THE 25 H.P.

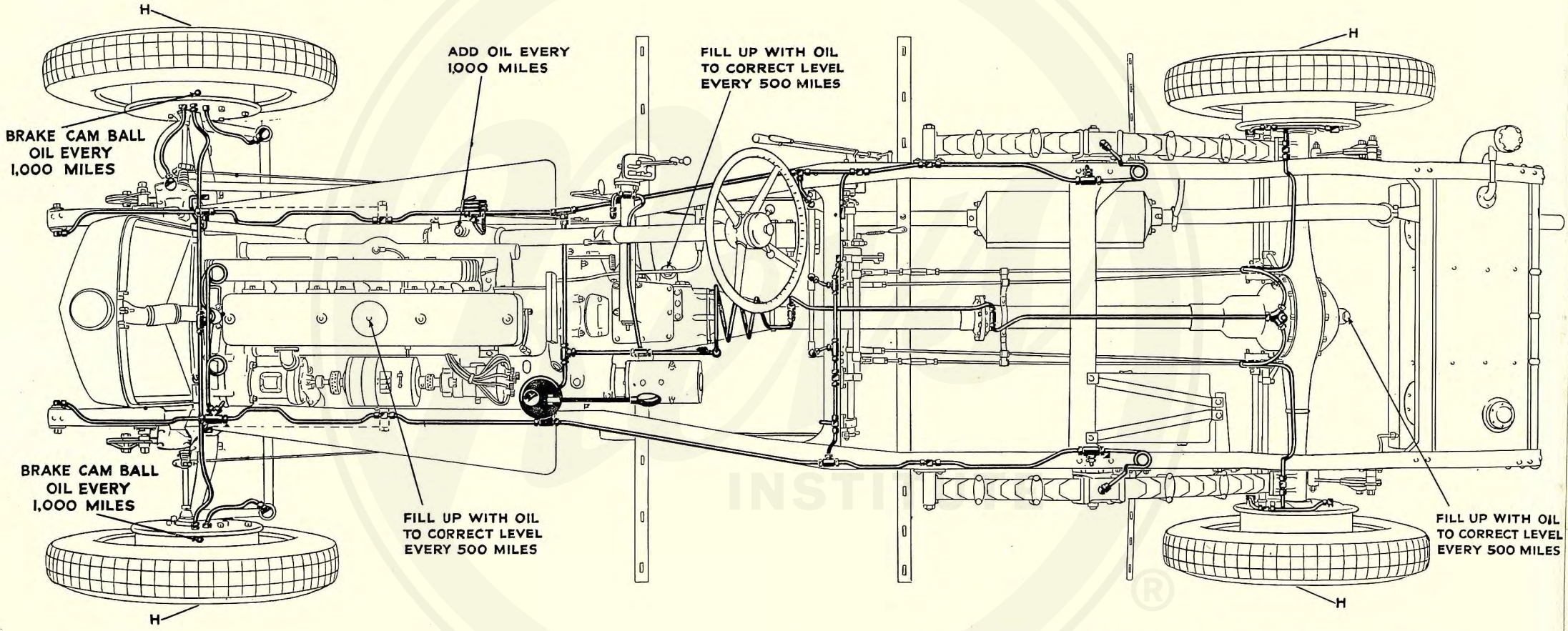
SUNBEAM

SIX-CYLINDER CAR

HANDBOOK of INSTRUCTIONS

FOURTH EDITION

LUBRICATION DIAGRAM FOR THE 25 H.P. SIX-CYLINDER SUNBEAM ENGINE AND CHASSIS.



SHOWING POINTS WHICH ARE LUBRICATED BY THE CENTRAL SYSTEM OF CHASSIS LUBRICATION AND THE GENERAL LAYOUT OF THE PIPE LINES.

THE ONLY LUBRICATING POINTS WHICH ARE NOT COVERED BY THE CENTRAL SYSTEM ARE THE BRAKE CAM BALLS AND THE HUBS.

From Instruction Book, Reg No. 371.

Date 193

Dear Sirs,

Kindly enter my name and address in your records, and send me from time to time any printed matter or revised instructions for my 25 h.p. Sunbeam Car, No. ..... which you may issue.

Name .....

Address .....

.....

From whom car purchased (through agent or direct)

.....

Date car received ..... 193 .....

The car number will be found (a) on a brass plate on the dash, under the bonnet, (b) stamped on the second cross member of the frame.

INSTRUCTIONS re LUBRICATION of ENGINE and CHASSIS.

ENGINE LUBRICATION.

For the lubrication of the engine we recommend the following Oils: Wakefield's "Castrol AA," or Double Shell.

The accompanying diagram shows the lubrication system for the chassis. The parts lubricated through the central system of chassis lubrication, together with the layout of the oil pipes, are clearly shown on the diagram. Further information concerning the lubrication of the Chassis is given on pages 7, 47 and 48.

The oil reservoir for the chassis lubrication should be filled with the same brand and grade of oil as used for the engine. The Steering box, Gear box and Back Axle Case should be lubricated through the oil plugs provided for these respective units and which are shown on the accompanying diagram. Oils recommended are Wakefield's "Castrol S," or Shell-Mex Gear Oil. The same brands of oil are suitable for the lubrication of the Brake Cam Balls (see diagram). The hubs (marked H) should be lubricated periodically, for which purpose we recommend Gargoyle Mobilubricant Soft Grease.

IMPORTANT.—Different brands of engine lubricating oil must not be mixed. If it is desired to change over to a different brand the engine and sump must be completely emptied, as explained in this handbook, before the new oil is used. THIS INSTRUCTION MUST BE OBSERVED.

FOURTH EDITION.

Instruction Book for the
25 h.p. Six-cylinder Sunbeam.

Reg. No. 371. **November, 1929.**

Extract from the Terms of Business and Conditions of Sale in the Maker's current catalogue of Sunbeam Cars:

"Illustrations are given as a general guide and are not binding in detail."

"The Makers reserve the right to alter their catalogues and lists, and the standard specifications stated therein, without any previous notice."

Handbook of Instructions

for the

25 h.p. SUNBEAM Car.

This Handbook is Published for the use and assistance of owners of 25 h.p. SUNBEAM Cars. It embodies in a concise form the advice and suggestions of the Company's Technical Staff in regard to lubrication and the general care and maintenance of this Model, together with supplementary information regarding the necessary adjustments which may be required from time to time.

Price 5/- Nett.

Compiled and Published by

THE SUNBEAM MOTOR CAR CO. LTD.,
Moorfield Works, Wolverhampton.

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Telegrams: "Sunoserv, Harles, London."

Northern Service & Repair Works:
288/294, Eccles New Road,
Weaste, Manchester.

Telephone: Pendleton 507/8.
Telegrams: "Sumorep, Manchester."

PRINCIPAL CHASSIS DIMENSIONS

OF THE

25 H.P. SIX-CYLINDER SUNBEAM.

	English.	Metric.
Bore	3.149″	80 mm.
Stroke	4.72″	120 mm.
Cubic capacity of cylinders ...	220.72 cu. in.	3619 c.c.
Wheelbase	11′ 5⅜″	349 cm.
Track	4′ 9″	145 cm.
Ground clearance	8″	20 cm.
Length overall	15′ 8¾″	480 cm.
Width overall	6′ 3″	190.4 cm.

Gear Ratios—	4th	3rd	2nd	1st	Reverse
	4.727 to 1	6.8 to 1	13.08	18.9 to 1	14.2 to 1

Tyre sizes	6″ for 21″ rims.
R.A.C. rating	23.8
Tax payable	£24

The 25 h.p. six-cylinder Touring Car has the following gear ratios. These apply only to Touring Car models.

4th	3rd	2nd	1st	Reverse
4.5 to 1	6.5 to 1	12.4 to 1	18 to 1	13.6 to 1

FOREWORD.

This Handbook of Instructions has been compiled for the use of owners and drivers of 25 h.p. six-cylinder Sunbeam cars, with a view to providing in a simple and handy form useful and necessary information in regard to the general care, lubrication and maintenance of this model. It is not intended as a complete manual of motor driving, and in its preparation it has been assumed that the reader is conversant with the general features of the modern motor car.

The illustrations appearing in this book, apart from the wiring and timing diagrams, etc., are from actual photographs. These have been prepared to supplement and make more clearly understandable the explanations in the text. In one or two instances, parts (such as wings, running boards, etc.) adjacent to the particular portion of the chassis referred to have been removed. This, however, has been done usually to give an uninterrupted view for the camera, and does not necessarily imply that in practice such parts need to be removed before the adjustment, or lubrication of such parts, can be effected.

All Sunbeams cars are guaranteed in accordance with the terms of guarantee printed in full in our catalogue. In the rare event of any unforeseen defect or unusual trouble developing, it is especially requested that the matter should be **at once** brought to the notice of the Company, either at their Head Office, or at any of their Depots, a list of which appears on page 1.

With regard to the various accessories not of our own manufacture, such as electrical equipment, carburetter, etc., brief instructions on their care, based on information supplied by their respective makers, are included in this handbook but in the event of difficulty clients are strongly recommended to consult the makers themselves. Most of them issue their own instruction pamphlets, which are generally supplied gratuitously on request.

THE SUNBEAM MOTOR CAR CO. LTD.

November, 1929.

READ THIS CAREFULLY.

The instructions embodied in the early chapters of this handbook give all the information re starting up and driving necessary for the motorist who has had some experience in handling a car.

Later chapters deal with the all-important question of Lubrication, the necessary adjustments which may be required from time to time, and the general points to be observed in maintaining the car in a condition which will ensure satisfaction to its owner. The best of cars will suffer under neglect.

Read carefully the chapters on lubrication. The central system of chassis lubrication as fitted to the 25 h.p. Sunbeam requires the minimum of attention—by depressing the foot pedal once a day the various lubricating points on the chassis receive an adequate supply of oil. Use one of the brands of oil recommended on the page facing the Lubrication diagram.

On no account must different brands of Oil be mixed. If it is desired to change over to a different brand the engine and sump must be completely emptied, as explained on page 14. before the new oil is used. **THIS INSTRUCTION MUST BE OBSERVED.**

Treat the new car with consideration. Although the engine, gear box, back axle, etc., of every Sunbeam car are " run-in " before being assembled in the chassis, and the complete car exhaustively tested on the road, the first few hundred miles should be done at moderate speed.

The owner who treats his car considerately during this initial period, instead of immediately attempting to attain very high speed, will make doubly sure of getting the utmost satisfaction from his car, and add appreciably to its life.

GENERAL RUNNING HINTS.

It has been remarked on an earlier page that this book is not intended as a manual on the art of driving a car. It is assumed that the Sunbeam owner has at least a rudimentary knowledge of a motor car and of driving. The following information may therefore be regarded more as general hints for the driver rather than as an instruction in driving. The quality of design, the care taken in the assembly of the chassis, the easy and effortless steering, and the convenient disposition of all controls make the 25 h.p. Sunbeam an unusually pleasing car to drive.

The illustration below and the illustration on page 7 show the position of the magneto and carburetter controls (on the steering wheel), the instrument board, the clutch, brake and accelerator pedals, the gear lever and the gate through which the gear lever operates.

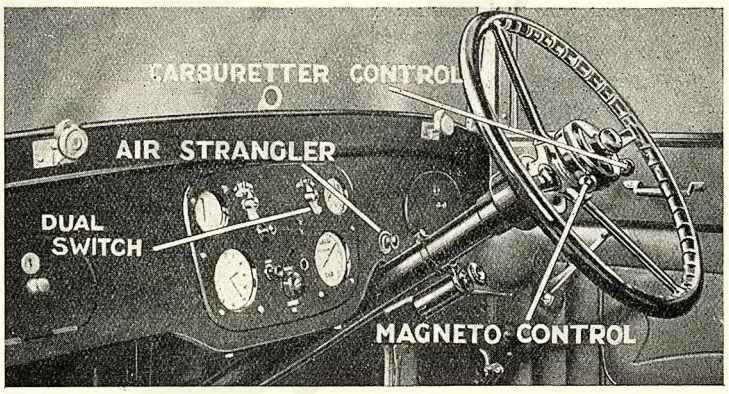


Fig. 1. Showing Steering Wheel, Instrument Board, Throttle and Ignition Controls, 'Air Strangler' and Control Switch for Dual Ignition.

Assuming that the car is ready for its first trip on the road after reaching its owner, the following points should be borne in mind. See that the oil level is correct (see page 13), the radiator filled, and the petrol turned on and reaching the carburetter. Always see that the gear lever is in the neutral position before attempting to start up the engine.

Before starting the engine with the electric starter, switch off the ignition, close the carburetter air strangler (fitted on the instrument board) and open the throttle slightly by means of the control lever. If the weather is very cold or the car has been standing for any length of time, swing the engine over for a few seconds with the starting handle. This eases the pistons and ensures gas entering the cylinders and as the ignition is switched off there is no danger of backfire. Switch on the ignition by moving the switch on the instrument board from "off" to "coil," leave the throttle in the position mentioned above, advance the ignition to midway between the advance and retard positions, depress the starter, and the engine should fire within the first twenty revolutions. If no explosion takes place, release the starter so as not to waste current and open the throttle fully. No difficulty should then be experienced when the starter is depressed again.

Do not run the engine with the carburetter air strangler closed longer than is necessary, either under its own power or by the starting motor, as the petrol sucked in is liable to wash away the oil and dry the pistons. The air strangler should be released immediately the engine fires, and after it has been running for a few minutes the ignition switched over from "coil" to "magneto."

Briefly the reasons for opening the throttle fully if the engine does not start quickly with the throttle slightly open are as follows. By turning the engine with the throttle only slightly open and the air strangler closed, a very rich mixture, practically pure petrol, will enter the cylinders and this in itself may be too rich to fire. By opening the throttle fully and

releasing the strangler sufficiently, air is admitted to reduce the richness of the mixture until it is more easily fired. A very rich mixture is just as likely to prevent starting as a weak one.

With the engine running (the air strangler should then always be released) the ignition should be kept at half advance or slightly retarded as the driver's judgment may suggest. The same applies to the throttle. It is impossible to fix actual positions, as there may be slight deviations with different engines, and this, like many other little points in connection with driving, must be left entirely to the driver, who will soon find from experience just the right positions for the controls at all speeds. It should be emphasized that when driving at any speed over 20 m.p.h. the ignition should always be kept as far advanced as possible.

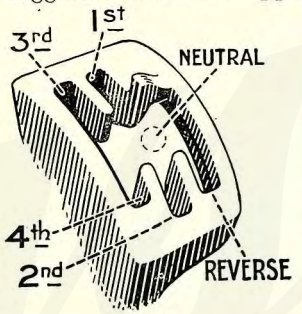


Fig. 2.
Showing Gear Lever Positions in gate.

When first starting up the car each day the pedal operating the central system for lubricating the chassis (see Fig. 3) should be depressed to its full extent. If the operation is carried out then no further attention need be given until the following day, except in the case of a very long day's run, when the pedal should again be depressed after the first 200 miles has been done. The pedal must always be depressed to its full extent.

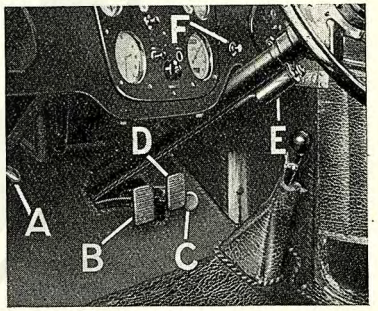


Fig. 3.
Showing foot operated pedal for central lubrication A, Clutch B, Accelerator C, Brake D, pedals, Control for dipping head light reflectors E, and F is the Carburetter "air strangler."

:: :: NEAR-SIDE VIEW OF ENGINE :: ::

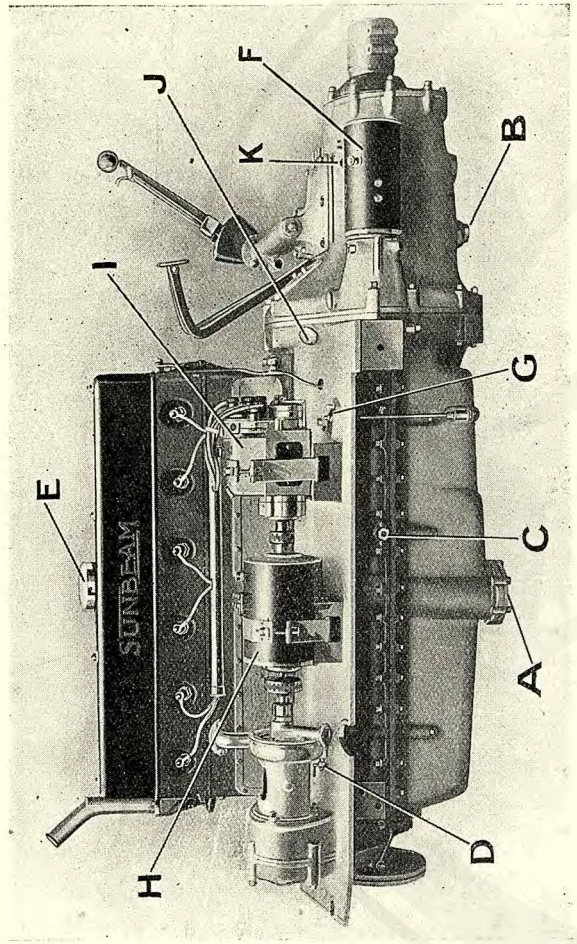


Fig. 4.

View of near side of 25 h.p. Engine, shown out of Chassis to illustrate more clearly Relief Valve, Drain Cock, etc. Showing Drain Plug (A) in centre of Crank Case Filter, Drain Plug in Gear Box (B), Oil Pressure Relief Valve (C), Drain Cock for the Water Pump (D), Oil Filler (E), Electric Starter (F), Oil Level Cock (G), Dynamo (H), Magneto (I) and Timing Inspection Hole (J).

:: :: OFF-SIDE VIEW OF ENGINE :: ::

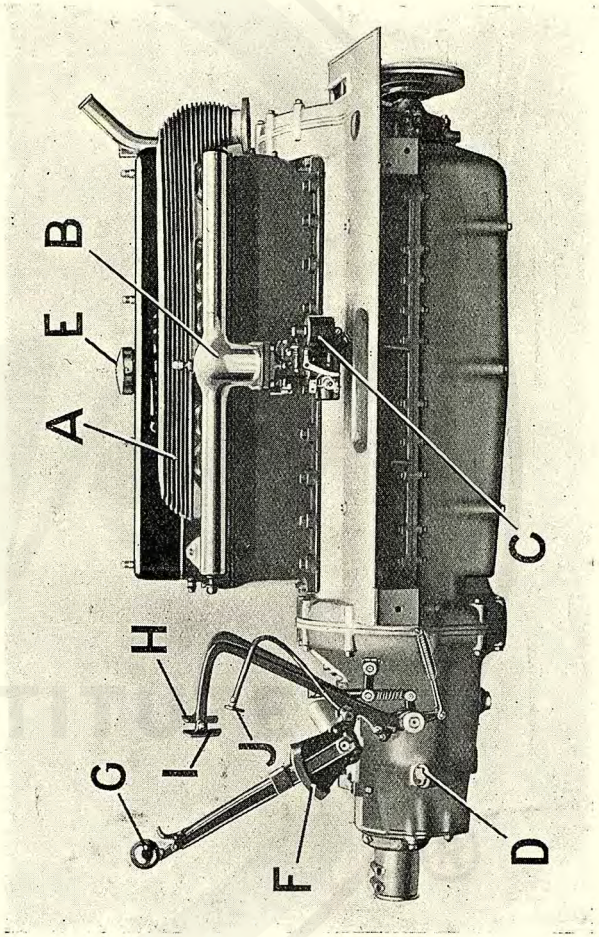


Fig. 5.

View of offside of 25 h.p. Engine shown out of Chassis to illustrate more clearly Carburetter, Starter, etc. A, Exhaust manifold; B, Inlet manifold; C, Carburetter; D, Oil filler for gear box; E, Oil filler cap; F, Change speed gate; G, Change speed lever; H, Clutch pedal; I, Brake pedal; J, Accelerator pedal.

CARE AND MAINTENANCE.

The 25 h.p. six-cylinder Sunbeam is built with the engine, clutch and gear box combined in a single unit suspended directly from the main frame. A glance at the chassis plan on the Lubrication Diagram at the front of this book will show that the design is on very clean lines, and all accessories are placed in convenient and accessible positions. The oil fillers for the engine, steering box, gear box and back axle case, are all accessibly placed. It is only necessary to treat the car with regular care and follow out the instructions given on the Lubrication Diagram and in these pages regarding lubrication to obtain and, what is more important, MAINTAIN the best possible service.

Lubrication is the most important matter for the motorist who wishes to get the best out of his car. Most of the troubles with which motor repairers have to deal are directly traceable to lack of proper lubrication. The absence of oil will damage any bearing and may necessitate costly repairs. Chassis lubrication is greatly simplified by the central system described on pages 47 and 48.

All Sunbeam engines are designed to provide perfect lubrication automatically and yet have a clear exhaust. An oil level cock (see Fig. 6) is fitted in the crankcase so that the correct level for the oil in the sump can always be maintained. The oil filler is shown in the illustration on next page.

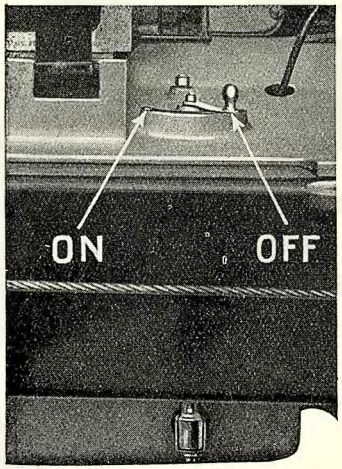


Fig. 6.
Oil Level Cock in Crankcase. Always turn to "off" position when the crankcase has been filled with oil to the correct level.

ENGINE LUBRICATION.

As regards lubricating oil, only the best quality oil should be used. It is false economy to buy a low-priced oil, which is almost sure to be deficient in those properties necessary in a good lubricant. For the 25 h.p. Sunbeam model we recommend the following oils, which we have found from our own experience to be most suitable :—for the engine, Wakefield's "Castrol AA" or "Double-Shell"; and for the gear box and transmission, Wakefield's "Castrol S," or "Shell-Mex Gear Oil."

IMPORTANT NOTICE re LUBRICATING OIL.

Different brands of engine lubricating oil must not be mixed. If it is desired to change over to a different brand, the engine and sump must be completely emptied, as explained in this handbook, before the new oil is used. **This instruction must be observed.**

Engine lubricating oil is not suitable for steering box, gear box or back axle case lubrication. See pages **34, 35, 36,** and **37** *re* lubrication of these parts.

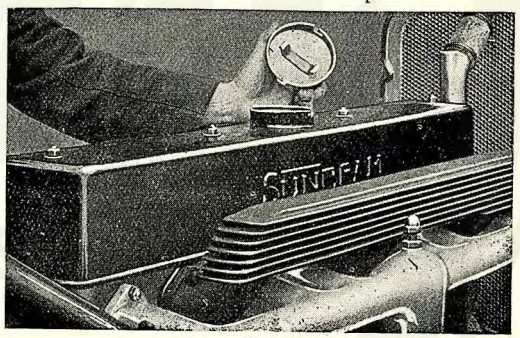


Fig. 7.
Oil Filler for Crankcase on top of valve cover with detachable gauze filter. Remove cap and filter can then be withdrawn by the fingers for cleaning.

The 25 h.p. engine lubricating system consists of a gear - driven pump for main engine feed, and in tandem with this is a small gear - driven pump for cooling the oil.

The former forces oil direct to the main crankshaft bearings and through the hollow crankshaft to the big end bearings of the connecting rods.

The latter forces oil through a radiator situated between the dumb irons, and returns it into the sump.

The surplus oil from the crankshaft is thrown by centrifugal force on to the cylinder walls and into the interior of the pistons, and this effectively lubricates the bearings of the small ends of the connecting rods. The oil drains back into a large sump in the base of the crankcase and passes through a filter, so that it is cleansed before again being circulated by the pump.

The rocker shafts, rockers and push rods are also lubricated from the main oiling system. An oil lead carries oil to the overhead shaft and effectively lubricates each rocker, the surplus oil passing to the push rods and falling by gravity on to the tappets. The camshaft runs submerged in a trough of oil.

It is advisable occasionally to remove the valve cover and, with an oil can, pour a **small quantity** of oil through the slot in the washer of each valve spring. This will lubricate the valve stems and guides, and prevent the possibility of rust forming (through condensation) or "squeaks" developing. Wipe away any trace of moisture from inside valve cover before replacing.

OIL PRESSURE.

With the supply of lubricating oil properly maintained, and the crankcase cleaned out periodically, it is almost impossible for the lubrication system of Sunbeam cars to fail. One point to note carefully is the maintenance of the correct oil pressure. The pressure gauge is fitted on the instrument board. On the 25 h.p. Sunbeam, for all normal running speeds the oil pressure should be about 25 lbs. per square inch. A relief valve of the usual ball type is fitted in the crankcase and deals with any excess pressure of oil which is returned to the sump. The position of the relief valve is shown in Fig. 4. To remove this first unscrew the large hexagon nut in centre and the two smaller nuts afterwards. The relief valve can then be withdrawn.

N.B.—When first starting up, the engine should never be "raced" while the oil is cold, as this will damage the pressure gauge.

FAILURE OF OIL PRESSURE.

Although, as mentioned on page 12, it is practically impossible for the lubrication system to fail, the following instructions are given to provide for the rare occurrence when trouble may be experienced. When the system is not working the needle of the oil gauge will either move erratically to and fro across the dial, or not register at all. The trouble may be due to one or a combination of several of the causes given below :—

(1) Lack of oil supply, *.i.e,* an empty crankcase.
(2) A broken or choked oil gauge pipe.
(3) A blocked system, due to not keeping the crankcase clean, or inferior or dirty oil being used.
(4) Dirt under the ball of oil relief valve.
(5) Not cleaning out oil filter periodically.
(6) Damage to oil pump or oil gauge.

When failure of pressure is indicated on the gauge, the engine should immediately be stopped. First ascertain if there is the correct quantity of oil in the crankcase by opening the oil level cock and adding oil through the filler (see Fig. 7) until the tap overflows (see Fig. 6). Leave this tap open for a few minutes to allow the oil to distribute itself evenly throughout the length of the crankcase. Then pour in a further slight quantity, and if it drips again the correct level has been reached. After doing this, make quite sure that the oil cock is turned to the "off" position.

When the engine is restarted, if the gauge still fails to register any pressure, test for the other causes of trouble enumerated above. Before examining the oil pump, detach the pipes which connect to the gauge and thoroughly clean these. This may remedy the trouble.

CLEANING AND REFILLING CRANKCASE.

It is important that attention should be regularly given to the oil level. After about every 500 miles the oil level should be maintained by replenishing with oil through the filler (see

Fig. 7), until it drips from the overflow tap. Under normal running conditions the crankcase should be thoroughly emptied and cleaned after about every 2,000 miles.

To empty and clean out the crankcase, remove the drain plug underneath (see Fig. 4). Drain off all the oil, which will drip more readily if the engine is warm when this operation is commenced. The drain plug should then be reinserted and properly screwed up and three or four pints of paraffin, **not petrol,** poured into the crankcase through the crankcase oil filler (see Fig. 7). With the sparking plugs removed, turn the starting handle vigorously for a few minutes so as to circulate the paraffin through the oilways, which will thoroughly cleanse the lubricating system. The drain plug should again be removed and the paraffin drained away, care being taken to see that no paraffin is left inside the engine.

The filter in the base of the crankcase (see Fig. 4) can be cleaned at the same time and the starting handle again turned for about a minute to ensure that neither old oil nor paraffin remains.

Do not run the engine under power until the supply of oil in the crankcase has been renewed.

After allowing ample time for the paraffin to drip from the crankcase, insert the drain plug and carefully screw up so that it is perfectly tight. Open the overflow oil tap, or oil level cock (see Fig. 6) by moving the lever to the "on" position. Pour in the lubricating oil through the filler (see Fig. 7) until it drips from the overflow tap. Leave this tap open for a few minutes to allow the oil to distribute itself evenly, and pour in a further slight quantity if necessary (see previous instructions on page 13). Turn the lever to the "off" position. **Do not forget this.**

Note.—When refilling the crankcase with oil see that the car is standing on level ground. If the crankcase is tilted, even at a slight angle, it is impossible to gauge exactly whether the correct amount of oil has been poured in.

VALVES.

One of the advantages of the Sunbeam overhead valve engine is that the operation of grinding-in the valves needs to be carried out at less frequent intervals than in the case of a side valve engine. This is largely due to the design of the valve seats, which, on the overhead valve engine, ensures more effective cooling for the valves themselves and the liability to burning and distortion is very appreciably reduced.

It is difficult to fix the exact period when valve grinding is necessary. The care with which the car has been driven and the quality of the fuel and oil used are all factors which have a bearing on the condition of the valves. Very largely it must be left to the judgment of the individual owner, although the majority of engines should have the valves examined, and ground-in if necessary after about every 8,000 miles on the road. The exhaust valves usually require grinding-in earlier than the inlet valves owing to the continual passage of the hot gases over their faces and seatings.

REMOVING CYLINDER HEAD.

Grinding-in the valves is not a difficult matter on the Sunbeam engine. After draining the water from the cylinder block, the cylinder head is easily removed by following these instructions:—(*a*)—Disconnect the high tension wires and sparking plugs and remove the plugs from the cylinder head. (*b*)—Remove the hose clip on the water outlet connection and detach the hose. (*c*)—Remove the nuts which hold down the valve cover and lift the latter away. (*d*)—Disconnect the carburetter controls. (*e*)—Remove the inlet and exhaust manifold and the carburetter. (*f*)—Disconnect all piping. (*g*)—Remove, first unscrewing each nut a few turns at a time (see illustration, Fig. 10), the nuts which hold down the cylinder head. (*h*)—Carefully lift the head clear of the studs in the cylinder block.

The push rods should not be removed from the cylinder block. These rods may vary slightly in length to suit their

respective positions and if replaced differently it may be necessary to re-adjust all the tappet clearances. For the adjustment of individual tappets see paragraph on Valve Tappet Adjustment, page 19.

No difficulty should be experienced in lifting the head off the cylinder block. Should the head, however, from some cause or other not be easily removed, care must be taken not to damage the joint (by the use of a screwdriver or similar tool) at the point of junction of the cylinder block and head. Special lugs (one can be seen at right bottom corner of cylinder head, Fig. 8) are provided to facilitate removal. Free the joint by lightly tapping the head with a mallet.

DEPRESSING VALVE SPRING.

Having removed the cylinder head, place in position as shown in Fig. 8 with a block of wood under each end. This will allow the hook end of the valve removing tool (included in tool kit) to be placed in the cup of the valve head, and the fork of the tool under the washer of the valve spring. When the spring is depressed the washer can be easily removed and the spring withdrawn from the valve. Then turn the cylinder head on its side.

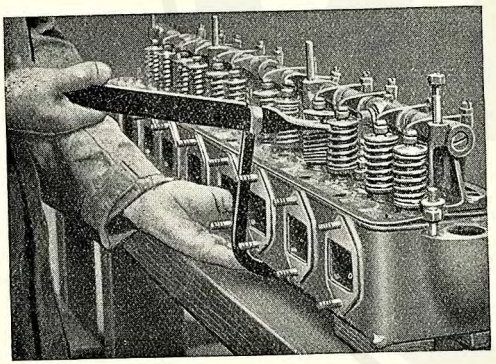


Fig. 8.
Using Valve Removing Tool.

GRINDING IN VALVES.

To grind a valve in, it is necessary only to smear a little valve grinding compound, which can be purchased from any accessory dealers, on the seating of the valve, insert a tool into the slot in the valve head, as shown in Fig. 9, and give it a light semi-rotary motion backwards and forwards. During this operation the position of the valve should be moved from time to time in order to secure even grinding all the way round.

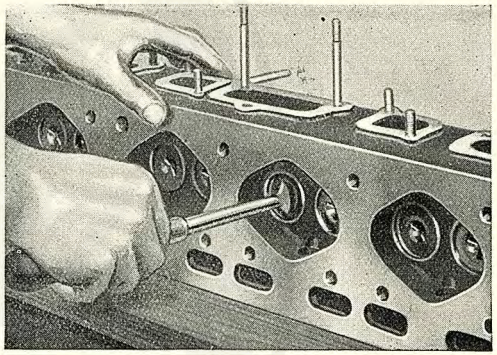


Fig. 9.
Showing method of Grinding in Valve.

Only the smallest possible quantity of grinding compound should be placed on the valve. After a minute or so the valve should be removed and another small smear of compound should be put on. The valve should be occasionally wiped with a piece of rag in order that the surface may be seen, when the "pitting" will be found to be gradually disappearing. As soon as it has disappeared, it is as well slightly to blacken the valve seat in a candle flame and carefully return the valve, very lightly pulling it in to its seat. On removal the soot should show an even contact all the way round. If this is so it may be taken that the valve is tight and is seating properly.

Scrupulous care must then be taken to wash out with a brush and petrol and clean away all particles of emery that

have been used in the grinding process, paying particular attention to getting well into the valve guide.

Do not remove all the valves before starting the grinding process; remove them one at a time, grind, and replace. The object of this is to ensure each valve being replaced in its original position.

In replacing the cylinder head, care must be taken to avoid damaging the ends of the studs, and the head should be lowered steadily and evenly with the joint faces parallel.

See that the surfaces of the cylinder block and head are clean, and that the gasket is flat and not wrinkled. If it is damaged fit a new one. It is important that the nuts should be free (but not slack), and any nut which has a tendency to bind on the stud must not be used when tightening up, otherwise the stud itself is likely to come out when the head is again removed.

TIGHTENING NUTS.

The nuts should be tightened progressively, that is, each nut should be given about one-third of a turn at a time. The order of tightening recommended is given in the illustration below, the numbers indicating the order of succession. By this means the joint will be made evenly, without putting undue stress on the cylinder head or the studs.

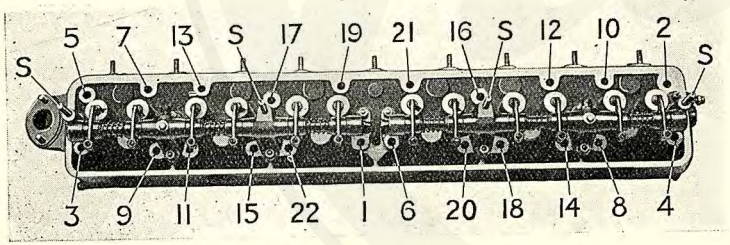


Fig. 10. Numbers give the order for tightening Cylinder Head Nuts.

NOTE.—In the event of the copper and asbestos gasket being damaged in removal and a new one having to be replaced, the following precautions should be taken:—First try the gasket on the cylinder block, and make sure that the hole in the gasket that should be coincident with the hole in the

cylinder block through which the water passes, registers exactly. This is most important.

When replacing the head, the use of gold size or other cementing material is not recommended, for the reason that damage to the gasket will almost certainly be caused when the head is again lifted.

TAPPET ADJUSTMENT.

Grinding-in the valves slightly reduces the distance or clearance which should be maintained between the push rods and tappet heads.

The clearance can be corrected and any slight wear counteracted by means of the separate hardened steel pin which is screwed into the split end of each rocker arm. Before commencing to adjust the tappet for the inlet valve of each cylinder, make sure that the exhaust valve of the same cylinder is fully open. In dealing with each exhaust valve, the corresponding inlet valve should, of course, be fully open. To adjust, loosen the lock-nut (see Fig. 11) and with a screwdriver turn the pin until the correct clearance is obtained. Then securely tighten the locknut again. The correct clearance for the inlet valve tappets is .006" (6 thousandths of an inch.) The correct clearance for the exhaust valve tappets

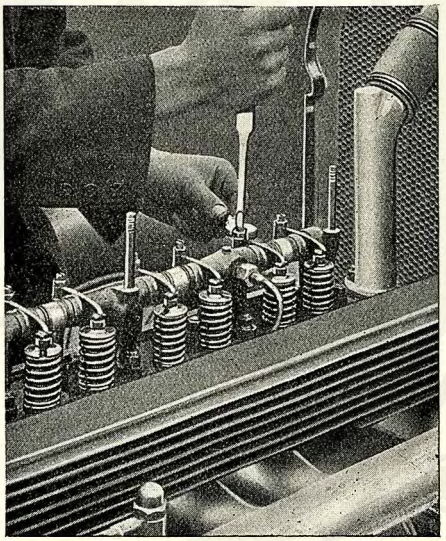


Fig. 11.
Showing method of adjusting the clearances for the valve tappets.

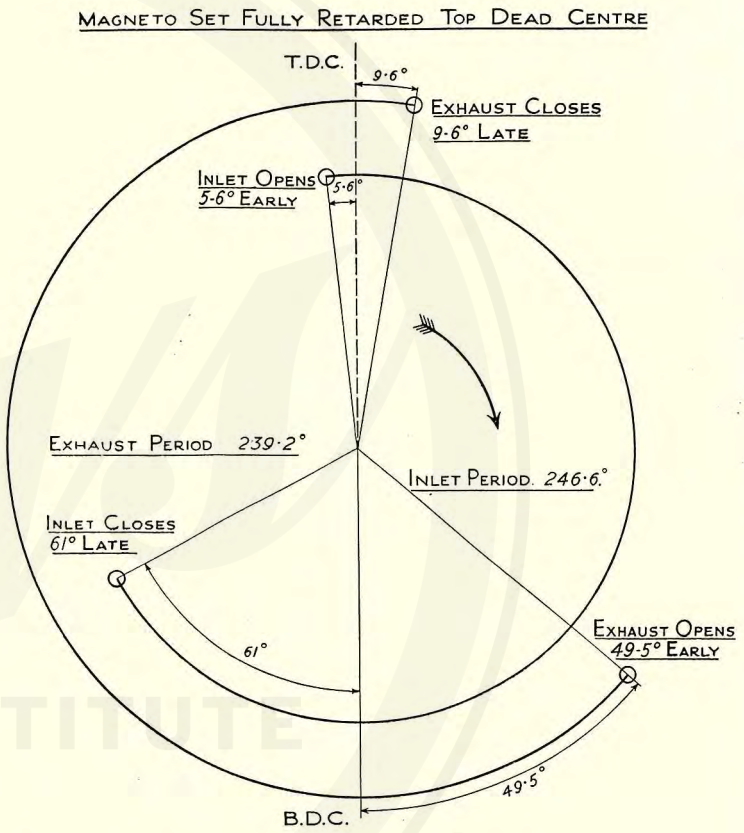
is .008in. (8 thousandths of an inch). These clearances should be measured when the engine is at normal running temperature. The measurements may be accurately determined by the use of "feelers," a set of which can be obtained from most dealers in motor tools.

DECARBONISATION.

Even with the greatest care in the construction of an engine it is impossible to avoid a small leakage of oil past the piston rings. This will cause carbon deposit to form in the combustion chamber, and the carbon should be removed periodically. The cylinder head should be removed as described on page 15 and the interior, together with the piston crowns, thoroughly scraped, afterwards wiping away all particles of carbon with a rag moistened with petrol. Before each piston is scraped bring it to its top dead centre to avoid risk of damage to the cylinder wall, and also more easily to remove the small pieces of carbon as they become detached. Smear a little engine oil round the edges of the piston crowns, only a very small quantity, before replacing the cylinder head. It is recommended that the engine should be decarbonised after about every 8,000 miles.

ENGINE AND MAGNETO TIMING.

On the following page a diagram is given which shows the timing for the engine and magneto of the 25 h.p. six-cylinder Sunbeam. This diagram should be followed whenever it is necessary to re-time the engine or magneto. When timing the magneto the contact breaker should be in the fully advanced position. For correct timing the points should be just breaking when the dead centre line of the flywheel is 45 degrees BEFORE the top centre.



TIMING DIAGRAM FOR 25 H.P. ENGINE.

Fig. 12.
Engine and Magneto Timing Diagram for 25 h.p. six-cylinder Sunbeam.
Firing Order of Cylinders, 1, 5, 3, 6, 2, 4.

IGNITION.

The dual type magneto fitted to the 25 h.p. Sunbeam is the B.T.H. type CED 6. This machine is specially designed to operate in conjunction with an ignition coil and high and low tension change-over switch. The magneto distributor and contact breaker are used for the ignition coil as well as the magneto windings.

The platinum points of the contact breaker must be kept absolutely free from oil and petrol. This is of the utmost importance. The contact breaker is intended to operate with a gap of .012 in., and this should be checked periodically by the aid of the feeler gauge on the magneto spanner.

Whenever the magneto is lubricated this must be done with care, and the quantities given here should not be exceeded. The following points should be lubricated every 3,000 miles with special light oil as used for typewriters or sewing machines. Two drops on the contact breaker cam pad, one drop on the wick in contact breaker pivot pin, six drops in the driving end cup and twelve drops in the distributor end cup.

Examine the bell crank lever bearing bush occasionally, and if this is dry smear with a little light oil. After refitting the lever on the bush any **excess of oil should be wiped away.**

The distributor should be removed after every 4,000 to 5,000 miles, and the internal surfaces cleaned with a cloth moistened with petrol. The surface of the brush holder should be similarly treated, but petrol must **not** be used for cleaning the contact breaker.

Should trouble be experienced with the ignition system, although this is very unlikely, it can be tested out in the following manner. Remove the wires from the two high tension terminals on the top of the magneto marked " D " and " M" in Fig. 13, and connect these two terminals together with a short length of high tension wire. Move the switch to " Magneto " and the system will function as a magneto only.

The engine should then start readily under these conditions, and if so, the fault can safely be assumed to be in the high tension cable or the change-over switch. The end of the two high tension cables removed from " D " and " M " should be carefully insulated from all metal work to avoid cutting-out the magneto through earthing.

The instruction book issued by the B.T.H. Company for the CED6 magneto should be consulted on all matters appertaining to the magneto and ignition system. If any trouble should arise, the magneto should be sent to the makers or to one of their Service Agents for expert attention.

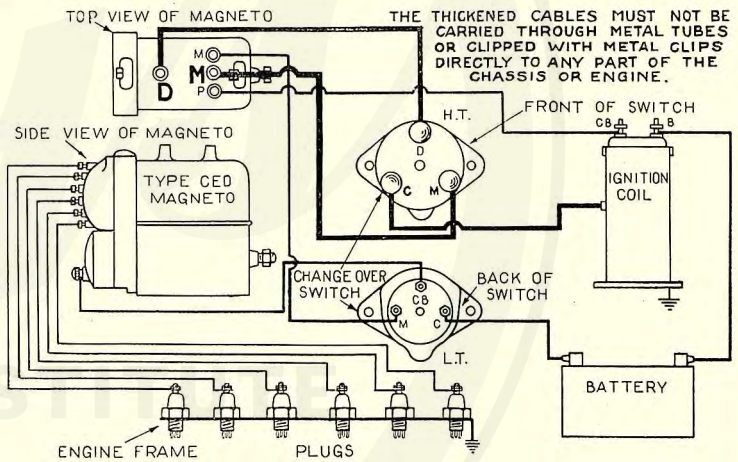


Fig. 13.
Wiring diagram of dual ignition system.

SPARKING PLUGS.

Keep the sparking plugs free from carbon deposit by occasionally brushing the points with a file card and afterwards washing them in petrol. The correct gap between the points is .018in.

CARBURETTER.

The carburetter fitted to the 25 h.p. Sunbeam engine is the Stromberg UX2. The following are some of the outstanding features of this type :—

1. A new warming up control which gives improved starting ability and unusually smooth operation after starting while the engine is cold.

2. A new positive acting accelerating device, consisting of a pump which delivers an accelerating charge immediately the throttle is moved and meters and delivers this charge over a definite period of time.

3. Idle and low speed jets above the throttle with separate idle adjustment for smooth low speed performance.

4. An economiser which permits the carburetter to operate on a very lean and economical mixture at the closed throttle positions of average driving, but automatically gives the needed richer setting when the full power of the engine is called for.

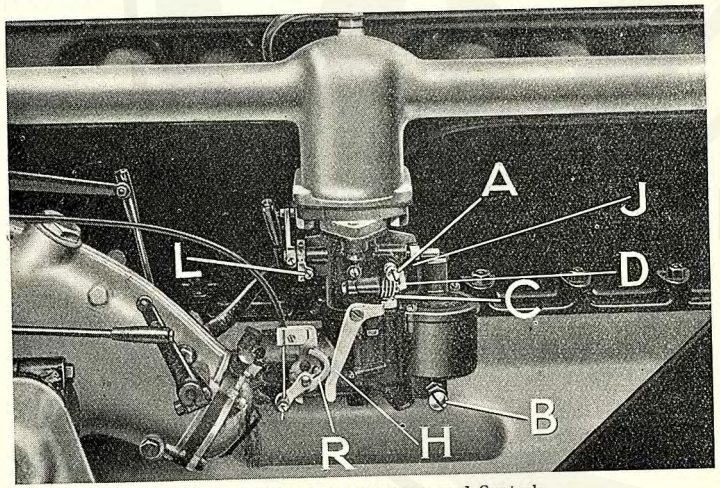


Fig. 14. Showing Carburetter and Controls.

Except in very rare instances it is inadvisable to make any alteraton or to spend needless time in experimenting. If any trouble is experienced and the symptoms point to the carburetter, first look over the carburetter connections, etc., but do not attempt to make any adjustment until other likely causes of trouble have been investigated. The carburetter adjustments are correct when cars leave our Works, but if for any reason an alteration has been made and adjustment is necessary to restore the normal setting, the following instruction should be carried out.

To adjust for high speed, fully advance ignition lever ; set throttle lever to a position which will give about 25 miles per hour speed on a level road, then turn the high speed adjustment " B " clockwise, which gives less fuel, until the engine begins to slow down ; then slowly return it anti-clockwise until the maximum engine speed is reached for that throttle position. This should give a good average adjustment.

Low Speed Adjustment. This may be restored as follows :—Have engine well warmed up, so that the intake pipe above the carburetter is at least warm to the hand, then slow the engine down by gradual motion of the throttle lever on the steering wheel till minimum steady idling speed is reached. Then turn low speed adjustment " A " gradually right or left till steadiest running, and fastest running for that throttle position, is obtained. This adjustment operates on air so that screwing it in gives a richer mixture, out, a weaker one. If after this adjustment is made the engine idles too fast, turn the small throttle stop screw at " L " counter-clockwise to reduce the minimum throttle opening until the desired idling speed is reached. If the engine idles too slowly, as shown by its " rolling " and stalling easily, screw the throttle top screw inward or clockwise to increase the minimum idling speed. When engine is idling properly there should be a steady hiss in the carburetter ; if the hiss is unsteady the

auxiliary control needle "C" may not be seated. To idle steadily on present fuel, the gap between the spark plug points should be approximately .018in.

Further instructions regarding starting, float level adjustment, etc., are given in the leaflet supplied by the manufacturers of the Stromberg carburetter.

The following points should be carefully noted. With the throttle in the closed position Roller J must have a little clearance from arm D. Lever H must be quite free from Cam R with strangler fully open, or the warming up valve will be held open and the mixture upset.

The Roller J and the arm D are more clearly shown on the instruction pamphlet issued by the Stromberg Company.

ADJUSTMENTS FOR BENZOLE, Etc.

Benzole and petrol require slightly different settings to obtain the best results, but an adjustment can be found which will serve equally well when running with either fuel.

Generally speaking, the best results with benzole are obtained by having a smaller jet opening, which is effected by screwing in the screw marked "B," on Fig. 14 on page 24. About half or three-quarters of a turn is usually sufficient to give the adjustment required.

Very good results can be obtained from a mixture of petrol and benzole of good quality in equal quantities, the standard carburetter setting being used.

AUTOVAC FUEL SUPPLY SYSTEM.

The fuel is fed to the carburetter from the tank carried at the rear of the chassis by means of the Autovac fuel supply system. The Autovac is of simple and durable construction. Full instructions for its care and maintenance are given in the booklet issued by the makers.

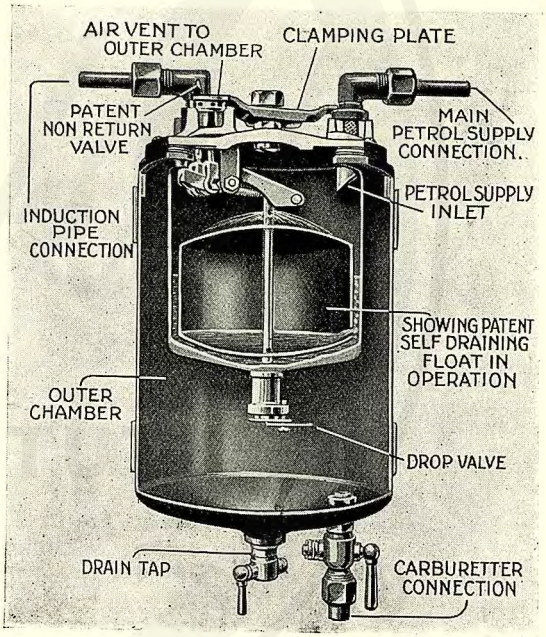


Fig. 15.
Sectional View of Autovac.

KEEP THE AUTOVAC STRAINER CLEAN.

Although full information is contained in the book issued by the makers, we would emphasize that the strainer in the Autovac, at the end of the main supply pipe from the fuel tank, should be removed and cleaned **about every three weeks.** This strainer is provided as a screen to collect all foreign matter which might otherwise get into the Autovac and be carried through to the carburetter. Note exact position when removing the strainer to ensure replacement being properly made.

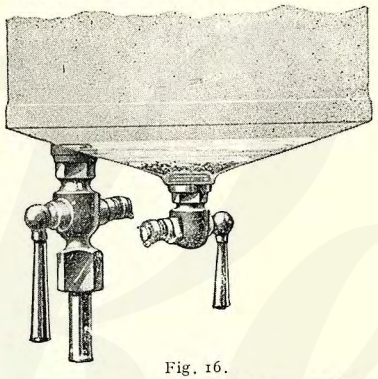


Fig. 16.

Showing the Drain Tap and Sediment Trap in bottom of Autovac which should be opened occasionally and any sediment cleared out.

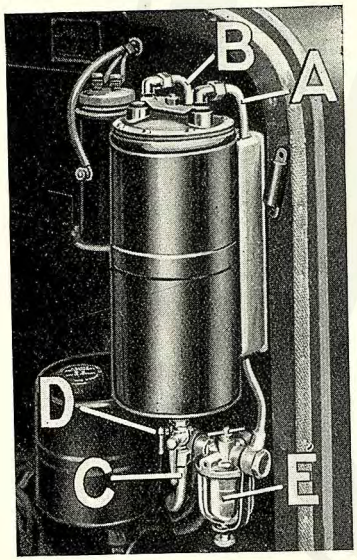


Fig. 17.

Showing position of Autovac. A is the pipe to main fuel tank; B the pipe to carburetter; C the suction pipe; D the drain tap; E the glass petrol filter.

Every three months, whether it seems to need it or not, flush the Autovac through the fuel connection. At the same time open the drain tap in the bottom of the tank, and let out any sediment or water which may have collected. Also, look over the suction and petrol pipe connections to see that they are absolutely tight.

AUTOVAC AIR VENT CAP.

In the air vent cap four holes are drilled, which allow an atmospheric condition to be maintained in the outer or emptying chamber, and these must always be kept clear of paint, grit or other kindred substances. If the cover has been removed for inspection, when replacing care should be taken to see that the air port corresponds with the port leading to the outer chamber.

SPECIAL PETROL FILTER.

A special type of petrol filter is fitted on the engine side of the dash which filters the fuel before it reaches the Autovac. The handle on this should be given one turn about once a week and any sediment collected will then fall into the sump of the filter. By unscrewing the retaining screw at the bottom, the glass sump can be taken off and the accumulated sediment removed.

FILLING UP WITH FUEL.

When filling the fuel tank, it is advisable to use a tundish fitted with a fine gauze strainer. A gauze filter is fitted inside the filler of the tank but the tundish provides a second filter and should almost entirely prevent particles of grit reaching the tank and eventually finding their way to the carburetter. Avoid using a tundish with a long funnel as this will damage the gauze in the tank filler.

Keep the fuel system clean. The filters provided should be regularly cleaned out. Despite the care taken in using a tundish with gauze bottom and the assistance of the gauze in the tank filler, minute particles of dirt are liable to get into the pipe and in course of time may cause an accumulation. This is not due to any lack of cleanliness in the pipe system when the car is new, but to the fact that some of the present-day fuels are not entirely free from particles of foreign matter. If the Autovac is to receive a perfectly regular supply of fuel, the pipe system **must** be kept clean.

If the carburetter jet tube becomes choked through the presence of grit or dirt, unscrew the plug at the base of the carburetter casing and the jet can then be unscrewed from its

seating and the obstruction removed. Any dirt which may accumulate on the carburetter casing should also be removed immediately it is noticed. See pages 24, 25 and 26 which deal more fully with the carburetter.

The importance of cleanliness in regard to the whole system of fuel supply cannot be too strongly emphasised.

ELECTRICAL EQUIPMENT.

Rotax electrical equipment is fitted to the 25 h.p. Sunbeam. For information as to the general care and maintenance of this equipment we recommend owners to consult the comprehensive instruction book published by Rotax Ltd.

DYNAMO.

The dynamo fitted is the Rotax model A.T. 82, this being driven by a vernier coupling from the water pump. The normal charging rate is 10 amps. at 20 m.p.h., and the speed of " cutting in " 12 m.p.h. on top gear.

STARTING MOTOR.

The Starting Motor is the Rotax M.T. 95, contained in a housing cast integral with the gear box and clutch casing, and has Bendix type engagement.

BATTERY.

A 12-volt battery is clamped in a container within the chassis frame and has a capacity of 66 ampere-hours.

LIGHTING EQUIPMENT.

A Rotax 12-volt set is fitted with internally wired lamps, and an externally operated arrangemnet for focussing. The head lamps are 36 watt, the side lamps 6 watt, and the tail lamp 4 watt.

WIRING DIAGRAM.

A complete wiring diagram is given on page 31, and a diagram of the dual ignition system on page 23. On all points affecting the general maintenance of equipment, see the Rotax instruction book.

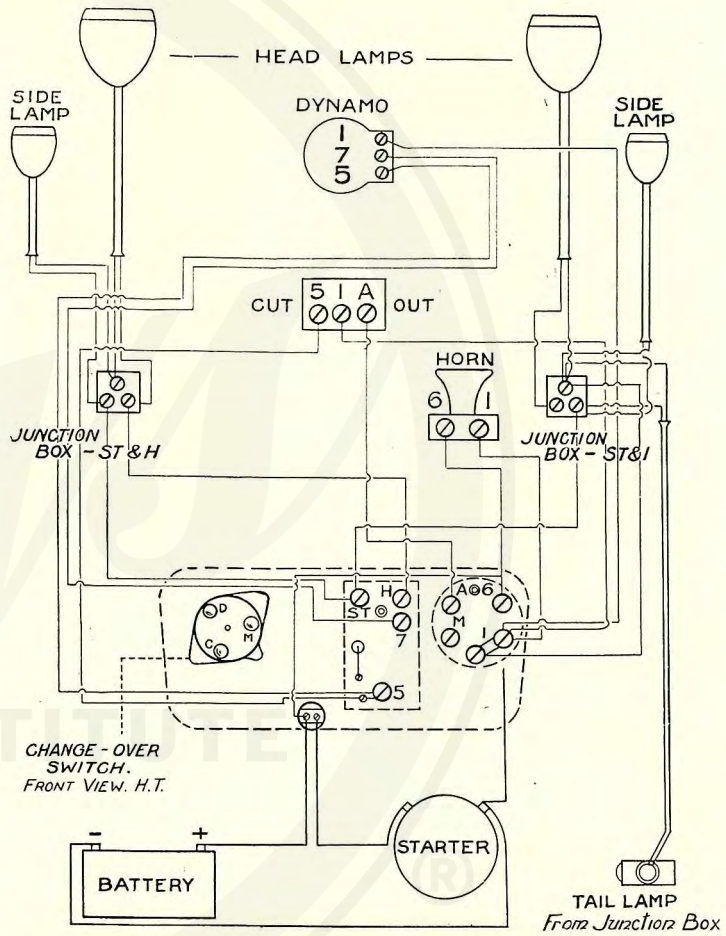


Fig. 18.

If any extra electrical fitments are added these should be wired to terminals 6 and 1.

FOCUSSING HEAD LAMPS.

The Rotax head lamps fitted to the 25 h.p. Sunbeam are internally wired, have dipping reflectors, electrically operated from a switch conveniently placed for the driver, and are focussed by sliding the lampholder in a liner on the reflector.

To focus or replace a bulb it is necessary to remove the lamp front. This can be done by taking out the round-headed screw at the top of the lamp and turning the front to the left as indicated by the arrow stamped on the rim. Loosen the screw in the liner and slide the lampholder backwards or forwards, reflecting the light on to a wall or some white object, for instance a white sheet, and the correct adjustment will be arrived at when the light reaches the highest point of brilliancy with an absence of shadows. Always make this adjustment when fitting new bulbs.

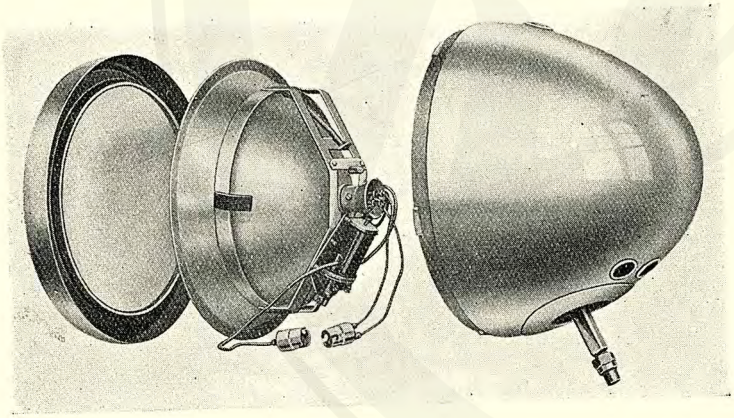


Fig. 19.
Head Lamp dismantled showing dipping reflector arrangement.

WATER PUMP.

As shown in Fig. 20, two glands are provided to prevent leakage from the water pump. These must be kept well packed with any standard gland packing. If any leakage is noticeable, first tighten up the gland nuts. Should the leakage persist drain all the water from the radiator and cylinder block, as explained below. Unscrew the locking nut "A," and the small pin "B," which retains the spring "C," to allow the gland nuts "D" being unscrewed as far as possible. Remove the old packing and repack carefully by winding the new packing round the spindle and forcing it at the same time towards the pump to ensure water tightness. See that it is wound towards the engine so that the rotation of the spindle does not tend to unwind it. Then screw up the gland nuts and tighten the locking nut and pin.

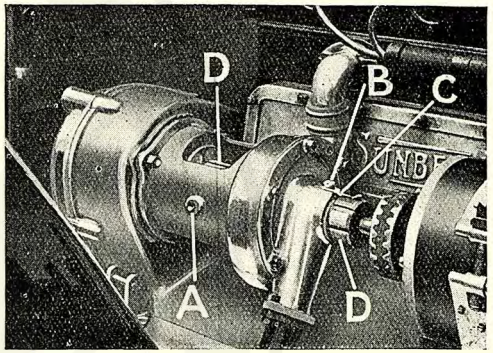


Fig. 20
Showing the Water Pump and Glands which should be packed when required to prevent leakage.

RADIATOR—Special Note.

During cold and frosty weather, when the car is left standing overnight, it is advisable to drain the water out of the radiator and cylinder block, also from the small cock on the water pump. A cock for this purpose is fitted at the bottom of the radiator inside the bonnet, and a drain cock on the off-side of the cylinder block, by the first holding-down stud. The position of the water pump cock is shown at "D," Fig. 4 (page 8).

DO NOT FORGET TO REFILL THE RADIATOR BEFORE AGAIN STARTING THE ENGINE.

STEERING GEAR.

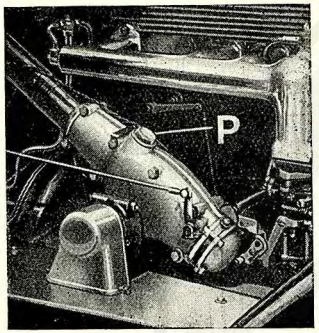


Fig. 21.
Keep the Steering Box well lubricated through the plug shown above.

The steering fitted on the 25 h.p. Sunbeam is of the screw and nut type. This method has been found very efficient. The surfaces in contact are of large area, the steering being very easy in operation, and there is an absence of all backlash.

A plug for lubrication is fitted on the steering box (see Fig. 21), and the box should be regularly filled with the same brand and grade of oil as used for the lubrication of the Gear Box and Back Axle Case.

Grease must not be used for the Steering Box.

Do not turn the road wheels entirely by the steering wheel when the car is stationary, as this practice strains the joints. If it is required to alter the position of the wheels when the car is standing, they should be assisted by hand.

CLUTCH.

On the 25 h.p. model, as on all other Sunbeam cars, the clutch and gear box form a unit with the engine (illustrated on Fig. 4, page 8). The clutch is of the single-plate type, no adjustment being required for the springs. The clutch disc, which is lined with fabric, and is situated between the floating clutch plate and the flywheel, runs on a splined shaft. The clutch pit is covered by a removable cover.

As the movement of the floating plate is frictionless, and the clutch being of the dry-plate type, no lubrication of any kind is required. The clutch withdrawal shaft is lubricated automatically. The clutch withdrawal race on the stemwheel is packed with grease when assembled, and there is no need to lubricate this further.

CLUTCH PEDAL ADJUSTMENT.

It is vitally important that drivers should not allow the left (or clutch pedal) foot **to remain in contact with the pedal plate** after the change speed or other operation is concluded. It is the first cause of clutch wear. It is necessary that the clutch pedal should have **at least $\frac{1}{2}$ in. idle movement,** measured at the top of the pedal plate. When the minimum movement is reached the pedal should be adjusted by screwing down the adjusting nut "A" until the pedal has an idle movement of 1 in. The nuts "B" are stops for the brake and clutch pedals respectively.

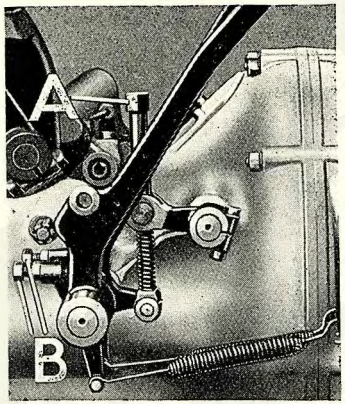


Fig. 22.
Adjustment for Clutch Pedal is marked A. The nuts marked B are stops for the brake and clutch pedals respectively.

GEAR BOX LUBRICATION.

In the gear box, as in the case of other units requiring regular lubrication, there is a correct level for the oil. The screw plug shown in the illustration on page 36 should be unscrewed and the oil replenished every 500 miles. Although the consumption of oil is small, the level must be maintained. If the oil is poured in slowly it will drain down into the gear box and when it reaches a point about $1\frac{1}{4}$in. below the top of the plug hole the correct level has been reached. Do not forget to screw the plug up tightly after filling with oil.

If the supply of oil is not maintained at the correct level there will obviously be unnecessary wear on all the gears and their life will be shortened.

It cannot be emphasised too strongly that proper lubrication is most important. The gear box is provided with a "mud sump" (Fig. 24) to prevent particles of foreign matter getting into the speedometer gears or universal joint oil ducts. The plug marked "A" (Fig. 24) should be removed occasionally and the accumulated sediment drained away from the "sump."

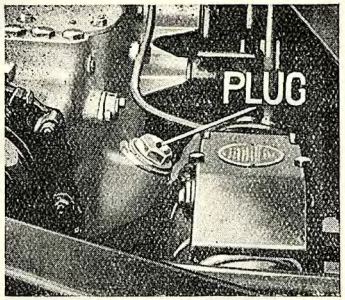


Fig. 23.
Showing Oil Filler in Gear-box.

SPECIAL NOTE.—Engine lubricating oil is not suitable for the gear box. We specially recommend Wakefield's "Castrol S," or Shell-Mex Gear Oil.

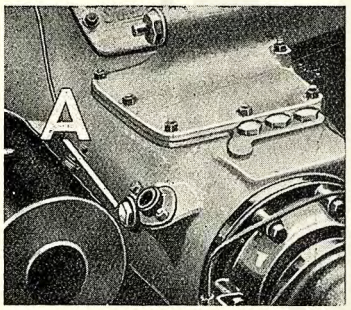


Fig. 24.
Plug for Speedometer Gear Sump.

LUBRICATION of the SPEEDOMETER DRIVE.

If at any time the speedometer is not registering correctly, or is intermittent in action, it is possible that the drive may need lubrication. When required, inject a little oil at the speedometer end of the flexible coupling. This is more easily effected if the oil is first warmed. Usually this operation will be required about once every three months.

LUBRICATING THE REAR AXLE.

At the back of the axle casing, as shown in Fig. 25, is a screw plug through which the axle is supplied with oil. As a safeguard, and to ensure getting the longest life from the axle parts, the supply of oil should be replenished every 500 miles.

The consumption of oil is moderate, and only a very small quantity will be required every 500 miles to maintain the proper level. The correct level is indicated when the oil reaches a point about $1\frac{1}{4}$in. from the top of the plug hole. The level is marked on the casing as shown in Fig. 25. This lubrication **must not be neglected.**

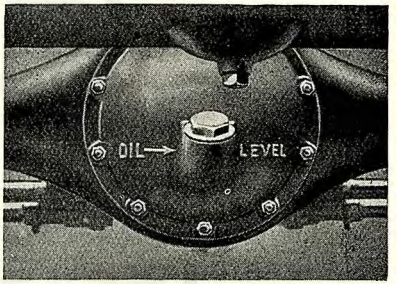


Fig. 25.
Unscrew plug to replenish oil supply in rear axle. See also Fig. 26. The small plug shown above it is the drain plug in the fuel tank.

In cold weather the oil tends to form a film across the plug hole. This conveys the impression that the oil level is correct. The film should be pierced and it will then probably be found that a small quantity of oil is required to bring the supply up to the proper level. Use oil as recommended for gear box.

See that the plug is properly screwed up after the oil supply has been replenished.

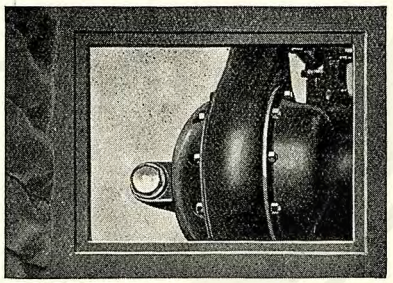


Fig. 26.
The oil plug is easily reached through the opening under the rear seat.

THE BRAKING SYSTEM.

Our wide experience in connection with four-wheel braking has enabled us to devise a system giving exceptional stopping powers with extreme smoothness of application.

The brakes on all four wheels are applied by pressure on the brake pedal, and are operated through a Dewandre Vacuum Servo. With this method of braking the physical effort required in application is considerably reduced, and only comparatively light pedal pressure is necessary. The braking power is applied progressively and the steering is not affected in any way by the action of the front wheel brakes.

No adjustment of the servo is required, and it is important that neither the mechanism between the brake pedal and the servo, nor the servo unit itself, should be touched in any way. The main adjustment for the brakes is at the back of the servo unit, as described on page 40.

The joints of the air pipe between the vacuum servo and the induction pipe must be kept tight, as in the event of an air leak developing, both the efficiency of the servo and the running of the engine will be affected.

After about every 2,000 miles the top cover of the servo box should be removed and oil applied—very sparingly—to the principal working parts. A few drops is all that is necessary. The same grade of oil as used for the lubrication of the engine is suitable for this purpose.

The principle governing the Sunbeam front wheel brakes will be easily understood from the following brief description in conjunction with the accompanying diagram (Fig. 27). The brake drum on each wheel contains two

shoes, C and D, one smaller than the other. The two shoes are connected together by a pivot B, which is free in its housing. The other end of the smaller shoe is connected to the cam gear. E is the main anchor pin.

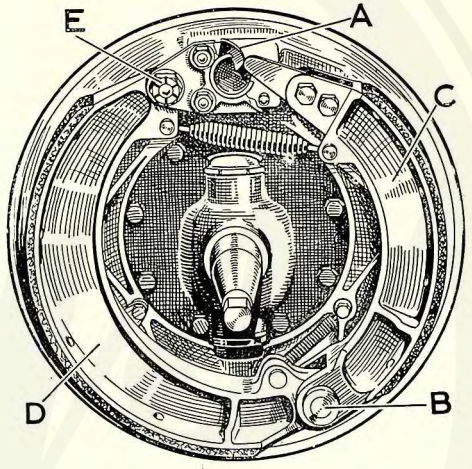


Fig. 27.
Showing lay-out of Sunbeam Front-wheel Brake. A portion of the plate has been cut away to show the operating cam A.

When the brake pedal is depressed the movement of the cam A, forces the smaller shoe into contact with the brake drum and the shoe thereupon tends to revolve with it. This alters the pivotal centre of the shoe, and in turn expands the larger or main shoe against the drum, both shoes thus exerting a retarding pressure on the drum.

In each rear brake drum two pairs of brake shoes are fitted. When the pedal is depressed one pair of shoes is expanded through the action of a cam. The second pair of shoes provides quite independent braking, being operated by the hand lever and not controlled in any way by the pedal.

It will be seen from this that the braking system on the 25 h.p. Sunbeam actually provides six brakes—four operated by the pedal, through the vacuum servo, and the two separate rear-wheel brakes operated by the hand lever.

FOUR-WHEEL BRAKE ADJUSTMENT.

When any adjustment of brakes becomes necessary the following instructions should be followed. There is individual adjustment provided for each of the four-wheel brakes, but the main adjustment is effected through the jaw " A " (see Fig. 28). If the balance of adjustment between all four brakes has been disturbed by the removal of the brake shoes, rods, etc., it can be restored as follows: the lock nut situated at the rear of the Dewandre servo, underneath the rubber cover, should be loosened, the pin removed from the jaw " A " (see Fig. 28) and the jaw unscrewed for several turns. The car should then be jacked up from underneath each axle so that the weight is on the springs and all the wheels are off the ground.

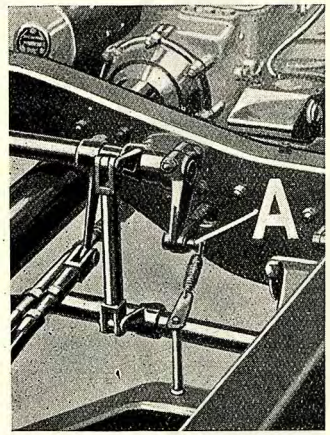


Fig. 28.
Showing Adjusting Nut for Front and Rear Wheel Brakes.

The front brakes should now be adjusted through their independent adjustments. The adjusting nut " FB " (see Fig. 30) on each side of the chassis should be tightened until both sets of front brake shoes are just touching the drums: THE NUTS AT THE END OF THE SPRING ON THE INSIDE OF THE BRAKE LEVER ARE NOT ADJUSTING NUTS AND NO ATTEMPT SHOULD BE MADE TO EFFECT ADJUSTMENT THROUGH THEM. Now, by means of the adjusting nuts " B " shown in Fig. 29, tighten the rods until both the rear wheel brakes are just touching the drums. Then finally adjust by turning the jaw " A " (see Fig. 28) to the required position. Replace the pin

together with washer and split pin and tighten up lock nut at the rear of the Dewandre servo.

Both front and rear wheel brakes should then be adjusted so that the shoes are just free of the drums. As a final test apply pressure to the foot pedal when the front and rear wheel brakes should all come into operation equally at the same time.

INDEPENDENT ADJUSTMENT FOR BRAKES.

Independent adjustment is effected by means of the adjusting nuts " FB " (see Fig. 30) for the front wheel brakes, and by the nuts " B " (see Fig. 29) for the rear wheel brakes. The hand brake is adjusted by the nuts " A " (Fig. 29). In all cases care must be taken to see that the offside and nearside brakes exert the same braking power on application of the foot pedal and hand brake levers respectively.

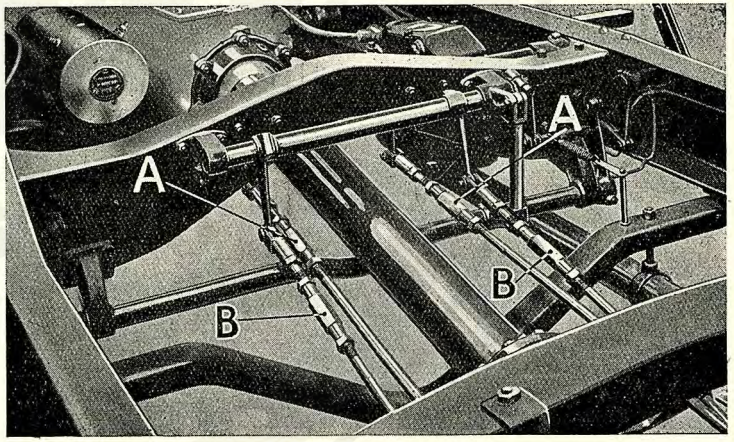


Fig. 29. Showing Independent Adjusting Points for Rear Wheel Brakes. The nuts marked A are on the hand brake rods; the nuts B are for the pedal operated brakes.

FRONT WHEEL BRAKES.

An eccentric stop marked "A" (Fig. 30) is fitted to hold the brake shoes in their proper position relative to the drum. It may be necessary after the car has been running for a considerable time to adjust this stop in order to counteract wear of the shoe linings. Such adjustment would only be slight, about $\frac{1}{8}$ of a turn of the screw (the nut is a lock nut) being sufficient. The screw must be held firmly with a screwdriver, both while unscrewing the lock nut, and also when tightening up again.

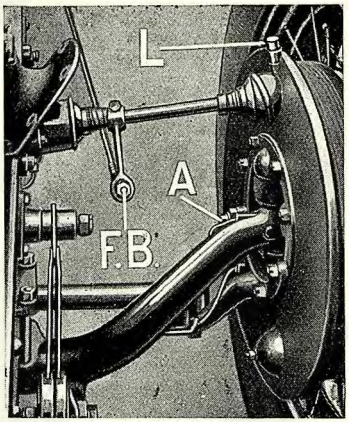


Fig. 30.
Showing near-side Front Wheel. F.B. is the Front Wheel Brake Adjusting Nut. A the Eccentric or Equalising Stop for the Brake Shoes.

After adjustment each wheel should spin freely; if it does not, the adjustment has been overdone, and the screw will have to be screwed back slightly until the wheel does spin freely. This should be tested with the wheels pulled round into full steering lock in each direction.

REAR WHEEL BRAKES.

The independent adjustment for the rear wheel brakes is described on page 41, and the adjusting nuts shown in the illustration Fig. 29. The nuts marked "A" are on the rods from the handbrake to the rear brake shoes, the nuts marked "B" on the rods from the pedal.

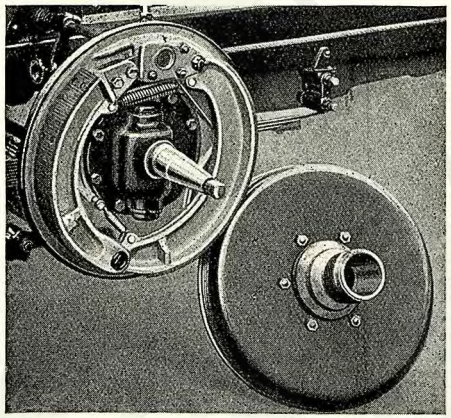


Fig. 31.
Showing Front Wheel Brake, with Wheel and Brake Drum removed.

REMOVING BRAKE DRUMS.

To remove a brake drum unscrew the six nuts which hold this on the hub. See Figure 31. If the drum should be too tight to pull off after the nuts have been unscrewed tap it lightly around its outer edge with a mallet or raw hide hammer. Do not use an ordinary steel hammer or the drum may be damaged.

As shown in Fig. 32, twin brake shoes are fitted on the rear wheels, the hand brake operating separate shoes to those actuated by the four-wheel brake pedal.

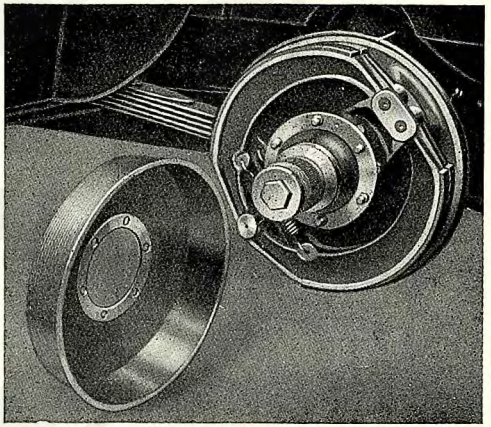


Fig. 32.
Rear Wheel Brake with Wheel and Brake Drum removed showing Twin Brake Shoes.

SPRINGS AND SHOCK ABSORBERS.

The springing of the 25 h.p. Sunbeam is designed to give the fullest comfort at all road speeds; semi-elliptic springs are fitted at the front and cantilever springs at the rear with Hartford shock absorbers on all springs. The spring shackles and leaves are lubricated from the central system.

The shock absorbers are set to the proper initial tension when each car leaves our works, and no change should be made in this adjustment until the car has been driven at least 100 miles, and not even then unless the spring action seems too free or not free enough. The frictional resistance can be increased by turning the centre adjusting nut to the right (clockwise movement) by not more than one graduation at a time. If the spring action feels stiff, the frictional resistance can be reduced by turning the adjusting nut to the left (anti-clockwise movement). Further adjustment may only become necessary after the car has run several thousands of miles, and even then the adjustment should not be altered unless the spring movement seems very free. In this case the indicator should be moved not more than half a graduation at a time. The full benefit of Hartford Shock Absorbers is felt when the car is travelling at high speed, and especially over bad roads when the springing action is most severe. When testing as to the correctness of the adjustment the observation should be made when the car is travelling at a comparatively high touring speed.

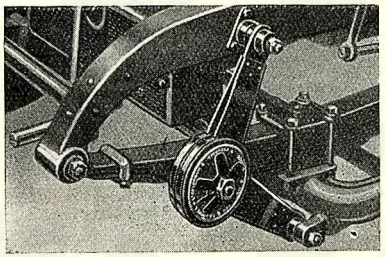


Fig. 33.
Showing Shock Absorbers in position and Adjustment Indicator.

Important.—The frictional resistance required to control the action of the springs is comparatively slight, and when adjusting the pressure should not be increased more than is absolutely necessary to obtain the desired results.

DETACHABLE WHEELS.

The wire wheels fitted to the 25 h.p. model are easily detached whenever removal is necessary.

To remove a wheel, the car should be jacked up and the lock nut on the wheel unscrewed by turning it in the direction in which the wheel revolves when the car goes forward. A special wheel spanner is provided with the tool kit. The lock nuts on the off, or right hand, side of the car have a left hand thread. Each lock nut is marked "Left side, Near side," or "Right side, off side" and arrows are stamped on showing the direction in which the lock nut should be turned.

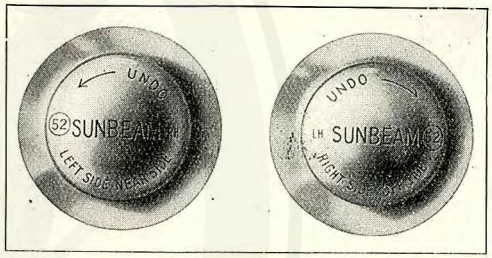


Fig. 34.
Showing lock nuts of Detachable Wheels.

In fitting a spare wheel the inside of the wheel hub and the outside of the permanent hub should be quite clean except for lubricant. Push the wheel right home on the inner hub, and screw up the lock nut, while the car is jacked up, until it is quite tight.

After changing a wheel it is advisable to test the lock nut after the wheel has been running fifteen or twenty miles to see if there is any slackness. This will be noticeable if the wheel is rocked backwards and forwards, and any tendency to movement should be removed by again tightening up the nut. This slackness is sometimes wrongly attributed to the lock nut unscrewing, a thing which never happens if it has been correctly put on.

TYRE PRESSURES.—The following are the minimum tyre pressures recommended for the 25 h.p. model, and it is important that the pressures should not be allowed to fall below these figures.

Front Tyres:	*Rear Tyres:*
40 lbs. per square inch.	35 lbs. per square inch.

REAR HUBS.

The rear hubs are very simply removed, no special tools being necessary. When the wheel and brake drum have been removed (see Fig. 35), a castellated circular nut will be seen, in the position shown in the accompanying illustration. B is the castellated nut, A is a locking plate held in position by a small set screw. If this locking plate is removed and the circular nut B unscrewed the rear hub, complete with the shaft, can easily be withdrawn. The nut B remains on the axle.

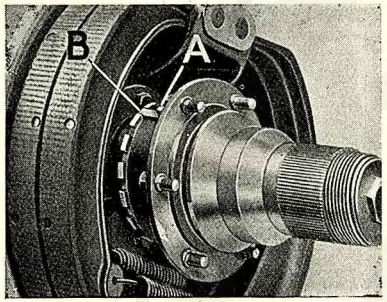


Fig. 35.
Showing Locking Plate and Screw (A), and Castellated Nut (B).

When replacing it is very important that care should be taken to screw up tightly the nut B and make sure that the locking plate A is firmly in position and the set screw properly screwed up.

We recommend Gargoyle Mobilubricant Soft Grease for the lubrication of front and rear hubs.

FRONT HUB ADJUSTMENT.

If the front hub bearings should require adjustment, care must be taken to see that they are not screwed up too tightly. The inner nut should be screwed up until there remains two or three thousandths of an inch end play. After placing lock washers in position, and the outer nut screwed home, practically all this end play will then be taken up.

CENTRAL LUBRICATION FOR THE CHASSIS.

The introduction of a central system of chassis lubrication is the outcome of exhaustive tests and experiments made over a considerable period. With the system now introduced on Sunbeam cars, lubrication of the chassis parts is effected in the simplest and cleanest way.

A spring-loaded pump, operated by a pedal, is situated to the left of the clutch pedal as shown in Fig. 3, page 7.

When the pedal is depressed the pump operating springs lift the plunger and allows a charge of oil to pass through the hollow centres of the piston into the delivery chamber whence it is pumped into the pipe lines. The time period during which the piston descends depends on the viscosity of the oil, so that with heavy oil on a cold day the period may be as much as half an hour, but the quantity of oil is constant.

On removing the foot, the pedal will gradually return to its normal position, and the charge of oil forced into the pipe lines feeds the valves fitted on the various points requiring lubrication.

These valves are so regulated that they pass the exact quantity of oil required by the particular bearing. Thus, parts in frequent frictional movement, as spring shackles, receive a larger supply of oil than such parts as brake camshafts, etc.

The pedal having returned to its normal position after the foot has been taken off, is ready for a further operation when required.

The pedal, when not in use, is held by a spring clip to the tool box support.

It is recommended that the pedal should be depressed when first starting up the car each day. If the operation is carried out then no further attention need be given until the following day, except in the case of a very long day's run, when the pedal should be again depressed after the first 200 miles has been done. The pedal must always be depressed to its fullest extent.

The oil tank or reservoir should be filled with the same grade of oil as used for the engine. The lubricating oils recommended for the 25-h.p. six-cylinder engine are Wakefield's "Castrol AA" or Double Shell. To prevent jet stoppage the oil is filtered at the tank filler by a filter insert. There is another filter at the tank outlet, and each connection is fitted with a small pad of filtering material.

The only points on the chassis not lubricated by the central system are the brake cam balls ("L," Fig. 30), which should be lubricated every 1,000 miles.

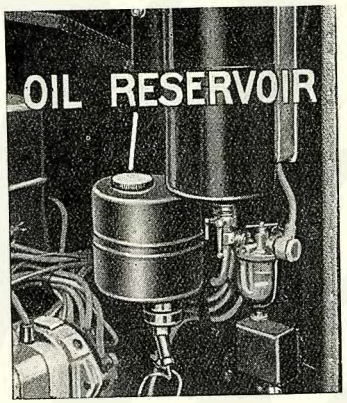


Fig. 36.
Showing Oil Reservoir.

The steering box, gear box and back axle case are not lubricated from the central system but through the oil plugs provided for these respective units, and which appear in the illustrations shown on pages 34, 36 and 37.

For the lubrication of these parts and for lubricating the brake cam balls (see lubrication diagram at front of this book) we recommend Wakefield's "Castrol S," or Shell-Mex Gear Oil.

It is important to note that the central lubrication system is entirely independent of the engine. Full instructions regarding engine lubrication are given on pages 10, 11 and 12. It is important also to note that the pedal must always be depressed to its fullest extent. See reference to this on page 47.

ADJUSTING REAR SEAT AND SQUAB.

The various types of bodies fitted to the 25 h.p. Sunbeam chassis are fitted with adjustable rear seats and squabs, *i.e.*, back rests, so that these may be adjusted to provide the most comfortable position for the occupants of the rear seat. The methods of adjustment are very simple and are described and illustrated on this and the following page.

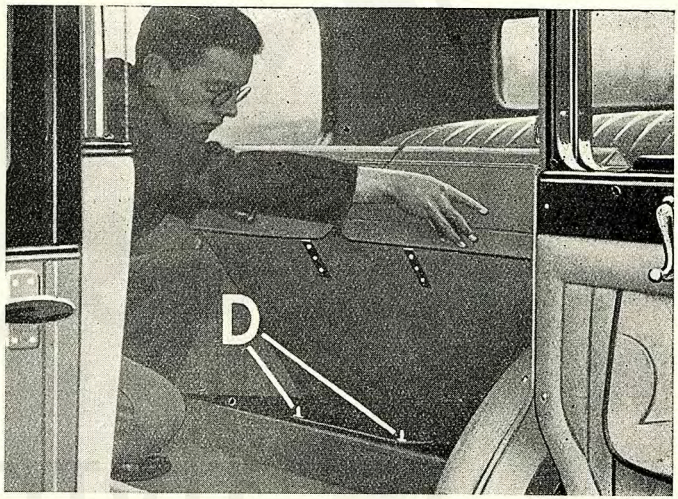


Fig. 37. Showing Adjustment for Rear Seat.

Fig. 37 shows the adjustment for the rear seat. This can be moved backwards or forwards within a range of about three inches, and is retained in position by the dowel pegs (as shown, marked "D," Fig. 37) engaging with the holes in the plates on the under side of the seat. When making any adjustment, either to the seat or the squab, see that the dowel pegs engage firmly in the holes in the plates.

To adjust the squab the seat should first be lifted out and the two wing nuts which hold the squab in position unscrewed. The squab can then be placed at the slope desired by moving it backwards or forwards as may be necessary. The wing nuts should then be tightened up again securely.

When the rear seat is removed access to the rear axle lubricating plug is provided through the opening in the seat frame. This is covered with black leather cloth, a portion of which folds back to enable the lubricating plug to be reached. An illustration showing this appears on page 37, where instructions are given regarding the lubrication of the axle and the oil recommended for this purpose.

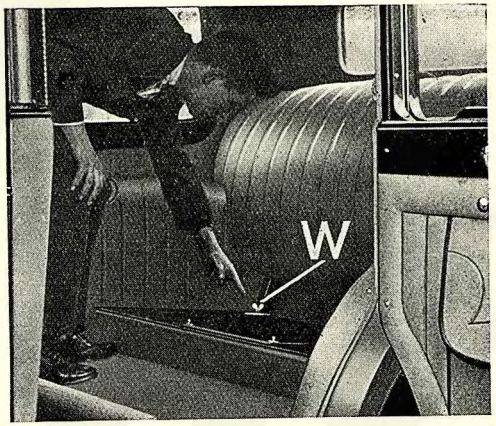


Fig. 38.
Showing Adjustment for Rear Squab.
W is one of the wing nuts.

CARE OF THE COACHWORK.

On cars finished in Cellulose, mud and dirt can be removed with a damp sponge without the necessity for hosing down with water, and the car afterwards polished with one of the special polishes recommended for Cellulose finish.

The following remarks apply only to cars finished in coach-paint and varnish and **not** to cellulosed cars.

WASHING THE CAR. Mud and dirt must be removed **at the earliest opportunity.** This should be carried out by using only **clean cold water.** Nothing should be mixed with it—certainly not petrol or paraffin, which act detrimentally on the varnish.

To remove accumulated mud well soak all over the body with the water just trickling from the hose pipe. Water applied at pressure direct on to the mud only tends to fix it rather than to soften it, especially in the case of a newly finished car. If water is used with any force then the nozzle of the hose should be held at an angle (pointing downwards) so that the water slides down the body instead of reaching it at right angles. Cleaning materials should be kept specially for the chassis and under-work where oil and grease are likely to be picked up.

The sponge and leather for the bodywork of the car **should never be used for anything else.** A honeycomb sponge is the best kind. When drying off after washing, always use the smooth side of the chamois leather. The rough or "flesh" side may cause minute scratches.

Stains can be removed with the aid of a good Varnish Reviver. This should be a really good preparation, as some revivers contain ingredients which may ultimately prove harmful to the varnish if used too frequently.

Cars fitted with Weymann bodies should be washed down with **clean cold water** and the surface of the fabric afterwards dried in the same way as a coach-built body would be treated.

It is advisable to oil the door locks and hinges, also the bonnet hinges, occasionally. Use the oil sparingly and keep it off the paintwork and upholstery.

IMPORTANT NOTE *re* CHROMIUM PLATING.

It is important to note that Metal Polish or any similar preparation must not be used for cleaning chromium plated parts.

Such parts should be cleaned by washing carefully with clean cold water and afterwards polished with a soft, clean wash leather.

CARE OF THE UPHOLSTERY.

The leather selected for the upholstery of Sunbeam cars is of the best possible quality, only first-grade hand-buffed hides being used. The result is that the leather work retains its appearance and wears for a very long period. Very little attention is needed beyond an occasional brushing to remove dust from around the buttons and from the folds.

We do not recommend the use of creams, polishes or other similar preparations as there is often a risk that the leather may be adversely affected by some ingredient in the polish itself.

To clean leather upholstery the use of pure soap and water is strongly advised, but on no account should this be used on cloth upholstery or furniture hide.

Cars upholstered in cloth require only occasional light brushing to remove dust. A brush should be kept specially for this purpose, and washed periodically, so that there is no likelinood of grease or oil getting on to it. If grease marks accidentally get on to the cloth, they can usually be removed with petrol applied with a piece of clean rag. The important thing is to remove them at the earliest opportunity, before the grease has had time to penetrate deeply into the cloth.

If touring cars are standing in the garage for any length of time the hood should be raised and left in this position, and under similar conditions Landaulette models should have the folding portion of the head **raised.**

RAISING AND LOWERING THE HOOD ON TOURING CARS.

The whole operation of raising the hood is very simple and can be carried out by one person. Unfasten the steel straps which hold the frame irons together. The hood can then be raised easily without disturbing the other occupants of the car. Sockets are provided in the front of the hood frame, which drop on to the rounded tops of the windscreen posts, and wing nuts secure the hood in position.

Before lowering the hood the doors of the car should be shut and fastened. Unscrew the wing nuts inside the hood frame so that it is free from its anchorage on the windscreen posts. When folding the hood care should be taken to see that none of the folds become trapped between the frame irons. Finally, see that the frame irons are fastened together with the steel straps.

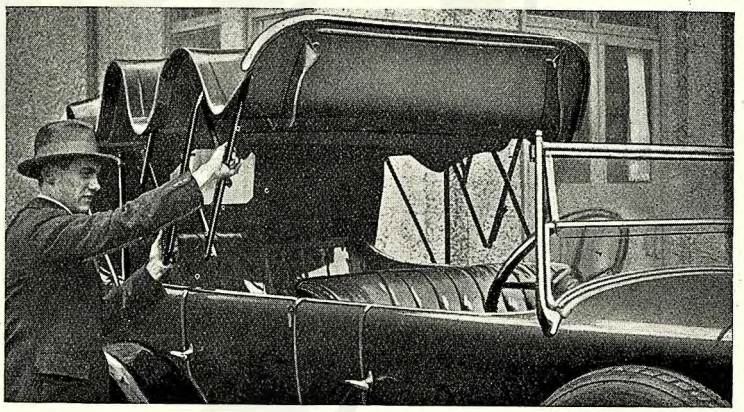


Fig 39.
Showing how to hold the Frame to avoid "trapping" the fingers.

PUTTING ON THE HOOD COVER.

When the hood is lowered the folds of material must be pulled clear of the frame. The hood material should then be folded on to the top of the frame and the cover slipped on. It will be found that this goes on more easily if the corner is turned back as shown in Fig. 40. Then fasten the straps, taking care not to pull these too tightly. The result should be a neatly folded hood, fully protected from dust and damage.

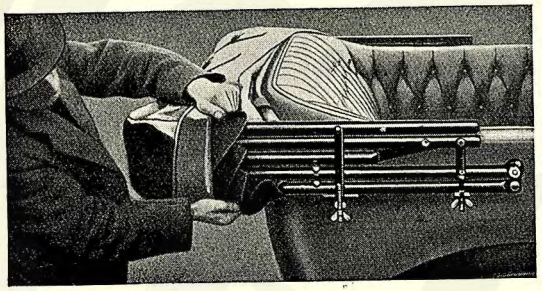


Fig. 40.
When placing the cover on the Hood turn back the corner, as shown. It will slip on more easily.

SIDE CURTAINS.

The rigid side curtains supplied with all Sunbeam touring cars are very easily erected in position. There are six curtains in all and each is marked with its respective position (*.e.g*, left front, right front, etc.) to facilitate correct fixing. The right-hand front curtain has a hinged flap through which the driver's hand can be projected. Any or all of the curtains may be used without the hood to give protection to the passengers against cold air or when a side-wind is blowing.

When not in use the curtains should be packed away in the receptacle provided for them at the back of the rear seat.

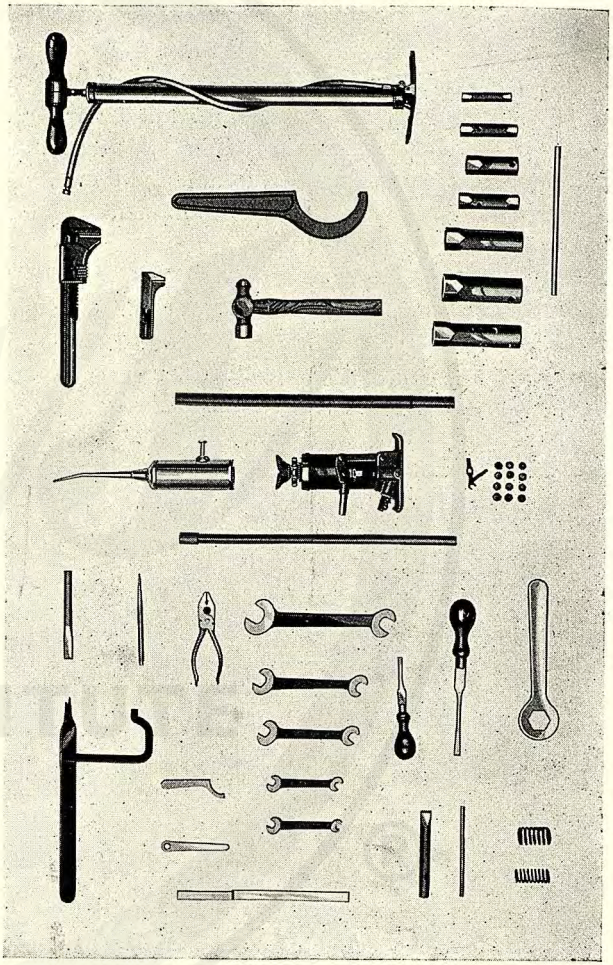


Fig. 41. Illustration showing Kit of Tools supplied with the 25 h.p. Sunbeam Car.

THE 25 H.P. TOOL KIT

Complete list of the tools provided with each 25 h.p. Sunbeam Car :—

1 Double-ended spanner, $\frac{1}{2}$in. and $\frac{5}{8}$in.
1 Double-ended spanner, $\frac{3}{8}$in. and $\frac{7}{16}$in.
1 Double-ended box spanner 6 mm. and 8 mm.
1 Double-ended box spanner, 10 mm. and 12 mm.
1 Double-ended open spanner, 6 mm. and 8 mm.
1 Double-ended open spanner, 10 mm. and 12 mm.
1 Box spanner, $\frac{3}{8}$in. and $\frac{7}{16}$in.
Box spanners for $\frac{1}{4}$in. square nuts.
Box spanner for gear-box and back axle case oil fillers.
Box spanner for Swivel Axle nut.
Spanner for valve tappet adjustment.
Spanner for central lubrication fittings.
Spanner for removing hub caps.
Spanner for removing fuel tank cap.
Spanner for adjusting water pump gland.
Spanner for magneto.
Jack, with handle.
Oil can.
Set of valve thimbles.
Valve lifting tool.
1 small adjustable spanner.
1 large adjustable spanner.
Spanner for differential shaft nut.
Spanner for sparking plugs.
Spanner for hub grease cover.
2 tommy bars for use with all box spanners.
Tyre pump.
Set of valve springs.
1 hammer, 2 screwdrivers, pair of pliers, punch, chisel, sponge cloth, tool bag.

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