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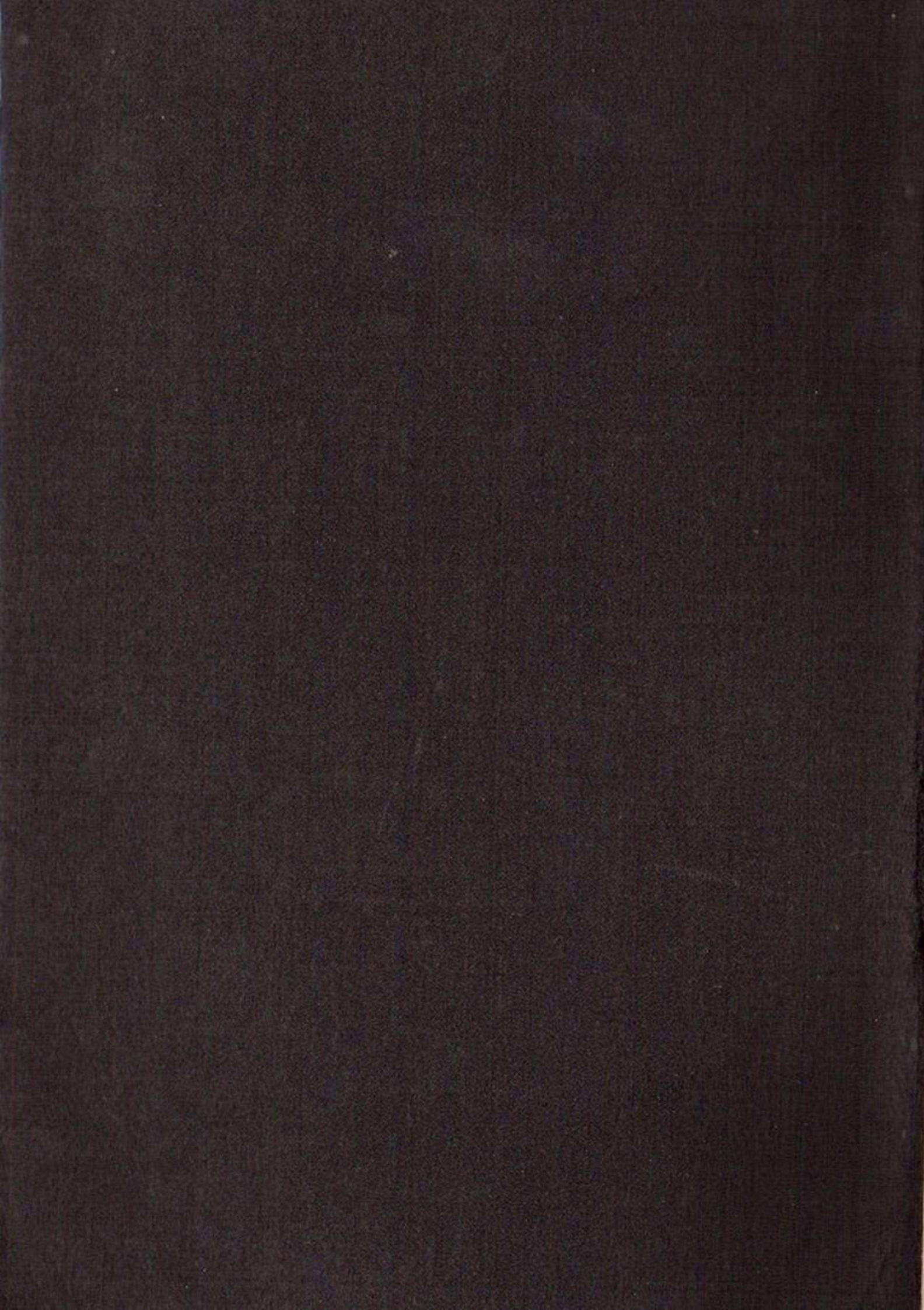
The
Driver's Handbook

Motor Cycle, Solo

Norton
REGD TRADE MARK

Model "16 H"

490 cc. Side Valve



DATA SHEET.

Carburetter	...	Make: AMAL. Type: 276AE/IBE. Jet size: 170.
Gear Ratios	...	5.28. 6.39, 9.35, 15.7.
Chains	... ..	Rear: $\frac{5}{8}$ in. pitch \times .250in. wide. No. of links, 91. Front: $\frac{1}{2}$ in. pitch \times .305in. wide. No. of links, 74. Magdyno: $\frac{3}{8}$ in. pitch \times .155in. wide. No. of links, 42.
Petrol Tank	...	Capacity: $3\frac{1}{4}$ gallons approx.
Oil Tank	... ..	Capacity: 3 pints. (Use oil 50 H.D.)
Oil capacity of Gearbox		$\frac{1}{2}$ pint. (Use oil 50 H.D.)
Oil Bath (Front Chain Case)		Fill through inspection cover, with level plug removed. (Use oil 50 H.D.)
Oil Filter	...	Situated in the Oil Tank on the Adaptor, to which the oil feed pipe is attached.
Petrol Filters	...	On Petrol Taps.
Lubrication Nipples (except Hubs)		Oil C. 600.
Lubrication Nipples (Hubs)		Grease No. 2.
Sparking Plugs	...	K.L.G. K.S.5 or M.80 (18 m/m.).
Tyres	... ..	26in. \times 3.25in.
Wheel Rim	...	W.M. 2-19.
Lamp Bulbs	...	6 volts, double filament, single pole, 24 watt. 6 volt, single pole, 3 watt. 6 volt, single pole, 3 watt.

CONTROLS.

FOOT.

Brake Pedal.—Operated by left foot to apply the brake to the rear wheel.

Change-speed Lever.—Controls the four speeds or ratios between the engine and the rear wheel revolutions, with a neutral or free position.

Operates by depressing or lifting lightly with the right foot when changing gear.

Kick Starter.—On the right of the machine, below the saddle.

HAND.

Throttle Control (Twist Grip).—Controls the engine speed.

Operated by gripping with the right hand and twisting inwards to increase engine speed and outwards to reduce.

The full movement is approximately half a turn.

Air Control.—Single lever near right hand. Controls the additional supply of air to the engine, enabling the mixture of air and petrol to be varied according to conditions.

To increase the air supply move the lever inwards.

Front Brake Lever.—Inverted lever below right hand. Operates on the front wheel only.

Horn Button Switch.—Adjacent to the right thumb.

Ignition Control.—Single lever near the left hand; advances or retards the spark given by the magneto. Normal running position fully advanced.

Retard slightly when starting, slow running or pulling hard. Move the lever inwards to advance.

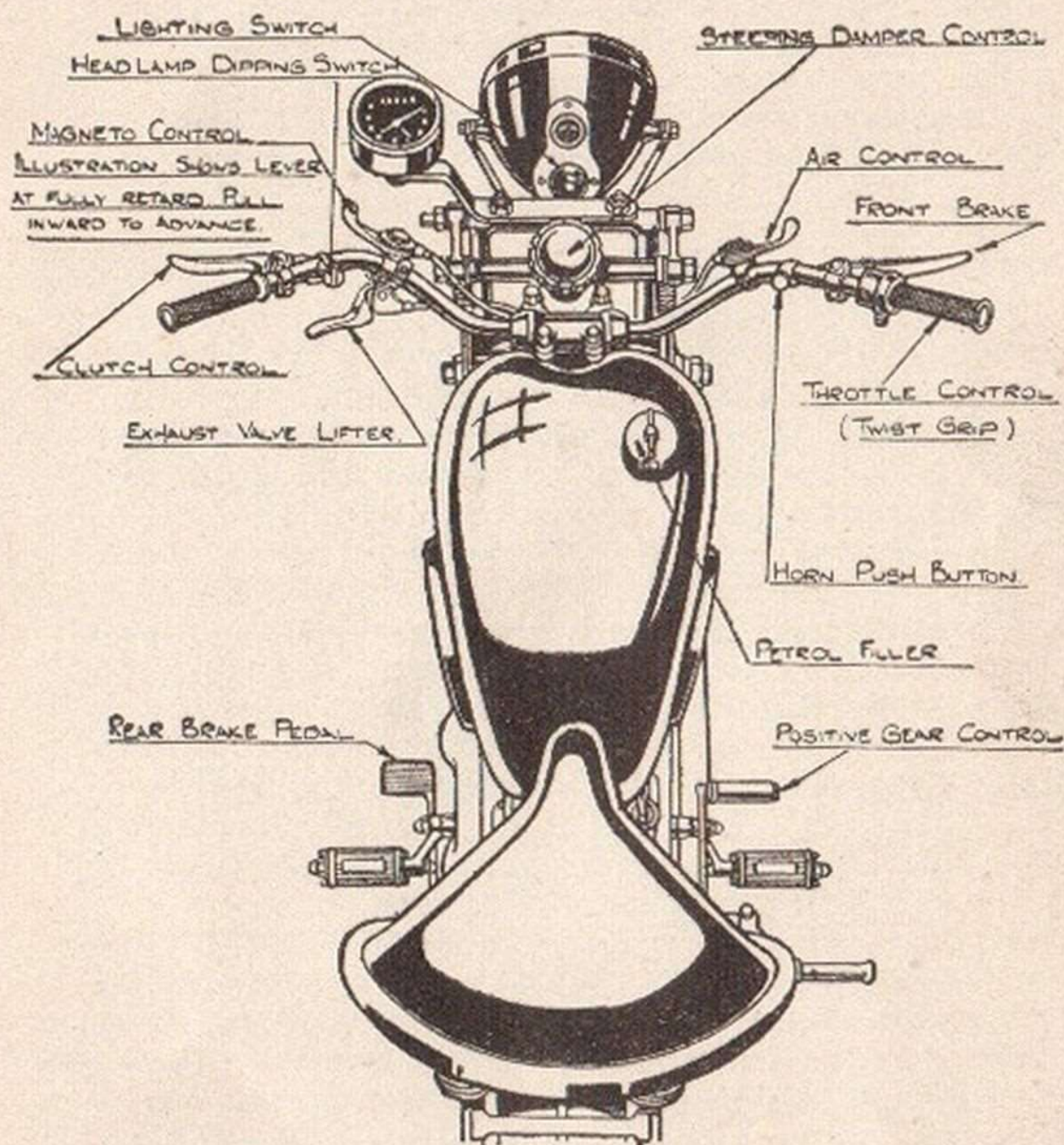
Clutch Lever.—Inverted lever below the left hand.

Disconnects the drive from the gearbox to the rear wheel. When engaging clutch, do so slowly, to enable the drive to be restored to the rear wheel gradually, without jerking.

Exhaust Lifter.—Small inverted lever below the left hand parallel with the clutch lever.

Lifts the exhaust valve from its seat, releasing compression from the combustion chamber, enabling the engine to be rotated easily.

Front Fork Damper.—Large hexagon nut on the offside of the fork assembly on the front bottom fork spindle. ONLY ADJUST THIS AFTER ADJUSTMENT HAS BEEN MADE TO THE FORK.



Steering Damper Control.—Milled knob in the centre of the handlebars on the fork column. Damps the

movement of the fork on the head ball races. Do not tighten down excessively. Use with discretion when travelling fast or over rough road. Turn milled knob in a clockwise direction to tighten.

Lighting Switch.—Controls the lighting of lamps by rotating the lever on the panel on the back of the head lamp. There are four positions:

1. All lamps off.
2. Tail lamp on.
3. Tail lamp and head Pilot on.
4. Tail lamp and head Main on.

On machines fitted with the modified type of lighting set, the main lighting switch is fitted to the offside rear chain stay.

This has four positions:—

Test.

Off.

T.—Tail lamp on.

H.—Tail lamp and Headlamp on.

The test position is provided to enable the rider to check that the dynamo is functioning correctly. To check the dynamo performance, start the engine and allow it to run at a fairly fast idling speed and place the switch to the Test position. If the dynamo is operating correctly, the tail light should light up brightly. As a further check of the charging, switch on the Headlamp with the engine stationary, and after two or three minutes start the engine, partly open the throttle and the charging is satisfactory if the brightness of the Headlamp increases.

The change-over switch fitted to the Headlamp is of the push operated type, by which means the driver can change the light from the main bulb to the pilot's bulb or vice versa.

Petrol Taps (2).—One on each side of the bottom of the petrol tank.

Operate slide by pressing the end with the hexagon head inwards to open; press the end with the round head inwards to close. Use one tap only, so that a small reserve of petrol is available when the second tap is used. This will give a reserve of petrol for a short distance.

Speedometer.—Registers motor cycle's speed and total mileage.

Ammeter.—Back of head lamp. Indicates flow of current into or out of the battery.

Oil Pressure Gauge.—Top of the crankcase, right hand side, plunger type. Plunger rises to indicate pressure in the system.

ENGINE STARTING.

Before using a new or strange motor cycle, sit astride on the saddle and become familiar with the position and operation of all the controls.

Check for petrol in the tank.

Check for oil in the oil tank; should be three-quarters full.

Check gear lever; gears must be in the neutral position.

Check by the indicator on the positive change.

Turn on the petrol, one tap only.

Close the air lever.

Set ignition lever at the two-thirds advanced position.

Note:—With cold engine only, depress the plunger on top of the carburetter float chamber until it is apparent (by feel) that the chamber is full of petrol. Do not allow the petrol to flood until it oozes out of the carburetter.

Free engine by depressing the kick-starter several times with the exhaust lifter control raised.

Set throttle slightly open.

Depress the kick-starter as far as possible WITHOUT using the exhaust lifter control.

Raise the exhaust lifter control.

Depress the kick-starter a further inch.

Release exhaust lifter control and allow the kick-starter to return to its normal position.

Give the kick-starter a long swinging kick, WITHOUT using the exhaust lifter control.

The engine should then fire.

If the engine back-fires, further retard the ignition, close the throttle a little, and try again.

Do not rest the foot on the kick-starter crank while the engine is running.

STOPPING THE ENGINE.

Close the throttle.

Raise the exhaust lifter control until the engine has stopped.

WARMING UP.

Slowly open the air control lever until the engine runs evenly.

Set the throttle control to a fast tick-over.

Check the oil pressure indicator; plunger should be right out.

Check the oil circulation by opening the oil tank filler cap, and the oil can be seen returning. Froth will be seen on the surface of the oil.

Do not race the engine when cold.

Allow time for the oil to circulate to all bearings.

If you are ordered to move off immediately, do not over rev. the engine or allow the engine to labour.

ON THE ROAD.

Sit astride the machine.

Disengage the clutch.

Engage the low gear.

Gear positions:

Bottom gear—lift the change-speed up from the neutral position.

Neutral—between bottom and second gear.

Push the level down sharply from bottom gear to engage the second gear.

Push the lever down from second to engage third.

Push the lever down from third to engage fourth (top gear).

(See indicator plate and pointer on change speed control box.)

Disengage the clutch while changing gear.

After engaging the first gear, slowly engage the clutch.

A good driver always makes a smooth get-away.

Note:—If the low gear will not engage at once, rock the machine backwards and forwards while attempting to engage the gear, and the gear will be felt dropping into position.

As the machine moves forward, slowly open the throttle. When under way (10 m.p.h.):—

Disengage the clutch, at the same time slightly close the throttle, to stop the engine from over-reving, and sharply push the change speed lever down, engaging second gear.

Engage clutch quickly and open throttle.

Note:—The engaging of the clutch and the opening of the throttle should be performed simultaneously. When a perfect change has been made the speed of the machine in the higher gear should be the same as when in the lower gear. This also applies when changing down; the machine should not jump forward when a higher gear is engaged or pull up when a lower gear is engaged.

Repeat the operation for changing up, at 25 m.p.h., and engage third gear.

Engage top gear at 35 m.p.h.

When changing down, disengage the clutch, open the throttle and pull the change speed lever upwards.

When the machine is under way, fully advance the ignition and open the air control lever as far as possible, allowing the engine to run evenly.

When an extra load is put on to the engine, and before it commences to labour, such as may occur in traffic, on a hill, or when cornering, it is necessary to change down to a lower gear.

Engine "knocking" or "pinking," and harshness in the transmission, are symptoms of such labour.

An experienced driver will anticipate these conditions before they occur.

Maximum permissible speeds on all gears during the "running in" period with a new or reconditioned engine (1st 500 miles):—

1st Gear	...	...	12	m.p.h.
2nd "	...	...	23	"
3rd "	...	...	35	"
4th "	...	...	40	"

POINTS TO WATCH.

Do not slip the clutch to control the road speed or on hills.

Do not allow the petrol to drip from the carburetter. If the carburetter floods, depress the plunger in the float chamber top, allowing a flush of petrol to pass the float needle seat and wash away any loose foreign matter on the seat.

If petrol, having been allowed to leak from the carburetter, catches fire, do not panic. Turn off the petrol, and if the engine is running, open the throttle as wide as possible to use up the petrol in the float chamber as soon as possible.

Do not allow the machine to fall to the ground; if possible, place the machine on to the stand.

Check the oil pressure and circulation before moving off. Remember that the gearbox is provided to be used.

Use the hand brake as well as the foot. Hand brake is as effective as the foot when travelling in a straight line.

When the machine is stopped at traffic lights or for any other reason, change to low gear as soon as stationary, enabling you to move off as soon as the obstruction in front is removed.

ENGINE LUBRICATION. (See Fig. page 24-25.)

The engine lubrication system is of the dry-sump type. Oil flows from the tank to the pump by gravity, assisted by suction from the feed side of the pump. From the pump, oil is forced to various parts of the engine, drains to the lowest part of the sump—the sludge trap—and returned to the tank by the return side of the pump.

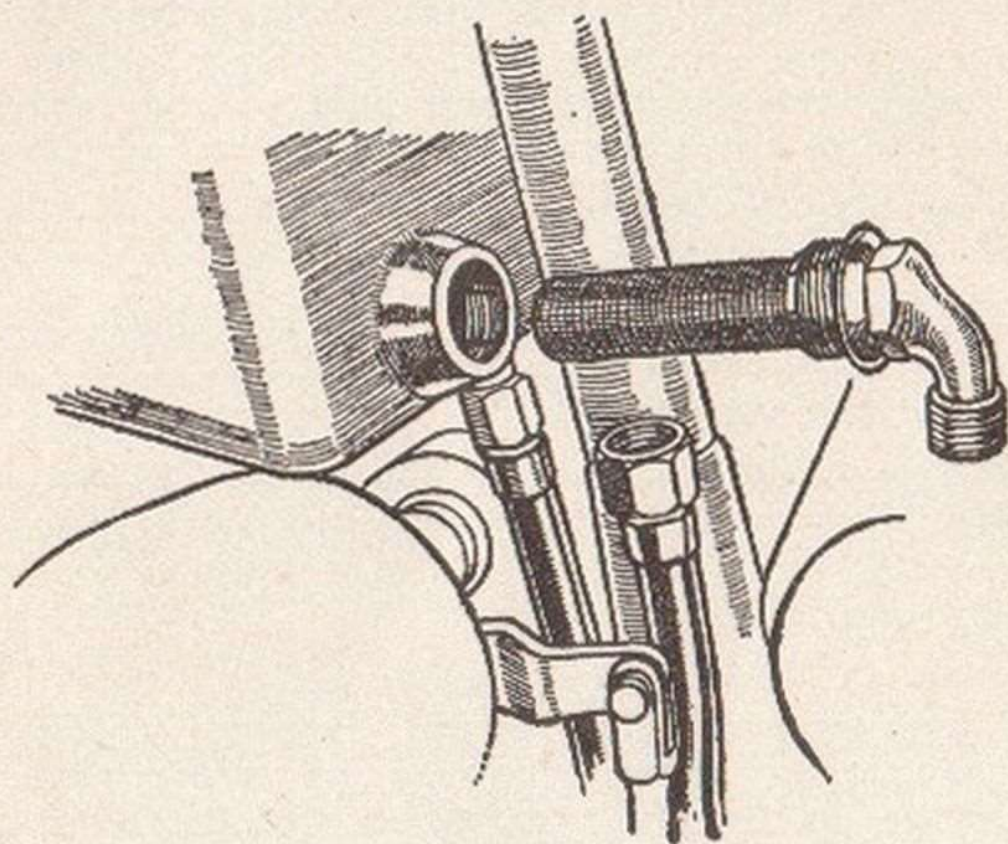
The only filter in the system is on the feed side of the circuit, a gauze type, fitted to the adaptor screwed into the tank, to which the oil feed pipe is connected.

Oil is forced by the pump to three points, the rear wall of the cylinder, the big-end and the pressure control valve.

- The pressure control valve is a safety valve in the oil circuit, releasing any excess of pressure.
- Oil is sprayed on to the big-end, the surplus is thrown on to the cylinder walls, etc., drains down the sides of the crankcase, is picked up by ducts and fed to the bearings and the timing gears, and then drains to the sludge trap in the bottom of the case, is sucked up by the return side of the pump and returned to the tank.
- No oil can pass to any part of the engine until the tell-tale is lifted, by oil pressure.
- The circulation of the oil can be checked by removing the oil tank filler cap, when the oil can be seen leaving the return pipe.
- Oil will not return in a continuous stream as the return capacity of the pump is greater than the feed, ensuring that when the engine is running the crank-case sump is clear of oil.
- The oil level should not be below half-full mark or the oil will tend to over-heat; if the level is above the three-quarter mark, oil may be lost through air pressure in the tank or when the machine is not upright for any reason, such as cornering or parked with the footrest against the kerb.
- The only filter in the oil system is fitted on the adaptor which screws into the oil tank.
- To remove, proceed as follows:—
- Remove the oil feed pipe, the pipe carrying the oil from the tank to the oil pump, and unscrew the adaptor. The filter will come away with the adaptor.
- Clean by rinsing in petrol.
- Do **not** puncture the gauze, which must be replaced if defective.
- Do **not** use paraffin for rinsing.
- The filter must be cleaned every time the oil is changed.
- Note:—When removing pipes (oil or petrol) from the unions, do not twist the pipes. Use two spanners, one on the union and one on the union nut.

When replacing the pipes do not damage the washers at the back of the unions by over-tightening.

Change the oil at intervals shown in Periodic Maintenance.



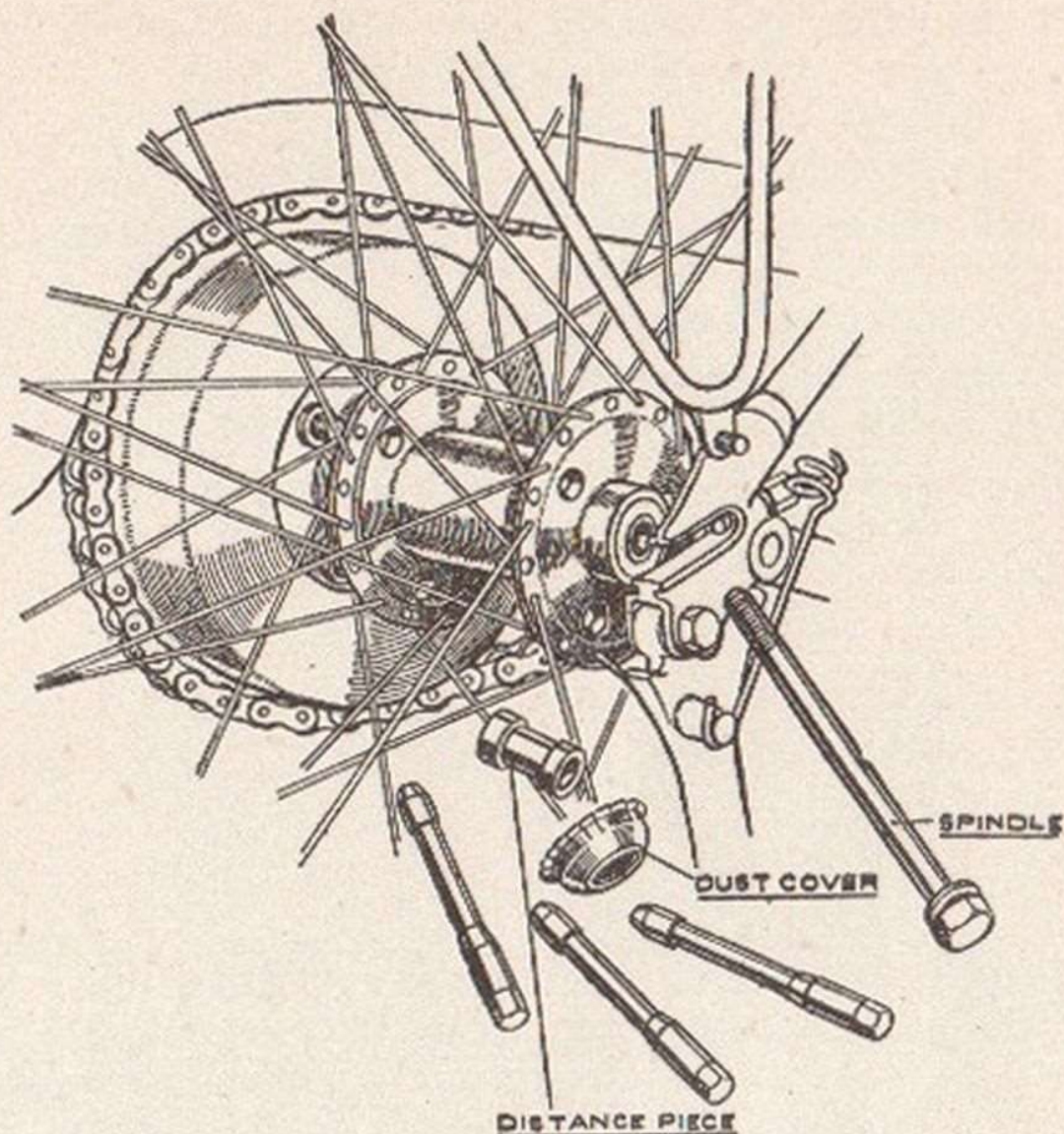
WHEEL REMOVAL.

Rear Wheel.

In the event of a puncture in the rear tyre, it is not necessary to remove the rear chain or brake mechanism, as the wheel can be removed without disturbing the brake drum and chain sprocket.

To remove the wheel:—

1. Roll back the rubber tube on the rear lamp lead, near the lamp, and break the connection by screwing out the brass sleeve.
2. Remove the tail piece of the rear guard by removing the two bolts holding the tail piece to the main guard, and the two bolts and nuts holding the stays to the tail piece.



Tail piece and rear lamp can now be removed.

3. Remove the three wheel sleeve nuts.
4. Remove the wheel spindle.
5. Remove the dust cover and the distance piece.
6. Pull the wheel free of the sleeve nut studs, and wheel will drop to the ground and can be rolled clear of the machine.

Front Wheel.

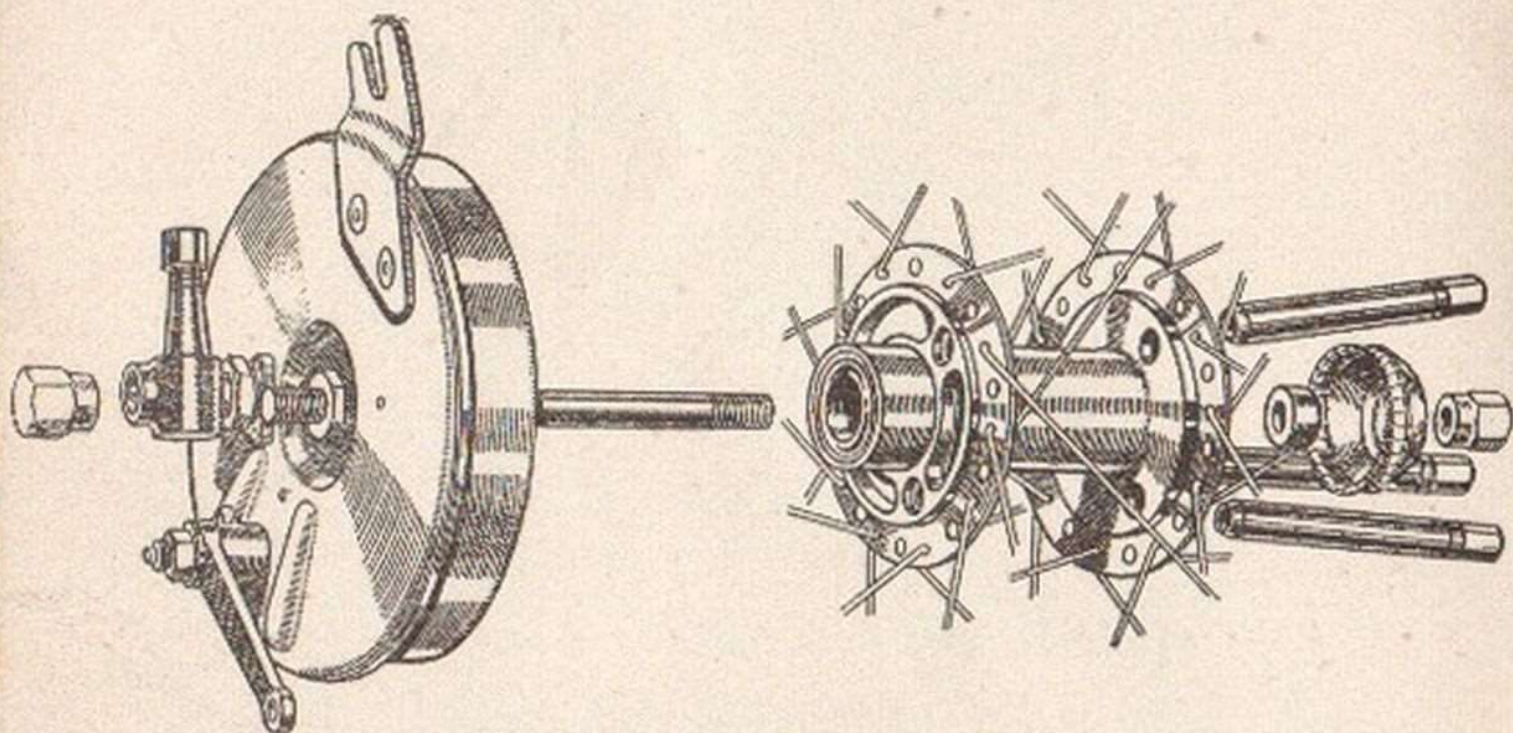
1. Place the machine on both stands.
2. Remove the brake cable from the brake arm.
3. Remove the speedometer cable from the speedometer gearbox.

4. Ease off the spindle nuts, and the wheel, complete with the brake drum, will fall to the ground.

If for any reason it is needed to change the wheels from the rear to the front, the front brake drum will have to be removed from the wheel.

Remove the three sleeve nuts, the dust cap and distance piece, from the front wheel, and the front wheel can be fitted to the rear of the machine.

Fit the brake drum to the rear wheel, with the dust cover and distance piece, and it can be fitted to the front.



PERIODIC MAINTENANCE.

(Items not covered by the Tasks.)

CHAINS.

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

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

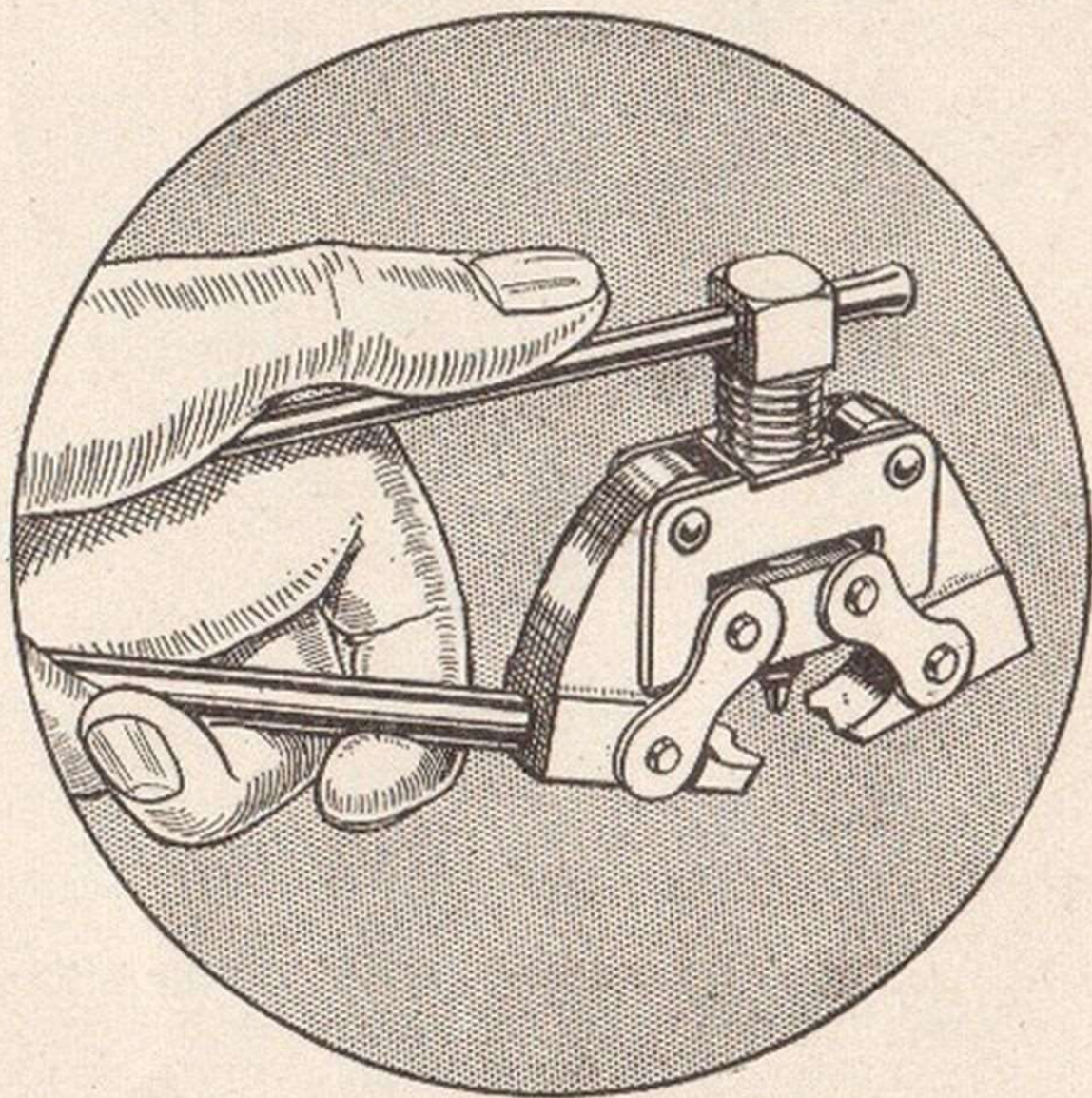
A repair can be made to a chain while on the road

with the use of the chain rivet extractor and the chain spares carried in the tool kit.

It may be necessary to shorten the length of a chain during the latter stage of its useful life to obtain correct adjustment.

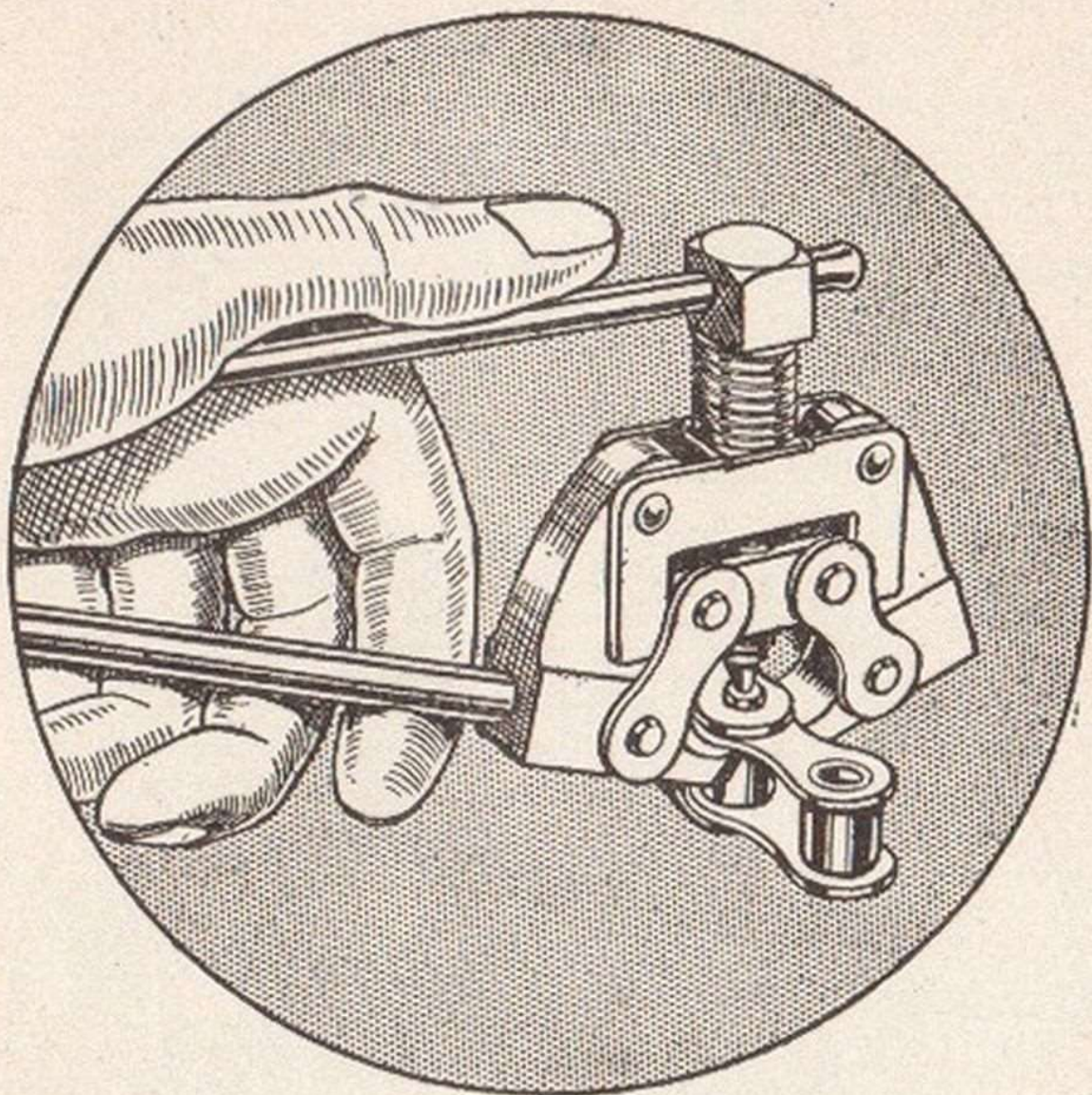
CHAIN RIVET EXTRACTOR.

1. See that the punch is screwed well away from the extractor.
2. Grip the handle and the tommy bar and the jaws will open. (Fig. 1.)



1

3. Place the chain in the jaws of the extractor and release grip. The jaws must grip the roller. (Fig. 2.)
4. Screw down the punch until it contacts the rivet head, and tighten down until the rivet is forced



2

from the plate. The rivet will leave with a distinct click.

5. Screw punch away from chain, grip handle and tommy bar and remove chain from extractor.
6. Place chain in extractor and remove the adjacent rivet from the same outer link plate.

The two rivets with the one outer link plate can now be removed from the chain.

PARTS REMOVED FROM CHAIN MUST NOT BE REFITTED.

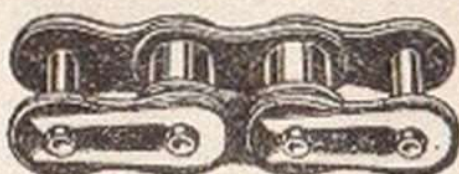
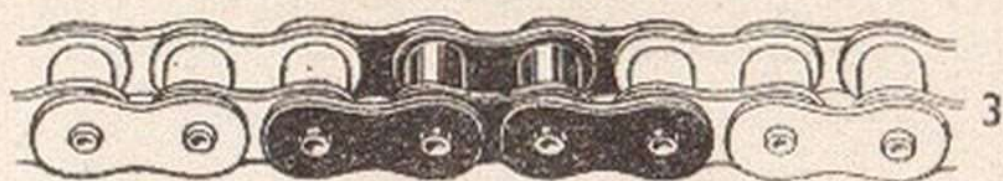
REPAIRS.

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

In the case of a chain breaking the damaged parts must first be removed.

If the chain has parted through weakness of an outer plate, remove the rivets holding the damaged side plate and replace with a single connecting link. (Fig. 10.)

In the case of a damaged roller or inside link, it is necessary to remove the link complete with the attached outer link plates (Fig. 3) and replace with an inner link and two single connecting links (Fig. 4).



4

ALTERATION TO THE LENGTH OF THE CHAIN.

To shorten a chain containing an even number of pitches, that is, a chain that does not contain a crank link (Fig. 13), remove the single connecting link holding the two ends of the chain together (Fig. 10) and remove chain from the machine.

10



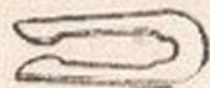
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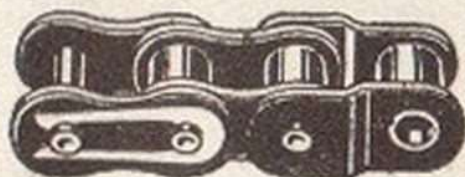
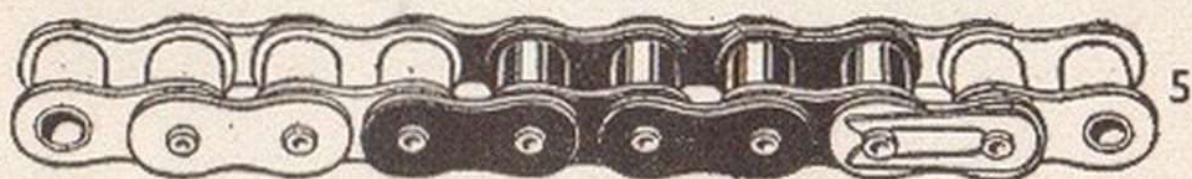


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- 10. Connecting link, single.
- 11. Inner link.
- 12. Connecting link, single (dismantled).
- 13. Cranked link, double.

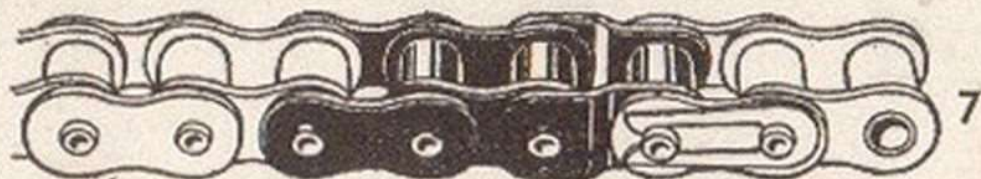
Remove the rivets holding the second pair of outer link plates which will shorten the length by four rollers and two pairs of outer link plates (Fig. 5), and replace with a cranked double link and a single connecting link (Fig. 6).



To shorten a chain with an odd number of pitches, that is, a chain containing a cranked link, remove the rivets holding the second pair of outer link plates (the first pair will be cranked) (Fig. 7), and replace with a single connecting link and an inner link (Fig. 8).

FITTING A NEW REAR CHAIN.

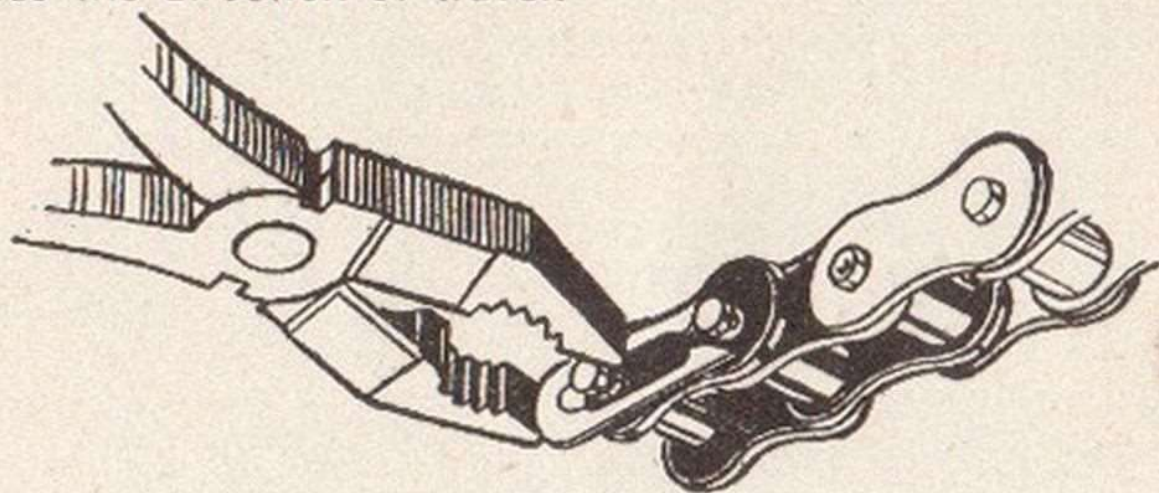
Slacken off the rear wheel spindle nuts and screw back the chain adjusters to allow the wheel to be as near the gearbox as possible. Remove the single connecting link from the old chain and connect the end of the new chain to the old one.



This is simplified if the connecting link is removed when it is fully engaged in the teeth on the sprocket, when the bottom of the old chain will drop to the floor and the top portion will be retained in position on the teeth.

Pull the old chain, revolving the gearbox sprocket and the rear wheel, until the new chain is in position, and then remove old chain and fit the two ends of the new chain together.

When fitting the connecting link, do not strain the fixed rivets on the plate of the connector; if the ends of the chain are pressed home on the teeth of the sprocket, the rivets will enter the two ends of the chain freely. Fit the loose outer plate and the spring clip fastener (Fig. 9). The closed end of the spring clip must face the direction of travel.



9

Care must be taken when fitting a new chain that the chain is not allowed to contact the floor; if allowed to, it will collect grit, etc.

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

If the chain should break and leave its sprockets, it may be difficult to replace.

Looking down the front of the battery, the gearbox sprocket is visible; pass the chain on to the sprocket and turn sprocket in the reverse direction (clockwise), and the one end of the chain can be guided over the chain stay to the rear sprocket and the other end threaded over the bridge tube to the sprocket.

If an old chain is removed and refitted in the reverse direction of travel, the effective length of the chain will be shorter and the position of the rear wheel may have to be altered; this is caused through the stress on the chain being in one direction only, causing the roller bushes to wear on one side only.

DAILY.

OIL TANK: Check level of oil and fill to three-quarters full. (Before filling run the engine for a few minutes to ensure that all the oil has been returned to the tank, as when a machine has been left for a considerable time a quantity of oil in some cases may syphon into the crankcase sump.)

PETROL TANK: Fill up.

TYRES: Check pressure with gauge provided and inflate to correct recommended pressures. It is not sufficient to make a visual examination; they must be checked before the machine is used (i.e., when the tyres are cold) with the gauge provided, and maintained at the pressures recommended. Inspect tyres for injuries in either tread or side walls; if found, it must be reported immediately. See that valves are fitted with valve caps.

OTHER INTERVALS.

NEW AND RECONDITIONED ENGINES:

The cylinder head nuts should be tried for tightness after the first 50 miles and again after 100 miles, after which no further tightening should normally be needed. See also Task 1.A. (i).

The oil tank and engine crankcase should be drained after the first 250 miles and again after a further 1,000 miles, the oil filter cleaned, and the oil tank refilled three-quarters full with new oil.

EVERY ONE THOUSAND MILES.

NEW AND RECONDITIONED GEARBOXES:

The gearbox should be completely drained after the first 1,000 miles, and refilled with oil to the level of filler plug. (When the gearbox appears to be full, kick the kick-starter down several times to expel any air-lock that may form.)

BRAKE CAM SPINDLES: A grease nipple is fitted to the front and rear brake cam spindle bushes. One or two shots with the grease gun. (Do NOT over-lubricate, as excessive grease is liable to enter the brake drum and damage the brake linings.)

EVERY TWO THOUSAND MILES.

OIL TANK: Drain, clean filter (see instructions, page 9) and refill three-quarters full with new oil. At the same time remove the drain plug from the crankcase and drain.

EVERY THREE THOUSAND MILES.

ATTENTION BY WORKSHOPS: Check and correct tension of primary (front) chain, clean out primary chain oil bath, test for lift in gearbox mainshaft carrying clutch. Tighten all the nuts and bolts inside the chaincase. Check and correct the tension of magneto chain. Remove the rear chain, clean and lubricate, adjust tension. Lubricate magneto.

EVERY FIVE THOUSAND MILES.

WHEEL HUBS: A grease nipple is fitted in the centre of each hub, between the spokes, for lubrication of the hub bearings. One or two shots of the grease gun. (Do NOT over-lubricate, as excessive grease is liable to enter the brake drums and damage linings.)

If the machine is used frequently in water or mud, attention should be given at shorter intervals.

EVERY FIVE THOUSAND MILES.

GEARBOX: Drain completely, refill with oil to level of filler plug.

MAINTENANCE OF THE TASK SYSTEM.

WHERE "INSPECT AND TIGHTEN" APPEARS, IT MUST BE UNDERSTOOD THAT IT IS NOT INTENDED THAT THE NUTS SHOULD BE TESTED WITH A SPANNER EVERY SIX DAYS, BUT THAT THE JOINT IN QUESTION SHOULD BE EXAMINED FOR SIGNS OF MOVEMENT OR LEAKAGE. TIGHTEN ONLY IF EITHER OF THESE CONDITIONS EXIST.

TASK No. 1.

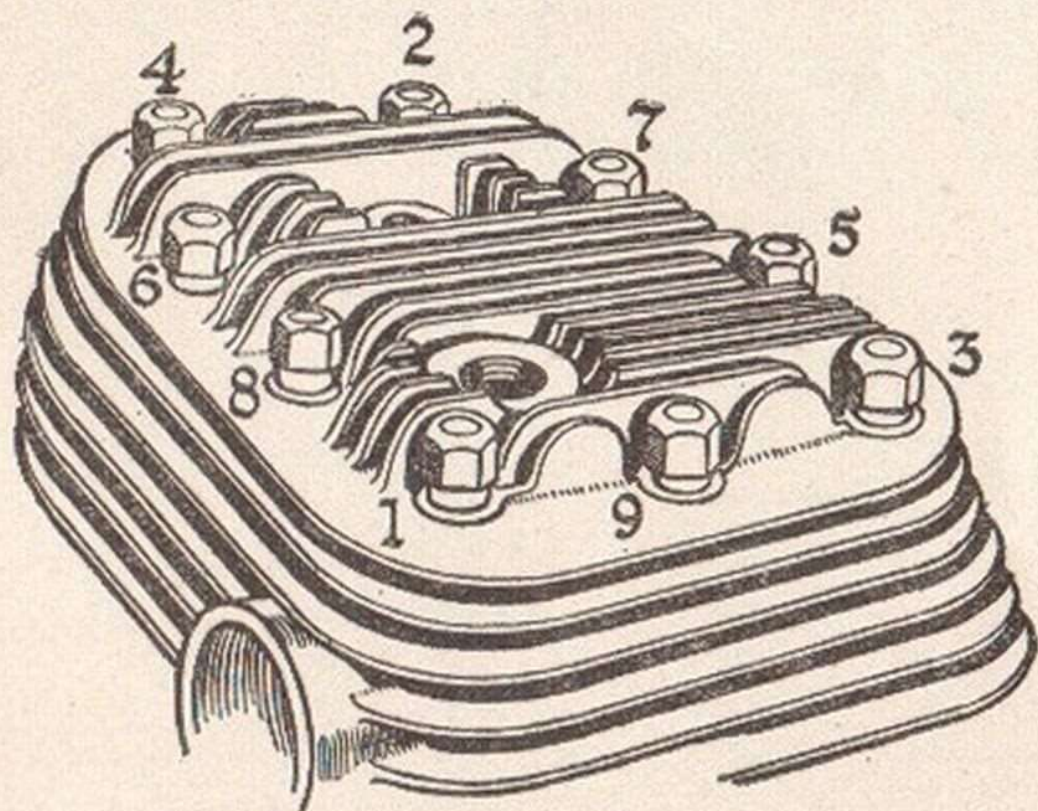
ENGINE.

A. INSPECT CYLINDER JOINTS AND TIGHTEN IF NECESSARY.

(i) **Cylinder Head Nuts for tightness.**

New and reconditioned engines require this operation after the first 50 and 100 miles. (See Periodic Maintenance, page 18.)

A copper asbestos copper washer is fitted between the cylinder head and barrel.



Do not over-tighten cylinder head nuts (9) in attempting to cure leak at this point. Tighten only when engine is cold.

Use the $\frac{5}{16}$ in. box spanner and bar in the tool kit and be careful not to touch cooling fins, as they can be easily broken off.

(ii) Cylinder Base Nuts.

If oil is leaking at the cylinder base, or cylinder is loose, tighten the four nuts, one at each corner of the cylinder base, evenly.

(iii) Carburettor Inlet Pipe.

Check tightness with adjustable spanner.

If tightened, refit carburettor upright to maintain correct petrol level.

Carburettor is held to the inlet pipe by a clip and bolt.

Slacken off bolt and carburettor can be moved on the inlet pipe.

Check for being upright by standing at the rear of the machine and looking towards the carburettor, the float chamber must be upright.

When set, tighten the clip bolt.

(vi) Exhaust Pipe Joint.

Exhaust pipe is a push-in fit in the exhaust port, held in position with two clips, one on the bend of the pipe and the other on the straight portion.

If the pipe shows signs of blowing, slacken off the clip pins, re-fit the pipe and tighten the pins.

B. INSPECT ENGINE MOUNTINGS AND TIGHTEN IF NECESSARY.

(i) Engine Plates and Frame Bolts.

Bolts holding engine plates to engine, two at the rear of the crankcase.

Tighten with flat spanners. Top, $\frac{3}{8}$ in. spanner; bottom, $\frac{5}{16}$ in. spanner.

Engine plates to frame, two bolts.

Nuts on nearside of machine between the plates and the oil-bath.

Hold nuts with a flat spanner on the nearside and tighten the bolts from the offside, using a $\frac{5}{16}$ in. spanner.

Front of the engine to the frame, two bolts. Tighten top from the offside using a $\frac{3}{8}$ in. spanner, the bottom from the nearside using a $\frac{5}{16}$ in. spanner.

(ii) **All Crankcase Nuts and Timing Panel Pins.**

Two bolts at the base of the crankcase, nuts fitted on the offside; tighten with a $\frac{1}{4}$ in. spanner.

One bolt with a screwdriver slotted head, near the crankcase drain plug.

Two stud nuts nearside of crankcase, just below the cylinder base; tighten with a $\frac{1}{4}$ in. spanner.

Seven timing cover screws, countersunk with screwdriver slotted heads, round the timing panel.

The two panel pins in the magneto chain cover should not normally require tightening unless the others are found to be loose.

C. **START ENGINE.**

(i) Listen for knocks.

If any unusual noise from engine, report.

(ii) Uneven firing.

Due possibly to faulty carburation.

May be caused by the suppression resistor and/or immobilisor being badly or incorrectly fitted.

(iii) With engine warm, check idling.

Report if engine races or eight strokes.

(iv) **Examine the exhaust smoke for correct mixture or excessive oil consumption.**

If the smoke is black, mixture is too rich.

Check the carburetter for flooding by wiping with a dry finger.

Weak mixture will cause spitting back through the carburetter.

If the smoke is pale blue, sign of excessive oil.

Remove the filler cap from the oil tank and the oil should be seen returning to the tank via the return

pipe, and the top of the oil should be covered with oil froth, if the pump is working satisfactorily.

(v) **Examine exhaust system for leakage.**

Leakage may take place either at the exhaust port or at the connection of the pipe and silencer.

Soot deposit will be shown at the leakage.

Refit pipe or silencer.

D. **STOP ENGINE.**

Test for weak compression by attempting to revolve the engine with the kick-starter without using the exhaust lifter.

(i) **Valve trouble.**

Insufficient tappet clearance.

(Checking and adjustment to be done under supervision only.)

Instructions for adjusting tappets.

When the engine is cold, the clearances should be: Inlet, .004in. Exhaust, .006in.

Remove the valve cover by unscrewing the winged nut.

The tappet has three hexagons, the top one on the tappet head, the middle one the locknut, and the bottom the tappet stem.

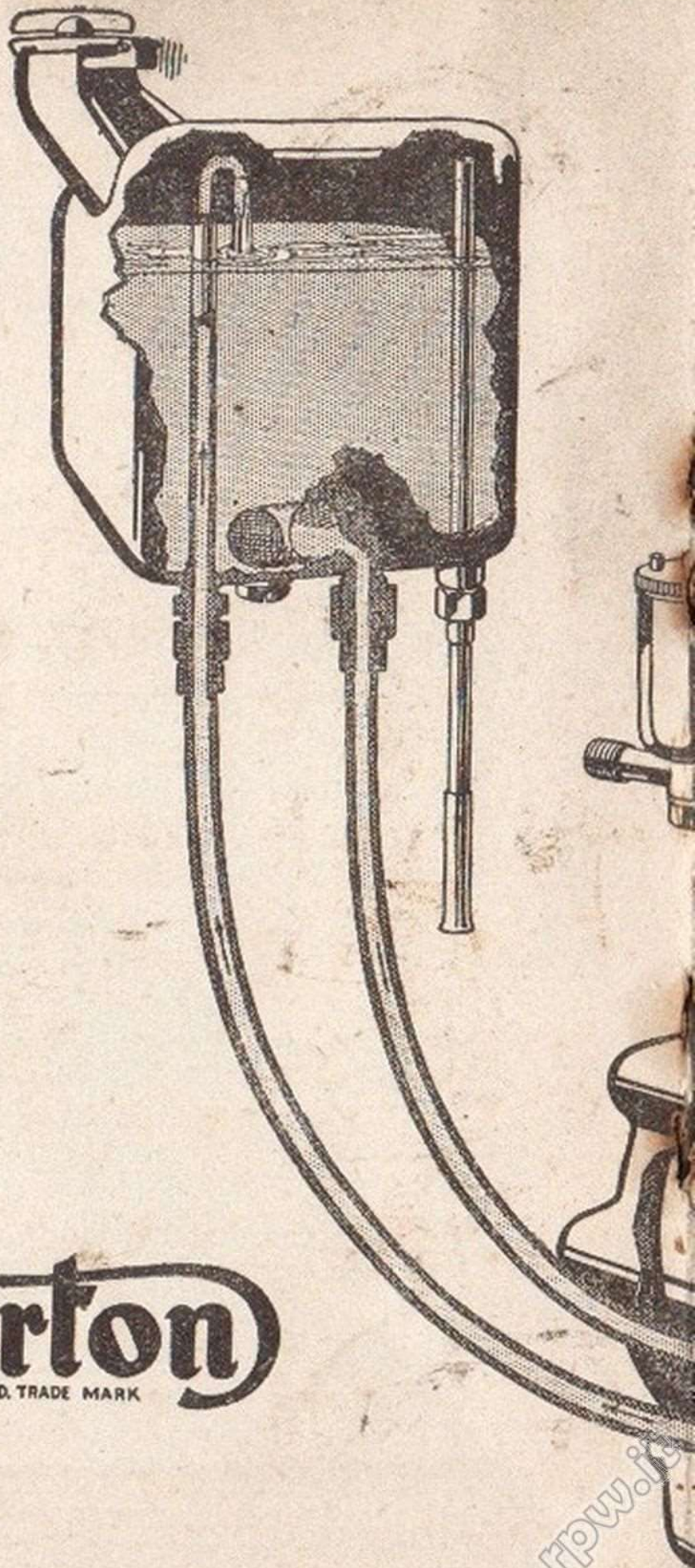
Hold the bottom hexagon with a $\frac{1}{4}$ in. flat spanner to prevent the stem from revolving in guide, and release the locknut with second spanner.

Revolve the tappet head in the desired direction until the required clearance is obtained, and tighten the locknut.

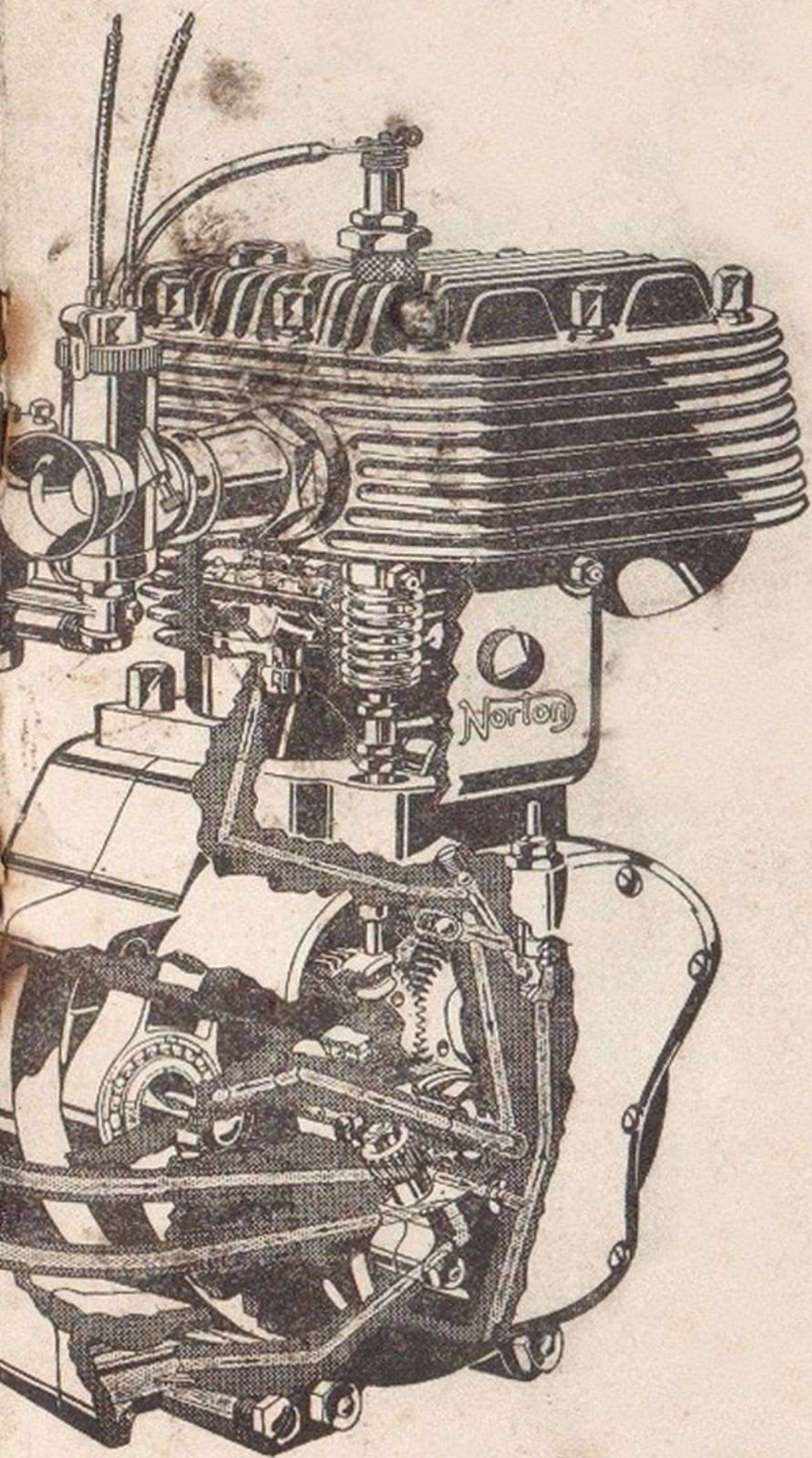
Check clearance when the locknut is tight.

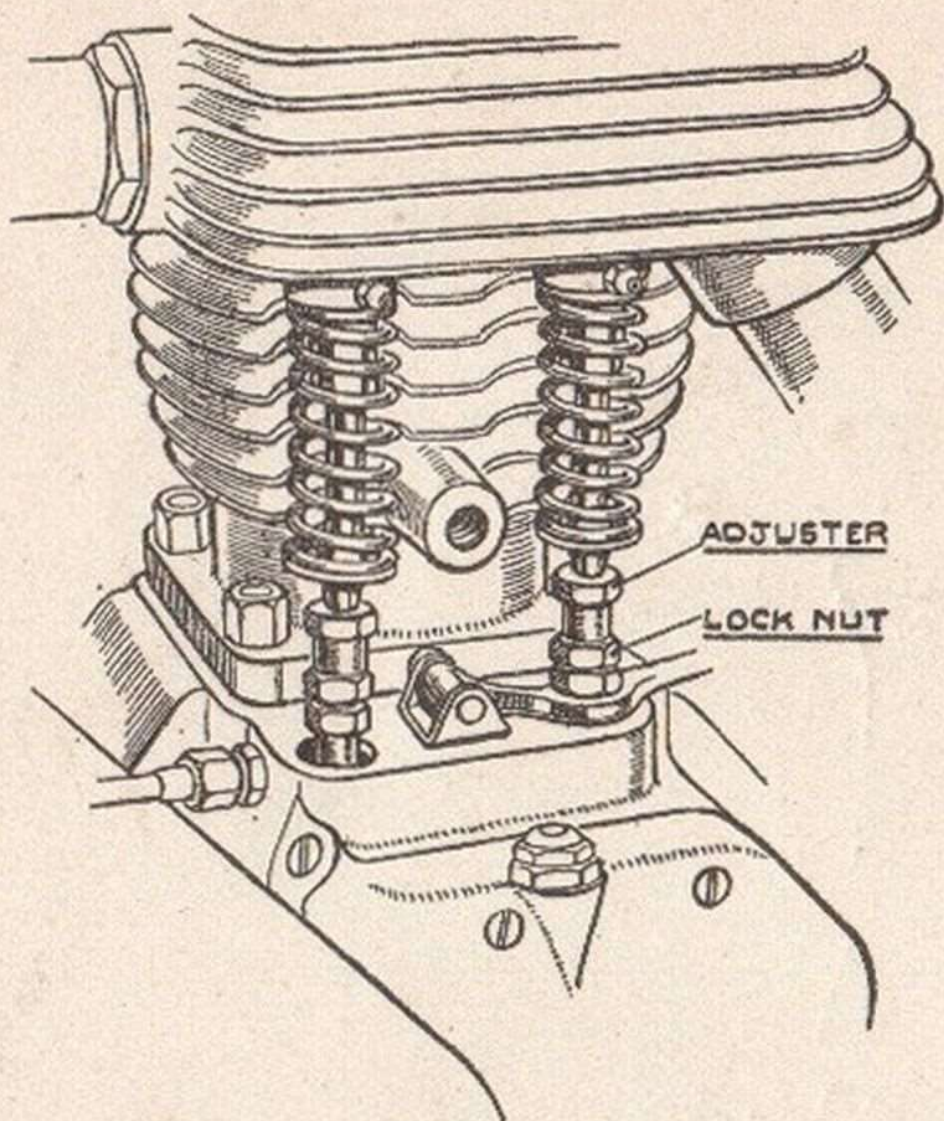
When adjusting tappets, make sure that the exhaust lifter cable is correctly adjusted and not lifting the tappet, giving a false clearance.

If the tappet clearance is correct and the compression is weak, the valve seats may be at fault.



Norton
REGD. TRADE MARK





Rotate the engine slowly and listen for hissing noise inside the valve ports, when the piston is on the compression stroke.

Faulty seating may be due to the need for decarbonizing, or valve stem binding in the guide; the latter defect often showing itself in excessive tappet clearance.

Excess of tappet clearance will not affect compression.

(ii) **Piston trouble.**

Worn piston rings or cylinder bore will cause a loss of compression.

(iii) **Cylinder head joint.**

A leak at the joint of the cylinder head to the cylinder barrel will cause a loss of compression.

This may show itself by the appearance of oil on the fins at the joint, and if the leak is bad, it may be heard blowing when the engine is running, particularly if the engine is accelerated violently. Report defects.

- (iv) **Examine cylinder fins for cracks or choked with dirt.**
- (v) Report defects.

TASK No. 2.

LUBRICATION SYSTEM AND FUEL SYSTEM.

No attempt must be made by the driver to alter or interfere with any adjustment.

Lubricate valve guides, using lubricating gun.

A. CHECK OIL LEVEL AND TOP UP IF NECESSARY.

Run engine for a few minutes before checking the oil level. This will allow the oil pump to return any oil that may be in the sump to the oil tank.

The tank should be only three-quarters full.

Never permit the oil level to be below the half full mark, as it is necessary to have not less than two pints of oil in the system so that the temperature of the oil is kept below a certain degree.

B. EXAMINE OIL.

If necessary, drain oil tank and sump.

Drain plug in the base of the oil tank.

Engine drain plug offside of the crankcase sump at the rear.

(See also Periodic Maintenance.)

C. INSPECT OIL TIGHT JOINTS AND TIGHTEN IF NECESSARY.

- (i) Oil drain plug in base of tank ($\frac{5}{16}$ in. spanner).

Oil drain plug in crankcase, at the offside rear of the crankcase ($\frac{5}{16}$ in. spanner).

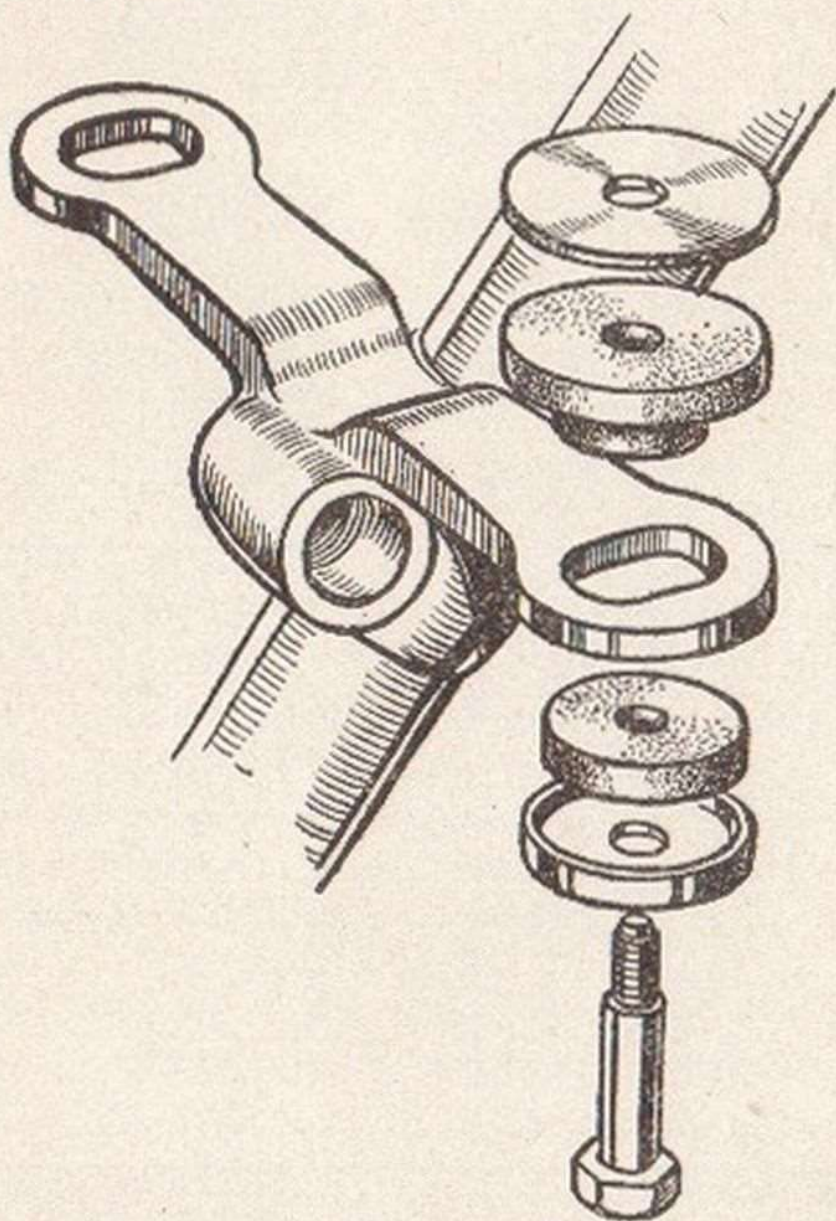
(ii) Oil pipes and unions.

(iii) Crankcase joints.

D. EXAMINE FUEL SYSTEM.

(i) **Security of tank.**

Tank is held to the frame by four bolts, one at each corner.



The order in which the washers for the tank mounting should be placed.

(ii) **Leaks—Taps, Unions and Tank.**

If the petrol taps are loose in the unions, remove the petrol pipe before tightening the tap.

Check the unions at both taps and at the carburetter adaptor.

Check nuts at the base of the float and mixing chambers.

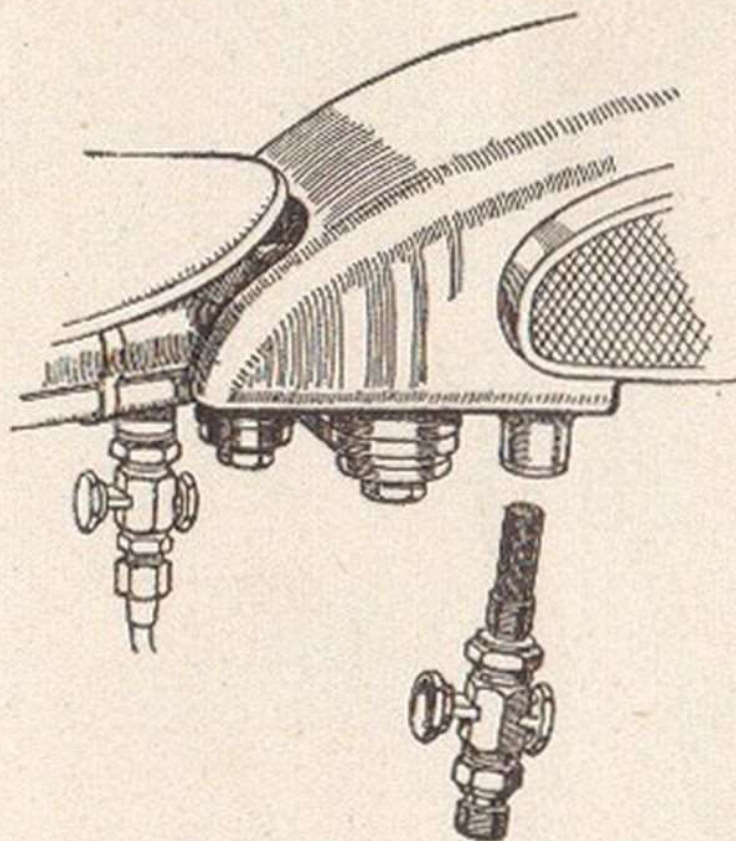
Check the welded joints round the base of the tank by passing the hand round the tank. Any leakage will moisten the hand.

(iii) **Petrol Filters.**

Two filters are fitted, which should not normally require cleaning.

If filters are choked, drain petrol tank, remove both petrol taps, and filters are exposed at the end of the taps.

Clean and replace.



Petrol Tank Filter.

(iv) **Rubbing or kinked pipes.**

Check rubber pipes. They must not touch the cylinder fins.

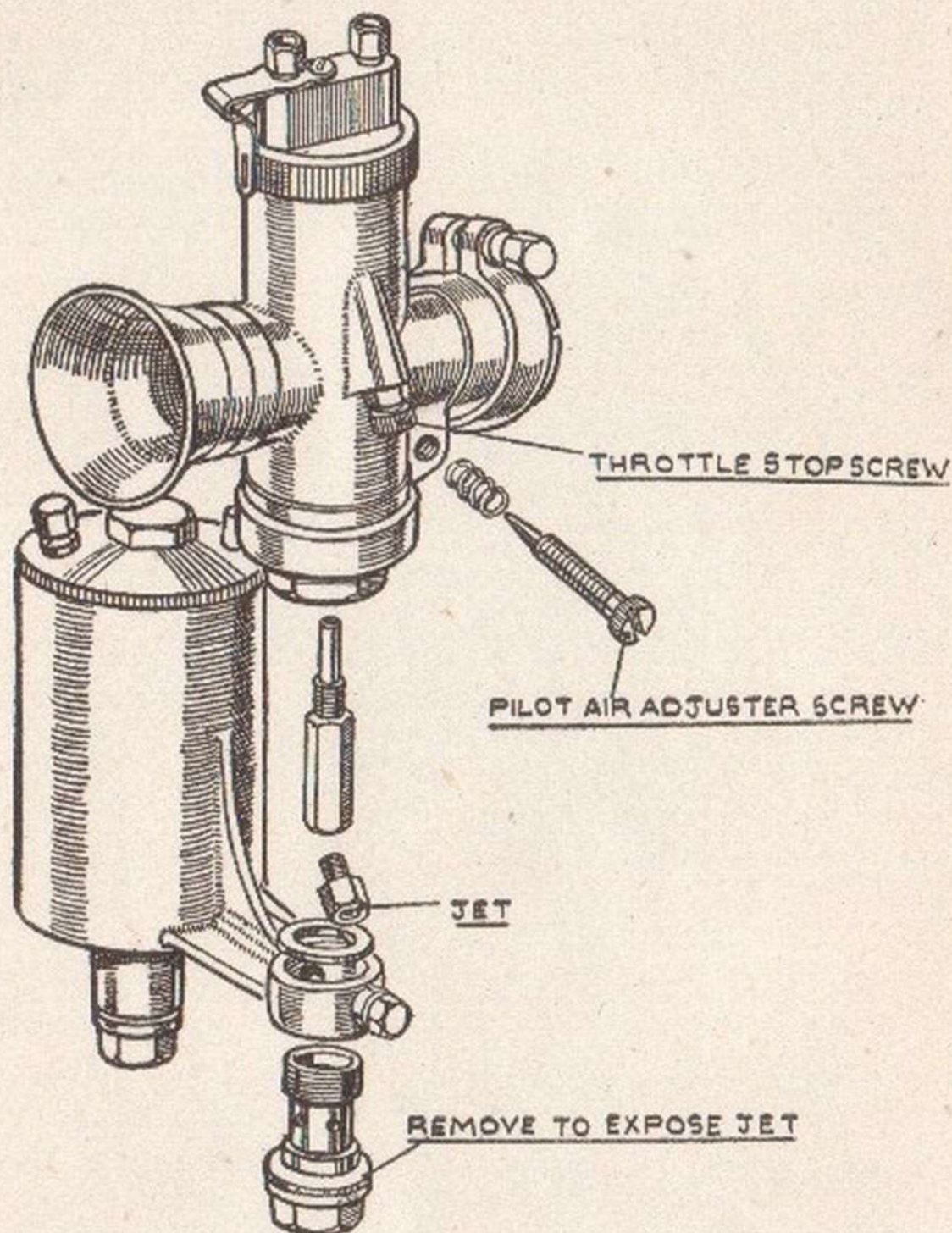
(v) **Flooding of the carburetter.**

If the carburetter is flooding, depress the float tickler and allow a flush of petrol to pass the seat

of the needle. This may wash away any foreign matter that is on the needle seat.

If the flooding continues, report defect.

Do not remove the float chamber top unless under supervision.



E. START ENGINE.

Set controls for slow running.

When the engine is warm, close the throttle until the engine is running as slow as possible.

If the speed is slow enough to give a satisfactory tick-over, do not touch any adjustment.

If the engine is eight-stroking, running unevenly, or a satisfactory tick-over is unobtainable, adjust by means of the pilot jet adjuster at the base of the mixing chamber.

Release lock nut; (on early models a spring was fitted in place of the locknut) and screw the adjuster clockwise.

If the running of the engine improves and gains speed, close the throttle and continue to turn the adjuster till the engine speed slows.

You have now passed the correct position, so turn adjuster in the reverse direction to the position in which the best results are obtained.

When turning the adjuster clockwise, the running may not show any improvement, so reverse the direction the adjuster is turned until the best position is found.

After adjustment, tighten the locknut.

Drivers are not allowed to alter jets or carburetter adjustments without supervision.

F. REPORT DEFECTS.

TASK No. 3.

IGNITION SYSTEM, SPARKING PLUG, CHARGING SYSTEM AND BATTERY.

A. MAGNETO.

- (i) The magneto is secured to engine plates by the centre of the three bolts and nuts, just below the magneto base.

Check and tighten if necessary.

- (ii) **Lubrication of the magneto chain.**

The chain is lubricated by oil supplied through the cam spindle bush.

The oil is sprayed on to the cam wheel and drains through the oilway in the bush to the chaincase.

No other lubrication is necessary.

(iii) Inspect contact breaker for correct operation.

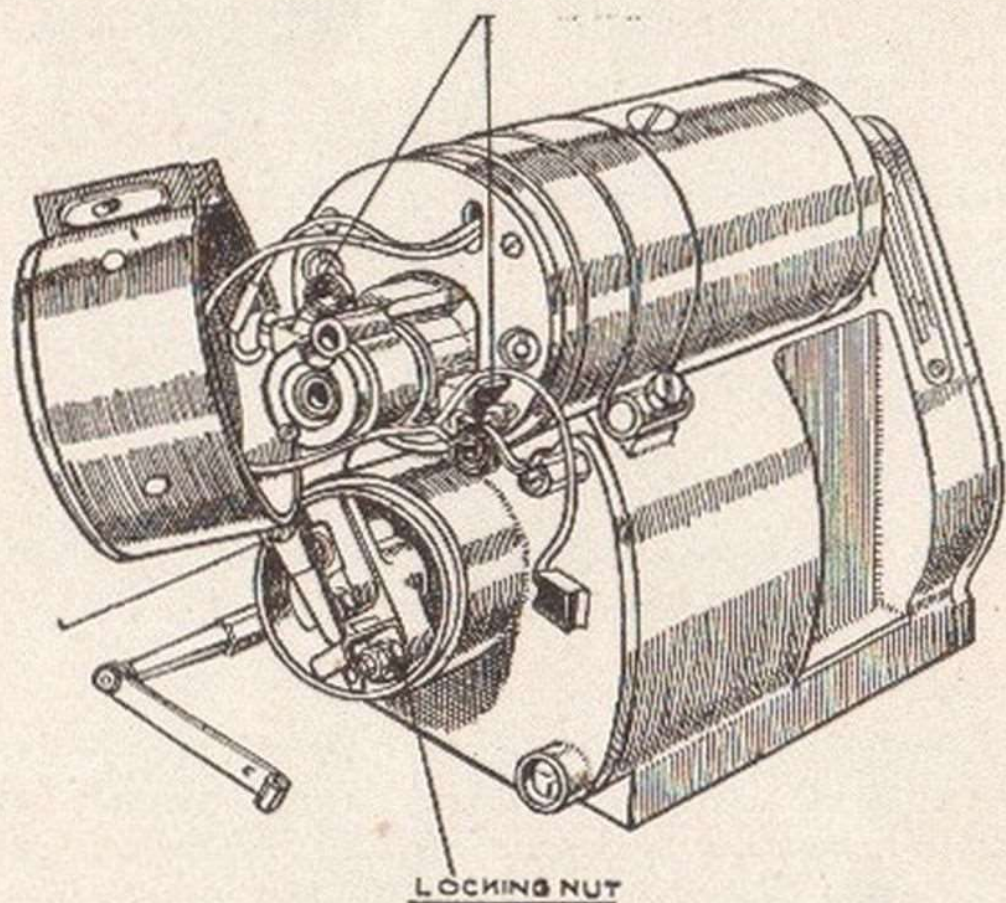
Remove the contact breaker cover on the nearside of the magneto and check the points for the correct gap, which should be .012in. checked with a feeler gauge.

Spanner in the tool kit for the adjustment of the points.

If the adjustment is altered, tighten locknut and re-check.

Examine for badly pitted or burnt points.

Alteration of gap, cleaning or fitting of new points should only be carried out under supervision.



(iv) Inspect insulated wires for:—

- (a) Shorts and cracks, frayed or rubber portions.
- (b) Contact with hot parts of the engine.

Check high tension wire for hardness. It may become hard and crack, allowing short circuit between cable and machine.

Check tail lamp wire round rear mudguard.

Check harness and horn wire. See that they are not likely to be caught in the front fork spring and damaged.

High tension lead should be as far as possible from the cylinder barrel.

Drivers are **not** to alter ignition settings.

B. SPARKING PLUGS.

(i) **Inspect for cleanliness.**

Plugs can be taken apart and cleaned.

Hold the large hexagon in a vice or with spanner, and unscrew the smaller hexagon, allowing the plug centre to be removed.

Do not damage the insulation above the small hexagon.

Clean the inside of the plug and the centre electrode with worn emery cloth.

Do not lose the small copper washer fitted between the centre electrode and the body.

After cleaning, refit centre to the body and tighten down.

(ii) **Inspect and adjust gap .015in.**

Do not bend the centre electrode.

(iii) **Check for leaks and tighten if necessary.**

If the plug is leaking, soot or oil deposit will be found round the insulation above the small hexagon.

C. DYNAMO.

(i) **Inspect and tighten if necessary, mountings and assembly, cut out mounting bolts and terminals.**

Dynamo is held to the magneto by a steel strap and one nut.

Strap tension adjusted by bolts, one at each end of the strap. The nut is on the stud extending through the cover on the offside.

Check tightness of the cover over brushes and commutator.

Voltage control is fitted on the offside fork stay, fixed by clip and two screws that can be seen at the back of the voltage control.

(ii) **Faulty Connections.**

Check that the high tension cable is securely fitted to the connector at the sparking plug end, to the pick-up at the magneto end, and to the suppressor and immobilisor.

To prevent interference with wireless communication, it is most important that the suppression resistor fitted in the high tension cable of all W.D. motor cycles is maintained in first class condition. It must be clean, free from grease, and be securely connected at both ends.

Loss of, or damage to, resistor or immobilisor must be reported for immediate replacement.

D. **BATTERY.**

(i) **Clean vents.**

Vents are in the porcelain stoppers.

(ii) **Check positive and negative terminals.**

Positive terminal is covered with a rubber tube.

Roll back the tube and check the connection to ensure it is tight.

Negative terminal is fastened to the battery carrier top bolt.

Check battery clips for tightness.

The battery charging rate is controlled according to the state of the battery. With a fully charged battery, the ammeter reading will drop almost to zero.

Maximum charging rate, when the battery is exhausted, should not exceed 6 amps.

(DO NOT start engine to test this.)

(iii) **Top up with DISTILLED water.**

Plates should be just covered.

Any excess will overflow.

If any liquid from the battery is spilt, report.

DO NOT USE TAP WATER.

E. REPORT DEFECTS.

TASK No. 4.

STEERING, BRAKES, WHEELS AND TYRES.

A. EXAMINE FOR WEAR, SECURITY AND CORRECT ADJUSTMENT.

(i) Handlebars.

The bars are held to the fork head clip by two split clips, four bolts to each clip.

Check each bolt for tightness.

(ii) Fork Links.

The fork links on the nearside have tapped holes, and the offside plain holes.

The spindles are screwed into the nearside links, the square on the end of the three spindles protruding through the link.

The fourth spindle passing through the front of the bottom links has a plain screwed end without the square machined on it.

On the nearside, the spindles are held by four nuts, one on each spindle; the offside three nuts and one bolt head.

Forks are correctly adjusted when the knurled washers between the links and the girders are free to rotate without any perceptible play.

To adjust:—

(a) Slacken off the fork damper, controlled by the large hexagon nut on the bottom front spindle. (The adjustable spanner in the kit can be used for this.)

(b) Slacken off the nearside spindle nuts.
 $\frac{3}{8}$ in. spanner.

(c) Slacken off the offside spindle nuts.
 $\frac{3}{8}$ in. spanner.

- (d) Rotate the spindles in the desired direction; to tighten—anti-clockwise; to slacken—clockwise.
- (e) Tighten the seven nuts and check washers for clearance.
- (f) Adjust the fork damper to give the desired damper action by screwing the large hexagon nut on the bottom front spindle clockwise. This nut must not be tightened down. Only tighten to give the desired damper action.

(iii) **Steering Head.**

To test for play in the head, place a block under the crankcase, lifting the front wheel from the ground.

Place the right hand under the front of the mud-guard and lift.

Any play in the steering head will be felt.

If the thumb of the left hand is placed so that it covers the joint of the head clip and the top of the column, the least play will be felt when the mud-guard is lifted.

Before testing, ease off the steering damper.

To adjust, slacken off the head clip pin and nut, and tighten the nut on top of the fork column directly below the steering damper control knob.

When adjusted correctly there should be no play in the steering head, but the movement of the handlebars should be quite free, without any tight spots.

(iv) **Steering Damper.**

The steering damper control is the knob situated on the top of the forks.

Turn knob clockwise to tighten damper and anti-clockwise to ease or free damper.

No set rule can be made for the amount of damper action needed; it depends solely upon the rider and the conditions under which he is driving.

The action of the damper should be even and the same damper effect wherever the handlebars are turned.

If the damper action is uneven, examine damper at the base of the fork column held to the frame by bracket and bolt.

If the bracket is strained, the action of the damper will be uneven. Remove the bolt holding the bracket to the frame and ensure that the bracket is correctly set and no distortion takes place when the bolt is refitted.

(v) **Rear Brake.**

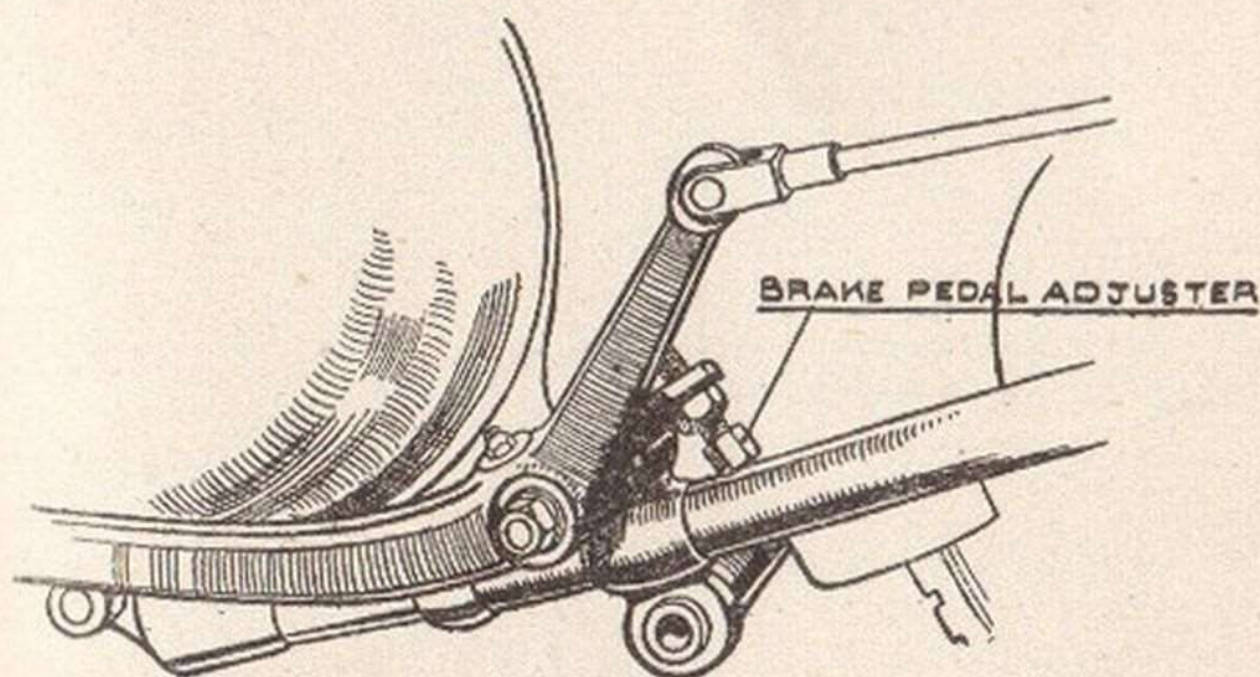
Examine the jaw joint at the brake pedal.

Examine the thread on the brake rod.

The position of the brake pedal is controlled by the pin and locknut at the rear of the pedal.

After adjustment at this point, check the brake adjustment.

Brake pedal must not foul the chaincase.

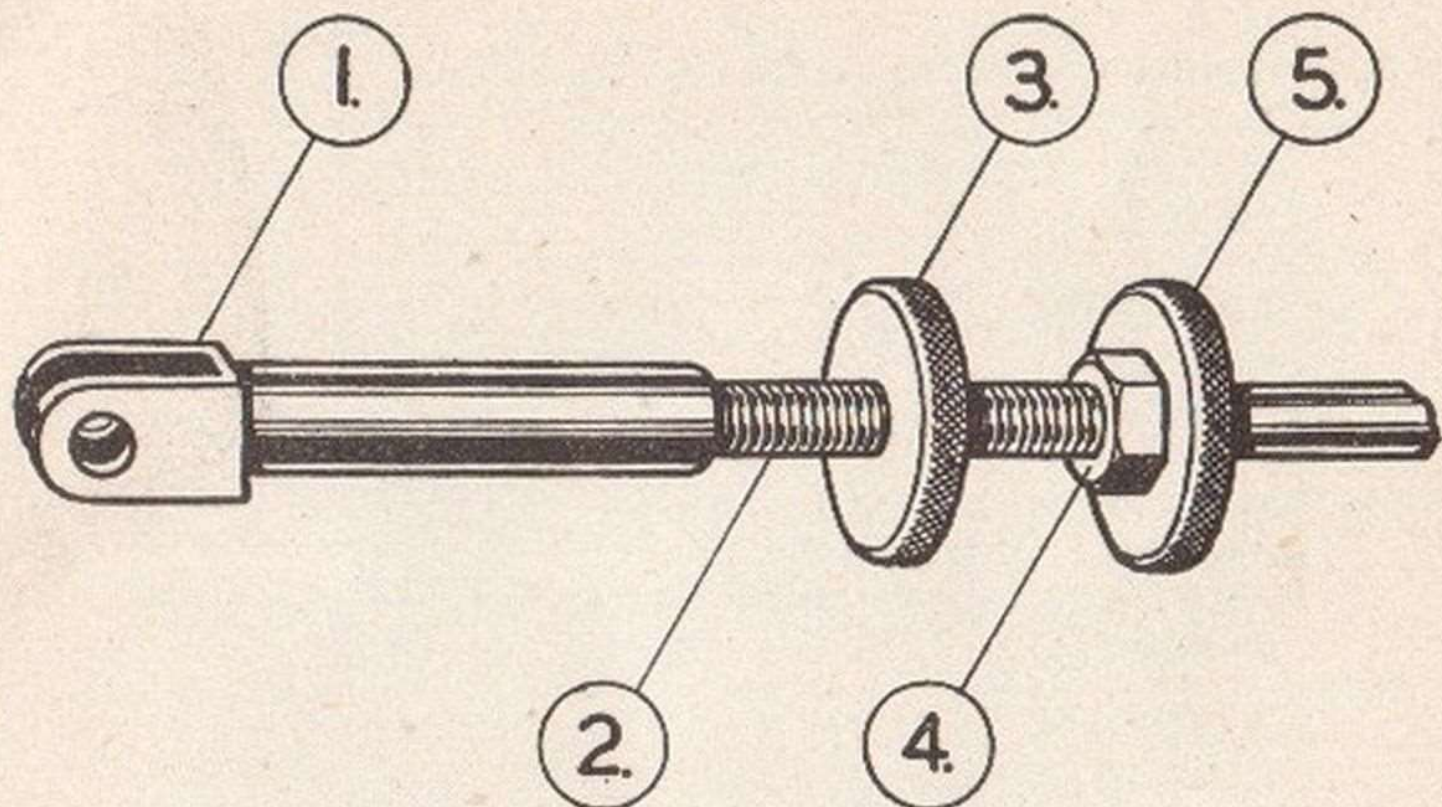


To adjust the rear brake, slack off the knurled locking nut at the pedal end of the brake rod, turn the second knurled nut in the desired direction, and lock with the first nut when the adjustment is correct.

Check that the wheel revolves freely.

Rear brake arm should point approximately 45° towards the rear of the machine.

If upright, linings are worn.



- | | |
|---------------|--|
| 1. Jaw joint. | 3. Knurled locking nut. |
| 2. Brake rod. | 4. Locking nut locking knurled nut to rod. |
| | 5. Knurled nut locked to rod. |

(vi) Front Brake.

Examine the front brake inner cable at the inverted lever end for fraying

Lever must be at least 1in. from the bar when fully applied.

Check "U" clip for freeness. If neglected, pin will rust in the clip.

Adjust the brake by means of the knurled adjuster and locknut on nearside of fork girder. After adjustment, tighten locknut, and ensure that the wheel is free to revolve.

Front brake arm is at the angle of 45° when the linings are new. When repeated adjustment brings this lever to near parallel with the road, the linings are worn and need replacing.

(vii) Hubs.

Test for rim rock in wheels; if any excessive play is found, the hub bearings need replacing as no adjustment is possible.

B. EXAMINE FOR SECURITY.

(i) **Mountings on handlebars, front forks, and clips.**

Check all inverted controls for tightness on the handlebars.

Check horn push, handlebar clips.

Check speedometer fixing bolts, bracket to forks and speedometer to bracket.

(ii) **Wheel mounting nuts.**

Tighten wheel driving stud nuts—three on each wheel— $\frac{5}{16}$ in. box spanner and bar in tool kit. It is most important that these nuts should be kept tight at all times. Test tightness frequently under severe operating conditions.

C. LUBRICATION.

Clean all nipples carefully before applying gun. Wipe off all excessive lubricant when finished.

There are four nipples that should **not** be lubricated every week:—

Two nipples on the brake cam spindles—one on the rear and one on the front. Loc. 10.

Two nipples on the wheel hubs. Loc. 6.

The remaining seventeen nipples should be lubricated every week when the machine is in regular use.

Fork Spindles.

There are two nipples on the top of the fork girder, attached to the bolts holding the speedometer bracket to the girder, supplying the top front spindle; one on the head clip supplying the top rear spindle; one on the girder bridge supplying the bottom front spindle; two on the crown lug supplying the bottom rear spindle. Loc. 2.

Rebound springs: Four nipples, one each end of the springs, on the pivot pins. Loc. 3.

Headraces: Two nipples, one at the top supplying the top races and one at the bottom supplying the bottom races. Loc. 9.

Speedometer Gearbox: Nipple in the centre of the box at right angles to the machine. Loc. 11.

Brake Pedal: Nipple at the pivot of the pedal. Loc. 8.

Foot change lever: Nipple extension of the bolt holding the indicator finger. Loc. 7.

Valve guides: One nipple on each guide. Loc. 4. Lubricate with oil can all jaw joints on front brake, rear brake, gear change, exposed ends of Bowden cables, all control levers on handlebars, and saddle pivot.

D. WHEEL ALIGNMENT.

Test wheels for signs of buckling, by revolving, when any damage will be seen.

Test each spoke for tightness.

- E. If the steering of the machine is not satisfactory or the tyres show evidence of the wheels running out of line, check alignment. Checking can be carried out with a straight-edge or length of string.

When using the straight-edge, place it against the two wheels as high as possible, when it should touch both wheels at two places, front and rear.

When using string, tie the string to the inner tube valve in the rear wheel, pass round the tyre and hold taut against the two wheels, and the string should touch the wheels in the four places.

If it is impossible to contact the wheels at the four places, the position of the wheel in the rear fork ends must be altered.

Slacken off the two spindle nuts and the position of the wheel can be altered by adjustment of the chain adjusters.

Care must be taken to ensure that the correct adjustment of the chain is maintained.

F. TYRES.

- (i) Check pressure with tyre gauge and inflate to the correct pressure.
- (ii) Examine covers for cuts, flints, nails, etc. Remove flints from covers.

- (iii) Examine for rotting, grease, oil, tar and general wear.
- (iv) Examine inner tube valves for missing caps; check valve nuts for tightness.
- (v) Check security bolt nuts for tightness.
- (vi) Examine for uneven tyre wear. This may indicate bent forks, or front and rear wheels out of line, or tyres under inflated.

Note:—See that any new tyres fitted have been recorded in the A.B.412, with the date, speedometer reading and serial numbers of the old and new tyres.

G. REPORT DEFECTS.

TASK No. 5. TRANSMISSION.

A. EXAMINE CONTROLS.

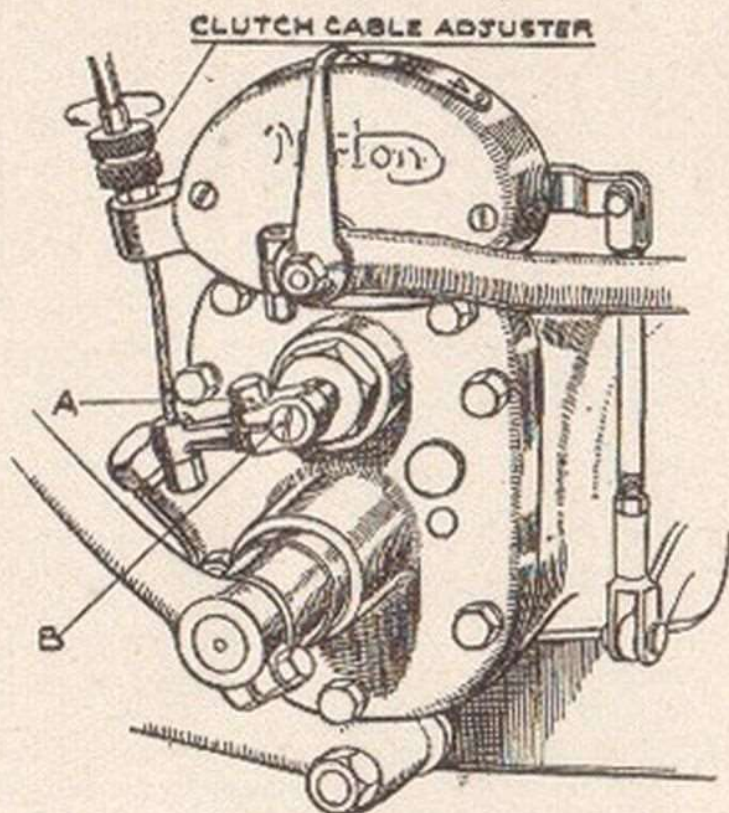
- (i) Check for the requisite free movement of the lever, and that the clutch springs are returning the lever to its normal position after operation.

Examine clutch cable at inverted control lever and adjuster for fraying.

Adjust clutch cable. A small adjustment of the cable can be obtained by the use of the adjuster on the nearside of the positive foot change casing, through which the cable passes. This should be only a temporary adjustment. The correct means of adjustment is as follows:—

- (a) Screw the adjuster on the change speed casing right home.
- (b) Ease the bolt (a) with a $\frac{1}{4}$ in. spanner, holding clutch arm to worm.
- (c) By means of the screw-driver slot machined in the end of the clutch worm (b), turn worm clockwise until it touches the clutch rod. This can be felt. Do **not** use pressure.

- (d) Still holding worm, rotate the clutch arm in an anti-clockwise direction until the cable is taut, and tighten the bolt (a). Leave $\frac{1}{8}$ in. play at inverted lever. See sketch.



The free movement of the clutch lever is approximately $\frac{1}{8}$ in.

If the clutch springs do not return the lever to the normal position, that is back to the $\frac{1}{8}$ in. movement, check the lever for binding through tightness.

- (ii) See that the gear control is functioning correctly. Examine jaw joints on control rod for wear.
- (iii) Check kick-starter for tightness on axle.

B. LUBRICATION OF GEARBOX.

- (i) **Correct level and grade.**

Fill gearbox with engine oil to the level of the filler situated on the off-side of the gearbox on the edge of the end cover. (Loc. 12.)

- (ii) **Cleanliness and good condition.**

Clean gearbox casing; check end cover nuts, fixing nuts on control levers, kickstarter fixing bolt.

C. SECURITY, LUBRICATION AND WEAR.

- (i) Check level of oil in primary chain case oil bath, by removing the plug at the bottom of the case and filling the case, through the inspection hole, to the level of the plug. (Loc. 13.)

In no case must oil be put in the chain case with the plug in position.

Over filling of the oil bath will ruin clutch inserts.

- (ii) **Gearbox security.**

Check tightness of gearbox top and bottom bolts, using the special cranked spanner in the tool kit.

- (iii) **Silence and easy selection of gears.**

If the gears are difficult to engage, this denotes a creeping clutch through faulty adjustment.

Ensure the clutch is freeing. Disengage the clutch and the kick-starter should be depressed without turning the engine. If the clutch is freeing, examine the jaw joints on the control rod for wear.

- (iv) **Silence in gearbox when running.**

Gearbox should be fairly quiet in all gears.

Any excessive noise denotes wear in the box.

- (v) **Security of rear chain guard.**

The rear chain guard is held by two bolts, one at the rear holding guard to the lug on carrier stay, and one at the front holding guard to the back of the oil bath.

- (vi) **Check chain sprockets for alignment and wear.**

If the front and rear wheels are in alignment, the chain and sprocket alignment should be correct.

Gearbox sprocket should show signs of wear first.

Teeth become pointed and then hooked.

Also wear on the sides of the teeth.

Examine for broken teeth on the gearbox and rear sprockets.

- (vii) If chains are dirty or dry, report to workshop for cleaning and lubrication.

When replacing the chain, the spring clip on the link must be fitted with the closed end facing the direction of travel.

D. REPORT DEFECTS.

TASK No. 6.

FRAME AND FITTINGS, LAMPS, HORN, AND GENERAL ITEMS.

A. EXAMINE BOLTED OR BRAZED ASSEMBLY JOINTS FOR SECURITY.

Check nuts and bolts on rear carrier, rear stand bolts, front stand nuts and bolts, and brazed lugs on frame and forks.

B. EXAMINE FOR CRACKED MEMBERS.

- (i) Steering column and head clip.
- (ii) Front forks.
- (iii) Rear fork ends and tubes.
- (iv) Head lamp brackets.

C. EXAMINE FOR FRAME DISTORTION.

If frame or forks are distorted, the steering will be affected; the machine will pull to the right or left. Check forks.

Stand astride the machine and look down on to the forks.

The links on both sides of the forks should be in alignment.

Bottom of fork column and head clip should be in alignment.

Check wheels for alignment with straight-edge.

Lay straight-edge along front and rear wheels as high as possible, and it should touch at the front and rear of both wheels.

D. EXAMINE SECURITY OF ALL BOLTED AND RIVETED STAYS, BRACKETS, HANGERS, ETC.

Examine horn mountings, footrest hangers and spindle.

E. LAMPS AND HORN.

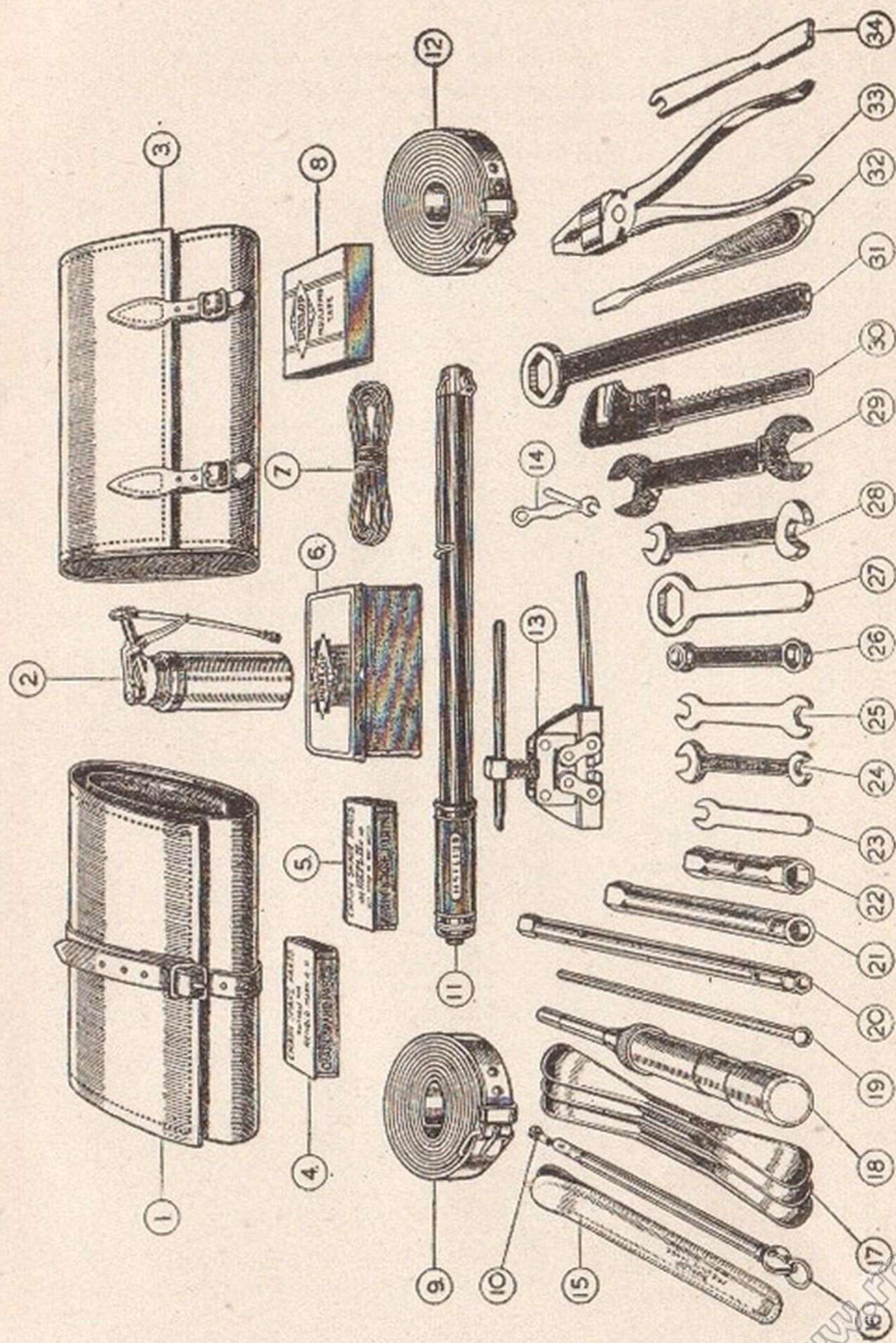
- (i) Check if the head lamp is correctly adjusted.
Position of head lamp altered by slackening off the pins holding lamp to brackets.
Lamp should tilt slightly downwards.
- (ii) Check lamp glasses.
- (iii) Examine switches, lights, horn and other electrical devices.
- (iv) Note if lamps conform to black-out orders.

F. GENERAL.

- (i) Replace missing lubricators; clear blocked oilways.
If lubricant will not enter nipples, remove nipples and clean.
See that the ball in the nipple is free.
- (ii) Check that the machine has been well lubricated throughout.
Seventeen points should have been lubricated in Task No. 4.
Lubricate all movable joints, etc., with oil can, not already done in Task No. 4.
Clean and lubricate all tools to prevent rusting.

TOOL KIT.

1. Tool roll.
2. Oil can.
3. Tool bag.
4. Chain spares.
5. Chain spares.
6. Tyre repair outfit.
7. Soft wire.
8. Insulating tape.
9. Leather strap.
10. Tyre valve tool.
11. Tyre inflator.
12. Leather strap.
13. Chain rivet extractor.
14. Magdyno spanner.
15. Tyre pressure gauge case
16. Tyre pressure gauge.
17. Tyre levers.
18. Lubricating gun.
19. Tommy bar.



20. Box spanner, $\frac{1}{4}$ in. \times $\frac{1}{8}$ in.
21. Box spanner for wheel sleeve nuts.
22. Box spanner for cylinder head nuts.
23. Spanner for Bowden cable adjusters.
24. Flat spanner, $\frac{1}{4}$ in. \times $\frac{3}{16}$ in.
25. Flat spanner, $\frac{1}{4}$ in. \times $\frac{3}{16}$ in.
26. Ring spanner, $\frac{5}{16}$ in. \times $\frac{1}{4}$ in.
27. Ring spanner for sparking plug.
28. Flat spanner, $\frac{5}{16}$ in. \times $\frac{3}{8}$ in.
29. Flat spanner, cranked, for gearbox fixing nuts.
30. Adjustable spanner, 6in.
31. Spanner for wheel spindles.
32. Screwdriver, 6in.
33. Pliers.
34. Spanner for dynamo strap bolts.

SOME DON'TS.

- Don't overflow the carburetter when starting up.
- Don't start up with the ignition fully advanced.
- Don't check the tyre pressure by kicking; use a reliable tyre gauge.
- Don't over grease the wheel bearings; the grease may get on the brake linings.
- Don't start on a long journey without checking the oil level.
- Don't run with both petrol taps turned on. The "off" position of one tap will always serve as a reserve supply.
- Don't allow the engine to "rev" unnecessarily.
- Don't hang on to a high gear.
- Don't leave the machine for a considerable time with the petrol tap turned on.
- Don't continue to use the machine without the tyre valve caps; replace as soon as one is missing.
- Don't forget to leave some slack when adjusting the clutch cable.
- Don't forget to dry off the brakes after negotiating a water splash. Light pressure on the pedal and hand lever for a few minutes is all that is needed.

Burman, Cooper & Co., Ltd.,
194, Corporation Street,
Birmingham, 4. Ref. 6497

IC	PART	W.D. LUB.	TASK NO.
2	ENGINE (OIL TANK CAP: 3 PINTS)	50 HD.	2
3	FORK SPINDLES.	C.600	4
4	REBOUND SPRINGS.	"	4
5	VALVE GUIDES.	"	2
6	REAR CHAIN.	GR. NO. 2	*
7	WHEEL BEARINGS.	"	*
8	FOOT CHANGE LEVER.	C.600	4
9	BRAKE PEDAL LEVER.	"	4
10	HEADRACES.	"	4
11	BRAKE CAM SPINDLES.	GR. NO. 2	*
12	SPEEDOMETER GEARBOX.	C.600	4
13	GEARBOX.	50 HD.	5
	CHAINCASE OILBATH.	"	5

OIL CAN LUBRICATION

14	CONTROL CABLES & LEVERS.	50 HD.	4
15	FRONT BRAKE CABLE 'U' CLIP.	"	4
16	ALL BRAKE ROD JAW JOINTS.	"	4
17	SADDLE PIVOT.	"	4
18	GEAR BOX CONTROL PINS.	"	4

* PERIODICAL MAINTENANCE AS ORDERED

LUBRICATION CHART FOR
 MOTOR CYCLE, SOLO, 490 C.C.
 HARTFORD, 16. H.

ILL. 362.

