Maintenance Manual

AND

Instruction Book

FOR

MOTOR CYCLE
SOLO

Norton
REGD. TRADE MARK

"16H." 490c.c. S.V.

Norton Motors Limited.

Norton

REG. TRADE MARK

SOLO

"16 H." 490 c.c. S.V.

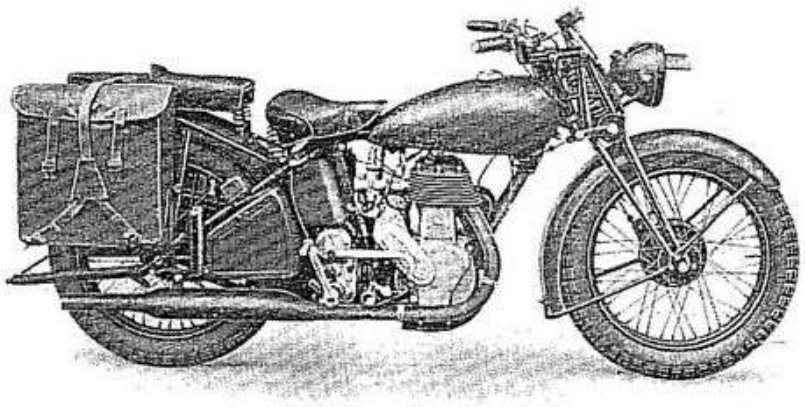


Fig. 1.

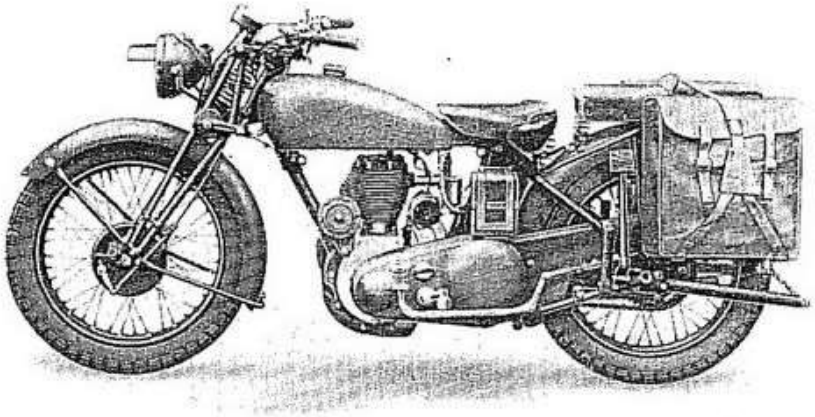


Fig. 2.

INDEX

DATA

CUBIC CAPACITY		490 c.c.
STROKE		100 m/m
BORE		79 m/m
COMPRESSION RATIO		4.9
PISTON RINGS	Dimensions:	
	Pressure ...	79 m/m x .062"
	Scraper ...	79 m/m x .125"
PISTON DIAMETERS	Top of Skirt	3.104"
	Bottom of Skirt	3.106"
GUDGEON PIN	Dimensions:	
	Length ...	2.593"
	Diameter ...	.875"
VALVES	Dimensions:	
	Head Diameter ...	1.625"
	Length from top of Seat to Tappet Face ...	4.937"
	Stem Diameter ...	.343"
	Angle of Seat ...	45°
VALVE TIMING	Inlet opens ...	27°—30° (5/16" before top centre)
	Exhaust closes ...	27°—30° (5/16" after top centre)
IGNITION TIMING		Points should commence to open 35° (7/16") before top centre fully advanced
SPARKING PLUG		K.L.G. KS.5 or M.80
MAGDYNO	Type ...	A.G.4
	Model ...	M.O.1-4
DYNAMO		E3.HM-10
VOLTAGE CONTROL		MCR.1. L.32
BATTERY		PUW.7E-5
CORRECT LAMP BULBS	Head. Main ...	6 volts, 24 watt. Double Filament Single Pole
	Head. Pilot ...	6 volts, 3 watt. Single Pole
	Rear ...	6 volts, 3 watt. Single Pole
CARBURETTER	Type ...	276AE/1BE
	Size of Main Jet ...	170
	Jet Needle—Normal Setting	Middle Slot
SPROCKETS	Engine ...	18 Teeth
	Clutch ...	42 "
	Gearbox Axle ...	19 "
	Rear Wheel ...	43 "
	Magdyno and Cam ...	15 "
CHAINS	Front (Primary) ...	½" pitch x .305" No. of links—74
	Rear ...	⅝" pitch x .25" No. of links—91
	Magdyno ...	⅜" pitch x .155" No. of links—42
CHAIN ADJUSTMENT	Front ...	⅜" whip
	Rear ...	½" "
	Magdyno ...	¼" "
ENGINE BEARINGS	Ball (3) ...	1" x 2¼" x ⅝"

DATA—continued.

GEAR RATIOS	Fourth (Top)	5.28
	Third	6.39
	Second	9.35
	First (Bottom)	15.7
GEARBOX BEARINGS	Main Gear	2½" × 1¼" × ⅝" MT7/4363
	Main Axle End Cover ...	⅝" × 1.9/16" × 7/16" MT7/6
	Layshaft	17 m/m × 40 m/m × 12 m/m MT7/33389
	Main Gear Wheel Rollers ...	¼" × ¼" MT7/6623
HUB	Hub Shell, Plain Side ...	17 m/m × 40 m/m × 12 m/m MT7/3173
	Hub Shell, Brake Side ...	17 m/m × 40 m/m × 16 m/m MT7/6908
FRAME HEAD RACE BALL BEARINGS (34)		5/16" diameter
WHEEL RIM SIZE		19 × WM.2
TYRE SIZE		26" × 3.25"
SECURITY BOLT Type		WM.2-19
TYRE VALVE Type		T.R.6
WHEEL SPOKES	Nearside (20 per set) ...	8/10 I.W.G. butted, 8-1/32" Angle of Head, 90°
	Offside (20 per set) ...	8/10 I.W.G. butted, 8-5/32" 40 Ths. per inch
BRAKE LINING DIMENSIONS...		6.23/32" × 1¼" × 3/16"
BRAKE DRUM DIAMETER		7"
PETROL TANK CAPACITY		3¼ gallons approximately. (Two taps—Use one Tap only and a reserve suitable for a small distance will be available when second Tap is used)
OIL TANK CAPACITY		3 pints approximately. (Filler offside of machine below saddle.) Drain and replenish Oil in Tank and Crankcase every 2,000 miles
OIL CAPACITY OF GEARBOX...		½ pint approximately. (Combined filler and level plug—rear of Gearbox under cover.) Drain and replenish Gearbox every 5,000 miles
OIL BATH CAPACITY		½ pint approximately. Fill through general inspection cover with level plug removed. On no account must level of the Oil be above the Plug or Clutch Plate Inserts will be damaged
OIL FILTER		The Oil Filter is of the gauze type situated in the Oil Tank on the feed side of the Oil Circuit, attached to the Adaptor, to which the Oil Feed Pipe is connected. Clean Filter when Oil Tank is drained. If gauze is damaged, replace
PETROL FILTERS		The Petrol Filters are of the gauze type, situated in the Petrol Tank attached to the Petrol Taps. Tank must be drained before removal of Taps. If gauze is damaged, replace

CORRECT GRADE OF OIL for Engine, Gear Box and Oil Bath is ... 50. H.D.

WEEKLY MAINTENANCE

BOWDEN CABLES.

Every week all exposed ends of any Cables should be lubricated with Oil Can, Nipples removed from the Control Levers and Inner Cables checked for free movement in Outer Casing.

At the same time by lubricating the exposed end of the Inner Cable, holding Cable as vertical as possible and working Outer Casing up and down on Inner Cable, a supply of Oil can be fed into the Casing.

CONTROL LEVERS.

Lubricate all moving Parts of Control Levers.

GREASE NIPPLES ON MACHINE.

Front Forks	6 Nipples.
Front Forks Rebound Springs	4 ,,
Head Race (Head Lug)	2 ,,
Speedometer Drive	1 ,,
Front Brake Cam Spindle	1 ,,
Rear Brake Cam Spindle	1 ,,
Rear Brake Lever Pivot	1 ,,
Change Speed Lever	1 ,,
Valve Guides	2 ,,
Hubs	2 ,,

PERIODIC MAINTENANCE

Oil Tank.—Every 2,000 miles, drain oil tank and engine sump, clean filter, and refill tank three-quarters full of new 50.H.D. On new and reconditioned engines this operation should be carried out at the first 250 miles and again after a further 1,000 miles, and subsequently every 2,000 miles.

At the same time remove drain plug from crankcase and drain.

Gearbox.—Drain completely, refill with oil 50.H.D. to level of filler plug every 5,000 miles. On new and reconditioned gearboxes, this operation should be carried out after the first 1,000 miles.

Cylinder Head Nuts.—On new and reconditioned engines the nuts should be tried for tightness after the first 50 miles, and then after 100 miles, after which no further tightening should be needed. Examine joint for evidence of leaking.

Wheel Hubs.—A nipple is fixed in the centre of each hub between spokes. This nipple is to grease the hub bearings. Grease every 5,000 miles.

Brake Cam Spindle.—A grease nipple is fitted to the front and rear brake cam spindle bushes.

Grease every 1,000 miles.

(Do NOT over-grease, as excess of grease is liable to enter drums and damage linings.)

Every 3,000 miles the following attentions should be carried out by workshops:—

Check and correct tension of primary (front) and rear chains, clean out primary chain oil bath, test for lift in gearbox mainshaft carrying clutch, tighten all nuts and bolts inside of chaincase.

Check and correct the tension of magneto chain.

CLEARANCES

Tappet Clearances—	
Exhaust	.006"
Inlet	.004"
Mag. Points Gap	.012"
Plug Point Gap	.015"
Piston Ring Gap—	
Compression	.030"
Scraper	.008"
Piston Ring Side Clearance	.002/.003"
Piston Clearances—	
Top Land	.029"/.027"
Second Land	.0155"/.0135"
Third Land	.0155"/.0135"
Top of Skirt	.0075"/.0065"
Bottom of Skirt	.0055"/.0045"
Side Float in Flywheel Assembly	.005"

CONTROLS

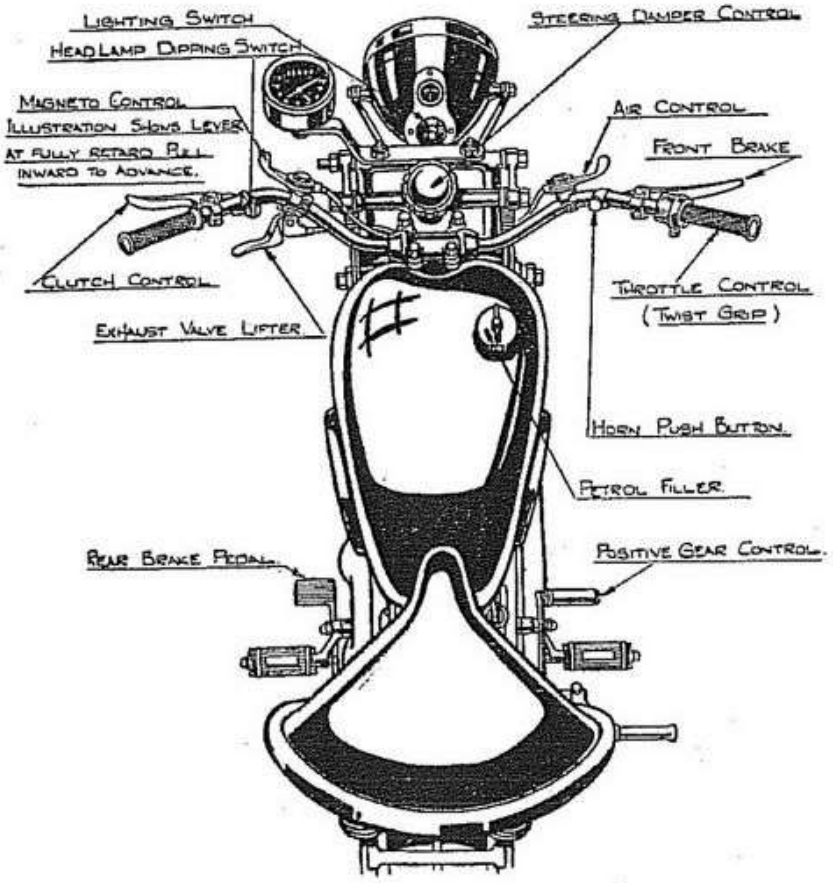


Fig. 3.

THE ENGINE

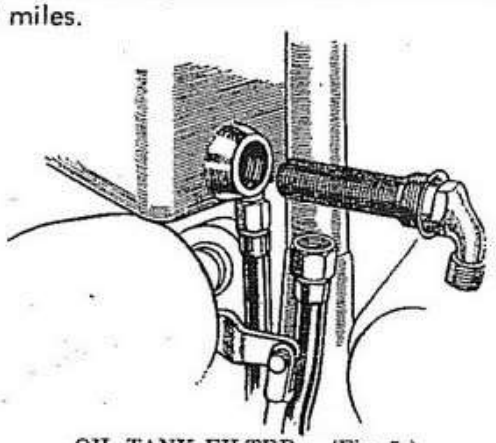
1. ENGINE. LUBRICATION SYSTEM. (Fig. 4.)

This is of the dry sump type. The oil flows from the oil tank to the pump by gravity, assisted by suction from the feed side of the oil pump, through the gears, and is forced under pressure to various parts of the engine, drains to the lowest part of the crankcase—that is the sludge trap—and by suction from the return side of the pump is lifted back to the oil tank.

2. THE FILTER. (Fig. 5.)

The only filter in the oil system is of the gauze type and is fitted on the feed side of the oil circuit, attached to the adaptor screwed into the oil tank, to which the feed pipe is connected.

Clean filter, when oil tank is drained, every 2,000 miles.



OIL TANK FILTER. (Fig. 5.)

3. ENGINE OIL PUMP.

This is of the gear type. The pump contains two pairs of gears, one on the feed side and the other on the return side.

The gears on the return side are twice the width of those on the feed, having twice the pumping capacity. This ensures that the crankcase is free from oil when the engine is running.

To check the return of the oil to the tank, remove the oil filler cap. The oil return pipe can then be seen. After the engine has been running for a few minutes, the oil return flow will be spasmodic, due to the greater capacity of the return gears.

4. OIL LEVEL.

The oil level in the oil tank should not be above three-quarters and not below half.

If the level is above the three-quarter mark, when the engine is running, the pressure built up in the oil tank by the oil return side of the pump will force the surplus oil through the air release pipe on to the road.

Always run engine for a few minutes before checking oil level. It is possible when an engine has been idle for any length of time for the oil to syphon through the return gears to the sump.

When this happens, all the oil is returned to the tank in the first few minutes that the engine is running, and the surplus is wasted.

When the oil level is below the half full mark there is such a small quantity of oil that it tends to over-heat.

5. THE CIRCULATION OF THE OIL.

The oil is forced from the pump to the oil pressure tell-tale. The pressure of the oil lifts the plunger. No oil can circulate until the plunger is lifted. From the plunger three ways are opened to the oil:

1. To the rear wall of the cylinder.
2. To the big-end bearing.
3. To the pressure control valve.

1. The oil passes from the tell-tale through the timing panel to the mouth of the crankcase, through the base of the cylinder, up the cylinder wall, and feeds the rear of the cylinder and piston.
2. The oil passes from the tell-tale down the timing panel, through the big-end restriction jet, along the timing shaft, up the flywheel and is sprayed on to the roller big-end.
3. The oil pressure control valve is a spring-loaded ball, and acts as a safety valve, in the oil circuit. When the pressure of the oil lifts the ball from its seat, the oil passes the ball and is sprayed upon the timing gears. When the engine is assembled at the Works, the valve ball spring adjusting screw is screwed home and released $1\frac{1}{2}$ threads. This is the only adjustment in the oil system and it is not advisable to remove the ball from the valve unless it is suspected that the ball is sticking or not seating.

The oil from the big-end is thrown by centrifugal force to the cylinder walls, lubricating the piston.

The small-end is also lubricated by splash.

From the cylinder the oil drains down the sides of the crankcase and is picked up by ducts

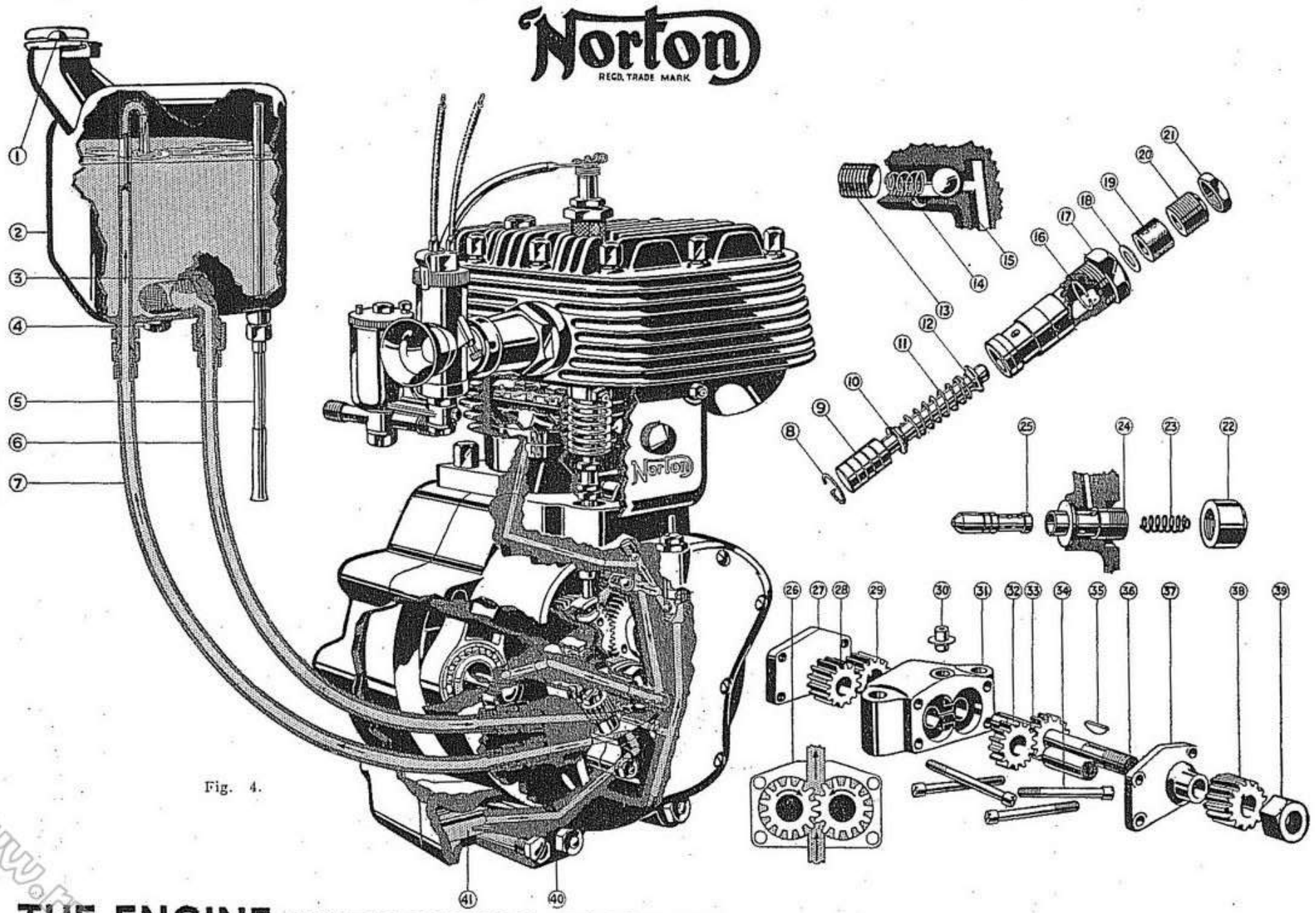


Fig. 4.

THE ENGINE (LUBRICATION DIAGRAM)

THE ENGINE (Lubrication Diagram)

1. Oil Tank Filler Cap.
2. Oil Tank.
3. Oil Tank Filter.
4. Oil Tank Drain Plug.
5. Oil Tank Air Release Pipe.
6. Oil Feed Pipe.
7. Oil Return Pipe.
8. Oil Pump Telltale Punger Circlip.
9. Oil Pump Telltale Plunger.
10. Oil Pump Telltale Plunger Return Spring Collar.
11. Oil Pump Telltale Plunger Return Spring.
12. Oil Pump Telltale Plunger Return Spring Collar.
13. Oil Pressure Control Ball Spring Screw.
14. Oil Pressure Control Ball Spring.
15. Oil Pressure Control Ball.
16. Oil Pump Telltale Gland Circlip.
17. Oil Pump Telltale Body.
18. Oil Pump Telltale Gland Steel Washer.
19. Oil Pump Telltale Gland Felt Washer.
20. Oil Pump Telltale Gland Screw.
21. Oil Pump Telltale Gland Screw Locknut.
22. Timing Cover and Main Shaft Connecting Jet Holder Nut.
23. Timing Cover and Main Shaft Connecting Jet Spring.
24. Timing Cover and Main Shaft Connecting Jet Holder.
25. Timing Cover and Main Shaft Connecting Jet.
26. Sketch showing Action of Pump.
27. Oil Pump Body End Cover (Brass).
28. Oil Pump Oil Return Gear (keyed).
29. Oil Pump Oil Return Gear (plain).
30. Oil Pump to Timing Panel Connecting Nipple.
31. Oil Pump Body.
32. Oil Pump Oil Feed Gear (keyed).
33. Oil Pump Oil Feed Gear (plain).
34. Oil Pump Body Bolts.
35. Oil Pump Spindle Key.
36. Oil Pump Spindle.
37. Oil Pump Body End Cover.
38. Oil Pump Spindle Worm Gear Wheel.
39. Oil Pump Spindle Nut.
40. Crankcase Drain Plug.
41. Crankcase Sludge Trap.

NOTE.—Arrows denote direction of oil flow.

and carried to the main bearing and the timing gear bearings.

The oil collects in the timing case to such a level that the oil pump pinion is immersed, carrying oil to the half-time pinion and the timing gears.

The level is controlled by a hole drilled in the case, the over-flow draining to base of the crankcase.

The cam rocker spindles are lubricated by splash from the timing gears.

Oil is fed to the magdyno chain by passing through the inlet cam spindle bush into the chain case. Any excess of oil accumulated in the case, drains through the breather pipe.

Crankcase pressure is also released by a valve on the driving side of the crankcase and oil mist is fed to the rear chain.

All the oil drains to the base of the crankcase to the sludge trap, is picked up by the suction of the return side of the pump and returned to the tank.

The oil-way from the sludge trap is situated so that any foreign matter is left in the trap. This leaves the case when the crankcase drain plug is removed and the oil drained.

MAINTENANCE OF ENGINE

DECARBONISING.

(Any repair to the engine can be carried out with the engine in position, with the exception of crankcase, big-end, connecting rod and main bearings.)

6. REMOVAL OF PETROL TANK.

(With the petrol tank removed, work on the engine is simplified.)

It is not necessary to drain tank, but make sure that the petrol tap slides are in the "Off" position, that is, with the round end of the slide pressed in.

Disconnect petrol pipes from taps. Use two spanners, holding the union nut with one and the tap union with the other.

Remove the four bolts and washers, and the tank is free from the frame.

Four shouldered rubber washers and steel washers should be on the tank brackets.

7. FITTING OF TANK.

Place the four shouldered rubber washers on the frame tank brackets, with the steel washers.

Place tank in position.

Fit cupped steel and rubber washers on to the tank bolts. (Fig. 7.)

Fit bolts to tank and tighten down evenly.

Ensure that the tank is clear of the frame.

Fit petrol pipes, using the two spanners as when removing.

8. REMOVAL OF CYLINDER HEAD.

The cylinder head is held to the barrel by nine studs and nuts.

Remove sparking plug lead.

Remove sparking plug.

Remove the stud nuts.

Remove cylinder head.

Remove cylinder head washer. This is of the copper asbestos copper type.

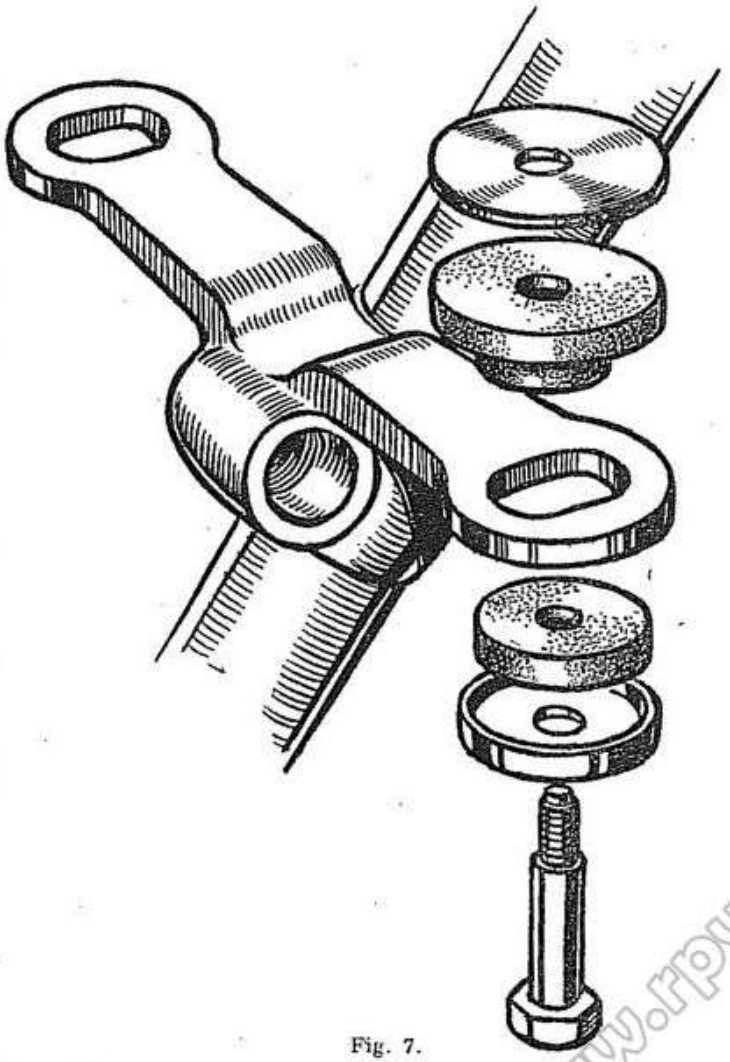


Fig. 7.

9. FITTING OF CYLINDER HEAD.

Examine copper asbestos copper washer. If damaged or shows any signs of blowing, replace.

Fit washer with the bright side to the barrel.

Fit cylinder head.

Fit cylinder head stud nuts, and tighten down evenly. (Fig. 8.)

Fit sparking plug and lead.

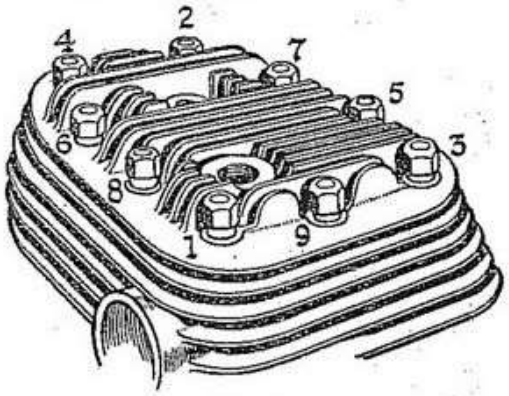


Fig. 8.

10. REMOVAL OF CARBON.

Scrape carbon from top of piston and cylinder head.

Piston is of the alloy type and care must be taken not to damage the top.

Place an old piston ring at the top of the bore, and resting on top of piston. It will prevent the carbon being removed at the edge of the piston and end of the bore.

After an engine has been used for any considerable time, wear in the bore and the rings takes place, allowing a small amount of oil to pass.

The carbon on the piston edge and the top of the bore acts as an oil seal and if removed, engine may use a little more oil till carbon is re-formed.

The carbon deposit in the valve ports cannot be removed unless the valves are removed.

Valves should NOT be removed at every de-carbonization.

Valves can be removed, seats reground, and fitted with the cylinder in position, but it is advisable to remove cylinder from crankcase for this operation.

11. REMOVAL OF CYLINDER BARREL.

Remove petrol tank (see Para. 6).

Cylinder barrel can be removed with or without the cylinder head in position.

Remove sparking plug and lead.

Remove carburetter.

Carburetter is fitted to the induction stub by split ring and bolt.

Ease bolt and remove carburetter complete with pipes from induction stub, when carburetter will hang on the control cables.

Remove valve cover.

Rotate engine till both valves are closed and piston at top of stroke.

Remove exhaust valve lifter from arm by raising the arm and detaching inner cable.

Screw out cable adjuster from cylinder barrel, and the cable is now free.

Remove the four base stud nuts.

Cylinder is now free and can be lifted from crankcase.

Rotate engine until the piston is at the bottom of the stroke before removing the barrel.

A paper washer is fitted between the barrel and the crankcase.

With the cylinder removed, the piston is exposed and the cylinder can be dismantled on the bench.

It is essential to cover the mouth of the crankcase with a large piece of clean rag, to prevent the ingress of any foreign matter.

12. REMOVAL OF VALVES FROM CYLINDER.

Compress valve springs with the standard type of valve compressor.

When springs are compressed the valve cotters will fall from the valve stems.

Remove valve compressor.

Remove valves.

Remove valve springs and collars from valve chest.

Remove carbon from valve heads.

DO NOT POLISH VALVE STEMS.

Check valve stems in guides; if free, do not touch guides, unless they are badly worn.

If guides and valves show no signs of excessive wear, re-grind valve seats.

Always grind the seats when new valves are fitted.

13. GRINDING OF VALVE SEATS.

If cylinder is left " in situ," slacken off tappets to ensure that the valve tips are free from the tappet heads. (Fig. 10.)

Hold the bottom hexagon on the tappet head with one of the ¼" spanners in the tool-kit, and with the second spanner release the middle hexagon—the locking nut.

Place second spanner on the top hexagon—the tappet head—and turn in a clock-wise direction, increasing the clearance between the tappet head and the tip of the valve.

Use as little grinding compound as possible.

Place valve in guide and grind lightly, using a screwdriver or similar tool.

Do not revolve valve a complete turn, but oscillate, frequently raising valve from seat and placing in a different position.

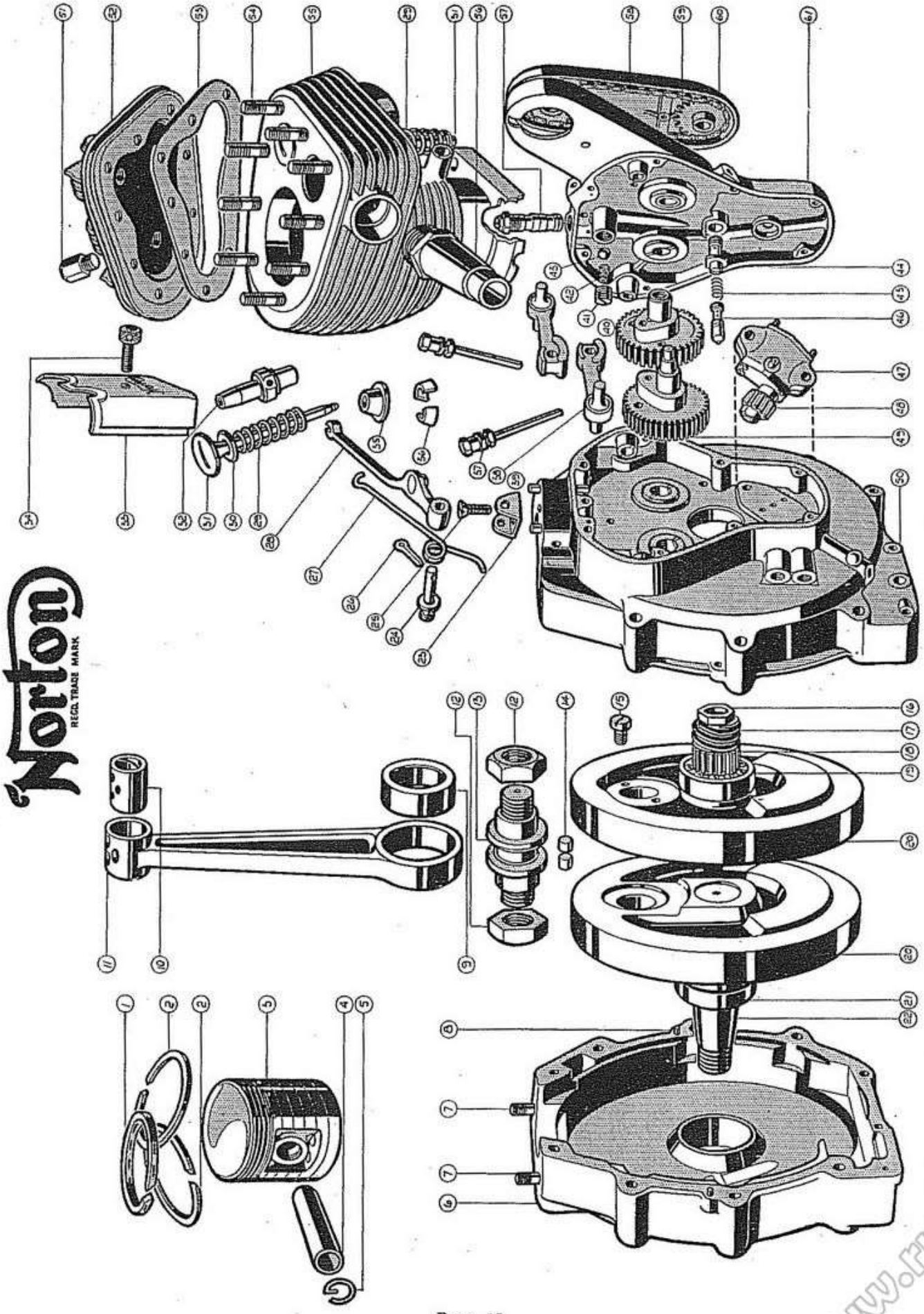


Fig. 6.

THE ENGINE

1. Piston Ring (scraper).
2. Piston Ring (compression).
3. Piston.
4. Gudgeon Pin.
5. Gudgeon Pin Circlip.
6. Driving Side of Crankcase.
7. Crankcase Cylinder Base Stud.
8. Crankcase Dowel Peg.
9. Big-end Bearing Outer Race.
10. Small End Bush.
11. Connecting Rod.
12. Crankpin Nut.
13. Crankpin.
14. Big-end Rollers.
15. Big-end Nut Locking Screws.
16 & 17. Engine Shaft Oil Pump Driving Worm and Half-time Pinion Nut.
18. Half-time Pinion.
19. Timing Side Ball Race.
20. Flywheels.
21. Driving Side Ball Race.
22. Driving Side Shaft.
23. Exhaust Valve Lifter Clip.
24. Exhaust Valve Lifter Pivot Bolt and Washer.
25. Exhaust Valve Lifter Clip Attachment Bolt.
26. Exhaust Valve Lifter Pivot Bolt Split Cotter.
27. Exhaust Valve Lifter Return Spring.
28. Exhaust Valve Lifter Lever (crankcase).
29. Valve Spring.
30. Valve Spring Top Collar.
31. Valve.
32. Valve Guide.
33. Valve Cover.
34. Valve Cover Fixing Bolt.
35. Valve Bottom Collar.
36. Valve Cotters.
37. Tappet.
38. Crankcase Rocker.
39. Tappet Guides.
40. Exhaust Cam Wheel.
41. Oil Pressure Control Ball Spring Screw.
42. Oil Pressure Control Ball Spring.
43. Oil Pressure Control Ball.
44. Timing Cover and Mainshaft Connecting Jet Holder.
45. Timing Cover and Mainshaft Connecting Jet Spring.
46. Timing Cover and Mainshaft Connecting Jet.
47. Oil Pump.
48. Oil Pump Driving Worm.
49. Inlet Cam Wheel.
50. Timing Side Half of Crankcase.
51. Cylinder Head Compression Plug.
52. Cylinder Head.
53. Cylinder Head Copper Asbestos Copper Washer.
54. Cylinder Head Stud.
55. Cylinder Barrel.
56. Induction Stub.
57. Oil Pressure Tell-tale.
58. Magdyno Chain.
59. Inlet Cam Wheel Magdyno Sprocket.
60. Magdyno Chain Cover.
61. Timing Cover.

Do not over-grind valve seats (a wide seat is not necessary).

When seat is ground sufficiently, that is, when the marks of the grinding make a complete ring on the seat and on the valve, remove all signs of grinding paste from seat, valve and valve pockets.

If the valves or the seats are badly burnt or pitted, it may be impossible to obtain a perfect seat by grinding. The seats will then have to be re-cut, and the valves re-faced.

The angle of the seats is 45°. This is the angle that most manufacturers use.

The faces of the valves may be machined on a centre lathe or on a special tool, if available. Do **not** file the seats.

The seats should be re-cut with a special cutter, with a pilot with a diameter of 11/32"

Enter the pilot into the valve guide and press cutter lightly on seat, and turn slowly. Do not allow cutter to vibrate.

After re-cutting, grind valve seat.

14. FITTING OF VALVES.

Thoroughly clean valves, seats, and valve pockets. Fit valve springs and collars. Lubricate valve stems.

Fit valves into guides.

Compress valve springs, and fit cotters.

If the valve cotters are greased with a thick grease, the grease will hold the cotters in place until the springs are released.

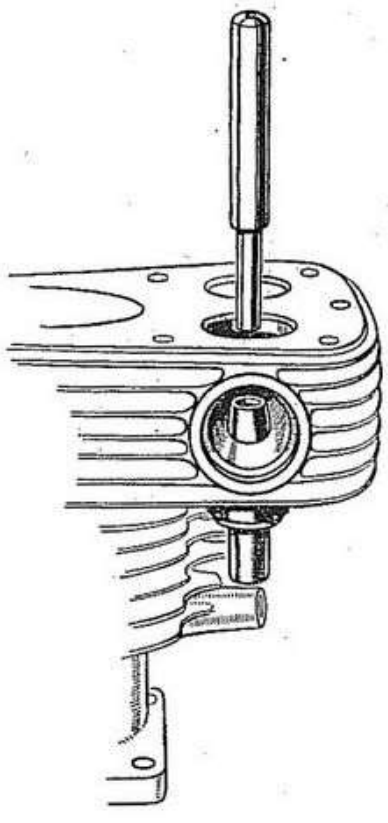


Fig. 9.

15. REMOVING AND RE-FITTING OF VALVE GUIDES.

Valve guides are a driving fit in the cylinder barrel.

To remove, tap out with a double diameter drift. (See Fig. 9.)

Use the drift to replace or fit new ones.

Seats must be trued-up with a cutter after re-fitting of guides, to ensure that the guides and seats are in alignment.

16. FITTING OF CYLINDER BARREL.

Place piston rings with ring gaps at 120° apart.

Lubricate rings, cylinder barrel, piston, small-end and big-end bearing.

Rotate engine until the big-end bearing is near the top of its travel, with the connecting rod and piston pointing towards the front engine tube.

Fit paper washer to crankcase mouth.

Fit ring compressor over rings, and fit barrel over piston, keeping the barrel square with the piston.

If a ring compressor is not obtainable, obtain assistance to enter rings into barrel.

Tighten base stud nuts down evenly.

Fit exhaust lifter cable adjuster to cylinder.

Fit exhaust lifter cable to arm.

Adjust tappets.

17. TO ADJUST TAPPETS.

Release the middle hexagon—the locking nut—by placing one spanner on the bottom hexagon—the tappet stem—and the second on the locking nut. (Fig. 10.)

Turn the top hexagon—the tappet head—in the desired direction, and when the correct clearance is obtained, tighten locking nut.

Check clearance after tightening locking nut.

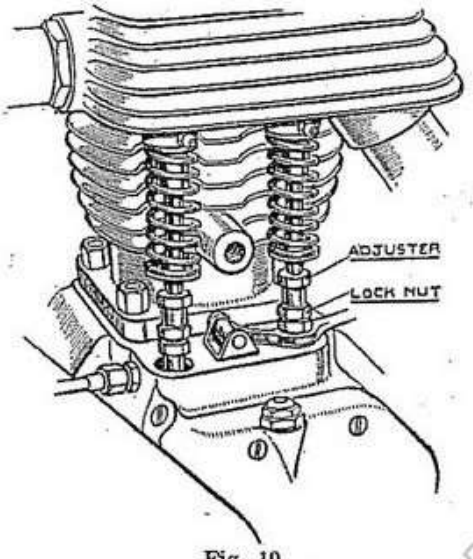


Fig. 10.

18. REMOVAL OF PISTON AND RINGS.

Remove cylinder barrel. (Para. 11.)

Remove circlips.

Remove gudgeon pin.

Gudgeon pin is a running fit in the piston and small-end bush.

Mark piston to ensure it is fitted the same way when replacing.

Remove rings from piston.

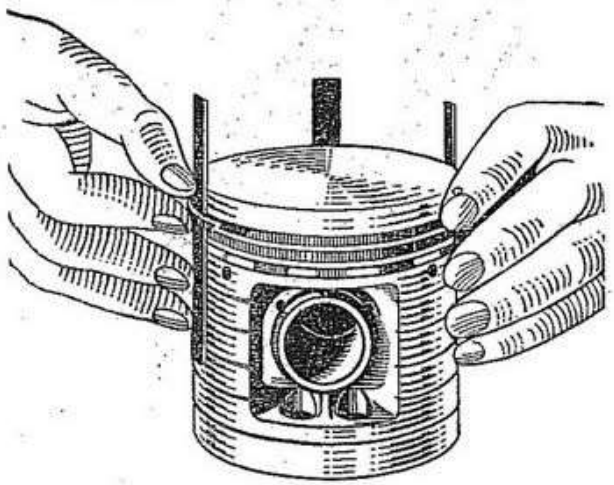


Fig. 11.

Place three thin metal strips approximately ½" wide × 2" long, behind the rings equally spaced and the rings may be readily removed. (Fig. 11.)

If it is decided not to fit new rings, it is not advisable to remove the carbon from the back of the ring or the bottom of the ring groove.

This carbon deposit has slowly accumulated, as the rings have worn, and has a tendency to increase the effective diameter of the ring. If the carbon is removed from the rings and the piston, the effective diameter is smaller and new rings should be fitted.

If it is decided to fit new rings, the grooves in the piston should be thoroughly cleaned. A portion of a broken hack-saw blade is an ideal tool for the job.

When the grooves have been cleaned, check the new ring for size in the grooves.

There should be a side clearance of .002".

If the rings are tight in the grooves they can be rubbed down by placing a sheet of smooth emery cloth on a surface plate and lightly rubbing ring on the cloth, using a circular movement.

If grooves are badly worn, true-up in a lathe and fit rings oversize in width.

Check rings in the cylinder bore for the correct width of gap.

Place ring in bore, push ring down bore, using the piston as a guide.

By using the piston in this manner it ensures that the ring is square with the bore.

The ring gap should be:

Compression ring ... .030"—.035".

Scraper ... ... .008".

Check gap with feeler gauge.

If the gap is not large enough, it can be enlarged with a file.

Hold ring lightly in vice and ensure that the angle is retained at the end of the ring.

19. REFITTING PISTON.

Fit rings to piston.

Fit piston to connecting rod with the piston in the same position as before dismantling.

Fit circlips. It is advisable to always replace circlips and fit new ones.

Fit cylinder barrel. (Para. 16.)

20. SMALL END.

When the cylinder barrel is removed, and it is found that the small-end bush is worn, it can either be removed or reamed oversize.

If it is decided to ream the bush, an oversize gudgeon pin must be obtained. They are manufactured in sizes of .001" to .005" oversize in .001" stages.

Ream bush with an adjustable reamer, to the smallest oversize possible.

Before reaming the bush, if the reamer is greased the grease will hold the swarf on the reamer. Wipe off swarf before withdrawing reamer. This prevents the swarf scoring the bush.

Ream piston bosses to the required size.

Hold reamer in vice while enlarging the gudgeon pin holes.

The gudgeon pin should be a running fit in the small-end and the piston.

21. REMOVING AND FITTING OF SMALL-END BUSH.

Bush must be withdrawn from connecting rod.

Obtain a bolt twice the length of the bush, place a washer at the head of the bolt with an outside diameter less than the bush. Place bolt in bush.

Over the screwed end of the bolt place a piece of tubing longer than the bush, with an inside diameter slightly larger than the outside of the bush.

Fit nut to bolt and tighten. As nut is tightened, the bush will be drawn from the rod into the tubing.

Care must be taken so that no strain is taken by the rod.

Fit new bush in the same manner.

Before fitting bush to rod. the inside diameter should be reamed to the size of the pin, as when fitted in the rod the bush will compress, leaving sufficient metal for true-ing with the reamer. If this is not done, too much metal will need to be taken away with the reamer.

Drill oil-holes in the bush before reaming to size.

22. EXAMINING CYLINDER BARREL AND PISTON FOR WEAR.

When cylinder and piston are removed from engine, they should be examined for wear. It will be found that the bore wears more than the piston.

Measure the bore at the top where the piston is when the mixture is ignited, that is just below the ridge that is formed at the top of the barrel.

Rebore when the wear is .006"—.008".

The piston is neither round or parallel.

Measure the piston at two places:

(1) Just below the bottom piston ring groove, at right-angles to gudgeon pin bosses.

(2). At the bottom of the piston skirt at right-angles to the gudgeon pin bosses.

The wear should not be more than .003".

22A. RECONDITIONING OF WORN CYLINDERS.

Cylinder requires reboring when the wear exceeds .008".

1st Stage. Bore out cylinder to .020" oversize (provided that it will clean up to that size) and fit appropriate oversize piston.

2nd Stage. Bore out cylinder to .040" oversize and fit appropriate oversize piston.

3rd Stage. Bore out cylinder to 3.249"—3.250" with fine finish, and liner back to plan size with standard size piston.

When the liner is in position, drill 3/32" diameter hole for cylinder lubrication, using the existing hole in the barrel as a guide.

Remove burrs from end of hole with scraper and blow out any swarf.

4th Stage. Remove worn liners and replace with new liners and standard size pistons.

NOTE. Liners will not be rebored to oversizes. All stages subsequent to first linering will consist of linering back to plan size.

23. REMOVING OF TIMING PANEL.

Remove magdyno chain cover held by two cheese headed screws.

Remove sprockets and chain. (Fig. 12.)

To remove the magdyno and cam wheel sprockets, slacken off both nuts, place the hook

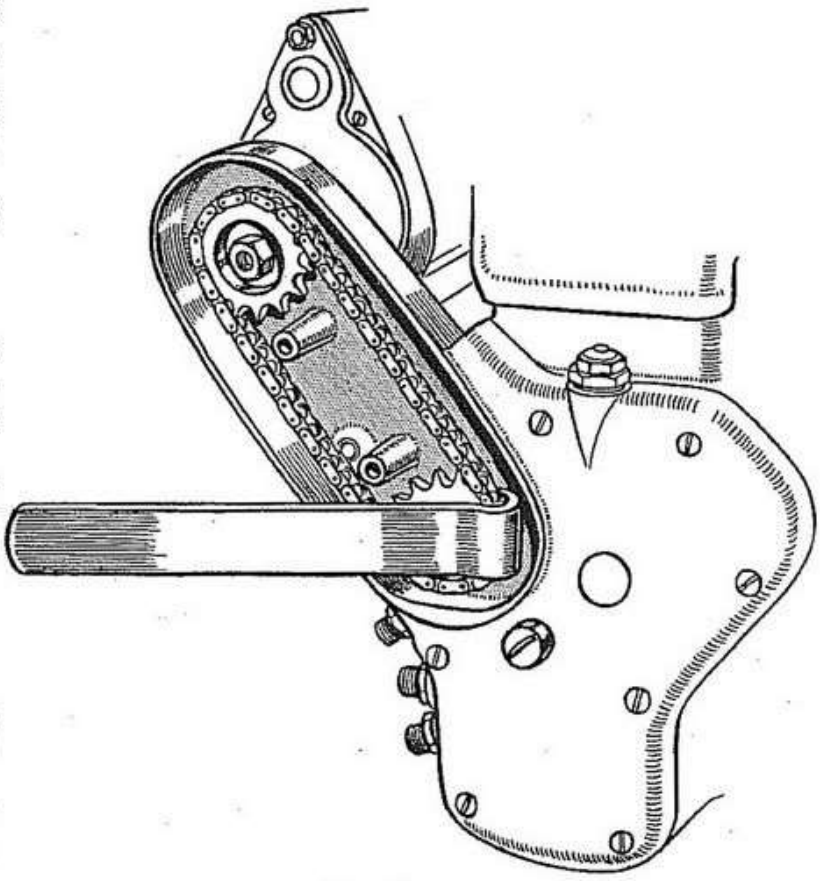


Fig. 12.

tool in the position as shown in the sketch.

A sharp blow on the end of the tool, delivered by the hand, will release the sprocket.

The cam wheel sprocket is held by a taper and key. The magdyno shaft is not keyed.

Remove timing panel screws—seven cheese headed and two countersunk. The counter-sunk screws are in the chain case.

If pressure is needed to remove the panel, apply it behind the tell-tale.

Partly remove panel, and the timing gears and rockers are visible.

See that the rockers or the inlet cam wheel do not come away with the panel. They can be held in position by a screw-driver.

When the panel is removed the big-end restriction jet will leave its holder through the pressure of the spring behind it.

Remove spring from holder. (Fig. 13.)

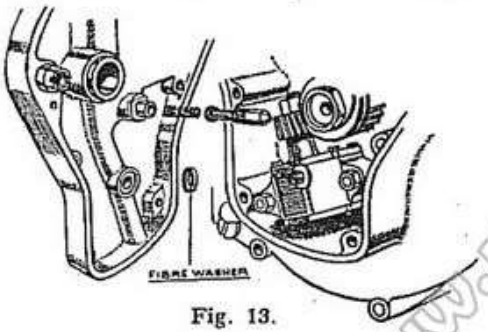


Fig. 13.

24. FITTING TIMING PANEL.

Clean the edges of the timing chest and the panel.

Smear the edges with gold-size or similar jointing compound.

Check fibre washer on the oil pump nipple, connecting pump to panel.

Place panel in position and the washer should prevent the edges of the panel meeting the case by 1/32". This ensures that when the panel pins are tightened, the washer is compressed, making an oil-tight joint.

Fit spring in jet holder.

Fit jet in holder. Fit panel.

Fit panel screws and tighten down evenly.

25. IGNITION TIMING.

Fit cam wheel sprocket (keyed) and chain.

Remove compression plug from cylinder.

Place gearbox change-speed lever in top gear position.

Advance ignition fully.

Rotate engine by turning the rear wheel, until both valves are closed and the piston is at the top of its stroke.

The position of the piston can be ascertained by placing a thin rule into the cylinder, via the compression plug hole.

Hold rule on the top of the piston and take the reading of the rule as it leaves the cylinder.

Turn the rear wheel backwards, still holding the rule on top of the piston, till the reading of the rule tells that the piston is 7/16" down the bore.

Remove magdyno contact breaker cover.

Turn contact breaker in an anti-clockwise direction till the points open.

Insert thin feeler gauge or thin piece of paper, between the points.

Turn contact breaker in clock-wise direction till the points hold the feeler.

Turn contact breaker in an anti-clockwise direction till the feeler is just free, that is when the points have just commenced to open.

Place chain round sprocket, fit sprocket carefully on to the magdyno shaft.

Place a tube over the end of the shaft and sharply tap tube, forcing sprocket on to the taper of the shaft.

Fit nut.

Tighten down nut carefully, so as not to turn the shaft.

When nut is tightened down, check timing.

Fit contact breaker cover.

Fit magdyno chain cover.

Fit compression plug.

26. REMOVING TIMING GEARS AND OIL PUMP.

Remove timing panel. (Para. 23.)

When the panel is removed, the timing gears and the oil pump are visible.

Remove rockers.

The rockers are identical, but it is advisable to replace them in the same position as removed.

Examine rockers for wear on the pad—the portion that rides on the cam.

Examine spindles. They should be tight in the rockers.

When removing cam wheels, care must be taken of the packing washers which may be fitted on either or both shafts.

Remove inlet cam wheel.

Exhaust cam cannot be removed until the half-time pinion nut is removed.

Remove half-time pinion nut. LEFT-HAND THREAD. This is also the oil pump driving worm.

Remove the exhaust cam wheel.

Oil pump must be removed before the half-time pinion.

Remove the two nuts holding the pump and remove pump from studs.

Do not distort the studs with undue pressure. Pump should slide freely off the studs.

Withdraw pinion from timing shaft.

27. FITTING OF NEW SHAFTS TO CAM WHEELS.

Examine cam wheels, they should not be replaced for slight back lash. When the shafts are worn they can be replaced.

Press shaft from cam wheel.

Fit Woodruff key to the new shaft.

Fit circlip to shaft.

Press shaft into cam wheel, entering shaft from the cam side of the wheel.

Cam must press against the circlip.

Care must be taken that the shafts are fitted to the correct wheel.

The inlet shaft is the longer.

The cams are marked, the exhaust "E.5," the inlet "I.5." On close inspection of the cams it will be noticed that the exhaust cam is slightly the wider on the peak.

28. FITTING TIMING GEARS AND OIL PUMP.

If new timing gears are being fitted, the cam wheels should be checked for side float.

Remove the plug covering the end of the exhaust cam spindle.

This is pressed into the panel.

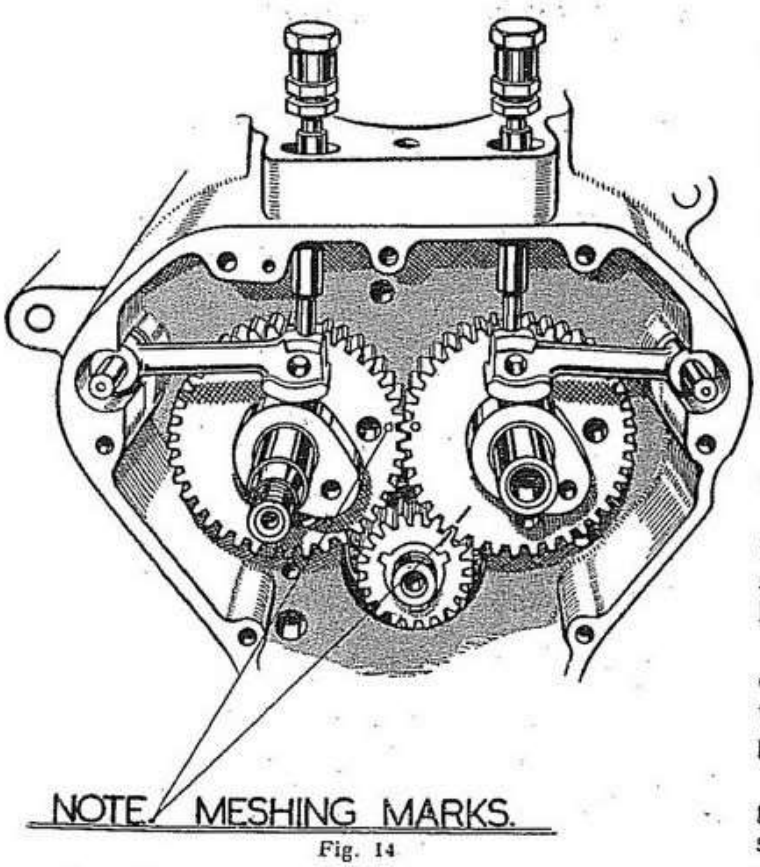


Fig. 14

Fit inlet and exhaust cam wheels in position and fit panel.

Fit and tighten all the panel pins.

The inlet cam spindle protrudes through the panel into the magdyno chain case. By pulling and pushing the spindle the side float can be felt.

In the case of the exhaust, lightly force a tapered piece of steel (the tang end of a file or screw-driver) into the hollow cam spindle, tight enough to allow the wheel to be pulled and pushed and the float felt.

The correct float is .004".

If the float is excessive, fit pen steel washers on the spindles each side of the wheels, to take up the float.

When the correct float is obtained, remove the panel and press in the plug.

Fit rockers in position and with a feeler gauge check the clearance between the face of the cam wheels and the back of the rockers. This should be .006".

If clearance is not correct, grind back of rockers.

Remove rockers and timing gears.

Fit half-time pinion.

It will be noticed that three key-ways are machined in the pinion.

Rotate engine until the piston is at the top of the stroke.

The key in the timing shaft is now at the bottom of the shaft.

Use the key-way in the pinion that will allow the timing mark on the pinion to be in the 2 o'clock position. (Fig. 14.)

Fit exhaust cam wheel, meshing teeth as marked.

Fit inlet cam wheel, meshing teeth as marked.

Fit rockers.

Check timing. It should read:

Inlet open 27° to 30° (5/16") before top centre.

Exhaust closes 27° to 30° (5/16") after top centre.

If the timing gears have for some reason been changed and the replacements are not marked, some difficulty may arise when re-timing. It can be simplified by adopting this method.

With piston on top dead centre, mesh the exhaust cam with the pinion in such a position that the valve is about to close, and the inlet in such a position that the valve is about to open.

Check timing and if not correct, by moving gears one tooth either way, the correct timing should be obtained. If this is not possible, remove pinion and refit, using the next key-way, until the correct timing is obtained.

By changing the pinion from one keyway to another, the difference of one-third of a tooth is obtained.

Fit oil pump drive and pinion retaining nut. LEFT HAND THREAD.

Fit oil pump.

Thoroughly clean back of pump and the face of the case on which the pump rests. If any jointing compound is used, use it very sparingly, and see that no compound is allowed to obstruct the oil holes in the pump or the crankcase.

Check the fibre washer on the oil nipple, connecting pump feed to panel.

Fit panel. (Para. 24.)

Time magdyno. (Para. 25.)

29. OIL PUMP. (Fig. 4.)

The oil pump is of the gear type. It is not advisable to dismantle it.

When pump is removed from timing chest, test for play in the spindle by pulling and pushing the worm wheel.

Revolve spindle and place fingers on the oil holes and the action of the gears should be felt if the pump is in good condition.

When revolving pump, any foreign matter obstructing the gears will be felt. Wash out with paraffin.

If pump is to be dismantled, remove worm wheel from spindle.

Remove the four screws holding pump end-plates.

The pump is an assembly of the following parts:—

The pump body.

Two end plates—the back plate made of brass.

Two sets of gears, the larger the return, and the others the feed.

Two spindles, the main and the idle.

The gears on the main spindle are held by keys.

There are no keyways on the idle spindle.

When re-assembling, ensure that all the parts are perfectly clean.

30. OIL CONTROL VALVE. (See Fig. 4.)

This is fitted in a boss on the back of the timing panel. It is an assembly of a ball, spring and adjusting screw. The adjustment is set at the works and should not need any attention.

The control valve acts as a safety valve in the oil circuit. When the oil is cold, the oil pressure in the circuit tends to become excessively high, but the excess of pressure lifts the ball from its seat, allowing the oil to spray on to the timing gears.

If for any reason this is dismantled, the order of assembly is—ball, spring and adjuster screw.

Tighten the screw home and then screw out one and a half threads, and lock with centre punch.

31. OIL PUMP TELL-TALE. (Fig. 4.)

The tell-tale is situated at the top of the timing panel. The oil must lift the plunger before it can circulate. It is an assembly of body, plunger, spring, oil retaining washers and circlips.

To dismantle the tell-tale, remove from the timing panel.

It is screwed into the panel, and can be removed by the use of a spanner on the large hexagon, visible at the top of the panel.

Remove circlip at the base of the body and the plunger, spring, and collar can be removed.

Remove the small hexagon at the top of the body and the gland nut can be screwed out, also the oil retaining washer and steel washer.

To reassemble, fit spring and collar on to the plunger spindle, and fit plunger into the body.

Fit circlip into body.

Fit the oil retaining steel washer, felt washer, and the gland nut.

Tighten the gland nut to obviate any oil leak, but not tight enough to stop the plunger lifting.

Fit into timing panel.

32. TAPPETS AND GUIDES.

Tappets are an assembly of tappet stem, head and locknut. The head is a sleeved nut screwed onto the stem and locked with the locking nut.

The tappet guides are of phosphor bronze and screwed into the crankcase.

New tappet guides must be reamed to size with a $\frac{1}{4}$in. reamer after fitting.

33. REMOVAL AND FITTING OF MAGDYNO.

The removal of the magdyno is simplified if the timing panel is removed.

Remove timing panel. (Para. 23.)

Remove leads from dynamo (3).

Remove high tension lead from sparking plug.

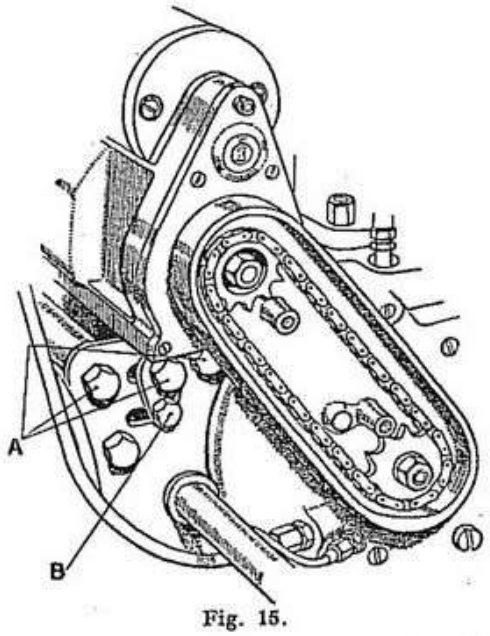


Fig. 15.

Remove the locking bolt marked " B " in Fig. 15.

Remove the centre bolt of the three marked " A."

Ease the nuts off the outside bolts marked " A."

Magdyno can now be removed.

Replace in the reverse order.

Do not tighten the bolts until the panel is re-fitted and the chain adjusted.

With the bolts slack, the magdyno can be moved in the desired direction, to correct the chain adjustment.

34. EXAMINATION OF THE ROLLER BIG-END.

With the cylinder removed, the big-end can be examined for wear.

Rotate the flywheels until the big-end is at the top of the flywheels.

Hold connecting rod with both hands, pull and push, and any up and down play can be felt.

DO NOT USE SIDE PRESSURE.

Do not mistake side float for end play.

A small amount of rock is of no importance.

35. REMOVING ENGINE FROM THE FRAME.

For any work on the engine other than has already been described, the engine must be removed from the frame.

Remove tank. (Para. 6.)

Remove exhaust lifter cable. (Para. 11.)

Remove carburetter. (Para. 11.)

Remove exhaust pipe and silencer.

The silencer is held to the rear of the machine by one bolt, and the exhaust pipe by two clips and bolts.

Remove clip bolts and nuts, and silencer bolt, and the pipe and silencer can be removed as one unit.

Remove oil pipes from the crankcase. If the oil has not been drained from the oil tank, plug the end of the feed pipe.

Remove rear chain guard.

Remove oil bath. (Para. 46.)

Remove engine sprocket. (Para. 46.)

Remove clutch. (Para. 46.)

Remove magdyno. (Para. 33.)

Place a block of wood under the crankcase to support the engine when the bolts are removed.

Remove electric horn from engine bolt.

Remove the nuts on the bolts holding the engine to the frame (two nuts—one on the engine bolt, carrying the exhaust pipe front clip, the other nut on the bolt carrying the electric horn.)

Slacken the gearbox bottom bolt nut.

Remove the nuts on the bolts holding the engine to engine plates, two nuts at the rear of the crankcase. The top one should have been slackened when removing the magdyno.

Remove the nuts holding the engine plates to the frame.

Remove the top bolt holding the engine plates to the crankcase.

Tap the remaining bolts clear of the near-side engine plate, and the plate can be swung downwards, pivoting on the bottom gearbox bolt.

Steady the engine with the hand and remove the bolts from the offside plate, and rest engine on the block of wood.

Remove the bolts at the front of the engine.

Lift engine from the frame.

36. PARTING OF THE CRANKCASE HALVES.

Remove crankcase drain plug and drain any oil that may be in the sump.

Remove crankcase shield from the base of the crankcase, held by two bolts.

A cradle made of angle iron to fit the base of the crankcase, and bolted to bench, is useful for holding the engine while dismantling or assembling the upper portion. (Fig. 16.)

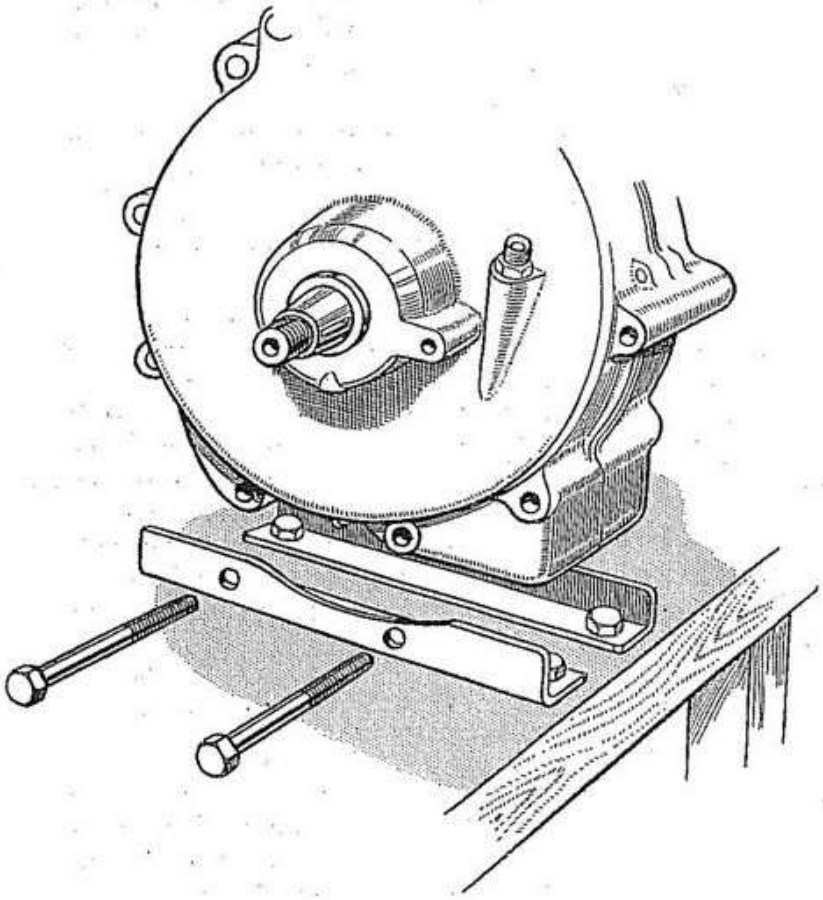


Fig. 16.

Another method is to bolt a thick piece of wood to the bench at the side of the vice, protruding from the edge of the bench sufficiently to support the engine, when the middle lug on the front of the crankcase is lightly held in the vice.

Remove cylinder barrel. (Para. 11.)

Remove piston. (Para. 18.)

Removing timing gear and oil pump. (Para. 26.)

Remove key from driving shaft.

Remove all the crankcase bolts and stud nuts.

Remove cheese headed screw from sump, behind the drain plug. This screw is easily missed if the case is dirty and damage can be caused by attempting to part case with this screw in position.

Crankcase halves can now be parted. Remove timing side first.

If leverage is necessary, revolve flywheels until the crankpin is at the mouth of the case, place a lever against the crankpin nut and lever outwards.

To remove the driving side of the case, lift the half of the case with the flywheels and lightly drop the end of the driving shaft on a block of hard wood, then the case should leave the shaft.

37. REMOVAL OF BEARINGS FROM CRANKCASE.

It should be possible to remove the bearings from the case by tapping a shaft through the bearings, the shaft having a diameter slightly larger than the engine shaft, but small enough to pass through the bearing, should the bearing be tight in the case, without damage.

If the bearings are too tight in the housing to be removed by this method, the case should be heated round the bearing housings, when they should drop out.

Do not heat case sufficiently to destroy the temper of the bearings. Use a bunsen type of flame, not a blow lamp.

38. FITTING OF BEARINGS TO CRANKCASE.

Test bearings, to be a sliding fit on shafts.

Press ball bearing lightly in to the driving side of the case.

Fit the spacing washer next to the ball bearing.

Press the bearing lightly in to driving side of the case.

Press the bearing lightly in to timing side of the case.

39. DISMANTLING OF THE FLYWHEELS.

Remove crank pin nuts locking screws—two—one in each flywheel.

Remove crankpin nuts.

A strong box spanner is needed with an exceptionally long tommy-bar, to remove these nuts.

The flywheels are pressed on to the crankpin.

If a press is not available, three taper steel wedges can be used to part the wheels.

Place a wedge each side of the crankpin between the wheels, and the third opposite the crankpin.

Tap the wedges alternately until the wheels are forced from the pin.

Connecting rod and crankpin are now free from the wheels.

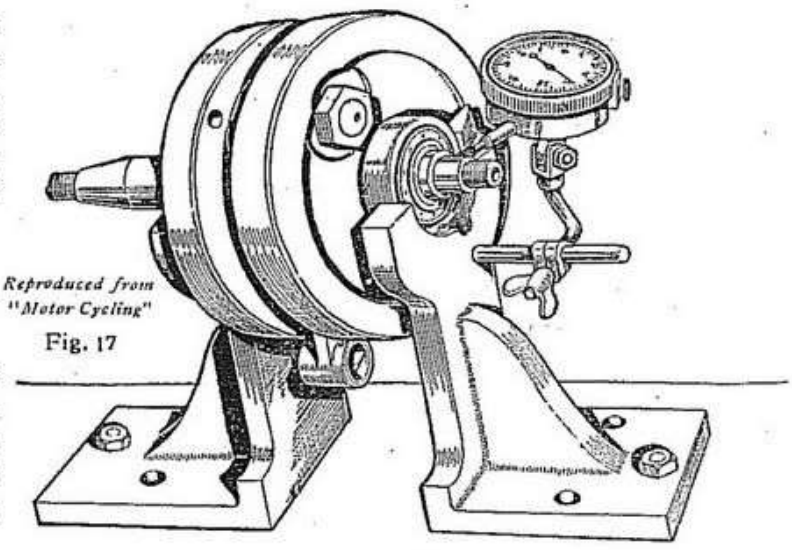


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Fig. 17

40. RE-BUILDING OF FLYWHEELS.

Smear the roller track on the crankpin with thick grease, and fit rollers. The grease will hold the rollers in position. Fit connecting rod.

Press the one end of the crankpin into a flywheel.

Place the other flywheel on the other end of the crankpin.

Line up wheels with a square.

Press home on pin.

Hold wheels in a vice with extended jaws to hold both wheels.

Fit crankpin nuts and tighten down.

Fit crankpin nuts locking screws.

Fit ballraces on to flywheel shafts.

Place wheels on a pair of "Vee" blocks, so that they can revolve on the races. (See Fig. 17.)

Test truth of shafts with a clock gauge.

The driving shaft should be within .0015".

The timing shaft should be within .0005".

Wheels can be moved sufficiently for truing with a large lead lump, though tight on the pin.

Remove wheels from "Vee" blocks when striking, taking the shock with your arm, ensuring that no damage can be done to the assembly.

41. BIG-END BEARING (CRANKPIN).

The big-end can be replaced when the flywheels are parted.

The big-end is an assembly of—

Crankpin.
Set of rollers.
Outer race.

These parts are not interchangeable with any other assembly.

The outer race is pressed into the connecting rod.

Outer race can be removed with a press or vice.

If a vice is used, obtain a short bar of steel with a diameter slightly smaller than the eye of the rod, and a piece of tubing with the bore slightly larger than the outside diameter of the outer race.

Place the bar one side of the rod and the tube the other.

Press in a vice, and the race will be forced from the rod.

Fit race as removed.

The race is wider than the rod, and when fitted to the rod, protrudes each side, to take the side thrust. The amount that the race protrudes each side must be equal. Test with a straight-edge. A slight tap on the side of the race is sufficient to move it.

Fit rollers. (Para. 40.)

42. CHECKING ALIGNMENT OF CONNECTING ROD.

Connecting rod should be checked for alignment after the fitting of big-end outer race.

Fit connecting rod to a mandrel (see Fig. 18), place mandrel in "V" blocks on a surface plate. Stand connecting rod vertically, place a test bar through the small-end bush. With clock gauge test each end of the test bar; this is a check to ensure that the bore of the small-end bush is parallel with the crankpin.

Place connecting rod in a horizontal position (see Fig. 19) and again test the two ends of the test bar with a clock gauge or scribing block. This is a check to ensure that the connecting rod is not twisted.

In both cases the connecting rod can be rectified with slight pressure when held in a vice.

43. ASSEMBLY OF CRANKCASE.

Fit flywheels in to case, and fit and tighten all bolts.

Test for side float in the flywheels. (See Fig. 20.)

The correct float should be .005".

To test for float, place case on the bench, timing side down, place a thick washer over driving shaft, and fit sprocket nut.

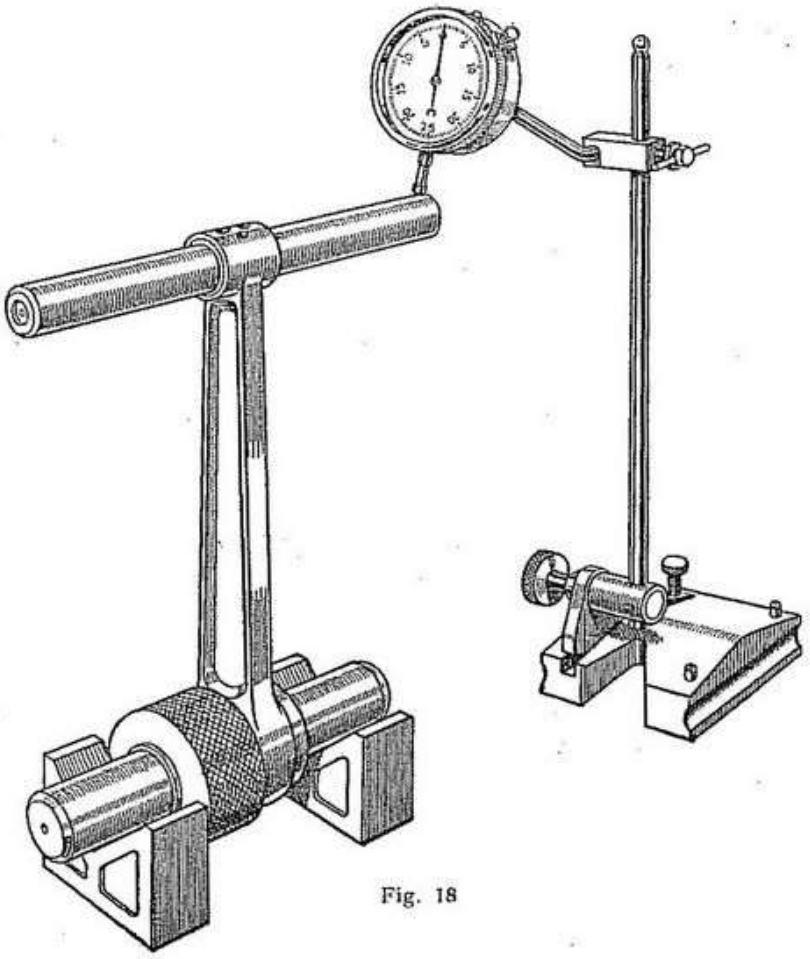

Fig. 18

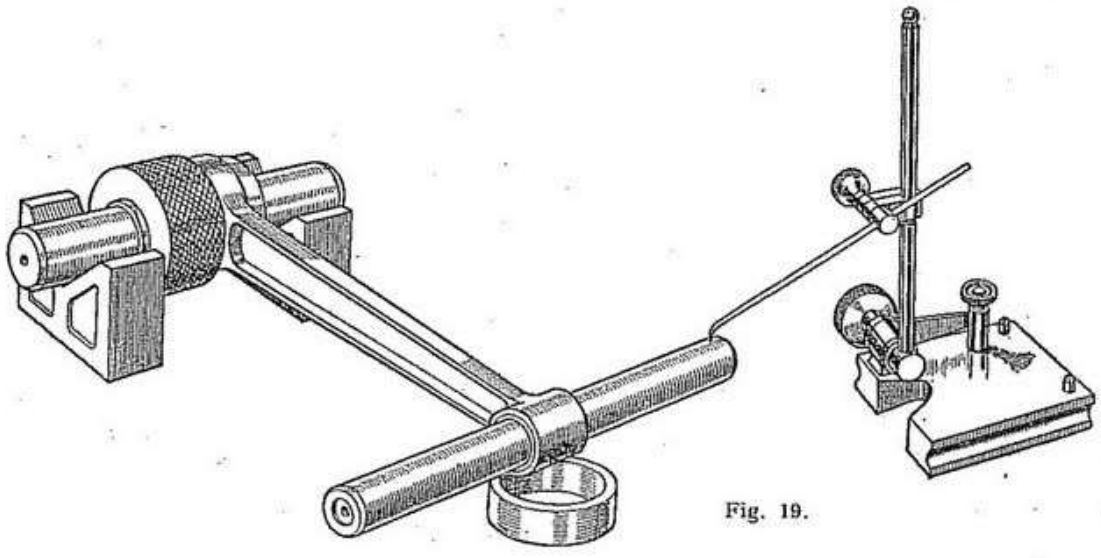

Fig. 19.

Lightly tap end of the shaft, to ensure that the wheels are against the timing side bearing.

Place a clock indicator on the case with the pointer on the end of the shaft.

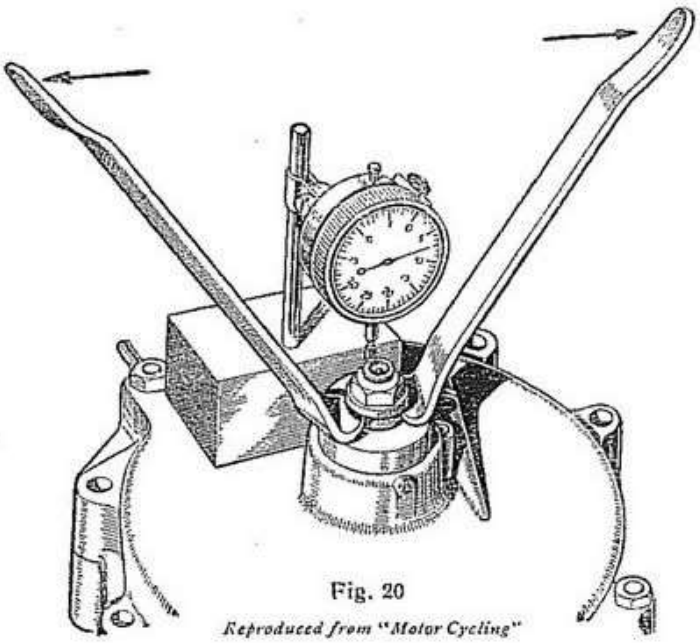

Fig. 20

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Place two tyre levers under the sprocket nut and lift the nut, and the amount of side float will register on the clock indicator. (See Fig. 20.)

If the float is excessive, remove wheels from case.

Fit pen steel washers to the engine and timing shafts to take up the excess of float.

Fit the same thickness of washers on each shaft, keeping the wheels central in the case.

Check side float.

If the side float is correct, check connecting rod for being central in case.

There is side float in the big-end.

Place fingers on the bottom of the connecting rod and push rod towards the timing side of the case.

Measure the distance from the end of the small-end bush to the side of the crankcase mouth on the timing side.

Push rod to driving side of case and take the same measurement, from the driving side.

The two measurements should be within 1/64" of each other.

Rod can be lined up by transferring the pen steel washers on the driving and timing shafts to whichever side needs them, to obtain the correct alignment.

When the correct alignment is obtained, remove wheels from case.

Lubricate main bearings and big-end.

Smear the two edges of the case with gold-size.

Fit wheels into the case and tighten all bolts and nuts.

Fit timing gears. (Para. 28.)

Fit timing panel. (Para. 24.)

44. FITTING ENGINE TO FRAME.

Fitting of the engine to the frame is a two-man job.

Swing nearside engine plate into position.

Hold engine in position and fit front top bolt.

Swing offside engine plate into position.

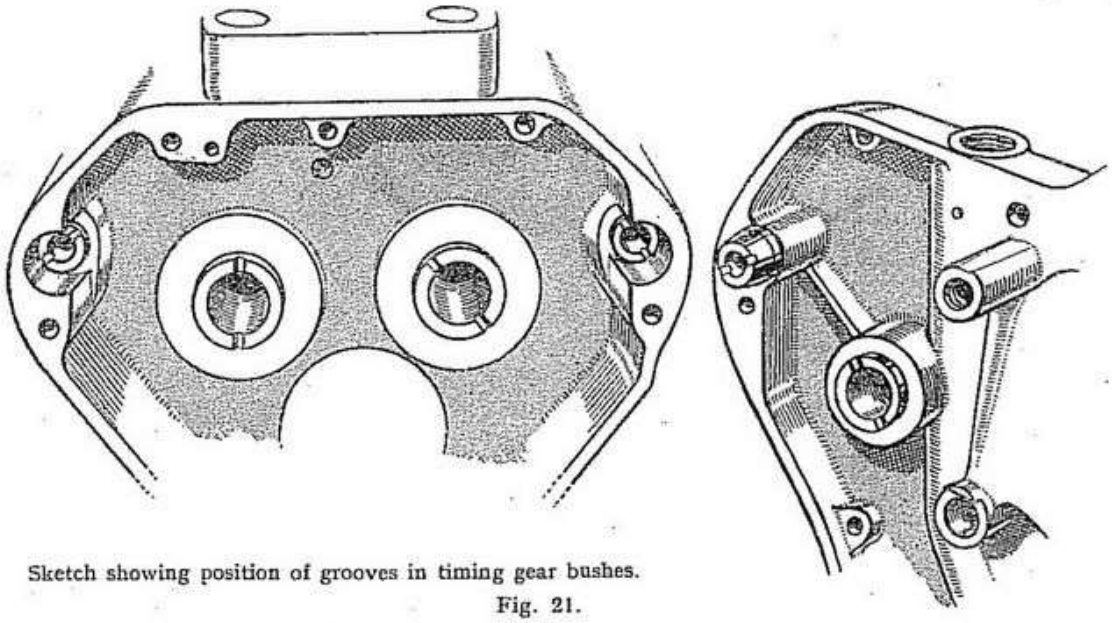
Fit all the bolts and nuts and tighten.

Fit crankcase shield.

Fit magdyno. (Para. 33.)

Fit clutch, oil bath, etc. (Para. 45.)

Time magdyno. (Para. 25.)



Sketch showing position of grooves in timing gear bushes.

Fig. 21.

45. REMOVING AND FITTING OF TIMING GEAR BUSHES.

When the engine is dismantled, it may be necessary to replace the timing gear bushes.

Bushes are pressed into the case and panel.

Remove the plug in the panel at the end of the exhaust cam spindle bush.

Remove old bushes.

A set of cam bushes comprises four.

The inlet and the exhaust bushes in the case are identical.

The inlet and exhaust in the cover are not the same.

The inlet has an annular "vee" groove machined on the head, and the oilway inside the bush stops before the end of the bore to restrict the flow of oil into the magdyno, chain case.

The bushes, with the exception of the inlet in the panel, should be pressed into position in such a manner that when the oil holes are drilled, with the bushes in position, they enter the oilways machined in the bore of the bushes.

The exhaust timing panel bush should be fitted with the cross groove machined in the head pointing towards the timing cover and mainshaft connecting jet boss.

The exhaust cam bush in the case—the groove should point towards the centre top panel pin hole.

The inlet cam bush in the case—the slot should point towards the oil hole feeding the cylinder wall.

The rocker bush—the groove should point at approx. 40°, converging towards the centre of the timing cover. (See Fig. 21.) When bushes are fitted, fit panel to case and ream bushes from the inside of the case.

THE TRANSMISSION

OIL BATH.

46. REMOVAL OF OIL BATH. (Fig. 22.)

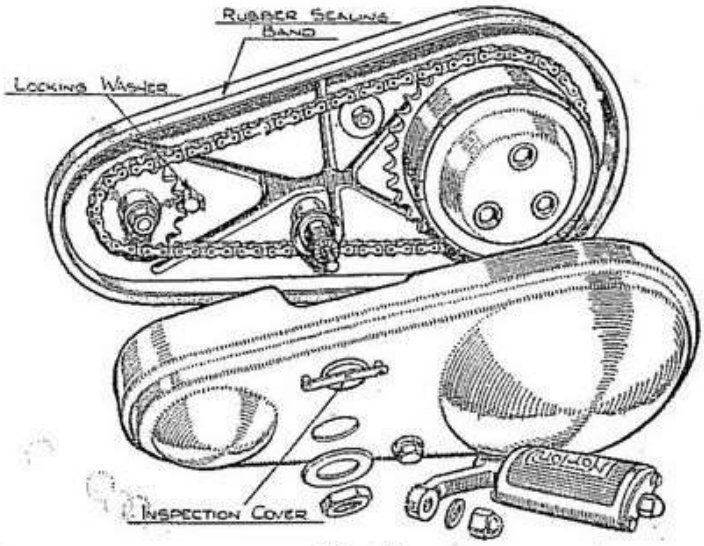


Fig. 22.

Remove the footrests and rod.

Remove the brake pedal.

Remove the large nut holding the outer portion of the oil bath.

Remove the oil bath outer portion.

Remove felt washer fitted to footrest tube.

Remove clutch spring screws, springs and cups (three of each).

Remove clutch outer plate.

Remove clutch thrust pin.

Remove clutch retaining nut.

Engage low gear and obtain assistance to hold the rear wheel while the nut is being removed.

Remove clutch body.

A special tool is required to remove the clutch body. (Fig. 23.)

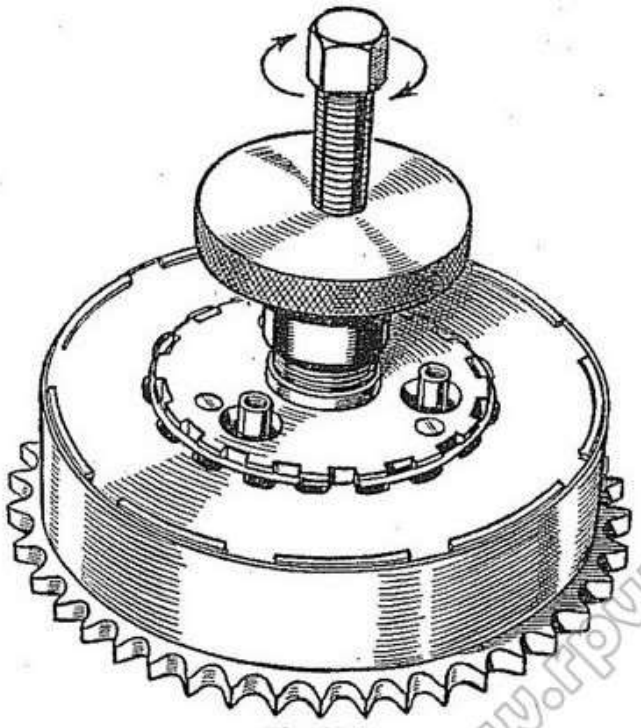


Fig. 23.

Screw the body of the tool into the clutch.

Screw the centre screw of the tool on to the end of the gearbox axle, forcing the clutch from the axle.

Remove engine sprocket (a claw-type extractor will remove this), and engine sprocket, clutch and chain can be removed together.

Remove rear portion of oil bath, held to the crankcase by bolt, to the engine plate by a nut, to the rear chain guard by a bolt, and by a nut on the gearbox pivot bolt.

47. FITTING OF OIL BATH.

Assemble in the reverse order.

Fit rubber washer (or leather) at the rear of the engine sprocket.

Fit gear box chain case washer next to axle sprocket.

Fit inner portion of oil bath.

Fit felt washer to footrest tube.

Examine rubber or cork washer fitted round the flange of the inner portion. This must be in a good condition to retain the oil in the case.

Fill oil bath with oil to the level of the plug near the bottom of the outer portion of the oil bath.

Fit inspection cover with rubber or felt washer.

THE CLUTCH.

48. CLUTCH—TO DISMANTLE.

Remove outer portion of the oil bath. (Para. 46.)

Remove clutch. (Para. 46.)

A steel band is pressed round the clutch sprocket to prevent an excess of oil entering the clutch plates.

The plates can be removed with the band in position, but it must be removed to examine the driving slots in the sprocket.

Remove circlip holding clutch plates on to the body.

Remove plates.

There are six plain steel plates, and five steel plates with ferodo inserts.

Remove clutch sprocket.

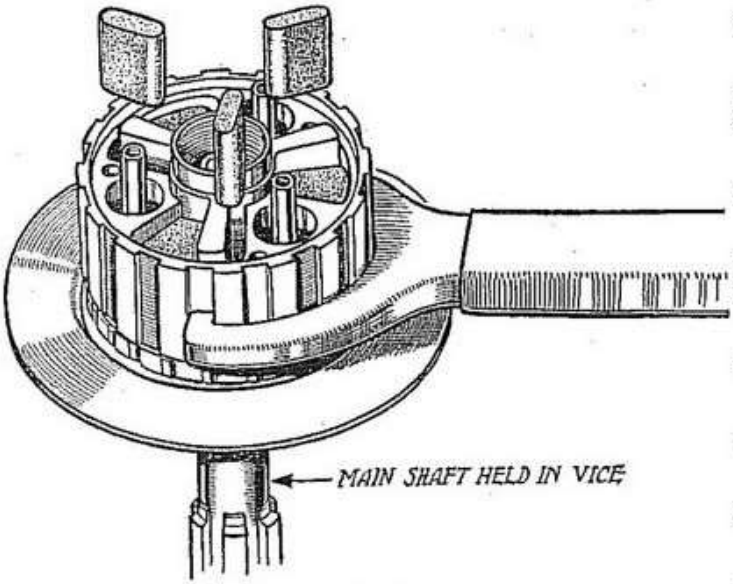


Fig. 25.

Place an old gearbox main axle in a vice with the splined end above the jaws, and fit body to axle.

Remove the three screws holding the front cover plate.

Remove the cover plate.

Remove the clutch shock absorber rubbers. (Fig. 25.)

A large " C " spanner is needed to remove the rubbers. This is placed over the body and engaged in the splines, and the large rubbers compressed while the small ones are removed.

The handle of the spanner should be of such a length that the load can be taken by the fitter's thigh, allowing both hands to be free to remove the rubbers.

A substitute for a " C " spanner can be made by fixing a handle to an old plain steel clutch plate.

Compress large rubbers and remove the small.

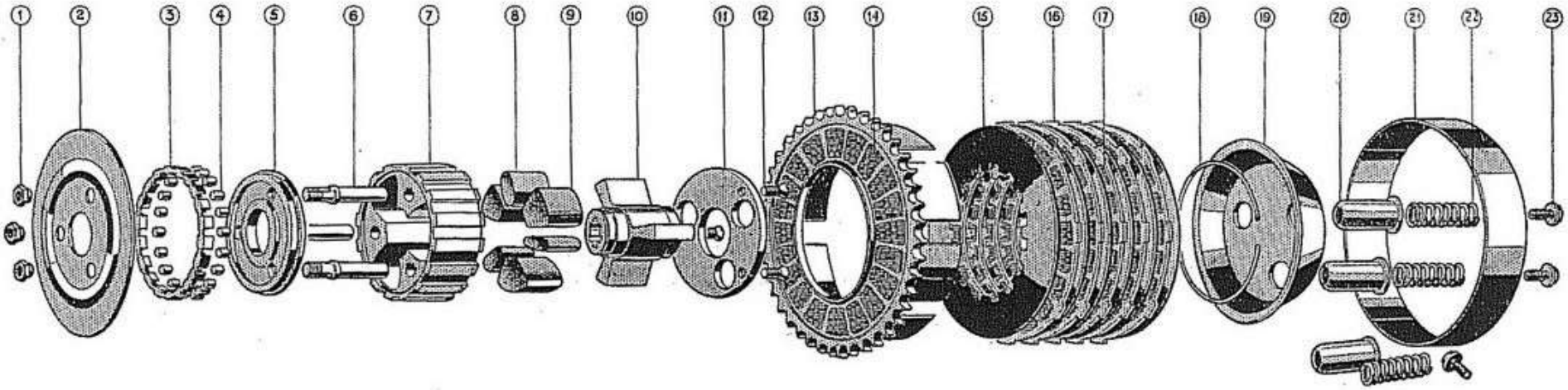
A small, sharp-pointed tool is necessary to remove the rubbers, as after use they adhere to the body.

Large rubbers are easily removed, after the small have been withdrawn.

Remove body from axle and replace in the reverse position.

Remove the three stud nuts on the back cover plate.

Back plate, roller race, back cover and body can be separated.



THE CLUTCH

INCORPORATING VANE TYPE RUBBER BUFFER SHOCK ABSORBER

Fig. 24.

1. Clutch Spring Stud Nut.
2. Clutch Back Plate.
3. Clutch Roller Race.
4. Clutch Roller Race Rollers.
5. Clutch Body Back Cover Plate.
6. Clutch Spring Stud.
7. Clutch Body.
8. Clutch Centre Rubber Buffer (small).
9. Clutch Centre Rubber Buffer (large).
10. Clutch Centre.
11. Clutch Body Front Cover Plate.
12. Clutch Body Front Cover Plate Retaining Screw.
13. Clutch Sprocket.
14. Clutch Sprocket Insert.
15. Clutch Steel Plate.
16. Clutch Friction Plate.
17. Clutch Friction Plate Insert.
18. Clutch Plate Retaining Clip Ring.
19. Clutch Outer Plate.
20. Clutch Spring Box.
21. Clutch Plate Cover.
22. Clutch Spring.
23. Clutch Spring Screw.

49. EXAMINATION OF CLUTCH PARTS.

Examine clutch inserts. They should be " proud " of the plate.

Fitting of separate inserts to a plate is not advisable as the new insert would be " proud " of the remainder and take all the drive on the plate in which it had been fitted.

It is advisable, if possible, to replace plates with either new or reconditioned ones.

If all new inserts are fitted to a plate, ensure that the inserts are level and flat and all contact the steel plates, taking their share of the drive.

Examine the drive on the plates for wear.

The plates with the inserts, drive on the outside diameter, and the plain steel, on the inside.

The splines on the body and the plain steel plates driven by the body rarely show any sign of wear.

The tongues on the plates with inserts, driving the sprocket, may show signs of wear, and they may have " eaten " in to the driven part of the sprocket.

This wear obstructs the free movement of the plates when the clutch is engaged or disengaged.

This can be rectified by filing or grinding the tongues on the plates square. Also the surface of the driven part of the sprocket.

The only effect this will have on the clutch is a slight amount of "back-lash " when the clutch is engaged or disengaged.

Examine plain steel plates for any roughness. The back plate frequently develops this fault.

Examine the roller race, rollers and the cage.

Examine the back cover plate face for wear by the clutch body centre.

Examine clutch shock absorber rubbers They may have become soft through the action of the oil.

50. ASSEMBLY OF CLUTCH.

Fit clutch body back cover plate to body, ensuring that the holes in the cover plate are in line with the holes in the body, and the spring studs an easy fit.

Fit clutch body centre.

Fit clutch large shock absorber rubbers.

Fit the rubbers in the position to take the drive.

Compress the rubbers in position and fit the small ones.

Fit body front cover.

Fit the three screws and tighten.

Fit roller race on to the back cover plate.

Fit clutch back plate, and spring studs.

Fit stud nuts and tighten. Lock nuts with a centre punch.

Test roller race for freeness on its track.

Fit steel band on to the sprocket. This should not be tight enough to distort the sprocket.

Check all the clutch plates in the sprocket and on body for freeness.

Fit sprocket to body. Revolve sprocket on race to check free movement.

Fit plates to sprocket and body. Order of fitting is—plain steel, inserts, plain, etc.

It will be noticed on examination that the plates are slightly bevelled on the one edge. Fit the bevelled edge towards the sprocket.

Revolve sprocket, ensuring that the plates are free.

Fit circlip, retaining plates.

Fit clutch to Gearbox axle.

Fit clutch outer plate.

Fit clutch spring cups.

Fit clutch springs.

Fit clutch spring pins. Tighten right home.

Fit oil bath outer portion. (Para. 46.)

CHAINS

51. A chain is an assembly of links with rollers connected together by outer link plates and held by rivets.

A chain rarely breaks if kept clean, lubricated and correctly adjusted, and is usually worn out long before the breaking point is reached.

The rear chain being exposed and more heavily loaded is more likely to give trouble.

52. CLEANING.

Remove the chain from the sprockets and soak in a bath of petrol or paraffin and well brush with a stiff brush to remove all external dirt and allow the paraffin to run through the joints of the chain. All the grit and dirt inside the joints must be removed.

Swill off in clean paraffin and dry.

53. LUBRICATING.

Immerse chain in bath of grease that has been heated until melted over a pan of boiling water. Move the chain about in the grease until the grease has cooled off to its normal semi-solid state, this will ensure that the grease has penetrated into the chain bearings.

Remove chain from grease and wipe off the surplus.

54. CHAIN RIVET EXTRACTOR.

A chain rivet extractor is supplied in the tool kit, also chain spares.

To use rivet extractor:—

1. See that the punch is screwed well away from the jaws of the extractor.

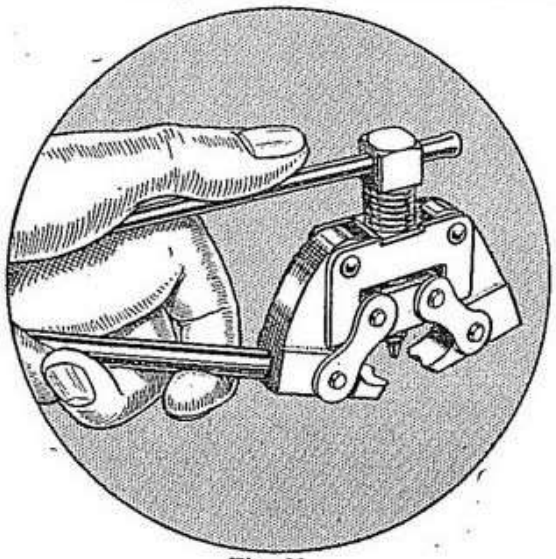


Fig. 26.

2. Grip the handle and the tommy bar and the jaws will open (Fig. 26).
3. Place chain in the jaws of the extractor and release grip. The jaws must grip the rollers. (Fig. 27).

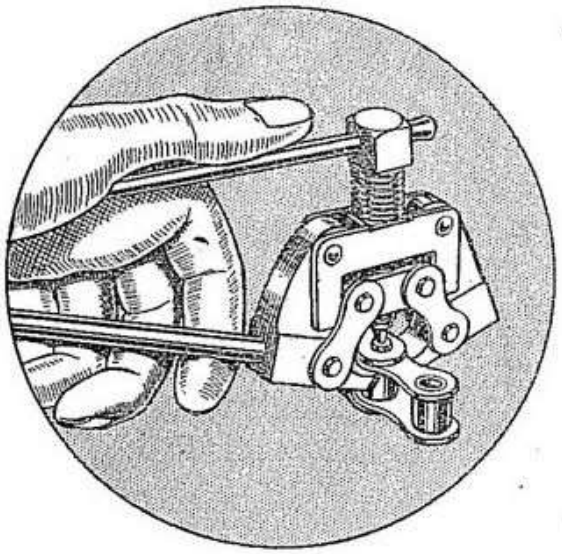


Fig. 27.

4. Screw down the punch until it contacts the head of the rivet, tighten down until the rivet is forced from the outer link plate. The rivet will leave the plate with a distinct click.
5. Screw the punch from the chain, grip the handle and tommy bar, and remove chain.
6. Replace chain in extractor and remove the adjacent rivet from the same outer link plate. The two rivets with the outer plate can now be removed from the chain.

PARTS FROM AN OLD CHAIN MUST NOT BE REFITTED.

55. REPAIRS.

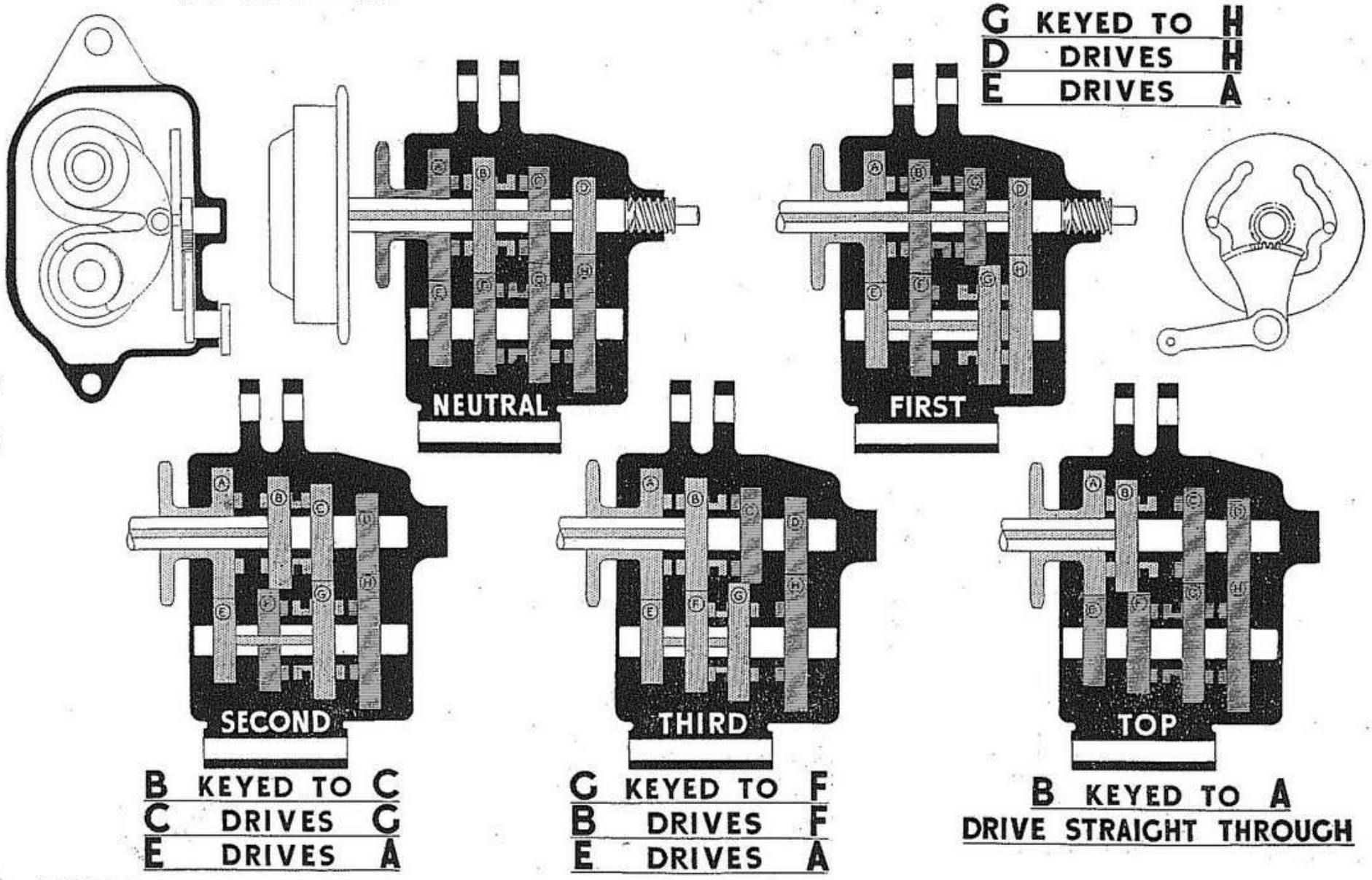
When a chain breaks the damaged parts must be removed.

If the chain has parted through a weakness of an outer link plate, remove the rivets holding the damaged side plate and replace with a single connecting link (Fig. 28.A).

In the case of a damaged roller or inside link it is necessary to remove the link complete with its attached outer link plates (Fig. 29.A) and

Norton
REGD. TRADE MARK

B&G (SLIDING) SPLINED TO SHAFT
E&D PERMANENTLY FIXED TO SHAFT



THE GEARBOX

Fig. 32.

A. Integral with the axle sprocket and free on axle (main) shaft.
B. Free to slide on main axle and is driven by main axle.
C. Revolves on main axle.
D. Fixed to axle.
E. Fixed to layshaft.
F. Revolves on layshaft.
G. Free to slide on layshaft, and is driven by layshaft.
H. Free on layshaft.

THE GEARBOX

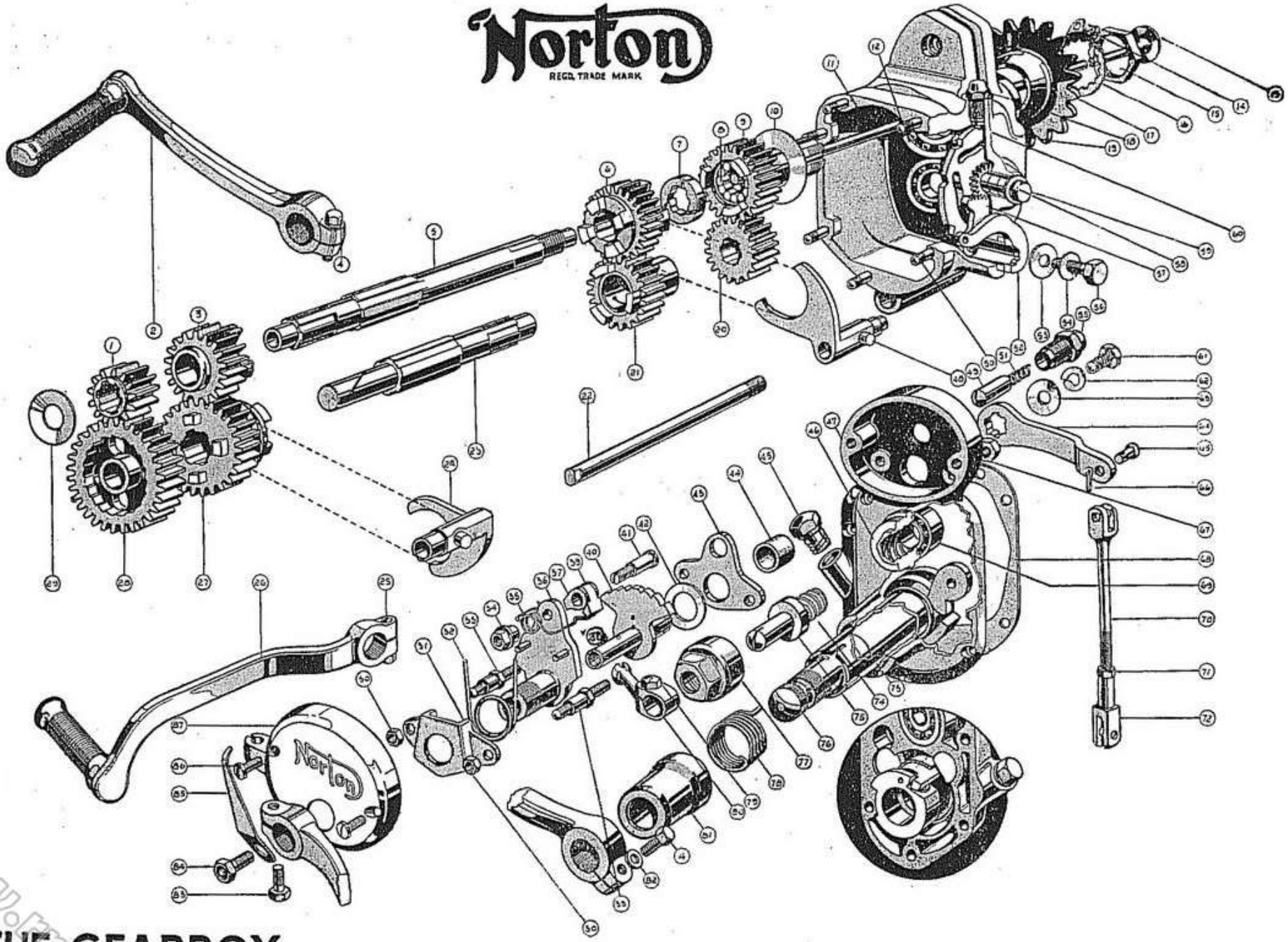


Fig. 33.

THE GEARBOX

1. Main Axle Pinion.
2. Kickstarter Crank.
3. Main Axle Free Pinion.
4. Kickstarter Crank Bolt.
5. Main Axle.
6. Main Axle Sliding Pinion.
7. Main Axle Thrust Washer
8. Main Gear Wheel Roller Bearings.
9. Main Gear Wheel.
10. Main Gear Wheel Oil Retaining Washer.
11. Layshaft Bearing.
12. Main Gear Wheel Bearing.
13. Clutch Thrust Pin.
14. Axle Sprocket Locking Washer Screw.
15. Axle Sprocket Locking Nut.
16. Axle Sprocket Locking Plate.
17. Axle Sprocket.
18. Cam Plate Indexing Plunger Bush.
19. Gearbox Shell.
20. Layshaft Pinion.
21. Layshaft Free Pinion.
22. Striker Fork Shaft.
23. Layshaft.
24. Striker Fork.
25. Change Speed Lever Bolt.
26. Change Speed Lever.
27. Layshaft Sliding Pinion.
28. Low Gear and Kickstarter Wheel.
29. Dished Steel Washer.
30. Return Spring Cover Plate Fixing Nut.
31. Return Spring Cover Plate.
32. Return Spring for Pawl Carrier.
33. Stop Stud for Pawl Carrier.
34. Pawl Pin Nut.
35. Pawl Return Spring.
36. Pawl Carrier.
37. Pawl (Forked).
38. Pawl Return Spring Stop.
39. Pawl (Plain).
40. Ratchet Plate.
41. Pawl Pin.
42. Ratchet Plate Spindle Steel Washer.
43. Cam Plate (Positive Change).
44. Ratchet Plate Cam Spindle Felt Washer.
45. Gearbox Oil Filler Plug.
46. Clutch Worm Nut.
47. Gearbox End Cover.
48. Striker Fork.
49. Cam Plate Plunger.
50. Gearbox End Cover Stud.
51. Cam Plate Plunger Spring.
52. Cam Plate Quadrant Lever.
53. Cam Plate Spindle Bolt Plain Washer.
54. Cam Plate Spindle Bolt Spring Washer.
55. Cam Plate Plunger Bush.
56. Cam Plate Spindle Bolt.
57. Cam Plate Quadrant.
58. Cam Plate Spindle.
59. Cam Plate Bolt.
60. Cam Plate Index Plunger and Bush.
61. Ratchet Lever Securing Bolt.
62. Ratchet Lever Securing Bolt Spring Washer.
63. Ratchet Lever Securing Bolt Plain Washer.
64. Ratchet Lever.
65. Gearbox Control Rod Pin.
66. Gearbox Control Rod Split Pin.
67. Pawl Carrier Stop Stud Nut.
68. Gearbox End Cover Washer.
69. Main Axle Ball Bearing in Cover.
70. Gearbox Control Rod.
71. Gearbox Control Rod Nut.
72. Gearbox Control Rod Bottom Connection.
73. Gearbox Kickstarter Axle Bush.
74. Clutch Worm.
75. Clutch Worm Felt Washer.
76. Kickstarter Axle.
77. Clutch Worm Nut Dust Cover.
78. Kickstarter Return Spring.
79. Clutch Worm Lever Bolt.
80. Clutch Worm Lever.
81. Kickstarter Return Spring Cover.
82. Kickstarter Crank Bolt Washer.
83. Change Speed Lever Bolt.
84. Control Gear Indicator Securing Bolt.
85. Control Gear Indicator.
86. Control Cover Fixing Pin.
87. Control Cover.

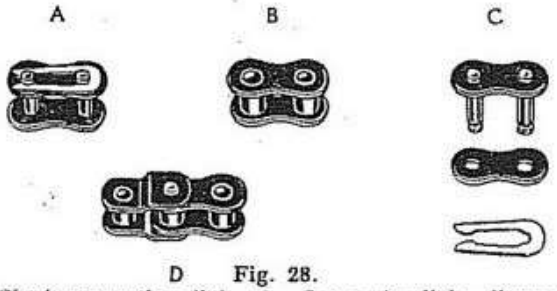


Fig. 28.

A. Single connecting link. C. Connecting link—dismantled.
B. Inner link. D. Crank link—double.

replace with an inner link and two single connecting links (Fig. 29.B).

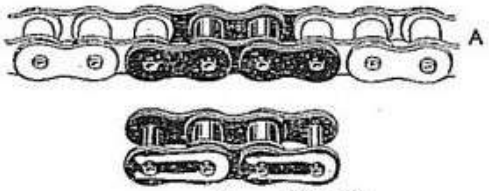


Fig. 29.

56. ALTERATION TO THE LENGTH OF A CHAIN.

Remove the single connecting link holding the two ends of the chain together and remove chain from the machine.

If the chain has an even number of pitches, that is a cranked link is not used in the chain, remove the rivets holding the second pair of outer link plates, which will shorten the chain by four rollers and two pairs of outer link plates (Fig. 30.A) and replace with a cranked double link and single connecting link (Fig. 30.B).

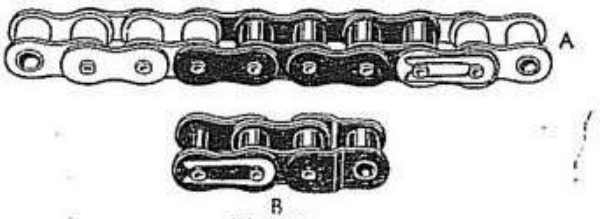


Fig. 30.

If the chain has an odd number of pitches, remove the rivets holding the second pair of outer links (the first pair will be cranked) (Fig. 31.A), and replace with a single connecting link and inner link (Fig. 31.B).

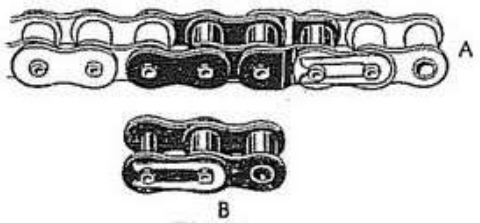


Fig. 31.

After the chain has been shortened using either of the above means the length of the chain is shorter by one roller or half a link.

57. FITTING A NEW REAR CHAIN.

Slacken off the rear wheel spindle nuts and screw back the chain adjusters to allow the wheel to be as near the gearbox as possible.

Remove the single connecting link from the old chain and connect the end of the new chain to the old one.

This is simplified if the connecting link is removed when it is fully engaged in the teeth at the back of the rear wheel sprocket, when the bottom half of the chain will drop to the floor while the top portion will be retained in position in the teeth.

Pull the old chain, revolving the gearbox sprocket and the rear wheel until the new chain is in position, and remove old chain and fit the single connecting link to the two ends of the new chain.

When fitting the connecting link do not strain the fixed rivets on the plate of the connector, if the ends of the chain are pressed home in the teeth of the rear sprocket the rivets will

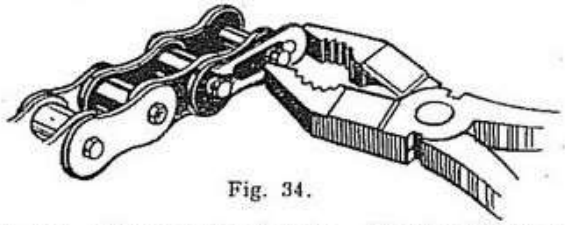


Fig. 34.

enter the rollers quite freely. Fit the loose outer plate and the spring clip fastener, the closed end of the spring clip must face the direction of travel of the chain.

Adjust chain, check wheel alignment and tighten wheel spindle nuts.

58. To fit a rear chain to a machine when the old one has been removed is rather difficult. Hold chain down the front of the battery and allow the end of the chain to rest in the teeth of the gearbox sprocket, turn the sprocket in a clock-wise direction and guide the end of the chain over the chain stay to the rear wheel sprocket, thread the other end of the chain round the gearbox sprocket, over the rear mudguard bridge tube to the sprocket.

59. Care should be taken when fitting a new chain to keep the chain from contact with the floor or any place from which it is likely to collect grit, etc.

If an old chain is removed and refitted in the reverse direction of travel the effective length may be shorter and the position of the rear wheel may have to be altered.

This is caused through the stress on the chain in one direction only causing wear to take place on one side of the roller bushes only.

60. REMOVAL OF THE GEARBOX FROM FRAME.

Remove clutch cable from clutch arm.

Remove clutch cable adjuster from positive control cover.

Remove oil bath outer portion. (Para. 46.)

Remove clutch and engine sprocket. (Para. 46.)

Remove rear portion of oil bath. (Para. 46.)

Remove rear chain guard, held at the rear by a bolt and nut.

Remove rear chain.

Remove rear wheel. (Para. 70.)

Remove toolbox held by three bolts, two at the top and one at the bottom.

Remove rear mudguard and carrier, held by six bolts, one at the bottom of the guard holding guard to chain-stay bridge, one holding guard to the seat-stay bridge, two holding carrier to saddle spring lugs, and two holding carrier to frame fork ends.

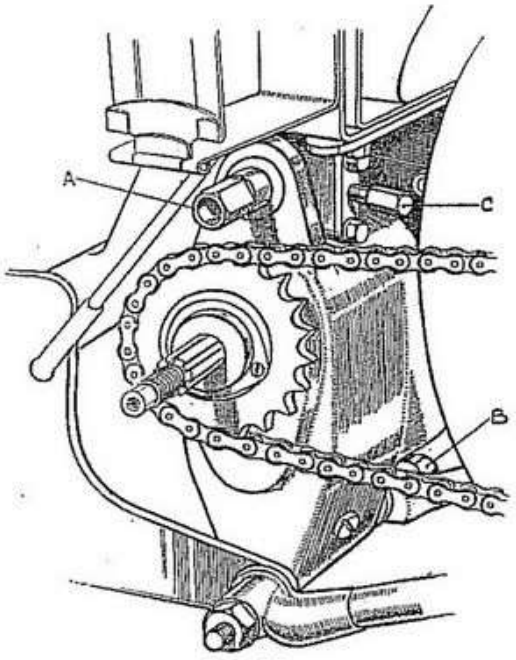


Fig. 35.

Remove large hexagon nut on the top gearbox bolt.

Remove the two bolts holding the gearbox adjuster plate.

Remove the adjuster bolt from the gearbox bolt.

Remove the top gearbox bolt.

If the top gearbox bolt is placed between the engine plates, and the nut screwed into such a position that the plates are held in position when the box is removed, it will facilitate the removing and replacing of the box.

Remove the gearbox bottom bolt and nut.

Remove gearbox from frame.

61. FITTING OF GEARBOX TO THE FRAME—(Fig. 35.)

To refit the gearbox, reverse the order of the removal operations.

Remove the gearbox top bolt from between the engine plates when the box is in position.

When fitting the top bolt, the tapped hole in the bolt must be in such a position to allow the adjuster bolt to enter.

62. REMOVAL AND DISMANTLING OF GEARBOX END COVER.

(It is not necessary to remove gearbox from the frame to remove the end cover or the gears from the box, but if a complete overhaul is necessary the gearbox is best removed from frame.)

Hold box in vice by the lugs at the base (if removed from frame.)

Remove split cotter and pin from the jaw joint on the control rod.

Remove kick-starter crank by slackening off the clip bolt.

Remove kick-starter axle return spring and cover from the bush.

Remove the seven nuts holding the end-cover to the box.

Remove end cover complete.

Remove kick-starter pawl pin from axle, and the pawl, plunger, and spring are free.

Remove clutch worm lever from worm, held by the clip bolt.

Remove clutch worm dust cover cap.

Remove clutch worm dust cover cap felt oil retaining washer.

Remove clutch worm.

Remove clutch nut.

Pressed into the end-cover is the steel bush that carries the kick-starter axle.

The head of the bush is recessed to take a compressed cork washer.

The end of the axle is bored out and a phosphor bronze bush is pressed in to carry one end of the layshaft.

In the cover a ball journal bearing is pressed, to carry the end of the mainshaft (or axle).

Between this bearing and the main axle pinion, a dished steel washer is fitted, with the concave side next to the bearing.

The bearing can be pressed from the panel.

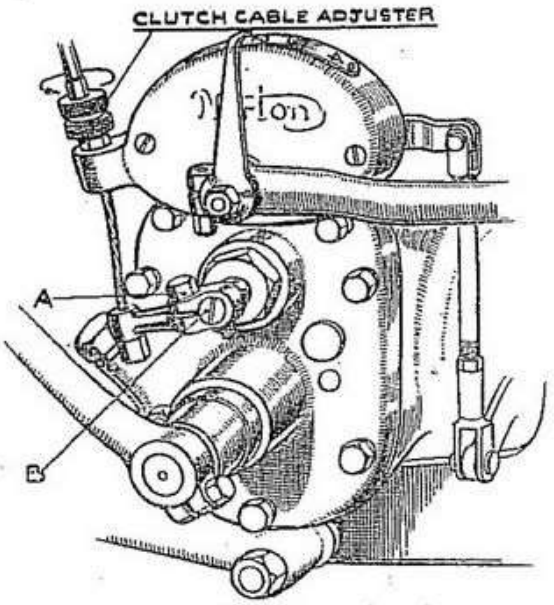


Fig. 36.

63. ASSEMBLY OF GEARBOX END COVER.

Press the kick-starter axle steel bush into the cover.

Press the ball journal bearing into the cover.

Examine kick-starter pawl. The tip of the pawl that engages with the kick-starter and low gear wheel is the portion where the wear takes place. If worn, replace.

Fit pawl, plunger and spring to axle, by placing in position and inserting the pawl pin.

Fit clutch worm nut to cover.

Fit clutch worm to nut.

Fit clutch worm nut felt washer.

Fit clutch worm nut dust cover.

Fit kick-starter axle into bush.

Kick-starter crank, spring and cover, and the clutch worm lever, can be fitted before or after the cover is fitted to the box.

Fit dished steel washer.

Fit cover to the box. A paper washer is fitted between the cover and the box.

Fit and tighten the seven nuts.

Fit clutch cable adjuster to positive control cover.

Fit clutch worm lever to worm.

Fit clutch cable to arm and tighten the clip pin.

Fit kick-starter crank return spring.

Fit kick-starter crank return spring cover.

Fit kick-starter crank to axle. The crank should not be upright. It should incline a little in the direction of its travel.

Fill gearbox with oil to the level of the filler plug.

64. REMOVAL OF THE GEARS FROM THE GEARBOX. (Fig. 33.)

Fit a length of steel tubing over the end of the gearbox main axle, from which the clutch has been removed, and retain by the clutch nut.

This will hold the axle in position while the gears are removed from the box.

Engage second gear.

Remove end cover. (Para. 62.)

Remove the low gear and kick-starter wheel—the large wheel on the layshaft. This has a phosphor bronze bush pressed into the centre.

Remove the small wheel on the main axle (or shaft), the main axle pinion.

Remove the second gear wheel from the main axle. This has a phosphor bronze bush, the bush being loose on the axle and in the wheel.

Remove the striker fork shaft by screwing out of the box with a spanner on the machined flats at the end.

Remove the layshaft second gear and the striker fork.

Remove the main axle third gear and the striker fork.

Remove the layshaft with its two remaining gears, exposing the roller race at the far end of the box.

The inner race with the rollers and cage will remain on the shaft, leaving the outer race in the box.

Remove the temporary tubular distance piece fitted on the clutch end of the main axle.

Remove the main axle carefully. The phosphor bronze thrust washer will remain on the axle.

If the axle has been carefully removed the rollers in the main gear wheel should remain in position.

Fit a tin or cardboard tube to replace the axle in the gear wheel to retain the rollers in position.

Remove the gearbox sprocket, held by a nut with a **left-hand thread.** The nut is locked with a locking washer and screw.

If the gearbox is in the frame, obtain assistance to hold the rear wheel while the sprocket nut is removed.

If the gearbox is removed from the frame, the sprocket can be held by passing a length of

old chain round the sprocket, holding the two ends in the vice. Obtain assistance to hold the box and remove the nut. Another method is shown in the sketch. (Fig. 37.)

When the sprocket is removed the main gear wheel can be removed from the box, complete with rollers.

At the back of the main gear wheel a large pen steel washer is fitted. This washer obstructs the oil flowing to the bearing, allowing only sufficient to lubricate the bearing.

The bearing carrying the main gear wheel can be pressed out. At the back of the bearing a pen steel washer is fitted between the bearing and the case.

The outer race of the layshaft bearing can be removed by carefully warming the case.

65. REMOVAL OF THE CAM PLATE FROM THE GEARBOX.

Remove the domed hexagon nut from the top of the gearbox. This contains the cam plate indexing plunger.

Remove the plunger and spring.

Remove the cam plate quadrant lever, held by a bolt and two washers, one plain and one spring.

Remove the cam plate, held by a bolt and two washers, one plain and one spring.

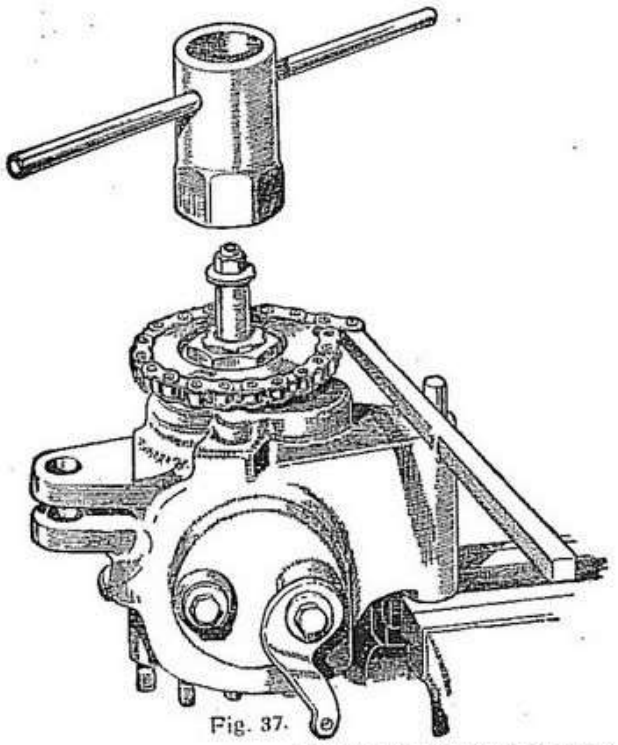


Fig. 37.

Reproduced from "Motor Cycling."

This simple " chain and bar " tool enables the operator to hold the mainshaft sprocket firmly while tightening the lock nut. The bar is wedged against the long bolt shown protruding through the gearbox lug.

The cam plate quadrant works in a phosphor bronze bush. This can be pressed from the box.

The outside of the boss carrying the bush is recessed to take a pressed cork oil retaining washer.

The cam plate spindle also works in a phosphor bronze bush that can be pressed out.

66. FITTING OF CAM PLATE.

If the bushes carrying the cam plate and quadrant spindles have been removed from the box, replace or renew.

Fit the quadrant to the box.

Fit quadrant lever cork washer.

Fit quadrant lever.

Rotate the quadrant until it rests against the blind end of the casing and fit the lever to the splines that allow the lever to be in its highest position.

Fit spring washer and bolt.

Tighten bolt and ensure that the quadrant rotates freely in its bush.

Round the periphery of the cam plate five " V " grooves are machined. The indexing plunger engages in these grooves. Each groove corresponds with a gear position.

Three of the grooves are close together. They are in the following order—bottom (first), neutral (the shallow one), and second.

The other two are third and top (fourth).

The cam plate gear must be meshed with the quadrant in such a manner that when the quadrant is moved to its extreme position in either direction, the end grooves have passed the plunger.

Fit the cam plate, meshing the teeth on the spindle with the teeth on the quadrant.

Fit plunger, spring and domed nut. Do not screw the nut down tight. Allow the plunger to lightly touch the periphery of the cam plate.

Turn the quadrant to its extreme position in one direction, and check the distance the groove has passed the plunger.

Turn the quadrant to its other extreme and again check the distance the groove has passed the plunger.

These two distances need not be equal, but there are only two positions the quadrant can be meshed with the wheel to allow the two end grooves to pass the plunger; either of these positions will permit of correct operation.

When the gears are correctly meshed, fit the cam plate retaining bolt and two washers, the spring washer next to the bolt head.

Tighten down the plunger domed nut.

67. FITTING GEARS INTO GEARBOX.

Fit pen steel washer into the bearing housing before fitting main gear wheel bearing.

Fit main gear wheel bearing to box.

Fit layshaft bearing outer race to box.

Fit rollers into the main gear wheel. Grease rollers.

Fit the tin or cardboard tube used in dismantling to retain the rollers.

Fit large pen steel washer to main gear wheel.

Fit main gear wheel to box.

Fit gearbox sprocket to the main gear wheel sleeve.

Fit gearbox sprocket nut—LEFT-HAND THREAD.

Fit gearbox sprocket nut locking washer and screw.

Remove carefully the tube holding the rollers in position in the main gear wheel.

Fit phosphor bronze thrust washer to the main axle so that the side with the oil groove will be against the hardened steel washer in the main gear holding the rollers in position.

Place cam plate in second gear position.

Fit main axle to main gear wheel.

Fit the tubular distance piece used in dismantling, to the clutch end of the axle.

Fit third gear wheel (20 teeth) to the layshaft.

Fit top gear wheel (18 teeth) to the layshaft.

Fit the inner race, with rollers and cage, to the end of shaft.

Grease rollers.

Fit shaft to box.

Fit striking fork to the main axle third gear (22 teeth).

Fit third gear with the fork onto the axle.

Fit the second fork to the layshaft second gear (24 teeth).

Fit the second gear with the fork to the layshaft.

The pegs on the striking forks fit in the cam plate.

With the gearbox in the frame, little trouble will be experienced in holding the first fork in position.

Fit the first fork in position and hold with a screw-driver or similar tool while the second is placed in position.

Fit striking fork shaft and screw it into the case.

Fit the remaining gears.

The chamfered side of the main axle pinion (13 teeth) is fitted first.

Fit end cover. (Para. 63.)

Check adjustment of the control rod.

The adjustment of the rod should allow the pins in the jaw joints to be free when top or bottom gear is engaged.

Remove tubular distance piece from axle.

68. DISMANTLING OF POSITIVE FOOT CHANGE. (Fig. 33.)

Remove control indicator bolt (also the lubricator) and washer.

Remove control indicator.

Remove control lever, by slackening the clip pin.

Remove control cover, held by two countersunk screws.

Remove return spring cover plate, held by two nuts.

Remove return spring.

Remove pawl carrier. This slides off the ratchet plate spindle, complete with the pawls and pawl spring.

Remove the ratchet lever, held to the back of the control box by a bolt with a spring and plain washer.

Remove the ratchet plate. At the back of the plate a plain steel washer is fitted.

At the back of the control box a plunger is fitted. The plunger engages in the back of the ratchet.

Remove the ratchet plunger by removing the dome nut at the back of the box, releasing the plunger and spring.

Remove the two nuts at the back of the box. These nuts lock the pawl carrier stops studs.

Remove the pawl carrier stop studs, screwed into the box.

Remove the cam plate.

The positive control box is now stripped.

Remove the pawls from the pawl carrier by removing the sleeved nut on the pawl pin. The end of the pawl pin with the screwdriver slot will have to be held while the nut is removed.

When the nut is removed, the pawls and the return spring are free.

69. ASSEMBLY OF POSITIVE FOOT CONTROL.

Fit the pawls and spring to the pawl carrier. When the nut is tight, the pawls must have free movement.

Fit the cam plate to the box.

Place cam plate in position and fit the two carrier stops to the box, holding the cam plate.

Fit the carrier stop stud locknuts at the back of the box.

Fit the ratchet plate, the splined end of the spindle through bush in the cam plate, the steel washer between ratchet and box.

Fit the felt washer onto the splined end of the shaft and into the boss on the back of the box.

Fit the ratchet lever, as high as possible with the bottom gears engaged.

Fit the retaining bolt and washers, the spring washer next to the bolt head.

Fit the plunger and spring.

Fit the pawl carrier complete with the pawls. The pawls can be sprung into position with a screwdriver.

Fit the pawl carrier return spring.

Fit one leg of the spring against the stop and prise the second leg with the aid of a lever into position.

Fit the return spring cover and the two nuts. Fill the control box with grease.

Fit the control box cover and the two countersunk screws.

Fit the control lever.

Fit the indicator arm.

Fit the indicator arm bolt, with washer.

WHEELS

70. REMOVAL OF REAR. (Fig. 40.)

Place machine on the rear stand. Roll back the rubber tube on the rear lamp lead, exposing the brass connection. Break the wire by parting the connector. Remove the tail piece of the mudguard by removing the two bolts holding it to the main portion and the two bolts at the bottom of the tailpiece holding the pannier bag carriers, and the stays.

Remove the three wheel sleeve nuts, the wheel spindle, the dust cover and the distance piece.

Pull the wheel free of the sleeve nut studs and the wheel will drop to the ground and can be rolled free of the machine.

When the wheel has been removed by the above method, the brake drum is left in position.

To remove the wheel complete with brake drum, remove tail piece of mudguard, rear chain, anchorage bolt holding the brake anchorage arm to the frame and part of the brake rod. (Fig. 40.)

To part the brake rod, release the lock-nut, the large knurled nut near the brake pedal and the rod can be screwed from the jaw joint, the rod will be withdraw with the wheel.

Ease the spindle nuts and the wheel can be removed from the fork ends of the frame.

71. FITTING OF REAR WHEEL TO THE FRAME.

When refitting the wheel, reverse the removal operations.

Ensure that the spindle is hard against the chain adjusters.

When refitting the chain spring link ensure that the closed end of the spring faces the direction of travel of the chain.

Check rear brake.

72. REMOVAL OF FRONT. (Fig. 41.)

Place machine on both stands. The front wheel complete with the brake drum is removed as one unit.

Remove the "U" clip connecting the brake cable to the brake arm.

Remove the speedometer cable from the speedometer gearbox.

Ease the spindle nuts and the wheel can be removed.

To remove the brake drum from the wheel, remove the three sleeve nuts and the spindle nut and the brake drum with the brake plate and spindle are free from the wheel.

Reverse the operations to refit wheel.

73. HUBS. (Figs. 38 and 39.)

To remove bearings from hubs (both hubs are identical), remove the locking ring from the hub, the felt washer and steel distance piece on the side of the hub opposite to which the brake drum is fitted.

Press out the inner sleeve and the bearing from the brake side of the hub.

Remove steel dished washer from brake side of hub and press out the bearing.

74. FITTING OF BEARINGS TO HUB.

Fit the single row bearing to the screwed side of the hub.

Pack the hub with thick grease.

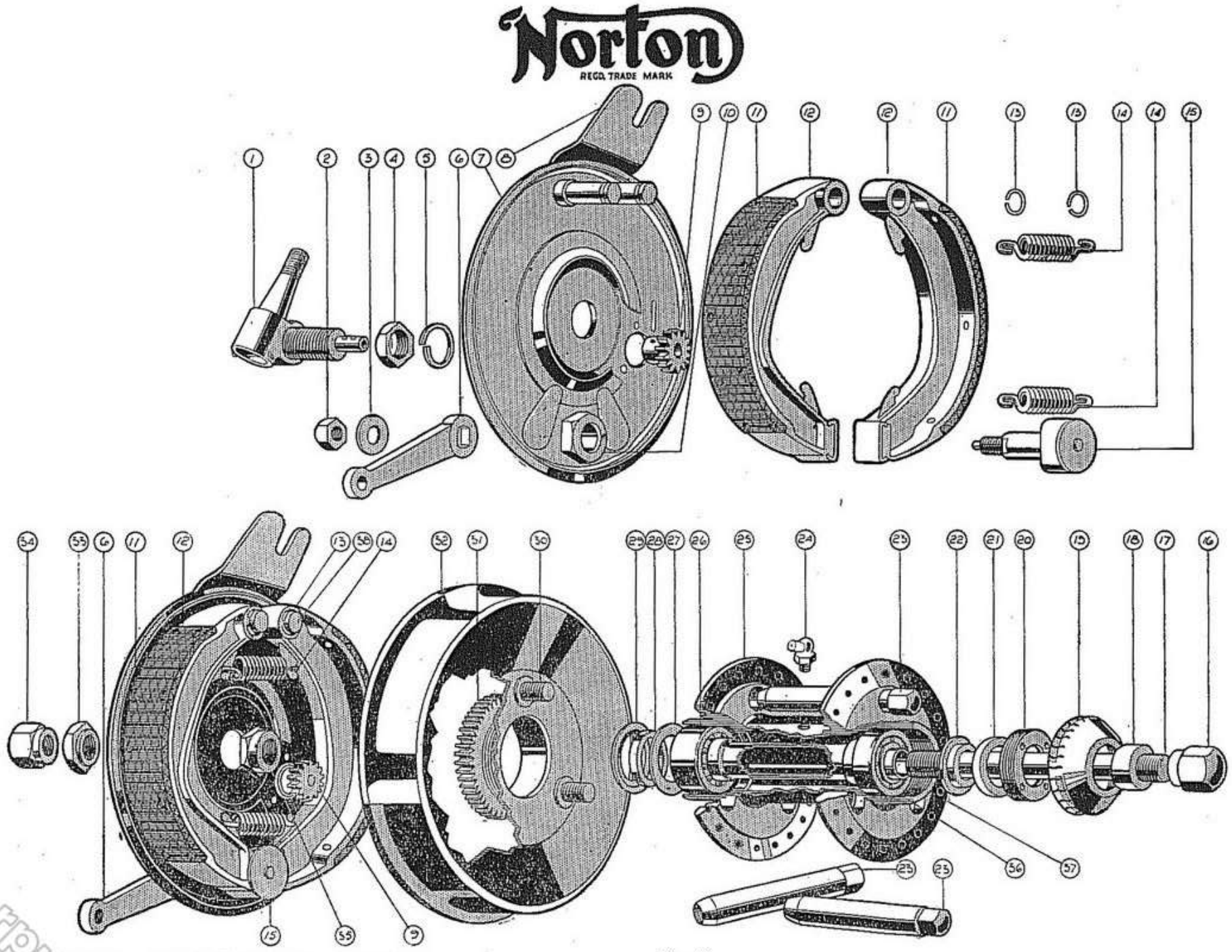
Fit inner sleeve, the end of the sleeve with the longer projection, fit into the single row bearing.

Press the double row bearing in to the hub and on to the inner sleeve.

Fit pen steel washer, felt washer and dished washer next to the double row bearings and "pean" the housing to retain washer in position.

Fit felt washer, distance piece and locking ring to the other side of the hub. The smaller diameter of the distance piece protrudes through the locking ring.

Tighten the locking ring.



THE FRONT HUB

Fig. 38.

FRONT HUB

1. Speedometer Gear Box.
2. Brake Arm Retaining Nut.
3. Brake Arm Retaining Nut Washer.
4. Speedometer Gear Box Lock Nut.
5. Speedometer Gear Box Lock Nut Spring Washer.
6. Brake Arm.
7. Brake Plate.
8. Brake Plate Anchorage Lug.
9. Speedometer Drive Pinion.
10. Brake Cam Bush Retaining Nut.
11. Brake Lining.
12. Brake Shoe.
13. Brake Shoe Retaining Circlip.
14. Brake Shoe Return Spring.
15. Brake Cam.
16. Wheel Spindle Nut.
17. Wheel Spindle.
18. Distance Piece.
19. Dust Cover.
20. Bearing Locking Ring.
21. Bearing Felt Washer.
22. Bearing Distance Washer (collared).
23. Wheel Sleeve Nut.
24. Grease Nipple.
25. Hub Spoke Flange.
26. Wheel Bearing (wide).
27. Wheel Bearing Steel Washer.
28. Wheel Bearing Felt Washer.
29. Wheel Bearing Felt Washer Steel Cup
30. Brake Drum Driving Stud.
31. Speedometer Gear Ring.
32. Brake Drum.
33. Brake Plate Locking Nut.
34. Spindle Nut.
35. Brake Plate Spacing Nut.
36. Hub Bearing.
37. Hub Shell.

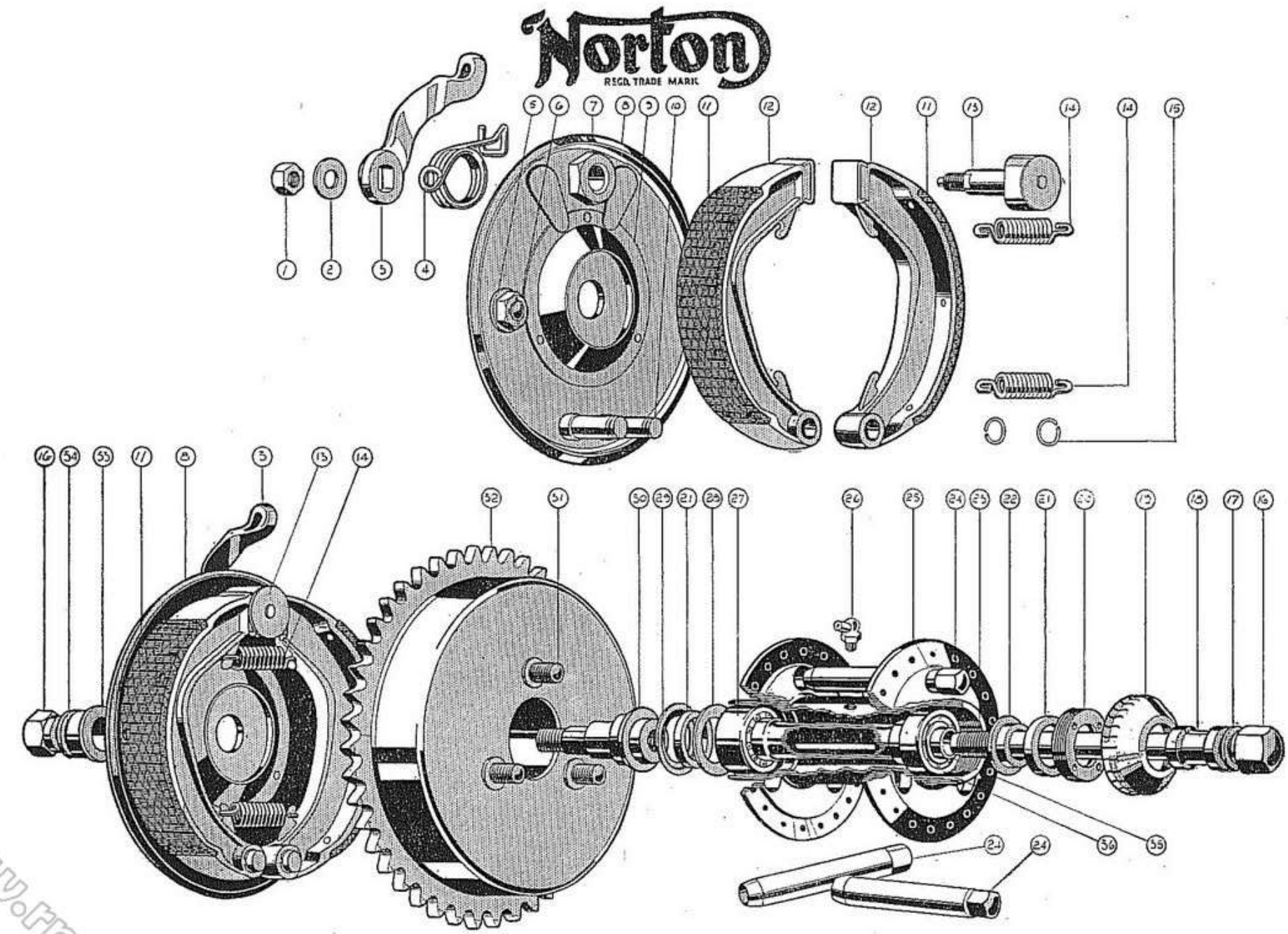


Fig. 39.

THE REAR HUB

REAR HUB

1. Brake Arm Retaining Nut.
2. Brake Arm Retaining Nut Washer.
3. Brake Arm.
4. Brake Arm Return Spring.
5. Brake Plate Torque Arm Stud Nut Washer.
6. Brake Plate Torque Arm Stud Nut Washer.
7. Brake Cam Bush.
8. Brake Plate.
9. Brake Grease Deflecting Plate.
10. Brake Shoe Pivot Pin.
11. Brake Shoe Lining.
12. Brake Shoe.
13. Brake Cam and Spindle.
14. Brake Return Spring.
15. Brake Shoe Retaining Circlip.
16. Wheel Spindle Nut.
17. Wheel Spindle Nut Washer.
18. Wheel Spindle Distance Piece.
19. Dust Cover.
20. Bearing Locking Ring.
21. Bearing Felt Washer.
22. Bearing Distance Washer (collared).
23. Hub.
24. Wheel Sleeve Nut.
25. Hub Spoke Flange.
26. Grease Nipple.
27. Wheel Bearing (wide).
28. Wheel Bearing Steel Washer.
29. Wheel Bearing Felt Washer Steel Cup.
30. Rear Hub Brake Drum and Sprocket Fork End Attachment.
31. Brake Drum Driving Stud.
32. Brake Drum and Sprocket.
33. Brake Drum Distance Piece.
34. Spinde Nut Washer.
35. Hub Shell Bearing Distance Piece Sleeve
36. Hub Bearing.

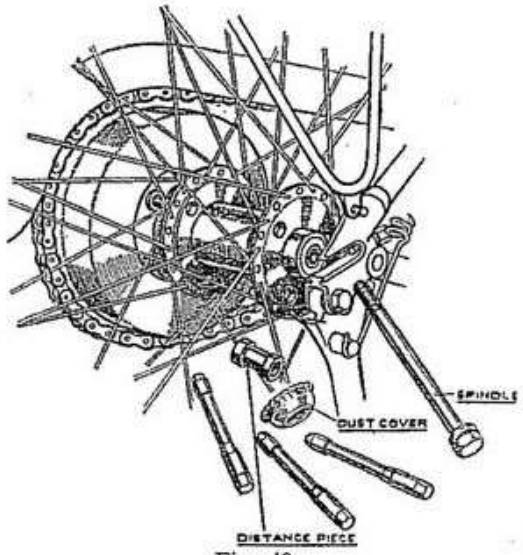


Fig. 40.

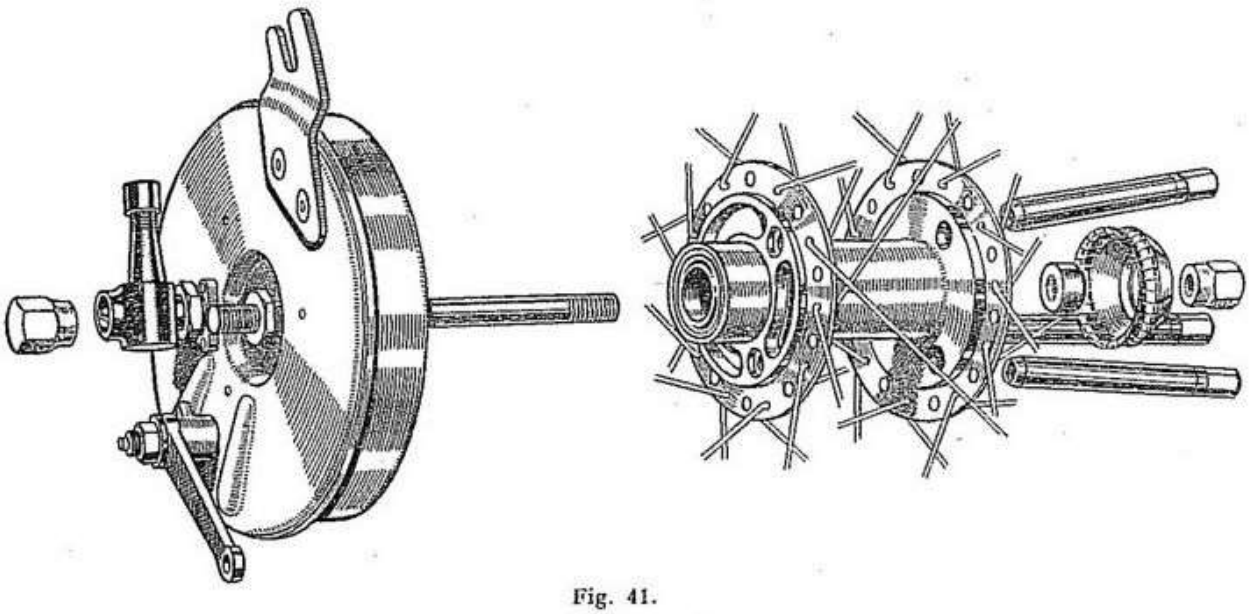


Fig. 41.

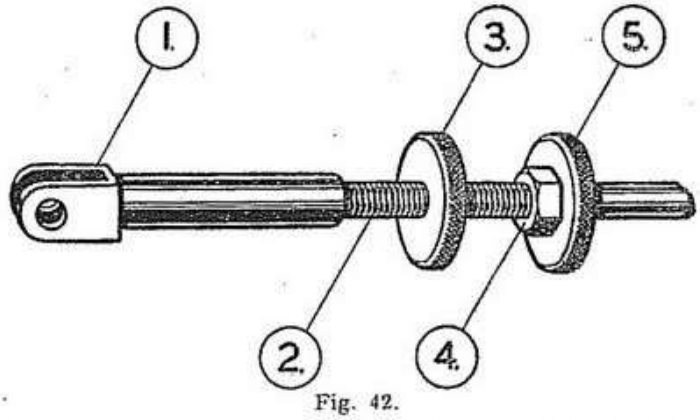


Fig. 42.

1. Jaw Joint.
2. Brake Rod.
3. Knurled Locking Nut.
4. Nut locking knurled nut to rod.
5. Knurled Nut locked to rod.

BRAKES

75. DISMANTLING OF THE BRAKES.

(Both the brakes are the same.)

Rear brake is removed from the machine with the wheel. (Para. 70.)

Front brake is removed from the machine with the front wheel. (Para. 72.)

Remove brake plate from the drum.

Remove brake lever arm return spring from the lever.

Remove nut and washer from the cam spindle.

Remove brake lever.

Remove cam and spindle from bush in the brake plate.

Tap the end of the spindle lightly until the cam is clear of the shoes.

Remove brake shoe return springs.

Remove the circlips retaining shoes to the pivot pins.

Remove the brake shoes.

Cam spindle bush can be removed from the plate after removing the nut holding bush to the plate.

76. ASSEMBLY OF BRAKES.

Fit cam spindle bush to plate.

Fit brake shoes. Smear a little oil on the pivot pins.

Fit ONE shoe to pivot pin.

Fit spring to the shoe fitted to the pin, near pin.

Hold second shoe near to the one fitted and fit the spring, stretch the spring and fit second shoe to pivot pin.

Fit second spring to both shoes.

Fit cam spindle to plate. Hold shoes apart with screw-driver or similar tool and allow cam to pass the ends of the shoes.

Fit NEW circlips to pivot pins.

This is simplified if a length of rod is obtained with the same diameter as the pivot pin.

Fit circlip to the rod.

Place a piece of tubing over the rod. Place rod at the end of the pivot pin. Tap end of rod and circlip is forced on to the pin and into the groove.

SPEEDOMETER DRIVE

77. DISMANTLING.

Remove speedometer gearbox from brake plate.

The small driven wheel fitted on the shaft from the gearbox is held by a peg. Tap out peg, remove wheel.

Slacken the lock nut, locking the box to the plate.

The box can be screwed from the plate.

The speedometer driving wheel is screwed onto the brake drum.

78. ASSEMBLY OF SPEEDOMETER DRIVE.

Fit front wheel spindle to brake plate. The nut (see Fig. 38) with the collar is fitted before the plate with the collar away from the plate.

Fit nut holding the spindle to the plate.

Fit gear box to the plate.

Fit driving wheel to the brake drum.

Check the meshing of the speedometer drive wheel and the pinion.

To do this, fill the teeth of the driving wheel with a thick grease, fit the plate to the drum and revolve the plate in the drum, remove plate, and where the teeth of the pinion are meshing with the driving wheel the grease will have been removed.

Adjust the position of the pinion by either screwing the gear box in or out of the plate until the full width of the pinion teeth is meshed with the teeth on the driving wheel.

When the correct position of the gear box is obtained, lock in position.

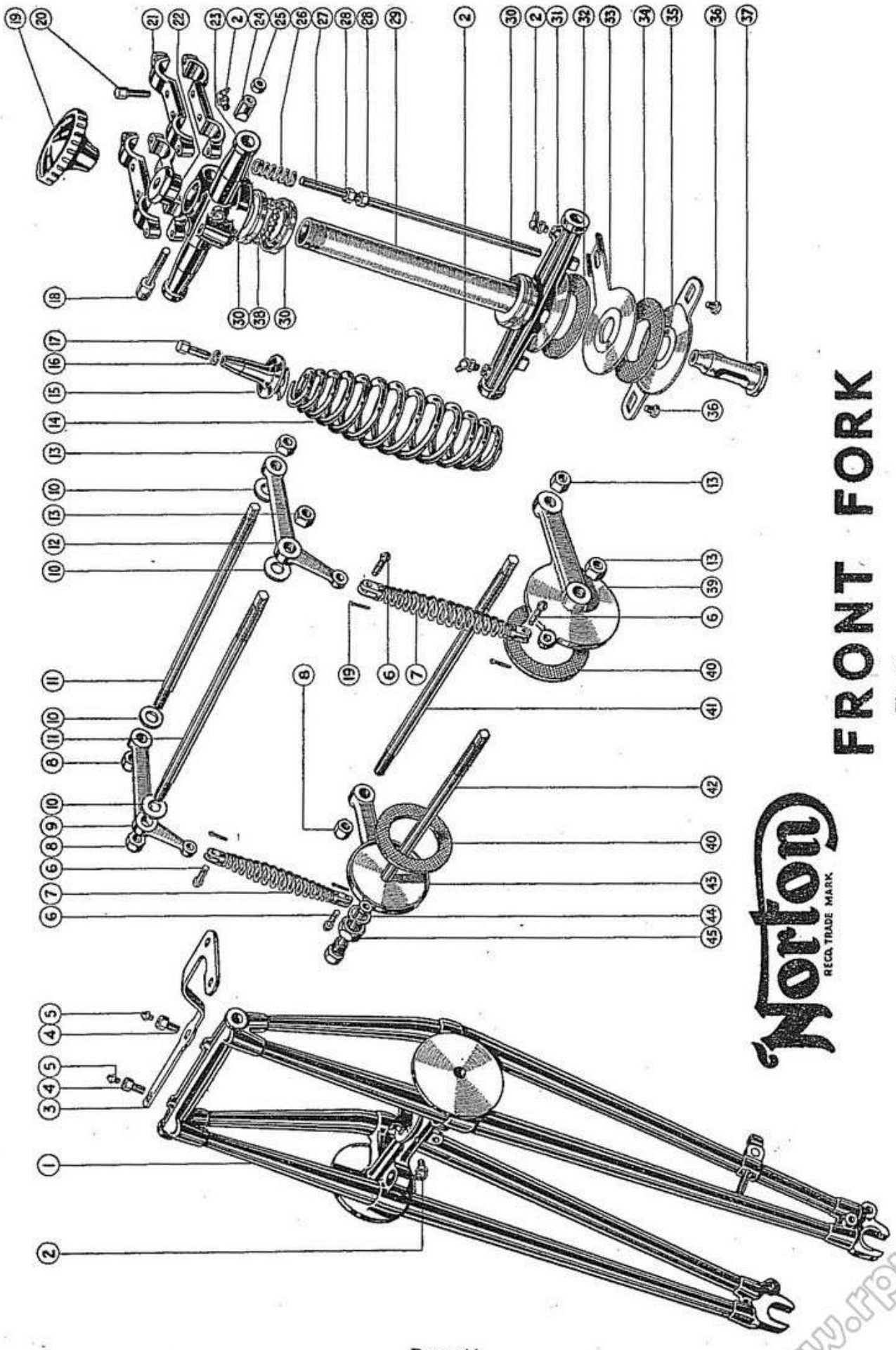


Fig. 43.

FRONT FORKS

1. Fork Girder.
2. Fork Angle Grease Nipple.
3. Speedometer Fork Attachment Bracket.
4. Speedometer Fork Attachment Bracket Bolt and Grease Nipple Adaptor.
5. Grease Nipple.
6. Fork Rebound Spring Jaw Joint Pin.
7. Fork Rebound Spring.
8. Fork Offside Spindle Nut.
9. Fork Offside Link.
10. Fork Spindle Knurled Adjusting Washer.
11. Fork Top Spindle.
12. Fork Nearside Link.
13. Fork Nearside Spindle Nut.
14. Fork Spring.
15. Fork Spring Lug.
16. Fork Spring Attachment Bolt Spring Washer.
17. Fork Spring Attachment Bolt.
18. Fork Top Clip Bolt.
19. Fork Steering Damper Knob.
20. Fork Handlebar Half-clip Bolt.
21. Fork Handlebar Half-clip.
22. Fork Steering Column Nut.
23. Fork Top Clip.
24. Fork Top Clip Bolt Sleeve.
25. Fork Top Clip Bolt.
26. Fork Steering Damper Adjuster Spring
27. Fork Steering Damper Rod.
28. Fork Steering Damper Rod Nut.
29. Fork Steering Column.
30. Fork Ball Race.
31. Fork Crown.
32. Fork Steering Damper Friction Disc.
33. Fork Steering Damper Friction Plate.
34. Fork Steering Damper Friction Disc.
35. Fork Steering Damper Bottom Plate.
36. Fork Steering Damper Bottom Plate Fixing Bolt
37. Fork Steering Damper Bottom Lug.
38. Fork Ball Race Bearings.
39. Fork Nearside Bottom Link.
40. Fork Shock Absorber Friction Disc.
41. Fork Bottom Rear Spindle.
42. Fork Bottom Front Spindle.
43. Fork Offside Bottom Link.
44. Fork Shock Absorber Adjusting Nut Spring Washer.
45. Fork Shock Absorber Adjusting Nut.
46. Fork Rebound Spring Jaw Joint Pin Split Cotter.

FRONT FORKS

79. REMOVAL OF FRONT FORKS FROM FRAME.

Place a block of wood or jack under the engine of such a height that the front wheel is clear of the ground.

Remove front wheel. (Para. 72.)

Remove front mudguard, held by a bolt holding the guard to the fork and the four bolts holding the guard stays and front stand to the fork ends.

Remove the handlebars. The bars are held by two split clips with four bolts to each clip.

Remove the bolts and the bars are free from the head clips.

Remove speedometer cables, inner and outer, from the fork.

Remove steering damper knob from the fork by releasing the steering column nut.

Turn knob until the rod is released from the "T" piece at the bottom of the column, and the knob with the rod and the column nut will leave the fork as one assembly.

Remove the bolt holding the steering damper anchorage plate to the frame, below the head lug.

Remove switch lever from head lamp.

Remove switch panel from the back of the head lamp, held by three screws.

Remove the wires attached to the bulb holders, and the switch panel can be passed through the fork girders and rest on the tank.

Remove the head clip bolt and nut. This is composed of three parts, the bolt, the sleeve and the nut.

Remove the head clip from the fork column. The head clip must be forced over the end of the column to overcome the action of the fork spring.

Fork will now drop from the frame.

80. FITTING OF FORKS TO THE FRAME.

Examine the ball bearings and their races.

The races are all pressed into position and are easily removed and replaced.

The only one that may present any difficulty is the one in the head clip. A chisel type of tool is required to remove this race. The tool should be forced between the back of the race and the clip.

The clip should be removed from the fork for this operation.

If the head races have been removed from the frame, refit.

The race in the bottom of the frame head lug has oil hole drilled in it and the top is plain.

Fit the ball bearings to the top head race. (17 balls—5/16in. diameter.)

Grease the bottom head race with a thick grease.

Fit a set of ball bearings into a spare race, offer the bearings in the race, against the bottom race, press bearings home and carefully remove the spare race, and the grease will hold the bearings in position.

Fit fork column through the head lug until the end of the column is at the top of the lug.

Force the head clip into position on top of the lug.

Place a steel rod under the crown lug at the end of the column so that when the rod is lifted, the column is forced through the head lug.

Place a second rod on the top of the fork girder, resting on the head clip, so that when pressure is put on the rod, the clip is forced onto the top of the head lug.

Lift the bottom rod, press down the top one, and the end of the column is forced through the head clip.

Fit the assembly of the damper knob, rod and column nut.

Screw damper rod into the "T" piece at the bottom of the fork column and the nut to the column.

If the assembly of the damper knob, rod and column nut has been dismantled, the order of assembly is—fit the two nuts to the end of the rod with the longer threaded portion, screw the nuts to the end of the thread and lock together; fit spring and column nut; fit the damper knob to the rod and tighten down.

Fit the head clip bolt and nut. The bolt may be fitted from either side, but at the Works it is fitted from the " nearside."

Fit the bush first with the cut-away side against the column, then the bolt with the cut-away side against the column.

Fit the washer and nut. **Do not** tighten nut.

Check the forks for free movement on races.

The forks should have free movement with no end play.

Adjust by tightening or slackening the column nut.

Place the thumb of the left hand at the top of the steering column, resting on the column and the head clip, lift the forks and any play can be felt.

When the adjustment is correct, tighten the head clip bolt.

Fit the two wires to the lamp holders, the wire from the second switch terminal should be connected to main bulb holder. The other to the pilot bulb holder.

Fit panel to the back of the head lamp.

Fit handlebars, front wheel, brake and speedometer cables.

Fit the steering damper anchorage plate to the frame.

Do not strain plate. Any distortion will cause uneven action of the damper.

81. DISMANTLING OF FORKS.

Remove forks from the frame. (Para. 79.)

Hold the fork assembly in a vice. Use lead clamps on the jaws of the vice.

Place the column in the vice jaws, with the forks lying horizontal.

Remove the two rebound springs.

Remove the top offside fork link. The links on the offside of the forks have plain holes and the nearside tapped.

Remove the nuts holding the top offside link and the link can be tapped from the spindles.

Remove the knurled washers from the spindles.

Remove the nearside link complete with the spindles.

Remove the head clip from the centre spring, held by a taper lug.

Remove the bolt and the lug can be tapped from the clip.

The other end of the spring is attached to a lug on the bridge of the girder.

Do not remove this end of the spring unless the spring needs replacing.

To remove the spring, turn spring in a clockwise direction and it will screw off the lug.

Remove the bottom front spindle. Girder and the shock absorber discs are free.

Remove the bottom rear spindle.

Remove the steering damper bottom plate, held by two bolts, and the damper plates with the bottom lug are free.

82. RECONDITIONING OF FORK BEARINGS.

When the forks are dismantled and the parts examined it may be found that the forks, spindles and the bearings in the girder, head clip and the column, are worn, and oversized spindles may be necessary.

Oversize spindles are supplied with a diameter of 9/16in., i.e., 1/16in. oversize.

Before fitting the spindles, the bearings will have to be re-bored to 35/64in., leaving 1/64in. to be reamed.

When drilling care must be taken that the drill runs true and is fed at right angles to the girder. It is advisable to use a four-grooved core type of drill.

Clamp the girder to the face plate of a drilling machine, the bearing taken on the centre girder lug damper face, and drill the one side of the girder at the centre lug. Move the table, and with the girder held in the same manner, place packing piece under the bottom of the top girder lug and drill bearing. Reverse girder on face plate and drill the opposite side.

When drilling column and head clip, place lug on a spigot, entered on the opposite side of the bearing to the side to be drilled. The machine face of the lug should bear on a flat surface at right angles to the spindle. Drill one side of both lugs, change spigot for one with a diameter of 35/64in. and drill second sides.

A 9/16in. reamer ground with sufficient lead at the start should be used and passed straight through the lug to ensure that both sides of the bearing are in alignment.

The off-side bottom link will have to be opened to 9/16in. diameter hole to take the bolt type bottom front spindle.

Assembly Forks (para. 83.)

83. ASSEMBLY OF FORKS.

Fit drilled ballrace to the head clip and plain to the column.

Fit steering damper plates on to the damper lug—the bottom plate, friction disc, friction plate and friction disc.

Fit spring to girder.

Fit the fork shock absorber adjusting nut to the bottom front spindle.

Fit the fork shock absorber adjusting nut spring washer.

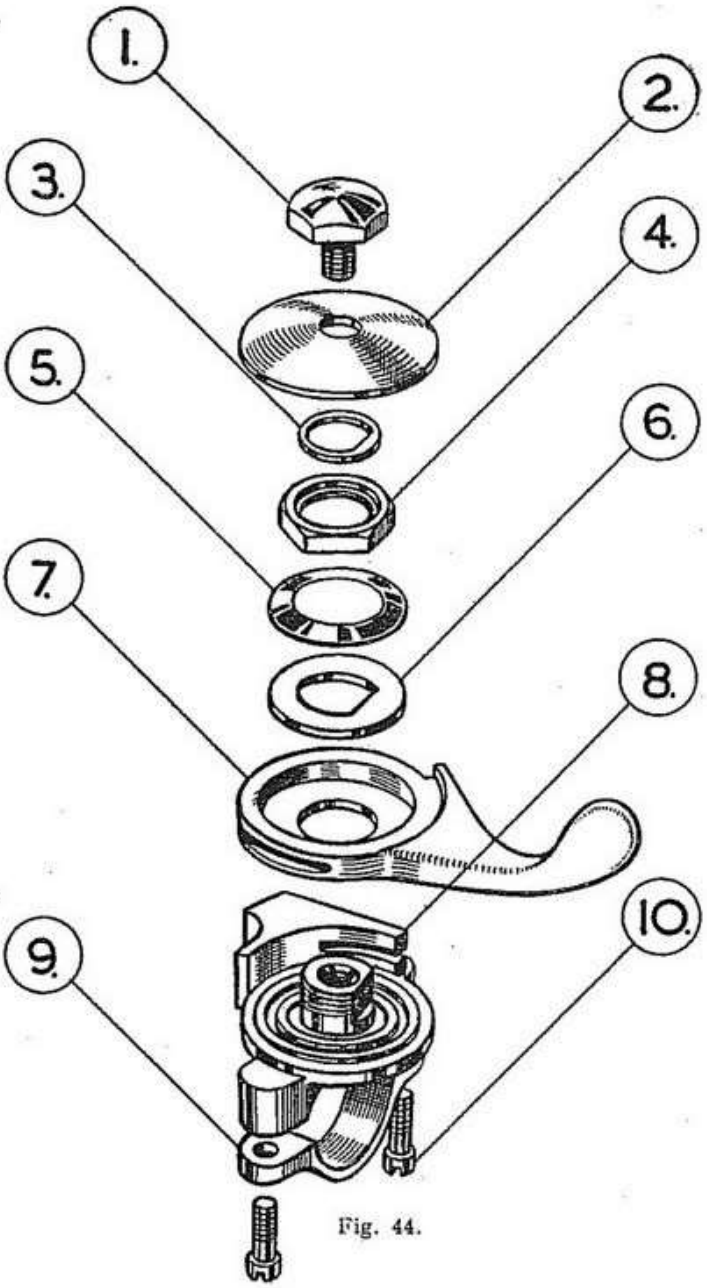


Fig. 44.

IGNITION AND AIR CONTROL LEVERS.

1. Centre Bolt.
2. Cap.
3. Small Washer with "D" hole.
4. Adjusting Nut, for tension spring.
5. Spring Tension Washer.
6. Large Washer with "D" hole.
7. Lever.
8. Body.
9. Half-clip.
10. Bolts.

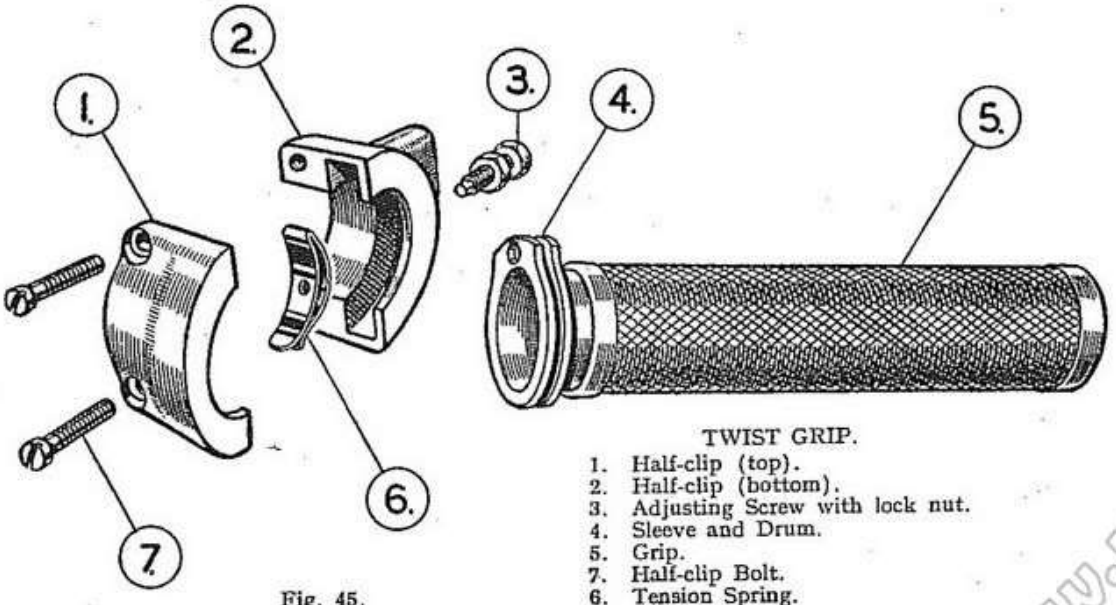


Fig. 45.

TWIST GRIP.

1. Half-clip (top).
2. Half-clip (bottom).
3. Adjusting Screw with lock nut.
4. Sleeve and Drum.
5. Grip.
7. Half-clip Bolt.
6. Tension Spring.

Fit the offside link to the spindle.

Fit the friction disc on link.

Fit the spindle into the girder.

Fit the bottom rear spindle into the near-side link.

Fit knurled washer to spindle.

Fit spindle into the fork column. When fitting the spindle to the column, hold the damper lug, with plates in position, in the column, and the spindle must pass through the lug.

Fit knurled washer to spindle.

Fit the offside bottom link, now attached to the girder, to the rear spindle (attached to the column) and fit the friction disc to the nearside link.

Fit rear spindle into offside link and front into nearside.

Fit the nuts to the bottom spindles. **DO NOT** tighten.

Fit top spindles into the nearside link. The end of the spindles should be 7/16in. through the link.

Fit knurled washers to the spindles.

Fit head clip loosely to the spring.

Fit the nearside link with the spindles to the top of the girder and the head clip.

Fit knurled washers to the spindles.

Fit offside link.

Fit nuts.

Fit the rebound springs to the top links.

Fit head clip over column.

Fit rebound springs to the bottom links.

Tighten fork spring bolt.

Adjust forks until the knurled washers can just be rotated by hand, with no side play.

Tighten all the nuts and re-check washers

HANDLEBAR FITTINGS

84. IGNITION AND AIR CONTROL LEVERS. (Fig. 44.)

The ignition and air control levers are assemblies of the following parts:

The body.
Half clip.
Two bolts.
Lever.
Plain steel washer with "D" shaped hole.
Spring tension washer.
Adjusting nut.
Small washer with "D" shaped hole.
Cap.
Centre bolt.

The large washer with the "D" shaped hole is fitted to prevent the adjusting nut moving when the lever is moved.

The small washer fitted into the adjusting nut takes the thrust when the cap and centre bolt are tightened.

Order of Assembly:

Grease both sides of the lever.

Fit lever to the body with the convex side uppermost.

Fit large washer.

Fit spring tension washer, concave side uppermost.

Fit adjusting nut, the recess uppermost.

Tighten nut to the required tension.

Fit small washer in the recess in adjusting nut.

Fit cap and centre bolt.

Tighten bolt. The bolt has no effect on the adjustment of the lever.

To remove the control cables from the lever, open the lever as far as possible, hold the outer cable, and as the lever is closed, pull the outer cable from the lever body.

Remove nipple from the lever.

To fit the cables, fit nipple into the lever, close the lever, pull the outer cable away from the lever and fit the cable to the lever body.

85. CLUTCH AND FRONT BRAKE CONTROL LEVERS.

The controls are assemblies of the following parts:—

The body.
Half clip.
Two bolts.
The lever.
Pivot bolt and nut.

When the levers are assembled in the Works, the pivot bolts are fitted from the outside of the lever.

The pivot bolts have shoulders machined on them, allowing the nuts on the bolts to be tightened while allowing clearance for easy movement of the lever.

To remove the clutch cable from the lever, turn the clutch operating arm on the clutch worm by other means than the cable, and the nipple can be removed from the arm, and inner and outer cables can be removed from the lever.

To remove the brake cable from the lever, remove the split cotter and pin holding the "U" clip to the brake arm, and the inner and outer cables can be removed from the lever.

Re-assemble in the reverse order.

86. EXHAUST LIFTER LEVER.

The arrangement of the exhaust lifter lever is similar to the clutch and brake, only smaller and has no half clip, the lever being fitted to the handlebar before the dummy twist grip and the clutch lever.

To remove the cables from the lever, turn the operating arm on the exhaust lifter by other means than the cable and remove the inner cable from the arm. Remove the nipple on the other end of the cable from the lever and the nipple will pass through the large hole in the lever body.

When re-assembling, the cables must be fitted to the lever first.

87. TWIST GRIP. (Fig. 45.)

The twist grip is an assembly of the following parts:—

A sleeve.
A grip.
Two half clips.
Two fixing bolts.
One adjusting screw and lock nut.
One adjusting spring.

To assemble the twist grip, grease the portion of the handlebar where the grip works.

Fit the sleeve to the bar.

Grease the drum on the sleeve.

Fit spring and adjuster bolt and nut to the bottom half clip.

Thread the cable through the hole in the half clip.

Fit the nipple to the drum on the sleeve.

(Sufficient length of cable can be obtained by lifting the throttle slide and holding in position by piece of soft wood placed in the air intake.)

Fit the top half clip.

Adjust the tightness of the grip with the adjusting screw and lock in the desired position.

Dismantle in the reverse order.

ASSEMBLY OF MACHINE

88. A SUGGESTED SEQUENCE OF ASSEMBLY OF A COMPLETE MACHINE.

Fit ball races to the frame.
Fit all studs to frame.
Fit rear wheel adjusters to frame.
Fit rear brake pedal pivot bolt.
Fit front fork stop studs.
Fit grease nipple to frame head lug.
Fit gear box and engine plates.
Fit rear stand and spring.
Fit front of saddle to frame.
Fit tool box.
Fit engine.
Fit magdyno and adjust the chain
Fit chain case, inner portion.
Fit clutch, engine sprocket and chain.
Fit chain case, outer portion.
Fit footrests.
Fit oil tank.
Assemble rear guard, pillion seat and carrier.
Fit assembly of rear guard, etc., less rear portion.
Fit saddle springs to frame.
Fit oil pipes.
Fit exhaust pipe and silencer.
Fit rear wheel, chain and chain guard.
Fit prop stand and pillion footrests.
Fit front fork and guard assembly.
Fit rear brake pedal.
Fit handlebars.
Fit speedometer.
Fit front wheel.
Fit carburetter and cables.
Fit rear guard, rear portion and pannier bag carriers.
Solder all cables and fit to levers.

Track up front and rear wheel and tighten rear wheel spindle nuts.

Fit head lamp and cables.

Time the magdyno.

Check all nuts and bolts.

89. LIST OF SPECIAL TOOLS TO AID COMPLETE DISMANTLING AND RE-ASSEMBLY.

Magdyno chain sprocket extractor.

Withdrawal tool to withdraw clutch from main axle.

'C' spanner for compressing clutch shock absorber rubbers.

Jig to hold clutch while compressing rubbers.

Valve seat cutter with arbor.

Gudgeon pin drift.

Valve spring compressor.

Valve guide drift.

Engine sprocket extractor.

Crankpin nut box spanner with tommy bar.

Rear stand spring fitting tool.

Peg spanner for hub bearing lock ring.

Box spanner for gear box sprocket nut.

Brake shoe circlip fitting tool.

Box spanner for oil pump driving worm and timing pinion nut.

AMAL CARBURETTER

90. DISMANTLING OF THE CARBURETTER.

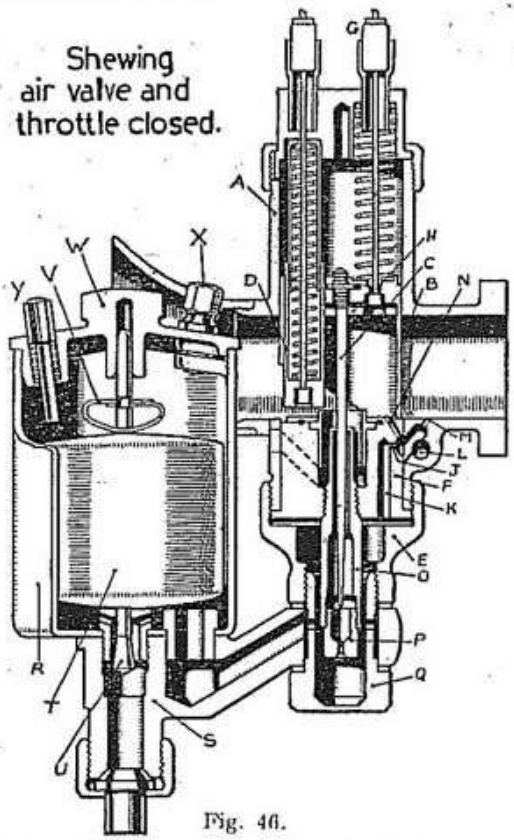


Fig. 46.

A. Mixture Chamber.
B. Throttle Valve.
C. Jet Needle and Clip.
D. Air Valve.
E. Mixing Chamber Union Nut.
F. Jet Block.
G. Cable Adjusters.
H. Jet Block Barrel.
J. Pilot Jet.
K. Passage to Pilot.
L. Pilot Air Passage.
M. Pilot Outlet.
N. Pilot By-pass.
O. Needle Jet.
P. Main Jet.
Q. Float Chamber Holding Bolt.
R. Float Chamber.
S. Needle Seating.
T. Float.
U. Float Needle.
V. Float Spring Clip.
W. Float Chamber Cover.
X. Float Chamber Lock Screw.
Y. Tickler.

The carburetter can be stripped while in position on the machine, but for examination it is advisable to remove it.

Remove the carburetter. (Para. 11.)

Remove the slides and needle. The slides and needle can be examined without removing the cables.

The throttle slide is the one that is drum-shaped and has the jet needle attached to it.

To remove the throttle slide from the cable, compress the spring, allowing the nipple on the end of the cable to leave the hole in which it is fitted, and on releasing the spring allow the nipple to pass through the larger hole, and the slide is free from the cable.

To remove the air slide, compress spring as before and release nipple from the end of the slide, and the slide is free.

To remove the needle from the throttle slide, remove the spring clip at the top of the slide. The needle is fitted into the middle notch.

The lower the needle the weaker the mixture.

Remove the float chamber. It is held by a bolt at the base of the mixing chamber. There are two fibre washers on this bolt, one under the head and one between the float and mixing chambers.

To remove the float and needle.

Release the float chamber cap locking screw and remove the cap.

Compress the spring clip on the top of the float and lift float from the chamber.

Remove the bolt at the base of the float chamber, and the needle will fall out.

On the bolt at the base of the float chamber two fibre washers are fitted in the same order as on the bolt at the base of the mixing chamber.

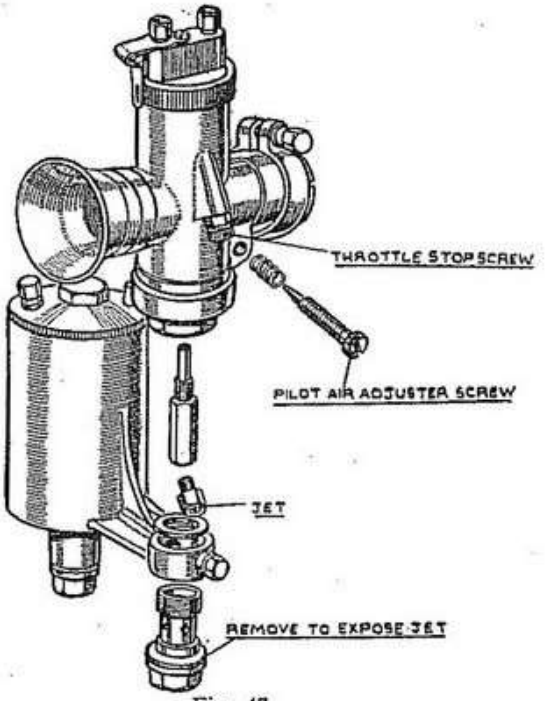


Fig. 47.

Remove the jet. The main jet is now exposed and can be removed from the needle jet.

Remove the needle jet from the jet block.

Remove the jet block by removing the union nut at the base of the mixing chamber.

91. RE-ASSEMBLY OF THE CARBURETTER.

Fit needle jet to the jet block.

Fit main jet to needle jet.

Fit jet block to mixing chamber, located by groove and pin.

Fit mixing chamber union nut and fibre washer.

Fit float to the float chamber.

Fit float needle through the base of the chamber and the centre of the float, compress the spring clip on the top of the float and allow the needle to enter the clip.

Release the clip and the clip will drop into the groove in the needle.

Fit the chamber top and lock with the locking bolt.

Fit the chamber to the mixing chamber. (Two fibre washers.)

Fit the bolt holding the union to the base of the float chamber. (Two fibre washers.)

Fit needle to throttle slide in middle position.

Thread cables through the mixing chamber, the throttle cable to be nearer to the cylinder barrel. The throttle cable has the shorter length of inner cable protruding from the outer cable.

Fit return springs to cables, the larger to the throttle.

Fit slides to cables.

Fit air slide to throttle slide.

Fit slides to the mixing chamber, carefully entering the needle into the needle jet. DO NOT FORCE.

Fit mixing chamber top.

Fit carburetter upright on induction stub.

TYRES

92. TYRES.

Components:—

One cover.
One inner tube.
One wheel.
One rubber rim band.
One security bolt, Type W.M.2-19.

Tools required:—

Two tyre levers (Motor cycle pattern).
One 5/16in. spanner, Whitworth.

Removal Instructions:—

Deflate tube.

Loosen nut on the security bolt, and push bolt into the inside of the cover.

Push the bead of the cover into the well of the rim, diametrically opposite the valve, and proceed to remove the cover, commencing at the valve.

Fitting Instructions:—

Lubricate with french chalk, cover beads, tube, security bolt and the inside of the rim.

Fit one side of the cover to the rim.

Fit security bolt in position.

Fit tube in position, and slightly inflate.

Fit remaining side of the cover to the rim, commencing diametrically opposite the valve, and working round until the security bolt is reached.

The portion at the security bolt should be gently levered over the rim flange but before this, push the security bolt well into the cover and make sure that the tube is resting on the pad of the security bolt and not over-lapping the sides.

Continue fitting the cover until the only portion not fitted is near the valve.

Fit cover at the valve position.

Inflate the tube to the scheduled pressure slowly, making sure that the cover sits on the rim correctly at the bolt positions.

This can be done by pushing the bead of the cover into the well of the rim, diametrically opposite the bolt.

Bounce the wheel at the points where the security bolt is fitted and tighten the security bolt and valve nuts with spanner.

WHEEL BUILDING

93. WHEEL BUILDING.

The wheels are laced 1 over 3 with a right-hand offset (a straight-edge placed across the end of the hub in which the single row bearing is fitted should give a measurement of 1⅜in. from straight-edge to the edge of the rim).

Building Operations:—

1st Operation. Fit the 20 long spokes to the single row bearing side of the hub; the heads of the spokes fitting alternately inside and outside of the hub flange.

2nd Operation. Fit 10 short spokes to the opposite side of the hub to alternate holes with the heads fitting inside the hub flange.

3rd Operation. Fit the rim.

4th Operation. Fit the 10 remaining spokes to the rim and hub.

5th Operation. True wheel and tighten spokes.

ELECTRICAL SECTION

IGNITION

" MAGDYNO " Type MO1.
Routine Maintenance.

94. LUBRICATION.

The cam is lubricated by a wick, contained in the contact breaker base, which must be given a few drops of thin machine oil about every 2,500 miles.

To get at the wick, remove the spring arm carrying the moving contact and withdraw the screw carrying the wick. (Fig. 48.)

At the same time remove the tappet which operates the contact breaker spring and lightly smear with thin machine oil.

When replacing the contact breaker components see that the small backing spring is fitted immediately under the securing screw and spring washer, and that the bent portion faces outwards.

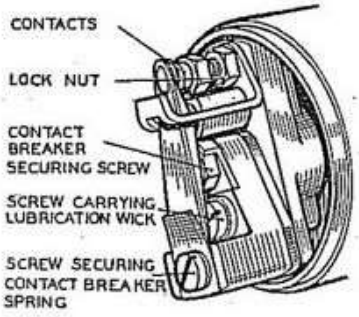


Fig. 48.

95. ADJUSTMENT.

After dismantling the contact breaker in order to lubricate, the contact setting should be checked.

Turn the engine until the contacts are fully opened and insert the gauge provided, .010 inch—.012 inch thickness, 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.

Tighten the lock nut after making the adjustment.

96. TESTING IN POSITION TO LOCATE CAUSE OF MISFIRING OR FAILURE OF IGNITION.

Disconnect the cable from the sparking plug and hold the end about $\frac{1}{8}$ inch from some part of the cylinder block while the engine is turning over.

If the sparking is strong and regular, the fault lies in the sparking plug, which must be removed for examination and if necessary cleaned and adjusted.

Next examine the high tension cable. After long service, it may have become cracked or perished and the magneto may be sparking through the insulation to a metal part of the engine or frame. Correct by replacing the cable.

If the performance of the magneto is still unsatisfactory, the contact breaker may require cleaning or adjustment (see paragraph 94), or there may be an internal fault in the magneto.

The following procedure should, therefore, be adopted.

97. CONTACT BREAKER—CLEANING.

Remove the contact breaker cover and examine the contacts.

If they are dirty, they must be cleaned by polishing with a very fiine 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 in paragraph 94.

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

Adjust as described in paragraph 95.

98. H.T. CABLE.

Should be 7 m/m. in diameter.

Other sizes such as 5 m/m. and 9 m/m. will not fit in the immobilizer and suppressor.

The cable must be replaced if the rubber insulation has perished or shows cracks and becomes brittle.

To fit the new cable to the pick-up terminal, thread the knurled moulded nut over the lead, bare the cable for about ¼ 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.

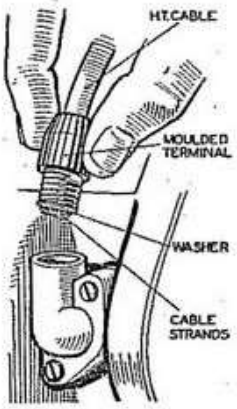


Fig. 49.

99. 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.

100. SUPPRESSOR AND IMMOBILIZER.

Check for cracks in the insulation and for positive contacts of the high tension cable.

Always disconect lead at spark plug end before unscrewing immobilizers.

101. SPARKING PLUG.

Clean the sparking plug by removing carbon or oil from the electrodes with a wire brush or dismantle the plug and wash in petrol.

Adjust the electrodes to give a gap setting of .020 inch—.025 inch.

102. SLIPPING CLUTCH.

Description:—

A shock absorbing drive is incorporated in the larger of the two gears which take the drive from the magneto shaft to the dynamo.

This considerably relieves the peak loading on the teeth of the driving gear, and gives a far longer life.

The drive is taken from the gear centre, which is keyed to the magneto shaft, through the fabric gear which is held against the gear centre under the pressure of a star-shaped spring, to the pinion on the dynamo shaft.

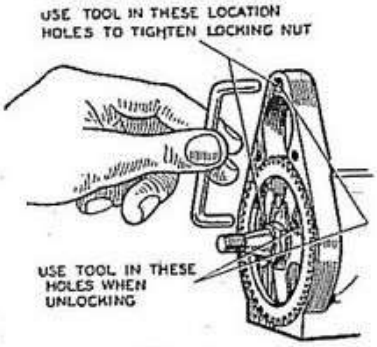


Fig. 51.

The effect of a violent overload is to cause the fabric gear to slip relative to the gear centre, and so prevents shock from being transmitted to the fabric gear.

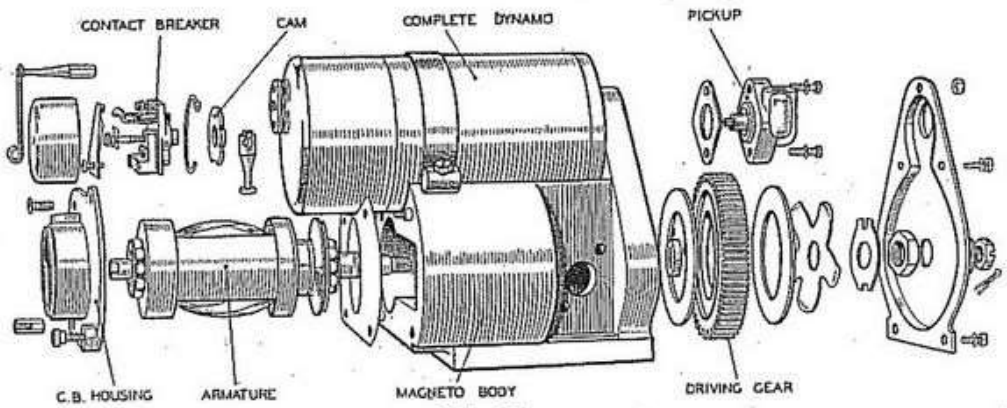


Fig. 50.

103. DISMANTLING.

Remove the dynamo and take off the driving end cover by unscrewing the four countersunk head screws.

To dismantle the slipping clutch it will be necessary to use a jig to hold the larger gear whilst the securing nut is being undone. (Fig. 51.)

This consists simply of a length of ¼ inch diameter mild steel rod bent to a flat " U," the ends being cut short with their centres 3-3/16 inch 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 usually goes.

The 7/16 inch box spanner can then be used on the central nut which unscrews in the normal left-hand direction.

Note that the tab of the locking washer must be bent back first.

Remove the locking washer, clutch spring, friction washer, driving gear and gear centre.

104. ARMATURE—REMOVING.

Take off the contact breaker cover, remove the spring arm carrying the contact.

Unscrew the bolt securing the contact breaker and draw the contact breaker off the shaft.

Spring the wire ring, securing the cam, out of its location in the contact breaker housing and remove the cam.

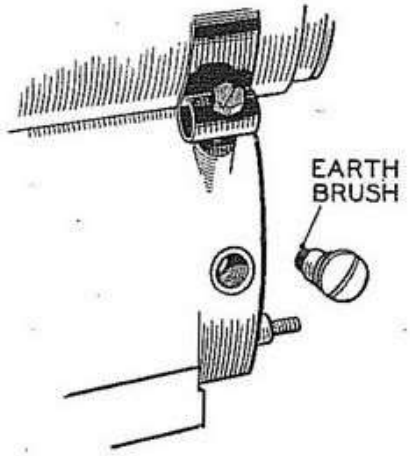


Fig. 52.

Unscrew the cable stop of the timing control and remove the control mechanism.

Remove the pick-up holder and the small earthing brush which will be found on the side of the " Magdyno." (Fig. 52.)

Unscrew the screw, earthing terminal and pillar from the contact breaker end plate, and remove the plate from the Magdyno.

The armature can then be drawn out of the machine.

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.

Do not allow the magneto body to become in close contact with any iron filings, as they may become attracted to the magnet and cause the armature to bind.

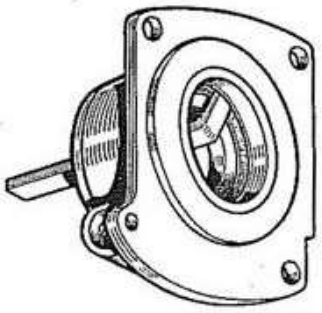


Fig. 53.

The ball races can be removed from the armature shaft by means of an extractor, while a tool of the type shown should be used to remove the other journals. (Fig. 53.)

105. TESTING.

If no test apparatus is available, a rough check of the armature windings can be made by means of a two volt battery and an ammeter.

Screw the contact breaker retaining screw into the end of the armature shaft.

Connect one terminal of the battery to the screw with the ammeter in series.

Connect the other battery terminals to the metal body of the armature.

The ammeter will then record the current taken by the primary winding—this should be approximately 4 amperes.

To check the secondary winding of the armature, connect a piece of H.T. cable to the brass insert of the slip ring and hold the other a little way 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 spark should occur between the H.T. cable and the core.

No spark at these points indicates a fault either in the armature windings or in the condenser, and a replacement armature must be fitted.

106. RE-ASSEMBLING.

Wash the bearings in petrol.

Dry thoroughly and repack with high melting point grease.

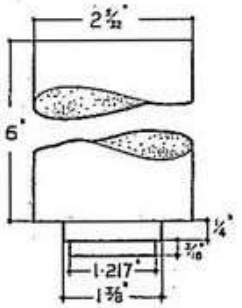


Fig. 54.

Fit ball races on armature shaft by means of a hand press, and use a mandrel of the type illustrated to fit the outer journals. (Fig. 54.)

The serrated fibre washer must be fitted behind the journal to prevent any electric current from damaging the bearing.

Place the armature in the body of the magneto and refit the contact breaker and plate, taking care that the end shims are in position, and tighten the securing screws.

Check the armature for end play.

The armature should revolve freely when turned by hand, but no end play should be felt.

Adjust by adding or removing shims under the contact breaker end plate until the adjustment is correct.

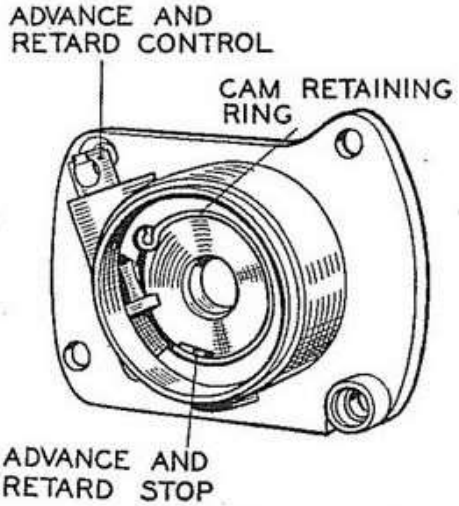


Fig. 55.

Fit the timing control and secure by tightening the cable stop.

Locate the cam in the contact breaker housing with the timing control plunger in its correct slot, and secure by springing the circlip into its location in the housing. (Fig. 55.)

(Note that the cam is fitted with is flat side towards the armature.)

Fit the contact breaker in position on the location at the end of the shaft, after making sure that the tappet is free and is located correctly in its guides. (Fig. 56.)

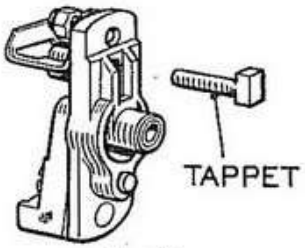


Fig. 56.

Place the contact breaker securing screw and locking plate in position, tighten and lock by bending up the tags of the locking plate.

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

Check the contact breaker gap, and if necessary adjust to correct setting.

107. RE-ASSEMBLING AND TESTING SLIPPING CLUTCH. (Fig. 57.)

Key the gear centre onto the spindle.

Replace the driving gear, friction washer, clutch spring, locking washer, and secure by tightening the fixing nut.

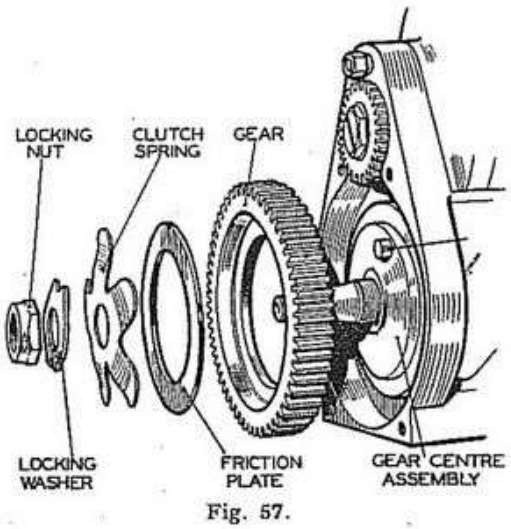


Fig. 57.

The " U " shaped jig must be used to prevent rotation of the shaft while tightening the nut.

After assembling, the setting of the clutch must be checked.

This can easily be done by locking the driving gear and applying a steady load on the driving spindle.

The clutch should slip with a load of 10lbs. feet or more, i.e., a 10lb. pull measured on a spring balance via a spanner one foot long.

The minimum loading is 4lb. feet.

After setting, by slackening or tightening the securing nut, prevent further movement by bending up the tab of the lock washer.

Refit the dynamo and pack the gears with high melting point grease.

Secure the drive end cover in position with the gasket correctly located.

Replace the pick-up, first checking that the brush moves freely, and that the cork gasket is free from cracks.

Refit the earthing brush.

CHARGING

Magdyno Type MO1. Dynamo Type E3HM.

108. TESTING IN POSITION.

Check that the dynamo and regulator unit are connected correctly. The dynamo terminal 'D' should be connected to the regulator unit terminal 'D' and dynamo terminal 'F' to regulator unit terminal 'F.'

Remove the cables from the dynamo terminal 'D' and 'F,' and connect the two terminals with a short length of wire.

Start the engine and set to run at normal idling speed.

Connect the positive lead of a moving coil voltmeter calibrated 0—10 volts, to one of the dynamo terminals, and connect the negative lead to a good earthing point on the dynamo yoke or engine.

Gradually increase the engine speed, when the voltmeter reading should rise rapidly and without fluctuation.

Do not allow the voltmeter reading to rise above 12 volts.

Do not race the engine in an attempt to increase the voltage.

It is sufficient to run the dynamo up to a speed of 1,000 r.p.m.

If there is no reading, check the brush gear.

If there is a low reading of approximately ½ volt, the field winding may be at fault.

If there is a reading of approximately 1½ to 2 volts, the armature winding may be at fault.

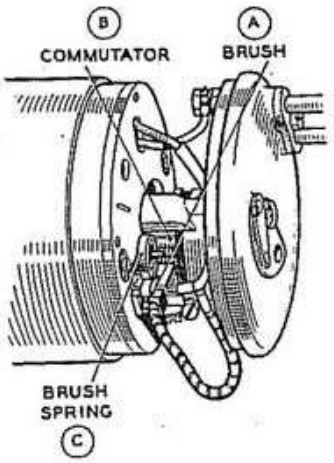


Fig. 58.

Remove the dynamo cover band and examine the brushes and commutator. (Fig. 58.)

Hold back each of the brush springs and move the brush by pulling gently on its flexible connector.

If the movement is sluggish, remove the brush from its holder and ease the sides by lightly polishing on a smooth file.

Always replace brushes in their original positions.

If the brushes are worn so that they do not bear on the commutator, or if the brush flexible is exposed on the running face, new brushes must be fitted.

If the commutator is blackened or dirty, clean it by holding a petrol-moistened cloth against it while the engine is turned slowly by hand.

Re-test the dynamo.

If there is still no reading on the voltmeter, there is an internal fault and the complete unit, if a spare is available, should be replaced. (Para. 109.)

If the dynamo is in good order, restore the original connections to the dynamo.

Connect regulator unit terminal 'D' to dynamo terminal 'D,' and regulator terminal 'F' to dynamo terminal 'F.'

Remove the lead from the 'D' terminal on the regulator unit and connect the voltmeter between this cable and an earthing point on the engine.

Run the engine as before.

The reading should be the same as that measured directly at the dynamo.

No reading indicates a break in the cable to the dynamo.

If the reading is correct, test the regulator unit. (Para. 117.)

109. DYNAMO—TO REMOVE AND REPLACE.

Take off the connections from the dynamo terminals.

Unscrew the hexagon headed nut from the driving end cover of the Magdyno.

Slacken the two screws securing the band clip, and draw the dynamo out of its mounting.

When replacing, slide the dynamo through the band clip so that fixing screw passes through its hole in the end cover and the gears mesh correctly.

Tighten the end nut and the band clip fixing screws and remake the connections to the dynamo terminals.

110. DYNAMO—DISMANTLING. (Fig. 59.)

Bend back the tag on the washer locking the screw securing the driving gear and remove the screw.

Withdraw the gear from the dynamo shaft by carefully levering it off, or by means of an extractor.

Remove the key from the shaft.

Remove the cover band, hold back the brush spring and lift the brushes from their holders.

Take out the screw, with spring washer, from the centre of the black moulded end cap.

Draw the cap away from the end bracket, take off nuts and spring washers and lift the connections off the terminals.

Unscrew and remove from the driving end bracket, the two through bolts securing the driving end bracket and commutator end bracket to the dynamo yoke.

Hold the nuts at the commutator end while unscrewing the bolts, and take care not to lose the nuts.

Draw the driving end bracket complete with armature out of the yoke.

Unscrew the nut from the drive end of the dynamo shaft, and remove the armature from the end bracket using a hide or wooden mallet.

Take out the screw securing the green field coil lead with the yellow sleeve to commutator end bracket and remove the end bracket, withdrawing the connectors through the slot in the insulating plate.

111. DYNAMO BRUSHES.

Test if brushes are sticking.

Clean with petrol, and if necessary ease the sides by lightly polishing on a smooth file.

Replace brushes in their original positions.

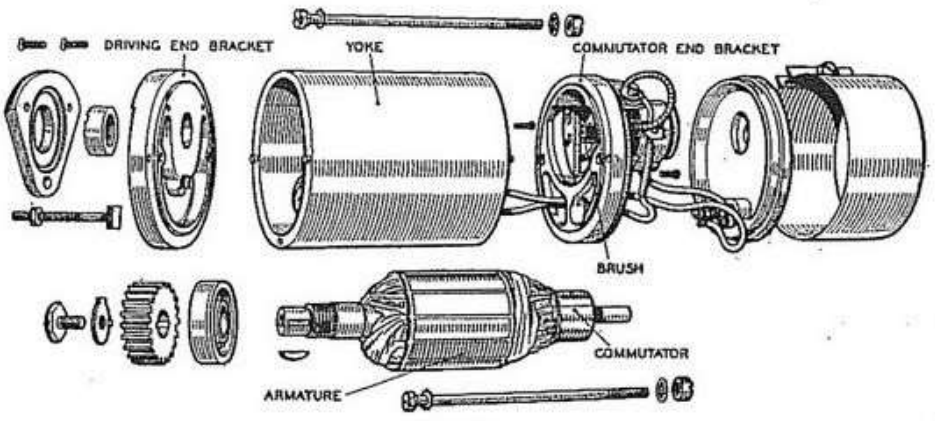


Fig. 59.

Test the brush springs with a spring scale if available.

The correct tension is 10—15 ozs. (Fig. 60.)

Fit a new spring if the tension is low.

If the brushes are worn so that the flexible is exposed on the running face, new brushes must be fitted.

Brushes are pre-formed so that bedding to the commutator is unnecessary.

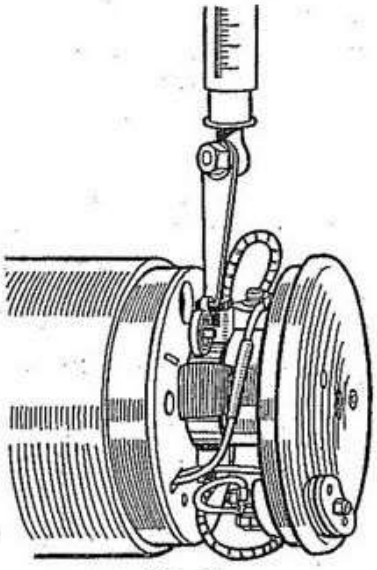


Fig. 60.

Dynamo-Commutator.

A commutator in good condition will be smooth and free from pits or burned spots.

Clean the commutator with a petrol-moistened cloth.

If this is ineffective, carefully polish with a strip of very fine glass paper while rotating the armature.

To remedy a badly worn commutator, mount the armature with or without the drive end bracket in a lathe, rotate at high speed and take a light cut with a very sharp tool. (Fig. 61.)

Do not remove more metal than is necessary.

Polish the commutator with very fine glass paper.

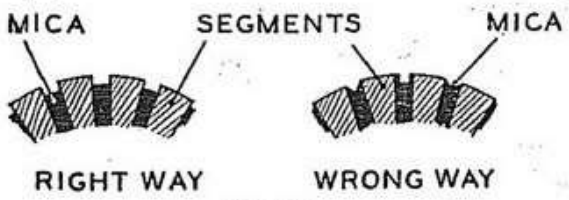


Fig. 61.

Undercut the mica insulation between the segments to a depth of 1/32 inch with a hacksaw blade ground down until it is only slightly thicker than the mica.

112. DYNAMO—FIELD COIL.

Test the field coil by connecting it in series with a 6-volt battery and a 6-volt, 3-watt. bulb.

If the field coil is satisfactory, the bulb should light up, but its brilliance should be somewhat less than when connected direct to the battery.

Failure of the bulb to light indicates an open circuit in the field winding, while if the bulb lights up with full brilliance, the field coil is probably either shorted or earthed to the pole shoe or dynamo yoke.

In either case, the complete dynamo assembly must be returned to a Depot and a replacement fitted.

If, however, a pole shoe expander and a wheel operated screwdriver are available, it is possible to replace the field coil.

A pole shoe expander is necessary to ensure that there will not be any airgap between the pole shoe and the inner face of the yoke.

Replace the field coils as follows:—

Unscrew the pole shoe retaining screw by means of the wheel operated screwdriver.

Draw the pole shoe and field coil out of the yoke and lift off the coil. Fit the new field coil over the pole shoe and place it in position inside the yoke.

Take care to ensure that the taping of the field coil is not trapped between the pole shoe and the yoke.

Locate the pole shoe and field coil by lightly tightening the fixing screw.

Insert the pole shoe expander, open it to its fullest extent and tighten the screw.

Remove the expander and give the screw a final tightening with the wheel operated screwdriver.

Tap some of the metal of the yoke into the slot in the screw to lock it in position.

113. DYNAMO—ARMATURE.

The testing of the armature winding requires the use of a voltdrop test or a growler.

If these are not available, the armature should be checked by substitution.

No attempt should be made to machine the armature core, or to true a distorted armature shaft.

114. DYNAMO—BEARINGS.

Bearings which are worn to such an extent that they will allow approximately .015 inch total side movement of the armature shaft must be replaced.

To replace the bearing bush at the commutator end, proceed as follows:—

Press the bearing bush out of the commutator end bracket and remove the felt ring.

Press the new bearing bush into the end bracket, using a shouldered mandrel of the same diameter as the shaft which is to fit in the bearing.

Note. Before fitting the new bearing bush it should be allowed to stand for 24 hours immersed for about ⅞ths of its length in thin engine oil.

The bush should be pressed in until it is flush with the face of the end bracket.

Fit the felt ring in the space between the bearing and the wall of the bearing housing.

The ball bearing at the driving end is replaced as follows:—

Take out the two screws and the long threaded bolt securing the bearing retaining plate, and remove the plate.

Press the bearing out of the end bracket, using a metal drift locating on the inner journal of the bearing.

Wipe out the bearing housing and pack the new bearing with H.M.P. grease.

Position the bearing in its housing and press it squarely home, applying pressure on the outer journal of the bearing.

115. DYNAMO—REASSEMBLY.

In the main, the reassembly of the dynamo is a reversal of the operations described in Paragraph 110, bearing in mind the following points:—

The field coil lead fitted with the short length of yellow tubing must be secure together with eyelet of the negative brush to the commutator end bracket by means of the screw provided.

The second field coil lead must be connected to terminal 'F' on the moulded end cap.

The lead coloured white from the terminal on the positive brush box must be connected to terminal 'D' on the moulded end cap.

116. REGULATOR UNIT TYPE MCR1.

This unit houses the dynamo voltage regulator unit and the cut-out.

Both units are accurately set and the cover should be removed for cleaning and adjustment only in the event of trouble with the charging circuit being experienced.

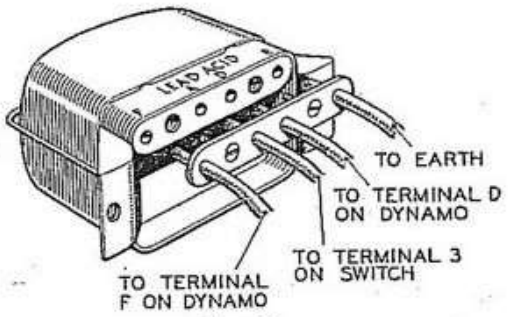


Fig. 62.

117. REGULATOR UNIT—TESTING IN POSITION.

Before checking the regulator unit make sure that the wiring between the regulator and the battery is in order. (Fig. 62.)

To do this, disconnect the wire from the 'A' terminal of the regulator unit, and connect the lead from the positive terminal of the voltmeter to the end of the wire.

If a voltmeter reading is given, the wiring is in order and the regulator should be examined.

If there is no reading examine the wiring for broken cables or bad connections.

Remove the cable from the terminal on the regulator marked 'A.'

Connect the positive terminal of the voltmeter to the 'D' terminal on the regulator, and connect the other lead of the voltmeter to an earthing point on the engine.

Start the engine and slowly increase the speed until the voltmeter needle "flicks" and then steadies. This should occur at a voltmeter reading between the limits given for the particular temperature of the regulator.

Atmospheric Temperature.	Regulator Setting.
30° F.	7.9—8.3 volts.
60° F.	7.8—8.2 volts.
90° F.	7.7—8.1 volts.

If the voltage at which the reading becomes steady is outside these limits, the regulator must be adjusted.

Shut off the engine, release the locknut on the regulator adjusting screw and turn the screw in a clockwise direction to raise the setting, or in an anti-clockwise direction to lower the setting.

Turn the screw a fraction of a turn at a time and then tighten the locknut.

When adjusting, do not run the engine up to more than half-throttle, as while the dynamo is an open circuit, it will build up to a high voltage if run at a high speed and so a false voltmeter reading would be obtained.

118. REGULATOR—CLEANING THE CONTACTS. (Fig. 63.)

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 to permit the fixed contact to be swung outwards.

The contacts can then be polished with fine emerycloth.

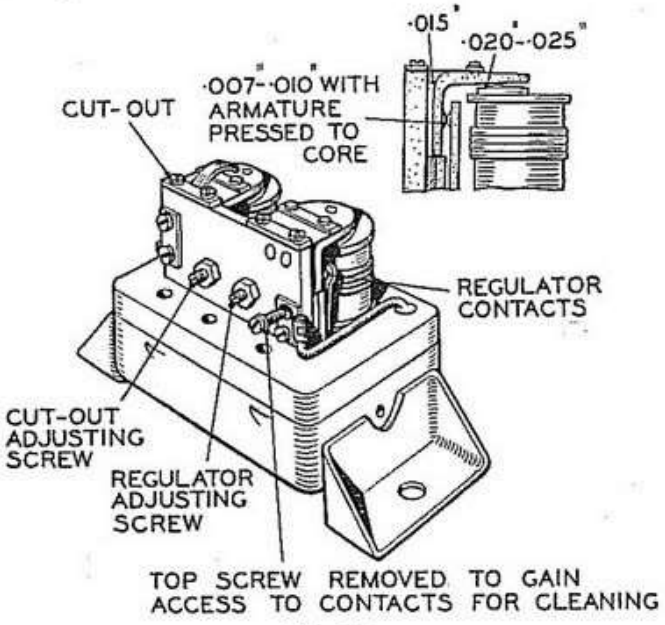


Fig. 63.

119. REGULATOR—MECHANICAL SETTING.

The moving contact of the regulator is accurately set, and should not be removed.

If, however, it does become necessary to reset the contacts, proceed as follows:—

Insert a .015 inch feeler gauge between the back of the fixed contact and the regulator frame.

Insert .020 inch—.025 inch feeler gauge between top of the bobbin core and the underside of the moveable armature. (Not under the stop rivet.)

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

Adjust the gap between the regulator contacts when the armature is pressed down on the bobbin to between .007 inch and .010 inch.

This is done by inserting or removing shims at the back of the fixed contact.

Finally check, and if necessary, reset the electrical adjustment of the regulator.

120. CUT-OUT.

If the regulator setting is within the correct limits, but the battery is still not receiving current from the dynamo, the cut-out may be out of adjustment, or there may be an open circuit in the wiring of the voltage regulator unit.

Remove the voltmeter lead from the 'D' terminal of the regulator unit and connect it to terminal 'A.'

Run the engine as before: the reading on the voltmeter should be the same as that obtained when the voltmeer was connected to terminal 'D.'

If there is no reading, the setting of the cut-out may be badly out of adjustment, and the contacts are not closing.

To check the voltage at which the cut-out operates, the voltmeter should be connected between the 'D' terminal and earth.

Slacken the locknut on the cut-out adjustment screw and turn the screw in a anti-clockwise direction until the cut-out contacts are seen to close.

Check the voltage at which the cut-out operates, and if necessary adjust by turning the screw in a clockwise direction to raise the setting or anti-clockwise direction to lower it.

Set the cut-out so that it operates at 6.2—6.6 volts.

Tighten the locknut after making the adjustment.

121. AMMETER TYPE CZ27.

Ammeter—Testing in Position.

Take out the three screws securing the panel on the back of the headlamp and lift the panel out of the headlamp.

Check the voltage, with the engine stationary, between each terminal of the ammeter and earth.

Both readings should be the same.

If there is a reading at terminal 'B,' but not at terminal 'A,' there is a broken connection in the ammeter and a replacement must be fitted.

Unscrew the ammeter terminal nuts and lift off the cable eyelets.

Bend back the four metal tags securing the ammeter and remove it from the panel.

The procedure must be reversed when fitting the replacement ammeter.

122. BATTERY, TYPE PUW7E.

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.

Battery—Topping-up.

About once a month, remove the battery lid, unscrew the filler caps and 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 a hydrometer.

Checking Battery condition.

The state of charge of the battery should be examined by taking hydrometer readings of the specific gravity of the acid in the cells.

The specific gravity readings and their indications are as follows:—

1.280—1.300. Battery fully 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° F.

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.

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 remain 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 discharged 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.

123. HEADLAMP, TYPE DU42.

Removing Lamp Front and Reflector. (Fig. 64.)

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.

Setting and Focussing.

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

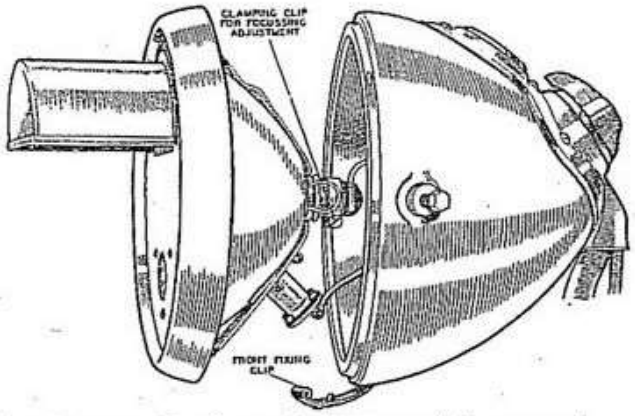


Fig. 64. Headlamp—Reflector partially removed.

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 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 lighting is obtained and finally tighten the clamping screw.

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.

The second filament is for use as a spare.

To bring it into service, remove the bulb, turn it through 180° and refit.

Replace the bulb at the first opportunity.

124. TAIL LAMP, TYPE L-WD-MCTI. (Fig. 65.)

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

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.

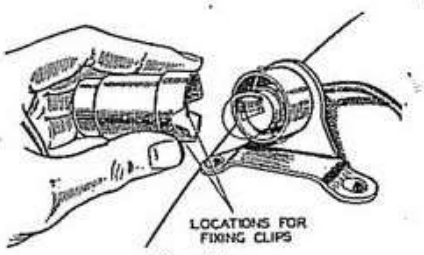


Fig. 65.

125. 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 1 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.

126. LIGHTING SWITCH, TYPE RS39.

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 the cables are identified by means of coloured sleevings.

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 $\frac{3}{8}$ inch, twist the wire strands together and turn back about $\frac{1}{8}$ inch 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.

127. MODIFIED HEADLAMP.

Modified lamp differs from the type described in paragraph 126 in that the ammeter is omitted and the main lighting switch is screwed from the lamp and mounted on a separate bracket.

The lamp is fitted with a push operated switch by means of which the rider can change from the main bulb to the pilot bulb or vice versa.

The method of removing the front and reflector and the setting of the focussing mirror is described in paragraph 123.

128. NEW TYPE LIGHTING SWITCH.

Main lighting switch type U.39-L.15.

The switch has four positions as follows:—

Test.
Off.
T.—Tail lamp ON.
H.—Tail lamp and Headlamp ON.

The test position is provided to enable the driver to check that the dynamo is functioning correctly. In this position the tail lamp is connected directly to the "D" terminal on the regulator unit.

To check the dynamo performance, start the engine and allow it to run at a fairly fast idling speed and move the switch to the "Test" position. If the dynamo is operating correctly, the tail lamp should light up brightly. As a further check of the charging system, switch on the headlamp with the engine stopped and after two or three minutes start the engine and partly open the throttle. An indication that the charging system is satisfactory is given if the brightness of the lamp increases.

The switch terminals are accessible when the moulded cover, which is secured by three nuts, is moved back along the cables.

129 CHANGE-OVER SWITCH.

A single lead connects the main lighting switch to the change-over switch and two cables connect the change-over switch to the main and pilot bulb holders.

To remove the switch, proceed as follows:—

Take out the three screws securing the panel fitted at the back of the lamp and withdraw panel. Slacken the three screws on the switch terminals and lift out the cables. Hold the switch body and unscrew the bezel ring on the outside of the switch and withdraw switch.

After replacing the switch, connect the cable fitted with the blue sleeving to the single terminal on the one side of the switch plate and connect the two cables from the bulb holders to the other two terminals.

130. HORN, TYPE HF.1235.

Electric horns are adjusted to give their best performance before leaving the works and will give a long period of service without any attention.

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, the horn may require adjustment.

131. METHOD OF ADJUSTING. (Fig. 66.)

The adjustment of a horn does not alter the characteristics of the note, but takes up wear of vibrating parts which, if not corrected, results in loss of power or roughness of tone.

If the horn is used repeatedly when badly out of adjustment, due usually to unsuccessful attempts at adjustment, the horn may become damaged due to the excessive current which it will take.

When testing, do not continue to operate the push if the horn does not sound.

If, when the push is operated, the horn does not take any current (indicated by an ammeter connected in series with the horn), it is possible that the horn has been adjusted so that its contact breaker is permanently open.

After adjusting, note the current consumption.

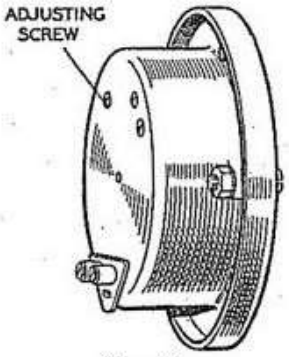


Fig. 66.

A horn may give a good note, yet be out of adjustment and taking an excessive current.

When adjusting, do not attempt to unscrew the nut securing the tone disc, or any other screw in the horn.

The adjustment is made by turning the adjustment screw, usually in a clockwise direction.

The underside of the screw is serrated, and the screw must not be turned for more than 2 or 3 notches before retesting.

If the adjustment screw is turned too far in a clockwise direction, a point will occur at which the armature pulls in but does not separate the contacts.

The current, when the horn is adjusted to give its best performance, must not exceed 4-5 amperes.

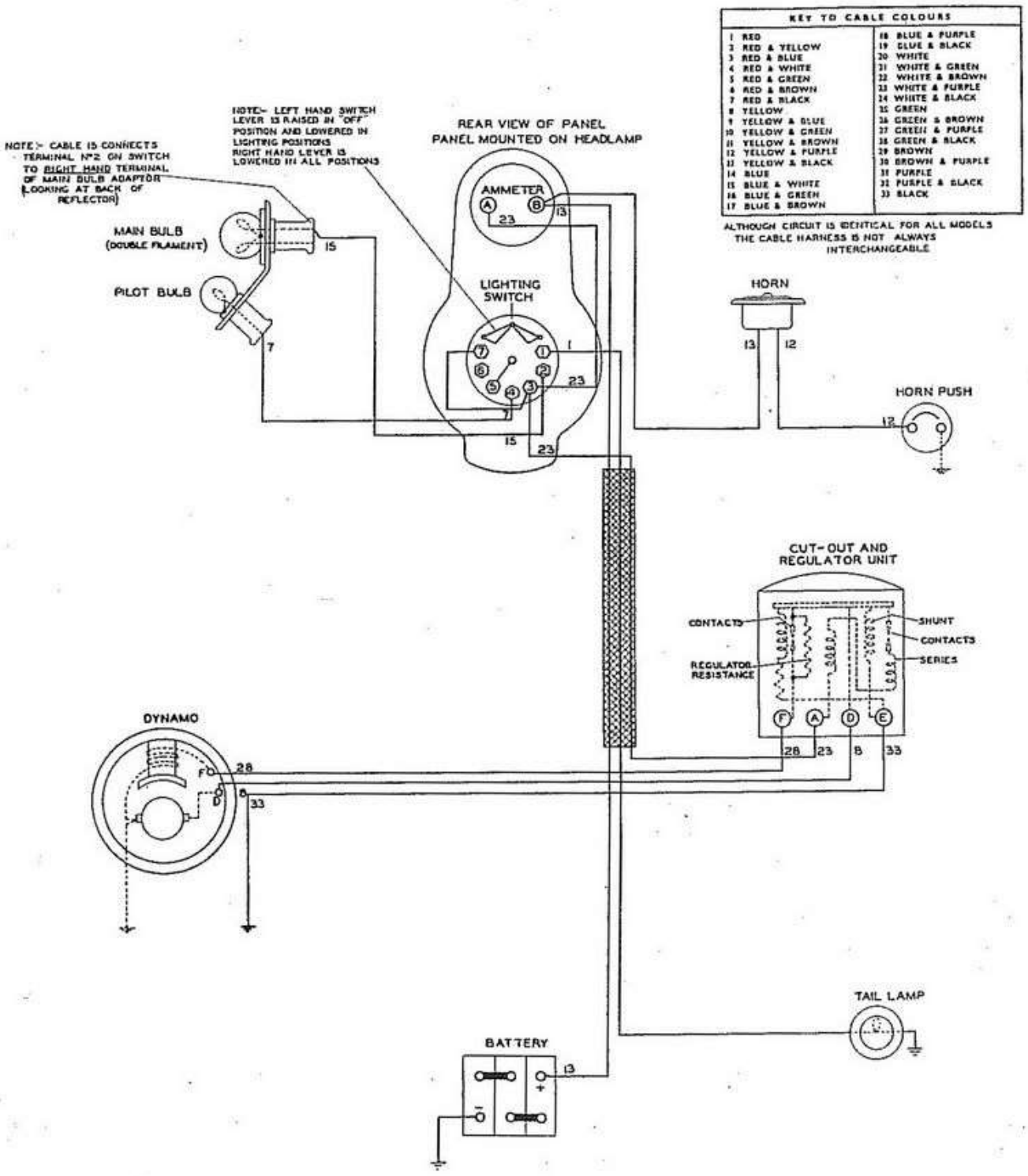
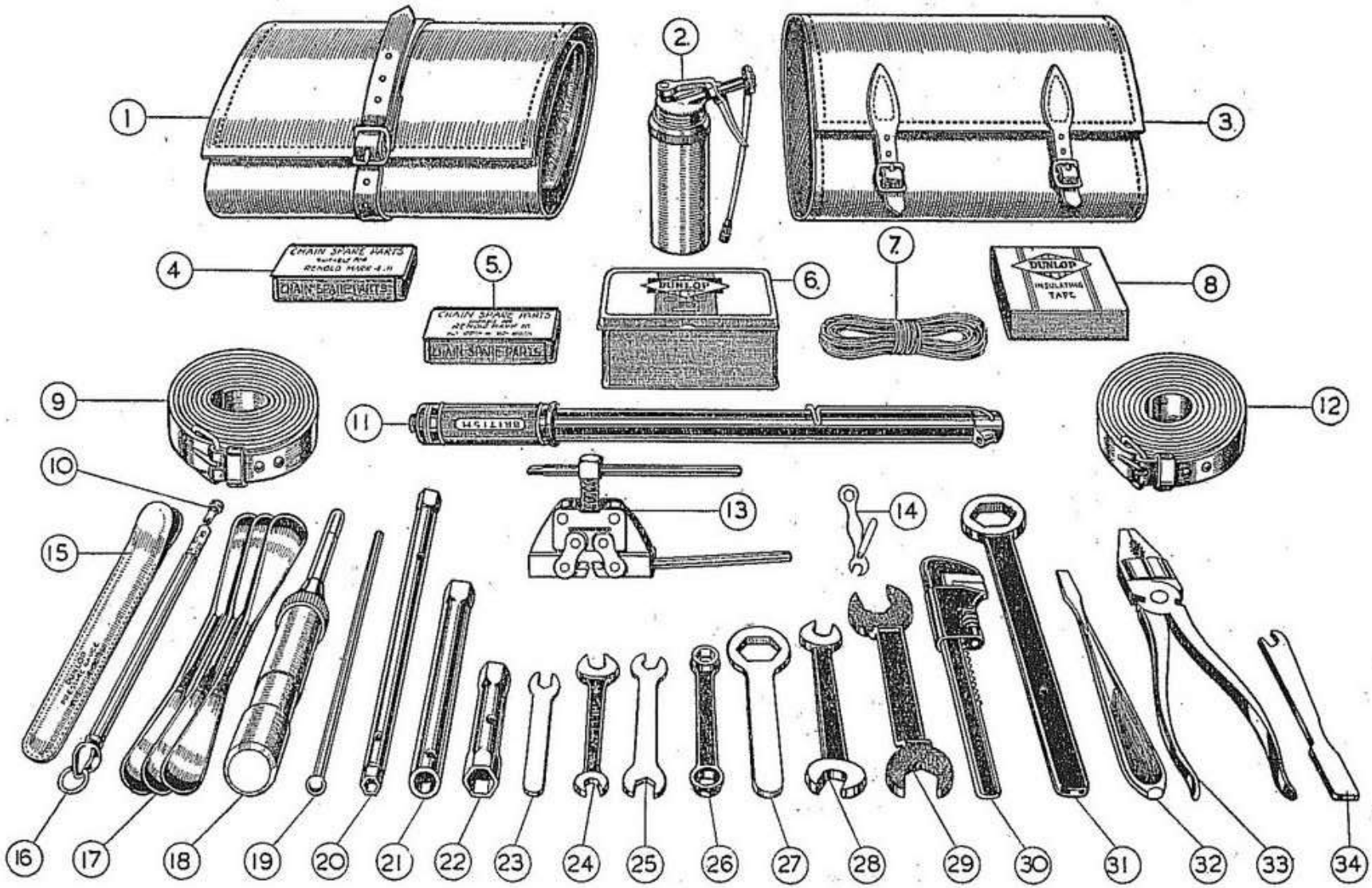
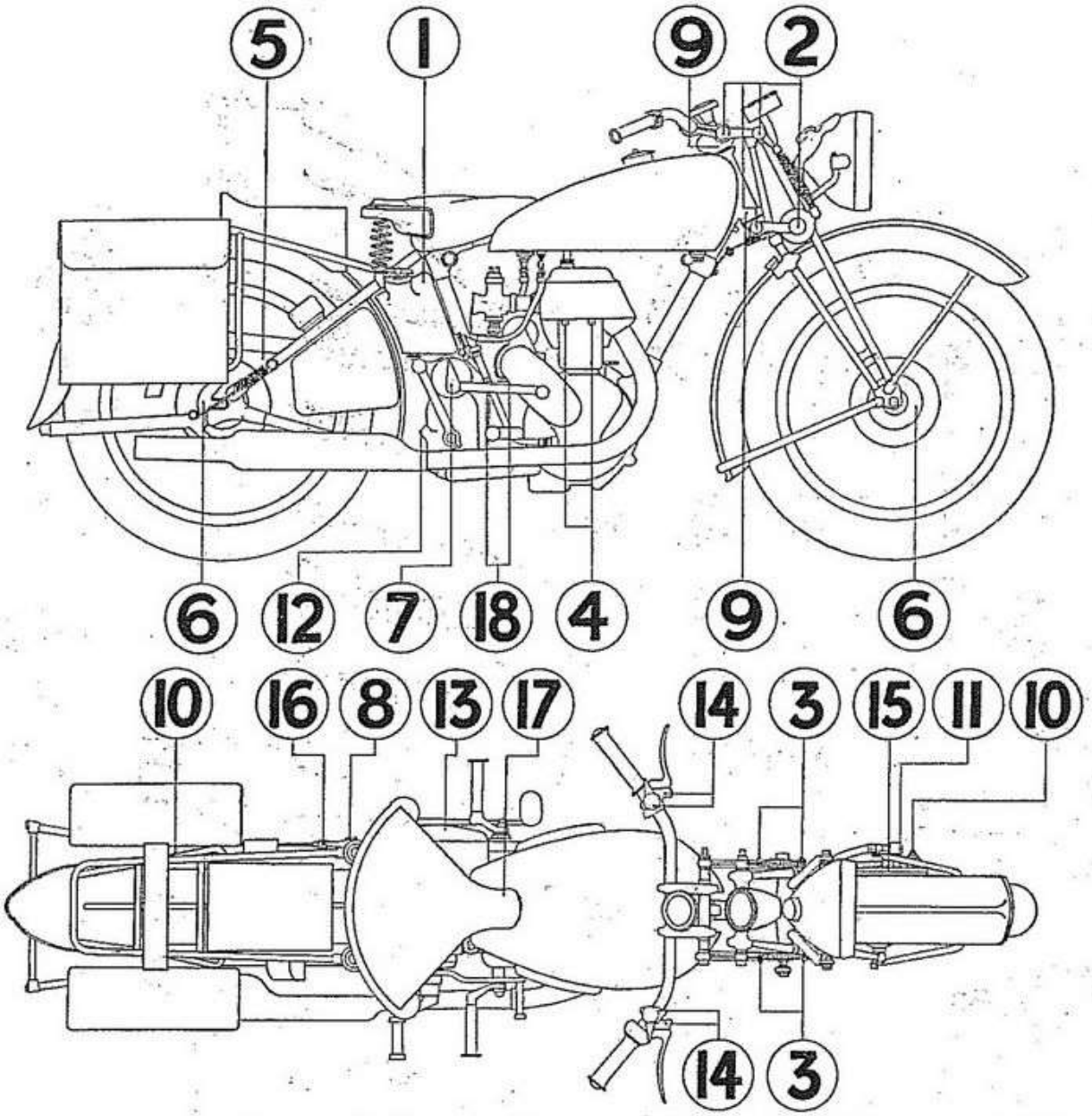


Fig. 67.



TOOL KIT.

1. Tool Roll.
2. Oil Can.
3. Tool Bag.
4. Chain Spares.
6. Tyre Repair Outfit
5. Chain Spares.
7. Soft Wire.
8. Insulating Tape.
9. Leather Strap.
10. Tyre Valve Tool.
11. Tyre Inflator.
12. Leather Strap.
13. Chain Rivet Extractor.
14. Magdyno Spanner.
15. Tyre Pressure Gauge Leather Case
16. Tyre Pressure Gauge.
17. Tyre Levers.
18. Lubricating Gun.
19. Tommy Bar.
20. Box Spanner, $\frac{1}{4}$in. × $\frac{5}{16}$in.
21. Box Spanner for Wheel Sleeve Nuts.
22. Box Spanner for Cylinder Head Nuts.
23. Spanner for Bowden Cable Adjusters.
24. Flat Spanner, $\frac{1}{4}$in. × 3/16in.
25. Flat Spanner, $\frac{1}{4}$in. × 3/16in.
26. Ring Spanner, 5/16in. × $\frac{1}{4}$in.
27. Ring Spanner for Sparking Plug.
28. Flat Spanner, 5/16in. × $\frac{3}{8}$in.
29. Flat Spanner Cranked for Gear Box Fixing Nut.
30. Adjustable Spanner, 6in.
31. Spanner for Wheel Spindles.
32. Screwdriver, 6in.
33. Pliers.
34. Spanner for dynamo strap bolts.



LUBRICATION CHART FOR MOTOR CYCLE, SOLO, 490 C.C.
S.V. NORTON. 16.H. T L C. 362

Loc. No.	Part	W.D. Lub.	Task No.
1	ENGINE (Oil Tank Cap: 3 pints)	50.HD.	2
2	FORK SPINDLES.	C.600	4
3	REBOUND SPRINGS.	,,	4
4	VALVE GUIDES.	,,	2
5	REAR CHAIN.	GR. No. 2	*
6	WHEEL BEARINGS.	,,	*
7	FOOT CHANGE LEVER.	C.600	4
8	BRAKE PEDAL LEVER.	,,	4
9	HEADRACES.	,,	4
10	BRAKE CAM SPINDLES.	GR. No. 2	*
11	SPEEDOMETER GEARBOX.	C.600	4
12	GEARBOX.	50. HD.	5
13	CHAINCASE OILBATH.	,, ,,	5

OIL CAN LUBRICATION

Loc. No.	Part	W.D. Lub.	Task No.
14	CONTROL CABLES & LEVERS.	50. HD.	4
15	FRONT BRAKE CABLE 'U' CLIP	,, ,,	4
16	ALL BRAKE ROD JAW JOINTS.	,, ,,	4
17	SADDLE PIVOT.	,, ,,	4
18	GEAR BOX CONTROL PINS.	,, ,,	4

* Periodical Maintenance as Ordered.