

HINTS and TIPS

for the 1140 c.c.

ROYAL ENFIELD

MOTOR CYCLES

Models K and KX.

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THE MOTOR CYCLE DEPARTMENT

1938

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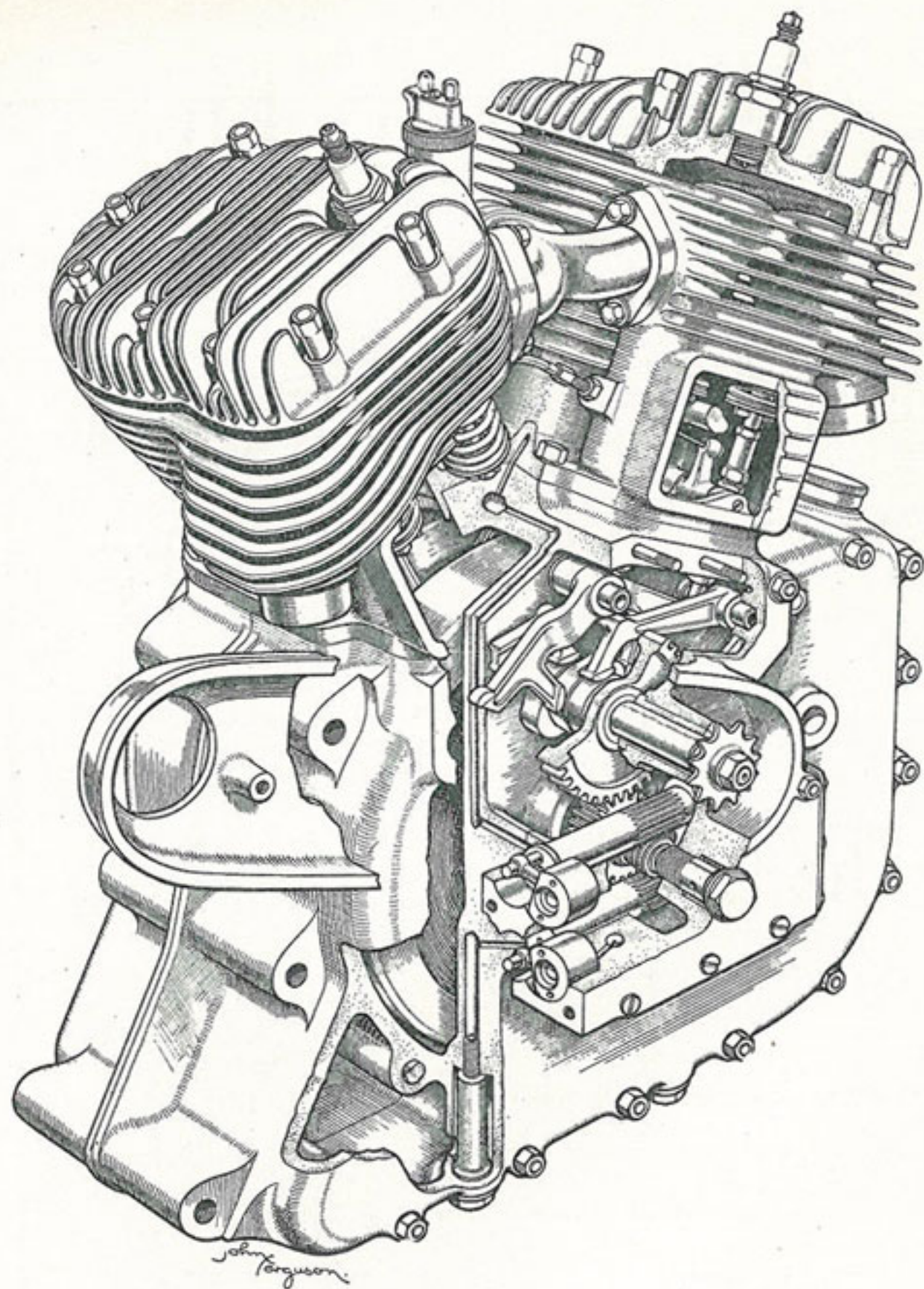
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THE ROYAL ENFIELD 1140 c.c. TWIN ENGINE.

HINTS AND TIPS FOR 1140 c.c. ROYAL ENFIELD MOTOR CYCLES.

Models K and KX.

- 1 **Foreword.** The Royal Enfield "big twin" machine is generally recognised as the last word in luxurious motor cycling. The 1140 c.c. models represent the applied knowledge of many years' experience, and embody every conceivable refinement in design and construction.

The large capacity side-valve engine has an enormous reserve of power, and the machine, despite its massive construction, is a delightful solo mount for the expert rider. In its more usual form as a sidecar machine the wealth of power at low revolutions renders the machine ideal for the novice as well as the experienced rider.

Like all other fine machinery a motor cycle needs a little regular attention to keep it in perfect condition, and the instructions given in this booklet should be carefully followed to ensure long and trouble-free service.

OPERATION OF THE MOTOR CYCLE.

- 2 **To Start the Engine.** Fill up the tank with petrol and the oil tank (in the engine crankcase) with oil. Turn on the petrol and depress the tickler of the carburettor until petrol overflows at the bottom of the carburettor body. Place the gear control in the neutral position, partly close the air lever, slightly retard the ignition, open the throttle lever about one-eighth, raise the exhaust lifter, and smartly depress the kick starter allowing the lifter to drop when about half way

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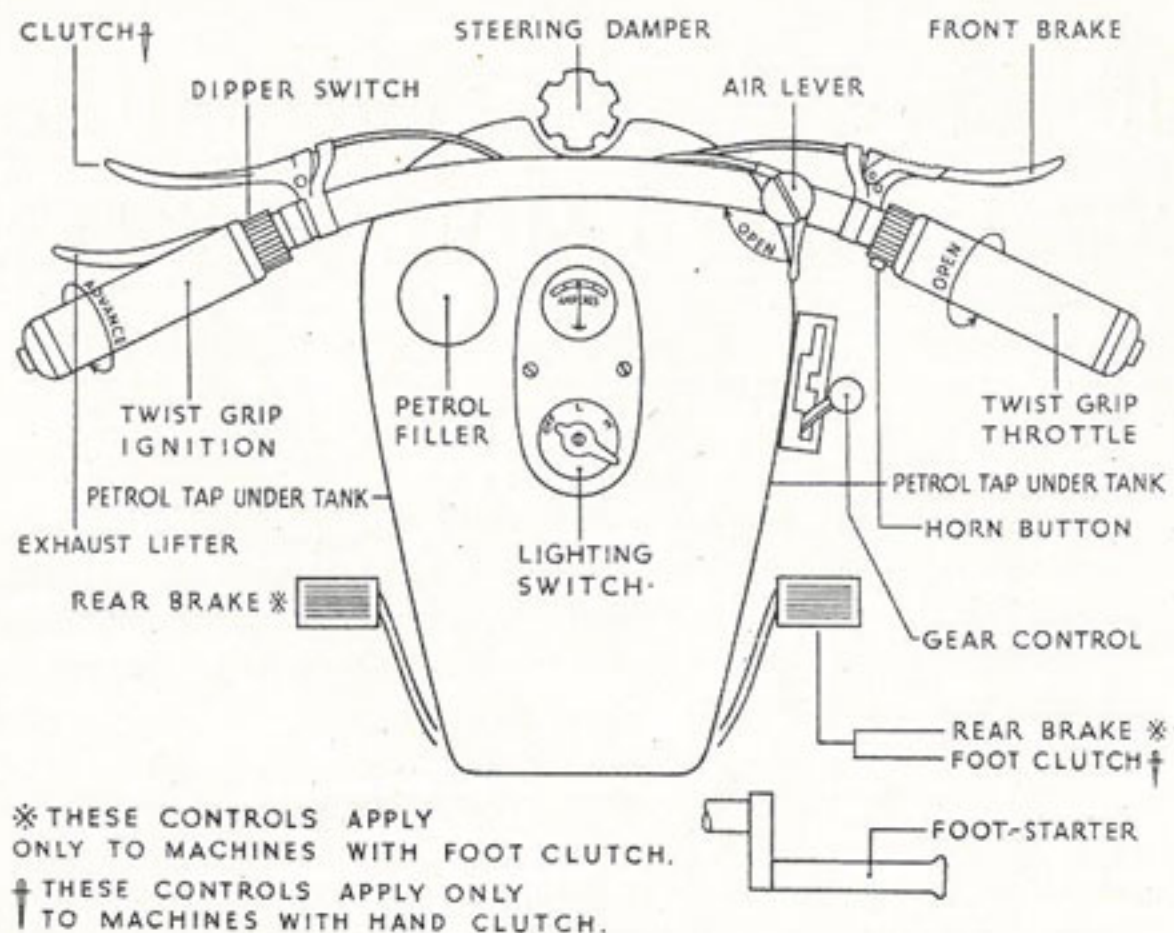


DIAGRAM OF CONTROLS.

through the stroke of the kick starter pedal. 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.

Note that two petrol taps are provided. Normally use the tap on the off side of the machine. About half a gallon of petrol will then be kept in reserve, available by turning on the near-side tap.

In the case of a new machine allow the engine to run gently until oil can be seen returning through the oil return pipe, visible through the oil filler hole. Never race a cold engine,

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especially in cold weather, until you are sure that the oil is circulating properly.

3 To Start the Machine. Declutch by operating the clutch control to its fullest extent and engage the lowest gear by pulling the lever smartly back into the low gear position. Slowly release the clutch control, 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, partly close the throttle, de-clutch and change to second gear by moving the lever forwards into the second position. 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, when the foregoing operations are repeated. Finally, change up to top gear when sufficient speed has been attained in third. Once top gear is engaged and the machine is running at a comfortable speed, the air lever should be fully opened and the ignition fully advanced.

4 Driving Hints. 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. After this period short bursts of speed may safely be indulged in, but no sustained full throttle work should be done until 1,000 to 1,500 miles have been covered.

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

As a guide to the correct positions for the magneto and air control levers the beat of the engine should be studied. If the engine is "eight-stroking," i.e., firing on only every alternate firing stroke, the mixture is too rich and the air lever should be opened further. If the engine cuts out on opening the throttle the mixture is too weak and the air lever should be closed further.

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If the engine "pinks" (*i.e.*, a sharp metallic knock), the ignition is too far advanced or the mixture is on the weak side.

Never allow the engine to labour on a hill. If the machine will not climb comfortably on top gear, change down by de-clutching and moving the gear control into the next lower position, leaving the throttle lever open during the change. When in the lower gear the magneto 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 place the gear lever in the neutral position. 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.

LUBRICATION.

- 5 **Lubrication of the Engine.** (See Diagram on page 7, and illustration on page 2.) The lubrication system employed on this engine is of the true dry-sump type, *i.e.*, the oil in the "sump" or portion of the crankcase beneath the flywheels is kept at a level below the bottom of the wheels so that these do not dip. The oiling system requires no regulation, oil being fed automatically to the big end, front cylinder and timing gear in large quantities, the surplus being returned to the oil tank.

The main supply of oil is carried in an oil tank A formed in the crankcase casting. (Note that this is not the sump, nor is oil carried in the sump which is kept dry.) This tank has a capacity of over seven pints and should always be kept well filled.

The oil is sucked by the two feed pumps B and C (at the rear end of the timing cover) through a filter D. Pump B delivers oil to the big end from which it is splashed over the

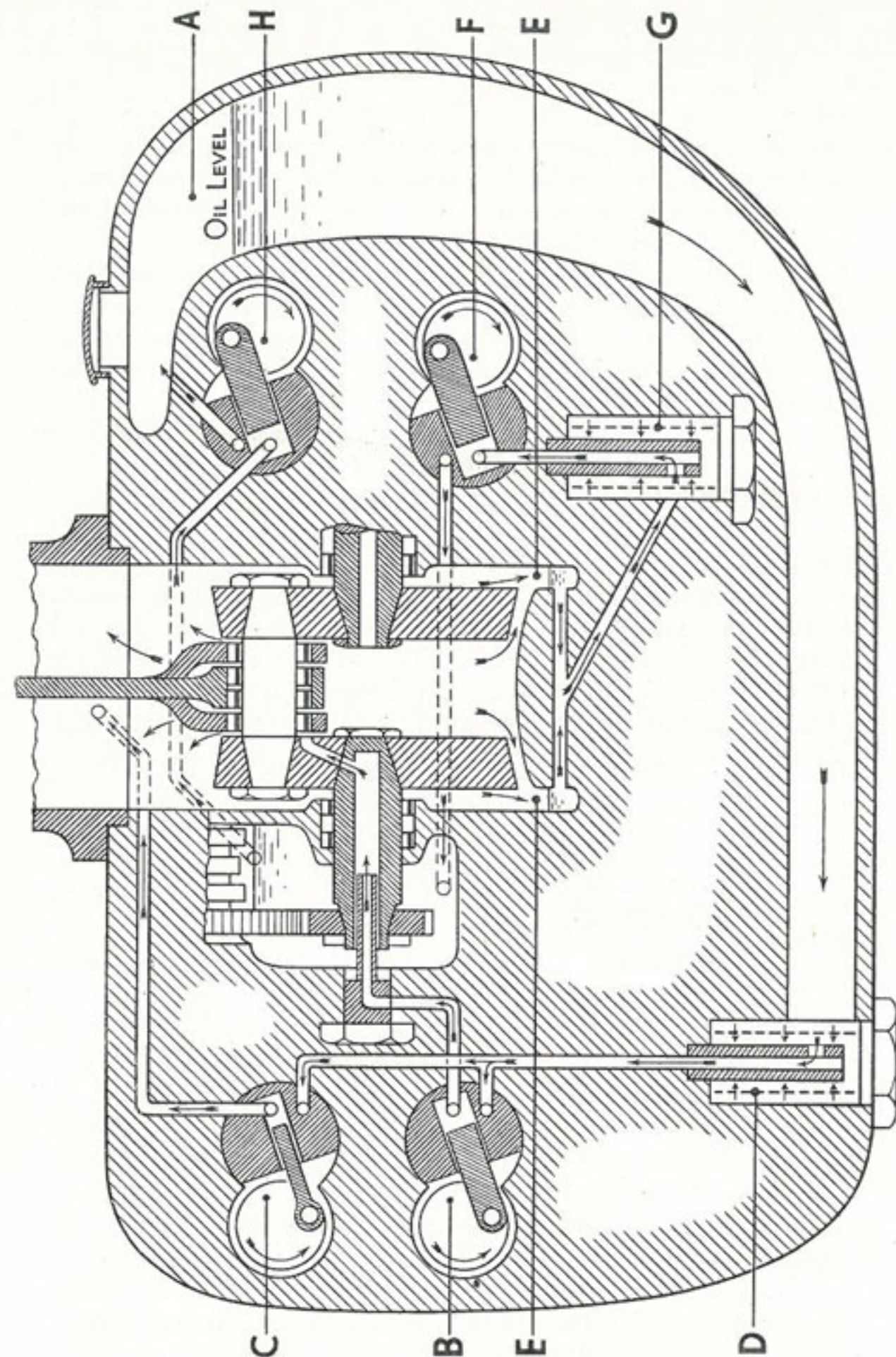


DIAGRAM OF LUBRICATION SYSTEM.

cylinders and pistons and is led by special channels to the main bearings. Pump C (which is smaller than B) provides an additional supply of oil to the front cylinder, which would otherwise receive less than the rear one. Surplus oil collects in the sumps E, E, at the bottom of the case, from which it is drawn by the first return pump F (which has a capacity greater than B and C together) through a second filter G, and is delivered to the timing case. The second return pump H (equal in size to F) draws the oil from a point at a high level in the timing case and returns it to the main oil tank A.

6 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 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.

We recommend the following oils for use in our engines :

Patent Castrol (XL),

Mobiloil (D),

Aeroshell,

Essolube (Racer),

Price's Motorine (B. de Luxe).

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 use of 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.

About every 1,500 to 2,000 miles the oil should be drained from the tank and the sump by removing the two filter plugs. (Note that the rear plug drains the tank, the front one the sump.) The filter gauzes should be brushed with paraffin to clean them and the tank and sump swilled through with petrol, allowed to drain, and refilled with fresh oil. This procedure is conveniently carried out when the engine is being decarbonised. The oil will flow more readily if the plugs are removed at the conclusion of a ride, or the tank and sump may be allowed to drain overnight. Waste of oil is reduced by allowing the oil level in the tank to become reasonably low before draining.

7 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.

8 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.

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

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

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

TROUBLE ON THE ROAD.

- 10 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.
- 11 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 in the pipe.
- 12 Engine Misfires or Stops owing to Faulty Ignition.** The symptoms in this case are that the engine will not run at low speeds and is very hard to start. In other cases the engine may suddenly "cut out" without any warning. First see that neither high tension lead has become disconnected nor worn or burnt through, allowing the bare wire to touch some metal part of the machine. See also that the plug insulators and high tension leads are not wet.

If all the above is in order, remove a 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 repeat with the other plug. If this also is satisfactory 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.

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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 a type designed to stand more heat (see paragraph 29). The gap between the plug points should be approximately .018in.

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 just 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 at the end of the high tension lead and clean the slip ring with rag pushed down with a piece of wood.

- 13 Other Causes of Engine Stoppage.** Other possible causes of an engine stoppage are :—
- (1) **Water in Carburettor.** The symptoms are usually intermittent misfiring and banging in the silencer following a heavy rain storm.
The remedy is to clean out the float chamber and jets.
 - (2) **No clearance at tappets.** This is evidenced by an entire lack of compression when turning over with the foot 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, or by neglect of the tappet clearances (see paragraph 21), or by running on too weak a mixture. The symptoms are that

the engine "cuts out" suddenly on one cylinder, one valve in which has no tappet clearance. Furthermore it is not possible to obtain any clearance at this tappet.

(5) **Seized Piston.** This is caused by overdriving a new machine before the engine is properly "run in." The symptoms are loss of power and a tendency to "pink," followed by the engine locking up solid. An aluminium piston will always free itself if allowed to cool. If the clutch was withdrawn and the throttle closed before the final seize up, 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.

14 **Clutch Trouble.** A slipping clutch may be caused by lack of clearance in the control (see paragraph 33), or by insufficient spring pressure.

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

OVERHAULING THE ENGINE.

15 **Decarbonising.** When an engine has been in use for some time, carbon deposit forms on the pistons and cylinder heads 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 1,000 to 1,500 miles, and subsequently at intervals of 2,000 to 3,000 miles.

16 **Removal of Cylinders.** First remove the petrol tank. The wires to the lighting panel need not be disturbed as the

whole panel will slide through the slot in the tank after removal of the two screws securing it and also the switch lever. (Disconnect one of the battery wires to prevent short circuits.)

Next take off the detachable heads by unscrewing the nuts which secure them to the barrels and lifting the heads clear of the studs. Now remove the silencer and exhaust pipes. Detach the induction pipe complete with the carburettor. Unscrew the four nuts at the bases of the cylinders and, with the piston at the bottom of the stroke, lift each cylinder until it clears the piston top. The front cylinder presents no problems, but to remove the rear one the three back cylinder head studs should be unscrewed. The pistons can be removed from the connecting rods by pushing out the gudgeon pins, after removal of the wire retaining clips. Mark each piston on the inside to ensure re-assembling them the same way round and in the same cylinders.

17 **Removal of Valves.** Having removed the cylinders and pistons, the next stage is to take out the valves. Place the cylinder upside down on the bench, and depress the spring with a large screw-driver until the cotter can be removed. Release the spring, which can then be removed and the valve withdrawn.

18 **Removal of Carbon and Grinding-in of Valves.** If desired, the engine can be decarbonised by removing the cylinder heads with all other parts in position. This is a great convenience when time is pressing, but care must be taken that no carbon is allowed to get between the cylinder and piston walls. It is not recommended that the valves should be ground-in when the cylinder is in position on the machine, and for this reason it is suggested that the first and at least every alternate decarbonisation should be carried out by removal of the cylinders as described in paragraph 16.

To remove the carbon deposit, scrape the piston top, cylinder head, ports and valves with a suitable scraper, followed by a rub with smooth emery cloth and polish the piston top with metal polish. Smear the valve seat with a little grinding com-

pound or fine emery and oil. Replace the valve in position, and rotate it with a screw-driver, frequently lifting the valve off its seat, until a bright ring is obtained on the face of the valve, and also on the seating.

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

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

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

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

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

- 21 Clearance of Valve Stems.** The valve stems should just clear the tappets when the valves are closed. As a guide to the correct clearances allow the following when the engine is cold :—

Inlet002in.
Exhaust004in.

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

To adjust the clearances, proceed as follows :—

Remove the tappet cover from the side of the cylinder and hold the tappet by means of the locknut (middle hexagon) and the head (top hexagon). Unlock the head by turning it to the right and the locknut to the left. Now hold the tappet body (bottom hexagon) and turn the tappet head and locknut to the right or left to lengthen or shorten the tappet as required. Lock up the lock-nut against the tappet head and replace the valve spring cover. As the exhaust lifter prevents a spanner from reaching the exhaust tappet head, in this case the second spanner should be fitted on to the tappet body (bottom hexagon) when tightening or loosening the locknut. Make the adjustment by turning the tappet body to left or right respectively to lengthen or shorten the tappet.

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

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

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

- 22 Engine Bearings.** Roller bearings are fitted to the big end and main shafts of all Royal Enfield 1140 c.c. engines. These allow the engine to revolve more freely than plain bearings and have better wearing qualities than either plain or ball bearings. A small amount of end play should be present in these bearings and some "shake" may be present in the connecting rods.

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 rods back to the works

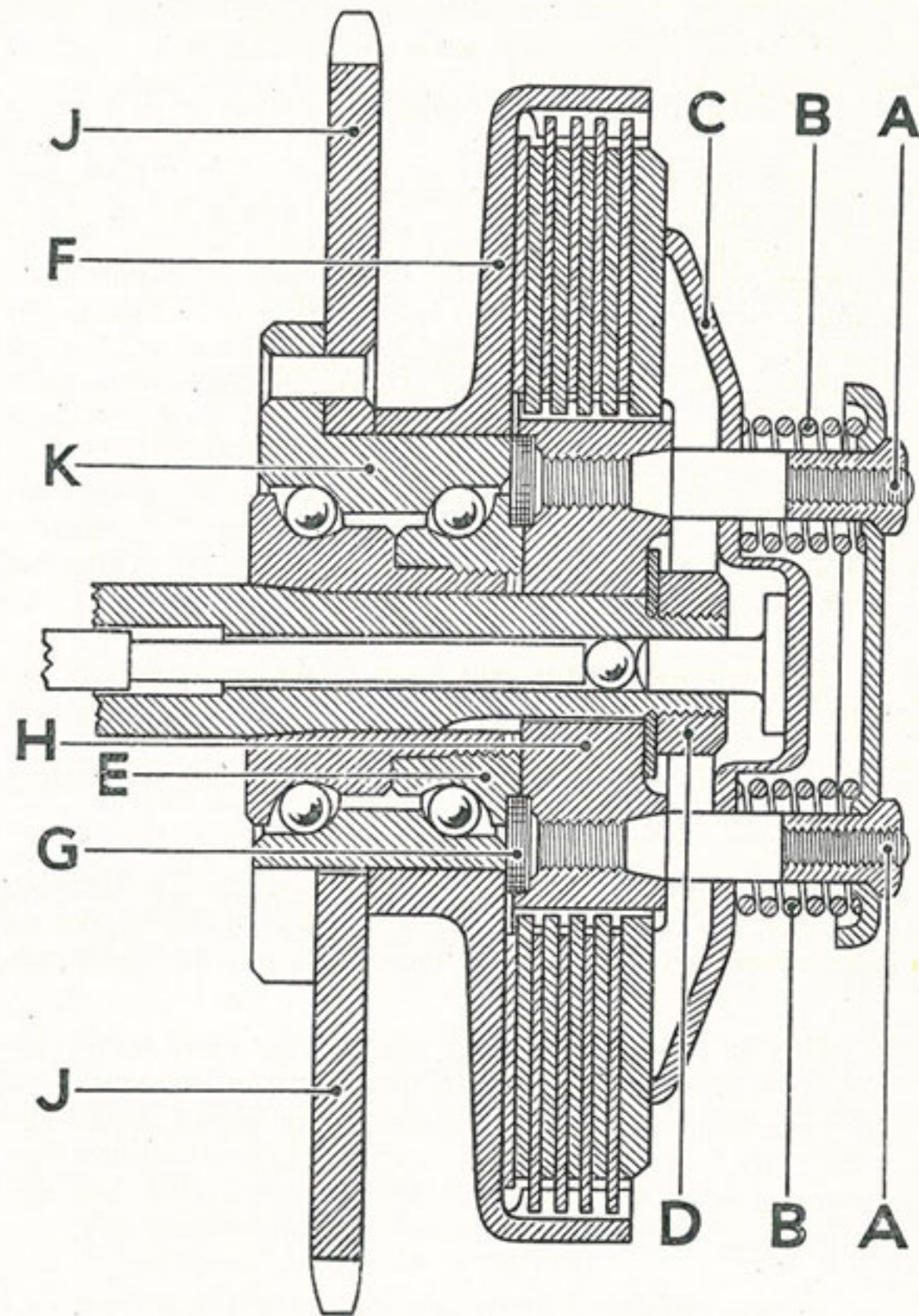


DIAGRAM OF FOOT-OPERATED CLUTCH.

for the worn parts to be replaced, as special appliances are necessary to ensure the correct assembly of these parts.

The camshaft bearings are phosphor bronze bushes. In the event of these requiring renewal it is also best to return the crankcase to the works.

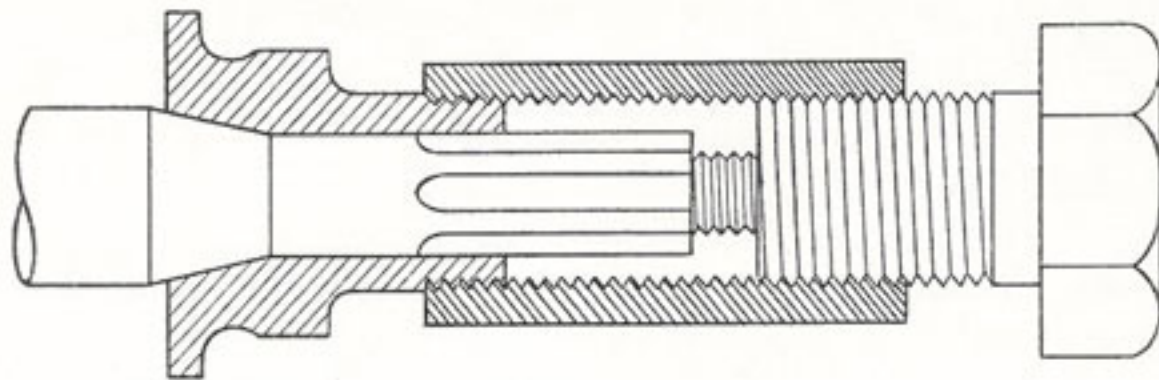
The gudgeon pins are fully floating and of large diameter. When the engine is cold, they should be a free working fit in the small end bushes and a push fit in the piston bosses.

- 23 **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.

When removing the engine, the first procedure is to take off the primary chain case as follows:—

Machines with Foot-operated Clutch. See illustration on page 16. Remove the domed cover over the clutch and unscrew the six nuts A, removing the springs B, pressure plate C and the friction plates. Next unscrew the nut D and pull the centre E off its splines. The clutch drum F can now be drawn off its splines, after which the front half of the chain case can be withdrawn, after removing the footrest and disconnecting the brake rod so as to allow the brake pedal to drop. Next remove the felt washer G and the outer clutch race cone H, catching the balls as they fall out. The clutch sprocket J and centre K can now be removed, together with the chain and engine sprocket, catching the second row of balls as they fall out. To remove the inner clutch race cone L a simple extractor is necessary, consisting of a piece of stout tubing about 2½ in. long threaded internally to suit the thread on the inner cone (1 in. diameter, 26 threads R.H.) together with a bolt having the same thread. (See illustration on page 18.)

Having withdrawn the cone, the rear half of the chain case can be removed, after undoing the three bolts which attach it to the frame and engine.



Machines with Hand-operated Clutch. In the case of machines fitted with a normal type hand-operated cork clutch running in oil, the procedure is much simpler. First remove the footrest and front half of the chain cover. Then unscrew the three pins near the centre of the clutch and remove the clutch springs, pressure plate and friction plates. Remove the large circlip round the splines of the clutch centre and lift off the clutch sprocket after removal of the chain and engine sprocket. The clutch centre can now be withdrawn, following which the rear half of the chain case can be removed after unscrewing the three bolts which attach it to the frame and engine.

NOTE.—Some machines are fitted with a hand-operated clutch similar to the foot-operated one illustrated on page 16. In this case the instructions for removing the foot-operated clutch will apply.

Having removed the primary chain case, take off the magneto chain cover, the magneto chain and sprockets, also remove the magdyno complete with its platform. Now take off the near-side engine plate and remove the gearbox completely. Next take away the off-side engine plate, when it is possible, after removal of the main front engine bolt, to lift the complete engine out of the frame. The clearance between the engine and the frame is, however, very small, and the engine can only be lifted out in one position. For this reason, and also because the engine is

very heavy, we recommend the removal of the cylinders and pistons before attempting to lift the engine out.

24 Dismantling the Crankcase. After removal of the engine from the frame, take off the cylinders and pistons if not already done. Remove all the nuts and screws securing the timing cover. Lift away the latter and pull out the cam wheel and rockers. It is now necessary to remove the small timing pinion and the engine sprocket. Insert a $\frac{3}{8}$ in. rod through the hole in the cam wheel bush. This will engage against the crank pin boss and prevent the flywheels from turning. Remove the timing pinion nut. The pinion can now be drawn off the taper shaft, preferably using an extractor. 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.

25 Re-assembly of Crankcase. Valve Timing. No difficulty should be experienced with this. The timing gears are marked to ensure their correct engagement, but if it is desired to check the valve timing the correct setting is :

Inlet opens	20 degs. before top dead centre.
Inlet closes	60 degs. after bottom dead centre.
Exhaust opens	65 degs. before bottom dead centre.
Exhaust closes	38 degs. after top dead centre.

These points are given for .005in. tappet clearance. For running set to the clearances given in paragraph 21.

The joint between the halves of the crankcase should be made with shellac, seccotine or a similar jointing. The timing cover joint and magneto chain cover joint **must** be made with

the special washer between the faces. Take care to have all parts scrupulously clean and put some clean oil on all bearings and on the cams.

- 26 **Magneto Timing.** To time the magneto, turn the engine until the back 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. With the engine in this position and the magneto lever fully advanced, turn the contact breaker in the direction in which it normally runs until the points are just beginning to break on the correct cam. The cam corresponding to the rear cylinder is the one followed by the longer distance between the two cams. On removing the brush holders a brass segment of the slip ring will be seen through one hole and a fibre segment through the other. The lead to the rear cylinder should correspond with the brass segment. Lock up the magneto sprocket on to its taper with the armature in this position and the magneto will be correctly timed.

The position of the piston can readily be measured when the cylinder head is removed. If, however, the head is in place, the position of the piston can be gauged by removing the small screwed plug from the centre of the head and using a piece of wire inserted through the hole. The opening of the contact points can conveniently be gauged by using thin tissue paper between the points.

- 27 **Lighting Set.** The battery on a new machine is sent out dry and uncharged. Before use it must be filled with sulphuric acid of density 1.285 and charged for 32 hours at a rate of 0.8 amps. When once charged the dynamo of 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.

These machines are fitted with an automatic voltage 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 acid level in the battery should be maintained at $\frac{1}{4}$ in. above the plates by the addition of distilled water at regular intervals.

The following are the correct bulbs for use in the head, tail and sidecar lamps.

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

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

When the lighting switch is in the "high" position the ring switch on the left handlebar can be used to dip the light.

The various wires or leads in the system should be examined occasionally to make sure they have not become disconnected or chafed. The two battery leads and the leads from the voltage regulator to the dynamo and to "earth" are particularly important. If the dynamo should cease charging (as shown by a steady discharge of 4-5 amps. with the lights on and the engine running fairly fast) the trouble 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 combined lighting and ignition set is fully described in a booklet issued by the manufacturers, a copy of which we will forward on request.

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

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

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

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

The following is the correct carburettor setting :—

Main jet 140. Needle in No. 3 groove.

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

29 Sparking Plugs. The following are the types of plugs best suited to this machine :—

(a) For running-in and ordinary touring—
Lodge TS3 or KLG 777.

(b) For prolonged high speed running—
Lodge H1, or KLG S1.

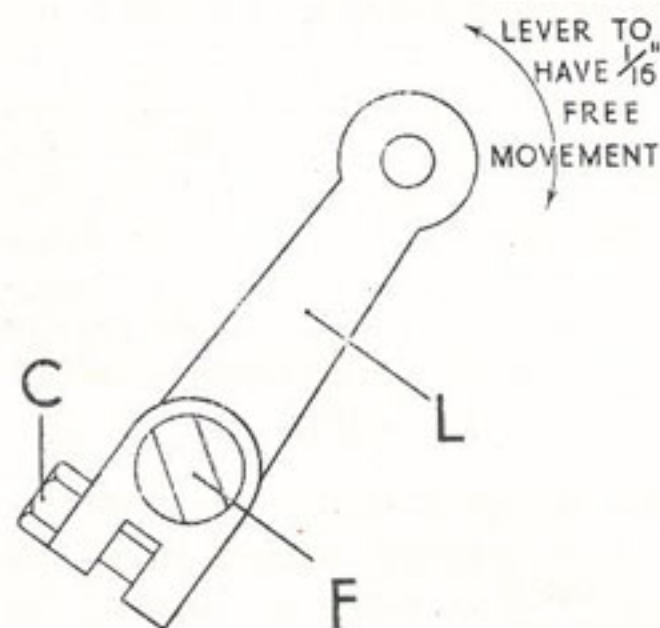
TRANSMISSION.

30 Enfield Four-Speed Gear. This gear box is very simple in operation and provided it is kept well lubricated and the control is correctly adjusted, 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 nor how much the gear is out of adjustment.

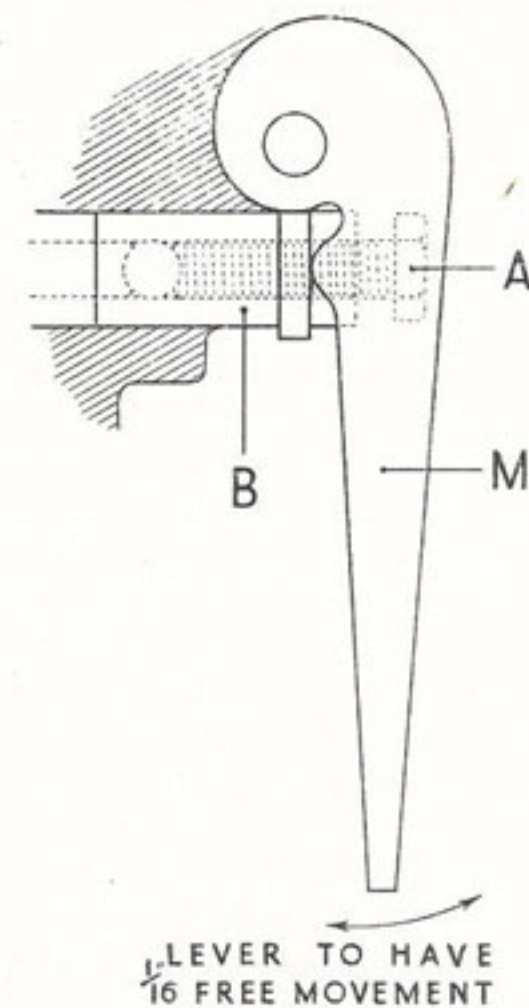
31 Gear Adjustment. To adjust the gear rod proceed as follows : Place the machine on its stand, engage second or third

gear and adjust the rod by means of the two nuts one on either side of the lever on the gear box. The correct adjustment is obtained when the control lever lies centrally in its notch in the quadrant. Lock up the two nuts and check the adjustment in all gears.

32 Clutch. The type of clutch used with the foot control is illustrated on page 16. This has fabric friction plates of large area, which provide a long-wearing clutch capable of withstanding an unlimited amount of intentional slipping. Owing to the enormous torque developed by this engine this type of clutch necessitates strong springs, and is rather heavy to lift by hand.



QUICK THREAD TYPE OF LEVER.



DIRECT TYPE OF LEVER.

For hand control, therefore, a clutch of normal construction with cork inserts is used running in oil. This needs less spring pressure and is easily operated by hand. It is, however, not recommended for regular heavy sidecar work in dense traffic where constant slipping is necessary. For this purpose the foot control clutch is ideal.

33 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 gearbox (see illustrations above). If this is not present, part of the spring pressure will be taken by the clutch control instead of by the friction surfaces, clutch slip will result and the clutch may be ruined. Excessive clearance will cause the clutch to drag.

To adjust the quick thread type of lever (fitted to foot control clutches and some with hand control) loosen the screw C. Hold the flats F with a spanner and turn them to the right until the clearance between the worm and the clutch push rod is just taken up. Then turn the lever L until there is a small amount of slack in the clutch control, and lock up the screw C.

To adjust the direct type of lever (fitted to some hand control clutches) first disconnect the control lever M from the cable and hinge it back to expose the adjusting screw A and 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. There is no lock nut, 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 hundred miles with a new machine. This point should therefore be examined soon after delivery and adjustment made if necessary.

- 34 **Patent Cush Drive Rear Hub.** All Royal Enfield motor cycles are fitted with a patent cush drive rear hub, which takes up the drive from the countershaft to the rear wheel with great flexibility and smoothness. This hub has a marked effect on the running of the machine, absorbing all engine shocks, and preventing any snatching of the driving chain, and consequently minimising the wear on the rear tyre. The drum on the driving side of the rear hub is provided with three metal vanes, and the inside of the driving sprocket has three similar vanes. On each side of the vanes in the hub is placed a 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 hub drive 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.

In the case of Model KX, which has detachable and interchangeable wheels, the rear brake drum occupies the position usually taken by the cush drive, which is placed between the back of the brake drum and the hub. (See illustration on page 27.) To dismantle the cush drive, first remove the detachable portion of the wheel (see paragraph 37). Then loosen the nut A, disconnect the chain, brake rod and anchor strap. Slide the brake, sprocket and cush drive assembly out of the fork end. Now remove the nut B and lift off the brake cover plate. Unscrew the three nuts C, knock out the shouldered pins D and lift the brake drum E off the cush drive centre F.

- 35 **Adjustment of Chains.** The front chain is adjusted by pivoting the gear box about the lower of the two bolts holding it to the rear engine plates, after first 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.

The magneto chain is adjusted by tilting the magneto base plate after loosening the two bolts securing it to the engine plates.

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

After adjusting the rear chain, the rear brake operating rod may also require adjustment, as may the gear control rod after adjusting the primary chain. 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 is behind the direction in which the chain travels.

MISCELLANEOUS.

- 36 **Detachable Rear Mudguard.** To facilitate tyre repairs, and the removal of the rear wheel, the rear mudguard of these machines is made quickly detachable, it being only necessary to slacken the four nuts securing the mudguard stays to the frame when the guard and carrier can be lifted away.

It is not always appreciated that this feature allows most punctures to 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 detach the mudguard, leave the wheel in position, remove one side of the outer cover and expose sufficient of the tube to enable the puncture to be repaired.

37 Removal of Wheels.

Model K—Rear Wheel. Place the machine on the rear stand and having taken off the detachable rear mudguard, remove the pin securing 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 end.

Model K—Front Wheel. Place the machine on both stands (never use the front stand only), disconnect the brake control, loosen the spindle nuts, spring the forks slightly open, and the wheel will drop out.

Model KX—Either Wheel. Place the machine on the stand(s), unscrew the three pins G and the nut H (see illustration below).

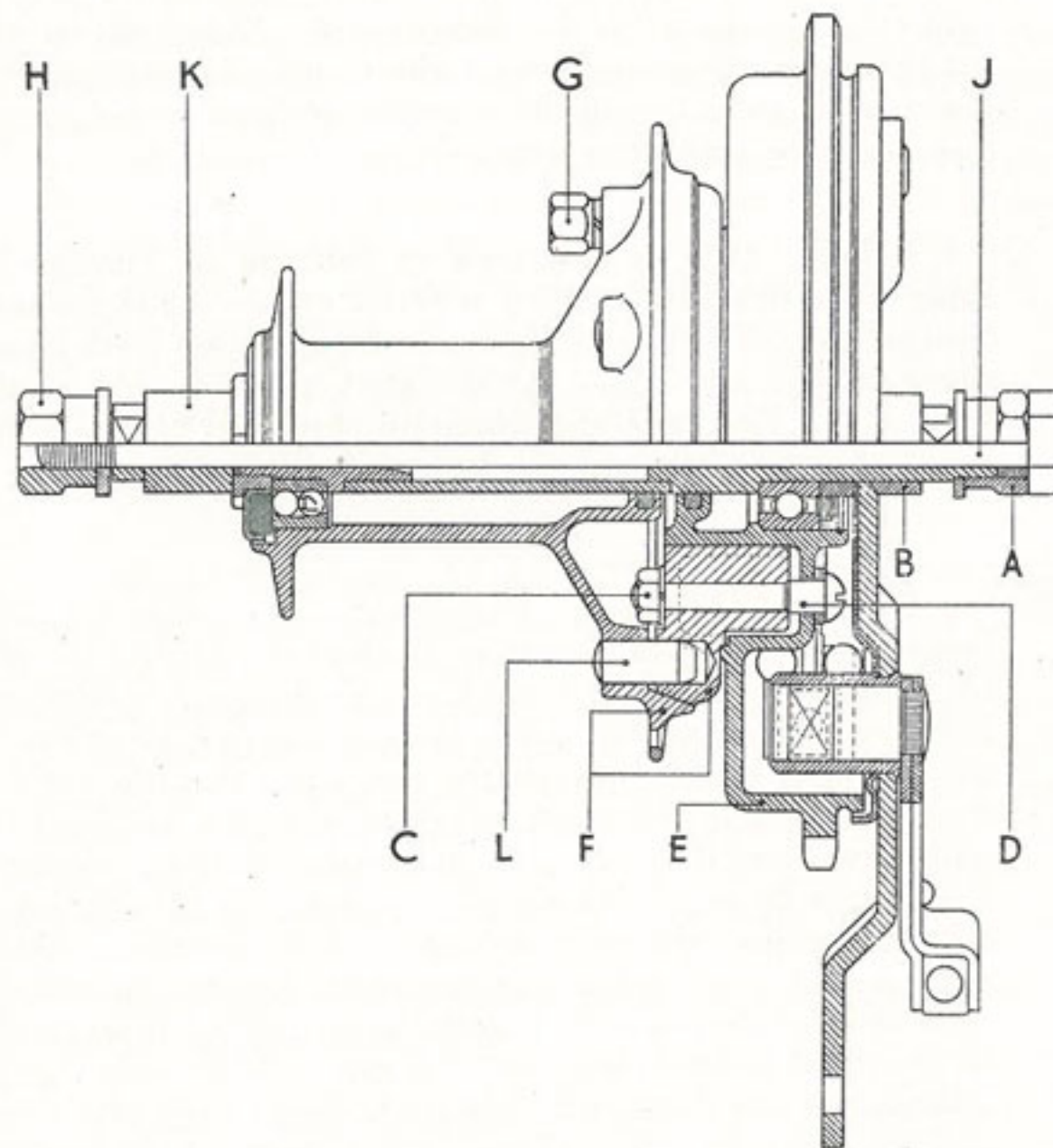


DIAGRAM OF HUB FOR DETACHABLE WHEEL.

Knock out the spindle J and slide the distance piece K out of the fork end. Now pull the wheel over to the side of the machine until the three pegs L are disengaged from the recesses in the cush drive centre F. The wheel can now be removed, leaving the brake in position (also the cush drive and driving sprocket in the case of the rear wheel).

When replacing the wheel, push the spindle J nearly into position so as to steady the wheel before engaging the pegs C with their recesses. Fit the distance piece K and tighten the nut H **before** tightening the three pins G and take care to tighten these evenly so as to pull the wheel squarely on to the conical seating of the cush drive centre F.

NOTE.—If it is required to remove or change an inner tube this can be done without removing the wheel. Simply unscrew the nut H, knock the spindle J back about three inches and slide the distance piece K out of the fork end. The tube can then be threaded through the space thus left between the hub and the fork end.

- 38 **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.

- 39 **Inflation Pressures for Tyres.** The recommended tyre pressures are as follows :—

Solo ... Front 16lbs. Rear 18lbs.

Single-seater

Sidecar ... Front 16lbs. Rear 22lbs. Sidecar 16lbs.

Two-seater

Sidecar ... Front 16lbs. Rear 24lbs. Sidecar 16lbs.

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

- 41 **Wheel Bearings.** Model K has taper roller bearings which are correctly adjusted at the Works, and should never require attention. If, however, the adjustment should accidentally be disturbed they can be readjusted by loosening the locknut inside the near-side fork end and turning the adjusting nut. This type of bearing must have a little play, and it should just be possible to feel a trace of side movement at the rim. The best procedure is to remove the wheel and adjust the bearings so that the spindle can be turned freely with the fingers.

Model KX is fitted with non-adjustable journal ball races which never require attention.

- 42 **Front Forks.** Side play in the front fork links is taken up as follows :—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.

The lower rear shackle pin is slightly offset in relation to the steering stem. For sidecar use this offset should be to the front of the steering stem. If it is required to convert from sidecar to solo steering the bottom fork links should be removed and the steering stem turned round so that the offset is to the rear.

43 Shock Absorbers. The shock absorbers on the front forks are provided with finger adjustment. If the springing is too harsh loosen the shock absorbers, if inclined to bounce, tighten them.

44 Steering Damper. A steering damper is fitted to these models. By turning the ebonite knob to the right the steering can be tightened to any desired degree. This will be found advantageous on sidecar machines or on solo machines at high speeds. When riding solo, the damper should not be tightened down too far at low speeds.

45 Cleaning. The black enamelled portions of the machine and coach-painted sidecars 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.

Fabric-covered sidecars should be washed with soap and luke-warm water, or if very soiled should first be washed with clean paraffin.

Sidecar upholstery and windscreen aprons should be wiped over with a damp cloth and polished with furniture cream, which is also excellent for polishing the black enamelled parts and coach-painted sidecar bodies. Certain brands of metal polish, notably "Brasso," are excellent for cleaning the celluloid windscreen.

46 Adjustment of Riding Position. Your comfort on long rides will benefit greatly by attention to details of the riding position.

The tilt and height of the handlebars can be varied, whilst the footrests can be swung round on their hangers. In addition the carburettor, brake, and clutch controls can all be adjusted on the handlebar to suit your individual requirements.

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.