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**MOTO GUZZI**

**1949**

**Motociclo tipo AIRONE Sport**

**250 c. c.**



GOMME **PIRELLI**  
LUBRIFICANTI **SHELL**

**MANUALE PER LE OPERAZIONI DI:  
SMONTAGGIO, CONTROLLO E MONTAGGIO**

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# MOTO GUZZI

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*I Edizione*

## Motociclo tipo **AIRONE Sport** 250 c. c.

**MANUALE PER LE OPERAZIONI DI:  
SMONTAGGIO, CONTROLLO E MONTAGGIO**

220

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**SOCIETÀ PER AZIONI MOTO GUZZI**  
**MANDELLO DEL LARIO**

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## **INTRODUCTION**

Premise of this manual is to provide in succinct form, but in practical terms, the necessary instructions to rationally carry out the reviews and general repairs of motorcycle type AIRONE SPORT.

For this purpose, the manual is accompanied by photographs, drawings and schematics, necessary to be able to perform safely and quickly disassembly, control, and assembly operations.

The manual must also be a guide for those who wish to use the construction details of the type under consideration: of these details, in the personnel engaged in repairs, is factor essential for a good execution of work.

S. p. A. MOTO GUZZI

MANDELLO LARIO, December 1950.

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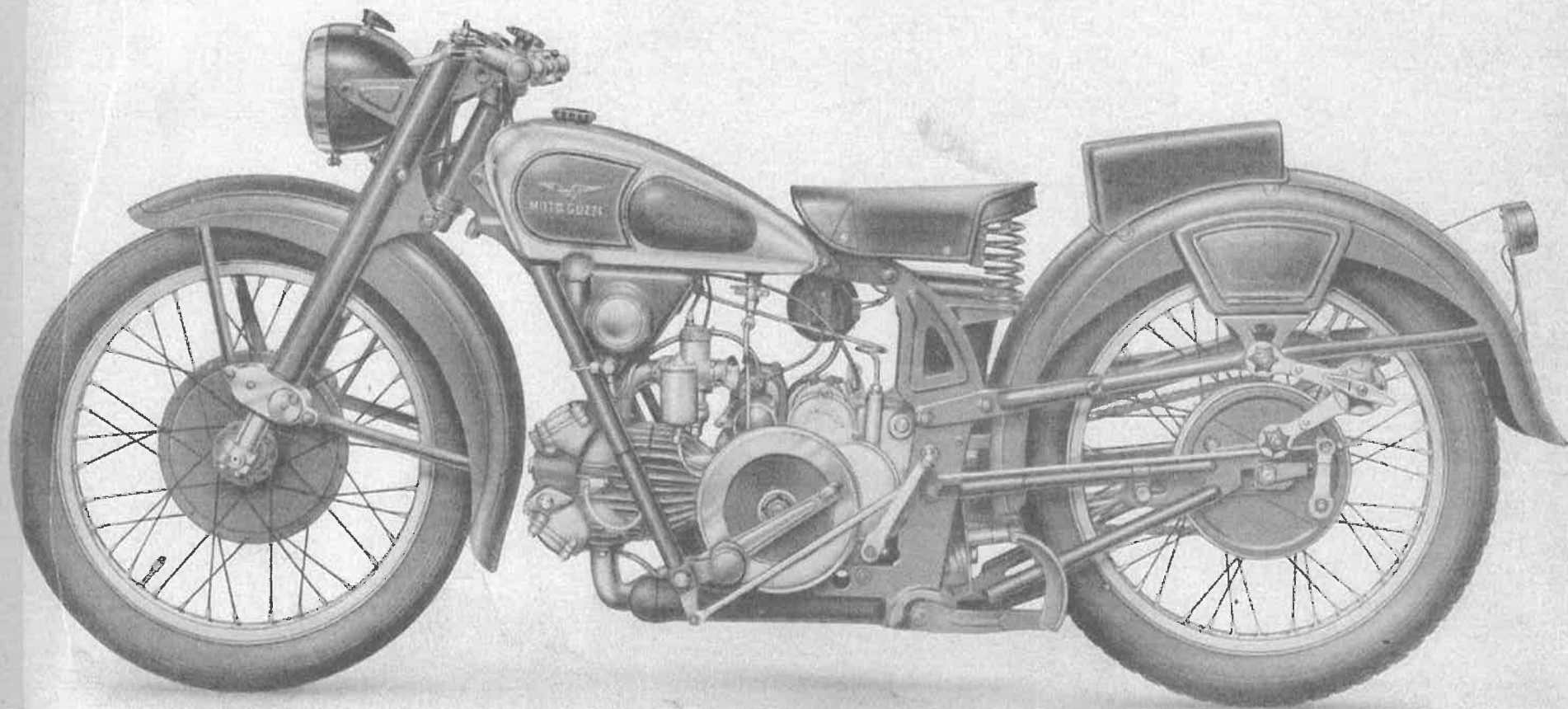
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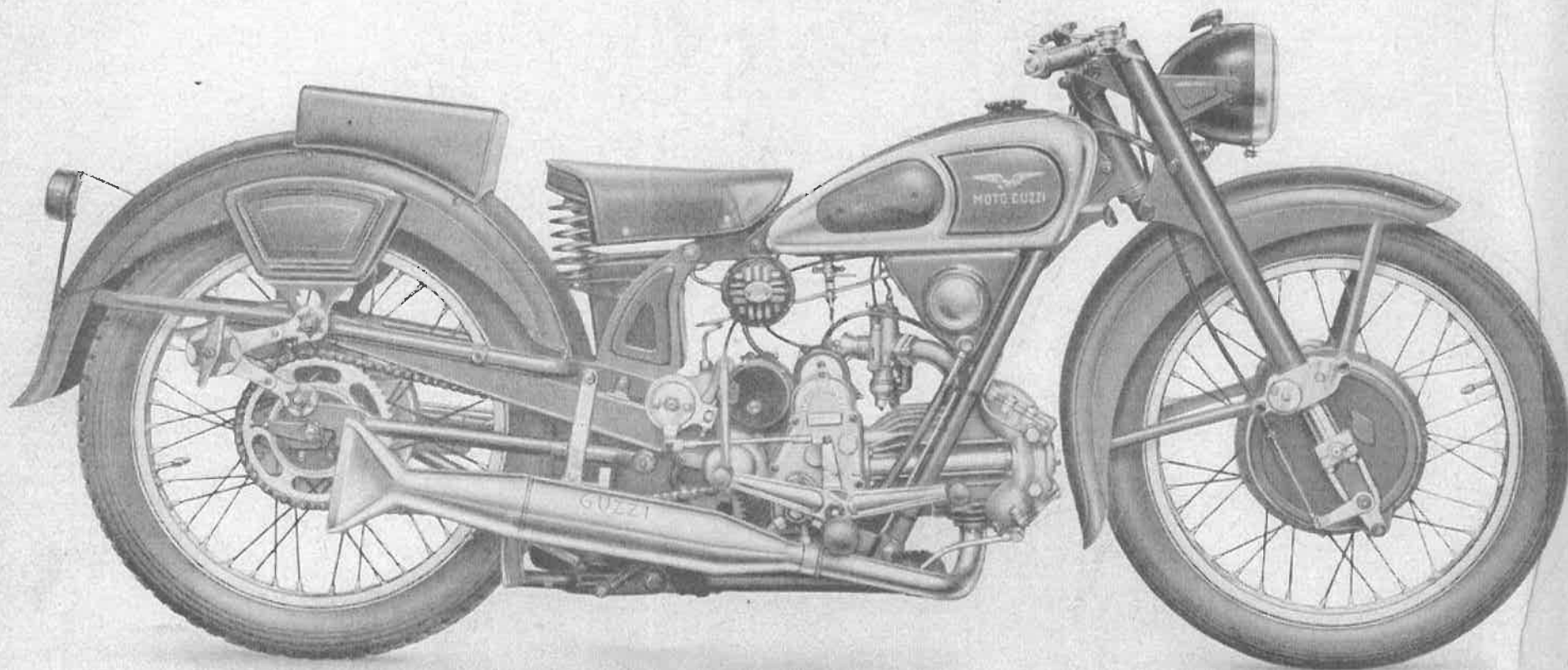
### REVISION AND ASSEMBLY

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N. B.-in the description, right must be understood to the right or left of those who are in the saddle.

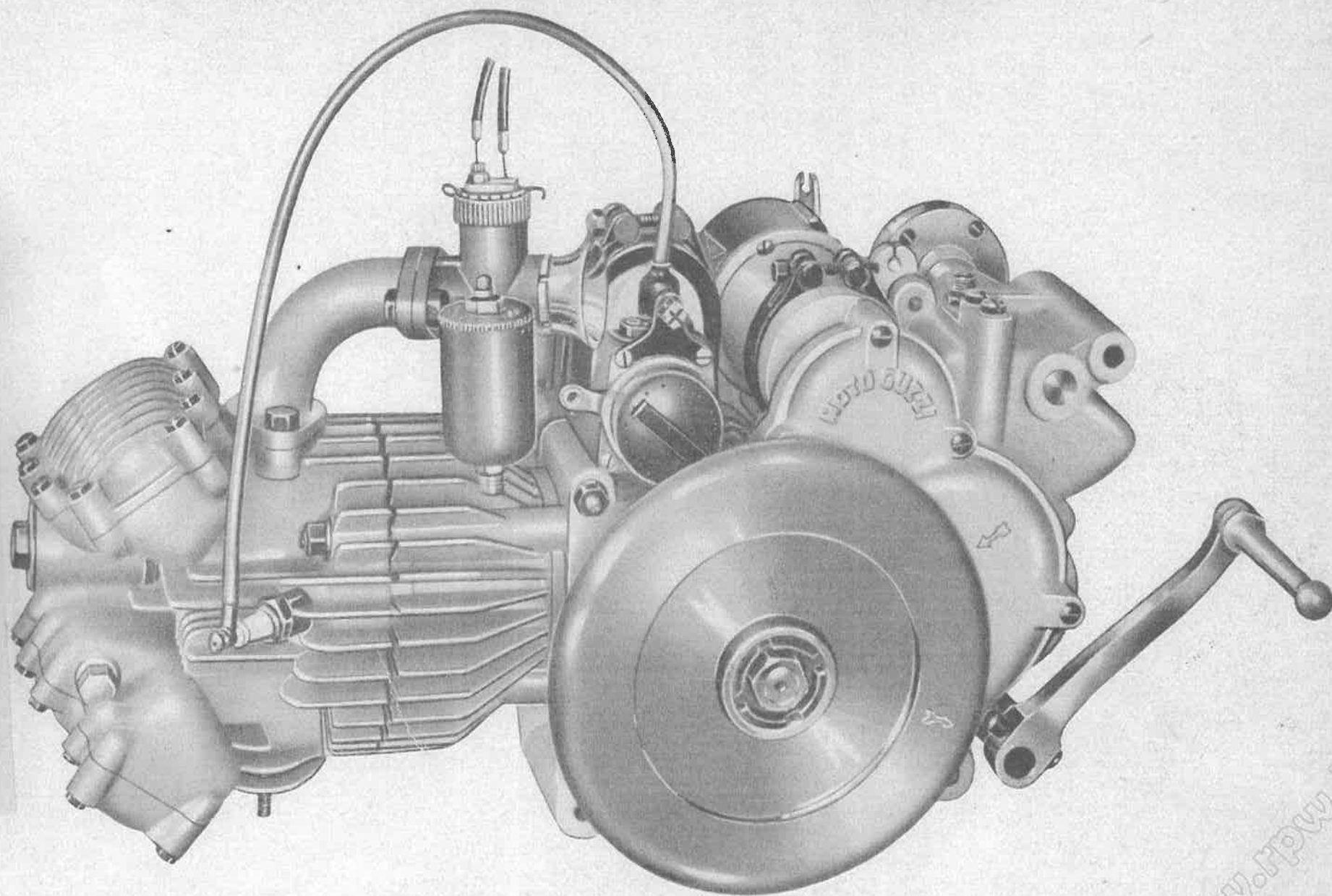


**Fig. 1 - Motociclo (lato volano)**

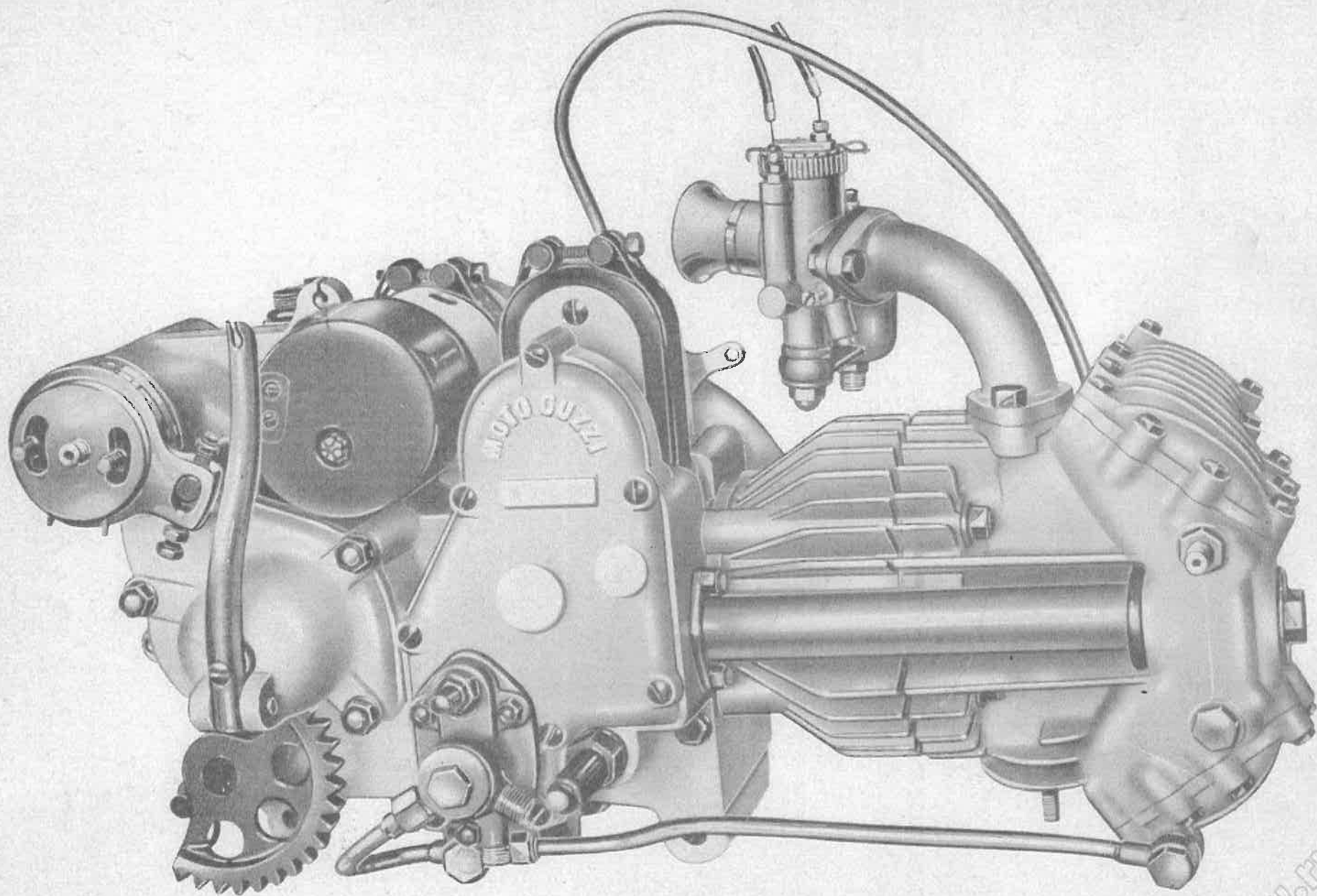


**Fig. 2 - Motociclo (lato distribuzione)**





**Fig. 3 - Gruppo motore (lato volano)**



**Fig. 4 - Gruppo motore (lato distribuzione)**

## GENERAL CARACTURISTICS OF THE MOTOR

Engine: 4-stroke cycle with overhead valves,  
Cylinder head: light alloy, with properly covered  
and oil-soaked valve control parts  
Number of cylinders: 1 in light alloy,  
with barrel in special cast iron  
Bore - 70mm  
Stroke - 64mm  
Engine capacity - 250cc  
Power at 6000 revolutions per minute - 13.5 HP  
Compression ratio - 1:7

### DISTRIBUTION

With clearance of mm. 0,20 to the valves (intake and exhaust)  
NB. The clearance of 0.20 mm to the valves for phasing.  
For Valve registration see Chapter  
"registration between rocker arms and rods"

### IGNITION

Magnet, left rotation, gear drive-  
brand Marelli type BL 1 - MBL 22.  
Adjustable advance with hand lever (pulling delays).  
Measured on the driving axle: maximum 41 degrees

### FUEL SUPPLY

Gravity. - Tank capacity about 12,5 liters.  
Carburetor with throttle adjustment and throttle air adjustment.  
Dell'Orto S. S. F. 25.  
Adjusting screw for minimum  
Normal carburetor registration:  
Diffuser mm. 25

Main jet: summer 115/100-Winter 120 100  
Minimum jet 50 100  
Piston No. 100  
Pin N. 7  
Winter IV notch  
Summer II notch  
For the numbering of the notches the departure  
is understood from the top of the pin.

### LUBRICATION

Forced with supply gear pump, vane  
recovery  
Capacity at full capacity about 60 liters per hour.  
Oil tank capacity 2 liters

### COOLING

Cylinder head and cylinder are equipped with fins  
Arranged radially relative to the axis of the cylinder.

### CLUTCH COUPLING

Dry - Multiple metal discs  
Number of discs 10 (4 Steel, 4 bronze, 1 ferodo  
1 post in bronze)

## SPEED CHANGE

With gears always in grip with front couplings  
number of Gears: 4

First speed ratio	16-26 x 16-26	1 : 2.64
Second speed ratio	20-22 x 16-26	1: 1,788
Third speed ratio	23-19 x 16-26	1: 1,34
Fourth speed ratio	23-19 x 16-26	1: 1

## TRANSMISSION

Gears with helical teeth between motor and exchange.

Roller chain between gearbox Sprocket and rear chainring.

Gear ratios:

Between engine and gearbox 1.805 : 1 36-65

Between Sprocket and rear Crown 3.33 : 1 15-50

Total gear ratios (wheel motor):

In first gear 6.00 : 1

In second gear 8.05 : 1

In third gear 10.70 : 1

In fourth gear 15.80 : 1

## GENERAL CHARACTERISTICS OF THE FRAME

Wheelbase - 1370 mm  
Motorcycle length - 2100 mm  
Motorcycle - Width. 660 mm  
Motorcycle - Height (empty) 930 mm  
Minimum height from the ground (empty) About 150 mm  
Motorcycle weight without fuel, oil, and accessories 137 kg

## SUSPENSION

Front: telescopic fork with hydraulic shock absorbers  
Rear: swinging swingarm with spiral Springs placed horizontally under the engine assembly, enclosed in special cases  
Rear shock absorbers  
Rear shock absorbers: clutch, adjustable (stroke type)

## WHEEL

Front wheel and rear wheel, rims in light alloy  
19 x 2 1/4

## TIRE

Ribbed front - 3,00 - 19  
Standard rear - 3,00 - 19

## TYRE INFLATION PRESSURES

Front wheel Kg/cm<sup>2</sup> 1.4  
Rear wheel Kg/cm<sup>2</sup> 1.8

## BRAKE

Expansion type (light alloy)  
Two controls: one on the front wheel controlled with lever placed on the right on the handlebar, one on the rear

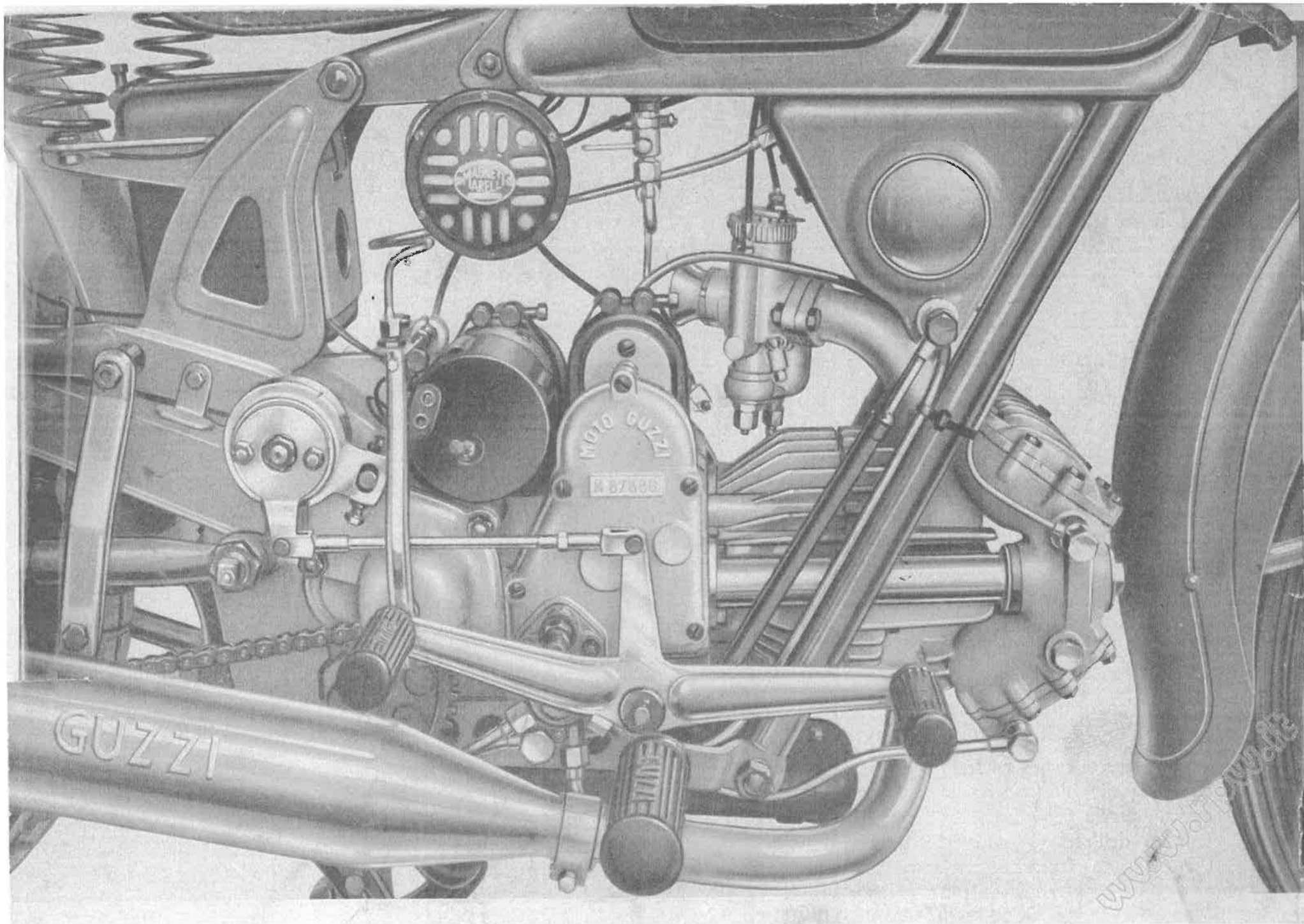
wheel controlled with pedal placed on the left of the motorcycle.

## ELECTRICAL SYSTEM

For lighting. - Consists of Dynamo Marelli type DN 19 G 30/6-2000 D with regulator 6 V 30 W.  
Right spin. Gear control.  
Dynamo motor ratio 1:1.  
Electric Horn Marelli T 38.  
SIEM front headlight with light control switch anti-glare and electric trumpet on the handlebar.  
Accumulator Marelli 3 M And 7/5.  
Reflective and reflective type taillight

## PERFORMANCE

Maximum slopes can be overcome with various Cam ratios-  
bio on roads in good maintenance condition.  
In first gear maximum slope 32 %  
In second gear maximum slope 19%  
In third gear maximum slope 11,6%  
In fourth gear maximum slope 3:3 %  
Maximum speed in the individual marks corresponding to the  
engine speed at 6000 rpm  
First gear 44.6 km/hr  
Second gear 66.0 km/hr  
Third gear 87.5 km/hr  
Fourth Gear 118 km/hr



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## DISMANTLING THE ENGINE FROM THE FRAME

Warning: for special conditions where sometimes use of the motorcycle (rain, mud, dust) it is always recommended, before proceeding to the disassembly of the individual parts, carry out a good general cleaning.

### DISASSEMBLY

Remove the left footrest pedal and the left footrest lever rear brake.

Remove the gasoline hose from the carburetor and the piping with filter after closing the taps.

Remove the intake manifold from the engine with the carburetor together after completely detaching the counter ring from the carburetor cap to remove the gas valve from the same, unscrew the special bolt on the side of the carburetor and remove the air valve

Remove the vent pipe that connects the top of oil tank with crankcase.

Remove the right footrest.

Before removing the flywheel read the warning of page 28.

The flywheel is removed by unscrewing the ring lock nut to about 3/4 turn (this ring is provided with left hand thread - to unscrew it must be rotated in the direction of the clock hands). Then unscrew the inner nut (right hand thread) making force if this puts up resistance when unscrewed it acts as a puller.

Remove the exhaust pipe from the cylinder head and support hanger on the frame.

Remove the control cable of the magneto advance mechanism. It should first detach the control cable from the handle on the handlebar, then remove the pin on the magneto and then unscrew the thread tensioner completely.

Detach the clutch control cable, compressing the lever to free the cable from the hole with the lever itself. Then loosen the cable tensioner completely by removing it from the crankcase holder.

Remove the pedal lever of the gearbox with the tie rod attached and the plate for shift sector control.

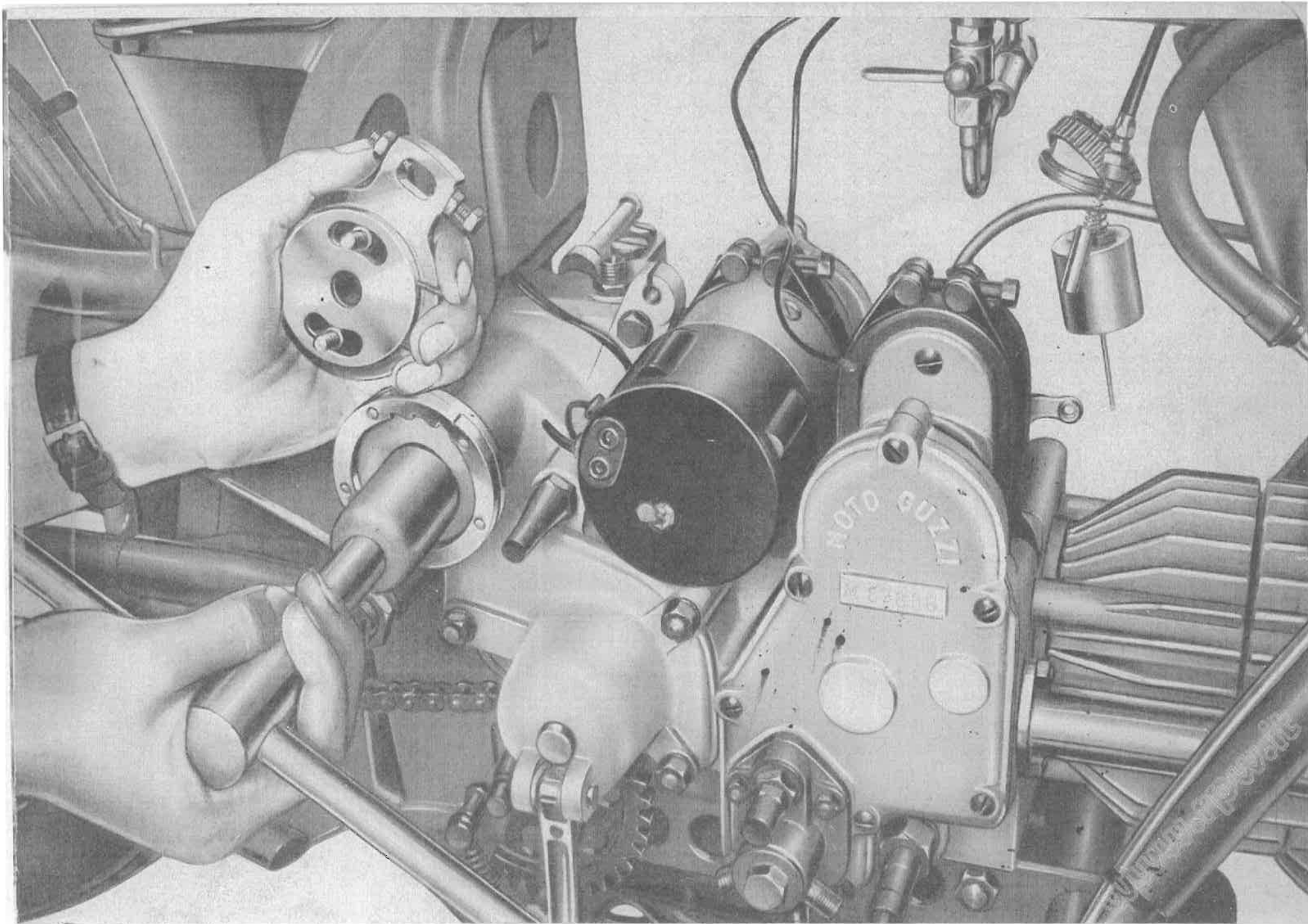
Detach the oil inlet pipe from the lower fitting of the pump by stopping the pipe at the top to avoid the oil outlet (see fig. 7)

- The recovery hose from the pump to the tank (fitting front of the pump).

- The recovery hose from the crankcase to the pump (fitting pump).

- The filter and piping for oil recovery from the head engine.

NB. - When reassembling, be careful (if the pipes from the oil tank have also been removed) not to reverse the Chrome bolt with 3 mm diameter hole for pipe attachment oil recovery from the head with the two for pipe attachment to the tank ahead of the 6mm diameter hole and not Chrome.





Remove the electrical wiring and disconnect the cables from the horn, to be sure not to provoke contact, first to carry out these operations and it is appropriate to detach the ground cable fixed under the saddle.

Remove the complete selector of the gearshift control shaft (see Fig. 6)

Remove the chain by removing the spring clip that secures the master link. Then pull the chain free of the drive sprocket.

Remove the kick start mechanism by removing the kick pedal on the left-hand side of the shaft, then remove the shaft pulling from the right side.

Remove the clamp for retaining the spark plug wire to the frame and the gasoline filter.

Remove the cylinder head from the engine by detaching the push rod tube seal from the head and by unscrewing the four fixing nuts, then beat with wooden mallet on the periphery of the head for remove.

Remove the nuts and bolts that secure the motor to the frame. There are three, you can remove them from the right or from left of the machine (see fig. 7). You can remove the engine by pulling it out the right side of the machine after pushing forward the motor about 5 cm. you lever from the rear as shown in fig. 8.

## **DISASSEMBLY OF THE ENGINE**

To proceed to the complete disassembly of the engine as follows as it is just removed from the frame (see fig. 9), it operates as follows:

Remove the push rods and the push rod tube cover.

The cylinder slides forward by rocking it with your hands.

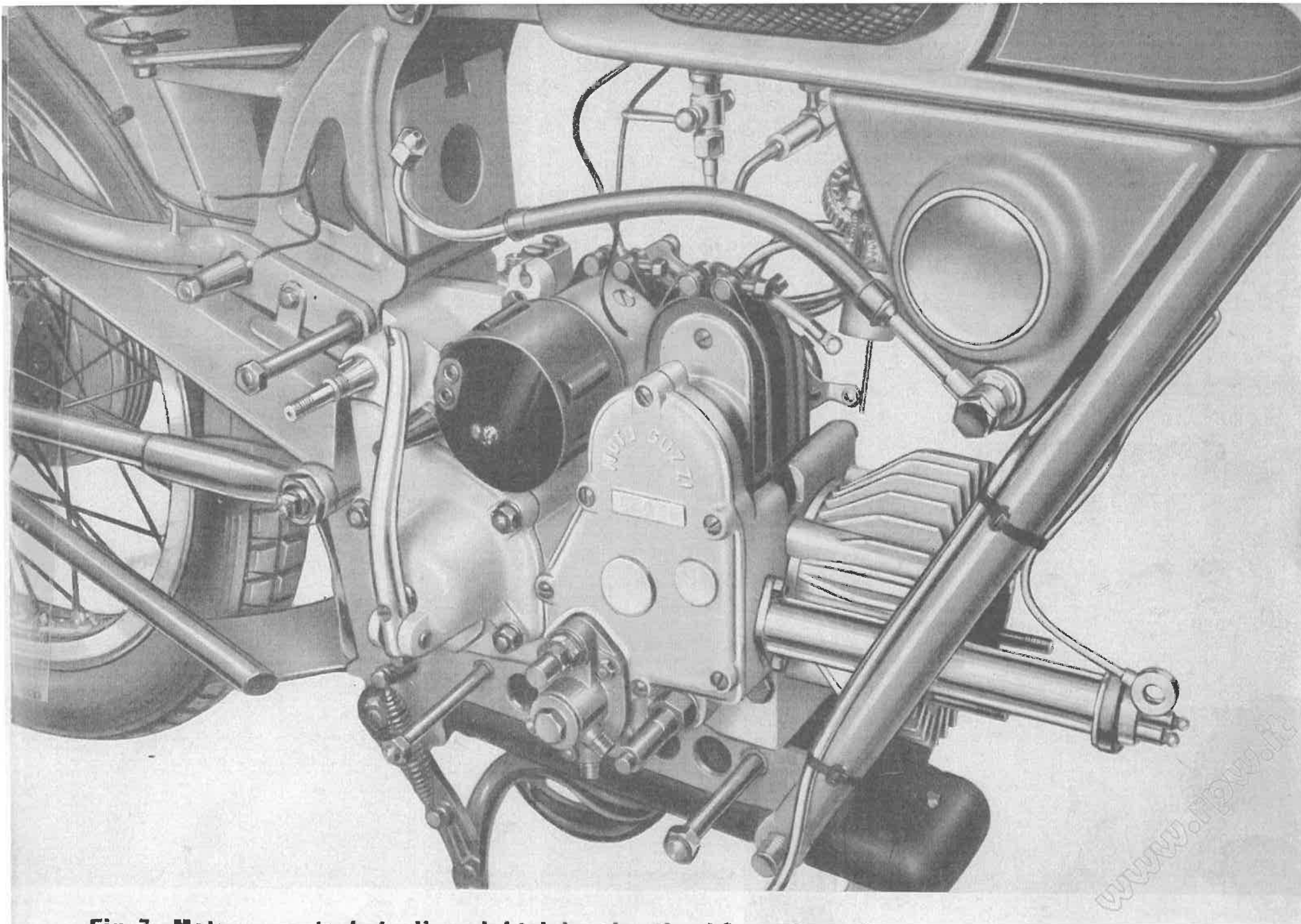
Lift the piston, removing the circlip that secures the gudgeon pin on the side flywheel and push the pin out.

N. B.-If (see Page, 38) it should be reassembled the same piston is necessary to be able to replace it in the same location he was in when it was taken off.

In order not to run into error just remove the circlip left (flywheel side and leave mounted on the piston the right circlip, pulling the plug to the left as already mentioned above. It will thus be impossible to reassemble the piston rotated 180° with respect to the axis of the cylinder, because, in that case, the circlip would be on the left that before it was right, and you could not then insert the gudgeon pin.

Remove the distribution side cover by removing the eight fixing screws. The pump will remain mounted on the cover.

Lift the magneto, loosening the nut for about three turns fixing the control gear on the spindle and bolt tightening of the two half clamps. Beating for with lead hammer, on the nut, you get the detachment from the shaft cone.



**Fig. 7 - Motore completo da installare del telaio di tipo "V" (1)**

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Then remove the magneto to the left (flywheel side). This will also expose the felt pad for oil seal that remains mounted on the gear. You can now remove the intake and exhaust cam and the control levers by sliding them to the right (distribution side).

Remove chain sprocket cover with lever mounted clutch control.

Remove the flywheel side cover, removing the 7 screws at an equal amount.

Warning: the 7 screws must be loosened simultaneously because the engine sprocket, no longer held to its place by the flywheel, pushed by the spring, presses against the lid. Such a warning, useful in disassembly is in the Assembly, since otherwise you could deform the lid.

Lift the Dynamo, performing the same operations with which the magneto was removed.

Remove the two springs from the inner control rod by unscrewing it completely (see Fig. 10).

For this to rotate, the threaded sleeve must be pushed against the toothed sleeve for starting.

Remove the threaded sleeve, which, remove the control rod, it comes free.

removing the pressure plate disc, clutch disc stack and the helical gear. All these pieces are removed to the left.

You will notice, at operation carried out, the fixed clutch body, know, integral to the primary shaft of the gearbox on which is mounted with conical insert and key. It is locked with nut.

This piece must not be disassembled unless after the two engine cases have separated.

Remove the toothed sleeve for starting to unscrew it completely, holding the shaft with key pipe machining over clutch body fixing nut fixed (see fig, 11). This frees the idle gear for the start-up, the push spring, and the plate hold spring.

Remove the lock screw from the chain drive sprocket.

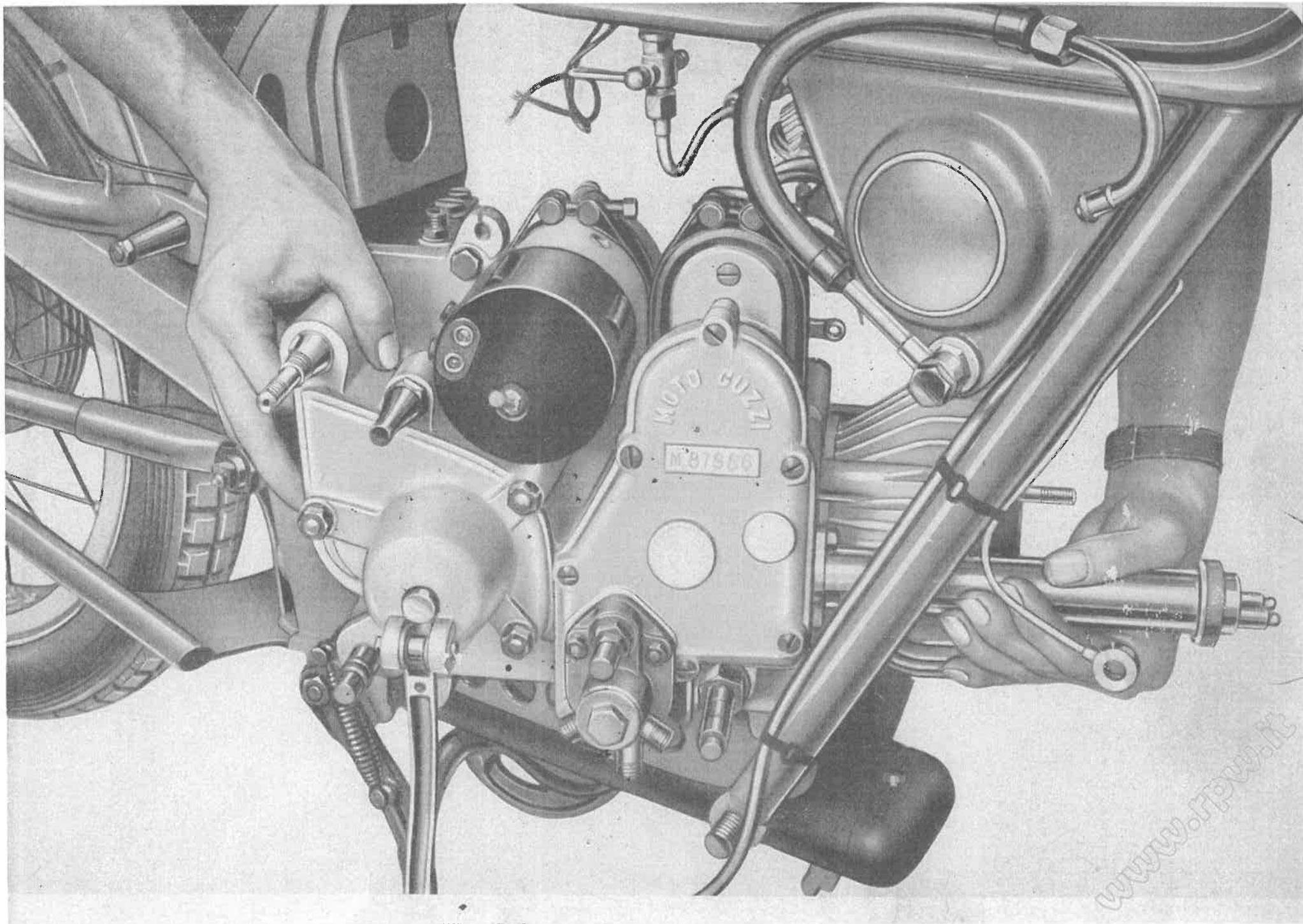
- The pinion clamping ring operating as for the timing sleeve of the start-up.

- remove the chain drive sprocket from the engaging dogs of the direct drive transmission gear.

Lift the key on the crankshaft (left side) fix the motor helical pinion.

After removing the key, pull out the pinion same, the push spring, the support washer for spring.

Remove from the crankshaft (right side) the nut, the distribution gear, control and oil pump, the relative key and the thick spool. After performing all these operations, to separate the two crankcases: unscrew the nuts on the captive suds, remove the 5 bolts, the 2 tie rods on the front of the crankcase, the bolt drilled for magneto clamp, the bolt on the top of the crankcase and the bolt with column head.



Keeping everything suspended (see fig. 12-13) beat with wooden mallet, alternately on the ends of the control shaft of the gearbox and the primary shaft of the gearbox (distribution side); thus, the opening is obtained of the two crankcase halves. On the middle right crankcase (distribution side) the complete crankshaft and the gear of the direct socket change (see fig, 15).

On the left half crankcase (flywheel side) remain mounted the shaft with drum control sector, the canopy change and the drum with its dropouts (see fig. 14).

Lift the crankshaft-connecting rod assembly complete by holding suspended the right half engine case and beating with mallet wooden from the outside to the inside.

Also remove the direct drive gear by making the same operation.

Lift the drum assembly with the corresponding gearshift control and gears on the primary shafts and secondary.

Remove the secondary shaft from the gearbox by extracting it from the ball bearing and gear of the first rate. This frees the shaft with toothed sector for shift drum operation. All these pieces slide inwards.

Fasten the left half crankcase (flywheel side) in a vice between lead jaws the primary shaft of the gearbox to be able to remove the fixing nut of the fixed clutch body. Slide over the primary shaft an iron tube, length about 220mm inner diameter 57mm so that the end of such a tube rests on the bearing ball bearing.

Lay the other end of the tube on a solid base and beat with aluminum punch and hammer, from the outside to the inside. This will remove the primary shaft of the gearbox (see fig, 16). Flip the crankcase by 180° and beat with aluminum punch (from the inside to the External) on the fixed clutch body: thus, the detachment from bearing ball bearing and out workpiece output on the left (flywheel side).

### **CRANKCASE AND COVER ASSEMBLY**

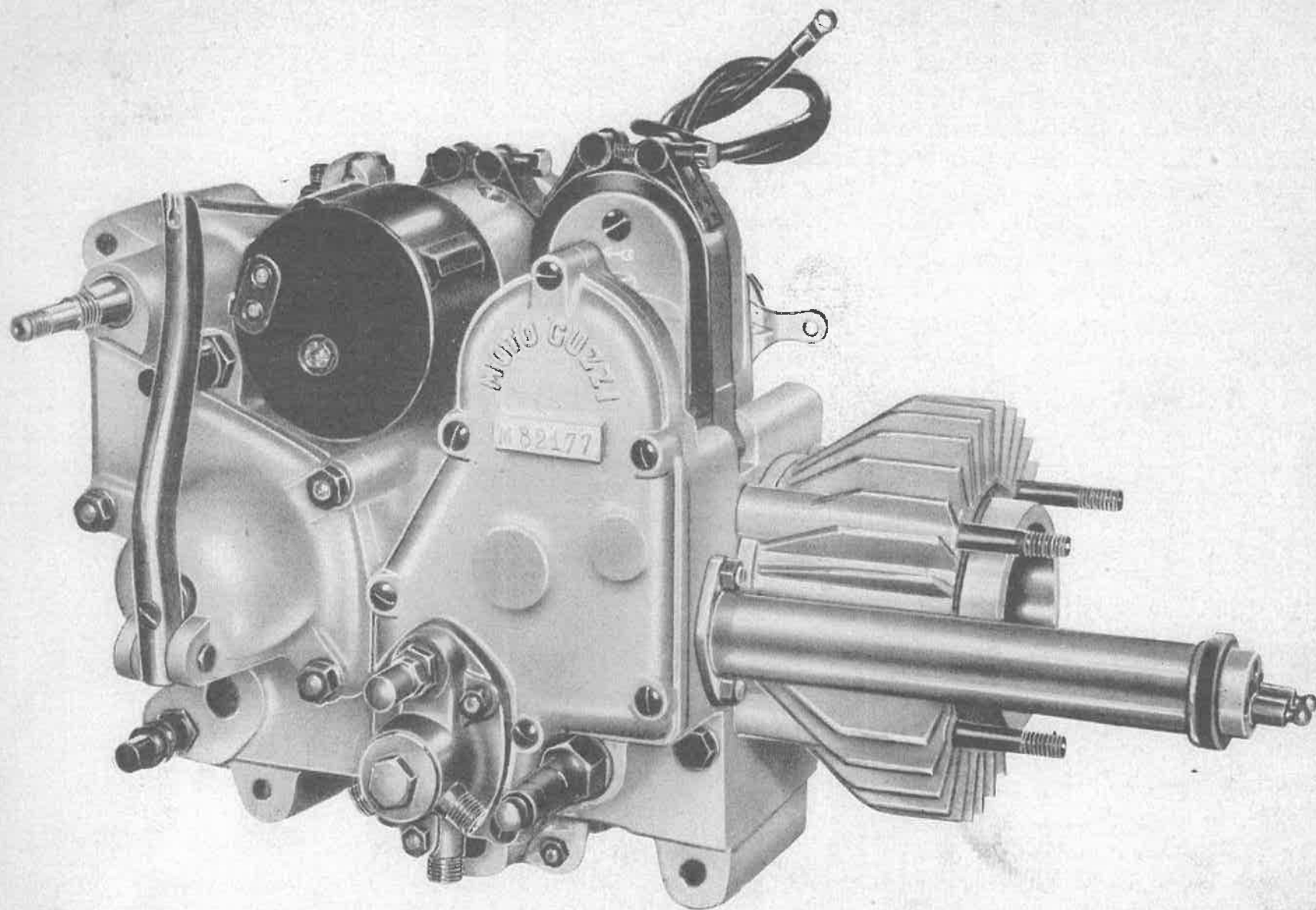
Perform the engine disassembly operations, proceed to the careful cleaning of individual pieces, washing them with oil or naphtha and drying them with clean towel or with compressed air.

Half right crankcase (distribution side.) fig, 17.

### **INSPECTION**

After thoroughly cleaning it (see above):

Observe if the crankcase does not have cracks in any part of the crankcase. If this is found, weld or replace the piece. Only if it is small cracks and advisable welding. In that case it is always good practice after welding that the crankcase has not undergone deformation. Check plans with special care of the crankcase and lids.



**Fig. 9 - Come si presenta il motore tolto dal telaio**

Check if the studs fixing the clutch cap, the cylinder head and for joining the crankcase are firmly fixed: if not, screw them fully. If you find that the thread in the crankcase hole is ruined, it must be filled with welded filler material, drilled and thread it again.

Check the surface of case joints to the engine covers and the left to right crankcase castings. To remove the gasket traces that you will notice, use a scraper blade, or better wash with alcohol and dry with clean rags. Remember that if the case joints are not perfect, you will not be able to achieve oil tightness.

Observing the right half crank case

- The large crankshaft support ball bearing.
- The bearing for direct drive gear.
- The right bearing for transmission secondary shaft.

Check that they are firmly fixed in their housings.

For control measures see P. 26.

- The bushing for bearing drum shift control. Observe the inner surface: it must be smooth.

Check the pressing in the crankcase. The diameter in- back of the bushing, in new piece, is mm. 12 H 8 maximum wear mm. + 0.05. + 0.027

- The shaft guide bushing with toothed sector.

Observe the inner surface: it must be smooth.

Check the pressing in the crankcase. The diameter in- bushing tern, new piece, and mm. 18 H 8 maximum wear mm. + 0.05. + 0.027

- The camshaft bearing bushing. Observe the inner surface: it must be smooth. Check the pressing in the crankcase.

For wear and tear (see Table No. 4, tab. IV). cover by means of right crankcase (distribution side).

Inspect the status of the crankcase union plan (see page 22).

- The camshaft bearing bushing. Observe the inner surface: it must be smoothed.

Check the pressing in the crankcase cover. For wear and tear (see Table No. 4, tab. IV).

- The oil pump is complete. To remove it first removed the three fixing nuts to the studs on the crankcase cover, the gear for pump control, then pull it towards the outside.

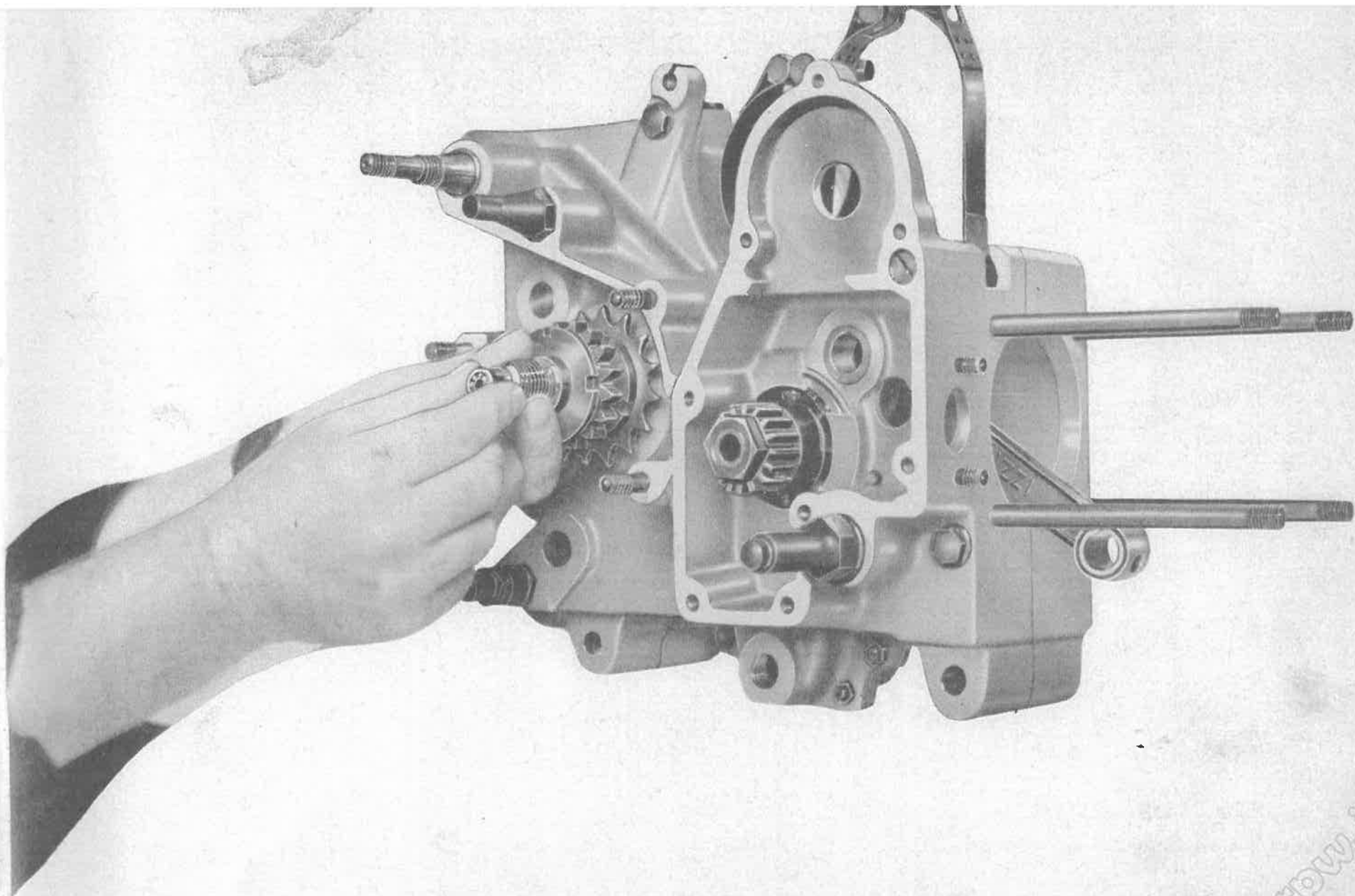
For inspection, review, etc., see on P. 70.

To replace it on the cover, reverse the operations of disassembly.

Left half crankcase (flywheel side) fig. 18. Check the status of casting surfaces, etc. (see P. 22).

Looking at the piece of the interior you will notice:

- The bushing for shaft support with toothed sector. Observe the inner surface: it must be smooth.



**Fig. 10 - Come si smonta l'asta di comando frizione**



Check the pressing in the crankcase. The diameter internal, a new piece, is of mm. 15 H 8

Wear, 0.027 maximum mm. + 0,05.

- The bushing for bearing drum shift control. Measurements and tolerances are identical to those of the piece right.
- The bearing for fixed clutch body. Under that bearing there is a seal for oil seal.

The left bearing for secondary shaft of the exchange.

- The Outer Ring of the roller bearing for driving axle, for inspection (see Page 28) above the bushing for drum support there is a hole that puts in communication the inside of the crankcase with the enclosed space - closed between flywheel side cover and left half crankcase.

At the top of this duct there is a steel ball which acts as a valve and which allows the passage in the direction described above. To inspect and clean enough remove the screw cap on the outside top of the left half crankcase, to the right of this there is the hole with fitting for breather pipe of the oil tank. On the left a small cap that serves to clutch washing.

Warning: take care when cleaning these holes.

Many times, the leakage of oil from the crankcase seals is dependent on the obstruction of these ducts. Cover for left half crankcase (flywheel side). Check the status of the union surface to the crankcase (see a page. 22).

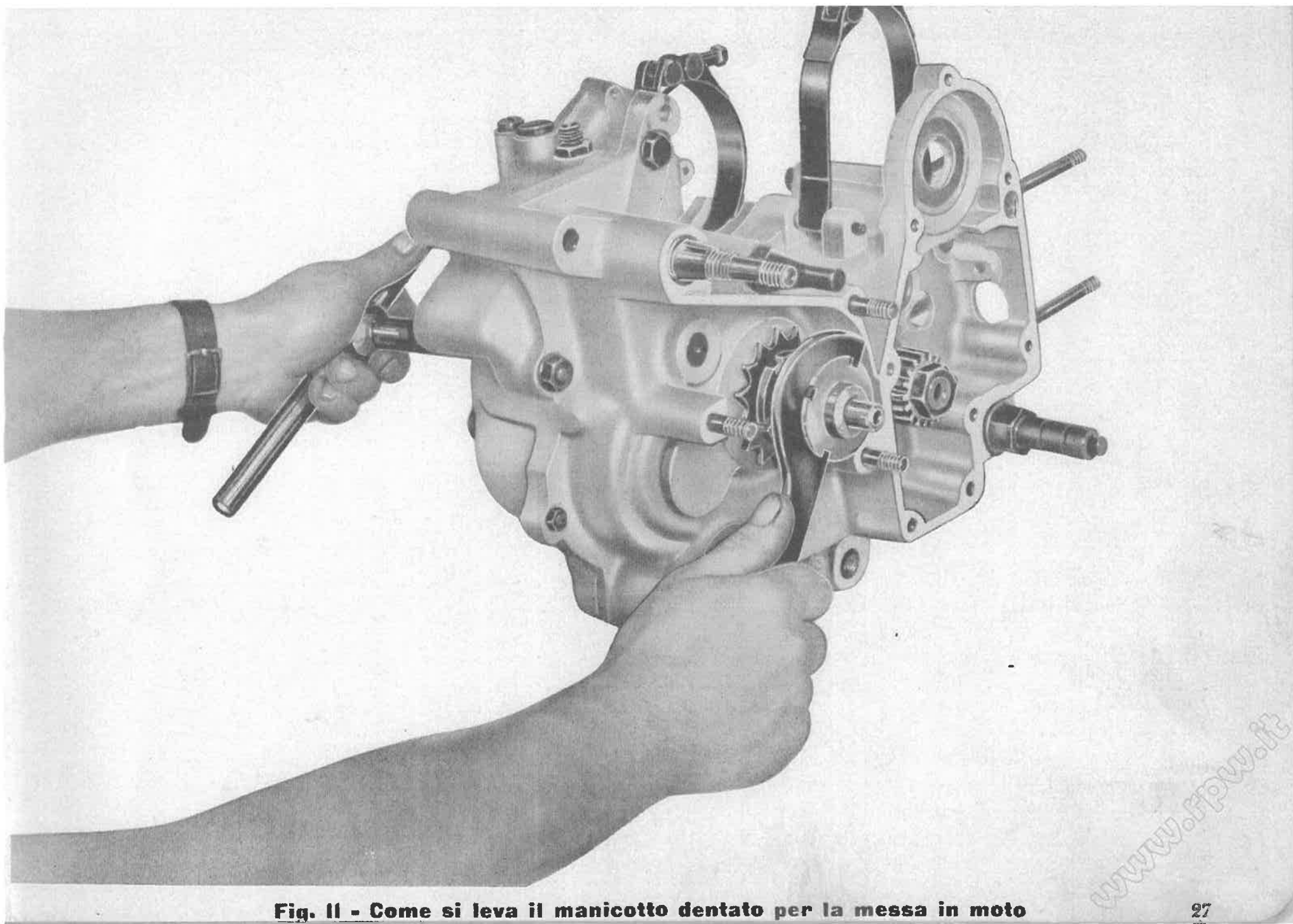
You can see at the bottom of the piece the drain plug for washing the clutch and spring with washer sealing felt.

General warning: All the ball and roller bearings used in the new Guzzi engine are largely sized to last for a very long time (over a thousand hours).

## **INSPECTION**

Observe carefully: - the outer surface of the inner ring, and the inner surface of the outer ring (rolling surfaces) they must appear perfectly smooth and polished. If cracks, or surface roughness occur, the complete bearing must be replaced.

The balls or the rollers. They must be intact and very smooth throughout the surface. If you find defects, change the bearings. Remember to never attempt partial repair, as it is very difficult to get good results from repaired bearings. Remember that the new bearings have a small radial play (of the order of thousandths of a millimeter) before being forced on the axis and in the housing: this play decreases because otherwise the balls or rollers would force, and the bearing would be damaged in a short time.



**Fig. 11 - Come si leva il manicotto dentato per la messa in moto**

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In ball bearings and thrust bearings is allowed a sensitive axial play (of the order of hundredths of a millimeter) Crankshaft bearings, there are two: one roller on the left (the flywheel) and one ball on the right (distribution side). The roller bearing is exclusively load bearing; the ball bearing is load bearing and thrust.

It is advisable to check the state of wear of these two bearings even before disassembling the flywheel. Grasp the flywheel with your hands try to move it in axial direction (pulling it to itself and pushing it back) and in radial. A very light radial clearance is tolerable (0.03 - 0.05 mm). An axial play of a slightly greater amount than the previous one is allowed but contained within approximately 0.10 mm.

If radial play occurs, the roller bearing must be replaced. If there is excessive axial play, replace the ball bearing. If axial and radial play occurs, replace both.

Primary shaft bearings of the gearbox; there are two ball shaped. The one mounted on the left crankcase; flywheel side bearing for fixed clutch body. The one mounted on the right half crankcase (timing side) bearing for direct drive gear.

Both are pressed from the inside of the crankcase. Gearbox secondary axle bearings are two ball type. They are pressed into the two crankcases means from the inside.

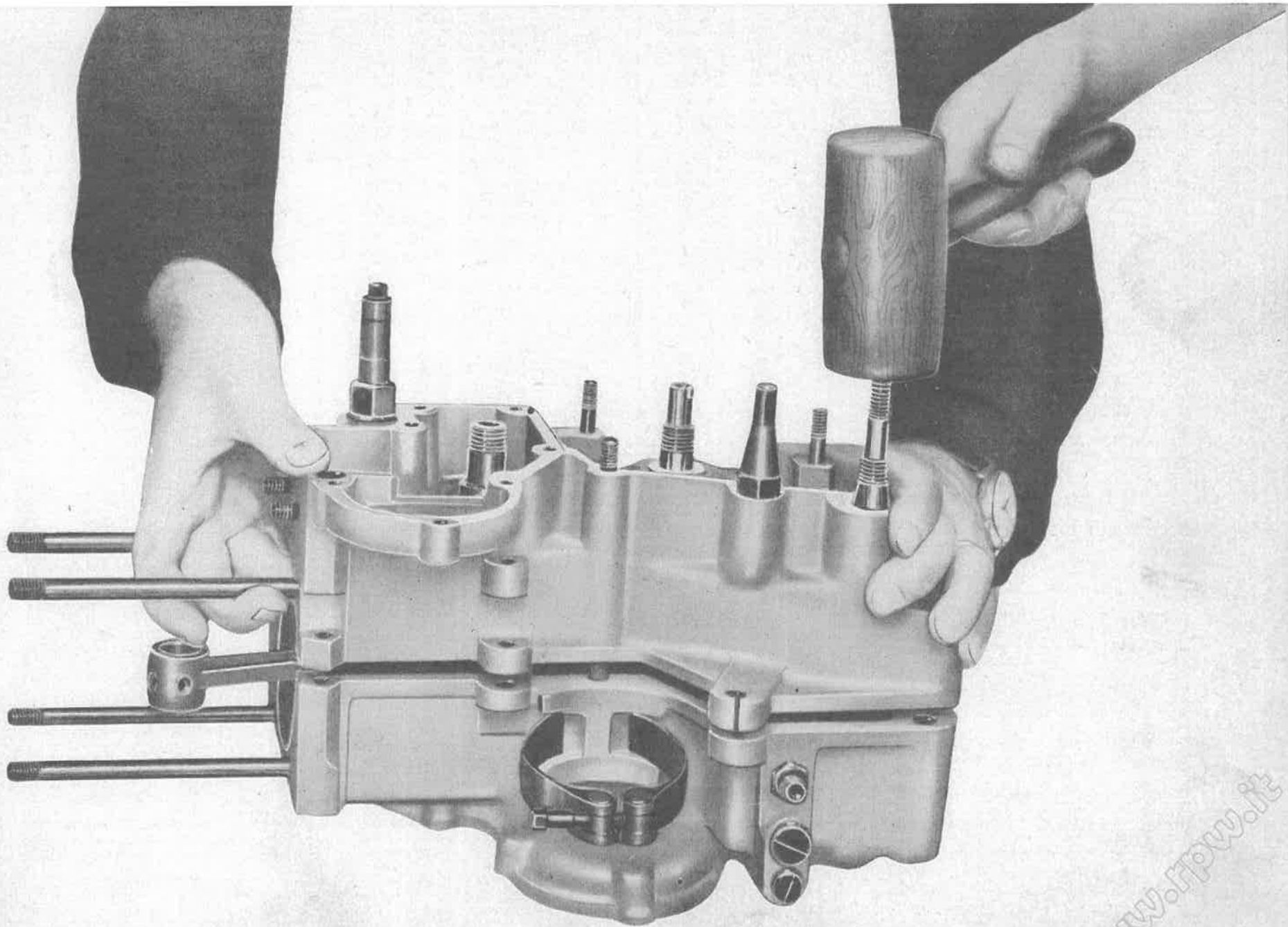
## **INSPECTION**

There are six oil seal seals:

- (1) two in the middle left crankcase (flywheel side) mounted under roller bearing for motor drive shaft
- (2) one rubber in the middle crankcase left at the top, allows the passage of the Dynamo shaft
- (3) one in the middle left crankcase mounted under the bearing for fixed clutch body
- (4) one fixed to the magneto gear
- (5) one in rubber mounted on the push rod cover tube.

Sensing oil leaks from these glands, check if the oil breather pipe is not clogged, if the oil recovery pump works well (see page, 70) and the wear conditions of the cylinder, piston assembly, piston rings (see Page 34).

In fact, if the vent is blocked, if the recirculating oil pump is damaged, or if the piston allows the passage in considerable quantities of gas in the crankcase, despite the efficiency of the seals will occur leakage of oil.



**Fig. 12 - Come si ottiene l'apertura del carter**

Observed the above and if oil continues to escape- if necessary, replace the seals.

The second, fourth and fifth are easily accessible and replaceable. For the replacement of the first and third seals – it is required to remove the bearings from their housings

## **HEAD - VALVE GROUP DISASSEMBLY**

After removing the cylinder head as indicated on page 18, eleven bolts and the rocker cover cap are removed by unscrewing the eleven bolts and removing the rocker cover cap; then unscrew the nut on the rocker pin, unscrew the pin and lift the rocker arm. With special puller (see fig. 19) compress the springs until the release of the upper plate with two half collars, lift the springs with joined bottom plate and internal pull out, mind the valve.

For the group of the other half head the operations are equal. Remove the spark plug and the cap with gasket for tappet adjuster.

## **INSPECTION**

Check, after removing the gaskets, the state of surfaces of the joining faces of cylinder head and rocker covers.

To remove the traces of gasket that you will notice, use a beveled scraper, or better wash with alcohol and dry with clean rags. Remember that if the surfaces they are not perfect, you will not get the perfect oil seal. Carefully remove the carbon residues (taking care to remove even those located in inaccessible positions) using scrapers and wire brushes. Then wash with alcohol and dry with compressed air.

Observe the state of the head; if the studs are well fixed and have the thread intact (otherwise repair -or replace). If there are cooling fins broken or chipped (if there are many broken fins replace the head).

Observe that there are no cracks or nicks on valve seats or guides, check the recess in the valve seats (especially for the exhaust one), replace them if consumed, see table No 1, tab. I.

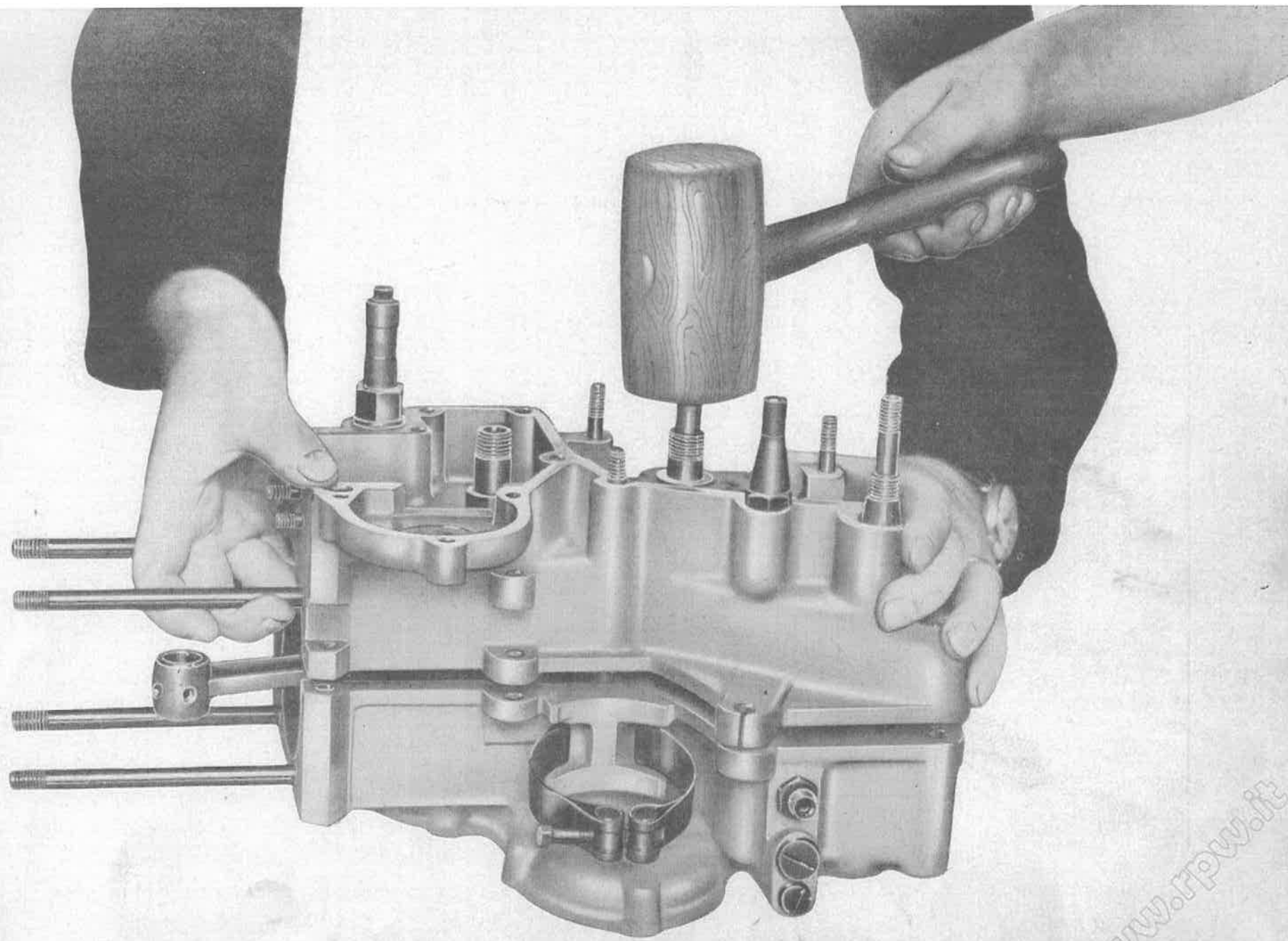
Observe the wear of the valve guides, to replace the intake guide, tap from the inside towards the outside.

For the exhaust guide it sometimes presents deformations and cracks in the internal parts, it is better to remove it by breaking the external support seat with a chisel and beating with a punch from the outside towards the inside.

## **VALVES**

Observe the support stem and crown on the seat (valve seat), see Table No. 1, tab. I.

Finding excessive wear or deformation, cracks, deep stippling, etc., replace valves and guides

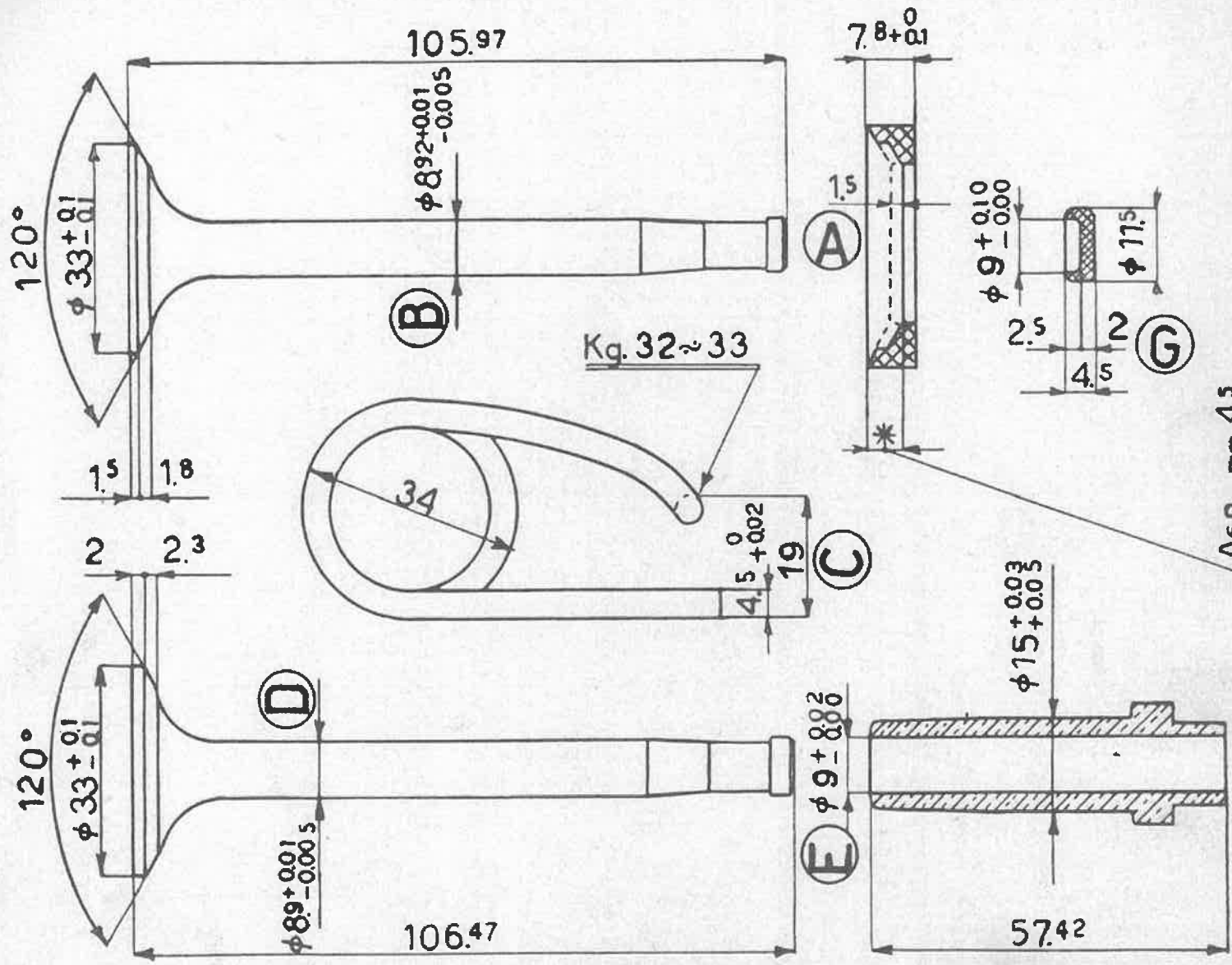


**Fig. 13 - Come si ottiene l'apertura del carter**

**Tabella N. 1**

DENOMINAZIONE	Misure	A pezzo nuovo mm.	Tolleranze costruzione		Usura massima mm.	Osservazioni
			+ mm.	- mm.		
Valvola aspir. (sede 120 <sup>o</sup> ) .	B	8,92	0,01	0,005	- 0,05	Lo spessore al bordo delle valvole (aspirazione e scarico) non dovrà ridursi, in seguito a rettifiche, oltre mm. 1. A nuovo, lo spessore è (vedere tavola) mm. 1,5 per la valvola aspirazione e mm. 2 per la valvola scarico.
Valvola scar. (sede 120) .	D	8,9	0,01	0,005	- 0,05	
Guida valv. asp. e scar. .	E	9	0,02		+ 0,10	
Cappelletto valv. scar. e asp. .	G	2			- 0,80	
Incassatura delle sedi .	A	0			1,5	

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Asp. mm. 4.5  
 \* Scar. mm. 5.5

Tav. I



NB. - It is always advisable when you replace a valve also change the relative guide. So too if you require replacement of a guide it is always advisable to change the relevant valve. Having with this guarantee of perfect seal. Warning: It is always advisable to mount guides and new valves, or in reassembling the old ones after performed the grinding of the seats, proceed to the grinding of the valves in their respective seats. Springs for intake and exhaust valves, check their efficiency measuring sagging: tablets to 19 mm Measure C tab. (I) must hold a load of Kg.32 - 33.

If at the established measure they hold less than Kg. 30 replace them. Check the thread on the part held by the upper cap. Finding strong wear replace the springs. Intake and exhaust valve plates: replace the plate if excessive wear is found where put the spring down.

## **ASSEMBLY**

Reverse disassembly operations. Warning. It is advisable before mounting the head on the cylinder to lap the joint between head and cylinder. After this operation remember to clean the parts well. Tighten the four fixing nuts thoroughly head to the cylinder.

## **CYLINDER AND PISTON GROUP**

**DISASSEMBLY** - See Page 18.

Remove the three piston rings and the segment from the piston oil scraper.

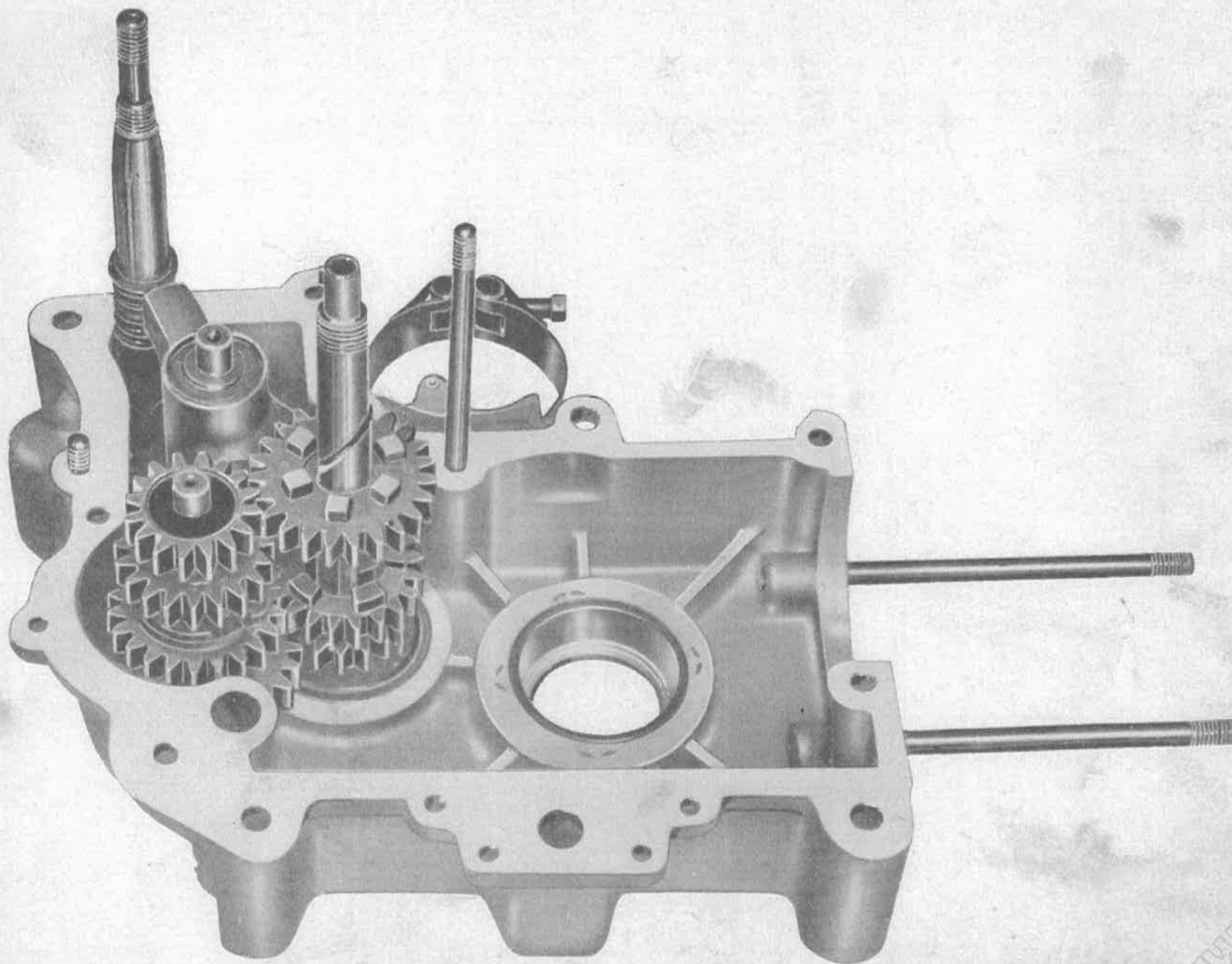
NB. - If you must have to reassemble the same piston, carefully observe the relative position of the piston rings and oil scraper, before disassembling the piston. In the assembly, such pieces will have to be reinstalled in the exact position they occupied at the time that the disassembly begins, with this a new adaptation between cylinder and segments.

### **INSPECTION - CYLINDER**

Observe the inner surface of the barrel of the cylinder. It must appear smooth and free from scratches, notches, otherwise bore the barrel or if it is scored very deep replace it. Check on the external surface the status of the union to the crankcase and the cylinder head. Check the condition of the cooling fins. Remember to fit new gaskets, between cylinder and casing of gasket paper with a thickness of 0.25 – 0.30 mm Check the internal diameter of the cylinder (see table 2, table II)

### **INSPECTION - PISTON**

Carefully examine the head and skirt. Remove any carbon build up, the surfaces must be smooth. If you notice deep streaks or seizure notches it is advisable to replace the piston.



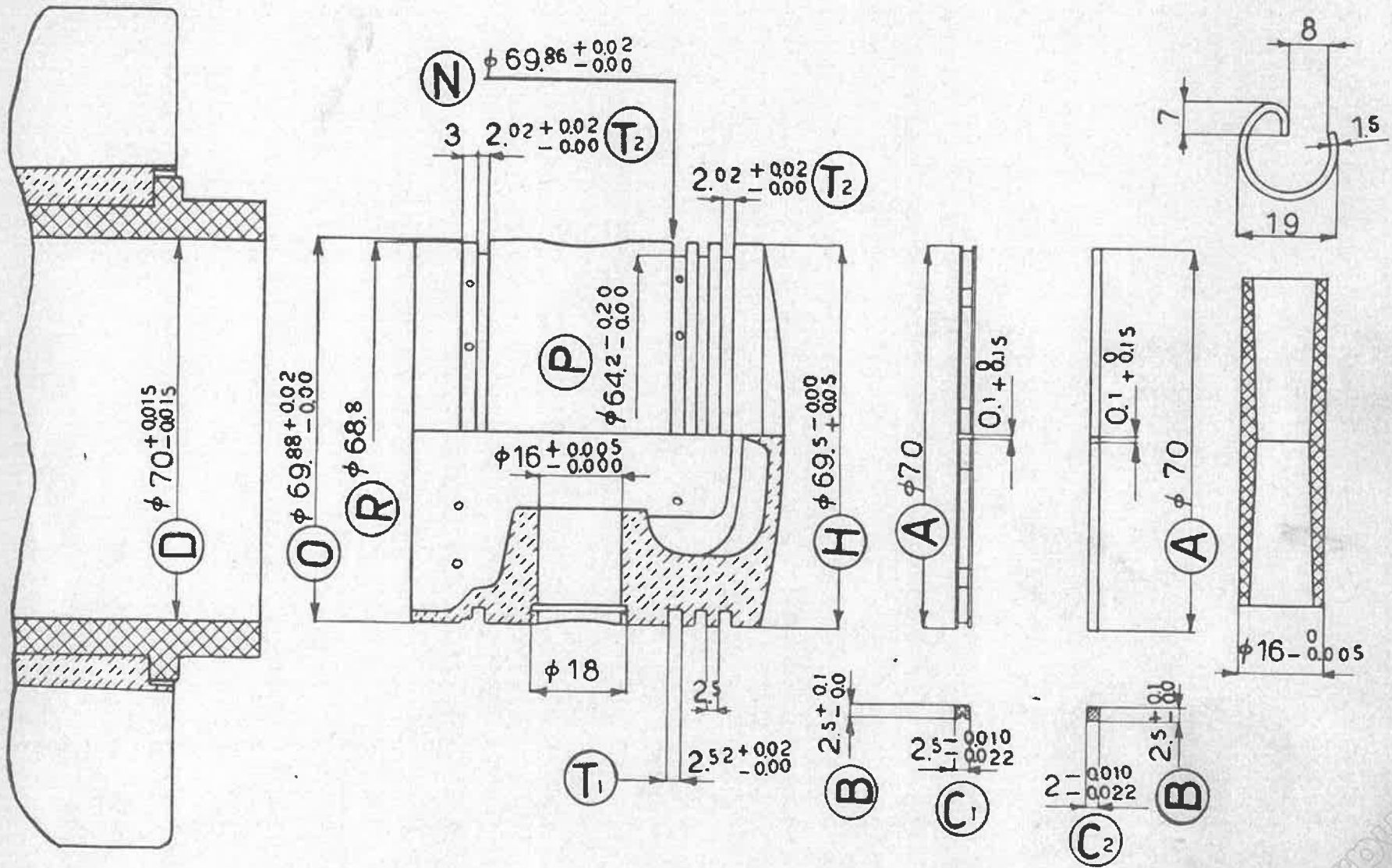
**Fig. 14 - Come si trova il mezzo carter sinistro appena operata la separazione**

**Tabella N. 2**

DENOMINAZIONE	Misure	A pezzo nuovo mm.	Tolleranze costruzione		Usura massima mm.	Osservazioni
			+ mm.	- mm.		
Cilindro . . . . .	D	70	0,015	0,015	+ 0,08	L'usura per le misure O - P R - N H, è minima.
Pistone . . . . .	O					
	P					
	R					
	N					
	H					
	T <sup>1</sup>	2,52	0,02		+ 0,08	
	T <sup>2</sup>	2,02	0,02		+ 0,08	
Segmenti . . . . .	B	2,5	0,1		- 0,1	
	C <sup>1</sup>	2,5		0,010 0,022	- 0,05	
	C <sup>2</sup>	2		0,010 0,022	- 0,05	

Scala di maggiorazione per pistoni di ricambio: mm. 0,2 - 0,4  
0,6 - 0,8 - 1,00.

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Tav. II

For measurements see. Table 2 tab. II.

NB. - Ask for the appropriate piston rings increased indicating the mark-up.

By mounting larger pistons, the cylinder must be rebored; measure (D) of 2 - 4 - 6 - 8 - 10 tenths in relation to the increased piston.

Check the status of the segment seats on the piston.

Check that the holes drilled in the piston wall under the scraper-oil segment are not blocked.

If verified, it was decided to still mount the old piston remember the warning page 18. For oversize pistons it is necessary to rebore and to the hone cylinder according to the oversize piston specification.

Gudgeon pin: It must be a precise fit in the connecting rod bronze bushing and slightly forced into the piston.

When changing the piston, it is also necessary to replace the gudgeon pin. Maximum wear mm. 0,03.

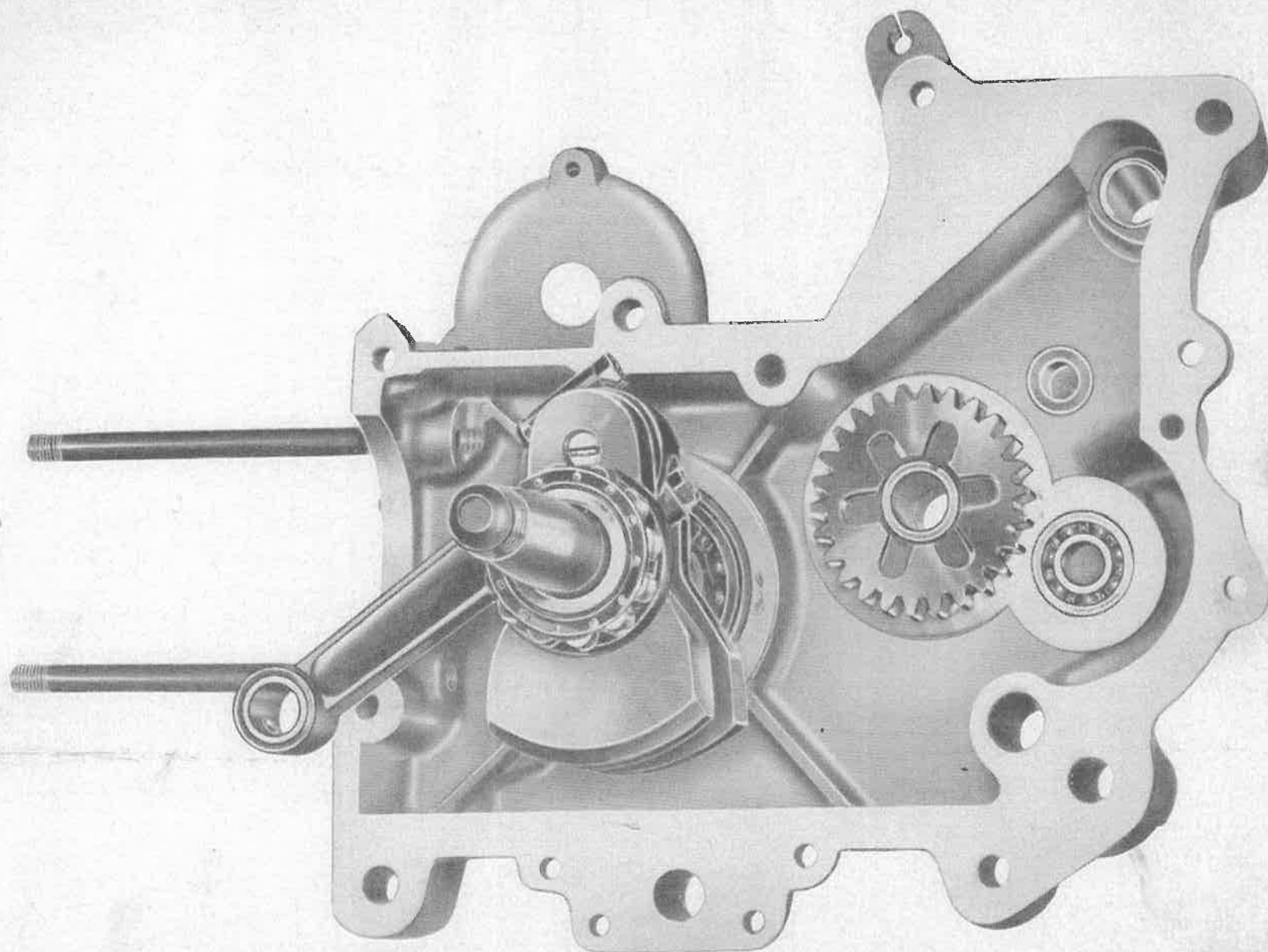
Piston rings; check the storage status. If consumed or not perfectly adhering to the cylinder for the whole periphery replace them. (See measure a).

Check the fit of the new rings in the appropriate grooves of the piston (seats).

The segments must be able to rotate freely, if little play in the appropriate grooves (see Table 2, tav. II). Insert the segment into the barrel of the cylinder. Verify that it lies in a normal plane to the axis of the cylinder (this can be done by introducing the piston inverted and making the ring adhere to the top of the piston). Measure the distance between the closing points at new segment, it must be 0.1 mm approx. For larger Pistons, according to the larger scale, ask for the appropriate oversize piston rings.

## **ASSEMBLY**

Assemble segments in the order shown in drawing a Tav. II, the two seal at the top, then the oil scrape and into low sealing other. Observe, before mounting the piston in the cylinder, which the closing points of the three upper rings are about 120°. This facilitates the departure of the newly fitted engine. But not being stopped for the rings, these will move during the period of settling, obtaining an angle other than 120°. This does not matter because when the segment has adapted, it ensures a good seal whatever the angle between the closing tip of the following ones.



**Fig. 15 - Come si trova il mezzo carter destro appena operata la separazione**

## **DISASSEMBLY**

Loosen the nuts and remove the two bolts that secure the cap. Taking the latter you can remove the needle bearings (there are 30) and connecting rod.

## **INSPECTION**

Rod - The inner surface of the connecting rod head must appear very smooth. The connecting rod foot bronze must be well fixed (forced), must not have internal notches or streaks. Take care of cleaning the lubrication holes. Maximum wear (see Table 3, tab. III).

Having to replace the bronze, press it into the small end of the connecting rod so that it protrudes 0.5 mm per part and go over the hole with Reamer from mm. 16.

Needle roller. Carefully examine them one by one. Must be in perfect condition and smooth. Otherwise replace them.

Connecting rod cap - Check the internal surface, it must be very smooth

Locking bolts - Important warning. - Never replace the bolts and locking nuts. even if you refit the connecting rod that was removed, you must fit new bolts.

Crankshaft - Examine the surface of the connecting rod pin. Must appear very smooth, otherwise it is necessary to proceed to the grinding or replacement of the workpiece. If the connecting rod pin is rectified, it is necessary, of course, to drive the same operation also for the connecting rod head and replace all rollers with new oversize rollers (see table n. 3).

Carry out cleaning of the internal channel in the crankshaft. To achieve the purpose, remove the safety wire fixing the inspection cap in the left side (flywheel side) and unscrew it completely. Wash the channel with oil injected by crankshaft hole (side distribution) and dry with compressed air.

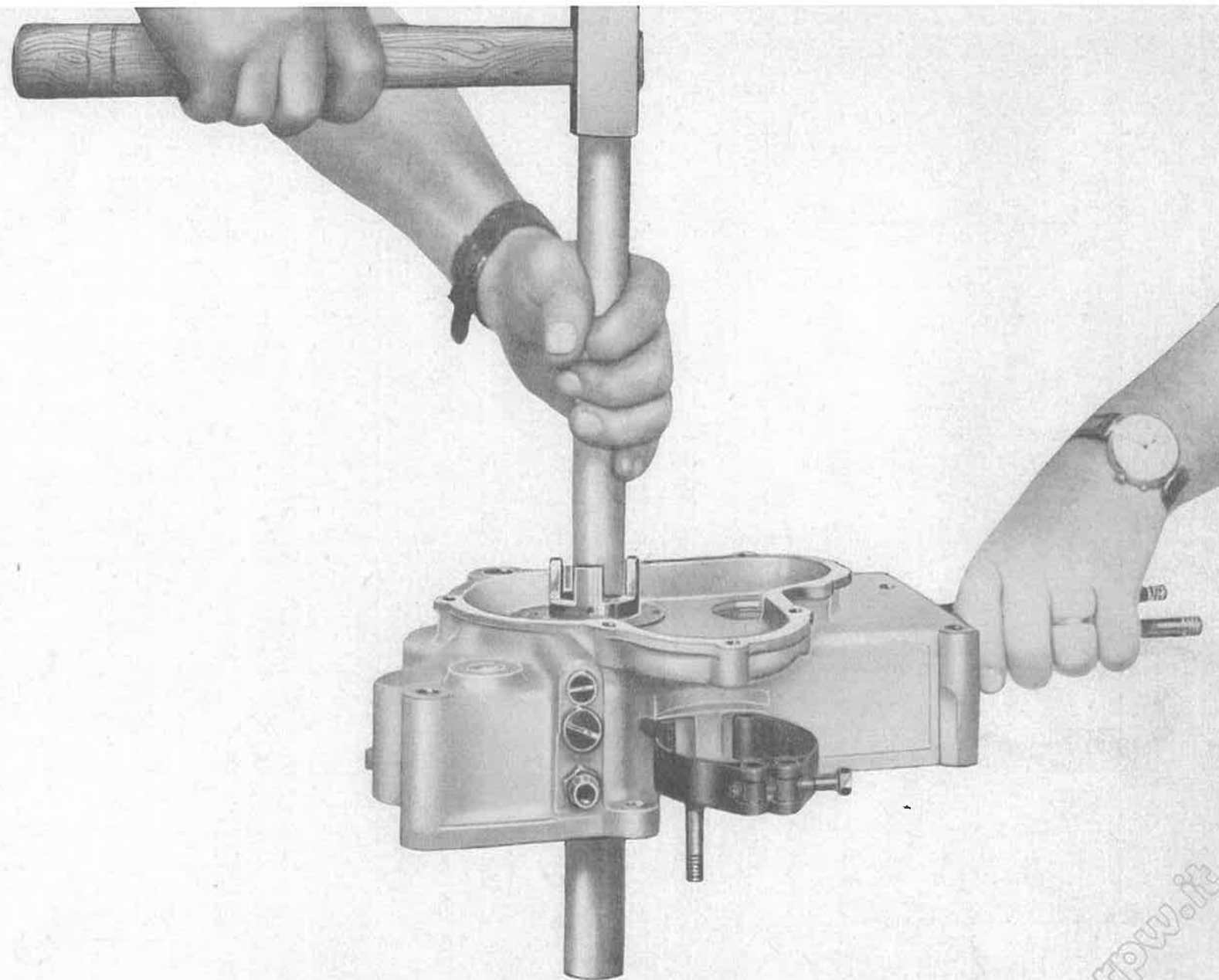
Examine the condition of the bearing rollers (see a page. 26).

- The cone for fixing flywheel.
- The thread for Flywheel tightening nut.
- The surface on which the inner rings were forced bearing and ball bearing.

## **ASSEMBLY**

To mount the roller bearing and the roller cap on the neck assembly is carried out by reversing disassembly operations.

Before mounting the connecting rod, it is necessary to check its squareness: that is, it is necessary to check that the two fore heads and small ends are parallel and coplanar. Any deformations can be corrected by acting on the rod using open-ended spanners and twisting in the opposite direction to the reconstructed deformation



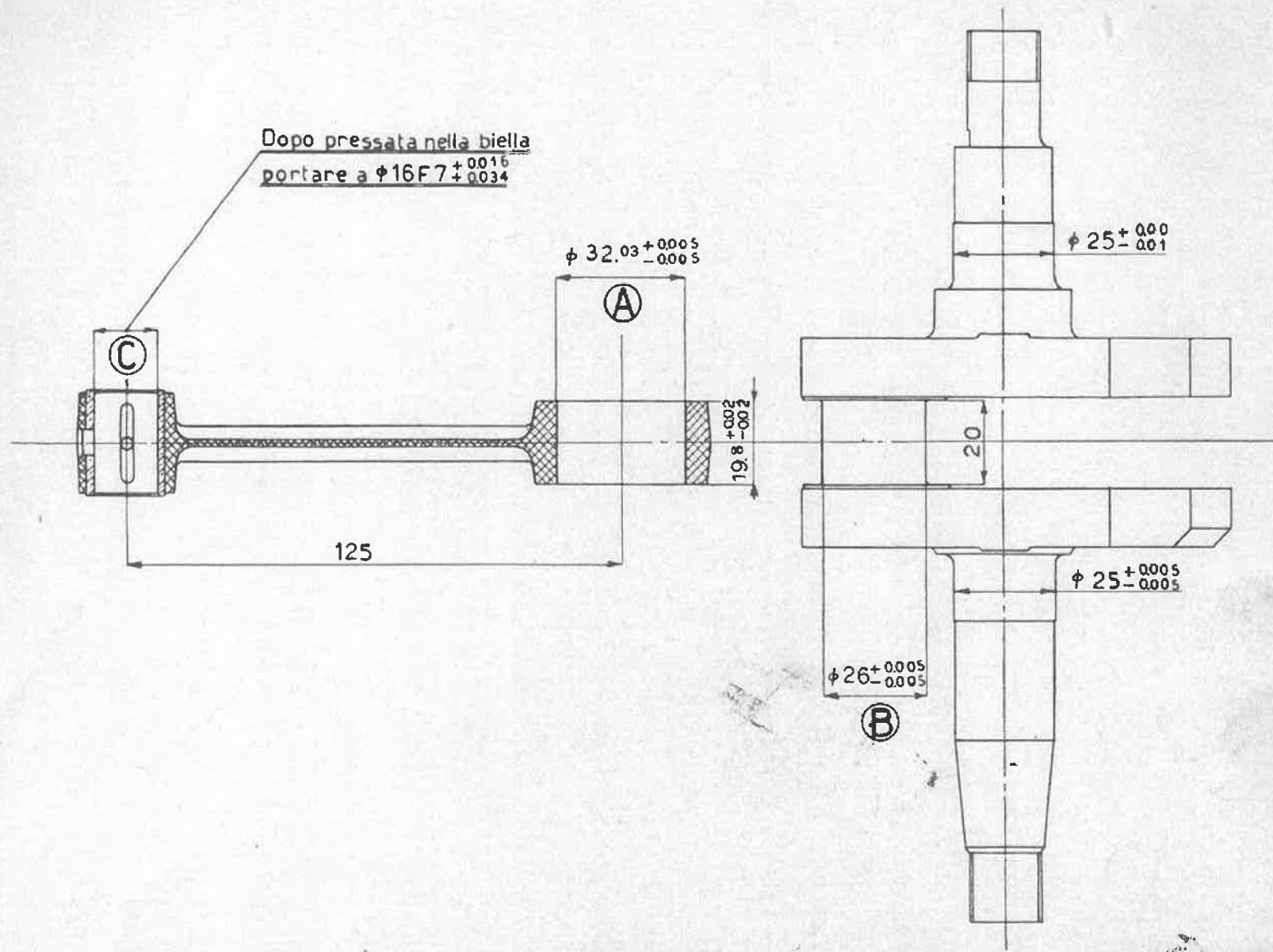
**Fig. 16 - Come si sfila l'albero primario del cambio**



**Tabella N. 3**

DENOMINAZIONE	Misure	A pezzo nuovo mm.	Tolleranze costruzione		Usura massima mm.	Osservazioni	
			+ mm.	- mm.			
Testa di biella . . . . .	A	32,03	0,005	0,005	+ 0,06	I rullini normali hanno il diametro di mm. 3 (il N.º dei rullini è di 30). Usura massima mm. 0,02.	
Perno di biella . . . . .	B	26	0,005	0,005	- 0,05		
Piede di biella . . . . .	C	16	{ 0,016 0,034	—	+ 0,08		
I Maggior. {	Misure per biella maggior	A	32,28	0,005	0,005	Con questa biella maggiorata e questo collo rettificato vanno montati gli appositi rullini maggiorati del diametro di mm. 3,25.	
	Misure per collo rettificato	B	25,75	0,005	0,005		
II Maggior. {	Misure per biella maggior.	A	32,53	0,005	0,005		Con questa biella maggiorata e questo collo rettificato vanno montati gli appositi rullini maggiorati del diametro di mm. 3,5.
	Misure per collo rettificato	B	25,5	0,005	0,005		

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Tav. III

To assemble the rollers and the connecting rod on the crankshaft proceed as follows:

Fix the connecting rod in a vice, pour a little thick oil and lay down the rollers. Put the crankshaft on the connecting rod, spread it with thick oil and apply the remaining rollers (see fig 20). Tighten the nuts just enough so that the flats of the cap adhere slightly to those of the connecting rod, then tap lightly with a wooden mallet around the periphery of the connecting rod head and move the latter alternately in order to obtain a perfect adjustment of the rollers, tighten alternately the nuts of the fastening bolts fully, punch the ends of the bolts so as not to make it possible to accidentally loosen the tightening nuts.

Warning. - Do not forget to mount the iron wire for sludge trap inspection cap, this forgetfulness may be due to the loosening of the above-mentioned workpiece with very serious consequences for the engine. The thickness spool, the key, the control gear for the oil pump and the relative tightening nut must be mounted when the crankshaft is already enclosed between the two crankcase halves. (see general assembly of the engine)

### **CAM AXIS GROUP AND TIMING CONTROL**

This group includes:

- The intake and exhaust cam with its shaft and control gear, in one piece.
- Shaft with cam followers and rollers for pushrod control.
- The pushrods
- The rockers

#### ***Cam for intake and exhaust levers***

Examine the intake and exhaust cam pin, check the surface: it must be polished and smoothed. When checking look for cracks, notches, etc, if visible, replacement is necessary. For play between pin and bushings in the housing (see Table 4, Table IV).

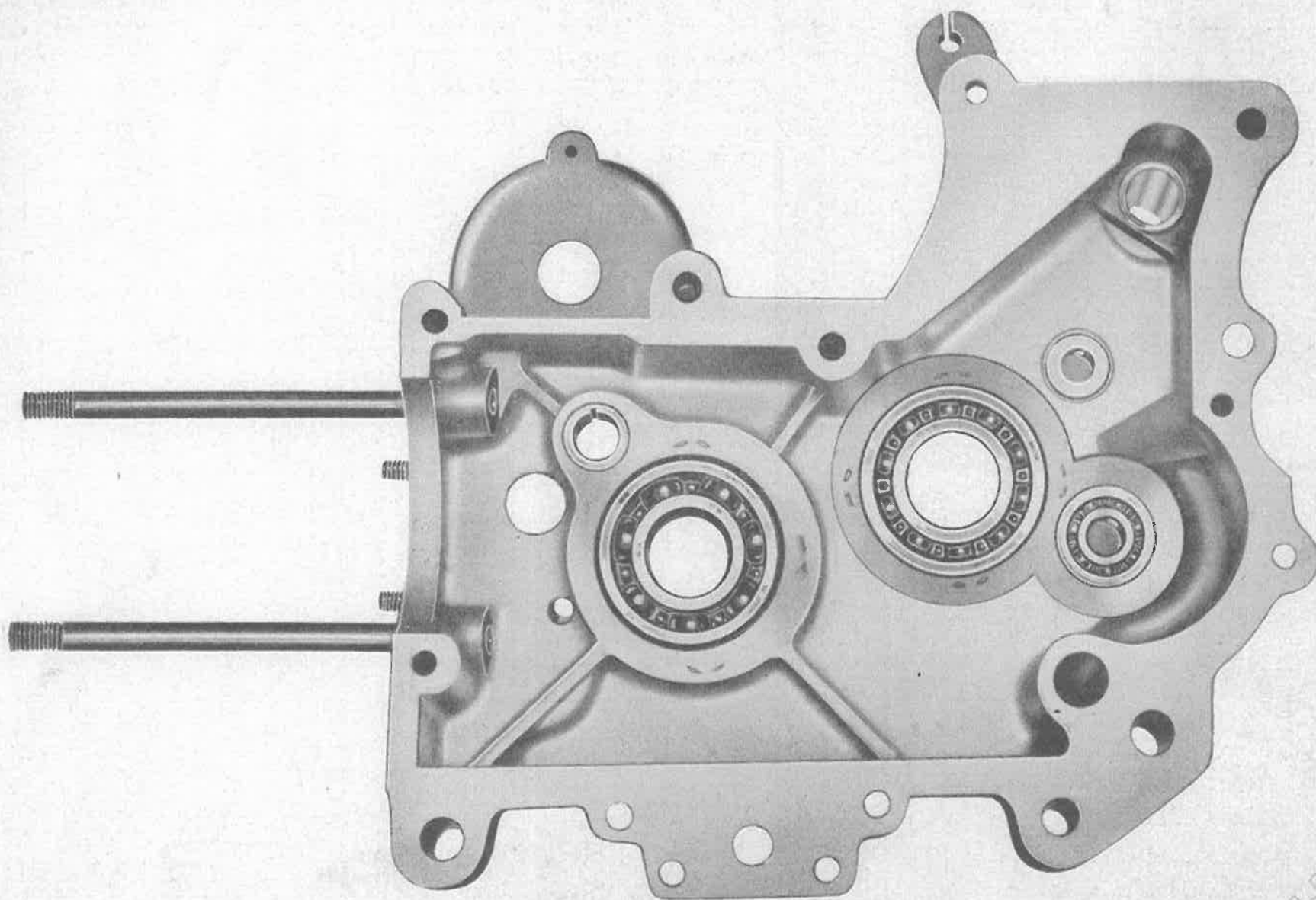
Observe the working surface of the cams, they must feel smooth. If there are deep lines or notches replace the piece. Observe the tothing of the drive gear, if worn or damaged, replace it.

#### ***Shaft with cam followers and rollers for pushrod control***

### **DISASSEMBLY**

Pull the pin outwards. It is thus freed (from the inside to the outside) the intake lever, the washer and exhaust lever.

Inspection. Examine the state of the shaft for supporting levers that is slightly pressed into the crankcase; for outer surface of the workpiece: it must be polished and smooth.

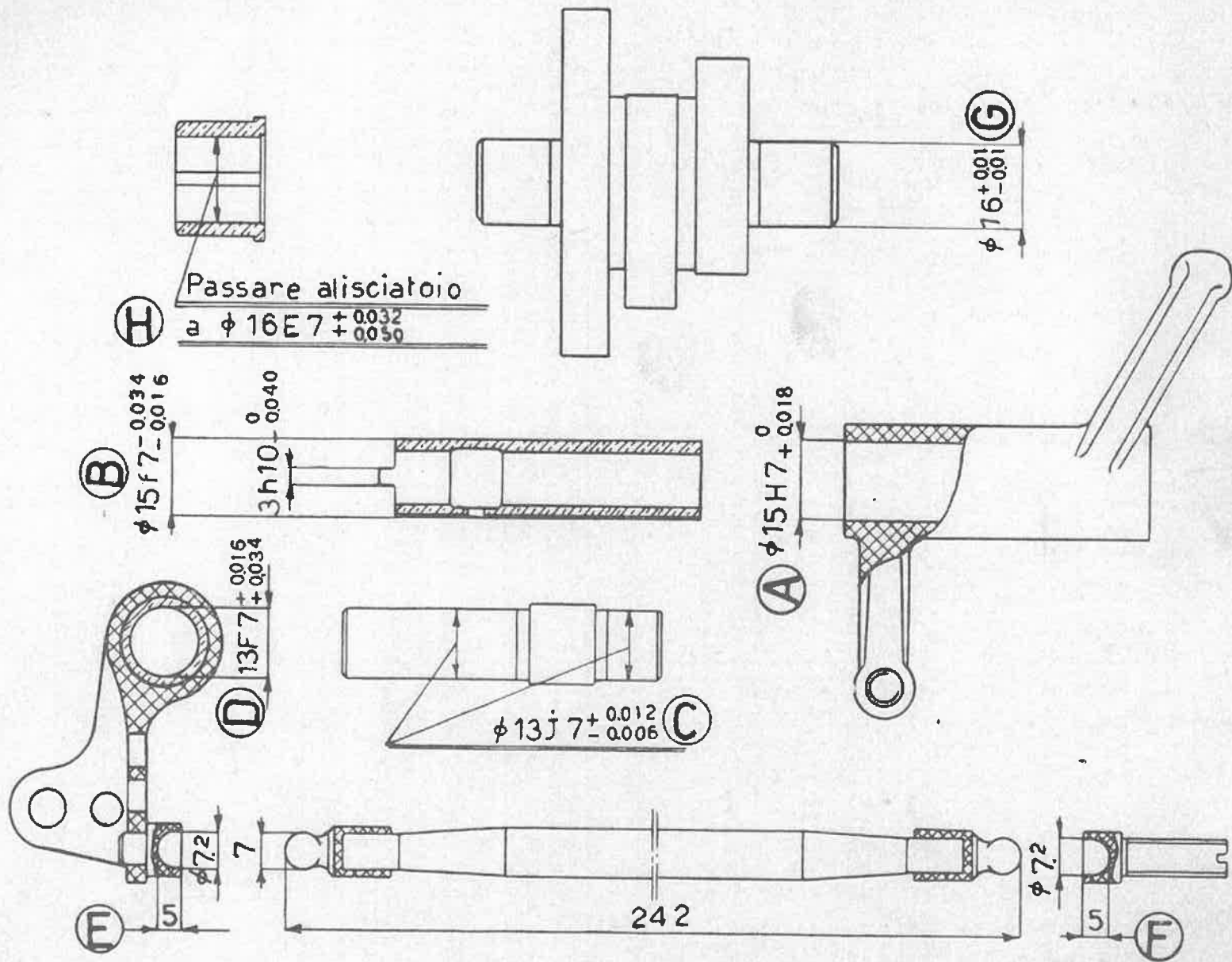


**Fig. 17 - Mezzo carter destro**

**Tabella N. 4**

DENOMINAZIONE	Misure	A pezzo nuovo mm.	Tolleranze costruzione		Usura massima mm.	Osservazioni				
			+ mm.	- mm.						
Aste comando bilancieri . . . . .						Vedere descrizione.				
Bilancieri aspirazione e scarico	A	15	0,018		+ 0,05					
Bronzina per bilancieri . . . . .	B	15		<table style="border: none;"> <tr> <td style="font-size: 2em;">}</td> <td>0,034</td> </tr> <tr> <td style="font-size: 2em;">}</td> <td>0,016</td> </tr> </table>	}		0,034	}	0,016	- 0,12
}	0,034									
}	0,016									
Perno levette aspirazione e scar.	C	13	0,012	0,006	- 0,05					
Levette sulle camme aspirazione e scarico . . . . .	D	13	<table style="border: none;"> <tr> <td style="font-size: 2em;">}</td> <td>0,016</td> </tr> <tr> <td style="font-size: 2em;">}</td> <td>0,034</td> </tr> </table>	}	0,016		}	0,034	+ 0,10	
	}	0,016								
}	0,034									
	E	5			+ 0,5					
Vite sui bilancieri . . . . .	F	5			+ 0,5					
Perno delle camme aspir. e scar.	G	16	0,01	0,01	- 0,1					
Bronzine per perno camme . . . . .	H	16	<table style="border: none;"> <tr> <td style="font-size: 2em;">}</td> <td>0,032</td> </tr> <tr> <td style="font-size: 2em;">}</td> <td>0,050</td> </tr> </table>	}	0,032	}	0,050		+ 0,12	
}	0,032									
}	0,050									

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Tav. IV

If cracks, notches, etc. occur, replace the part. For the clearance between pin and bushings (see table 4, table IV) The internal surface of the two bushings of the levers must be smooth, otherwise replace. To do this, ream the special bushing and go over with a 13mm reamer + 0.016 / +0.034. The washer should be smooth on the sides and in the hole. New piece thickness 2.0 mm , + 0.0 / -0.2 maximum wear mm. 0.2 mm, hole diameter 13.2 mm. The state of the outer surface of the rollers must be smooth and must be able to rotate freely around the shaft. The play of the rollers in the levers: must not be greater than 0.3mm. Otherwise, replace the pin, bushing and roller. After reiterating the pin, the protrusions on both sides must be trimmed. The clearance per new piece must not be less than 0.08mm. This prevents the roller from deceiving and thus damaging the profile of the cam.

#### **ASSEMBLY**

Reverse disassembly operations.

#### ***Push Rods, Rocker Arms Exhaust, and Intake.***

#### **INSPECTION**

They are duralumin pushrods with end caps (see Table IV). Check that the pushrods are straight and that the wear on both ends is not excessive. In case of irregularities, it is advisable to change the complete pushrod.

#### **ASSEMBLY**

Put some sealant on the flange of the tube cover, then mount it on the crankcase by means of the two special studs and nuts.

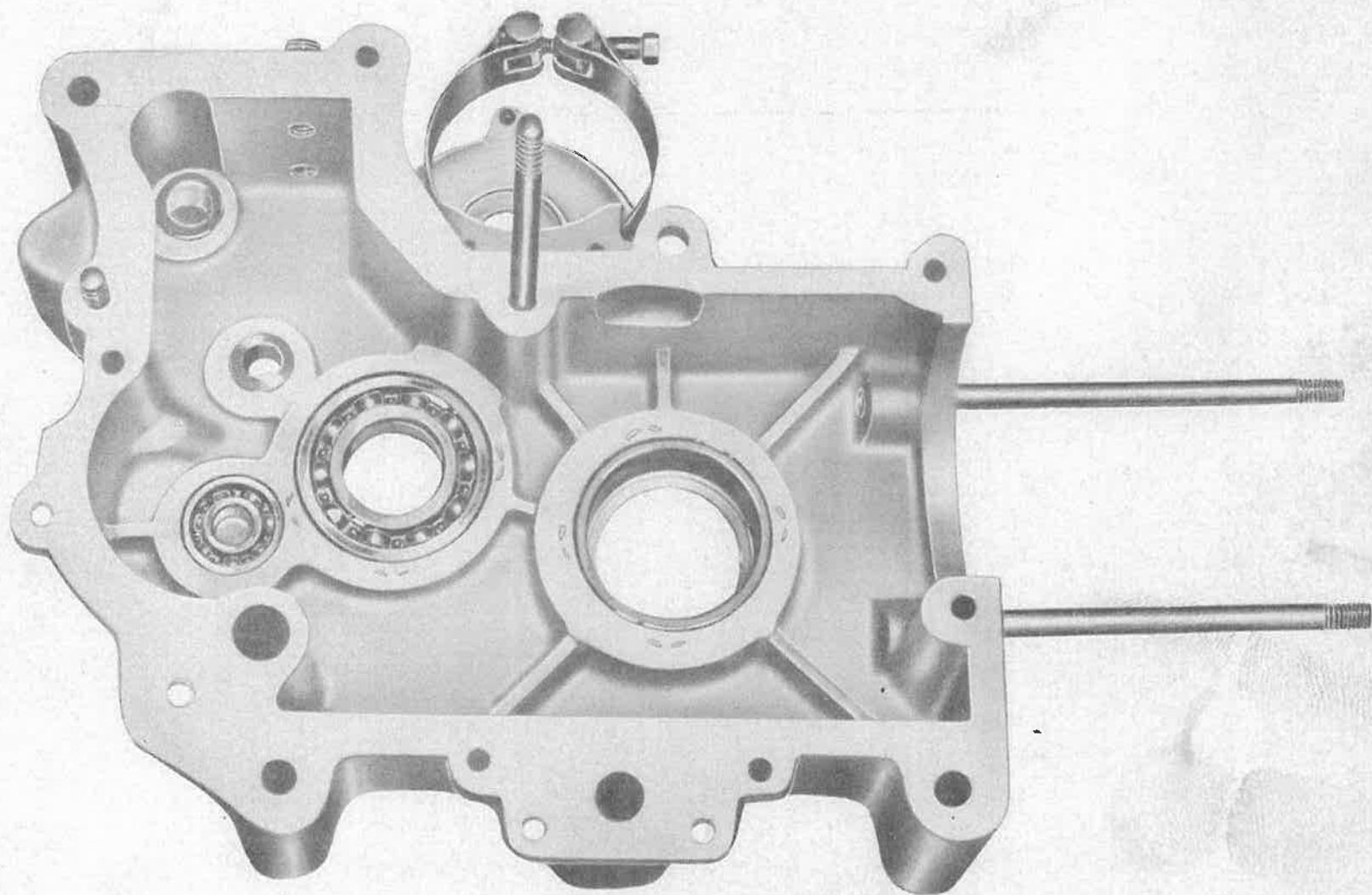
#### ***Exhaust and Intake Rocker Arms***

#### **DISASSEMBLY**

After removing rocker arms from the head as described on page 30, to completely disassemble them one must remove the bushing; check the measurements by referring to Table 4, tav. IV. Remove the adjustment screws from the rocker arms. NB. - Check the external dimensions of the bushings and internal of the rocker arms. Clean the holes in the pins and the slots for oil passage in the bushings.

#### **INSPECTION**

Observe whether the threads of the screws and nuts are in good condition, otherwise replace. Check on the convex part of the screws and if worn replace them (see Table 4, Table IV).



**Fig. 18 - Mezzo carter sinistro**



## CLUTCH AND STARTER GROUP

### DISASSEMBLY

See Chapter engine disassembly

### INSPECTION

This group includes (from left to right):

Plate pusher discs. Observe, with a straight edge that the face that rests on the discs is flat. If not, replace the plate. If there are slight surface scratches, go over the piece again. If the grooves are deep replace the piece. Check the thread for the command rod is intact.

**Clutch Discs;** there are one in ferodo, one small in bronze, four in steel and four in bronze. They must not be scratched, deformed, or heavily worn. Finding scratches, deformed or very worn.

The initial thickness of the bronze discs is 1 mm, it can wear up to 0.8 mm.

The initial thickness of the ferodo disk is 4 mm it may wear to 3 mm. but if cracks are found it is advisable to make the replacement even if it is not consumed. The initial thickness of the steel discs is 1 mm, they are not subject to appreciable wear. Should be replaced only if deformed. Helical gear with clutch body. Check the profile and wear of the gear teeth; check if there are chipped or broken teeth, note that the surface of the bushing pressed into the gear has not suffered any cracks or wear exceeding + 0.3mm. In such cases, replacement is required of the gear or the bronze. If you need to change the bronze, after pressed in the gear should be brought to 44 mm diameter, + 0.04, + 0.07, check that the bronze does not protrude from the gear plans.

Fixed clutch body. It is integral with the gearbox main shaft to which it is joined by means of a conical coupling, key and locking nut.

### DISASSEMBLY

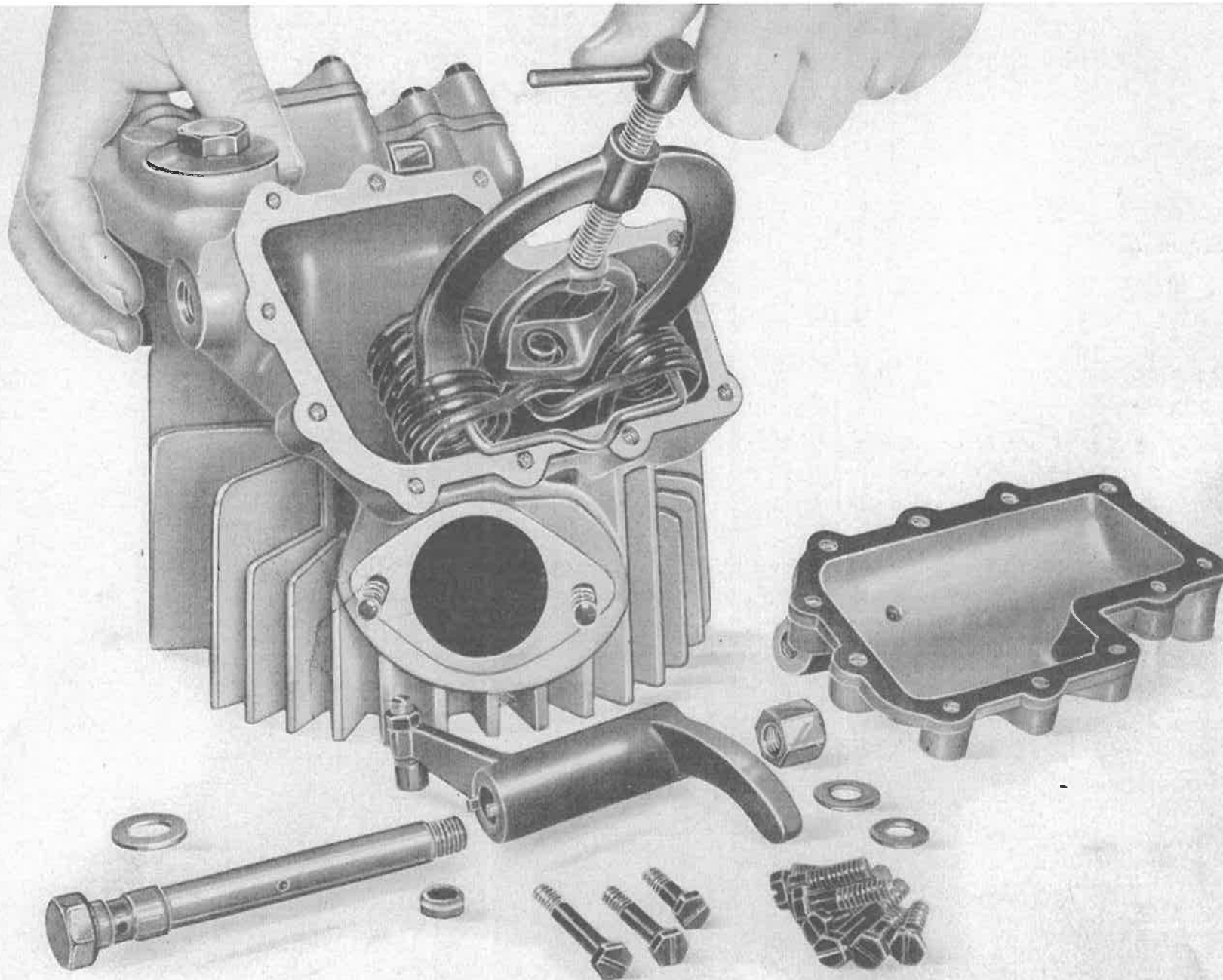
See Chapter " engine disassembly

Check that the plate, from the outside (where it works on the disc) is free from scratches and flat.

- That the four teeth of the Claw are straight and smooth in the outer surface.
- That the inner cone is in perfect condition.
- That the hollow for the key has no wear. In case of contrary cases, the piece is replaced.

### Control Rod

Check that the thread you need to screw the rod on the disc Push Plate is intact. – check that the rod is straight.



**Fig. 19 - Come si esegue l'estrazione delle molle dalla testa**

That the thrust bearings balls mounted on the rod (at the right end), is effective. If consumed, replace the complete piece. Check that the tempered lid acting on the thrust is not worn. Maximum wear, at center 0.8 mm.

***Spring holding plate, spring, pre-set, free starting.***

Examine the condition of individual pieces.

***The plate*** that is not deformed. ***The spring***, new and unloaded, it has a length of 20 mm and it takes 2 kg to compress it to a length of 6 mm (shortening 14 m). If compressed to 6 mm brings less than about 1.5 kg, it must be replaced.

***Gear***. Must not have broken teeth or damage. Also check the front teeth. It is necessary that the teeth have retained their primitive profile which is at right triangle shape. If malfunctions are found replace the workpiece.

***Fixed toothed sleeve*** for start-up. Check the status of the thread you need to join it to the tree primary gear and front gear (as per the free gear starter).

***Load springs for clutch.***

There are two concentric. The external spring has a new and unloaded length of 45 mm and it takes 67 kg to compress it to a length of 25 mm (20 mm shortening). If compressed 25 mm carries less than 60 kg it must be replaced. The internal spring has a new and unloaded length of 43 mm and it takes 70 kg to compress it to a length of 25 mm (18 mm shortening). If compressed 25 mm carries less than 63 kg replace them.

***Threaded sleeve for clutch adjustment.***

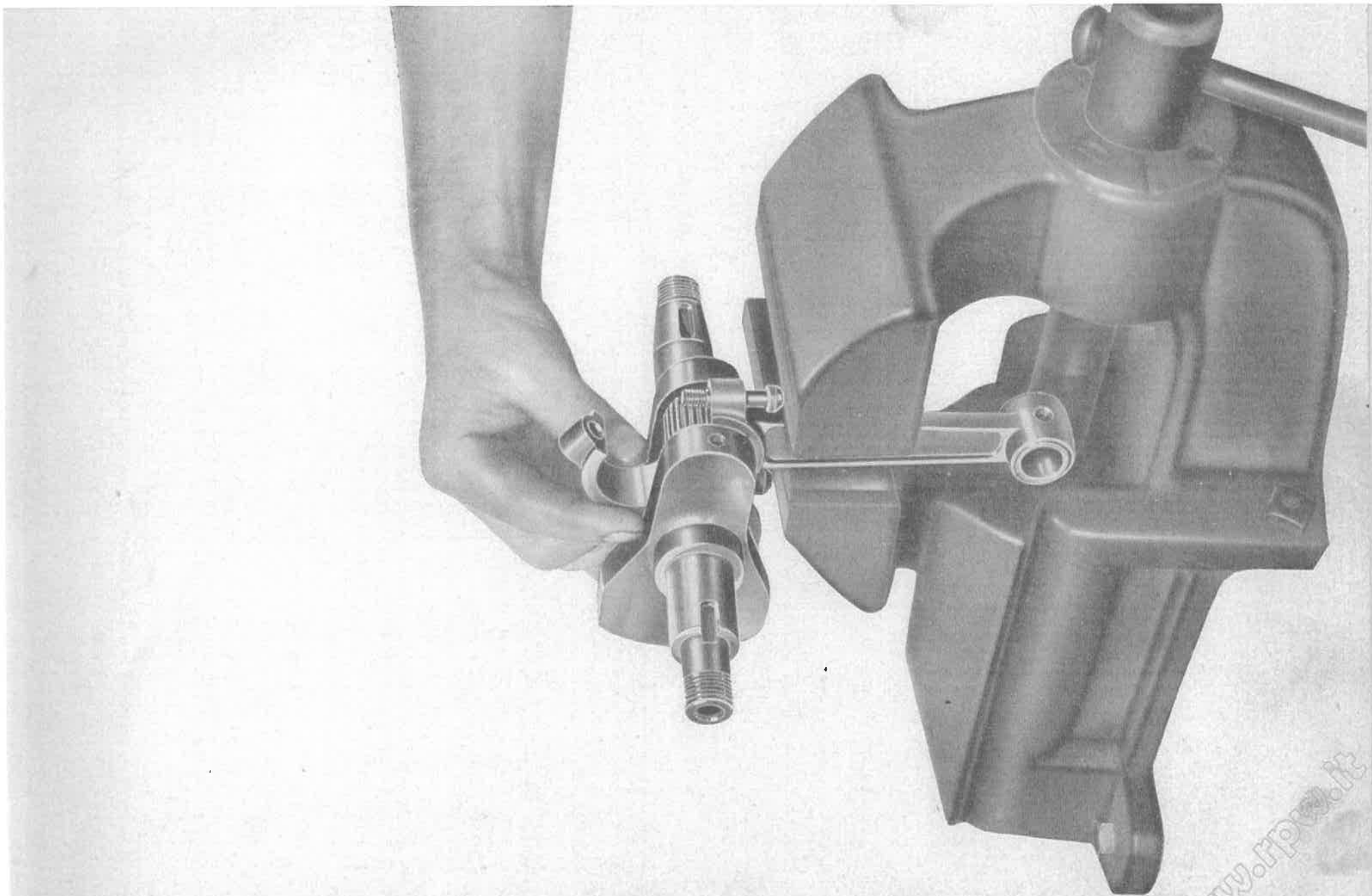
Check the wear of the screw resting on the tempered cover mounted on the thrust bearing of the clutch control rod. When new, the tempered hemispheric part of this screw protrudes from the plane of the lever about 3 mm. If flattening of the head is observed, it is advisable to replace the screw.

***Clutch Assembly***

**ASSEMBLY**

Reverse the disassembly order (see case disassembly of the motor)

Assemble the discs in the order in which they were removed (see fig. 21). They must be clean and lightly greased. The clutch control rod must screw onto the disc pusher plate so that it protrudes by about one thread. It is advisable to check that the maximum stroke of the rod and the plate (when the control is in the fully disengaged position) is such as not to allow the plate itself to exit from the front notches of the jaw,



**Fig. 20 - Come si esegue il montaggio della biella e degli aghi sull'albero a gomito**

and the exit of the extreme discs from the slots of the rotating body. If this is found, the control rod must be screwed in more. The knurled disc that adjusts the compression of the springs must be screwed so that the length of the same is reduced to 27 mm approx. Check, once mounted, the centering of the two springs relative to the primary axle of the gearbox on which they are mounted, turning the whole set by hand.

### ***Clutch Adjustment.***

In practical use, there are three problems that can arise:

1- The clutch tears, that is the engagement is abrupt and violent this can depend on: Springs too loaded. Remedy: Loosen the knurled disc. Worn or deformed discs: replace them. Impurity between the discs. Wash with petroleum by introducing it through the hole in the top cap practiced in the left half crankcase and emptying it, after having rotated the control by hand and moved repeatedly, from the hole in the bottom cap.

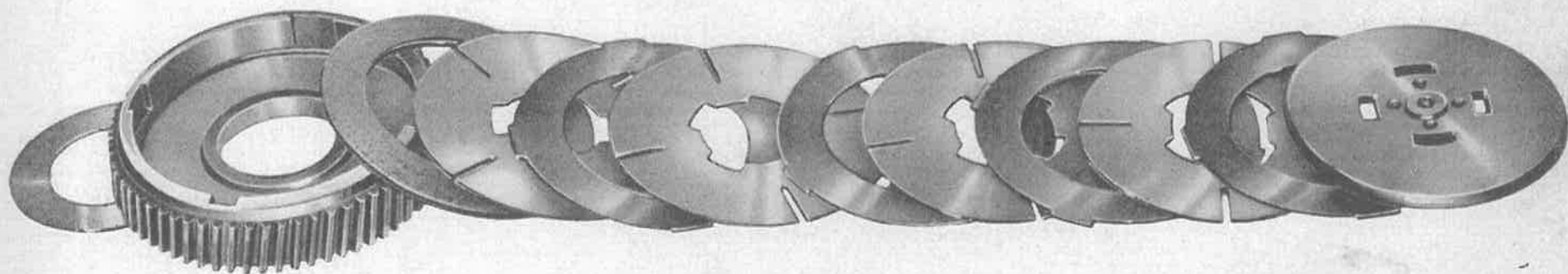
2 - The clutch slips, ie sliding between the discs occurs even when the command is engaged. This may be due to: Springs too low. Remedy: Screw in knurled disc or replace springs. Lack of play between external control lever and internal control rod. Adjust this clearance to measure (about 0.2 mm) by acting on the special tensioner located on the flexible control sheath. Excessive oil seepage in the clutch. Remedy: washing with oil. Repeating the problem, it is necessary to check the condition of the gaskets and clean the duct that drains oil on the chain.

3 -The clutch does not completely disengage. In other words, it occurs between the fixed clutch body and the movable clutch body even when the control is in the fully disengaged position. This causes difficult starts and noisy speed change maneuvers. This causes difficult starts and noisy gearshift maneuvers. The inconvenience may depend on: Excessive play between the lever and the internal control rod (adjusts the play; see above. Excessive sagging of the control sheath: replace it.

Friction discs: wash (see above).

### ***Set in motion***

Check the state of the teeth in the sector.  
The return spring: if weakened, replace it.



**Fig. 21 - Frizione smontata : osservare l'ordine di montaggio dei vari pezzi**

## SPEED CHANGE GROUP

### DISASSEMBLY

See Chapter engine disassembly

### INSPECTION

This group includes:

**Primary Shaft** - check the integrity of the threads at both ends. The surface of the engagement cone and the fixed clutch body must be very smooth.

**Woodruff Key** - observe that it enters the special slot without play.

**The condition of the six notches** on which the fourth and second speed mobile gear slides (see table V)

**The surface that works on the bushings** of the direct drive gear - must be smooth. If a displacement greater than 0.05 mm is detected, it is necessary to straighten under the press.

**Washer on the left side shaft** - It must be mounted with the flat part against the ball bearing. Check that it is not deformed.

**Sliding mechanism** - for third speed with frontal notches, second and fourth speed engagement. Check the clearance in the control dropout and slots: do not exceed 0.4 mm.

**Direct Drive Gear** - check the condition of the teeth and frontal notches.

- The thread on which the clamping ring is screwed to chain sprocket.
- The surface to be forced into the internal ring of the bearing must be super smooth.
- The inner bronze must be free from notches, scratches, etc. take care of the cleaning of the oil Channel with compressed air
- For play and wear shaft-bronze (see table n. 5 table V).

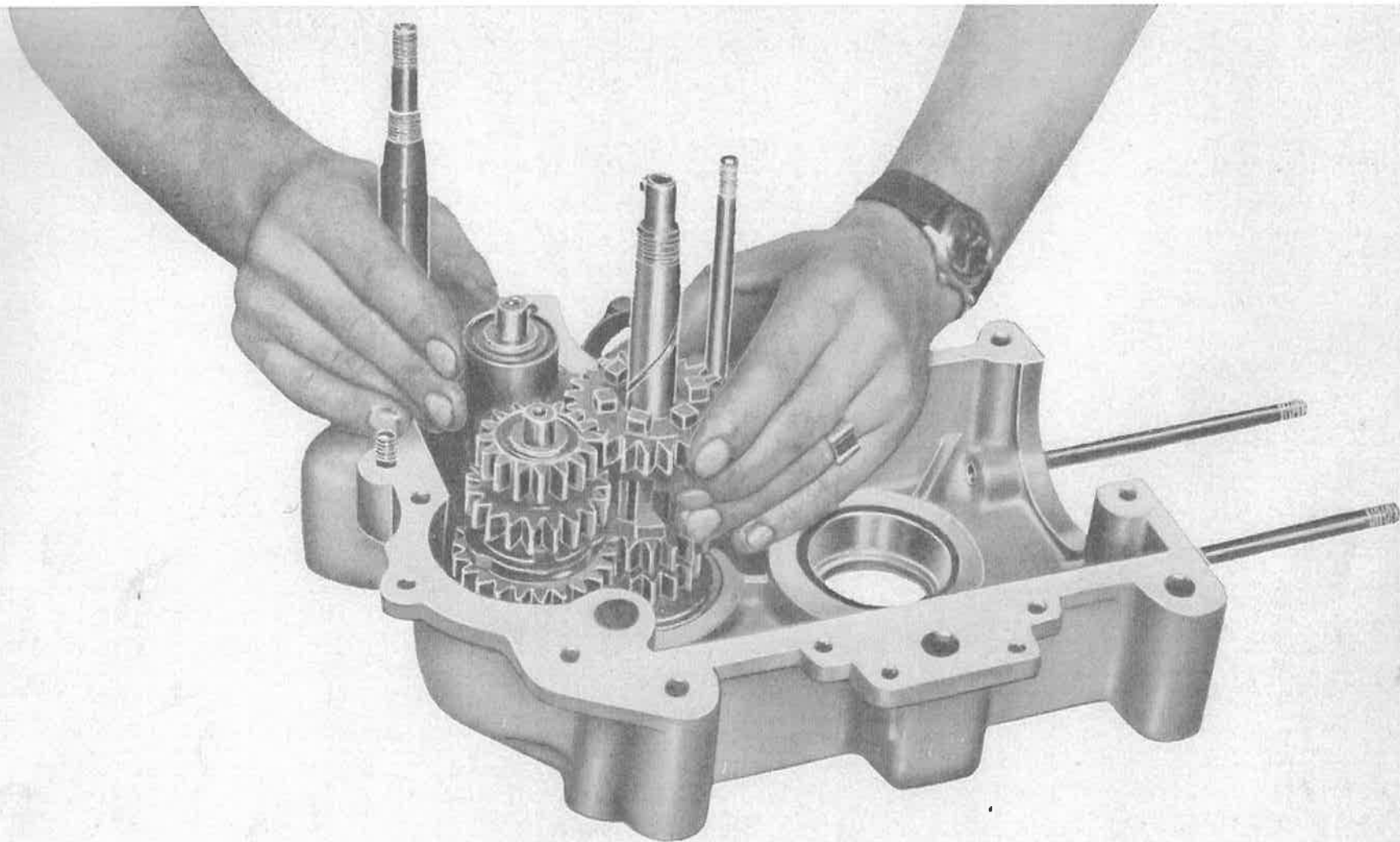
**Thick washer** on direct drive gear. It must be mounted with the flat part towards the bearing.

**Secondary gearbox shaft** - Check:

- The centering of the shaft (see primary).
- The two ends (which must be forced into the inner ring of the bearings) must be very smooth.
- The condition of the six notches on which sliding first and third speed moving gear (see tables V).

**The washer mounted on the secondary shaft** (right side it must be mounted with the flat part against the gear) check that it is not deformed.

**Sliding gear** - For second speed with front notches for engagement, first and third speed.

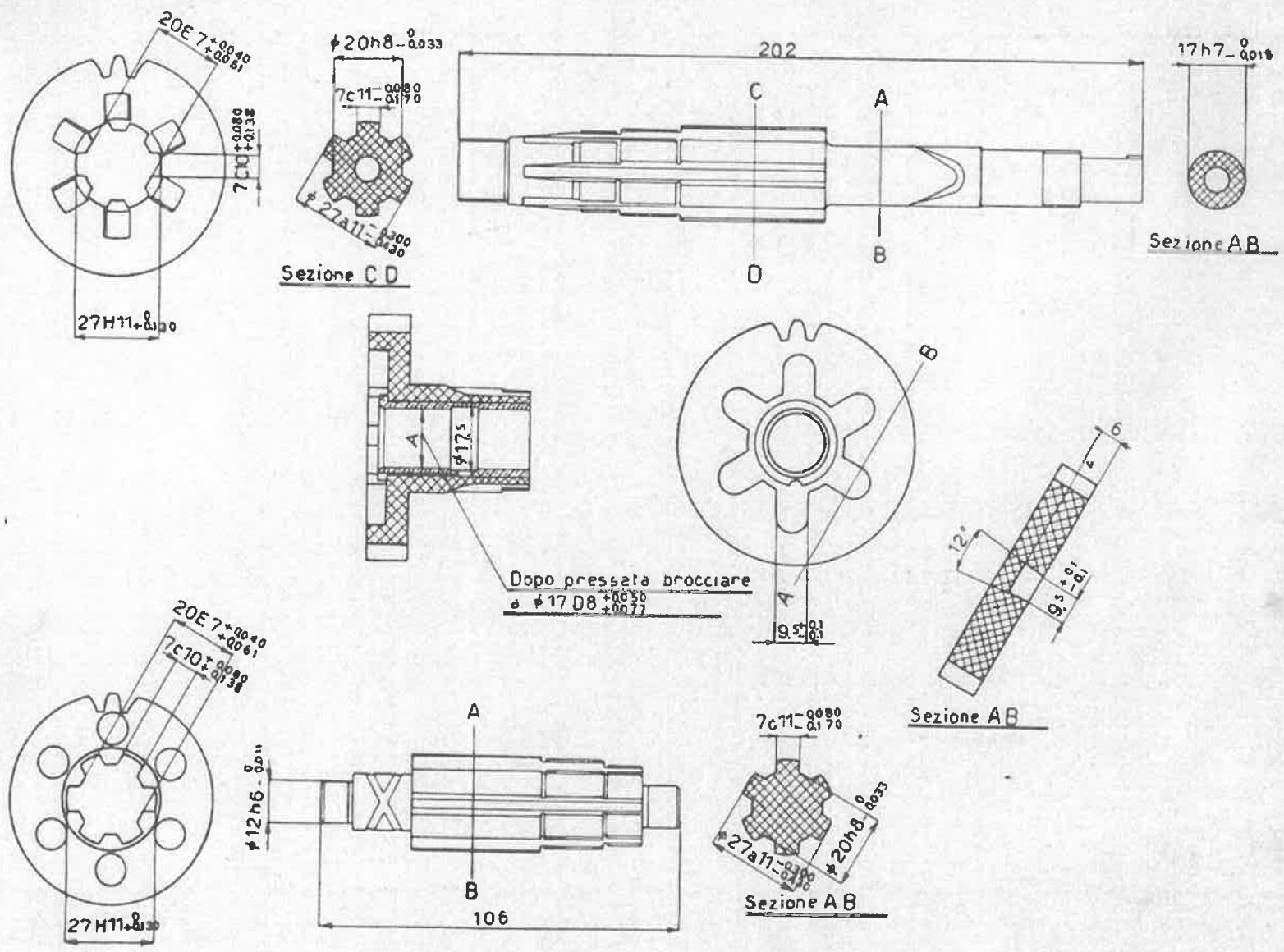


**Fig. 22 - Come deve essere montato il cambio nel mezzo carter sinistro**



**Tabella N. 5**

DENOMINAZIONE	Misure	A pezzo nuovo mm.	Tolleranze costruzione		Usura massima mm.	Osservazioni
			+ mm.	- mm.		
Bronzina ingranaggio presa diretta . . . . .	A	17	{ 0,050 0,077		+ 0,10	



Tav. V

Check the clearance between the control dropout and the slots, it must not exceed 0.4 mm.

**Bushing for free gear first speed.** Check the inner surface, it must be smooth and free from scratches.

Check the pressing in the gear. The internal diameter of the new piece bushing after pressing in the gear and broaching is  $16 \text{ mm } D 8 + 0.05 + 0.077 \text{ maximum wear} + 0.1 \text{ mm}$ .

**Gears on primary and secondary shafts** -check the state of the teeth of individual gears, they must not be broken or damaged teeth. Check the status of the front notches, which are not chipped or broken. If faults are found replace the piece.

**Grooved drum with shift forks for sliding gears** - Check the two ends of the drum (supported from the bronze bushes in the crankcase): they must be smooth.

**The state of the pinion teeth** - If it is deemed necessary to disassemble the shift forks from the drum you need: Remove the safety wire. - The tempered screw working in the groove of the drum. - The cap, the spring and the ball to stop gears. You can then remove the two shift forks.

**Check the surface of the drum:** it must be smooth.

The groove should have smooth sides.

The tempered screw must not be worn or warped.

The shift forks must not be worn or deformed.

## ASSEMBLY

To reassemble this group, reverse the operations of disassembly.

Shaft with swinging sector. Check the ends (where it works in the bronze bushes of the cases): they must be smooth.

- The state of the thread: it must be intact.

- The state of the teeth of the sector: must not be worn or broken.

The surface of the cone must be very smooth. The state of woodruff key: observe that It fits tight in the slot in the shaft.

Warnings for the General Assembly of the gearbox.

All the pieces that make up this group are mounted in the left crankcase (see fig. 22), exception is for the direct drive gear that is mounted in the appropriate bearing on the right crankcase.

Pressing fixed clutch body with aluminum punch in the internal ring of the special ball bearing mounted in the middle left crankcase. Take care so as not to damage the bearing, use a steel tube that rests one end of a solid base and the other on the internal ring of the bearing.

Mount the primary shaft assembly (with the second speed mobile gear) the fixed gear, the washer (with the flat part towards the bearing) and the spreading ring.

Insert the shaft from the conical part into the female end of the fixed clutch body with key.

Beat on the primary shaft with light strokes of wood mallet to bring the surface of the two cones in contact. (Observe that the flat washer has no play)

Turn over the crankcase and clamp the main shaft. Apply the fixing nut and tighten thoroughly.

Check, when the operation is completed, if the shaft is centered; if it not then center it with light strokes of wooden mallet and you will control it by spinning it by hand, measuring if there are displacements at the free end.

Fit the shaft with the toothed sector in position 4. To obtain this, it is necessary to move the shaft sector in such a position as to be able to check that the side of the toothed sector coincides with the line drawn on the crankcase next to n. 4.

Place the gear for speed on the surface of the crankcase and then insert the shaft by beating lightly with a wooden mallet.

Take the shift drum assembly, arrange it so that the top (right) dropout is flush with the top edge of the drum and the bottom (left) dropout is at the stop.

To check this, it is necessary to measure whether there are 7 mm from the level of the dropout to the surface of the drum.

The two sliding gears can thus be inserted into the dropouts. In the right dropout, mount the gear for 2nd and 4th speed with square front notches. In the left dropout, mount the gear for 1st and 3rd speed with round and square front notches.

Thus, mount the complete assembly in the middle left crankcase. Being careful not to forget the washer on the right side of the drum.

Thread the free gear on the secondary shaft to III speed, introducing it with the front notches facing on the left side of the crankcase. After this, thread the in-fixed gear and the washer with the top facing the gear.

Direct drive gear.

Before mounting it in the appropriate new bearing half right crankcase (timing side) it is necessary to check the play by making the front of the notches in the primary shaft and the stop of the bushing in the direct drive gear.

Insert the latter on the primary shaft and approach it to the front of the notches until then accurately measure the distance between the right end of the main shaft and the outer plane of the direct gear.

Insert the latter on the main shaft and bring it closer to the front of the notches until it is carefully reduced to 0.2 ~ 0.3 mm.

The distance between the right extension of the primary shaft and the external plane of the direct drive gear is then carefully measured. Mount the direct drive gear in the appropriate bearing (not forgetting the thick washer that is placed with the flat part facing the bearing) then temporarily close the two half casings and, after having ascertained that the joining planes are well connected, measure the distance mentioned above.

If the measurement has remained unchanged, it means that the play has remained what it was established (ie 0.2 ~ 0.3 mm). If it is decreased, the internal clearance is increased (a maximum clearance of 1 mm can be achieved and therefore the reduction of 1 mm in the external measure). If this limit is exceeded, the washer must be replaced with another one of greater thickness.

If yes if this limit is exceeded, the washer should be replaced with other of greater thickness. If the internal clearance is increased, it is necessary to then replace the washer with another of less thickness.

NB - This check is necessary if the primary shaft, the direct drive gear, the relative bushing, or the thickness washer are replaced. If reassembling old pieces this step may be omitted.

## TRANSMISSION GROUP

This group includes helical gears transmission motor gearbox, chain sprocket, rear sprocket, drive chain, rear bumper

### Motor Helical Pinion

DISSASEMLY (see Page 20).

## INSPECTION

**Flywheel** - Check the condition of the teeth and the two frontal notches to the flywheel. They must be in perfect condition. The key must not show any cracks and must enter the special slot of the motor shaft without play (slightly forced).

**The spring** - A new and unloaded piece is 29 mm long. It takes about 38 kg to reduce it to a length of 16 mm. If compressed to 16 mm it takes less than 30 kg, then replace it.

**Spring and gasket support washers** - Make sure they are flat and not worn (replace them otherwise).

**Helical gear with clutch body.** See P.50

**Chain sprocket** - Check the profile of the teeth. If very worn replace the piece.

**Chain sprocket fixing ring** - Check that the inner thread is intact.

**Rear Sprocket** - Check the profile of the teeth. If very consumed replace the piece. Make sure it is flat.

**Drive chain** - Examine the condition of the rollers, plates, and check for stretching.

To carry out this last operation, it is necessary to: fix an end of the chain in a vice and count the number N of the pins. Since the pitch, with a new chain, is 12.7 mm, the length L of the chain measured between the centers of the two fixed pins will be  $L = (N - 1) \times 12.7$ .

Chain used, admitting an increase in pitch  $A = \text{mm. } 0.15$  the length will be:  $L = (N - 1) \times (12,7 + A) = (N-1) \times 12.85$ .  
When measuring a length greater than  $L$ , it is necessary to replace the chain. When doing this, carefully check the state of the front and the rear sprockets. If these sprockets have worn teeth, it is necessary to replace them. The new chain fits well only on the new teeth; it can so happen, if you do not diligently carry out the check, you will have bad results by changing only the chain.

### ***Flexible coupling***

### **DISASSEMBLY**

Remove the rear wheel of the machine, then remove from the inside of the hub the 6 nuts they hold the body of the flexible coupling bearing the rear sprocket is joined to. Remove the 6 bolts from the outside and disassemble completely the rubber bumpers. Examine the conditions of the 6 rubber blocks. If they are consumed or deformed replace the pieces.  
Adjusting chain tension -To make the adjustment you need to loosen the nuts of the rear of the wheel axle and the locknuts on the two chain tensioners bolts, then acting in equal proportions, in order not to offset the wheel, adjust the two chain tensioners. With the machine on the stand the chain must not be excessively tight (check that it has a range of 30 ~ 35 mm). This is necessary because, otherwise, there would be excessive tension when the swinging swingarm is halfway up. After adjusting the chain, it is necessary to check the adjustment of the rear brake.

### **SUPPLY AND DRAIN UNIT**

***This group includes petrol tank.***

### **DISASSEMBLY (see P. 80).**

Inspection - Check that the vent hole of the tank closure cap is free. If there are leaks in the tank, before proceeding with welding it must be emptied carefully, then dry the interior so be sure that all traces of gasoline fumes have disappeared. It is always prudent to carry out welding leaving the tank open.  
Make a good internal rinse with oil or petrol. Insert a piece of chain into the filler cap opening which is held at one end while shaking the tank. By carrying out this operation it is possible to remove the dirt well and the rust deposits on the bottom.  
Filter taps and piping - Wash the filter and make sure it is intact. If the taps leak, lightly grind the top of conical surface, if necessary, change the tap. Carry out the cleaning of the pipes by means of compressed air

Carburetor - Dellorto type SSF 25.

## **DISASSEMBLY**

After removing it from the engine as indicated on Page 16, proceed as follows:

Remove the lid of the bowl (unscrew it). Remove the float. (It is removed upwards after having it unhooked from the rod).

Remove the conical Rod. (moves down). Remove the nut that is at the far end of the carburetor body.

Remove the jet, the cup holder nut, and the bowl. Remove the jet holder, the screw with spring for adjustment air and idle jet.

N. B.-The gas and air control valves and the rod conical acting on the jet holder had already been disassembled before removing the engine from the frame.

## **INSPECTION**

Carry out a good cleaning of the bowl and make sure that the pipe that carries the fuel from the bowl to the jet is clean (clear it with compressed air). Check the place where the conical pin works. It must be smooth.

- The floats; if it is dented or not perfectly watertight, replace it.

The cone of the PIN must fit well in the seat of the bowl. If slightly deformed grind it on the premises.

- Jet -Make sure you carry the indicated number (see adjustment) and that the hole has not been manipulated. Proceed to cleaning with compressed air.

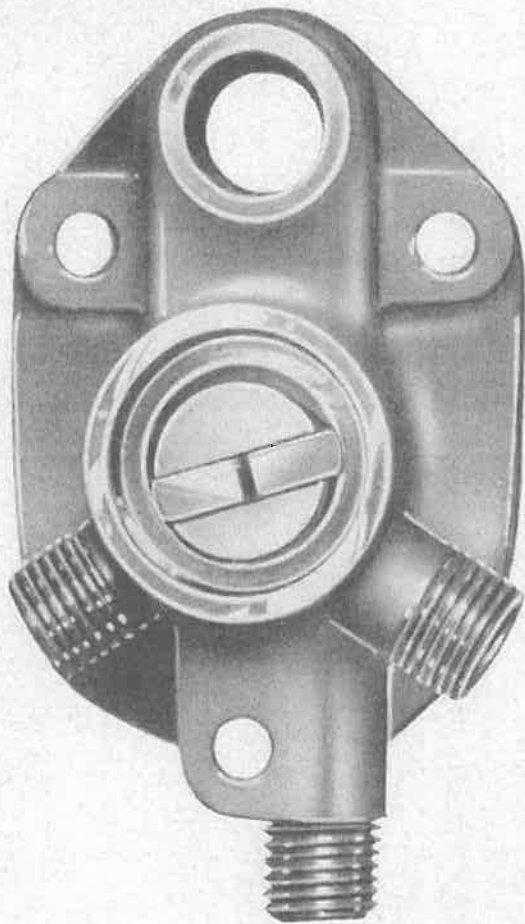
NB. -- For cleaning all holes it is recommended to use compressed air, it is not recommended to use metal wires- needles, etc. which could alter the diameter of the holes and make it difficult to adjust the carburization.

Clean the lid holes. Check the diffuser body. Clean the air holes on the jet and the small hole by blowing from the practice hole in the base (bottom) of the body itself. Examine the locations where gas valves flow and air and the hole through which the jet rod passes. Experiencing noticeable wear replace the workpiece.

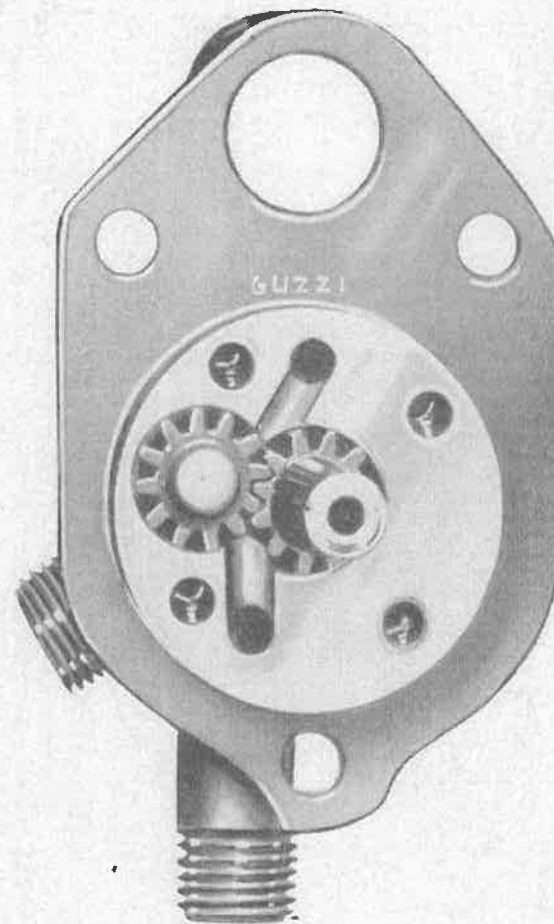
- The gas and air valves and the jet rod: these pieces remained on the machine when disassembling the engine from the chassis should not exhibit significant wear. Examine the position of the dipstick before lifting it. - you will be relocated to the same notch. Check that the spring that holds the rod and the spiral springs of the controls are efficient.

## **ASSEMBLY**

Reverse disassembly operations by taking care of do not forget about fiber washers.



**Fig. 23**



**Fig. 24**

**Fig. 23 - Corpo pompa vista dal lato esterno**  
**Fig. 24 - Corpo pompa vista dal lato interno**

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## **ADJUSTMENT**

Normal adjustment:

Main jet Summer 115 /100

Main Jet Winter 120/100

Pilot jet 50/100

Adjustment of idle and mixture:

It is carried out by acting on the size of the jet, (replacing the latter with a larger or smaller main jet) and on the position of the rod. Increasing the jet size and raising the rod enriches the mixture, the opposite occurs by decreasing the jet and lowering the rod.

There are hints of rich mixture: black smoke at the exhaust, uneven running with loss of power, sooty dark colored spark plug insulator.

There are indications of poor mixture: light colored spark plug insulator with porous tips. Remember that by decreasing the ambient temperature it is necessary to enrich the mixture; vice versa it is necessary to improve it if the temperature increases.

Idle adjustment - this must be carried out with the engine warm and carried out by acting on the knurled wire tensioner placed at the head of the carburetor, which adjusts the position of the gas valve and on the horizontal screw (located immediately after the diffuser) which adjusts the idle count. Screwing this screw into its seat the mixture it gets richer and vice versa. First adjust the knurled wire tensioner so that the gas control all closed the engine can turn still low. Then screw or unscrew, according to the cases, the horizontal screw until the minimum idle.

Warning: inspect carefully for air leaks in the intake pipe (between carburetor and intake manifold, between intake manifold and head). Sometimes therefore it fails absolutely the adjustment of the minimum.

Exhaust pipe - Remove carbon deposits with metal brushes and iron wire introduced into the curved part of the pipe.

Silencer - Disassembly: lift the tail from the body of the silencer loosening the three sealing screws.

Check that the perforated sheet is not rusty. Or ruined, otherwise replace it. Clean the drain holes thoroughly by means of metal brushes. When assembling, take care that the pieces match perfectly to avoid gas leakage.

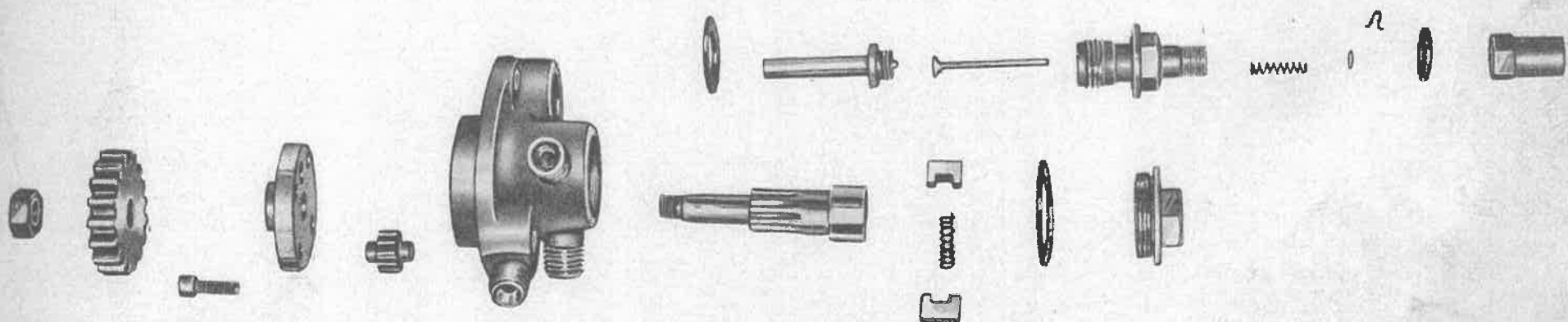
## **LUBRICATION**

For engine lubrication use Shell Oils

below 10° C. Double Shell (SAE 30)

above 10° C. Triple Shell (SAE 50)

This group includes oil tank (disassembly- see P. 80).



**Fig. 25 - Pompa smontata: si noti l'ordine di smontaggio**

## **INSPECTION**

Check for leaks. Clean the inside of the tank with oil and dry carefully.

Disassemble the filter and check that the metal mesh is intact. Clean it by washing it with oil.

Oil Pipe - they should be washed with oil and blown with compressed air. Clean lubrication lines of distribution bodies. Fitting. Check that the mouth is not deformed, otherwise replace the fitting. This is very important because the pump can suck in air from defective fittings, normally causing serious problems.

### ***Oil Pump***

Disassembly from the crankcase (see fig. 23-24). Remove the three fixing nuts from the timing cover studs. Remove the pump outwards after removing the control gear.

Remove the automatic valve by unscrewing it completely from his headquarters.

Automatic valve disassembly (see fig. 25).

Take off top cap.- The tube. - The pin and remove the valve from the inside.

Oil pump disassembly. Remove the outer cap and the inner cover by unscrewing the four screws.

- remove the gear by pulling it out of its seat towards the interior.

- The toothed shaft by sliding it outwards. Remove the two wipers and the spring.

Important warning: Do not tamper with the spring which is calibrated at the factory.

## **INSPECTION**

Control gear. Check the condition of the teeth.

Outer closure cap. Check that the seal is intact Replace the leather gasket if it is not in excellent condition

Inner cover. Check the connection plane to the pump body. No scratches or deformations may be observed.

Check the hole that allows the passage of the shaft. A piece has a diameter of mm. 9,5 H 7 + 0. 015.

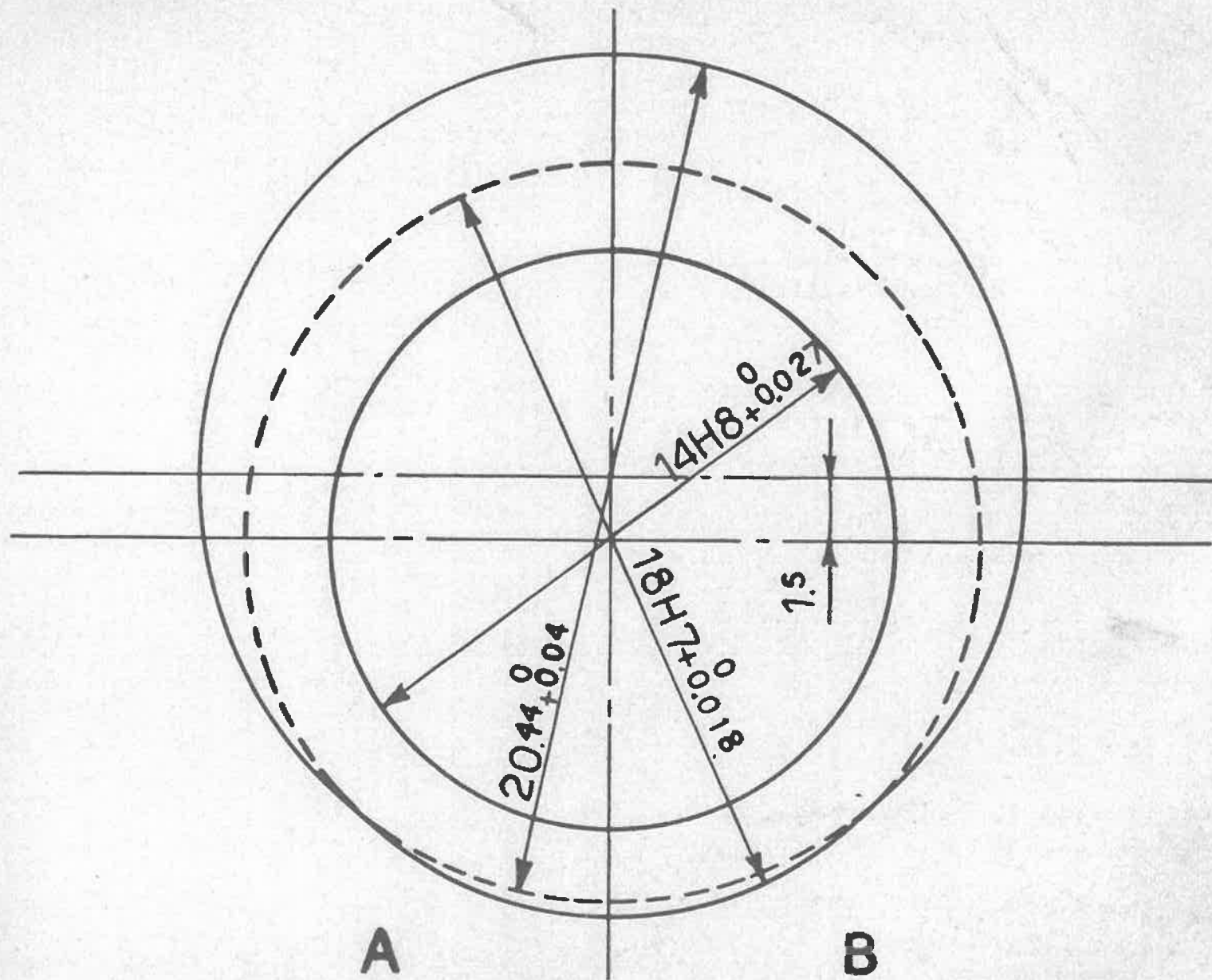
Finding wear over mm. 0.08 replace the workpiece. The blind hole that allows the support of the in Shaft 7 mm + 0.04, -0.00, maximum wear mm. 0.08.

Toothed shaft. Check the condition of the thread at the inner end. It must be smooth and free of scratches.

- The state of the conical forcing surface in the gear seat. Must be smoothed and free of linings.

- The state of the gear teeth.

- The cylindrical surface that rests in the body of bronze. It needs to be smooth.



**Fig. 26 - Schema sede delle palette sulla pompa olio**

Since the piece is made of steel, the thickness is minimal and any play that will occur will be due to the wear of the body of the pump which is made of bronze.

Vanes: check that the surface are not scratched, otherwise replace the vanes.

Pump body. It is built in bronze. After you carefully clean with oil and blown with compressed air proceed to the following verifications: - By examining the inside body you will notice the housings of the two gears. When new the diameter is 14 mm H8 +0 / 0.027. Maximum wear 0.08 mm.

The support seat of a gear pin. When new the diameter is 7 mm + 0.04 / - 0.00 Maximum wear 0.80 mm.

Turning the piece over and examining it from the outside will note:

- The cylindrical support of the shaft. new piece diameter is mm. 14 H 8 + 0 / 0.027. maximum wear mm. 0,08.
- The sliding seat of the two vanes. It does not it is circular but has the shape and dimensions marked in Fig. 26.

For this purpose, mount the shaft in the pump body and rotate it by hand. The play between the cylindrical surface of the shaft that guides the two vanes and the lower part of the seat of the pump body (A-B in the figure) must be minimal and must not exceed 0.03 mm.

## **ASSEMBLY**

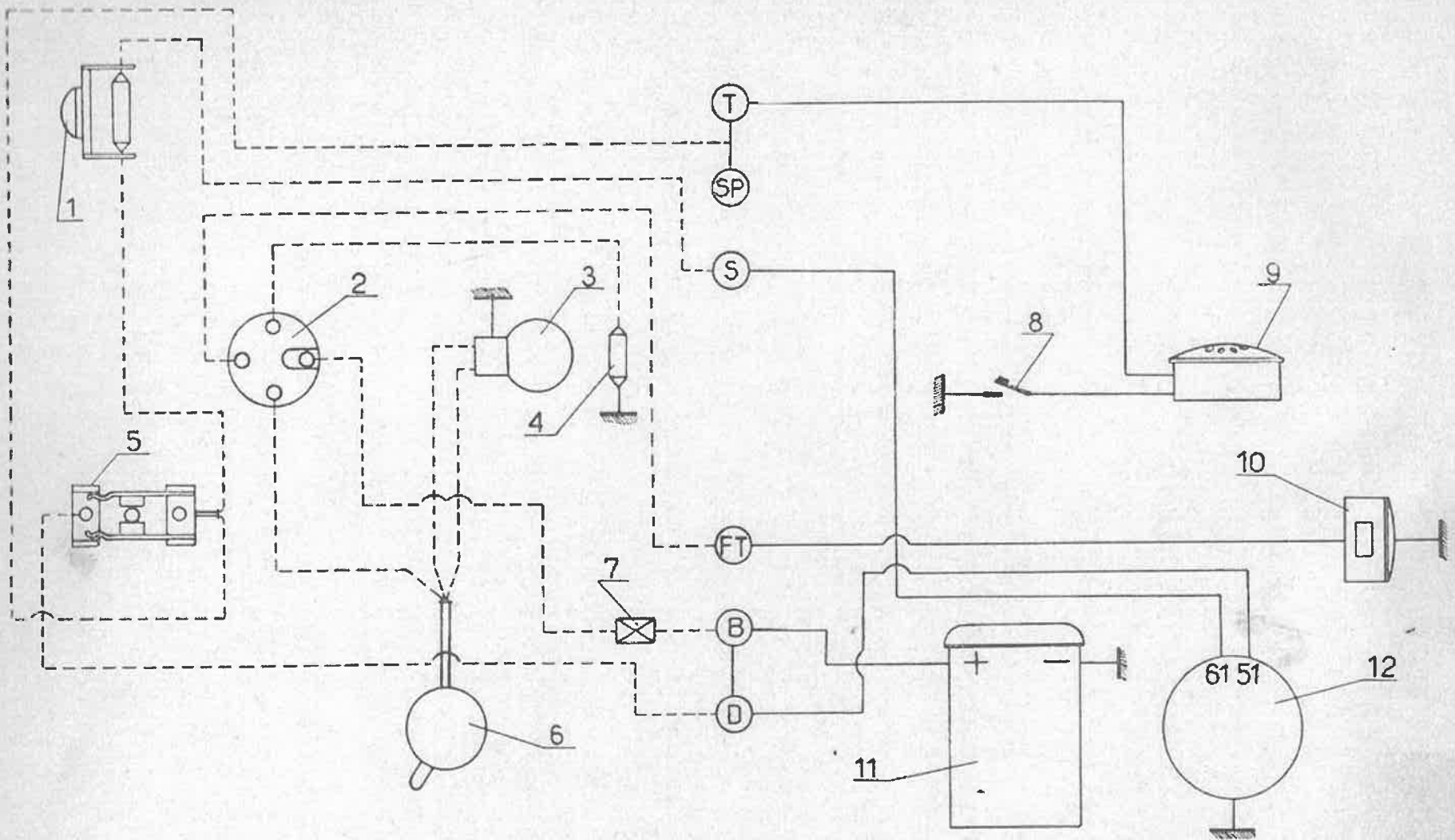
Warning Do not forget the gaskets when assembling; the pump must be perfectly sealed because, if not, it can suck in air and therefore work in poor filling conditions, causing a faulty circulation.

As soon as the assembly is completed, before reassembling the pump on the distribution cover is good to check operation, rotating the spindle in the direction contrary to the hands of the clock, looking at the gear and by connecting the lower connection and the rear with a pan full of oil, the lubricant output from the front connection and from the automatic valve must be seen.

### Oil circulation

After starting the pump on the engine, make sure that the oil circulates regularly. Since the pump is empty, it is convenient to remove a fitting and fill it with oil.

To make sure that the oil circulates regularly and well, touch the walls of the tank: they must be lukewarm after a few minutes of running.



- 1 Spia carica batteria
- 2 Commutatore luce città e viaggio
- 3 Lampadina luce viaggio
- 4 Lampadina luce città
- 5 Interruttore
- 6 Deviatore luce abbagliante e anabbagl.

- 7 Valvola fusibile
- 8 Pulsante tromba
- 9 Tromba elettrica
- 10 Fanale targa
- 11 Batteria
- 12 Dinamo

- D Dinamo
- B Batteria
- FT Fanale targa
- S Segnalazione carica
- SP Spinterogeno
- T Tromba

**Fig. 27 - Schema delle connessioni dell'impianto elettrico**

## IGNITION GROUP

Ignition is ensured by high voltage Magneti Marelli type BL 1-MBL 22.

**DISSASSEMBLY** (see P. 18).

### INSPECTION

Check the points by cleaning them with a fine file. If beyond service replace them with original type components.

Lift the hammer and lubricate the pin with mineral spirits. Lubricate with mineral oil the surface of the cam and ring guide in the cylinder head. When you install the bushing make sure that the key is fully positioned in its seat.

Check the opening of the points: it must be three or four tenths of a millimeter.

- Ball bearings, do not need special care, being filled with grease at assembly, lubrication is ensured for a long period of time.

They can be inspected by disassembling the magnet bushing complete; supply them with special mineral grease.

If possible, after the inspection is check the operation of the magnet on a special bench equipped with a gauge.

Important warning: when mounting the magnet on the engine crankcase do not forget the special thicknesses. If the latter were unusable or lost, check carefully: 1) the parallelism between the axis of the magnet and the axis camshaft.

2) the distance between these axes. This must be such that allow the correct contact between the teeth of the gears.

The cable that connects the magnet to the spark plug - Check the condition of the insulated surface. If you find worn or cut areas where ground discharges can occur (causing missed hits to the engine) replace the cable.

Spark plug: C W 225 A (Marelli).

Check the condition of the insulation; if cracks are found or breakage replace the spark plug.

- The distance between the electrodes must be 0.5 mm.

To check the compression seal, pour a little oil between the insulation and the external hexagon of the spark plug. Observe while the engine is running if there are bubbles in the oil; in this case, replace the spark plug. It is not advisable to disassemble the spark plug.

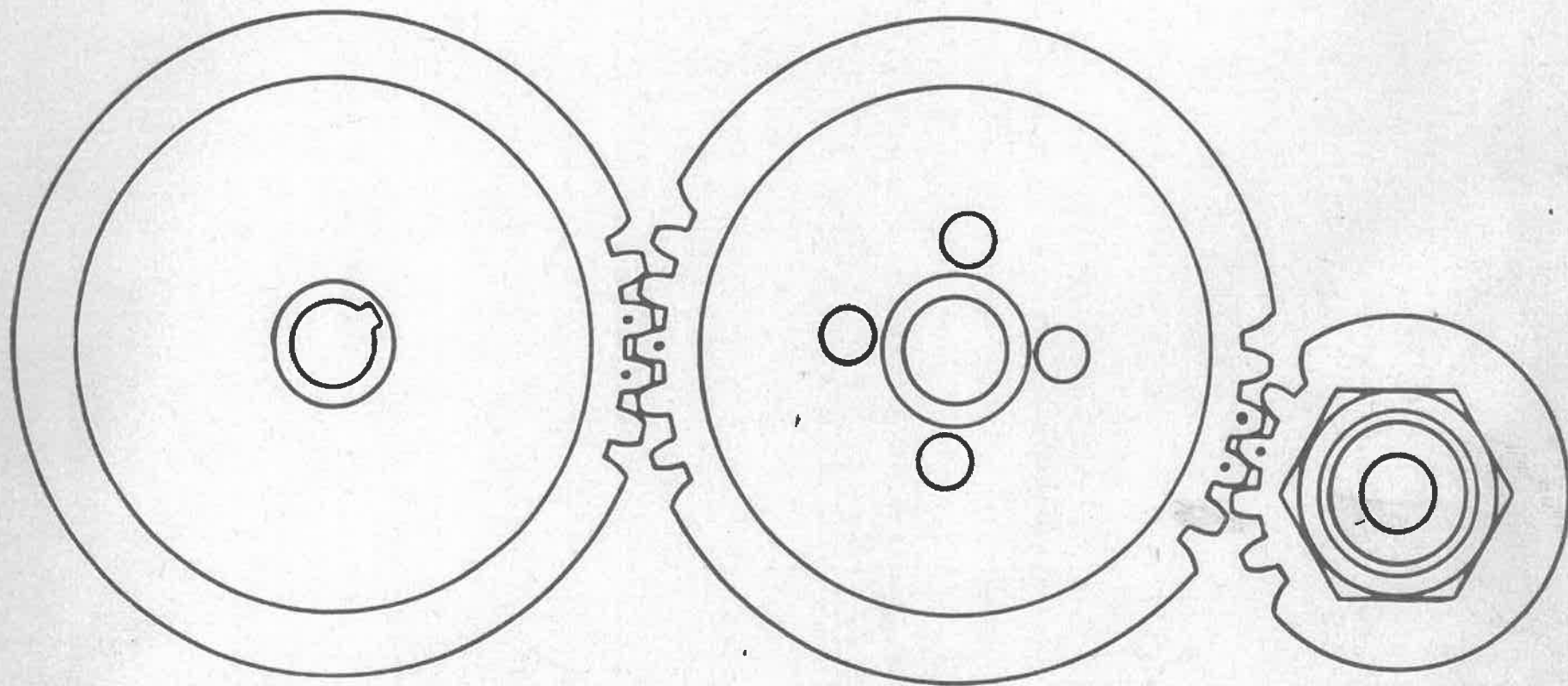
To clean the spark plug, use clean gasoline. - It is good not to change the type of the spark plug.

Remember that many inconveniences to the engine can be avoided with the constant use of a suitable type of spark plug.

Bench test of magneto.

1 - With a distance to the standard spark plug gap of 5 mm, the spark must be obtained at a speed not exceeding 100 revolutions if the ring is in the "fully advanced" position at a speed not exceeding 200 revolutions if the ring is in the "fully retarded" position.

2 - pressure test. the spark must be obtained at a speed not exceeding 100 revolutions if the ring is in the "all advanced" position at a speed not exceeding 200 revolutions if the ring is in the "fully retarded" position - 2 pressure test.



**Fig. 28**



At the speed of 3000 rpm, the sparks caused by the electrodes of a spark plug mounted on a special pressure chamber must follow one another regularly, raising the pressure up to five atmospheres and in full advance.

Removing Dynamo from Engine: see page. 19.

## **INSPECTION**

Dynamo (DN 19 G 30/6 2000 D).

Check the status of the brushes. slide freely within their guides. If they are dirty, clean them and replace them if worn.

- The status of the collector. If it is blackened, clean it with petrol (never use petroleum for this operation). It is not advisable to use emery paper even if it has a very fine grain. If deep scratches are found on the manifold, it is advisable to lightly turn it.

- Ball bearings do not need lubrication at very long intervals. The rotor is removed and the bearings filled with special mineral grease.

- Automatic voltage regulator calibration is performed on a test bench and therefore it is not recommended to vary it.

Cable -check the external state especially in places where sliding between metal parts and isolated. If defects are found, replace the cables.

Headlight (SIEM). It is perfectly watertight, which makes internal inspection unnecessary. Remember that the specular surface of the dish does not need to be cleaned because it scratches easily and loses its luster.

Focus. Its fixed focus and occupied by the filament of the light bulb.

Bulb - Use lamps of the same size and type of those mounted by 25/25 Watts.

Anti-glare Button and switch - Lubricate the switch located on the handlebar and the movement of the switch located inside the headlight. For correct operation it is necessary to check whether the electrical contacts inside the headlight correspond to the two extreme positions of the switch lever, if not, adjust the sheath using the tensioner located outside the headlight. The above is for the Marelli FMN 150 headlight. On S.I.E.M. and E.C.I. the changeover switch does not require any registration as it is electrically controlled.

Electric horn adjustment.

With the operation of the alert, it may occur that,

or for the adjustment of some parts or for the consumption of others, the sound is no longer what it was at the time of the first installation.

Adjustment is therefore essential. After checking that the accumulator is loaded, use a screwdriver to go to the back of the appliance and adjust the sound by turning the round head screw located to the left of the support. This screw has a knurled cone under the head, so that, by turning it to the right or to the left, the teeth will click. Removed the screwdriver, it will remain in the position sought which is the one in which the sound emitted is the best.

## Battery

Carry out a thorough cleaning especially in the upper part of the elements and check that there are no cracks. Remove the caps and check the level and electrolyte density (with special density meter). If the battery and efficient the electrolyte must have the density of 28 BE in each element; otherwise recharge it.

The level should be about one cm. above the plates if it is missing add distilled water. The latter operation should be performed more often in the summer months every 30 days, while in the winter months it is checked 50 days approximately. It is advisable to keep dry and clean the terminals and the top of the battery elements. It is convenient to grease with Vaseline the threaded part of the terminals themselves.

NB. If the battery does not keep the charge contact a specialized workshop equipped with all those appliances needed for disassembly.

Diagram of electrical system connections.

See fig. 27.

The conductors marked with solid lines are external, the dotted ones are contained inside the lighthouse. The six terminals marked with the letters D – B – FT - S – SP - T (they are located in the inner part of the headlight) must be connected respectively: the connection D to the dynamo (51) terminal B to the battery, the connection FT to the license plate light, the connection S to the dynamo indicator light (62), the connection T to the horn.

If you have a special bench is recommended check the operation of the Dynamo.

Let's give here below, for this purpose, the hot calibration data: Power 30 W voltage. Self-regulation of the voltage within the limits from 6.3 to 7.3 volts at varying the load and temperature (up to +50) with respect to the ambient temperature. Start charging 1000 rpm. Normal power at 1900 rpm. Maximum operating speed 5500 rpm. Right spin. Dynamo motor ratio 1: 1.

To proceed with the assembly of the engine arrange first assembled the individual groups as they were obtained from the general disassembly. Then reverse the operations of disassembly. Omit the head, flywheel, and cover in the assembly distribution. These will be mounted after you put the engine on the machine. After mounting the head, it is necessary to introduce from the hole for adjusting valves about 50 cm<sup>3</sup> of oil equal to the engine.

The distribution cover is the last operation to perform and will be done after setting the motor timing. Verify that the mating surfaces of crankcases, lids, etc., are very clean and smooth. Before mounting they should be evenly coated with gasket cement.

## **ENGINE TUNING**

To start up the engine, the following steps must be performed: following two operations, after putting the motor in the machine and having mounted the head and flywheel.

Deployment phase (first operation):

When the arrow on the flywheel is 95 ~ 105 mm measured on the periphery of the flywheel from the one marked on the cover (see Fig. 29 A), the intake valve must start to open: once the intake has been set up, the exhaust is also adjusted.

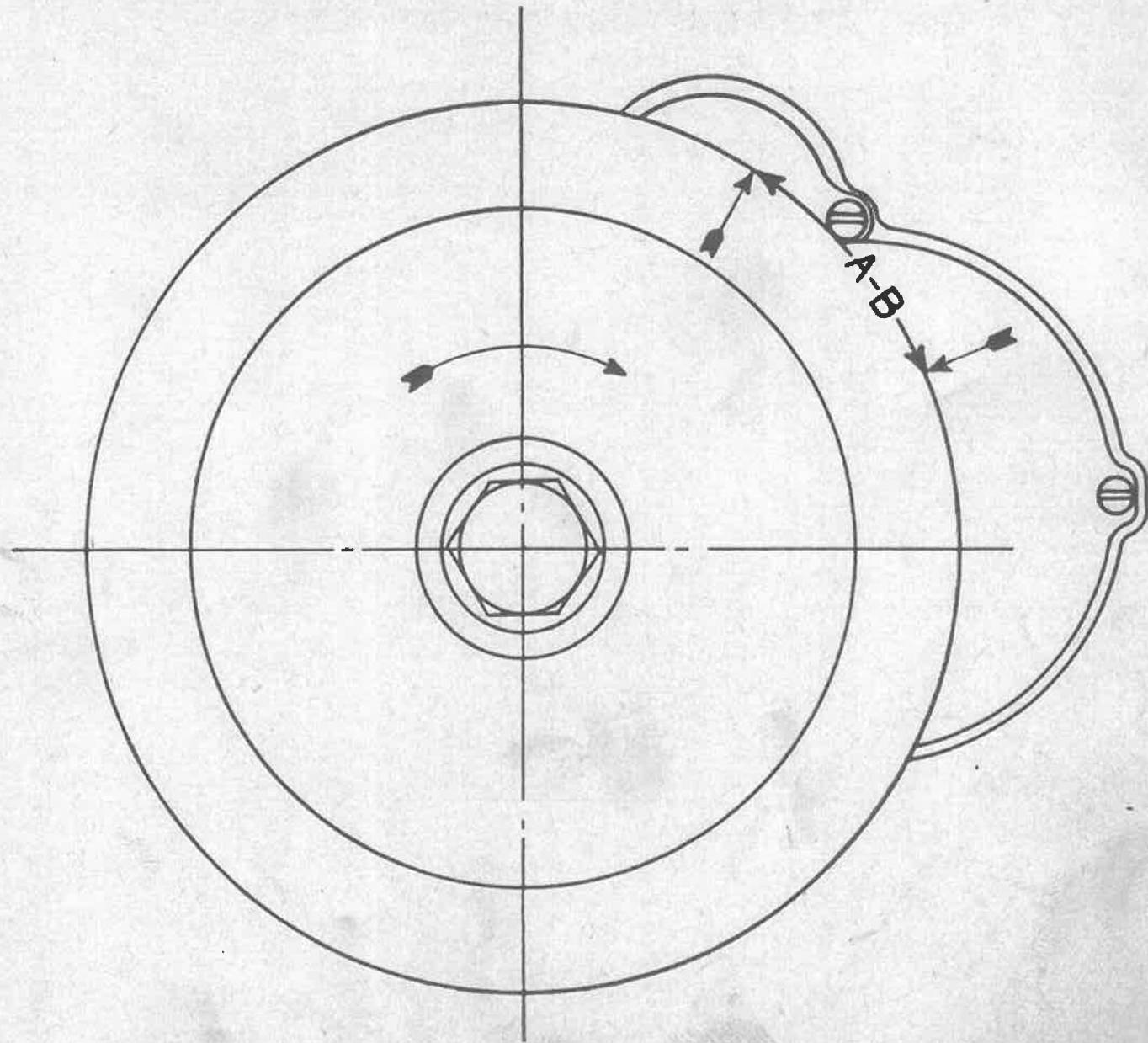
When no timing gear has been replaced, timing is made easier by the marks traced on the gear teeth.

Bring to Top dead center the piston before mounting the timing gears. The marked tooth of the drive shaft pinion must enter between the marked teeth of the camshaft gear and the marked tooth of the latter must enter between the marked teeth on the magnet control gear

(see - fig. 28).

Adjustment between rocker arms and rods. Adjustment is carried out on a cold engine. Using of special socket wrench and of screwdriver unlock the nut and screws or loosen the screw with slot acting on the tablet of the rod. When adjusting, it is necessary not to leave any slack and make sure that, even if there is no slack, the screw does not point on the pad of the forend of the rod. Once the adjustment has been made, holding the screw firmly, the nut is locked.

NB. - Once the work has been completed, check again that the screws do not point on the rods, it may happen that when locking the nut, the latter drags the screw varying adjustment.



A = mm. 95 ÷ 105

**Fig. 29**

B = mm. 78 ÷ 80

The adjustment must be done with the piston at top dead center, with closed valves and precisely at the end of the compression phase, Phasing of the magnet (second operation).

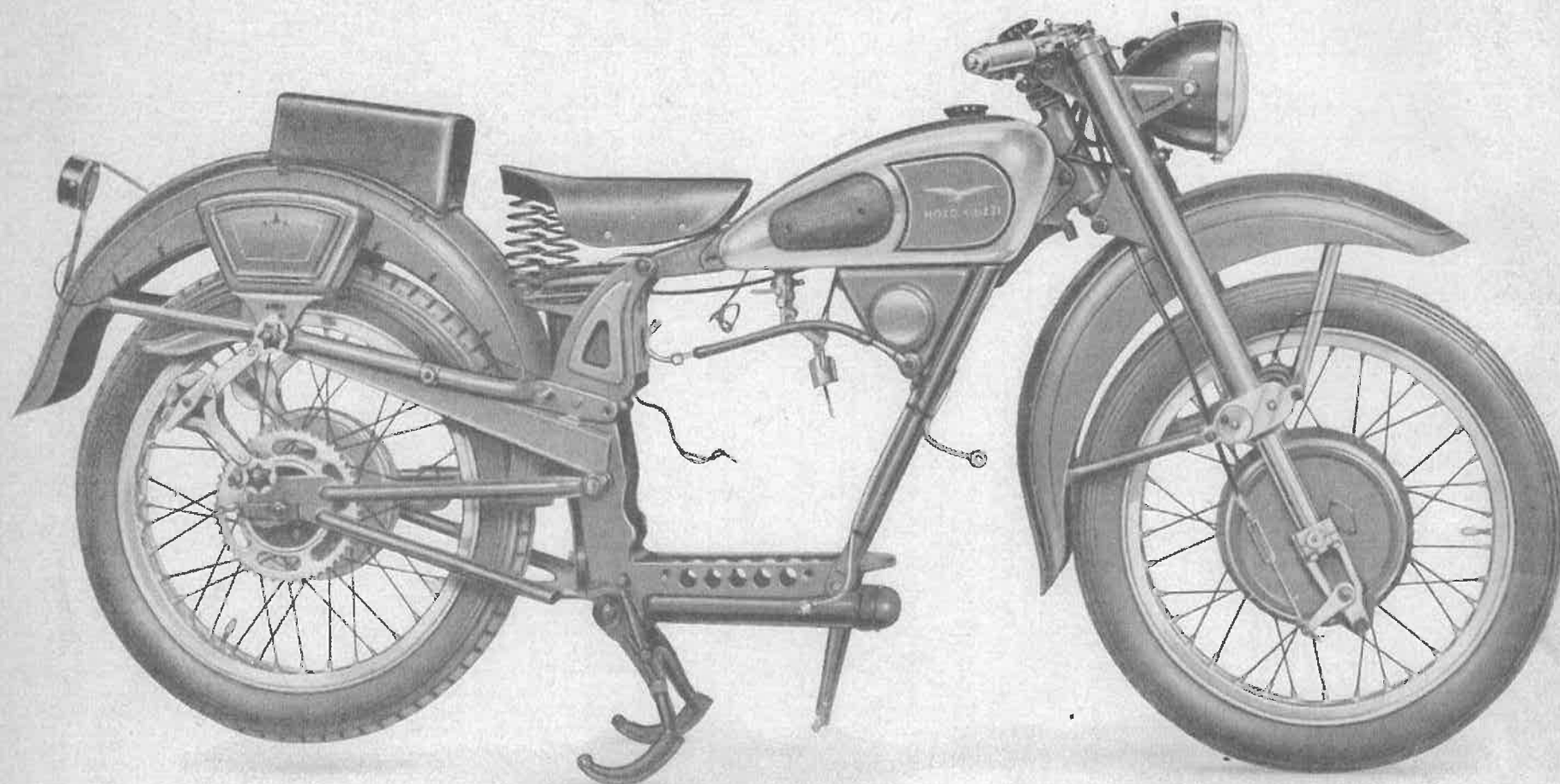
When the motor is about at the end of the compression phase, with the piston in the vicinity of the upper dead center, the valves closed and with advance control in position fully advance, the breaker points of the magneto must begin to open, when the arrow marked on the flywheel is 78 ~ 80 mm (measured on the periphery of the flywheel) from the one drawn on the cover (see fig. 29 B)

## **ENGINE TEST**

Carried out the general review is always advisable, where possible, test at the engine bench.

If piston replacement and reaming have been performed of the cylinder, it is necessary to run the engine, that is to make it work with little brake load, for about three hours, at speed progressively increasing from 800 to 3000 rpm. Then briefly try the maximum power: at 6000 revolutions must be obtained, at free discharge, about 13.5 Hp. It is strongly recommended not to force the engine overhauled before vehicle has traveled about 1500 Km., and not to overdo it in the first 500 Km. in the rotation of the engine having the warning of not open more than half the gas control.

If you do not have a test bench, take care of carry out the run-in on the vehicle, following the procedure described above. It is recommended to replace the lubricant and wash filters after the first 500 Km.



**Fig. 30 - Telaio completo pronto per lo smontaggio**

## **DISASSEMBLY OF THE CHASSIS**

To proceed with the disassembly of the frame as soon as the operations to wash the engine have been completed (see chapter "Disassembling the engine from the frame and fig 30), proceed as follows:

Remove the saddle and battery after loosening the respective fixing bolts.

Remove the petrol tank. By loosening the fastening bolts, the tank is removed from above.

Remove the oil tank by loosening the two fixing bolts after having disconnected the oil recovery and delivery pipes to the pump and head.

## **DISASSEMBLY OF THE REAR PART OF THE FRAME**

Remove the rear brake link by unscrewing the bolt that fixes the joint to the swingarm pivot and the nut that fixes the link to the brake lever. Remove the rear wheel by unscrewing the anchor bolt and loosening the 2 center pin nuts. (for wheel removal see page 84). Remove the shock absorbers, the cushion, the toolboxes, the chain guard, the light, the mudguard and the two rear arms.

## **DISASSEMBLY OF REAR SUSPENSION AND SWINGARM**

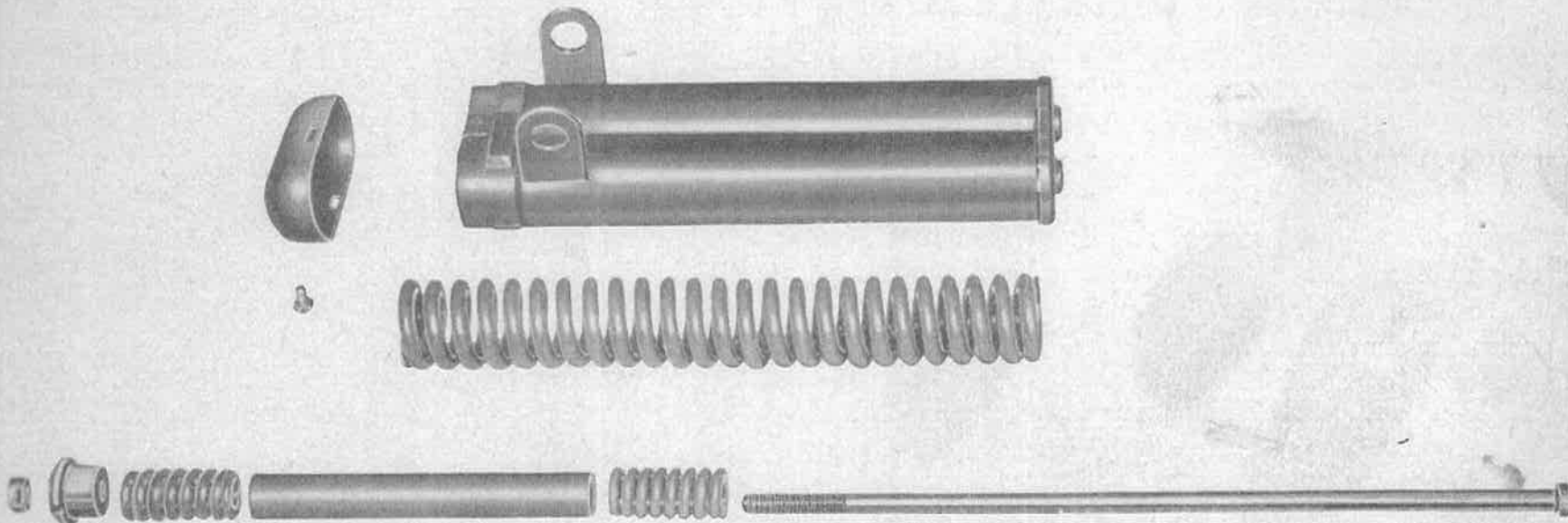
Remove the cover for the spring tubes. Unscrew the locknuts and sleeve nuts on the two suspension rods.

Remove the nuts of the main pivot of the swingarm. Completely unscrew the pin itself, taking it with a suitable wrench on the appropriate frame, it slips out to the right.

In this way, the complete swing arm spring box and its tie rods can be removed.

Remove the two shock absorbers from the swingarm. Remove the covers and the springing joints and extend them sideways.

NB. Check the exact order in which the individual pieces are removed to be able to reassemble them exactly. For overhaul and assembly see page. 90.



**Fig. - 31 - Tubi porta molle: si noti sfilato il gruppo del molleggio**



## **REMOVAL OF THE TELESCOPIC FORK (see figure 32)**

Remove the headlight by unscrewing the two attachment bolts. It can be removed with all the cables and headlight switch after having detached them from the handlebar.

Unthread the inner body of the fork, to obtain this: unscrew the nut #1, the cap for the sleeve, #2, remove the spring #3 (using a special socket wrench) unscrew the ring nut #4, then remove the internal body slowly allowing the fork oil to drip into the inside of the arm where it is contained before completely removing the body.

Remove the wheel, to obtain this: detach the brake cable from the front brake control lever by removing the cotter pin, dowel and the wire tensioner bolt. Remove the 4 bolts, the lower part of the left clamp and the wheel (to remove the wheel see page 84)

Detach the fork with the mudguard mounted from the steering unit by removing the two attachment bolts. Once the fork has been removed, remove the arm #5 by holding it with one hand and at the same time by turning it slowly. Be careful not to spill the liquid contained in it.

To remove the mudguard and the inside of the fork boxes it is necessary to: Remove the upper part of the fender attachment bolt and the 4 #6 bolts on the slider boxes, you can thus remove the fender and the two #7 plates, unscrew the two screws from the #8 cover of the slider box; remove the cover with the pin #12 together and operate the eccentric pin #9, the adjustment washer #10, the roller #11, and the sliding block #13.

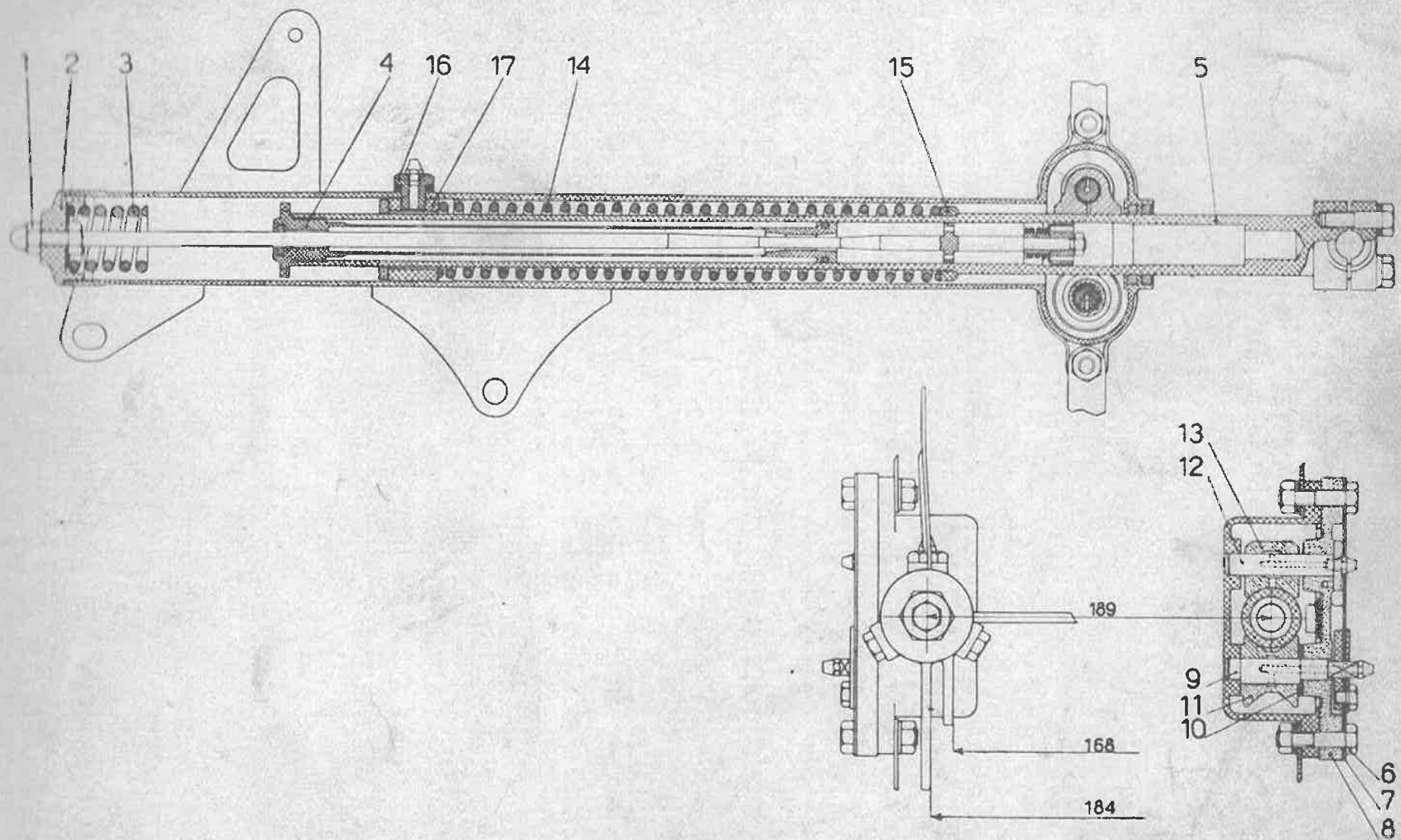
To remove the spring #14 and the ring #15 you need to unscrew the three bolts #16 that hold the upper guide. Remove these pieces from the top of the fork. NB - Disassembly is the same for both forks.

## **DISASSEMBLY OF THE STEERING HEAD**

Remove the handlebar by removing the two retaining clamp caps. Remove the steering damper hand wheel by unfastening it completely and the steering head nut, tapping lightly with a wooden mallet on the steering base, the steering head is removed alternately to the right and left. Once this is done, the complete assembly of the steering tube can be easily removed.

Warning: Immediately remove and contract the bearing balls of the caps which, no longer held, may fall. There are 18 in the upper part and 18 in the lower part. Remove the two rods that hold the front part of the frame together.

Remove the spring tube and the respective springs of the suspension system. Remove the motorcycle support stand by removing the two fixing bolts and opening the return spring.



**Fig. 32 - Come si presenta l'interno della forcella telescopica**

## **DISASSEMBLY OF THE FRONT HUB COMPLETE WITH WHEEL**

Clamp the axle of the wheel assembly in the vice opposite to the brake drum. Unscrew the nut that fixes the brake holder disc and remove the disc, the clip for felt seal / washer, the washers and the felt seal. Remove the axle from the vice and put it back on the opposite side. Unscrew the nut securing the dust cover and remove the cover. Unscrew the lock nut and the bearing adjusting nut, remove the felt sealing clip, the washers and the felt seal. Remove the wheel from the vice again and with a lead hammer strike the axle on the side opposite the drum to extract the axle and bearings from the hub.

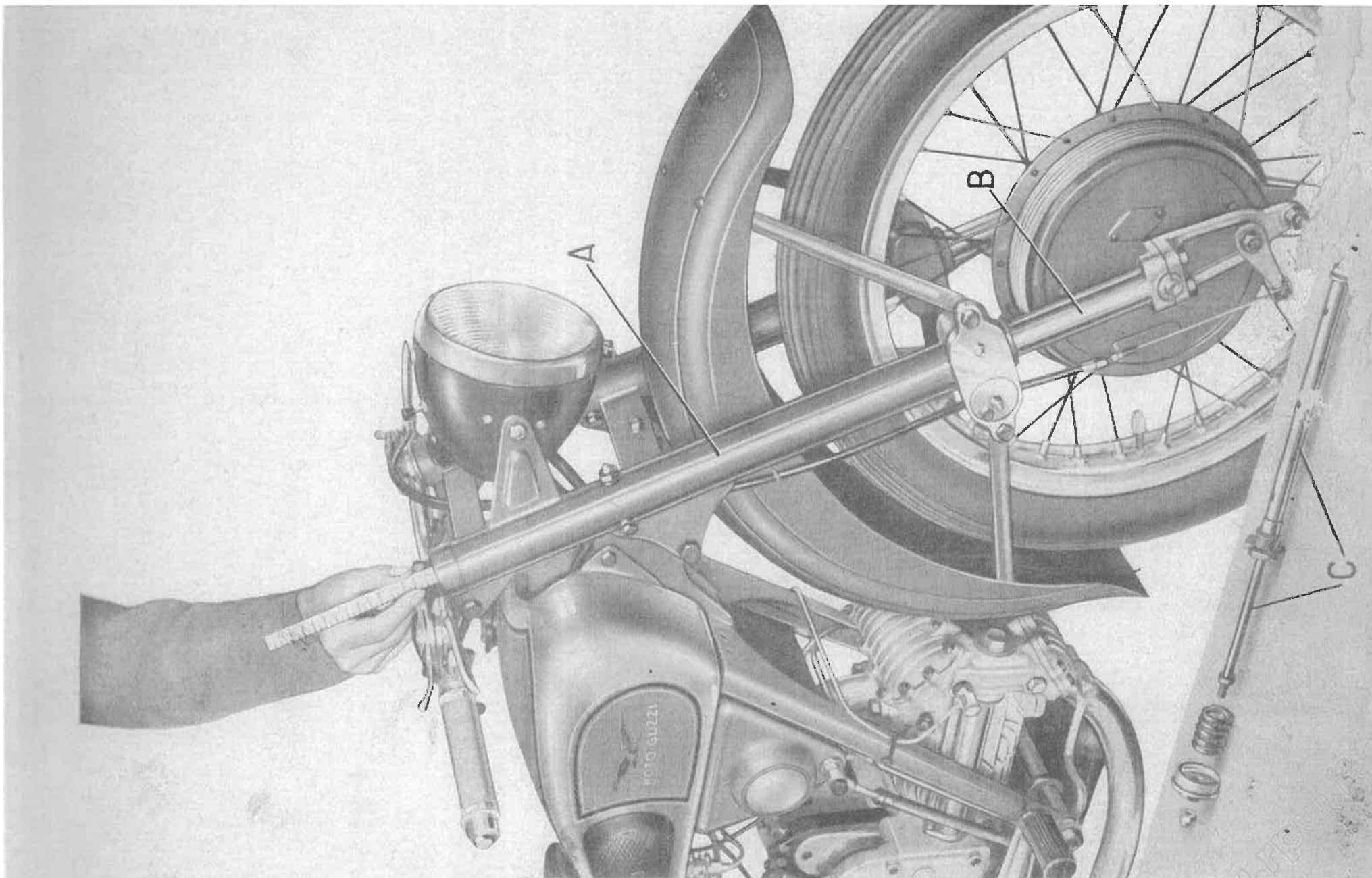
## **DISASSEMBLY OF THE COMPLETE REAR HUB WITH WHEEL**

Unscrew the two nuts from the axle and then remove the two chain tensioners, the dust cover plate, and the spool. On the opposite side, remove the spacer, the disc holder and the spool. Clamp the axle on the drum side in a vice, remove the spring, the washer, the felt and the washer.

Remove the axle from the vice, put it back on the opposite side and unscrew the ring nut after releasing it from the screw. Remove the wheel from the vice again and with a lead hammer strike the axle on the side opposite the drum to extract the axle and bearings. Remove the flexible coupling assembly by removing the 6 bolts and the brake drum by removing the 5 sealing bolts.

## **REVIEW AND ASSEMBLY**

Warning: The inspection and revision of the frame can be divided into normal and accidental. The first is carried out on a general overhaul of the machine, and particularly concerns wear between fixed and moving parts (bushings, pins, etc.); the second is carried out independently of the first, when following a violent impact, some part has suffered permanent deformations. We will expose below the checks relating to the normal overhaul and the control measures to be able to operate, whenever possible, the squaring of the deformed pieces.



**Fig. 33 - Verifica del liquido nella forcella telescopica**

## TELECOPIIC FORK

### INSPECTION

After proceeding with the disassembly of the individual parts (see page 82), proceed as follows:

**Fork.** Check the measurements of the cross section of the tubes and of the ears (see fig 32).

**Seals.** Clean and check all seals, see if they have lost their elasticity of perfect sealing, if they are worn or broken. In these conditions it is certainly necessary to replace them.

**Springs.** The compression-acting fork spring has a new and unloaded piece with a length of 300 mm and 33 kg are required to reduce the length to 250 mm. Check the load; if less than 29 kg replace the piece. The additional spring for the compression acting fork has a length of 40 mm when the piece is new and unloaded and 107 kg are required to reduce the part by 97 kg.

**Upper Fork.** Check the bushings of the upper fork, they must be free from scratches, notches, and cc. Check the play between the arm and relative bushing. This play must not exceed 0.3 mm. If not, replace the bushings.

**Fork Sliders.** Check the upper part of the arm where it slides into the bushing, it must have a play not exceeding 0.3 mm. Check the lower part of the fork where it slides between the bronze guide and the bronze roller; if you find scoring or light wear, you must bring the arm to 30-0.10 diameter by grinding. If the wear is greater than the above measurement, it is necessary to grind to 30 diameter b 8 -0.130 - 0.193 then, by means of thickness and grinding, bring the fork tube to 30 diameter h 8 -0, -0.033. If the scoring or wear is deep, the arm must be replaced.

**Roller Guide.** If the surface where the fork tube slides is scratched or heavily worn, the piece must be replaced.

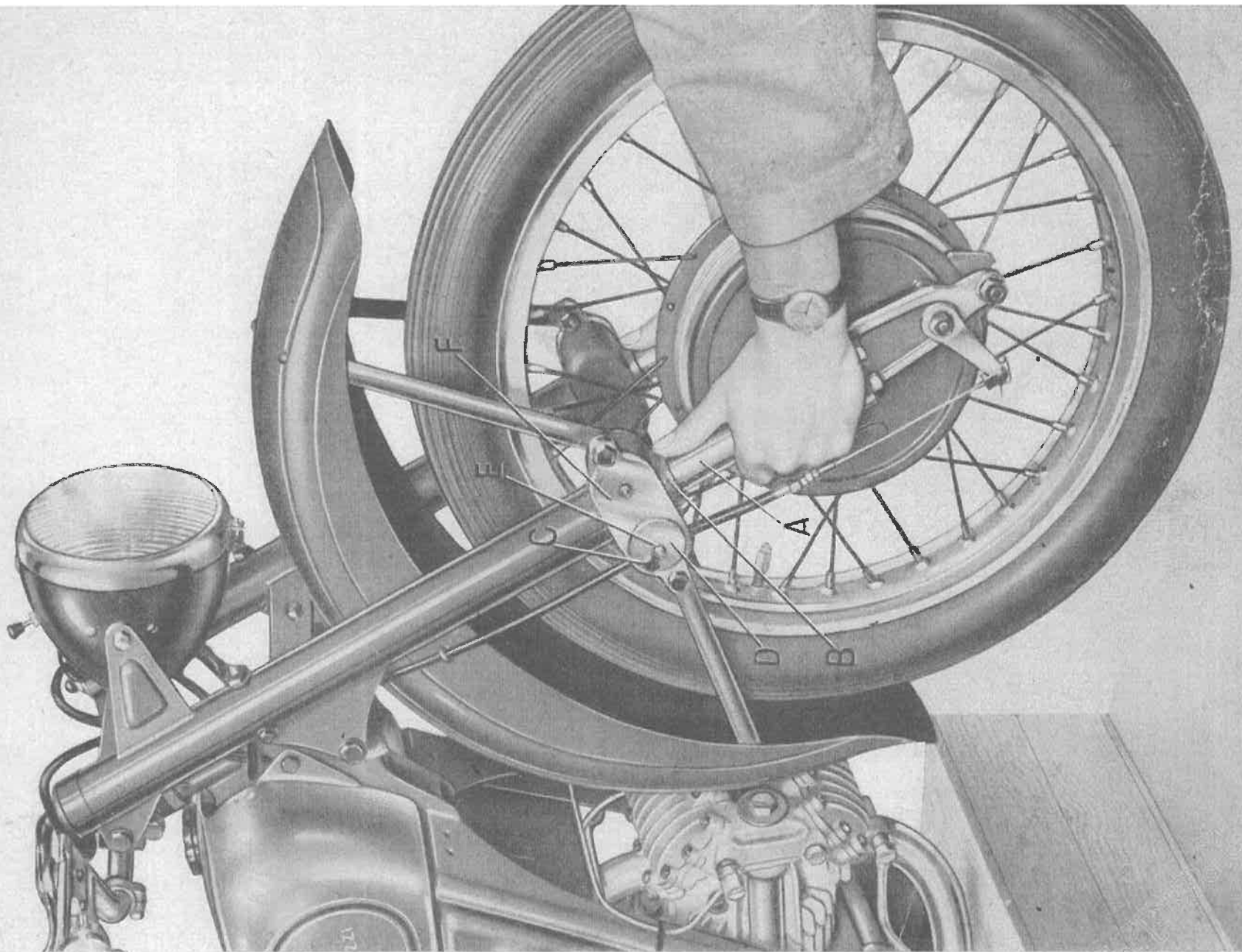
**Rollers.** Check that the surface where the fork tube slides is not worn, that there is no plane formed; finding this it is necessary to replace the rollers.

Check the play between the eccentric pin and the roller; should not exceed 0.2 mm, otherwise replace the roller.

### ASSEMBLY

To assemble the complete unit, reverse the disassembly operations.

Warnings. Check that all the seals have a perfect seal 'see Fig 32 how they must be assembled.



**Fig. 34 - Registrazione della forcella telescopica**

Check that the spring holder ring (see Fig 32, No. 15) has the flat part where the spring rests.

During assembly, the flat part where the spring rests. When mounting the roller guides and rollers, make sure that when mounting the roller, the shim faces the inside of the box and the adjustment washer (see Fig. 32, No. 10) is mounted towards the outside. After having mounted the cover of the slider box, with a finger inserted inside check that the roller turns with normal play. If the roller is jammed or has too much play, it is necessary to replace the adjusting ring with one having a thickness less or more than the one fitted.

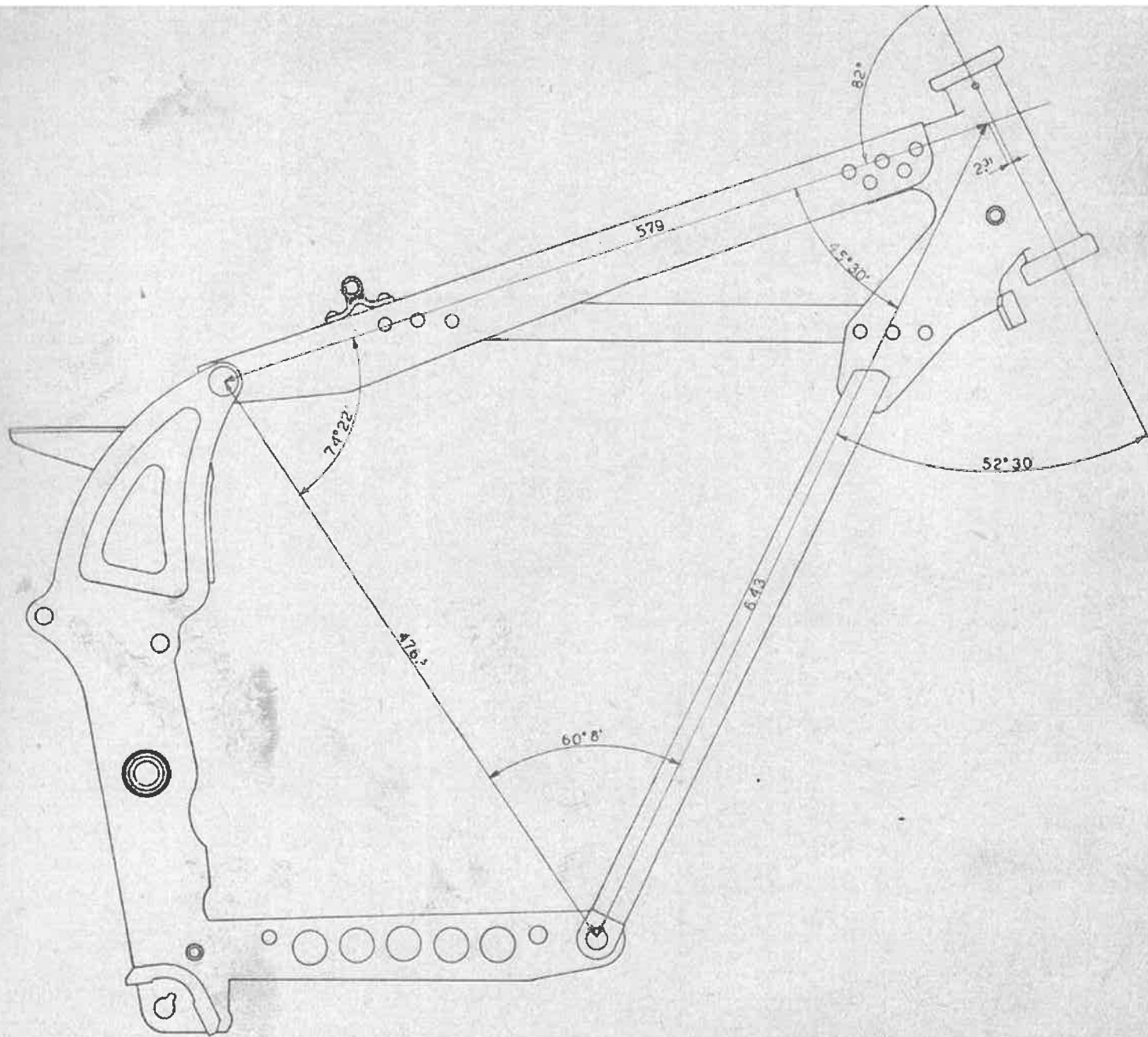
Insert the two fork tubes and temporarily secure them by closing the rollers. Place the fork, mudguard and wheel on the frame. At the end of these operations, it is necessary to put in the fork the fork fluid; to introduce it into the fork tubes B (see Fig. 33) it is advisable to use a plastic tube, to ensure that the liquid is not poured between the sliding arm B and the inside of the tube A. Check the level of the liquid whose height must be 26/28 cm measured from the inner bottom of the fork tube B. We recommend using special liquid for SHELL DOAX A1.

Before inserting the body of the damper C remember to mount the lining ring on the guide. After having completely assembled the fork, it is necessary to proceed to its adjustment (see Fig. 34) checking the play of the fork tubes, roller guides and rollers. To perform this check, it is necessary to raise the front part of the machine just enough to remove the wheel from the ground.

Then, grasp the fork tubes A with your hands, taking care to place the thumb of each hand on the lower edge of the roller box B and at the same time on the fork tube A, to feel any play. Adjust the fork sliders in the following way: loosen the bolt C on the roller guide D, then with the appropriate wrench turn the square end of the pivot pin E in the clockwise for the right rod and in counterclockwise for the left fork tube just enough to bring the roller against the fork slider which is being adjusted to eliminate play. In these conditions the arm A cannot slide between the roller and the guide. Then rotate the square of pin E in the opposite direction to the previous one, just enough to move the disc D by three or four millimeters on the edge of the disc itself. To obtain this measure, it is necessary to make a mark between the disc D and the cover of the box F before making this movement. After recording, lock the bolt C on disk D, check as already said above and as shown in Fig. 34 that there is the minimum play not to block the movement.

It is necessary to keep the arms well adjusted, because, if sensitive play is formed, the arms, guides and rollers would wear out, making any further adjustment difficult with consequent unsatisfactory operation.

Remember to lubricate the fork using the special grease nipples with SHELL RETINAX CD.



**Fig. 35**

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## CENTRAL FRAME

### DISASSEMBLY

See chapter "Removing the frame"

### INSPECTION

**Steering head**, check the clearance between the steering pivot tube of steering gear and frame pipe of head. This play is the one existing between the ball bearings and the caps (two upper and two lower). If you find an excess of 0.5 mm clearance both at the top and at the bottom, replace the pair of caps concerned and the balls. Warning: To make it easier to assemble the balls, it is necessary to spread thick grease on the caps and immerse the balls (18 below and 18 above) in the grease, thus remaining retained by loosening.

**Steering damper**, steering damper must also be adjusted according to road conditions and driving speed.

**Swing arm**, check the clearance between the swingarm pin and the relative bushings. It must not exceed 0.15 mm; Fig. 35 gives the main measurements of the frame.

**Central Frame**, the frame is made up of a fixed part and an articulated part with respect to the central frame. In the part integral with the central frame are to be noted: mudguard, saddle, fixed arms, etc. All these pieces do not require particular care except for the preservation of the paint.

The articulated part includes: the swingarm with joints and pullers.

### DISASSEMBLY (see Page 80)

If there is no need to replace the tie rods or the inside swingarm, it is not advisable to disassemble the joint between the two pieces.

**Swingarm**, for inspection measurements of the swingarm (see Fig. 36) Joint, fill it with grease after cleaning.

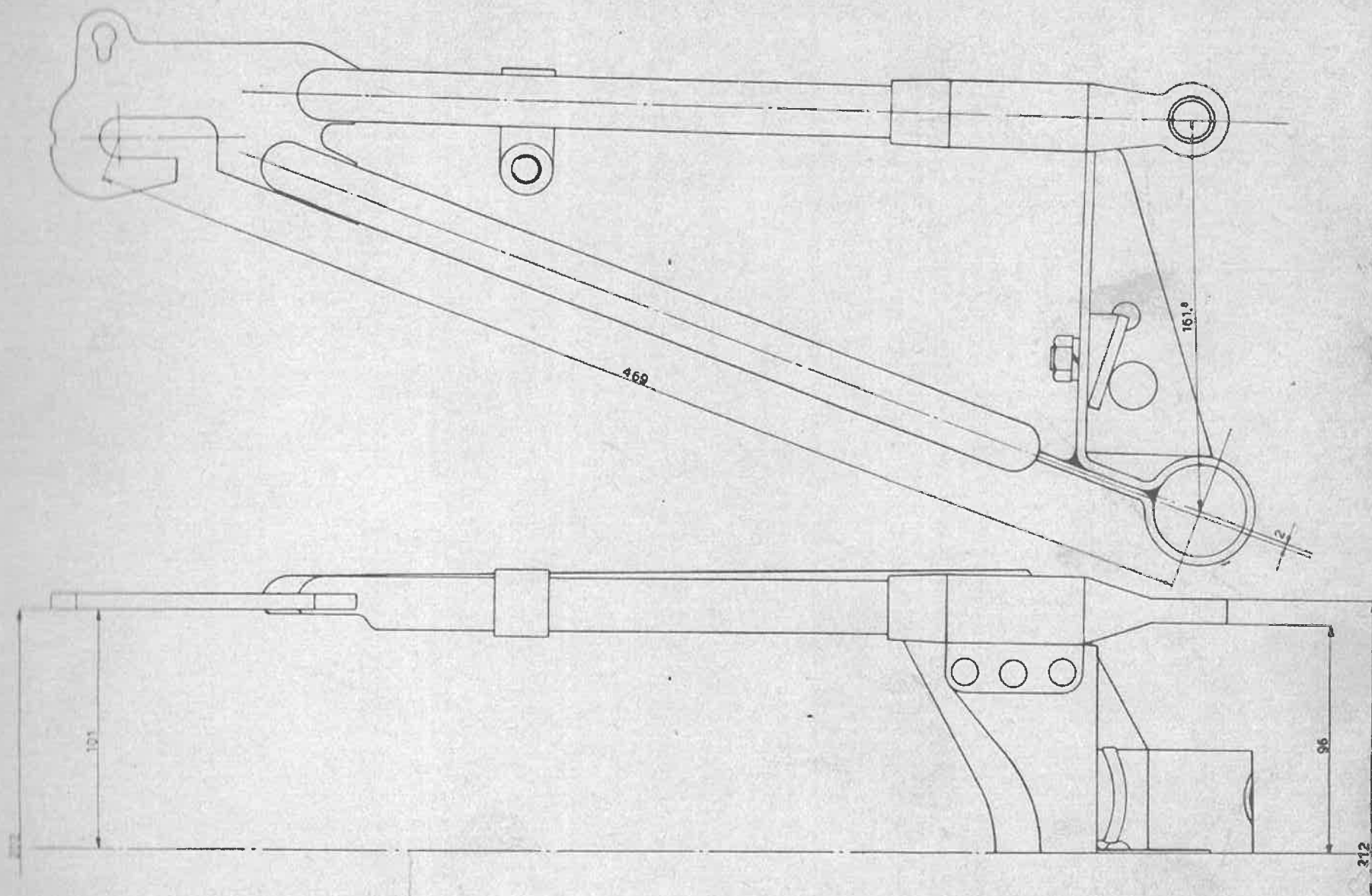
NB - For this last operation it is not necessary to disassemble the joint.

**Rods**, check the condition of the end thread. Check that they are straight.

**Spring pack** (see Fig. 31)

The pack is made up of two large springs |: inside these springs there are two short springs, on the front part, two spacer tubes on the central part, and on the rear part two medium springs. We give below the lengths and loads:

**Large springs**, new piece unloaded length 330 mm +1 / -1 130 +/- 5 kg are needed to reduce the length to 306 mm.



**Fig. 36**

**Short springs**, New piece length and unloaded 46 mm - +1 / -1  
93 +/- 5 Kg is needed to reduce the length to 40 mm.

**Medium springs**, length with new and unloaded piece 55.5 mm +1 / -1 95 +/- 5 kg are needed to reduce the length to 52 mm. Check that the springs are not broken or have undergone excessive yielding, if necessary, replace.

## ASSEMBLY

For the spring pack, for the swingarm assembly with rods and joints, reverse the disassembly operations. Reassemble the springs, these must be fully compressed on both sides by means of the two sleeve nuts (keeping the machine resting on the stand, and therefore with the wheel raised) by about 25 mm with respect to their position of unloaded springs.

## WHEELS, BRAKES AND HUBS

After disassembling the single parts (see page 84), proceed as follows:

### INSPECTION

**Wheel**, check the wheel rim for deep dents or cracks. If not, replace it.

If there are spokes broken or with torn threads, replace them.

**Spokes**, when fitting new spokes, it is necessary to check the centering of the wheel. To carry out this operation, proceed as follows: Clamp the front fork in a vice, mount the wheel on it and make it turn, checking its displacements at the periphery in the radial and axial (lateral) direction. To correct the radial positions, it is necessary to pull or loosen the spokes (right and left) diametrically opposite to the points of maximum displacement.

**Brake drums**. Check that there is no deep scoring. If not, replace the piece. Check that the inner surface (where the friction material works) is centered with respect to the axis of rotation.

**Brake shoes**. Check the state of the segments of the friction material. Front and rear brake segments. The new piece thickness is 4 mm. If reduced to about 3 mm, replace both segments. Use the appropriate copper rivets to nail the segments onto the frames.

It is convenient to replace it if cracks or cuts are found on the piece. When replacing it, take care that the outer end of the fixing nail is embedded in the thickness of the segment, to avoid scratches in the drum. Check the tension of the return springs between the blocks.

The two springs for the rear brake shoe under a load of 55 +/- 2 kg must lengthen to 13 mm. The two wheels for front brake tiles under load of 15 +/- 1 Kg/ must lengthen by 20 mm. Load tolerance approx. 10%.

**Brake adjustment**, for a good adjustment it is necessary that there is a clearance (measured at the end of the pedal if it is the rear brake, of the hand lever if it is the front brake) of about 10 ~ 15m before the friction material comes into contact with the drums. This play is adjusted by acting on the tensioner located on the right side of the fork for the front brake, and on the nut screwed on the tie rod, for the rear brake.

**Hubs**, the hubs of the wheels of the Guzzi motorcycles are watertight, they do not need lubrication but very long intervals.

For bearings see general standards on Pag. 26.

Felt seal: if damaged replace the felt.

## **ASSEMBLY**

Wheels, Brakes, Hubs

Reverse the disassembly operations. Observe the order in which the various pieces are to be assembled. Fill the bearings with grease

The front hub being equipped with tapered roller bearings and are adjustable. Remove the dust cover on the left of the machine, adjust the play as much as needed. Untighten the lock nut. It is necessary (after locking the lock nut) to have a small lateral play (0.01 mm): it is thus certain that the bearings do not bind, causing rolling resistance and rapid wear of the pieces.

## **RULES FOR PAINTING**

They are painted with nitro-cellulose: mudguards, petrol and oil tanks, chain guards and toolboxes.

They are fire painted: telescopic fork, swingarm, pedal assembly, brakes, and flywheel. As these are small-sized pieces, in general, it is advisable to recycle the entire piece. After having completely cleaned the surface to be treated, the rust inhibitor is applied by spray and dried

in the oven at a temperature of 90 ~ 100 C for about 3 hours.

After this first general procedure, with the two aforementioned systems, the piece is primed and sanded.

If the piece is fire painted, apply a first coat (opaque color) and let it dry in the oven for 2 hours at a temperature of 90 ~ 100C. The first coat of enamel is then sprayed and dried for approximately 3 hours at 60 ~ ~ 70C. Then apply the second and last coat, drying for about 3 hours at 60 ~ 70C.

If the piece is painted with nitro-celulose, after the application of the anti-rust, we proceed with primer and sanding, then the insulating mastic is sprayed and left to dry in the air for about 2 hours. We then proceed to spray it with nitrocellulose paint, leaving it to dry in the air for about 2 hours after each coat.

It is convenient to apply three coats of paint for excellent results; polishing is then carried out by rubbing with cotton balls impregnated with the appropriate paste prepared for this use.

## **DECALS**

The decals bearing the eagle and the words MOTO GUZZI must be applied on the tank and on the fenders with a special paint (flatting).

After about an hour from the application, any trace of paint is removed with white spirit, then washed off with pure water.