



INSTRUCTION BOOK

FOR THE

ROYAL ENFIELD

350c.c. SIDE VALVE

MODEL W.D./C.

MOTOR CYCLE

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Instruction Book

FOR THE



350c.c. SIDE VALVE
MODEL W.D./C.
MOTOR CYCLE

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The
350c.c. Side Valve
ROYAL ENFIELD
Model W.D./C. Motor Cycle

- 1 Controls.** The rider should familiarise himself with the positions of the various control levers so that their operation becomes instinctive. The controls are shown diagrammatically opposite.

OPERATION OF THE MOTOR CYCLE.

- 2 To Start the Engine.** Fill up the tank with petrol and the oil tank in the engine crankcase with oil. Turn on the petrol and depress the tickler of the carburettor until petrol overflows at the bottom of the carburettor body. There are two petrol taps beneath the tank, one on either side. Use the tap on the right hand side. A reserve of petrol will thus be available by turning on the left hand tap. Place the gear control in the neutral position, partly close the air lever, slightly retard the ignition, open the throttle control about one-eighth, and smartly depress the kick starter. If the engine fails to fire first or second time, repeat with a slightly different

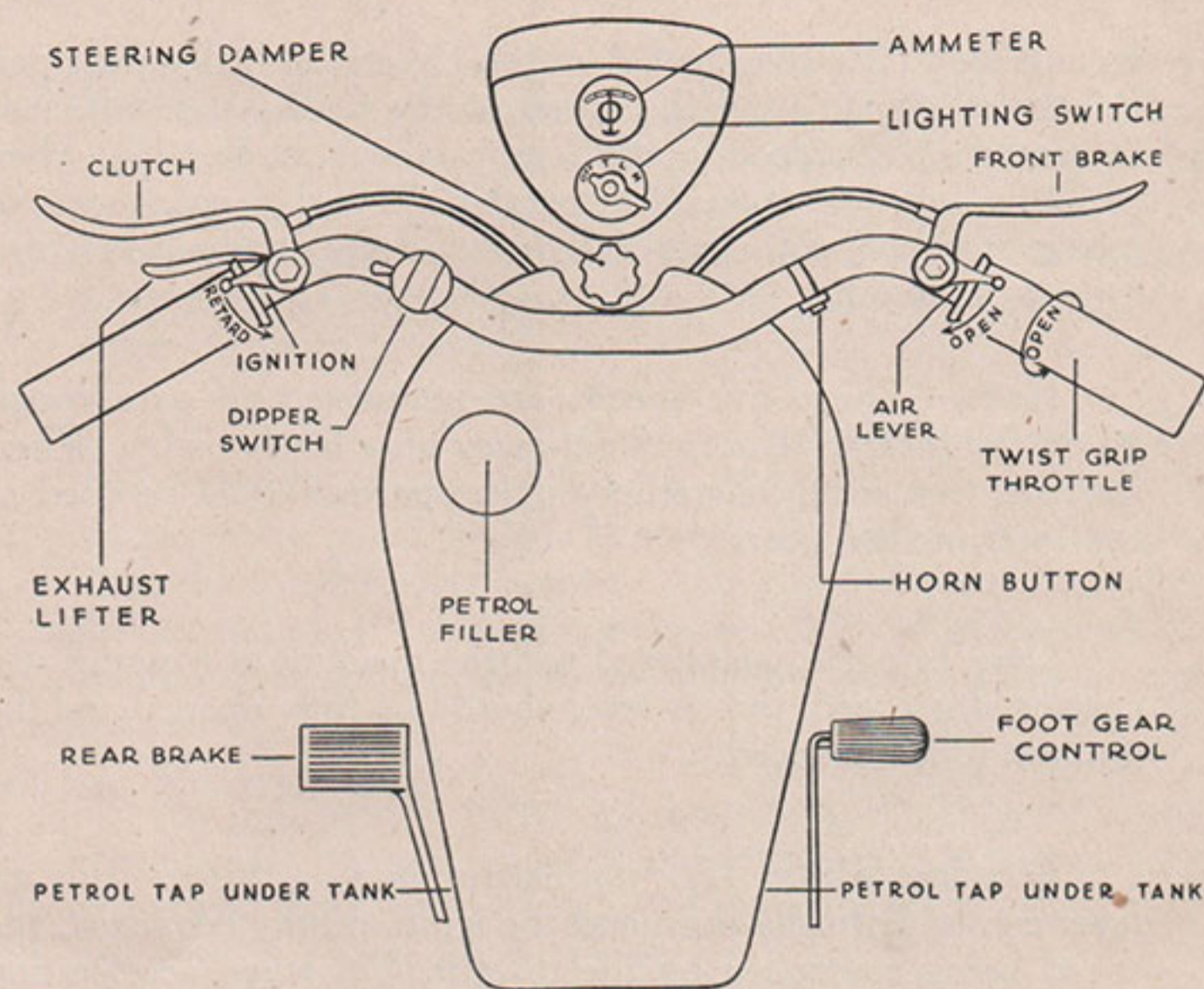


Fig. 1. CONTROL DIAGRAM.

throttle opening. The best position for starting will soon be found from experience. When starting a warm engine, do not flood the carburettor or the mixture will become too rich.

- 3 To Start the Machine.** Pull up the clutch lever. Engage the lowest gear by pressing the foot control up as far as possible and then releasing it. Slowly release the clutch lever, at the same time accelerating the engine by opening the throttle slightly and the machine will move away without jar or jerk. When the machine has attained sufficient speed (about 10 m.p.h.) partly close the throttle, de-clutch and change to second gear by pressing the foot control downwards as far as it will

go and then releasing it. Let in the clutch gradually and open the throttle again until the speed of the machine is sufficient to require a change into third gear (about 20 m.p.h.), when the foregoing operations are repeated. Finally, change up to top gear when sufficient speed has been attained in third (about 30 m.p.h.).

Note.—The above speeds are intended only as a rough guide for making a normal get-away on a level road. When starting up a steep hill rather higher speeds should be used in the intermediate gears.

Once top gear is engaged and the machine is running at a comfortable speed, the air lever should be fully opened and the ignition fully advanced.

- 4 **Driving Hints.** For normal running on the level the air lever can be left fully open and the ignition fully advanced, the speed being controlled by the throttle, but when accelerating or climbing a hill it may be necessary to retard the ignition slightly, and while the engine is cold, partly close the air lever.

As a guide to the correct positions for the ignition and air control levers the beat of the engine should be studied. If the engine is "eight-stroking," i.e., firing on only every alternate firing stroke, the mixture is too rich and the air lever should be opened further. If the engine cuts out on opening the throttle the mixture is too weak and the air lever should be closed further. If the engine "pinks" (i.e., a sharp metallic knock), the ignition is too far advanced or the mixture is on the weak side.

Never allow the engine to labour on a hill. If the machine will not climb comfortably on top gear, change down by de-clutching and moving the gear lever upwards as far as possible and then releasing it, leaving the throttle control open during

the change. When in the lower gear the ignition may be advanced and the air lever opened to suit the higher engine speed. If a hill is long and steep enough to demand a change to a lower gear, it is always desirable to make this change before the engine has commenced to labour. One change low down may save two higher up, and at the same time enable a faster climb to be made.

To stop the machine, close the throttle and apply the brakes. Before coming to rest, de-clutch and engage neutral gear. All machines are set at the Works so that the engine "ticks over" when the throttle lever is shut. To stop the engine, therefore, it is necessary to raise the exhaust lifter. Alternatively the throttle-stop can be set so as to allow the throttle to close completely.

An indicator is fitted to the foot-operated gear control showing which gear is in use. **To obtain neutral from bottom or second gear**, move the control down or up half the amount necessary to engage the next gear.

- 5 **Running In.** A new machine should not be driven at a speed exceeding 30 m.p.h. for the first 200 miles and until at least 500 miles have been covered the throttle should not be opened above half way, except for very short periods. After this distance short bursts of speed are desirable in order to hasten the bedding down of the thrust faces of the piston. Gradually increase the duration of these speed bursts until the machine will stand large throttle openings for indefinite periods.

The necessity for progressive running-in cannot be over-emphasized. Pistons are sent out with close clearances in order to give long service with freedom from "slap." The cooling of the cylinder obviously must be unsymmetrical so that some distortion of both piston and cylinder is bound to occur. This may result in seizure if the piston is allowed to reach too high a temperature before it is properly bedded down. This bedding down can only take place within a reasonable period if the

ROYAL ENFIELD 350c.c. W.D./C. MOTOR CYCLE

engine temperature is **progressively** increased. Running 1,000 miles at 30 m.p.h. will **not** bed down the piston to enable it to withstand continuous high speed running. Note that piston temperature is the important factor and that this depends not only on speed and throttle opening, but also on how long that particular throttle opening has been sustained. Thus a machine after the preliminary 200 miles might stand full throttle for half a mile and yet pull up if driven at three-quarter throttle for five miles or so.

If the engine is run too long on a large throttle opening and shows the slightest tendency to pull up or seize, **lift the clutch and close the throttle.** Even if a seizure then occurs it will do little or no damage and after cooling for a minute or two the piston will free itself. If a seizure does occur, the piston should be examined by a competent mechanic to have any high spots eased down.

LUBRICATION.

- 6 **Lubrication of the Engine.** The lubrication is of the dry sump type and provides a positive supply of oil to the big-end, valve gear, timing gear and the rear cylinder wall.

Fig. 2 shows the paths round which the oil circulates. Oil is drawn from the reservoir A by the feed pump B through the filter C. The pump B is double-acting, the primary side being used to deliver oil through the filter L* and thence through the feed plug D down the timing side shaft to the big-end from which it is splashed to the cylinder, piston and main bearings. The secondary side of the feed pump B delivers a further supply to the back of the cylinder wall. Surplus oil collects in two wells at the bottom of the crankcase from which it is drawn by the return pump E through the filter F and delivered to the reservoir A. A ball valve at the point G at the outlet end of the delivery passage (See Fig. 3) creates a pressure which forces part of the return oil up an external pipe to the

*Not fitted to early models in which the oil goes direct from the pump B to the feed plug D.

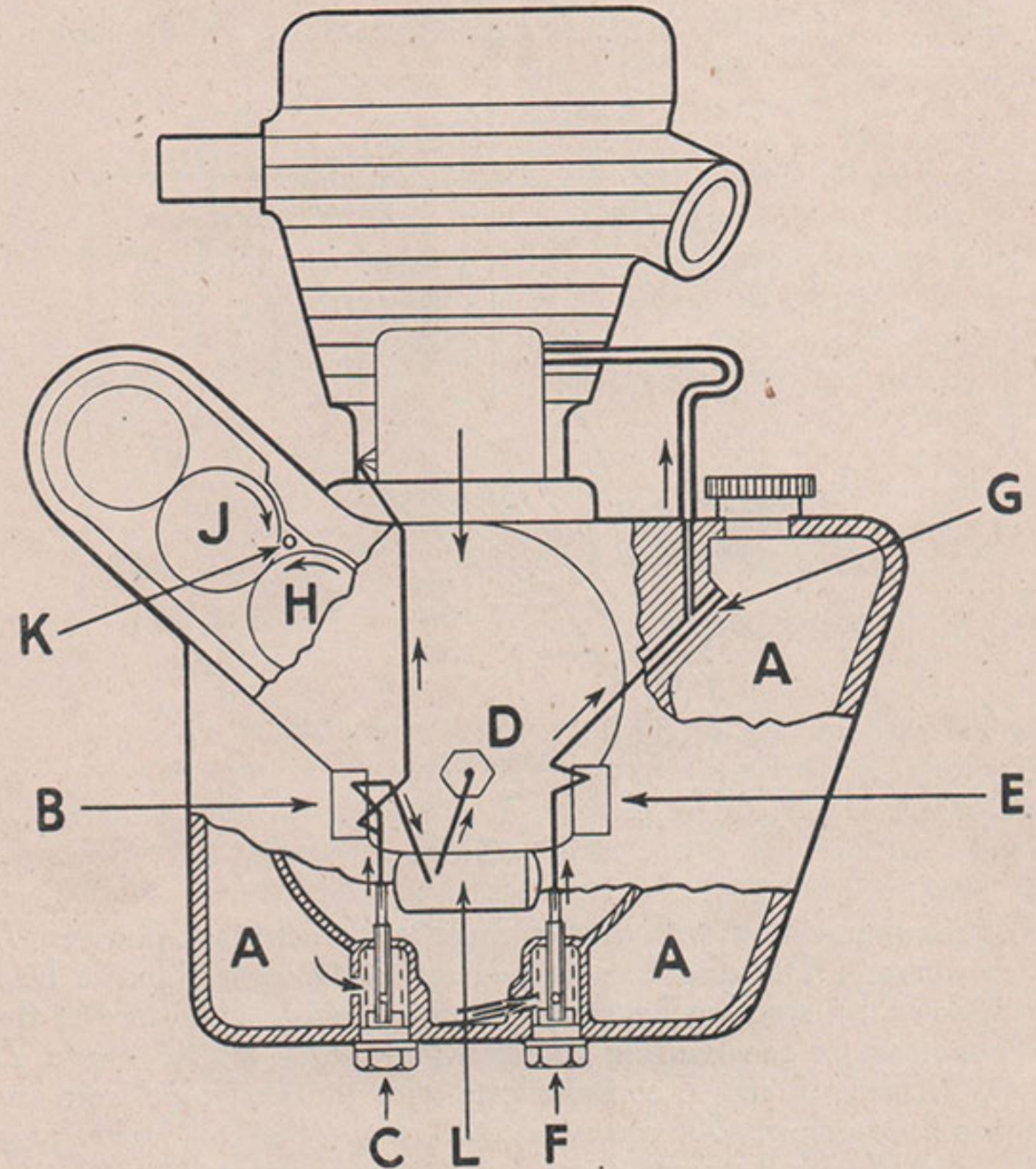


Fig. 2.

valve chest. From here, the oil drains through a hole between the tappet guides to the timing case from which it is picked up by the gear wheels H and J and returned through the passage K to the reservoir A.

Fig. 4 shows the action of the double-acting feed pump. The plunger A is driven by a pin B (on the end of the cross shaft) and works in a cylinder formed in the disc C which can oscillate in its housing. The lower face of the disc has a port T

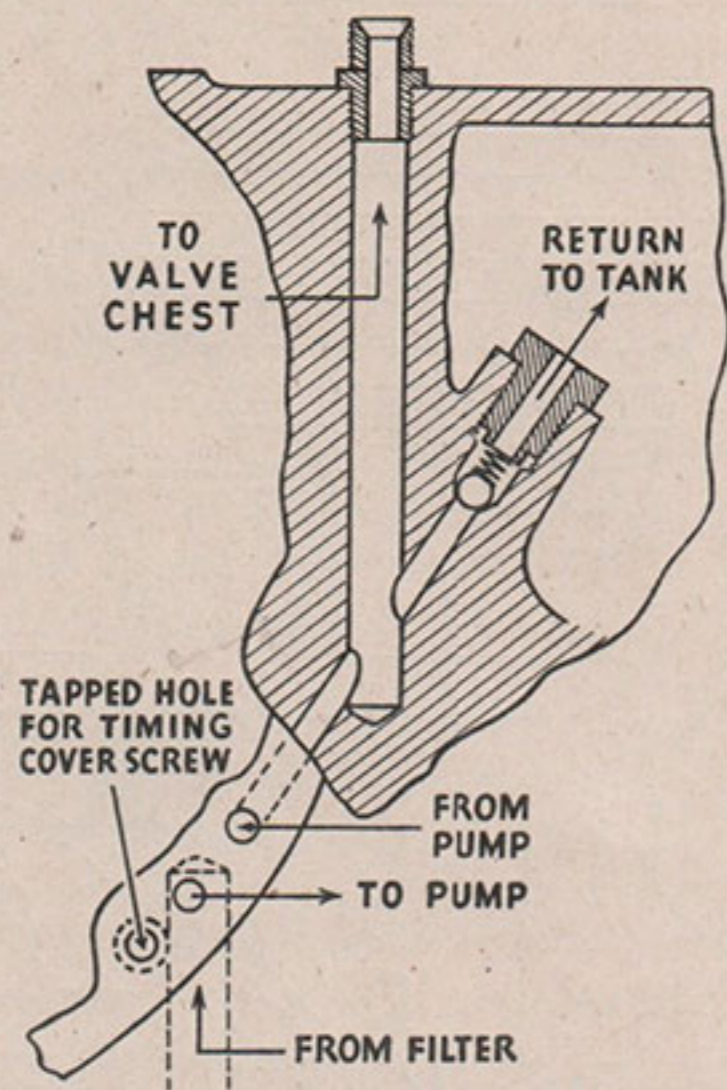


Fig. 3

communicating with the cylinder in which the plunger A works. The disc C is lapped on to its seating and is held down by a spring beneath the pump cover. The face at the bottom of the housing contains four ports W, X, Y and Z. Of these Y and Z communicate with the feed pipe from the oil reservoir, X communicates with the oil feed plug and W with the passage leading to the cylinder wall.

As shown, the plunger A is being drawn out of its cylinder, the port T registers with Y and oil is drawn in from the reservoir. At the same time the clearance space in the housing D is being decreased as the plunger is drawn out of C and in consequence oil is delivered through port W to the cylinder wall.

As the plunger reaches the outer end of its stroke, the disc C turns and, on the inward stroke, port W is covered by the disc, Z is open and T registers with X. Consequently oil is delivered through X to the big-end and is drawn in through Z from the oil reservoir.

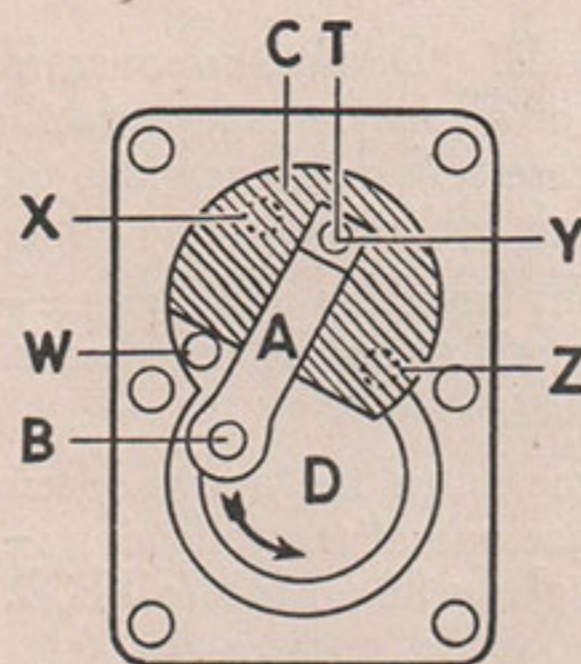


Fig. 4.—FEED.

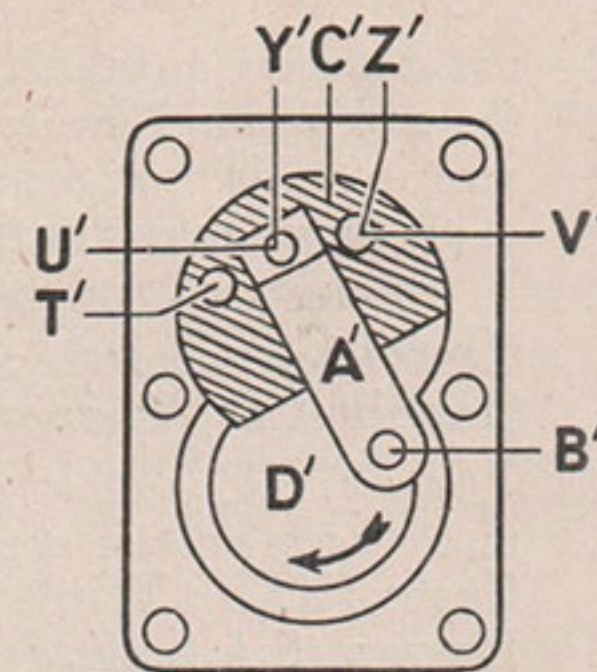


Fig. 5.—RETURN.

The construction of the return pump is similar, but the arrangement of the ports is slightly different. As shown in Fig. 5 there are two ports, Y' and Z', in the face at the bottom of the housing. Y' communicates with the suction passage from the well at the bottom of the crankcase; Z' with the delivery passage to the oil reservoir. The lower face of the disc has three ports T', U' and V', of which U' communicates with the cylinder in which the plunger A' works; T' and V' are drilled right through to the upper face. In the position shown, U' registers with Y' and V' with Z'. Oil is being drawn in through U' and Y' and simultaneously is delivered through V' and Z'. On the opposite stroke, T' registers with Y'; U' with Z'. Oil is then drawn in through T' and Y' and delivered through U' and Z'.

7 LUBRICATION ROUTINE FOR THE ENGINE.

Never allow the oil tank to become empty. Since there is no reserve of oil in the sump, an empty tank means immediate shortage of oil to the working parts. The oil level must always be kept above the bottom of the dipstick attached to the filler cap. By keeping a large quantity of oil in circulation, its temperature is kept low and the oil retains

its lubricating qualities for long periods. Do not, however, fill the tank within 2 inches of the top, or oil may escape from the vent in the joint at the rear of the case. A notch near the top of the dipstick marks the upper limit for filling.

We recommend the following oils for use in our engines:—
Castrol Grand Prix ; *Golden Shell ; †Essolube Racer ; ‡Mobiloil D ; Energol S.A.E. 60.

In very cold weather, or at any time when the above special motor cycle oils are not available, use one of the following:—
Castrol XXL ; Triple Shell ; Essolube 50 ; Mobiloil B.B. ; Energol S.A.E. 40.

These flow freely when cold and at the same time have adequate heat resisting properties. The importance of efficient lubrication cannot be over-estimated. The use of cheap oils is false economy and we strongly recommend the oils mentioned above, as we have found from experience that these are the most suitable for our engines. It is advisable to specify the brand as well as the grade, and as additional precaution, oil should be bought from branded cabinets or sealed cans.

After the first 500 miles and subsequently every 2,000 miles the oil must be drained from the tank and the sump by removing the two filter plugs C and F. (See Fig. 2.) Note that the rear plug drains the tank, the front one the sump. At the same time, the felt filter L must be removed and washed in petrol. A new felt element should be fitted every 5,000 miles. The filter gauzes must be brushed with paraffin to clean them and the tank and sump swilled through with clean engine oil, allowed to drain, and refilled with fresh oil. This procedure is conveniently carried out when the engine is being decarbonised. The oil will flow more readily if the plugs are removed at the conclusion of a ride, or the tank and sump may be allowed to drain overnight. Waste of oil is reduced by allowing the oil level in the tank to become reasonably

*Known in some countries as Shell X100 (SAE 60).
 † " " " " " " Essolube 60.
 ‡ " " " " " " Mobiloil B.

low before draining. **After changing the oil, allow the engine to tick over gently for a few minutes until the oil is circulating.**

8 Lubrication of the Gear Box. The gear box must be filled to the level of the filling orifice with engine oil. On no account should grease be used in the gear box. The oil level should be checked every 500 to 1,000 miles.

If the gearbox has been dismantled it should be packed with a soft grease on re-assembly and then topped up with engine oil.

9 Lubrication of Chains. The front chain case must be filled with engine oil up to the level of the overflow plug. The chain will thus be kept clean and well lubricated, giving a silent and efficient drive.

The rear chain must be lubricated at frequent intervals with engine oil or grease, and should be removed about every 2,000 miles, and after washing in paraffin should be soaked in melted tallow.

10 Grease Gun Lubrication. The fork spindles, rear brake pedal, and gear control spindle must be lubricated, with the grease gun provided, every 200 miles or once a week. The hubs should be greased very sparingly and not too often, or grease may find its way on to the brake linings.

For the fork spindles a low melting point grease, such as Castrolase (Medium), Mobilgrease (No. 2), Shell Retinax CD, *Esso Grease or Belmoline (D), should be used. For the hubs use a high melting point grease such as Castrolase (Heavy), Mobilgrease (No. 4), Shell Retinax RB Grease, *Esso Grease or Belmoline (C).

After using the grease gun it is an excellent practice to go over all nuts and see that they are tight.

TROUBLE ON THE ROAD.

11 Royal Enfield Motor Cycles enjoy a wonderful reputation for reliability. Trouble on the road is very unusual; nevertheless

*Known in some countries as Esso Cup Grease.

stoppages may sometimes occur and it is hoped that the following hints may help towards the speedy location of the trouble.

12 Engine Stops owing to lack of Petrol. This is the commonest form of engine stoppage. The first symptoms are irregular firing, which is temporarily cured by closing the air lever. Make sure that there is plenty of petrol in the tank. If so, disconnect the petrol pipe at the carburettor end and turn on the tap. If a good flow of petrol occurs, the stoppage is probably in the jet itself. If the flow from the petrol pipe is restricted, the stoppage lies either in the petrol tap, or the pipe itself.

13 Engine Misfires or Stops owing to faulty Ignition. The symptoms in this case are that the engine will not run regularly and is very hard to start. In other cases the engine may suddenly "cut out" without any warning. First see that the high tension lead has not become disconnected at either end and is not worn or burnt through, allowing the bare wire to touch some metal part of the machine. See also that the plug insulator and high tension lead are not wet.

If all the above is in order, remove the sparking plug and hold it with the body touching the engine cylinder, but with the terminal clear of the machine and connected to the high tension lead. Turn the engine round by the kick starter. If a good spark is obtained at the plug points, the ignition is in order and the trouble lies elsewhere. If no spark or a very weak spark is obtained, remove the plug and hold the end of the high tension wire about $\frac{1}{8}$ in. from a metal part of the machine and rotate the engine. If a spark is obtained from the wire, the fault lies with the sparking plug. If this is oily or sooty it can be taken apart and cleaned, but if the points are red and burnt the plug has been too hot and a new one should be fitted, preferably of the type recommended in paragraph 29. The gap between the plug points should be .018 in. to .025 in.

If the plug is satisfactory, the trouble lies in the magneto. See that the contact breaker points are clean and that they open

and close properly. These should open to the thickness of the gauge supplied on the magneto spanner. If necessary, remove the contact breaker by unscrewing the centre screw and clean out the housing behind it. This should be free from oil or damp. Also remove the carbon brush holder and clean the slip ring with rag pushed down with a piece of wood.

14 Other Causes of Engine Stoppage. Other possible causes of an engine stoppage are :—

(1) **Water in Carburettor.** The symptoms are usually intermittent misfiring and banging in the silencer following a heavy rain storm.

The remedy is to clean out the float chamber and jets.

(2) **No clearance at tappets.** This is evidenced by an entire lack of compression when turning over with the kick starter. The remedy is to adjust the tappets.

(3) **Sticking Valve.** In this case there is no compression and excessive tappet clearance, the valve remaining partly open. The valve may free itself on cooling, but sometimes it is necessary to dismantle the engine to free the valve.

(4) **Broken Valve.** This trouble is very rare and is usually caused by consistent overdriving of the machine and by neglect of the tappet clearances (see paragraph 23). The symptoms are that the engine "cuts out" suddenly and stops with no tappet clearance. Furthermore, it is not possible to obtain any clearance at the tappets.

(5) **Seized Piston.** This is caused by overdriving a new machine before the engine is properly "run in." The symptoms are loss of power and a tendency to "pink," followed by the engine locking up solid. An aluminium piston will always free itself if allowed to cool. If the clutch was withdrawn and the throttle closed before the final seizure, the consequences may not be serious, but the cylinder and piston should be examined as soon as possible by a competent mechanic to have any score marks removed. A seizure may also occur through running with insufficient oil, in which case the consequences will be far more serious.

- 15 Clutch Trouble.** A slipping clutch may be caused by lack of clearance in the control (see paragraph 35).

A binding clutch is caused by too much slack in the control wire. New clutches sometimes tend to bind until the inserts have bedded down dead level.

OVERHAULING THE ENGINE.

- 16 Decarbonising.** When an engine has been in use for some time, carbon deposit forms on the piston and cylinder head and the engine must be partly dismantled to allow this deposit to be scraped off and the valves to be re-ground.

The time when decarbonising becomes necessary will be indicated by an increased tendency to "pink" and will occur after approximately the first 2,000 to 2,500 miles and subsequently at intervals of about 4,000 to 5,000 miles.

- 17 Removal of Cylinder Head.** To remove the cylinder head, unscrew the nuts securing it to the cylinder and lift the head straight off.

- 18 Removal of Cylinder and Piston.** First remove the silencer and exhaust pipe, also the carburettor. Unscrew the four cylinder base nuts and the oil pipe leading to the valve chest. Place the piston at the bottom of its stroke and lift the cylinder off. Push out the gudgeon pin after removal of one of the wire retaining clips and remove the piston. The inside of the piston should be marked to ensure reassembling the same way round.

- 19 Removal of Valves.** Compress the valve spring, preferably using one of the many spring compressors on the market (the "Terry" is a suitable type). Lift out the split conical collars and release the spring, when it and the valve can be withdrawn. It is advised that the cylinder be removed, in addition to the head, before removing the valves.

- 20 Removal of Carbon and Grinding-in Valves.** To remove the carbon deposit, scrape the piston top, cylinder

head, ports and valves with a suitable scraper, followed by a rub with smooth emery cloth and polish the piston top with metal polish. Smear the valve seat with a little grinding compound or fine emery and oil. Replace the valve in position, and rotate it with a screwdriver, frequently lifting the valve off its seat, until a bright ring is obtained on the face of the valve, and also on the seating.

If the valves or seats are very badly pitted and will not form good faces with a reasonable amount of grinding, the parts should be returned to the Works for new seats to be cut. Excessive grinding forms a pocket which will restrict the flow of the gases.

- 21 Re-assembly of Parts.** Before replacing the valves, make quite sure that all trace of grinding compound has been removed from the ports.

Do not interchange inlet and exhaust valves, as these are made of different materials and the inlet valves may fail if used in the exhaust position.

After re-assembly of the valves, it is an excellent plan to test the seats by pouring petrol into the ports and watching for leakage past the valves. Not the slightest sign of moisture should be permitted.

- 22** Care should be taken that all parts are scrupulously clean before re-assembling. To replace the cylinder, proceed in the reverse order to that employed in taking it off. Smear the cylinder wall and piston with oil before replacing the cylinder. When tightening down the cylinder base nuts, give each a successive turn, otherwise, by screwing one home by itself, the cylinder is liable to be damaged or distorted and will not bed accurately on the crankcase.

To ensure a gas tight joint at the cylinder head, the copper washer should be smeared with shellac varnish or a similar jointing compound.

Do not forget to fit the gudgeon pin retaining circlips before replacing the cylinder and use new circlips every time as they are liable to distortion when being removed.

23 Clearance of Valve Stems. The following are the correct clearances when the engine is cold :

Inlet	...	·004in.
Exhaust	...	·008in.

Always test valve clearances with the piston at the top of the compression stroke.

To adjust the clearances, proceed as follows :—

Remove the tappet cover from the side of the cylinder and hold the tappet by means of the locknut (middle hexagon) and the head (top hexagon). Unlock the head by turning it to the right and the locknut to the left. Now hold the tappet body (bottom hexagon) and turn the tappet head and locknut to the right or left to lengthen or shorten the tappet as required. Lock up the locknut against the tappet head and replace the tappet cover. **Check the adjustment after locking the lock nut.**

In the case of the exhaust tappet, the exhaust lifter prevents the spanner from reaching the hexagon on the tappet body. To hold the tappet body when adjusting the head, it is therefore necessary to wedge a screwdriver between the hexagon on the tappet body and the exhaust lifter. Alternatively, the engine can be turned round until the exhaust valve is fully lifted when the hexagon can be reached with a spanner.

Running with insufficient valve clearance causes loss of power and burning (and possible fracture) of the exhaust valve.

Running with excessive valve clearance causes valve clatter and may result in the fracture of either valve.

Owing to the initial bedding down of the wearing surfaces, the tappets on new machines frequently require adjustment after the first one or two hundred miles have been run.

24 Engine Bearings. The mainshaft bearings consist of a double row of caged rollers on the driving side and a single row on the timing side. There is also a plain bush on the timing side, the main purpose of which is to act as an oil seal between the timing case and the crankcase.

The big-end bearing consists of a floating bush with whitemetal facings which has been found to have better wearing qualities than a roller bearing big-end.

A small amount of end play should be present in the mainshaft bearings and some "shake" may be felt in the connecting rod. If, however, after long use, definite up and down play can be felt in either the big-end or the mainshaft bearings, the crankcase must be dismantled and the worn parts replaced.

The gudgeon pin is fully floating and of large diameter. When the engine is cold it should be a free working fit in the small end bush and a push fit in the piston bosses.

25 Removal of Engine from the Frame. Before taking the engine out of the frame, the gearbox must be removed. To do this remove the near side footrest and the front half of the primary chain case ; disconnect the chain, dismantle the clutch and remove the engine sprocket and clutch centre. (Special extractors are required for these.) Now remove the rear half of the primary chain case and the upper gearbox attachment stud. Loosen the nuts on the lower attachment stud and lift the gearbox away.

Now remove the exhaust pipe, silencer and carburettor. Rest the machine on a box beneath the cradle tubes and remove the offside engine plate. It is now only necessary to remove the front engine attachment bolt when the engine can be lifted away.

26 Dismantling the Crankcase. After removal of the engine from the frame, drain the oil tank and remove the cylinder and piston, if not already done.

Next unscrew the timing cover nuts and tap off the cover, then remove the magdyno driving pinion. This is a taper fit on its shaft and is tapped for a small extractor, which will be found in the tool kit. Now lift out the two cam wheels and the intermediate driving pinions for the magneto drive.

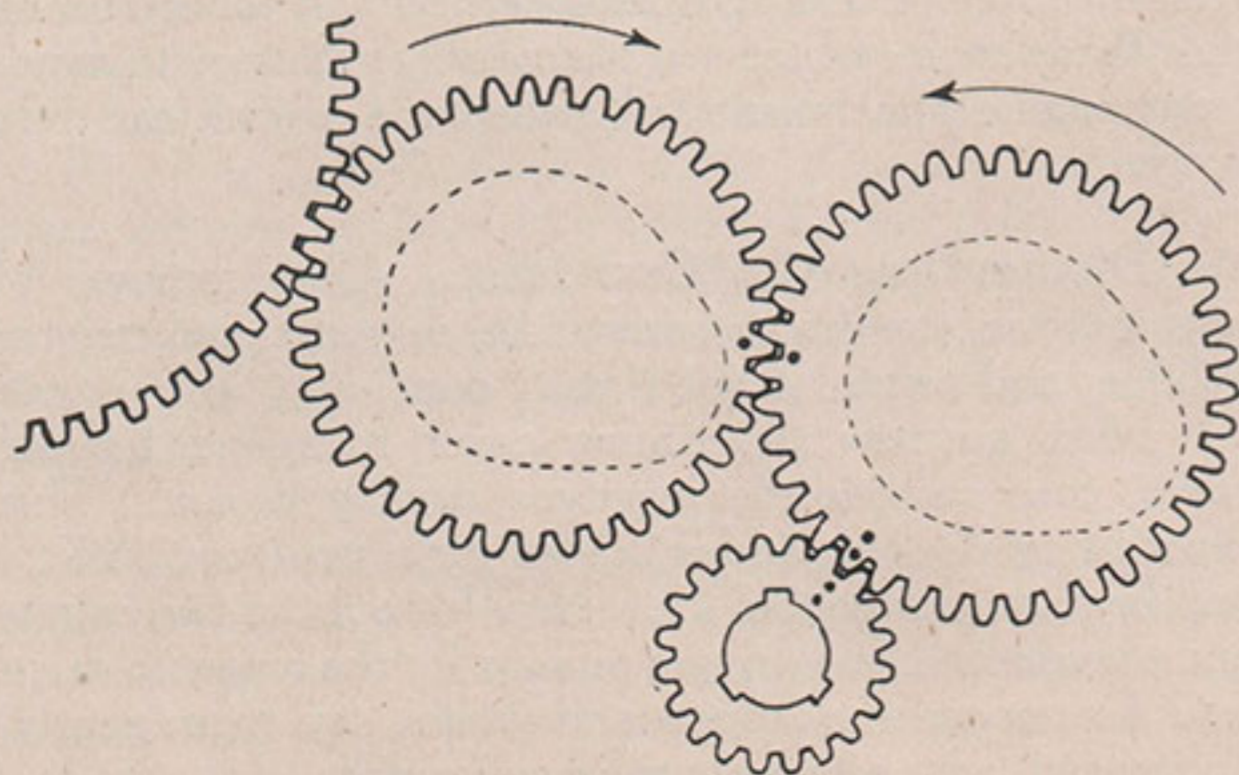
To remove the tappets and guides, tap them gently from underneath with a brass or aluminium drift.

Now loosen the magdyno securing strap and lift the complete instrument away.

Remove the timing pinion nut which has a left-hand thread. The pinion can now be drawn off the taper shaft by wedging a screwdriver behind the pinion and tap the end of the shaft, taking great care not to damage the shaft. It is now only necessary to remove the bolts holding the two halves of the crankcase together, when these can be separated. Do not lose the rollers from the main bearings as these fall out.

27 Re-assembly of Crankcase—Valve Timing. No difficulty should be experienced with this. Take care to have all parts scrupulously clean and put some clean oil on all bearings and on the cams.

The valve timing is marked and the cam wheels should be so assembled that the two dots on the small pinion are in line with the two on the exhaust cam wheel, while at the same time the single dot on the exhaust cam wheel is in line with the single dot on the inlet cam wheel. (See Diagram below.)



For those who wish to check the valve timing the opening and closing points are given below :—

Exhaust opens 75° before bottom dead centre.		
Exhaust closes 35° after top	“	“
Inlet opens 30° before top	“	“
Inlet closes 60° after bottom	“	“

These points are all given at .005in. tappet clearance and it is important that this clearance should be used when checking, as the first part of the valve lift is comparatively slow and a small variation in clearance considerably alters the opening and closing points. For running, set to the clearances given in paragraph 23.

The joint between the halves of the crankcase should be made with shellac, seccotine or a similar jointing. The timing cover joint **must** be made with the special washer between the surfaces.

When replacing the tappets and guides note that the longer pair operate the exhaust valve.

If the oil pumps have been stripped down, see that they are assembled correctly—the larger plunger goes in the return pump, which is the one in front of the timing cover. Do not omit the spring washer between the pump disc and the cover plate. This is essential to the correct functioning of the pump.

28 Ignition Timing. To time the ignition, turn the engine until the piston is at the top of its compression stroke (both valves closed). Then turn the engine backwards until the piston has descended $\frac{3}{8}$ inch. (This can be gauged by a piece of wire inserted through the tapped hole in the centre of the cylinder head.)

With the engine in this position and the ignition lever fully advanced, turn the contact breaker in the direction in which it normally runs until the contact points are just beginning to break. This position can be gauged conveniently by using thin tissue paper between the points. Lock up the magdyno driving pinion in this position and the ignition will be correctly timed. **Always check the timing after locking up the driving pinion to make sure it has not moved.**

29 Sparking Plugs. The following plugs are suitable for this machine :—

Lodge C14 ; Champion L10 ; KLG. F50.

30 Lighting Set. The battery on new machines is sent out charged ready for use.* The dynamo on the machine will keep the battery well charged provided the proportion of night riding is not excessive and the machine is not left standing with the lights on for long periods.

The following are the correct bulbs for use in the head and tail lamps :—

Head lamp (main light, twin filament), 6 volt—24 and 24 watt.

Tail lamp and head lamp pilot light, 6 volt—3 watt.

When the lighting switch is in the "high" position, a finger-operated switch on the left handlebar can be used to switch on the "dipped" filament.

The various wires or leads in the system should be examined occasionally to make sure that they have not become disconnected or chafed. The two battery leads and the positive lead from the dynamo to the voltage regulator are particularly important. If the dynamo should cease charging, the cause may be a faulty lead. As a temporary expedient, disconnect the field circuit lead (green marking) from the dynamo. This will not make the dynamo charge but may save it from damage.

The acid level in the battery should be maintained at $\frac{1}{4}$ in. above the top of the plates by the addition of distilled water at regular intervals. Any loss from spillage should be made up by the addition of fresh sulphuric acid, density 1.825.

Regular attention to the battery and wiring will ensure the satisfactory working of both lights and ignition.

*For export to certain countries the battery is supplied dry and uncharged. Before use it must be filled with Sulphuric Acid of density 1.285 and charged for 32 hours at a rate of 0.8 amps.

31 Automatic Voltage Control. The rate of charge is controlled by an automatic regulator which limits the dynamo voltage to approximately seven volts. The rate of charge is consequently high when the battery is nearly discharged and low when the battery is fully charged.

One of the advantages of this system is that it enables the machine to be run without the battery, with the lights on, without risk of burning out the bulbs.

Note. If the battery is disconnected for any reason the positive lead to it should be taped up, **not earthed.**

The lighting and ignition set is fully described in a separate booklet issued by the manufacturers.

32 Carburettor. The carburettor is correctly set at the works, and is unlikely to require attention beyond occasional cleaning, and possibly resetting the slow running adjustment.

This adjustment is made with a small milled-head screw on the side of the carburettor. The adjustment should be made when the engine is warm and should be set so that the engine will "tick-over" evenly when the throttle is nearly closed. A throttle stop is also provided so that the throttle can be set to be slightly open when the control is shut.

Do not attempt to save petrol by fitting a smaller main jet. The main jet has no effect unless the machine is being driven at above half throttle.

If the machine uses an excessive amount of petrol look for possible leaks, check the slow running adjustment and try lowering the taper needle (held in the throttle slide) one notch. Examine also possible causes in the machine, such as brakes binding, tight or dry chains, incorrect tappet adjustment, slipping clutch, etc.

The following is the correct carburettor setting :—

Main Jet No. 58, 85

Throttle Valve 4/5.

Needle clip in Middle Groove.

Full particulars of the carburettor are given in a separate booklet, issued by the makers.

TRANSMISSION.

33 Enfield Four-Speed Gear. This gear box is very simple in operation and provided it is kept well lubricated will give long and trouble-free service. **A special feature is that the gears are controlled by a single striking fork so that it is quite impossible to engage two gears at once no matter how much wear has taken place.**

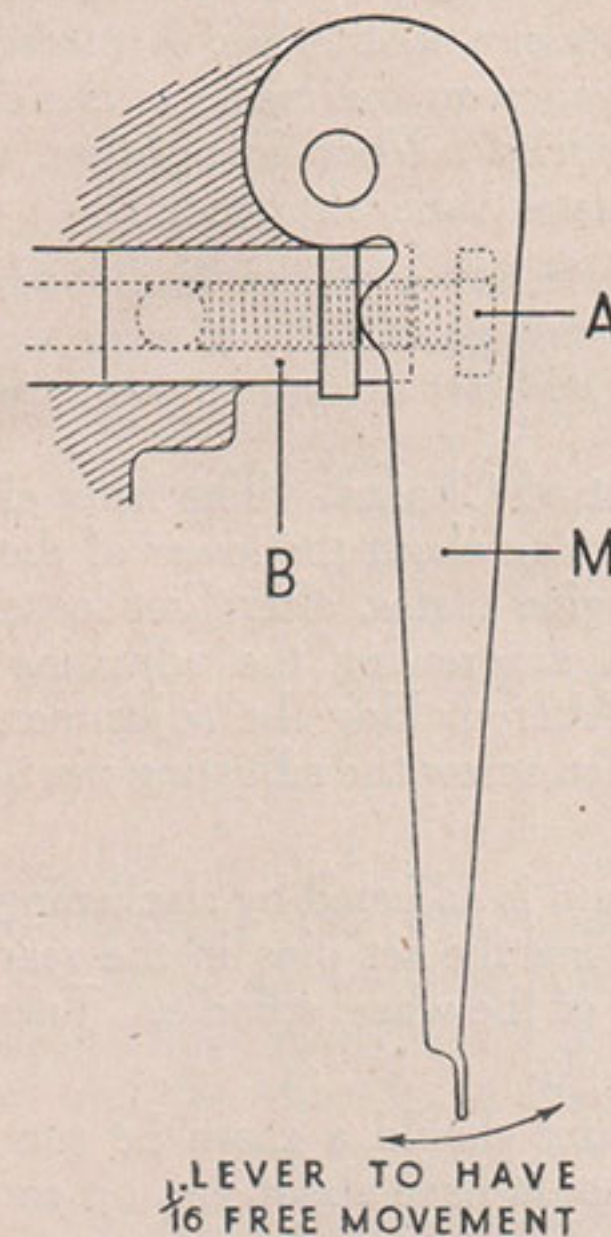
The foot control lever is mounted directly on the box and consequently the gear cannot get out of adjustment. It may, however, be found that, after moving the gear box to tension the front chain, the gear control lever is too close to, or too far from, the footrest. In this case, slacken the pin securing the lever to the operating mechanism on the box, remove the lever and replace it one serration higher or lower as required.

34 Clutch. The clutch is of the four-plate type, with oil resisting Ferodo inserts. If clutch slip occurs first make sure that there is some slack in the control wire (see next paragraph). If this is in order, the clutch plates should be examined. To do this remove the front half of the primary chain case and unscrew the three pins near the centre of the clutch. The springs and plates may now be lifted away. If the inserts are worn flush with the metal they should be renewed. If the machine has been run for some time with a slipping clutch, new springs as well as new inserts may be required.

35 Adjustment of Clutch Control. Important. It is absolutely essential that there should be a small amount of free movement of the clutch operating lever on the gear box. (See illustration opposite.) If this is not present, part of the spring pressure will be taken by the clutch control wire instead of by the friction surfaces, clutch slip will result and the clutch inserts may be ruined.

To adjust the lever first disconnect it from the cable and hinge it back to expose the adjusting screw A and the

sleeve B. To give more clearance to the control turn the screw A to the left; to take up clearance turn it to the right. No locknut is required as the screw and sleeve are automatically locked by the lever M when this is in position and the control wire connected.



NOTE. Owing to the initial bedding down of the clutch friction material, it frequently happens that the clearance in the clutch control is taken up during the first few hundred miles with a new machine. This point should therefore be examined soon after delivery and adjustment made if necessary.

36 Patent Cush Drive Rear Hub. All Royal Enfield motor cycles are fitted with a patent cush drive rear hub, which takes up the drive from the countershaft to the rear wheel with great flexibility and smoothness. This hub has a marked effect on

the running of the machine, absorbing all engine shocks and preventing any snatching of the driving chain and consequently minimising the wear on the rear tyre. The drum on the driving side of the rear hub is provided with three metal vanes and the inside of the driving sprocket has three similar vanes. On each side of the vanes in the hub is placed a solid block of rubber and the vanes on the inside of the driving sprocket fit between these blocks. When in position, there is a block of rubber and a metal vane alternately.

The cush drive hub is so simple that adjustment is seldom necessary. The only parts likely to wear are the rubber blocks which, however, will last a considerable time.

- 37 **Adjustment of Chains.** The front chain is adjusted by pivoting the gear box about the lower of the two bolts holding it to the rear engine plates, after first loosening the two nuts securing it, and unscrewing the adjusting pin between the engine plates. After making the adjustment, tighten the two main nuts and then screw the adjusting pin up to the lug on the gearbox.

The rear chain is adjusted by slackening the wheel spindle nuts, then adjusting the set pins in the rear fork ends, which vary the position of the wheel spindle. Take care to adjust the two set pins equally.

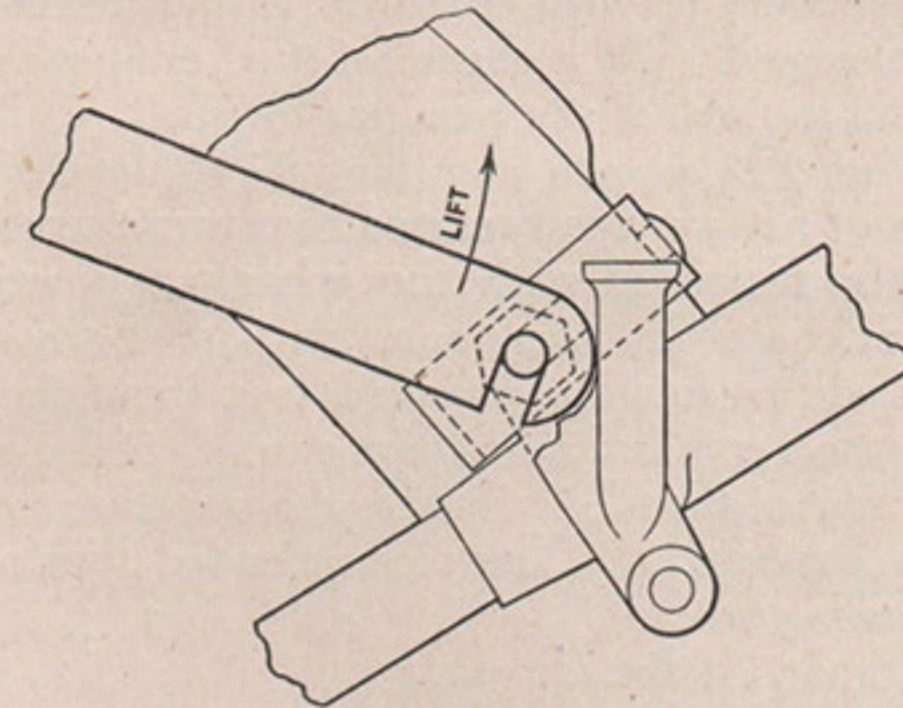
On no account should a chain be run quite tight. The primary chain should have about $\frac{1}{4}$ in. up and down free movement; the rear chain about $\frac{1}{2}$ in.

After adjusting the rear chain, the rear brake operating rod may also require adjustment. Should it be necessary to remove either of the chains, it is important that, when replacing the connecting link, the spring fastening is so fitted that the split end points away from the direction in which the chain travels.

MISCELLANEOUS.

- 38 **Removal of Wheels. Detachable Rear Mudguard.** To facilitate tyre repairs and the removal of the rear wheel, the rear mudguard on these machines is made quickly detachable,

it being only necessary to slacken the four nuts securing the mudguard stays to the rear portion of the frame, when the mudguard can be lifted away. In the case of machines fitted with pannier bags and pillion seats, before the mudguard can be lifted off it is necessary to lift up the stays running from the front of the carrier to the back stays. (See illustration below.)



The entire assembly of mudguard, carrier, pillion seat and panniers can then be lifted off. Having done this, remove the pin retaining the brake anchor arm and the brake adjusting wing nut, disconnect the rear chain at the spring link, loosen the spindle nuts and the wheel will slide out of the slotted fork ends.

To remove the front wheel, place the machine on both stands (never use the front stand alone), disconnect the front brake control, loosen the spindle nuts, spring the forks slightly open and the wheel will drop out.

- 39 **Removal of Tyres.** The wired-on tyres fitted are easily removed if the correct procedure is adopted. Deflate the tyre by unscrewing the inside of the valve with the key formed on the dust cap. Remove the milled locknut securing the valve to the rim and unscrew the nut on the security bolt. At a point opposite the tyre valve, press the walls of the tyre down into the well in the centre of the rim, and work the walls down

into the well as far as possible in either direction. It will then be found possible to lever the cover off, starting at a point near the valve and working in either direction. When replacing the cover reverse this procedure, starting opposite the valve and finishing close to it with the tyre at the opposite side of the wheel pressed down into the rim. When only slightly inflated, see that the wired edges are in their proper places, not down in the well. As a check on this, examine the fine line moulded on the wall of the tyre near the rim. This should be about a quarter of an inch from the rim, all the way round.

It is not always appreciated that punctures in the rear tyre can be repaired with the wheel in position. If the puncture is caused by a nail or similar object, whose position is known, it will be found convenient to remove the mudguard, leave the wheel in position, remove one side of the cover and expose sufficient of the tube to enable the puncture to be repaired.

40 Tyre Pressures. The recommended tyre pressures for normal loading are :

Front, 16 lbs./sq. in.
Rear, 20 lbs./sq. in.

41 Expanding Hub Brakes. All Royal Enfield expanding hub brakes are fitted with brake shoes lined with a special woven material, which it will be found has long-wearing qualities, does not score the drums and seldom requires renewing. Should an excess of grease find its way from the hub bearings on to the brake linings, the brake will lose a certain amount of its efficiency. In this case the shoes and linings should be taken out and scraped to remove the grease. After re-assembly, drive with the brake "on" for half a mile or so to burn off the last traces of grease. The rear brake is adjusted by a wing nut at the end of the brake rod, while the front brake adjustment is by means of a milled nut towards the end of the front fork.

42 Wheel Bearings. The bearings of both wheels are single row, deep groove journal ball races. These have been proved by extensive tests to be superior to cup and cone bearings and are adequate to deal with both radial and thrust loads. They require no adjustment.

43 Front Fork. Side play in the front fork shackles can be taken up as follows: *Top swivel pins**: Unscrew the lock nut (near side) and adjust the pin as required, finally locking up the lock nut. *Bottom swivel pins*: Release the nuts on the fork spindles and adjust the latter with the squares provided on their ends. Each spindle is provided with a right and left-hand thread, which will open or close the fork links as required. The left-hand threads are on the off-side of the machine and the locknuts are loosened by turning in the direction of the arrows on the fork links. To obtain access to the locknuts on the front bottom swivel pin, first remove the shock absorber adjusting nuts and star washers.

44 Shock Absorbers and Steering Damper. The adjustment of the hand-operated shock absorbers is entirely independent of the links. The adjuster on the right-hand side has a left-hand thread so that, when seated on the saddle, both adjusters are tightened by turning them towards the rider. A spring-loaded plunger prevents the adjusters slackening themselves off.

By turning the ebonite knob of the steering damper to the right, the steering can be tightened to any desired degree. This will be found advantageous at high speeds, but the damper should not be tightened down too far at low speeds.

45 Ball Head. All Royal Enfield motor cycles are designed with ball heads of ample dimensions which rarely require attention. If on inspection, however, it is found, when lifting at the handle bars, that a small amount of play has developed, this should immediately be taken up. To adjust the ball head, release the pinch bolt through the ball head clip, and adjust the nut on the top of the steering stem, which holds the ball head clip in position, until all play has disappeared. **Make quite sure that the nut on the pinch bolt is correctly tightened after making the adjustment.**

When testing for play in the head, take the weight off the front wheel by placing a suitable box underneath the crankcase.

Do not adjust so tightly that the handlebars will not swing freely to full lock on either side.

*On early models the top front swivel pin is adjusted in the manner described for the bottom swivel pins.

ROYAL ENFIELD 350c.c. W.D./C. MOTOR CYCLE

MOTOR CYCLE GUARANTEE.

Reprinted from our current Motor Cycle Catalogue.

The following is a copy of the Guarantee given by Dealers in Royal Enfield Motor Cycles :—

We give the following Guarantee with our Motor Cycles, Motor Cycle Combinations and Sidecars, which is given in place of any implied conditions, warranties or liabilities whatsoever, statutory or otherwise, all such implied conditions, warranties and liabilities being in all cases excluded. Any statement, description, condition or representation contained in any catalogue, advertisement, leaflet or other publication, shall not be construed as enlarging, varying or over-riding this guarantee.

In the case of machines (a) which have been used for "hiring out" purposes or (b) any motor cycle and/or sidecar used for any dirt track, cinder track, or grass track racing or competitions or any competition of any kind within an enclosure for which a charge is made for admission to take part in or view the competition or (c) machines from which the trade mark, name or manufacturing number has been removed, no guarantee of any kind is given or is to be implied.

WE GUARANTEE, subject to the conditions mentioned below, that all precautions which are usual and reasonable have been taken by us to secure excellence of materials and workmanship, but this guarantee is to extend and to be in force for six months only from the date of purchase (in the case of ex-W.D. machines whether reconditioned or otherwise, the guarantee is to extend and be in force for three months only from the date of purchase), and damages for which we make ourselves responsible under this guarantee are limited to the free supply of a new part in exchange for the part of the motor cycle, motor cycle combination or sidecar which may have proved defective. We do not undertake to replace or refix, or bear the cost of replacing or refixing, such new part in the motor cycle, motor cycle combination or sidecar. We undertake, subject to the conditions mentioned below, to make good at any time within six months (three months in the case of ex-W.D. models) any defects in these respects. As motor cycles, motor cycle combinations and sidecars are easily liable to derangement by neglect or misuse, this guarantee does not apply to defects caused by wear and tear, misuse or neglect. The term "misuse" shall include amongst others the following acts :—

1. The attaching of a sidecar to the motor cycle in such a manner as to cause damage or calculated to render the latter unsafe when ridden.
2. The use of a motor cycle or of a motor cycle and sidecar combined, when carrying more persons or a greater weight than that for which the machine was designed by the manufacturers.
3. The attaching of a sidecar to a motor cycle by any form of attachment not provided or supplied by the manufacturers or to a motor cycle which is not designed for such use.

Any motor cycle or motor cycle combination or sidecar sent to us to be plated, enamelled or repaired will be repaired upon the following conditions, *i.e.*, we guarantee that all precautions which are usual and reasonable have been taken by us to secure excellence of materials and workmanship, such guarantee to extend and be in force for three months only from the time such work shall have been executed or until the expiration of the six months (three months in the case of ex-W.D. models) above referred to, and this guarantee is in lieu and in exclusion of any common law or statute warranty or condition, and the damages recoverable are limited to the cost of any further work which may be necessary to amend and make good the work found to be defective.

CONDITIONS OF GUARANTEE.

If a defective part should be found in our motor cycles, motor cycle combinations or sidecars, or in any part supplied by way of exchange before referred to, it must be sent to us CARRIAGE PAID, and accompanied by an intimation from the owner that he desires to have it repaired or exchanged free of charge under our guarantee, and he must also furnish us at the same time with the number of the machine, the date of the purchase, or the date when the alleged defective part was exchanged as the case may be.

Failing compliance with the above, such articles will lie here AT THE RISK OF THE OWNER, and this guarantee and any implied guarantee, warranty or condition shall not be enforceable.

We do not guarantee specialities such as tyres, saddles, chains, lamps, etc., or any component parts supplied to the order of the purchaser differing from standard specifications supplied with our motor cycles, motor cycle combinations, sidecars or otherwise.

NOTICE.

We do not appoint agents for the sale on our behalf of our motor cycles or other goods but we assign to motor cycle Dealers, areas in which we supply to such Dealers exclusively for re-sale in such areas. No such Dealer is authorised to transact any business, give any warranty, make any representation or incur any liability on our behalf.