

YAMAHA

'71, '72, '73 MODEL SPECIFICATIONS

and

SL2000/EP2000

SERVICE MANUAL



YAMAHA MOTOR CO., LTD.

NOTICE

This manual has been written by Yamaha Motor Company for use by Authorized Yamaha Dealers and their qualified mechanics. In light of this purpose it has been assumed that certain basic mechanical precepts and procedures inherent to our product are already known and understood by the reader.

Without such basic knowledge, repairs or service to this model may render the machine unsafe, and for this reason we must advise that all repairs and/or service be performed by an Authorized Yamaha dealer who is in possession of the requisite basic product knowledge.

Other information is produced by the U.S. distributor, Yamaha International Corporation, and is necessary to provide total technical coverage regarding the product.

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The Research, Engineering, and Service Departments of Yamaha are continually striving to further improve all models manufactured by the company. Modifications are therefore inevitable and changes in specifications or procedures will be forwarded to all Authorized Yamaha Dealers and will, where applicable, appear in future editions of this manual.

YAMAHA SL292C/GP292B SERVICE MANUAL

1st Edition

JUNE 1972

ENGINEERING & SERVICE DEPARTMENT

YAMAHA MOTOR COMPANY

HAMAMATSU, JAPAN

FOREWORD

The Service Manual for this year's Yamaha snowmobiles is divided into two volumes for single-cylinder models and twin-cylinder models. These two books will be used as the basic service manuals for this year's models.

This manual contains service information for standard and GP models equipped with a 292-c.c. cylinder. It also includes specifications of 1971 to 1973 models for convenience of Yamaha service technicians.

**YAMAHA MOTOR CO., LTD.
ENGINEERING & SERVICE DEPARTMENT**

1940-1941

The following table shows the number of persons who were employed in the various occupations in the United States in 1940 and 1941. The figures are in thousands of persons.

Occupation	1940	1941
Agriculture	10,000	10,000
Manufacturing	20,000	20,000
Commerce	10,000	10,000
Transportation	10,000	10,000
Communication	10,000	10,000
Education	10,000	10,000
Health	10,000	10,000
Other	10,000	10,000

Source: Bureau of Economic Warfare, Office of Statistics, Washington, D.C.

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CHAPTER 1. GENERAL

1-1 FEATURES

1. Optimum Engine Performance

The new, exclusive, five-port cylinder design is being used in this year's model to insure optimum performance. The five-port system innovated by the Yamaha engineers has already proven itself in many fields of competition.

2. Increased Engine Reliability and Economy

As another first in the industry Yamaha has introduced its already proven Autolube oil injection system in Yamaha snowmobile engines. The Autolube system will insure long engine life and also result in a decrease in operational and maintenance costs.

3. Smooth and Positive Clutch System

Yamaha snowmobiles have an improved automatic centrifugal clutch and power train system. The new clutch allows the engine to achieve the most usable r.p.m. under all operating conditions. The drive ratio will vary from 3.5 : 1 - 1 : 1 thus giving maximum acceleration and climbing ability.

4. Diaphragm Carburetor

The Yamaha snowmobiles have one diaphragm-type carburetor. This carburetor incorporates an internal metering device which always meters the correct air/fuel mixture to the engine regardless of vibration or machine position.

5. Superior Braking

A new design in the track, sprocket, V-belt and caliper disc brake has greatly improved the braking efficiency and safety of the Yamaha snowmobile.

6. Tilt-up Engine Shroud

The attractive fiberglass engine shroud has been designed to tilt up and away from the engine. This functional feature allows for easy refueling and engine maintenance.

7. Superior Comfort

The suspension system of the main track rides on individually mounted torsion spring bogie wheels. The adjustable torsion springs of the rear pivot arm of the track, in combination with the attractive and durable seat, assure tireless comfort even on the longest trips.

1-2 SPECIFICATIONS

'73 Models

MODEL	SL292C	GP292B
Dimensions and Weight:		
Length (W/Skis)	105.5 in. (2,680 mm)	105.5 in. (2,680 mm)
Width	34.7 in. (880 mm)	34.7 in. (880 mm)
Height (W/Windshield)	40.6 in. (1,030 mm)	39.0 in. (990 mm)
Weight (approx.)	337 lbs. (153 kg)	337 lbs. (153 kg)
Engine:		
Type	Air cooled two-stroke 5-port induction Cast iron sleeve aluminum cylinder	Air cooled two-stroke 5-port induction Cast iron sleeve aluminum cylinder
No. of cylinders	1 cylinder	1 cylinder
Bore and stroke	2.874 in. x 2.756 in. (73 mm x 70 mm)	2.874 in. x 2.756 in. (73 mm x 70 mm)
Displacement	17.82 cu.in. (292 c.c.)	17.82 cu.in. (292 c.c.)
Max. Horse power	20 H.P. @5,500 r.p.m.	27 H.P. @6,000 r.p.m.
Carburetor	KEIHIN CD38-32 x 1	KEIHIN CD42-38 x 1
Lubrication system	"Autolube" oil injection	"Autolube" oil injection
Ignition method	Flywheel magneto	Flywheel magneto
Magneto output	12V - 70W @3,000 r.p.m.	12V - 70W @3,000 r.p.m.
Spark plug	N.G.K. B-7ES	Champion N-3G
Starting System:	Manual recoil starter with add'l emergency rope starter	Manual recoil starter with add'l emergency rope starter
Track and Suspension:		
Track	Molded rubber, steel reinforced	Molded rubber, steel reinforced
Width	15 in. (381 mm)	15 in. (381 mm)
Length on ground	50 in. (1,270 mm)	50 in. (1,270 mm)
Suspension wheels	12 rubber wheels bearing mounted	12 rubber wheels bearing mounted
Drive sprocket	Single, polyurethane, 9 teeth	Single, polyurethane, 9 teeth
Wheel sprocket	Single, polyurethane, 9 teeth	Single, polyurethane, 9 teeth
Transmission:		
Type	Automatic centrifugal engagement, infinitely variable 3.5 : 1 - 1 : 1	Automatic centrifugal engagement, infinitely variable 3.5 : 1 - 1 : 1
Drive	Duplex roller chain enclosed in oil bath	Duplex roller chain enclosed in oil bath
Reduction	25/13 = 1.923 : 1	25/13 = 1.923 : 1
Frame:		
Type	Fabricated steel	Fabricated steel
Cowl:		
Type	Reinforced fiberglass (removable)	Reinforced fiberglass (removable)
Seat:	Removable	Removable
Storage Box:	Fiberglass reinforced in the engine room	Fiberglass reinforced in the engine room
Fuel Tank:		
Capacity	5.0 U.S. gal. (19.0 ℓ)	5.0 U.S. gal. (19.0 ℓ)
Oil Tank:		
Capacity	2.1 U.S. qt (2.0 ℓ)	2.1 U.S. gal (2.0 ℓ)
Front Bumper:	Chromed tubular steel	Chromed tubular steel
Rear Bumper:	Chromed tubular steel	Chromed tubular steel

MODEL	SL292C	GP292B
Electrical: Headlight Taillight Ignition key switch	12V 60/60W 12V 8W 12V 23W	12V 60/60W 12V 8W 12V 23W
Brake: Type Control	Disc brake Handle lever, left-hand operated	Disc brake Handle lever, left-hand operated
Throttle: Type	Handle lever, right-hand operated	Handle lever, right-hand operated
Accessories: Emergency starter rope Tool kit	Yes Yes	Yes Yes

'71 Models

MODEL	SL292
Dimensions and Weight: Length (W/Skis) Width Height (W/Windshield) Weight (approx.)	99-1/2 in. (2,526 mm) 32 in. (815 mm) 38 in. (965 mm) 310 lbs. (141 kg)
Engine: Type No. of cylinders Bore and stroke Displacement Max. Horse power Carburetor Lubrication system Ignition method Magneto output Spark plug	Air cooled two-cycle 5-port induction Cast iron sleeve aluminum cylinder 1 cylinder 73 x 70 mm (2.87 x 2.76 in.) 292 c.c. (17.6 cu.in.) 20 BHP @5,500 r.p.m. One (diaphragm-type) Mikuni "Autolube" oil injection Flywheel magneto 12V - 40W @3,000 r.p.m. N.G.K. B-7ES
Starting System:	Manual recoil starter with add'l emergency rope starter
Track and Suspension: Track Width Length on ground Suspension wheels Drive sprocket Wheel sprocket	Molded rubber, steel reinforced 15 in. (381 mm) 50 in. (1,270 mm) 12 rubber wheels bearing mounted Single, polyurethane, 9 teeth Single, polyurethane, 9 teeth
Transmission: Type Drive Reduction ratio	Automatic centrifugal engagement, infinitely variable 3.5 : 1 - 1 : 1 Duplex roller chain enclosed in oil bath 25/13 = 1.923 : 1
Frame: Type	Fabricated steel
Cowl: Type	Reinforced fiberglass (removable)
Seat:	Removable
Storage Box:	Fabricated steel, located behind backrest
Fuel Tank: Capacity	4.0 gal. (15.0 l)
Oil Tank: Capacity	2.1 qt. (2.0 l)
Front Bumper:	Chromed tubular steel
Rear Bumper:	Chromed tubular steel
Electrical: Headlight Taillight Ignition key switch	12V - 35/35W Hi-Lo beam 12V - 5W (rectangular) 4 position on dash

MODEL	SL292
Brake: Type Control	Disc brake Handle lever, left-hand operated
Throttle: Type	Handle lever, right-hand operated
Accessories: Emergency starter rope Tool kit Seat spring upper Spark plug	Yes Yes No Yes (B7Hz)

'72 Models

MODEL	SL292B	GP292
Dimensions and Weight:		
Length (W/Skis)	103-3/8 in. (2,625 mm)	103-3/8 in. (2,625 mm)
Width	33-1/2 in. (850 mm)	33-1/2 in. (850 mm)
Height (W/Windshield)	38 in. (965 mm)	38 in. (965 mm)
Weight (approx.)	320 lbs. (145 kg)	320 lbs. (145 kg)
Engine:		
Type	Air cooled two-stroke 5-port induction Cast iron sleeve aluminum cylinder	Air cooled two-stroke 5-port induction Cast iron sleeve aluminum cylinder
No. of cylinders	1 cylinder	1 cylinder
Bore and stroke	2.87 x 2.76 in. (73 x 70 mm)	2.87 x 2.76 in. (73 x 70 mm)
Displacement	17.6 cu.in. (292 c.c.)	17.8 cu.in. (292 c.c.)
Max. Horse power	20 BHP @5,500 r.p.m.	27 H.P. @6,000 r.p.m.
Carburetor	One (diaphragm-type) Mikuni BN38-34	One (diaphragm-type)
Lubrication system	"Autolube" oil injection	"Autolube" oil injection
Ignition method	Flywheel magneto	Flywheel magneto
Magneto output	12V - 40W @3,000 r.p.m.	12V - 40W @3,000 r.p.m.
Spark plug	N.G.K B-7ES	Champion N-2G
Starting System:	Manual recoil starter with add'l emergency rope starter	Manual recoil starter with add'l emergency rope starter
Track and Suspension:		
Track	Molded rubber, steel reinforced	Molded rubber, steel reinforced
Width	15 in. (381 mm)	15 in. (381 mm)
Length on ground	50 in. (1,270 mm)	50 in. (1,270 mm)
Suspension wheels	12 rubber wheels bearing mounted	12 rubber wheels bearing mounted
Drive sprocket	Single, polyurethane, 9 teeth	Single, polyurethane, 9 teeth
Wheel sprocket	Single, polyurethane, 9 teeth	Single, polyurethane, 9 teeth
Transmission:		
Type	Automatic centrifugal engagement, infinitely variable 3.5 : 1 - 1 : 1	Automatic centrifugal engagement, infinitely variable 3.5 : 1 - 1 : 1
Drive	Duplex roller chain enclosed in oil bath	Duplex roller chain enclosed in oil bath
Reduction ratio	25/13 = 1.923 : 1	25/13 = 1.923 : 1
Frame:		
Type	Fabricated steel	Fabricated steel
Cowl:		
Type	Reinforced fiberglass (removable)	Reinforced fiberglass (removable)
Ignition timing	0.102 in. (2.6 mm) B.T.D.C.	0.090 in. (2.3 mm) B.T.D.C.
Seat:	Removable	Removable (Racing seat)
Storage Box:	Fabricated steel, located behind backrest	
Fuel Tank:		
Capacity	4.0 gal. (15.0 ℓ)	4.0 gal. (15.0 ℓ)
Oil Tank:		
Capacity	2.1 qt. (2.0 ℓ)	2.1 qt. (2.0 ℓ)
Front Bumper:	Chromed tubular steel	Chromed tubular steel
Rear Bumper:	Chromed tubular steel	Chromed tubular steel

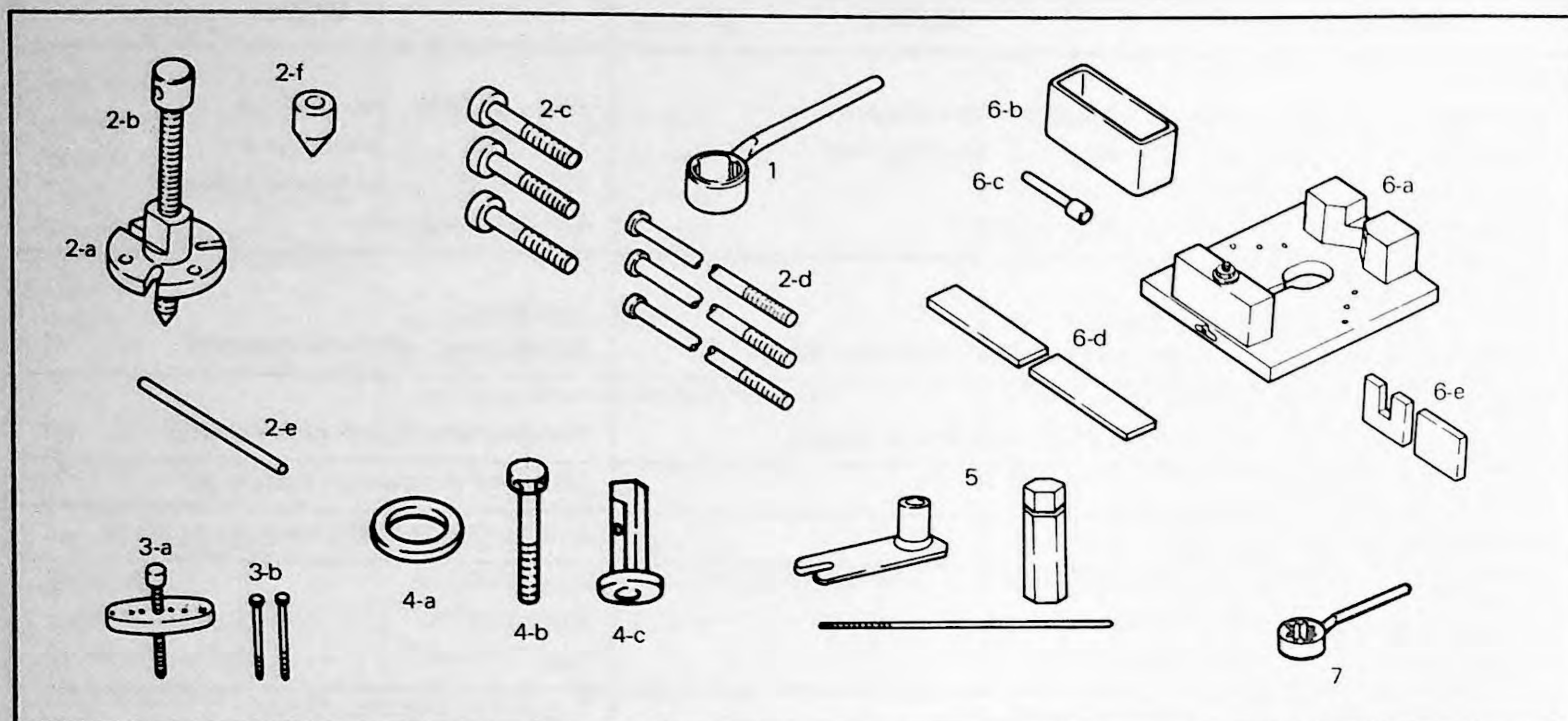
MODEL	SL292B	GP292
Electrical: Headlight Taillight Stop light Ignition key switch	12V - 35/35W Hi-Lo beam 12V - 5W (rectangular) 12V - 10W 4 position on dash	12V - 35/35W Hi-Lo beam 12V - 5W (rectangular) 12V - 10W with twin reflector 4 position on dash
Brake: Type Control	Disc brake Handle lever, left-hand operated	Disc brake Handle lever, left-hand operated
Throttle: Type	Handle lever, right-hand operated	Handle lever, right-hand operated
Tachometer:		Center of the steering handle bar
Speedometer:		Left-hand side of the instrument panel
Accessories: Emergency starter rope Service tool	Yes Yes	Yes Yes
Optional equipment parts:	Electric starter Speedometer Tachometer High windshield	Expansion muffler (SS kit) SR kit

Note:

The research and engineering departments of Yamaha are continually striving to further perfect the Snowmobile. Improvements and modifications are therefore inevitable. Information regarding changes will be forwarded to all Authorized Yamaha Snowmobile Dealers as soon as it is available.

1-3 TOOLS

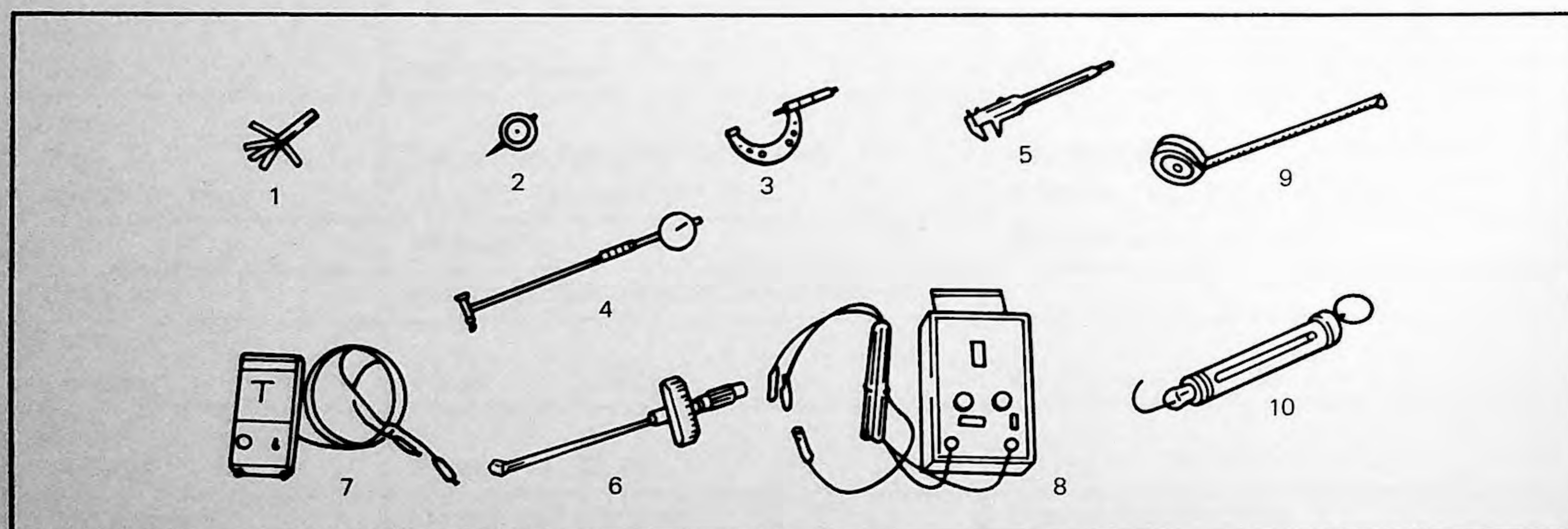
1. Special Tools



1. Bearing nut wrench (For primary sheave)	90890-01812	4. Crankshaft setting tool	
2. Flywheel/Primary sheave puller		4-a Spacer	90890-01818
2-a Body, magneto puller	90890-01802	4-b Crank setting bolt	90890-01020
2-b Screw, magneto puller	90890-01804	4-c Crank setting tool (Boss)	90890-01019
2-c Screw, 8 mm L: 80 mm (For flywheel magneto)	90890-01806	5. Ignition timing setting tool	
2-d Screw, 6 mm L: 160 mm (For primary sheave)	90890-01816	Dial gauge stand assembly	90890-01825
2-e Handle	90890-01817	6. Crankshaft assembly disassembling and reassembling jigs	
2-f Attachment, magneto puller	90890-01804	6-a Crank jig	90890-02300
3. Crankcase disassembling tool		6-b Press box	90890-02202
3-a Crankcase disassembling tool	90890-01011	6-c Press pin	90890-02203
3-b Bolt	90890-01819	6-d Support plates	90890-02204
		6-e Stops	90890-02215
		7. Socket and wrench	90890-01813

Fig. 1-1

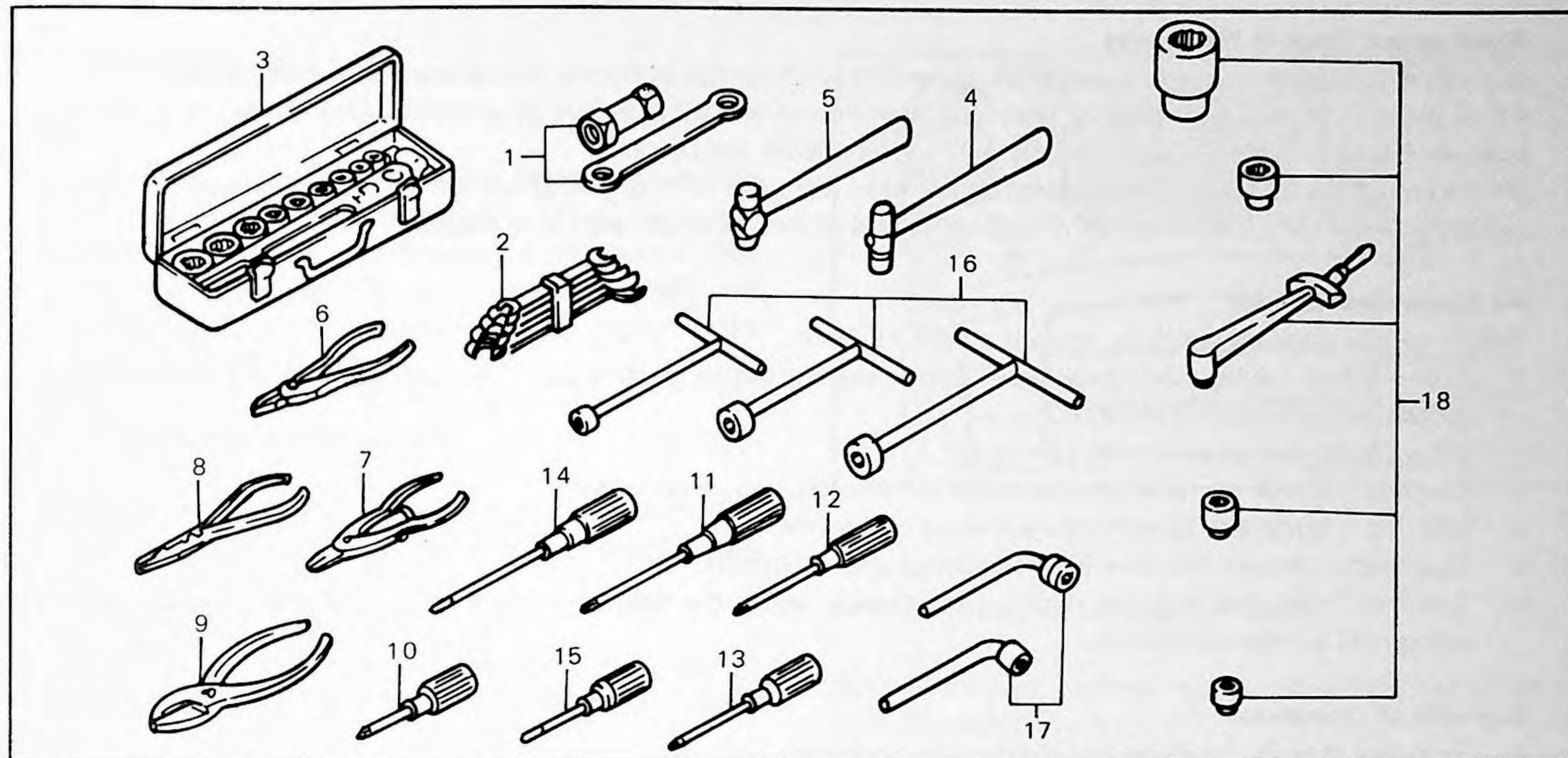
2. Gauges



1. Thickness gauge	6. Torque wrench
2. Dial gauge	7. Point checker
3. Micrometer	8. Coil tester
4. Cylinder gauge	9. Tape measure
5. Vernier caliper	10. Scale

Fig. 1-2

3. General Tools

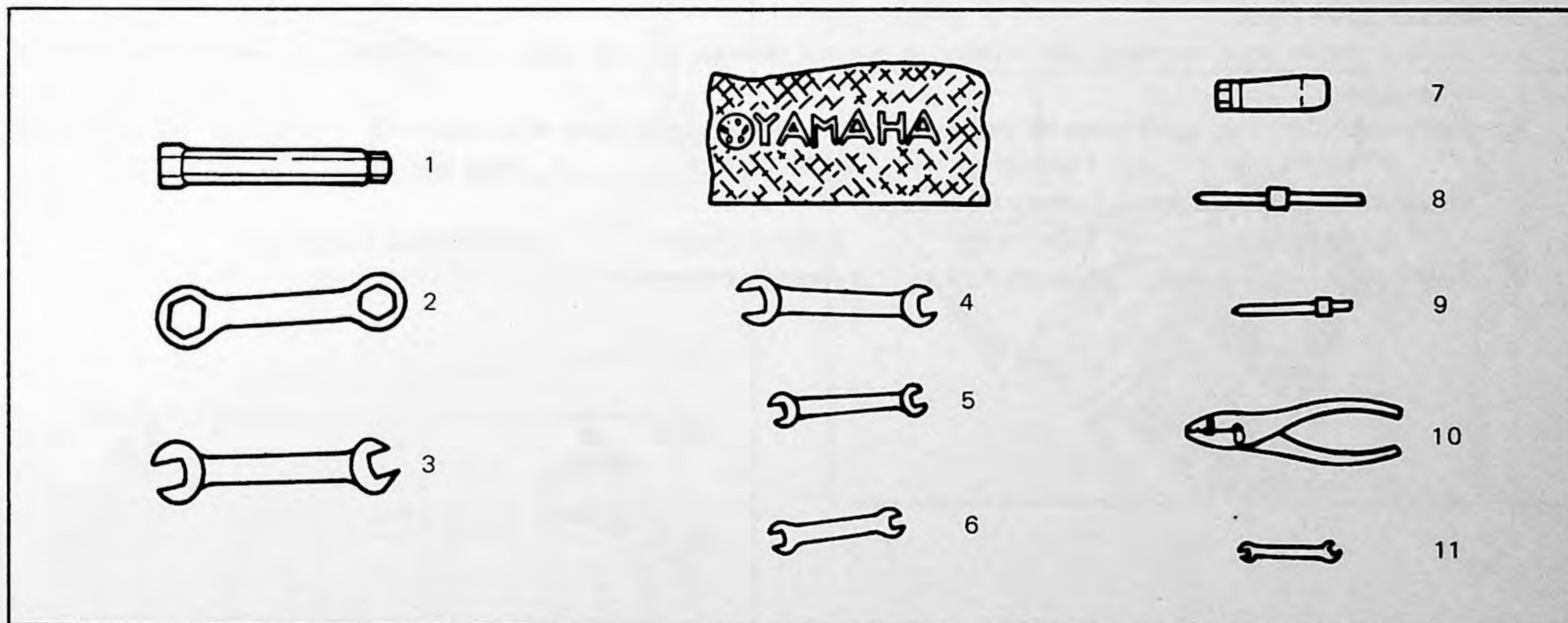


1. Plug wrench
2. Set of open-end wrenches
3. Set of socket wrenches
4. Soft-faced hammer
5. Steel hammer
6. Circlip pliers (ST type)
7. Circlip pliers (RT type)
8. Needle nose pliers
9. Pliers

10. Philips-head screw driver
11. Philips-head screw driver (large)
12. Philips-head screw driver (medium)
13. Philips-head screw driver (small)
14. Slot-head screw driver (medium)
15. Slot-head screw driver (small)
16. T-type socket wrench
17. L-type socket wrench
18. Torque wrench and sockets

Fig. 1-3

4. Standard Tool Kit



1. 13 x 21 mm Plug wrench
2. 29 x 22 mm Special wrench
3. 21 x 19 mm Open-end wrench
4. 17 x 13 mm Open-end wrench
5. 12 x 10 mm Open-end wrench
6. 8 x 7 mm Open-end wrench

7. Screw driver handle
8. Combination slotted and philips type screw drivers
9. Philips type screw driver
10. Pliers
11. Point wrench and feeler gauge

Fig. 1-4

1-4 OPERATION

1. Warm-up and Break-in Procedures

Each time the engine is started it should be allowed to reach normal operating temperature before being used.

When the unit is new, full speed or laborious operation in wet snow should be avoided. After 10 hours of operation, break-in is usually complete, and the unit will run both better and cooler.

At the end of the 10 hour break-in period, it would be advisable to thoroughly check nuts, bolts, and screws for tightness. Loose hardware can cause excessive vibration and lead to damage of the engine or chassis.

2. Pre-Operational Checks

Before operating the snowmobile, make it a habit to check:

- a. Fuel — When fueling, use straight gas. Check amount before starting out. The fuel tank holds approximately five gallons and is located in the shroud.
- b. Oil — Check level of oil in autolube tank.
- c. Controls — Check to make sure the brake and throttle operate correctly.
- d. Lighting — Make sure all lighting equipment is operable.
- e. Drive-belt — Inspect the drive belt for damage and adjustment.
- f. Track — Check the track for cracks. If necessary, adjust the tension of the track and align the track so that it is brought to a centered position.

3. Sequence of Operations

- a. Turn switch on by inserting key and turning clockwise.
- b. Depress carburetor choke lever — (Return to its original position when the engine will rev smoothly).
- c. Pull the starter — Firmly grasp the starter handle and pull slowly until engagement of the mechanism can be felt. Then, pull briskly, but be careful not to pull the cable so far out that it "bottoms". This will result in longer cable life.
Sometimes an engine will start better at a certain throttle opening. A little practice will insure immediate-starting.
- d. Warm up the engine — Once the engine is running cleanly, movement of the throttle lever will increase engine r.p.m. and cause engagement of the drive system.
- e. Regulate the speed of the snowmobile with various throttle positions. Since the throttle is spring loaded, the snowmobile will stop and the engine will return to an idle any time the hand is removed from the lever.
- f. The disc brake can be used to stop the snowmobile. It brakes the entire drive mechanism. It is actuated by the lever mounted on the left side of the handle lever.

4. Service and Spare Parts

- a. Always check your machine periodically to prevent damage to parts because of improper adjustments or wear of other parts.
- b. Carry tools with you at all times so that minor maintenance can be done when required. These tools should include:
1. Tool kit 2. Flashlight 3. Vinyl tape 4. Steel wire 5. Tow rope
- c. Spare parts recommended as a safety measure.
1. Drive belt 2. Light bulbs 3. Spark plugs 4. Emergency starter rope
- d. Fuel — When making long trips, extra fuel and oil should be carried.

CHAPTER 2. ENGINE

2-1 Engien Removal

Note:

For engine removal only, it is not necessary to remove the magneto assembly or primary sheave assembly. However, crankshaft maintenance does require, their removal. Maintenance of the magneto assembly and primary sheaves can be done with the engine in the snowmobile frame.

2-1-1 Removing the Double Seat

The double seat is bolted at its front and rear ends. The rear end is fastened with two 13 mm nuts located beneath the seat.

As for the front end, the SL292C double seat is secured with a panhead screw, and the GP292B with a 10 mm bolt.

Note:

The 10 mm bolt means that its distance across flats of the hexagon head is 10 mm.

Note:

Before removing the double seat, disconnect the stop/tail lamp connector at the front of the double seat.

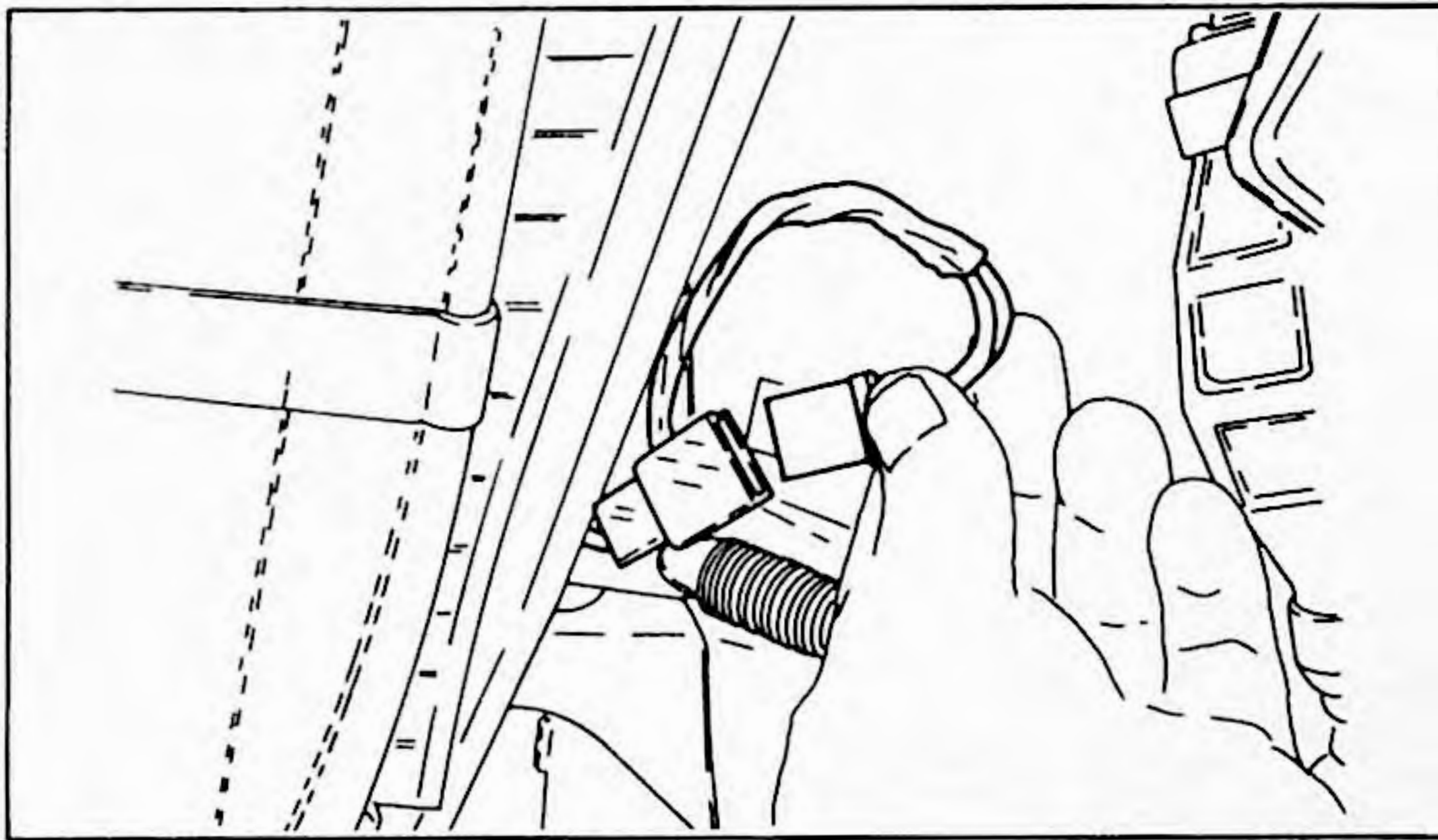


Fig. 2-1

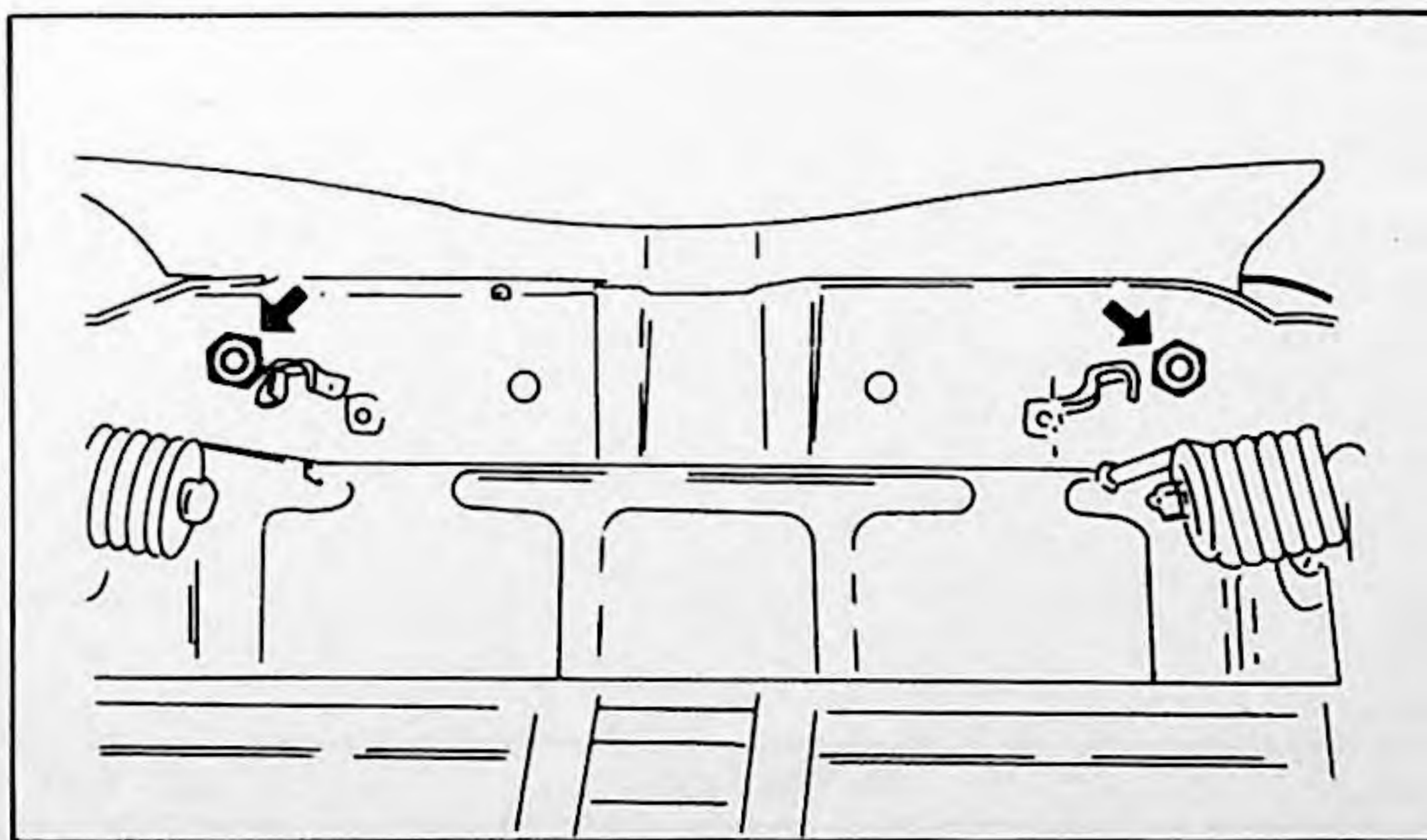


Fig. 2-2

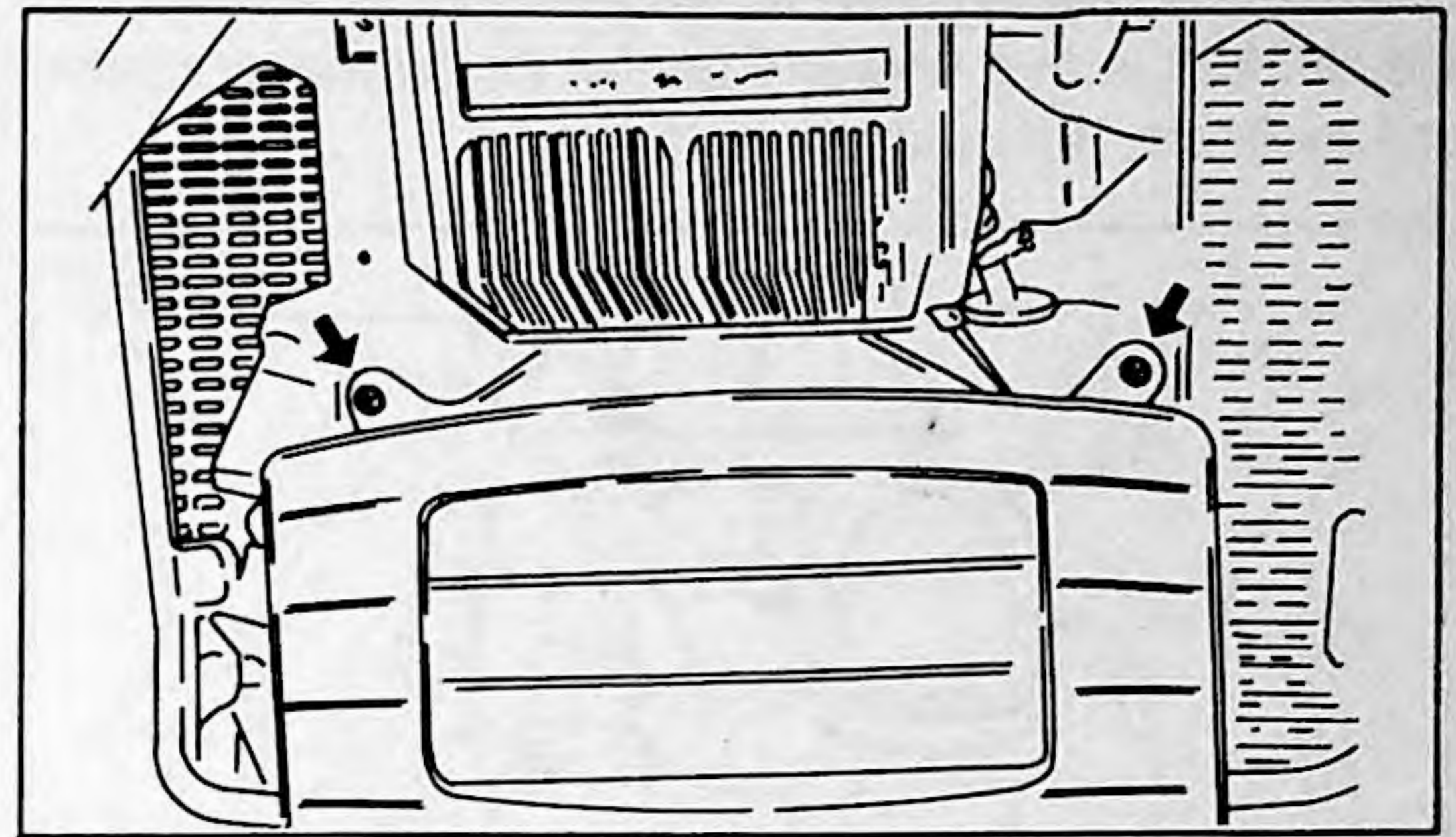


Fig. 2-3

2-1-2 Removing the Silencer Cover

Remove the four panhead screws, and remove the oil gauge from the silencer cover.

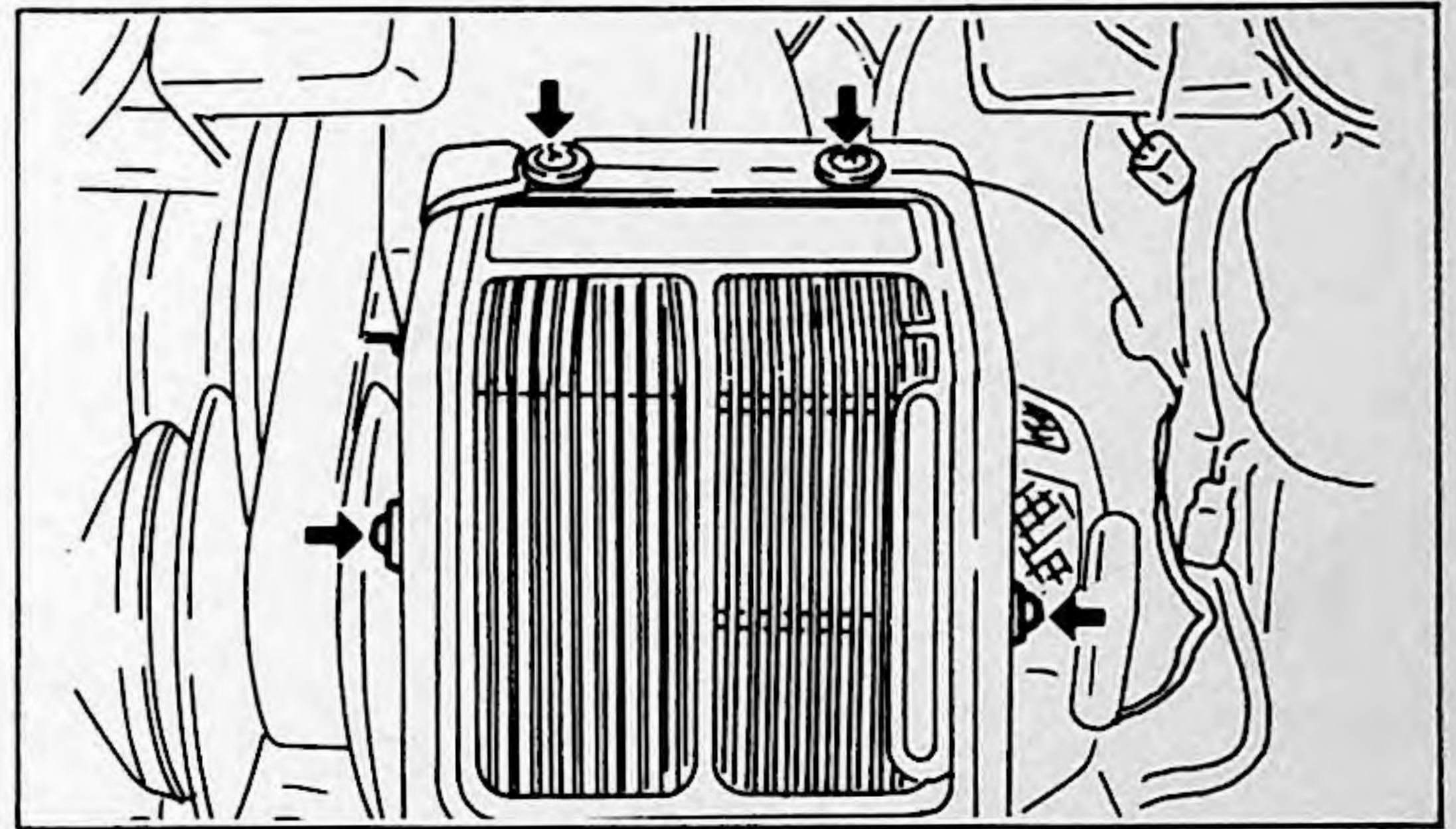


Fig. 2-4

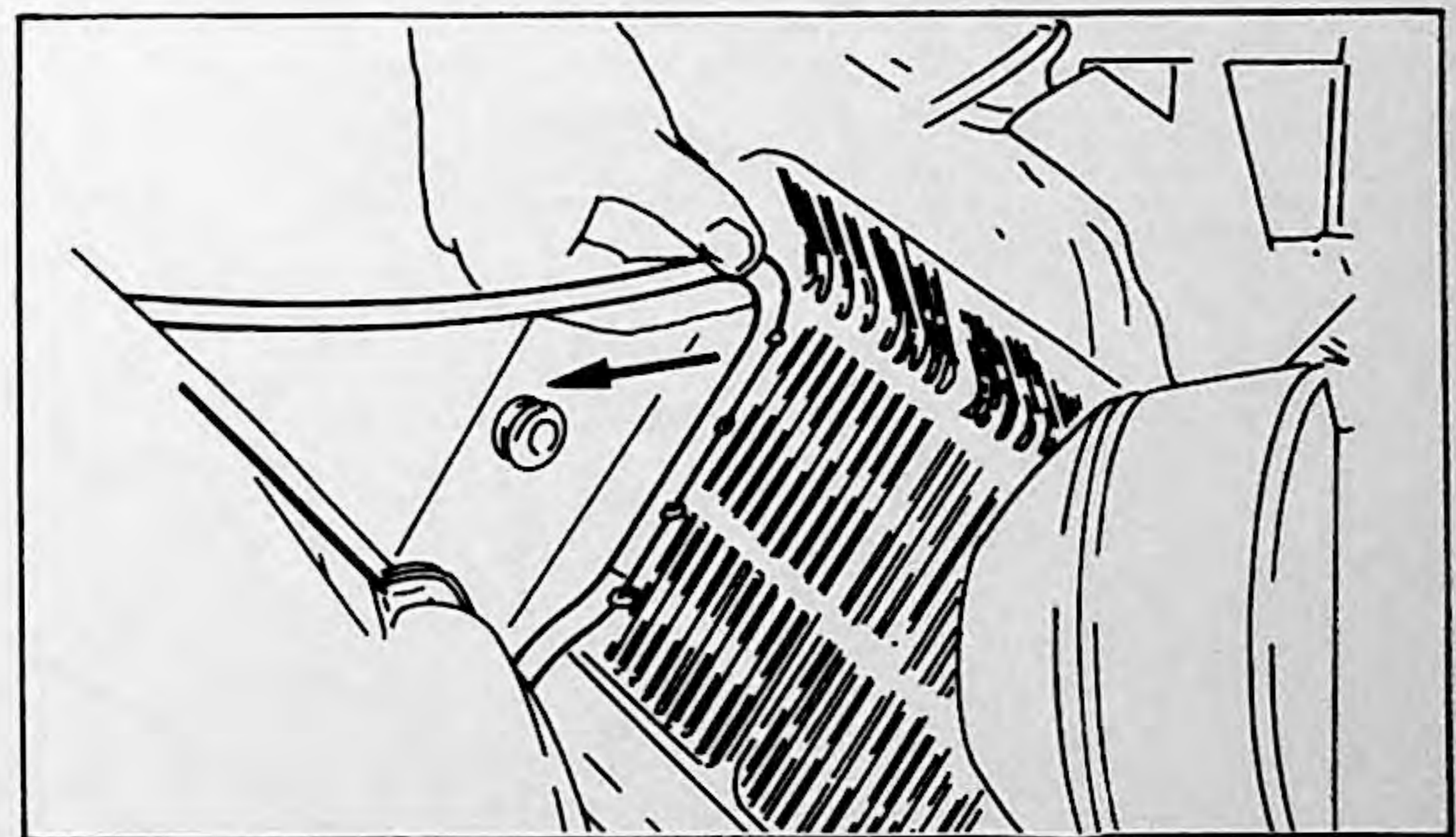


Fig. 2-5

2-1-3 Removing the Silencer

Remove the five panhead screws indicated by arrows. On the GP292B, a lock washer is used at the carburetor intake, and therefore, it should be bent flat.

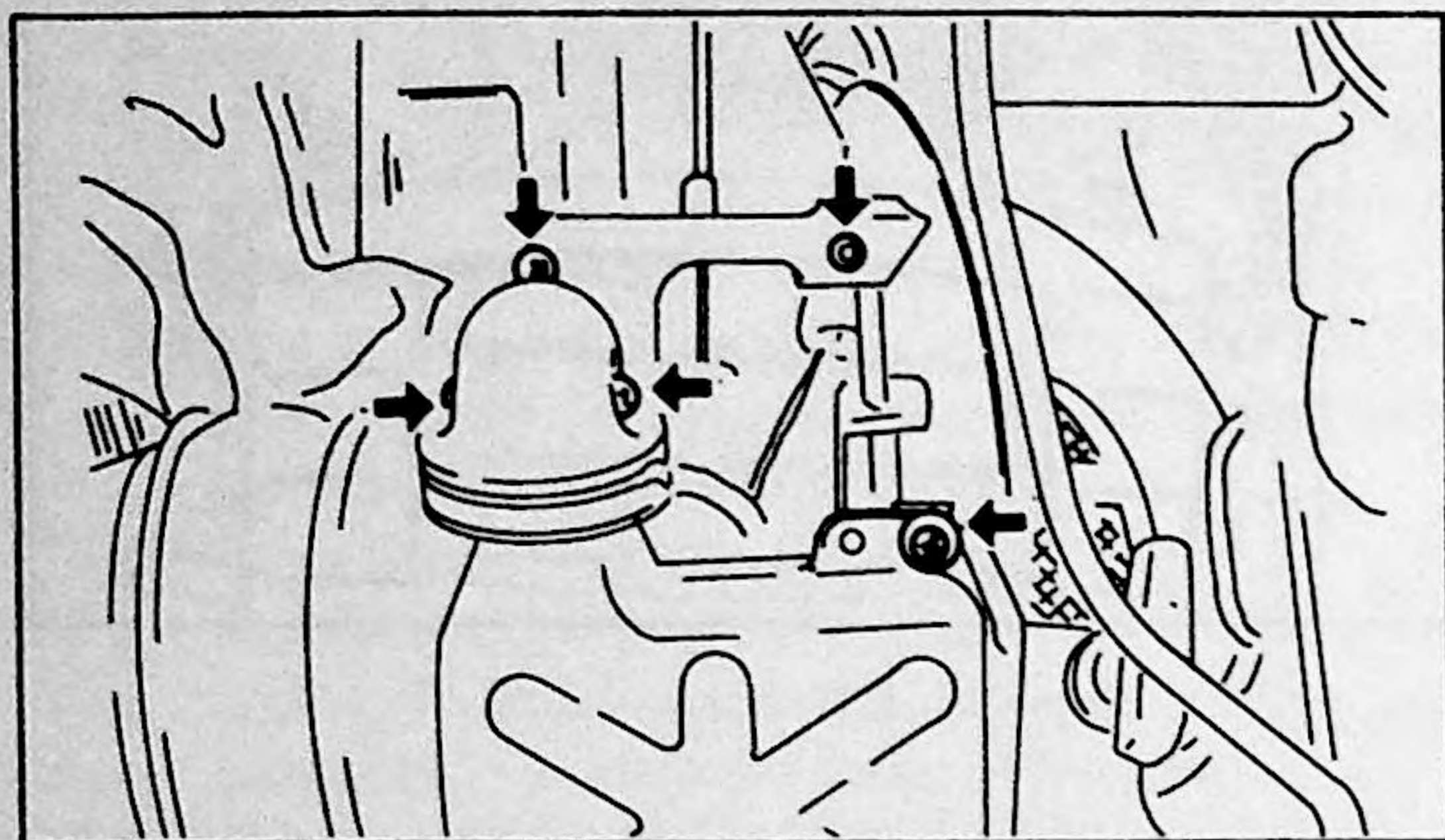


Fig. 2-6

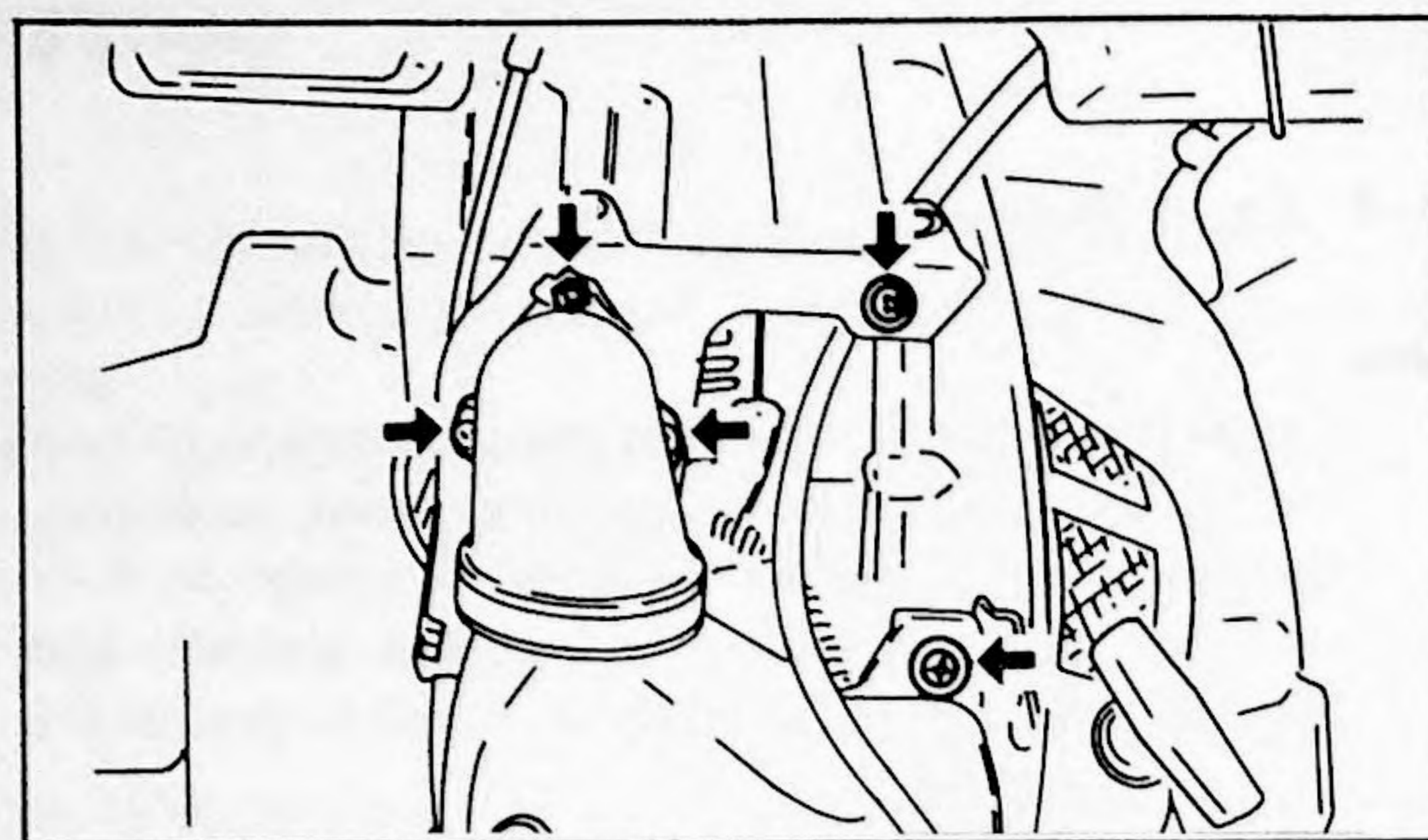


Fig. 2-7

INTAKE

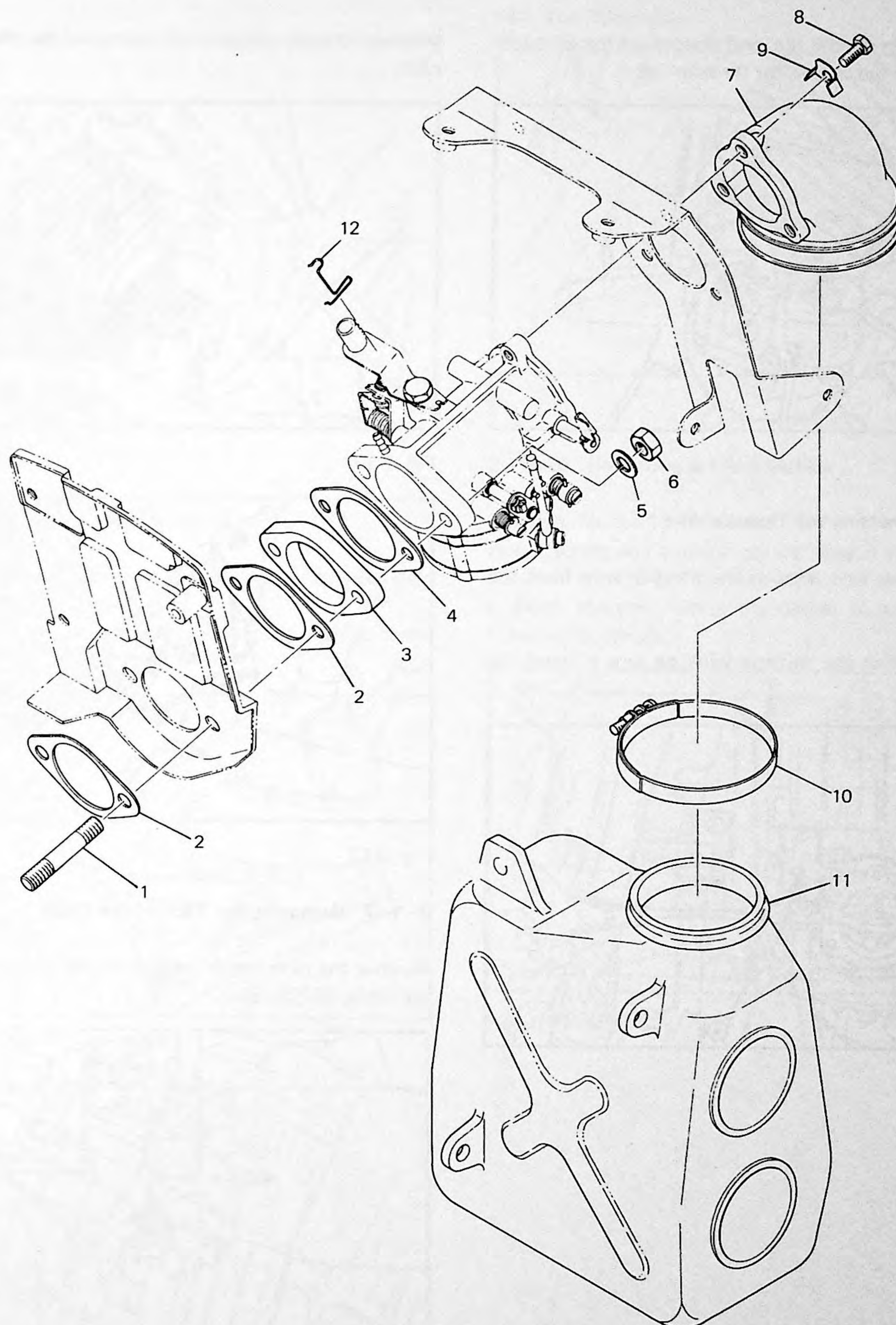


Fig. 2-8

Ref. No.	Description	Q'ty	Ref. No.	Description	Q'ty
1	STUD	2	7	JOINT, silencer	1
2	GASKET	2	8	BOLT	3
3	JOINT	1	9	PLATE, lock	3
4	GASKET	1	10	BAND	1
5	WASHER, spring	2	11	SILENCER	1
6	NUT	2	12	CLAMP, throttle	1

2-1-4 Disconnecting the Oil Pump Control Rod

Loosen the 6 mm double nut, and disconnect the oil pump control rod from the carburetor throttle link.

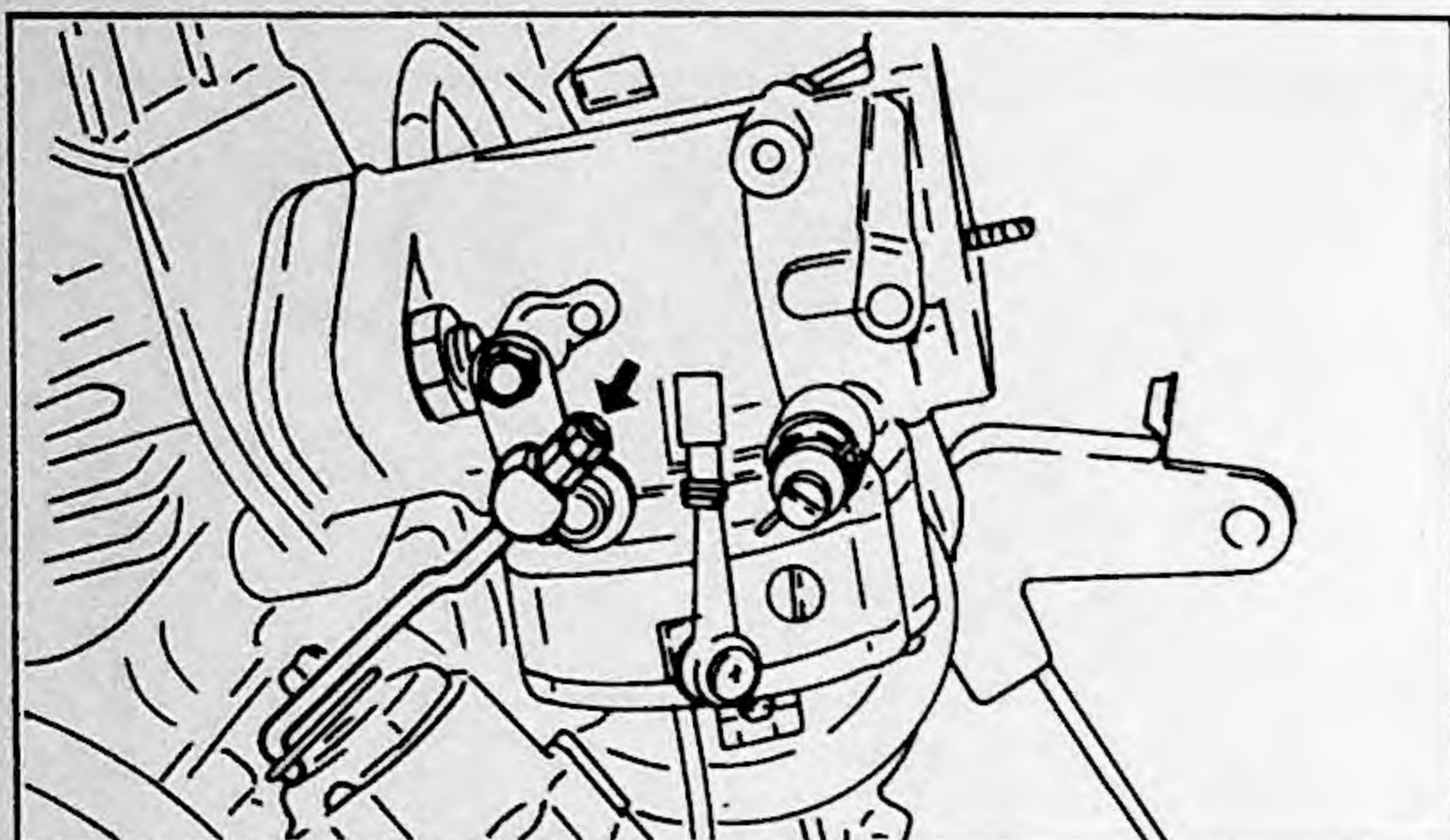


Fig. 2-9

2-1-5 Disconnecting the Throttle Wire

Loosen the screw, and remove the throttle wire from the carburetor.

Note:

After installing the throttle wire, be sure to bend the wire end.

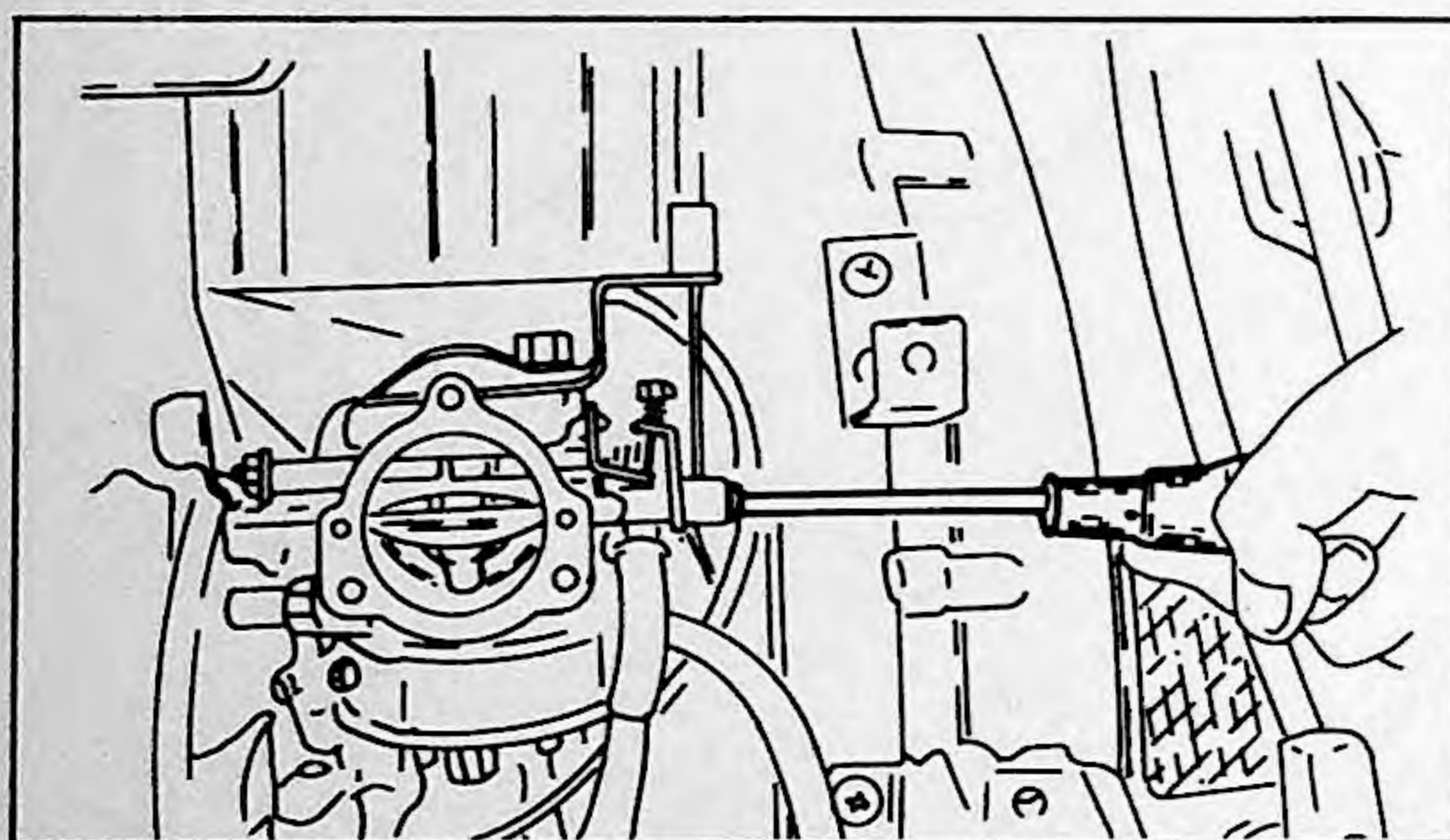


Fig. 2-10

2-1-6 Disconnecting the Decompression Cable

Remove the air shroud, and remove the decompression cable.

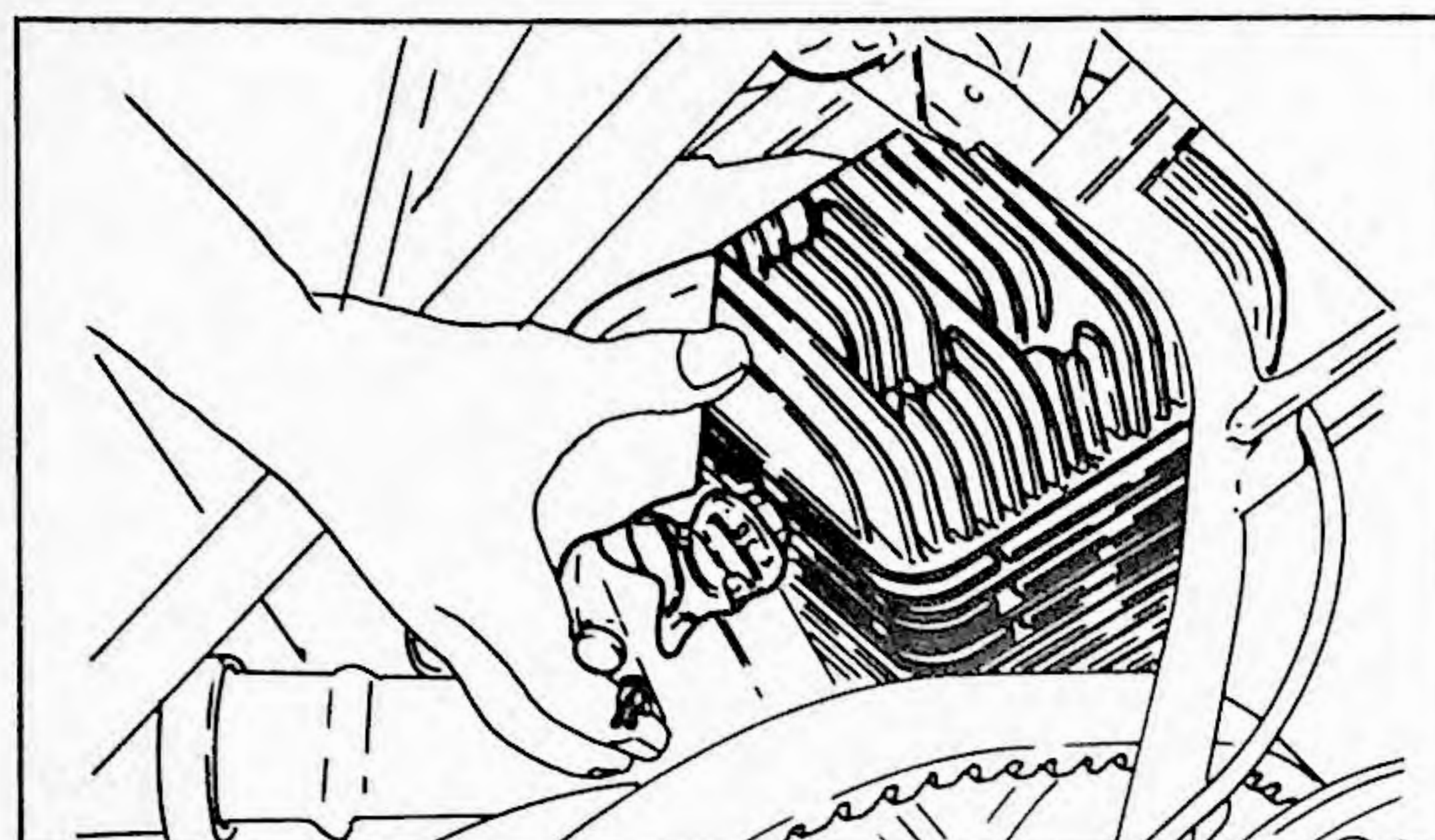


Fig. 2-11

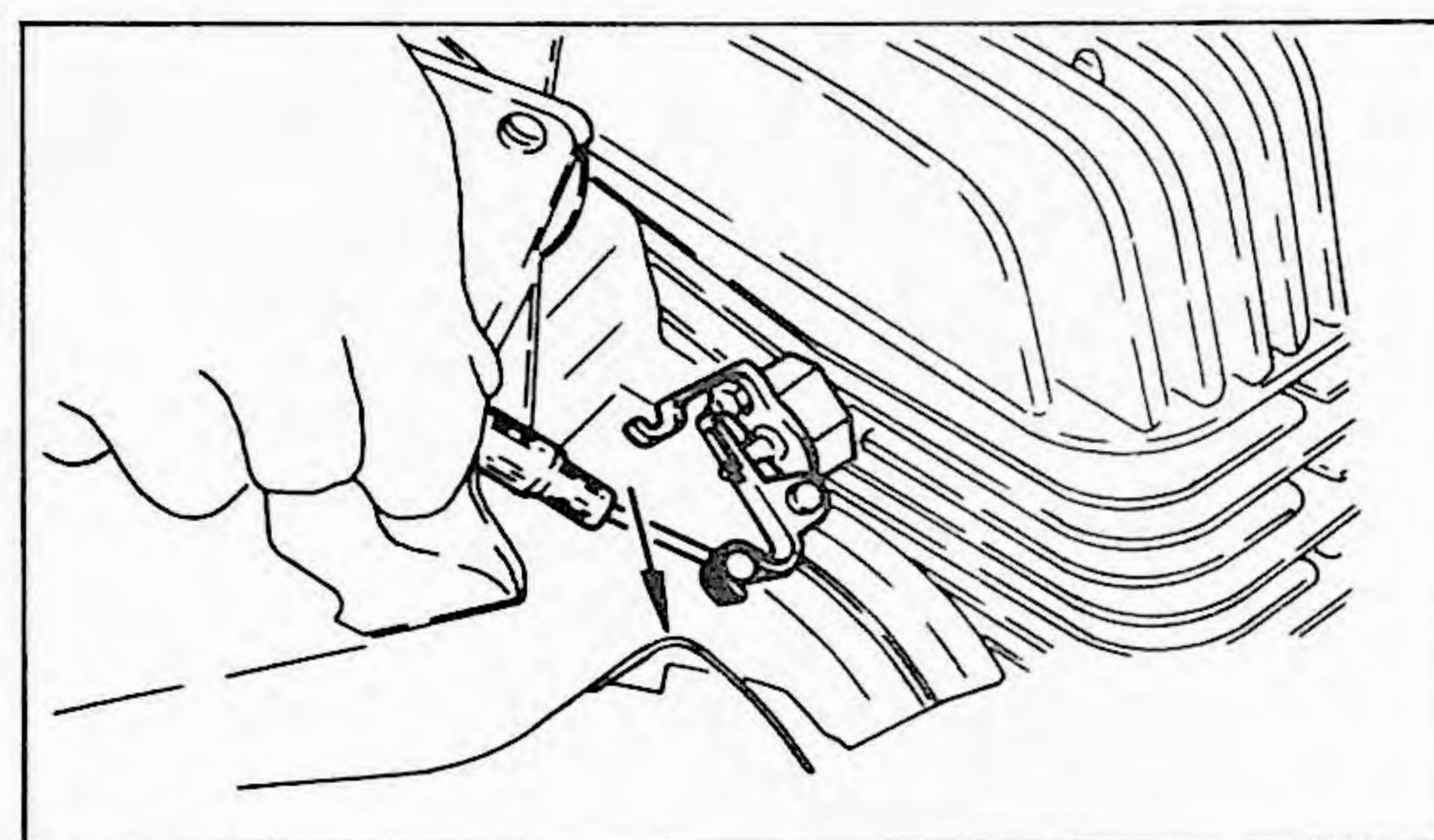


Fig. 2-12

2-1-7 Removing the Tachometer Cable

Remove the tachometer cable from the oil pump by turning the cable. (GP292B)

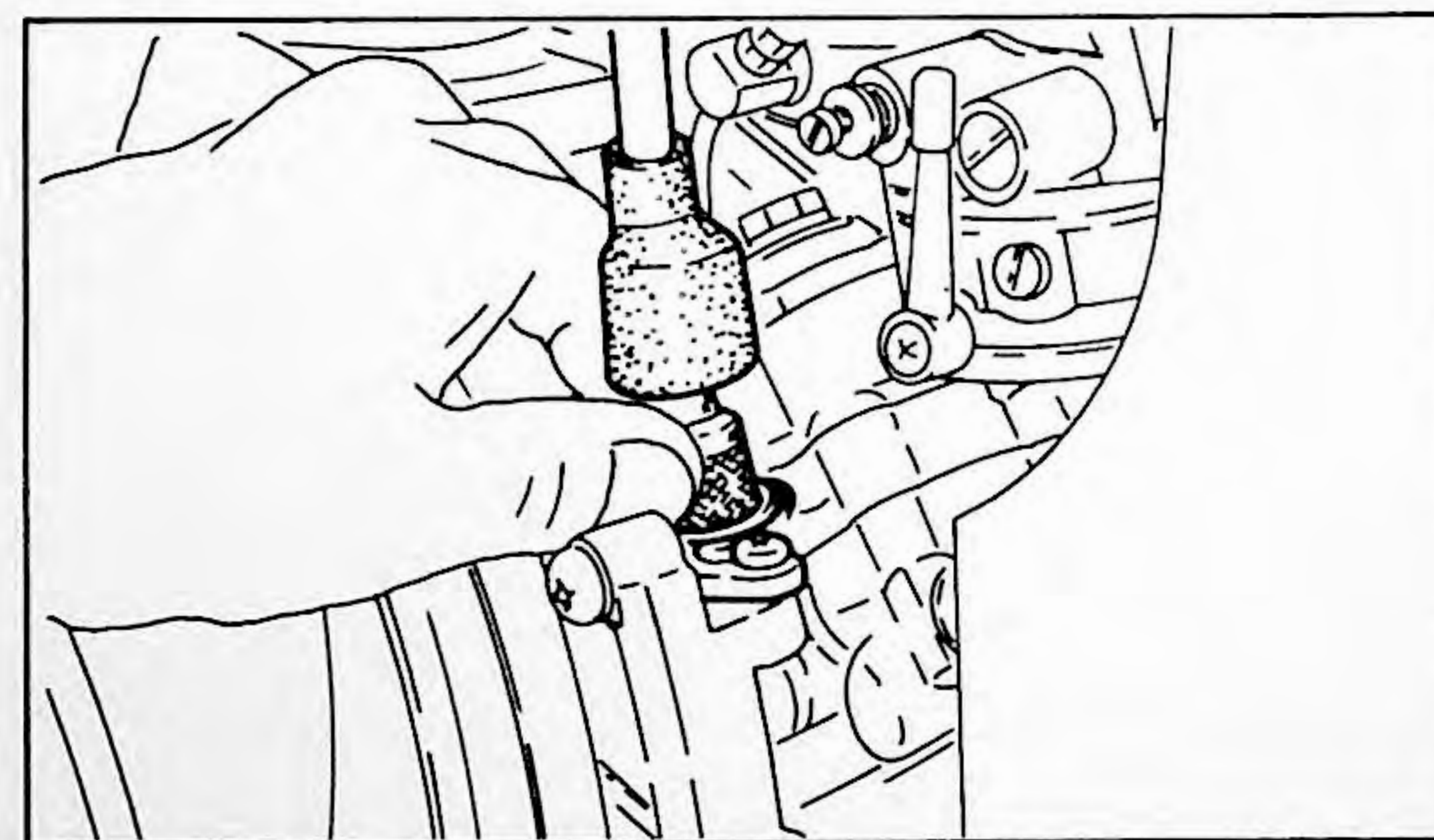


Fig. 2-13

2-1-8 Disconnecting the Flywheel Magneto Leads

Disconnect the leads coming from the flywheel magneto at the connector.

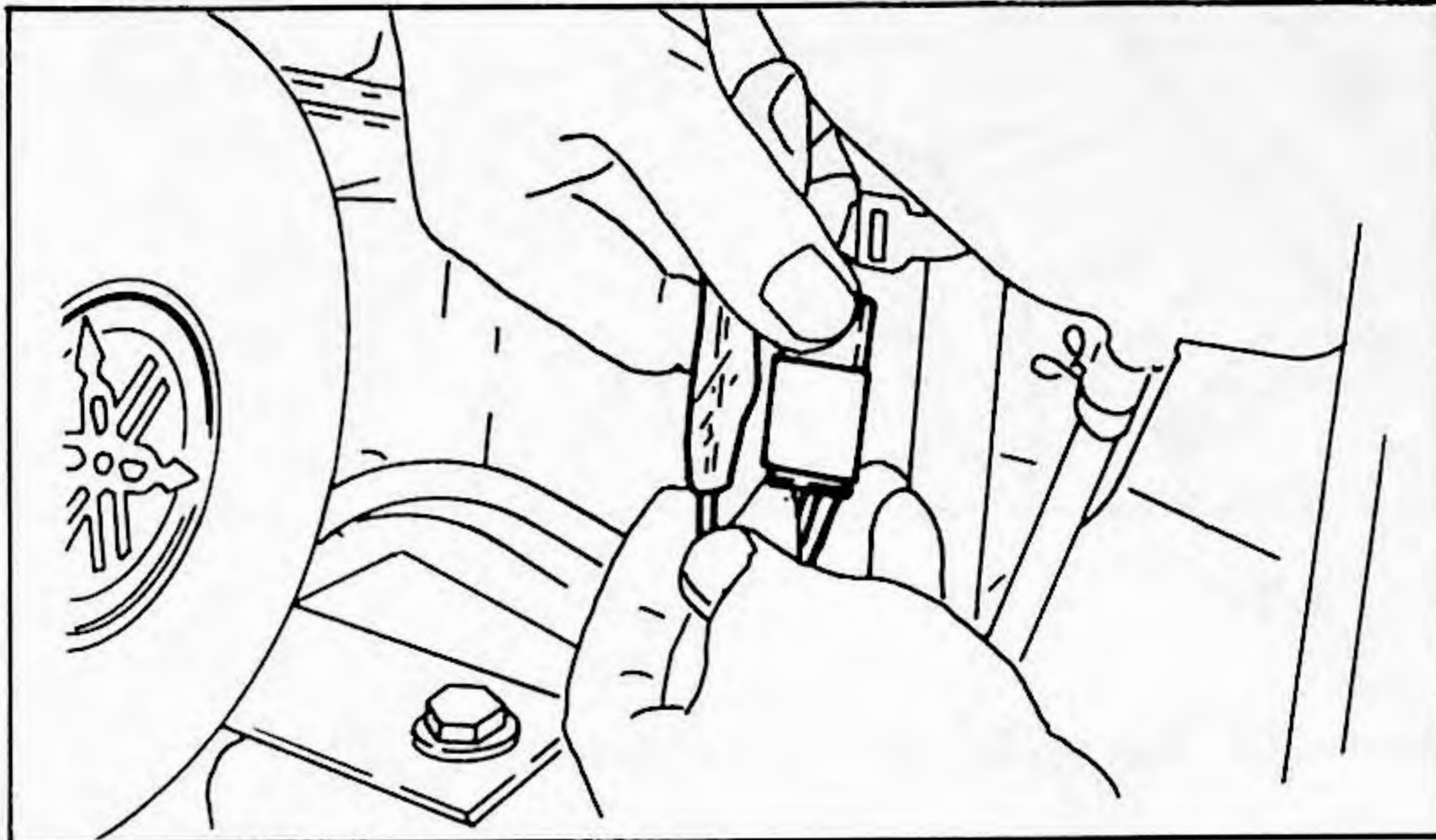


Fig. 2-14

2-1-9 Removing the Muffler Ass'y

Remove the two coil springs at the joint of the exhaust pipe and the muffler ass'y.

Also remove the two 13 mm bolts setting the muffler to the frame.

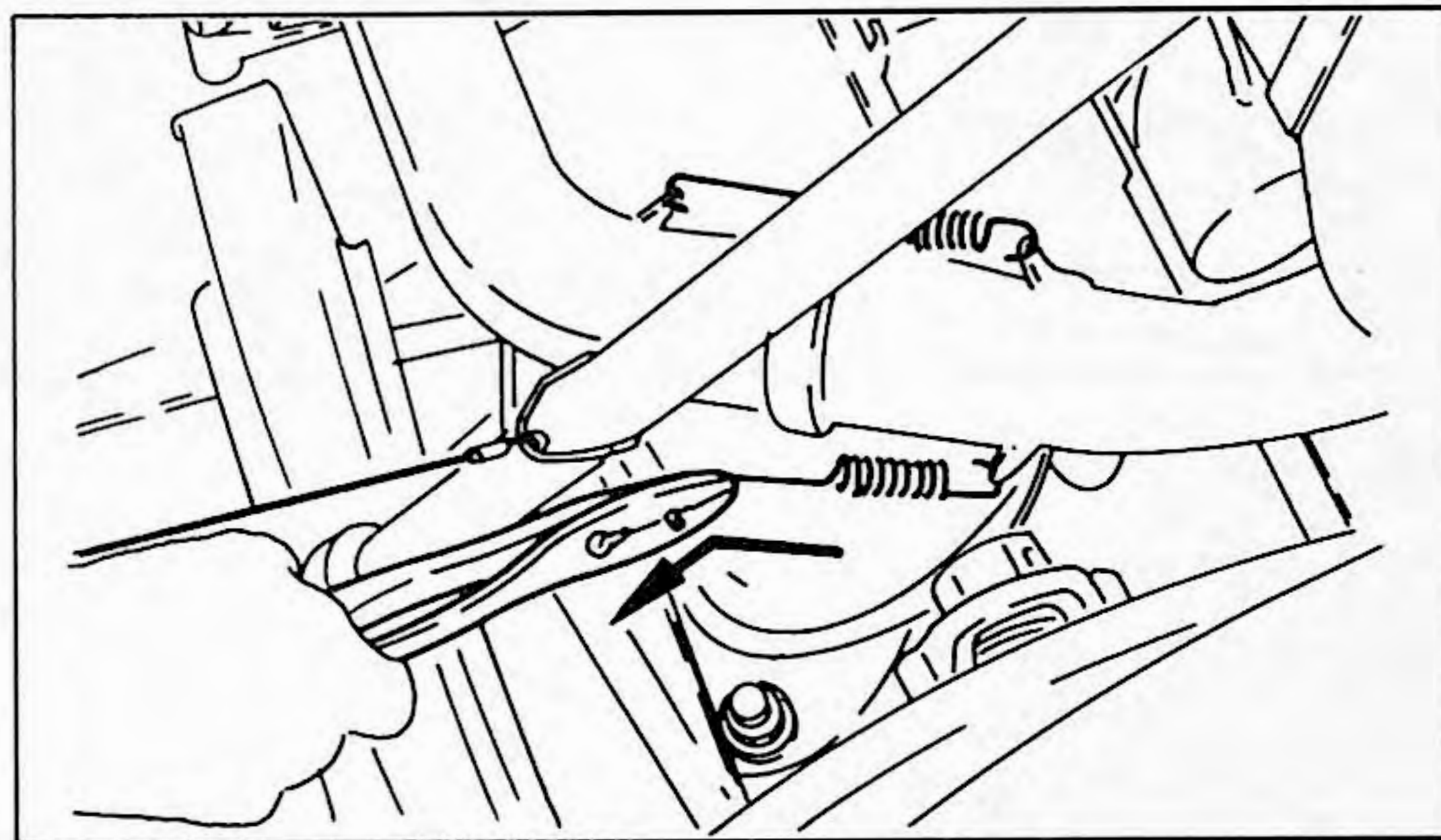


Fig. 2-15

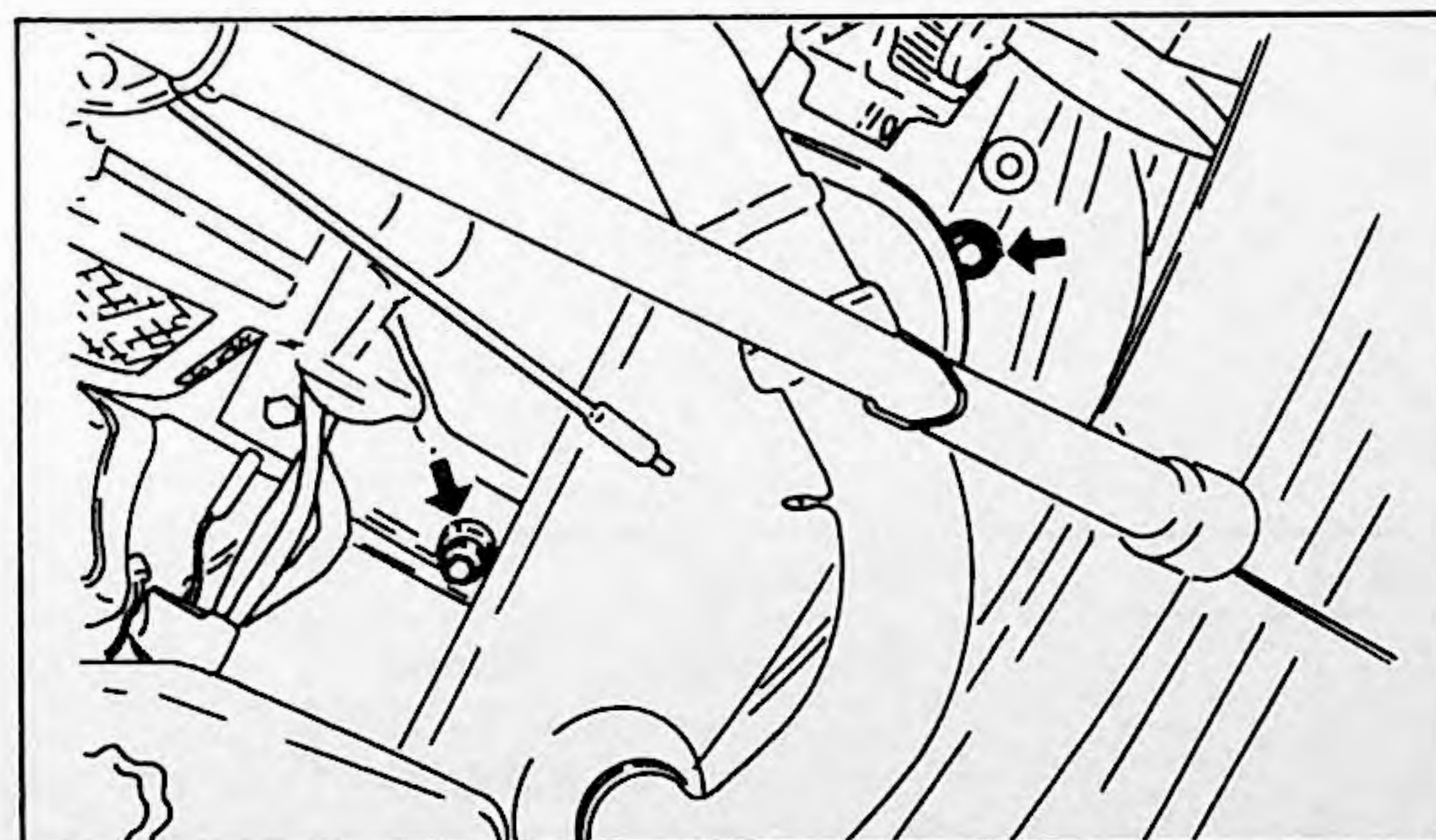


Fig. 2-16

Remove the four 13 mm bolts, and remove the exhaust pipe from the engine.

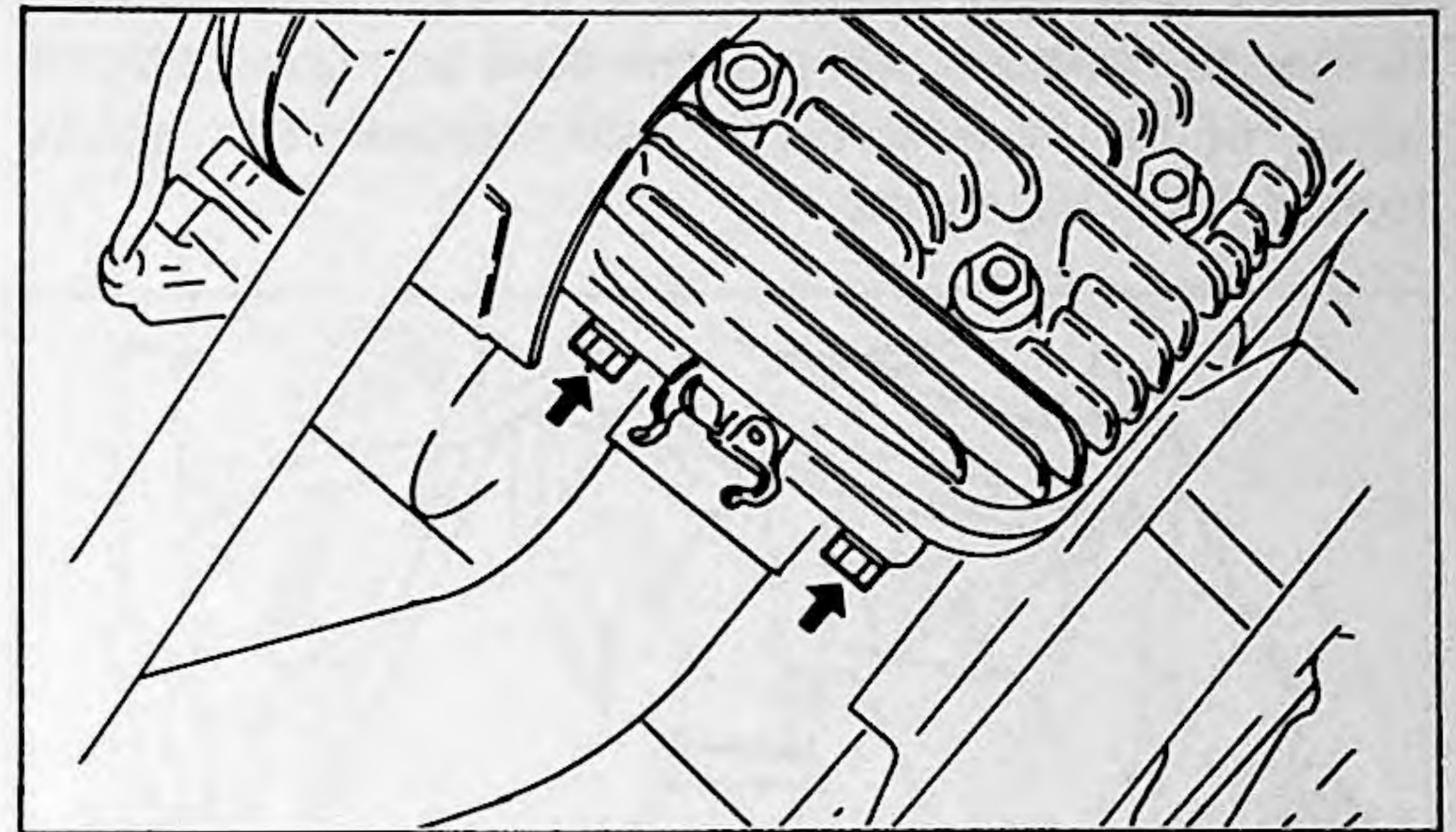


Fig. 2-17

2-1-10 Removing the Sub Muffler

Remove the two 13 mm bolts.

A coil spring and a gasket are installed at the joint between the main muffler and the sub muffler. The spring is used as a shock absorber, while the gasket is used as a seal to prevent gas leakage.

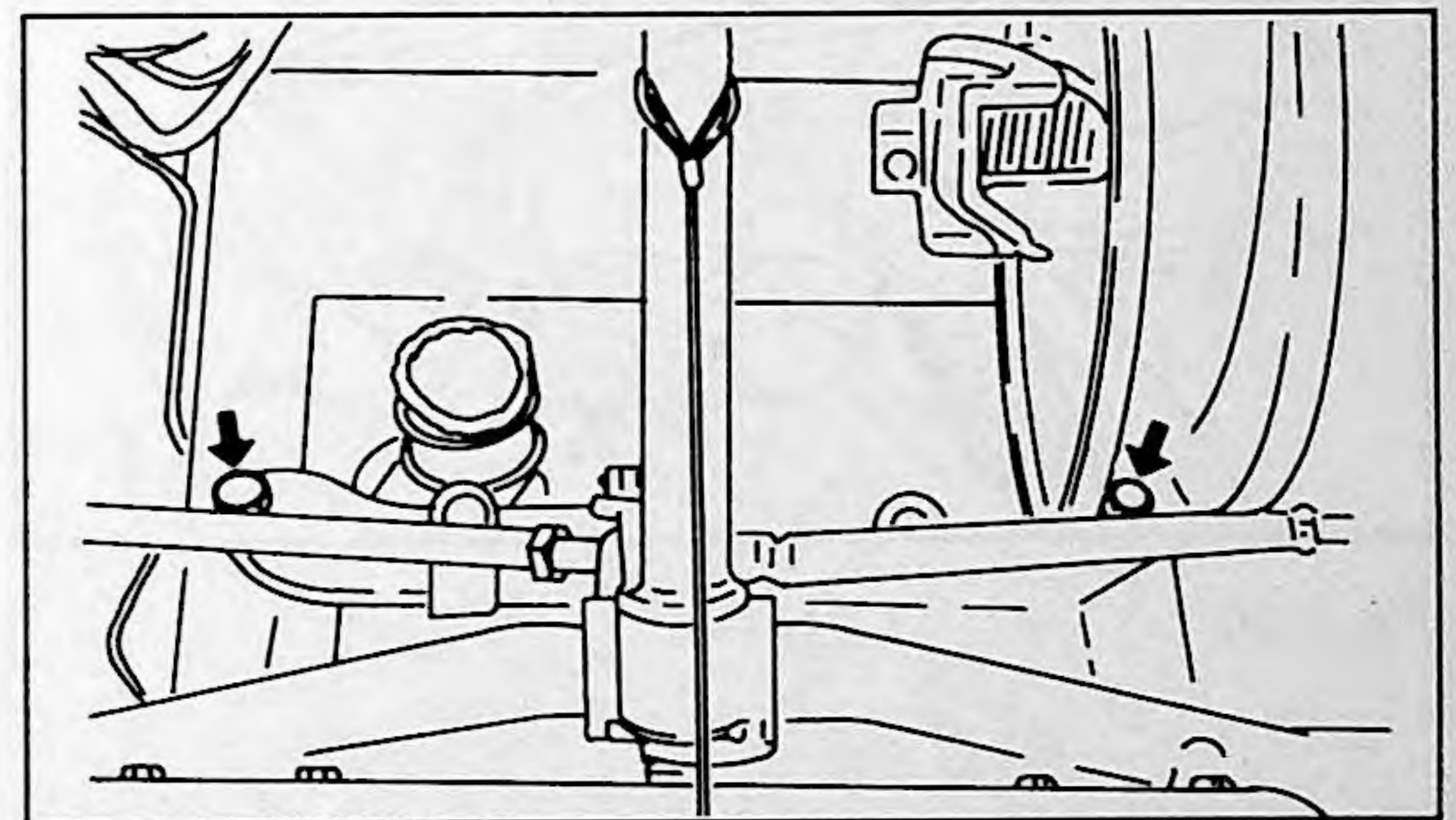


Fig. 2-18

2-1-11 Removing the Drive Belt (V-belt)

Push the secondary sliding sheave to the other side while turning to the right, and pull the drive belt upward at the center of its upper section. Then, remove it by pulling toward the sliding sheave.

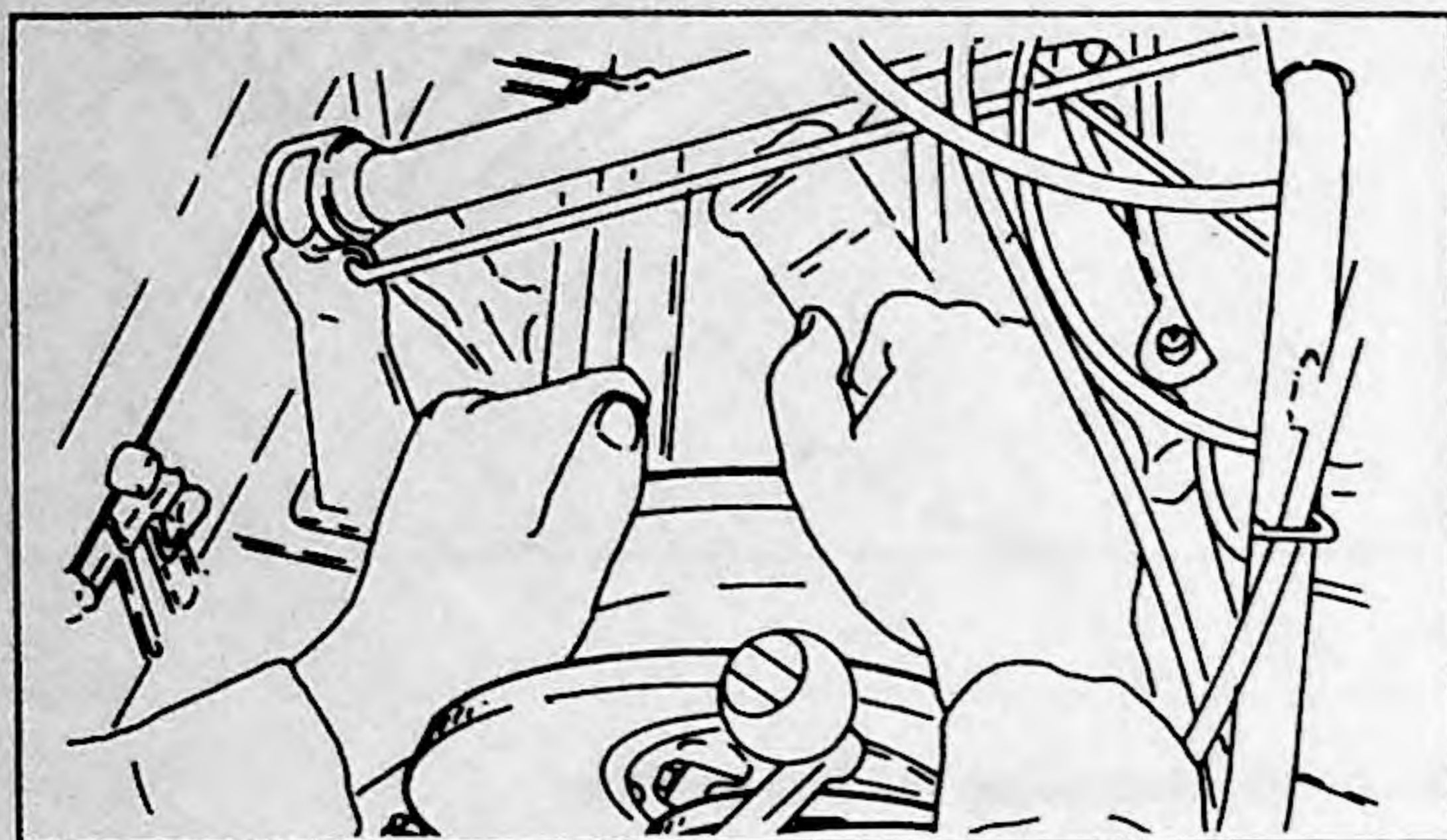


Fig. 2-19



Fig. 2-20

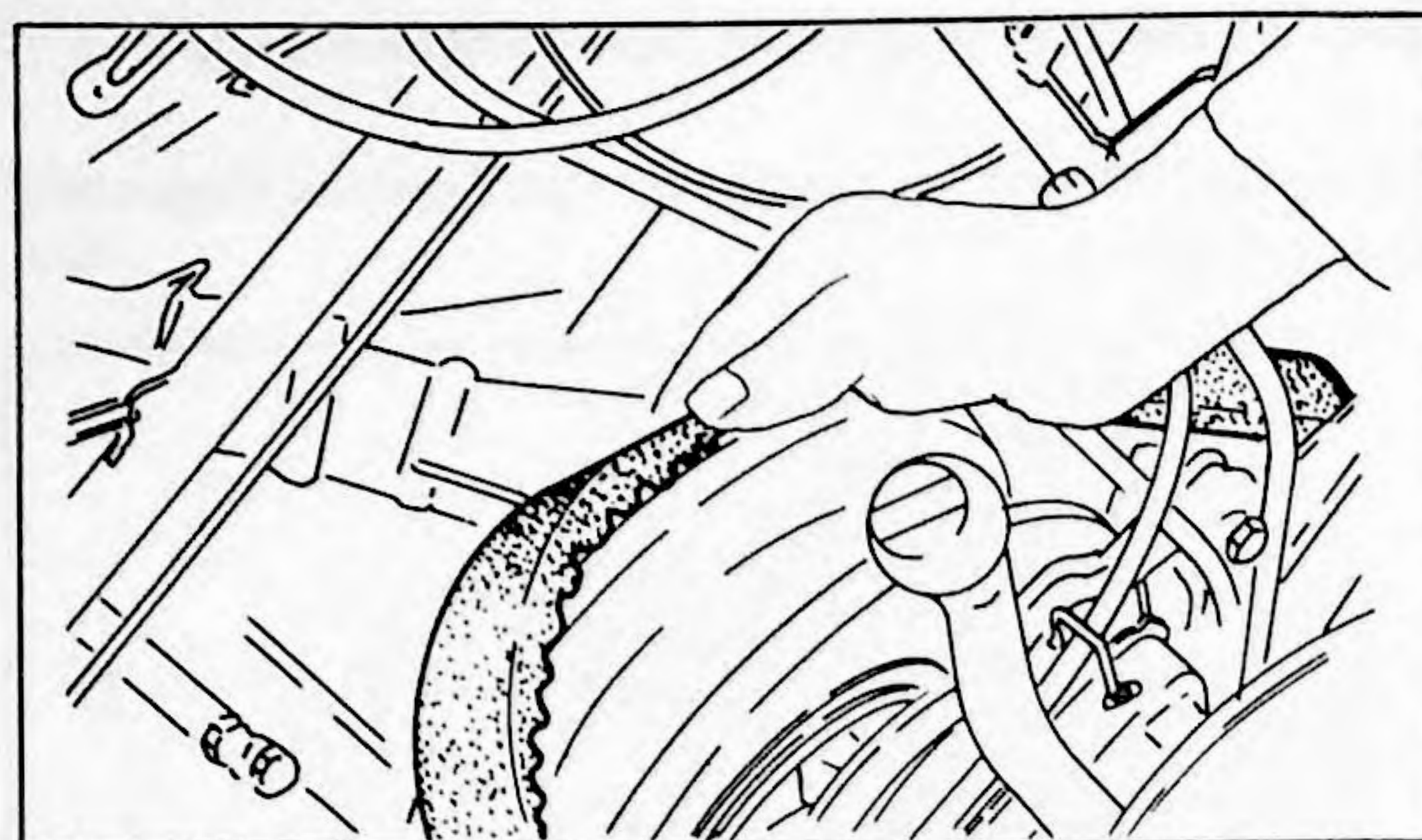


Fig. 2-21

2-1-12 Removing the Engine Mounting Bolt

Loosen the four 17 mm bolts on the engine lower bracket held to the frame.

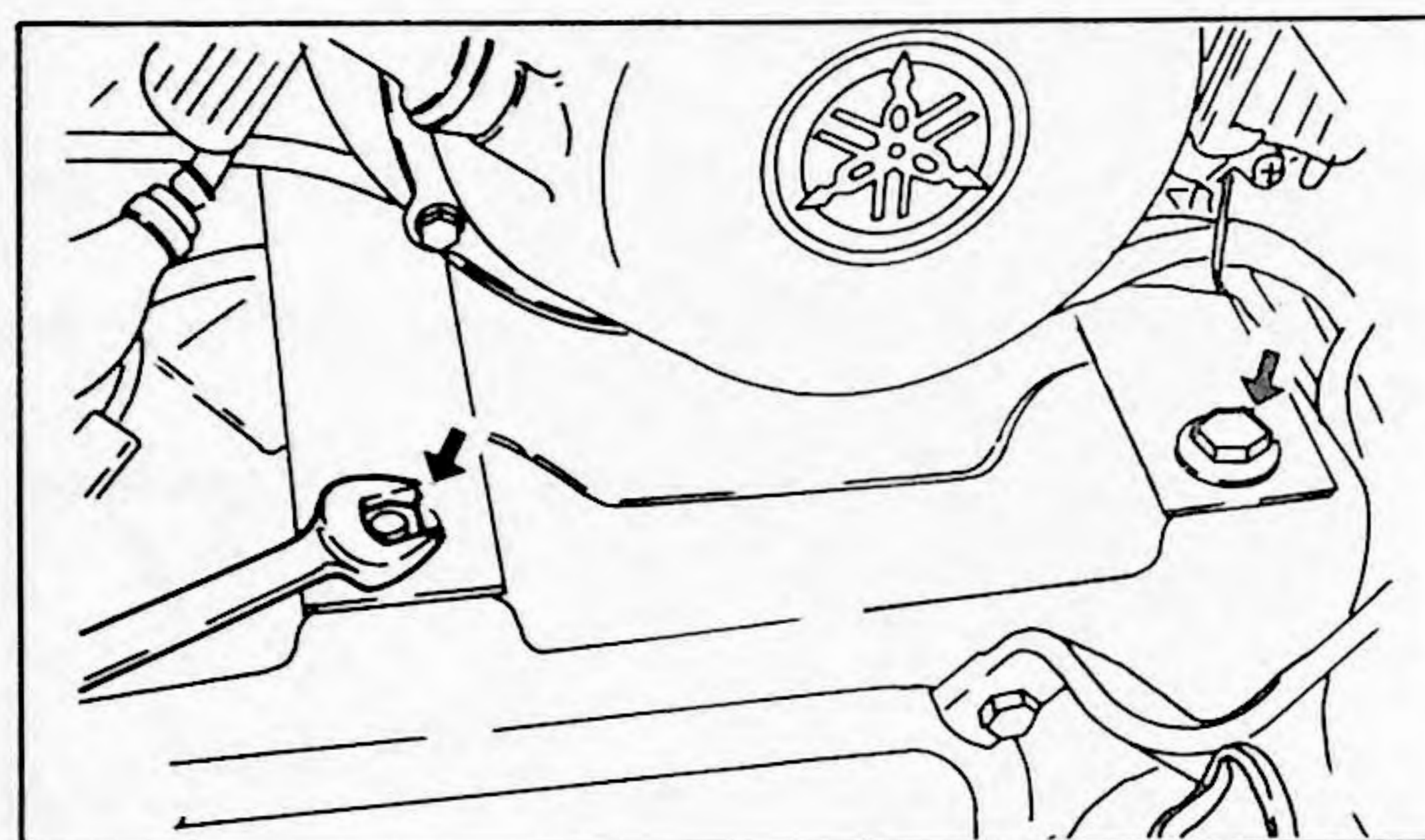


Fig. 2-22

2-1-13

At this time, the engine is ready for removal from the snowmobile. Grasp the engine firmly at each end, slide the engine assembly back and lift out, place the engine on a

bench suitable for further disassembly. Always make sure that the work area is clean to avoid and possible damage to the engine during assembly.

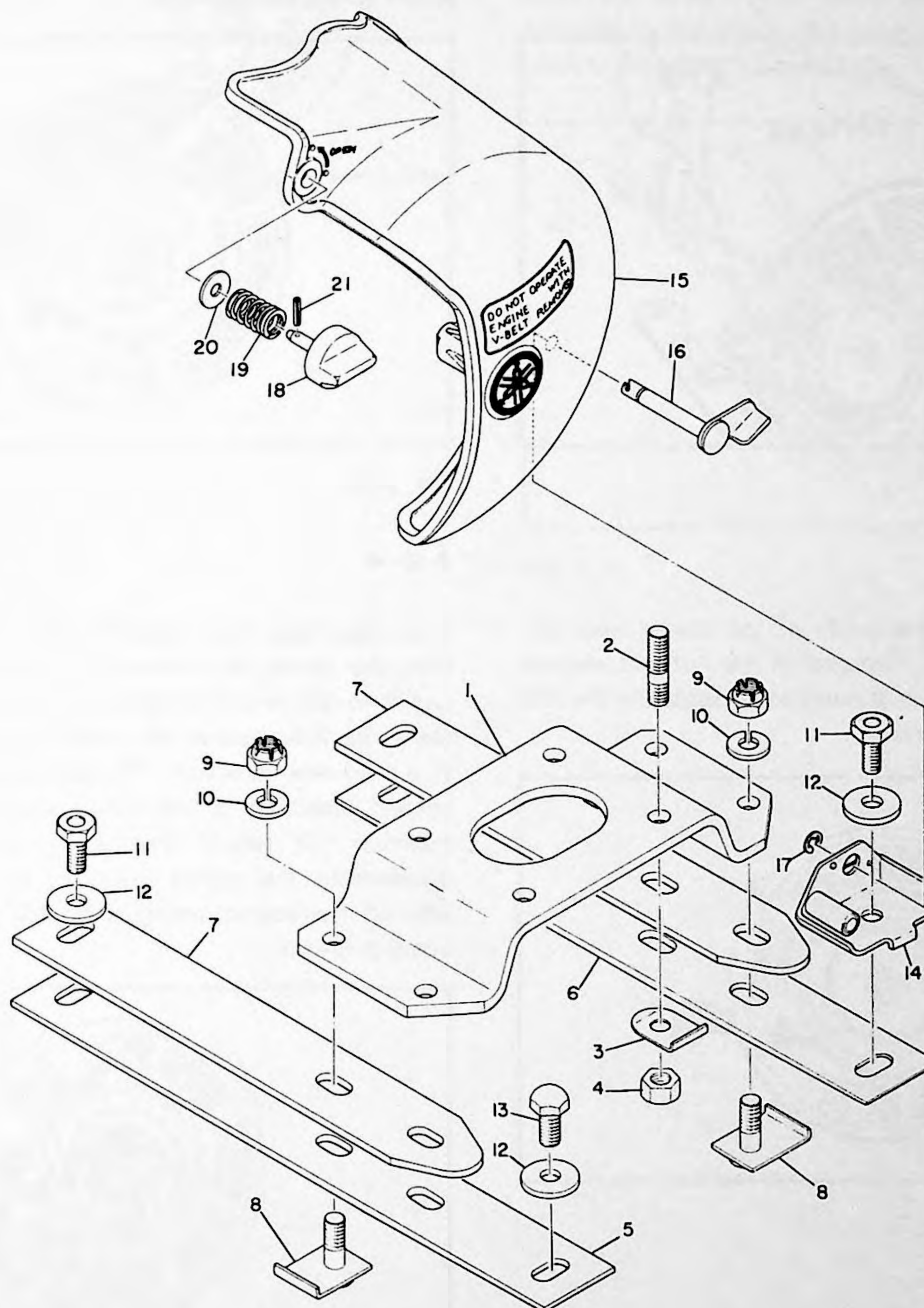


Fig. 2-23

Ref. No.	Description	Q'ty	Ref. No.	Description	Q'ty
1	BRACKET, engine upper	1	12	WASHER 2	4
2	BOLT, stud	4	13	BOLT, engine mounting 2	1
3	WASHER, lock	4	14	BRACKET, guard drive	1
4	NUT	4	15	GUARD, drive	1
5	BRACKET, engine lower front	1	16	ARM, fitting	1
6	BRACKET, engine lower rear	1	17	CIRCLIP (E-6)	1
7	BRACKET, engine lower right	2	18	KNOB	1
8	BOLT	4	19	SPRING 1	1
9	NUT	4	20	WASHER	1
10	WASHER, spring	4	21	PIN, spring	1
11	BOLT, engine mounting 1	3			

2-2 STARTER AND MAGNETO REMOVAL

2-2-1

Remove the four bolts that hold the manual starter assembly to the engine. The manual starter assembly will now slide off.

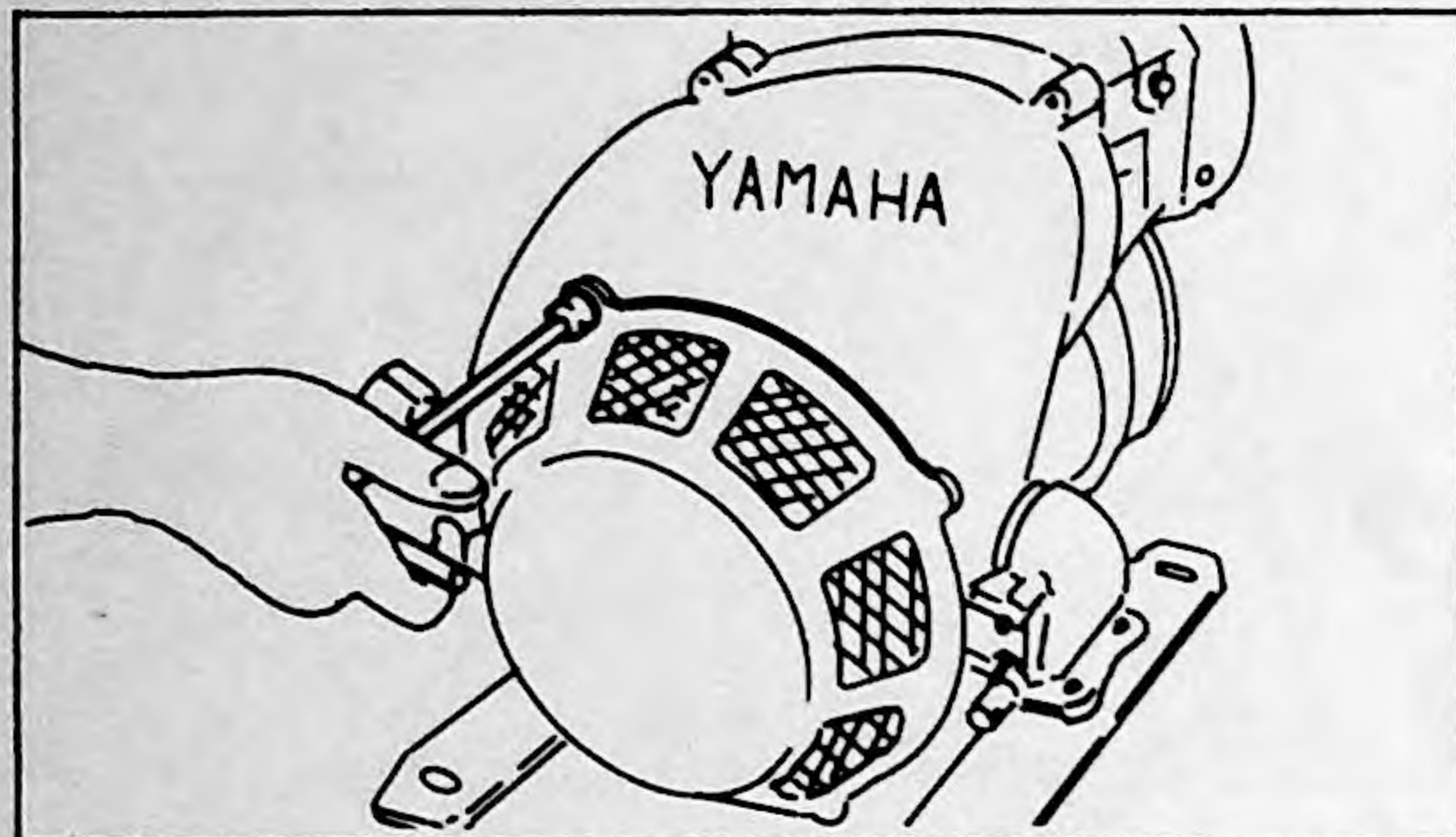


Fig. 2-24

2-2-2

This illustration shows the inside of the starter assembly before it is disassembled. Removal of the nut and washers located in the middle makes it possible to dismantle the rest of the starter assembly parts.

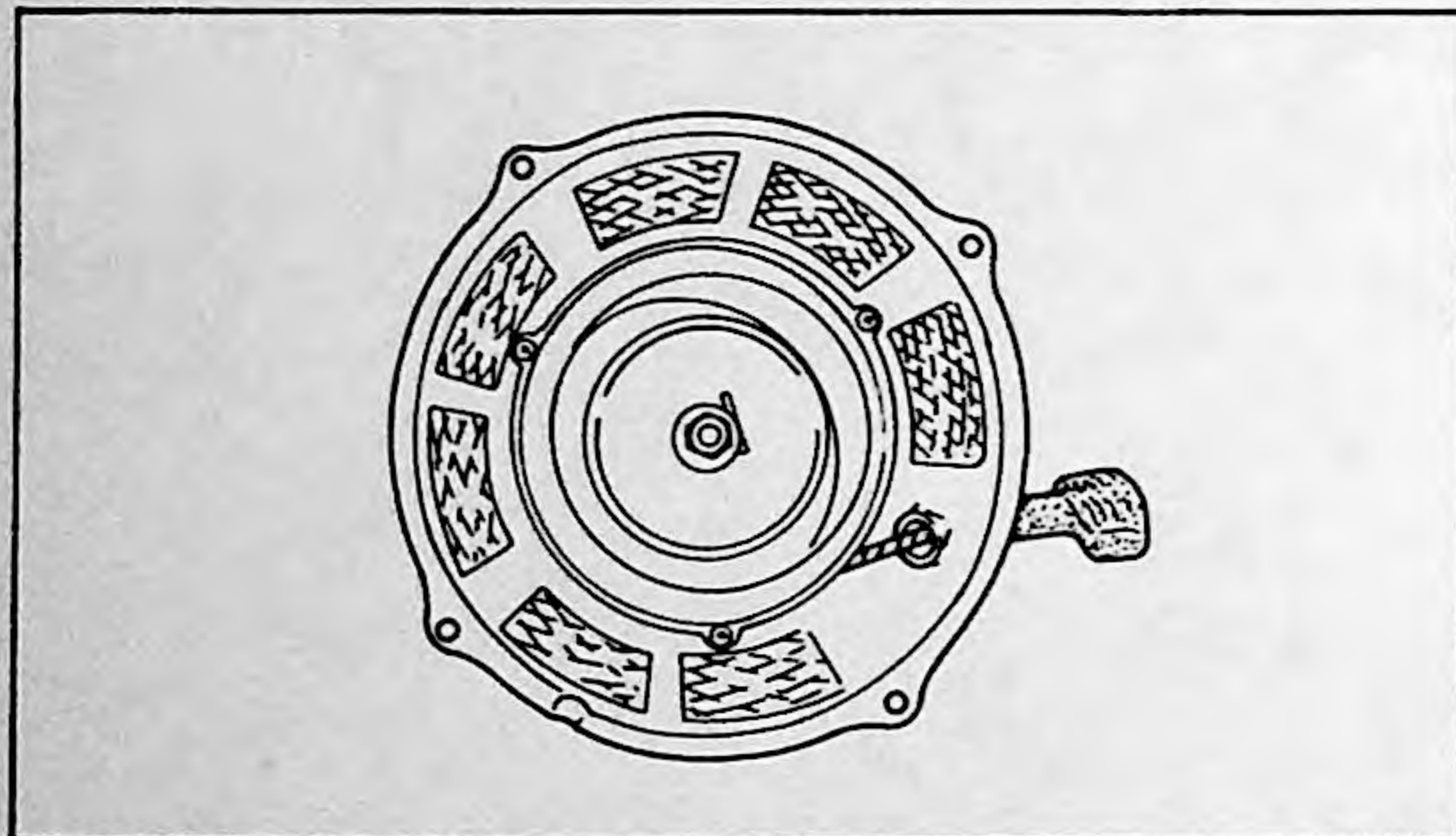


Fig. 2-25

2-2-3

Fig. 2-27 shows the nut and washers and drive plate removed for inspection should not be necessary to completely dismantle the starter assembly. This step would only be followed if replacement of the starter rope or main return spring was required.

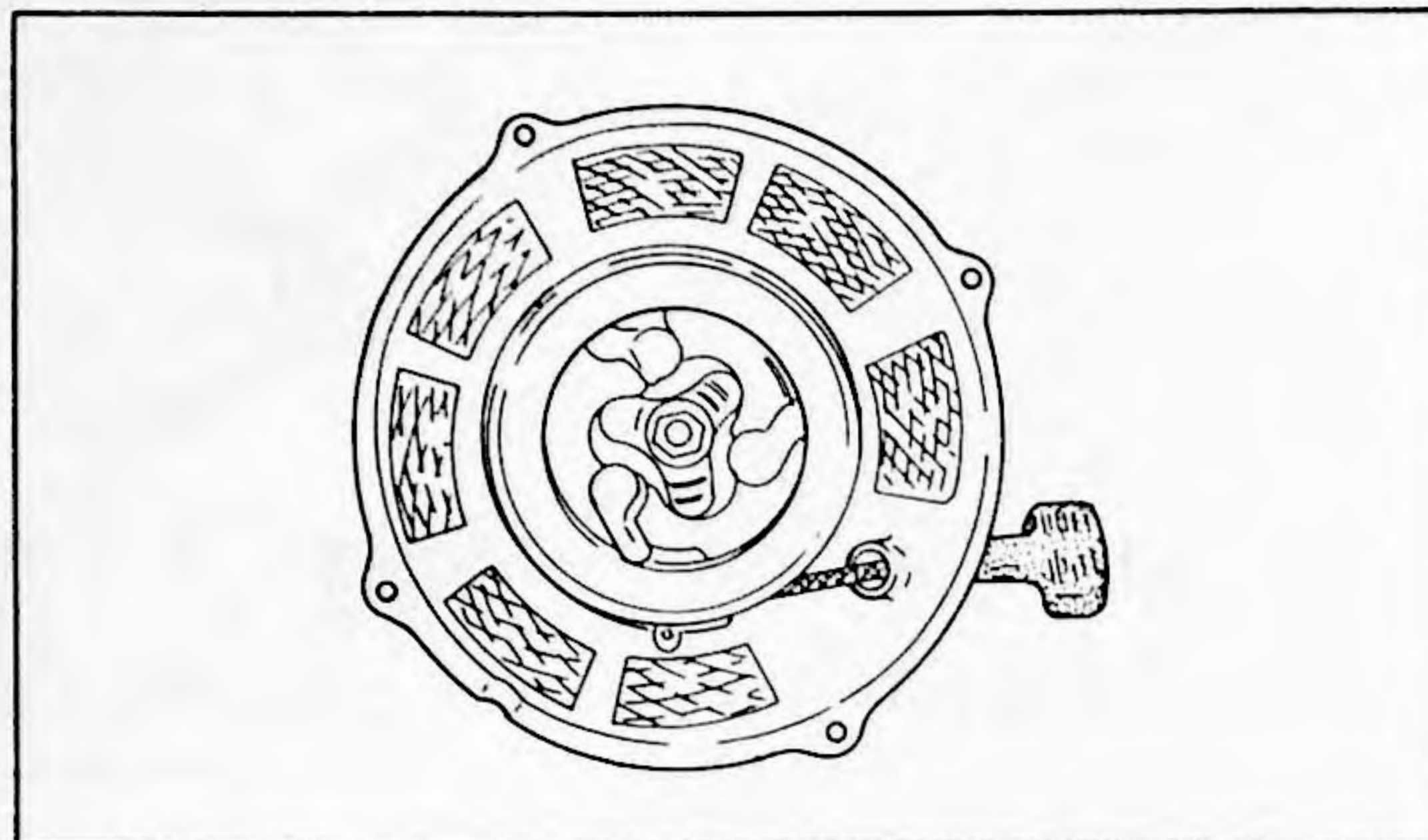


Fig. 2-26

2-2-4

It is important when reassembling the main return spring that the spring be installed in the correct position and coiled in the proper direction. Notice in the picture that the spring is hooked to the center shaft and wound outward in a clockwise direction. The spring must be wound in the correct direction or the entire starter assembly will not function. It would then be necessary to completely disassemble the starter assembly to correct the mistake preload the starter spring with $1/3 \sim 2/3$ of a turn for positive return.

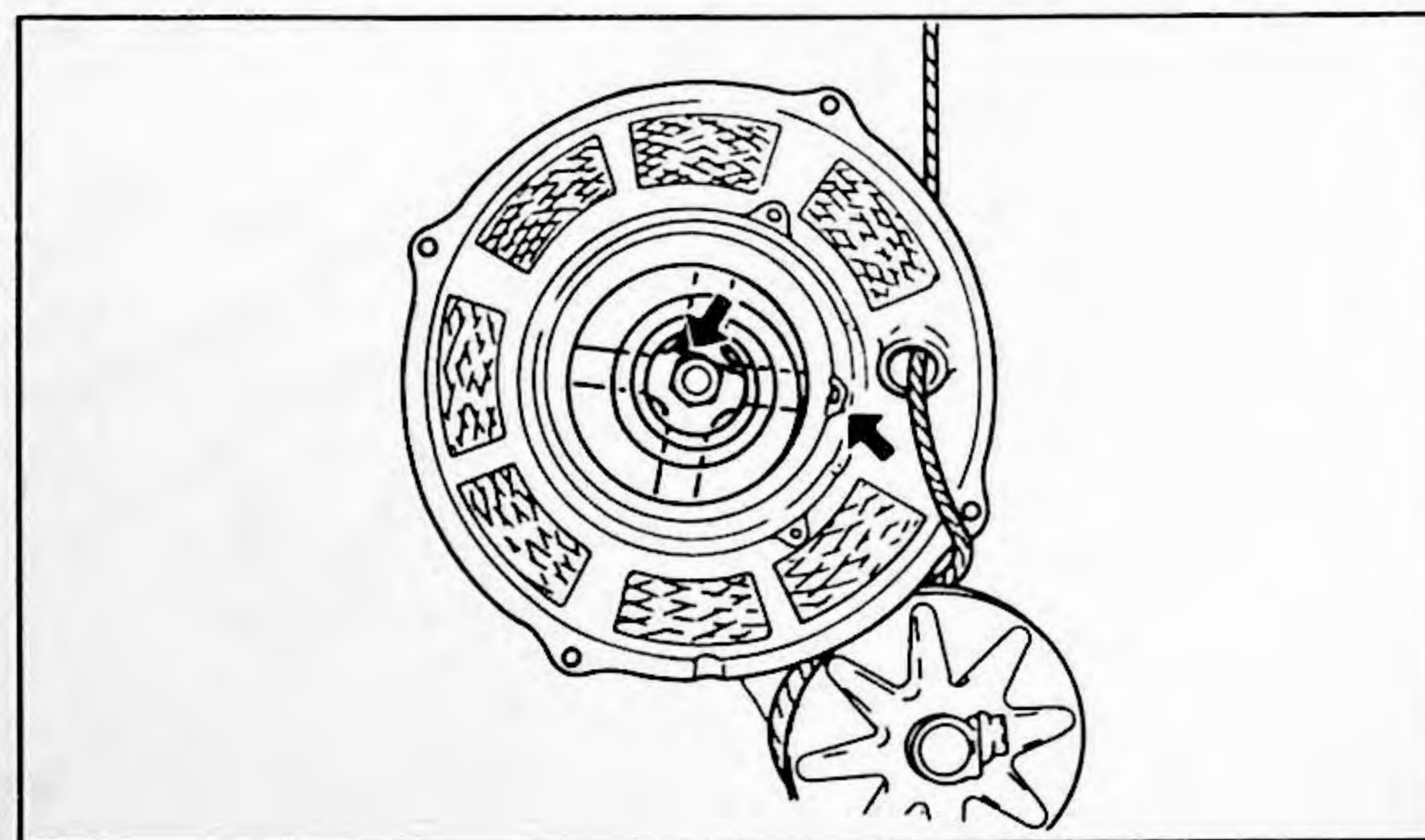


Fig. 2-27

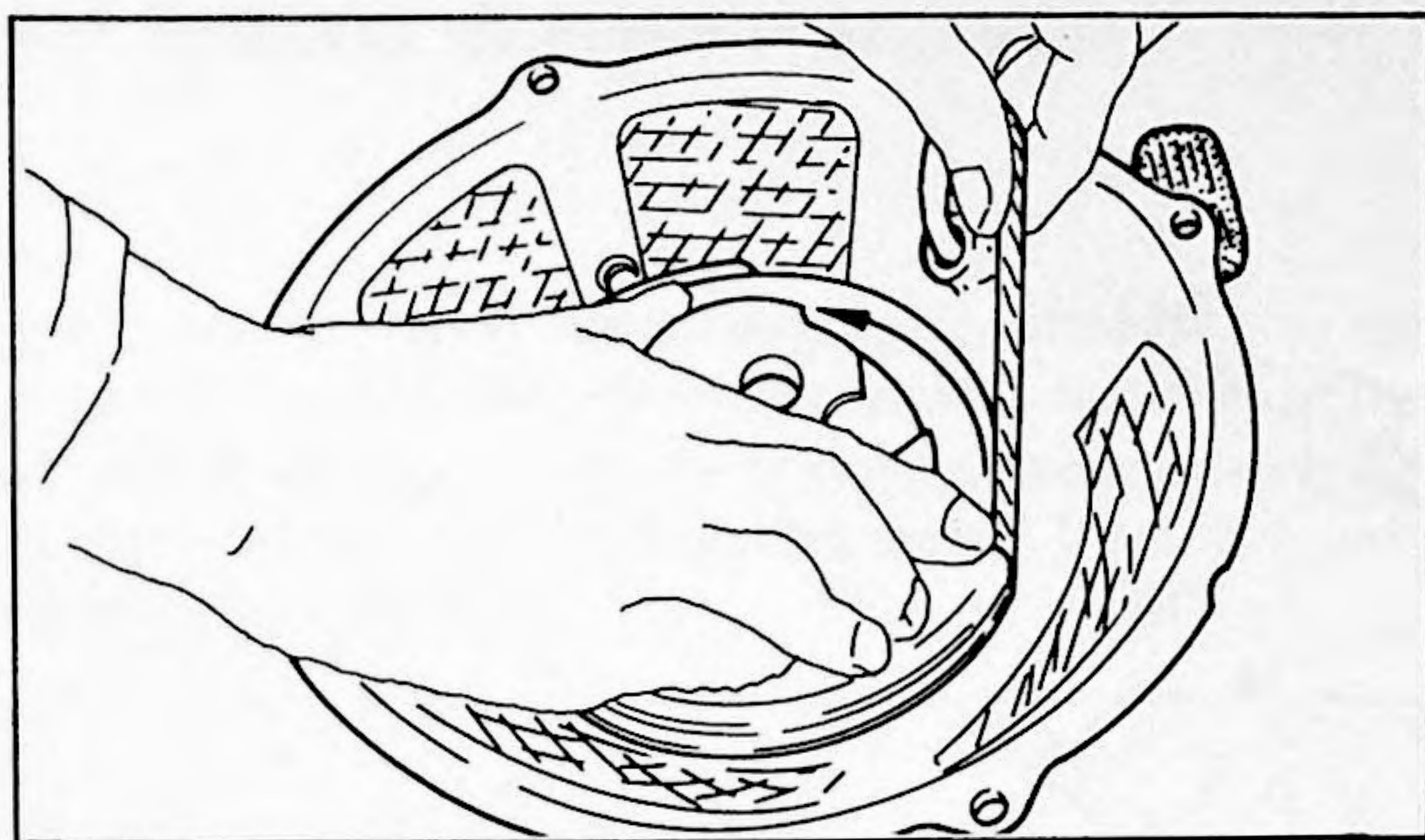


Fig. 2-28

2-2-5

Once the starter assembly has been completely reassembled, it should be checked for proper starter action. Follow the example as shown in the picture and pull the starter rope out approximately 3 ~ 5 in. (76.2 ~ 127 mm). At this time, the three starter pawls should come out. When attached to the engine this would engage the starter pulley, causing the engine to turn.

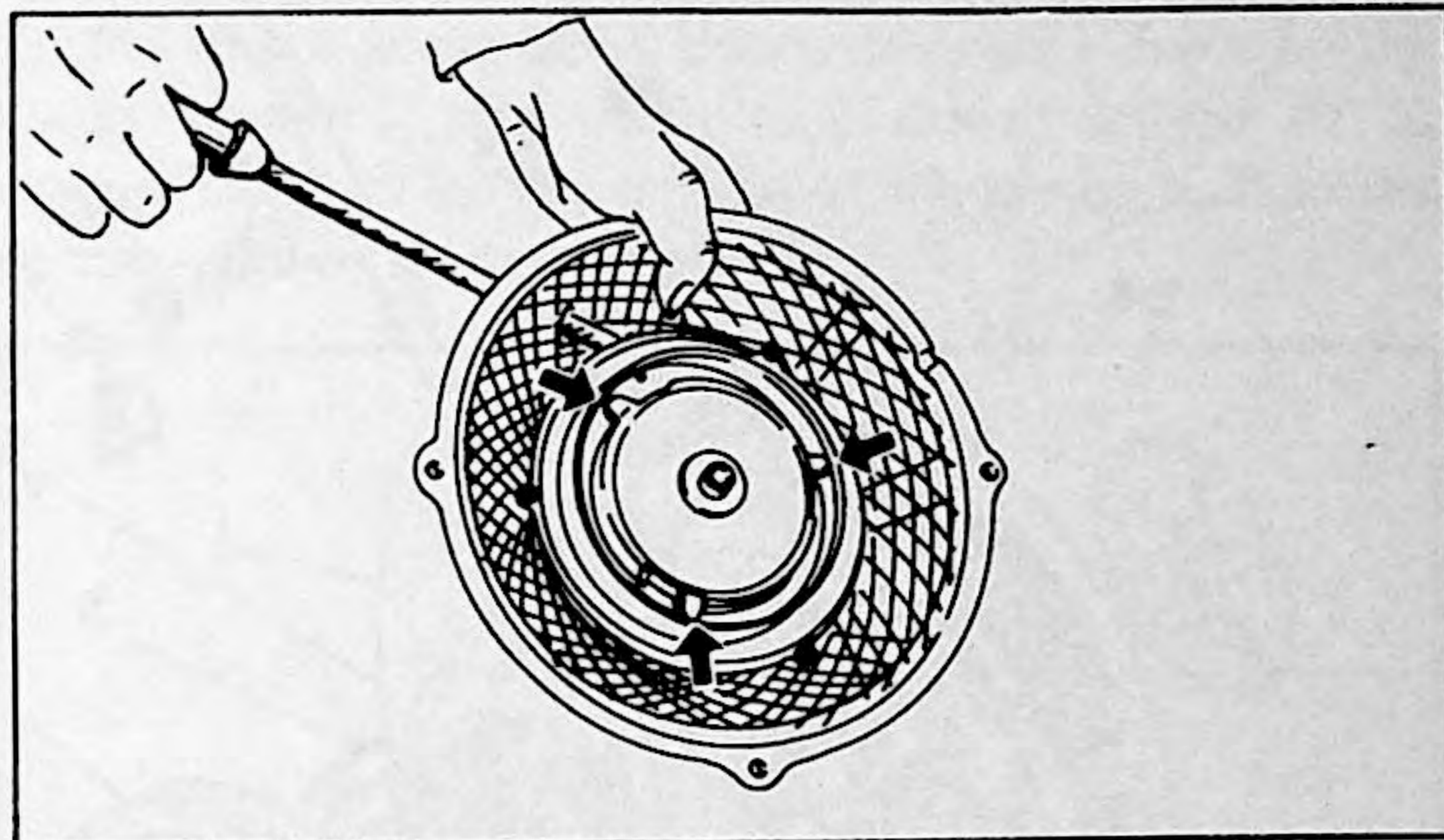


Fig. 2-29

STARTER

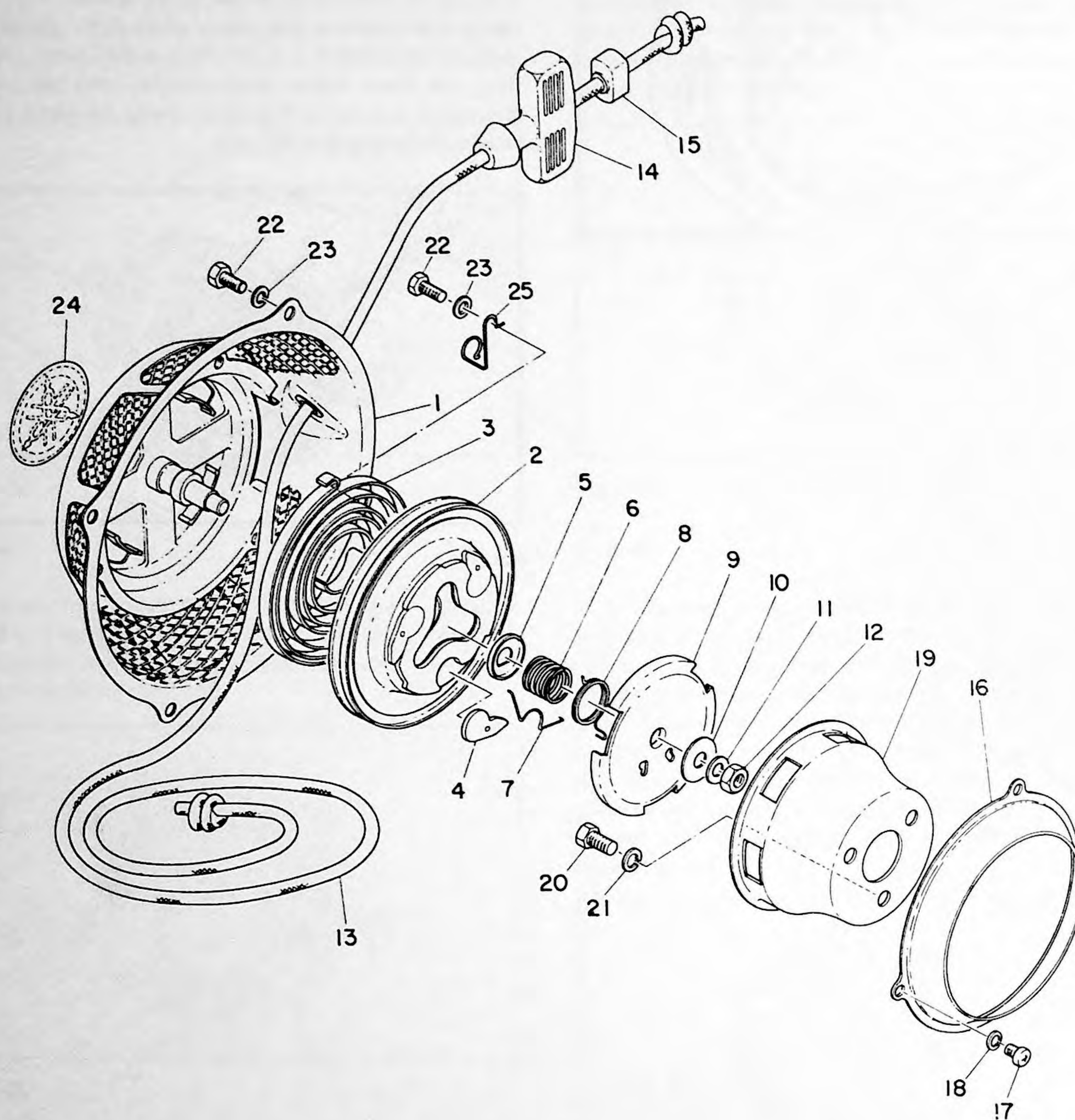


Fig. 2-30

Ref. No.	Description	Q'ty	Ref. No.	Description	Q'ty
0-1	STARTER ASS'Y	1	13	ROPE	1
1	CASE, starter	1	14	HANDLE, starter	1
2	DRUM, sheave	1	15	CONNECTOR	1
3	SPRING, starter	1	16	COVER, sheave	1
4	PAWL, drive	3	17	SCREW, round head	3
5	WASHER, thrust	1	18	WASHER, spring	3
6	SPRING, drive plate	1	19	PULLEY, starter	1
7	SPRING, return	3	20	BOLT	3
8	SPRING, return	1	21	WASHER, spring	3
9	PLATE, drive	1	22	BOLT	4
10	WASHER, flat	1	23	WASHER, spring	4
11	WASHER, spring	1	24	EMBLEM	1
12	NUT	1	25	CLAMP, fuel pipe	1

2-3 REMOVAL OF PRIMARY SHEAVE

2-3-1

The primary sheave cap assembly is attached to the crankshaft on the left side of the engine. Removal of the primary sheave bolt allows the primary sheave cap assembly to slide off the end of the crankshaft. There is a lock washer to be bent down.

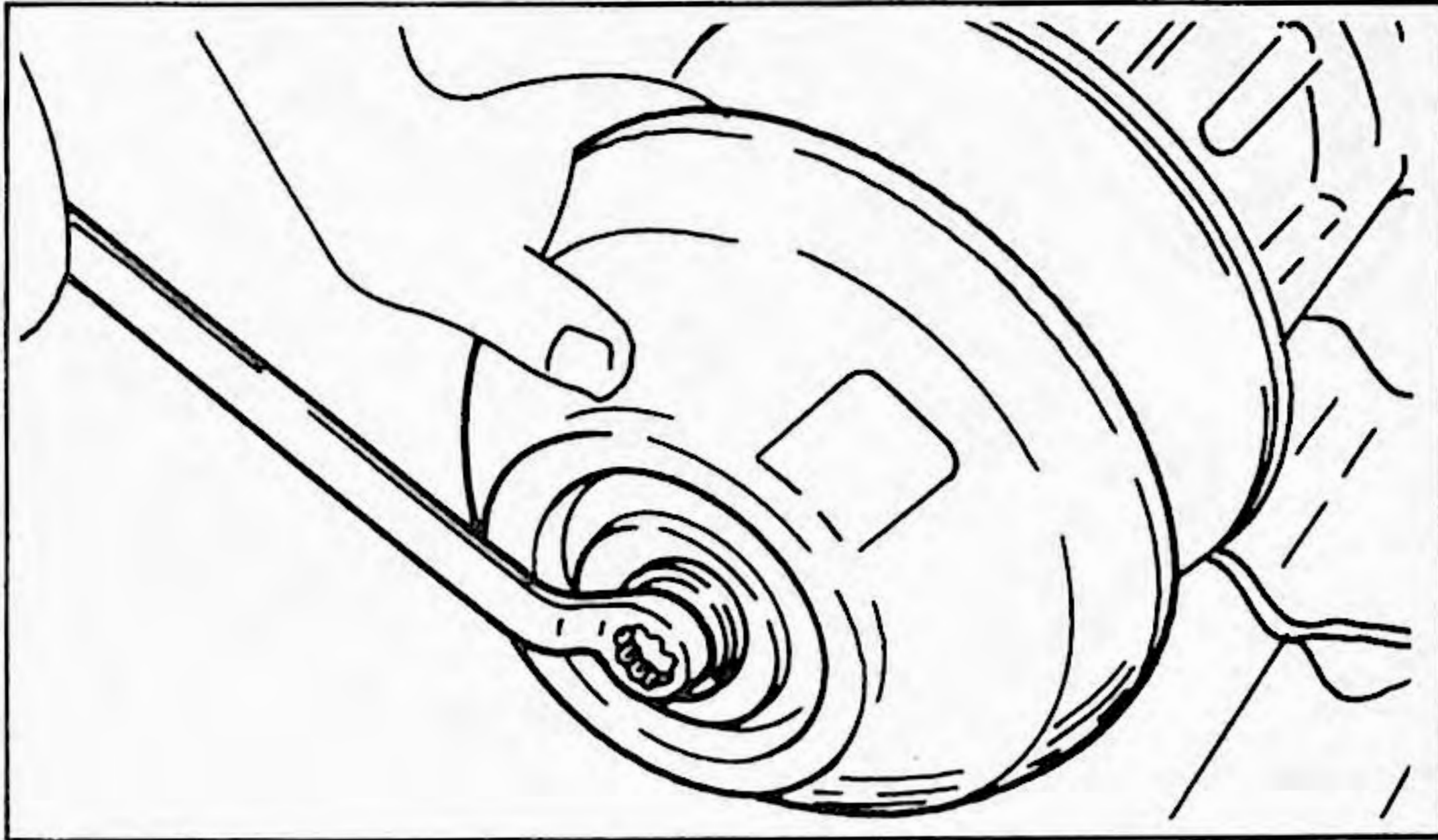


Fig. 2-31

2-3-2

Remove the circlip and the collar. Remove the sliding sheave from the crankshaft. Now, the primary spring can be removed.

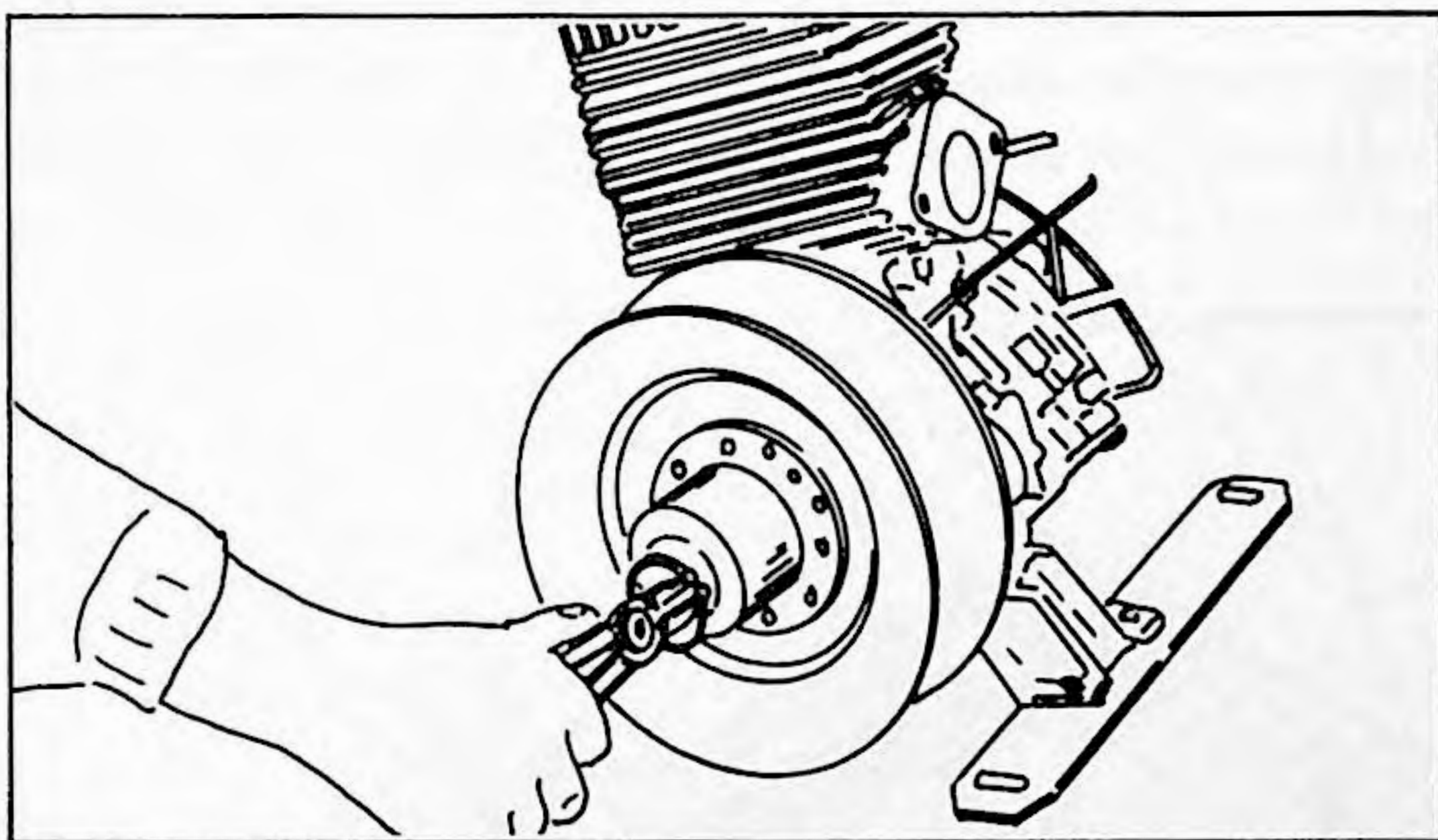


Fig. 2-32

2-3-3

As shown in Fig. 2-34, the primary sheave cap is provided with a weight. As the engine speed increases, the weight is pulled by centrifugal force in the direction of the circumference. Then this movement is converted into the force which turns in the direction of the axle, and pushes the sliding sheave. The drive belt is driven as a result of being held tight between the sliding sheave and fixed sheave.

As the engine speed slows down, centrifugal force by the weight weakens, and the sliding sheave returns to its original position by the tension of the spring built in the primary sheave ass'y.



Fig. 2-33

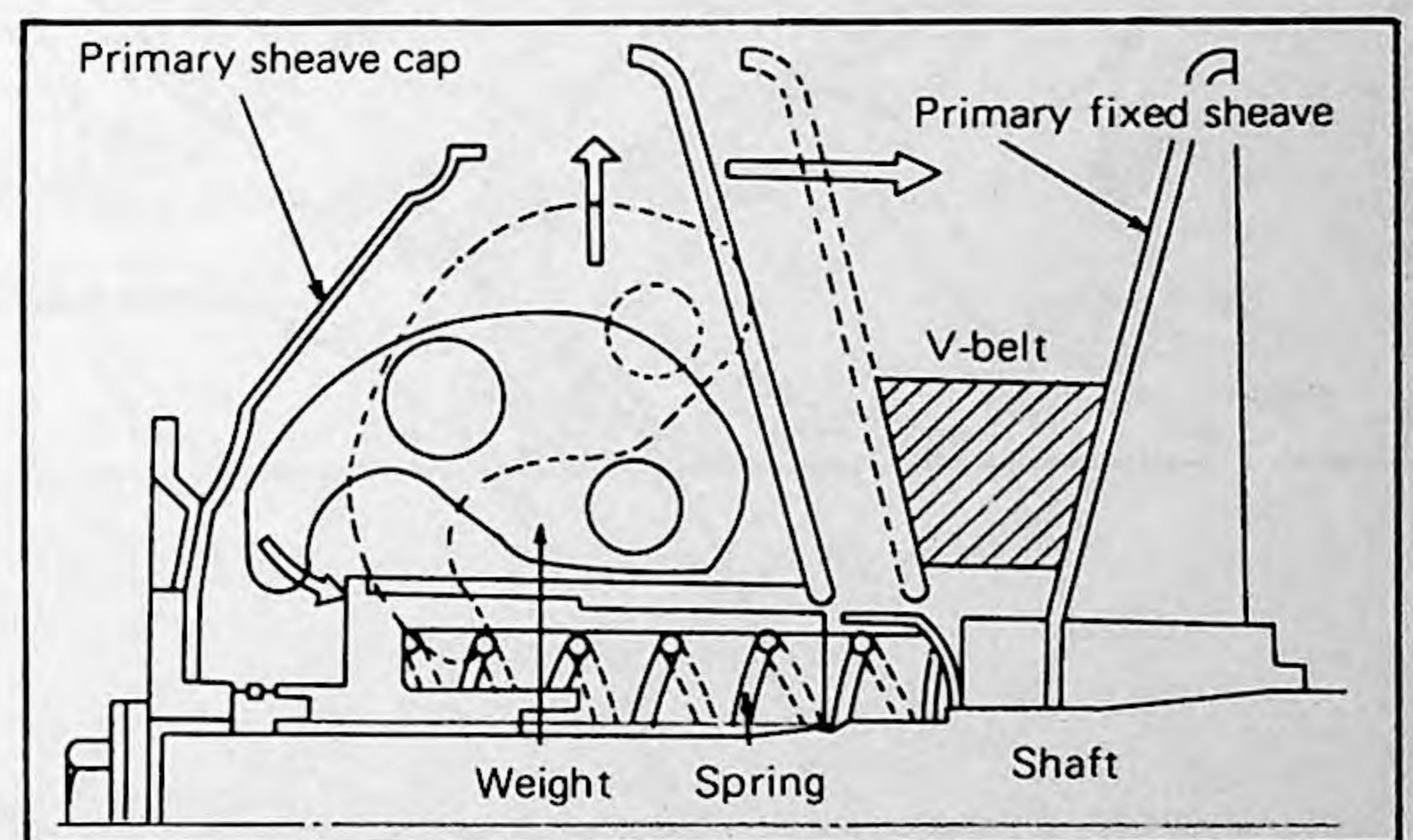


Fig. 2-34

PRIMARY SHEAVE

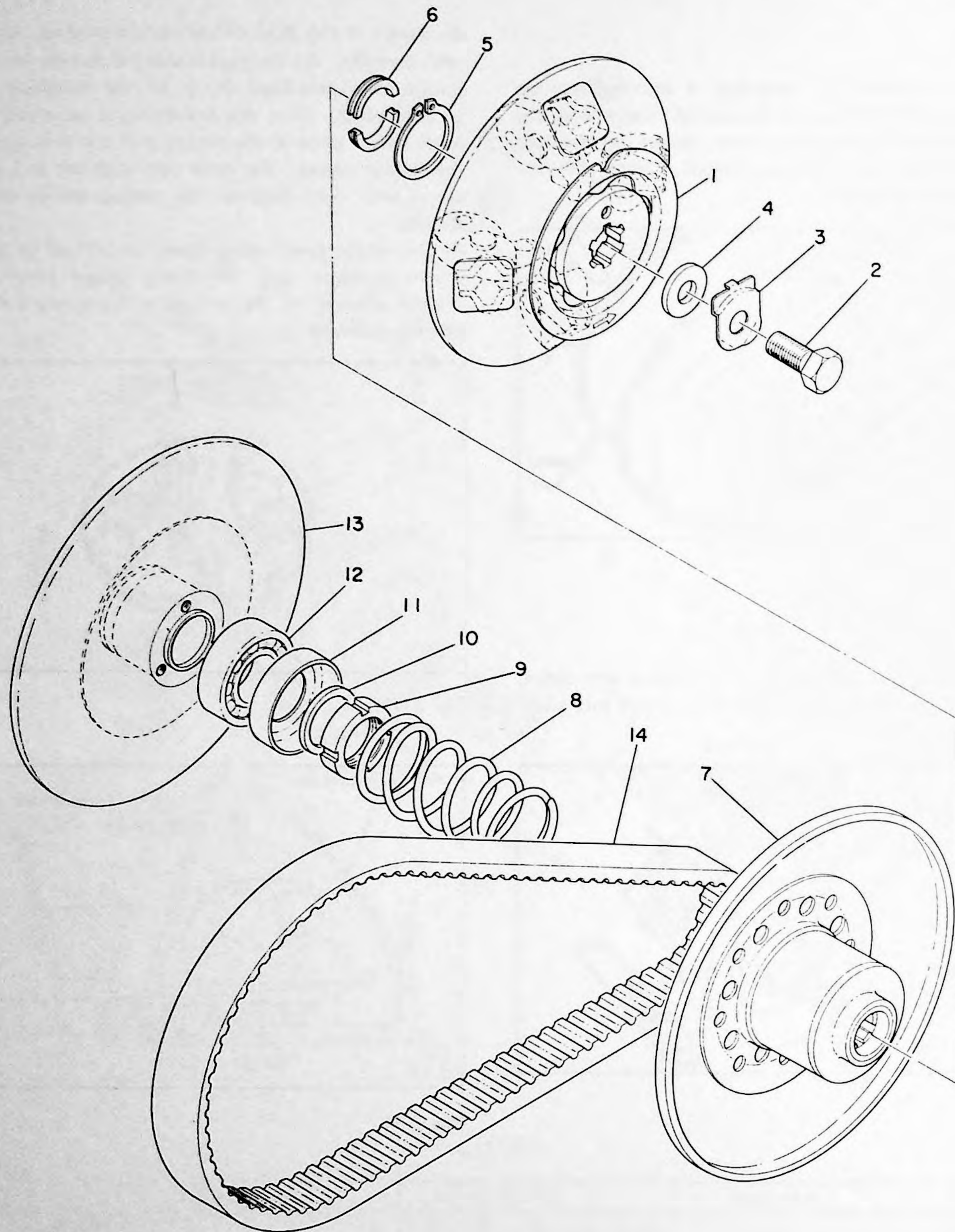


Fig. 2-35

Ref. No.	Description	Q'ty	Ref. No.	Description	Q'ty
1	PRIMARY SHEAVE CAP COMP.	1	8	SPRING, primary	1
2	BOLT	1	9	NUT, bearing	1
3	WASHER, lock	1	10	WASHER (28-36-2)	1
4	WASHER (10.2-28-3.2)	1	11	SEAT, spring	1
5	CIRCLIP (S-30)	1	12	BEARING (6205)	1
6	COLLAR	2	13	PRIMARY FIXED SHEAVE COMP.	1
7	PRIMARY SLIDING SHEAVE COMP.	1	14	V-BELT	1

2-3-4

The bearing ring nut must be removed in order to continue with the disassembly. The special bearing ring nut removal tool arise used as shown to take the nut off the end of the shaft. Once this ring nut has been removed, the spring washer spring seat and bearing can be slipped off, usually by hand.

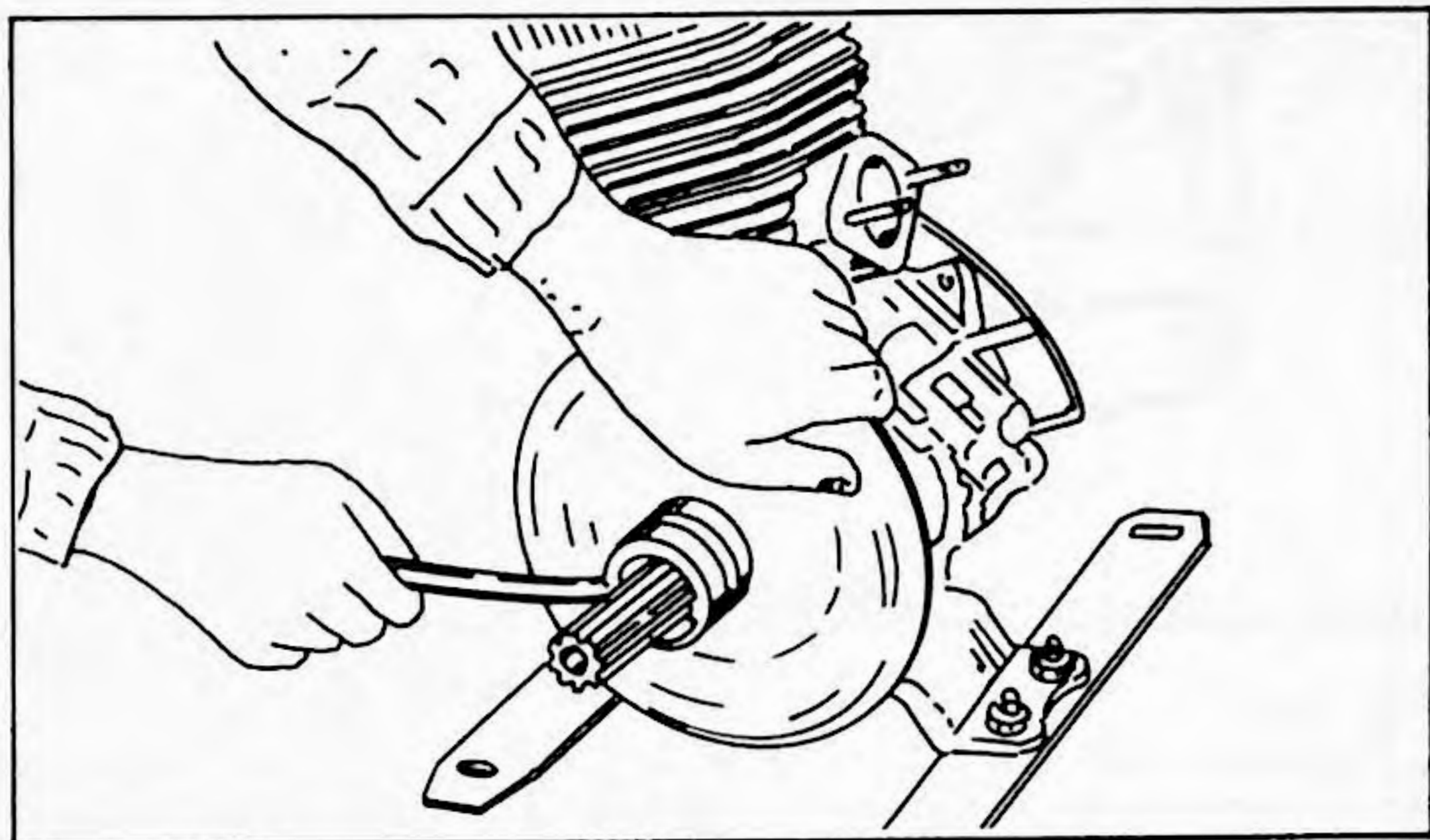


Fig. 2-36

2-3-5

A taper-fit holds the inner primary sheave to the shaft. A special tool is used to pull the inner sheave off of the shaft. This tool is the one that was used to remove the magneto flywheel, only the long screws are used to hold the special tool in place rather than the short ones. As you will notice in the picture, a wrench is used to hold the special tool so that it will not turn as the T-handle is screwed in.

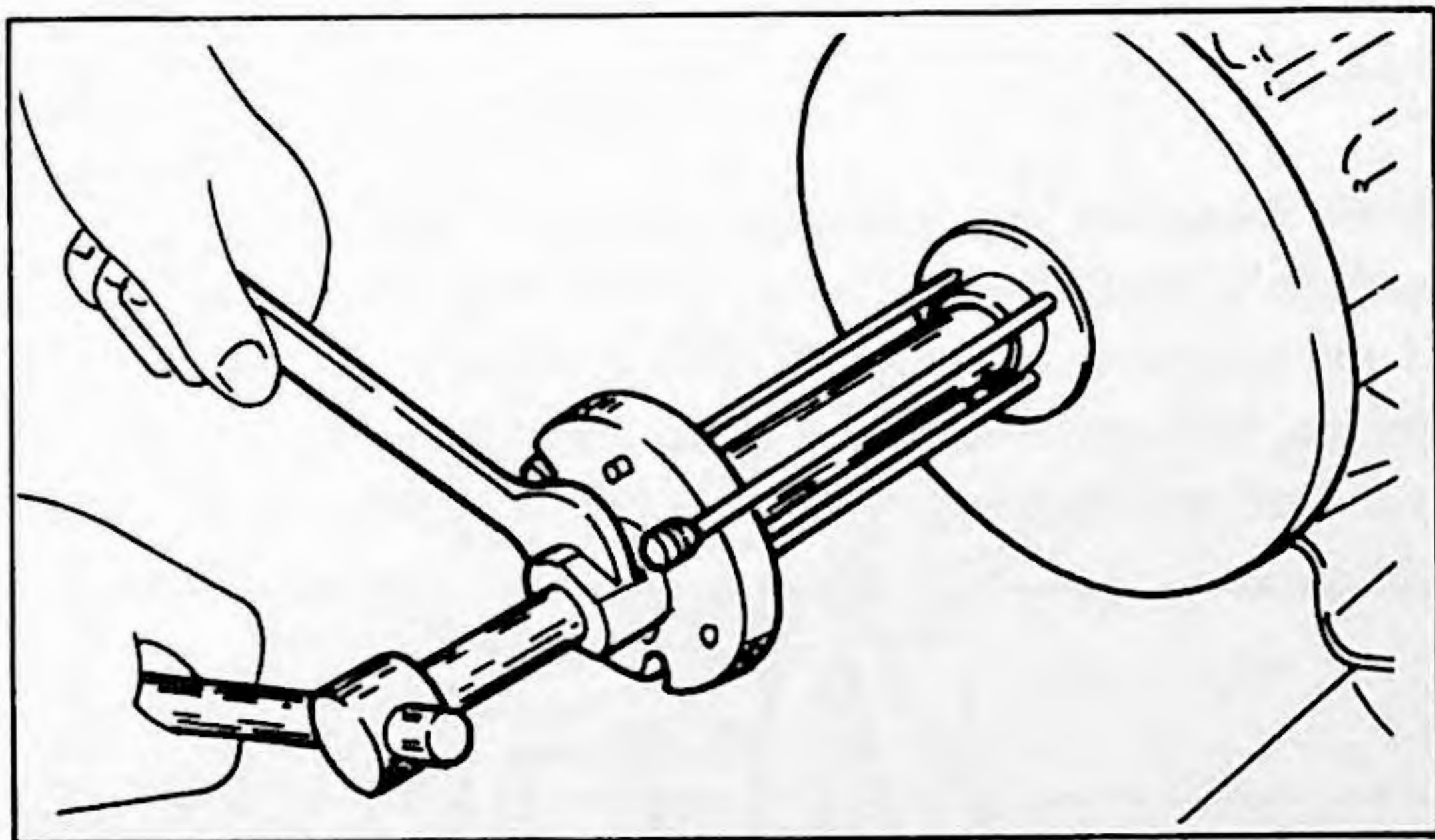


Fig. 2-37

2-3-6

As shown in the illustration, a gear for driving the oil pump is fitted in the reverse side of the primary fixed sheave.

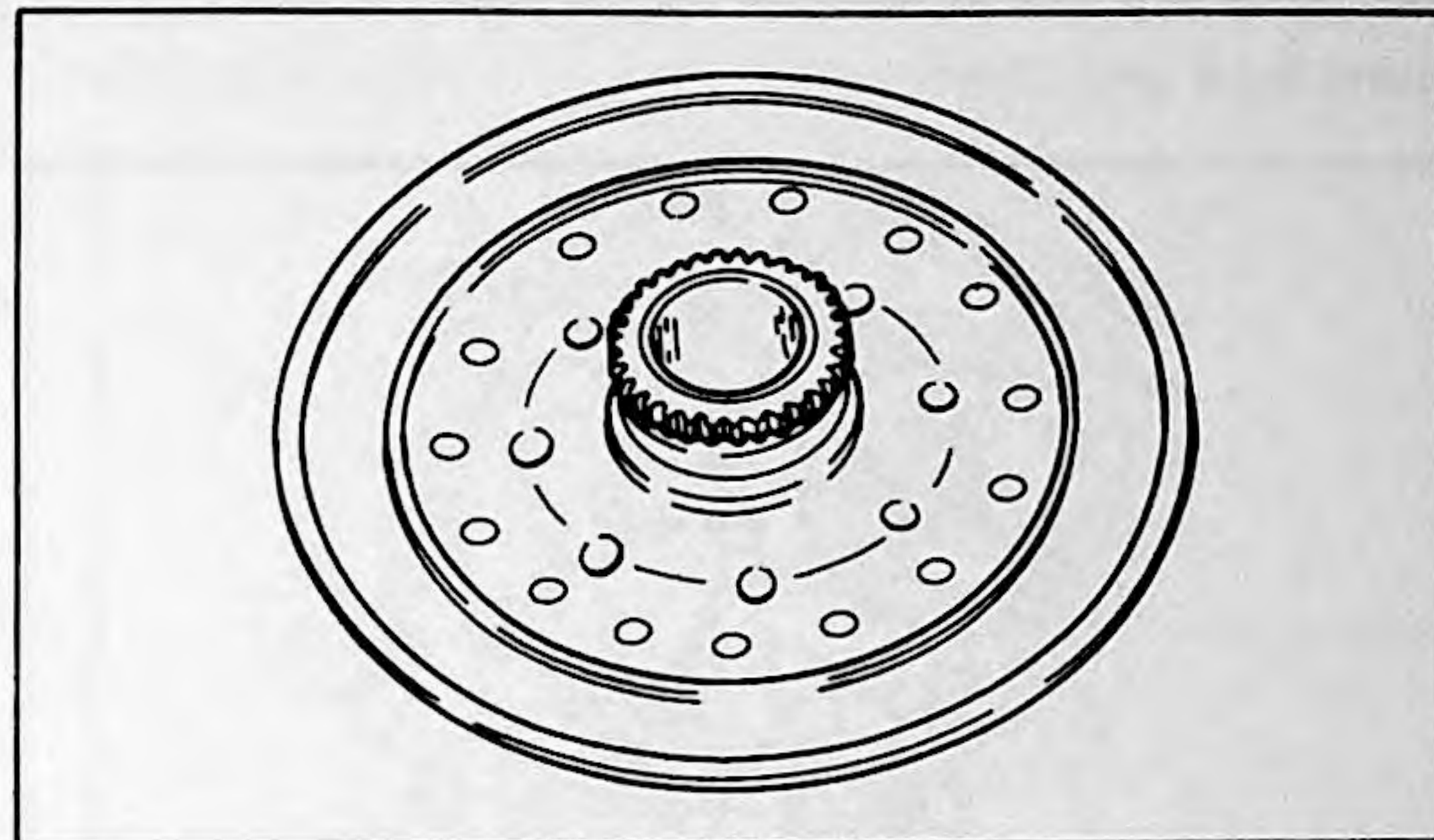


Fig. 2-38

2-4 REMOVING THE OIL PUMP**2-4-1**

Remove the oil delivery pipe from the oil pump.

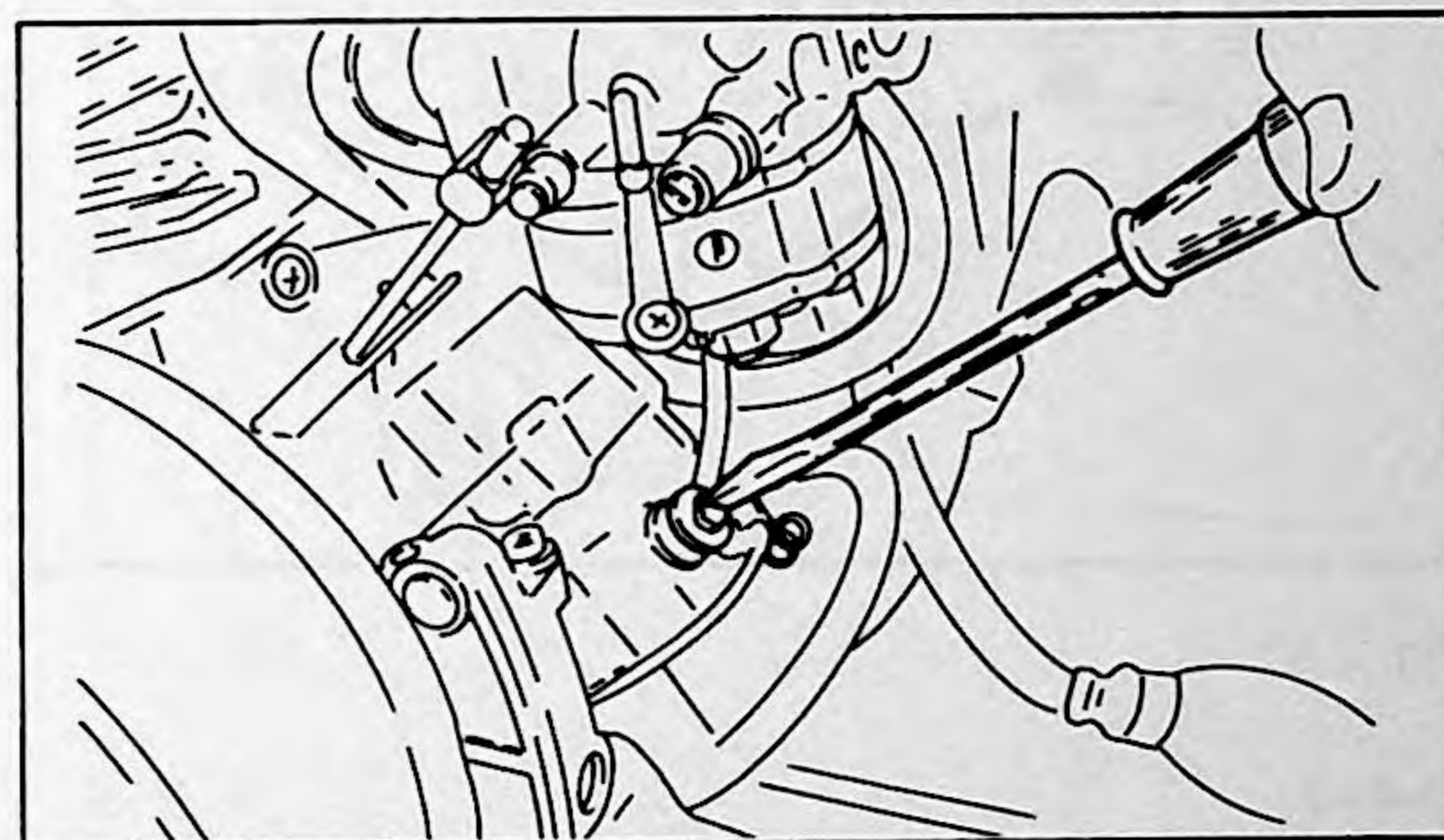


Fig. 2-39

2-4-2

Remove the four 10 mm bolts and one hexagon bolt, and remove the oil pump drive gear cover. The oil pump can be removed as an assembly with the oil pump drive gear cover.

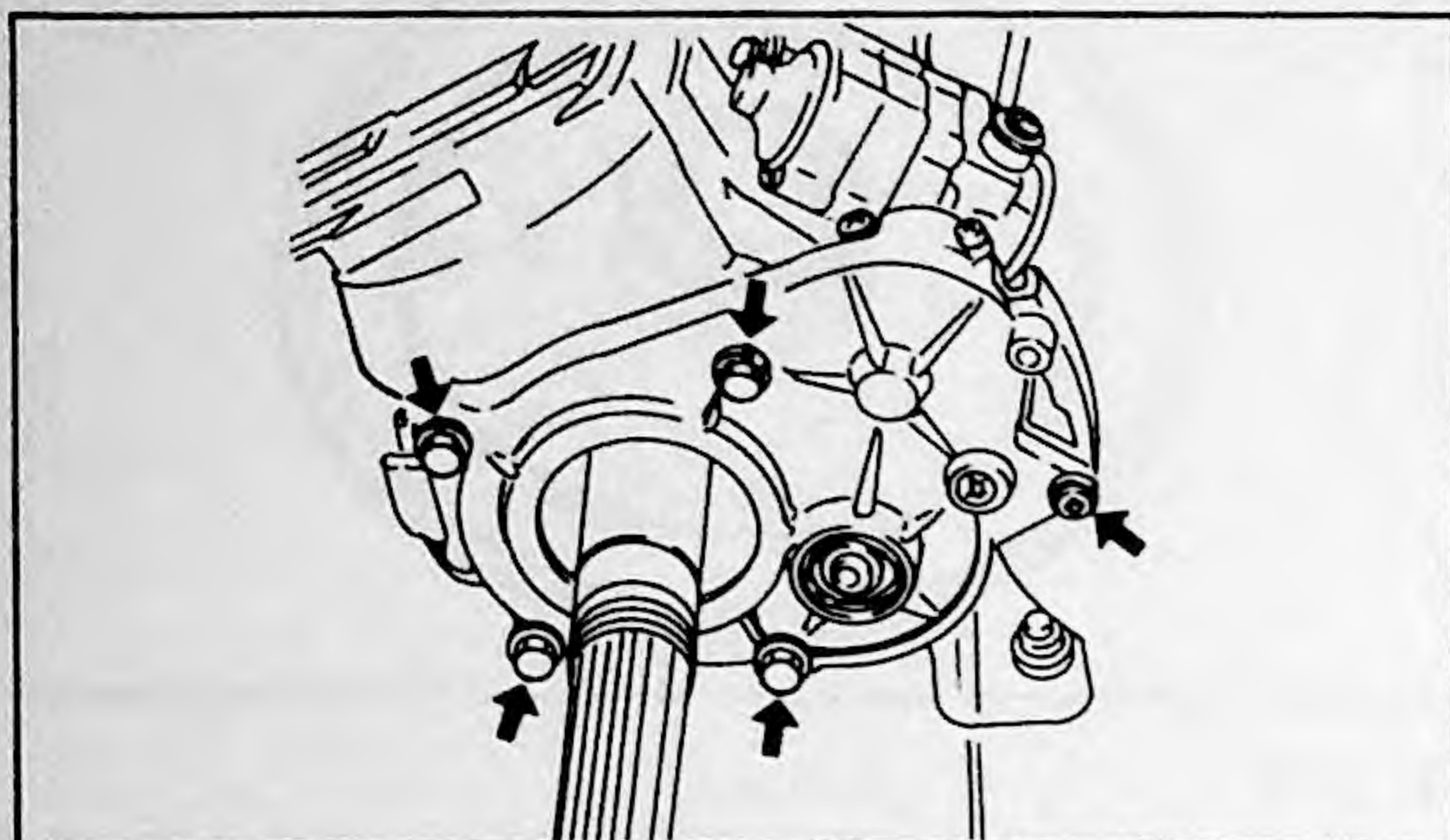


Fig. 2-40

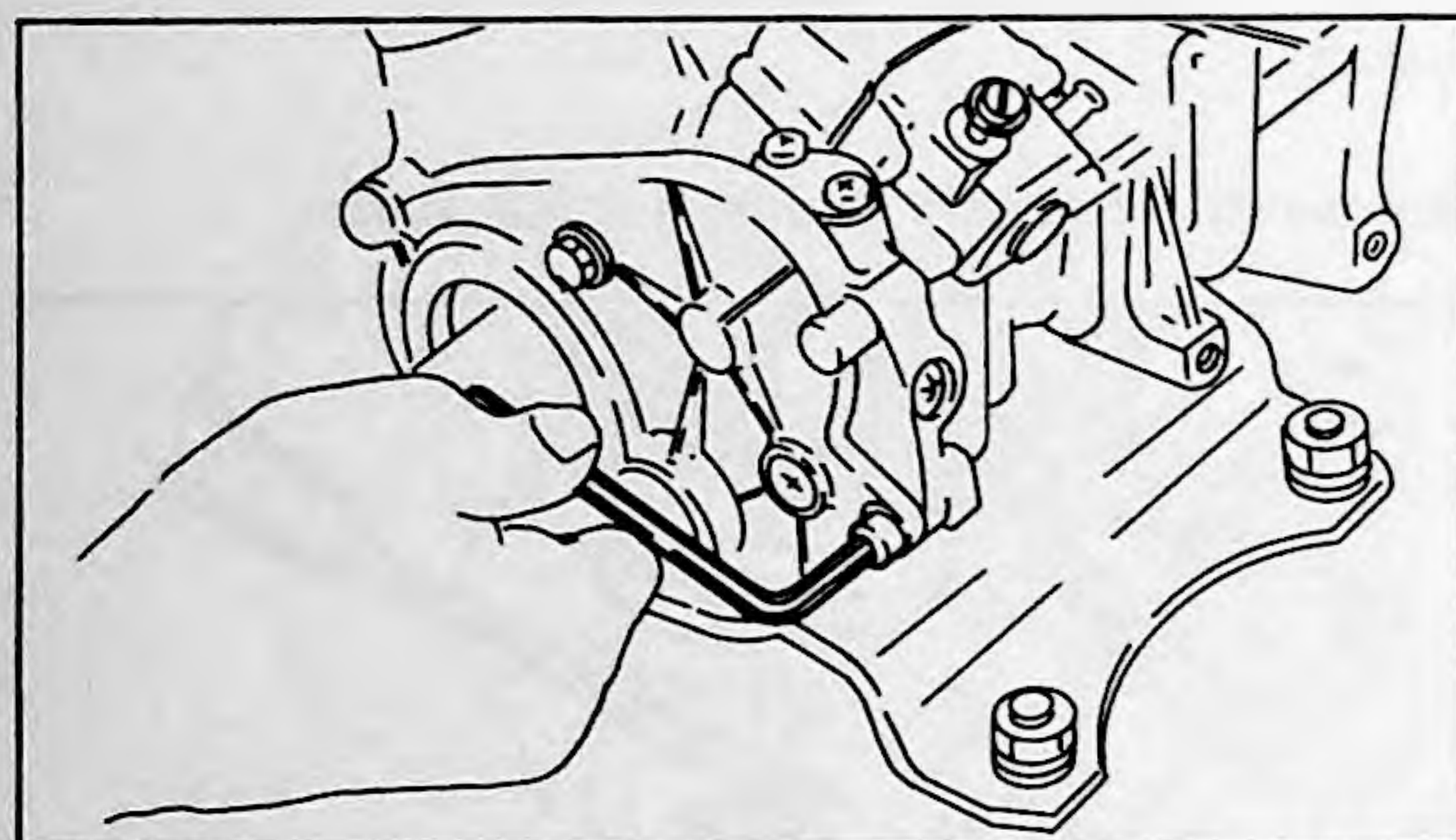


Fig. 2-41

2-4-3

Remove the two panhead screws, and remove the oil pump from the oil pump drive gear cover.

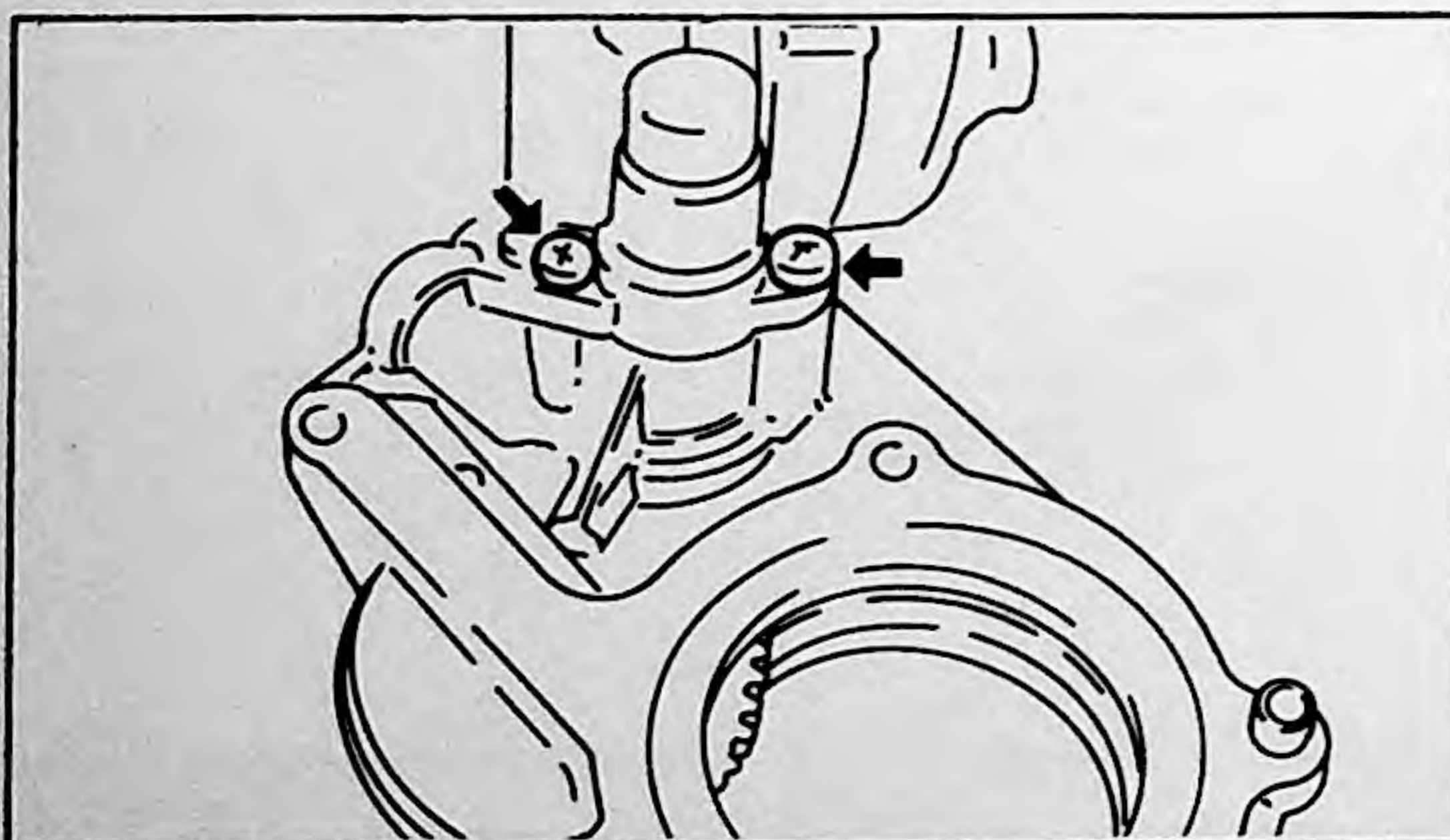


Fig. 2-42

2-4-4

To separate oil pump drive cover 1 from oil pump drive cover 2, remove the panhead screw on the cover 1 side and the flat head screw on the cover 2 side.

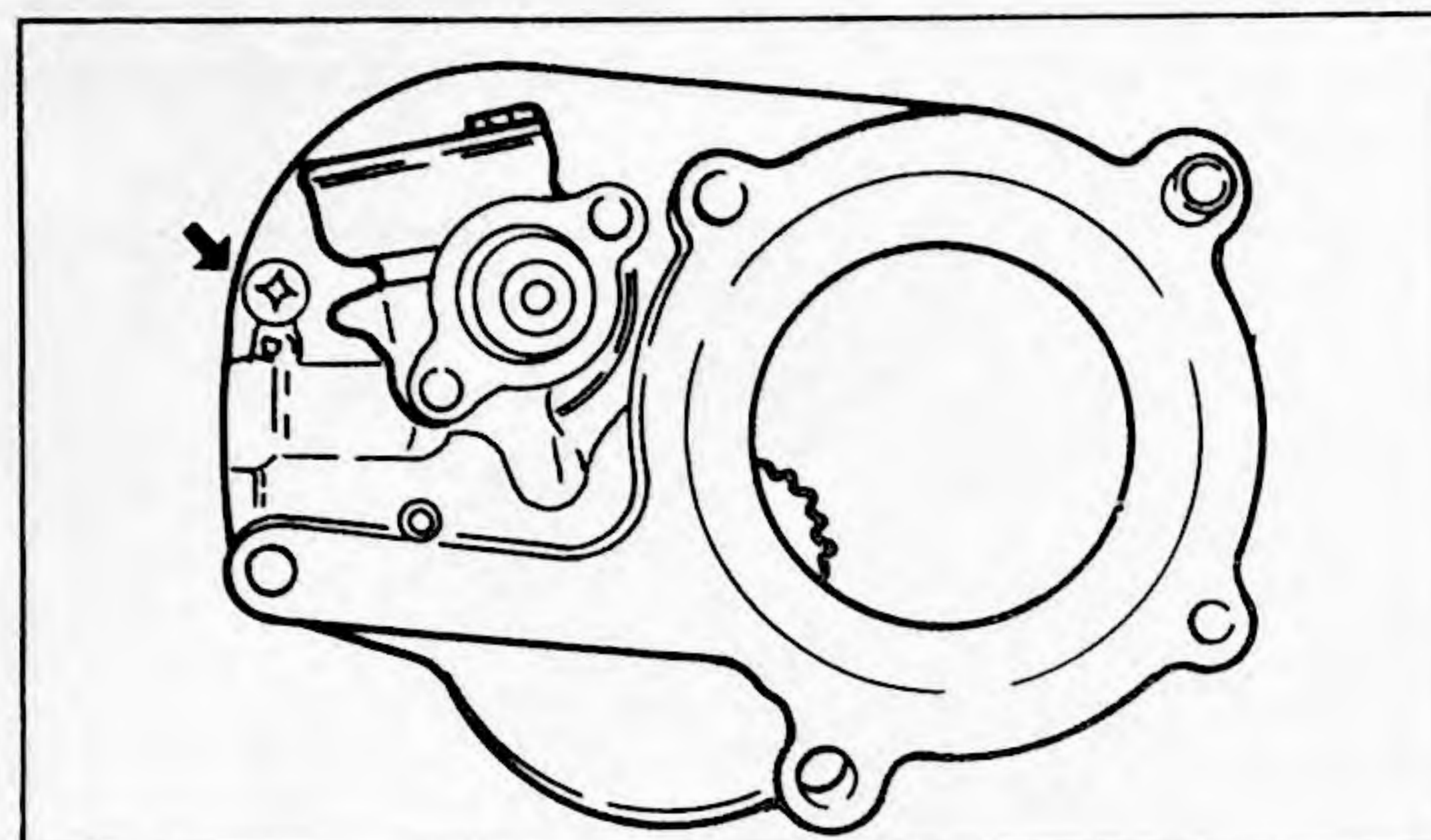


Fig. 2-43

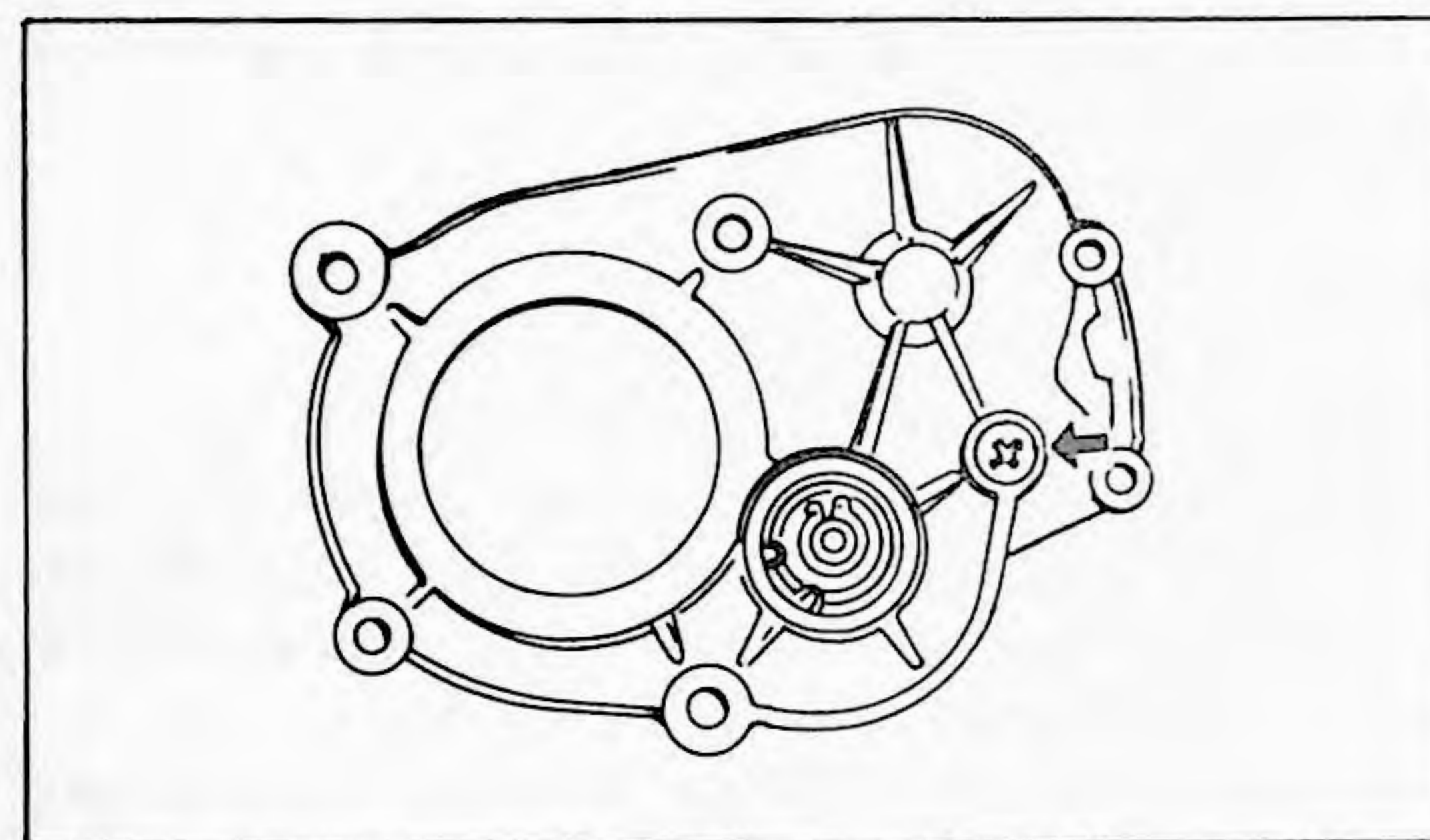


Fig. 2-44

2-4-5

When installing the idle gear and drive gear 2, coat them with anti-freeze grease Beacon 325 or Aero Shell 7A. If the oil pump drive gear cover is already installed on the engine, first remove the panhead screw as illustrated below, and feed anti-freeze grease Beacon 325 or Aero Shell 7A.

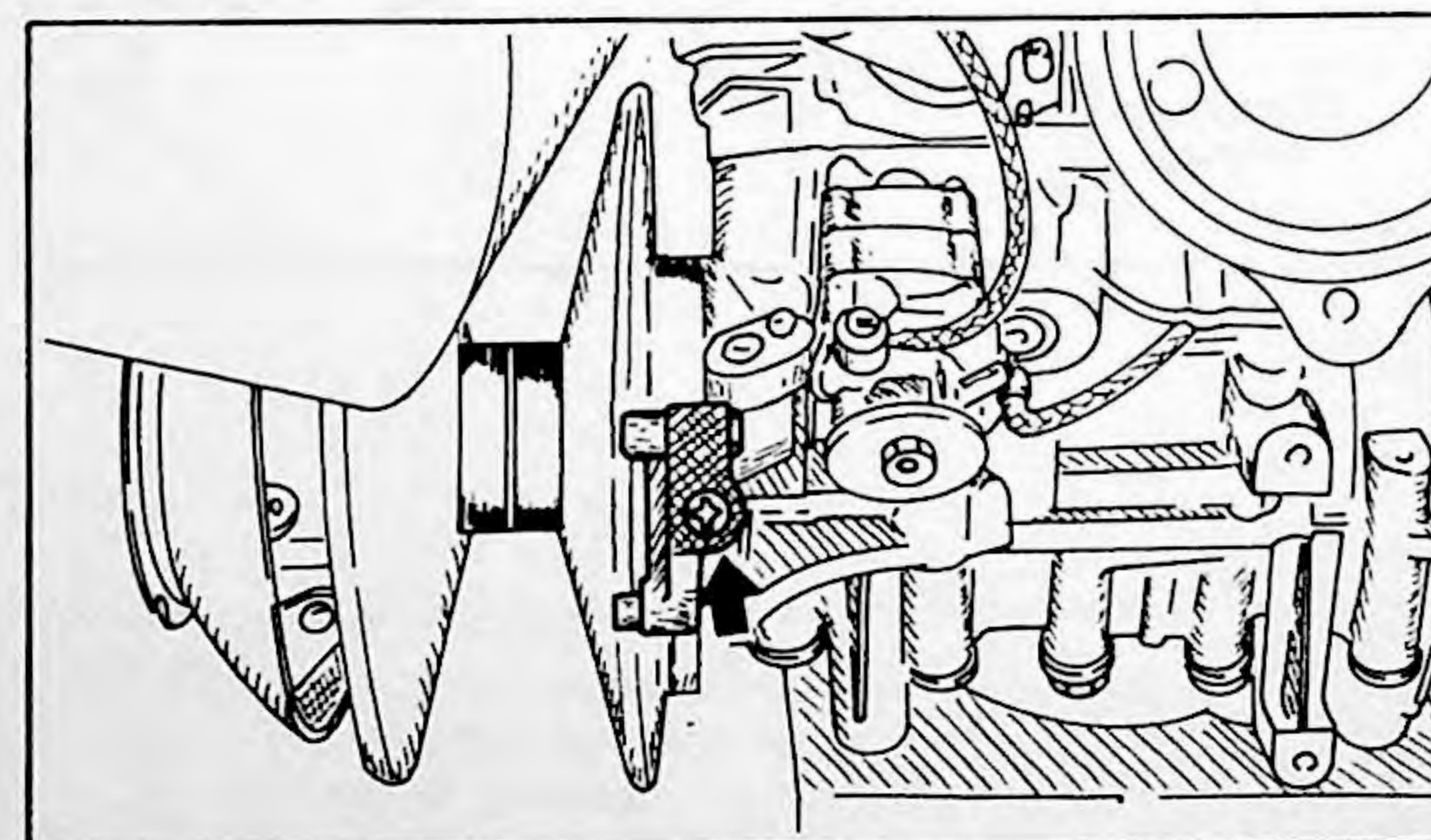


Fig. 2-45

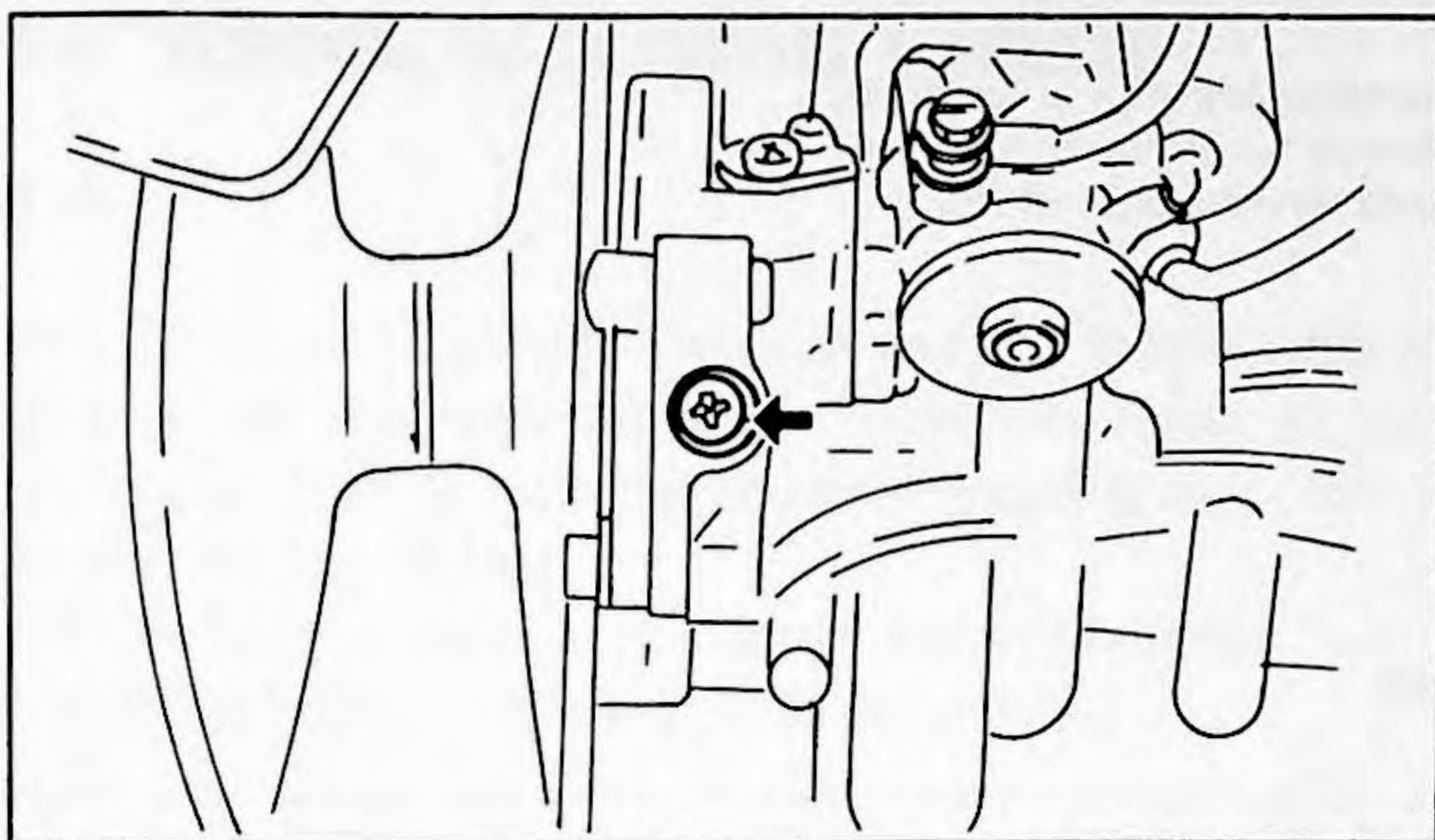


Fig. 2-46

2-4-6

To remove the idle gear, the circlip must be removed from oil pump drive gear cover 2 from its outside.

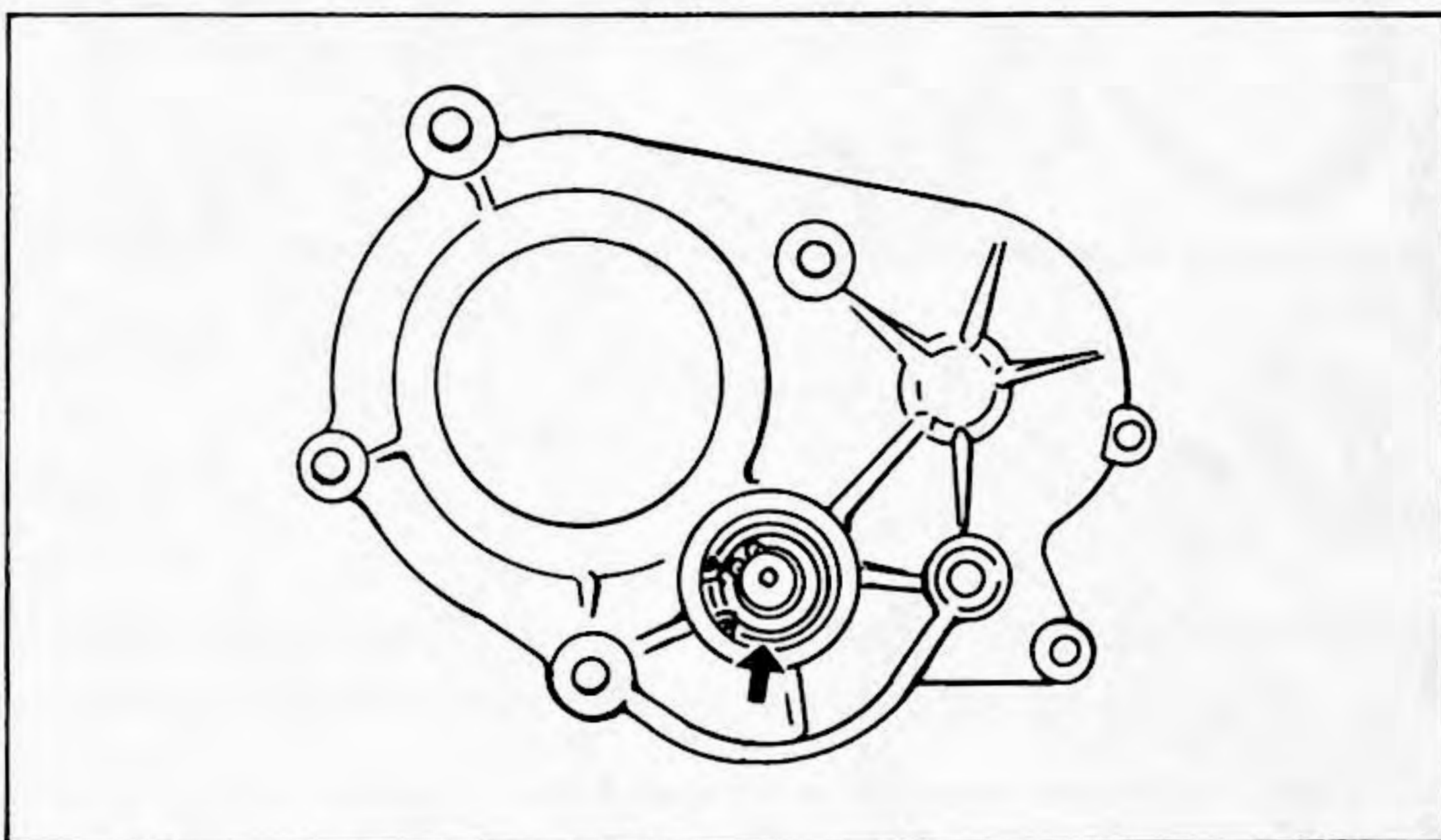


Fig. 2-47

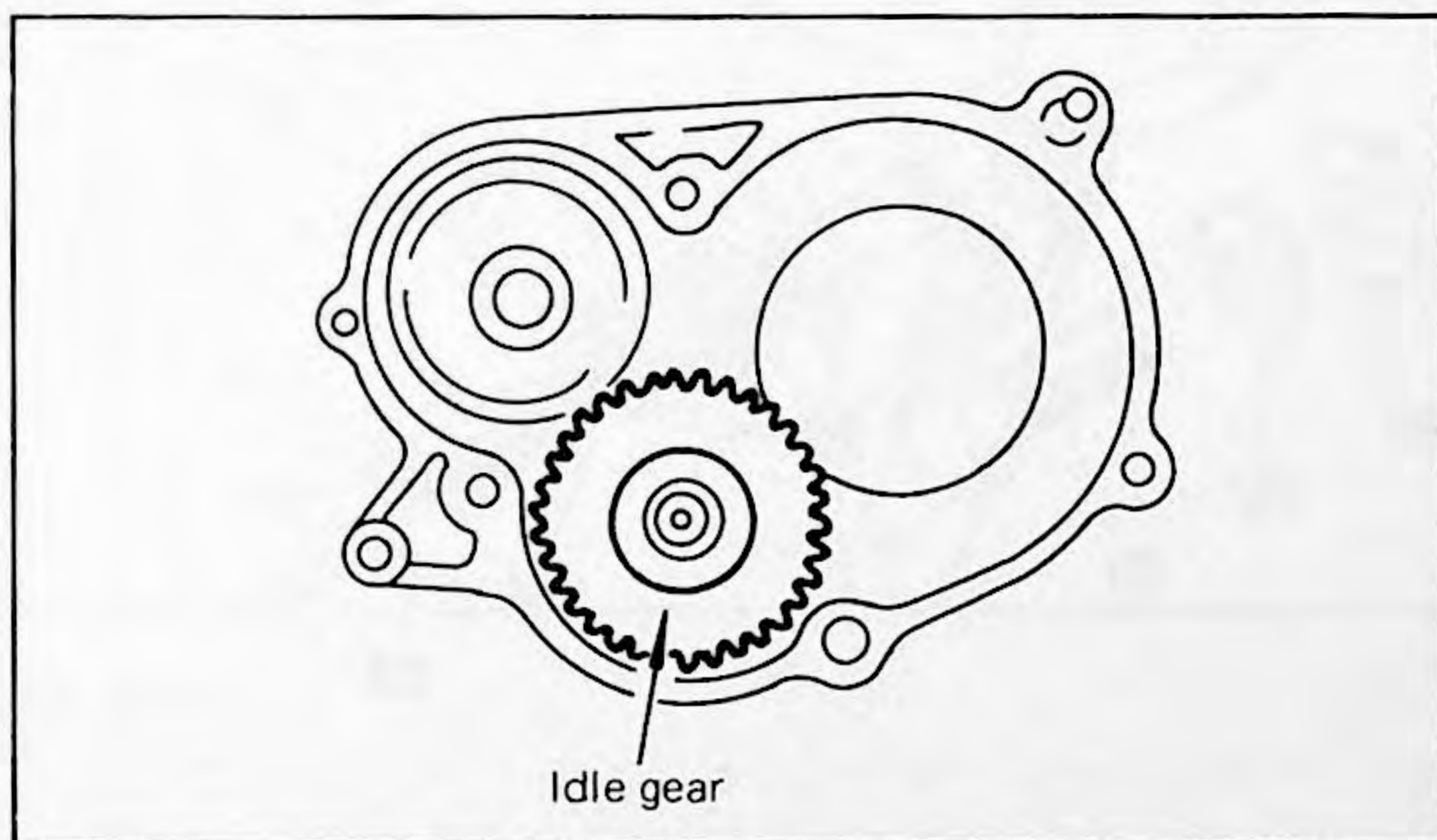


Fig. 2-48

2-4-7

To remove drive gear 2, remove the circlip on the warm shaft end.

To install drive gear 2, be sure to insert the dowel pin into the warm shaft.

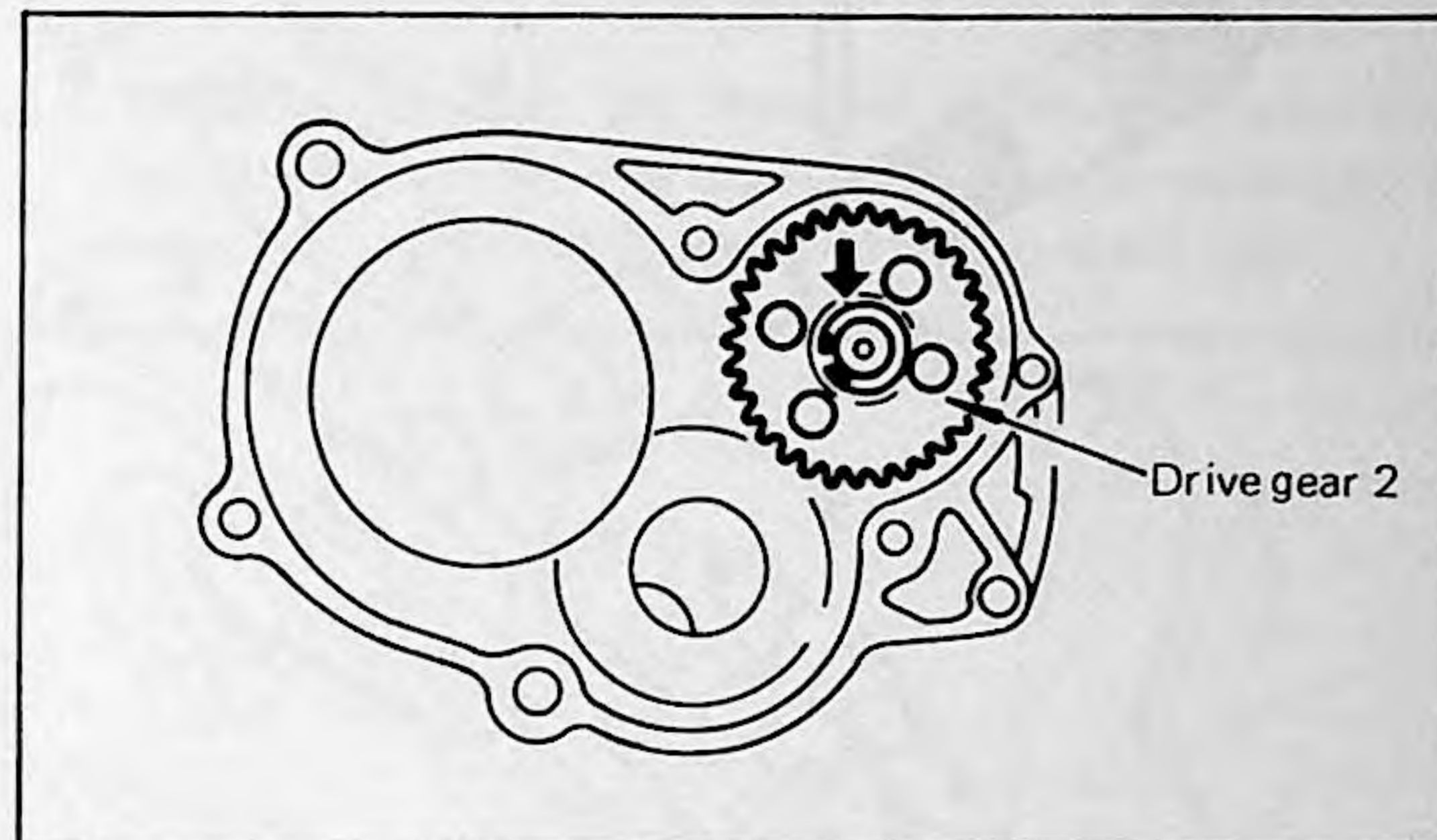


Fig. 2-49

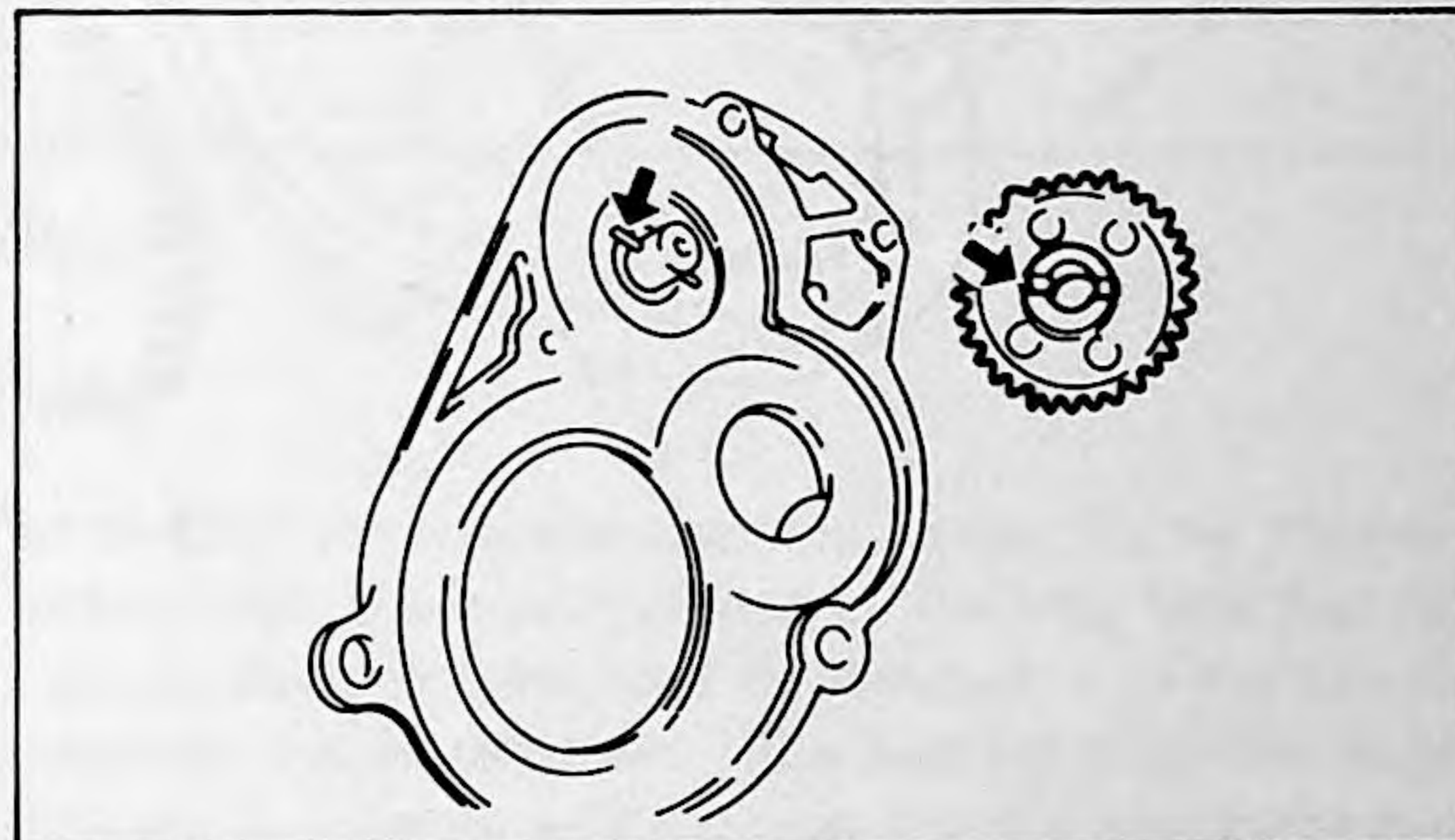


Fig. 2-50

2-4-8

For assembly, reverse the procedure for disassembly.

2-4-9

A ring gear is attached to the rear side of the primary fixed sheave. When installing, coat it with anti-freeze grease Beacon 325 or Aero Shell 7A.

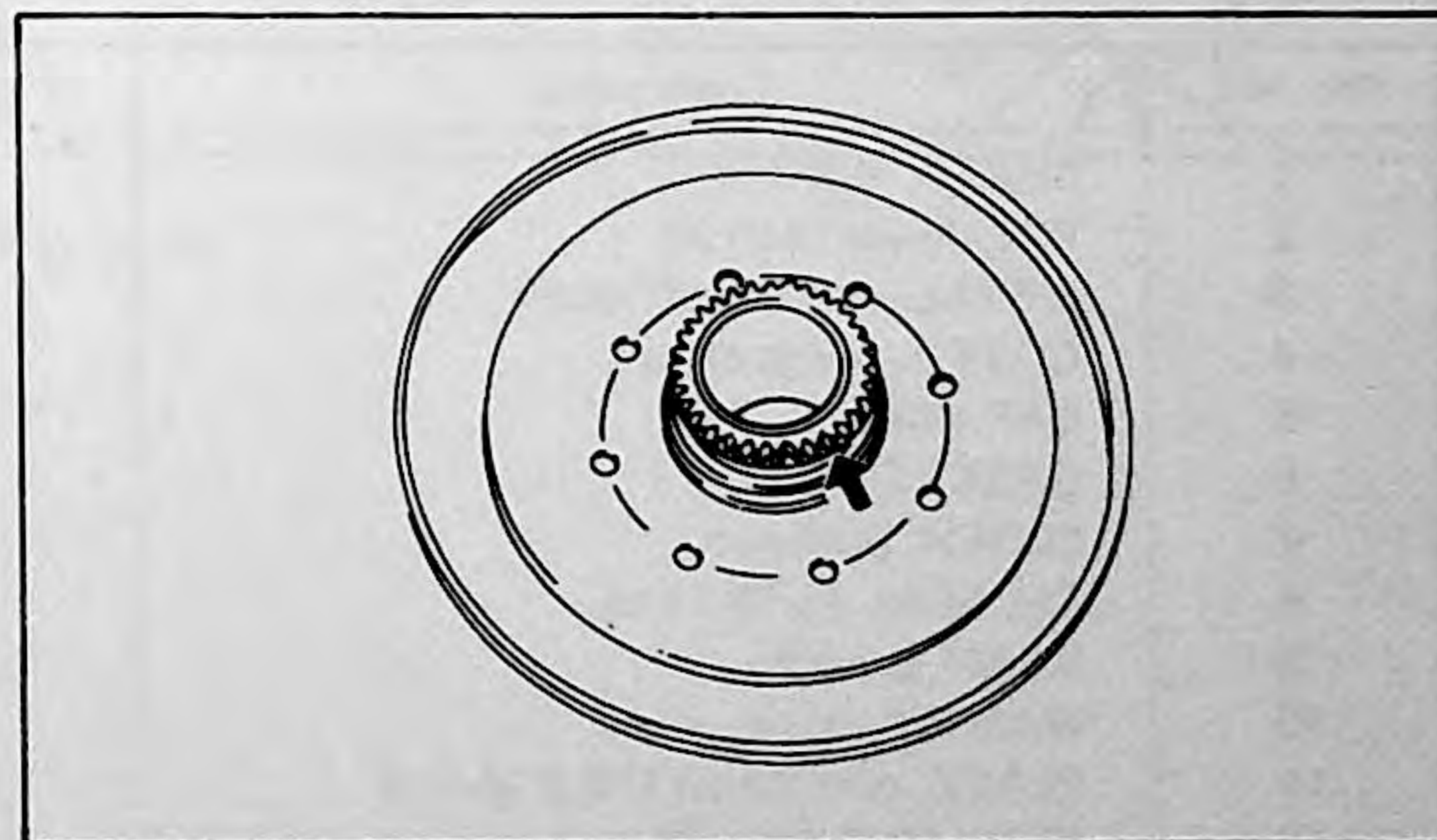


Fig. 2-51

PUMP DRIVE GEAR

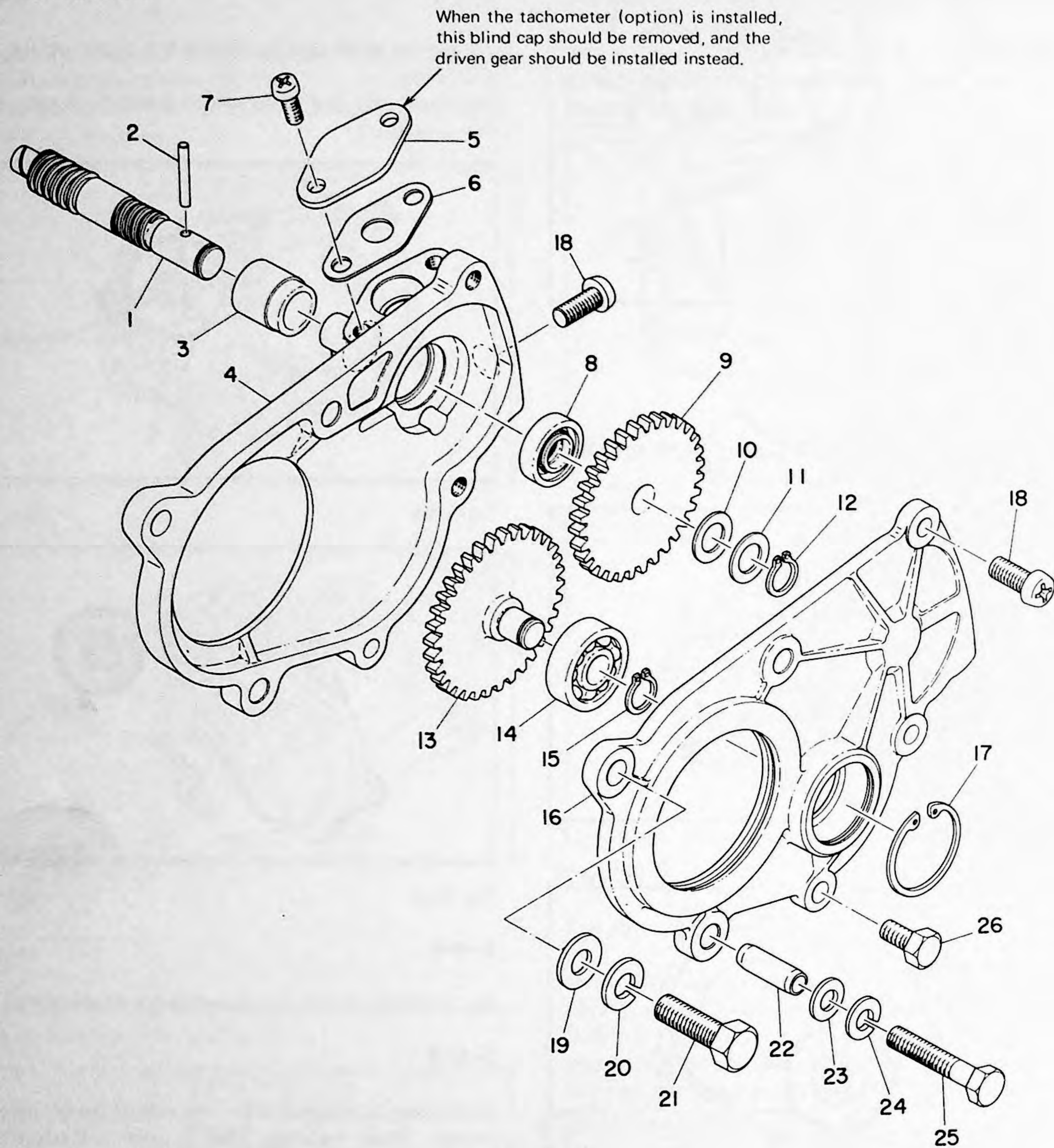


Fig. 2-52

Ref. No.	Description	Q'ty	Ref. No.	Description	Q'ty
1	SHAFT, worm	1	14	BEARING (B6000 2RS)	1
2	PIN, dowel (3-21.8)	1	15	CIRCLIP (S-10)	1
3	METAL, worm shaft outer	1	16	COVER, pump drive 2	1
4	COVER, pump drive 1	1	17	CIRCLIP (R-26)	1
5	CAP, blind	1	18	SCREW, panhead	3
6	GASKET	1	19	WASHER, plain	1
7	SCREW, panhead	2	20	WASHER, spring	1
8	OIL SEAL (S-10-21-5)	1	21	BOLT	1
9	GEAR, drive 2	1	22	PIN, dowel	2
10	WASHER, wave	1	23	WASHER, plain	2
11	PLATE, cam thrust (10.2-16-0.3)	1	24	WASHER, spring	2
12	CIRCLIP (S-10)	1	25	BOLT	2
13	GEAR, idle	1	26	BOLT	1

2-5 REMOVAL OF FLYWHEEL MAGNETO**2-5-1**

With the starter assembly removed you will now be able to remove the magneto assembly. The first step in this procedure is to remove the flywheel securing nut. Use a socket wrench (26 mm).

(In this case, to loosen or tighten the flywheel the "bar" should be inserted into the hole in the pulley.)

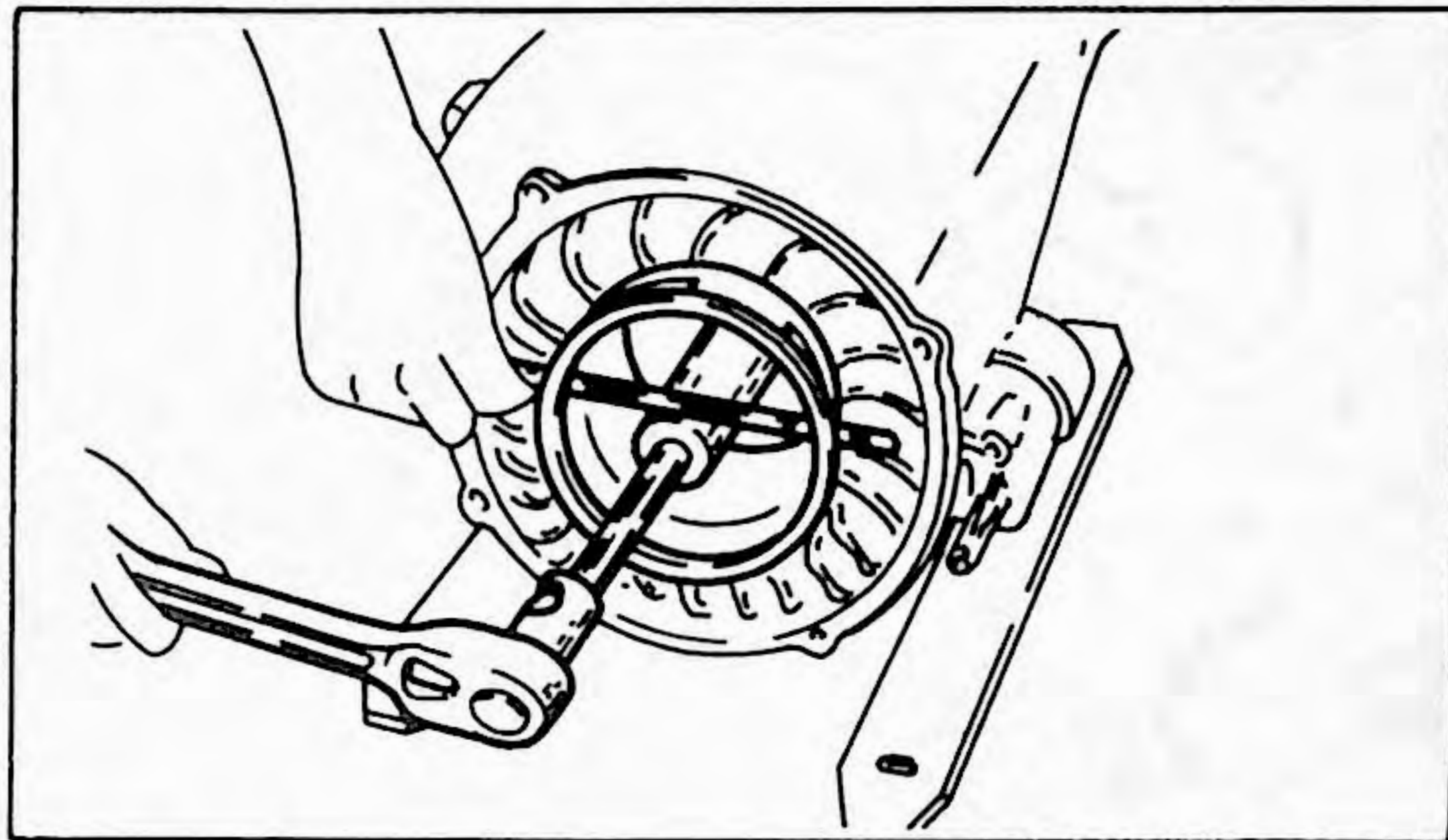


Fig. 2-53

2-5-2

Remove the three bolts that hold the starter pulley. Once these bolts are removed, the pulley can be set aside.

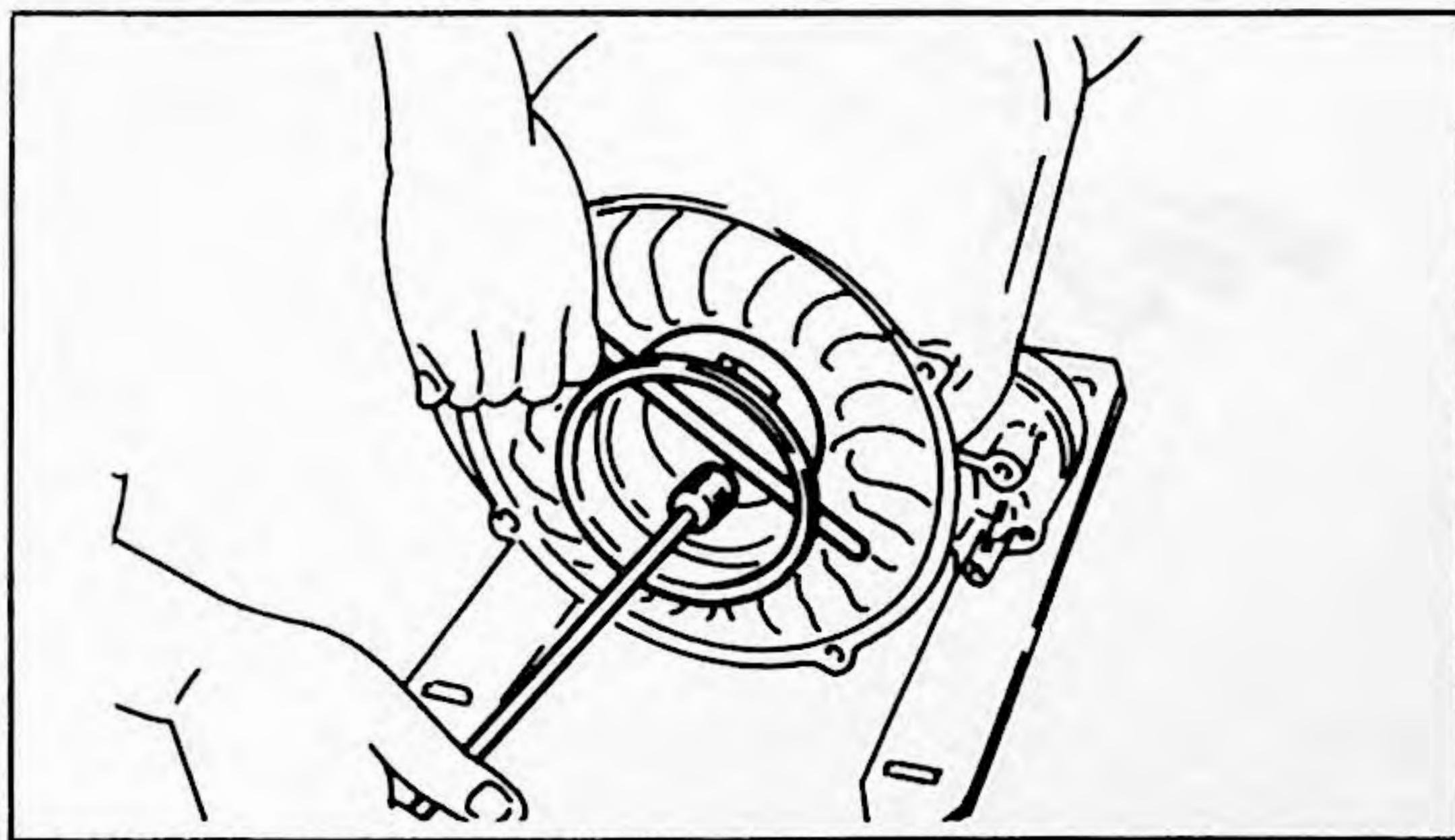


Fig. 2-54

2-5-3

The magneto flywheel can now be removed. This requires the use of special puller that you will find in our special tool kit. Be sure to use the three short screws that come with the puller when removing the flywheel.

Note:

Immediately after the flywheel is removed, take the woodruff key off the shaft and in same satisfactory way attach it to the flywheel so that it is not lost.

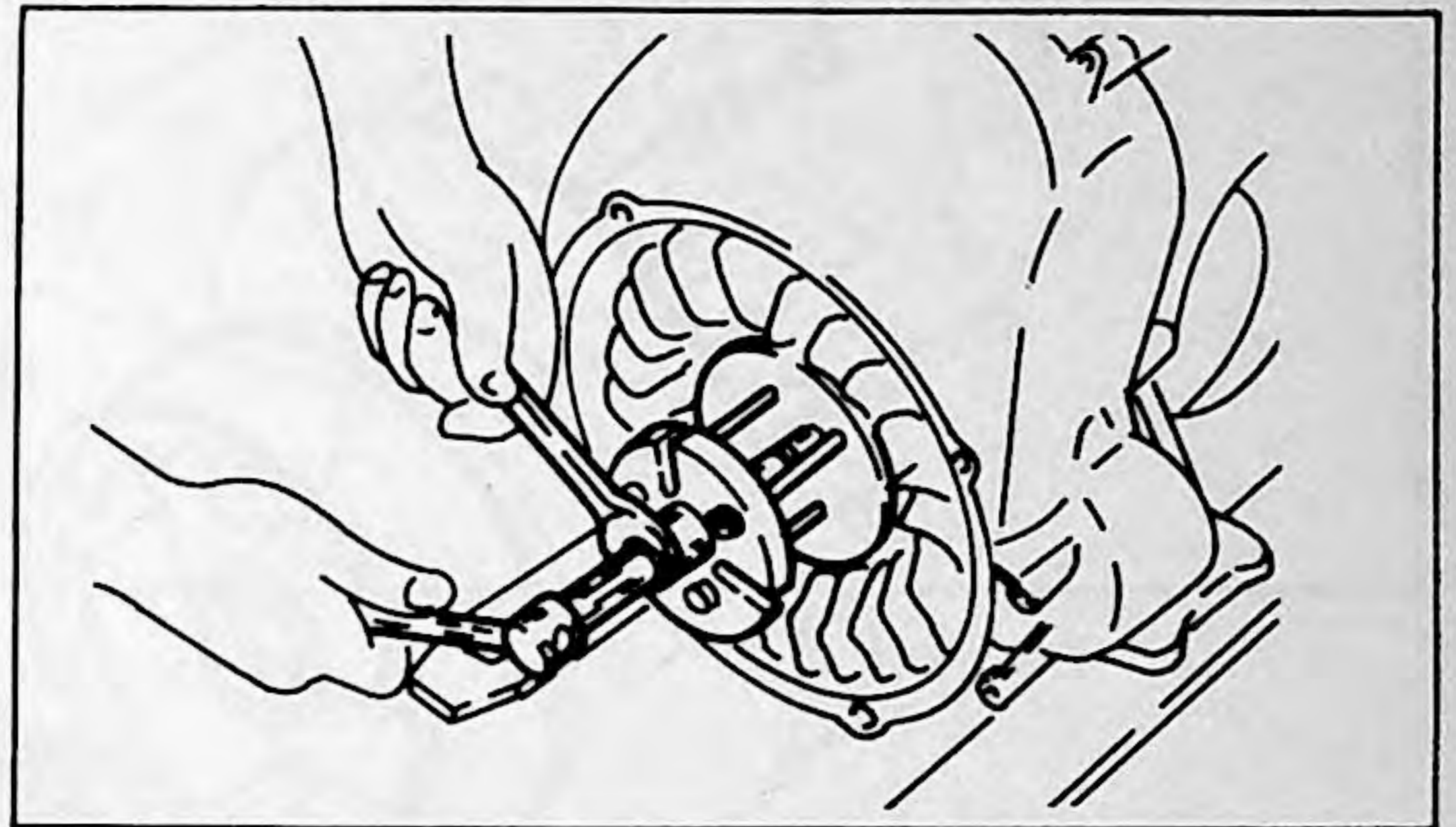


Fig. 2-55

2-5-4

All parts of the magneto assembly, except for the magneto backing plate, have been removed. The only time that the magneto backing plate need be removed is in the case of complete engine teardown. The backing plate has to be removed in order to split the cases and this is accomplished by removing the four hold-down screws, with an impact screw driver.

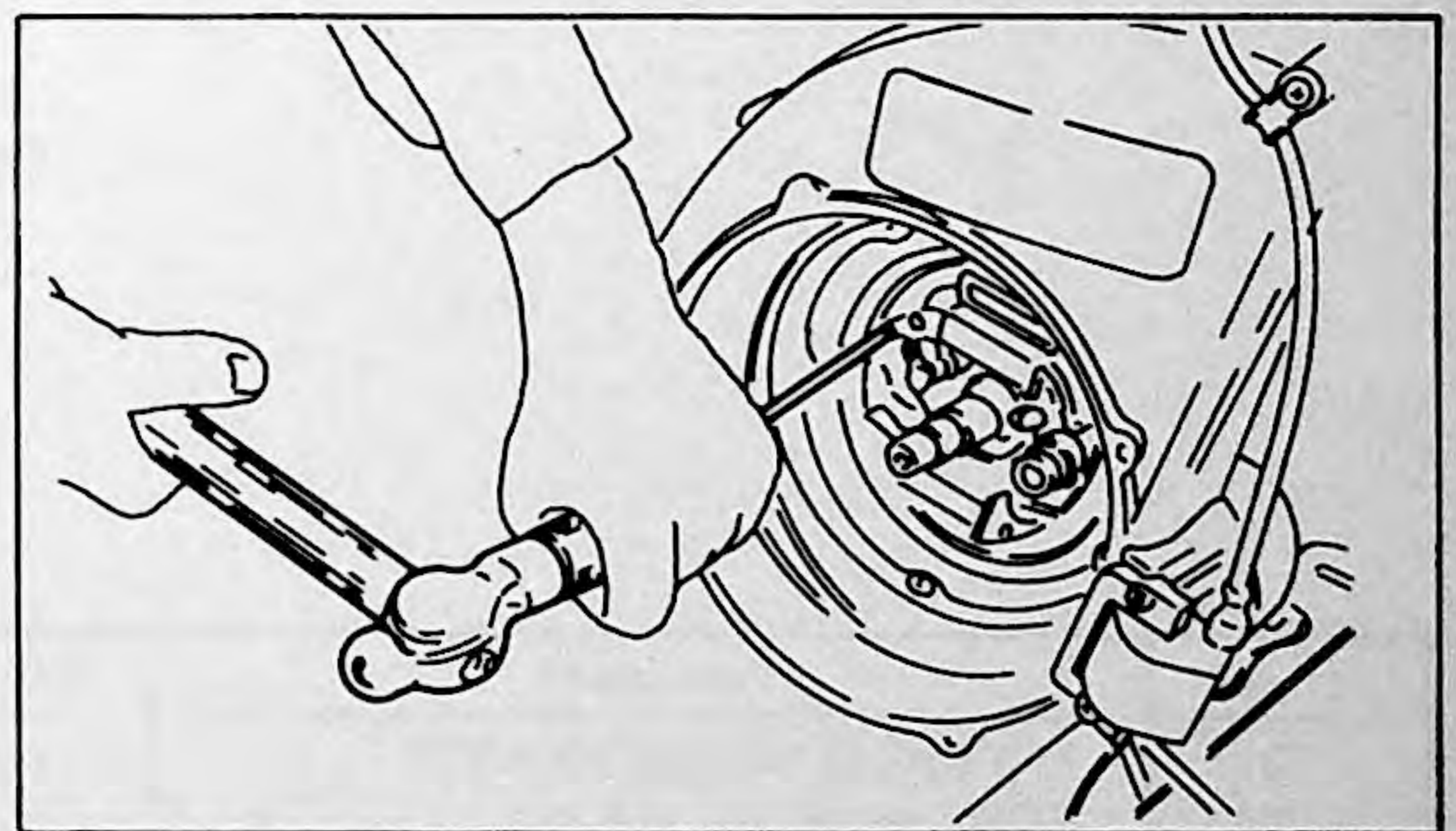


Fig. 2-56

FLYWHEEL MAGNETO

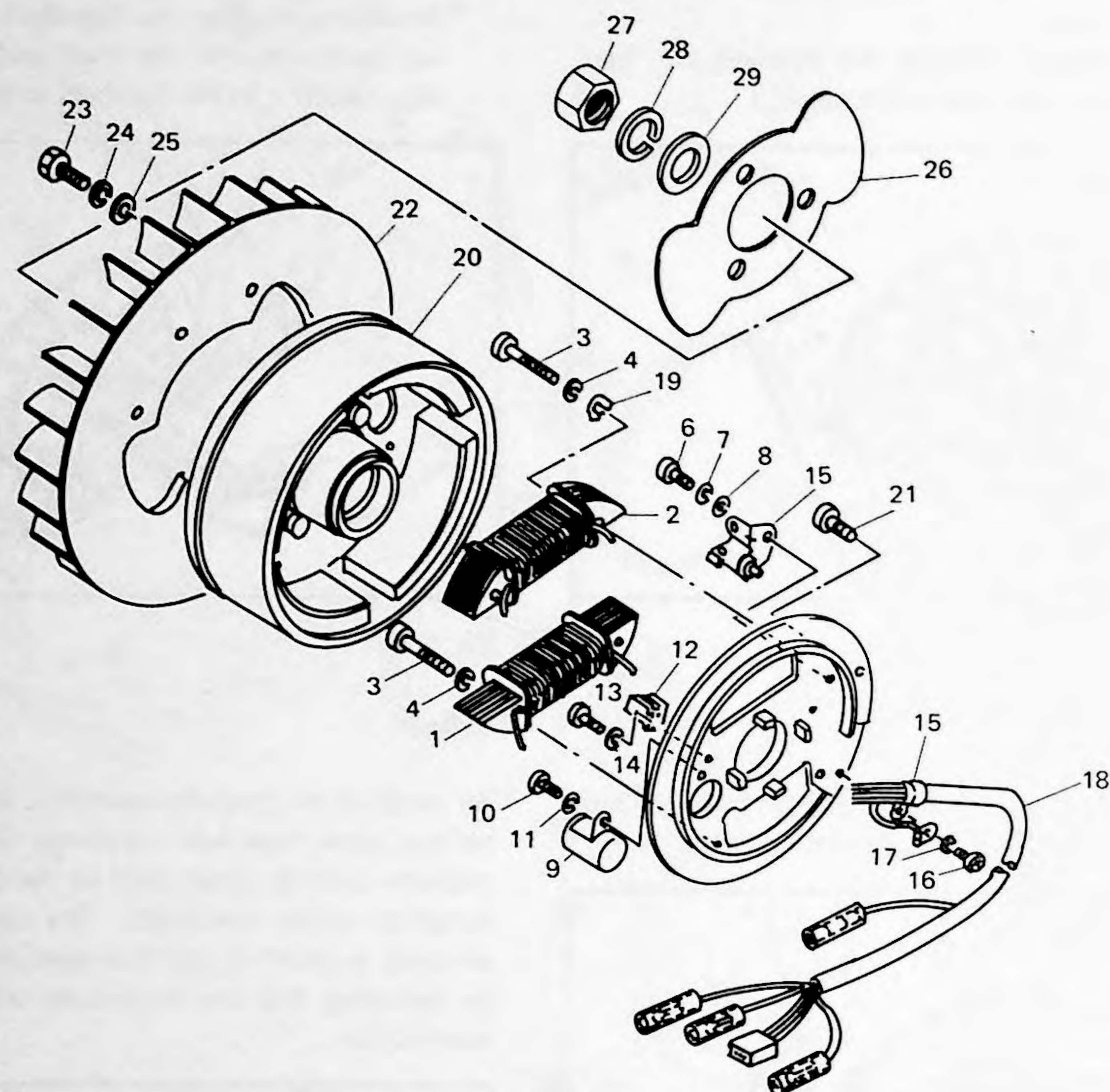


Fig. 2-57

Ref. No.	Description	Q'ty	Ref. No.	Description	Q'ty
0-1	FLYWHEEL MAGNETO ASS'Y	1	15	CLAMP, lead	1
1	COIL, source	1	16	SCREW, panhead (4-8)	1
2	COIL, lighting	2	17	WASHER, spring	1
3	SCREW, panhead (5-25)	4	18	LEAD WIRE ASS'Y	1
4	WASHER, spring	4	19	PLATE, timing	1
5	CONTACT BREAKER ASS'Y	1	20	ROTOR ASS'Y	1
6	SCREW, panhead (4-12)	1	21	SCREW, panhead	3
7	WASHER, spring	1	22	FAN	1
8	WASHER, plain	1	23	BOLT	6
9	CONDENSER	1	24	WASHER, spring	6
10	SCREW, panhead (4-10)	1	25	WASHER, plain	6
11	WASHER, spring	1	26	COVER, hole	1
12	LUBRICATOR	1	27	NUT, crankshaft	1
13	SCREW, panhead (4-10)	1	28	WASHER, spring	1
14	WASHER, spring	1	29	WASHER 1	1

2-6 REMOVAL OF FANCASE AND AIR SHROUD**2-6-1**

Remove the air shroud that covers the top of the engine. There are six screws that hold the air shroud in place.

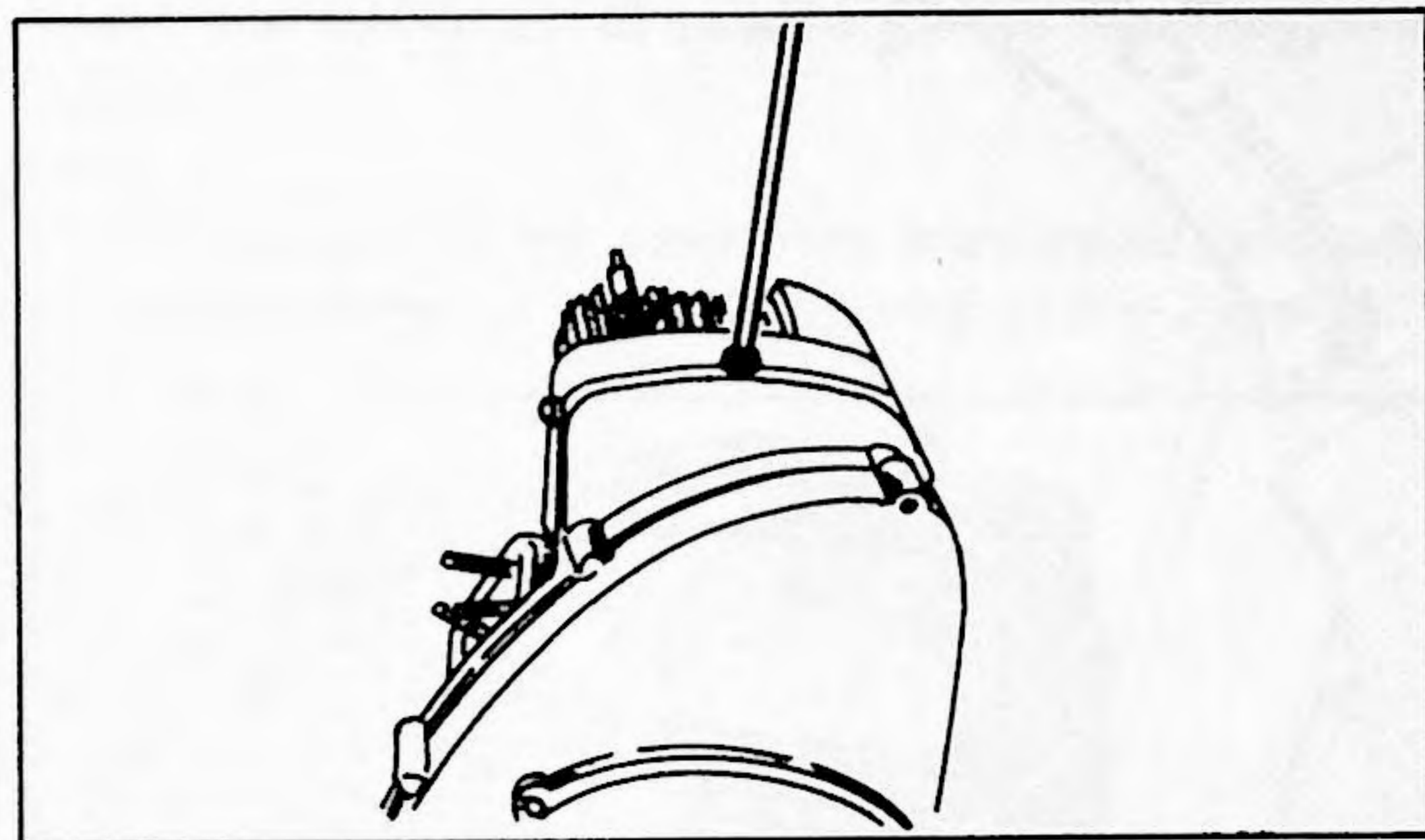


Fig. 2-58

2-6-2

Straighten the bent positions of lock washers 1 and 2, and remove the bolts. The fancase 1 and 2 can be removed out of the crankcase.

(Note that a packing agent gasket is applied to the mating surfaces of the fancases 1 and 2.)

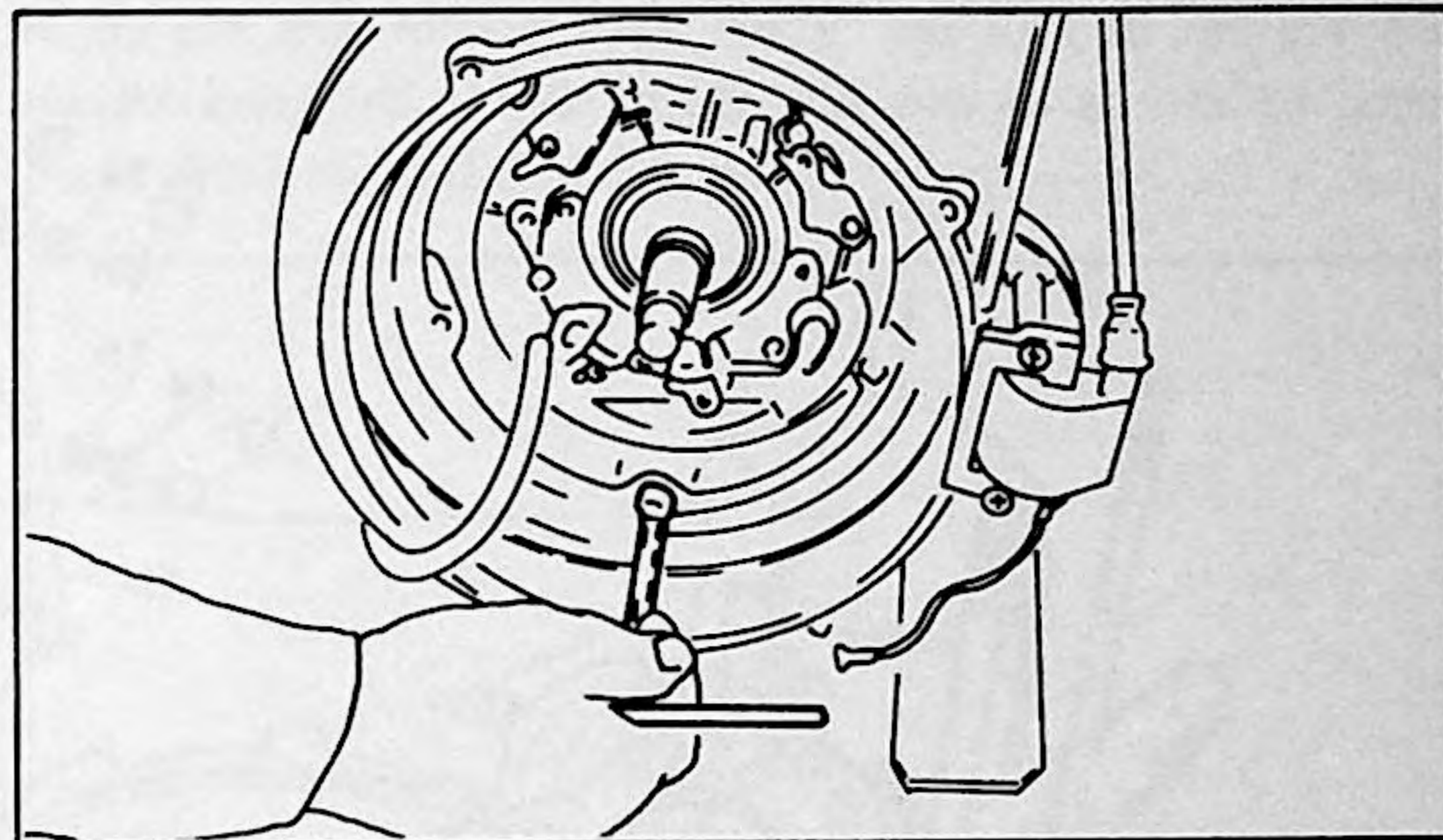


Fig. 2-59

FANCASE & AIR SHROUD

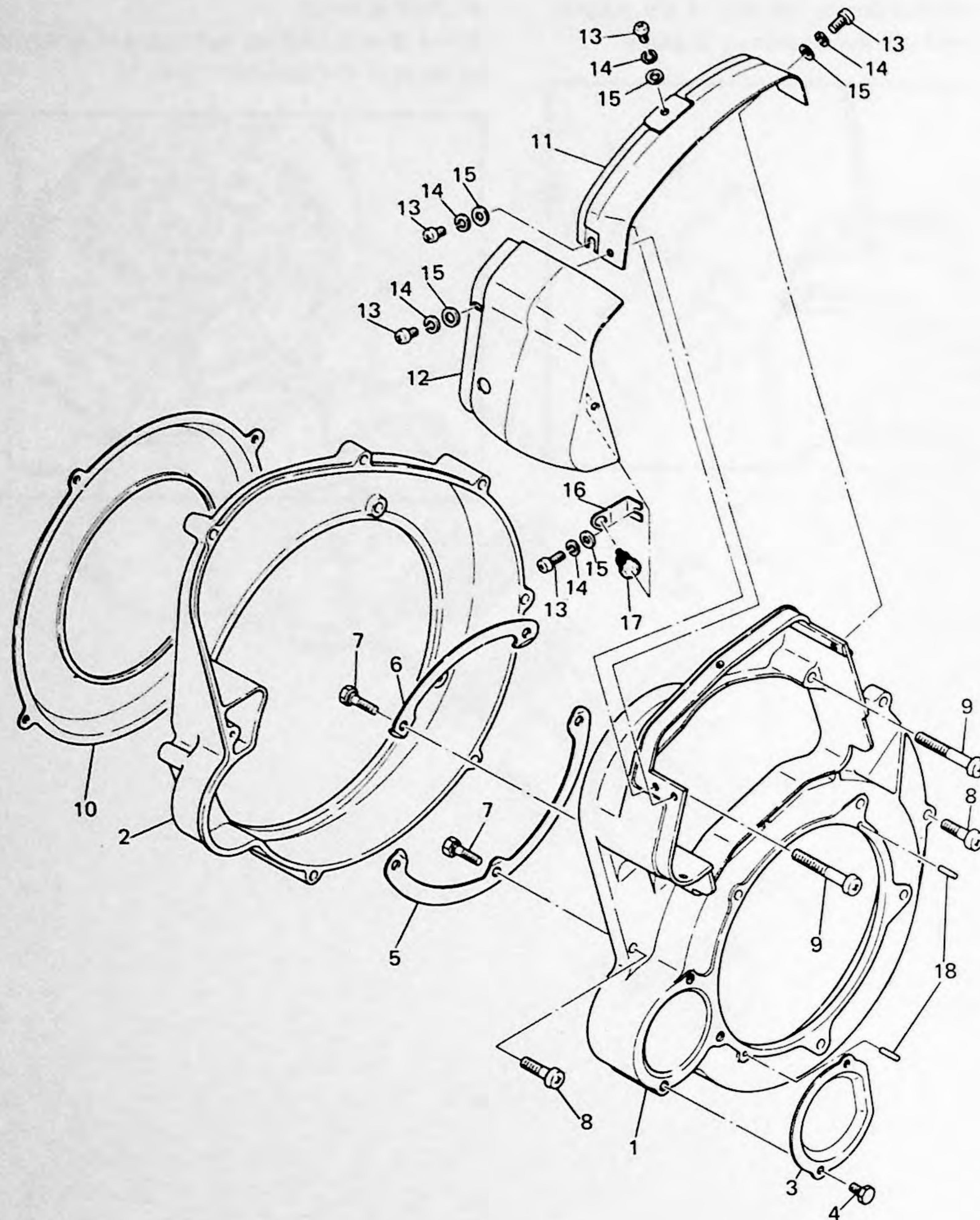


Fig. 2-60

Ref. No.	Description	Q'ty	Ref. No.	Description	Q'ty
1	CASE, fan 1	1	10	DEFLECTOR	1
2	CASE, fan 2	1	11	AIR SHROUD, cylinder 1	1
3	PLATE	1	12	AIR SHROUD, cylinder 2	1
4	SCREW, panhead	2	13	SCREW, bind	6
5	WASHER, lock 1	1	14	WASHER, spring	6
6	WASHER, lock 2	1	15	WASHER, plain	6
7	BOLT	5	16	STAY, clamp	1
8	SCREW, panhead	5	17	GROMMET, air shroud cylinder	1
9	SCREW, panhead	2	18	PIN, dowel (4-13, 8)	2

2-7 TOP END REMOVAL

2-7-1

Remove the cylinder heads. The head is held down by six bolts.

Break each nut loose, in pattern, before removing completely.

Note:

On reassembly, the head bolts are torqued, gradually and in pattern, to 16.5 ~ 19.5 ft-lbs. (2.3 ~ 2.7 m-kg).

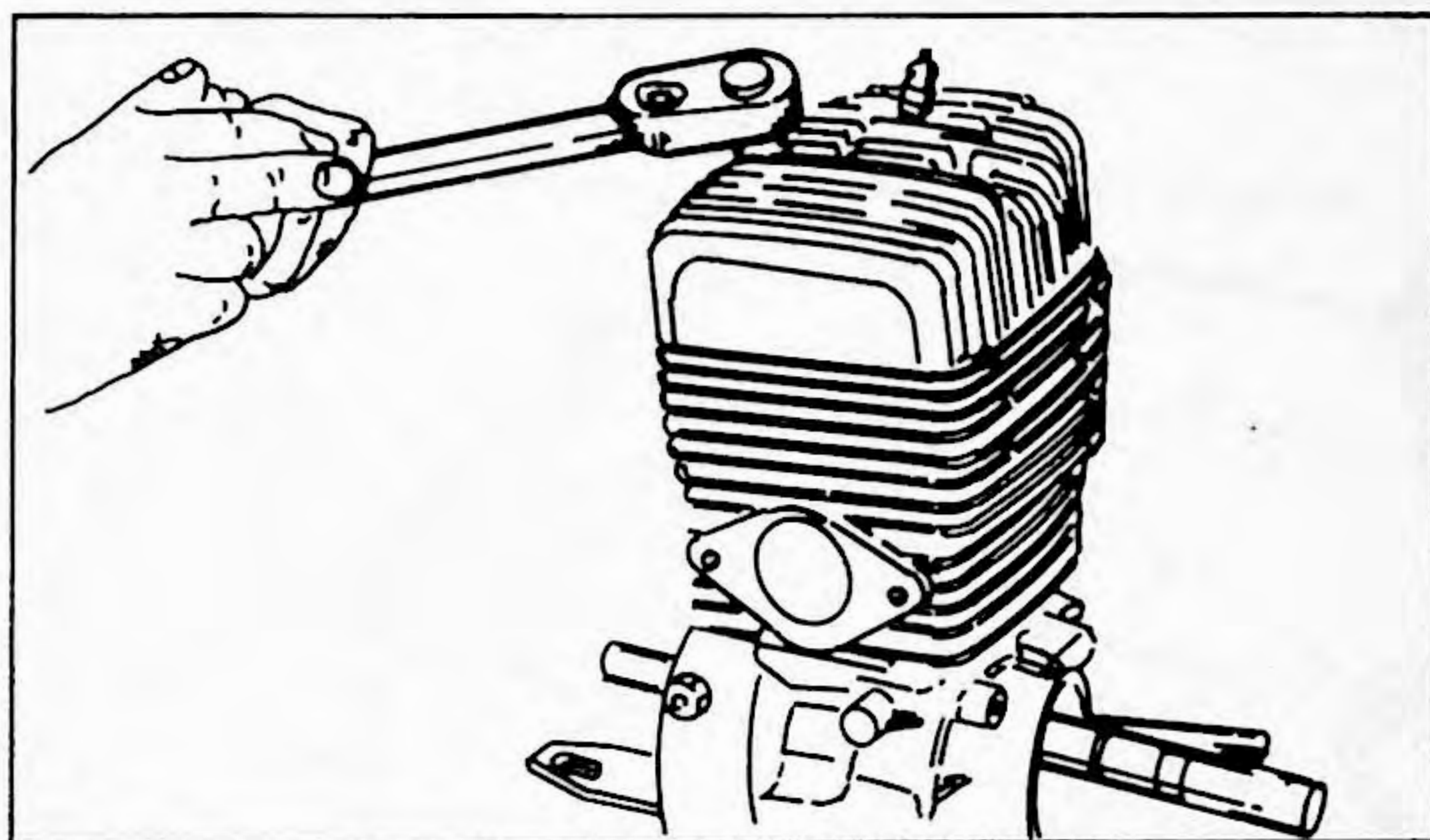


Fig. 2-61

2-7-2

The next step is to remove the cylinders.

When the cylinders are lifted off it is advisable to slip a clean rag beneath the piston. This will stop any carbon, broken parts, or other contaminations from falling into the engine.

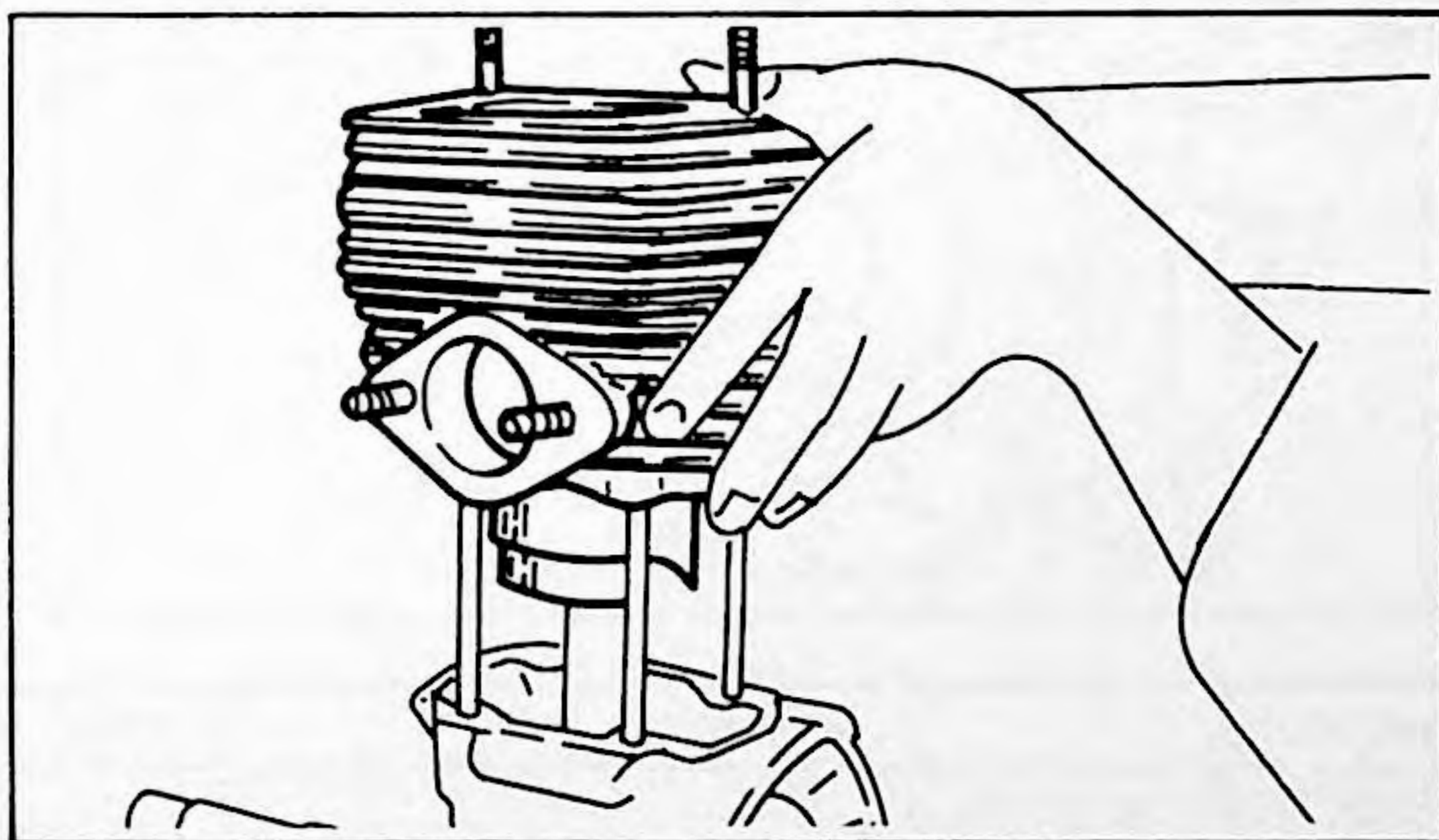


Fig. 2-62

2-7-3

The piston assembly is removed at this time. Use a needle nose pliers to remove the piston pin clip.

Use a soft drift pin to push the piston pin out to allow a pair of pliers to grip and completely remove the piston pin. Once the piston pin has been removed the piston can be lifted off the rod and set aside. Be sure to remove the needle bearings in the upper rod end so as not to lose them when the engine is moved.

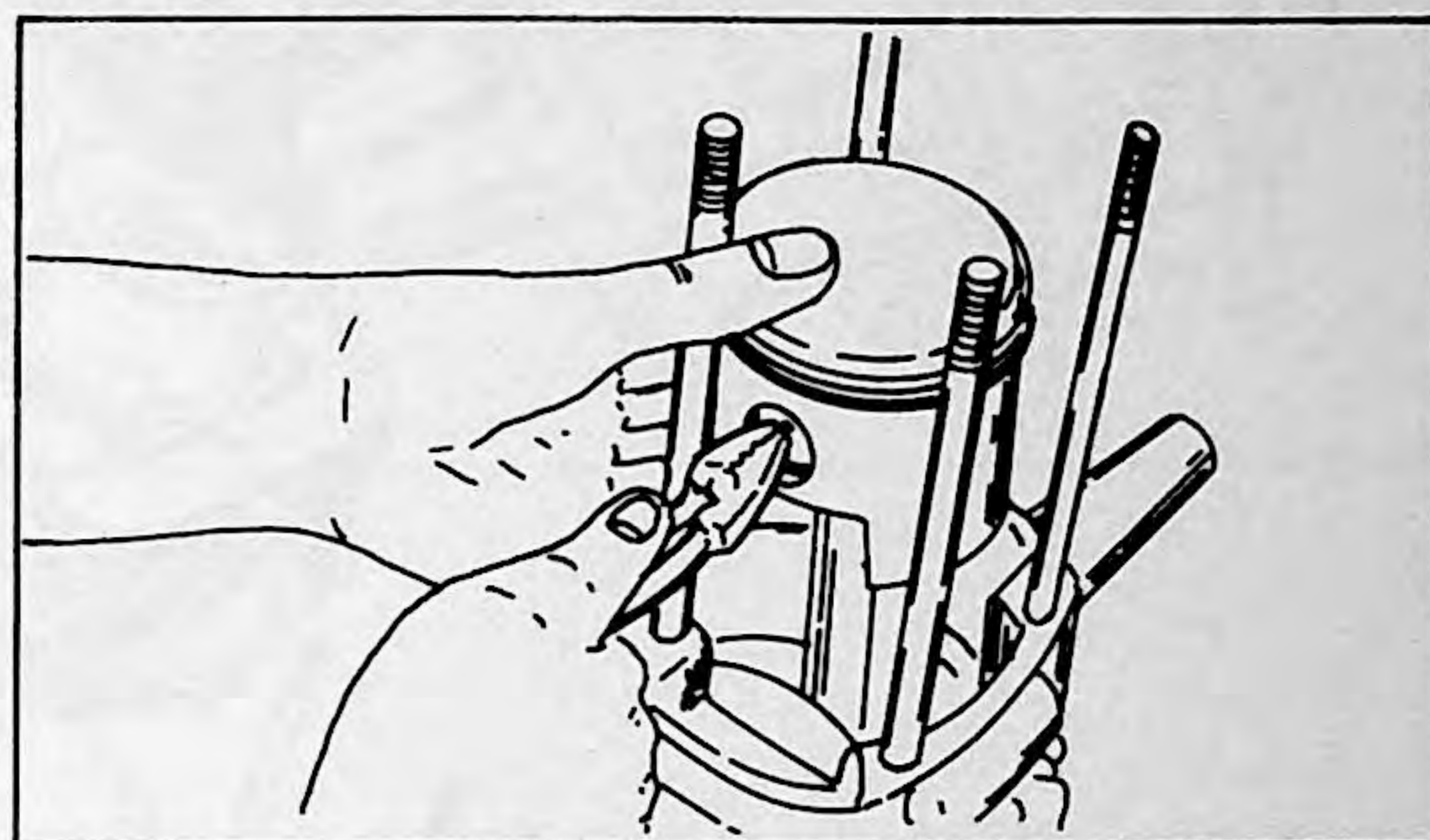


Fig. 2-63

2-7-4

Be sure to remove the cylinder gasket before dividing the crankcase.

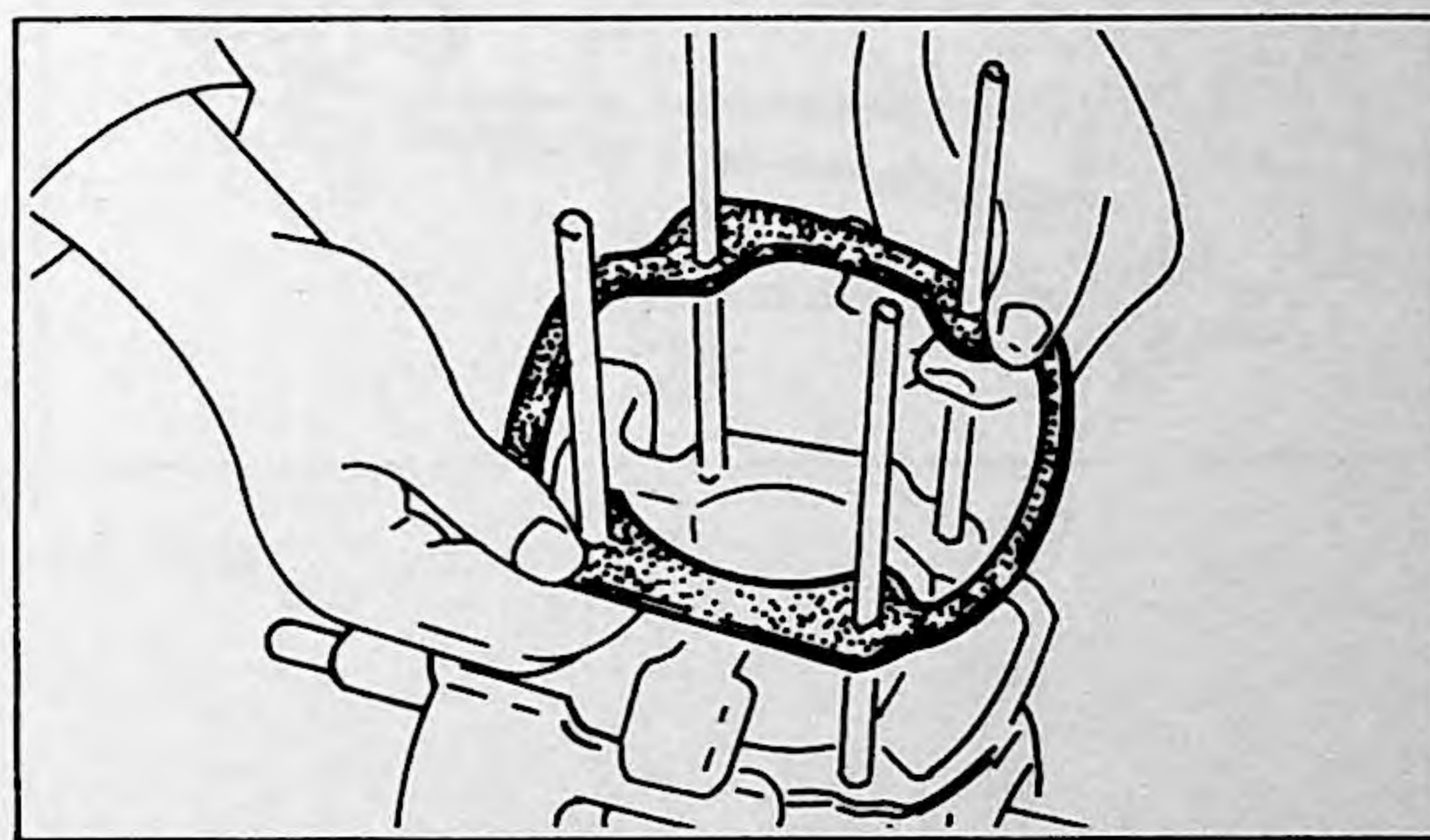


Fig. 2-64

CRANKCASE, CYLINDER & CYLINDER HEAD

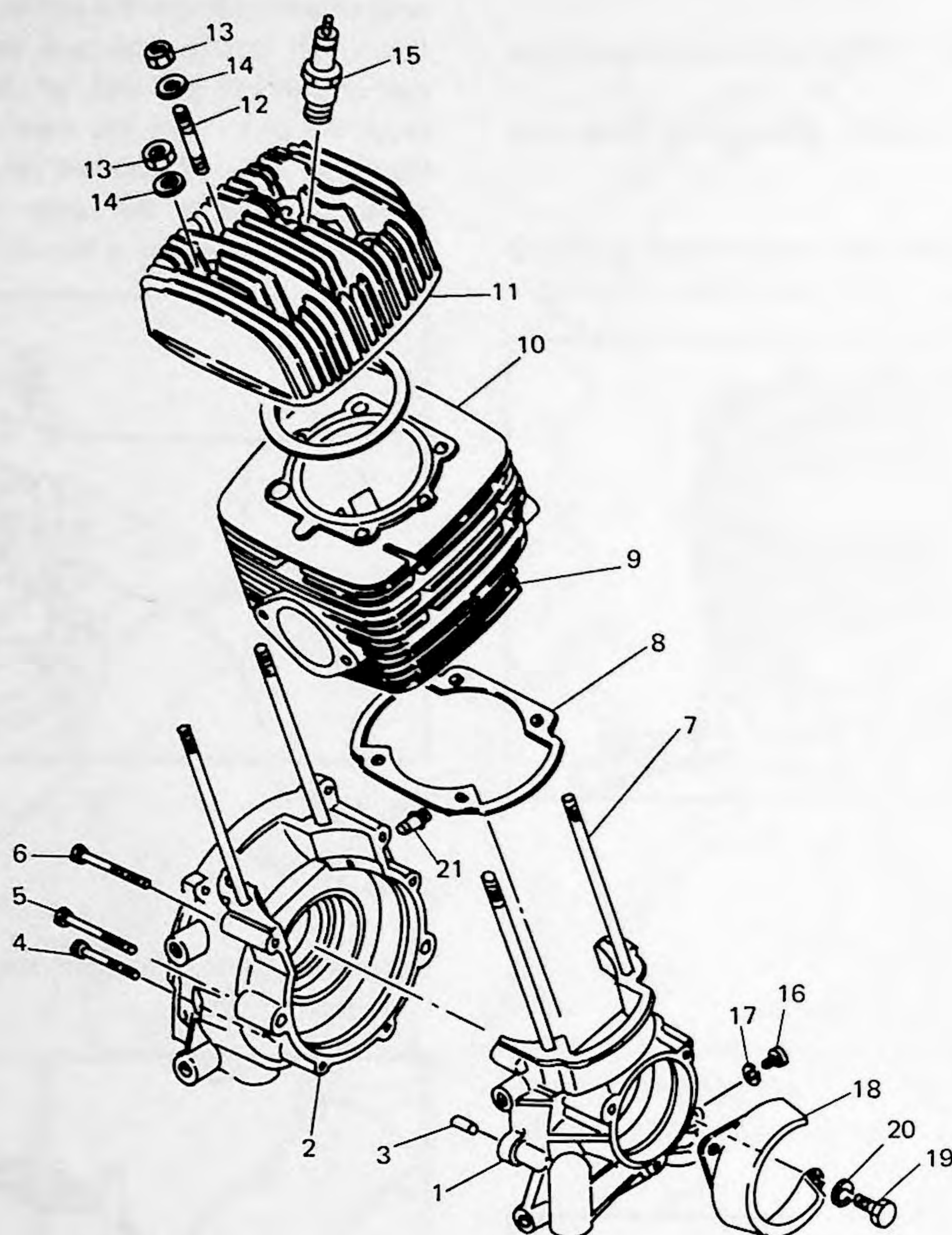


Fig. 2-65

Ref. No.	Description	Q'ty	Ref. No.	Description	Q'ty
1	CASE, crank left	1	12	BOLT, stud	2
2	CASE, crank right	1	13	NUT, holding	6
3	PIN, dowel (6.4-10-15)	2	14	WASHER, holding (8.5-19-2.6)	6
4	SCREW, panhead	3	15	PLUG, spark (B-7E)	1
5	SCREW, panhead	2	16	SCREW, panhead	1
6	SCREW, panhead	2	17	GASKET, screw	1
7	BOLT, cylinder holding	4	18	PROTECTOR	1
8	GASKET, cylinder	1	19	SCREW, panhead	2
9	CYLINDER	1	20	WASHER, spring	2
10	GASKET, cylinder head	1	21	PIPE, joint	1
11	HEAD, cylinder	1			

Reference:

The crankcase has a drain screw. This screw is used to empty the crankcase before the engine is stored away for long periods. When installing this screw, apply a sealing agent so that it will become loose.

2-8 CRANKSHAFT ASS'Y REMOVAL

2-8-1

Remove the four bolts that hold the upper engine mounting bracket. The engine is now free of all extra external parts and attachments. The cases are now ready to be split, if so desired.

Note:

The crankshaft ass'y can be removed by dividing the crankcase into two halves, right and left.

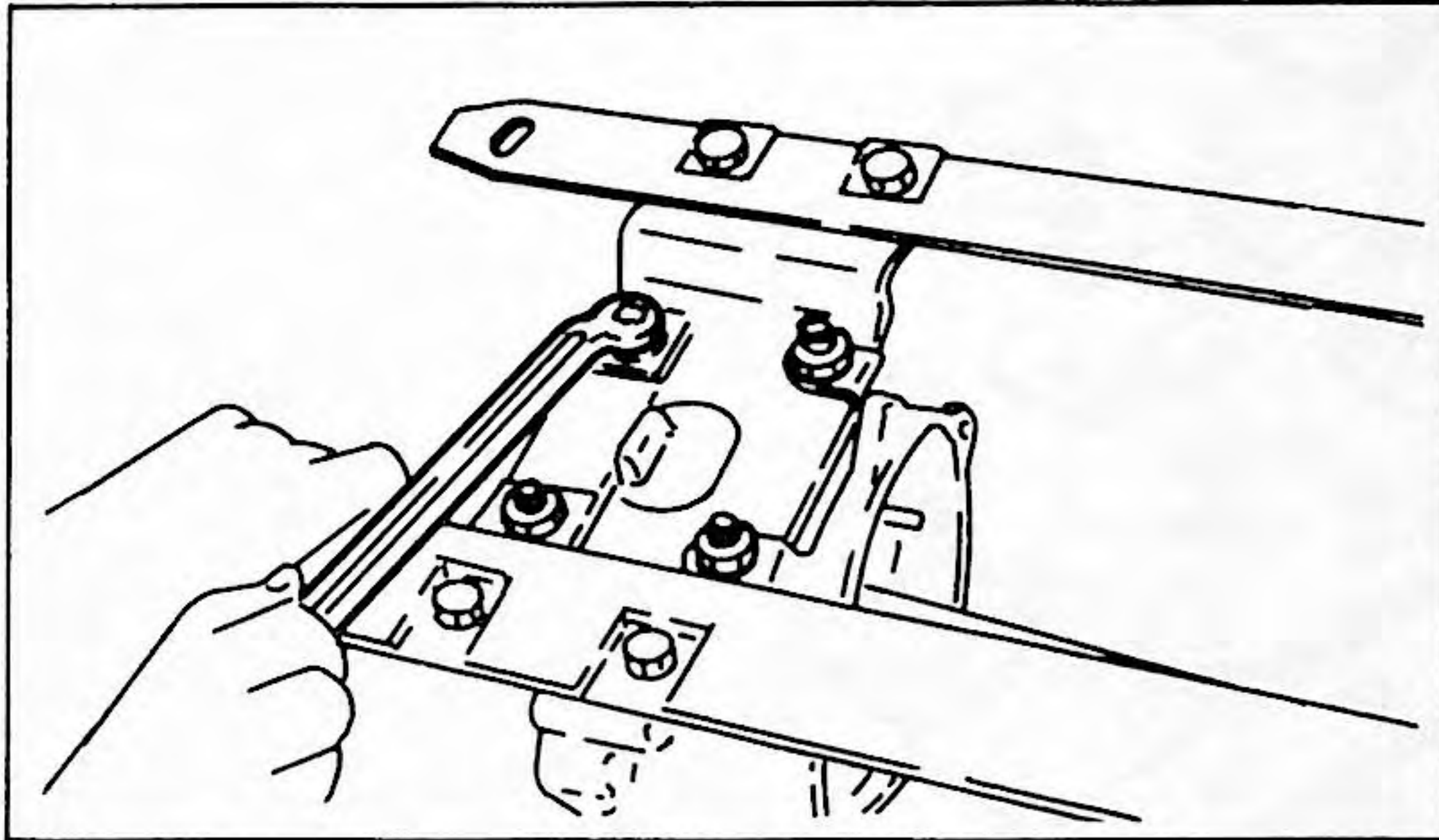


Fig. 2-66

2-8-2

The seven screws holding the crankcase are located on the magneto flywheel side.

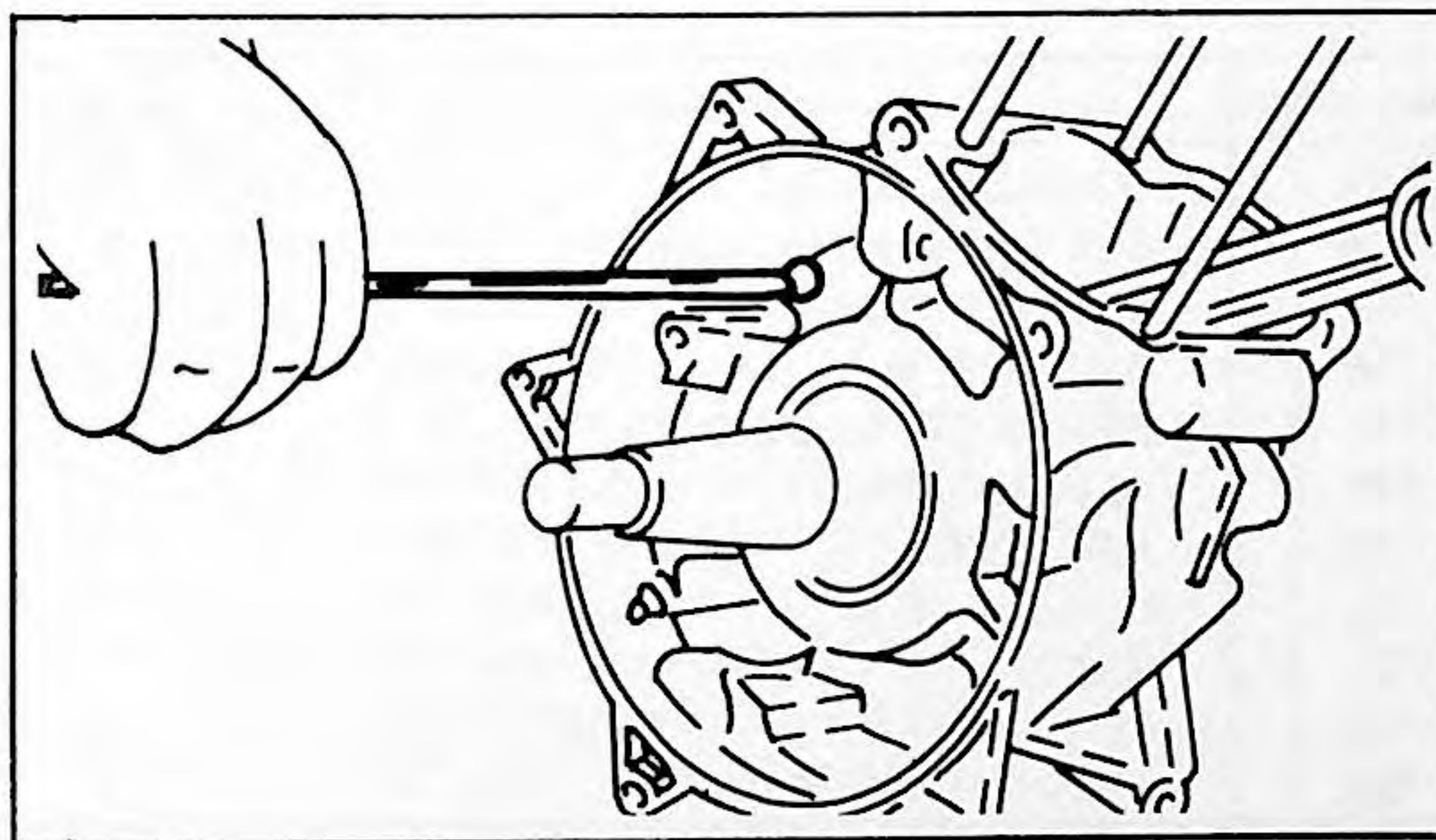


Fig. 2-67

2-8-3

After removing all screws, divide the crankcase by using the crankcase dividing tool (special tool) as shown in the illustration.

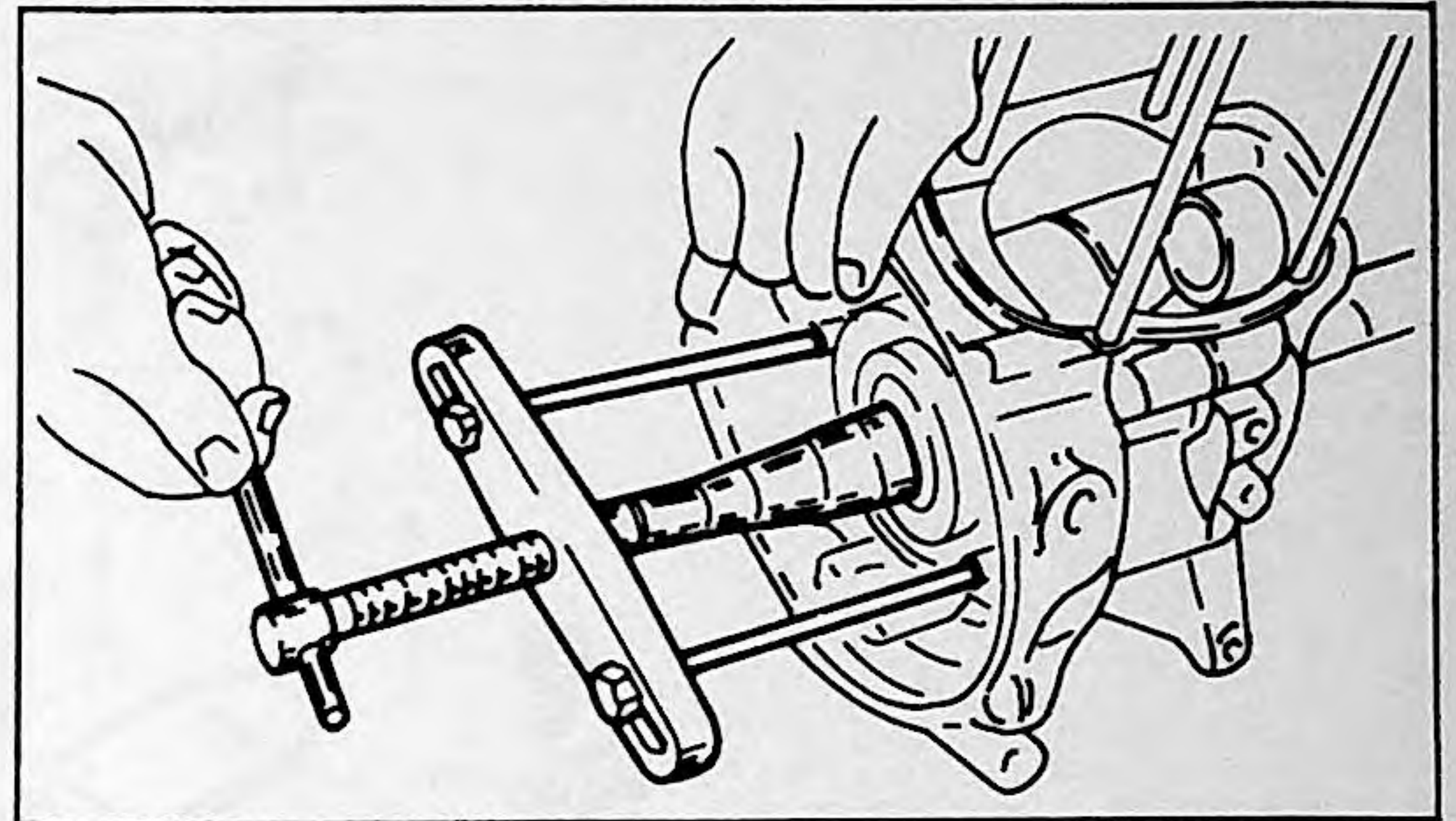


Fig. 2-68

2-8-4

Push the crankshaft out of the crankcase by using the same crankcase dividing tool in the same manner as 2-8-3.

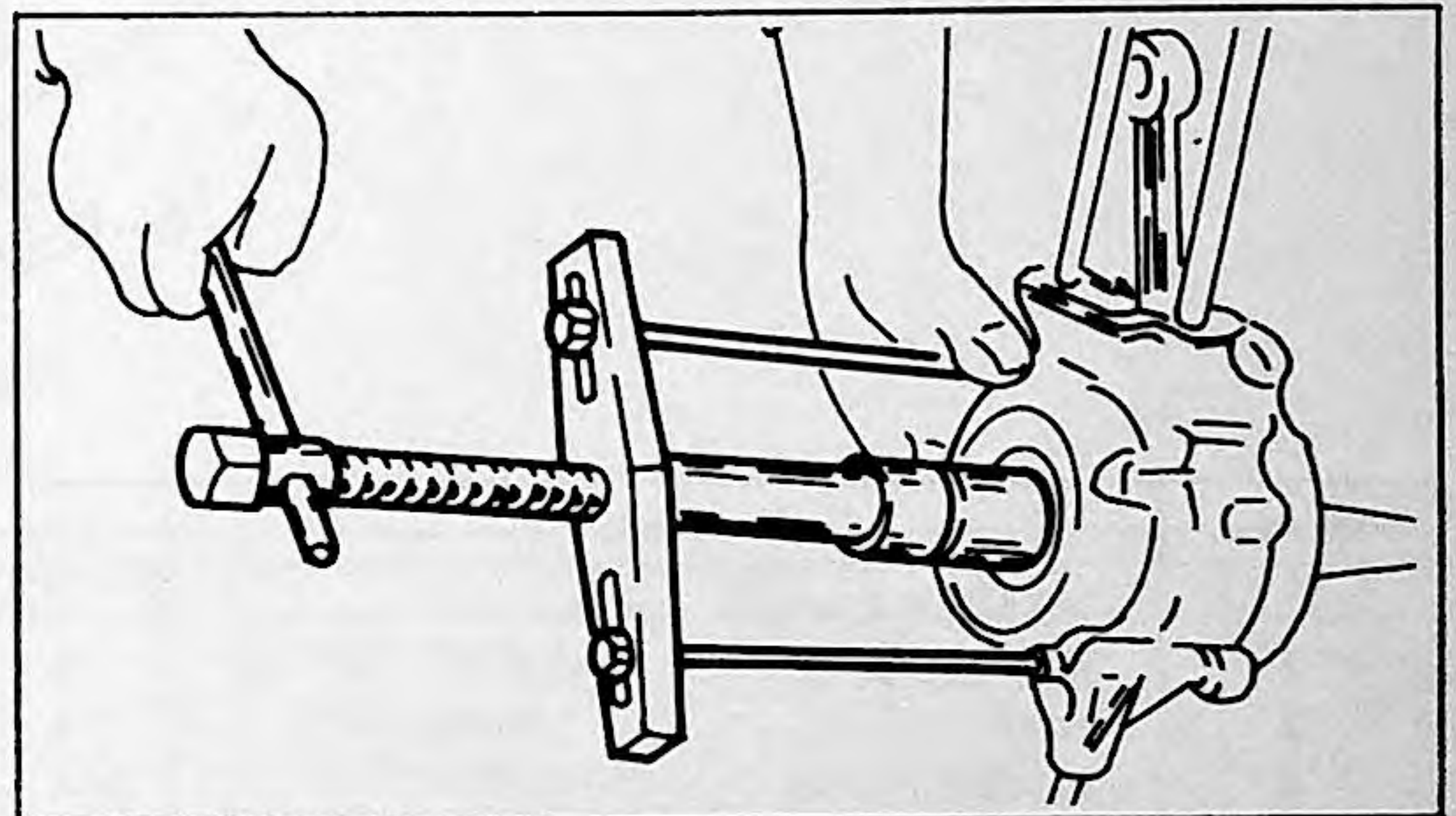


Fig. 2-69

ENGINE BRACKET

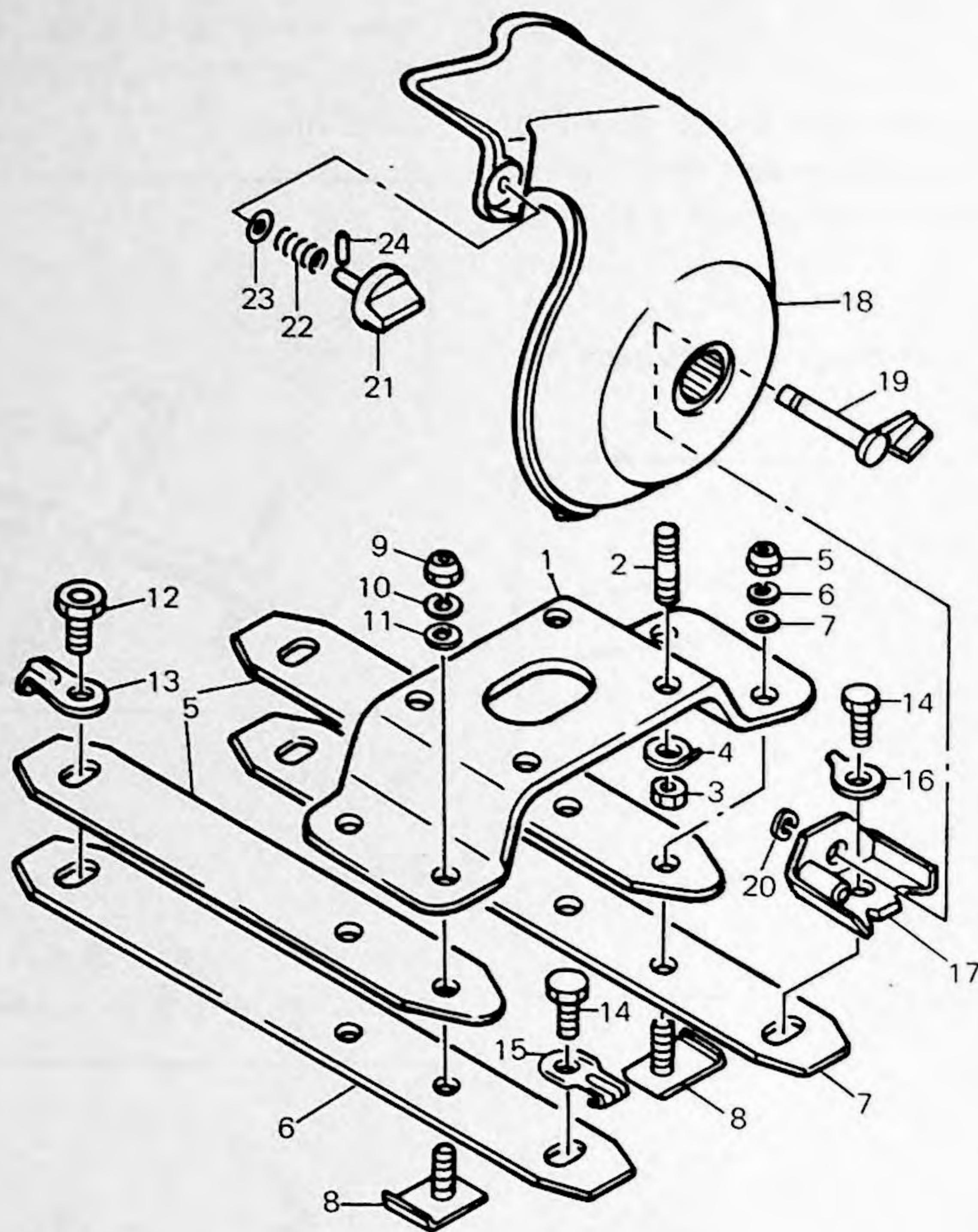


Fig. 2-70

Ref. No.	Description	Q'ty	Ref. No.	Description	Q'ty
1	BRACKET, engine upper	1	13	WASHER, lock 2	2
2	BOLT, stud	4	14	BOLT, engine mounting 2	1
3	NUT	4	15	WASHER, lock 3	1
4	WASHER, lock	4	16	WASHER, lock	1
5	BRACKET, engine lower right	2	17	BRACKET, drive guard	1
6	BRACKET, engine lower front	1	18	GUARD, drive	1
7	BRACKET, engine lower rear	1	19	ARM, fitting	1
8	BOLT	4	20	CIRCLIP (E-6)	1
9	NUT	4	21	KNOB	1
10	WASHER, spring	4	22	SPRING	1
11	WASHER, plain	4	23	WASHER (6.5-20-1.0)	1
12	BOLT, engine mounting	2	24	PIN, spring	1

Installing the engine bracket

1. The engine bracket lower should be installed with special care so that it will not be positioned with the upside down or with the inside out or with the right side on the left.

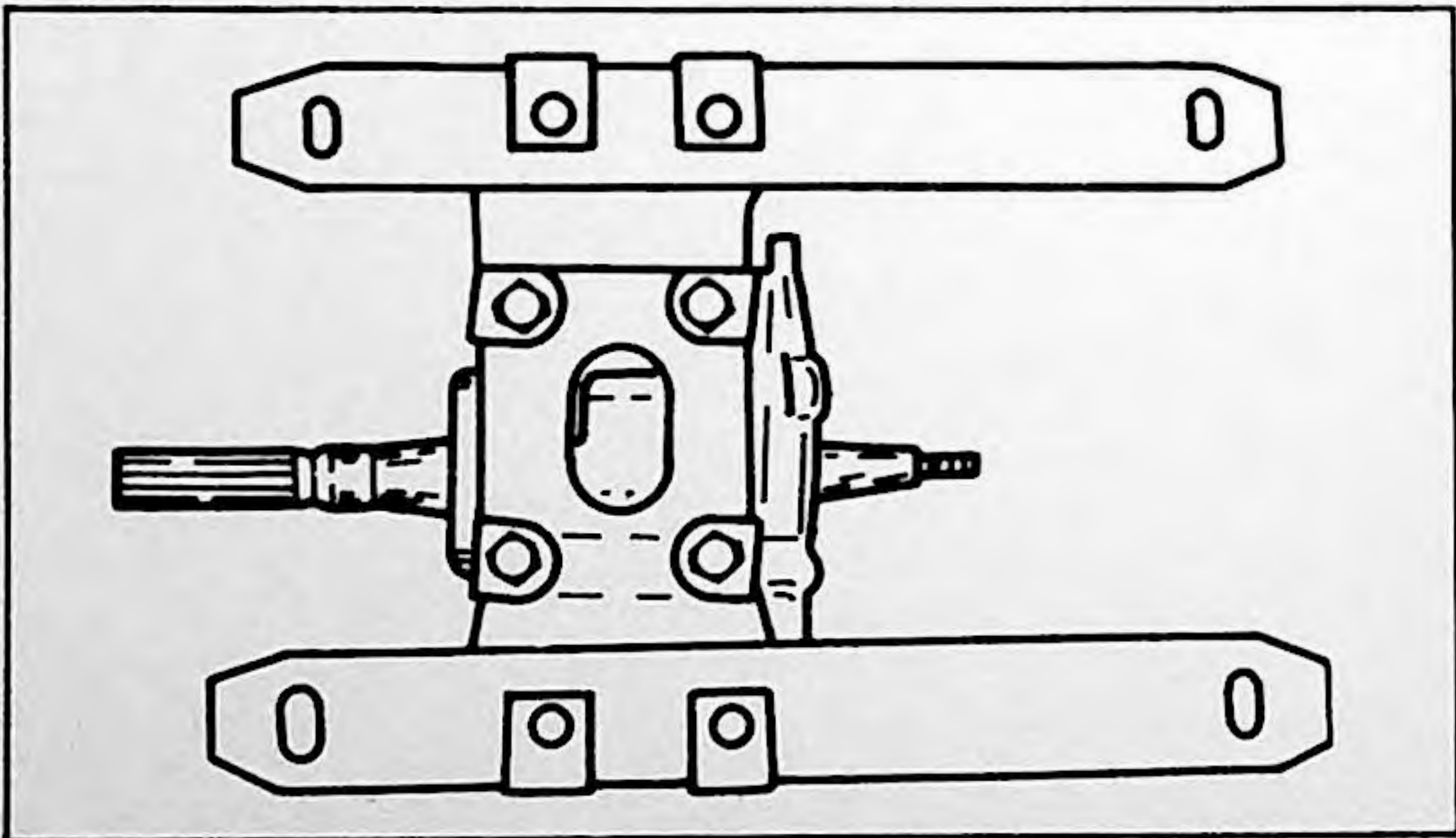


Fig. 2-71

CHAPTER 3. REASSEMBLING

CRANK & PISTON

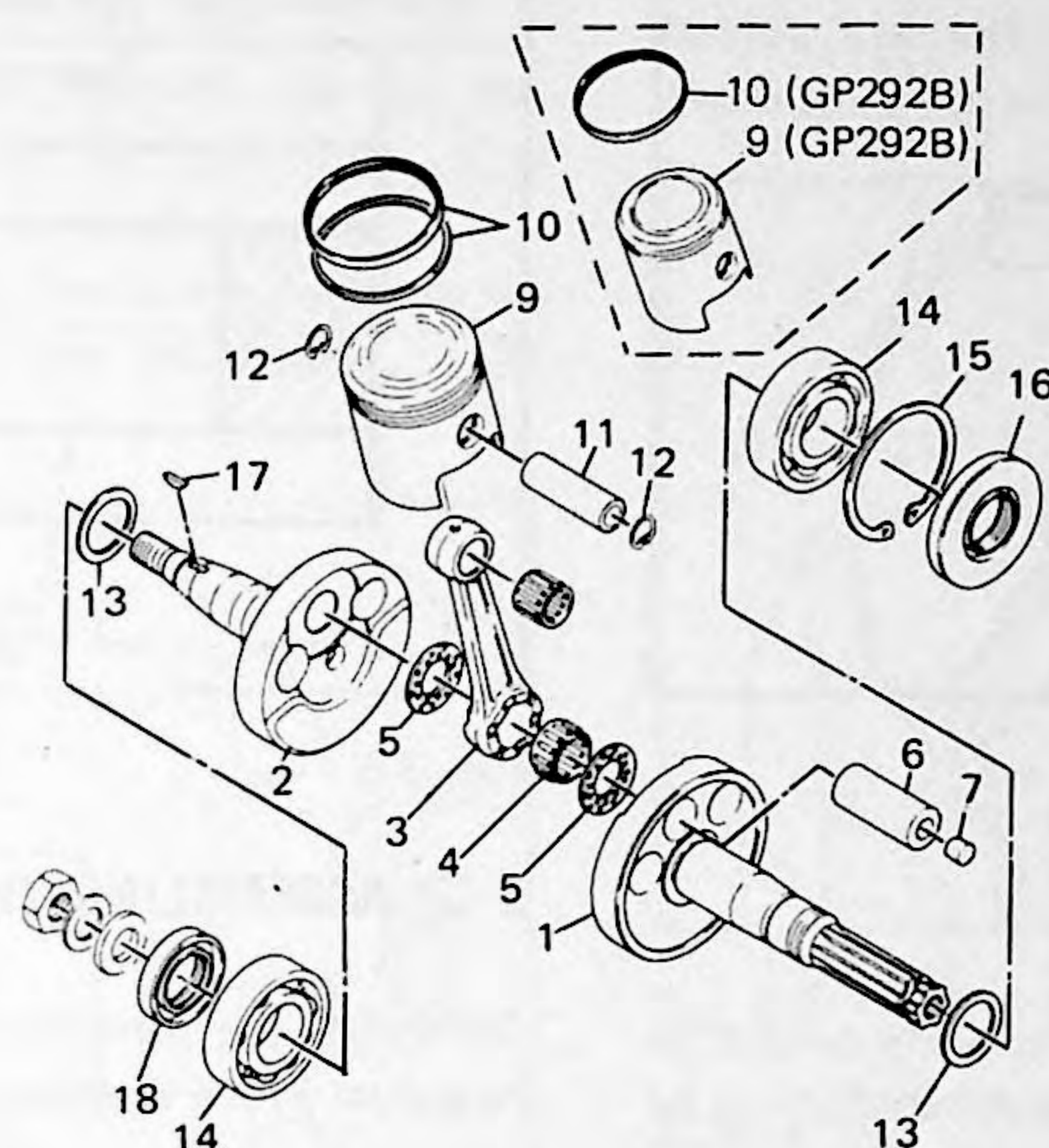


Fig. 3-1

Ref. No.	Description	Q'ty	Ref. No.	Description	Q'ty
0-1	CRANK ASS'Y	1	10	PISTON RING	1s
1	CRANK, left	1	11	PIN, piston	1
2	CRANK, right	1	12	CLIP, piston pin	2
3	ROD, connecting	1	13	SHIM, crank (32.2 44-0.2)	U.R
4	BEARING, con-rod big end	1	14	BEARING (B6306 special)	2
5	WASHER, crank pin (24.2-38-1.0)	2	15	CIRCLIP (R-72)	1
6	PIN, crank	1	16	OIL SEAL (SW-32-72-10)	1
7	BUSHING, pin crank	2	17	KEY, woodruff	1
8	BEARING, con-rod small end	1	18	OIL SEAL (SW-32-48-10)	1
9	PISTON	U.R 1			

3-1 CRANKSHAFT ASS'Y

3-1-1

After removal of the crankshaft, wear of the connecting rod big end, crank pin and bearing should be checked.

Excessive wear of the connecting rod big end is checked by measuring the axial play of the connecting rod small end when it is moved from side to side with your fingers. The axial play should not exceed 0.080" (2 mm).

After the crank pin and bearing are replaced, maximum axial play should not exceed 0.032 ~ 0.04" (0.8 ~ 1.0 mm).

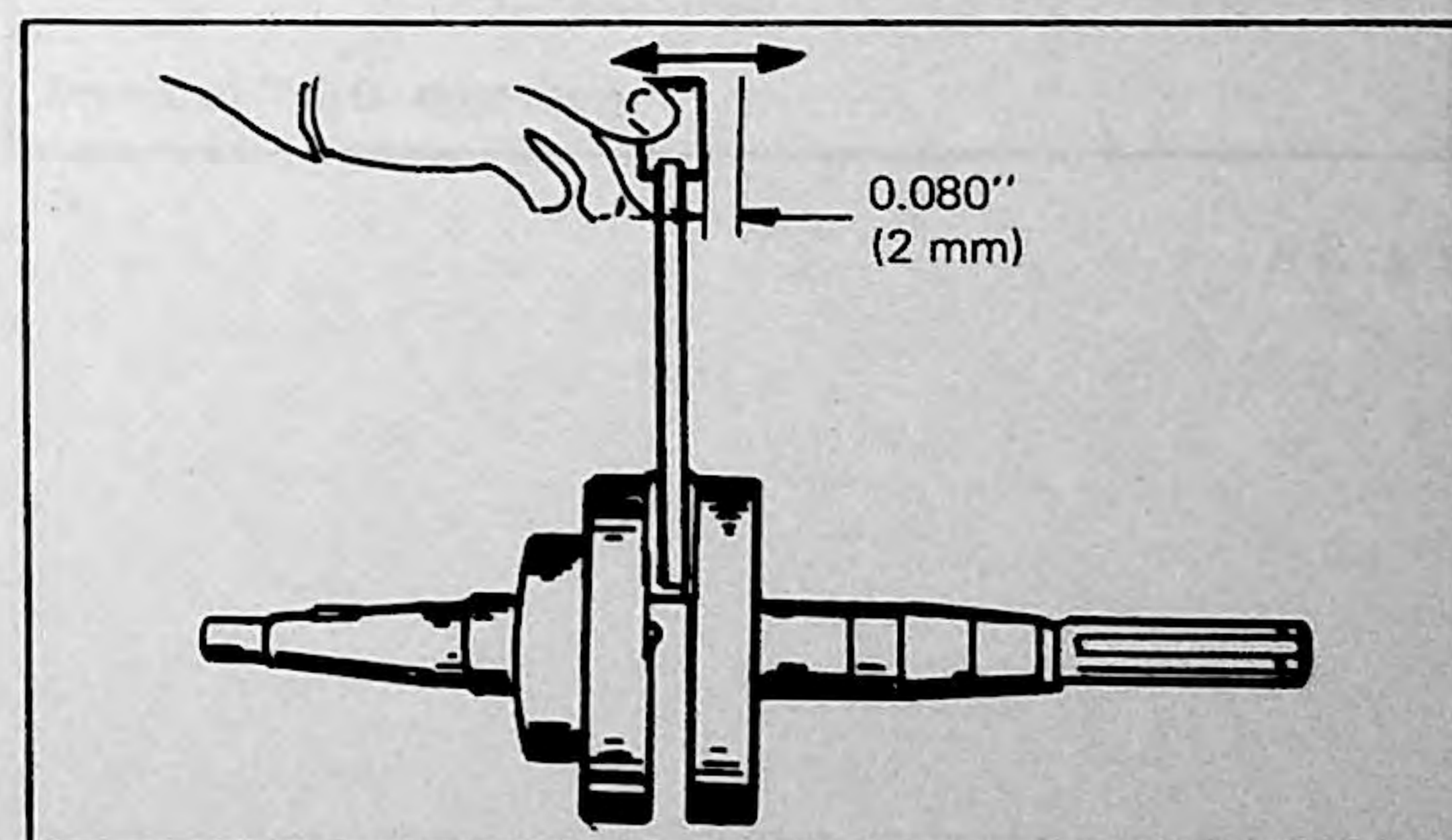


Fig. 3-2

3-1-2

Use a feeler gauge to measure for the correct free play of 0.001 ~ 0.030" (0.25 ~ 0.75 mm).

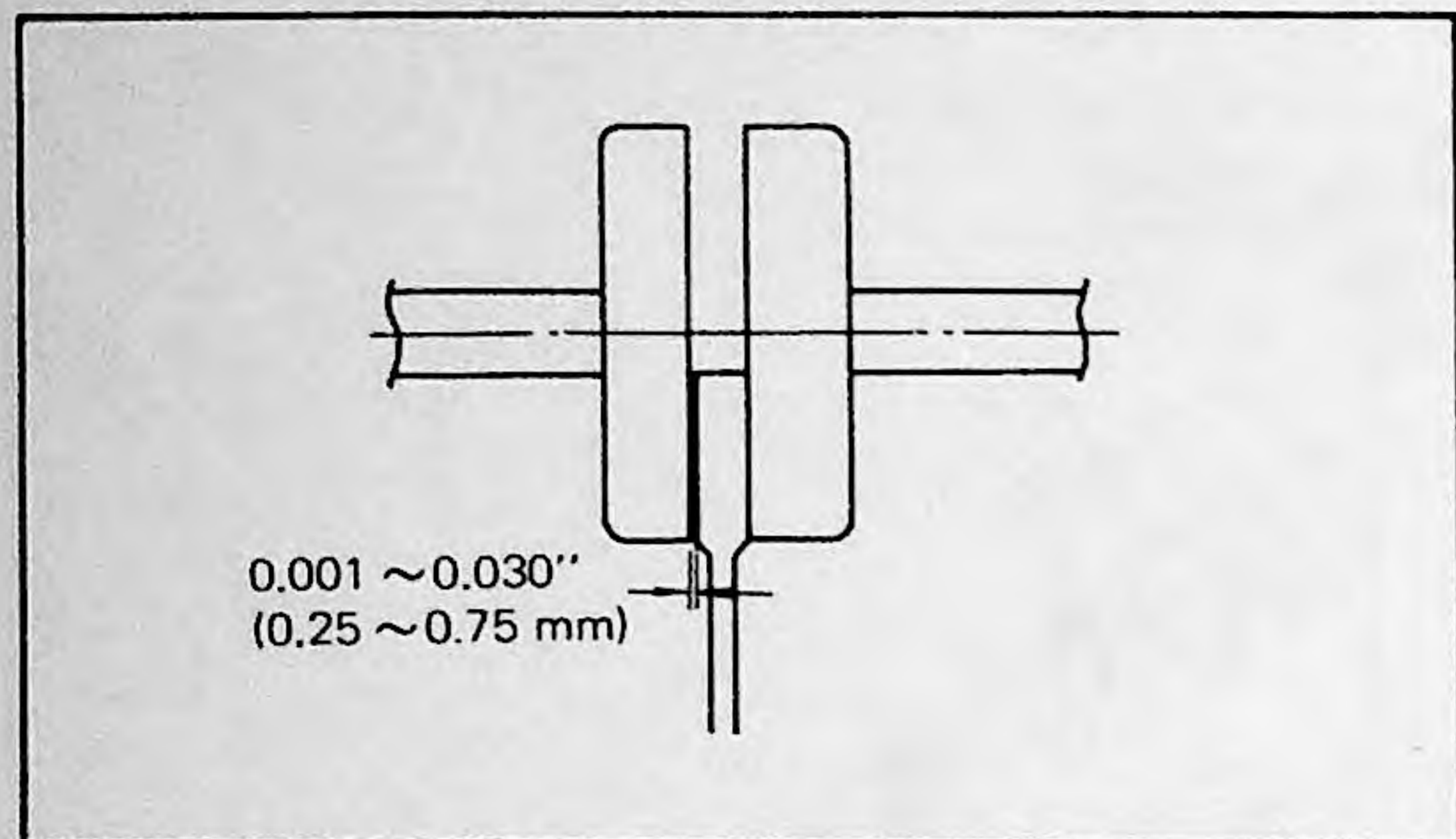


Fig. 3-3

3-1-3

The runout of the crankshaft greatly affects the output of the engine at high speed. Therefore, the crankshaft must be checked for runout after reassembled.

If the machine runs in races, the crankshaft must be checked every 300 miles of operation. The connecting rod large end bearing should also be carefully checked for smoothness.

To measure the runout of the crankshaft, support the crankshaft at its both ends, and measure the points (as illustrated below) with a dial gauge.

The runout should be 0.0008" (0.02 mm) or less at journals A and B, 0.0016" (0.04 mm) or less at C, and 0.002" (0.05 mm) or less.

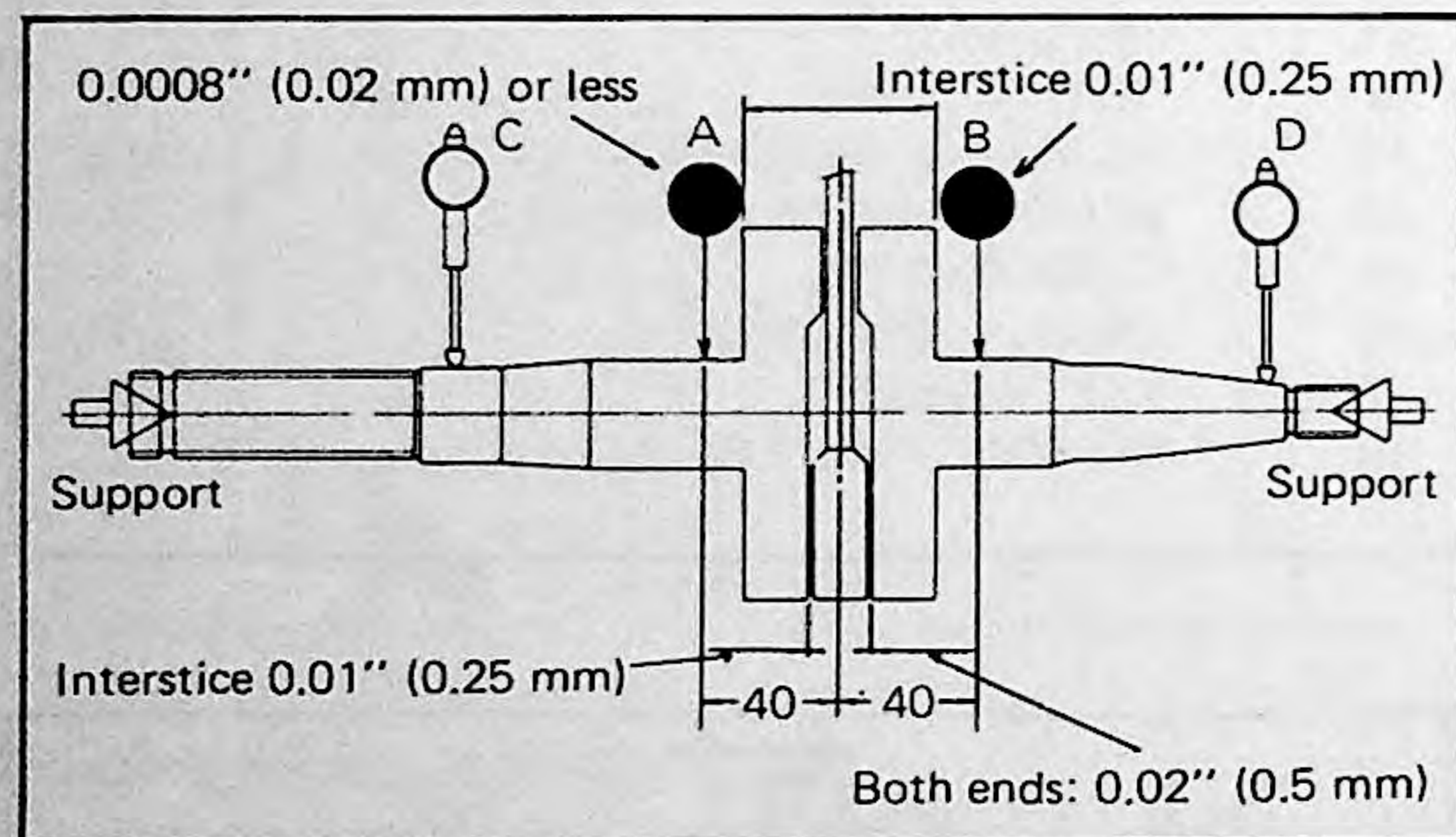


Fig. 3-4

3-1-4

For procedures for disassembly and assembly of the crankshaft, refer to the Special Tool Manual.

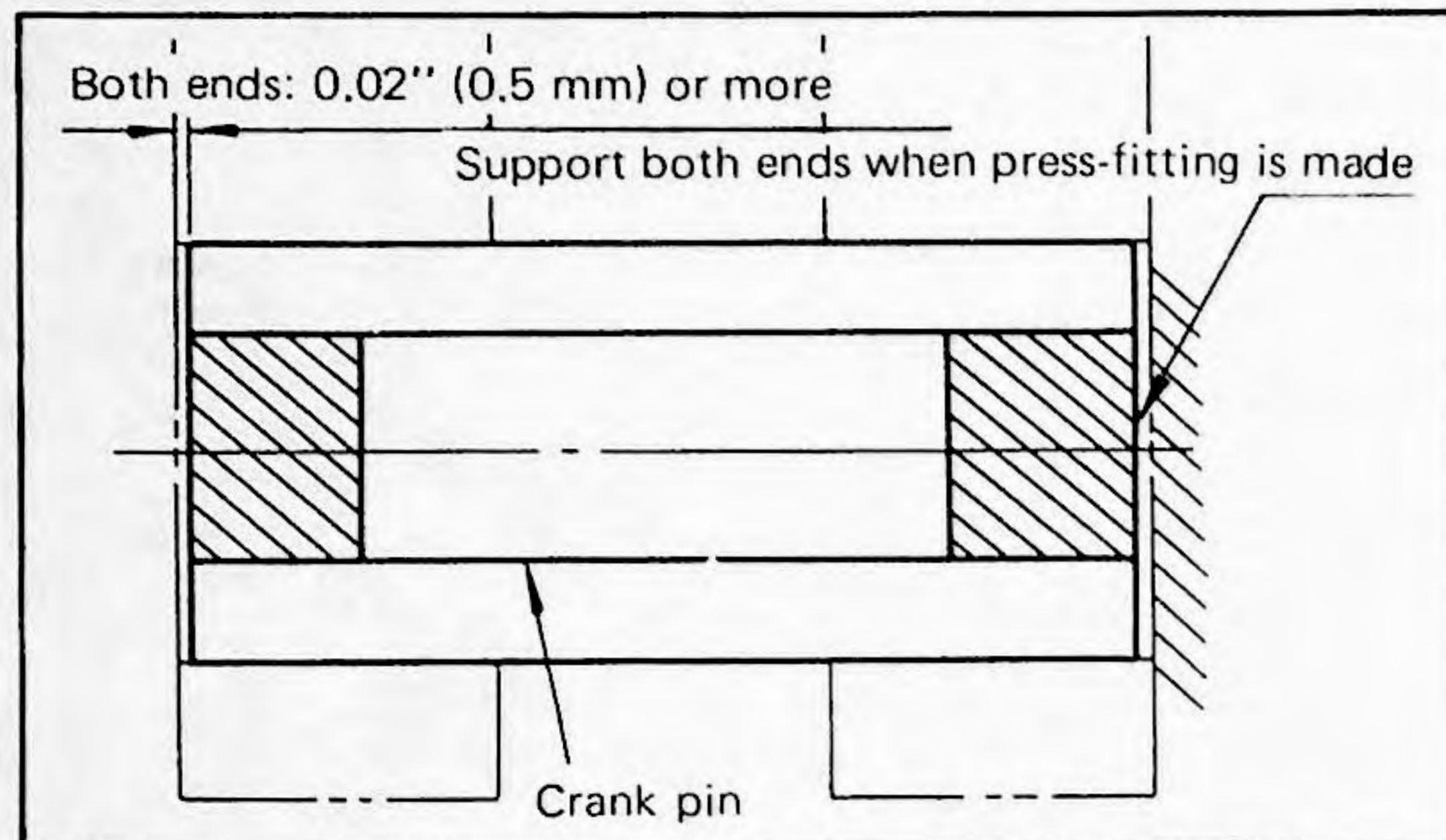


Fig. 3-5

3-2 ASSEMBLING THE CRANKCASE

To install the crankshaft in the crankcase, the special tool as shown in the illustration should be used.

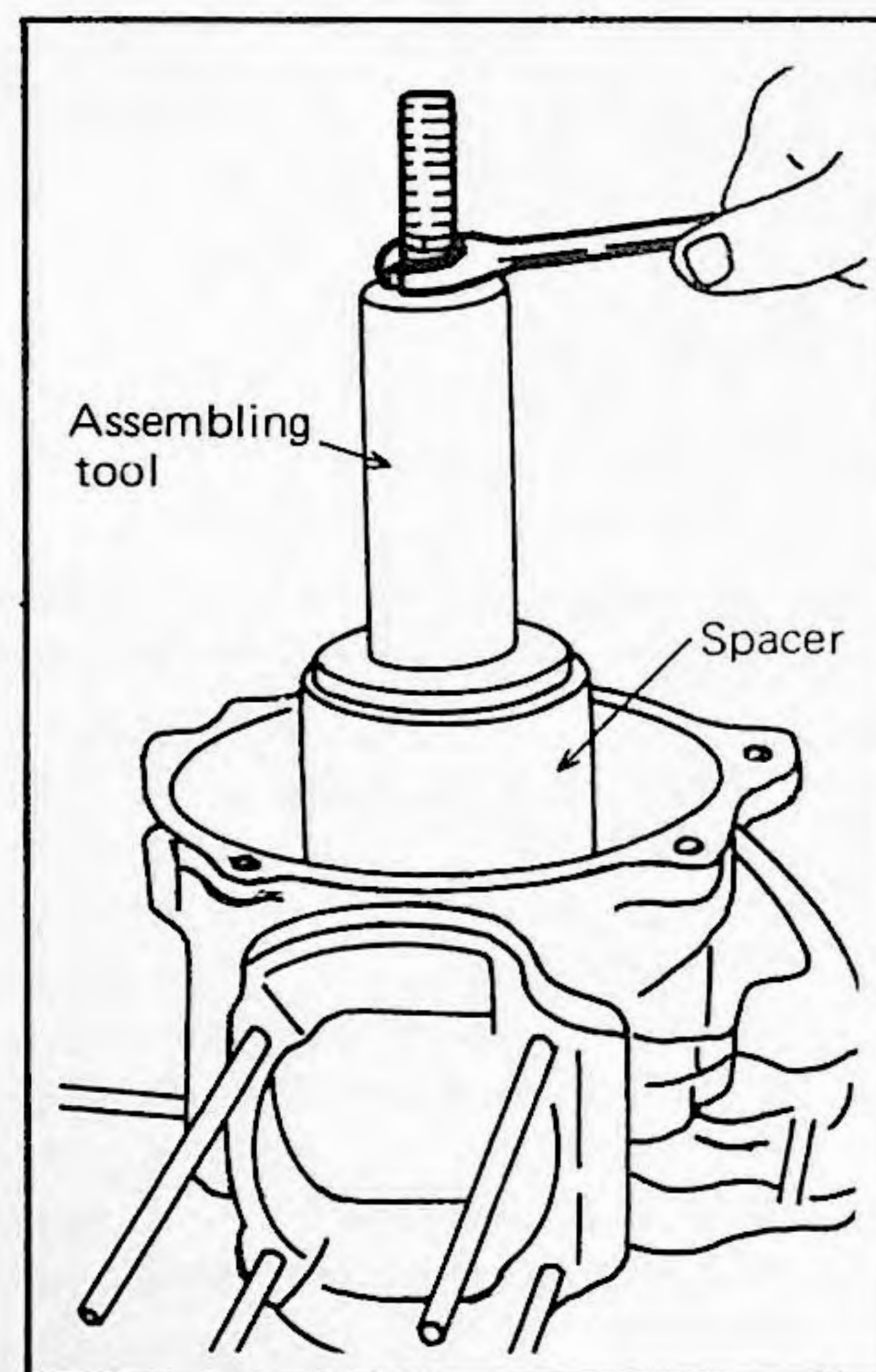


Fig. 3-6

CHAPTER 4. POWER TRAIN

4-1 DISC BRAKES AND SECONDARY SHEAVES

4-1-1

The brake pads are located on the left side of the snowmobile and on the outside of the chain case. The brake pads are removed by pulling the single pivot pin. Once this pin has been removed, the brake pads can be pulled out of the way to allow the brake disc to be removed.

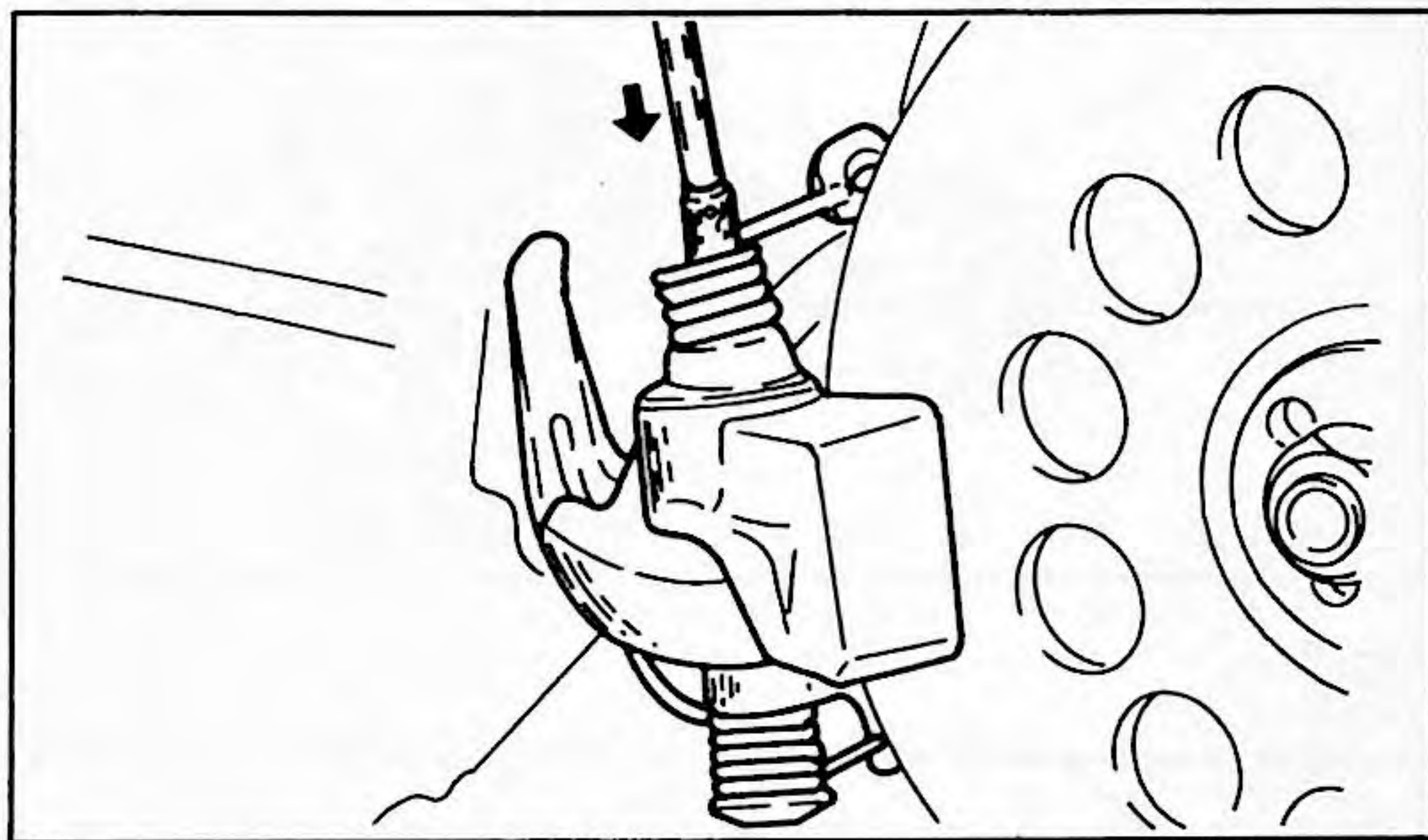


Fig. 4-1

4-1-2

The brake disc is removed at this time. This is done by removing the nut and spring washer, the brake disc itself, and on some machines the shims immediately behind it. You will notice in the illustration that the shims are situated in front of the brake disc. This is merely for purpose of identification, as they actually are located behind the brake disc.

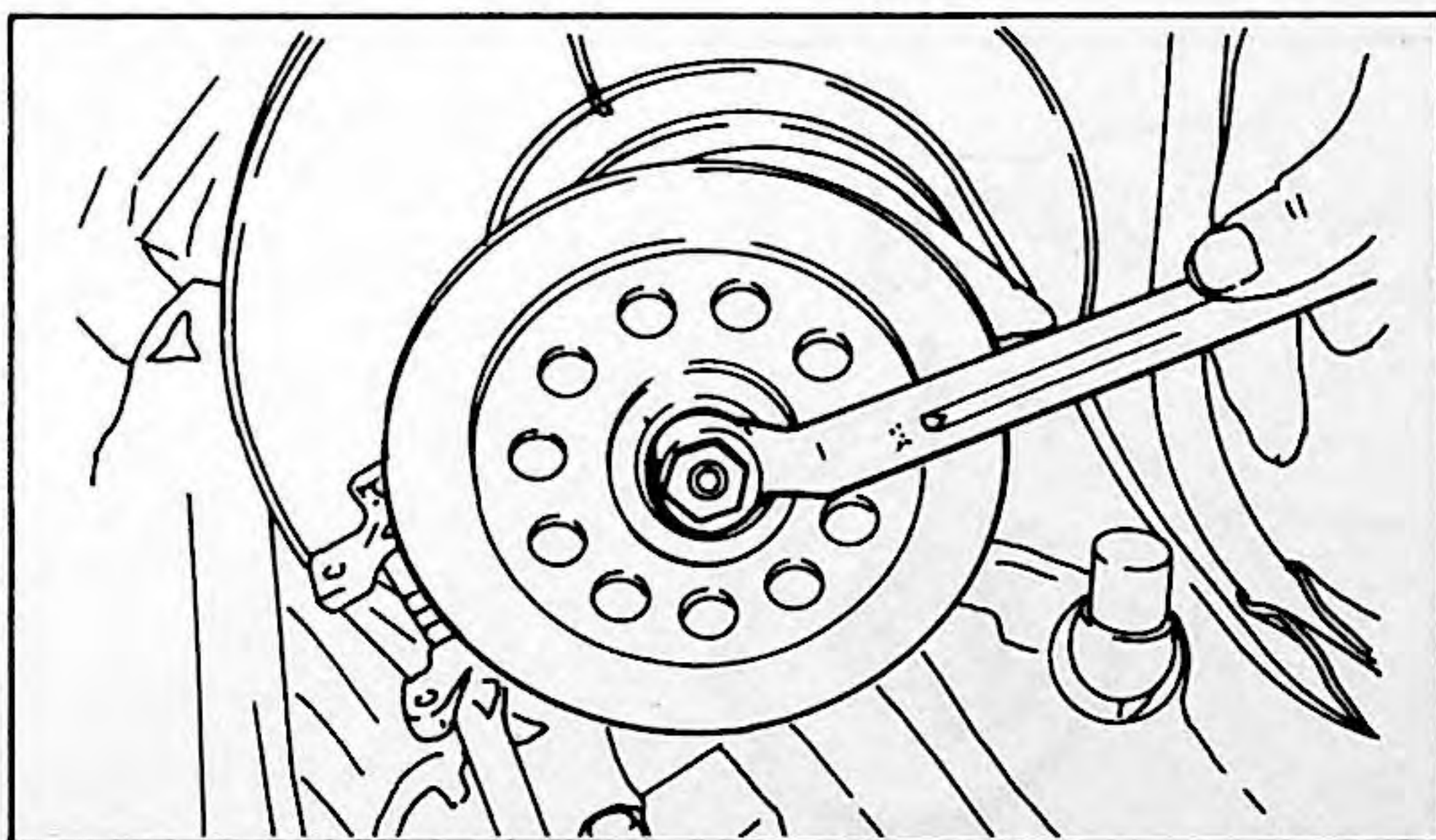


Fig. 4-2

4-1-3

Once the brake disc has been removed, the two bolts holding the left- and right-hand secondary shaft housing together can be removed.

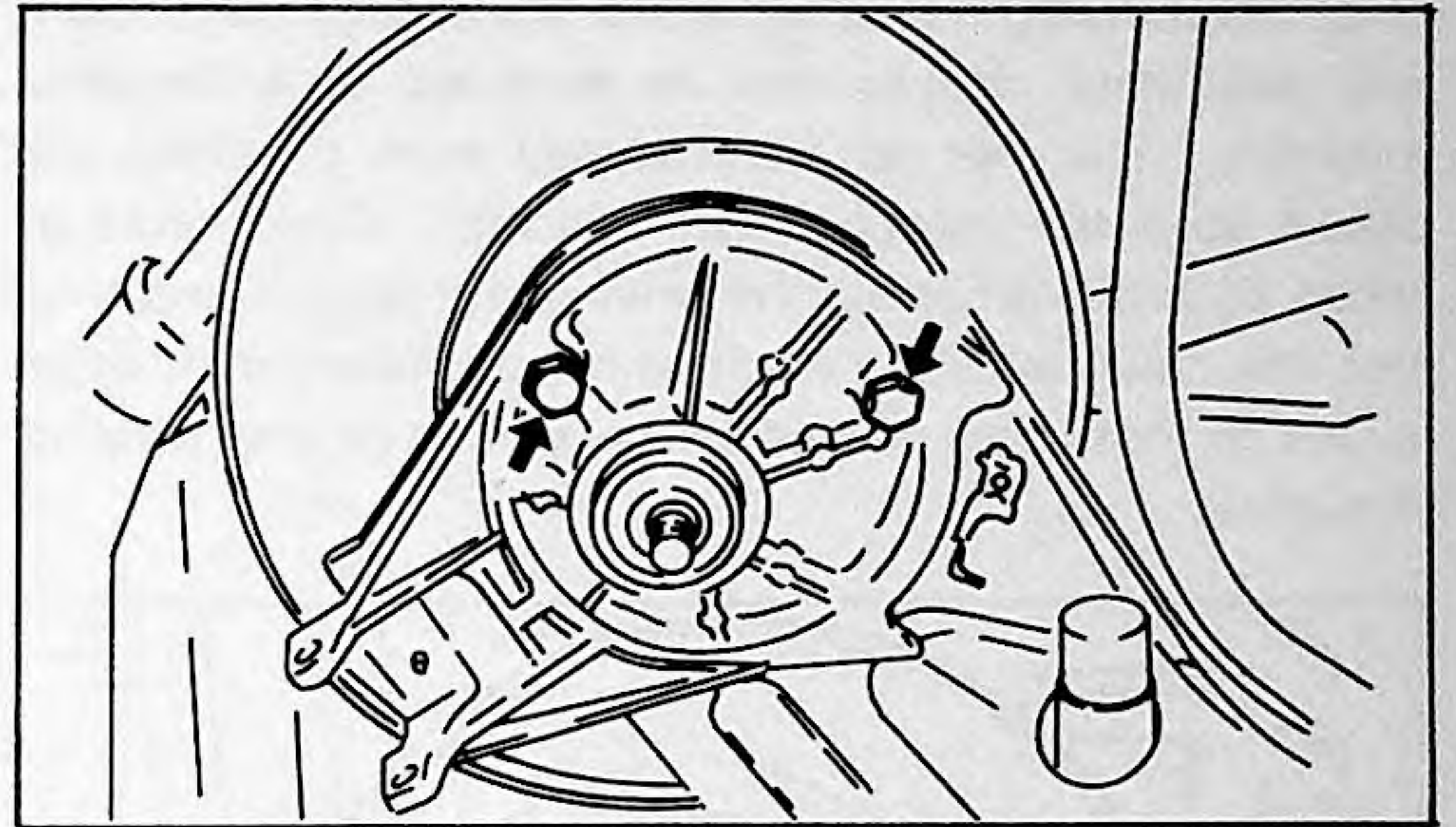


Fig. 4-3

4-1-4

With the two bolts removed, the left-hand secondary shaft housing can be taken off. The housing can be pried off using one screwdriver on each side.

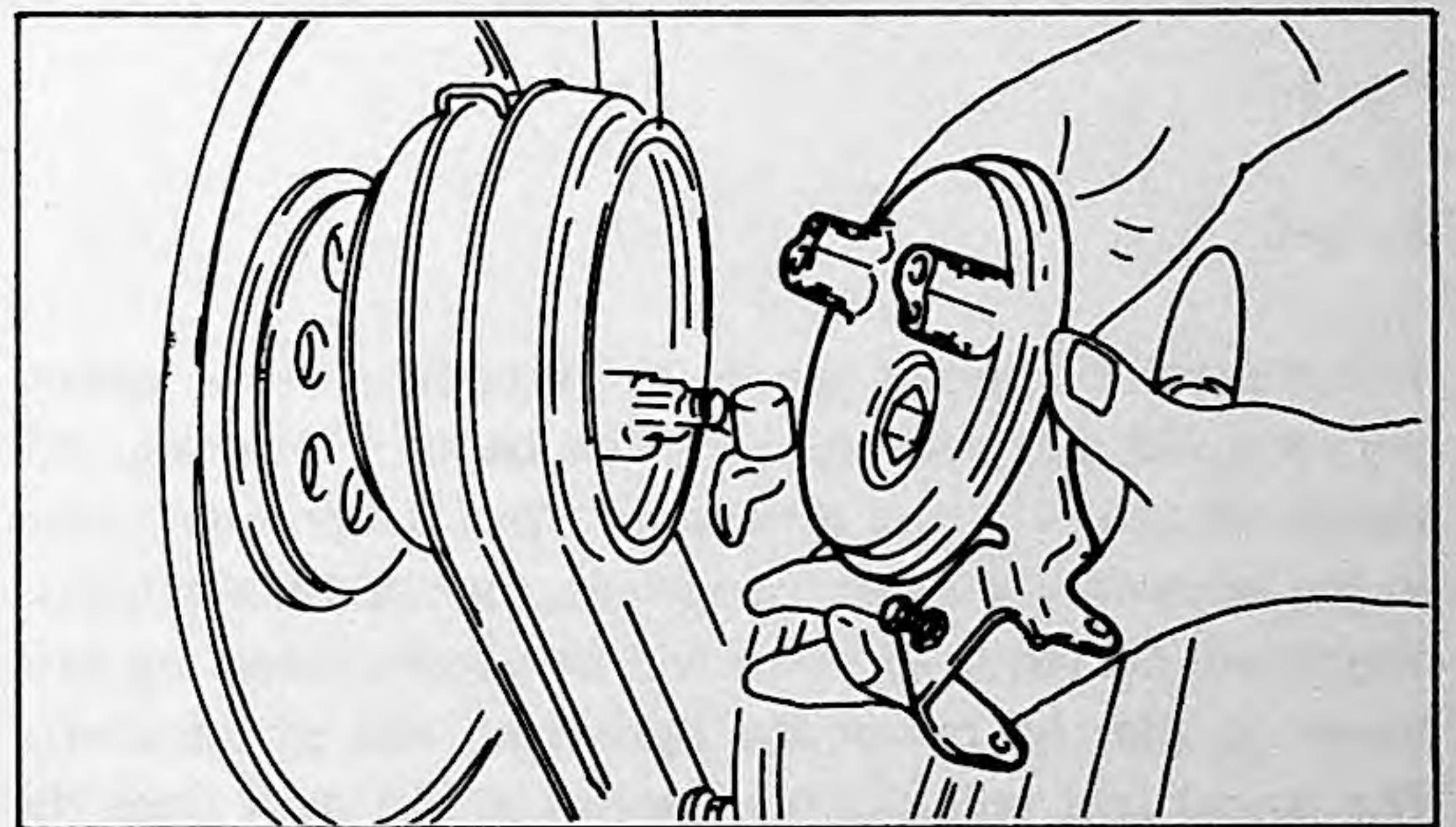


Fig. 4-4

4-1-5

You are now ready to remove the right-hand secondary shaft housing. Use a hammer and soft punch to tap the right-hand housing back out of the chain case.

After the housing is forced back, you will have to slip the chain and drive sprocket off the end of the shaft in order to completely remove the housing.

Once the housing has been tapped loose, then the housing and secondary sheaves can be removed as a complete assembly. The gear can be separated from the chain and placed with the assembly just removed. Care should be taken to avoid dropping the drive shaft spacers and shim into the chaincase. If a machine has secondary shaft shims (some do not) they should be reinstated in their original positions.

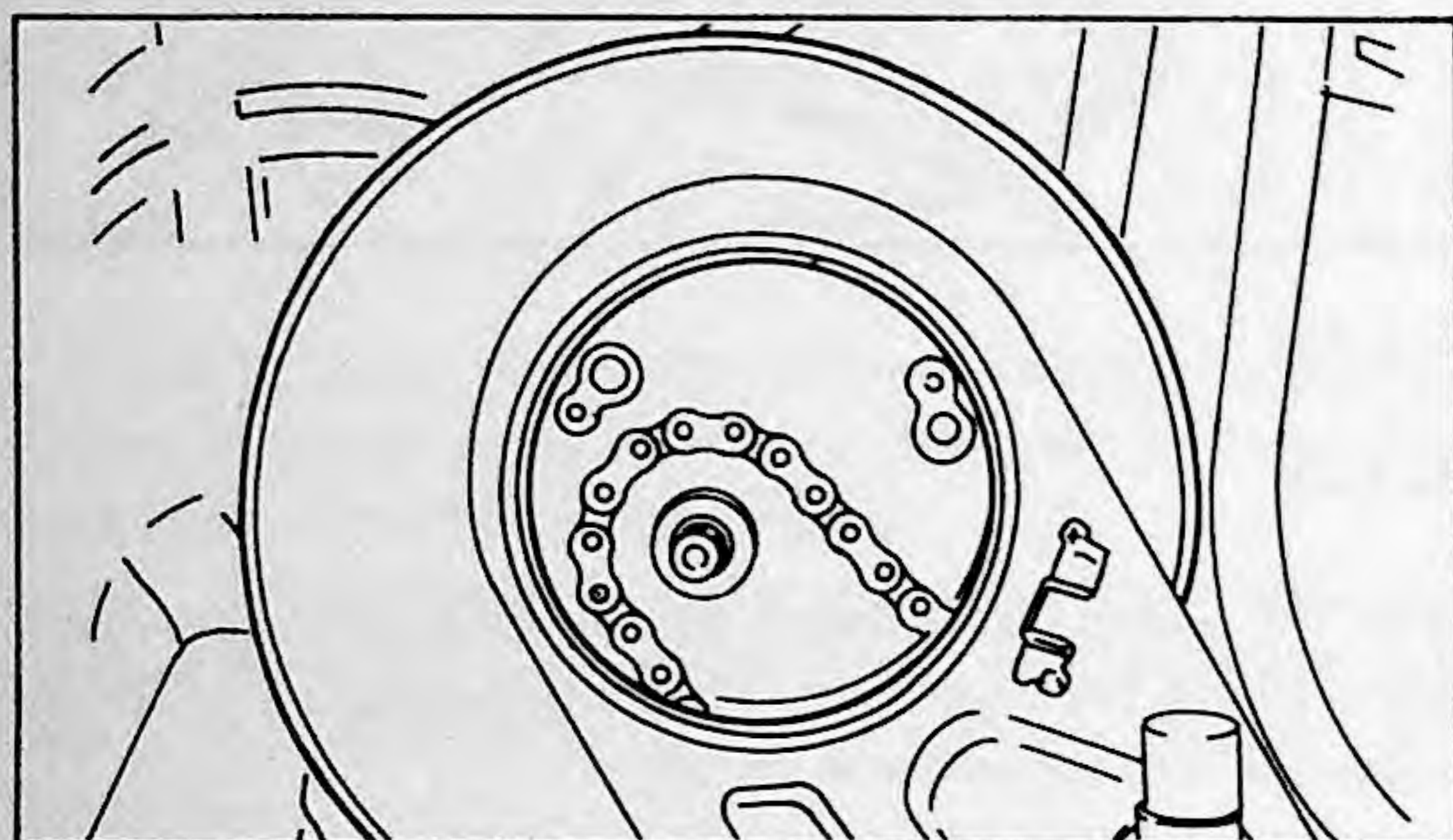


Fig. 4-5

4-1-6

This illustration shows the entire secondary sheave assembly removed and assembled on the bench. Normally this should be the extent of disassembly, but if a problem arises in the secondary sheaves themselves, then additional break-down will be required. This will be accomplished by first removing the roll pin at the right-hand end of the shaft. The spring seat will slip off the end of the shaft once the roll pin has been removed. The spring will also slide off since it is held in place only by the spring seat. This would complete the final disassembly of the secondary sheave assembly.

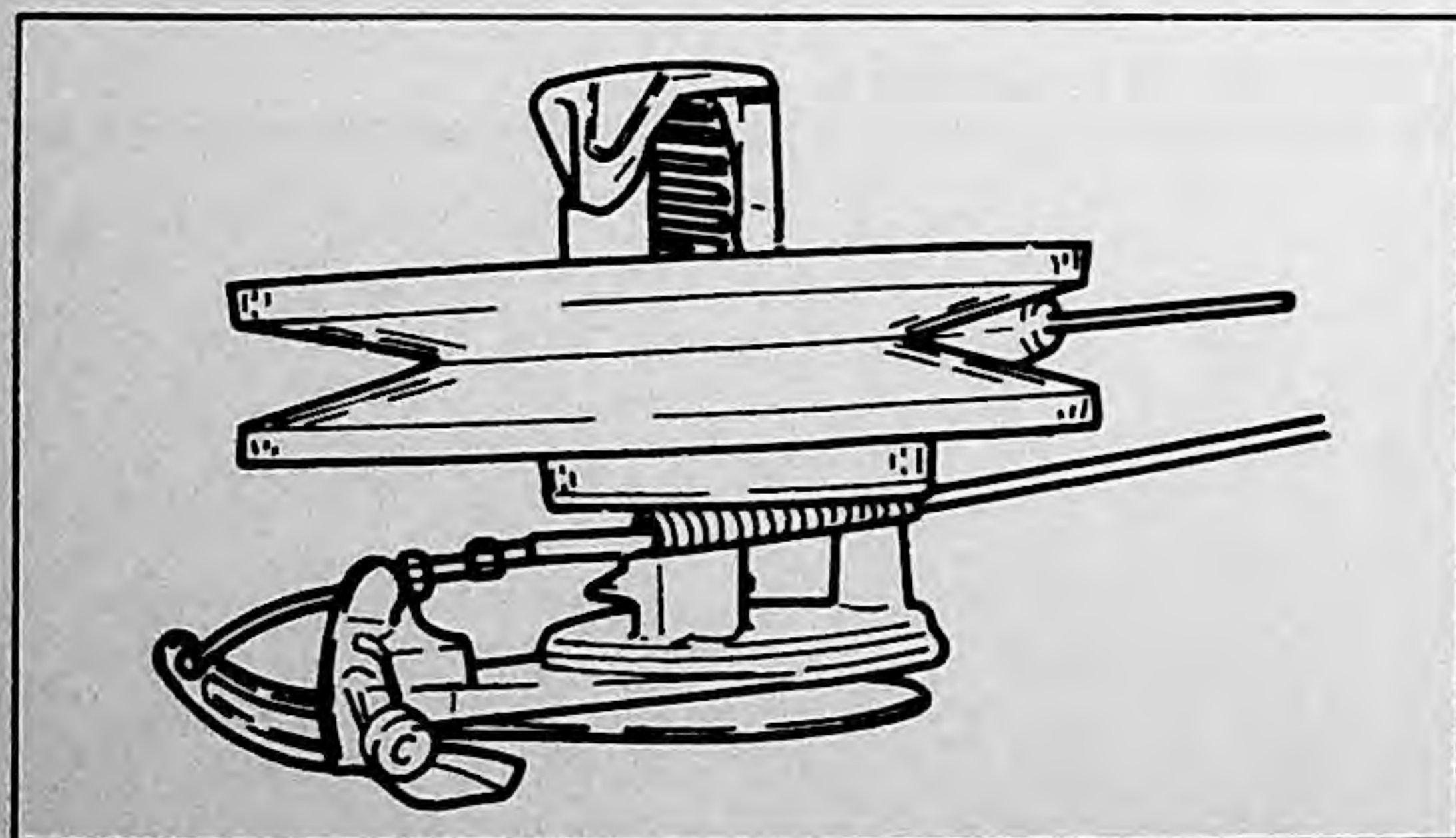


Fig. 4-6

4-1-7

When installing the secondary sliding sheave on the secondary shaft, first hook one end of the secondary spring on the sliding sheave, and then hook the other end on the spring seat. Turn the spring seat two turns (corresponding to two pitches of the sliding sheave threads) clockwise. Then insert the ball pin into the spring seat so that it will be locked to the secondary shaft.

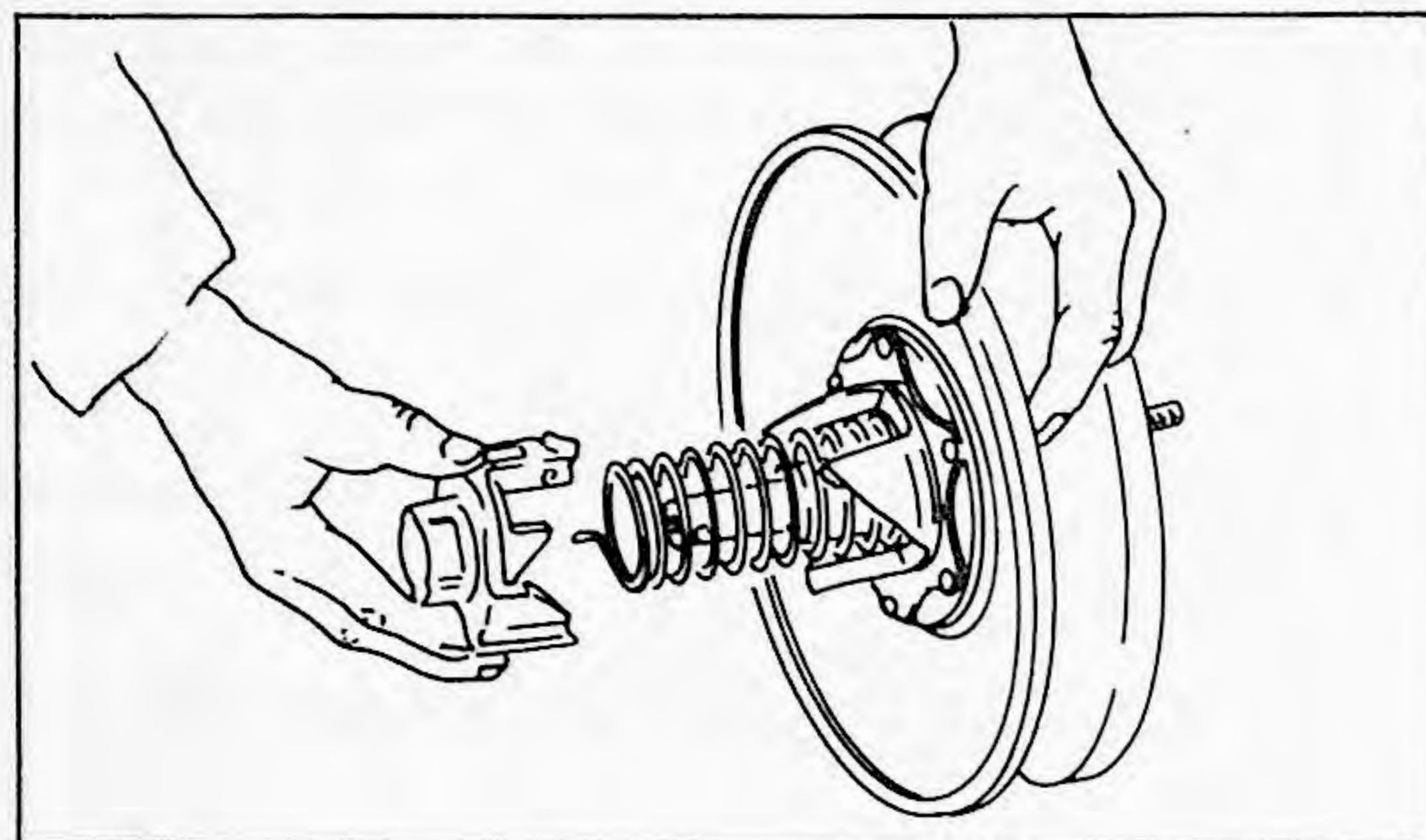


Fig. 4-7

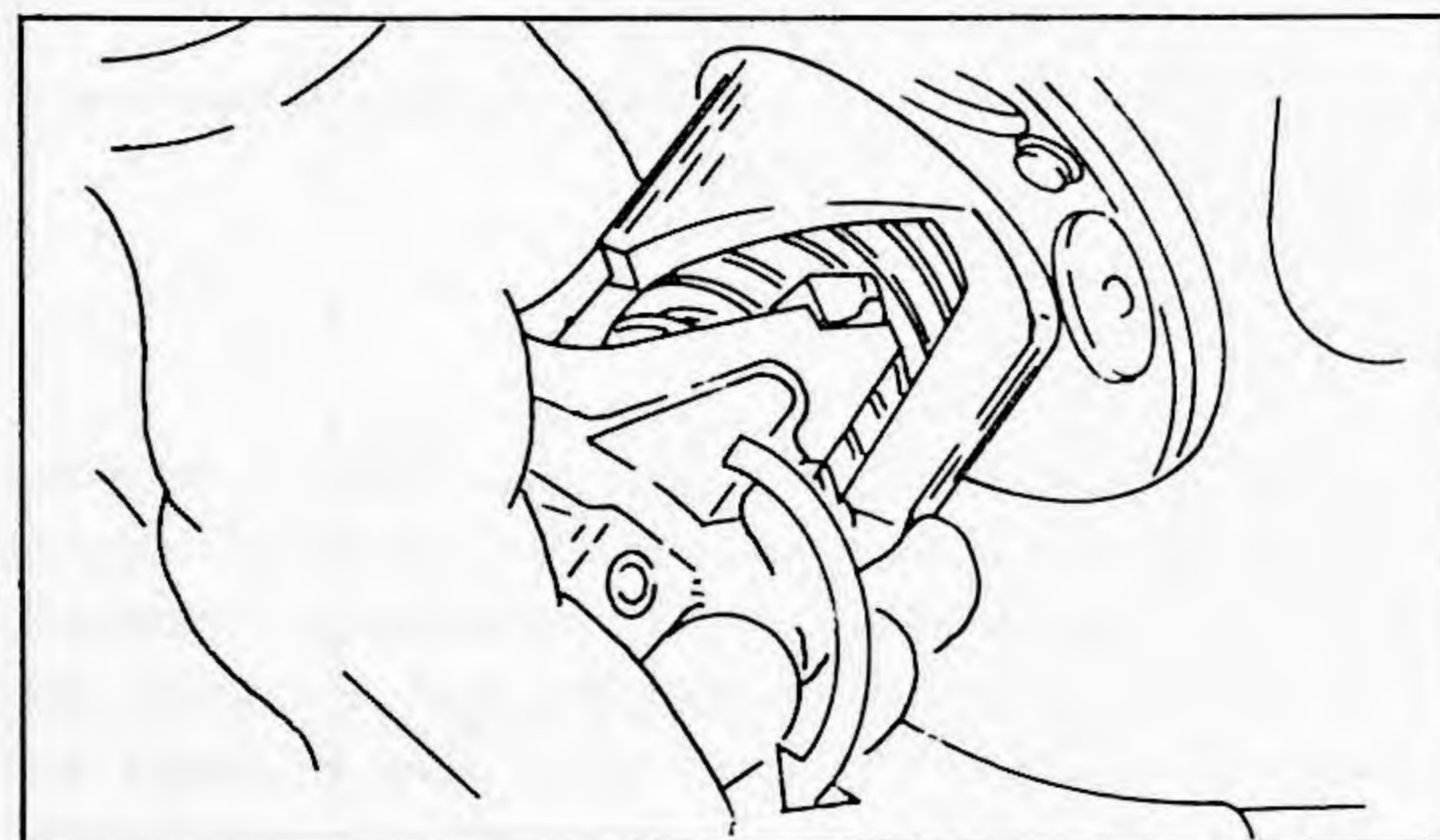


Fig. 4-8

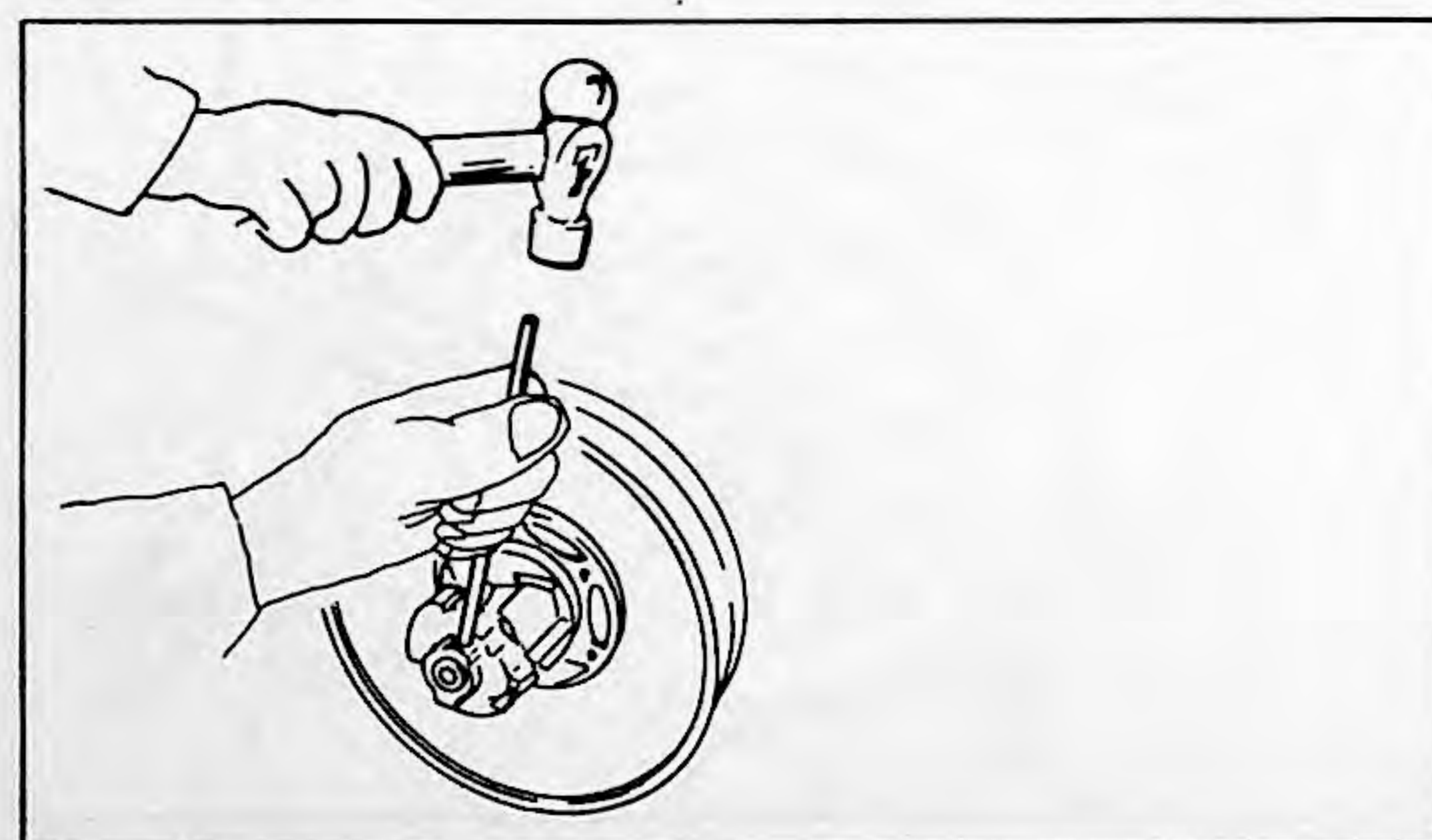


Fig. 4-9

4-1-8

When installing the secondary sliding sheave, feed the Shell Alvania grease (#2 or #3) between the sheave and the secondary shaft.

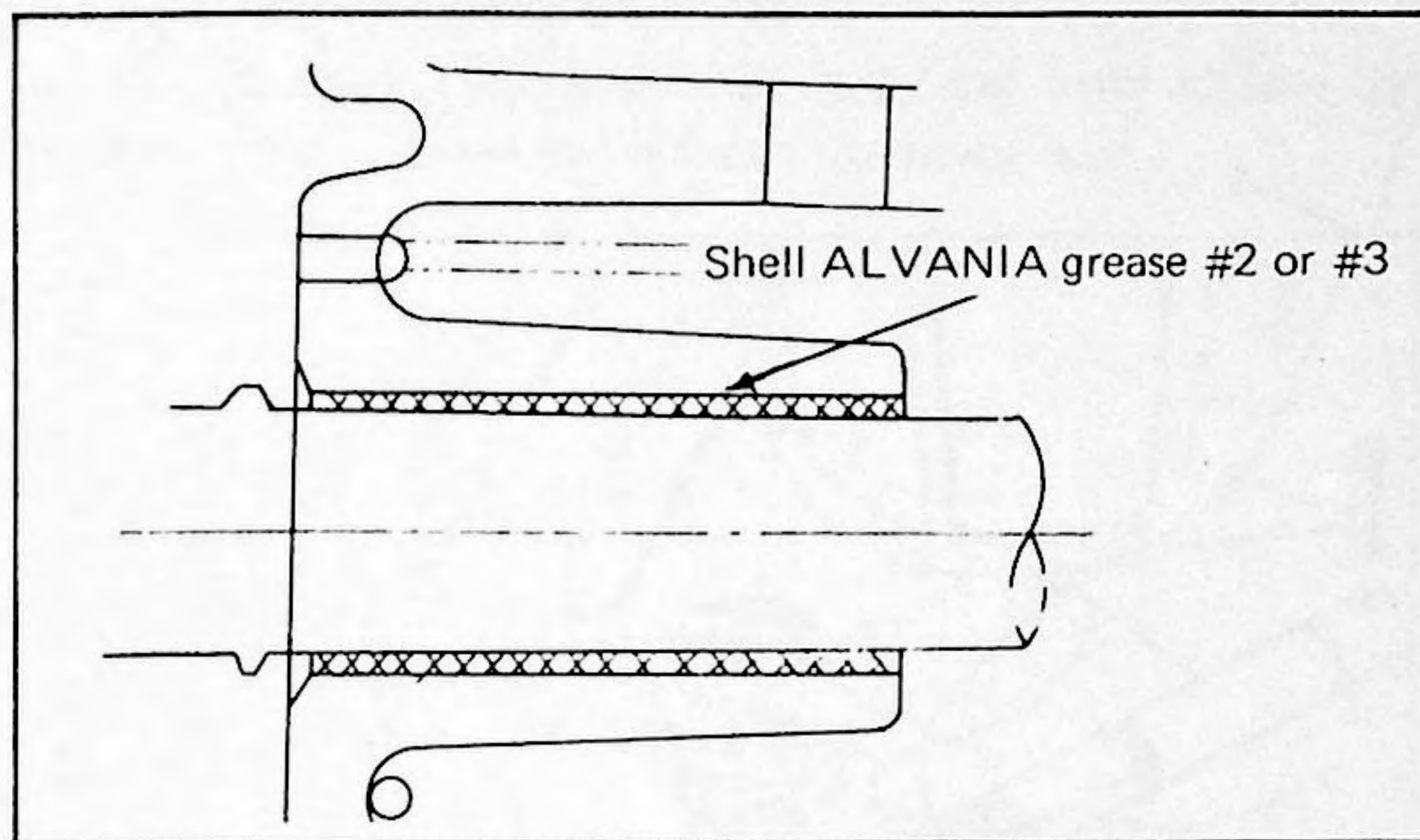


Fig. 4-10

SECONDARY SHEAVE

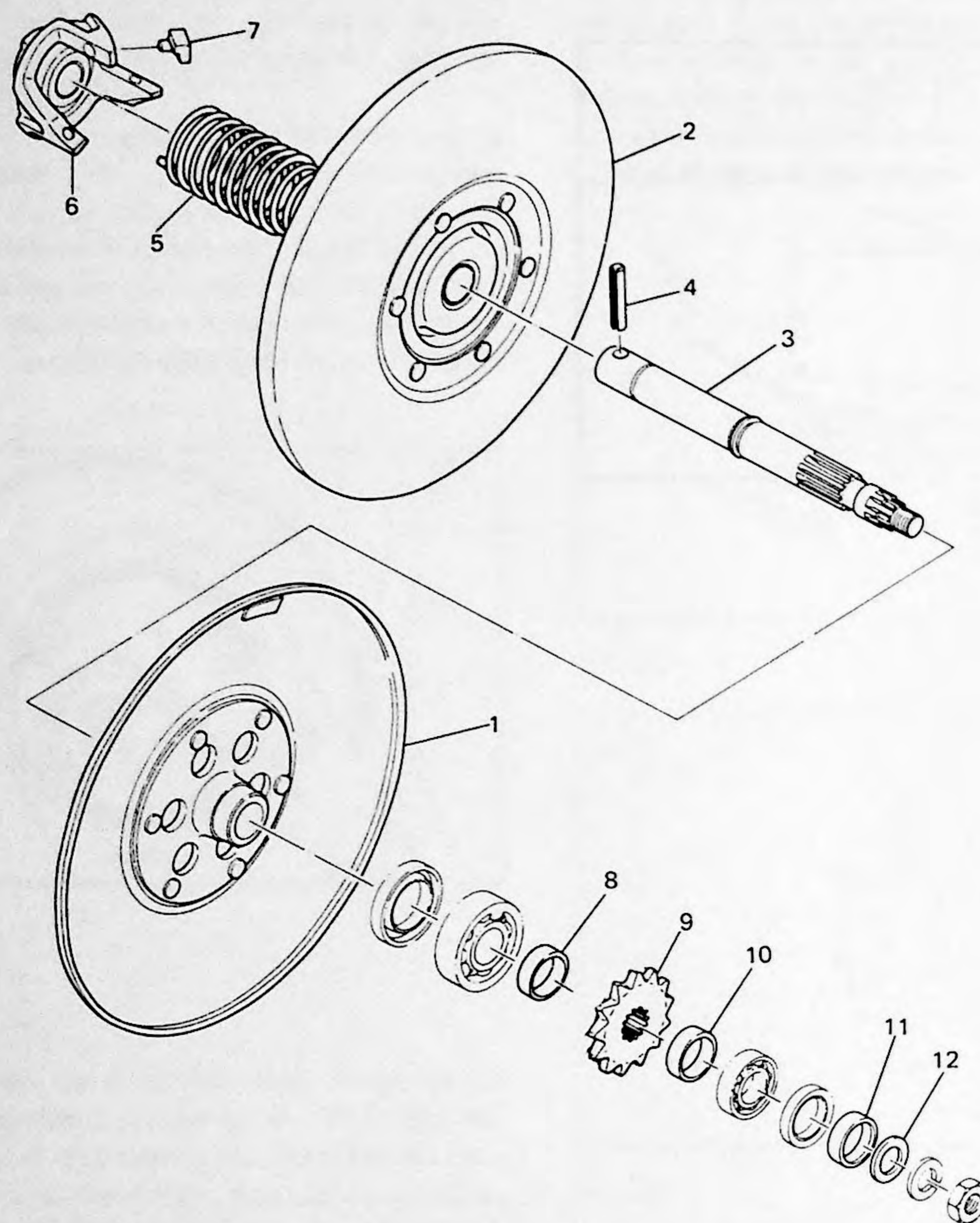


Fig. 4-11

Ref. No.	Description	Q'ty	Ref. No.	Description	Q'ty
1	SECONDARY FIXED SHEAVE COMP.	1	10	COLLAR, distance 3	1
2	SECONDARY SLIDING SHEAVE COMP.	1	11	COLLAR 2	1
3	SHAFT, secondary	1	12	SHIM (17.2-25-0.2)	1
4	PIN, spring	1		SHIM (17.2-25-0.3)	1
5	SPRING, secondary	1		SHIM (17.2-25-0.4)	1
6	SEAT, spring	1		SHIM (17.2-25-0.5)	1
7	SHOE, lamp	1		SHIM (17.2-25-0.6)	1
8	COLLAR, distance 1	1		SHIM (17.2-25-0.7)	1
9	SPROCKET, chain drive (13T)	1			

4-2 CHAIN CASE AND FRONT AXLE REMOVAL**4-2-1**

To remove the front axle, fully loosen the drive track, and the front axle can easily be removed.

Loosen the rear pivot bolt lock nut, and fully loosen the adjusting screw or remove it from the pivot bolt.

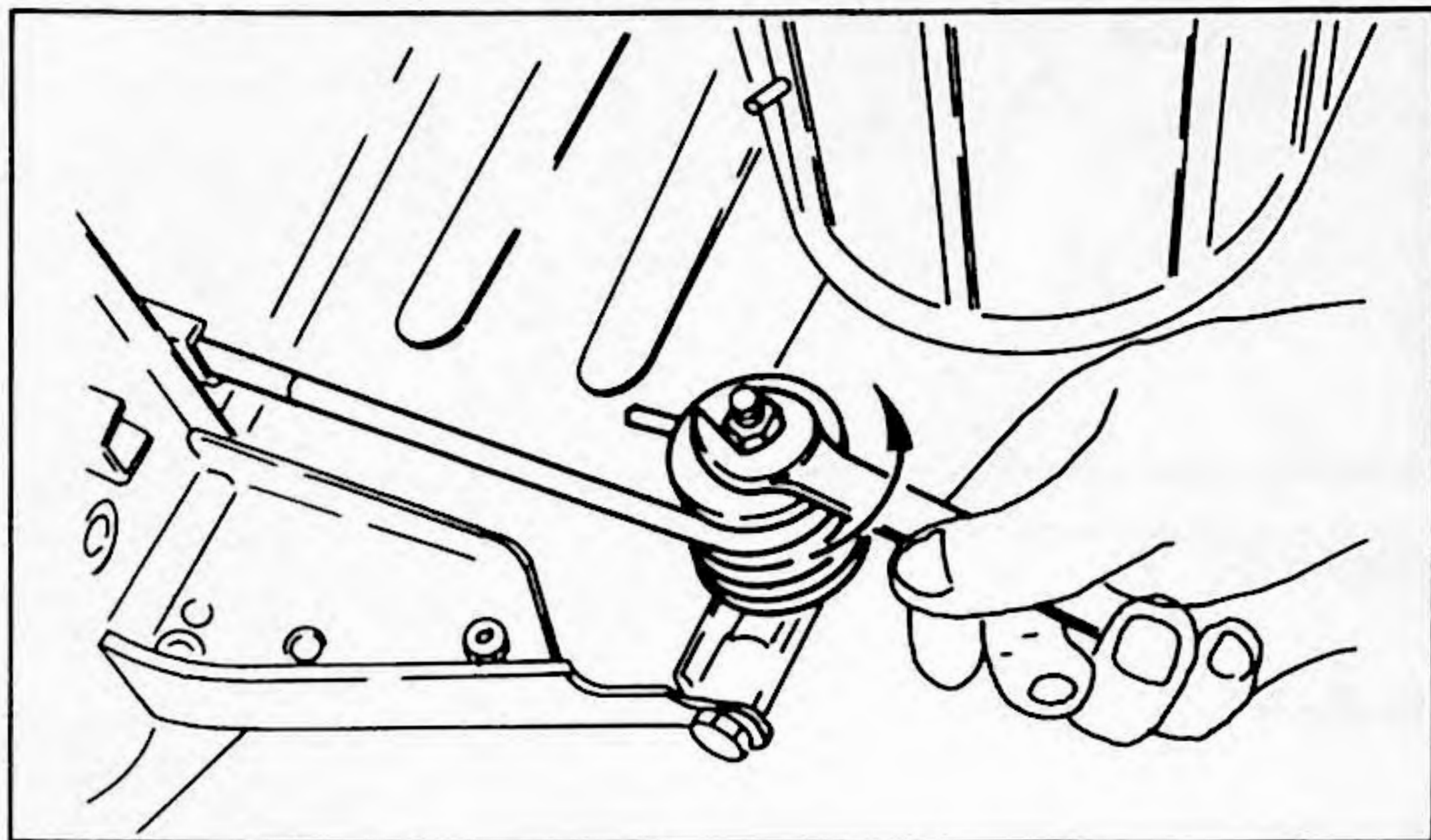


Fig. 4-12

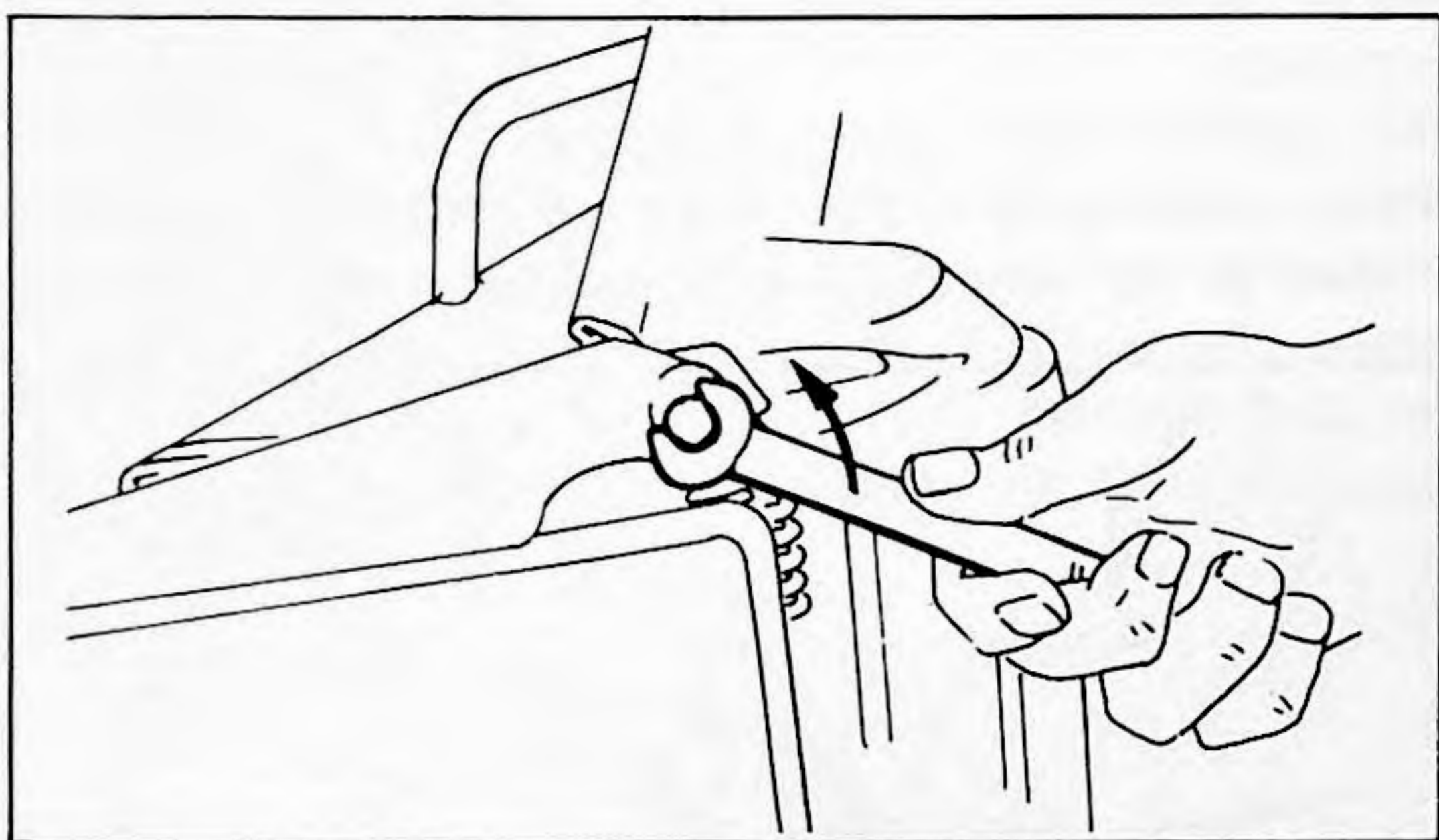


Fig. 4-13

4-2-2

Return to the left side of the snowmobile. You will find at the bottom of the chain case, the chain case cover. Remove the six retaining bolts and remove the chain case cover. It should be noted that an oil drip pan should be placed beneath the snowmobile as oil will drain out of the chain case once the cover has been removed.

Note:

This cover need only be removed if the driven sprocket is to be changed.

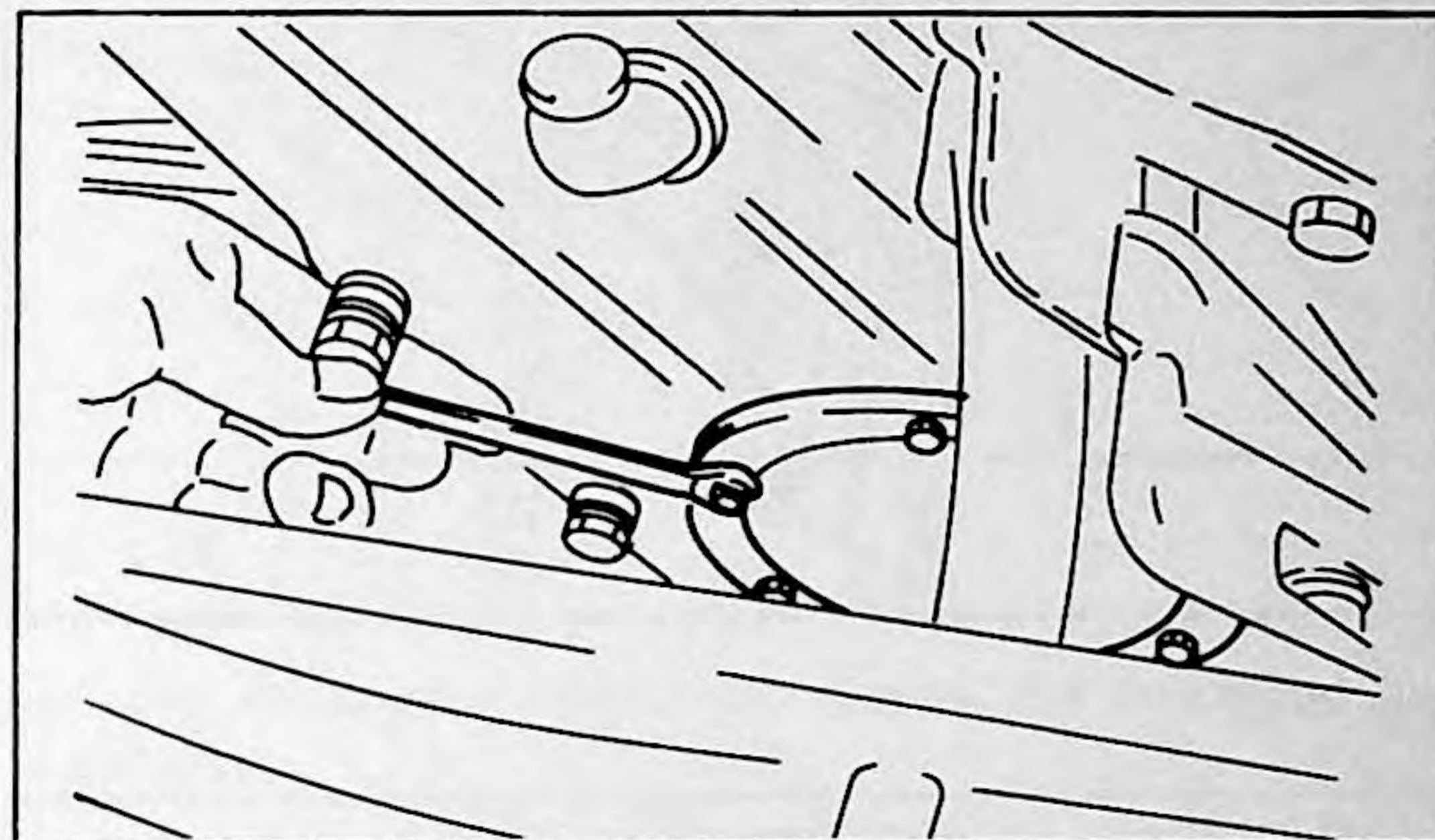


Fig. 4-14

4-2-3

Remove the four 13 mm bolts from the chain case cover.

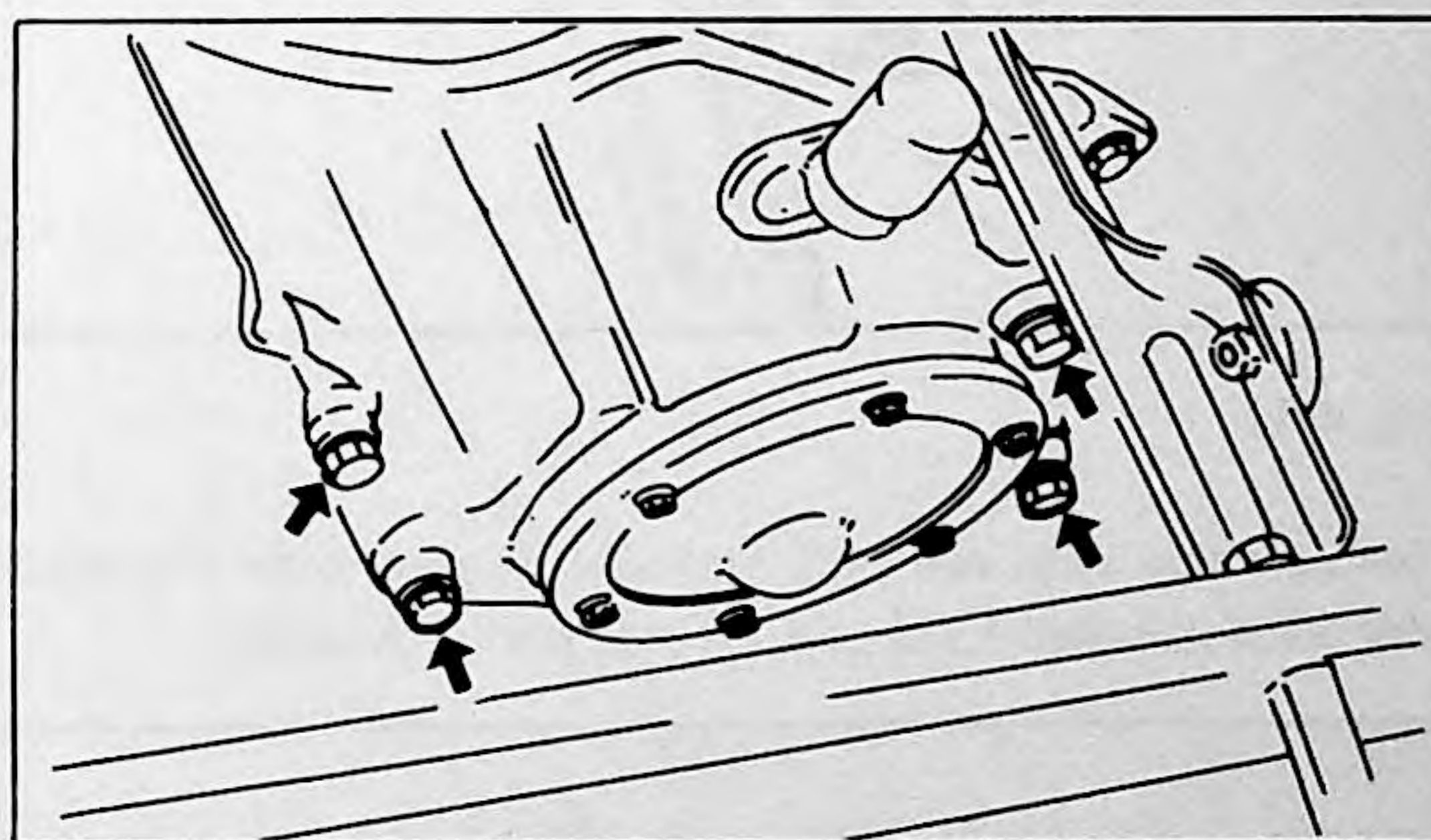


Fig. 4-15

4-2-4

Position yourself at the right side of the snowmobile for this next step. Pry off the rubber cap in the center of the axle housing.

On a model (GP292B) equipped with a speedometer, first remove the two 10 mm bolts, and remove the speedometer housing.

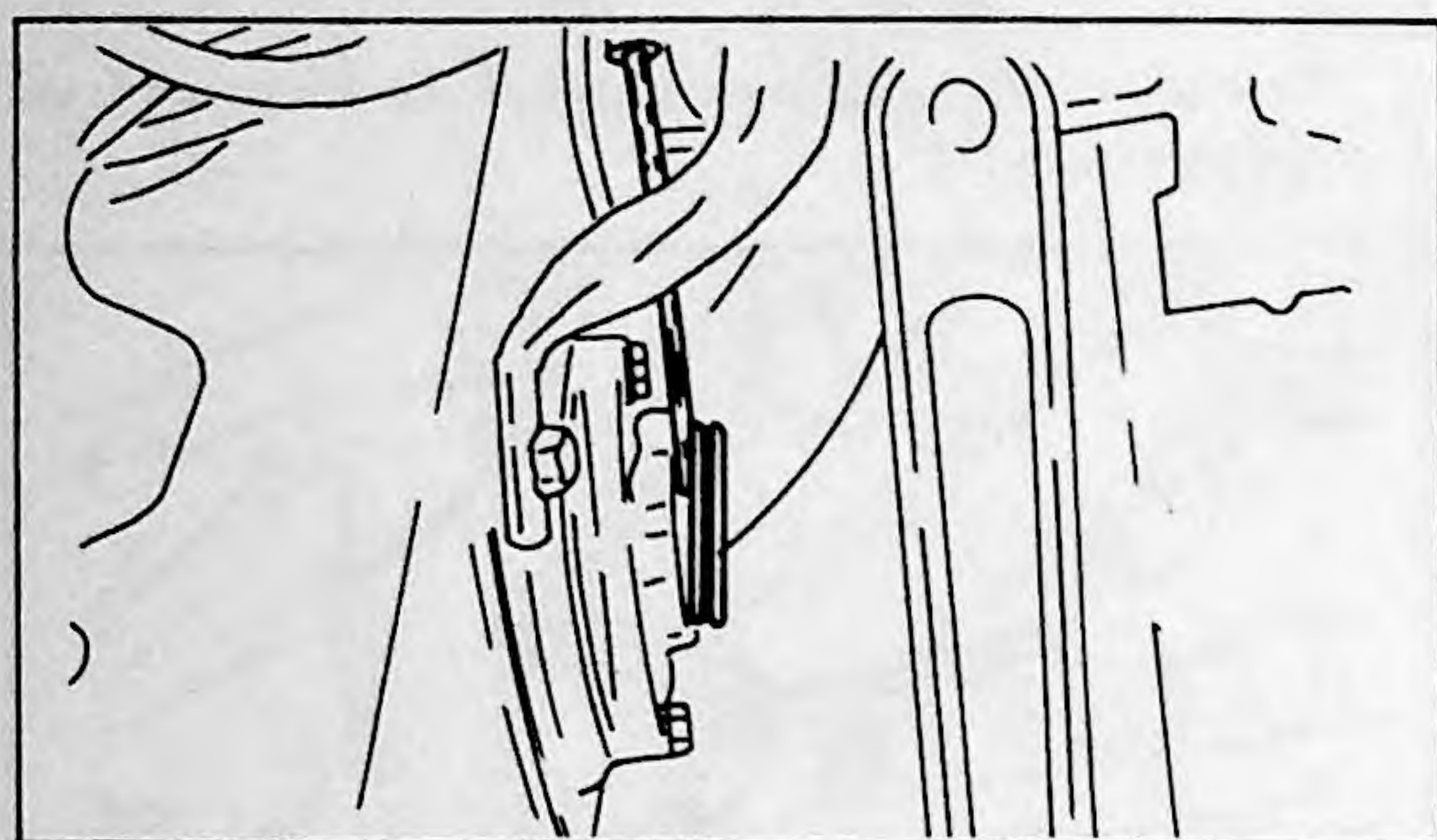


Fig. 4-16

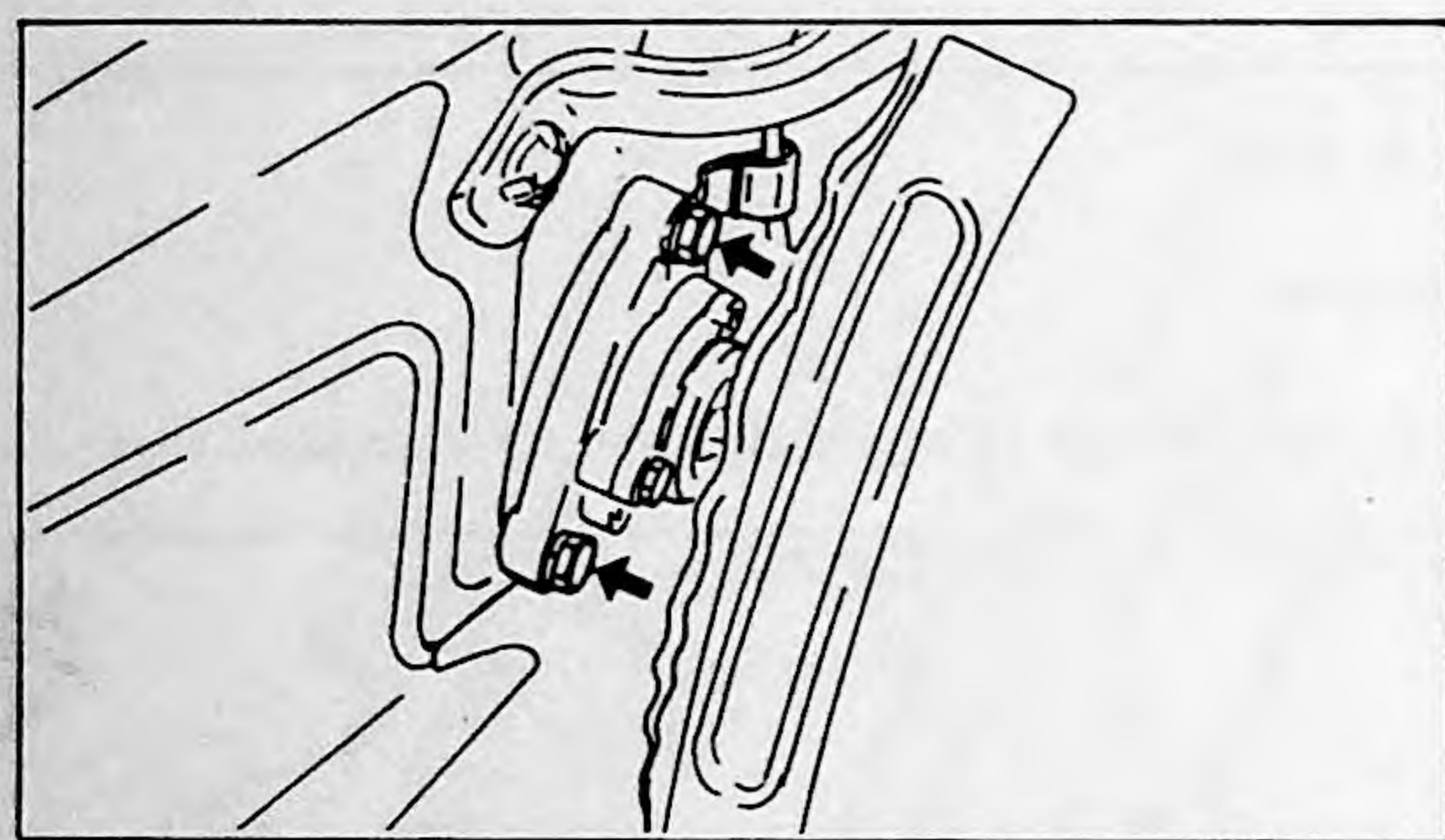


Fig. 4-17

Remove the axle nut and Belleville washer with a special tool (Nut removal tool) or a 26 mm socket wrench.

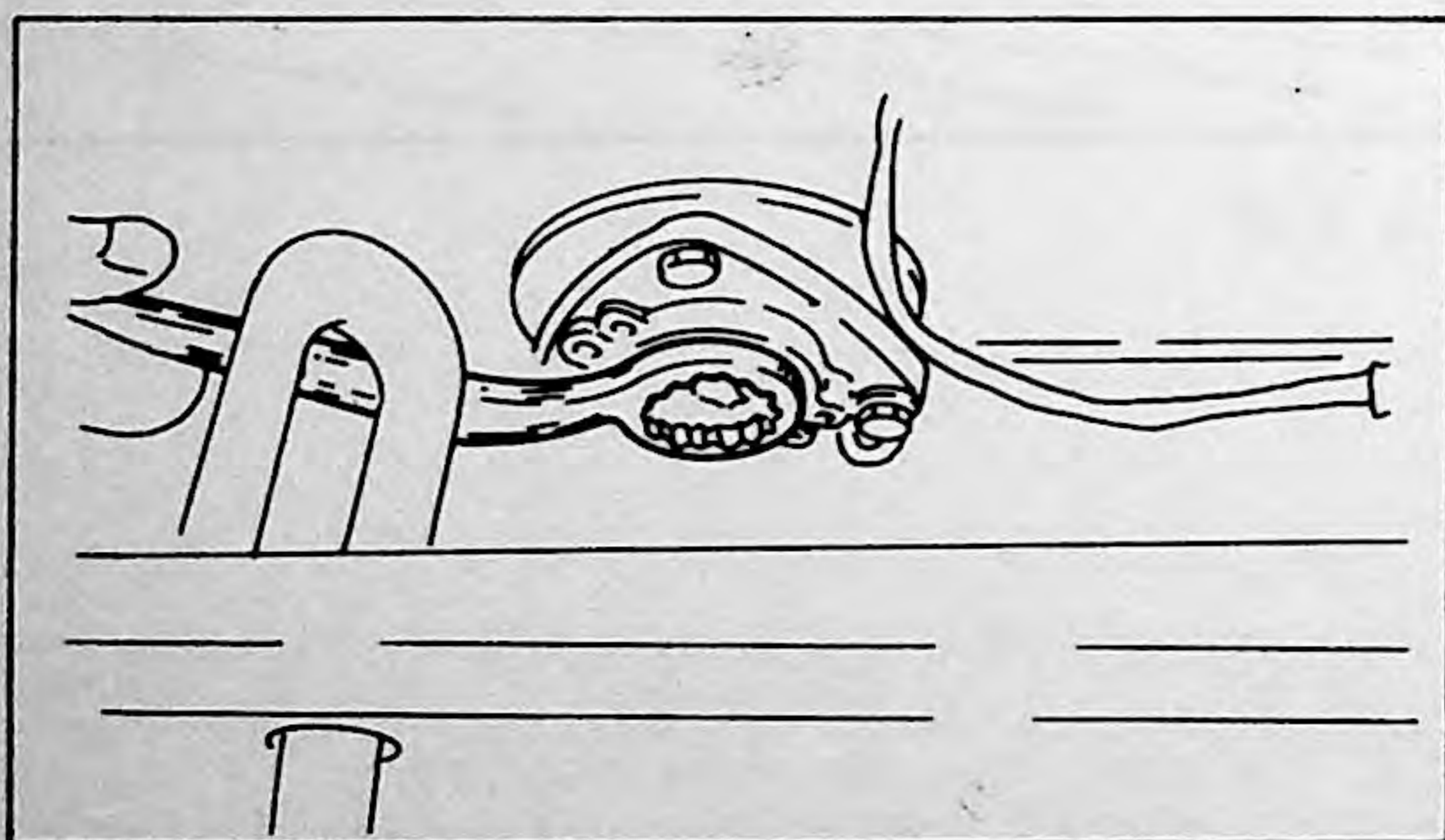


Fig. 4-18

The right-hand axle housing is held in place by three bolts (10 mm). At this time, remove the bolts from the frame and pull off the housing.

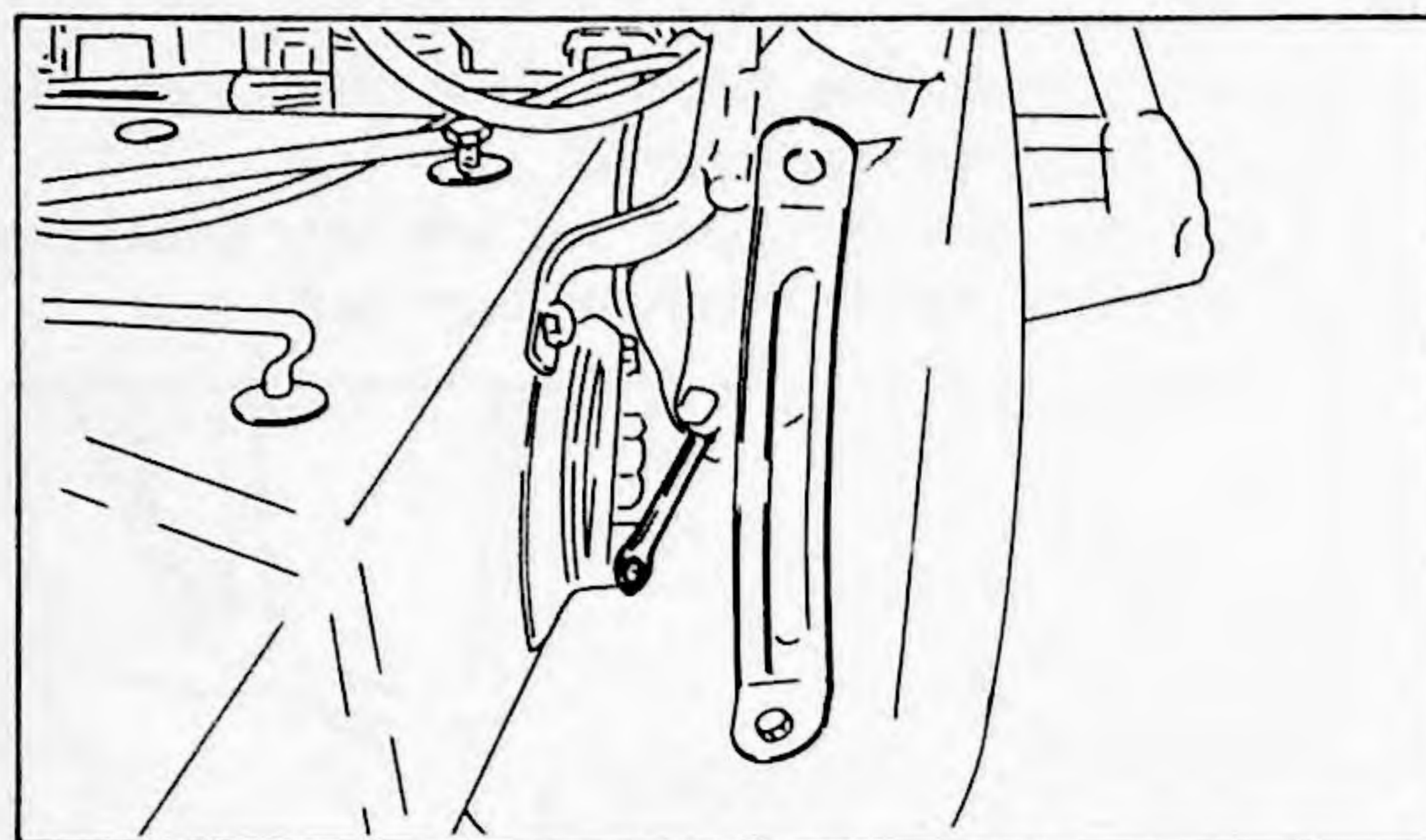


Fig. 4-19

4-2-5

Place the snowmobile with the left side down.

Straighten the lock washer, and remove the bolt.

Then, whether the sprocket or the chain case can be removed.

The sprocket is splined to the journal.

When removing the chain case, the front axle should be shifted to the right as much as possible for easy operation.

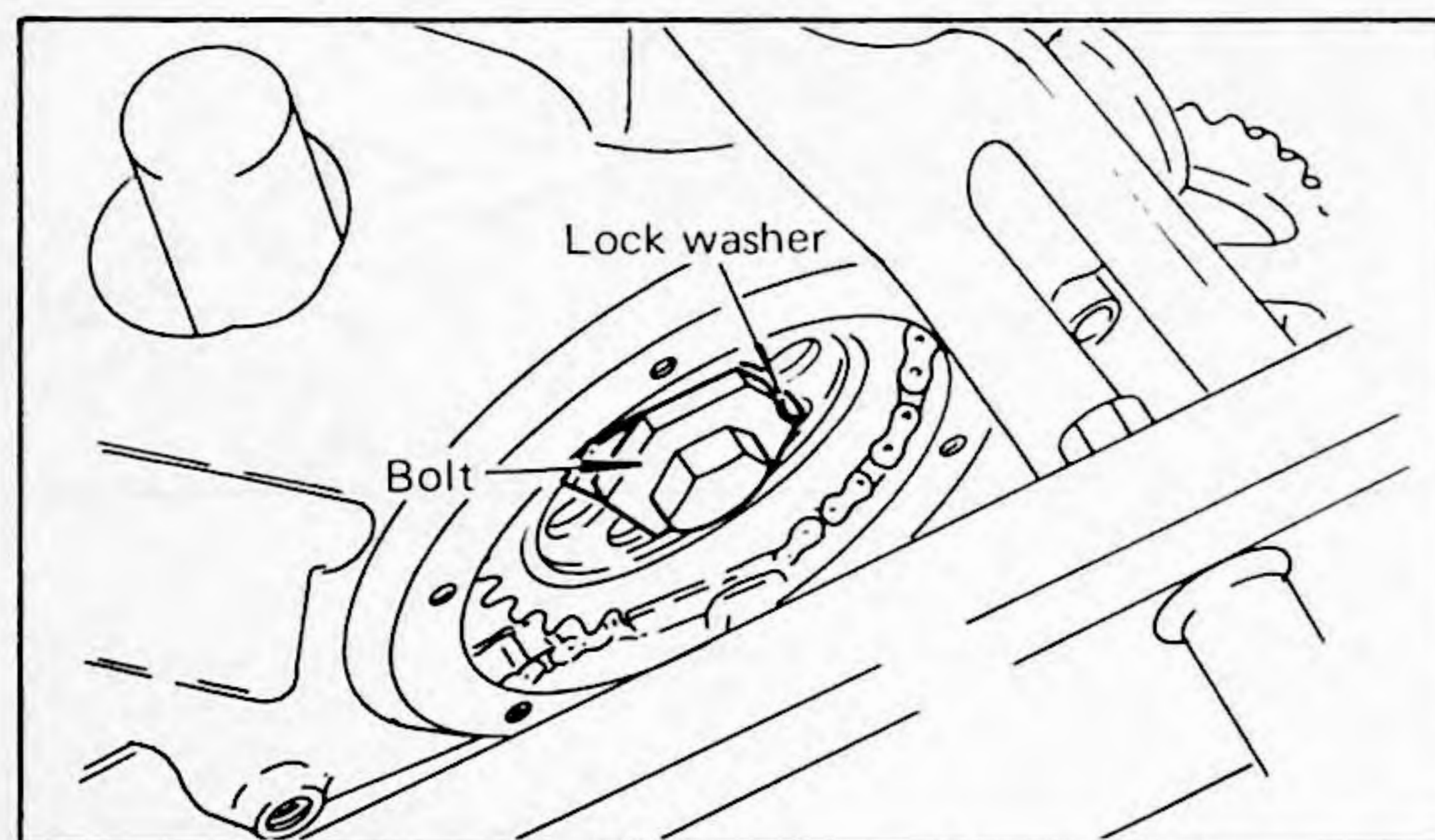


Fig. 4-20

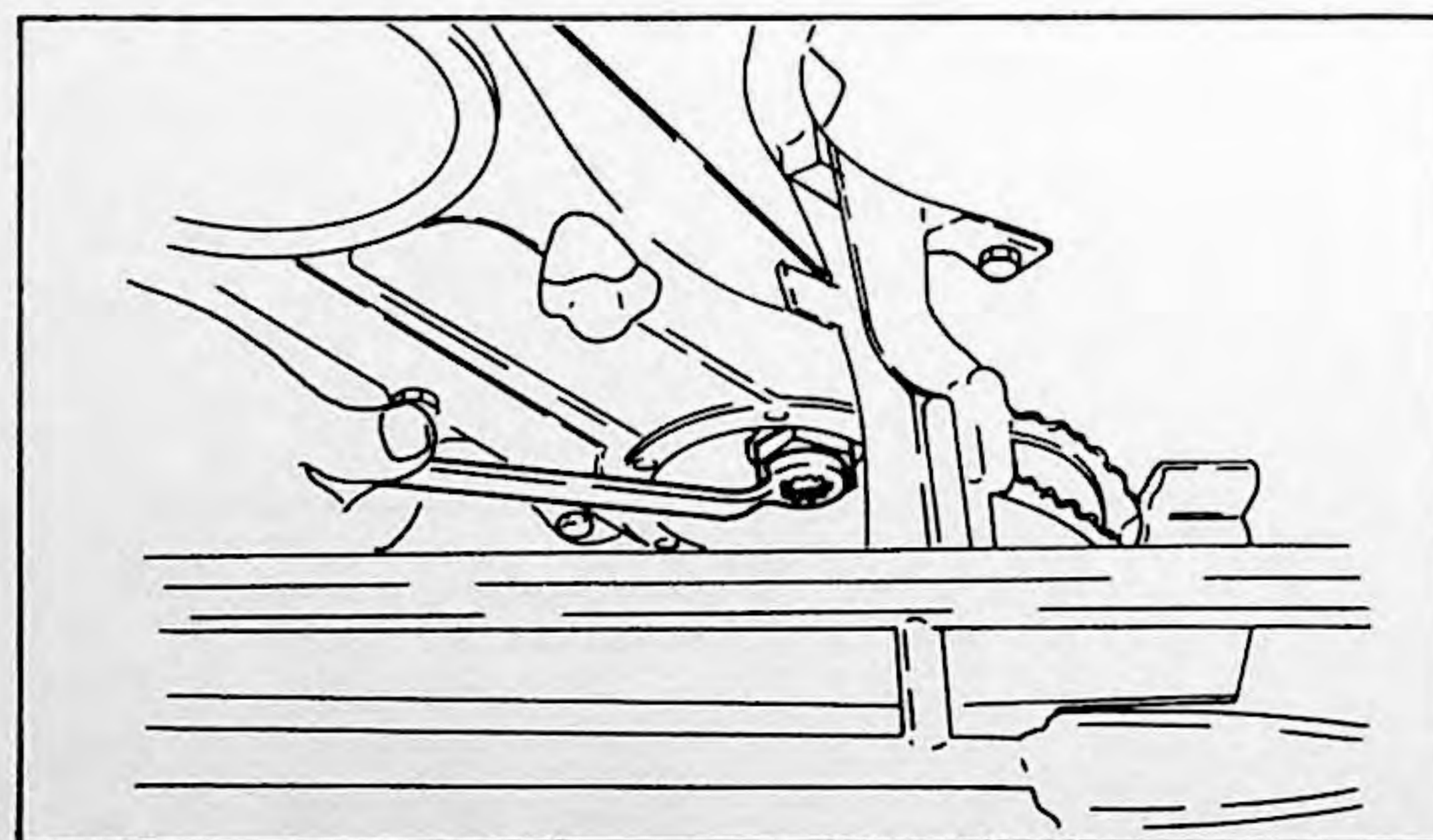


Fig. 4-21

4-2-6

At this time it will be necessary to tip the snowmobile on its right side in order to allow the axle to be removed.

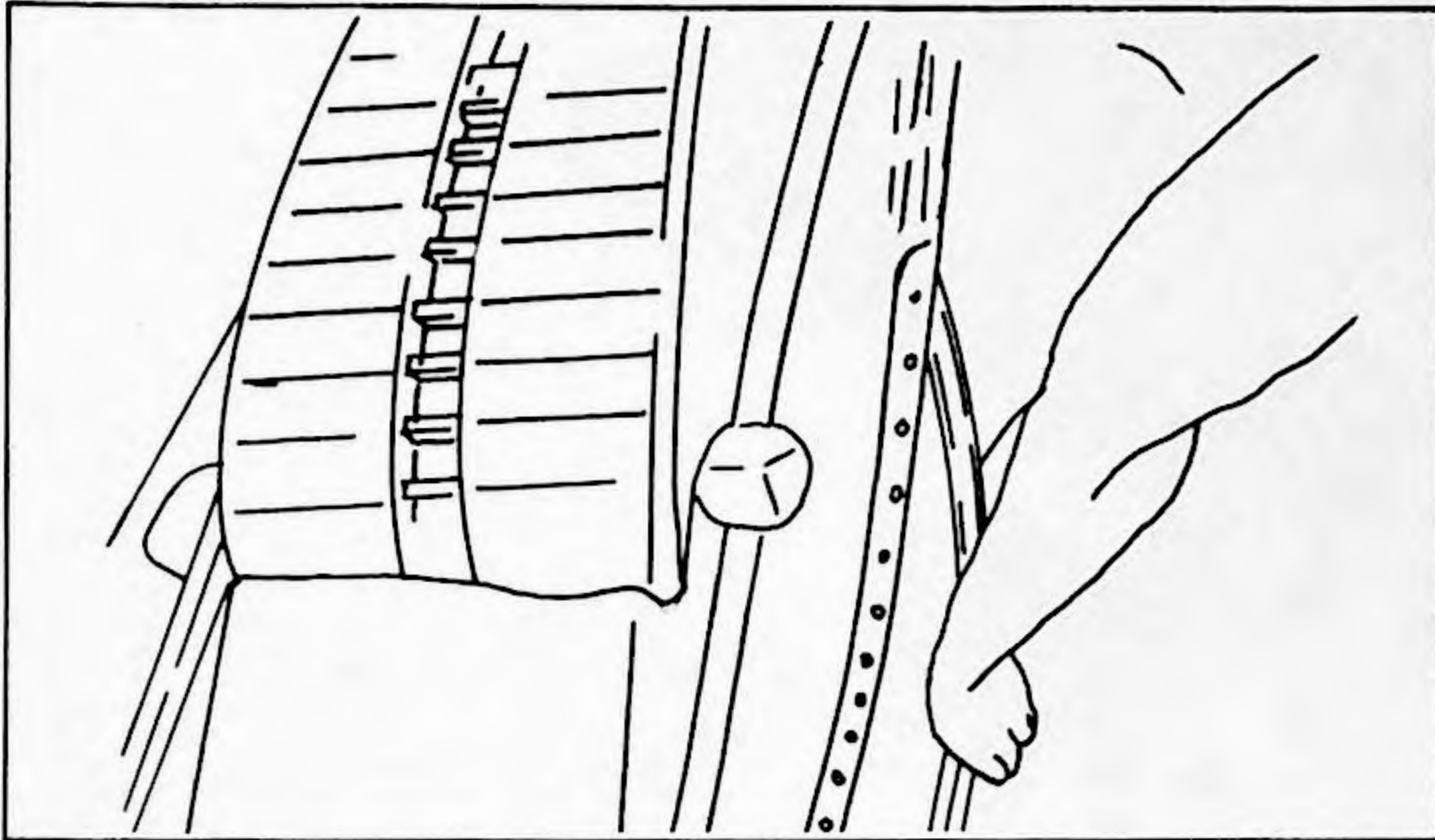


Fig. 4-22

4-2-7

Reach underneath the snowmobile and grab hold of the axle. Lift up on the axle as far as possible so that the tip of the axle will extend up out of the chain case hole.

This should allow you enough room to take hold of the right end of the axle, pull it free of its housing on the right-hand side, and pull the right end of the shaft backward and downward sliding the shaft free. It is most likely that the track will drop out as the axle is being removed. This completes the removal of the front axle assembly from the frame.

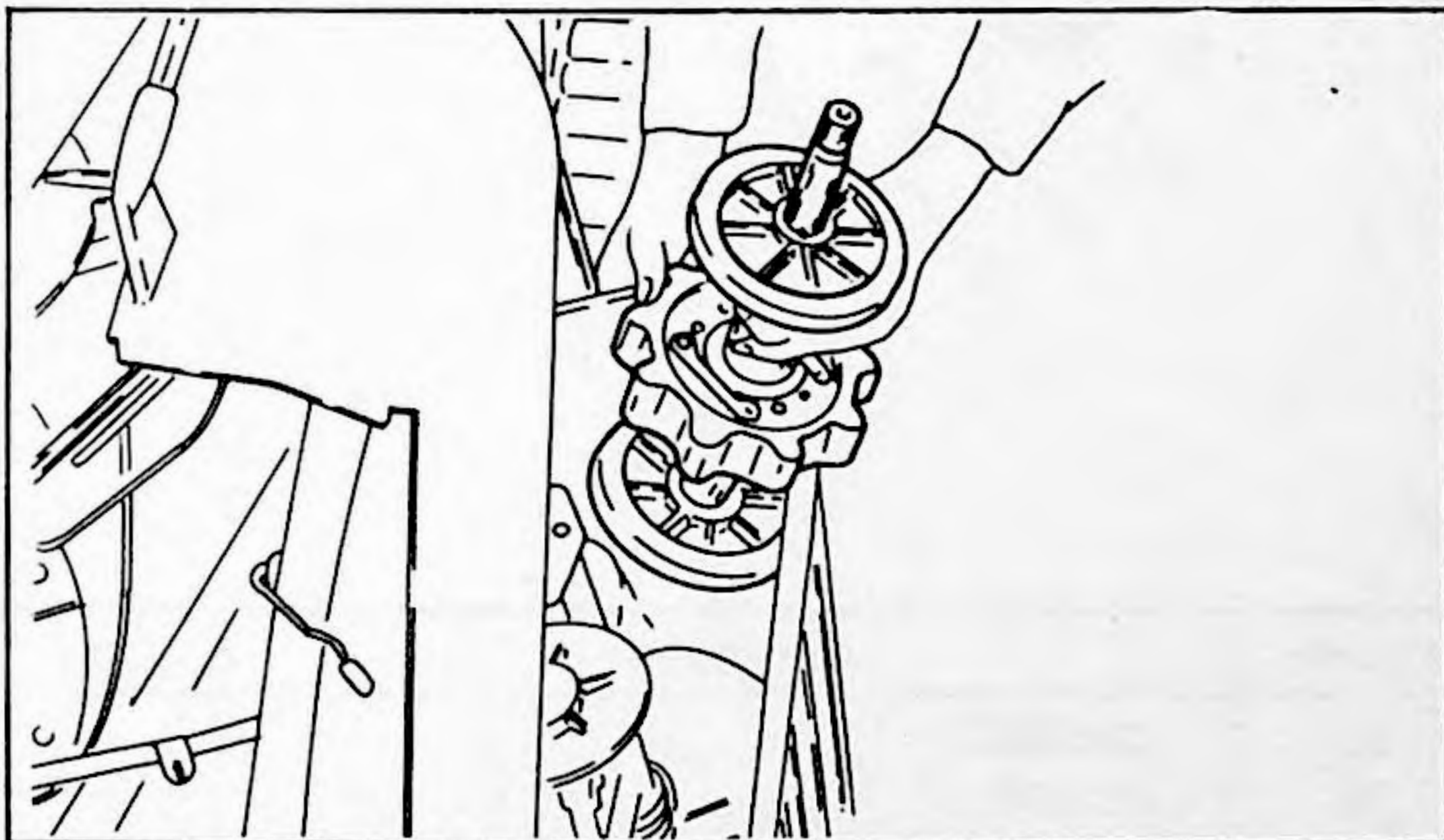


Fig. 4-23

4-2-8 Front Axle Installation

When installing the front axle, the front axle end should be inserted into the chain housing. With collar, sprocket, and journal installed on the chain housing, insert the front axle and into the chain housing.

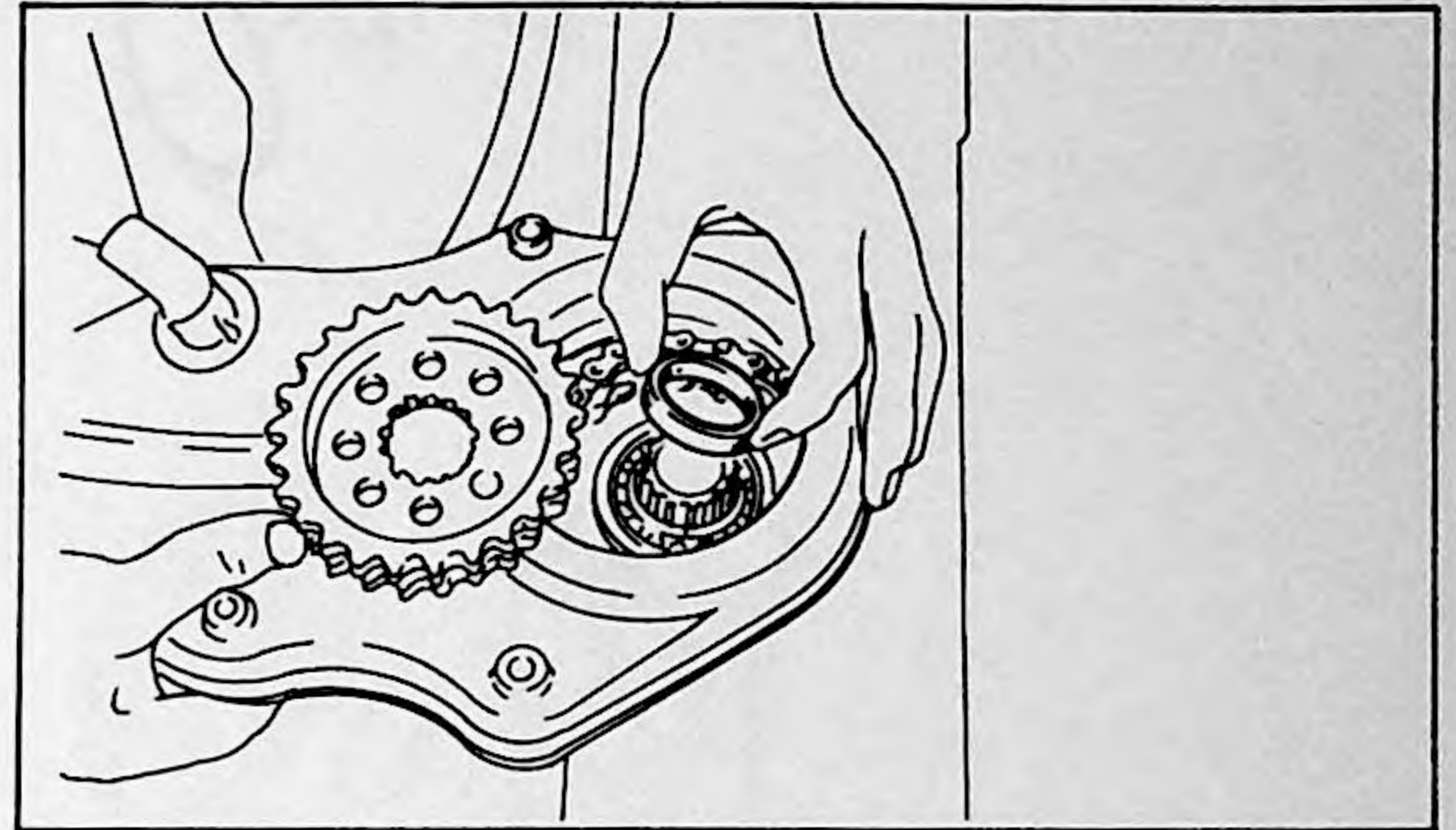


Fig. 4-24

For the subsequent operation, reverse the procedure for installation.

CHAIN HOUSING

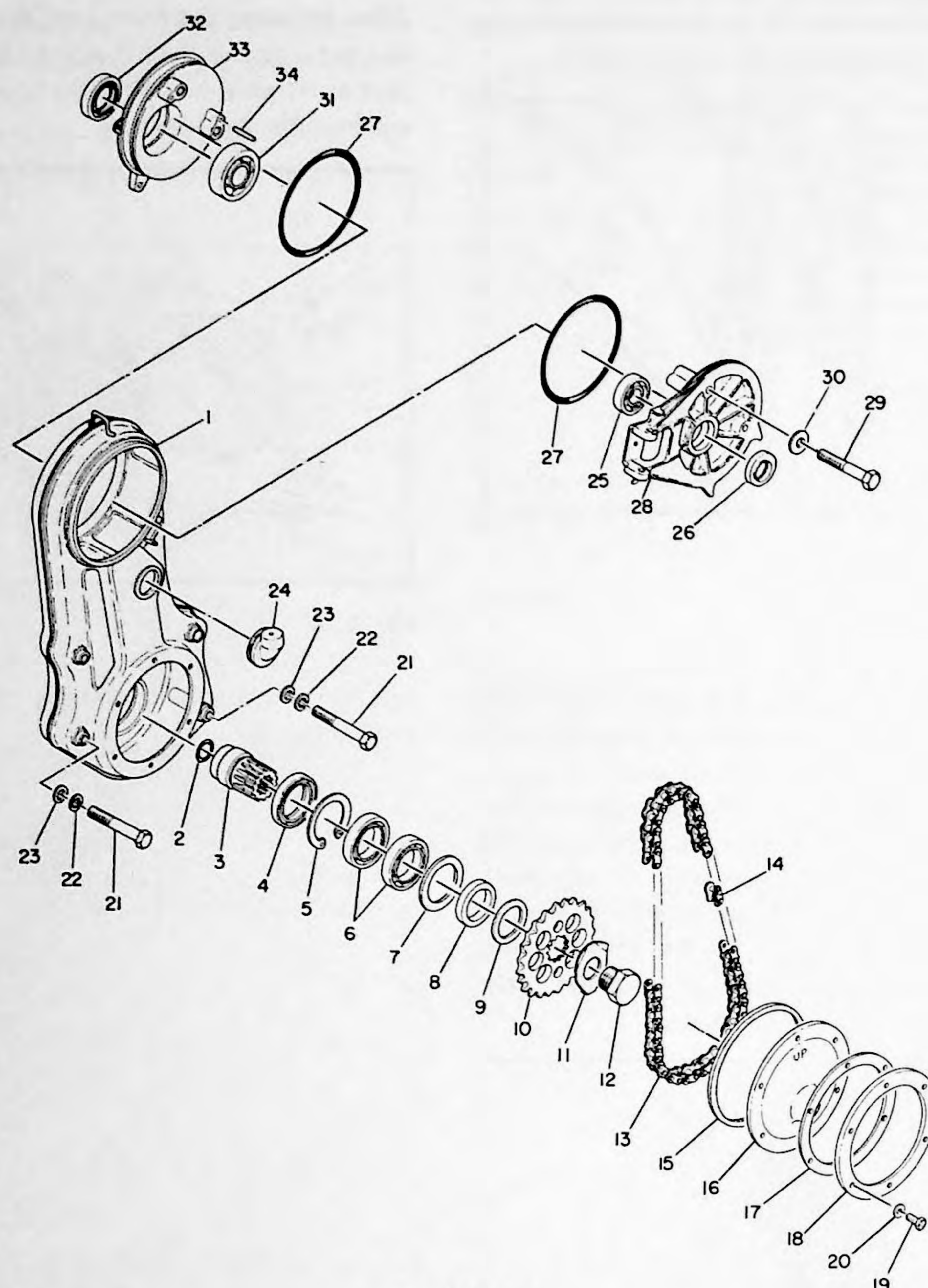


Fig. 4-25

Ref. No.	Description	Q'ty	Ref. No.	Description	Q'ty
1	HOUSING, chain	1	17	GASKET	1
2	O-RING (3.2-24.5)	1	18	PLATE	1
3	JOURNAL, 1	1	19	BOLT	6
4	OIL SEAL (SD-40-55-8)	1	20	WASHER	6
5	CIRCLIP (R-55)	1	21	BOLT	4
6	BEARING (B-6907)	2	22	WASHER, spring	4
7	SPACER	1	23	WASHER, plain	4
8	COLLAR	1	24	CAP 2	1
9	WASHER, lock (35-45-1.0)	1	25	BEARING (B6203C3)	1
10	SPROCKET, chain driven (25T)	U.R 1	26	OIL SEAL (SD-22-32-5)	1
	SPROCKET, chain driven (24T)		27	O-RING (3.1-113)	2
	SPROCKET, chain driven (23T)		28	HOUSING, secondary shaft left	1
11	WASHER, lock	1	29	BOLT	2
12	BOLT	1	30	WASHER	2
13	CHAIN (RS40V 68L)	U.R 1	31	BEARING (B-6304C3)	1
	CHAIN (RS40V 66L)		32	OIL SEAL (SD-30-47-7)	1
14	JOINT, chain	1	33	HOUSING, secondary shaft right	1
15	RING, rubber housing	1	34	PIN, dowel (4-17.8)	2
16	CAP, housing	1			

FRONT AXLE COMP.

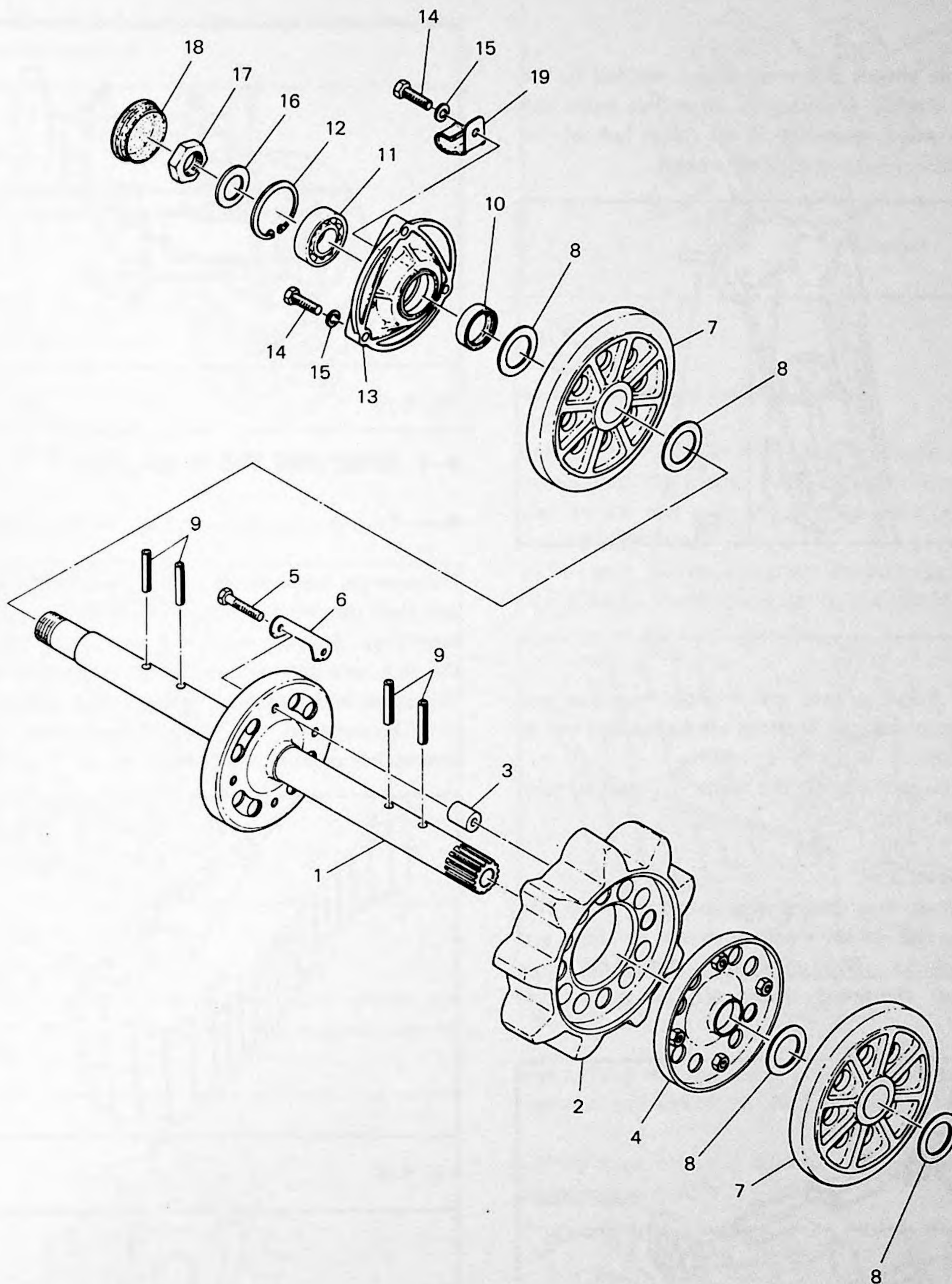


Fig. 4-26

Ref. No.	Description	Q'ty	Ref. No.	Description	Q'ty
1	FRONT AXLE COMP.	1	11	BEARING (B6004 special)	1
2	WHEEL, sprocket 1	1	12	CIRCLIP (R-44)	1
3	COLLAR	4	13	HOUSING, front axle	1
4	RIM, sprocket wheel 2	1	14	BOLT	3
5	BOLT	4	15	WASHER, spring	3
6	WASHER, lock	2	16	WASHER	1
7	GUIDE WHEEL COMP.	2	17	NUT	1
8	PLATE (25.5-38-2)	4	18	CAP	1
9	PIN, spring	4	19	CLIP, wire	1
10	OIL SEAL (SD-25-34-7)	1			

4-3 BOGIE WHEELS

4-3-1

Each set of bogie wheels is bolted to ears welded to the bottom of the chassis. Removal of these two bolts will allow the bogie wheel assembly to be taken out of the chassis. The bolts are secured by lock washers.

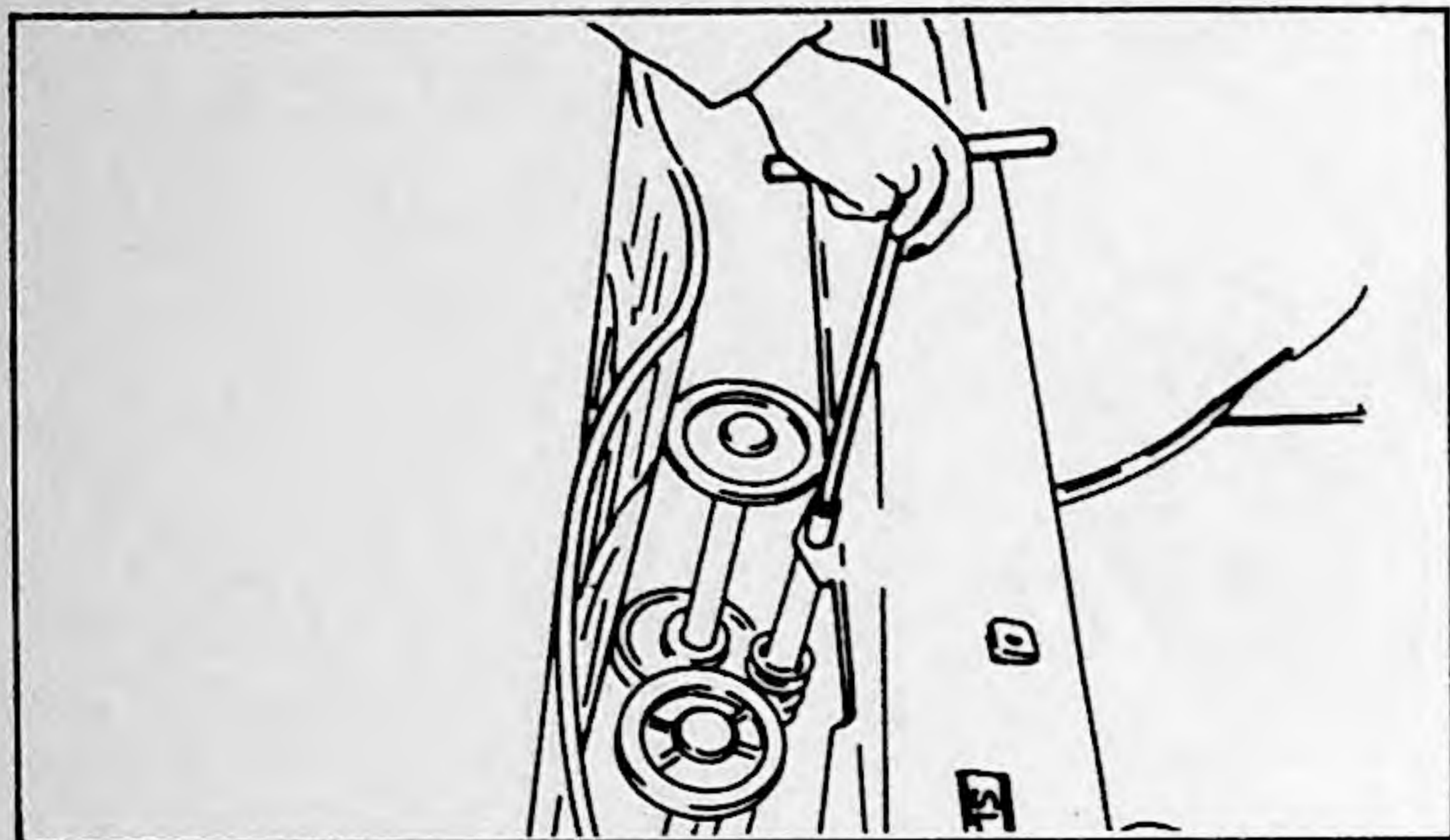


Fig. 4-27

4-3-2

The individual bogie wheels are rivetted together and cannot be disassembled; the bearings are sealed and not to require lubrication. If the unit is disassembled all the metal to metal surfaces should be greased.

Precautionary Note:

If the snowmobile is immobile or stored for more than a week, the rear of the machine should be raised and placed on blocks. This will prevent the rubber bogie wheels from flattening under the weight of the machine.

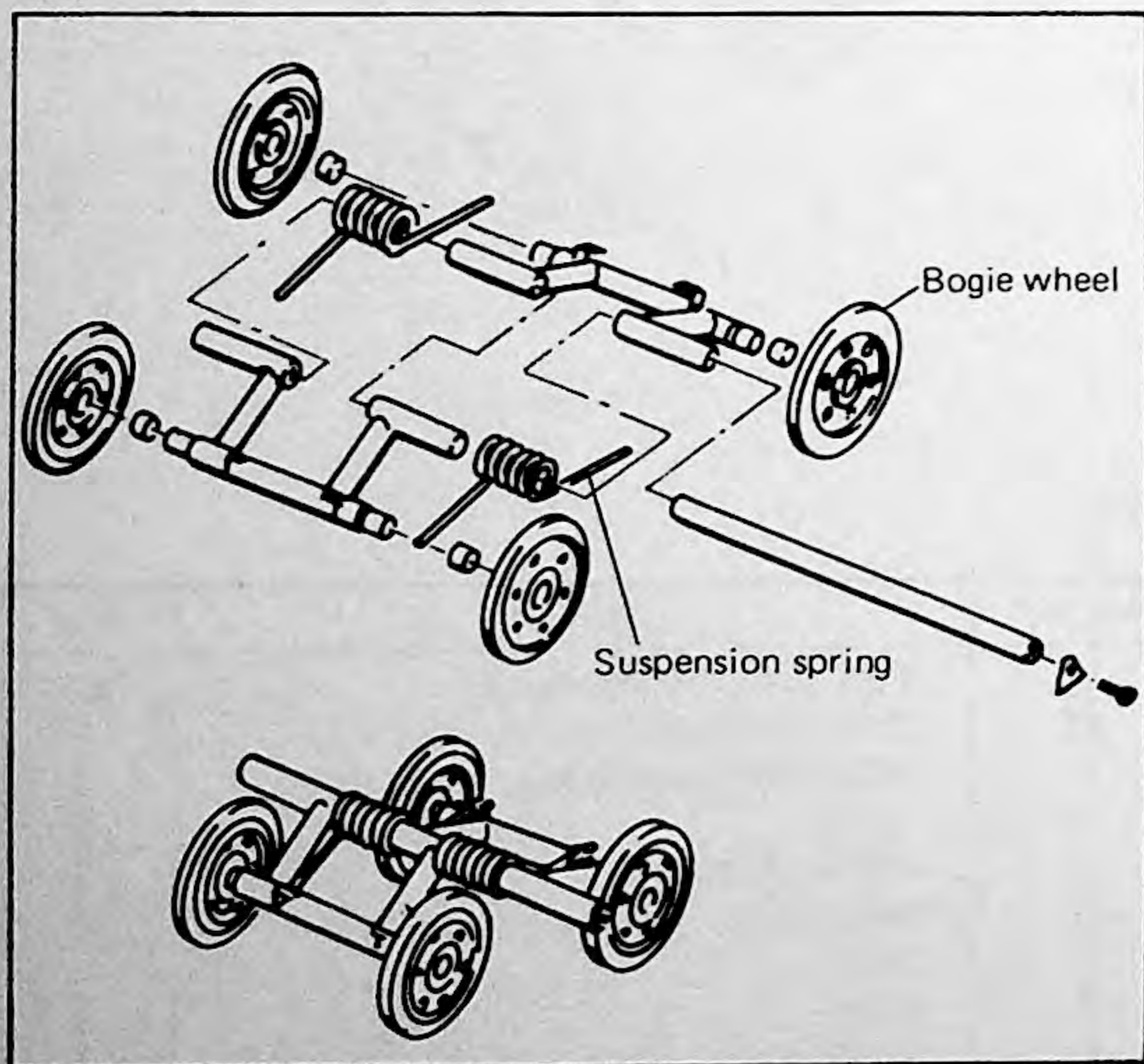


Fig. 4-28

After installation, be sure to bend the spring end stoppers at four places.

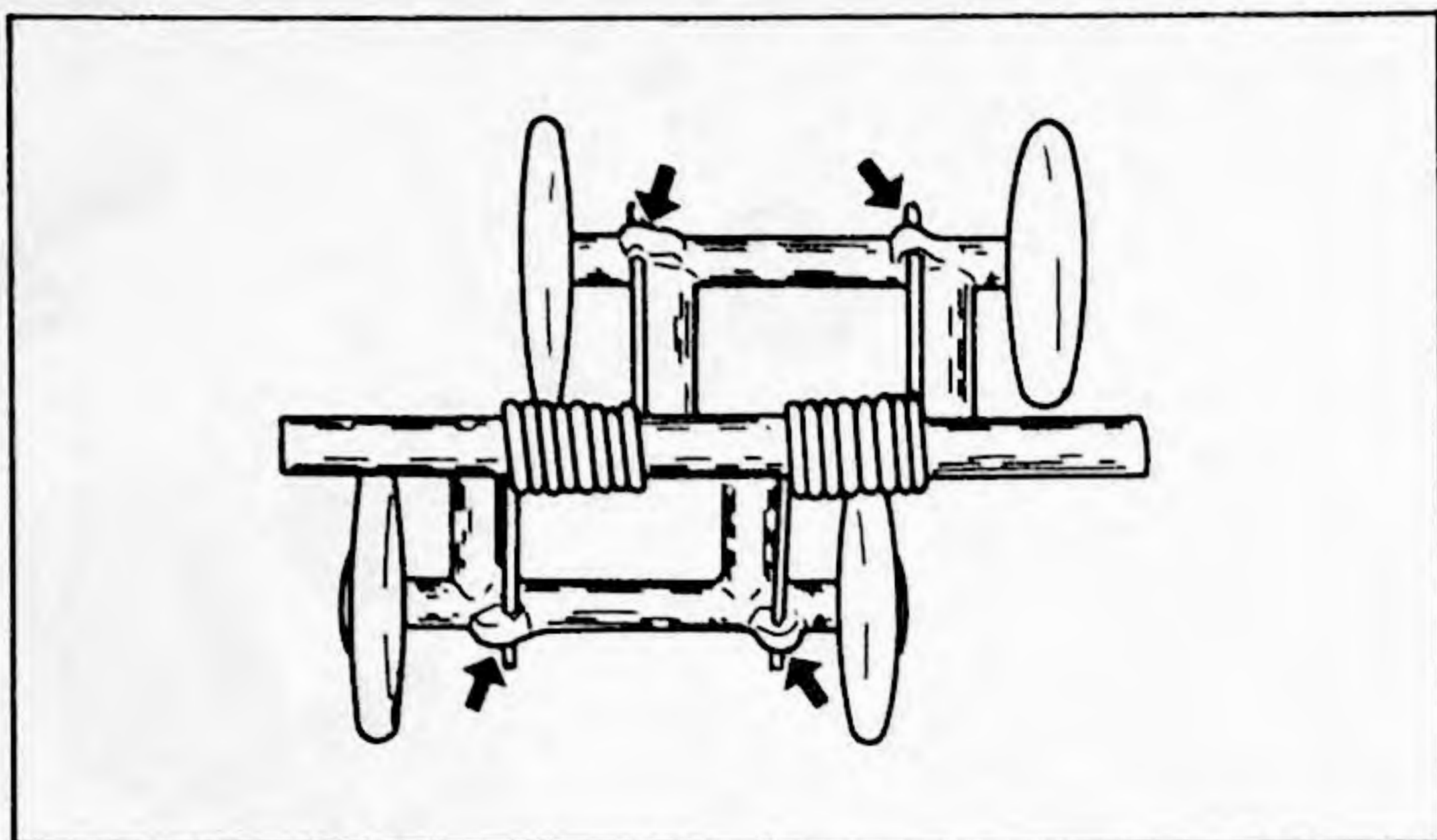


Fig. 4-29

4-4 REMOVING THE REAR AXLE

4-4-1

Remove the track adjust screw, pivot rear screw and collar, and then remove the rear pivot arm and the rear axle as an assembly. As you may understand from the illustration, the rear axle can not be removed from the drive track in this stage, and therefore, either of the two pivot rear arms must be removed. To remove, loosen the nut using a 26 mm socket wrench, and remove the nut.

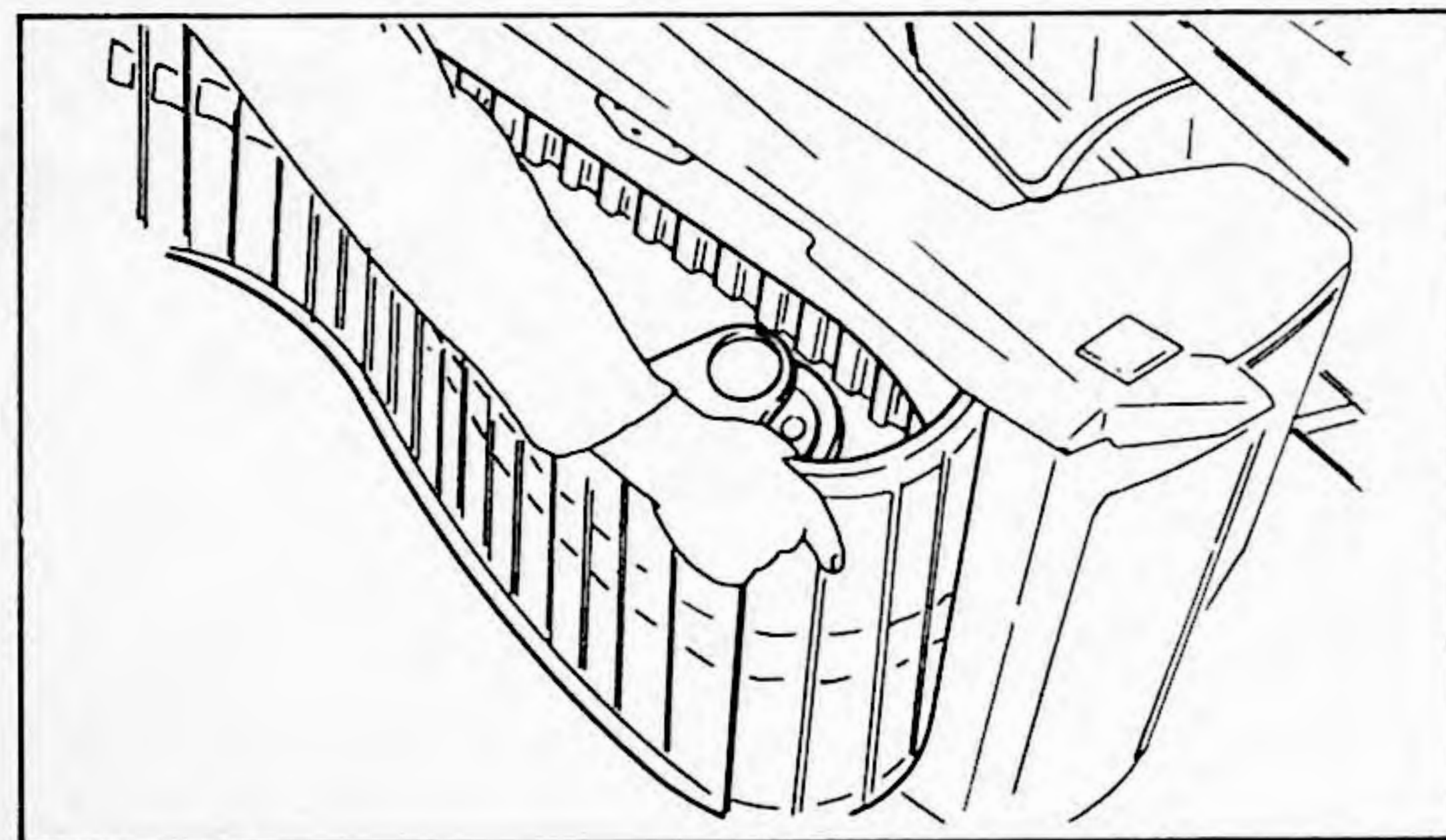


Fig. 4-30

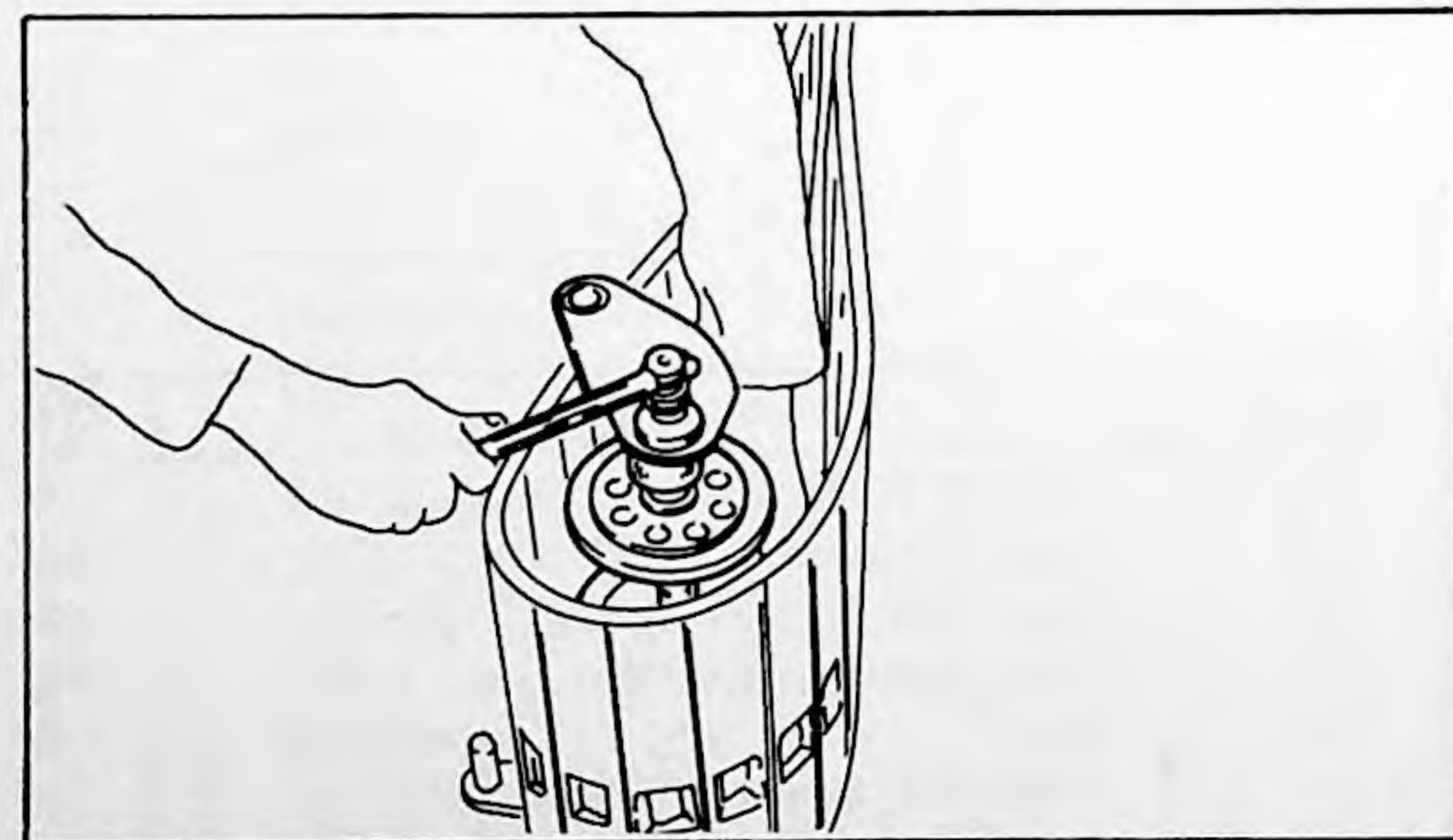


Fig. 4-31

4-4-2 Disassembling the Rear Axle

Remove the 26 mm nut, and remove the remaining pivot rear arm from the rear axle.

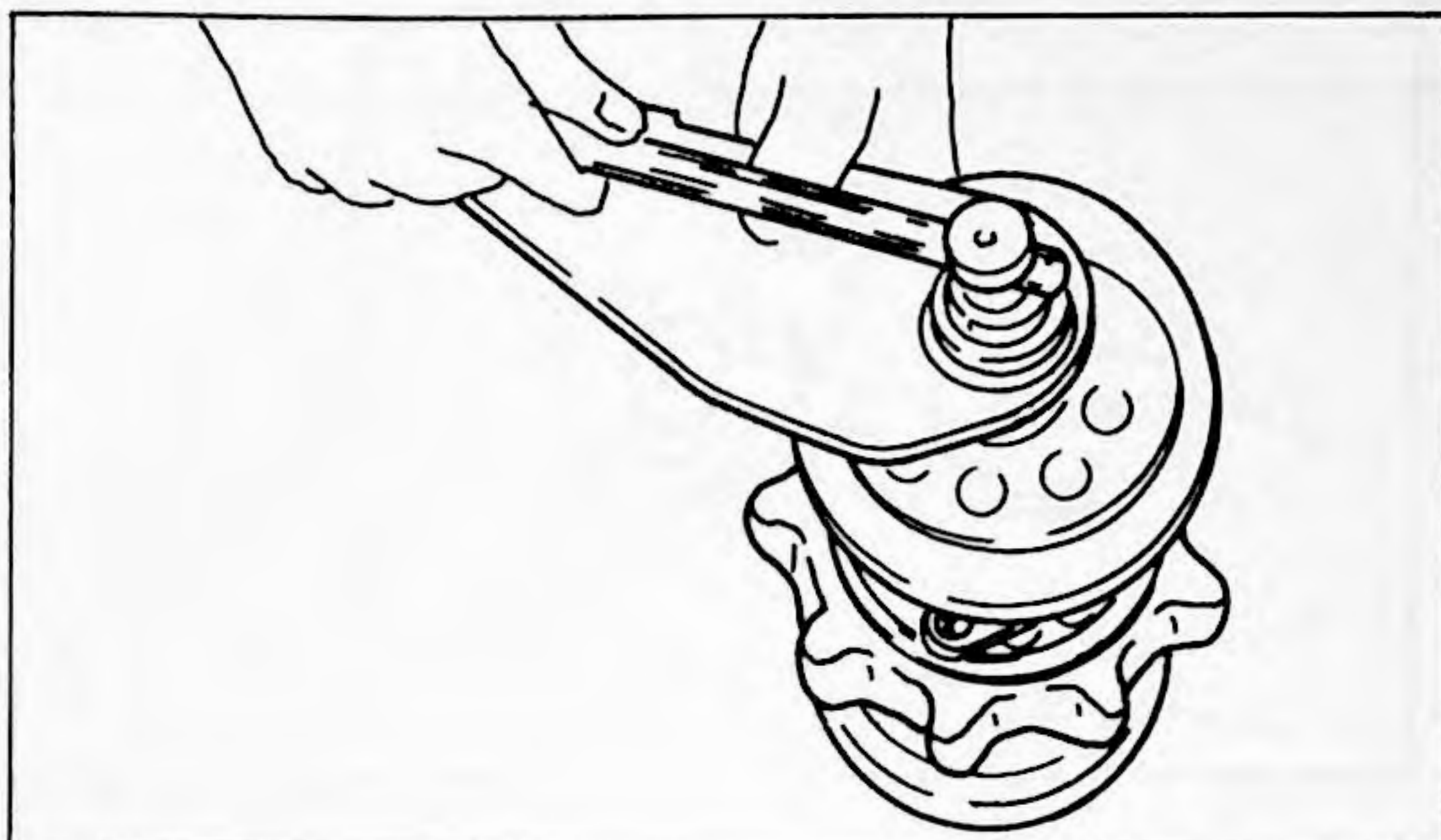


Fig. 4-32

Pull out the spring pin holding the suspension wheel.

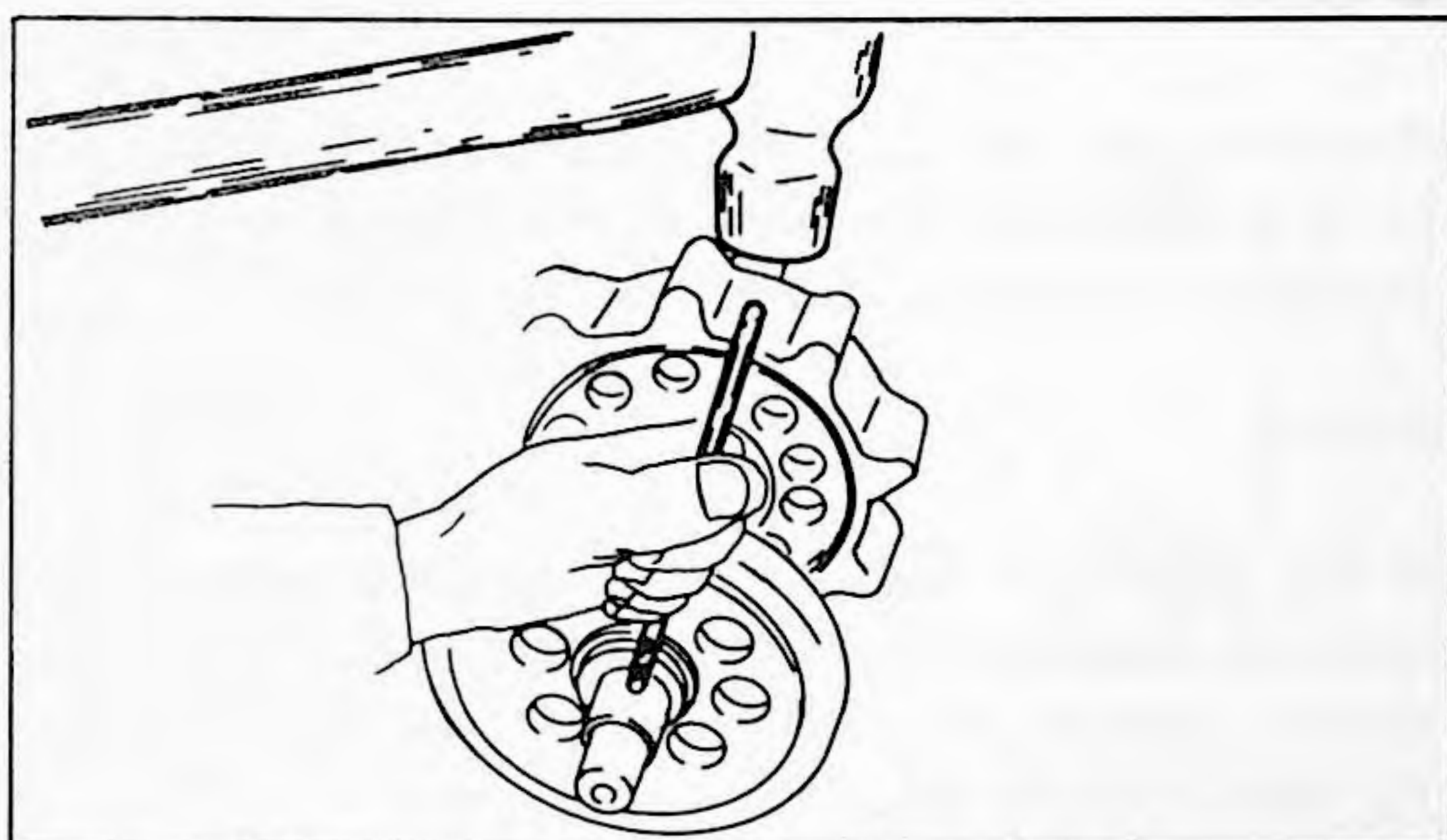


Fig. 4-33

Straighten the four bolt lock washers, and remove the bolts. Remove the rim, and then the sprocket can be removed.

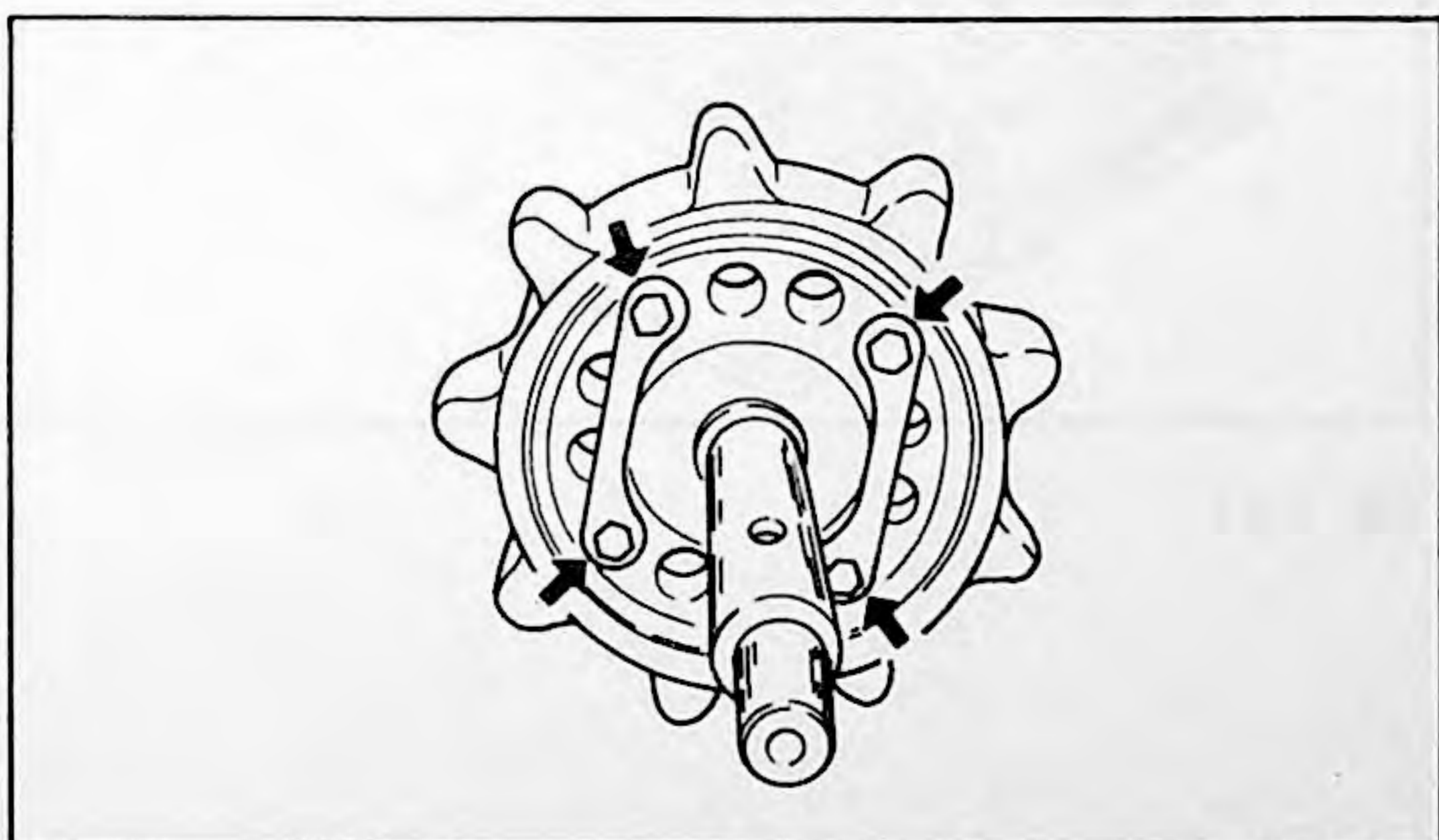


Fig. 4-34

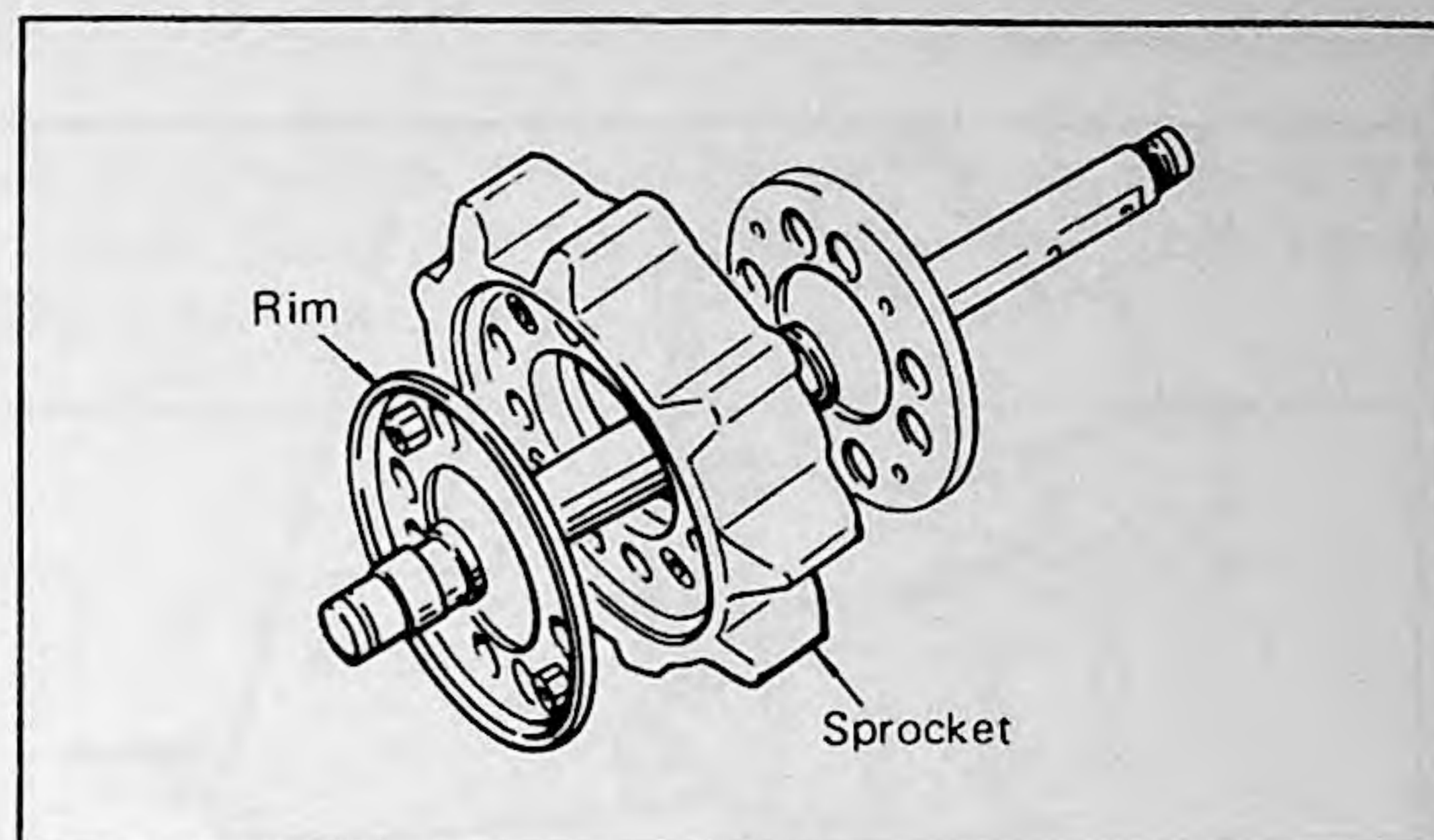


Fig. 4-35

4-4-3 Installing the Rear Axle

Before installing the rear axle, the bogie wheels must be installed on the frame. As illustrated, install the pivot rear arm on the rear axle with the rear axle positioned on the inside of the track.

In this case, the rear arm pivot should be positioned outside of the track. Install the collar on the rear arm.

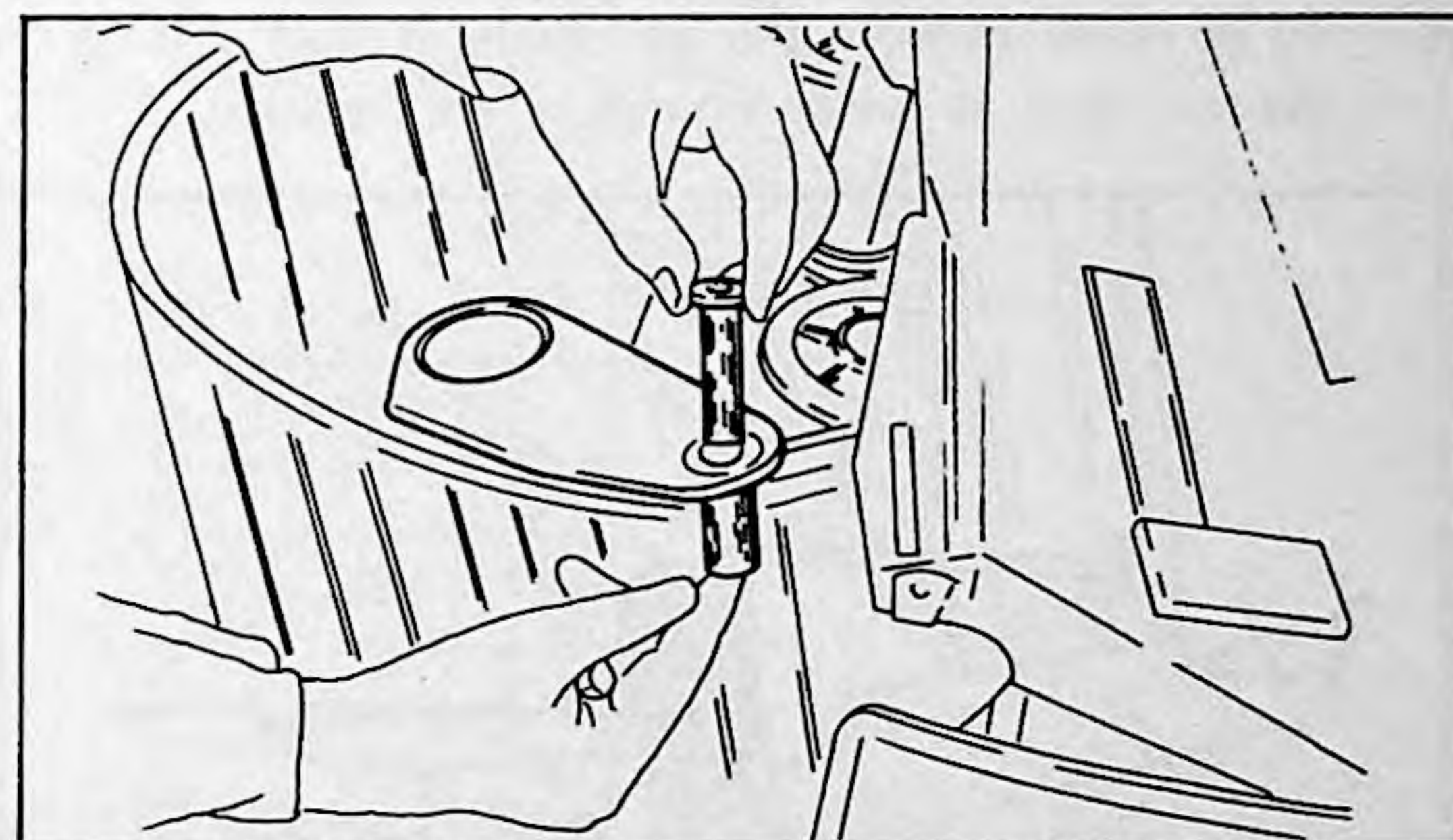


Fig. 4-36

Insert the pivot rear screw into the pivot hole in the pivot rear arm, and secure the pivot rear arm to the frame.

Lightly turn in track adjusting screw into the pivot rear screw hole to hold it in position.

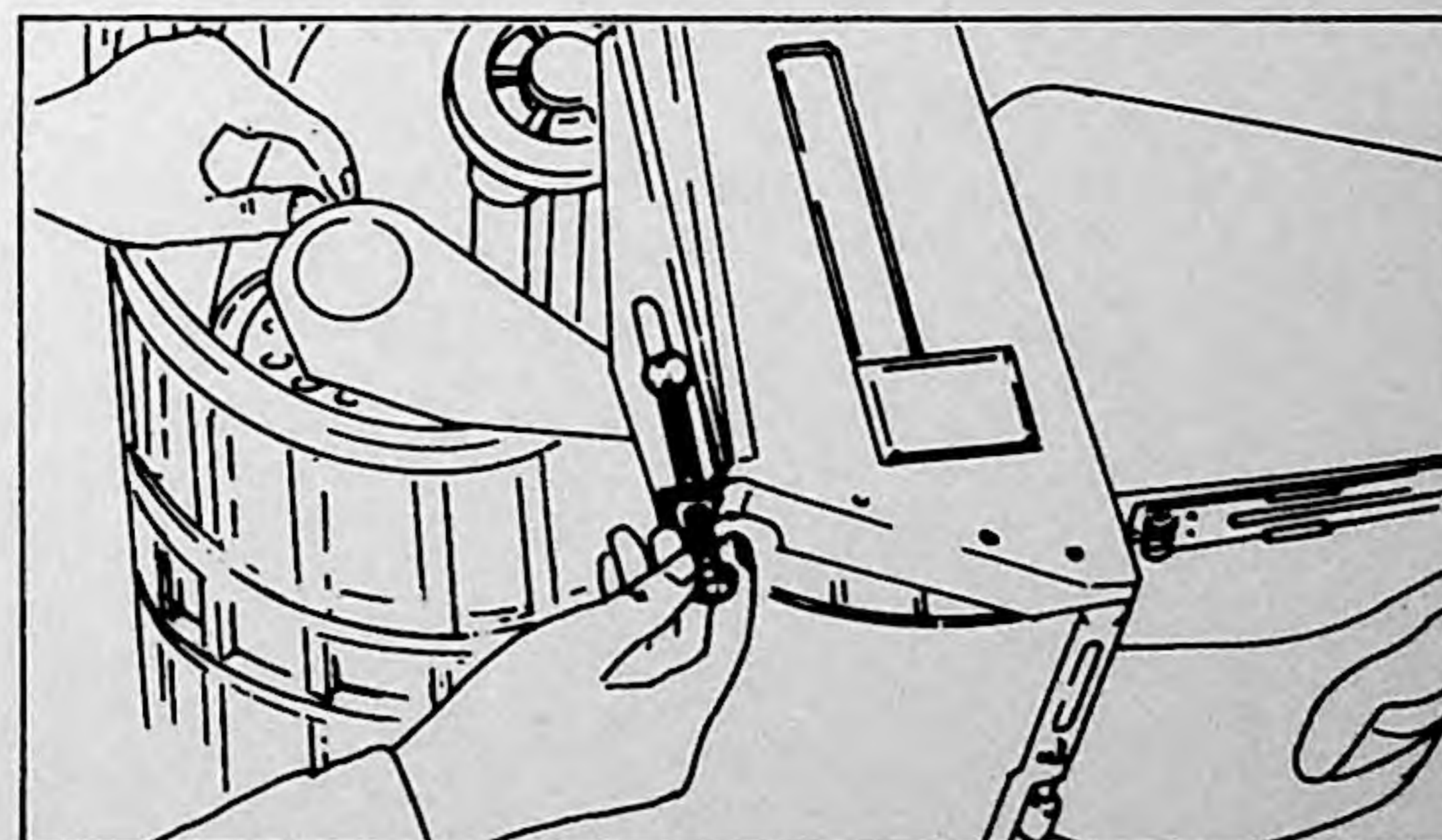


Fig. 4-37

Install the rear spring.

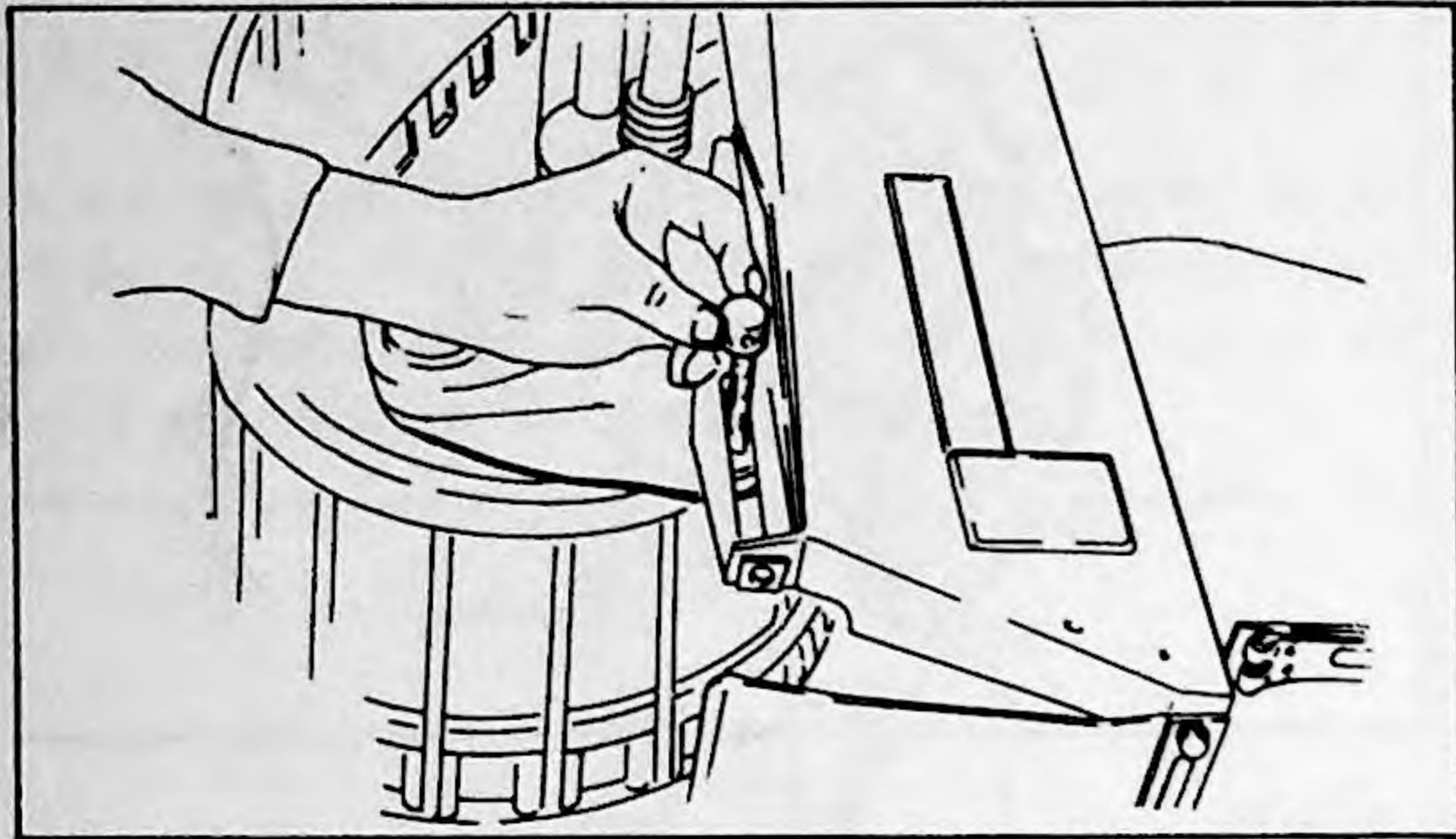


Fig. 4-38

4-4-4

The strength of the rear spring is adjustable to two positions according to snow and running conditions.

- a) To make the steering more positive, the rear spring should be hung on the front hook to raise the rear of the machine.
- b) To increase traction, the rear spring should be hung on the rear hook to lower the rear of the machine.

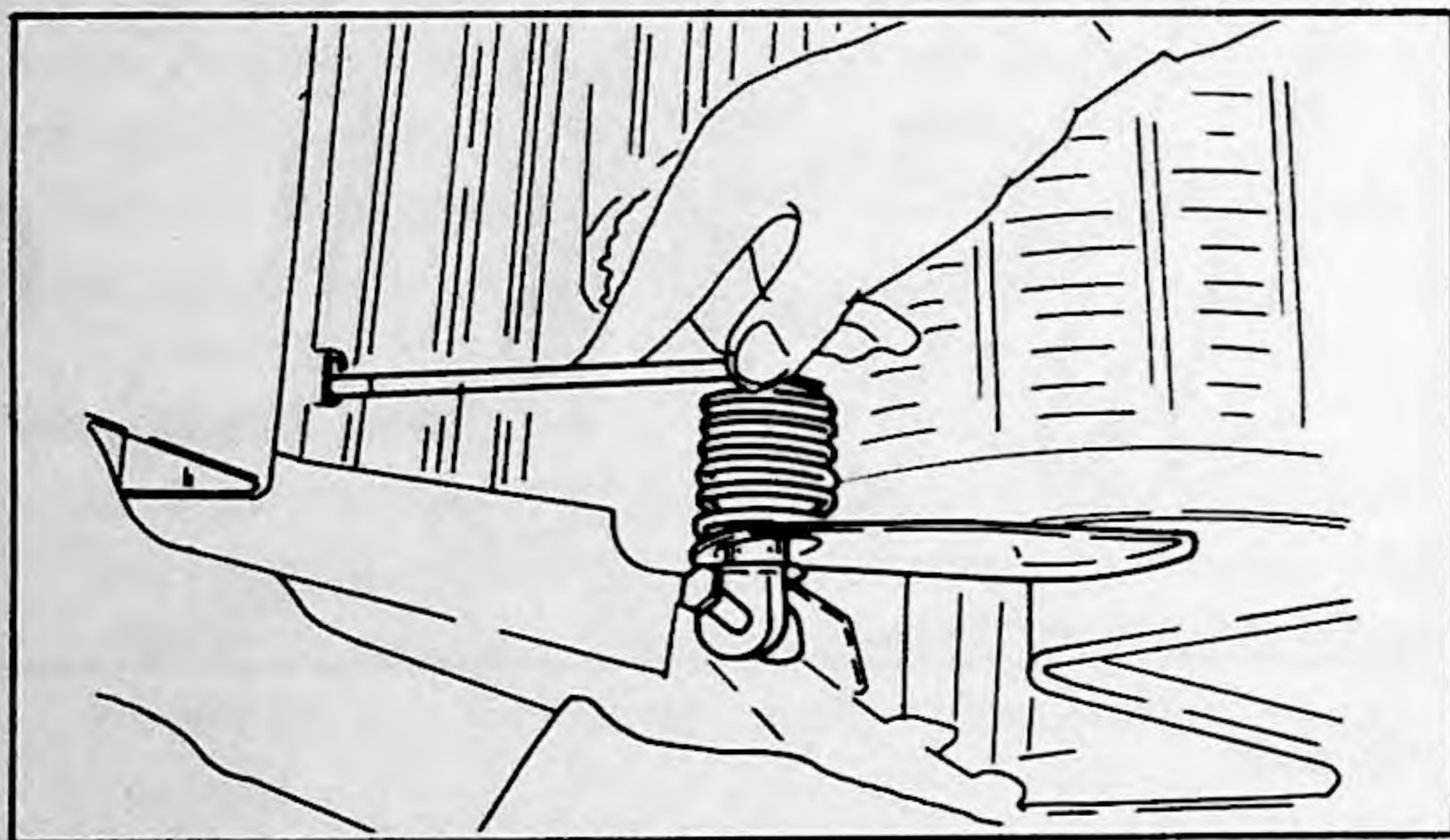


Fig. 4-39

Install the inside washer and plain washer, and secure the rear pivot screw with the nut. After tightening the nut, lock the nut with the cotter pin.

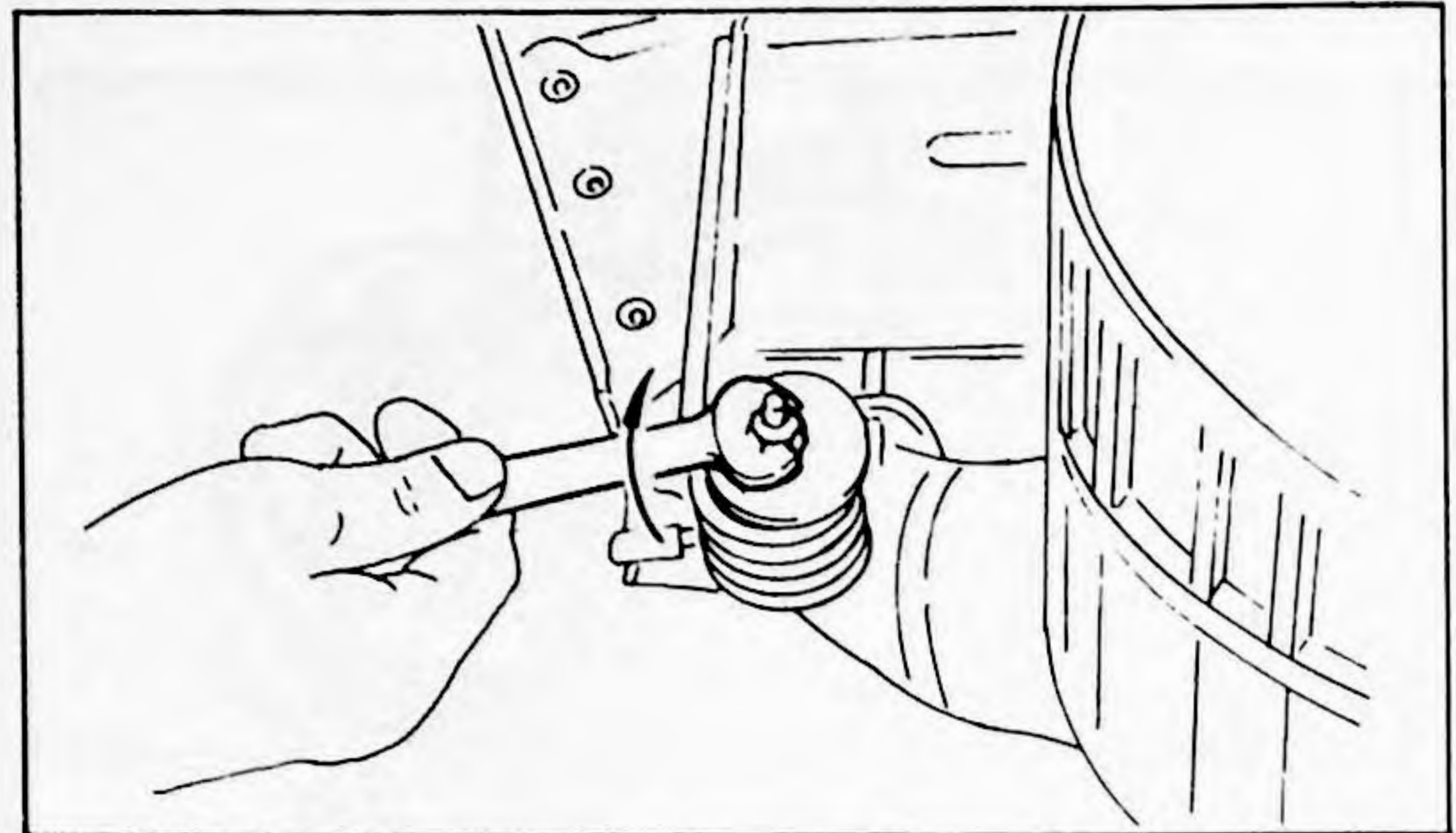


Fig. 4-40

4-5 TRACK REMOVAL

4-5-1

The front axle, rear axle, and bogie wheel assemblies must be taken out of the chassis in order to remove the track. The track can then be lifted out of the chassis.

4-5-2

If the center link plate of the drive track comes off the sprocket, the drive track rubber will be quickly worn due to contact between the rubber and the sprocket. Therefore, the drive track should be checked frequently.

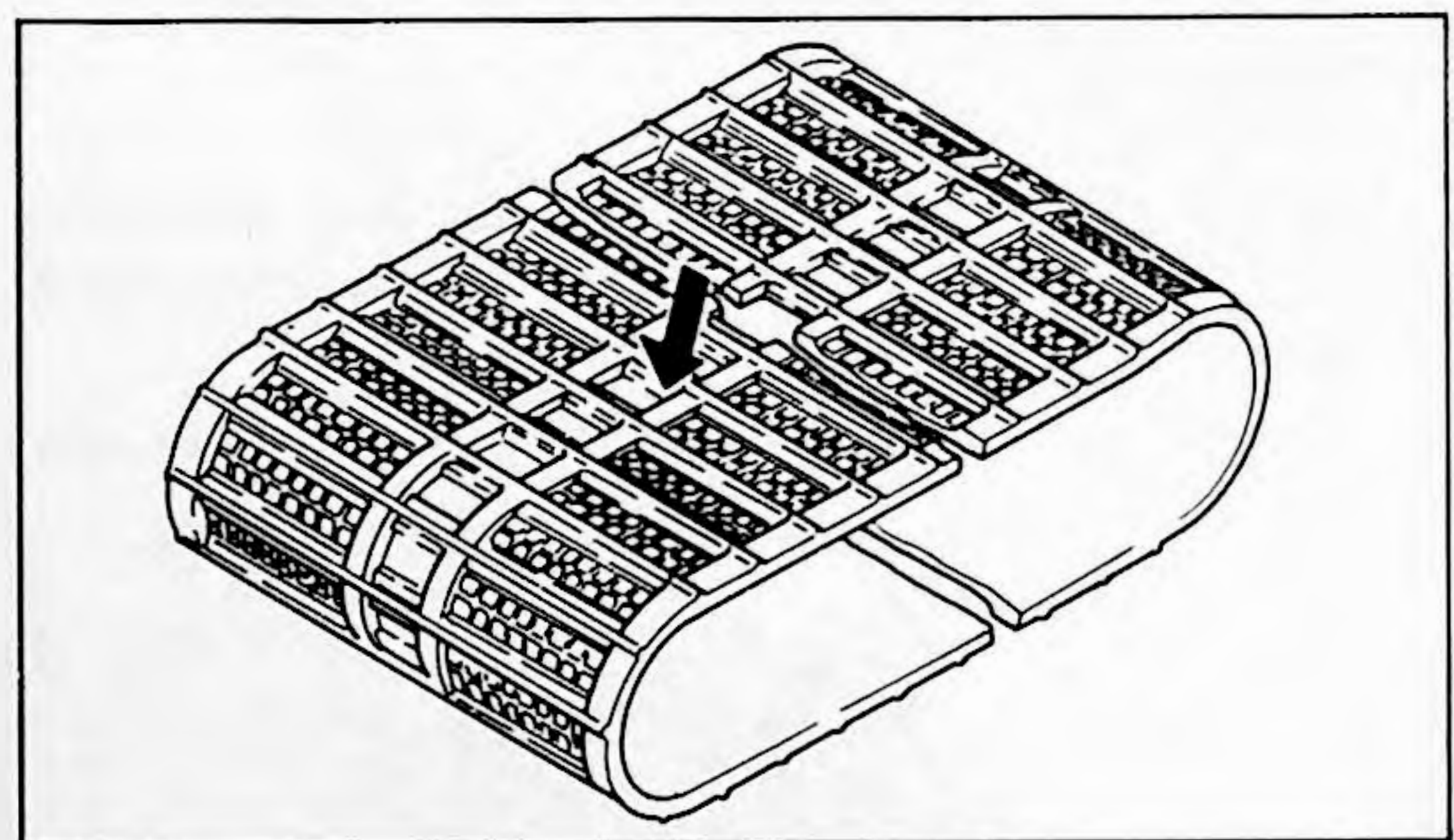


Fig. 4-41

4-5-3

When fitting the center link plate to the drive track rubber, it is advisable to use special jigs for easy and accurate work. Position the B portion (of the jig) inside the track and the

A portion outside the track. Install the two bolts in the B through the A and C jigs, and tighten them. Then, tighten the center bolt.

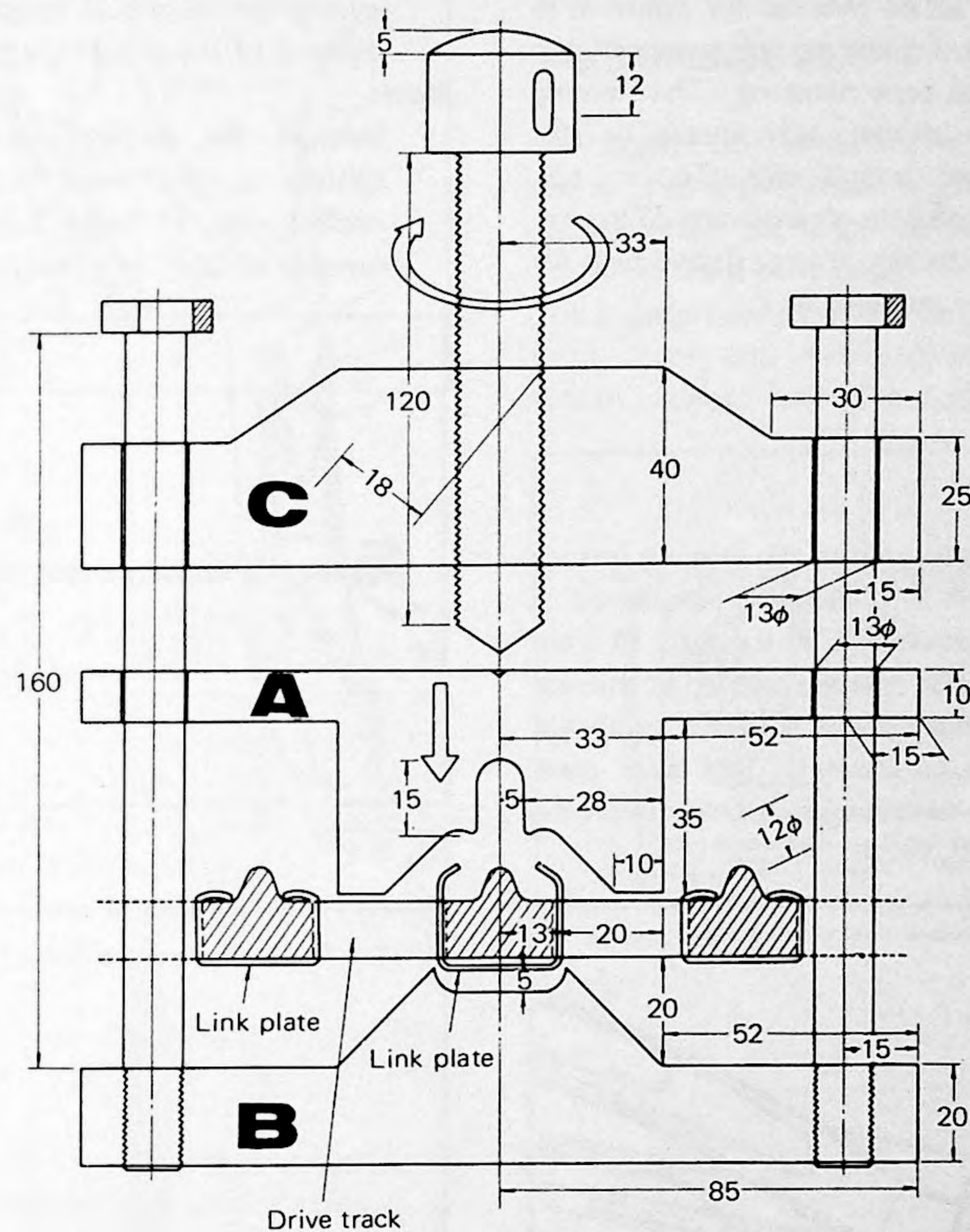


Fig. 4-42

CHAPTER 5. STEERING (SKIS) AND CHASSIS

5-1 STEERING

1. Maintenance

The steering column support, relay rod, outside arms and ski columns should all be checked for tightness as often as possible. Loosening and excessive wear of any of these items can cause poor handling. The steering column support on the steering gate should be disassembled and lubricated periodically. The ski columns should be lubricated with grease every 20 hours. Lubrication of all other steering linkage should be done every 40 hours. (See lubrication chart.)

5-2 SKIS

1. Maintenance

Tightness of the steering column to the steering linkage system is very important in controlling parallelism of the skis while the snowmobile is in motion. Skis are supported on 5 leaf springs that are pivoted at the rear of the ski and free to expand and contract on a wear plate at the front part of the ski. This wear plate should be greased often to reduce friction between the spring and wear plate.

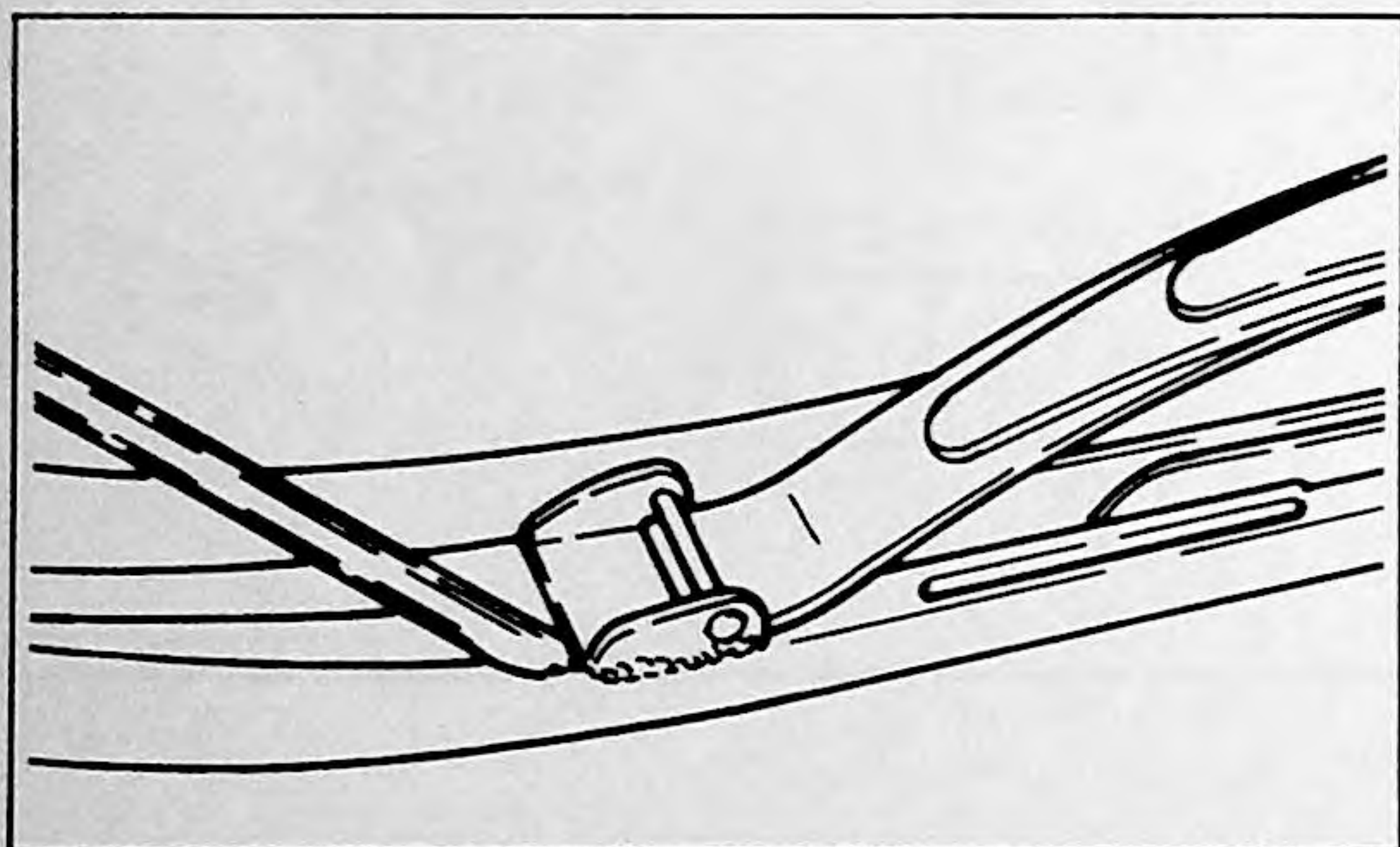


Fig. 5-1

2. Ski Parallelism

Parallelism of the skis is checked by measuring from center to center (outside of one ski to inside of other ski). Adjustment of parallelism accomplished by adjusting the relay rod length. Correct center to center distance of the skis is: 24.1" (613 mm).

Note:

Measure the distance between the skis (center to center) at the front ends and at the rear ends respectively. If the difference of the value measured exceeds $\pm 0.394"$ (± 10 mm), adjustment is required.

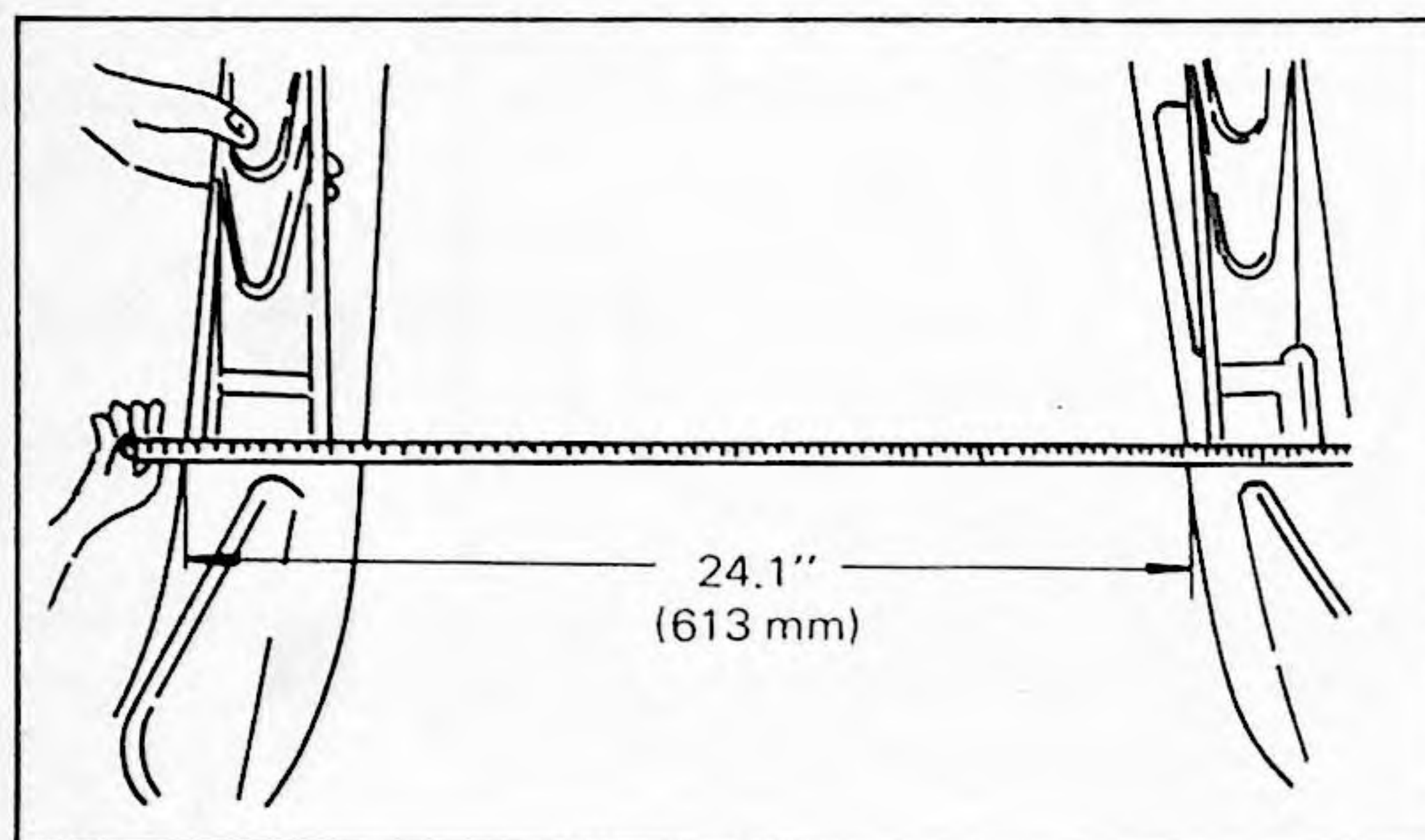


Fig. 5-2

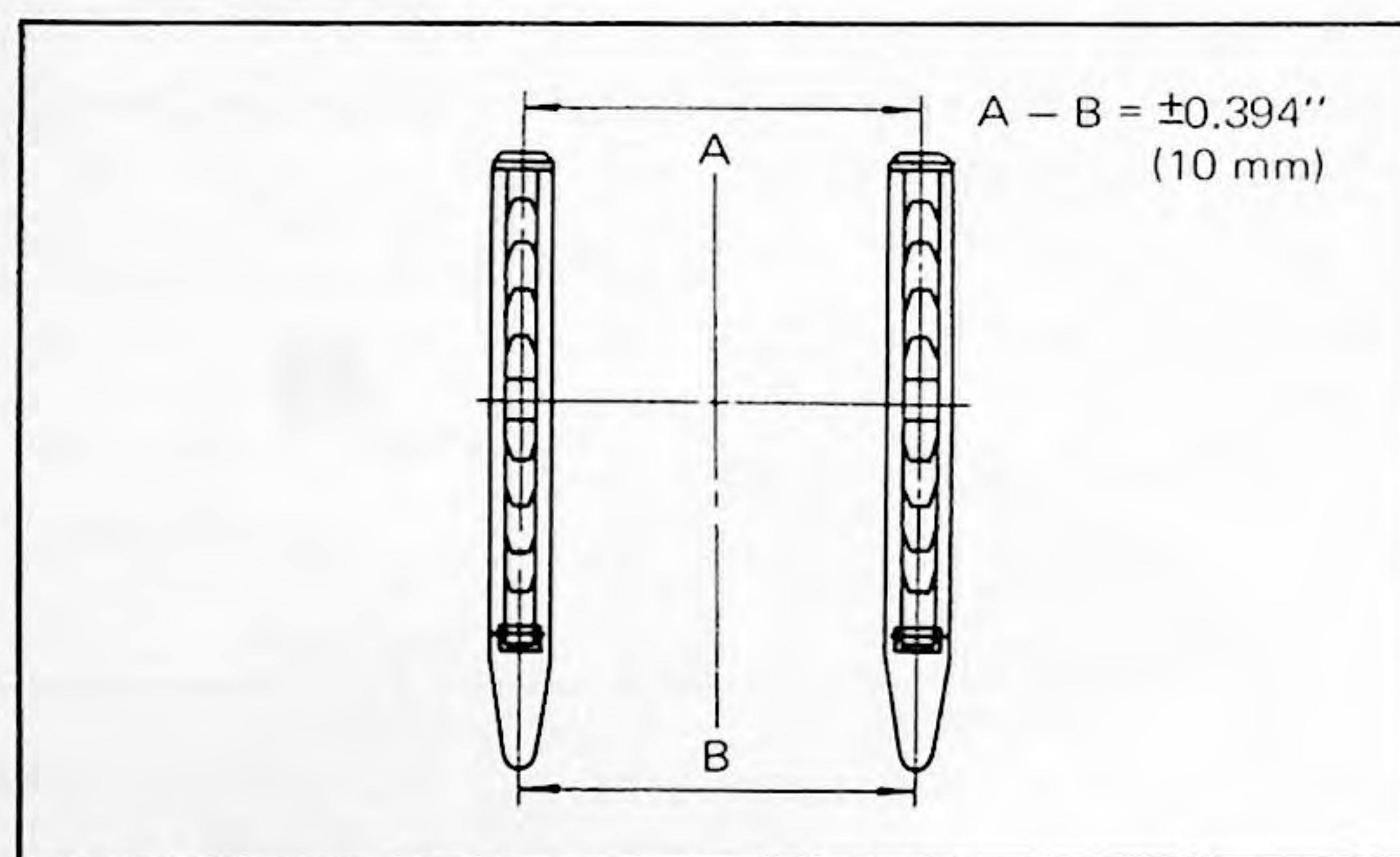


Fig. 5-3

The proper distance from center of the skis is shown above. To obtain this measurement place a ruler as shown in A above and adjust the relay rod as shown in Fig. 5-4.

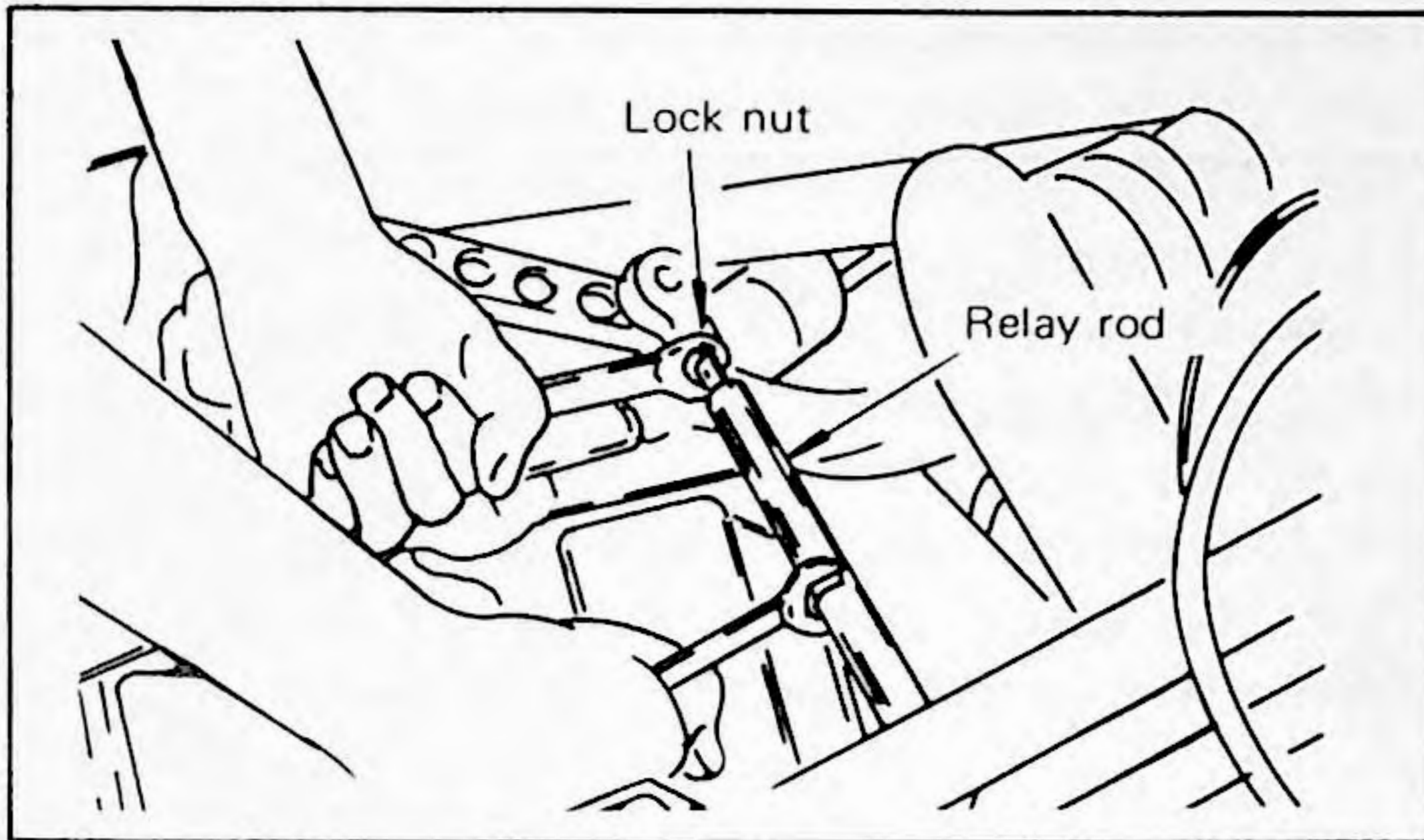


Fig. 5-4

5-3 CHASSIS AND SHROUD

Description — The chassis is of a monocoque design. It is a single unit stamped steel frame. Checking the chassis for corrosion and rust is very important to insure strength and reliability. If any corrosion or rust spots are found, the area should be sanded and painted with a rust proof paint. Any welded and formed parts of the frame should be checked periodically for cracking or breaking.

When the machine is stored, the chassis should be coated with a film of oil or light grease to prevent corrosion and rust.

The shroud is painted fiberglass and should require little maintenance. Checking for cracking will insure it from serious damage.

The windshield is clear PVC and should require no maintenance. When it is cleaned, you should attempt to wash off any dirt or mud first and then wipe it off. This will keep scratches to a minimum.

5-4 SEAT

The seat is a single unit of foam chips covered with vinyl. If the machine is allowed to sit outside for any period of time, the seat and backrest can be removed to prevent weathering by unsnapping the cover from the chassis.

5-5 LUGGAGE BOX

The luggage box in the engine room is made of a glassfiber and secured with five pan head screws.

As illustrated, the longer screw is used for position marked #1, while the shorter one is for #2.

The luggage box should be used for storing spare oil, service tools, ropes, etc. Avoid storing such a thing as to cause a serious accident when the machine runs against something.

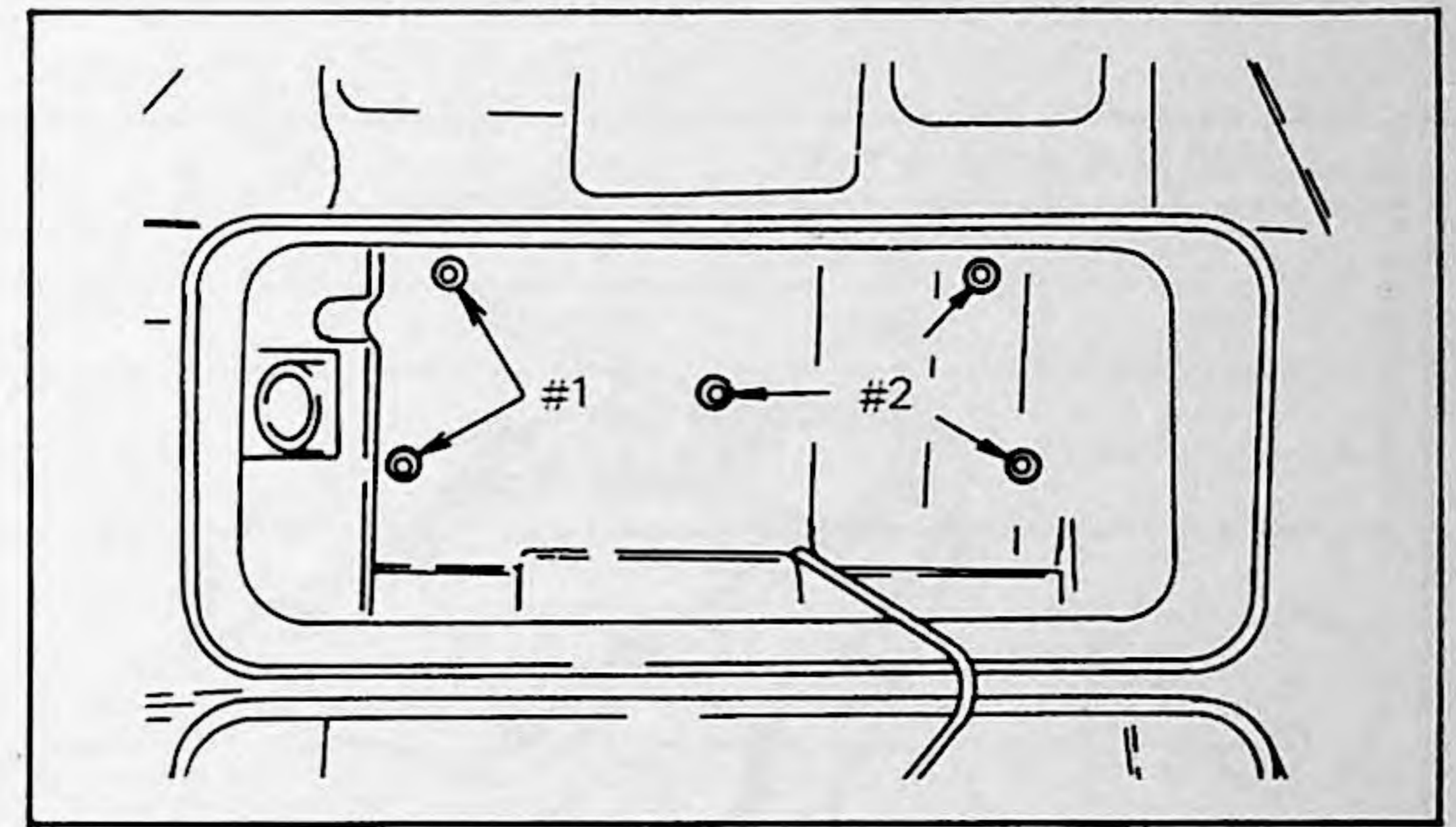


Fig. 5-5

CHAPTER 6. TIGHTENING BOLTS AND NUTS

The snowmobile tends to bounce up and down on rough snow-covered terrain, causing bolts and nuts to loosen. In particular, the bolts and nuts as illustrated below should

be carefully tightened and locked with a bond, when the machine is serviced.

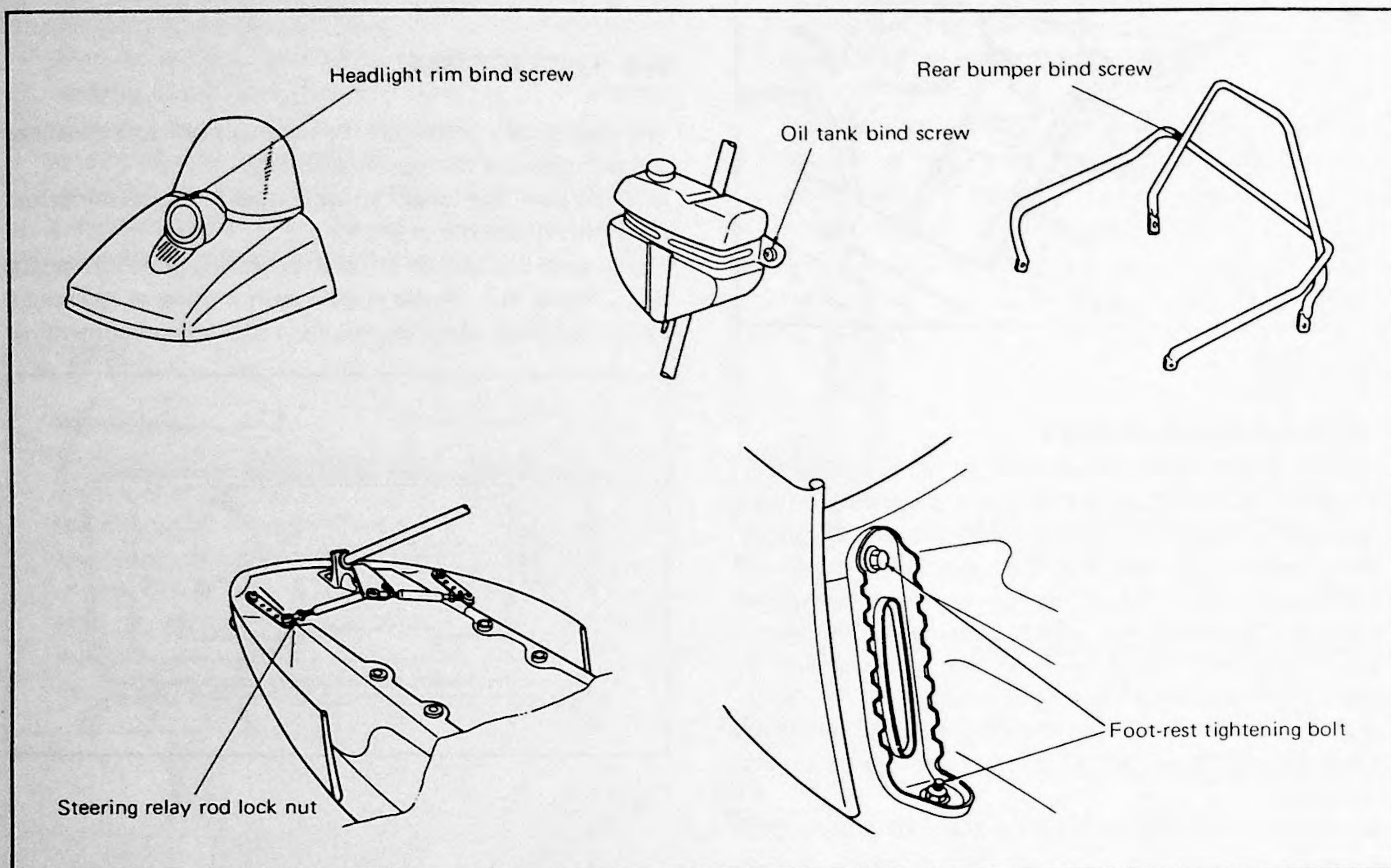


Fig. 6-1

CHAPTER 7. ELECTRICAL

7-1 IGNITION SYSTEM

Current for the ignition system is provided by the magneto assembly. The magneto assembly consists of the magnetized rotating flywheel and the primary source coils (attached is the magneto backing plate). The action of the rotating flywheel generates a low voltage primary current in the primary source coils. This current is timed, by the opening and closing of the ignition points, to pass to the secondary (high voltage) coils at the correct moment. The secondary coils convert the primary voltage into high voltage current and deliver it through the high tension leads to the spark plugs.

7-2 LIGHTING SYSTEM

Lighting current is generated in a similar manner by the lighting coil located on the point plate. The lighting system is of a balanced output type design for the headlight and taillight. Overloading of the lighting system by adding on lighting equipment is not recommended. Because the lighting system is of a balanced output type, burning out of either the headlight or taillight can result in a heavy surge of electricity being forced to the remaining light bulb. The remaining bulb can also burn out because of this surge.

7-3 WIRING CIRCUIT

SL292C

	Gy-O	G-Br	R-Y-L-Br	R-G/W-L-Br
OFF	O	X	X	X
1	X	O	X	X
2	X	X	O	X
3	X	X	X	O

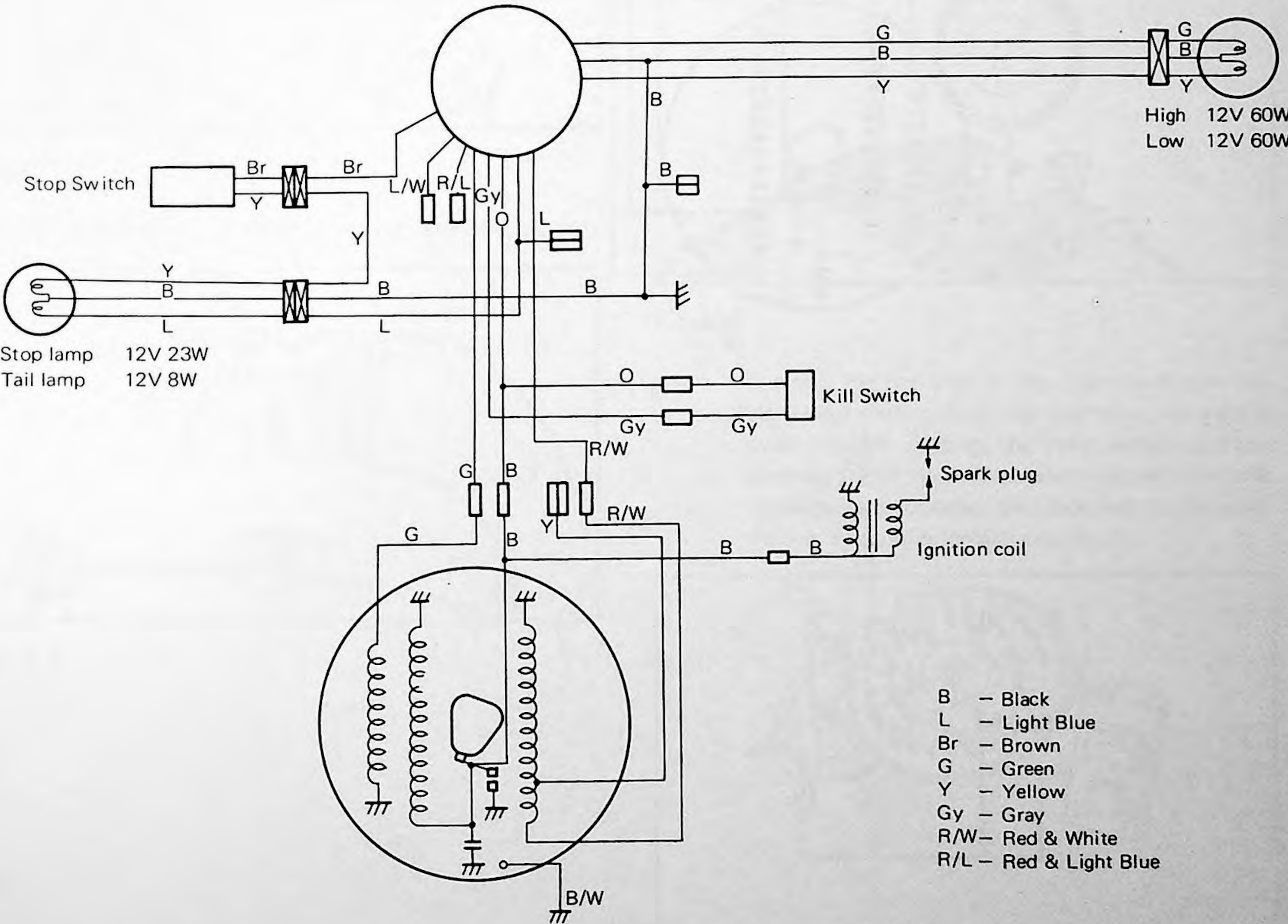


Fig. 7-1

GP292B

	Gy-O	G-Br	R-Y-L-Br	R-G/W-L-Br
OFF	O	X	X	X
1	X	O	X	X
2	X	X	O	X
3	X	X	X	O

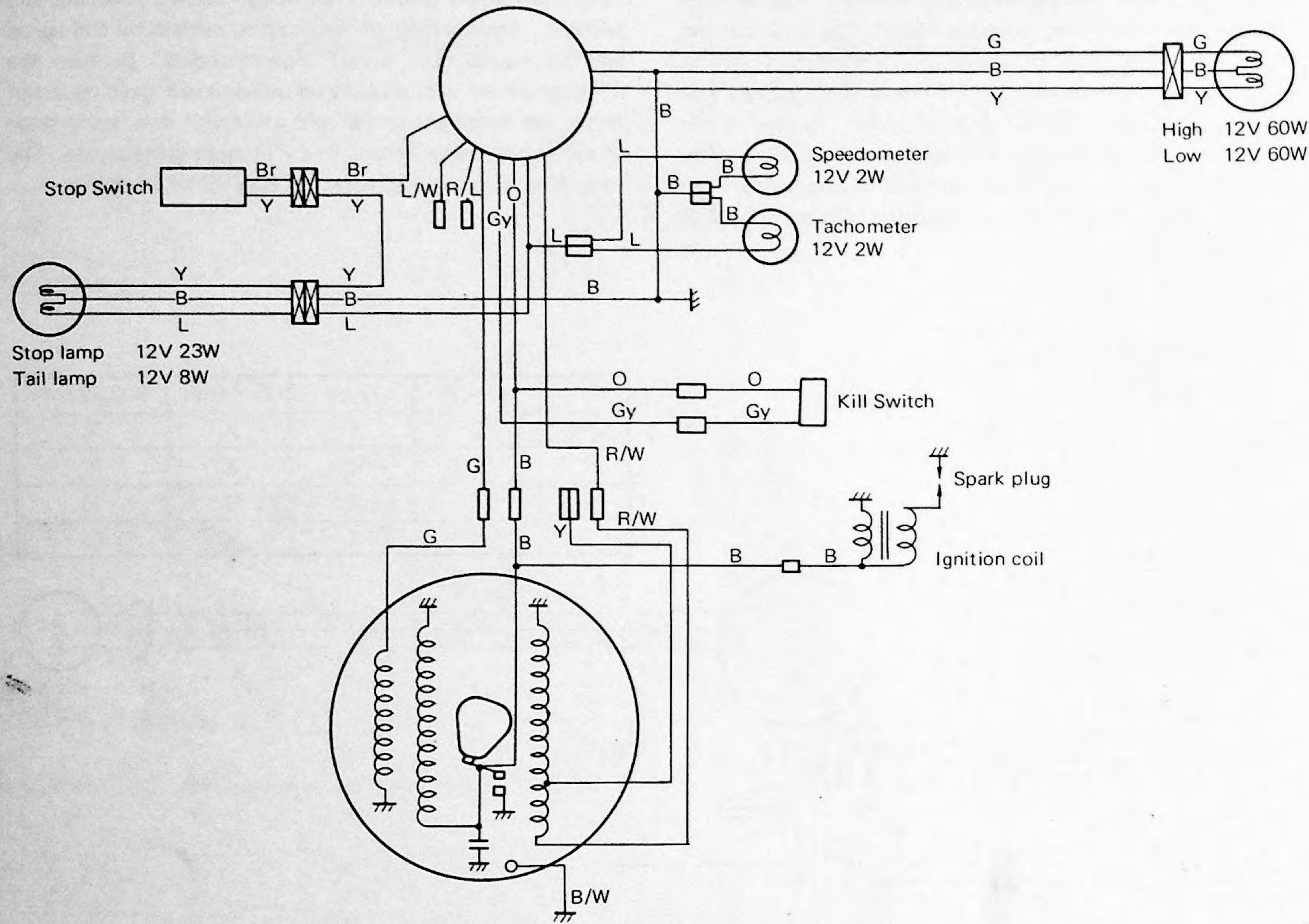


Fig. 7-2

CHAPTER 8. ENGINE MAINTENANCE

8-1 IGNITION TIMING

1. Ignition timing is most accurately set with a point checker and a dial gauge.

It is necessary to set the ignition timing at a specified position $\pm 0.004''$ (± 0.1 mm) B.T.D.C.

If the ignition timing is found to be $\pm 0.014''$ (± 0.35 mm) off the specified position, it must be corrected.

2. The following procedures for setting ignition timing should be adhered to very closely:

- a. Clean the points by letting them snap closed on a strip of business card that has been dipped in lacquer thinner. The card should then be drawn from between the points to remove residue. Repeat this procedure until the points are clean.

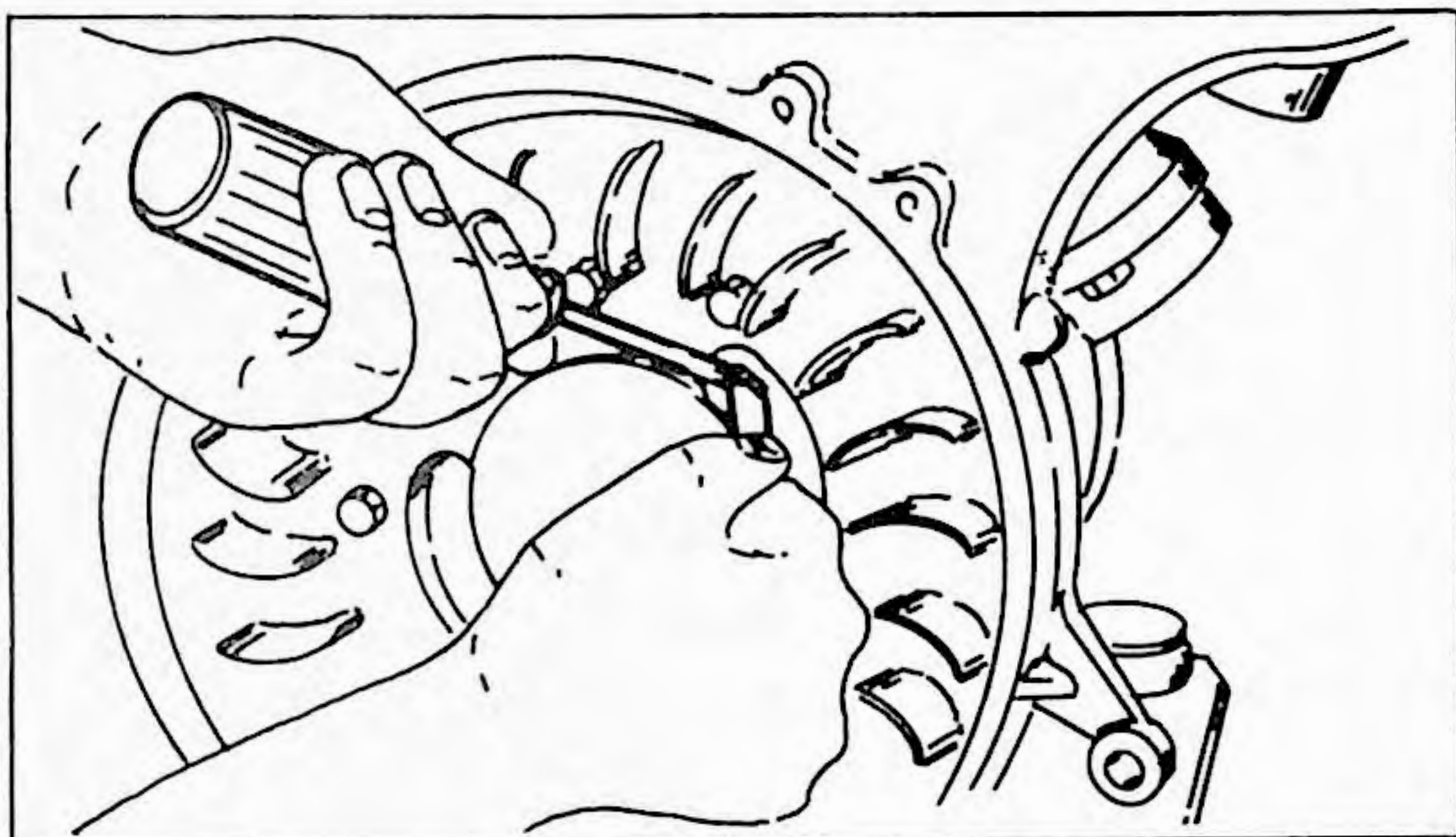


Fig. 8-1

- b. Remove the spark plug and cylinder holding nut.

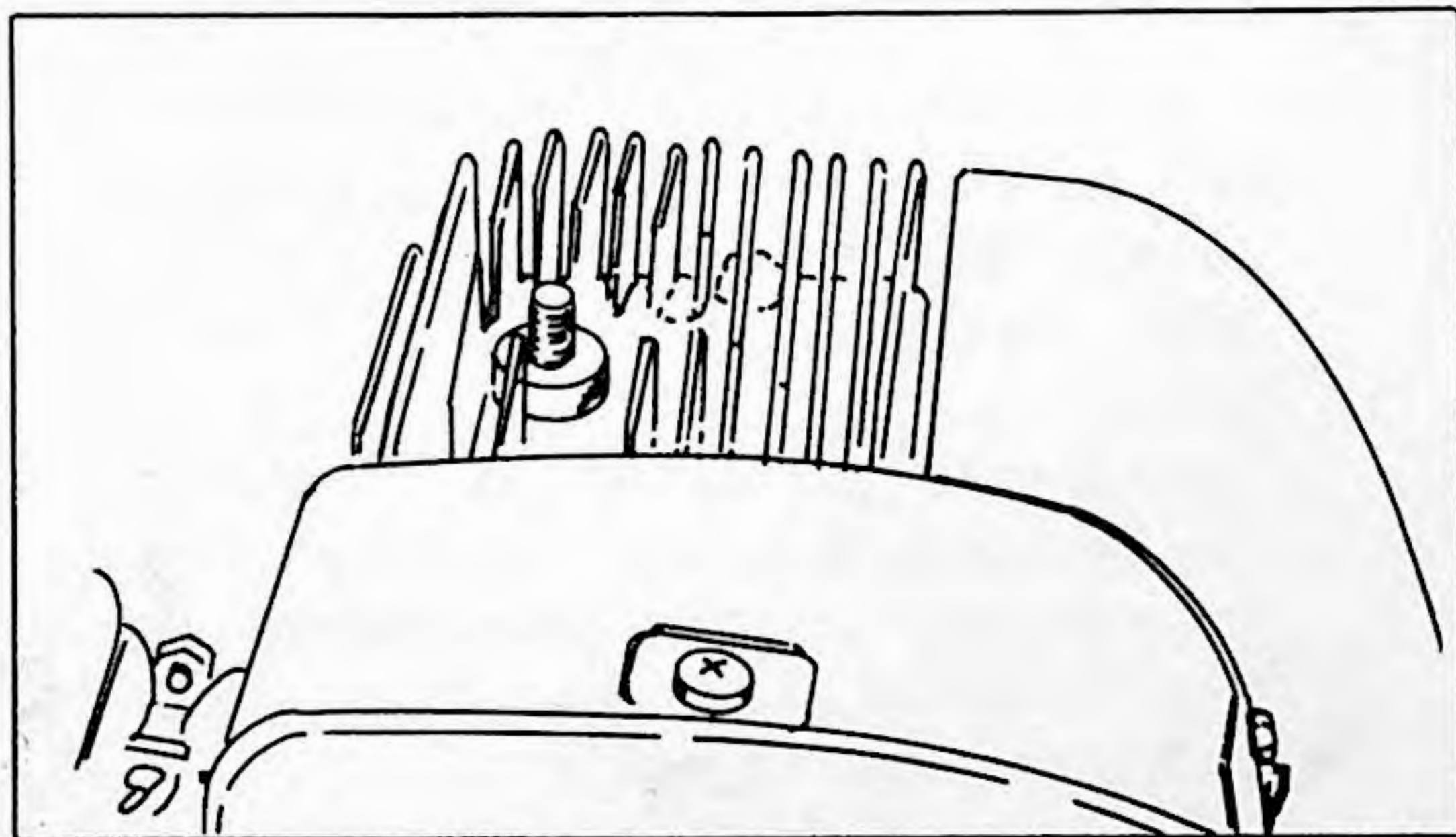


Fig. 8-2

- c. Install the dial indicator holder on the bolt. Put the dial indicator into the indicator and lock it with the bolt. Install the dial gauge on the dial indicator and insert the adapter into the dial gauge, then adjust the ignition timing.

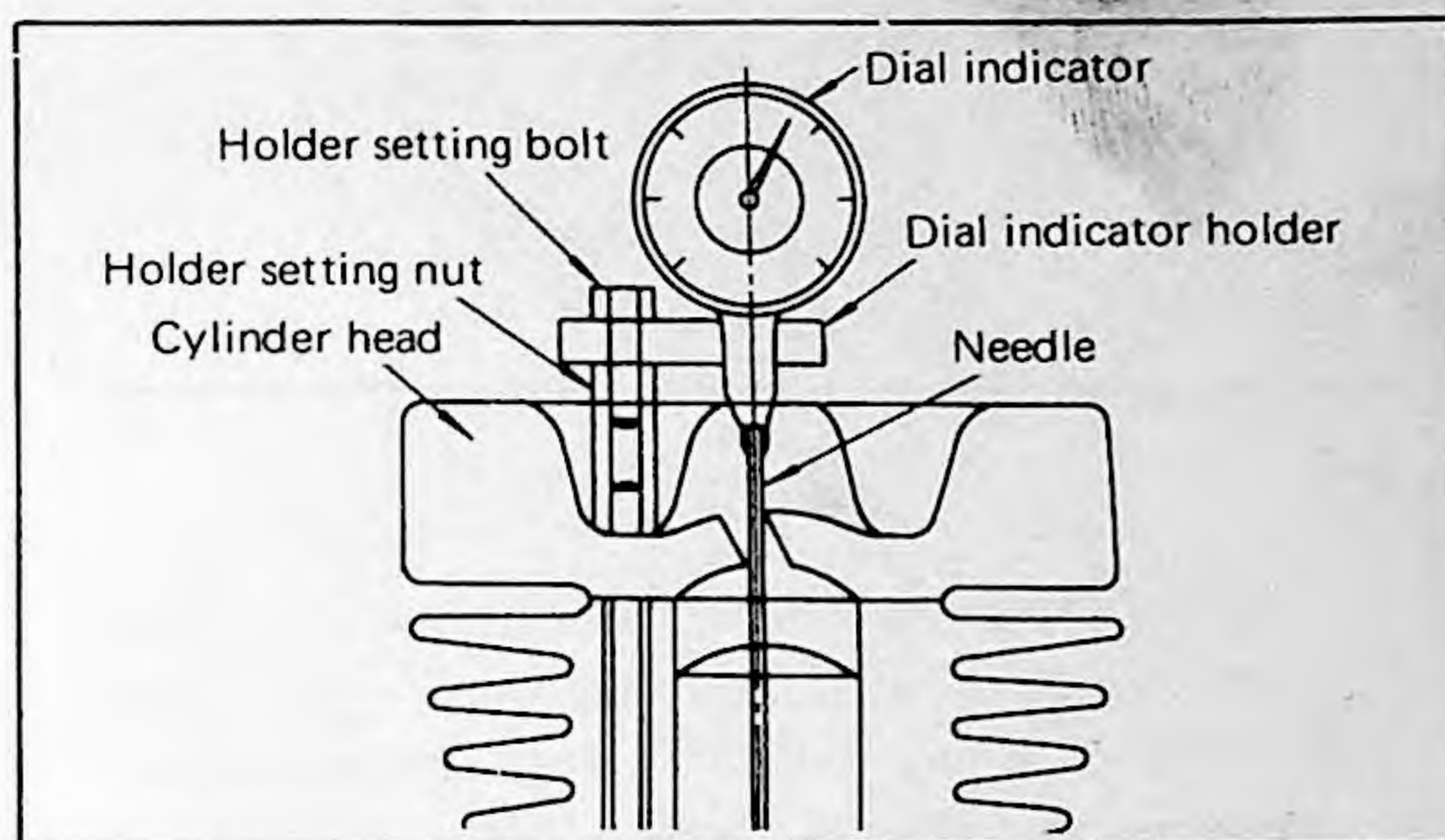


Fig. 8-3

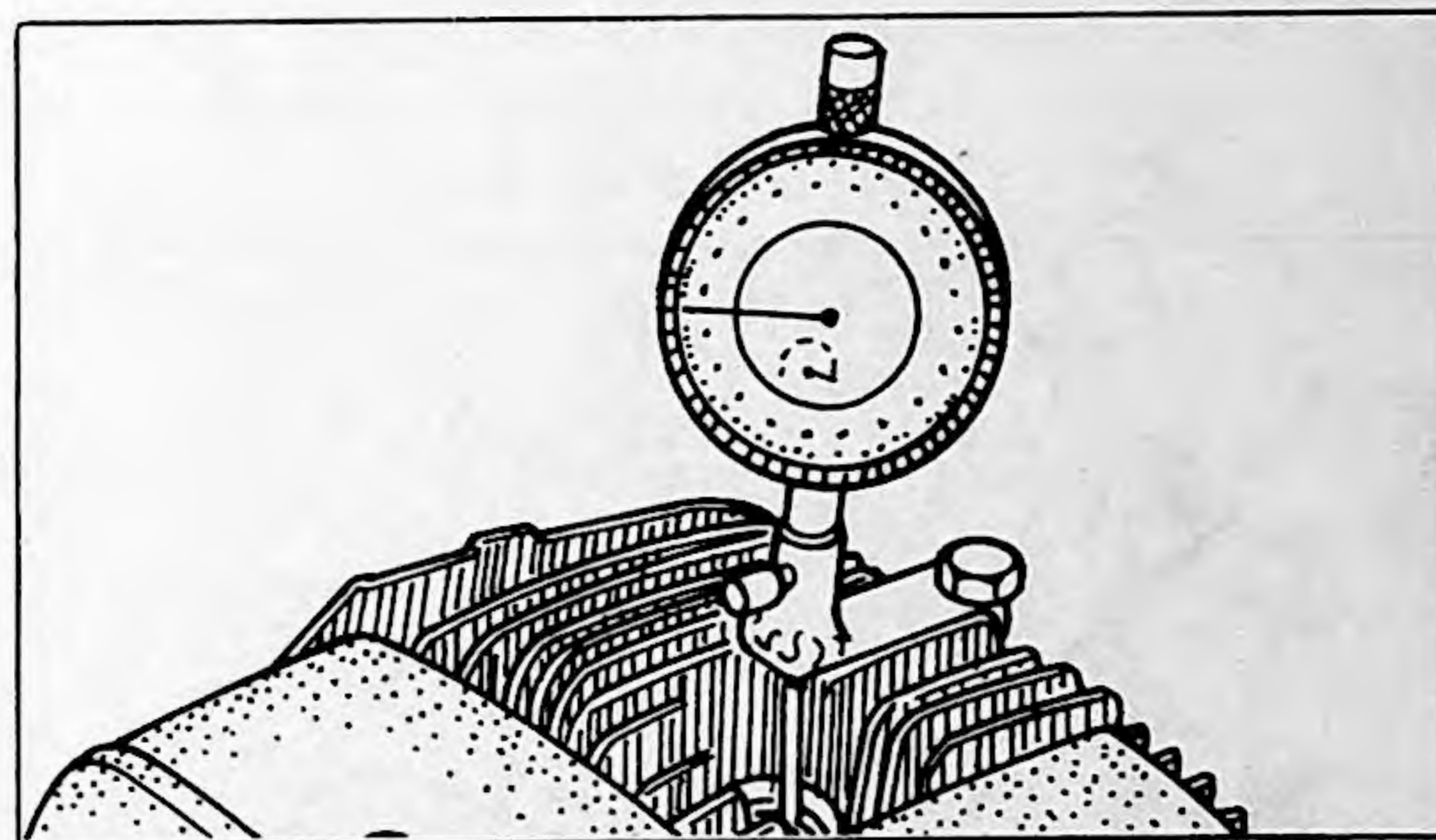


Fig. 8-4

- d. Connect the red lead of the point checker to the black lead coming from the magneto. For a good point checker reading, the main switch and the secondary coil should be disconnected from the magneto wire. Connect the black lead of the point checker to ground (engine case, etc.).

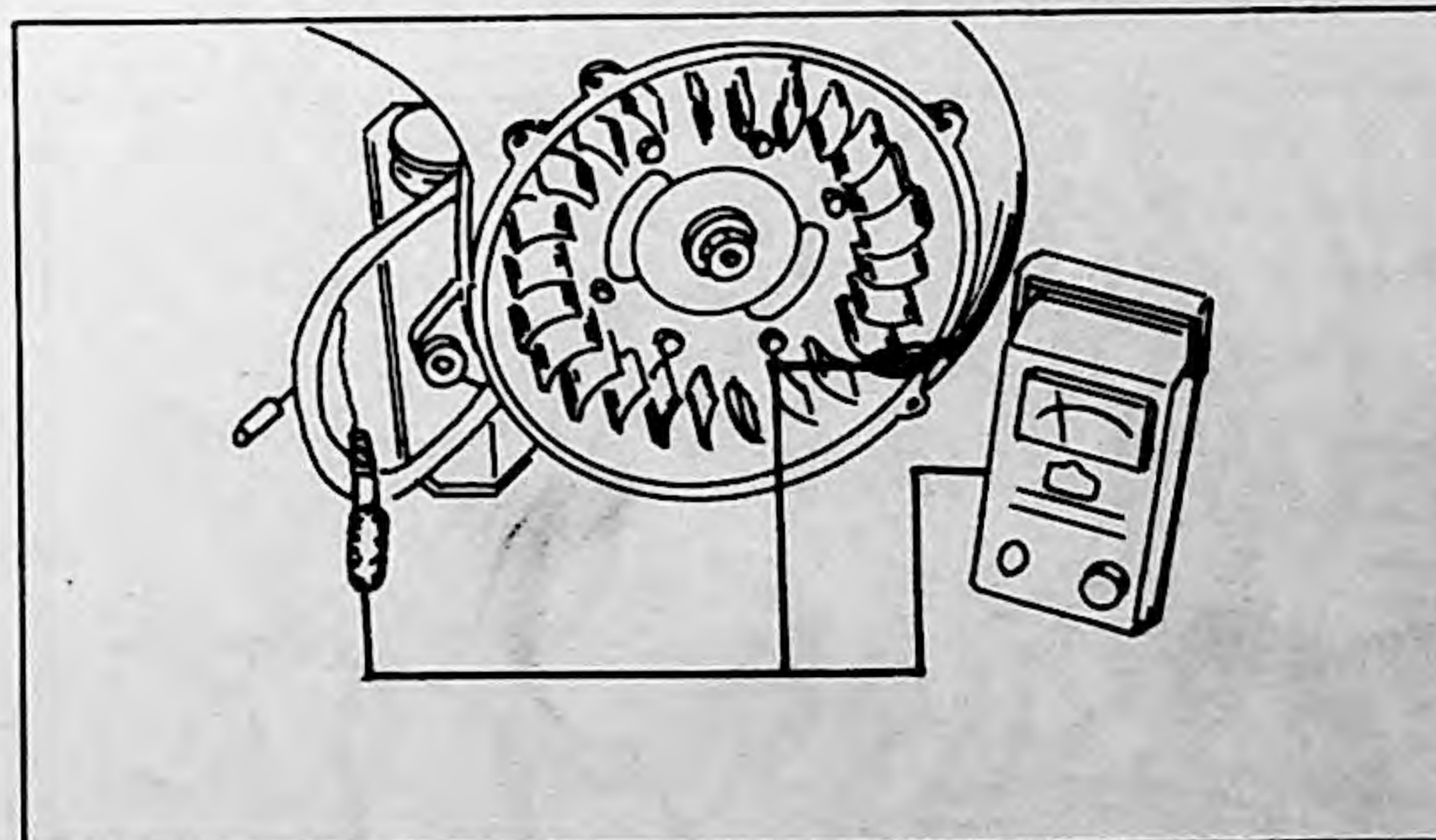


Fig. 8-5

Note:

Wedge the governor fully open.

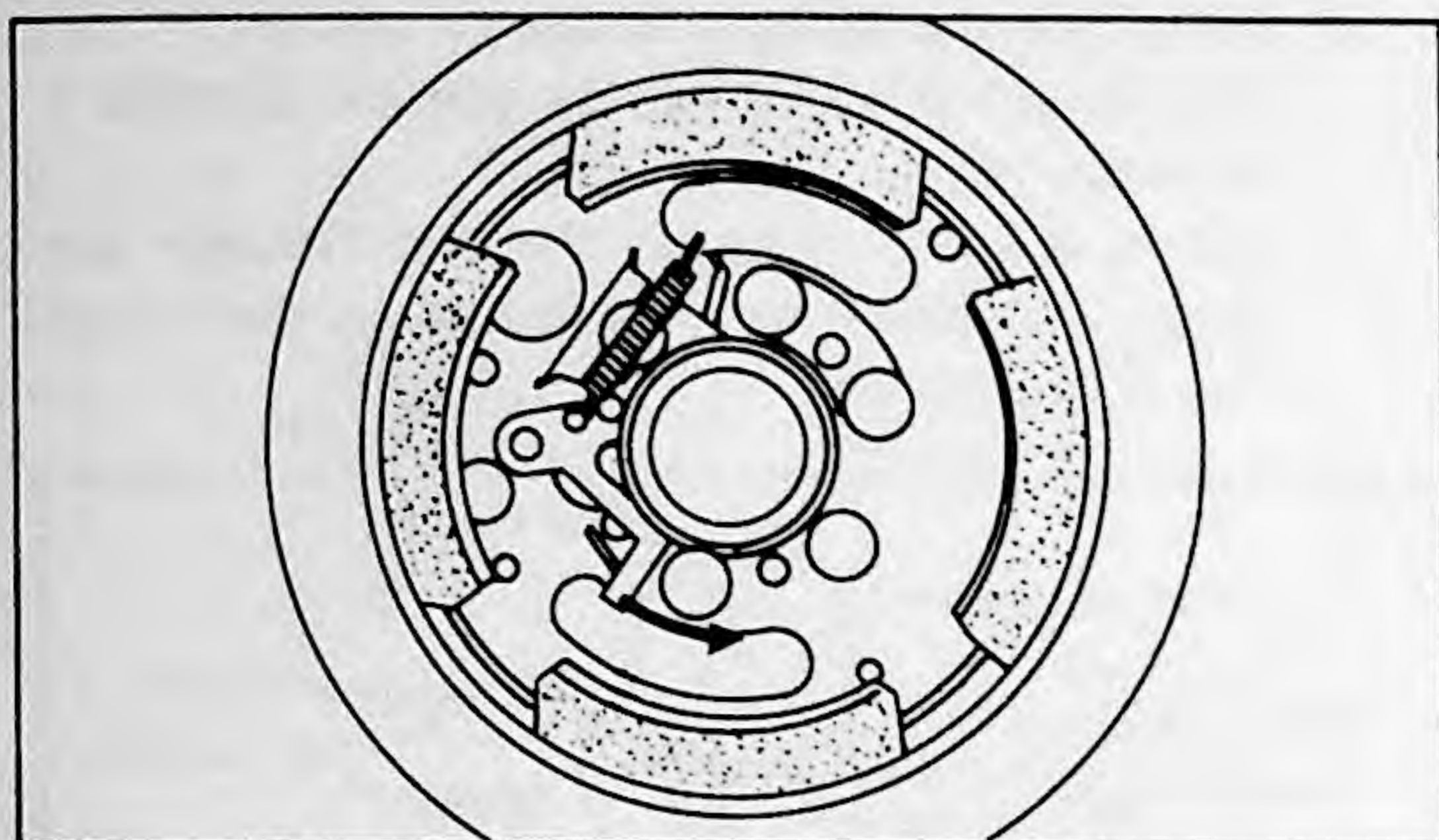


Fig. 8-6

- e. Rotate the crankshaft until the dial indicator shows the piston to be at top dead center. This is the point where the needle hesitates just before it reverse direction. Set the "0" reading on the face on the dial to correspond with needle position at this point.
- f. With the piston at top dead center, rotate the crankshaft backwards until the dial indicator reads 0.091" (2.3 mm) bore top dead center.

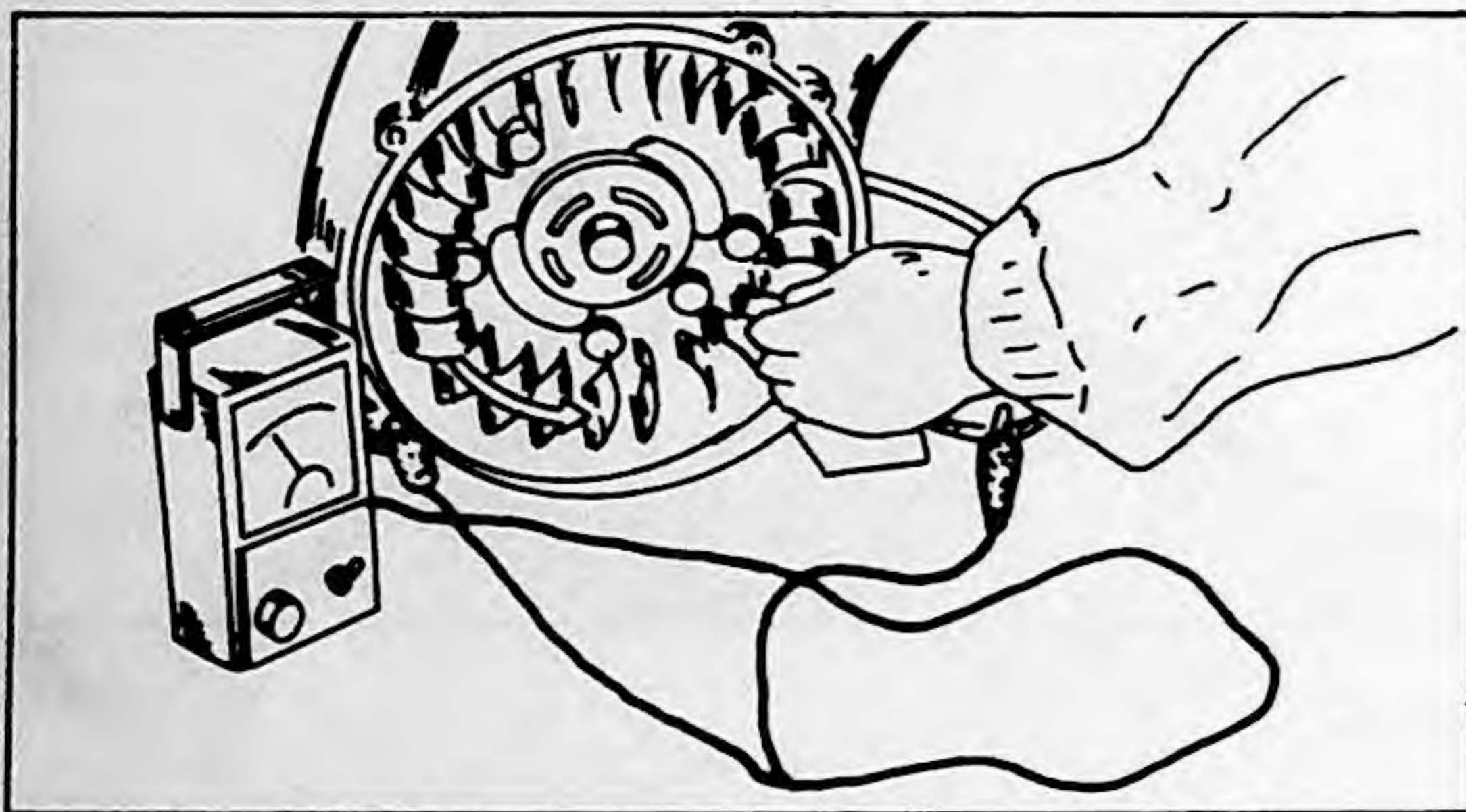


Fig. 8-7

- g. Adjust the points by loosening the point securing screws and moving the point adjustment with a slotted screwdriver. Set the adjustment so that the points are just opening at 0.091 ± 0.004 " (2.3 $\pm$ 0.1 mm) B.T.D.C.

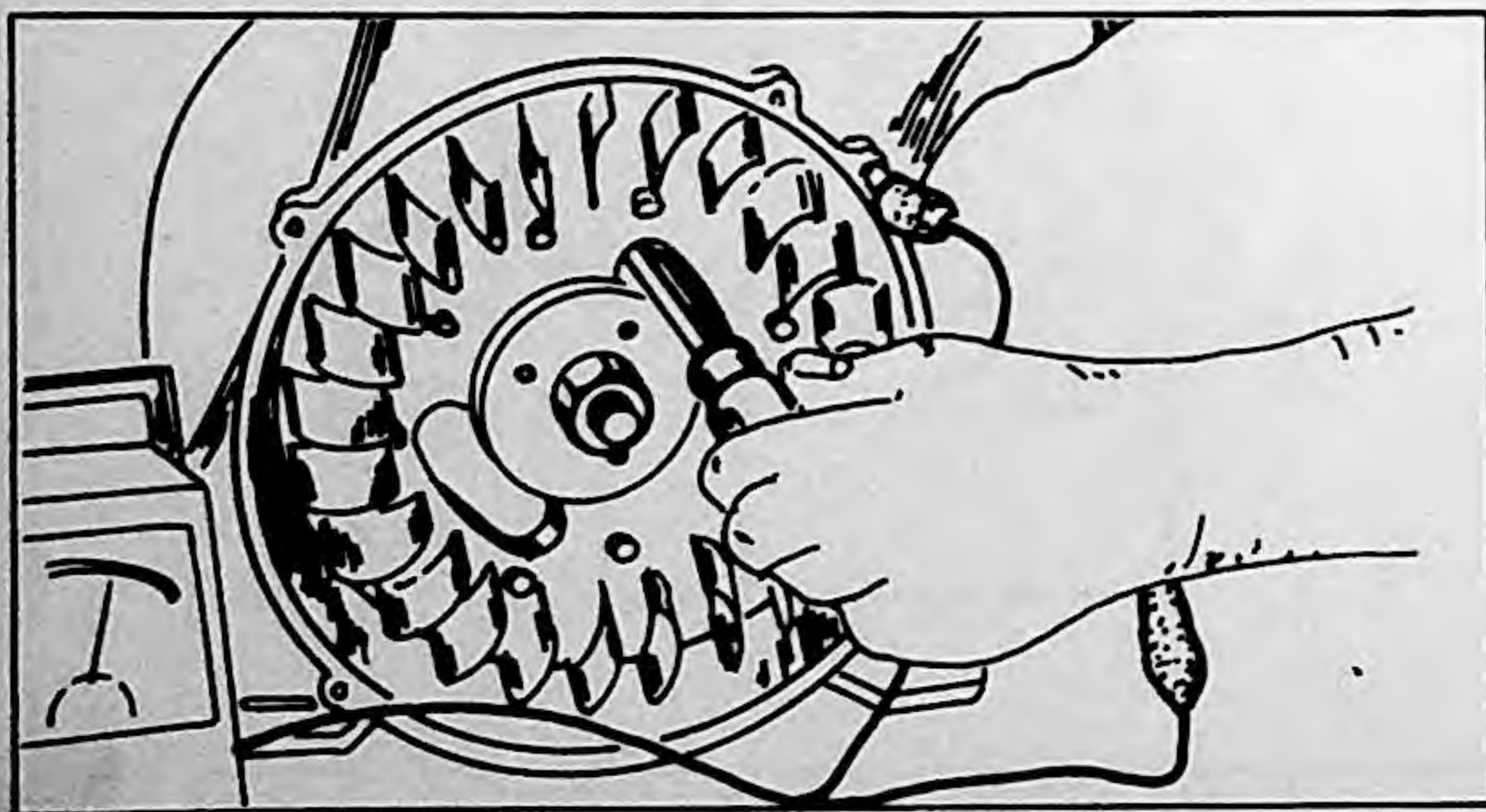


Fig. 8-8

- h. Tightening the securing screws and recheck the timing.
- i. When the timing has been adjusted correctly the point gap will also be correct. When the mark on the flywheel aligns with the pointer on the stator, a spark is produced. (With the cam advanced.)

When the mark on the flywheel magneto aligns with the pointer on the dinamo stator, a spark takes place (with the advanced ignition timing).

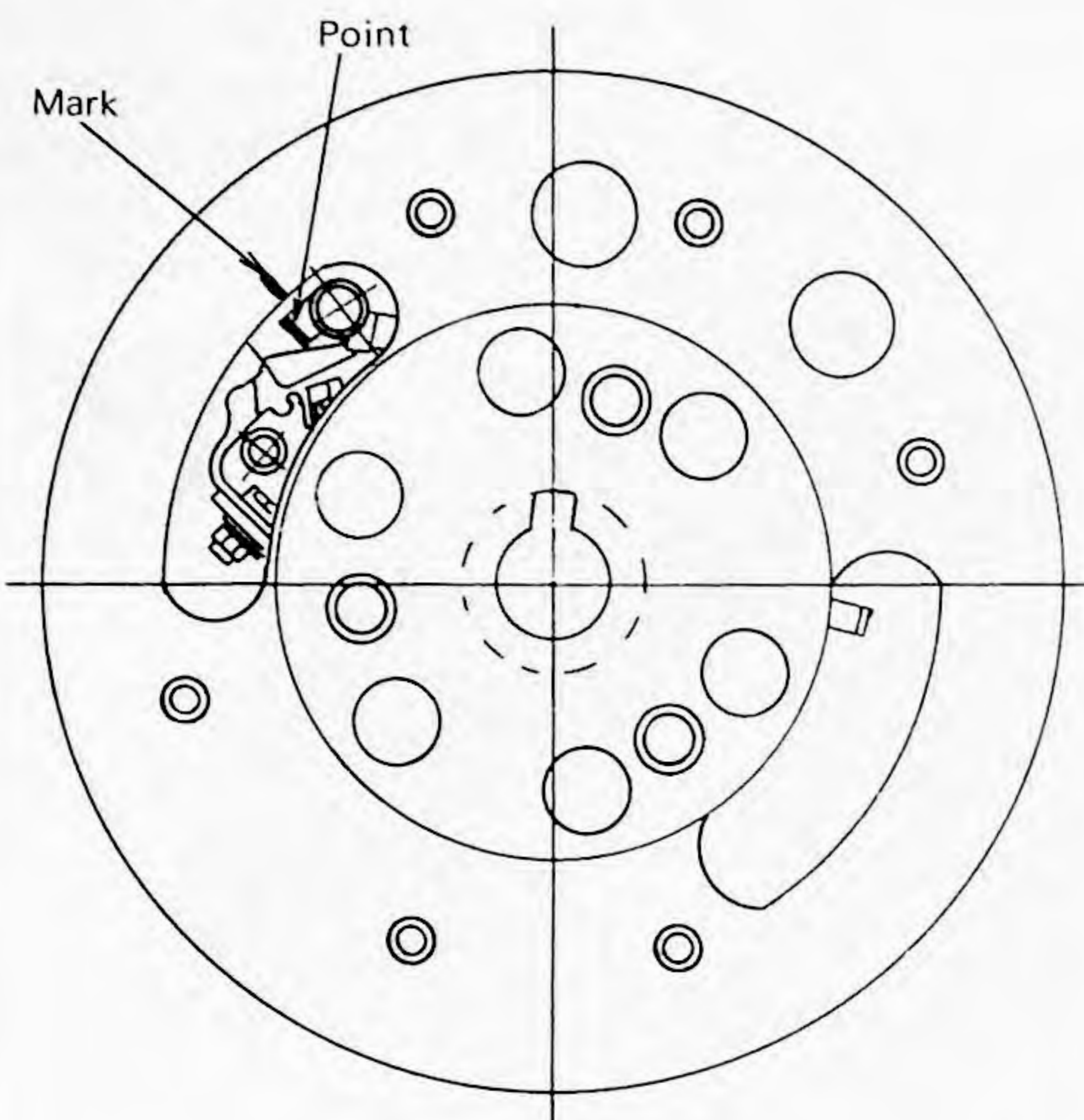


Fig. 8-9

- j. As illustrated, when the mark on the flywheel magneto aligns with the pointer on the dinamo stator, the piston position is 0.091" (2.3 mm) B.T.D.C. The automatic ignition advancer should be so set that the breaker points open with the piston in the above position. On the motorcycle employing the flywheel ignition system, the ignition timing is set by the breaker point gap. Therefore, when the mark on the flywheel magneto aligns with the pointer on the magneto backing plate, the breaker point gap should be measured at 0.014" (0.35 mm) with a feeler gauge. With this adjustment, the ignition will be timed to 0.091" (2.3 mm) B.T.D.C.
- k. When the mark on the flywheel magneto aligns with the pointer on the magneto backing plate, a spark takes place (with the advanced ignition timing).

8-2 CARBURETION AND FUEL SYSTEM

The SL292C is equipped with a KEIHIN diaphragm type carburetor CD38-32 (venturi bore 32 mm), while the GP292B is with a KEIHIN diaphragm type carburetor

CD42-38 (venturi bore 38 mm). (These carburetors are known as floatless type carburetors.)

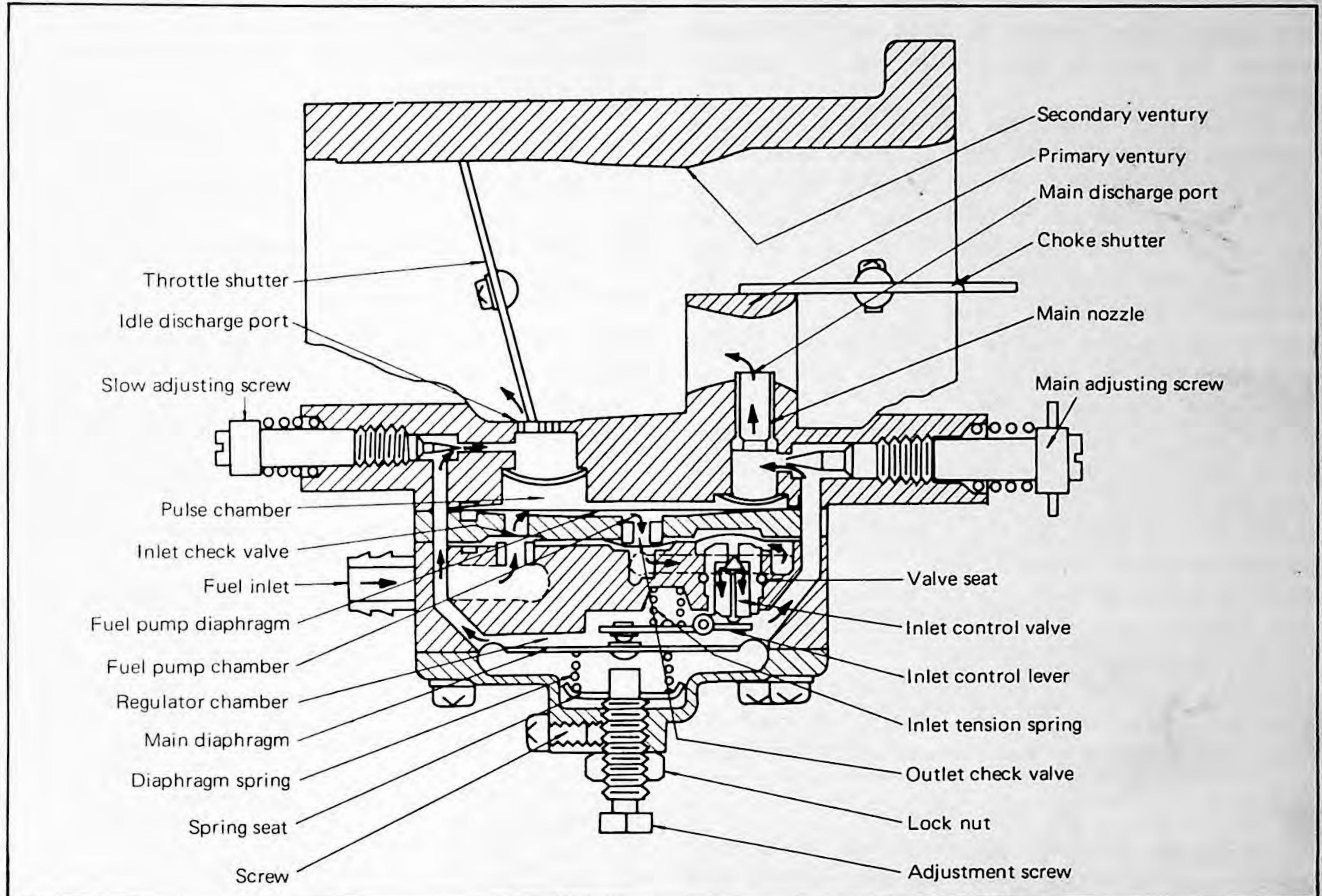


Fig. 8-10

1. The diaphragm carburetor draws the fuel at a proper rate from the fuel tank where the fuel is then metered to the engine according to fuel consumption in the engine.

The diaphragm type carburetor, adopted by Yamaha, has the following three main mechanisms:

1. Mixing body supplying an air-fuel mixture to the engine.
2. Fuel pump drawing the fuel from the fuel tank to the carburetor.
3. Regulator maintaining the pump fuel pressure constant by reducing or increasing it in order to deliver a proper air-fuel mixture according to engine speed.

The regulator of the diaphragm type carburetor plays a role similar to the float of the float type carburetor. The fuel level in the float chamber is likened to the regulator internal pressure.

Accordingly, the regulator internal pressure must be kept at a constant level just as the fuel level of the float chamber type carburetor, because a proper air-fuel mixture must be

supplied to the engine according to its requirements. To this end, the regulator internal pressure (difference between the regulator set fuel level and the main and idle discharge ports) must be optimum for feeding a proper air-fuel mixture.

For this reason, the above mentioned three main components are arranged as follows: The mixing body is provided with the fuel pump, and the regulator is positioned apart from the mixing body so that the regulator may maintain positive pressure. In addition, the regulator pressure setting is designed to be varied freely. The diaphragm for the fuel pump is made of thin stainless steel so that it quickly responds to variations in engine speed. As a result, it may be said that the fuel pump is superior in discharge performance as well as in durability.

As the engine runs, the pulses which are generated in the crankcase are carried from the impulse port to the fuel pump driving chamber, thus vibrating the fuel pump diaphragm. As a result, the fuel is drawn from the fuel tank, through the fuel pipe and inlet check valve, into the

fuel pump chamber. Then, the fuel continues to flow through the outlet check valve and inlet control valve into the regulator chamber.

When the fuel flows into the regulator chamber, the main diaphragm is given a downward force, and at the same time, the diaphragm control lever is moved down at the one end and moved up at the other end. This causes the inlet control valve (needle) to move up to its closed position and stops the flow of fuel into the regulator chamber.

As the fuel level lowers, the pressure against the main diaphragm decreases and the main diaphragm spring overcomes the force of the inlet tension spring, thus pushing up the inlet control lever at the one end. This causes the inlet control lever to move down at the other end, and allows the inlet control valve to move down. At this movement, the fuel begins to flow in. This is, as the fuel lever in the regulator chamber lowers, the inlet control valve opens. On the contrary, as the fuel level rises, the inlet control valve begins to close.

In this way, the balance between the main diaphragm spring tension and the inlet tension spring tension maintains the fuel level constant, and the fuel is fed to the engine. At low speed, the fuel is drawn into the engine through the idle discharge port alone.

With 1/4 throttle or more, the fuel is drawn through the main discharge port and fully atomized in the primary venturi, being supplied to the engine.

The fuel is controlled by the slow adjusting screw at low speed and by the main adjusting screw at high speed at a proper rate according to fuel consumption in the engine.

2.

To remove the carburetor, disconnect fuel line, pressure pulse line, disconnect the pump operating rod and then loosen the carburetor from the cylinder.

Cleaning of the carburetor and any carburetor parts should be done in clean gasoline or solvent. After any dirt or film build-up has been removed, all parts should be blown off with an air hose.

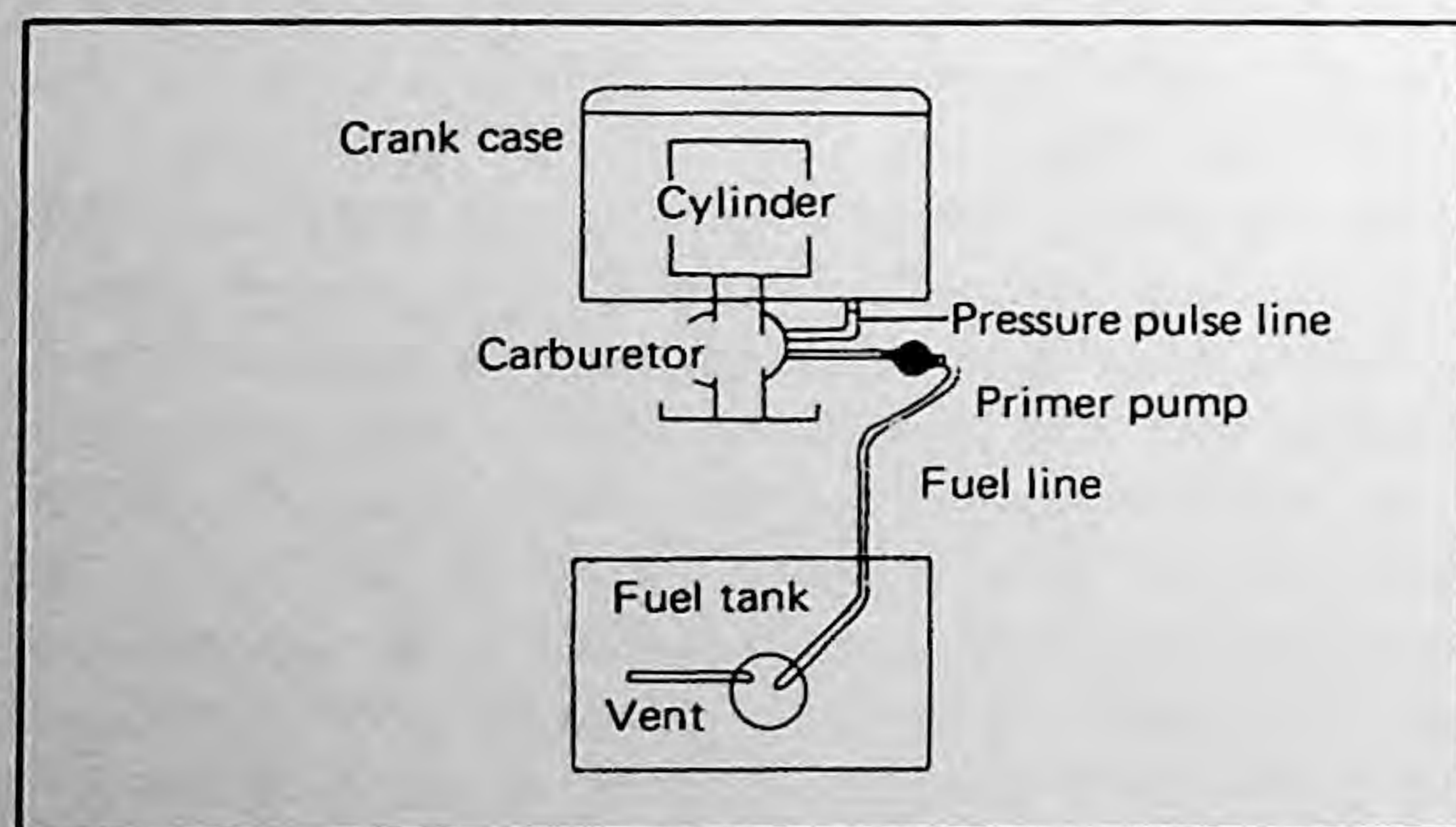


Fig. 8-11

3. Carburetor Setting

All carburetors are subject to strict testing before shipment. Therefore, no attempt to touch the adjusted points should be made unnecessarily, otherwise the performance of the carburetor will be impaired. If the carburetor is checked, cleaned or disassembled for replacement of parts, or used under special atmospheric conditions, or at altitude, the following procedures must be followed with special care for readjustment. The adjustment points are three places as follows:

1. Slow adjusting screw controlling the air-fuel mixture at idling speed.
2. Idle speed screw (throttle stop screw) controlling the idling speed.
3. Main adjusting screw controlling the air-fuel mixture while the throttle shutter is past 1/4 throttle.

The setting is done with the consideration that the snowmobile is used in winter at low altitude. If the snowmobile is operated at high altitudes or under special atmospheric conditions, the specified setting may not be suitable. Accordingly, the carburetor may be readjusted so that its performance will be maximum. It should be pointed out that, in general, the carburetors, both right and left, should be evenly adjusted.

The adjust screw should be turned out from a lightly seated position according to the following table.

Number of turns to be backed off.

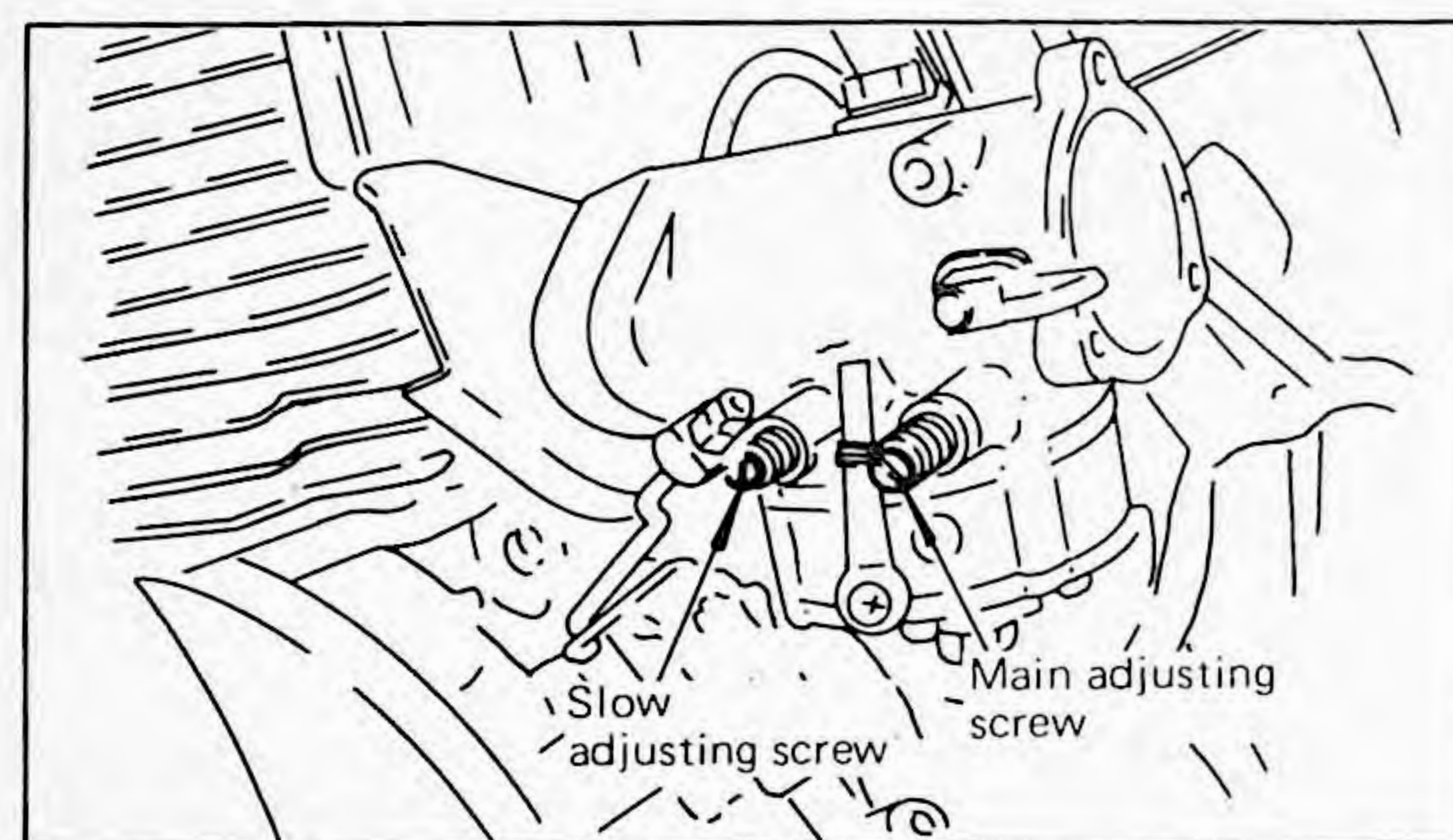


Fig. 8-12

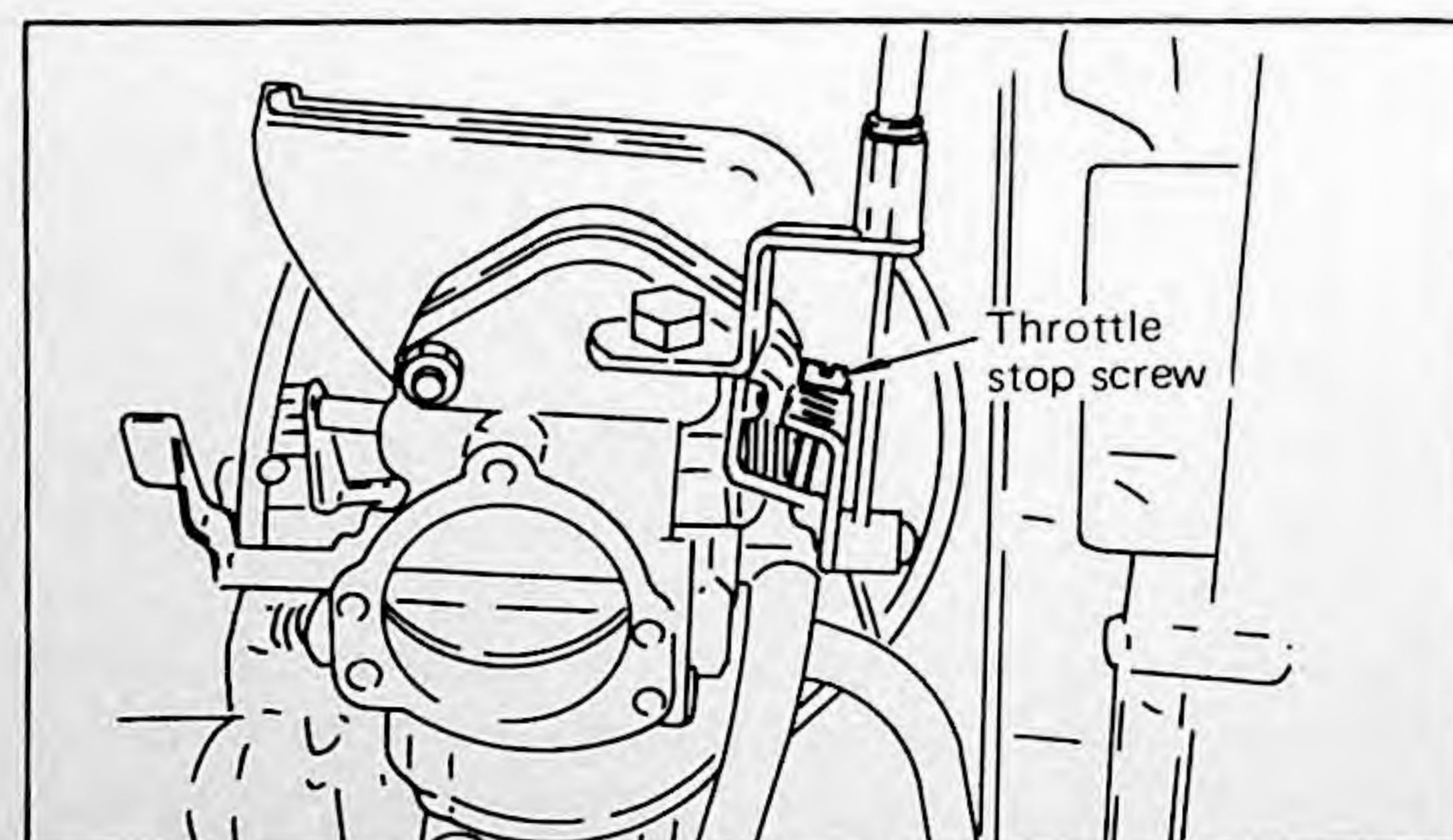


Fig. 8-13

	Slow Adjusting Screw	Main Adjusting Screw
SL292C	—	—
GP292B	15/16	#150

4. Fuel Level Adjustment

The carburetor is provided with a level pipe which is used for fuel level adjustment. When adjusting the fuel level, remove the level pipe cap and start the engine. While keeping the engine speed at specified engine idle speed, loosen the fuel level adjust screw lock nut located on the lower part of the carburetor and adjust the fuel level by turning the fuel level adjust screw.

Tightening the adjust screw raises the fuel level, and loosening it lowers the fuel level.

The standard fuel level is 0.2" (5 mm) below the contacting surface between the carburetor and the pump body 1, and an allowable difference in the fuel level should be in the range of 0" to -0.4" (0 mm to -10 mm) below the contacting surface.

After adjusting, be sure to tighten the fuel level adjust screw lock nut.

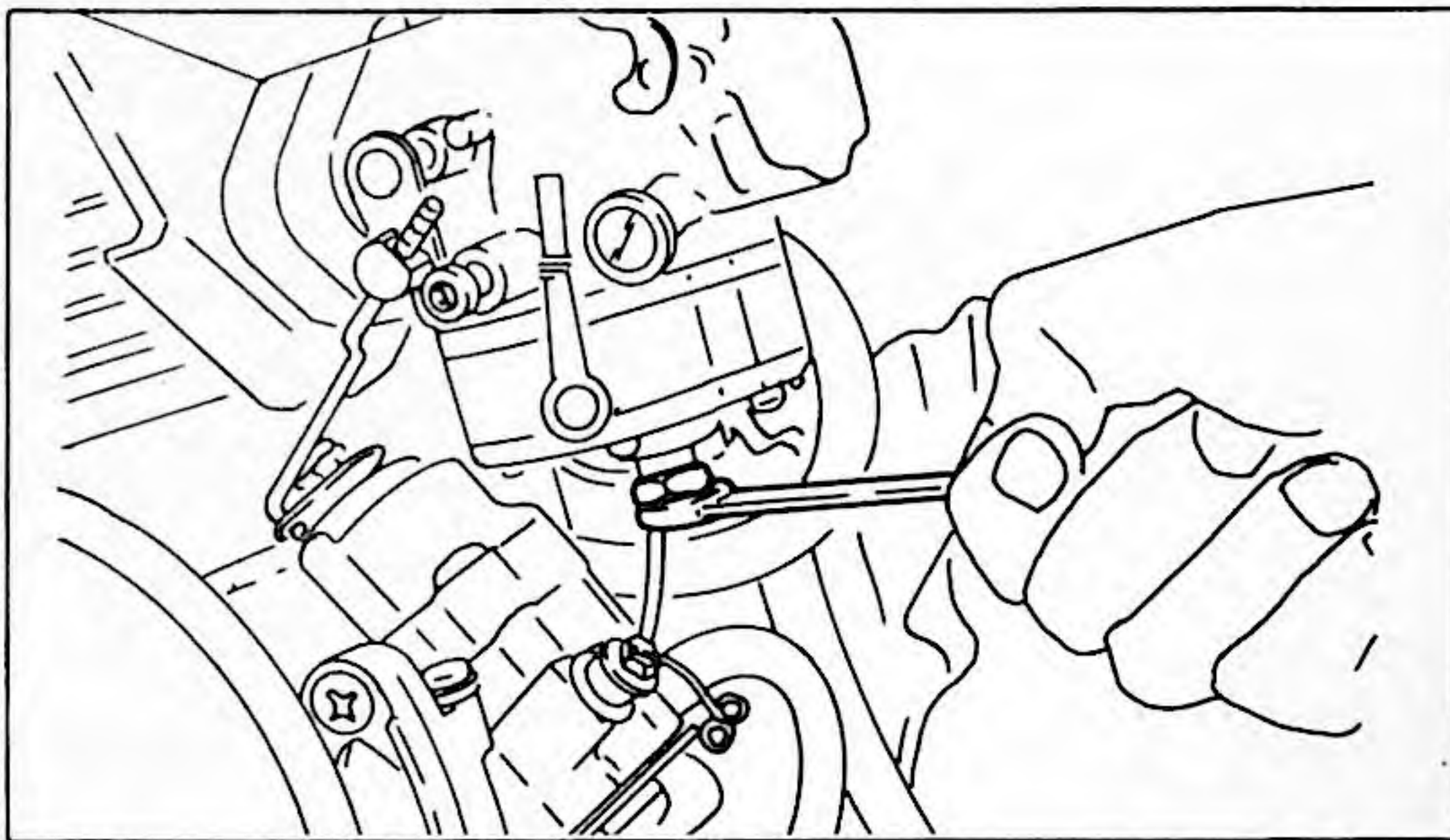


Fig. 8-14

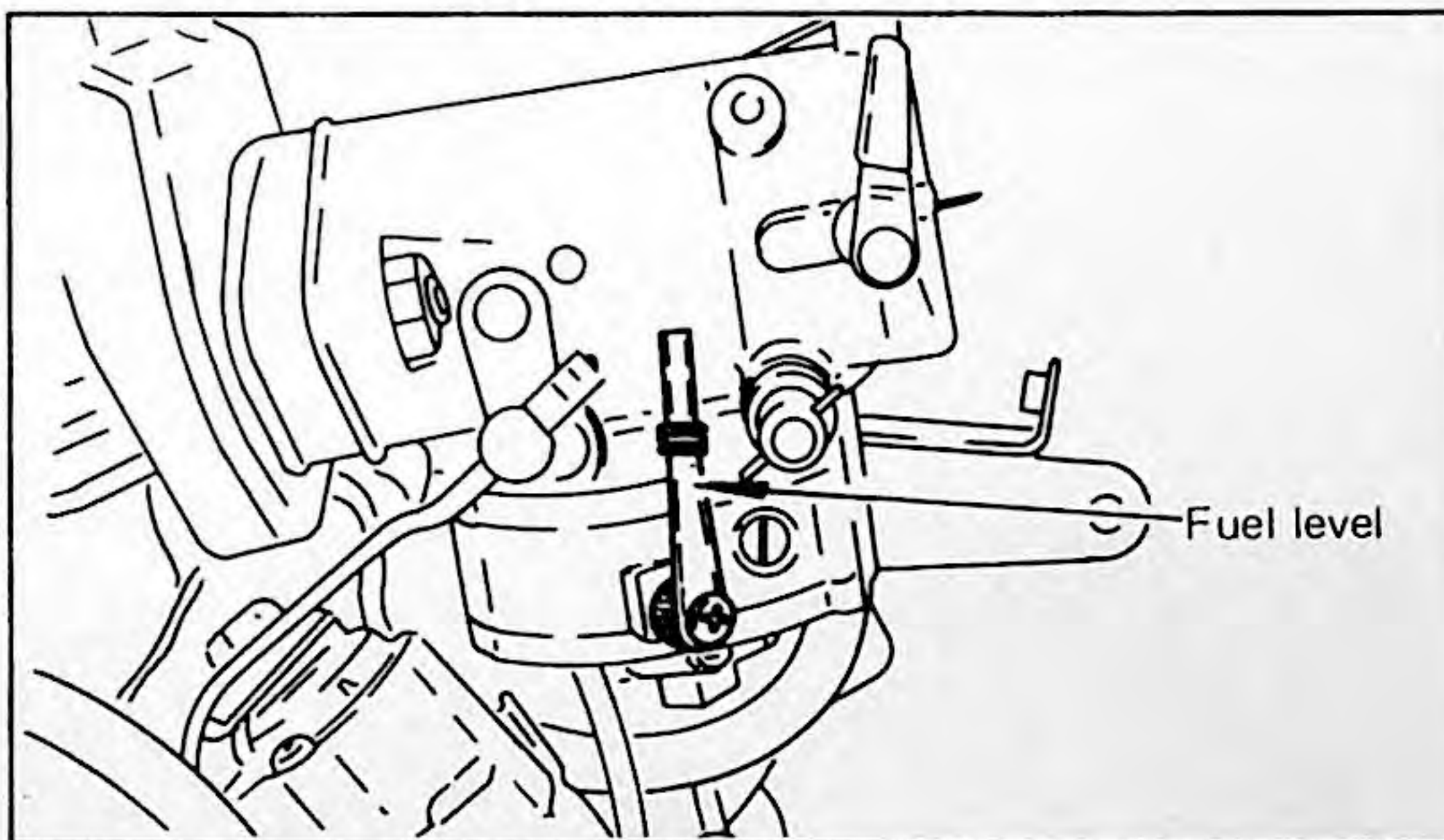


Fig. 8-15

5. Idling Speed Adjustment

The idling speed should be set according to the following table.

	Idling r.p.m.
SL292C	1,100 r.p.m.
GP292B	1,100 r.p.m.

For smooth idling, the slow adjusting screw must be correctly set so that an optimum fuel-air mixture may be fed to the engine. The setting of the slow adjusting screw will greatly affect the engine performance from starting to acceleration in the range of low and medium speeds.

Turn in or out the slow adjusting screw, and when the engine speed reaches its maximum, back out the screw 1/8 turn to enrich the mixture a little.

The final adjustment of idling speed is made by the throttle stop screw (idle speed screw). The throttle stop screw is closely related to the slow adjusting screw in the adjustment of idling speed. Their positions cause the engine speed to increase or decrease, but by turning in and out the throttle stop screw, the final adjustment should be done so that the engine may run idle at 1,100 r.p.m.

Adjustment Sequence is as Follows:

1. Back out the slow adjusting screw from a lightly seated position, at the same time, the setting of the main adjusting screw should be adjusted to factory recommended setting.

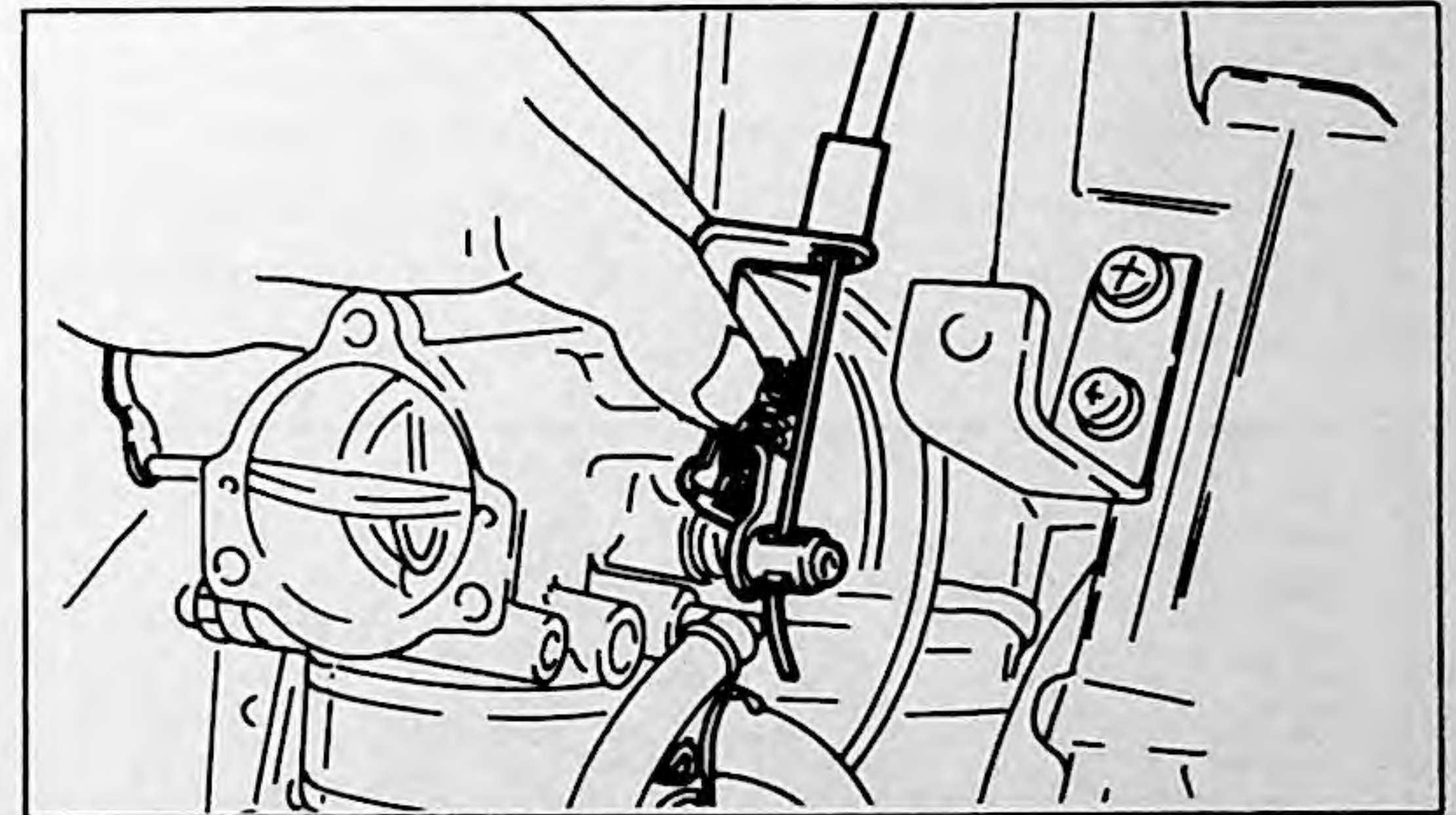


Fig. 8-16

2. Start the engine and let it warm up.
3. Increase the engine speed to 1,100 r.p.m. by use of the throttle stop screw.

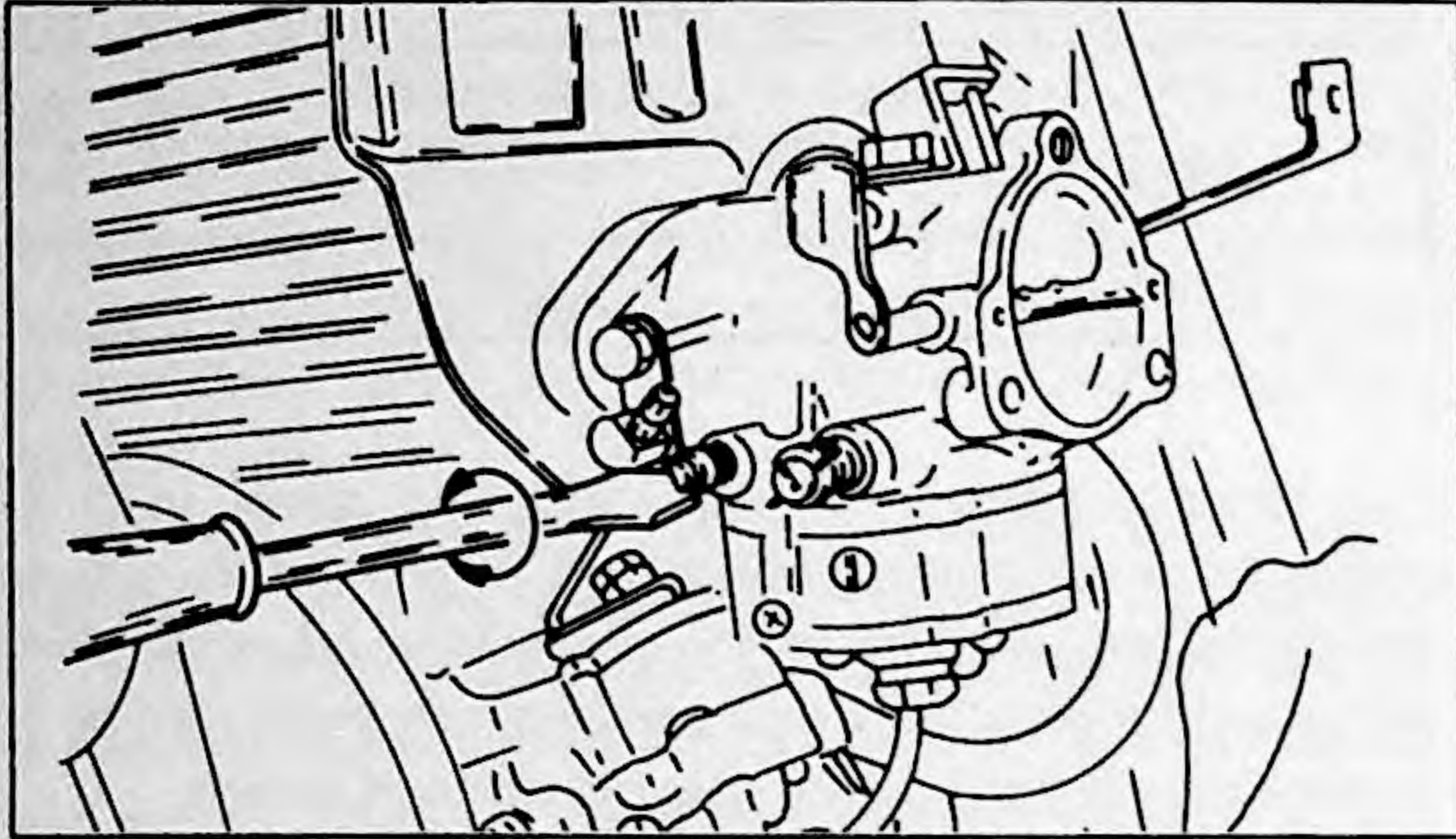


Fig. 8-17

4. Turn the slow adjusting screw in or out 1/8 turn each time and when the idling speed reaches its maximum and becomes stable, stop turning the screw. Adjust the throttle stop screw once again, and set it so that the engine idle at 1,100 r.p.m.
5. Back off the slow adjusting screw 1/8 turn.
6. Ride the snowmobile to test the engine performance start dash, acceleration and idling speed. If the engine is not so responsive to acceleration, the fuel-air mixture may be too lean. If the engine runs roughly, the mixture may be too rich. The carburetor should be readjusted.

Main Adjuster Adjustment:

The main adjusting-screw is used to adjust the air-fuel mixture when the snowmobile runs at high-speed. Adjustment should be made so that the mixture becomes as rich as possible, provided that the engine still runs smoothly. (This is necessary to prevent engine overheating.)

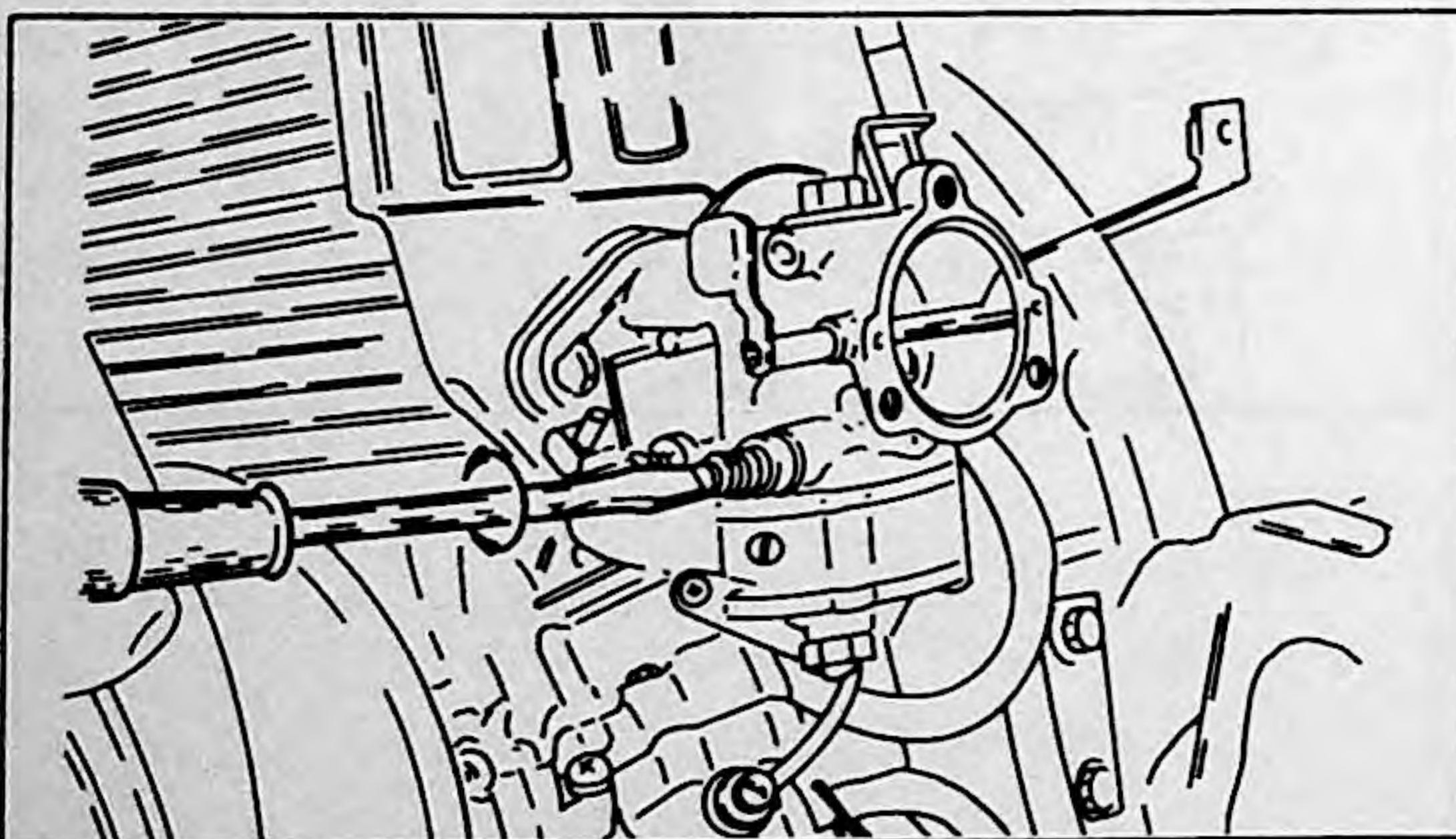


Fig. 8-18

For adjustment, follow the following steps:

1. First, back out the main adjusting screw as specified.
2. To adjust the main adjusting screws, run the snowmobile at high-speed and find the range of setting positions (number of turns out) at which the engine runs cleanly. Set the main adjusting screw to a position where the richest practical mixture is obtained. For this adjustment, the main adjusting screw should be turned 1/8 turn or less each time.
3. To test the engine, quickly bring the throttle shutter to full-open from idling position and acceleration the snowmobile. Then, watch the performance of engine operation.
4. After running at high-speed, check the spark plug for coloration for an indication of carburetor mixture.
5. Run the snowmobile at high-speed, and test if the engine will pick up speed smoothly. Repeat the adjustments as specified in 1-2 if necessary.

Note:

When the snowmobile is used under severe condition the following spark plugs may be selected:
NGK B-7ES, B-8ES or Champion N-3G for SL292C
Champion N-3G or Champion N-2G for GP292B.

	Standard Spark Plug
SL292C	NGK B-7ES
GP292B	Champion N-3G

Locked Main Jet

The GP292B carburetor uses a locked main jet in order to set minimum flow rate of mixture. The purpose of setting the minimum mixture flow rate is to prevent the engine from overheating resulting from the main adjusting screw which is tightened too much.

The main jet must be selected according to the temperature and altitude of the area where the snowmobile is operated. For details on the main jet replacement procedure, refer to the Technical Service Information which will be published later on.

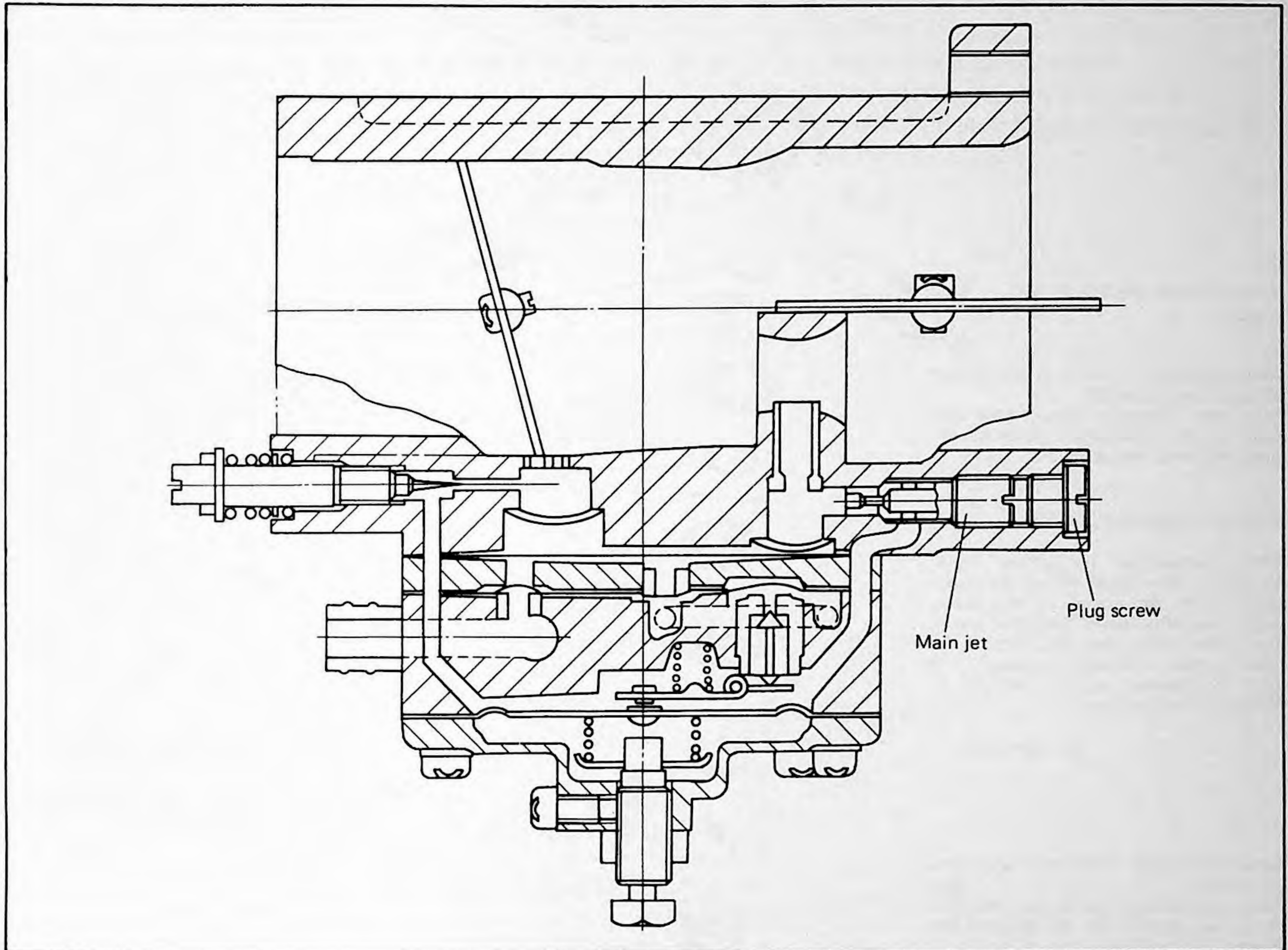


Fig. 8-19

Replacing the Locked Main Jet

Remove the plug screw.

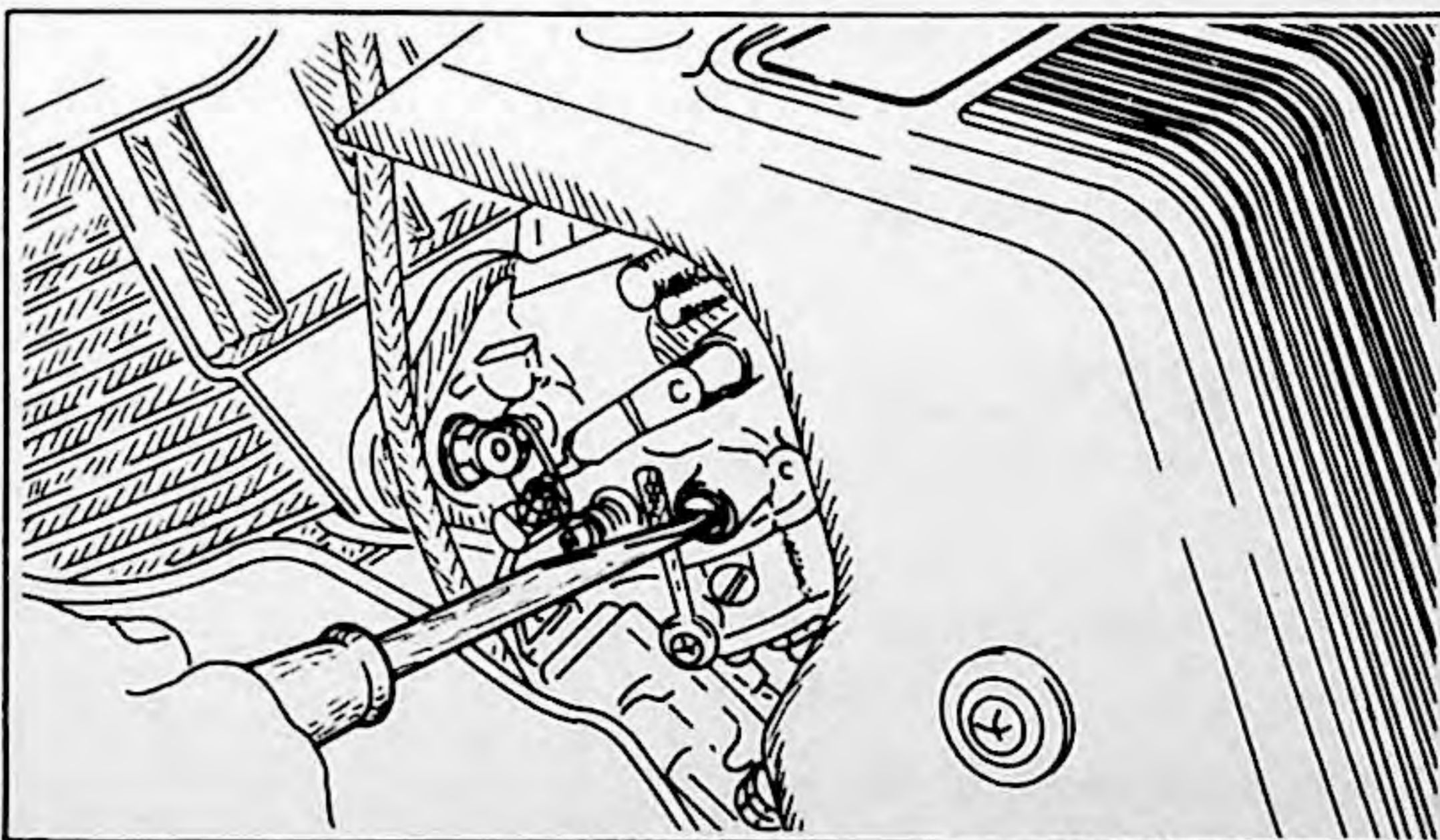


Fig. 8-20

To remove, use a small slotted head screwdriver.

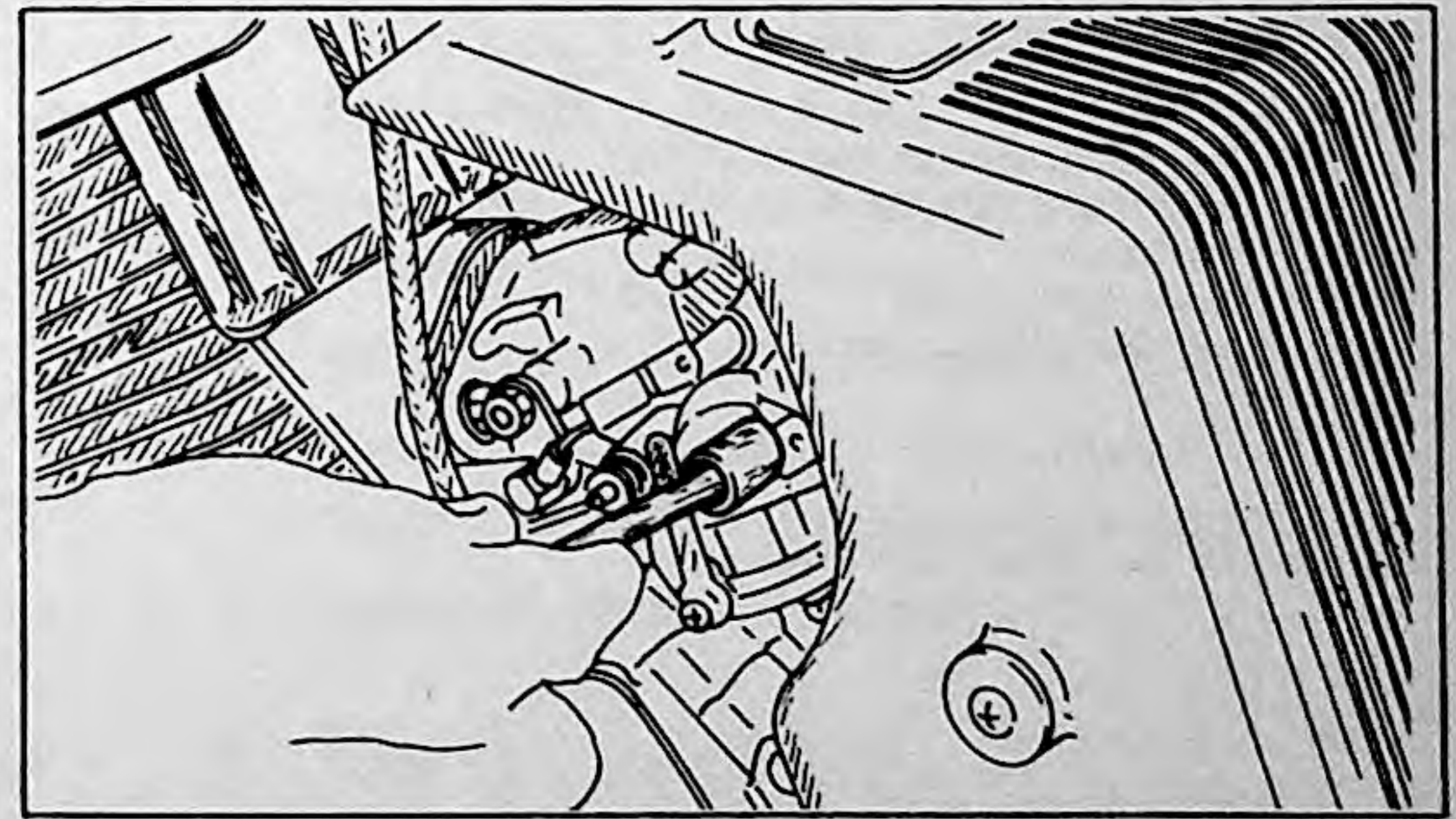
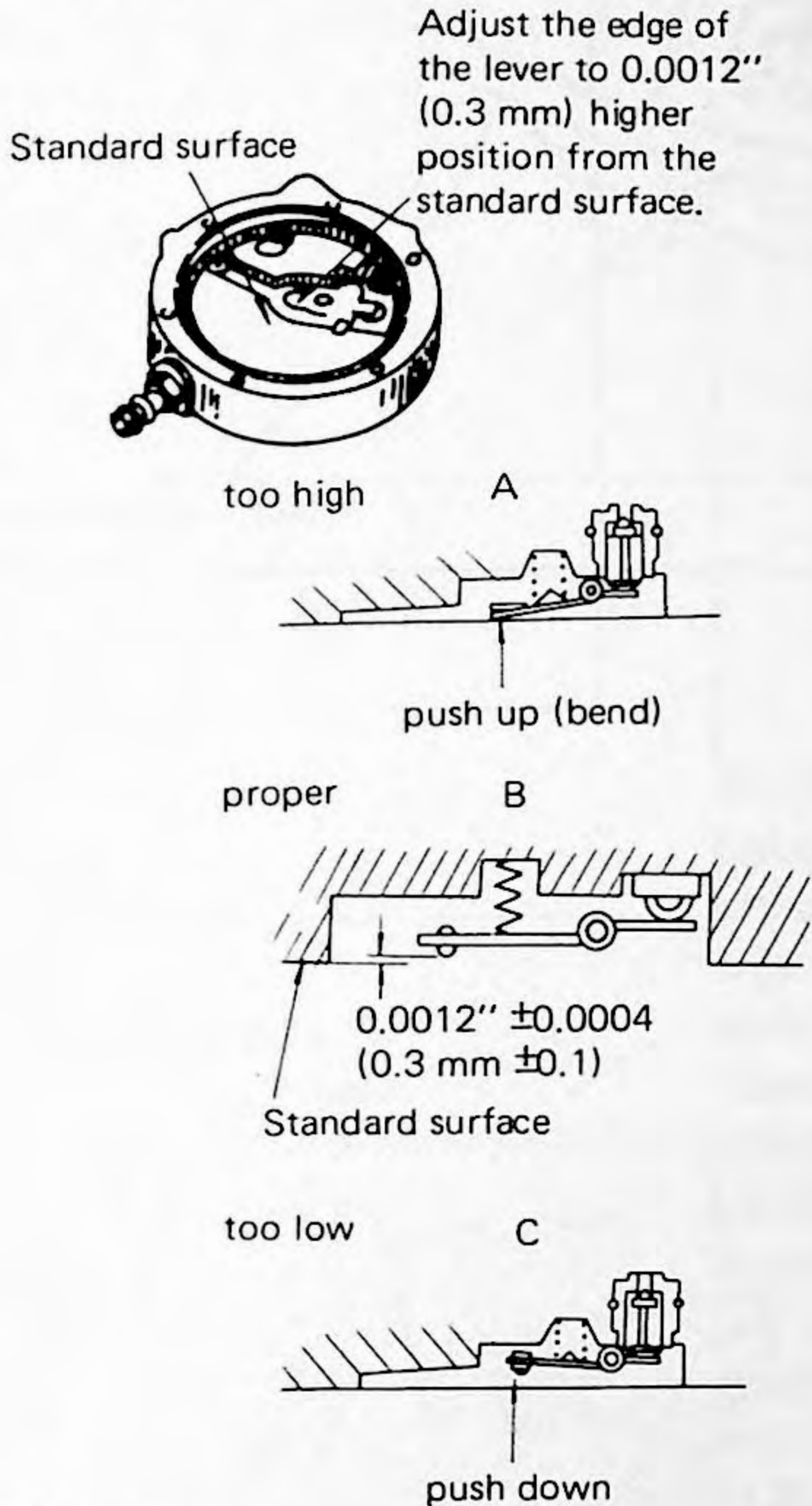
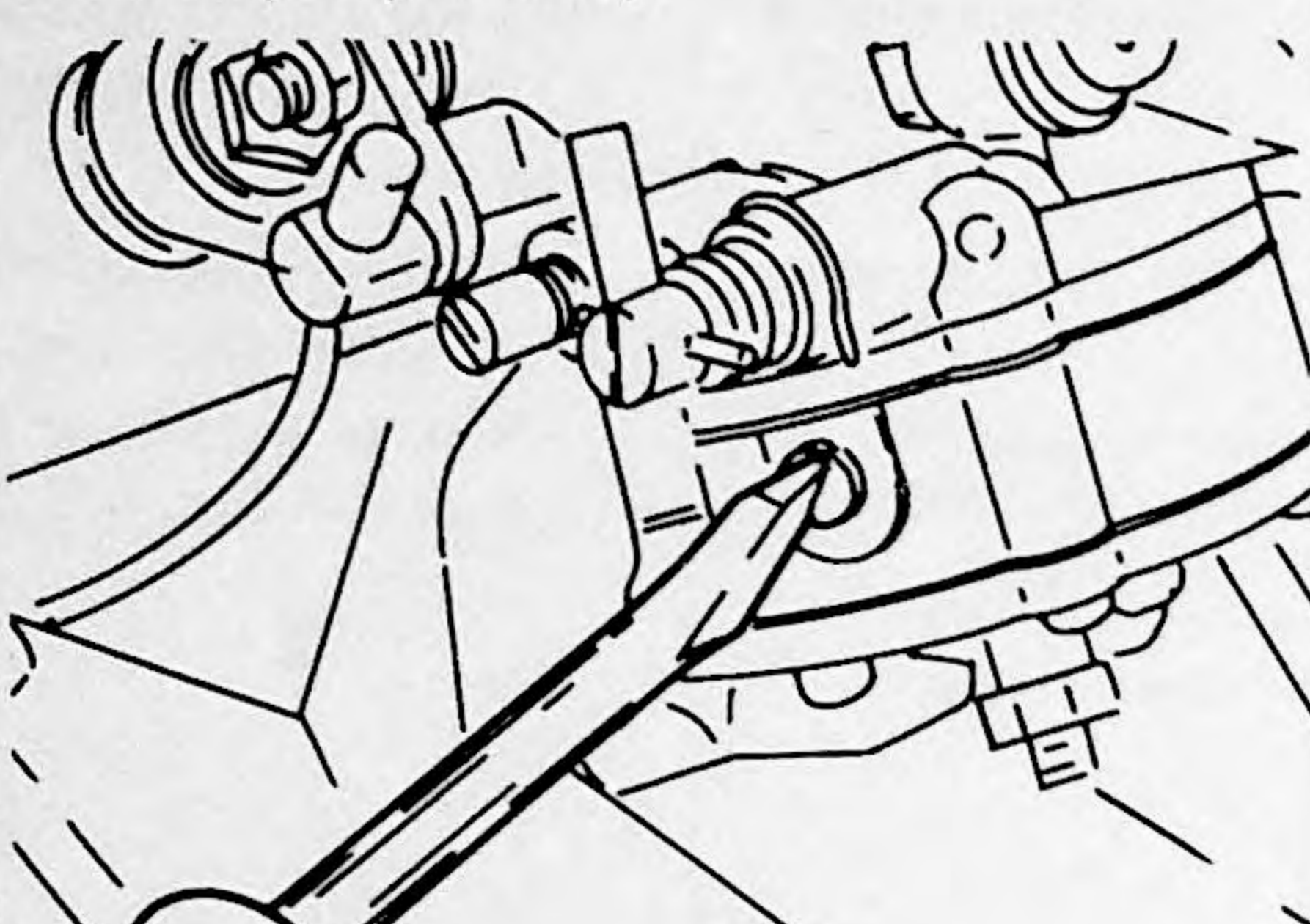


Fig. 8-21

Trouble Shooting

Trouble	Cause	Remedy
1. Overflow	○ Inlet valve is dirty. ○ Inlet control valve does not close perfectly. ○ Inlet control valve does not operate smoothly. Adjust the edge of the lever to 0.0012" (0.3 mm) higher position from the standard surface.  Fig. 8-23 ○ Main diaphragm is not correctly installed. ○ Regulator internal pressure is too high.	Remove inlet valve and clean it. Replace inlet control valve. (When replacing it, make sure the seat surface is free of scratches.) 1. Replace inlet control lever. 2. Reinstall inlet control lever correctly. (Adjust the end of lever to the position as shown in Fig. 8-23.) Reinstall main diaphragm correctly. Reduce the pressure.
2. Hard starting	○ Fuel passage is clogged. ○ Fuel pump is inoperative.	Clean fuel passage with gasoline, and blow it out carefully with air. Check impulse port, fuel pump diaphragm, and check valves (inner and outer).
3. Rough idling	○ Choke does not open perfectly. ○ Fuel supply is insufficient. ○ Fuel supply is in excess. ○ Adjustment is incorrect. ○ Inlet control lever end is incorrect in height. ○ Fuel pump operation is not smooth. ○ Both carburetors do not synchronize.	Reassemble it correctly. Check the linkage between both carburetors. Use primer pump. Refer to Starting Procedures on the following page. Refer to C of Starting Procedure. Readjust as specified. Particularly, check regulator fuel level and readjust as required. Readjust. (Refer to "Overflow".) Refer to "Hard Starting". Check synchronization.

Trouble	Cause	Remedy
4. Engine speed will not increase. Main adjusting screw is not workable.	◦ Main adjusting screw adjustment is improper. ◦ Fuel pump is faulty.  Fig. 8-24	See page 60 and readjust. Air is in fuel pump. Remove plug screw, and bleed air at idling speed. (Fig. 8-24)
	◦ Fuel passage is clogged.	Overhaul carburetor.

Note:

1. In order to maintain the diaphragm carburetor in good condition it must be cleaned and checked periodically. Dust and careless handling are the major causes for carburetor malfunctions. Cleaning and checking should be conducted in a clean place. For cleaning, gasoline should be used. Solutions including alcohol, acetone, lacquer, thinner, benzol, etc. should not be used as cleaning agents for they will damage the synthetic rubber in the carburetor.
2. When the primer pump is used for the diaphragm type carburetor, it should not be squeezed more than one time or an excess amount of fuel will be fed to the cylinder.
3. Fuel filter is attached in the fuel tank.
It is advisable that it be replaced with a new one each season. If the filter is found faulty (obstructing the fuel flow or having a breakage in the element), it should be replaced in the form of an assembly unit.

8-3 AUTOLUBE

1. The autolube tank should be supplied with YAMA-LUBE or another suitable oil for two-stroke, aircooled engines. Check the rubber hose from the tank to the oil pump for obstructions from pinching or damage.

Note:

Two stroke oil is recommended for the extra added protection it offers. However automotive oil of SAE "MS" designation is suitable. Use a 10W-30 weight.

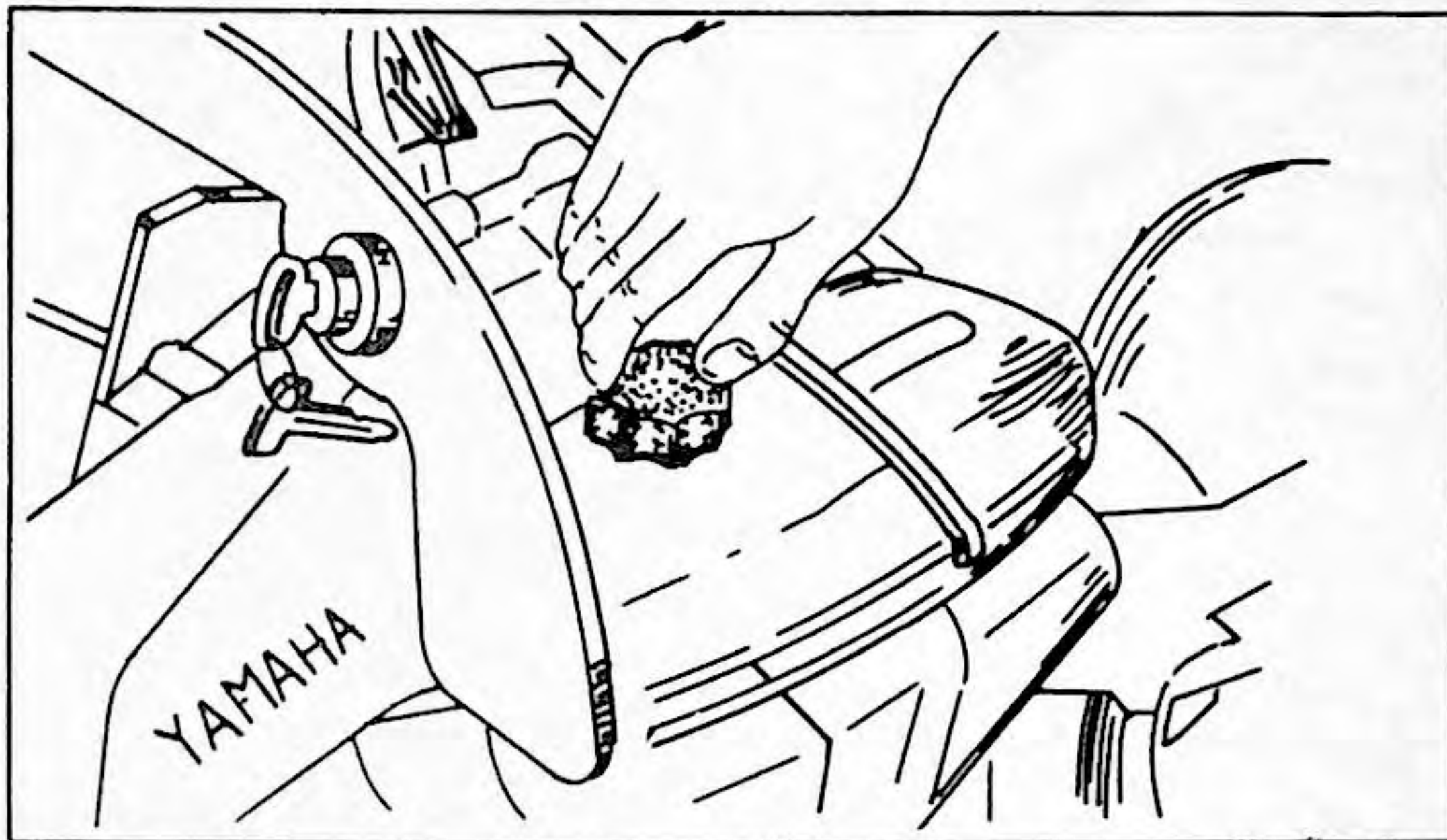


Fig. 8-25

2. Adjustment of the pump.
 - 1) Fully open the carburetor throttle valve.
 - 2) Turn pump control lever so that it is set to the match mark on the oil pump. (Adjust can be made by turning the pump control rod nuts.)
 - 3) After adjustment fully tighten the nuts, by holding bottom nut while tightening top nut.

When fully open the carburetor, mold as shown in Fig. 8-25 and adjust to the marking.

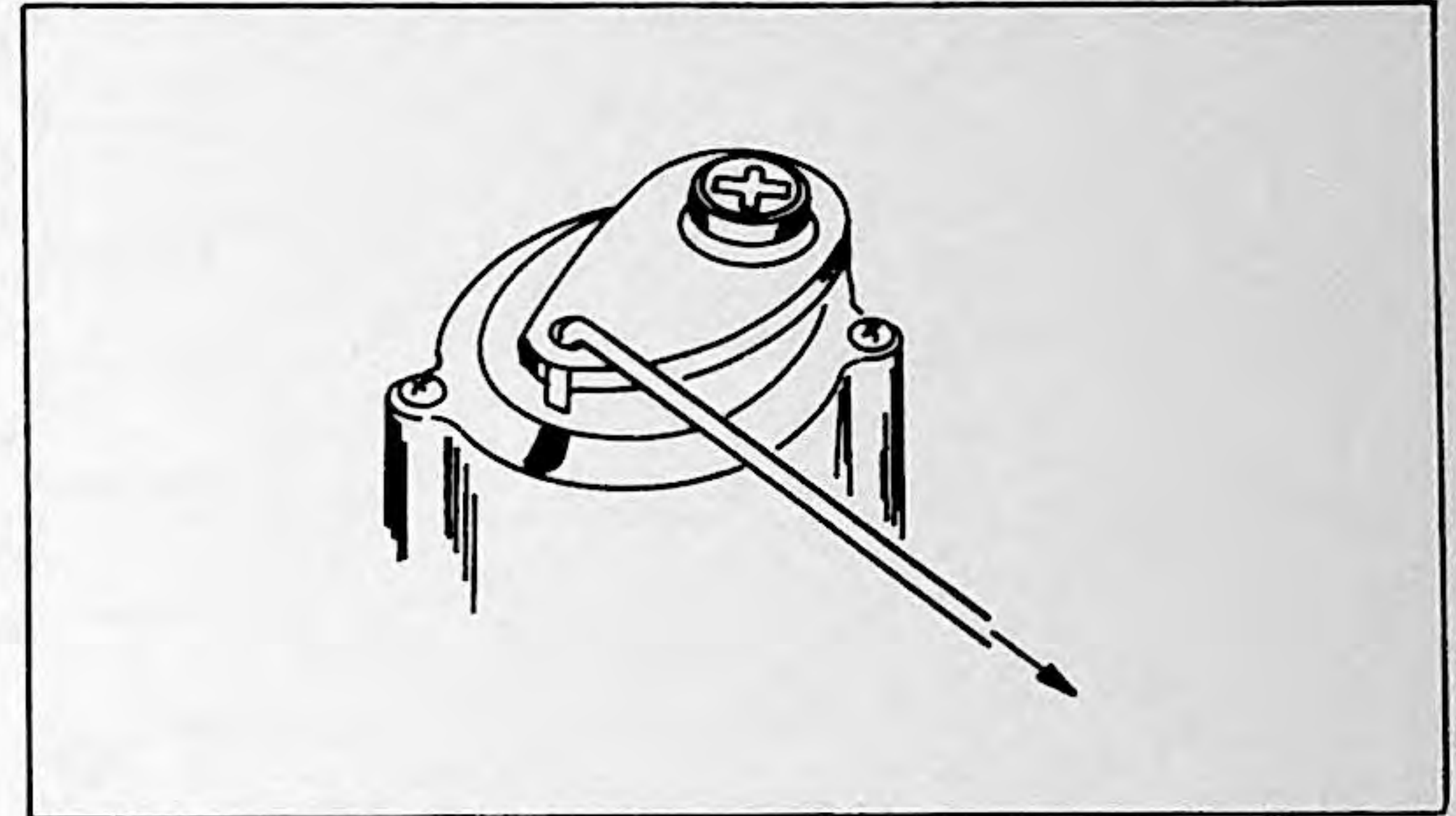


Fig. 8-26

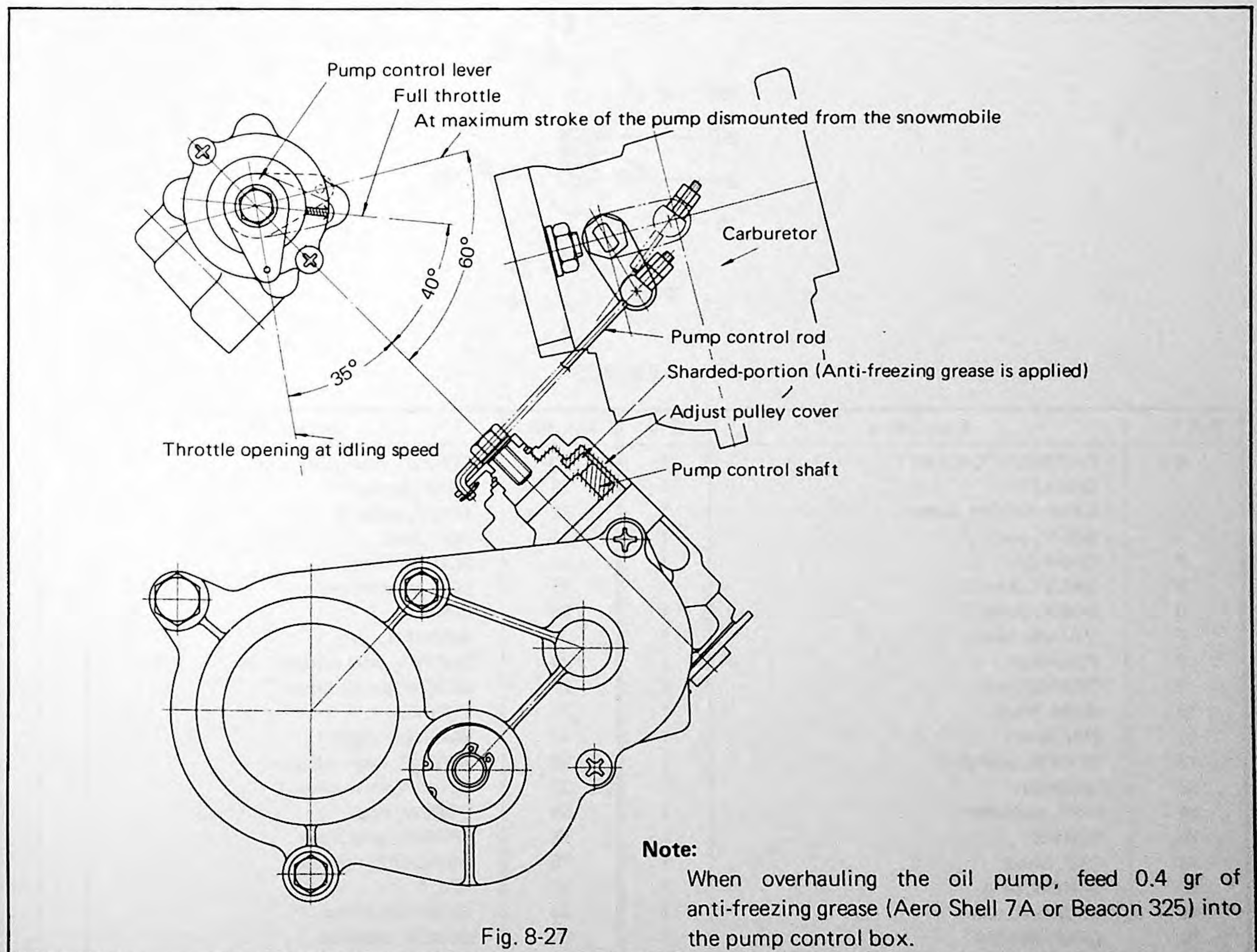


Fig. 8-27

Note:

When overhauling the oil pump, feed 0.4 gr of anti-freezing grease (Aero Shell 7A or Beacon 325) into the pump control box.

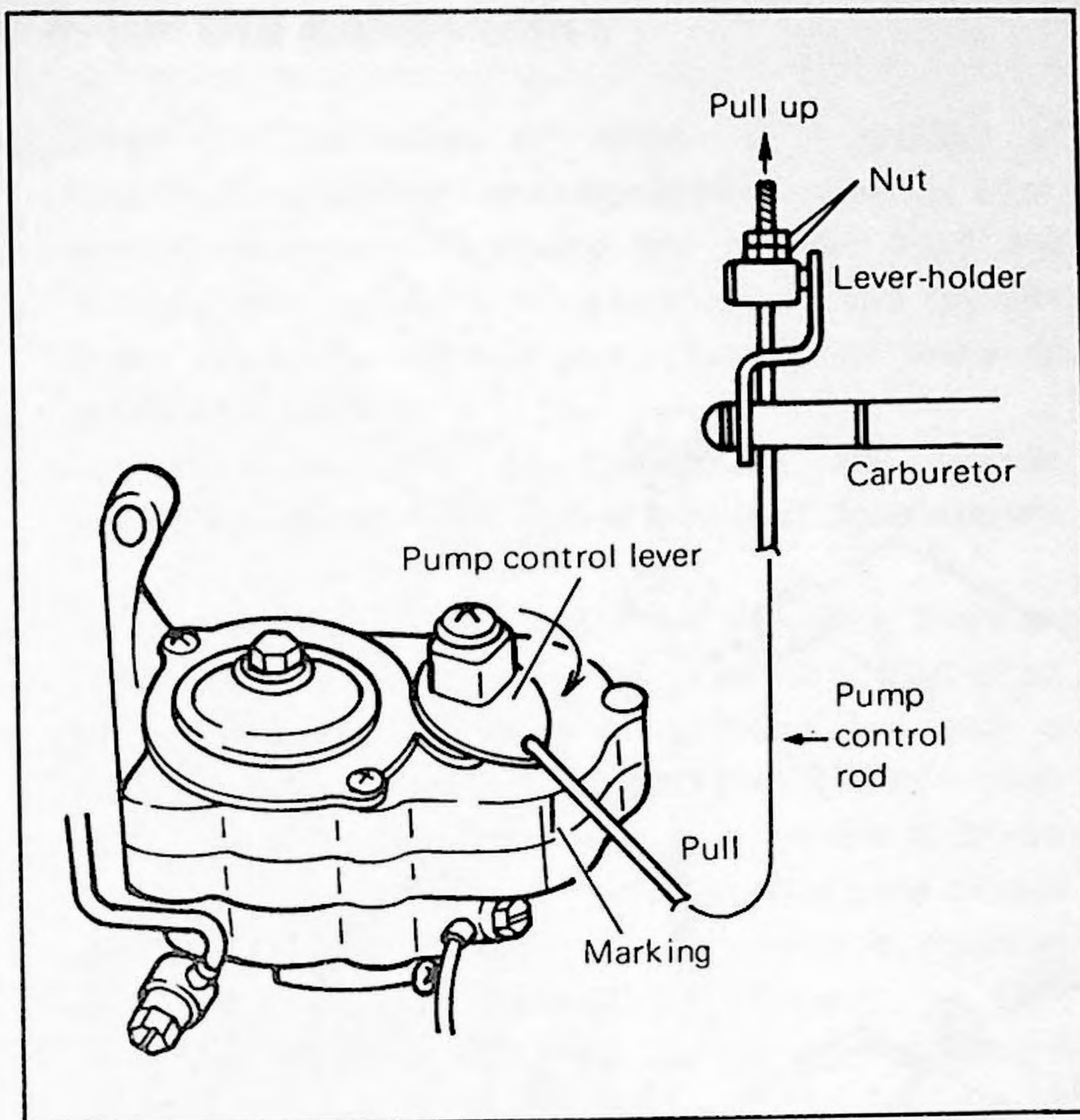


Fig. 8-29

Note:

When the pump control lever reaches the maximum working range, the center line of the lever and the marking on the case should be in line. In this case, the carburetor throttle valve is in the full-open position.

OIL PUMP

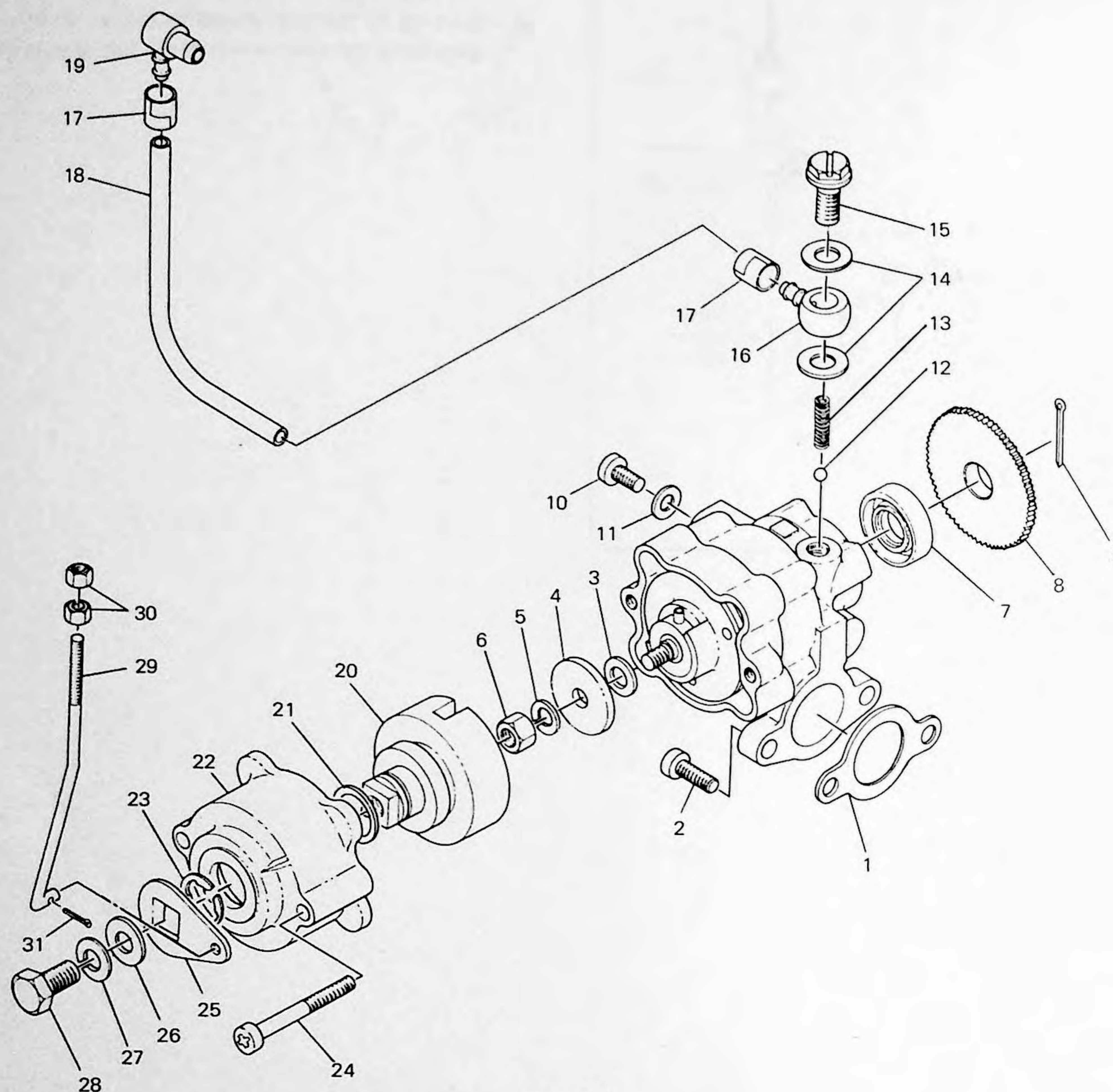


Fig. 8-30

Ref. No.	Description	Q'ty	Ref. No.	Description	Q'ty
1	GASKET, pump case	1	16	BANJO, delivery pipe	1
2	SCREW, panhead	2	17	CLIP, delivery pipe	2
	OIL PUMP ASS'Y	1	18	PIPE, delivery (3-240)	1
3	SHIM, plunger (5.8-10-0.1)	U.R	19	NOZZLE	1
4	PLATE, adjusting	1	20	SHAFT, pump control	1
5	WASHER, spring	1	21	SHIM	1
6	NUT	1	22	COVER, adjust pulley	1
7	OIL SEAL (S-10-21-5)	1	23	CIRCLIP (E-9)	1
8	PLATE, starter	1	24	SCREW, panhead	2
9	PIN, cotter	1	25	LEVER, pump control	1
10	SCREW, bind	1	26	WASHER, plain	1
11	GASKET, breather	1	27	WASHER, spring	1
12	BALL (5-32 inch)	1	28	BOLT	1
13	SPRING, check ball	1	29	ROD, pump control	1
14	GASKET, banjo bolt	2	30	PIN, cotter	1
15	BOLT, banjo	1	31	NUT	2

8-4 TOP END MAINTENANCE

1. Since the formation of carbon is a product of two-stroke operation, decarbonization at regular intervals is essential. Removing the cylinder head and scraping the carbon from piston crown and cylinder head should be done at every tune-up or every 40 hours of operation.
During every other decarbonization, the cylinder should be removed and the exhaust port decarbonized.
2. When the cylinder and piston are removed, there are several checks which should be performed. First of all, the cylinder bore should be checked for wear or scoring each time it is removed. The "out of round" and "taper" can be checked with an inside micrometer. The out of round of the cylinder bore circular direction 90° at a time. The difference in measurements should not exceed 0.002" (0.05 mm).
Honing or reboring should be done if this tolerance is exceeded. Taper of the cylinder bore is measured by moving the micrometer from the top to the bottom of the cylinder being careful to miss the port openings. The difference in these measurements (between top and bottom) should not exceed 0.002" (0.05 mm). If upon inspection of the cylinder bore, scoring of the cylinder wall is observed hone or rebores until these scores disappear. Before assembly, always clean the carbon from the exhaust port. Also wash out the cylinder with solvent or soap and water to insure that all hone material has been removed. Failure to do this may result in premature wearing or scoring of the cylinder and piston.

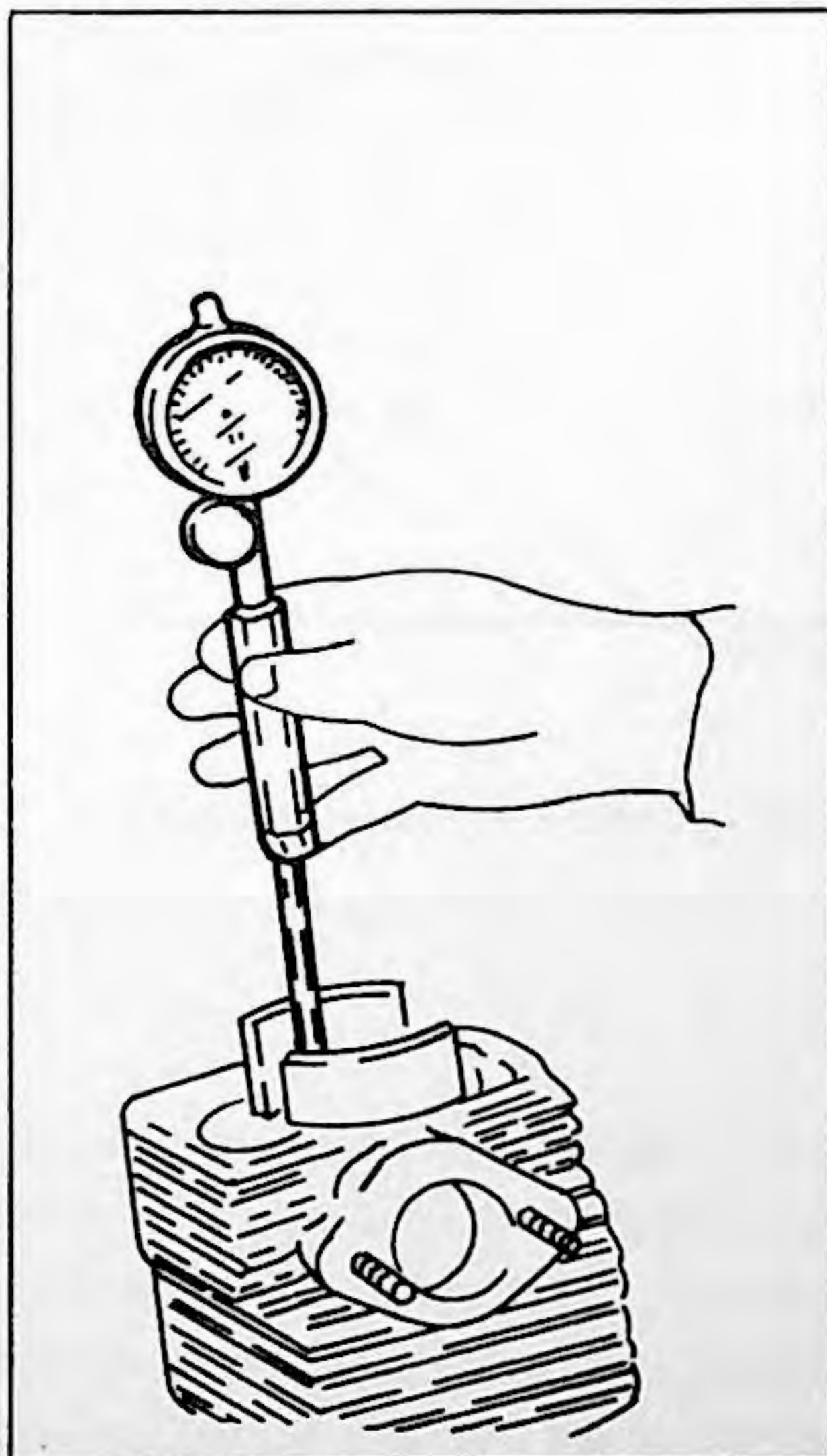


Fig. 8-31

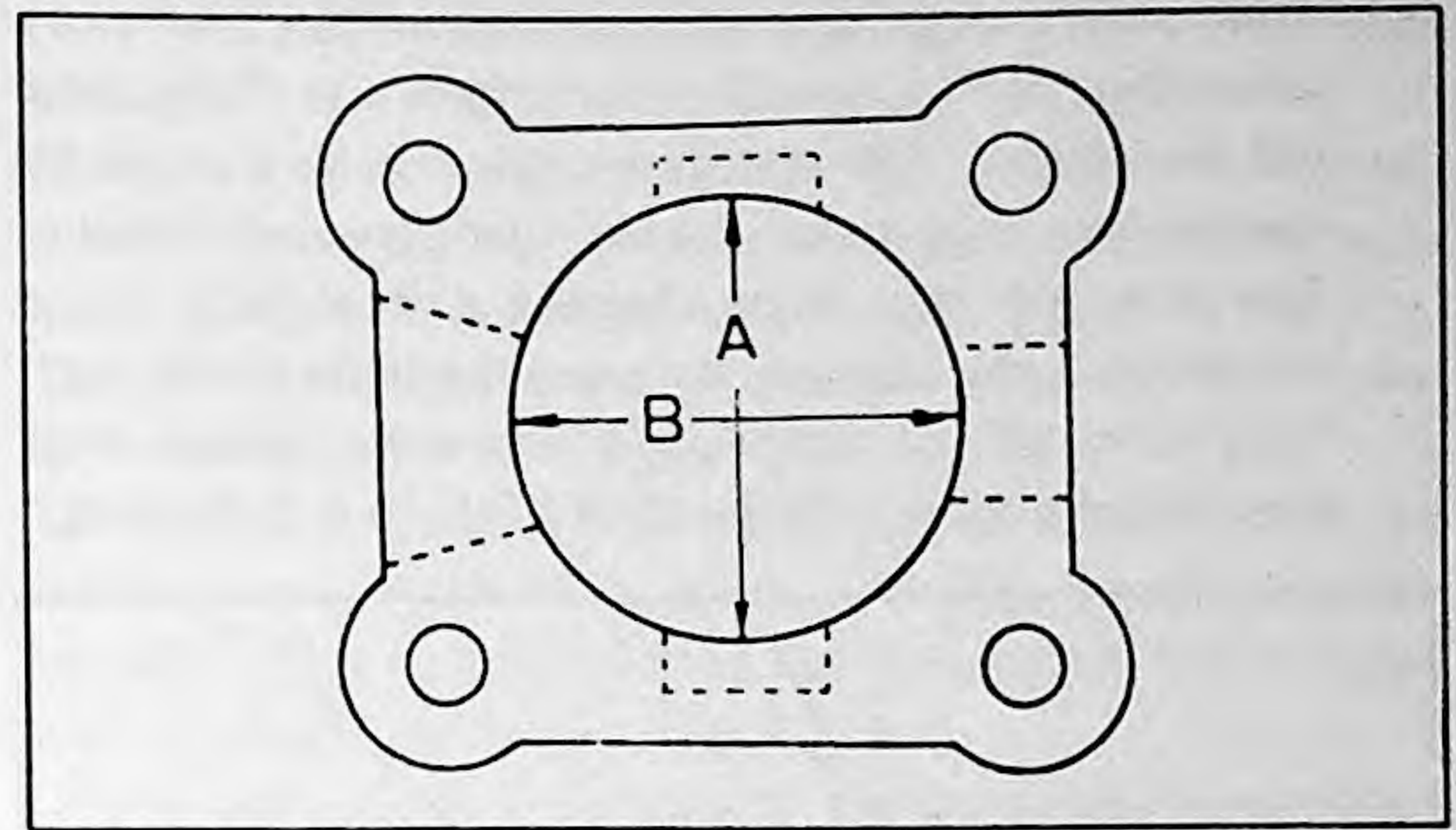


Fig. 8-32

3. The piston-to-cylinder wall clearance should be checked before reassembly.
This is done by measuring the largest outside diameter of the piston and the smallest inside diameter of the cylinder bore. The largest diameter of the piston is checked 0.4" (10 mm) above the bottom of the piston skirt and at right angles to the piston pin hole. New piston to cylinder wall clearance is 0.0018 ~ 0.002" (0.045 ~ 0.050 mm).

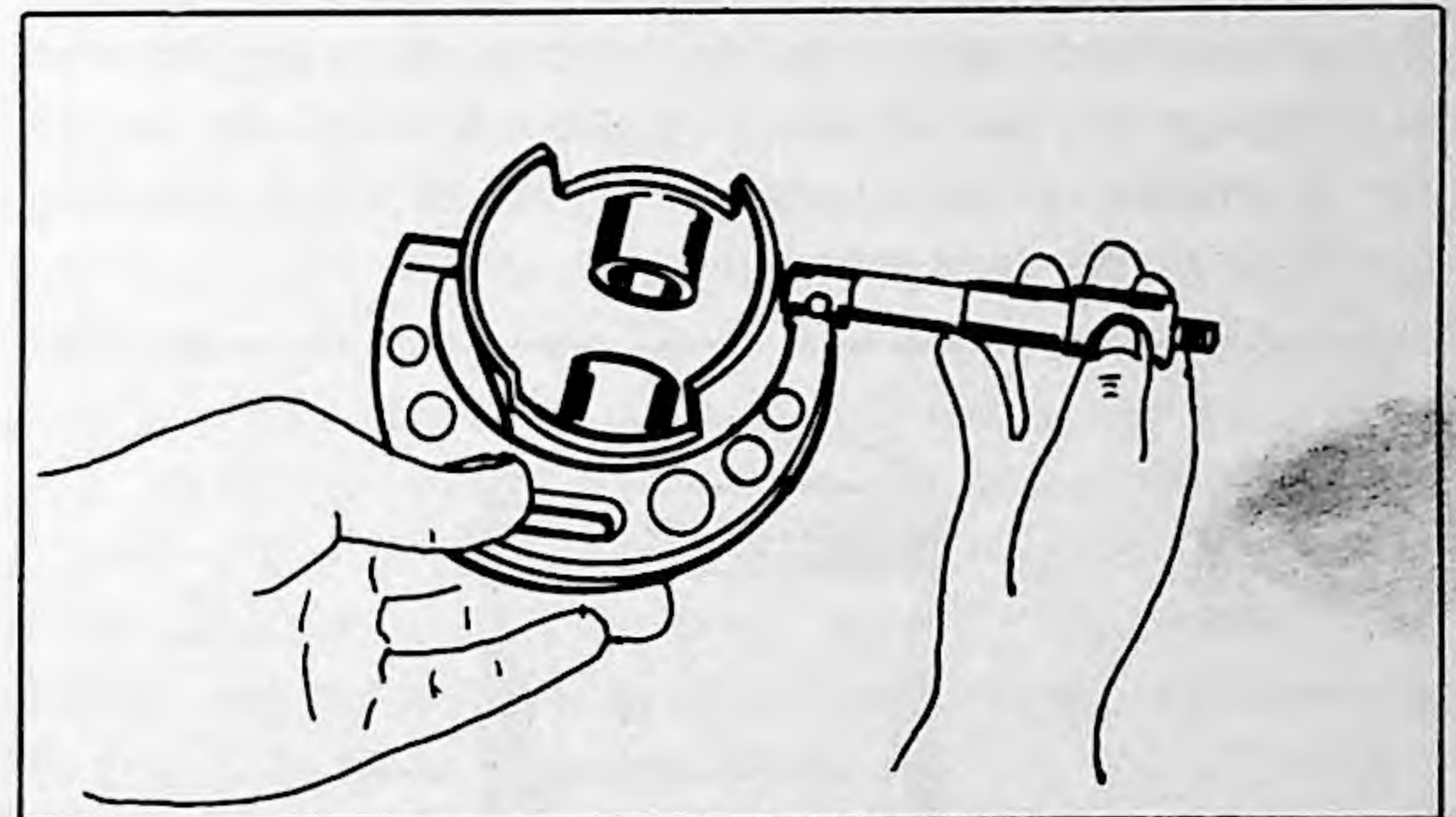


Fig. 8-33

4. The piston pin-piston fit can be checked by inserting the piston pin into the piston and checking the amount of resistance encountered. The piston pin should fit into the piston with a snug, thumb press fit.
Also check the needle bearings and needle bearing cage for excessive wear, or overheating.



Fig. 8-34

5. The piston rings are removed from the piston by spreading them open with your fingers and lifting them off the piston. The piston ring gap can be checked by placing the rings inside the cylinder bore horizontally. The ring gap should be checked with a feeler gauge placed into the opening between the ends of the ring. Maximum gap of both upper and lower piston rings should not exceed 0.006 ~ 0.014" (0.15 ~ 0.35 mm).

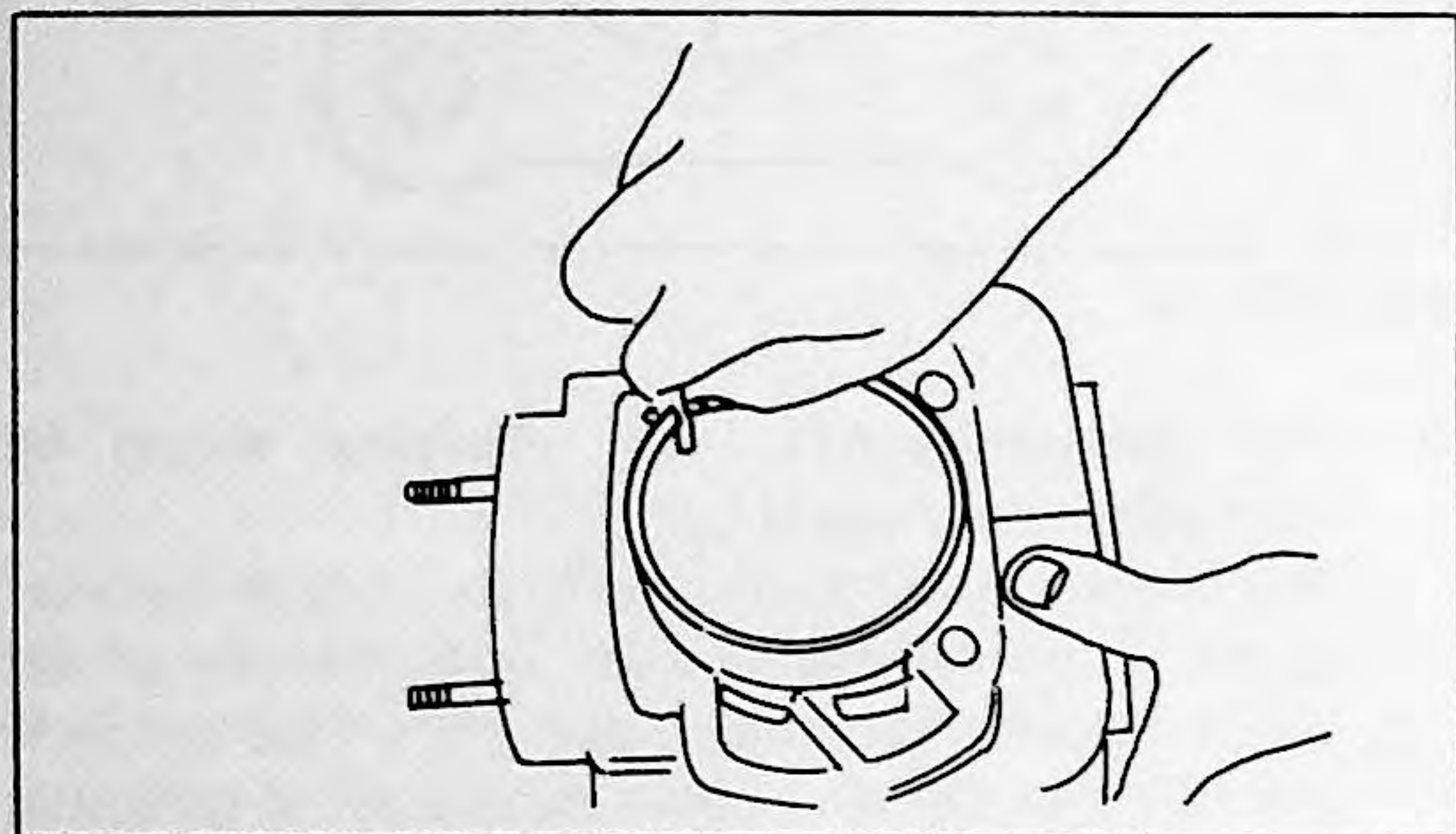


Fig. 8-35

6. Remove the carbon build-up from the piston ring grooves and replace the piston ring gap be aligned with the knock pin in the ring groove as shown in the illustration. This is especially critical when installing the cylinder over the piston.

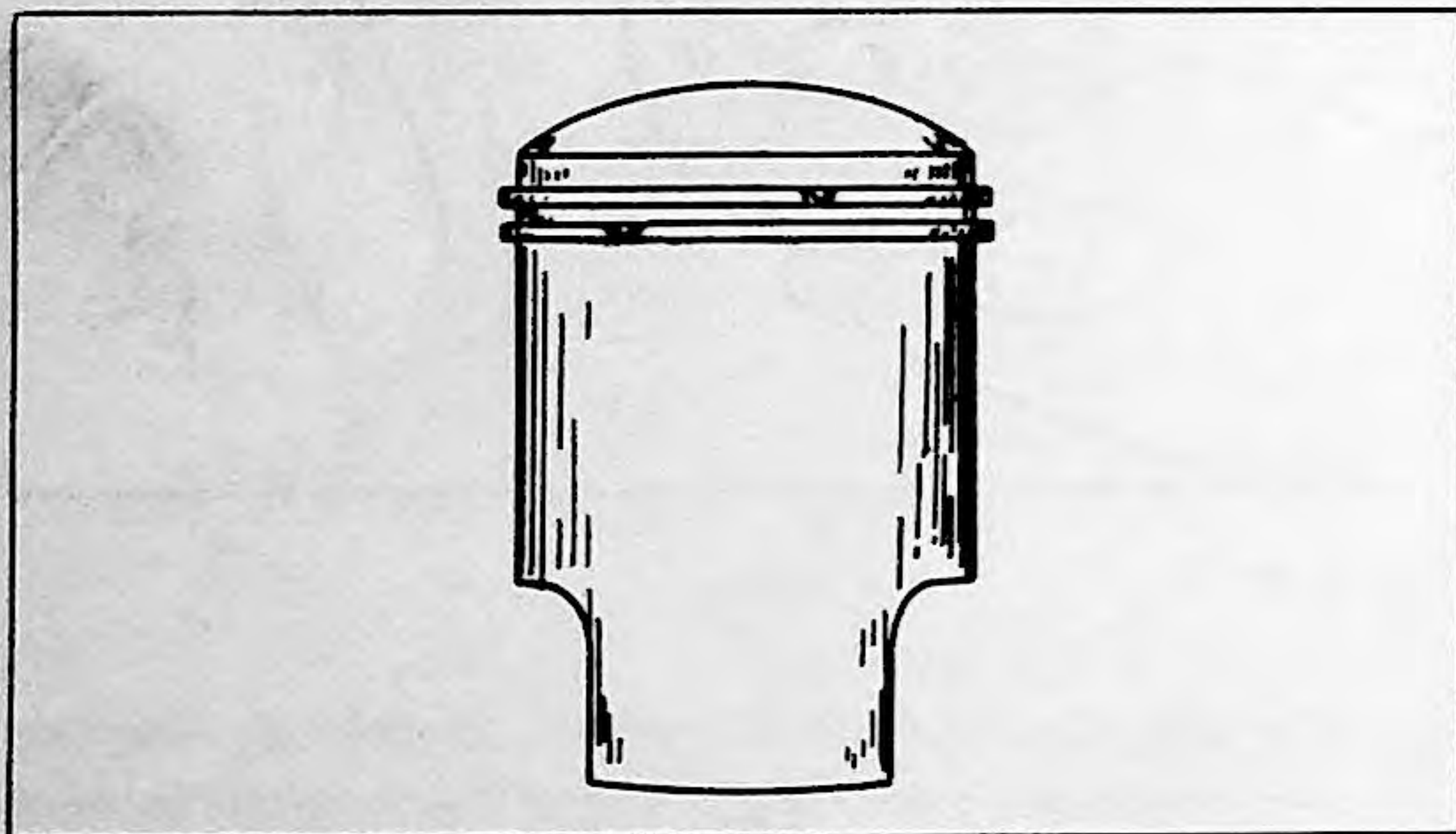


Fig. 8-36

7. The up and down play of the piston rings in the piston ring groove should be checked with a feeler gauge. Tolerance should be 0.001 ~ 0.0027" (0.03 ~ 0.07 mm) for both upper and lower rings.

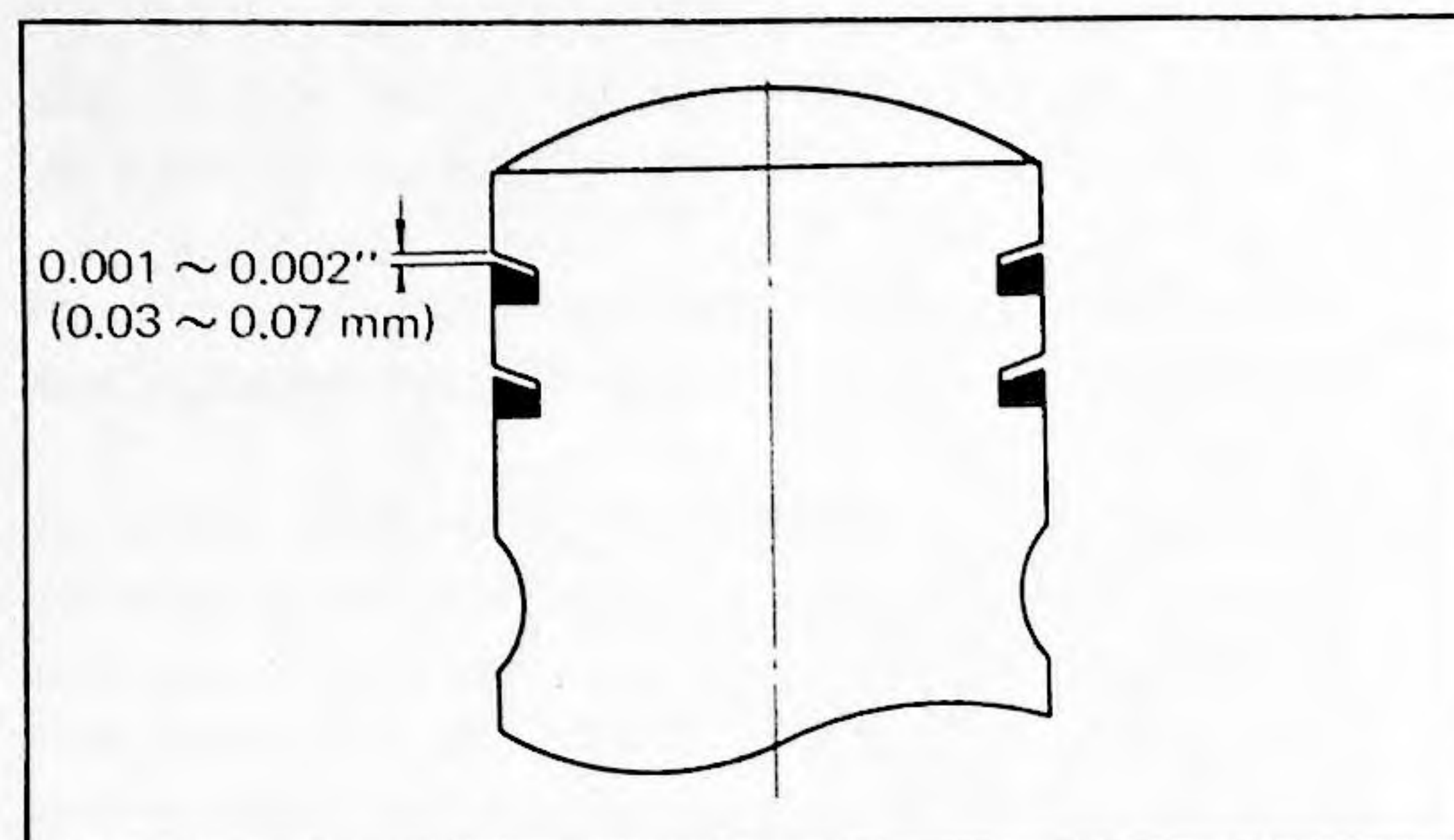


Fig. 8-37

8. Installing the piston

The piston should be installed so that the arrow mark on the piston head points to the exhaust port (toward the front of the engine).

Note:

If the piston dome or piston skirt is badly scored or damaged, it would be advisable to replace the piston. If a piston has once seized it would be advisable to replace the piston. Once seizure has occurred and the piston has been damaged, seizure can more readily re-occur.

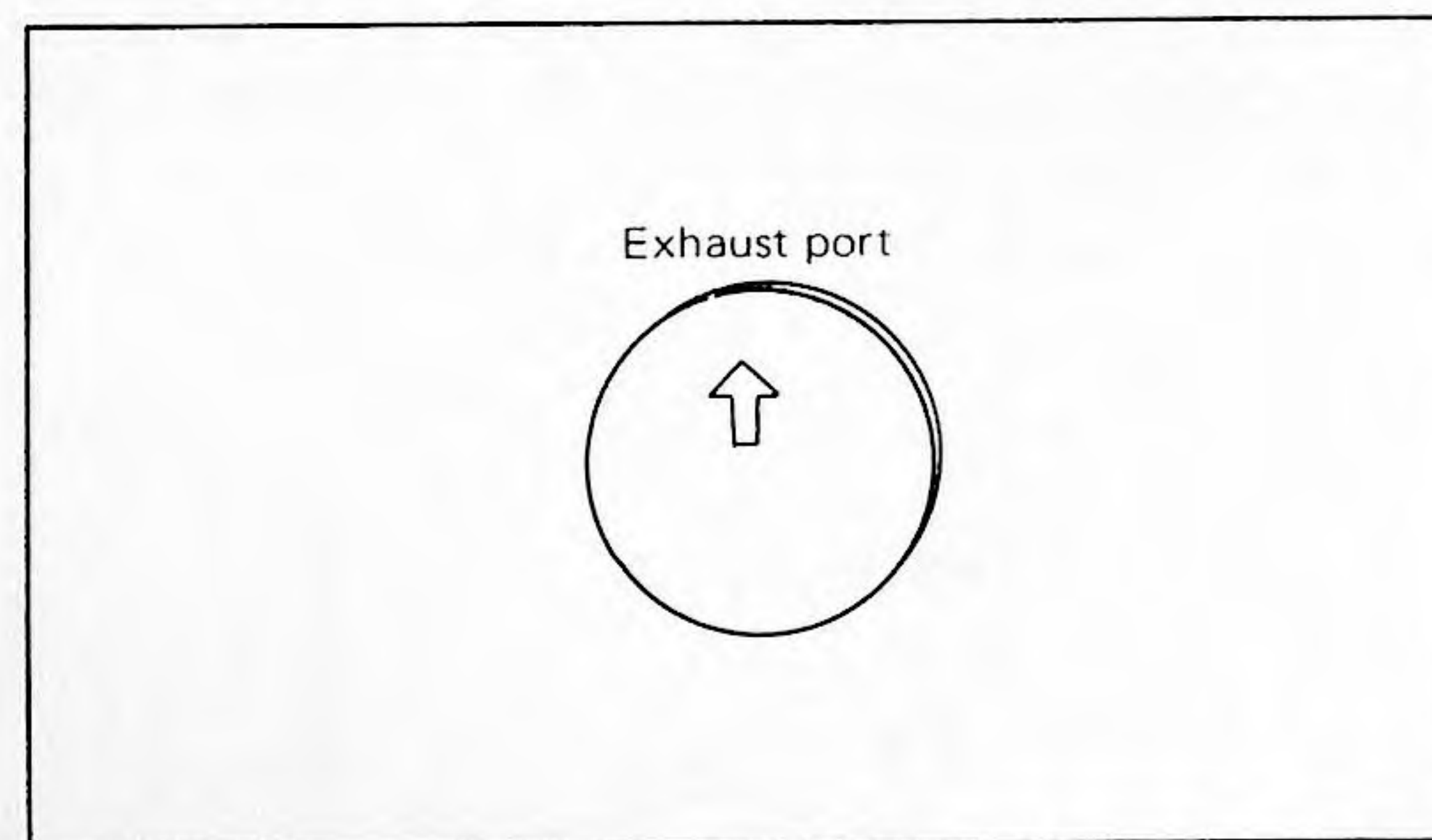


Fig. 8-38

9. Installing the cylinder head

The cylinder head tightening torque is 16.5 ~ 19.5 ft/lbs. (2.3 ~ 2.7 m·kg).

The six bolts should be tightened evenly.

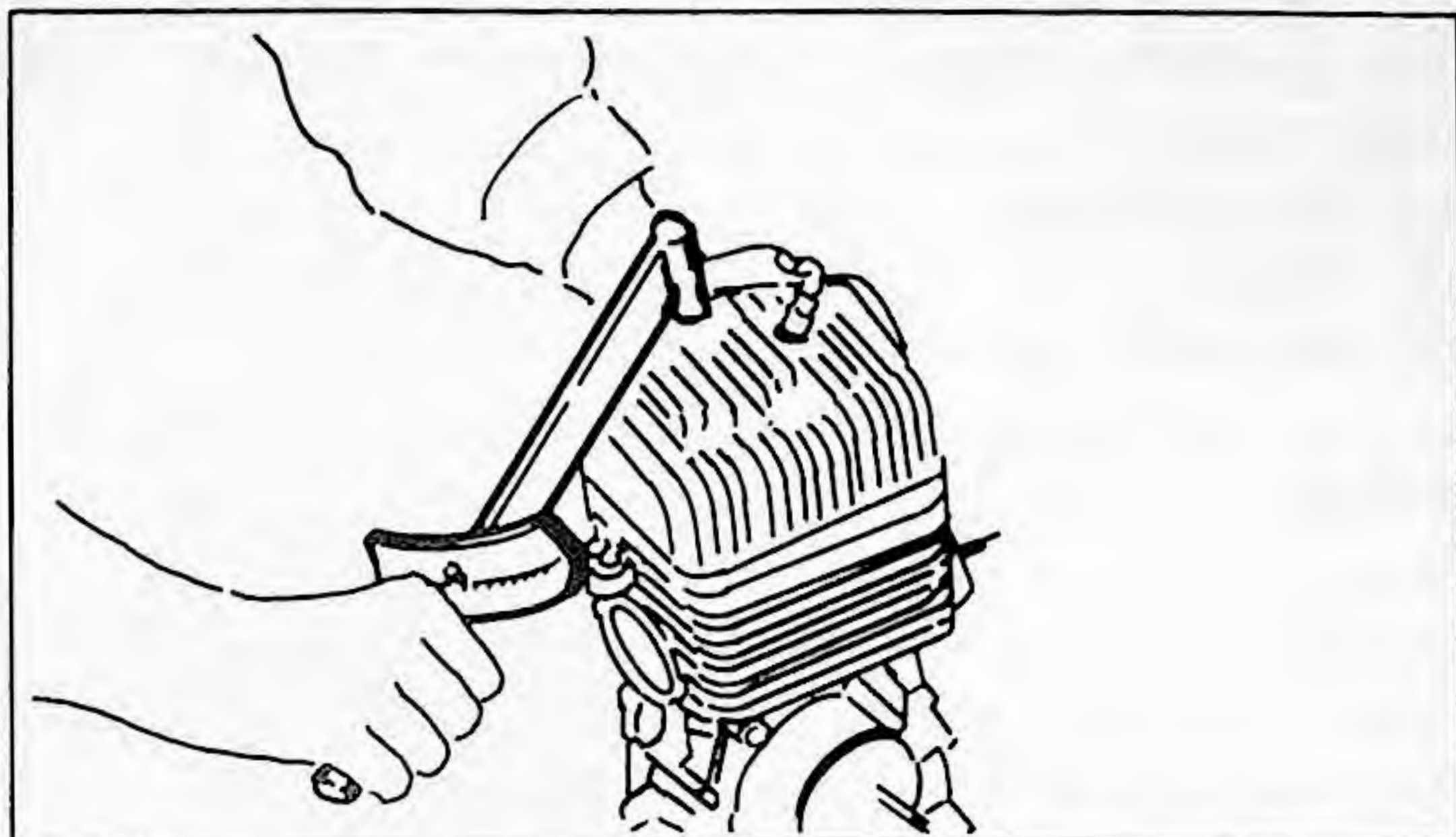


Fig. 8-39

10. Keystone Type Piston and Keystone Ring

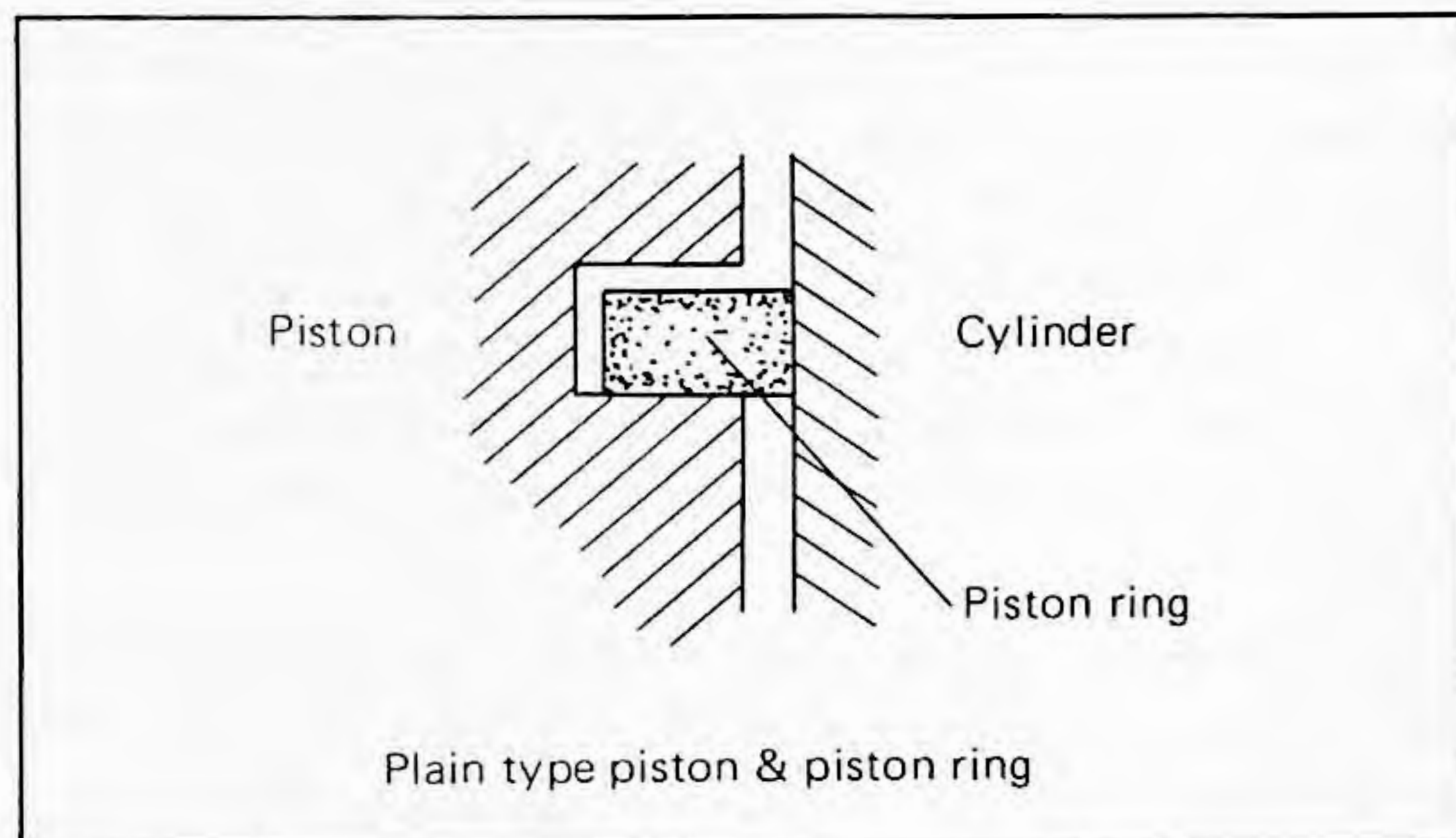


Fig. 8-40

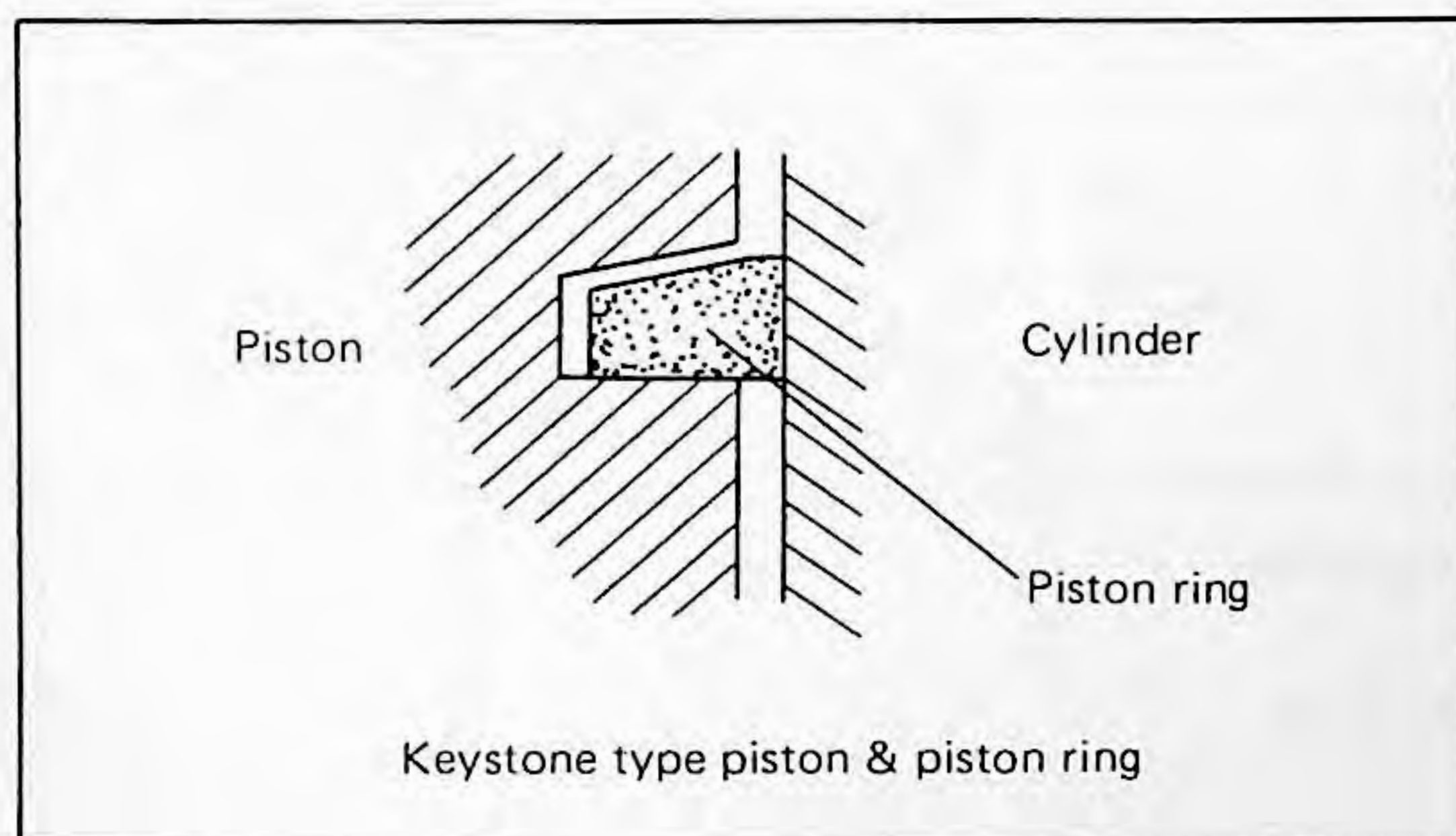


Fig. 8-41

A good seal must be maintained between the piston and cylinder wall for effective use of combustion pressures. It is not practical, however, to attempt to secure a perfect seal. With this in mind, importance is placed on effective sealing and prevention of piston ring sticking. Piston ring sticking is generally caused by gum deposits which are produced through a breakdown of the fuel and oil from the heat of the combustion process. This gum residue will deposit itself in the ring lands and rings. The subsequent

blow-by tends to speed up the accumulation of these gum deposits.

In order to prevent the rings from sticking and to provide more effective sealing of the combustion pressures Yamaha has employed the keystone piston and ring in its engines. This marks the first time such an application has been made in the history of motorcycle engineering.

The design of the keystone ring is such that combustion gas pressures force the ring down and out almost simultaneously. This forces the ring tightly against the cylinder wall preventing blow-by. (Fig. 8-42)

On the other hand, in the case of the plain ring, combustion pressure first acts on the top of the ring, forcing it down, and then passes between the ring and piston to force the ring against the cylinder wall. This action is considerably slower than that of the keystone type ring, and will allow more blow-by.

With blow-by, heat cannot be dissipated from the piston ring to the cylinder wall and, as was mentioned earlier, excessive combustion heat will cause the oil film to breakdown creating additional gum deposits. The keystone ring allows for much better heat transference than the standard type ring.

The most important advantage of the keystone type ring is that the piston ring land clearance changes as the piston moves up and down. Fig. 8-43 and 8-44 show variations in the clearance resulting from the floating action of the piston in the cylinder. This variation in ring land clearance produces a "scrubbing" effect that reduces the accumulation of gum deposits and thus prevents the ring from sticking in the land. Lastly, the outer surface of the ring is coated with Teflon (Fig. 8-45). The Teflon coating serves as an effective aid during ring "seating". In addition, the Teflon coating will follow microscopic irregularities in the Technical Notes on Keystone Rings.

The keystone ring can be handled in the same manner as conventional rings as far as servicing is concerned.

However, the keystone ring is not interchangeable and must be used as a set with a matching keystone piston.

The keystone ring can be identified from the conventional by its unique cross-sectional shape. The conventional ring has a rectangular cross-section where as the keystone ring employs a 7° slope on the top.

Important:

The keystone type piston has the "K" mark stamped after the numerals indicating the piston size on its head. The keystone type piston ring has a symbol such as "1(2)N" or "1(2)T".

(Numeral "1" denotes the 1st ring, and Numeral "2" the 2nd ring.)

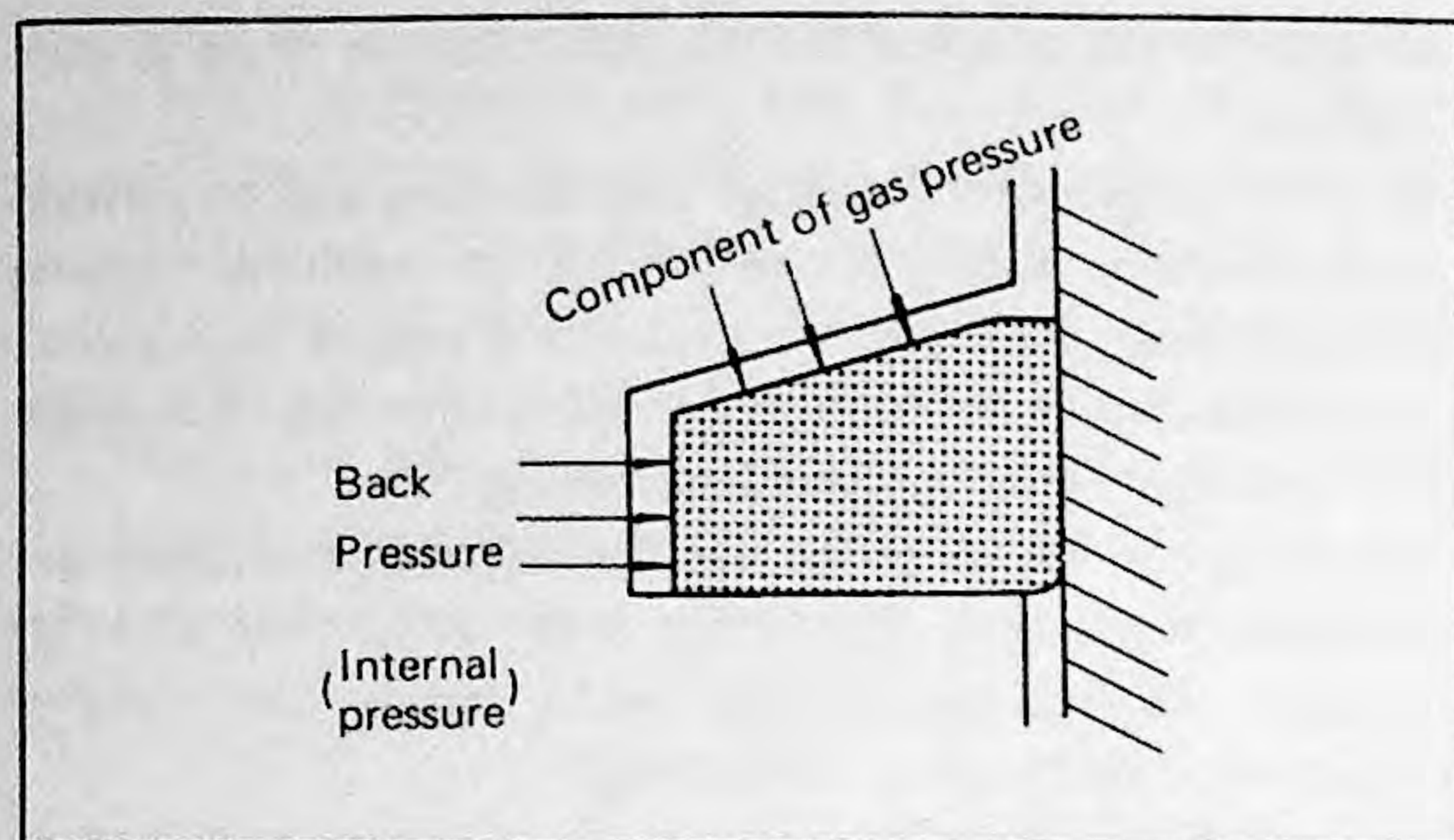


Fig. 8-42

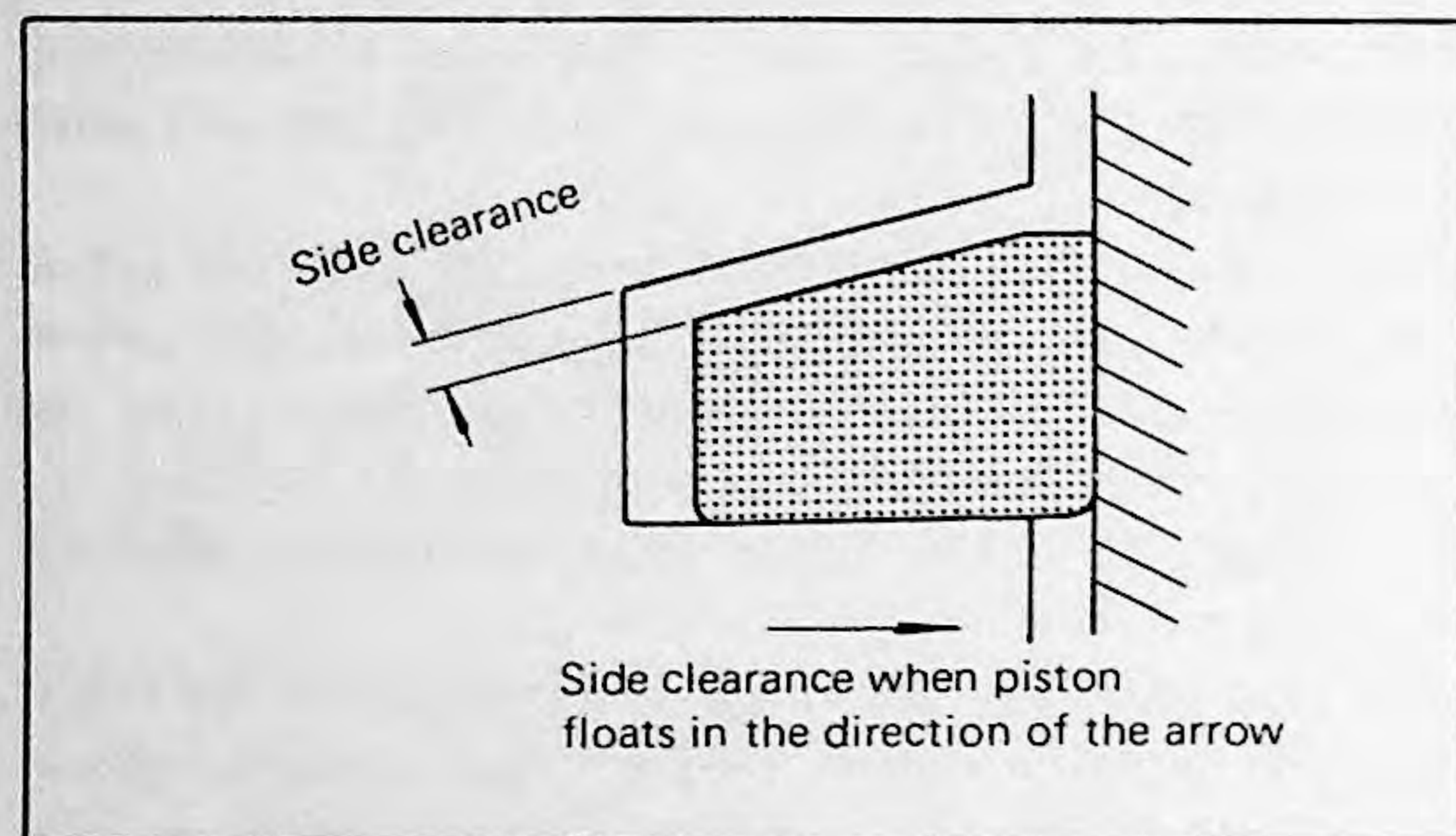


Fig. 8-43

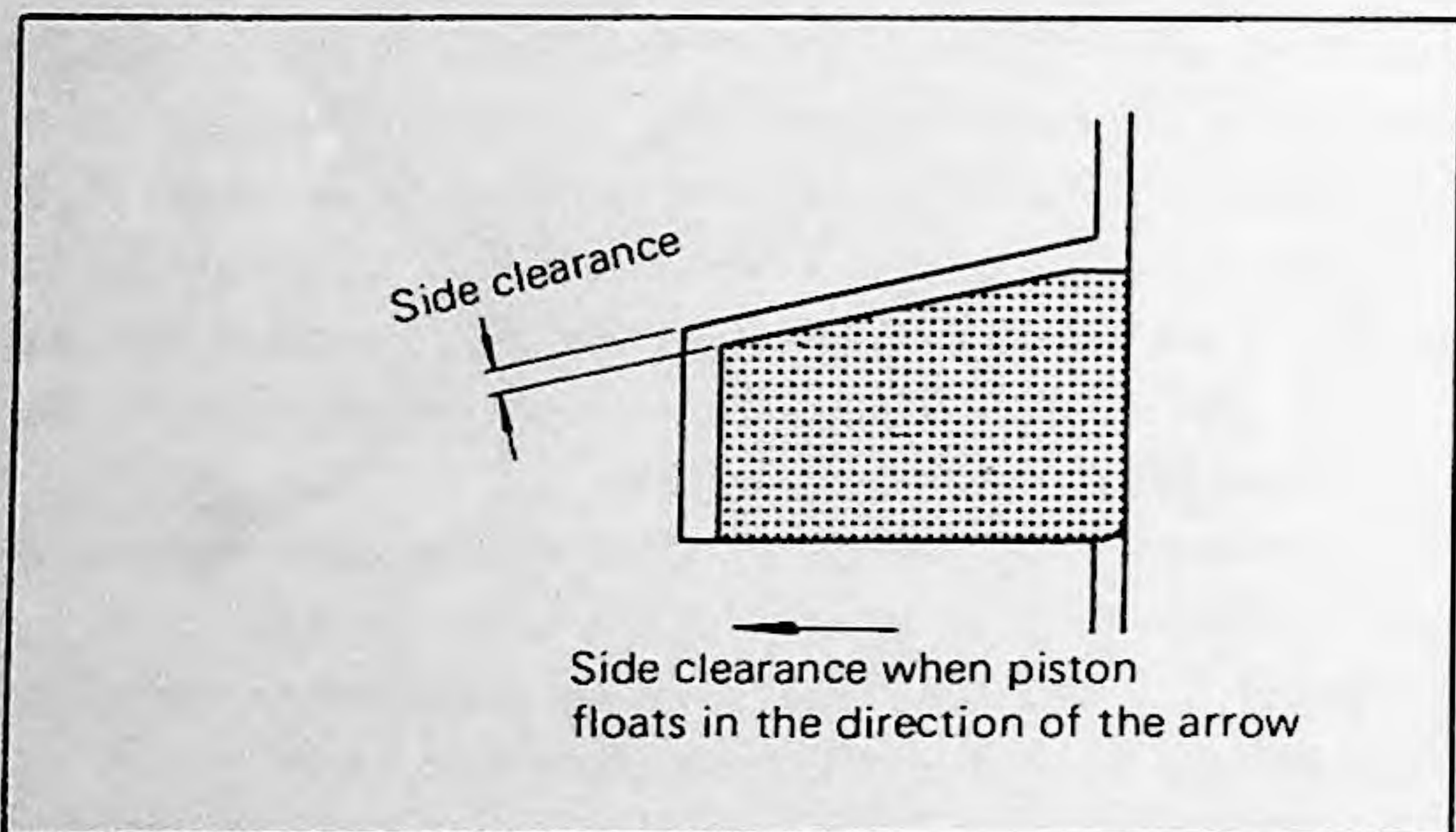


Fig. 8-44

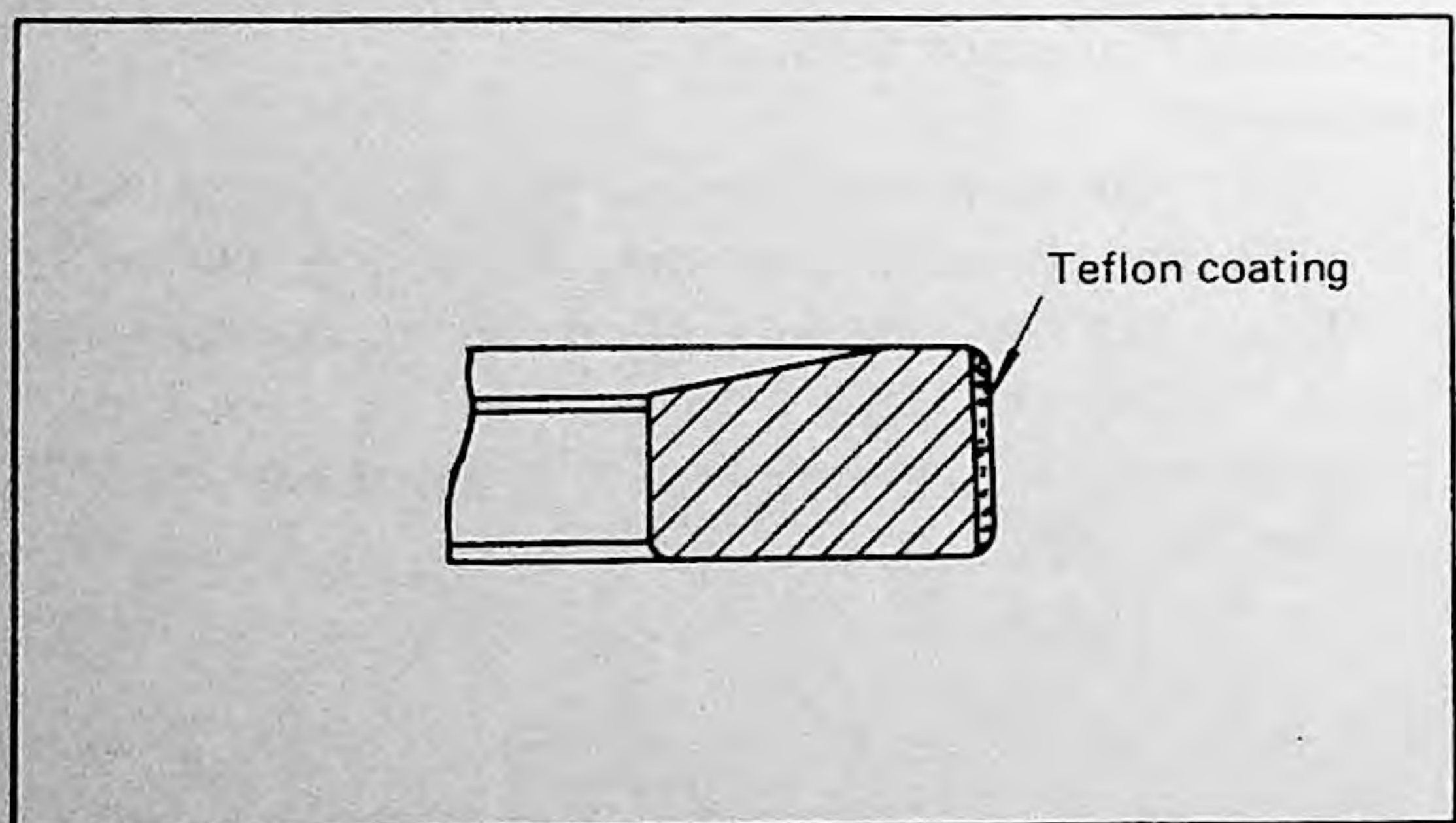


Fig. 8-45

8-5 PISTON AND PISTON RING MAINTENANCE (GP292B)

8-5-1

The L-shaped piston rings featuring the following three improvements:

- (1) Better sealing
- (2) Higher output
- (3) Improved radiant efficiency

8-5-2

Remove the piston ring from the piston, and place it in the cylinder so that it is in tight contact with the cylinder wall. By using the piston head, position the ring in parallel to the cylinder top edge. Measure the ring end gap with a feeler gauge. If the gap measured is in the range of 0.0012 to 0.0020" (0.3 to 0.5 mm), the ring is in satisfactory condition. If more than 0.0020" (0.5 mm), the ring face is excessively worn.

Remove the ring from the cylinder and keep it in a free position. Then, measure the ring end gap. If the gap measured is less than 0.0012" (0.3 mm), the ring is considered to be fatigued with heat. Replace it with a new one; otherwise, power loss or ring breakage may result. When installing a ring on the piston, avoid opening the end gap apart more than 0.64" (16 mm), because the ring may break.

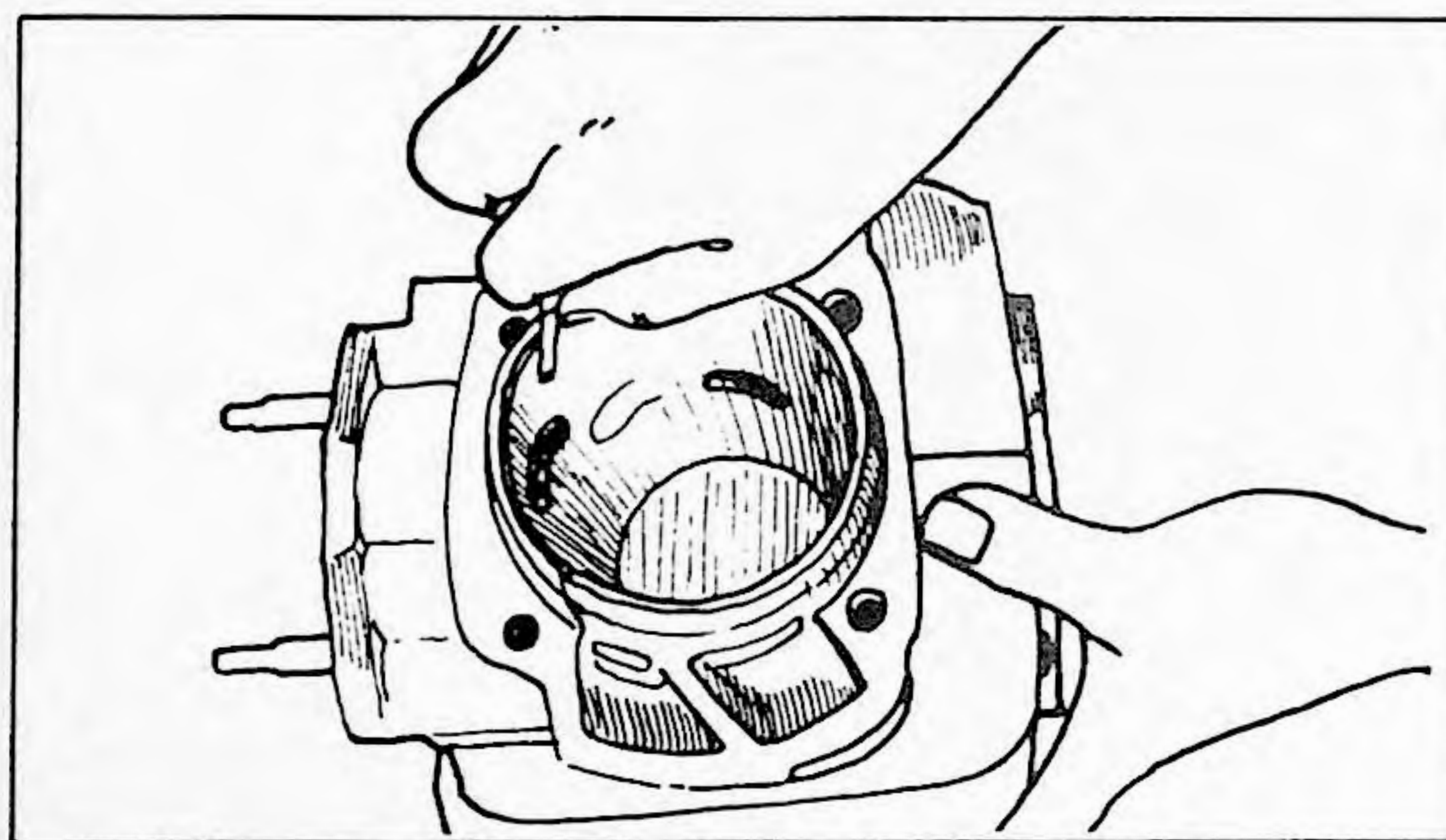


Fig. 8-46

8-5-3

In addition to the description referring to the judgement of the condition of piston rings, the following check-ups should be made:

- (1) Check the piston ring for sticking to the piston groove.
- (2) Check for scuffing by the piston rings.
- (3) Check the piston ring face for contact with the cylinder wall.
- (4) Check the piston ring bottom for contact with the groove:

Remedies:

- (1) If any piston ring is found stuck, poor sealing will result.
- (2) If the cylinder wall is scuffed, poor sealing will result as in the case of the piston ring being stuck. In the above two cases, the piston ring should be replaced with a new one, and at the same time, the cylinder wall should be checked for scratches.
- (3) Whether the contact between the piston ring and the cylinder wall is good or not will have a great effect on sealing. The entire area of the piston ring face must be in tight contact with the cylinder wall. If excess wear is found on the upper or the lower half of the piston ring face, the piston ring groove is considered to be worn unevenly, causing the ring to twist. (See Fig. 8-48)
If imitation piston rings (other than genuine Yamaha parts) are used, such defects as mentioned in (3) and (4) above may easily occur, and in the worst case, serious engine troubles may result.
- (4) When a good seal between the piston ring bottom and the ring groove bottom is noticed, the piston ring is considered to smoothly slide in and out on the ring groove bottom in a correct manner.

8-5-4

Before replacing the piston ring, remove carbon accumulations from the gap between the ring and the groove. The piston ring must be installed so that the locating pin knocked in the groove is between both ends of the ring as illustrated. This is the most vital requirement to be observed when the piston is inserted into the cylinder.

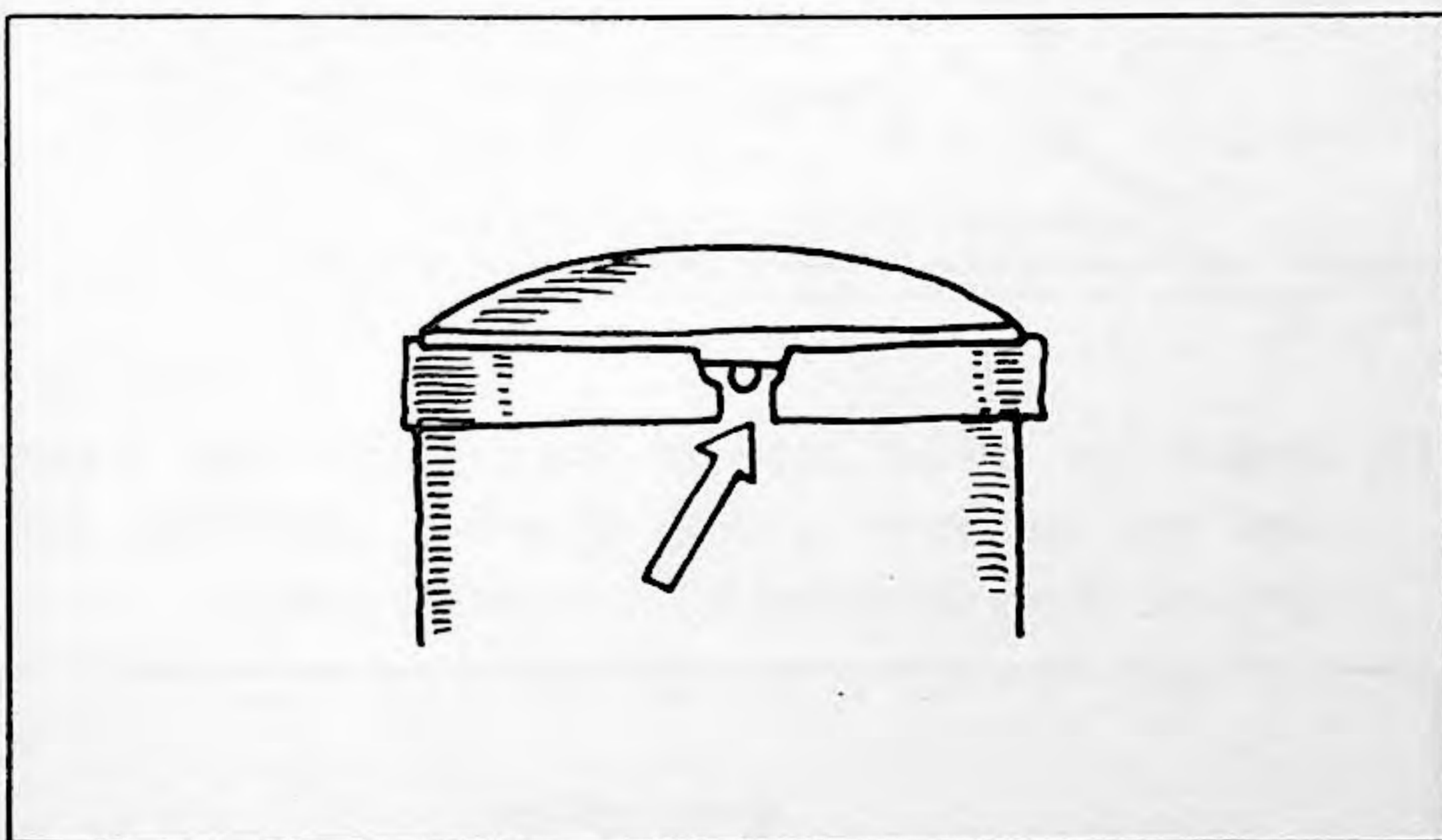


Fig. 8-47

8-5-5

The up and down movement of the piston ring in the piston groove can be calculated from the side clearance as illustrated. This side clearance is created by wear on the ring bottom. If the side clearance is measured more than 0.0008" (0.2 mm), the ring should be replaced. The illustration shows the sectional view of a new piston ring installed in the ring groove.

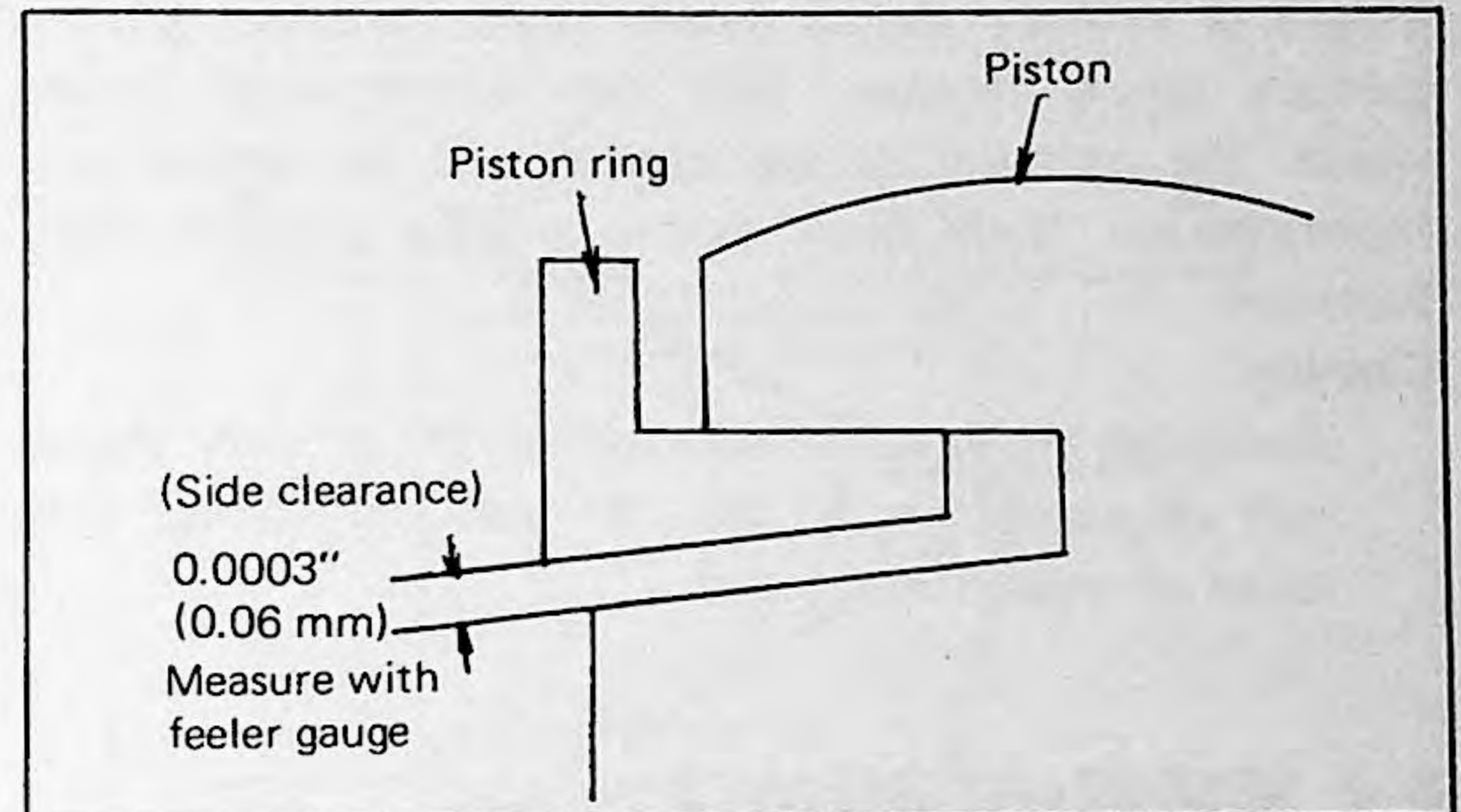


Fig. 8-48

CHAPTER 9. DRIVE TRAIN AND CHASSIS MAINTENANCE

9-1 PRIMARY SHEAVES

Very little maintenance of the primary sheaves is necessary, however, periodic removal, checking and lubrication is advisable. The mating surfaces of the crankshaft and the sliding sheave should be lubricated with molybdenum disulfide grease. Any warpage of either the primary fixed sheave or primary sliding sheave might indicate improper primary spring tension. The four counterweight hooks inside the primary sheave cap should be periodically lubricated at their pivot points with a graphite spray lubricant.

Caution:

Excessive amounts of lubricant on the primary sheave will be transferred to the "V" belt and slippage may occur at engagement speed.

9-2 SECONDARY SHEAVES

After approximately 40 hours riding time, sliding secondary sheave should be removed and the secondary shaft greased. This will keep the sheave from binding up from lack of lubrication.

9-3 DRIVE-BELT

Tension of the drive-belt is adjusted by maintaining a pre-determined distance between the centers of the primary and secondary sheaves. It should be 10.8" (270 mm). Adjustment is made by shifting the engine after loosening the four mounting bolts.

Note:

New belt width is 1.24" (31 mm). Replace the belt if it is worn to a width of 1.04" (26 mm).

9-4 PRIMARY SHEAVE AND SECONDARY SHEAVE ALIGNMENT

The two sheave assemblies must be parallel with one another for the drive-belt to obtain maximum grip and minimum wear. Use the special sheave gauge that comes in our special tool kit.

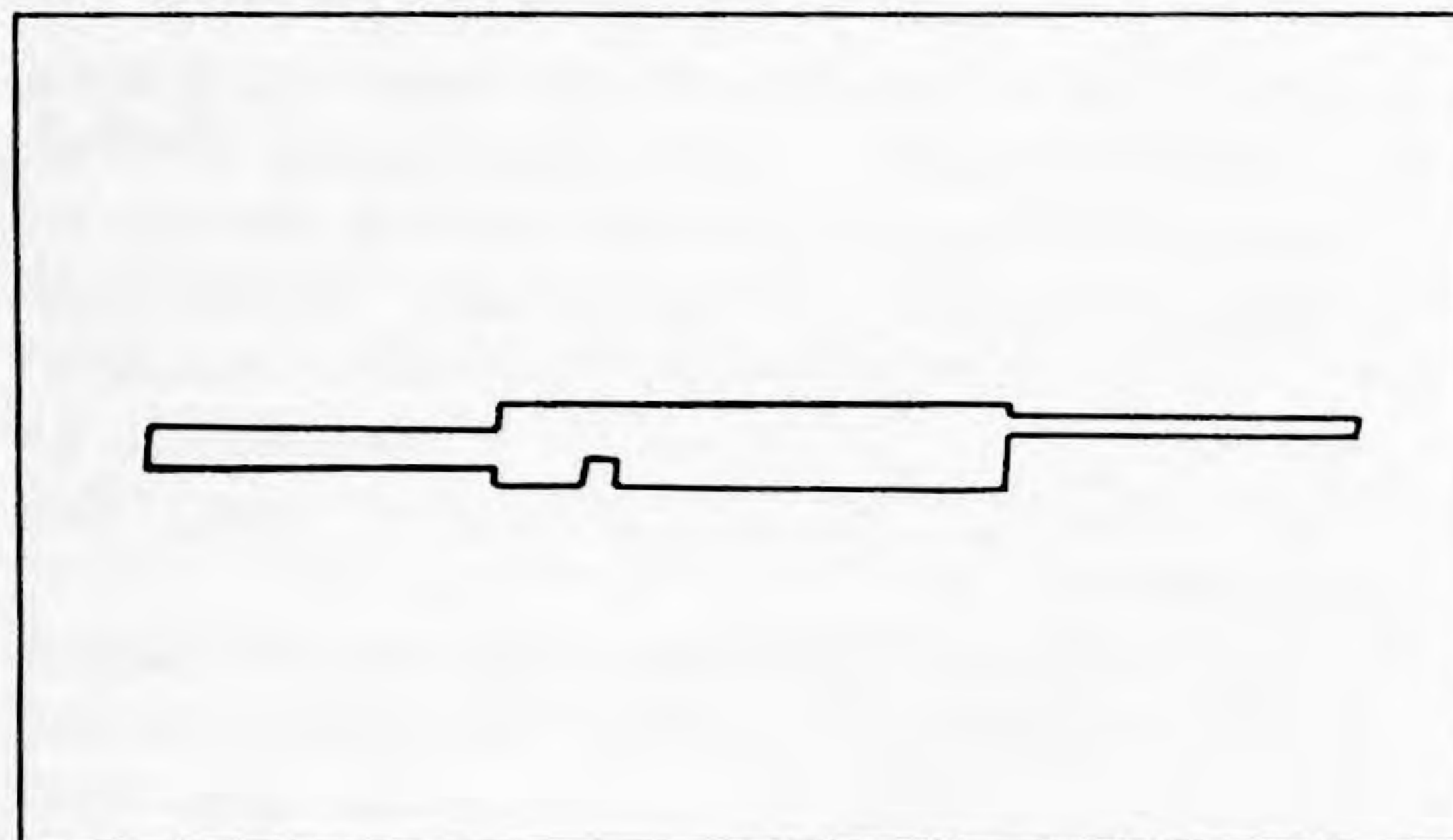


Fig. 9-1

Each sheave must be adjusted at two points.

- (1) Distance between centers of sheaves.

Adjust the distance between the centers of the primary shaft and the secondary shaft to 10.8" (270 mm).

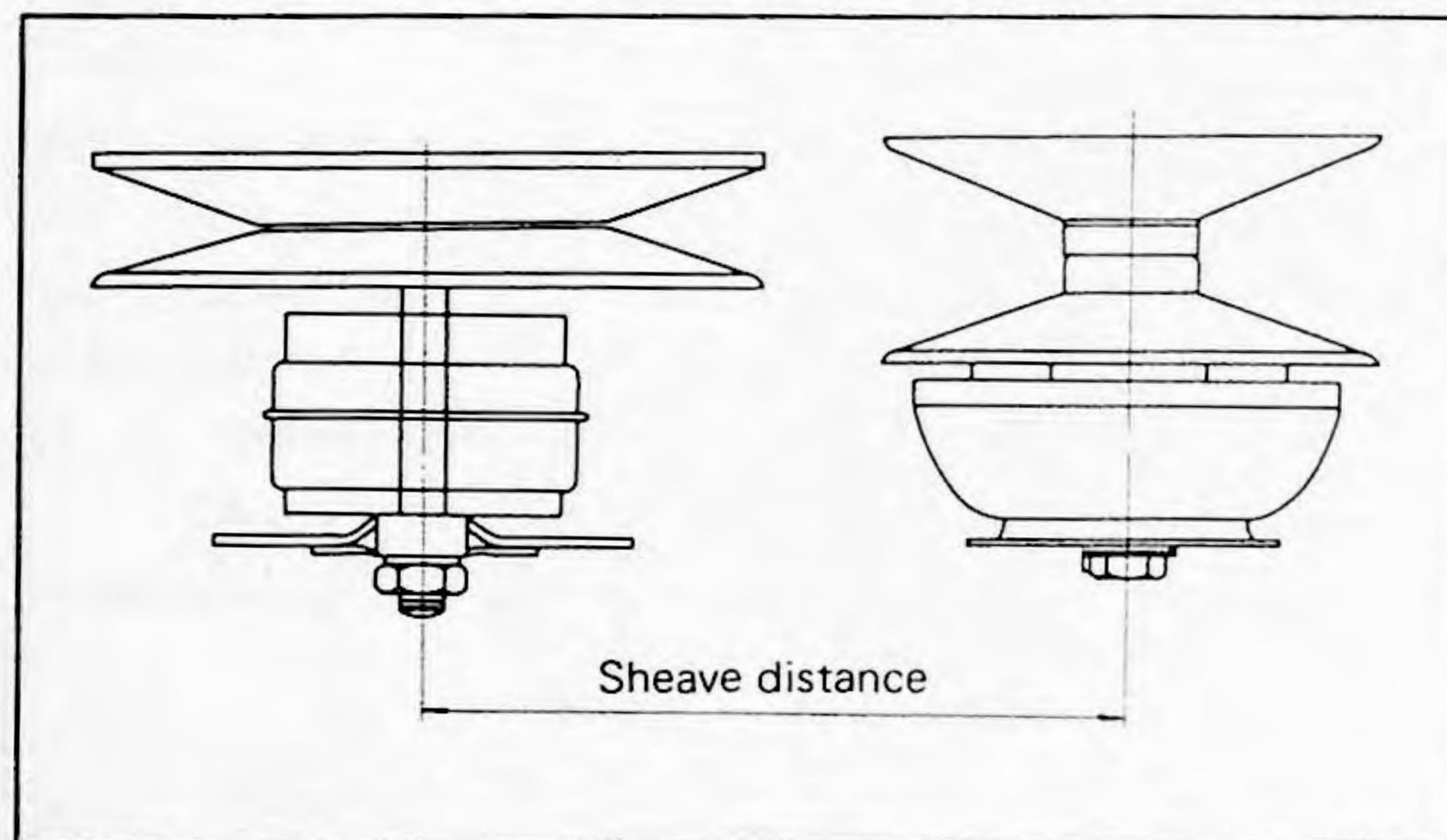


Fig. 9-2

- (2) Adjust the off-set between the primary fixed sheave and the secondary sliding sheave as specified. The amount of off-set varies from model to model.

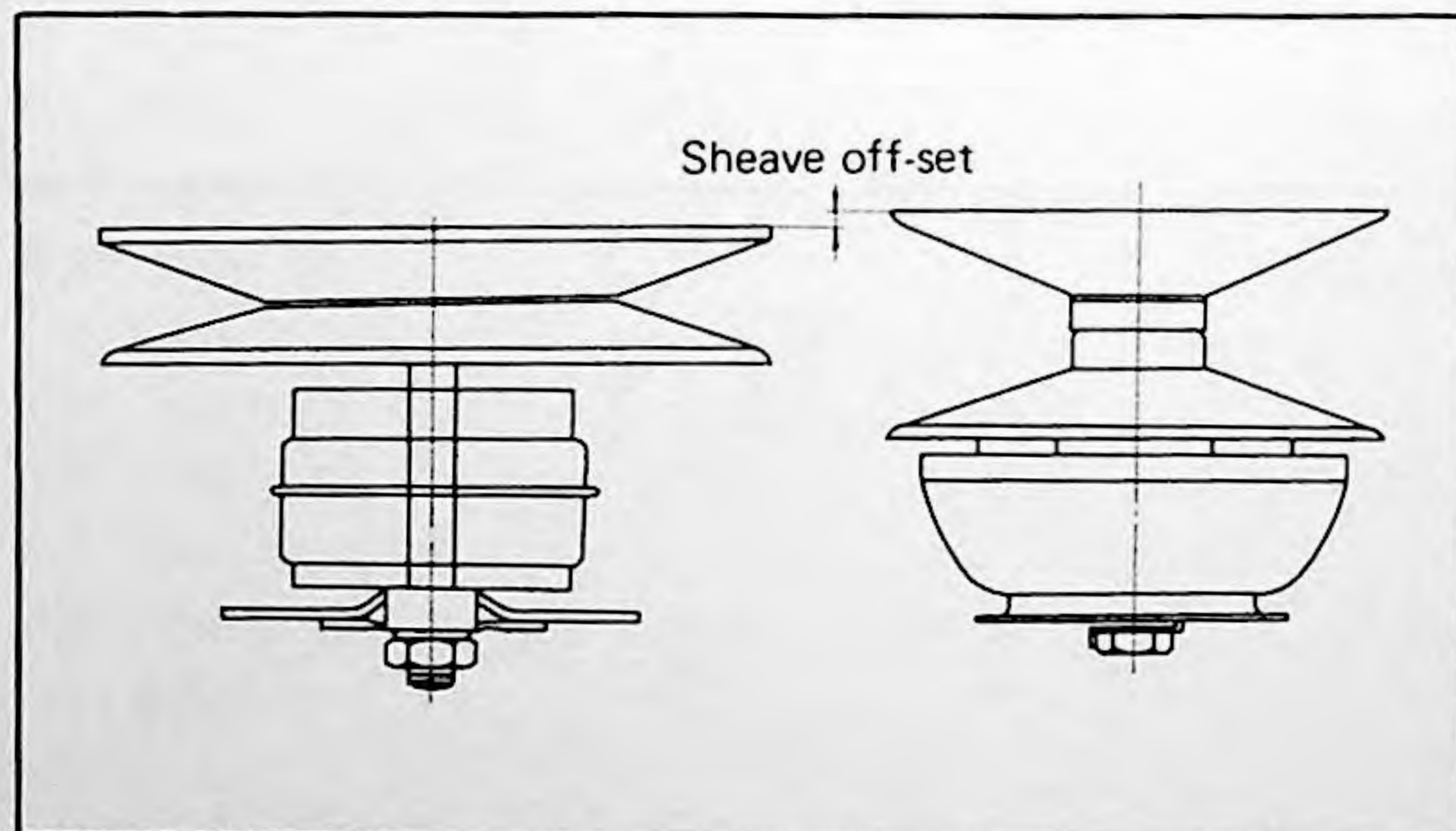


Fig. 9-3

- (3) How to set distance between centers of sheaves.

The distance between the centers of the sheaves can be set by moving the engine back and forth. To move the engine, the four engine lower bracket mounting bolts should be loosened.

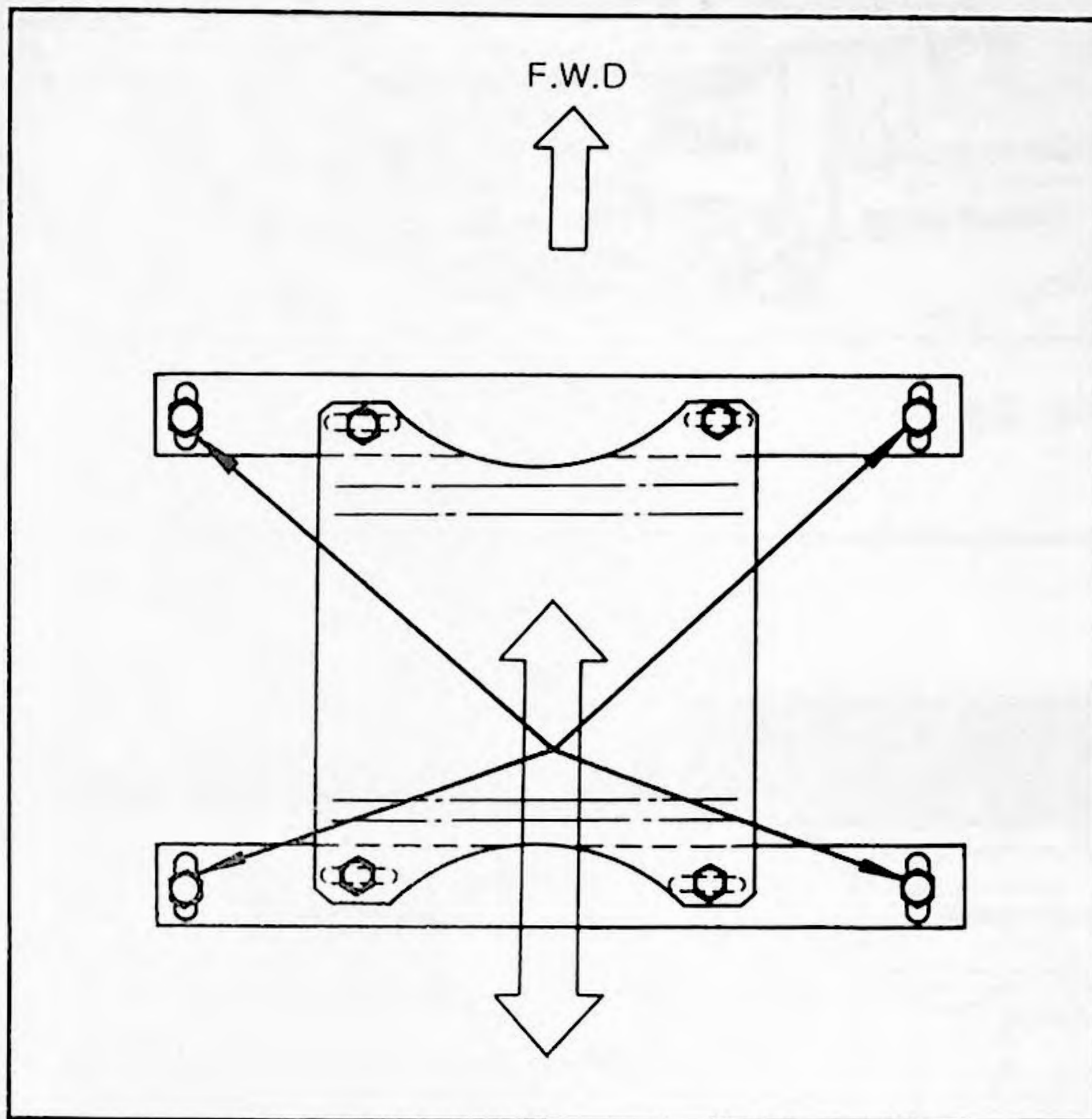


Fig. 9-4

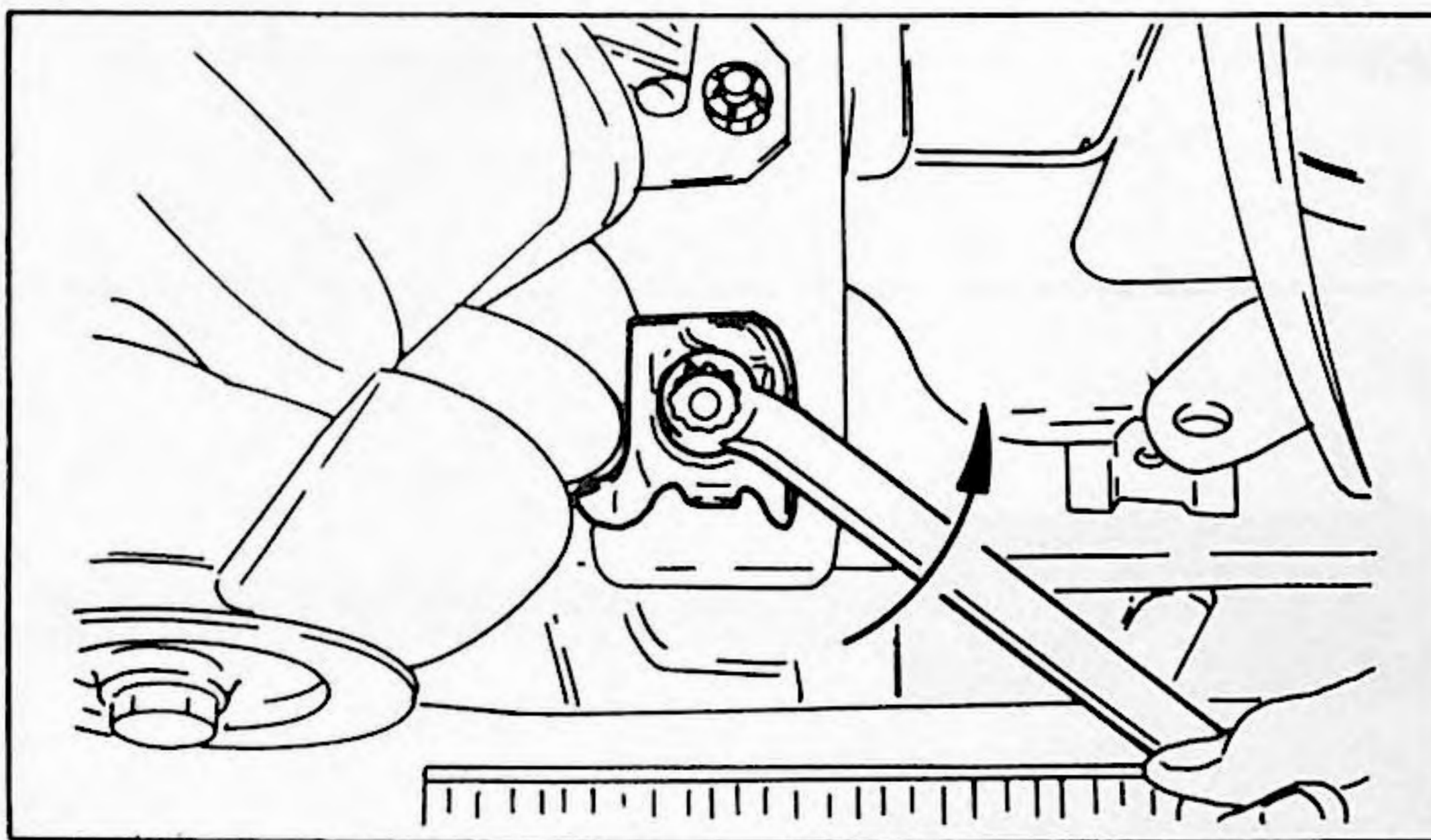


Fig. 9-5

- (4) How to set the off-set between sheaves.

The sheave off-set can be set by moving the engine sideways.

To move the engine, the four engine upper bracket mounting bolts should be loosened.

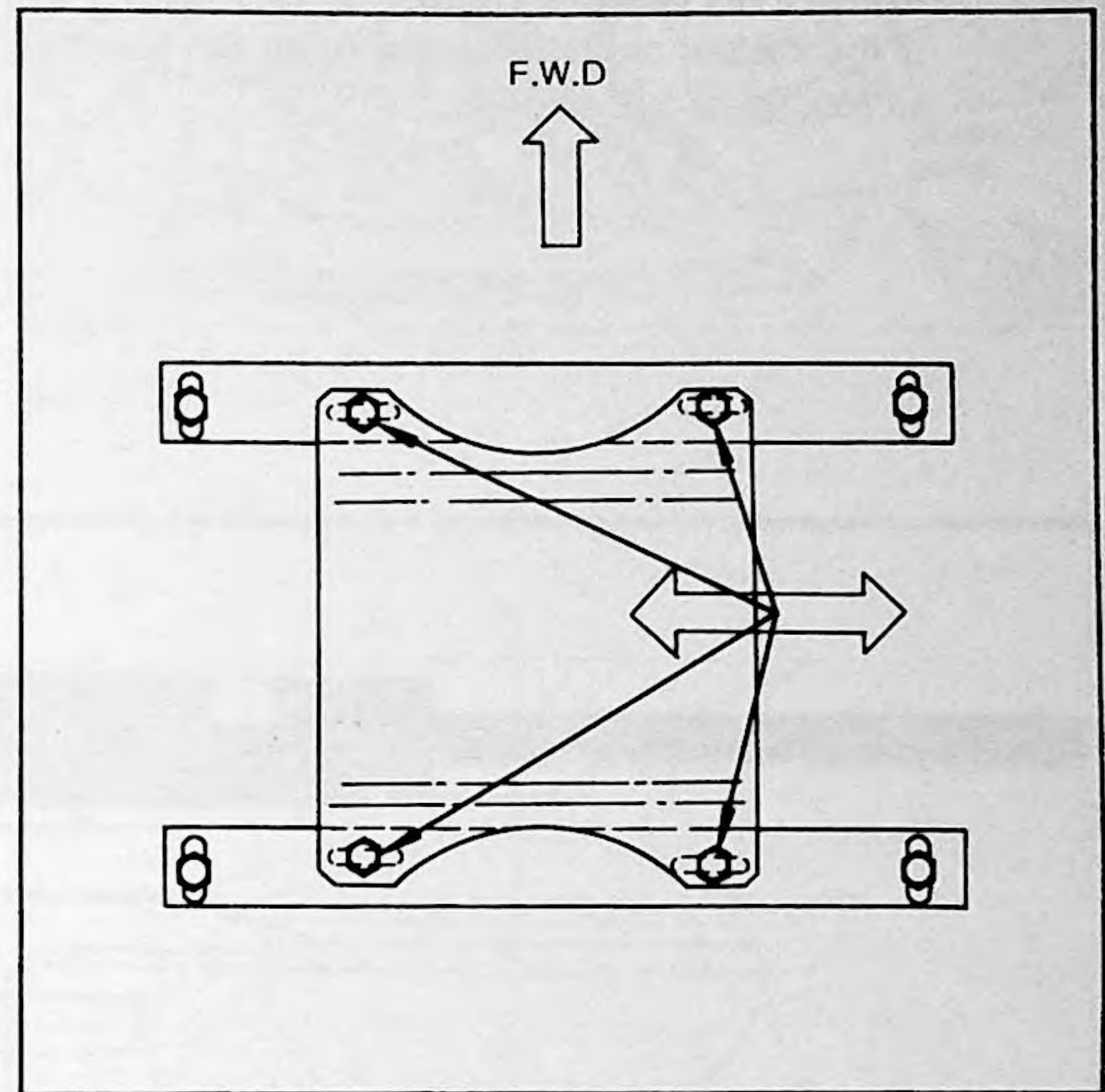


Fig. 9-6

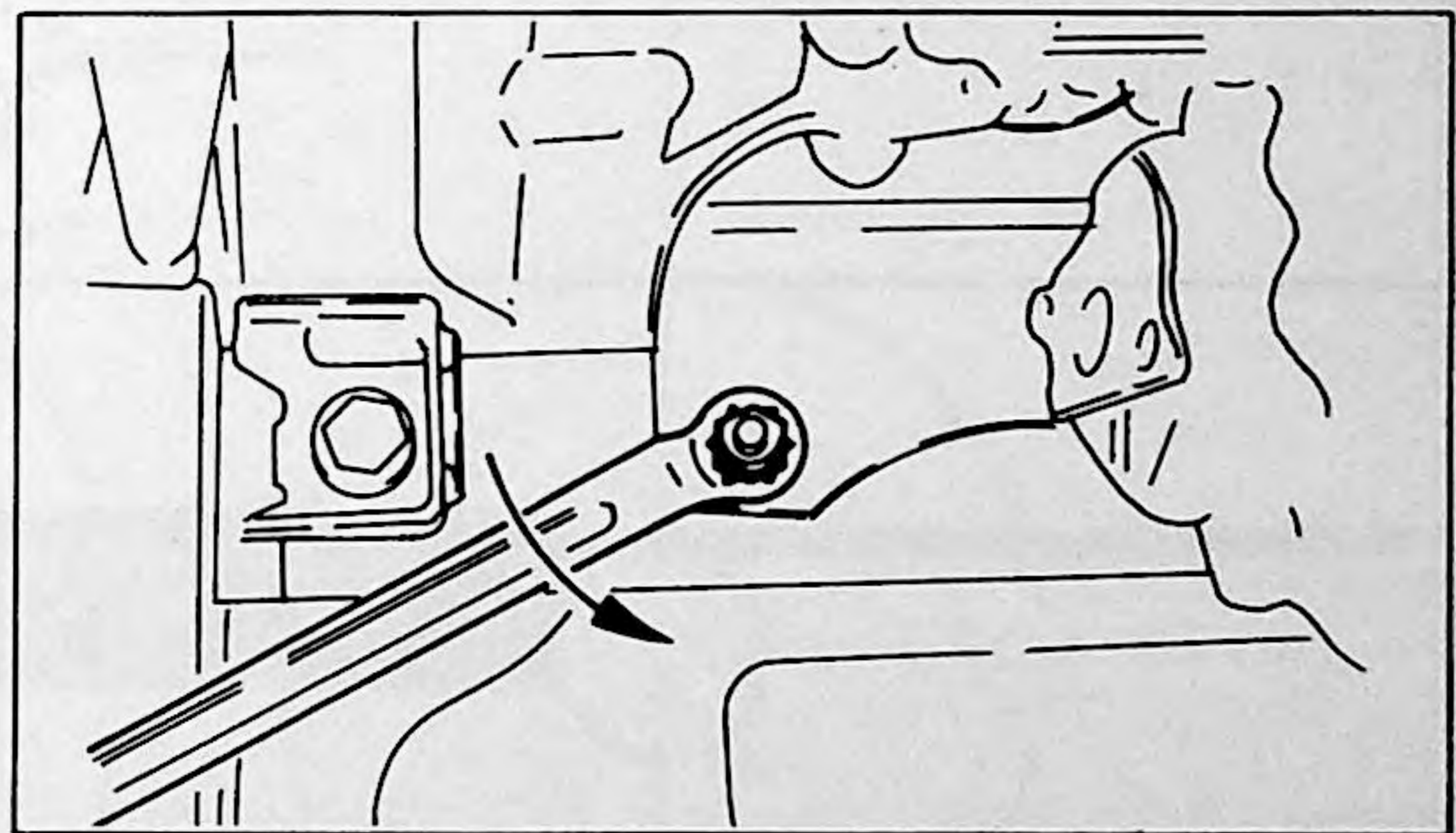


Fig. 9-7

(5) Using the sheave gauge.

(a) Sheave off-set.

Remove the V-belt, and allow the secondary sliding sheave to contact the secondary fixed sheave. Then, as illustrated, place the sheave gauge against inner sheave surfaces.

If the sheaves are parallel, the gauge will touch at all four spots (see arrows).

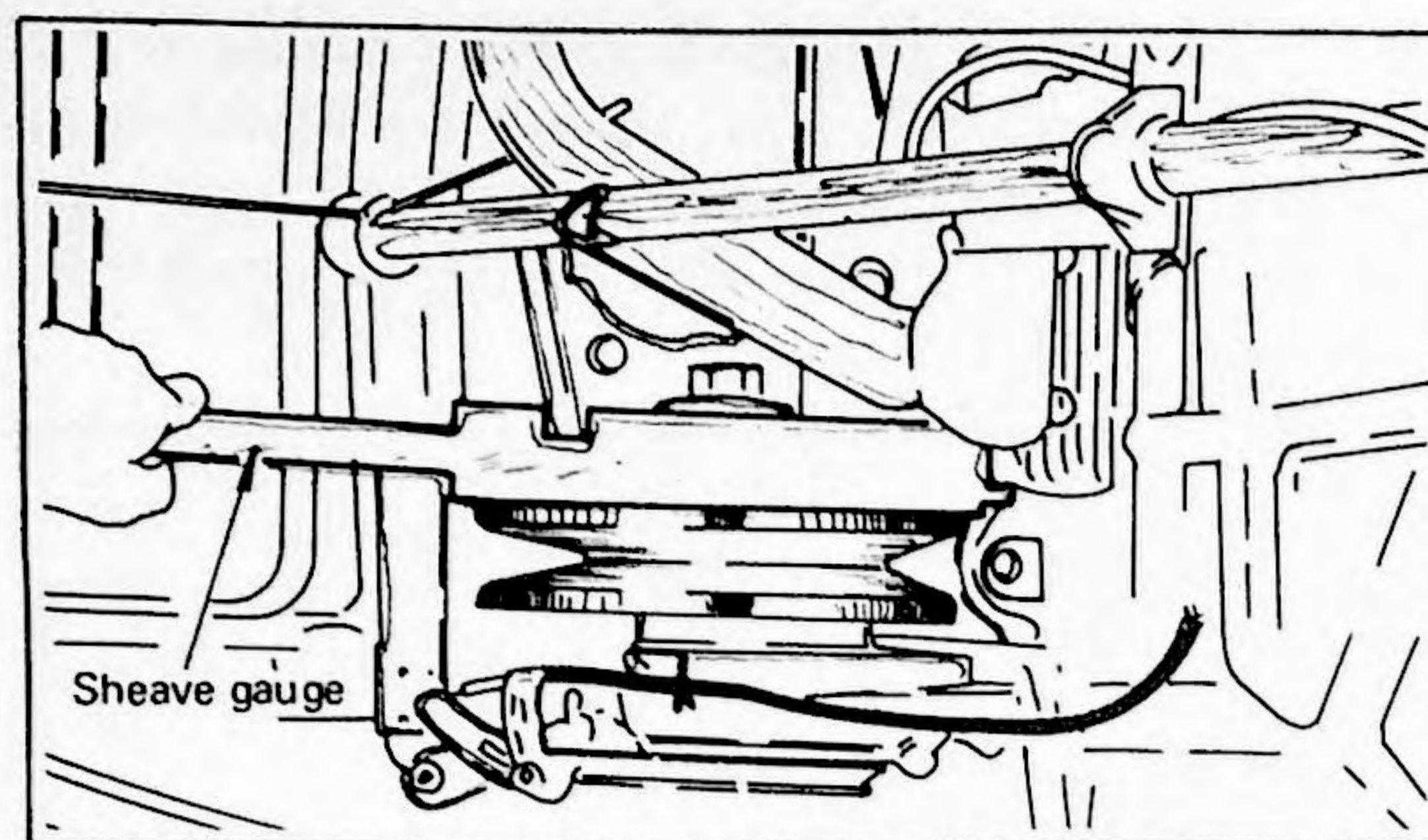


Fig. 9-8

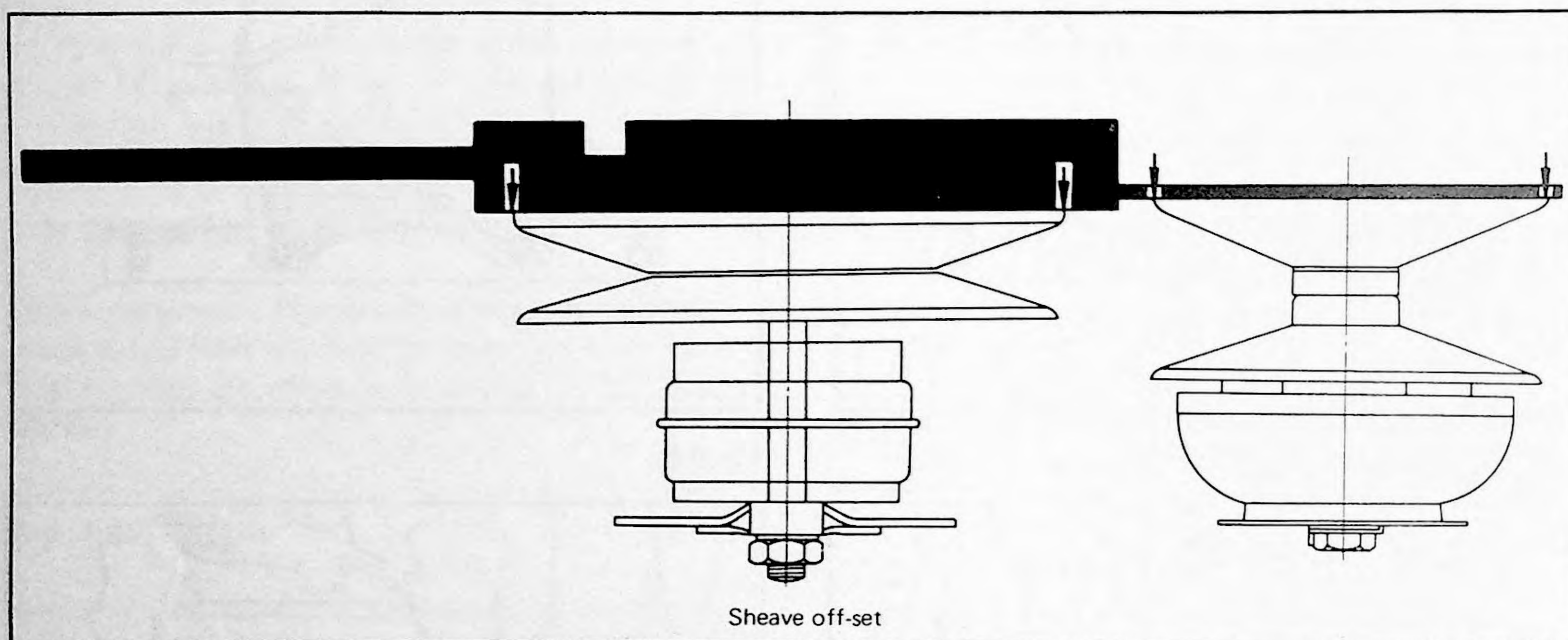


Fig. 9-9

(b) Distance between sheaves

Remove the V-belt, and push apart the secondary sliding sheave. Then, measure the distance between the primary shaft and the secondary shaft by placing the 9.2 in. (233 ± 0.1 mm) scale side of the sheave gauge between the shafts. If both sheave shafts contact the sheave gauge at the positions indicated by arrows, the distance is correct.

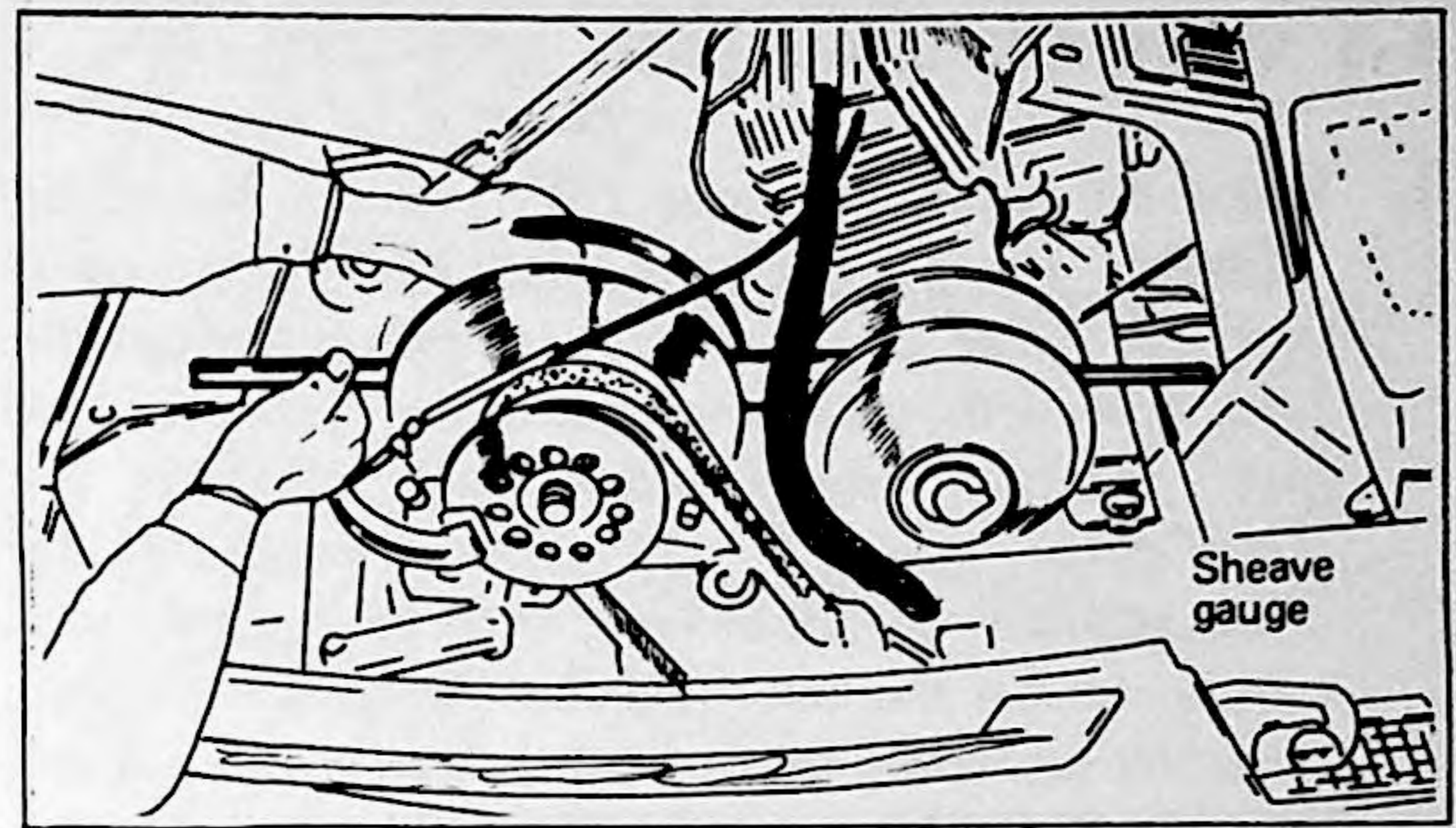


Fig. 9-10

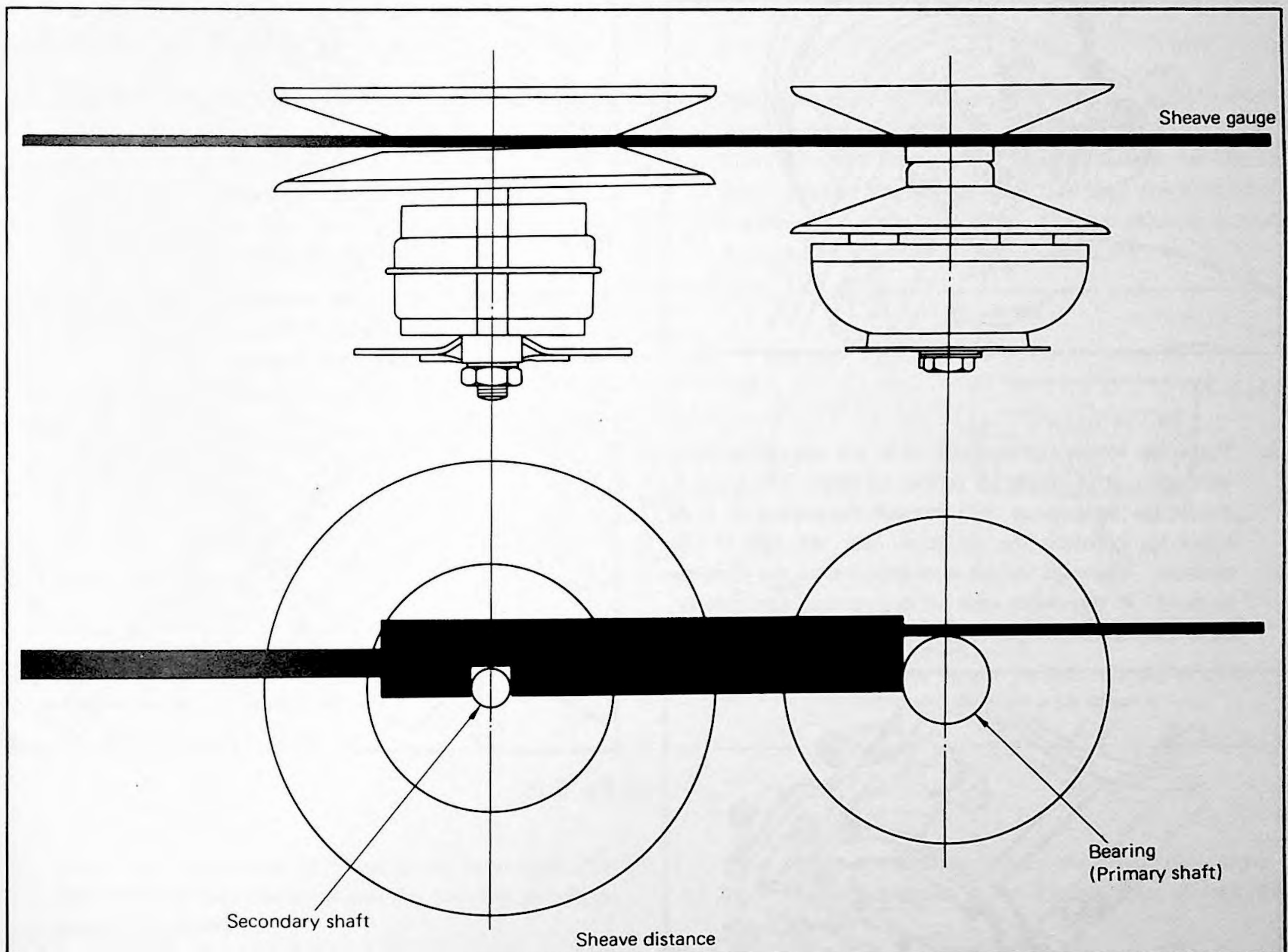


Fig. 9-11

9-5 CHAIN AND CHAIN CASE

1. Every 40 hours the drive chain tension should be adjusted. Remove the rubber oil filler tube located near the center of the chain case. Reach through the filler hole with your fingers and feel the chain free play. Without pushing hard in either direction, the chain should have 0.4" (10 mm) movement. If the chain requires an adjustment, then follow this procedure: loosen the two hold-down bolts (see arrows); grasp the secondary shaft housing at the brake mounting flange and lift up or push down, depending on the adjustment needed; check the chain for proper free play and tighten the bolts. Make a final tension check.

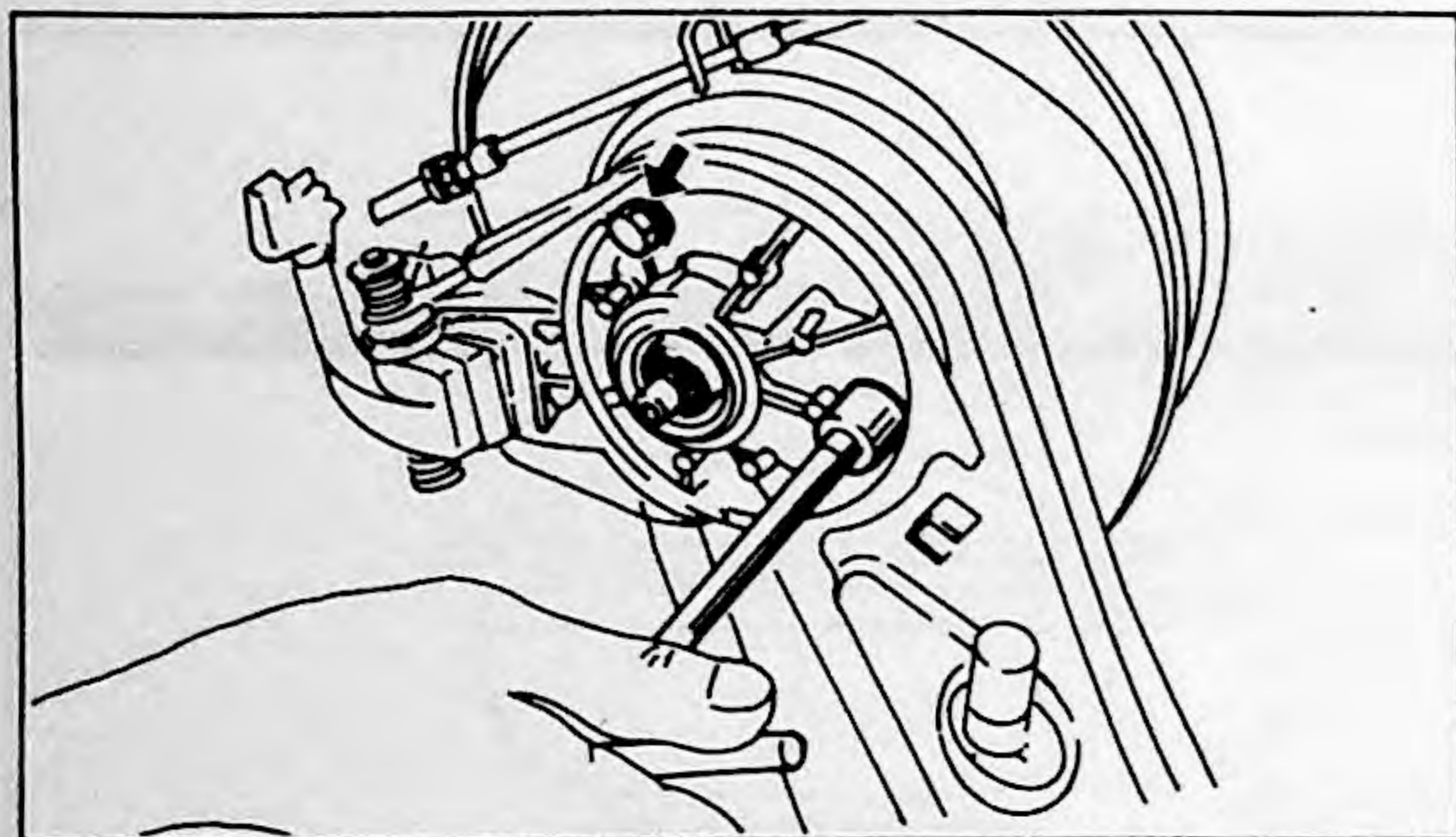


Fig. 9-12

2. The cover located at the bottom of the chain case has a window in it to check for proper oil level. The oil level should be 'topped up' (fill through the rubber oil filler tube) to maintain the oil level near the top of the window. Never let the oil level drop below the window bottom. If the chain case oil is emptied completely, then refill with 24 fl.oz (710 c.c.) of 10W/30 motor oil.

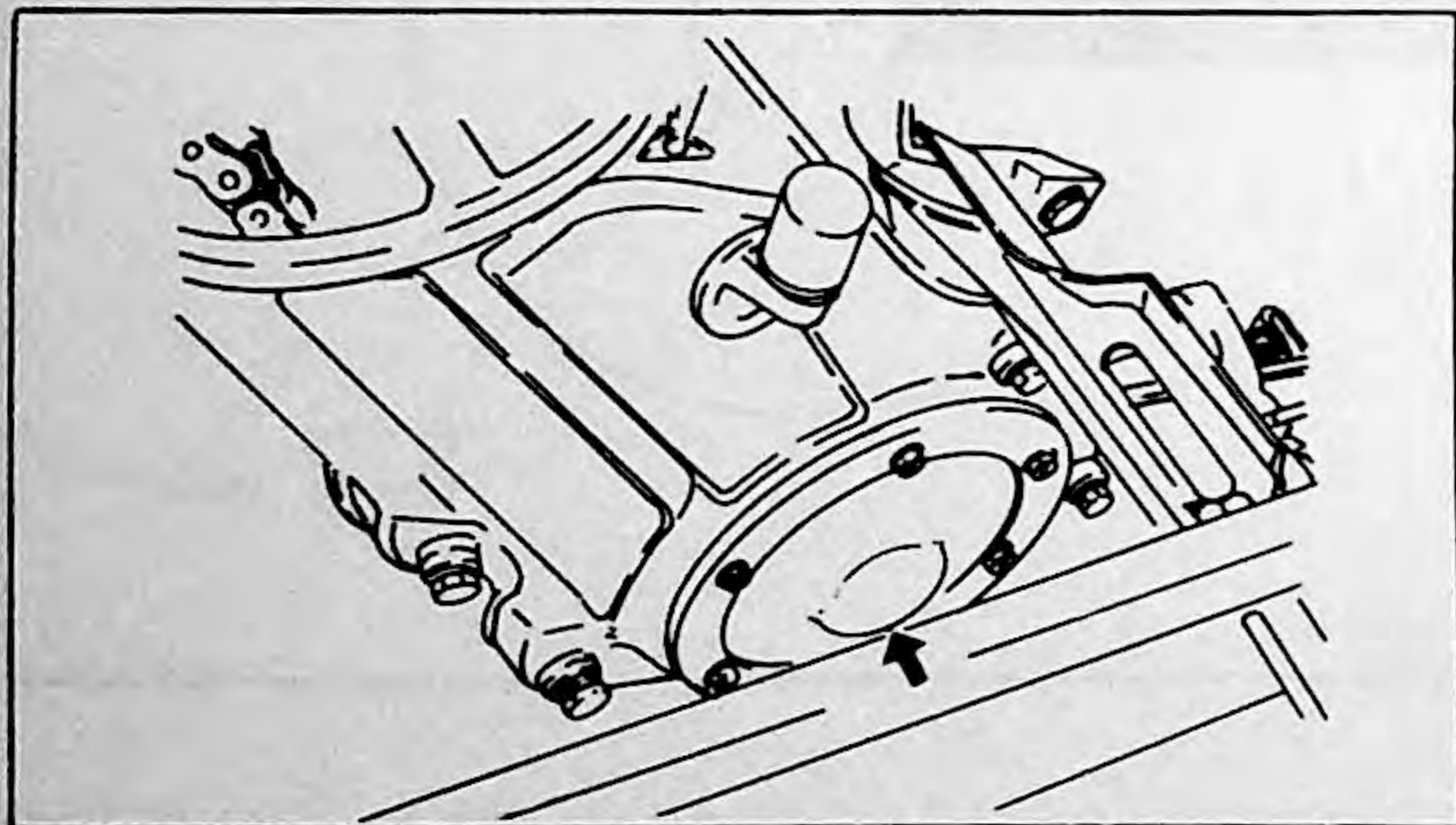


Fig. 9-13

9-6 BREAKES

The brake pads should each be adjusted to within 0.40" (10 mm) of the brake disc.

1. This picture shows how to adjust the inner brake pad. There is a bolt and lock nut assembly. Back off the lock nut and screw in the bolt, forcing the pad toward the disc. Cinch down the lock nut.

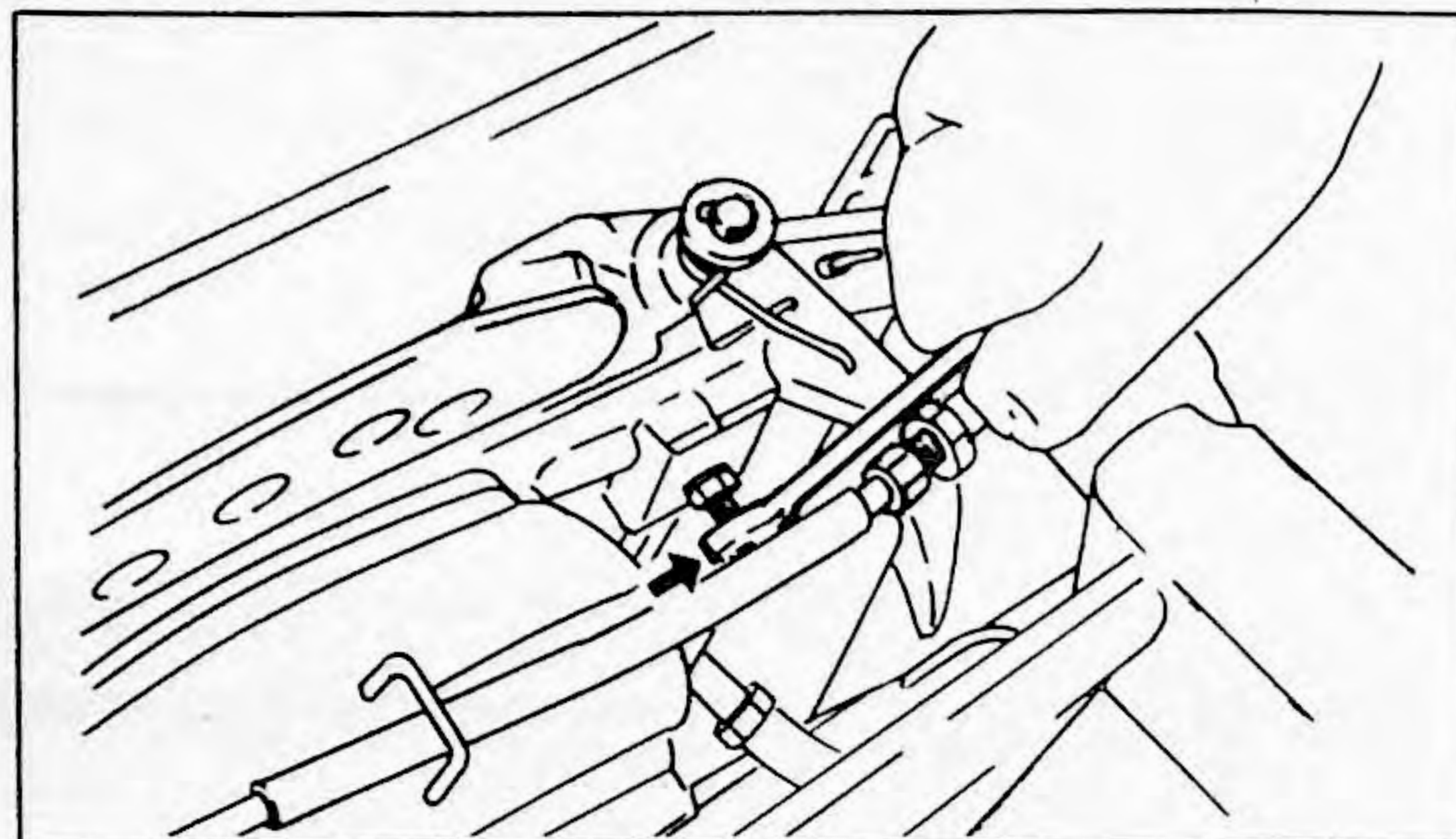


Fig. 9-14

2. Adjustment for the outer pad is located at the end of the brake cable. Back off the lock nut and adjust the cable until the brake pad is within tolerance.

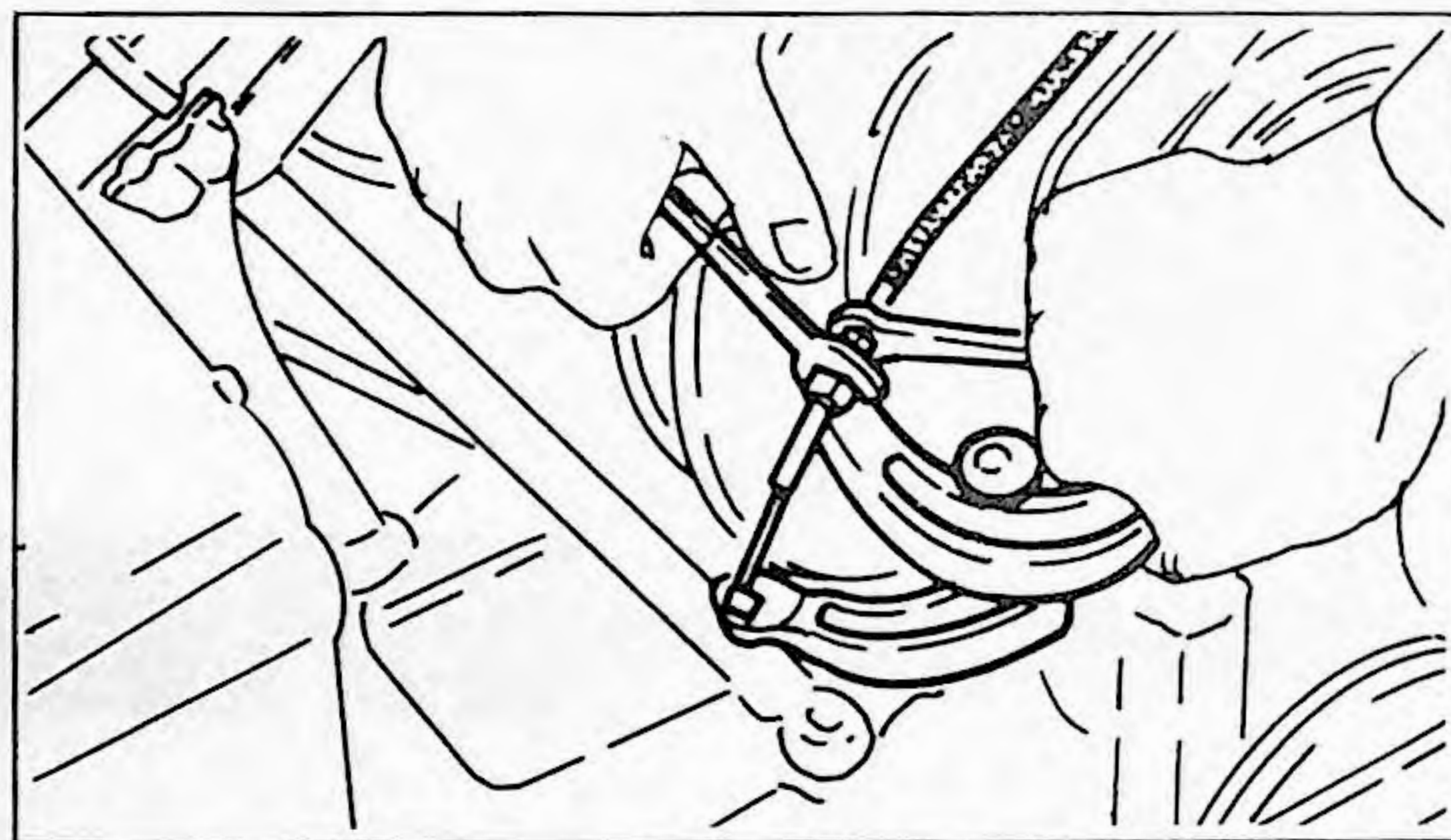


Fig. 9-15

9-7 TRACK

The track should be checked for correct adjustment before any long trip and after replacement.

Check the track tension as shown in the picture. The deflection should be 1" (25 mm) when pulled by a 22 lbs. (10 kg) force. Loosen pivot arm nuts on right and left sides and make adjustment to bring the slack within tolerance. Be sure to make adjustment equally to each side so that basic track alignment is maintained.

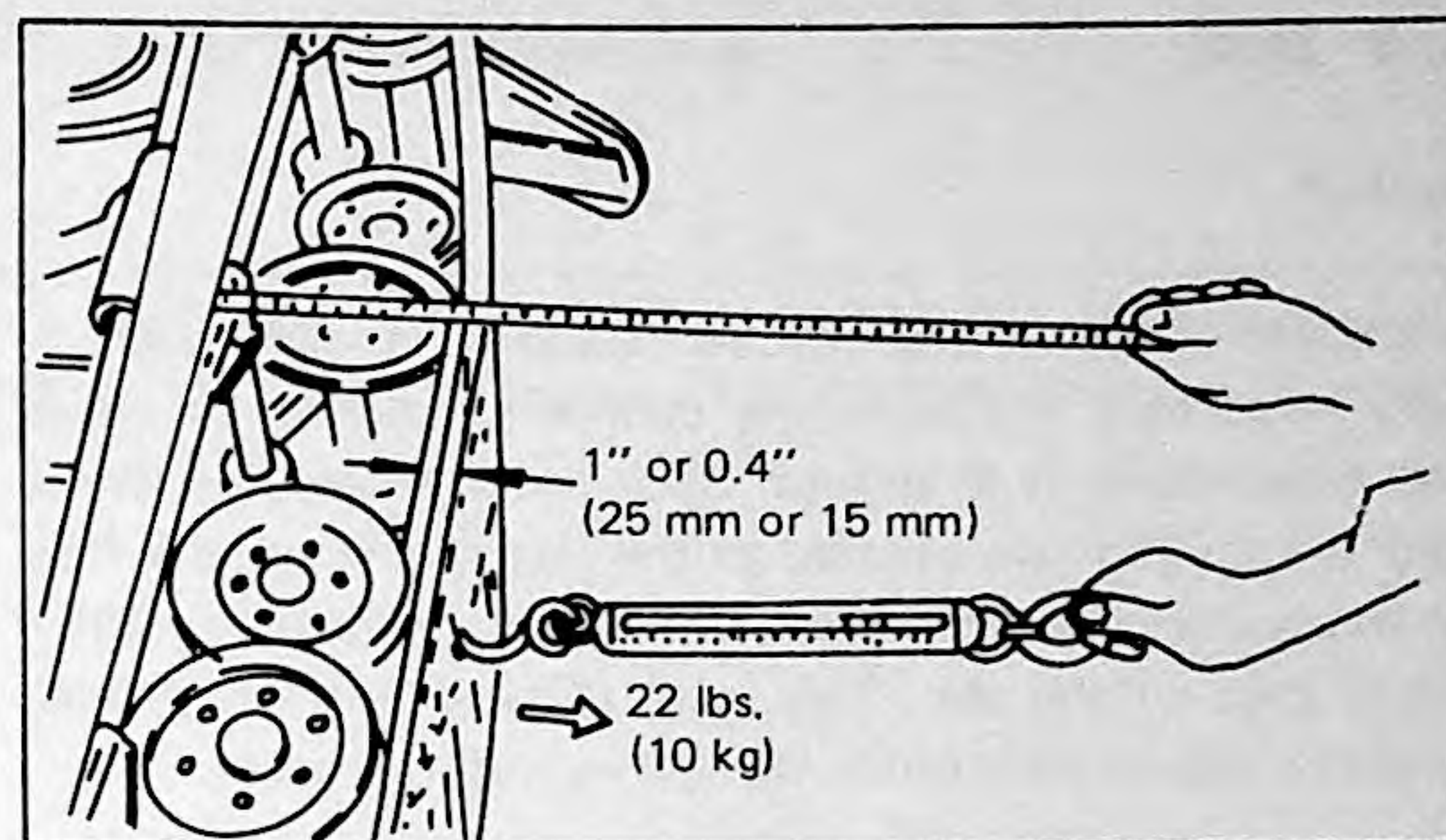


Fig. 9-16

9-8 ADJUSTING THE TRACK

1. The track adjust screws should be tightened little by little and alternately between the right and the left sides. If they are tightened one by one and with a quick motion, the rear arm may be deformed.
2. The tension of the track should be adjusted, with the rear pivot screw nut loosely tightened.
3. The deflection of the track should be 1" (25 mm), when pulled by a 22 lbs. (10 kg) force.
4. Turn the track by running the engine with the rear of the machine raised, and make sure that the tension of the track is even at both sides. If the tension is uneven, it should be adjusted in the following manner.

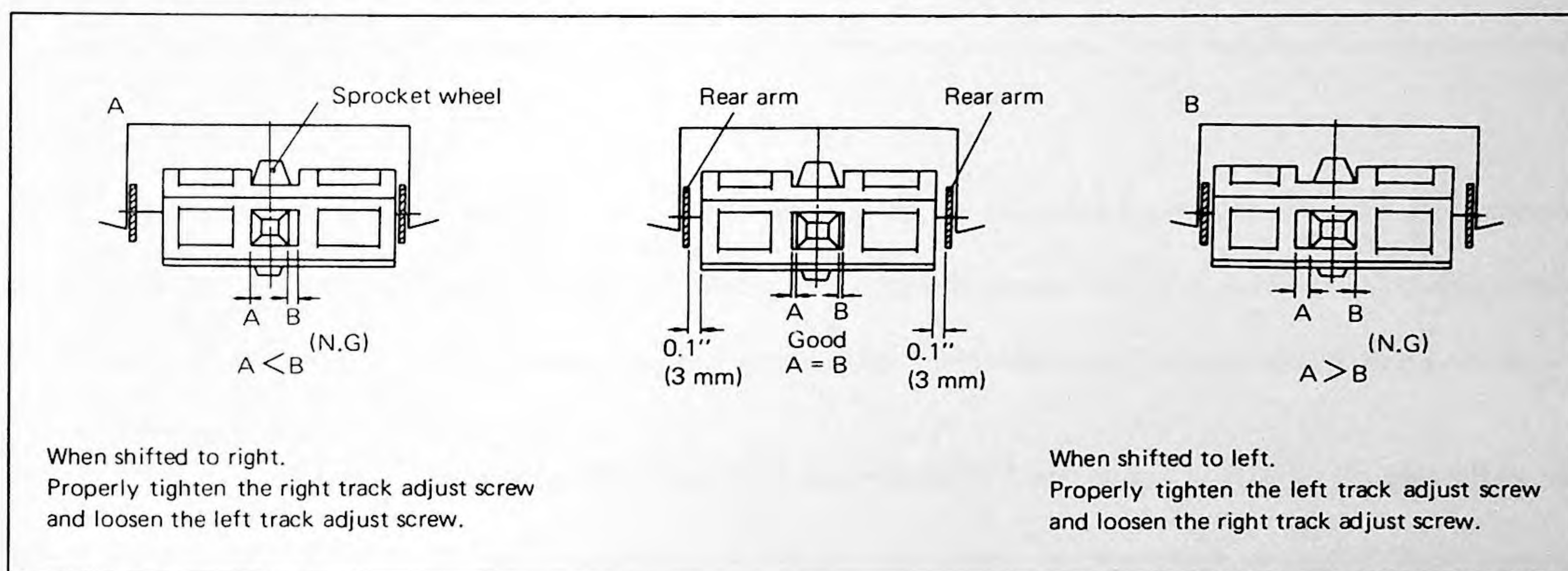


Fig. 9-17

5. After the track tension is adjusted correctly, the clearance between the track and the rear arm should be about 0.1" (3 mm).
The amount of clearance should be equal at both right and left tracks.
6. There must be a clearance between the frame and the rear arm so that the rear arm can operate correctly.
7. Fully tighten the rear pivot bolt nuts, and retighten the track adjust bolts. To prevent the nut from becoming

loose, drive a cotter pin into the rear pivot screw. Then, bend the adjust screw lock washer to lock the adjust screw.

Note:

If the track shows excessive wear, it should be replaced. Also, if the reinforcement rods are exposed, the track should be replaced and alignment checked prior to running the new track.

9-9 SKIS

9-9-1

Tightness of the steering column to the ski linkage system is very important in controlling parallelism of the skis while the snowmobile is in motion. Skis are supported on two 5 leaf springs that are pivoted at the rear of the ski and free to expand and contract by being set in a wear plate at the front part of the ski. This wear plate should be greased often to reduce friction on the spring and wear plate.

9-9-2

Parallelism of the skis is checked by measuring from center to center (outside of one ski to inside of other ski). Adjustment of parallelism is accomplished by adjusting the tie rod length. Correct center to center distance of the skis is 24.1" (613 mm).

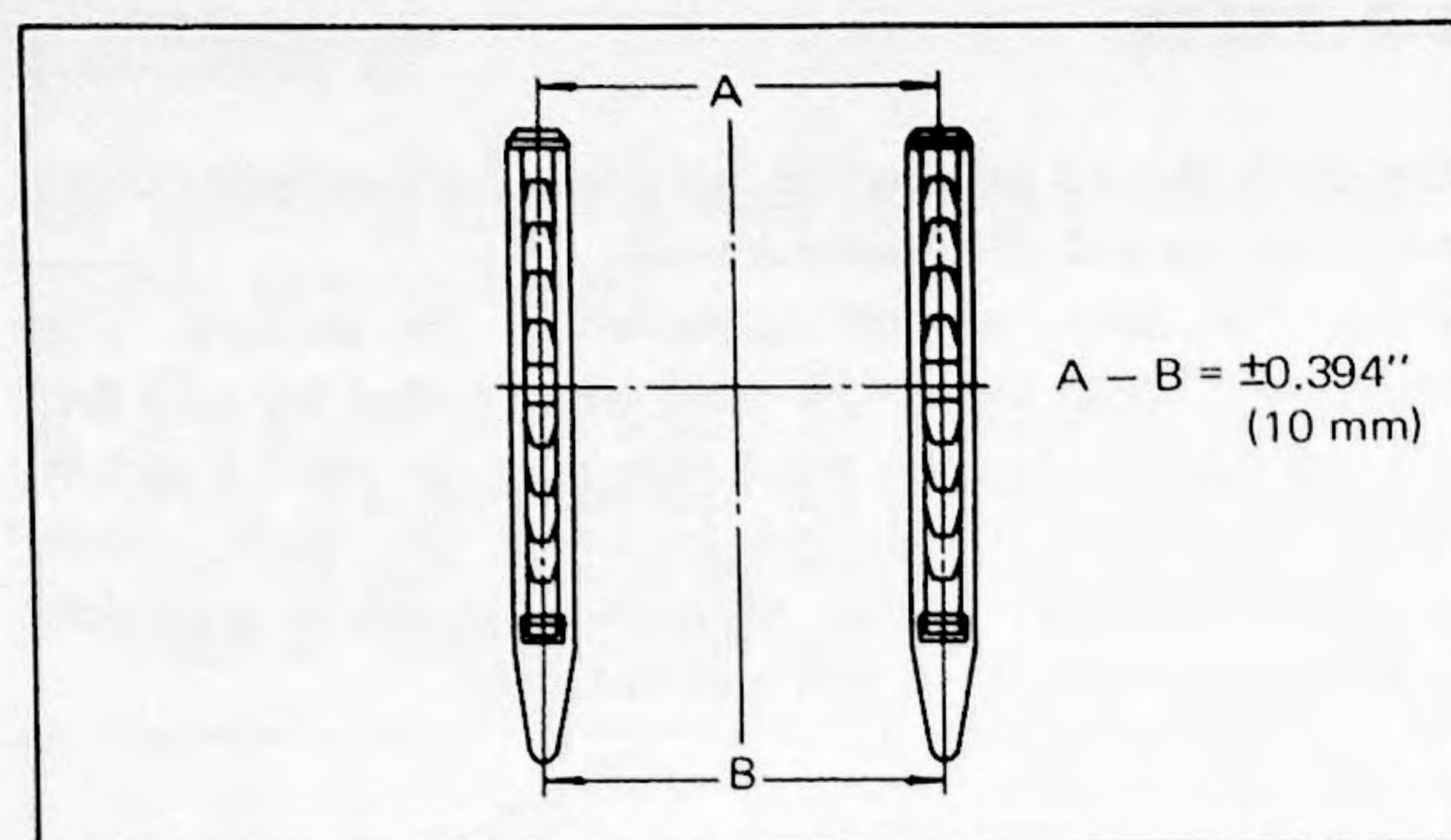


Fig. 9-18

Note:

Measure the distance between the skis (center to center) at the front ends and at the rear ends, respectively. If the difference of the value measured exceeds $\pm 0.394''$ (± 10 mm), adjustment is required.

APPENDIX 1. INSPECTION AND MAINTENANCE

INSPECTION

No.	DESCRIPTION	20 HR.	40 HR.	80 HR.	Seasonally
1	Tighten bolts/nuts	X			
2	Cracks or breakage	X			
3	Oil leakage	X			
4	Ignition timing	X			
5	Abnormal noise	X			
6	Lights and wiring	X			
7	Brake functioning	X			
8	Chassis reinforcements	X			
9	Power train	X			
10	Chain housing lubricant	X			
11	Chain tension		X		
12	Track tension		X		
13	Bolts/nuts re-tightening		X		
14	Ski alignment		X		
15	Removal of carbon (complete) Spark plug	X			
	Cylinder head & Piston dome		X		X
16	Cleaning/inspection of carburetor				X
17	Lubrication				

MAINTENANCE

- (1) Use Yamalube, or (2) a good 20 or 30 weight two-cycle oil for air-cooled engines, or (3) a quality, detergent, automotive 10W-30 oil (in that order of preference).
- The factory recommends Aeroshell Grease #7 which is a synthetic aircraft lubricant having a useful temperature range to 100°F.
- The factory recommends a molybdenum - disulfide grease. Shell Lithal MDS Grease and Aeroshell Grease #17 conform roughly to these specifications.
- 10W-30 detergent automotive motor oil.
- The factory recommends Shell Alvania #2 or #3 which is a moderately heavy, smooth, lithium soap base grease. All purpose.

ITEM	PERIOD			
	When Nec.	40 hours	80 hours	Seasonally
Autolube	1			
Autolube Pump Control Box				2
Primary Sheave Shaft			3	
Primary Sheave Weight Pivot Points			4	
Secondary Sheave Shaft			3	
Chain Case	4			4
Steering Bearings (two)			5	
Ski Pivot Points and Columns		5		
Ski Wear Plates		5		
Bogie Wheel Ass'y Pivot Points				5
Drive Axle Bearing (R)				5
Rear Axle Pivot Points				5
Guide Wheel Bearings				5

APPENDIX 2. CONVERSION TABLE

LENGTHS					
Multiply	By	To Obtain	Multiply	By	To Obtain
Millimeters (mm)	0.03937	Inches	Kilometers (km)	0.6214	Miles
Inches (in.)	25.4	Millimeters	Miles (mi.)	1.609	Kilometers
Centimeters (cm)	0.3937	Inches	Meters (m)	3.281	Kilometers
Inches (in.)	2.54	Centimeters	Feet (ft.)	0.3048	Meters
WEIGHTS					
Kilograms (kg)	2.205	Pounds	Grams (g)	0.03527	Ounces
Pounds (lbs.)	0.4536	Kilograms	Ounces (oz.)	28.35	Grams
VOLUMES					
Cubic centimeters (cc.)	0.061	Cubic inches	Imperial gallons	77.26	cu.in.
Cubic inches (cu.in.)	16.387	c.c.	Liters (ℓ)	1.057	Quarts
Liters (ℓ)	0.264	Gallons (U.S.)	Quarts (qt.)	0.946	Liters
Gallons (gal.) (u.s.)	3.785	Liters	Cubic centimeters (c.c.)	0.0339	Fluid ounces
U.S. gallons	1.2	Imperial gals.	Fluid ounces (fl. oz.)	29.57	cc.
Imperial gallons	4.546	Liters			
OTHERS					
Metric horsepower (ps.)	1.014	bhp.	Foot-pounds (ft-lbs.)	0.1383	m-kg
Brake horsepower (bhp.)	0.9859	ps.	Kilometers per liter (km/ℓ)	2.352	gpm
Meter kilogram (m-kg)	7.235	Foot-pounds	Miles per gallon (mpg)	0.4252	km/ℓ

— MEMO —

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SINCE 1887

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