NPO "VNIISTROIDORMASH"

REINFORCED CONCRETE PILE HEAD BREAKER FOR PILE CAPS

CERTIFICATE

СП – 88.00.00.000 ПС

1989

CONTENTS

This certificate is designed to be a manual for installation,operation and maintanance of machines to break reinforced concrete pile heads and prepare them for pile caps (hereinafter referred to as the machine).

The manufacturer reserves the rightnot to include into the Certificate modifications of the design that may be introduced as the machine is perfected if they do not alter its basic parametrs and do not affect its operation,maintenance and installation.

The customer is asked to send a report about the operation of the machine to the manufacturer at least once a year.

1. GENERAL

The description and designation of the product:

The СП-88 reinforced concrete pile head breaker for pile caps

The manufacturer:

NPO "VNIISTROIDORMASH" (73 Volokolamskoe road, 123424, Moscow , Russia)

The designer:

NPO "VNIISTROIDORMASH" (73 Volokolamskoe road, 123424,Moscow ,Russia)

Specifications No. TU 22-036-30-89

Serial No.....

Date of manufacture " " _____ 198

2. FUNCTION

The machine is designed for breaking the underdriven parts of reinforced concrete piles protruding above ground (with the reinforcement bar diameter up to 18 mm and the number of bars not more than 4) and for exposing the reinforcement bars for latter imbedding into a pile cap, and for transferring the broken parts of the pile to storage or a vehicle.

The machine is used in industrial construction and civil engineering for installation of pile foundations and is suspended from the hook of a pipe layer or excavator being connected to its hydraulic system.

The machine can operate in moderate climate at an ambient temperature between $-40^{o}C$ and $+40^{o}C$.

3. BASIC SPECIFICATIONS AND PERFORMANCE DATA

3.1. Basic specifications

Table 1

Nos.	Parameter	Unit	Value
1	Max.cross sectional area of broken pile (max. pile size in plan)	cm^2 cm x cm	1225 35 x 35
2	Min. distance between adjacent pile faces required for machine to be installed	cm	45
3	Min.breaking height of pile reinforcement bars from ground	mm	300
4	Min.breaking height of pile concrete from ground	mm	50
5	Max.height of pile broken part	mm	2000
6	Type of drive		hydraulic
7	Nominal fluid pressure	MPa	16
8	Max.hydraulic fluid flow	l/min	40
9	Max.technical output (without conveying broken-off pile head)	pile/h	34
10	Min.technical output (without conveying broken-off pile head)	min	1.76
11	Operators	men	2
12	Overall dimensions with grips opened and vertical cylinder rods retracted	mm	1250Lx1250Wx x1085H
13	Weight	kg	1750

3.2. Characteristics of hydraulic equipment

Table 2

Item No. in diagram*	Description and brief technical characteristic	Standard No.	Qnty
КН1, КН2	Hydraulic valve with ПД Г66-32М check valve	ТУ2-053--1627-83	2
ДП1-ДП3	Flow dividing valve МКД-С12/32-П check valve	ТУ2-053--1440-79	3
КО1-КО6	Check valve		6
Ц1-Ц4	Hydraulic cylinder Cyl Ø=125mm Rod dia. 60 mm, l = 300 mm	СП-88.01. 01.000	4
Ц5-Ц12	Hydraulic cylinder Cyl Ø=125mm Rod dia. 60 mm, l = 120 mm	СП-88.02. 01.000	8

*see Fig. 3

3.2. Characteristics of sealings

Table 3

Nos.	Description and designation	Standard No. or designation of drawing	Qnty
1	Ring		
	019-023-25-2-2	GOST 9833-73	10
	023-028-30-2-2	"	2
	040-045-30-2-2	"	12
	060-070-058-2-2	"	12
	I20-I25-30-2-2		I2
2	Collar		
	3-80x60-2a	GOST 14896-84	12
	3-125x95-2a	"	24

3.4. Characteristics of bearings

Table 4

Nos.	Description and designation	Standard No. or drawing designation	Qnty
1	Bearing I-ЕШС-50	GOST 3635-78	24

4. Standard equipment

4.1. Composition of the product

The machine (Fig. 1) consists of the following basic components:

Table 5

Nos.	Description	Qnty	Designtaion	Item No. in Fig.1
1	Working member	1	СП-88.0I.00.000	1
2	Hydraulic equipment	1	СП-88.02.00.000	2
3	Casing	4	СП-88.00.00.00I	5
4	Casing	4	СП-88.00.00.002	6
5	Casing	4	СП-88.00.00.003	7
6	Casing	4	СП-88.00.00.004	8
7	Bar	2	СП-88.00.00.005	9
	"	2	-0I	10
	"	2	-02	11
	"	2	-03	12

4.2. Delivery set

The delivery set includes:

- 1 machine in assembly;

- 1 Certificate each for the machine and standard accessories;

- a set of spare parts, tools and accessories (see Appendix 1).

The documents and the SPTA set are packed into a case. The document packing should be waterproof to keep the

documents safe during transportation and storage. The machine is delivered already assembled and unpacked.

The packing case should bear the transport marking as specified by GOST 14192-77.

5. COMPOSITION, DESIGN AND PRINCIPLE OF OPERATION

5.1. Composition

The working member (Fig. 2) comprises:

1. Upper grip (3) - 1
2. Lower grip (4) - 1
3. Horizontal hydraulic cylinders (2) of the upper grip - 4
4. Horizontal hydraulic cylinders (2) of the lower grip - 4
5. Vertical hydraulic cylinders (1) for breaking - 4

The upper grip (3) consists of:

1. Inner sections (8,9) - 2
2. Outer sections (10,11) - 2

The lower grip (4) consists of:

3. Inner sections (5) - 2
4. Outer sections (6,7) - 2

The composition of the hydraulic system is shown in its circuit diagram (Fig. 3).

5.2. Design

The upper grip (3) and the lower grip (4) are placed one above the other and they are connected by 4 vertical

hydraulic cylinders (1) for breaking (Fig. 2, section Б-Б).

Each grip consists of 4 movable sections, including two outer sections and two inner sections. The sections are welded U-shaped members connected by horizontal cylinders (2) (Fig. 2, section А-А).

The horizontal hydraulic cylinders are hinged to the sections.

Plates (16,17) are attached to the interior sides of the sections of the upper grip and of the lower grip (Fig. 2), the shorter plates being attached to the outer sections and the longer ones to the inner sections. The plates may be of different thickness and length according to the cross section of the pile being broken (see Section 7.3.1, Table 6).

The upper grip carries plates with cutting edges made in the form of Δ-shaped facing (Fig. 2, section Г-Г) for better adherence to the pile, and to cut concrete in compression and to produce the smooth breaking surface of the pile.

In accordance with the selected type of operation, the sections of the lower grip may carry plates (17) either with welded-on teeth (Fig. 2, section Д-Д and diagram 1) or without them (diagrams 2 and 3).

When a pile is gripped, the teeth cleave the concrete and so make it easier to remove from the reinforcement bars.

Two ears (18) are welded on each section (Fig. 2) to hold the fixing pin (14) of the rope suspension and the

fixing pin (12) of the vertical hydraulic cylinder (1) whose rod ear is fixed with the fixing pin (13), (Fig. 2, section Б-Б).

The performance characteristics of the hydraulic equipment are given in Table 2.

The inner section of the upper grip supports a hydraulic panel (Fig. 4) that consists of the plate (1) whose body has built-in check valves (2) (K01-K06) while the exterior side of the plate carries KH1 and KH2 pressure valves (3,4), and three DP1, DP2 and DP3 flow dividing valves (5).

Hydraulic fluid is delivered to the machine through the quick-release joint (6), (Fig. 4.).

It is transferred to the lower grip via a manifold (3) (Fig. 1) mounted along the vertical cylinder. The safety valve of the base vehicle's directional valve is set for a pressure P = 16 MPa, the KH1 valve of the upper grip for P = = 8 MPa and the KH2 valve of the vertical hydraulic cylinders for a pressure of 14 MPa.

When the hydraulic system is connected to the directional valve of the base vehicle, the pressure in the pressure line is monitored on a gauge installed in the operator's cab.

The simultaneous operation of the vertical cylinders is ensured by the DP1-DP3 flow dividing valves.

A general view of a vertical hydraulic cylinder is shown in Fig. 5.

The horizontal cylinders (Fig. 6) have a damper (4) with a lock (5) to ensure smooth running of the rods.

Stationary components of the upper grip and lower grip are interconnected with pipelines while the moving parts are joined with high pressure hoses of d_y = 12 mm.

The hydraulic system is installed as shown in Figs. 3 and 4. Points I ... II in Fig. 3 on the hydraulic panel circuit correspond to outlet unions I ... II in Fig. 4.

The hydraulic cylinders, high pressure hoses, and pipelines are covered with detachable casings (5,6,7,8,11 and 12 in Fig. 1).

The machine is operated from the cab of the base vehicle: two high pressure hoses (d_y = 20 mm) (Fig. 1) are connected to a free section of the base vehicle's direction control valve.

5.3. Principle of operation

The operation of the machine is based on breaking concrete and the reinforcement of a pile with a static force directed along its axis.

This results from lateral compression of the pile over its four faces using two grips located one above the other followed by application of vertical forces to the grips acting in opposite directions.

Teeth faced on the grips ensure that the concrete is broken in one plane.

The area of the gripping plates and the gripping force are selected so as to prevent any deformation of the

reinforcement in the body of the pile and to keep the pile concrete intact in gripping.

The machine can operate according to three schemes.

Scheme 1 (Fig. 7) makes the concrete break on the ground level at a height under 50 mm, the reinforcement being exposed by the force of the hoist mechanism.

Scheme 2 (Fig. 8) provides a minimum pile breaking height of at least 300 mm from the ground, the reinforcement being exposed only by the action of vertical hydraulic cylinders without the force of the hoist mechanism.

Scheme 3 (Fig. 9) makes the reinforced concrete pile and the reinforcement bars break at a height of at least 300 mm from the ground without exposing its reinforcement.

The machine is suspended from a lifting appliance (hereinafter referred to as the crane) before the operation and is connected to its hydraulic system or a separate pump plant (hereinafter referred to as the pump plant) through a high pressure hose of appropriate length, the return and pressure lines of the pump plant being joined to appropriate ports of the machine marked "return" and "pressure".

When operating according to scheme 1, the machine is installed on a pile by the crane (Fig. 7a) with the sections of the upper and lower grips being fully opened and is set on the lower level in height.

When hydraulic fluid is supplied to the machine's hydraulic system, the rod ends of the horizontal cylinders of the upper grip and lower grip are filled first. The

latter compress the pile and when the pressure in the machine's hydraulic system reaches 14 MPa, the KH2 valve operates and the rods of the vertical hydraulic cylinders begin to extend forcing first the concrete of the pile and then the reinforcement bars to break along the plane marked by the concentrators (Fig. 7b).

All the reinforcement bars having been broken, the machine is hoisted by the crane winch with its upper and lower grips closed and is moved to the place where the broken parts of the piles are to be dumped (Fig. 7d), part of the concrete being pulled away like a stocking since it was separated from the pile by the teeth faced on the plates of the lower grip (Fig. 7c).

When the hydraulic fluid flow is reversed, the upper and lower grips open and the vertical cylinder rods are retracted while the broken-off part of the pile and the part of the concrete that was pulled off are dumped (Fig. 7e).

When operating according to scheme 2 (Fig. 8), the machine performs the same operations but the concrete is removed (the reinforcement bars exposed) by repeating the pile breaking operation (see Section 7.6 for details).

Scheme 3 (Fig. 9) involves breaking the bars without exposing the reinforcement (Fig. 9c) whereupon the machine, its lower grip opened and upper grip closed, is removed from the pile left in the ground (Fig. 9d) and is transferred to the dumping place for the broken-off parts of piles.

The machine leaves in the ground pile heads all leveled

off to a specified design elevation, with flat ends without cracks, and with protruding reinforcement bars fully prepared for embedding into a cast-in-place pile cap (Figs. 7b and 8g) or without protruding reinforcement (for installation of a precast pile cap) (Fig. 9d).

6. SAFETY PRECAUTIONS

6.1. The machine shall be operated by an operator of category 5 and by a worker of category 4 trained in safety requirements for piling, those established for the base vehicle, and trained in the safety precautions described in this Certificate, which should be recorded in the log.

6.2. The operator shall be fully responsible for proper operation of the machine.

6.3. No unauthorized persons shall be allowed to be present at the working site.

6.4. Check before starting the security of all threaded joints, make sure that the machine is free from concrete debris, dirt, sand, etc., and that there are no leaks of hydraulic fluid.

6.5. The operator should sound a warning signal before starting to work.

6.6. The machine should be lifted on ropes with at least triple safety margin. It can be attached to slings only by a worker wearing gloves.

6.7. Always make sure that the machine is slung properly with the slings not crossing. Replace the slings if

any damage is detected.

6.8. The work area should be adequately illuminated when working in the dark.

6.9. If anything is broken or a malfunction is detected, stop the operation until the fault is repaired.

6.10. Concrete can be pulled away with the upper grip and lower grip closed only if the base vehicle is provided with a load limiter. Besides, make sure that all the reinforcement bars of the pile have been broken.

6.11. It is strictly forbidden:

1) to operate a faulty machine;

2) for unauthorized persons and the maintenance personnel to be present in the dangerous area under a lifted machine and in the proximity of the pile broken parts being dumped;

3) to work in the dark without adequate lighting;

4) to work without safety hats;

5) to service at the beginning of a shift and to provide maintenance or repairs during operation of the machine with the engine of the base vehicle running, or without placing the machine on a support;

6) to do any servicing when the machine is suspended (for example, to replace plates for a new pile size since the machine should be placed sideways in this case);

7) to leave the machine suspended and to stand under it;

8) to handle piles protruding more than 2 m above

ground (when working with a pipe layer);

9) when reinforcement bars are not broken properly (with 1 or 2 bars remaining intact), to try to take the machine off the pile by lifting it with the grips closed, i.e. to try to pull the unbroken reinforcement bars through the concrete. In this case the grips must be opened and the operating cycle repeated. If the bars are not broken again, the work should be stopped, the grips opened and the machine removed from the pile;

10) to use open fire to heat any component of the hydraulic system.

6.12. When the work is finished or for considerable intervals between operations, the machine should be set on the ground and the engine of the base vehicle disconnected.

6.13. All the malfunctions and troubles found during operation should be recorded in the shift log.

7. PREPARING FOR OPERATION AND WORKING PROCEDURE

7.1. Preparing for operation

7.1.1. Suspend the machine on ropes from the hook of the base vehicle.

7.1.2. Connect high pressure hoses to the hydraulic system of the base vehicle according to the hydraulic circuit diagram.

7.1.3. Read the record in the shift log. Correct the malfunctions if any.

7.1.4. Do shift maintenance as required.

7.1.5. Check the operation of the base vehicle and make sure that there is hydraulic fluid in the hydraulic system.

7.1.6. Make sure that the dimensions of the plates installed in the upper grip and the lower grip match the cross sectional size of the piles to be handled.

7.2. Preparations for starting

7.3. Make sure that there are no foreign objects or tools left on the machine.

7.4. Check the operation of the hydraulic cylinders in idling using the control handle and make sure that there are no leaks of hydraulic fluid.

7.3. Adjustment and setting

7.3.1. The opening of the machine is adjusted as required for a certain size of the piles to be cut by installing plates of appropriate dimensions selected from Table 6.

Table 6

Pile cross section, mm	Upper grip			Lower grip		
	Plate sizes* mm		Qnty	Plate sizes** mm		Qnty
250 x 250	l = 220	s = 25	2	l = 220	s = 25	2
	l = 500	s = 25 optional	2	l = 500	s = 25	2
300 x 300	l = 260	s = 14	2	l = 260	s = 14	2
350 x 350	l = 500	s = 14	2	l = 500	s = 14	2
250 x 350	l = 220	s = 14	2	l = 220	s = 14	2
	l = 500	s = 25 optional	2	l = 500	s = 25	2

*plates with Δ-shaped facing;

**plates with teeth facing are installed on the lower grip only if the pile head is to be cut for a pile cap on the ground level.

WARNING

When a pile head is handled according to schemes 2 and 3, install plates without teeth on the lower grip.

When a pile is gripped, the plates should be snug against the pile faces without skewing or gaps.

7.3.2. Check pressure in the KH1 and KH2 valves and in the pressure line by the gauge. If the pressure does not correspond to values specified in the hydraulic circuit diagram (Fig. 3), adjust the valves accordingly.

The KH1 and KH2 valves shall be adjusted to working pressure in idling as follows:

a) pressure in the KH1 valve is checked when rods of

the horizontal cylinders of the upper grip are extended;

b) pressure in the KH2 valve is checked when rods of the vertical cylinders are extended.

7.4. Checking the working condition

The working condition of the machine shall be checked to see whether it is fit for operation.

The list of main checks of the equipment

Table 7

Things to be checked, tools instruments and equipment to be used	Specifications
Serviceability of cylinders. Checked visually	Pressure of cylinder rods should be even and uniform
Absence of cracks on cylinder ears. Checked visually	Cracks shall not be allowed
Absence of cracks or dents on plates of upper and lower grips. Absence of any deformation on teeth of lower grip. Checked visually.	

7.5. Operating personnel

The machine is operated by an operator of category 5 from the base vehicle and by a worker of category 4. They should:

1. know and take general safety precautions for piling, safety precautions for the base vehicle and for this machine as recorded in this Certificate;

2. know the design and operation of the machine and be

able to control it;

3. see to it that the machine operates properly and take appropriate measures in good time when it malfunctions.

7.6. Operating procedure

Having prepared the machine for operation as specified in 7.1-7.3, do the following:

a) when the pile head is to be cut on the ground level (Fig. 7):

- put the machine into initial position; the grips are opened as much as possible and are pressed against each other;

- raise the machine above the pile and let the worker bring it in on the pile, then lower the machine on the ground;

- move the control lever to the end position wherein hydraulic fluid is delivered to the rod ends of horizontal cylinders of the upper grip and lower grip and into the piston ends of vertical cylinders. When the pile is gripped, teeth on the plates of the lower grip cut into the concrete of the pile and cleave it. After the pile was compressed by the the upper grip and lower grip, the rods of the vertical cylinders are extended and the grips are moved apart vertically stretching and finally breaking the reinforcing bars.

- make sure that all the four bars are broken and then signal the crane operator to raise the machine;

- raise the machine with the upper grip and lower grip

closed by the crane hoist. The cleaved part of the concrete is pulled away in the process and the reinforcing bars are exposed;

- transfer the machine with the pile broken parts to the storage area;

- move the control lever to the opposite end position whereupon both grips are opened releasing the pile and pressed against each other. Having dumped the pile pieces, the machine is returned to its original position.

b) when the pile head is to be cut above the ground level (Fig. 8):

- put the machine into initial position;

WARNING! Install plates without teeth on the lower grip.

- raise the machine above the pile and let the worker bring it in on the pile and set so that the parting line of the grips would coincide with the designed elevation;

- move the control lever to the extreme position to start the operating cycle, that involves gripping and breaking the concrete and reinforcing bars;

- reverse the direction of the hydraulic fluid flow by moving the control lever to the opposite end position whereupon the upper grip and the lower grip are opened and are pulled to one another;

- lower the machine by 200 or 250 mm;

- move the control lever to the original extreme position, i.e. repeat the pile gripping and breaking but

since the gripped area is small, the reinforcing bars are not broken when the rods of vertical cylinders are extended but the concrete is pulled away;

- reverse the direction of the hydraulic fluid (move the control lever to the extreme opposite end again) and as soon as the lower grip opens return the lever to neutral thus locking the upper grip in closed position;

- raise the machine with the broken=off part of the pile and the lump of concrete that was pulled away transfering them to the storage area;

- move the control lever to the extreme opposite position whereby the upper grip is opened and the broken-off parts are dumped. The operating cycle is over. The machine takes its original position and is ready for the next cycle.

c) when the pile head is to be cut without leaving the protruding reinforcement (to install a precast pile cap) (Fig. 9):

- install plates without teeth on the lower grip;

- place the machine into initial position;

- raise the machine above the pile, bring it on the pile from above and set on the designed elevation;

- grip the pile with the upper grip and lower grip, and break the reinforcing bars (move the control lever to the extreme position).

WARNING! Make sure that all the reinforcing bars are broken. Continue the operation only after breaking all the

bars* .

- move the control lever to the opposite position and as soon as the lower grip opens return the lever to neutral;

- transfer the machine with the broken-off part of the pile to the dumping place;

- move the control lever to the end position whereby the upper grip is opened, the rods of the vertical cylinders are retracted and broken-off part of the pile is released. The operating cycle is over. The machine takes its original position wherein the upper grip and the lower grip are fully opened and are pressed against one another.

8. MAINTENANCE

8.1. Types and periods of maintenance

8.1.1. Maintenance is a set of measures taken to retard deterioration of components by regular preventive inspections to detect and repair defects.

The following is needed to ensure trouble-free operation of the machine:

1. To keep the machine clean and in good working order.

2. To carry out shift and periodic maintenance as specified by this Certificate.

3. To use the grades of lubricants and hydraulic oil

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*If any of the bars remain unbroken repeat the operating cycle all over again.

specified by the service manual for the base vehicle.

4. To carry out maintenance when necessary without waiting for a specified period to end.

8.1.2. Maintenance is divided into:

1.Shift maintenance.

2. Periodic maintenance.

8.1.3. Shift maintenance is carried out at the start of each working shift to check serviceability of the equipment by the operating personnel and includes also preparation of the equipment for the next shift. Average labour input of shift maintenance is maximum 0.13 men-hrs.

8.1.4. Periodic maintenance is carried out generally on the jobsite by a specialized team according to a schedule taking into account the required interval of 240 hours of the machine operation. Specific total labour input of the periodic maintenance is 0.007 men-hrs/h.

8.2. Preparations for maintenance

8.2.1. The following should be done during maintenance of the machine:

- watch the condition of high pressure hoses to prevent any damage that may be incurred;

- use filtered oil to fill in the hydraulic system of the base vehicle;

- do not allow any leaks in the system.

8.2.2. The preparations for maintenance include planning the maintenance schedule, and provision of tools, devices, and materials required for the job.

Table 8

Operations	Specifications	Instruments, tools, devices and materials required
	Shift maintenance	
1. Inspect parts and components visually	Components should not have cracks, large deflections, dents and other defects	
2. Inspect connecting hoses visually	No leaks in hose joints are allowed	Bench tool kit
3. Check fasteners on protective casings and plates	Fastening joints should be tightened	Bench tool kit
4. Check operation of hydraulic cylinders	Grips should move smoothly without sticking	
5. Clean grips and plates of dirt and remaining concrete	No concrete debris or foreign objects should be left between grips	Wire brush
	Periodic maintenance	
6. Shift maintenance operations		
7. Grease hinges of cylinders after removing guards	Grease should be put into hinges	Grease C Grease gun, spatula
8. Check surfaces of cylinder rods	Cylinder rods should be clean, without rust, dents or nicks	kerosene rags
9. Check paint	Restore paint where it is defective	Paint, brush

8.2.3. The maintenance operations include inspection of and checking the condition of components, hydraulic elements, and fasteners, lubrication, testing of the machine and small repair jobs.

8.2.4. The list of operations, specifications for their performance, the instruments, devices, tools and materials required are listed in Table 8.

8.3. Greasing the equipment

8.3.1. The machine should be greased as shown in Table 9 and Fig. 10.

8.3.2. The hydraulic system shall be filled with oil from the base vehicle.

8.3.3. Remove dirt thoroughly before greasing.

8.3.4. To lubricate journals of hydraulic cylinders press grease from the gun until it oozes from gaps.

8.4. Storage and preservation

When brought for storage the machine should be preserved following some rules as described below.

8.4.1. Storage

1. The machine should have maximum size in plan and minimum size in height and it should be stored on timbers under shelter.

2. High pressure hose ports should be plugged with special plugs.

8.4.2. Preservation

1. All the components and parts should be cleaned of dirt and rust.

Machine greasing table

Table 9

Mechanism to be greased and item No. in grease chart	Grease and standard (specs) No. for usage			Number of grease points	Greasing method	Check and replacement intervals, h	Note
	temp. up to (-40°C)233K	temp.up to (+40°C)313K	for long storage				
Hydraulic cylinder:							
Rod and housing ear journals	Grease C GOST 4366-76		-	24	Gun spatula	240	
Bearing I-E 1IC50 GOST 3635-78, item 1							
Hydraulic system	filled in with hydraulic fluid (oil) from base vehicle						

2. The paint on the structure of the machine should not have any defects.

3. Unpainted surfaces should be slushed and wrapped in paper.

8.5. Instructions for running repairs

8.5.1. Running repair is a minimum amount of repairs to ensure normal operation of a machine until next planned repairs. Running repairs include replacement or rehabilitation of individual components (fast wearing parts), and adjustments and greasing of all hinged joints.

Running repairs shall be preceded by inspection of the machine to detect any defects whereupon a repair request form is made to serve as a basis for measures to be taken to repair the fault.

9. TROUBLE SHOOTING

9.1. Troubles and remedies

Typical failures of assemblies and components, their causes and the most efficient remedies are listed in Table 10.

Table 10

Nos.	Trouble and its symptoms	Probable cause	Remedy
1.	Grips either move in jerks or fail to move laterally	1)Air present in cylinders	1)Bleed air from cylinders,ensure good sealing of pressure and return hoses
	The same	2)Filter of base vehicle hydraulic system is blocked	2)Clean filter
2.	Grips do not move evenly in horizontal plane		
3.	Grips do not go apart vertically	Rods of vertical cylinders fail to extend	Set KH2 valve for pressure as shown in Fig. 3
4.	Rods of vertical cylinders fail to extend evenly	1)Air present in hydraulic system	1)Bleed air from cylinders
		2)Spool sticking in flow dividing valves	Wash spool

9.2. Instructions for using the SPTA set

The set of spare parts, tools and accessories consists

of a number of wrenches required to service and repair the machine, replacement plates and high pressure hoses.

The list of the SPTA set is given in Appendix 1.

10. ACCEPTANCE, PRESERVATION AND PACKING

10.1. Acceptance certificate

The CII-88 reinforced concrete pile head breaker for pile caps, serial No. complies with the specifications and was found fit for regular service.

The machine was subjected to preservation treatment and was packed as specified by this Certificate.

Date of treatment _____ 19

Preservation time

Date of manufacture

Stamp here Chief Quality Inspector _____
name

Head of State Acceptance body _____
name

APPENDICES

Appendix 1

Delivery list

Line No.	Designation	Description	Qn-ty	Overall dimensions	Weight, kg	Notes
1	СП-88.00.00.000	Assembled reinforced concrete pile head breaker for pile caps	1	1250x1250x x1085H	1750	Complete with plates for 30x30 and 35x35 piles
2	СП-88.00.00.000ПС	Certificate	1			
3	МКД-000ПС	Flow dividing valve certificate	1			
		Service manual				
4	Г66-3-000РЭ	Pressure hydraulic valve	1			
		ЗИП				
5	СП-88.01.00.001					
	-04	Plate	2	L=260,S=14	5	
	-05	Plate	2	L=500,S=14	10	
6	СП-88.01.00.004	Wrench	1	s=27,l=200	1	
7	ГОСТ 2839-80	Wrench	1 each: 22x24; 27x30; 30x36			

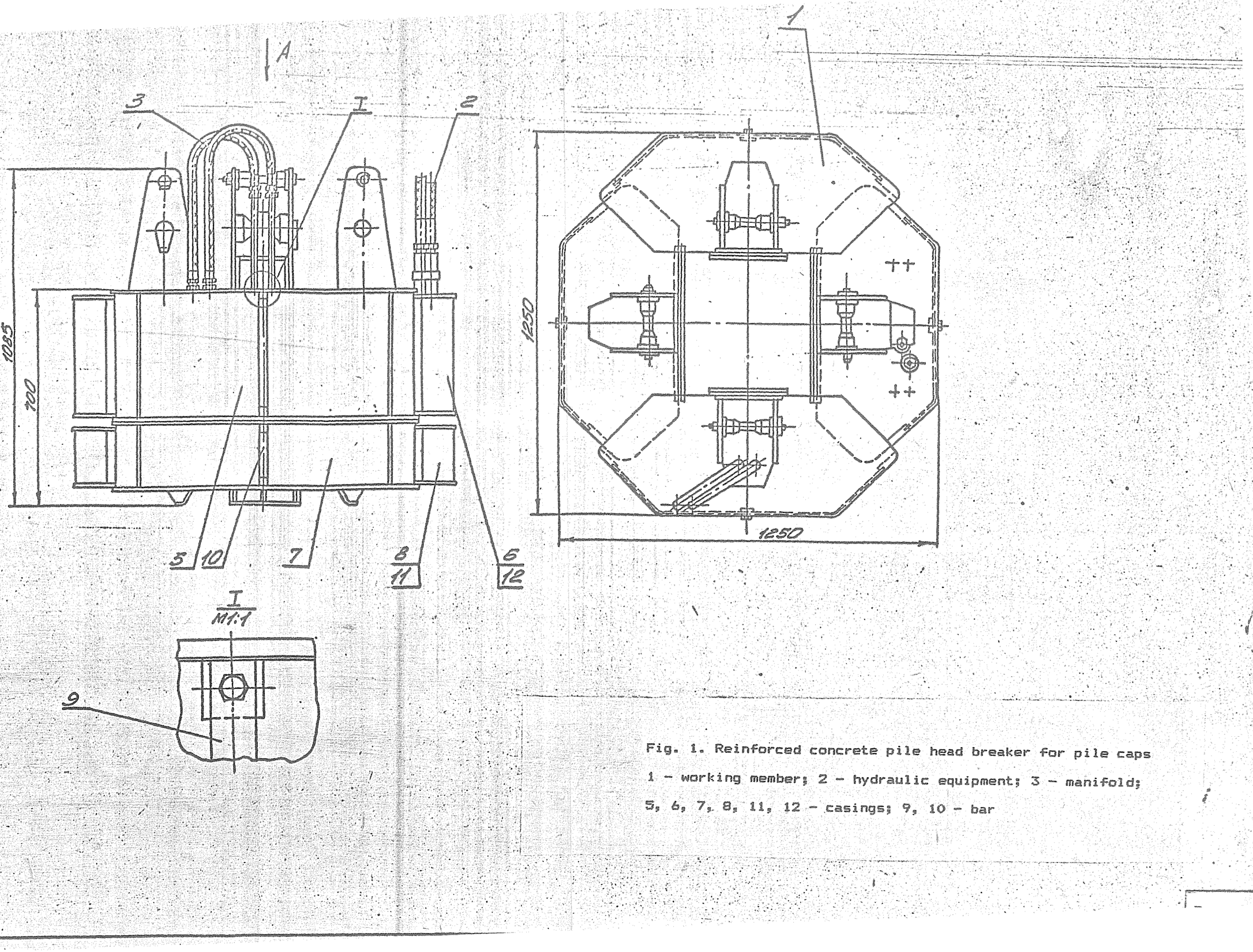


Fig. 1. Reinforced concrete pile head breaker for pile caps

1 – working member; 2 – hydraulic equipment; 3 – manifold;

5, 6, 7, 8, 11, 12 – casings; 9, 10 – bar

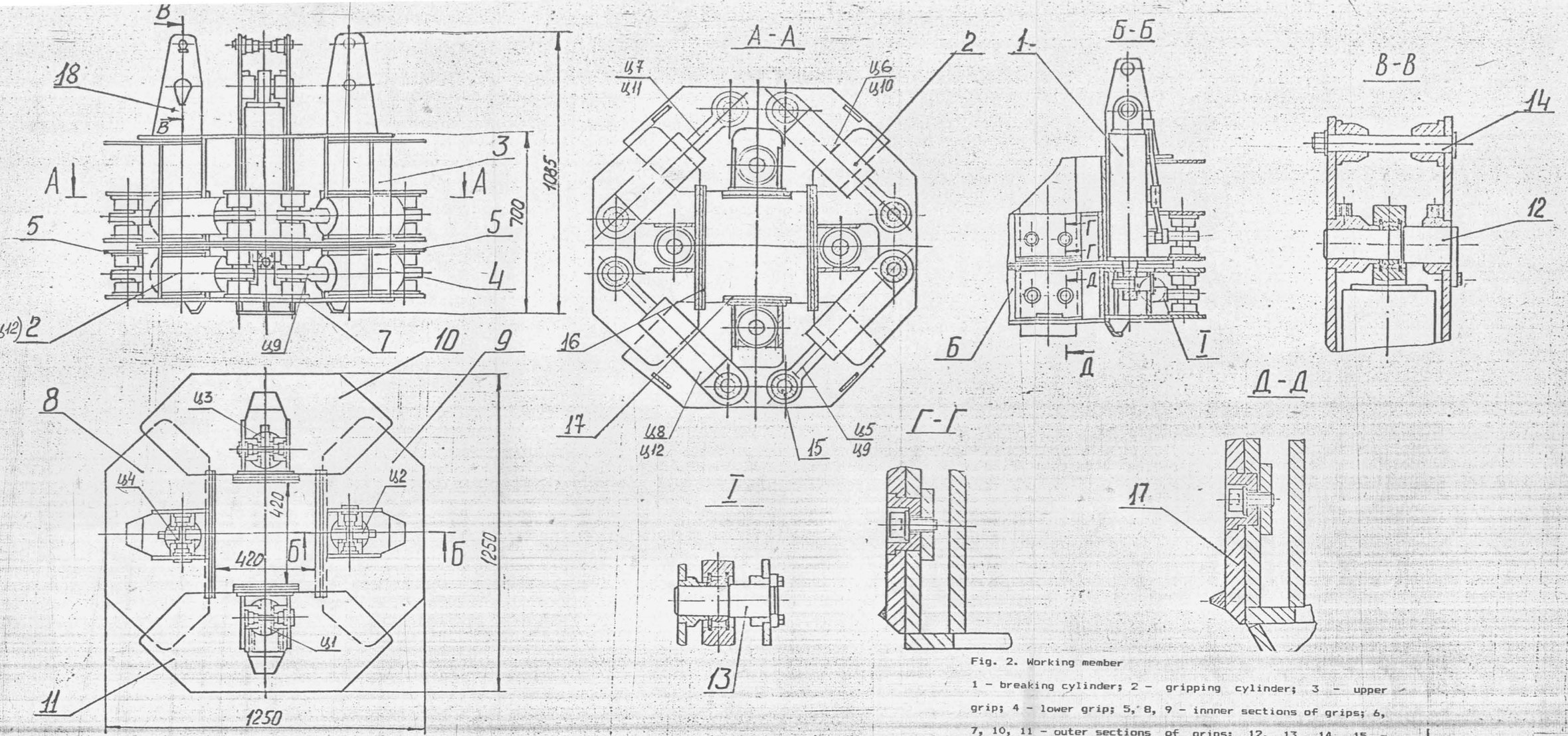


Fig. 2. Working member

1 – breaking cylinder; 2 – gripping cylinder; 3 – upper grip; 4 – lower grip; 5, 8, 9 – innner sections of grips; 6, 7, 10, 11 – outer sections of grips; 12, 13, 14, 15 – – fixing pins; 16, 17 – plates; 18 – ears

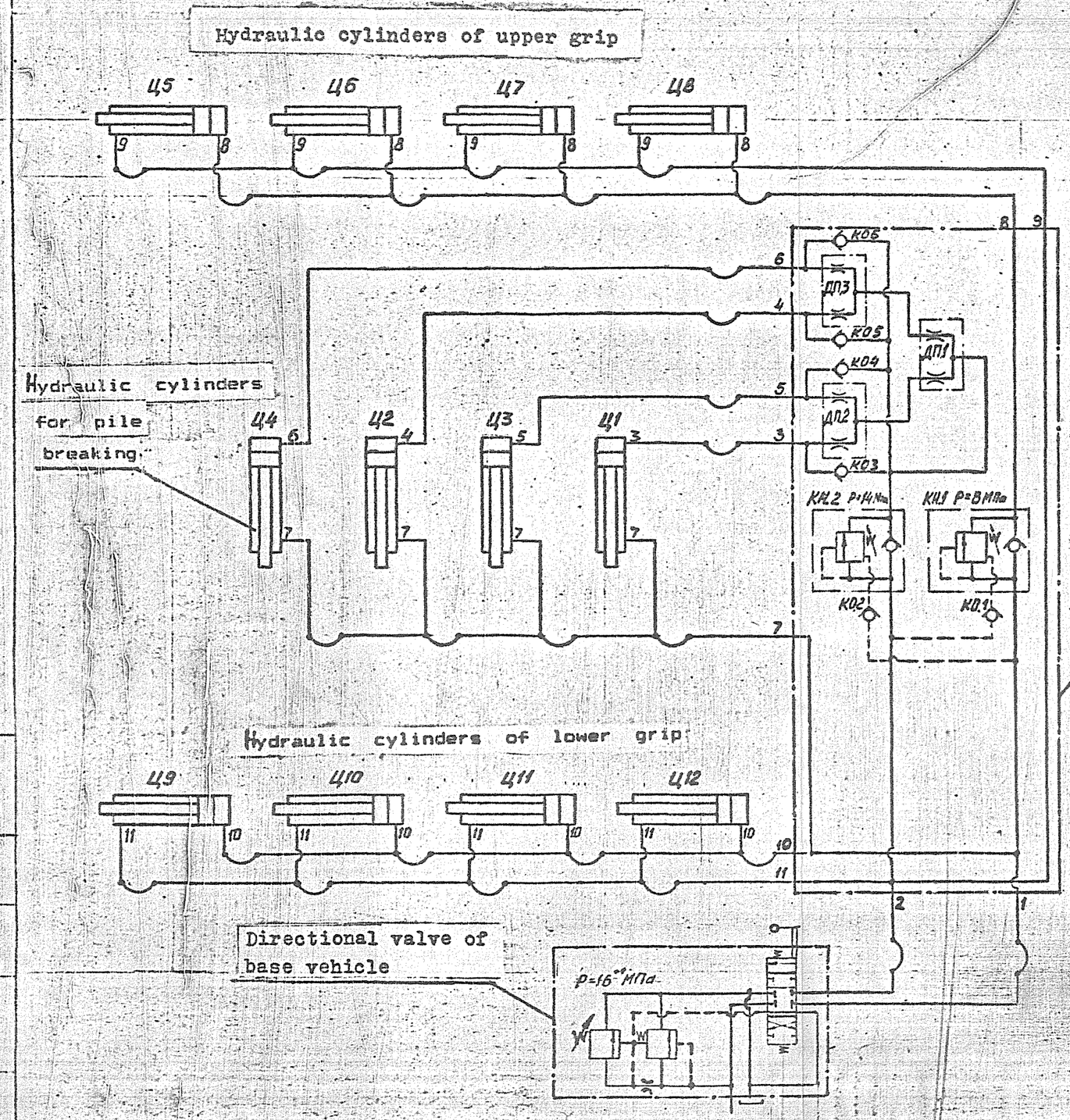
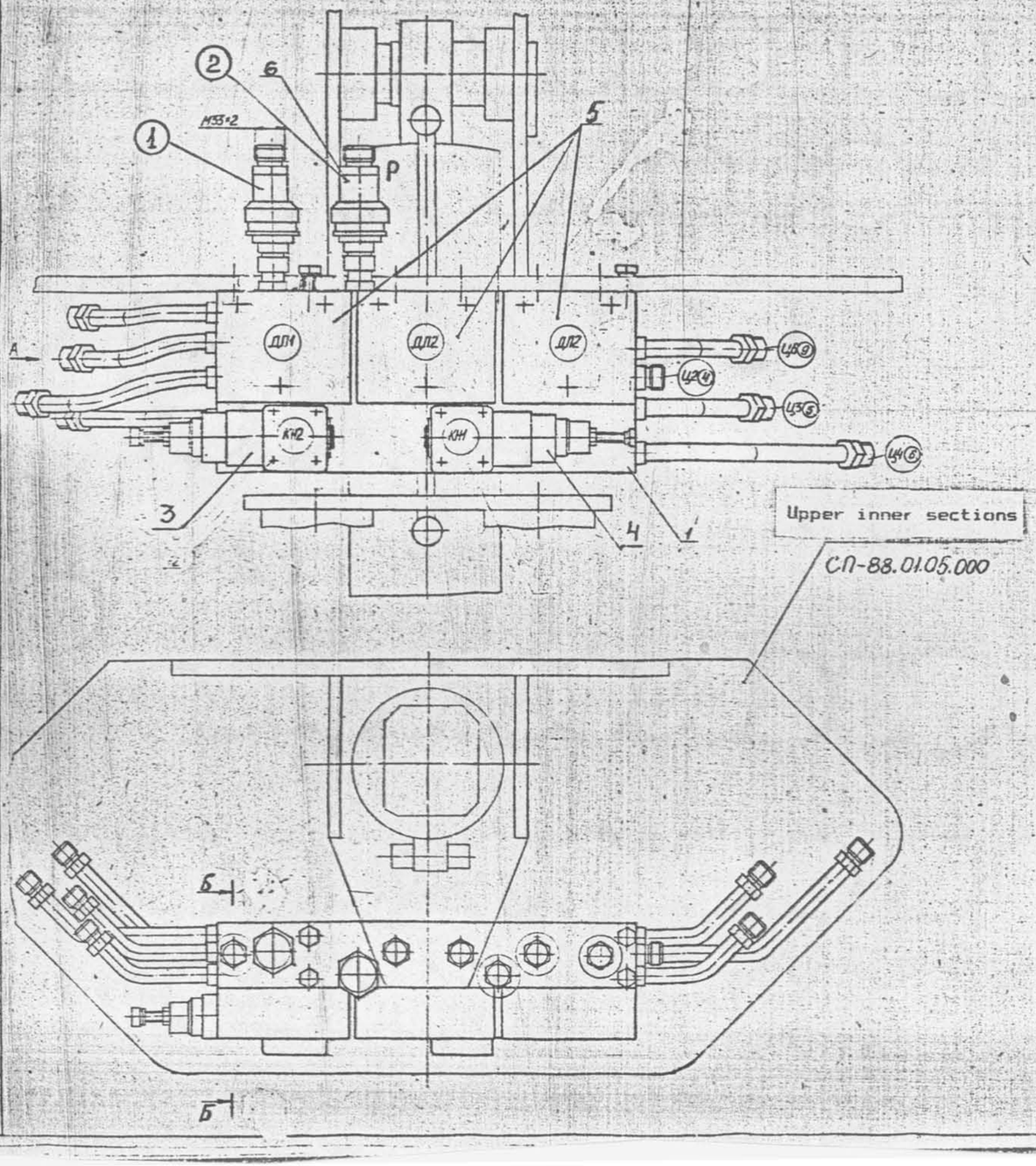
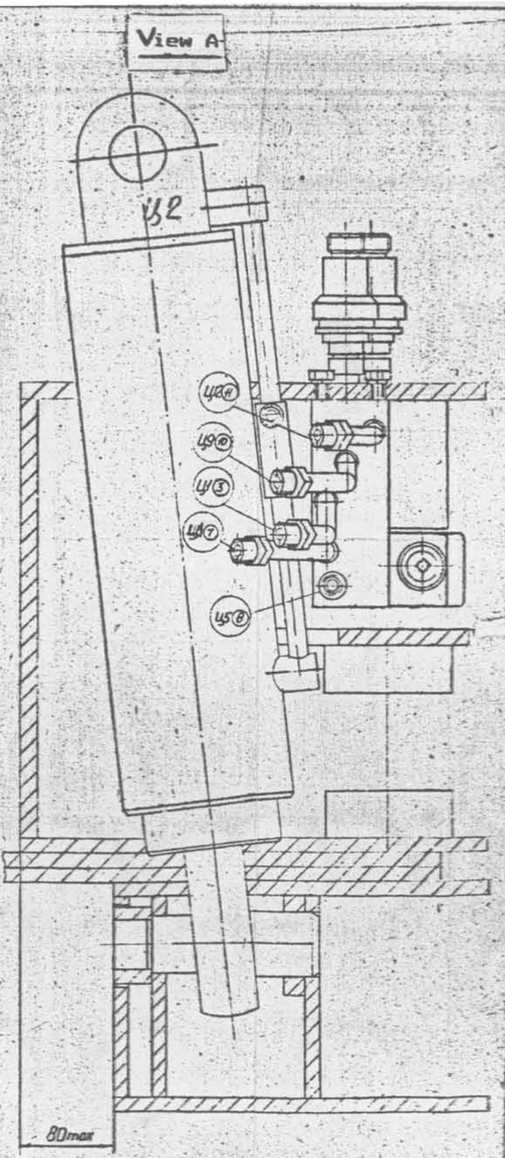


Fig.3. Hydraulic circuit diagram

ДП I...ДП3 - flow divider; КН1, КН2 - pressure valve with check valve; КО1 ... КО6 - check valve; I ...II - lines of communication.





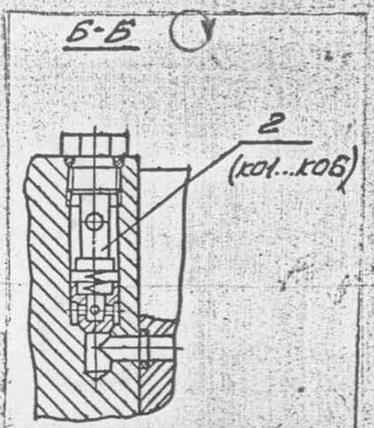


Fig.4. Hydraulic panel installation

I - plate; 2 - check valve; 3,4 - pressure valves; 5 - flow dividing valve; 6 - fast-release joint; (I). (II) - numbers of unions according to lines of communication in fig.3 and fig.2.

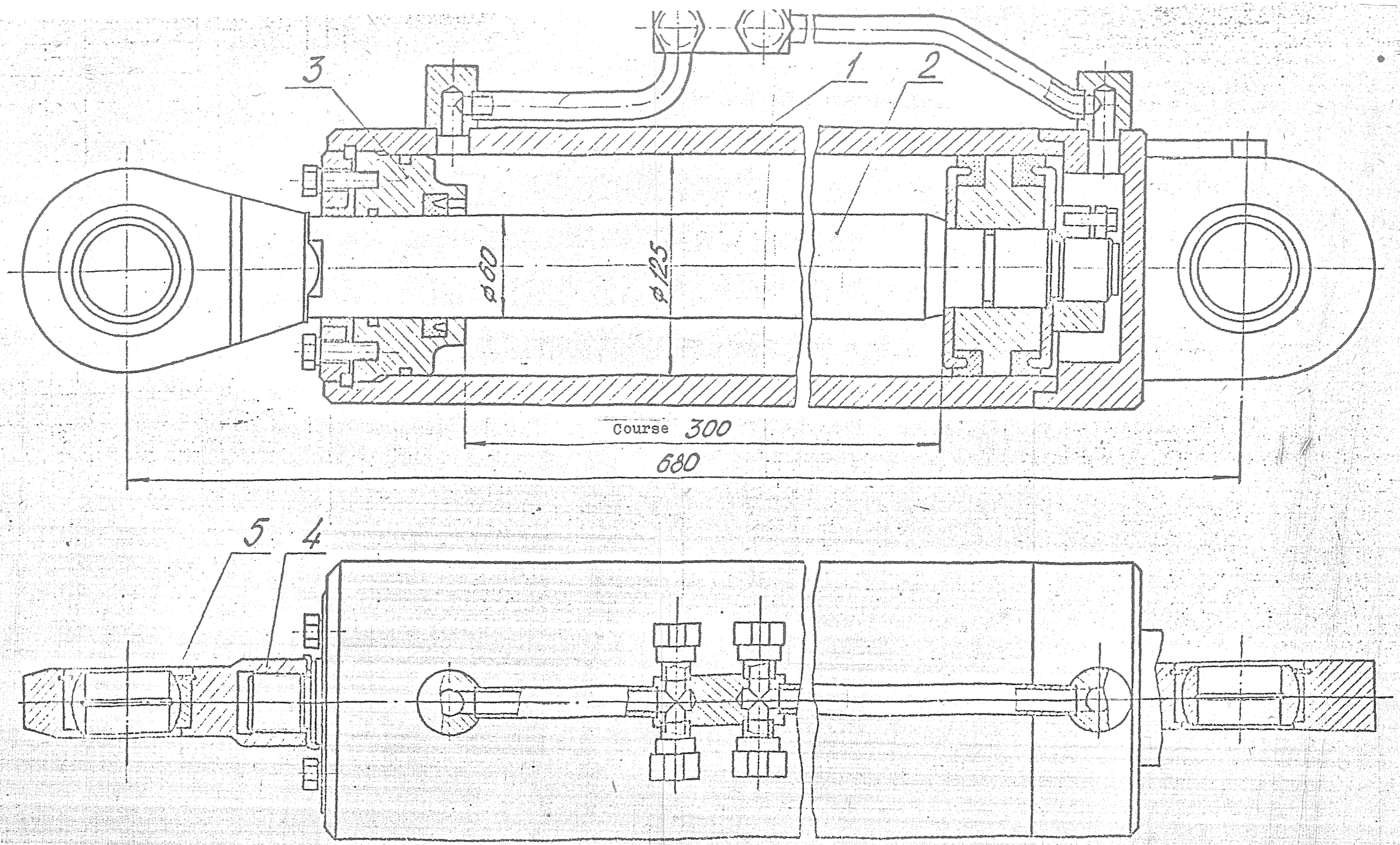


Fig.5. Pile breaking vertical cylinder

1 - cylinder; 2 - rod; 3 - cover; 4 - ear; 5 - bearing

TE WC-50

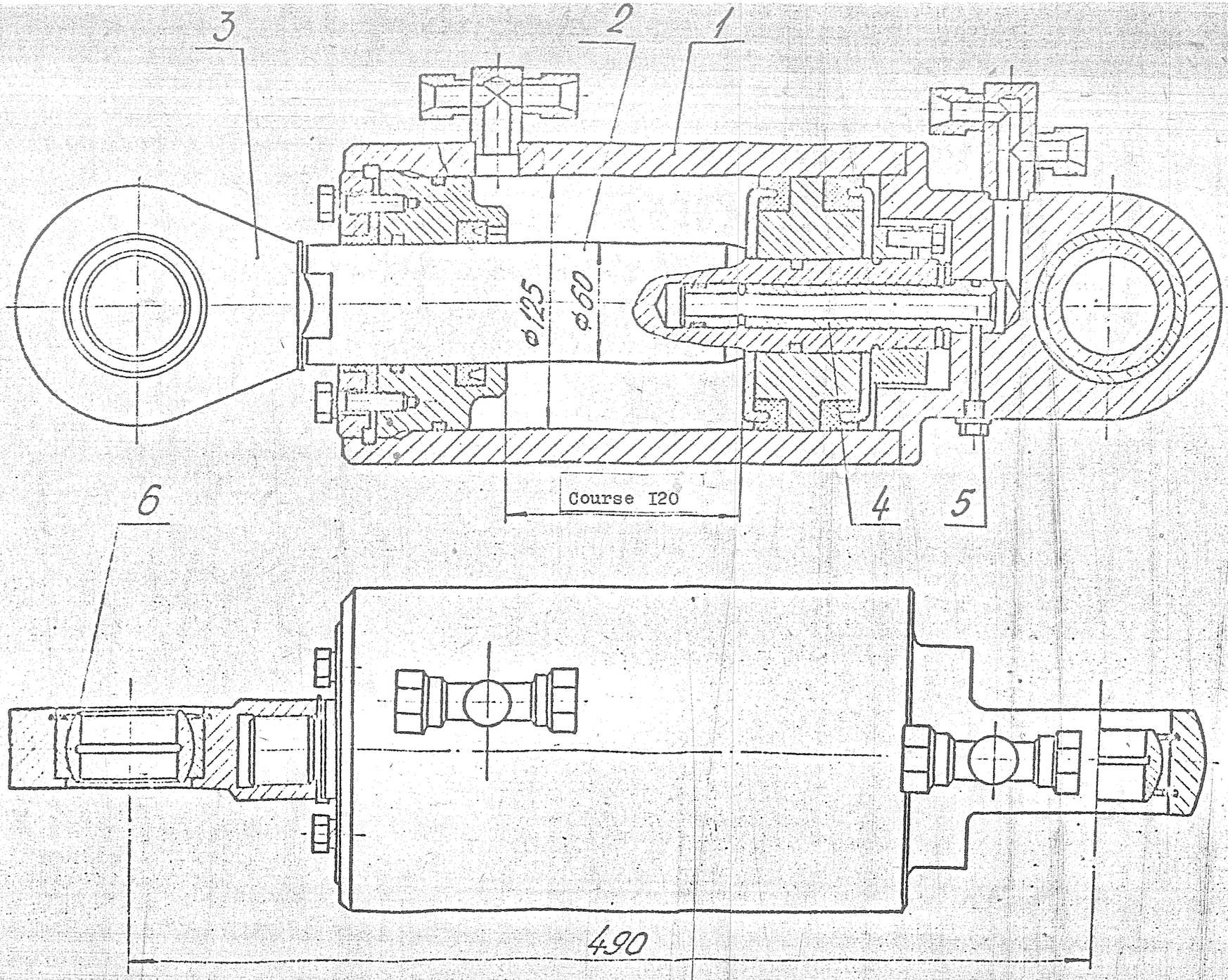
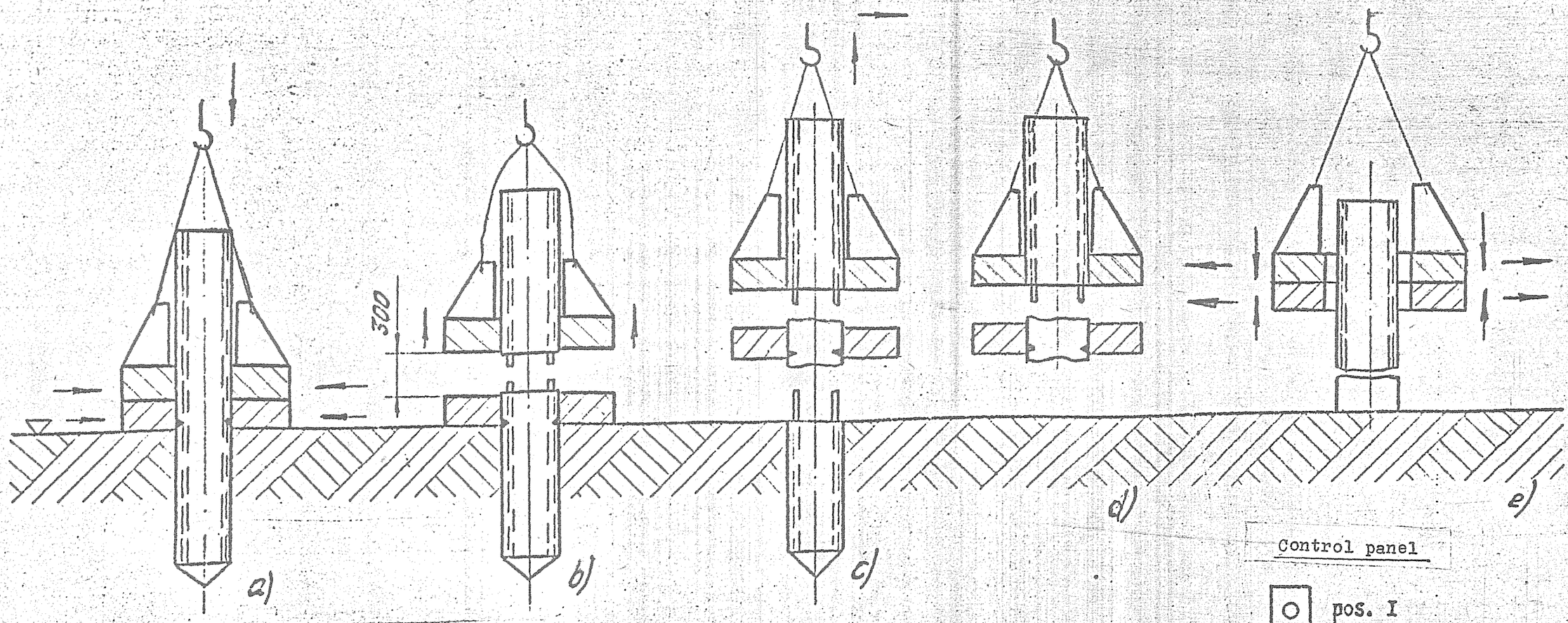


Fig. 6. Horizontal pile gripping cylinder

1 - cylinder; 2 - rod; 3 - ear; 4 - damper; 5 - lock;

6 - bearing IE WC-50

S C H E M E I – Cutting reinforced concrete pile heads on the ground level exposing the reinforcement



Sequence of operations:

a) setting the machine on the designed elevation of pile height and gripping the pile;

b) breaking concrete together with reinforcing bars;

c) removing the concrete from the reinforcing bars by winch of the base vehicle with the grips closed;

d) conveying the broken parts of the pile to dumping;

e) opening the grips to dump the broken-off parts of the pile.

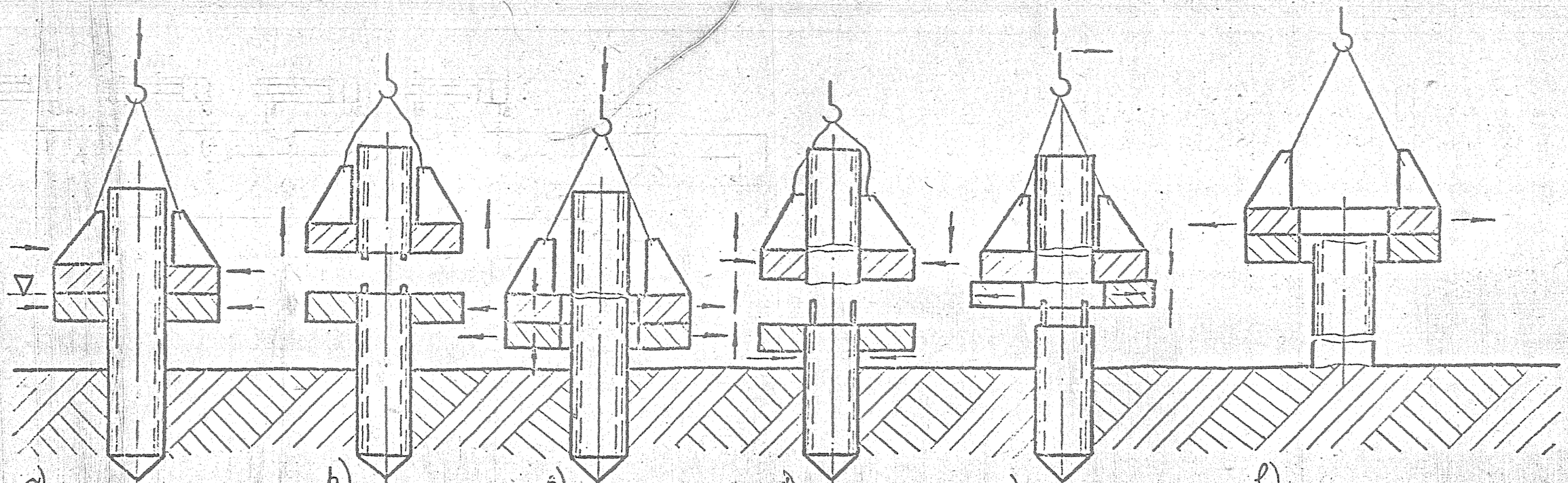
Note: Arrows indicate movements of the machine and its

Control panel

position of directional valve control:-

position I - figs. a) and b)
position 2 - fig. e)

S C H E M E 2. Cutting reinforced concrete pile heads above the ground level exposing the reinforcement



Sequence of operations:

▽- designed elevation

a) setting the machine on the pile at the designed elevation and gripping;

b) breaking concrete together with reinforcing bars;

c) opening the grips and lowering the machine;

d) closing tne grips and removal of the concrete from tne reinforcing bars by vertical cylinders;

e) opening tne lower grip and moving tne control lever to neutral;

f) raising tne machine together with the broken parts of the pile, opening the upper grip and dumping the broken-off parts of the pile.

Note: arrows indicate movements of the machine and its elements.

Control panel

pos.I

pos.3 - neutral;

pos.2 -

Position of directional valve control:

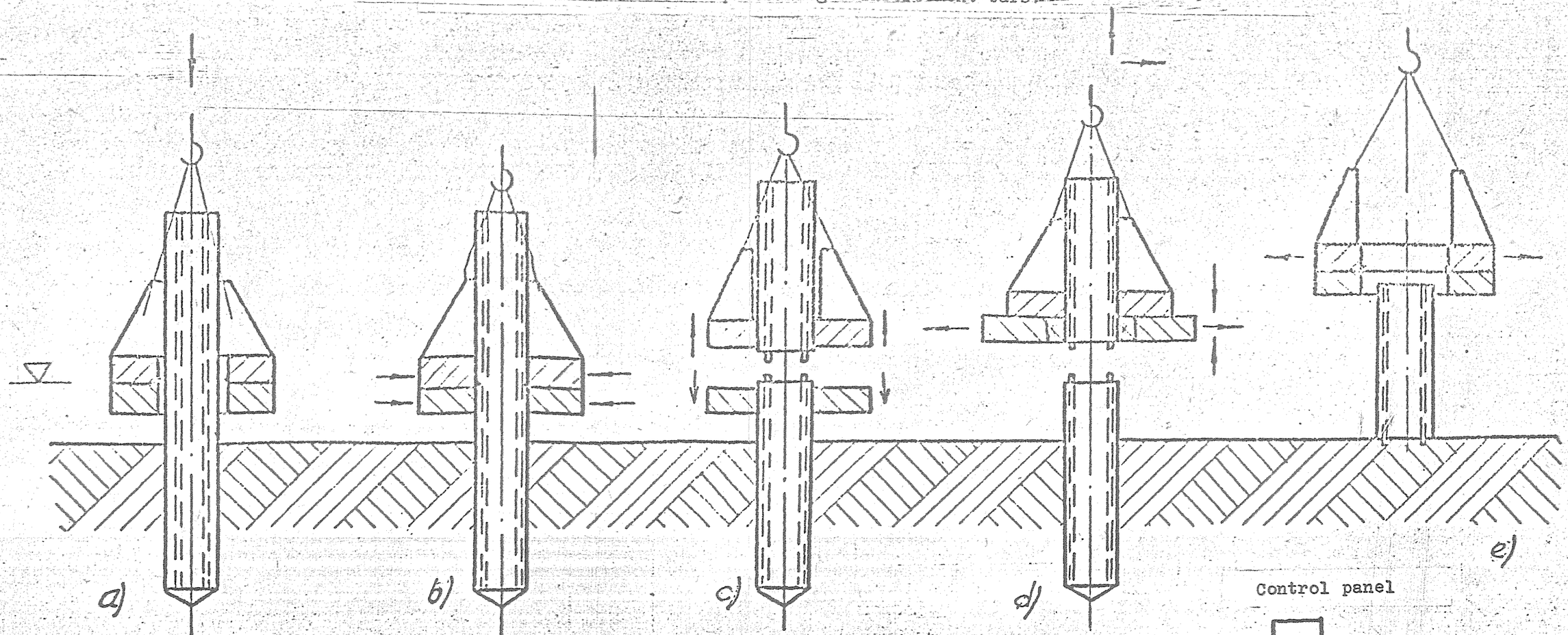
position 1: Figs. a) and b);

position 3: Fig. e);

position 2: Fig. f)

Fig.8

S C H E M E 3. Cutting reinforced concrete pile heads without protruding reinforcement bars



Sequence of operations:

a) setting the machine at the designed elevation;

b) gripping the pile;

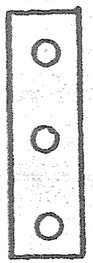
c) breaking concrete and reinforcement bars;

d) opening the lower grip and pressing the upper grip and lower grip to each other, moving the cohtrol lever to neutral, raising the machine together with the gripped broken part, transferring the part to a storage for broken-off pile parts;

e) moving the control lever to extreme position, opening the upper grip to dump the broken-off part of the pile

Note: Arrows indicate movements of the machine and its elements.

Control panel



Position of directional valve control

position I: Figs. b) and c);
position 2: Figs.d) and e)
position 3: Fig. d)

Fig.9

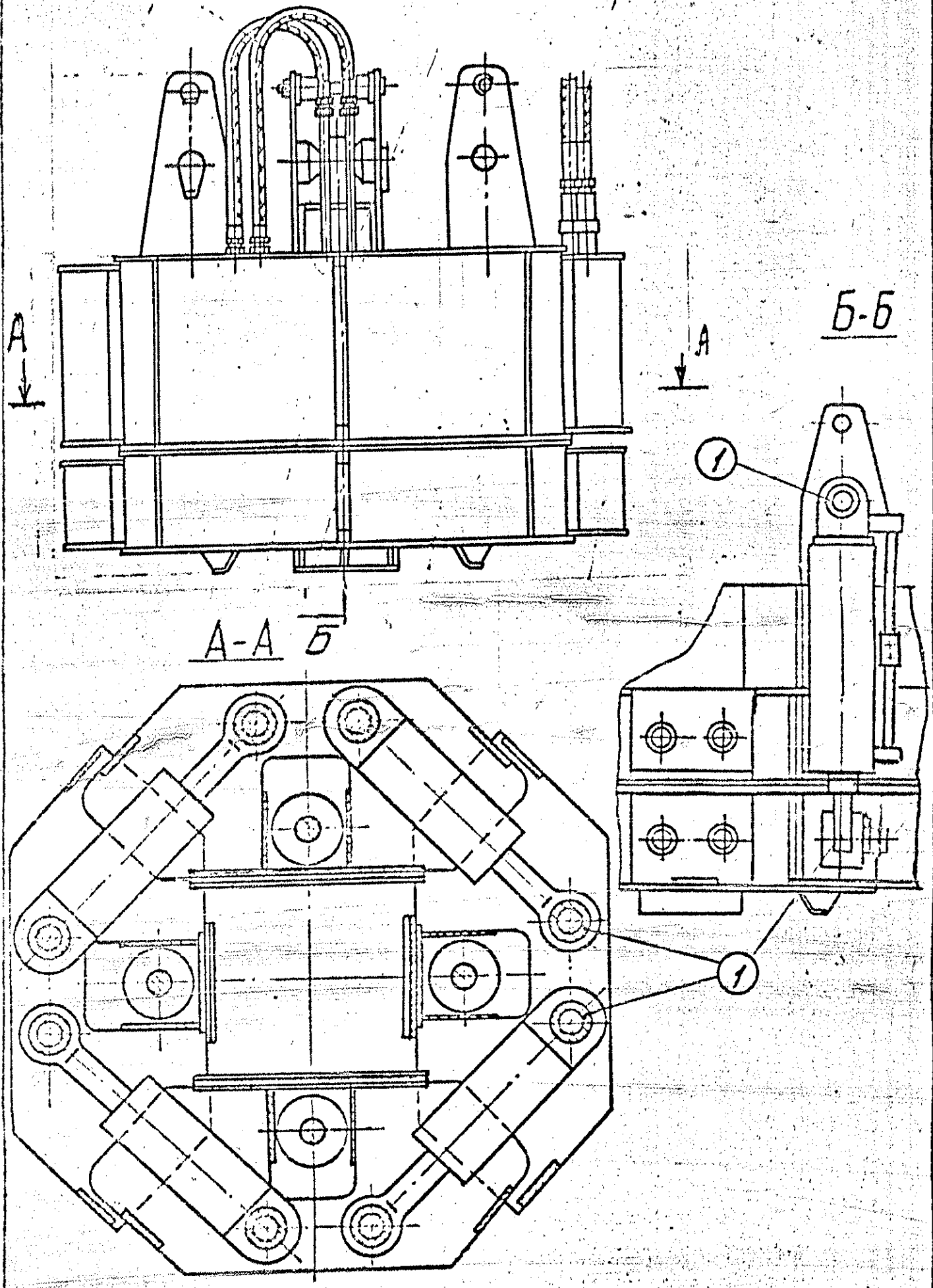
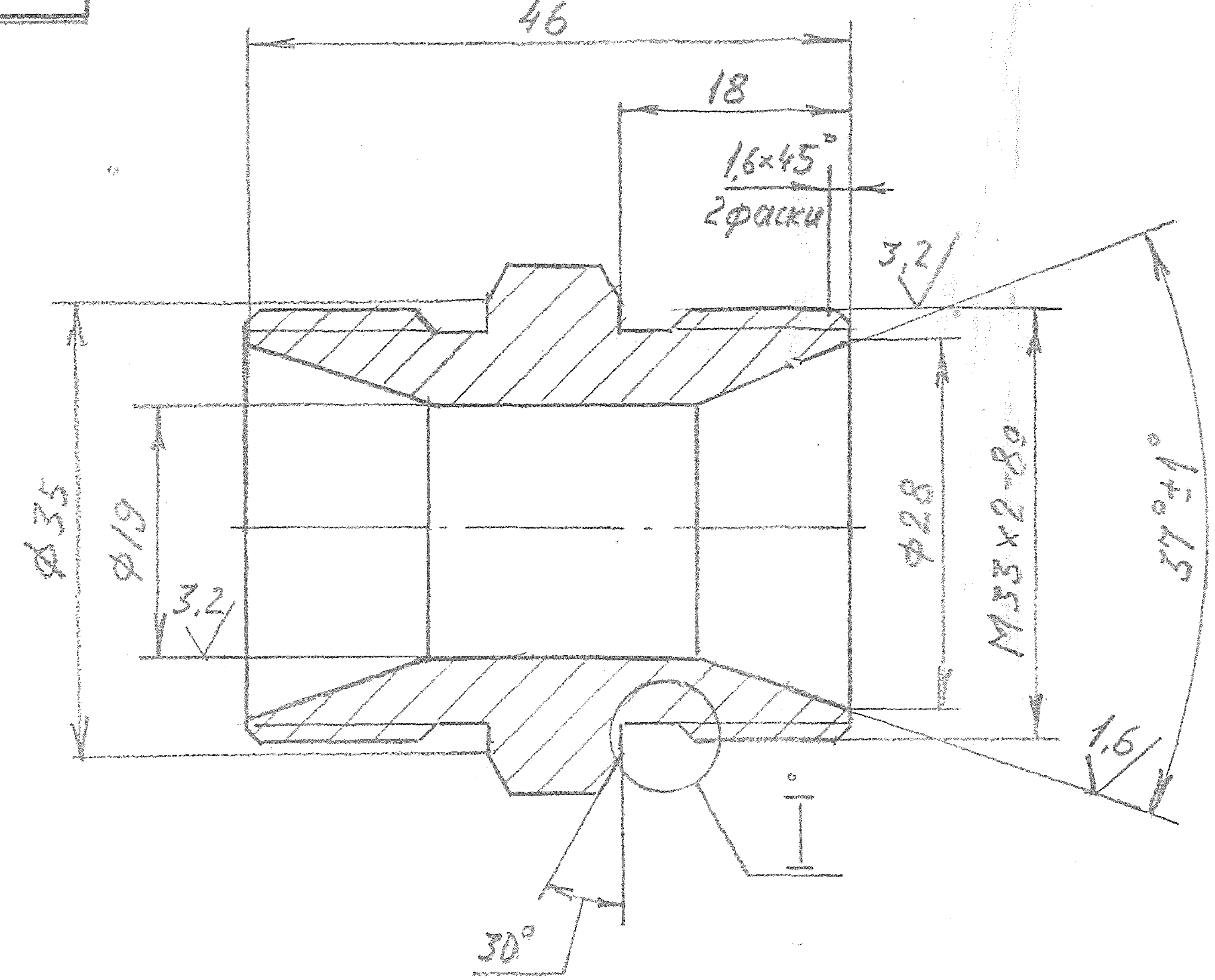
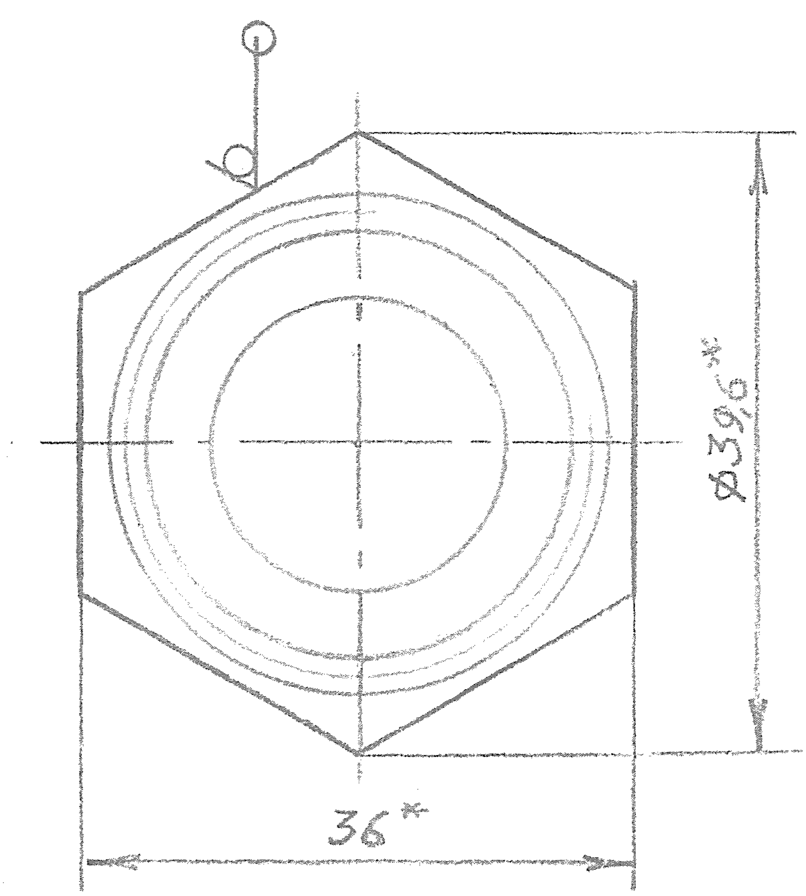


Fig. 10. Greasing diagram

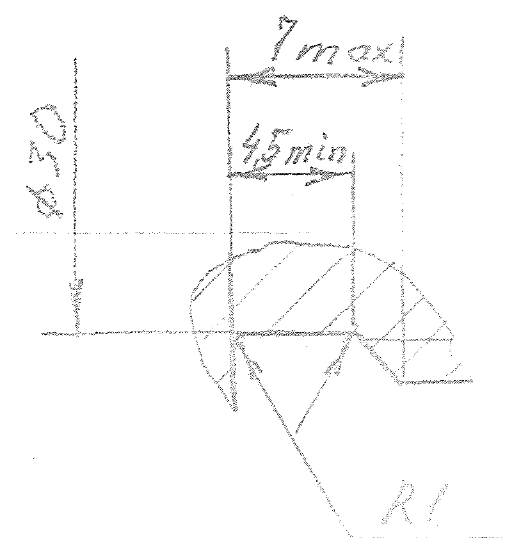
1 - bearings ШС-50





I

М 4:1



1. h14, $\pm\frac{IT14}{2}$.
2. Покрытие Хим. Окс. прм.
3. *Размеры для справок.

Изм.	Лист	№ докум.	Подп.	Дата				
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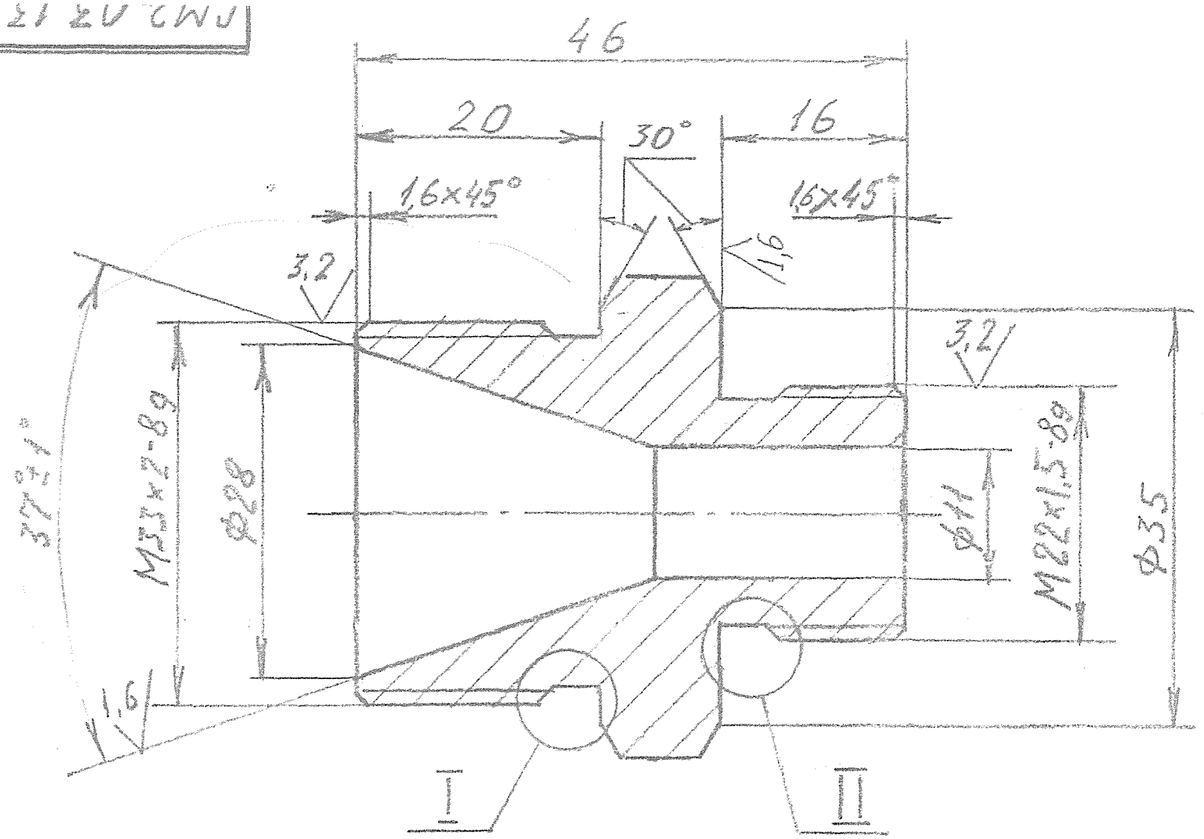

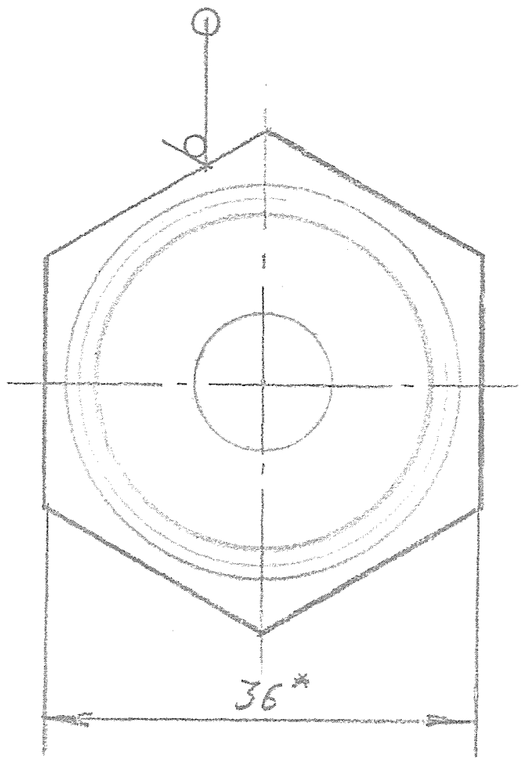

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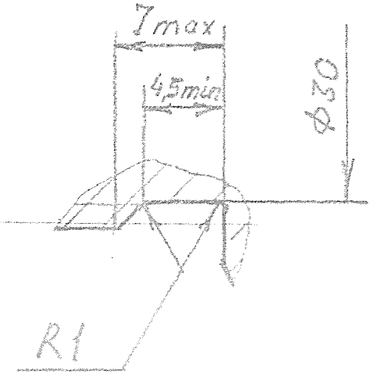
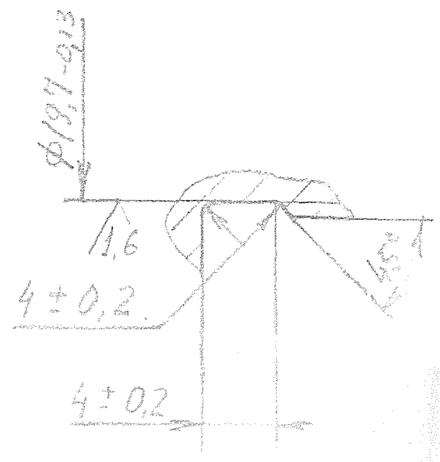


II
M4 : 1



1. H14, h14, $\pm \frac{IT14}{2}$.
2. Покрытие Хим. Окс. прм.
3. *Размеры для справок.

					СМ2-03.13.015		
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Пров.						Лист	Листов 1
Т.контр.						ЗНИИмаш
Н.контр.						
Утв.						

Инв. № подл. | Подп. и дата | Взам. инв. №