Rammer SERVICE

Rammer S 82

Workshop Manual

Note !
This manual contains confidential information and it must not be given to a third party without permission.

Specifications and design presented in this manual are subject to change without notice.

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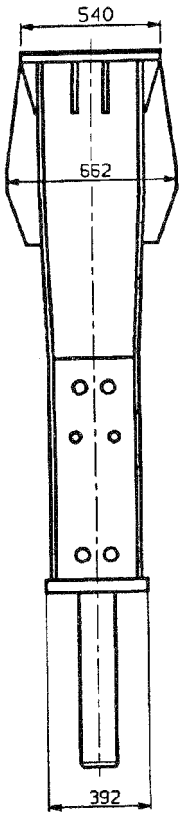
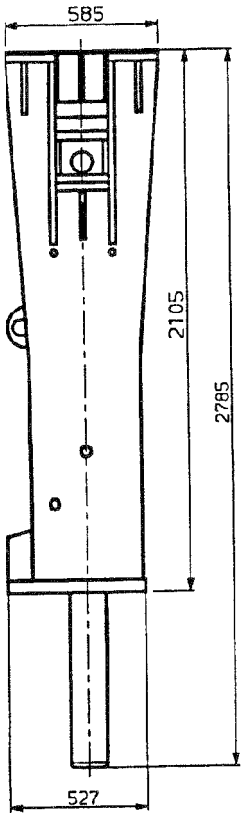
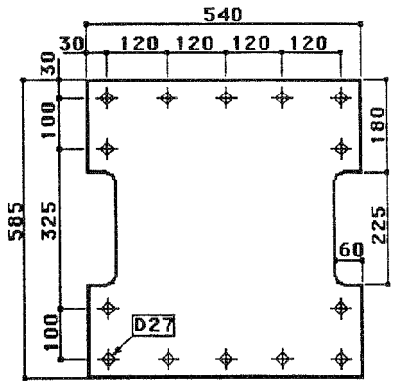
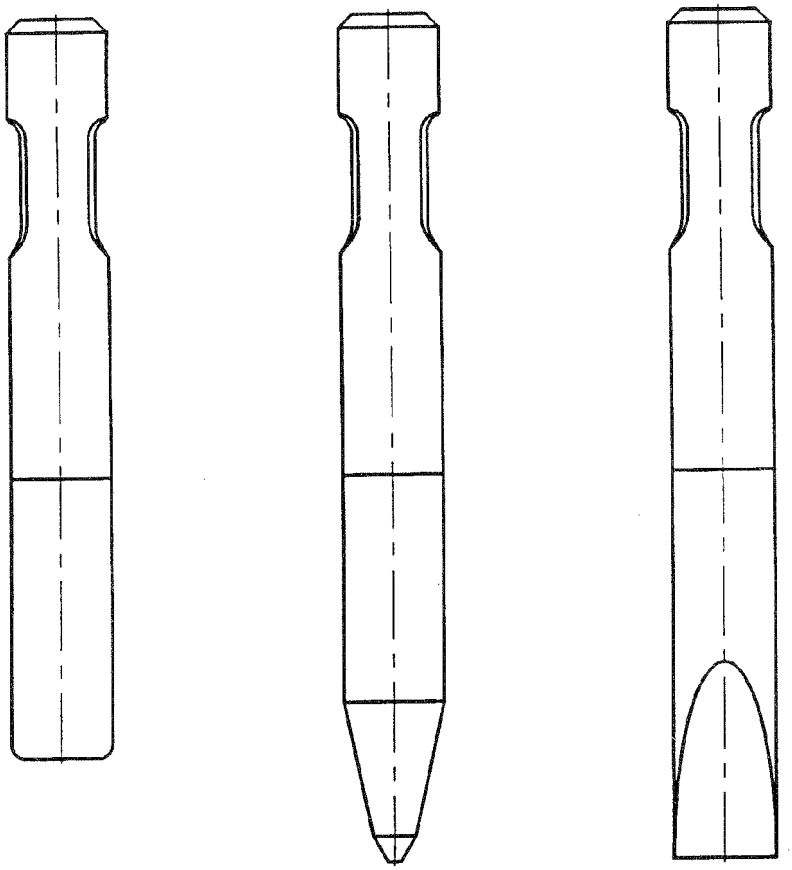
Valid from serial number 82A01XXX / A01
82W01XXX / W01







WORKING WEIGHT (with mounting bracket and tool)		**2100**	**kg**
IMPACT ENERGY		**5200**	**J**
IMPACT FREQUENCY		**360...520**	**bpm**
OPERATING PRESSURE		**140**	**bar**
PRESSURE LIMITS		**180...190**	**bar**
OIL SUPPLY		**160...230**	**L/min**
RETURN LINE COUNTER PRESSURE		**max. 5**	**bar**
INPUT POWER		**max. 54**	**kW**
OUTPUT POWER		**max. 45**	**kW**
EFFICIENCY		**0,8**	
TOOL SHANK DIAMETER		**140**	**mm**
CONNECTIONS IN HAMMER			
	/PRESSURE LINE	**(BSP) R 1" -Int**	
	/RETURN LINE	**(BSP) R 1 1/4" -Int**	
LINE SIZE / INNER DIA /	**PRESSURE LINE**	**25**	**mm**
	RETURN LINE	**32**	**mm**
OIL TEMPERATURE		**-20...+80**	**° C**
HYDRAULIC OIL VISCOSITY		**1000...15**	**cSt**
CARRIER WEIGHT, ALLOWED		**25...40**	**ton**
CARRIER WEIGHT, OPTIMUM		**28...35**	**ton**



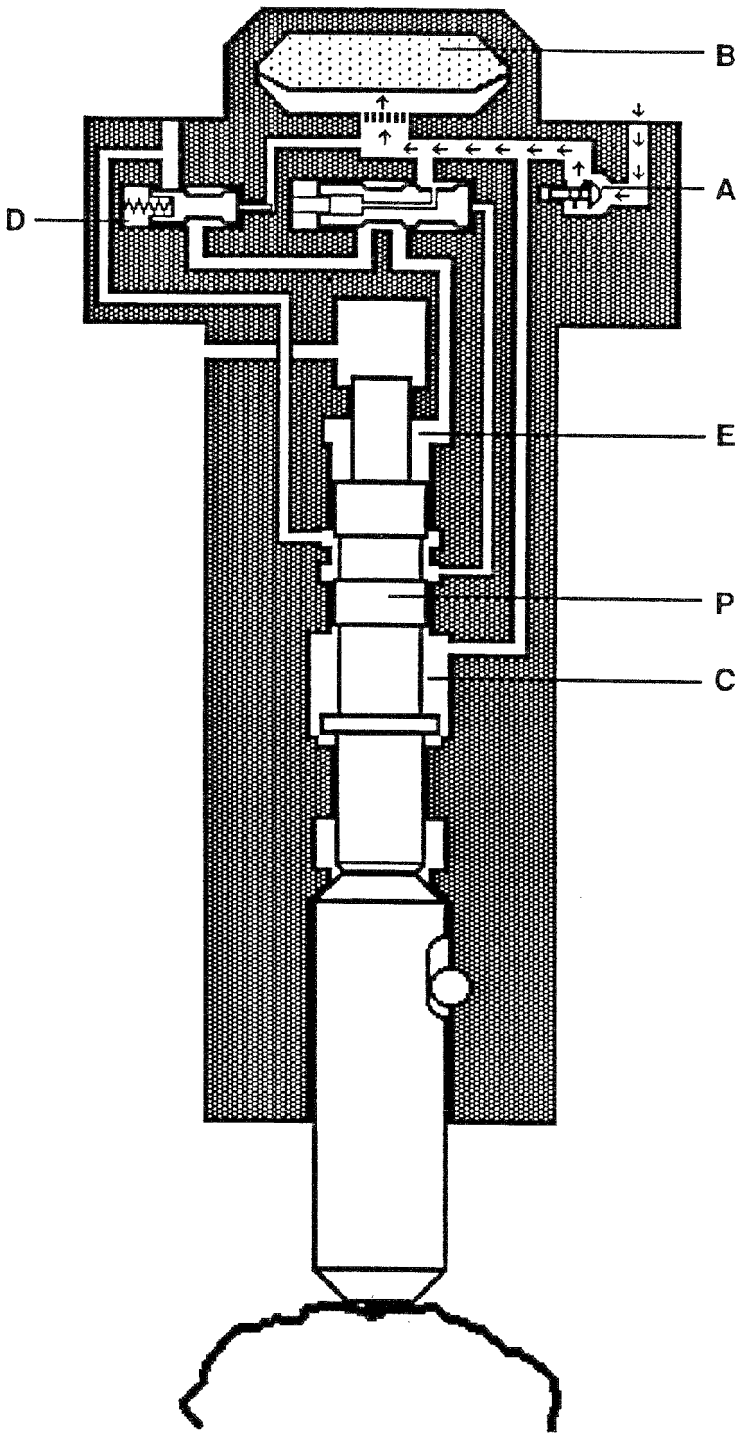
A B C

Standard tools : lengths mm:s

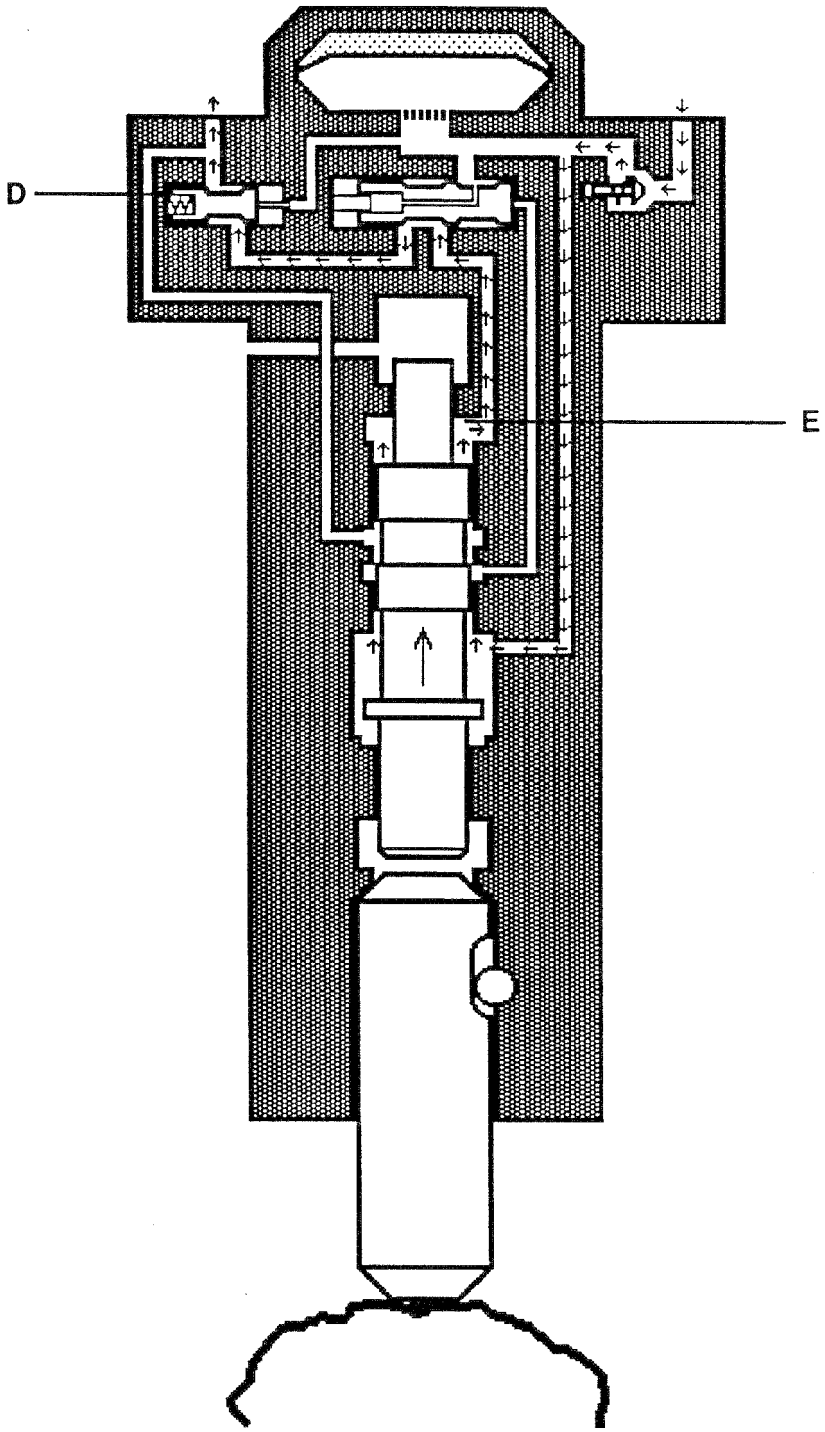
	Name	Part no.	Total length	Working length	Weight (kg)	Diameter (mm)	Note
A	Blunt tool	31618	1050	480	122	140	
B	Moil point	31620	1200	630	137	140	
C	Chisel tool	31619	1200	630	137	140	

Special tools:

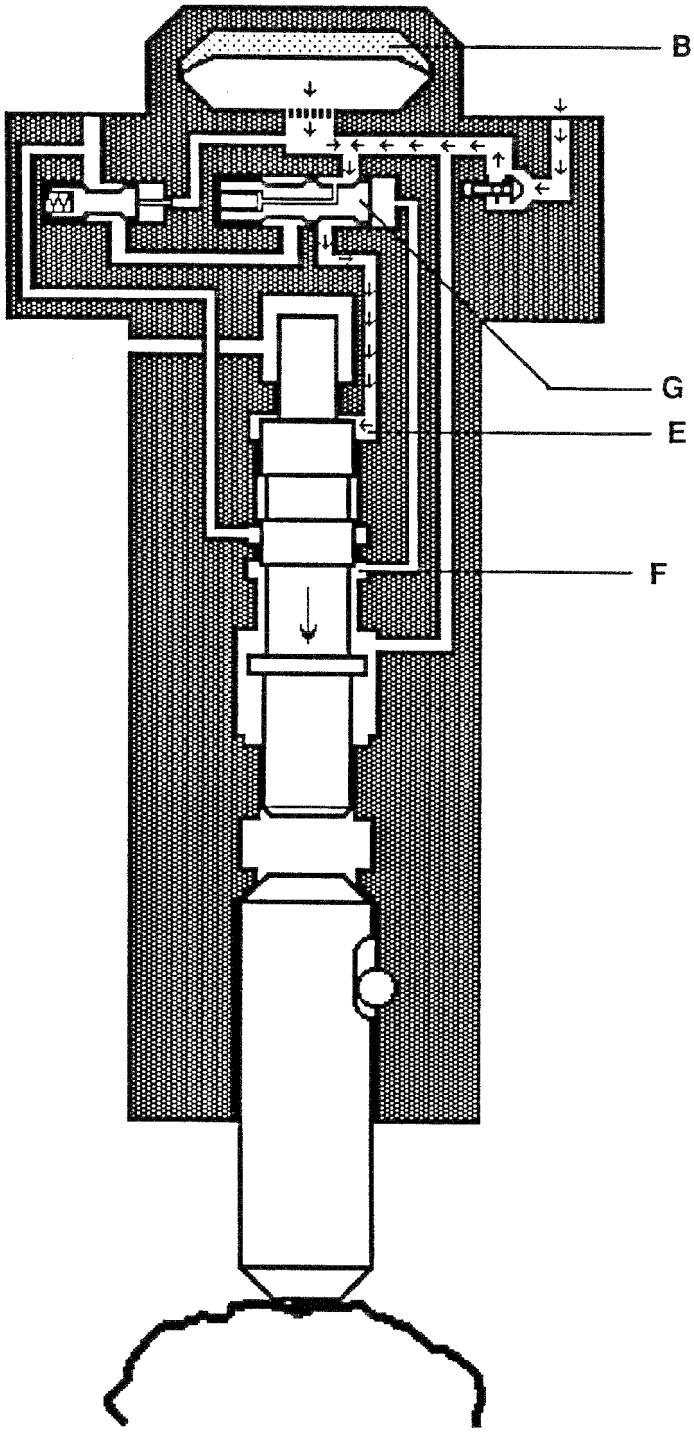
D							
E							
F							



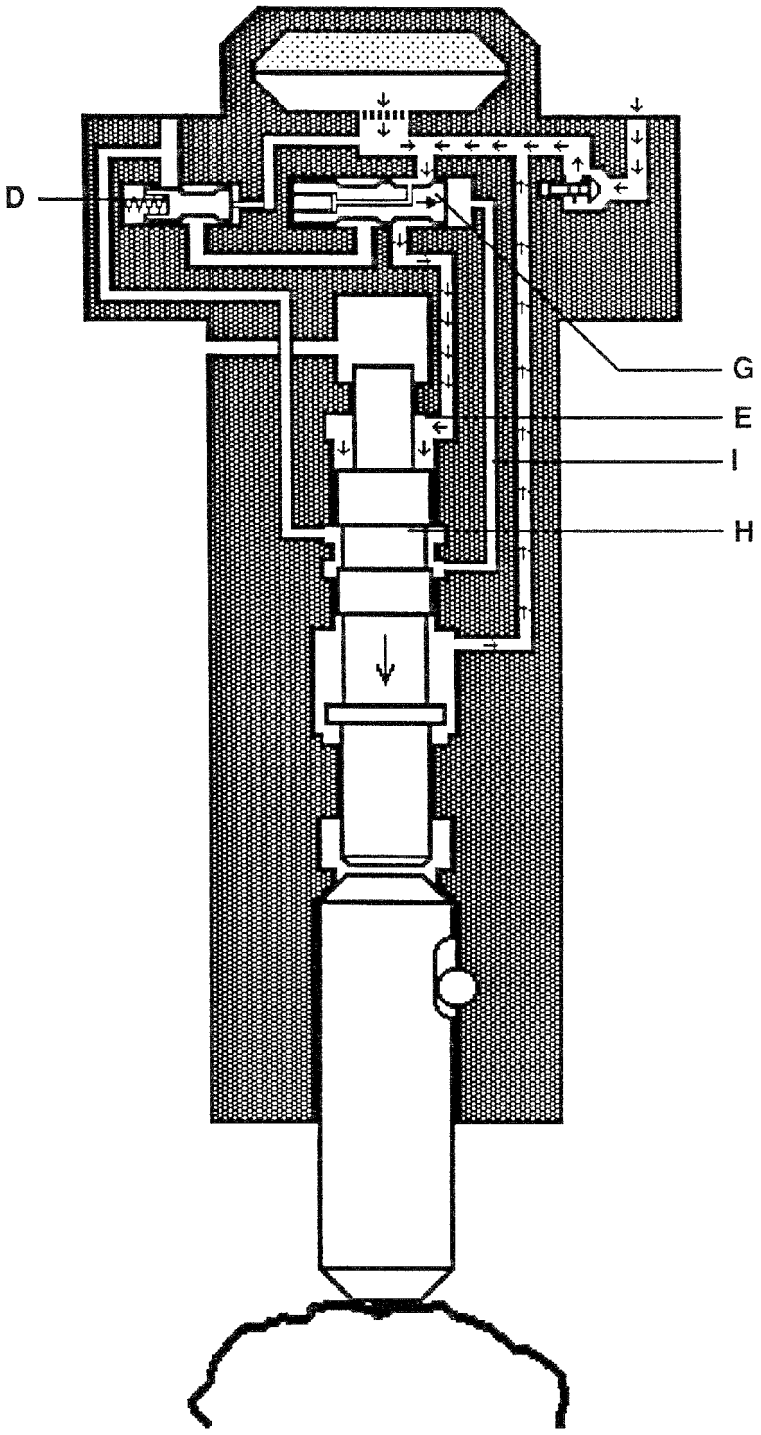
1. Oil flows through the check valve A into the accumulator B and to the space C under the piston P.
   The pressure control valve D has closed the outlet channel from space E and prevents the piston to move.
   Pressure inside the hammer increases and compresses the nitrogen gas in the accumulator.



2. When the preset operating pressure has been reached, the valve D opens the outlet channel from space E to tank line.
   Piston starts the return stroke, due to the pressure under the piston.



3. In its highest position the piston allows the pilot pressure to pass through the channel F to the other end of the main valve G.
Main valve changes position and opens the space E to the accumulator B.
The piston starts its impact stroke, during which oil is supplied from the accumulator.



4. Piston moves downwards with high velocity.
Groove H in the piston connects pilot channel I to tank line.
Main valve G starts to move back and connects space E to outlet channel.
Moving of piston causes reduction in the accumulator pressure and activates the valve D to close the outlet channel.
After the impact the piston remains in position until the oil pressure rises and the cycle is repeated (phase 1).

3. DISASSEMBLING AND ASSEMBLING OF S 82

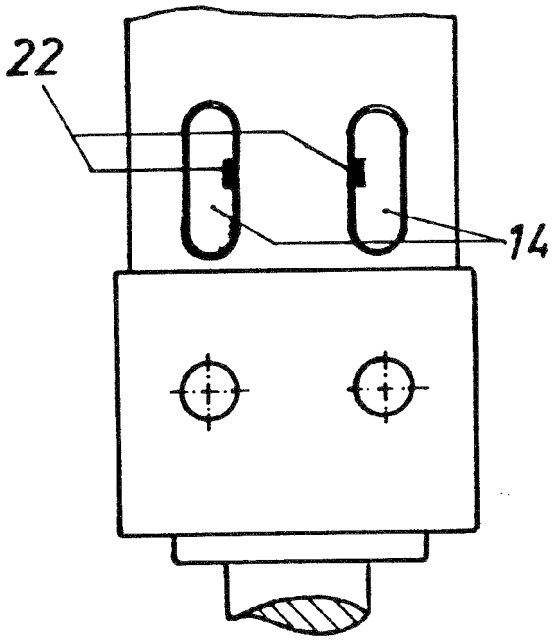
3.1 Removing and inserting of tool

3.1.1 Removing

Turn the hammer to vertical position.
Push the pins 22 (2 pcs) and simultaneously the pins 14 on the opposite side.
Remove the tool by lifting the hammer.

3.1.2 Inserting

Turn the hammer to horizontal position.
Clean and lubricate the tool and pins 14.
Insert the tool, check that the grooves of the tool allow inserting of the pins.
Press the pins 22 with the slanting edge of pins 14 and push in the pins 14.



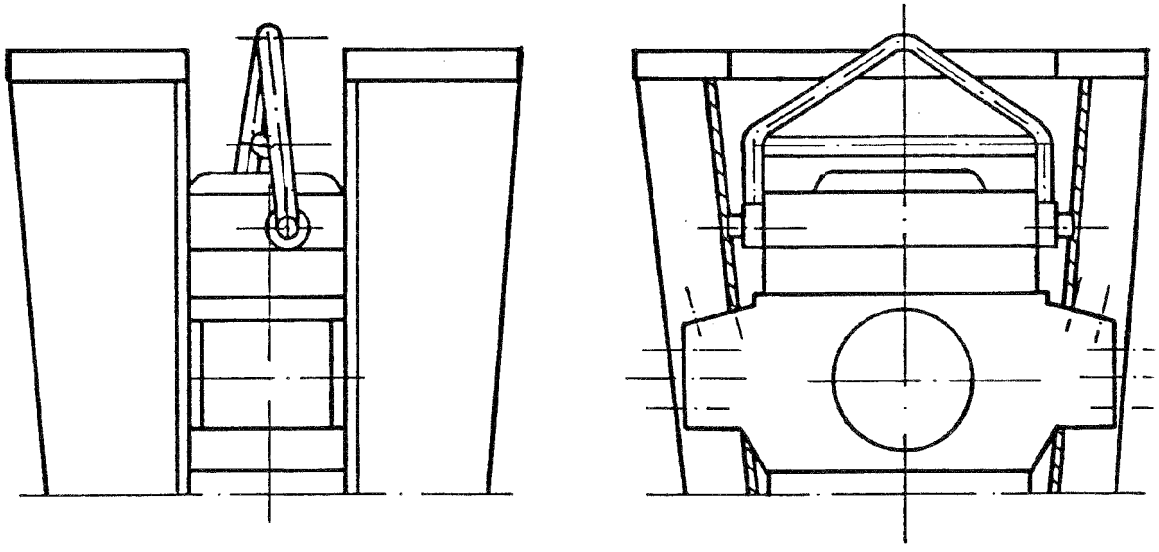
THE TOOL WEARS ONLY ON TWO SIDES. THE TOOL HAS TO BE REJECTED IF THE DIAMETER OF THE SHANK PART IN THE WORN DIRECTION IS LESS THAN 138 MM.

3.2 Removing and installing of hammer, changing of wearing plates

3.2.1 Hammer removing and installing

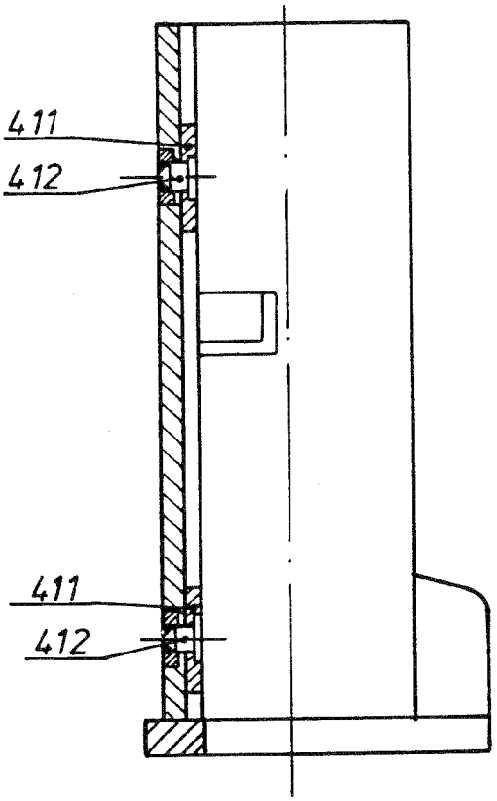
Remove the tool and set the hammer to vertical position on the floor on wooden supports.
Loosen the housing from the mounting plate.
Disconnect the hoses and plug them as well as the hammer inlet and outlet.
The excavator can be taken aside.

Fasten the lifting device on accumulator (see picture) and lift the hammer so that there is 10 mm clearance under the valve housing shoulders.
Wag the hammer. If the hammer moves more than $\pm$ 10 mm at the level of shoulders, the wearing plates 411 between the hammer front end and the housing are too worn.
Lift the hammer out of the housing and change the wearing plates (see 3.2.2).



After changing the wearing plates set the hammer into the housing and check the clearance by waging the hammer.
After placing the hammer into the housing, springs and intermediate plate with buffer are put in their place.
The mounting plate and hoses are connected to the hammer.
Insert the tool.

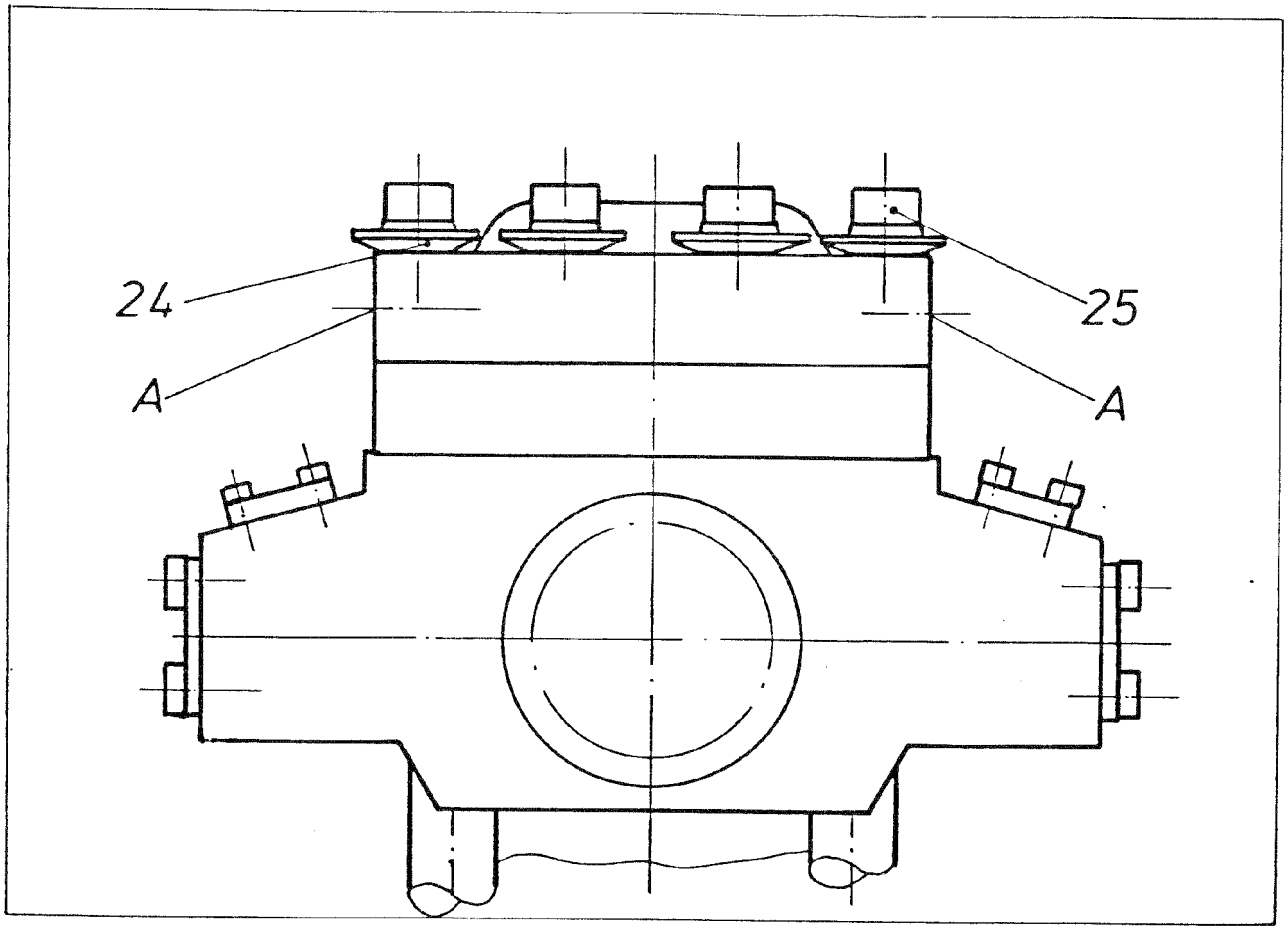
3.2.2 Changing of wearing plates



The distance between the wearing plates has to be $311^{+2}/_{-0,4}$ mm.
The wearing plates 411 can be changed or fitting plates added between the wearing plates and the housing by cutting the welding round the pins 412.
Plates 411 or fitting plates shall be added so that the hammer lies in the middle of the housing.
The plates will be fastened by welding new pins 412.

3.3 Assembling and installing of accumulator

3.3.1 Removing



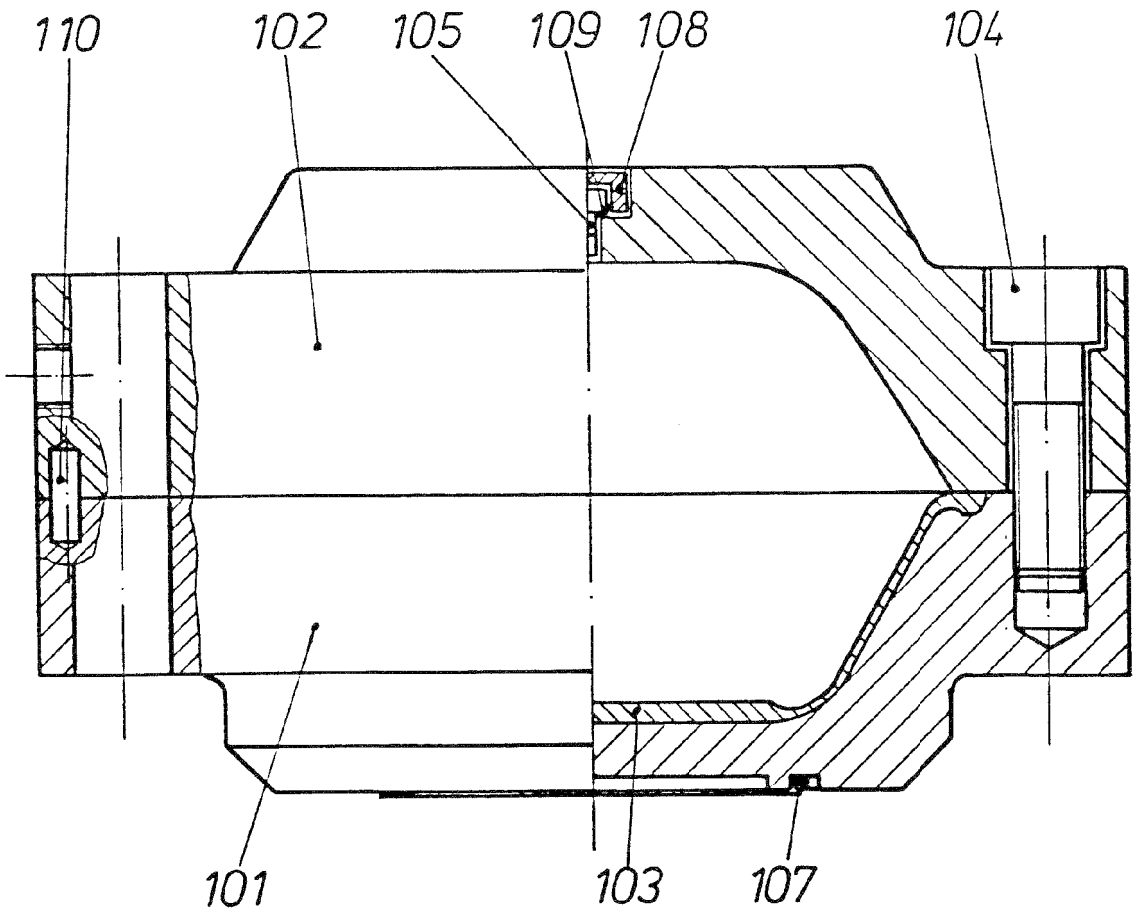
Open the socket screws 25 (8 pcs).

Screw the lifting eyes in the holes A and remove the accumulator.

WARNING:

DO NOT OPEN THE SCREWS OF THE COVER (12 PCS) WHEN THERE IS PRESSURE INSIDE!

3.3.2 Disassembling



Remove the seal 107.
Set the accumulator on the assembly tool.
Connect the charging device to the accumulator.
Check that the exhaust screw of the charging device is closed.
Open the screw 105 through the charging device.
Open the exhaust screw of the charging device and let the nitrogen flow out.
When there is no pressure in the accumulator, remove the charging equipment, screw 105 and seal 109.
Open the socket screws 104 (12 pcs).
Remove the cover 102, pins 110 and membrane 103.

3.3.3 Assembling

Clean and dry parts carefully.
Set the accumulator bottom on the assembly tool.
Insert the guide pins 110 and put a new membrane 103 in its place.
Furnish the cover with a new Usit-seal 109 and fasten screw 105.
Tighten the screws 104 with a torque wrench first to the torque of 200 Nm (20 kpm) and finally to the torque of 500 Nm (50 kpm).

3.3.4 Charging of the accumulator

Connect the charging device 41 377 to the accumulator.
Open the screw 105 through the charging device.

Open the valve of the nitrogen bottle and observe the gauge pressure. Shut the bottle valve, when the pressure is 4,3 MPa (43 kp/cm^2).

Wait 10 minutes (because temperature changes).

Adjust the pressure to 4,0 MPa (40 kp/cm^2).
Shut the screw 105, torque 20 Nm (2 kpm
Let the pressure out from the hose and remove the charging device.

Check the gas-tightness by dropping some oil on the screw 105.

3.3.5 Fastening of the accumulator

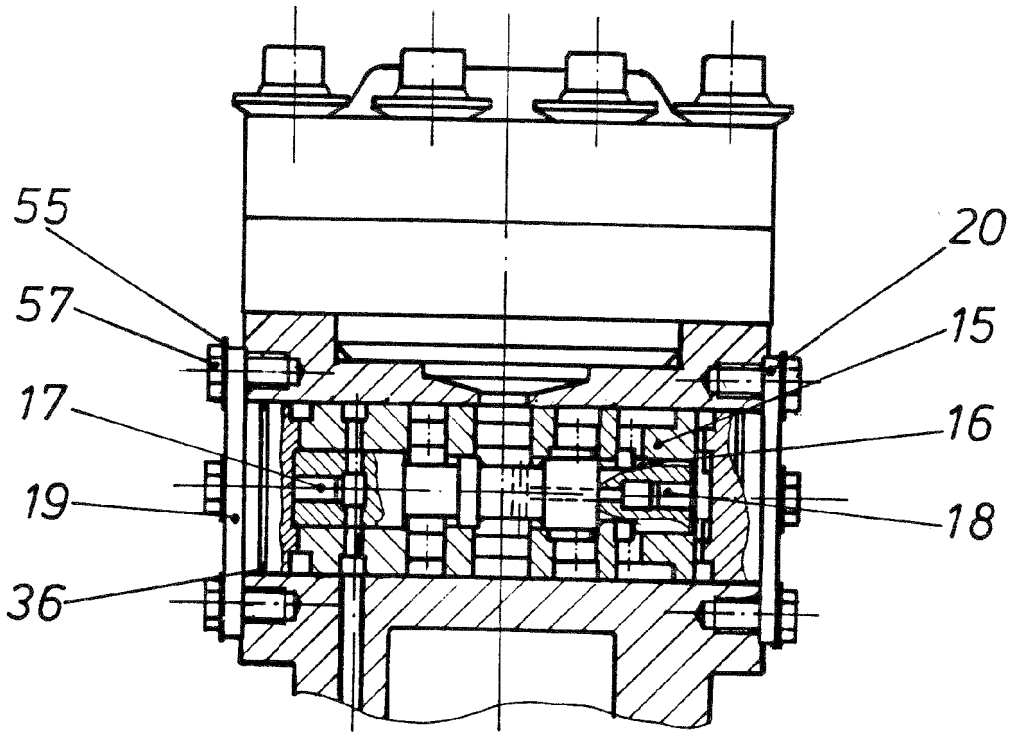
Install the seal 107 into the groove in the bottom of accumulator. Use some grease to prevent the seal from falling down during mounting. Install the guide pins into the holes on the valve housing. Lift the accumulator into its place. Install the washers 24 and socket screws 25.

Using a torque wrench tighten the socket screws first to the torque of 200 Nm (20 kpm) and finally to the torque of 700 Nm (70 kpm).

3.4 Removing and installing of main valve

3.4.1 Removing

Loosen the screw 57 of the covers 19 and 20.
Using a screwdriver pry out the covers.
Push out the spool 16. Take care of small spools 17 and 18 in the ends of spool 16.
Fasten the puller (41 360) in the holes of screws 57.
Put the flange against the main valve bushing and drive the bushing carefully out.



3.4.2 Installing

Check the parts carefully. If necessary use fine emery cloth or grinding agent. Clean and oil the parts.

Set new O-rings on covers.
Fasten the puller (41 360) on the valve housing side marked with x. Install the main valve bushing so that x on its end comes to the same side with valve housing x. Using the flange against the bushing drive the bushing in.

Install the spool 16 so that x on its end will be again on the x -side of the valve housing.
Do not forget the spools 17 and 18.

Install the covers 19 and 20. Tighten the screws to the torque of 200 Nm (20 kpm). Use locking washers under the screws.

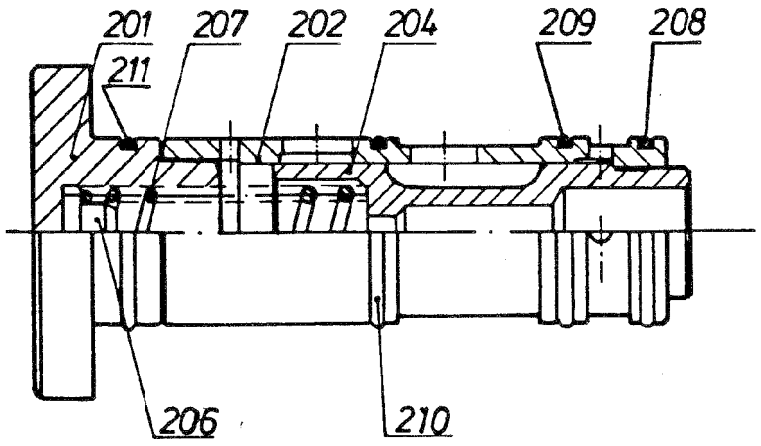
3.5 Removing and installing of pressure control valve

3.5.1 Removing

Loosen the screws 56 (4 pcs). (The pressure control valve is located under the return oil connection.) Using a screwdriver pry the valve out.

Fix the valve cover 201 in vise bench and loosen the guide bushing 203 at the same time pushing spool 204 a little.
Remove the spool from bushing 202 and spring and spring guide from cover 201.

Remove all O-rings 208, 209, 210 and 211.



3.5.2 Installing

Check the parts carefully. Clean and oil the parts.

Fix the part no. 201 to vise bench and insert the spring guide 206 and spring 207.

Insert spool 204 in bushing 202.
Fasten the bushing 202. Install O-rings 208, 209, 210 and 211.

Push the valve into its housing. Put the locking washers on screws 56 and tighten the screws to the torque of 85 Nm (8.5kpm).

3.6 Removing and installing of check valve

3.6.1 Removing

Loosen the screws 56 (4 pcs) and pry the valve out using a screwdriver.
Push the spring guide of cartridge 302 and remove the spring ring 303, spring guide, spring and spool.
Remove O-rings 305 and 306.

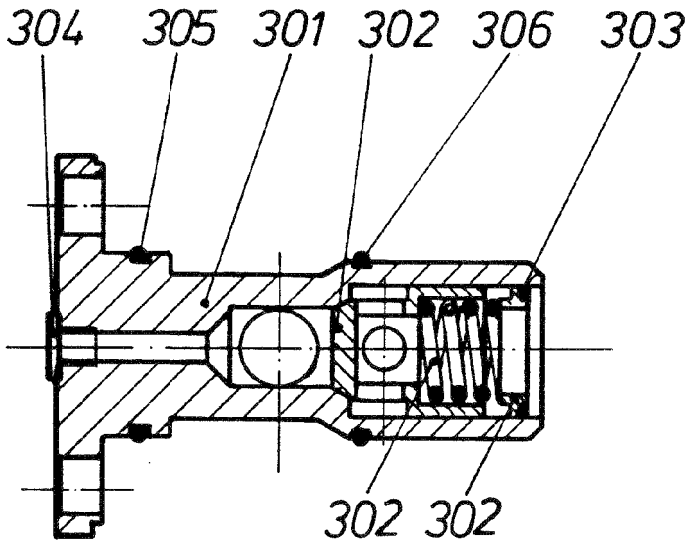
3.6.2 Installing

Clean all parts carefully.

Insert cartridge parts, spoo., spring and spring guide 307 into the housing 301. Install spring ring 303 and O-rings 305 and 306.

Check that the spool moves properly.

Push the valve and hit it with plastic hammer to get it into its place in valve housing.
Take care of O-rings.
Tighten the screws 56 to the torque of 85 Nm (8.5kpm).



3.7 Loosening and tightening of tie rods

3.7.1 Loosening

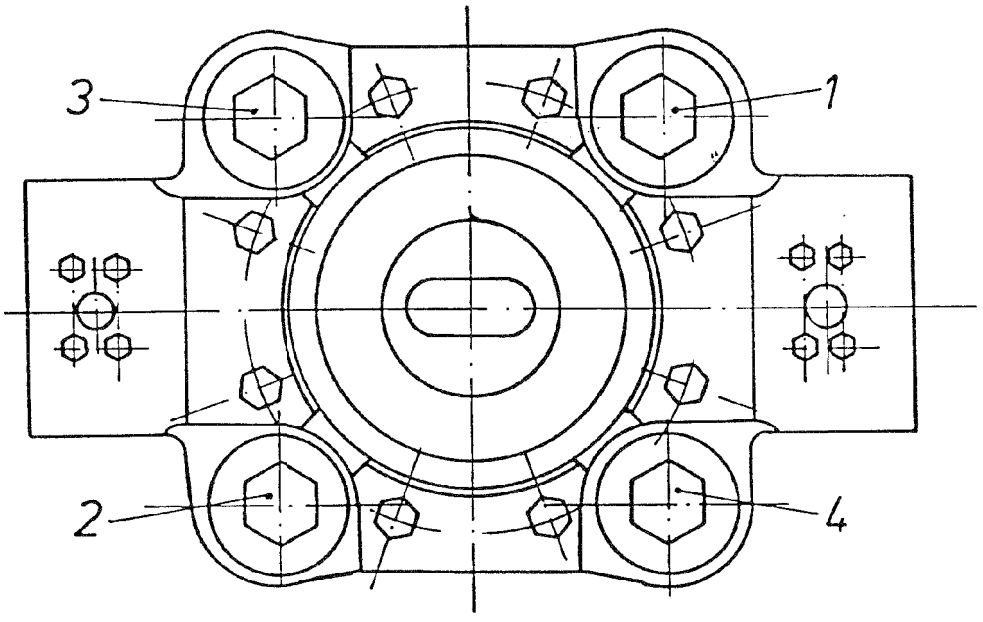
Remove the accumulator, rings 27 and locking plates 26.

- mark each tie rod and its nut as a pair
- mark the upper end of each nut
- mark each tie rod's location in the hammer

Heat the tie rods with propane flame so much that the rods can be opened. See the opening order. Remove the nuts 11.

3.7.2 Tightening

Clean and grease the threads. Spread corrosion resistant paint on the part of the tie rod going inside front head.
Install the tie rods and nuts to the same places they were before disassembling. Check that each tie rod has the right nut as its pair, and that the installation direction of the nut is correct.



Tighten the screws crosswise first to the torque of 100 Nm, then to 300 Nm and finally to 700 Nm.

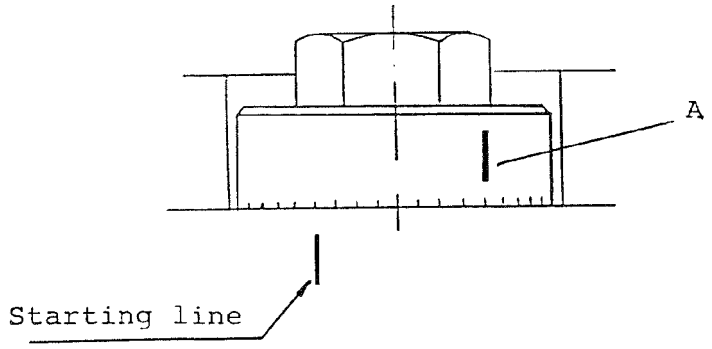
Mark the starting line A on the valve body and mark line B on the tie rod head at **120 degrees** distance from the mark A.

Heat the tie rods with propane flame and tighten the tie rods in the order shown before so that mark B on tie rod head comes to the point of starting line.

Install the locking plates 26 and rings 27 on tie rod heads so that they cannot loosen.

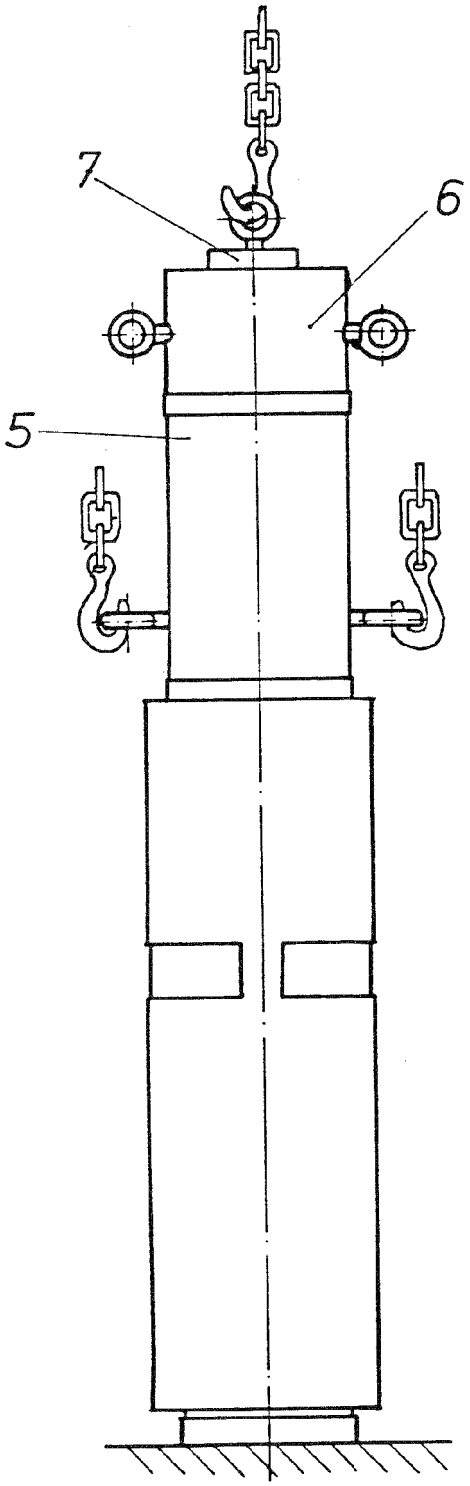
Install the accumulator.

Apply silicone compound between screws and front head.



3.8 Disassembling and assembling of cylinder

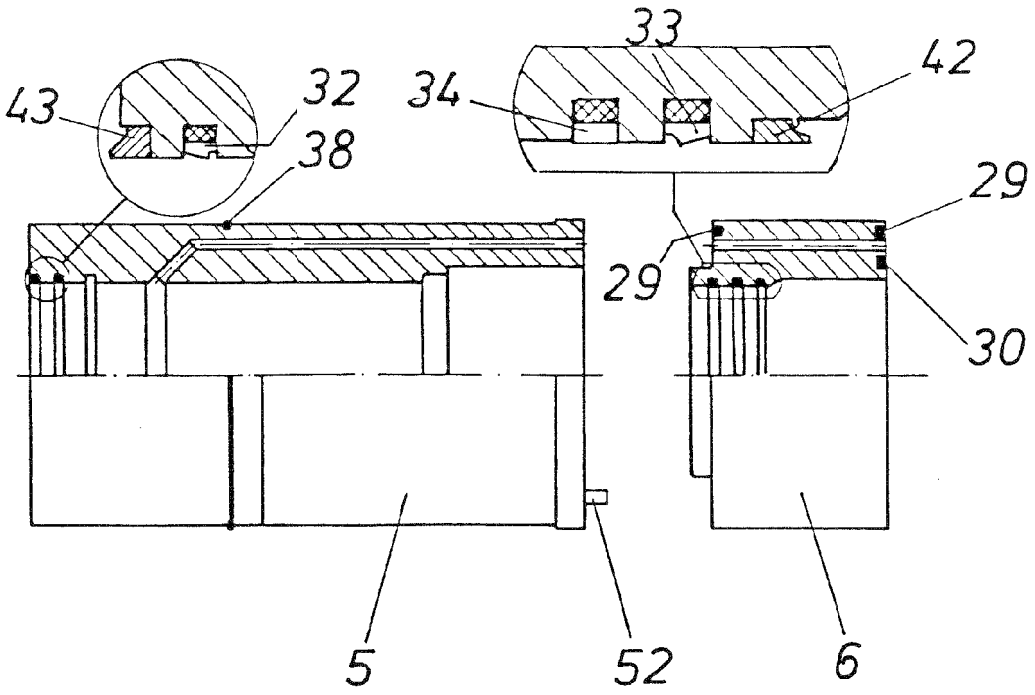
3.8.1 Disassembling of cylinder



After the accumulator and valve housing have been removed screw M24 lifting eyes in ring 6 and lift the ring out.

Screw lifting eye M12 into the hole in the head of piston and lift the piston out.

Screw the lifting eyes M24 into the holes of cylinder side and lift the cylinder out.



Remove the sealings 29, 30, 33, 34 and wiper 42.
Remove from cylinder guide pin 56, sealing 32, wiper 43 and O-ring 38.

3.8.2 Assembling of cylinder

Check the condition of cylinder 5, piston 7, ring 6 and and the front end. If necessary use fine emery cloth or grinding agent. Clean and oil parts carefully.

Check and charge if necessary sealings 32, 38 and wiper 43.

Screw lifting eyes M24 into the cylinder and lift cylinder in to the front end. Put guide pin 52 on its place.

Lift the piston in to the cylinder.

Check and change sealings 29, 30, 33, 34 and 42 of ring 6.

Lift the ring on its place so that guide pin on the cylinder hits in the respective hole of ring.
Hit the ring carefully on its place.
Loosen the lifting eyes.

Check that opposite surfaces are clean. Put the guide pin 52 on its place in the ring.

Screw lifting eyes and put valve housing in its place.

Tighten side rods (see 3.7.2).

Fasten accumulator (see 3.3.5).

3.9 Disassembling and assembling of front end

3.9.1 Disassembling

Remove accumulator, valve housing, side rods and cylinder.
Remove the wedge 21 and the thrust ring 9 and the upper bushing of tool 12.
Remove grease nipple 59.
Disassemble the locking pin by removing pin 62, plugs 63, pin 22 and spring 44.

THE BUSHINGS 12 AND 13 WILL WEAR ONLY ON TWO SIDES. IF THE BIGGEST DIAMETER IS MORE THAN 142 MM, BUSHING HAS TO BE REJECTED.

In case the bushing 13 has worn out remove plugs 28 and pin 23.
Using sleeve puller pull bushing out. If bushing is tight, warm the under part of the front end.

3.9.2 Assembling of front end

Check the parts carefully. Clean, dry and oil them.

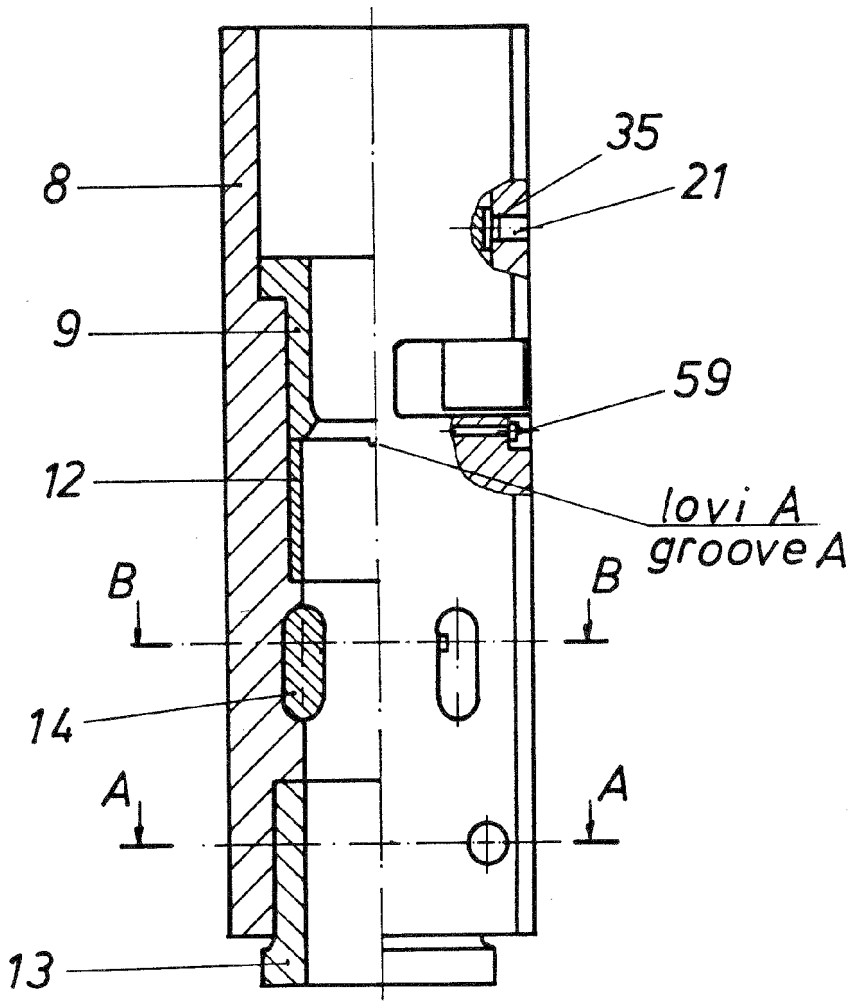
Heat the front end with propane flame and insert the bushing 13. Observe that the groove on bushing 13 allows the pin 23 to come in.
Hit the pin 23 in and install the plugs 28.

Insert the bushing 12 so that the grooves are upwards.

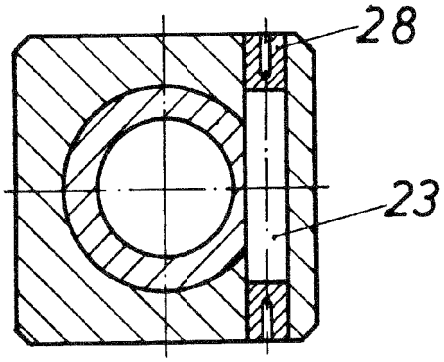
Insert the ring 9.

Fasten grease nipple 59, springs 44 and pins 22, 62 and plugs 63.
Install the wedge 21 having O-ring 35.

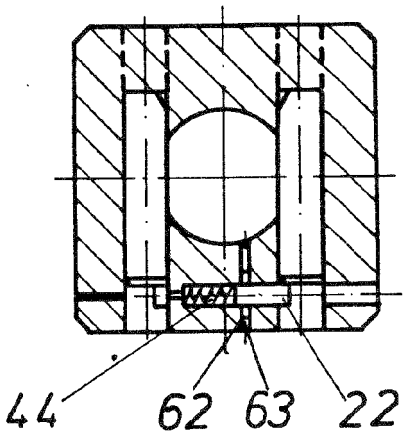
Assemble cylinder, ring and valve housing.
Tighten side rods (see 3.7.2).
Fasten accumulator (see 3.3.5).



A-A



B-B



TROUBLE SHOOTING

TROUBLE	PROBABLE CAUSE	REMEDY
1 The hammer does not start	1 The relief valve in hydraulic circuit opens at too low pressure.The present hammer operating pressure 14.0 MPa (140 kp /cm^2,2100 PSI) is not reached	Measure the pressure of the high pressure line in the hammer.Adjust the relief valve in hydraulic circuit to open at pressure of 18,0 MPa (180 kp /cm^2, 2540 PSI.
	2 The piston is in its lower hydraulic brake	Keep the hammer control valve open and push the tool strongly against an object. The tool head lifts the piston out of the brake.
	3 The hammer control valve does not open	When operating the hammer control valve, check that high pressure line will pulsate.(that means the hammer control valve opens) If the valve does not operate,check the operating means:mechanical connections,pilot pressure, or electrical control.
	4 The pressure control valve in the hammer does not open and the piston cannot take a return stroke	Remove the pressure control valve. Push the valve spool against a wood piece and check that the spring works and the spool moves properly.
	5 The check valve in the hammer does not open	Remove the check valve.Press the spool with finger and check that spring works and the spool moves properly.
	6 The main valve in the hammer does not operate properly	Check that the covers 19 and 20 of the main valve housing are firmly tight.If so,remove the covers and check that spools 16 17 and 18 are moving properly. Remove the main valve bushing 15 and check O-rings.
	7 Piston failure	Dissassemble the whole hammer.

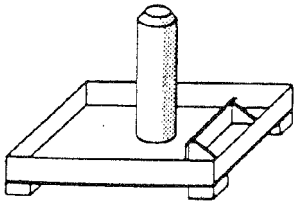
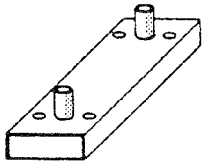
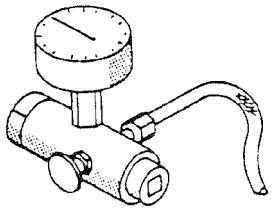
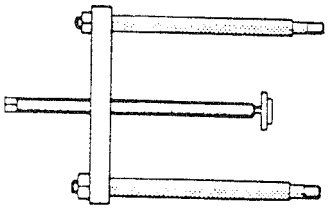
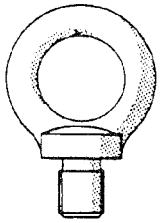
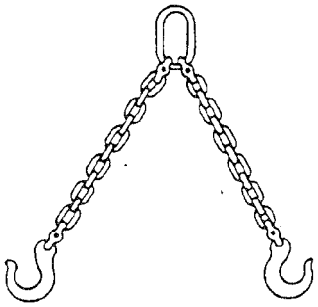
TROUBLE	PROBABLE CAUSE	REMEDY
2 The hammer operates irregularly but the blow has full power	1 The relief valve in hydraulic circuit opens at too low pressure	Check the relief valve operation. Adjust to open at the pressure of 18,0 MPa (180 kp/cm^2, 2540 PSI).
	2 The pressure control valve in hammer tackles	Remove the valve and check the spring and spool operation.
	3 Strange particles prevent the small spools 17 and 18 in the main valve from operating	Remove covers and main spool and check spools 17 and 18.
	4 The main valve spool touches the breaks in covers 19 and 20	Remove covers and main spool and check them.
	5 A side rod is broken	Disassemble the whole hammer.
3 The hammer operates poorly and the blow has no power	1 The relief valve in hydraulic circuit opens at too low pressure	Check the relief valve operation and adjust it to open the pressure of 18,0 MPa (180 kp/cm^2, 2530 PSI).
	2 The pressure control valve in the hammer allows the hammer to operate at too low pressure	Remove the pressure control valve. Check that the spring is not damaged and the spool moves properly.
	3 The membrane at the accumulator is broken	Check the accumulator pressure. Discharge the accumulator, remove the cover and change the membrane. Recharge the accumulator.
	4 There is no nitrogen pressure in the accumulator	Check accumulator pressure. If there is no pressure or the pressure is less than 4 MPa (40 kp/cm^2, 580 PSI) discharge the accumulator, remove the cover and check the membrane.
	5 A side rod is broken	Disassemble the whole hammer.

TROUBLE	PROBABLE CAUSE	REMEDY
4 Oil warms up strongly	1 The relief valve in the hydraulic circuit leaks	Check the relief valve.
	2 Sealing failure	The hammer needs to be serviced.
5 The hammer bleeds oil between the tool and the front end bushing	1 The sealing 32 in the cylinder has failed	Disassemble the hammer and charge all sealings if necessary in the cylinder and ring.
6 The hammer bleeds oil between the hammer and the housing	1 A plug at borings in the valve housing has loosened	Lift the hammer out of the housing and change the plug.
	2 O-ring between the ring and the valve housing and the accumulator has failed	Disassemble the hammer and change all O-rings.
7 The hammer bleeds oil between ring and valve housing	1 The sealing 33 or 34 in the ring has failed	Disassemble the hammer and change all O-rings if necessary.
8 The hammer swings in its housing	1 Wearing plates between the hammer and the housing have worn strongly	Lift the hammer out of the housing and replace wearing plates.

SERVICE TOOL SET 41 382
TYÖKALUSARJA

RAMMER S 82, S 82 W

11.11.1985 0032v TH/peh
Muutos 26.11.86

	Ref.No. Viite no	Description Nimitys	Qty Kpl
	30 905	Hammer assembly stand Vasaran kokoonpanoteline	1
	30 794	Accumulator assembly stand Akun kokoonpanoteline	1
	41 377	Accumulator charging equipment Akun täyttölaite	1
	41 360	Sleeve puller Ulosvedin	1
	90 641	Lifting eye M24 DIN 582 Nostosilmukka	2
	90 605	Lifting eye M24 Nostosilmukka	2
	41 381	Lifting eye M27 x 2 Nostosilmukka	2
	90 607	Lifting eye M12 Nostosilmukka	2
	41 385	Lifting eye M30 Nostosilmukka	1
	90 624	Lifting eye M20 Nostosilmukka	2
	90 609	Lifting chain Nostoketju	1

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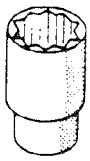
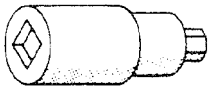
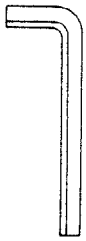
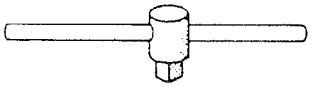
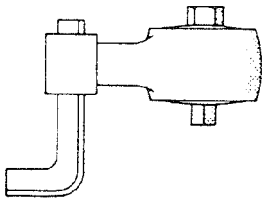
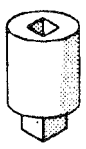
	Ref. No. Viite no	Description Nimitys	Qty Kpl
	90 610	Torque wrench 150-700 Nm Momenttiavain	1
	90 639	Socket 50/1" Holkki	1
	90 642	Socket 36/1" Holkki	1
	90 612	Allen-type screw socket 17/ 3/4" Kuusiokoloväänti ö	1
	90 613	" 19/ 3/4"	1
	90 614	Allen wrench 6 mm Kuusiokoloavain	1
	90 616	" 10 mm	1
	90 617	" 12 mm	1
	90 620	" 19 mm	1
	90 625	Sliding T-handle 3/4" T-väännin	1
	90 635	" 1"	1
	90 643	Slogging ring wrench 36 mm Lyöntiavain	1
	90 634	Torque converter 1650 Nm Momentinkertoja	1
	90 627	Spanner 36 mm Kiintoavain	1
	90 637	Adaptor 3/4" - 1" Muutoskappale	1