



INSTRUCTION BOOK

FOR THE 346 c.c. O.H.V.

ROYAL ENFIELD

MOTOR CYCLES

MODELS WD/CO and CO

Instruction Book

FOR THE

346 c.c. O.H.V.



MOTOR CYCLES
MODELS WD/CO and CO.

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Royal Enfield O.H.V. Models

WD/CO and CO.

- 1 **Foreword.** The motor cycles dealt with in this book are of a design well proved under the most exacting conditions in the Navy, Army and Air Force. The WD/CO models are actual military machines which are sold either unused or re-conditioned. The CO models are machines built since the end of hostilities and are finished in black enamel, have rubber footrests and knee grips, civilian type lighting switches, and are without pannier bags.

OPERATION OF THE MOTOR CYCLE.

- 2 **Controls.** The driver should familiarise himself with the positions and method of operation of the various controls so that their use becomes instinctive. The controls for Model WD/CO are shown diagrammatically overleaf and in most cases the method of operation is obvious. The following notes may, however, be of assistance :—

Exhaust Lifter. Operate by lifting lever on left handlebar to stop engine. Can also be used when descending a very steep hill having a difficult surface. If engine is hard to "kick over" when starting, the exhaust lifter can be raised momentarily to release compression.

Gear Control. Move up for change to lower gear. Move down for change to higher gear.

Kick Starter. Operate with long swinging kick.

Lighting Switch. Model CO machines have a three-position switch on which position L gives the headlamp pilot bulb and the tail light. Position H gives the headlamp main bulb and the tail light. When in this position the **Dipper Switch** can be used to dip the beam from the headlamp. Model WD/CO machines have a four-position switch on which position T gives the tail light only and positions L and H are the same as for the three-position switch used on Model CO except that no dipper switch is fitted on Model WD/CO machines.

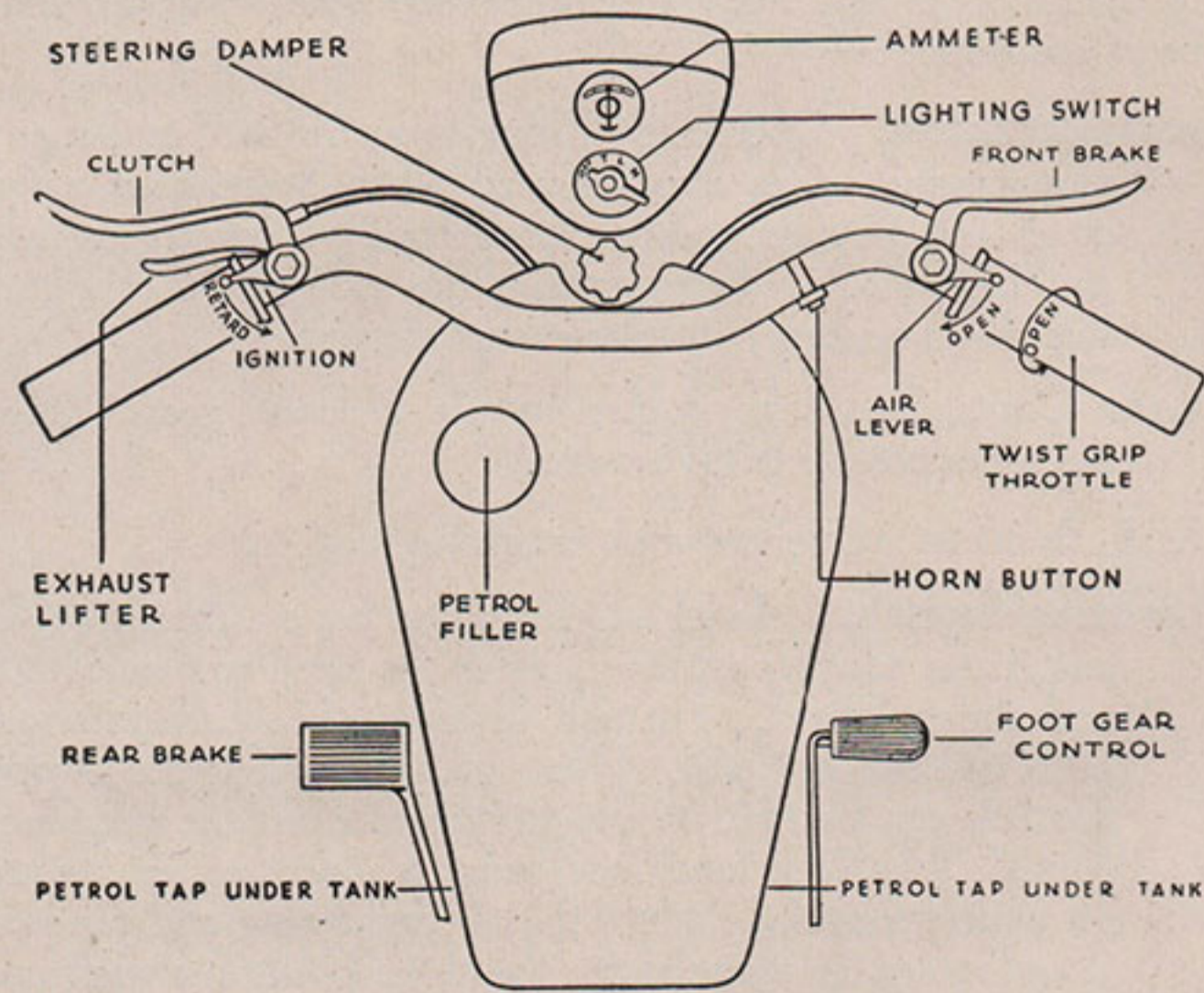
In some instances the lighting switch on Model WD/CO machines will be found beneath the saddle on the right-hand side of the machine. In this case it has three positions including one for the tail lamp only. A push button switch in the back of the head lamp determines whether the main or pilot bulbs are used. No ammeter is fitted but means are provided for testing the dynamo output.

Petrol Filler. To open, turn to left till catch is felt, push down and turn again to left as far as possible, then lift off. To close, push down and turn to right as far as possible.

Petrol Taps. To open, pull knob outward. To close, push knob inward.

The following controls are not shown in the diagram :—

Carburettor Tickler. On top of float chamber. For flooding carburettor before starting from cold.



CONTROL DIAGRAM.

Fig. 1.

Oil Filler. On engine crankcase. Operates same way as petrol filler.

Steering Damper. This is fitted only to the earlier Models WD/CO, not the later ones nor to Model CO.

3 Starting the Engine. Fill the tank with petrol and the oil tank in the engine crankcase with oil. Always use one of the oils recommended in paragraph 8. 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 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.

4 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.) de-clutch, at the same time closing the throttle and changing 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.

- 5 **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 in order to prevent "pinking" or knocking.

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.

Note that the positions of the handlebars, footrests and all controls (including the gear lever and the brake pedal) are adjustable. A rider cannot have proper control of his motor cycle unless he is comfortable and the controls are conveniently situated. Riders should set the controls to suit their individual requirements.

- 6 **Running-in.** All Royal Enfield Motor Cycles have a special oval formed piston which minimises the risk of seizure

with a new engine. Nevertheless careful running-in is highly desirable if the best results are to be obtained.

It is recommended, therefore, that 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. Note the importance of **progressively** increasing the work done by the engine. Running 1,000 miles at 30 m.p.h. will **not** bed down the piston to enable it to withstand continuous high speed running. Piston temperature is the important factor and 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.

- 7 **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 felt filter E to the feed plug D. From the feed plug D the oil is delivered 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 F through the filter G and delivered to the reservoir A. A ball valve at the point H 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 overhead rocker box. From here, the oil drains down

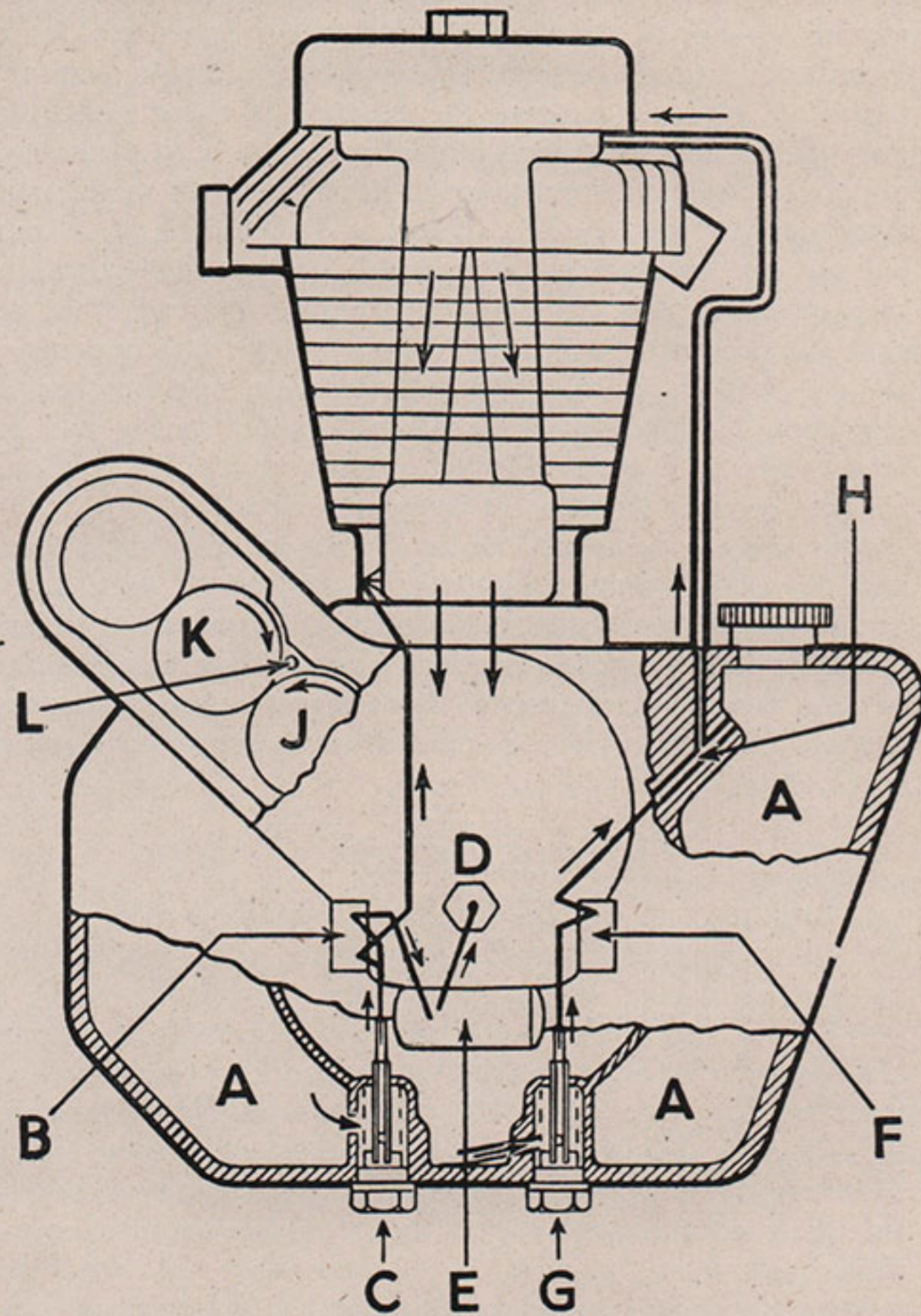


Fig. 2.

the push rod enclosure tubes and through grooves in the tappet guides to the timing case from which it is picked up by the gear wheels J and K and returned through the passage L to the reservoir A.

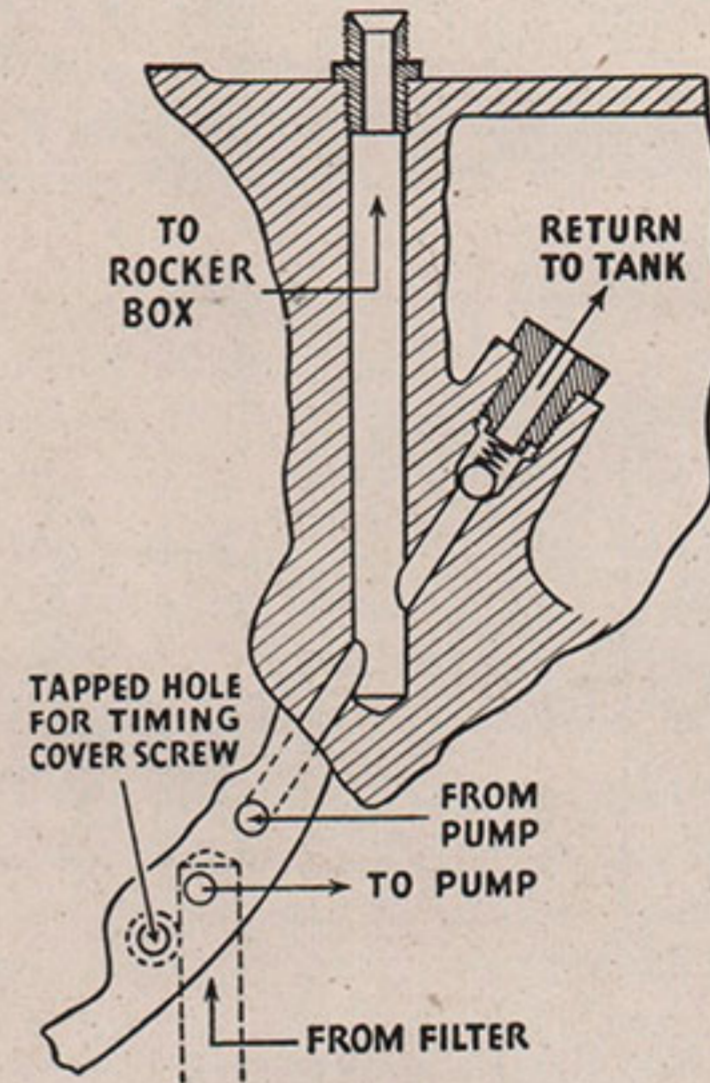


Fig. 3.

Fig. 4 shows the action of the double-acting feed pump A 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 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 felt filter and 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.

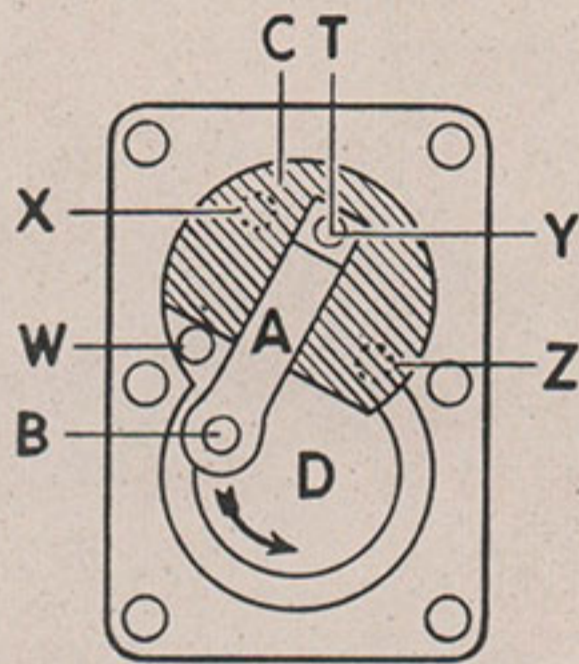


Fig. 4—FEED.

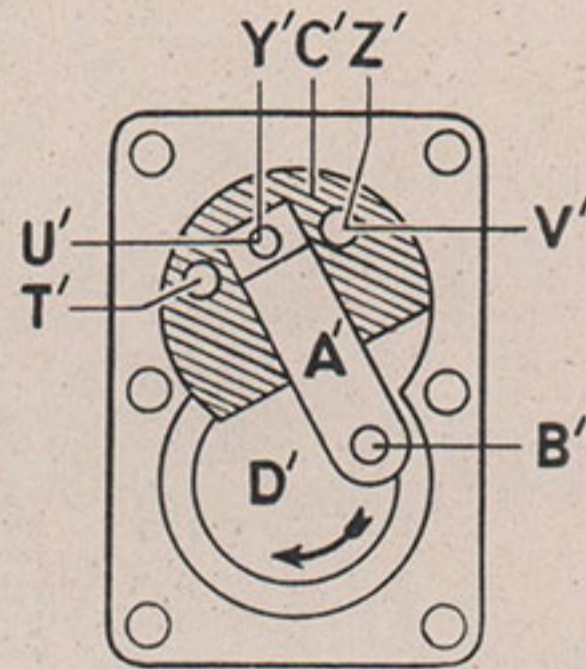


Fig. 5—RETURN.

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 wells 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'.

8 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 should be kept well 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 past the filler cap.

We recommend the following oils for use in our engines :

- * **Essolube Racer ; Motorine B de Luxe ;**
- † **Golden Shell ; Castrol Grand Prix ;**
- ‡ **Mobiloil D.**

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 ; Mobiloil B.B. ;**
- Motorine C ; Essolube 50.**

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 an additional precaution oil should be bought from branded cabinets or sealed cans.

During the running-in period we recommend the addition of Acheson's Colloidal Graphite to the oil in the engine.

After the first 500 miles and subsequently about every 2,000 miles, the oil should be drained from the tank, timing-case and felt oil filter (see next paragraph). To drain the tank and sump, remove the two filter plugs C and G. (See Fig. 2.— Note that the rear plug drains the tank, the front one the sump.) The filter gauzes should be brushed with paraffin to clean them

* Known in some overseas countries as Essolube 60.
 † " " " " " " Shell X100 (S.A.E. 60).
 ‡ " " " " " " Mobiloil B.

and the tank and sump swilled through with clean 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, alternatively 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 low before draining.

To drain the oil from the timing case remove the feed plug D (see Fig. 2) and lean the machine over on its right hand side. After draining the timing case the oil fed into it will not be returned

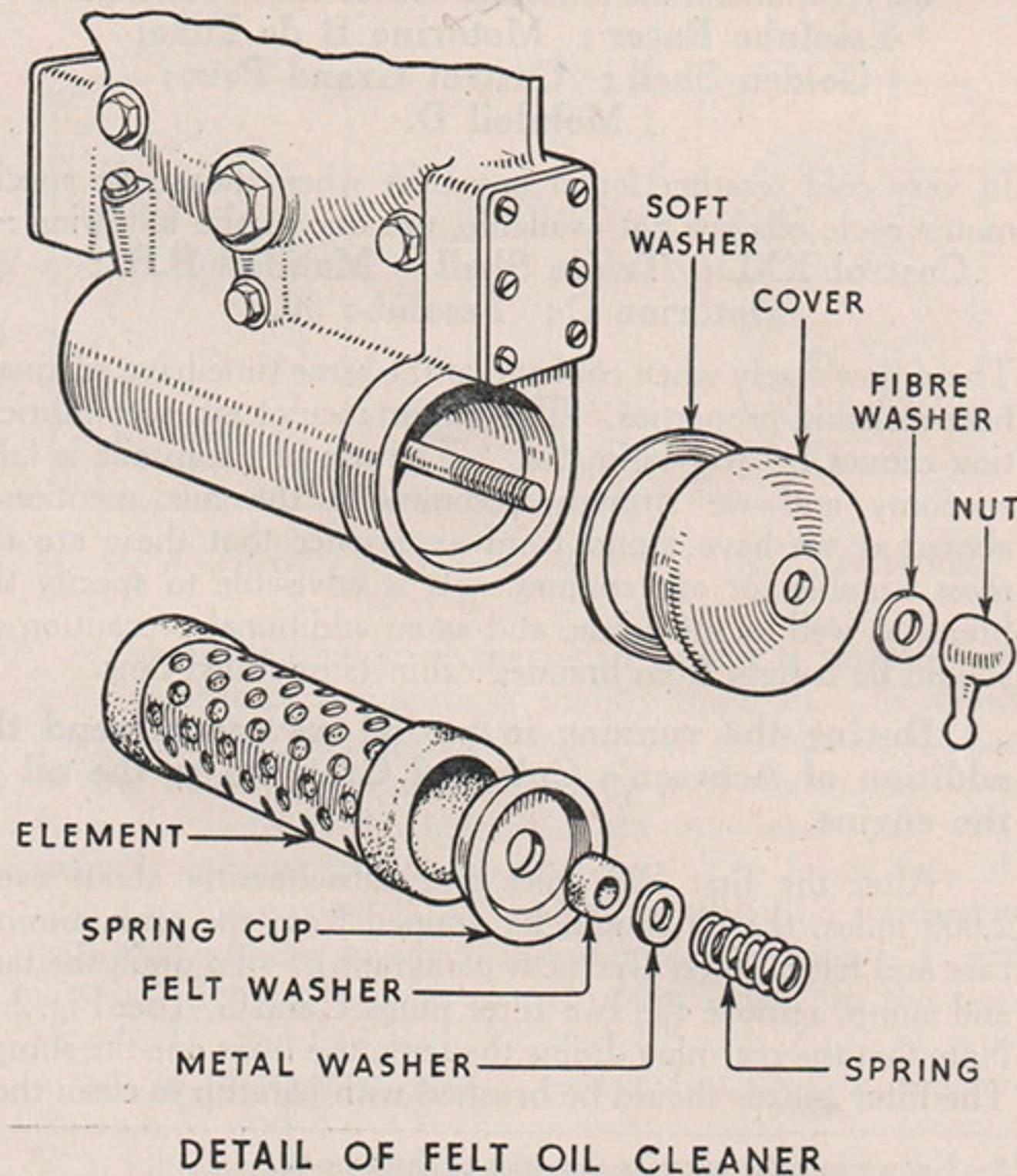


Fig. 6

to the tank A until the normal level in the timing case has been restored. This will cause an apparent loss of about half a pint of oil.

- 9 **Felt Oil Filter.** The construction of this is clearly shown in Fig. 6. The felt filter element should be cleaned by washing in petrol every 2,000 miles and in addition the element should be renewed every 5,000 miles.
- 10 **Lubrication of the Gear Box.** The gear box should be filled to the level of the filling orifice with engine oil. On no account should heavy yellow grease be used in the gear box. The oil level should be checked every 500 to 1,000 miles.
- 11 **Lubrication of Chains.** The front chain case should be filled with 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 should 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.

- 12 **Grease Gun Lubrication.** The rear brake pedal, fork spindles and gear control spindle should be greased with the grease gun provided every 200 miles or once a week. We recommend one of the following greases:—

Castrolase (Medium),
Mobilgrease (No. 2),
Shell Retinax C.D.

* Esso Grease,
Belmoline (D).

The hubs and speedometer drive angle box should be greased very sparingly and not too often using one of the following greases:—

Castrolase (heavy),
Mobilgrease (No. 4),
Shell Retinax R.B. Grease,

* Esso Grease,
Belmoline (C.)

* Known in some countries as Esso Cup Grease.

TROUBLE ON THE ROAD.

13 **Royal Enfield Motor Cycles** enjoy a wonderful reputation for reliability. Trouble on the road is very unusual : nevertheless stoppages may sometimes occur and it is hoped that the following hints may help towards the speedy location of the trouble.

14 **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.

15 **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 31. The gap between the plug points should be .018in. to .025in.

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.

16 **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 rainstorm.

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 25). 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. A valve breakage on an O.H.V. engine is likely to have very serious consequences.

(5) **Seized Piston.** This is caused by over-driving 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.

17 **Clutch Trouble.** A slipping clutch may be caused by lack of clearance in the control (see paragraph 37).
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.

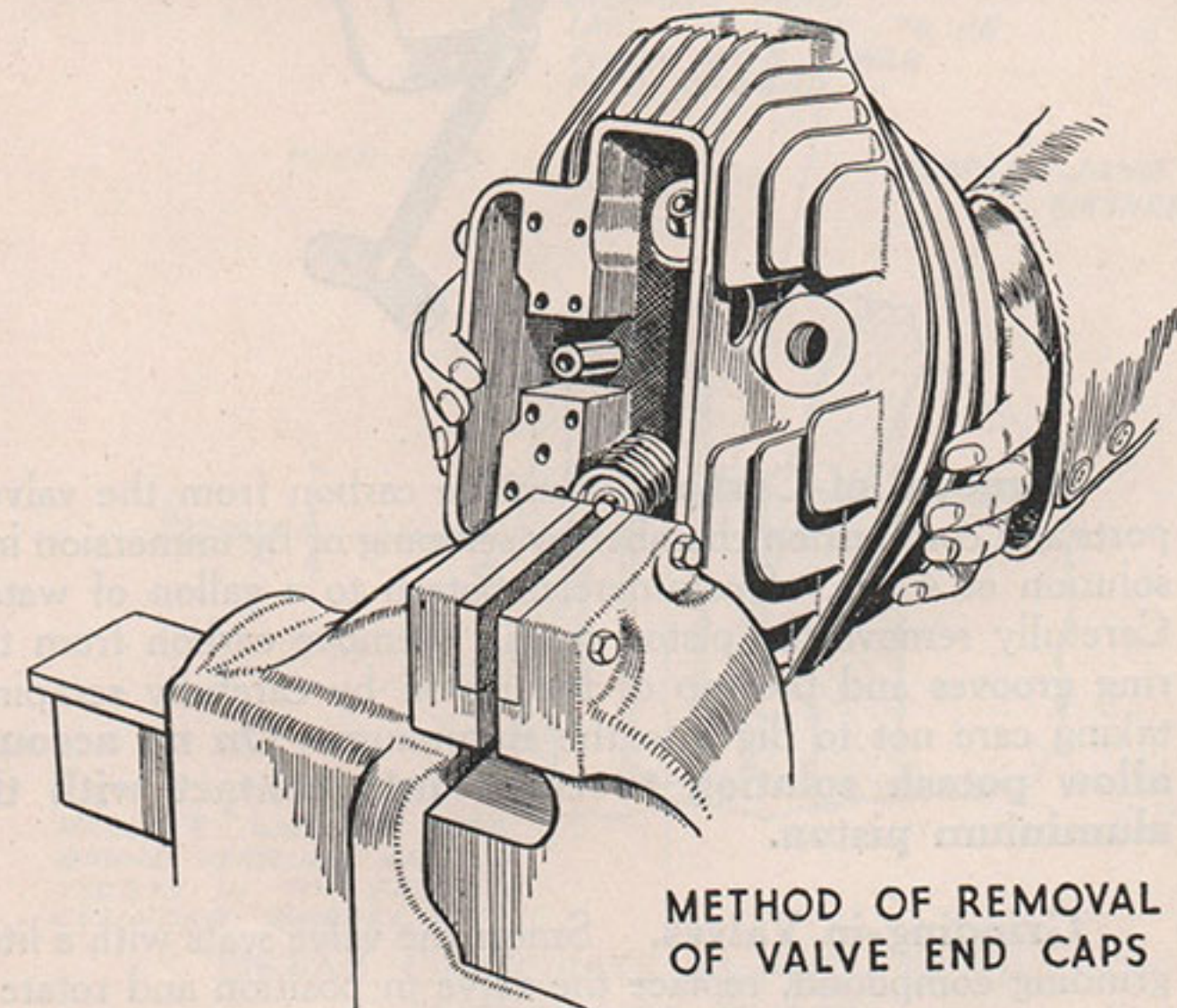
18 **Decarbonising.** When an engine has been in use for some time, carbon deposit forms on the piston and cylinder head and the engine must be partly dismantled to allow this deposit to be scraped off and the valves to be re-ground.

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 5,000 miles.

19 **Removal of Cylinder Head.** First remove the petrol pipe and the four bolts underneath the tank which secure it to the brackets and remove the tank. (If necessary the front saddle attachment bolt must be removed.) Next remove the cover over the valve gear, the carburettor, exhaust pipe and silencer. Remove the rocker bearing caps and rockers and lift the push rods out of their tubes (if the collar on the exhaust push rod will not clear the joint between the cylinder head and the barrel, leave this rod in position until after the head has been lifted off). The cylinder head can then be lifted off after unscrewing the four nuts which secure it to the cylinder.

20 **Removal of Cylinder and Piston.** While it is not strictly necessary to remove the cylinder barrel and piston, this should preferably be done so that the condition of the piston, rings and big-end bearing can be examined. To remove the cylinder barrel after removal of the head, unscrew the **five** cylinder base nuts (the fifth nut is inside the tappet chest between the two tappets), disconnect the exhaust lifter cable from the handlebar lever, place the piston at the bottom of its stroke and lift the barrel off. To remove the piston, push out the gudgeon pin, after removal of one of the wire retaining clips with a suitable tool (such as the tang end of a small file) and lift the piston off the rod. Mark the piston so as to ensure reassembling the same way round.

21 **Removal of Valves.** To remove the valves from the cylinder head, first lift off the hardened end caps from the valve stems. If these have stuck, they can be removed by compressing the spring slightly and gripping the end cap in a vice (see Fig. 7).



METHOD OF REMOVAL OF VALVE END CAPS

Fig. 7.

Then compress the valve springs with a suitable compressor, lift out the split conical collars and release the springs, when the valve can be withdrawn. Fig. 8 shows a Terry compressor in use. Keep the split conical collars and the top spring collars paired up with their respective valves and replace in the same positions when reassembling.

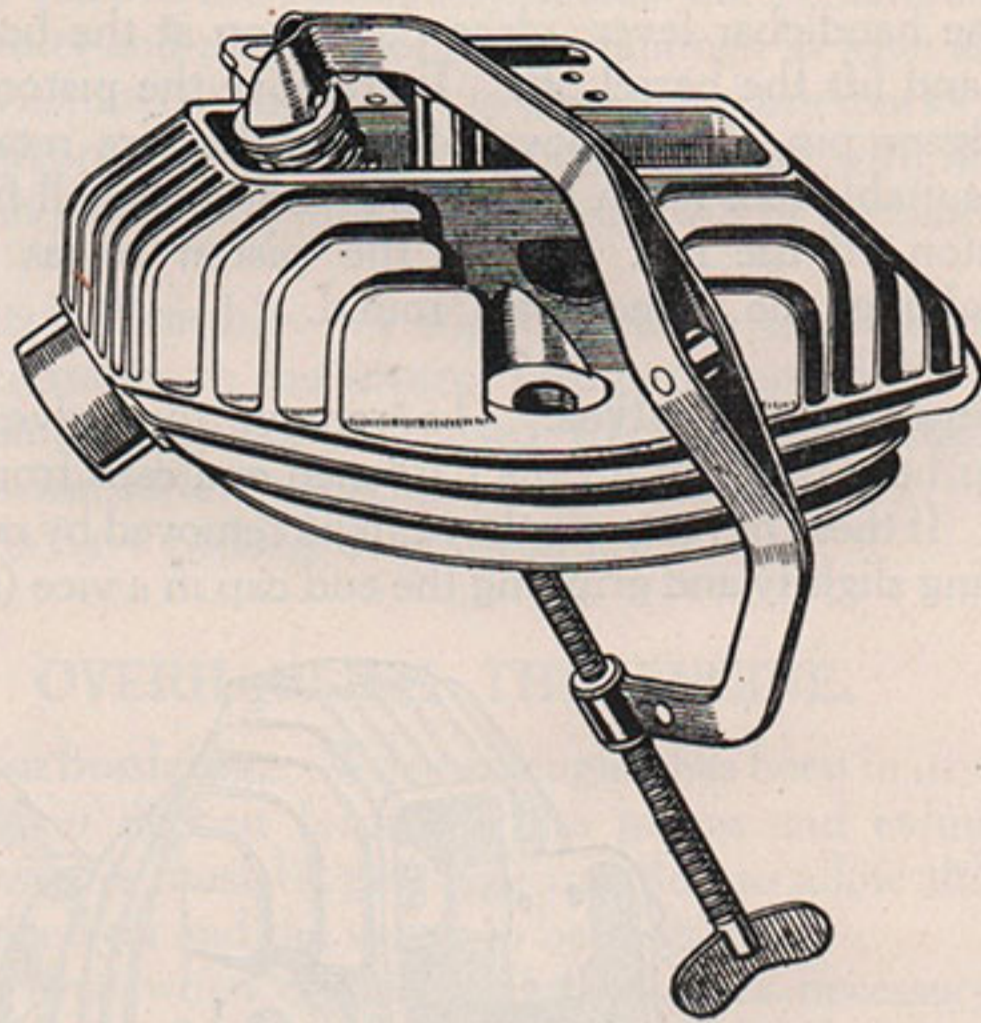


Fig. 8.

22 Removal of Carbon. Remove carbon from the valves, ports and combustion chamber by scraping or by immersion in a solution of 4 ozs. of commercial potash to a gallon of water. Carefully remove the piston rings. Remove carbon from the ring grooves and the top of the piston by carefully scraping, taking care not to dig into the aluminium. **On no account allow potash solution to come into contact with the aluminium piston.**

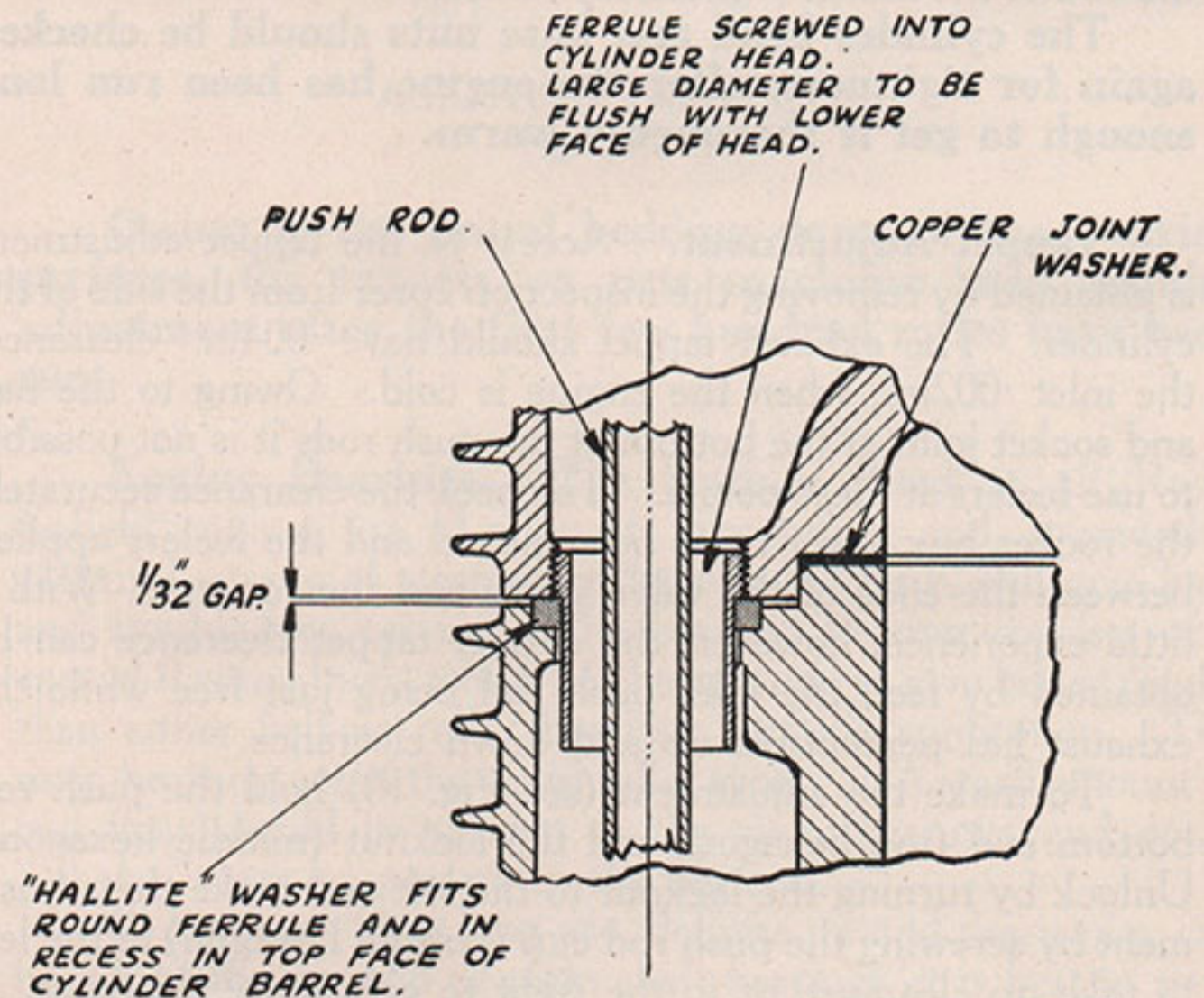
23 Grinding-in Valves. Smear the valve seats with a little grinding compound, replace the valve in position and rotate it with a semi-rotary motion with a screwdriver, frequently lifting

it off its seat and gradually working the valve round so that each point on the valve face comes into contact with each part of the seat. Continue grinding until a bright ring is obtained on both the valve and its seating.

If the valve 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 restricts the flow of the gases.

Do not interchange the inlet and exhaust valves as there is a difference of .002in. in the stem diameter.

24 Reassembly of Engine after Decarbonising. When reassembling the engine, take great care to have all parts perfectly clean and put clean oil on the piston, particularly round



DETAIL OF JOINTS IN PUSH ROD ENCLOSURE TUBES

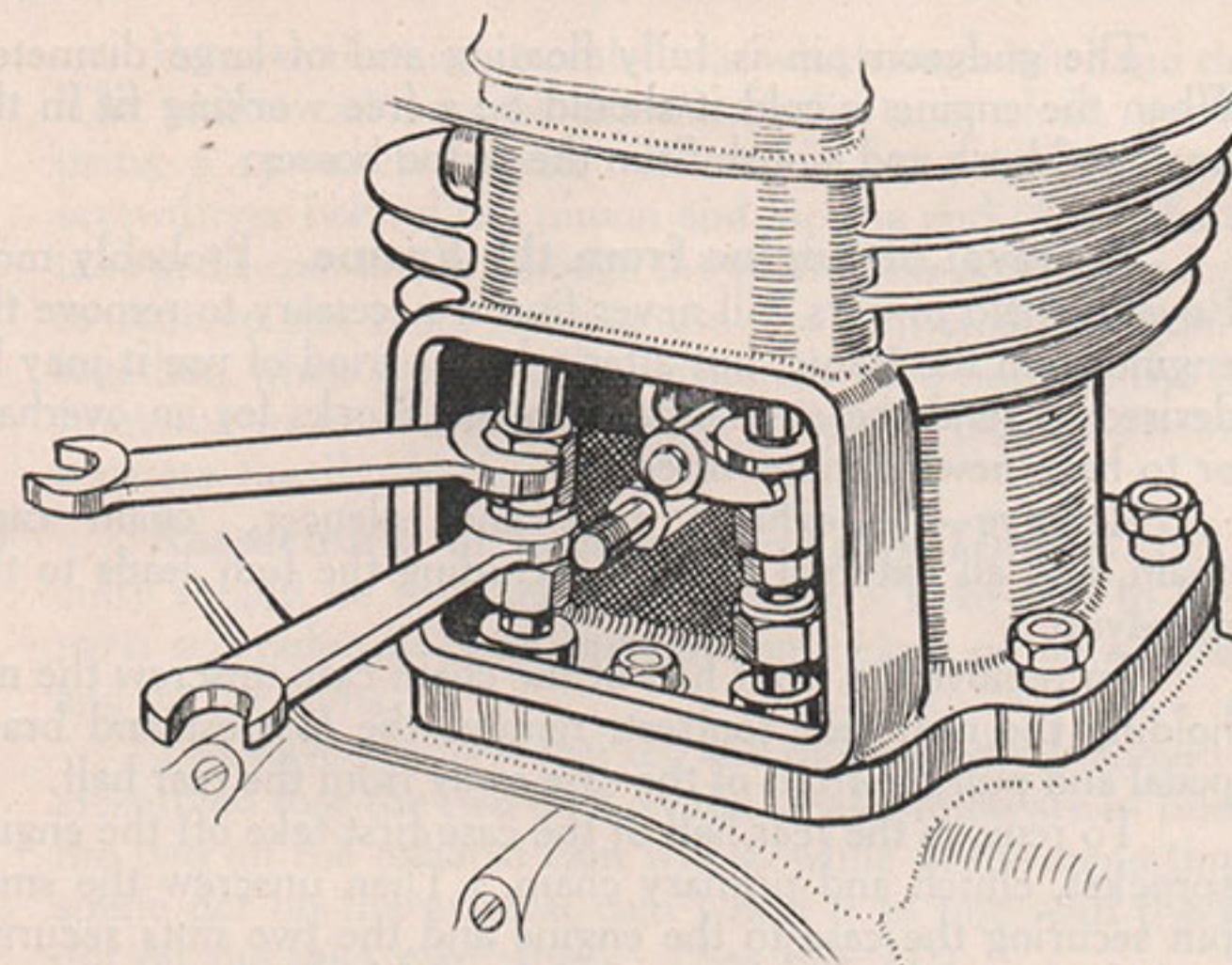
Fig. 9.

the rings. The cylinder base joint must be made with a paper washer which must have a small hole in it registering with the oil feed to the back of the cylinder. The cylinder head joint may be made with the old copper washer which, however, should preferably be annealed by heating to red heat, then quenching. New Hallite washers painted with gold size or shellac should be fitted to make the joints in the push rod enclosure tubes (see Fig. 9). When tightening down the cylinder base nuts, work diagonally from one to another to ensure pulling the base down dead level. When tightening down the cylinder head nuts put pressure first of all on the two at the push rod side of the engine so as to ensure compressing the push rod enclosure tube washers thoroughly and bringing even pressure on the copper head gasket. When replacing the valve rockers and caps put a little oil on each rocker and make sure that the rocker is free after the cap has been tightened down. If necessary, a sharp tap on the end of the rocker will usually free it.

The cylinder head and base nuts should be checked again for tightness, after the engine has been run long enough to get it thoroughly warm.

25 **Tappet Adjustment.** Access to the tappet adjustment is obtained by removing the inspection cover from the side of the cylinder. The exhaust tappet should have .004in. clearance, the inlet .002in., when the engine is cold. Owing to the ball and socket joint at the bottom of the push rods it is not possible to use feelers at these points. To check the clearance accurately the rocker box cover must be removed and the feelers applied between the ends of the valve stems and the rockers. With a little experience, however, the correct tappet clearance can be obtained by feel, the inlet push rod being just free while the exhaust has perceptible up and down clearance.

To make the adjustment (see Fig. 10) hold the push rod bottom end (top hexagon) and the locknut (middle hexagon). Unlock by turning the locknut to the left and make the adjustment by screwing the push rod cup (bottom hexagon) to the left to take up clearance or to the right to give more clearance, at the same time holding the push rod bottom end. Finally, lock up the locknut against the push rod end and check the clearance after finally tightening the locknut.



ADJUSTING TAPPETS.

Fig. 10.

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

26 **Engine Bearings.** The bearings fitted to all Royal Enfield engines are of adequate dimensions and, provided a plentiful supply of clean oil is kept in the tank, will give long and trouble-free service. The big end bearing consists of a special floating bush, which has been found to give better results than either ball or roller bearings for this application. The main bearings are of the caged roller type. A small amount of end float should be present in the main bearings and some "shake" may be present in the big end.

If, however, after long use, definite up and down play can be felt in the big end or main shaft bearings, it is best to send the crankcase, flywheels and connecting rod back to the Works for the worn parts to be replaced, as special appliances are necessary to ensure the correct assembly of these parts.

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.

- 27 **Removal of Engine from the Frame.** Probably most Royal Enfield owners will never find it necessary to remove the engine from the frame, but after a long period of use it may be desired to send the engine back to the Works for an overhaul or to have new bearings fitted.

Remove the exhaust pipe and silencer, chain case, chain, and all external fittings, including the four leads to the magdyno.

To remove the front half of the chain case unscrew the nut holding the near side footrest, remove the footrest and brake pedal and pull the front of the case away from the rear half.

To remove the rear half of the case first take off the engine sprocket, clutch and primary chain. Then unscrew the small pin securing the case to the engine and the two nuts securing it to the gear box attachment bolts and lift the case away.

Now remove the bolts holding the engine into its plates.

In the case of Model CO and the later Model WD/CO machines having frames with tank rails, one front and one rear engine plate must be removed, after which the engine can be lifted away sideways.

In the case of the earlier Model WD/CO machines having frames without tank rails or front engine plates, both rear plates must be removed and the engine lifted away backwards.

- 28 **Dismantling the Crankcase.** After the 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 pinion for the magneto drive.

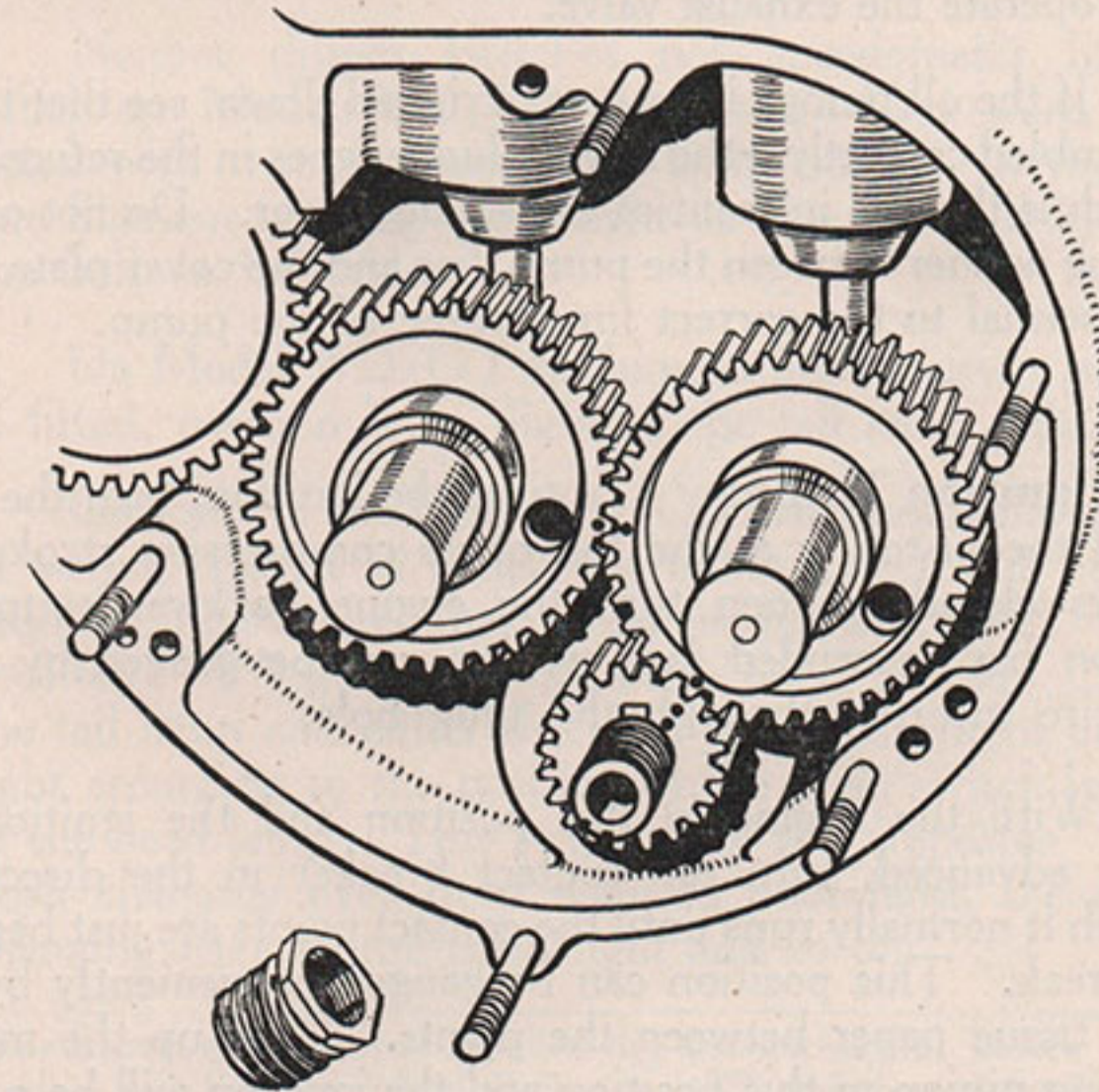
To remove the tappets and guides, tap them gently from underneath with a brass or aluminium drift.

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, preferably using a sprocket drawer. If one is not available, wedge a screwdriver behind the pinion and tap the end of the shaft, but take 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. Do not attempt to separate the flywheels.

- 29 **Reassembly 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 Fig. 11.)



VALVE TIMING MARKS.
Fig. 11.

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 dead centre.

Inlet opens 30° before top dead centre.

Inlet closes 60° after bottom dead centre.

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 25.

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.

30 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 $\frac{3}{8}$ in., which can be gauged by a piece of wire inserted through the plug hole.

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.

31 Sparking Plugs. The following are the plugs which we have found most suitable for this model :—

Lodge H14. K.L.G. F70. Champion L10. S.

32 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.

Speedometer light, 6 volt—1.8 watt (.3 amp.).

On Model CO a dipper switch is fitted enabling the main head lamp beam to be dipped at will.

Neither dipper switches nor speedometer lights were fitted on Model WD/CO machines; which were, however, fitted with twin filament head lamp bulbs. In the event of one filament burning out a light can be obtained by reversing the bulb in its holder.

On Model WD/CO machines a four-position lamp switch is fitted, position "T" lighting the tail lamp only.

On some of the latest WD/CO machines a simplified form of wiring is used in which the lighting switch is beneath the saddle. This switch has positions marked OFF, T and H. Position "T" gives the tail lamp only, position "H" gives the tail lamp and either the head lamp main light or the pilot light according to the position of the push switch in the back of the head lamp. This switch is of the "repeater" type: one push changing over from main to pilot light, the next push changing back to the main light and so on.

* For Export 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 amp.

No ammeter is fitted with this type of wiring. Instead the switch is provided with a "TEST" position to the left of "OFF." When in this position the tail lamp should light when the engine is running. On some switches of this type the "TEST" position is marked and the lever will remain in this position. On later models the test position is not marked and the switch lever is spring loaded to return to the "OFF" position after testing.

Whichever type of switch is fitted, 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. **Regular attention to the battery and wiring will ensure the satisfactory working of the lighting system.**

- 33 **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 booklet issued by the manufacturers, a copy of which we will forward on request.

- 34 **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 are the correct carburettor settings:—

- (a) Model G.
Main Jet No. 130.
Throttle Valve $6/4$.
Needle Clip in Middle Groove.

Full particulars of the carburettor are given in a booklet issued by the makers, a copy of which we will supply on request.

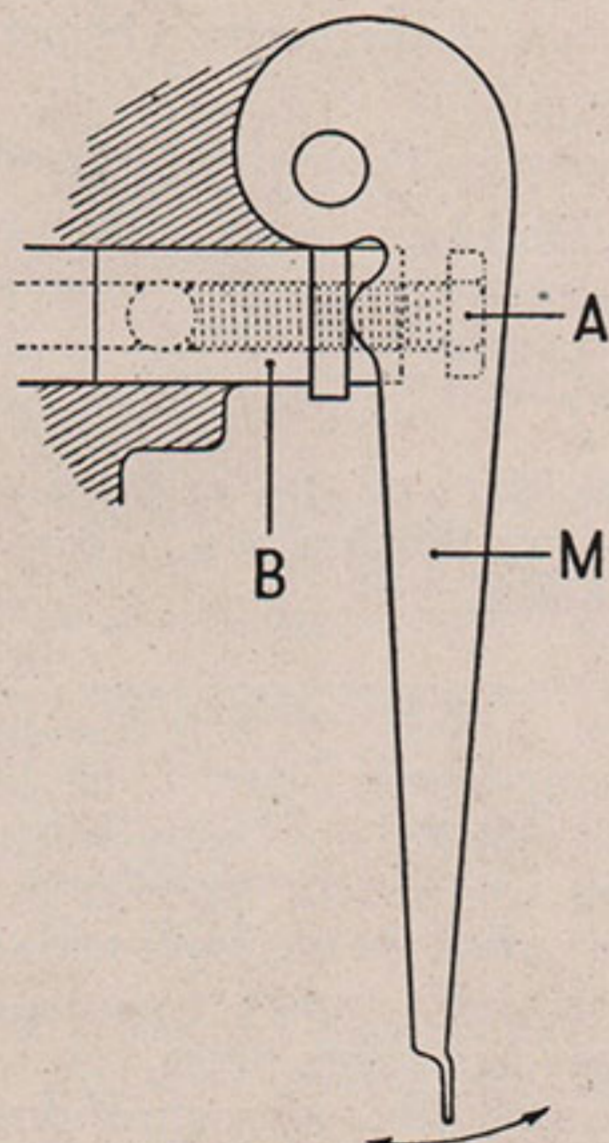
TRANSMISSION.

- 35 **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.

- 36 **Clutch.** The clutch is of the four-plate type. 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. The WD/CO machines have Ferodo inserts which will not burn but may slip if much oil gets into the clutch. In this case the plates should be washed in petrol, dried and replaced.



LEVER TO HAVE
1/16" FREE MOVEMENT
Fig. 12.

Model CO machines have Ferodo discs riveted to the clutch sprocket which may occasionally require washing, but the three loose plates are fitted with cork inserts which grip equally well whether oily or dry but will not stand an unlimited amount of slipping. If these cork inserts are worn flush with the metal, or are burnt, 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.

- 37 **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 Fig. 12.) 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.

- 38 **Patent Cush Drive Rear Hub.** All Royal Enfield 346 c.c. 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 block of solid 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.

This 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.

- 39 **Adjustment of Chains.** The front chain is adjusted by pivoting the gearbox about the lower of the two bolts holding it to the rear engine plates, after first slackening the two nuts securing it.

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 in the opposite direction to that in which the chain travels.

MISCELLANEOUS.

- 40 **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 Fig. 13.) 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, disconnect the speedometer drive, spring the forks slightly open and the wheel will drop out.

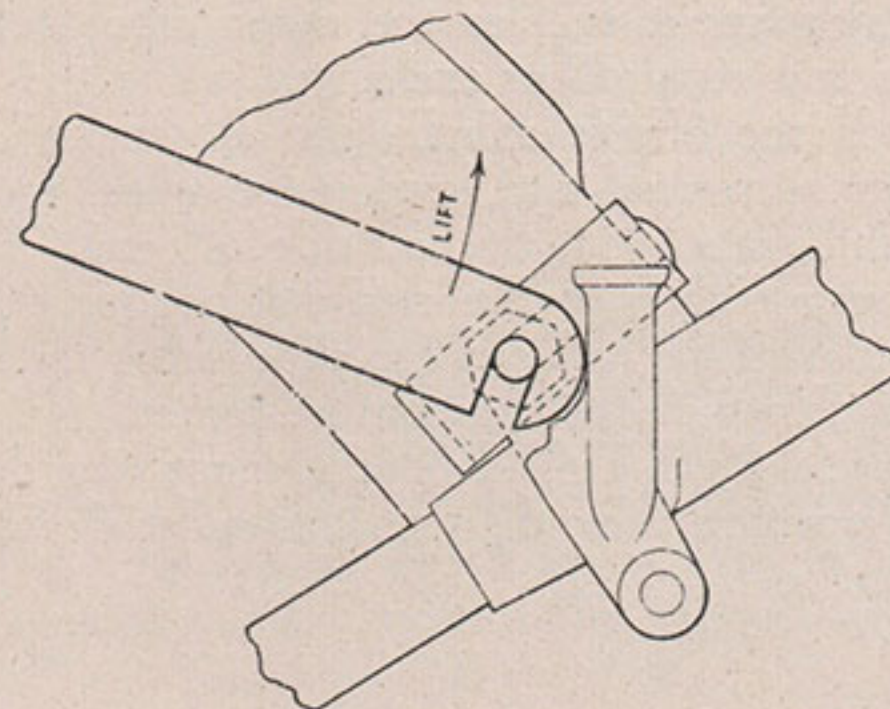


Fig. 13.

- 41 **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 if fitted. 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.

- 42 **Tyre Pressures.** The recommended tyre pressures for normal loading are :

Front, 16 lbs./sq. in.

Rear, 22 lbs./sq. in.

- 43 **Knock-Out Spindle to Rear Wheel.** On these models a further refinement enables the inner tube to be removed completely and repaired or exchanged while the wheel is in position. If the offside spindle nut is removed, the wheel spindle can be pushed out, leaving the wheel mounted on a tubular spindle attached to the near side fork end. By springing the forks very slightly the knurled distance piece between the wheel and the offside fork end can slide out to the rear, leaving a gap through which the tube can be passed. In conjunction with the special Royal Enfield detachable mudguard, this system is of more practical value than most so-called "quickly-detachable wheels."

- 44 **Expanding Hub Brakes.** The expanding hub brakes are fitted with shoes lined with a special woven material, and have drums of special cast iron giving freedom from scoring. 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 on the cover plate.

- 45 **Wheel Bearings.** The bearings of both wheels are single row, deep groove journal 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.

- 46 **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.

- 47 **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.

The earlier Model WD/CO machines were fitted with a steering damper. By turning the ebonite knob to the right the steering can be tightened to any desired degree. Care must be taken not to tighten the damper down too far at low speeds.

- 48 **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.

49 **Cleaning.** The enamelled portions of the machine are best cleaned with cold water, using a brush for the wheels. A hose pipe is the ideal, but if buckets must be used, the parts can be prevented from drying with a "smeary" finish by swilling several buckets of cold water over the machine after washing.

The engine, gear box and any other parts which are greasy should be brushed with paraffin.

The bright parts being finished in chromium plate need no polishing except for an occasional rub with a soft cloth. Never use metal polish on chromium plate.



A DOZEN "DON'TS" FOR DRIVERS.

DON'T let in the clutch with a jerk. This practice places unfair strains on the engine, transmission and tyres.

DON'T leave the brakes alone till the last moment and then have to apply them hard. This is only asking for skids and tearing miles off your tyres.

DON'T slam the throttle open suddenly. Give your machine an easy life and it will repay you.

DON'T drive on the exhaust lifter. Its purpose is to help in starting and stopping the engine.

DON'T slip the clutch to save changing gear. The clutch is for use, but this is abusing it.

DON'T be afraid of the lower gears. They also are for use. On the other hand—

DON'T race the engine in a low gear when it will readily pull a higher one. This is abuse.

DON'T try to economise in grease or oil. They are cheaper than repair bills.

DON'T neglect the essential adjustments, particularly the tappets and the clutch control. If you do—

DON'T blame the makers for the inevitable consequences.

DON'T run your tyres too soft. They are expensive, but air is cheap.

DON'T neglect to consult our Service Department at any time.

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 this motor cycle.
2. The use of a motor cycle when carrying more persons or a greater weight than that for which the machine was designed by the manufacturers.

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.