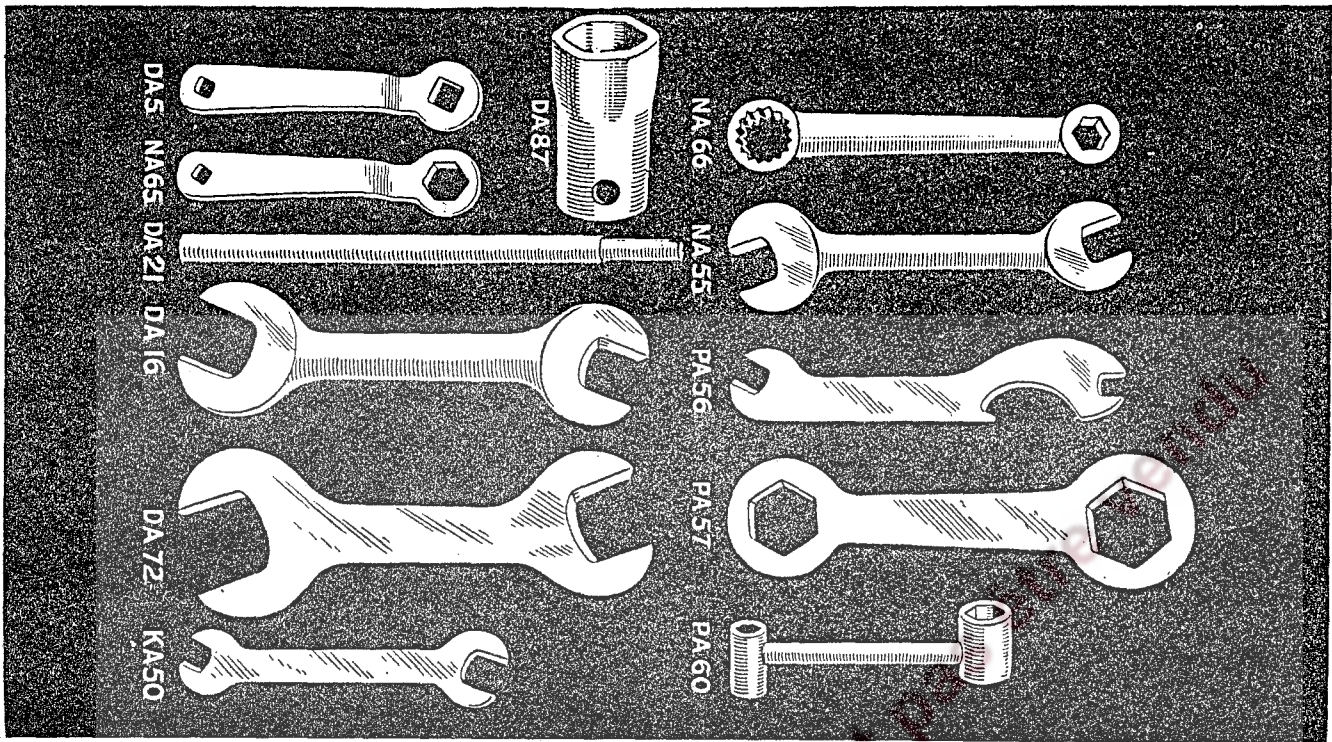
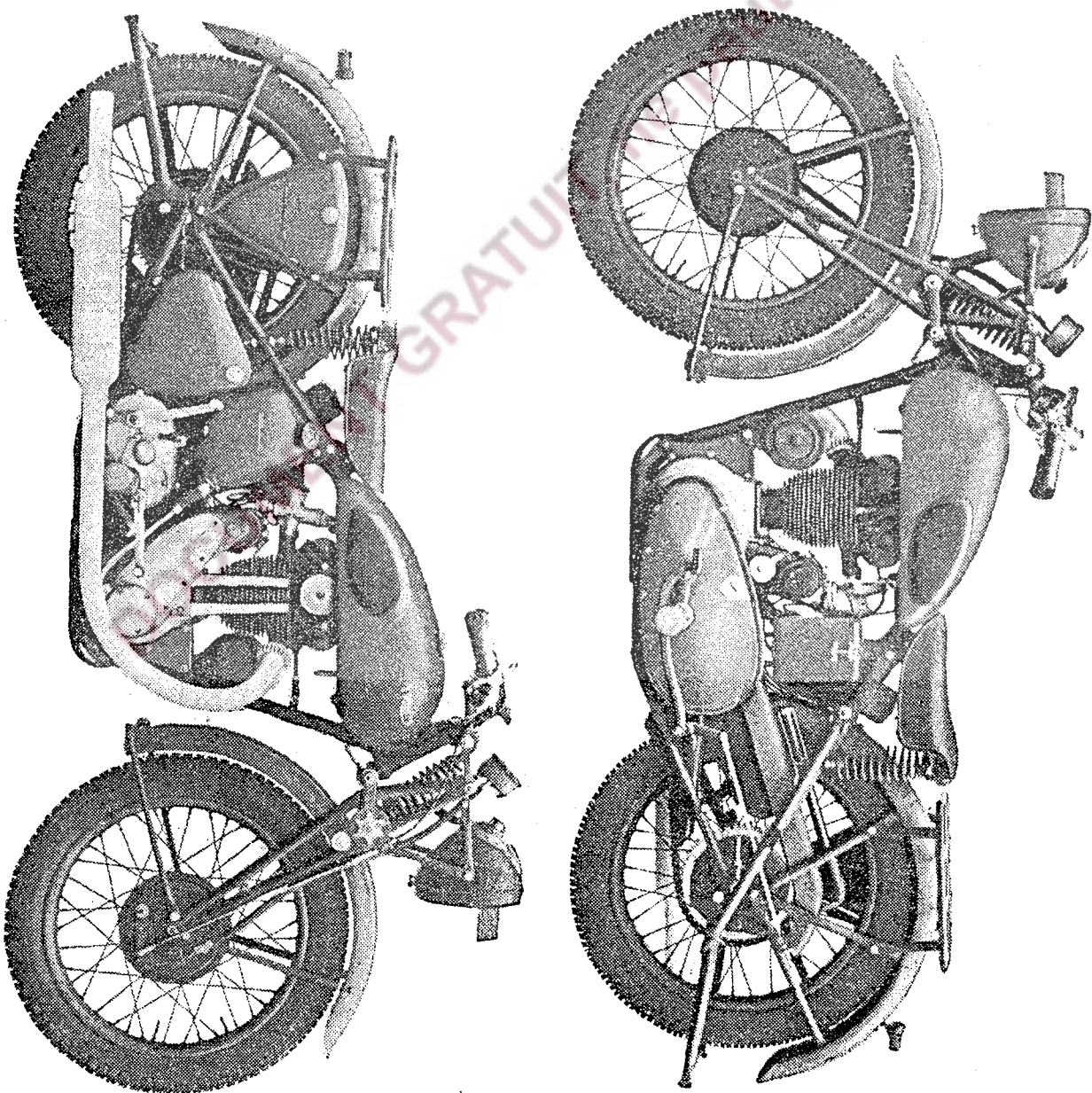
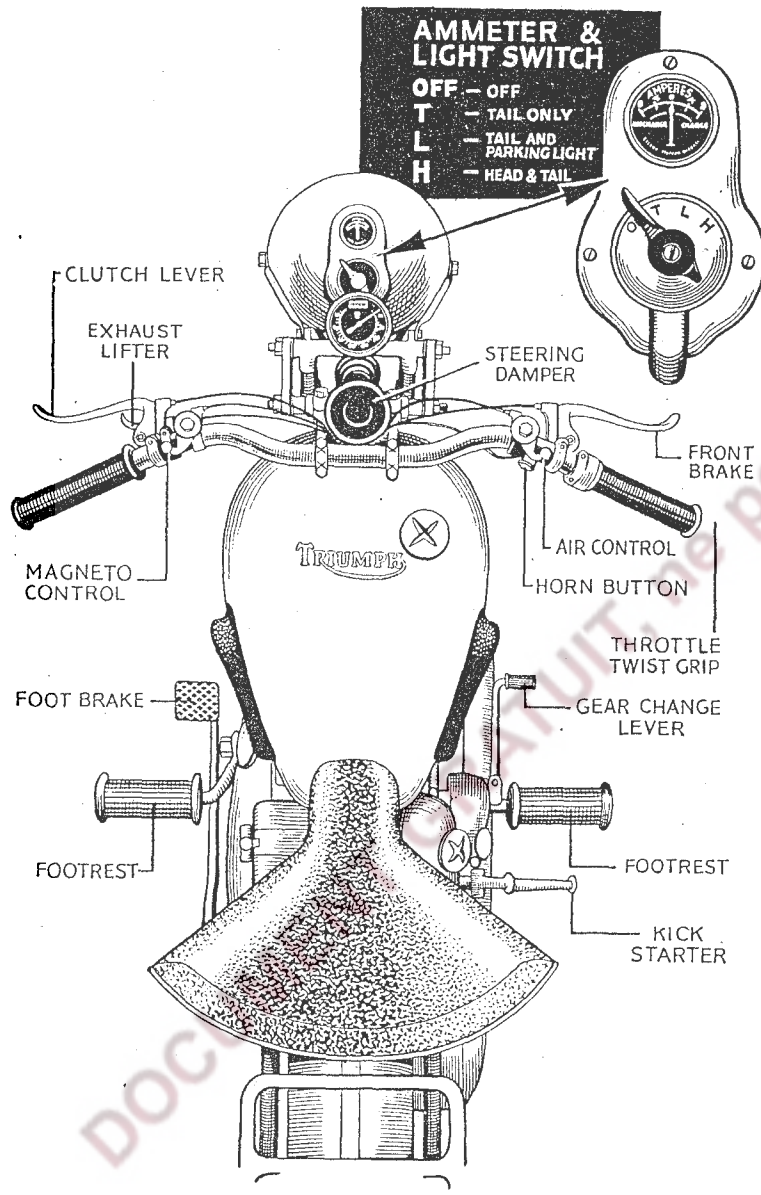


# MOTOR CYCLE SOLO

350 c.c. O.H.V.



MODEL 3 H.W.



LAY-OUT OF CONTROLS

## Technical Data

MODEL	3 H.W.
TYPE	O.H.V. Single Cylinder
CAPACITY	349 c.c.
BORE	70 mm.
STROKE	89 mm.
LUBRICATION	Dry sump.
<b>GEAR RATIOS—</b>	
Top	5.80
Third	8.40
Second	13.30
Bottom	17.80
<b>CAPACITY—</b>	
Petrol	3½ gallons (including
Oil	6 pints 1½ pt. reserve)
<b>BIG-END—</b>	
Con. Rod—Side play	.003" — .015"
Big-end diameter	1.4620" — 1.4623"
Crankpin—Bearing diameter	.9620" — .9617"
<b>SHAFTS AND TAPPETS—</b>	
Timing Shaft diameter (bearing position)	.9995" — 1.000"
Drive Shaft diameter (bearing positions)	.9995" — 1.000"
	1.1246" — 1.1248"
Camshaft Bush diameter (internal)	.5610" — .5620"
Idler Gear Bush diameter (internal)	.4995" — .5005"
Tappet Guide diameter (internal)	.3740" — .3750"
Tappet diameter (external)	.7495" — .7500"
<b>PISTON AND BARREL—</b>	
Bore diameter	2.7555" — 2.7560"
Maximum permissible wear before reboring	.008"
Piston Clearance—Top of Skirt	.008" — .0085"
Bottom of Skirt	.004" — .0045"
Piston Rings—Gap	.010" — .014"
Groove Clearance, Compression	.001" — .003"
Groove Clearance, Scraper	.0005" — .0025"
<b>VALVES—</b>	
Valve Guide diameter (internal)	.3120" — .3130"
Valve Stem diameter—Inlet	.3095" — .3100"
Exhaust	.3083" — .3088"
Valve Seat Angle	45°
Tappet Clearance	Nil
Rocker Bush diameter (internal)	.5620" — .5630"
Rocker Spindle diameter	.5605" — .5610"
Timing—Inlet Opens, B.T.C.	47½°
Inlet Closes, A.B.C.	68½°
Exhaust Opens, B.B.C.	69½°
Exhaust Closes, A.T.C.	46½°
<b>IGNITION—</b>	
Timing, fully advanced	3/8"
Contact Breaker Point Gap	.012"
Sparkling Plug Point Gap	.015" — .018"

TECHNICAL DATA (continued)	
<b>OIL PUMP—</b>	
Body, Scavenge diameter (internal) .....	.37475"—.37525"
Body, Feed diameter (internal) .....	.31225"—.31275"
<b>CARBURETTOR—</b>	
Main Jet .....	150
Slide .....	6/4
Needle Jet .....	107
Needle .....	6
<b>CLUTCH AND GEARBOX—</b>	
Clutch Rod, Lost Motion .....	1/32"
Clutch Cable, Lost Motion .....	1/16"
High Gear Bush—Layshaft diameter (internal)	.7498"—.7505"
Mainshaft diameter (internal)	.8115"—.8125"
Clutch Spring, Free Length .....	1.5"
<b>FORK—</b>	
Spindle diameter .....	.435"—.436"
Spindle Bushes diameter (internal) .....	.437"—.438"

NOTE.—All bush measurements are finished sizes in position where the bush is not floating.

## How to use this Manual

This maintenance manual has been produced to assist workshop staff in servicing the Triumph Motor Cycle, Model 3 H.W.

A comprehensive index will be found at the end of the book, and should be studied so that the user knows what information is available. Any complete operation or part of an operation can be located from the index. The maintenance manual should be read in conjunction with the Driver's Handbook No. 100 TCIA. The various spare parts which are required to carry out a repair can be identified from the illustrations and will be found listed in the Replacement Parts List for Model 3 H.W.

The extruded views of the engine, gearbox and other parts should be closely studied as they will assist greatly in dismantling and re-assembly.

The special equipment referred to will be found to be of the simplest type which, where necessary, can easily be made up by a unit in the field.

All necessary measurements will be found on the Data Sheet (page 3).

## Engine

### DECARBONISING

The 3 H.W. engine requires decarbonising only at long intervals. It should not be necessary to lift the head until 10,000 miles has been run. Even then very little carbon will be found: the dismantling is necessary in order to give attention to the valves. It is never necessary to lift the head to remove the carbon only. Failure to start easily, loss of power, detonation when accelerating, uneven running at low speeds and increased petrol consumption are all signs that an engine requires attention.

### REMOVING THE CYLINDER HEAD.

The procedure for removing the cylinder head is as follows:—

1. Screw off the carburettor mixing chamber cap and remove slides.
2. Take off petrol pipe and carburettor.
3. Drain petrol tank.
4. Remove "U" petrol pipe at front of tank.
5. Take off petrol tank after removing the four holding bolts.
6. Remove rocker spindle acorn nuts and oil feed pipe.
7. Disconnect plug lead.
8. Take off torque stay.
9. Disconnect exhaust lifter cable.
10. Unscrew the four cylinder head bolts, using the double box spanner (Part No. PA60, see inside front cover).
11. Remove cylinder head.

### DISMANTLING THE CYLINDER HEAD.

To remove the rockers and the valves, proceed as follows:—

1. Remove the rocker inspection covers.
2. Knock out the rocker spindles from the oil feed side.
3. Remove the rockers, thrust and spring washers from the rocker boxes.
4. Remove the valves by depressing the collars and tapping out the split cotters.

### ROCKERS AND PUSH RODS.

The rockers should be tried on the spindles to make certain that there is no excessive wear in the bushes. Where required, new bushes must be pressed in and reamed to size. The ball pins and the adjustable pins should be examined and replaced if necessary. The ball pins are a press fit into the rockers. If the lock nuts are at all worn and burred they should be renewed. The push rods should be replaced if the ends are worn or loose.



Shoulder Drift for Removing and Fitting Valve Guides.  
Total Length, 6ins.; Small Diameter, 1in. long; Diameters, 1/2in. and 19/64in.

### GRINDING THE VALVES AND REMOVING THE CARBON.

The valves must be carefully and thoroughly cleaned and all carbon removed. The stems should be polished, but care must be taken to avoid the excessive use of emery cloth. Remove the carbon from the cylinder head and polish out the dome.

Test the valves in the guides to make certain that the guides are not unduly worn. If the guides are worn the valve stems will usually show considerable wear also.

To remove a guide a shoulder drift should be employed. The smaller diameter should be 19/64in. and the larger 1/2in. A new guide can be inserted by the same method. Make certain that it is tapped fully home.

## ENGINE

After inserting a new guide, the valve seating should be re-cut with a seating cutting tool. The valve should be placed in position and a little fine valve grinding compound placed on the face. Grind for a few moments only and then remove the valve, wash in paraffin and examine the face. If the face is badly pitted, the valve must be re-faced; excessive grinding to remove deep markings on the face will create a pocket for the valve with consequent loss of engine power.

After re-facing, when necessary, the valves should be ground in the usual manner and then re-assembled in the head, employing new valve springs. The life of a set of valve springs should be taken as 10,000 miles. Normally the engine will be dismantled at 10,000 mile intervals and the valve springs should then be replaced. If, for some reason, the engine is dismantled after a smaller mileage, valve spring renewal may not be necessary.

## BEARINGS.

It is possible to examine the bearings for wear without dismantling the engine entirely. It will often be convenient to carry out this examination when the machine is being decarbonised. With the cylinder removed, some idea of the big-end bearing condition can be obtained. Turn the engine round until it is in the top dead centre position and test the big-end for up and down play. This should be barely perceptible. If the connecting rod can be moved from side to side and will touch the flywheels with the engine in the bottom dead centre position, the bearing should be replaced.

To examine the main bearings, the primary chain case and the engine shock absorber should be removed. It should not be possible to lift the engine shaft even slightly. The timing side bearing can be tested by removing the timing cover and using a screwdriver in an attempt to lift the small timing gear. Here again, the bearing must be renewed if there is any perceptible lift.

## ASSEMBLING THE ROCKERS.

The rockers are not interchangeable. The exhaust rocker can be recognised as it has a "horn" on the end to take the valve lifter. It is impossible to fit a rocker in an incorrect position.

Each spindle is fitted with five washers. The rocker spindle should be placed through the hole in the box at the side opposite to the oil feed. First place a plain washer, then a spring washer, and then another plain washer on the spindle inside the box. Now pass the spindle through the rocker and finally place another plain washer on the spindle before pushing it through the box on the oil feed side. Finally, tap in the spindle until it is right home. The order of the parts inside the rocker box from the side opposite the oil feed should be:—

PLAIN WASHER  
SPRING WASHER  
PLAIN WASHER  
ROCKER  
PLAIN WASHER

## CYLINDER HEAD JOINT

The cylinder head is ground to the barrel to make a gas-tight joint. No gasket or jointing compound is employed. See that the faces of both parts are clean and apply a very thin even film of fine valve grinding compound to the barrel face. Now place the head in position and grind the two faces together until both show an even grey surface. Carefully clean away all traces of grinding compound from both parts.

## REPLACING THE CYLINDER HEAD.

New washers should always be used at the bottom and top of the push rod tubes. The round cover in the head should be removed to enable the push rods to be properly located. Assembly is assisted if the engine is rotated until the tappets are both in the lowest position. Great care must be taken to see that the push rod tube washers are correctly positioned in order to prevent oil leakage.

The four bolts securing the cylinder head must be tightened down evenly and the engine then turned over to see that the valve gear is operating correctly. The tappets should then be adjusted as described on page 13.

Fit the oil feed pipe to the rocker spindles, using new washers. Re-assemble the exhaust lifter and adjust it so that the peg is well clear of the horn in the rocker.

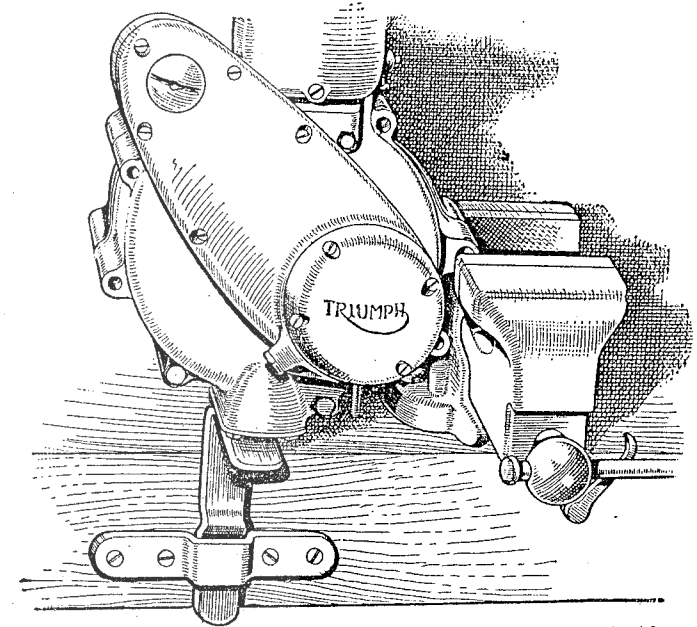
Before closing the rocker boxes with their covers, a copious supply of engine oil should be injected on to the moving parts. See that the washers are in good condition before fitting the covers.

## ENGINE

## REMOVING ENGINE FROM FRAME, SERVICING & REPLACING

### REMOVING ENGINE FROM FRAME.

1. Drain oil tank.
2. Disconnect plug lead.
3. Drain petrol tank and remove it (see page 13).
4. Disconnect dynamo cables and earth wires on magneto.
5. Take off advance and retard control from magneto (see page 39) and disconnect exhaust liner cable.
6. Remove carburettor (see page 36).
7. Remove horn.
8. Release oil block under timing case by taking off nut and pulling block downwards off stud.
9. Disconnect rocker oil feed pipe.
10. Remove torque stay clip bolt and screw out torque stay stud from cylinder head.
11. Take off exhaust pipe and silencer as a complete assembly by slacking off the clip bolt at exhaust port and removing silencer hanger bolt.
12. Drain chain case and remove both halves. This will necessitate the removal also of the clutch (see page 21). The engine shock absorber must also be taken off. The nut has a right-hand thread and a robust box spanner must be employed. The tommy bar should be given a few sharp blows in order to start the nut.
13. Remove entirely the front engine plates and undershield.
14. Take out the rear engine plate to frame bolts.
15. Remove engine with rear engine plates attached to crankcase.



Reproduced from  
"Motor Cycling"

Simple Jig for Holding Engine on Bench.

### DISMANTLING.

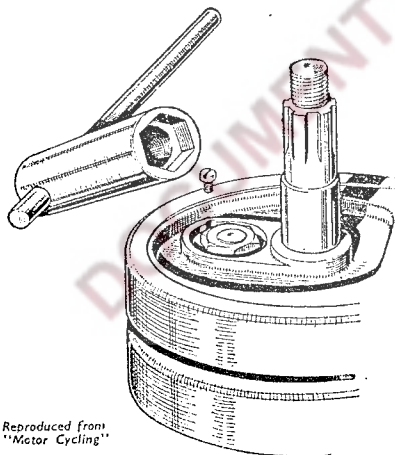
Having removed the engine from the frame it should be mounted on the bench so that work on it can be conveniently carried out. The illustration shows a useful and simple method of holding the engine firmly on the bench. If the vice is a light one, it is advantageous to fit a distance piece in the jaws at the end opposite to that which is holding the crankcase lug. This arrangement has the advantage that there is no heavy jig required to hold the engine.

## ENGINE

Dismantling should now proceed as follows :—

1. Remove the magdyno (see page 39).
2. Remove the four securing screws and take off the oil pump cover.
3. Cut the security wire on the oil pump studs, remove them and the oil pump complete.
4. Unscrew the remainder of the screws securing the timing cover and remove it.
5. Remove the nut from the main shaft (left-hand thread).
6. Extract the mainshaft pinion from the shaft, using a standard two or three claw puller.
7. Remove the cylinder head after taking out the cylinder head bolts and removing the oil leads.
8. Take off the cylinder barrel holding-down nuts, and lift off the cylinder barrel.
9. Take out a gudgeon pin circlip and push out the gudgeon pin. Take off the piston and mark the inside front with the tang of a file, so that it can be assembled again in the same position.
10. Remove the crankcase bolts.
11. Take the engine out of the vice and remove the crankcase filter.
12. Split the crankcase by "bumping" the end of the mainshaft on a piece of soft wood on the floor. It will be found that the assembly will easily separate.
13. Remove the crankshaft assembly from the crankcase.
14. Warm the timing side crankcase and drop the case from a height of about 6 ins., open side downwards on to a bench. The bearing will fall out. Another method is to tap the bearing out, employing a disc of such a size that it will only just pass into the crankcase from the timing side. It will thus be prevented from falling through by the bearing, which can be tapped out.
15. Remove the drive side inner bearing in the same manner as the timing side, and then the drive side outer bearing after springing out the circlip.

**Note.**—Machines fitted with pressed steel in place of aluminium chain cases have a cased felt washer installed between the two drive side bearings. There is also a distance sleeve which keeps the two bearings apart. When dismantling the crankcase, drive side, the inner bearing should first be removed as described in 14 and 15 above. The sleeve which fits through the centre of the cased felt washer can be taken out with the fingers or with pliers. The felt washer must not be used again under any circumstances and can, therefore, be handled irrespective of any damage which may be done to it. The outer bearing can then be removed in the same way as the inner bearing.



Crankpin nuts are locked with small screws.

The box spanner used on the engine shock absorber nut also fits the crankpin nuts.

Reproduced from  
"Motor Cycling"

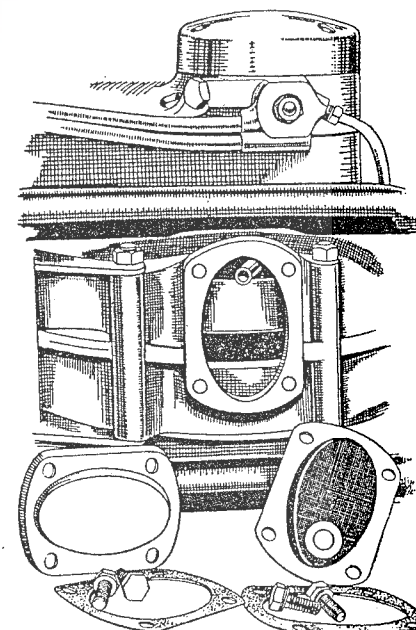
## ENGINE

### DISMANTLING FLYWHEEL ASSEMBLY.

The dismantling of the crankshaft assembly presents no difficulty. The nuts are locked by locking screws, which must be removed. The box spanner used for the engine shaft nut should be employed for the crankpin and mainshaft nuts.

The parts should all be checked for wear, using the data sheet on page 3. The main bearings should be replaced if they show any signs of rusting or if, after cleaning by washing thoroughly in paraffin, there is any appreciable amount of play. The bearing cages should also be examined and the bearing discarded if they are not in perfect condition.

It is not always necessary to remove the main and timing shafts from the flywheels as these can be measured for wear whilst in position.



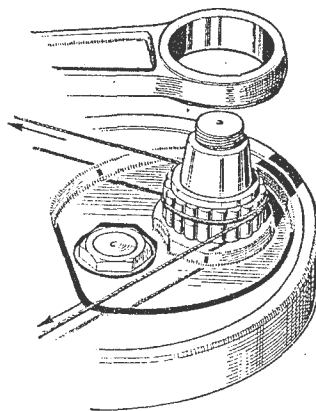
View of the underside of the crankcase, showing the parts of the crankcase filter and the bottom of the scavenge pipe which returns the oil to the oil tank.

### ASSEMBLY OF FLYWHEEL UNIT.

First fit the main and timing shafts to the flywheels, tighten up the nuts and secure with the locking screws. Now fit the crankpin to the timing side flywheel and tighten the nut hard up and fit the locking screw. Place a quantity of Grease No. 2 on the bearing surface of the crankpin and fit the double row of rollers (30 in all) in position. To fit the connecting rod use a piece of thin string, as shown in the illustration (page 10). This will bring the rollers into position and allow the big end of the connecting rod to pass over them. The string should be used on each row of rollers in turn.

## ENGINE

When fitting the connecting rod to the rollers, use a piece of thin twine to position them so that the big end of the connecting rod can be slipped over easily.

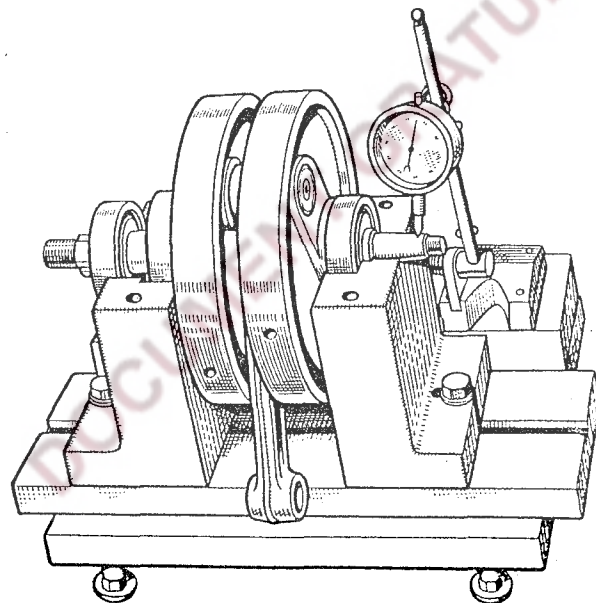


Reproduced from  
"Motor Cycling"

Now fit the other flywheel and tighten down the nut, but not fully home. Place a pair of bearings on the timing and drive shafts and true the assembly on a V block, making a final check with a dial gauge on the gearshaft. Finally, tighten up the crankpin nut and lock with the lock screw. After tightening make a final check with the dial gauge.

Make certain that the oil way to the big end is clear by squirting some oil into the timing shaft with an oil gun.

It must be ascertained that the connecting rod is quite free after the assembly has been tightened up. If it is "pinched" or the side play is insufficient, some metal must be machined off the flywheel bosses.



V Blocks and Dial Gauge used for checking the Flywheel Assembly.

## ENGINE

### TAPPET GUIDES.

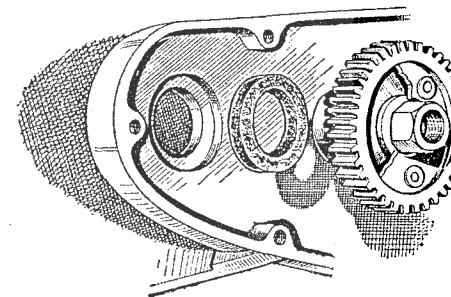
Wear on the tappet guides is unusual under normal conditions. In order to remove the guides the tappet nuts should be removed and the tappet allowed to drop as far as it will into the crankcase. The guide should be removed by using a split tube which can be fitted round the shank of the tappet and tapped out with a drift and hammer, using the drift on the foot of the tappet. The split tube must be of a diameter slightly less than the guide and a little longer.

The fixing stud or screw must, of course, be removed from the crankcase before the tappet can be extracted.

### TIMING GEAR.

The camshaft bushes in the crankcase and the timing cover give very long service and do not normally require replacement. If replaced they must be reamed in line by using a reamer on each pair of bushes at the same time. The intermediate gear is fitted with a bush which requires replacing only after a considerable mileage. This bush should be reamed after pressing in. The intermediate gear spindle is a drive fit into the crankcase. If it is found to be loose, it should be tinned and replaced.

There is a cork washer fitted behind the magneto drive gear to prevent oil leakage. This should be renewed as a precaution when the crankcase is stripped. The magneto gear should be carefully examined prior to assembly. The rivets which attach the plate to the gear occasionally slack off—usually due to rough handling of the nut—and if this has happened the gear should be repaired.



A cork washer is fitted behind the magneto drive gear in the timing case to prevent oil leakage.

Reproduced from  
"Motor Cycling"

### RE-ASSEMBLING THE CRANKCASE.

1. Fit the bearings to the case, not forgetting to spring in the bearing circlip securing the outer bearing on the drive side.
2. Assemble the crankshaft assembly to the drive side of the crankcase.
3. Assemble the timing side of the crankcase.
4. Bolt the two halves of the crankcase together with the crankcase bolts. The joint between the two halves of the case is made with jointing compound. See that the faces of the case are both clean before the compound is applied.

**Note.**—If a pressed steel primary chain case is fitted special attention must be paid to the installation of the felt washer between the drive side bearings. This washer must be soaked in oil 50 H.D. for 2 hours before fitting. After fitting the lubricated outer drive side bearing to the crankcase shell and springing in the retaining circlip, take the cased felt washer out of the oil and press it into the crankcase shell. Place the distance sleeve through the felt washer and install the inner bearing.

## ENGINE

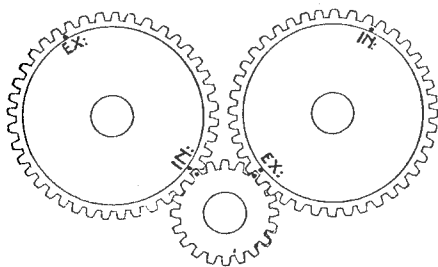
### VALVE TIMING.

The valve timing gear is marked, and if the marked teeth are meshed together the timing must be correct.

When carrying out this operation, the EX marking on the inlet camwheel and the IN marking on the exhaust camwheel should be ignored.

If the markings on the small timing pinion are not visible, the nut should be moved about one-eighth of a turn when they will be exposed.

Should it be necessary to check up the timing with a degree chart, the valve tappet clearances must first be checked to make sure that they are set to nil.



The timing gear teeth are marked to facilitate valve timing. This illustration shows the correct setting.

### PISTON AND CYLINDER BARREL.

The gudgeon pin should be a very tight push fit in the piston bosses. It should, however, be free in the small end bush of the connecting rod without any play with the parts dry and unlubricated. The gudgeon pin is held in position by circlips, which must be fitted carefully to make sure they are fully engaged in their grooves. If a circlip is omitted or insecurely fitted the gudgeon pin is likely to groove the cylinder.

If new piston rings are fitted they should be tried in the barrel at the bottom of the bore and the gap measured. The piston should be used to push the ring up the barrel as this will make sure it is correctly positioned in the bore. Gap should be measured with a feeler gauge.

Each piston ring should also be tried in its groove to make certain that it is free and also that the groove is not worn, thus giving an excessive clearance.

Wear normally only takes place at the top end of the bore. Wear should be measured with a precision instrument. Measurement with a feeler gauge between the piston and the bore is not reliable.

If there is a "step" at the top of the bore, due to wear, this should be removed with a scraper, as otherwise the top piston ring may fracture.

Where the original piston is to be refitted the rings must be checked for freedom in the grooves. If necessary they should be carefully removed and cleaned before refitting.

In cases where seizure has occurred, care must be taken to remove all traces of aluminium "smear" from the face of the bore. This can be done by boiling the barrel in strong caustic soda solution. Another method is carefully to remove the aluminium with a bearing scraper.

When a new piston is not available, the damaged portion of the skirt must be smoothed off with a fine file and polished.

## ENGINE

Though it is not necessary to check the piston clearance when fitting a new piston to a used barrel, care must be taken that the correct piston is employed and the possibility that the barrel has been rebored must not be overlooked.

### FITTING THE CYLINDER.

Before fitting the cylinder to the crankcase, the bore and the piston should be well lubricated with engine oil. About a teacupful of oil 50HD should also be put into the crankcase. See that the piston ring gaps are not in line and insert the piston in the barrel. No difficulty will be experienced in springing in the piston rings as there is an adequate chamfer at the end of the bore.

A new washer should always be employed to make a good joint between the cylinder and the crankcase. This washer should be oiled, but no jointing compound should be used. The nuts should be tightened down evenly on the studs.

The cylinder head should now be fitted as described on page 6 followed by the magdyno (page 39).

The engine is now ready for fitting into the frame.

### REPLACEMENT OF ENGINE IN FRAME.

The replacement of the engine in the frame is a reverse of the removal operation. It will be found convenient to leave the bolts which attach the rear engine plates to the crankcase slack, as this facilitates the location of the engine plate to frame bolts. Make certain that every nut is tight, particularly the engine shock absorber nut and the clutch nut on the gearbox mainshaft. A new washer should be employed for the primary chain case joint. The joint between the chain case, inner portion, and the crankcase is made with jointing compound.

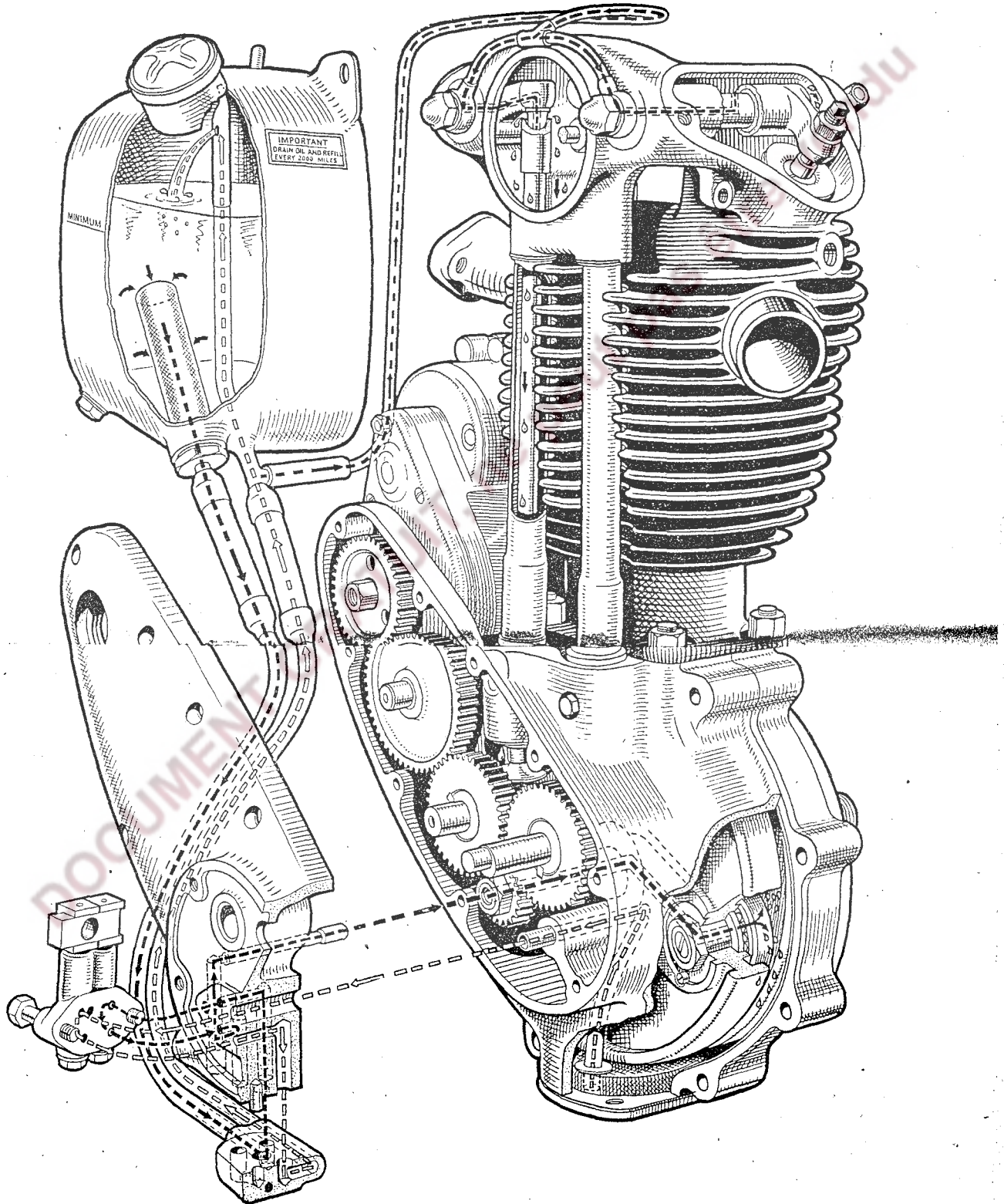
### TAPPET ADJUSTMENT.

Tappet adjustment must be made with the engine cold and the valves closed. The adjustment is accessible after removing the rocker box covers. The adjusting pin in the rocker is provided with a lock-nut. The clearance should be nil, but care must be taken that the valve is not held off its seating. There should be no up and down shake on the rocker, but it should be possible to slide it sideways a little on the shaft. If it will not slide there is no clearance.

### PETROL TANK

The petrol tank is fitted to the frame with four bolts which each pass through two rubber pads, one on each side of the supporting bracket. These pads are fitted in order to enable the tank to "sit" on a resilient mounting. A tank bolted direct to the frame would very soon leak. When re-fitting a tank it is, therefore, extremely important to see that the circular rubber pads are properly positioned and in good condition. The heads of the bolts are drilled and should be wired together.

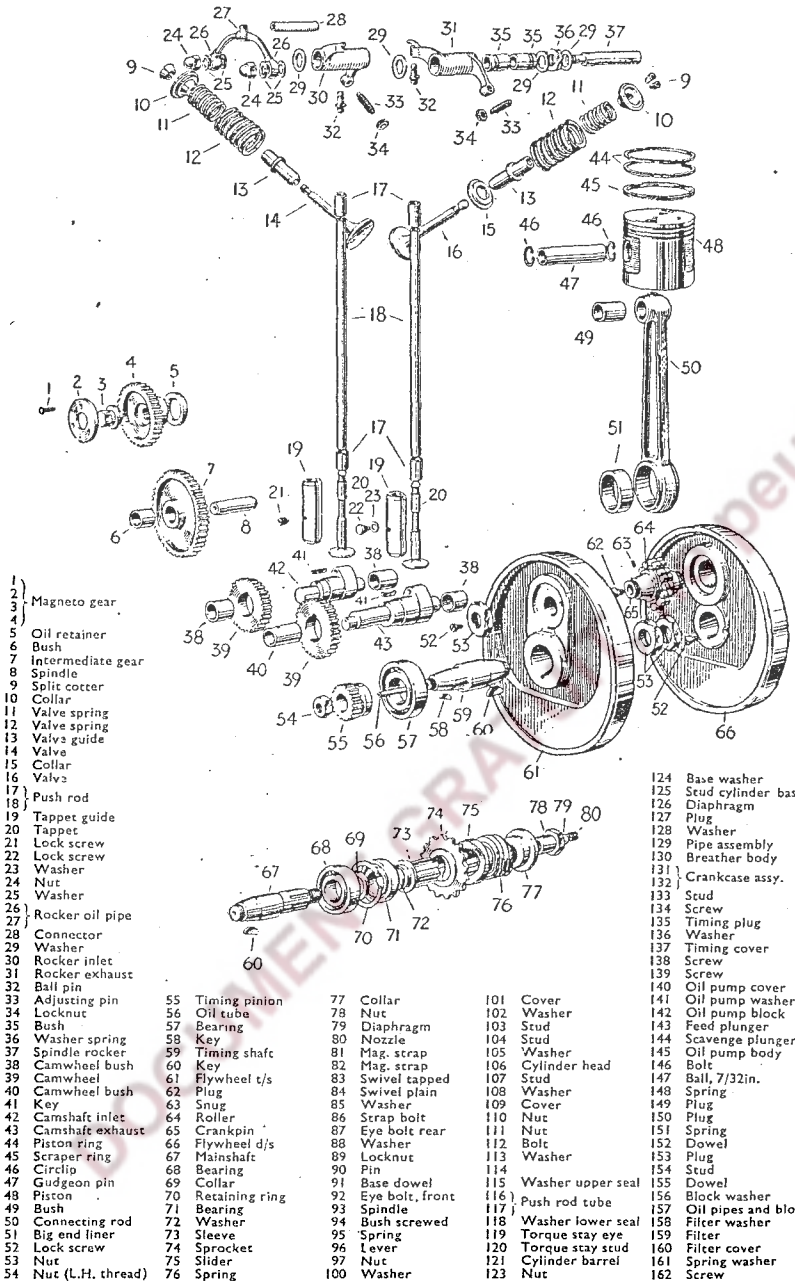
To remove the petrol tank it is necessary to disconnect the petrol feed pipe and the "U" pipe at the front of the tank. The opportunity should be taken to clean out the "U" pipe as frequently a certain amount of dirt collects in it. It should be blown out with the tyre pump, after being allowed to dry out if time permits.



**ENGINE LUBRICATION DIAGRAM**  
OIL PRESSURE FEED    — — — — —  
OIL RETURN            - - - - -



ENGINE

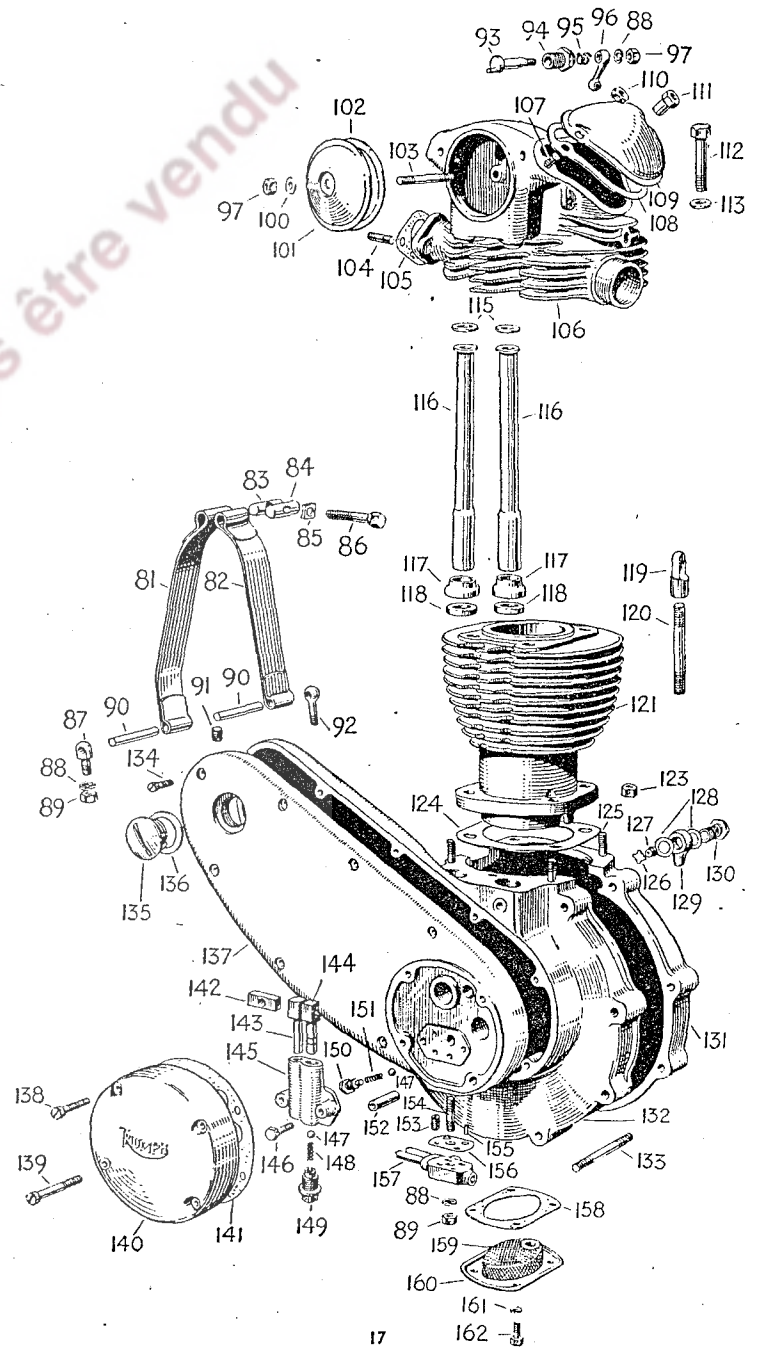


- 1 Magneto gear.
- 2 Oil retainer
- 3 Bush
- 4 Intermediate gear
- 5 Spindle
- 6 Split cotter
- 7 Collar
- 8 Valve spring
- 9 Valve spring
- 10 Valve guide
- 11 Valve
- 12 Collar
- 13 Valve
- 14 Push rod
- 15 Tappet guide
- 16 Tappet
- 17 Lock screw
- 18 Lock screw
- 19 Washer
- 20 Nut
- 21 Washer
- 22 Rocker oil pipe
- 23 Connector
- 24 Washer
- 25 Rocker inlet
- 26 Rocker exhaust
- 27 Ball pin
- 28 Adjusting pin
- 29 Locknut
- 30 Bush
- 31 Washer spring
- 32 Spindle rocker
- 33 Camwheel bush
- 34 Camwheel
- 35 Camwheel bush
- 36 Key
- 37 Camshaft inlet
- 38 Camshaft exhaust
- 39 Piston ring
- 40 Scraper ring
- 41 Circlip
- 42 Gudgeon pin
- 43 Piston
- 44 Bush
- 45 Connecting rod
- 46 Big end liner
- 47 Lock screw
- 48 Nut
- 49 Nut (L.H. thread)
- 50 Timing pinion
- 51 Oil tube
- 52 Bearing
- 53 Key
- 54 Timing shaft
- 55 Flywheel t/s
- 56 Plug
- 57 Snug
- 58 Roller
- 59 Crankpin
- 60 Flywheel d/s
- 61 Mainshaft
- 62 Bearing
- 63 Collar
- 64 Retaining ring
- 65 Bush
- 66 Washer
- 67 Sleeve
- 68 Sprocket
- 69 Nut
- 70 Slider
- 71 Spring
- 72 Collar
- 73 Nut
- 74 Oil tube
- 75 Diaphragm
- 76 Nozzle
- 77 Mag. strap
- 78 Mag. strap
- 79 Swivel tapped
- 80 Swivel plain
- 81 Washer
- 82 Cover
- 83 Strap bolt
- 84 Eye bolt rear
- 85 Bolt
- 86 Locknut
- 87 Pin
- 88 Base dowel
- 89 Eye bolt, front
- 90 Spindle
- 91 Bush screwed
- 92 Spring
- 93 Lever
- 94 Nut
- 95 Washer
- 96 Cover
- 97 Nut
- 98 Washer
- 99 Cover
- 100 Nut
- 101 Cover
- 102 Washer
- 103 Stud
- 104 Stud
- 105 Washer
- 106 Cylinder head
- 107 Stud
- 108 Washer
- 109 Cover
- 110 Nut
- 111 Nut
- 112 Bolt
- 113 Washer
- 114 Pin
- 115 Washer upper seal
- 116 Eye bolt, front
- 117 Push rod tube
- 118 Washer lower seal
- 119 Torque stay eye
- 120 Torque stay stud
- 121 Cylinder barrel
- 122 Nut
- 123 Base washer
- 124 Stud cylinder base
- 125 Diaphragm base
- 126 Plug
- 127 Washer
- 128 Pipe assembly
- 129 Breather body
- 130 Crankcase assy.
- 131 Stud
- 132 Screw
- 133 Timing plug
- 134 Washer
- 135 Timing cover
- 136 Screw
- 137 Oil pump cover
- 138 Oil pump washer
- 139 Oil pump block
- 140 Feed plunger
- 141 Scavenge plunger
- 142 Oil pump body
- 143 Bolt
- 144 Ball, 7/32in.
- 145 Spring
- 146 Plug
- 147 Spring
- 148 Dowel
- 149 Filter washer
- 150 Filter
- 151 Filter cover
- 152 Spring washer
- 153 Block washer
- 154 Oil pipes and blocks
- 155 Filter washer
- 156 Filter
- 157 Filter cover
- 158 Spring washer
- 159 Screw

ENGINE DETAILS

Note that Shaft No. 67 fits into Flywheel No. 66

ENGINE



- 93 Base washer
- 94 Stud cylinder base
- 95 Diaphragm base
- 96 Plug
- 97 Washer
- 98 Pipe assembly
- 99 Breather body
- 100 Crankcase assy.
- 101 Stud
- 102 Screw
- 103 Timing plug
- 104 Washer
- 105 Timing cover
- 106 Screw
- 107 Oil pump cover
- 108 Oil pump washer
- 109 Oil pump block
- 110 Feed plunger
- 111 Scavenge plunger
- 112 Oil pump body
- 113 Bolt
- 114 Ball, 7/32in.
- 115 Spring
- 116 Plug
- 117 Spring
- 118 Dowel
- 119 Filter washer
- 120 Filter
- 121 Filter cover
- 122 Spring washer
- 123 Screw
- 124 Block washer
- 125 Oil pipes and blocks
- 126 Filter washer
- 127 Filter
- 128 Filter cover
- 129 Spring washer
- 130 Screw
- 131 Block washer
- 132 Oil pipes and blocks
- 133 Filter washer
- 134 Filter
- 135 Filter cover
- 136 Spring washer
- 137 Screw
- 138 Block washer
- 139 Oil pipes and blocks
- 140 Filter washer
- 141 Filter
- 142 Filter cover
- 143 Spring washer
- 144 Screw
- 145 Block washer
- 146 Oil pipes and blocks
- 147 Filter washer
- 148 Filter
- 149 Filter cover
- 150 Spring washer
- 151 Screw
- 152 Block washer
- 153 Oil pipes and blocks
- 154 Filter washer
- 155 Filter
- 156 Filter cover
- 157 Spring washer
- 158 Screw
- 159 Block washer
- 160 Oil pipes and blocks
- 161 Filter washer
- 162 Filter

## LUBRICATION

### Lubrication ENGINE

See Illustration, pages 14 and 15.

The engine is lubricated on the dry sump system. Oil is fed to the oil pump pressure side from the oil tank by gravity and suction. To reach the oil pump it has to pass through a filter which is fitted to the large hexagonal nut securing the oil pump union to the tank. After leaving the pump the oil passes to the timing side of the crankshaft assembly. The assembly is suitably drilled and the oil travels through the timing shaft and into the crankpin oilways. From there it passes through and lubricates the big-end assembly and creates an oil fog in the crankcase. This oil fog lubricates the main bearings, piston and cylinder, and other moving parts, and also passes into the timing case to supply lubricant for the timing gear.

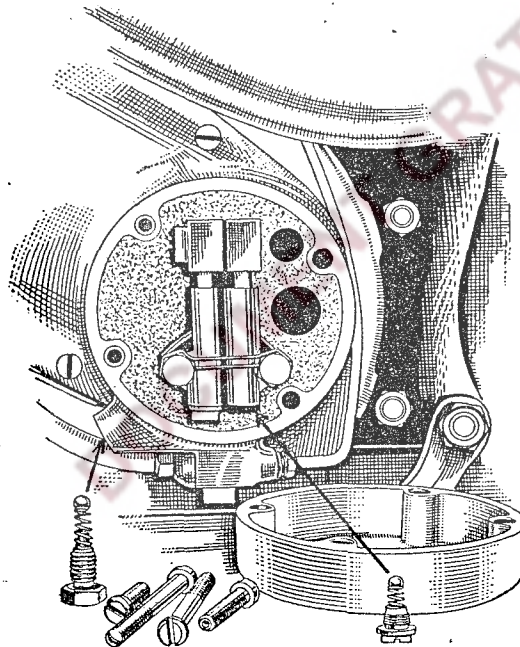
The surplus oil runs down the walls of the crankcase and drains through a filter into the crankcase base. From there it is picked up by the scavenge pump through a return pipe, the outlet of which is at the bottom of the crankcase. The scavenge pump returns the oil to the oil tank.

The oil in the oil tank should normally be changed every 2,000 miles. Under adverse conditions, where mud, dust or sand are likely to enter the oil tank or engine, the changes should be more frequent.

#### ROCKER GEAR LUBRICATION.

A branch pipe from the oil return pipe is connected to the oil feed pipe for the two rocker spindles. Oil passes into the drilled rocker spindles and through suitable "bleed" holes into the rocker bushes, from where it exudes into the rocker boxes to lubricate the other parts. Surplus oil drains down the push rod tubes to the crankcase. There is no adjustment to this oil feed as the quantity fed to the valve gear has been found in practice to be adequate, but not excessive, at all times.

To check the quantity of oil fed to the rocker gear, slack off the exhaust spindle nut and lever the banjo union away from the rocker box. Start up the engine and run for a few minutes, when the oil which would normally be fed to the rockers will leak from the slacked off joint.



Oil pump showing ball valves, oil pump cover, and fixing screws.

## LUBRICATION

#### OIL PUMP.

The oil pump is of the double plunger type and is actuated from the end of the exhaust camshaft through a drive block. The pump is accessible after removing the oil pump cover at the bottom of the timing case. The pump body is secured by two studs which are wired together for security. Between the pump body and the timing case is a paper washer. The smaller diameter plunger supplies the pressure feed and the larger diameter the scavenge. Because the scavenge plunger is the larger, there is always more scavenge capacity than feed and, consequently, the crankcase is kept free of accumulated oil. For the same reason the oil return to the oil tank will be spasmodic, consisting of a spurt of oil followed by a number of air bubbles. At the base of each plunger is a non-return valve, consisting of a ball and spring. Each valve is closed by a screwed plug.

This type of pump is particularly trouble-free, and will run for very considerable mileages without attention. A loss of pressure or of scavenge may result from one of the balls failing to seat properly, either due to foreign matter or otherwise. The remedy is to remove the oil pump complete, dismantle and clean it thoroughly and before re-assembly give each ball a sharp tap on to its seating.

The drive block should also be examined to make certain that the centre hole is circular. If it has worn oval, the travel of the plunger will be reduced and the block should be changed. Wear on the body or plungers is rarely encountered as the parts are constantly running in oil.

A new paper washer should be employed when the pump is re-fitted. A washer from the spare parts stock should be used, as, owing to the number and position of the holes it is not satisfactory to make one.

#### SCAVENGE.

Entire loss of or reduced scavenge will mean that oil will remain in the crankcase instead of being returned to the oil tank. The amount of oil in the crankcase will build up until it starts to be exhausted via the crankcase breather. If there is no scavenge the oil will soon be all passed out of the breather. This is a very rare occurrence. If the rear of the machine is seen to be oily a check-up should immediately be made on the oil return.

Oil will not be returned to the tank if the oil pump is not working efficiently (see Oil Pump, above). At the top of the oil tank there is a breather pipe. Should this pipe be obstructed, pressure will build up in the oil tank and this will prevent an adequate scavenge.

#### OIL PIPE CONNECTIONS.

Care should be taken when fitting the two synthetic rubber connections on to the oil pipes that the ends of the pipes are not permitted to dig into the rubber. This may cause pieces of rubber to become detached and obstruct the lubrication system. If the connections are hard, place them in paraffin for a few minutes.

#### GEAR BOX

The gear box is lubricated with engine oil 50 HD. Heavy gear oil as used on trucks must not be used or serious damage will result.

The oil is put into the gear box by way of the filler cap orifice. There is a level plug at the rear of the inner cover and oil should be filled in until it runs out of the level plug hole. The oil should be warmed up before it is put into the box so that it will flow freely.

The drain plug will be found at the rear of the box and not on the bottom of it; the oil must not be drained by removing the dome nut which retains the camplate plunger and spring.

#### REAR AND PRIMARY CHAIN AND CLUTCH

The primary chain and clutch are lubricated with 10 HD oil, or a mixture of half engine oil 50 HD and paraffin. This mixture should be employed only if 10 HD oil is not available. The correct quantity is three-quarters of a pint.

The rear chain is lubricated from the primary chain case. The screw at the rear end of the case should be screwed in to decrease or out to increase the supply of the lubricant.

#### FORK AND CYCLE PARTS

All moving parts such as the head race, fork spindles, etc., are lubricated with C 600 Oil by means of the grease nipples provided. The hub bearings are lubricated with Grease No. 2 as described on page 31. Brake rod joint pins, etc., should be lubricated with the oil can.

## CLUTCH

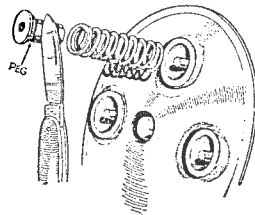
### Clutch

In order to obtain access to the clutch it is necessary to remove the primary chaincase, outer portion. The footrest and the brake pedal must first be taken off. The brake pedal can be taken off the spindle after removing the securing nut. It is not necessary to remove the rod.

A large sized screwdriver is required to remove the chain cover screws. If necessary the machine should be allowed to lie on the near side footrest, which will permit the mechanic to apply more pressure on the screwdriver. This is important if the slots in the screw heads are not to be damaged. Having removed the screws, the outer portion of the chain case can be removed. Care should be taken not to damage the paper washer between the inner and outer cases if it is to be used again, a new washer not being available. Under no circumstances should a screwdriver or other tool be forced between the two halves of the chain case in order to separate them, as this procedure is likely to damage the faces. If the outer half is given a sharp tap with a mallet or hammer handle, no difficulty will be experienced in breaking the joint. It should be noted that there is a tubular distance piece fitted to the footrest rod between the case and the frame. If this is not replaced when re-assembling, the chaincase may be fractured when the footrest rod nut is tightened up.

#### DISMANTLING THE CLUTCH.

The clutch plates are dismantled by removing the four brass clutch nuts, using the special key provided in the tool kit. On the underside of the head of each nut is a small "pip" to prevent the nut from unscrewing. When attempting to unscrew the nut this "pip" may engage with the end of the clutch spring, thus preventing it being turned. In order to overcome this difficulty a knife blade, or a portion of a ground-off hack-saw blade, should be inserted under the head of each nut. This will hold the "pip" away from the spring end while the nut is turned.



To facilitate unscrewing of clutch screws, slip a knife blade or a ground-down hack-saw blade between the peg and the spring.

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When the nuts have been taken off their pins the outer pressure plate and the driven and driving plates can be removed. Three corked and four steel plates should be fitted.

#### CORK INSERTS.

The corks fitted should protrude 1/32 in. on each side of the plate. They should be in an oily condition and the steel plates should be smooth and not scored. The tongues of the cork plates should be in good condition and unworn. The clutch springs should be stood on their ends and their length compared with a new clutch spring. If the length is not the same, or very nearly so, the springs should be replaced.

#### CLUTCH DRAG.

Clutch drag is often caused by sticky plates, and if they are found to be in this condition they should be washed in paraffin or petrol. Sticky plates are often caused by the use of engine oil 50 HD in the chaincase. 10 HD is the correct grade, but if this is not available a mixture should be made of half 50 HD and half paraffin. This mixture is satisfactory for the clutch plates, and is also a good lubricant for the chain. It should only be used if 10 HD is not obtainable.

#### CLUTCH CABLE.

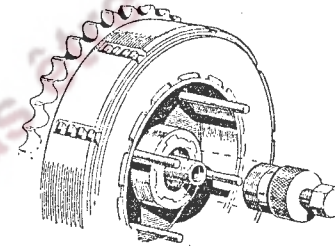
If the clutch cable is not free in the casing, lubricate as described for carburettor control cables page (38).

## CLUTCH

#### CLUTCH HUB REMOVAL.

A withdrawal tool is provided to facilitate removal of the clutch hub from the gearbox mainshaft after taking off the nut and washers. The hub has an internal thread and the withdrawal tool screws into it.

The clutch housing and sprocket revolves on the clutch hub when the clutch is withdrawn. A bearing is provided by twenty 1/4 in. by 1/4 in. rollers. The bearing surfaces should be examined for wear.



The clutch hub is threaded internally to accommodate the extractor provided in the tool kit.

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#### RE-ASSEMBLY OF THE CLUTCH.

The clutch hub presents no difficulty in re-fitting to the mainshaft. Care should be taken to see that the key is properly positioned and the nut tightened fully up on the washer. The housing and sprocket assembly should be fitted to the hub before it is installed on the mainshaft. Grease No. 2 should be used on the roller bearing. See that the clutch studs are properly fitted into their slots before assembling the plates.

#### CLUTCH PLATE LUBRICATION AND FITTING.

The corked clutch plates should be well soaked in 10 HD oil or the half-and-half mixture of 50 HD and paraffin before they are assembled. A plain plate is fitted first, followed by a corked plate, then a plain plate and so on, which will leave one plain plate to be fitted last on the outside of the clutch. On to the plain plate, the pressure plate is fitted. The clutch rod engages in the button in the centre of the plate. The clutch springs can now be put into their cups and the four nuts screwed into the pins. With new corked plates the nuts should be screwed up until the ends of the pins are level with the heads of the screws. If the corks are worn, a little more pressure on the springs may be necessary.

#### FINAL ADJUSTMENT.

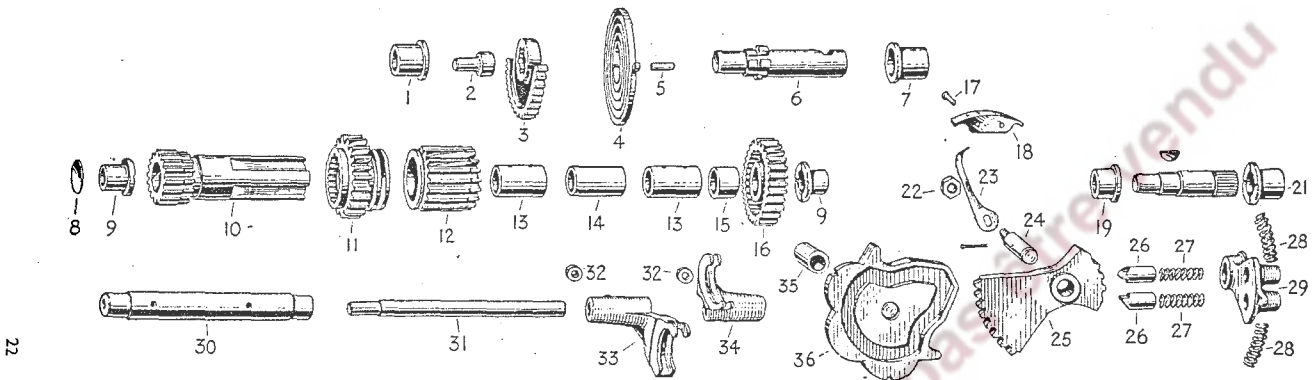
The clutch should be extracted by means of the handlebar lever and spun with the kickstarter while the mechanic looks down on to it to make certain that it spins true. If the pressure plate "wobbles" when the clutch is spun an adjustment of the clutch nuts is indicated. By screwing in the nut adjacent to the part of the pressure plate which appears to be nearest to the edge of the housing, spinning the clutch and, if still not true, repeating the process, the plate can be made to spin accurately. If the adjustment is not correctly made, the clutch will not free properly, causing a difficult gear change and trouble with selecting bottom gear from neutral.

#### CABLE AND ROD ADJUSTMENT.

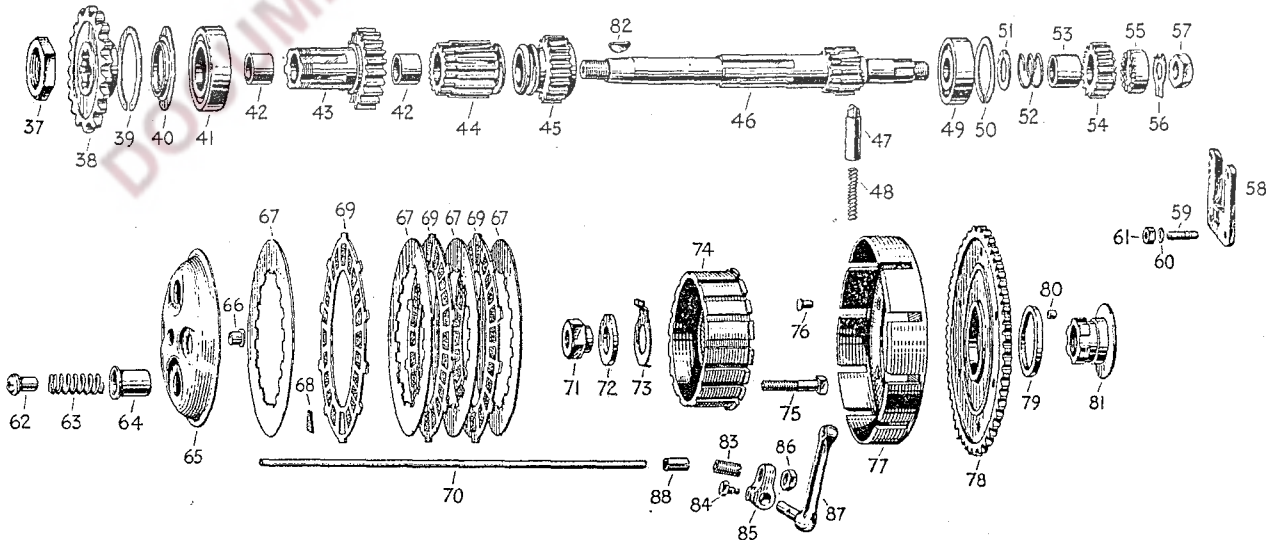
After replacing the clutch, the rod and cable adjustment should be checked up. The rod adjustment is exposed by removing the gear box filler cap. There should be about 1/32 in. of free movement on the clutch rod. If necessary, adjustment can be made with a screwdriver after slacking off the lock nut. The cable adjuster is on the top of the gear box. There should be about 1/16 in. free movement at the handle-bar lever. When altering the adjustment, do not allow the jaw of the spanner to lever up the adjuster, or the lug on the gear box cover may be fractured.

## GEARS AND CLUTCH

GEAR BOX



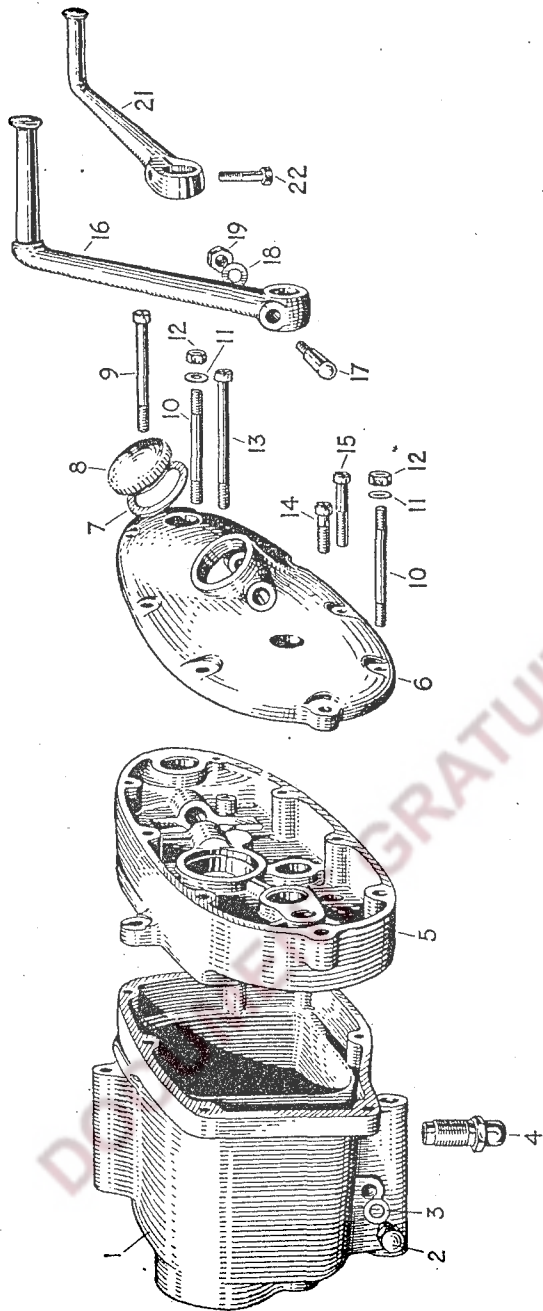
1 Bush	15 Layshaft low gear bush	30 Layshaft	44 Mainshaft second gear	59 Stud	74 Clutch centre
2 Quadrant stop	16 Layshaft low gear	31 Selector fork rod	45 Mainshaft third gear	60 Washer	75 Pin
3 Quadrant	17 Pin	32 Roller	46 Mainshaft	61 Nut	76/9 Clutch housing and sprocket
4 K.S. return spring	18 Indicator quadrant	33 Layshaft selector fork	47 Plunger	62 Clutch nut	80 Rollers
5 Anchor peg	19 Bush	34 Mainshaft selector fork	48 Spring	63 Spring	81 Clutch hub
6 Axle	21 Bush	35 Bush	49 Bearing	64 Cap	82 Key
7 Axle bush	22 Nut	36 Camplate	50 Bearing ring	65/6 Pressure plate assembly	83 Adjuster
8 Disc	23 Gear indicator finger	37 Nuts	51 Washer	67 Clutch plate	84 Lever peg
9 Layshaft bush	24 Spindle	38 Sprocket	52/3 Spring and sleeve	68 Clutch cork	85 Operating arm
10 Layshaft high gear	25 Operating quadrant	39 Bearing ring	54 Pinion	69 Clutch plate	86 Nut
11 Layshaft second gear	26 Plunger	40 Dust cover	55 Ratchet	70 Clutch rod	87 Clutch lever
12 Layshaft third gear	27 Spring	41 Bearing	56 Washer	71 Nut	88 Bush
13 Layshaft high gear bush	28 Spring	42 Bush	57 Nut	72 Washer	
14 Layshaft distance tube	29 Quadrant and spindle	43 Mainshaft high gear	58 Guide plate	73 Washer	



GEAR BOX—CLUTCH

## GEARBOX

### GEARBOX CASING AND LEVERS



- 1 Casing with bushes
- 2 Drain plug
- 3 Washer
- 4 Camplate plunger bush

- 5 Inner cover with bushes
- 6 Outer cover with bushes
- 7 Washer
- 8 Filler cap

- 9 Screw
- 10 Stud
- 11 Washer
- 12 Nut

- 13 Screw
- 14 Screw
- 15 Screw
- 16 K.S. crank

- 17 Cotter
- 18 Washer
- 19 Nut
- 21 Footchange pedal
- 22 Set screw

## GEARBOX

### Gearbox

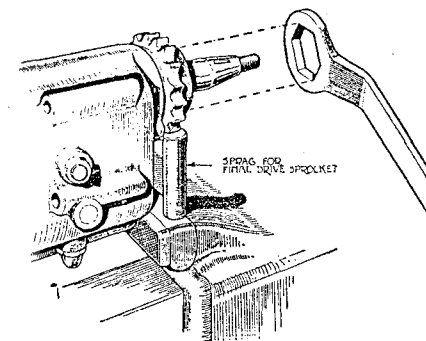
If the gearbox is to be overhauled it should be removed from the machine. First the chains, front and rear, should be removed, and then the clutch complete, as described under the "Clutch" section (page 20). Disconnect the clutch cable at the lever adjuster, unscrew the primary chain adjuster, take out the clamping bolt and the pivot bolt, and remove the box. If it is clamped tightly between the frame tubes slack off the adjacent frame bolt.

#### DISMANTLING.

Clamp the gear box in a vice by the ends of the bottom lug with the gear change end facing the mechanic. The sequence of dismantling after draining the oil is as follows:—

1. Remove the nut in the mainshaft (drive side). In order to prevent the shaft turning use a small piece of metal bar about 2½ to 3 ins. long, placing one end on the jaw of the vice and the other under a tooth (see illustration). Do not remove the sprocket at this stage.

A short steel bar should be employed to prevent the sprocket turning when tightening or removing the nut.



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2. Remove five screws and three nuts securing the outer cover to the gear box casing.
3. Take off the cover by gripping the foot change lever and the kick starter crank and rotating the crank a little to the left (mechanic facing the box). The joint is made with jointing compound so the faces will be stuck together requiring a little force to break them.
4. Remove the kick starter ratchet nut, preventing the shaft from turning with the metal bar as described in 1 (above).
5. Slide the ratchet mechanism from the shaft. The teeth of the ratchet and pinion should be unmarked and clean cut. If they are badly worn the kick-starter will not engage or will slip badly. The spring should not be distorted and the sleeve unworn.
6. Remove the three screws securing the inner cover to the gearbox shell.
7. Take off the inner cover by tapping the drive end of the mainshaft with a lead hammer or a piece of wood. The mainshaft will then come away with the cover.
8. Tap out the selector fork spindle with a long ¼ in. drift.
9. Remove the gearbox from the vice, grip a ⅜ in. bar in the jaws of the vice and turn the gearbox with the open end uppermost, fitting the ⅜ in. bar into the swivel boss.
10. Remove the gears, selectors, camplate and plunger from the casing. There are two small steel rings which fit over the pegs on the selector forks. Care should be taken that these are not lost. It should be noted that there is a drain plug in rear of the case. **Draining should not be carried out by removing the acorn nut which secures the camplate plunger and spring.** Where the plunger and spring are found to be missing, this is often due to careless draining, which means that the Driver's Handbook (Task 5, Item 3) has not been studied.
11. The ball bearings are held in position by means of circlips, which can be removed with sharp nosed pliers. After removing the circlip the bearing can be tapped out.
12. The layshaft bushes can be driven out with a soft drift of suitable size. The bush in the case has a dust cover disc which should first be tapped out from inside the box. New bushes need not be reamed after fitting.

**GEARBOX**

13. The layshaft and mainshaft high gear bushes should be examined for wear. When new bushes are fitted no reamering is necessary as an allowance is made for pressing in during manufacture. It should be noted that a distance piece is fitted between the two bushes in each gear.
14. Examine all gears and other parts and replace any not serviceable. The gear change lever return springs should be particularly inspected, and it should be seen that they are approximately each the same length. The footchange plunger springs must be replaced if doubtful as regards strength or if they are rusty.

**KICKSTARTER CRANK RETURN SPRING.**

If the return spring is to be replaced the gear box need not be removed from the machine.

1. Remove the outer gearbox cover as described in 2 and 3 (page 25).
2. Take off the crank and then the spindle and quadrant. Note the spline to which the inner end of the spring is fitted.
3. Remove the old spring and fit a new one to the same spline, attaching the outer end to the peg in the cover. Note the position of the spring in the illustration (page 28). When the crank is depressed the spring should wind up—not unwind. Too much tension in the spring will cause it to break. Too little tension will cause the pinion to engage. Errors in tension are caused by fitting the inside end of the spring to the wrong spline on the shaft.
4. Fit the crank.
5. Fit the cover as described in 14 (below).

**REASSEMBLING THE GEAR BOX.**

Immediately prior to reassembly, make certain that all parts are scrupulously clean and before each part is placed in position lubricate it well with engine oil 50HD. Proceed in the following sequence :—

1. With the gear box casing on the bench fit the camplate into the case with the pointed end towards the closed side of the casing (the clutch end). This will place the camplate in the high gear position.
2. Insert the mainshaft high gear through the bearing in the case and screw on the nut a few threads to keep it in position.
3. Place the gear box in the vice, fitting the swivel lug on to the bar as described in 9 (page 25).
4. Insert the remainder of the mainshaft gears, the mainshaft selector and finally the mainshaft itself. (See illustration; pages 28 and 29, for correct position).
5. Insert the layshaft gears (less the low gear and the layshaft) and layshaft selector. (See illustration for correct position.)  
**Note.**—The mainshaft selector is the smaller of the two. Don't omit the two steel rings on the selector pegs. Use grease to keep them in position while assembling.
6. Fit the selector shaft.
7. Insert the layshaft.
8. Put the layshaft low gear on the layshaft.
9. Replace the inner cover, using jointing compound to make the joint.
10. Tighten evenly the screws fixing the cover to the case.  
**Note.**—When the inner cover is fitted the gear box must be in top gear. If the camplate has been correctly inserted this should present no difficulty. Check up on the gear indicator on the top of the gear box before tightening the cover screws.
11. Remove the box from the bar and clamp in the vice as in dismantling (page 25).
12. Replace the kick-starter parts on the shaft and tighten up the nut. Use a new tab washer to retain it in position. (See illustration for correct assembly.) Test the ratchet for freedom.
13. Fit the final drive sprocket and tighten the nut; use a new tab washer.  
**Note.**—To facilitate tightening the nuts, use the small bar illustrated on page 25. Where tab washers are not available, the nuts should be centre-punched in three places.
14. Assemble the outer cover to the box. Use jointing compound to make an oil tight joint, and position the kick-start crank half way down before pushing the cover into position.
15. Tighten up the screws and nuts, progressing evenly.
16. Test the gear selection.
17. Re-fit the clutch.
18. Assemble gearbox to machine and fit chains.
19. Adjust chains (see page 27).
20. Adjust clutch (see page 21).
21. Re-fit primary chain case, both sections, foot brake, foot rests, etc.
22. Fill primary chain case and gear box with the correct amount and grade of lubricant (see page 19).

**Brakes****ADJUSTMENT.**

Both brakes are adjusted by means of knurled hand adjusters. The pedal position of the rear brake can be adjusted on the stop fitted to the frame.

**WEAR.**

The brake linings on the rear brake shoes normally require renewing if the brake cam lever is approaching the vertical with brake off and the rear wheel on the ground. As the adjustment is taken up on the front brake more and more of the adjuster thread will be exposed. The linings should be renewed when about half-an-inch of thread can be seen. The fitting of new linings present no difficulty. Access to the brake parts is obtained after removing the wheel by taking off the spindle nut and brake anchor plate locking nut, when the anchor plate can be removed with the brake parts attached. The linings are supplied ready drilled and countersunk for the rivets and are the correct shape to fit the shoes. After fitting, the sharp edges should be eased off and the ends chamfered with a file.

**GREASY LININGS.**

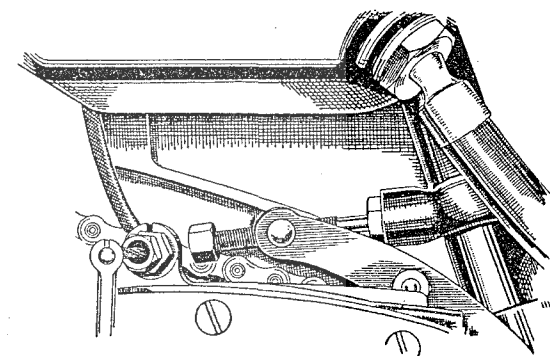
If oil or grease has found its way on to the linings, they must be removed. No amount of washing in petrol will eliminate grease if the lining is impregnated. Though it may appear to have been removed, more grease will exude when the brake heats-up in operation.

**Chains****CARE OF CHAINS.**

The rear chain should be removed for thorough cleaning and lubrication every 2,000 miles. The primary chain does not require attention so frequently, as it is totally enclosed. If the primary chain is removed for any reason it should be cleaned. First, brush with a stiff brush in a paraffin bath and wash in clean paraffin. Hang up to drain. Melt some grease No. 2 in a suitable container and put the chain into it. The grease should be just melted: care must be taken not to overheat it. See that the chain is entirely covered and leave it in the grease until this has solidified again. Now remove the chain and wipe off the superfluous grease. If the chain is removed before the grease has solidified the melted lubricant will drain out. See page 7 for method of removing primary chain case.

**TENSION : REAR CHAIN.**

There should be approximately  $\frac{1}{2}$  in. up and down "slack" in the middle of the run of the rear chain. To adjust, slack off the two spindle nuts and also the chain adjuster locknuts. Turn the chain adjusters an equal number of turns on each side in order to keep the wheel in true line. Test the chain in a number of different positions, as the amount of slack may vary owing to uneven stretch. Adjustment for tension may make necessary the adjustment of the rear brake.



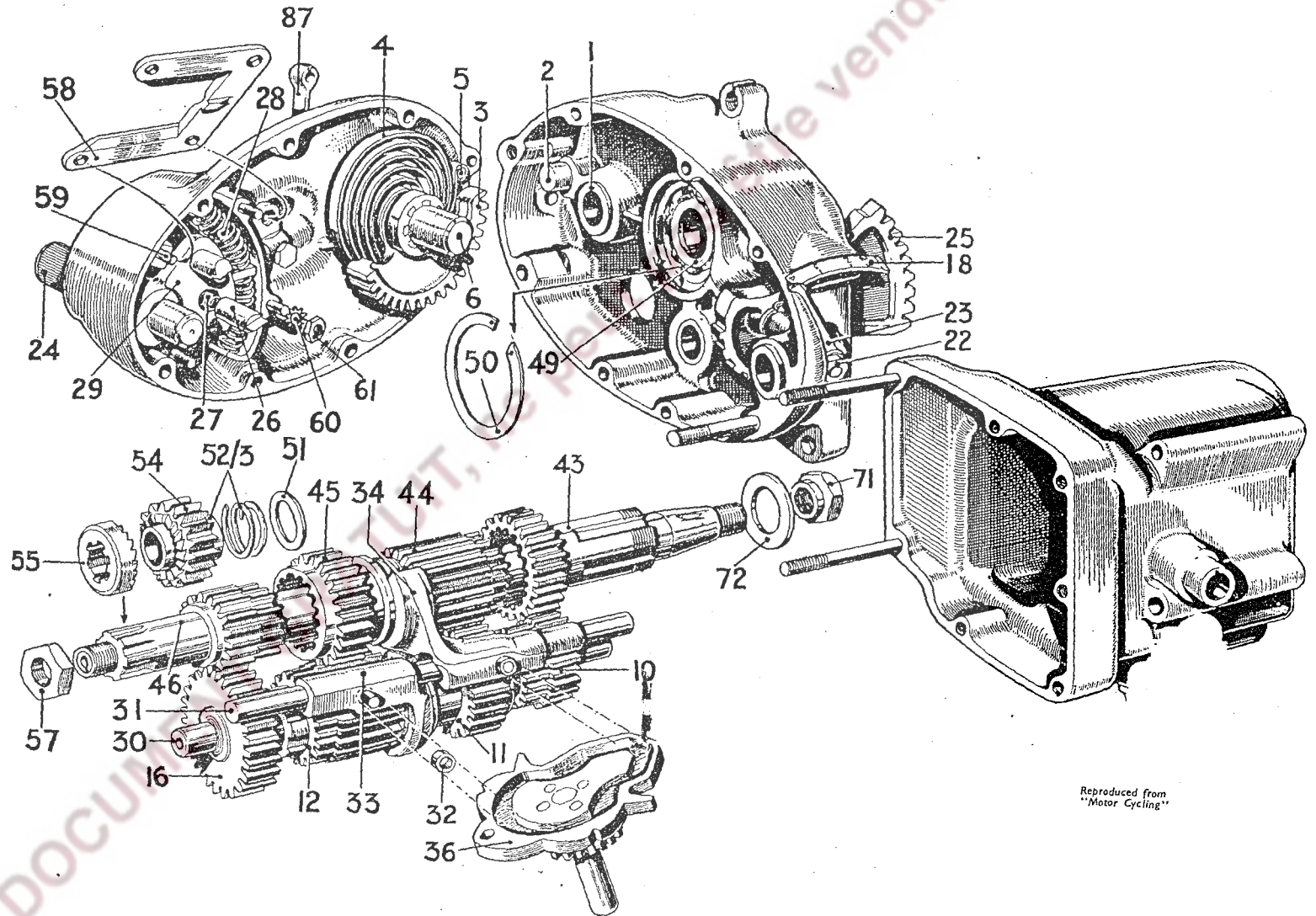
This adjuster alters the gearbox position to vary the tension on the primary chain.

**TENSION : PRIMARY CHAIN.**

The filler cap on the primary chain case should be removed to inspect the chain. There should be  $\frac{1}{2}$  in. total up and down "slack." To adjust, the gearbox must be moved on the swivel. Slack off the gearbox clamping bolt and the swivel bolt, loosen the locknut on the

GEARBOX

GEARBOX



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TRIUMPH 4-SPEED FOOT-CHANGE GEARBOX

For Key to Numbers see Pages 22, 23 and 24.

## CHAINS

gearbox adjusting bolt, and make the necessary adjustment by turning the bolt. Finally, tighten up the locknut and the clamping and swivel bolts. The alteration in the gearbox position will necessitate the adjustment of the rear chain.

### INSPECTION.

The chains should be carefully inspected during overhaul to see that all the rollers are present. Breakage of primary chain rollers will cause very rough running and also rapid wear on the sprocket teeth. Maximum permissible stretch is 3 per cent. of the length.



Fig. 1



Fig. 4



Fig. 2



Fig. 5



Fig. 3



Fig. 6

### ALTERATIONS AND REPAIRS.

If the chains have been correctly serviced very few repairs should be necessary. But should the occasion arise to repair, lengthen or shorten a chain, a rivet extractor and a few spare parts will cover all requirements.

To **SHORTEN** a chain containing AN EVEN NUMBER OF PITCHES remove the dark parts shown in Fig. 1, and replace by cranked double link and single connecting link as Fig. 2.

To **SHORTEN** a chain containing an ODD NUMBER OF PITCHES remove the dark parts shown in Fig. 3, and replace by single connecting link and inner link as Fig. 4.

To **REPAIR** a chain with a broken roller or inside link remove the dark parts in Fig. 5, and replace by two single connecting links and one inner link as Fig. 6.

### RIVET EXTRACTOR.

The rivet extractor can be used on all motor cycle chains up to  $\frac{3}{4}$  in. pitch whether the chains are on or off the wheels.

When using the extractor :—

1. Turn screw anti-clockwise to permit the punch end to clear the chain rivet.
2. Open the jaws by gripping tommy bar and handle together. (See Fig. 7).
3. Pass jaws over chain and release grip. Jaws should rest on a chain roller free of chain link plates. (See Fig. 8.)
4. Turn screw clockwise until punch contacts with and pushes out rivet end through chain outer link plate.

Unscrew punch, withdraw extractor and repeat complete operation on the adjacent rivet in the same chain outer link plate.

The outer plate is then free and the two rivets can be withdrawn from opposite side with the opposite plate in position. Do not use the removed part again.

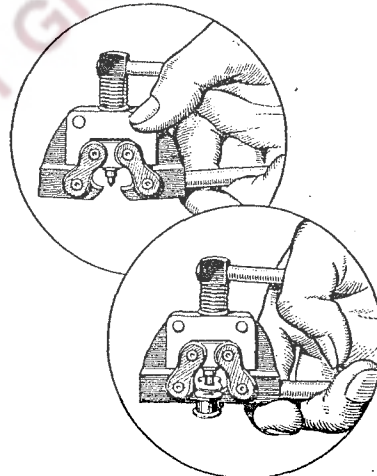


Fig. 8

The Chain Rivet Extractor.

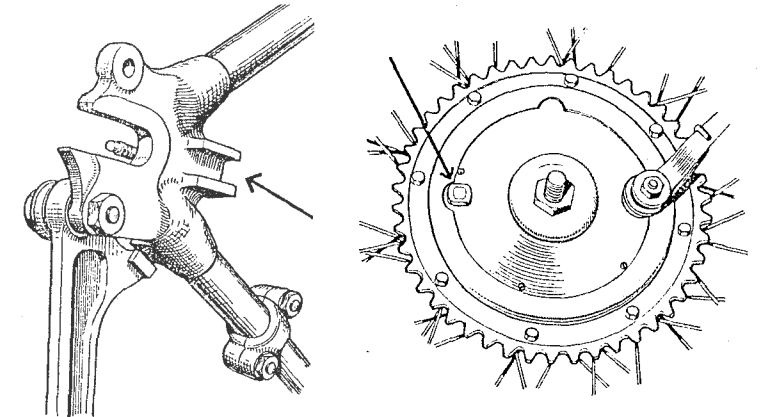
## Wheels and Hubs

### FRONT WHEEL REMOVAL AND REPLACEMENT.

Disconnect the speedometer drive and front brake rod at the lower end. Remove the brake torque rod bolt. Lower the front stand and slack off the spindle nuts, when the wheel can be withdrawn. To replace, reverse the removal procedure.

### REAR WHEEL REMOVAL.

Slack off the nuts securing the tailguard mudguard stays and remove the two hexagonal-headed screws securing the tailguard to the mudguard blade. Where pannier equipment is fitted the steady stay fitted to the tailguard should be detached from the pannier frame at each end. Remove the tailguard and place it at the side of the machine. It is not necessary to remove the rear lamp cable as there is sufficient slack to allow for the removal of the tailguard. Break the rear chain by removing the spring link. Be careful to see that the gearbox is not in the neutral position, as if the gearbox sprocket is free the weight of the chain may rotate it and the chain will then fall off. Screw off the brake adjusting nut. Slack off the two spindle nuts and withdraw the wheel from the fork.



When fitting the rear wheel the stud on the brake anchor plate must be fitted into the brake anchor channel in the rear end of the frame.

### REAR WHEEL REPLACEMENT.

To replace the wheel, reverse the removal procedure. Note that there is a stud on the brake anchor plate which must be fitted into the locating channel on the inside of the rear fork.

### BEARINGS : DISMANTLING AND ASSEMBLY.

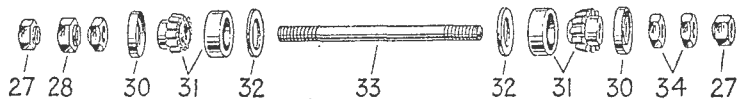
The order of dismantling and assembly will be clear from the illustration on page 32. After removing the parts from one side of the spindle it can be tapped out. When assembling, the hub should not be packed full of grease. The bearings themselves should be copiously packed with grease when further attention will not be required for at least 5,000 miles.

### ADJUSTMENT.

Great care must be taken in adjusting the taper roller wheel bearings after assembly of the wheel to the machine. If the adjustment is too close the bearings will quickly give trouble. On the other hand, a properly adjusted and lubricated bearing will give at least 5,000 miles service without any further attention.

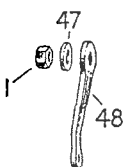
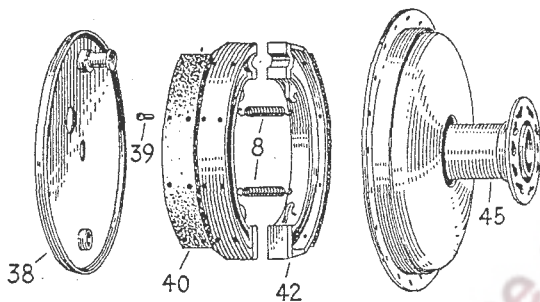
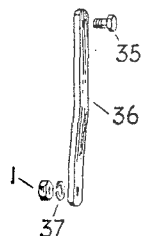
There is a bearing adjusting nut secured by a locking nut on each spindle at the side opposite to the brake mechanism. The lock nut should be slacked off and the adjusting nut turned until it is right home. Then slack off a little until there is just the slightest amount of lateral movement perceptible, when the rim is gripped with both hands at opposite points and rocked by pushing with one hand and pulling with the other. This operation must be carried out with the machine on the front or rear stand. Finally, spin the wheel to make certain that it is quite free. If it does not spin easily, remember the brake may be the cause of the trouble.





**FRONT HUB AND BRAKE**

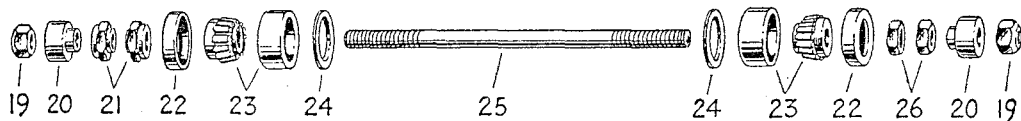
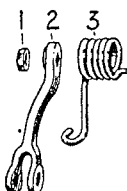
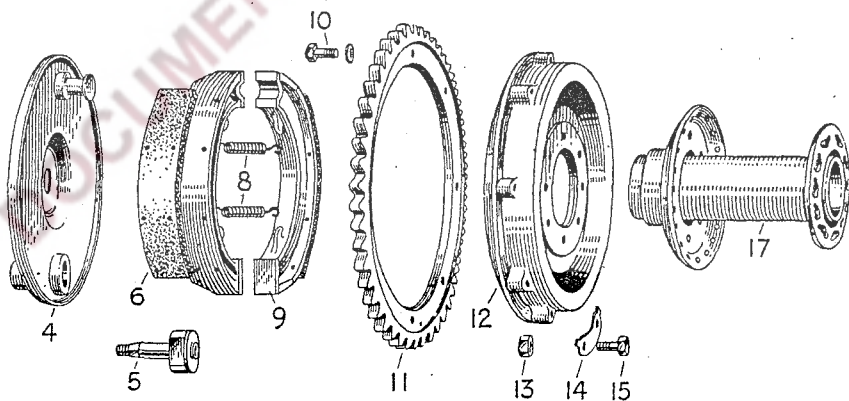
- 27 Spindle nut
- 28 Lock nut
- 30 Dust cap
- 31 Roller bearing assembly
- 32 Bearing back ring
- 33 Spindle
- 34 Adjuster nut
- 35 Bolt
- 36 Torque link
- 37 Spring Washer
- 38 Brake anchor plate
- 39 Brake lining rivet
- 40 Brake shoe lining
- 42 Brake shoe and lining
- 45 Hub assembly with brake drum.
- 47 Washer
- 48 Brake cam lever
- 49 Brake cam assembly



32

**REAR HUB AND BRAKE**

- 1 Nut
- 2 Outer cam lever
- 3 Return spring
- 4 Brake anchor plate
- 5 Brake cam assembly
- 6 Brake shoe lining
- 8 Return spring
- 9 Brake shoe and lining
- 10 Rear chain sprocket bolt
- 11 Rear chain sprocket
- 12 Brake drum
- 13 Nut
- 14 Lock plate
- 15 Bolt
- 17 Hub assembly
- 19 Spindle nut
- 20 Chain adjuster collar
- 21 Lock nut
- 22 Dust cap
- 23 Roller bearing assembly
- 24 Bearing backing ring
- 25 Spindle
- 26 Adjuster nut



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## FRONT FORK

# Front Fork

### REMOVAL FROM MACHINE.

1. Place a box or other suitable article under the crankcase to raise the front wheel off the ground.
2. Disconnect brake cable at handlebar lever.
3. Disconnect electric cables from head lamp. This can be accomplished by removing the screws from the panel and disconnecting the cables inside the lamp.
4. Remove bolt securing top fork spring anchor.
5. Remove the rear top and bottom fork spindles. The spindles are screwed into the off-side fork links.

The fork, complete with front wheel mudguard and head lamp, can now be removed from the machine for attention. The further dismantling of the fork presents no difficulty.

### STEERING HEAD.

To dismantle the steering head, first remove the steering damper. Take off the handlebar caps and release the handlebar. Screw off the large adjusting nut at the top of the fork crown after slacking off the pinch bolt and take off the head clip, removing the crown and stem from below.

### CUPS AND CONES.

The bearing tracks on the cups and cones should be carefully examined and if the slightest pitting or damage is observed the part must be changed. It is always desirable to assemble with new bearing balls. No difficulty will be experienced in tapping out the cups from the frame head lug with a suitable drift. Damage to the cups and cones is usually the result of maladjustment of the steering head. If the machine is run with the head slack, hammering will occur.

### SPINDLE BUSHES.

Worn spindle bushes can be removed by tapping out with a long drift. New bushes should be pressed in after which they must be cut to size with a line reamer. It is not satisfactory to use a reamer on each bush separately.

### ASSEMBLY.

The fork can either be assembled and fitted to the fork crown and head clip or, if these parts have been removed from the machine, the whole can be assembled and fitted to the frame head lug. The cups should be filled with grease and the balls pressed into them in order to facilitate assembly. Twenty-two 3/16 in. balls are fitted into each cup.

It should be noted that the off-side fork links are threaded and the near-side plain. The knurled washers are fitted for testing the adjustment.

### ADJUSTING FORK LINKS.

The knurled washers should be just free to turn, but there should be no side play. To adjust slack off bolt end nuts and turn the fork spindle by means of the squared end the estimated correct amount. Tighten up the spindle nuts and test again. Adjustment is best made with the fork fitted to the machine. As each spindle is adjusted the fork should be bounced up and down to make certain that the spindle is free. Carry out this test as each adjustment is made, as otherwise if the fork is not free, each spindle must be slacked off in turn to locate the "offender."

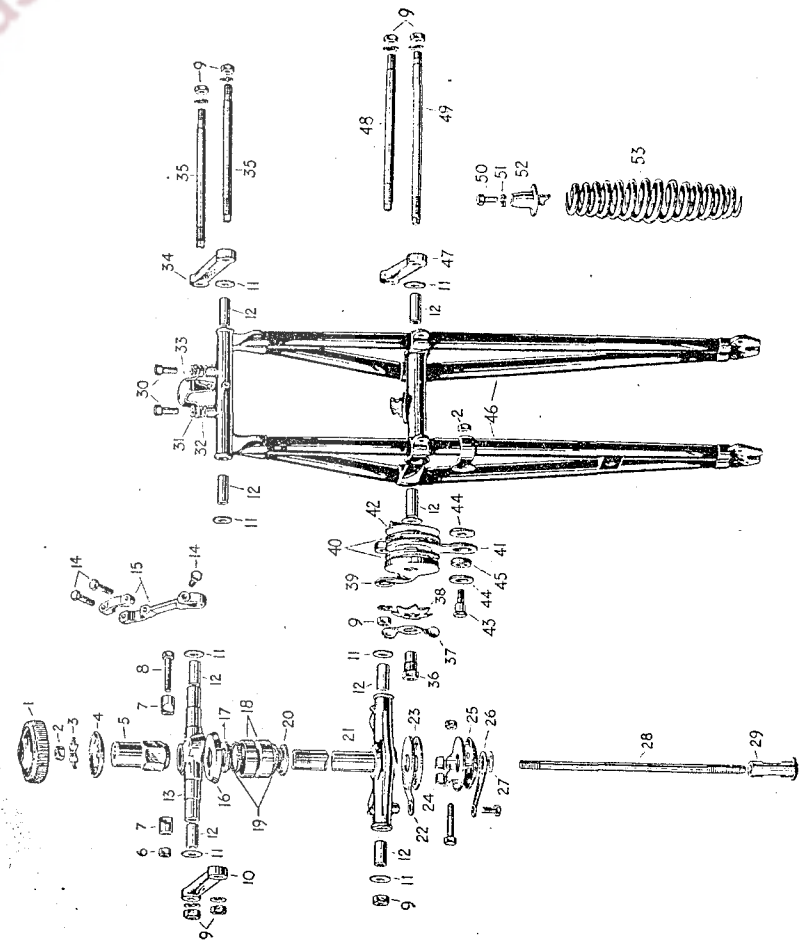
### ADJUSTING STEERING HEAD.

Unscrew the steering damper knob until it is quite free. Slack off the pinch bolt nut and gently tighten down the large adjusting nut as far as it will go, but do not apply more than "two finger" pressure on the spanner. Place a box or other suitable article under the crankcase to lift the front wheel off the ground. Slack off the large adjusting nut a quarter of a turn and test the steering for freedom by turning the forks on to the full lock in both directions. If the steering is not entirely free, the nut should be slacked off a little further. Finally, tighten up the pinch bolt nut.

## FRONT FORK

### FRONT FORK ASSEMBLY

- |                         |                         |
|-------------------------|-------------------------|
| 1 Knob                  | 28 Rod                  |
| 2 Rod nut               | 29 Sleeve and washer    |
| 3 Star spring           | 30 Bracket screws       |
| 4 Locating plate        | 31 Washer               |
| 5 Lock nut              | 32 Washer               |
| 6 Eccentric bolt nut    | 33 Speedo bracket       |
| 7 Eccentric bolt sleeve | 34 Top link             |
| 8 Eccentric bolt        | 35 Top spindle          |
| 9 Spindle nut           | 36 Nut                  |
| 10 Top link             | 37 Adjuster             |
| 11 Knurled washer       | 38 Star washer          |
| 12 Spindle bush         | 39 Outer plate          |
| 13 Head clip            | 40 Friction disc.       |
| 14 Cap bolt             | 41 Inner plate          |
| 15 Arms and cap         | 42 Bottom link          |
| 16 Ball race cap        | 43 Pin                  |
| 17 Cone                 | 44 Washer               |
| 18 Cup                  | 45 Pad                  |
| 19 Ball bearing         | 46 Girder               |
| 20 Cone                 | 47 Bottom link          |
| 21 Crown and stem       | 48 Bottom spindle rear  |
| 22 Back plate           | 49 Bottom spindle front |
| 23 Friction disc        | 50 Pin                  |
| 24 Anchor plate         | 51 Spring washer        |
| 25 Spring plate         | 52 Lug                  |
| 26 Bottom plate         | 53 Fork spring          |
| 27 Brass washer         |                         |



## CARBURETTOR

### Carburettor and Controls

#### REMOVING CARBURETTOR.

It is sometimes necessary to remove the carburettor from the machine in order thoroughly to clean it or to examine for wear.

To remove the carburettor proceed as follows :—

1. Turn off petrol and remove petrol pipe.
2. Unscrew the mixing chamber cap.
3. Slack off the holding bolt under the mixing chamber.
4. Remove the nuts from the carburettor fixing studs.
5. Withdraw the carburettor from the studs and remove from machine, leaving the slides attached to the cables.

#### CLEANING AND EXAMINATION.

Completely dismantle the carburettor and thoroughly clean all parts. Remember to slack off the float chamber cover lock screw before removing the cover. It is desirable to allow the carburettor to dry out if possible before cleaning as this facilitates the removal of any deposit.

Examine the float needle for wear and renew if necessary. The needle jet should also be carefully inspected and replaced if worn. A worn needle jet is frequently the cause of heavy petrol consumption. Note that the needle never wears. Wear on the throttle slide is unusual except after long service ; where a machine is used under adverse conditions slide wear may be more rapid. When renewing the slide see that it is the correct size ; the size and cutaway is marked on it, the slide for the model 3 HW being marked 6-4.

When re-assembling the carburettor see that all the washers are in good condition. Do not tighten fully home the holding bolt as the float chamber position is best adjusted after the carburettor has been fitted to the engine. Make certain that the clip on the float is engaged in the groove in the needle.

It is not normally necessary to remove the slides unless they are to be renewed. Removal is effected by detaching the cables. If the needle is removed, see that it is fitted into the correct position when it is replaced. The normal position is in the second groove from the top.

#### RE-FITTING CARBURETTOR.

To replace carburettor proceed as follows :—

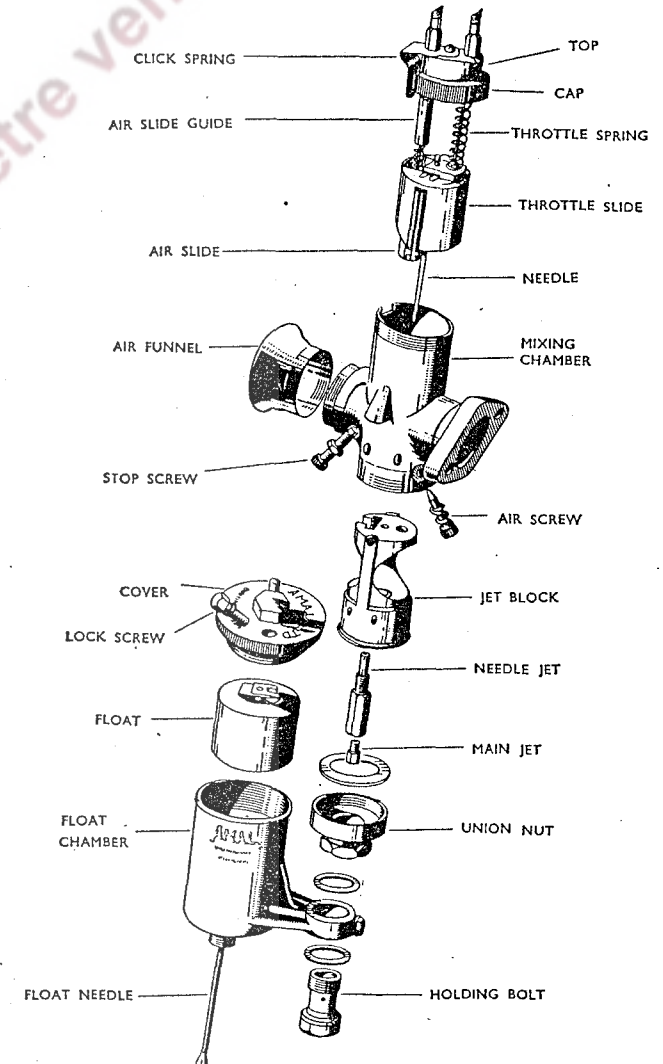
1. Fit the slides into the body, being careful to insert the needle into the needle jet. There is a positioning projection on the mixing chamber top which fits into a slot in the top edge of the mixing chamber. Secure by screwing down the knurled mixing chamber cap.
2. Fit the carburettor flange to the two studs on the cylinder barrel induction pipe, using a new washer to make the joint. Tighten up the nuts evenly, a little at a time to avoid distorting the flange.
3. Position the float chamber and tighten up the holding bolt.
4. Fit the petrol pipe and turn on the petrol.
5. Start up the engine and warm it up a little.
6. Adjust the slow running by positioning the throttle stop screw so that the throttle is slightly open when the twist grip is closed down. Adjust the slow running mixture strength with the pilot air adjusting screw. It is best to start with the throttle stop so adjusted that the engine runs rather fast and the pilot air screw screwed well in, thus giving a rich mixture. This will cause the engine to "hunt"—run alternately fast and slow. The engine should then be slowed down by screwing out the stop screw and the mixture adjusted with the pilot air screw until the engine runs evenly and smoothly, with the ignition slightly retarded.

Do not make this adjustment with the engine cold or fully warmed up. Allow the engine to run for about two minutes from cold before making the slow running adjustment.

#### AIR VALVE (SLIDE).

It is important to check that the air slide opens fully. If the air slide is opening only partially the mixture will be too rich and the consumption will be heavy. Adjustment can be made on the cable adjuster at the top of the carburettor.

## CARBURETTOR



Amal Carburettor Parts

## CARBURETTOR

### CONTROL CABLES.

The throttle and air cables require no attention with the exception of periodical lubrication. If it is found that a cable is not operating freely in the casing, this is usually because it is dry. To lubricate, the cable should be detached from the handlebar lever and the end supported as high as possible. A small funnel should be made with thick brown paper and tied round the end of the casing. This should then be filled with thin oil (10 HD) and allowed to stand overnight, when the oil will penetrate down the casing and effectively lubricate the parts.

### MIXTURE.

The machine is turned out from the works with the correct main jet and throttle slide. The sizes of these parts have been arrived at after experience, and no useful purpose will be served by fitting a jet or slide of a different size to the standard part.

The needle position is variable, and controls a wide range of throttle opening. The lower the needle the leaner the mixture.

Too rich a mixture is indicated by black smoke from the exhaust, "lumpy" running, and a sparking plug the electrodes of which are covered with soot. A lean mixture causes the engine to run hot with some loss of performance. The sparking plug has a grey, over-heated appearance and the running of the machine is improved if the air lever is partially closed.

Normally the needle should be fitted with the clip in the second groove from the top. If the mixture is still too rich with the needle in the top groove, this is an indication that the needle jet is worn and requires renewal.

Do not confuse black smoke from the exhaust with blue oil smoke caused by worn piston rings or cylinder bore or both.

### CARBURETTOR FAULTS.

Dirt or water in the carburettor will cause the engine to stop or to run only on a small throttle opening.

If the throttle slide sticks in the carburettor barrel it is probable that the mixing chamber is distorted. This distortion is frequently the result of the two nuts on the flange studs being tightened up unevenly.

The carburettor will flood if the float chamber needle is not seating properly, or if the needle is bent or the float punctured.

Before investigating any fault connected with weak mixture or bad starting, see that the flow of petrol to the carburettor is adequate. Starvation of the float chamber can be due to a blocked petrol pipe or an obstructed filter. The filter is above the petrol tap and comes away with the petrol tap when it is removed from the petrol tank.

Air leakage at the flange joint will cause a weak mixture. If the main jet or the mixing chamber union nut is slack a rich mixture will result.

## MAGDYNO

### Ignition

#### TYPE.

Magdyno Lucas Model MO14, Type L541 anti-clockwise.

### Magdyno

#### REMOVAL.

In order to remove the magdyno it is not necessary to take off the timing case. The timing plug at the top of the case should be removed when the nut securing the gear to the armature shaft is accessible. Unscrew the nut with a slow but firm turning movement (right-hand thread) which will release it from the shaft and will also withdraw the gear from the shaft. The shaft has a key-way cut in it, but no key is fitted.

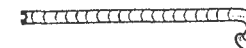
Remove the two dynamo leads by taking out the centre screw on the kidney-shaped fixing plate. (Note that it is impossible to refit the leads in an incorrect position.) Release the earth wires by screwing out the securing plug adjacent to the contact breaker cover. Screw out the advance and retard control after turning over the ear of the tab washer. After releasing the clamp on the top, the magdyno can be removed from the engine.

#### RE-FITTING.

Before installing the magdyno a check should be made to see that the screwed studs in the base are secure. Place the unit on the magdyno platform and locate the end of the shaft through the centre of the drive gear. Screw on the shaft nut about one turn only. Clamp down the unit securely on to the platform. Attach the dynamo, earth wires, and advance and retard control.

#### IGNITION TIMING.

It is convenient first to make a gauge from a piece of spoke so that the piston position can be accurately gauged. The spoke should be about 5 ins. long and must be graduated in eighths of an inch with a small fine file.



Spoke gauge for checking piston position.

The ignition on the model 3 HW is correctly timed when, with the magneto fully advanced and the contact breaker points just breaking, the piston is three-eighths of an inch from top dead centre.

Take off the contact breaker cover and rotate the magneto until the contact points are just opening. Make certain that the magneto is rotated in the correct direction—anti-clockwise as viewed from the drive-end.

Remove the sparking plug and turn the engine by engaging a gear and, with the machine on the stand, rotating the rear wheel in the correct direction for forward travel. When both valves are closed, bring the piston up to top dead centre, inserting the graduated spoke through the sparking plug hole to test the position. First making certain that the piston is on true top dead centre, rotate the engine backwards until the piston has dropped three-eighths of an inch. This amount can be measured on the graduated spoke without difficulty. Now check up to see that the magneto is correctly positioned—fully advanced and contact breaker points just breaking—and being careful that neither the engine nor the magneto move, tighten up the nut on the armature shaft. Finally turn over the engine a few times and then make a check by again positioning the piston three-eighths of an inch before top dead centre and ascertaining that the contact breaker position is correct. Though this operation calls for great care in order to make certain that the timing is exactly correct, the job presents no real difficulty.

### CONTACT BREAKER MECHANISM

#### LUBRICATION.

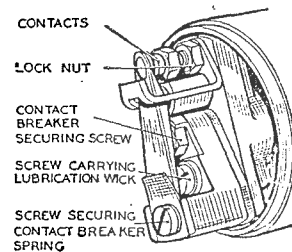
The cam is lubricated by a wick contained in the contact breaker base, which must be given a few drops of oil 10HD. To get at the wick, remove the spring arm carrying the moving contact and withdraw the screw carrying the wick. At the same time remove the tappet which operates the contact breaker spring, and lightly smear with oil 10HD; when replacing, see that the small backing spring is fitted immediately under the securing screw and spring washer and that the bent portion faces outwards.

## MAGDYNO

### CLEANING.

Remove the contact breaker cover and examine the contacts. If they are dirty, they must be cleaned by polishing with a fine carborundum stone or very fine emery cloth; afterwards wipe away any dirt or metal dust with a petrol-moistened cloth. Cleaning of the contacts is made easier if the spring arm carrying the moving contact is removed as described on page 39.

Examine the spring arm of the contact breaker and wipe away any rust.



Contact breaker mechanism with cover removed.

### ADJUSTMENT.

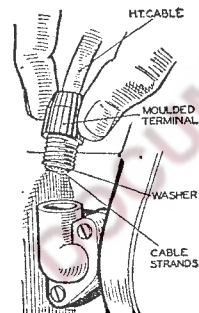
To check the contact setting, turn the engine until the contacts are fully opened, and insert the gauge provided, .012 in.—.015 in., between the contacts; if the setting is correct, the gauge should be a sliding fit. If there is an appreciable variation from the gauge, slacken the lock nut and turn the contact screw by its hexagon head, until the gap is set to the gauge. Finally tighten the lock nut.

### H.T. CABLE

Should be 7 mm. in diameter. Other sizes, such as 5 mm. and 9 mm. will not fit in the Immobilizer and Suppressor. The cable must be replaced if the rubber insulation has perished or shows cracks and has become brittle.

### PICK-UP

Examine the pick-up or high tension terminal (magneto end). See that the carbon brush moves freely in its holder, being careful not to stretch the brush spring unduly. While the pick-up is removed, clean the slip-ring track and flanges by holding a soft cloth on the ring while the engine is slowly turned by hand. To fit new cable, thread the knurled moulded nut over the lead, bare the cable for about a quarter-inch, thread the wire through the metal washer removed from the old cable, and bend back the strands. Finally, screw the nut into its terminal.



Pick-up, moulded nut removed to show method of making connection.

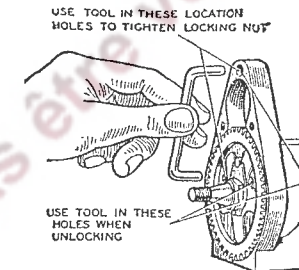
### SUPPRESSOR AND IMMOBILIZER

Check for cracks in insulation, check for positive contacts of H.T. wire, always disconnect lead at spark plug end before unscrewing immobilizers.

## MAGDYNO

### DISMANTLING

To dismantle the "slipping clutch" apparatus it will be necessary to procure, or make-up, a jig to hold the wheel whilst the securing nut is being undone. This consists simply of a length of  $\frac{1}{4}$  in. mild steel rod bent to a flat U, the ends being cut short with their centres  $3\frac{1}{8}$  in. apart, so that one can be slipped in the hole in the wheel whilst the other is engaged with the hole in the top of the casting through which the dynamo securing stud normally goes. The  $\frac{1}{8}$  in. box spanner can then be used on the central nut, which unscrews in a normal left-hand direction. Note that the ear of the tab washer must be bent back first.



Jig for use when removing or tightening locking nut.

The next step is to remove the contact breaker end-plate, which is held in position by four screws. The advance and retard cable stop must be unscrewed, also the high tension pick-up holder, and the small earthing brush, which will be found at the side of the "Magdyno." This is essential, otherwise the pick-up and brush, and perhaps the slip-ring, will get broken. The armature can now be knocked out with a soft drift from the drive end.

There is no need to put a "keeper" across the magnet, as it retains its magnetic properties more or less indefinitely. Although it loses a certain immaterial amount of power in the first removal of the armature, subsequent removals do not affect it.

### TESTING.

If no testing apparatus is available to check the armature windings, some idea of its condition may be obtained with the aid of a battery.

Screw contact breaker retaining screw into the end of the armature shaft. Connect one pole of a 2-volt cell to this with an ammeter in series. Connect the other pole of the battery to the core of the armature. The ammeter will then record the current taken by the primary turns—this should be approximately 3 amperes. To check the fine winding, connect a piece of H.T. cable to the brass insert of the slipping and hold the other end a little away from the armature core. If the lead from the battery which was connected to the core is then flashed quickly on and off the core, a high tension spark should occur between the H.T. cable and the core.

No spark between these points indicates there is a fault either in the armature windings or the condenser, and a replacement should be fitted.

### RE-ASSEMBLY

Thoroughly wash out cages and balls and dry. Re-pack with high melting point grease. Refit armature and contact breaker endshield, taking care that the distance shims are in position. Check armature for end play. Armature should revolve easily when turned by hand, but no endplay should be felt.

Adjust by adding or leaving off shims under contact breaker endshield until correct.

Fit cam in position with Bowden control lever in its correct slot and secure with spring circlip. Examine fibre "boot"—see that it slides freely without having sideplay.

Moisten cam lubricating wick with oil. Fit contact breaker in position on horseshoe shaft location on end of armature shaft. Make sure the fibre heel of the contact breaker push rod is located correctly in its guides.

Fit centre screw with locking plate. Tighten and lock by bending up tags of locking plate.

Refit spring contact arm with backing plate in its correct position.

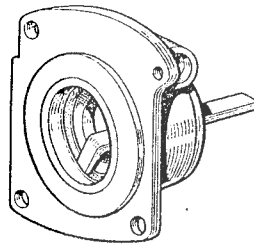
Turn armature till points are fully open and adjust the gap to .012 in. with feeler gauges.

Tighten lock nut at foot of contact screw.

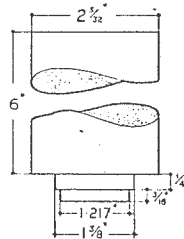
Re-check gap setting.

## MAGDYNO—SPARKING PLUG

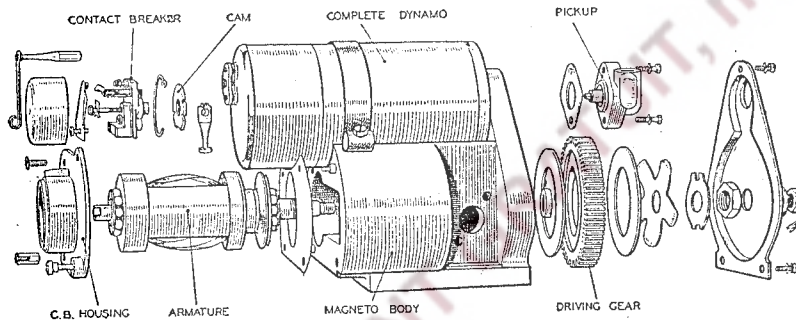
It is important that the two ball bearings which support the armature are in good condition. If they are packed on assembly with a grease such as a suitable high-melting point grease, they will stand an almost unlimited amount of normal wear, but if they start to fail, due to a bent shaft or other cause, they must be replaced. They can be removed with a tool as shown in the sketch (illustration below), and they should be replaced with a pressure of 250lbs.; at the works this is done in an hydraulic press, but in case of emergency they can be driven in with a mandrel made to the dimensions shown in the sketch (illustration below). The serrated fibre washer fits behind the race to prevent any electric current attacking the surface of the bearings.



Tool for removing armature bearings and dimensions of mandrel for replacing them.



When re-assembling the clutch it is not difficult to get the correct degree of pressure on the central steel spring. The springs are calibrated to give this pressure when the nut is dead tight. It is possible to check the degree of slip by locking the driving wheel. The clutch should fail to transmit more than 10ft./lb., i.e., 10lb. pull measured on a spring balance via a spanner one foot long. The minimum loading is 4ft./lb.



Exploded View of Magneto.

## SPARKING PLUG

If the plug is of the demountable type, it should be carefully dismantled and cleaned. The body should not be gripped tightly in a vice for dismantling purposes, as this will tend to nip the threads. If the insulation is of mica it must not be scraped or rubbed with emery cloth. Cleaning with a rag wet with petrol is permissible. Where the insulation is of the porcelain type, it can be scraped with a knife to remove oil and carbon.

The body of the plug should be scraped free of carbon, and all parts well washed in clean petrol before re-assembly. See that the sealing washer which fits inside the body is carefully positioned.

The type of plug which cannot be dismantled can only be cleaned by washing in petrol if special electrical cleaning is not available. Mica insulated plugs must not be cleaned on plug cleaning machines. The plug gap should be set by levering the outside electrode toward or away from the centre electrode. Never attempt to change the position of the centre electrode. The correct gap is .015 in. to .018 in.

## Charging

### TYPE.

Dynamo, Lucas, Model E3HM-LO Clockwise.  
Cutting-in speed, 1250-1350 r.p.m. at 7 dynamo volts.  
Output test 5 amps at 1850-2050 r.p.m.

## Dynamo

### REMOVAL.

To remove the dynamo from the magneto portion of the "Magdyno," unscrew from the driving end plate the securing nut and slacken the two screws in the clamping band. The dynamo can then be drawn away from its mounting.

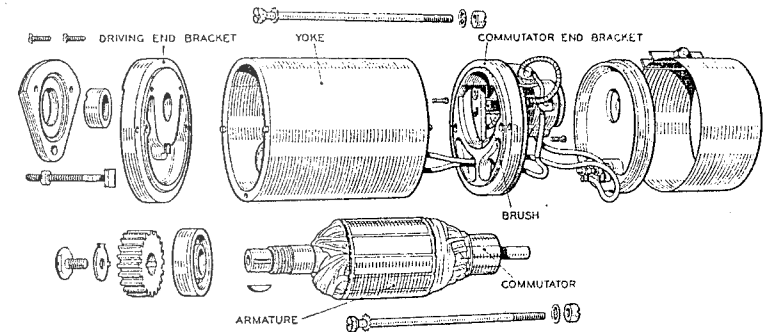
### DISMANTLING.

Bend back the tab washer from over the screw securing the driving pinion and remove the screw. Withdraw the pinion by means of an extractor. Lift the two brushes from their holders and unscrew the two through bolts securing the driving end bracket to the yoke. Withdraw the end bracket complete with armature. The armature can be removed from the end bracket by means of a hand press.

### TEST AND REPAIR—COMMUTATOR AND BRUSHES CLEANING.

About every 10,000 miles, remove the metal cover band in order to inspect the commutator and brushgear. Check that the brushes are clean and move freely in their holders. If there is any stickiness, remove the brush and clean the sides with a cloth moistened with petrol, or by lightly polishing with fine glass paper. Always replace brushes in their original positions. Brushes which have been worn so that they do not bear firmly on the commutator, or which expose the embedded end of the flexible on the running face, must be replaced.

The commutator must be clean, and free from trace of oil or dirt. Clean a dirty or blackened commutator by pressing a fine duster against it while the engine is slowly turning over. If the commutator is very dirty, the duster should be moistened with petrol.



Exploded View of Dynamo.

### METHODS OF MAKING CONNECTION TO DYNAMO OR REGULATOR TERMINALS.

To make a connection to the dynamo or regulator terminals, slacken the fixing screw on the terminal block and remove the clamping plate.

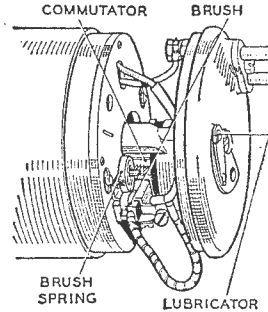
Withdraw the metal sleeve in each terminal. Pass about 1in. of cable through the holes in the clamping plate and bare the ends for 3/4in. Fit the metal sleeves over the cables, bend back the wire over the sleeves and push them well home into their terminals. Finally, screw down the clamping plate. The leads connected to the "D" and "F" terminals of the dynamo or regulator units must not be reversed. To prevent this occurring, the screw in the dynamo terminal block is off-centre, and the screws which secure the regulator terminal clamping plate are of different size.

## DYNAMO

### BRUSH WORN.

Brushes which have worn to such an extent that they do not bear properly on the commutator, must be replaced. Remove machine from engine and withdraw dynamo cover band.

Remove screw securing eyelet on end of brush lead. Hold back brush spring and remove brush from its holder. Place new brush in holder and gently lower the spring. Secure eyelet on end of brush lead in original position.



Commutator and Brush Gear.

### COMMUTATOR BADLY WORN.

To remedy a badly worn commutator it will be necessary first to remove the armature from the dynamo. (See Dismantling, page 43.)

Mount the armature complete with the end bracket in a lathe, rotate at high speed and take a light cut with a very sharp tool. Do not remove more metal than is necessary. Polish the commutator with very fine glass paper. Now undercut the mica insulation between the commutator segments to a depth of  $\frac{1}{32}$  in. below the surface of the segments. A hacksaw blade ground down until it is only slightly thicker than the mica forms a suitable tool. Draw this backwards and forwards along the mica until it is undercut to the proper depth.

### HIGH MICAS ON THE COMMUTATOR.

High mica necessitates the removal of the armature.

To do this, proceed as follows:—

1. Remove bakelite terminal cover, make rough diagram of the connections to the two terminals "D" and "F." Disconnect wires from back of terminals and remove cover.
2. Lift brushes from boxes, noting which way round they are fitted.
3. Unscrew the two through bolts, noting position of cupped and flat spring washer.
4. Remove armature complete with drive and bracket.

Examine commutator and if it is badly grooved, mount the armature complete with the end bracket in a lathe and skim commutator. Polish the commutator with very fine glasspaper. Now undercut the mica insulation to a depth of  $\frac{1}{32}$  in. below the surface of the segments. A hacksaw blade ground down until it is only slightly thicker than the mica, forms a suitable tool. Care should be taken to undercut the mica squarely and for the whole width of the slot.

### CHARGING CIRCUIT.

With compensated voltage control equipment, the reading on the ammeter will only show one or two amperes charge during the daytime running when the battery is fully charged.

It is most important that the main dynamo and field leads are not interchanged either internally or externally at the dynamo, or at the control box.

### TESTING.

Remove dynamo leads from terminals "D" and "F." Bridge the two terminals and with engine running at a good fast tickover (fast enough to make the dynamo charge if there were no fault) connect a voltmeter between the link joining terminals "D" and "F" and the yoke of the dynamo. Speed up engine slightly, when the voltage should rise with speed.

If the dynamo proves to be in order, re-connect leads at the dynamo. Be quite sure that the connections "D" (yellow) and "F" (green and black) are not interchanged.

## DYNAMO—REGULATOR

Next disconnect leads to "D" and "F" terminals at the regulator. Join these wires together and test with voltmeter connected between them and a good earth on the machine. If the voltage rises with speed, then the leads from the dynamo to regulator are in order.

At this stage test the battery and connections. With voltmeter:—

1. Test between positive and negative battery terminals.
2. Test between positive battery and frame of motor cycle. No reading indicates bad earth or broken earth wire from battery to frame.
3. With engine running at charging speed, turn front wheel through full lock, to stress cables, and check for fractures under insulation.

Assuming that components and wiring so far tested have been proved to be in order, test the control box and the remaining cables.

Remove the lead from terminal "A" at the control box. Test with voltmeter between this lead and earth. If reading is obtained, the fault lies in the cut-out and regulator unit.

If no reading:—Connect voltmeter between terminal No. 3 on headlamp switch, and earth, when a reading will indicate there is an open circuit in wire between regulator and switch.

If no reading:—Test first between terminal "A" at ammeter and earth and then terminal "B" and earth. A voltmeter reading at terminal "A" indicates a break in the link between ammeter and switchbox. No reading at terminal "A" but a reading at "B" ammeter is open circuit. No reading at terminal "B" indicates either broken wire between terminal "B" and battery, or bad battery connections.

Re-connect lead to terminal "A" at control box.

### FIELD COIL

The fitting of the field coil requires the use of a pole shoe expander. If one of these is not available, do not attempt to replace the coil. When fitting a new field coil, take care to tighten the pole shoe fixing screw to the fullest extent.

### ARMATURE

The testing of the armature requires the use of a volt drop test or "growler". If these are not available, check by substitution.

### BEARINGS AND LUBRICATION

When re-assembling the dynamo, the ball race at the driving end must be re-filled with Grease No. 3. If the bearing bush at the commutator end is badly worn it must be replaced. Before fitting, the new bush must be partly immersed in clean, thin machine oil to ensure that the cavities in the bushes are completely filled. The bush must be fitted by means of a shouldered mandrel of the same diameter as the armature shaft.

Subsequent lubrication in service is by adding a few drops of oil 10HD to the lubricator on the commutator end bracket.

### SPECIAL ATTENTION REQUIRED IF WATER HAS ENTERED DYNAMO.

1. Check fibre wedges located in armature core slots. These may have swollen and become proud of the core. Cut level with sharp knife.
2. Thoroughly dry out field coils and brush gear.
3. Remove drive end ballrace. Wash out and if no excessive wear or roughness is apparent, re-pack with Grease No. 3.

## Regulator and Cut-out

The regulator provides complete automatic control, causing the dynamo to give an output which varies according to the load on the battery or its state of charge. Normally during daytime running, when the battery is in good condition, the dynamo gives only a trickle charge, so that ammeter readings will seldom exceed one or two amperes. If, under normal running conditions, it is found that the battery is continually in a low state of charge, or is being over-charged, then the regulator has become out of adjustment and a replacement must be fitted.

Always check that the D and F leads between the regulator and battery (coloured yellow and green and black respectively) are connected to their correct terminals at both ends.

### REGULATORS FOR USE WITH NIFE BATTERIES.

A special regulator marked NiFe is supplied for use with these batteries. If a NiFe battery is substituted for the lead acid type, a new regulator must be fitted.

## REGULATOR

### TO CHECK THE REGULATOR SETTING.

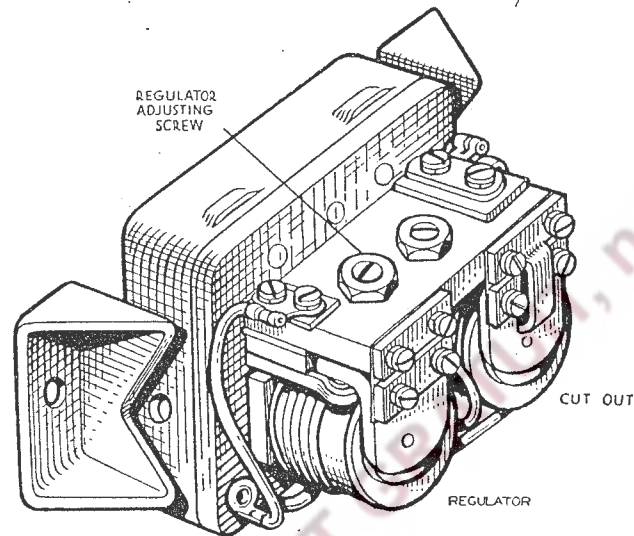
Regulators are set on open circuit. To do this:—Either disconnect the wire from terminal "A" at the regulator or place a piece of thin paper between the cut-out points. Connect voltmeter between the frame of the regulator and earth.

Start engine and rev up slowly till voltmeter flicks and steadies. This reading should be between the following limits:—

- At 30 degs. Fahr. or very cold temperatures set between 7.9—8.3 volts.
- At 60 degs. Fahr. or normal shop temperatures set between 7.8—8.2 volts
- At 90 degs. Fahr. or hot temperatures set between 7.7—8.1 volts.

If an open circuit voltage does not come within these limits, adjustments can usually be effected by increasing or decreasing the tension on the armature spring as follows:—

1. Slacken adjusting screw locking nut.
2. Turn adjusting screw in clockwise direction to increase the open circuit voltage, and in an anti-clockwise direction to decrease.



Regulator and Cut-out showing Adjusting Screw.

After long periods of service, it may be found necessary to clean the vibrating contacts of the regulator. These are accessible if the top screw securing the fixed contact is turned back and the bottom screw slackened, permitting the fixed contact to be swung outwards. The contacts can then be polished with a fine emery cloth.

The moveable contact is accurately set and should not be removed.

In the event of this contact having been removed, it should be reset as follows:—

Insert .015in. feeler gauge between back of fixed contact and regulator frame.

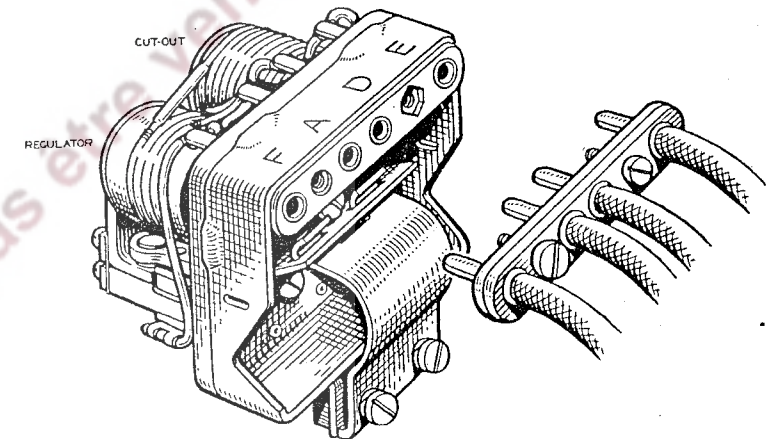
Insert .020-.025in. feeler gauge between top of bobbin core and underside of moveable armature (not under stop rivet).

Press armature back against yoke and down on to the bobbin core with feelers in position and lock armature in position by tightening two fixing screws.

Adjust gap between the regulator points when armature is pressed down on bobbin to between .007-.010in. This is done by inserting or removing packing shims at the back of the fixed contact.

## AMMETER—BATTERY

If, after setting the open circuit voltage and reconnecting the wire to the "A" terminal (or removing the paper from the cut-out points), no charge is registered on the ammeter, check the cut-out points. Ascertain that these are clean and making good contact when closed. Set the voltage at which the points close at 6.2-6.6 volts. Adjust the cutting-in voltage in a similar manner to the regulator, using the cut-out adjusting screw, and noting the voltage at which the points close.



Connections for Regulator and Cut-out

## Ammeter

### TYPE.

Lucas. Fitted into headlamp.

### REMOVAL AND REPLACEMENT.

Take out the three screws from the panel on the headlamp and remove the panel. Unscrew the ammeter terminal nuts and lift off the cable eyelets. Bend back the four metal tags securing the ammeter and remove the ammeter from the panel.

### AMMETER FAULTS.

Check for faults in ammeter by substitution.

## Battery

### TYPE.

PUW7E5, Lucas, 6 volt, 10 amps.

### TOPPING-UP.

When examining a battery, do not hold naked lights near the vents, as there is a danger of igniting the gas coming from the plates. Remove the vent plugs and see that the ventilating holes in each are quite clear. Remove any dirt by means of a bent wire. A clogged vent plug will cause the pressure in the cell to increase, due to gases given off during charging, and this may cause damage. Make sure that the rubber washer is fitted under each vent plug, otherwise the electrolyte may leak.

Pour a small quantity of distilled water into each of the cells to bring the acid level with tops of the separators.

Acid must not be added to the battery unless some is accidentally spilled. Should this happen, the loss must be made good with acid diluted to the same specific gravity as the acid in the cells. This should be measured by means of an hydrometer.



## BATTERY—LIGHTING

### CHECKING CONDITIONS.

First ascertain that the battery is a lead acid type and not a NiFe (nickel-cadmium alkaline) type, as the same hydrometer must not be used to take readings on both types of battery.

The state of charge of the battery should be examined by taking hydrometer readings of the specific gravity readings and their indications are as follows:—

1.280—1.300—Battery full charged.

About 1.210—Battery about half discharged.

Below 1.150—Battery fully discharged.

These figures are given assuming the temperature of the acid is about 60 degs. Fahr.

Each reading should be approximately the same. If one cell gives a reading very different from the rest, it may be that the acid has been spilled or has leaked from this particular cell, or there may be a short circuit between the plates. This will necessitate its return to a Repair Depot for rectification.

### CLEANING.

Wipe the top of the battery to remove all dirt or water.

**Note.**—Do not leave the battery in a discharged condition for any length of time. If a motor-cycle is to be out of use, the battery must first be fully charged, and afterwards given a refreshing charge about every two weeks.

### EARTHING CONNECTIONS.

Check that the lead from the negative terminal is securely connected to the cycle frame or other suitable earth.

### CHARGING.

If the previous tests indicate that the battery is merely discharged and if the acid level is correct, the battery must be recharged from an external supply. Charge the battery with a constant current of 1.2 amperes until the specific gravity of the electrolyte in the cells remains constant.

If the battery does not respond to a freshening charge, it must be put through what is known as a "cycle".

First charge as described above for a period of 10 hours, and then discharge it at the rate of 1.2 amperes. The time taken to discharge should be 7-8 hours. If the battery discharges in a shorter time, repeat the charging and discharging cycle. If the efficiency of the battery is not improved by this process there is probably an internal fault and the battery should be replaced.

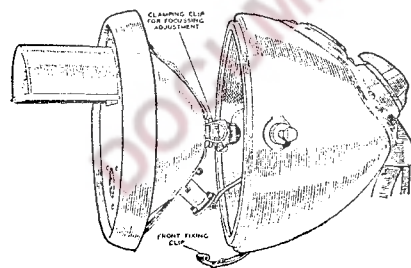
## LIGHTING AND ACCESSORIES

### Headlamp

#### REMOVING LAMP FRONT AND REFLECTOR.

To remove the lamp front and reflector, press back the fixing clip at the bottom of the lamp. When replacing the front, locate the top of the rim first, then press on at the bottom and secure by means of the fixing clip.

To remove the bulb holder, press back the securing springs.



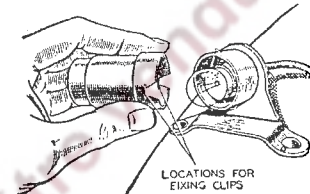
Headlamp with reflector partially removed.

## LIGHTING—HORN

### SETTING AND FOCUSING.

The lamp must be set to ensure that the beam is projected below the horizontal.

To obtain the best driving light the bulb should be correctly focussed in the reflector. To adjust the position of the bulb remove the front and the reflector and slacken the screw on the clamping clip at the back of the reflector. Slide the bulb holder backwards or forwards until the best light is obtained and finally tighten the clamping screw.



Tail lamp with cap removed.

### CLEANING.

Care must be taken, when handling the reflector, to prevent it from becoming finger marked. It can, however, be cleaned by polishing with a fine chamois leather. Metal polishes must not be used.

The bulb should be 6 volt, 24 watt, double filament type.

### Tail Lamp

To remove the cover carrying the red glass, twist and pull away from base. When replacing position the locations in the cover over the spring and push home.

The bulb should be 6 volt, 3 watt, S.B.C.

### Cables

Before making any alterations to the wiring or removing the switch from the headlamp, disconnect the positive lead at the battery to avoid the danger of short circuits. The lead, about one foot long, from the positive battery terminal is connected to the lead from the switch by means of a brass connector. The connector is insulated by a rubber sleeve which must be pushed back to allow the connector to be unscrewed. Do not allow the brass connector to touch any metal part of the engine, as this will short circuit the battery. When connecting up again, pull the rubber sleeve over the connector.

### Lighting Switch

All leads to the headlamp are taken direct to the switch, which, together with the ammeter, is incorporated in a small panel. The panel can be removed when the three fixing screws are withdrawn. The ends of all cables are identified by means of coloured sleeveings. The colour scheme and the diagram of connections are shown in the wiring diagram. When making connections to the switch, bare the end of the cable for about  $\frac{3}{16}$  in., twist the wire strands together and turn back about  $\frac{1}{4}$  in. so as to form a small ball. Remove the grub screw from the appropriate terminal and insert the wire so that the ball fits in the terminal post. Now replace and tighten the grub screw; this will compress the ball to make a good electrical connection.

### Horn

Electric horns are adjusted to give their best performance before leaving the works and will give a long period of service without any attention. No subsequent adjustment is necessary. If the horn becomes uncertain in action or does not vibrate, it has not necessarily broken down. The trouble may be due to a discharged battery or a loose connection or short circuit in the wiring of the horn.

The performance of the horn may be upset by the fixing bolt working loose, or by the vibration of some part adjacent to the horn. To check this, remove the horn from its mounting, hold it firmly in the hand by its bracket, and press the push. If the note is still unsatisfactory, do not attempt to dismantle horn, but return it to a depot for examination.

## LIGHTING

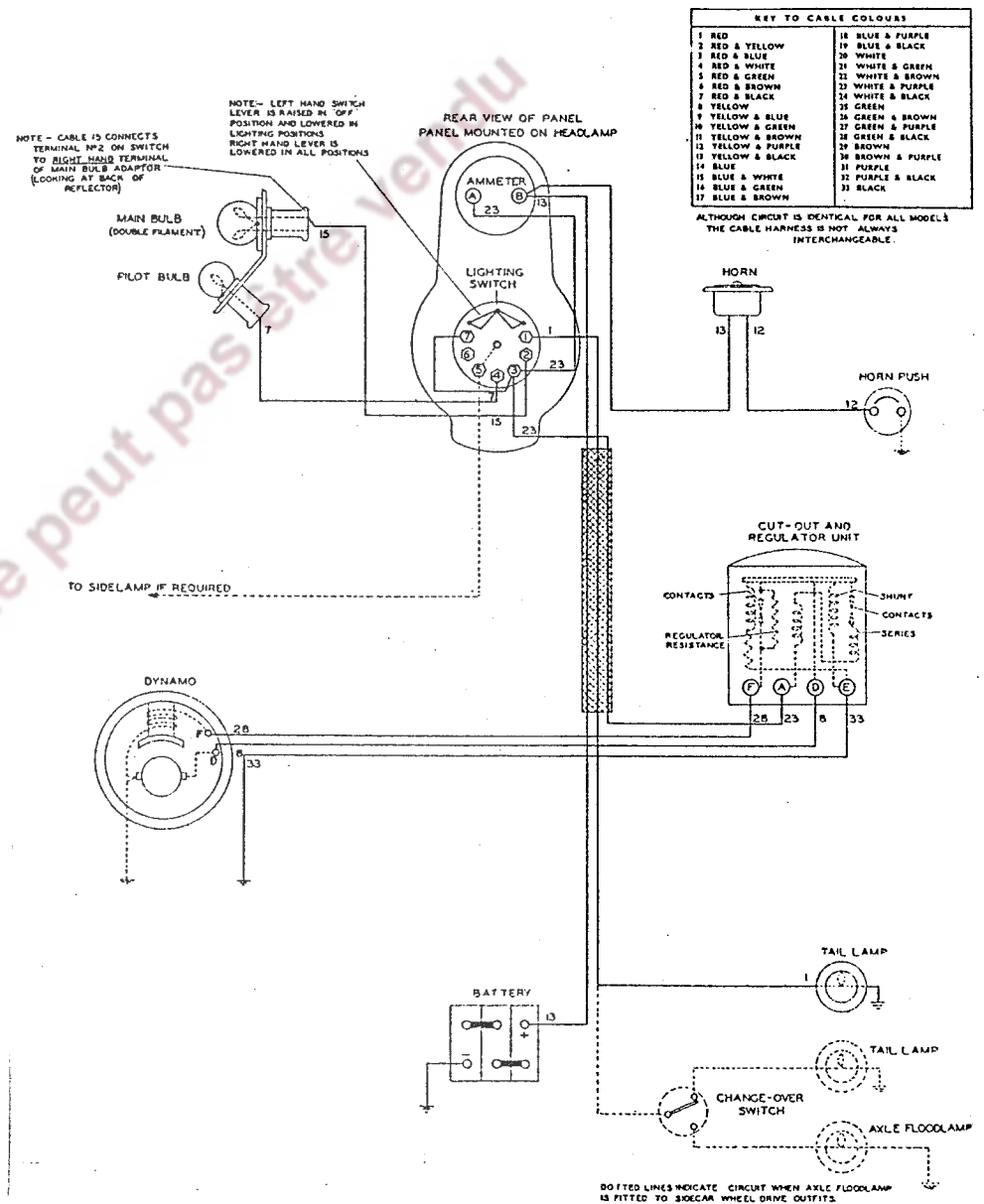
### LIGHTING CIRCUIT.

The headlamp bulb is of the twin filament type, the second filament being used as spare. To bring the second filament into service, remove the bulb, turn through 180 degs., and refit. Replace bulb at earliest opportunity.

If the headlamp does not light, and the bulb proves to be in order:—Test battery with voltmeter to ascertain that current is available. Then with switch in "Head" position check with voltmeter between terminal "2" on switch and a good earth on the frame of the motor cycle. If no reading, check between terminal "3" and earth, when reading will indicate a fault in the switch. If a reading is obtained between terminal "2" and the frame of the motor cycle, connect voltmeter between terminal "2" and the lamp reflector. No reading will prove there is a poor earth, due either to a break in the short lead from the reflector to body of the lamp or between the lamp body and the frame of the motor cycle.

Similar tests should be made to locate faults in the pilot light circuit, except that terminal "4" should be used instead of terminal "2"

To locate a fault in the tail lamp circuit, switch on to "Head" position, when, if the headlamp lights, the battery and circuit to the switch will have been proved in order. Then connect voltmeter between terminal "1" and earth to test switch. If no reading is obtained, test between terminal "7" and earth. If current is present as far as terminal "7" examine the two toggles at the top of the switch and see that these make contact with the switch terminals "1" and "7" in all positions of the switch except the "Off" position, when the left hand lever should be raised. Current at terminal "7" but none between the end of the cable and earth, will indicate a broken wire from switch to lamp. A reading between the end of the wire and a good earth on the frame of the cycle and no reading between cable end and lamp body, will prove that there is a bad earth between lamp body and frame.



Wiring Diagram No. W2053A.

# Periodical Attentions

## EVERY 1,000 MILES

### CLUTCH.

Drain primary chain case by removing plug at bottom. If the machine is used under adverse conditions wash out the case by putting in a pint of paraffin and running the engine for approximately one minute. Drain and replace the plug, and refill with three-quarters of a pint of engine oil 10HD. Do not use 50HD. When 10HD is not available, use half 50HD and half paraffin.

### SPEEDOMETER DRIVE GEARBOX.

Lubricate with one stroke of the oil gun. Do not give more than one stroke as over-lubrication may cause the oil to penetrate to the brake linings.

## EVERY 2,000 MILES

### ENGINE OIL.

Drain engine oil tank when the oil is warm after a run. Clean oil tank filter and crank-case filter by washing in petrol. Refill to within 2ins. of the filler cap with engine oil 50HD. Oil should be changed more frequently if the machine is used in sandy or muddy country or if it is employed on a succession of short runs. If the machine is new or a replacement unit has been fitted, the first oil change should be at 500 miles.

### BRAKE CAM SPINDLES.

Each time the engine oil is drained, the nipples on the front and rear brake cam spindles should receive one stroke from the grease gun. Do not give more than one stroke or the spindles may be overlubricated and grease may penetrate to the brake linings.

### CHAINS.

Remove rear chain and clean and lubricate (see page 27).

## EVERY 5,000 MILES

### GEARBOX.

Drain after a run when the oil is warm. The drain plug is located in the rear of the gearbox. Do not drain by removing the domed nut under the gearbox casing. Refill with engine oil 50HD through the filler plug orifice. There is a level plug at the rear of the inner cover. If the machine is new or a replacement gearbox has been fitted, drain after 500 miles running.

### CONTROL CABLES.

Lubricate with engine oil 10HD as described on page 38.

### SPEEDOMETER DRIVE.

Remove the front wheel and take off the spindle nut and anchor plate. Thoroughly clean the speedometer drive pinions and lubricate with grease No. 2. Do not leave too much free grease on the gears. Lubricate the drive by detaching the top end and using the oil can.

### MAGDYNO.

Lubricate contact breaker cam and dynamo commutator end bearings (see pages 39 and 45).

### WHEEL BEARINGS.

Remove wheels and dismantle hubs (Page 31). Wash bearings and other parts in paraffin and dry. Lubricate with grease No. 2, re-assemble and adjust. On the earlier models a grease nipple was fitted to the hubs, but was discontinued later and, when provided, should not be used for lubricating the bearings. It is convenient to stop up the nipple, when fitted, by tapping a short length of wire into the hole in the mouth. This attention should be carried out by workshops.

## EVERY 10,000 MILES

### DECARBONISING.

At this period the engine should be decarbonised and the valves ground in. It is normally unnecessary to do this at an earlier period.

### DYNAMO.

Inspect commutator and clean if necessary.

## EVERY 20,000 MILES

### MAGDYNO.

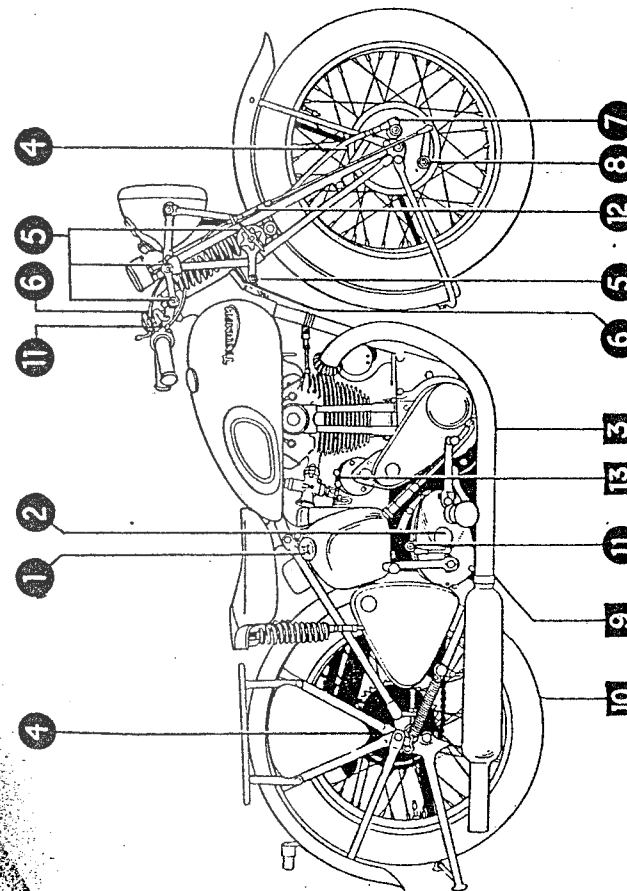
The magdno should be removed from the machine and sent to workshops for thorough overhaul and lubrication.

### REGULATOR.

The voltage control regulator should be sent to workshops for examination and adjustment if necessary.

Loc. No.	PART	W.D. Lubricant	TASK No.
1	Engine Oil Tank (Capacity 6 pints)	50 HD	•
2	Gear Box	50 HD	5
3	Primary Chain Case	10 HD	•
4	Wheel Hubs	GR. No. 2	•
5	Fork Spindles	C 600	4
6	Steering Head	Do.	•
7	Speedometer Gear Box	Do.	•
8	Front Brake Cam Spindle	GR. No. 2	•
9	Foot Brake Pedal Spindle	C 600	•
10	Foot Brake Cam Spindle	GR. No. 2	•
11	Exposed Cables	50 HD	•
12	Brake Spring Box	C 600	•
13	Dynamo	10 HD	•
	OIL CAN LUBRICATION		
	All Brake Rod Joints and Pins	50 HD	4

\* Periodical Maintenance as ordered.



Figures in Circles refer to Offside of Machine and those in Squares refer to points on Nearside not visible in Illustration.

LUBRICATION CHART. TRIUMPH MODEL 3 H.W. 350 c.c., O.H.V. T.L.C.378A

End