Index

Preface

In the high latitudes of Finland, in the parching heat of Africa, hence, under the most different conditions, the MZ moto-cycles run to the satisfaction of their owners.

To ensure that the vehicles remain in perfect working order and reliable in service after a long period of operation, involving a certain amount of wear, we issue this Repair Manual to give the necessary instructions to our MZ-Workshops at home and abroad.

Repair work is a matter of confidence in several respects:

> The safety of the driver depends an the reliability and workmanship of the mechanic.
>
> The finding of the actual cause of the trouble ensures that no material is wasted and labour costs are restricted to a minimum.
>
> From these items, 3 advantages result:

1. No retouching work,
2. short times of inoperation, and
3. low repair costs!

A good workmanship in repairs largely depends on the use of the special tools and means recommended by MZ. We should like to underline that especially self-service workshops and amateur constructors should bear this in mind in order to avoid considerable additional expenditure of labour and material costs.

Our MZ-Workshops may purchase the special tools from the MZ Spare Sales Department - for amateur constructors, there is only the possibility of constructing them with the help of the sketches given in Section 8.2.

We hope this Reference Book offers the required information to the staffs of the workshops contracted for servicing our products at home and abroad, and to the friends of MZ motor-cycles throughout the world; and we wish good success to each and all.

VEB MOTORRADWERK ZSCHOPAU
Betrieb des IFA-Kombinates Zweiradfahrzeuge
Service Department

Table of Contents

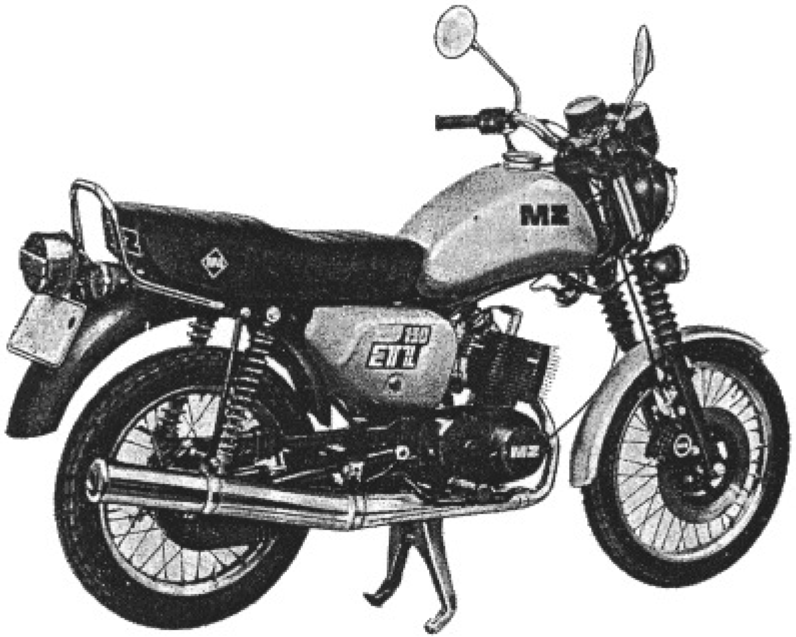

Fig. 1. ETZ 125/150 with disk brake

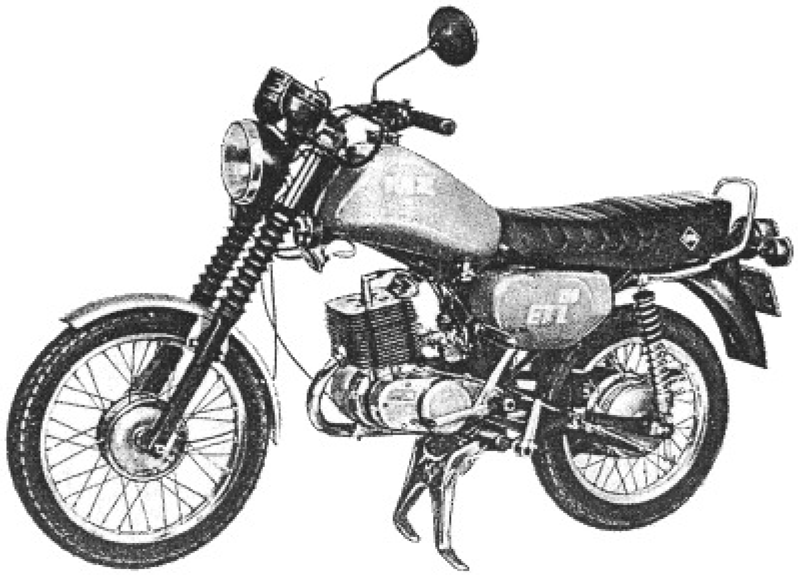

Fig. 2. ETZ 125/150 with drum brake in standard design

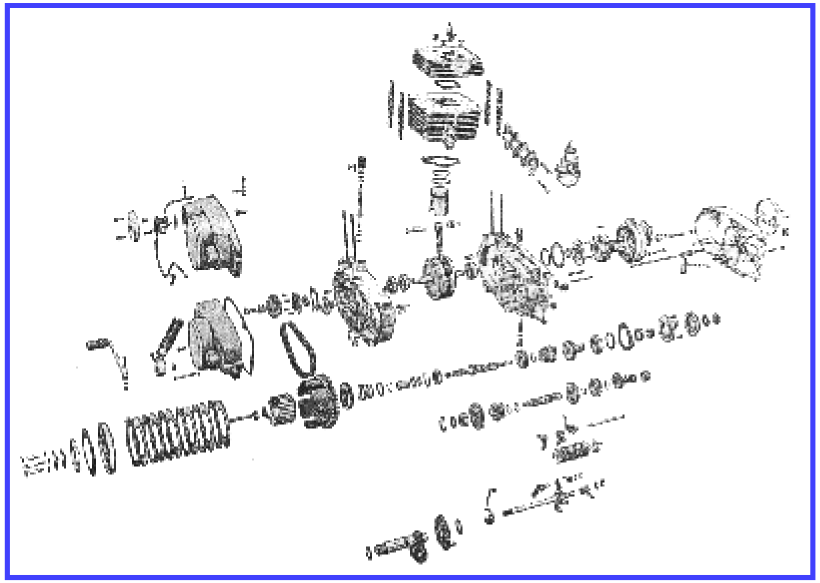

Fig. 3. Exploded view of the EM 125/150 engine

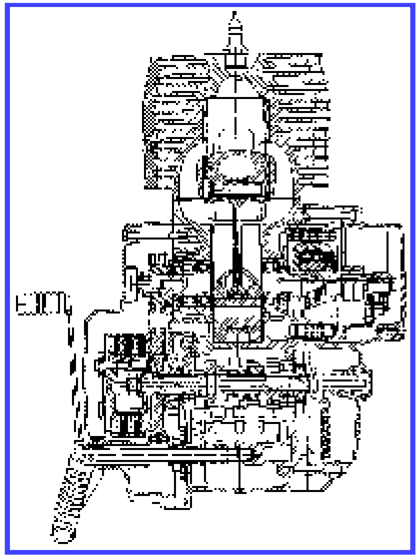

Fig. 4. Cross-section of the EM 125/150 engine

1. Technical Data

1.1. Engine

zum nächsten Punkt ; Index

	ETZ 125	**ETZ 150**	**ETZ 150**
Engine type	EM 125	EM 150.2	EM 150.1
Cycle	two-stroke reverse scavenging		
Type of cooling	air (relative wind)		
Number of cylinders	1	1	1
Stroke/bore (mm)	58/52	58/56	58/56
Swept volume (cm^3)	123	143	143
Compression ratio	10 : 1	10 : 1	10 : 1
Compression volume of the cylinder cover (in the mounted state) (cm^3)	14.25 ± 0.5	15.8 ± 0.5	15.8 ± 0.5
Maximum output	7.5 kW (10.2 hp)	9.0 kW (12.2 hp)	10.5 kW (14.2 hp)
at about	6,000 rpm	6,000 rpm	6,500 rpm

FRG		7.5 kW (10 hp) 6,000 rpm	
Maximum torque	12.3 Nm (1.2 kpm)	15 Nm (1.5 kpm)	15.8 Nm (1.6 kpm)
at about	5,500 rpm	5,400 rpm	6,200 rpm
FRG		13 Nm (1.3 kpm) 5,000 rpm	
Lubrication	petroil lubrication or, for selected export countries, oil feed through oil dosing equipment		
Connecting-rod bearings	cage-type needle bearings for big end and gudgeon pin 1 bearing 6304 TNG 4 f, TGL 2981 (20x52x15) 2 bearings 6204 TNWC 4 f, TGL 2981 (20x47x14) matched		
Lubrication of the main bearings	petroil lubrication		
Timing in terms of crank angle			
induction	151	151	155
transfer	114	114	120
exhaust	165.5	169.5	179

1.2. Carburetter

zum nächsten Punkt ; Index

	ETZ 125	**ETZ 150**	**ETZ 150**
Carburetter type	BVF 22 N 2-2	BVF 24 N 2-2	BVF 24 N 2-2

Induction Port	22 mm	24 mm	24 mm
Main jet	100	120	120
Needle jet	70	70	70
Air-correction jet (drilled into needle jet)	2x60	2x60	2x60
Partial-load needle	2.5 A 513	2.5 A 513	2.5 A 513
Needle position from top	3[1])	3[1])	3[1])
Starting jet	70	70	70
Slow-running jet	50	40	40
Float-needle valve	15	15	15
Slow-running air screw (revolutions open)	about 1.5; but adjustment of the maximum concentration of CO in exhaust gas to 2.5 to 3.5 with percentage by volume at 1,200 rpm		
Throttle valve opening	30	40	40
[1]) 2 after running-in			

1.3. Electrical Equipment

zum nächsten Punkt ; Index

	ETZ 125	ETZ 150	ETZ 150
Ignition	battery ignition		
Ignition timing	$2.5^{+0.5}$ mm before T.D.C. = 22°45' to 23°45'		

Contact breaker points gap	$0.3^{+0.1}$ mm
Sparking-plug	ZM 14-260
Electrode gap	0.6 mm
Dynamo	14 V, 15 A, three-phase current
Rectifier	silicon semi-conductor in 3-phase bridge circuit
Regulator	one-system regulator, temperature-compensated, positively regulating
Battery	12 V, 5.5 Ah
Ignition coil	12 V small ignition coil
Headlamp	light emitting opening 170 mm in diameter (optionally H 4), symmetric passing beam
Combined stop, tail and number-plate lighting fitting	light emitting opening 122 mm in diameter
Horn	under the fuel tank
Direction indicator	4-lamp flashing-light System
Switches	
Ignition light switch	in instrument holder
Switch-combination at the handle-bars	dimmer switch flashing-light direction indicator, horn, light switch by-pass light signal
Stop light switch	in rear-wheel hub and hand brake lever (drum brake) or brake master cylinder
Electric bulbs	

Headlamp	12 V 45/40 W (twin-filament bulb) or TGL 11413 12 V 60/55 W (H 4) TGL 200-8188
Parking light	12 V 4 W cap BA 9 s TGL 10833
Stop light	12 V 21 W cap BA 15 s TGL 10833
Direction indicator	12 V 21 W cap BA 15 s TGL 10833
Tail light	12 V 5 W cap BA 15 s TGL 10833
Charging control light	12 V 2 W cap BA 7 sTGL 10833
Idling indicating light	12 V 2 W cap BA 7 s TGL 10833
High-beam headlight indicator	12 V 2 W cap BA 7 s TGL 10833
Control of direction indicator	12 V 2 W cap BA 7 s TGL 10833
Speedometer illumination	12 V 2 W cap BA 7 s TGL 10833
Fuses	
Main fuse (2 fuses)	fuse link 16 A (A 16, TGL 11135)
Direction indicator	fuse link 4 A (A 4, TGL 11135)
Dynamo (line DF)	fuse link T 2 A (micro-fuse 2 A)

1.4. Gearbox

zum nächsten Punkt ; Index

	ETZ 125	ETZ 150	ETZ 150

Clutch	multi-plate clutch in oil bath with Belleville spring		
Gear-shift system	foot-operated		
Number of speeds	5	5	5
Gear ratios			
1st speed	3.833 = 12 : 34 and 17 : 23 teeth		
2nd speed	2.345 = 15 : 26 and 17 : 23 teeth		
3rd speed	1.567 = 19 : 22 and 17 : 23 teeth		
4th speed	1.191 = 25 : 22 and 17 : 23 teeth		
5th speed	1 direct		
Revolution counter drive	4 = 16 : 4		
Speedometer drive	1.75 = 21 : 12		

1.5. Power Transmission

zum nächsten Punkt ; Index

	ETZ 125	**ETZ 150**	**ETZ 150**
Transmission			
engine - gear	2.055 = 18 : 37 teeth		
by double-strand silent chain	3/8" x 3/16" 06 C 2 acc. to ISO, 50 links, endless		
Transmission			

gear - rear wheel	3.2 = 15 : 48 teeth	3.0 = 16 : 48 teeth	3.2 = 15 : 48 teeth
by roller chain	0.8 B-1-128 TGL 11796/03 (128 rollers) (12.7 x 7.75 x 128)		
Total gear ratio			
1st speed	25.215	23.639	25.215
2nd speed	15.426	14.461	15.426
3rd speed	10.305	9.660	10.305
4th speed	7.831	7.342	7.831
5th speed	6.578	6.167	6.578
Kick-starter total ratio	3.197 = 18 : 37 and 27 : 42		

1.6. Cycle Parts

zum nächsten Punkt ; Index

	ETZ 125	**ETZ 150**	**ETZ 150**
Frame	central tubular frame (welded rectangular section)		
Engine suspension (elastic)	at cylinder cover and at the casing rear		
Steering angle	63°		
Caster	105 mm		
Type of springing			

front	telescopic fork with oil-hydraulic damping spring deflection 185 mm
rear	spring-loaded suspension units with oil-hydraulic damping, spring pre-load adjustable, spring deflection 105 mm; two hinged fastening points for spring loaded suspension units at rear swing arm
Wheels	wire-spoke wheels with non-offset spokes
Rim size	
front	1.60 x 18
rear	1.85 B x 16
Tyres	
front	2.75 - 18
rear	3.25 - 16
Tyre inflation pressure	
Solo: front	150 kPa (1.5 kp/cm²)
rear	190 kPa (1.9 kp/cm²)
With permissible total mass:	
front	150 kPa (1.5 kp/cm²)
rear	270 kPa (2.7 kp/cm²)
Brakes	
front	drum brake, diameter 150 mm lining width 30 mm actuation by cable control or hydraulic single-plate fixed saddle brake, brake disk diameter 280 mm

rear	drum brake, diameter 150 mm lining width 30 mm actuation by linkage

1.7. Masses (Weights)

zum nächsten Punkt ; Index

	ETZ 125	ETZ 150	ETZ 150
Weight unladen (with fuel and tools)	118 to 122 kg (depending an design)		
Permissible total weight	290 kg	290 kg	290 kg

1.8. Capacities

zum nächsten Punkt ; Index

	ETZ 125	ETZ 150	ETZ 150
Gearbox	500 cm³	500 cm³	500 cm³
Fuel tank	13.0 l [1]	13.0 l [1]	13.0 l [1]
Oil container for oil dosing system	1.3 l	1.3 l	1.3 l
Telescopic fork	230 cm³	230 cm³	230 cm³
[1]) including about 1.5 l of reserve			

1.9. Dimensions, Measured Values, Diagrams

zum nächsten Punkt ; Index

	ETZ 125	**ETZ 150**	**ETZ 150**
Maximum Speed	100 km/h	105 km/h	110 km/h
Acceleration from 0 to 80 km/h	12.5 s	11.3 s	11.0 s
Fuel consumption l/100 km	3.5	3.5	4.0

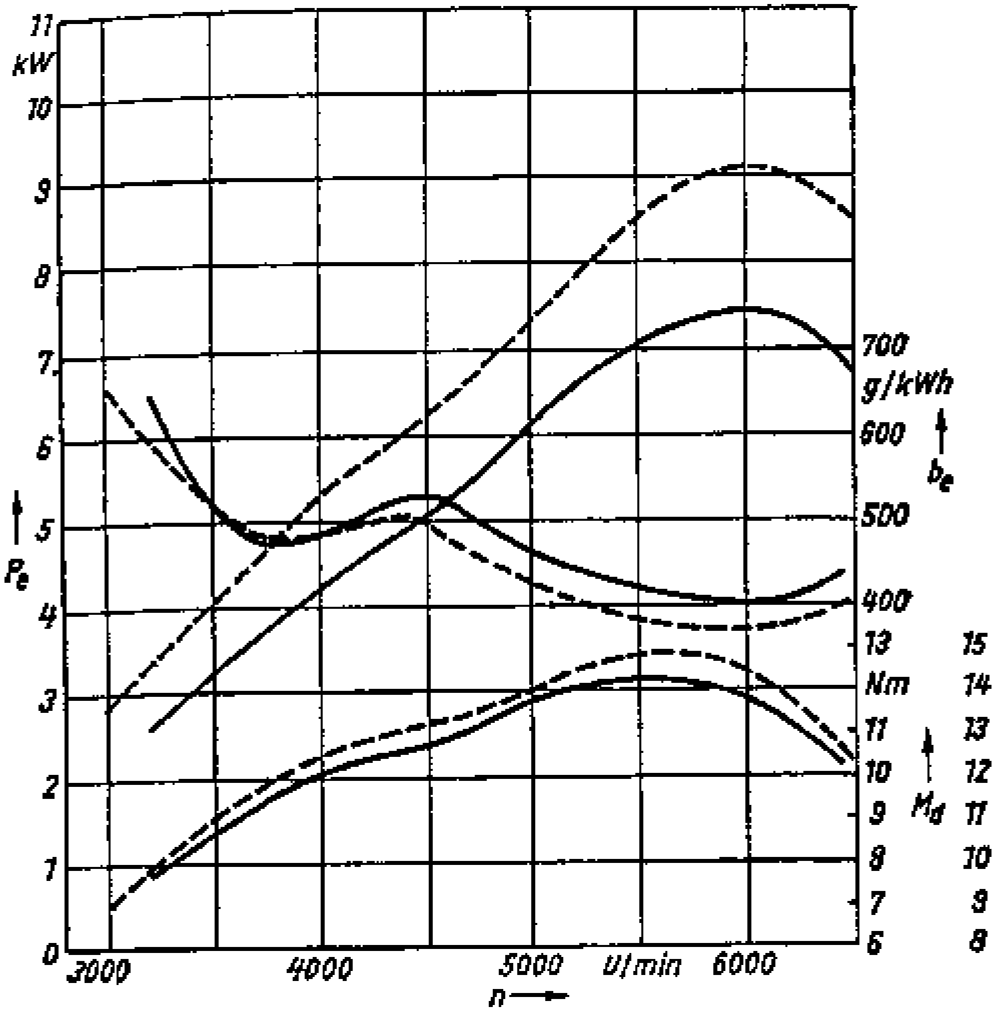

Fig. 5a. Full-load characteristics of the engine EM 125 and of the engine EM 150, 9 kW (12.2 hp) (dashed, curve of torque extends to right M_d-scale)

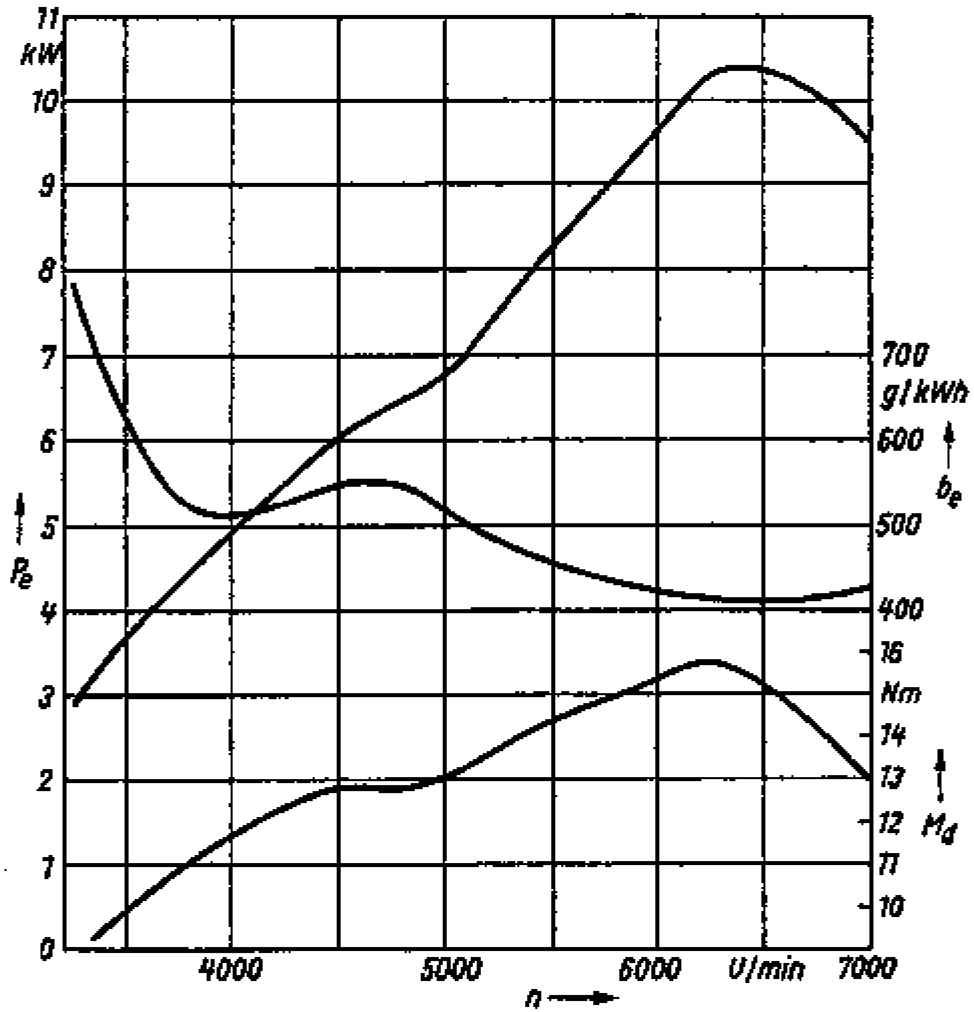

Fig. 5b. Full-load characteristics of the engine EM 150, 10.5 kW (14.2 hp)

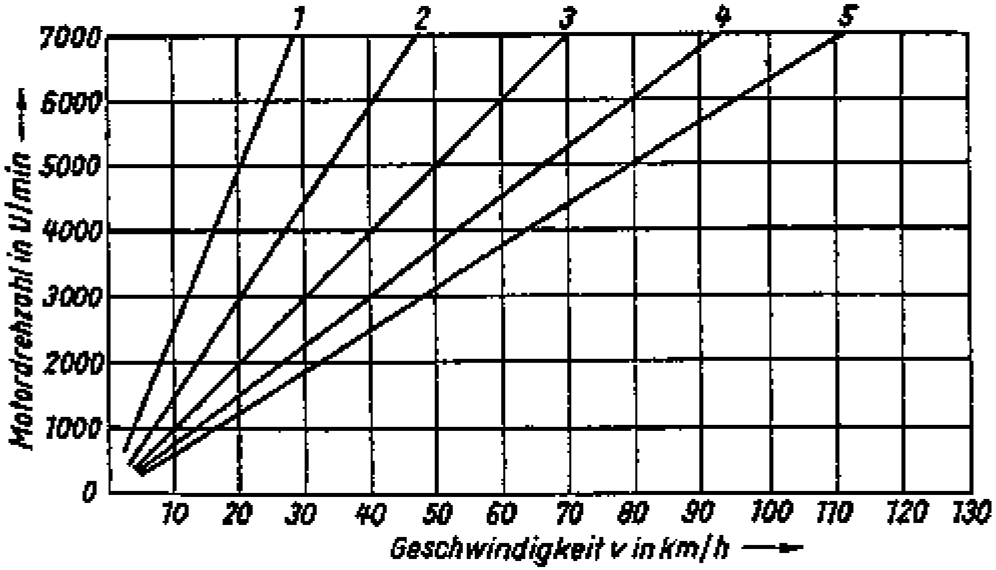

Fig. 6a. Rotational speed/gear diagram of ETZ 125/ETZ 150 10.5 kW

Motordrehzahl in U/min	Engine speed in rpm
Geschwindigkeit v in km/h	Speed in km/h

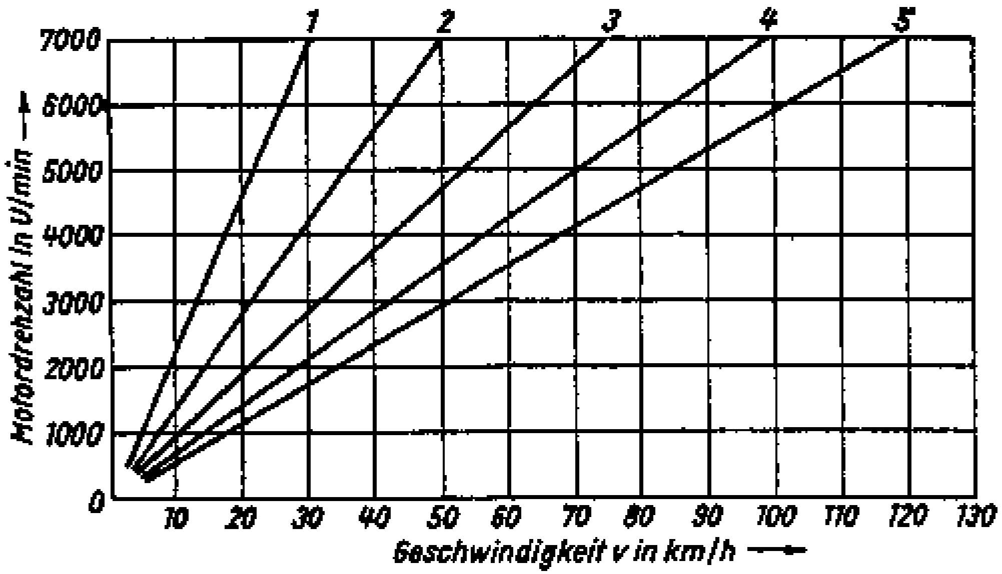

Fig. 6b. Rotational speed/gear diagram of ETZ 150 9 kW

Motordrehzahl in U/min	Engine speed in rpm
Geschwindigkeit v in km/h	Speed in km/h

2. Fuel, Lubricants and Fluids

2.1. Fuel

zum nächsten Punkt ; Index

According to the design of the engine, a petrol of an octane rating of at least 88 (abbreviated as ROZ 88 - called "normal" fuel in the GDR) should be used.

In countries other than the GDR, the use of a fuel with a similar rating is recommended.

2.2. Two-stroke Engine Oil for Preparing the Fuel-oil Mixture

zum nächsten Punkt ; Index

The engine oil for two-stroke engines is added to petrol in the

ratio of 1 : 50

(e.g. 0.2 litres of two-stroke engine oil to 10 l of fuel).

This mixing ratio of 1 : 50 also applies to the running-in period.

This simple and reliable system of petroil lubrication supplies oil to the two connecting-rod bearings, cylinder liner, piston and the crankshaft main bearings.

Experiences gathered by us in the course of many years have shown that it is advisable to, use exclusively

MZ22 two-stroke engine oil

in the GDR.

This additive-type oil meets the following technical requirements:

viscosity at 50 °C is between 20 and 25 mm²/s
(20 to 25 cSt) pour point maximum -30 °C

For MZ *motor-cycles operated in countries other than the GDR*, we also recommend the exclusive use of two-stroke engine oils which possess these properties (e.g. Shell 2 T, Castrol 2 T, Aral 2 T, Mixol "S", LT-2 T, etc.).

2.3. Lubricants for Motor-cycles Provided, with Oil Dosing Equipment

zum nächsten Punkt ; Index

For engine lubrication; fill the container for oil with a branded two-stroke oil (e.g. Castrol 2 T, Shell 2 T, etc.) or a lubricating oil for four-stroke engines of a similar viscosity and quality.

2.4. Amount of Oil in Gearbox

zum nächsten Punkt ; Index

For the gearbox and the primary drive, 500 cm³ of gear oil "GL 100" are required.

This is an additive-type gear oil which is suitable for the lubrication of change-speed gearbox and axle drive. It is an ageing-resistant refined lubricating oil with additives for an increase of load-bearing capacity and a reduction of wear.

It has favourable low-temperature properties and meets the following technical requirements:

viscosity at 40 °C	to 110 mm²/s (110 cSt)
pour point maximum.	-25 °C
flashpoint	180 °C
water content	0.1%

In countries other than the GDR engine oil SAE 30 to 40 or gear oil SAE 80 with the same properties should be used.

2.5. Lubricants for the Cycle Parts

zum nächsten Punkt ; Index

The following lubricating points of the cycle parts must be lubricated with antifriction bearing grease "SWA 532" TGL 14819:

Steering bearing, wheel bearings, bearing for rear-wheel drive, secondary chain, brake cams and brake shoes bearings, foot-operated brake shaft, and speedometer drive (the two latter parts only when being mounted or repaired).

This antifriction bearing grease has a pour point of about 130 to 150°C, can be used for a temperature range from -20 to +100°C, and it is water-resistant up to +50°C.

In countries other than the GDR, an antifriction bearing grease of similar characteristics should be used.

2.6. Shock-absorber Oil - Telescopic Fork

zum nächsten Punkt ; Index

As a damping fluid, a mixture of

50% of shock-absorber oil and
50% of two-stroke engine oil

should be used.

Shock-absorber oil viscosity:

8 to 12 mm²/s (8 to 12 cSt) at 50 °C.

2.7. Shock-absorber Oil - Spring-loaded Suspension Units

zum nächsten Punkt ; Index

Shock-absorber oil *without additives* and the above-mentioned viscosity only has to be used.

The damping characteristics of the telescopic fork and the spring-loaded suspension units are based an this viscosity. Damping and roadability will be impaired if shock-absorber oil of a different viscosity will be used.

2.8. Lubricant for Contact Breaker

zum nächsten Punkt ; Index

Special oil for ignition contact breakers, viscosity 700 to 1,300 mm²/s (700 to 1,300 cSt) at 50°C.

2.9. Brake Fluid

zum nächsten Punkt ; Index

For the disk brake, brake fluid "Karipol grün" or, in foreign countries, a brake fluid SAE 70 R3 or SAE J 1703 (for disk brakes) should be used.

3. Disassembly of the Engine

3.1. Preliminaries

zum nächsten Punkt ; Index

It is advisable, before starting the disassembling operations, to disconnect the battery and to remove it from the vehicle. During the repair period, it can be serviced and re-charged. When the motor-cycle is kept in the workshop, the two fuses should be removed from the fuse holder under the right-hand panel.

During the subsequent operations, the gear oil should be allowed to drain [open the oil drain plugs (1) and (2)].

NOTICE! The neutral detent screw (3) does not serve for oil draining!

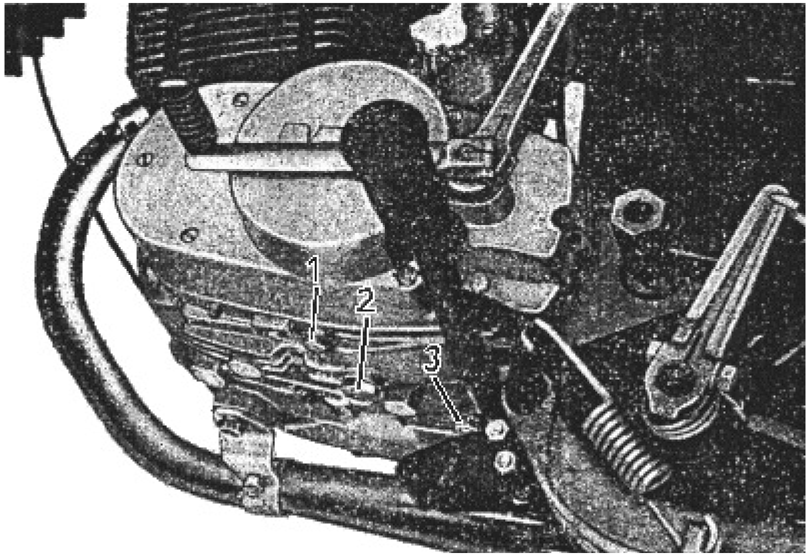

Fig. 7. Draining the oil from gearbox and clutch compartment

3.1.1. Right-hand Side of Motor-cycle

zum nächsten Punkt ; Index

At the right-hand side, the operations are started with disassembling the exhaust system:

1. Union nut at the cylinder to be loosened by means of hook spanner,
2. Exhaust pipe holder at the front of the engine (width across flats 17),
3. Rear brace at the silencer (spanner width across flats 13), and
4. Dynamo cover to be removed (hexagonal socket head width across flats 5) and clutch cable control (1 in Fig. 9) to be unhooked. For this purpose, draw the cable control sheath out of the cover in the direction of the arrow-head, turn the cable control and lift it out of the lever.

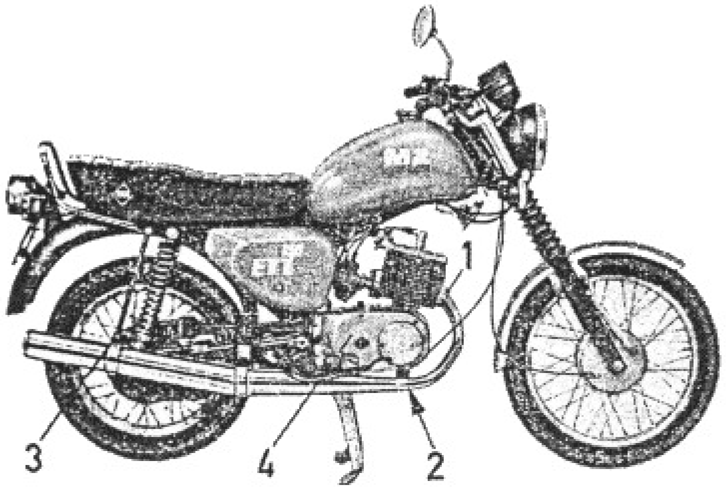

Fig. 8. Right-hand side of motor-cycle

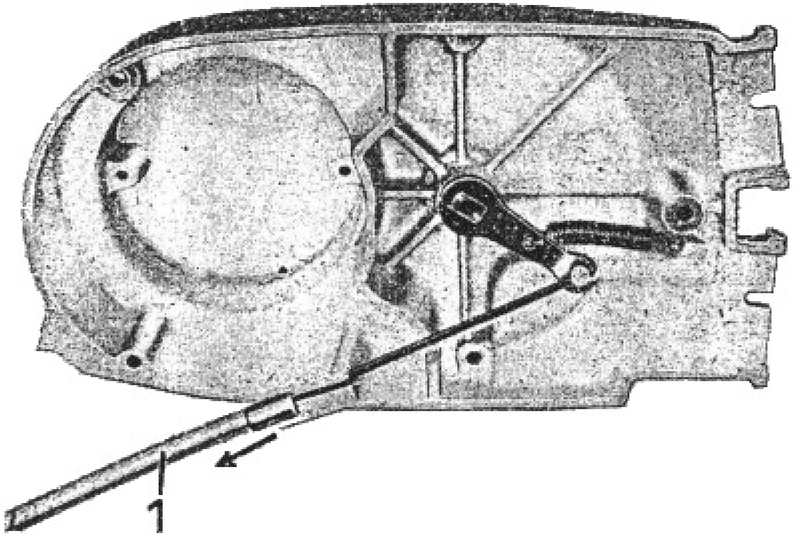

Fig. 9. Unhooking the clutch cable control (1)

After having withdrawn the cables (1), unscrew the brush holder (2). The stator can be removed after loosening the fastening screws (3). A box spanner (width across flats 13) serves for loosening the fastening screw of the cam of the dynamo. Sense of rotation of the spanner is opposite to the sense of rotation of the engine. The cam can then be pulled off when slightly shaking the fastening screw (thread M 7).

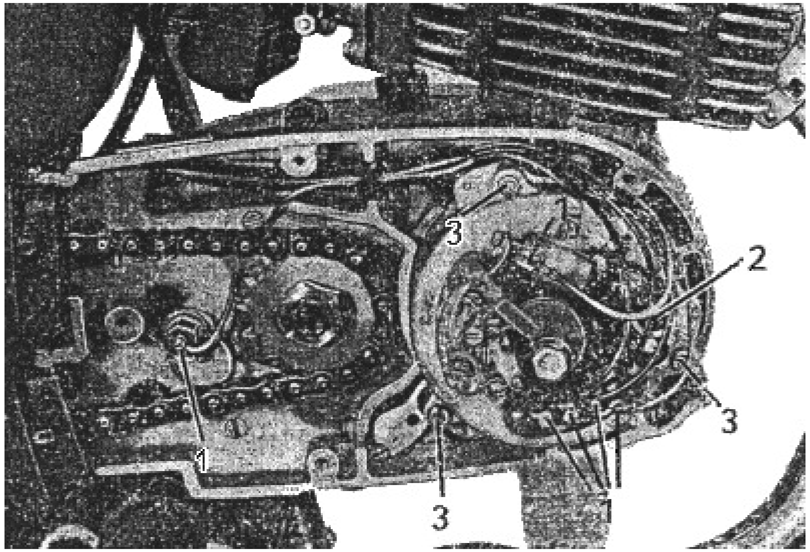

Fig. 10. Demounting the stator of the dynamo

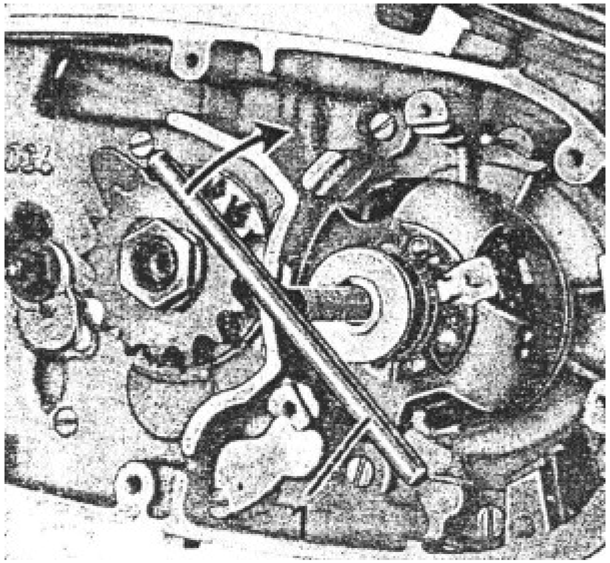

Fig. 11. Pressing off the rotor of the dynamo

The pressing-off screw 02-MW 39-4 (1) disconnects the rotor from the cone of the crankshaft (apply a bouncing blow with the hand an the lock in the sense of rotation of the engine).

For the amateur constructor or home-mechanic, a M 10x100 hexagon-head screw will do good service.

The chain need not be opened when the sprocket is removed together with the chain from the shank wheel (see also Fig. 13).

3.1.2. Demounting the Carburetter

zum nächsten Punkt ; Index

The carburetter is to be removed only after having closed the fuel shut-off cock and withdrawn the fuel hose.

Sequence of operations for removing the carburetter from the motor-cycle:

1. Raise the protective rubber cap and unscrew the starting carburetter actuation arranged under this cap (spanner width across flats 14)
2. Unscrew the carburetter casing cap and draw it out together with the throttle valve
3. Loosen the clamping connection between carburetter and induction pipe (use a screw-driver)
4. Loosen the clamping screw (spanner width over flats 10) of the induction socket fastening

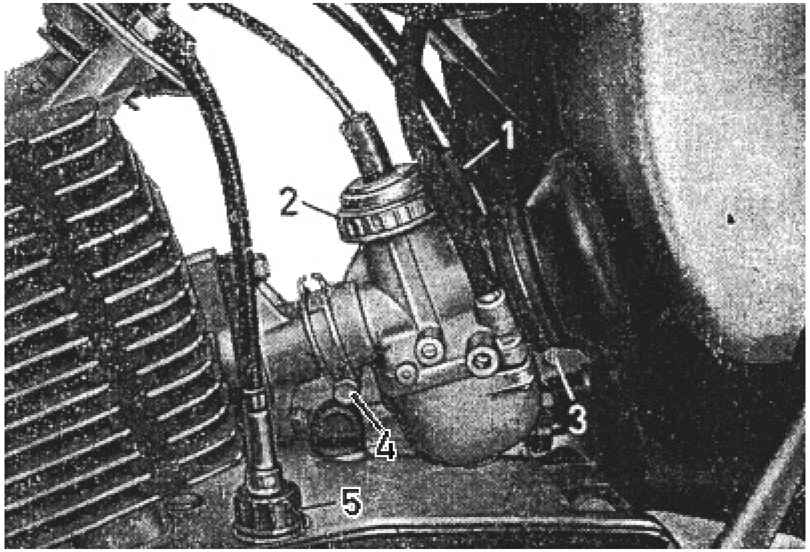

Fig. 12. Demounting the carburetter

Pull the carburetter from the induction socket at the cylinder, turn it to the left and draw it out of the induction pipe (rubber).

Then unscrew the flexible shaft for the revolution-counter drive (5).

3.1.3. Demounting the Engine

zum nächsten Punkt ; Index

Demounting the engine:

- Remove two nuts (width across flats 13) (1) together with corrugated washers from the stay bolt of the cylinder cover. Prop the engine from

below.
- Unscrew two fastening screws (2) for the engine from the rear of the engine shoes (width across flats 13, socket wrench).
- The engine tilted over downwards is then pulled out of the vehicle forward.

Replacement of the cylinder:

The cylinder cover, the cylinder and the elastie engine suspension can also be replaced in the assembling position shown in Fig. 13.

If necessary, loosen the rear upper engine fastening screw in addition to the engine mounting at the cylinder. The dynamo may be left at the engine.

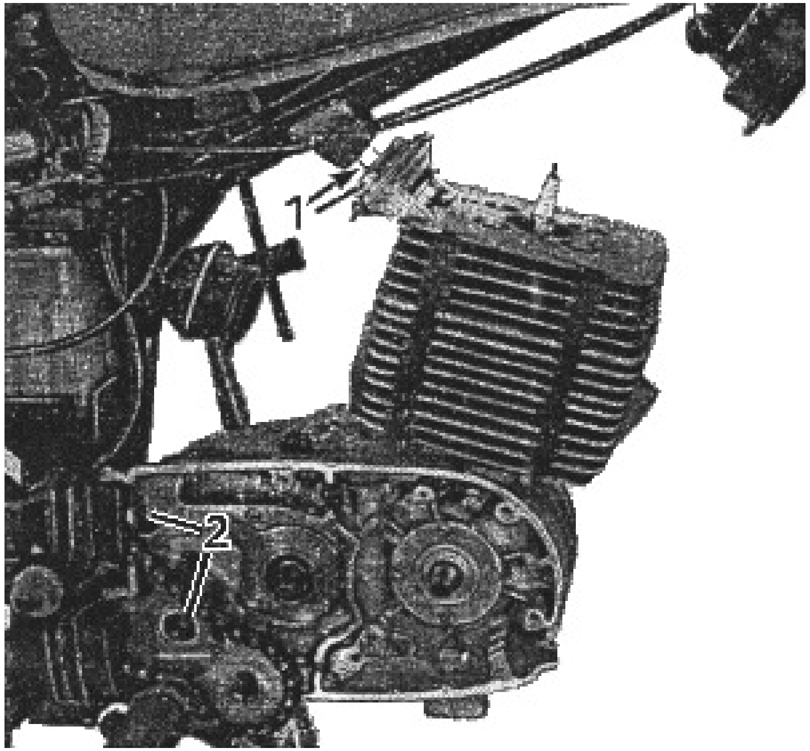

Fig. 13. Demounting the engine or replacing the cylinder

3.2. Dismantling the Engine

3.2.1. Preliminaries

zum nächsten Punkt ; Index

Before disassembling the engine removed from the motor-cycle into its parts, we think you agree that the engine should be cleaned externally. It also goes without saying that all parts should be placed or kept in such a way that nothing can be lost or damaged.

3.2.2. Removing the Clutch Cover

zum nächsten Punkt ; Index

After loosening the clamping bolt with nut (width across flats 10), remove the gear-change pedal (1). After loosening the clamping screw (width across flats 13), the kick-starter crank (2) is pulled off.

In vehicles with oil dosing equipment, then remove the cover of this equipment and demount the dosing pump.

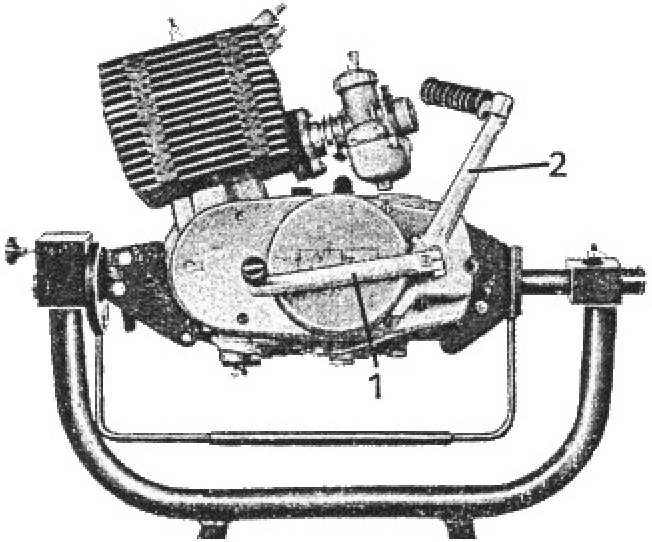

Fig. 14. Removing the clutch cover

After removing the 5 fastening screws of the cIutch cover, disconnect the clutch cover by applying blows with a plastic or rubber mallet at the front and rear end of the cover.

3.2.3. Removing the Clutch and the Primary Drive

zum nächsten Punkt ; Index

At first bend up the locking plates (1) and then remove the three screws (2) by means of a spanner having a width across flats of 10 mm. Then remove the complete disk parcel out of the clutch drum.

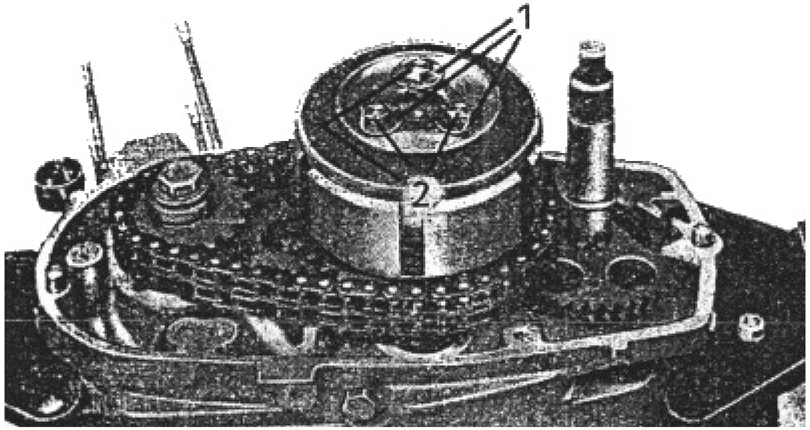

Fig. 15. Demounting the clutch

After applying the holding-up device (1) and the clamping piece (2), unlock the nut on the clutch shaft and loosen it (left-hand thread, width across flats 19). Remove the clutch driver.

The fastening screw of the sprocket wheel, width across flats 19, has a right-handed thread.

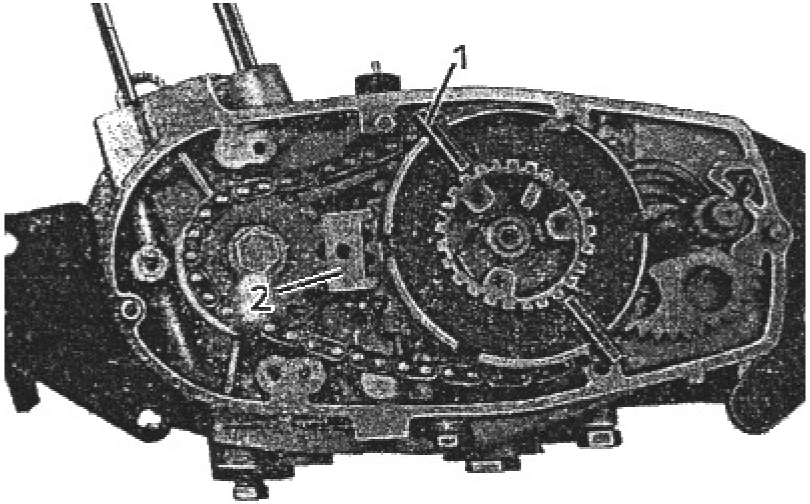

Fig. 16. Removing the clutch driver

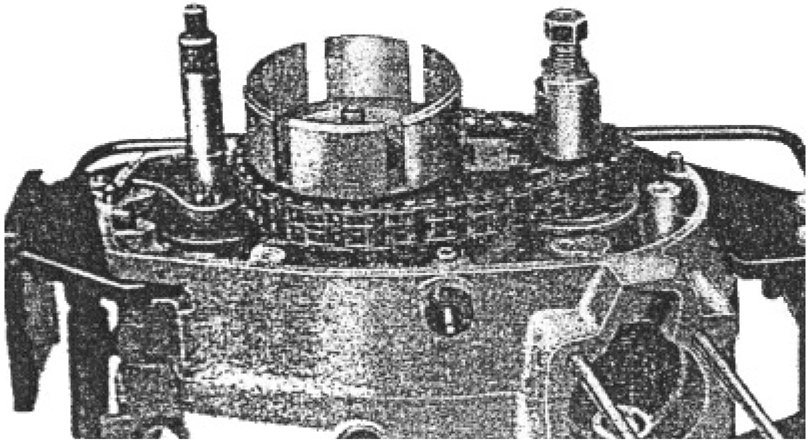

Fig. 17. Pulling the sprocket pinion

Then using the puIler 12 MV 32-4, disconnect the sprocket pinion from the crankshaft. The puller must be tightly screwed to the sprocket. During the pulling action, the clamping piece remains between the two sprocket wheels. After having removed the pinion from the cone, unscrew the puller, remove the clamping piece and remove the two sprocket wheels together with the chain.

3.2.4. Removing the Kick-starter and the Revolution Counter Drive

zum nächsten Punkt ; Index

Slightly turn the kick-starter shaft in order that the segment no longer contacts the stop, and then draw out the kick-starter shaft with segment and spring.

For dismantling the engine, it is advisable to unscrew the sealing cap (1) at the left-hand side. The intermediate gear (2) is retained by a lock ring 9 TGL 0-471. This gear must be pulled off prior to the aforesaid operation. A precision washer 9x0.5 TGL 10404-St is placed between the lock ring and the wheel. The intermediate shaft (3) may remain in the casing when the engine is dismantled. If it has to be removed for other reasons, then - after unlocking and screwing out the hexagonhead screw (4) (width across flats 8) - it must be drawn out of the casing together with the bearing bush. Finally, unhook the neutral detent screw (5) and take it off from the notched pin.

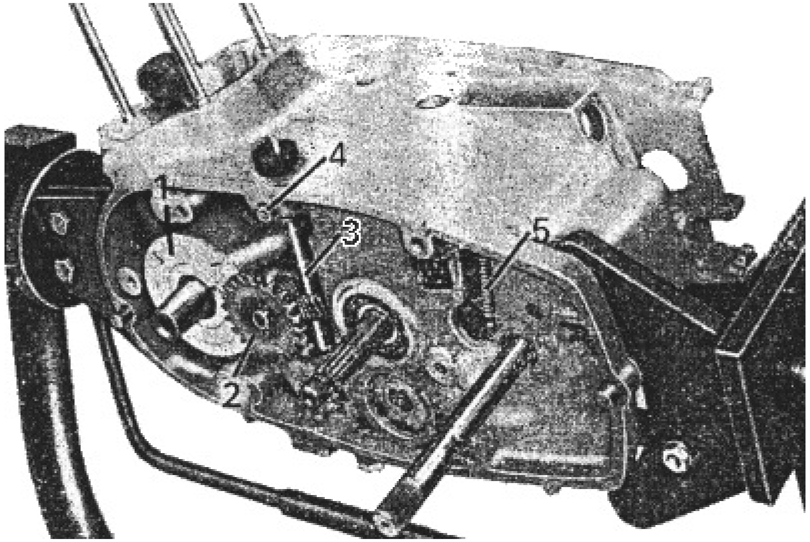

Fig. 18. Demounting the revolution counter drive

3.2.5. Removal of the Cylinder Assembly

zum nächsten Punkt ; Index

Loosen the nuts (width across fiats 13) one after the other and crosswise from the cylinder studs by means of a socket wrench, then take off the cylinder cover and the cylinder.

NOTICE!

When the engine is not to be dismantled, then the opening of the crankcase must be covered with a clean rag!

Press out the gudgeon pin by means of the pressing-out device (1) 22-50.010 and take off the piston from the connecting rod.

NOTICE!

Beating out the gudgeon pin is detrimental to the crankshaft and destroys the needle bearing an the gudgeon pin!

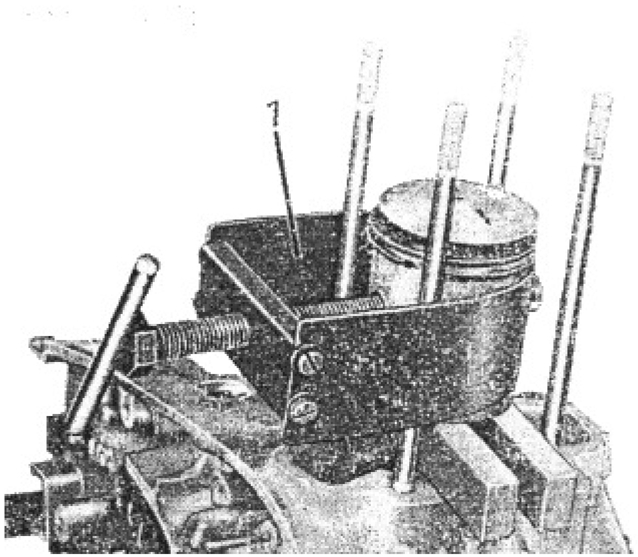

Fig. 19. Pressing out the gudgeon pin

3.2.6. Engine - Demounting the Dynamo Side

zum nächsten Punkt ; Index

- Unscrew idle gear contact switch (3).
- Before loosening the nut of the sprocket wheel (width across flats 27, right-hand thread!) bend up the lock plate (1) and apply the holding-up device (2) with chain - clutch thrust pin is drawn out.

- Pull the sprocket wheel from the gear and unscrew the sealing cap (4) under it.

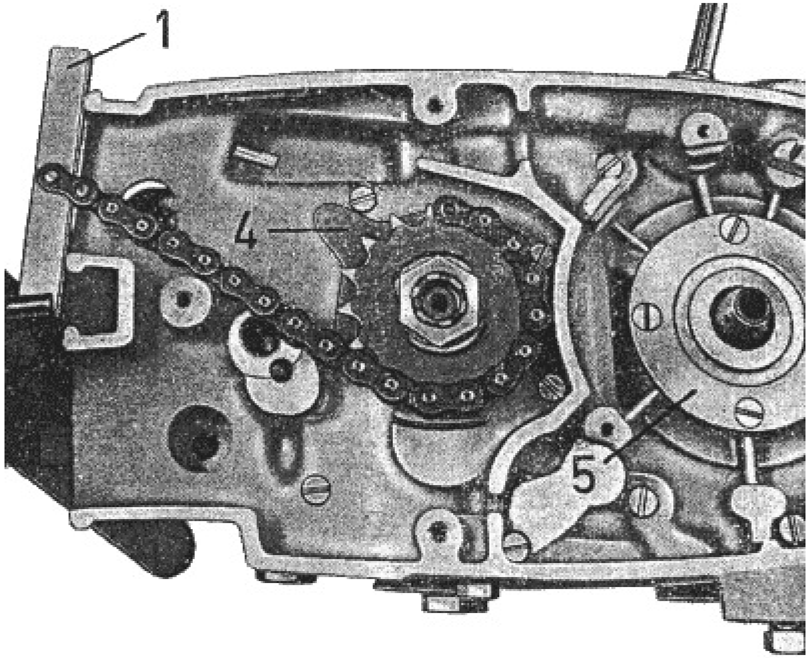

Fig. 20. Removing the sprocket wheel from the gearbox

- Unscrew the sealing cap for the crankshaft bearing (5), take it off together with the packing and remove the compensating shims.
- Remove the plate spring 4x5 TGL 9499 for the armature detent an the crankshaft.
- Loosen the casing fastening screws (11 screws) by means of a screw-driver and take them out of the casing.
- Open the tommy screw of the engine assembling device.

3.2.7. Separating the Two Casing Halves

zum nächsten Punkt ; Index

The assembly bridge 22-50.430 is screwed to the right-hand casing half by means of two screws M 5 (1) and one screw M 6 (2). Then turn out the neutral detent screw (No. 3 in Fig. 7).

The two casing halves are separated by means of the clutch puller (3) by uniformly turning the thrust spindle and slight blows by means of a rubber mallet against the members receiving the chain protection hoses (4).

NOTICE!

> The use of other aids such as a screw-driver, chisel and the like leads to the destruction of the casing!

Take off the right-hand casing half and clamp the left-hand casing half in the engine assembly device.

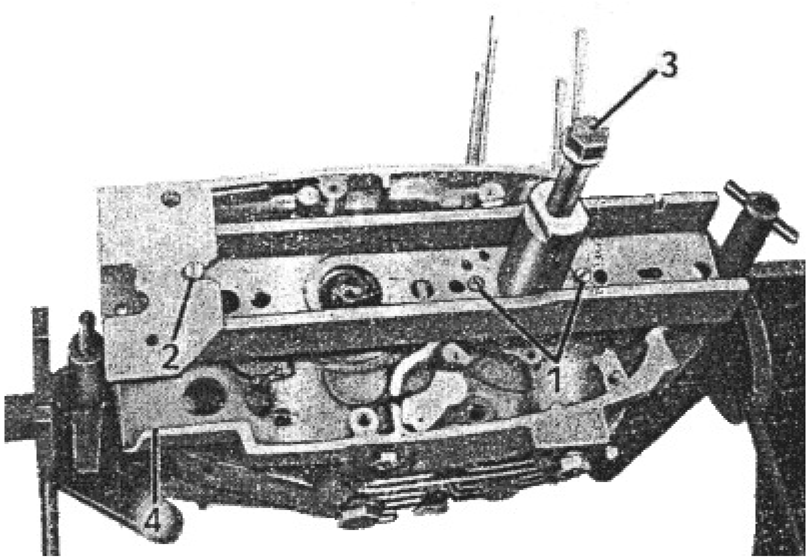

Fig. 21. Separating the casing

3.2.8. Removing the Gear-shift Mechanism and the Gearbox

zum nächsten Punkt ; Index

The control position of the gearbox wheels and gears is of no consequence for the demounting operations. Shank wheel (1) and needle bearing (2) usually remain in the right-hand casing half. Otherwise they have to be removed. Below, the further sequence of operations is given:

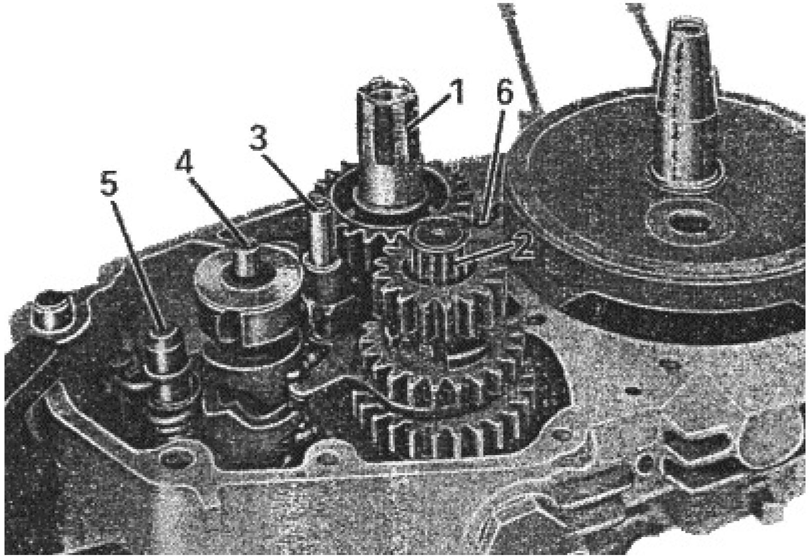

Fig. 22. Demounting the gearbox

- Draw out the guide pin (3) for the gear-shift fork.
- Alternately remove the gear-shift wheels together with the gear-shift forks from the countershaft and clutch shaft. For this purpose, turn the gear-shift forks laterally out of the control roller (4).
- Drive out the clutch shaft and countershaft from the clutch side.

NOTICE!

Use an aluminium mandrel in order to protect the ends of the shaft.

- Draw control roller (4) and gear-shift shaft (5) together out of the casing.
- Take the separating disk (6) of rubber out of the oil catch pocket of the casing.

3.2.9. Dismantling the Gear-shift Shaft

zum nächsten Punkt ; Index

The arresting lever (1) can be drawn out of the gear-shift shaft (2) without any difficulty. For removing the return spring (4) and the control finger (7), the lock washers (3) and (5) must be pressed out of their grooves by means of a screw-driver, and the washer (4a) must be removed.

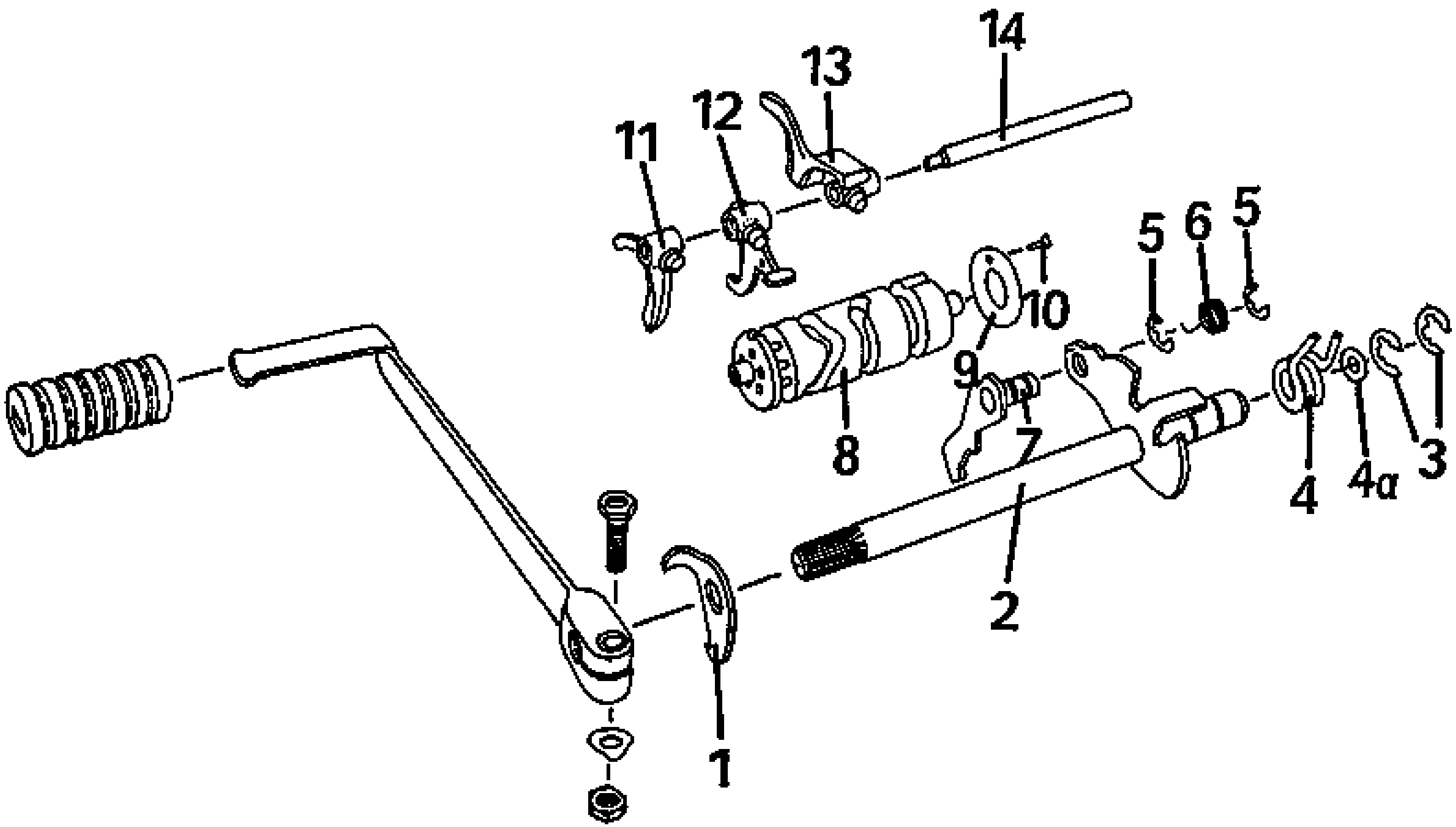

Fig. 23. Arrangement of the gear-shift mechanism

1. Locking lever
2. Gear-shifting shaft with control member
3. Lock washer 9 TGL 0-6799
4. Return spring for gear-shifting shaft
   a) Washer ø 20 x ø 12.6 x 0.9
5. Lock washers 7 TGL 0-6799
6. Torsion spring for gear-shift finger
7. Gear-shift finger
8. Gear-shift roll
9. Insulating disk for idle-gear indicating switch
10. Contact for idle-gear indication (countersunk notched nail 3x5 according to TGL 0-1477-4.6)
11. Gear-shift fork 011 for 1st and 2nd speed
12. Gear-shift fork 013 for 3rd speed
13. Gear-shift fork 015 for 4th and 5th speed
14. Guide pin for gear-shift forks

3.2.10. Pressing-out the Crankshaft

zum nächsten Punkt ; Index

The crankshaft can be pressed out even when, the gearbox is installed in the vehicle.

- Fasten the assembly bridge (1) 22-50.430 with the pulling sleeve (2) inserted on the clutch side of the left-hand casing half by means of the fastening screws M 5 (3).

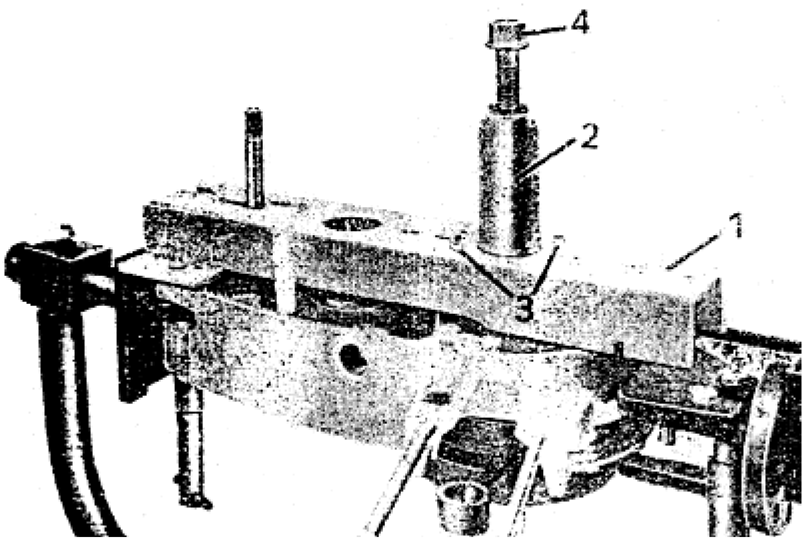

Fig. 24. Pressing-out the crankshaft

- Press out the crankshaft by means of the pressure spindle (4) of the pulling sleeve by turning clockwise; at the same time, your right free hand retains the crankshaft from below to take care that the shaft will not fall down after leaving the bearing seat.

3.2.11. Demounting the Bearings

zum nächsten Punkt ; Index

Before removing the ball bearings, the two casing halves should be heated in order that damage to the bearing seats is avoided.

The ball bearings are driven out by means of the driving mandrel 11 MW 7-4 or other suitable mandrels.

Left-hand casing half

Remove the circlips of the bearings 6201 and 6202 at the clutch side and drive out the bearings from the gear compartment.

The bearings 6204 of the crankshaft mounting have to be driven out from the outside at the left-hand side in the direction of the crankshaft compartment (the sealing cap has already been removed after the demounting of the primary drive).

Right-hand casing half

The crankshaft bearing 6304 at the dynamo side can be driven out by means of the driving mandrel 12 MW 31-4 and the shank wheel bearing 6204 by means of the driving mandrel 11 MW 7-4 in the direction of the interior of the casing.

The bearing bush for the needle bearing of the countershaft is pushed out of the right-hand casing half, which has been heated to a temperature of at least 100 °C, by striking it against a plane support, e.g. a clean hardwood plate, or the like.

3.2.12. Pulling the Bearings from the Crankshaft

zum nächsten Punkt ; Index

When the crankshaft main bearings have remained an the crankpin during the demounting operation, then have to be pressed off from the crankshaft by means of the ball bearing extractor 22-50.431 (1). For this purpose, the two halves of the tool are applied to the crankshaft between bearing and crank gear, compressed in a vice and pre-stressed by means of two screws M 8x100 (2).

By screwing in 2 more screws with hardened pin at the beginning of the thread (3), the bearings are pressed against the crank gears of the crankshaft.

For the bearing 6204 (left-hand side) insert the intermediate ring (4) having the order No. 22-50.432 and for the bearing 6304 (right-hand side) insert the ring 22-50.434.

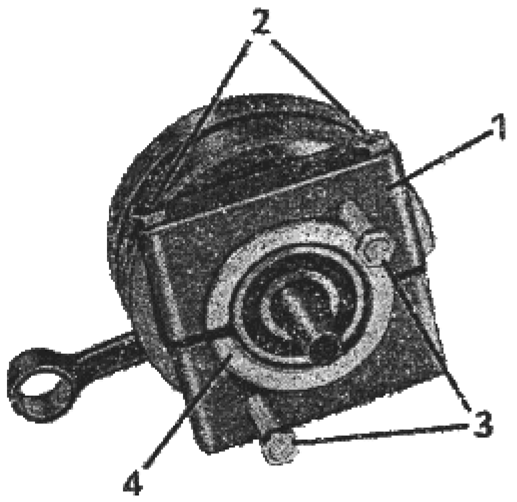

Fig. 25. Pulling the ball bearings from the crankshaft

3.3. Cleaning all Engine Parts

zum nächsten Punkt ; Index

Before the engine parts are subjected to careful inspections for wear, they must be thoroughly cleaned. The type of equipment and the methods to be used largely depend on the given facilities.

It should be borne in mind, however, that all parts must be properly clean and not corroded before they are subjected to further treatment.

Take care to see to it that the passage of the oil ducts for the crankshaft main bearings in the two casing halves are free. To be sure push a wire through the oil ducts (1).

In the cylinder, clean carbonised spots an the exhaust port and the transfer ports, if necessary. Remove car-

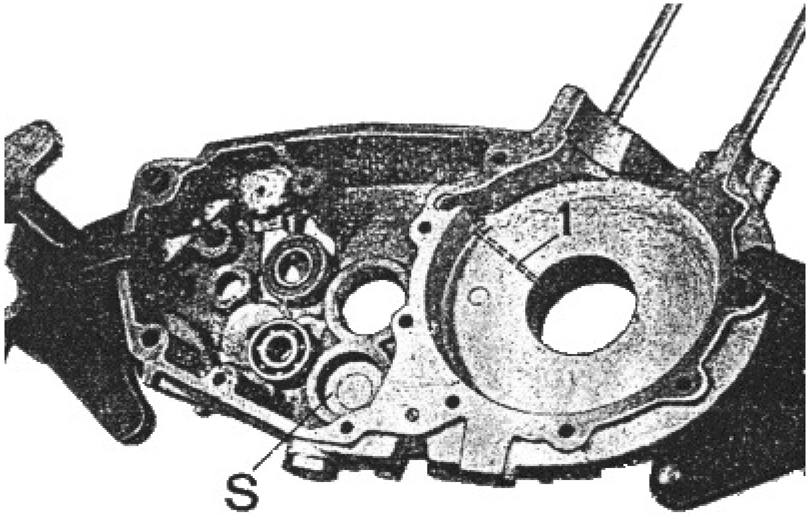

Fig. 26. Checking the oil ducts in the casing

1. Oil duct
2. Disk

bonaceous deposits from the combustion chamber in the cylinder cover and the piston head by means of scraper and wire brush. These two surfaces must not show any tooling marks after cleaning and they must be metallically bright.

About cleaning the piston ring grooves of the piston, information is given in Section 3.4.6.4.

3.4. Inspections for Wear

3.4.1. Clutch and Clutch Actuation Mechanism

zum nächsten Punkt ; Index

Parts particularly subjected to wear:

- EXTERNAL DISK (FRICTION DISK)

  Wear will appear to a higher degree when the clutch is improperly adjusted (no free play of clutch or clutch was allowed to slip for prolonged periods of time).

  In the extreme case, the material will be burnt.

When the clutch cannot be re-adjusted any more and when it slips upon acceleration of the engine, new disks have to be fitted.

New disks have a thickness of 3.4 ± 0.1 mm.

Permissible amount of wear: -0.2 min.

- INTERNAL DISK

Such disks must be replaced when they had become too hot due to clutch slipping or when they are distorted.

Take care that the disks are annealed normally in production, that is to say, they must be bright in new condition.

Thickness in a new condition: $1.5^{+0.06}_{-0.1}$ mm.

Deviation from the plane of the surface is maximum 0.2 mm related to a diameter of 75 mm.

- BELLEVILLE SPRING

The spring action may diminish, that is to say, the travel of the spring is reduced.

In severe cases, the clutch will slip even if all other components are in perfect working order and the adjustment is correct.

Since proof of the diminished spring action can only be furnished by measurements of force/spring deflection, measurements which cannot be made in a workshop without any difficulty, remedy should be made by new alignment and/or a new spring.

- CLUTCH DRUM, KICK-STARTER GEAR

Subject the complete clutch drum to the following checks:

A. check if the drivers of the friction-lining disks have produced marks in the clutch drum.
   Small depressions are removed by means of a finishing file. If there are deeper marks, the part must be replaced by a new one because in this state, the clutch will fail to separate properly.
B. check if the edges of the windows in the driver and the claws of the kick-starter gear show abnormal wear (these edges are rounded). In case of particularly high degree of wear, replace the parts in question by new ones otherwise the kick-starter will slip.

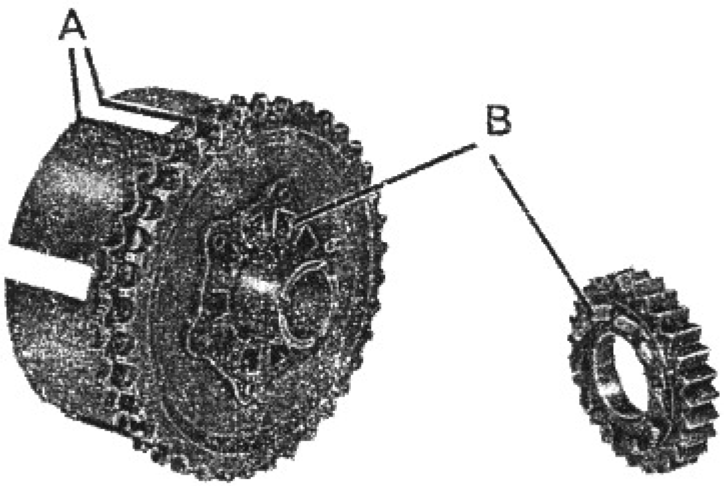

Fig. 27. Wear at the clutch drum

- INTERNAL DRIVER

  At the internal driver check that the internal toothing meshes with the profile of the clutch shaft still "free of chatter".

  Depressions which just can be seen in the grooved profile of the driver and which are produced by the clutch (steel) disks are negligible.

  In case of depressions of more than 0.1 mm, the internal driver must be replaced by a new one.

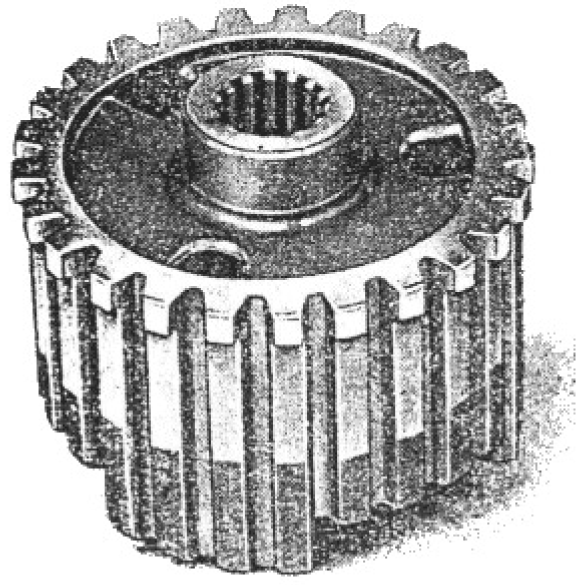

Fig. 28. Internal clutch driver

3.4.2. Primary Drive

zum nächsten Punkt ; Index

Subject the sprocket wheel an the crankshaft, the silent chain and the clutch sprocket wheel to an inspection for wear. For this purpose, provisionally put this parts in place.

With the engine standing vertically, and when one strand of the chain is taut, the other one must not show a sag of more than 8 to 10 mm. If the sag of the chain is too large the chain will "whip", rise an the teeth and break eventually.

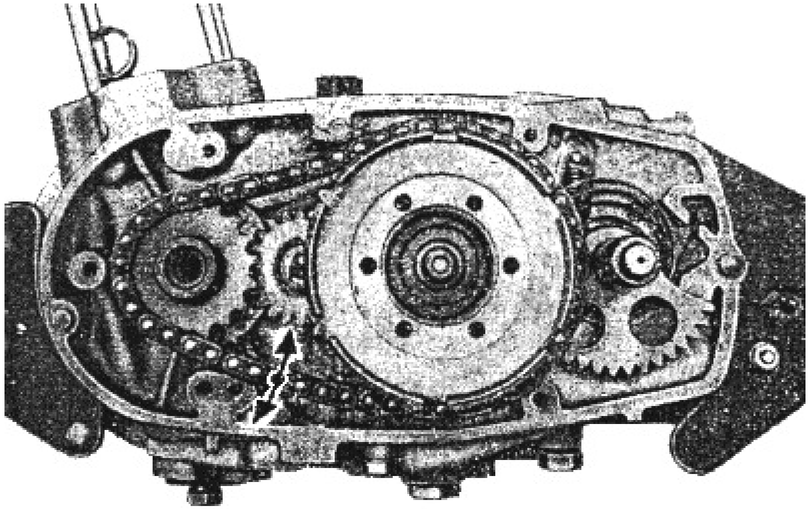

Fig. 29. Checking the primary drive

3.4.3. Kick-starter

zum nächsten Punkt ; Index

Check the teeth running up the kick-starter segment for wear.

The kick-starter segment must be seated an the kick-starter shaft free from any play. The ends of the kick-starter spring must not show any crack. Observe the instructions given for Fig. 27!

3.4.4. Gears, Shafts and Gear-shift Forks

zum nächsten Punkt ; Index

The relief cuts in the claws at the gear-shift wheels (on both sides) and in the counter-gears are arranged at an angle of *a*=3°.

In the engaged state (a speed is in engagement), the wedge action of the relief cuts produce a force having the task of retaining gear-shift wheel and gear (loose gear) in the meshed condition.

This shows that not only the locking lever (Fig. 23) keeps the individual speeds in the meshed condition but also the wedge action of the relief cuts contributes to the same effect.

When the claws of the gear-shift wheels are worn to a high degree, the bearing surface becomes smaller and the speeds in engagement will jump out of this state.

The gear-shift forks have to be checked for their angular state; they must be exactly at a right angle to the guide bolts of the gear-shift forks (90°). Slightly distorted gear-shift forks can be carefully realigned in a cold state.

A gear-shift fork which does not form a right angle with the aforesaid bolt will continuosly strike against the gear-shift wheel and will become blue in colour in the same way as the gear-shift wheel. With this, the case-hardening effect will be lost and the two parts become useless after a short period of operation, they must be replaced by new ones.

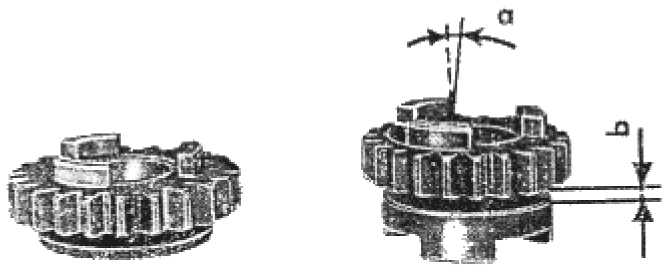

Fig. 30. Gear-shift claws and guide grooves

a. Wedge angle of 3°
b. Width of guide groove 3.5 (3.2 from August 1986)$^{+0.18}_{+0.10}$mm

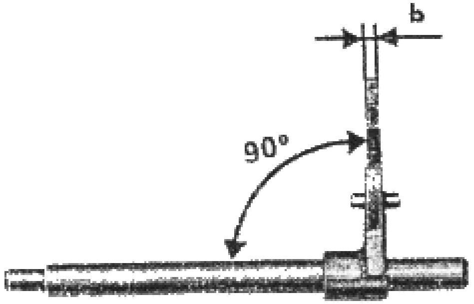

Fig. 31. Gear-shift fork and guide pin

b. Width of gear-shift fork 3.5 (3.2 from August 1986)$^{-0.030}_{-0.078}$mm

For a proper control of the gear set it is necessary to clean all individual parts carefully in order that parts that have become blue in colour can be indentified.

Check the clutch shaft for clean oil holes.

Gears, shafts and gear-shift forks that have become blue in colour must be replaced in any case. This also applies to the following conditions: when the lock-ring grooves of the gearbox shafts are heavily worn, when the splines of the shafts and gear-shift wheels are excessively worn, and when the width (b) of the guidering grooves of the gear-shift wheels and the width (b) of the gear-shift forks are subjected to excessive wear (Fig. 30 and 31).

Gearbox shafts must not show a radial runout of more than 0.05 mm.

Further, with respect to the gears for the 1st speed, the 2nd speed and with respect to the shank wheel, take care to see to it that the control edges are in a good condition and that the gear-shift windows do not show wear marks. The bearing bush in the shank wheel must not exhibit abnormal wear.

3.4.5. Gear-shift Mechanism (Fig. 23)

zum nächsten Punkt ; Index

Gear-shift roll (8)

The gear-shift roll is scarcely subjected to wear. It is of particular importance that the driving pins are tightly seated in their holes. This also applies to the contact (10). On no account should the countersunk notched nail be driven in too far otherwise the insulating disk will be destroyed.

Gear-shifting shaft (2)

The serration for fastening the foot-operated gear-shift lever will be exposed to unusual wear when the clamping screw is not tightened properly. The lock washers (3) must be firmly seated in their grooves. This also applies to the lock washers (5) on the gear-shift finger.

At the gear-shift finger (7) and the arresting lever (1), pay particular attention to wear the effective edges. "Round" edges lead to faults in gear-shifting. The welded connection between bolt and plate of the gear-shift finger must be checked for their condition. The gear-shift finger must not show excessive clearance in the hole of the gear-shift member of the gear-shifting shaft.

Defective parts must be replaced by new ones.

3.4.6. Crank Assembly

3.4.6.1. Piston and Cylinder

zum nächsten Punkt ; Index

When the performance of the engine should diminish and this fact cannot be traced back to wrong ignition timing, carburetter tuning, leaky shaft seal rings or clogged exhaust system (dynamic pressure too high), and when the demounted piston is "black" on the entire piston skirt below the piston-ring portion, then piston and cylinder must be replaced because the pressure of compression and combustion blows through along the sliding area of the piston rings and the cylinder wall.

In this case, the cylinder shows in the liner (port zone) a pronounced state of wear (bulging) and below the upper edge of the liner a distinct collar.

The replacement of the worn piston rings alone will not produce the desired effect.

3.4.6.2. Checking Piston and Cylinder

zum nächsten Punkt ; Index

In the new condition of piston and cylinder, the assembly clearance between cylinder liner and piston is 0.03 mm.

The limit of allowable wear is about 0.1 mm. When this has been reached, a new or a replacement cylinder must be fitted since the noise increases with increasing assembly clearance (especially when gases are exchanged and when the engine is unloaded).

The nominal dimension of the piston is measured about 12 mm above the piston lower edge. Only a new piston, when subjected to a control measurement, can show the stamped on nominal dimension, taking the measuring specifications into consideration. A piston that has been operated already will be deformed.

The cylinder must be measured by means of an internal measuring device in the upper and lower third of the liner. Without the help of a measuring instrument, the wear can be found by the fact that there is an edge (shoulder) about 7 mm below the upper edge of the cylinder liner.

3.4.6.3. Elimination of a Slight Piston Jamming

zum nächsten Punkt ; Index

When jamming or sticking of the piston has happened, then - in a slight case - the piston can be restored to proper working condition by re-finishing the areas of jamming by means of a corundum stone dipped into a fuel-oil mixture.

Slight points of jamming in the cylinder due to pressed on aluminium remains (caused by the cylinder) have to be removed by means of fine abrasive paper (grain size about 400), whereby painstaking care should be observed.

Perform the re-finishing operations on the areas of jamming on piston and cylinder only in longitudinal direction.

NOTICE!

> After the sticking of a piston, it is of no use to remove the areas of sticking and to restore the piston to proper working condition only while the cause leading to jamming is not found and not removed.

Below, a few examples of possible causes are given:

- Lack of oil (no fuel-oil mixture but only fuel was filled into the tank in refuelling or the oil container of the oil dosing device has been empty).
- Lack of fuel and, hence, also lack of oil due to insufficient feed from the fuel tank to the carburetter. Vent hole in the tank cover clogged.
- Fuel filter cock clogged or the retaining screw in the locking handle excessively tightened (the locking handle must be free to be moved easily).
- Basic carburetter tuning changed although this is not allowed.
- Ignition timing wrong, consequently, the engine is overheated.

- Exhaust system changed by intervention by an unauthorised person, dynamic pressure wrong.
- Air filter system defective.
- Engine draws in wrong amount of air (mixture becomes lean in the upper speed range).

3.4.6.4. Piston Rings

zum nächsten Punkt ; Index

Before re-using used pistons, particular attention should be paid to the piston rings and the ring grooves.

Piston rings sticking due to an excessive supply of, or unsuitable, oil in the fuel (two-stroke mixture) are carefully removed from the piston. Take care that the rings are not over-stressed, therefore, use a pair of piston ring pliers or three thin strips of sheet metal as an aid (Fig. 32).

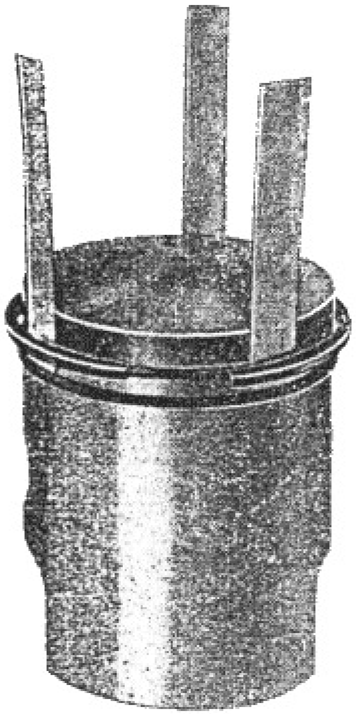

Fig. 32. Taking off the piston rings

The carbon deposits an the internal diameter of the piston ring is removed and the ring grooves in the piston are carefully cleaned with the help of an old broken ring of the same type.

Fig. 33. Cleaning the piston ring grooves

After this operation, the piston ring must be free to move easily in the piston ring grooves.

Piston rings must not be exchanged, that is to say, they must be fitted into the same ring groove from which they were removed.

Width of the ring grooves

Upper ring	$2.06^{+0.02}$ mm
Lower ring	$2.04^{+0.02}$ mm
Permissible wear limit	2.10 mm

Thickness of the piston rings

All piston rings	$2.00^{-0.010}_{-0.022}$ mm
Permissible wear limit	1.90 mm

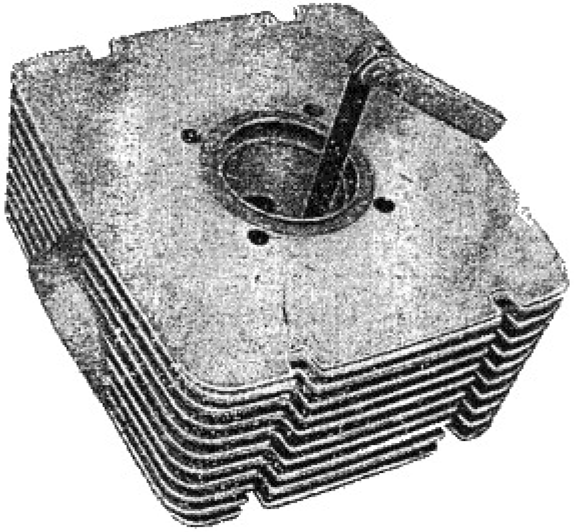

Fig. 34. Measuring the piston ring gap

Before the rings are re-fitted to the piston, check the state of wear of their outer diameter. For this purpose, the piston ring is inserted into the cylinder liner about 10 mm below the upper edge of the cylinder and then the piston ring gap is measured. In the new state of the piston ring, the ring gap should be 0.2 mm.

When the piston ring gap between the abutting ends of the ring is more than 1.6 mm, piston and cylinder have becomes useless.

When the locking pins in the piston have worked (faces of the pins are bright) or when they are missing, a new piston and cylinder (the latter may be ground out must be assembled.

NOTICE!

> The edges of the port windows must be chamfered, otherwise an unpleasant noise will be produced when the engine is unloaded. Therefore, always chamfer the windows of newly ground cylinders.

3.4.6.5. Cylinder Cover

zum nächsten Punkt ; Index

When the cylinder cover has become leaky, a fact which is indicated by the upper oiled up ribs of the cylinder, then the cylinder cover may be restored to proper working condition by moving it in circles on a surface plate covered with fine abrasive cloth (400 grain size); this, however, is possible only to a small extent - unless a new cylinder cover is available.

When a cylinder cover is leaky, the additional fitting of a second aluminium gasket is wrong. It will not show any success because the compression ratio, will be changed and, consequently, the performance is reduced.

NOTICE!

> When demounting and fitting the cylinder cover, take care that the fastening nuts are loosened and tightened, respectively, uniformly and crosswise. When this is neglected, the cylinder cover will be subjected to stresses and becomes leaky.

3.4.6.6. Crankshaft

zum nächsten Punkt ; Index

An inspection will show whether the collars of the sealing rings (1) are worn too muck, whether the thread of the fastening for the sprocket wheel to the crankshaft (2), the bearing seats (3), and the thread for the armature fastening screw (4), as well as the tapers (5) are still in proper condition.

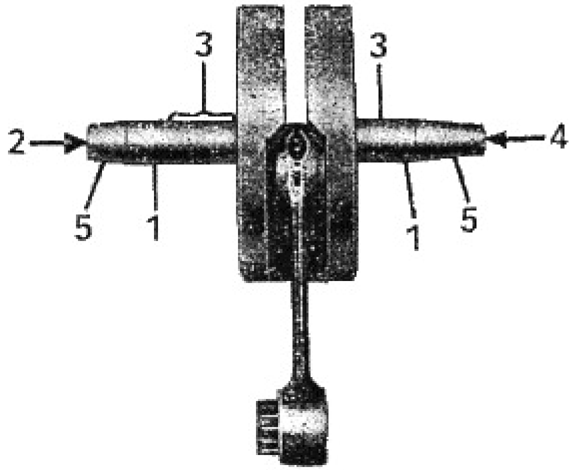

Fig. 35. Crankshaft

When the defects found cannot be removed by refinishing, mount a new or properly overhauled crankshaft.

Various functional dimensions for checking the state of wear of crankshafts that have been in operation or for checking for transport damages of new or regenerated crankshafts can be tested by means of a dial gauge. For this purpose, the crankshaft is clamped between the centres of a concentricity testing equipment or of a lathe (Fig. 36).

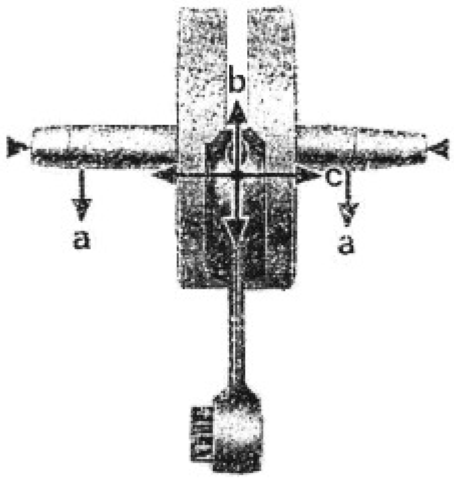

Fig. 36. Control dimensions of the crankshaft

The following dimensions are measured:

Deviation from true running

a = 0.02 mm, (bearing seats)

Radial play of connecting-rod bearing

b = 0.02 to 0.035 mm, wear limit 0.05 mm

Axial play of connecting-rod bearing

c = 0.21 to 0.523 mm, wear limit 1.0 mm

The condition of bearing in the small-end boss of the conrod can be judged only subjectively by means of the usual workshop equipment. For a new mating, the gudgeon pin must be free from play in the connecting rod and it must be possible to turn it while a resistance is felt but it must not jam.

Gudgeon pins that show wear marks or a blue colour are useless and must be replaced.

3.4.7. Casing and Packings

zum nächsten Punkt ; Index

In the first place, inspections should determine the state of the sealing surfaces of the casing. If the sealing surfaces are damaged, they can be restored to proper condition in less severe cases on a surface plate, in the manner described in Section 3.4.6.5. with respect to the cylinder cover, using fine abrasive cloth.

Further, you should inspect the bearing seats and the grooves for the lock rings or circlips for proper condition.

Bearing seats are useless when the bearings can be fitted by hand into the cold casing or on to the bearing seat on the shafts (while the bearing inner rings are in a **cold** state).

Old paper packings must be replaced in any case.

Shaft seal rings have to be checked for rents or fissures in the sealing lip, for their state of wear (flattening) and strain; for the presence of the spring in the groove designed for it, and the quality of the connection of the two spring ends. It is better to replace a shaft seal ring prematurely than to dismantle the engine once more because of this relatively cheap part a month later.

Shaft seal rings to be used:

	left	right
crankshaft	D 20 x 30 x 7	D 20 x 30 x 7
clutch shaft (shank wheel)		D 25 x 35 x 7

Finally, the oil ducts from the oil collecting duct in the gearbox compartment to the crankshaft bearings must have free passage.

3.4.8. Radial Grooved Ball Bearings for Crankshaft and Gearbox

zum nächsten Punkt ; Index

Defective crankshaft main bearings are identified by the engine noise and the impossibility to adjust the contact breaker points gap properly.

The condition of the running surfaces and balls in bearings with plastic edge can be determined after pressing apart. Worn bearings are characterised by pitting.

For bearings, the principle also holds that after a longer service life of the engine (general overhaul) all bearings have to be replaced by new ones.

The following bearings have to be used:

	left	right
crankshaft	2 x 6204 TNW C 4 f (in the radial play brought into line with each other)	6304 TNG C 4 f
clutch shaft	6202	slide bearing (in the shank wheel) 6204 (on the shank wheel)
countershaft	6201	needle cage K 15x19x13

4. Assembling the Engine

4.1. Preliminaries

zum nächsten Punkt ; Index

It is taken for granted that all engine parts are cleaned. Defective parts were discarded and replaced by new ones. Parts that are further usable were prepared for refitting. Before describing the assembly of the engine, we below give some instructions regarding the selection and mating of various units of construction.

4.1.1. Selection of Piston and Cylinder

zum nächsten Punkt ; Index

A clearance in mounted condition between piston and cylinder of 0.03 mm is specified. The following Table facilitates the selection of components to be mated.

In this Table, piston and cylinder having dimensions in the new state listed, which were bought from our Department for Single Part Distribution or which were mounted in the production process in our works.

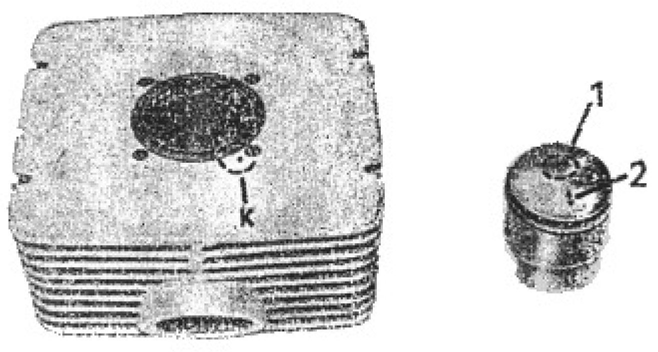

Fig. 37. Cylinder and piston markings
(K) Cylinder marking
(1) Nominal dimension of piston
(2) Mounting direction of the piston

Engine	Cylinder		Piston	Mounting clearance
	Nominal dimension in mm	Marking	Nominal dimension in mm	in mm
EM 125	51.99	- 1	51.96	0.03
	52.00	0	51.97	
	52.01	+ 1	51.98	
	52.02	+ 2	51.99	
EM 150	55.99	- 1	55.96	0.03
	56.00	0	55.97	
	56.01	+ 1	55.98	
	56.02	+ 2	55.99	

The above principles of selection are applicable to regenerated cylinders only with respect to the mounting clearance of 0.03 mm.

The cylinder must be ground according to the nominal dimension of the piston. The original marking present on the cylinder must be cancelled in order to prevent errors at a later time.

Piston in the over-sizes

EM 125	EM 150
52.50	56.50
53.00	57.00
53.50	57.50
54.00	58.00

are available.

4.1.2. Regeneration of the Cylinder

zum nächsten Punkt ; Index

Every cylinders can be ground out for maximum 2.00 mm, starting from the basic dimension (52.00 or 56.00 mm).

The cylinder is ground in the cylinder grinding department according to the available piston, taking the specified mounting clearance of 0.03 mm into consideration and delivered in the mated condition.

4.1.3. Selection of the Needle Bearing for the Gudgeon Pin

zum nächsten Punkt ; Index

The selection of the suitable needle bearing is facilitated by the use of the following Table. This is only possible for new parts (crankshaft, piston and gudgeon pin and needle bearing). New and regenerated crankshafts are delivered with needle bearing. The matings are adapted to the series produced gudgeon pin.

Table for selecting the needle bearing for the gudgeon pin

Connecting rod Marking	Gudgeon pin Marking	Needle bearing mean deviation in µm
black	white	-2 ; -3

	black	-1 ; -2
green	white	-4 ; -5
	black	-3 ; -4
white	white	-6 ; -7
	black	-5 ; -6
blue	white	-8 ; -9
	black	-7 ; -8

Please, note that the commercial packings of the needle bearings are marked only with the mean deviations (determined from the upper and lower needle deviation). The needle bearings themselves are not marked! Therefore, keep opened packings always separate.

When gudgeon pin, piston and crankshaft in the used state are further used, then fit the needle bearinq according to feel. (Colour markings will not be visible any more). The gudgeon pin must be fitted without any

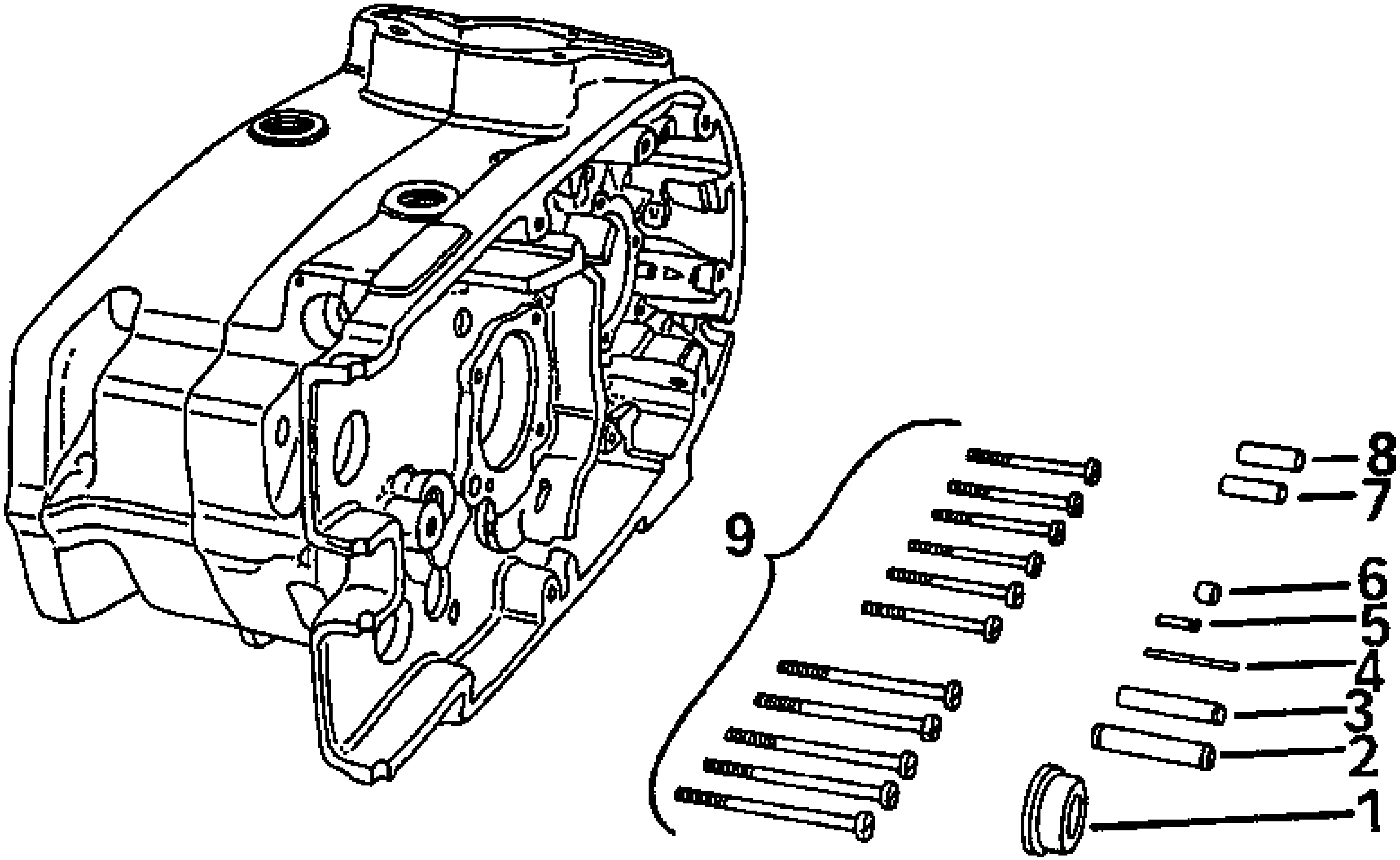

Fig. 38. Replacement casing with accessories

1. Bush for countershaft
2. Bearing bolt for double wheel to revolution counter drive
3. Cylindrical pin 8 x 40 TGL 0-6325
4. Taper notched pin 3 x 36 TGL 0-1471
5. Necked notched pin B 6 x 16 TGL 7408-5.8
6. Cover 8 TGL 0-443
7. Cylindrical pin 6 m 6 x 20 TGL 0-7-5.8
8. 2 x cylindrical pin 8 m 6 x 20 TGL 0-7-5.8

9. Casing screws M 6

clearance and it should offer a resistance to turning which can just be felt but not jam.

4.2. Pre-assembling the Replacement Casing

zum nächsten Punkt ; Index

Replacement casings are not delivered in the ready state. The casing includes a bag with accessories according to Fig. 38. These parts must be fitted before assembling the engine.

Left-hand half of casing:

- 2 cylindrical pins 8x20 (8) for locking the clutch cover have to be pressed in place.

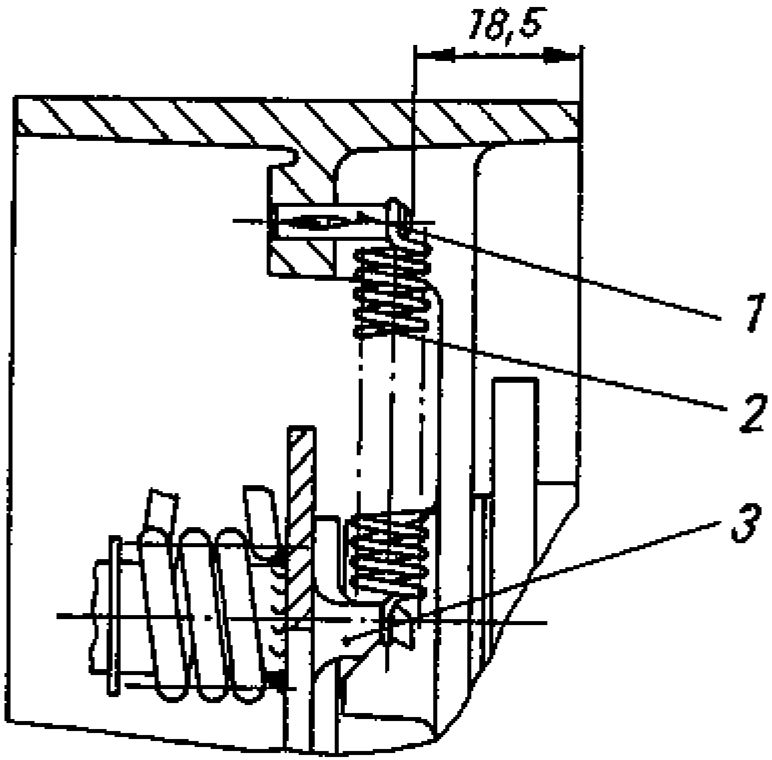

Fig. 39. Fitting the notched pin for gear-shift detent

1. Notched pin B 4x16
2. Spring for gear-shift detent
3. Lever for gear-shift detent

- Press the cylindrical pin 8x40 (3) as a stop for the return spring of the gear-shift shaft from inside just far enough in its place that the pin is flush with the casing surface in the clutch compartment.
- Drive in the necked notched pin B 4x16 for suspending the detent spring in the gear-shift mechanisin (pay attention to Fig. 39).
- Press in the bearing bolt for the double wheel for the revolution counter. Distance of the free end of the bearing bolt from the casing is $26^{+0.2}$ mm.

Right-hand half of casing

- Drive in the taper notched pin 3x35 for locating the dynamo stator.
  Free length of the pin is about 24 mm.
- Heat the casing half to a temperature of about 100 °C. Fit the bush for the countershaft (external ring for needle set K 15x19x13) in the gearbox compartment until its contacts the casing.
- Provide the cover 8 with sealing compound and with the closed end ahead press it into the hole of the gear-shift roll bearing. The cover must be flush with the casing and must be secured with sealing compound after driving in.

4.3. Preparing the Left-hand Casing Half

zum nächsten Punkt ; Index

- Heat the clean casing half to a temperature of about 100 °C.
- Fit the circlips for the bearings of the clutch shaft and the countershaft.
- Place a washer (ø 35x17v0.5 ± 0.9 mm) on the lock ring of the countershaft bearing from inside.
- Mount the bearings 6201 (countershaft) and 6202 (clutch shaft). In case of bearings with plastic cage, the **open** end of the bearing 6201 points to the gearbox compartment and the **open** end of the bearing 6202 to the clutch compartment - see also Fig. 26!
- Fasten the sealing cap with radial seal ring D 20x30x7 and packing. Screw in the screw with sealing compound.
- Push in place the two bearings 6204 until they contact the sealing cap.

4.4. Mounting the Crankshaft and the Gearbox

zum nächsten Punkt ; Index

Crankshaft

- Heat the internal races of the bearing 6204 already fitted in the casing by means of a heating mandrel (1 in Fig. 40).
- Insert the crankshaft with the crankpin that is provided with internal thread M 10 ahead into the bearing and allow it to slide in one pass up the stop.

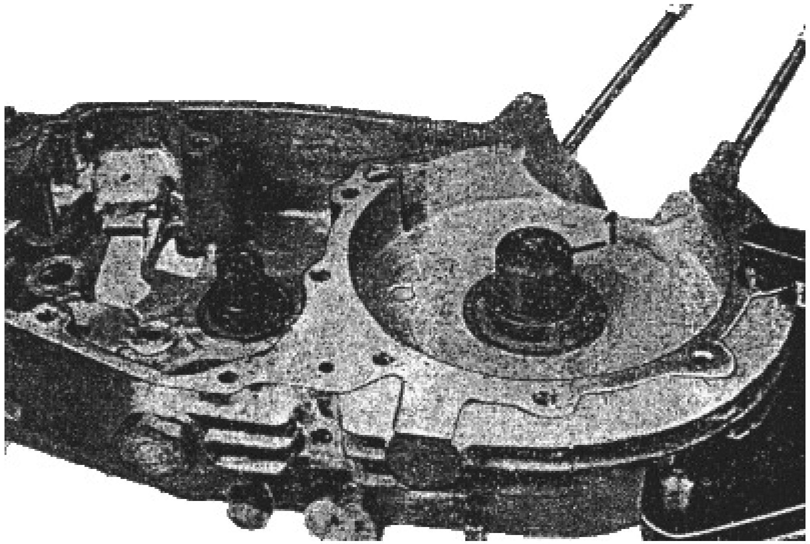

Fig. 40. Heating the infernal races

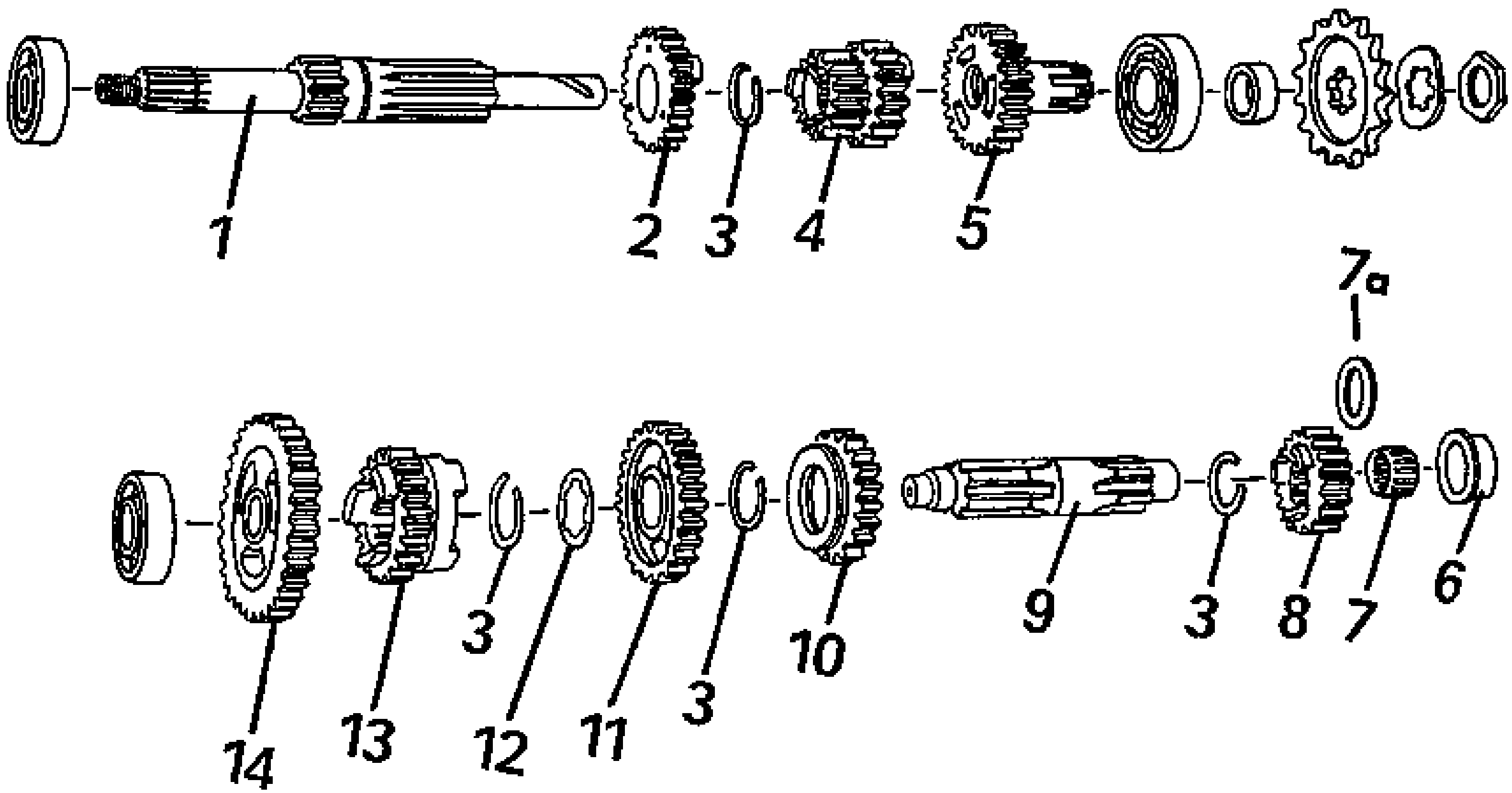

Fig. 41. Exploded view of the gearbox

1. Clutch shaft
2. Gear of 4th speed
3. Circlips
4. Gear-shift wheel of 4th/5th speeds
5. Shank wheel
6. Bush for countershaft
7. Needle cage K 15x19x13
   a) Fitting washer 15x0.5
8. Gear of 3rd speed
9. Countershaft
10. Gear-shift wheel of the 3rd speed

11. Gear of 2nd speed
12. Profile disk
13. Gear-shift wheel 1st/2nd Speeds
14. Gear of 1st speed

- If the crankshaft should stick due to delayed inserting or improperly heated internal races, then it must be pressed out and, after properly heating the bearing internal races, mounted once more.

Gearbox

The Figs. 41 to 46 illustrate the relationship between the individual parts and the power flow in the various speeds. In the Figs. 42 to 44, a pre-assembly state is not represented. The gearbox cannot be mounted completely but must be assembled in the individual steps described below.

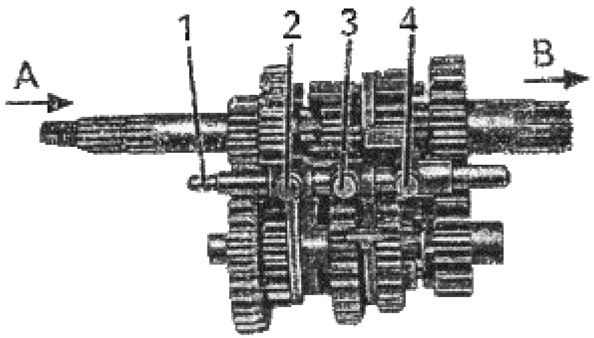

Fig. 42. Gear Set with gear-shift fork

A. Drive
B. Output

1. Guide bolt for shift forks
2. Gear-shift fork 1st/2nd speeds (011)
3. Gear-shift fork 3rd speed (013)
4. Gear-shift fork 4th/5th speeds (015)

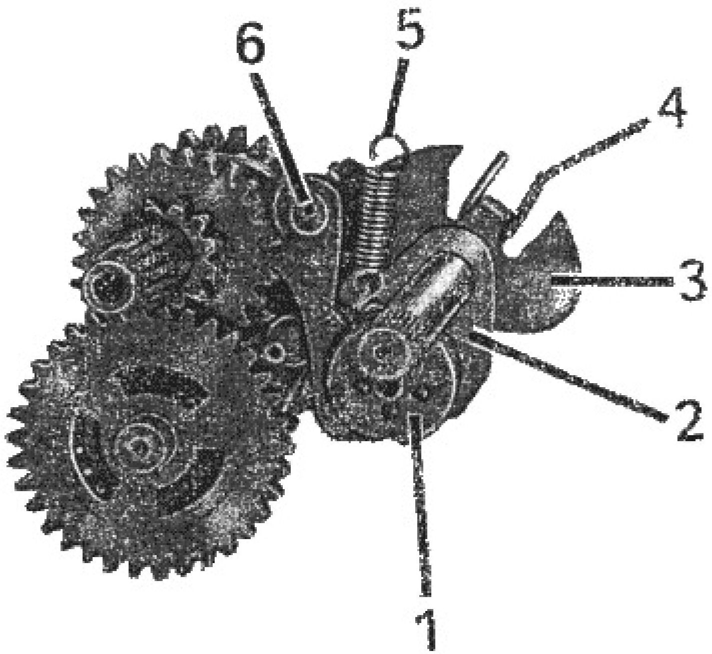

Fig. 43. Gearbox and gear-shift mechanism

1. Gear-shift roll
2. Detent lever for gear-shift mechanism
3. Gear-shift shaft with gear-shift member
4. Return spring for gear-shift lever
5. Detent spring for gear-shift mechanism

6. Gear-shift finger

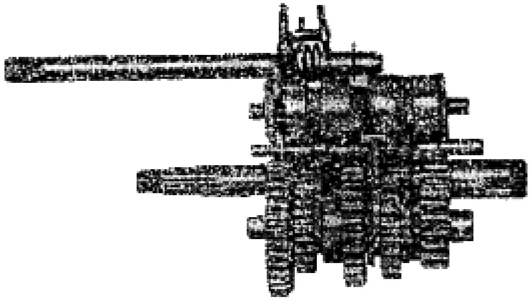

Fig. 44. Gearbox with gear-shift mechanism (view from below)

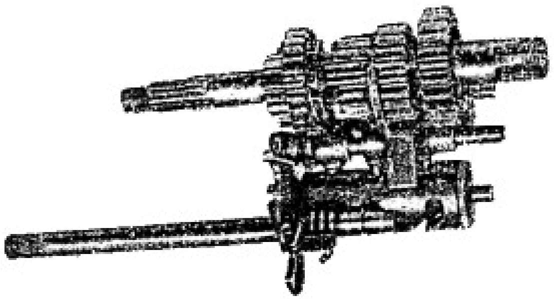

Fig. 45. Gearbox with gear-shift mechanism (view from top)

Sequence of assembling operations

- Provide the clutch shaft with the gear for the 4th speed which must be secured by means of a circlip. Heat the internal race of the 6204 bearing and cause the clutch shaft to contact the bearing internal race (Fig. 47).

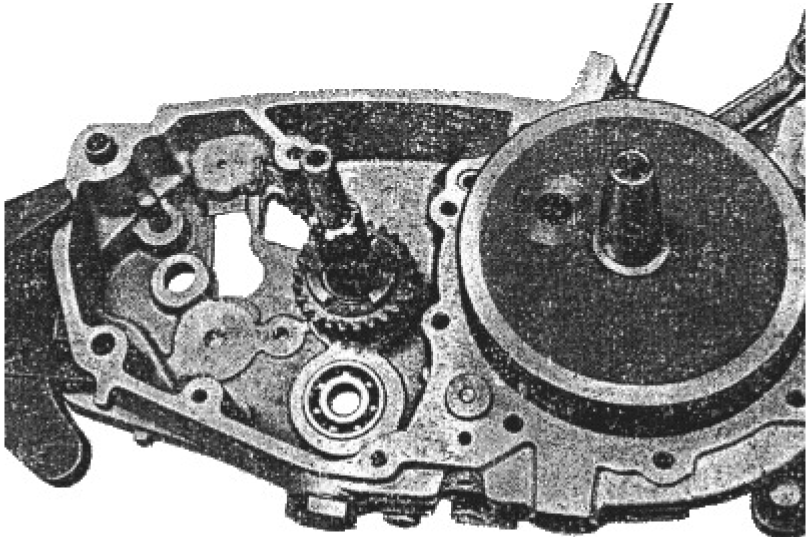

Fig. 47. Fitting the clutch shaft

- Insert the gear-shift finger and the detent lever for the gear-shift mechanism into the gear-shift roll; mount gear-shift roll and gear-shift shaft together in the casing; take care that the return spring of the gear-shift shaft is pressed over the gear-shift stop. Place the gear for the 1st speed, with the **side bored in a lathe** pointing to the observer, an the bearing 6201 for the countershaft.

  NOTICE!

  To facilitate subsequent operations, the gear-shift roll must be inserted in such a way that the contact rivet (N) points to the rear and downwards (Fig. 48).

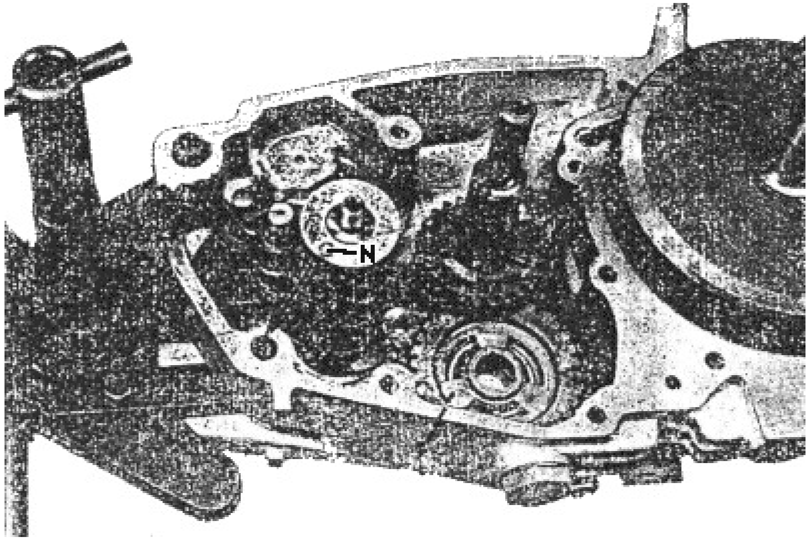

Fig. 48. Mounting the gear-shift mechanism

(N) Contact rivet for neutral indication
(1) Gear of 1st speed

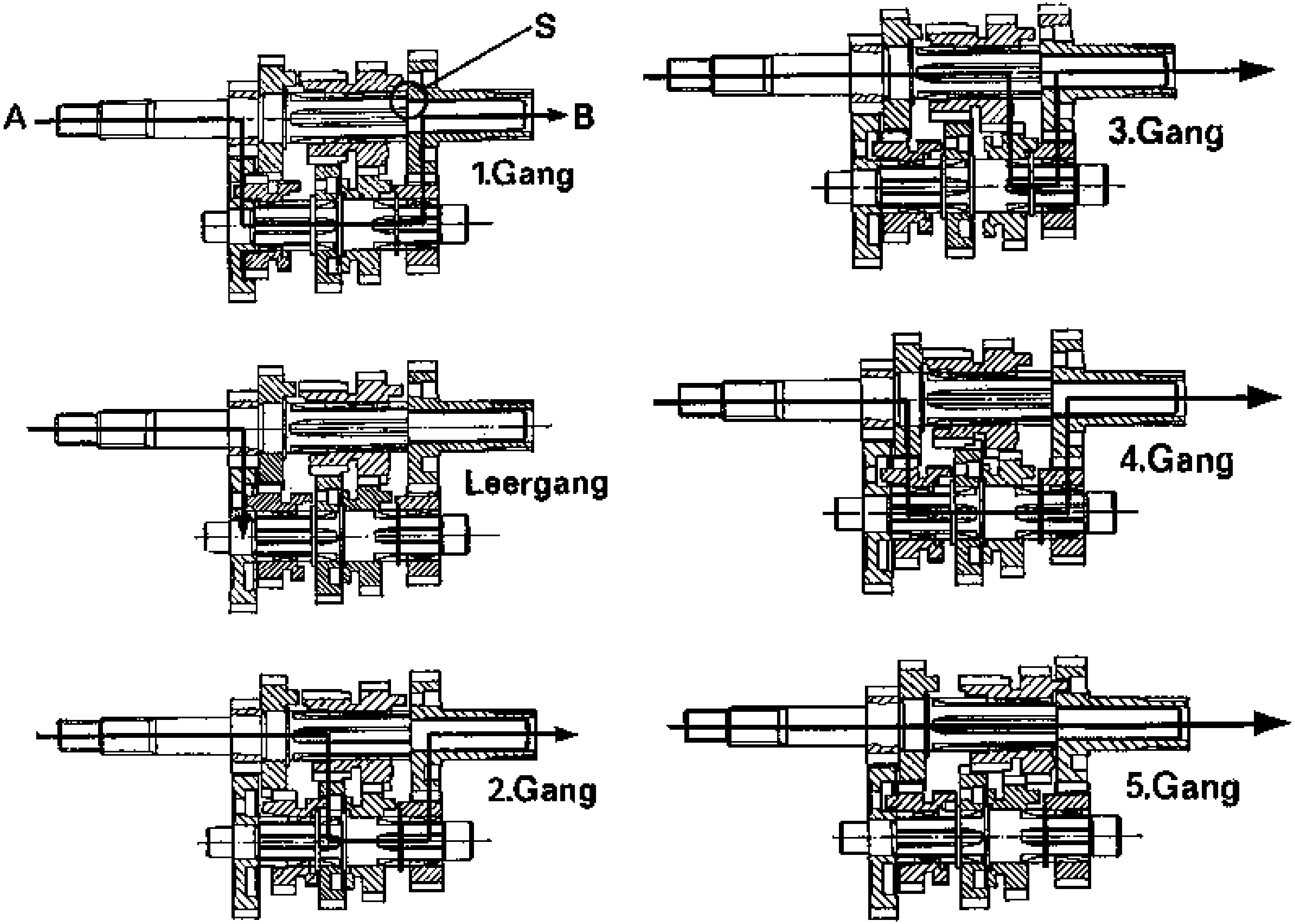

Fig. 46. Power flow in the speeds 1 to 5

(A) Drive
(B) Output
(S) Clearancc of 0.2 mm between clutch shaft and shank wheel

1. Gang 1st speed
Leergang neutral
2. Gang 2nd speed
3. Gang 3rd speed
4. Gang 4th speed
5. Gang 5th speed

- Push the gear-shift fork (1) (011) into the guide groove of the gear-shift wheel (2) for 1st and 2nd speeds, place the gear-shift wheel with the toothed part ahead an the gear of the 1st speed and engage the gear-shift fork with the lower groove to the gear-shift roll. The claws of the gear-shift wheel must not extend into the windows of the first speed gear.
  A second possibility consists in the fact to place the contact rivet (N) vertically upwards and to allow the claws of the gear-shift wheel 1st/2nd speeds to engage with the windows of the 1st speed gear.

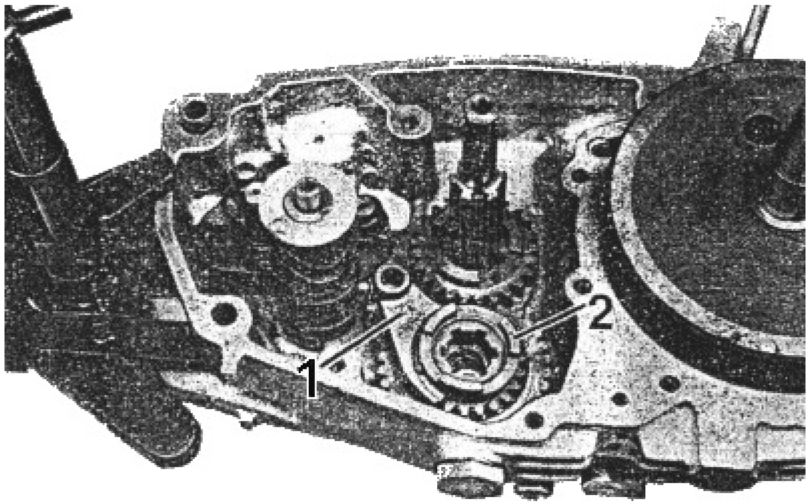

Fig. 49. Mounting the gear-shift wheel of 1st/2nd speeds

- Provide the countershaft (1) with the gear of the 2nd speed, fit the circlips and the profile washer (see also Fig. 41) and insert it, with the small bearing pin ahead, through the gear-shift wheel 1st/2nd speeds and gear of 1st speed up to the stop into the bearing 6201.
  Gear-shift fork (2) (013) is to be inserted into the guide groove of the gear-shift wheel (3) for the 3rd speed and slip the two parts on the countershaft (1). Secure the gear-shift wheel with a circlip.

  NOTICE!

  > The gear-shift claws of the gear-shift wheel point to the observer, the gear-shift fork is to be engaged with the central groove of the gear-shift roll.

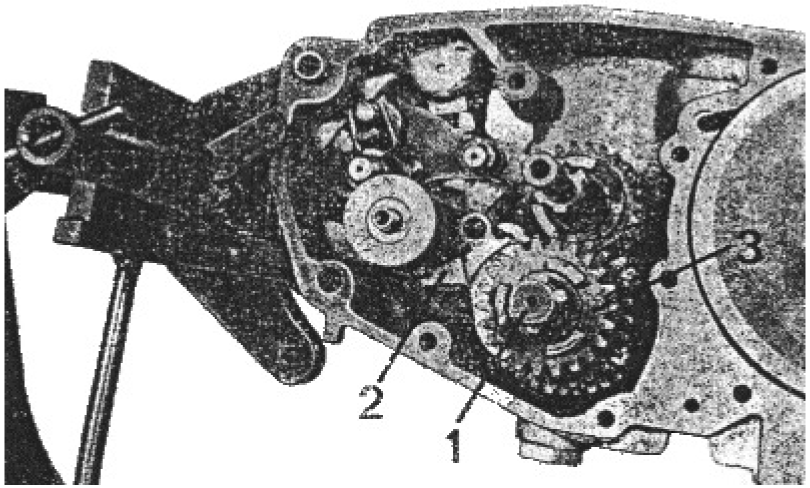

Fig. 50. Mounting the gear-shift wheel of the 3rd speed

- Put the gear-shift fork (1) (015) and the gear-shift wheel (2) of 4th/5th speeds together. Slip the gear-shift wheel over the clutch shaft (with the small wheel diameter ahead) and turn the gear-shift fork from top to bottom into the upper groove of the gear-shift roll.

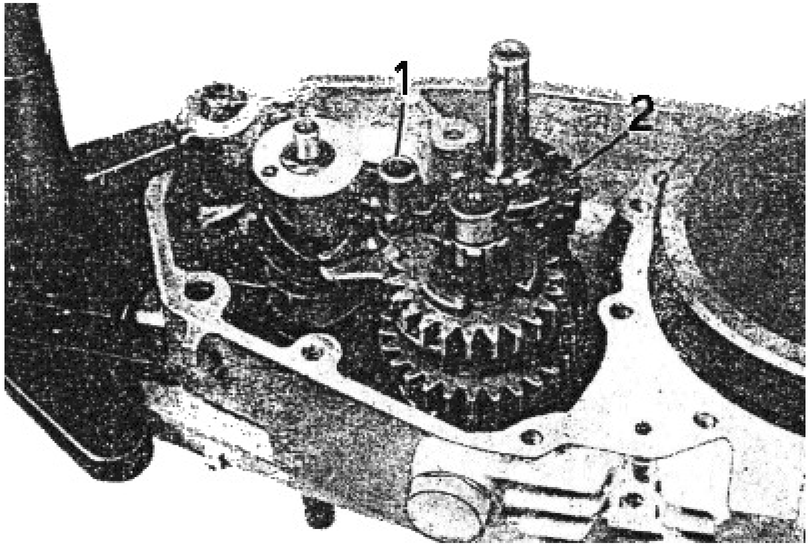

Fig. 51. Mounting the gear-shift wheel of 4th/5th speeds

- With the thin pin ahead, push the guide holt (1) through the appertaining holes of the gear-shift forks into the left-hand casing half.
  Plug the gear of the 3rd speed (2), with the gear-shift claws in the direction of the clutch, on the countershaft. The fitting washer 15x0.5 and the needle bearing (3) K 15x19x13 is to be pushed on the oiled journal of the countershaft.
  When the shank wheel (4) has been removed from the right-hand half of the casing, slip it on the clutchshaft. Fit the separating disk (5) and apply

a thin film of sealing compound to the sealing area of the casing.

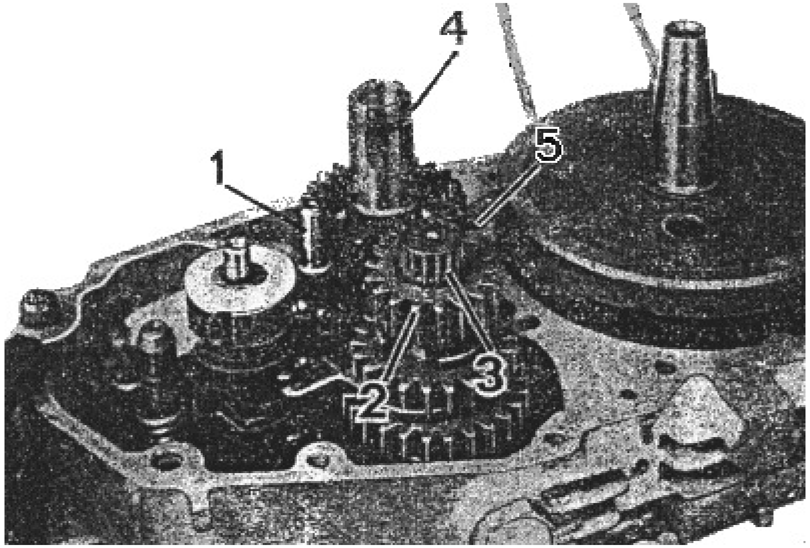

Fig. 52. Gearbox - readily mounted

4.5. Mounting the Right-hand Casing Half

zum nächsten Punkt ; Index

- Heat the casing half to a temperature of about 100 °C.
- Put the casing half in place. It must properly contact the sealing area.
- Clamp the engine in the assembly device.

- Heat the internal races of the 6204 bearing (shank wheel) and 6304 bearing (crankshaft) to a temperature of about 150 °C and press it in place by means of a suitable mandrel until it contacts the shank wheel and the crankshaft.

  NOTICE!

  > The operation must be performed without delay. When one of the bearings will stick before it contacts the specified part, again dismantle the casing half and repeat the operation after properly heating.

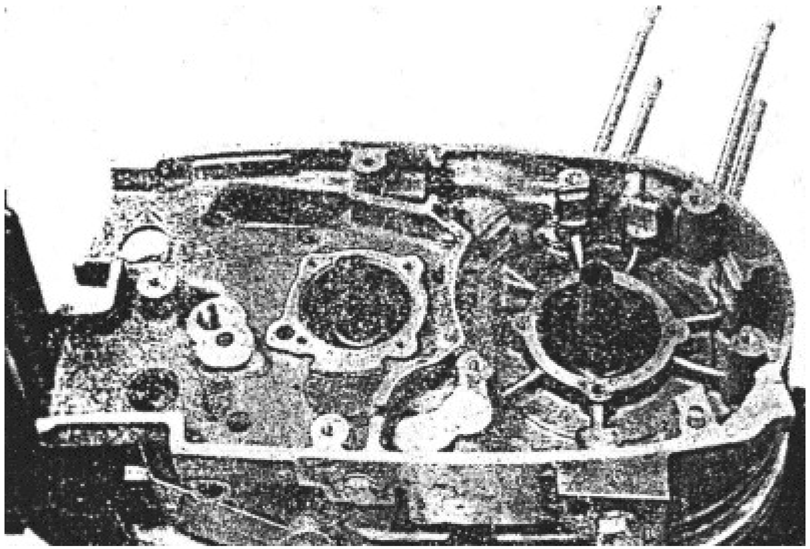

Fig. 53. Right-hand half of the casing mounted

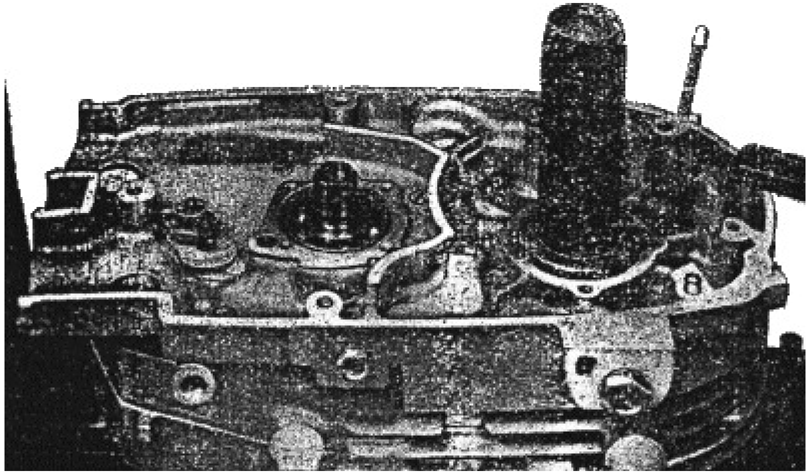

Fig. 54. Fitting the bearings

- Tighten all 11. casing screws crosswise, starting in the centre of the casing, with a torque of 10_{-3} Nm ($1_{-0.3}$ kpm).
- Screw the idle gear indicating switch (1 in Fig. 55) in place.

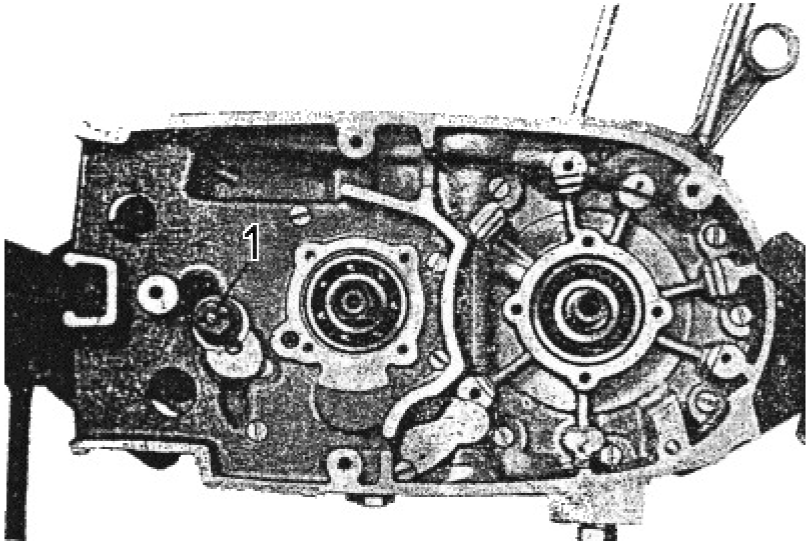

Fig. 55. Screwing the casing

- Mount the idle gear detent (Fig. 56). Tightening torque for the screw is $23_{-4.5}$ Nm ($2.3_{-0.45}$ kpm).
- Fasten the sealing caps:
    - Crankshaft
      After checking the packing ring 20x30x7 in the sealing cap, measure this distance (1) between

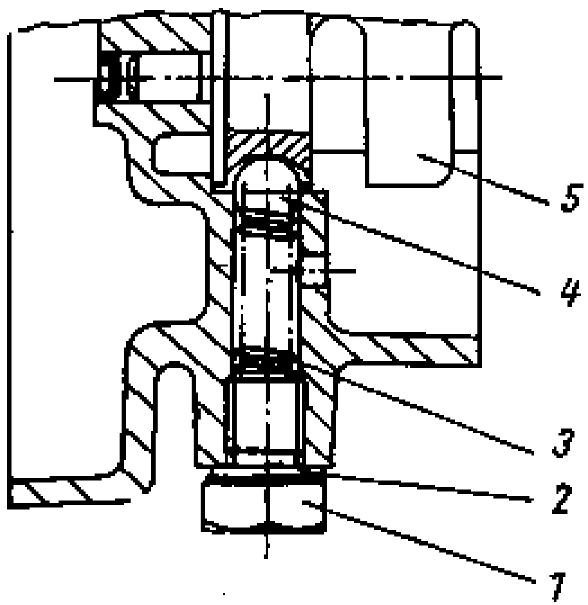

Fig. 56. Idle gear detent

1. Screw M 12x16 TGL 0-933-8.8
2. Packing A 12x16 (AL)
3. Compression spring C 1.2x8.5x11.5
4. Ball 10-70 TGL 15515
5. Gear-shift roll

sealing cap and ball bearing by means of a vernier caliper and provide an end play of 0.2 to 0.3 by fitting spacing washer (available: 0.1; 0.2 ; 0.3 ; and 0.5 mm in thickness). The thickness of the original paper packing (2) of 0.5 mm must be taken into account. The fastening screw must be provided with sealing compound and tightened with a torque of 6_{-2} Nm ($0.6_{-0.2}$ kpm).

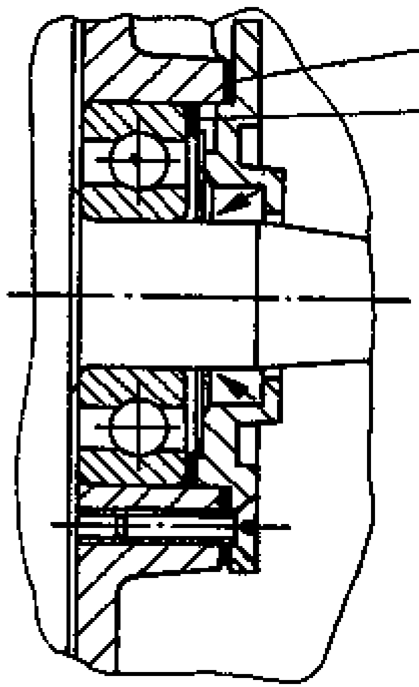

Fig. 57. Aligning the sealing cap of the crankshaft

- Shank wheel
  Measure the distance from the external edge of the casing to the external race of the bearing and, if required, align it by means of spacing washers (available: 0.1; 0.2; 0.3; and 0.5 mm in thickness).
  A distance (1) of 0.2 to 0.3 mm from the sealing cap must remain. In this connection, the thickness of the original packing (3 = 0.5 mm) must be taken into account. Check whether the spacer sleeve (4) has shrunk considerably due to the sealing lip and that the packing ring itself is in perfect working order.
  Properly clean the sealing area of the sealing cap (2), place a paper packing provided with sealing compound on it and tighten the screws crosswise (apply sealing compound to the screws and tighten with a torque of 5_{-2} Nm ($0.5_{-0.2}$ kpm).

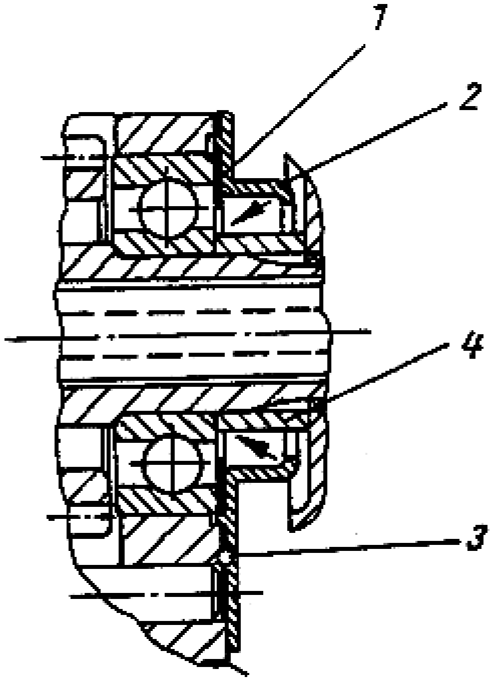

Fig. 58. Aligning the sealing cap of the shank wheel

- Ensure the ease of motion of crankshaft and gearbox:
  Place the engine in vertical position - if there is no assembling error or fault, the crankshaft can be turned easily.
  The gearbox is subjected to gear-shifting of all speeds for trial - at the same time, the clutch shaft is turned. The clutch shaft must be easily moved; if this is not the case, then drive the shaft (lower arrow) for 0.2 mm ahead by means of a plastic mallet and then drive it back by means of a copper mandrel (through the shank wheel) (upper arrow). Now, the end play shown in Fig. 46 and indicated by 'S' must be present between the face of the groove profile of the clutch shaft and the shank wheel.

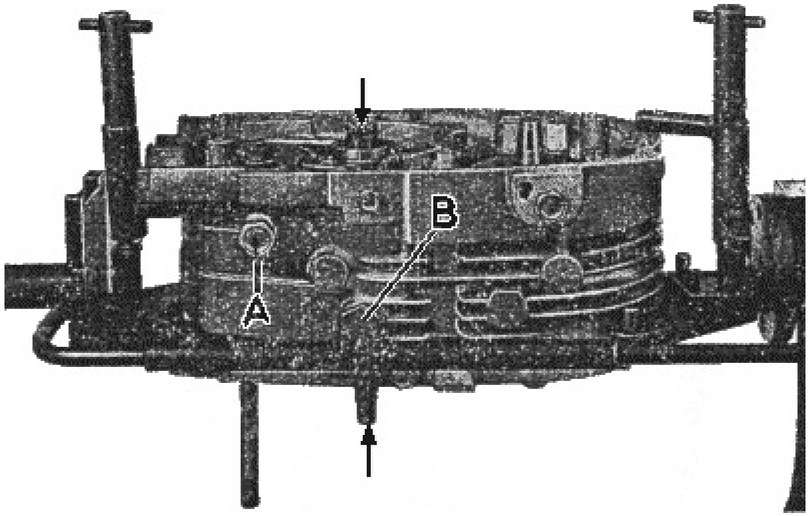

Fig. 59. Aligning the gearbox

A. Locking screw for idle gear detent
B. Oil drain screw for gearbox

- Mount the sprocket wheel:
  Slightly grease the lip at the sealing rings of the sealing cap - slip on the spacer sleeve (4 in Fig. 58). Fit the gearbox sprocket wheel (opening directed to the engine) and the lock plate. Tighten the nut having a width across flats of 27 mm with a torque of 60_{-12} Nm (6_{-12} kpm) **(right-hand thread)**, use the holder-on (1) for this purpose and fold over the lock plate.

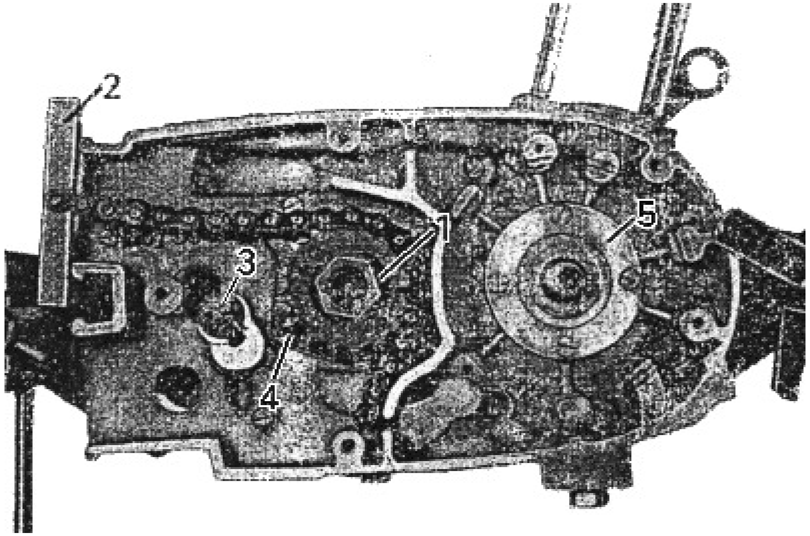

Fig. 60. Mounting the sprocket wheel

1. Lock plate
2. Holding-up device
3. Neutral indicator switch
4. Sealing cap
5. Sealing cap of the crankshaft bearing

4.6. Mounting Piston, Cylinder and Cylinder Cover

zum nächsten Punkt ; Index

Ample information about the selection and correct mating of pistons and cylinders has already been given in Section 4.1.1.

In this Section, additional information is given about the correct assembly of piston and cylinder and adjustment of the compression ratio.

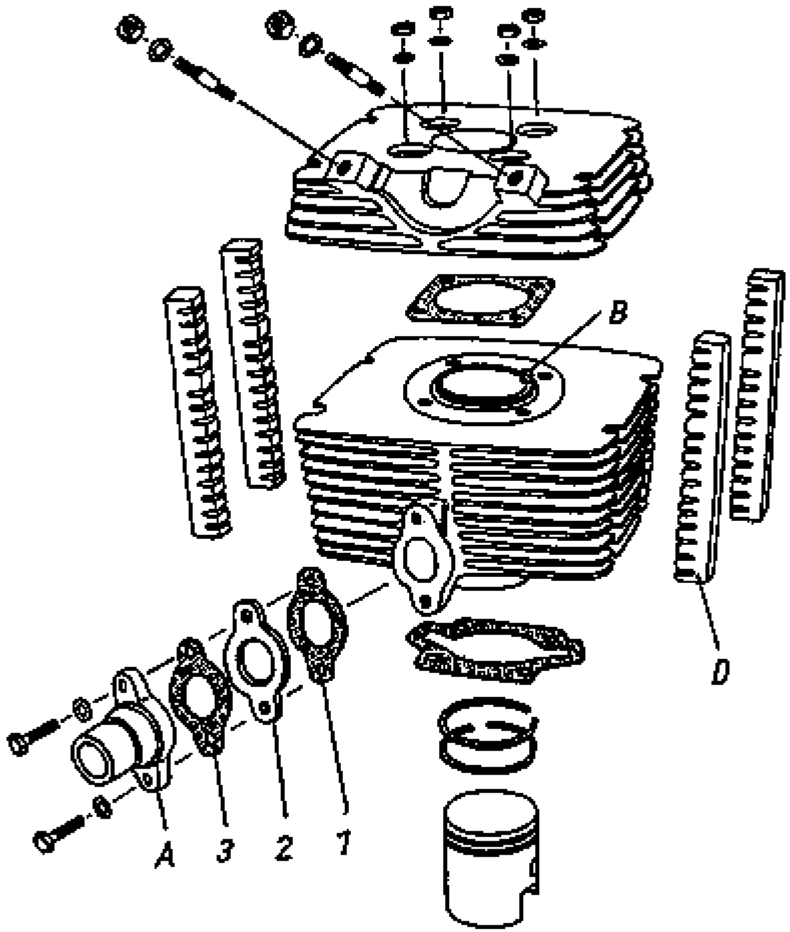

Fig. 61. Cylinder assembly
(1), (3) Packing
(2) Insulating flange
(A) Intake socket
(B) Cylinder collar
(D) Damping comb

4.6.1. Piston and Cylinder

zum nächsten Punkt ; Index

The cylinder stay bolts are checked for tight fit. The needle bearing for the gudgeon pin is to be inserted with engine oil into the small-end boss.

Until the instant at which the cylinder is mounted, the crankcase is to be closed by means of a clean rag in order that no foreign body, e.g. a lock ring for the gudeon pin, can get into the crankcase.

For facilitating the assembly, the piston ist to be heated on an electric heating plate to a temperature of anything between 40 to 50 °C. Before assembling, pay attention to the fact that piston and gudgeon pin show the same colour marking.

While the piston is heated, stick the cylinder foot gasket (without sealing compound) but with a dot of grease to the lower sealing area of the cylinder.

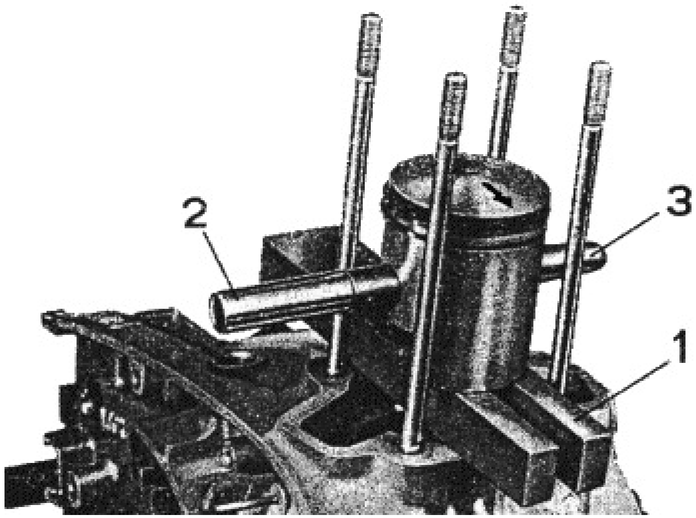

Fig. 62. Mounting the piston

Place the piston support (1) 22-50.412 on the casing and plug the heated piston, pointing with the arrow to the exhaust port, on the connecting rod. The cold gudgeon pin (2) is plugged on the cold guide mandrel (3) 02 MW 33-4 and inserted into the piston with the taper end of the guide mandrel ahead. With this, piston and connecting rod are aligned and the needle bearing is not damaged when the gudgeon pin is pressed in place.

The gudgeon pin must be inserted into the piston without delay and without any interruption in order that the temperature of the piston is not transferred to the gudgeon pin. Otherwise, the latter would expand and get stuck in the piston.

A sticking gudgeon pin should be pressed in place only with the help of the pressing-out device 22-50.010. Driving by means of hammer and mandrel will lead to the deformation of the piston and sometimes also of the connecting rod.

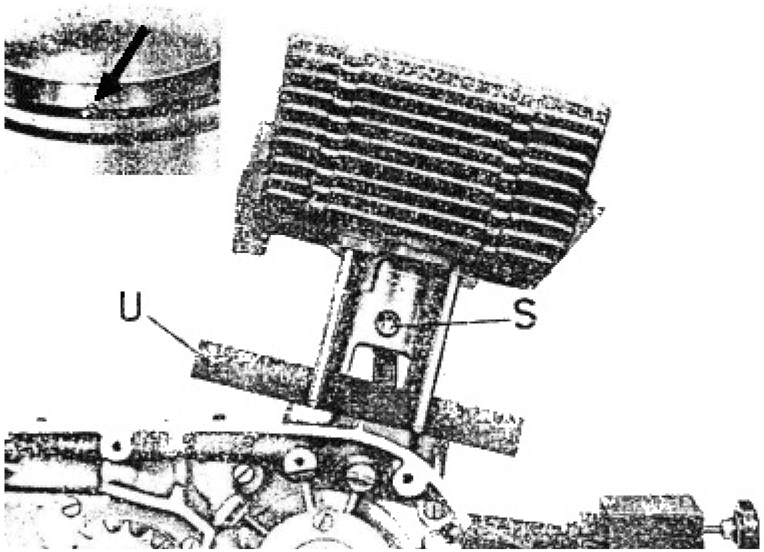

Fig. 63. Mounting the cylinder

Fit the two locking rings (S), which must always be new, by means of a taper-nose pliers and pay attention to the fact that they are tightly seated in the grooves of the piston; take care that the eyes of the locking rings point downwards or upwards.

Turn the piston rings in such a way that the locking pins are aranged between the gaps of the rings (Fig. 63, arrow to the left on top) otherwise the piston rings will jam in the cylinder and will be broken when the cylinder is mounted.

Then put the cylinder whose liner is slightly oiled over the piston. The piston support (U) 22-50.412 props the piston. It is removed as soon as the cylinder fully covers the piston. Then completely push an the cylinder.

4.6.2. Cylinder Cover and Compression Ratio

zum nächsten Punkt ; Index

The engine will emit rough noise if the compression ratio of *e*=10:1 is exceeded. If it is below 10:1, the engine will fail to produce the full output.

When the compression ratio is correct, the combustion chamber has a swept volume of

$V_{Br.r.}$ = 14.3 ± 0.5 cm^3 (at EM 125) and

$V_{Br.r.}$ = 15.8 ± 0.5 cm^3 (at EM 150)

The gap (1) is dimensioned at 0.9 to 1.2 mm. Fig. 64 shows the method of measuring this dimension. A piece of lead wire - a commercial soldering wire having a thickness of 2 mm will be suited best - is inserted through the sparking-plug hole into the combustion chamber. The piston turned so that it moves beyond the T.D.C. presses the lead wire so that it becomes flat. After withdrawing the lead wire, the dimension of the gap is found with the help of a vernier caliper or a micrometer screw.

For every measuring procedure, the cylinder cover must be tightened crosswise at least by means of two nuts.

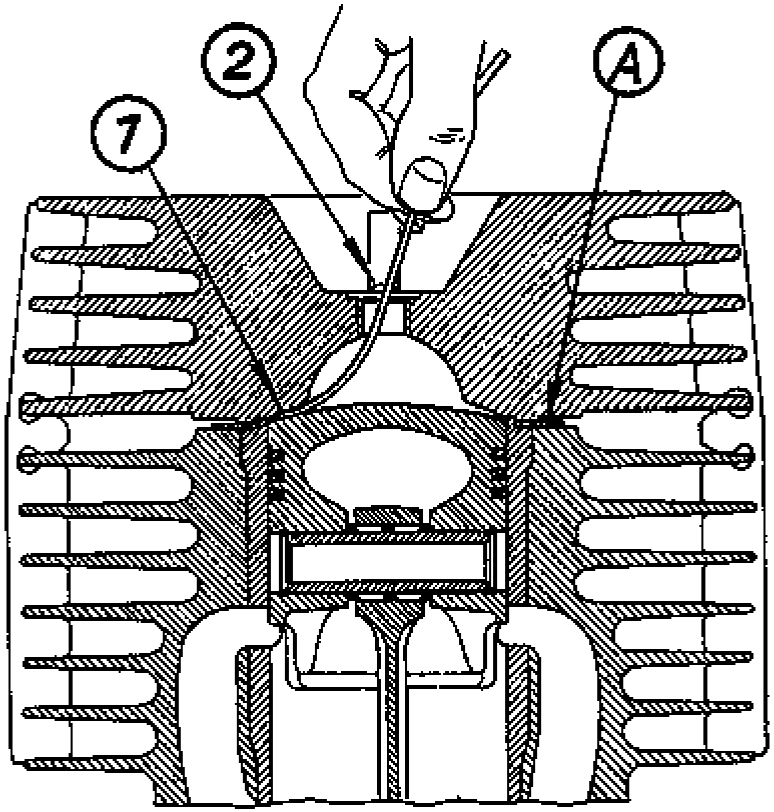

Fig. 64. Measuring the dimension of the gap

1. Dimension of the gap
2. Water drain hole

A. Compensating shims

Compensating shims (A) of the thicknesses 0.2 mm, 0.4 mm and 0.6 mm enable a correction of the dimension of the gap.

Only use original shims of aluminium and replace them by new ones after any demounting of the cylinder cover.

One shim (minimum of 0.2 mm) must be fitted in any case.

At the top of the cylinder liner, a collar (B in Fig. 61) of $2_{-0.2}$ mm in height is provided by turning in lathe which centres the compensating shims and prevents the combustion temperature from getting directly at the aluminium compensating shims.

After measuring the dimension of the gap, the compensating shim determined to be used is placed over the centring collar (B) an the cylinder.

Put the cylinder cover in place and gradually tighten the nuts crosswise by means of a socket wrench (width across flats 13) with a torque of 25_{-2} Nm ($2.5_{-0.2}$ kpm).

Finally, press the four damping combs (D) into cylinder cover (see also Fig. 61).

Then mount the intake socket (A). Observe the order (see also Fig. 61) of packing (1), insulating flange (2), packing (3 - identical with 1), and intake socket. Tighten the two screws M 6x25 alternately with a maximum torque of 10_{-3} Nm ($1_{-0.3}$ kpm) taking care that the insulating flange is not destroyed.

4.7. Mounting the Revolution Counter Drive and the Kick-starter

zum nächsten Punkt ; Index

Kick-Starter

When a new segment is used, press it an the kick-starter shaft (1).

Insert the bent up end of the kick-starter spring (3) into the slot in the starter segment (2) - if required, align the spring slightly so that the end of the spring is not too tight in its seat.

Put the GUIDE (or check) PLATE 30x17x1 in place and mount the starter shaft with spring. Put the kick-starter lever in place and pre-tension the starter spring for one revolution clockwise. For this purpose, draw out the starter shaft far enought that the segment just passes the stop (4). Press the rolled up end of the spring into the holder.

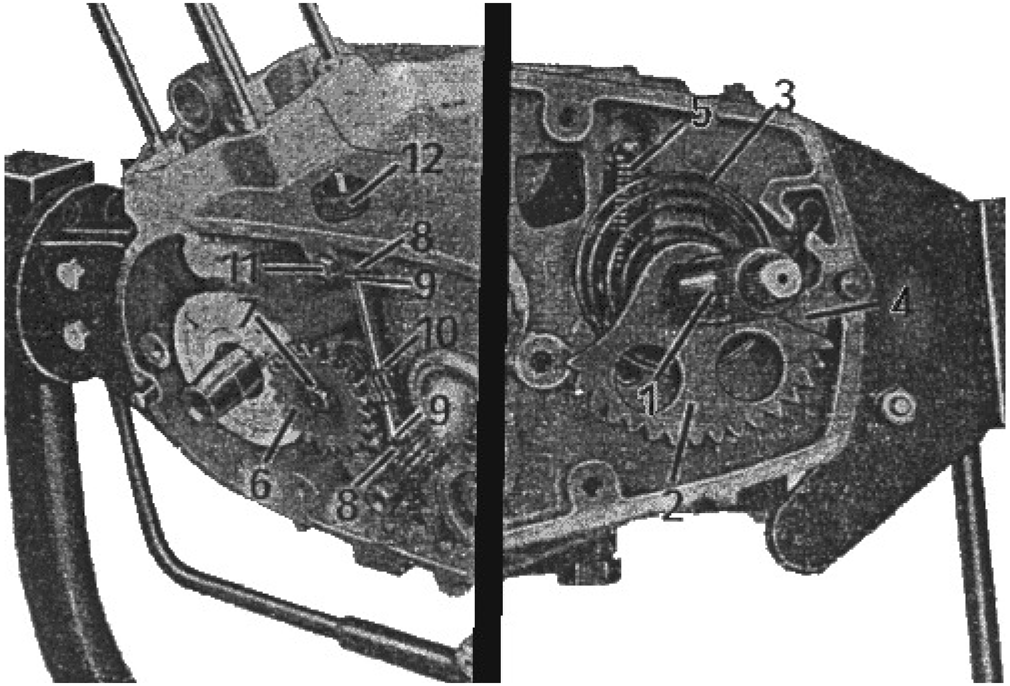

Fig. 65. Mounting the kick-starter and revolution counter drive

1. Kick-starter shaft
2. Kick-starter segment
3. Kick-starter spring
4. Stop for kick-starter segment
5. Spring for detent for gear-shift mechanism
6. Double wheel
7. Lock ring 9 TGL 0-471
8. Fitting washers 8x1.5
9. Lock rings 8 TGL 0-471
10. Intermediate shaft with pinion
11. Hexagon head screw M 5x10 with lock plate
12. Bearing plug

Revolution counter drive

- Put the double wheel (6) an the oiled bearing bolt and properly secure it by means of the lock ring 9 (7).
- Mount the fitting washer (8) and lock rings (9) on both ends of the intermediate shaft (10) and put the shaft into the casing.
- Provide the bearing plug (12) with the annular ring 14x2, push it over the intermediate shaft into the casing, fasten it by means of the screw (11) and lock it by means of the lock plate.

4.8. Mounting the Primary Drive

zum nächsten Punkt ; Index

Aligning the sprocket wheels

First slip the check plate 25x15x0.5 and then the clutch drum with bush on the clutch shaft and sprocket wheel on the tailshaft.

Check by means of a straight edge that the two sprocket wheels are in line. Corrections are made by means of compensating shims (0.1; 0.2; 0.3; and 0.5 mm in thickness) to be fitted between bush and check plate under the clutch drum.

Sprocket wheels that are not properly in line cause premature wear on chain and sprockets.

Before fastening the primary drive, the compensating shims required for mounting the clutch must be determined according to Section 4.9.

Apply the holding-up device 31-50.405, put on the thrust washer and internal driver (2) and arrest them by means

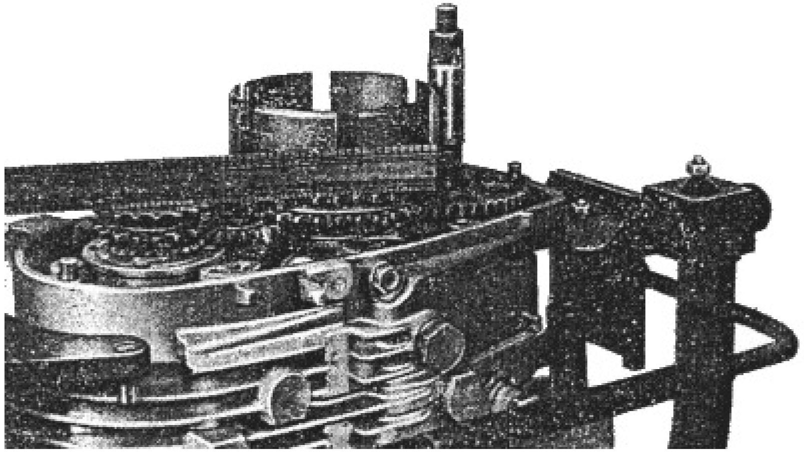

Fig. 66. Aligning the primary drive

of the holding-up device 01-MW 22-4 (3). Put the lock plate on the clutch shaft. Tighten the nut (width across flats 19) by means of a socket wrench with a torque of $75_{-1,5}$ Nm ($7.5_{-1.5}$ kpm) (LEFT-HAND THREAD). Fit the lock plate.

Provide the screw M 10x25 (4) with spring lock washer and washer and screw the sprocket wheel to the crankshaft with a torque of 56_{-11} Nm ($5.6_{-1.1}$ kpm).

4.9. Mounting the Clutch

zum nächsten Punkt ; Index

The assembly of the clutch and its actuation mechanism is illustrated in Fig. 68.

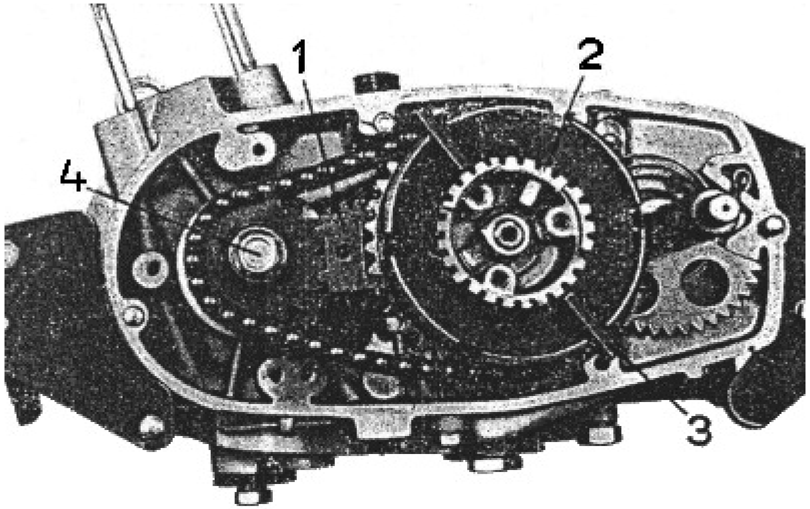

Fig. 67. Fastening the driver

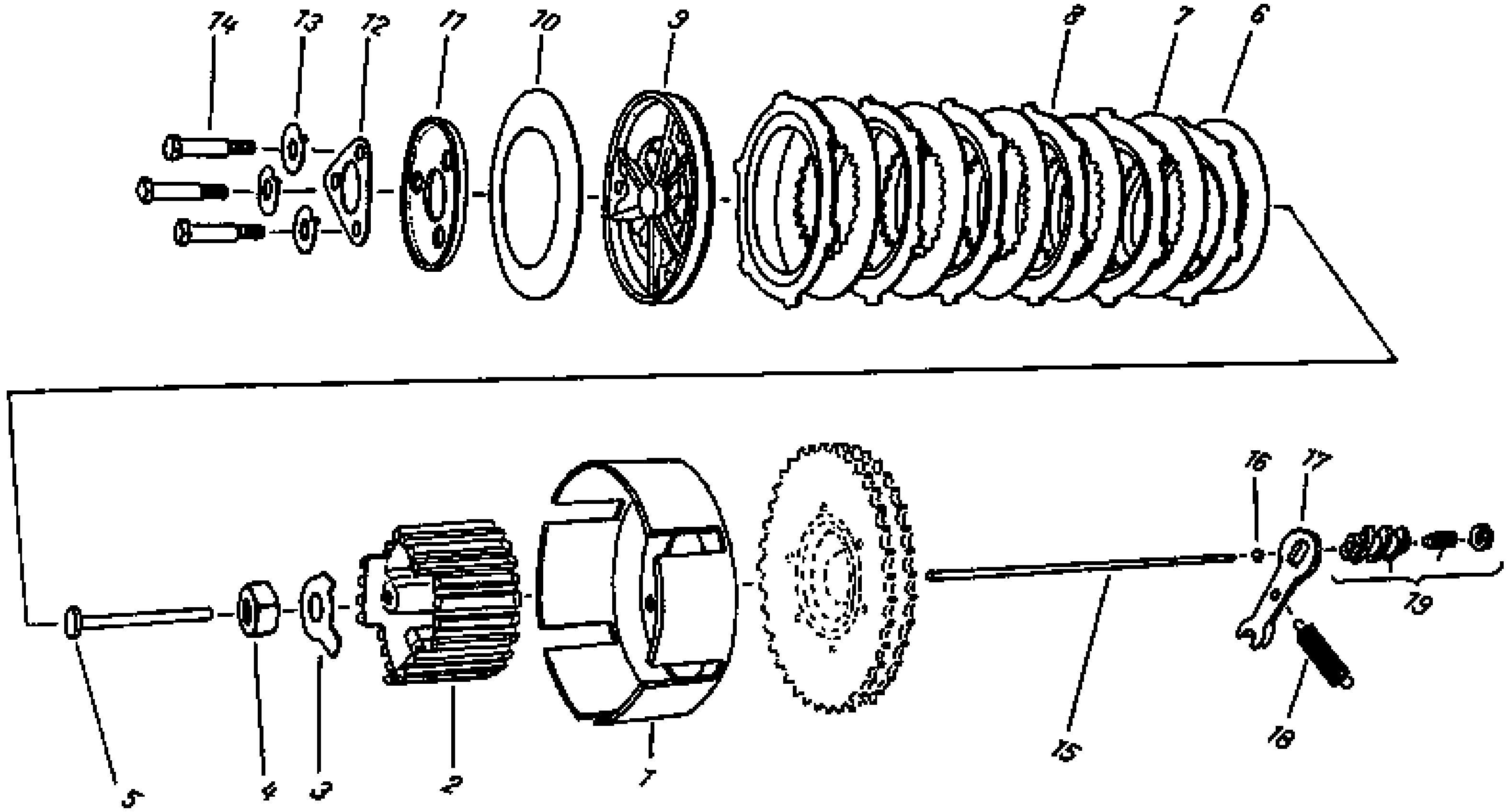

Fig. 68. Exploded view of the clutch

1. Clutch drum
2. Internal driver
3. Lock plate B 13 TGL 0-463-St
4. Heaagon nut M 12x1.5 left-hand TGL 0-934-6
5. Pressure nail
6. Retaining disk
7. Clutch disk
8. Clutch plate A 6 TGL 39-716 (lining disk)
9. Pressure plate
10. Belleville spring
11. Supporting plate

12. Compensating shim
13. Lock plate 8.4 TGL 9-432 - St
14. Threaded holt
15. Pressure bar
16. Ball 1/4"
17. Lever for thrust spindle
18. Tension spring
19. Thrust spindle with threaded pin M 8x20 and nut M 6

When new parts are installed in the clutch which change the overall height of the clutch parcel, the correct number and thickness of the compensating shims (12) must be determined before mounting. Only when this work is done painstakingly, the clutch will function optimally while the lowest possible force by hand is required at the clutch lever.

For measurement, the parts of the clutch are put together in the order shown in Fig. 69. Then the parcel is pressed together by hand or in a vice so far that there are no longer any interspaces while the Belleville spring is not yet deformed. Then measure the dimension A by means of a vernier caliper or depth gauge.

On the basis of the dimension A, thickness and number of compensating shims are selected according to the following Table (this Table is given on the next page).

After measuring, mount the primary drive (see Section 4.8.) and then the clutch can be assembled. The pressure plate is mounted in such a way that its marking (1) is opposite to the marking of the internal driver (2).

NOTICE!

Do not forget the pressure nail (5 in Fig. 68)!

Finally, put the Bellevalle spring on the supporting plate together with the shims and screw them together and lock them with the three bolts 8x19x12 (tightening torque $5_{-0.5}$ Nm). Before mounting the clutch cover, put

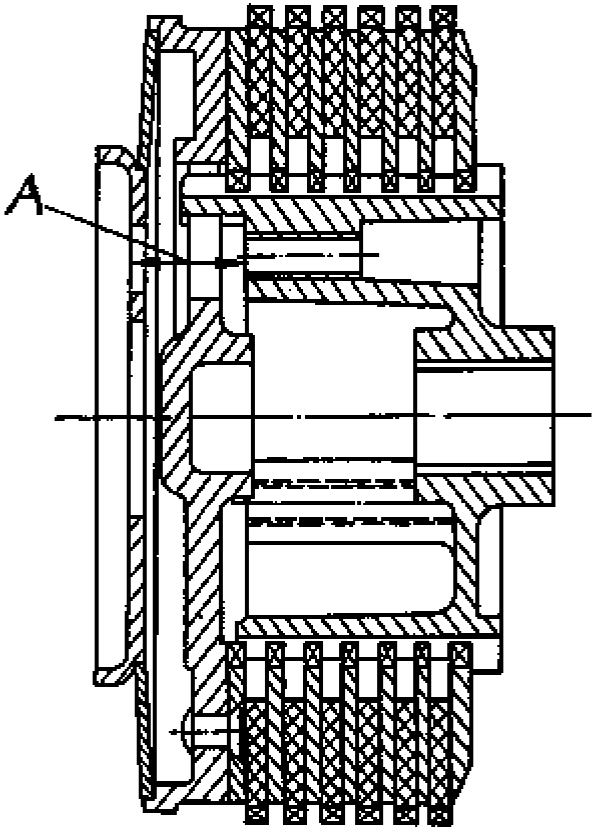

Fig. 69. Measuring the clutch parcel

the intermediate disk (S) an the kick-starter shaft. Provide the clutch cover with an annular ring 20x2 for sealing the kick-starter shaft, mount it together with a packing and tighten the fastening screws with a torque of 10_{-3} Nm ($1_{-0.3}$ kpm).

Table for adjusting of the Belleville spring EM 125/150 according to the "Measurement-method"

Dimension A in mm	Compensation required in mm	Shims to be fitted in mm
16.9	3.8	1.0 + 1.0 + 1.0 + 0.5 + 0.3
17.0	3.7	1.0 + 1.0 + 1.0 + 0.5 + 0.2
17.1	3.6	1.0 + 1.0 + 1.0 + 0.3 + 0.3
17.2	3.5	1.0 + 1.0 + 1.0 + 0.5
17.3	3.4	1.0 + 1.0 + 1.0 + 0.2 + 0.2
17.4	3.3	1.0 + 1.0 + 1.0 + 0.3
17.5	3.2	1.0 + 1.0 + 1.0 + 0.2
17.6	3.0	1.0 + 1.0 + 1.0
17.7	3.0	1.0 + 1.0 + 1.0
17.8	2.8	1.0 + 1.0 + 0.5 + 0.3
17.9	2.8	1.0 + 1.0 + 0.5 + 0.3
18.0	2.7	1.0 + 1.0 + 0.5 + 0.2
18.1	2.6	1.0 + 1.0 + 0.3 + 0.3
18.2	2.5	1.0 + 1.0 + 0.5
18.3	2.4	1.0 + 1.0 + 0.2 + 0.2
18.4	2.3	1.0 + 1.0 + 0.3
18.5	2.2	1.0 + 1.0 + 0.2
18.6	2.0	1.0 + 1.0
18.7	2.0	1.0 + 1.0

18.8	1.8	1.0 + 0.5 + 0.3
18.9	1.8	1.0 + 0.5 + 0.3
19.0	1.7	1.0 + 0.5 + 0.2
19.1	1.6	1.0 + 0.3 + 0.3
19.2	1.5	1.0 + 0.5
19.3	1.4	1.0 + 0.2 + 0.2
19.4	1.3	1.0 + 0.3
19.5	1.2	1.0 + 0.2
19.6	1.0	1.0
19.7	1.0	1.0
19.8	0.8	0.5 + 0.3
19.9	0.8	0.5 + 0.3
20.0	0.7	0.5 + 0.2
20.1	0.6	0.3 + 0.3
20.2	0.5	0.5
20.3	0.4	0.2 + 0.2
20.4	0.3	0.3
20.5	0.2	0.2

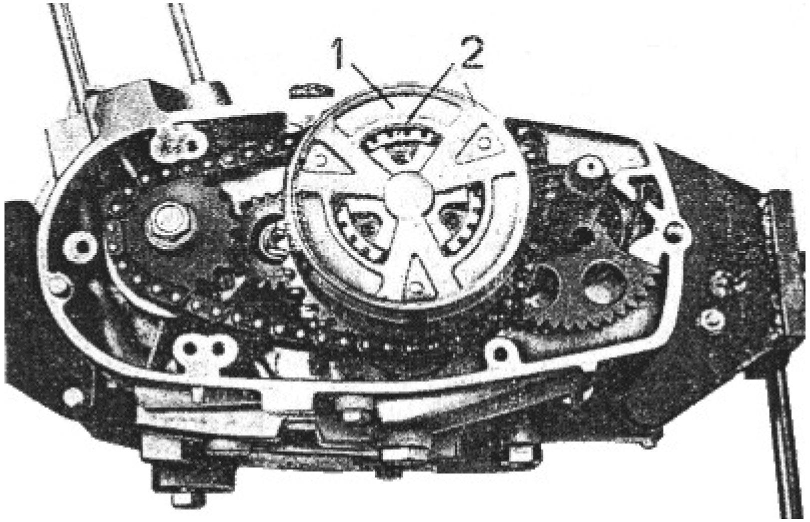

Fig. 70. Mounting the pressure plate

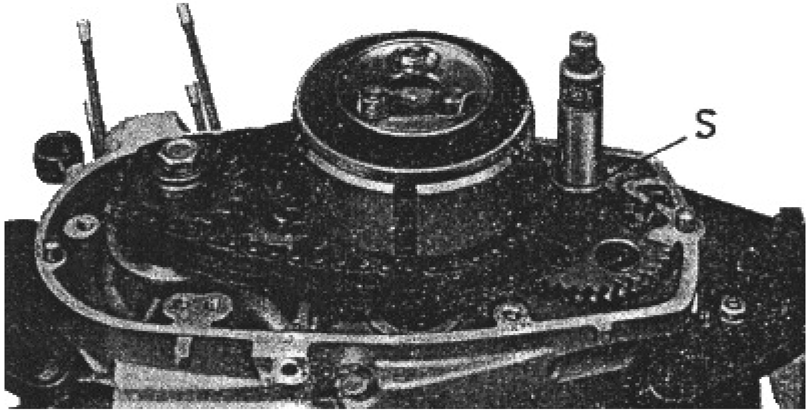

Fig. 71. Fastening the clutch

Finally, fasten the kick-starter lever and the foot-operated gear-shift lever.

4.10. Mounting the Engine

zum nächsten Punkt ; Index

The engine is to be mounted in the inverse order of the demounting operation (see Section 3.1.). After mounting, adjust the carburetter and the ignition timing or check these adjustments.

When work has been done at the clutch, its rough setting must be corrected as follows:

Loosen the check nut and screw down the pressure screw (1) until the stop can just be felt. Unscrew the pressure screw through three quarters of a revolution, retain it and lock it by means of the nut. Due to wear an the disk parcel, the distance will not become greater but smaller!

Due to the sliding (scraping) motion of the clutch worm, the use of molybdenum sulphide is advisable. Add MoS_2 powder to the lubricant and fill the cavity around the setting screw.

Then close this space by means of the protective cap (2). When occasionally pressing the protective cap with your finger, grease is fed to the clutch worm so that a special lubricating nipple is not required.

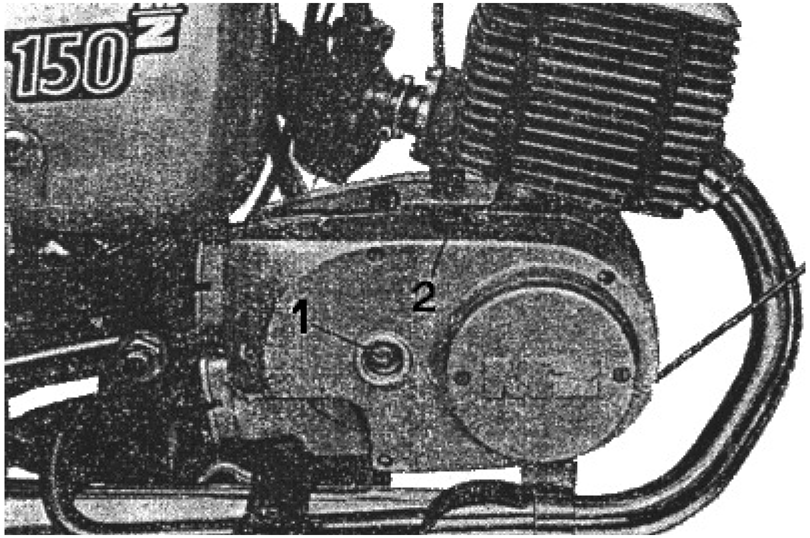

Fig. 72. Roughly adjusting the clutch

5. Cycle Parts

zum nächsten Punkt ; Index

The general structure - which has already been indicated by the Figs. 1 and 2 - is illustrated by the exploded view of the cycle parts (Fig. 73). Below, detailed information is given about various assemblies of the cycle parts and about their repair.

5.1. Rear Wheel Springing and Elastic Rear Engine Support

zum nächsten Punkt ; Index

Fig. 74 shows the design of the rear wheel springing. The rear wheel springing includes the rear wheel swing arm, its bearing which is combined with the rear engine suspension, and the spring-loaded suspension units.

5.1.1. Bearing of the Rear Wheel Swing Arm

zum nächsten Punkt ; Index

The carrying part of the bearing is the swing bearing bolt (3) which is clamped in the frame by means of the frame bearing tube (11), the rigth-hand and the left-hand inner tube (6) and the check plates (7) with the help of the hexagon-head screws (2).

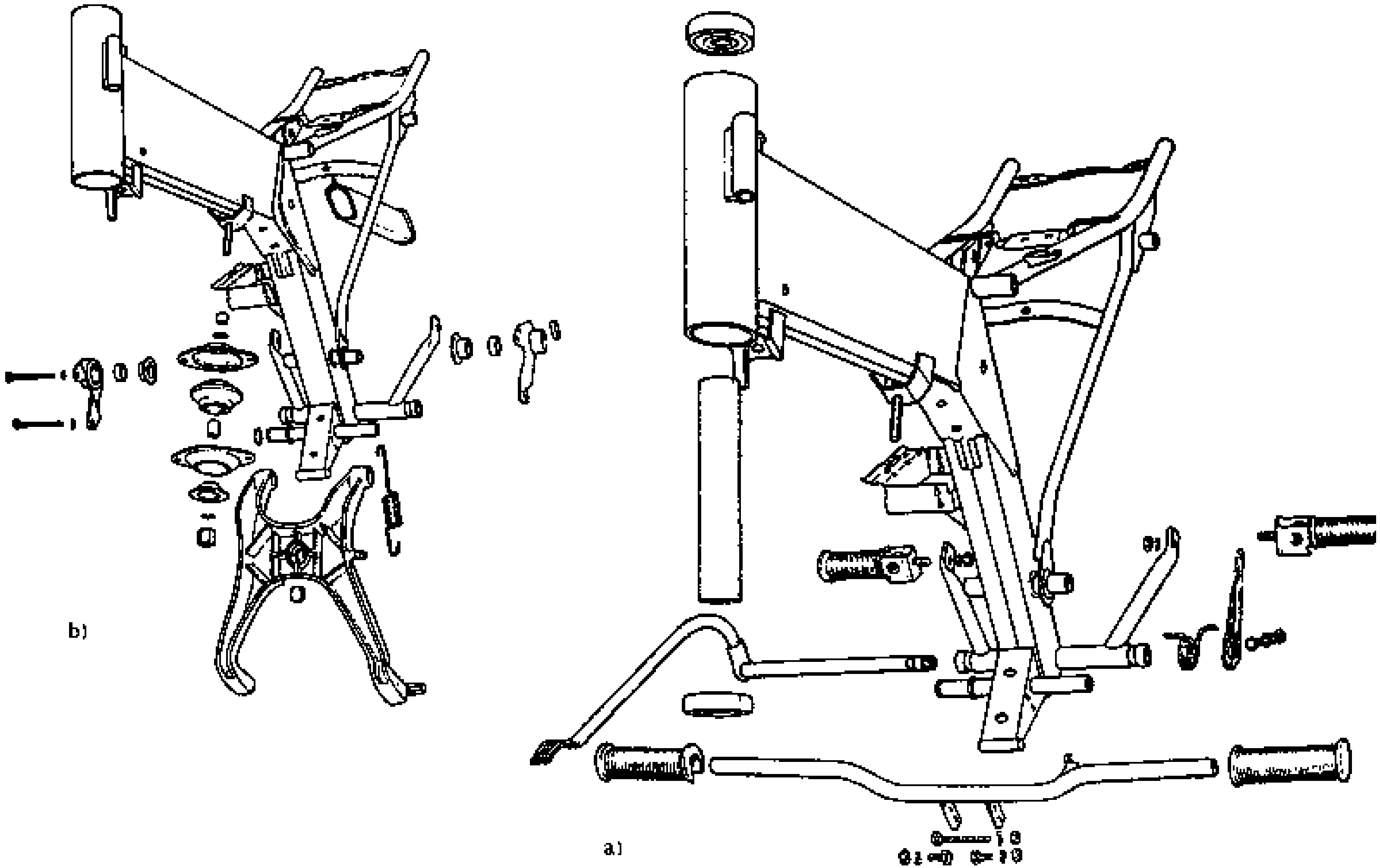

Fig. 73. Exploded view of the cycle parts

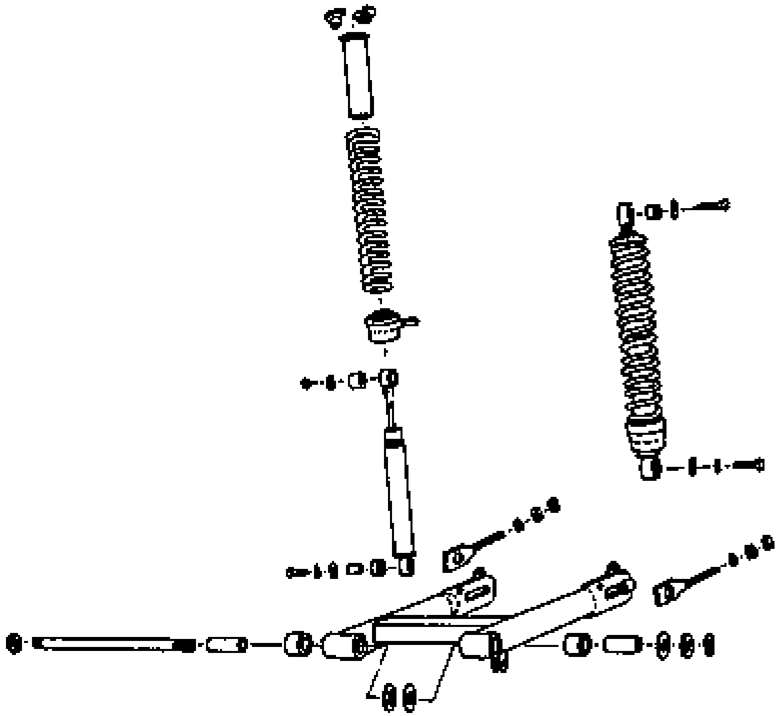

Fig. 74. Rear wheel springing

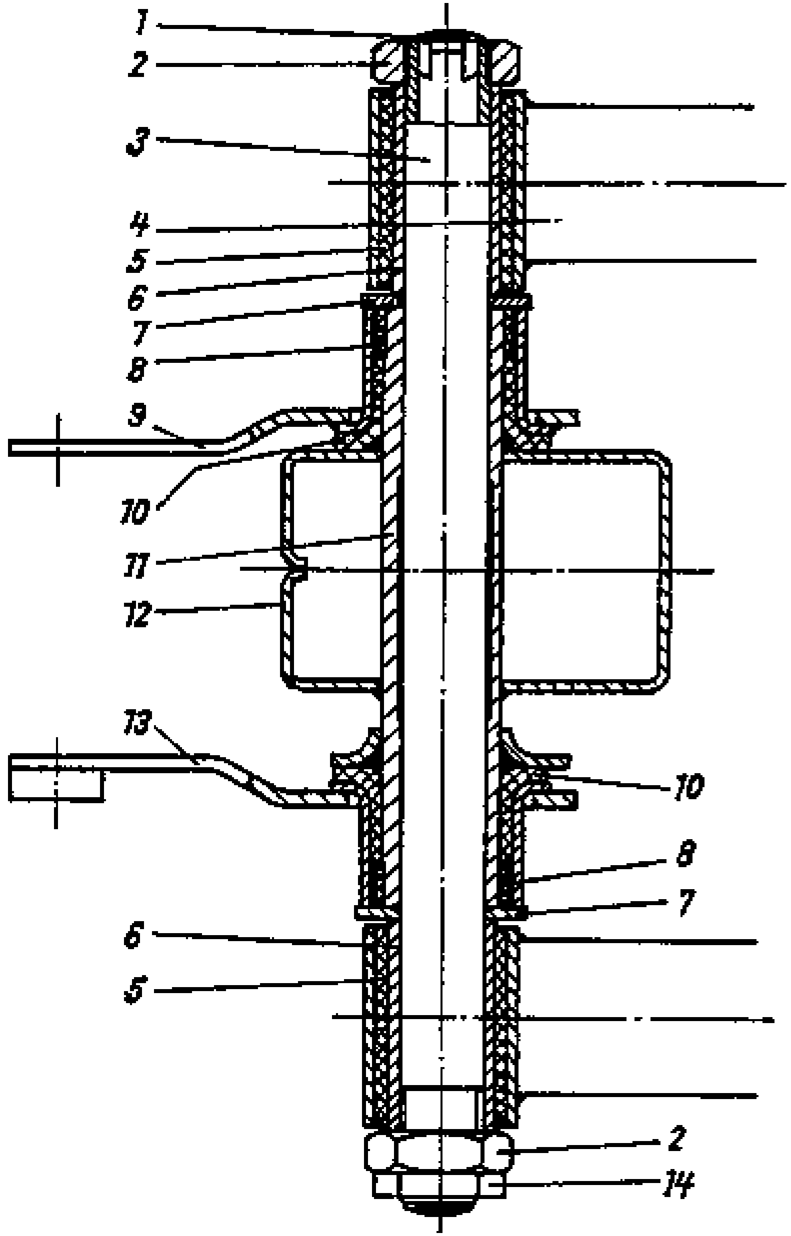

Fig. 75. Swing-arm bearing

1. Covering plug (omitted from 1987)

2. Hexagon nuts M 18x1.5 TGL 0-936-5.8
3. Swing bearing bolt (solid material from 1987)
4. Rear wheel swing arm
5. Rubber bushing
6. Inner tubes, 44 mm long
7. Check plates
8. Spacer rings
9. Engine shoe right-hand side
10. Bearing rubber
11. Frame bearing tube
12. Frame
13. Engine shoe left-hand side
14. Setting ring

After mounting, the swing-arm bearing does not require any maintenance.

The rear wheel swing arm is delivered as complete spare part with the rubber elements pressed in place by our Spare Part Sales Department.

5.1.2. Replacement of the Rubber Bearing - Rear Wheel Swing Arm

zum nächsten Punkt ; Index

- Pressing out the inner tubes (1) and (2) by means of the mandrel (3) in a mandrel press.

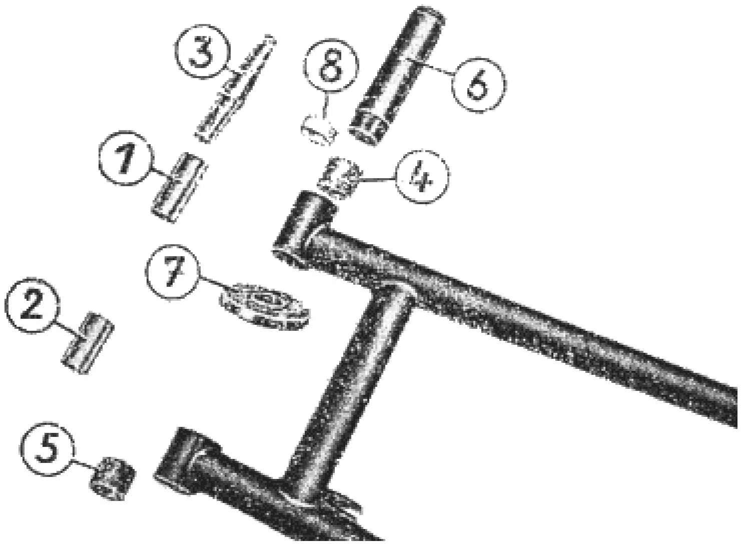

Fig. 76. Mounting the rubber bearings

8. not for ETZ 125/150

- Cutting up and pressing out the rubber bushings (4) and (5).
- Pressing in the new rubber bushings (4) (in a dry state) by means of the mandrel from outside the swing arm, inserting the intermediate ring (7). Use the short cylindrical lug of the mandrel (6).
- Slip the inner tube (1) or (2), 44 mm in length, on the cylindrical end of the mandrel (3) and, with the taper end ahead, press mandrel into the rubber bushings wetted with soap water until the inner tube uniformly projects from both ends of the swing tube.

5.1.3. Demounting and Mounting the Swing Bearing Bolt

zum nächsten Punkt ; Index

Remove the setting ring (14) and the left-hand hexagon nut (2), leave the right-hand swing bearing bolt with auxiliary mandrel and the auxiliary mandrel for centring plugged into the swing arm (see Figs. 75 and 77).

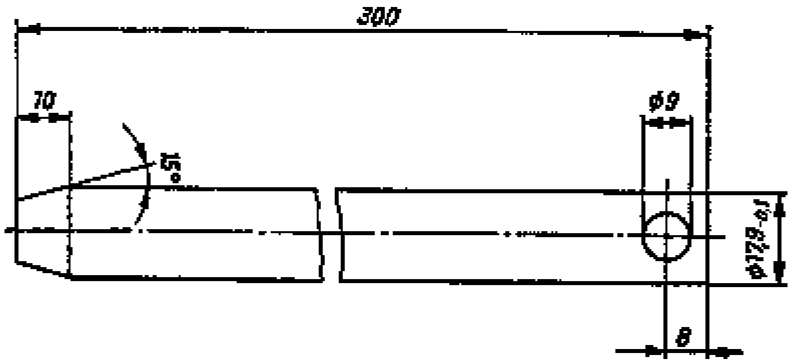

Fig. 77. Sketch of auxiliary mandrel

Before mounting, grease the swing bearing bolt in order that it will not stick in place due to rusting.

Screw the hexagon nut on the right-hand side of the swing bearing bolt until the end of the thread is reached.

Then push through the swing bearing bolt from the right to the left. At the left-hand side, tighten the hexagon nut with a torque of 80^{+20} Nm (8^{+2} kpm) (the spring for the swing is fully extended) and lock the setting ring.

5.1.4. Mounting the Rear Swing Including the Engine Suspension

zum nächsten Punkt ; Index

- Slip the bearing rubbers and engine shoes on the frame bearing tube at the left-hand and right-hand side.
- Compress the engine shoes axially by means of the pressure rings to the length of the frame bearing tube (see Fig. 78).

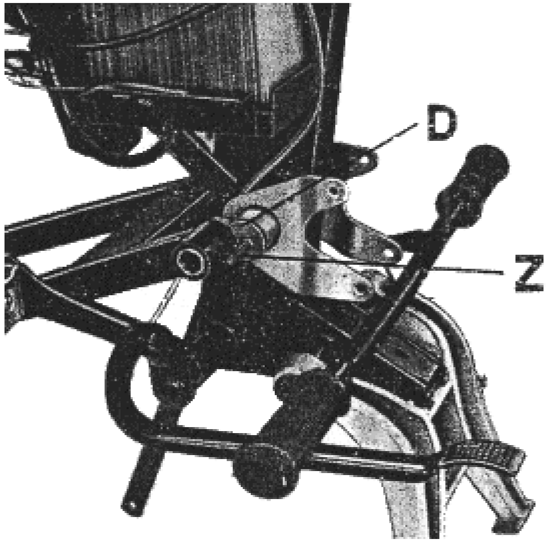

Fig. 78. Engine shoes axially compressed by pressure ring (D) and draw spindle (Z) with M 6 thread. Rear wheel swing arm fitted

- Slip the rear wheel swing arm with check plates from the rear on the engine shoes until the stop at the pressure rings is reached. Remove the pressure rings and further push the swing up to the centre of the hole for the bearing bolt.
- Press in the auxiliary mandrel from the left-hand side and thus centre the bearing.

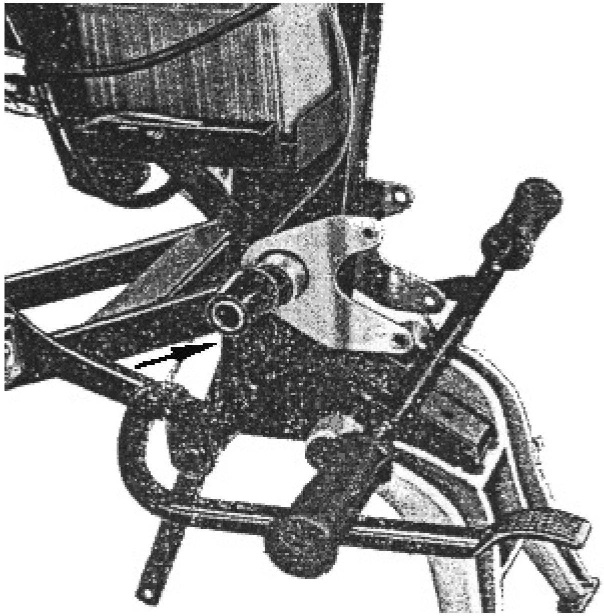

Fig. 79. Push the rear wheel swing arm in place in the direction of the arrow head, the pressure rings are already removed

- Screw an the right-hand fastening nut an the swing bearing bolt until the end of the thread is reached.
- Grease the swing bearing bolt and press it in place from the right to the left.
- Tighten the left-hand hexagon nut wich a torque of 80^{+20} Nm (8^{+2} kpm) (spring for the swing fully extended) and lock the setting ring.

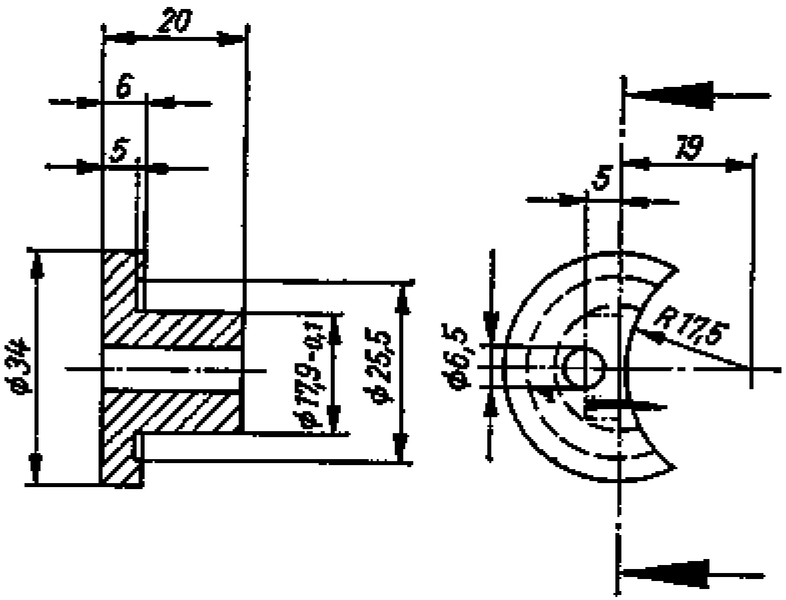

Fig. 80. Sketch for the pressure ring

5.1.5. Rear Engine Suspension (Fig. 75)

zum nächsten Punkt ; Index

The bearing rubbers (10) and spacer rings (8) of the rear engine suspension can be replaced according to the above Section only when engine and rear wheel swing arm are demounted.

The wear limit is reached when the engine shoes in the mounted state no longer show any pre-tension and can be moved by hand laterally.

When replacing the bearing rubbers (10) and spacer rings (8), check whether the bearing sleeves of the engine shoes show any wear marks. When in the hole, at the place where the spacer ring is applied, a shoulder can be felt, it is advisable to replace the engine shoes by new ones at the same, time in the interest of an adequate service life of the new rubbers and spacer rings.

5.1.6. Repairing the Spring-loaded Suspension Units

zum nächsten Punkt ; Index

The repair is restricted to the replacement of defective parts of the suspension units and the lubrication of the adjustment sleeves of the rear suspension units.

The shock absorbers must be replaced completely and then be subjected to regeneration. Repair of the shock absorbers in the workshop is not possible. In case of oil loss, the missing amount can be replenished (special wrench 05-MW 82-4), but in the majority of cases the sealing of the piston rod will be defective - this means that the shock absorber must be given to a special enterprise for regeneration.

Shock absorber marking

The marking is arranged above the lower fastening eye. Example: A 22 - 100 - 88/8 M 1.50/1

Explanation

A22	design
100	nominal stroke in mm
88	damping force in the direction of pull in kp
8	damping force in the direction of compression in kp
M	with adjustinent
1.50/1	manufacturer's number

Demounting the shock absorbers

Clamp the lower suspension unit eye in a vice. Press down the protective sleeve (8) and take out the two halves of the supporting ring (1). Then, the parts (8), (9) and (11) can be removed.

Possible defects in shock absorbers

1. The shock absorber is inefficacious without any visible loss of oil (foreign body between the diaphragms of the piston valve).
2. Damping starts not softly but jerkily - the suspensions units are "stamping" (damping fluid insufficient or bottom valve leaky).
3. Damping fluid is leaking.

Topping up shock absorber oil

Turn out the threaded piece by means of a special wrench 05-MW 82-4 (4 in Fig. 81) and draw out the damping device. Clean all parts in pure benzine and top up with new oil. Tighten the threaded part with a torque of about 49 Nm (5 kpm).

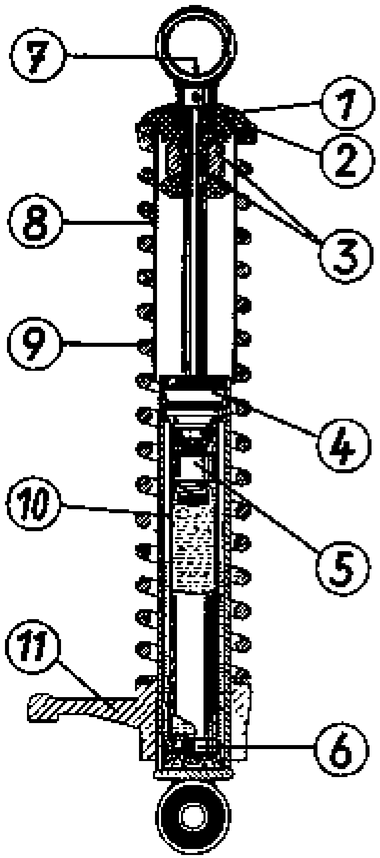

Fig. 81. Design of the shock absorber

1. Halves of the supporting ring
2. not applicable
3. Stop rubbers
4. Threated piece with radial seal ring AC 10x19x7
5. Piston wlith non-return valve (top) and damping valve (bottom)
6. Bottom valve with supporting ring
7. Marking of tolerance group
8. Protective sleeve
9. Compression spring
10. Piston tube
11. Adjusting sleeve

Mating shock absorbers

To ensure good road-holding properties, the shock absorbers of one axle must show the same damping values.

The marking of the tolerance group is arranged at the upper face of the piston rod (7 in Fig. 81).

The green colour dot means a negative deviation from the nominal value of the damping force. If there is no colour marking, then a positive deviation is given. Always mate shock absorbers having the same marking

Springs for spring-loaded suspension units

length (relaxed)	272^{+10} mm
external diameter of the spring	$54.3_{-0.8}$ mm
wire diameter	6.3 mm
windigs (total)	14.5
spring constant	11.6 N/mm

5.2. Engine Suspension at the Cylinder Cover

zum nächsten Punkt ; Index

The design of the elastic engine suspension is illustrated in Fig. 73. For repairing or replacing the front engine suspension, it is advisable to demount the carburetter and intake socket and to remove the ignition cable.

The exhaust system may remain at the vehicle, only the connecting screw between rear exhaust clip and exhaust brace must be loosened.

After unscrewing the two nuts M 8 from cylinder cover and, if necessary, the rear engine fastening screw, lower the engine to the position indicated in Fig. 82. Then loosen the M 10 nut serving for fastening the front suspension to the frame and all individual parts can be taken off.

When assembling, take care that the screwed joints are properly tightened!

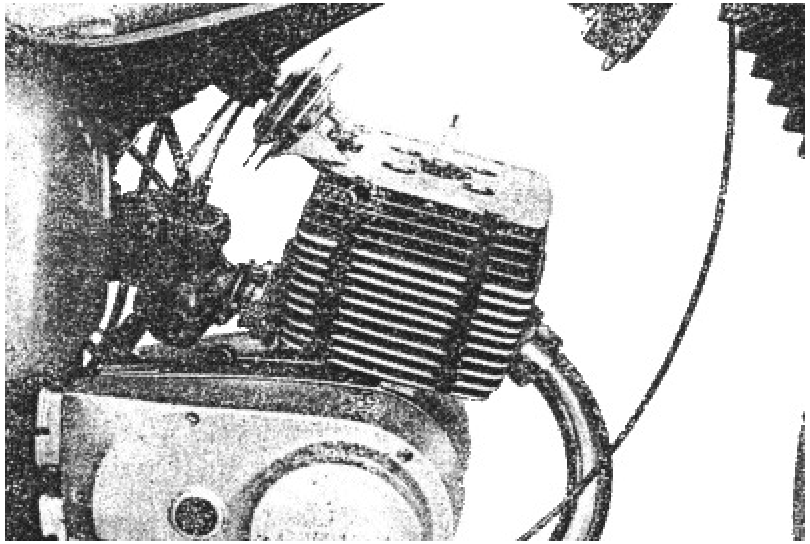

Fig. 82. Replacement of the eIastic engine suspension at the cylinder cover

5.3. Telescopic Fork

zum nächsten Punkt ; Index

The structure of the telescopic fork and the arrangement of the individual parts are illustrated in Figs. 83 and 84. The repair of various assemblies is described below in full detail.

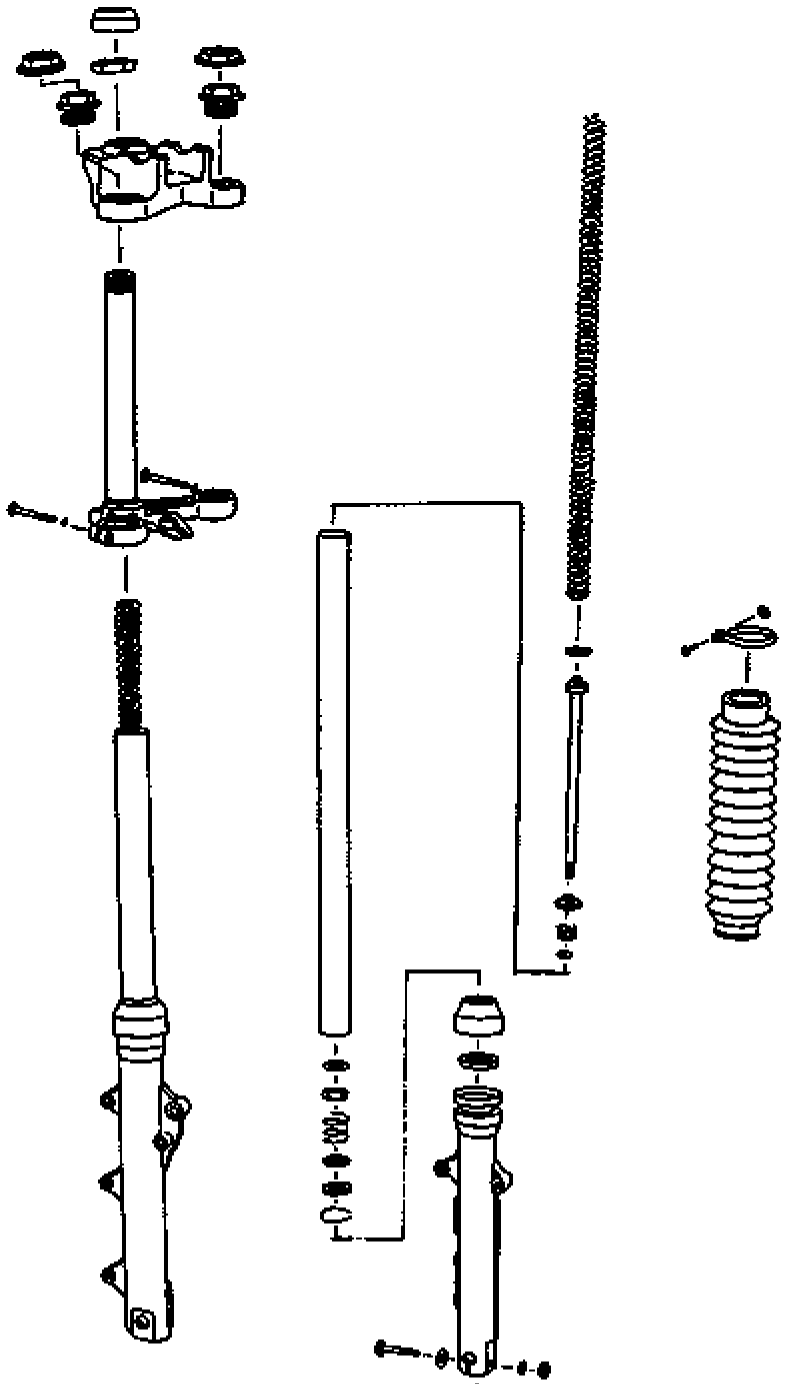

Fig. 83. Exploded view of the telescopic fork

5.3.1. Steering Bearing

zum nächsten Punkt ; Index

The steering system is supported by two radial grooved ball bearings 6006 between which a spacer sleeve (32x35x171) is mounted. The steering bearing is completely free from any maintenance.

During mounting and at a later time no adjustments have to be made.

THE STEERING SYSTEM IS MOUNTED IN THE FOLLOWING WAY:

- Fill the ball bearings of type 6006 with antifriction bearing grease.
- Press the lower bearing into the frame up to the stop. Use a spacer ring ø 54x20 for this purpose.
- Fit the spacer sleeve.
- Press the upper bearing on the spacer sleeve until the internal race contacts the stop.
  Pay attention to the following:
  Place a spacer ring ø 54x40 between the lower bearing and the supporting table in order that the lower bearing cannot be pressed out. Use the space ring ø 54x20 for pressing in the upper bearing.

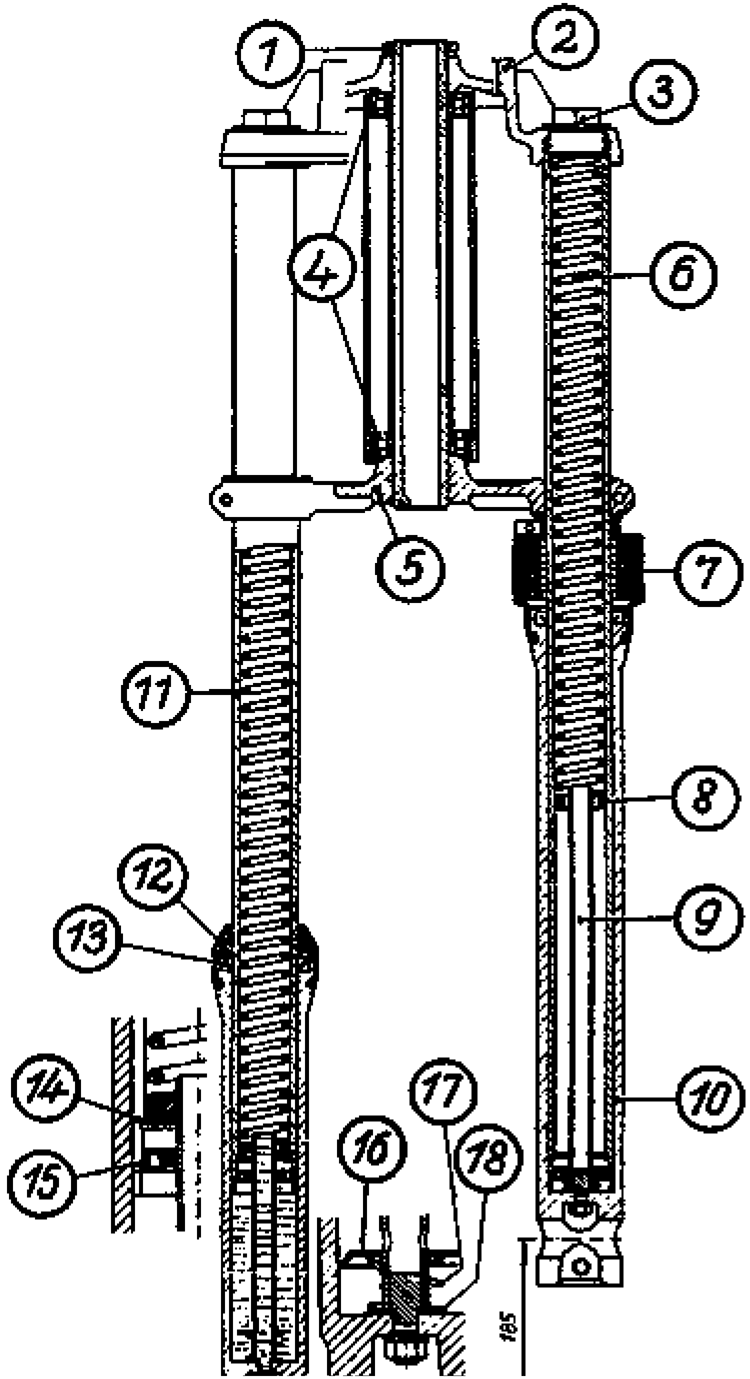
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Fig. 84. Telescopic fork and steering bearing (sectional view)

Left-hand fork member
Spring fully compressed, spring deflection = 185 mm
Design with protective bellows

Right-hand fork member
Spring fully extended
Design with protective cap

1. Nut for control tube
2. Upper clamping-head
3. Screw plug (with cap of plastic)
4. Steering bearing 6006
5. Lower clamping head
6. Compression spring
7. Protective bellows
8. Piston ring at supporting tube
9. Supporting tube
10. Slide tube
11. Guide tube
12. Protective cap
13. Radial seal ring 35x47x7
14. Check washer, thickness 2.0 mm, and lock ring
15. Valve plate, throttle and circlip
16. Cup for final stop
17. Compression spring for final stpp
18. Sealing washer

NOTICE!

During the later mounting of the lower and upper clamping head take care that the nut for the control tube (1 in Fig. 84) is tightened with a torque of 105 to 125 Nm (10.5 to 12.5 kpm).

Then the steering system must be free to be moved easily and must not jam in any steering position. If this should happen, then replace the spacer sleeve arranged between the internal races of the bearings (a too short spacer sleeve leads to the fact that the bearings are subjected to stress).

The removal of the steering bearings from the frame is effected by means of the puller 22-51.006 according to the Figs. 85 to 87.

The demounting and mounting of the telescopic fork necessary for this purpose is explained in Section 5.3.2.

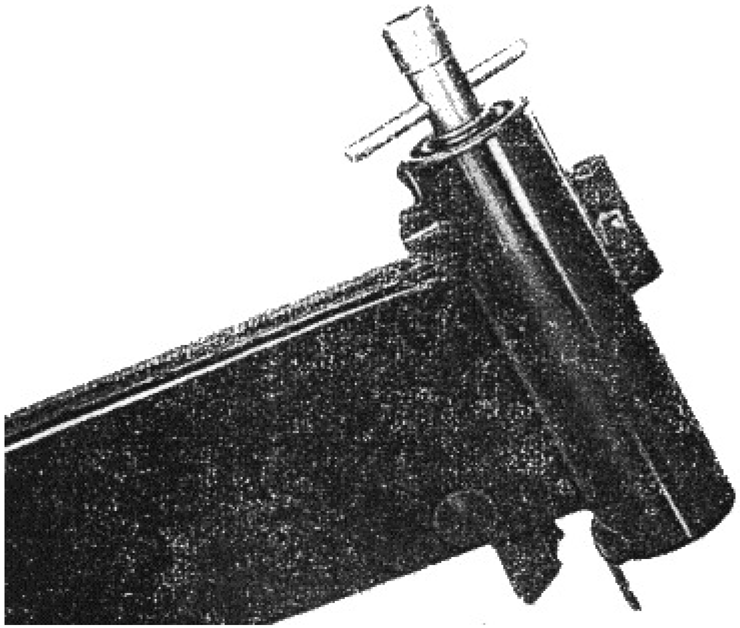


Fig. 85. Pressing the internal part of the puller into the ball bearing

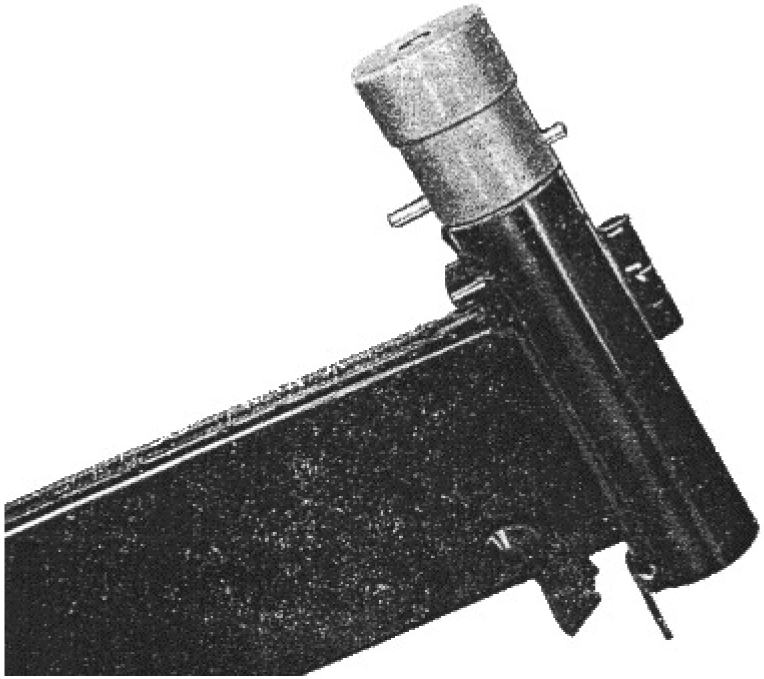


Fig. 86. Mounting the upper part of the puller

5.3.2. Criteria for Demounting the Telescopic Fork

zum nächsten Punkt ; Index

Demounting the members of the telescopic fork will be necessary:

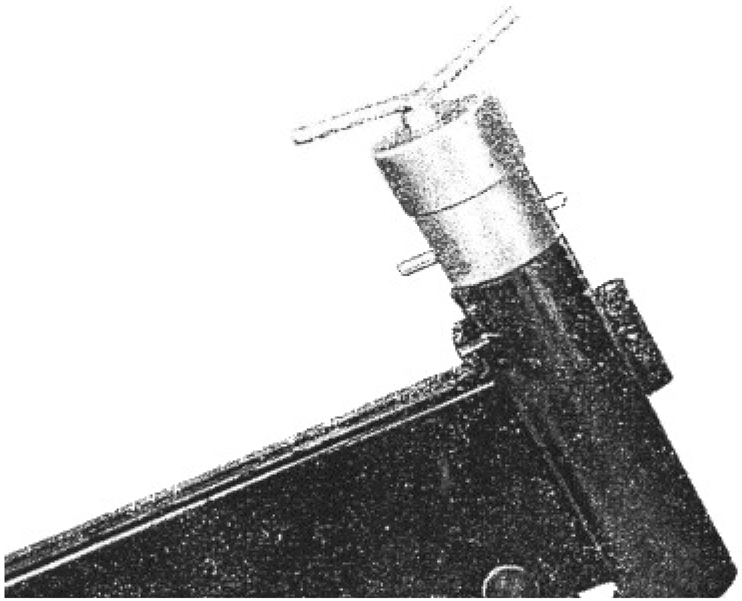


Fig. 87. Screwing the serew, tightening it and pulling the bearing out of the frame

1. when, due to an accident, the guide tubes are distorted.
   The telescopic fork jams when the springs are compressed.

   NOTICE!
   The telescopic fork will also jam when the springs are being compressed when the fork members are not parallel!

   CAUSE:

   The clamping screw of the knock-out axle was clamped before tightening the nut of the knock-out axle. Consequently, the two fork members are subjected to stresses.
2. when the telescopic fork members leak oil (radial seal rings in the sliding tube are leaky).
   For oil level checking see Fig. 98.
3. when the hydraulic oil damping is insufficient although the full capacity of oil is present.

4. when the protective caps or protective bellows have to be replaced.
5. when the permissible wear limit between guide tube and sliding tube has been reached.

   TESTING METHOD:

   The vehicle stands on the prop stand, the springs of the telescopic fork are fully extended. The two sliding tubes are moved to and fro at the axle holders. The maximum clearance must not exceed 2.2 mm (0.8 to 1.2 mm in a new state). During this measurement, the two fork members must not be distorted or subjected to stresses, otherwise the present clearance will be reduced.
   In cases of doubt, the complete fork members must be taken from the vehicle, the guide tubes must be clamped between "soft protective jaws", and the clearance present at the axle holtlers measured by means of a dial gauge.

5.3.3. Demounting and Mounting the Complete Telescopic Fork (see also Fig. 84)

zum nächsten Punkt ; Index

The telescopic fork can be demounted without disconnecting cable connections. The following sequence of operations is advisable:

- Unhook the hand brake cable control from the handle-bars and loosen the brake hose from the brake saddle. Draw the hose out of the lower clamping head, close the opening of the hose by a suitable plug and fasten it to the handle-bars.
- Remove the cap for the control tube fastening nut and steering damper.
- Loosen the nut for the control tube and the screw plugs of the guide tubes by means of a socket wrench or flat box spanner.
- Demount the headlamp (completely).
- Remove the instrument holder, place the handle-bars on the fuel tank.
- Remove the front wheel, brake saddle and front wheel mudguard.
- Completely remove the flashing-light direction indicators, front, inclusive of their holders.
- Unscrew the nut for control tube and screw plugs.
- Carefully beat out the upper clamping head, upwards and the lower clamping head together with the telescopic fork members downwards.

  NOTICE!

  Secure the hanging down instrument holder, the flashing-light direction indicators, headlamp and handle-bars in such a way that nothing will be damaged and the cables will not be drawn out.

The complete telescopic fork is mounted in the inverse order of the above demounting operations. Pay particular attention to the correct installation of the cable harnesses. After connecting the brake hose, the disk must be bled.

THE SCREWED CONNECTIONS MUST BE TIGHTENED IN THE FOLLOWING ORDER AFTER ASSEMBLING (Fig. 88):

- Nut for control tube (1)
  Tightening torque 105_{-20} Nm (10.5_{-2} kpm)
- Screw plugs (2)
  Tightening torque 150_{-30} Nm (15_{-3} kpm)

  NOTICE!

  Provide the screw plugs at their external thread with adhesive lacquer "Chemiesol 1405" (manufacturer: VEB Schuh-Chemie, Erfurt) and then fit them (remove the old sealing compound).
  In countries other than the GDR, an adhesive should be used which remains elastic after curing.
  Take care that no adhesive gets into the guide tubes, remove adhesive from the faces of the screw plugs.

- Clamping screws (3) at the lower clamping head
  Tightening torque 15^{+3} Nm ($1.5^{+0.3}$ kpm)
- Nut for knock-out axle (4)
  Tightening torque 80 Nm (8 kpm)
- Clamping screw for knock-out axle, when the spring of the telescopic fork is compressed
  Tightening torque 20 Nm (2 kpm)

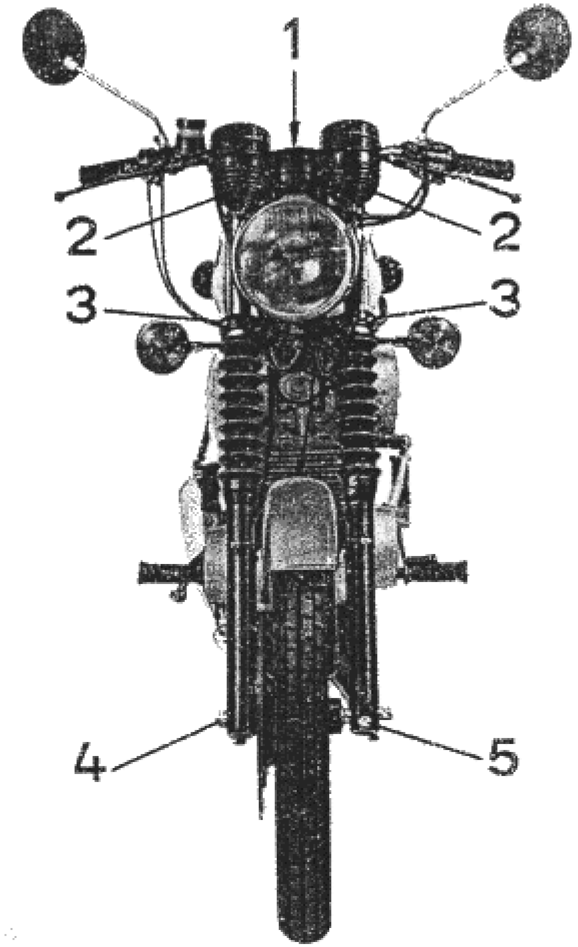


Fig. 88. Sequence for tightening the screws

5.3.4. Demounting and Mounting the Telescopic Fork Members

zum nächsten Punkt ; Index

For demounting the individual fork members, handle-bars, headlamp and instrument holder need not be removed. The brake system of the disk brake can also remain in the closed state. When removing the right-hand member, the brake saddle must be disconnected from the slide tube and be fastened at a suitable place until re-mounting. The photograph represented in Fig. 89 has been taken without these parts to obtain a better view of the essentials.

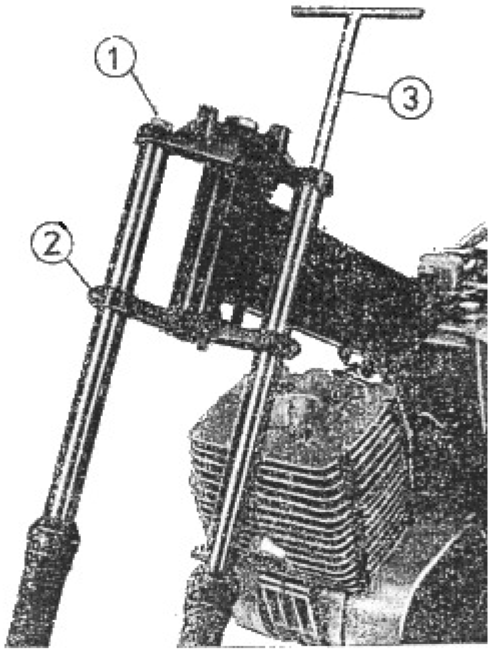


Fig. 89. Demounting and mounting the telescopic fork members

- Remove the screw plugs (1).

- Remove the front wheel.
- Demount the front-wheel mudguard.
- Mark the guide tubes immediately below the lower clamping head.
- Loosen the clamping screws (2).
- Draw the complete guide tubes together with slide tube downwards out of the assembly, using the assembly wrench with slide piece M 30x1.5 (3).

Mounting is to be effected in the inverse order. Tighten the screws in the manner described in Section 5.3.3.

5.2.5. Dismantling the Telescopic Fork Members Removed from the Vehicle

zum nächsten Punkt ; Index

After having removed the protective caps or protective bellows from the slide tube, the telescopic fork members are sujected to an external cleaning procedure, the compression springs (present in the guide tube) are drawn out upwards, and the damping liquid is canted, performing axial motions with the slide tube.

DISMANTLING IS THEN PERFORMED IN THE FOLLOWING ORDER:

- Using an L-handled socket wrench (width across flats 10), loosen the fastening nut (1) for the supporting tube and remove this nut and the corrugated washer (2) (Figs. 90 and 91).
- When during loosening or tightening the fastening nut of the supporting tube, the latter will be caused to turn, then arrest the supporting tube by putting a screw-driver through the socket wrench.
- Draw the guide tube (A) out of the slide tube (B).

  NOTE:

  Observe in any case - when clamping the guide tubes (A) in a vice, only use soft protective jaws and clamp them only in the upper third of their length.
  The slide tubes have to be clamped only at the axle holders or at the fastening hubs for the mudguard or the brake saddle!

Fig. 90. Removing the fastening nut for the supporting tube

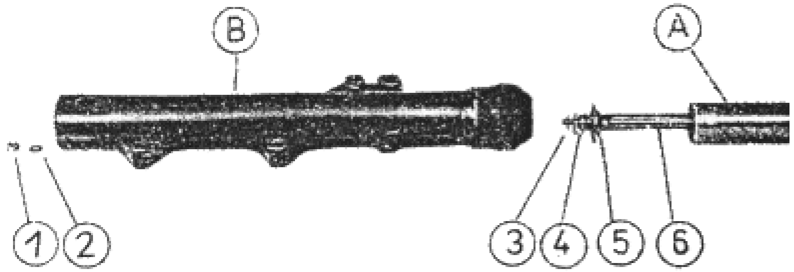


Fig. 91. Guide tube drawn out of the slide tube

- Remove the sealing disk (3), compression spring (4), 19 mm in diameter, and the cup for the final stop (5) from the supporting tube (6).
- Push the supporting tube (6) into the guide tube (A).
- Remove the annular ring 32x1.6 (Fig. 92) from the guide tube. The throttle (3) behind the annular ring is milled out at the external diameter in such a way that the annular ring can be pressed out by means of a small screw-driver. Remove the throttle (3), the valve plate (4) and the compression spring for valve plate (5) (see Fig. 93).
- The photograph represented in Fig. 93 was taken without the supporting tube pushed in place to facilitate understanding.

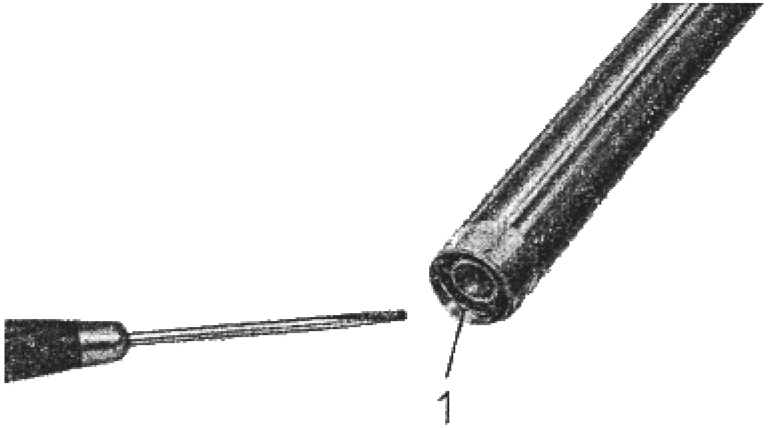


Fig. 92. Pressing the annular ring out of the guide tube

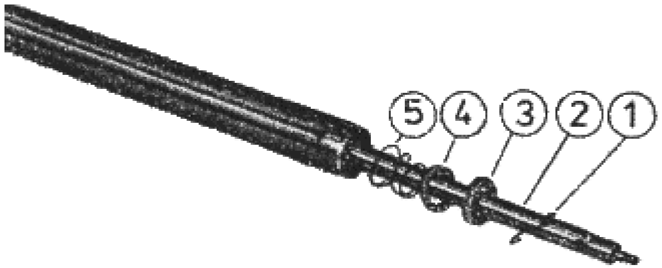


Fig. 93. Demounting throttle, valve plate and spring

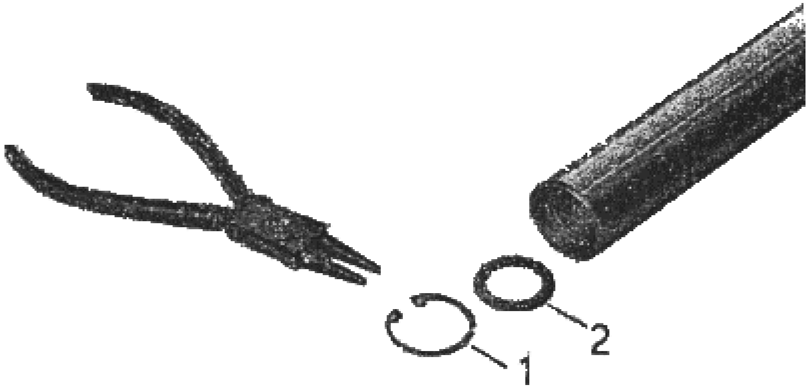


Fig. 94. Removing the check plate (2 mm in thickness)

- Now remove the lock ring (1) and the check plate (2) under it from behind the valve spring (Fig. 94).
- Using a suitable piece of round timber (broom stick, about 600 mm long) push out the supporting tube downwards. Do not push over the internal thread of the guide tube because this means damage to the piston ring on the supporting tube.

5.3.6. Mounting the Telescopic Fork Members and Checking for Wear

zum nächsten Punkt ; Index

A fundamental condition for proper functioning of the telescopic fork after mounting is a clean working place. Dirt and dust deposits on the parts to be assembled will lead to premature wear and failure of the telescopic fork.

THE ASSEMBLING OPERATIONS ARE CARRIED OUT IN THE FOLLOWING ORDER:

- In case of a telescopic fork that was leak-proof before demounting, the shaft seal ring must be checked for wear of the sealing lip and for correct seat of the supporting spring (tension spring under the sealing lip). In case of doubt, it is better to replace the shaft seal ring.

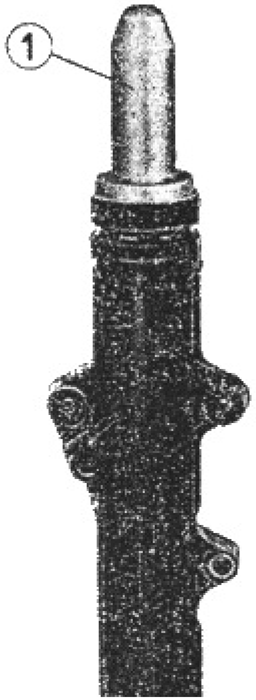


Fig. 95. Pressing in the shaft seal ring

ASSEMBLING INSTRUCTIONS:

Press the shaft seal ring in place only by means of the driving mandrel (1) 11 MW 7-4.

DO NOT BEAT IT IN! The spring of the sealing ring may jump off. In fitting, the sealing lip points to the damping oil, the closed side of the shaft seal ring points upwards.

- Check the guide tube (A in Fig. 91) for damage to the chromium coat, ridges and distorsions. In case of doubt check for true running; permissible eccentricity 0.05 mm.

  BENDING OR REALIGNMENT IS NOT ALLOWED!

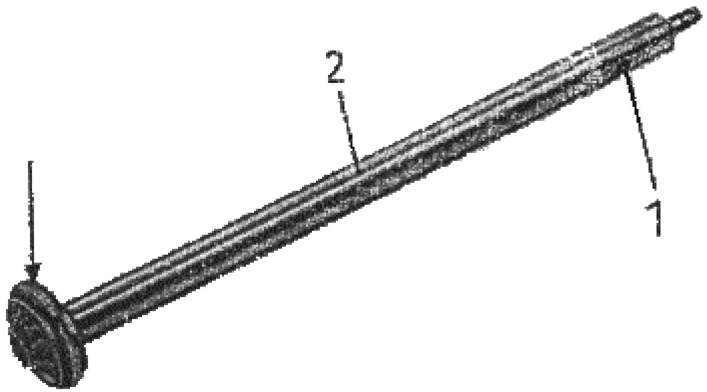


Fig. 96. Checking the supporting tube

- Check the supporting tube (2 in Fig. 96) for damage. The Miramid piston ring (arrow) must not show any ridges on the sealing surface, otherwise the damping pressure would be too low. The damping hole (1) of the supporting tube must be free from burr and its diameter must not be changed.
- The supporting tube (2 in Fig. 96) is pushed into the tested guide tube (A) from helow (valve side); prior to this, the Miramid piston ring is fitted with shockabsorber oil.

According to Fig. 94, mount the check plate (2) and the lock ring (1). Take care that the lock ring is properly seated.
Place the compression spring (5) having a diameter of 27 mm against the lock ring and fit the valve plate (4) pointing to the following throttle with the ground side. Then smooth the throttle (3) on one side, opposite to the radius and the milled in portion, by means of fine abrasive cloth on a surface plate, and mount it so that the smoothed side points to the valve plate (Fig. 93).
Fit the annular ring (1). For reasons of safety use new rings whenever possible, and take care that the ring is properly seated in the groove (see Fig. 93).

- Insert the piece of round timber into the guide tube from top and push out the supporting tube downward until the stop is reached, leave the round timher in the guide tube.
Clamp the guide tube at its upper end in a vice with soft protective jaws while the supporting tube points upward. The round timber still in the guide tube now props the supporting tube; fit the cup for the final stop (5), the compression spring (4), 19 mm in diameter, and the sealing washer (3) (Fig. 91).
- Apply some damping liquid to the guide tube for the shaft seal ring and push the slide tube from top over the guide tube and, at the same time, thread the threaded piece of the supporting tube into the hole in the slide tube. Fit and tighten the corrugated washer (2) and fastening nut (1). Fig. 91.
- Push the protective bellows or the protective cap over the guide tube and insert the collar (A) into the groove (B) of the slide tube. Prior to this, clean the groove (B) in the slide tube. The vent hole in the protective bellows must show to the rear. Fasten the protective bellows on top by means of a clip.
- Insert the compression spring from top into the guide tube and fill in the specified amount of damping liquid.

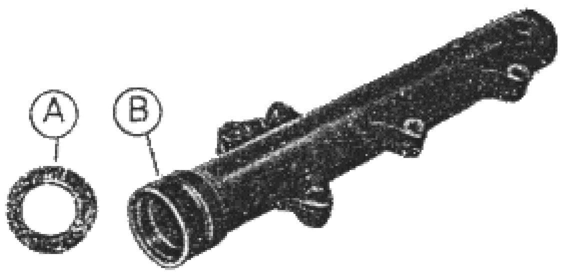


Fig. 97. Correct seat of the protective bellows or the protective cap

Springs for telescopic fork

Length	527 ± 4 mm
External diameter	25.6 mm
Wire diameter	3.6 mm
Windings (total)	52.5
Spring constant	3.12 N/mm

5.3.7. Functional Test of the Telescopic Fork

zum nächsten Punkt ; Index

After assembling, the telescopic fork members must be subjected to a functional test for leakage and damping force. If a suitable testing equipment is not available, the test must be performed manually, i.e. the springs are compressed and released several times. The damping effect must be distinctly felt when the spring is released.

The cortect oil level is checked with the telescopic fork in the mounted state according to Fig. 98.

For checking the oil level in the telescopic fork members, remove two screw plugs from the upper clamping head, and insert the measuring wire (4 mm in diameter) into the centre of the compression spring. The measuring wire must get down to the deepest point in the fork members, that is to say, the measuring wire must pass through the supporting tube.

When checking the oil level or when newly filling the members, take care that the oil levels are equal in the two fork members, otherwise the road-holding prop-

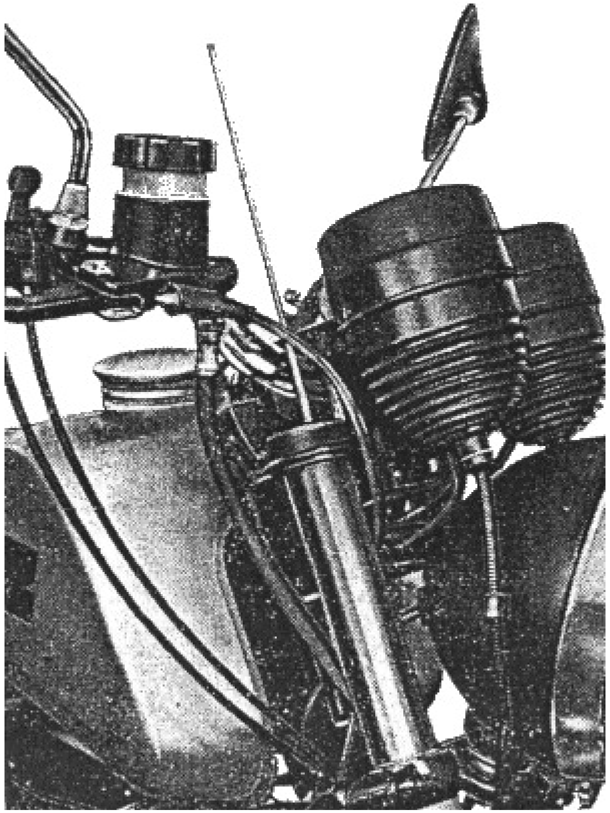


Fig. 98. Oil level checking

erties will be impaired. The specified maximum oil levels must not be exceeded because the pressure will rise too much in the telescopic fork when the spring is compressed. As to the oil quality, observe Section 2.6.

The oil capacities are:

Normal	230 cm³ = 350 mm level
Maximum	250 cm³ = 370 mm level

5.4. Fuel Tank

zum nächsten Punkt ; Index

Because of the danger of explosion, repairs in the fuel tank are only allowed when the relevant safety regulations are observed.

At the FRONT and REAR, the fuel tank is ELASTICALLY fastened to the frame (Fig. 99).

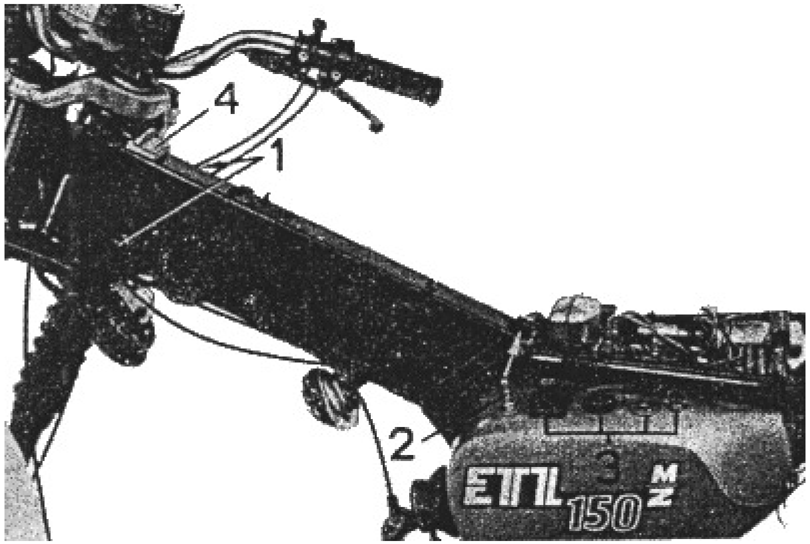


Fig. 99. Fastening of the fuel tank

1. Supporting stopper, front
2. Fastening screW, rear
3. Fastening elements, rear
4. Holding rubber, front top

Consequently, the transfer of vibrations from the frame to the fuel tank is effectively damped. After removing the fuel tank, the rubber parts can be subjected to inspection.

The elastic mounting of the fuel tank is not exposed to particular wear. It must not, be changed into a rigid mounting.

5.5. Fuel Shut-off Cock

zum nächsten Punkt ; Index

The condition of the fuel shut-off cock exerts a considerable influence on the proper function of the engine. Insufficient fuel feed may lead to piston sticking.

In the fuel shut-off cock, the fuel flows through two strainers. The first one (1) is accessible after unscrewing the fuel shut-off cock from the fuel tank; the second one (2) after loosening the filter bowl (3).

It is advisable to clean the strainers thoroughly after every 5,000 km of road operation or once a year.

Another cause of trouble in the fuel shut-off cock may be the rubber packing (4) under the actuating lever (5) whose hole may be clogged or closed due to swelling or too tightly fastened screws (6).

Actuating lever and rubber packing can be removed after loosening the two fastening screws arranged by the side of the actuating lever.

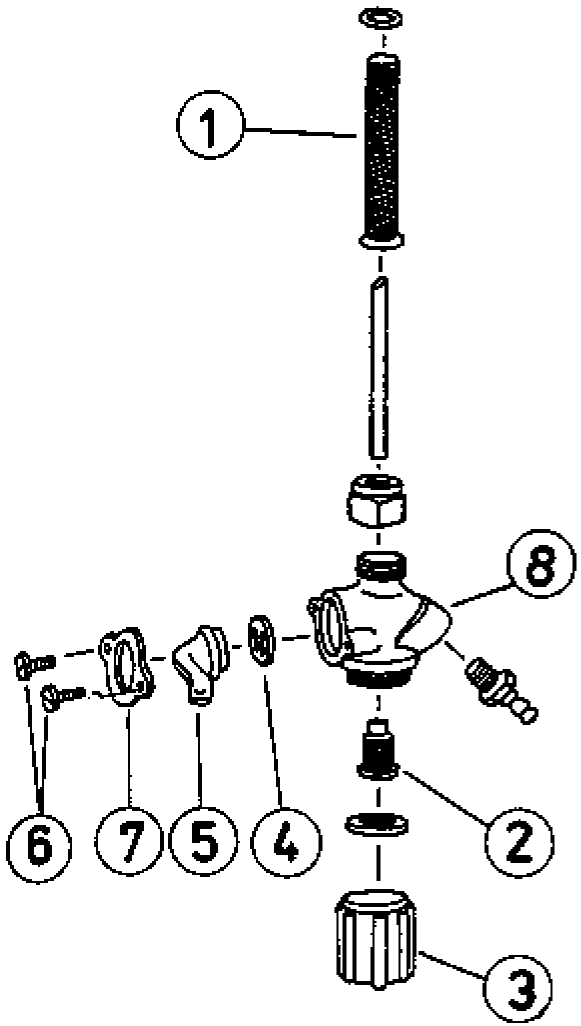


Fig. 100. Fuel shut-off cock, dismantled

On the occasion of repairs in the fuel shut-off cock, the fuel hose leading to the carburetter must also be checked.

When this hose has become brittle, leaks may occur at the points of connection. Then, the installation of a new fuel hose having the dimension of 5x8.2 mm is required.

NOTICE!

On no account should the fastening screws (6) be tightened so that the spring plate (7) contacts the casing (8). The actuating lever (5) must move easily. When the fuel shut-off cock should drop occasionally, then tighten the fastening screws (6) uniformly through maximum one revolution.

The flow rate must be at least 12 litres per hour.

5.6. Rear Wheel Drive and Rear Wheel Hub

zum nächsten Punkt ; Index

The design of the rear wheel drive is shown in Figs. 101 and 102.

The chain covering contains a continuous bushing (1) which allows to tighteh the nut (2), see Fig. 101, with the adequate torque without destroying the covering.

The rear wheel hub corresponds to that of the former type except for a few insignificat corrections of shape.

5.6.1. Dismantling the Rear Wheel Drive

zum nächsten Punkt ; Index

For this purpose, the rear wheel and the rear wheel drive must be removed from the vehicle. At first, drive out the flange bolt (Fig. 103).

Then heat the rear wheel drive to a temperature of about 100°C. Remove the lock ring 42 (3) and then beat out the bearing 6004 (4) (Fig. 101).

After heating the rear wheel drive once more, assemble it in the inverse order.

5.6.2. Speedometer drive

zum nächsten Punkt ; Index

The speedometer drive is represented in Fig. 104 in the form of a sectional view.

The pertinent helical gear is fastened to the damping body with gear ring by means of a hooked circlip. The

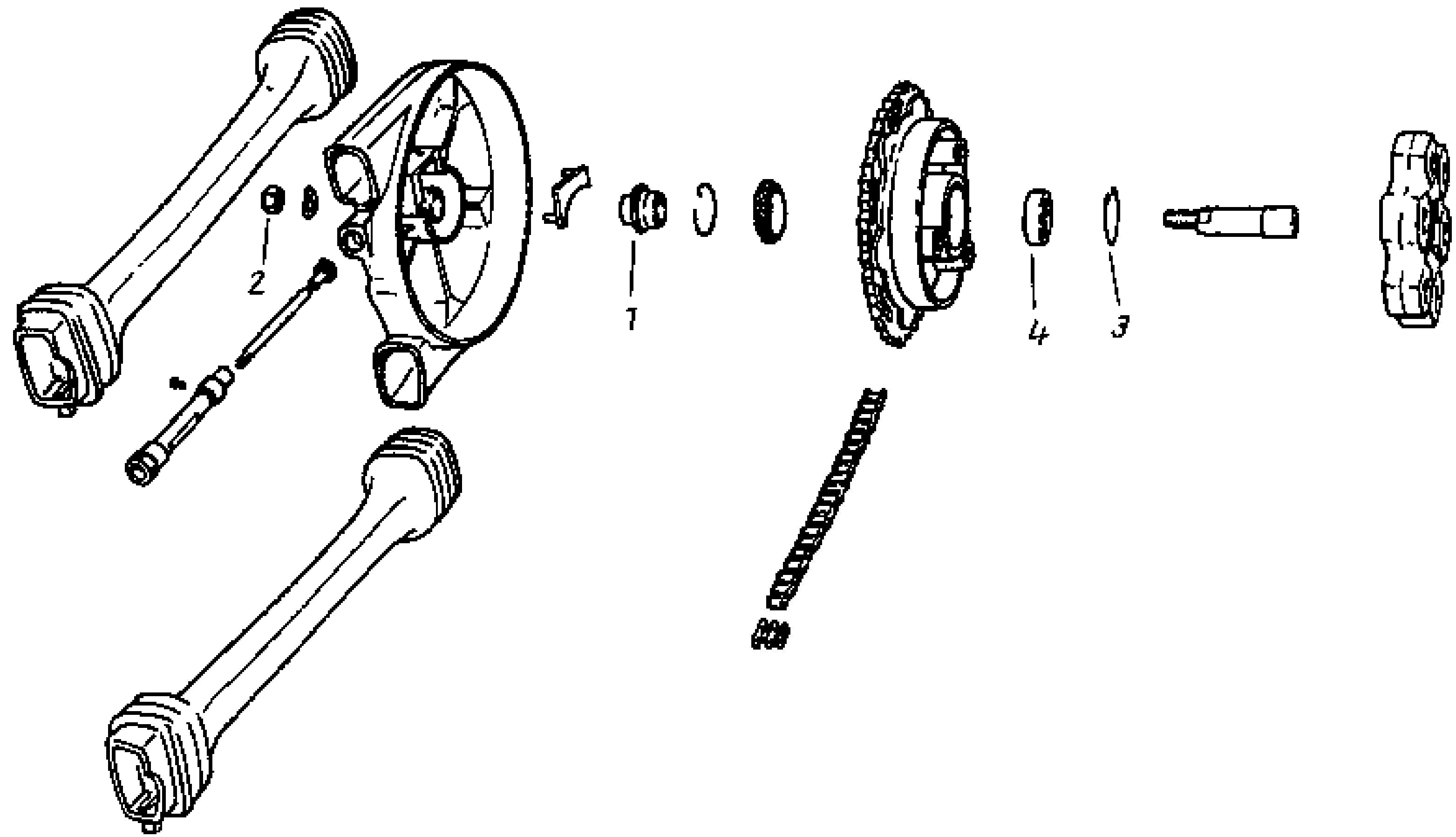
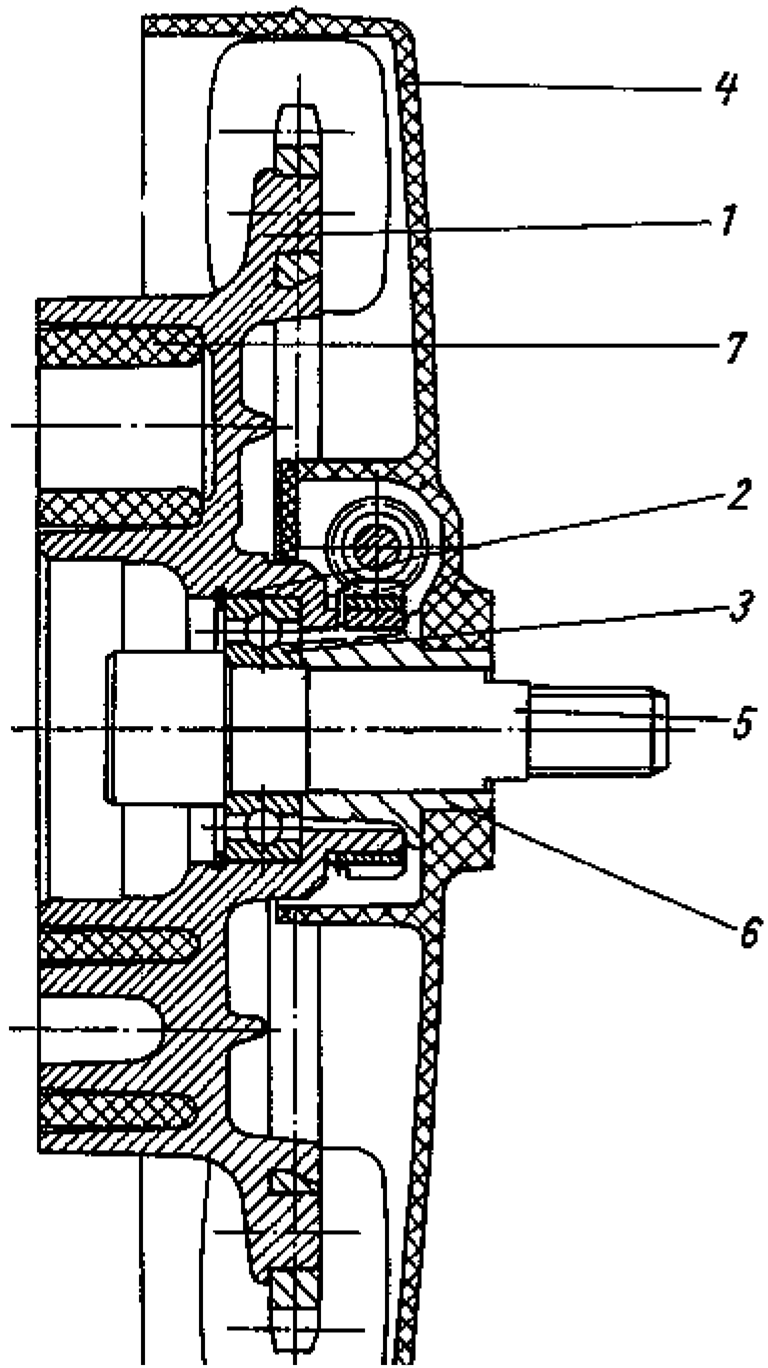


Fig. 101. Exploded view of the rear wheel drive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1
7
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3
5
6

Fig. 102. Rear wheel drive

1. Damping body
2. Lock ring
3. Bearing 6004
4. Chain covering
5. Flange bolt
6. Bushing
7. Damping rubber

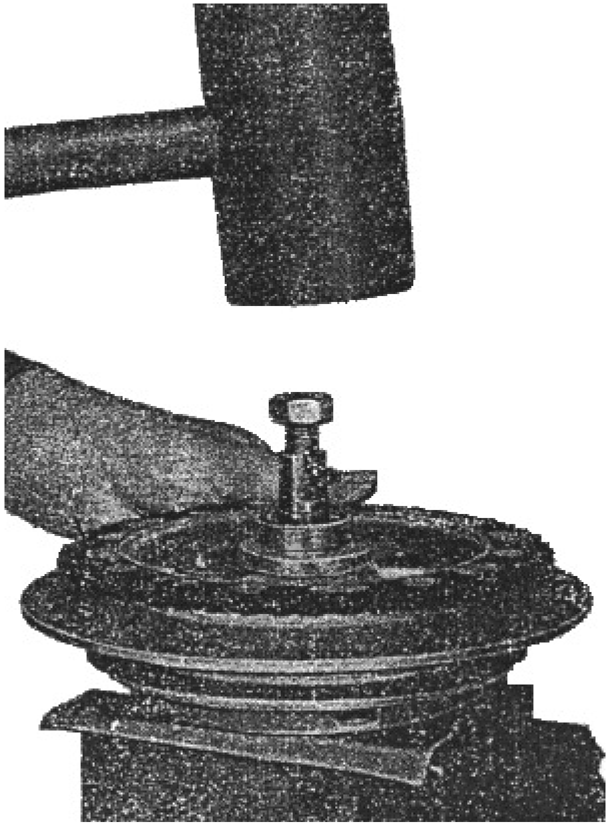


Fig. 103. Driving out the flange bolt

pinion for the speedometer drive is exchanged by unscrewing the countersunk screw (5) from the chain covering and drawing out backwards the bearing bush (6) with pinion (3) and (7).

When assembling, the pinion, the pinion shaft and the helical gear must be fitted with antifriction bearing grease.

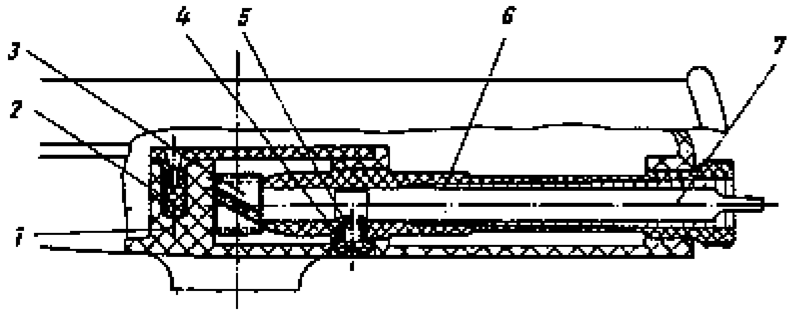


Fig. 104. Speedometer drive (sectional view)

1. Chain covering
2. Packing
3. Pinion body
4. without importance
5. Countersunk screw BM 6x8
6. Bearing bush
7. Pinion for speedometer drive

5.7. Replacement of the Wheel Bearing

zum nächsten Punkt ; Index

By means of an expansion arbor (special tool M-8-820-3), the removal of the wheel bearing is facilitated. For this purpose, the wheel body is slightly heated. After driving in the expansion arbor, the wheel bearings are driven out in the direction of the outside (Fig. 105). For mounting the wheel bearings, the wheel body must also be heated.

On no account should the spacer sleeve between the bearings be forgotten. Only use ball bearings 6302 Z with sheet-metal cage and covering plate.

When fitting the complete wheel, take care that the covering plates of the wheel bearings in the mounted state must point outside.

Between the wheel bearings, the following spacer sleeves must be fitted:

Front wheel	
drum brake	(18x22x41.2) mm
disk brake	(18x22x60.8) mm
Rear wheel	(18x22x41.2) mm

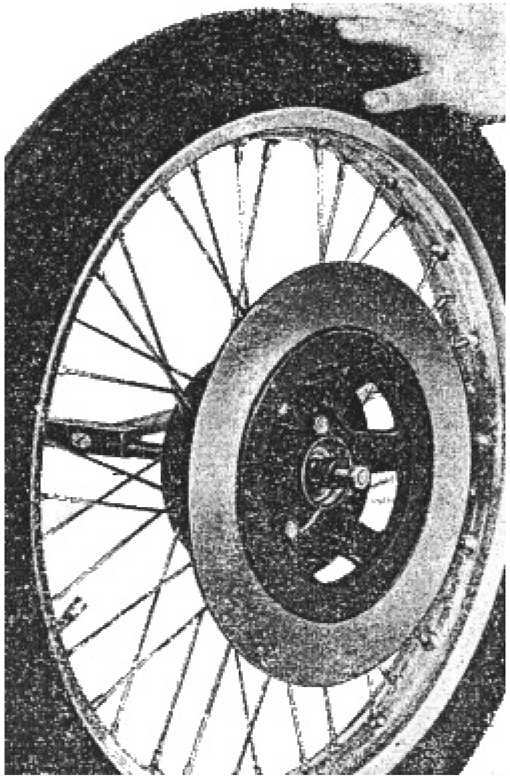


Fig. 105. Driving out the wheel bearings

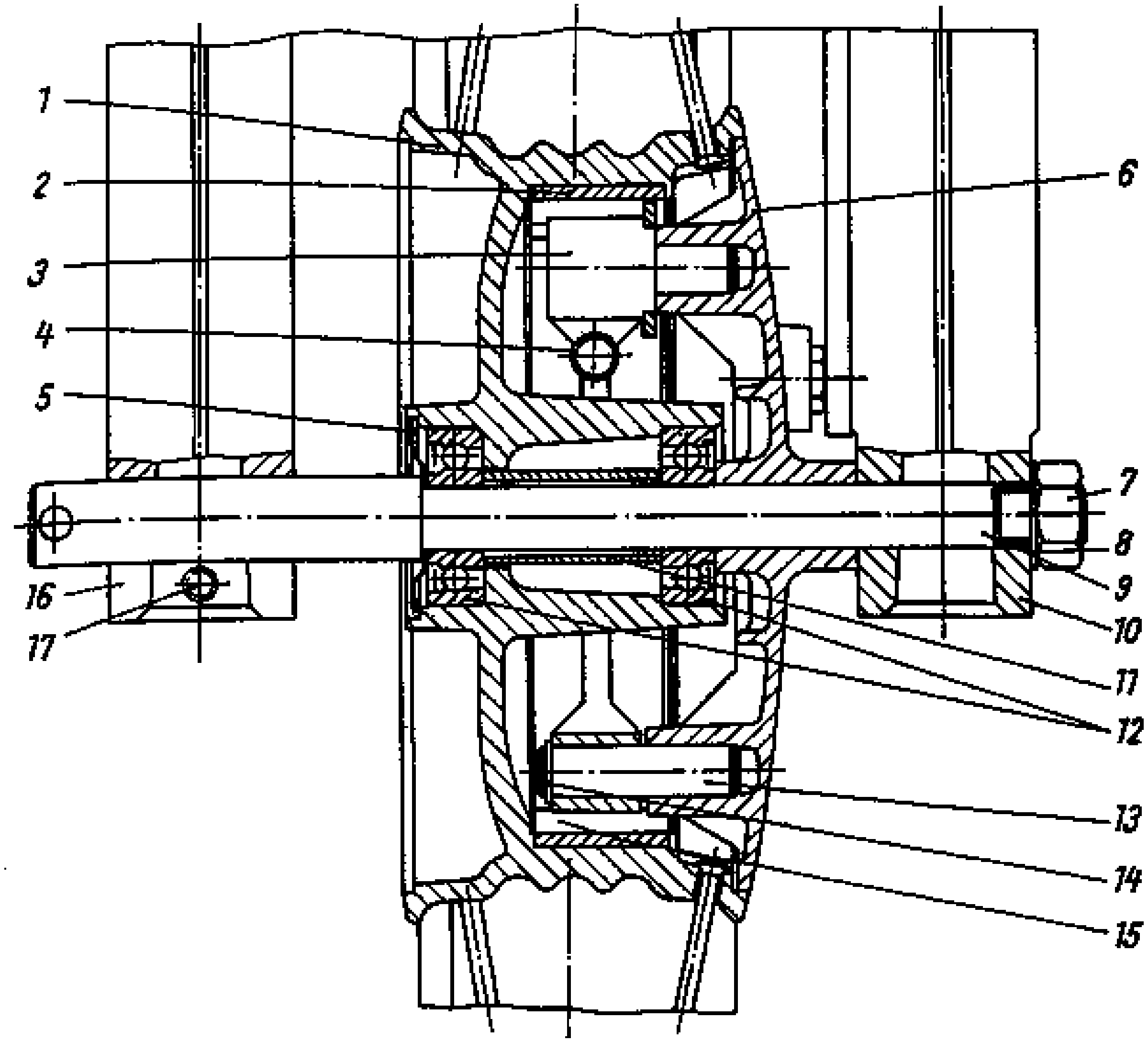


Fig. 106. Front wheel hub (sectional view)

1. Wheel body with cast-in brake ring
2. Brake ring
3. Brake lever
4. Return spring for brake shoe
5. Covering plate

6. Brake back rest
7. Hexagon nut M 14x1.5
8. Washer
9. Axle
10. Axle holder, right-hand
11. Spacer sleeve
12. Ball bearing 6302 Z
13. Anchor bolt
14. Lock ring 12
15. Brake shoe
16. Axle holder, left-hand
17. Hexagon-head screw for clamping the axle

For fitting the wheel bearings, they must be provided with anti-friction bearing grease.

5.8. Brakes

5.8.1. Internal-expanding Shoe Brake

zum nächsten Punkt ; Index

The anchor bolts (1) are firmly fitted in the brake rest. The brake shoes (2) are mounted on the anchor bolt and the cam spindle (3) in the brake back rest (Fig. 107).

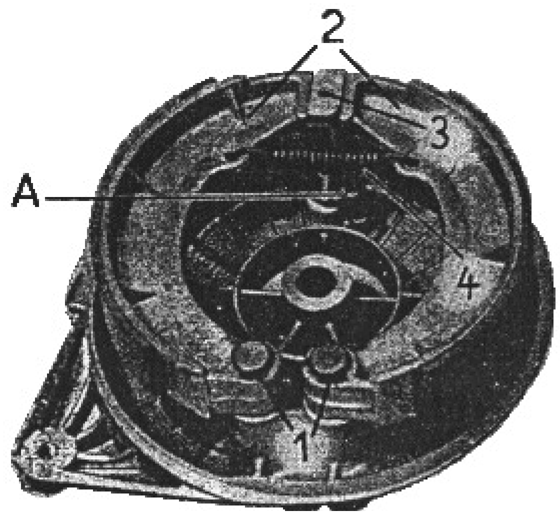


Fig. 107. Brake anchor plate, complete

A. Ground contact for stop light

As experience has shown, the mounting of the brake shoes is subjected to minimum wear only, however, it is necessary to clean the points of support about every 10,000 km of road operation, at least once a year, and to provide them newly with antifriction bearing grease. This also applies to the bearing of the cam spindle in the brake anchor plate.

When demounting the brake shoes, they must be marked in such a way that they can be installed in their initial places.

When replacing the brake shoes which are capable of being regenerated it should be noted that brake shoes which have been machined can be fitted. Non-machined brake shoes must be subjected to turning in a lathe. For this purpose, they are fastened to the brake back rest with the help of the return spring (4). The brake back rest is to be centred in the bore-hole, and shoes should be tooled in a lathe in such a way that the difference between the diameter of the brake shoes is at least 0.6 mm.

5.8.2. Disk Brake for the Front Wheel

zum nächsten Punkt ; Index

The fixed saddle brake is hydraulically actuated by means of a lever at the brake master cylinder. The arrangement of the components is shown in Fig. 108).

The Figs. 109 and 113 show in an exploded view the arrangement of the parts of brake saddle and brake master cylinder.

Demounting and mounting the brake master cylinder

- Disconnect the cable connections at the stop light switch.
- Loosen the brake hose through about 0.25 revolutions.
- Unscrew the brake master cylinder from the handle-bars.
- Remove the protective cap and hermetic bellows and pour out the brake fiuid.
- Completely unscrew the brake hose.

For assembling, at first loosen the screwed joint of the brake hose at the brake saddle (union nut) in order that the brake hose will not be twisted when screwing in place. Tighten all screwed joints, fill in brake fluid and bleed the brake.

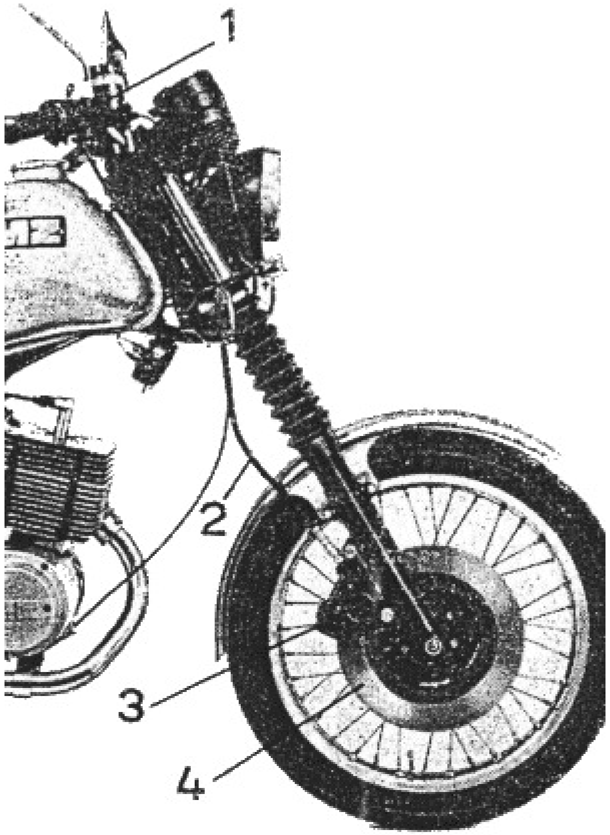


Fig. 108. Arrangement of the disk brake

1. Brake master cylinder
2. Brake hose
3. Brake saddle
4. Brake disk

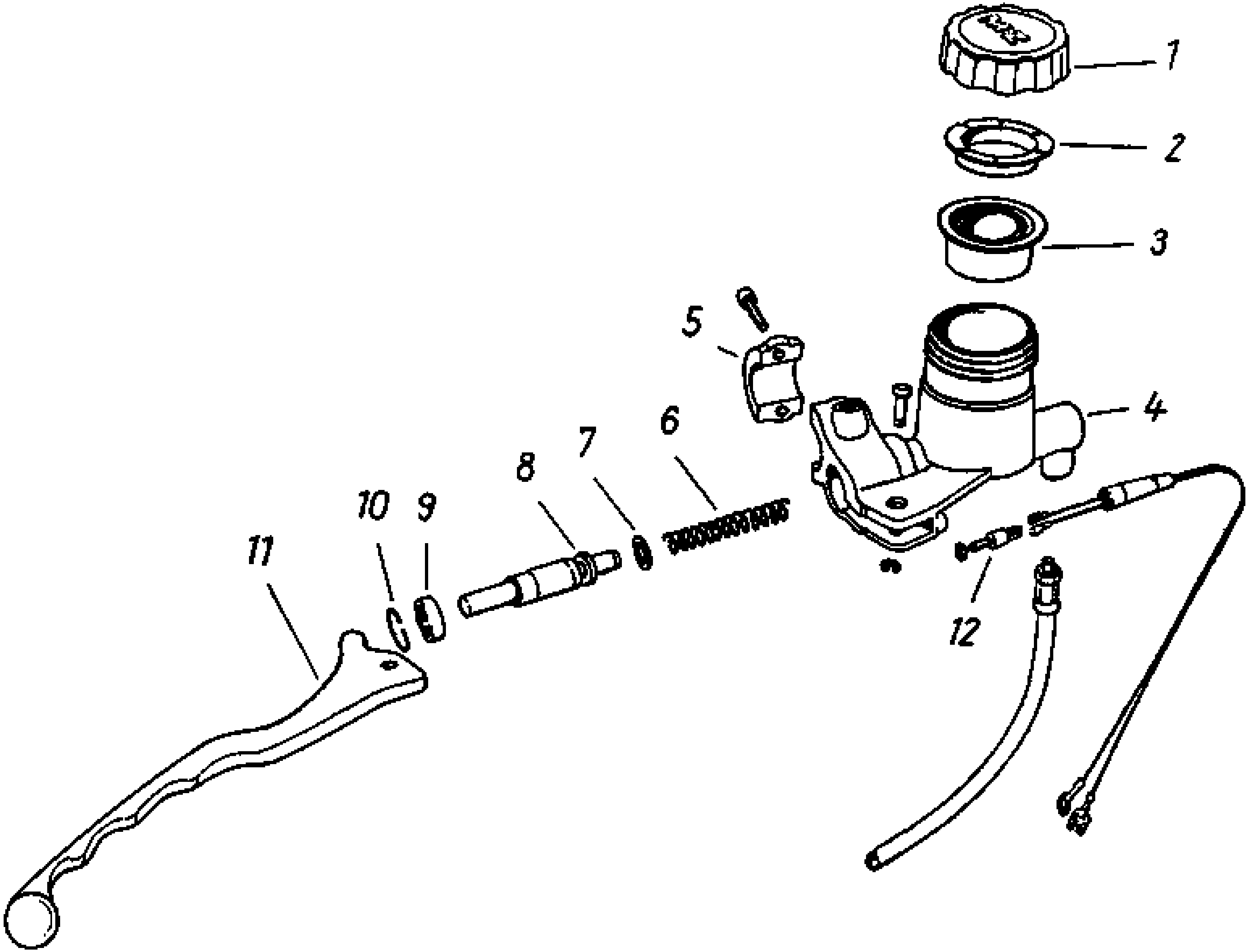


Fig. 109. Brake master cylinder of the MZ disk brake

1. Cover

2. Vent ring
3. Hermetic bellows
4. Casting
5. Fastening clip
6. Spring
7. Packing ring
8. Brake piston
9. Internal lip ring A 10 TGL 6357
10. Circlip 20x1.2 TGL 31666
11. Hand brake lever
12. Stop light switch

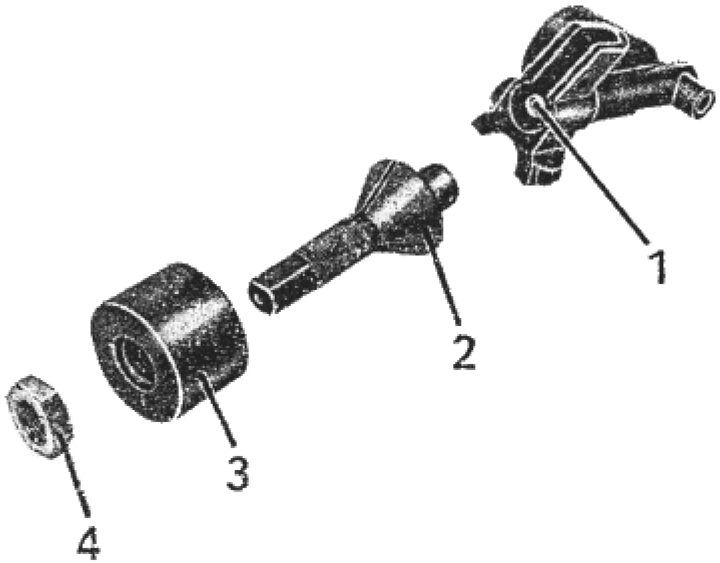


Fig. 110. Demounting the brake piston

1. Brake piston
2. Sleeve
3. Pressure member

4. Hexagon nut

Repairing the brake master cylinder

Remove the hand brake lever. Then remove the circlip (10) from the brake master cylinder. Subsequently, fasten the piston extractor in numerical order (Fig. 110) at the brake piston (1). Clamp the square (Z) of the piston extractor in a vice and draw out the brake piston by drawing at the brake master cylinder.

Ridges in the sliding surfaces of cylinder and brake piston necessitate the replacement of the complete brake master cylinder. If only the sealing rings are defective, the brake master cylinder can be assembled when using a set of new sealing rings. Painstaking cleanliness is a pre-condition. All sliding surfaces and packings should be wetted with brake fluid and then all components are mounted according to Fig. 109.

It is advisable to plug together in the correct order for mounting, the spring (6), the brake piston (8) and the packing ring (9); using a bolt, press this pre-assembly into the brake master cylinder according to Fig. 112, and push the circlip (10) into the groove until engagement is reached by means of the bolt.

The brake lever (11) is not adjustable. Turn the stop light switch (12) into the articulated piece (4) or the casing only so far that the stop light will flash up immediately when the brake lever begins to actuate the brake, while the brake lever still contacts the casing in its position of rest.

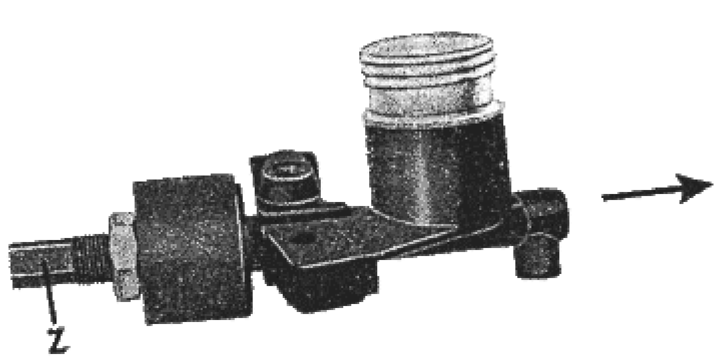


Fig. 111. Extracting the brake piston

Z. Square

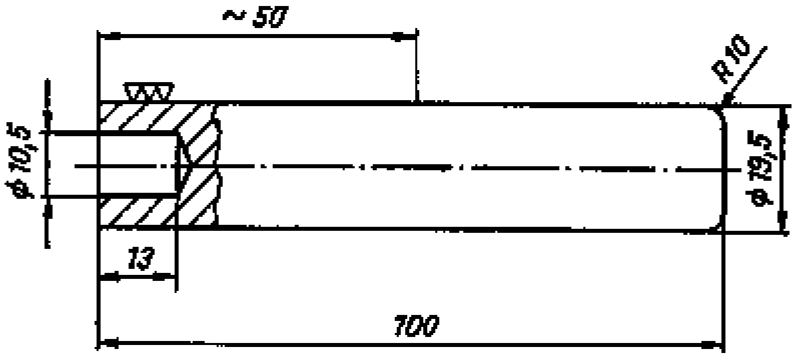


Fig. 112. Bolt for pressing in place the internal lip ring and circlip

Demounting and mounting the brake saddle

- Disconnect the brake hose by loosening the union nut. Fasten the hose by means of binding wire to the telescopic fork.

  NOTE:
  The hose opening must not be at a lower level than the liquid level in the reservoir of brake master cylinder!

- Demount the brake saddle from the slide tube of the telescopic fork.

Mounting is to be performed in the inverse order. If required, top up brake fluid; bleed the brake.

Repairing the brake saddle

- Remove the covering.
- Drive out the two bolts from the side of the small bolt diameter by means of a mandrel.
- Remove the brake shoes.
- Dismantle the brake saddle.
- Press out the brake piston with compressed air.
  TAKE CARE ! Cover the brake saddle with a cleaning rag.

For discarding parts, the same criteria apply as to the brake master cylinder.

The assembling of the painstakingly clean individual parts is to be performed in the inverse order. Before mounting, apply brake fiuid to the sliding surfaces and internal sealing rings.

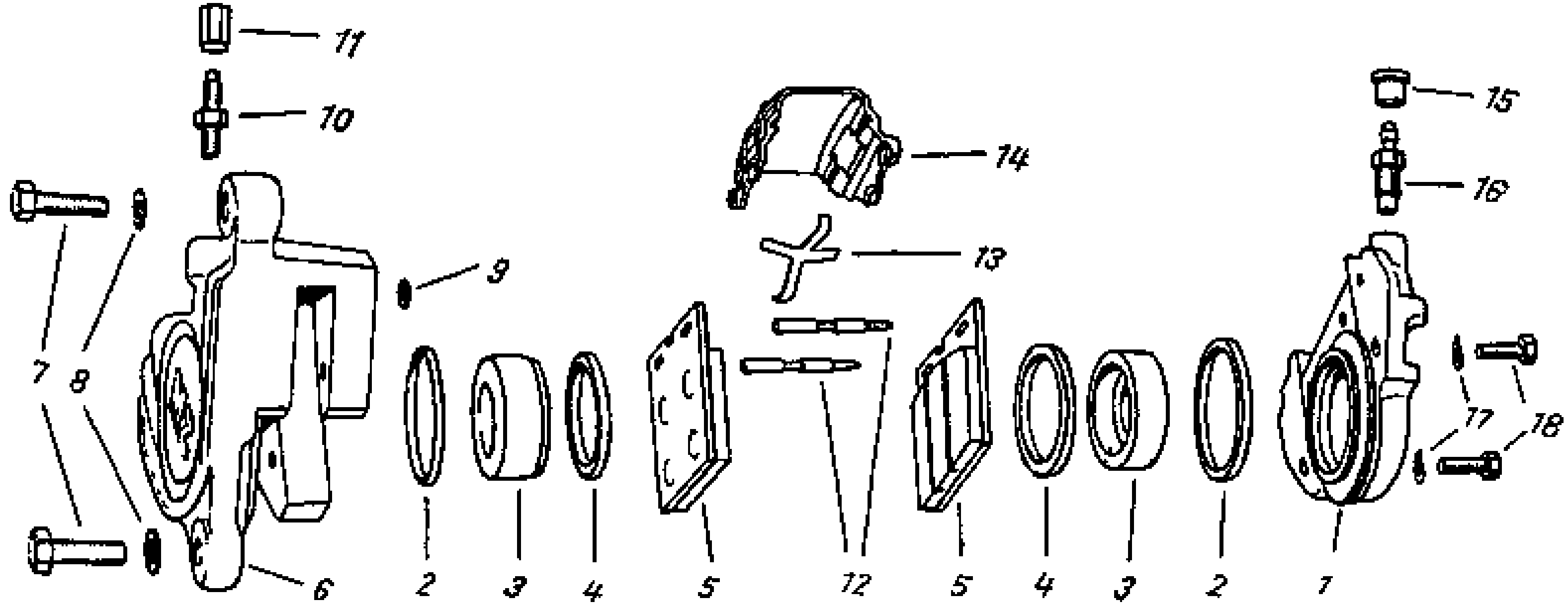


Fig. 113. Brake saddle of the MZ disk brake

1. Internal brake saddle
2. Piston sealing ring
3. Brake piston
4. Sleeve
5. Brake shoe
6. External brake saddle
7. Hexagon-head screw M 10x30
8. Washer 10.5
9. Packing
10. Double nipple
11. Union nut
12. Guide pins
13. Return spring
14. Covering
15. Protective cap
16. Vent screw plug
17. Spring lock washers

18. Hexagonal socket-head bolts M 8x25

Replacing the brake shoes

The brake shoes must be removed and replaced by new ones in the following order when they are worn down to the minimum thickness of the lining.

- Remove the front wheel.
- Remove the protective cap.
- Demount the brake shoes in the same way as has already been described in Section "Repairing the Brake Saddle".
- Externally clean the brake saddle.
- Press back the brake piston (press at the same time diagonally opposite otherwise tilting may occur).
- Mount the new brake shoes.
- Mount the front wheel and then actuate the brake lever repeatedly until counterpressure is offered again.

NOTE:

When the brake shoes are removed from the vehicle, do not actuate the brake.

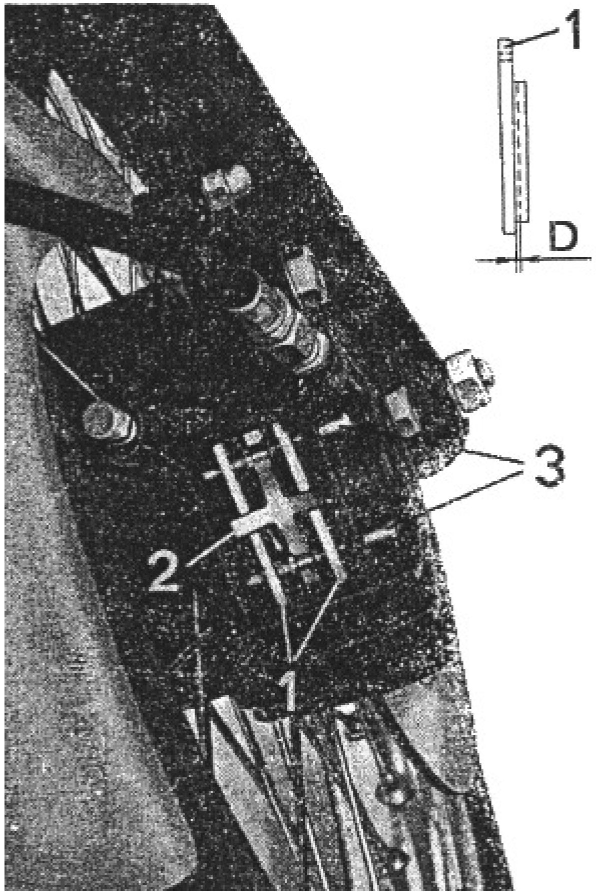


Fig. 114. Replacement of the brake shoes

1. Brake shoes
2. Return spring
3. Guide pins

D. Minimum thickness of the brake lining 0.5 mm

Replacement of the brake disk

For the brake disk, the following dimensions should be used to evaluate the condition of wear:

	new value	wear limit
thickness in mm [1])	$5^{+0.2}_{-0.1}$	4.5
side throw in mm [1])	0.2	0.3
deviation in thickness in mm [1])	0.025	0.04

[1]) measured over the diameter of 260 mm of the brake disk

Irrespective of dimensional deviation, the brake disk must be replaced when it shows abnormal phenomena of wear possibly caused by foreign bodies; due to the latter, the wear limits given above may not be reached or exceeded.

NOTE:

For reasons of safety, use new self-locking nuts whenever the brake disk is mounted!

Before mounting the wheel provided with a new brake disk, press back the brake pistons in the brake saddle.

Replacing the brake fluid

After about two years, the brake fluid must be replaced by new fluid. This may be done by means of a filling device or the manner described below.

- Put a suitable hose on the vent valve of the brake saddle.
- Open the vent valve. By continuously pumping the hand brake lever, discharge the brake system through the hose into a suitable container.
- Fill in new brake fluid.
- Bleed the brake system.

Filling brake fluid

When the brake system is newly installed, has been repaired or when the brake fluid must be replaced, the filling of brake fluid into the system can be effected by means of a filling device or in the manner described below.

- Remove the covering cap and hermetic bellows from the brake master cylinder.
- Provide the hose (1 m in length) with a funnel and put it on the vent valve.
- Open the vent valve.
- Raise the hose so that the funnel is at least 20 cm on top of the reservoir and pour in brake fluid until the maximum liquid level in the reservoir has been reached.
- Close the vent valve.
- Fit the hermetic bellows and screw the cap in place.
- Bleed the brake.

Bleeding the brake

The brake deaerates itself automatically. This will take about an hour with the reservoir opened (handle-bars turned to the left). Last remains of air will escape when slightly tapping brake saddle and brake hose. Then fit the hermetic bellows and screw the cap in place.

The deaeration, also known as bleeding, can be achieved quicker in the following way:

- Close the reservoir.
- Put the filling hose on the vent valve and fill it up to about the half of the funnel.
- Keep the hose high (the funnel must be at least 20 cm on top of the upper level marking of the brake master cylinder).
- Open the vent valve through 1/2 revolutioh and, at the same time, draw the hand brake lever up to the stop. Close the valve while the hand brake lever is still drawn.
- Repeat this procedure until no air bubbles will emerge. The liquid level must not fall below the lower level marking.
- Finally, fill the brake master cylinder up to the upper marking, fit the hermetic bellows and screw the cap in place.

Faults in the brake system

Fault	Possible Cause	Remedy
Braking effect insufficient	brake disk dirty	braking at intervals until the brake disk has

		become dry
	brake lining oiled up	replace the brake shoes
	piston in brake saddle sticks	release the piston or replace the brake saddle, replace the brake fluid
	brake shoes sticking in brake saddle	demount the brake shoes, clean the contact surfaces
No counterpressure offered at hand brake lever	air in brake system	bleed the brake system
	brake lines or brake cylinder leaky	properly seal or replace the brake lines, brake cylinder
	amount of brake fluid too small	to up brake fluid
Brake lever moves during braking	there are differences in thickness of the brake disk	replace the brake disk
Brake fluid level drops	brake lines or brake cylinder leaky	seal the brake lines, replace the packings in the brake cylinders, replace brake master cylinder and brake saddle
	brake shoes worn	replace brake shoes
	brake hose porous or defective	replace brake hose
Diminishing resistance offered at hand brake lever when brake is considerably heated	formation of water-steam bubbles in brake fluid	replace the brake fluid
Brake fluid contains water	interval for changing not observed	pay attention to the maintenance chart
	hermetic bellows not fitted or defective	fit or replace the hermetic bellows replace the brake fluid
Stop light fails to light when front wheel	cable interrupted, plug connector oxidised	restore the connection to proper working

brake is actuated		order
	stop light switch defective	replace the stop light switch by a new one

5.9. Secondary Chain

zum nächsten Punkt ; Index

Figs. 115 to 117 illustrate how a new chain is to be fitted.

For this purpose, the rear axle should be loosened and the rear wheel push ahead. When placing on the rear toothed-wheel rim, the chain is pulled through from top to bottom. The upper end is fixed with the help of a

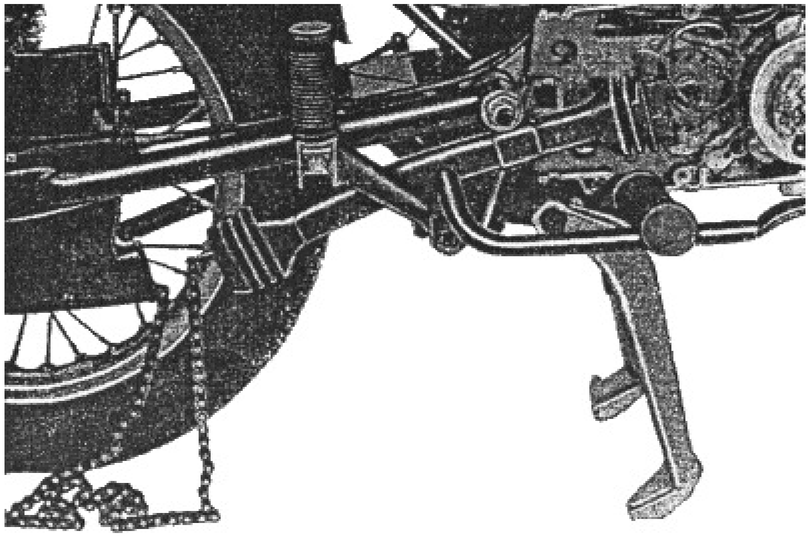


Fig. 115. Fitting a chain - 1st stage

spoke or a screw-driver. Then the chain is drawn from the rear to the front through the lower chain protection hose by means of a wire with hook, and placed around the front sprocket wheel.

Finally, the chain is drawn from the rear to the front through the upper chain protection hose again by means of a wire with hook, kept together between sprocket wheel and upper chain protection hose and connected by the chain connector.

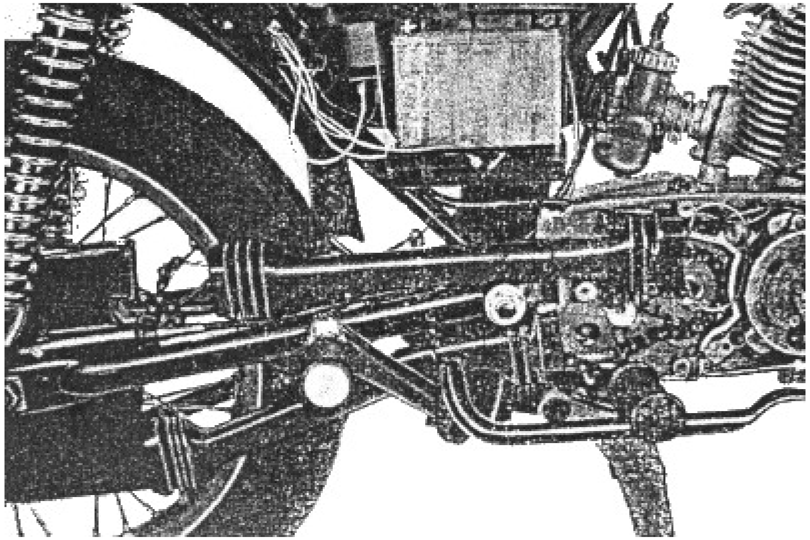


Fig. 116. Fitting a chain - 2nd stage

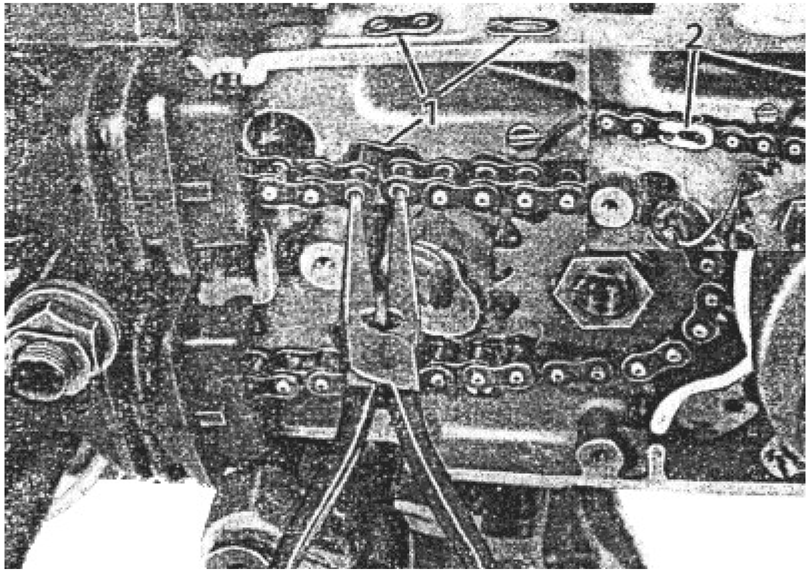


Fig. 117. Fitting a chain - 3nd stage

1. Chain connector
2. Mounting position of the chain connector

For this purpose, the protective chain hoses must be pressed properly into the cavities provided for this fact in the engine casing. The correct position of the connecting link is of particular importance (2 in Fig. 117):
OPENING TO THE REAR!

When replacing a chain, the new chain should be connected to the old chain and pulled through. Replacement of the chain is required when more than 5 rollers or more than 2 rollers side by side are broken or when the chain bolts in the shackles are worn down.

When a chain of a different brand is fitted, the pertinent chain connectors must be used in any case because the bolt diameters may be different.

When replacing a chain, the sprocket wheels must be checked. When they are worn down, then they have to be replaced also.

Correct chain sag and chain lubrication exert a considerable influence on the service life of a chain.

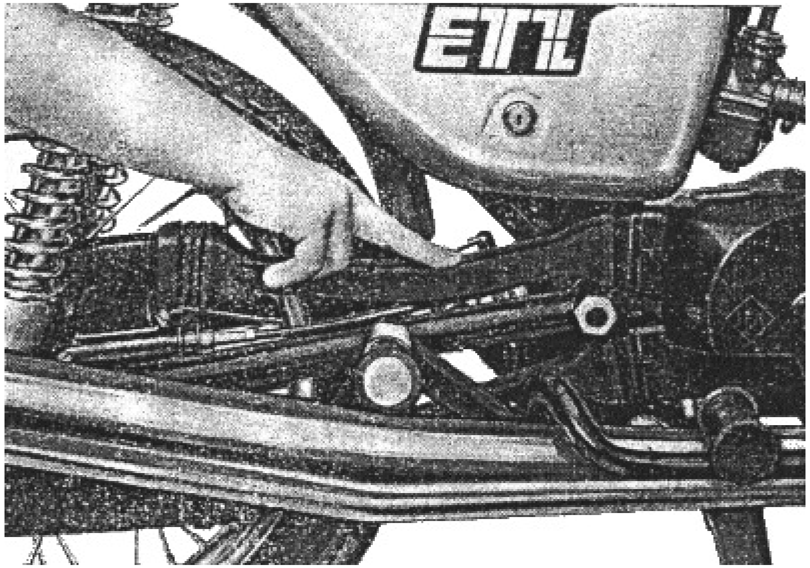


Fig. 118. Checking the chain sag

A correct sag of the chain is ensured when the upper chain protection hose including the chain can be pressed down on to the cross tube of the rear wheel swing arm with two fingers without undue force. When checking, the full length of the chain must be covered at least once!

The springs of the rear wheel must be fully extended (motor-cycle on the prop stand). When the chain appears to be too slack, you should bear in mind that the chain will become taut when the springs of the rear wheel are loaded!

Lubrication of the chain is required every 2,500 km of road operation.

With the cover of the dynamo removed, the antifriction bearing grease SWA 532 TGL 14819 is applied to the lower strand of the chain by means of a screw-driver and, at the same time, the rear wheel ist turned in travel direction through one full chain revolution; then the same amount of grease is applied to the upper strand of the chain while the rear wheel is turned opposite to the normal sense of rotation.

5.10. Aligning the Wheels, Balancing the Front Wheel

zum nächsten Punkt ; Index

When the track is properly aligned, good road-holding properties will be ensured.

Since the front tyre is smaller in width than the rear tyre, the front wheel must be placed parallel to the measuring lath.

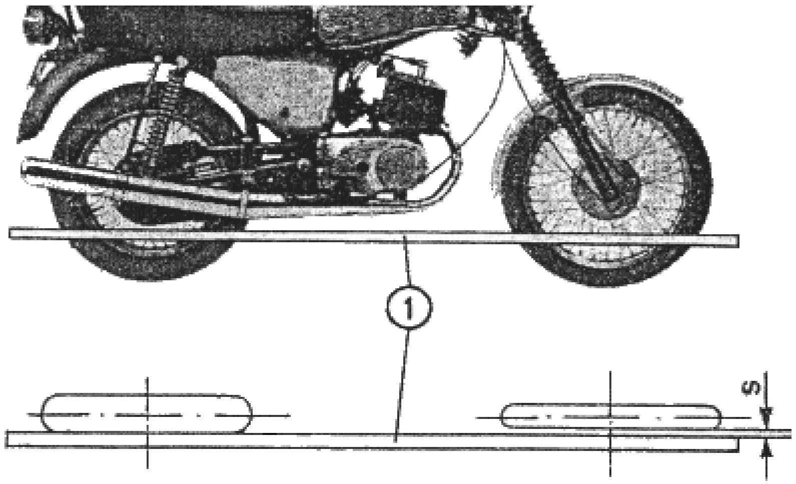


Fig. 119. Aligning the wheels

1. Measuring lath

S. Gap between measuring lath and front wheel

To improve the road-holding properties, the front wheel is balanced in series production. In case of damage to the tyre, the tyre must be fitted in the same position with respect to the rim, i.e. red dot at the valve.

The unbalance may change due to unequal wear after a prolonged time of operation, therefore, the wheel must be newly balanced after about 10,000 km of road operation. When mounting a new tyre, the wheel must also be newly balanced.

Balancing is effected by allowing the wheel with greasefree bearings to swing on the wheel axle until it comes to rest and by the application of counterweights (either MZ balancing bodies or lead or copper wire as makeshift) to the spoke nipples at the point of the wheel which remains on top after it has come to rest.

5.11. Exhaust System

zum nächsten Punkt ; Index

The exhaust system is so properly matched with the engine that, firstly, the desired performance characteristic is reached and, secondly, the permissible noise limit is observed. It should be noted that, therefore, the exhaust system should not be subjected to any changes.

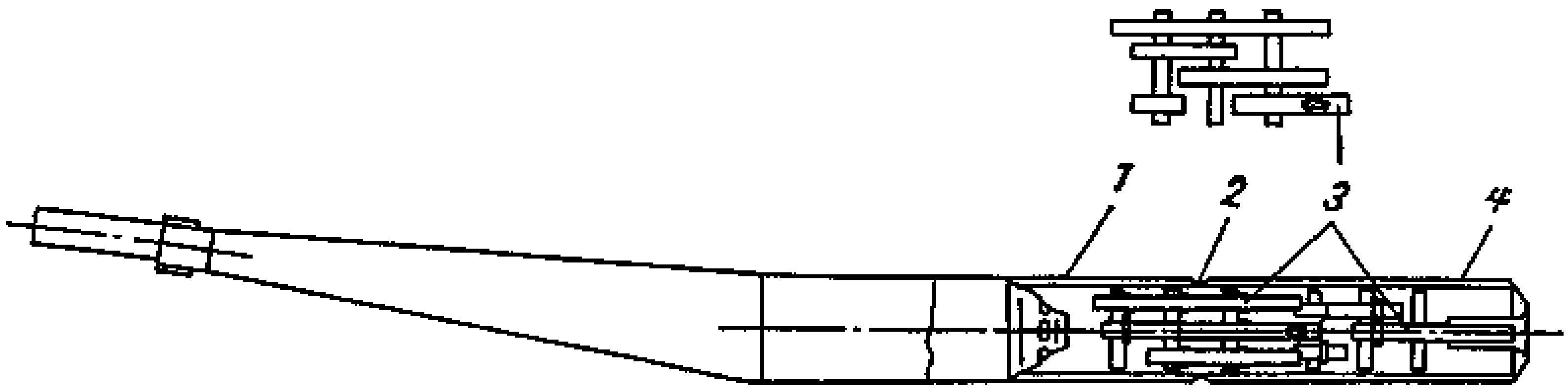


Fig. 120. Sectional view of the exhaust muffler

1. Exhaust pipe
2. Weld seam
3. Damping insert
4. Exhaust tail piece

The exhaust muffler is welded and no longer of the detachable design.

The exhaust pipe is attached to the cylinder by a union nut with additional packing which presses the tapered and knurled edge against the cylinder.

In a new condition, the union nut should be tightened with a torque of 150^{+3} Nm (15_{+3} kpm). In any case, it must be re-tightened after having covered a distance of about 500 km, using the same torque value, because the taper of the exhaust pipe will require this time for properly mating with the jointing face at the cylinder and the thrust point of the union nut.

For re-tightening, a hook spanner of type B 39-442 with a plugged-in extension tube should be used.

In mounting the exhaust pipe, care should be taken that all three suspension points (cylinder, lower connection, rear brace) are properly fastened and sufficiently firm. If one of these points is defective, the other two will be subjected to excessive stresses and work loose.

The rubber bearings of the brace should not be replaced by a rigid joint because of the elastic engine suspension.

5.12. Cable Controls

zum nächsten Punkt ; Index

The cable controls of a motor-cycle are frequently exposed to external influences such as rain, dirt and lye. In the case of motor-cycles which are ridden every day and frequently parked in the open, the interior of the cable controls is subjected to great frictional stresses so that the control levers offer resistance to pulling and control efforts are increased.

Service life and ease of motion are improved by protecting the cable controls at the actuating levers from the ingress of water and dirt and by lubricating them.

The simplest form of sealing, in addition to the protective caps provided in series production, is by applying a film of water-repellent grease such as SWA 532 to the projecting end of the cable and to the slot in the adjusting screw of the control lever.

For lubricating the cable controls, the device shown in Fig. 121 is to be used.

As lubricant, either a mixture of gear oil and gear grease in the mixing ratio of 1 : 3 or a mixture of antifriction bearing grease SWA 532 TGL 14819 and fuel (mixing ratio 1 : 1) is used.

The cable controls are clamped at one end of their sheaths in the tapered rubber cap and, together with this rubber cap, screwed to the lubricating device by means of a union nut.

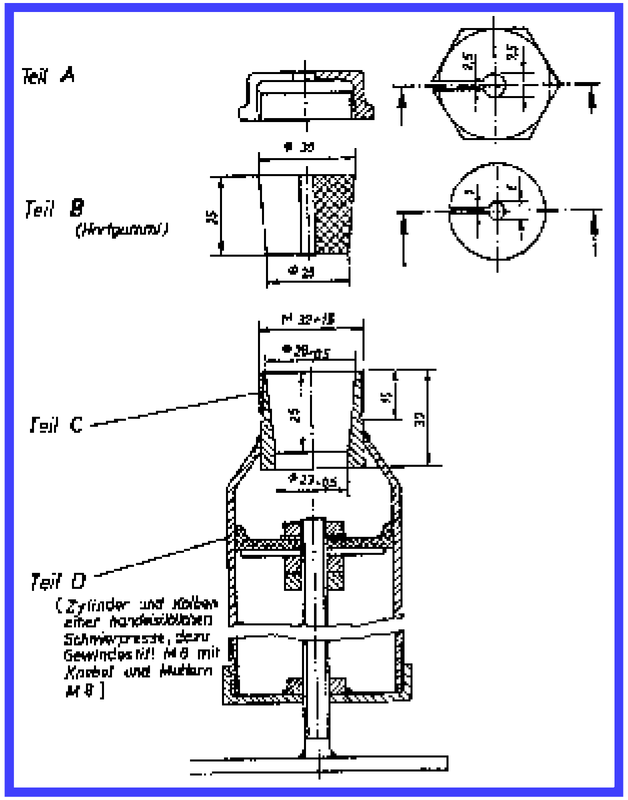


Fig. 121. Devise for lubricating cable controls

Teil A	Part A
Teil B (Hartgummi)	Part B (ebonite)
Teil C	Part C
Teil D (Zylinder und Kolben einer handelsüblichen Schmierpresse, dazu Gewindestift M 8 mit Knebel und Muttern M 8)	Part D (Cylinder and piston of a commercial grease gun, in addition threaded pin M 8 with lock and nuts M 8)

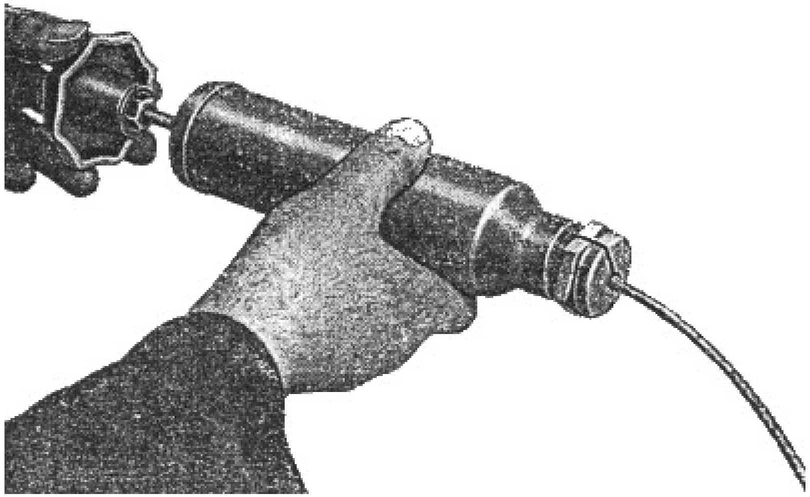


Fig. 122. Cable control clamped in the lubricating device

6. Electrical Equipment

6.1. Three-Phase Current Dynamo

6.1.1. Mode of Operation

zum nächsten Punkt ; Index

Three-Phase current dynamos do not possess a commutator, the output current is drawn from the stator winding without contact. Only a small exciter current, branched off via 3 exciter diodes, is transmitted to the rotor via 2 carbon brushes and slip rings so that operation a high rotational speeds is possible.

The alternating current drawn by the stator is converted into direct current by an efficient three-phase bridge rectifier.

The latter ensures maintenance-free operation and a long service life due to the use of modern silicon semiconductors.

The bridge rectifier represents a separate module an which the exciter diode is mounted. The emitted voltage is maintained at the desired level by means of an electromechanical single-element regulator. At the same time, the maximum current is limited by the regulator.

When the regulator voltage and mounting conditions required in the technical documents are observed, protection of the three-phase current dynamo from destruction and a long service life of the electrical equipment are ensured.

6.1.2. Technical Data

zum nächsten Punkt ; Index

Identifcation No.	8046.2
Dynamo voltage	14 V
Idling speed	1,500 rpm
Speed at 2/3 of the maximum current	2,200 rpm
Maximum speed	10,000 rpm
2/3 of the maximum current	10 A
Maximum current	15 A
Resistance of the rotor winding	4.2 ± 0.3 ohm
Carbon brush length	16 mm
Carbon brush length (minimum)	9 mm
Carbon brush spring force	1.4 to 3.2 N (0.14 to 0.32 kp)

Slip rings (minimum diameter)	31 mm
Permissible run-out	0.05 mm
Tightening torque for the rotor fastening screw	20 ± 2 Nm (2 ± 0.2 kpm)
Sense of rotation (when viewing the slip ring body)	clockwise
Polarity	ground negative

6.1.3. Technical Characteristic

zum nächsten Punkt ; Index

The three-phase current dynamo is 3-phase, 8-pole synchronous generator in star connection.

The rotor carrying the exciter winding and the slip rings is fastened on the frustum of a cone of the crankshaft of the driving engine. The stator housing the three-phase winding is practically arranged in the engine housing and fastened by means of three screws through the external diameter of the stator together with an aluminium die-cast cap carrying the ignition device and the carbon-brush holder.

The three-phase current is rectified in a rectifier in three-phase bridge circuit.

The exciter current for the generation of the magnetic field is branched off from the stator winding and rectified by three additional exciter diodes and the three negative power diodes.

The exciter current is fed to the exciter winding from terminal 61 via the regulator, the carbon brushes and the slip rings. The regulator keeps the dynamo voltage constant and limits the maximum current.

The three-phase current dynamo shows good self-excitation properties. Operation without battery is possible.

Ignition system:

Contact breaker with ignition capacitor. With pertinent cam, one ignition pulse per crankshaft revolution.

6.1.4. Fault Diagnoses

zum nächsten Punkt ; Index

Below, procedures are described which serve for the detection of defects in the power supply equipment without delay.

Depending on the given case, the relevant method should be selected.

Faults in the power supply equipment are generally indicated by the appearance of one of the following deviations:

- Abnormal behaviour of the charging control lamp.
- Insufficiently charged battery. Indicated by the fact that the serviceable engine will not start up and by the low density of the battery acid.
- Excessively charged battery. Indicated by a high water consumption and boiling battery acid.
- Formation of noise due to mechanical wear of the carbon brushes and slip rings or rubbing of the rotor against the stator parcel.

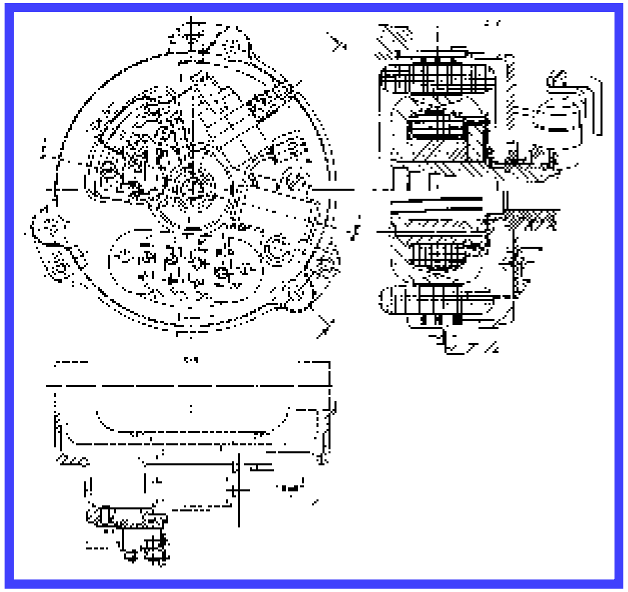


Fig. 123. Three-phase current dynamo 14 V, 15 A

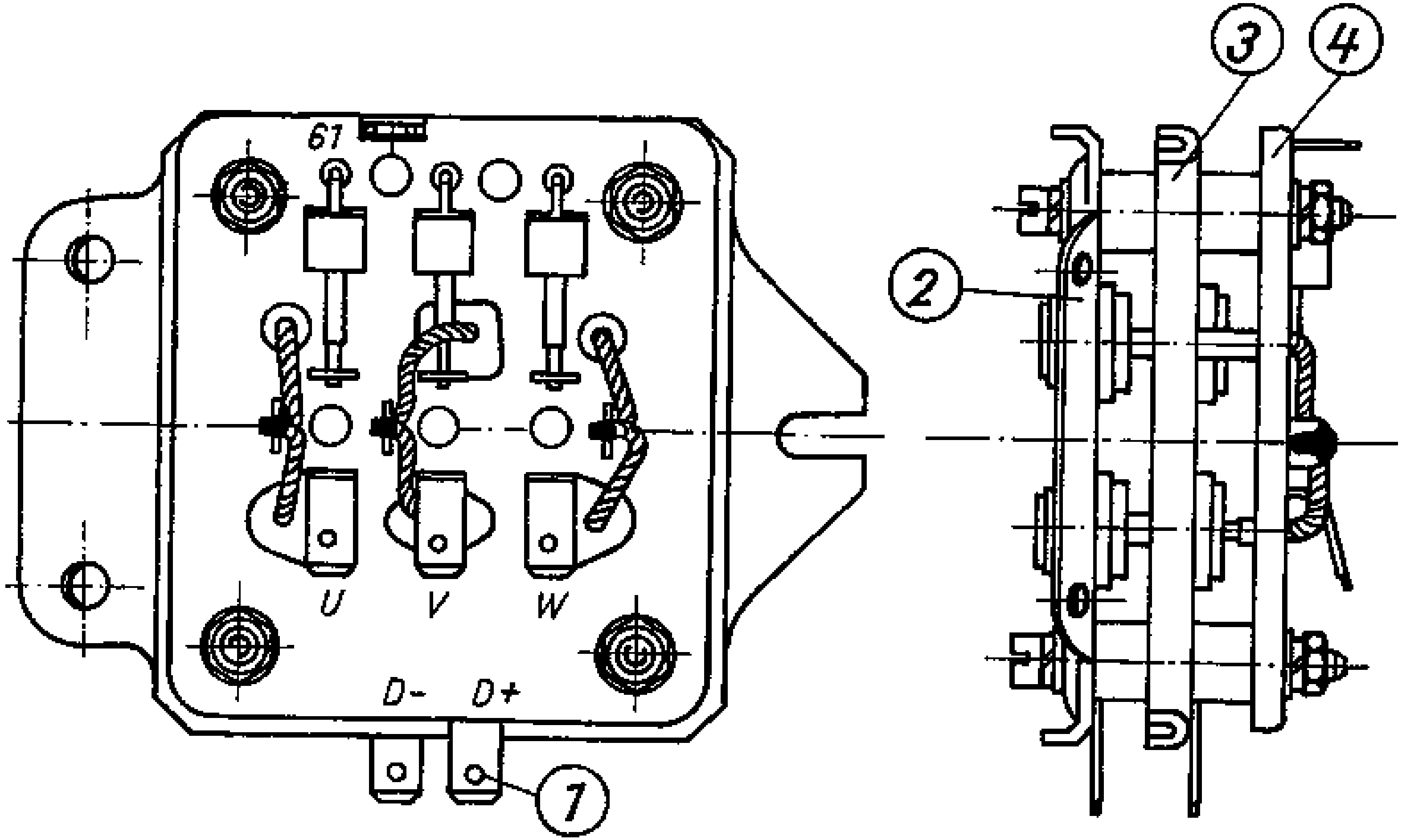


Fig. 124. Rectifier for three-phase current dynamo 14 V, 15 A

1. 6 x flat plug-in connections 6.3 TGL 22425
2. Diode plate (negative)
3. Diode plate (positive)
4. Insulating plate with exciter diodes

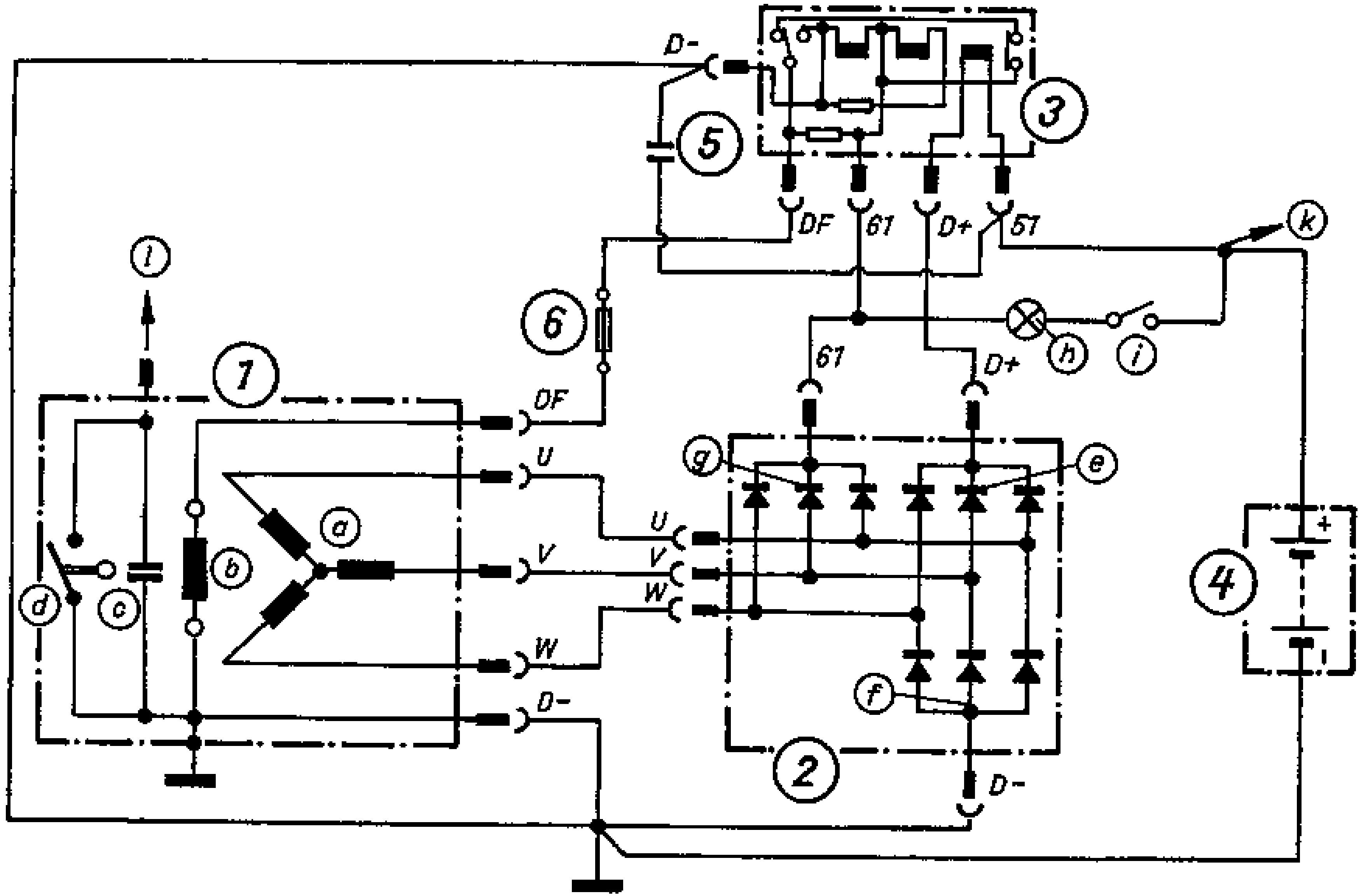


Fig. 125. Circuit of three-phase eurrent dynamo, rectifier and regulator

1. Three-Phase current dynamo
    a. Stator
    b. Rotor

   c. Ignition capacitor
   d. Contact breaker
2. Rectifier
   e. Positive diodes
   f. Negative diodes
   g. Exciter diodes
   h. Tell-tale lighting fitting
   i. Ignition switch
   j. to the consumers
   k. to ginition coil
3. Regulator
4. Battery
5. Capacitor 2.5 µF, 50 V (omitted in rectifier diodes with an inverse voltage of 200 V from August 1986)
6. Fuse link 2 A (T) (miniature fuse)

6.1.5. Behaviour of the Charging Control Lamp

zum nächsten Punkt ; Index

Mode of operation of the electrical system:

Ignition switch	Charging control lamp	Engine	see Section 6.1.7.2.
according to specifications			
Off	Off	stopped	
On	On	stopped	
On	Off	running	

faulty			
Off	On	stopped	Part I
On	Off	stopped	Part II
On	reduced brightness	stopped	Part III
On	On	running	Part IV

6.1.6. Measuring Instruments

zum nächsten Punkt ; Index

Measuring instrument	Use
Autolicht-Prüf-Fix 12 V (test lamp with voltalte source)	line testing, diode testing
Test lamp 12 V, 21 W	testing according to Section 6.1.7.1.
Multipurpose instrument	voltalte measurement, diode testing
Resistance measuring bridge according to Thomson	resistance measuring in the stator
Resistance measuring bridge according to Wheatstone	resistance measuring in the rotor

6.1.7. Measurements in the Vehicle

zum nächsten Punkt ; Index

Most of the faults can be located when the electrical devices are still installed in the vehicle.

For this purpose proceed according to the simple method given in Section 6.1.7.1. or according to the fault location scheme given in Section 6.1.7.2. Fault finding is also possible by means of an oscilloscope. Since, however, the technical pre-conditions are not given normally in the workshops, this method is not described here.

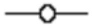
6.1.7.1. Fault Location - Simple Method

zum nächsten Punkt ; Index

For this purpose, a test lamp (e.g. flashing-lighting fitting with electric bulb 12 V, 21 W) with two connections and a battery in the motor-cycle which is in perfect working order are required. Fault location is carried out with the ignition switched off and the duel seat removed.

The following abbreviations and symbols are used in the text and in the pertinent schematic sketches:

A and B	connections of the test lamp (alligator clips)
P	test lamp
M	negative potential (ground)
GR	rectifier
R	regulator
+	battery positive
	battery negative
	flat plug-in connection
	sleeve for flat plug-in connection earth point

 loose connection

Checking the rotor for interruption and body contact

- A to terminal 51 (regulator) (positive potential).
- Cable DF to be pulled from the regulator and connected with B (see Fig. 126).
  P must light (consequently, there is no interruption).

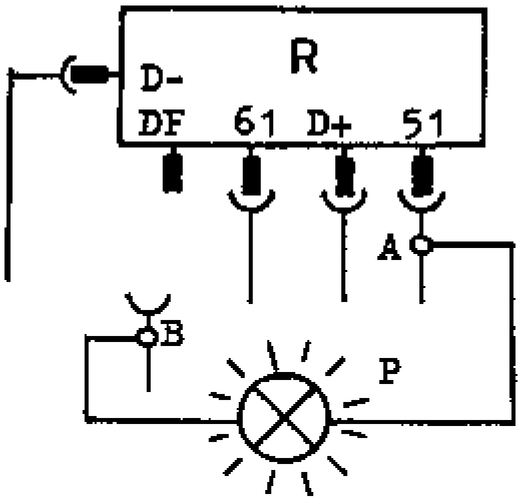


Fig. 126.

- Then the connection of cable DF with B is directly applied to earth (see Fig. 127).
  P must light brighter than in the previous case (when the brightness remains constant, there is a body contact in the rotor).

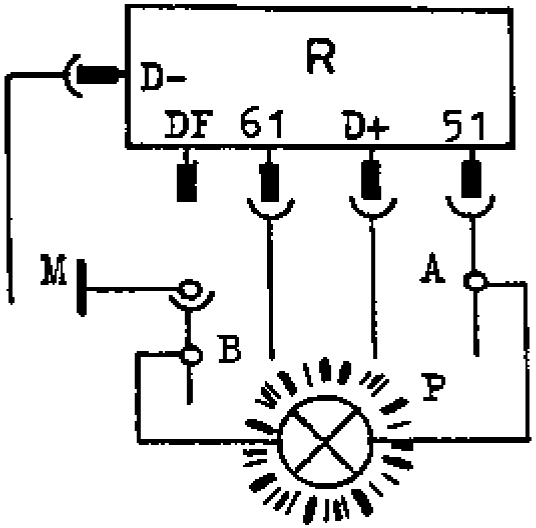


Fig. 127.

Checking the stator for interruption and body contact

- Pull the three cables, U, V and W from rectifier.
- U is to be applied to the positive potential (battery positive).
- Connect A with V or W and apply B to earth (see Fig. 128).
  P must light (consequently, there is no interruption)

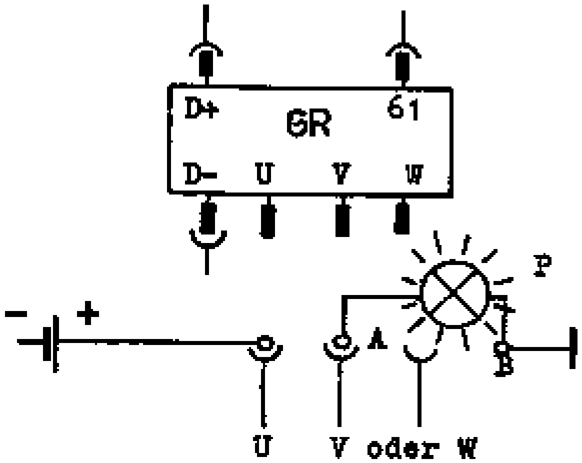


Fig. 128. oder or

- Connect A successively with the cables U, V and W and apply B to the positive pole of the battery (see Fig. 129).
  P must not light (if there is body contact in the stator, P will light).

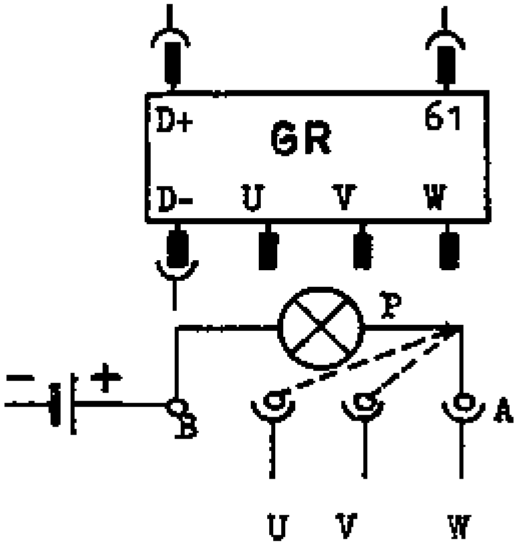


Fig. 129.

Checking the regulator

Checking for the presence of the negative potential

- Pull the cable DF from the regulator.
- Apply A to D+ (regulator), place B an the regulator cap (earth) (see Fig. 130).
  P must light (otherwise earth is not available).

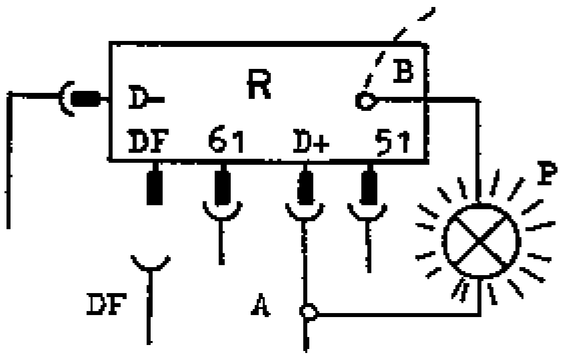


Fig. 130.

Checking for interruption of the winding and body contact

Voltage regulator

- Pull the cable DF from the regulator.
- Apply A to D+ (regulator).
- Place B an terminal DF (regulator) (see Fig. 131).

  P must light weakly (when P fails to light, the winding is interrupted).

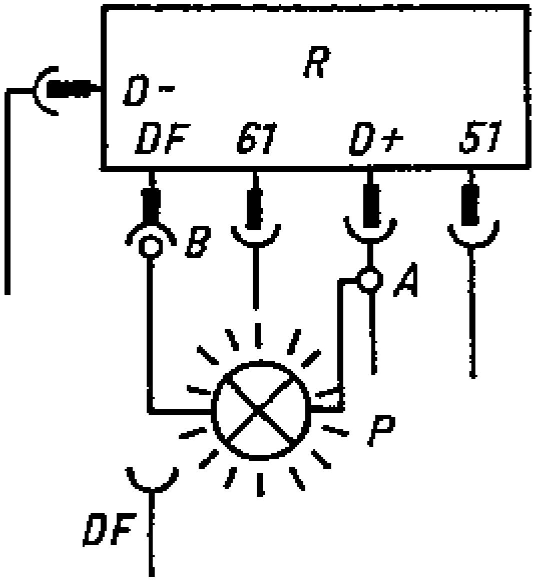


Fig. 131.

Current winding of the current-limiting circuit breaker

- Establish a direct connection between terminal DF (regulator) and regulator cap (earth) by means of a screw-driver (or a similar means) (see Fig. 132).

  P must light considerably brighter (when the brightness does not change, body contact is given).

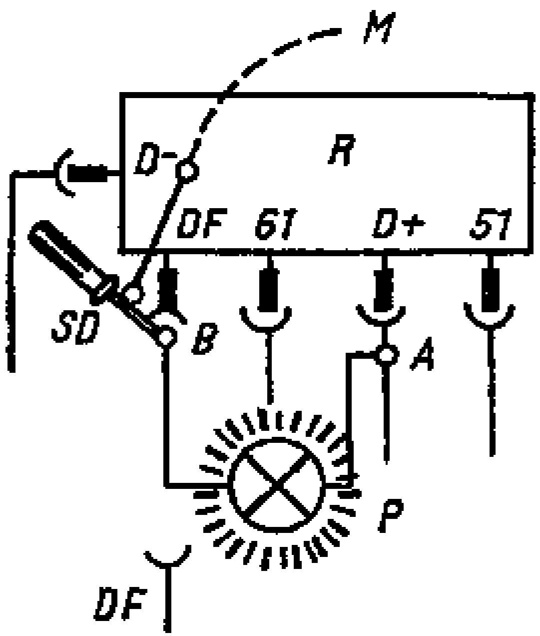


Fig. 132.
(SD) screw-driver

Checking the contacts

- Pull the cable 61 from the regulator.
- Pull the cable 51 from the regulator and place it on terminal 61 at the regulator.
- Apply A to terminal DF (regulator), apply B to earth (see Fig. 133 and position 1 in Fig. 134).
  P must light brightly.

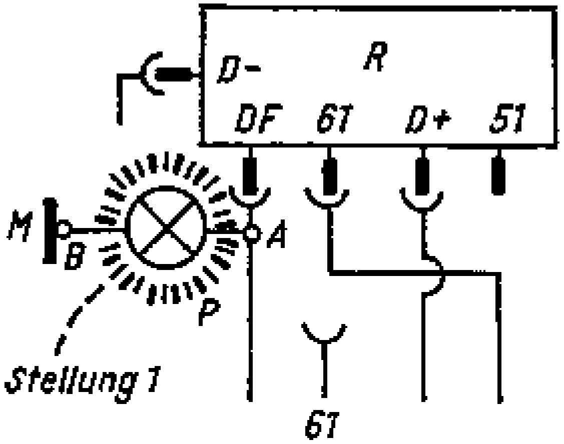


Fig. 133.
Stellung 1 Position 1

- At the regulator side (in travel direction to the left), the contact tag is raised by hand until a contact is no longer given (see Fig. 134, position 2).
  P must light more faintly (this is the check of the series resistor).

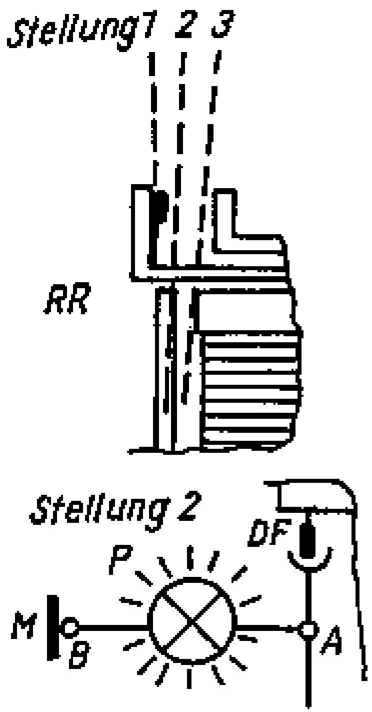


Fig. 134.
Stellung 1, 2, 3 position 1, 2, 3
Stellung 2 position 2
(RR) Regulator side

- The contact tag is moved further until it reaches an other stop (see Fig. 134, position 3).
  P must go out.
- Move the contact tag back into its initial position.
- The contact tag at the current regulation side (in travel direction to the right) is raised (see Fig. 135, position 4).
  P must glow faintly

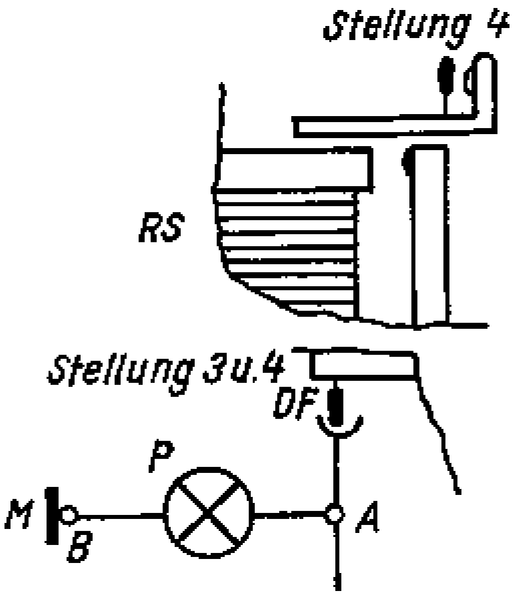


Fig. 135.
Stellung 4 position 4
Stellung 3 u. 4 position 3 and 4
(RS) Current regulator side

6.1.7.2. Fault Location Scheme

zum nächsten Punkt ; Index

Fault	Possible Cause	Remedy

Part I		
Charging control lamp **lights** -	ignition switch defective	replace the ignition switch
ignition switch switched off -	cable to control lamp has a short-circuit in the positive potential	remove the short-circuit
engine stopped		

Part II		
Charging control lamp does **not light** - ignition switch	charging control lighting fitting defective	replace electric bulb or the lighting fitting
switched on - engine stopped	cable 61 to regulator interrupted	replace the cable by a new one
	earth of regulator and cable DF interrupted	replace the cable by a new one
	rectifier defective (testing according to Section 6.1.10.1.)	replace the rectifier

Part III		
Charging control lamp **lights with a faint brightness** - ignition switch is switched on - engine stopped	corrosion in the holder of the charging control lighting fitting	clean or replace the holder
	cable DF from regulator to three-phase current dynamo interrupted	replace the cable by a new one
	rotor defective (testing according to Section 6.1.10.3.)	replace the rotor

Part IV (switch off the consumers)		
Charging control lamp **lights** - ignition switch is switched on - engine runs	damaged cables and connections between 61 regulator and 61 rectifier, D+ regulator and D+ rectifier, 51 regulator and battery	repair or replace the damaged parts
	the voltage measured between D+ regulator and earth is greater than that between 51	replace the regulator

	regulator and earth (dU>0.2V)	
	regulator contacts between DF and 61 of the regulator isolated from each other checking by means of a resistance measuring bridge (R > 0.5 ohm) with the battery disconnected and plug-in connections withdrawn between DF and 61 at the regulator	replace the regulator
	rectifier defective (testing according to Section 6.1.10.1.)	replace the rectifier
	cable DF between regulator and three-phase current dynamo interrupted	replace the cable or renew the connections in question
	damaged carbon brushes or carbon-brush connections	replace the defective parts by new ones
	rotor defective (testing according to Section 6.1.10.3.)	replace the rotor by a new one
	cables U/V/W between stator and rectifier and/or earth connection damaged	replace the damaged parts by new ones
	magnetic shunt of the stator (testing according to Section 6.1.10.2. to be carried out)	replace the stator by a new one
	interturn short-circuit in the stator (testing according to Section 6.1.10.2 to be carried out)	replace the stator by a new one

6.1.8. Removal from the Vehicle

6.1.8.1. Demounting the Three-Phase Current Dynamo

zum nächsten Punkt ; Index

NOTICE:

Before demounting, disconnect the battery, from the circuit of the vehicle!

All plug-in connections (U, V, W, DF, 61, D-) must be removed from the three-phase current dynamo.

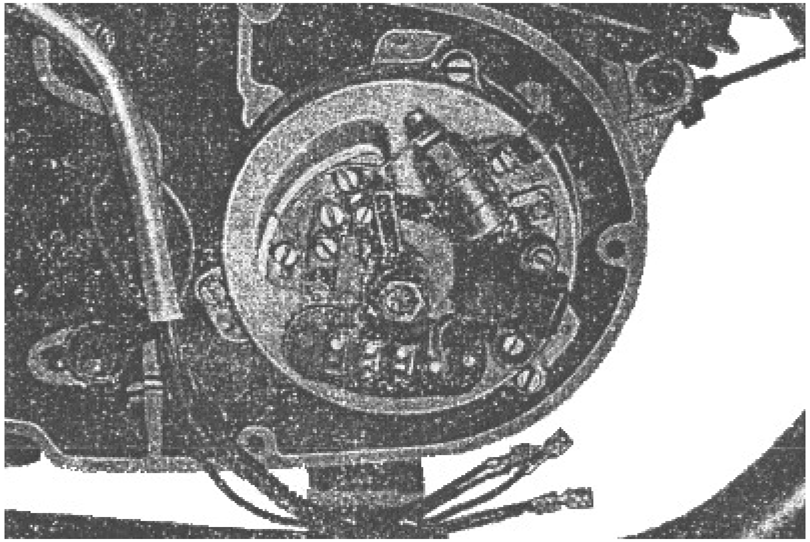


Fig. 136. Withdrawing the cables from the three-phase current dynamo

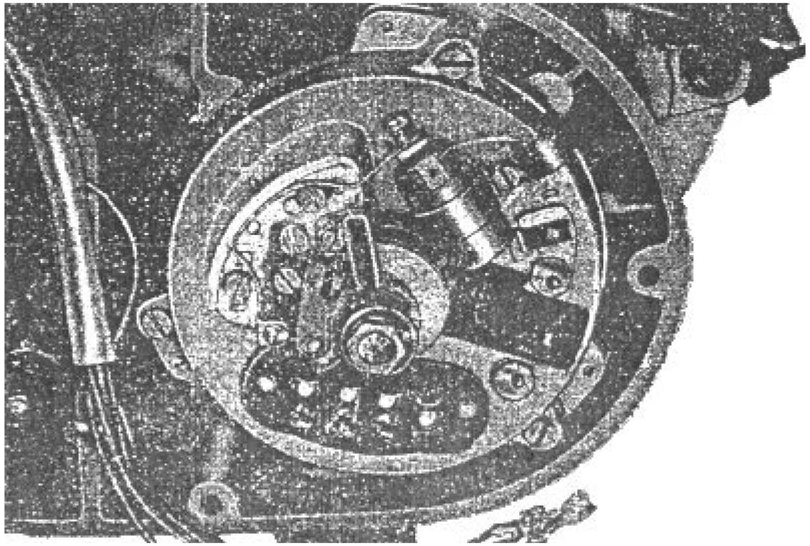


Fig. 137. Carbon brush holder demounted

Remove the carbon brush holder by loosening the two fastening screws.

Remove the stator with retaining cap after loosening the three fastening screws.

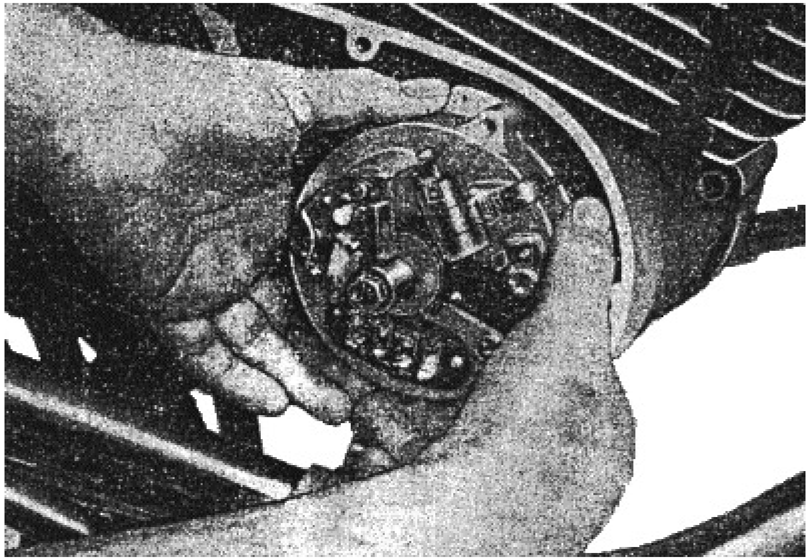


Fig. 138. Removing the retaining cap

Remove the rotor screw together with the cam. Separate the rotor from the crankshaft by means of the pulling screw 02-MW 39-4.

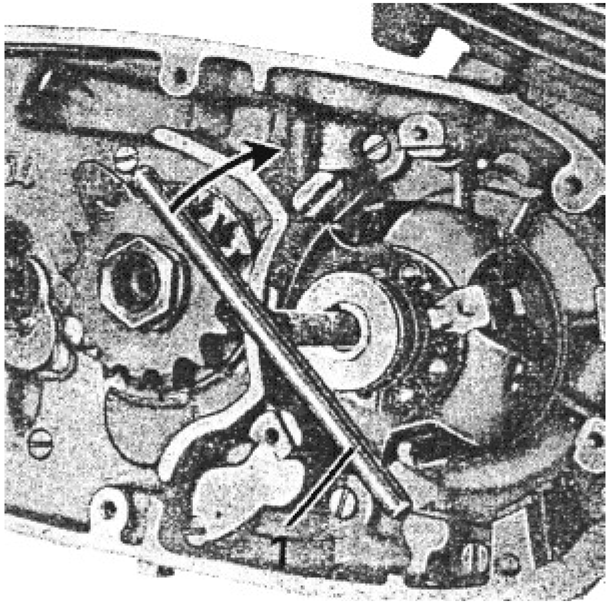


Fig. 139. Pulling the rotor from the assembly

Take every care in demounting this component because the slip rings can be damaged easily. The demounted parts must be protected from dirt, moisture and mechanical damage.

6.1.8.2. Demounting the Rectifier

zum nächsten Punkt ; Index

NOTICE! Before demounting, disconnect the battery from the circuit of the vehicle!

Remove the plug-in connections (U, V, W, 61, D+ and D-). For assembling at a later time, it is advisable to mark the cables D+, D- and 61 distinctly because an exchange of these connections will lead to the destruction of the diodes of the rectifier.

The connections U, V and W between three-phase current dynamo and rectifier may be exchanged mutually without any damage occurring.

The rectifier is removed by loosening the fastening screws (6).

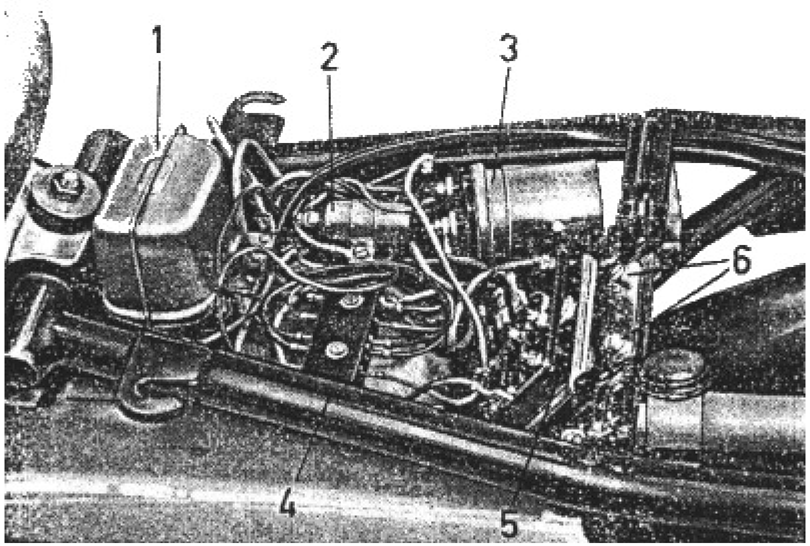


Fig. 140. Internal electrical equipment

1. Regulator
2. Capacitor 2.5 µF, 50 V
   (omitted from August 1986)
3. Ignition coil
4. Line connector
5. Rectifier
6. Fastening screws

6.1.9. Dismantling the Three-phase Current Dynamo

6.1.9.1. Stator with Retaining Cap (Fig. 141)

zum nächsten Punkt ; Index

Carbon brush holder (9)

Loosen the plug-in connections of the carbon brushes. Remove the fastening screws. Withdraw the holding clip (10).

At the same time, hold the carbon brushes (8) to prevent them from jumping out.

Check the carbon brushes and compression springs for wear.

Stator (6)

Unsolder the stator winding U/V/W.

Loosen the retaining angle (5).

With this, the stator as a complete component can be removed from the retaining cap (7).

Rotor (4)

The rotor is not designed for being repaired.

A replacement of the slip ring body must be carried out in specialised regenerating workshops.

6.1.9.2. Rectifier

zum nächsten Punkt ; Index

Loosen the four M 4 fastening screws and unsolder the rectifier stranded wires from the plug-in tags U/V/W.

The three components can be tested and repaired separately (see Section 6.1.10.3.).

For pressing out defective positive or negative diodes, use a pressing-out mandrel.

For pressing new rectifiers in place, a special pressing-in mandrel must be used.

A maximum pressing force of 4,000 N (400 kp) is permissible. Take care that the mandrel is applied exactly to the edge of the diode.

For handling and using semi-conductor diodes, the instructions given by the manufacturer must be observed.

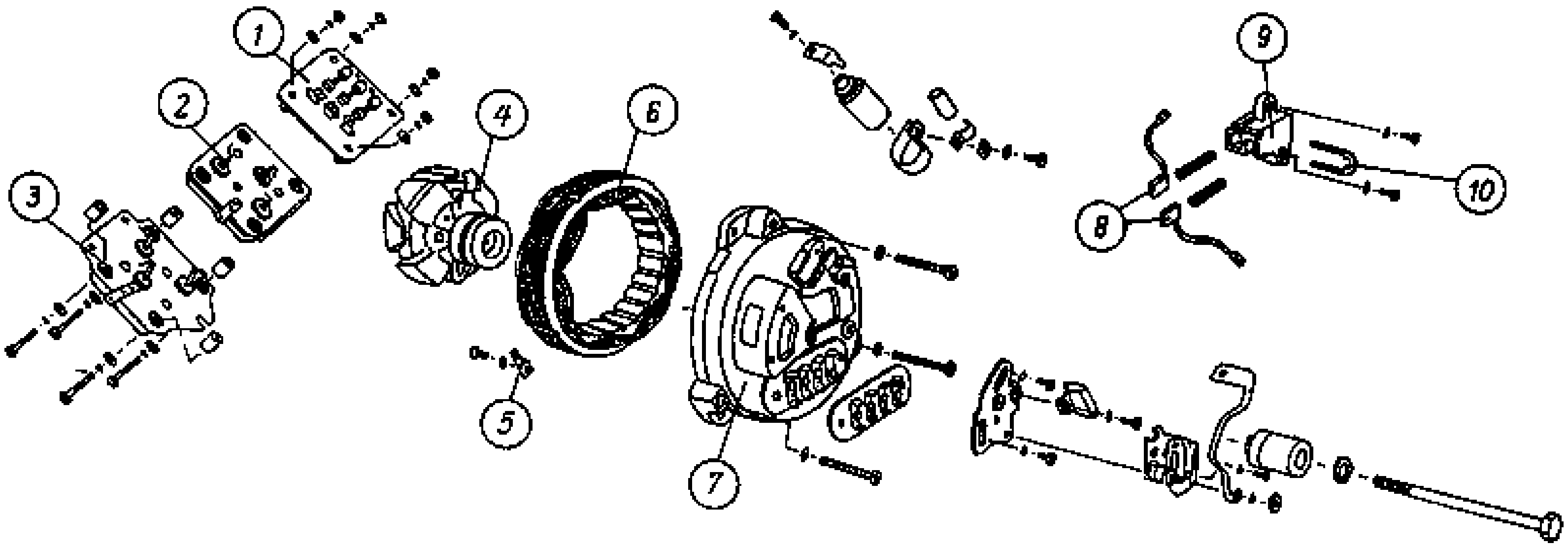


Fig. 141. Exploded view of the three-phase current dynamo

1. Insulating plate with exciter diodes
2. Diode plate (positive)
3. Diode plate (negative)
4. Rotor
5. Retaining anale
6. Stator
7. Retaining cap
8. Carbon brushes
9. Carbon brush holder
10. Holding clip

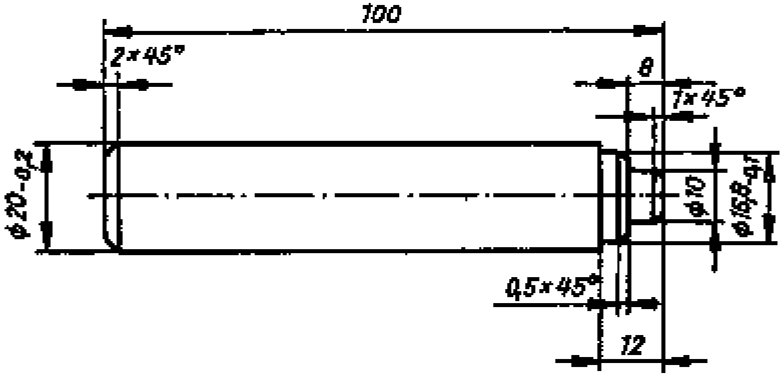


Fig. 142. Pressing-out mandrel
Round steel 22 TGL 11163 St 50 K TGL 0-1652

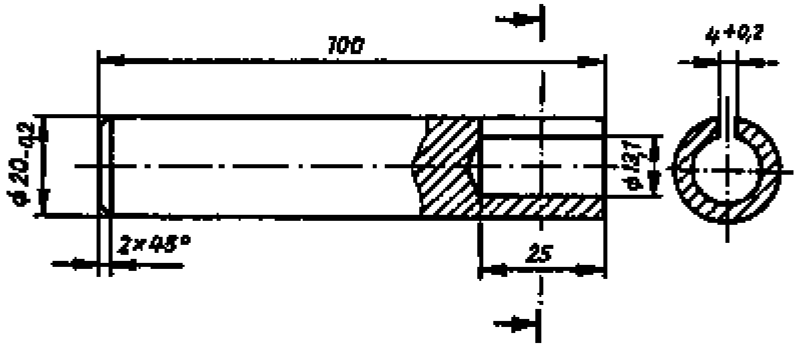


Fig. 143. Pressing-in mandrel
Round steel 22 TGL 11163 St 50 K TGL 0-1652

6.1.10. Checking the Components

6.1.10.1. Checking the Rectifier

zum nächsten Punkt ; Index

The rectifier diodes should be checked by means of a continuity tester.

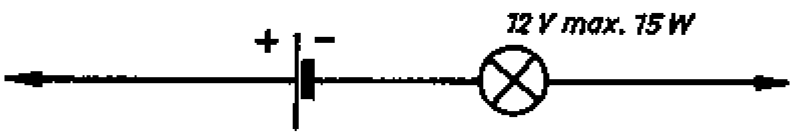


Fig. 144. Principle of diode testing

The measuring tips are applied to the anode and cathode connections of the diodes.

When the positive measuring tip is applied to the anode and the test lamp lights up, then the diode is serviceable.

When the lamp fails to light or when the test lamp lights up when the positive pole is applied to the cathode, a diode fault is given and the diode must be replaced by a new one.

In the diode plate positive (D+), the cathode are at the cooling plate, in case of the negative diode plate (D-), the anodes are at the cooling plate.

The exciter diodes together with the cathode are at connection 61.

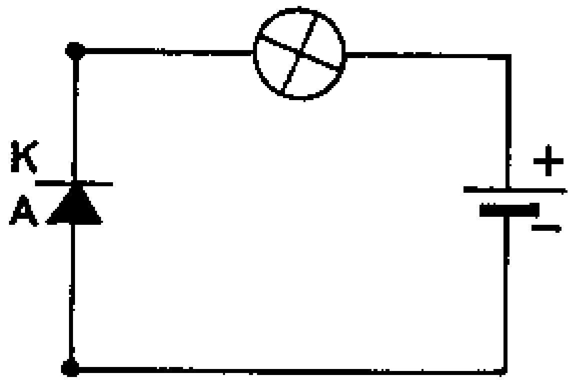


Fig. 145. Diode in perfect working order

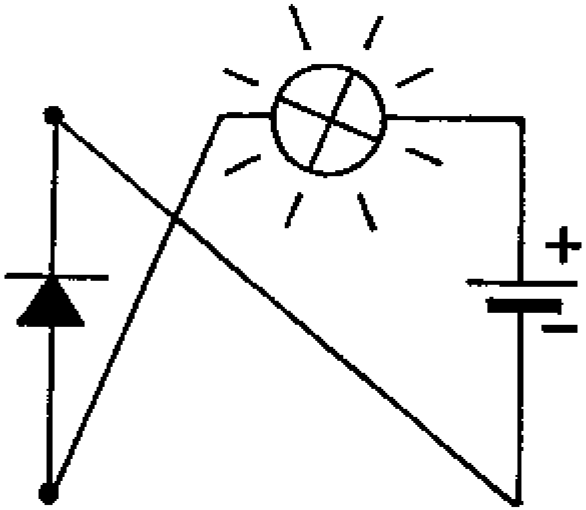


Fig. 146. Check-test - diode in order

6.1.10.2. Checking the Stator

zum nächsten Punkt ; Index

Checking the stator winding for interturn short-circuit:

Between the individual phases (U/V/W, V/W), a resistance of about 0.32 ohm should be measurable.

Checking the stator for magnetic shunt:

The stator is checked for magnetic shunt between the stator iron core and the winding turns of the stator by interposing a test lamp and applying a test voltage of 24 V a.c. All cables U/V/W must be separated from the stator. When the test lamp lights up, the stator is defective and must be replaced.

6.1.10.3. Checking the Rotor

zum nächsten Punkt ; Index

Checking the rotor winding:

Measure the resistance by means of a resistance measuring bridge. It should be about 4.2 ± 0.3 ohm. After removing the component from the vehicle, the measurements are taken at the slip rings.

The test tips should be applied only very slightly to the slip rings in order to prevent damage to the graphite slip rings.

6.1.10.4. Checking the Length of the Carbon Brushes

zum nächsten Punkt ; Index

Demounting is to be performed according to Section 6.1.9.1.

When the length of the carbon brush falls below 9 mm, a new carbon brush must be inserted.

6.1.11. Assembling Instructions

zum nächsten Punkt ; Index

Joints to be soldered have to be made by means of acid-free soldering agents and protected from corrosion by electro-insulating protective lacquer (can be soldered).

This protection should cover also newly soldered-in exciter diodes wholly. This can be effected by dipping the whole rectifier. For this purpose, the plug-in connections must be covered and after dipping remains of lacquer must be removed.

Stator

When mounting the stator into the retaining cap, take care that the groove of the stator coincides with the groove in the retaining cap.

Permissible tightening torque for the stator fastening screw M 7-5.8

20 ± 2 Nm (2 ± 0.2 kpm)

Permissible tightening torque for the rotor fastening screw M 5-5.8

4 ± 0.5 Nm (0.4 ± 0.05 kpm)

It is advisable to fit the carbon brush holder after mounting the retaining cap.

NOTICE!

Before connecting the battery, check the electric wiring. When the connections D+, D-, 61 and DF are exchanged by mistake, there is the danger of the destruction of the semi-conductor elements and of additional units. Take care that the polarity of the battery is observed (negative pole to earth) when connecting it.

Information about ignition timing and the application of the lubricating felt is given in special documents for the vehicle.

6.1.12. Important Information

zum nächsten Punkt ; Index

For charging the battery by means of mains-operated charging sets, the battery must be disconnected from the supply system of the vehicle.

When carrying out electric welding operations in the vehicle take care that the +-lines of the supply system of the vehicle do not get into contact with the welding electrode. The battery must be disconnected.

When the engine is running, connections between the three-phase current dynamo, the rectifier and regulator must not be interrupted otherwise damage to the electrical equipment may be the consequence.

For checking operations in the three-phase current dynamo and rectifier, the measuring instruments must be provided with safe connections.

When operating the three-phase current dynamo without battery, a capacitor of 2.5 µF, 50 V, must be connected between earth and terminal 51. (This is available in the ETZ as standard equipment close by the line connector at the intake silencer.) [1])

When the miniature fuse 2 A T (time-delay) between line DF and dynamo-regulator has failed, in any case insert a fuse of the same type; never bridge the fuse in any other way! Without this fuse, the motor-cycle can be operated without hesitation for short distances as long as the battery voltage will suffice.

[1]) Not applicable to rectifiers with diodes of an inverse voltage of 200 V from August 1986

6.2. Regulator

zum nächsten Punkt ; Index

The three-phase current dynamo is provided with a temperature-compensated, positively regulating regulator with break characteristic. This single-system regulator of 14 V, 15 A, operates with voltage regulation. The current control limits the maximum current to 15 A. A variable series resistor (connection side) and an adjustable resistor are incorporated into the regulator.

6.2.1. Mounting

zum nächsten Punkt ; Index

In order to ensure proper functioning of the regulator, it is necessary to fasten it so that it is not exposed to vibration.

This has been achieved fully in the ETZ because it is suspended elastically; the regulator cut-out is provided with a pocket of foamed plastic and a rubber stopper for this purpose.

When mounting every care must be taken that the regulator and cut-out are properly inserted into the holder provided for this purpose.

6.2.2. Maintenance

zum nächsten Punkt ; Index

The maintenance of the regulator in general is restricted to the cleaning of the connections. When the headlamp light is too faint, when there are difficulties in starting, etc., do not look for the fault in the regulator neither intervene inexpertly but first check the lines and their plug-in connections for proper condition and corrosion.

The regulator must not be touched by parts that may be put under the dual seat such as the replacement inner tube, etc.

6.2.3. Adjustment

zum nächsten Punkt ; Index

Before the electrical adjustment, always a mechanical adjustment or a correction of the mechanical adjustment must be made. This facilitates the electrical adjustment and ensures that the required voltage/current characteristic is adhered to.

An electrical adjustment of the regulator and cut-out IN THE VEHICLE is only a makeshift and should be avoided in the interest of an optimum maintenance of the function of the power supply system.

For adjusting the regulator and cut-out, they are placed on a test bench which is continuously variable within a speed range from 0 to 7,000 rpm together with a dynamo of the type in question.

In order to avoid errors in adjusting, the voltage must always be started from the rotational speed "zero" of the dynamo. The voltage is measured between the terminals D+ and D- of the regulator. The measuring instrument to be used should be at least of quality class 1.5.

The following items have to be adjusted:

- Regulated voltage U_{3A}

  Voltage which is regulated over the full rotational speed range when the dynamo is loaded with 3 A. The voltalte must remain within the specified tolerance range. Short-time voltage peaks beyond the tolerance range at the beginning of the lower-position or upper-position regulation should not, be mistaken for wrong settings.

  The regulated voltage may differe for about +0.2 to -0.1 V between end of the lower-position regulation and beginning of the upper-position regulation (voltage transient).

  The voltage transient must not be adjusted too negatively otherwise the regulator armature will "chatter", i.e. it will continuously oscillate between lower position and upper position.

- Maximum load voltage U_{HL}

  Voltage which is regulated when the dynamo is loaded with 15 A at a rotational speed of more than 3,800 rpm.

- Minimum operating current I_{AS}

  At this current, the current regulation is started.

Electrical adjustment values

The following values hold for a regulator temperature of (20 ± 5) °C.

regulated voltage	13.8 to 14.6 V
maximum load voltage	13.0 to 13.5 V
minimum operating current	11.5 to 14.0 A

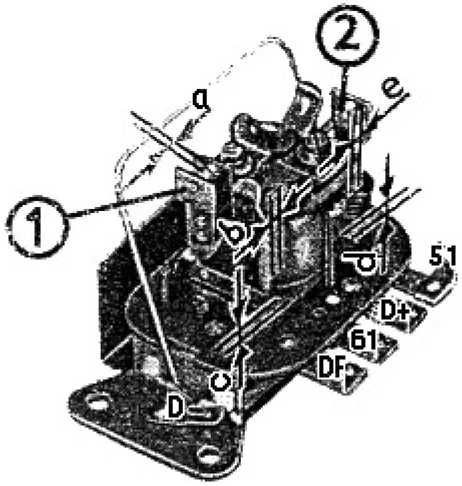


Fig. 147. Mechanical adjustment of the regulator

a. at least 0.3 mm
b. 0.8 to 1.1 mm
c. 0.5 ± 0.1 mm
d. 0.5 ± 0.1 mm
e. 1.4 to 1.5 mm

1. Contacts of the voltage regulator
2. Contact of the current regulator
   (current limiting switch)

NOTICE!

A change of the regulated voltage and of the minimum operating current is to be carried out only by carefully bending the spring holder. Do not bend the contact tags!

6.2.4. Damages and Their Causes

zum nächsten Punkt ; Index

This subject has already been dealt with in Section 6.1. where the most important things have already been said.

In addition, observe the following:

An improper fitting of the protective cap of the regulator and cut-out leads to body contact when the cap gets in contact with the core or with the contact angle of the regulator and cut-out. Whenever opening the regulator, the fuses must be removed before this operation. The lugs arranged at the side of the cap must be properly put into the openings in the regulator base provided for this purpose. The wire bow must press firmly on the cap.

6.3. Battery

zum nächsten Punkt ; Index

A flat lead battery with a nominal voltage of 12 V and a reated capacity of 5.5 Ah is used.

For putting into operation, accumulator sulphuric acid (in the following text referred to as electrolyte) of the density of 1.28 ± 0.01 g/cm³ (in the tropics 1.22 ± 0.01 g/cm³, measured at (20 ± 2) °C, is filled into the battery.

All cells must be filled up to 5 mm on top of the separators or up to the given acid level marking.

The temperature of the electrolyte must not exceed 25 °C when pouring it into the battery.

After about 2 to 3 hours, plates and separators are fully soaked and the electrolyte level has dropped.

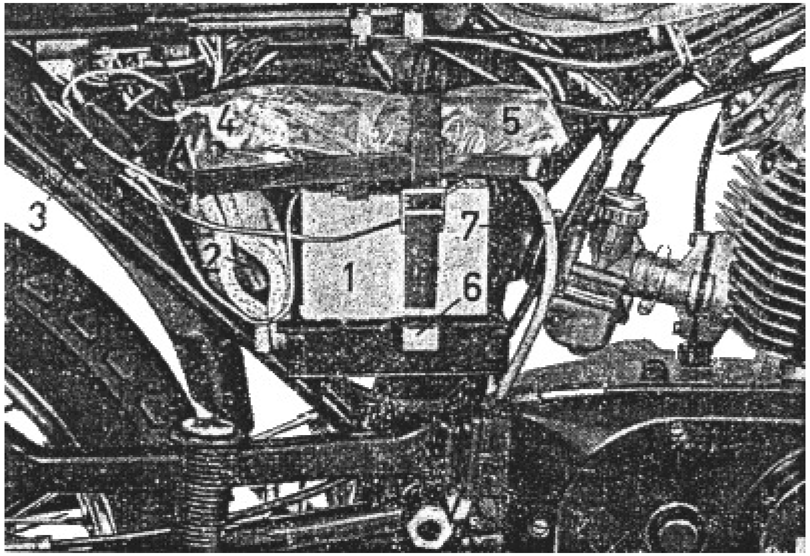


Fig. 148. Battery arrangement

1. Battery
2. Flasher unit
3. Fuse box
4. Replacement electric bulbs
5. Tool kit
6. Battery holder
7. Vent hose

Then, electrolyte of the same density and temperature has to be replenished up to the top edge of the separators. Subsequently, the battery is charged with direct current of 0.5 A.

During charging, the screw plugs of the battery must be opened.

Charging must be continued until all cells briskly and uniformly evolve gas and a voltage of 2.5 to 2.7 per cell has been reached.

For 2 to 3 measurements taken at an interval of one hour, density of the electrolyte (1.28 ± 0.01 g/cm³) and cell voltage must remain constant. During charging, the temperature, of the electrolyte must not exceed 50 °C. At the end of charging, the electrolyte level must again be checked.

Mounting the battery

Before the battery is mounted into the vehicle the two battery cables (red cable to the positive pole, brown cable to the negative pole) must be connected to the battery and preserved with some grease for battery terminals or acid-free vaseline. Subsequently the battery can be mounted and the two battery cables connected to the fuse box.

IT SHOULD BE BORNE IN MIND:

red cable to red cable,
brown cable to brown cable!

The vent hose should be placed in such a way that acid which may escape from it cannot get on varnished or metal parts.

Maintenance of the battery

The average service life of the battery is about 2 years. This period can be extended or it may be shortened, depending on the care bestowed on the battery. The maintenance operations are mainly restricted to the cleaning of the terminals - they must be preserved with a thin film of grease for battery terminals - and the checking of the acid level.

When greasing the terminals take care that no grease can get into the cells.

When the acid level has dropped below the specified value, top up with distilled water only.

When acid should have been spilled from the battery, then the density of the amount of acid to be replenished must be selected in such a way that the density of the total amount of acid in the battery in the charged state is 1.28 ± 0.01 g/cm³.

When the battery is not used, it must be re-charged with 0.5 A once every month.

6.4. Ignition

6.4.1. Ignition Coil

zum nächsten Punkt ; Index

The ignition coil is comparable with a transformer which transforms a low voltalte into a high one. Since, as everybody knows, only an alternating voltage can be transformed but the supply system of the motor-cycle is fed with a direct voltage, a continuous voltage change must be caused, and this is done by the contact breaker together with the capacitor.

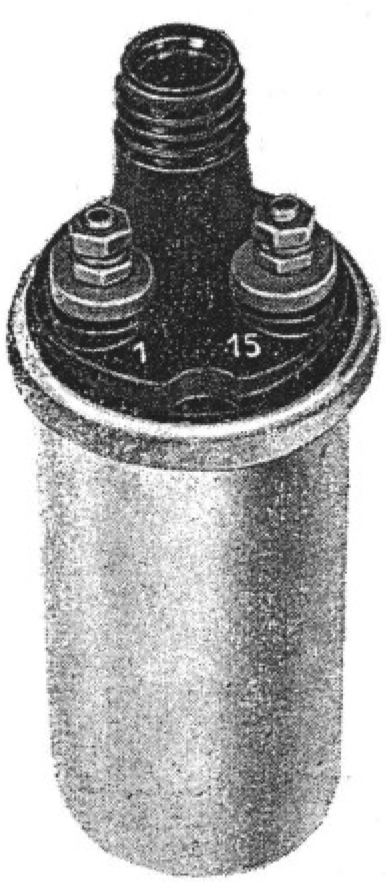


Fig. 149. Ignition coil

The voltage of 12 V of the vehicle's supply system is transformed to the ignition voltage of about 12,000 V. The two connecting bolts of the ignition coil are marked.

Terminal 1 is connected with the contact breaker and terminal 15 with terminal 15/54 in the ignition lock.

NOTICE!

When the engine is stationary, the ignition switched on and the contact breaker closed, the ignition coil carries a current which heats the ignition coil after a certain time. As a consequence, the insulating material will be destroyed. The ignition coil breaks down and, hence, is useless.

6.4.2. Contact Breaker

zum nächsten Punkt ; Index

The design of the contact breaker is shown in Fig. 150.

On the one hand, the adjusting plate (4) is used as carrier of the plate (3) and the felt wiper (11) and, on the other hand, for adjusting the firing point.

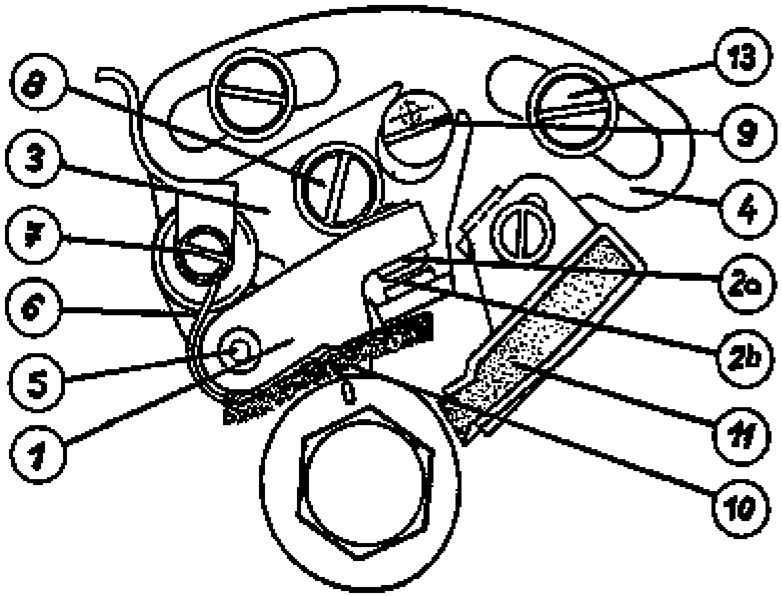


Fig. 150. Contact breaker

The bearing bolt (5) is fastened to the plate (3) with the fixed contact (2 b); the lever (1) is pivoted an this bolt.

The contact (2 a) riveted to the right-hand end of the lever (1) is pressed against the fixed contact (2 b) by the return spring (6) which also serves as conductor and one end of the spring is propped on the connecting screw (7). The breaker points gap is precisely adjusted by means of the eccentric screw (9) after loosening the fastening screw (8). The felt wiper (11), which is slightly soaked in the special oil for contact breakers, should be approached to the cam so far that it just touches the lobe of the cam.

When this neglected and the felt wiper is further advanced to the cam, the oil will be pressed out of the felt and lubrication of the cam track is no longer ensured. Result: the operating nose shows a high rate of wear - the breaker points gap and, thus, the adjusted spark advance are changed.

The felt (10) serves for collecting the excessive supply of oil and must not be oiled itself. When this felt is heavily contaminated, it must be replaced by a new one.

6.4.3. Spark Setting

zum nächsten Punkt ; Index

Adjusting the contact breaker points gap

Before starting adjusting, it is necessary to subject the breaker points to a check. For this purpose the contacts should be removed (see Fig. 150).

The screw (7) is unscrewed, the current bar pressed up, the fastening screw (8) removed, and the contact breaker base plate with contact breaker is taken off. When small burns are visible on the contact areas, they can be removed by means of a fine emery file. In case of heavy burn-up of the contacts, the contact breaker base plate with contact breaker must be replaced.

When mounting take care that the adjusting plate (4) is clean and oil-free as well as the complete contact breaker set. When this is neglected, intermittent firing and starting difficulties will be the consequence. Remove the remains of old lubricants from the bearing bolt, and fit the contact breaker hammer with some contact breaker oil. The contact breaker contacts must be adjusted in such a manner that the contacts are parallel to each other.

The crankshaft is turned for adjusting the breaker gap so far that the nose of the contact breaker lever is arranged at the highest point of the cam.

The fastening screw (8) is loosened and, by means of the eccentric screw (9), the contact gap is adjusted so that the feeler gauge can just be drawn through the gap.

Tighten the fastening screw (8) and once more check the contact gap by means of the feeler gauge.

The set contact breaker gap must remain constant when the crankshaft is turned during the full angle of opening, on no account should it become greater. Otherwise there will be a cam eccentricity which will lead to intermittent firing at higher rotational speeds.

Setting the firing point

($2.5^{+0.5}$ mm before T.D.C. or 22°45' to 23°45' crank angle).

Setting is effected by means of the ignition setting gauge 29-50.801 and a test lamp.

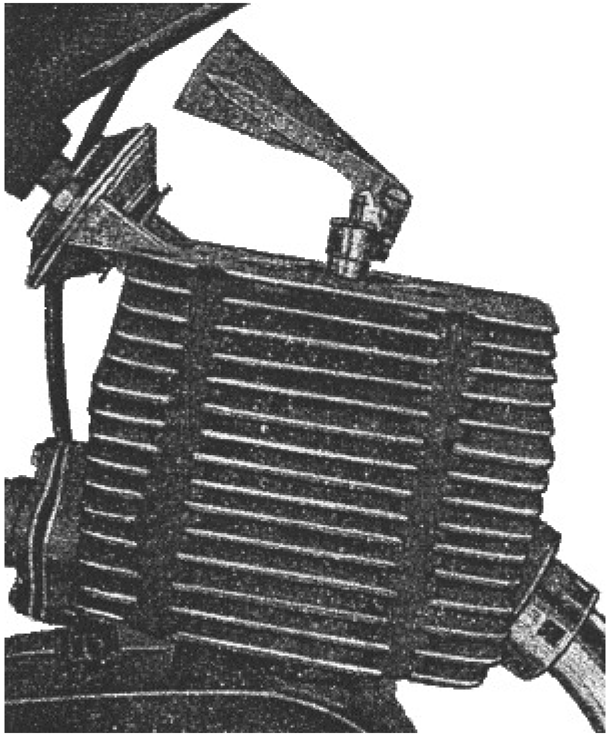


Fig. 151. Ignition setting gauge 29-50.801 screwed in place

The ignition setting gauge is screwed into the thread for the sparking-plug, and by turning the crankshaft clockwise, the scale of the setting gauge is automatically adjusted to the top dead centre (T.D.C.).

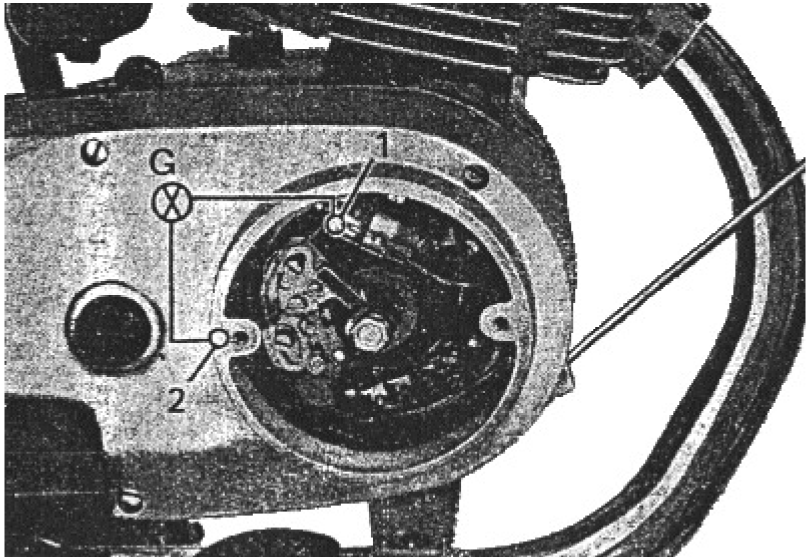


Fig. 152. Test lamp clamped

The pointer of the setting gauge is on "0" of the trailing scale when the piston is in T.D.C.

The test lamp with an electric bulb (G) of 12 V and maximum 2 W is clamped to the current bar (from the contact breaker to the capacitor) at the positive side (1) and to the engine casing for the cylinder at the negative side (2).

When turning the crankshaft through about 340° clockwise, the pointer of the setting gauge will arrive above the scale values 5 to 4 (mm) at the firing point $2.5^{+0.5}$ (mm) of the trailing scale. When at this point the test lamp starts lighting (battery is connected to the circuit of the vehicle and the ignition is switched on), then the firing point is correctly set.

When the test lamp lights too early (e.g. between the scale values of 4 and 3), then the contact breaker opens too early and the adjusting plate (4) must be displaced clockwise after loosening the fastening screw (13). When the test lamp lights after the scale value of 3 (e.g. at the scale value of 2), then the conctact breaker opens too late and the adjusting plate (4) muest be displaced opposite to the sense of rotation, i.e. anti-clockwise (see also Fig. 150).

After any adjustment of the adjusting plate (4), the contact breaker gap must be checked and corrected, if necessary. The measurement of the firing point must be repeated until the test lamp lights up at the scale value of $2.5^{+0.5}$ while the piston moves upwards.

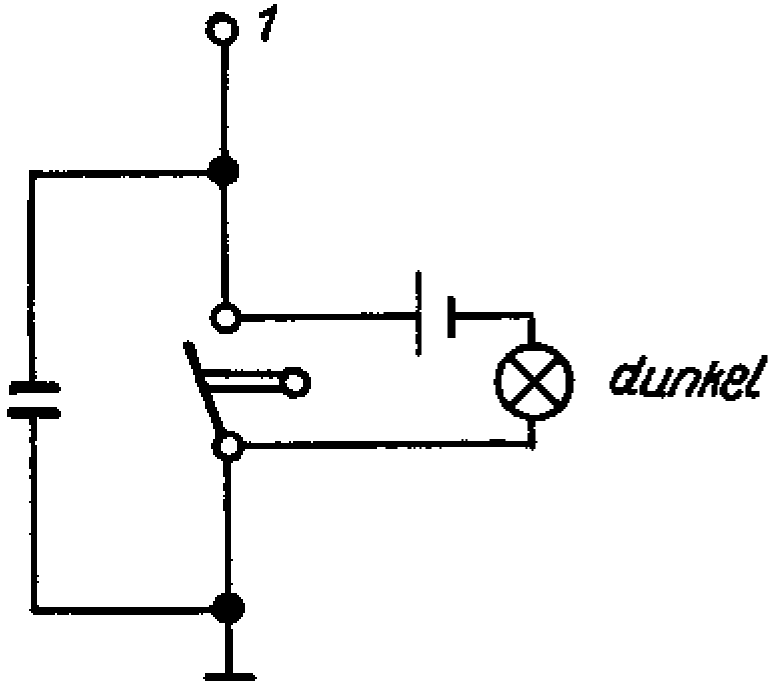


Fig. 153. Checking the firing point with the help of a current source outside the vehicle
dunkel dark

When for setting the firing point a current source out-side the vehicle is used, then the test lamp will go out when the contact breaker opens.

NOTICE!

On no account should be contact breaker open earlier than $2.5^{+0.5}$ mm before T.D.C. otherwise the combustion in the engine will be concluded too early and the pressure of combustion presses on the piston already before T.D.C., a fact, which means overheating, reduction of performance, and a high rate of wear of the engine.

6.4.4. Sparking-plug

zum nächsten Punkt ; Index

In essence, the sparking-plug consists of the three parts. These are the insulating body, the central electrode and the steel casing with earth electrode. The spark flashes over between central electrode and earth electrode, igniting the fuel-air mixture.

The insulating body must have a very high breakdown strength. In order to ensure this breakdown strength at any time, the sparking-plug should be treated carefully.

Due to inexpert treatment (blow, impact), almost invisible hair cracks may occur which render the plug useless. The service life of a sparking-plug in two-stroke engines is 10,000 km of road operation on an average. After this performance, it is generally correct TO REPLACE THE SPARKING PLUG BY A NEW ONE.

The ETZ is provided with a sparking-plug ZM 14/260. It is advisable to use always this type of plug (observe the thermal value).

A lower thermal value in winter or a higher thermal value in summer will not offer any advantage rather disadvantages; but in extreme climatic zones this may be necessary.

The correct seat of the plug should also be observed. The thread of the plug must be flush with the thread in the cylinder cover. When the sparking-plug projects too far into the combustion chamber (no packing ring or a ring that has been pressed flat is under the plug) or when the plug is not properly screwed down (2 packing rings under the plug), heat accumulation and overheating phenomena will be the result.

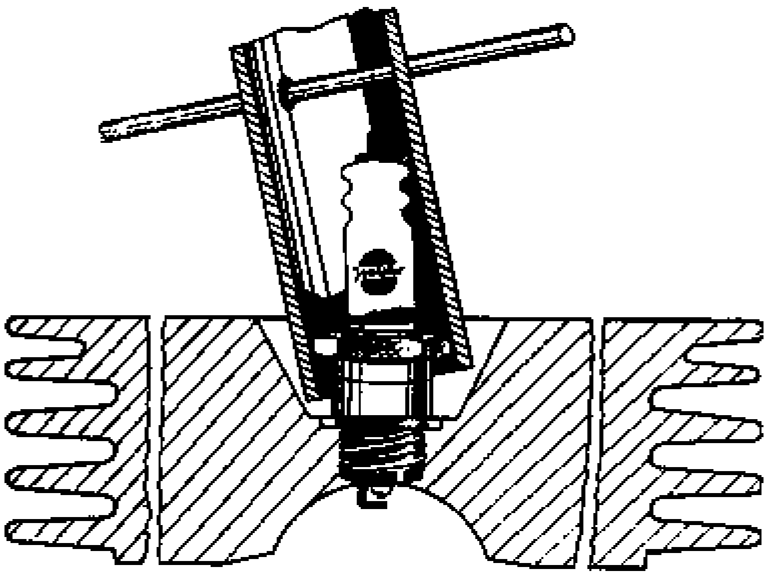


Fig. 154. Sparking-plug improperly screwed down or out

The maintenance requirements of the plug are relatively modest. The electrode gap should be checked about every 2,500 km, and the plug electrodes must be cleaned.

For changing plugs, a properly fitting sparking-plug wrench must be used in order to avoid breakage of the insulating body (Fig. 154).

In any case, pay attention to the "plug appearance". After a longer use of the plug, its appearance enables to draw conclusions as to the mode of operation of the engine, the mixture formation, the fuel used, the carburetter tuning, and the suitability of the plug for the engine.

The correct SPARKING-PLUG APPEARANCE:

The face of the sparking-plug thread is black and the insulating body tip with earth electrode is grey-yellow to fawn.

6.4.5. Ignition Line Terminal (Plug Terminal)

zum nächsten Punkt ; Index

The ignition line terminal is designed to establish a connection between sparking-plug and ignition cable and to screen the electrical field of the sparking-plug externally.

In order to screen the sparking-plug properly, take care that the metallic armour fastened to the ignition line terminal is correctly seated on the hexagon of the plug.

On no account should be metallic armour be removed otherwise interferences in VHF and television reception will be caused.

Like the sparking-plug, the ignition line terminal must also be treated with every care. Hair-line cracks in the insulating body which lead to tracking render is useless. When the plug terminal is moist, dirty or oiled up in its interior, irregular firing will be the consequence.

6.4.6. Faults in the Ignition System

zum nächsten Punkt ; Index

Due to wear and aging of the individual devices, faults may be caused in the ignition system.

Below some of the frequently occurring causes and their effects are mentioned:

1. Cam travel badly lubricated

   wear of the nose of the contact breaker contact gap too small or no gap at all =
      starting difficulties,
      irregular running of the engine,
      reduction of performance

2. Breakdown of capacitor

   high wear an contact =
   irregular firing at higher rotational speeds

3. Setting the contact gap in case of severe pitting

   on the contact surfaces
   the true distance is too great =
   irregular firing at higher rotational speeds,
   weak ignition spark,
   reduction of output

4. Crankshaft bearings badly worn

   excessive eccentricity of the crankshaft and, hence, of the cam carbon brushes and contact breaker "jump" =
   irregular firing

5. Insufficient pressing force of the contact spring (contact breaker)

   contact breaker lever has no exact guide on the cam travel =
   irregular firing at higher rotational speeds

IGNITION LINE TERMINAL:

1. Dust and water is between the insulating body of the sparking-plug and the pressure part of the ignition line terminal =
   starting difficulties,
   irregular firing

2. Due to improper treatment, the insulating body is cracked (hair cracks)

   tracking towards earth =
   starting difficulties,
   weak ignition spark,
   reduction in output

LINES:

1. Defective insulation of the high-voltage line (ignition cable)

   spark flashing to earth (cylinder cover) =
   difficulties in starting especially in moist weather,
   irrigular firing at high rotational speeds

2. Broken lines

   short circuit =
   blown fuse

3. Flat plug-in connections heavily corroded

   very high contact resistance =
   the voltage applied to the various devices is too low

6.5. Lighting and Signalling Installation

6.5.1. Headlamp

zum nächsten Punkt ; Index

The headlamp is opened, by loosening the fillister-head screw and removing the front part of the headlamp housing. The front parts consists of the chromium-plated front ring, the reflector with diffusing screen, the twin-filament bulb and the town-light lamp and their holders.

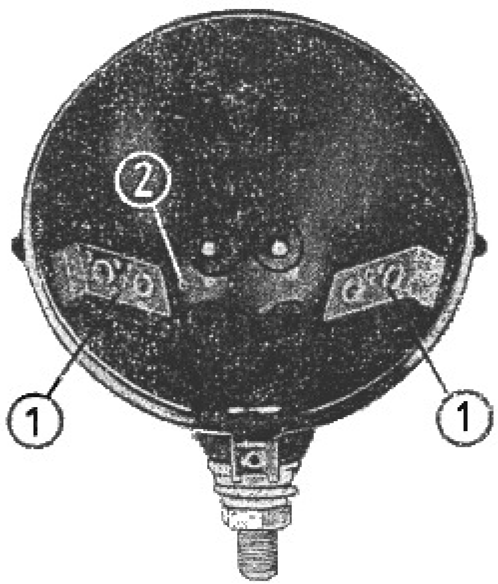


Fig. 155. Headlamp housing

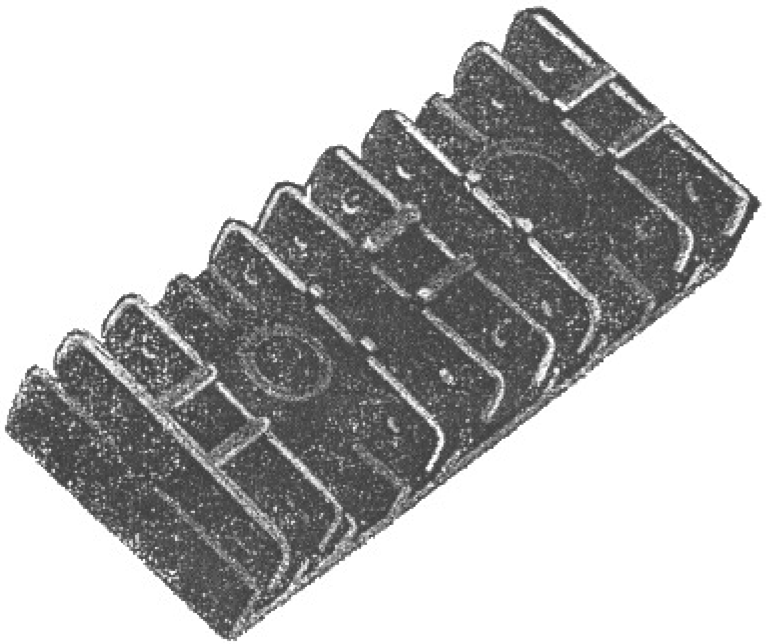


Fig. 156. Line connector for headlamp and internal electric devices (open)

In the headlamp housing, there are two line connectors (1) and one earth point screw (2) which is used as a collector of all earth cables passed into the headlamp.

NOTICE! As a line connector, only that one which is shown in Fig. 156 should be used!

When replacing the twin-filament bulb, pay attention to the following:

The clamping piece (part of thermosetting plastic) which establishes the electric connection to the lamp must be withdrawn straight - do not tilt it - otherwise the contact plates will be distorted. As a consequence, the current supply may be interrupted.

The cables which lead to the terminals 31, 56 a, 56 b need not be disconnected. It is advisable, however, to check them for tight fit. Only cable 58 (town light) must be disconnected.

The holder (1) for the twin-filament bulb and the townlight lamp is loosened by raising the retaining spring (H) from the upper plate nose of the reflector. Then, the twin-filament bulb can be taken out the reflector. The glass bulb of the lamp must not be touched with the bare hand. Even clean fingers leave grease traces!

When mounting, take care that the nose at the lamp cap is properly fitted into the cut-out of the reflector.

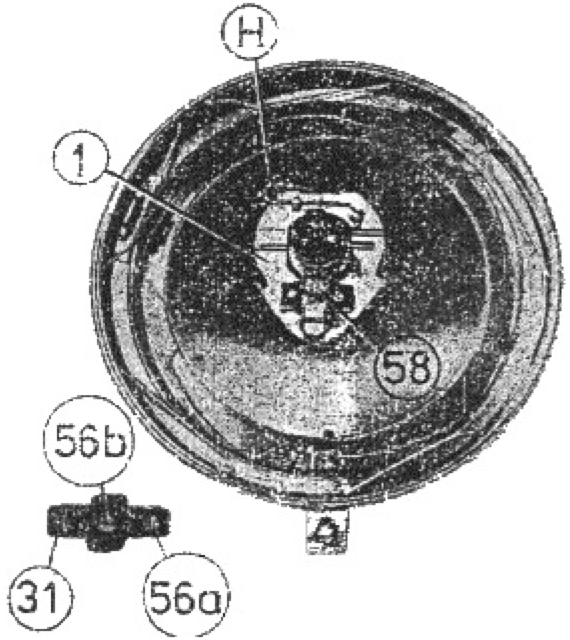


Fig. 157. Front part of the headlamp with lamp holder

In case of insufficient illumination of the carriageway the contact points of the lead to the twin-filament bulb must be checked and, if required, carefully cleaned.

DIRTY CONTACTS CAUSE A CONSIDERABLE VOLTAGE DROP!

In older vehicles, the reflector may haue become doll. In the interest of your own safety it is necessary to replace it by a new one. The diffusing screen and the reflector are glued together, they cannot be replaced individually.

A very important work is the adjustment of the headlamp. It serves for the safety of the other road users and for your safety.

After loosening the fastening nut (1), the headlamp can be adjusted.

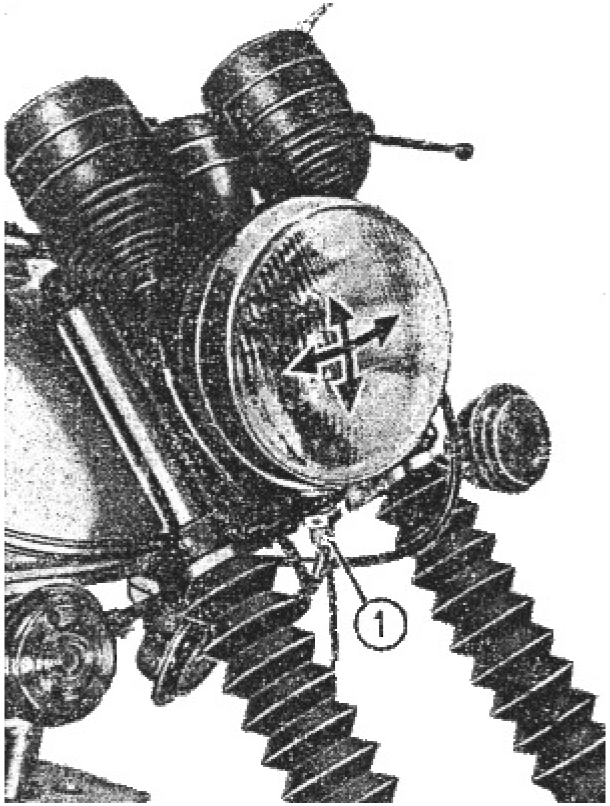


Fig. 158. Adjusting the headlamp

The correct adjustment of tue headlamp passing beam is carried out according to the scheme given in Fig. 159.

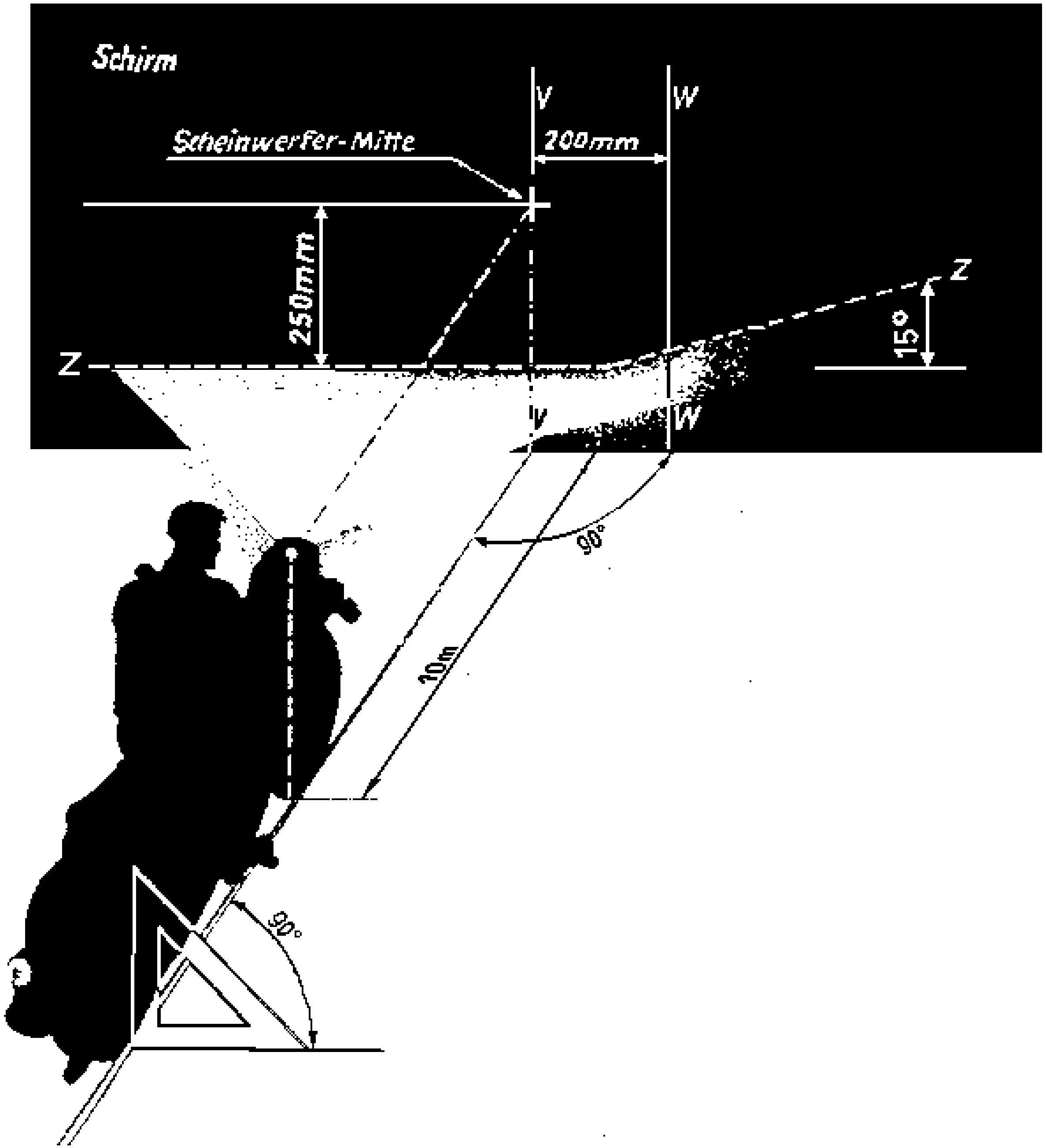


Fig. 159. Headlamp adjustment scheme

Scheinwerfer-Mitte	centre of the headlamp
Schirm	screen

The vehicle is placed according to the scheme and loaded so that the main operating conditions are represented. Consequently, the spring-loaded suspension units are set to "hard" or "soft".

The bright-dark boundary must exactly coincide with the Z-line and the angle must be between the lines V-V and W-W. When the headlamp has been adjusted according to these instructions, then the bright-dark boundary will have the correct height in all operating and load conditions.

6.5.2. Combined Stop, Tail, Number-plate Lighting Fitting

zum nächsten Punkt ; Index

The stop, tail and number-plate lighting fitting is provided with ball lamps which are kept in holders with bayonet catch, as is generally accepted.

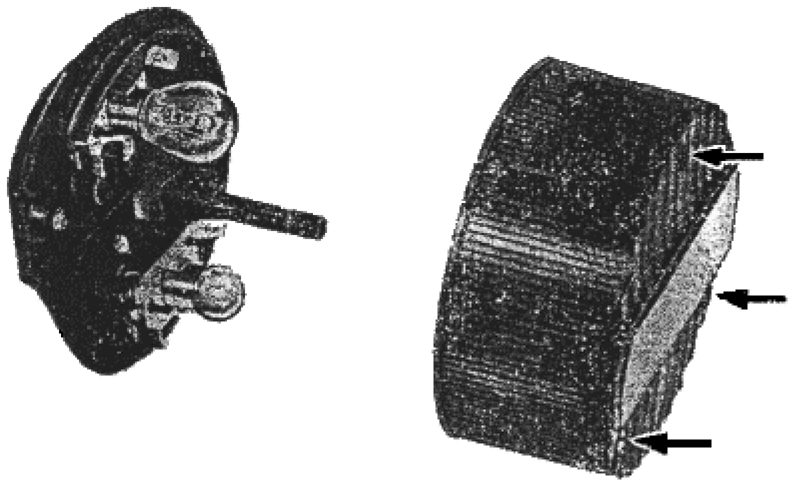


Fig. 160. Combined stop, tail, number-plate lighting fitting, interior (partly sectional view)

The electric bulbs and cable connections are accessible after turning out the fastening screws (arrows) and removing the light emitting pane.

Firm, non-corroded connections are also of importance to the combined stop, tail and number-plate lighting fitting. When mounting, after placing the packing, screw the light emitting pane in such a way that the combined lighting fitting is protected from moisture but that the light emitting pane does not break.

6.5.3. Ignition-light Switch

zum nächsten Punkt ; Index

The ignition-light switch is the main switch of the electrical system of the vehicle.

It is used for switching (see Fig. 161 and wiring diagram. Fig. 170)

0. All loads switched off,
   ignition key can be withdrawn

1. Parking position at night (town light)
   ignition key can be withdrawn

2. Operation during day-time (ignition switched on, giving a push with the 2nd speed engaged; this is possible when the battery is discharged or without battery)
   ignition key cannot be withdrawn

3. Ignition switched on, town light lights,
   ignition key cannot be withdrawn

4. Riding at night, ignition and main light switched on
   ignition key cannot be withdrawn

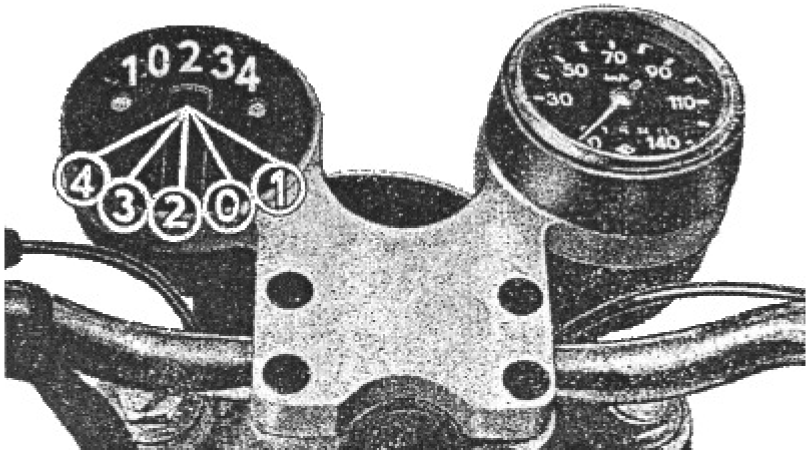


Fig. 161. Switch positions of the ignition-light switch

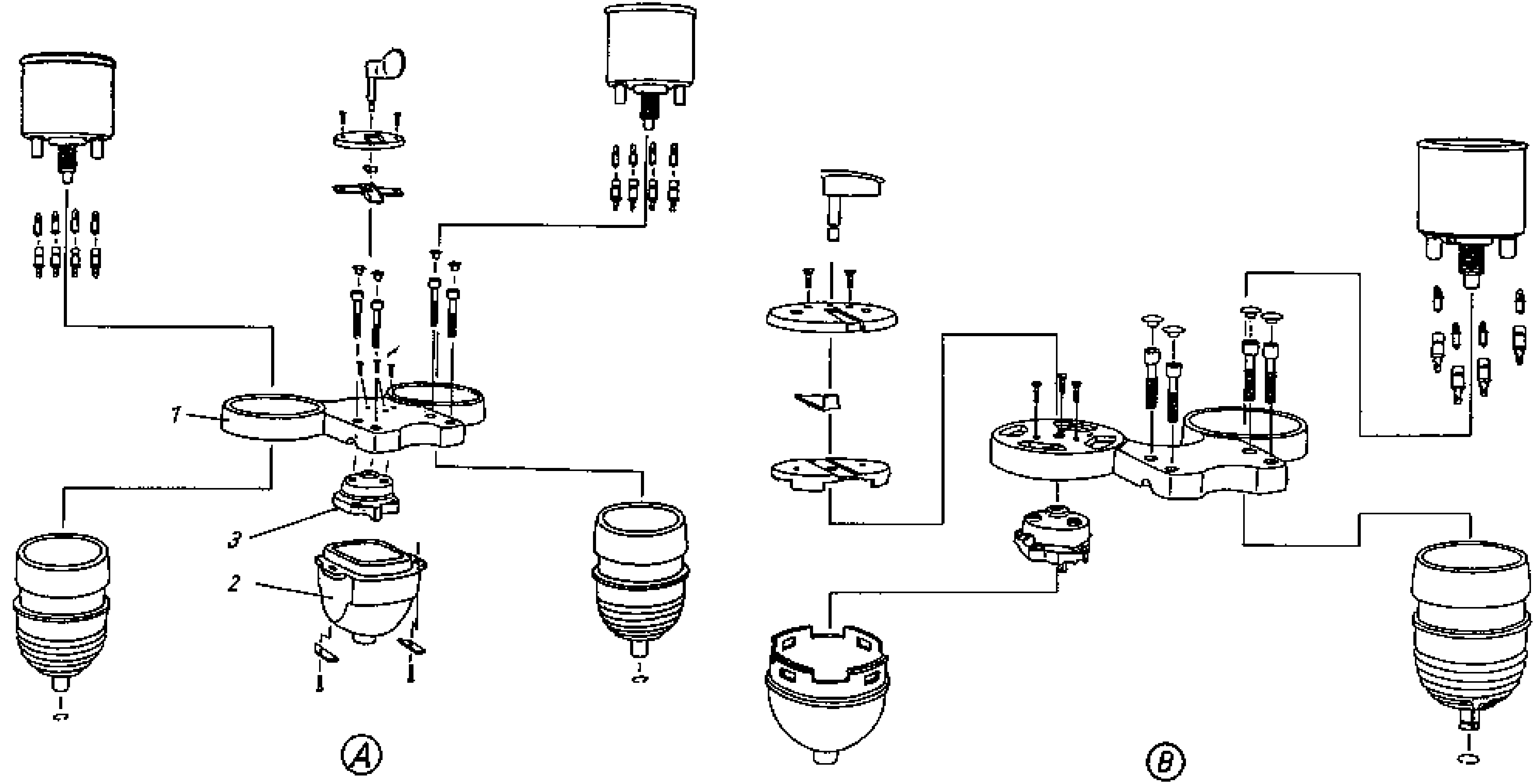


Fig. 162. Exploded view of the instrument holders

A. Deluxe model
B. Standard design

Demounting and mounting the ignition-light switch is shown in Fig. 162. In the deluxe model (A in Fig. 162), the instrument (handle-bar) holder (1) must be unscrewed from the upper clamping head. Then, the protective cap (2) and the ignition-light switch (3) are accessible.

In order to be in a position to put the cables on the correct tags after a replacement of the ignition-light switch, the individual connections are once more clearly represented in Fig. 163.

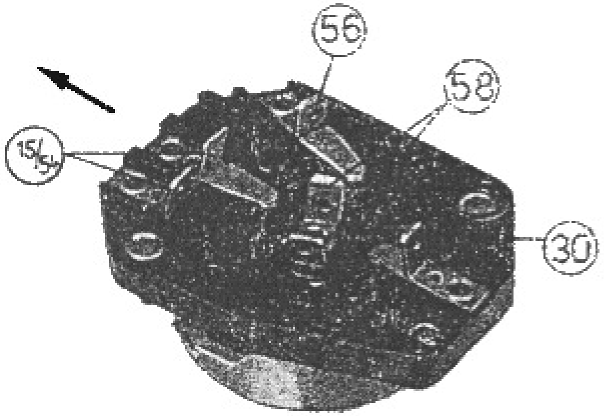


Fig. 163. Connections of the ignition-light switch

The ignition-light switch shown in Fig. 163 cannot be used for older MZ types because the former switch position (5) is no longer switched electrically. On the other hand, an ignition-light switch of the older types can also be used for the ETZ.

MOUNTING INSTRUCTION:

The arrow in Fig. 163 shows the mounting position of the ignition-light switch in travel direction, connections downward.

6.5.4. Switch Combination at the Handle-Bars

zum nächsten Punkt ; Index

The switch combination at the left-hand handle-bar contains the following switches (Fig. 164):

1. Dimmer switch
2. Switch for direction indicator
   (L) flashing-light left-hand side
   (R) flashing-light right-hand side
3. Switch for horn
4. Switch for by-pass light signal

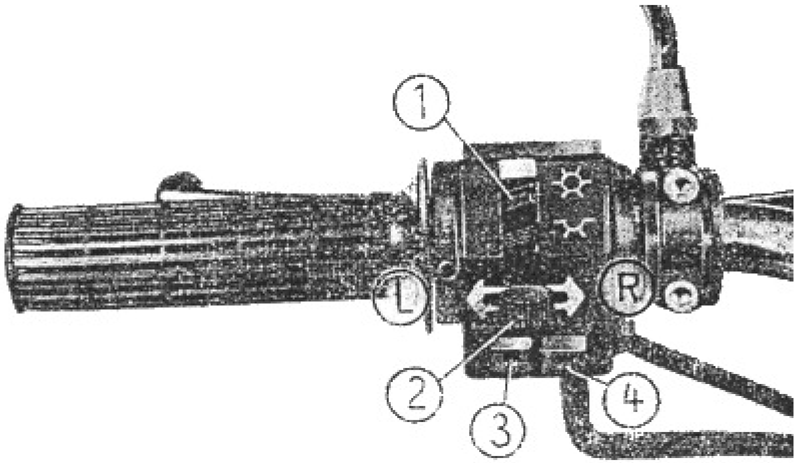


Fig. 164. Switch combination at the handle-bars

The individual switches are fastened in the casing by means of sheet metal screws (switch for direction indicator A and switch for horn B_1 and switch for by-pass light signal B_2) or by actuating slide and spring (dimmer switch C). The cables are soldered to the switches already by the manufacturer.

When fastening the combination switch to the handle-bars, install the thin cable strand **over** the handle-bars, the thick cable strand **under** the handle-bars. The two cable strands must be passed out of the switch downwards. They must not be squeezed.

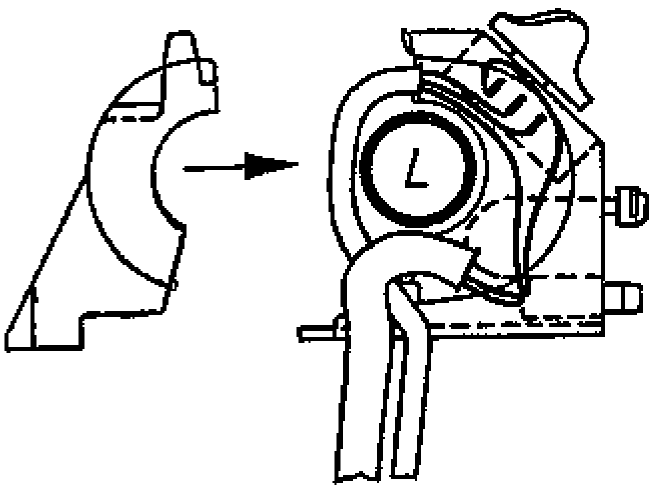


Fig. 165. Mounting the switch combination at the handle-bars

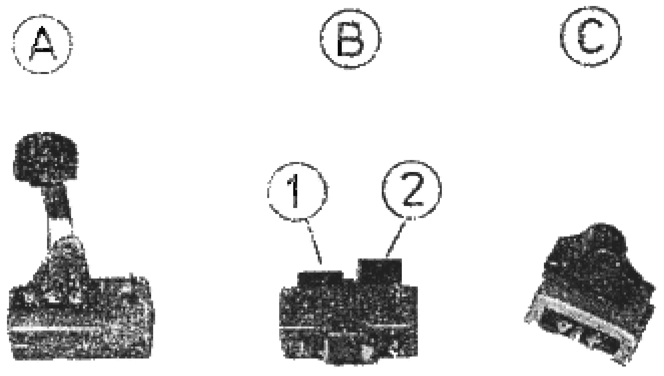


Fig. 166. Individual switches of the switch combination at the handle-bars

NOTICE!

The switch combination of the "Simson S 51" light motor-cycles cannot be used for the ETZ because different cables are soldered to the switches otherwise equal to those of MZ!

6.5.5. Stop-light Switch

zum nächsten Punkt ; Index

In the design with disk brake, two stop-light switches are installed. The front drum brake can also be provided with a stop-light switch which at the hand-brake lever corresponds to the switch of the disk-brake design.

For adjusting the stop-light switch, the plug-and-socket connection (2) is loosened and the check nut slackened back until the rear nut can be properly handled by means of an open-ended spanner. This nut is slackened back through a quarter of a revolution.

Then an assistant presses the brake pedal down until the brake shoes start sliding on the brake drum when the rear wheel is turned. The brake lever must be retained in this position and the adjusting screw turned until the stop light flashes up.

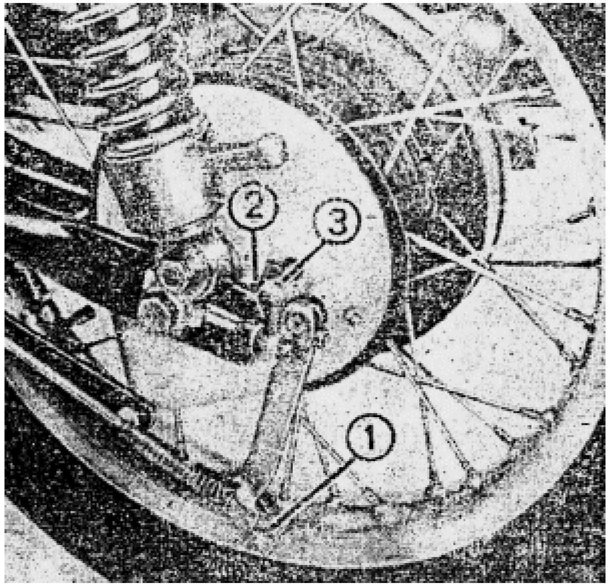


Fig. 167. Adjusting the rear wheel brake and the stop-light switch

1. Adjusting nut of the brake

For this work, the ignition must be switched on and the cable is to be connected. Subsequently, the two nuts must be tightened. The rear nut must be tightened very carefully because the insulating bush is a part of plastic. In this connection, the adjusting screw (3) must be secured against turning by means of a screw-driver.

When the adjusting range is insufficient, then the back rest must be removed and the contact spring at the cam spindle must be re-adjusted.

6.5.6. Flashing-light Direction Indicator System

zum nächsten Punkt ; Index

The ETZ has a 4-indicator flashing-light direction indication system provided with 21-watt ball lamps.

When the adjusting range is insufficient, then the back to be re-inserted. Other lamps, e.g. 15 watt, change the specified flashing frequency of 90 ± 30 periods/minute.

Direction indication is checked by a control lighting fitting (4 in Fig. 171).

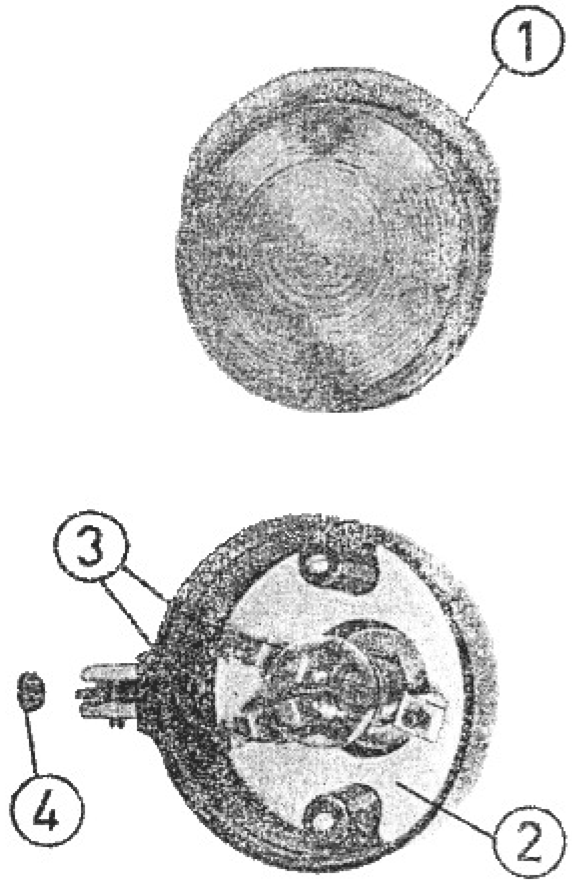


Fig. 168. Flashing indicator, front

1. Rim for checking the flashing function
2. Plastic reflector
3. Terminals
4. Packing

The two front flashing indicator diffusing screens are provided with a larger rim (1) than the two rear indicators. This rim is also intended to check the flashing-light direction indicator system.

The failure of one flashing indicator is indicated by an increased flashing frequency (>150 periods/minute) of the other flashing indicators.

The entire system is secured means of a 4-A fuse.

The flasher unit is elastically suspended with the connections downward at the battery holding cover.

NOTICE!

The line with positive potential arriving from the ignition lock is to be connected to terminal 49 of the flasher unit and the line arriving from the flasher switch with negative potential to terminal 49 a of the flasher unit.

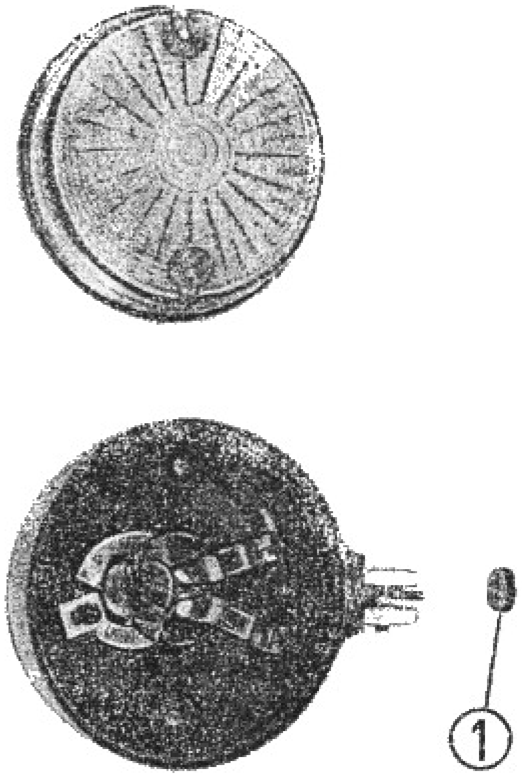


Fig. 169. Flashing indicator, rear

1. Packing

6.5.7. Horn

zum nächsten Punkt ; Index

The horn is fastened to the frame under the fuel tank.

Before the cylinder cover or the cylinder can be demounted, the horn must be unscrewed.

When, upon actuation of the pressure switch, the horn fails to produce the required sound level, then the feeder cables, their connections and the pressure switch must be checked for dirty points of contact. In this case, the applied voltage will be too low.

If this not the cause, then slightly turn the adjusting screw at the horn to the left or right by way of trial, until the sound will again be loud enough.

6.5.8. Wiring Diagram and Circuit Diagram

zum nächsten Punkt ; Index

For repairs in the various loads and the other electrical installation, the wiring diagram (Fig. 170) furnishes the required data on cable run and cable colours.

The circuit diagram is included in this Repair Manual in the form of a folder.

NOTICE!

On the enclosed, coloured circuit diagram, in the 12-V system, the cable represented black from the external

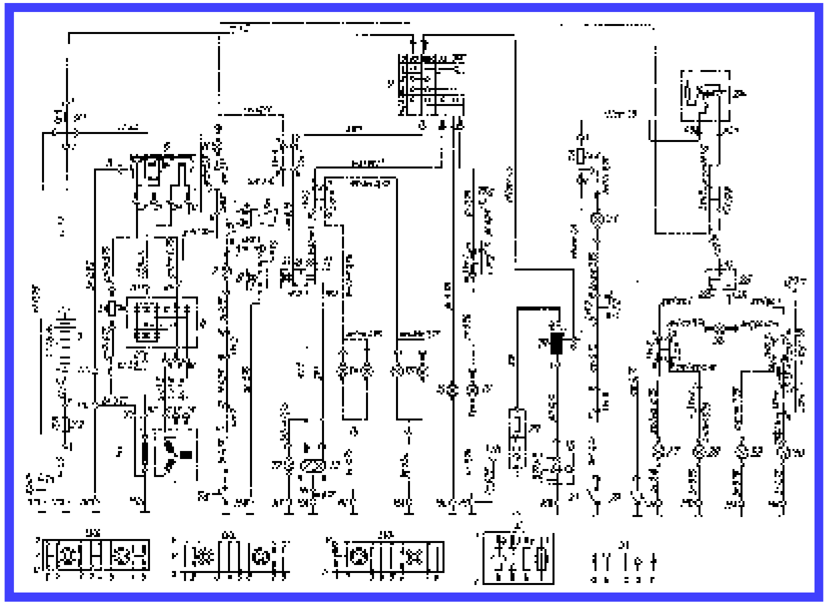


Fig. 170. Wiring diagram

Legend for Fig. 170, wiring diagram

1	Battery
1a	Capacitor
2	Ignition-light switch
3	Dynamo
4	Rectifier
5	Regulator
6	Charging control lighting fitting (in the standard design also for checking the direction indicators)
7	Idle gear control lamp (only in deluxe model)
7a	Switch for idle gear control lamp
8	Switch for Korn (switch combination at the handle-bars)
9	Horn
10	Switch for by-pass light signal (switch combination at the handle-bars)
11	Dimmer switch (switch combination at the handle-bars)
12	Control lamp for high headlight beam

13 Lamp for headlamp
 a high beam
 b passing beam
14 Illumination for revolution counter scale (only in deluxe model)
15 Illumination for speedometer scale
16 Town light (parking light, in headlamp)
17 Tail light and number-plate illumination (in the combined stop, tail and number-plate lighting fitting, bottom)
17a not applicable to ETZ 125/150
17b not applicable to ETZ 125/150
18 Ignition coil
19 Contact breaker of the ignition System
20 Sparking plug with screened terminal
21 Stop-light switch - front wheel brake
22 Stop-light switch - rear wheel brake
23 Stop light (in the tail lighting fitting, top)
24 Flasher unit
25 Switch for direction indication (switch combination at the handle-bars)
26 Control lamp for direction indication (only deluxe mode)
27 Flashing-light direction indicator, front left
28 Flashing-light direction indicator, rear left
29 Flashing-light direction indicator, front right
30 Flashing-light direction indicator, rear right
30a not applicable to ETZ 125/150
31 Circuit symbols for:
 a Flat plug
 b Sleeve for flat plug-in connection or socket
 c Earth
 d Detachable connection (screw, terminal)
 e Fixed connection
LVR Line connector in headlamp, right-hand side
 o top
 u bottom

- v front
- x occupied connection

LVL Line connector in headlamp, left-band side

- o top
- u bottom
- v front
- x occupied connection,

LVF Line connector at cycle parts, on top of the filter housing

- v front
- h rear
- x occupied connection

Si Fuse box

- l left
- r right

MA Earth point of headlamp
MB Earth point of stop, tail, number-plate lighting fltting
ML Earth of lamp for headlamp
MC Earth point of vehicle (at line connector at cycle parts)
MD Earth point of dynarno
MT Earth point of speedometer

Cable colours

German abbreviation	Meaning	German abbreviation	Meaning
br	brown	sw/rt	black-red
rt/sw	red-black	sw/bl	black-blue
sw	black	sw/gn	black-green
sw/ws	black-white	ws	white
ws/sw	white-black	gn	green
gr	grey	gn/bl	green-blue
gn/rt	green-red	bl/ws	blue-White
bl	blue	rt/ge	red-yellow

ge	yellow	br/sw	brown-black
rt	red		

[1]) Dash-dotted conductors are only present in the standard design
[2]) Dashed conductors are only present in the deluxe model

right-hand connection of the line connector to the stop light in the motor-cycle is installed in **brown/black** and the cable represented **red** between regulator and rectifier is installed in **red/yellow** colour (see also wiring diagram, Fig. 170).

6.6. Instruments and Indicator Lamps

zum nächsten Punkt ; Index

The arrangement of the instruments is shown in Fig. 162. The standard design of the ETZ is provided only with a speedometer (at the right-hand side in the instrument holder).

The deluxe model possesses in addition to the speedometer, also arranged at the right-hand side, a mechanically driven revolution counter arranged at the left-hand side (see Fig. 171).

The arrangement and meaning of the indicator lamps is shown in Fig. 171. About wiring and connection with other electrical devices, the necessary information is given in the wiring diagram (Fig. 170).

Speedometer and revolution counter are illuminated when riding at night. For this purpose, the lamps designated by (3) in Fig. 172 are used which receive earth via the flat plug-in connection (4). The function of the lamps identified by (1) is shown in Fig. 171. The

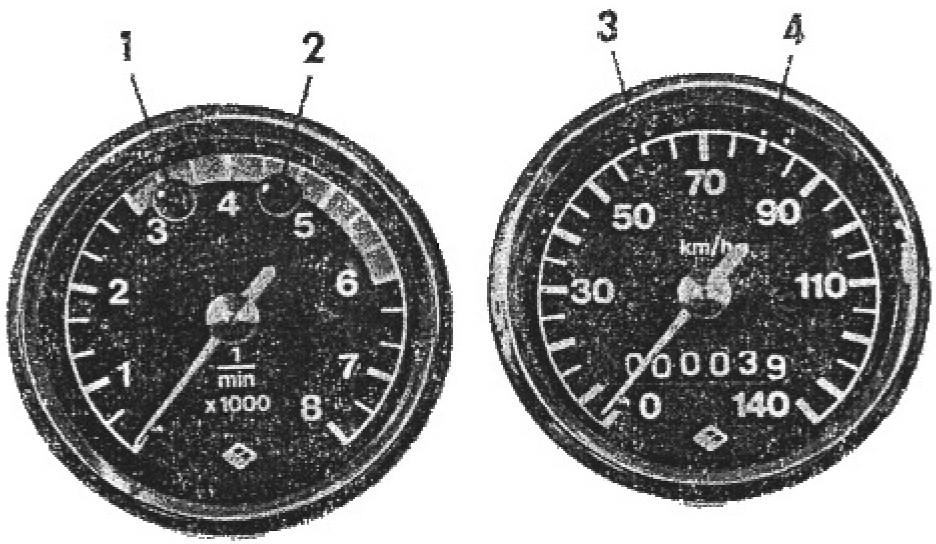


Fig. 171. Arrangement of the indicator lamps

1. Idle gear indication, yellow (only deluxe model)
2. Control lamp for dynamo, red (only deluxe model)
3. High-beam head-light indicator, blue
4. Control of the direction indicators, green
   (in the standard design it is also the control lamp for the dynamo)

missing electrical potential is fed to the control lamps (1) via the flat plug-in connections (2).

The removal of the lamps from the instruments is possible when the flat plugs have been withdrawn from the vertical connections of the lamps. Then, the lamps can easily be drawn out of the instrument housing.

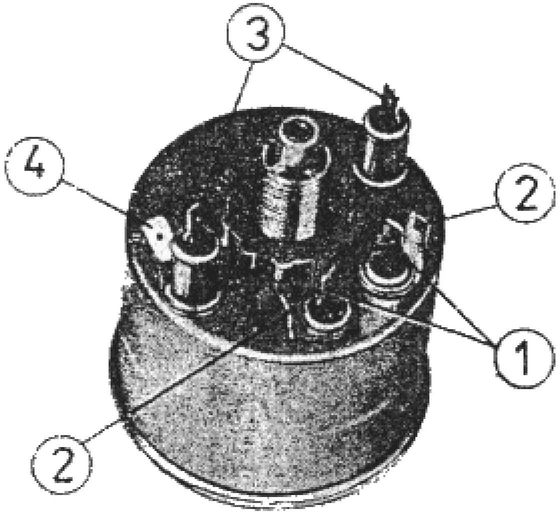


Fig. 172. Arrangement of the lamps in the instruments

7. Induction System

7.1. Description and Function of the System

zum nächsten Punkt ; Index

The entire induction equipment is an integrated system which is mated with the engine to an optimum degree. Any change in this system will impair output, fuel consumption, rate of wear, etc.

The induction system starts with the hole arranged under the regulator and ends with the inlet port of the cylinder. There should be not point in the whole system where air can be drawn in additionally to the holes provided for this purpose.

The air and the fuel-air mixture from the carburetter must pass through the following path in order to get into the crankcase:

Air is sucked up through opening (A) of the intake pipe (1), see Fig. 174. The intake pipe serves for silencing and air stilling.

After leaving the intake pipe, the air flows back into the frame carrier and enters the air filter housing tightly screwed to the frame tube (L in Fig. 173).

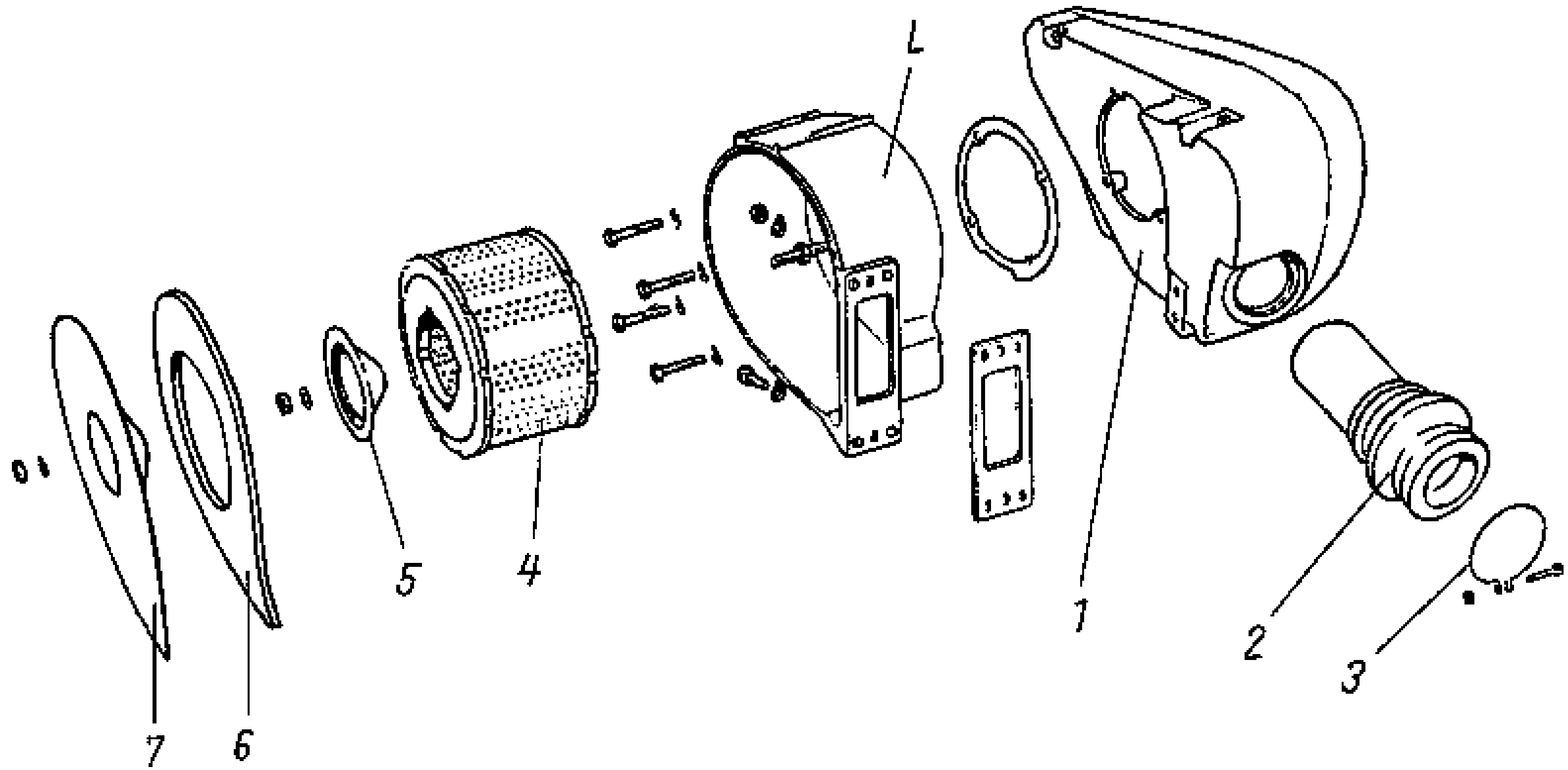


Fig. 173. Intake silencer and air filter

When passing through the air filter, the air is cleaned. The dust particles contained in the air adhere to the filter. The pressure differences caused by intake vibrations are neutralised to a high degree in the intake silencer compartment (1).

Then the air is drawn through the connecting piece (2), which is fastened to the carburetter by the clamping ring (3), to the carburetter.

In the carburetter, the incoming air is mixed with the atomised fuel in a certain ratio. This fuel-air mixture then passes through the intake port into the crankcase of the engine casing.

7.1.1. Air Filter

zum nächsten Punkt ; Index

For the ETZ, a dry air filter is used. The air filter (4) is arranged in the air filter housing.

It is centred at once face in the engine casing and at the other face by a cup (5) which is guided by and fastened on a threaded bolt (Fig. 173).

In order that the filter is properly sealed at its two faces, the cup (5) and the cover (7) must be screwed together in such a way that the air filter is firmly seated and the packing (6) can fulfil its function.

The air filter is accesible after removing the battery. The dust is deposited on the external surface of the filter. This should be observed in cleaning. The dry air filter should be carefully tapped for cleaning or brushed with a dry and clean hair brush.

7.1.2. Intake Silencer

zum nächsten Punkt ; Index

The intake silencer consists of two light-alloy castings which are screwed together so that they are non-detachable, thus forming the housing.

The air filter housing (L) is attached to this silencer housing.

The noise suppression compartment (1) serves for keeping the loudness level of the intake noise at the permissible value and also as a reservoir for the air required by the engine for combustion.

The intake silencer housing is connected to the frame by means of three screws.

The induction hose (1 in Fig. 174), which also serves for silencing, is fastened to the rear end of the frame carrier directly in the opening in the sheet-metal with the help of a groove in the rubber. A lug cast on the front end of the hose (H) retains it in the opening (Ö) of the frame carrier.

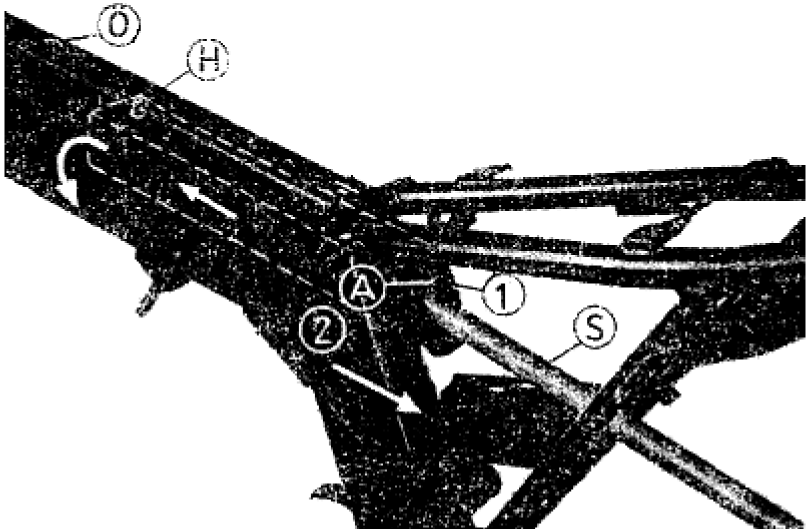


Fig. 174. Mounting the intake pipe

The induction hose can be replaced when the induction system, the rear wheel mudguard and the rear wheel have been removed.

A broom stick (S) or another wooden stick facilitates the induction of the lug (H) into the opening (Ö).

7.1.3. Connecting Piece to Carburetter

zum nächsten Punkt ; Index

The connecting piece is a rubber moulding which establishes the connection between intake silencer and carburetter. Care should be takem to see to it that the wall of the hole in the intake silencer housing properly fits in the groove in the connecting piece provided for this purpose, and that the other end of the connecting piece is properly connected with the carburetter by means of a clamping ring.

The connecting piece must be inspected, from time to time, for porous parts especially within the portion of the folds.

7.1.4. Carburetter

zum nächsten Punkt ; Index

For the types ETZ 125/150, BVF carburetters of type 22 or 24 N 2 are used. It is a carburetter with starting device.

7.1.4.1. Design and Function of the Carburetter

zum nächsten Punkt ; Index

The carburetter consists of two systems. To familiarise yourself properly with their design and function, it is thought to be helpful to explain each system separately.

1. Cold starting device

As the name of this system already implies, it is incorporated to facilitate the starting of the engine from cold.

The starting device is shown in Fig. 175 (driving position, lever for starting carburetter at the handlebars contacts the stop in forward direction) and in Fig. 177 (cold) starting, lever for starting carburetter at the handle-bars is drawn in the direction of the driver).

In the driving position of the lever for the starting carburetter at the handle-bars, the packing (2) at the starter piston (1) must completely close the starter mixing tube (3).

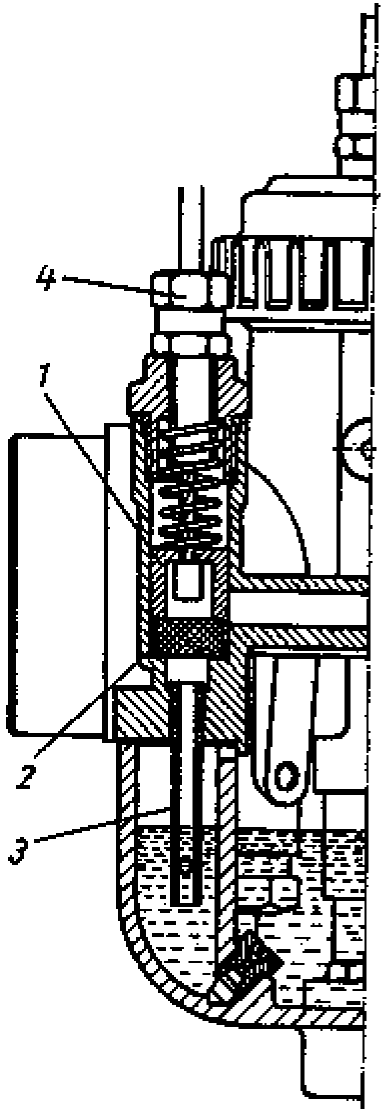


Fig. 175. Starter piston closed (driving position)

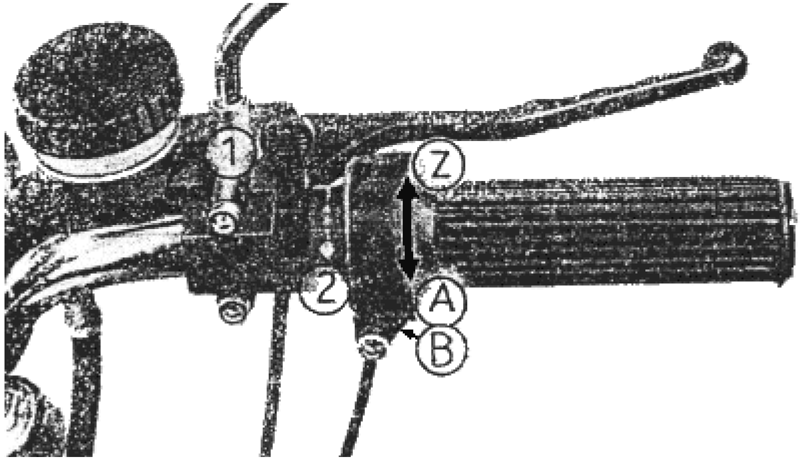


Fig. 176. Lever for starting carburetter

1. Starting device closed
2. Starting device switched on

Z. Throttle twist-grip OFF
A. Throttle twist-grip ON (full load)
B. Friction brake throttle twist-grip, adjusting screw

The cable control set screw (4) must be adjusted in such a way that a clearance of about 1 mm is existing between cable control sheath and set screw.

When the lever for the starting carburetter at the handle-bars is moved into cold start position (lever is drawn towards the driver), then the starten piston with packing is raised and, consequently, the upper opening of the starter mixing tube (A in Fig. 177) is released.

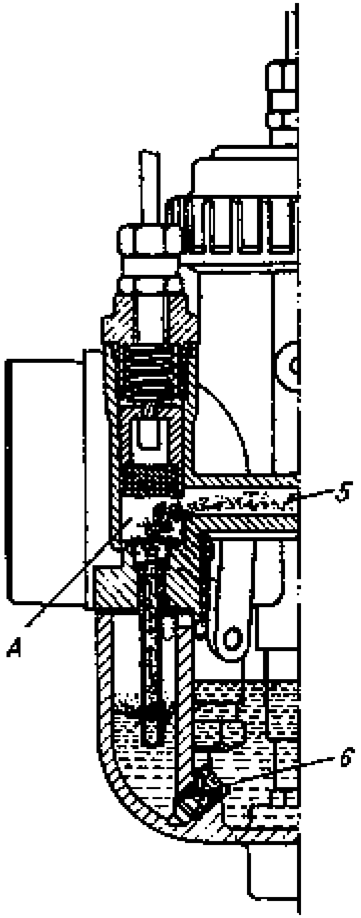


Fig. 177. Starter piston raised (cold start)

The fuel in the starter mixing tube is sucked up when starting the engine and conducted through the starter duct (5 in Fig. 177) which ends in the intake duct after the throttle valve.

In order to have the underpressure required for cold starting in the starting system, the throttle valve must be in the no-load position.

The starting device will be ineffective when, in starting the engine, the throttle valve is moved beyond and above the no-load system!

The lower opening of the starter mixing tube ends in a separate compartment, the starter duct, which is connected with the compartment for the central float through the starter jet (6 in Fig. 177).

The hole of the starter jet is designed in such a way that, after sucking up the amount of fuel given in the starter mixing tube, only such an amount of fuel is allowed to be fed that the engine, with readily drawn starter lever, can just cope with the fed too rich mixture.

The fuel required for starting is pre-mixed in the starter duct.

The air required is sucked up through a recess in the top edge of the partition wall from the compartment for the central float. This compartment is ventilated through a hole in the carburetter casing.

2. Carburetter

The fuel flows through the float needle valve (10 in Fig. 178) into the float chamber. When the fuel level has reached a certain heigth, then the float needle valve is closed by a sheet-metal nose (A in Fig. 183) which is arranged at the holder of the float.

When the engine is running, the partial load needle is drawn out of the needle jet more or less (2) by accelerating and, consequently, the throttle valve is raised for the same distance. The air sucked up by the engine passes through the intake duct of the carburetter and past the atomising insert. Consequently, the fuel is sucked up through the main jet and needle jet to the intake duct which is at a higher level.

By the atomiser (11 in Fig. 178), the fuel is atomised and mixed with the air flowing through. This ignitable fuel-air mixture is then fed to the engine.

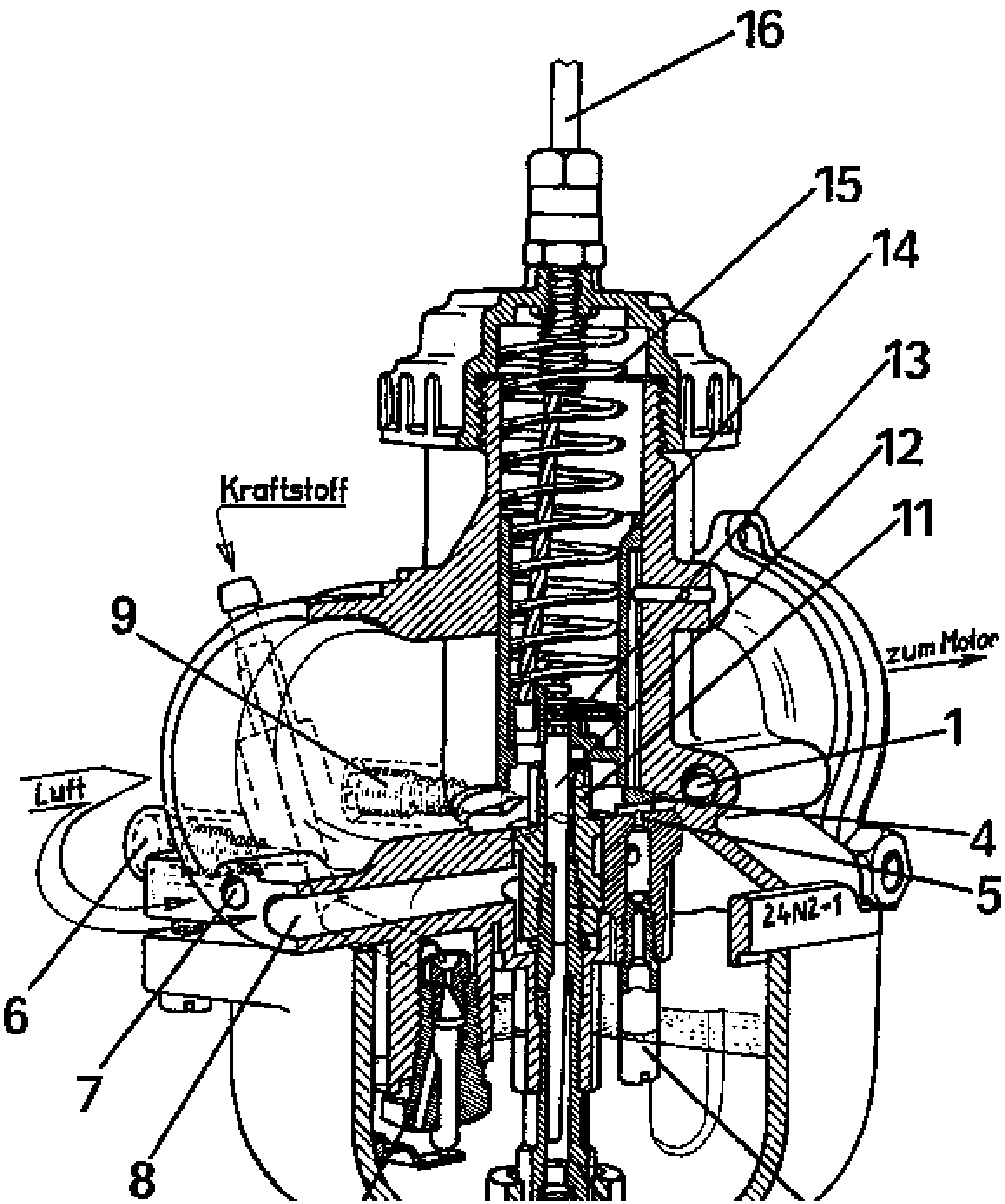
For an ignitable mixture for slow-running, the slow-running jet and the specified adjustment of the slow-running air screw are responsible.

The needle position, i.e. the notch which the partial load needle is suspended, is decisive for the correct ratio of mixing between fuel and air in the partial load range.

Apart from fixing the partial load needle, the needle holder (13) has the task of guiding the needle (upper plate of the needle holder).

For setting the needle, the lower plate (A) of the needle holder is decisive (Fig. 179).

The needle holder (13) lies flat on the bottom of the throttle valve (14). The latter, which is axially displaceable in its guide, is pressed into the initial position (slow-running position) by a spring which is supported by the screw cap. The spring force acts against the cable control force (see Fig. 178).


16
15
14
13
12
11
Kraftstoff
9
zum Motor
1
Luft
4
5
24N2-1
6
7
8

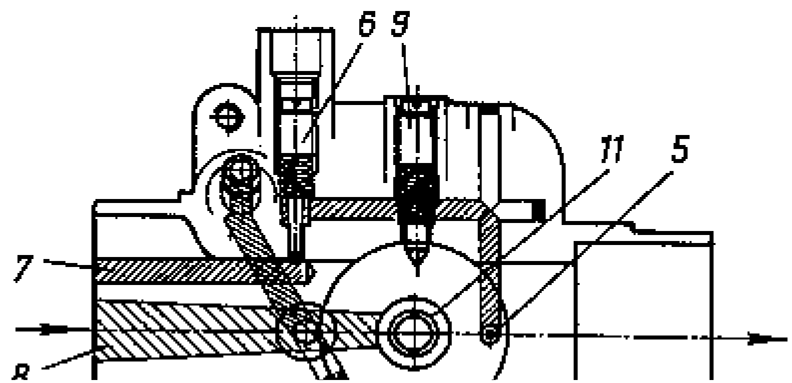

6
9
11
5
7

Fig. 178. Carburetter BVF 22 N 2 and 24 N 2 sectional view

1. Starter duct
2. Needle jet with main jet
3. Slow-running jet
4. Slow-running duct
5. Idling bore
6. Slow-running air screw
7. Slow-running air hole
8. Compensating air duct
9. Valve stop screw
10. Float needle valve
11. Atomiser
12. Partial load needle
13. Needle holder
14. Throttle valve
15. Spring for throttle valve
16. Cable control for throttle valve

Kraftstoff	fuel
zum Motor	to engine
Luft	air

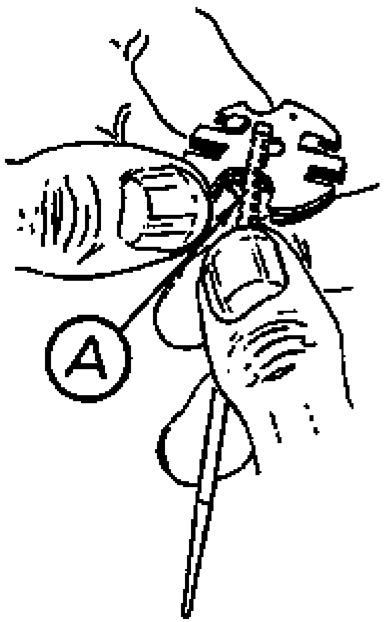


Fig. 179. Partial load needle with needle holder

7.1.4.2. Fuel Level - Basic Setting

zum nächsten Punkt ; Index

For combustion in the engine, an ignitable fuel-air mixture in the ratio of 1:15 is required (mean value).

When this ratio is changed, e.g. by feeding more air, (1:18), the mixture becomes too lean.

When the proportion of air is lower, e. g. 1:13, the mixture is too rich and, thus, not readily ignitable.

The fuel level to be kept constant in the float chamber is regulated by the float needle valve and the float.

The setting of the fuel level is an essential contribution to the formation of this fuel-air mixture.

When the fuel level is set too high this means the formation of a too rich mixture; when it is too low, the mixture is lean.

This shows that the basic setting of the fuel level is of great importance.

The fuel level can be checked in the vehicle. Pre-conditions are a mechanically perfect carburetter (faults such as a sticking float needle valve, defective float, etc. must be removed before testing), a full fuel tank, a clean serviceable fuel shut-off rock, and a test float chamber which you have to prepare yourself. For this purpose, a float chamber that fits the carburetter must be provided with an opening of 20 mm x 20 mm into which a Piacryl disk, about 2 mm in thickness, is glued with a fuelresistant synthetic resin glue.

In the carburetters 22 N 2 and 24 N 2, the level of fuel in the float chamber, measured from the **sealing surface of the float chamber**, is 12 ± 1 mm. Therefore, markings at 11 mm and 13 mm must be provided an the Piacryl disk.

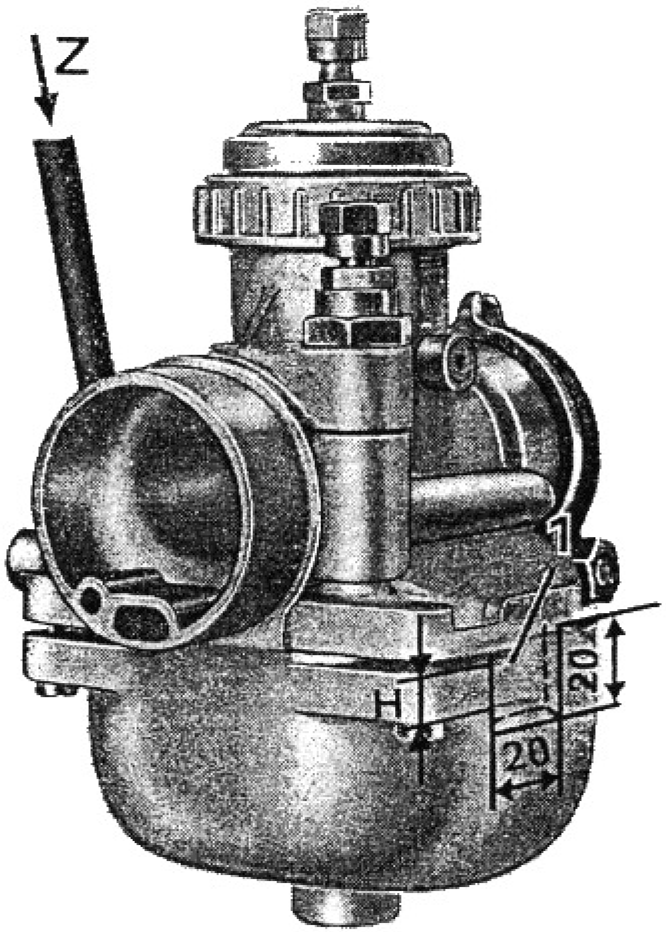


Fig. 180. Carburetter with test chamber

1. Piacryl disk
H. Measure of the height of the fuel level
Z. Feed of fuel

Before the fuel level is determined, the specified values for the float adjustment must be checked with the carburetter removed from the vehicle.

First, the correct float must be mounted. In contrast to the other BVF carburetters, the float of the carburetters 22/24 N 2 is provided with a boss (K) on the stop lever (B) as distinctive mark.

Then, using a vernier caliper, the dimension *e*1 and *e*2 between sealing surface of the carburetter casing and float have to be measured **without packing**; where

*e*1 = 30 mm:
  float needle valve closed, actuating tongue (A) is applied to the spring pin, spring pin not pressed in (see also Figs. 182 and 183)

*e*2 = 32 mm:
  float needle valve open, stop tongue (B) is applied to the carburetter casing

When the dimensions differ, then re-bend the hinged or the stop tongue (B).

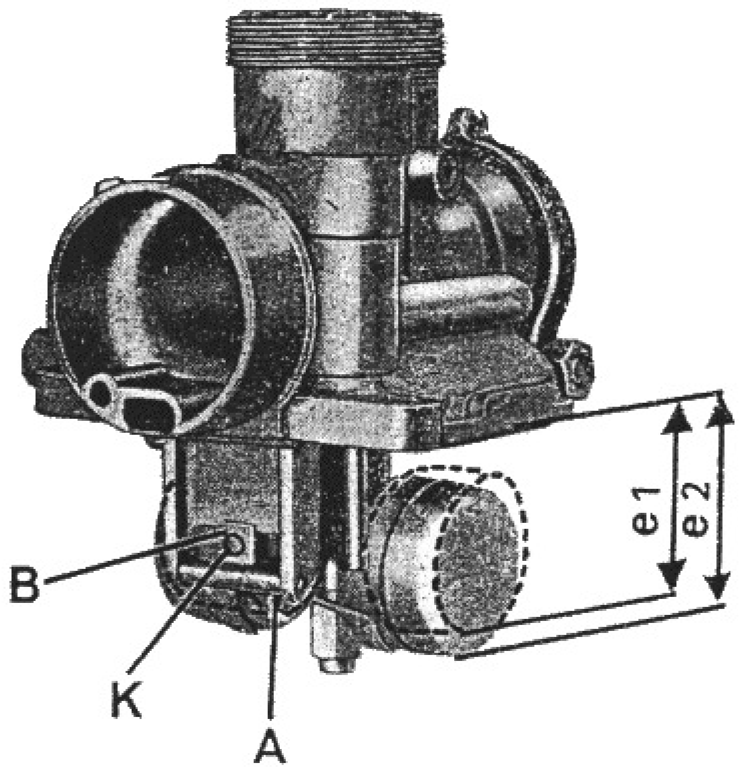


Fig. 181. Float setting - specified values

A. Actuating tongue for float needle valve
B. Stop tongue
K. Distinctive mark (boss)

NOTICE!

The float bodies must be parallel and at the same level with respect to each other.
The actuating tongue (A) must be parallel to the hinged lever.

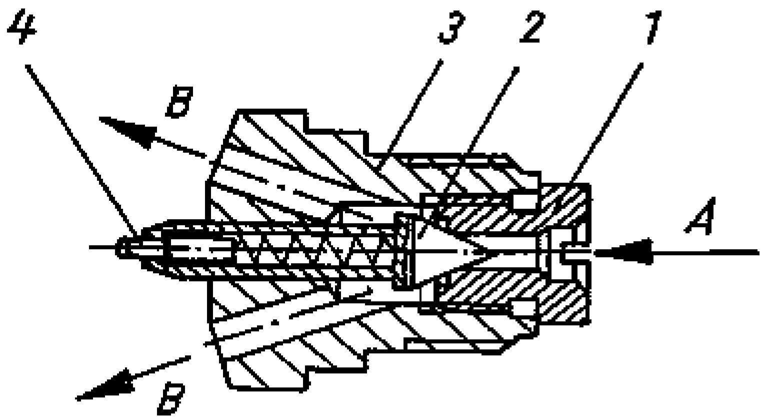


Fig. 182. Sectional view of float needle valve

1. Jet
2. Float needle, closed position
3. Valve body
4. Spring pin, not pressed in

A. Fuel feed
B. Fuel outled

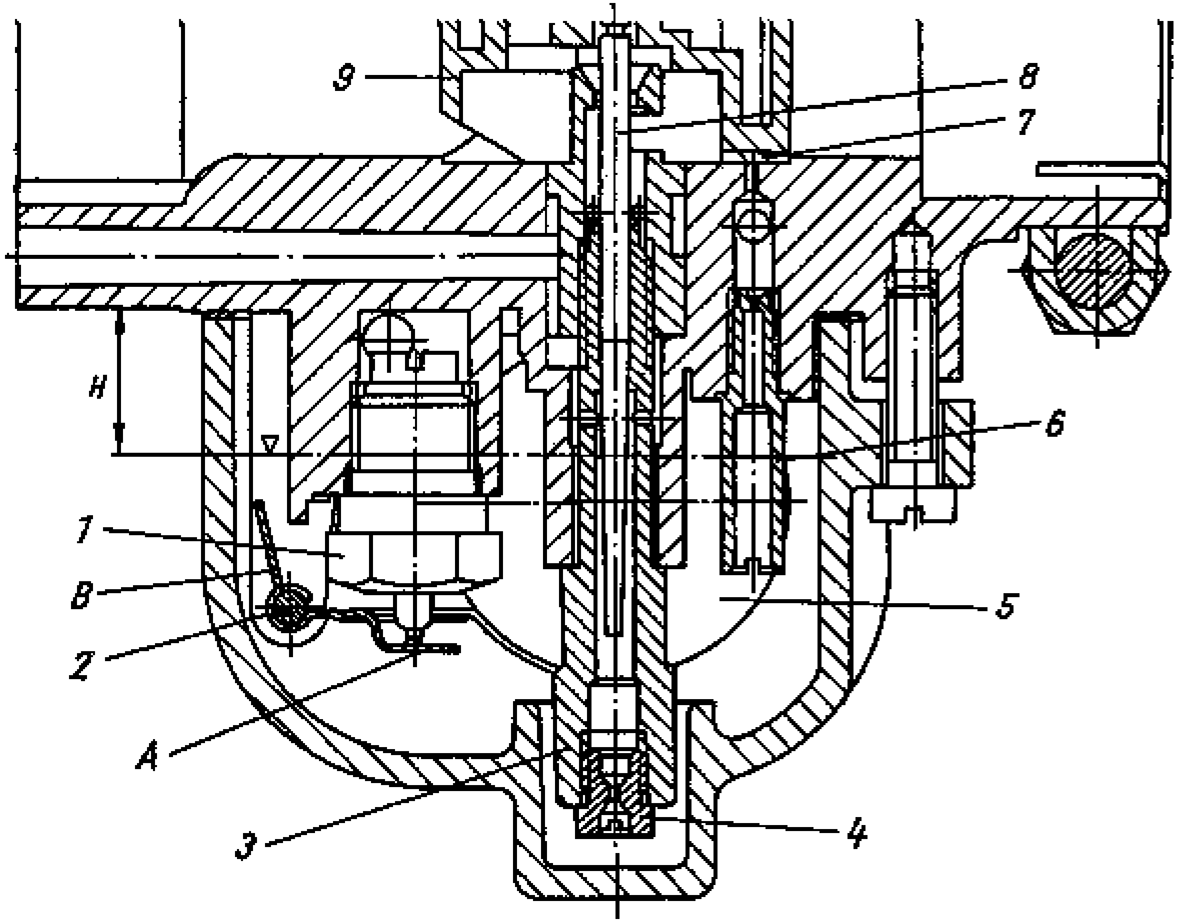


Fig. 183. Sectional view of carburetter lower part

1. Float needle valve (closed, spring pin not pressed in)
2. Float axle
3. Needle Jet
4. Main jet
5. Float, left half, at position of dimension *e*1
6. Slow-running jet
7. Slow-running duct in throttle valve
8. Partial load needle
9. Throttle valve

H. Measure of height of fuel level (12 ± 1 mm)

A. Actuating tongue of float needle valve
B. Stop tongue

For measuring and setting the fuel level, proceed as follows:

- Plug the test chamber with packing an the carburetter and retain it.
- Connect the fuel hose. In order to maintain the required fuel pressure, a fuel hose of the necessary length must be used. Keep the carburetter at the motor-cycle in a horizontal position and so deep that the fuel level in the fuel tank is actually 500 mm above the inlet socket at the carburetter.
- Open the fuel shut-off cock.
- When the fuel level is between the markings 11 mm and 13 mm, then the setting is correct.
- When the fuel level is not correct, close the fuel shut-off cock, remove the test chamber, pour the fuel into the fuel tank, and re-adjust the float.

  Fuel level H < 11 mm: increase *e*1
  H > 13 mm: reduce *e*1
- Recept the checking operation until the fuel level is within the tolerance range.
  NOTICE!
  The fuel level in the float chamber must remain constant for at least 3 min, otherwise there are still faults in the float needle valve or in the float.
- Fasten the original float - chamber and mount the carburetter.

7.1.4.3. Slow-running Adjustment

zum nächsten Punkt ; Index

In the interest of an optimum fuel consumption and the observance of the limit for the emission of noxious substances specified by legal regulations, the slow-running adjustment should be carried out with the help of measuring instruments for the analysis of the CO emission.

Pre-conditions for an optimum slow-running adjustment are:

- an engine that is mechanically in perfect condition;
- good sealing of the induction system and the carburetter connections between engine and induction system;
- proper air filter;
- correctly set advanced ignition and good condition of the ignition system;
- the engine must have operating temperature!

Since the probe of the measuring instrument must project at least 60 cm into the exhaust system, an adapter for attaching to the silencer is required. This adapter (Fig. 184) can be fastened to the silencer by means of a part of an air hose 2.75x18 having a width of about 100 mm.

At first an engine speed of 1,200 rpm must be regulated at the throttle stop screw of the carburetter. By slowly turning the slow-running air screw, the CO portion in the exhaust gas is set to 2.5 to 3.5 vol.%.

NOTICE!

> The legally specified maximum value of 4.5 vol.% must not be exceed. Adjust the slow-running air screw only within the specified limits (see "Technical Data", Section 1.).

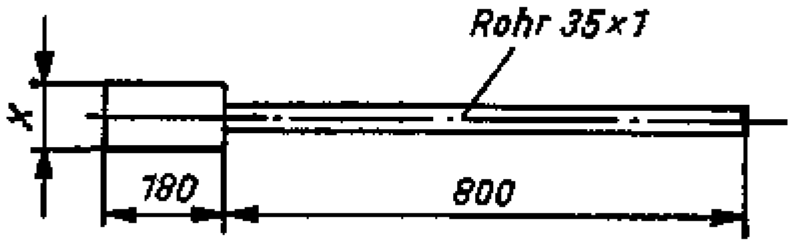


Fig. 184. Adapter for setting slow-running

x = 80.5 mm
Rohr pipe

After slow-running setting, adjust the slow-running speed by means of the valve stop screw in such a way that the engine can be subjected to gear-shifting without noise.

7.1.5. Intake Socket

zum nächsten Punkt ; Index

The intake socket is designed to fix the position of the carburetter and to form the connecting link between carburetter and intake port of the cylinder. It is fastened to the cylinder by means of hexagon-head screws.

To ensure that the heat of the cylinder is not transmitted to the carburetter, a plastic flange (in the 7.5 kW (10 hp) FRG design with intake part 16 mm in dia.) and two packings (on either side of the plastic flange) are placed between intake socket and cylinder.

7.2. Fault Finding Procedure

7.2.1. Too Lean Mixture

zum nächsten Punkt ; Index

Identification symptoms for too lean a fuel-air mixture are:

1. Heavy consumption of the electrodes of the sparking-plug.
2. Welding beads appear at the sparking-plug.
3. When riding in the range from half load to full load, the engine performance is too low.
4. The engine tends to stall.

Faults or damages which lead to the supply of too lean a mixture and their remedies:

1. Air filter not seated properly an the centring edge of the air filter casing.
   - Remove the air filter and properly fit it into the centring edge.
2. Air filter has been damaged due to negligence.
   - Replace the air filter by a new one.
3. Packings between air filter housing and intake silencer or between air filter housing and frame defective.
   - Replace the packings by new ones and properly tighten the screwed joints.
4. Packing between dir filter housing and cover missing or defective.
   - Fit or replace the packing.
5. Connecting piece to carburetter defective or porous or not properly seated in the hole of the intake silencer casing.
   - Replace the conneting piece by a new one or align it.
6. Intake socket porous.
   Replace the intake socket by a new one or, if possible, seal it with artificial resin.
7. Insulating flange cracked or porous; packings defective.
   - The parts involved must be replaced by new ones.
8. Insufficient fuel feed due to
   - contamined fuel-shut-off cock,
   - compressed rubber packing,
   - hardened or defective fuel feed pipe,
   - choked vent hole in tank cap.
   - Remove the fuel shut-off cock and carefully clean each part of it separately.
   - Replace the defective or hardened fuel feed pipe and the defective rubber packing by new parts.
   - Blow compressed air through the hole in the tank cap.
9. Partial load needle is suspended too deep
   - Supspend the partial load needle at a higher level, for one or several notches, as required to obtain a normal mixing ratio.
10. The float is deformed - the float needle valve is insufficiently opened.
    - Set the correct fuel level in the float chamber.
11. Float needle sticking.
    - Polish the shaft of the float needle and the through bores of the valve body.
    - Check the valve for foreign particles.
    - Replace float needle and jet by new parts.

7.2.2. Too Rich Mixture

zum nächsten Punkt ; Index

Symptoms of faults associated with too rich a fuel-air mixture are as follows:

1. Engine fails to start readily.
2. Engine output drops with increasing temperature of the engine.
3. High fuel consumption.
4. Inclination to "four-stroking".
5. Sparking-plug of specified thermal value fouled.
6. Emission of heavy smoke visible with the engine at operating temperature.

Faults or damages which lead to the supply of too rich a mixture and their remedies:

1. Dry air filter too old (more than 10,000 km of road operation).
    - Replace the air filter by a new one.
2. The dry air filter is wet.
   Cause: air filter housing leaky - water has entered.
    - Allow, the air filter to dry or, what is to be preferred, replace it.
3. Partial load needle suspended at too high a level.
    - Suspend the partial load needle at a lower level, one or several notches deeper, until a normal mixing ratio is obtained.
4. Wear of needle jet and partial load needle (more than 20,000 km of road operation).
    - The two parts must be replaced by new ones.
5. Float needle valve leaky.
   Cause:
    1. Valve contaminated,
    2. Float needle worn.
    - Clean the float valve;
    - Mount a new float needle.

7.3. Oil dosing

zum nächsten Punkt ; Index

Fuel	Octane number 88 without oil admixture
Engine lubrication	High-quality two-stroke engine oil. The oil is kept in the oil reservoir (capacity about 1.3 l) under the intake muffler and is pumped through a Mikuni oil pump into the crankcase.
Actuation of the pump	by means of the throttle twist-grip
Range of operation	with one oil filling up to 1,600 km, depending on driving habit
Putting into operation	• fill the oil reservoir • open the bleeder screw for about 3 to 4 revolutions and only close it again when oil emerges free from air bubbles • fill about 2 l of fuel-oil mixture - ratio 50 : 1 - into the fuel tank and perform a trial ride of about 5 km • switch on the pump

Care and maintenance

Before any ride:	Check the oil level in the oil reservoir (oil level inspection eye and marking on lower part of stopper).
After every 2,500 km:	Check the cable control for wear and the oil lines for properly tight fit.
After every 5,000 km:	• Lubricate the actuating cable control. • Check the adjustment of the pump and re-adjust it, if required (Fig. 185).

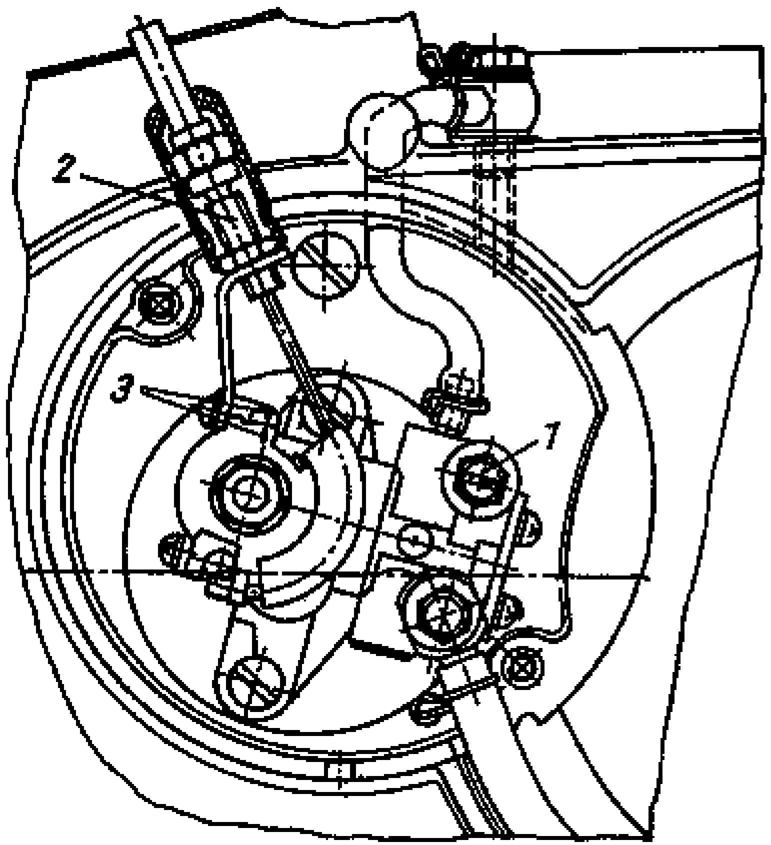


Fig. 185. Maintaining the dosing pump

1. Bleeder screw
2. Cable control adjusting screw
3. Markings of the setting point

If the markings **3 are not opposite each other**, then

1. Remove the idling speed fuel supply by screwing out the stop screw of the throttle valve;
2. Set the engine speed to 1,200 rpm by means of the throttle twist-grip;
3. operating adjusting screw 2, re-adjust the cable control until the markings coincide;
4. Set the idling speed to 1,200 rpm.

Repairs	• The oil pump is not designed for any repair. If necessary, have a new pump mounted. • The fastening screws have to be tightened uniformly with a maximum torque of 2.5 Nm in order that the fastening flange of the pump will not be distorted. • Before putting into operation a new pump, bleed it (1, Fig. 185) and adjust the pump newly.

Marking of the partial-load needles

From the beginning of the 4th quarter of 1984 the partial-load needles of all BVF motor-cycle carburetters have been marked no longer with letters and figures but by, turned-in grooves. This also applies to spare parts. At the same time, the partial-load needles are provided with a new designation which is coded in the marking.

Example:

	Partial-load needle	2,5	A	5	1	2
nominal size (shaft diameter in mm)		x				
shape of partial-load needle (position of the notches)			x			

number of notches (a)				x		
number of marking grooves (b)					x	
number of marking grooves (c)						x

6. Float is distorted - float needle valve remains open in an excessive position.
    - Set the correct fuel level in the float chamber.
7. Main jet too large.
    - Use another main jet with the same dimension marked on it (jets with the same nominal dimension difier by their tolerances).
8. Packing at starter piston defective.
    - Replace the packing by a new one.
9. Spring for starter piston has an insufficient pretension.
    - Replace the spring by a new one.
10. Sheath of the cable control for the starting device is without play; as a consequence, the starter piston cannot properly seal the starter mixing tube.
    - Adjust the cable control sheath so that a play of about 1 mm is ensured.

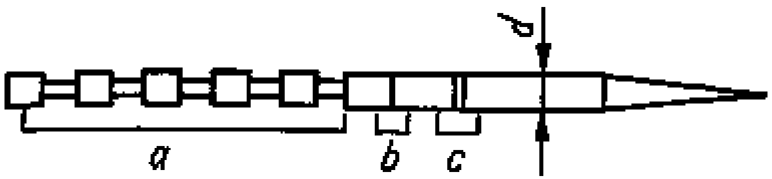


Fig. 186. New needle markings:

Marking old	Marking new
C3	2,5 A 511

C6	2,5 A 512
C8	2,5 A 513

8. Special Tools

zum nächsten Punkt ; Index

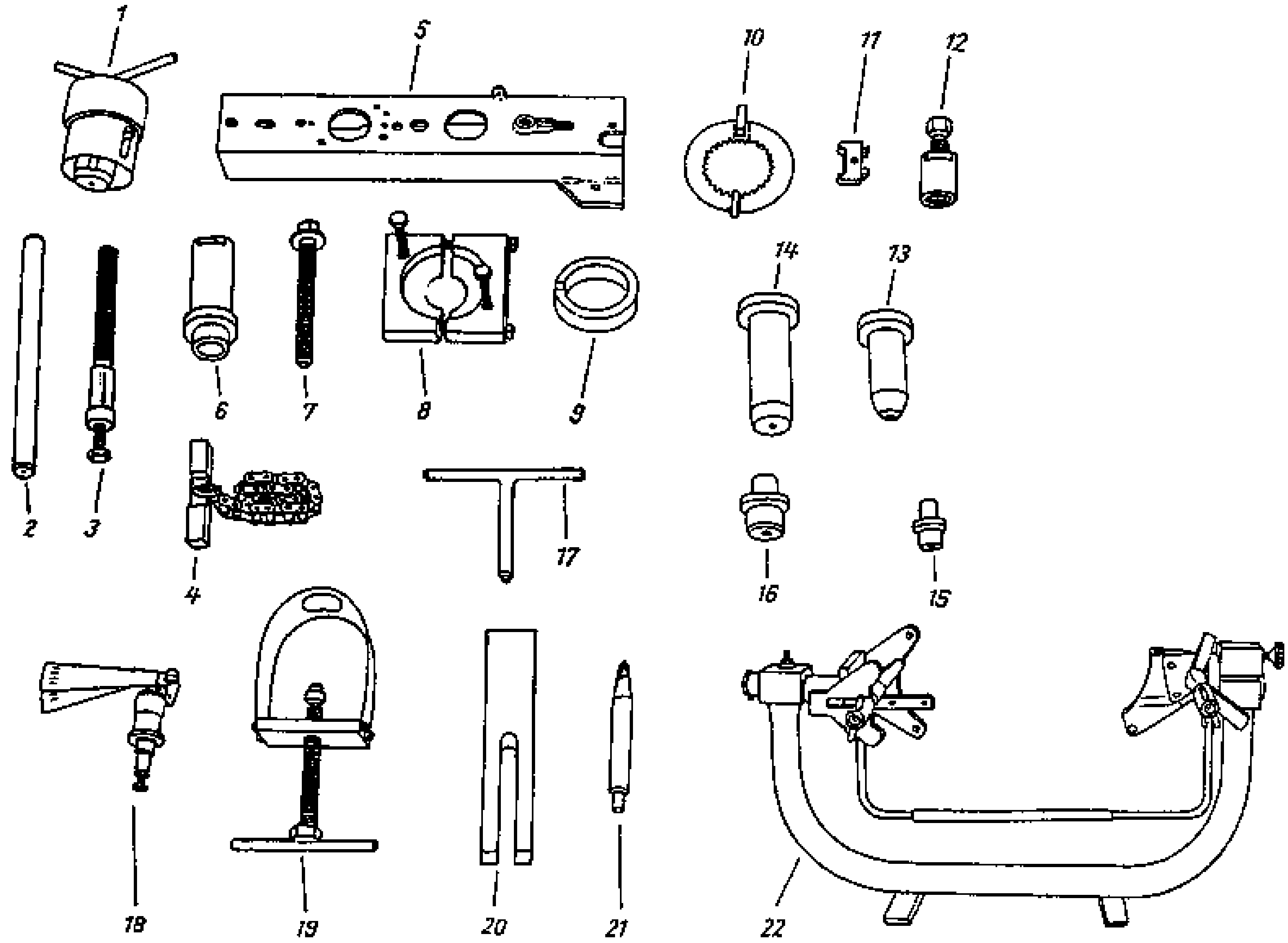


Fig. 187. Set of special tools for ETZ 125/150

8.1. List of Special Tools

zum nächsten Punkt ; Index

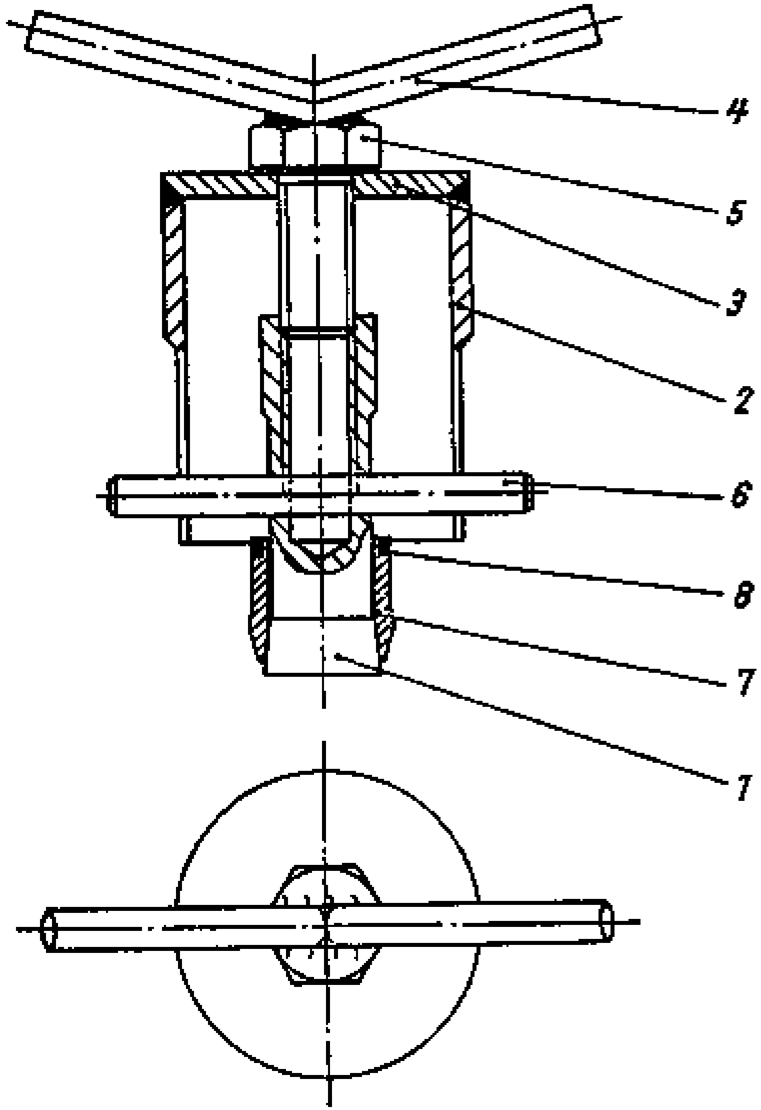
Item No.		Reference number	Drawing in Repair Manual
1	Pulling device for bearing in control head	22-51.006	1
2	Centring bolt for swing arm (05-MW 26-4)	89-99.055	2
3	Expanding mandrel for wheel bearing (M 8-820-3)	89-99.090	3
4	Holding-up hammer for sprocket at gearbox	31-50.404	4
5	Assembling bridge	22-50.430	5
6	Pulling sleeve	22-50.435	6
7	Pressure spindle	22-50.437	7
8	Ball bearing extractor	22-50.431	8
9	Auxiliary ring for ball bearing extractor		
	for bearing 6204	22-50.432	9
	for bearing 6304	22-50.434	9 a
10	Holding-up hammer for clutch driver (01-MW 22-4)	89-99.012	10
11	Holding-up hammer for primary drive	31-50.405	11
12	Puller (12 MV 32-4) for sprocket wheel on crankshaft	89-99.305	12
13	Drift (11 MW 7-4)	89-99.073	13
14	Drift (12 MV 31-4)	89-99.304	14

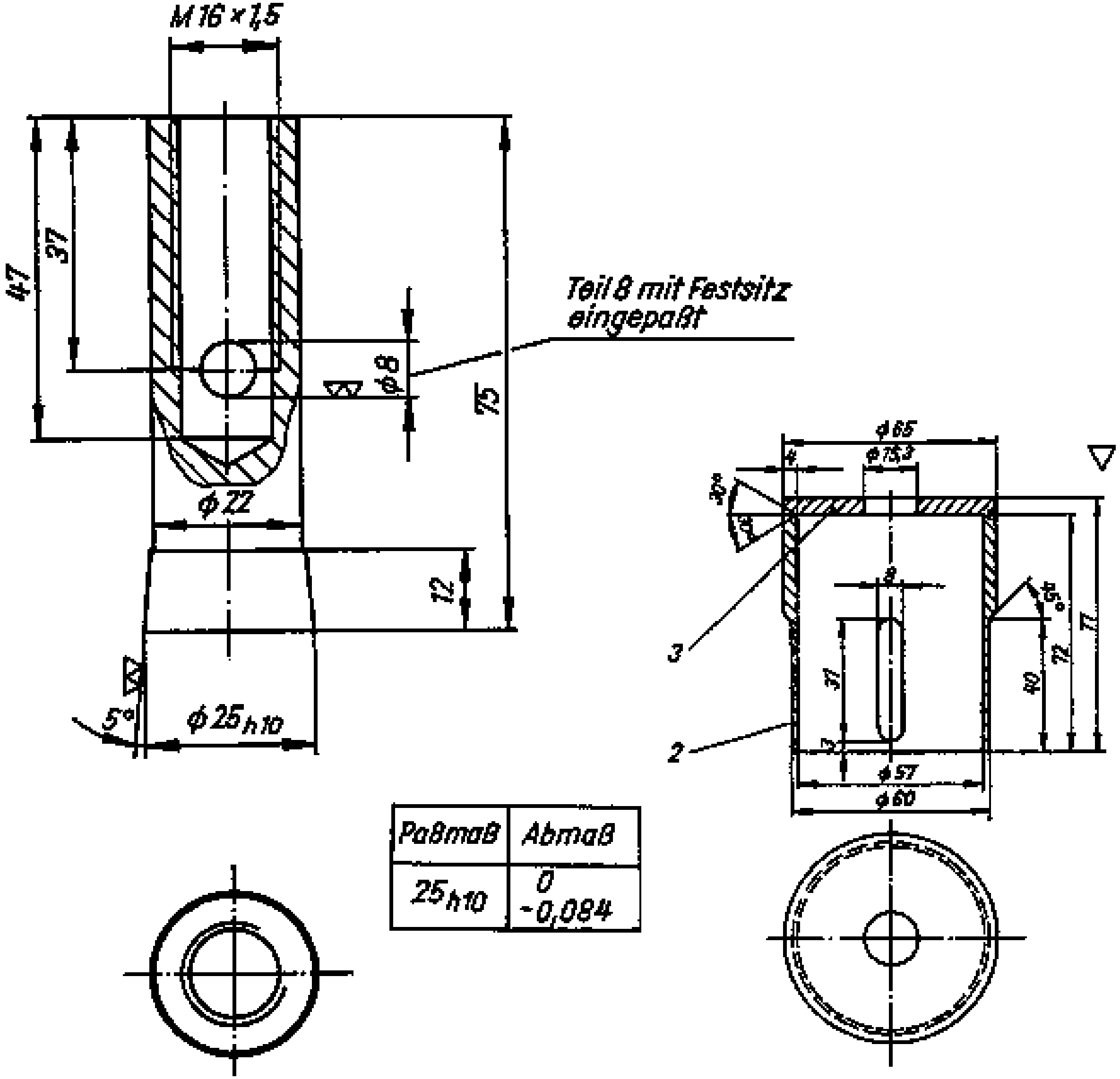
15	Heating mandrel for bearing 02 and 03	31-50.406	15
16	Heating mandrel for bearing 04 and 06	31-50.408	16
17	Armature pulling screw (02-MW 39-4)	89-99.026	17
18	Ignition setting gauge	29-50.801	without
19	Gudgeon pin ejecting device	22-50.010	18
20	Piston support	22-50.412	19
21	Guide mandrel for gudgeon pin (02-MW 33-4)	89-99.021	20
22	Engine assembling device with auxiliary parts for EM 125/150	22-50.014	without
-	Auxiliary tool for demounting and mounting the guide tubes	only intended for self-construction	21
-	Special wrench for shock absorber		22
-	Assembly device for swing arm bearing	22-50.455	23
-	Demounting device for brake master cylinder	30-51.043	24

8.2. Drawings for Special Tools

Index

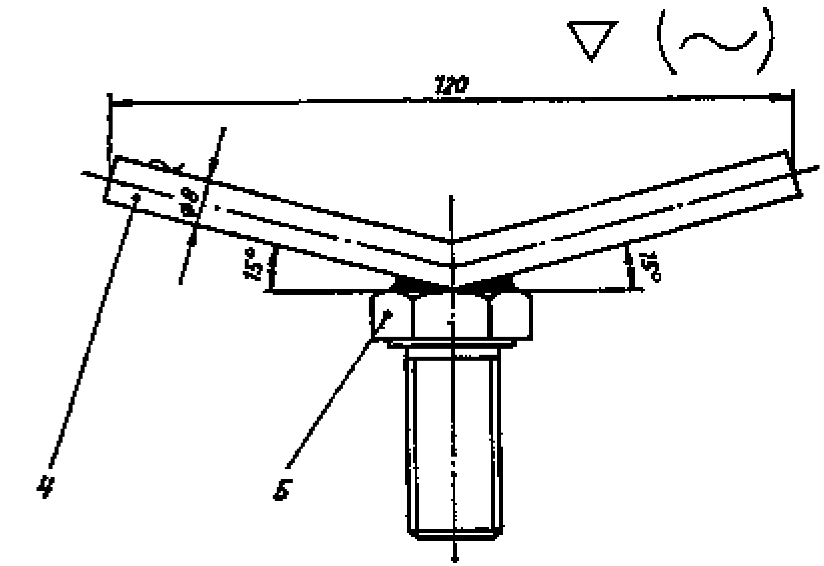
1. Pulling device for bearing in control head 22-51.006

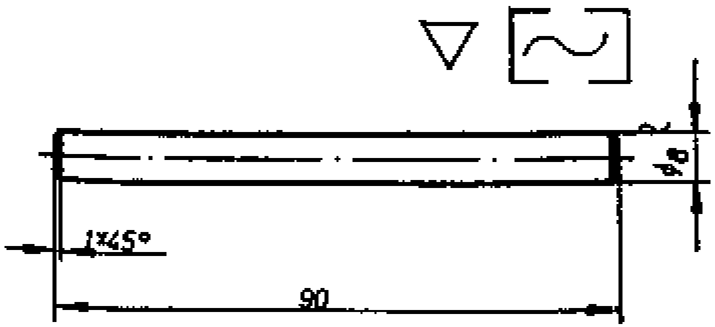

4
5
3
2
6
8
7
1

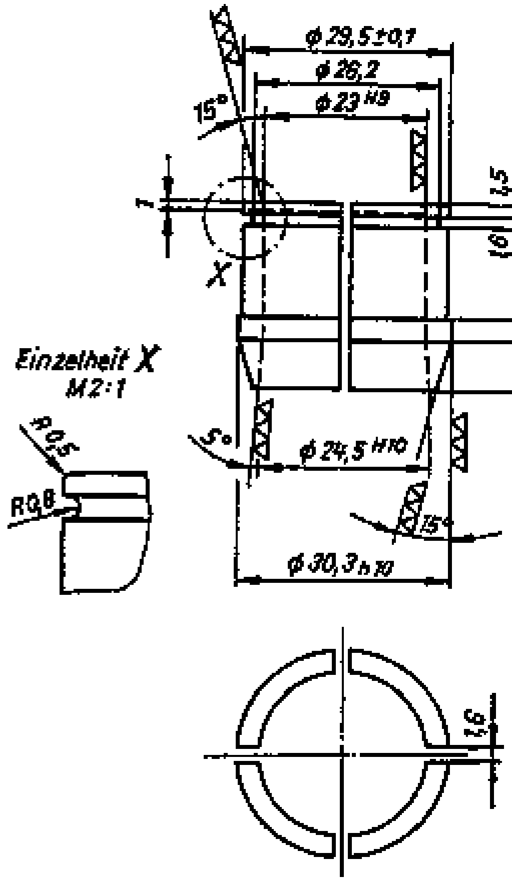


Paßmaß	Abmaß
25_{h10}	0 -0,084

Teil 8 mit Festsitz eingepaßt Part 8 mounted with tight fit







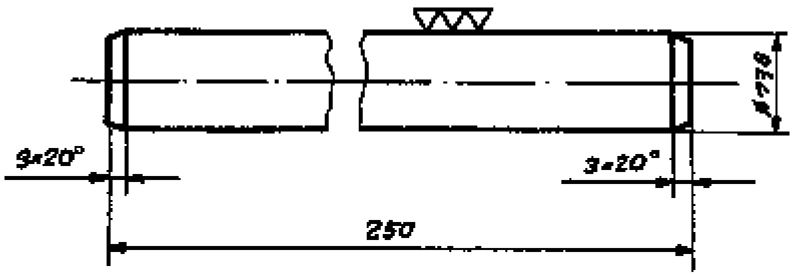
Paßmaß	Abmaß
23 H9	+0,052
	0
24,5 H10	+0,084
	0
30,3 h10	0
	-0,100

Einzelheit X	Detail X
Paßmaß	Dimension of fit
Abmaß	Deviation

Part	Quantity	Description	Material	Rough Size	Remarks

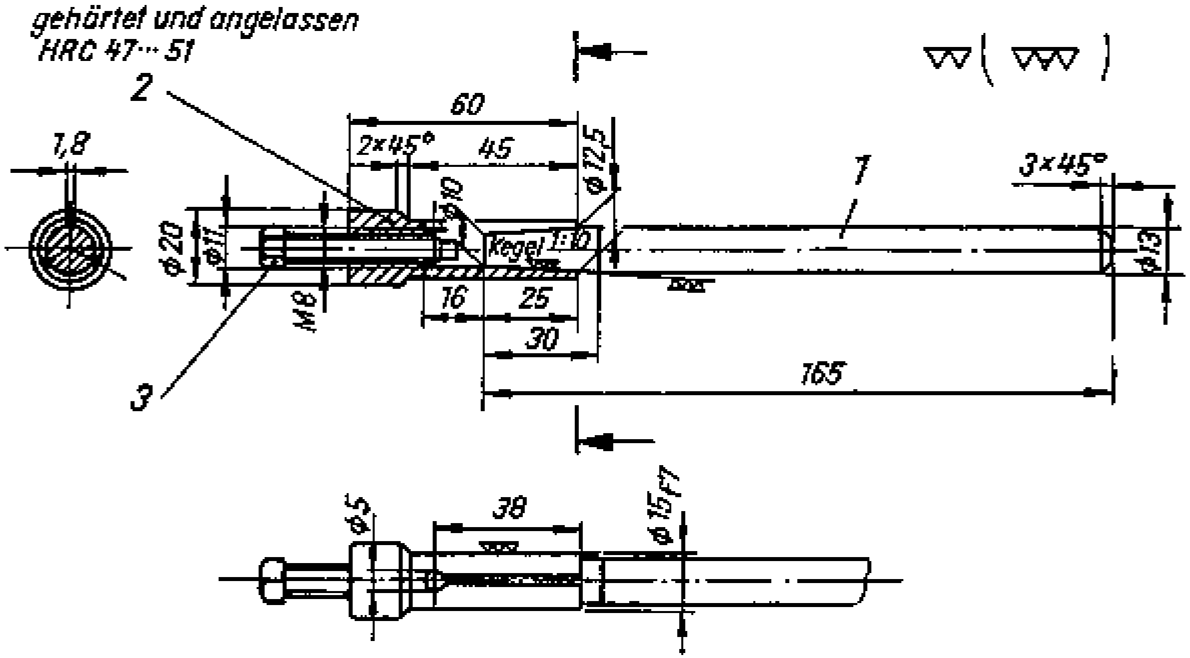
<table>
<tr><td>1</td><td>1</td><td></td><td>C 45</td><td>ø 30x80</td><td></td><td>hardened and tempered</td></tr>
<tr><td>2</td><td>1</td><td>tube 76x10</td><td>St 35 hb</td><td>75 long</td><td rowspan="2">welded part</td><td></td></tr>
<tr><td>3</td><td>1</td><td></td><td>St 38 b-2</td><td>ø 65x10</td><td></td></tr>
<tr><td>4</td><td>1</td><td></td><td>St 38 b-2 K</td><td>ø 8x130</td><td rowspan="2">welded part</td><td></td></tr>
<tr><td>5</td><td>1</td><td>hexagon-headscrew M 16x1.5x35</td><td></td><td></td><td>TGL 0-961</td></tr>
<tr><td>6</td><td>1</td><td></td><td>St 38 b-2 K</td><td>ø 8x92</td><td></td><td></td></tr>
<tr><td>7</td><td>1</td><td></td><td>16 Mn Cr 5</td><td>ø 36x30</td><td></td><td>case hardened</td></tr>
<tr><td>8</td><td>1</td><td>circlip 28x1.6</td><td></td><td></td><td></td><td>TGL 0-9045</td></tr>
</table>

2. Centring bolt for swing arm (05-MW 26-4) 89-99.055



Part	Quantity	Description	Material	Rough Size	Remarks
1	centring bolt	C 15 K	ø 18x255	case hardened	

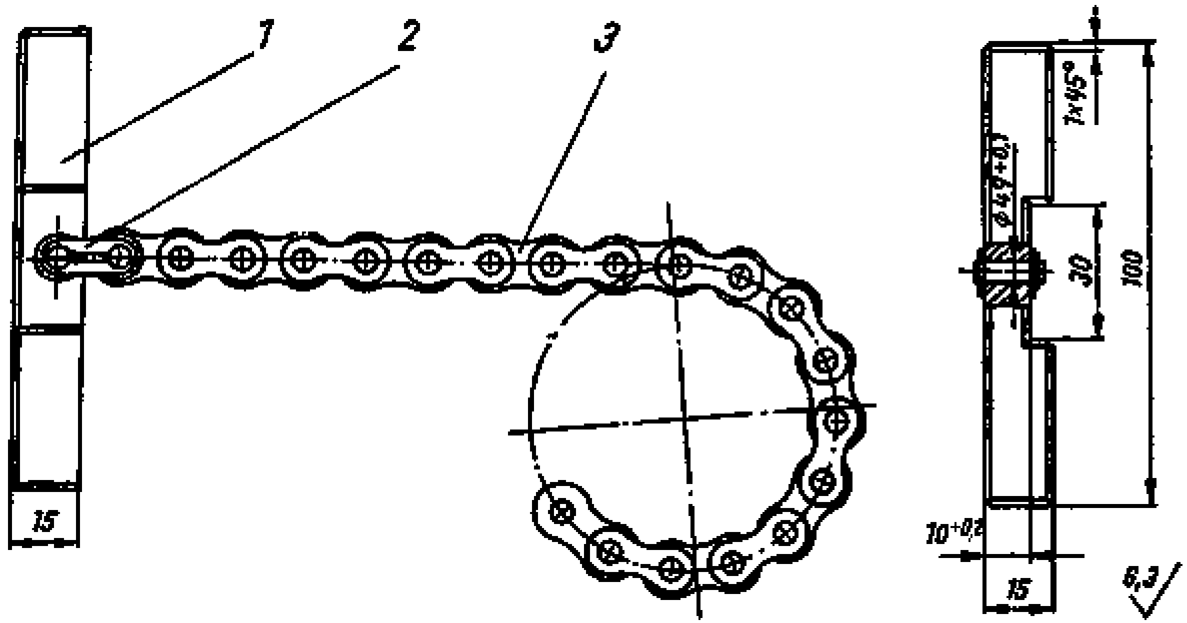
3. Expanding mandrel for wheel bearing (M 8-820-3) (89-99.090



gehärtet und angelassen   hardened and tempered

Part	Quantity	Description	Material	Rough Size	Remarks
1	1	drift	C 15	ø 15x170	case hardened
2	1	expanding bush	67 Si Cr 5	ø 25x65	
3	1	hexagon-headscrew M8x45			TGL 0-561

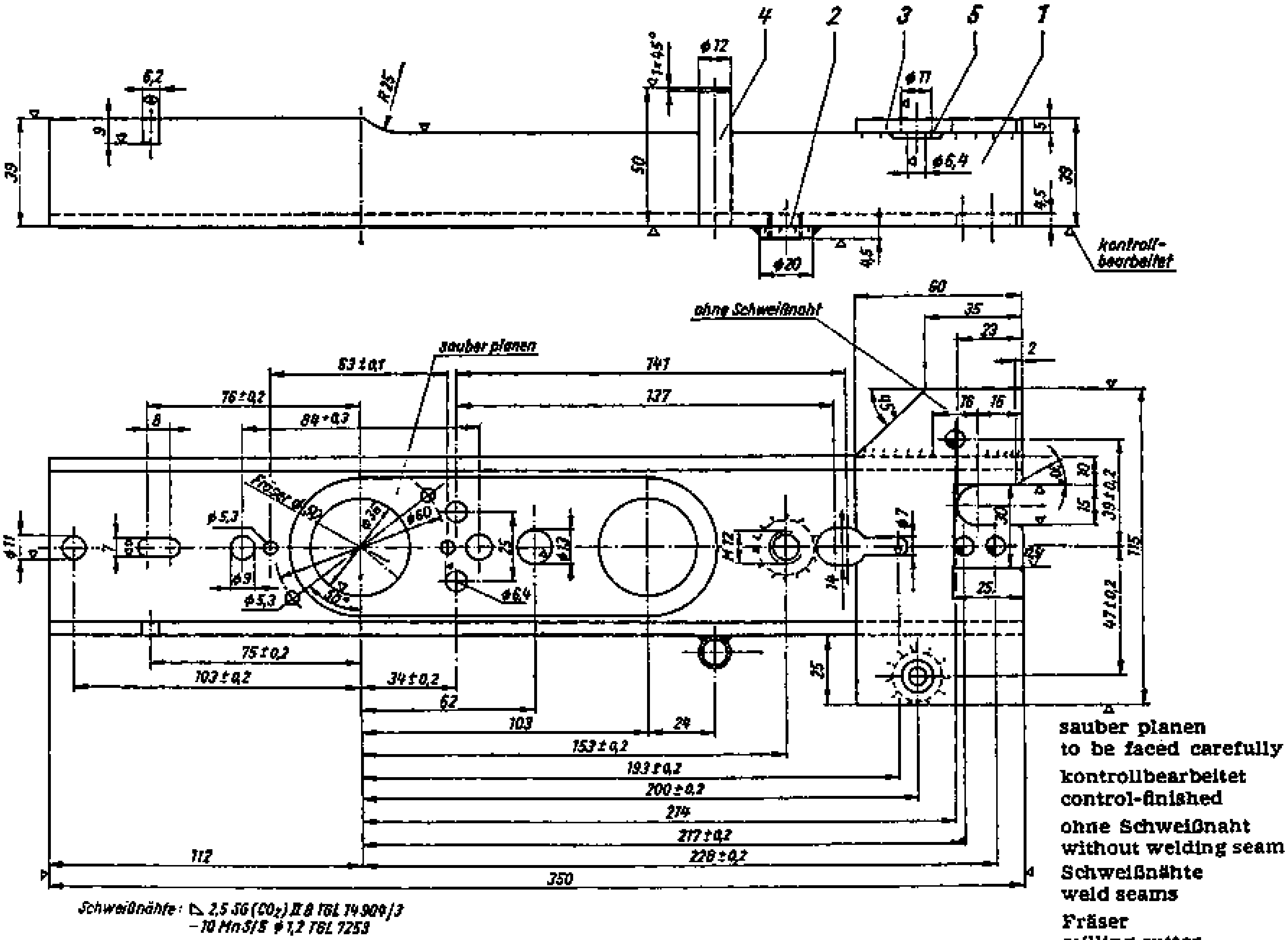
4. Holding-up hammer for sprocket at gearbox 31-50.404



Part	Quantity	Description	Material	Rough Size	Remarks
1	1	holder	St 60-2 k	20x20x105	
2	1	plug link D 0.8 B-1			TGL 11796
3	1	roller chain D 0.8 B-1, 19 links			TGL 11796

5. Assembling bridge 22-50.430

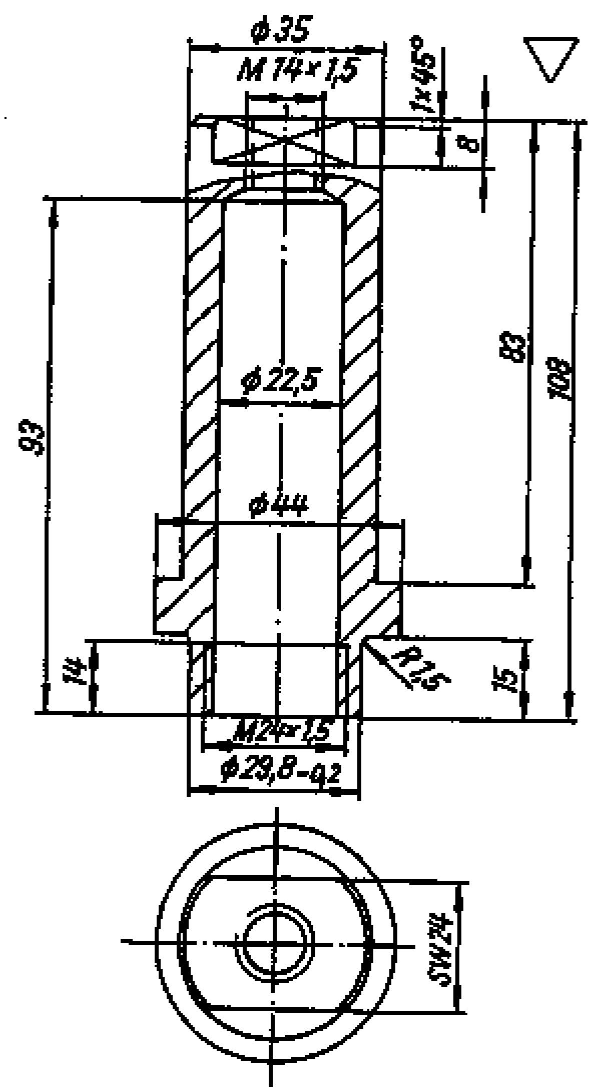
Weld seams : > 2.5 SG (CO_2) II B TGL 14904/3-10 Mn S/5, ø 1.2 TGL 7253



sauber planen
to be faced carefully
kontrollbearbeitet
control-finished
ohne Schweißnaht
without welding seam
Schweißnähte
weld seams
Fräser
milling cutter

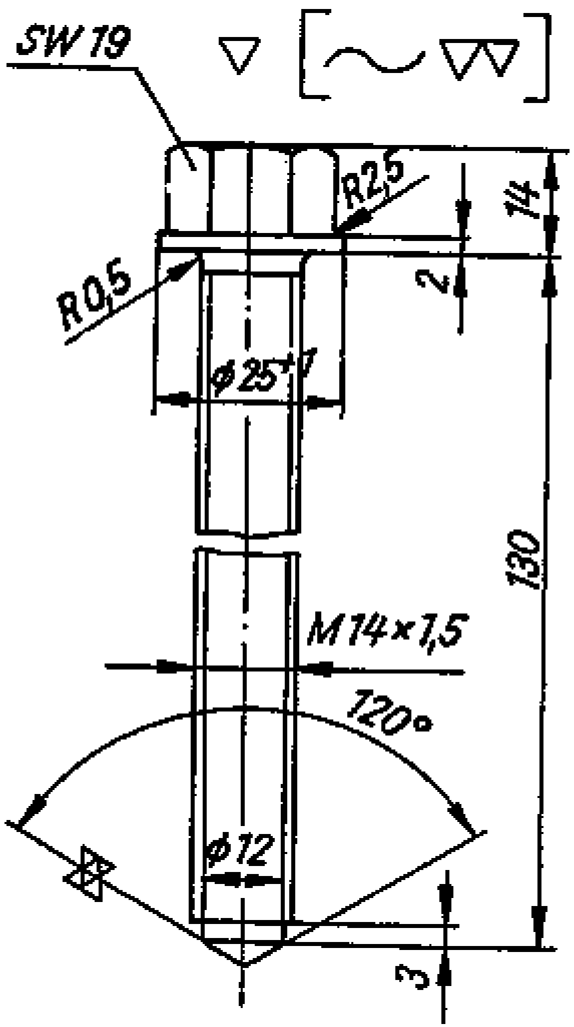
Part	Quantity	Description	Material	Rough Size	Remarks
1	1	basic body	U-steel 6 1/2 St 38 b-2	350 long	TGL 0-1026
2	1	disk	St 38 b-2 k	ø 20x8	TGL 0-1026
3	1	plate	St 38 b-2	5x60x115	TGL 0-1026
4	1	bolt	St 38 b-2	ø 12x55	TGL 0-1026
5	1	washer	R 5.8		TGL 0-440

6. Pulling sleeve 22-50.435



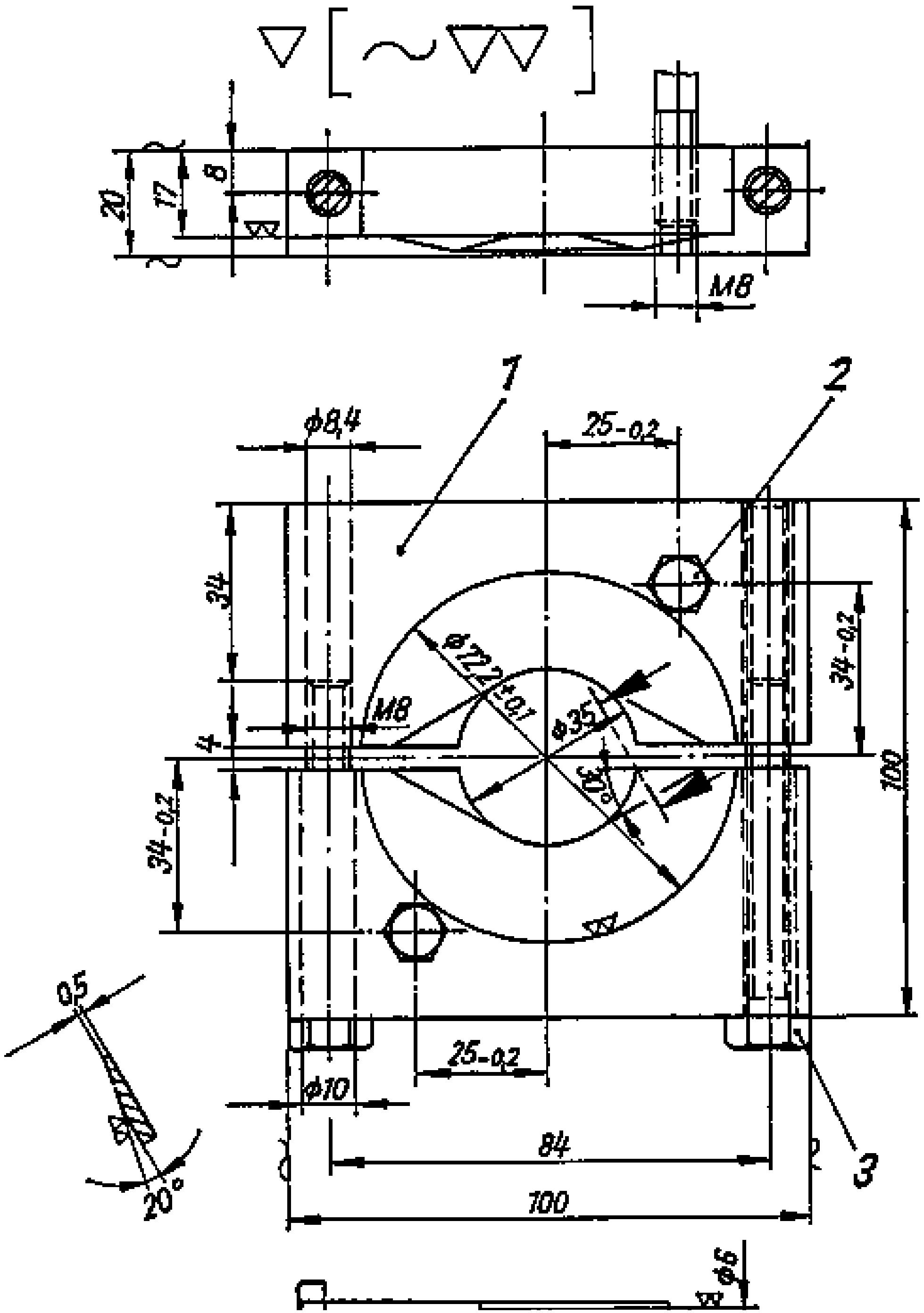
Part	Quantity	Description	Material	Rough Size	Remarks
	1	sleeve	C 45	ø 45x112	

7. Pressure spindle 22-50.437



Part	Quantity	Description	Material	Rough Size	Remarks
	1	screw	C 60 K	ø 26x169.5	

8. Ball bearing extractor 22-50.431



M8
1
2
3
φ8,4
25-0,2
34
34-0,2
4
100
φ35
30°
0,5
20°
φ10
84
φ6

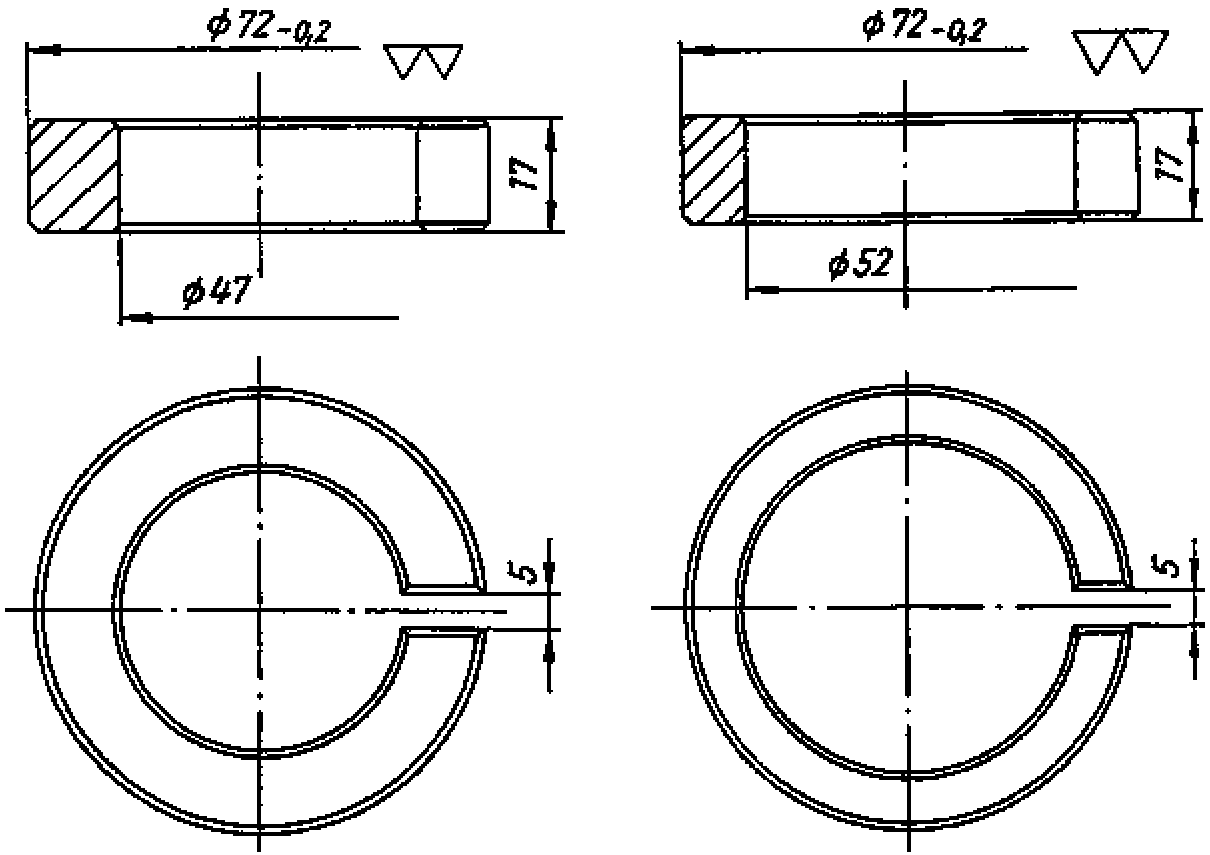
Zapfen gehärtet pin hardened

Part	Quantity	Description	Material	Rough Size	Remarks
1	1	extractor	C 15	20x100x105	carbonitrided
2	2	hexagon-headscrew M8x70			TGL 0-931
3	2	hexagpn-headscrew M8x100			TGL 0-933

9. Auxiliary ring for ball bearing extractor for

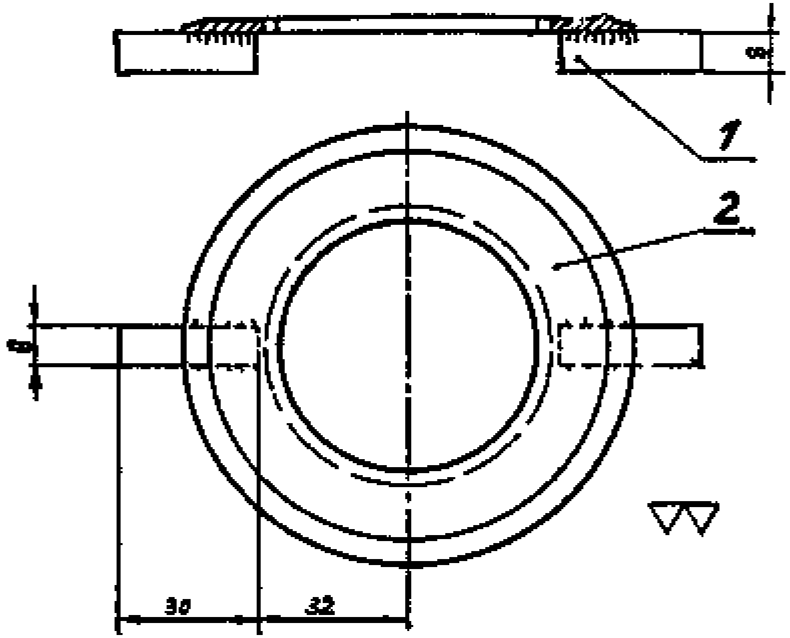
bearing 6204 22-50.432
all chamfers 1 x 45°

bearing 6304 22-50.434
all chamfers 1 x 45°



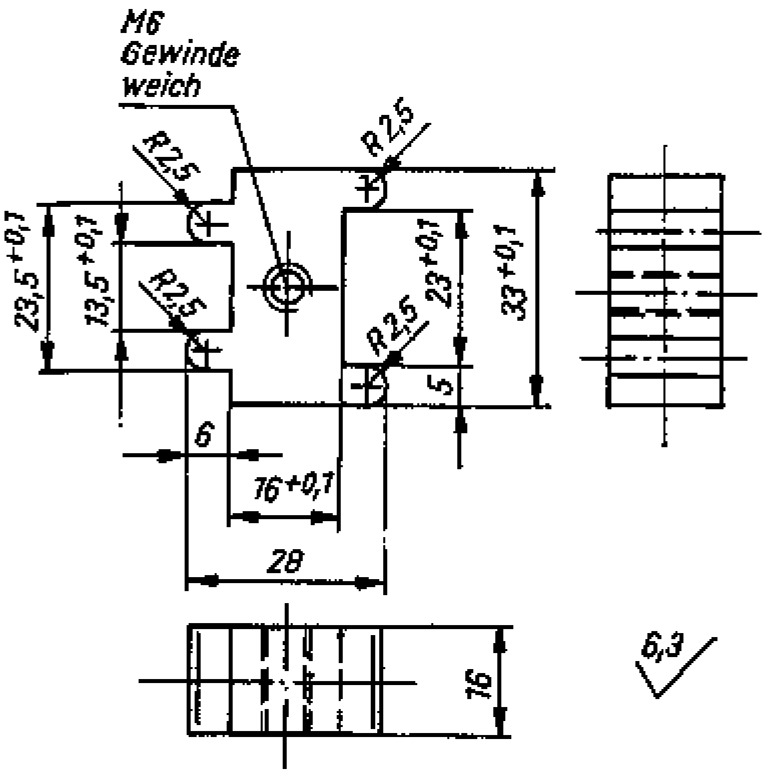
Part	Quantity	Description	Material	Rough Size	Remarks
1	1	ring	St 35 hb	ø 76x12x22	TGL 9013
2	1	ring	St 38 b-2	ø 75x20	TGL 0-1026

10. Holding-up hammer for clutch driver (01-MW 22-4) 89-99.012



<table>
<tr><th>Part</th><th>Quantity</th><th colspan="2">Description</th><th>Material</th><th>Rough Size</th><th>Remarks</th></tr>
<tr><td>1</td><td>1</td><td>lamina</td><td rowspan="2">welded part</td><td></td><td></td><td>drawing No. 01-46.007</td></tr>
<tr><td>2</td><td>2</td><td>support</td><td>St 38 b-2</td><td>9x9x30</td><td></td></tr>
</table>

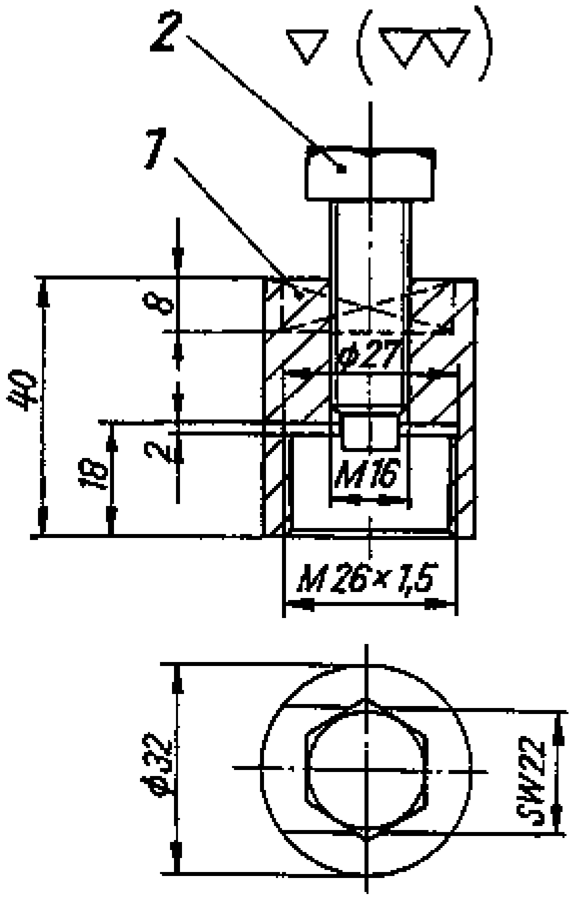
11. Holding-up hammer for primary drive 31-50.405



Gewinde weich   thread soft

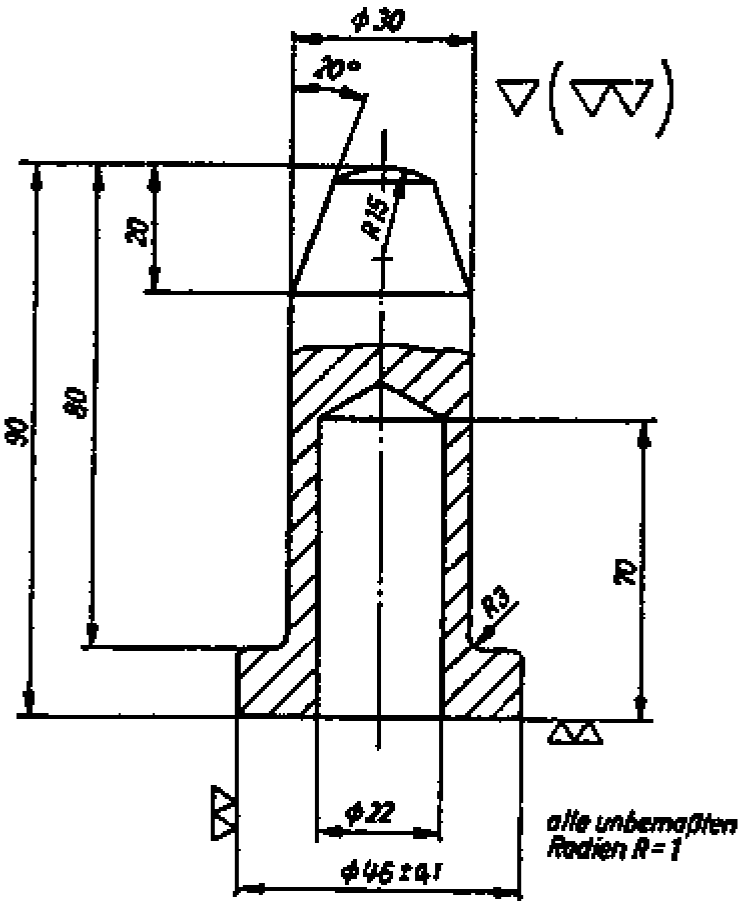
Part	Quantity	Description	Material	Rough Size	Remarks
	1	holding-up hammer	C 15	20x33x38	case hardened

12. Puller (12 MV 32-4) for sprocket wheel on crankshaft 89-99.305



Part	Quantity	Description		Material	Rough Size	Remarks
1	1	puller	St 38 b-2	ø 36x45	TGL 0-1026	
2	1	screw M 16x60			TGL 0-561 pin hardened	

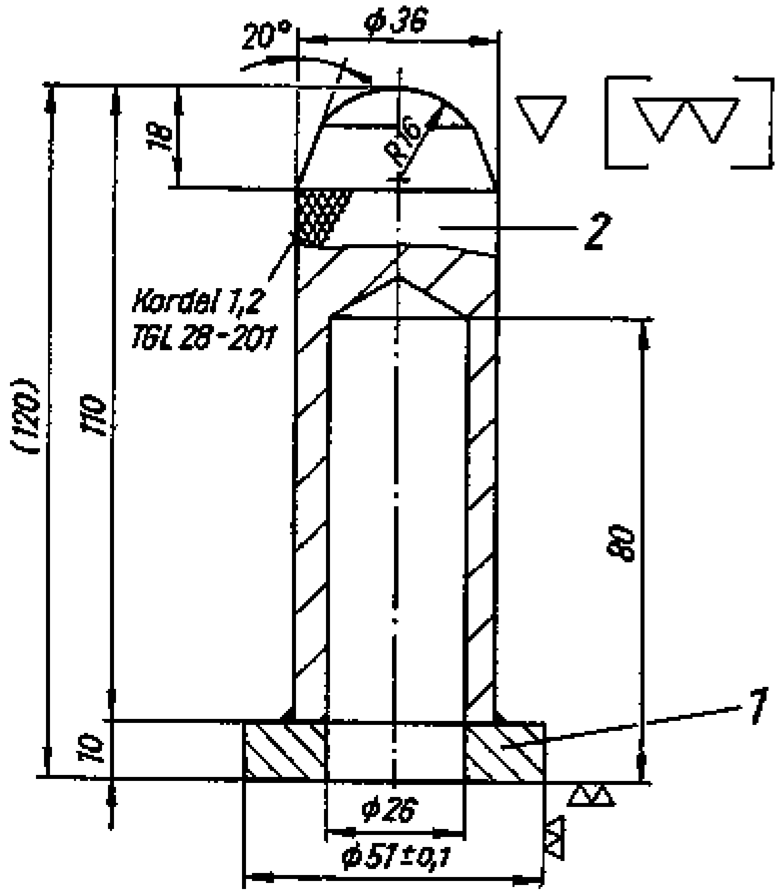
13. Drift (11-MW 7-4) 89-99.073



All non-dimensioned radii *R* = 1 mm

Part	Quantity	Description	Material	Rough Size	Remarks
	1	drift	C 15	ø 50x95	case hardened

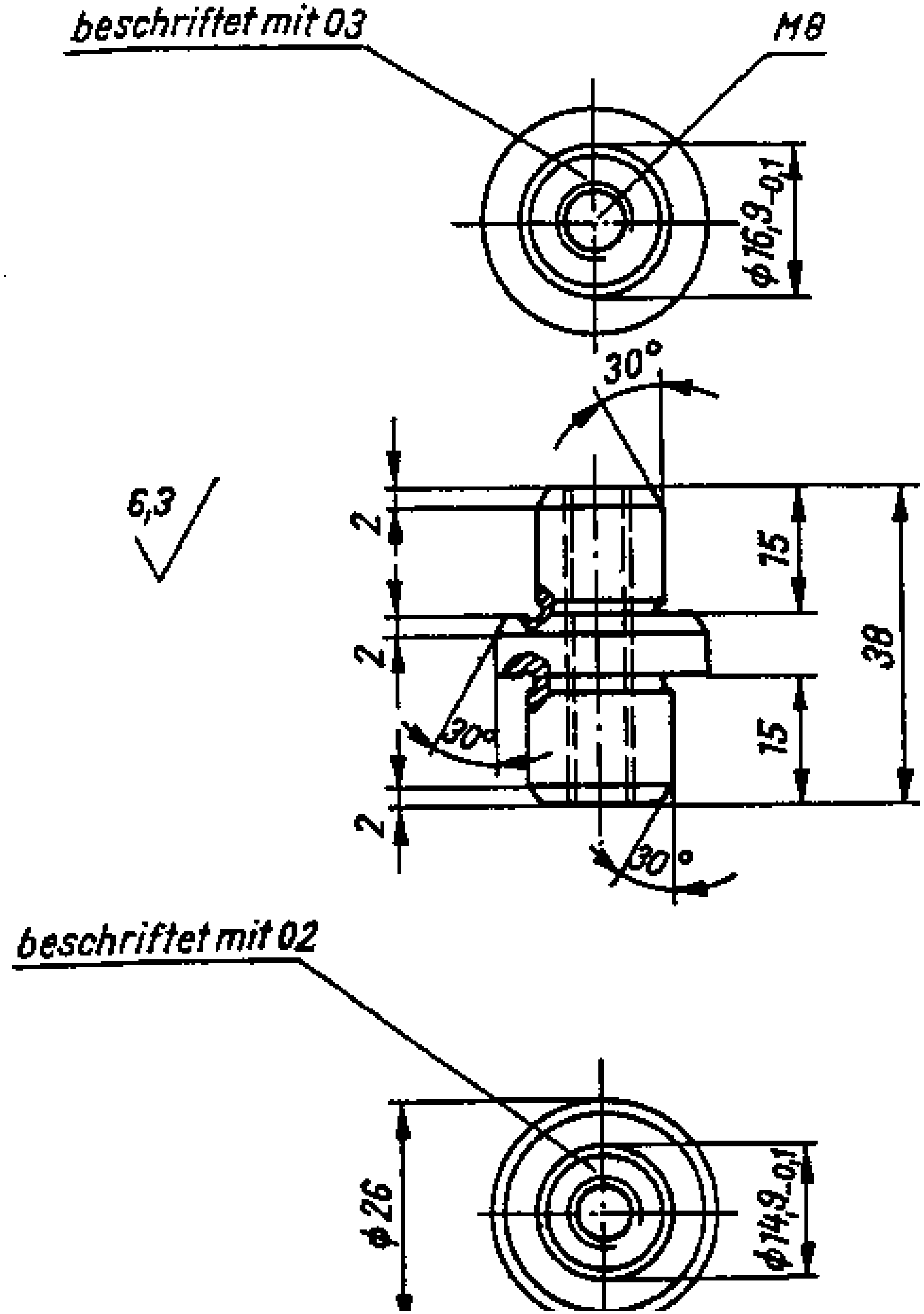
14. Drift (12-MV 31-4) 89-99.304



inserted, hardened - all non-dimensioned radii *R* = 1 mm
Kordel 1, 2 knurl 1, 2

Part	Quantity	Description		Material	Rough Size	Remarks
1	1	ring	C 15	ø 56x12	case hardened	
2	1	shank	C 15	ø 36x112	case hardened	

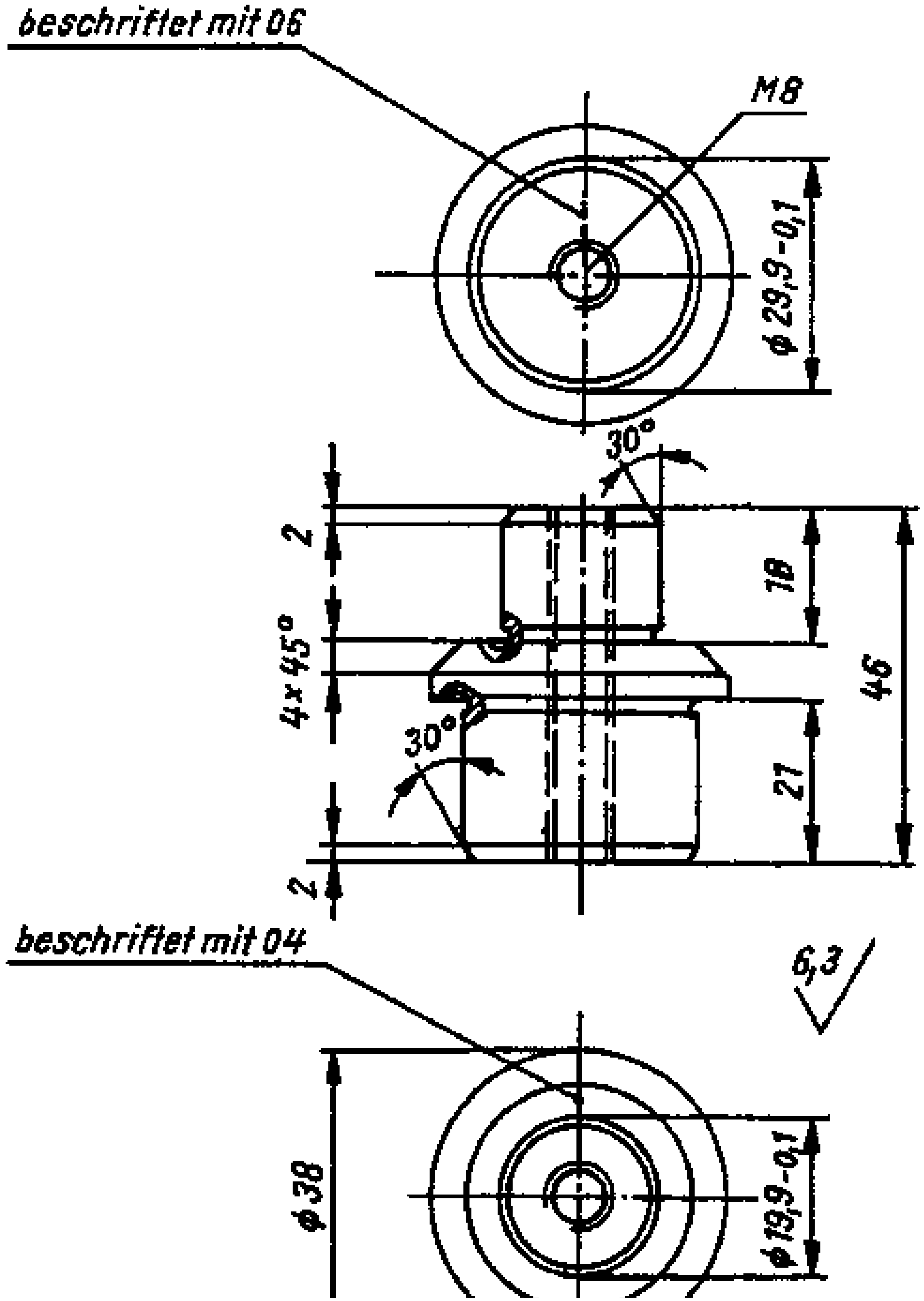
15. Heating mandrel for bearings 02 and 03 31-50.406


beschriftet mit 03
M8
ϕ16,9-0,1
30°
6,3
2
2
2
2
15
15
38
30°
30°
beschriftet mit 02
ϕ26
ϕ14,9-0,1

beschriftet mit 03	marked with 03
beschriftet mit 02	marked with 02

Part	Quantity	Description		Material	Rough Size	Remarks
	1	mandrel	C 15	ø 30x43	case hardened	

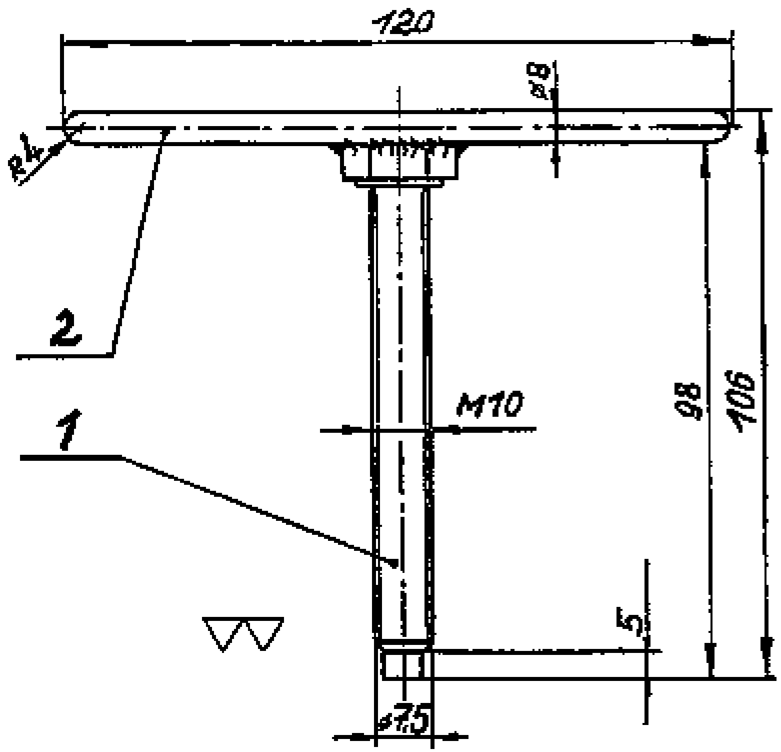
16. Heating mandrel for bearings 04 and 06 31-50.408


beschriftet mit 06
M8
ϕ 29,9-0,1
30°
2
4x45°
18
46
30°
21
2
beschriftet mit 04
6,3
ϕ38
ϕ 19,9-0,1

beschriftet mit 04 marked with 04
beschriftet mit 06 marked with 06

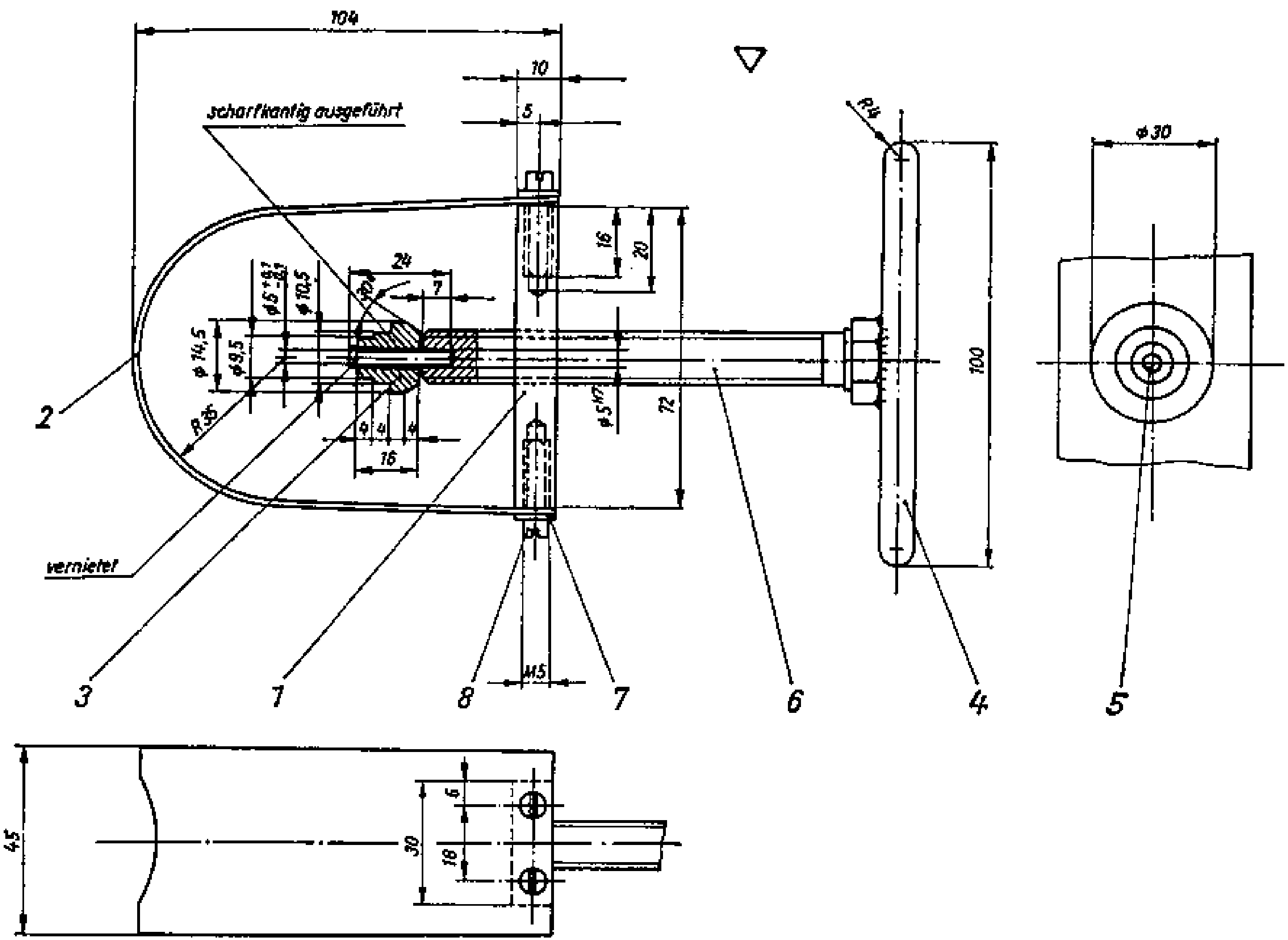
Part	Quantity	Description	Material	Rough Size	Remarks
	1	mandrel	C 15	ø 45x50	case hardened

17. Armature pulling screw (02-MW 39-4) 89-99.026



Part	Quantity	Description	Material	Rough Size	Remarks
1	1	hexagon-head screw M 10x30	St 38 K		lug turned on in a lathe
2	1	lock		ø 8x125	

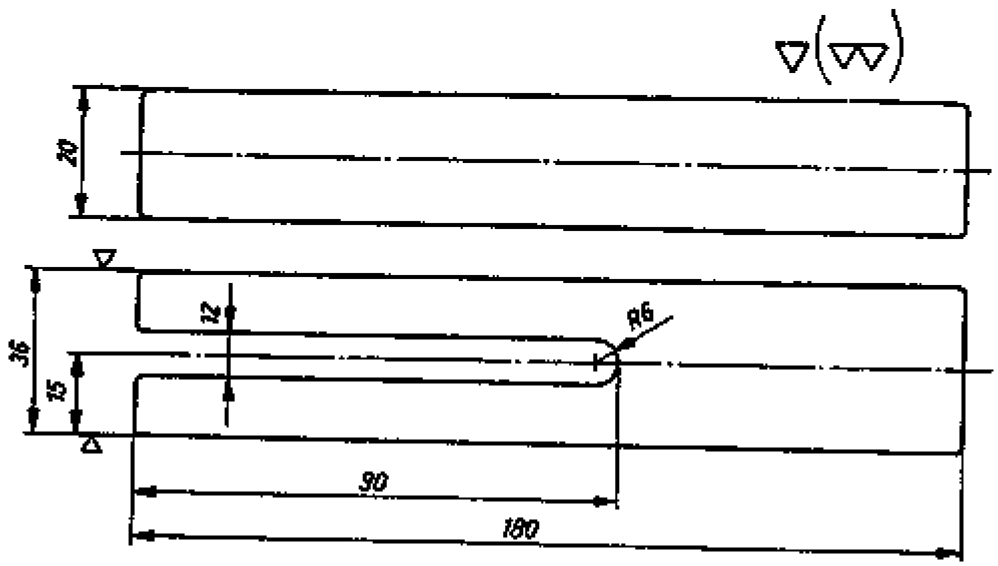
18. Gudgeon pin ejecting device 22-50.010



Pressure member (3) must still be capable of being turned
scharfkantig ausgeführt   made with Sharp edges
vernietet   riveted

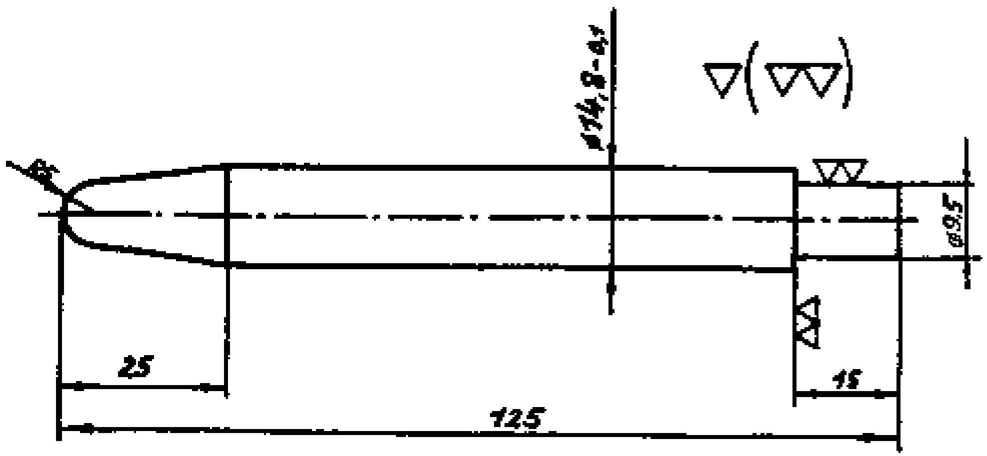
Part	Quantity	Description	Material	Rough Size	Remarks
1	1	threaded piece	St 38 b-2	30x10x72	TGL 7973
2	1	spring-steel cross-bands	Ck 67	245x45	TGL 7975
3	1	pressure member	C 45	ø 20x20	TGL 7970
4	1	lock	St 38 K	ø 8x100	TGL 7970
5	1	pin	St 38 K	ø 5x30	TGL 7970
6	1	hexagon-headscrew M 12x100		TGL 0-933	
7	4	washer ø 5.3		TGL 0-125	
8	4	fillister-head screw M 5x16		TGL 0-84 - 5 S	

19. Piston support 22-50.412



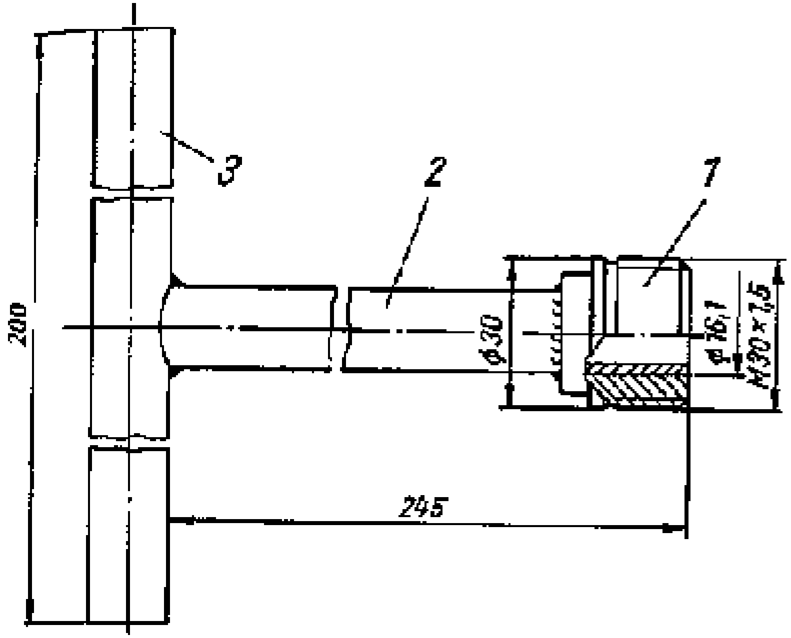
Part	Quantity	Description	Material	Rough Size	Remarks
	1piston support	HgW 2088	180x35x20	TGL 12246	

20. Guide mandrel for gudgeon pin (02-MW 33-4) 89-99.021



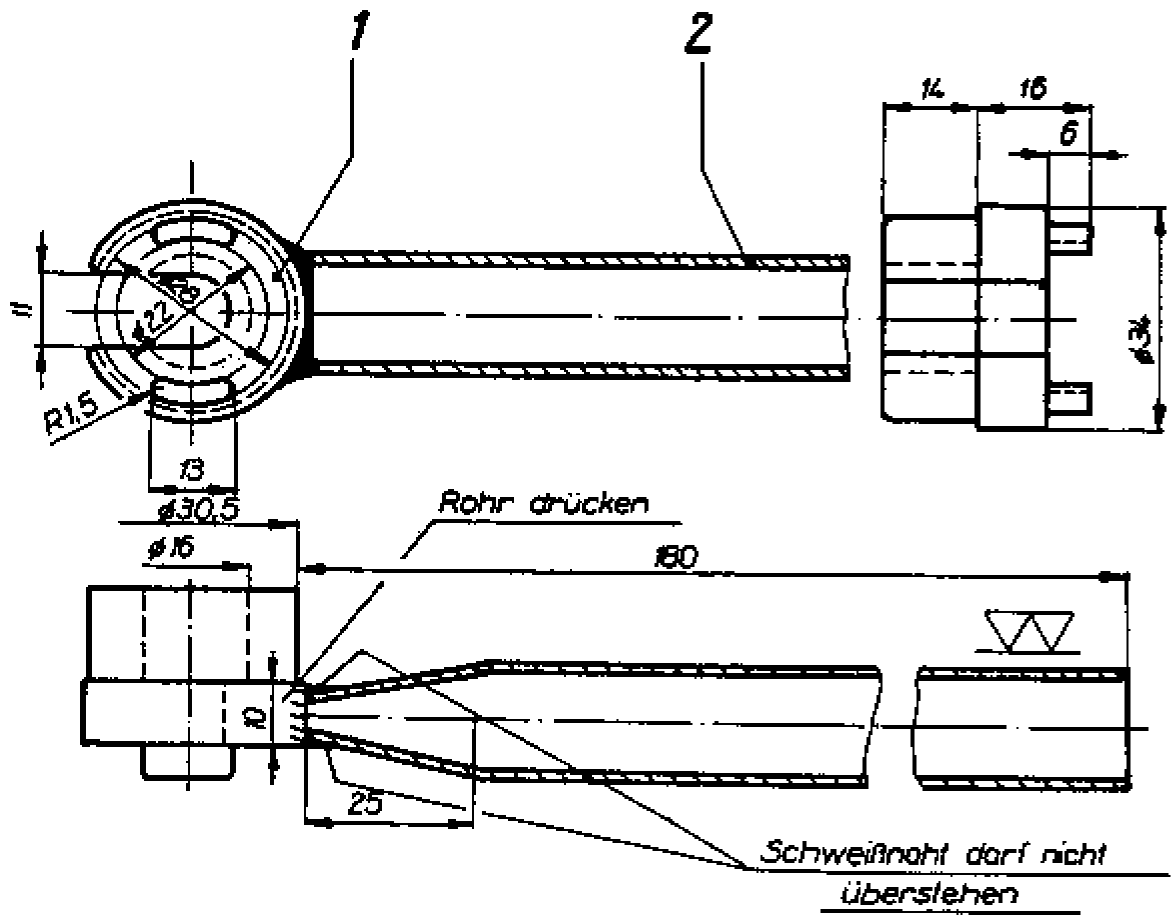
Part	Quantity	Description	Material	Rough Size	Remarks
	1	mandrel	St 38 b-2	ø 18x130	

21. Auxiliary tool for demounting and mounting the guide tubes



Part	Quantity	Description	Material	Rough Size	Remarks
1	1	screw plug M 30x1.5	St 38 u-2		
2	1	tube 16.2x2	St 35	250 long	
3	1	tube 16.2x2	St 35	205 long	

22. Special wrench for shock absorber

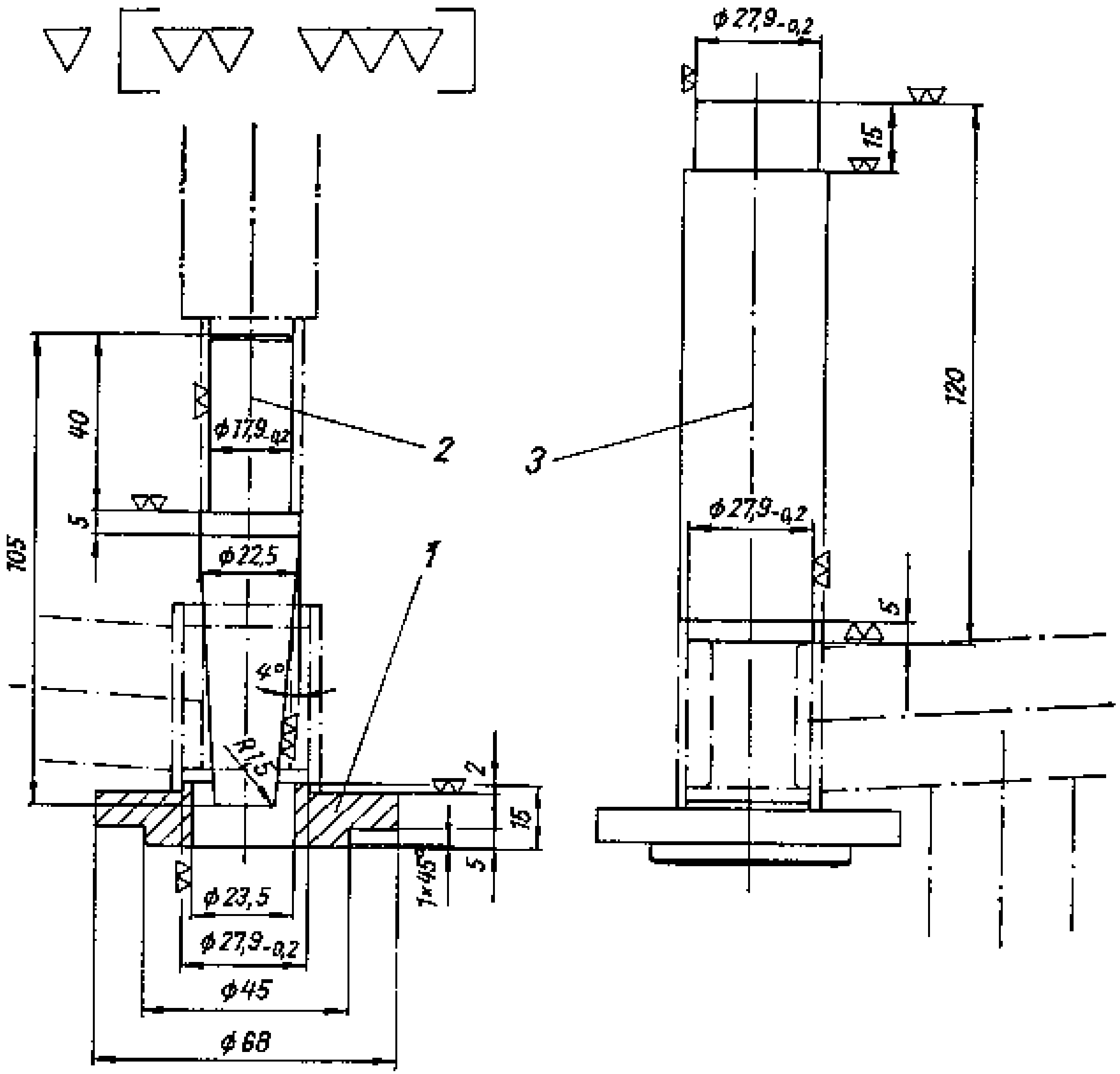


Rohr drücken tube to be pressed
Schweißnaht darf nicht überstehen weld seam must not project

Part	Quantity	Description		Material	Rough Size	Remarks
1	1	rim	M ST 3	ø 35x35	welded part	

2	1	tube 18x1.5	St 35 hb	185 long	

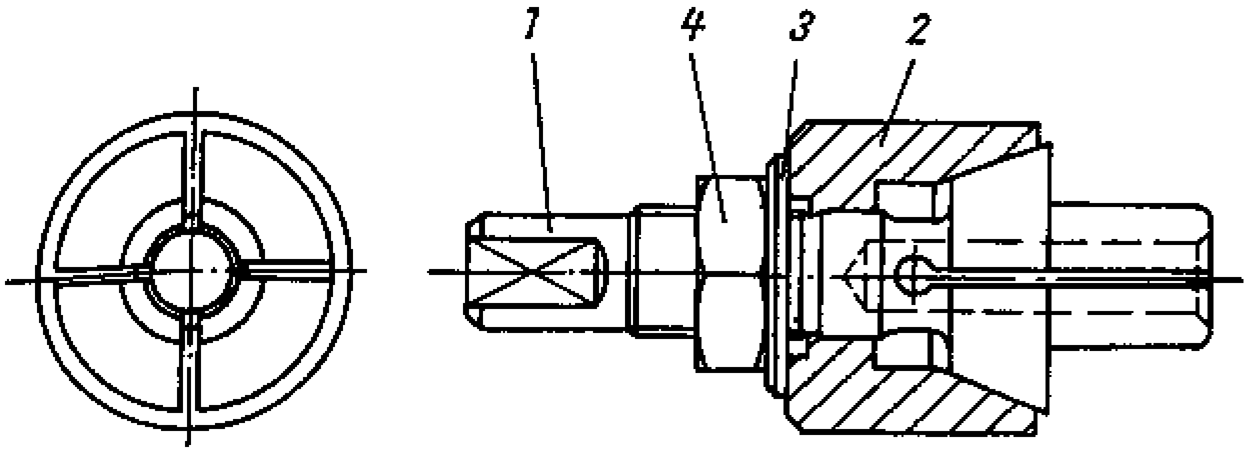
23. Assembly device for swing arm bearing 22-50.455

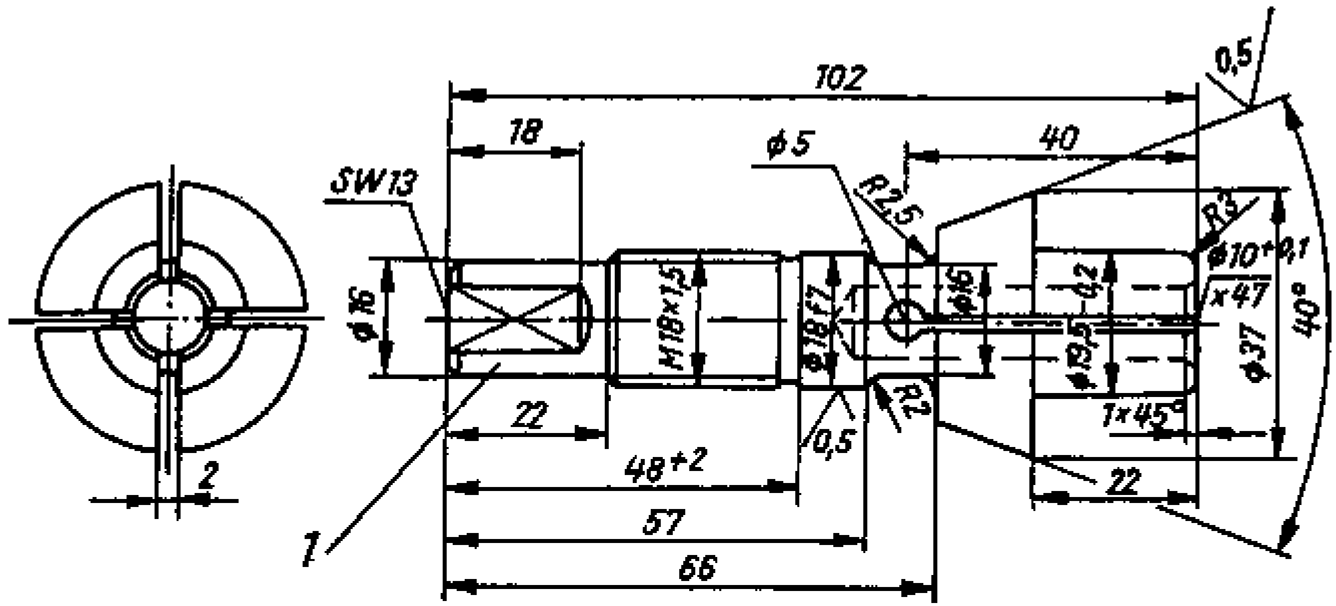


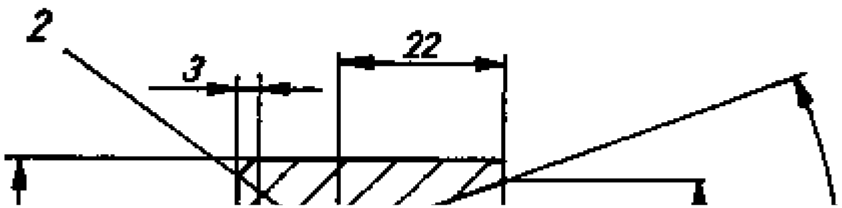
Part	Quantity	Description	Material	Rough Size	Remarks

1	1	supporting disk	St 38 b-2	ø 70x20	TGL 0-1026
2	1	guide mandrel	C 45	ø 25x110	nickel-plated
3	1	pressing-in mandrel	St 38 b-2 K	ø 32x125	nickel-plated TGL 0-1026

24. Demounting device für brake master cylinder 30-51.043


1
4
3
2


102
0,5
18
40
SW13
ϕ5
R2,5
R3
ϕ10+0,1
x47
ϕ16
M18x1,5
ϕ18 f7
ϕ16
ϕ19,5-0,2
ϕ37
40°
1x45°
22
R2
0,5
2
48+2
22
57
66
1


2
3
22

Part	Quantity	Description	Material	Rough Size	Remarks
1	1	clamping sleeve	C 60	ø 40x107	hardened and tempered
2	1	clamping ring	C 60	ø 50x40	hardened and tempered
3	1	washer 19			TGL 0-125
4	1	hexagon-headscrew M 18x1.5			TGL 0-936 - 8.8

Index