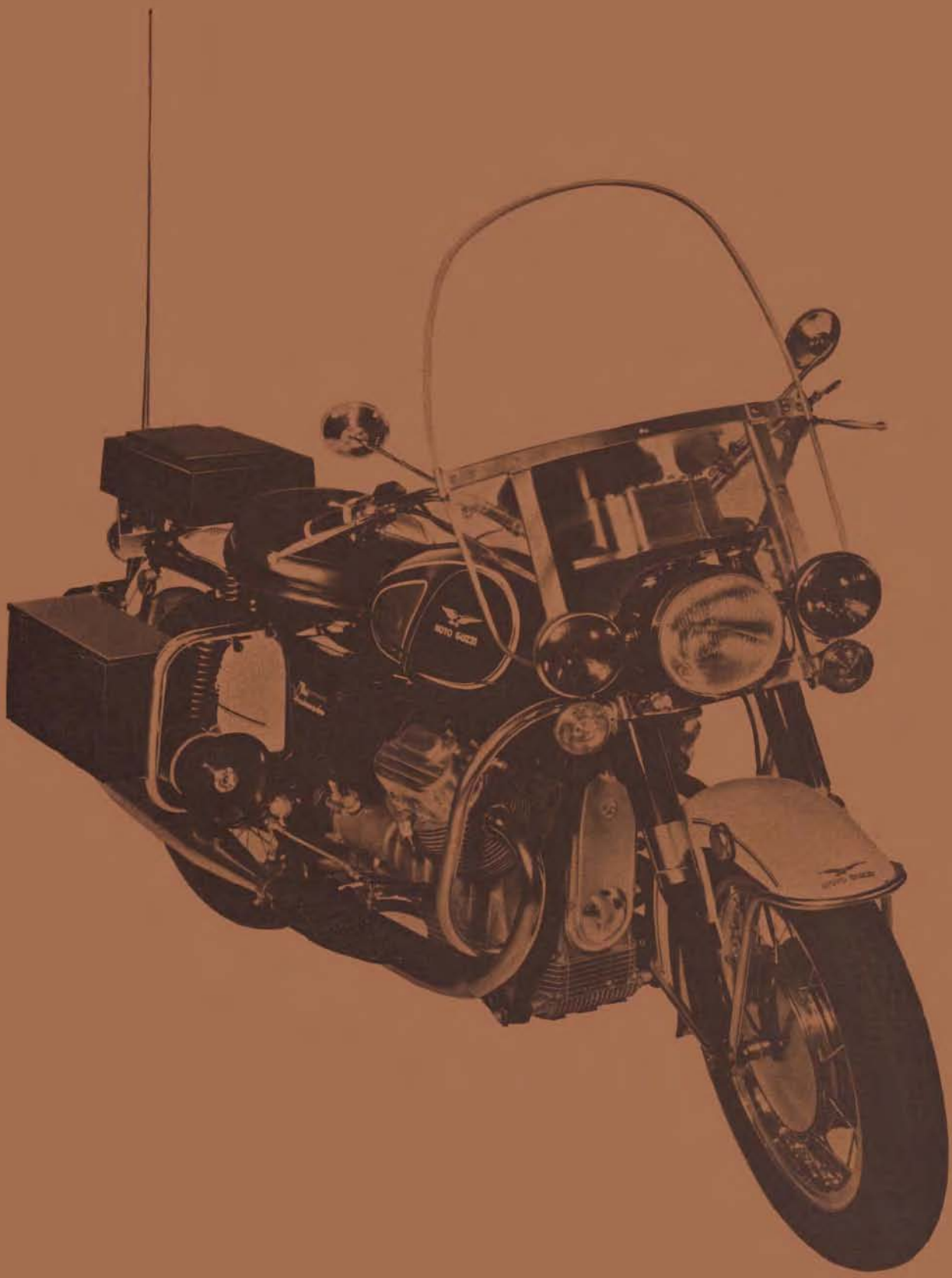
V7

# 700cc and 750cc

## OPERATING HANDBOOK FOR STRIPPING, CHECKING AND ASSEMBLING OPERATIONS

MOTO GUZZI

PREMIER
MOTOR CORPORATION
HASBROUCK HEIGHTS, NEW JERSEY 07604
Sole Importer of Moto Guzzi in the United States and Canada



MOTO GUZZI

# V-7 700 cc.

# and

# V-7 750 cc.

OPERATING HANDBOOK

FOR STRIPPING, CHECKING AND

ASSEMBLING OPERATIONS

# INTRODUCTION

The purpose of this handbook is to supply the necessary instructions for carrying out overhauls and repairs in a rational way.

The data provided here are meant to give a general knowledge about the main checking operations to be carried out when overhauling the different groups.

The handbook is provided with illustrations, drawings and diagrams necessary to carry out stripping, checking and assembling operations.

This handbook will also be a guidance for those who wish to know the manufacturing characteristics of the parts in concern. The knowledge of such characteristics by repairing personnel will be an essential factor for performing a good job.

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**NOTE - The terms « RIGHT HAND » and « LEFT HAND » used in the text are to be considered as seen from the rider astride the saddle.**

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# INDEX

# MAIN FEATURES
## V7 700 cc.

### ENGINE

| | |
|---|---|
| Cycle | : 4 strokes |
| Number of cylinders | : 2 |
| Cylinder disposition | : « V » - 90° |
| Bore | : 80 mm. (3.149") |
| Stroke | : 70 mm. (2.755") |
| Displacement | : 703.717 cc. (42.93 cu. in.) |
| Compression ratio | : 9 to 1 |
| Revs at max engine speed | : 6000 r.p.m. |
| Output at max engine speed | : 50 HP SAE |
| Crankcase | : in light alloy |
| Cylinders | : light alloy barrels with hard chrome linings |
| Cylinder heads | : in light alloy, hemispherical, with special cast iron inserted valve seats |
| Crankshaft | : steel construction |
| Crankshaft supports | : of anti-friction material pressed in suitable housings (as used in all F1 Race cars) |
| Connecting rods | : steel construction with AL-TIN alloy thin wall bearings |
| Pistons | : in light alloy |

#### Valve gear

O.H.V., push rod operated via the camshaft in the crankcase and gear driven by the crankshaft.

Inlet:
— opens 24° before TDC
— closes 58° after BDC

Exhaust:
— open 58° after BDC
— closes 22° after TDC

Rocker clearance for valve timing
— 0,5 mm. (.0196")

Normal rocker clearance (cold engine):
— inlet 0.1 mm. (.00393")
— exhaust 0,2 mm. (.00787")

#### Carburation

Both carburetors are gravity fed from the tank.
Carburetor Make:
type Dell'Orto S.S.I. (right and left)

#### Lubrication

Pressure, by gear pump driven by the crankshaft.
Oil strainer in crankcase.
Normal lubricating pressure 2.5 - 3 kgs./sq. cm. (35.6 - 42.7 lbs/sq.in.)
(Controlled by relief valve)
Electrically controlled oil pressure gauge.

#### Cooling

By air. Cylinder and cylinder heads deeply finned.

#### Ignition

By battery with automatic advance Marelli distributor type S 123 A.
Initial advance: 10°.
Automatic advance: 28°.
Ignition timing 38° full advance.
Contact breaker gap: 0.42-0.48 mm. (.016-.018").
Spark plug: n. 225 in Bosch-Marelli scale or equivalent.
Plugs point gap: 0.6 mm. (.023").
Ignition coil: Marelli BE 220 D.

#### Starter motor

Marelli starter MT 40 H (12 V - .7 HP) with electromagnetic ratchet control. Ring gear bolted on flywheel.

#### Exhaust system

Dual exhaust pipes and mufflers.

### TRANSMISSION

#### Clutch

Twin driven plates, dry type, located on the flywheel. Controlled by lever on left handlebar.

#### Gear box

Four speeds, frontal engagement. Constant mesh gears. Cush drive spring incorporated.
Separate case bolted on cranckase, operated by rocker, pedal on the right hand side of the machine.

| | | | | |
|---|---|---|---|---|
| Engine-gearbox ratio: | 1 | to | 1.375 | (16-22) |
| Internal gear ratios: | | | | |
| — Low gear | 1 | to | 2.230 | (13-29) |
| — Second gear | 1 | to | 1.333 | (18-24) |
| — Third gear | 1 | to | 0.954 | (22-21) |
| — High gear | 1 | to | 0.750 | (24-18) |

#### Secondary drive at rear wheel

By constant speed homokinetic double joint cardan shaft.
Bevel layshaft gear-wheel ratio: 4.625 (8-37)

Overall gear ratios:

| | | | |
|---|---|---|---|
| — Low gear | 1 | to | 14.180 |
| — Second gear | 1 | to | 8.473 |
| — Third gear | 1 | to | 6.063 |
| — High gear | 1 | to | 4.768 |

### FRAME

Duplex cradle, tubular structure.

#### Suspension

Rear swinging fork with external adjustable springs.
Telescopic front fork incorporating hydraulic dampers.
Telescopic front fork with external adjustable spring.
Wheels: 18 x 3 spoked steel rims, front and rear.
Wheels: 18 x 3 spoked steel rims, front and rear.

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**Tires**

4.00 x 18 front and rear, block type « high speed ».

**Front tire pressure**

Solo rider / With pillion: 1,5 kgms/sq. cm. = 21 P.S.I.

**Rear tire**

| | | | | |
|---|---|---|---|---|
| Solo rider | 1,8 | kgms/sq. cm. | = | 25 P.S.I. |
| With pillon | 2,0 | kgms/sq. cm. | = | 28 P.S.I. |

Note - The above recommendation is for normal riding (cruising speed). If using the machine at constant high speed or on motorways the above pressures should be increased by 0,2 kgms/sq. cm. (2,8 P.S.I.).

**Brakes**

Twin leading shoes expanding type front brake, operated by hand lever on the right handlebar.
Large rear brake operated by pedal on left hand side of machine.

**Overall dimensions and weight**

| | |
|---|---|
| — Wheelbase | 1.445 mts. (abt. 56.9") |
| — Length | 2.230 mts. (abt. 87.5") |
| — Width | 0.795 mts. (abt. 31.2") |
| — Height (dry) | 1.050 mts. (abt. 41.2") |
| — Minimum ground clearance | 0.150 mts. (abt. 5.9") |
| — Curb weight | 243 kgs 536 Lbs |

**Performance**

Maximum permissible speed and gradients climbable in each gear, solo riding.
Low gear 66 Kms/h (41 m.p.h.) Cimbing ability 60%
Second gear 96 kms/h (59.6 m.p.h.) Climbing ability 34%
Third gear 120 kms/h (74.5 m.p.h.) Climbing ability 23%
High gear 170 kms/h (106 m.p.h.) Climbing ability 14%

**Capacities**

Fuel tank: 20 liters (5.28 US gls.) including about 4 liters reserve (about 1 USA gl) - Petrol 98/100 No (Regular octane) Sump 3 liters (3¼ Quarts) Shell Super Motor Oil 100 - Transmission 0.750 liter (1¾ Pints) Shell Spirax 90 E. P. - Real wheel drive 0.180 liters (0.4 Pints) Shell Spirax 90 E. P. - Front fork dampers 0.160 liters = 5,4 oz USA « Shell Tellux 33 ».

# MAIN FEATURES
## V 7 750 cc.

### ENGINE

| | |
|---|---|
| Cycle | : 4 stokes |
| Number of cylinders | : 2 . |
| Cylinder disposition | : « V » 90° |
| Bore | : 83 mm. (3.26") |
| Stroke | : 70 mm. (2.75") |
| Displacement | : 757.486 cc. (46.21 cu. in.) |
| Compression ratio | : 9 to 1 |
| Revs at maximum engine speed | : 6500 r.p.m. |
| Output at maximum engine speed | : 60 HP SAE |
| Crankcase | : in light alloy |
| Cylinders | : in light alloy with hard chromed barrels |
| Cylinder heads | : in light alloy, hemispherical, with special cast iron inserted seats |
| Crankshaft | : steel construction |
| Crankshaft supports | : in anti-friction material pressed in 2 suitable housings (as used in all F1 race cars) |
| Connecting rods | : steel construction with AL-TIN alloy thin wall bearings |
| Pistons | : in light alloy |

#### Valve gear

O.H.V., push rod operated via the camshaft in the crankcase and gear driven by the crankshaft.

Inlet:
— opens 24° before TDC
— closes 58° after BDC

Exhaust:
— opens 58° after BDC
— closes 22° after TDC

Rocker clearance for valve timing:
— 0.5 mm. (.0196")

Normal rocker clearance (cold engine)
— inlet 0.15 mm. (.0059")
— exhaust 0.25 mm. (.0098")

#### Carburation

2 dell'Orto carburetors type VHB 29 CD (right) and VHB 29 CS (left) both gravity fed from the tank.

#### Standard carburetor setting

| | |
|---|---|
| — Choke | 29 mm. |
| — Throttle slide | 60 |
| — Atomizer | 265 |
| — Main jet | 145 |
| — Pilot jet | 45 |
| — Starter atomizer | 80 |

With needle SV9 set at second notch from top:
idling screw open 1 and ½ turns for the left carburetor and 1 and ¾ — 2 turns for the right carburetor.
With needle SV5 third notch from top:
idling screw open 1½ to 2 turns for the left carburetor and 2-2½ turns for the right carburetor.
Air intake provided with dry filter.

#### Lubrication

Pressure, by gear pump driven by the crankshaft Oil strainer in crankcase.
Normal lubrication pressure 3.8-4.2 kgs/sq. cm. (54 to 60 lbs sq. in.) controlled by relief valve.
Electrically controlled oil pressure gauge.

#### Cooling

By air. Cylinder and cylinder head deeply finned.

#### Ignition

By battery with automatic advance distributor
Initial advance: 10°
Automatic advance: 28°
Ignition timing 38° full advance
Contact breaker gap: 0.42-0.48 mm. (.016-.018")
Spark plug: n. 225 in Bosch-Marelli scale or equivalent.
Plugs point gap: 0.6 mm. (.023")
Ignition coil.

#### Starting

Electric starter with electromagnetic ratchet control. Ring gear bolted on flywheel. Operated by starter button.

#### Exhaust system

Dual exhaust pipes and mufflers.

### TRANSMISSION

#### Clutch

Twin driven plates, dry type, located on the flywheel. Controlled by lever on left handlebar.

#### Gear box

Four speeds, frontal engagement. Constant mesh gears. Cush drive incorporated.
Separate case bolted on cranckase, operated by rocker, pedal on the right side of the machine.

| | | | | |
|---|---|---|---|---|
| Engine gear-box ratio: | 1 | to | 1.375 | (16-22) |
| Internal gear ratios: | | | | |
| — Low gear | 1 | to | 2.230 | (13-29) |
| — Second gear | 1 | to | 1.333 | (18-24) |
| — Third gear | 1 | to | 0.954 | (22-21) |
| — High gear | 1 | to | 0.750 | (24-18) |

#### Secondary drive

By constant speed double joint, cardan shaft.

| | | | |
|---|---|---|---|
| Layshaft bevel gears-rear wheel ratio: | 4.375 | | (8-35) |
| Overall gear ratios: | | | |
| — Low gear | 1 | to | 13.413 |
| — Second gear | 1 | to | 8.015 |
| — Third gear | 1 | to | 5.735 |
| — High gear | 1 | to | 4.510 |

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**FRAME**

Duplex cradle, tubular structure.

**Suspension**

Telescopic front fork incorporating hydraulic dampers. Rear swinging fork with externally adjustable springs.

**Wheels**

18x3 rims, front and rear.

**Tires**

4.00x18 front and rear, block type (high speed).

**Tire pressure**

| | |
|---|---|
| Front tire: | |
| solo / with passenger | 1.5 kgs/sq. cm. = 21 p.s.i. |
| Rear tire: | |
| solo | 1.8 kgs/sq. cm. = 25 p s.i. |
| with passenger | 2.0 kgs/sq. cm. = 28 p.s.i. |

**Note** - The above recommendation is for normal riding (cruising speed). If using the machine at constant high speed or on motorways, the above pressures should be increased by 0.2 kgs/sq. cm. (2.8 p.s.i.)

**Brakes**

Twin leading shoes front brake operated by hand lever on the right handlebar.
Large rear brake operated on left hand side of machine.

**Overall dimensions and weight**

| | |
|---|---|
| — Wheelbase . . . . . | 1.470 mts. (about 57.8") |
| — Length . . . . . | 2.245 mts. (about 88.3") |
| — Width . . . . . | 0.830 mts. (about 32.6") |
| — Height (dry) . . . . . | 1.070 mts. (about 42.1") |
| — Minimum ground clearance | 0.150 mts. (about 5.9") |
| — Curb weight . . . . . | 228 kgs. (about 502 lbs) |

**Performance**

Maximum permissible speeds and gradients climable in each gear, solo riding.
Low gear: 62 kms/h (38.5 m.p.h.) climbing ability: 60%
Second gear: 104.250 kms/h 64.6 m.p.h.) climbing ability: 40%
Third gear: 145.250 kms/h (89.2 m.p.h.) climbing ability: 20%
High gear: 185.276 kms/h (115 m.p.h.) climbing ability 8%

**Fuel consumption**

37 m.p.g. (US).
Measured according to CUNA standards.

**Fuel and oil capacities**

Fuel tank: 22.5 liters (5.84 US gls.) including about 4 liters reserve (about 1 US gl.) - Petrol 98 NO (Regular octane) - Sump 3 liters (3¼ quarts) Shell Super Motor Oil 100 - Transmission 0.750 liters (1¾ pints) Shell Spirax 90 E.P. - Rear wheel drive 0.180 liters (0.4 pints) Shell Spirax 90 E.P. - Front fork dampers 0.160 liters = 5.4 oz US Shell Tellux 33.

# V7 700 cc.

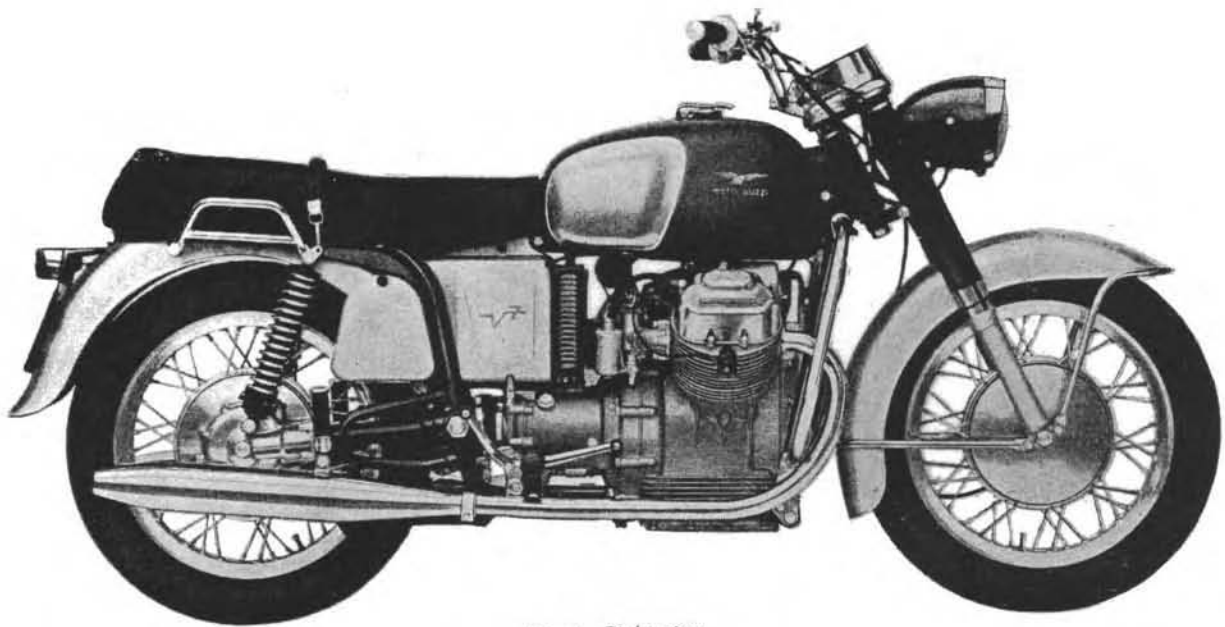
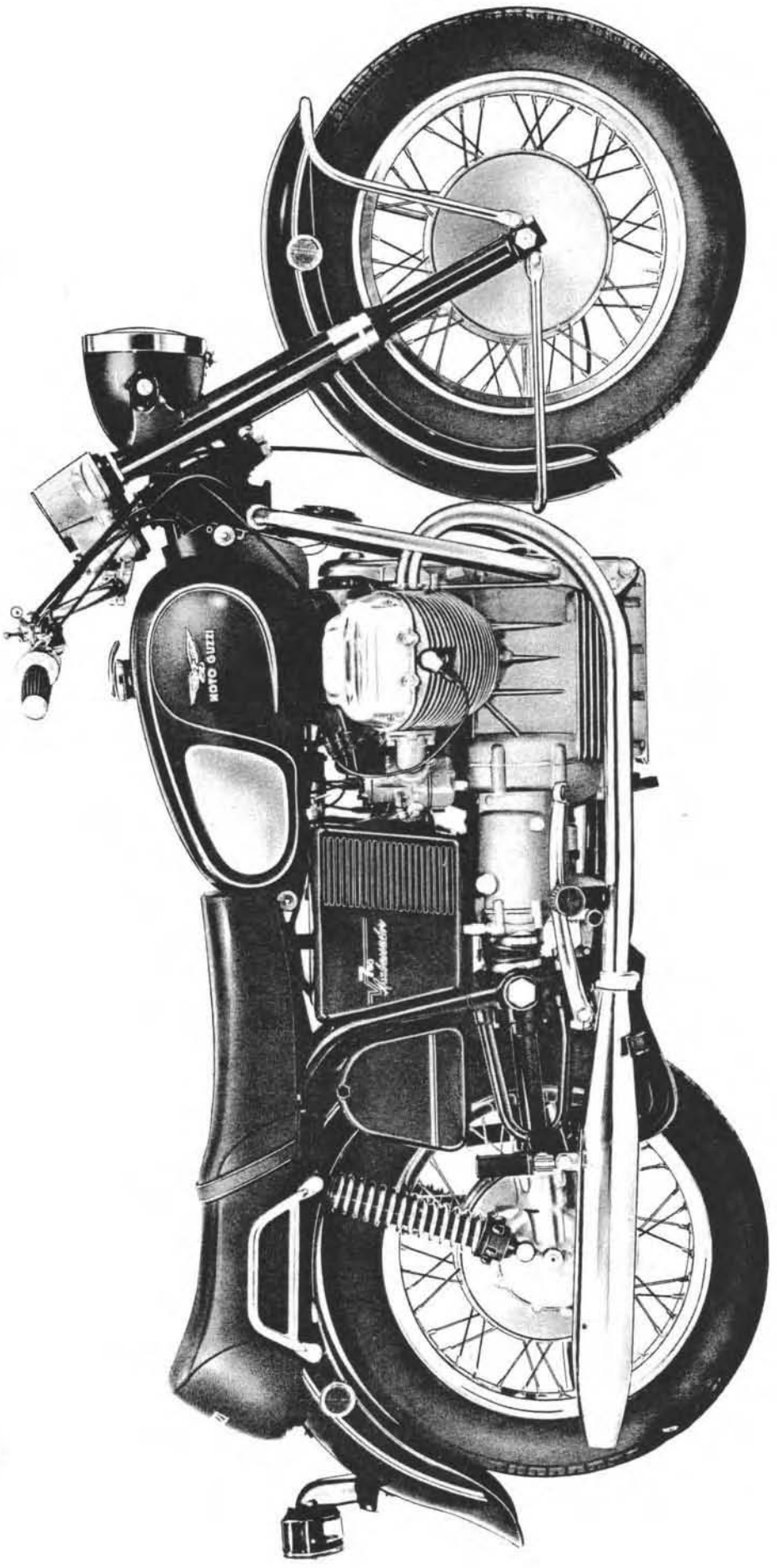


Fig. 1 - Right view

Fig. 2 - Left view




V7 750 cc.

## TOOLS REQUIRED FOR STRIPPING, CHECKING AND REASSEMBLING

(see Fig. 3)

| Fig. No. | Order No. | Description |
|---|---|---|
| 1 | 12904700 | Puller for taper bearing races on rear fork. |
| 2 | 12906900 | Puller for roller bearing race in drive box. |
| 3 | 60910500 | Steering top linking plate puller. |
| 4 | 12909500 | Front fork rods assembling tool. |
| 5 | 12905400 | Wrench for removal of layshaft lockring. |
| 6 | 12912700 | Lockring adjusting tool for rear dampers. |
| 7 | 60907200 | Valve dismantling and assembling tool. |
| 8 | 12913700 | Puller for layshaft ball bearing in transmission box. |
| 9 | 12913100 | Puller for mainshaft roller bearing in transmission box. |
| 10 | 12907000 | Puller for mainshaft and clutch shaft bearings in transmission box cover. |
| 11 | 12912600 | Special wrench for front fork lockring. |
| 12 | 12912000 | Flange assembling and oil seal locating tool on crankshaft, flywheel side. |
| 13 | 12903000 | Tool for rear fork taper roller bearing adjustment. |
| 14 | 12910700 | Bush for oil seal fitting on mainshaft. |
| 15 | 32906302 | Oil pump gear puller. |
| 16 | 12911801 | Flywheel and clutch unit holding tool. |
| 17 | 26907800 | Piston pin puller. |
| 18 | 12907100 | Layshaft and rear drive bevel holding tool. |
| 19 | 12913600 | Tool for removing the flange c/w bearing, flywheel side. |
| 20 | 12912900 | Special tool to check positioning marks on timing gears. |
| 21 | 12906500 | Clutch dismantling and assembling tool. |
| 23 | 12908300 | Tool for timing cover assembling and oil seal locating on crankshaft, timing side. |
| 22 | 12905900 | Tool for removal of clutch shaft. |
| 25 | 12905300 | Tool for holding crankshaft when removing bevel nut. |
| 24 | 12913800 | Tool for transfer of positioning marks on timing gear. |

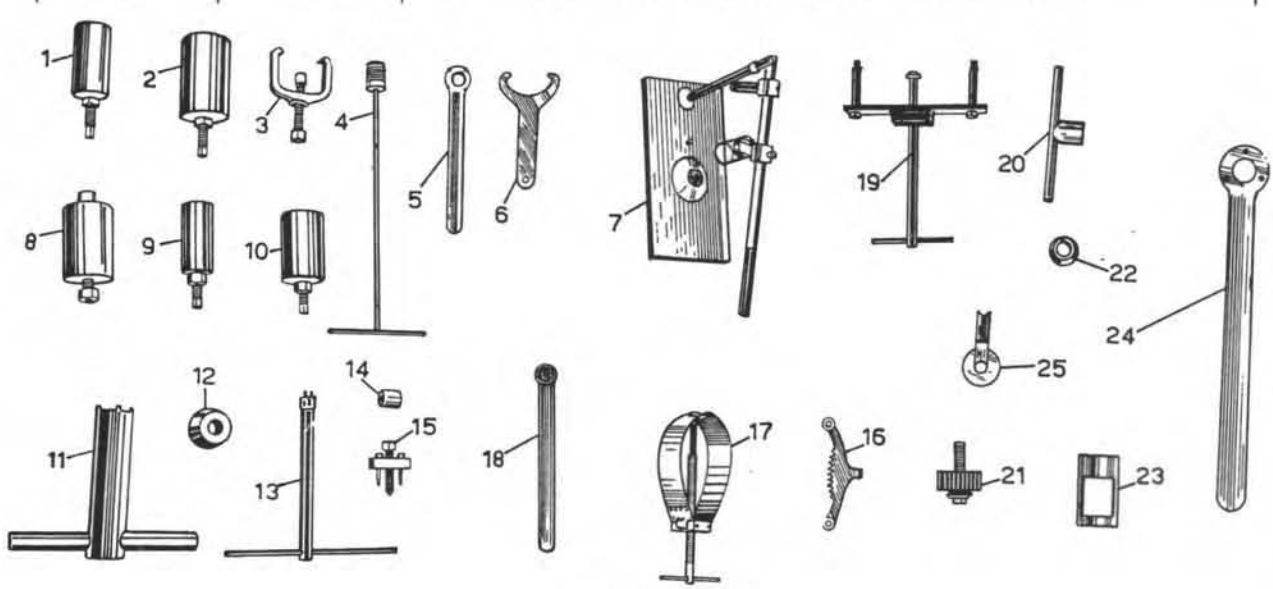



Fig. 3

## DESCRIPTION OF ENGINE

(see Fig. 4 & 5)

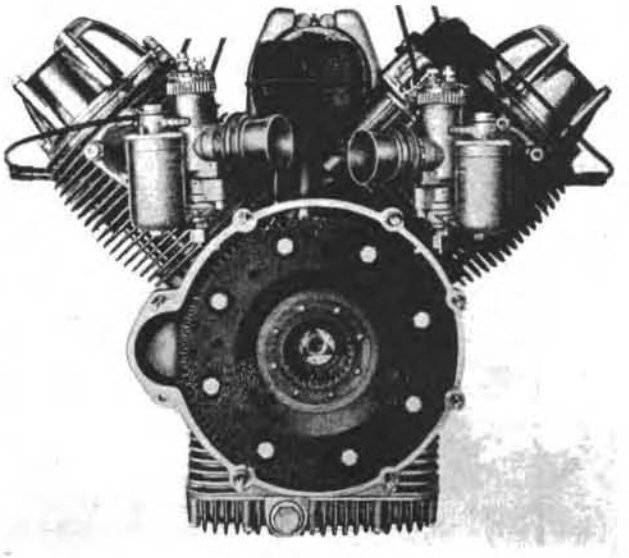


Fig. 4

The « V7 » model is equipped with a twin-cylinder 90° V engine. Cylinders have light alloy barrels with hard crome linings and are deeply finned for cooling.

Cylinder bottoms fit into suitable housings in crankcase.

Crankcase in light alloy, provided with six bolts (four long, two short) to secure cylinders and cylinder heads.

Cylinder heads are in light alloy, with special cast iron inserted valve seats.

Rocker box covers in light alloy. Steel construction crankshaft on two special tin-aluminium alloy main bearings, pressed in suitable housings.

Steel construction con-rods with thin wall bearings at big ends and bronze bushes at small ends.

Piston in light alloy, with 4 rings: 3 over pin (two piston rings and one oil scraper) and 1 below pin (oil scraper).

O.H.V. valve gear, operated through camshaft, tappets, push rods and rockers. Camshaft gear driven by crankshaft. Carburetors are gravity fed.

Pressure lubrication from oil sump through gear pump driven by crankshaft. Oil recovery by gravity. Wire gauze type oil cleaner in crankcase. Lubrication pressure controlled by relief valve.

Breather tube conveys oil vapors into breather box from which, after condensation, oil returns into sump.

Pressure is discharged outside through vent tube. Engine is air cooled. Cylinders and cylinder heads are suitably finned.

Ignition by battery, coil and distributor operated by crankshaft through built-in gear.

Electric starting, electrically controlled.

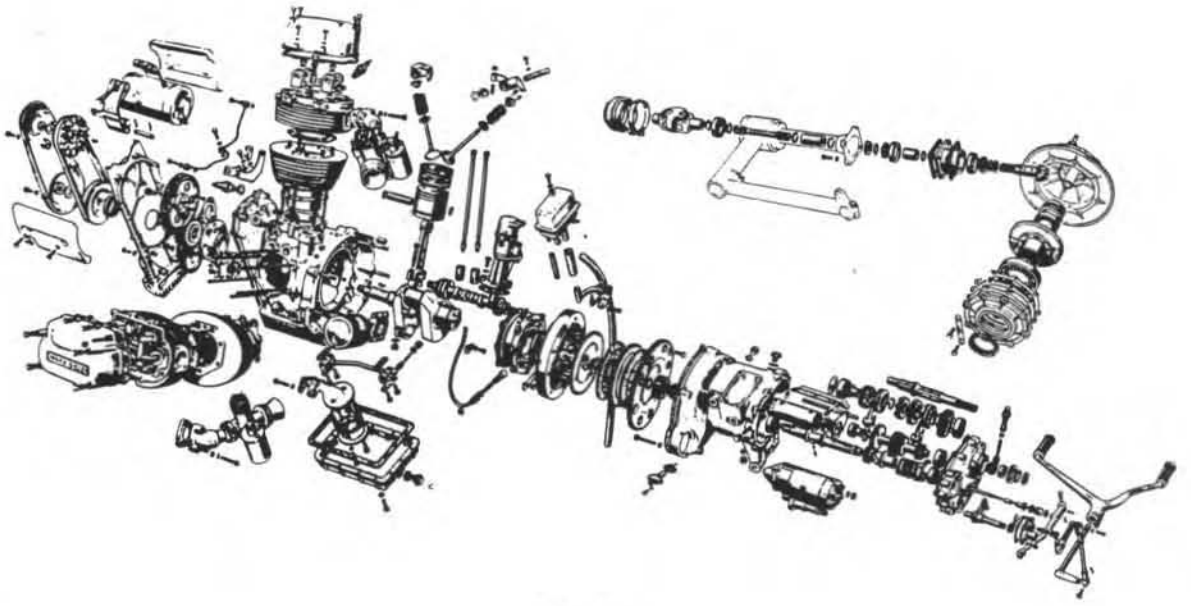


Fig. 5

## REMOVAL OF « ENGINE-GEARBOX » GROUP FROM FRAME

(see Fig. 6)

For the removal of the « engine-gearbox » group from frame, remove the following:

— battery covers (L/H & R/H) and disconnect cables from battery.
— speedo control cable from transmission in gearbox.
— saddle, fuel tank and battery, after removal of holder bracket.
— throttle and air cables two-ways adapter, without disconnecting cables.
— battery support plate, clutch control cable from lever on gearbox, starter control electric cables and neutral indicator cable from gearbox.
— coil, after disconnecting electric cables; distributor cap, after disconnecting spark plugs cables; distributor rotor.
— generator covers; generator belt guard and generator unit.
— mufflers, large band on rubber gaiters.

Put engine on a support and after unscrewing nuts extract bolts securing « engine-gearbox » group to frame; move the group forward (towards front wheel) tilting it to the right then extracting it from frame.

**N.B.:** The above operation is suggested to be carried out by **two** mechanicians.

After removal of group from frame, wash same with petrol and dry by compressed air. Then separate engine assy from gearbox assy.

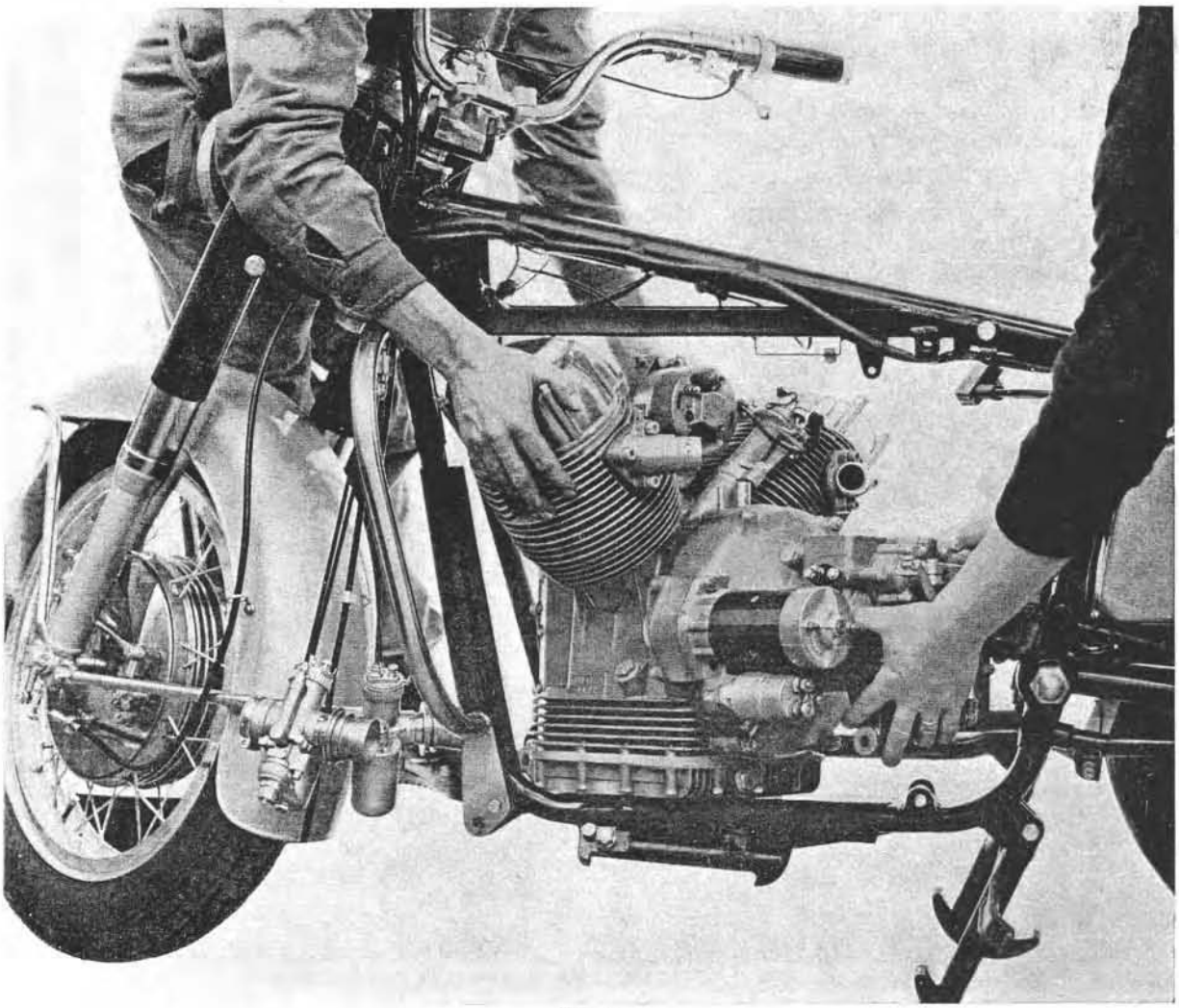


Fig. 6

# ENGINE OVERHAUL

## ENGINE STRIPPING

To strip remove the following:

— drain oil from sump by unscrewing oil drain plug (see B on Fig. 7).

— remove spark plugs.

— ignition distributor unit c/w support, after unscrewing bolts securing same to crankcase and removing gasket.

— generator securing band, after removal of cotter pins and pins.

— generator support bracket, after unscrewing bolts securing same to crankcase.

— clutch unit, unscrewing bolts securing starter ring gear by means of ring wrench and tool No. 12911801 (see 16 on Fig. 8). Bear in mind that such bolts must be unscrewed in crossed sequence. After removal of ring gear remove

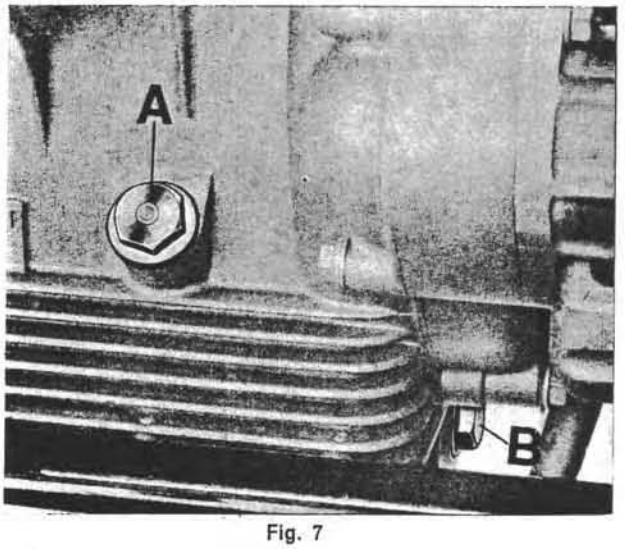



Fig. 7

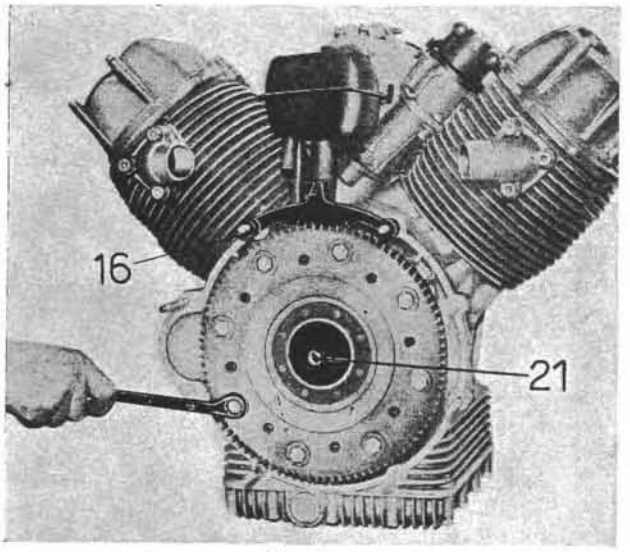



Fig. 8

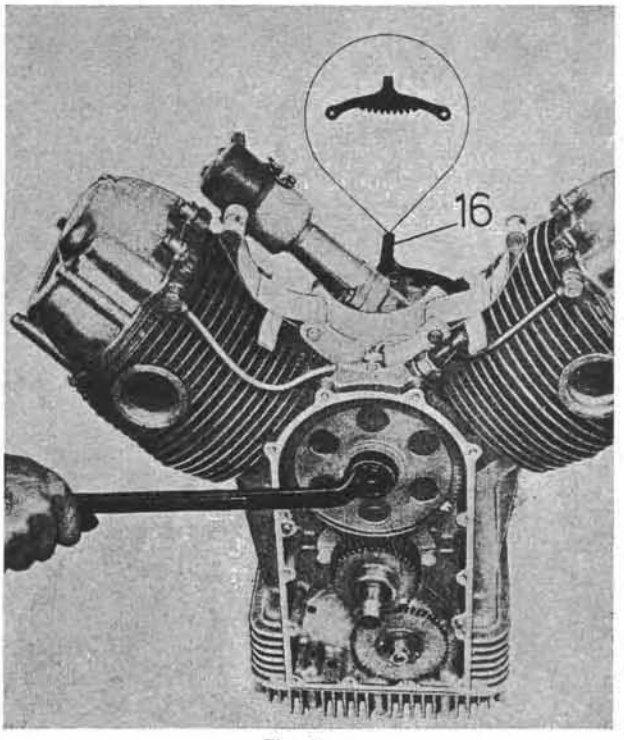



Fig. 9

n.s. clutch plate, intermediate plate, f.s. clutch plate, pressure plate, washer and springs.

— generator driving pulley, after unscrewing nut on crankshaft by means of ring wrench and tool No. 12911801.

— timing cover, after unscrewing bolts securing same to crankcase.

— seal ring from timing cover.

— cam wheel, removing nut securing same to camshaft, by means of ring wrench and tool No. 12911801 (see 16 on Fig. 9).

— oil pump gear, by means of tool No. 12911801 (see 16 on Fig. 10) and oil pump gear puller No. 32906302 (see 15 on Fig. 10).

— distribution gear.

— flywheel. After flattening the lock plates, unscrew bolts securing flywheel to crankshaft, by means of box wrench and tool No. 12911801 (see 16 on Fig. 11).

— cylinder head lubrication oil pipe.

— rocker cover screws, then remove covers and gaskets.

— rocker spindle bolts and washers.

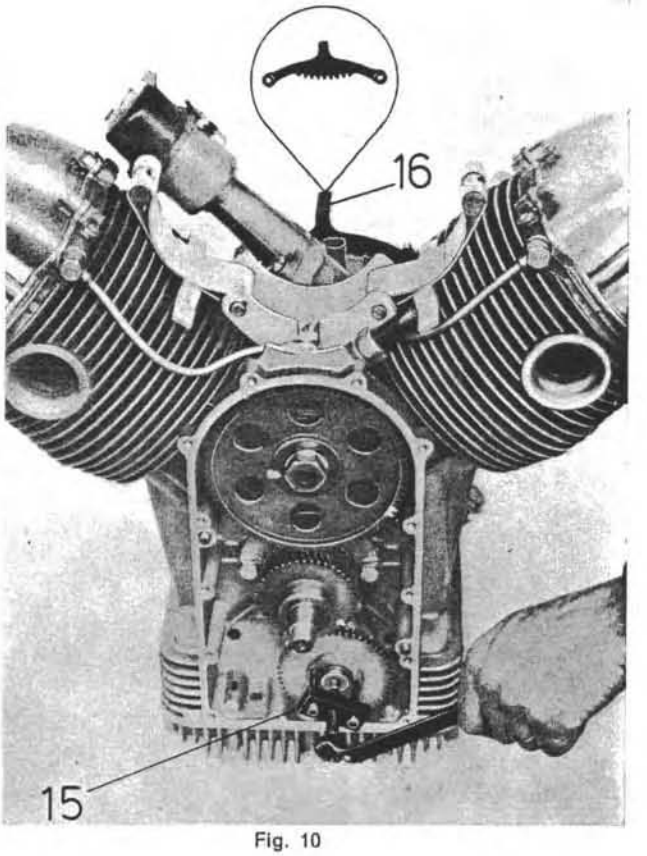



Fig. 10

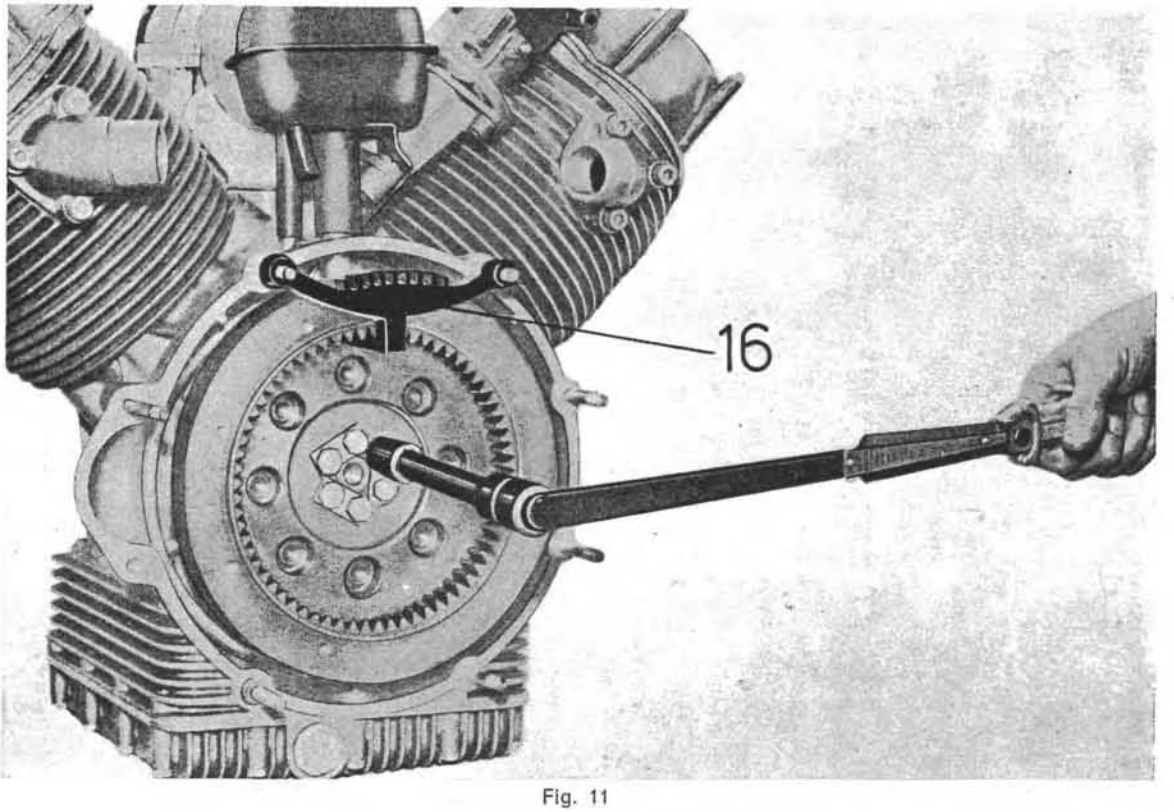



Fig. 11

— rocker arm spindles, rocker arms, rocker arm springs and washers (see Fig. 12). Remove tappet adjusting screws after loosening nuts.

— push rods.

— rocker arms support, after unscrewing the four long bolts and the two short bolts (each head) which secure cylinder and cylinder head to crankcase.

— cylinder heads c/w valves and remove gasket. Using tool No 60907200 (see 7 on Fig. 13) remove from cylinder head the semicones, top collars, springs, bottom collars and then extract valves from inside.

— cylinders and relative gasket.

— tappets from housing on crankcase.

— piston pin, by means of puller No. 26907800 (see 17 on Fig. 14), after removal of circlips.

— the piston and from same remove piston rings.

— oil sump, after unscrewing screws securing same to crankcase. Also remove oil sump gasket.

— oil pump, after removing screws securing same to crankcase. From pump remove key, driven gear and driving shaft.


Fig. 13

— complete oil cleaner and gasket (see B on Fig. 15). Cleaner consists of: 2 retaining bolts, bottom plate, wire gauze and cleaner body.

— oil pipe (see A on Fig. 15), after flattening lock plates and unscrewing securing bolts and washers. Remove from pipe the pressure relief valve, consisting of: plunger, spring, bottom plate and plug.

— con-rod caps, after flattening lock plates and unscrewing nuts. Then extract con-rods from

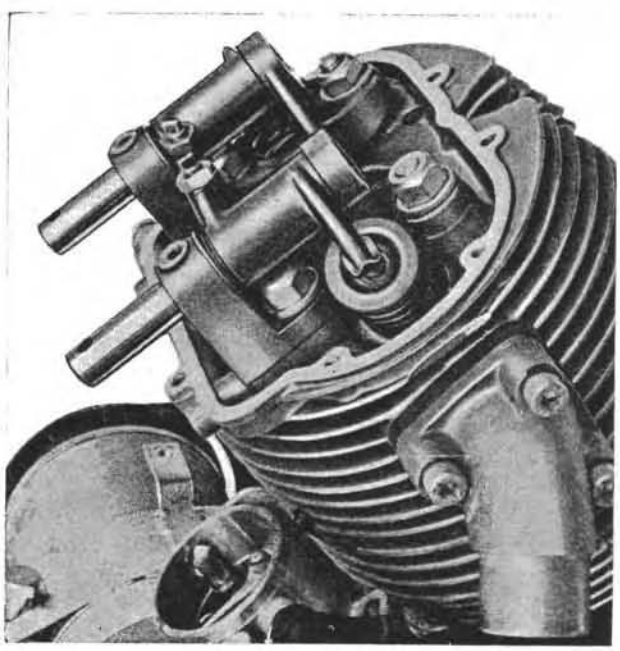


Fig. 12

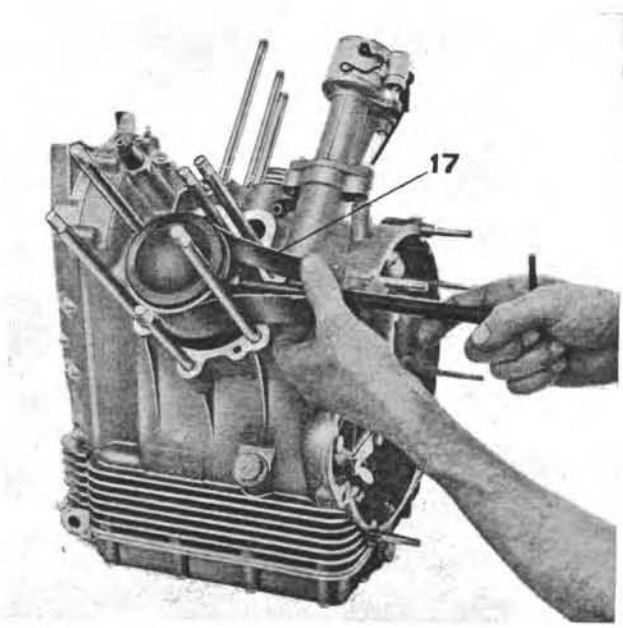



Fig. 14

top of crankcase. Remove half bearings from con-rods.

— camshaft, after unscrewing bolts securing flange to crankcase.

— flange c/w crankshaft bushing, timing side, after flattening lock plates and unscrewing bolts securing flange to crankcase.

— flange c/w main bearing, flywheel side, after flattening lock plates and unscrewing bolts securing flange to crankcase. Then, by means of tool No. 12913600 (see 19 on Fig. 16) remove flange c/w main bearing from crankcase.

— crankshaft.

— oil pressure solenoid.

— oil filler plug (see A on Fig. 7).

After the above operations the crankcase is completely stripped, except for the long and short bolts.

N.B.: During stripping it is strongly recommended to keep well apart the two « cylinder-rod-piston » groups.

To remove timing cover without removing engine from frame, it is necessary to proceed as follows:

— after removing belt cover and generator belt, unscrew the three bolts securing pulley assembly. Extract pulley outer flange and washers.

— using the three bolts previously securing pulley, fit tool No. 12905300 on pulley hub (see 24 on Fig. 17) and thus holding crankshaft, unscrew crankshaft nut by means of a ring wrench.

— unscrew the three bolts and remove special tool, inner body of pulley and pulley hub.

— block or support engine.

— remove bottom frame/engine stud.

— remove screws securing timing cover to crankcase.

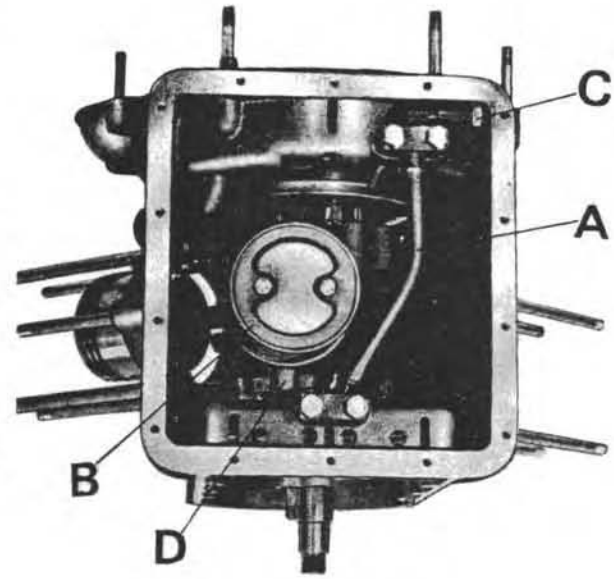


Fig. 15

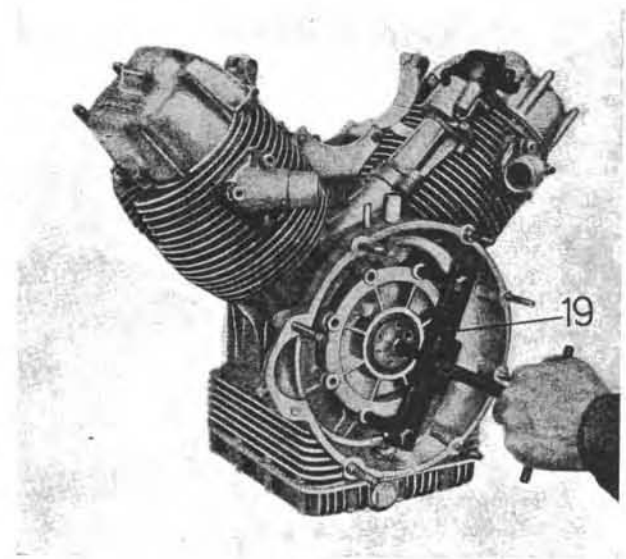


Fig. 16

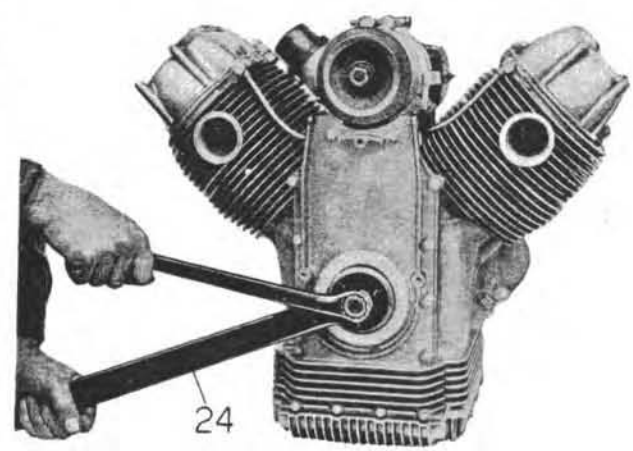


Fig. 17

## ROCKER BOX COVERS - CYLINDER HEADS - VALVES - GUIDES - SPRINGS

Cylinder heads, in light alloy, are finned to increase cooling surface. Long bolts, short bolts and nuts secure cylinder heads to crankcase.

### STRIPPING

Removal and stripping of cylinder heads are required when loss of compression is noticed, such loss being imputable to defective valve sealing, and also after a certain period of operation, in order to remove carbon deposits in combustion chamber.
When engine is on frame, cylinder heads stripping is carried out as follows:

Disconnect:

— sparks cables.
— air inlet tubes and carburetors.
— exhaust pipes and mufflers.
— distributor cap.
— rocker box covers.
— rocker arms and rocker arms supports.

Then remove cylinder heads.
No difficulties are involved in stripping down cylinder heads into parts. In any case all stripping, overhauling and assembling operations, and required tools, are listed in the following paragraphs:

### REMOVAL OF SPRINGS AND VALVES

Position cylinder head on tool No. 60907200 (see 7 on Fig. 13) and with the arm of same press on the valve top collar so to remove semicones, top collar, spring, bottom plate and, from inside cylinder head, the valve.

### INSPECTION AND OVERHAUL OF CYLINDER HEADS

Using a chamfered scraper and a wire brush remove carbon deposits and inspect valve seats.

### INSPECTION AND OVERHAUL

Valve guides are pressed in their housings in cylinder heads. Removal and refitting are carried out by means of a round punch (see Fig. 18 & 19). Valve guide must be replaced in case of excessive lash between its hole and the valve stem, whenever such lash is not eliminable by simply replacing valve.
After pressing guide in housing, hole must be reamed with a straight reamer in order to bring same to size as shown in coupling data chart. (See fig. 19/1).
Negative allowance in pressing guides in their housings on cylinder heads, for both inlet and exhaust valves, is to be comprised between mm. 0.046 and 0.075 (.0018 - .00295).

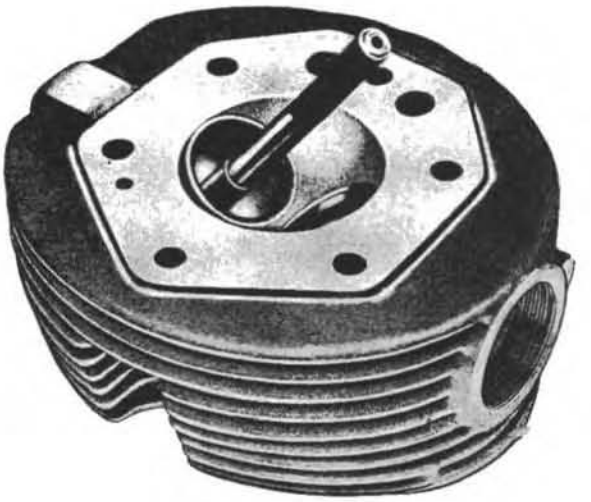


Fig. 18

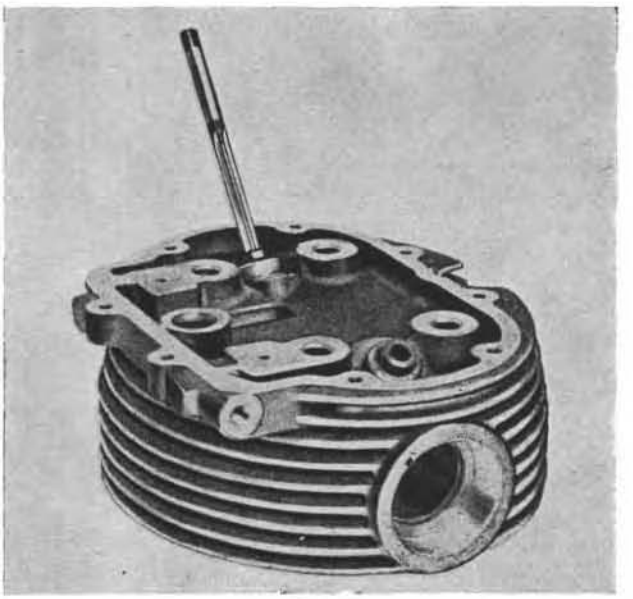


Fig. 19

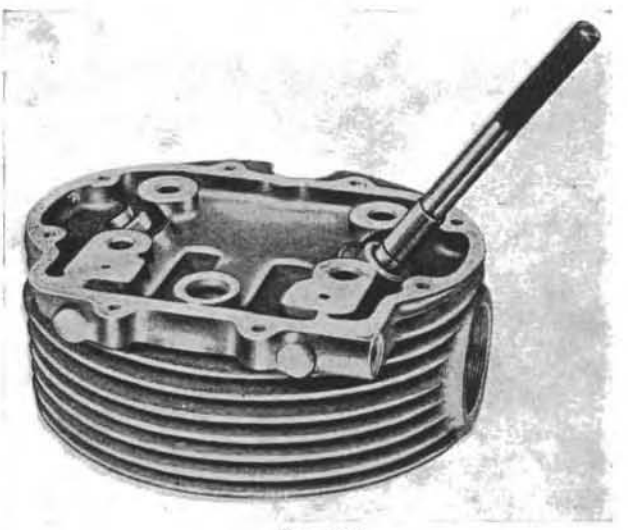


Fig. 19/1

# VALVES - VALVE GUIDES COUPLING DATA

| | Valve guide I.D. | Valve stem diameter | Clearances |
|---|---|---|---|
| Inlet valve | 8.000 ÷ 8.022 mm. (.3149 - .3158") | 7.972 ÷ 7.987 mm. (.3138 - .3144") | 0.013 ÷ 0.050 mm. (.0005 - .0019") |
| Exhaust valve | | 7.965 ÷ 7.980 mm. (.3136 - .3142") | 0.020 ÷ 0.057 mm. (.0008 - .0022") |

## INSPECTION AND OVERHAUL OF VALVE SEATS IN CYLINDER HEADS

In order to obtain a perfect match with valves, valve seats must be reground. Angles of inclination of the seats are as follows:

**V7-700 cc.** (see fig. 20)

— inlet valve : 60° 25' $^{0}_{+15'}$

— exhaust valve: 45° 25' $^{0}_{+15'}$

**V7-750 cc.** (see fig. 21)

— inlet valve : 45° 30' ± 5'

— exhaust valve: 45° 30' ± 5'

Regrinding is carried out by means of a milling cutter, guided by a stem inserted in valve guide. After milling, in order to obtain a perfect match, it is necessary to grind the valve in its seat with emery paste. Should valve seats be so deteriorated that normal milling will not be sufficient, replacement of same will then be required.

## INSPECTION OF VALVES

Check valves condition and existing lash between stem and guide (for clearance refer to coupling data chart and Fig. 20). To regrind valves, insert valve stem in self-centering chuck of Universal Grinder (see Fig. 22) and adjust chuck swivel table so that valve will have an angle of inclination as follows:

— exhaust valve: 45° 25' $^{0}_{+15'}$

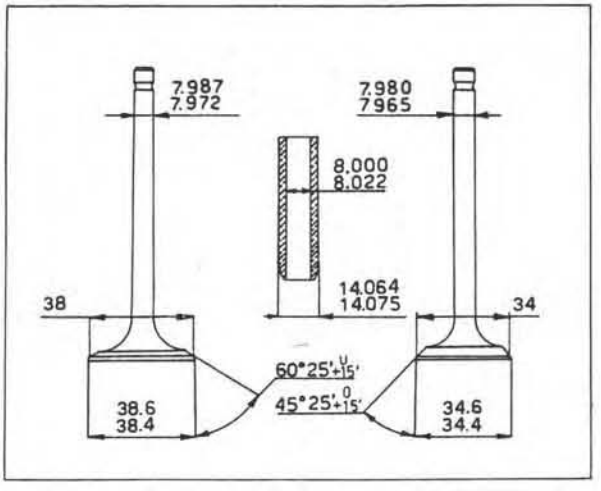



Fig 20

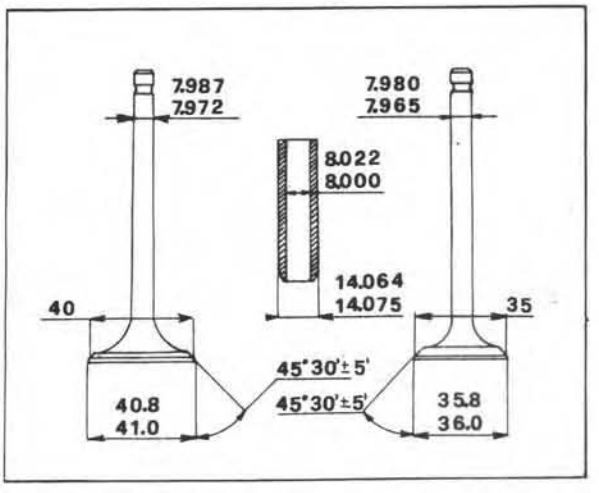



Fig. 21

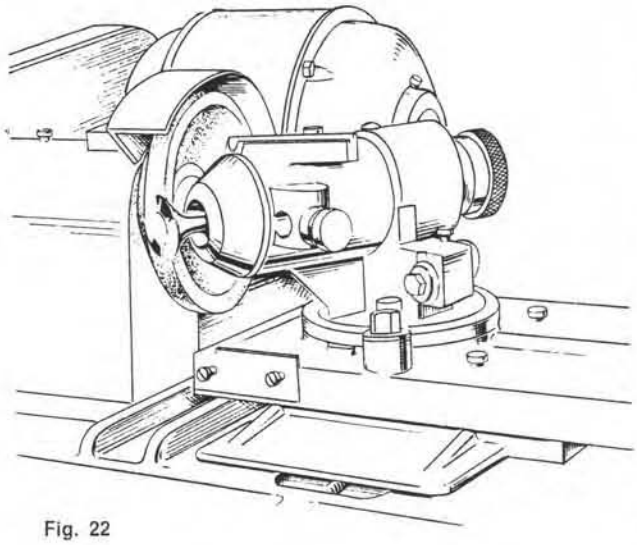


Fig. 22

— inlet valve: 60° 25' $^{0}_{+15'}$

After grinding check thickness of valve head at max. dia. not less than 0.8 mm. (.0315"). Should surface at stem end show any deformation, regrind same on grinding wheel.
Whenever regrinding valve seats, it is advisable to check that valve springs are compressed between 37 mm. and 38 mm. (1.456-1.496"). Adjust by adopting suitable washers at bottom collar, between spring and cylinder head.

## INSPECTION OF VALVE SPRINGS

Check that valve springs are not cracked and have not lost their elasticity.

**V7-700 cc.** (see fig. 23)

Spring, compressed at 37 mm. (1.456"), must show a load of Kg. 33 $^{0}_{+2}$ (72 lbs) (closed valve position).

Spring, compressed at 28 mm. (1.024"), must show a load of Kg. 60 $^{0}_{+2}$ (132 lbs) (open valve position).

**V7-750 cc.** (see fig. 24)

**External spring:**

Spring, compressed at 36 mm. (1.417"), must show a load of Kg. 29,5 ± 3% (65 lbs ± 3%) (closed valve position).

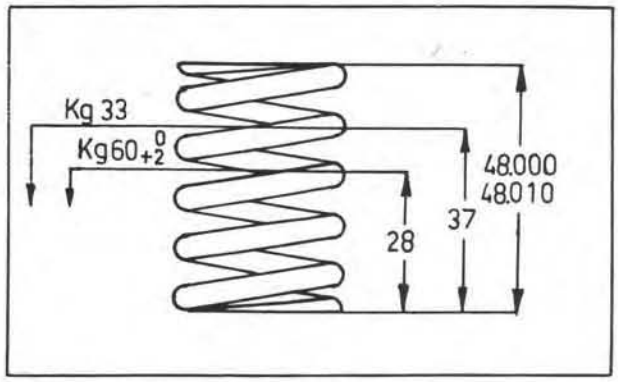



Fig. 23

Spring, compressed at 27 mm. (1.063"), must show a load of Kg. 45,5 ± 3,5% (100 lbs ± 3,5%) (open valve position).

**Internal spring:**

Spring, compressed at 31 mm. (1.220"), must show a load of Kg 16,7 ± 3% (37 lbs ± 3%) (closed valve position).

Spring compressed at 22 mm. (0.866"), must show a load of Kg. 27,4 ± 4% (60 lbs ± 4%) (open valve position).

Springs flexibility can be checked by suitable apparatus. As to load and deformation data refer to fig. 23 and 24.

## ASSEMBLING OF CYLINDER HEADS ON CYLINDERS

Assembling of cylinder heads on cylinders is carried out as follows:

— reposition a new gasket between cylinder and cylinder head, making sure that lubrication openings in gasket match with lubrication holes in cylinder and cylinder head.

— secure the head assembly to the six bolts in crankcase.

— fit rocker arms support.

— position washer on cylinder bolts.

— screw down nuts on long and short bolts, in crossed sequence, without tightening. Using a torque wrench rated at Kg/m. 3.800 (27.48 ft.lb) gradually tighten long and short bolt nuts accordingly to sequence shown in Fig. 25 (1-2-3-4-5-6).

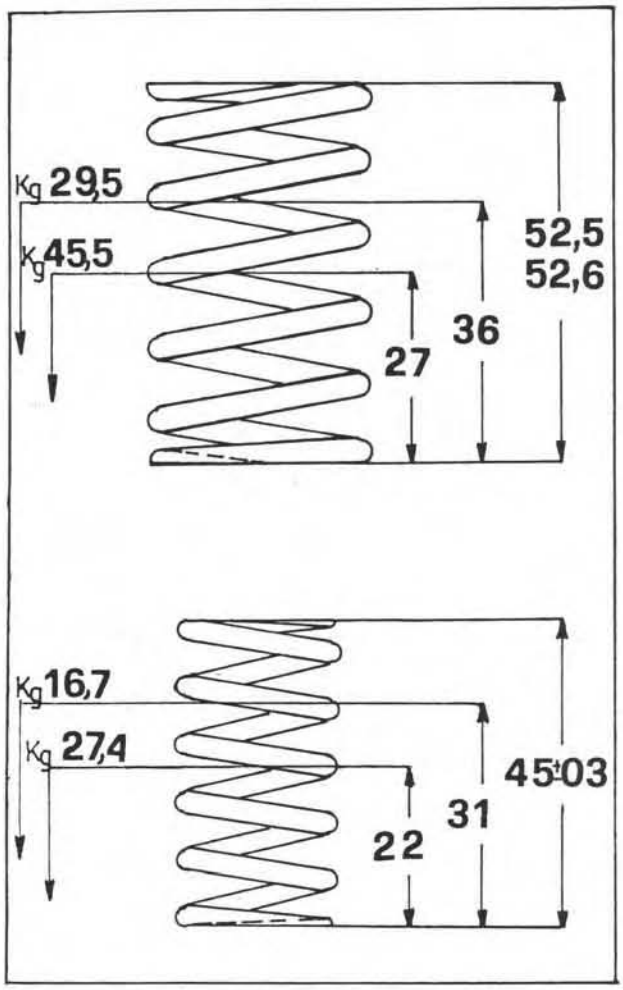



Fig. 24

N.B.: In order to avoid deformation of cylinder heads during assembling, above instructions must be strictly followed.

When positioned, fit on support the rocker arms c/w adjusting screw, spring and washer. After having lined them all up, by means of a punch insert spindle and secure it to support by bolt and washer.

— fit a new gasket between cylinder head and rocker box cover.

— fit rocker box cover and screw it to cylinder head in crossed sequence.

— connect cylinder head lubricating pipe.

— insert inlet tube reducing bush on cylinder head.

— fit air inlet tube seal.

— fit air inlet tube complete with carburetor.

— fit distributor cap.

— connect sparks cable.

Repeat same assembling operations for second cylinder head.

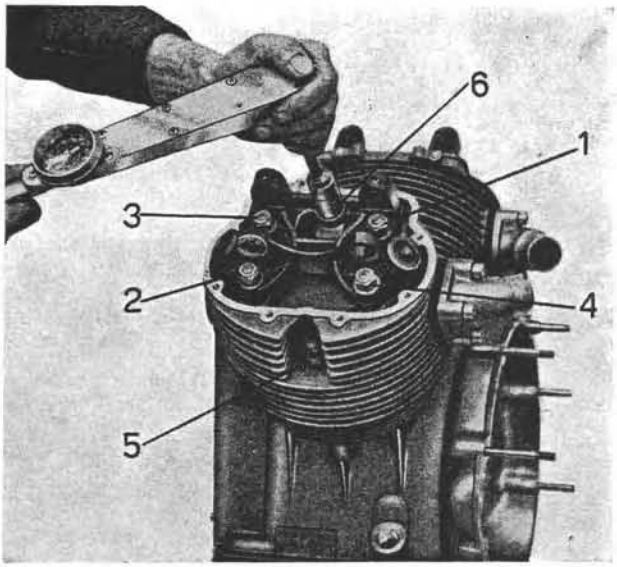



Fig. 25

# CYLINDERS - PISTONS - PISTON RINGS V7 700 cc.

## CYLINDERS WEAR CHECK

Measurement of internal diameter of cylinders must be taken at three different heights, both in transversal and longitudinal directions.
Dial gauge must previously be set to zero on ring gauge (see Fig. 26) and measurement chart (see Fig. 27).

Should scorings ovalization or any wear exceeding 0.10 mm. (.0034") be noticed in chrome lining (see top portion of cylinders), cylinders must then be replaced.

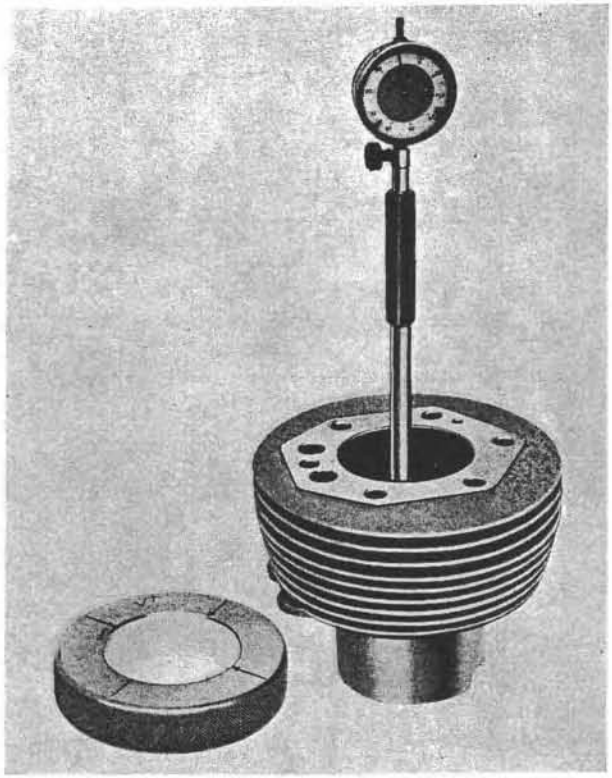


Fig. 26

## SELECTION OF CYLINDERS DIAMETER

| Class "A" | Class "B" | Class "C" |
|---|---|---|
| 80.000 mm. (3.14963") | 80.006 mm. (3.14987") | 80.012 mm. (3.15010") |
| 80.006 mm. (3.14987") | 80.012 mm. (3.15010") | 80.018 mm. (3.15034") |

N.B.: Cylinders must always be matched with pistons of same class.

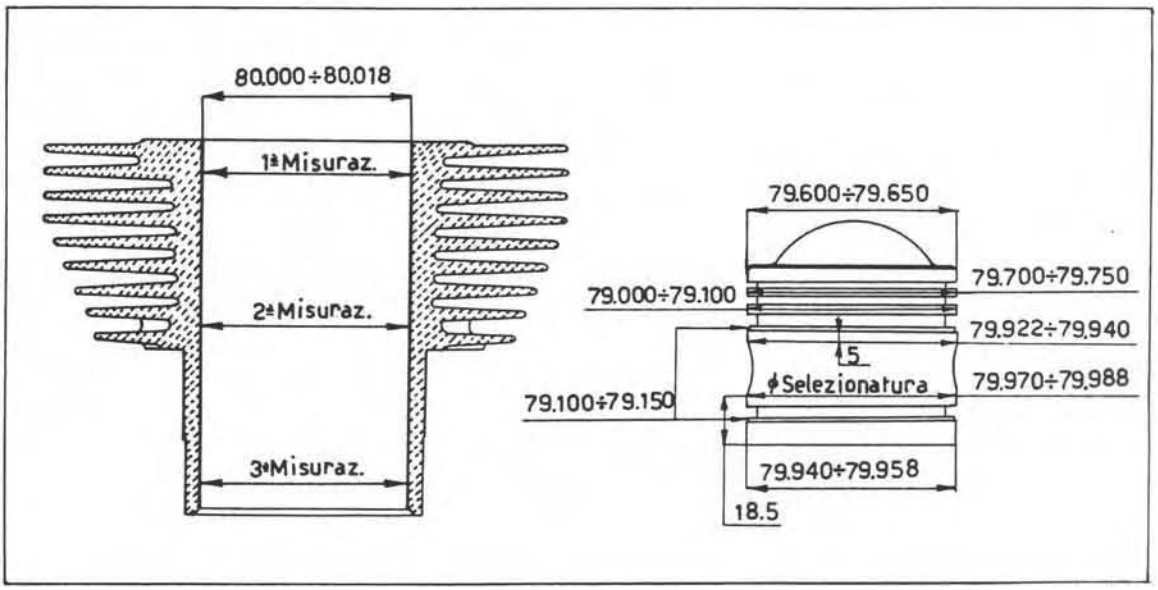



Fig. 27

## PISTONS

When overhauling, decarbonize piston crowns and ring slots. Then check cylinder-piston clearance (see Fig. 28).

If clearance exceeds measurement stated by chart, then replace cylinders and pistons.

For engine balancing, both pistons must be of same weight. Maximum permissible weight difference is 1.5 grammes (23 grains) (see Fig. 29). As to sizes refer to chart on Fig. 31.

Selection measurements shown in chart below must be taken at 18.5 mm. (.7283") from piston bottom edge, in orthogonal sense with respect to piston pin axis (see Fig. 30). Ovalization shall have to be 0.055÷0.065 mm. (.0021÷.0025") less than selection size.

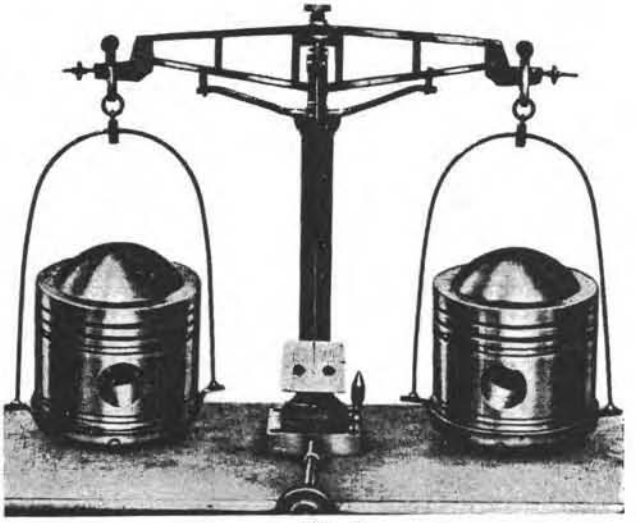


Fig. 29

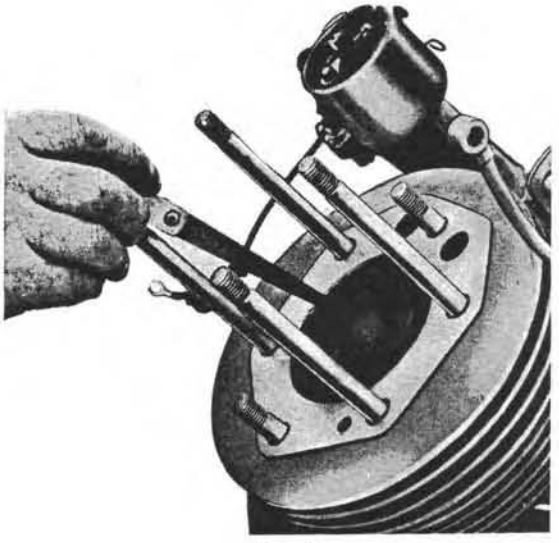


Fig. 28

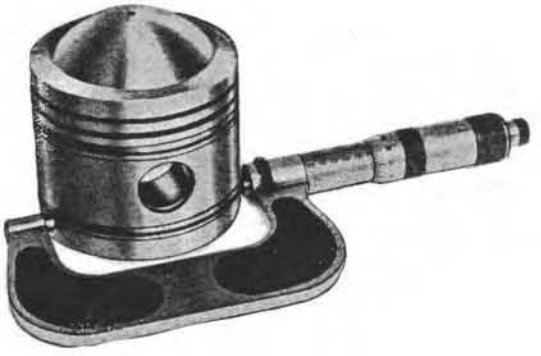


Fig. 30

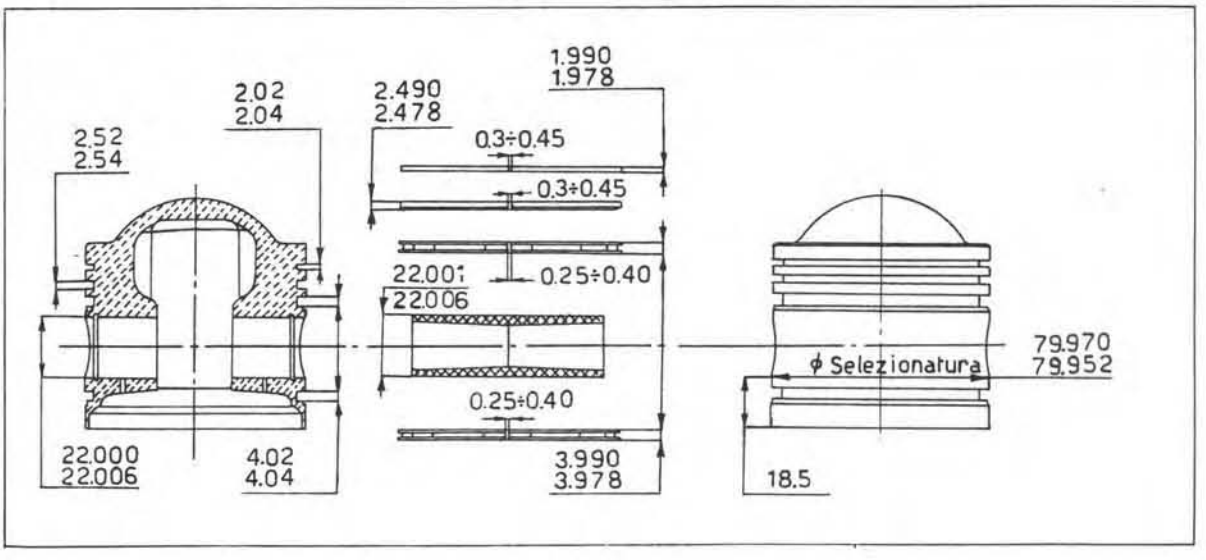



Fig. 31

## SELECTION OF PISTON DIAMETER

| Class "A" | Class "B" | Class "C" |
|---|---|---|
| 79.952 mm. (3.14774") | 79.958 mm. (3.14798") | 79.964 mm. (3.14821") |
| 79.958 mm. (3.14798") | 79.964 mm. (3.14821") | 79.970 mm. (3.14845") |

N.B.: Pistons must always be matched with cylinders of same class.

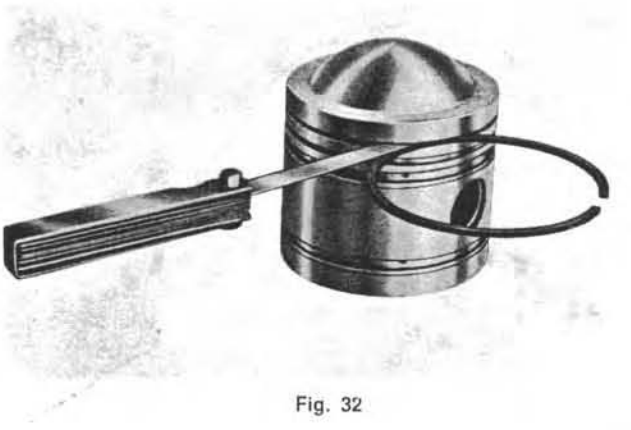


Fig. 32

## PISTON RINGS AND OIL SCRAPERS

When fitting rings over piston pay attention to the position of end gap which must be placed out of line with each other.

Check clearance between rings and slots on piston (see Fig. 32). Such clearance must be within measurements shown in paragraph « Piston rings and scrapers-piston slots height clearance ».

Before fitting rings over piston, it is indispensable to insert them in cylinder and check clearance at ends (see Fig. 33) to be as shown in paragraph « Piston rings and oil scrapers gap.

## PISTON RINGS AND SCRAPERS - PISTON SLOTS HEIGHT CLEARANCE

Vertical clearances:

1st - Piston ring
0.030 - 0.062 mm. (.001 - .0024")

2nd - Piston ring
0.030 - 0.062 mm. (.001 - .0024")

3rd - Oil scraper
0.030 - 0.062 mm. (.001 - .0024")

4th - Oil scraper
0.030 - 0.062 mm. (.001 - .0024")

## PISTON RINGS AND OIL SCRAPER GAP

— Between piston ring gap:
0.30 - 0.45 mm. (.012 - .018")

— Between oil scraper gap:
0.25 - 0.40 mm. (.010 - .016")

## FITTING OF PISTON PINS

Before fitting pins, pistons should be heated at about 60 °C (140 °F) in order to cause a slight dilatation of the hole, thus easing introduction of pin. To fit pin use tool No. 26907100 (see 17 on Fig. 14).

Negative allowance between piston pin and hole in piston: 0.001 mm. (.00004").

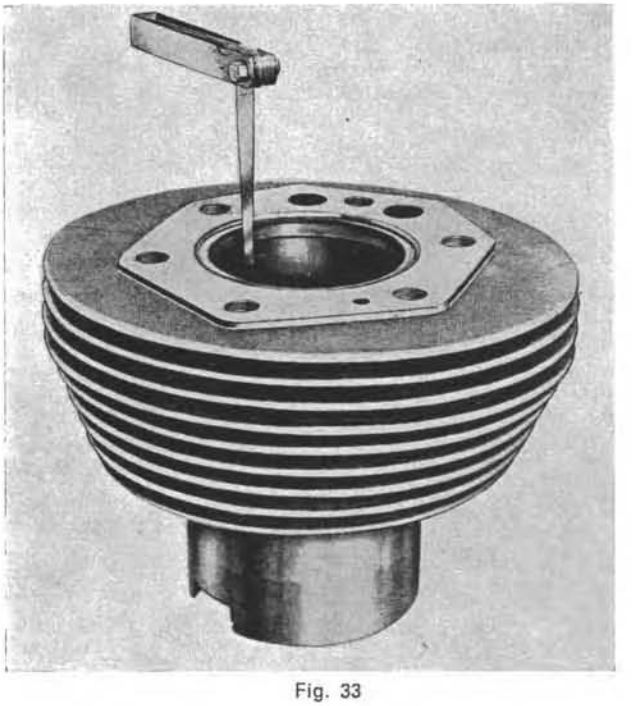


Fig. 33

## CYLINDERS - PISTONS - PISTON RINGS V7 750 cc.

(see fig. 27/1 and 31/1)

| Class « A » | Class « B » | Class « C » |
|---|---|---|
| 83.000 mm. (3.2677") | 83.006 mm. (3.2679") | 83.012 mm. (3.2681") |
| 83.006 mm. (3.2679") | 83.012 mm. (3.2681") | 83.018 mm. (3.2683") |

**N.B.** - Cylinders must always be matched with pistons of same class.

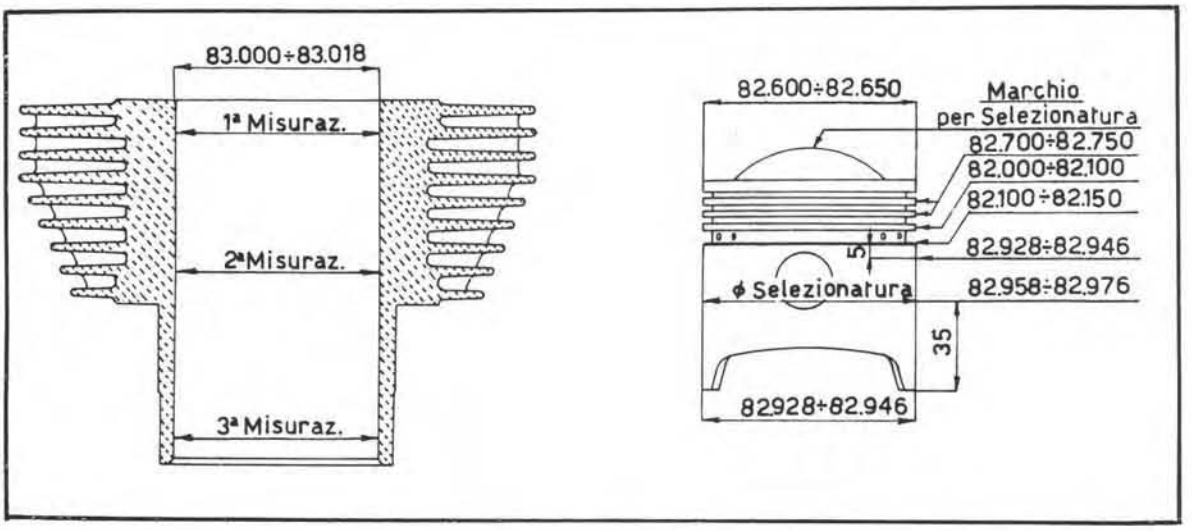



Fig. 27/1

### PISTONS

Selection measurements shown in the chart must be taken at 35 mm. (1.38") from the piston bottom edge, in an orthogonal sense to the piston pin axis (see fig. 31/1).

### SELECTION OF PISTON DIAMETER

| Class « A » | Class « B » | Class « C » |
|---|---|---|
| 82.958 mm. (3.2260") | 82.964 mm. (3.2262") | 82.970 mm. (3.2264") |
| 82.964 mm. (3.2262") | 82.970 mm. (3.2264") | 82.976 mm. (3.2266") |

**N.B.** - Pistons must always be matched with cylinders of same class.

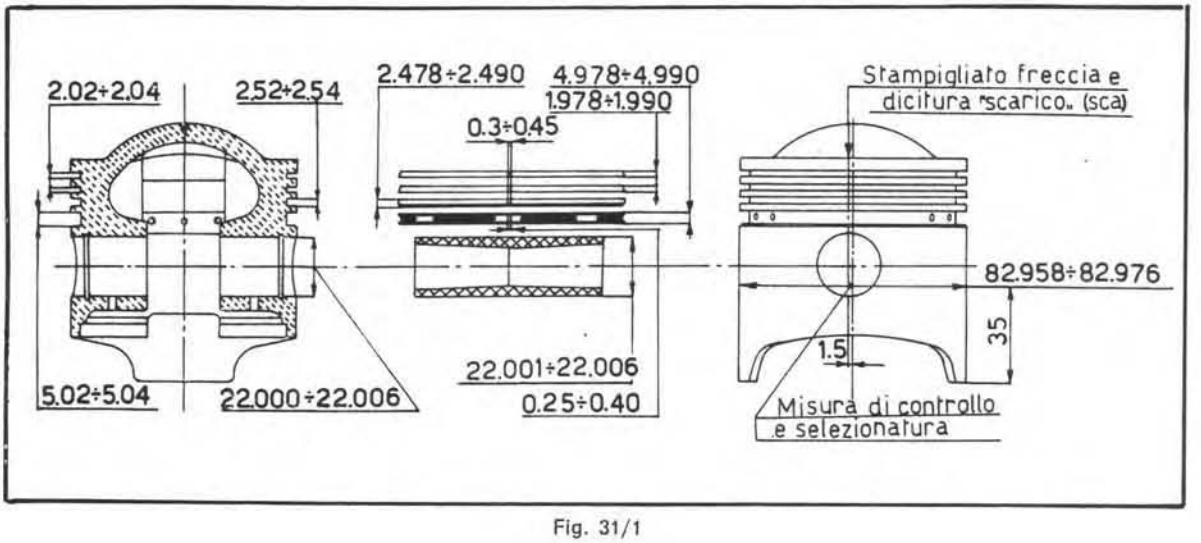



Fig. 31/1

# CON-RODS - CRANKSHAFT - MAIN BEARING, Flywheel side - MAIN BEARING, Timing side

**CON-RODS:**

When overhauling con-rods, check the following:

— conditions of small end bushings and clearance between same and piston pins.

— weight of both con-rods.

— parallelism of the two axis.

— big end bearings.

Big end bearings are of thin wall type, in antifriction alloy, and do not allow for any adjustment. Therefore if scoring, excessive wear or seizing are detected, positive replacement must take place. When replacing bearings, crankshaft pin must be reconditioned. Before regrinding crankshaft pin, measure diameter of same at major wear point (see Fig. 44) in order to select class of o/s replacement bearing and consequently to which diameter crankshaft pin shall have to be reground. Refer to charts « Thickness of big end bearings » and « Diameter of crankshaft pin ».

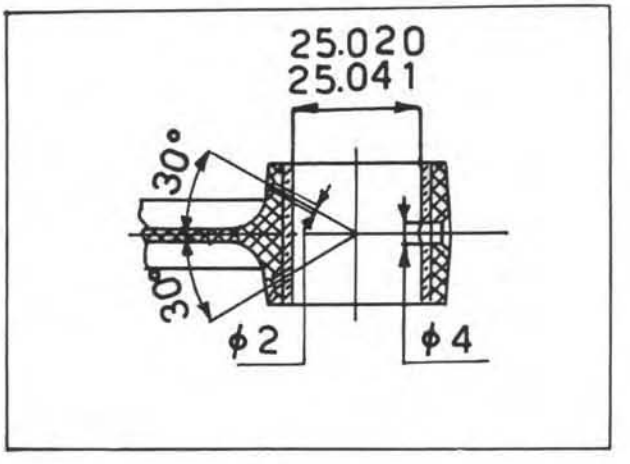



Fig. 34

## THICKNESS OF BIG END BEARINGS

| Original Thickness | Oversize | | | |
|---|---|---|---|---|
| | 0.254 mm. (.010") | 0.508 mm. (.020") | 0.762 mm. (.030") | 1.016 mm. (.040") |
| 1.534 - 1.543 mm. (.06039 - .06074") | 1.661 - 1.670 mm. (.06539 - .065748") | 1.788 - 1.797 mm. (.07 - .07074") | 1.915 - 1.924 mm. (.07539 - .07574") | 2.042 - 2.051 mm. (.08039 - .08074") |

## DIAMETER OF CRANKSHAFT PIN

| Original Diameter | Undersize | | | |
|---|---|---|---|---|
| | 0.254 mm. (.010") | 0.508 mm. (.020") | 0.762 mm. (.030") | 1.016 mm. (.040") |
| 44.013 - 44.033 mm. (1.7328 - 1.7336") | 43.759 - 43.779 mm. (1.7228 - 1.7236") | 43.505 - 43.525 mm. (1.7128 - 1.7136") | 43.251 - 43.271 mm. (1.7028 - 1.7036") | 42.997 - 43.017 mm. (1.6928 - 1.6936") |

## SMALL END BUSHING

Bushing is pressed in con-rod and its internal surface must not show any seizing mark, deep scoring or excessive wear. If so, it must be replaced. Deteriorated bushing must be removed from con-rod by means of suitable round punch. After new bushing is pressed-in, the same must be drilled in correspondence with holes existing in con-rod (see Fig. 34). Inside of bushing must then be reamed to bring diameter to sizes shown in following chart (see Fig. 35).

| I/D of bushing after pressing-in and reaming | Piston pin dia. |
|---|---|
| 22.020 - 22.041 mm. (.8669 - .8678") | 22.001 - 22.006 mm. (.8662 - .8663") |

| Pin-bushing clearance |
|---|
| 0.014 - 0.040 mm. (.0005 - .0015") |

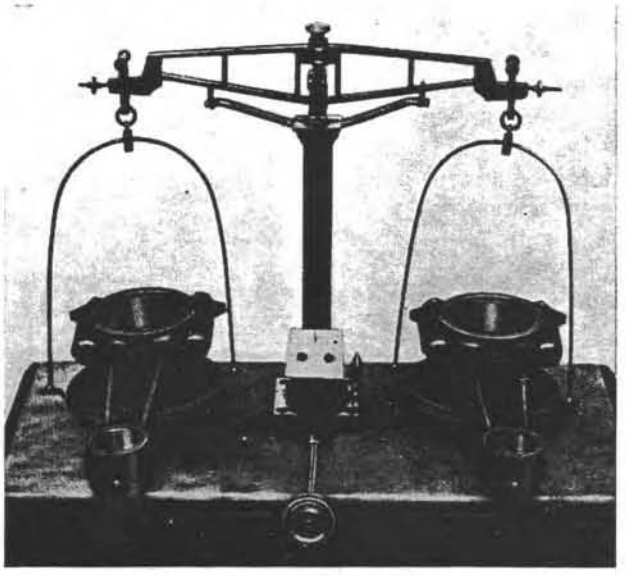


Fig. 36

Weight of complete con-rod as above: $560 + \begin{matrix}0\\10\end{matrix}$ grams (1 lb 3 3/4 ozs).

Maximum permissible difference: 3 grams (46 grains) (see Fig. 36).

## CHECKING WEIGHT FOR ENGINE BALANCING

Con-rods, complete with small end bushings, nuts, bolts and lock plates, must be of same weight.

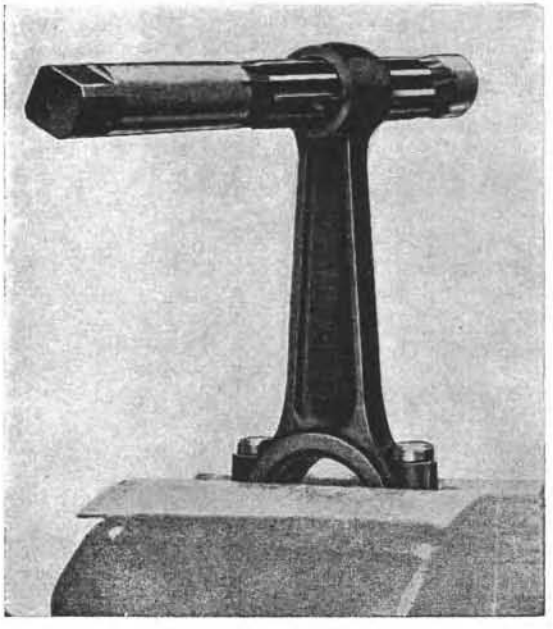


Fig. 35

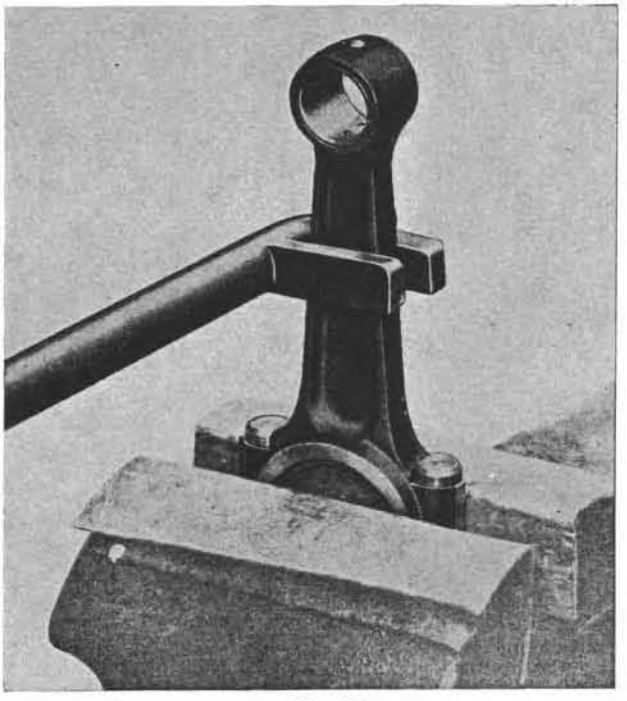


Fig. 37

## CHECKING PARALLELISM OF END AXIS

Before fitting con-rods, check their « squaring », meaning that the two axis of big and small end holes must be parallel to each other. Possible deformations can be eliminated operating on rod with forked lever (see Fig. 37).

Maximum permissible offset to the two axis, measured at 200 mm. (7.874") is 0.03 mm. (.00118").

Fig. 39

## FITTING-UP CON-RODS ON CRANKSHAFT

When fitting up con-rods on crakshaft, pay attention that lubrication ducts in con-rod big ends are set as follows (see A on Fig. 38):

—- Upward, for L/H cylinder con-rod

— Downward, for R/H cylinder con-rod

N.B.: Viewing engine from clutch side, number marked on con-rod big end must match with number marked on cap. Both numbers must be on same side (see Fig. 38).

Bearing-crankshaft pin clearance is 0.011 - 0.061 mm. (.000433 - .0024") (see Fig. 39).

Con-rod-crankshaft side clearance must be 0.3 0.5 mm. (.0118-.0196") (see Fig. 40).

Fit con-rods on crankshaft and tighten nuts by means of torque wrench at 3.500 Kg/m. (25.31 ft.lbs.) (See Fig. 41). Fig. 42 shows dismantled conrod assembly. As to measurements, refer to Fig. 43.

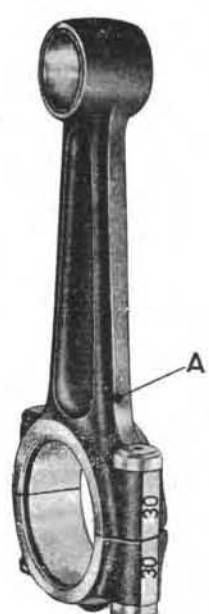



Fig. 38

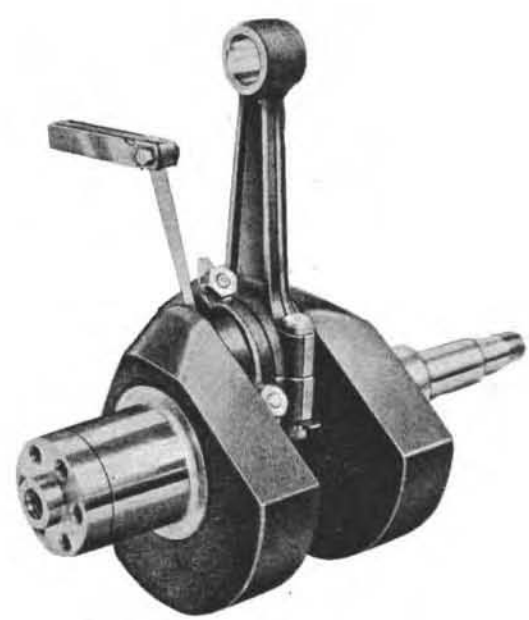


Fig. 40