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MOTO GUZZI

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RIDER'S HANDBOOK



INTRODUCTION

This booklet is intended to provide owners with the necessary information on operating and maintaining their machines for maximum efficiency.

The manual should be read very carefully as most troubles and failures arising from neglect or poor maintenance will be avoided if all the instructions herein contained are strictly followed.

Don't forget that all major overhaul jobs and repairs are best carried out by officially appointed Moto Guzzi dealers who have the necessary facilities to quickly and competently repair your Moto Guzzi.



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RUNNING IN

During the first 1600 kms (1000 miles) a new or overhauled engine should be used with intelligence as the efficiency, performance, and life of the engine are largely dependant on how it is run in at the start.

In this period the engine should never be allowed to reach a high number of revolutions before it has had a chance to warm up sufficiently.

Avoid to ride the machine at the highest permissible speeds before it has been well broken in. Whenever the engine speed drops off considerably on an uphill grade, a lower gear should be immediately engaged.

If the engine overheats, it is best to stop and let it cool down.

Under no circumstances whatever should the following speeds be exceeded during the running in period:

**Up to 800 kms
(500 miles)**

Low gear : 25 kms/h (15.6 miles)
Second gear : 45 kms/h (28 miles)
Third gear : 65 kms/h (40.6 miles)
High gear : 80 kms/h (50 miles)

**From 800 kms
(500 miles)
up to 1600 kms
(1000 miles)**

Low gear : 30 kms/h (18.7 miles)
Second gear : 55 kms/h (34.4 miles)
Third gear : 75 kms/h (47 m.p.h.)
High gear : 95 kms/h (59.4 miles)

From 1600 to 3000 kms (1000 to 1800 miles) the speed can be gradually increased up to maximum permissible limits.

**After the first
500 kms
(300 miles)**

Replace the engine oil.
Check tightness of all nuts and bolts.
Check tappet clearance and the contacts gap in the distributor.

**Every 500 kms
(300 miles)**

Check oil level by means of the dipstick which is welded to the filler cap.
Correct oil level is in between the minimum and maximum marks.



CONTROLS AND ACCESSORIES

(See fig. 1)

- 1 - Front brake lever.
- 2 - Air control lever.
- 3 - Twist grip throttle control.
- 4 - Fuel filler cup.
- 5 - Gear change lever.
- 6 - Pillion footrests.
- 7 - Luggage grid.
- 8 - Headlamp.
- 9 - Instrument panel.
- 10 - Ignition key switch.
- 11 - Clutch lever.
- 12 - Valve lifter lever.
- 13 - Light switch and horn button.
- 14 - Syren button.
- 15 - Side stand.
- 16 - Rear brake lever.
- 17 - Footrests.
- 18 - Central stand.
- 19 - Tail lamp.

N.B. - The terms right and left in the text are used in the sense they would appear to one sitting in the saddle.

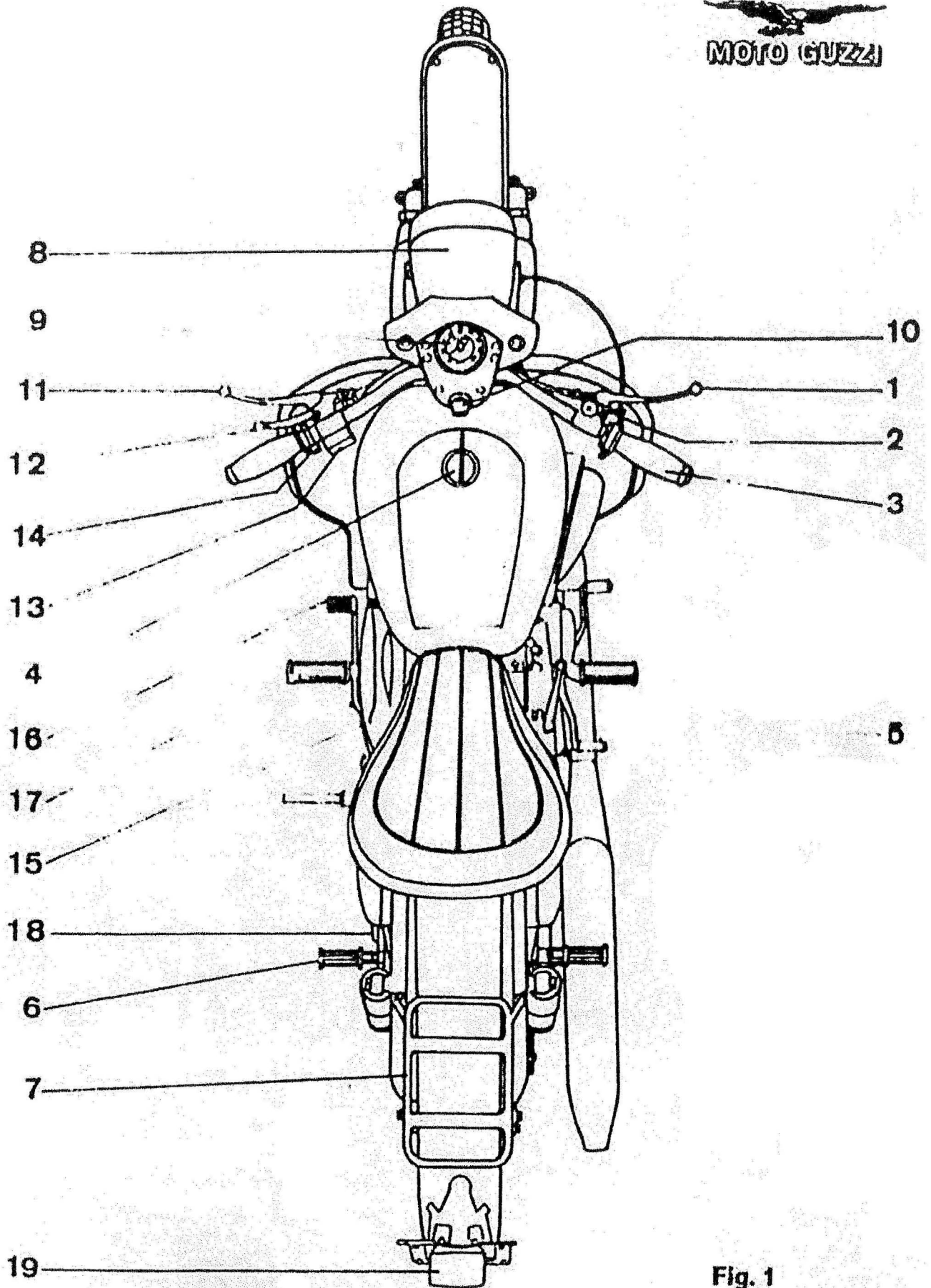


Fig. 1

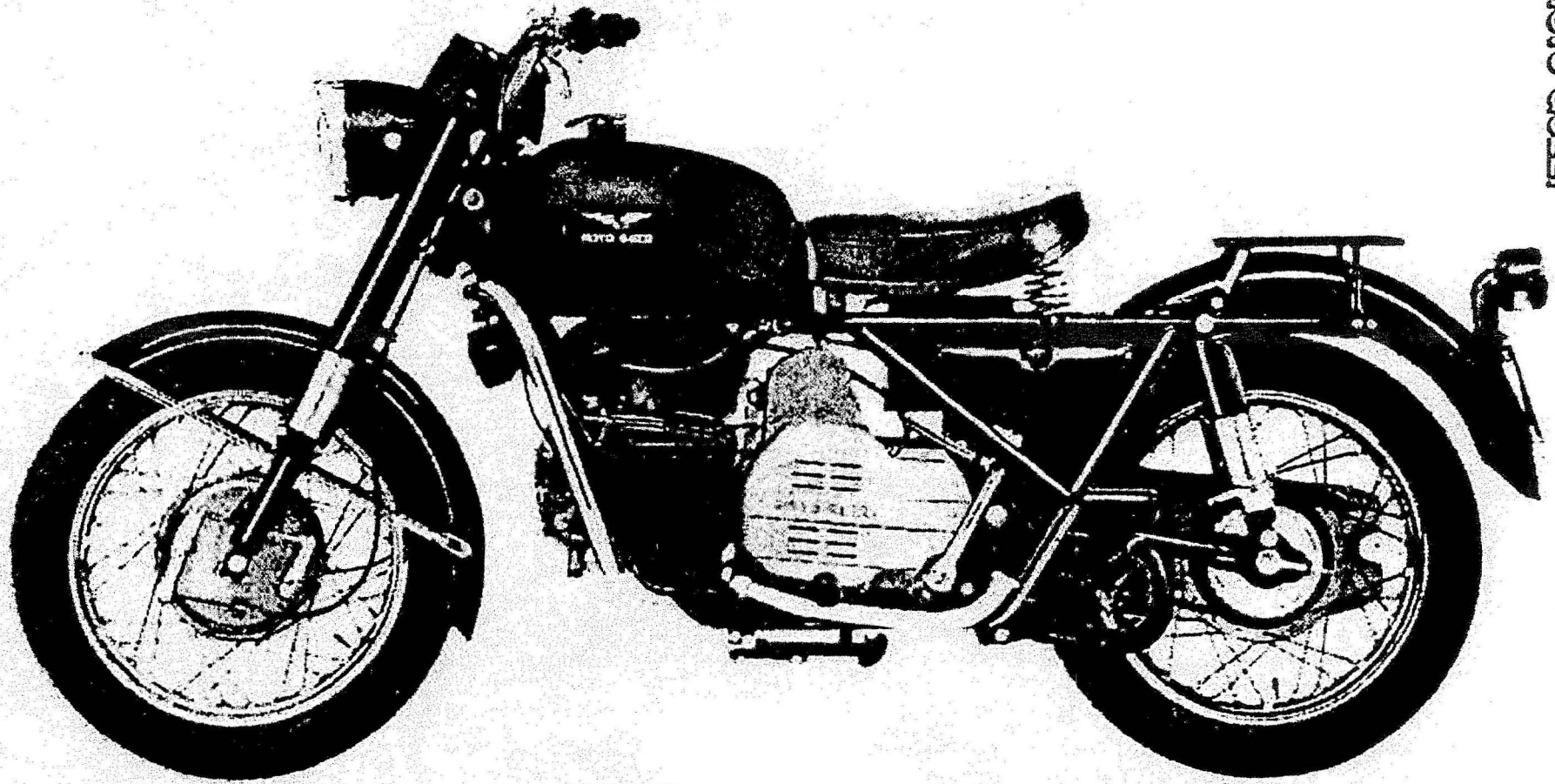


Fig. 2 - Left view

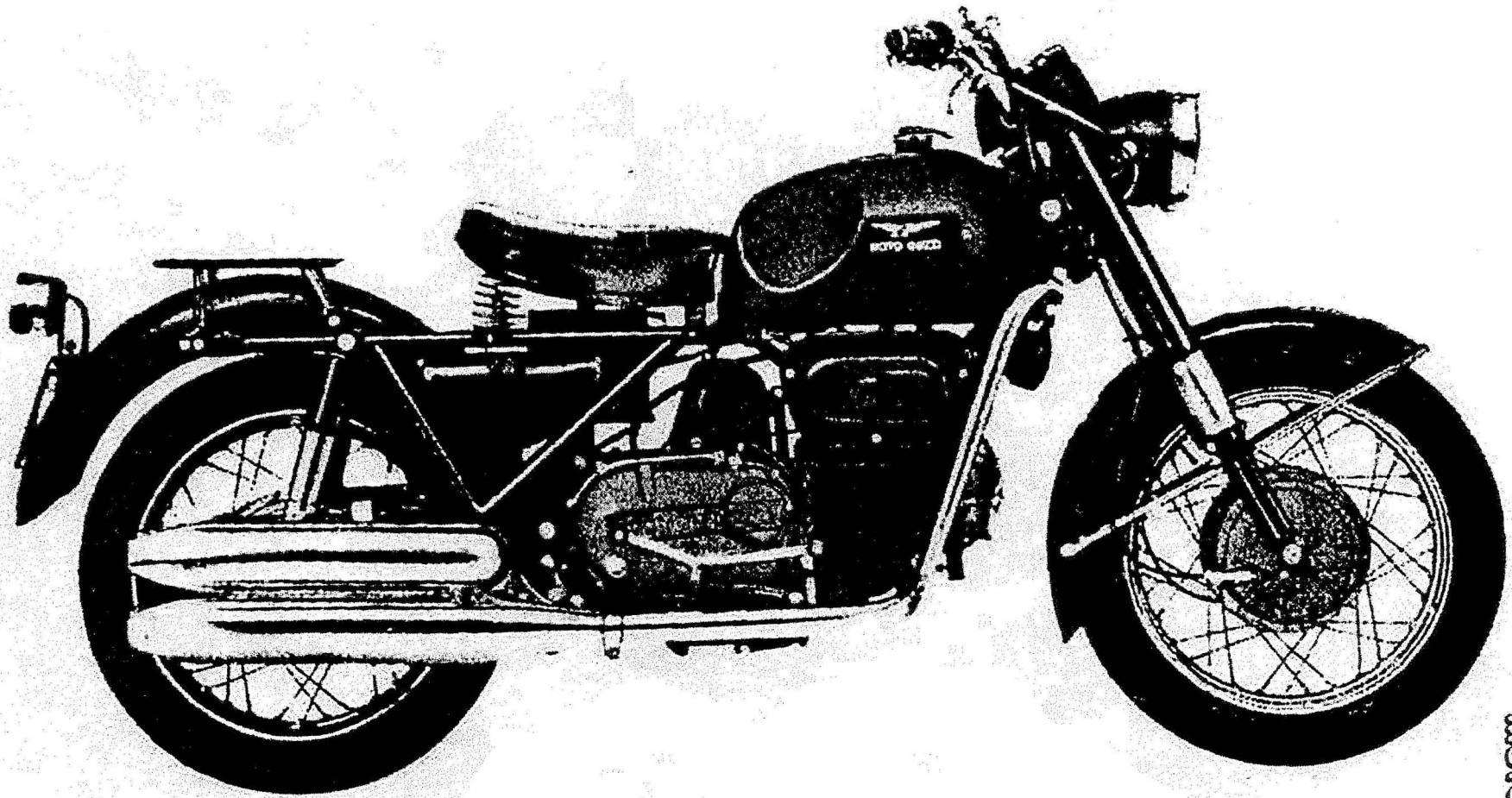


Fig. 3 - Right view

MOTO GUZZI





Identification data Each machine is identified by a serial number (See fig. 4) which is stamped on the frame downtube and on the crankcase.

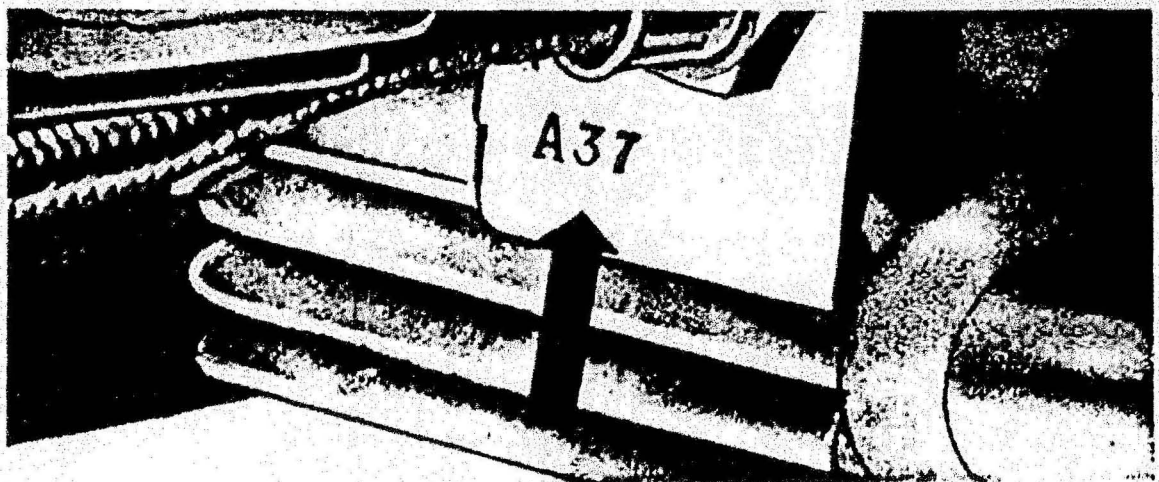
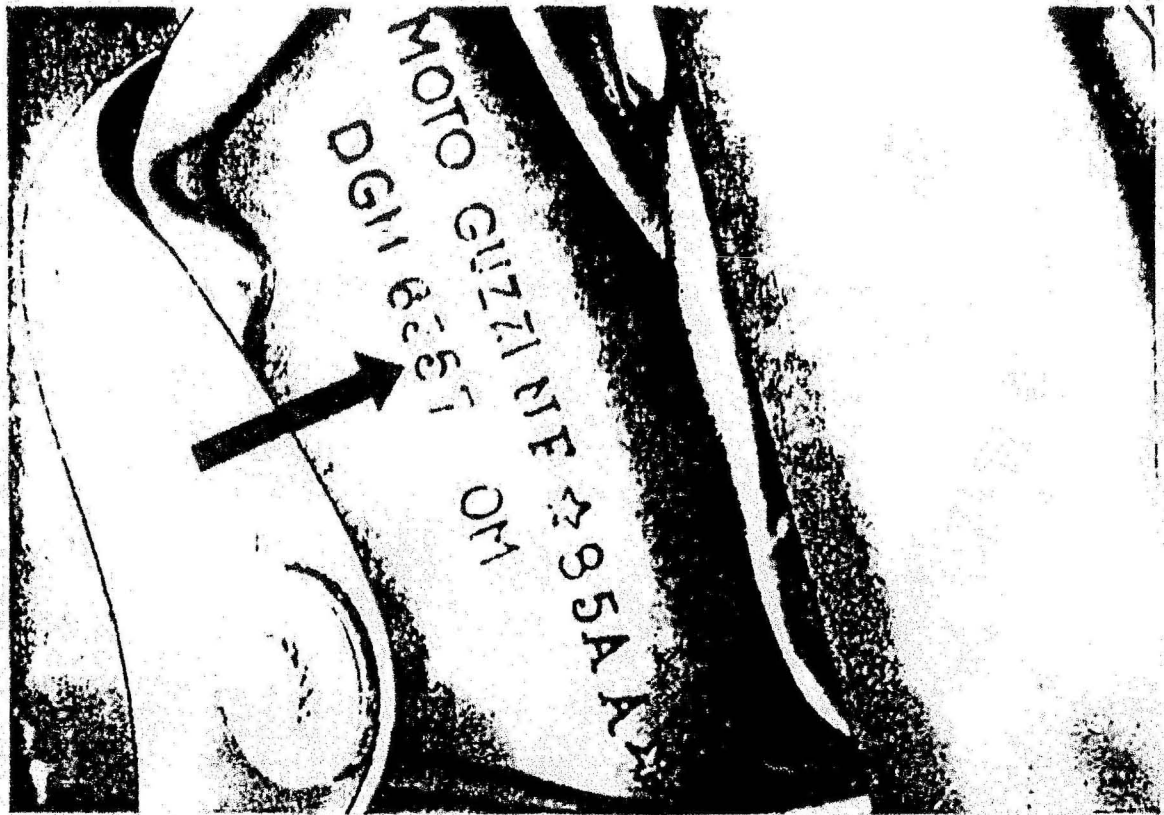


Fig. 4

Standard tool kit
(See fig. 5)

- 1 - Box spanner, 19-21-22 mm.
- 2 - Open ring spanner, 17-19 mm.
- 3 - Open ended spanner, 13-14 mm.
- 4 - Open ended spanner, 8-10.
- 5 - Box spanner 10-13.
- 6 - Allen key, 5 hex.
- 7 - Allen key, 6 hex.
- 8 - Open ended wrench 10-13 mm.
- 9 - Tappet adjusting wrench.
- 10 - Ring wrench, 24 mm.
- 11 - Universal pliers.
- 12 - Adjustable wrench.
- 13 - Screwdriver.
- 14 - Ring wrench.
- 15 - Tool bag.

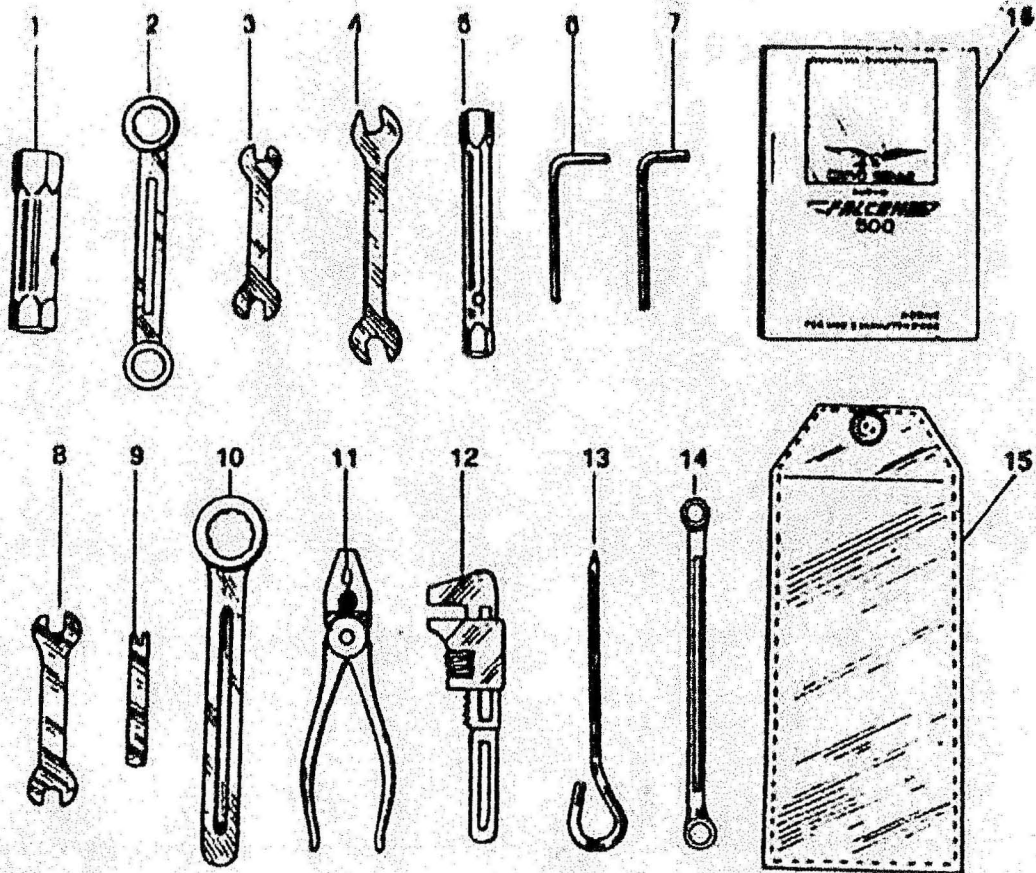


Fig. 5



GENERAL CHARACTERISTICS OF ENGINE

(Fig. 6)

Engine	: 4-stroke, single cylinder
Bore	: 88 mm
Stroke	: 82 mm
Swept volume	: 499 cc
Compression ratio	: 6,86 to 1
Output	: 26.2 HP
Nominal power	: 5 HP

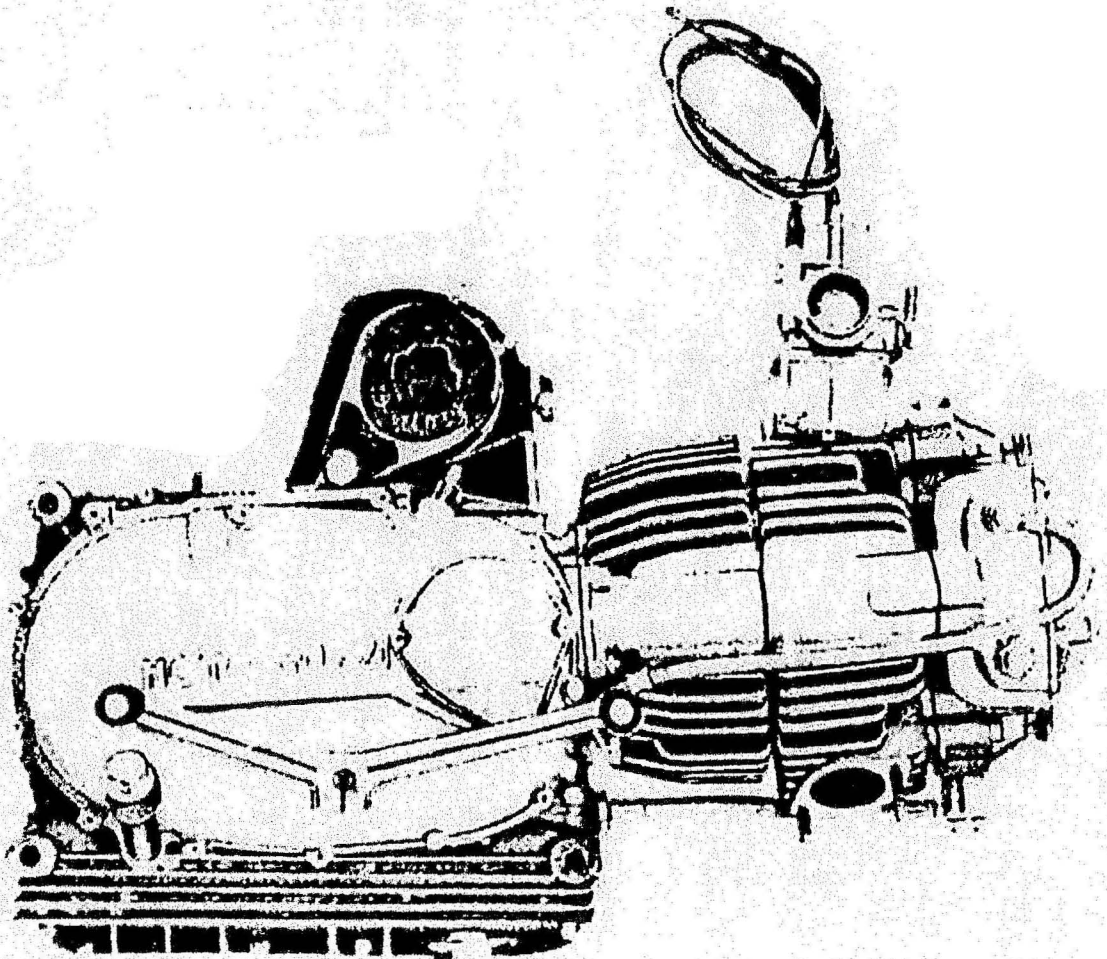


Fig. 6



Revs at maximum
engine output : 4800 r.p.m.
Crankcase : in light alloy
Cylinder : in light alloy with special
cast iron inserted liner
Cylinder head : in light alloy with spe-
cial cast iron inserted
seats
Crankshaft : steel construction
Main bearings : 1 ball on driving side and
one roller on timing side
Con-rod : steel construction with
AL-TIN alloy thin wall
bearings
Pistons : in light alloy

Valve gear

OHV push rod operated via the camshaft in
the crankcase and gear driven by the crank-
shaft.

Inlet valve:

- opens 40° before TDC
- closes 74° after BDC

Exhaust valve:

- opens 67° 30" before BDC
- closes 33° after TDC

Rocker clearance for valve timing:
0,5 mm (.0195")

- Inlet: 0,05 mm (.00195")
- exhaust: 0,10 mm (.0039")

Carburation

1 Dell'Orto carburetor type VHB 29A, gravity
fed from the tank.

Standard carburetor setting

Choke : dia. 29 mm
Throttle slide : n. 50



Atomizer : 265 P
Main jet : n. 132
Pilot jet : n. 55
Needle : V10, 2nd notch from top
Idling screw opening : 1 and a quarter turn
Air Inlet provided with dry filter.

LUBRICATION

Primary drive Helical gears - Engine-gearbox ratio: 1 to 2 (30/60).

Clutch Multiplate in oil bath driven by the gearbox mainshaft, hand controlled from the left handlebar.

Gearbox 4 speeds, constant mesh gears with front engaging dogs. Positive lever control from the R/H side of the machine.
Internal gear ratios:
— Low gear : 1 to 3.21 (14/30-18/27)
— 2nd gear : 1 to 1.80 (20/24-18/27)
— 3rd gear : 1 to 1.25 (24/20-18/27)
— Top gear : 1 to 1

Secondary drive 5/8 x 9.6 chain, pitch 15.97, roller dia. 10.16, 90 pitches.
Gearbox-rear wheel ratio: 1 to 2.187 (16/35).
Overall gear ratios:
— Low gear : 1 to 14.04
— 2nd gear : 1 to 7.87
— 3rd gear : 1 to 5.46
— Top gear : 1 to 4.374

Frame Duplex cradle - tubular structure.



Suspensions Telescopic front fork incorporating hydraulic dampers; rear swinging fork with externally adjustable springs.

Wheels 18 x 3 spoked rims, front and rear.

Tyres 3.50 x 18 front and rear, studded.

Tyre pressures

Front: solo	}	1.5 kg/cm ² (21 p.s.i.)
with pillion		
Rear: solo	}	1.75 kg/cm ² (25 p.s.i.)
with pillion		

N.B - The above recommendation is for normal riding (cruising speed). If using the machine at constant high speed or on motor roads, the above pressures should be increased about 0.2 kg/cm² (2.8 p.s.i.).

Brakes Large diameter, twin leading shoe front brake, hand operated from the handlebar. Single leading shoe rear brake, pedal operated from the left hand side of the machine.

Overall dimensions and weight

Wheelbase	1450 mm (57")
Length	2170 mm (85½")
Width w/ windscreen	805 mm (31.7")
Width w/o windscreen	770 mm (30.3")
Height w/ windscreen	1495 mm (59")
Height w/o windscreen	1040 mm (41")
Minimum ground clearance in running order	150 mm (5.9")
Minimum ground clearance in running order with passenger	120 mm (4.72")
Curb weight	214 kgs (470 lbs.)



Performances

Maximum permissible speeds and gradients climbable in each gear, solo riding:

	speed	gradient
Low gear	39.6 kms (25 m.p.h.)	76%
2nd gear	70.6 kms (44 m.p.h.)	31%
3rd gear	101.7 kms (63.5 m.p.h.)	15%
top gear	127 kms (79.3 m.p.h.)	7,5%

Fuel consumption according to CUNA measurements: 4.1 litres per 100 kms (68 m.p.g. imp.).

Fuel and oil capacities

Fuel tank: 19 litres (4.2 gal. Imp.) including 1/4 g. reserve.

Sump and Gear box : { SHELL X 100 SAE 20W/30 in winter or equivalent
SHELL X 100 SAE 40W/50 in Summer or equivalent

Front fork dampers: 0.160 litres (5.6 oz.)
Shell Tellus 33.

INSTRUMENTS AND CONTROLS

- 1) Instrument panel including (fig. 7):
 - a) Speedometer;
 - b) Green light indicating lights on;
 - c) Oil pressure gauge (red). Goes out when pressure for engine lubrication is sufficient;
 - d) Orange indicator for the neutral position. Watch this indicator before starting the engine as it is not lighted when a gear is engaged;

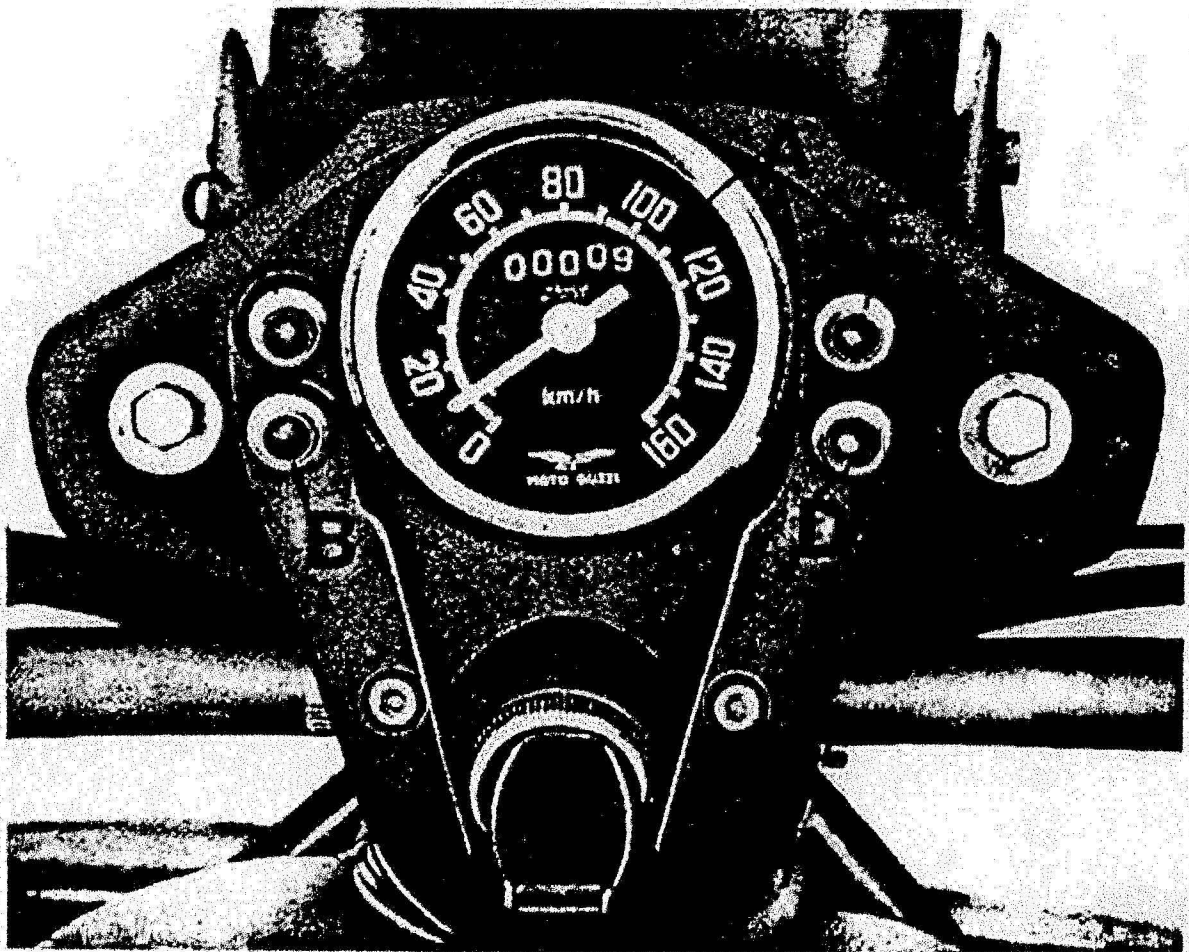


Fig. 7

e) Indicator showing insufficient flow of current from generator to battery (red). Should go out when the engine has reached a certain number of revolutions.

2) Ignition switch and key (fig. 8)

This key has 3 positions:

- «0» Machine at standstill, key removable, all electrics switched off. This key acts also as an anti-theft device.
- «1» Machine standing still, key removable, parking light on.
- «2» Machine ready to be started or normal riding position. All controls on. For

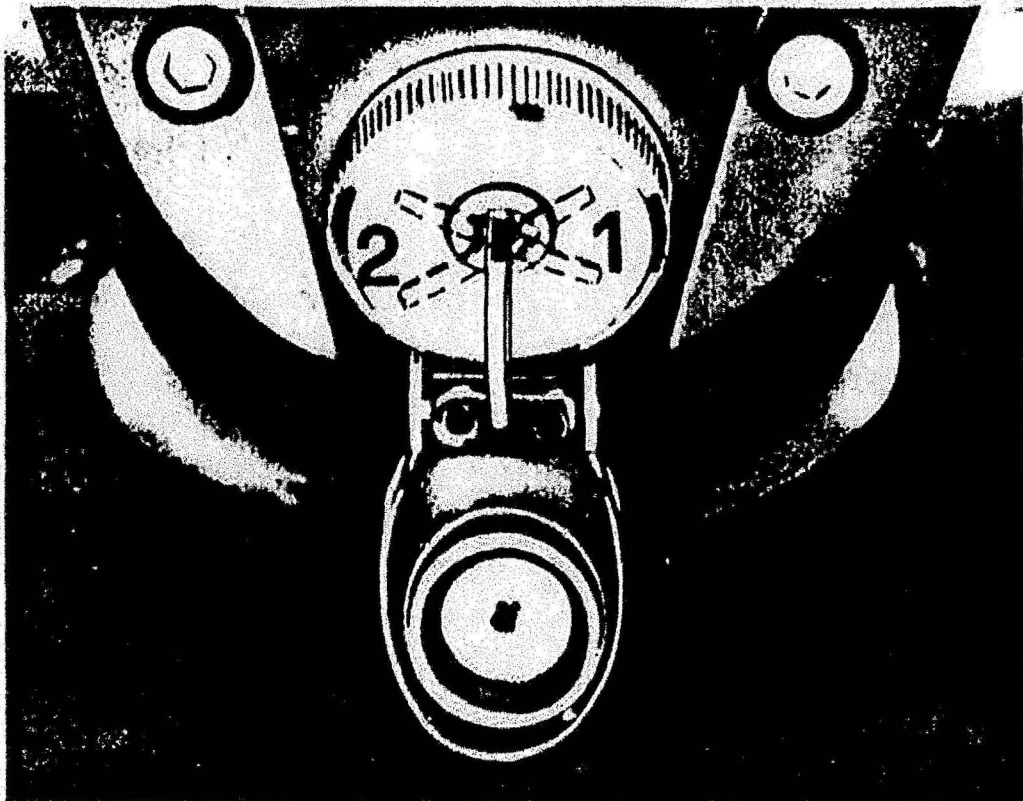


Fig. 8

daylight riding no other operation is necessary. For night driving levers A and B on the switch must be actuated (see fig. 9).

- 3) **Each vehicle is supplied with 2 keys.** The key number should be recorded in order to report it in case of loss.
- 4) **The steering lock is located on the L/H side of the steering column and is key operated (fig. 27/1).**
- 5) **Steering lock keys.** Each machine is supplied with a key and a duplicate. Record its number and report it to your dealer in case of loss.
- 6) **Clutch lever.** It is located on the L/H side of the handlebar and should be actuated only for starting and changing gears.
- 7) **Valve lift lever.** Is on the L/H side of the handlebar. Pulling this lever raises the exhaust valve.
- 8) **Twistgrip throttle control.** Is on the R/H side of the handlebar and is opened by turning it towards the rider.
- 9) **Air lever.** Is on the R/H side of the handlebar. It is opened when pulled towards the rider and viceversa.
- 10) **Front brake lever.** It is on the R/H side of the handlebar.
- 11) **Light switch and horn button (fig. 9).** It is on the L/H side of the handlebar.
 - a) **Light switch**
 - Position «0»: Lights off;
 - Position «1»: Parking or town driving light on;
 - Position «2»: Antidazzle light on;

b) Dimmer switch

Position «3»: Dazzling light on;

Position «4»: Dimmed light;

c) Horn button

- 12) **Side stand.** It is located on the right hand side of the machine and its only purpose is to make parking easier during brief stops.

When re-starting make always sure that this stand is returned to the rest position as if it is left inadvertently down, possible serious trouble may ensue.

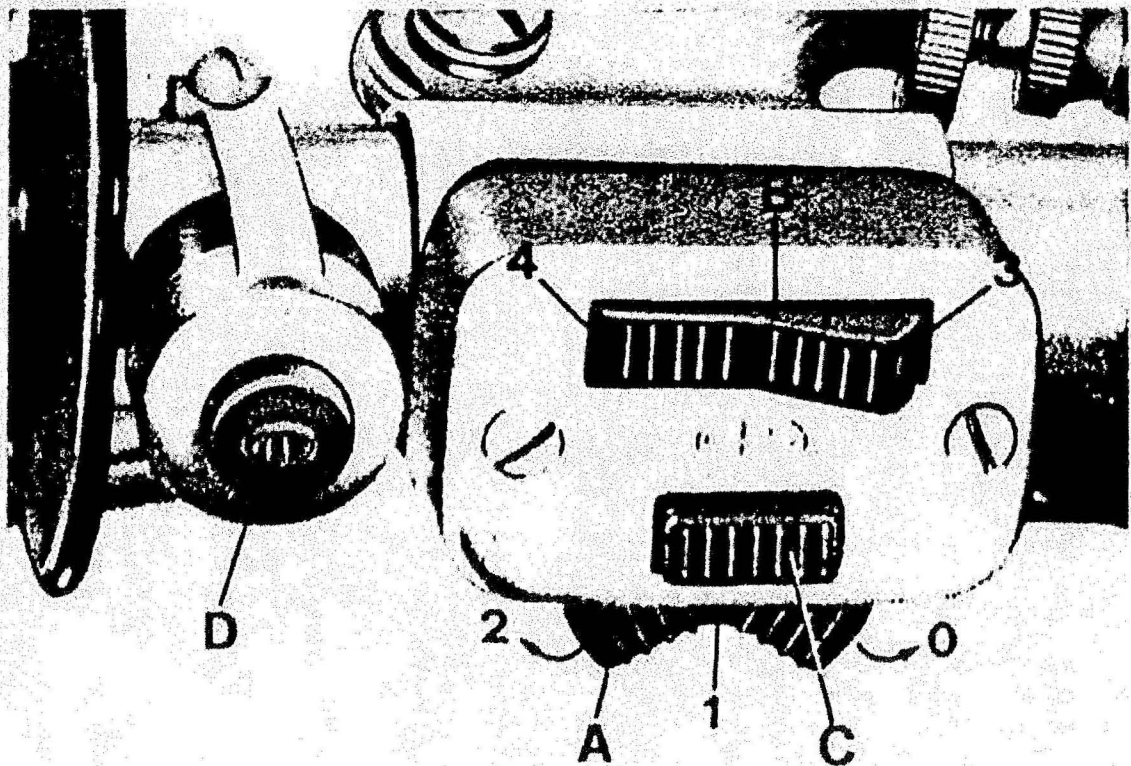


Fig. 9



RIDING INSTRUCTIONS

Before starting the engine ensure that there is sufficient fuel in the tank, the crankcase oil is at correct level, the ignition key in position «2» (fig.8), and that all the warning lights in the panel are on (2 red, one green, one orange).

If starting from cold make also sure that the air lever is turned completely towards the rider (position «A»).

Open the gas 1/4 turn, pull the valve lift lever and depress the kickstarter vigorously. The valve lift lever should then be released when the kickstarter is about halfway of its travel in order to allow the engine to start.

When the engine is started, allow it to idle for a few seconds in the hot and a few minutes in the cold seasons, before returning the air lever in its normal riding position «C» in order to allow the oil to reach all the lubricating points and the cylinder to get sufficiently warm.

Important

Don't forget that driving with the air lever in the «A» position (open) will result in a greatly increased fuel consumption and in an irregular carburation with possibility of seizure due to an excess of oil going into the cylinder.

This because this lever not only controls the input of air through the carburetor but also the extra fuel input device which is now incorporated on the VHE 29 A type carburetor which is fitted on this model.

Caution

Attempting to start the engine in gear can be very dangerous as with the firing of the engine the machine itself may start off.



Make always sure that the orange warning light in the panel is on before depressing the kickstarter.

The engine should always start easily provided everything is in good order. If not, do not persist in many attempts but check carburation, ignition, battery charge, also that the oil is of correct grade.

Starting a hot engine

When starting a hot engine there is no need to open the air lever as this would richen the mixture and make starting difficult.

If there is any difficulty in starting a hot engine, it is well to open the throttle completely before depressing the kickstarter.

Getting under way

Pull the clutch lever completely, engage low gear, release the clutch slowly and at the same time turn the gas on.

As soon as the engine picks up some speed, close the gas, pull the clutch and by downward toe pressure engage second gear. Then release the clutch rapidly (but without a jerk) and turn the gas on again. Third and top gears are likewise engaged by toe pressure.

On the way

In normal riding conditions, all the tell-tale lights in the panel should be off except, of course, the green light when night riding in towns.

If any of the indicators light up, this means there is some fault in the system or that the oil pressure is insufficient.

The maximum speed in each gear should never be exceeded, not even on steep downhill grades.

Do not forget that by toe pressure you pass gradually to a higher gear and by heel pressure to a lower gear (fig. 10).

Before engaging any gear, make sure the clutch is completely disengaged. It is necessary to fully close the gas when you change up but it can only be closed partially when you change down. To locate this position it is necessary to pass to low gear and then by slight toe pressure to feel for the neutral position. With the machine standing still and the engine running, the gearbox should always be kept in neutral.

Do not keep the clutch lever pulled, even during the briefest stops, rather than pass to neutral.

Riding downhill

Never descend hills with the gearbox in neutral or the clutch disengaged but always make use of the engine braking power, keeping the throttle at minimum opening. If the downhill ride is long, it is well to occasionally ac-

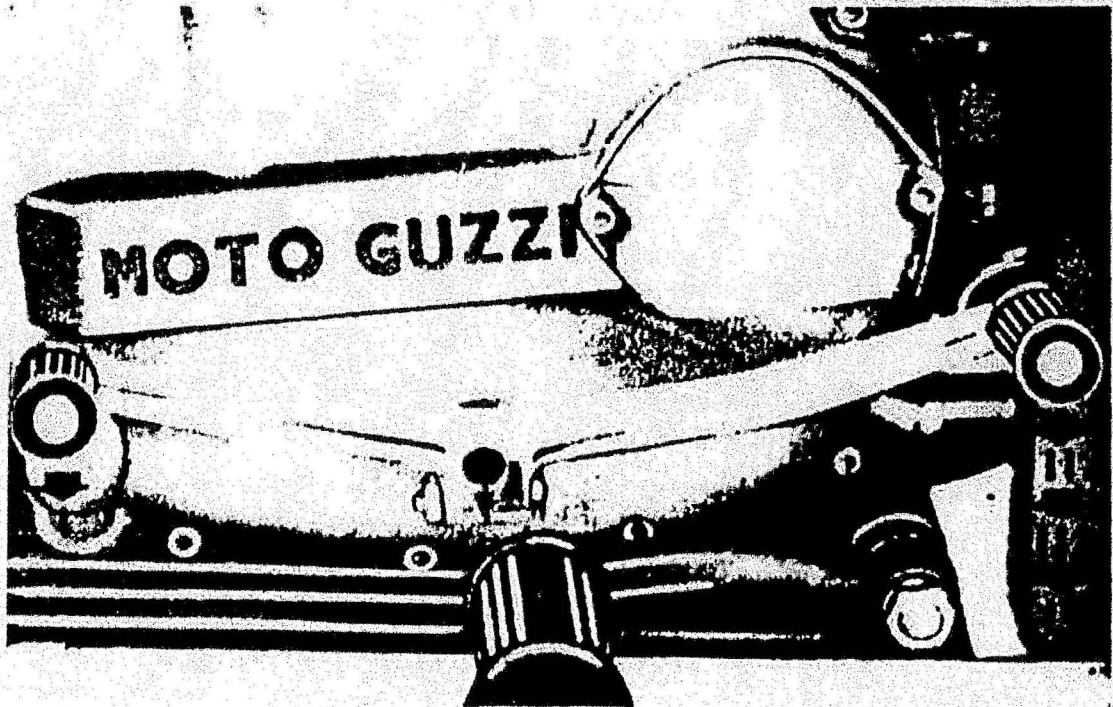


Fig. 10



celerate whenever the road allows it in order to burn up the oil that may have deposited in the combustion chamber and so prevent the plug from getting fouled.

Riding uphill

When ascending hills, it is well to select a gear which allows the engine to run easily without stress. Under no circumstances whatever should clutch slipping be used to increase the engine revolutions.

Stopping the machine

Close the gas, shift to neutral, pull the valve lift lever, remove the Ignition key and close the fuel tap.

LUBRICATION AND GENERAL MAINTENANCE CHART

Monthly	1) Check electrolyte level in battery (every 15 days in the summer).
Periodically	2) Check tyre pressure with a gauge (See "Tyres").
After the first 500 kms (300 miles)	3) Replace the crankcase oil. 4) Check tightness of all nuts and bolts. 5) Check and eventually adjust tappets.
Every 500 kms (300 miles)	6) Check and eventually top up the crankcase oil. Correct oil level is in between the minimum and maximum marks on the dipstick. Always use oil of the same quality and gradation.
Every 1000 kms (600 miles)	7) Lubricate cable ends (Clutch, front brake, air lever, valve lifter). 8) Wash chain in petrol and smear it lightly with grease.
Every 3000 kms (1800 miles)	9) Replace oil in crankcase. 10) Check tappet clearance. 11) Check and clean spark plug. Check gap.
Every 5000 kms (3000 miles)	12) Check condition of the contact points and if correctly distanced.
Every 10.000 kms (6000 miles)	13) Clean fuel tap, filters and lines. 14) Strip the carburetor and check all parts. Clean out all ducts using an air jet. 15) Check cleanliness and tightness of all battery connections and smear them with vasoline.
After the first 20.000 kms (12000 miles)	16) Check that the wheel bearings are in good state and if still efficient pack them with grease. 17) Check condition of the steering races and cups and pack them with grease. 18) Replace oil in the fork legs.

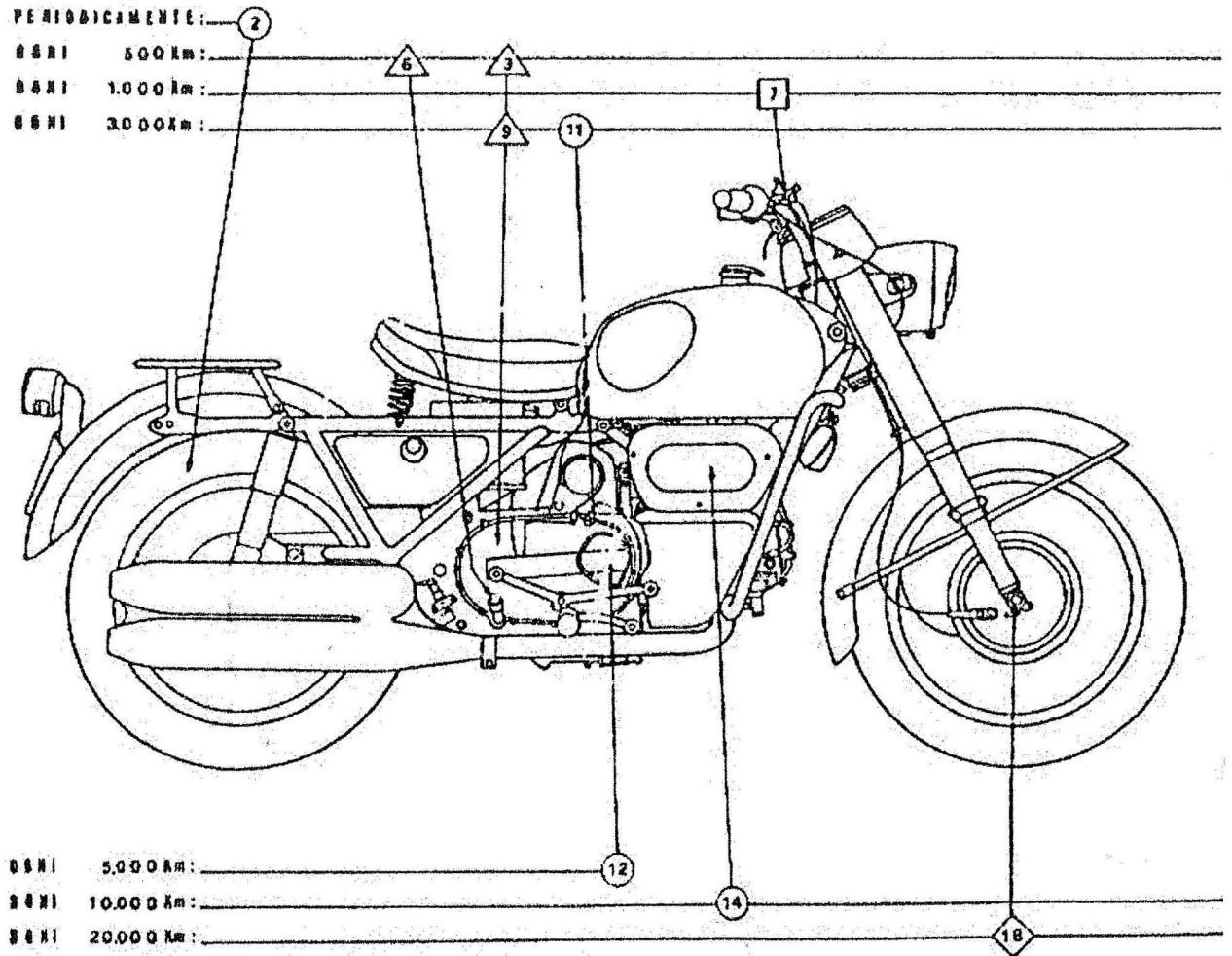
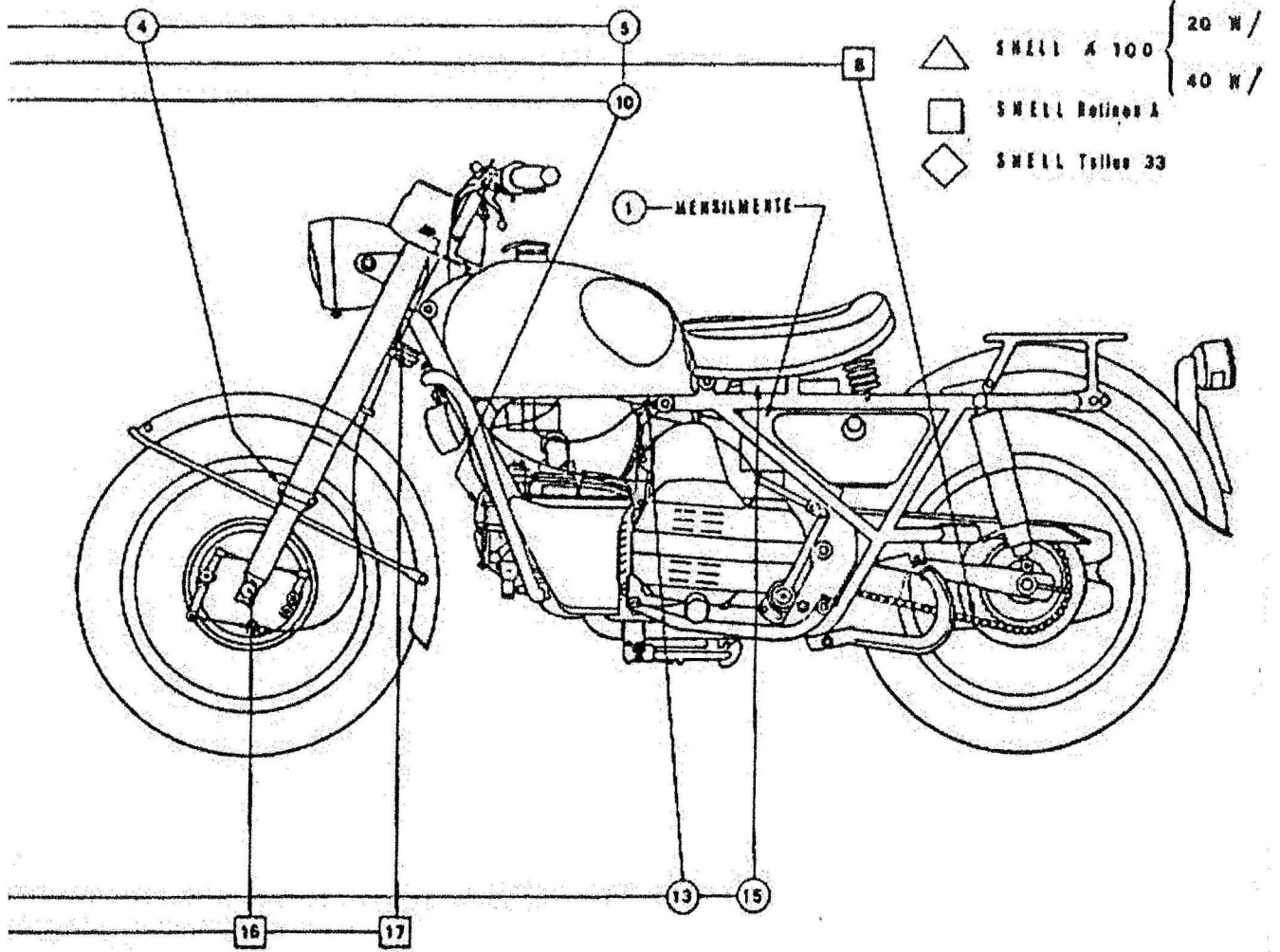


Fig. 11





GENERAL MAINTENANCE

Lubrication of the engine gearbox assembly (fig. 12)

Using the dipstick welded to the filler cap, check the oil level in the sump every 500 kms (300 miles).

Correct oil level is in between the minimum and maximum marks. This check should be made on a warm engine with the filler cap screwed on one turn. Every 3000 kms (1800 miles) replace the oil. On a new or reconditioned engine the first change must be made after the first 500 kms (300 miles). The oil has to be changed when the engine is HOT by unscrewing filler cap (A) and drain plug B. Allow the old oil to drain completely before introducing fresh oil.

Quantity required : about 3 liters (3/4 gal.)

Oil recommendation:

Shell X 100 { 20W/30 in winter
 } 40/50 in summer

or Shell super 100 multigrade or any equivalent.

Oil pressure relief valve

Should never be tampered with as it has already been calibrated at the factory for a pressure operation of 3.8 - 4.2 kg/cm² (54/60 lbs/sq. in.).

Oil pressure gauge

The indicator light goes out when the pressure is sufficient to open the contacts of the pressure operated solenoid. If this light does not go out, then the oil pressure is incorrect and in such case the engine should be immediately stopped and the oil line and passages closely inspected to determine the cause for the failure. Restart only after these have been corrected.

- Lubrication of the front fork and hydraulic dampers (fig. 13)** Every 20.000 kms (12.000 miles) or earlier if necessary, change the oil in the fork tubes proceeding as follows:
 Remove the bottom fork plugs and washers (A) and the top filler plugs (B).
 Allow the old oil to be drained and after refitting the bottom plugs introduce fresh oil.
 Quantity of oil required for each fork tube: about 0.160 litres (5.4 oz.).
 Oil recommendation: Shell Tellus 33.
- Lubrication of the steering races and balls** Check condition of these every 20.000 kms (12.000 miles) and if still efficient pack them with «Shell Alvania Grease 2».
- Lubrication of wheel bearings** Check their efficiency every 20.000 kms or so (12.000 miles) and re-pack with «Shell Alvania Grease 2».

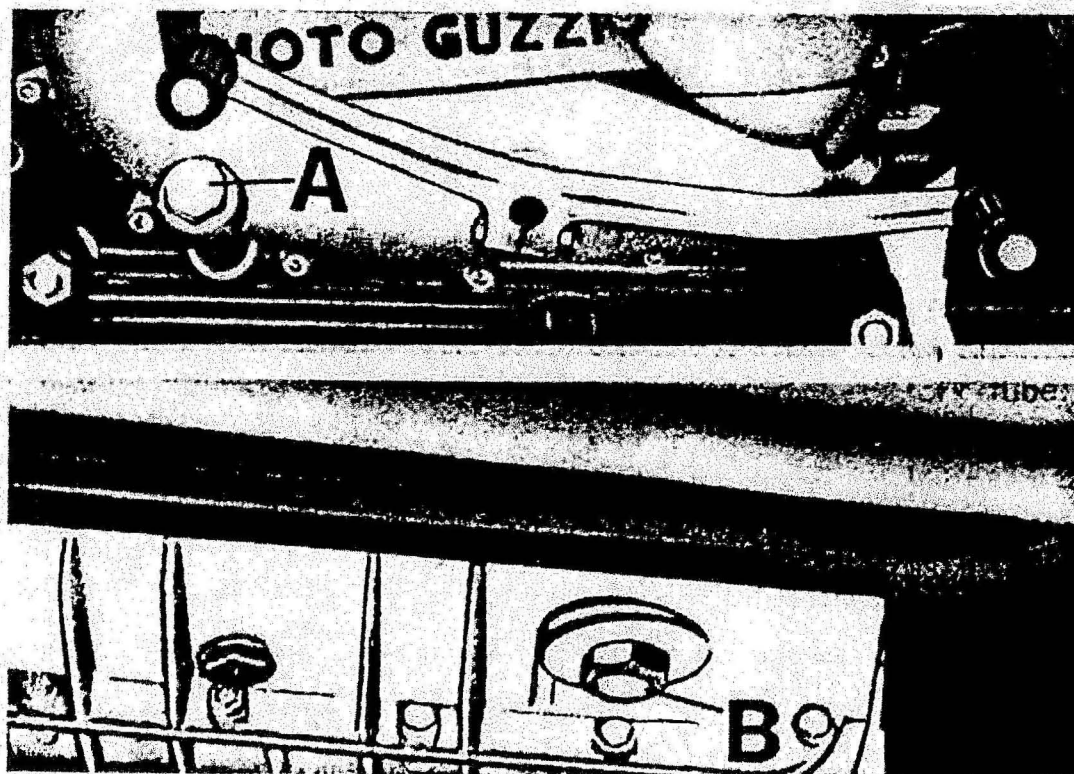


Fig. 12

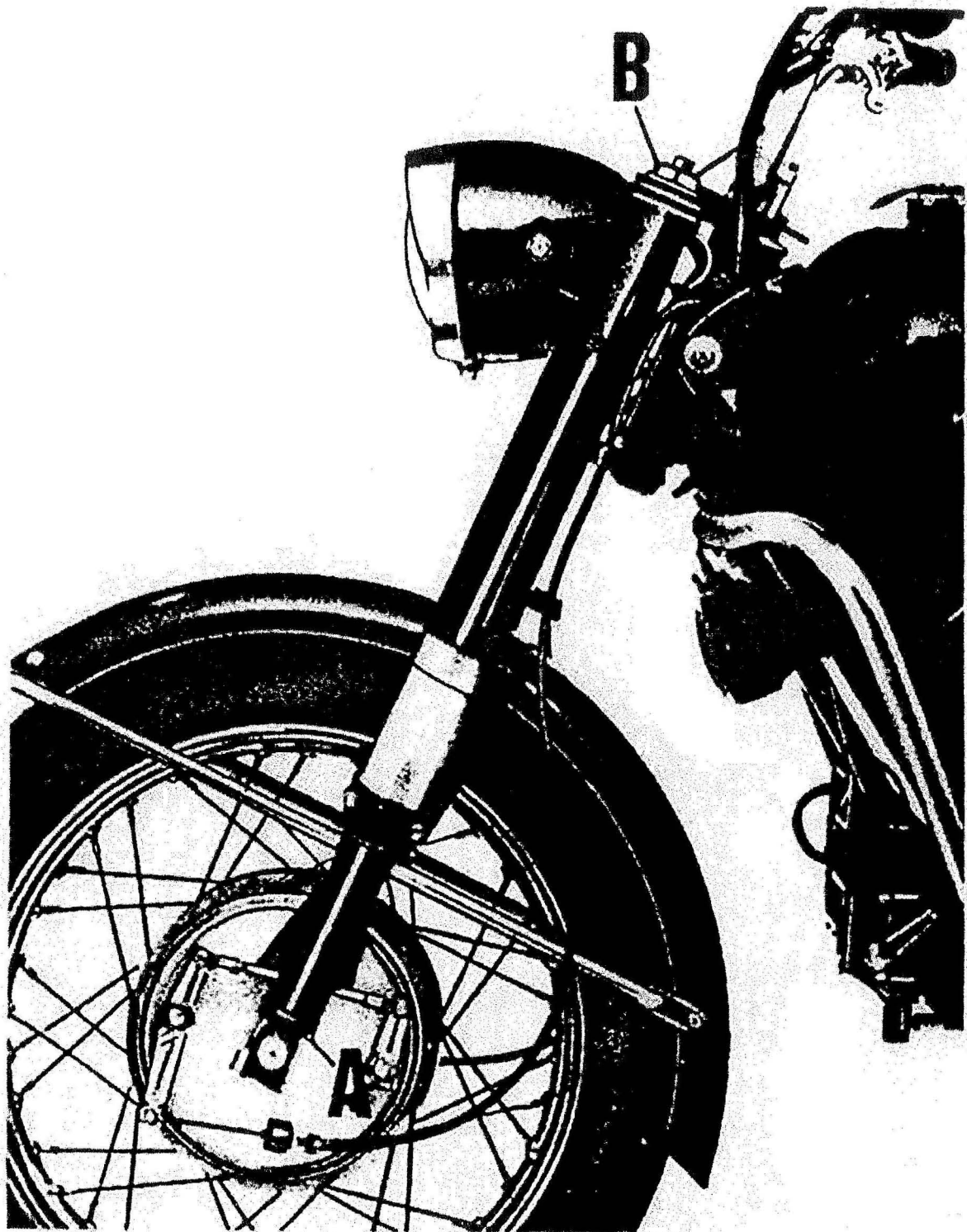


Fig. 13



Lubrication of control cable ends

The terminal ends of the clutch, front brake, and valve lifter control cables should be cleaned and greased every 1000 kms (600 miles).

Operate the control levers several times in order to allow some of the grease to enter into the casings. Use «Shell Alvania Grease F2».

Lubrication of the swinging arm bushes

At the time of a general overhaul, it is well to inspect these bushes for wear. If worn, replace them ensuring that either a new or old bush is re-fitted fully packed with grease.

CARBURETOR

Carburetor Information and maintenance hints

This model is fitted with a dual control Del-l'Orto carburetor type VHB 29 A.

Both controls are on the right handlebar: one is the easy starting lever for cold starts, the other is the throttle twist grip control. When starting a cold engine, the easy start lever is turned on the open position «A» (See fig. 14).

After the engine has warmed up — a few seconds in the summer and a few minutes in winter, — this lever must be returned to the normal riding position «C» in fig. 14.

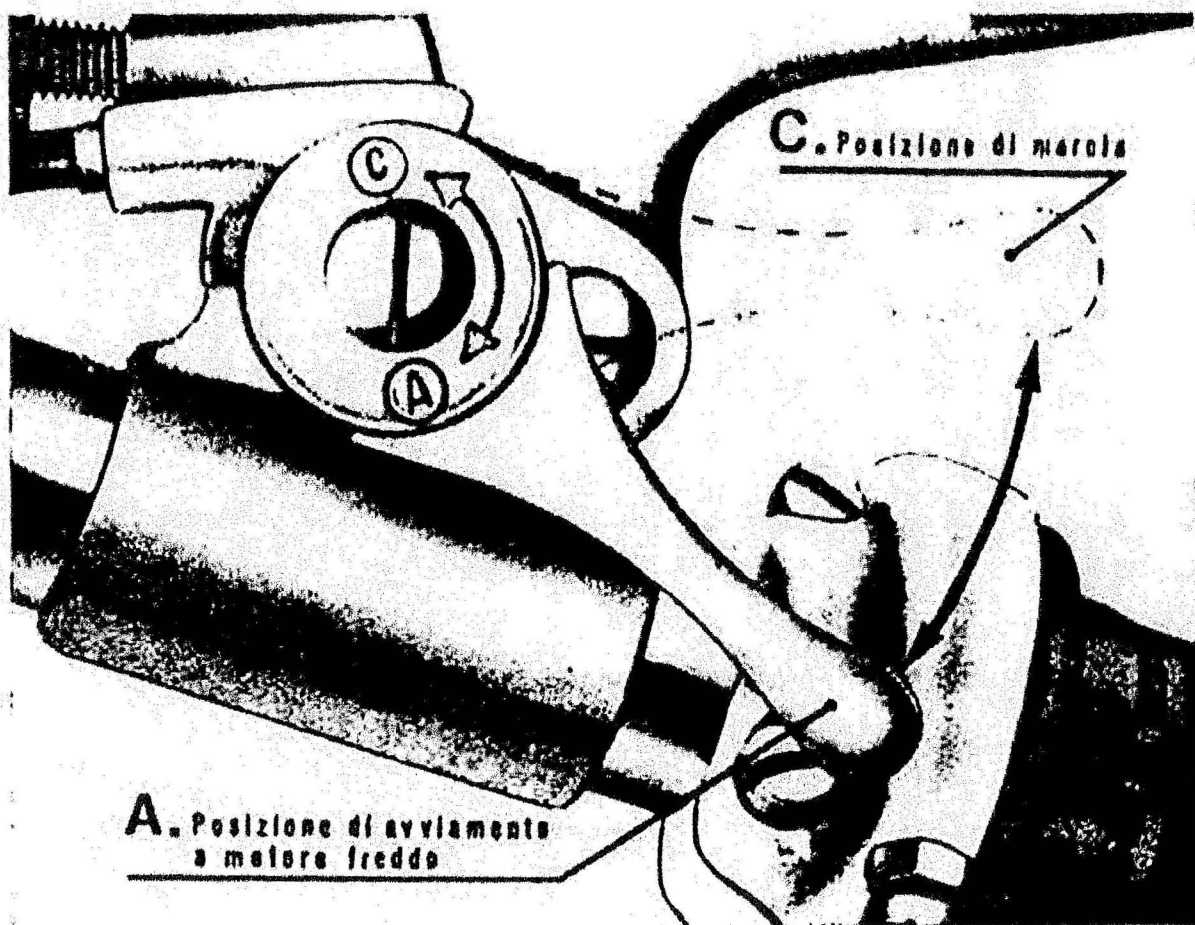


Fig. 14

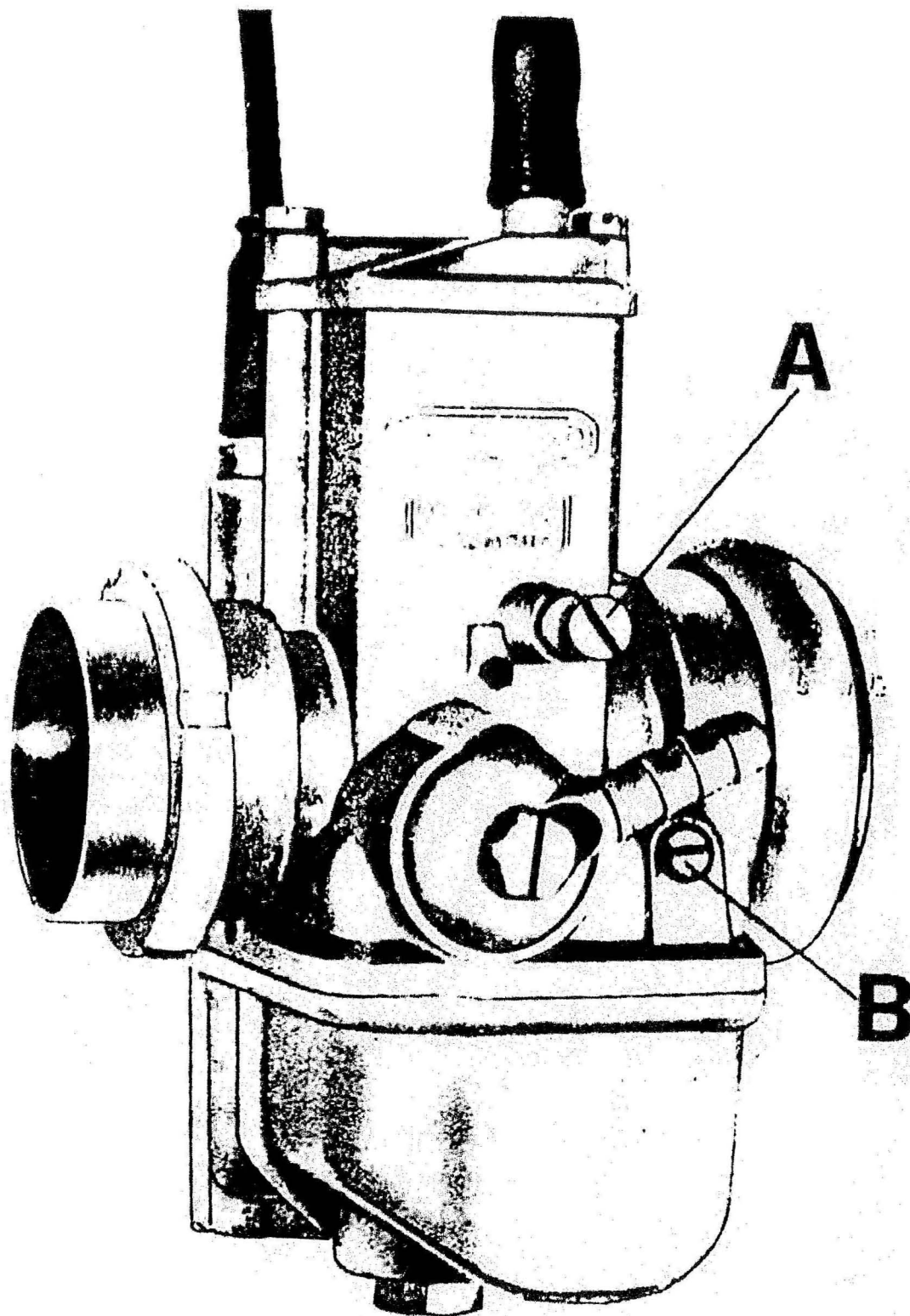


Fig. 15



**Standard
carburetor
setting**

Choke	:	dia. 29 mm
Throttle slide	:	50
Atomizer	:	265 P
Main Jet	:	132
Pilot Jet	:	55
Starter atomizer	:	80
Needle	:	V10, 2nd notch from top
Idling screw opening:		1 and 1/4 turn

**Adjusting the
carburation
(fig. 15)**

This adjustment is made on a hot engine as follows:

- 1) Ensure that the easy start control lever for cold starts has about 4 mm (.16") end play in its fully closed position. If it is too stretched there is the possibility that engine vibration may cause the valve on the carburetor to open and a resulting irregular carburation.
- 2) Ensure that the twist grip throttle control is in its fully closed position.
- 3) Start the engine and let it run for a short while until it reaches normal operating temperature. Then screw on completely the idling screw (B) and undo it one and a quarter turn.
- 4) Set the air screw A in the position which will give an engine speed of about 1000 rpm.
- 5) To correct carburation, lightly screw in or out the throttle adjusting screw B to the position which will give the best obtainable engine speed (the higher).
N.B. - Screwing this screw in decreases the fuel flow and viceversa.
- 6) Finally, turn in or out again idling screw A to the position which will give the required idling speed.

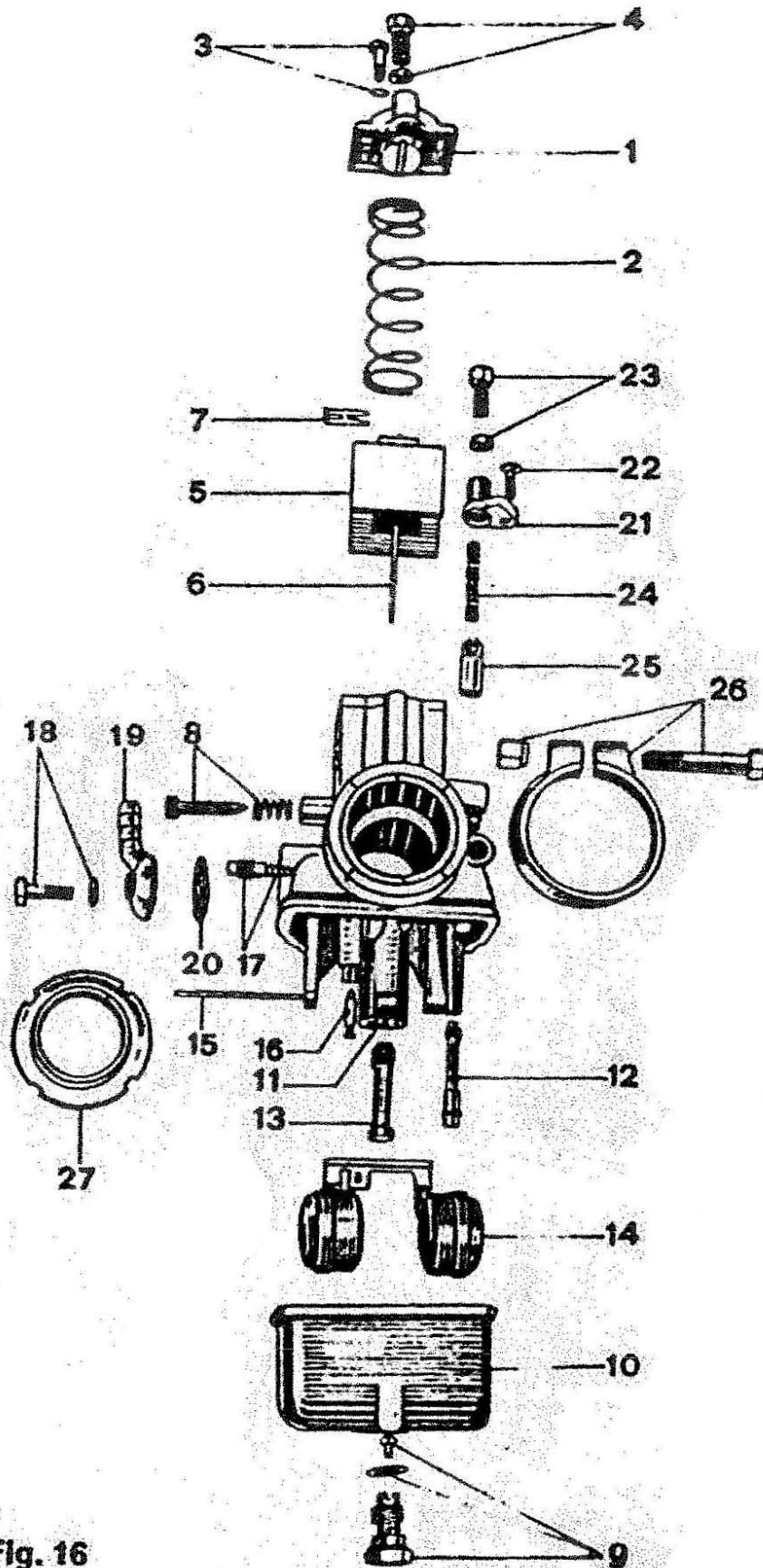


Fig. 16



Stripping of carburetor (fig. 16)

Every 10.000 kms (6000 miles) or any time the machine is overhauled it is well to strip the carburetor. Proceed as follows:

Remove:

- Mixture chamber cover (1) by removing screws and washers (3);
- Return spring (2) and cable adjuster (4) from the cover;
- Throttle valve (5) complete with taper needle (6) and clip (7);
- Throttle slide adjusting screw and spring (8);
- Main jet and washer (9);
- Carburetor bowl (10);
- Pilot jet (11);
- Easy starter device jet;
- Atomizer (13);
- Float (14) and needle (15);
- Needle (16);
- Idling screw (17);
- Adapter screw with washer (19) with adapter (19);
- Strainer (20);
- Plug (21) and screw (22);
- Air control cable screw and nut (23);
- Spring (24);
- Atomizer check valve (25);
- Band c/w screw and nut (26);
- Adapter (27).

All the dismantled carburetor parts should be thoroughly cleaned in a petrol bath and dried off with an air jet. All lines and filters should also be blown through with air. Never use needles or wires to clean the jets as these may alter the size of the jets and so upset carburation.



**Air filter
(fig. 17)**

The dry type air filter is located in a box secured to the frame and consists of:

- 1) Box.
- 2) Filtering element.
- 3) Box cover.
- 4) Cover fixing bolts and washers.
- 5) Rubber sleeve.
- 6) Hose (breather to filter).

Every 15.000 kms (9000 miles) it is well to replace the filtering element as it may be clogged with dust. This replacement should be made oftener if the machine is used on very dusty roads.

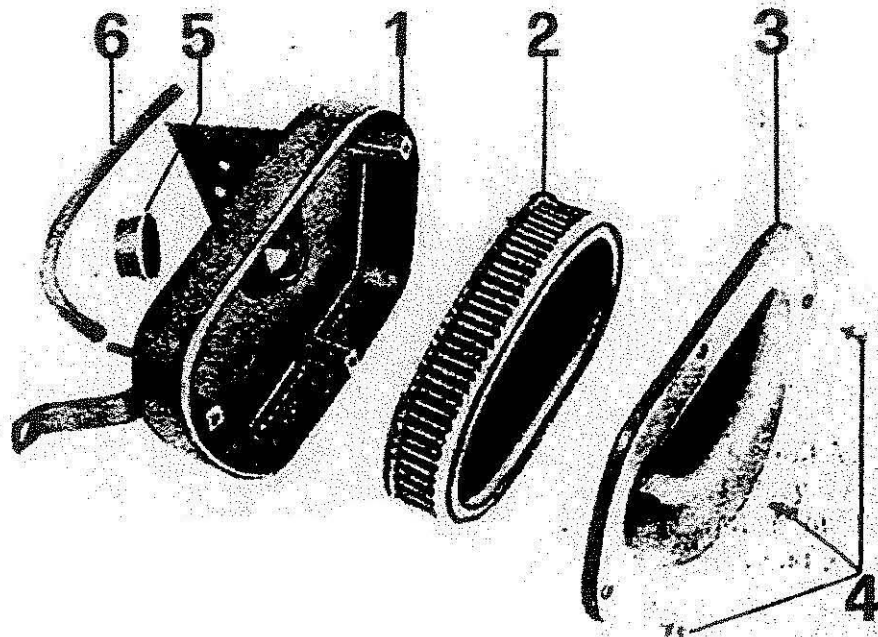


Fig. 17



VALVE GEARING

Tappet Play
(fig. 18)

Every 3000 kms (1800 miles) or any time valve operation is too noisy, the tappets should be adjusted.

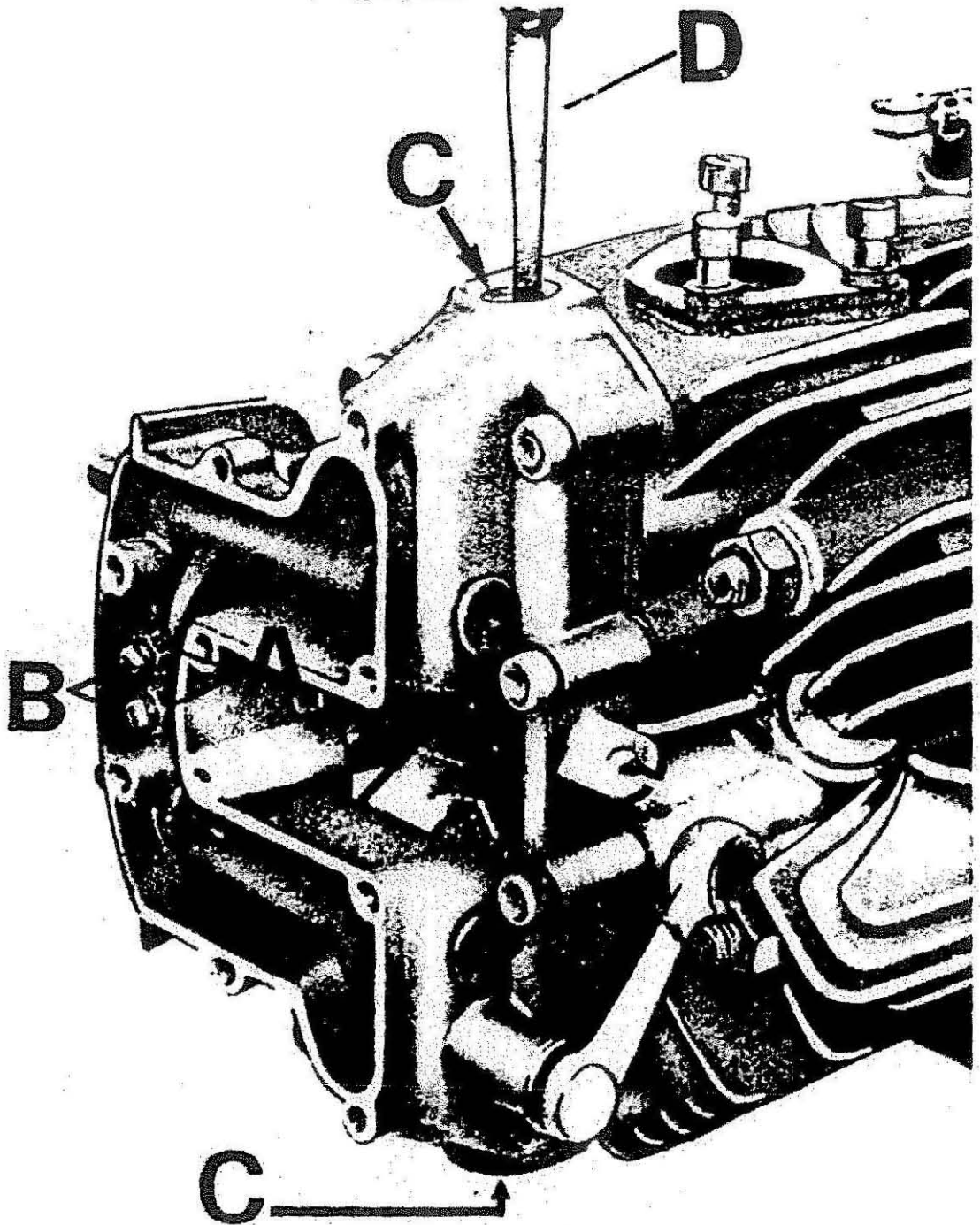


Fig. 18



This adjustment must be made on a COLD ENGINE with the piston at TDC and both valves closed.

After removing the rocker box cover, proceed as follows:

- 1) Undo nut A.
- 2) Using the wrench supplied in the tool kit, screw in or out adjusting screw B until the following clearances are obtained:
 - Inlet 0.05 mm (.00195")
 - Exhaust 0.10 mm (.0039")
- 3) Re-tighten nut A strongly.

This adjustment is best made with a feeler gauge inserted between the valve stem and the rocker through the slots in the head (see arrow C). Play is correct when by acting on adjuster B the gauge offers slight resistance. When this play is excessive there will be noisy valve operation.

If it is less, the valves may not close fully causing compression loss, rapid valve and seats wear, overheating of the engine etc.

It is highly recommended to have this adjustment made on new machines after about 500 kms (300 miles).

Checking valve timing

This job is best carried out by our dealers who have the necessary facilities.

IGNITION

Contact breaker (fig. 19)

Every 3000 kms (1800 miles), the cam felt pad should be lightly lubricated with a few drops of oil. Beware of using too much oil as this may get on to the contacts.

If the points are dirty, clean them with a petrol soaked cloth. Check that the points gap is 0.42 - 0.48 mm (.016 - .018").

Adjustment is made by loosening the securing screw and moving the fixed points carrier to the position that gives the correct gap.

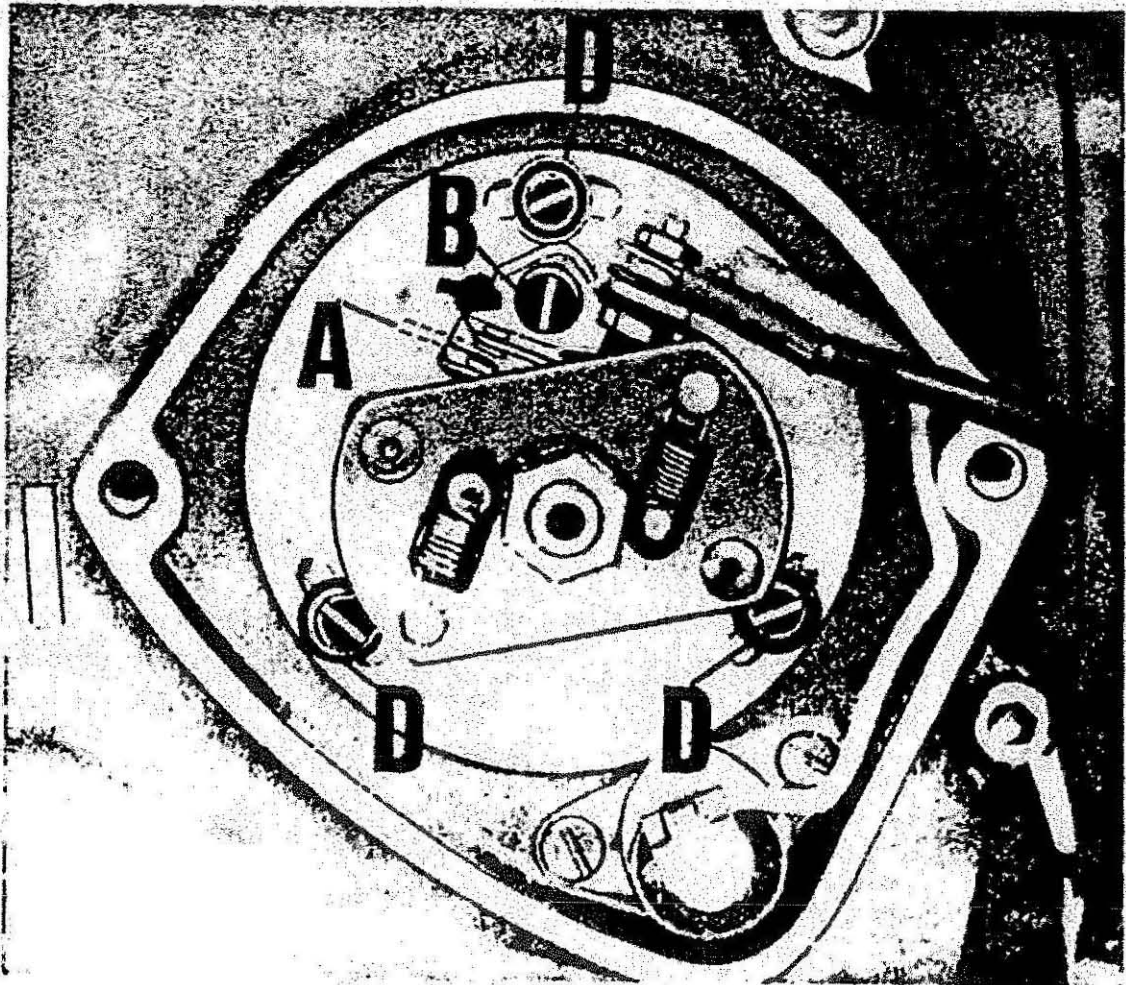


Fig. 19



The points should be changed after several adjustments or when necessary.

Spark plug

Every 3000 kms or so (1800 miles) check the electrodes gap which should be 0.6 mm (.023"). Check also the H.T. lead and replace if damaged.

The spark plug is best cleaned with petrol, a wire brush and a needle for the inner part. In refitting the plug make sure to start it by hand for a few turns and to complete the operation by means of the plug spanner in the tool kit.

Beware of overtightening as the thread may strip.

Checking of ignition timing

— Set up tool 32 in fig. 20 on the engine cover;

— Ensure that the points gap is 0.42 - 0.48" (.016 - .018");

— Ensure that the piston is at TDC at the end of the compression stroke with both valves closed. The mark PMS on the flywheel should coincide with the mark on the tool (A fig. 19);

— Turn the flywheel anticlockwise until the mark AF10 on the flywheel is opposite the arrow on the tool (A in fig. 20).

At this point the contacts should start to open. The exact opening point is best determined using an electric timer or a simple lamp.

When the breaker points start opening the lamp lights up. If the points start to open before or after the mentioned point, slacken screws D in fig. 19 and shift the contact breaker to the right or left to the position where the contacts start opening at the fixed point.

**Checking the
ignition advance
by means of a
stroboscope lamp**

For checking the ignition advance it is necessary to first mark off point D (see fig. 20) on the flywheel. This mark is at 44° to the TDC mark (PMS) already traced on the flywheel.

Marks B and C already traced on the flywheel and the new mark D when in coincidence with arrow A on the tool serve to determine if the ignition is correctly timed.

The reference marks on the flywheel can be defined as follows (See fig. 20 and the diagram (fig. 21)).

— «B» (PMS) is the TDC position mark (first on the left);

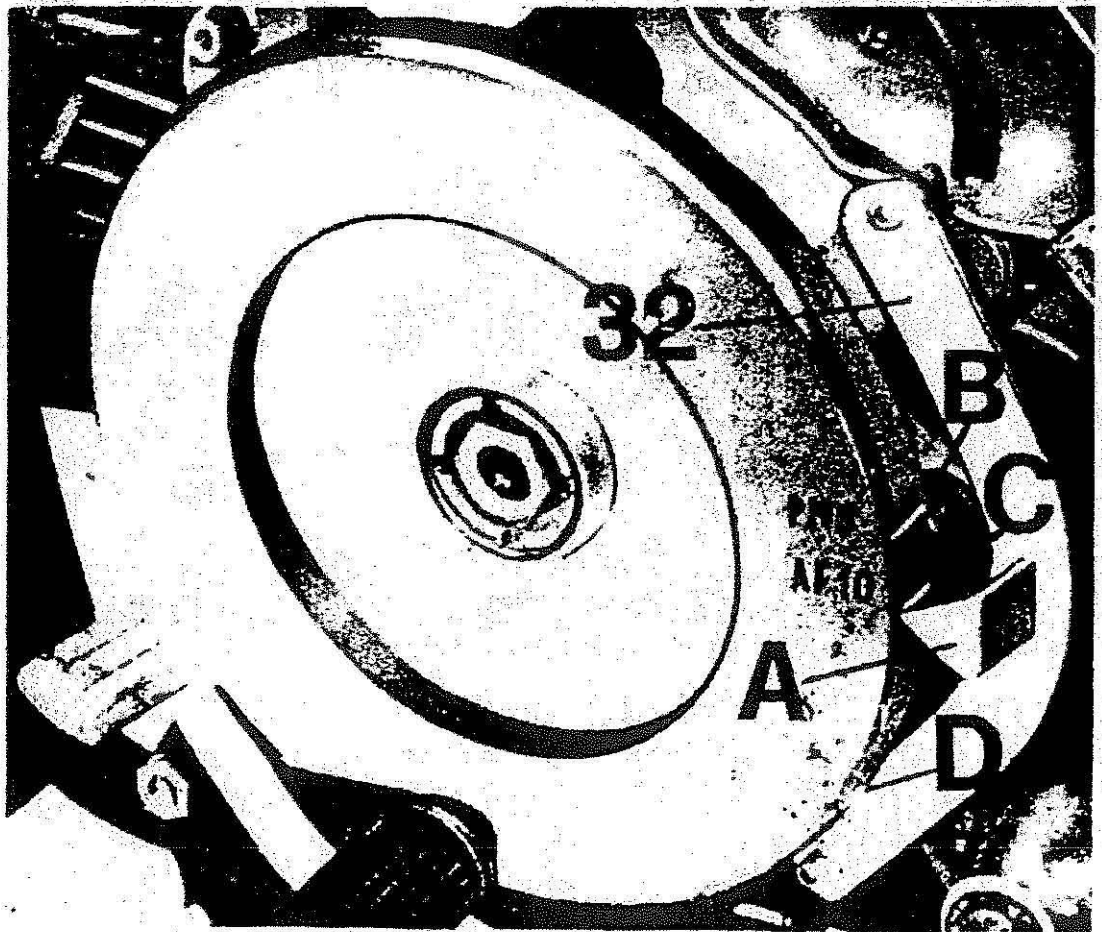


Fig. 20

IGNITION CHART

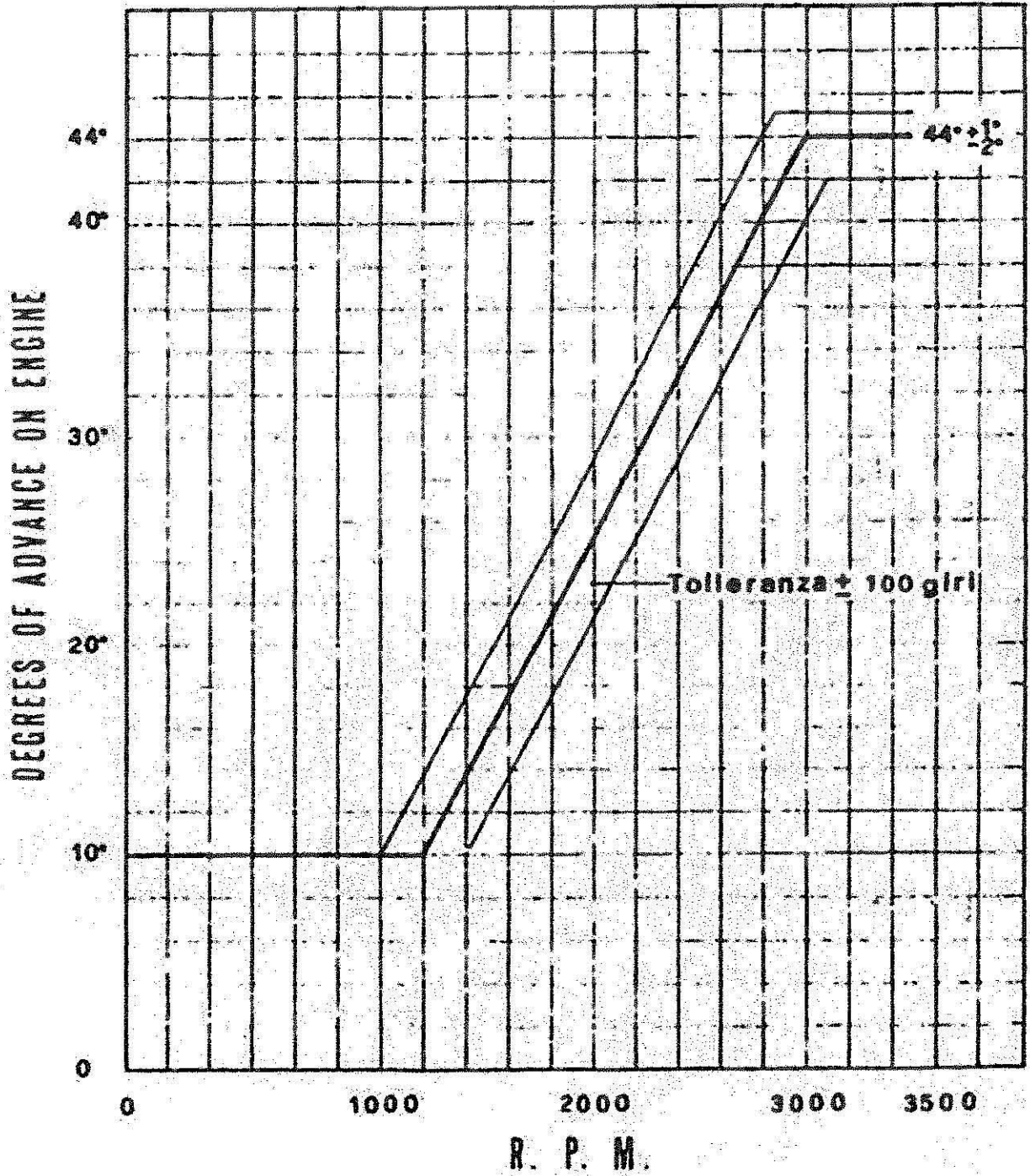


Fig. 21



— «C» (AFIO) is the 10° fixed advance position to the TDC;

— «D» is the maximum advance to the TDC. With the engine assembled on the vehicle, this control is made as follows:

— Connect the timing device cable to the plug;

— Connect the 2 stroboscope cables with clamps to a battery, ensuring that clamp (1) is secured to battery pole (+) and the other to pole (—).

After these connections to the plug and battery have been made, start the engine and direct the stroboscope light on arrow (A) of the chocking device. Check that arrow A coincides with the flywheel marks C and D at the following engine speeds:

— Mark C at 1200 rpm ± 100 rpm;

— Mark D at 3500 rpm ± 100 rpm.

If this check shows that arrow A on the timer is in coincidence with marks C and D on the flywheel at the above engine speeds, this means that the fixed and automatic advances are quite normal.

CLEANING OPERATIONS

Oil filters (fig. 22)

When changing the oil it is well to thoroughly wash in petrol the oil filters and to blow them through with a jet of compressed air. The filter is located under the crankcase (See fig. 12 - B).

When stripping the carburetor, the fuel tank, tap filter, tap duct, carburetor filter and fuel line should also be cleaned out thoroughly. To clean the tank, remove it from the frame. Pour some petrol in it and shake vigorously to take away any scaling which may have deposited in it and drain out.

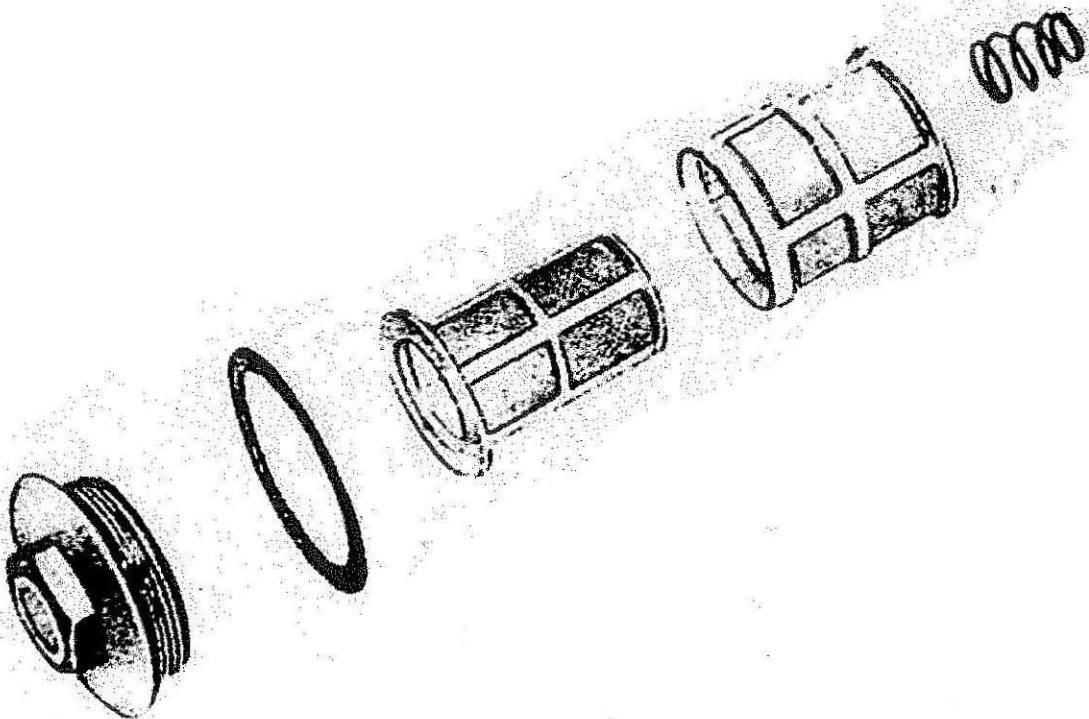


Fig. 22

Taps on the tank
(fig. 23)

These should be cleaned in a petrol bath and dried off with compressed air, after removing them from the tank.

The taps are open when turned downwards (fig. 23 - A) and closed when in position C (horizontal).

It is recommended to keep one tap only open and to use the other as a reserve tap to be opened in an emergency. This tap should be opened occasionally to see that it works properly and has not clogged up.

**Filter in the
adaptor and fuel
lines**

When cleaning the tank or when there is an irregular flow of fuel to the carburetor, the filter in the adaptor and the fuel lines should be closely inspected.

If the filter is dirty it should be cleaned in a petrol bath and dried off with compressed air.

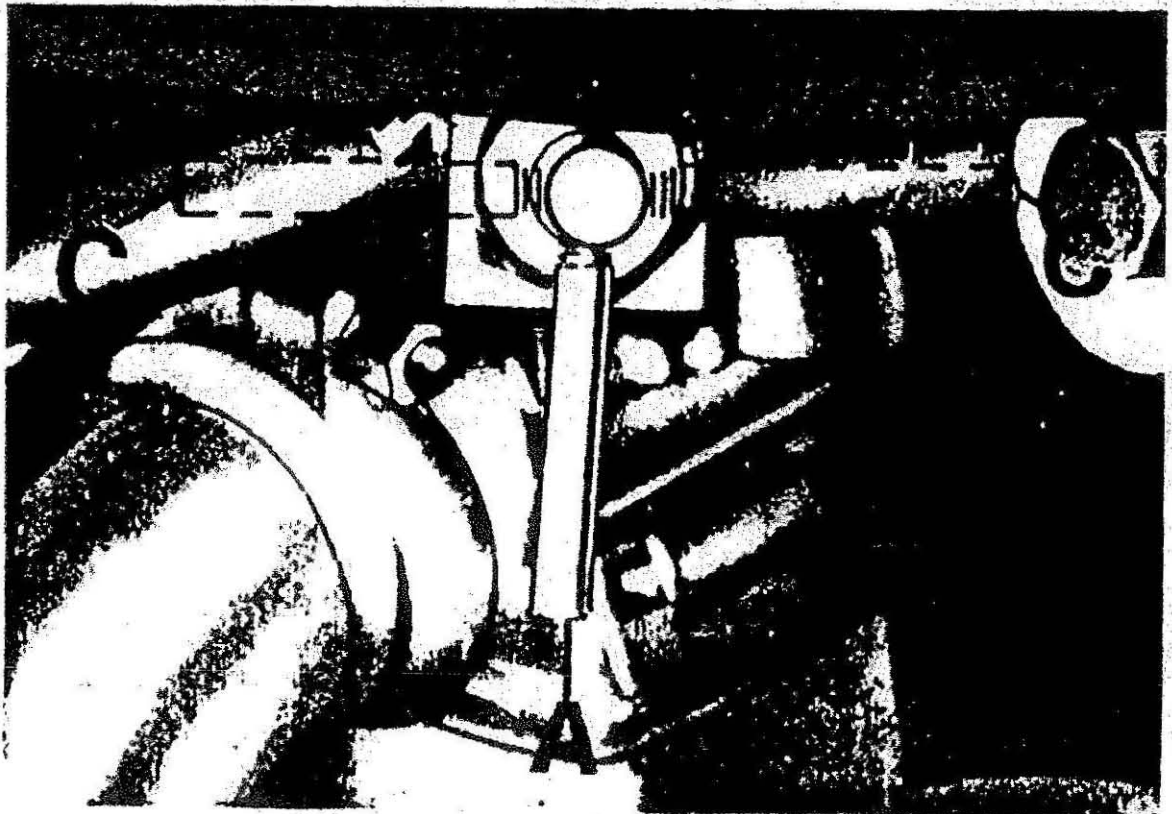


Fig. 23

The fuel lines from the carburetor should also be blown through with air.

**Cylinder head,
pistons and
valves**

Every 10,000 kms (6000 miles), the cylinder head should be removed and cleaned as follows:

- Using a chamfered scraper and a wire brush, clean the combustion chamber and the piston top, washing down with petrol;
- Check if the valve seats seal properly. To do this, pour some petrol through the inlet and exhaust ducts in the head and see if any seeps through between the seats and valves.

If so, the valves should be dismantled from the cylinder head and the seats

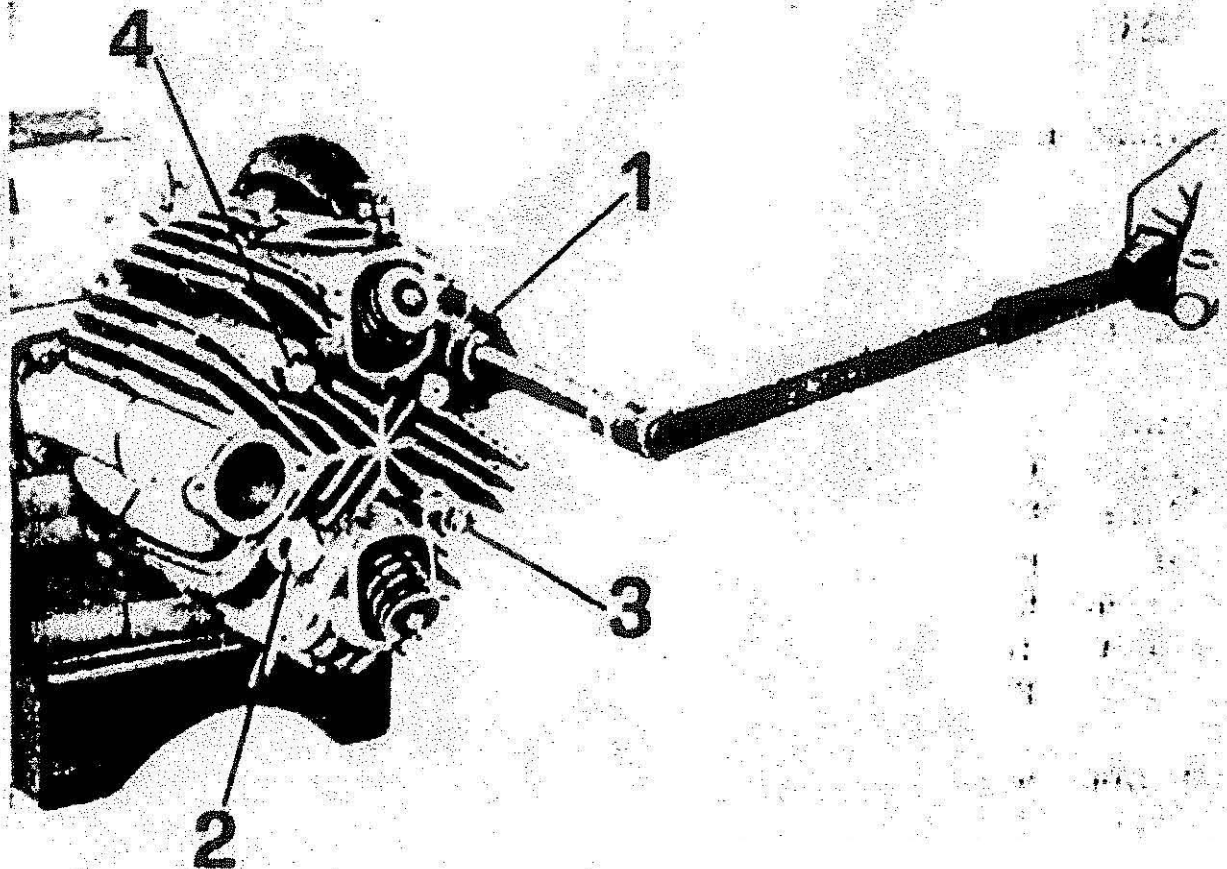


Fig. 24



ground in using emery paste. At the end of this operation, the head and valves should be thoroughly cleaned with petrol and compressed air to remove all traces of the abrasive. When re-assembling the heads, the nuts on the hold down studs should be tightened in a crossed sequence (See fig. 24 «1-2-3-4») using a torque wrench rated at kgs 4,5 (33 lb ft.).

Exhaust pipe and silencer

Internal cleaning of the mufflers is carried out as follows: after removing any scaling at the ends, fill the silencers with a solution of boiling water and caustic soda (20%) and allow this to stand for about 1 hour when it can be emptied and rinsed out with fresh boiling water shaking vigorously to take away all the scaling.

ADJUSTMENTS

Generator belt (fig. 25)

After long use the generator belt may slacken and should be tensioned. Normal belt slack is 5-6 mm (.19-.23") under a pressure of 10 kgs (22lbs.).

To tighten, proceed as follows:

Loosen bolts B and C which secure the generator bracket and the generator and by means of a lever placed between the crankcase and generator, tension the belt and then re-lock bolts B and C.

Clutch control lever (fig. 26)

When the free play at the handlebar is more or less than about 4 mm (.15"), the lever should be adjusted.

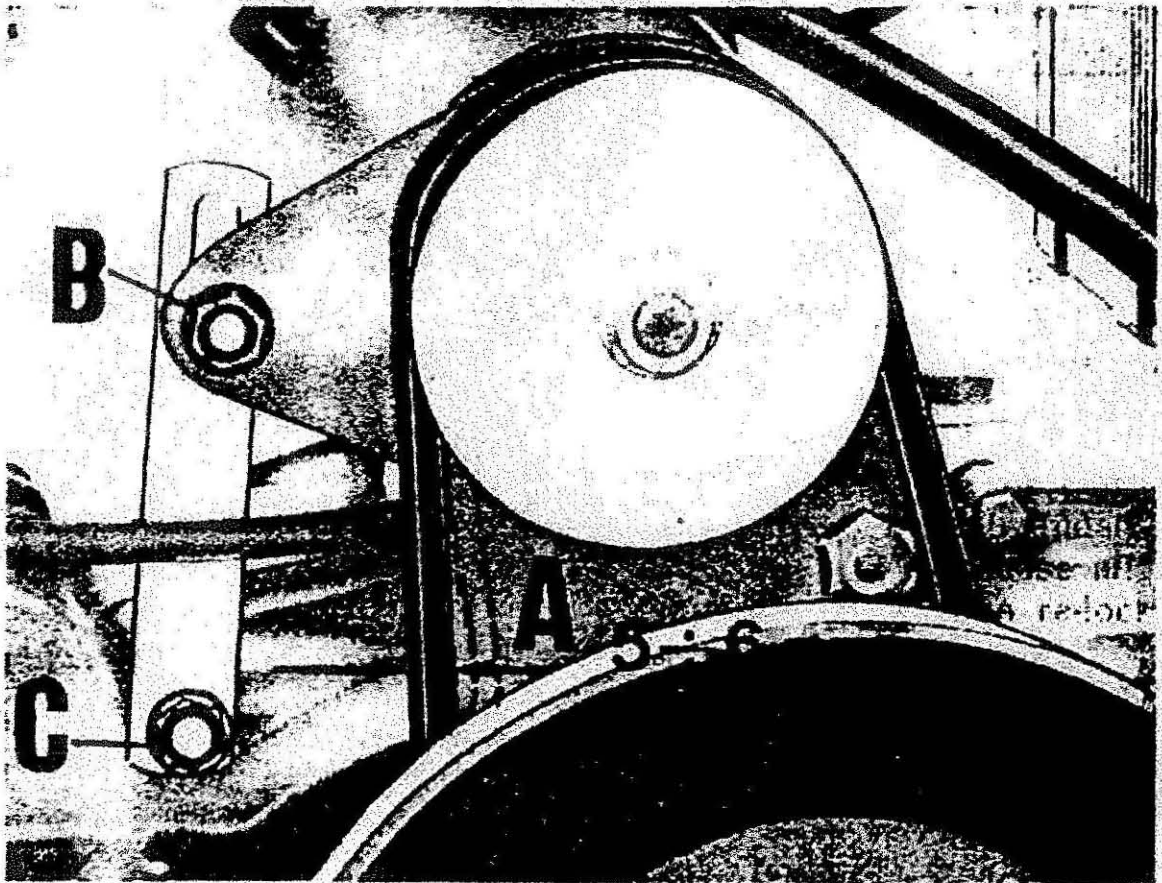


Fig. 25

Slacken thumb screw and screw the adjuster in or out until the lever play is correct, relocking then the thumb screw .

If this distance is less, the clutch may slip causing the plates to wear out rapidly. If it is more, there may be incomplete disengagement of the clutch with consequent noisy gearshifting.

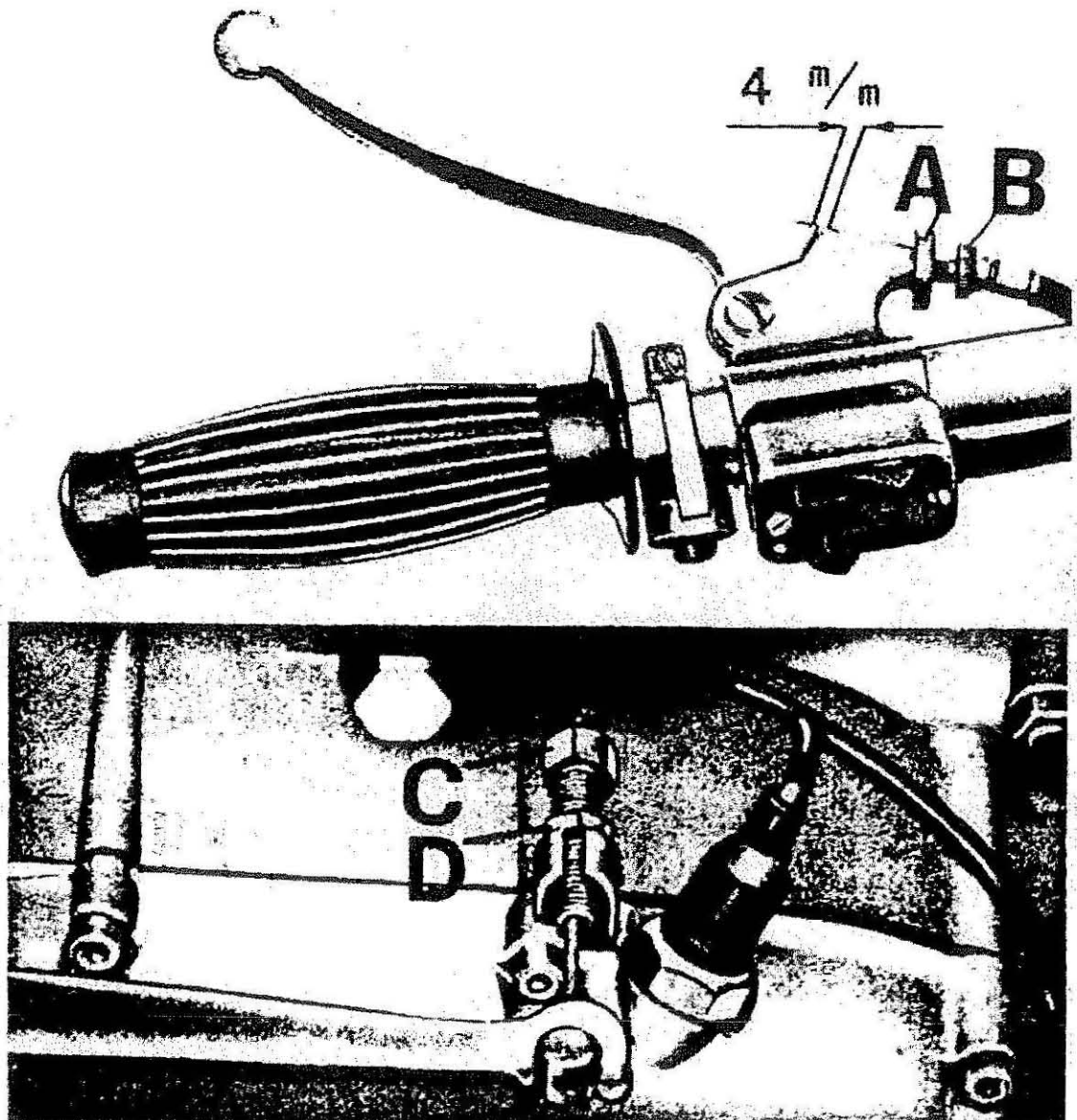


Fig. 26

The adjustment can also be made through the adjusting nut and locknut (C and D) on the engine cover.

Valve lifter lever (fig. 27) This lever should be adjusted when the play at the handlebar end is more or less than about 4 mm (.15"). Loosen thumb screw B and screw in or out adjuster A to obtain the correct play. Then lock thumb screw B.

Steering (fig. 28) To eliminate looseness of the steering proceed as follows: Slacken locknut A and screw on adjusting nut B until the excessive play is taken up. Then re-lock counter nut A keeping a hold on nut A. Do not forget that if the steering is loose there may be dangerous wobbings and premature wear of the cups and balls.

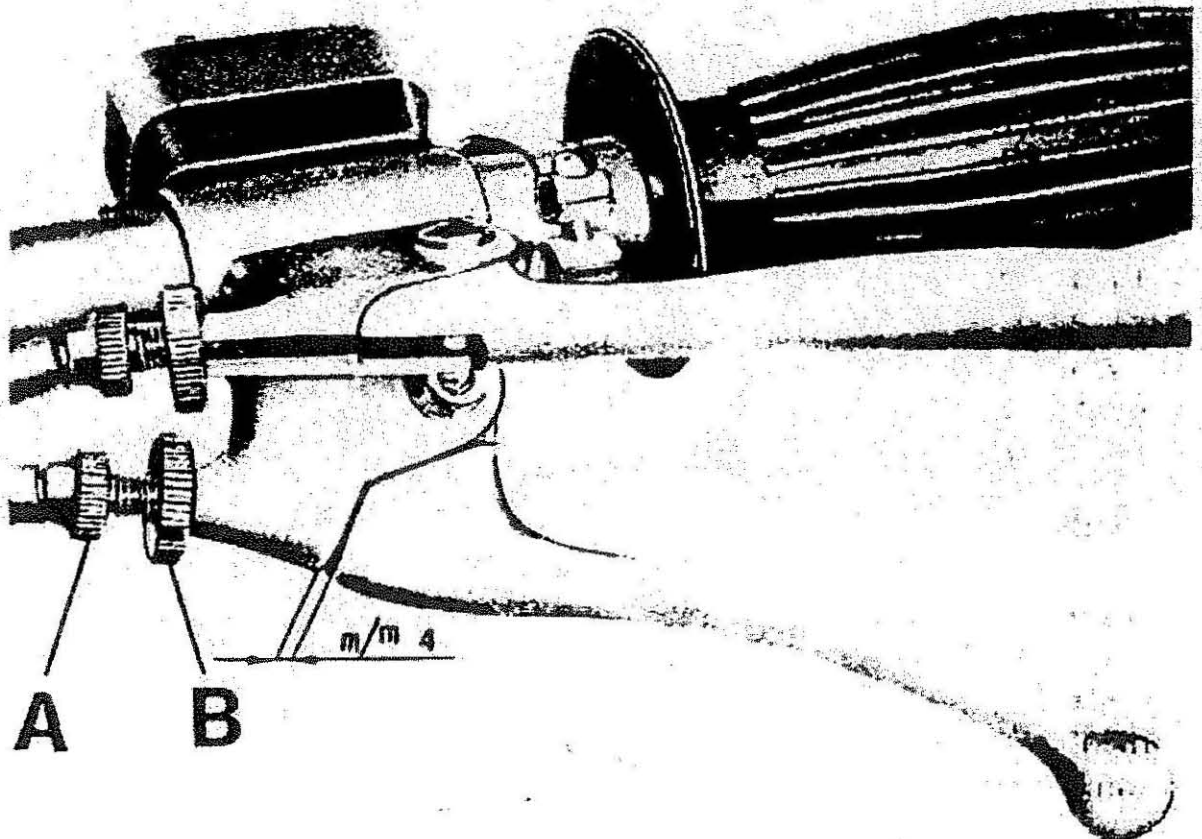


Fig. 27

Steering lock
(fig. 29)

This device is located on the L/H side of the steering column and it is key operated (A).
To lock: turn the handlebar completely to the right and insert the key turning it to the left (towards the front wheel). Push the key in completely, release it, and pull it out.
To open: insert the key, turn it to the left and release it.

Front brake lever
(fig. 30)

Check its play at the handlebar end periodically.
The lever is adjusted when there is about 20-25 mm (.78 - .98") play at the handlebar before the lining contact the drums.
Excessive play is corrected by acting on the thumb screw and adjuster (A and B) or on the nut and adjuster on the hub cover (C and D).

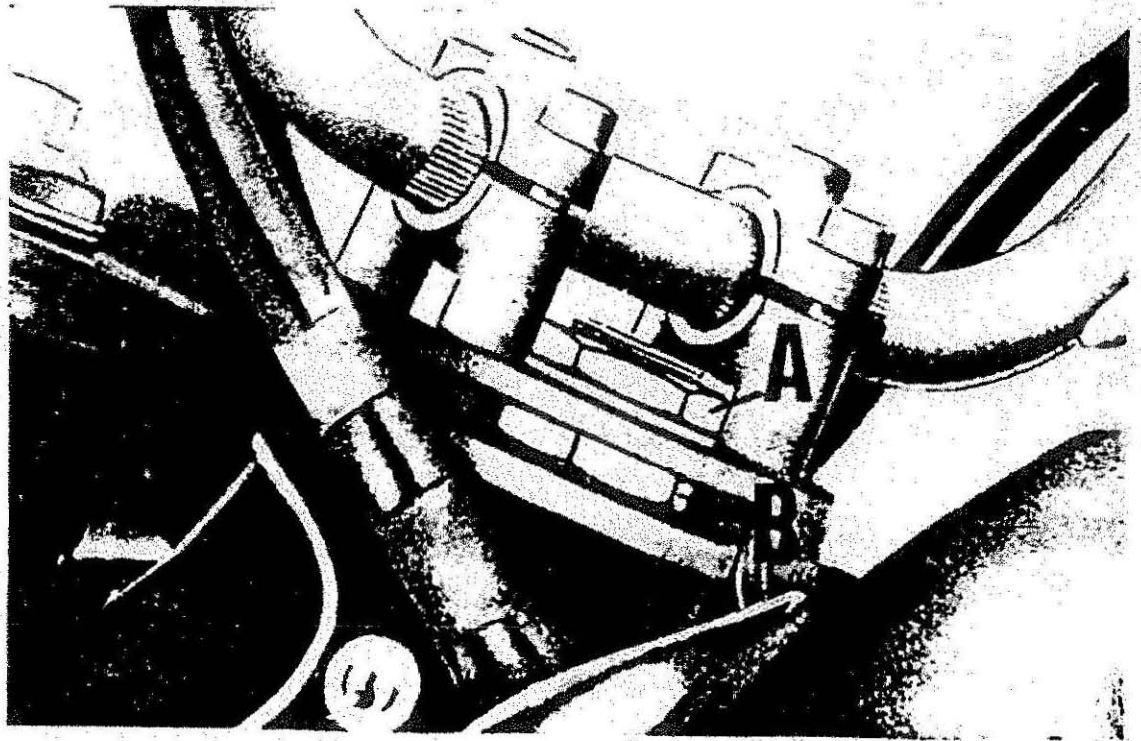


Fig. 28

Tensioning the chain
(fig. 31)

Chain adjustment is made with the machine on the stand.

In the middle position of its travel, the chain should always have an up and down movement of about 30 mm (1.18") to prevent it from overstretching due to the movement of the swinging arm.

Excessive chain slack is taken up by loosening the wheel spindle securing nut and acting on the chain tensioners each by the same amount in order to ensure perfect wheel truing to the swinging arm.

At the end of this operation don't forget to adjust the rear brake.

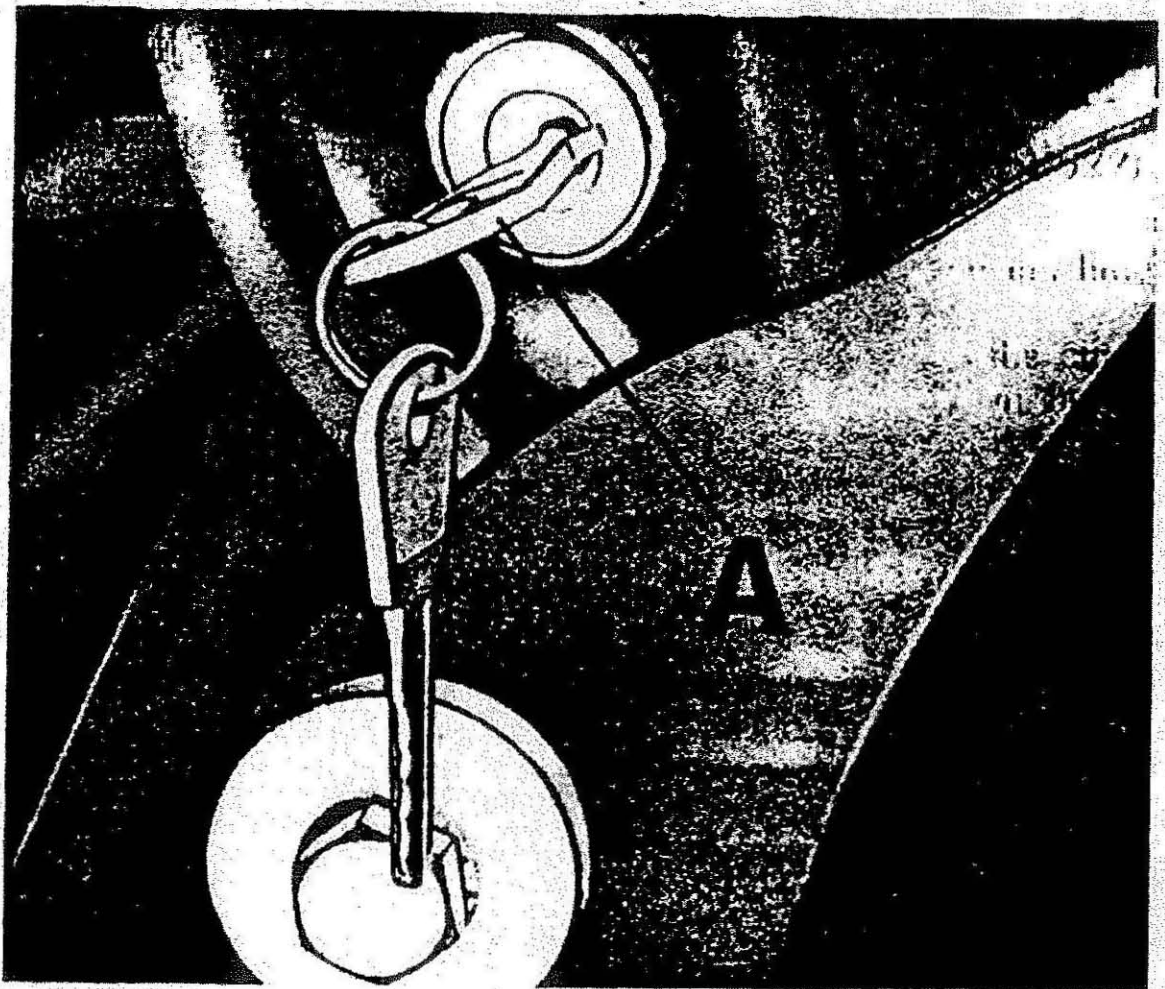


Fig. 29

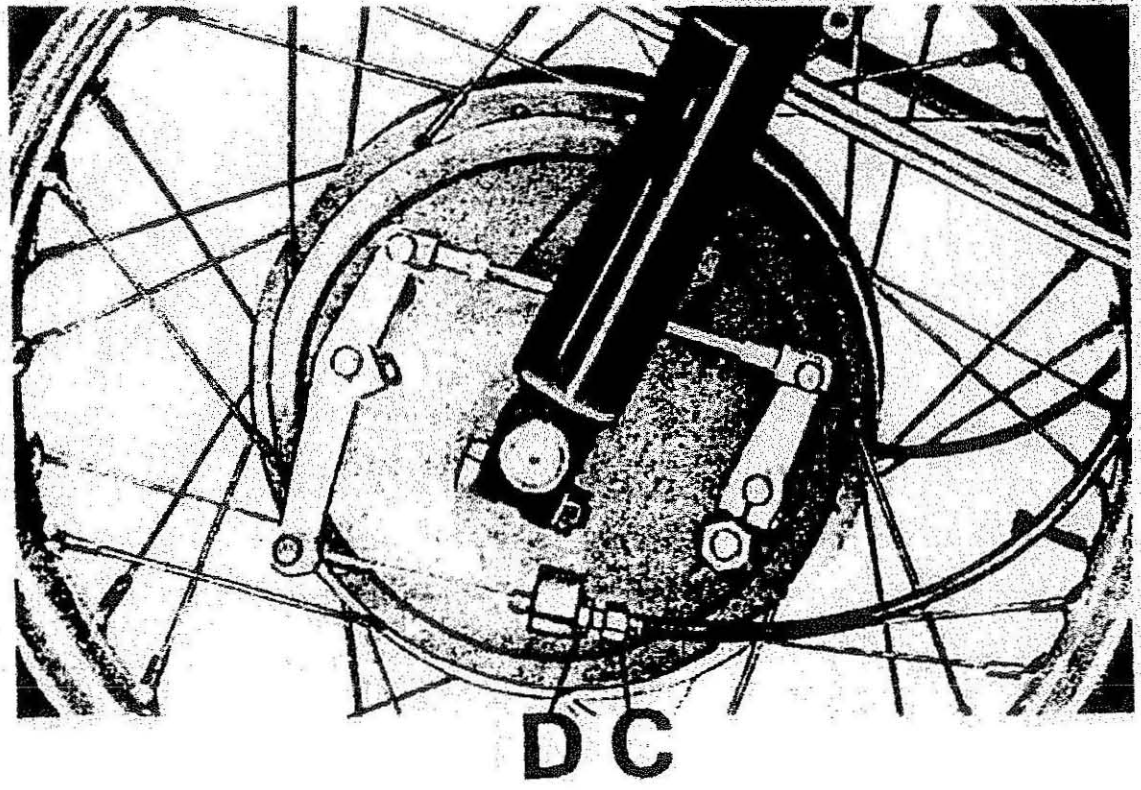
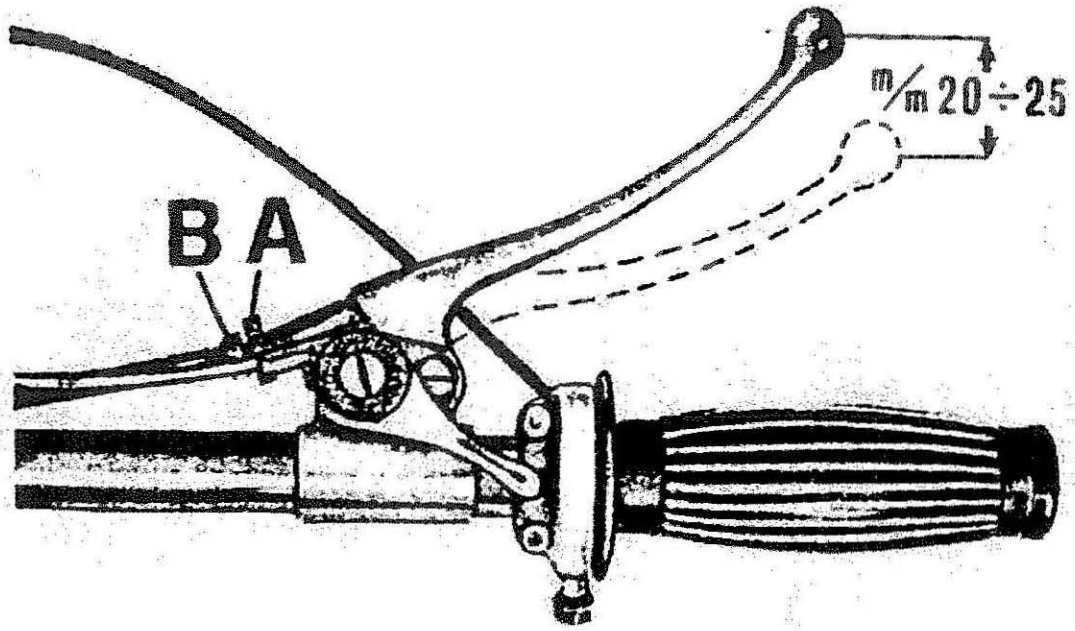


Fig. 30

**Rear brake pedal
(fig. 32)**

Adjustment of this foot control is made through the thumb screw A on the threaded portion of the brake rod.

Excessive play is corrected by screwing in the thumb screw until there is a play of about 20-25 mm (3/4 to 1") at the pedal end before the linings contact the drum. Generally, when this adjuster is fully screwed in it means that the linings are completely worn out and need replacing.

**Adjustment of
the gear
operating
mechanism
(fig. 33)**

Remove the engine cover at the driving side and undo counternut B. Turn nut A to the right or left to the position where it is felt that by changing up and down with the gearshift lever provisionally assembled on

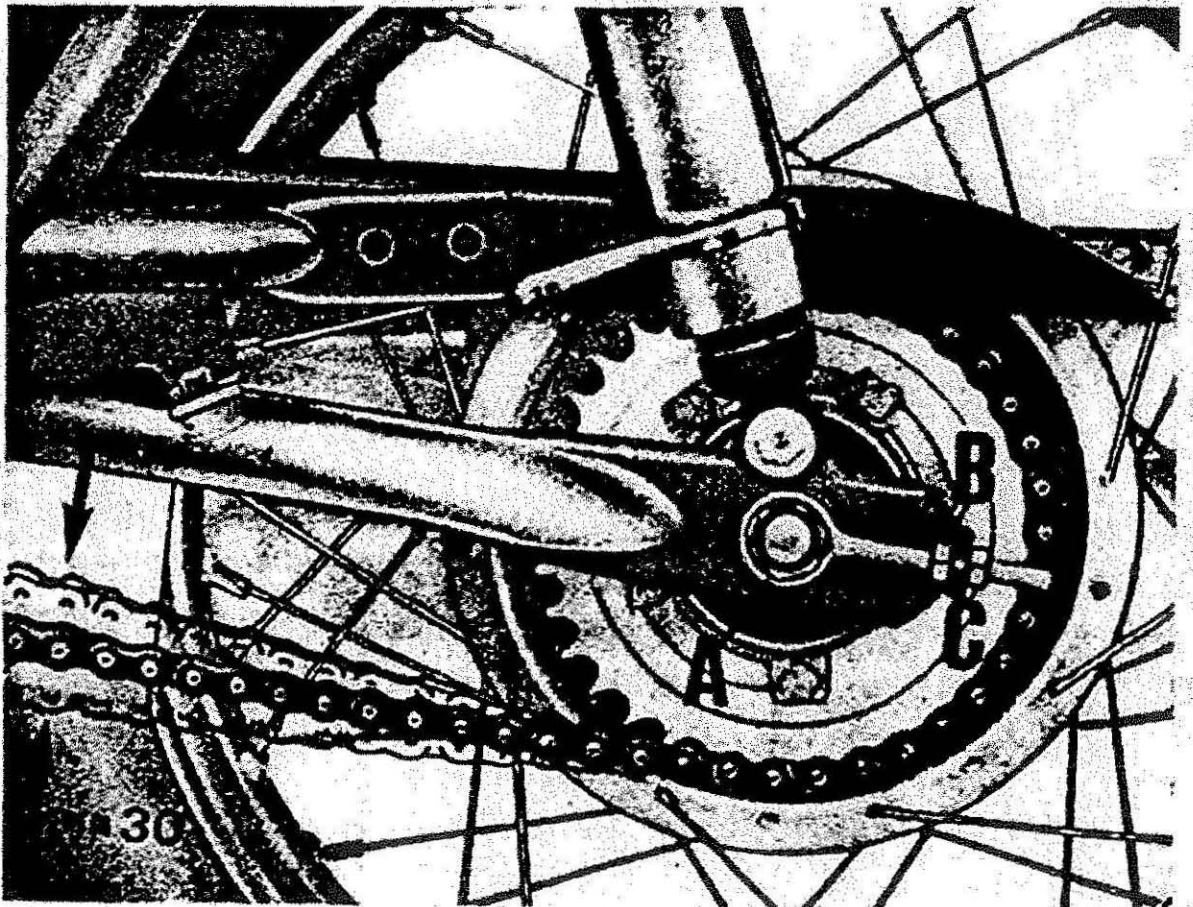


Fig. 31

the quadrant pin all gears engage smoothly and the neutral position is easily selected. This done, lock counternut B keeping a fast hold on nut A and remove the gearshift lever provisionally fitted on the pin and re-assemble the engine cover.

Rear suspension
(fig. 34)

The rear suspension unit has a two-position adjustment according to the load on the rear wheel.

If not working properly, the dampers should be overhauled.

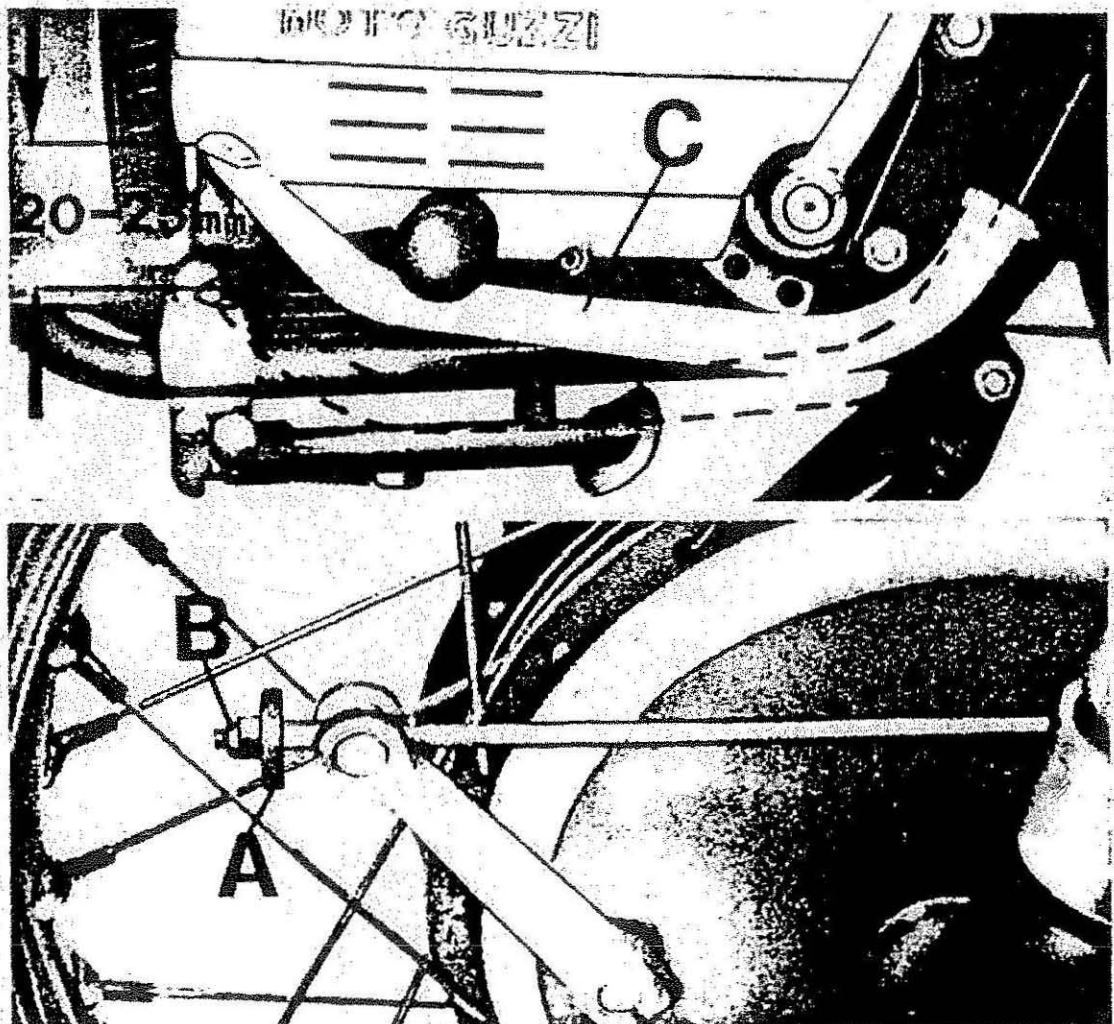


Fig. 32

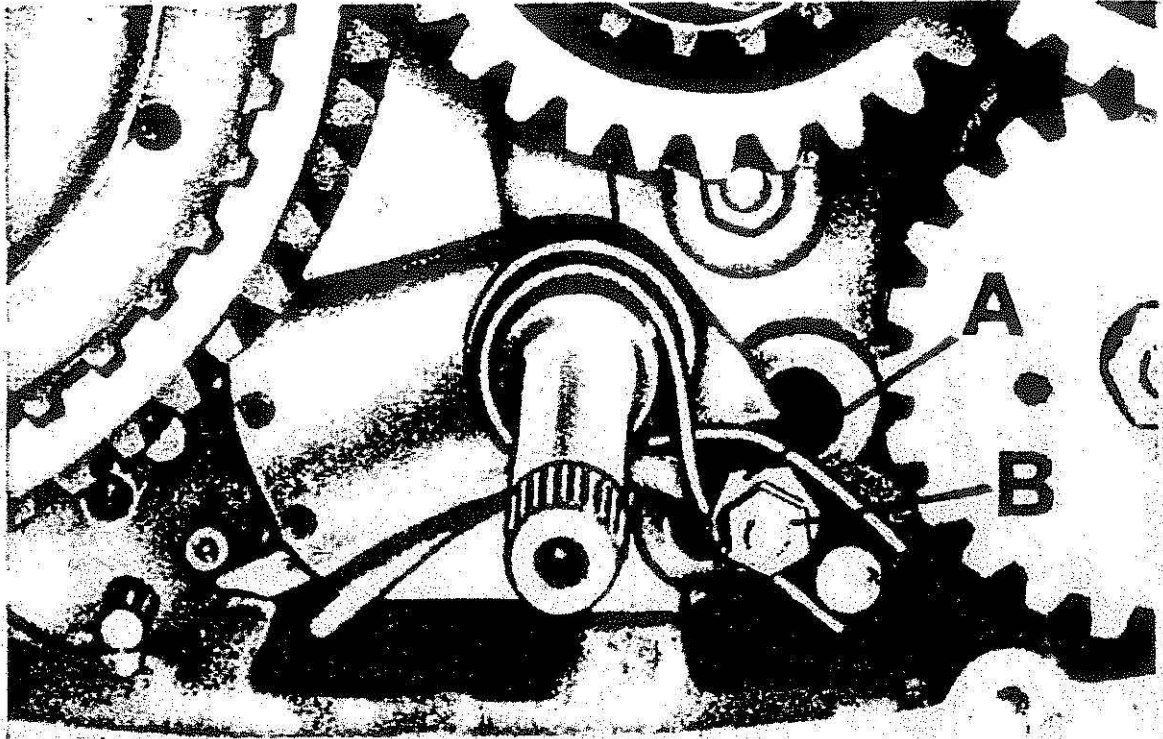


Fig. 33

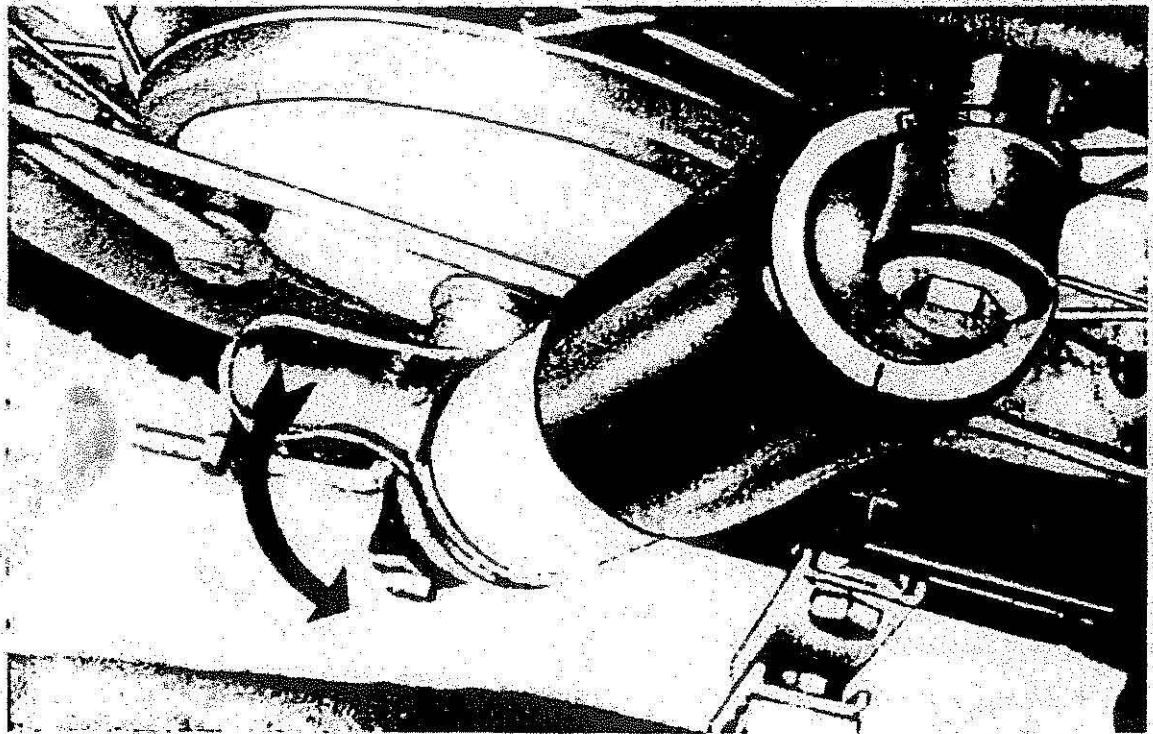


Fig. 34



REMOVAL AND ASSEMBLY OF THE WHEELS

Removal of front wheel (fig. 35)

The front wheel is removed by disconnecting the front brake cable from the operating lever on the hub cover and unacrewing the cable adjuster (B).

Remove then the speedo cable disconnecting it from the drive (C) and take off nut E which secures the wheel spindle to the right fork member.

Unscrew spindle securing bolts D from the fork legs and take out the wheel spindle. Push the wheel down just sufficiently to free the brake block from the anchoring lug on the left fork leg and back out the wheel.

Assembly front wheel

Assembly of the front wheel is made following the reverse sequence used for the dismantling operation.

Don't forget to insert the brake block in its anchoring lug welded on the left fork member.

Dismantling of rear wheel (fig. 36)

Unscrew the wheel spindle securing nut A and the nut (B) on the chain tensioners. Nut E on the brake rod, Thumb screw D on the rod, anchoring lug nut C, and draw out the wheel spindle.

Shift the wheel forward and remove the chain from the sprocket. Back out the rear brake rod from the operating lever on the brake block.

Remove the spacer between the wheel and swinging fork right member.

Lean the machine on the right and back out the wheel from the swinging arm.

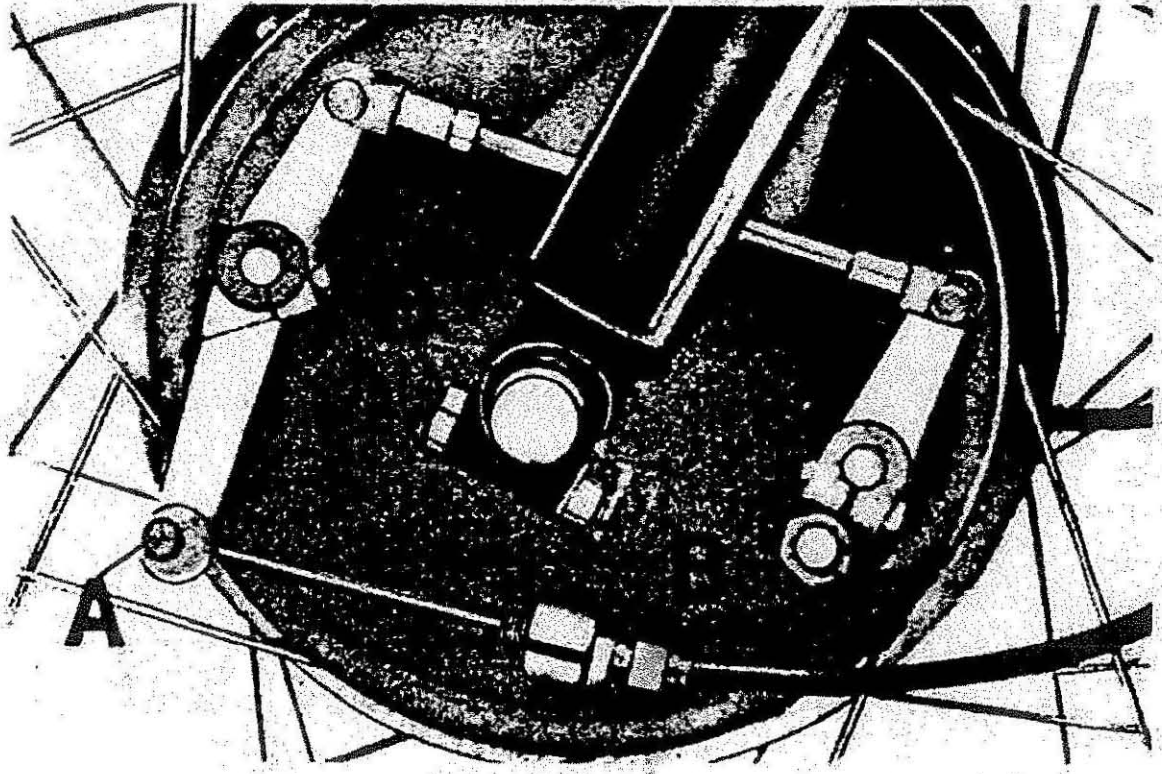
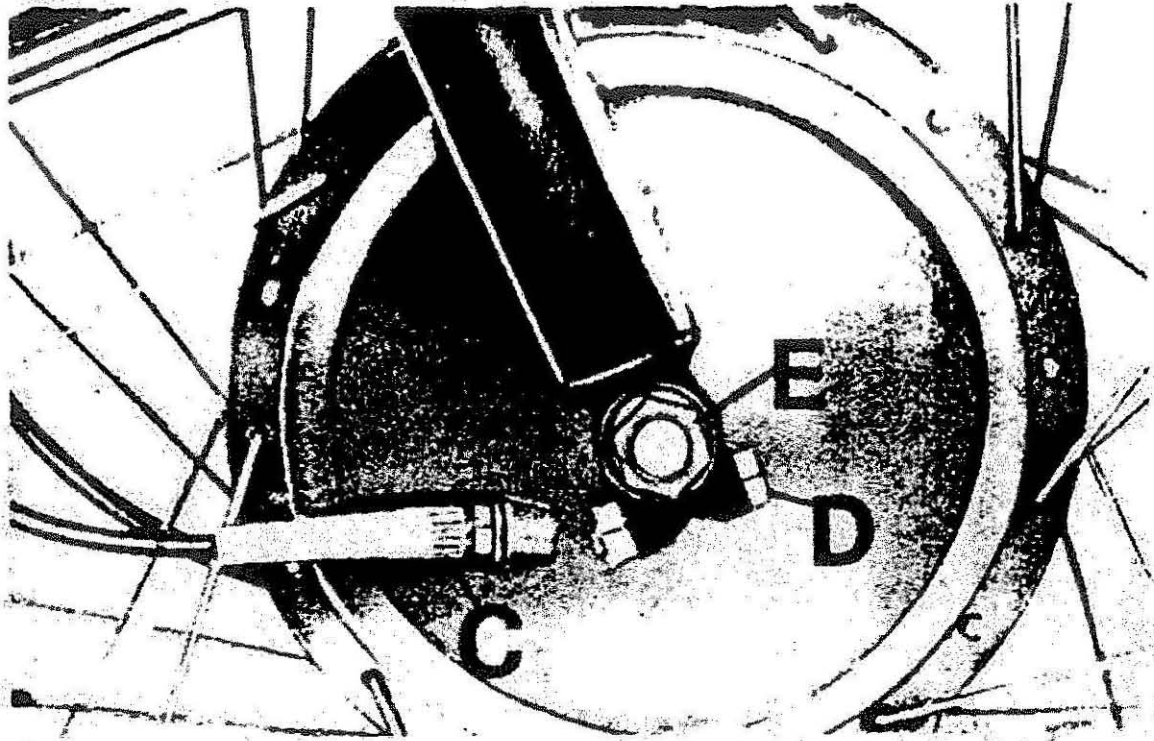


Fig. 35

**Assembly of
rear wheel
(fig. 36-37)**

To correctly re-fit the rear wheel in position
proceed as follows:

- Lean the motorcycle on the right and in-
sert the wheel between the swinging fork
arms.

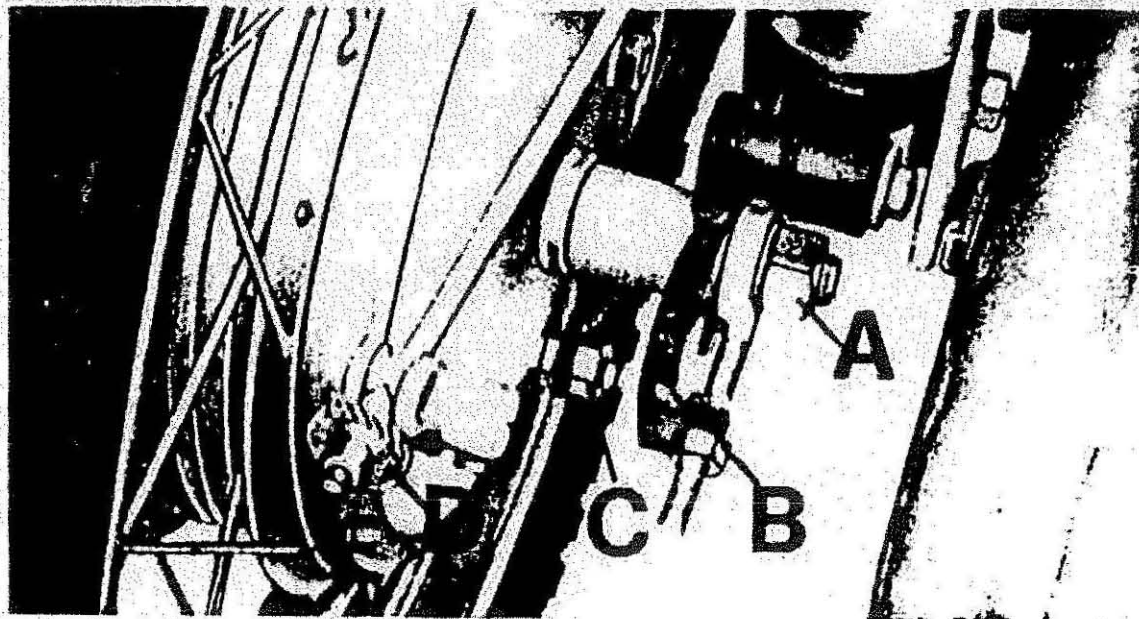
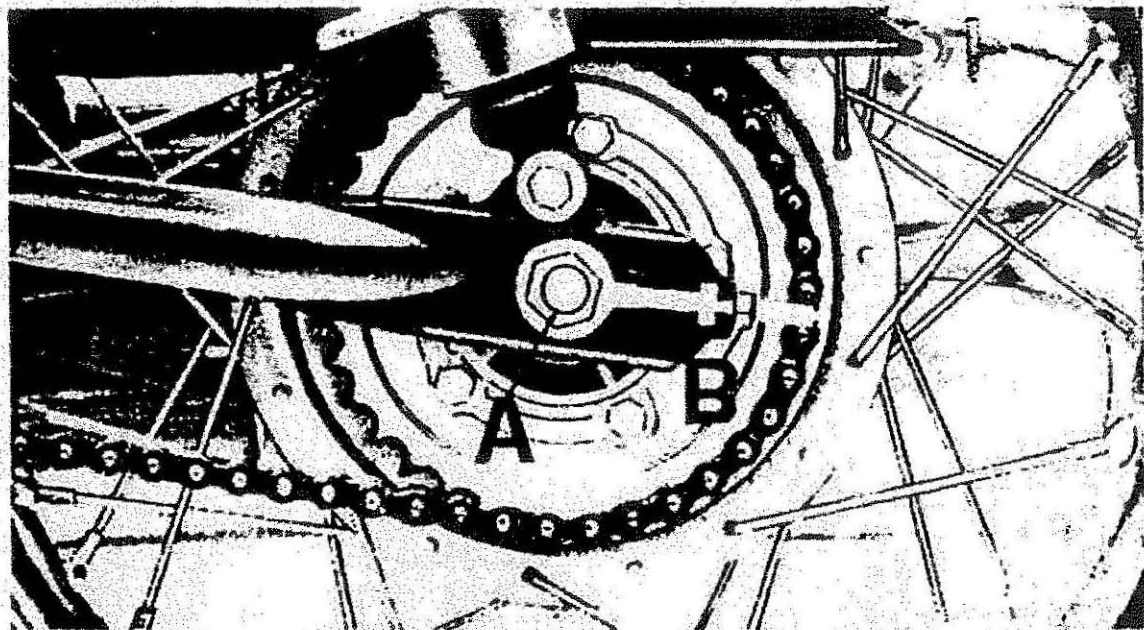


Fig. 36

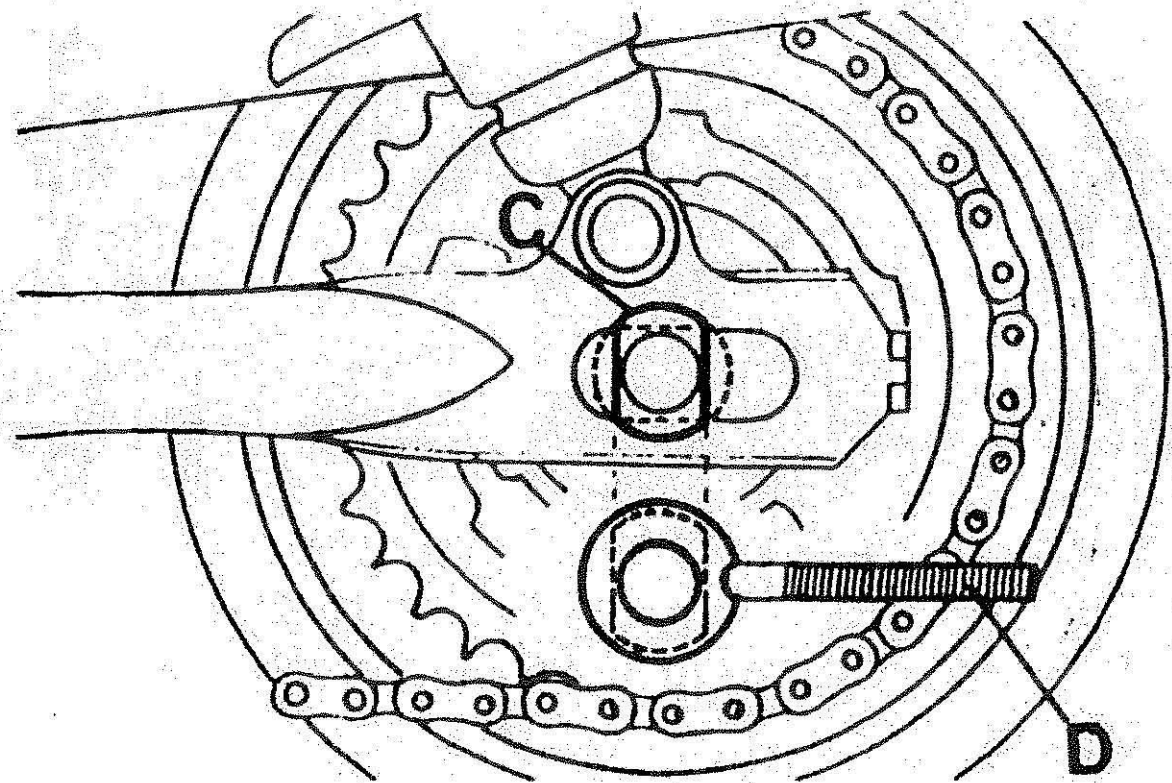
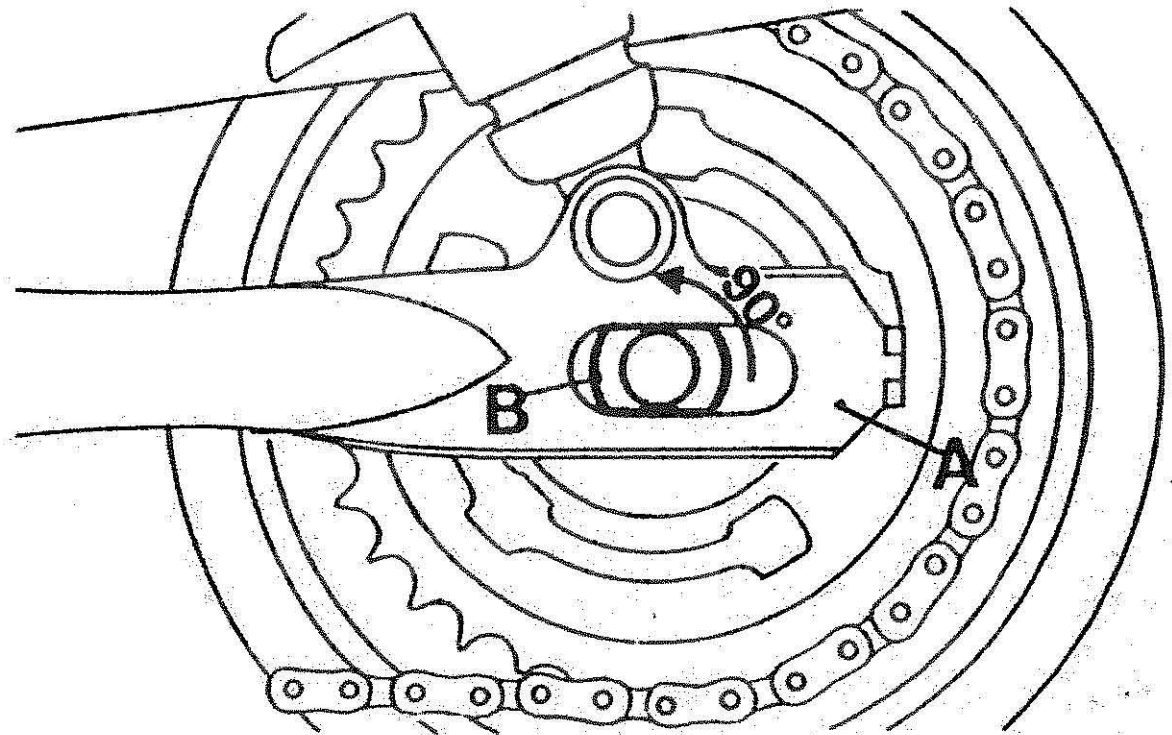


Fig. 37

- Insert the brake operating rod on the brake block and screw on a few turns the adjusting nut (D fig. 37).
- Set up the chain on the sprocket.
- Insert the wheel on the left hand member of the swinging arm (A fig. 37) ensuring that the spindle top is in the position shown at B fig. 37.
- Turn the top of the hollow spindle by 90° (C fig. 37).
- Fit the left chain adjuster D fig. 37 on the left hand arm of the swinging fork ensuring that it fits snugly on the head of hollow spindle which has already been turned in position (C fig. 37).
- Fit the other tensioners on the R/H member of the swinging fork.
- Fit the spacer between the hub and the R/H member of the swinging fork.
- Insert the spindle with washer in the L/H side of the hub and on the right fit the washer and screw on the nut a few turns on the spindle.
- Adjust chain using nuts B in fig. 36.
- Lock nut A in fig. 36.
- Check clearance at the brake pedal end and screw on thimble screw D fig. 36. When the brake is adjusted fit self locking nut E fig. 36 against the adjusting thumb screw.

ELECTRICAL EQUIPMENT

(See diagram in fig. 38)

Battery

The 12 V battery is centrally mounted and has a capacity of 18 Ah. It is charged directly by the generator.

Every month or earlier in the hot season check the electrolyte level in each cell and if necessary top up with distilled water, using a glass or plastic funnel. The level is correct when the acid tops the plate separator by about 6 mm (1/4"). Always top up with distilled water and not with sulphuric acid.

Add distilled water to a cold battery after it has not been in use for at least 6 hours. Make sure that no electrolyte flows over the top of the battery which must always be in a perfectly dry condition. If the level in any one cell is lower than in others, this may be due to either cracks or other faults and in such case the battery should be immediately replaced.

Every 6000 miles check that all battery connections are in a perfectly clean condition and smear them with vaseline to prevent oxidation.

The battery is charged when the hydrometer reading shows about 1.28 sp.g. for normal service and about 1.23 sp.g. for service in tropical conditions. An almost discharged battery shows a reading of about 1.16 sp.g. for normal service and about 1.1 sp.g. for tropical conditions.

Putting the dry charged battery in service

- 1) Break off the seal and unscrew the plug.
- 2) Introduce pure sulphuric acid of 1275 sp.g. - temperature 15° (31° Baumé).



This operation has to be carried out very carefully and particular attention should be paid to the specific gravity of the recommended liquid.

The correct electrolyte level is 6 mm over the plate separators (.23").

- 3) Let the battery at rest for about 2 hours and then top up with electrolyte to the recommended level.

The battery can now be charged for 8-15 hours at a current intensity equal to 1/10th of its normal ampereage (in 10 hours discharge).

- 4) The battery is now ready to be put in service.

Varta type battery

This brand battery is put in service exactly as said at points 1 and 2 above but point 3 should read as follows:

- 5) Let the battery at rest for 15 minutes and shake it lightly. Check the electrolyte level and top up as necessary. Screw the plugs on tightly.

At this stage the battery is ready to be installed on the motorcycles and the cables connected.

Maintenance instructions

During the period that the battery is left at rest before use, ensure the electrolyte level is about 6 mm (.23") over the top of the plate separators. Ensure that this level is maintained at all times with the addition of distilled water. Never add sulphuric acid. If the battery is not used immediately, it is best to have it charged for a short period every month or every time before it is used.

Successive charges

Before re-charging make absolutely certain that the battery is in a perfectly clean condition.

Connect to the charging medium and use preferably an amperage equal to but not exceeding 1/10th of the rated battery capacity over a period of 10 hours.

If during the charge the electrolyte temperature (measured with a thermometer immersed in the electrolyte) should get up to 50° C (122° F), it will be necessary to reduce or interrupt the charge until the temperature has dropped to under 40° C (104° F).

Never add sulphuric acid but top up only with chemically pure distilled water.

Generator

Every 10.000 kms (6000 miles) the commutator should be cleaned with a cloth slightly moistened in petrol.

Copper or carbon dust which may have deposited in between the rotor blades can be removed with compressed air.

When cleaning the commutator check also the state of the brushes and if chipped or worn, replace them ensuring that they make good contact and are flush with the commutator, or else this may get damaged.

N.B. - When replacing the brushes use only original parts and have this job done preferably by a qualified electrician.

Regulator unit

The regulator is sealed to prevent it from being tampered with.

In case of failure or incorrect operation it should be sent to the makers or their official agents.

Replacements must always be made with original parts bearing the same part number.

Horn

The 12 V horn does not require any maintenance. In case of irregular operation have it seen to by a competent electrician or replace it.



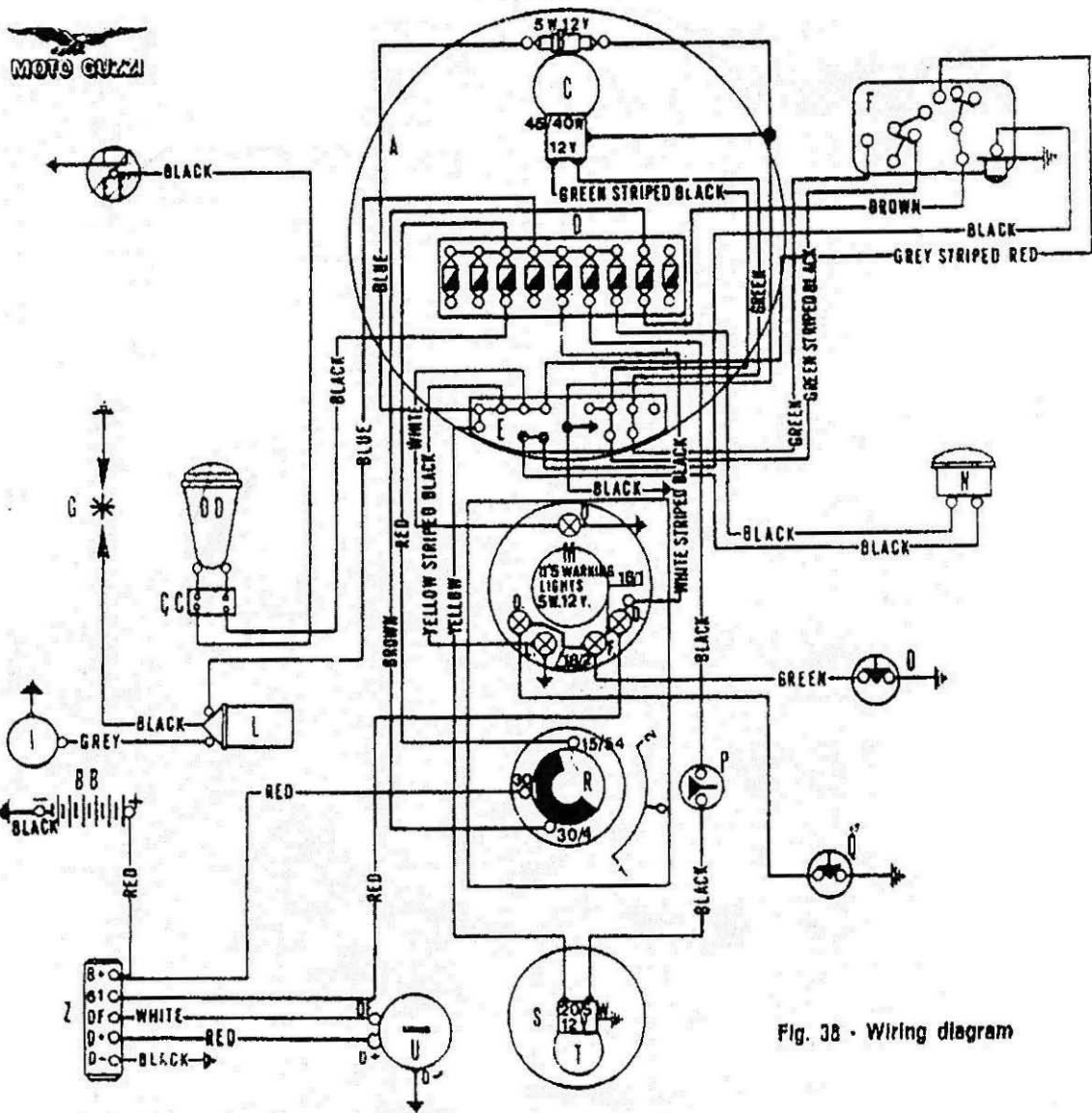
- Light switch and horn button** Does not require any maintenance. If not working properly, replace it.
- Syren** Tension 12 V. Does not require any maintenance. If it should lose its tone have it seen to by specialized shops.
- Headlamp** It is perfectly watertight which makes internal inspection practically unnecessary. If bulbs need replacing, use size and power lamps as originally fitted.
- Bulbs:**
- 2 filament main bulb 45/40 W (round).
 - 5 W pilot bulb (tubular).
 - 5/20 W double filament tail lamp.
 - Instrument panel lamps:
 - panel illumination 3 W (round).
 - pilot light indicator 3 W (round).
 - Ammeter 3 W (round).
 - Neutral and oil pressure 3 W (round).
- Fuses** 9 fuses of 25 Ah are fitted. These protect the system fed by the battery. If a fuse blows, trace and correct the cause, and replace with a similar fuse.
- Cables**
(See diagram fig. 38) Check these over occasionally and replace if not in good condition.



- A HEADLIGHT
- B LAMP 5W - 12V
- C LAMP 45/40 W - 12V
- D TERMINAL BLOCK WITH FUSES
- E DISTRIBUTING BLOCK
- F LIGHT SWITCH AND HORN BUTTON
- G SPARK PLUG
- I RUPTOR
- L H.T. COIL
- M INSTRUMENT PANEL WITH LIGHTS
- N HORN
- O NEUTRAL INDICATOR CUTOUT
- P STOP LIGHT CUTOUT
- Q OIL PRESSURE CUTOUT
- R IGNITION SWITCH
- S NUMBER PLATE AND TAIL LIGHT
- T PLATE ILLUMINATION AND STOP LIGHT
- U GENERATOR
- Z REGULATOR
- BB BATTERY
- CC ONE OR TWO WAY TERMINAL BOARDS
- DD SYREN
- EE SYREN BUTTON

IGNITION SWITCH POSITION

- 0 — 30
- 1 — $\frac{30 - 30/4}{30 - 15/54}$
- 2 — 30 — 30/4



- A HEADLIGHT
- B LAMP 5W - 12V
- C LAMP 45/40 W - 12V
- D TERMINAL BLOCK WITH FUSES
- E DISTRIBUTING BLOCK
- F LIGHT SWITCH AND HORN BUTTON
- G SPARK PLUG
- I RUPTOR
- L H.T. COIL
- M INSTRUMENT PANEL WITH LIGHTS
- N HORN
- O NEUTRAL INDICATOR CUTOUT
- P STOP LIGHT CUTOUT
- Q OIL PRESSURE CUTOUT
- R IGNITION SWITCH
- S NUMBER PLATE AND TAIL LIGHT
- T PLATE ILLUMINATION AND STOP LIGHT
- U GENERATOR
- Z REGULATOR
- BB BATTERY
- CC ONE OR TWO WAY TERMINAL BOARDS
- DD SYREN
- EE SYREN BUTTON

IGNITION SWITCH POSITION

- 0 - 30
- 1 - 30 - 30/4
- 2 - 30 - 15/54
- 3 - 30 - 30/4

Fig. 38 - Wiring diagram