

Vehicle Maintenance Manual

AND

Instruction Book

FOR

MOTOR CYCLE SIDECAR
COMBINATION

Norton
REGD TRADE MARK

“BIG 4,” 633c.c., S.V.
(SIDECAR WHEEL DRIVE)

Norton Motors Limited.

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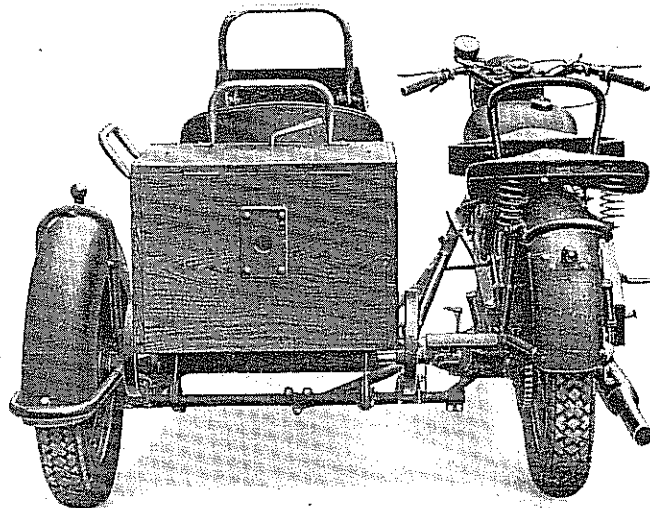
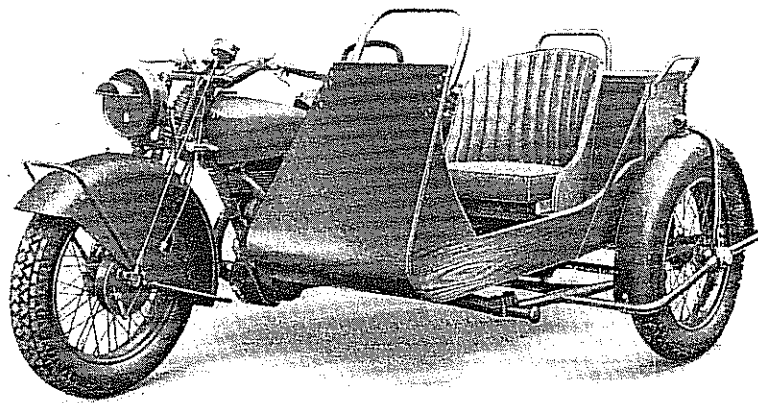
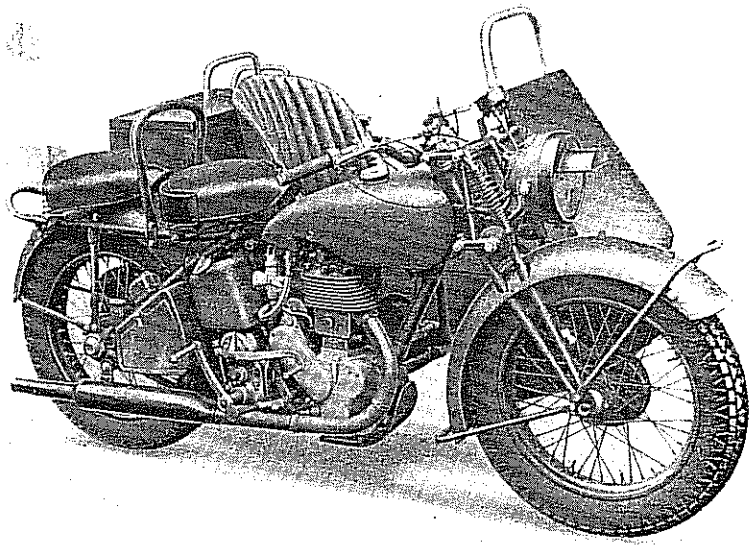
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DATA

CUBIC CAPACITY	633 c.c.
STROKE	120 m/m
BORE	82 m/m
COMPRESSION RATIO	4.8
PISTON RINGS	Dimensions:				
	Pressure	...	...	...	82 m/m x .093"
	Scraper	...	...	...	82 m/m x .125"
PISTON DIAMETERS	Top of Skirt	...	...	...	3.221"
	Bottom of Skirt	...	...	...	3.223"
PISTON CLEARANCES	Top Land	...	...	...	.029"—.027"
	Second Land	...	...	...	.0155"—.0135"
	Third Land	...	...	...	.0155"—.0135"
	Top of Skirt	...	...	...	.0075"—.0065"
	Bottom of Skirt	...	...	...	.0055"—.0045"
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° (11/32" before top centre)
	Exhaust closes	...	...	...	27°—30° (11/32" after top centre)
IGNITION TIMING	...	...	...	...	Points should commence to open 28° (3/8") before top centre
SPARKING PLUG	...	...	...	...	K.L.G. KS.5
MAGDYNO	Type	...	...	...	A.G.4
	Model	...	...	...	M.O.1-4
DYNAMO	...	...	...	...	E3.HM-10
VOLTAGE CONTROL	...	...	...	...	MCR.1. L32.
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 and Sidecar	...	...	...	6 volts, 3 watt. Single Pole
	Axle Light	...	...	...	6 volts, 3 watt. Double Pole
CARBURETTER	Type	...	...	...	276/011
	Size of Main Jet	...	...	...	170
	Jet Needle—Normal Setting	...	...	...	Middle Slot
SPROCKETS	Engine	...	...	...	18 Teeth
	Clutch	...	...	...	42 "
	Gearbox Axle	...	...	...	19 "
	Rear Wheel	...	...	...	52 "
	Magdyno and Cam	...	...	...	15 "

DATA—continued.

CHAINS	Front (Primary)	$\frac{1}{2}$ " pitch x .305"
	Rear	No. of links—74. $\frac{5}{8}$ " pitch x .25"
	Magdyno	No. of links—96 $\frac{3}{8}$ " pitch x .155" No. of links—42.
CHAIN ADJUSTMENT	Front	$\frac{3}{8}$ " whip
	Rear	$\frac{1}{2}$ " "
	Magdyno	$\frac{1}{4}$ " "
GEAR RATIOS	Fourth (Top)	6.4
	Third	9.4
	Second	15.3
	First (Bottom)	23.6
ENGINE BEARINGS.	Roller (2)	1" x 2 $\frac{1}{4}$ " x $\frac{5}{8}$ "
	Ball (1)	1" x 2 $\frac{1}{4}$ " x $\frac{5}{8}$ "
GEARBOX ..	Main Gear	2 $\frac{1}{2}$ " x 1 $\frac{1}{4}$ " x $\frac{5}{8}$ " MT7/4363
	Main Axle End Cover	$\frac{5}{8}$ " x 1.9/16" x 7/16" MT7/6
	Layshaft	17 m/m x 40m/m x 12m/m MT7/33389
	Main Gear Wheel Rollers	$\frac{1}{4}$ " x $\frac{1}{4}$ " MT7/6623
HUB ..	Hub Shell	17 m/m x 40 m/m x 12 m/m MT7/3173
	Front Brake Drum	17 m/m x 40 m/m x 16 m/m MT7/6908
REAR AND SIDECAR SPINDLE BEARINGS.	Large	30 m/m x 62 m/m x 20 m/m MT7/6260
	Small	17 m/m x 40 m/m x 16 m/m
FRAME HEAD RACE BALL BEARINGS (34)	...	5/16" diameter
WHEEL RIM SIZE	...	18 x W.M.3.(26 x 4)
TYRE SIZE	...	4.00 x 18 (26 x 4)
SECURITY BOLT	Type	W.M.4-18
TYRE VALVE	Type	T.R.6
WHEEL SPOKES	Nearside (20 per set)	8/10 I.W.G. butted 7 $\frac{5}{8}$ "
	Offside (20 per set)	8/10 I.W.G. butted 7 $\frac{3}{4}$ "
BRAKE LINING DIMENSIONS	...	6.23/32" x 1 $\frac{1}{4}$ " x 3/16"
BRAKE DRUM DIAMETER	...	7"
PETROL TANK CAPACITY	...	3 $\frac{1}{2}$ 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	...	4 pints approximately. (Filler off-side of machine below saddle). Drain and replenish Oil in Tank and Crankcase every 2,000 miles
OIL CAPACITY OF GEARBOX...	...	$\frac{1}{2}$ pint approximately. (Combined filler and level plug—rear of Gearbox under cover). Drain and replenish Gearbox every 5,000 miles

DATA—continued.

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 ... M.220.

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.

SIDECAR CHASSIS.

Lubricate Shackle Plates and all moving Parts on Sidecar Chassis and Body.

DOG CLUTCH.

Check and grease Dog Clutch on S.W.D. by releasing Press Studs on leather gaiter and packing with G.S. Grease.

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 "
Shaft Driving Sidecar Wheel Splined End	...	...	...	1 "
Rear Sidecar Wheel Spindle Bearing	...	...	...	4 "
Hubs	...	...	...	3 "

It is not necessary to use the Grease Nipples in the Rear and Sidecar Hubs, as the Hub Bearing only carries a load when the Wheel is used as the Front Wheel of the Machine.

When fitting any Wheel into the Front Forks, both Hub Bearings are visible, and can be examined to ensure that they are greased before use.

PERIODIC MAINTENANCE

Oil Tank.—Every 2,000 miles, drain, clean filter, and refill three-quarters full of new M.220. On new and reconditioned engines this operation should be carried out at the first 500 miles and 2,000 miles.

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

Gearbox.—Drain completely, refill with oil M.220 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 which are only in use when the wheel is used as a front wheel. With the sidecar and the rear wheel, the hub is carried by the spindle bearings. When wheel is fitted to the front forks, the bearings are exposed, and if grease is needed, can be added during the fitting of the wheel, and will only need fresh grease every 1,000 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.

Check and correct alignment between motor cycle and sidecar.

CLEARANCES

Tappet Clearances—

Exhaust ...	...	...	...	...	...	.006"
Inlet ...	...	...	...	...	...	.004"

Mag. Points Gap012"
---------------------	-----	-----	-----	-----	-----	-------

Plug Point Gap015"
--------------------	-----	-----	-----	-----	-----	-------

Piston Ring Gap—

Compression ...	...	...	...	...	...	.030"
Scraper ...	...	...	...	...	...	.008"

Piston Ring Side Clearance002/.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 Assembly005"
-------------------------------------	-----	-----	-----	-----	-----	-------

Cylinder requires boring when the Cylinder wear exceeds...008"
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CONTROLS

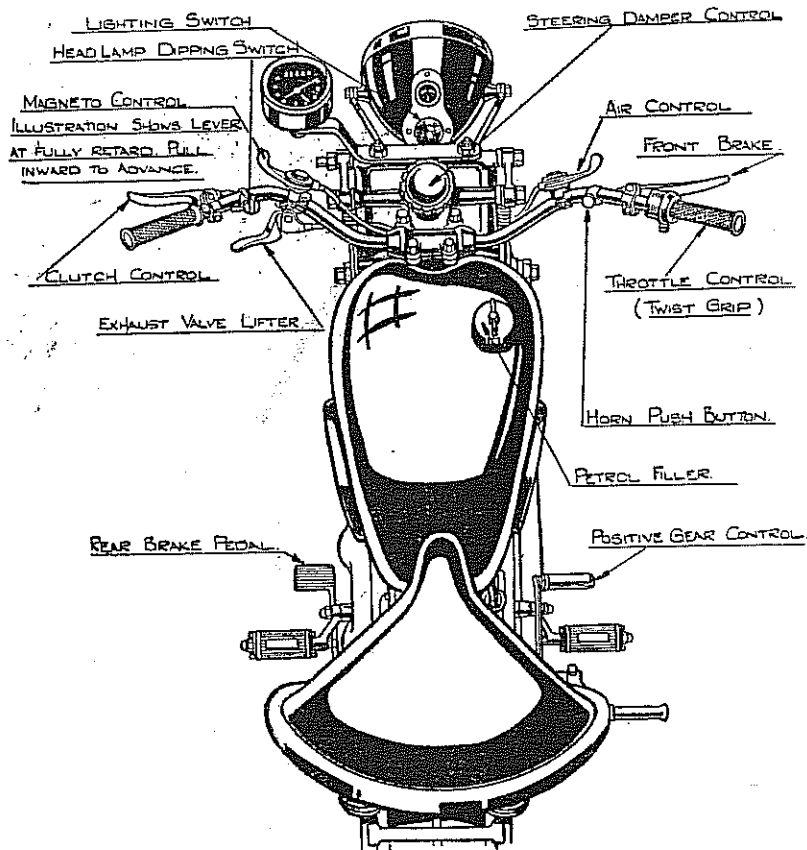


Fig. 3.

BIG 4 TOOL KIT

- | | |
|--|--|
| 1 Tool Bag. | 1 Oil Can. |
| 1 Tool Roll. | 1 Grease Gun. |
| 1 Tyre Inflator. | 1 Box of Front Chain Spares, containing:— |
| 1 Chain Rivet Extractor. | 1 Double Connecting Link, $\frac{1}{2}$ ". |
| 1 6" Adjustable Spanner. | 1 " " Cranked Link, $\frac{1}{2}$ ". |
| 1 Screwdriver. | 1 Single Connecting Link, $\frac{1}{2}$ ". |
| 1 pr. Tappet Spanners. | 1 Box of Rear Chain Spares, containing:— |
| 1 Double-ended Ring Spanner, $5/16"$ \times $3/8"$ | 1 Double Connecting Link, $5/8"$. |
| 1 Tubular Box Spanner, $1/4"$ \times $1/8"$. | 1 " " Cranked Link, $5/8"$. |
| 1 " " " $3/8"$ \times $3/8"$. | 1 Single Connecting Link, $5/8"$. |
| 1 " " $5/16"$. | 1 Repair Outfit. |
| 1 Tommy Bar. | 1 Spare Sparking Plug. |
| 1 Flat Spanner, $1/8"$. | 1 Roll of Insulation Tape. |
| 1 " " $5/16"$ \times $3/8"$. | 2 Leather Straps. |
| 1 Magdyno Spanner. | 1 Special Spanner, Wheel Dome Nuts, with handle. |
| 1 Sparking Plug Spanner. | 1 Jack and Handle. |
| 1 Special Spanner for Gearbox Bolts. | |

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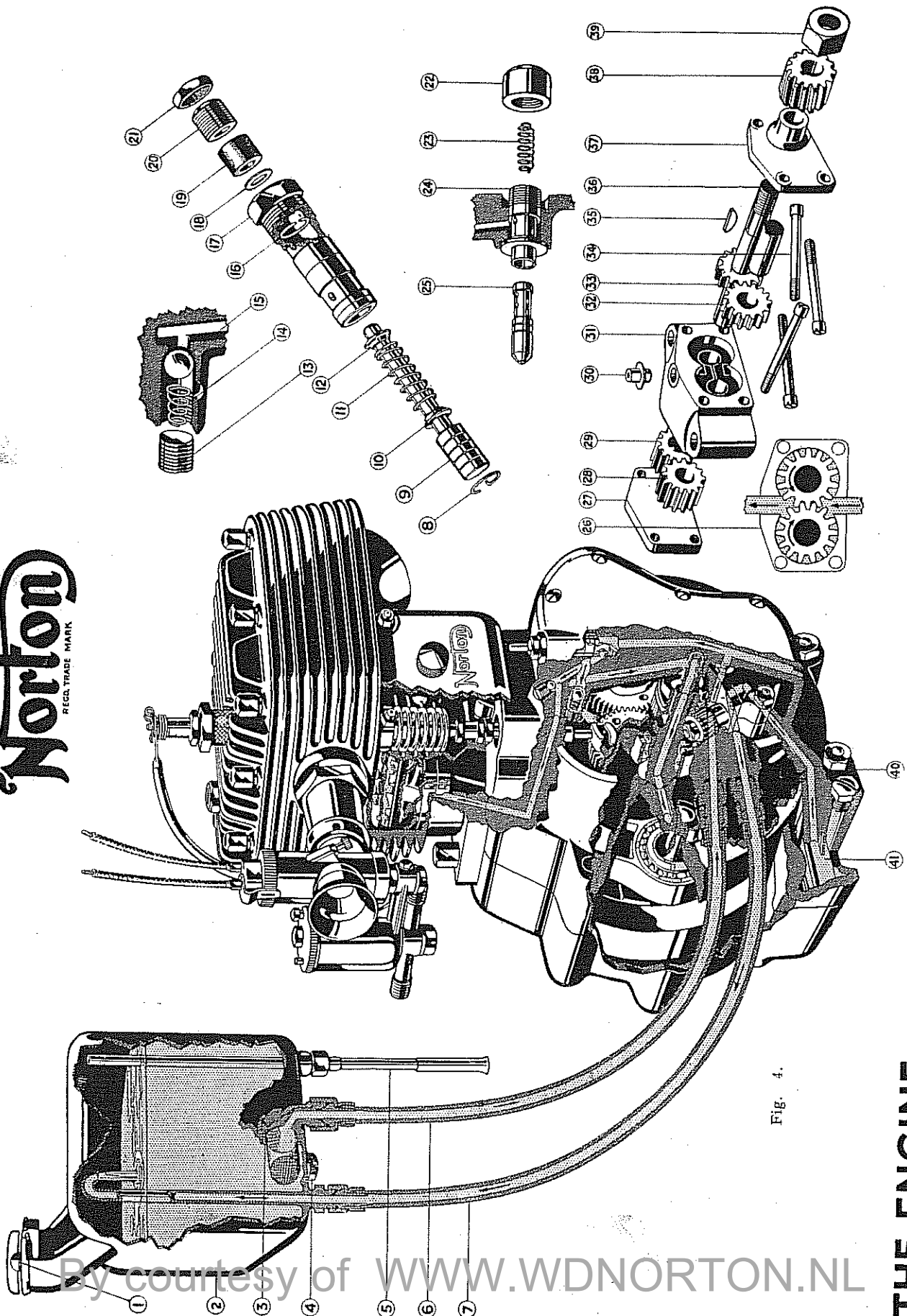


Fig. 4.

THE ENGINE (LUBRICATION DIAGRAM)

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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 Plunger 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.

THE ENGINE

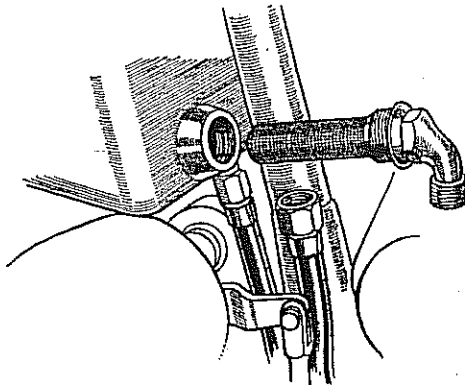
1. ENGINE. LUBRICATION SYSTEM. (Fig. 4.)

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 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 mist is sprayed by crankcase compression, through the valve lubricator on to the valve stems.

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.

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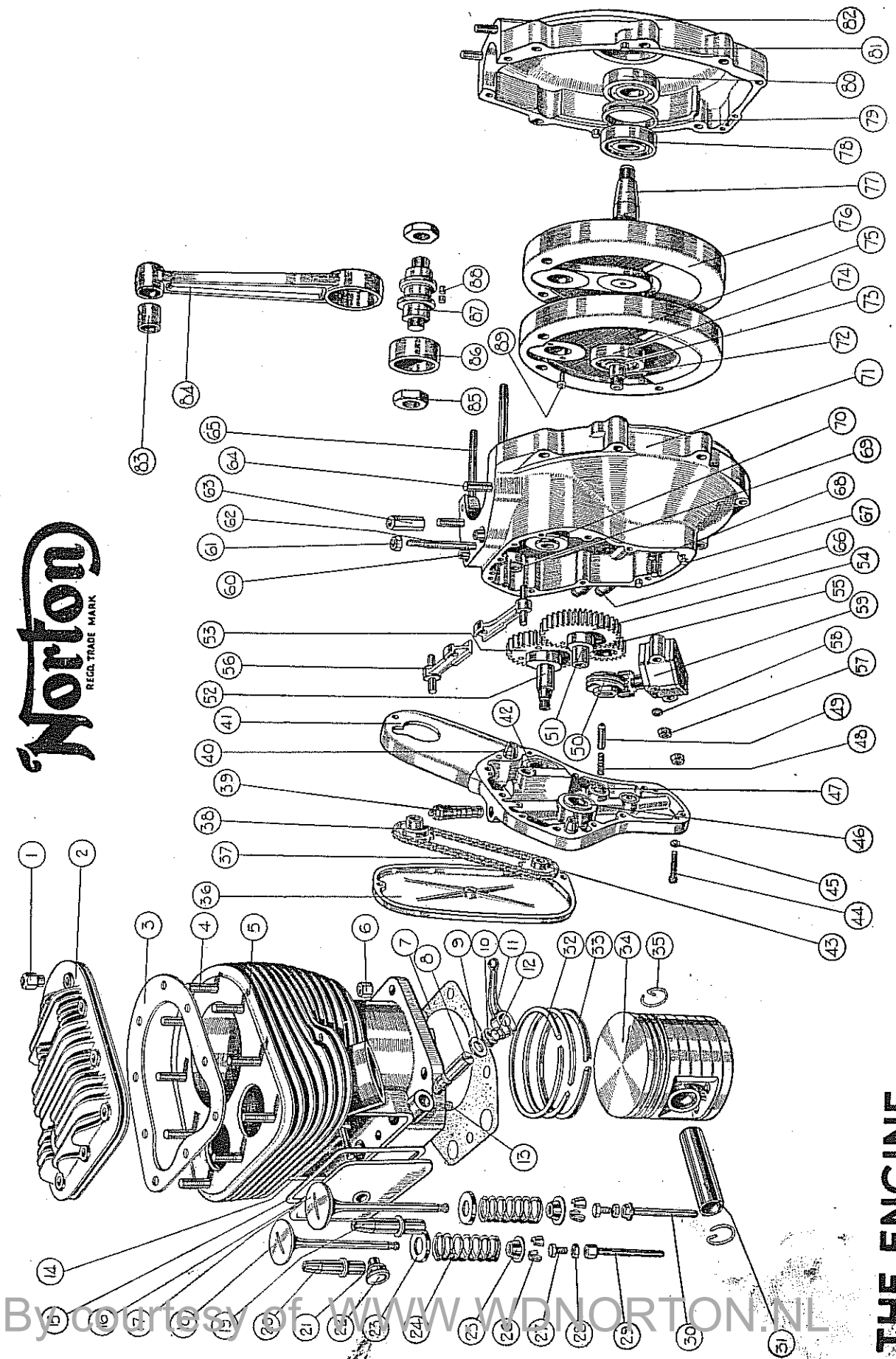


Fig. 6.

THE ENGINE

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THE ENGINE

1. Cylinder Head Holding Down Stud Nut.
2. Cylinder Head.
3. Cylinder Head Copper Asbestos Copper Washer.
4. Cylinder Head Holding Down Stud.
5. Cylinder Barrel.
6. Cylinder Stud Nut.
7. Cylinder Base Paper Washer.
8. Exhaust Valve Lifter.
9. Exhaust Valve Lifter Fibre Washer.
10. Exhaust Valve Lifter Spring.
11. Exhaust Valve Lifter Lever.
12. Exhaust Valve Lifter Lever Bolt.
13. Exhaust Valve Lifter Securing Screw.
14. Valve Cover Securing Stud.
15. Valve Cover Washer.
16. Valve Cover.
17. Exhaust Valve.
18. Inlet Valve.
19. Exhaust Valve Guide.
20. Inlet Valve Guide.
21. Valve Cover Securing Nut Fibre Washer.
22. Valve Cover Securing Nut.
23. Valve Spring Cup, Top.
24. Valve Spring.
25. Valve Spring Cup, Bottom.
26. Valve Split Cotter.
27. Tappet Head.
28. Tappet Locknut.
29. Inlet Tappet.
30. Exhaust Tappet.
31. Gudgeon Pin.
32. Piston Ring Pressure.
33. Piston Ring Scraper.
34. Piston.
35. Gudgeon Pin Circlip.
36. Magdyno Chain Cover.
37. Magdyno Chain.
38. Magdyno Sprocket.
39. Oil Pump Tell-tale.
40. Timing Cover Rocker Shaft Bush.
41. Timing Cover.
42. Timing Cover Inlet Cam Spindle Bush.
43. Inlet Cam Magdyno Sprocket.
44. Panel Screw.
45. Panel Screw Fibre Washer.
46. Timing Cover Exhaust Cam Spindle Bush.
47. Timing Cover and Mainshaft Connecting Jet Holder.
48. Timing Cover and Mainshaft Connecting Jet Spring.
49. Timing Cover and Mainshaft Connecting Jet.
50. Engine Shaft Oil Pump Driving Worm.
51. Exhaust Cam Spindle.
52. Inlet Cam Spindle.
53. Inlet Cam Wheel.
54. Exhaust Cam Wheel.
55. Half Time Pinion.
56. Crankcase Rocker.
57. Oil Pump Stud Nut
58. Oil Pump and Timing Cover Oil Connecting Jet Fibre Washer.
59. Oil Pump.
60. Tappet Guide.
61. Valve Stem Lubricator Stud Nut.
62. Valve Stem Lubricator.
63. Cylinder Stud Nut (Long).
64. Crankcase Cylinder Stud.
65. Crankcase Stud.
66. Oil Return Union.
67. Crankcase Dowel Peg.
68. Oil Pump Stud.
69. Crankcase Rocker Shaft Bush.
70. Crankcase Cam Spindle Bush.
71. Crankcase Timing Side.
72. Flywheel Timing Side Shaft.
73. Flywheel Packing Steel Washers.
74. Timing Side Main Bearing (Roller).
75. Timing Side Flywheel.
76. Driving Side Flywheel.
77. Flywheel Driving Side Shaft.
78. Driving Side Main Bearing (Roller).
79. Driving Side Main Bearing Distance Piece.
80. Driving Side Main Bearing (Ball).
81. Crankcase Dowel Peg.
82. Crankcase Driving Side.
83. Small End Bush.
84. Connecting Rod.
85. Big End Nut.
86. Big End Outer Race.
87. Crank Pin.
88. Big End Rollers.
89. Big End Nut Locking Screw.

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 levers are in the "Off" position, that is, with the round end of the lever 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 fibre washers and steel washers should be on the tank brackets.

7. FITTING OF TANK.

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

Place tank in position.

Fit cupped steel and fibre 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.

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.

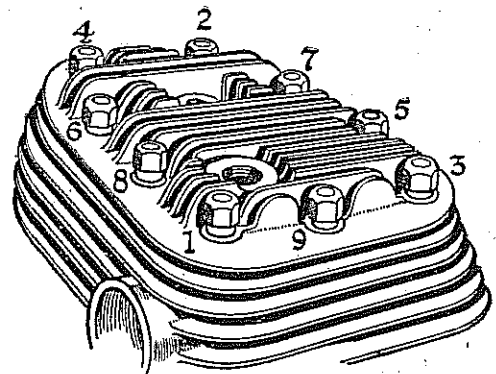
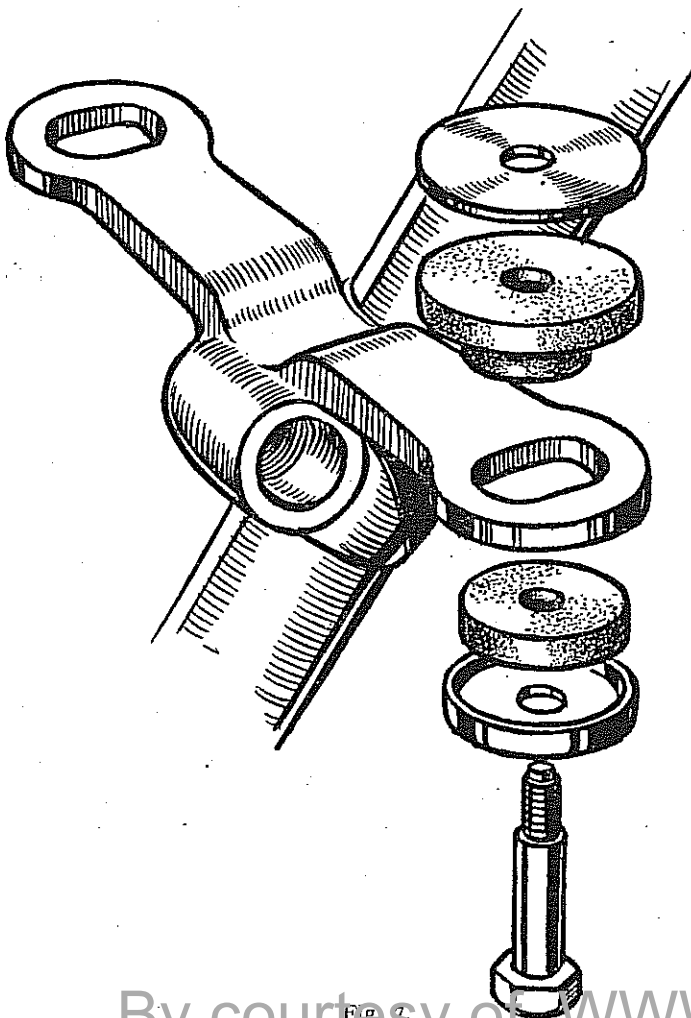


Fig. 8.

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 decarbonization.

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 bottom of stroke.

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

This releases the return spring.

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

Remove exhaust lifter spindle from cylinder barrel. This is retained in position by a set pin in the base of the cylinder.

Remove set pin, and spindle complete can be removed with oil retaining washer and spring.

Remove the five base stud nuts. (Note: one in valve chamber.)

Cylinder is now free and can be lifted from crankcase.

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

The crankcase breather feeding the oil to the valve stems need not be removed.

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 cot- ters 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 $\frac{1}{4}$ " 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.

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.

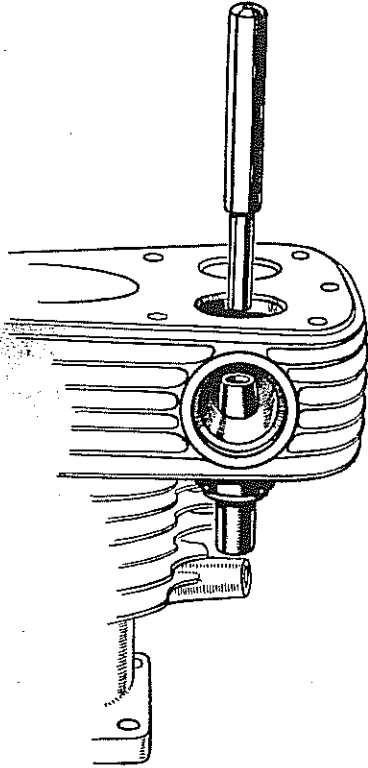


Fig. 9.

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 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 and small-end.

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 spindle to cylinder with spring and felt washer, placing the milled end under the collar on the exhaust tappet, so that when spindle is rotated, the tappet is lifted.

Fit set pin to retain spindle in position.

Fit exhaust lifter cable adjuster to cylinder.

Fit exhaust lifter cable return spring.

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.

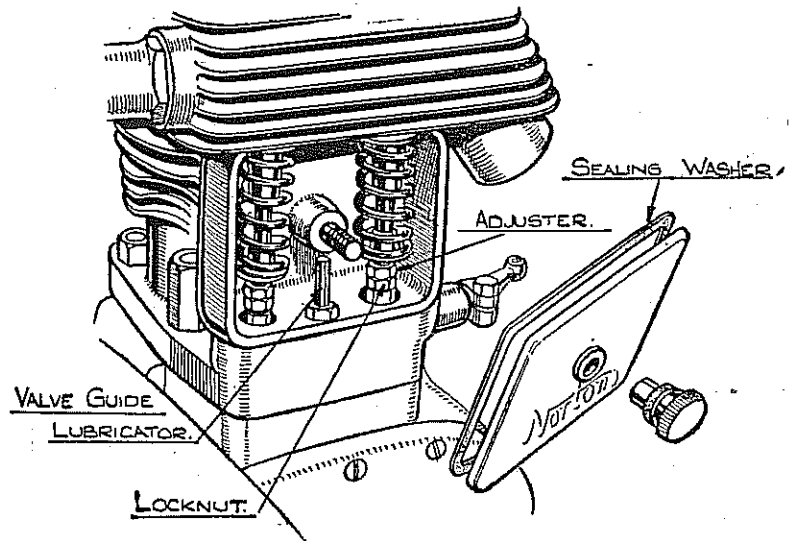


Fig. 10.

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.

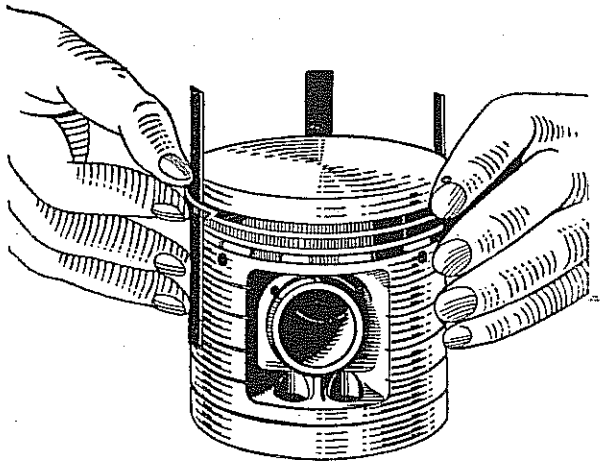


Fig. 11.

Place three thin metal strips approximately $\frac{1}{2}$ " wide \times 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 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 ring030"—.035".

Scraper008".

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.

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".

23. REMOVING OF TIMING PANEL.

Remove magdyno chain cover held by three cheese headed screws.

Remove sprockets and chain. (Fig. 12.)

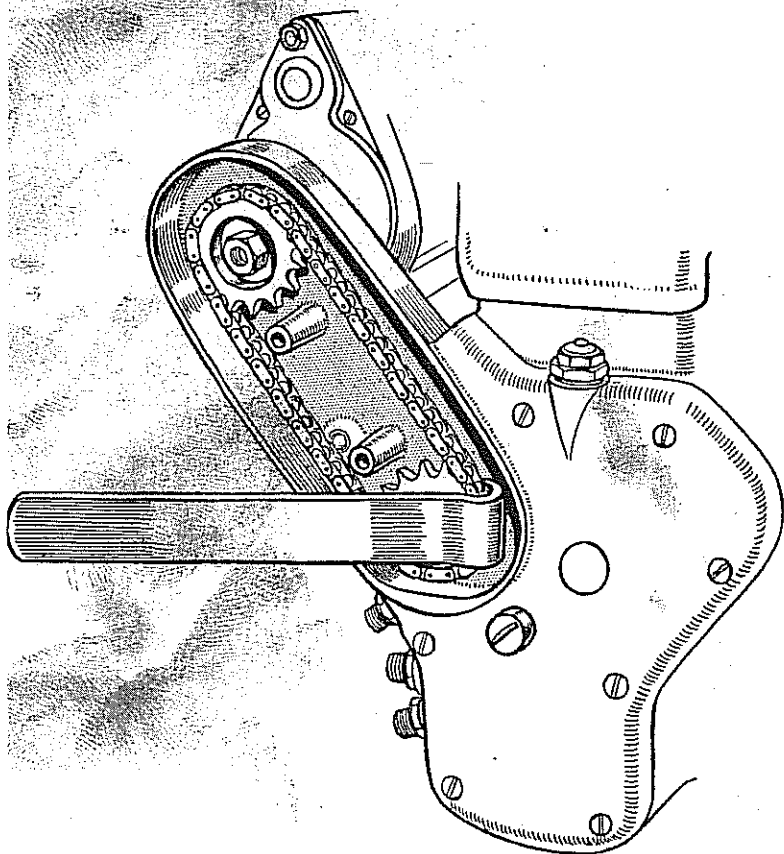


Fig. 12.

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

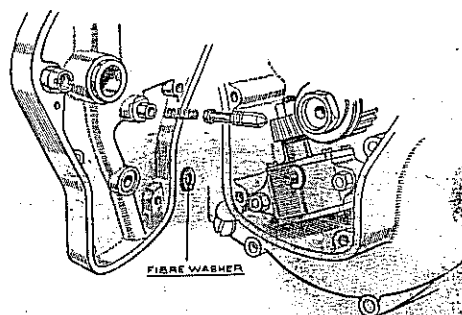


Fig. 13.

24. FITTING TIMING PANEL.

Clean the edges of the timing chest and the panel.

Smear the edges with gold-size.

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 $\frac{3}{8}$ " 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.

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.

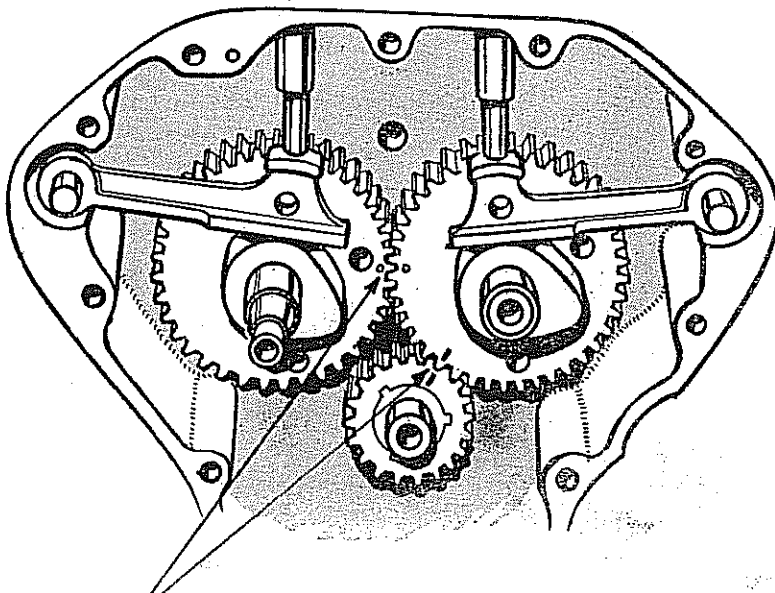
Remove the exhaust cam wheel.

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 freely slide off the studs.

Withdraw pinion from timing shaft



NOTE MATING TIMING MARKS

Fig. 14.

27. 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.

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 tag 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° ($11/32''$) before top centre.

Exhaust closes 27° to 30° ($11/32''$) 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 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.)

28. 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.

29. 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 nut. 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 nut.

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

30. 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 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.

31. 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 exhaust stem has a collar machined below the hexagon, to accommodate the exhaust lifter.

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

32. 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.

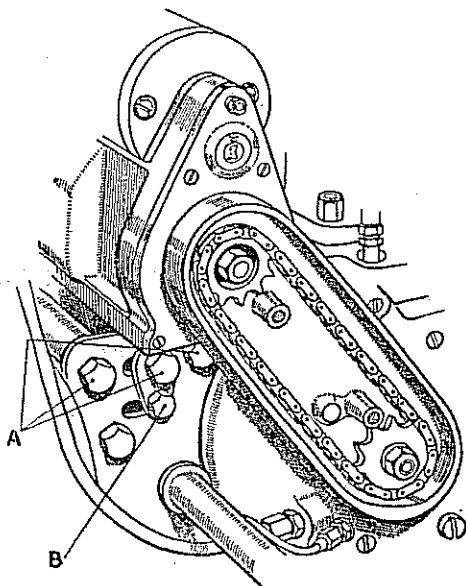


Fig. 15.

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.

33. 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.

34. 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.

For the sake of convenience the sidecar body should be partially removed from the chassis or sidecar chassis removed from machine. (See Para. 84.)

To partially remove body, remove coach bolts, holding the front of the body to the chassis bearer bar, and the front of the body can be lifted, pivoting on the rear bearer bar, and propped or held in such a position that access to the nearside of the engine is obtained.

Remove tank. (Para. 6.)

Remove magdyno. (Para. 32.)

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 oil bath. (Para. 44.)

Remove engine sprocket. (Para. 44.)

Remove clutch. (Para. 44.)

Remove magdyno. (Para. 32.)

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

Remove the large hexagon nut on the bolt holding the front sidecar arm to the chassis, and free the plate attached to the fourth point attachment 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 long bolt, holding the engine to the frame and also acting as a fourth point attachment to the sidecar.)

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.

35. 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.)

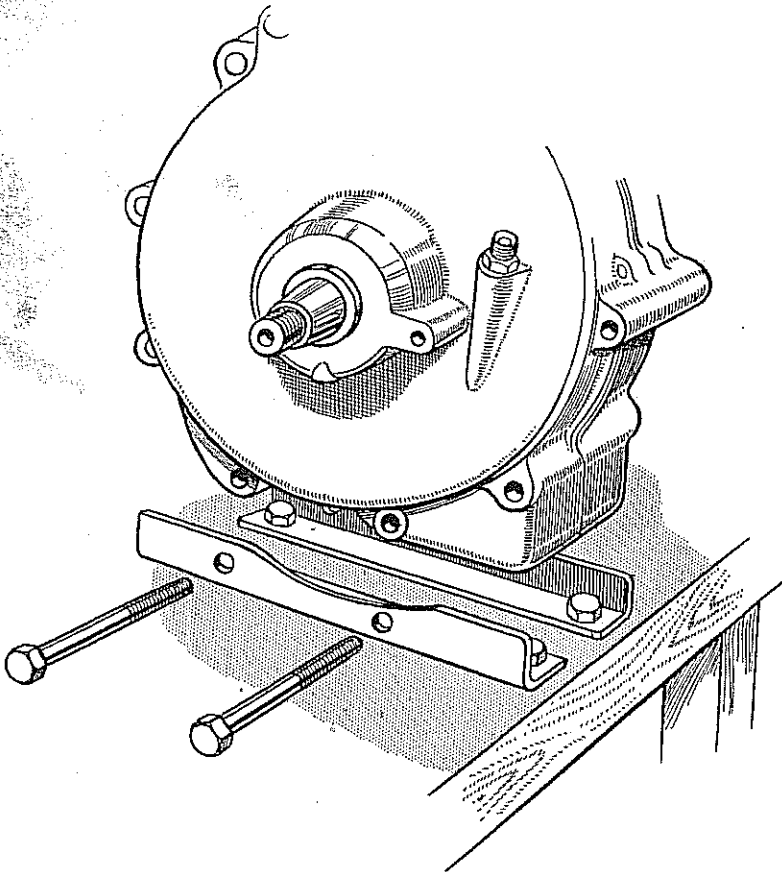


Fig. 16.

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.)

Remove 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 to a block of hard wood, then the case should leave the shaft.

36. 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.

37. FITTING OF BEARINGS TO CRANKCASE.

Test bearings, to be a sliding fit on shafts. Press the ball bearing lightly in to the driving side of the case.

Fit the spacing washer next to the ball bearing.

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

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

38. DISMANTLING OF THE FLYWHEELS.

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

Remove crankpin nuts.

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

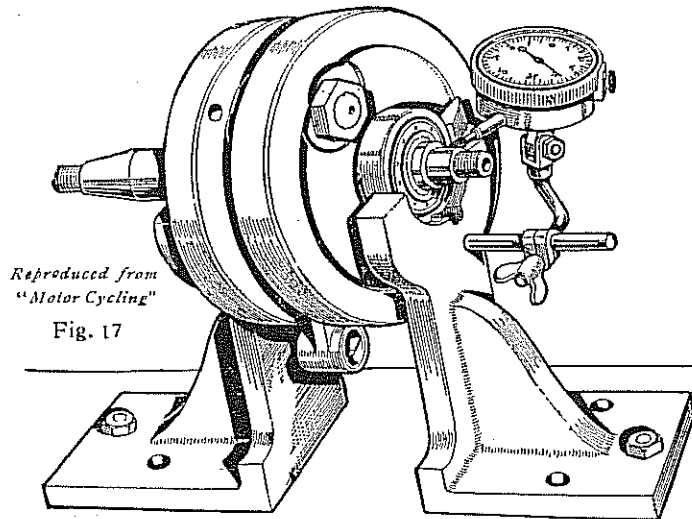
The flywheels are pressed on to the crankpin.

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.



Reproduced from
"Motor Cycling"

Fig. 17

39. 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 wheel home on pin.

Hold wheels in a vice with the 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.

40. 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. 39.)

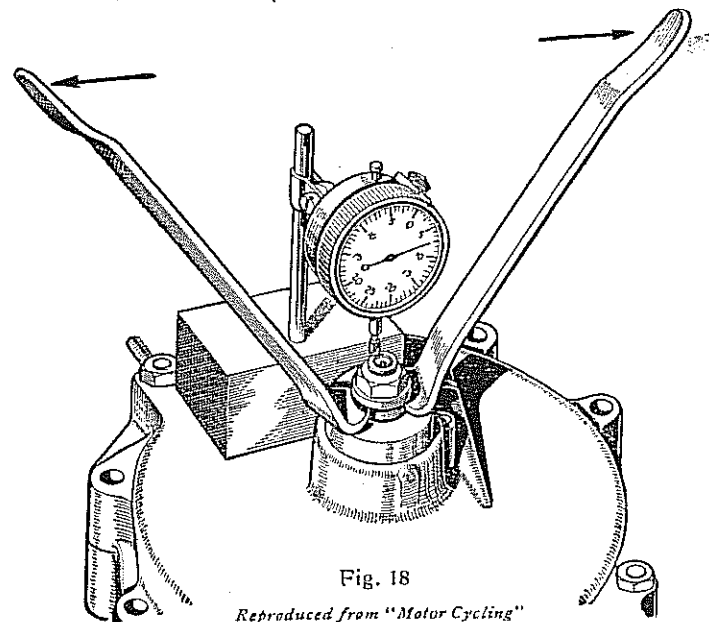


Fig. 18

Reproduced from "Motor Cycling"

41. ASSEMBLY OF CRANKCASE.

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

Test for side float in the flywheels. (See Fig. 13.)

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.

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.

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. 18.)

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.

If the valve stem lubricator has been removed from the timing side of the case, re-fit. Screw lubricator into case, and when tight the oil holes should point towards the valve stems and the bevelled side should face the cylinder barrel.

Fit timing gears. (Para. 27.)

Fit timing panel. (Para. 24.)

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

Fit magdyno. (Para. 32.)

Time magdyno. (Para. 25.)

43. 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 in the case are the same, the two with the thick collars at the head.

The bushes for the panel have thin collars at the heads, the one for the exhaust having the oil-way running through the bush, and on the inlet the oil-way stops approximately $3/16$ " before the end.

The bushes must be pressed into the case in such a position that when the oil holes are drilled, the hole enters the bush and breaks into the oil-way.

On the heads of the bushes a groove is machined. If the grooves are used as a guide to the fitting of the bushes, the groove in the inlet crankcase bush should point towards an imaginary point half-way between the oil hole feeding the cylinder wall and the tapped hole, into which a panel pin is screwed.

In the case of the exhaust, the groove should point towards valve stem lubricator.

In the panel no oil hole is used for the inlet bush.

The groove in the exhaust should point towards the left-hand edge of the boss into which the panel pin hole is drilled, directly above the bush.

The rocker spindle bushes can be pressed out and replaced, but no oil holes are drilled into these.

When the bushes are fitted, fit panel to case and ream bushes from the inside of the case.

Fit plug to the panel.

By courtesy of WWW.WDNORTON.NL

THE TRANSMISSION

44. REMOVAL OF OIL BATH. (Fig. 19.)

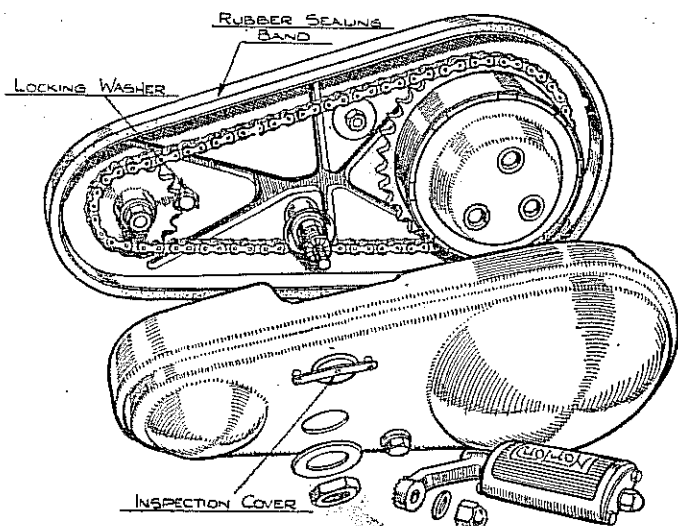


Fig. 19.

Remove the footrests and rod.

Remove the brake pedal.

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

Remove oil bath outer portion.

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. 20.)

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.

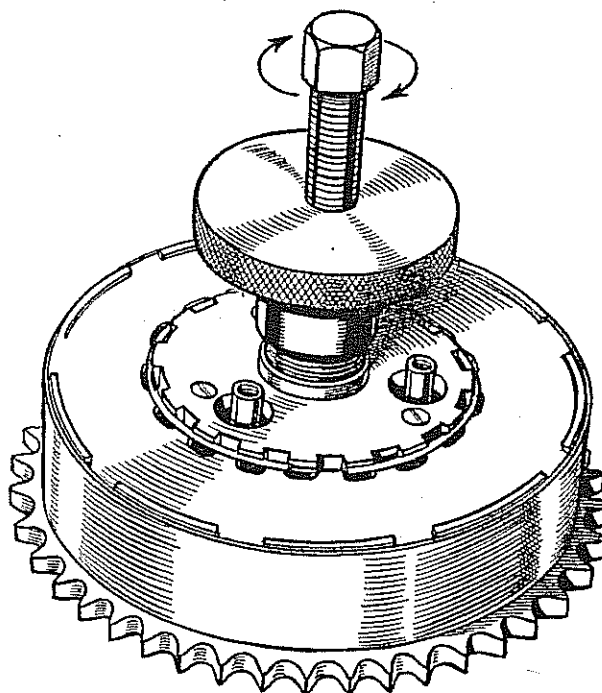


Fig. 20.

45. FITTING OF OIL BATH.

Assemble in the reverse order.

Examine rubber 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.

46. CLUTCH—TO DISMANTLE.

Remove outer portion of the oil bath. (Para. 44.)

Remove clutch. (Para. 44.)

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

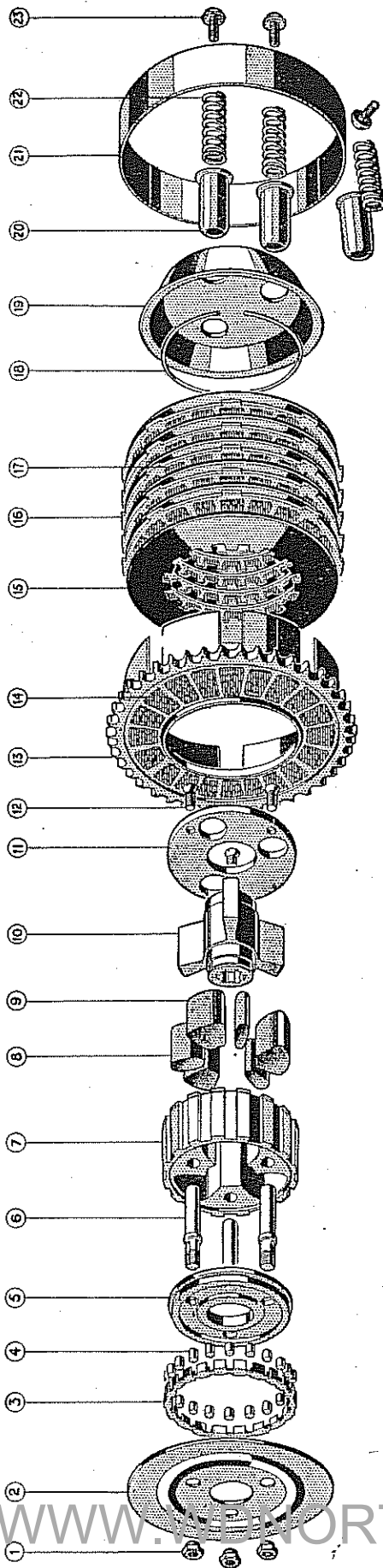
The plates can be removed with the band in position, but it must be removed to examine the driving slots in the sprocket.

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.



THE CLUTCH
INCORPORATING VANE
TYPE RUBBER BUFFER
SHOCK ABSORBER

Fig. 21.

By courtesy of WWW.VANMORTON.NL

THE CLUTCH

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.

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. 22.)

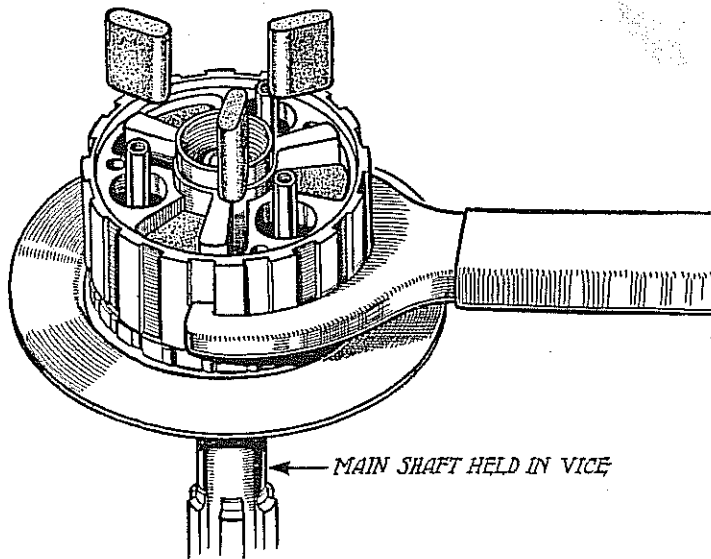


Fig. 22.

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.

47. 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.

48. 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.

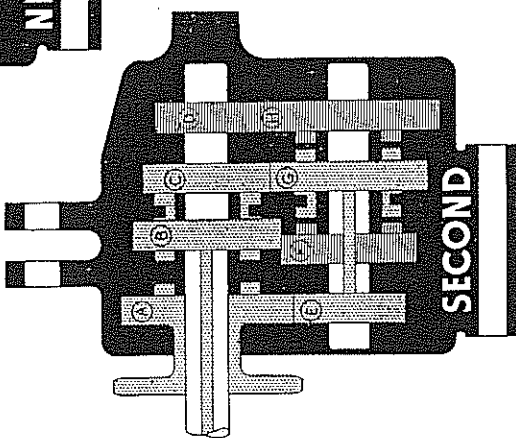
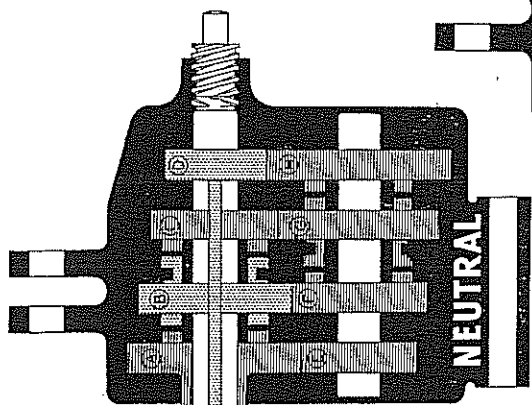
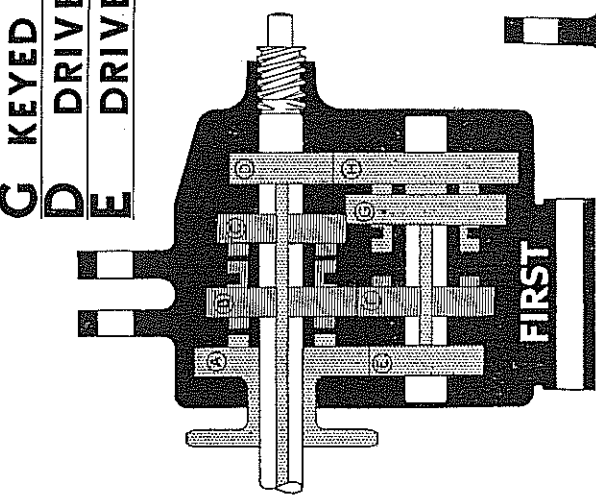
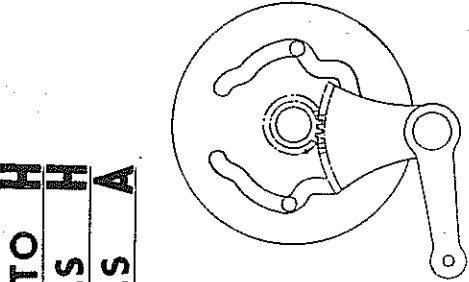
Fit stud nuts and tighten. Lock nuts with a centre punch.

Test roller race for freeness on its track.

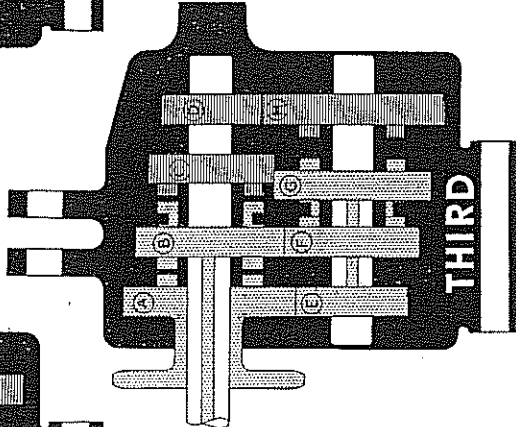


B & G (SLIDING) SPLINED TO SHAFT
E & D PERMANENTLY FIXED TO SHAFT

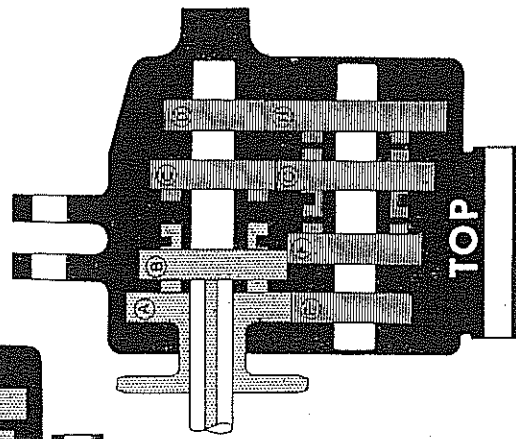
G KEYED TO H
D DRIVES H
E DRIVES A



B KEYED TO C
C DRIVES C
E DRIVES A



G KEYED TO F
B DRIVES F
E DRIVES A



B KEYED TO A
DRIVE STRAIGHT THROUGH

THE GEARBOX

Fig. 28.

Norton
REGD. TRADE MARK

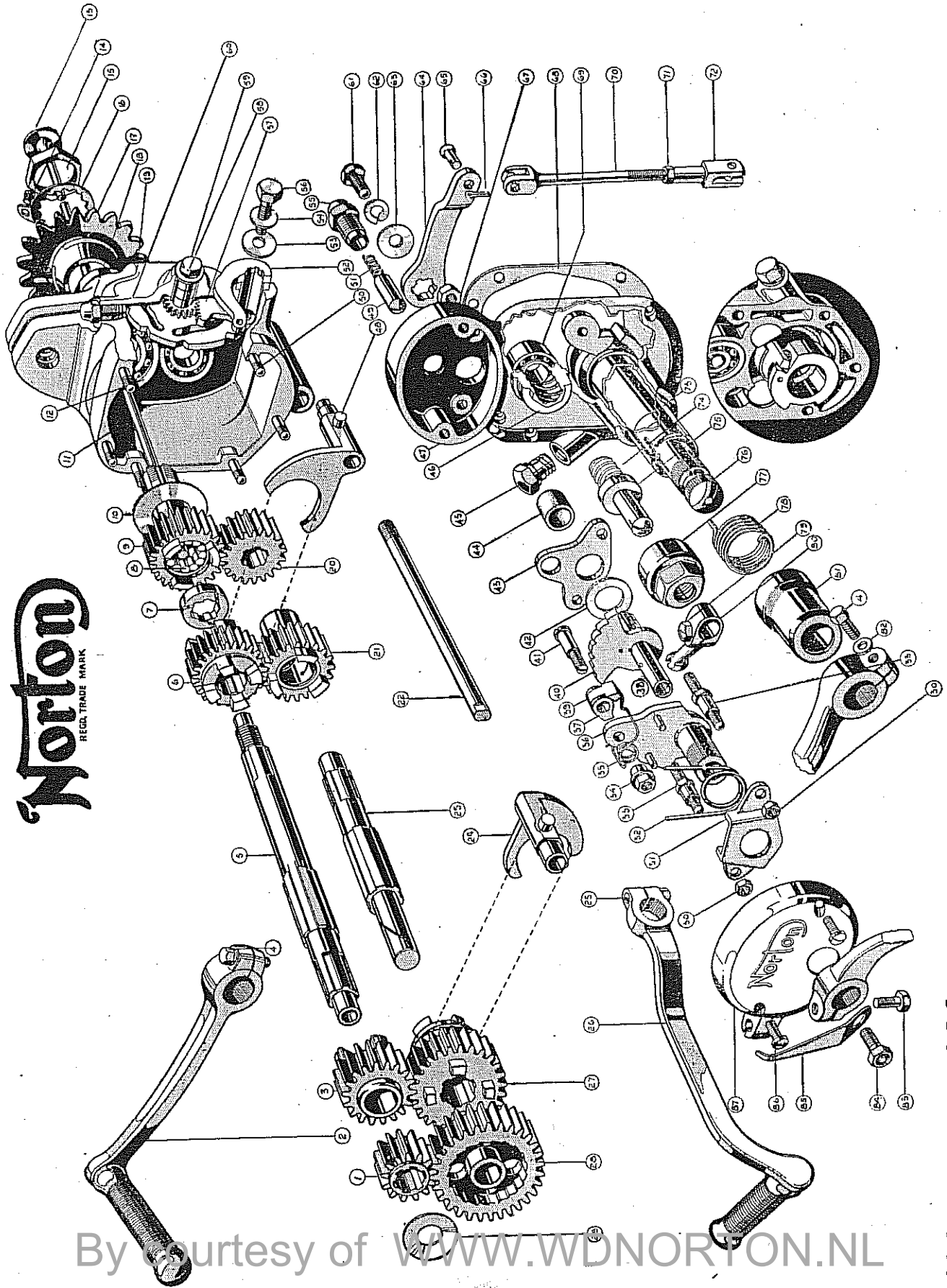


Fig. 24.

THE GEARBOX

By courtesy of WWW.WDNORTON.NL

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.

Place assembly on the axle shaft held in vice. (Para. 46).

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. 44).

THE GEARBOX

49. 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. 44.)

Remove clutch and engine sprocket. (Para. 44.)

Remove rear portion of oil bath. (Para. 44.)

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

Remove rear chain.

Remove rear wheel. (Para. 59.)

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

Remove rear mudguard, 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, and four holding guard to the sub-frame.

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.

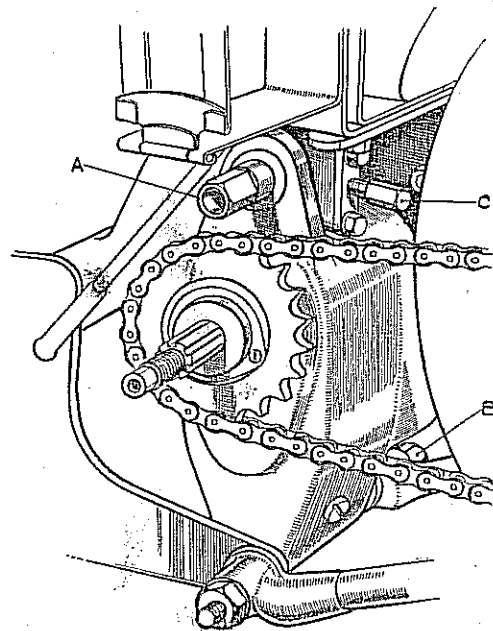


Fig. 25.

50. FITTING OF GEARBOX TO THE FRAME (Fig. 25.)

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.

51. REMOVAL AND DISMANTLING OF GEARBOX END COVER.

(It is not necessary to remove the 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 the seven nuts holding the end-cover to the box.

Remove end cover complete.

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

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

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 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 kick-starter wheel, a dished steel washer is fitted, with the concave side next to the bearing.

The bearing can be pressed from the panel.

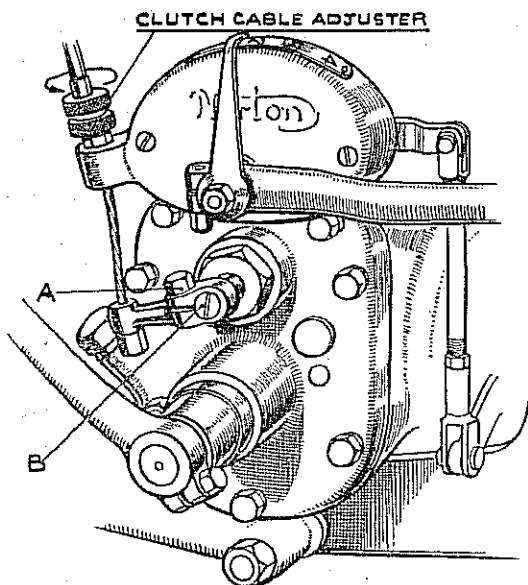


Fig. 26.

52. 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.

53. REMOVAL OF THE GEARS FROM THE GEARBOX. (Fig. 24.)

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.

Remove end cover. (Para. 51.)

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 and 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.

54. 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 quadrant, held by a bolt and two washers, one plain and one spring.

Remove the cam plate.

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.

Remove the temporary tubular distance piece, fitted on to 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 main axle in the main 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 by 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.

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 in the box, allowing only sufficient to lubricate the bearing.

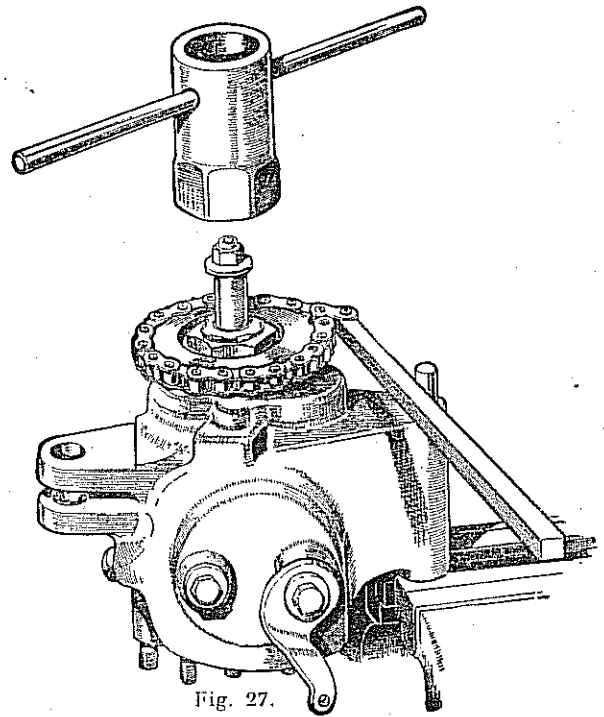


Fig. 27.

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 bearing carrying the main axle can be pressed out of the box. 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 left in the case can be removed by carefully warming the case.

55. FITTING OF CAM PLATE.

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

Fit the quadrant to the box but do not fit the retaining bolt.

Round the circumference 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 by an equal distance, approximately three-quarters of an inch.

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 circumference 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.

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.

Fit the compressed cork washer to the quadrant spindle.

Fit the quadrant lever to the shaft, using the splines that allow the highest position for the lever with bottom gear engaged. If any attempt is made to fit the lever any higher, the lever will foul the boss carrying the quadrant spindle.

Fit bolt and nut, the spring washer next to the bolt head.

56. FITTING GEARS INTO GEARBOX.

Fit pen steel washer to the boss before fitting main axle bearing.

Fit main axle 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.

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 (21 teeth) to the layshaft.

Fit top gear wheel (17 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 (26 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 (12 teeth) is fitted first.

Fit end cover. (Para. 52.)

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.

57. DISMANTLING OF POSITIVE FOOT CHANGE. (Fig. 24.)

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 counter-sunk 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.

Norton
REGD. TRADE MARK

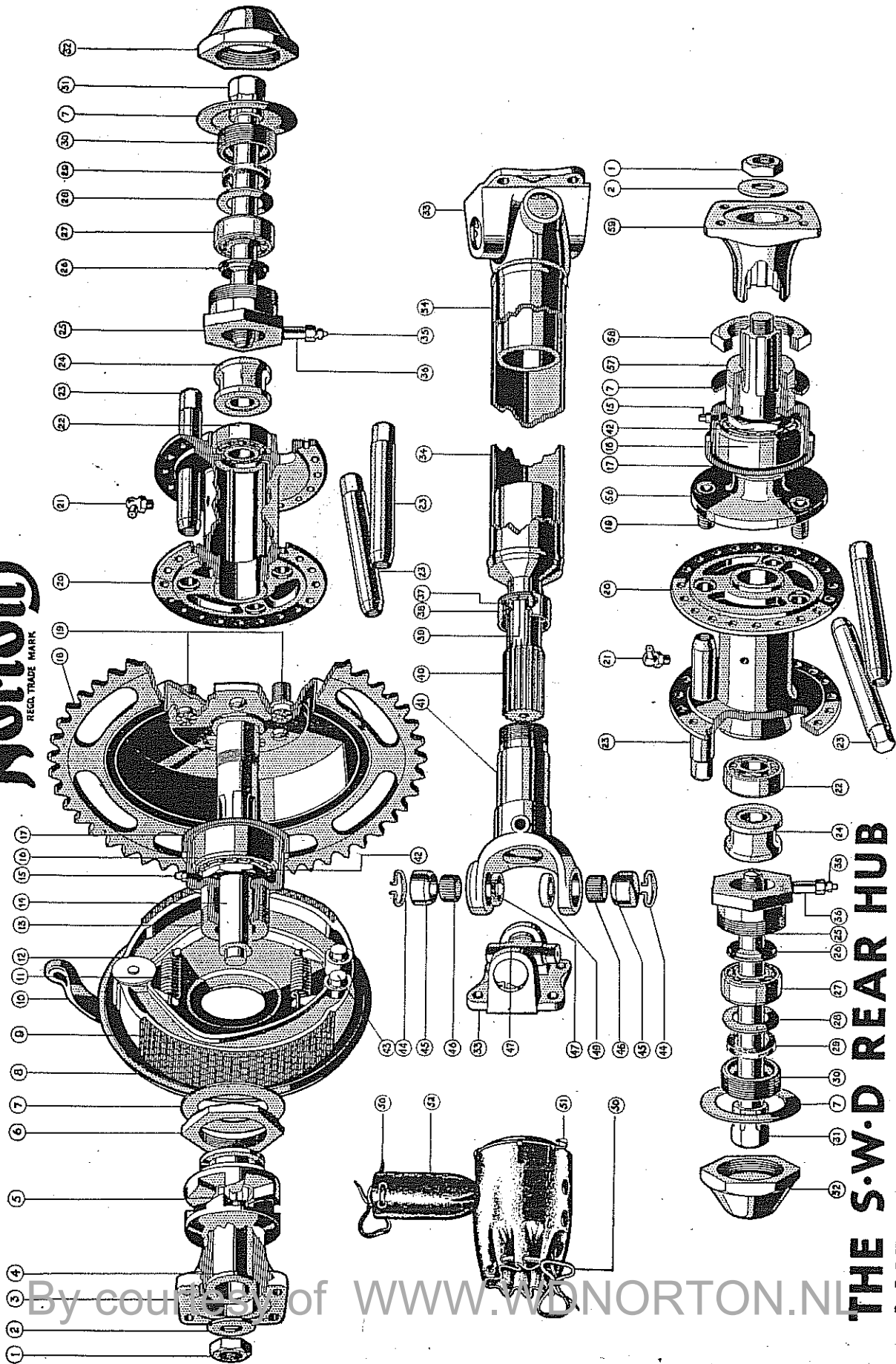


Fig. 28.

**THE S.W.D. REAR HUB
AND SIDECAR DRIVE**

By courtesy of WWW.WDNORTON.NL

S.W.D. REAR HUB AND SIDECAR DRIVE

1. Dog Clutch Free Member Retaining Nut.
2. Dog Clutch Free Member Retaining Nut Washer.
3. Dog Clutch Free Member.
4. Dog Clutch Free Member Bush.
5. Dog Clutch Sliding Member
6. Large Bearing Rear Housing Nut.
7. Large Bearing Rear Housing Nut Washer.
8. Rear Brake Plate.
9. Rear Brake Shoe and Lining.
10. Rear Brake Cam Lever.
11. Rear Brake Shoe Return Spring.
12. Rear Brake Cam.
13. Large Bearing Housing Rear.
14. Rear Wheel Stub Axle.
15. Grease Gun Nipple.
16. Large Bearing.
17. Large Bearing Housing Locking Ring.
18. Rear Wheel Sprocket and Brake Drum.
19. Rear Wheel Driving Stud.
20. Rear Hub.
21. Hub Grease Gun Nipple.
22. Hub Bearing.
23. Wheel Driving Stud Sleeve Nut.
24. Hub Spindle Distance Piece.
25. Small Bearing Housing.
26. Small Bearing Distance Piece.
27. Small Bearing.
28. Small Bearing Housing Pen Steel Washer.
29. Small Bearing Housing Locking Ring Felt Washer.
30. Small Bearing Locking Ring.
31. Wheel Spindle.
32. Small Bearing Housing Nut with Dust Cap.
33. Universal Joint Shaft Flange Yoke.
34. Tubular Shaft Assembly.
35. Grease Gun Nipple.
36. Grease Gun Nipple Extension Piece.
37. Spline Dust Cover Oil Retaining Washer.
38. Spline Dust Cover.
39. Spline Dust Cover Oil Retaining Spring Washer.
40. Splined Portion of Shaft.
41. Universal Joint Shaft Sleeve Yoke.
42. Large Bearing Locking Nut (Rear).
43. Rear Brake Shoe Pivot Pin.
44. Universal Joint Snap Ring.
45. Universal Joint Needle Bearing Dust Cap.
46. Universal Joint Needle Bearing.
47. Universal Joint Journal Assembly.
48. Needle Bearing Dust Cap Oil Retaining Washer.
49. Needle Bearing Dust Cap.
50. Dog Clutch Gaiter Leather Lace.
51. Dog Clutch Gaiter Circlip, pin and bolt.
52. Dog Clutch Gaiter.

Remove the two nuts at the back of the box. These nuts lock the pawl carrier stop 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 screw-driver slot will have to be held while the nut is removed.

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

58. 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 screw-driver.

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.

REAR WHEEL AND STUB AXLE

59. REMOVAL OF REAR WHEEL. (Fig. 29.)

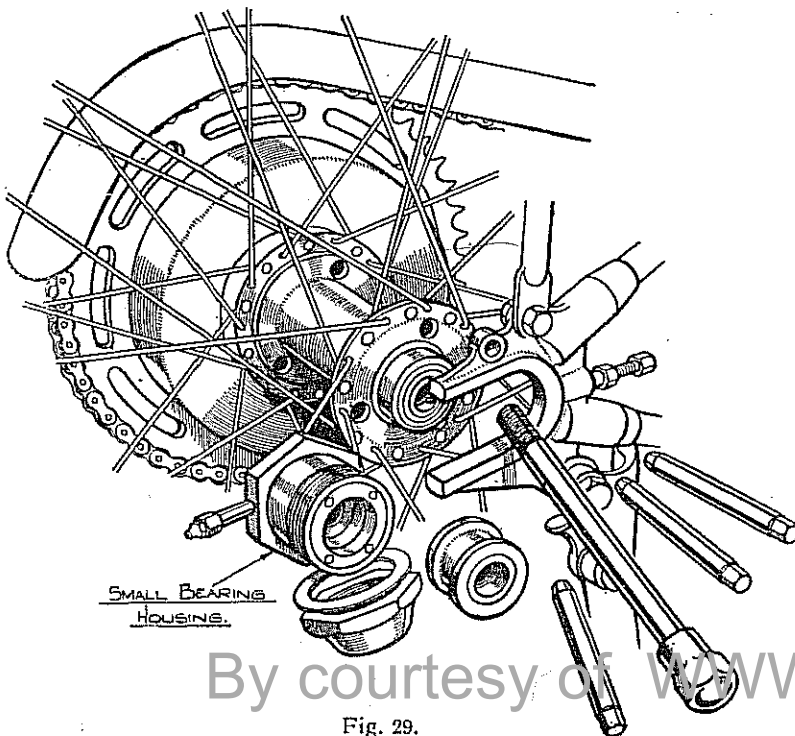


Fig. 29.

Disconnect rear lamp wire, by breaking the connection a few inches from the lamp. Roll back the rubber tube over the connector, screw out the brass sleeve and the wire is free.

Remove the tail piece of the rear mudguard, complete with lamp, and stays. The rear portion is held to the remainder of the guard by two pins, the stays by a nut each side of the frame on a stud screwed into each fork end.

Jack-up rear wheel.

Remove the three wheel sleeve nuts.

Remove the small bearing housing nut and washer.

Remove the spindle.

Remove the distance piece.

Pull the wheel towards the offside, clear of the driving studs, and the wheel is free.

60. FITTING OF WHEEL TO FRAME.

Fit wheel to the driving studs.

Fit driving stud nuts.

Fit small bearing housing to the fork end

of the frame.

Fit distance piece between hub and housing.

Fit spindle.

Fit housing domed nut and washer.

Before finally tightening the domed nut, ensure that the housing is against the chain adjuster.

61. DISMANTLING OF HUBS.

(All the hubs are interchangeable.)

There is one single row ball bearing pressed into the hub on the side with the plain spoke flange

All the hubs are fitted with this bearing, but the bearing only operates when the wheel is used as a front.

62. REMOVAL OF REAR BRAKE AND STUB-AXLE. (Fig. 28.)

Remove rear wheel. (Para. 59.)

Remove winged nut from the end of the brake rod.

Remove guard from sidecar wheel drive dog clutch, held by three bolts, one attached to a clip on the nearside sidecar spring, one to the end of the bolt holding the rear end of the sidecar chassis to the frame, and one to the frame fork end.

Remove dog clutch leather gaiter held by circlip and leather lace.

Remove shaft held by four hexagon headed bolts to the dog clutch free member.

Remove the dog clutch operating lever pivot bolt and nut.

Remove the dog clutch operating lever.

Remove the dog clutch free member, held by nut and washer.

Remove the dog clutch sliding member from the splined shaft.

Remove the rear chain guard, held by two bolts, one on the carrier stay, and one on the back portion of the oil bath.

Remove the rear chain from the sprocket.

Remove the rear brake anchorage bolt, holding the rear brake arm to the frame.

Release the large housing nut and the brake assembly can be removed from the fork end of the frame.

63. FITTING OF THE REAR BRAKE AND STUB AXLE TO THE FRAME.

Fit the parts in the reverse order of dismantling.

The large bearing housing must be hard against the chain adjuster.

Fill the leather gaiter with grease when fitted.

Fit the spring link to the chain with the closed end of the spring clip facing the direction of travel.

64. DISMANTLING OF THE REAR BRAKE AND STUB AXLE.

Remove rear wheel. (Para. 59.)

Remove rear brake and stub axle. (Para. 62.)

Remove large housing nut and washer.

Remove grease nipple and extension from housing.

Remove brake plate.

Hold the housing in a vice and remove the large nut at the rear of the housing with a "C" type spanner. While removing the nut, it will bind against the axle. A tap on the end of the axle will ease the nut.

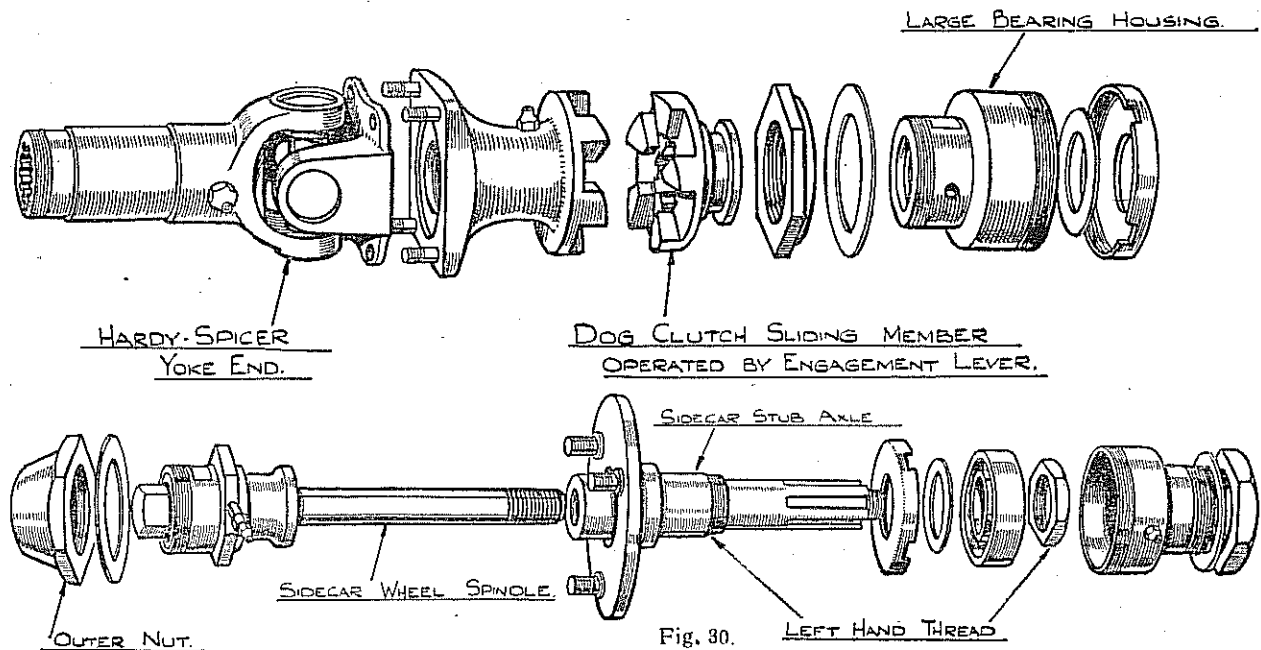


Fig. 30.

Remove the axle and bearing from the housing.

Remove the locking washer and cap retaining the bearing to the axle.

Remove bearing from the axle.

Remove the cap with dust excluding washer.

65. ASSEMBLY OF REAR BRAKE AND STUB AXLE.

Fit housing cap and dust excluding washer to axle.

Fit bearing to axle.

Fit bearing retaining nut and locking washer. Seal washer.

Grease bearing.

Fit housing over the bearing and screw the cap to the housing.

Tighten cap, occasionally tapping the housing to ensure that it is right home when the cap is tight.

Seal the cap with a centre punch.

Fit brake plate.

Fit grease nipple and extension.

Fit assembly to frame. (Para. 63.)

SIDECAR WHEEL AND STUB AXLE

66. REMOVAL OF SIDECAR WHEEL.

Jack-up sidecar wheel.

Remove the three wheel driving sleeve nuts.

Remove the dome nut on the small housing.

Remove the spindle.

Remove the distance piece.

Pull the wheel from the driving studs and wheel is free.

Refit in the reverse order.

67. THE DISMANTLING AND ASSEMBLY OF THE SIDECAR WHEEL STUB AXLE.

The dismantling and assembly of the stub axle is the same as for the rear (Para. 64) with the exception that the nut holding the large bearing in position has a LEFT HAND THREAD, and the bearing housing lubricator is fitted into the housing without the extension.

68. DISMANTLING OF THE SMALL HOUSINGS.

The small housings in the rear and sidecar wheels are identical.

At the threaded end of the small housing, a locking ring is fitted.

Remove locking ring. A felt washer is fitted into the ring.

Press out bearing and distance piece.

69. RE-ASSEMBLY OF SMALL HOUSINGS.

Fit distance piece in housing, with the larger diameter against bearing.

Press bearing into housing.

Grease bearing.

Fit pen steel washer against bearing.

Fit felt washer.

Fit locking ring.

When pressing in the bearing, place housing on a piece of tubing with an inside diameter slightly larger than the hole in the housing. This will allow the smaller diameter of the distance piece to protrude through the housing.

BRAKES

70. DISMANTLING OF THE BRAKES.

(Both the brakes are the same.)

Rear brake is removed from the machine with the stub axle. (Para. 62.)

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.

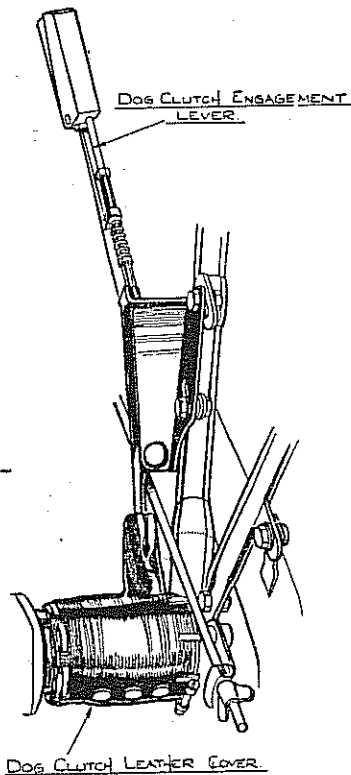


Fig. 31.

71. 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.

Fit rear brake to stub axle. (Para. 65.)

Fit front brake to wheel. (Para. 75.)

72. REMOVAL AND FITTING OF FRONT WHEEL TO FORKS.

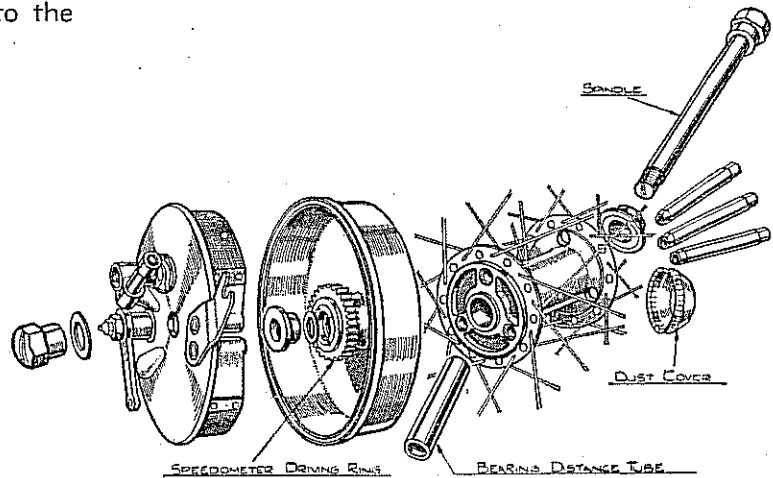


Fig. 32.

The front wheel with the brake drum is removed as one unit.

Use the front stand to hold the wheel from the ground.

Remove the "U" Clip connecting the front brake cable to the brake lever.

Remove the speedometer cable from the speedometer gearbox.

Slacken-off the spindle nut and the wheel can be removed from the fork ends.

Replace wheel assembly in the reverse order.

73. REMOVAL OF FRONT WHEEL FROM BRAKE DRUM. (Fig. 32.)

(This is necessary when fitting the spare wheel to the forks.)

Remove wheel from forks. (Para. 72.)

Remove the three driving stud nuts.

Remove the spindle.

The wheel is now free from the drum.

When the wheel is removed from the drum, the inner sleeve fitted between the two ball races is released.

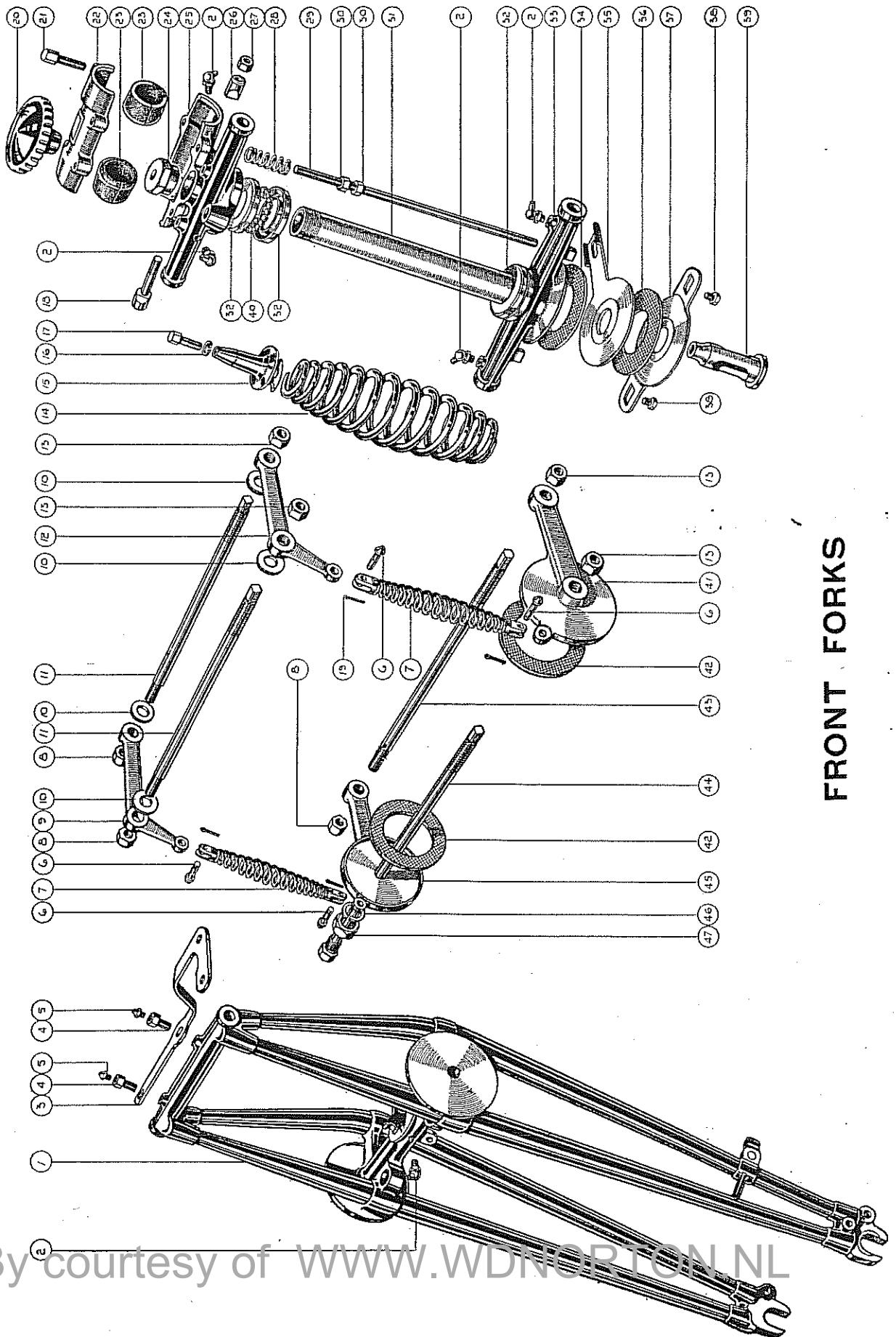
74. DISMANTLING OF FRONT BRAKE AND HUB.

Remove wheel from the forks. (Para. 72.)

Remove brake drum from wheel. (Para. 73.)

Remove brake shoes from brake plate. (Para. 70.)

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FRONT FORKS

By courtesy of WWW.WDNORTON.NL

FRONT FORKS

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

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.

On the other side of the brake drum the double row bearing is pressed into the drum, and retained with a locking ring.

75. ASSEMBLY OF THE FRONT BRAKE AND HUB.

Fit gearbox to plate.

Fit brake shoes to the plate. (Para. 71.)

Fit bearing to drum.

Fit pen steel washer and felt washer.

Fit locking ring.

Fit speedometer driving wheel to drum.

Fit distance piece into hub and retain in position by spindle until wheel is fitted.

Fit wheel to drum.

Fit spindle through hub from the side

opposite to the drum, and test the width of the driven wheel of the speedometer that is engaged with the driving wheel.

This can be adjusted by the amount the gearbox is screwed into the plate.

Fill the teeth of the driving wheel with a thick grease.

Fit the brake plate.

Revolve the plate in the drum.

On examination of the driving wheel, it will be seen that the driven wheel has forced the grease from the portion of the teeth with which it has engaged.

The entire width of the small driven wheel should be engaged.

Screw gearbox into or out of the plate to the required position.

Lock box in position with the nut.

Remove spindle.

Fit distance piece and dust cover, the large diameter of the distance piece against the ball race.

Fit spindle through hub with the screwed end at the brake side.

Fit brake plate.

Fit steel washer against plate.

Fit nut to spindle.

Fit wheel to forks. (Para. 72.)

FRONT FORKS

76. 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 handlebars. The handlebars are held in an extension of the fork head clip, which is in two halves, the bottom a part of the head clip, the top a half clip. Round the portion of the bar held by the handlebar clip rubber shock absorbers are fitted.

The rubbers fit in the clip and the assembly is held by four bolts.

A flat spring plate is attached to the bar and held to the fork head clip by two bolts.

Remove the two bolts holding the spring to the fork head clip.

Remove the four bolts holding the bars in the handlebar clip, and remove the top half of the clip.

Lift the bars from the bottom half of the clip and they can be rested upon the tank.

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 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.

77. 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 bearings to the race at the bottom of the fork column. The same method can be used.

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 panel to the back of the head lamp.

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 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.

78. DISMANTLING OF FORKS.

Remove forks from the frame. (Para. 76.)

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.

79. 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.

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 nearside 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

80. IGNITION AND AIR CONTROL LEVERS.

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 concave side uppermost.

Fit large washer.

Fit spring tension washer, concave side against lever.

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.

81. 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 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.

82. 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.

The return spring will have to be refitted to the cable before the cable is fitted to the operating arm.

83. TWIST GRIP.

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.

Fit and tighten the two bolts.

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

Dismantle in the reverse order.

SIDECAR

84. REMOVAL OF SIDECAR FROM THE MACHINE.

Disconnect the three lighting lead wires to the sidecar. The wires are connected by brass terminals situated near the battery, covered with rubber tubing.

The lead with the red marking connects

the positive of the battery to the axle light switch.

The lead with the white and mauve markings connects the axle switch to the tail lamp.

The lead with no marking connects the sidecar lamp to the switch in the back of the head lamp.

Remove the dog clutch shield. (Para. 62.)

Disconnect the driving shaft from the dog clutch free member. (Para. 62.)

Remove the nut holding the centre sidecar arm to the machine. The nut is on the offside of the machine beneath the saddle.

Release the bolt on the centre arm on the nearside of the machine, and remove the centre arm from the frame.

Remove the large hexagon nut on the bolt holding the rear sidecar arm to the fork end of the frame.

Remove the nut and bolt holding the sidecar chassis to the front sidecar arm and the front of the sidecar chassis will be free from the machine, leaving the front arm attached to the machine.

Obtain assistance to hold the machine while the rear of the chassis is lifted from the bolt attached to the fork end of the machine.

Re-assemble in the reverse order.

85. ALIGNMENT OF SIDECAR CHASSIS TO MACHINE.

When sidecar chassis is fitted to the machine it is necessary to check the alignment of the machine and the chassis. The sidecar wheel should "toe-in" $1\frac{1}{2}$ inch in the length of the machine.

Place a straight edge against the machine wheels, touching at four points, front and rear of the rear wheel and the front and rear of the front wheel.

Mark the ground directly in front of the front wheel and directly at the rear of the rear wheel.

Place the straight edge against the sidecar wheel touching both sides of the wheel, and mark the ground opposite the previous marks.

Measure the distance between the two rear marks, and the distance between the front marks.

The distance between the front marks should be $1\frac{1}{2}$ inch less than between the rear.

The position of the sidecar wheel can be altered by the length of the centre arm and the position of the rear arm on the rear chassis tube.

Release the two clip bolts holding the rear arm to the chassis and the clip bolt on the centre arm, and the rear of the sidecar chassis can be moved to the position giving the correct "toe-in."

Tighten the clip bolts and re-check the alignment.

86. REMOVAL OF SIDECAR BODY FROM CHASSIS.

Remove the axle lamp and switch from the body.

Disconnect shock absorber from the body.

Remove the four coach bolts, two at the front and two at the rear, holding the body to the chassis.

The springs are held to the chassis by "U" clips and nuts.

When fitting the rear springs to the chassis, the end of the springs should pass the front "U" clip by 1 inch.

87. THE SUB-FRAME.

The sub-frame is held to the rear of the machine by two bolts at the top of the seat tube, and a nut and bolt on each of the two frame fork ends.

The sub-frame carries the pillion saddle and the pillion handle.

The saddle is held to the sub-frame by a bolt and nut at the nose of the saddle frame, on which the saddle pivots, and the two springs are held by two bolts to lugs.

88. THE SADDLE.

The saddle on the frame is attached in the same manner as the one on the sub-frame.

AMAL CARBURETTER

89. DISMANTLING OF THE CARBURETTER. (Fig. 34.)

Shewing
air valve and
throttle closed.

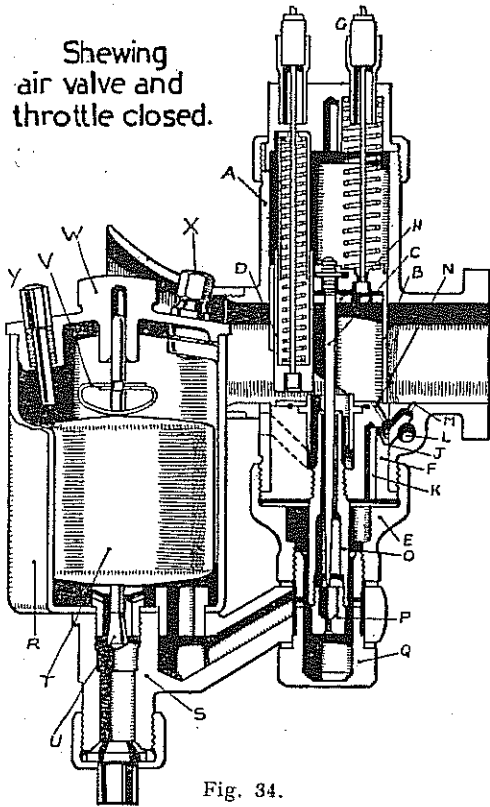


Fig. 34.

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

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

Remove the carburettor. (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.

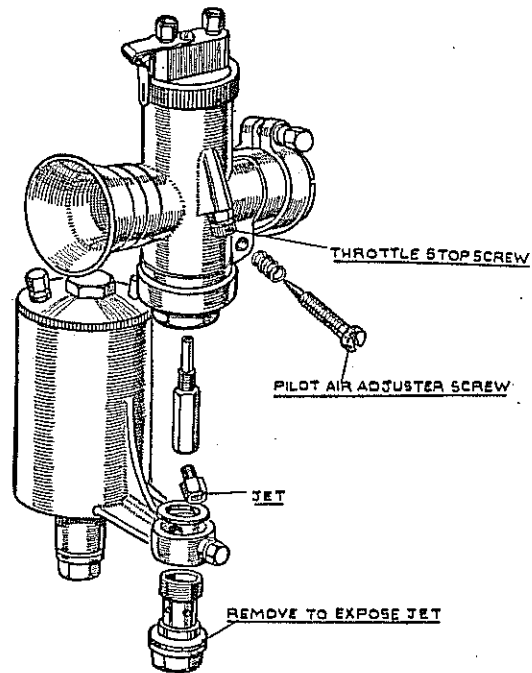


Fig. 35.

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.

90. 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.

Fit slides to the cables.

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

91. TYRES.

Components:—

- One cover.
- One inner tube.
- One wheel.
- One rubber rim band.
- Two security bolts. (Type W.M.3-18.)

Tools required:—

- Two tyre levers. (Motor cycle pattern.)
- One 5-16-inch spanner, Whitworth.

Removal Instructions:—

Deflate tube.

Loosen nuts on the security bolts, and push bolts 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 bolts and the inside of the rim.

Fit one side of the cover to the rim.

Fit security bolts 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 first 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 second security bolt and the valve.

Fit the second bolt as the first, and fit the 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 bolts.

Bounce the wheel at the points where the security bolts are fitted and tighten the security bolt nuts with spanner.

ELECTRICAL SECTION

IGNITION

"MAGDYNO" TYPE M01.

Routine Maintenance.

92. 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. 36.)

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.

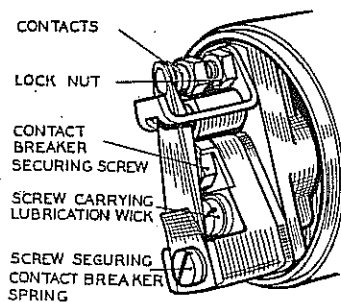


Fig. 36.

93. 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.

94. 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 93), or there may be an internal fault in the magneto.

The following procedure should, therefore, be adopted.

95. 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 fine carborundum stone or very fine emery cloth; afterwards wipe away any dirt or metal dust with a petrol-moistened cloth.

Cleaning of the contacts is made easier if the spring arm carrying the moving contact is removed as described in paragraph 92.

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

Adjust as described in paragraph 93.

96. 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 $\frac{1}{4}$ 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.

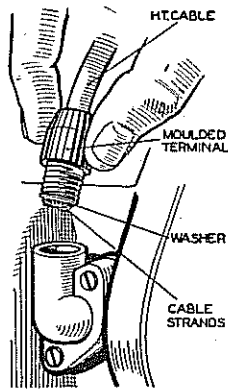


Fig. 37.

97. 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.

98. SUPPRESSOR AND IMMOBILIZER.

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

Always disconnect lead at spark plug end before unscrewing immobilizers.

99. 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.

100. 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.

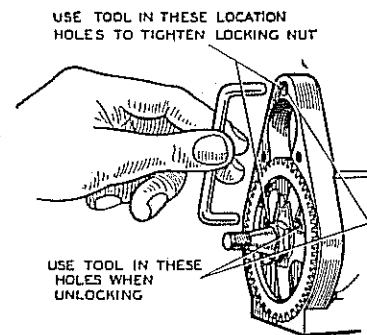


Fig. 39.

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.

101. DISMANTLING.

Remove the dynamo and take off the driving end cover by unscrewing the four counter-sunk 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. 39.)

This consists simply of a length of $\frac{1}{4}$ inch diameter mild steel rod bent to a flat "U," the ends being cut short with their centres 3 3-16 inch

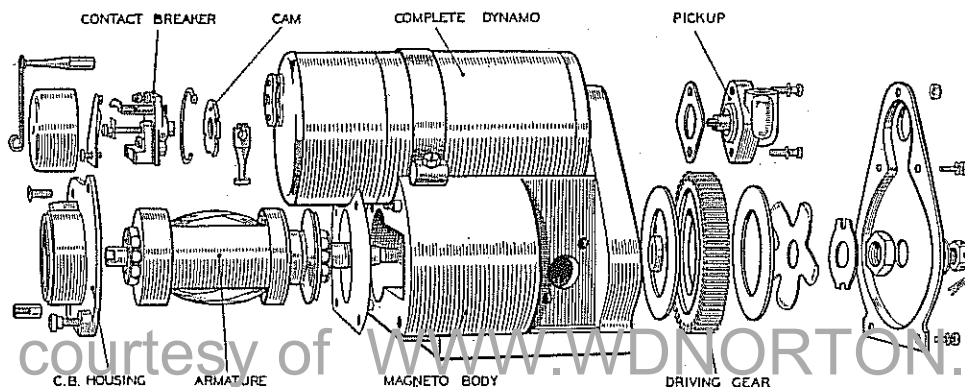


Fig. 38.

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.

102. 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.

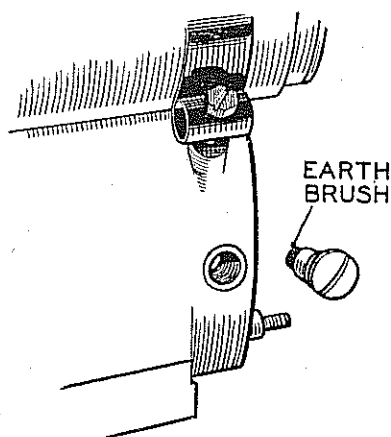


Fig. 40.

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. 40.)

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 end cause the armature to bind.

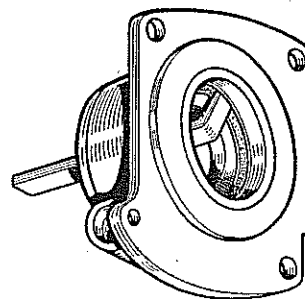


Fig. 41.

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. 41.)

103. 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.

104. RE-ASSEMBLING.

Wash the bearings in petrol.

Dry thoroughly and repack with high melting point grease.

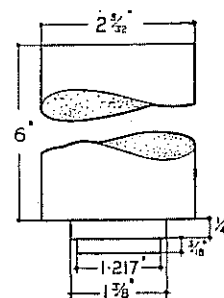


Fig. 42.

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. 42.)

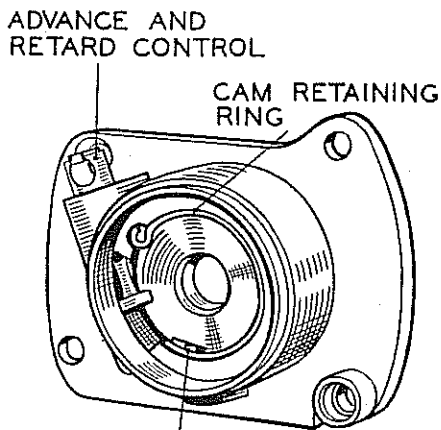
The serrated fibre washer must be fitted behind the journal to prevent any electric current from damaging the bearing.

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.



ADVANCE AND RETARD STOP

Fig. 43.

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. 43.)

(Note that the cam is fitted with its 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. 44.)

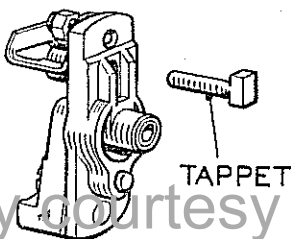


Fig. 44.

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

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

105. RE-ASSEMBLING AND TESTING SLIPPING CLUTCH. (Fig. 45.)

Key the gear centre onto the spindle.

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

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.

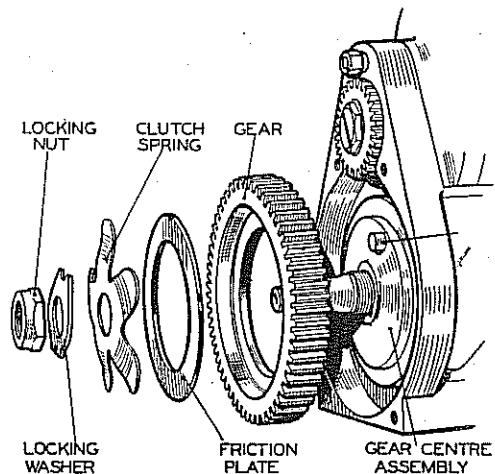


Fig. 45.

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.

106. 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 terminals '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 $\frac{1}{2}$ volt, the field winding may be at fault.

If there is a reading of approximately $1\frac{1}{2}$ to 2 volts, the armature winding may be at fault.

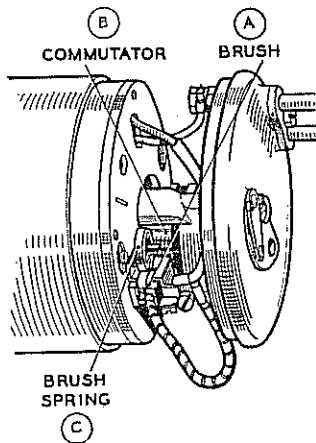


Fig. 46.

Remove the dynamo cover band and examine the brushes and commutator. (Fig. 46.)

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. 107.)

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. 114.)

107. 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.

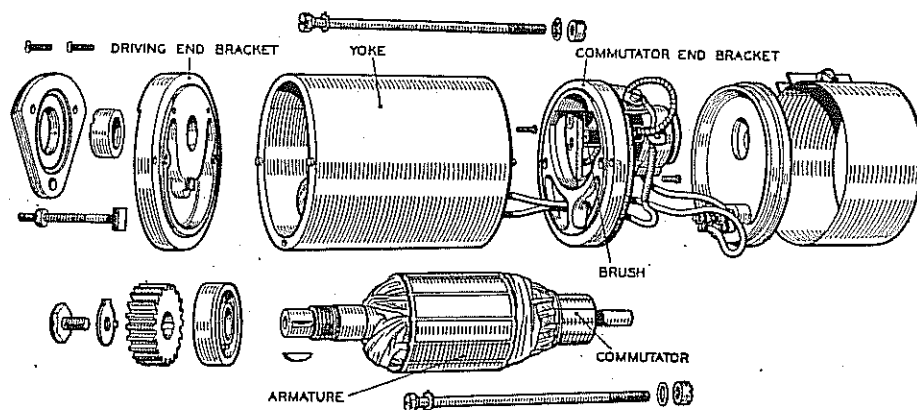


Fig. 47.

108. DYNAMO—DISMANTLING. (Fig. 47.)

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.

109. 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.

Test the brush springs with a spring scale if available.

The correct tension is 10—15 ozs. (Fig. 48.)

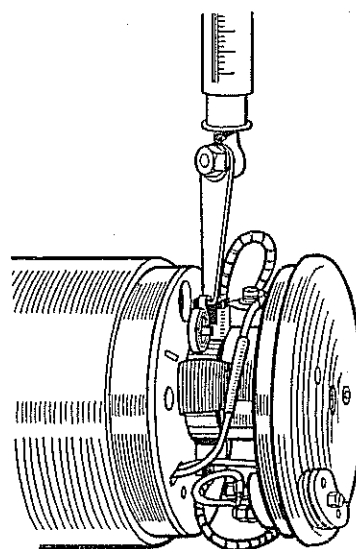


Fig. 48.

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.

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. 49.)

Do not remove more metal than is necessary.

Polish the commutator with very fine glass paper.

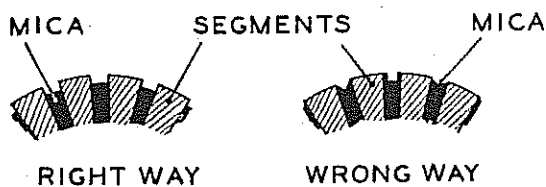


Fig. 49.

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.

110. 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.

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.

111. 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 $\frac{2}{3}$ ths 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.

112. DYNAMO-REASSEMBLY.

In the main, the reassembly of the dynamo is a reversal of the operations described in Paragraph 108, 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.

113. 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.

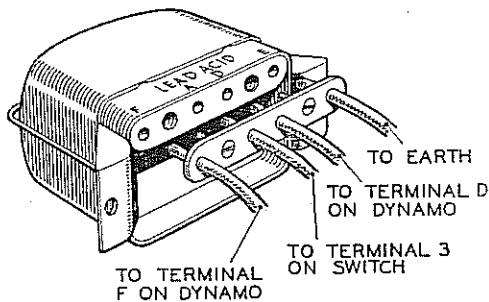


Fig. 50.

114. 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. 50.)

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.

115. REGULATOR—CLEANING THE CONTACTS. (Fig. 51.)

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.

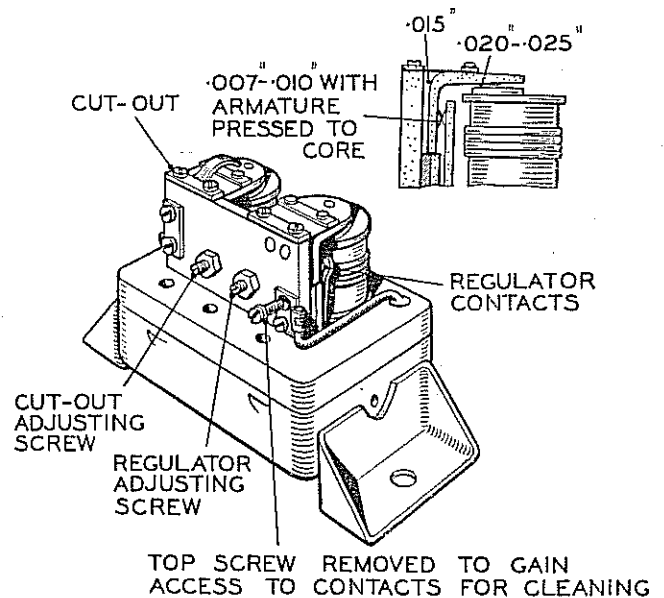


Fig. 51.

116. 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.

117. CUT-OUT.

If the regulator setting is within the correct limits, but the battery is still not receiving current from the battery, 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 voltmeter 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 an 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.

118. 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.

Ammeter—Removal and Replacement.

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.

119. 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.

LIGHTING AND ACCESSORIES

120. HEADLAMP TYPE DU42.

Removing Lamp Front and Reflector. (Fig. 52.)

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.

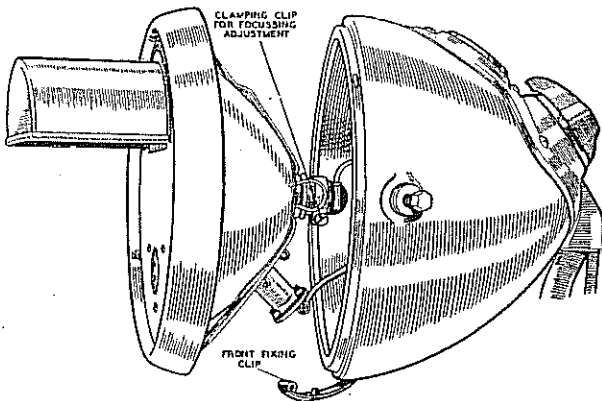


Fig. 52. Headlamp—Reflector partially removed.

Setting and Focussing.

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

To obtain the best driving light, the bulb should be correctly focussed in the reflector.

To adjust the position of the bulb, remove the front and 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.

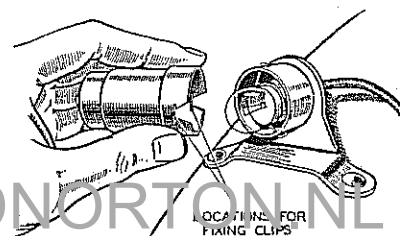


Fig. 53.

121. TAIL LAMP TYPE L-WD-MCT1. (Fig. 53.)

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.

122. SIDECAR LAMP TYPE RC. 330. (Fig. 54.)

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

To gain access to the bulb, withdraw the securing screw on the lamp stem and then pull the body away from the base.

The bulb can then be removed from its holder.

Replace the lamp body and secure with the screw.

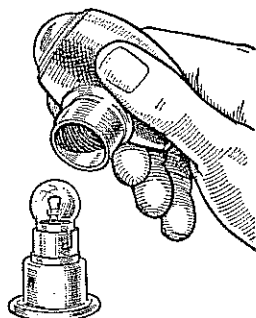


Fig. 54.

123. AXLE FLOODLIGHT. TYPE L-WD-AF1.

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

The method of replacing the bulb is as described for the Tail Lamp.

124. 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.

125. 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 sleeveings.

The colour scheme and the diagram of connections are shown in the wiring diagram.

When making connections to the switch, bare the end of the cable for about $\frac{3}{8}$ 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.

126. 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.

127. METHOD OF ADJUSTING. (Fig. 55.)

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.

A horn may give a good note, yet be out of adjustment and taking an excessive current.

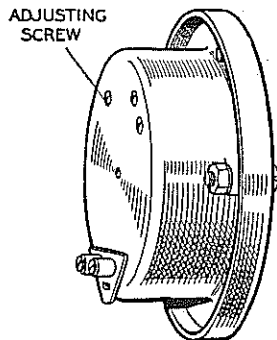


Fig. 55.

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.

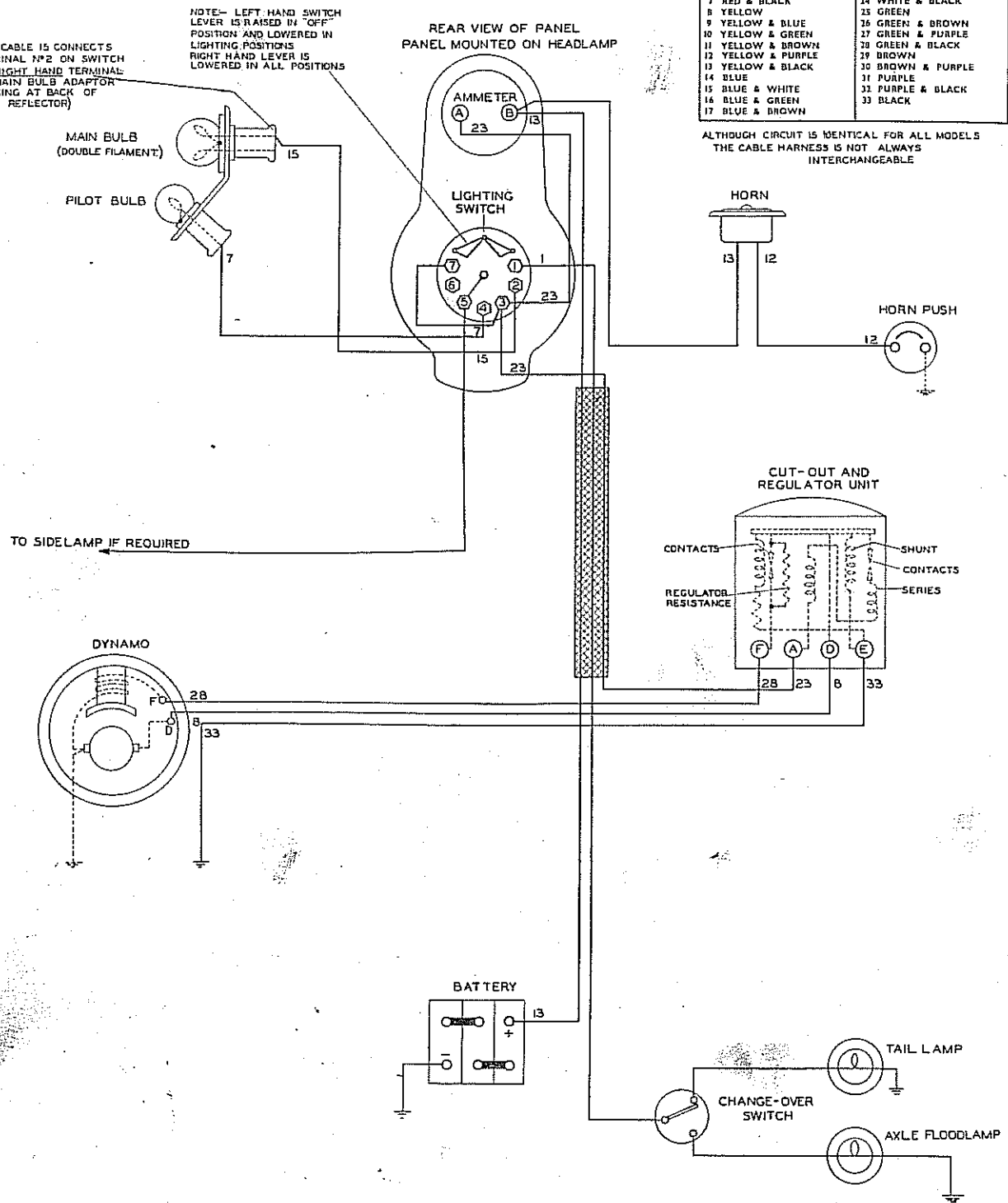
The current, when the horn is adjusted to give its best performance must not exceed 4—5 amperes.

NOTE:- CABLE 15 CONNECTS TERMINAL N°2 ON SWITCH TO RIGHT HAND TERMINAL OF MAIN BULB ADAPTOR (LOOKING AT BACK OF REFLECTOR)

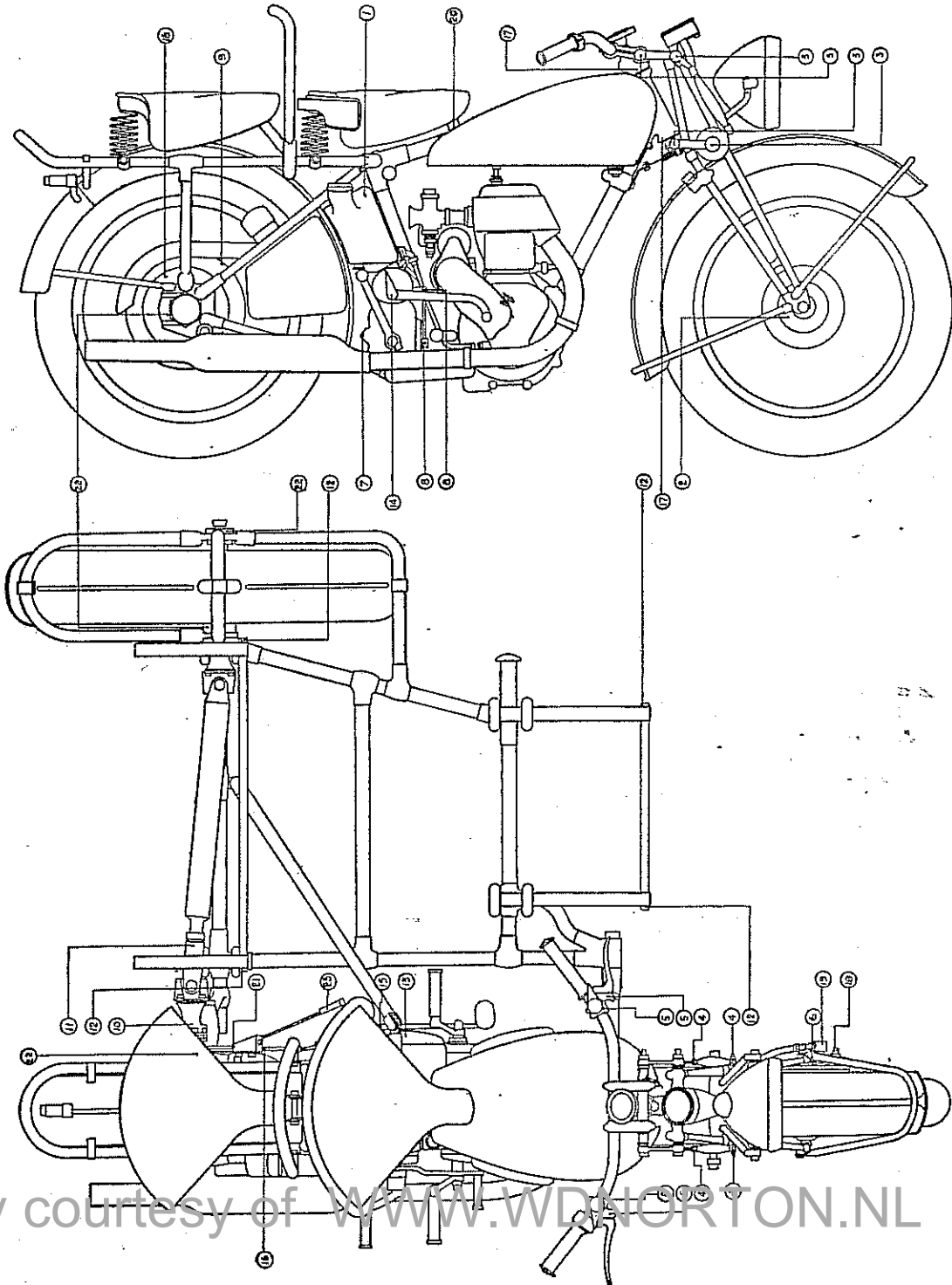
NOTE:- LEFT HAND SWITCH LEVER IS RAISED IN "OFF" POSITION AND LOWERED IN LIGHTING POSITIONS
RIGHT HAND LEVER IS LOWERED IN ALL POSITIONS

KEY TO CABLE COLOURS	
1 RED	18 BLUE & PURPLE
2 RED & YELLOW	19 BLUE & BLACK
3 RED & BLUE	20 WHITE
4 RED & WHITE	21 WHITE & GREEN
5 RED & GREEN	22 WHITE & BROWN
6 RED & BROWN	23 WHITE & PURPLE
7 RED & BLACK	24 WHITE & BLACK
8 YELLOW	25 GREEN
9 YELLOW & BLUE	26 GREEN & BROWN
10 YELLOW & GREEN	27 GREEN & PURPLE
11 YELLOW & BROWN	28 GREEN & BLACK
12 YELLOW & PURPLE	29 BROWN
13 YELLOW & BLACK	30 BROWN & PURPLE
14 BLUE	31 PURPLE
15 BLUE & WHITE	32 PURPLE & BLACK
16 BLUE & GREEN	33 BLACK
17 BLUE & BROWN	

ALTHOUGH CIRCUIT IS IDENTICAL FOR ALL MODELS THE CABLE HARNESS IS NOT ALWAYS INTERCHANGEABLE



ITEM NO.	PART	W.D. OIL	TASK NO.
1	OIL TANK, TOP UP	M.220	2
2	FRONT WHEEL HUB BEARING	G.S. GREASE	PERIODIC MAINTENANCE
3	FORK SPINDLES	G.S. GREASE	4
4	REBOUND SPRING PIVOT PINS	G.S. GREASE	4
5	CONTROL CABLES AND LEVERS	M.220	4
6	FRONT BRAKE "U" CLIP	M.220	4
7	GEARBOX, TOP UP	M.220	5
8	GEARBOX CONTROL ROD PINS	M.220	4
9	REAR CHAIN	G.S. GREASE	5
10	DOG CLUTCH	G.S. GREASE	4
11	SCAR WHEEL DRIVING SHAFT (SPINDLE SHIFTER)	G.S. GREASE	4
12	SCAR SPRING PIVOT OR SHACKLE	M.220	4
13	OIL BATH (PRIMARY CHAINCASE)	M.220	5
14	CHANGE SPEED PISTON CONTROL	G.S. GREASE	4
15	REAR BRAKE PEDAL PIVOT	G.S. GREASE	4
16	BRAKE JAW JOINTS	M.220	4
17	STEERING HEAD BALL RACES	G.S. GREASE	4
18	BRAKE SHOE CAM SPINDLE	G.S. GREASE	PERIODIC MAINTENANCE
19	SPEEDOMETER DRIVE GEARBOX	G.S. GREASE	4
20	SADDLE PIVOT	M.220	4
21	DOG CLUTCH OPERATING LEVER	M.220	4
22	WHEEL SPINDLE BEARINGS	G.S. GREASE	4
23	DOG CLUTCH OPERATING LEVER HANDLE	M.220	4



TLC 361

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