N241

CherkassyElevatorMash

GRAIN EXTRUDER

E-500 BRONTO

Operating Manuál
E-500 RE

Cherkassy 2008

Contents

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Introduction

This operating manual's purpose is to familiarize the operating personnel with the structure, technical information, operation and servicing rules of the extruder.

The extruder's duly performed work as well as its long life depend on its correct operating, that is why you should read thoroughly this operating manual before the extruder's mounting and putting in operation.

This operating manual can be changed and completed as the extruder itself can be improved and within the process of the experience's accumulation.

1. Purpose

The extruder is purposed for the extruded fodder of wheat, rye, barley, corn, peas and soybeans preparing for farm animals and poultry. The climatic execution is UHL 4.2 according GOST 15150.

2. Specifications

Parameter	Unit	Rate
Performance (at the feed stock's density = 750 kg/m^3, humidity 12-16%)	Kg/h	up to 500
Grain explosivity grade in relative units, at the least, for:		
peas and corn	-	3
other crops	-	1,5
Temperature of the product processed in the homogenization area	K(C)	383-433 (110-160)
Set power	KW	56,1
Mains supply current		Three-phase four-wire mains of alternating current
Frequency	Hz	50±1
Voltage	V	380^{+38}_{-57}
Dimensions, at the most		
length	mm	2300
width (together with cutting device)	mm	2100
height	mm	1700
Weight, at the most	Kg	1400

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3. Complete set

The extruder's complete set includes:	
1. Assembled extruder	1 piece
2. Spare parts set, according the SPS list	1 set
3. Operating manual	1 piece
4. Electric motors' registration certificate	2 pieces

4. Structure and Principle of Operation

4.1. The extruder consists (fig. 1) of a frame 1, a rotor 2, a screw part 3, a driving actuator 4, a hopper with dozer 5, a cutting device 7 and control system 6.
4.2. The frame 1 is a welded construction. There is a driving actuator's electric motor installed on it, delivering rotation to the rotor through the V-belt drive 8.
4.3. The rotor (fig. 2) serves to transmit the rotational motion from the driving actuator's electric motor to the screw part; it consists of the cylindrical case 8, shaft 9 with bearings 10, 11 and 12. A shaft 13 is set into the boring of the shaft 9 (fig. 3, 4) on one end and is fixed with a finger 14. On another end a driven pulley 16 (fig. 5) is installed onto a collet 15 (fig. 2).
4.4. The screw part is purposed for the processed product's transportation, crushing and mixing.
4.4.1. The screw part assembled for soybeans' processing (fig. 3) consists of screws 19, 20, retaining washes 21, 22 and 23 assembled on the shaft 13 and tightened with a left-hand thread tip 24, barrels 25, 26, 27, 57 tightened with locks 28. Sleeves 29, 30, 58 are built into the barrels 25, 26 and 57. The outlet barrel 27 is provided with a threaded opening, where a nut 31 and an inlet plug 32 are installed.
The barrel 25 and the sleeve 29 have the matched rectangular openings for the receiving cone's installation. The screws 20 are double-threaded.
The rotation moment's from the shaft 13 is transmitted to the screws 19, 20 and washers 21, 22 and 23 through keys 33, 34, 35.
There are longitudinal ribs made on the inner surface of the sleeves 29, 30 and 58 to provide the product's movement along the screw part's axis.
To exclude the barrels' turning regarding each other dowels 36 are provided.
Screws 37 are for the axis fixation of the sleeves 29 and 30.
Two replacement plugs 38 and 39 are installed in the supporting washers' area.
A temperature probe 40 is installed on the inlet barrel 27.

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The final product's quality is regulated via the clearance change between the nut 31 and the tip 24, as well as by change of the outlet plug 32's opening diameter.

4.4.2. Mounting of the screw part for cereals processing (fig.4) differs as follows: instead of each double-threaded screw 20 (fig. 3) two screws 19 are placed, and instead of the nearest to the spindle screw 19 the elongated screw 41 is placed.

Two washers 42 and 43 and a tip 45 are installed instead of the washers 21, 22, 23 (fig. 3) and the tip 24. At that, two additional keys 33 are put; a key 34 is placed instead of the key 35. The correspondent outlet plug 32 is also placed.

4.5. The driving actuator consists of an electric motor, a pulley 17 (fig.6), placed on the electric motor's shaft through the collet 18, V-belt drive and a pulley 16, installed on the shaft 9 (fig. 5). The pulley 17 of the electric motor is replaceable. For soybeans processing the pulley with an external diameter 351.4 mm is required. For cereals and peas the external diameter is 235.4 mm.

4.6. A hopper 5 with a dozer controls the grains supply to the extruder's screw part. A dozer (fig.10) constitutes a shaking feeder consisting of a tray 46, installed on the leaf springs 47, 51 and electromagnet 48.

In order to exclude getting of any foreign steel things into the screw part there is a magnetic catcher installed in the cone.

4.7. The slicer device 7 (fig. 4) consists of a crusher shaped as a spiral, where a rotor with blades rotates. The rotor receives rotation from the electric motor installed together with a spiral on the platform. The platform, in its turn, is connected with the frame via the revolving brackets' system. The crusher is driven away in the off-position. In on-position the crusher's feed throat is put on the nut 31 and fixed with a special grip.

4.8. The water supply system (fig. 7) serves to moisten the base mixture and consists of the tap 52, manometer 57, adjusting cock 54, rotameter 55 and a valve 56.

4.9. The extruder's control system is placed into the control case 6 (fig.1) The electrical schematic is presented in the fig. 9. The box constitutes a metal welded box with an opening door, where operational control devices and visual control devices are placed. The purpose of operational control and visual control devices is as follows:

The circuit breaker **ON, OFF** serves for voltage supply into the control box.

The **START** button serves for voltage supply to the switches.

The **STOP** button serves for emergency de-energization of the control circuits.

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Switchers:

- EXTRUDER START / STOP is to switch on (off) the driving actuator's motor.
- FEEDER START / STOP is to supply power or to de-energize the control card and to supply voltage to the shaking feeder's coil.
- SLICER START / STOP is to switch on (off) the cutting device's electric motor.
- VOLTAGE signal fittings are to control the voltage availability.
- GRAIN SUPPLY control device is to control the shaking feeder's output.
- DRIVE CURRENT ammeter is to control the load of the driving actuator's motor.
- TEMPERATURE numeric display is for indexing the temperature in the homogenization area of the extruder's screw part.

WARNING!
The digital ammeter serves to protect the extruder's electric motor. Before the electric motor's start check up (change if necessary) settings of the digital ammeter. Do not start the motor with the blocked contact of the digital ammeter or with wrong settings.

The digital ammeter's settings:

- Current strength I = 120A
- Delay time t = 3s

In emergency situations the digital ammeter stops the voltage supply on the control scheme, disabling thus the further work of the extruder.

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For electrical cabinet powering use copper thread wires of the least cut 35 mm^2, for aluminum thread wires the least cut is to be 50 mm^2.

4.10. The extruder works as follows:
The base mixture is supplied into the extruder's hopper from the internal supply system. When the electric motor and then shaking feeder are on, the mixture comes out from the hopper into the receiving cone, and further into the extruder's screw part.
When passing the screw part the mixture is milled and is treated thermally, it mixtures under pressure and is pressed out from the extruder.
The mixture is heated due to friction within the process when the mixture moves along the screw part.
The ready product comes out from the outlet plug's opening. When cereals and peas are processed the product is braid-shaped. The slicer's knife crushes the product as it comes out from the screw part.
The process temperature and grain explosivity grade are adjusted by the clearance change between the nut 31 and the tip 24 (fig. 3), and correspondingly between the nut 31 and the tip 45 (fig. 4), as well as by change of the outlet opening's area. Reducing of the clearance or the outlet opening's area results in raising the product's temperature and explosivity grade; and vice versa increasing of the clearance or the outlet opening's area results in the temperature's and explosivity grade's drop.
To make the cereals and peas processing steady they are to be moistened with the water supply system.
The extruder is started and stopped and its output is controlled from the control case.

5. Safety Measures

5.1. Mounting and operation of this equipment is to be carried out by personnel qualified to complete this work only, with document certifying their right to operate the extruder.
5.2. The operator working on the extruder must wear special working clothes, a head-dress, he must use heat-resistant gloves.
5.3. The premises where extruders are installed are to be equipped with mandatory exhaust ventilation. Quantity of dust and vapor in the working area's air must not exceed the legitimate values prescribed by regulations of GOST 12.1.005. It is prohibited to switch on the extruder when ventilation does not work.
5.4 The extruder's foundation is to be earthed.
5.5. The operator should not remedy any defects in electric equipment. The electrician on duty is to be called for.

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5.6. Do not stand opposite the outlet opening of the screw part during the start, adjusting and operation of the extruder, as the process of the product's manufacturing is connected with high temperature and high pressure.

5.7. Do not push the mixture through with hands or any gears into the receiving cone, do not remove extraneous things from the magnetic catcher when the extruder is on.

If any trouble happens stop the extruder.

5.8. Do not start the extruder without protective shroud on the V-belt drive and sliver.

5.9. It is absolutely prohibited to start the extruder with the clogged product or partially closed opening of the screw part's outlet plug. It is necessary to remove the plug with the outlet device and to clean the opening.

5.10. **WARNING!** Do not clean the outlet plug's opening when the extruder is on.

5.11. The maintenance staff MUST NOT stay opposite the screw part when the outlet barrel 27 is being demounted.

Where it is necessary to take off fasteners for the barrels' disassembling, take into consideration that those may be thrown forward due the mixture's processed pressure, and the hot mixture may get in eyes and face. That is why it is recommended to disassemble the plug or the outlet and intermediate barrels, if the screw part results clogged, when their temperature drops down to 40єC.

5.12. Use a scoop when taking a sample of the base mixture at the outlet of the feeder's tray. Do not take a sample with hands.

5.13. In emergency situations do the emergency switching of the extruder: using the fungiform button "EMERGENCY STOP" switch off the electric motors of the cutting device's and the feeder.

5.14. Do not disassembly the screw part when the temperature of the parts exceeds 90єC and without gloves.

5.15. Do not work with defective instruments.

5.16. Do not use a spanner extension when tightening nuts on the fasteners.

5.17. Acoustic pressure and vibrational load within the operator's working place do not exceed the values established by the GOST 12.1.003 and 12.1.012 relatively.

5.18. No hazard substances escape into the environment during the extruder's operation.

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6. Extruder's Assemblage

6.1. The extruder is to be installed on the plain horizontal surface on the floor or concrete base with the most inclination 5 mm for 1 m length. At that there must be a free surface 1000 mm at least - in front of the screw part.
6.2. The extruder's location above the curb level may differ depending on location of the base mixture supply and final product discharge.
6.3. The systems supplying base mixture must be connected to the extruder, as well as the final product receivers and ventilation.

7. Preparation and Order of the Extruder's Operation for Soybeans Processing

Assembly the screw part according to the fig. 3. Install a pulley of the external diameter 351.4 mm on the motor's shaft.

7.1. Extruder start:

- Loosen the nut 31 for 4 turns from the starting position (tightened up to the stop) and fix it with a lock.
- Take the outlet barrel 27 off and heat it up to 90-100°C
- Install the outlet barrel 27
- Supply voltage to the control case with the ON circuit breaker.
- Supply voltage to the switchers with the button START.
- Switch on the driving actuator's motor with the EXTRUDER START / STOP switcher.
- Enable the shaking feeder with the FEEDER START / STOP switcher, supply soybeans into the receiving cone with the GRAIN SUPPLY control device, increasing the supply gradually. The mass must go out from the nozzle constantly. The current strength must not exceed the rating value (107 A).

NOTE. Where the start is improper the extruder's screw part can be "clogged up"; the evidence of this is as follows: grain is supplied into the receiving cone, but does not discharge out from the screw part; as a result the current load at the driving actuator's motor increases, and then it sharply drops.
If such "clogging up" up happens de-energize the extruder.
Disassemble the screw part, clean and examine parts of the screw part to find out any defects. If the screw part is defect-free, assemble it and re-start as described above.

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7.2. Operating Mode

7.2.1. When the extruder is started the mode where its output, process temperature and current load of the electric motor must correspond to the rating value, is set.

7.2.2. Where the extruder is mode-operated the operator must monitor functioning of all extruder parts, the process temperature, rare materials' and final product's quality. If the temperature does not correspond readjust it according to the technique described in the item 7.4.

7.2.3. The operator must examine the magnetic catchers twice at least during a shift.

7.2.4. The operator must control the load of the main drive's motor and power supply at all phases.

7.3. Extruder stop

7.3.1. Stop the base mixture supply with the GRAIN SUPPLY control device's handle.

7.3.2. Switch off the shaking feeder with the FEEDER START / STOP switcher.

7.3.3. When the product does not discharge out from the screw part any more, switch off the main drive's motor with the EXTRUDER START / STOP switcher.

7.3.4. Stop the power supply into the control box's scheme with the STOP button.

7.3.5. De-energize the control box with the OFF circuit breaker.

7.3.6. Disassemble the outlet barrel 27 together with parts installed on it, install the E-500.50.00.001 ring instead, switch on the driver's electric motor and turn the screws through to remove the mixture. Disassemble barrels 26, 57 in the same way.

7.3.8. Assemble the screw part. Tighten nuts of the locks 28 with standard spanners only. Do not use any levers or tubes to increase the tightening torque. Normal tightening torque is 150 N/m (15 kg-force/m)

7.4. Rating change, adjusting and setting.

7.4.1. The output can be determined when the current load of the main motor is 100%, the quality of the ready product is satisfying, the temperature corresponds to the set one. Weight the mass discharged out from the outlet opening of the screw part within 3 minutes. The result multiplied by 20 results the hourly consumption (output).

7.4.2. If the shaking feeder does not provide the nominal output, the clearance (fig. 10) between the keeper 49 and the electromagnet 50 is to be examined and adjusted if necessary.

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7.4.3. The process temperature's is checked up by the control board's reading. Free ends' temperature correction is set beforehand for the minimal temperature 20°C.
7.4.4. If the process temperature is lower than the set one and the final product's does not meet the requirements, reduce the clearance between the nut 31 and tip 24. If this measure does not result the desired effect, install the outlet plug 32 of the less diameter.
7.4.5. It is necessary to take into consideration that the raw material's humidity increased by 1% reduces the process temperature by 10єC; thus if achieving of the set temperature results impossible it is necessary to check up the raw material's humidity, which must not exceed 12%. The nominal humidity is 9...12%.
7.4.5. Other ratings specifying the product quality are evaluated in a lab via the special techniques.

8. Preparation and Order of the Extruder's Operation for Cereals and Peas Processing

Assembly the screw part according to the fig. 4. Install a pulley of the external diameter 235.4 mm on the motor's shaft.
8.1. Set the outlet plug of the required diameter depending on processed cereal.

8.2. Extruder start
8.2.1. Loosen the nut 31 for 4 turns from the starting position (tightened up to the stop) and fix it with a lock.
8.2.2. The cutting device is driven aside.
8.2.3. Supply voltage to the control box with the ON circuit breaker
8.2.4. Supply voltage to the switchers with the button START.
8.2.5. Switch on the driving actuator's motor with the EXTRUDER START / STOP switcher.
8.2.6. Enable the shaking feeder with the FEEDER START / STOP switcher, supply grains into the receiving cone; at that add 0.5...0.7 liters of water together with the first portion of grain into the receiving cone, adding it in small parts - 0.1...0.15 liters each 5...10 sec.
8.2.7. As soon as the product is discharged as a continuous braid and the stable explosion of the product is seen, enable the cutting device's motor with the SLICER START / STOP switcher and put the cutting device in its on-position.
8.2.8. When the barrels are heated up to 70...90єC, set the grain supply up to the rating value of the motor's current strength.
8.2.9. If necessary moisten the processed product using the water supply system.

NOTE. Where the start is improper the extruder's screw part can be "clogged up"; the evidence of this is as follows: grain is supplied into the receiving cone, but does not discharge out from the screw part; as a result the current load at the driving actuator's motor increases, and then it sharply drops.
If such "clogging up" up happens de-energize the extruder.

Disassemble the screw part, clean and examine parts of the screw part to find out any defects. If the screw part is defect-free, assemble it and re-start as described above.

8.3. Operating Mode

8.3.1. When the extruder is started, the mode where its output, process temperature and current load of the electric motor must correspond to the rating value, is set.

7.2.2. Where the extruder is mode-operated the operator must monitor functioning of all extruder parts, the process temperature, water supply and final product's quality. If the temperature does not correspond readjust it according to the technique described in the item 8.5.

The operator must do control tests of the base mixture's composition and density, of the output and the final's product quality.

8.3.3. The operator must examine the magnetic catchers twice at least during a shift.

8.3.4. The operator must control the load of the main drive's motor and power supply at all phases.

8.4. Extruder stop

8.4.1. Stop the base mixture supply with the GRAIN SUPPLY control device's handle.

8.4.2. Switch off the shaking feeder with the FEEDER START / STOP switcher. Stop the water supply.

8.4.3. When the product does not discharge out from the screw part any more, switch off the main drive's motor with the EXTRUDER START / STOP switcher.

8.4.4. Switch off the cutting device's motor with the SLICER ON / OFF switcher.

8.4.5. Stop the power supply into the control box's scheme with the STOP button.

8.4.6. De-energize the control box with the OFF circuit breaker.

8.4.7. Drive the cutting device into the starting position.

8.4.8. Disassemble the outlet barrel 27 together with parts installed on it, install the E-500.50.00.001 ring instead, switch on the driver's electric motor and turn the screws through to remove the mixture.

8.4.9.Clean the screw part and the outlet plug 23's opening.

8.4.10. Assemble the screw part. Tighten nuts of the locks 28 with standard spanners only. Do not use any levers or tubes to increase the tightening torque. Normal tightening torque is 150 N/m (15 kg-force/m)

8.5. Rating change, adjusting and setting.

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8.5.1. The explosivity grade is determined as the weight ratio of equal volumes of comminuted grain and comminuted ready-made product.

The weight of equal volume of comminuted grain or grain mixture must 3 times (for peas and corn) and 1.5-2 times (for other cereals) exceed the weight of comminuted ready-made product. Practically it may be done as follows. Bolt comminuted grain and ready-made product. To determine the explosivity grade take a fraction from a 1 mm, 2 mm hole size bolter in a volume1 liter.

Weight volumes of raw material and extruded article using technical scales to within 0.1 g. The explosivity grade is calculated by weight ratio of volumes.

8.5.2. The output can be determined with the feeder's output, when the current load of the main motor is 100%, the quality of the ready product is satisfying, the temperature corresponds to the set one. Weight the mass discharged from the outlet opening of the screw part within 3 minutes. The result multiplied by 20 results the hourly consumption (output). To reduce the output to the conditional density of 750 kg/m^3 it is necessary to multiply the output measured quantity by the coefficient, received as a quotient of division of conditional and actual base product's density.

8.5.3. If the shaking feeder does not provide the nominal output, the clearance (fig. 10) between the keeper 49 and the electromagnet 50 is to be examined and adjusted if necessary.

8.5.4. The process temperature's is checked up by the control board's reading. Free ends' temperature correction is set beforehand for the minimal temperature 20°C.

8.5.5. If the process temperature is lower than the set one and the final product's does not meet the requirements, install the outlet plug 32 of the less diameter.

8.5.6.The described temperature setting is the main one. It is necessary to take into consideration that the raw material's humidity increased by 1% reduces the process temperature by 10єC; thus if achieving of the set temperature results impossible it is necessary to check up the raw material's humidity. The optimal humidity:

- corn14.3.....15.3%
- wheat14.7...15.7%
- barley14.5...15.5%
- peas15.5.....16.5%

8.5.7. Executed requirements of the item 8.5.6. will also increase the explosivity grade.

8.5.8. Other ratings specifying the product quality are evaluated in a lab via the special techniques.

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9. Maintenance

9.1. Exact observance of rules and regulations concerning maintenance and servicing will provide the constant due operation of the extruder.

9.2. There are the following types of maintenance for the extruder. Daily maintenance (DM), weekly (M1), every three months (M2) and every six months (M3).

9.3. The following maintenance (DM) is to be done before each shift:

- check up tightening of the thermometer connection on the outlet device's case, as well as that of nuts, locks and connection of the screw part to the rotor's case.
- check up if there are any foreign objects on the magnetic catcher's surface.
- examine the outlet device's opening. There should not be any rests of mixture or foreign objects in the openings;
- check up the working order and availability of instruments;
- the electrician on duty must check up the extruder's earth and bonding wires' reliability;
- take off barrels of the screw part. Remove rests of product from the parts. Assemble the screw part.

9.4.Weekly maintenance (M1):

- check up tension of the driving actuator's belts. Belt sag must not exceed 10^{+1} mm at the load of 40N (4Kg-force);
- disassemble the screw part. If it results difficult take off barrels and screws, use removers to dismount them (see fig.12);
- when screws are worn-out at one end - a turn in its middle part is less than 6 mm turn over the corresponding part thus that the non-worn end results turned forward the product's movement. Replace the screw when its both ends are worn-out. Replace washers if any cracks or nicks are noticed on them;
- when sleeves ridges within 30 mm of their length are worn-out for the 2..3 mm depth, replace the cartridge;
- assemble the screw part and check up bolts tightening in the units' fastening;
- through the corresponding oil feeder lubricate the axial bearing 10 (8326 GOST 7872) and the journal bearing 12 (60226 GOST 7242) (see fig. 2) Lubricant Litol-24 GOST 21150. At that, first remove the screw-top on the side opposite to the oil feeder. Insert the lubricant till it appears out from the opening. After that turn the rotor shaft to remove the lubricant excess and screw the top down. The lubricant excess may cause the bearings' overheating.
- do all proper DM works.

9.5. Every three months (M2):

- lubricate the journal bearings unit 11, (218 GOST 8338) (Fig. 2) as described in the item 9.4.6.

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- remove the protective shroud and check up the pulleys' fastening;
- check up the pulleys' positioning regard to each other the edges are to be situated in the same surface (displacement must not exceed 2mm);
- check up the belts' tension;
- place the protective shroud back;
- check up tightening of all bolts;
- the electrician on duty must check up the earth and examine the electrical equipment;
- do all proper M1 works.

9.6. Every six months (M3):

- disassemble partially the extruder remove the rotor pulley and dismount the rotor shaft together with bearings;
- remove the debris-contaminated lubrication from the bearings and fill up with Litol-24 lubricant GOST21150;
- assemble the extruder (for assemblage clearance of the rotor bearing unit see the fig.2);
- do all proper M2 works.

10. Trouble Shooting and Fault Removal

Troubles, defect manifestation and additional symptoms	Probable cause	Fault removal
1. The extruder does not run at its normal output.	**1.** High dockage in the initial grain. **2.** Drive's belts are weakened.	Change the initial grain for the graded one. Adjust the belts' tension moving the drive's motor.
2. The receiving cone is overfilled, the product does not discharge out, the drive's motor load drops, evaporations from the cone.	**1.** The screw part's channel is clogged up. **2.** Turns close to washers are worn-out. **3.** Sleeve ridges are worn-out. High dockage in the initial grain.	Clean the screw part's channel. Turn screws over thus that the non-worn end results turned forward the washer; replace the screw when its both ends are worn-out. Replace sleeves. Change the initial grain for the graded one.

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3. The process temperature is lower than normal.	**1.** The output is over-estimated. **2.** The opening diameter of the outlet plug is excessive. **3.** The initial grain's humidity exceeds 16% (12% for soybeans). **4.** Washers are worn-out for more than 1 mm in diameter.	Reduce the output. Replace the outlet plug for one of less diameter. Change the initial grain for the graded one. Replace washers.
4. Grain does not proceed to the receiving cone	**1.** There is an arch formed in the hopper. **2.** The hopper's gate is closed. **3.** The clearance between the feeder's keeper and electromagnet is increased/decreased. **4.** Feeder's springs are disabled.	Knock slightly at the hopper until the arch disappears. Open the hopper's gate. Adjust the clearance between the feeder's keeper and electromagnet. Replace the feeder's springs.
5. Strong oscillation of the meter needle of the main drive's motor load	**1.** High dockage in the initial grain.	Change the initial grain for the graded one.
6. The drive's motor fails to switch on, the circuit breaker actuates.	**1.** The set value on the digital ammeter is less than nominal. **2.** A closure happened in the power circuits. **3.** The drive's motor is faulty.	Set the delay period on the digital ammeter. Remove the closure. Repair or replace the drive's motor.
7. The feeder's electromagnet fails to switch on.	**1.** The feeder's control card is faulty (in the control box). **2.** The feed circuit of the shaking feeder's electromagnet is damaged. **3.** The shaking feeder's electromagnet is faulty.	Replace the feeder's control card. Check up the feed circuit of the shaking feeder's electromagnet; repair if necessary. Replace the feeder's electromagnet.

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8. The rotor case's temperature where the bearing are installed is over 353 K (80° C)	**1.** There is no lubricant or insufficient lubricant in the bearings. **2.** The bearings are damaged.	Lubricate the bearings. Replace the bearings.
9. The process temperature exceeds the normal, there is no extrusion	**1.** Low humidity of the initial grain	Change the initial grain for the graded one.

11. Transportation and Storage

11.1. Extruder is supplied in or without package via railway, motor vehicle, river and sea transport, if all rules and requirements of this or another transport are kept.

11.2. Terms of this device's transportation to the moderate and cold zones regarding climatic conditions belongs to the storage conditions group 8 (ОЖ3), GOST 15150, for sea transportation - group 8 (ОЖИ), GOST15150.

11.3. Storage conditions 2 (С) GOST15150.

11.4. Conservation is purposed to provide the extruder's safety for 18 months at least after delivery to the customer, and for 30 months for spare parts. If the customer intends to store the extruder and spare parts for more than the said period he must re-conserve them himself in accordance with regulations GOST 9.014.

11.5. If the customer violates transportation, storage and re-conservation rules the manufacturer does not guarantee the extruder's safety.

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Wearing Parts

Supplement 1

1. Washer E-500.30.00.002	(pos. 21, fig.3)
2. Washer E-500.30.00.001	(pos. 22, fig.3)
3. Washer E-500.30.00.005	(pos. 23, fig.3)
4. Screw E-500.30.00.003	(pos. 20, fig.3)
5. Screw E-500.00.00.012	(pos. 19, fig.3, 4)
6. Washer E-500.00.00.009	(pos. 42, fig.4)
7. Washer E-500.00.00.008	(pos. 43, fig.4)
8. Sleeve E-500.00.00.031	(pos. 30, fig.3, 4)
9. Sleeve E-500.00.00.038	(pos. 29, fig.3, 4)
10. Plug E-500.00.00.011	(pos. 39, fig.3, 4)
11. Plug E-500.00.00.005 (⌀11 mm)	(pos. 32, fig. 4)
12. Plug E-500.00.00.005-01 (⌀12 mm)	(pos. 32, fig. 4)
13. Plug E-500.00.00.005-02 (⌀10 mm)	(pos. 32, fig. 4)
14. Plug E-500.00.00.005-03 (⌀6 mm)	(pos. 32, fig. 3)
15. Plug E-500.00.00.005-04 (⌀7 mm)	(pos. 32, fig. 3)
16. Plug E-500.00.00.005-05 (⌀5 mm)	(pos. 32, fig. 3)
17. Plug E-500.00.00.030	(pos. 38, fig. 3, 4)
18. Tip E-500.00.00.006	(pos. 45, fig. 4)
19. Tip E-500.00.00.007	(pos. 24, fig. 3)
20. Sleeve E-500.00.00.033	(pos. 58, fig. 3, 4)

Bearings Set

Supplement 2

1. Bearing 8326 GOST 7872-89 (1 pc)	(pos. 10, fig.2)
2. Bearing 218 GOST 8338-75 (2 pcs)	(pos. 11, fig.2)
3. Bearing 60226 GOST 7242-81(1 pc)	(pos. 12, fig.2)

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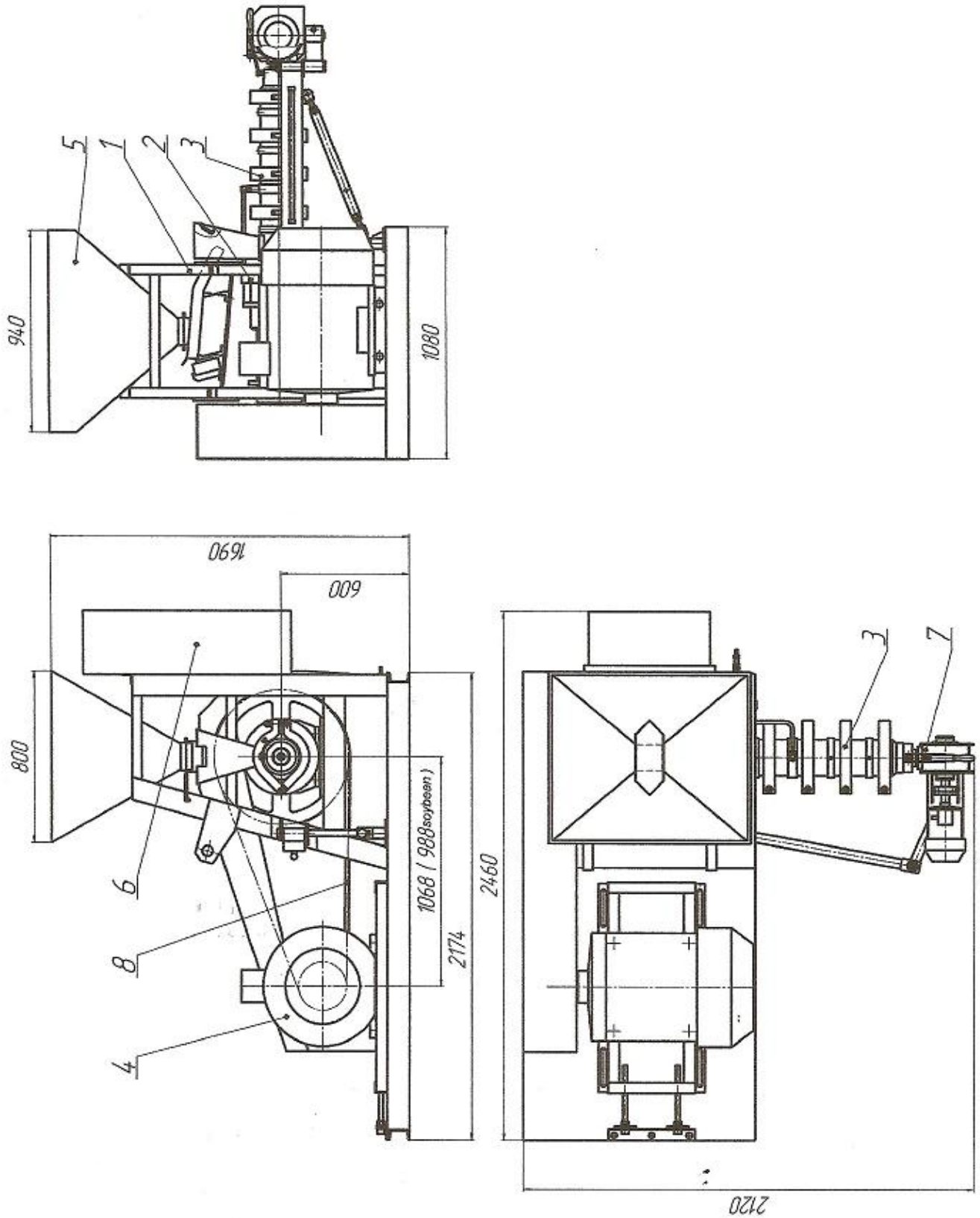

Figure 1

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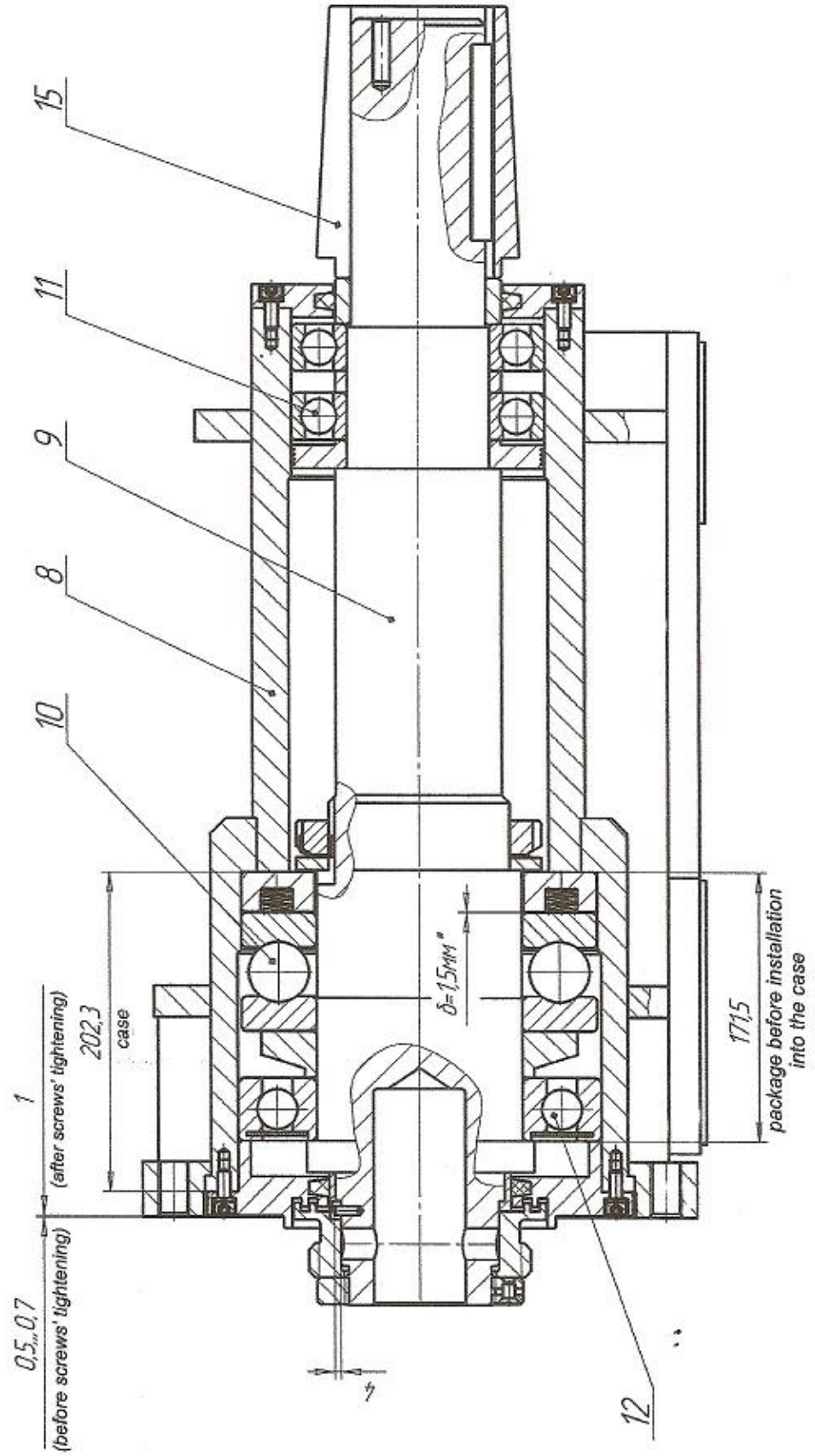

* clearance before the package's installation into the case

Figure 2

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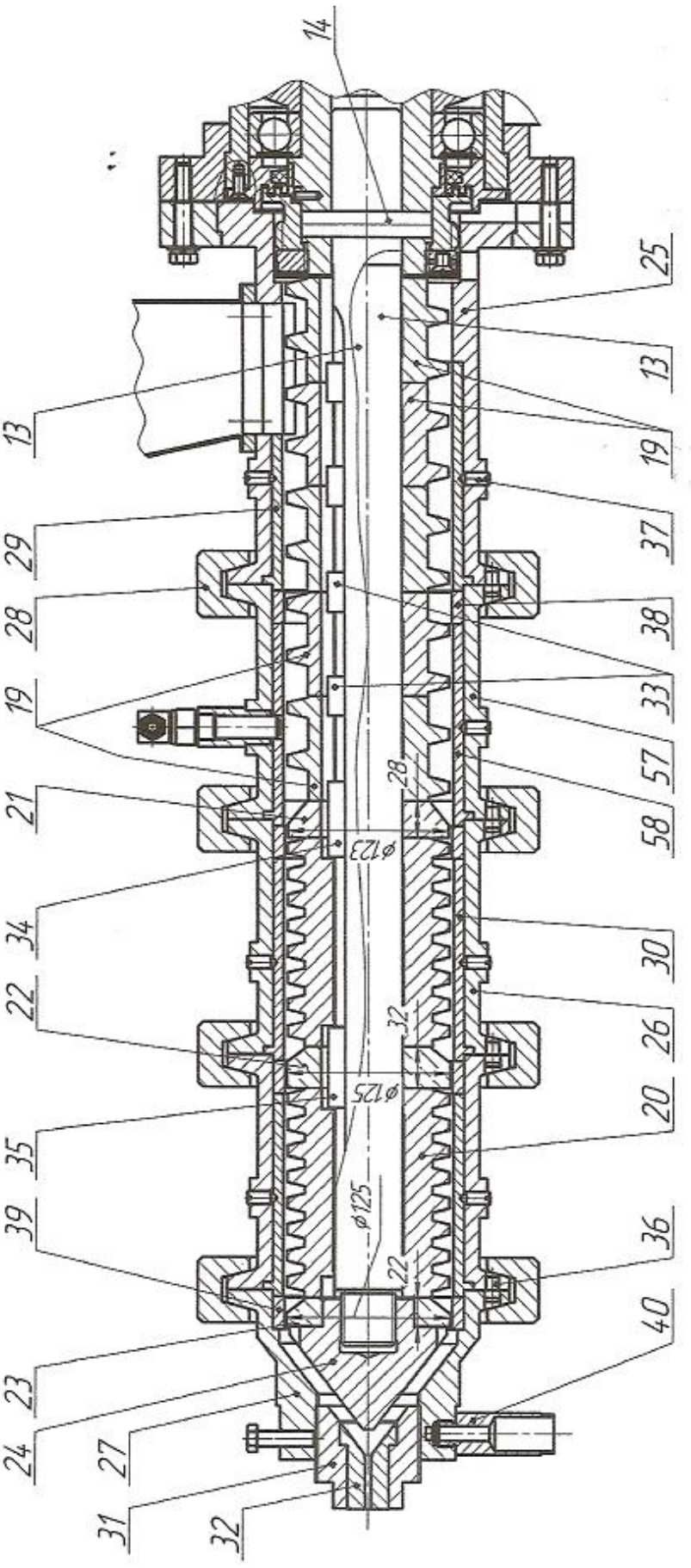

Screw part adjusted for soybean

Figure 3

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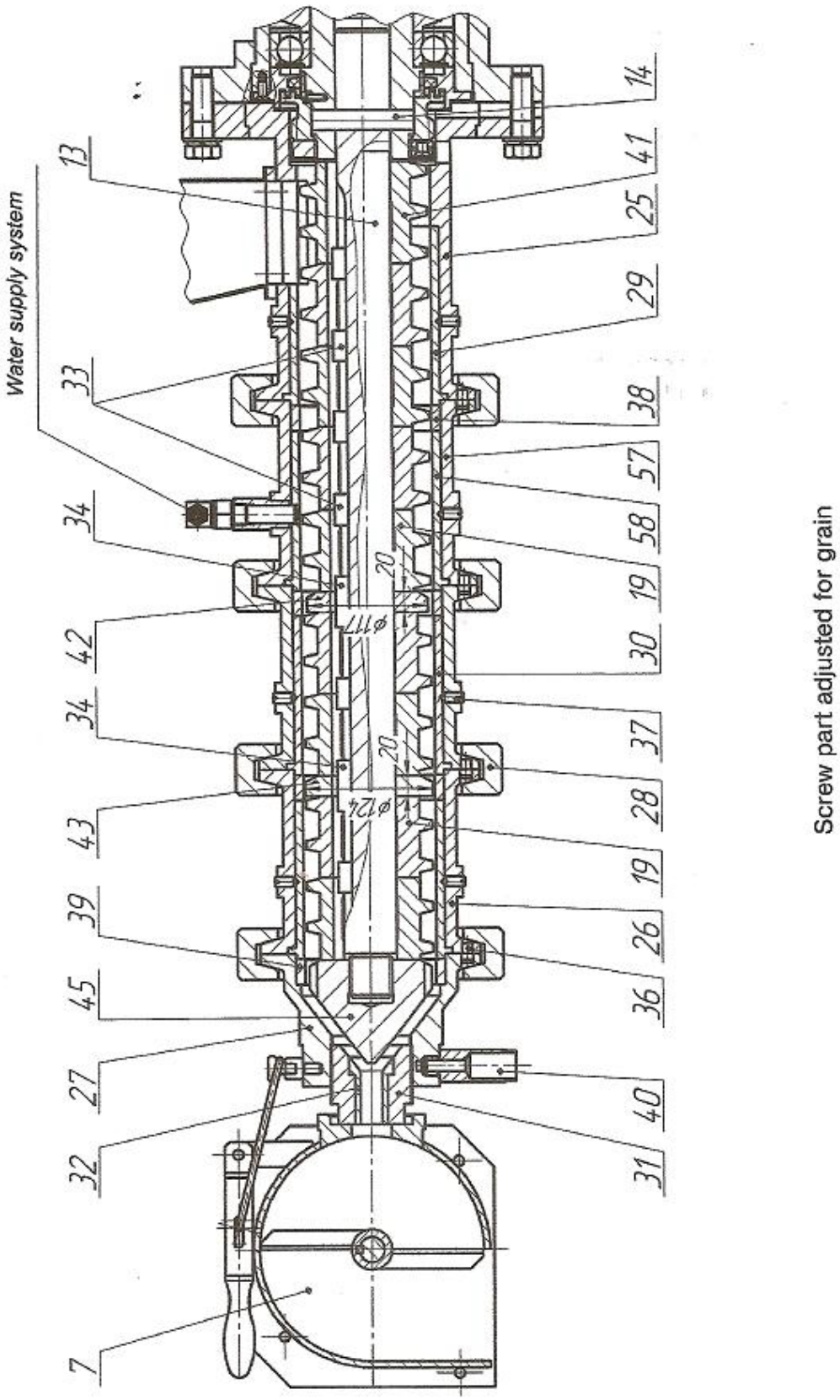

Figure 4

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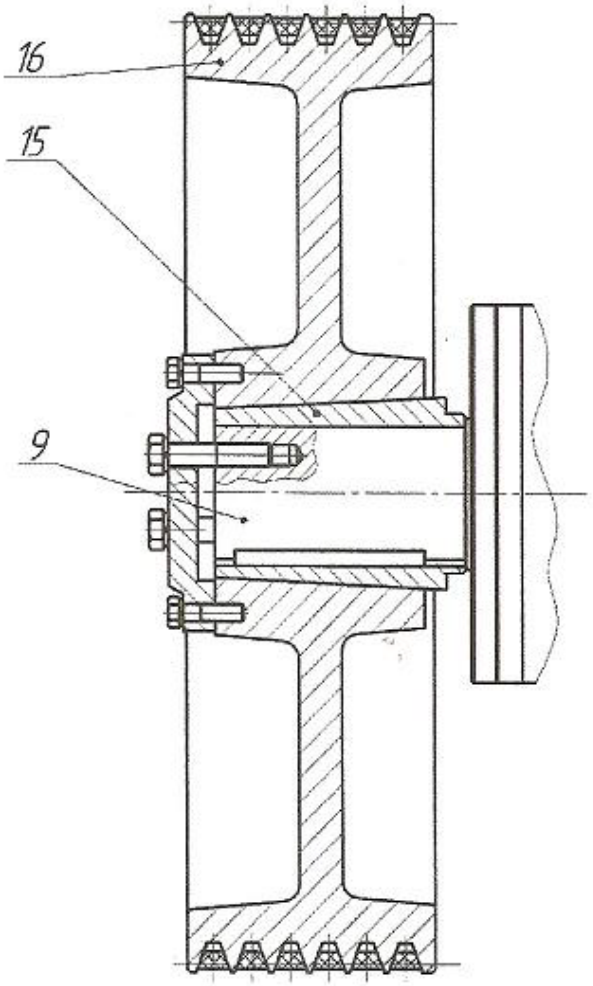

Figure 5

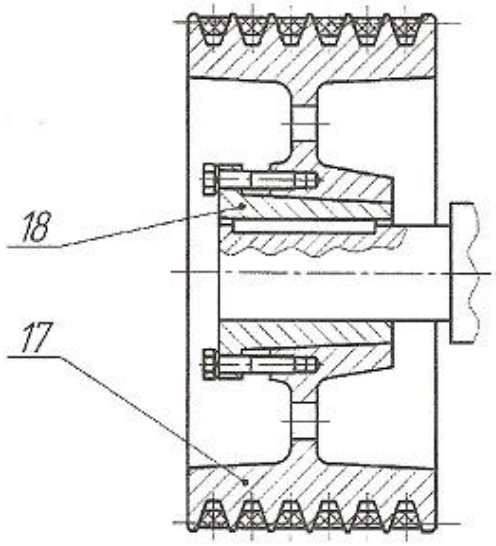

Figure 6

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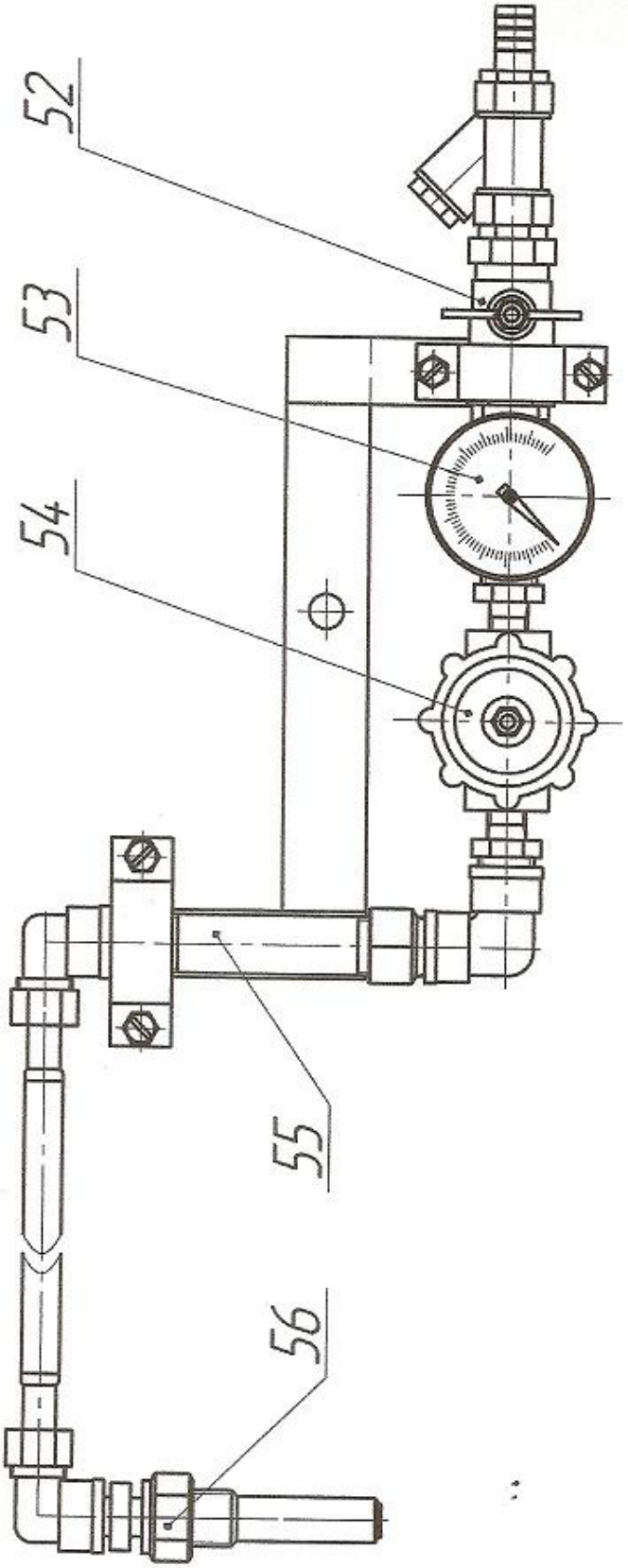

Figure 7

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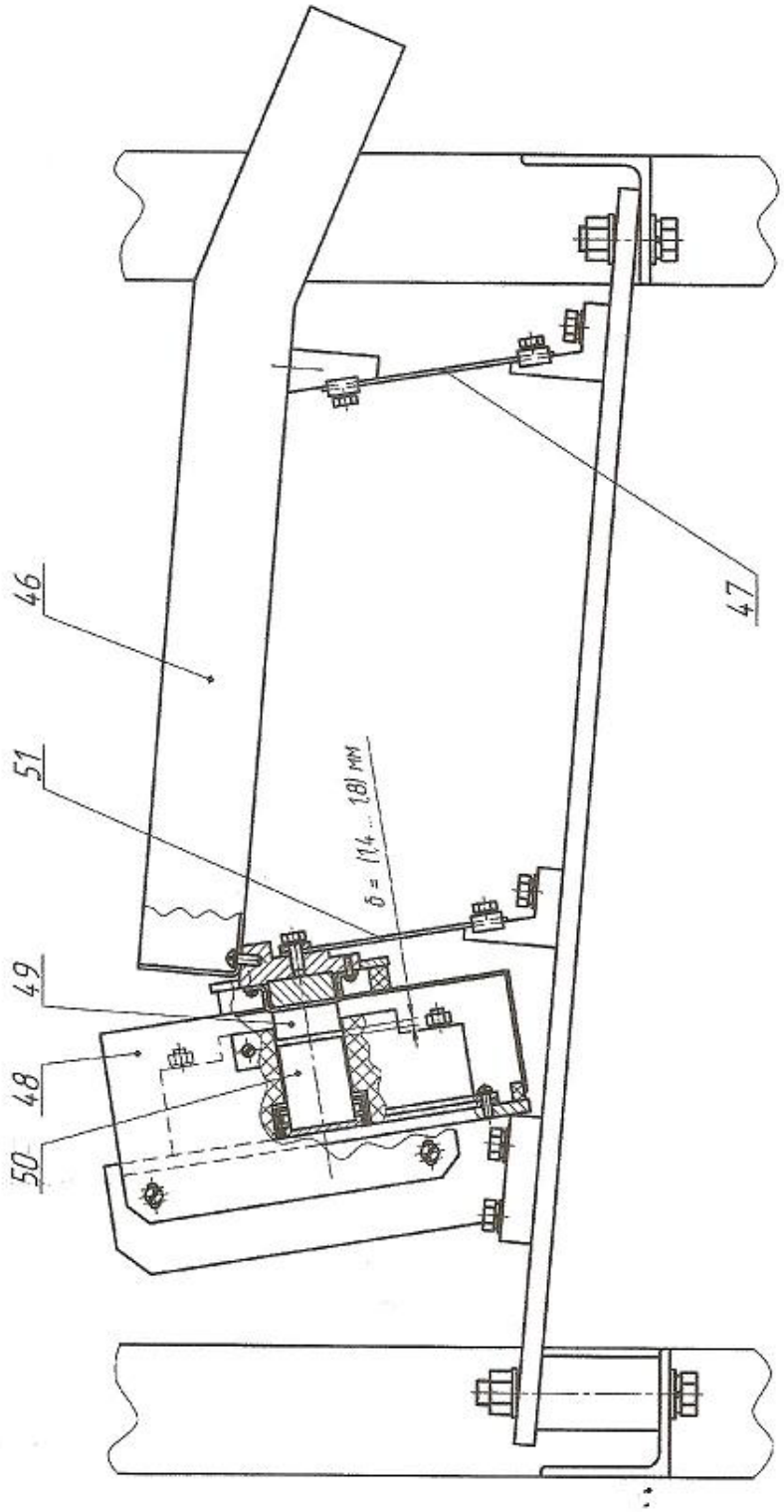

Figure 10

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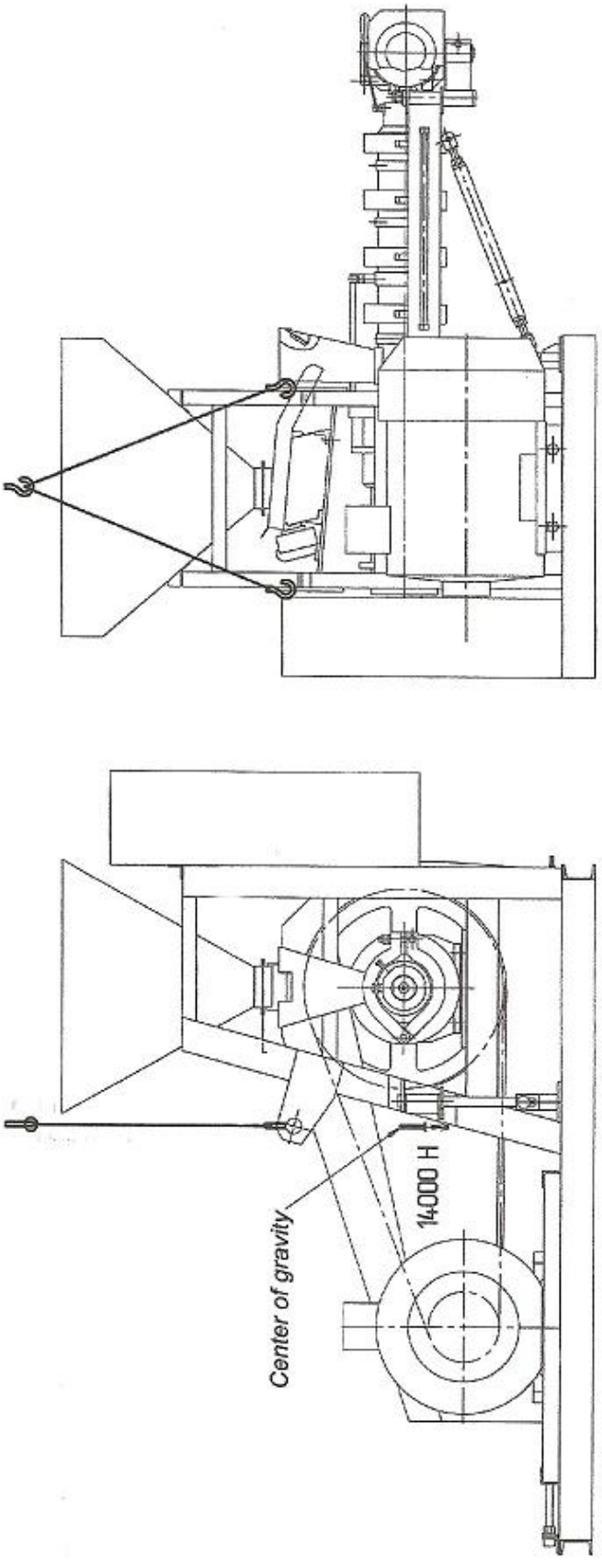

Extruder's strapping diagram

Figure 11

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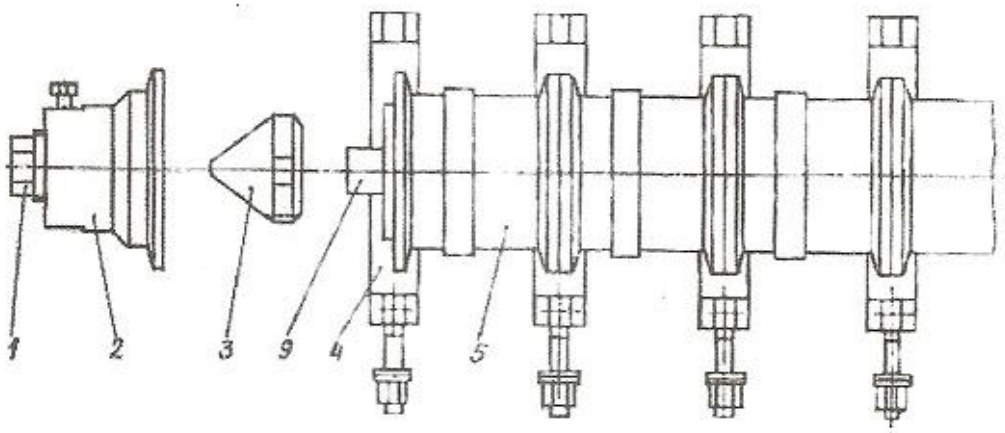
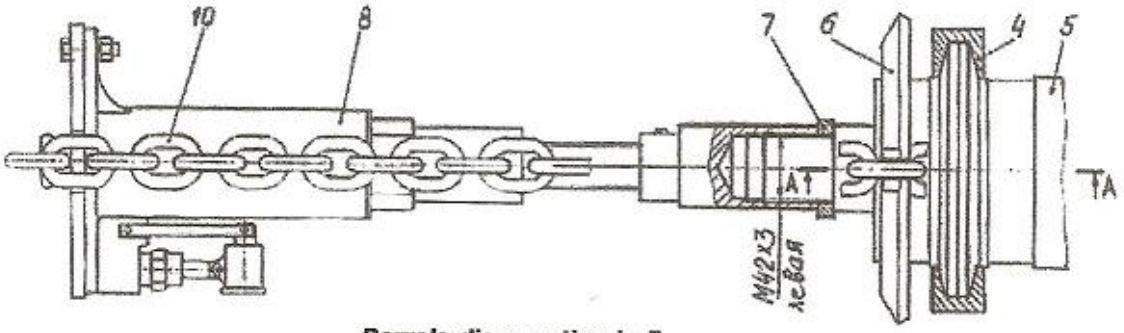


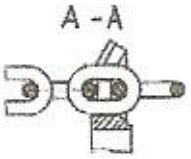
1.Take of the exterior clock 4, outlet barrel 2 with a plug 1, tip 3.

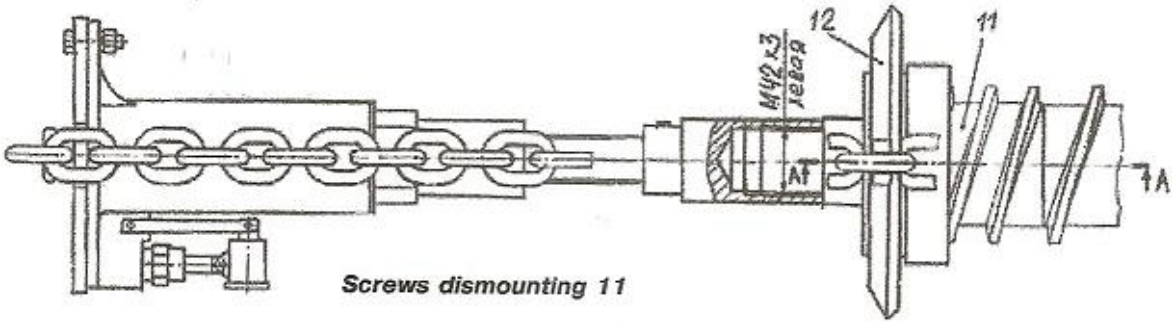
2.Remove rests of the processed products from the taken off parts.



Barrels dismounting in 5

1.Install the ring 6 instead of the outlet barrel 2 and fix with the lock 4.
2.Install the washer 7, screw the tip of the puller 8 on the shaft 9.
3.Thread the chain 10 into slots of the puller's base 8 and the ring 6.
Thread the chain into slots of the ring 6 as shown on the figure A-A.
4.Lift the puller with a jack and remove the first barrel.
5.Take off other barrels moving the ring 6.





Screws dismounting 11

1.Screw the ring 12 on the exterior screw 11.
2.Screw the tip of the puller 8 on the shaft 9.
3.Thread the chain 10 into slots of the puller's base and the ring 12.
4.Lift the puller with a jack and remove the first screw.
5.Take off other screws moving the ring 12.

Figure 12

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