

INSTRUCTION BOOK
for the
Royal Enfield
* *Made like a Gun* *
"500 TWIN" AND
"METEOR 700"
MOTOR CYCLES

January, 1953

Price 2/-

SPECIAL NOTICE

PLATED PARTS

Owing to the world-wide shortage of nickel the Government have issued an Order which prevents us from chromium plating many of the bright parts of our machines.

Instead we are employing an alternative finish which is very similar in appearance to chromium plating and has exceptionally good rust-proof properties. The alternative finish will not, however, withstand abrasion **and in no circumstances should any form of metal polish be used for cleaning plated parts.**

To polish parts which have become slightly dull use a soft cloth. If the parts are muddy **wash with a plentiful supply of water** and polish with a soft cloth.

1953 *Er*
January, 1953.

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"500 TWIN" AND
"METEOR 700"

MOTOR CYCLES

THE
ENFIELD CYCLE COMPANY
LIMITED

Head Office and Works:
REDDITCH, WORCESTERSHIRE

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ROYAL ENFIELD TWINS

- 1 **Foreword.** The "Meteor 700" is a worthy addition to the Royal Enfield range of motor cycles. Certain new features are embodied in its design, but since there are many points of similarity between it and the "500 Twin," the instructions which follow cover both models.

Basically, the two engines are alike, having a massive one-piece crankshaft supported on large diameter ball and roller bearings on the drive and timing sides respectively.

The improved oiling system which has for some time been a feature of the "500 Twin" is incorporated in the larger engine which, in addition, has white metal shell bearings at the big ends of the connecting rods.

Smooth engine performance and, due to the cush drive hub, snatch-free transmission are prominent features. Comfort and safety are ensured by the really luxurious front and rear suspension, and powerful brakes.

2 OPERATION.

The Controls. Operation of the controls should be practised and their positions learned so thoroughly that the necessary movements are performed instinctively without any fumbling or time lag. Their arrangement is shown in the diagram on page 4, and the following remarks will give added assistance to the uninitiated.

Gear Control. Move up to change to a lower gear and down to change to a higher gear.

Neutral Finder. Neutral position from second, third or top gear is found by pressing the lever downward as far as it will go, keeping the machine rolling and lifting the clutch meanwhile.

Ignition Switch. This is mounted in the right hand tool box and operation of the key will cause the red warning light in the headlamp to glow. The glow will continue until the engine passes idling speed.

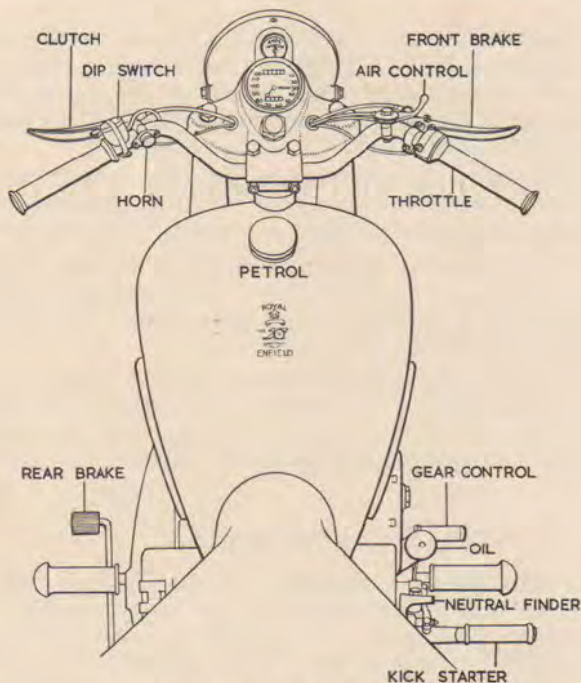


Fig. 1.—Plan of the Controls.

Petrol and Oil Filler Caps. To remove the cap, turn it anti-clockwise until resistance is felt, then press down and continue turning as far as possible until cap is freed.

To replace, press the cap down and turn clockwise as far as it will go.

Petrol Tap. The two-level tap beneath the near side of the tank is opened by pushing the hexagon-shaped end and closed by pushing the round end. To retain the reserve supply of fuel, move the small lever above the tap anti-clockwise; the reserve supply is released by moving the lever clockwise.

3 Starting the Engine. Before starting a new machine, or any machine which has come into your possession for the first time, check the oil levels in the crankcase, gearbox, and primary chain case. Having been satisfied that these are correct and that there is sufficient fuel in the tank, turn on the petrol as described above and observe that the reserve supply lever above the tap is turned anti-clockwise against its stop. Depress the tickler of the carburettor momentarily, two or three times, but cease this "tickling" should flooding be observed; switch on the ignition.

Open the throttle by turning the twist grip towards you about one-quarter of its full travel. Close the air lever completely and give a firm swinging kick to the kick starter. If two or three kicks fail to start the engine, experiment with varying throttle openings until results are achieved. Different engines may require different settings and a few trials will discover the correct one.

When starting a warm engine leave the air lever open, or partly open. Do not flood the carburettor or the fuel mixture will become too rich. Do not race an engine when the machine is stationary, a brief burst of acceleration to test pick-up is permissible, but sustained high engine speed can only be harmful under these conditions.

4 Driving Instructions. To set the machine in motion, lift the clutch lever to its fullest extent and engage first gear by lifting the gear lever upwards as far as it will go and then releasing it when it will return to its normal position ready to select the next gear. Now gradually release your grip on the clutch lever and, as you feel the clutch begin to take up the drive, gently open the throttle until the clutch is fully home. In this way, by judicious synchronisation of the clutch and throttle operation, the machine will move away smoothly.

Allow the machine to reach, say, 12 m.p.h. and change up to second gear by lifting the clutch and, at the same time, closing the throttle. Depress the gear lever to its fullest extent and release it again; engage the clutch and re-open the throttle. Repeat this operation at about 25 m.p.h. to engage third gear and again at 35 m.p.h. for changing to top gear.

The above speeds are intended only as a rough guide for use on flat roads under normal conditions. Starting on a hill will, of course, require rather more throttle, depending on the severity of the gradient, and changing to a higher gear on a hill should only be done at a speed high enough to avoid labouring of the engine.

Except in very cold weather, it will be found that, after a few moments running at a comfortable speed, the air lever can be fully opened and left there for the remainder of the run. Do not close the air lever to relieve a labouring engine on a hill, change to a lower gear instead.

Never hang on to a high gear on a hill to the point where "pinking" sets in, give the engine a chance to develop its true character by using the gearbox.

In changing from a high gear to a lower one, it will be necessary to speed up the engine slightly with the clutch lifted just before operating the gear lever. By leaving the throttle control alone, the very act of de-clutching will cause the engine to accelerate and this may be all that is required to effect a smooth change. A little experiment at varying speeds and in the different gears will show the correct course to follow, but the uninitiated should note that when changing *up* engine speed should be reduced, and when changing *down* it should be increased. When the engine speed is correctly judged there will be no snatch as the clutch goes home.

To stop the machine, close the throttle, apply the brakes and, as the machine comes to rest, lift the clutch, and select neutral position by pressing downwards on the neutral finder lever with the heel.

If the Works carburettor setting has not been disturbed, it will be found that, with the twist grip fully closed, the engine will tick over gently. In these circumstances, the engine must be stopped by operating the ignition switch.

- 5 **Running In.** Careful handling of an engine in the early stages is imperative if satisfactory subsequent running is to be achieved. Oval, slotted pistons, fitted to Royal Enfield engines minimise the risk of seizure, but abuse can cause damage which may affect the performance and the life of an engine.

It is recommended that a new machine should not be driven at a speed in excess of 35 m.p.h. for the first 200 miles, and on no more than half throttle until 500 miles have been covered.

Short bursts of wider throttle openings than this will do no harm, and after 500 miles, may be made more frequently in order to hasten the bedding down of the thrust faces of the pistons.

By a gradual increase of speeds, the engine will be conditioned to withstand prolonged, wide throttle openings and, indeed, by progressively increasing the work done by the engine there is greater assurance of securing better performance and more lasting results than by slavishly keeping down to 30 m.p.h. for 1,000 miles.

Too long a period, in the early stages, on full throttle, or shortage of oil by neglect, may lead to a seizure. Should the slightest tendency to pull up be noticed, close the throttle and release the clutch immediately. Most likely, if this is done, the piston will free itself in a few minutes and the journey may be continued more gently. However, after any such happening it is essential that the piston and cylinder be examined by a *competent* mechanic and any high spots relieved.

Always remember that good driving is the first—and by no means the least important—act of maintenance. Fierce acceleration, satisfying and showy though it may be to some people, places an undue strain on engine and transmission. Leaving the braking to the last minute and applying the brakes viciously is harmful to the machine and tyres, besides being dangerous. If you will make your progress as unobtrusive as possible—and this doesn't mean slow travel—not only will you earn the goodwill of the general public, but you will enjoy many more carefree miles of motor cycling.

6

LUBRICATION.

In both 500 c.c. and 700 c.c. engines, the lubrication system is identical. It is of the dry sump type and oil is carried in a container cast integral with the crankcase. A feed pump and a return pump, each of the plunger type are operated by a common spindle, driven by a worm gear from an extension of the crankshaft.

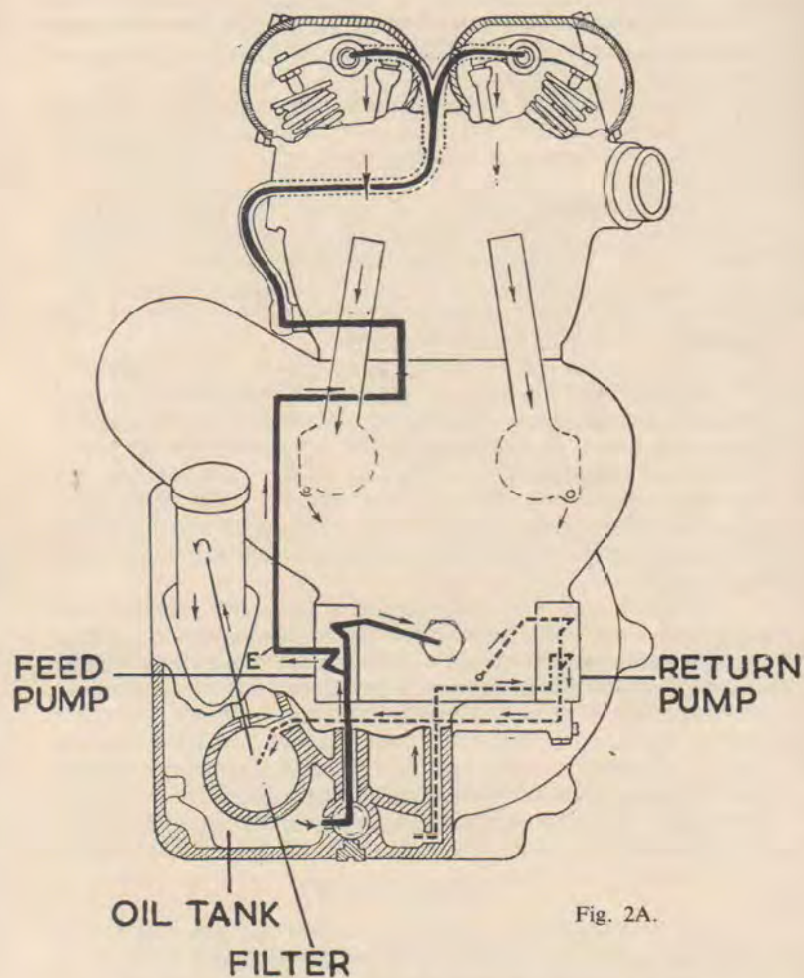


Fig. 2A.

Figs. 2A and 2B.—Diagrams of the oil circulation. The heavy lines show the delivery to crankshaft, big end bearings and rockers ; the dotted lines show the return.

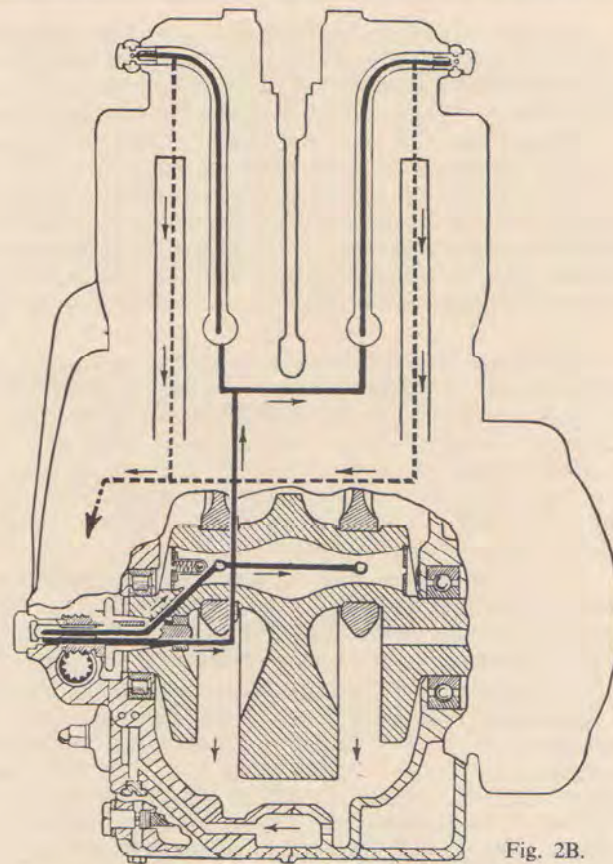


Fig. 2B.

Oil is drawn from the oil tank by the feed pump through a strainer and passed on by the primary side of the pump to a jet which directs oil through the drilled crankshaft to the big-end bearings. From this point the oil is splashed on to the cylinders, pistons and main bearings. The secondary side of the pump delivers oil through a drilled passage in the crankcase from which external pipes take it to the overhead valve rockers.

Surplus oil which has been used for lubricating big-end bearings, cylinders and pistons, drains into wells at the base of the crankcase from which it is picked up by the return pump and passed through a large felt filter back to the tank.

Surplus oil from the rocker gear drains down the push rod tubes to the tunnels which house the camshafts. Some oil drains from the inlet camshaft tunnel through holes drilled in the lower ends of the cylinder barrels, providing additional lubrication for the pistons. Most of the oil from the camshaft tunnels drains to the timing case, and the return pump picks it up and returns it through the felt filter back to the tank.

7 **Action of the Oil Pump.** Each end of the oil pump drive spindle terminates in an eccentrically mounted peg which works in a hole drilled through the end of each pump plunger. These plungers slide in bored holes or cylinders in small blocks—or discs as they are termed—which fit into housings, being held in position there by short coil springs, the outer ends of which press against domed metal pads located in the oil pump case covers.

In the feed pump housing there are four ports; two of them are suction ports from the oil tank and two of them are delivery ports to the engine. In the disc is a single port at the inner end of the plunger cylinder.

Rotation of the drive spindle causes the disc to oscillate in its housing and the plunger to move up and down in its cylinder. As the disc oscillates, a port is uncovered and oil is drawn into a space beneath the disc. Further rotation closes this port and opens another through which the oil is transferred to the passage leading to the overhead valve rockers. While this has been going on, the port in the disc has registered with one of the other ports in the housing and the downward stroke of the plunger has drawn oil from the port into the pump cylinder. Further rotation of the drive oscillates the disc until the port in it registers with the one in the housing which communicates with the passages to the big-end bearings. Movement of the plunger in its cylinder forces the oil trapped therein to the bearings.

The return pump works in exactly the same way, but, in this case the plunger is greater in diameter. As the disc

oscillates, oil is drawn into the pump through one of the four ports in the housing from the timing case. Further movement closes this port and opens another through which the oil is transferred to the passages leading to the felt filter and the tank. Meanwhile, the port in the disc has registered with another port in the housing and the downward stroke of the plunger has drawn oil through this port from a well in the crankcase into the pump cylinder. Further oscillation brings the disc port opposite the one in the housing which communicates with the passages to the felt filter and tank and upward movement of the piston pumps oil back to this point.

Put more briefly, the primary side of the double-acting feed pump supplies oil to the big end, piston and main bearings and the secondary side supplies oil to the rocker gear and

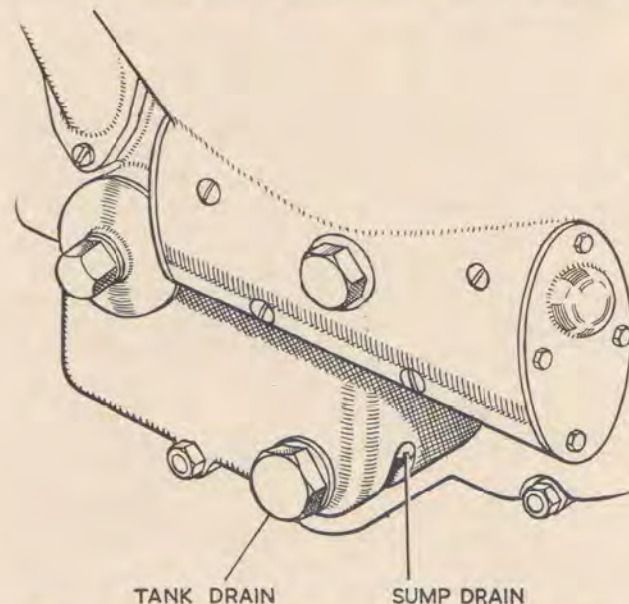


Fig. 3.—To drain the oil tank and the sump, remove the two plugs indicated.

timing case. The primary side of the return pump returns oil from the crankcase to the tank and the secondary side returns oil from the timing case to the tank.

Included in the oiling system are a pressure release valve fitted into the timing side of the hollow crank and a disc type breather at the top of the crankcase on the drive side with a lead from it to the rear chain.

Note. Sludge may be collected in the hollow crank and it should be cleaned out after removal of the oil release valve mentioned above.

- 8 Engine Lubrication Routine.** It is impossible to over emphasise the importance of correct lubrication. Always use one of the oils recommended in the chart below, specify the brand as well as the grade when buying oil and, if possible, see that it comes from branded cabinets or sealed containers.

Note that the sump is continually being pumped dry, therefore an empty oil tank results in an immediate shortage of oil to the working parts. Always keep an adequate supply of oil in circulation since the larger the supply the cooler will be the oil and the longer will it retain its lubricating qualities. Do not, however, fill the oil tank to a higher level than 2in. below the top of the filling orifice, and always keep it well above the bottom of the dipstick.

RECOMMENDED LUBRICANTS.

	Wakefield	Mobiloil	Essolube	Price's	Shell
Engine (Summer)	XXL	BB	40	Energol SAE40	X100 (SAE40)
Engine (Winter)	XL	A	30	Energol SAE30	X100 (SAE30)
Gearbox	XXL	BB	40	Energol SAE40	X100 (SAE40)
Chains	XXL	BB	40	Energol SAE40	X100 (SAE40)
Grease Gun	Castrolase (Heavy)	Mobilgrease (No. 4)	Esso Grease	Belmoline	Retinax A
Front Forks & Rear Suspension	Castrolite	Vacuum Arctic	Essolube 20	Energol SAE20	X100 (SAE20)

During the running-in period, an addition to the engine oil of running-in compound, containing Acheson's Colloidal Graphite, is recommended.

After the first 500 miles and, subsequently, about every 2,000 miles, the tank, sump, timing case and felt filter chamber should be drained. Drain the tank and sump by removing the two plugs shown in the illustration on page 13; the rear plug drains the tank, and the front one the sump.

Draining will be quicker if carried out at the end of a run while the oil is warm, and more economical if a moment is chosen when the oil is fairly low in the tank.

Immediately below the oil filler is the felt oil filter, the element of which should be removed and washed in petrol after the first 500 miles and every subsequent 2,000 miles. Fit a new element every 5,000 miles.

Oil is drained from the timing case by removing the feed plug from the lower face of the timing case cover and then lying the machine over on its side.

After draining the timing case, no oil will be returned from it to the tank until the normal timing case level has been restored. Similarly, after draining the felt oil filter chamber, no oil will be returned from this point to the tank until the oil pump has refilled the chamber. For these reasons, the initial running of the engine after draining operations will lower the level of oil in the tank. Make sure that this level is high enough to ensure proper circulation.

- 9 Lubrication of the Gearbox.** Soft grease is used, during assembly, to pack the gearbox which, subsequently, should be filled to the level of the filling orifice with engine oil. Check level every 500—1,000 miles when the gearbox is warm, and with the machine standing upright on its wheels on level ground. Never use heavy yellow grease in the gearbox.

- 10 Lubrication of Chains.** To lubricate the front chain, remove the filler plug and the smaller overflow plug, and pour in oil until it commences to overflow. Again, keep the machine upright and level when doing this.

Engine oil or grease may be used on the rear chain, but do not use an excessive quantity or much of it will merely

be thrown on to the roadway, to other parts of the machine and on to your clothing. It is a good plan after, say, every 2,000 miles to remove the chain, wash it well in paraffin, leave it to drain thoroughly and then immerse it in molten tallow or grease. Allow the tallow to set, remove the chain, wipe away surplus lubricant and refit.

- 11 **Grease Gun Lubrication.** The rear brake pedal, gear control, speedometer drive and rear suspension pivot should be greased with a grease gun every 500 miles; the clutch operating worm every 200 miles. The grease nipple for the rear suspension pivot is on the underside of the lug at the forward end of the swinging arm. Later models have greasers at each end of the spindle which is drilled for the grease. For the correct grade of grease, refer to the chart on page 14.

Grease the hubs only very sparingly; there must be no possibility of grease finding its way into the brakes, but should this inadvertently happen, remove the brake shoes, scrape the linings thoroughly, wash in petrol, clean the brake drums, and re-assemble.

- 12 **"500 Twin." Lubrication of Front Forks and Rear Spring Boxes.** Lubrication of the front forks is automatically carried out by the same oil as is used for the hydraulic damping. Top up the fork legs by removing the two large hexagon-headed plugs which are screwed through the fascia panel into the top of each leg. Pour oil in through the gauze filter which is thus exposed. Allow the machine to stand for a little while, then unscrew the small plug at the base of the legs and allow surplus oil to drain away. When the flow stops, the correct quantity of oil is retained in the legs; replace the drain plugs and the top plugs.

Treat the rear spring boxes in exactly the same manner. Remove the plugs at the top, pour in oil, remove the drain plugs and wait until the flow of oil ceases; replace all plugs.

- 13 **"Meteor 700." Lubrication of Front Forks and Rear Spring Boxes.** On the front forks of the "Meteor 700" the legs are filled with oil on assembly, and should require no further addition of lubricant. There are no drain plugs or correct level indicators and, unless oil seepage is noticed

on the aluminium sliding member, nothing need be done. Such seepage could only occur as a result of a worn oil seal or badly worn bearings, and the remedy is obvious.

After dismantling, refill the forks with five ounces of oil in each leg.

Similar remarks apply to the rear spring boxes on this model. The addition of lubricant should not become necessary except as a result of badly worn parts. To refill with oil after dismantling, remove the plug at the top, and compress the spring to its fullest extent. This can be done in a press or by loading the rear of the machine with the spring box in place. Pour in oil very slowly, being careful not to form an air lock, until it overflows. Release the spring allowing the leg to extend, and after waiting a little while, bounce the leg up and down. Compress again and check the overflow, fill up if the level has fallen due to the elimination of air locks.

The chart on page 14 will give the correct grades of oil to use.

ROUTINE ADJUSTMENTS.

- 14 **Clutch Control.** Unless the adjustment of the small clutch control lever on the gearbox be maintained accurately, the clutch plates will not engage firmly, clutch slip will result with consequent and, should it be allowed to persist, irreparable damage to the clutch plates.

It should be possible, at all times, to feel $\frac{1}{16}$ in. of free movement on the end of this lever, and should it not be present, obtain it in the following manner.

Slacken the clamping screw which secures the lever to the operating worm. Now turn the latter clockwise until the $\frac{1}{16}$ in. of free movement is achieved; tighten up the clamp screw. When the clutch is fully lifted, the lever should be approximately square with the cable, and this may be regulated by adjusting the length of the inner cable below the lever by means of the adjuster and locknut, provided.

The position of the lever endwise on the worm is important, and its inner face should not be more than $\frac{1}{8}$ in. from the small triangular cap from which the worm protrudes. Should this point be neglected, the lever may foul the kick-starter.

During the early life of a clutch the friction material may bed down fairly rapidly so that clearance in the clutch control is lost. Therefore, keep an eye on this point during the first few hundred miles, making any necessary adjustment.

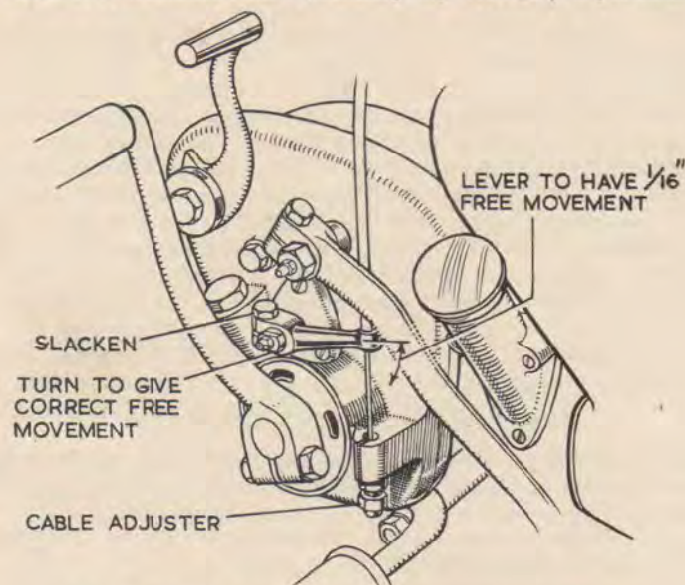


Fig. 4.—Clutch Lever and cable adjustments must be maintained as recommended in order to avoid undue clutch wear.

- 15 **Chain Adjustment.** Access to the primary chain adjustment is gained by removing the chain cover which is held in place by a single nut. Have a tray handy to catch the oil as the cover is removed. Beneath the bottom run of the chain is a curved slipper on which the chain rests. This may be raised or lowered by turning the adjusting screw after first having slackened its locknut. Do not adjust the chain dead tight but revolve the engine slowly and while doing so, test the tension of the top run of the chain by pressing it up and down with the fingers. Note whether the chain is tighter at some spots than at others and adjust the tension

so that there is $\frac{1}{4}$ in. up and down movement at the tightest spot. This amount of slack should be present all round if there are no tight spots. Re-tighten the locknut on the adjusting screw, replace the chain cover and replenish with oil as described on page 13.

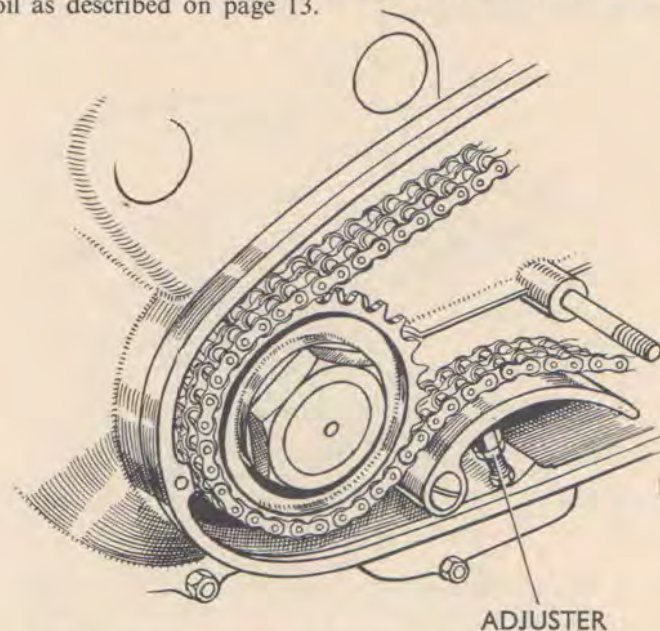


Fig. 5.—To take up slack in the primary chain, unscrew the lock nut and turn the adjuster beneath the curved slipper until correct chain tension is obtained; re-tighten the locknut.

Rear chain adjusters take the form of cam plates on the ends of the wheel spindle outside each fork end. The wheel will be correctly aligned when each adjuster has the same notch engaging against the fixed peg in the fork end. Any adjustment is made by slackening the spindle nuts and turning the cam plates until the required chain tension is achieved. Test this by spinning the wheel and feeling the up and down play as described for the front chain. In this case, however, allow $\frac{1}{2}$ in. movement. If the wheels can be lined up only by having one adjuster engaging a different notch from the

other, it is possible, that as a result of an accident the frame is out of truth. If there is a discrepancy of more than two notches, the chain will be running out of line even though the wheels align correctly. The remedy is, of course, to straighten the frame.

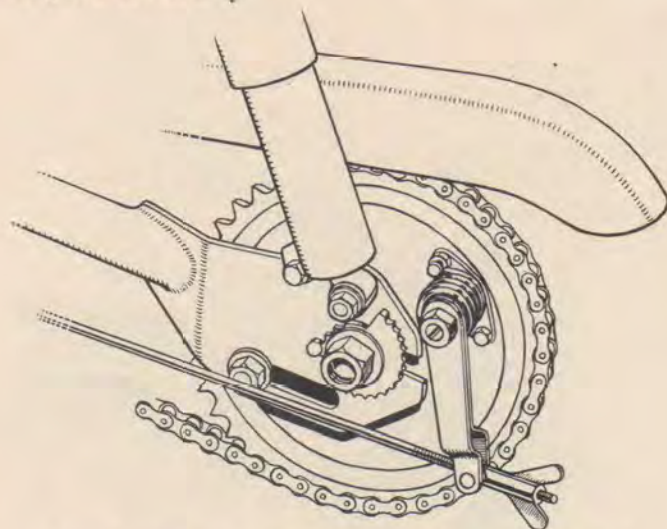


Fig. 6.—The rear chain is adjusted by slackening the wheel spindle nuts and turning the notched cam plates on either side of the wheel fork. A wing nut on the end of the brake rod adjusts the rear brake.

When replacing a chain after removal, or fitting a new one, see that the spring clip securing the connecting link is fitted with the blind end pointing in the direction in which the chain travels. Don't forget to readjust the rear brake after chain adjustment.

- 16 **Brake Adjustment.** Rear brake adjustment is carried out by means of a winged nut at the end of the brake operating rod. A milled nut, or, in the case of the "Meteor 700," two milled nuts beneath the outer casing of the brake cable adjust the front brakes. In either case, screw up the adjuster until the brake is hard on, then gently slack back until the

wheel will spin freely without any trace of the brake shoes rubbing the drums. Both wheels have deep groove journal ball races which require no adjustment.

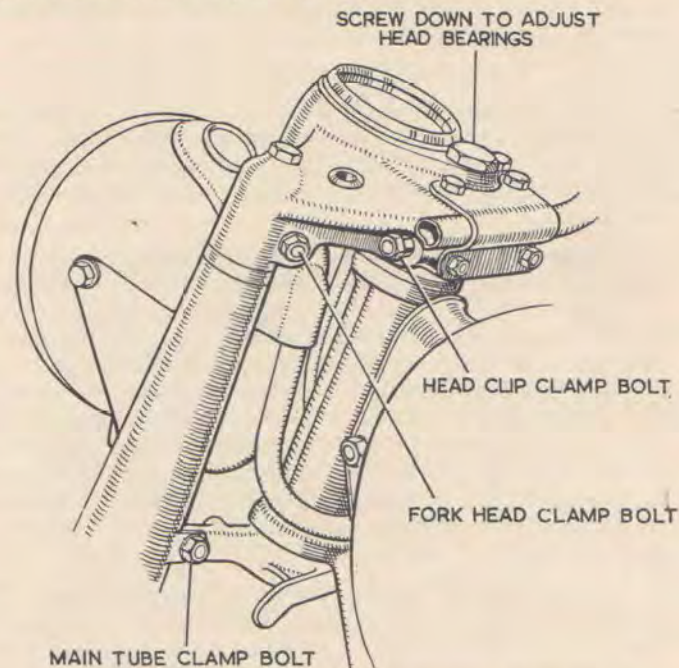


Fig. 7.—Showing the positions of the clamp bolts securing the steering stem and fork tubes

- 17 **Steering Head Adjustment.** Take the weight off the front wheel by placing a suitable box or block beneath the crankcase. Loosen the clamp bolt which passes through the ball head clip and the two which anchor the top ends of the fork legs to the fork head. Take up play in the bearing by tightening down the large, central nut on the fork head. Do this gently and test for diminution in shake meanwhile. When correctly adjusted there should be no perceptible play, but the steering must be perfectly free so that the wheel and fork assembly will fall over to full lock when given the slightest push in

either direction. Tighten all three clamp bolts after making the adjustment.

Other adjustments relating to the engine are dealt with in the section "Overhauling the Engine" commencing on page 24.

TROUBLE ON THE ROAD.

18 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.

19 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, and if necessary turn the lever above the petrol tap to the "Reserve" position. If there is plenty of petrol in the tank make sure that it reaches the carburettor by disconnecting the petrol pipe at the carburettor end and turning 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 in the pipe itself.

20 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 leads have not become disconnected at either end, and that they are not worn or burnt through, allowing bare wire to touch some metal part of the machine. See also that the plug insulators and high tension leads are not wet, and check the connections to the battery, dynamo, coil and distributor to make sure that none of these have pulled out.

If all the above is in order remove the sparking plugs and place each one 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 with the ignition switched on. 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 $\frac{1}{2}$ 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, of the type recommended in paragraph 37. The gap between the plug points should be .018 in. to .025 in. (.45 to .65 mm.).

If the plugs are satisfactory, the trouble lies in the ignition system. See that the contact breaker points are clean and that they open and close properly. These should open to a gap of .012 in. (.30 mm.). If this point is in order try the battery by switching on the lights, as the ignition will not function if the battery is discharged.

21 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 over-driving of the machine and by neglect of the tappet clearances. 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 cylinders and pistons 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.

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

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

OVERHAULING THE ENGINE.

- 23 **Decarbonising.** The removal of carbon deposit from cylinder heads and pistons will become necessary at intervals. Decarbonising should be done after the first 2,000—2,500 miles and, subsequently, approximately every 5,000 miles.

Except in the matter of dimensions and the type of big end bearings, the 500 c.c. and 700 c.c. engines are structurally similar, and the following instructions cover both units.

- 24 **Cylinder Head Removal.** Remove the petrol tank by detaching the petrol pipe and removing the two bolts which secure the tank to the frame at front and rear. It may help if the front saddle anchorage also is removed. Take away the cylinder head stay, detach the external oil pipes, carburettor, induction pipe, and remove the exhaust pipes and silencers.

Five sleeve nuts secure each head, there being three short ones on the outer side and two long ones on the inner side. After removing these the head may be lifted.

- 25 **Removal of Valves.** Remove the rocker covers each held by four nuts, swing the rocker clear of the valve and lift, or prise away the hardened steel thimbles or end caps. If these have stuck, they can be removed by means of a screwdriver (Fig. 8). Using a suitable valve spring compressing tool (Fig. 9), compress the valve springs and remove the split conical collars from the end of the valve stem. Slacken



Fig. 8.

back the compressor and release the spring; withdraw the valve and place its springs, top spring collar (and bottom collar if it is loose) and split conical collars together in order that they may be assembled with the valve from which they

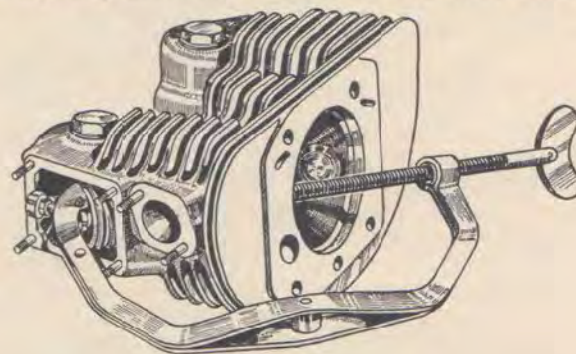


Fig. 9.

were removed. Deal similarly with the other valve in the head.

- 26 **Removing the Carbon.** Scrape away all carbon from valve heads and beneath the heads, being very careful not to cause any damage to the valve faces. Bearing in mind that you are dealing with aluminium, remove carbon also from the cylinder head and valve ports. Scrape gently and avoid scoring the combustion chamber or damaging the valve seats which are of austenitic iron shrunk into the head. Be careful while performing this work not to injure the joint face which beds down on to the head gasket.

Do not, in any circumstances, use potash or caustic soda for carbon removal from these aluminium alloy heads.

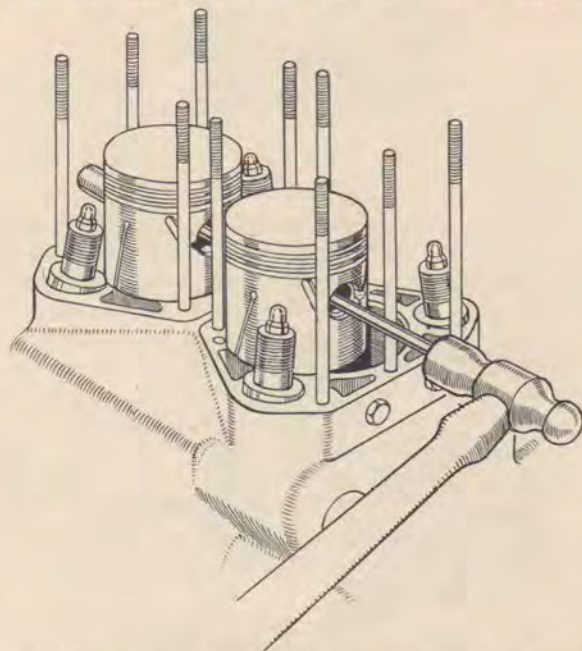


Fig. 10.—Positions in which the pistons should be held while the far gudgeon pin is being tapped out by a rod passed through the nearer piston.

- 27 **Piston Removal.** It is possible to scrape the piston tops clear of carbon without removing the cylinder barrels, but, since this latter is a very easy task and it may be just as well to examine the state of the piston rings, the cylinders may be lifted clear. With the tang of a file remove the wire circlips retaining the gudgeon pins. Rotating the engine very gently, bring the pistons into such a position that the gudgeon pins, when being withdrawn, will clear the long cylinder studs. Using a rod about $\frac{1}{4}$ in. in diameter, insert this right through one gudgeon pin and push the other pin out of its piston. Having lifted the first piston away, the other one may readily be removed. Mark them so that each goes back into the same cylinder and the same way round.

In the case of broken or gummed-up piston rings, they should be removed, the grooves cleaned out and new rings fitted or the old ones cleaned carefully and refitted. For cleaning the grooves, a piece of a discarded ring thrust into a wooden handle and filed to a chisel point is a useful tool.

While the cylinders and pistons are not in position on the engine, cover the crankcase with a clean cloth to prevent the ingress of dust and dirt of all kinds. Do not, of course, attempt to scrape the carbon from the pistons when the mouths of the crankcase are open.

- 28 **Grinding-in Valves.** Wipe the valve faces clean and examine them carefully. If they are at all pitted, have the faces re-cut. Pay similar attention to the valve seats in the head; excessive grinding will form a pocket and the gas flow will be restricted.

To grind in a valve, smear the seatings with a little grinding-in compound, place a light, short coil spring over the valve stem and beneath the head, insert the valve into its appropriate guide, press it on to the seat, using a screwdriver or a valve grinding tool, and with a backwards and forwards rotary motion, grind it on to its seat. Frequently lift the valve and change its position so that you achieve an even and true seating. If you have no light spring, the lifting will have to be done by hand. Continue grinding until a bright ring is obtained on both valve and seating.

- 29 **Re-assembling the Engine after Decarbonising.** Before building up the engine again, see that every part is scrupulously

clean and, having cleaned them, place them conveniently to hand on a trestle or working platform covered with a clean sheet of brown paper.

It might be mentioned here, that it is recommended that new cylinder base and head gaskets be fitted.

Smear clean oil over the pistons, having replaced the rings if these have been removed, put the inside circlip into its groove in the gudgeon pin boss, lower the piston over the connecting rod and insert the gudgeon pin from the outer side; fit the second circlip and then fit the second piston in a similar manner.

Place the cylinder base gaskets in position and make certain that each has two holes which register with the two oil passages leading to the overhead rockers.

Oil the cylinder bores and lower each barrel over the pistons and seat them gently on their gaskets. Drop the push rods down their tunnels on to the tappet heads. Note that the cupped ends of the rods are not equal in size and that the small cups make contact with the tappets and the large cups bear against the overhead rockers. Fit the cylinder head gaskets—copper asbestos ones—and all is now ready to receive the cylinder heads.

The valves must first be fitted into the heads by a reversal of the process of removing them. Ease the heads over the cylinder studs and when they are safely in position, screw on the sleeve nuts and commence to tighten them down. Don't forget that the longer nuts are the two inside ones and tighten all nuts progressively and diagonally from one side to the other in order that no distortion shall take place and that a true joint shall be made. Just before the nuts are tight, fit the induction pipe and gaskets and finally tighten the cylinder head nuts. In replacing the heads take care that the push rods engage the rockers in the right manner.

- 30 **Tappet Adjustment.** Before replacing the rocker covers, check the tappet adjustment. Always adjust the tappets when the engine is cold. Make the adjustment by releasing the locknut beneath the rocker head and turning the adjusting screw in the desired direction. Set the inlet so that the rocker is just held without it being possible to move it endwise by hand. Set the exhaust so that the rocker will just move

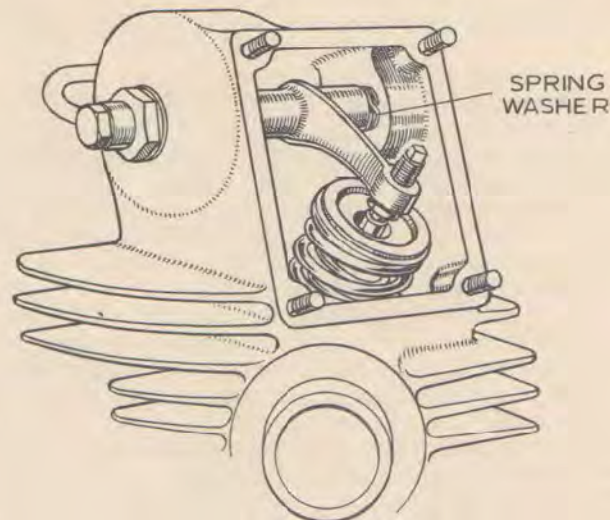


Fig. 11.—The tappet adjuster is screwed into the rocker and retained by a locknut beneath the rocker. Note the position of the spring washer behind the rocker pivot.

endwise when pushed by hand. Alternatively, set the tappets with a .001in. feeler gauge between the adjuster and the valve end. Adjust until it is impossible to pull the feeler clear. Lever up the rocker to free the feeler. Refit rocker covers and gaskets.

- 31 **Completing Assembly after Decarbonising.** All that now remains to be done is to refit the external oil pipes, making sure that they are clear and that the oil passages, too, are free of dirt; re-connect the cylinder head steady to the engine and frame, refit the carburettor and the exhaust pipes then remount the petrol tank and connect up the petrol pipe.

Start the engine and let it run gently until it is nicely warm and excessive smoking at the exhaust has ceased. Stop the engine and go over all the cylinder head nuts, including those between the cylinders, oil pipe unions, carburettor

securing nuts and exhaust pipe nuts. Do this again after the engine has had a good run and reached a high temperature.

- 32 **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.

The engine and gearbox, being bolted together, must be removed as a unit. To do this, proceed as follows:—Remove the exhaust pipes and silencers, rear chain and chain guard, cylinder head stay, carburettor slides and the low tension leads to the distributor. Support the machine on a box placed beneath the rear fork pivot lug and place a second box below the engine to take its weight when it is released from the frame. Remove both front engine plates completely, disconnect the stand spring and remove the central stand. Remove the attachment plates beneath the gearbox completely, loosen the nuts securing the top attachment plates to the gearbox and remove the stud which secures these plates to the bottom of the seat tube of the frame. Remove the nuts securing the fixed half of the rear mudguard to the bracket on the gearbox. The engine and gearbox can now be withdrawn by pulling them forward and turning them slightly to the right.

Removal of the engine and gearbox will be facilitated if the cylinder heads, cylinders, pistons and primary chain case are removed first. The method of removal of the cylinder heads, cylinders and pistons is described in page 24. To remove the primary chain case unscrew the single bolt which secures the cover, lift away the latter and remove the chain and sprockets. The chain is endless so that it is necessary to remove both engine and clutch sprockets simultaneously. The engine sprocket is mounted on splines. To remove the clutch sprocket unscrew the three clutch spring pins then lift away the spring cap, springs and distance pieces, clutch front plate, centre retaining rings and the assembly of driving and driven clutch plates. The clutch sprocket can be withdrawn from the centre after removal of the large circlip which secures it. The clutch centre itself must now be withdrawn, this being mounted on splines on the gearbox mainshaft held up with a nut with a right hand thread. The back half of the chain case

can now be lifted off after removal of the three nuts securing it to the crankcase.

- 33 **Dismantling the Crankcase.** After removal of the engine from the frame drain the oil tank and remove the cylinders and pistons and the primary chaincase, chain and sprockets, if not already done. The gearbox can now be withdrawn from the back of the crankcase after unscrewing the four nuts which secure it.

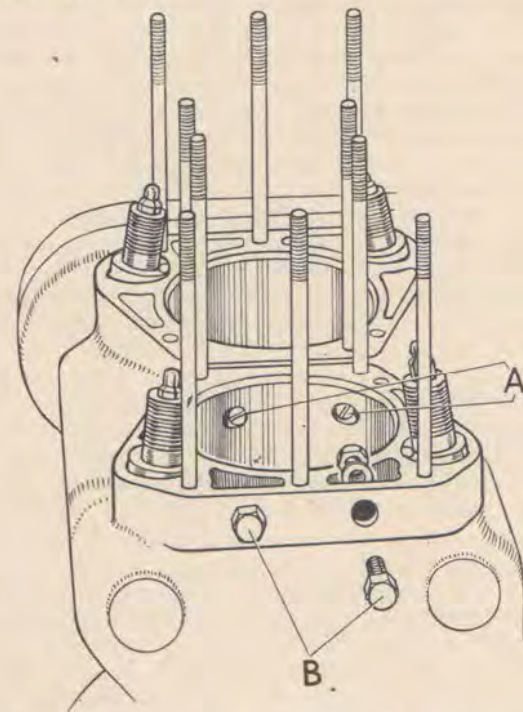


Fig. 12.—The two screws A holding the upper parts of the crankcase halves are accessible after the removal of the cylinder. The plug screws B on the outside of the crankcase should never be removed or the inner nut will fall loose.

Before dismantling the engine further, drain the oil from the timing cover, oil tank and flywheel chamber by removal of the two drain plugs as described on page 15.

Next unscrew the three screws which secure the oil filler to the crankcase and remove the filler. Unscrew the twelve timing cover screws and remove the cover. Now unscrew the three screws which secure the dynamo end flange to the back of the timing case. Remove the back half of the strap securing the dynamo and withdraw the latter, tilting it slightly so as to disengage the sprocket from the chain. To remove the timing chain first unscrew the set screws securing the sprockets on to the camshaft. **These have left-hand threads.** Remove the nut which locks the position of the quadrant on the jockey sprocket sleeve, slacken the chain and remove the jockey sprocket and its spindle and quadrant. The chain can now be withdrawn from the bottom sprocket leaving the latter secured to the crankshaft, but the camshaft sprockets must be withdrawn from the shafts. These are held on by a taper and key, and are provided with two tapped holes* for an extractor.

Now remove the cradle which supports the dynamo after unscrewing the three screws which secure it to the crankcase.

Two screws A (Fig. 12) are now fitted in the top joint of the crankcase between the cylinders. Access to these is obtained, after removal of the driving side cylinder, by removing the two hexagon-headed plugs B, on the driving side of the case just below the cylinder base. **On no account must these plugs be disturbed unless the driving side cylinder has been, or is to be, lifted.**

The two halves of the case can now be separated after removing the nine $\frac{5}{16}$ in. and four $\frac{1}{2}$ in. nuts which hold them together. The small timing sprocket will not pass through the hole in the steel washer which forms an oil seal for the timing side bearing (except in the case of a small number of early engines) and must be withdrawn by unscrewing the pump worm (left hand thread) and prising the sprocket off, taking great care not to damage it or the crankcase.

The inner race of the roller bearing on the timing side will remain on the shaft, bringing with it the cage and rollers

* Except on a few early engines.

and leaving the outer race fixed in the crankcase. The inner race of the ball bearing on the driving side is a tight fit on the shaft, which must be driven out with a hammer and a soft metal drift. To avoid damage to the ball bearing, the case should be warmed to about 100° C. before doing this.

- 34 **Main and Big End Bearings.** If it is required to replace the driving side ball bearing the old one must be driven out of the case. When fitting the new bearing press it into the case **using a drift which applies pressure to the outer race only.** It is desirable to warm the case by immersion in hot water or in an oven before either removing or refitting bearings.

To remove the timing side outer roller race from the case use a small punch through the three holes provided for the purpose. The inner race and rollers can be withdrawn by means of a claw type extractor.

If the big end bearing caps are removed to examine the condition of the bearings make sure that caps are refitted the same way round on the same rods and that the rods themselves are refitted the same way round on the same crankpins. If there is perceptible up and down play in the big end bearings (with oil in them) this can be taken up by filing the joint face between the rod and the cap and, if necessary, scraping or reboring the bearing.

On the "Meteor 700," detachable shell bearings are fitted to the big end and play in this bearing should be eliminated by fitting new shells. The big end bearing caps are secured by screws which screw into the top half, and are locked by split pins passed through the rods and the screws each of which is drilled for this purpose.

- 35 **Re-assembly of Crankcase.** When fitting the crankshaft into the driving side of the case support the shaft in a vertical position with the driving end uppermost and drive the case on to the shaft by means of a tubular drift applied to the inner race of the bearing. This will prevent damage to the balls and ball tracks.

The joint between the two halves of the case should be made with shellac, seccotine or a similar jointing.

The timing sprockets are marked and must be assembled with the marks in the positions as shown in Fig. 13.

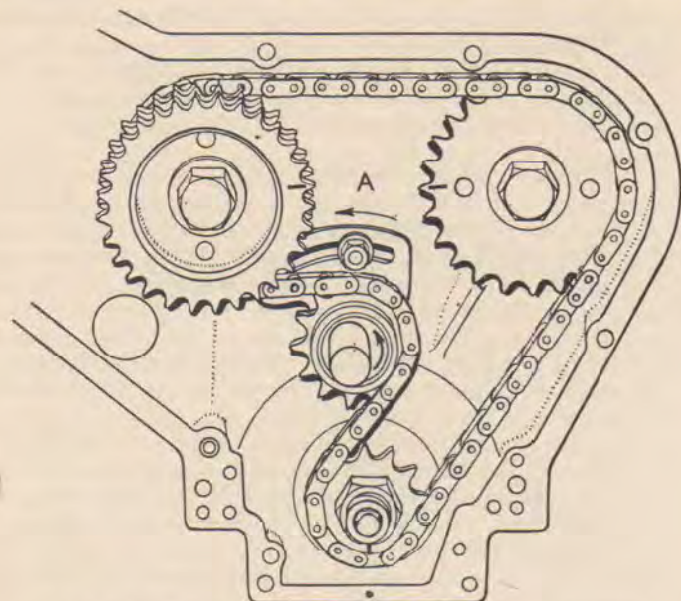


Fig. 13.—Timing marks and direction in which eccentric and locking plate must be moved to adjust the timing chain.

36 Tension of the Timing Chain. The tension of the timing chain is altered by moving the quadrant after slackening the nut A which secures it. As assembled at the Works, the positions of the quadrant and the eccentric are as shown in the illustration and tightening of the chain is effected by moving the quadrant to the left. When all movement has been utilised, no attempt should be made to turn the quadrant or the eccentric round. Instead, a new chain should be fitted.

The joint between the timing cover and the crankcase **must** be made with the special washer between the surfaces.

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.

37 Ignition Timing. Owing to the provision of automatic ignition advance the contact breaker is always fully retarded when the engine is at rest or is being turned over slowly. The cam can be brought to the fully advanced position by turning the rotor clockwise, but doing this will advance the timing further than is done by the automatic mechanism owing to backlash between the weights and the cam being taken up when the rotor arm is turned by hand. It is, therefore, necessary to time the engine with the contact breaker in the fully retarded position. The timing should be set so that the contact points are just about to open when the pistons are $\frac{1}{32}$ in. past top dead centre, having first made sure that the rotor arm is, in fact, fully retarded. An approximate setting can be obtained by engaging the most suitable tooth of the dynamo sprocket with the chain when reassembling the engine, or subsequently by withdrawing the distributor after slackening the screws A and B (see Fig. 14) and replacing it with a different tooth of the skew gear in engagement. The fine

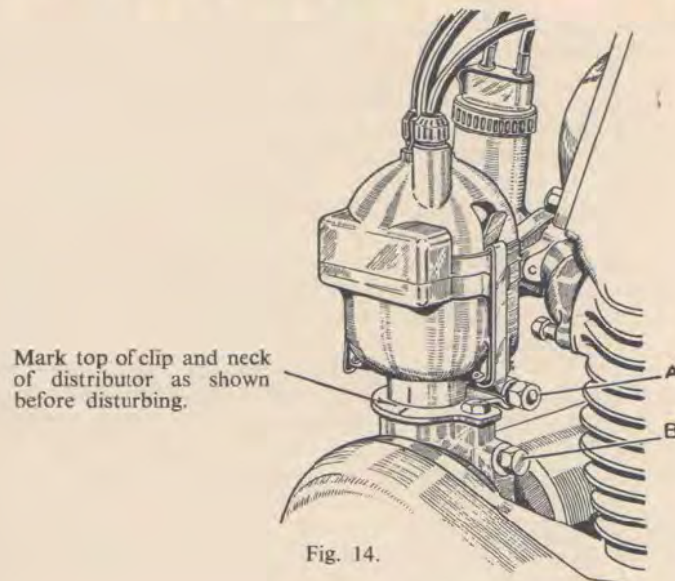


Fig. 14.

adjustment of the setting is obtained by the simple process of turning the distributor body. Since it is difficult to set the engine to $\frac{1}{32}$ in. past T.D.C. with sufficient accuracy and since individual distributors will vary slightly in the amount of advance which they give, we recommend that a final adjustment to the setting should be made after running the machine on the road. The timing should be such that there is just a slight tendency to "pinking" when the engine is warm and the throttle is opened wide at low engine speeds. Before altering the position of the distributor head make a fine scratch or pencil mark as shown in Fig.14 so as to enable a return to be made to the original setting if desired. Move the head only about $\frac{1}{32}$ in. or so at a time, clockwise to retard the timing, anti-clockwise to advance it.

- 38 **Sparking Plugs.** The following are the types of plugs which we have found most suitable for this model :—

Lodge H14 ; K.L.G. F70 ; Champion L10S.

- 39 **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, tail, and other lamps :—

Head lamp, main bulb, 6 volt—30 × 24 watt, pre-focus type.

Head lamp, pilot bulb, 6 volt—3 watt, m.b.c. type.

Tail lamp, 6 volt—3 watt, s.b.c. type.

Speedometer light, 6 volt—1.8 watt, m.b.c. type.

Warning light, 6 volt—0.1 amp. screw contact.

When the lighting switch is in the "high" position, a finger-operated switch on the left handlebar can be used to dip the light. The speedometer is illuminated when either the main or pilot bulbs are on.

The various wires or leads in the system should be examined occasionally to make sure that they have not become

* 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.

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. **Note that the positive terminal of the battery is the one which is earthed.**

- 40 **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.

The lighting and ignition set is fully described in a booklet issued by the manufacturers, a copy of which we will forward on request.

- 41 **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 mill-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.

Note.—The locknut on the throttle stop will be found to be much more accessible if the float chamber top is removed while adjusting the slow running.

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:—

Main Jet No. 150.	Throttle Valve 6/4.
Needle Jet No. 109.	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.

- 42 **Air Cleaner.** The air cleaner ensures that no dust or grit reaches the engine. Owing to its efficient design it does not impair the performance in any way, so that no advantage is gained by running the machine without it. It must be removed about every 2,000 miles, washed in petrol, dipped in engine oil and refitted.

TRANSMISSION.

- 43 **Enfield Four-Speed Gear.** This gearbox 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 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.

On these machines a special neutral finding lever is fitted. This enables neutral to be found immediately from second, third or top gears. Forward and downward travel of this lever is limited by a stop sleeve. If the lever fails to locate neutral, loosen the hexagon-headed screw which secures the sleeve, and turn the latter. The sleeve is eccentric so that rotating it adjusts the position of the neutral finder at the end of its travel.

- 44 **Clutch.** On the "500 Twin" the clutch is of the four plate type; the "Meteor 700" has a five plate clutch. If

clutch slip occurs, first make sure that there is the requisite amount of slack in the control wire, see page 17.

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 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.

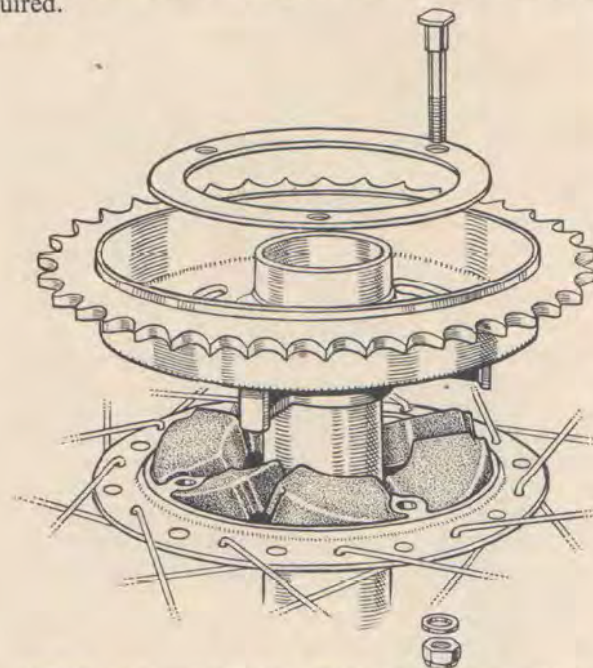


Fig. 15.—In assembling the cush drive hub, set the rubbers against each other, as shown, to provide a lead for the vanes.

- 45 **Patent Cush Drive Rear Hub.** All Royal Enfield four-stroke 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, consequently minimising 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.

To renew rubbers, or refit them if the cush drive has been dismantled, place the rubbers in the hub leaning at an angle against each other as shown in the illustration in Fig. 15. Insert the opposing vanes between them, having first coated the vanes lightly with soap—**not oil**—to ease their entry. Administer a good hefty blow to drive the vanes home, put on the sprocket lock ring, insert the three bolts and secure them with their nuts and washers.

FRONT FORKS.

46 "500 Twin." Construction. A polished aluminium fork head, carrying the speedometer, crowns the top of the fork, being held in position by a large clamp bolt which secures it to the steering stem, and two clamp screws securing the tops of the main tubes of the forks; a central, large, plated nut passes through the fork head and is screwed to the top of the steering stem.

At the top of each main tube is a gauze air cleaner within a small housing and a breather hole is formed in the fork head casting.

Thrust into its socket in the fork head, and held there by the clamp bolt already mentioned, is the main tube which passes through the fork crown at the base of the steering stem, being secured at this point by another clamp bolt. Between the fork crown and the fork head, and pinched between the two, cushioned by a rubber packing collar, is a tapered outer tube carrying a lamp bracket.

The bottom tube, or sliding member, encases the lower part of the main tube and slides over two, widely spaced,

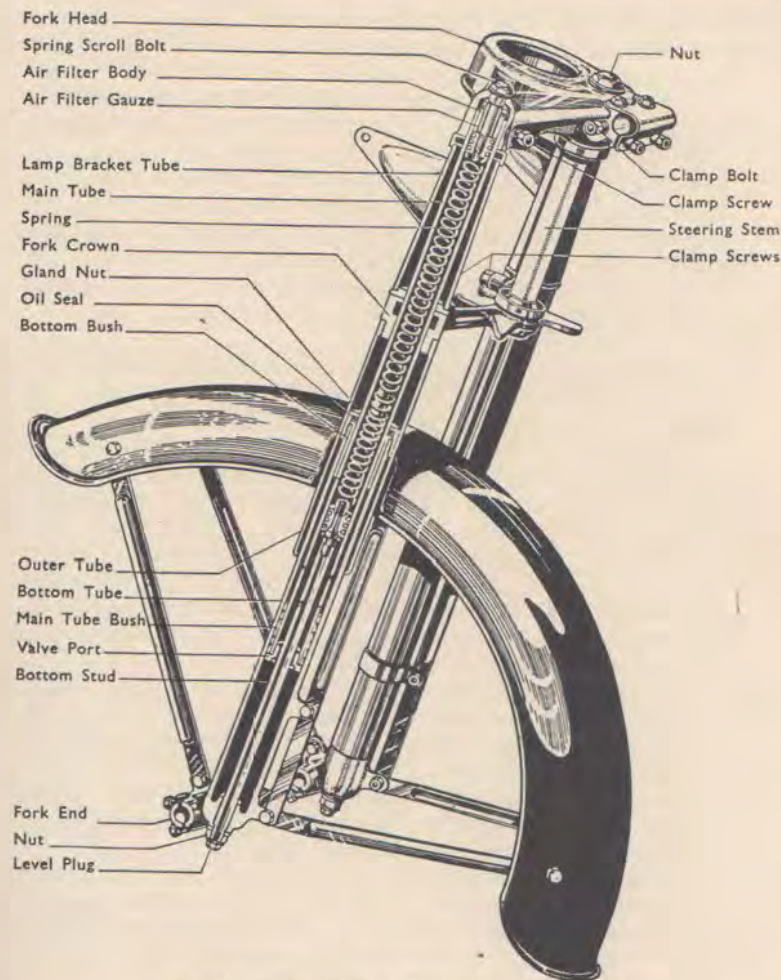


Fig. 16.—"500 Twin" Telescopic Front Fork.

bushes. Secured to the top end of the bottom tube is a gland nut which houses an oil seal and secures the top bush. This part of the sliding member is covered by a lower outer tube

screwed to the underside of the fork crown. Into the bottom end of the main tube a valve port is screwed which also retains the bottom bush.

A long, flexible spring is anchored at its upper end by the bolt which passes through the fork head. At its lower end, the spring is attached to a long, hollow, central stud which is secured to the lower extremity of the bottom tube by a large nut. This stud is tapered and passes through the valve port; consequently as it moves upwards with the sliding member, the taper gradually restricts the port and the flow of oil, producing a progressive damping effect. A drain plug is fitted at the base of the hollow stud.

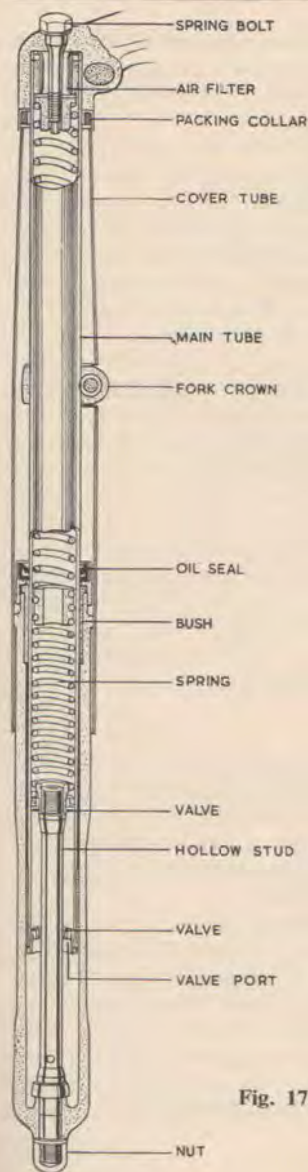
- 47 **Dismantling.** First remove the headlamp, disconnect the speedometer drive from the speedometer and detach the lead to the speedometer light.

Loosen the clamp bolts which clamp the fork head to the steering stem and the two main tubes; remove the central, plated nut from the fork head and the two bolts which pass through the latter into the main tubes. Lift the fork head complete with handlebars clear and the two upper, outer tubes. In doing this take care not to lose the balls from the upper head race, some may adhere to the fork head race, others to the steering head; they should all be collected and placed safely away.

Have the machine resting on the central stand during these operations and not jacked up well clear of the ground or the steering stem will drop out of the steering head, and the fork and wheel will fall.

Remove the air filter and its housing and then, having placed a tin below the fork leg to catch the oil, remove the drain plug from the bottom and the larger nut which is above it. When the oil has drained, tap the stud which protrudes through the base of the fork leg and, from the top, remove the spring and with it the hollow central stud. The top of the spring can be brought into access by pressing downwards on the front of the petrol tank.

When removing the bottom tube, some means must be found of supporting the fork while the wheel is being detached or the steering stem will drop from the head. With the wheel away, it may prove more convenient to do the rest of the



dismantling with the fork removed from the machine and the mud-guard detached.

Unscrew the remaining outer tube from below the fork crown and slide it downwards until the gland nut on top of the slider is exposed. Unscrew the gland nut and when it is free pull the bottom tube down and clear of the main tube, leaving the gland nut, oil seal and bushes on the main tube.

By slackening the clamp bolt securing the main tube to the fork crown, the main tube may be slid free downwards. Dismantling is completed by sliding off the gland nut, oil seal and top bush, unscrewing the valve port and removing the bottom bush and separating the spring from the hollow stud.

- 48 **"Meteor 700." Construction.**

The construction of the fork head, speedometer mounting and the anchorage of this to the steering stem and the main tubes of the fork is identical with the "500 Twin." A similar air cleaner at the head of the main tube also is used, but there the similarity ends.

Instead of there being an upper and lower outer tube, there is one long outer tube extending from the fork head to a point well below the top of the sliding or bottom tube of the fork. This

Fig. 17.—"Meteor 700" Telescopic Front Fork.

long outer tube is held to the fork crown by two ears through which passes a clamp bolt securing the main tube. At its upper end, the main tube is held by a clamp bolt exactly as in the case of the "500 Twin."

The bottom, or sliding tube encases the lower part of the main tube and has, screwed to its upper end, an oil seal housing which, besides containing the oil seal, retains the top bush in the sliding tube. Screwed into the base of the main tube is a valve port which also secures the bottom bush.

In this fork a two-phase spring is used, and it abuts against spring guides at top and bottom, and has a third guide at the point where the spring phases alter.

Thrusting upwards from the base of the sliding tube is a hollow spring stud which passes through the bottom valve port and has the bottom spring guide attached to its upper end by a nut. This spring guide has a ring of ports similar to those in the bottom valve port and each ring of ports is controlled by a valve plate or flap valve.

As the spring is compressed, both valve ports remain open, oil passes freely through them and no damping is achieved. Under very severe shocks, however, an oil control collar at the base of the sliding tube comes into play, trapping oil, and forming a cushion to check movement. On the rebound, both flap valves close, and oil is forced to return through very restricted passages, thus damping the rebound movement of the fork.

- 49 **Dismantling.** Proceed in the same way as for the "500 Twin" for the removal of the fork head and air cleaners. Remove the clamp bolt which secures the main tube to the fork crown. The bottom and main tubes, together with all other parts, may then be withdrawn from the long cover tube, and this, too, may be removed.

Since the spring is not anchored at either end, when the air filter has been taken away the spring may be withdrawn.

Remove the nut from below the bottom or sliding tube, and, with a tin below the fork leg to catch escaping oil, tap the hollow bolt upwards with a hammer and a soft drift. Allow oil to drain away. Unscrew the oil seal housing from the top of the sliding tube and slide it clear of the main tube together with the top bush. The sliding tube can now

be slid downwards clear of the main tube. Unscrew the bottom valve port from the main tube, thus freeing the bottom bush, and slide it over the lower end of the hollow stud.

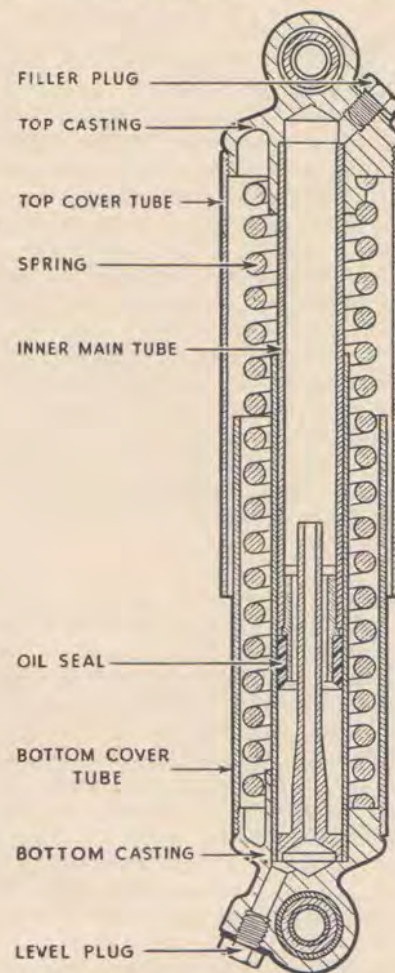


Fig. 18.—"500 Twin" Rear Suspension Unit.

Remove the stud from the main tube and, if desired, unscrew the nut from the top of the stud and remove the valve port.

REAR SUSPENSION.

- 50 "500 Twin." **Construction.** Of the swinging arm type, the substantial wheel fork is pivoted at its forward end which is provided with bronze bushes working on a tube through which a spindle is passed. Thrust washers are inserted at each end and the spindle secured by two ring nuts.

To the fork ends, the lower ends of the spring boxes are attached, their upper ends being anchored to rearward projecting horns welded to the seat stays.

To the top casting of the spring box, an inner main tube is attached, carrying at its lower end, an oil seal and a valve port. The bottom casting embodies the outer main tube and a central hollow, tapered stud which, on the upward movement of the wheel, gradually restricts the flow of oil through the port and damps the spring action. A cover tube is screwed to the bottom casting and another, larger one is screwed to the top casting. A single central spring is anchored to the top and bottom castings. There is an oil filler plug at the top and a level plug at the bottom of the assembly.

- 51 **Dismantling.** Remove the spring box, complete, from the frame. Unscrew the top cover tube from the top casting and then unscrew the spring from its top scroll. The top casting and inner main tube can now be withdrawn complete with oil seal and valve port. By unscrewing and removing the bottom cover tube, the spring can be released from its bottom anchorage, leaving the bottom casting with the hollow stud within the outer main tube.

Dismantle the pivot bearing by removing the ring nuts and driving out the spindle. When attempting to withdraw the swinging arm, it will be necessary to spread the side members of the fixed portion of the frame for which purpose a special expander will be necessary.

- 52 "Meteor 700." **Construction.** Top and bottom castings each carry a cover tube and within these tubes lies the spring.

Screwed into the top casting is a small central tube called the top bearing tube, carrying at its base a plunger head and a flap valve, or oil control valve plate.

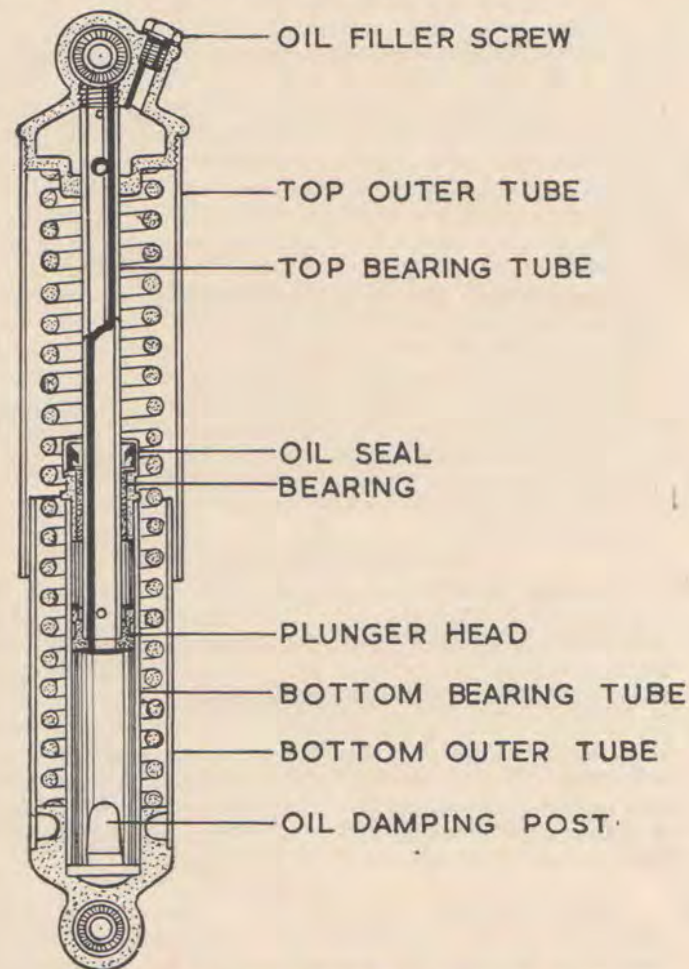


Fig. 19.—"Meteor 700" Rear Suspension Unit.

Fixed to the bottom casting is a larger, bottom bearing tube which surrounds the top one and carries at its upper end a bearing and an oil seal in a housing.

On compression of the spring, oil is forced from the lower chamber, up the top bearing tube to a reservoir in the top casting and also past the flap valve to an annular space between the upper bearing and the plunger head. On the rebound, the valve closes and the oil that has been trapped in the space can flow back only past the outside of the plunger head, clearance being arranged for this purpose. At the base of the bottom bearing tube is a short, oil damping valve post which, under severe shocks, closes, or nearly closes, the end of the top bearing tube, thus trapping a cushion of oil.

- 53 **Dismantling.** Remove the spring box from the frame and unscrew the top cover tube from the top casting. Take out the spring—it is not anchored—and then unscrew the top bearing housing. The top bearing tube may then be withdrawn from the bottom bearing tube. When the plunger head has been unscrewed from the bottom of the top bearing tube, the top bearing housing, bearing and oil seal may be slid from the tube.

MISCELLANEOUS.

- 54 **Brakes.** Brake adjustment has already been dealt with and there is little to say except that the "Meteor 700" has duplex front brakes, giving the wheel a well balanced, symmetrical appearance, and the machine a most impressive stopping power. A compensating device is included at the lever end of the operating cables. Royal Enfield brakes have their cam spindles mounted in the cover plates in such a manner that they are not rigidly anchored, but are free to float within a certain limit. This means that when the brake is applied, the shoes centralise themselves and make positive contact with the drum surfaces all round.

- 55 **Wheel Removal.** For the rear wheel this is greatly facilitated by the detachable rear mudguard. By undoing four nuts securing the mudguard stays to the frame, the mudguard may be lifted away. All that then remains to

be done is to remove the adjusting nut from the brake rod, disconnect the rear chain by removing the spring link, loosen the spindle nuts and draw the wheel from the fork ends.

To remove the front wheel, place the machine on the stand, disconnect the front brake cable, take the caps from the fork ends by removing their securing nuts, lift the front of the machine slightly and the wheel will fall clear.

- 56 **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. 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.

The following are the recommended tyre pressures :—
 "500 Twin": Front, 18 lbs. per sq. in. Rear, 20 lbs. per sq. in.
 "Meteor 700": Front, 18 lbs. per sq. in. Rear, 22 lbs. per sq. in.

A DOZEN "DON'TS" FOR DRIVERS.

- DON'T forget to switch off the ignition when the machine is standing.
- 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 inviting skids and shortening the life of your tyres.
- DON'T slam the throttle open suddenly. Give your machine an easy life and it will repay you.
- 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 hesitate to consult our Service Department at any time.

MOTOR CYCLE GUARANTEE

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 overriding 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, 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 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 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 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. Such parts are, however, normally guaranteed by their respective manufacturers, to whom any claims should be made in the event of such parts proving defective.

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.

