OWNER'S HANDBOOK

FOR

L.E. MODEL 149 c.c.

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F437

OWNER'S HAND INSTRUCTION BOOK

Model LE 149 c.c.

Issued free with each new model.

Additional copies **2/6**

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INTRODUCTION

This book has been compiled to provide the owners of the Velocette machine with the necessary information for its proper care and maintenance and for the making of such small adjustments as the majority of owners will wish to carry out themselves. The aim of the designer has been to cut down to the absolute minimum the number of points requiring periodical attention. For this reason it will be found that there are no grease gun points on the machine and no grease gun is needed or provided.

We have tried to present this information in such a way as to be intelligible to a complete novice, and have included many illustrations so as to make the instructions as clear as possible. At the same time we realize that there may be occasions when the owner finds himself in some difficulty. We are always pleased to give such cases our special attention, and to reply as fully as possible to any queries our customers may raise.

Immediate attention to any adjustments that may be required, and regular and adequate lubrication (as described on Pages 17-22) will not only keep the machine in good order but also reduce the upkeep cost to the minimum.

The machine is very carefully tested and adjusted before leaving the Works and the owner will be well advised to avoid interference with the adjustment without good cause. A word of warning may not be out of place, however, against inexperienced persons attempting repair work beyond their capacity.

VELOCE LTD.,

1949.

Useful Information

CAPACITY.

Petrol Tank Capacity, 1¼ gallons (5.7 litres).
Capacity of Cooling System, 2½ pints (1.42 litres).
Engine Sump Capacity, 1¼ pints (.71 litres).
Gearbox Capacity, ¼ pint (.142 litres).
Final Drive Casing Capacity, ¼ pint (.142 litres).
Front Fork Capacity, ⅛ pint per strut (.071 litres).

Engine Number will be found stamped on machined surface of crankcase beneath carburetter.

Frame Number on plate inside tool box lid.

RECOMMENDED OILS.

Engine. Summer.

Viscosity S.A.E.50.

Wakefield Castrol "XXL."
Vacuum Mobiloil B.B.
Essolube "50"
Price's Motorine "C."
Triple Shell.

Winter.

Viscosity S.A.E.30.

Wakefield Castrol "XL."
Vacuum Mobiloil A.
Essolube 30.
Price's Motorine "M."
Double Shell.

Gearbox. Summer and Winter.

Viscosity S.A.E.50.

Wakefield Castrol "XXL."
Vacuum Mobiloil "D."
Essolube "50"
Price's Motorine.
Triple Shell.

RECOMMENDED OILS *Continued.*

Final Drive Casing. Summer and Winter.

Viscosity S.A.E.140.

Wakefield Castrol " D " Gear Oil.
Shell Spirax " C."
Vacuum Mobiloil " C."
Essolube Gear Oil—Heavy.
Price's Motorine Battersea " A."

Front Fork and General Details.

Viscosity S.A.E.30.

Wakefield " XL."
Vacuum Mobiloil "A."
Essolube 30.
Price's Motorine " M."
Double Shell.

For B.T.H. Generator Unit.

Viscosity 10 S.A.E. Oil.

Wakefields	..	Wakefields Oilit.
Prices	..	Motorine U.C.T.
Vacuum	..	Mobil Handy Oil.
Shell	..	Donax A.I.
Essolube	..	Esso Shock Absorber, Light.

Minimum Tyre Pressures.

Front, 17-lb. per square inch (1.2 kilogrammes per square centimetre).

Rear, 24-lb. per square inch (1.7 kilogrammes per square centimetre).

See also page 23.

HOW YOUR VELOCETTE IS CONTROLLED.

Throttle Control. The throttle is controlled by turning the Twist Grip on the right hand end of the handlebar. Movement towards the rider opens the throttle, away from the rider closes the throttle.

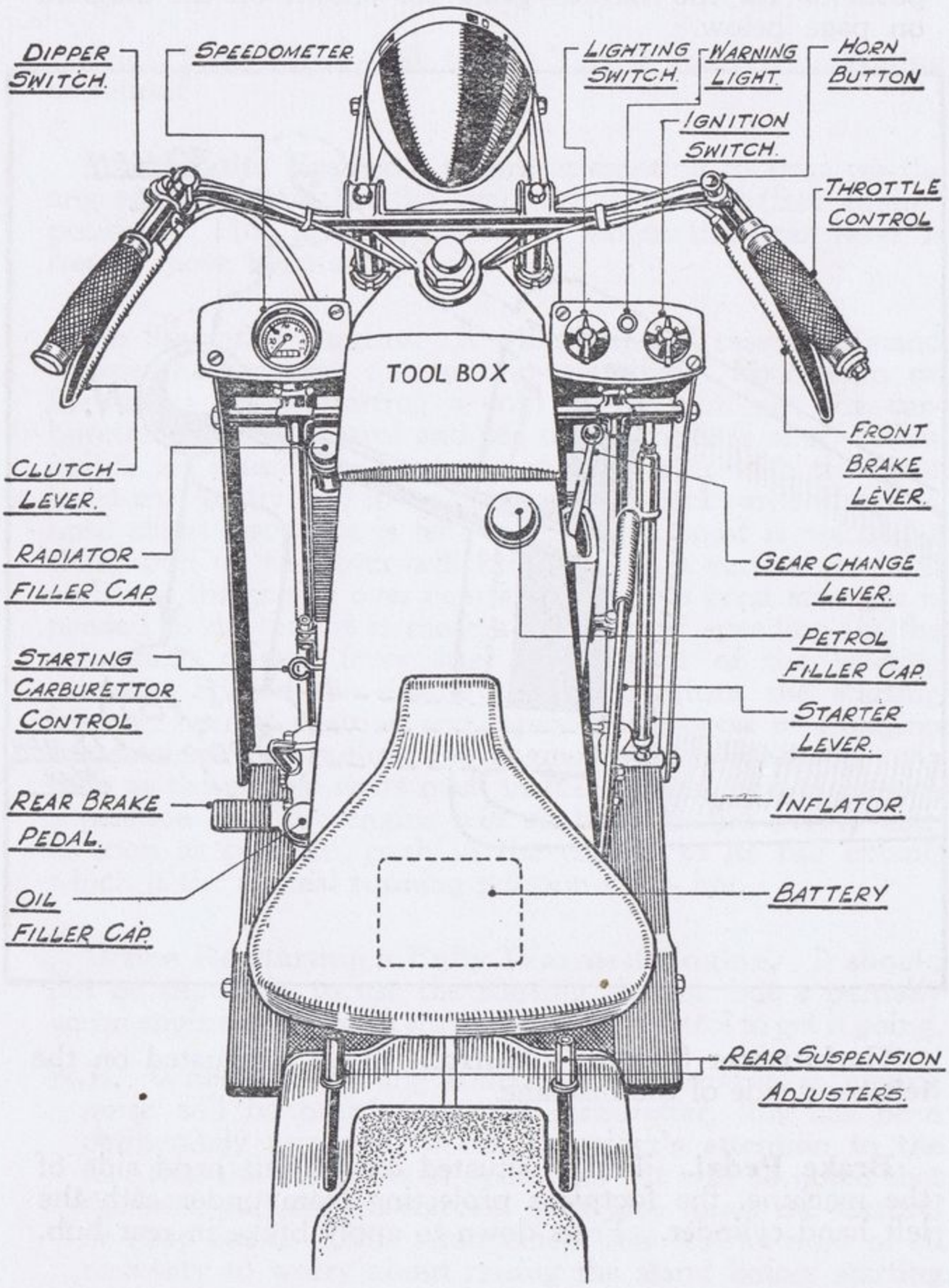
Front Brake Control. The lever on the right hand side of the handlebar when pulled towards the twist grip applies the brake in the front hub.

Horn Button. Adjacent to the front brake lever. Press to sound the horn.

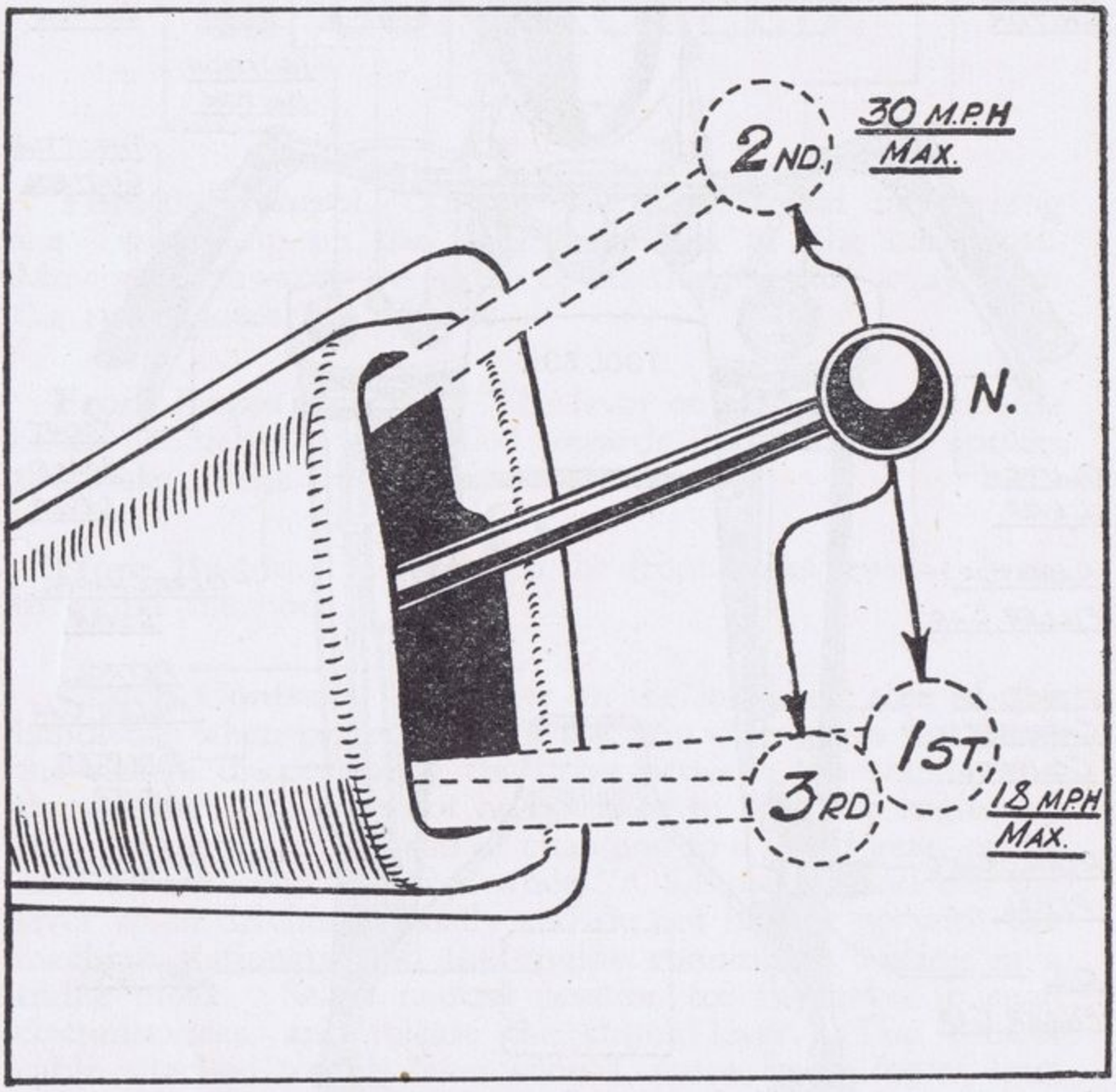
Clutch Control. The lever on the left hand side of the handlebar when pulled towards the grip disengages (or frees) the clutch, disconnecting the drive between the engine and the gearbox. It must not be operated to ease the engine by slipping the clutch instead of changing to a lower gear, or be held up in order to "free wheel." Keep the hand off the lever when driving normally and do not hold it up with the machine stationary and the engine running if waiting in a traffic block. Select neutral position for the gears in such circumstances, and release the clutch lever. The control cable attached to this lever should move freely for at least $\frac{3}{32}$" before the pressure of the clutch springs is felt. If less than $\frac{3}{32}$" movement is present refer to page 27.

Dip Switch. To dip light for oncoming traffic move switch over.

Starting Lever. This is situated on the right hand side of the machine and is the lower of the two levers on this side. The finger type hand grip helps to distinguish it from the other. This lever has a dual function, firstly to start the engine and secondly to raise the prop stand.



Gear Control Lever. This is situated on the right hand side and projects from the side panel of the machine. The positions for the various gears are shown on the diagram on page below.



Carburetter Starting Control. This is situated on the left hand side of the machine.

Brake Pedal. This is situated on the left hand side of the machine, the footpiece projecting from underneath the left hand cylinder. Press down to apply brake in rear hub.

Starting Switch. This is situated on the small panel built into the top of the right hand leg shield.

Speedometer. This is mounted in the small panel built into the top of the left hand leg shield. Registers total mileage run, and indicates speed.

Fuel Tap. Push-pull type. Tap is marked indicating direction.

Starting the Engine. Before attempting to start up the engine make sure that the gears are in neutral (free engine) position. This is the position in which the gear lever is free to move from side to side.

To Start the Engine. It will be found easiest to stand astride the machine during this operation. First, turn on fuel tap. When starting a cold engine pull out the carburetter starting control and see that throttle is shut. Now switch on ignition. Grasp the starting lever with the right hand and gently pull in an upwards and backwards direction until slight resistance is felt. When this point is reached a sharp pull on the lever will bring it into a vertical position and turn the engine over compression. No great strength is needed to do this, it is more a question of speeding up the movement of the lever after engagement of the starting ratchets. Should the engine not start, return the starting lever to normal position and repeat the process of engaging the ratchets and pulling the engine over compression. As soon as the engine starts push in the starting control to such a position that the engine will continue to fire evenly and, as soon as possible, push in the control to its full extant, which is the normal running position when hot.

When Re-starting a Fully Warmed Engine. It should not be necessary to use the starting control, but a partially warm engine may need a small use of the control to get it going.

N.B. When the starting control is in operation a hissing noise will be heard from the carburetter, this has been deliberately arranged to call the rider's attention to the fact that the control is in operation. It will be noted that the first pull on the starting lever also raises the Central or Prop stand. This arrangement relieves the rider of all necessity to worry about raising the stand before starting away. The stand must of course be lowered by foot when necessary.

Engaging First Gear. Pull up the clutch lever to its full extent, move the gear lever in towards the frame (i.e., to the left) and then push it forward into 1st position on diagram, page 6. This engages first gear. If the gear lever cannot be moved forward into 1st position by light pressure this is probably due to the gears being in an unfavourable position for engagement. Do not force the lever but return to 'N' position, release clutch lever momentarily and try again. The object of this procedure is to alter the relative positions of the gears to permit the driving dogs to interlock.

Moving from Rest. Having engaged first gear, release the clutch lever very gradually and at the same time open the throttle slightly when the drive will gradually be taken up and the machine begin to move forward. When this occurs do not be in a hurry to release the clutch lever suddenly, but continue to let it out slowly and at the same time slowly increase the amount of throttle opening. Do not "race" the engine up to high speed before releasing the clutch lever. A small amount of practice will enable any rider to co-ordinate the movement of clutch lever and twist grip to obtain a smooth start. On a level road or under easy conditions speed up to 10-12 m.p.h. and then change to second gear.

Engaging Second Gear. Simultaneously pull up the clutch lever and close the throttle fully. Pull the gear lever lightly backwards into 'N' position, move it sideways to the right and pull lightly back to 2nd position. Open throttle gradually and release the clutch lever fairly quickly. Here again co-ordination of the various movements will ensure a perfectly smooth change. If, when making this change, a light pressure in an outwards direction is maintained on the gear lever at the same time as it is being pulled back it will be found that the lever will slip naturally across the 'N' position or 'gate' and the whole will be done in one continuous movement. On a level road, or under easy conditions, change into 3rd gear (top). at 25 m.p.h. approximately.

Engaging Third (Top) Gear. Simultaneously pull up the clutch lever and close the throttle fully. Push the gear lever lightly forward into 3rd position. Open the throttle gradually and release the clutch lever fairly quickly. The road speeds just quoted are for a fully run-in engine and

are right for all general riding. Special conditions, as when starting on a hill may make it necessary to reach higher road speed, before changing up as, of necessity, some speed is lost as a change is made, and if made too early the machine may be running too slowly for the engine to pull away properly by the time the higher gear is engaged. The normal maximum speeds in the lowest gears are, first gear 18 m.p.h., second gear 30 m.p.h.

To Change to a Lower Gear. In all cases when engaging a lower gear, i.e., Second from Third (top) or First from Second, the movements of the gear lever are a reversal of the movement for changing up, and the clutch is operated in just the same way as before but it will be found necessary only to close the throttle partially to obtain smooth changes.

Stopping the Machine. To stop, close the throttle and apply brakes as required, when the speed is reduced to about 15 m.p.h. pull up the clutch lever, move the gear lever to position N and release clutch lever. If now leaving the machine switch off the ignition switch to stop engine and turn off fuel tap.

Running in a New Machine. A new machine requires driving with restraint until all working parts become thoroughly free or " bedded down," and will not give of its best until this has been done. It is a mistake to drive a new machine hard and give it too much " collar work " to do. Hard pulling on a large throttle opening up-hill must be avoided, and liberal use should be made of the gearbox so as to ease the load on the engine and allow it to run as lightly loaded as possible. During the first 100 miles the speed should be limited to 30 m.p.h. in Third (top gear,) 17 m.p.h. in Second gear, and 10 m.p.h. in First gear. From this mileage onwards these speeds may be gradually increased until at approximately 1,200 miles the machine should be fully run in. It has been found by experience that to run in a new machine at a fixed and regular speed is sometimes very unsatisfactory and the procedure of gradually increasing the speed is better practice.

POINTS TO NOTE.

Do not attempt to start the engine with the throttle too far open. Feel the starter lever ratchets engage before increasing the pull on the starter lever.

Do not omit to push in the starting control as soon as possible after the engine is started.

Do not put undue force on the gear lever.

Do not "hang on" to the higher gears too long when ascending hills.

Use **both** brakes in preference to one only.

Always close fuel tap and see that ignition is switched off when leaving the machine.

Do not neglect essential adjustments, particularly the clutch cable adjustment.

Difficulty in Starting. May be due to any one or more of the following :—

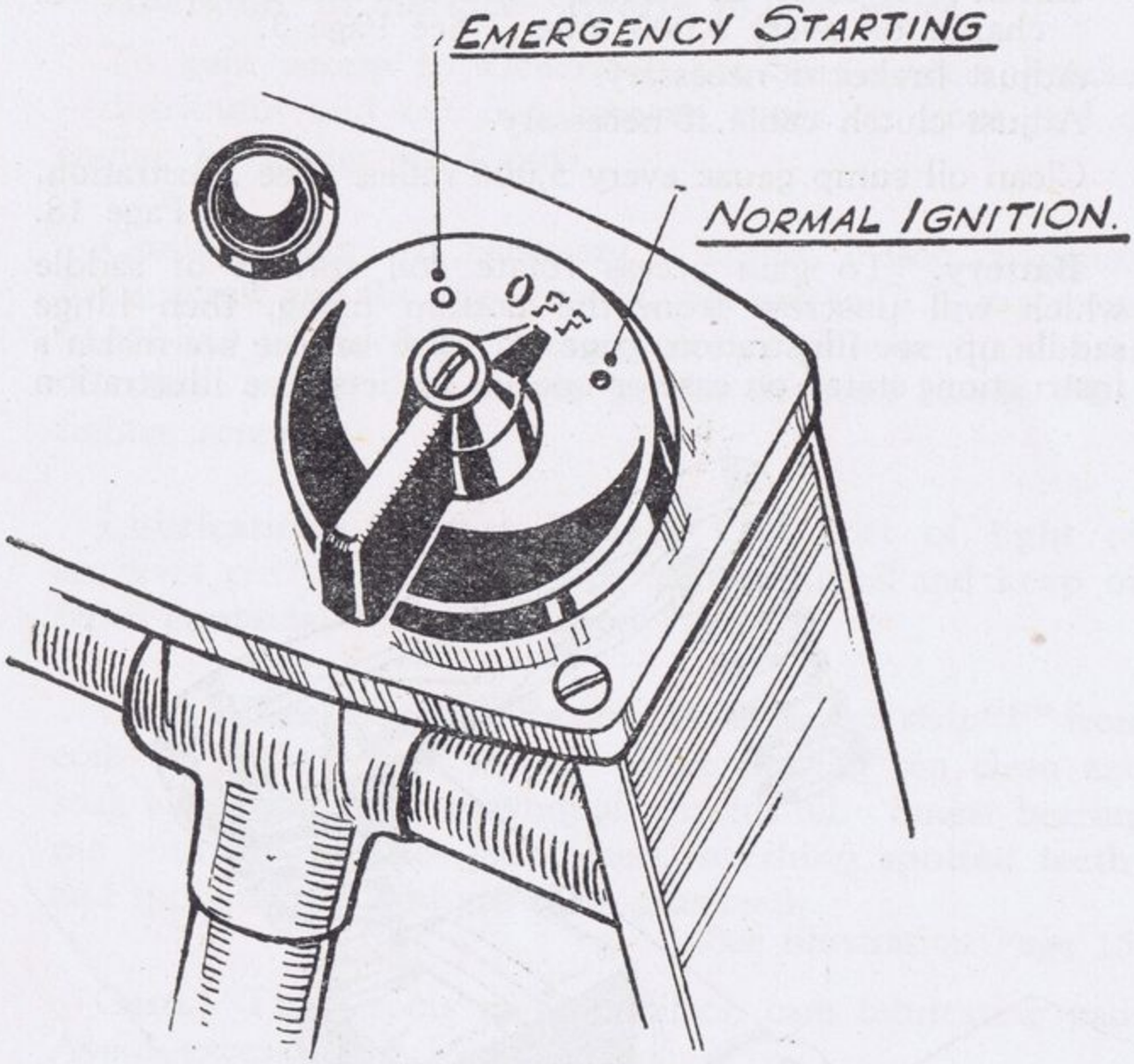
Ignition not switched on.
Dirty sparking plugs.
Fuel tap not turned on.
Choked fuel filter.
Throttle open too far.
Plug points too far apart.
Fuel tank empty.

Emergency Starting. Should the ignition be left in the "on" position overnight, current will, of course, be drained from the battery. This, however, does not mean that it will be impossible to start the engine subsequently.

In these circumstances, all that need be done to obtain an immediate start is to turn the switch to the left with the pointer directed towards the position indicated in the illustration. Engage low gear, hold up clutch lever and push the machine forward at walking speed then let clutch in when the engine will fire immediately., Keep the throttle open slightly in order that the revolutions may be a little faster than idling speed in order that the dynamo may generate sufficient current to keep the engine running. Having got on the move, **turn the switch to the right towards the position indicated on the illustration to recommence battery charging.**

See opposite page

The lights will not function with the switch in the emergency starting position. The machine can be run satisfactorily without a battery in the daytime.



USEFUL HINTS.

The following hints may be found useful when the machine is in regular use, assuming a daily run of about 100 miles.

Daily or Every Hundred Miles (160 kilometres).

Fill up fuel tank, fill up radiator to normal level, check oil level in crankcase with dip rod.

Weekly or Every Six Hundred Miles (960 kilometres).

Test tyre pressures. See Page 3.

Every 1,500 Miles (2,400 kilometres).

Drain engine oil sump and replenish with fresh oil using one of the correct grade of one of the brands recommended. See Page 2.

Monthly or Every 2,500 Miles ((4,000 kilometres).

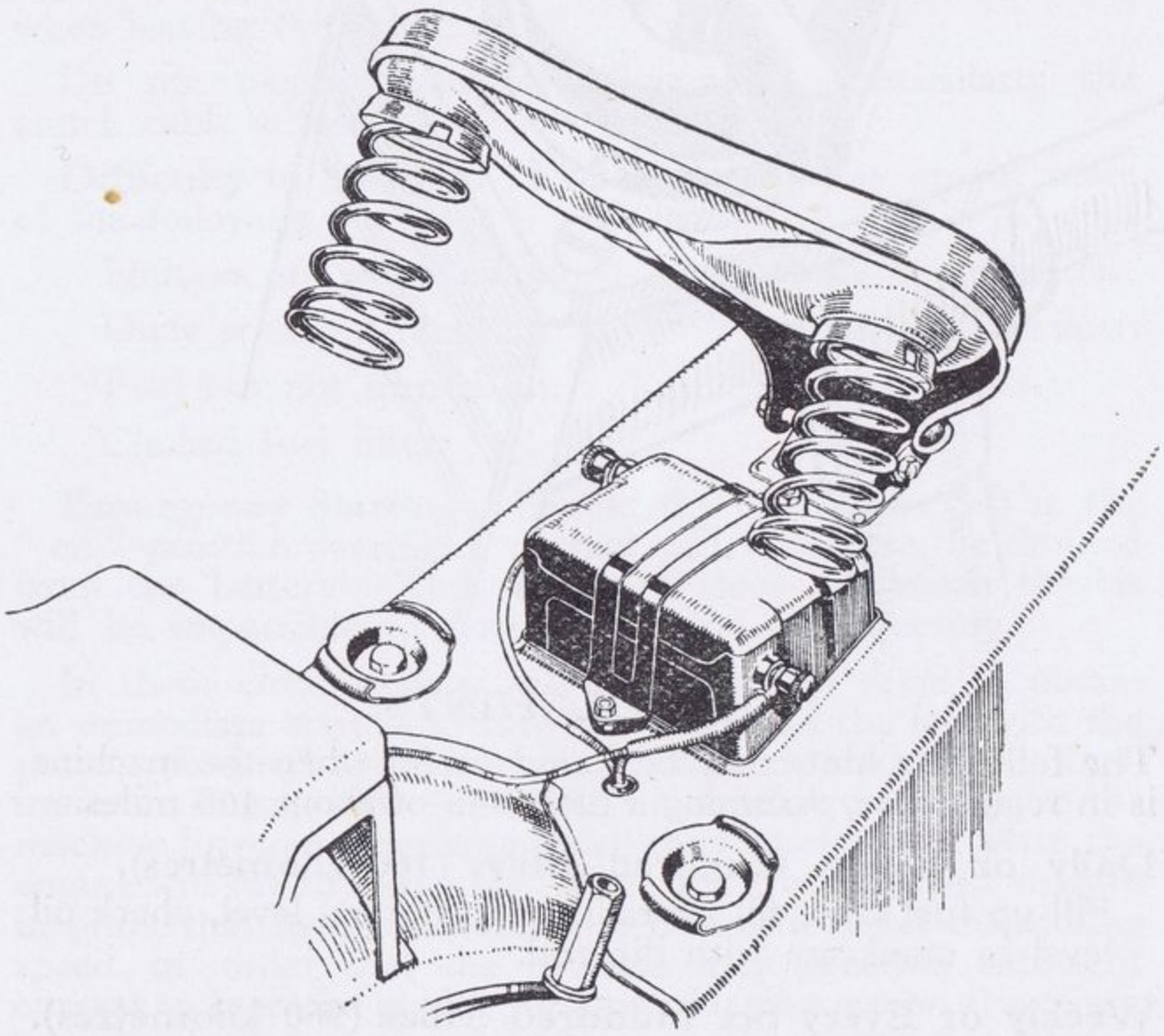
Check level of oil in gearbox, and in Final Drive Casing, change oil every 5,000 miles. See Page 3.

Adjust brakes if necessary.

Adjust clutch cable if necessary.

Clean oil sump gauze every 5,000 miles. See Illustration. Page 18.

Battery. To gain access rotate coil springs of saddle which will unscrew from the bottom fixing, then hinge saddle up, see illustration, page 12. For service see maker's instructions stated on case or special leaflets. See illustration



Lighting Bulbs.

Headlamp	6 volt 24-24 W. Double Filament S.B.C.
Head Pilot	6 volt 3 W S.C.C.
Tail Lamp	6 volt 3 W. S.C.C.

TYPE PEC.2 GENERATOR-IGNITION UNIT.

Attention in Service—Every 10,000 miles.

To gain access to Generator Brushes—contact breaker —distributor and cut out, remove cover on front end of engine by taking off 4 nuts.

Contact Gap. If necessary to adjust, loosen condenser fixing screw and the one above it. Set gap to G.B. gap gauge (0.012-in.) provided by levering contact plate in the desired direction, using screw-driver in slot between screws. Re-tighten screws.

Lubrication—Contact Lever. One spot of **light** oil on pivot pin wick "D". Wipe off surplus oil and **keep oil from contacts.** See illustration Page 15.

Gear Wheel Bearing. Remove H.T. contact strip "F" from coil. Withdraw gear wheel. Wipe bearing pin clean and soak with **light oil,** removing all surplus oil. Smear bearing pin with oil Replace gear wheel, **meshing spotted teeth,** and apply a **little** light grease on gear teeth.

See illustration Page 15.

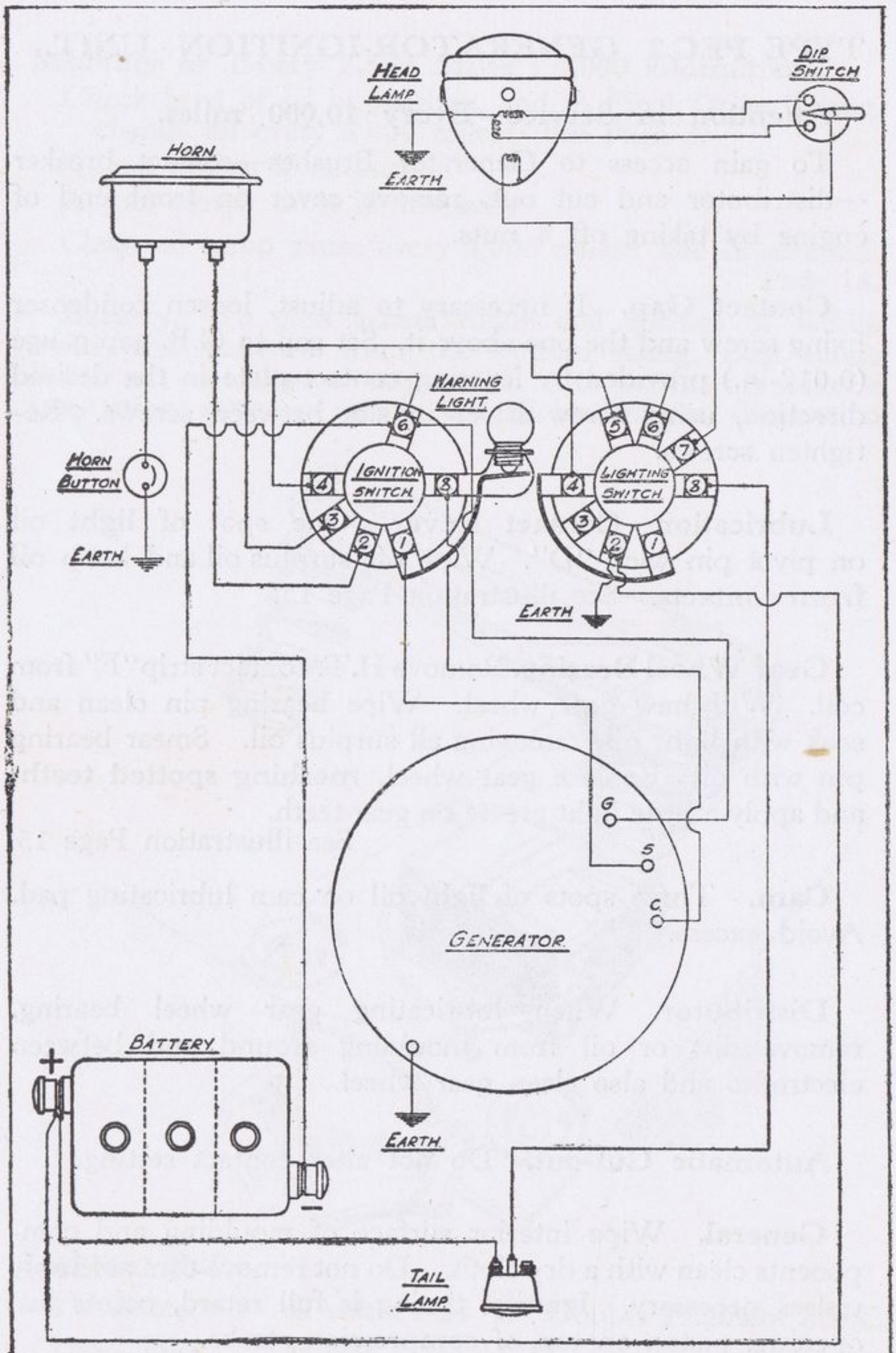
Cam. Three spots of **light** oil on cam lubricating pad. Avoid excess.

Distributor. When lubricating gear wheel bearing, remove dirt or oil from moulding around and between electrodes and also clean gear wheel.

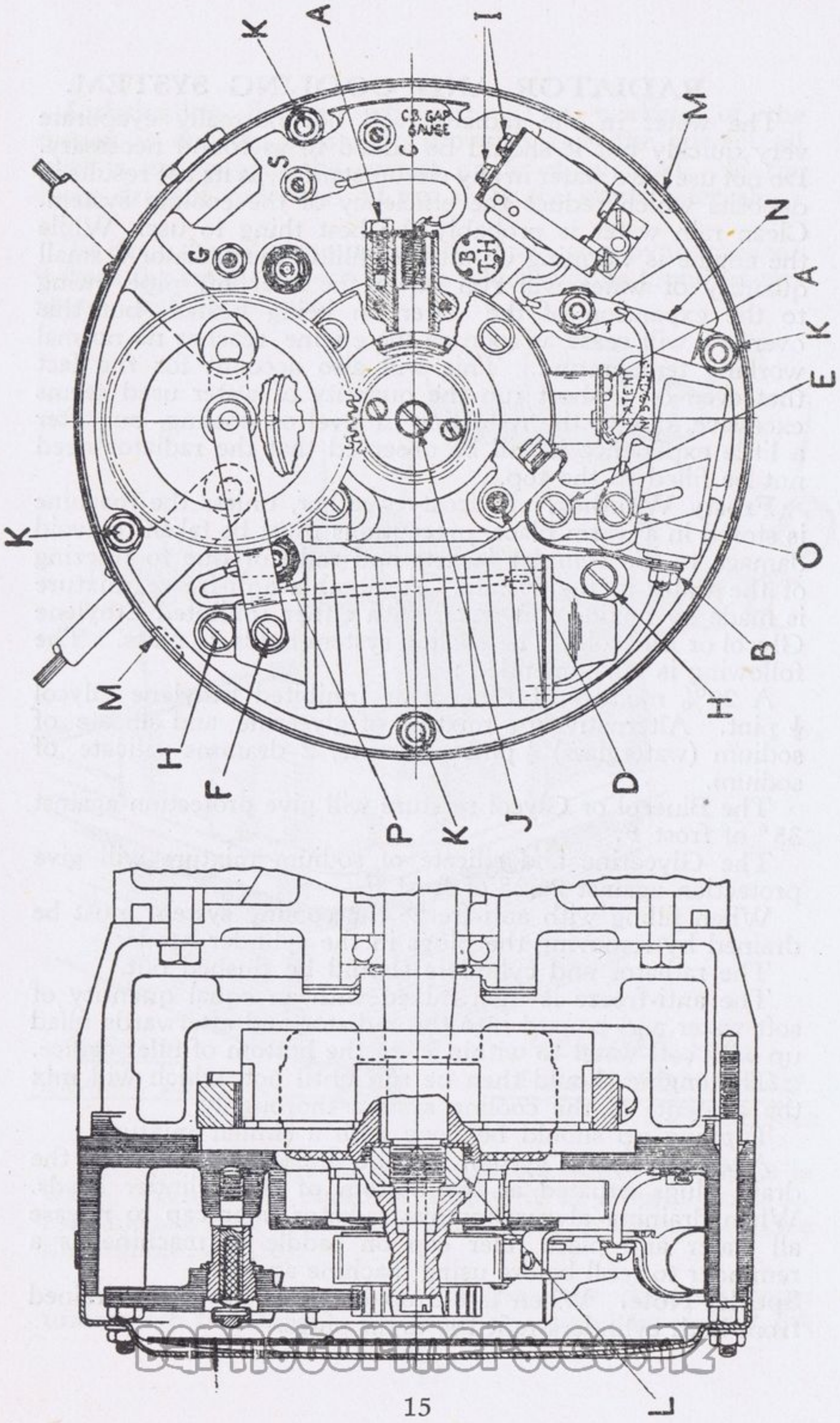
Automatic Cut-out. Do not alter contact setting.

General. Wipe interior surface of moulding and components clean with a dry cloth. Do not remove cam assembly unless necessary. Ignition timing is full retard, points just opening, piston on top of compression stroke.

See illustration Pages 14 & 15.



WIRING DIAGRAM



RADIATOR AND COOLING SYSTEM.

The water in the radiator will not normally evaporate very quickly but it should be added to as found necessary. Do not use hard water in any circumstances, as its use results in deposits which reduce the efficiency of the cooling system. Clean rain water is probably the best thing to use. While the engine is warming up after re-filling the radiator a small quantity of water will run down the overflow pipe owing to the expansion of the water on being heated, but this overflow will cease as soon as the engine reaches its normal working temperature. This will also account for the fact that even on a short run the quantity of water used seems excessive, due to the reduction in level on cooling, but after a little experience it will be observed that the radiator need not be filled to the top.

Frosty Weather. In frosty weather, unless the machine is stored in a warm place, precautions must be taken to avoid damage to the cylinder jackets and radiator due to freezing of the water in the system. A suitable anti-freeze mixture is made by mixing soft water with either Inhibited Ethylene Glycol or Bluecol. The cooling system holds 2½ pints. The following is recommended :—

A 20% mixture of Bluecol or Inhibited Ethylene Glycol ½ pint. Alternatively a mixture of glycerine and silicate of sodium (waterglass) ½ pint glycerine, 2 dramms silicate of sodium.

The Bluecol or Glycol mixture will give protection against 35° of frost F.

The Glycerine and silicate of sodium mixture will give protection against 26.2° of frost F.

When filling with anti-freeze the cooling system must be drained by removing the plugs in the cylinder heads.

The radiator and cylinders should be flushed out.

The anti-freeze is then mixed with an equal quantity of soft water and poured into the radiator and afterwards filled up with soft water to within ¾″ of the bottom of filler orifice.

The engine should then be run until hot, which will mix the contents of the cooling system thoroughly.

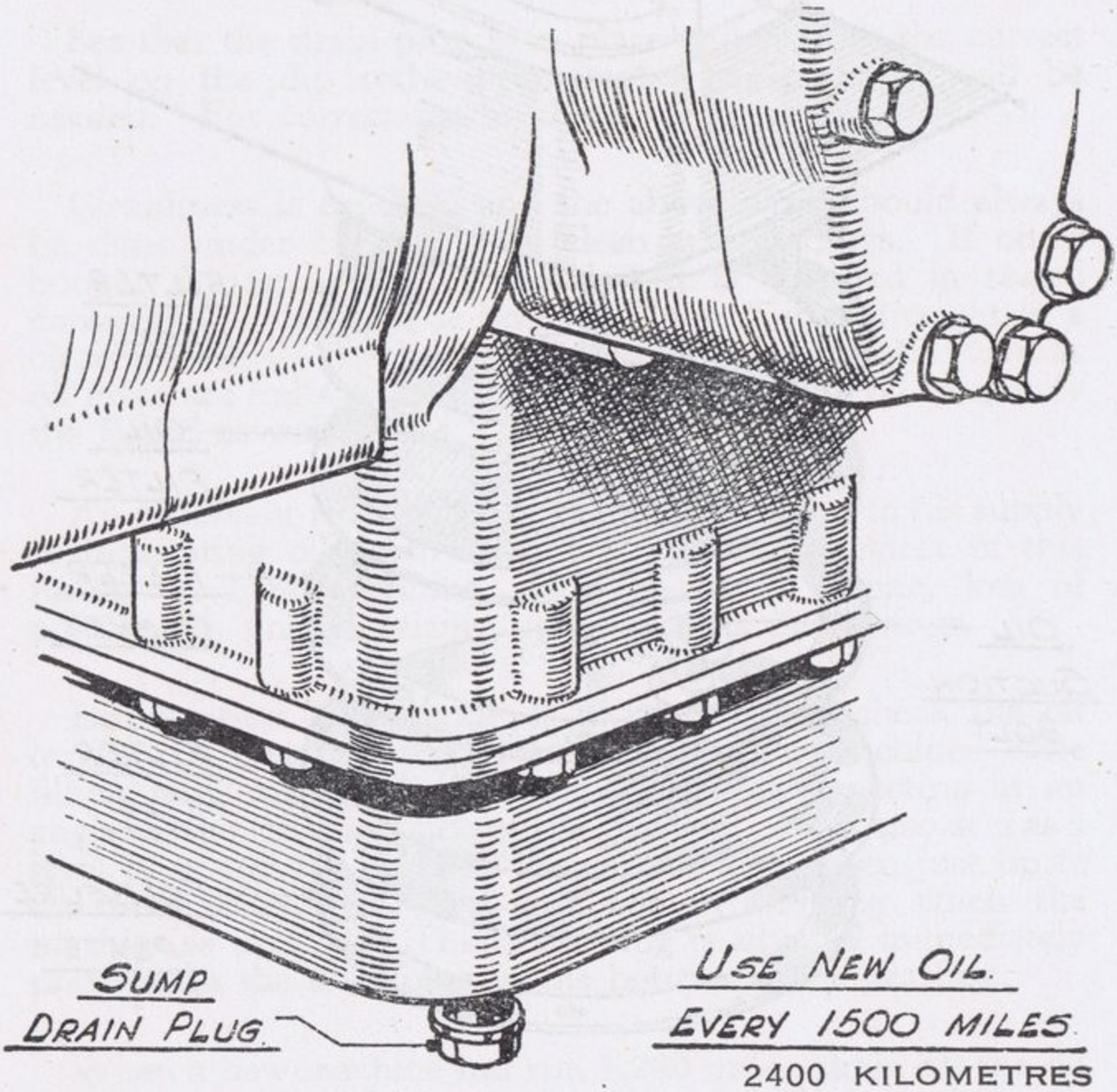
Topping up should be done with a similar mixture.

Alternatively the system may be drained by means of the drain plugs situated at the bottom of the cylinder heads. When draining always remove radiator filler cap to release all water and place filler cap on saddle of machine as a reminder to refill before using machine again.

Special Note. When last drop of water has been drained from both cylinders refit the drain plugs.

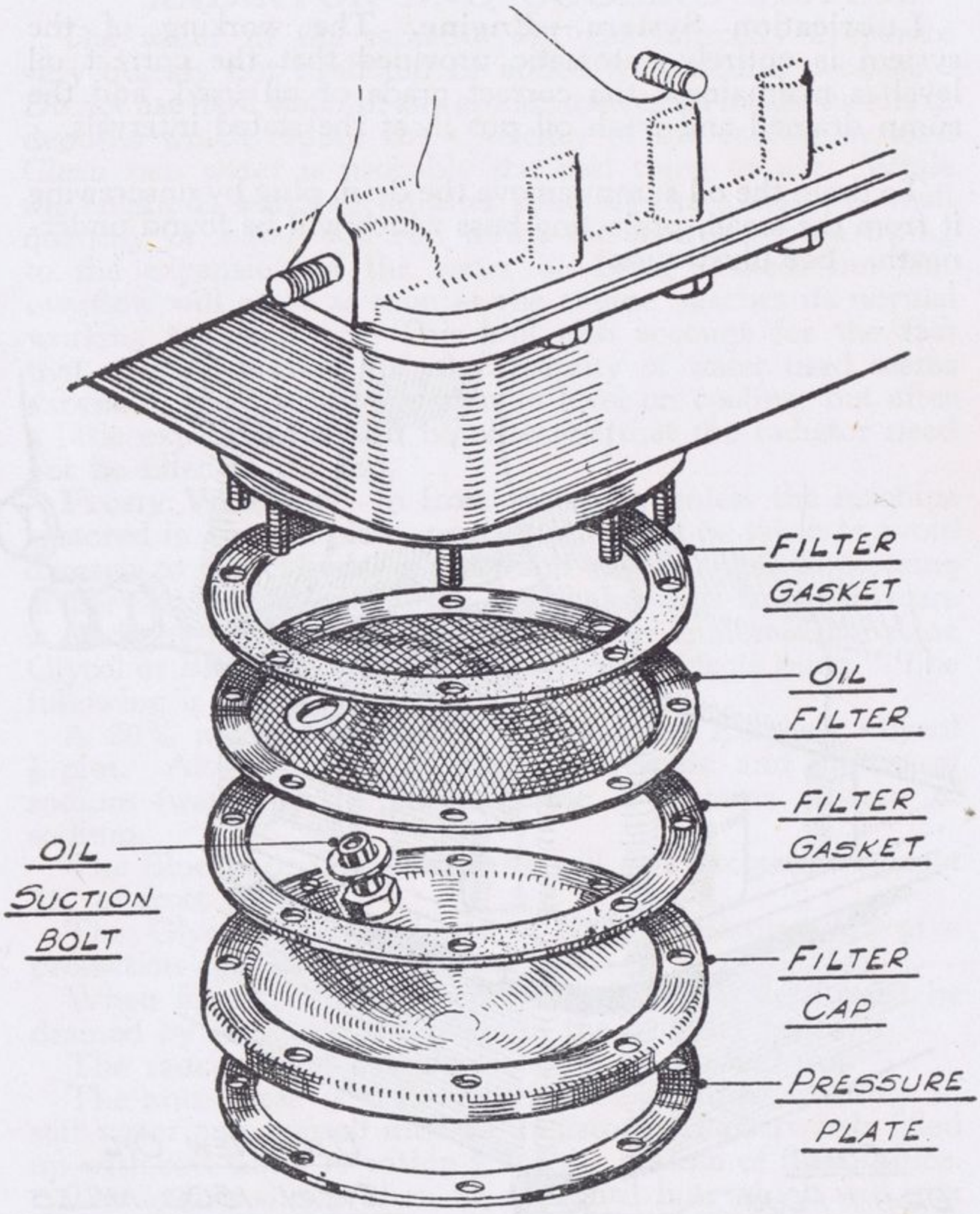
Lubrication System.—Engine. The working of the system is entirely automatic provided that the correct oil level is maintained, the correct grade of oil used, and the sump drained and fresh oil put in at the stated intervals.

To drain the oil sump remove the drain plug by unscrewing it from the small, projecting boss which will be found underneath. See illustration



This operation should be carried out while the engine is warm. While the sump is empty it is advantageous to examine and clean the wire gauze strainer in the sump. (See illustration Page 18).

This is reached by removing the large diameter cover underneath the sump. The cover is secured by eight 2 BA



nuts and a stiffening ring which will separate from the cover when the nuts are taken off. Between the cover and the gauze strainer will be found a composition joint washer, there is a second joint washer between the strainer and the sump face. Before the strainer can be removed it will be necessary to unscrew and remove the hollow bolt which will be seen projecting from the wire gauze screen. Having

removed the strainer wash it clean in petrol leaving it to dry. Do not in any circumstances attempt to dry it with rag or cotton waste. Clean the cover.

When refitting see that the two composition joint washers are clean and undamaged and that the hollow bolt is securely refitted. Also see that the stiffening ring is replaced between the nuts and the cover.

See that the drain plug is in place and refill to the correct level on the dip rod—approximately 1¼-pints oil will be needed. For correct grade of oil see Page 2.

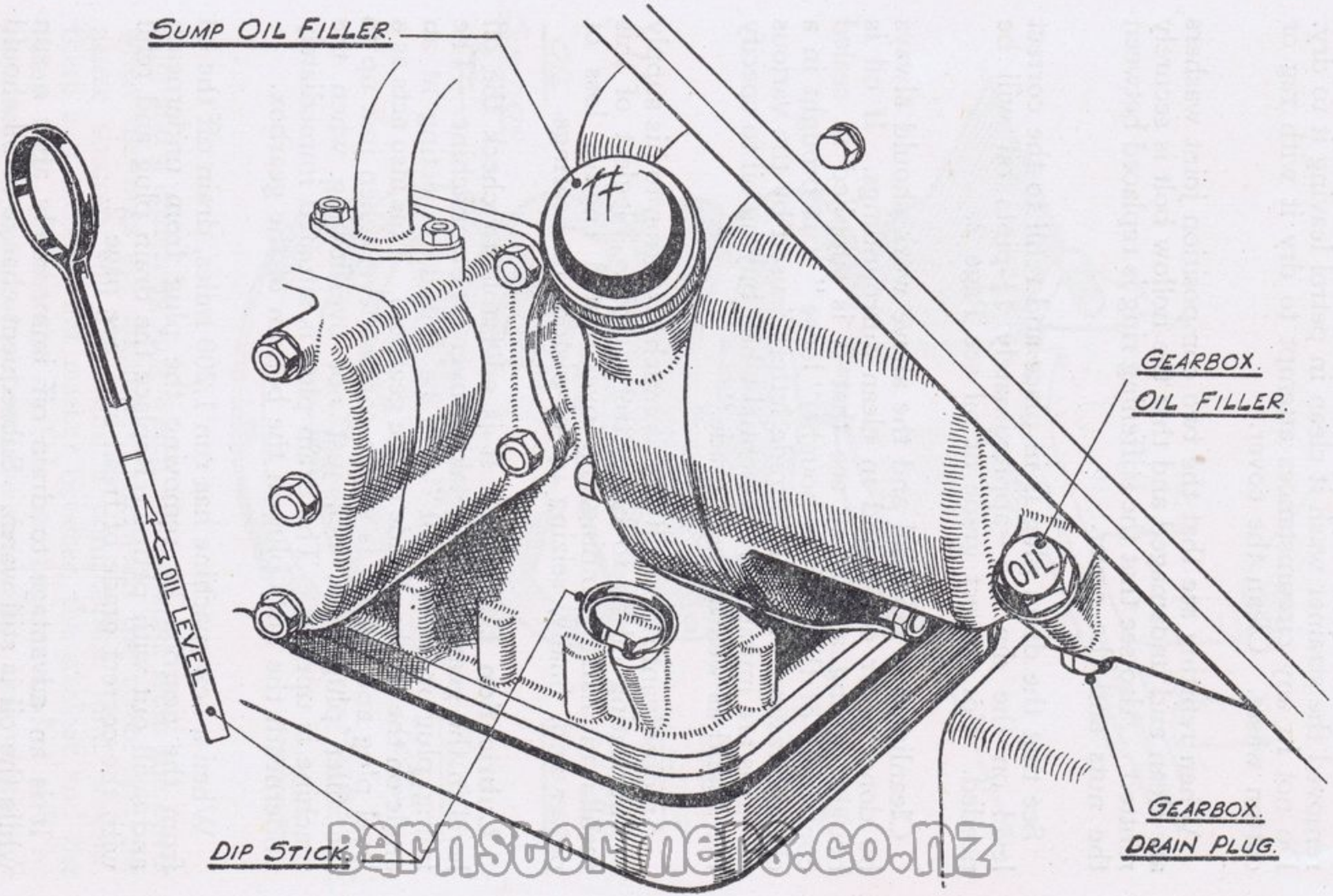
Cleanliness is essential and the above work should always be done under cover and in clean surroundings. If oil is bought during a journey see that it is supplied in sealed containers or that if it is bought " loose " it is brought in a clean measure. As the " grade letters " used by the various oil firms are imitated it is essential when buying oil to specify the Brand as well as the " grade."

An observant rider will pay as much attention to his supply of lubricating oil as to his petrol supply. Neglect of this results in harsh running, an over-heated engine, loss of power and, finally, seizing up of pistons or bearings.

Lubrication Gearbox. It is advisable to check the oil level in the gearbox when taking over a new machine. The filling plug marked " **oil** " will be found projecting at an angle on the left hand side of the gearbox. This also acts as a level plug and the oil is at the correct level when just up to the filler plug hole, i.e., just not overflowing when the machine is upright. The drain plug is situated immediately underneath the filler plug in the bottom of the gearbox.

When a new machine has run 1,200 miles, drain off the oil from the gearbox by removing the plug from underneath and swill out with petrol. Replace the drain plug and refill with the correct grade of fresh oil. See page 2.

It is an advantage to drain off immediately after a run while the oil is still warm. Subsequent change of oil should be made every 5,000 miles. See illustration page 20.



Lubrication—Final Drive Casing. Check the oil in the casing when taking over a new machine. The filling plug is in the side cover of the casing and is the larger of the two and is marked "**Oil.**" The level plug is fitted about 1" lower than the filler plug and is the smaller of the two. The oil is at the correct level when it is just up to the level plug hole, i.e., just not overflowing when the machine is upright. It will be found easier to check the level when the oil is warm and the machine has been standing long enough to allow the oil to drain back off the various components on to which it is flung when the machine is in motion.

The drain plug is fitted in the bottom of the casing.

Drain off the oil when the first 1,200 miles have been covered and swill out the casing with petrol Refit the drain plug and refill with the correct grade of fresh oil to the correct level. Do not replace the level plug until all surplus oil has drained off with the machine upright. See illustration page 22.

N.B. Overfilling must be avoided. Subsequent changes of oil should be made every 5,000 miles. For correct grade of oil see page 3.

Lubrication—Front Fork. The front fork struts have the correct amount of oil in them when the machine is made, and this supply of oil is sufficient under normal conditions for 20,000 miles running.

Lubrication—Rear Spring Struts. Graphite Grease should be smeared between the Springs and the damper tube to avoid squeaking at this point and a light engine oil (SAE 30) introduced into the open end of the upper or larger tube to maintain the lubrication of the internal bushes. It will be found easier to carry out this operation by placing the stand on a suitable block of about 3" height so that the rear wheel is lifted clear of the floor. Remove the long nuts at the top of the spring struts (shown on Page 28) and the rear wheel will drop to the floor.

The spring struts can now be removed by unscrewing the lower pivot bolts, taking care not to lose the loose hardened steel bushes. This operation should be carried out every 5,000 miles.

Lubrication—Hubs. The hubs are packed on assembly with a high melting point grease and require no further attention for 20,000 miles.

Lubrication—General Details. A feature of the machine is the fact that the points requiring periodical lubrication have been reduced to the absolute minimum by the extensive use of self-lubricating bushes. It is however beneficial to oil occasionally the following parts :—

Lubrication (*Continued*)

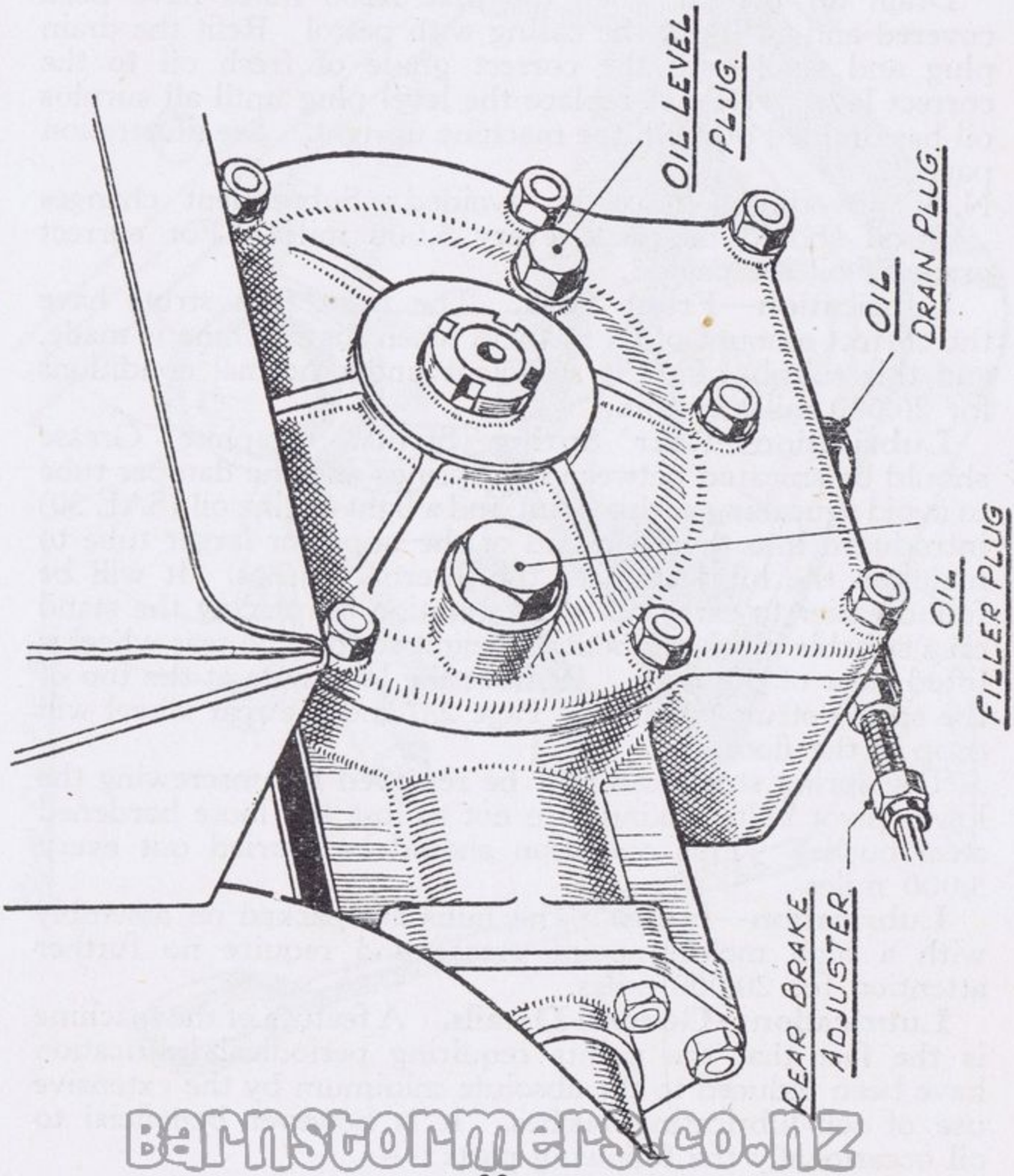
The two brake cable shackle pins (connecting cable shackles of front and rear brakes to their respective cam levers).

The pivots of the handlebar control levers, i.e., the Brake lever and Clutch lever.

Twist Grip.

The Linkage from the Starting lever to the stand and the stand pivots.

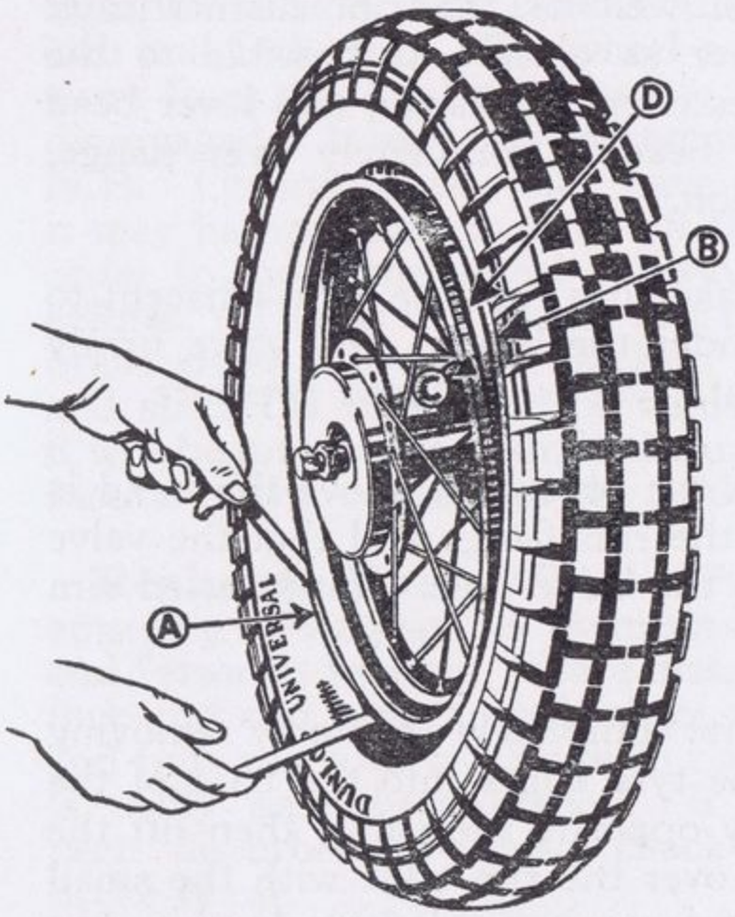
The exposed parts of the control cables which should be smeared with grease to prevent rusting.



TYRES.

To obtain the best service from the tyres careful attention should be paid to inflation —minimum pressures are given on page 3. Occasionally the tyre treads should be inspected, and any small flints, pieces of glass or other sharp material removed.

Do not let oil or grease get on to the tyres as they have a destructive effect on rubber. Wipe tyre clean immediately any oil or grease is noticed.



TO FIT TYRES.

You cannot pull the cover bead at "A" over the rim flange until the cover bead at "B" is pushed off the rim shoulder "C" down into the well "D," then the cover bead at "A" comes over the rim flange easily.

Remember, the cover beads are inextensible —force will only damage the cover and cannot stretch the bead.

Front and rear wheels are not interchangeable. The correct tyre must be fitted to the correct wheel. Front wheel can be identified by red paint inside the drum and the ribbed tyre should be fitted to this.

To Fit Tyre. Inflate tube just sufficiently to round it without stretch. Too much air will make tyre fitting difficult. Too little will make tube more liable to be nipped by levers. Fit tube in cover and pull out slightly at valve position so that it protrudes about 1-in. beyond the beads for a length of about 4½-ins. each side of the valve.

Lay the cover eccentrically over the wheel, the overhang being at the valve position and towards the operator. See that the valve is in line with the valve hole in the rim. Squeeze the beads together at valve position to prevent the tube slipping back inside the cover and push cover towards rim, threading the valve through rim band and rim. Allow the lower bead to go into the well of the rim and the upper bead to lie above the level of the rim flange. Working from the valve position press lower bead over the rim flange by hand. A tyre lever may be used for the last few inches. See that the bead lies right down in the well of the rim—this is important. Press upper bead into the well of the rim diametrically opposite valve. Insert lever as closely as possible to the point where the bead passes over the flange, and lever bead over flange. Repeat until bead is completely over flange, finishing at the valve position.

Push valve inwards to make sure that the tube adjacent to the valve is not trapped under the bead. Pull valve firmly back into position and inflate tyre to required pressure.

Check that fitting line on the cover just above the bead is concentric with the top of the rim flange and that the valve protrudes squarely through the valve hole. Fit knurled rim nut and valve cap.

To Remove Tyres. First completely deflate by removing all valve parts and push the tyre edges into the base of the rim at a point diametrically opposite the valve, then lift the cover edges near the valve over the rim edge with the small lever provided. No undue force is needed to do this, but the edges of the cover opposite the valve must be in the base of the rim.

Removal of Front Wheel. Push up the brake cam lever and slip the cable out of the slot in the cable shackle. Loosen and remove spindle nut from brake side of spindle. Loosen clamp bolt in fork end on opposite side. Support the front of the machine to take the weight off the wheel, pull out the spindle and remove wheel. Occasionally the spindle may have to be tapped out using a tommy bar or similar tool.

Replacing Front Wheel. Push wheel into place engaging the forked brake anchor with the brake stop peg on the fork tube. Push the spindle back into position through the fork ends and the hub from the left towards the brake side. Replace spindle nut and tighten securely. Replace the brake cable. Remove support from below the machine and with the wheel resting on the ground push the front of the machine up and down to ensure freedom of working in the fork struts, and finally re-tighten the clamp bolt in the left hand fork end.

Removal of Rear Wheel. Support machine on stand. Loosen, unscrew, and pull out the rear spindle from the right hand side, and remove distance piece from between hub and fork end. The wheel may now be pulled sideways away from the final drive casing until the driving splines are disengaged. It may now be removed. in a rearward direction. **N.B.** On machines which have run several thousand miles it may be necessary to slack off the rear brake adjustment in order to move the wheel sideways to disengage the driving splines. This is due to the fact that after prolonged use the brake shoes will wear a track of larger diameter in the hub and since the brake will be adjusted to this larger diameter it will be impossible to draw the unworn and therefore smaller mouth of the drum over the brake shoes.

Replacing Rear Wheel. Push the wheel into place engaging driving splines by means of a semi-rotary backwards and forwards motion. Place distance piece between hub and fork end and push spindle through fork end, distance piece, and hub and turn clockwise to tighten. See that the spindle is really securely tightened. If the brake adjustment has been disturbed re-adjust, check wheel for freedom when brake is off.

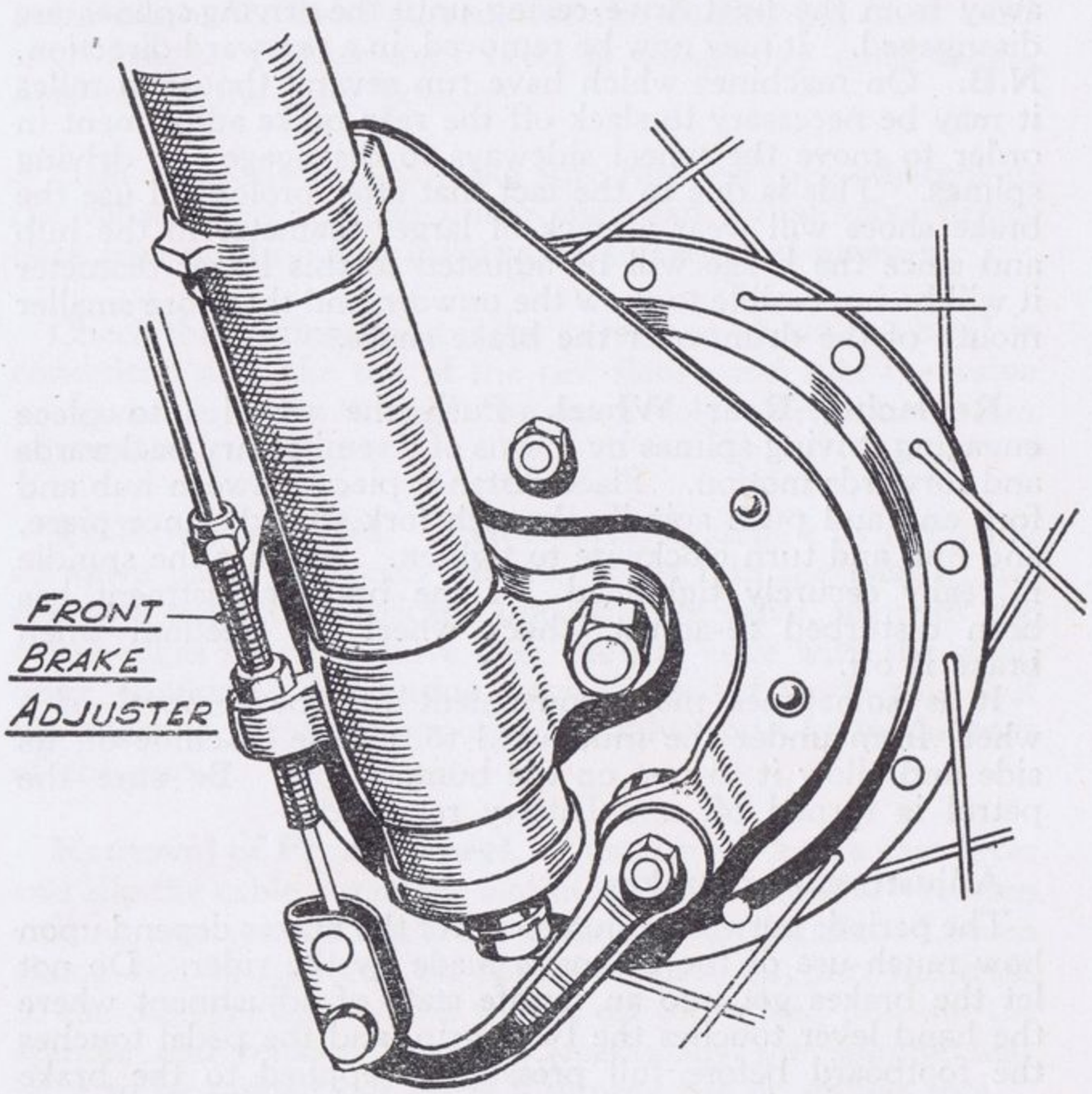
It is sometimes more convenient for the removal of a wheel from under the mudguard to lay the machine on its side and allow it to rest on the bumper bar. Be sure the petrol is turned off and battery removed.

Adjustment of Brakes.

The periods between adjustments of the brakes depend upon how much use of the brakes is made by the rider. Do not let the brakes get into an unsafe state of adjustment where the hand lever touches the twist grip, and the pedal touches the footboard before full pressure is applied to the brake

shoes. The brakes should be fully on when the lever or pedal, as the case may be, has travelled no more than half of its total possible movement. It is equally important that the brakes are not adjusted too tightly, resulting in the shoes dragging on their drums when the brakes are off. Not only will this give rise to excessive heat and wear, but on a small capacity machine the effects of even a slightly dragging brake are very noticeable.

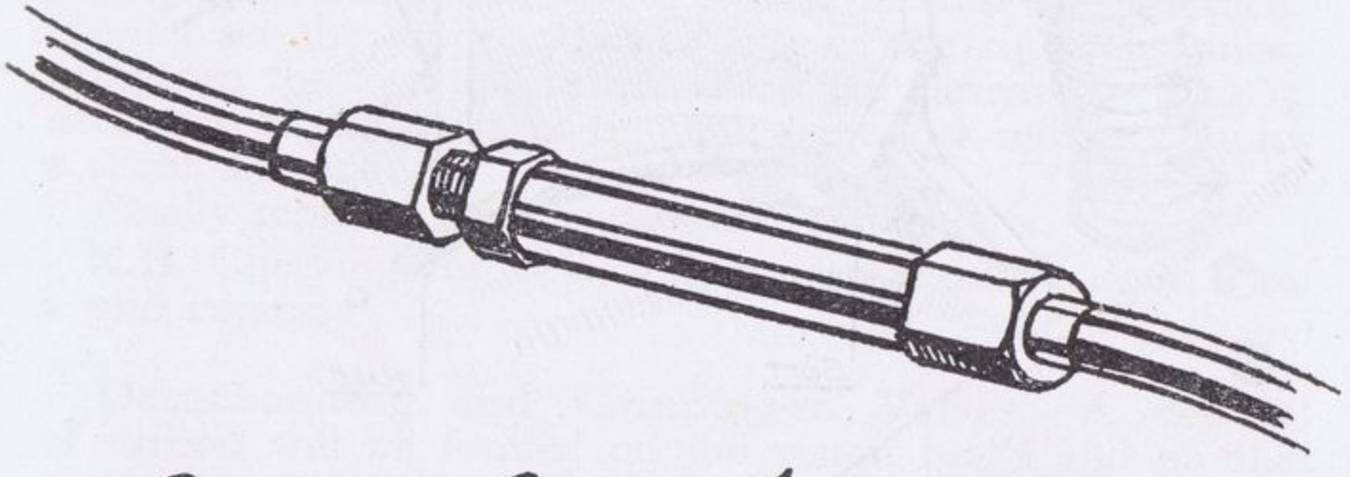
The Front Brake Adjuster is found on the right hand side of the machine screwed through a projection on the fork end. To tighten adjustment slack off the locknut above the projection and turn the adjuster so that the head of the adjuster recedes from the projection. When adjustment is correct (see illustration,) re-tighten locknut.



The Rear Brake Adjuster is found underneath the final drive casing and is also screwed through a projection on this casing. The method of adjustment is identical with that employed for the front brake. See illustration page 22.

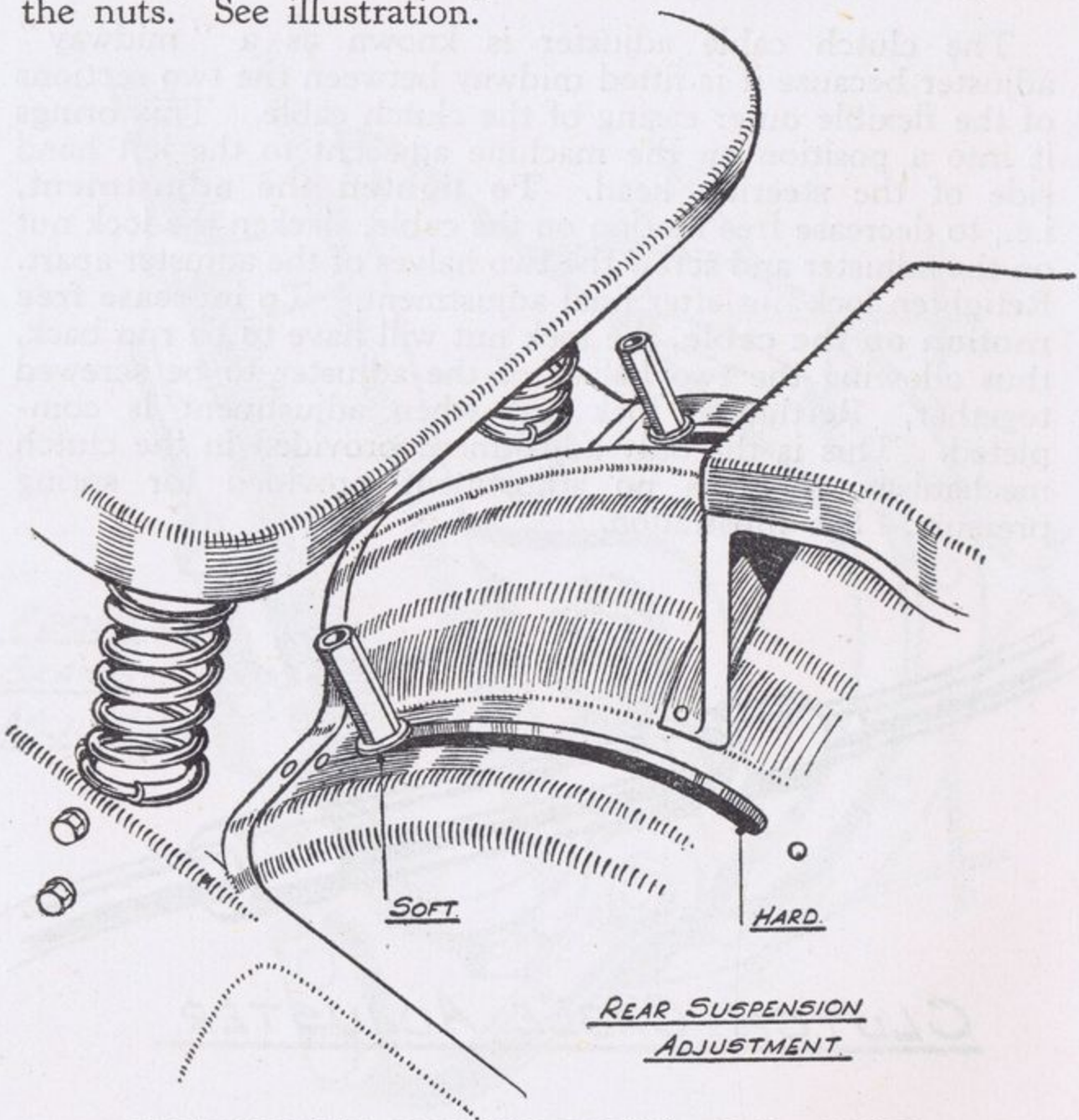
Adjustment of Clutch. Adjustment of the clutch is essential when there is less or more than $\frac{3}{32}$" free motion on the clutch cable. Less than this amount will result in pressure being applied to the operating mechanism of the clutch instead of upon the friction linings. This will give rise to serious heat and wear, and will badly affect the performance of the machine. On the other hand, excess free motion on the clutch cables will prevent the clutch freeing, which will cause difficulty in engaging any of the gears and may harm the gearbox.

The clutch cable adjuster is known as a "midway" adjuster because it is fitted midway between the two sections of the flexible outer casing of the clutch cable. This brings it into a position on the machine adjacent to the left hand side of the steering head. **To tighten the adjustment,** i.e., to decrease free motion on the cable, slacken the lock nut on the adjuster and screw the two halves of the adjuster apart. Retighten lock nut after final adjustment. **To increase free motion on the cable,** the lock nut will have to be run back, thus allowing the two halves of the adjuster to be screwed together, Re-tighten lock nut when adjustment is completed. This is the only adjustment provided in the clutch mechanism, there is no adjustment provided for spring pressure. See illustration.



CLUTCH CABLE ADJUSTER.

Adjustment of Rear Suspension. The rear suspension has been provided with a simple and effective means of adjustment to-cater for different loads. This is arranged for by moving the upper ends of the spring mountings along two slots in the rear mudguard. When the springs are set in the fully forward position the effect is to give a "soft" suspension. This position will be found suitable for many solo riders. The extreme back position gives a "hard" suspension, and it will be found necessary to use this position if an unusually heavy load is carried. Any intermediate position may be used to suit individual requirements, but the spring mountings must be level with each other. To vary the adjustment, slack off the two sleeve nuts on the spring mountings and using these as handles push the spring mountings to the required position on the slots and re-tighten the nuts. See illustration.



REAR SUSPENSION ADJUSTMENT.

Valve Tappet Adjustment. We have found that the valve tappet clearances remain constant over periods of many thousands of miles running and consequently the tappets seldom require re-adjustment. We strongly urge riders not to tinker with this adjustment, but if the engine is running normally and there is no excessive tappet clatter to leave well alone. Usually re-adjustment becomes necessary only after the valves have been ground in. The adjustment is made after removing the two small rectangular covers which will be found on top of the crank case.

Having removed the covers rotate the engine until one piston is at top dead centre of comprssion stroke. To set the piston to this position watch carefully the operation of the valves during rotation of the engine. It will be found that as either of the exhaust valves reaches its closed position so its corresponding inlet valve commences to lift. There is in point of fact a short interval during which both valves are slightly open.

This short interval when found on one cylinder, corresponds approximately to top dead centre of compression stroke on opposite cylinder.

When slackening the tappet and adjuster lock nuts, place the second spanner on the head of the adjuster and " take the strain " on this so that the full force applied to the first spanner does not tend to turn the tappet. This point should also be carefully watched when tightening the lock nuts. The correct tappet clearances checked when the engine is cold are Inlet .004" (.1m/m) Exhaust .006" (.15m/m)

Should re-adjustment be needed, the clearance is increased by screwing the tappet adjuster into the tappet movement ; in the opposite direction will, of course, decrease the clearance. Having set the tappet adjuster to give the right clearance, re-tighten the lock nut and re-check the clearnace. This is necessary as the action of tightening the lock-nut may cause a slight alteration.

Finally replace covers and tighten fixing nuts.

N.B. Checking and re-setting tappets must be done with a cold engine.

Decarbonising and Grinding-in Valves. A deposit of carbon will be formed on the piston heads and on the combustion chambers after the engine has been running for a considerable time. No hard and fast rule can be expressed either in mileage or time, as to when it is necessary to clean this out. It is not advisable to disturb the engine

for decarbonising unless definite evidence such as overheating or serious loss of power indicates that this operation is necessary.

To remove the carbon deposit proceed as follows :—

Removal of Cylinder Heads. Drain off cooling water. See Page 35. Remove high tension leads from sparking plugs and take out the sparking plugs. Loosen and remove the nuts holding the cylinder heads (six on each head) but when doing so slacken off each nut only half a turn at a time until they are all quite loose. Remove the cylinder heads. If the heads will not start easily tap them with a piece of hard wood, but do not in any circumstances attempt to lever them off by jamming levers or screwdrivers between head and cylinder, this would destroy the copper and asbestos gaskets and might damage the metal joint faces. Carefully remove both gaskets and set aside for further use where they will not be damaged. Before removing the cylinders it is more convenient to remove the carbon deposit not only from the piston heads but from all exposed portions of the cylinders and valve heads. Also clean off the carbon from the undersides of the c linder heads. When scraping the carbon off these various surfaces do not use a sharp-edged tool. This is particularly important in the case of the piston heads, and the cylinder heads where the aluminium alloy of which these components are made would be badly cut or scratched by the use of such an implement. Put the heads away carefully until needed for re-assembly.

Removal of Cylinders. First, remove water connections after loosening hose clips, noting the position of the various pipes. Slacken and remove the two small nuts securing the exhaust pipe flanges to the cylinders (4 nuts in all). Slacken the screws, clamping the exhaust pipes to the silencer and remove both exhaust pipes by pulling forward off cylinder studs and out of silencer. Note, the exhaust pipe flanges are loose on the pipes, and are ot a part of them. Should the pipes prove a little sticky to remove, a wriggling motion will usually free them without difficulty.

Carefully remove and set aside the joint washers which will be found on the cylinder flanges. These are made of a special composition and should not be replaced by joints of any other material.

Turn off petrol tap. Slacken and remove the nuts securing the inlet manifold to the cylinders (4 in all) and lift up the manifold with carburetter. The action of doing this will release the rubber pipe connecting the carburetter air intake to the Air Filter box. Avoid damaging joint washers on manifold flanges.

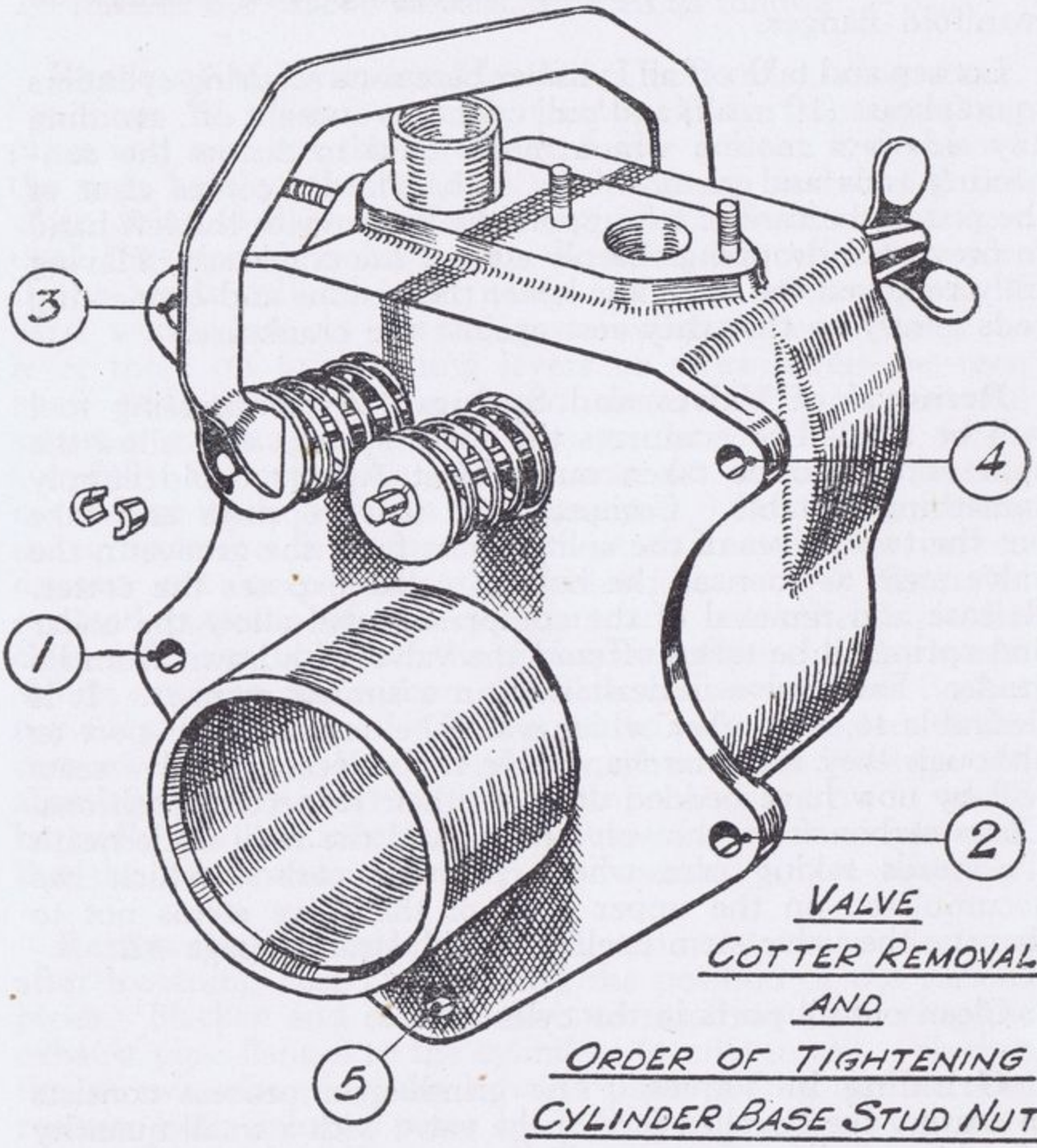
Loosen and take off all cylinder base nuts securing cylinders to crankcase (10 in all) and pull cylinders straight off, avoiding any sideways motion which might tend to distort the connecting rods and pistons. As each cylinder comes clear of the piston, be careful to support the piston with the left hand to prevent it dropping sharply against the crankcase. Having fully removed the cylinders lower the pistons and connecting rods gently so that they rest against the crankcase.

Removal of Valves and Springs. A compressing tool will be needed to compress the valve springs and allow the split cotters to be taken out. Most Agents could supply something suitable. Compress the valve springs and take out the two halves of the split cotters from the groove in the valve stem as soon as the bottom collar exposes the cotter. Release and removal of the compressor will allow the collar and spring to be taken off and the valve withdrawn from its guide. Each valve is dealt with in a similar manner. It is desirable to remember which valve belongs to each port as although they are interchangeable the valves and valve seats will by now have bedded down in their respective positions. Clean carbon from the valve heads and the radii underneath the heads taking care when removing carbon which has accumulated on the upper ends of the valve stems not to damage the valve stem itself. See illustration page 32.

Clean out all ports in the cylinders.

Grinding in Valves. The grinding-in process consists in coating the bevelled face of the valve with a small quantity of valve grinding paste—applied on the end of a match stick —re-inserting the valve in its guide and partially rotating it backwards and forwards on its seating by means of a suction cup applied to the valve head, or a proprietary valve grinding tool applied to the lower end of the valve stem. Here we come to the secret of good valve grinding. The valve should be raised from its seating every few reciprocations and given a half turn in order that the grinding compound may spread itself evenly over the whole of the surface. The valve should

never be given a complete revolution in contact with the seating, for this may possibly cut minute circular grooves into the faces of both the valve and its seating which will absolutely prevent a good gastight fit.



VALVE COTTER REMOVAL AND ORDER OF TIGHTENING CYLINDER BASE STUD NUTS.

Grinding in is completed once the faces of both valve and seating have assumed a clean, even, matt surfaced appearance. A polished surface must not be expected and is quite unnecessary.

If the engine has been run for a long period without the valves receiving attention their faces may be " pitted," that is, they will have a number of small black spots or depressions

on their faces. Should these depressions or "pits" not clear away after light grinding—it is best to have the valves refaced or trued up on a special machine at a Service station. Prolonged grinding in only wears away the seatings in the cylinders to an unnecessary degree. This is a matter of some importance as the seatings cannot be renewed without replacing the cylinder.

After each valve is ground in, it should be withdrawn and carefully washed in petrol or paraffin, and, equally important, the valve seating and the surrounding valve port in the cylinder should also be cleaned thoroughly with a rag moistened with paraffin or petrol. Do not wash out the valve ports with liquid, paraffin, or petrol or some of the grinding paste may find its way into the valve guides or other working parts and it is of the utmost importance that it should be prevented from reaching any of the working surfaces of the engine, as extensive damage would be done.

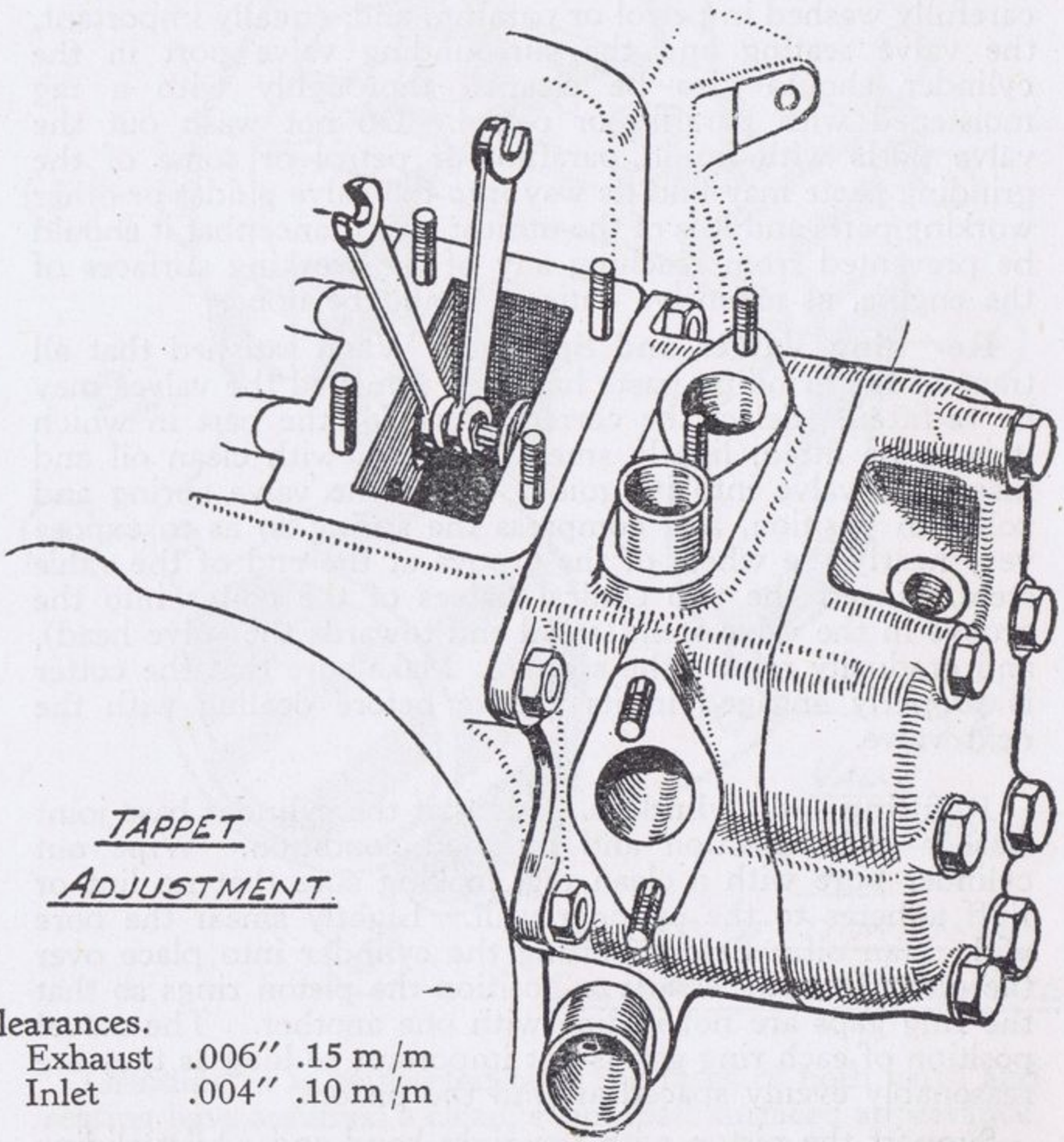
Re- tting Valves and Springs. When satisfied that all trace of the grinding paste has been removed the valves may be re-fitted. Select the correct valve for the part in which it is to be fitted, lightly smear the stem with clean oil and insert the valve into its guide. Place the valve spring and collar in position, and compress the spring so as to expose very nearly the whole of the groove at the end of the valve stem. Insert the two conical halves of the cotter into the groove in the valve stem (small end towards the valve head), and gradually release the spring. Make sure that the cotter is properly engaged in its groove before dealing with the next valve.

Refitting the Cylinders. See that the cylinder base joint washer is in position and in good condition. Wipe out cylinder bore with a clean rag, making sure that no lint or fluff adheres to the cylinder wall. Lightly smear the bore with clean oil. Before putting the cylinder into place over the piston it is necessary to position the piston rings so that the ring gaps are not in line with one another. The actual position of each ring gap is not important so long as they are reasonably evenly spaced around the piston.

Support the piston with the right-hand and whilst sliding the cylinder over the piston, compress the rings one at a time into their grooves with the fingers of the right hand. The cylinder is chamfered at its mouth to assist the rings to enter. Push the cylinder over the studs until they project slightly

through the base flange far enough to allow the nuts to be started on the threads. The nuts can now be run down with the fingers as the cylinder is pushed home. Tighten the nuts tightly and in correct order. See Illustration Page 32.

Re-Adjustment of Tappets. It will now be necessary to reset the tappet clearances. This work has already been described on Page 29.



TAPPET ADJUSTMENT.

Clearances.

Exhaust	.006″	.15 m/m
Inlet	.004″	.10 m/m

Re-fitting Inlet Manifold, Exhaust Pipes and Water Connections. See that the Inlet and Exhaust Pipe flange joint washers are in place and in good condition. Place the Inlet manifold with Carburetter in position over the four

studs, refit the four fixing nuts and tighten them evenly and securely. Now replace the rubber pipe connecting the carburetter air intake to the Air filter box.

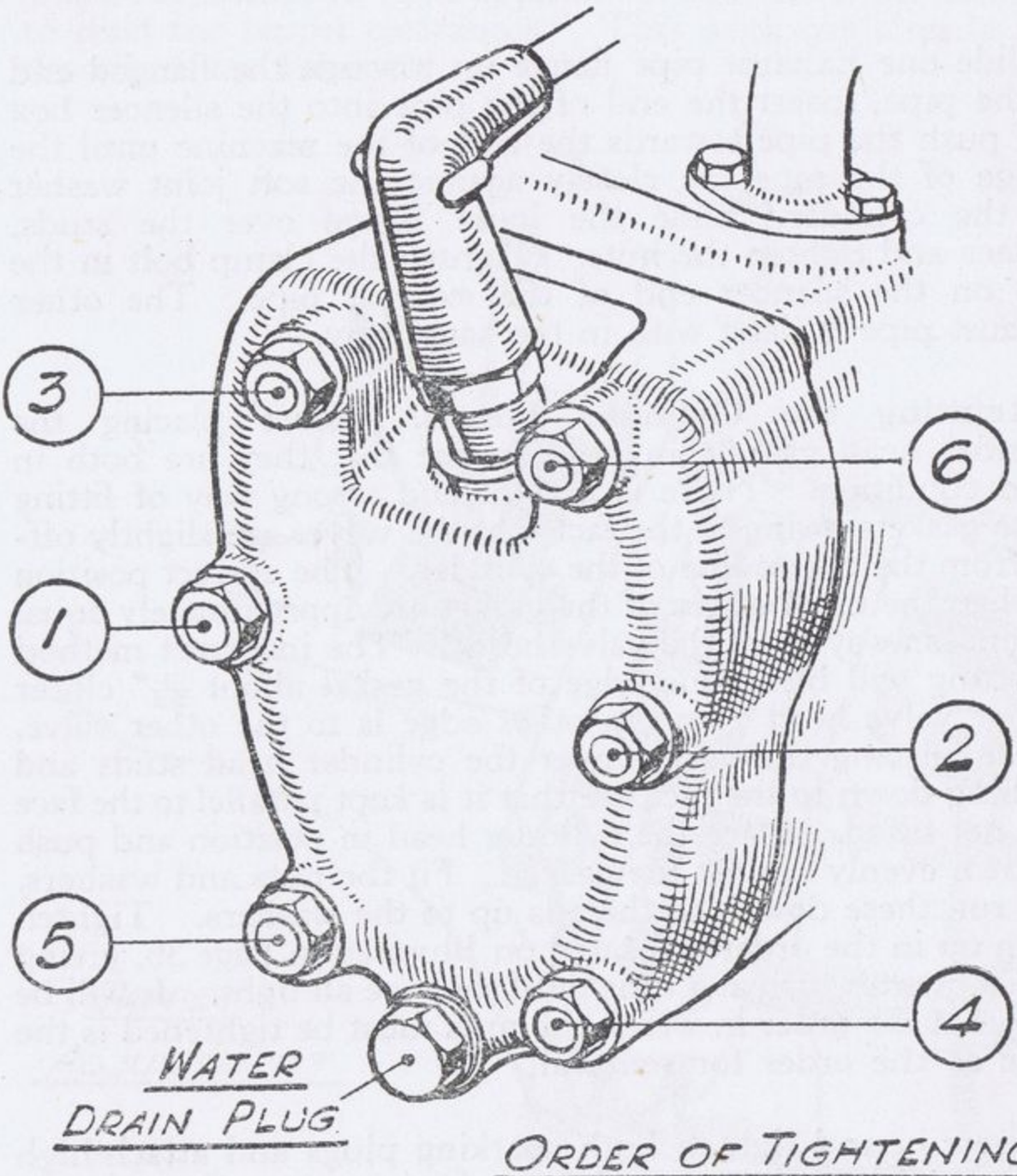
Connect up the top and bottom water connections to both cylinders, and tighten hose clips.

Slide one Exhaust pipe flange up towards the flanged end of the pipe, insert the end of the pipe into the silencer box and push the pipe towards the rear of the machine until the flange of the pipe fits closely against the soft joint washer on the cylinder. Slide the loose flange over the studs, replace and tighten the nuts. Tighten the clamp bolt in the clip on the silencer end of the exhaust pipe. The other exhaust pipe is dealt with in the same way.

Refitting the Cylinder Heads. Before placing the cylinder head gaskets in position see that they are both in good condition. There is a right and wrong way of fitting these gaskets owing to the fact that the valves are slightly off-set from the centre line of the cylinder. The correct position is when the inner edges of the gasket are approximately equal distances away from the valve heads. The incorrect method of fitting will bring one edge of the gasket about $\frac{3}{32}$" closer to one valve head than the other edge is to the other valve. When placing the gasket over the cylinder head studs and pushing down to the face see that it is kept parallel to the face and not tilted. Place the cylinder head in position and push it down evenly against the gasket. Fit the nuts and washers, and run these down the threads up to the washers. Tighten them up in the order indicated on Illustration Page 36, giving each a quarter turn at a time until they are all tight. It will be seen that the order in which the nuts must be tightened is the same as the order for removal

Screw in and tighten both sparking plugs and attach high tension cables.

Finally refill radiator to correct level, and check water connections for leakages. There should be no leakages if the hoses and clips are in good condition and if each hose is equally spaced over the gaps between the radiator nozzles and water pipes, and between the water pipes and the cylinders.



ORDER OF TIGHTENING

CYLINDER HEAD STUD NUTS.

Cleaning Sparking Plugs. Size 10 m.m. dia. thread K.L.G. type Ten. L30 is fitted. Other types suitable Champion Y7. Lodge CL.10. Before re-fitting the sparking plugs is is advisable to clean them internally and reset the gap between firing points.

A detachable type of sparking plug (see illustration,) may, as its type denotes, be taken apart for cleaning. First unscrew the gland nut from the body of the plug and withdraw the insulated central electrode. Clean thoroughly in petrol until all trace of carbon is removed from the insulation. The metal electrode may be cleaned with coarse glass paper. The plug body should be screaped clean internally with a knife or wire brush and rinsed in petrol.

Lightly smear the internal washer with thin oil and verify that it is seating properly in the plug body before reinserting the central electrode. Screw in and tighten the gland nuts.

" Non-detachable " types may be cleaned by brushing the firing points with a wire brush and washing in petrol, or may be taken for attention to a Service Station equipped with a plug cleaning machine. If the sand method is used to clean the plugs very great care must be taken to see that no sand is left inside the plug as it can so easily reach the cylinder and quickly destroy the bore and rings. The gap should now be reset to .020". The adjustment must be made by bending the " earth " point attached to the plug body and not in any circumstances by bending the centre electrode.

REMOVAL OF THE FRAME.

When a major overhaul becomes necessary it will be better to place the machine in the hands of a competent service agent who is properly equipped to perform such a task.

Those people in remote places who are compelled to despatch their machines by train or road transport over long distances, will find it advantageous to send the unit only and not the complete machine. By doing this, much space will

be saved, crating is far simpler and cheaper and there is less risk of damage being done *en route*.

To gain access to the complete unit, normal motor cycle procedure is reversed and the frame is removed from the engine. The task is quite simple and should be carried out in the following manner :—

Place the machine on a stout box in such a manner that it rests securely on the base of the engine unit with the front and rear wheels overhanging.

Drain the petrol tank, detach the petrol pipe and remove the battery from its housing beneath the saddle. Below the switch panel on the offside legshield all electric leads are provided with quickly detachable connections ; these should be separated at this point, and the panel detached by removing its two retaining screws.

Now remove the legshields, each is held by one large bolt to the frame at the top end and by smaller pins to the tubular construction two at the top and two at the bottom end. Having removed these pins, the legshields may be drawn sideways off the tubular construction. Before removing the near side shield it will be necessary to disconnect the speedometer cable. Remove the rubber knob from the gear lever and unscrew gear lever to remove it through its slot in the frame.

Slack off front brake adjuster and remove cable from handlebar lever. Remove clutch cable from handlebar lever, and without disconnecting wires, remove dip switch from handlebar. Disconnect wires from electric horn. Detach throttle cable from carburetter and pull clear of the frame from the front. Do not disconnect from twist grip.

Remove two large nuts and washers securing handlebar to forks and lift handlebars away complete with lamp, switch panel and dip switch.

Remove cap nut from steering column and detach the top fork cross member.

Support front wheel and remove head adjusting nut and dust cover ; tap column downwards with a soft mallet to free top head race.

When free the complete fork, front wheel and mudguard can be drawn clear and stored in a vertical position so that oil will not leak out of forks.

Remove rear wheel and remove the two long nuts which protrude through the slots in the rear mudguard and anchor the upper ends of the rear suspension struts.

Remove the four pins (two on either side) holding the tubular construction to the steering head plates. Remove the four pins (two on either side) from the lower part of the frame just above the rear portion of the footboards. As these are removed a " C " shaped " nut plate " will fall from inside the frame, and should, of course, be preserved.

The frame may now be lifted straight off the engine unit. Drain the radiator and remove the water pipes by uncoupling the hose connections at the cylinder. Similarly disconnect the rubber breather pipe from the engine crankcase and air cleaner, and the other larger pipe from the air cleaner to the carburetter air intake.

Remove the two nuts which secure the tubular construction to the base of the engine at the front, just above the sump, and the four bolts (two on either side) which secure the tubular construction to the footboards. Lift the tubular construction complete with radiator clear of the engine unit, which will now be ready for despatch.

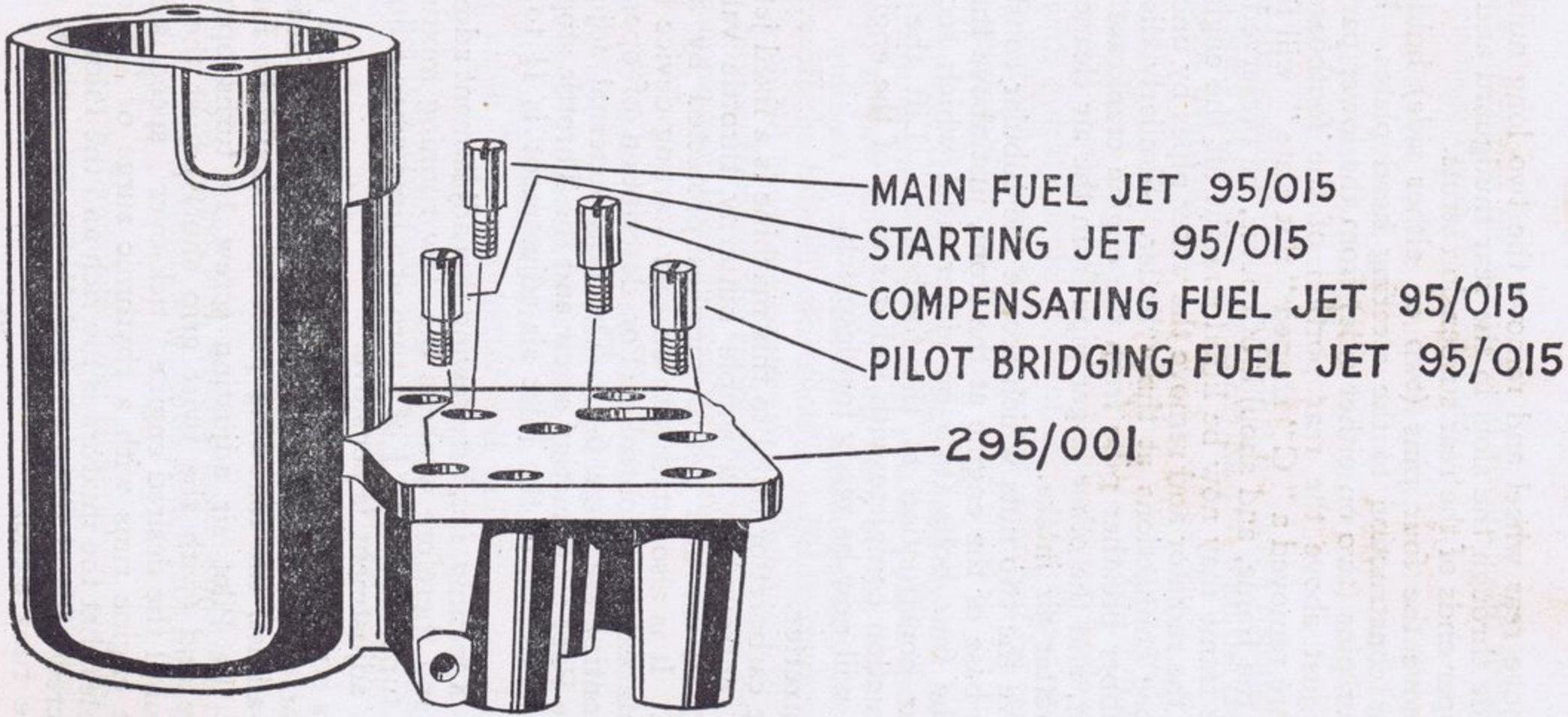
Carburetter.

The carburettor fitted to this machine is a fixed jet instrument controlled by a simple butterfly throttle valve, and having its air and petrol supplies protected by adequate filters. It is also fitted with an easy starting device having a separate external control. (For description of operation of this control see Page 6-7). The only external adjustments are the Pilot air adjusting screw and the Throttle stop. The normal position of the Pilot air adjustment is 1½ to 2 turns open.

N.B. Opening, *i.e.*, unscrewing this adjustment admits more air and therefore weakens the slow running mixture. Do not turn more than ⅛ of a turn at a time when adjusting, as this adjustment is sensitive.

It is strongly recommended that the adjustments made by the Factory before delivery are not altered, but if it is desired to re-adjust, the following procedure should be followed :

Set the Pilot air adjusting screw 1½ turns open. Start engine and (with the twist grip shut) adjust the Throttle Stop until the desired engine " tick-over " speed is obtained. If the engine runs with a rhythmic surge or " hunt " this indicates that the mixture is too rich and the Pilot Air adjusting screw should be unscrewed (⅛ turn at a time) until the engine runs steadily



The "tick-over" speed will now probably be faster and this should be re-adjusted by means of the Throttle Stop.

The foregoing adjustments should always be made when the engine is fully warmed up.

The fuel jets are located in the lower half of the mixing chamber of the carburettor and have the following sizes stamped on their outer diameters. (See illustration, Page 40).

Main Jet	20	Compensating Jet	25
Pilot Jet	30	Starter Jet ..	15

Do not vary the size of these jets at all, as the performance of the machine will be adversely affected by any alteration from the standard setting.

The top half of the mixing chamber carries 3 Spray Tubes. Two long ones stamped 145 and a short one stamped 25.

The petrol filter is carried in a bowl located at the side of the carburettor float chamber, and is of a type that renders choked jets very unlikely.

The filter bowl is easily detached by pulling the spring clip sideways when the bowl can be dropped away from its seating. This seating is made on a rubber ring and care should be taken that this is not dropped and lost.

Any accumulated dirt will be found in the bottom of the bowl and can be washed out with petrol, we suggest every 2,500 miles.

The filter itself will be seen projecting down from the float chamber lid and is held in position by a screwed lock ring. To clean the filter, remove the lock ring by means of a spanner when the filter will drop into the hand. Wash off any dirt in petrol and blow through the filter from the flanged end.

Should it be suspected that any of the fuel jets are stopped or choked, they can be removed by means of a small screw-driver and cleaned by blowing through them from their plain or large ends. Never try to clean them by passing a needle or a piece of wire through them as this will inevitably cause trouble.

When making any enquiries always state Engine and Frame Numbers.

Maintenance of Finish. After washing down in the usual way and removing any grease or oil which may be on the surface, the high standard of finish may be maintained by a light rub over with a good car polish.

If further assistance is required we recommend that you call on the nearest Velocette agent.