brake shoe cams. Separate actuation is provided for the hand brake, which operates independently on the rear wheel brakes only.

Suspension. The Rear Suspension (Fig. 19) is of Lanchester Cantilever design. A range of four types of springs are standardised, to suit different weights of bodywork, and provision is made for adjustment vertically. The springs are pivoted at their centre on bearings having a floating anti-friction metal bush. Oil is employed as a lubricant, and the pin on which the bearing is mounted is of large diameter and hollow, forming an oil reservoir. In place of the usual spring shackles the ends of the springs are carried in phosphor bronze trunnions provided with a rectangular aperture passing diametrically through them for the reception of

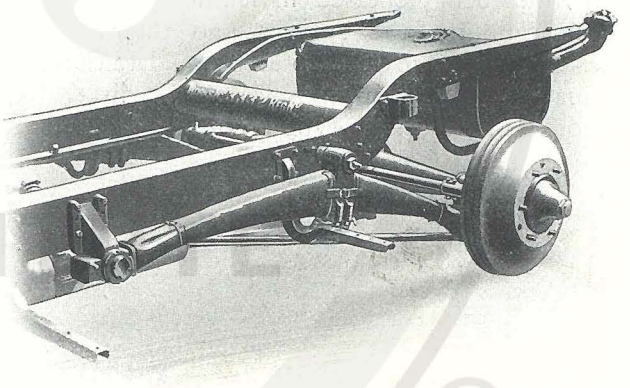


Fig. 19. Rear Suspension

the spring extremities, and an adjustment is provided to take up side play due to wear. The spring leaves themselves are highly polished and are interleaved with hard rolled brass perforated inserts. These are loaded with lubricant and the whole spring encased in a leather gaiter. The trunnions are located in the suspension brackets, which are provided with lubricators.

The Front Suspension, whilst closely following orthodox design, possesses some marked differences. The springs are mounted on the top of the axle and are more robust than those of any other chassis marketed to-day. They are anchored at their front end to the dumb iron with Phosphor Bronze trunnions, enveloping the ends of the two master-leaves ; at the rear end are also Phosphor Bronze trunnions in which both sliding and rotational motion is provided for. Following the construction of the rear springs, the leaves are polished and are built up alternately with polished brass inserts loaded with lubricant, the springs then being encased in leather gaiters. Oil is the lubricant for the springs and their trunnions, lubricators being provided to accommodate the oil gun. Two marks of front springs are standardised, to suit variations in load due to type of body and equipment.

Starting and Running Instructions.

The following is intended to give the purchaser a knowledge of the use and position of the mechanism referred to in the instructions.

The ignition switch is placed centrally on the instrument board.

The ignition timing is, as usual, controlled by a manette lever mounted on the steering column, the direction of advance being indicated by an arrow on the manette dial. The controls for throttle and air (21-h.p.) or Air Strangler (30-h.p.) are also mounted on the steering column.

The carburettor is arranged on the offside of the engine, and is fed by means of the Autovac System described on page 24. Vacuum feed is to-day accepted as being the most reliable system and rarely requires attention of any kind.

The Electric Starter is operated by a push-in switch situated on the instrument board to the right of the ignition switch. The starter pinion is of the bendix type and automatically engages with a gear ring mounted on the engine flywheel.

The Starting accumulators are housed in a box on the near-side step board.

The charging Dynamo, situated at the rear of the Crankcase on the nearside, is controlled by the charging switch on the instrument board. Different charging rates are provided for Summer and Winter.

When first starting up in cold weather it is kinder to the accumulators to hand crank the engine over slowly two or three times, in order to disturb the oil film, which may have become congealed.

INSTRUCTIONS.

Before Starting. See that the radiator is filled with water nearly to the top of the glass level gauge.

See that the engine crankcase is filled with oil to the requisite level. (See Lubricating Instructions).

See that there is sufficient petrol in tank.

See that the petrol tap situated on the instrument board is turned on.

STARTING A COLD ENGINE.

Advance ignition lever fully.

21-h.p. See that the air control lever is at "strong" position.

30-h.p. Close the Air Strangler, but release it immediately the engine starts.

Turn ignition switch to "on" position and press in the starter switch firmly and decisively, releasing pressure immediately the engine is started.

21-h.p. After a few minutes running the position of the air control lever may be altered from "strong" towards "weak" as far as possible consistent with obtaining good "pulling."

21-h.p. In warm weather the engine will be started without flushing the carburettor, but where the Motor house is insufficiently heated it may be found necessary in cold weather to flush the jets in the usual manner by lifting the Float Needle. Priming taps are fitted in the Induction pipe as an additional aid, to facilitate starting in exceptionally cold weather.

When starting from cold, before switching on the ignition, it is advisable to open the throttle fully and give the engine about half a dozen turns with the starter, then close the throttle and switch on. This generally speaking, facilitates starting and obviates the necessity of flushing the carburettor, even in cold weather. Immediately after starting it is frequently advisable to keep the induction flow agitated by sharply patting the accelerator pedal with the foot.

DRIVING.

The engine speed, and consequently car speed, is controlled alternatively by the throttle manette lever on the steering wheel or by the accelerator which is placed to the right of the brake pedal. The usual and most convenient method of speed control is to place the throttle lever in the best position for slow running and increase speed by the use of the accelerator. The average position of the ignition manette lever is approximately half-way up the rack. It should only be retarded for dead slow running, or advanced beyond this point for high speed running. In cold weather, or before the engine has got warmed up, it may be found advantageous to advance the ignition.

Maintenance.

FOREWORD.

A Car, like every other mechanical device, requires a certain amount of care and periodical attention, in order to obtain the best service.

In the Lanchester Cars, facilities have been provided, to enable the owner himself to make minor adjustments incidental to ordinary usage and to render the ordinary maintenance of the Car as simple as possible. The replenishment of the water and oil supplies are ordinary operations which every owner realises must be executed, but it is to be feared that too few regard the running adjustments in the same light, and in consequence because the Car, although not quite up to its usual form, is running well enough, adjustments are neglected. It is not suggested that the owner-driver should undertake, or be able to undertake mechanical repairs, but there are several running adjustments, which, although important are very easily carried out by the man who may have but little mechanical knowledge, and in the following pages are instructions for such adjustments as are in no instance beyond the skill of the owner-driver.

Lubrication.

IN general design the Lanchester 30-h.p. 8-cylinder and 21-h.p. 6-cylinder Chassis are identical, and the instructions given here for lubrication apply to both.

An examination of the chassis reveals many instances of the care that has been exercised in order that the lubrication of any part shall be simple and effective, and expeditiously carried out. It will be found that the Oil Fillers are of generous proportions with lids needing no tools to open. The Oil Filler, Oil Filters, Oil Drains and Lubrication Nipples are located in the most accessible positions, whilst the number of lubrication points has been reduced to a minimum consistent with the safe and efficient running of the car.

The Engine Oil Sump capacity is 2 gallons (1¾ gallons in the case of the 21-h.p. Chassis), sufficient to run about 700 miles. The Oil Filler "A," Fig. 20, is fitted on the off-side front engine bracket, and on the same side, towards the rear of the engine, visible whilst filling, is an Oil Level Indicator "B" and Drain Cock "C." When filling, remove the screwed cap from the oil level indicator to allow the float stem to rise. The correct level is marked on the stem. In the event of over filling, open the oil drain cock and allow it to remain open until the indicator falls to the correct level. In the base of the oil sump is a fine mesh gauze strainer, which is on the suction side of the oil pump, and on the pressure side of the pump is an Oil Filter "D," Fig 21. The oil is forced under pressure from the pump through the filter and thence by pipe to the main bearings, and through ducts in the crank to the connecting rod heads. From thence it passes to the connecting

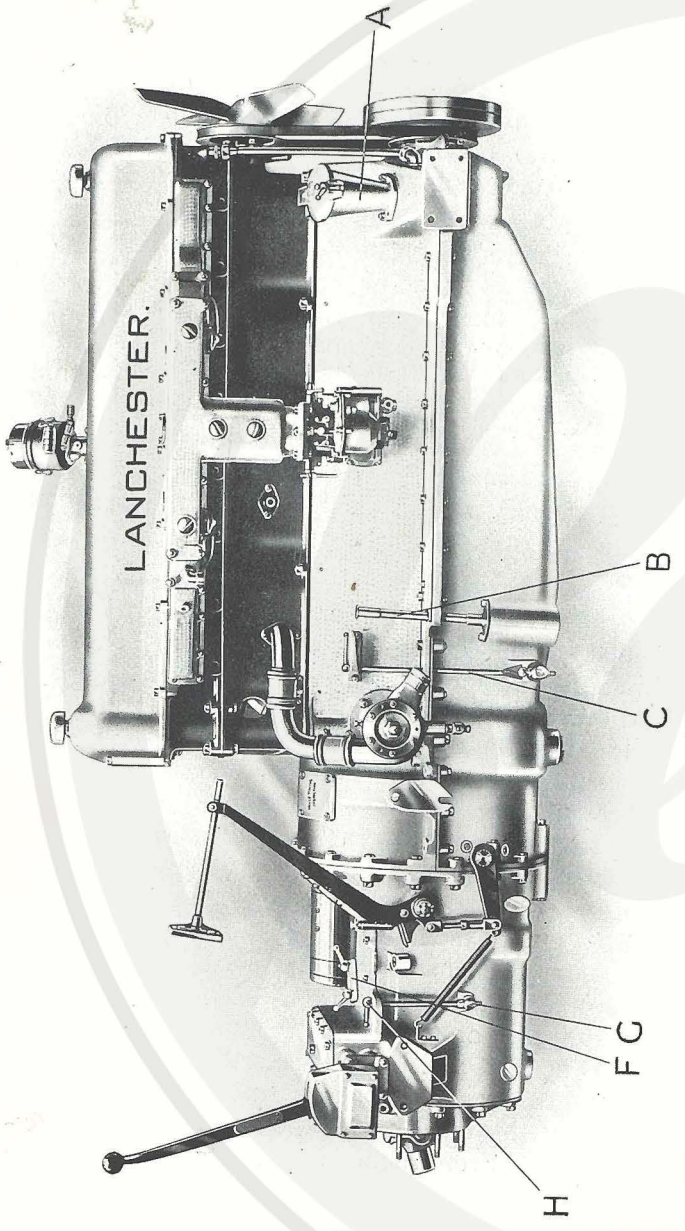


Fig. 20.

rod small end bearings through a steel tube secured to the connecting rod. The oil pressure pump also feeds the camshaft bearings, surplus oil from which is sprayed on to the cams and valve levers. The oil filter is so designed as to be removable for cleaning without loss of oil or the necessity of emptying the sump, and incorporates an oil pressure relief valve. In addition to the oil filter an automatic oil cleaner is provided ("E" Fig. 21) which filters a portion of the oil continuously during circulation. The cartridge should be changed every 8000 miles. To keep the driver informed as to the automatic lubrication of the engine an Oil Pressure Gauge is provided on the instrument board. As long as the oil gauge operates there is no need to re-fill with oil; the first indication that the engine requires re-filling will be that the pressure gauge ceases to act when travelling down-hill and recovers when travelling on the level or up-hill.

Note. Drain stale oil from Engine and re-fill every 2,000 miles.

The Gear Box contains 1 gallon of oil. The filler ("F" Fig. 20) is located in the centre of the gear box inspection cover. Access is obtained by removing the driver's floorboard. Adjacent to the filler on the offside is an oil level cock "G" and handle "H" (Fig. 20) which should be opened when filling the gear box. When oil commences to flow from the level cock, cease filling, close the level cock, and screw down the filler lid. The gear box should be replenished after about 1000 miles. Oil from the gear box automatically lubricates the propeller shaft central bearing.

For both Engine and Gear Box use Lanchester "A" Cylinder Oil.

The Rear Axle Worm Gear Box contains half gallon of oil; sufficient to run about 800 miles. The

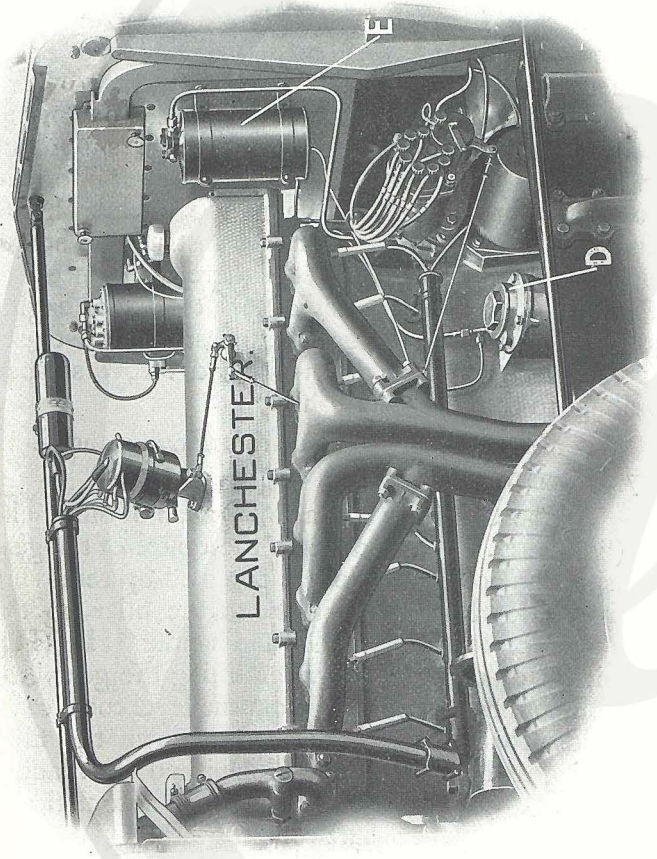


Fig. 21.

worm gear box oil filler ("J" Fig. 22) is accessible by removing the rear seat cushion and seat board. An oil level cock "K" is provided on the offside of the worm gear box. When filling, the level cock should be opened, and when oil commences to flow from the level cock, cease filling, close the level cock, and screw down the filler lid. Leakage from the rear axle casing automatically lubricates the rear wheel hub bearings. The oil employed for the Rear Axle is Lanchester "B" Oil.

The Dynamo and Starter require very little lubrication ; a small quantity of thin grease should be applied to the commutator end bearing, accessible by removing the hexagon nut which keeps the commutator cover in place. Over lubrication will cause sparking of brushes and should be avoided.

The Magneto is lubricated through two small oil wells provided at the distributor end and one oil well at the driving spindle end. Only a very small quantity of thin oil is needed. Oiling instructions will be found on a small engraved plate mounted on the body of the magneto and the quantities stated thereon should not be exceeded.

Parts requiring hand lubrication periodically are :—

Front Springs Front and Rear Trunnions.
Steering Link Joints.
Steering Coupling Link, both ends.
Steering Pivot Pins, both wheels.
Front Wheel Brake Cross Shaft Bearing, both ends.
Manette Control Shaft.
Front Brakes Cam Shafts, located under Front Axle.

Steering Column Base.

Rear Spring Front Trunnion.

Rear Spring Centre Pin.

Foot Brake Pedal Shaft.

Radiator Fan Hub

The Actuating Shaft Bearings of the Foot and Hand Brakes are lubricated by means of oil pipes leading through the near side chassis frame to a bracket mounted on the outside ("L" Fig. 22) which carries four lubrication nipples. An engraved plate indicates that two nipples serve the Foot Brake Shaft and two the Hand Brake Shaft.

The Brake Shafts on the Rear Axle are lubricated through nipples carried on a bracket ("M" Fig. 22) adjacent to the Rear Axle Oil Filler and are accessible by removing the rear seat board.

All the above parts are lubricated by means of the oil gun, and the lubricant employed is Lanchester "B" Oil.

The Accelerator Pedal Shaft is provided with an oil-less bearing and requires no lubrication.

The parts in the following list should be hand oiled, using the Lanchester Syringe Loco Oiler and Lanchester "A" Oil :—

Rear Brake Link Knuckles.

Hand Brake Link Knuckles.

Brake Compensator Lever Knuckles, located at the lower end of foot brake pedal lever.

Front Wheel Brake Link Knuckles.

Front Wheel Brake Actuation, Coupling Shaft and Knuckles.

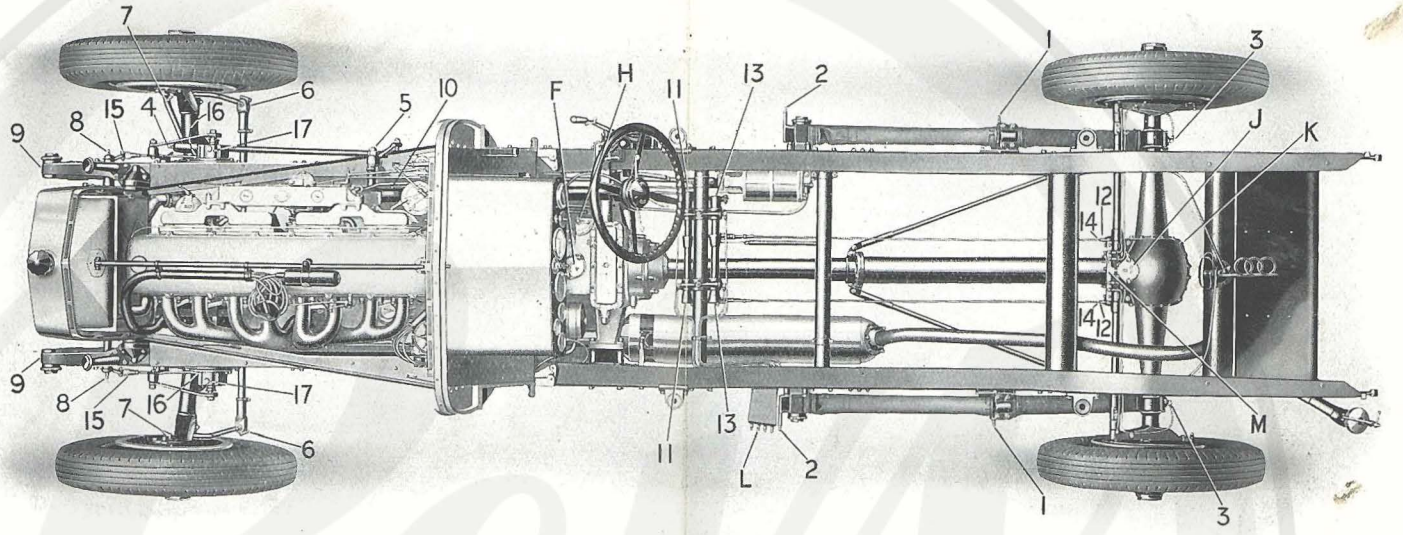


Fig. 22.

DESCRIPTION OF FIG. 22.

F	Gear Box Oil Filler.
H	Gear Box Oil Level Cock Handle.
J	Rear Axle Worm Gear Box Oil Filler.
K	Rear Axle Worm Gear Box Oil Level Cock.
L	Brakes Actuation Shaft Bearings Lubrication Nipples.
M	Rear Brake Shafts Lubrication Nipples.
1	Rear Spring Centre Pin.
2	Rear Spring Front Trunnion.
3	Rear Spring Rear Trunnion
4 & 5	Steering Link Joints.
6	Steering Coupling Link.
7 & 8	Steering Pivot Pins.
9	Front Wheel Brake Shaft.
10	Manette Control Shaft.
11	Front Spring Dumb Iron Pins.
12 & 13	Rear Brake Link Knuckles.
14 & 15	Hand Brake Link Knuckles.
16 & 17	Front Wheel Brake Link Knuckles.
18	Shock Absorber Filler Plugs.

Drain stale oil from engine and gear box, and replenish every 2,000 miles.

Starting Handle Guide.
Change Speed Gear Selector Shaft Bearing.
Clutch Brake Shaft.
Clutch Pedal Bearing.

Lubrication of the Front Wheel Hub Bearings is effected by unscrewing the small plug located in the centre of the hub, and into its place screwing the special lubrication nipple supplied with the tool kit ; grease is then injected by means of the Tecalemit Gun.

In lieu of Lanchester Oils specified, other proprietary brands equivalent may be used, such as :—

For Engine and Gear Box :

Vacuum Mobiloil " A."
Shell-Mex " D."
Pratts Medium Heavy Grade Lubricating Oil for Summer and Winter Use in the Engine.
Pratts Gear Oil for the Gear Box.
Prices Motorine " C."

For Rear Axle :

Vacuum Mobiloil " B."
Golden Shell Grade.
Wakefields Castrol " S."
Prices Amber Gear Oil.
Pratts Gear Oil.

ELECTRICAL PLANT.

Instructions concerning the Electric Starter and Generator are contained in a separate book issued by the manufacturers Messrs. J. Lucas Ltd., and included in the car equipment.

BATTERY MAINTENANCE.

General instructions including those for first charge of Accumulators.

Acid. This should be pure Brimstone (Sulphuric). Specific Gravity 1.225. The Electrolyte (another term for dilute acid) is a mixture of Pure (not Commercial) Sulphuric Acid and Distilled Water. The density in the cells should be 1.225 and is in the proportion of about one part of acid to four parts of water, by volume.

The specific gravity of the acid will be affected to some extent by the temperature and may vary 10 to 20 points above or below the normal.

When cells are sent out dry and uncharged and the dilution of acid has to be carried out on site, care must be taken to pour the water into the mixing vessel *first*, adding the acid by degrees and stirring constantly.

To mix the acid; either a lead, lead-lined wood or a glazed earthenware tank should be employed.

On no account must metal vessels be used.

The Acid must not be used until it is quite cold.

The first charge must be continuous.

Charging must commence immediately after adding acid to the cells, otherwise damage will result.

The rate should be 4 amperes and should be continued until gas is freely evolved from all the plates and the voltage has remained constant at 2.55 to 2.6 volts for at least three hours.

This generally requires about 48 hours.

After the preliminary first charge has been completed and the battery has been put into regular working condition, the following procedure should be adopted for charging, etc. The charge should be continued until gas bubbles are being given off from both positive and negative plates.

As a general rule about 11 per cent. more in ampere hours or about 34 per cent. in watt hours (an ampere hour efficiency of about 90 per cent. equals a watt hour efficiency of about 75 per cent.) should be put into a battery than has been taken out since the previous charge, this excess of charge over discharge causing the above mentioned gassing to take place.

Insufficient Charge. Positive plates which are insufficiently charged become, first, a brick-red colour and next a patchy light red, or even in certain cases, a grey colour. (Don't be misled by the loose lead sulphate which settles on the top of the plates.) Under such conditions electrical action taking place between the component parts of the plates themselves, may cause buckling and will in any case, tend to rot the plates and shorten their useful life.

Cells must never be run down below 1.8 volts per cell, nor must they be left in a discharged or partially discharged state, but always be recharged as soon as possible after a discharge is completed.

Overcharge. Positive plates which are systematically overcharged become almost black and the active material is dislodged, causing heavy deposit and growth on negatives. Excessive charging must be avoided as it destroys the plates and causes the active material to be thrown out and deposited on the bottom, when eventually it will cause a short circuit between the positive and negative plates.

MAINTENANCE OF IGNITION.

Sparking Plugs. The importance of keeping the spark gap correctly adjusted is too frequently overlooked. The gap should be adjusted to not less than .016" wide and not more than .020". The valve clearance slip gauges together total .015" and may be used as a minimum gauge for the spark gap. Neglect of this precaution may result in the breakdown of the magneto high tension circuit, either by causing the high tension slip ring brush and insulation to become burnt, or by breaking down the armature winding, due to the resistance caused by a wide gap; whilst too narrow a gap will cause missing fire.

MAGNETO.

Contact Breaker. The contact breaker is intended to operate with a *gap of* 0.012 *in. when the contacts are fully open*, and this should be checked periodically by the aid of the feeler gauge on the spanner provided with the magneto. It is extremely important that the contacts are kept clean and, in particular, free from oil, which if present on the contacts becomes oxidized and impairs the efficiency of the magneto.

Distributor and Distributor Brush Holder. The distributor may be removed every 3,000 to 5,000 miles, or when decarbonizing the engine, and the inside surfaces cleaned with a cloth soaked in petrol.

The surface of the brush holder should be treated in a similar manner.

Adjustments and Location of Faults. (1) If the engine is firing irregularly, though some portion of the ignition is frequently at fault, the magneto is seldom the cause of the trouble.

The plugs should be first examined to see that they are not sooted up or the electrodes burnt away to such an extent that a big sparking gap results.

Another trouble with plugs, which is not so apparent, is leakage, especially when hot, and when this is suspected it is advisable to fit new ones before making any adjustments to the magneto.

(2) *The low tension lead connection must be rigidly clamped under the insulated terminal nut on the contact breaker cover.*

This lead serves to connect the primary winding of the armature to the contact breaker and therefore any faulty connection may interfere with the satisfactory operation of the magneto.

(3) The platinum points of the contact breaker should be inspected to see that they are quite clean and that the gap between them, *when they are fully open, is* 0.012 *in.* A minute particle of foreign matter lodged between the contacts is quite sufficient to put the magneto out of action, and also large or small contact gaps will seriously affect the operation of the magneto.

(4) If sparking persistently occurs at the safety gap of the magneto, it is an indication that there is a break in the external high tension circuit, or a plug in which the sparking gaps are excessive.

(5) A possible cause of the magneto not sparking is the cable from the low-tension cut-out terminal to the switch on the dashboard coming in contact with the frame, due to a fracture of the insulation around the wire.

RADIATORS.

Radiators are more susceptible to corrosion when allowed to stand empty than if completely filled. It is therefore advisable at all times, except when there is a danger of the water freezing, to keep the radiator filled well above the level of the cell block.

If a Car is standing idle for some weeks it should be inspected from time to time and the radiator re-filled in event of the water failing to cover the cells.

Running Adjustments.

ADJUSTMENT OF FOUR WHEEL BRAKES.

In the majority of internal expanding brakes as fitted to the road wheels of automobiles the wear of the brake drums and shoe linings is adjusted by rotating the cam which expands the brake shoes. This procedure alters the leverage of the cams and when the adjustment is approaching its limit the cams are liable to assume an angle at which the spring returns them to zero with difficulty, and sometimes fails to return them, leaving the brake shoes rubbing the drums.

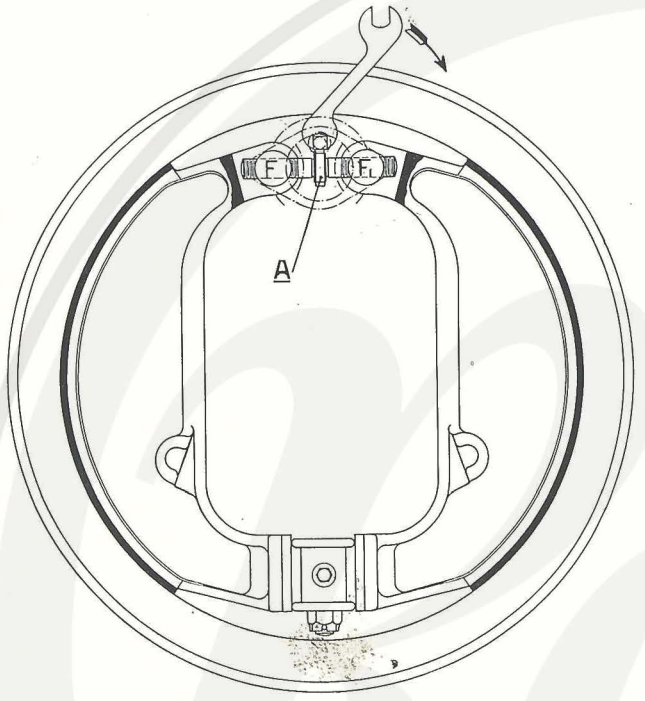
In the Lanchester four-wheel brakes this difficulty has been overcome by arranging the cams so that their axis invariably returns to a direction radial to the centre of the brake drum, and the adjustment is made by moving the pivots of the brake shoes relatively to one another. The brake shoes are pivotted separately on trunnions mounted on a rotable spindle (Fig. 23) the ends of which are screwed Right and Left, holes through the trunnion being tapped to correspond.

The Spindle is rotated by a worm gear, the worm shaft terminating with a square end for operation by means of a key or spanner.

To set up the brakes rotate the worm shaft clockwise.

For road adjustment it is sufficient to rotate the adjustments an equal number of turns, which is generally speaking about six complete turns but may be more or less.

Periodically it is advisable to make the adjustment in garage when the following procedure should be observed :—



A Worm Wheel and Rotable Spindle.
B Worm.
C Wormshaft.
D Detent Spring.
E Detent Ball.
F, Fi R. & L. Threaded Trunnions

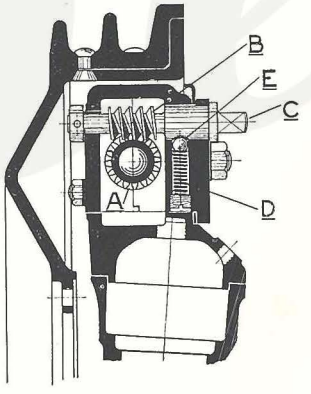


Fig. 23.

Jack up chassis until all four wheels are clear of the ground. Release hand brake. Turn each of the adjustments clockwise until the wheel is stiff to rotate by hand. In this state it is comparatively easy to estimate the equality of adjustment between the near and the off-side brakes.

Having equalised the adjustment, slack off by rotating each adjustment six complete turns contra clockwise.

The adjustment worms are self-locking.

Owing to the fact that there is no compensator between the near and offside brakes, either front or rear, the brake linings tend to wear an equal amount. Therefore when an adjustment becomes necessary, both sides are set up an equal amount.

VALVE ADJUSTMENT.

The tappet levers are mounted on a pedestal (A-Fig. 24) having an eccentric pin (B) which forms the bearing of the levers, the eccentric being arranged so that partial rotation of the pin lifts or lowers the lever fulcrum ; rotation in the one direction raises the fulcrum and (regarding the end in contact with the valve as invariable) reduces the clearance between the cam roller and the cam ; rotation in the opposite direction correspondingly increases the clearance between the cam roller and the cam. The correct clearance between the valve stem and tappet levers is .005″ to .006″ on the exhaust valves and .004″ to .005″ on the feed valves. A slip gauge is provided in the car's tool equipment for measuring this clearance, but in lieu of the slip gauge, a piece of 38 S.W.G. sheet metal is suitable for checking the exhaust valves and a piece of 40 or 41 S.W.G. metal for the feed valves.

REMOVAL OF CYLINDER HEAD.

Valve Cover. Remove the $\frac{5}{16}$" nuts by which the cover is secured, also remove the washers beneath the nuts.

The oil joint between the cover and the cylinder head is made with "Hermetite" varnish, and it will probably be found necessary to give the cover a smart blow with a mallet or hammer stave as near as possible to each end, to dislodge the joint. Then by means of the finger grips at the front and rear ends of the cover, lift it off. Before replacing it, scrape the joint face on the cylinder head and on the cover and make same thoroughly clean, then re-dress thinly with "Hermetite."

To remove the Cylinder Head. Drain water out of cylinders and radiator ; disconnect electric cable from buzzer horn and remove the horn from the induction pipe. Disconnect vacuum pipe union from

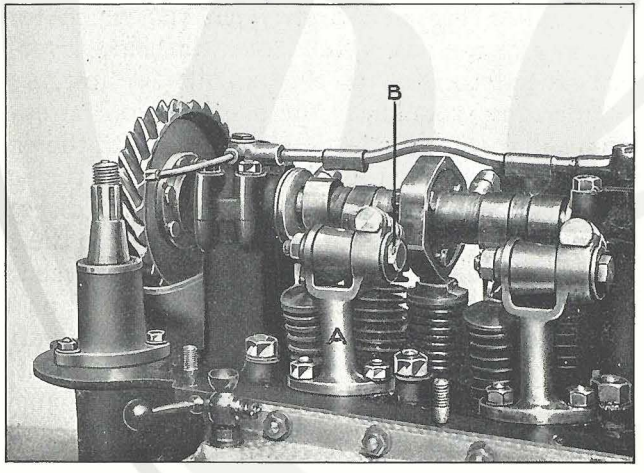


Fig. 24.

the induction pipe and slack out or remove same from autovac. Disconnect manette links from throttle and air. (21-h.p only. Disconnect water outlet pipe union from the back of the carburettor jacket). Turn off petrol from autovac. Disconnect petrol pipe union from the float chamber and remove the carburettor from the induction pipe.

Exhaust Downtake Pipes. Disconnect the exhaust downtake pipes from the header pipe (as seen in Fig. 20 page 42).

Water Connection. Remove hosepipe joint between the radiator and cylinder head, and remove the water pipe where secured to the cylinder head. Disconnect oil supply union and oil drain pipe unions from the cylinder head (see Nos. 12 & 13, Fig. 4, page 14). The oil drain pipes are fitted at both front and rear of cylinder head. Remove the nut on the top

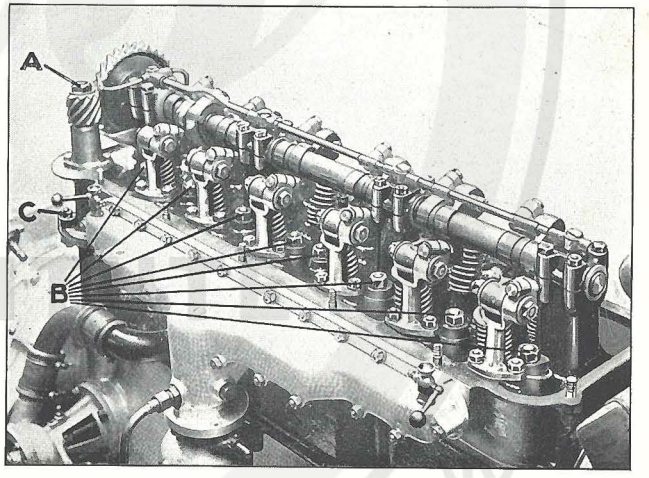


Fig. 25.

stud of the fan bracket which secures the latter to the cylinder head.

Cylinder Head. Remove the nut (A-Fig. 25) from the top of vertical shaft and withdraw the spiral pinion from the vertical shaft; remove $\frac{7}{16}$" nuts (B) and washers with box spanner supplied in kit; remove three $\frac{3}{8}$" bolts (C) securing the vertical shaft housing to the cylinder. Use slight leverage to dislodge the cylinder head from the dowel bolts, prising off the fan bracket stud at the front end (Fig. 26) and under the cam gear tray at the rear end prise off a packing block placed on the crankcase (Fig 27). The cylinder head can then be lifted off.

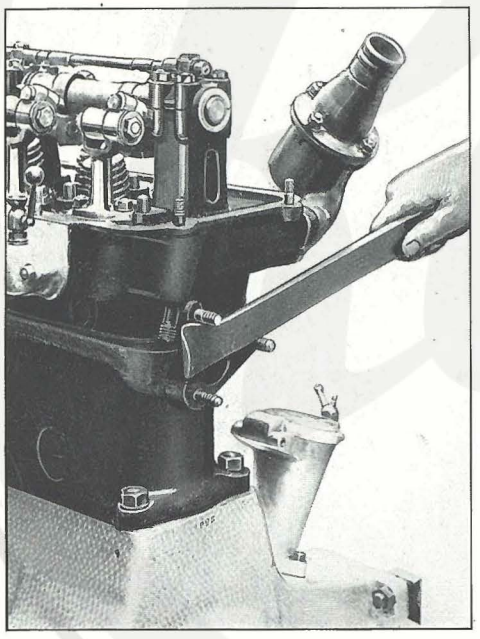


Fig. 26.

Note :-

1. Lift off true and square; at the same time rotate the engine shaft slowly to ease withdrawal from the vertical shaft bearing.
2. Do not damage gasket by inserting a sharp tool in the joint to dislodge the head.
3. Wipe gasket clean and replace it dry.
4. Replace $\frac{7}{16}$" washers and nuts and tighten up evenly, commencing at the centre four and working outwards towards the ends.
5. Replace the three $\frac{3}{8}$" bolts round vertical shaft housing.
6. Repeat the operation of tightening nuts, and repeat it yet again when the engine is warm.

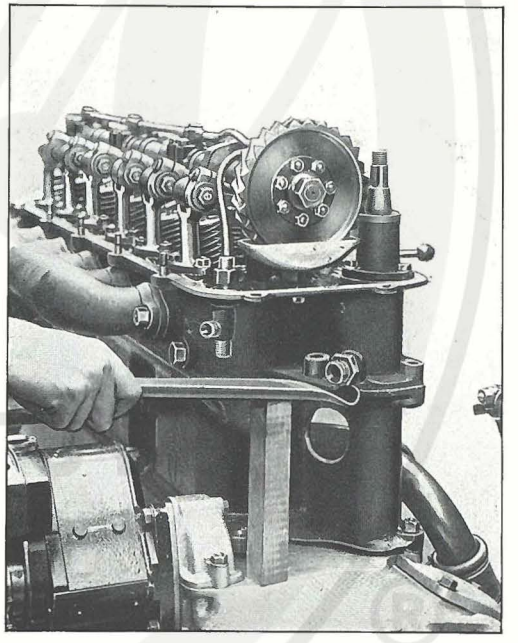


Fig. 27.

REASSEMBLING THE CYLINDER HEAD.

Having replaced the valves and valve tappets, and replaced the cylinder head on the cylinders ; in order to replace the vertical shaft screw pinion in the position which brings the valve timing correct, rotate the engine crankshaft forward until the mark on the flywheel "No. 1 and 6 Feed Opens" is opposite the centre of the valve timing inspection hole. See that the magneto distributor is in position to fire No. 1 cylinder. (Position of distributor segment should be opposite the No. 1 cable terminal in the distributor cover). Set No. 6 inlet and exhaust valves to the correct clearances as mentioned on page 55. Standing on the feed side of the engine, pull the camshaft gear wheel over towards you until No. 6 inlet valve commences to open, and mark the outside edge of the thrust flange (A-Fig. 28) and the rear bearing

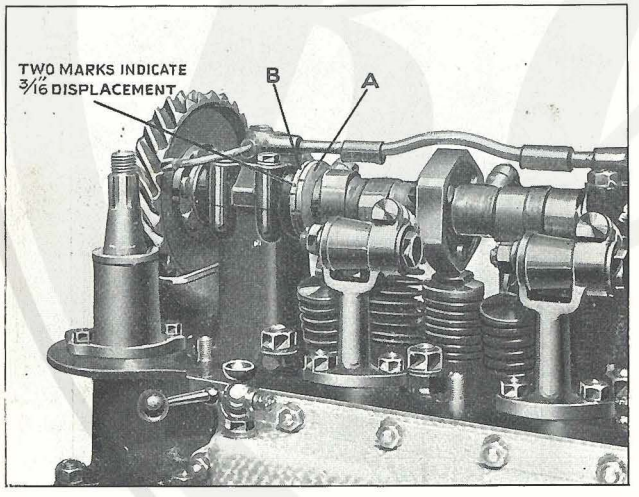


Fig. 28.

flange (B) corresponding to it, then rotate the camshaft backward so that the marks are $\frac{3}{16}$" apart. Intermesh the pinion with the worm wheel and set it so that the splines come true to one another, then rotate the worm wheel, pressing the screw pinion downwards on to the shaft when the marks should again come opposite.

GRINDING-IN VALVES.

Remove the tappet levers, detaching same from the cylinder head, together with their pedestals (A-Fig. 24). Press the valve springs down with a screwdriver (Fig. 29) ; remove the split collars from the valve stems and release the spring slowly. Withdraw the washer and spring. The valves can now be removed.

It will be noticed that the valves are numbered on the stem by the split collar, and the valves should be ground into and reassembled in the seats from which they were removed.

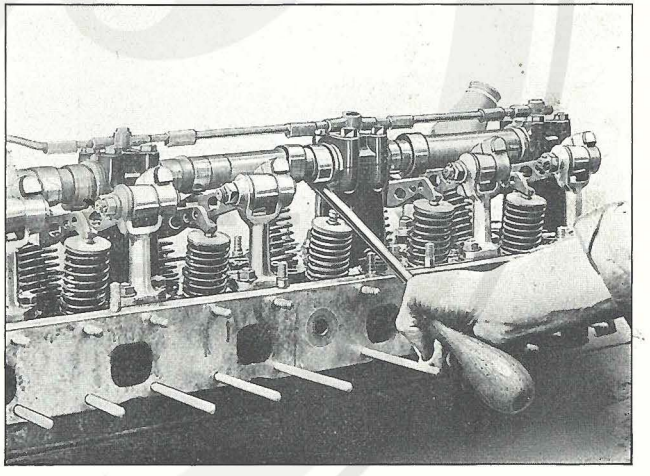


Fig. 29.

The valves should be placed in the seatings and ground in one by one, the seats being dressed with either Emery of No. 90 or 100 grade and paraffin, or with carborundum grinding paste. Place the valve in position, grip the stem in a drawback collet provided for the purpose, rotate the valve to and fro about half a turn in each direction, frequently lifting it from its seat. Occasionally wipe off the paste and redress it, repeating the process until a good clean seating contact is shown. (It is advisable to remove the induction pipe to facilitate the cleansing of the ports of any grinding compound which might collect there).

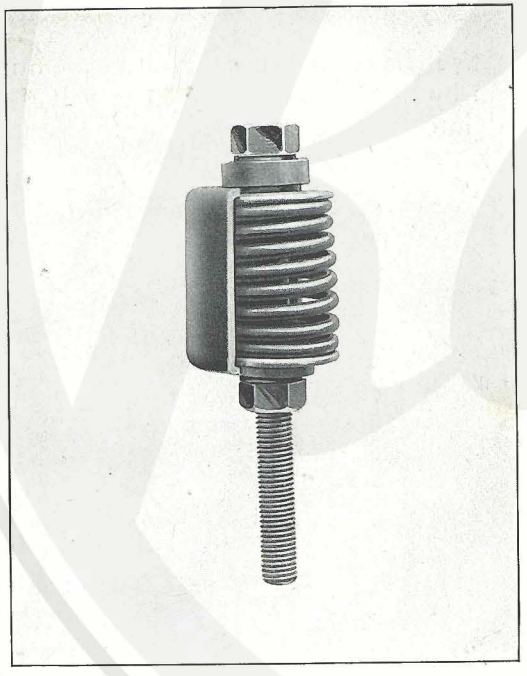


Fig. 30.

In order to test the accuracy of the grinding it is best to wipe all traces of paste and oil from the seats, lay an even coat of soot on the valve head by smoking it over an oil flame or wax taper, replace the valve—taking care not to let it come down carelessly on the seat—press the seat lightly home and turn it to and fro about $\frac{1}{8}''$. A good contact will be apparent by the regularity of the surface from which the smoking is removed.

To replace the valve spring, place the valve spring washers, (top and bottom), in position on the spring, close it with the bolt and bolt washers provided, and insert the spring into one of the half sockets (as in Fig. 30), remove the bolt and bolt washers, thread the spring over the valve stem and replace the split collars. Prise off the half-socket with a screwdriver and the valve spring on releasing will hold the valve spring washers and split collars in position.

ADJUSTMENT OF CARBURETTOR.
(21-h.p. only)

The circumstances which necessitate the dismantling of the carburettor only arise in event of it being necessary to change a jet or to clean the jets owing to the presence of water or dirt in the apertures. The choke pillar requires dismantling only in event of dirt accumulating and interfering with the free motion of the piston valve—a very rare occurrence.

To dismount the jet platform :-

1. Turn off petrol supply at autovac (P-Fig. 11, page 24).
2. Disconnect float chamber union.
3. Disconnect air control link.
4. Disconnect the throttle spring.
5. Unscrew the jet platform stud (D-Fig. 31), which is then removed together with the air control lever, throttle spring arm, jet platform and float chamber.

Access to the choke pillar and automatic piston valve is obtained by proceeding as in removal of jets, operations 1 to 4.

Remove the four nuts from studs (E-Fig. 31) which secure the choke pillar flange (F) to the carburettor body (G), lower the choke pillar and float chamber until clear of the carburettor body and remove.

The automatic piston valve (H-Fig. 31) is not attached to the choke trunk and can be readily withdrawn.

AUTOVAC.

It is seldom necessary to dismantle the Autovac, but in event of doing so care should be taken to remove the float chamber without damaging the joint gaskets. When replacing, smear joints with

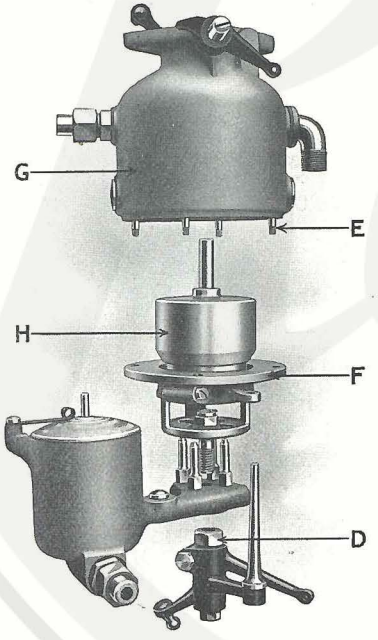


Fig. 31

Hermetite, (a tin of which is included in the car tool kit). If a joint gasket be damaged, replace it with a new one ; as the functioning of the Autovac depends on the joints being air tight. In order to recharge the Autovac in event of it running dry, it is usually sufficient to drive the engine a few turns by means of the starter, *with the Throttle closed*, or failing this fill the carburettor float chamber and start the engine. Alternatively remove the Autovac Feed Pipe and attachment and prime the Autovac with about half pint of petrol.

REMOVING THE MAGNETO.

Fully retard the ignition lever, remove the distributor block and the contact breaker inspection cover, turn the engine until the contact points are just parting and note the position of the distributor brush (see separate booklet), remove the chain case cover—this is secured by two nuts holding it to the crankcase and one bolt attaching it to the flange of the magneto—and unscrew the nut which holds the sprocket on to the magneto spindle ; the unscrewing of this nut automatically withdraws the sprocket. Remove the two remaining magneto flange nuts and the magneto can then be withdrawn from the crankcase.

In replacing the magneto, see that the ignition lever is still fully retarded, turn the magneto spindle until the distributor brush is making contact with the same segment as it was on removal and that the contact breaker is just breaking contact, lift the sprocket and chain, making quite sure that the links are on both sprockets at the bottom (it is possible to get only one series of chain rollers engaged with one half of the sprocket, the other portion overhanging) push the magneto into position, threading the sprocket on to the spindle, and reassemble the sprocket nut on to the spindle. Replace the magneto base nuts and adjust the chain so that slogger is barely perceptible.

Before finally tightening the sprocket nut check the magneto timing points to see that the engine and magneto have not moved relatively.

In tightening up the sprocket nut, prevent the magneto spindle from turning by holding the contact breaker centre pin with the magneto spanner provided.

After checking the ignition timing and tightening up the sprocket, replace the chain case cover and nuts.

N.B. For cars produced prior to No. 3315 the removal of the sprocket nut does not withdraw the sprocket, which has to be detached from the magneto spindle by using a hammer and a brass drift. A sharp tap with the hammer will dislodge the sprocket from the taper on the magneto spindle. Care should be taken with this type when removing the nut and washer not to drop same into the chain case.

THE CARE AND PRESERVATION OF MOTOR BODY WORK.

The Motor House should be kept airy and dry and moderately lighted, otherwise the colours of the carriage will be impaired. The house should, if possible, be kept at a temperature exceeding 50 degrees F.

Whenever the car is kept standing for days together, it should always be covered by a large linen sheet, of sufficiently close texture to keep the dust off without excluding the light.

N.B.—Care should be taken to keep the dust sheet dry.

A car should never, under any circumstances, be put away dirty.

When a car is new or newly painted, it is better for it to stand for a few weeks before being used —even then, however, it will stain or spot unless care be taken to remove the mud before it drys on.

In washing, keep the car out of the sun. Use plenty of water, which apply where practicable with a hose or syringe, taking great care that the water is not driven in to the body to the injury of the lining or upholstery. When forced water is not obtainable use a large soft sponge ; this when saturated squeeze over the panels, and by the flow down of the water the dirt will soften and harmlessly run off ; then finish with a soft chamois leather and polish with an old silk handkerchief.

The same remarks apply to the under work and wheels, except that when the mud is well soaked, a soft mop, free from any hard substance in the head, may be used instead of a sponge. Do not use your panel leather for axles and under work, a separate leather should be used, as it is liable to become greasy.

For the wheels *excepting in the case of wire wheels*—the spoke brush should be avoided, as when the

grit gets amongst the bristles of the brush, it acts like sandpaper on the varnish, scratching it and effectually scouring the gloss off. Persistent use of the spoke brush on coach finish will eventually rub off the varnish and paint. Wire wheels being stove enamelled will stand the spoke brush without injury.

N.B.—In order to preserve the colour and varnish on the Bonnet it is advisable when garaging the car after a long run, to open the Bonnet and remove the top. This particularly applies to cars finished in delicate colours such as grey or fawn.

When washing the car after a run it is advisable to leave the Bonnet until last.

Never allow water to dry itself on a car, as it will invariably leave stains.

Where tool boxes or accessories lockers are made detachable, they should be removed when washing the car.

To renovate the panels or to remove spots or stains on the varnish, a few drops of furniture polish or linseed oil put on a "swab" or "dab" made of woollen rags (using as little of the fluid as possible) will generally suffice. If the panels are badly spotted nothing but a regular flatting down and re-varnishing will be effectual.

Japanned or "patent" leather may be easily revived by the process described for renovating the varnish.

A car having a folding head should never be allowed to stand in garage with the head folded—otherwise it will soon get to look shabby through being creased. The head should be washed occasionally with soap and water and then lightly rubbed over with olive oil. In the case of an old head leather, it should be well washed with soap and warm water, and while the leather is still wet a good dressing of neatsfoot oil

should be applied. This should be allowed to remain until the leather is thoroughly dry and then well brushed with a soft brush. It will sometimes be found advantageous to finish by polishing the hood with a little harness composition (paste, not liquid).

Never clean leather upholstery with petrol or other spirit or wash with strong alkaline soap. Dirt can be removed by gently washing with a good superfatted soap—ordinary curd soap is safest.

To freshen up leather upholstery rub over with a soft rag slightly moistened with olive oil.

For cleaning cloth upholstery a carpet soap may be used (obtainable from chemists and generally termed "cloth ball." In the event of the upholstery becoming greasy, however, it may be necessary to resort to petrol in order to effectually cleanse it.

To prevent or destroy moths in woollen upholstery use turpentine and camphor. Place some in an open pan or saucer. This mixture when placed in a closed carriage, completely shut up, is a certain remedy.

Keep a small bottle of black japan and a brush to touch up the wheels and axles, or places on the chassis, should the enamel chip. Lay it on as thin as possible. Never allow a chipped place to get rusty, as the rust will eat under the surface of the surrounding enamel and blister it off.

In cleaning metal work be careful not to smear the upholstery or paint with the polish. In cleaning silver or electro silver plate care should be taken to use only the finest jewellers' polish. The ordinary plate polish and the liquid polishes commonly used are too abrasive for cleaning silver plating.

If it is necessary to leave a car idle in motor house for long periods, it should occasionally be drawn out into the open air, and if a headed car the hood opened to air the interior.

Instructions for Folding Hoods.

IN order to prevent undue wear and preserve the appearance of Touring Car Hoods it is necessary to exercise care when folding, otherwise unsightliness quickly develops and the material becomes damaged in such a way as to destroy the efficacy of the hood.

The following instructions and illustrations are intended to give assistance in the folding of hoods on the Lanchester Touring Cars, and by carefully following them it will be found that the operation is quite a simple one, and the hood will retain its appearance and usefulness throughout a long life.

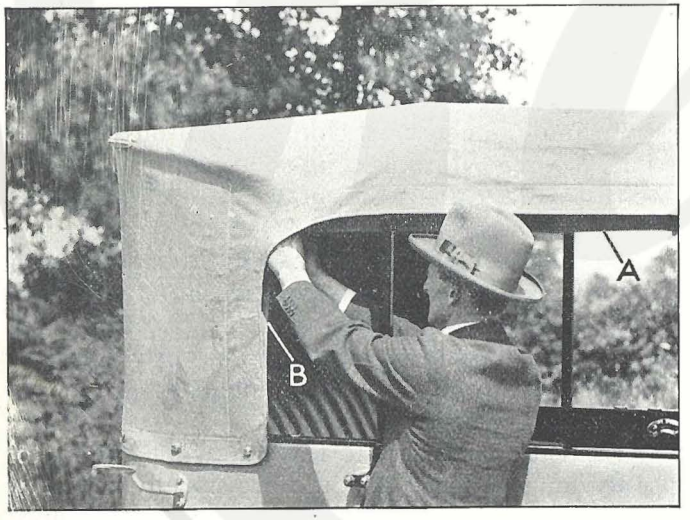


Fig. 32. Releasing the Draught Curtain from the Fly.

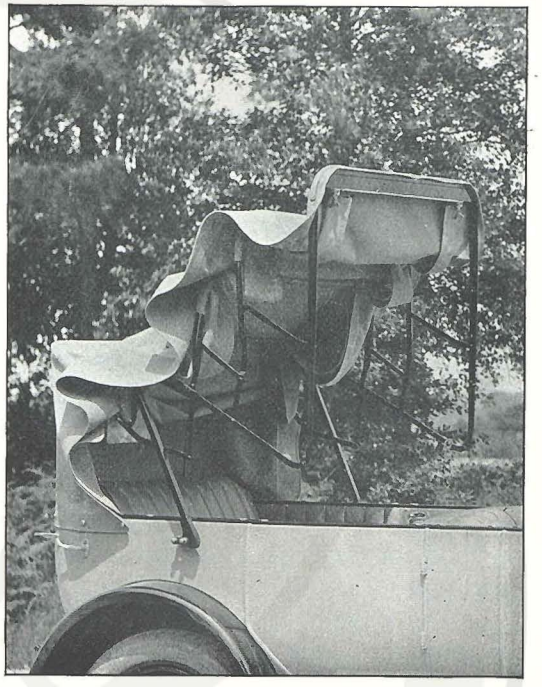


Fig. 33. Showing Hood in half-closed position.

See that the draught curtain A (Fig. 32), fixed inside the hood for use with loose side curtains, is buttoned to the studs in the roof of the hood and unbuttoned from the fly B. Release the wing nuts at the top of the wind screen and push the hood in an upward and backward direction until it is half folded (Fig. 33). Now allow the hood to close by its own weight as far as it will go automatically, then pull the material outwards from between the sticks (Fig. 34). The loose material should now be rolled up and packed neatly into the crevice thus formed between

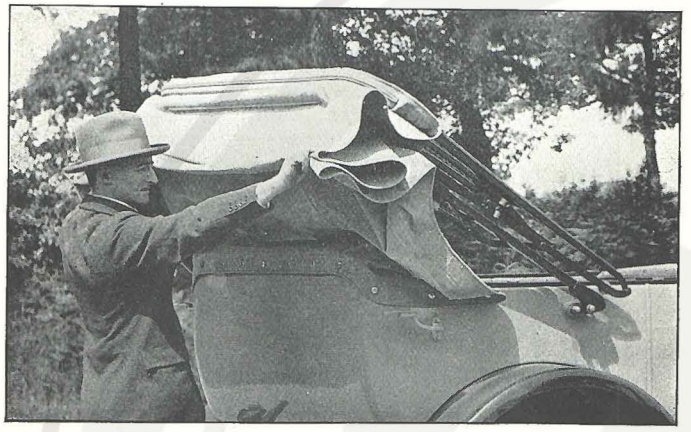


Fig. 34. Pulling Material from between Sticks.

the top and bottom sticks (Fig. 35), the corners then being folded over (Fig. 36). The hood is now in readiness for the envelope, which should be drawn on tightly and the ends strapped round the hood

Fig. 35. Rolling up loose Material.

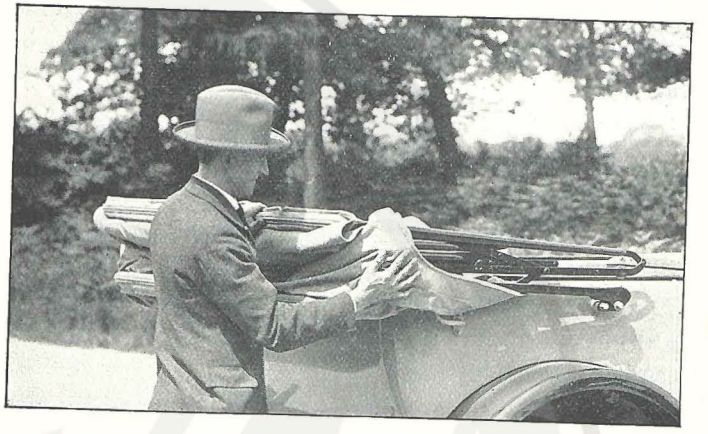


Fig. 36. Folding Corners.

stick brackets C (Fig. 37), the under part of the envelope resting on the hood crutches D. Two short straps are provided on the envelope, and these should be passed upwards between the folded hood and the back of the body (Fig. 37), and fixed by the press

Fig. 37. Showing Short Straps.

studs on top of the body. Fig. 38 shows the hood in its envelope, secured to the hood crutches by straps passing round all the hood hoops and through the strap eye provided under the crutches.

The hood should never be folded down whilst wet, or even damp, but left erected until quite dry. Neglect of this will result in shrinkage and rotting of the material.

Do not leave the Car standing in the garage for long periods with the hood folded, otherwise creases will develop.

Dust should be periodically removed by well brushing.

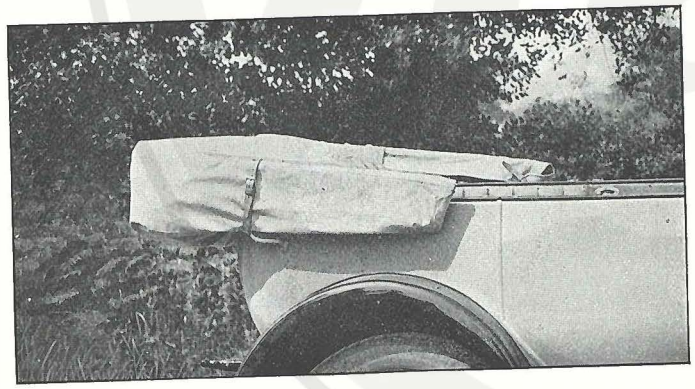


Fig. 38. Showing Hood in Envelope secured to Crutches.

Tools and their Uses.

Fig. 39 shows the wheel brace being used to facilitate the jacking up of the car. For this purpose the end of the lifting jack handle is hexagon shaped.

The function of the Valve Rod is to prevent the valve dropping down into the cylinder-head when the valve spring is being removed. The valve rod A Fig. 40 is inserted in the sparking plug hole until it is felt to enter a hole in the exhaust side of the cylinder-head, it thus supports both the inlet and exhaust valves, the springs from which can now be easily removed. The method used for removing is described in Fig. 29 page 61.

The wheel fitting tool is provided to render the changing of a wheel an easy and simple operation. Fig. 41 shows the tool in use for fitting a rear wheel. To prevent the wheel hub revolving under the weight

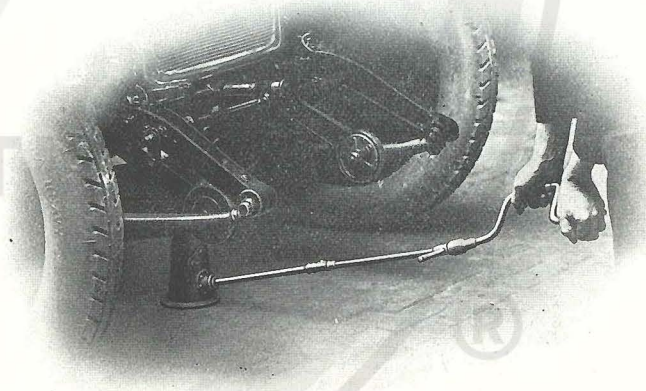


Fig. 39.

of the wheel put on the hand brake ; now insert the wheel fitting tool into one of the stud holes in the wheel allowing the spooned shaped end of the tool to rest on the top stud of the wheel hub. Lever up the wheel with the fitting tool and apply a little pressure with the foot to the bottom of the tyre when it will be found that the wheel will slide into position.

When fitting a front wheel it is advisable, if assistance is not at hand for the purpose of holding the

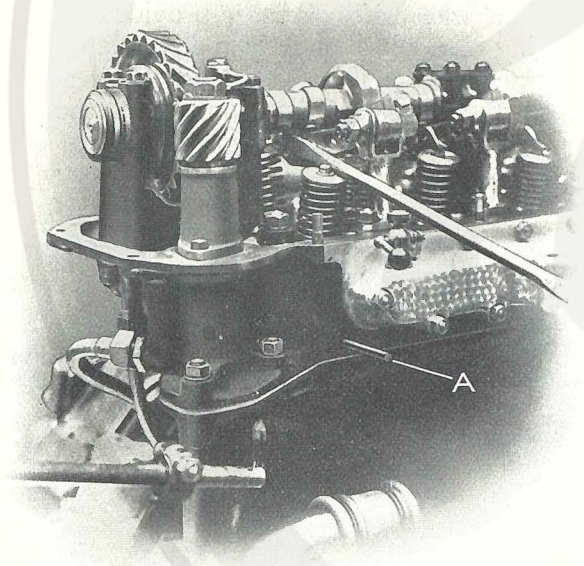


Fig. 40. Showing Valve Rod in Use.

brake on, to use the wheel fitting tool in conjunction with the bottom stud on the hub, otherwise the weight of the wheel will cause the hub to revolve.

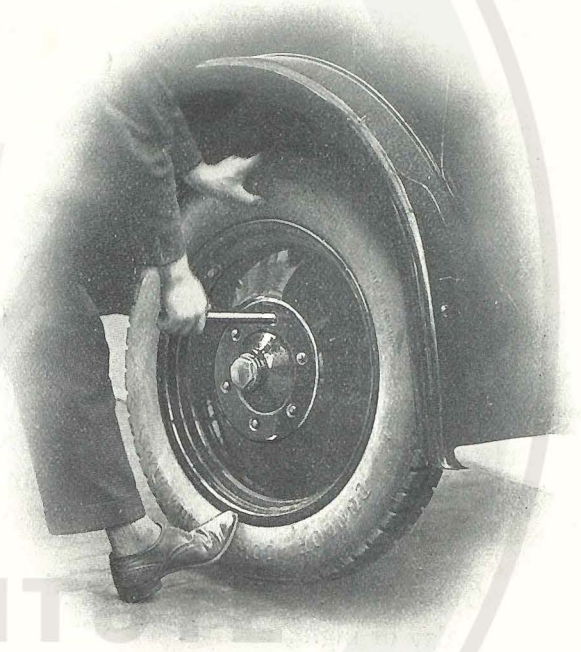


Fig. 41.

In the foregoing description we have endeavoured to furnish all information necessary to the maintenance and good running of our cars, but owing to detail changes, errors and omissions will necessarily occur, and whilst we always endeavour to keep the booklet up-to-date, we are unable to hold ourselves responsible for failures due to lack of information.

Although our guarantee expires two years from date of delivery (see Catalogue) we make a point of studying the interests of our Customers at all times, and are always pleased to give advice as to maintenance, or assistance enabling owners of our Cars to obtain the best results from them.

Our Service Department will render Service at any time, day or night, and we are usually able to despatch Spare and replacement parts immediately on receipt of instructions. Small delays are occasionally unavoidable.

Printed and Published by—The Lanchester Motor Co. Ltd.

4.375
2.4
17500
8750
10.5000

Top 4.375 : 1
Thick 6.781
Sec 10.5
First 17.5

4.375
17.500

4.375
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