



MOTORCYCLE  
MANUFACTURERS BY  
APPOINTMENT TO  
H.M. THE KING.

# CARE and MAINTENANCE

of the

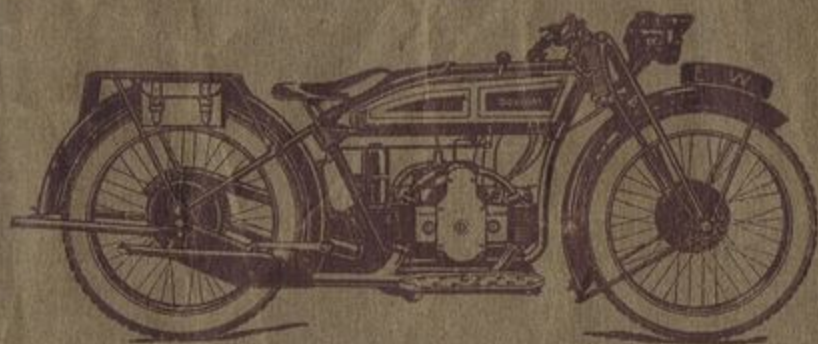
## 350

c.c.

## Models

1926 — 1930

# Douglas



Douglas Motors Ltd.  
KINGSWOOD — BRISTOL.

# Running Instructions

FOR

“350 c.c.” MODEL

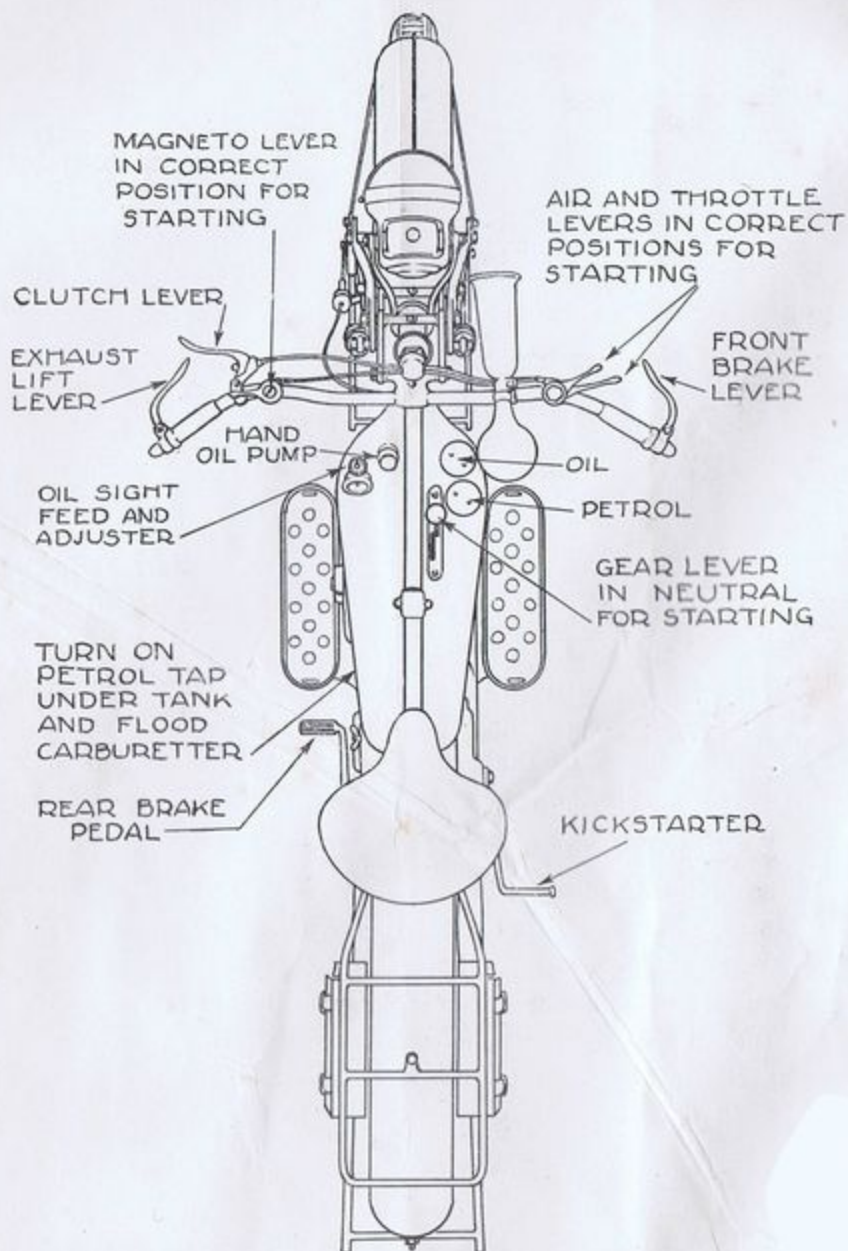
# Douglas



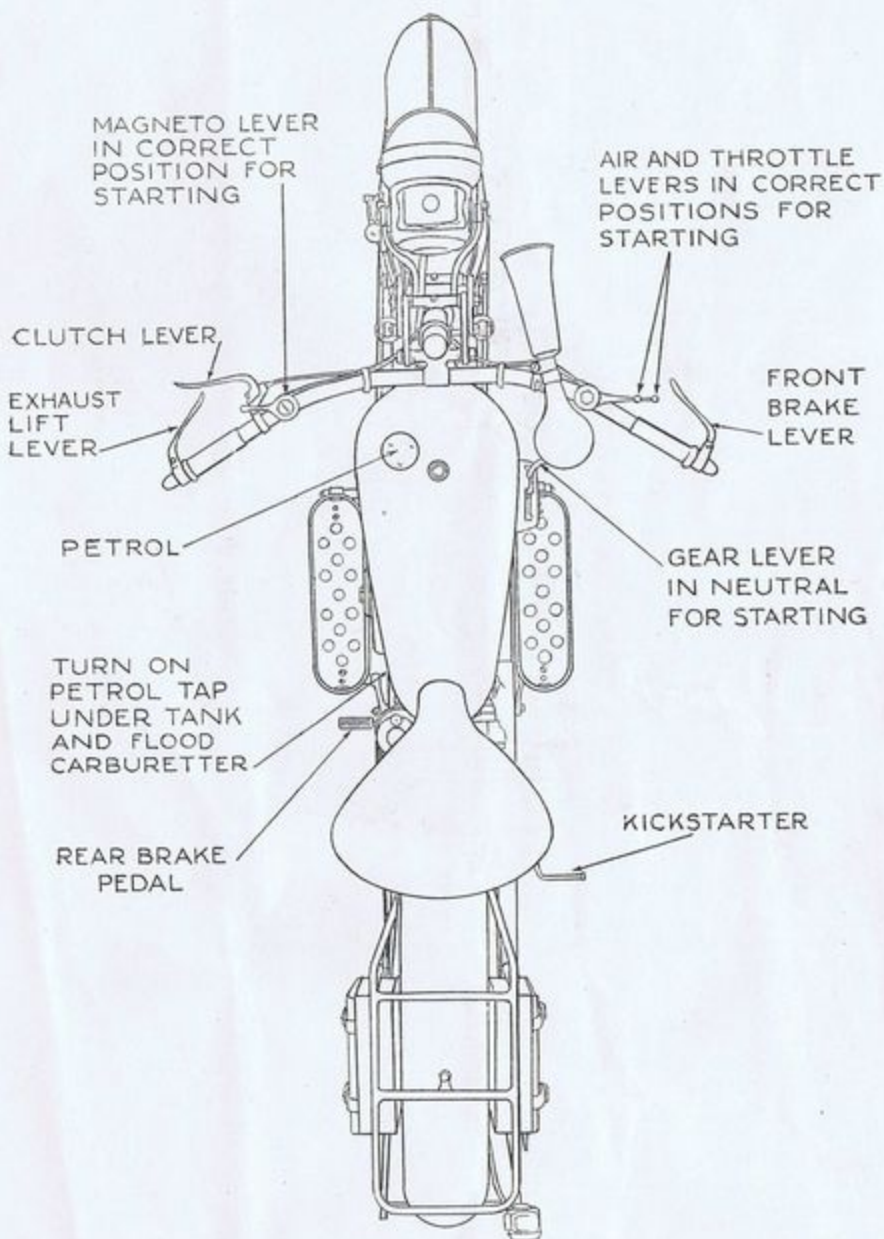
WHEN taking delivery of the machine, make sure that no damage has been done in transit. All machines are tested before leaving the factory and should reach you in proper running order.

IT is advisable to use the machine carefully for the first 500 miles, as it is of course impossible to give a test over such a distance before finally leaving the Works. Do not exceed 30 m.p.h. in the initial stages and do not attempt to cut the oil and petrol consumption down to the minimum until the machine is thoroughly run in.

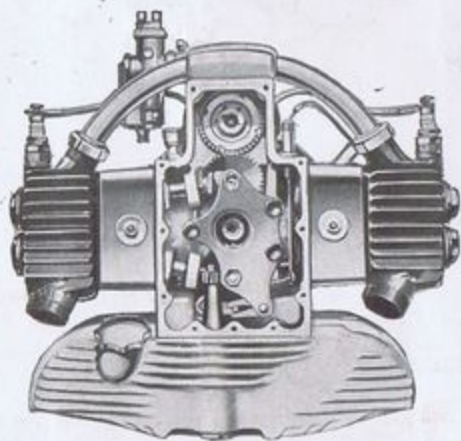
THE oil supply on the B/29 Model dry sump engine is not adjustable, therefore it is only necessary to keep the sump supplied with oil and see that the pressure indicator is raised when engine is running. Very little smoke should be coming from the exhaust after running 500 miles, that is when the piston rings are properly bedded.



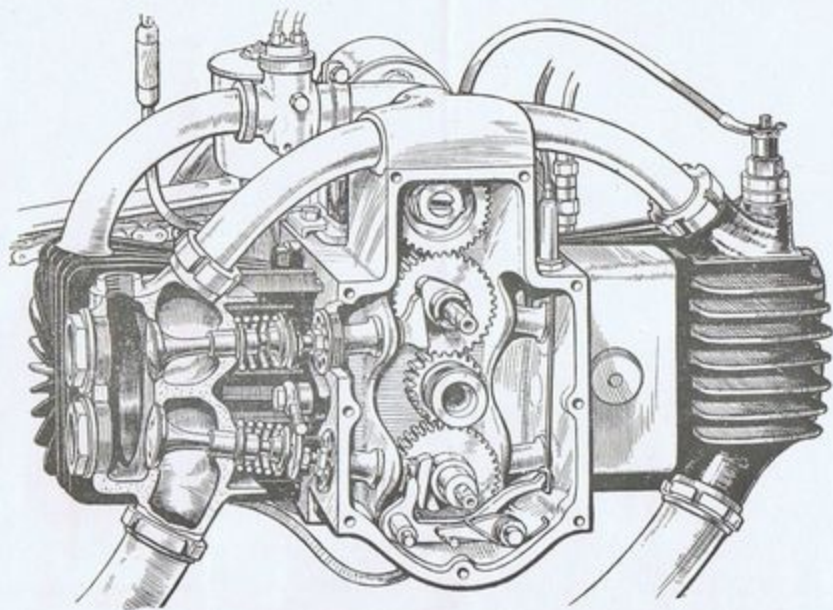
A plan view of the 350 c.c. Model Douglas prior to 1929 showing the controls in the correct positions for starting.



Plan view of B/29 Model Douglas showing the Controls in the correct positions for starting.



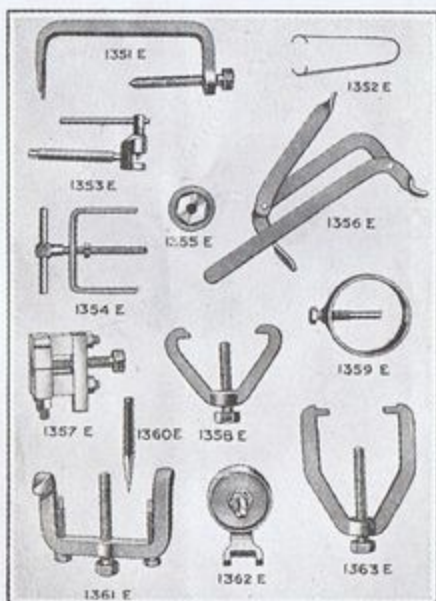
View of B/29 Model Douglas dry sump engine showing timing gear, etc.



The 356 c.c. Engine prior to 1929 in part section. The timing cover with the oil pump has been removed to show the timing gear

## TOOLS.

A set of special tools for use on the 350 c.c. machine has been prepared, particulars of which can be obtained from the Spares Department. These tools are conducive to quicker and better repairs. Quote the part number when ordering.



1351 E. Valve Spring Compressor.

1352 E. Tool for inserting Collets.

1353 E. Chain Rivet Extractor.

1354 E. Tool for compressing Flywheel Clutch Spring.

1355 E. Flywheel Extractor.

1356 E. Tool for compressing Valve Spring.

1357 E. Tool for removing Roller Bush of Main Shaft.

1358 E. Tool for removing Gear Box Sprocket.

1359 E. Gudgeon Pin Extractor.

1360 E. Punch for starting Roller Bush.

1361 E. Tool for removing Gear Box Chain Wheel.

1362 E. Tool for removing Big End Bush.

1363 B. Tool for removing Crankshaft Ball Race.

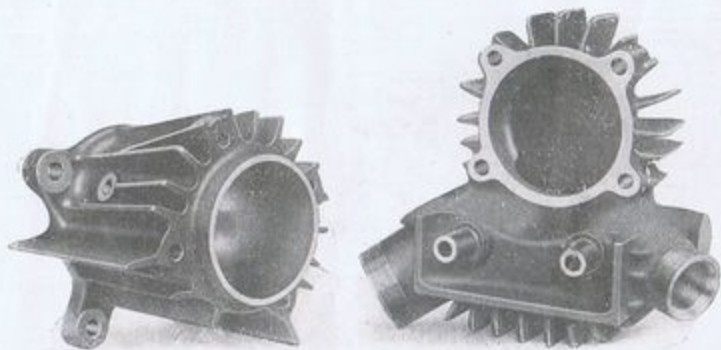
Designed especially for the owner mechanic.

## DECARBONISING.

Should it become necessary to remove the cylinders at any time for decarbonising, etc., the following procedure should be adopted :

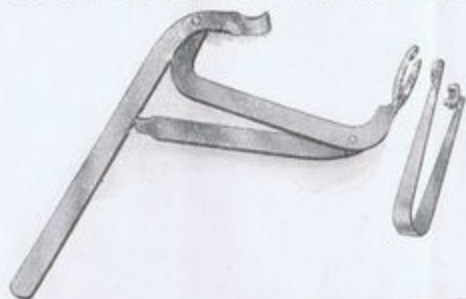
Remove exhaust and induction pipes, chain guard and chain, oil and petrol pipes, and control wires. Remove the engine bolt nuts, situated underneath the crankcase. The engine may then be removed from the frame and the cylinders can be taken off by undoing the holding-down nuts.

The Model B/29 can be decarbonised without removing engine from frame.



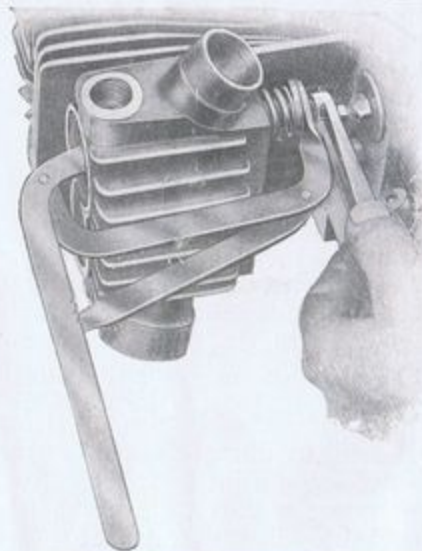
Cylinders and detachable heads as fitted to the 350 c.c. Model.

## VALVE FITTING AND EXTRACTING.



Special valve extracting and fitting tool together with pen steel valve collet tongs.

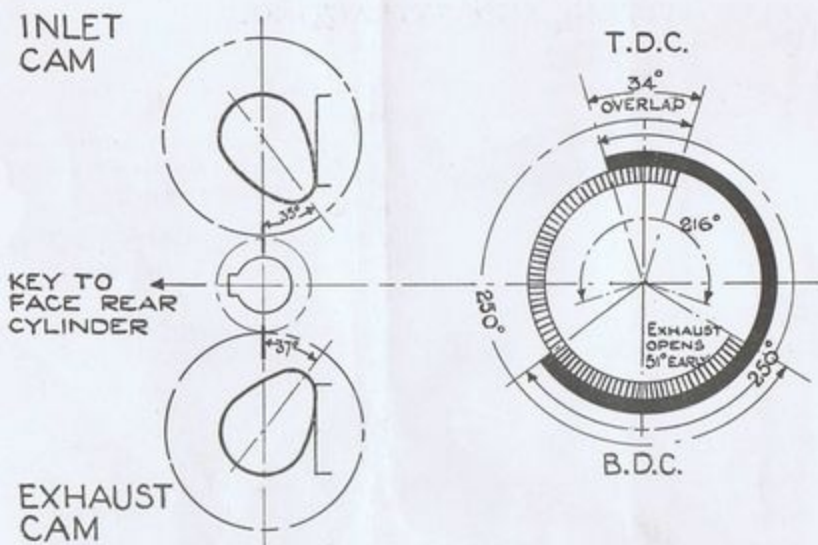
Operating valve extractor tools.



Valve spring refitted and collets being put on to valve stems by tongs.

This tool and tongs can be obtained from Spares Department.  
Price, Extractor 3/6, Tongs 1/6





#### TAPPET CLEARANCES.

The following tappet clearances should be given when the engine is cold :—

Inlet	..	..	..	.006".
Exhaust	..	..	..	.006".

#### VALVE TIMING.

Valve timing should be set as follows :—

- Inlet opens 15° before top centre.
- Inlet closes 50° after bottom centre.
- Exhaust opens 50° before bottom centre.
- Exhaust closes 15° after top centre.

#### MAGNETO TIMING.

The correct timing of the magneto is most important and to check this proceed as follows :—

1. See that contact points are set to proper gap.
2. Fully advance magneto control.
3. Open contact points and insert between them a strip of paper no thicker than this leaf.
4. Turn engine until the points grip the paper, then turn engine very carefully forward, at the same time pulling the paper gently, when the paper is released. At this position the pistons should be just 5/16in. before top of stroke. When using paper for this test care must be taken to avoid leaving any fragments between the points. If difficulty is experienced in setting the timing as above, the driving edge of the peg or key may be filed to allow the magneto wheel to turn further round the driving shaft in a clockwise direction.

## IGNITION

By B.T.H. magneto, instruction booklet of the particular make being included in the tool box, also contact breaker point adjusting spanner.

Should the magneto of a 1926 machine be detached at any time, make sure that the small spring between the end of the armature shaft and the driving dog is replaced, as this keeps the fibre washer in the magneto drive up against the shoulder to retain the oil in the timing chest.

Contact point gaps should be set to the gauge supplied and should not exceed .011.



Compact Magneto Spanner  
and contact point gauge.



Contact Breaker.

## LUBRICATION.

### Model A29, A28, B28, etc.

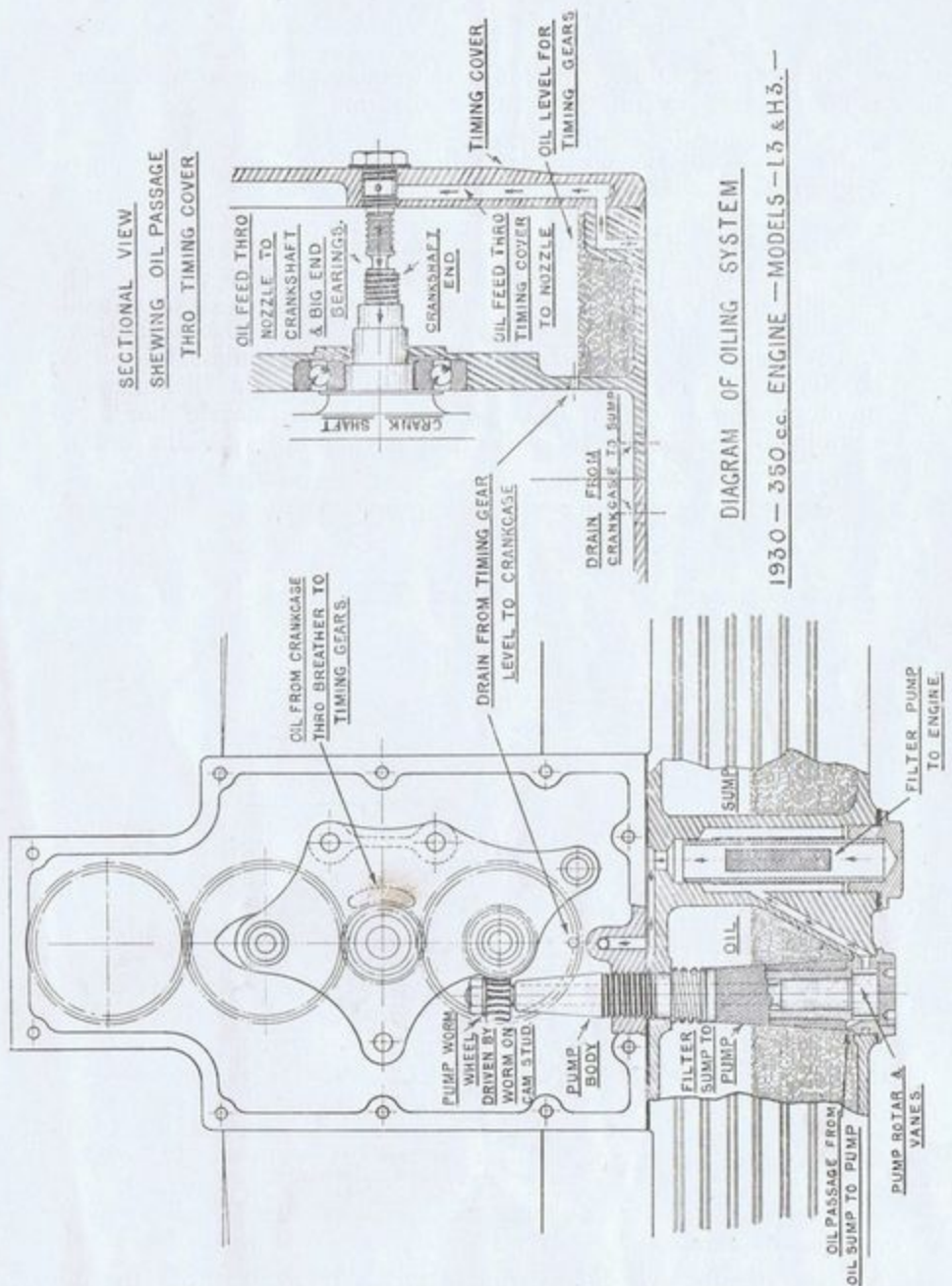
A study of the DOUGLAS lubrication systems will well repay the rider. Two distinct methods are provided:—

- 1.—Mechanical pump which is situated on the inside of the timing chest cover, working through a sight feed situated on top of the tank and—
- 2.—Conveniently placed hand pump working through the same sight feed.

Please note, the mechanical pump is arranged to pump oil and not air, you must therefore see that all joints are kept air tight.

E.W. Machines up to Y.E. 6500 are fitted with "suction" type oiling systems, from this number onwards they are fitted with "pressure" systems. Should owners of the first type wish to convert their machines to the latest type we shall be pleased to exchange them at the special price of 25/- per set, providing that this amount is sent to us with the original timing cover, oil pump, pipes and tap.





SECTIONAL VIEW  
SHOWING OIL PASSAGE  
THRO TIMING COVER

DIAGRAM OF OILING SYSTEM

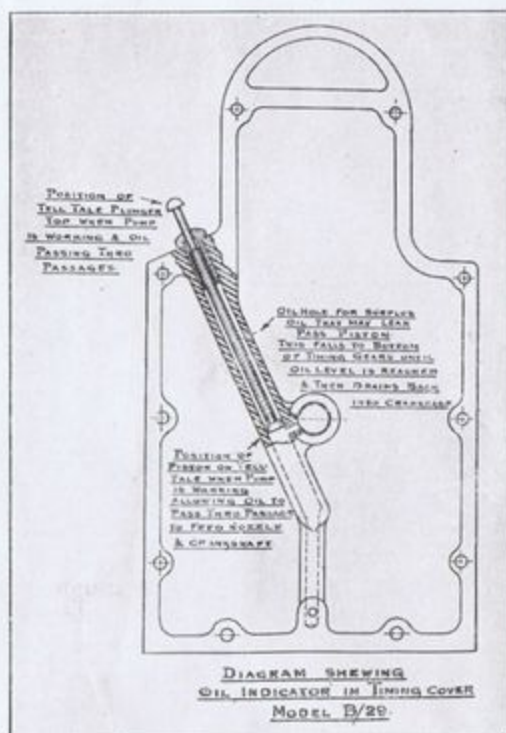
1930 — 350 cc. ENGINE — MODELS — L3 & H3. —

## DOUGLAS MODEL B29 DRY SUMP OILING SYSTEM.

This type of Oiling System is extremely simple in operation, as can be seen by referring to the diagram.

The pump is driven by a small worm wheel and spindle by a dog worm attached to the cam wheel on the cam stud.

Before the oil can flow to the crankshaft feed nozzle it must first raise the piston type of indicator approximately  $\frac{1}{4}$  in. When the indicator is raised more than this amount it shows that the oil is being delivered under greater pressure. From this explanation, and reference to sketch, it will be obvious that unless the oil is holding the indicator up at least approximately  $\frac{1}{4}$  in. there can be no oil passing through the feed nozzle. This feed nozzle should be examined occasionally to see that it is in proper working order.



In case of any over-oiling trouble please remember that the oil system itself cannot possibly supply **too much** oil, therefore the piston rings and cylinders must be examined to make sure they

are in good order, and the scraper rings fitted with the bevelled edge upwards. In the event of the engine being dismantled care must be taken to have the joint washers between engine and sump and between timing cover and crankcase properly fitted to leave the oil passages free.

A cylindrical gauze filter is fitted round the pump body. This filters the oil from the sump, before passing to the pump.

The oil is forced by the pump through the vertical passage marked "B" in the oil sump connected with the vertical passage in the timing cover. Here the oil passage connects with the oil nozzle and passes through the crankshaft end to the big end bearings. There is a continual flow of oil while the engine is running, and the oil is drained back from the crankcase by passages in the bottom of the crankcase leading to the oil sump.

The pump body, complete with spindle, worm and filter, can be readily withdrawn from the oil sump for cleaning purposes, without in any way interfering with any other part of the engine.

The more often the oil is changed the better the engine will like it, but this need not be done more often than, say, 1000 miles running.

## **"E.W." OILING SYSTEM.**

**As fitted to Engines from No. Y. E. 6500 upwards  
to 1929 Model.**

This type of mechanical oiling system has two pipes leading to the timing cover, and one delivery pipe from the sight feed lubricator to front cylinder. The pump is double acting, and driven off the crankshaft.

Oil flows by gravity from the tank through the tap and oil feed pipe to the upper part of the pump, which forces it back through the other pipe to the sight feed, where the flow to the engine can be regulated by turning the dial of the needle valve.

Surplus oil which reaches the timing case from the crankcase is picked up by the lower pump, and forced through a nozzle to the passages in the crankshaft which lead to the big end bearings.

When the tap handle points downwards, the mechanical pump is working, and the hand pump can also be used. When

the tap handle points backwards, only the hand pump can be used.

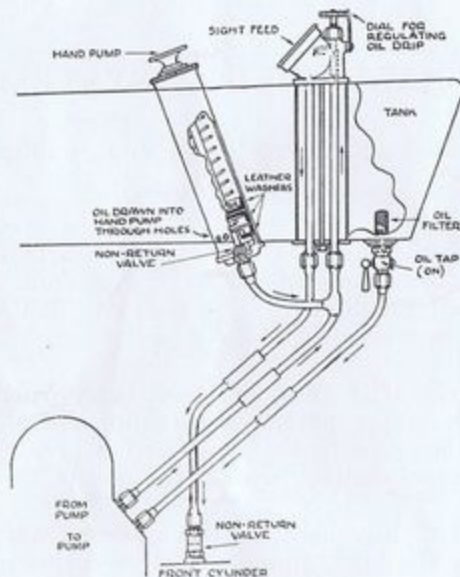
The hand pump should be used when starting, in order to fill the oil pipes. As with the mechanical pump the whole of the oil supplied to the engine passes through the sight feed lubricator, and so the rate of flow is always under the rider's control.

We recommend Wakefield's Castrol XL, Shell Triple or Mobiloil T.T.

When using the hand pump, adjust the sight feed valve so that a pump full of oil lasts from 5 to 7 miles, at an average speed of 20 to 25 m.p.h. When using mechanical pump adjust valve so that oil flows at the same rate.

## "E.W." OILING SYSTEM,

As fitted to all Engines from No. Y E 6500 to 1929 Models.

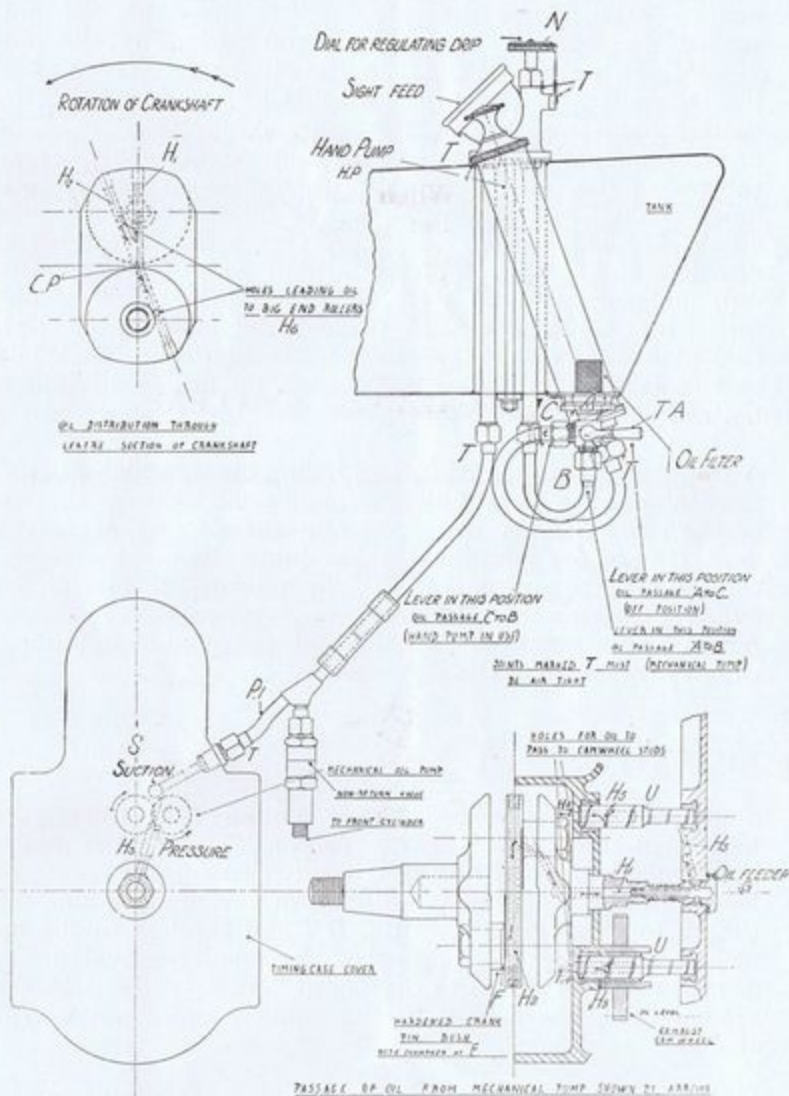


The arrows show the circulation of the oil to and from the pump.

The following is a description of the working of the original

## "E.W." OILING SYSTEM.

As fitted to all Engines up to No. Y E 6500.



The tap "T.A." situated at the bottom of the oil filter "A," is first turned to the "on" position (mechanical pump), the handle of the tap then pointing towards the ground. Unscrew



the regulating needle "N" and when the engine is started, oil should drip in the sight feed.

Mechanical pump "M.P." causes a suction at the point "S," which suction is communicated by means of the pipe "P.1." to the sight feed. This causes the oil to leave the tank under suction and passing through the filter "A," is drawn through under control of the regulator "N" to the sight feed and is sucked through the pipe "P.1." and forced by the pump "M.P." to the hole "H.3." to the oil feeder "G" and into the crankshaft, through the hole "H.1." where it is led to a central point on the middle crank check "C.P." A hole drilled diagonally across the crank check communicates with the end of the hole "C.P." and distributes oil equally to the holes "H.6" and round the groove formed by the chamfer on the big end bearing ring "F" thence out to the big end bearings, and thrown off on to the little ends of the connecting rod, gudgeon pin and piston. A certain amount of oil is forced by crankcase pressure through the holes "H.4." to the cam pinion spindles "U" and out through the holes "H.5" to the cam pinion bearings. Excess oil drains off into the bottom of the timing chest.

A drain pipe is provided in the timing chest, which assists in maintaining the correct oil level, sufficient to cover the teeth of the lower cam pinion, a certain amount of the excess oil being taken for additional chain lubrication. A branch is arranged in the pipe "P.1." which leads oil to the front cylinder through the medium of a non-return valve. The non-return valve assists the mechanical pump in maintaining a negative pressure in the sight feed.

## HAND SYSTEM.

Should the hand pump be resorted to at any time, the tap must be turned through 90° to the position "C." If the pump is now pulled up to its full travel and released, the spring contained in the pump body will return the plunger and cause the oil to pass from "C" to "B" and through to the sight feed "S" under the control of the regulating valve "N," down the pipe "P.1" to the pump "M.P.," after which the system operates in exactly the same manner as described above.

It is most important to see that all joints are air tight and that the oil is of a well known brand.

All machines are tested on Wakefield's Castrol X.L., Mobiloil 'T.T.' or Shell Triple, which grades are recommended for this system.

## INITIAL PRIMING.

In very cold weather, when the oil is sluggish, it is an advantage to give half a pumpful by the hand system to ensure oil getting to the mechanical pump to set the mechanical system into operation.

## DESCRIPTION OF "B. & B." CARBURETTOR.

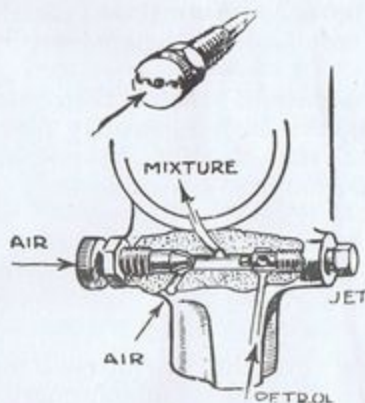
The Carburettor is a Douglas Model made specially for us by Messrs. Brown & Barlow, Ltd., of Westwood Road, Witton, Birmingham, the Manufacturers of the well-known "B. & B." Carburettors.

The Carburettor is of the 2-lever semi-automatic control type, *i.e.*, the Engine can be started with the Throttle Lever slightly open and the Air Lever fully closed. After the Engine has been started the Air Lever can be opened fully and the Engine controlled by the Throttle Lever only.

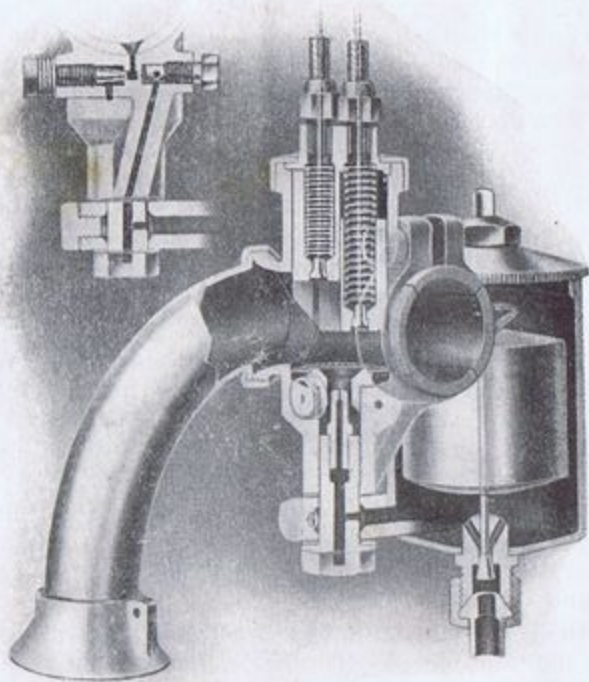
The Carburettor is fitted with two Jets—a Pilot and a Main, the size of Main Jet may vary slightly with different Engines and varying conditions, but generally speaking a 75 Jet should be found correct.

The Pilot Jet is for obtaining the required slow running, and the size is definitely fixed. The Knurled Screw on the side at the bottom of the Throttle regulates the amount of *Air* admitted to the Pilot Jet and to enrich the mixture this knurled screw should be turned in a clockwise direction, *i.e.*, Screwed into body and to weaken this mixture this operation should be reversed. These adjustments are made with the air control lever fully open.

It is imperative that the knurled screw should not be closed off any more than is necessary to get the required slow-running, otherwise the petrol consumption will suffer in consequence.



Construction of "B. & B." Pilot Jet



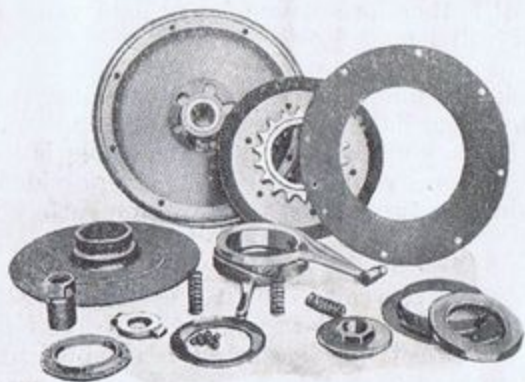
If it is desired that the engine should be made to tick over idle with the throttle lever closed, the result can be obtained by unscrewing the throttle-cable-adjusting-bush situated on top of the spraying chamber cap. As this adjusting bush is unscrewed so the engine will run faster, and the throttle lever should then be closed sufficiently to compensate for this. This operation should be continued until the desired result is obtained, which of course is done with the engine running.

It should be borne in mind that if there is an air leak in the induction system, the engine can only function on the pilot jet with the *throttle fully closed*, and the leak, if of any magnitude, makes slow running impossible.

**All Jets are known by their actual flow when measured by the B.E.S.A. Standards on a Flowmeter, and not by drill sizes as hitherto.**

A Booklet dealing with the general construction of the Carburettor together with much useful information can be obtained from the Makers, free of charge, upon application.

## USE AND MAINTENANCE OF THE DOUGLAS FLYWHEEL CLUTCH.



The various parts of the Douglas Flywheel Clutch

From the illustration it will be seen that there are only six main parts in the clutch—the flywheel, which also acts as a clutch body, the back plate, the centre plate, which is a driven plate and the pressure plate upon which the springs act. To alter the load capacity of the clutch, the nut on the outside has merely to be adjusted to give the required grip. The pressure plate is driven by a key, clearly shown in the sketch, and has a bearing of large diameter on the flywheel boss. This large bearing prevents one of the commonest troubles found in clutches—the binding of the pressure plate on its key or castellation.

The boss must have careful attention at any time the clutch is dismantled, because if the pressure plate does not slide freely on this bearing, the working of the clutch will be very seriously interfered with. If it be carefully assembled, it should give no trouble for at least 10,000 miles. Lubrication of this bearing is provided for by a special nipple for grease gun lubrication, and is situated in the centre of the main clutch adjusting nut. This should be charged with grease, one third of a grease gunfull every 500 miles. The various parts which require lubricating are fed by centrifugal force.

The pressure plate is made with deep radial ribs to give great rigidity, so that when the spring pressure is applied, there is no distortion or whipping, the whole of the spring pressure being passed on to the driven member. The driven member is a very light, steel plate, riveted to the sprocket. It is made flexible,

and is the reverse of the pressure plate and back plate in this respect. The two latter plates are expected to be absolutely rigid under all circumstances. The driven member is expected to conform in almost any direction to the pressure exerted upon it. It is therefore made of very light gauge spring steel, so that it will flex.

The sprocket is mounted on a radial bearing, the inner race for which is cut in the boss of the pressure plate. When the drive is taken up by the clutch the whole is locked rigidly together. A special thrust bearing is provided for clutch release, which in turn relieves the friction surface of all spring pressure.

It is important to remember that as the adjusting screw is screwed up to accommodate wear of the friction material, the releasing arm must be likewise adjusted, by lengthening the Bowden wire; otherwise the spring pressure is exerted on the ball bearing and on the cam face instead of the pressure plate. *This is very important and there should be at least 1/16" of play between the operating cam and the release thrust race.*

Another point to note is that after overhauling, the clutch should be cleaned out; Ferodo and other lining materials form a considerable amount of dust, and unless this is removed from the clutch body it will gradually pack up between the periphery of the clutch plate and the inside of the flywheel, and eventually prevent the clutch functioning.

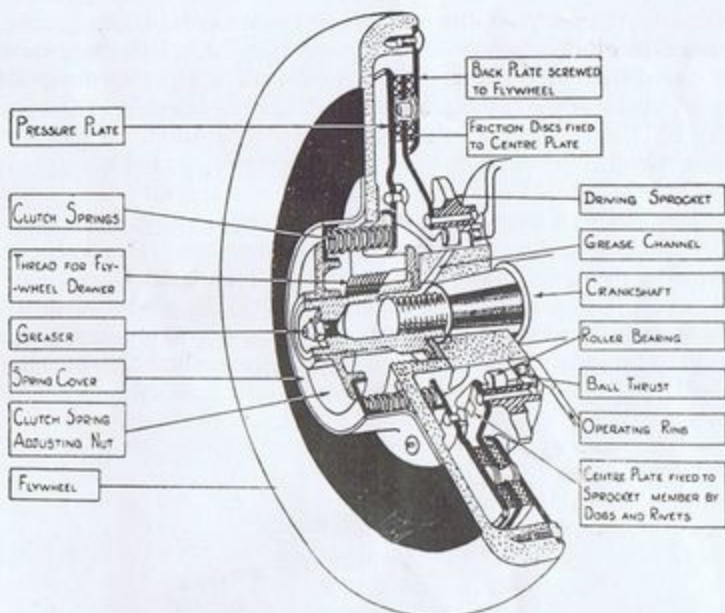
In assembling the clutch after overhauling it will be seen from the illustration that the whole of the parts, with the exception of the springs, flywheel nut and washer, or driving key and the adjusting nut, can be assembled and placed on the crankshaft as a single unit. There should be at least 1/16" clearance between the end of the shaft and the face of the flywheel boss, with the flywheel forced on the shaft. With this correct, insert the driving key, which acts as a washer to the flywheel lock nut, then screw up the lock nut. It is essential that this nut is absolutely tightly secured. With the lock nut in place the four springs should be inserted, their retaining washer put into place, and the adjusting nut screwed on. Under no circumstances should the adjusting nut be screwed tighter than necessary. It is well to try the clutch three or four times, and adjust until all slipping is prevented. Care should be taken that as this nut is screwed up the cam operating lever is allowed to go back towards the crankcase by lengthening the Bowden operating wire.

It is advisable to remove the Bowden wire nipple from the operating arm, and allow the arm to fall free, until the required

adjustment of the spring pressure has been obtained. It will be appreciated that as the Ferodo plate wears, so the spring pressure will require adjustment, and the operating lever resetting accordingly. The life of the fabric is very considerable, and the life of the clutch is very great with ordinary use, and it will stand a great amount of abuse.

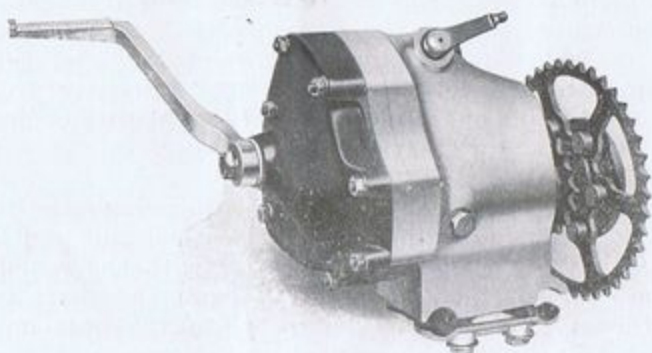
In dismantling all that is necessary is to remove the adjusting nut, the springs and ring, the flywheel lock nut and then the driving key. The flywheel, together with the remainder of the clutch, can then be removed from the shaft with the withdrawal tool. Screw the tool into the boss until it is against the end of the crankshaft. Hammer it round one turn or more and then strike it sharply with the hammer, when the shock will loosen the fly-wheel from the taper of the shaft.

Occasionally, say every 500 miles, charge the bore of the flywheel lock nut with grease. This operation is performed by fixing the grease gun to a special nipple in the centre of the adjusting nut, and screwing in one-third of an average grease gun charge. This keeps all moving parts and bearings well lubricated.



Section of Flywheel Clutch

On latest type clutches the friction rings are riveted to the centre plate, the plate itself being carried on roller bearings.

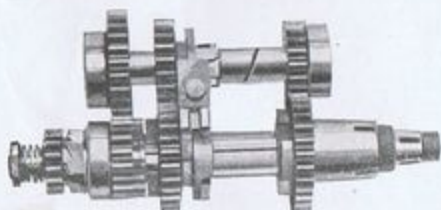


350 c.c. Gear Box complete—as fitted to latest Models.

## GEAR BOX.

Should receive supplies of grease by means of the grease gun every 300-400 miles. It is better to add a little occasionally than to overfill at irregular periods. The plug in front of the box can be removed to determine if there is sufficient lubricant in the box. Grease should be injected until it reaches the plug level.

Wakefield's Castrolase, Shell Grease, Soft or Gargoyle Mobilgrease should be forced through the nipple or filler plug on top of the box. The gear box selector plunger, consisting of a spring and ball in the middle gear pinion automatically holds the gears in full engagement as the ball is forced by the spring into countersunk holes in the gear shaft.



Shafts and Pinions—350 c.c. Gear Box.

## CHAIN ADJUSTMENT—MODEL B/29.

For primary chain adjustment the engine unit fixed to oil sump is adjustable on engine rails of frame; while the gear box is fixed to bottom rear bracket of frame. The adjusting bolt and nut for the engine unit will be found in the centre of bottom front cross tube of frame. To adjust rear chain, move wheel forward or backward by means of adjusting nuts in wheel lugs of rear fork.

## CHAIN ADJUSTMENT—MACHINES PRIOR 1929.

Chains should be adjusted, and kept adjusted, so that they can be pressed down with the finger a  $\frac{1}{4}$ " and never less than an  $\frac{1}{8}$ ". Adjustment is effected in the case of the front chain by loosening the four fixing bolts found underneath the gear box frame lug, the movement being obtained by rotating the draw bolt located immediately behind the box, in a right hand direction to tighten the chain and left hand direction to loosen. Back chain adjustment is carried out by sliding the wheel back in the fork ends. Care should be taken that the chain adjusters are screwed up exactly the same amount each side, so as to keep the wheels in track. *The spindle nuts of the back wheel have left hand threads.* It is most important to keep your chains properly lubricated. A mixture of grease and graphite should be used.

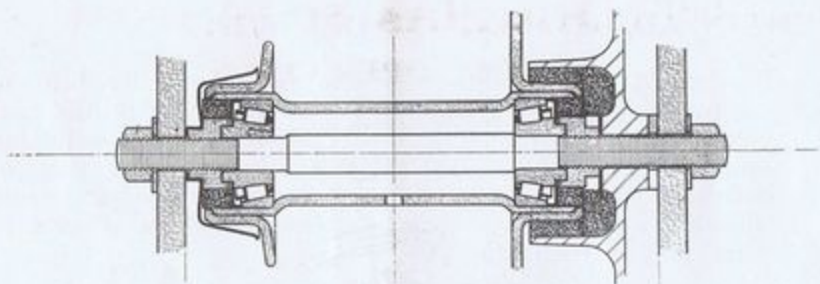
## WHEEL ADJUSTMENT.

The best way to check wheel alignment is to put the machine on the stand and put the front wheel straight with the frame. Tie one end of a piece of string to one leg of the rear stand, then pass it round the back tyre, along one side of the machine, under the footrest, and past the front wheel. Pull the string tight and bring it against the front tyre. If the wheels are in line the string will be quite straight and will touch two points on the front tyre and two on the back. Check by testing the other side of the tyres.

## BALLOON TYRES, 25" × 3".

The standard rim ( $24" \times 2\frac{1}{4}"$ ) will take the following tyre sizes:  $24" \times 2\frac{1}{4}"$ ,  $24" \times 2\frac{1}{2}"$  for  $2\frac{1}{4}"$ ,  $25" \times 3"$ . This medium-pressure tyre was specially manufactured for Douglas machines.  $26" \times 3"$  (710 x 85 mm) can be supplied at extra cost. For overseas  $26" \times 3\frac{1}{2}"$  tyres are fitted.





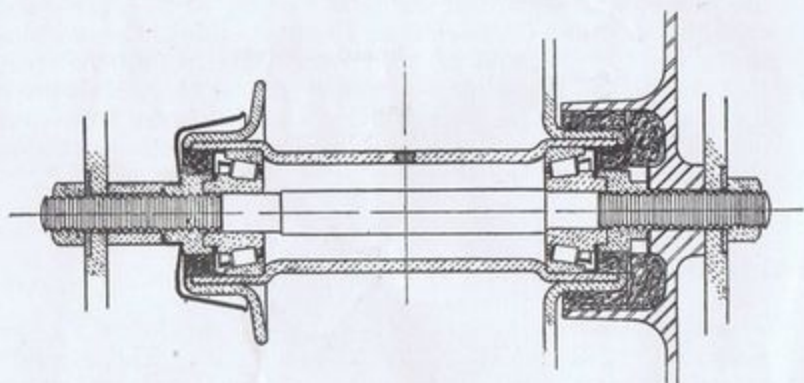
Rear Hub.

### WHEEL BEARINGS.

Great care should be taken in adjusting the taper roller wheel bearings, on no account should they be screwed up tight. All bearings must have a small running clearance, which is naturally greatly magnified if checked at the tyre. In other words, the bearings should be adjusted so that there is perceptible play present when the wheel is grasped by the tyre and rocked to and fro.

For strenuous competition work it is advisable to fit two security bolts to the back wheel and one to the front. This is unnecessary for ordinary touring.

*Wheel nuts have left hand threads.*



Front Hub.

# THE **Douglas** SERVO-ACTING BRAKE OPERATION.

DIRECTION OF WHEEL ROTATION.

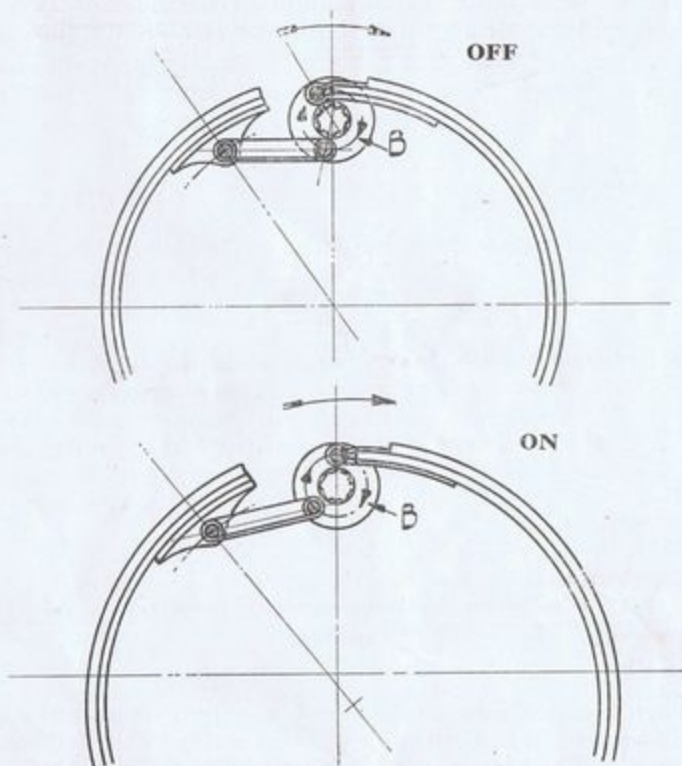
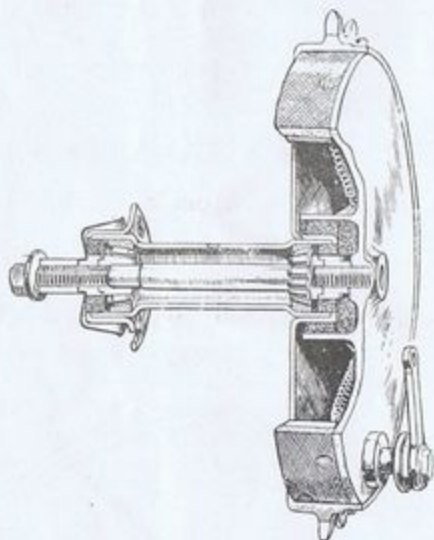


Diagram illustrating the servo action of the Douglas brakes.

The **Douglas** low pressure brake operates on a controlled servo principle—the amount being limited by the design employed—this is rather less than that necessary to overcome the effort of the various return springs.

Of these there is the spring steel band which contracts when released—three small springs connecting the band to the anchorage plate and a spring on the pedal itself. On depressing the pedal the bobbin "B" is rotated in the same direction as the wheel. This forces the ends of the band apart and so expands it whereas the leading end is drawn closer into contact, the other end tending to be dragged off, this latter being opposed by the link which thus reacts on the bobbin, tending to operate it in the opposite direction by suitably proportioning the various details.

Sufficient servo action takes place to allow of exceedingly low pedal pressure ; this is, of course, considerably helped by the use of a relatively large frictional surface (25 sq. ins.). In order to maintain the brake at its highest efficiency, the adjusting screws in the brake anchor plate should be set so that there is only the minimum of clearance between the band and the drum when the brake is not in action.



Sectional view of Douglas semi-servo acting brake.

## BRAKES.

When the machines are delivered, a certain amount of stiffness will be present in both wheels. This is due to the felt washers, which will bed in, in a few hundred miles. The brakes should be adjusted so that the wheels will spin freely when the machine is on the stand. Keep the controls properly adjusted



Brake Anchor Plate complete

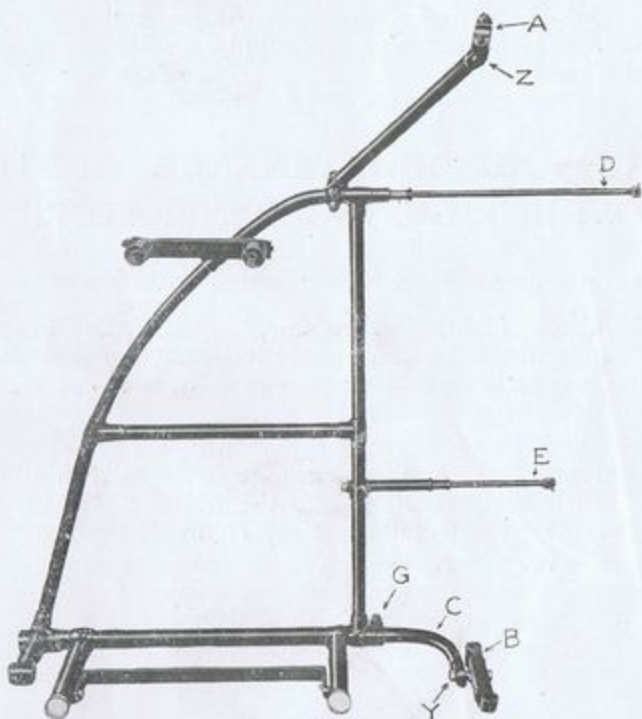
## PRESSURE GREASE GUN LUBRICATION.

All DOUGLAS machines are arranged for pressure grease gun lubrication, and the gun should be used thoughtfully and regularly, great care being taken to see that the lubricant used is of high class make, as much damage may be done to the delicate mechanism, especially ball and roller bearings, by the use of grease containing a large percentage of free acid and alkali. For this purpose we recommend Wakefield's "Castrolase," Gargoyle Mobilgrease or Shell Grease.

## THE 350 c.c. EXHAUST SILENCER.

The silencer should be cleaned out with a wire bottle brush at least once a year.

## INSTRUCTIONS FOR FITTING 350 c.c. SIDECAR.



The fitting of this Sidecar is a simple matter as there are four points of attachment and the chassis needs no alignment to the machine when properly fitted. It should be noted that there is no

drop arm to the rear of the chassis, this being unnecessary as the chassis bolts right through the frame at two points.

It should not take more than half an hour at the outset, but when once the yokes are bolted to the frame it may be removed and attached in a very few minutes. The proper method is as follows :

Remove yokes A and B. Loosen curved member C at G but do not pull it out. Remove nuts and washers from cross bolts D and E.

Remove the large plated nut and washer from the end of the rear brake mounting. Attach yoke A to the front down tube and yoke B to the rear stays. Slide the bolts D and E through the cross members of the frame and bolt up tightly.

Attach member C to yoke B and front connecting arm to yoke A. Tighten up curved member C at G. Go over all the nuts and bolts again to make sure they are all dead tight.

To remove the Sidecar it is only necessary to undo the connections at Z, D, E and Y and slide the bolts D and E out of the frame leaving the yokes A and B on the machine.

*N.B.* Do not attempt to use standard gear ratios with a sidecar. Our Spares Department can supply a suitable sprocket to reduce the gear.

## CARE AND MAINTENANCE OF THE B.T.H. LIGHTING GENERATOR.

*As Fitted to Douglas Motor Cycles.*

THE B.T.H. Lighting Generator, Type P.A., Form B, as fitted to the Model E.W. motor cycle, is a four-pole machine, the magnetic flux being provided by a cobalt steel permanent magnet of ring shape.

The armature is of the drum type, with wave windings. Two brushes only are used, and these are set at 90° to each other, the negative brush being connected to the frame of the generator. As will be seen from the illustration, Figure 1, the general con-

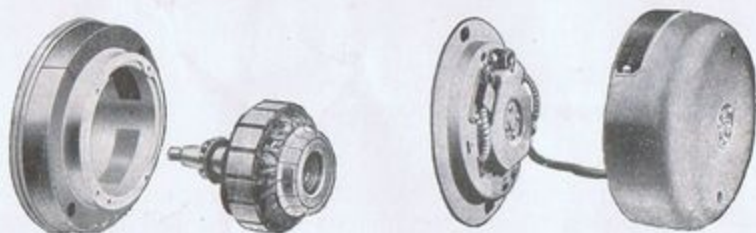


FIG. 1.

struction is very simple, and comprises four assemblies, viz., housing, armature, commutator endshield and cover. The housing is provided with a spigot which locates in a recess provided in the timing case cover of the engine. The generator is secured by two stout bolts, the heads of which are exposed on removing the aluminium cover.

The spigot on the generator housing is machined  $1/64$  in. eccentric with the armature spindle, thus by simply turning the generator on its spigot the gear meshing can be varied, and by means of the series of tapped holes in the timing case cover, secured by the two fixing bolts, in the desired position. Turning the generator in a clockwise direction when looking at the front, tightens the meshing and *vice versa*.

The commutator endshield carries the brushes, and slots are provided so that the endshield can be turned about the axis of the generator for the purpose of adjusting the brush position for the best commutation. This adjustment, however, is made by the makers, and should not be altered except in special circumstances.

The generator runs at approximately  $1\frac{1}{4}$  times engine speed and gives an output of 3 to 3.5 amperes at 3,000 r.p.m., which corresponds to approximately 26 m.p.h. in top gear.

The generator commences to charge at 1,400 r.p.m. or 12 m.p.h. in top gear.

#### ATTENTION IN SERVICE.

The cover should be removed from the generator about every 2,000 miles and attention paid to the following points.—

- (1) Examine the brushes to see that they are free in the boxes and that the springs are bearing on the ends of the brushes. If the brushes are badly worn, the spring pressure will be weak, and new brushes should be fitted. It is very important that only the correct grade of brush is fitted, otherwise the commutator may be badly and permanently damaged. Replacement brushes should therefore be obtained from the manufacturers.
- (2) Wipe away any brush dust from around the brush boxes and the inside of the cover, using a piece of clean cloth moistened with petrol. The commutator may also be cleaned in this way, the cloth being lightly pressed against the commutator, whilst the kick start is gently depressed once or twice.
- (3) Any brush dust in the slots in the commutator should be removed with a small splinter of wood. Care must be taken, however, not to damage the armature connections when cleaning the commutator.

- (4) The armature must not be removed from the generator housing, otherwise the complete generator will have to be returned to the manufacturers for re-magnetising.
- (5) Inspect the battery regularly, say once a month, and add distilled water where evaporation has occurred. Note that the terminals are clean and the leads tightly held. Vaseline should be smeared on the ends of the leads and terminal to prevent corrosion.

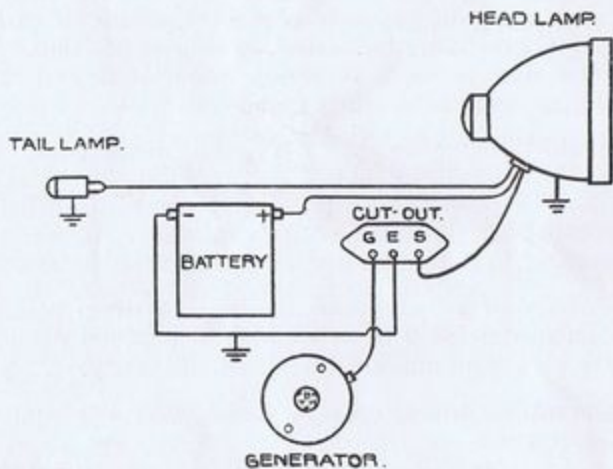


FIG. 2.

#### LOCATION OF FAULTS.

If the battery is not being kept charged, do not conclude that the generator is out of order, but first examine the various leads and connections to ascertain whether any have become loose or detached.

Figure 2 shows the diagram of connections, which are as follows :—

- (1) The negative brush of the generator is earthed and the positive brush is connected to the cut-out terminal "G" by a short lead.
- (2) Cut-out terminal "E" is taken to earth, i.e., some part of the engine or frame, such as a screw or nut, where good contact is assured.
- (3) Cut-out terminal "S" is connected to the head lamp switch.

*Note.*—In some lighting sets the "S" terminal is connected direct to the battery positive.

- (4) Other leads from the head lamp switch go to the tail lamp and battery.
- (5) The negative terminal of the battery is also earthed.

In the case of the first lighting sets fitted, the cut-out was earthed by connection to the bracket supporting the cut-out. The enamel on the frame and also on the bracket prevented good electrical contact with the frame, and an unreliable earth connection was sometimes obtained, and in consequence of this the cut-out did not operate and the battery was not charged.

On later models, however, an earthing lead, as shown in Figure 3, was fitted. The centre terminal of the lead is secured under one of the magneto fixing nuts, and the two end terminals were taken to the negative terminal of the battery and the "E" terminal of the cut-out respectively.

The cut-out itself is adjusted before it leaves the manufacturers, and is not likely to give trouble. It should therefore never be tampered with or readjusted, and for this reason the cover is sealed.

The generator is driven through a metal cone clutch situated in the driving gear in the timing case. This clutch takes care of any undue strain which might be imposed on the generator or gearing by rapid acceleration. Should the clutch become too free, through wear or a weakened spring, it will slip when moderate speeds are reached, and the generator will not give its correct output. Probably it will not charge above two amperes at any speed.

This may be checked by first removing the generator from the timing case, thus exposing the driving gear of the latter. If by



FIG. 3.

pressing a screwdriver against the teeth of this gear it can be revolved easily, it is evident that the clutch needs attention.



# GUARANTEE

*A Reproduction is supplied in the licence holder of each motorcycle.*

We give the following guarantee with our bicycles, motor cycles, motor cycle combinations and sidecars, which is given in place of any implied conditions, warranties or liabilities whatsoever, statutory or otherwise, all such implied conditions, warranties and liabilities being in all cases excluded. Any statement, description, condition or representation contained in any catalogue, advertisement, leaflet or other publication shall not be construed as enlarging, varying or overriding this guarantee. In the case of machines (a) which have been used for "hiring out" purposes, or (b) any motor cycle and/or sidecar used for any dirt track, cinder track, or grass track racing or competitions (or competition of any kind within an enclosure for which a charge is made for admission to take part in or view the competition), or (c) machines from which the trade mark, name or manufacturing number has been removed, no guarantee of any kind is given, or is to be implied.

WE GUARANTEE, subject to the conditions mentioned below, that all precautions which are usual and reasonable have been taken by us to secure excellence of material and workmanship; but this guarantee is to extend and be in force for six months only from the date of purchase, and damages for which we make ourselves responsible under this guarantee are limited to the free supply of a new part in exchange for the part of the bicycle, motor cycle, motor cycle combination or sidecar which may have proved defective. We do not undertake to replace or refix, or bear the cost of replacing or refixing such new part in the bicycle, motor cycle, motor cycle combination or sidecar. We undertake, subject to the conditions mentioned below, to make good at any time within six months any defects in these respects. As bicycles, motor cycles, motor cycle combinations or sidecars are easily liable to derangement by neglect or misuse, this guarantee does not apply to defects caused by wear and tear, misuse or neglect.

The term "misuse" shall include, amongst others, the following acts:—

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

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

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

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

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

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