SZLH350 PELLET MILL

OPERATION MANUAL

ZTMT
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Important instruction:

1 This manual detailedly describes SZLH350 series pellet mil of each system structure, function and use and maintenance method. Before installation and use of the machine, customer should read the manual, and have a full understanding of the ministries and its structure and function ,then have operation and maintenance of the machine. Due to the continuous improvement of product structure, after a certain time period, the manual of narrative content and the actual situation of the products will have small changes.Users should pay attention to it.

2 Please propose your advice to us for melioration when finding quality problem or others.Thanks!

1. APPLICABLE SCOPE AND FEATURES

1.1 SZLH350 pellet mill is the main machine for producing pellet feed and is applicable to large and medium-scaled feed plant with an output of 1.5-8t/h of pellet feed. It can be used in the feed plant which can produce 15000 t powder feed per year.

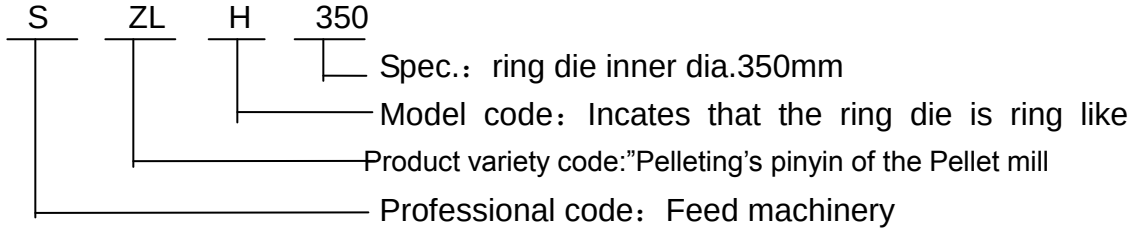
1.2 This machine features of compact structure, fine appearance, high capacity, low power consumption, convenient operation, and reliable performance.

1.3 Dies of various hole diameter are available for this machine. Dies of different hole diameter can be made for users and users can choose freely according to different requirements.

1.4 This machine adopts a system of conversion speed-adjustable feeding and is equipped with strong safety magnet, overload protector, outboard discharging mechanism and manual oil pump lubrication system.

2. TECHNICAL PARAMETERS AND PERFORMANCE INDEXES

2.1 Model implication



2.2 Technical specification

Capacity: 1.5-8t/h;

Main Motor Power: 55KW (1500rpm);

Feeder Screw Motor Power: 1.1KW;

Conditioner Power: 3KW;

Die I. D.: ¢350mm;

Pellet Powdering Rate: ≤10%;

Roller Number: 2;

Pellet Forming Rate: ≥90%;

Noise: ≤86dB (A);

Steam Pressure: 0.1-0.4Mpa;

Steam Amount: ≥0.4t/h;
Overall Dimension (LxWxH): 2865x1035x2285 (mm).

3. MAIN STRUCTURE AND WORKING PRINCIPLE

See Figure 1 for the main structure of the machine and Figure 2 for the schematic drawing. It mainly consists of systems of the feeding, conditioning, pelleting, driving and lubrication. Mixed material of less than 15% moisture content is fed from the hopper into the feeder screw through magnetic separator and enters into the conditioner with proper flow rate adjusted by the conversion speed-adjusting motor. The iron impurities in the material are removed by the safety magnet. The material is mixed with steam in the conditioner. Molasses or oil, if needed, can be added and mixed with steam to be conditioned. (The oil adding volume should not be more than 3%, otherwise, it's hard to form pellets.) The conditioned material temperature can be 65-85℃ and moisture content 14-16%. Then the material enters into the pellet chamber through the chute and is pelleted.

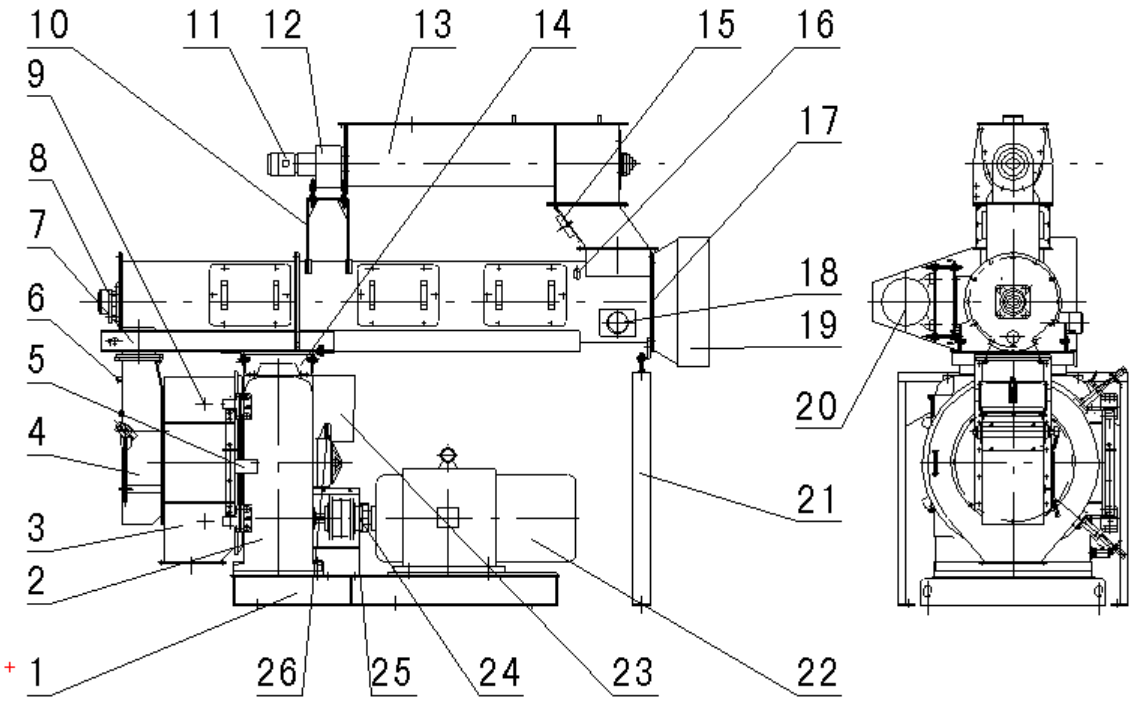


Figure 1 SZLH350 PELLET MILL STRUCTURE

1. Base 2. Gearbox 3. Pellet Chamber Door 4. Feed Chute 5. Limit Switch 6. Sight Glass 7. Hoist Guide（not equipped now） 8. Bearing with Housing 9. Knife Assembly 10. Support 11. Speed-adjusting Motor 12. Reducer 13. Feeder Screw 14. Support 16. Molasses Inlet 17. Bearing 18. Steam Inlet 19. Guard 20. Motor 21. Support 22. Motor 23. Oil-adding Pump 24. Coupling 25. Guard 26. Limit Switch

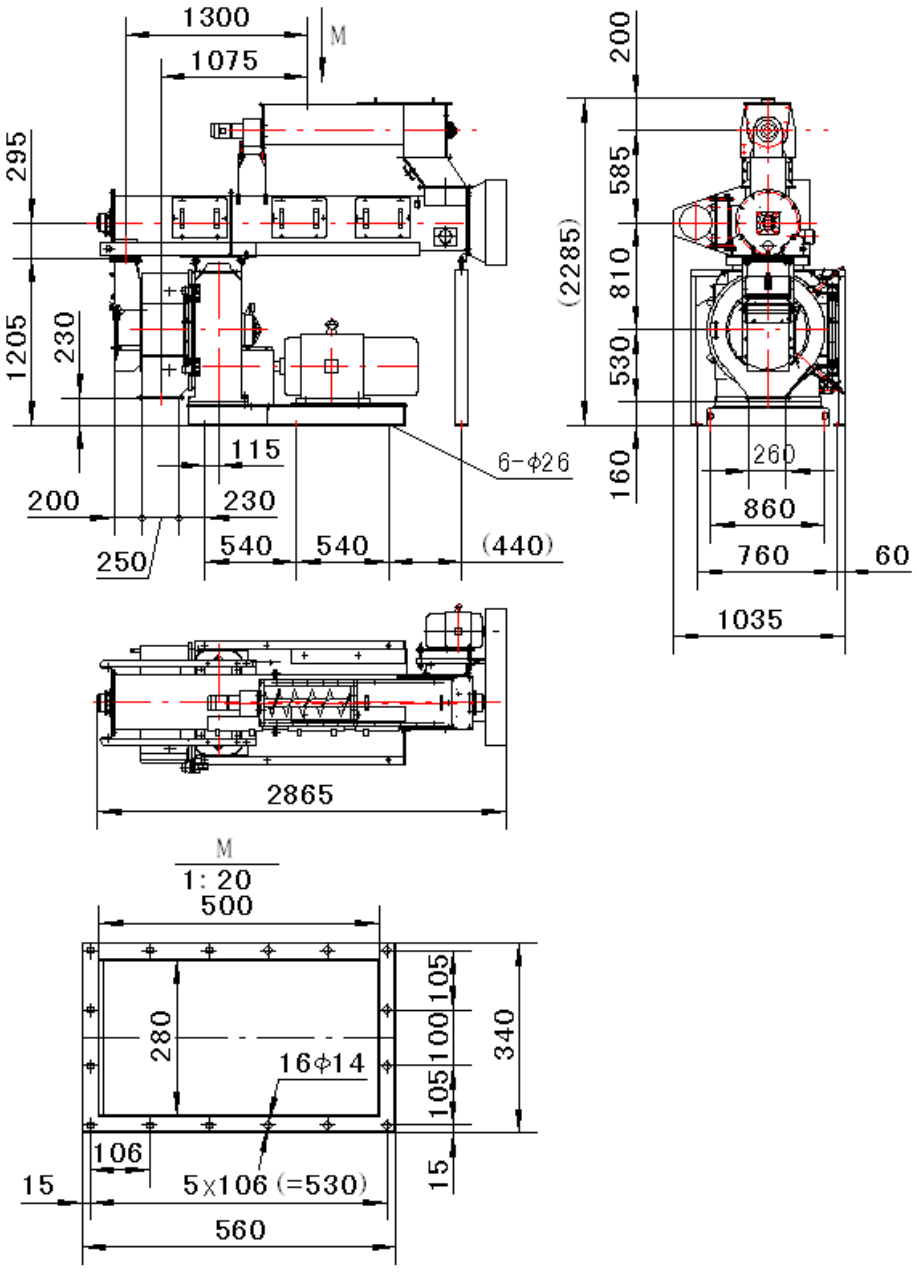


Figure 2 SZLH350 Sample

3.1 Feeder

Feeder mainly consists of conversion speed-adjustable motor, reducer, screw shell and screw shaft (See Figure 3).

3.1.1 Reducer

Cycloidal pin gear reducer is used for feeder reducer with the reducing ratio of 1:9. It's directly coupled with speed-adjusting motor so that the effective rotational speed of feeder screw is regulated between 15-120 rpm.

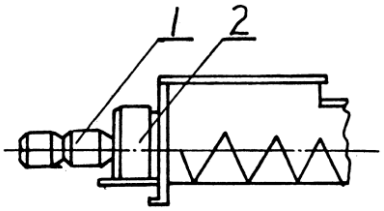


Figure 3 Speed-adjustable Motor and Reducer

1. Speed-adjustable Motor 2. Reducer

3.1.2 Feeder Screw

See Figure 4 for the structure of the feeder screw. It consists of screw shell, screw shaft and bearing with housing. The screw is used for feeding and the rotational speed can be adjusted so that the feeding volume can be changed to reach the rated current and capacity. Screw shaft can be drawn out from the right end of the screw shell for cleaning and inspection.

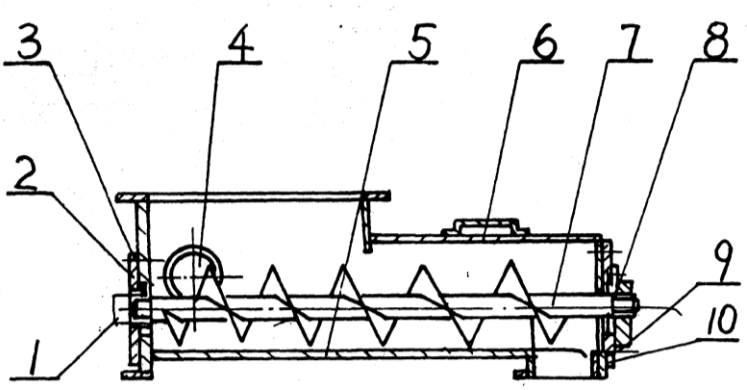


Figure 4 Feed screw conveyor structure

1. Driving Shaft 2. Front End Plate 3. Nut 4. Cover 5. Screw Shell 6. Cover Plate 7. Screw Shaft 8. Bearing with Housing 9. Cap Nut 10. Rear End Plate

3.2 Safety Magnet

Safety magnet is mounted at transition part of the feeder discharger, and its magnetic field is over 2000 gauss. It's used to remove the impurities in the compound materials and make sure the pellet mill runs normally.

3.3 Conditioner (See Figure 5)

Conditioner is sometimes called mixer. It mainly consists of conditioning shell (3), mixer shaft (4), bearing with housing (1), pulley, motor (11), steam inlet (8), oil inlet (7) and paddle (6). Conditioner shell is pieced together with two sections whose length can be added properly according to the requirements of users. There is inspection and cleaning doors for convenience of maintenance and cleaning. Dry steam of 0.1-0.4Mpa is injected into the conditioner shell to mix thoroughly with the feed so that the material is softened. A moderate amount of oil or molasses heated up to appropriate degree can be compressed into fog and sprayed into the conditioner shell through the oil or molasses inlet.

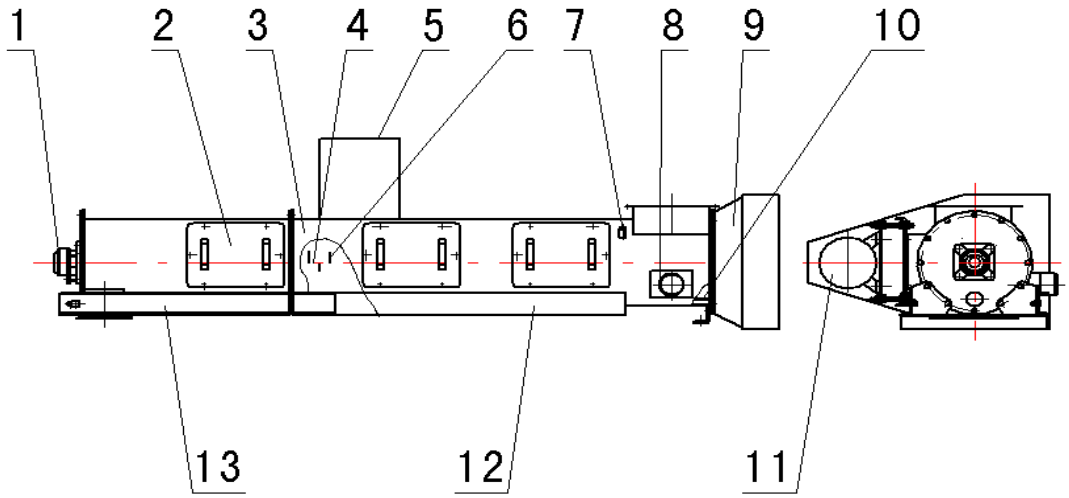


Figure 5 Conditioner

1. Bearing with Housing 2. Cleaning Door 3. Shell 4. Conditioning Shaft 5.Base 6. Paddle 7. Oil Inlet 8. Steam Inlet 9. Guard 11. Motor 12. Support 13. Hoist

3.4 Pellet Chamber

See Figure 12 for the structure and working principle of the pellet chamber. It mainly consists of a die (1), two rollers (3), deflectors (8), knives (11) and screw for adjusting the clearance between die and rollers.

The material is fed into the two pressing zone through the feed cone and deflector. The quill flange drives the die and the material is rolled between the die and

rollers. The two parts rotate oppositely and press the material into the die holes. The material is pelleted in the die holes and pressed out from the holes and cut to the needed length by the knife. The pellet feed is discharged out of the machine.

See Figure 6 for the mounting of the roller. The roller (12) is mounted on the roller shaft (16) by two bearings (10). The inner end of the roller is fixed with the main Shaft (17) and the outer end is fixed with the roller support (4). As the roller shaft is eccentric, the clearance between the die and roller can be adjusted by the rotation of the roller. The clearance can be adjusted by rotating the roller adjusting gear.

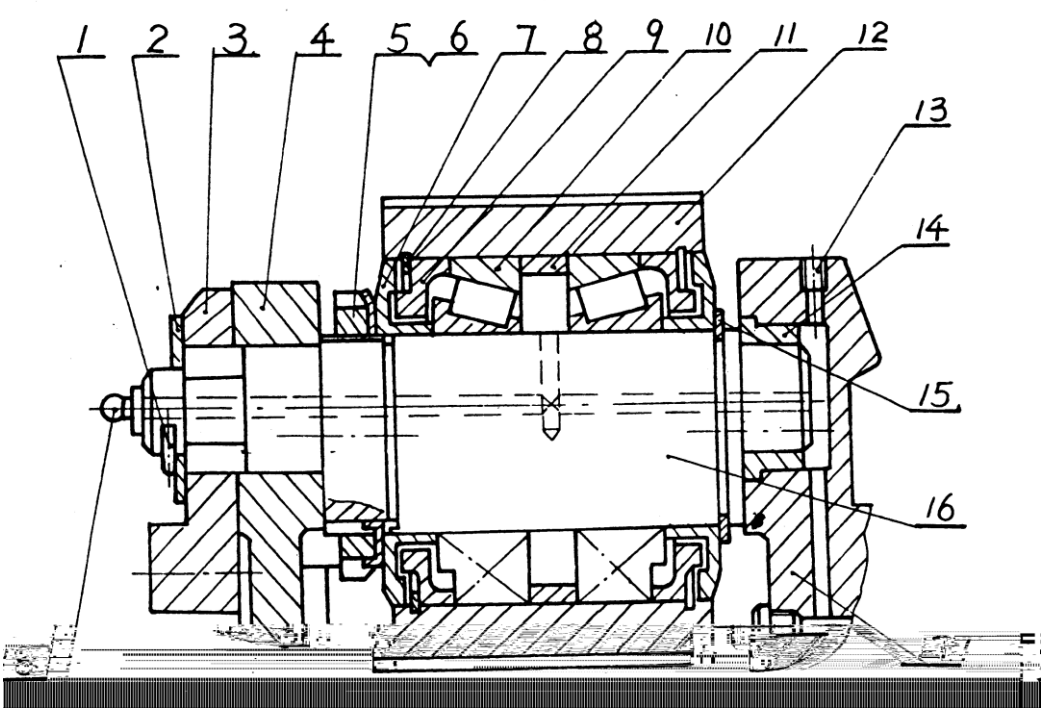


Figure 6 ROLLER ASSEMBLY

1. Retaining Pin 2. Retaining Ring 3. Roller Adjusting Gear 4. Front Roller Support 5. Locknut 6. Retaining Ring 7. Gland 8. Retaining Ring 9. Oil Splash Collar 10. Bearing 11. Spacer 12. Roller 13. Screw 14. Roller Shaft Bushing 15. Retaining Ring 16. Roller Shaft 17. Main Shaft 18. Oil Cup

3.5 Gearbox

See Figure 7 for the structure of gearbox which consists of pinion shaft (20), main gear (13), main shaft (5), quill shaft, gearbox body, bearing etc. A motor drives pinion shaft to rotate through flexible coupling and meshes with driven gear so that the quill shaft (8) is driven to rotate. The quill shaft is fixed with die by clamp

(28) and driving key (11), thus the die is driven to rotate.

Main shaft does rotate (except overload) during the normal run, the front end is stationary support of roller and deflector, the rear end is equipped with overload protection system.

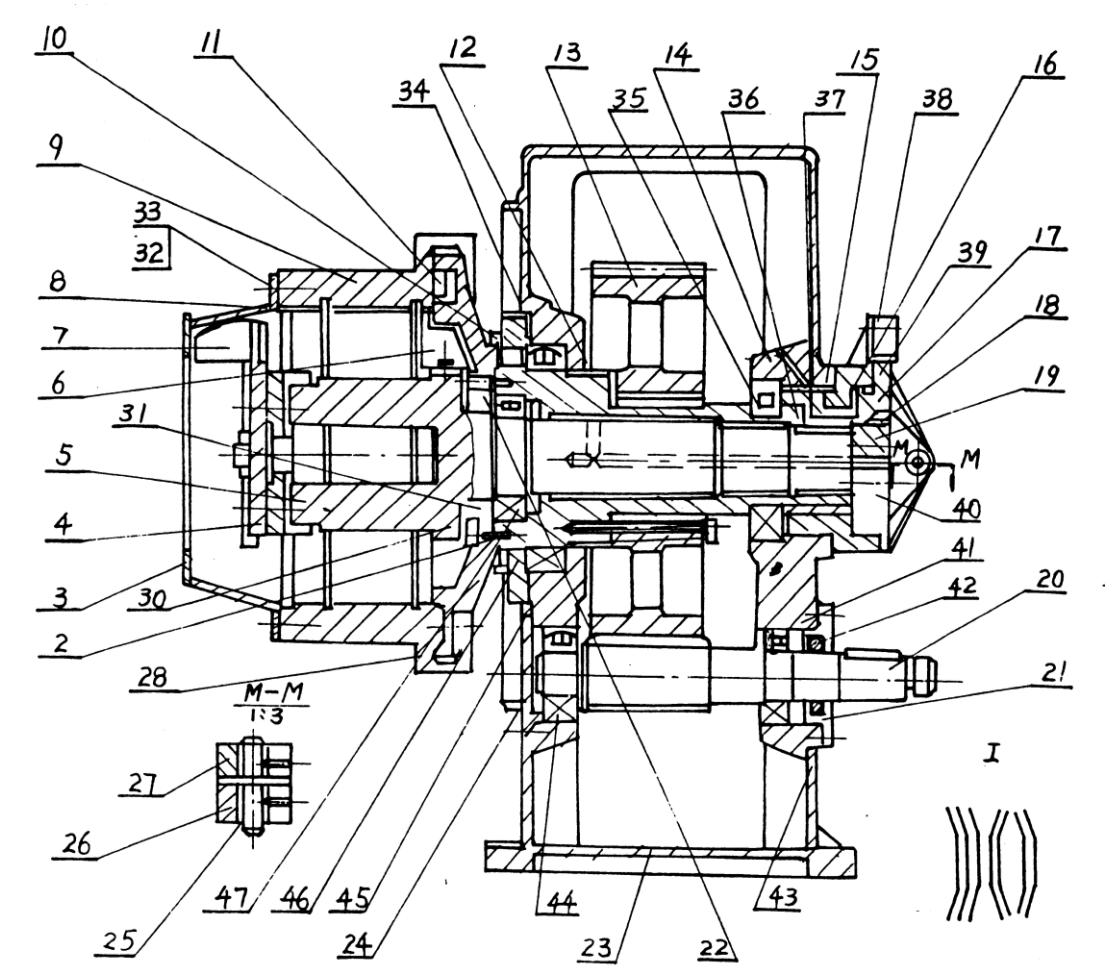


Figure 7 MAIN GEARBOX STRUCTURE

2.Main Shaft Seal Cover 3. Feed Cone 4. Front Roller Support 5. Main Shaft 6. Wiper 7. Deflector 8. Quill Shaft 9. Die 10. Quill Shaft Seal Cover 11. Driving Key 12. Gear Retaining Ring 13. Main Gear 14. Oil Splash Plate 15. Liner 16. Bush 17. Main Shaft Splined Hub 18. Butterfly-shaped Spring 19. Main Gland 20. Pinion Shaft 21. End Cover 22. Oil Seal of the Main Shaft 23. Gearbox 24. Gearbox Front Liner 25. Shear Pin 26. Shear Pin Sleeve 27. Fixed Bolt 28. Fastening Screw 30. Clamp 31. Oil Seal 32. Hexagon Socket Screw 33. Washer 34. Seal 35. Bearing 36. Oil Seal 37. Seal 38.Limit Switch 39. Seal 40. Seal 41. Bearing 42. Oil

Seal 43. Seal 44. Bearing 45. Bearing 46. Oil Seal 47. Bearing

3.6 Safety System

This safety system includes overload protection, safety magnet, protection switch for pellet chamber door and discharger outside the machine.

3.6.1 Overload Protection System

When the foreign materials such as iron, stone, flaxen thread enter pellet chamber or the feed flow is excess, and rollers do not rotate along with die any more, the torque main shaft bears will exceed the normal torque resulting in that the main gland rotates and touches limit switch to stop the machine.

Figure 8 Structure of Frictionclutch of SZLH350 Pellet Mill

1. Limit Switch 2. Socket Head Cap Screw 3. Main Shaft 4. Key 5. Main Gear 6. Socket Head Cap Screw 7. Lock Nut 8. Quill Shaft 9. Bearing 10. Oil Seal 11. Seal 12. Fixing Housing 13. Socket Head Cap Screw 14. Outer Friction Disc (Ⅰ) 15. Outer Friction Disc (Ⅱ) 16. Main Shaft Housing 17. Double-head Bolt 18. Nut 19. Washer 20. Clutch Disc 21. Seal 22. Butterfly Spring (Ⅱ) 23. Brass Bush 24. Lubricator 25. Socket Head Cap Screw 26. Gland 27. Seal 28. Inner Friction Disc 29. Butterfly Spring (Ⅰ) 30. Rivet 31. Gearbox

3.6.2 Protection Switch for Pellet Chamber Door

In order to avoid body injury caused by the fast rotating die during operation after opening the pellet chamber door, a safety limit switch is mounted on the right support of the door. When the door is open, the limit switch shutdown all the control circuit of the pellet mill in the system and the pellet mill stops running or cannot be started so that operator's safety is guaranteed.

3.6.3 Discharger outside the machine

When discharging outside the machine is needed, push the discharge handle to make the feed chute move. The material in the conditioner flows out of the machine without entering into the pellet chamber. This unit is mainly used for trial run of the machine before the pellet mill start to run normally. Or when the pellet mill is found operating abnormally and you are going to remove the trouble without enough time to stop the machine, or with the machine running, you can make the material discharged out of the pellet chamber. When the machine runs normally, push the handle on to reset feed chute so that the material is discharged normally.

3.7 Electric Control System

See Figure 9 for electric control principle. It is only used in the installation of a single machine. Separate design is needed for the use in the complete project.

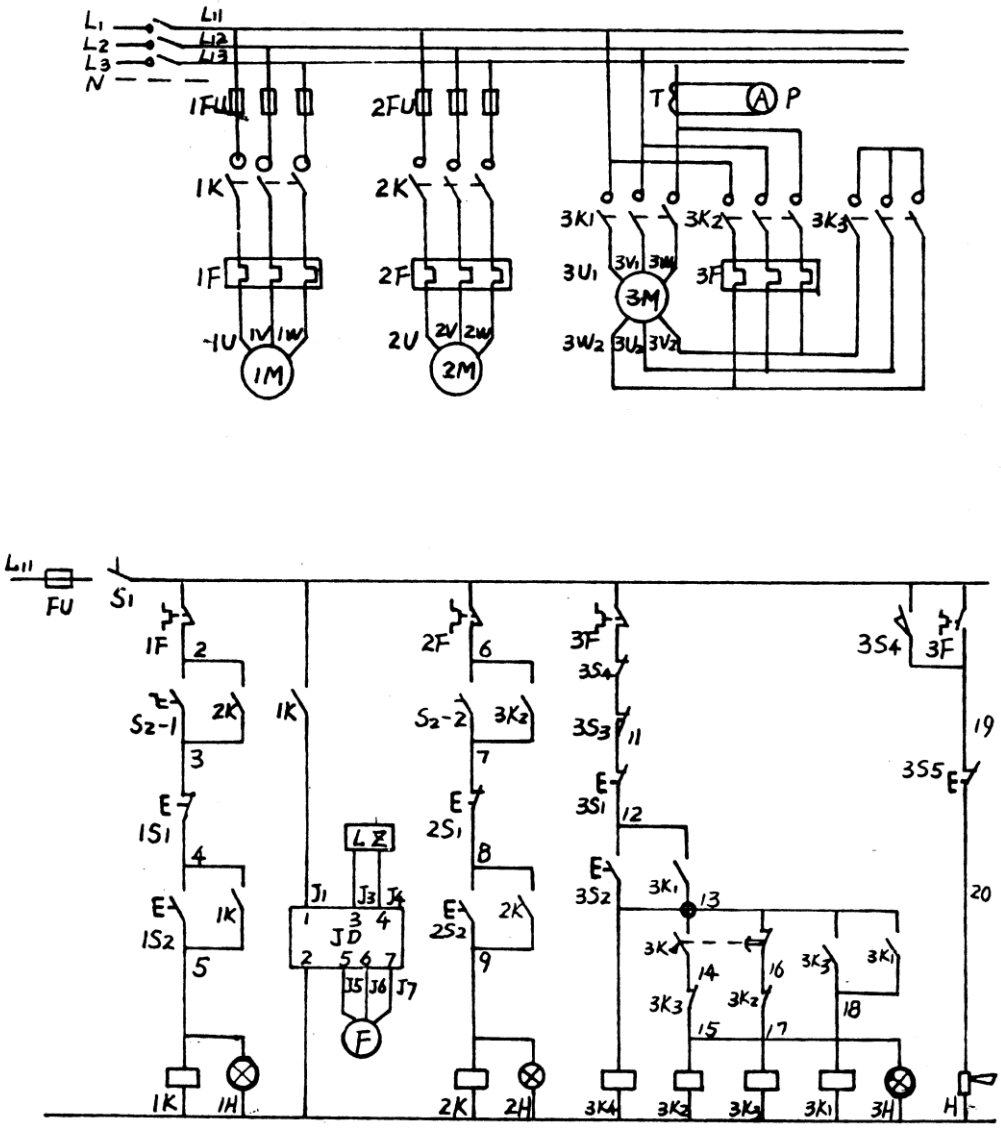


Fig. 9 Schematic Diagram

3.8 Lubrication System

The grease is pressed into the oil hole of the main shaft by the manual oil pump or electric oil pump to lubricate the roller bearing or quill bearing.

4. INSTALLATION, ADJUSTMENT AND TRIAL RUN

4.1 Installation

4.1.1 For equipment installation, the technological process (feeding, discharging,

cooling, etc) should be thought over, floor should be determined and distance from the wall should be considered to make it easy for worker to operate and open the pellet chamber.

4.1.2 The equipment must be installed on the firm foundation. Dig the foundation according to the base size on the schematic diagram (see Figure 2), pour cobble concrete and screw the foundation bolt on. Some good practice should be followed when installing the pellet mill on the floor to make sure that vibration of machine during the normal run can be absorbed after the installation.

4.1.3 Generally pellet mill is positioned on the floor where dimension should be digged with proper size of 500x300mm. See Figure 10 for the outlet.

4.1.4 In order to ensure continuous operation of 10 minutes, mount a feeding hopper of 3 cubic meters on the top of the feeder. Assemble a slotted plate at the bottom of the hopper for convenient control. Condition permitting, assemble a lump-breaker on the hopper.

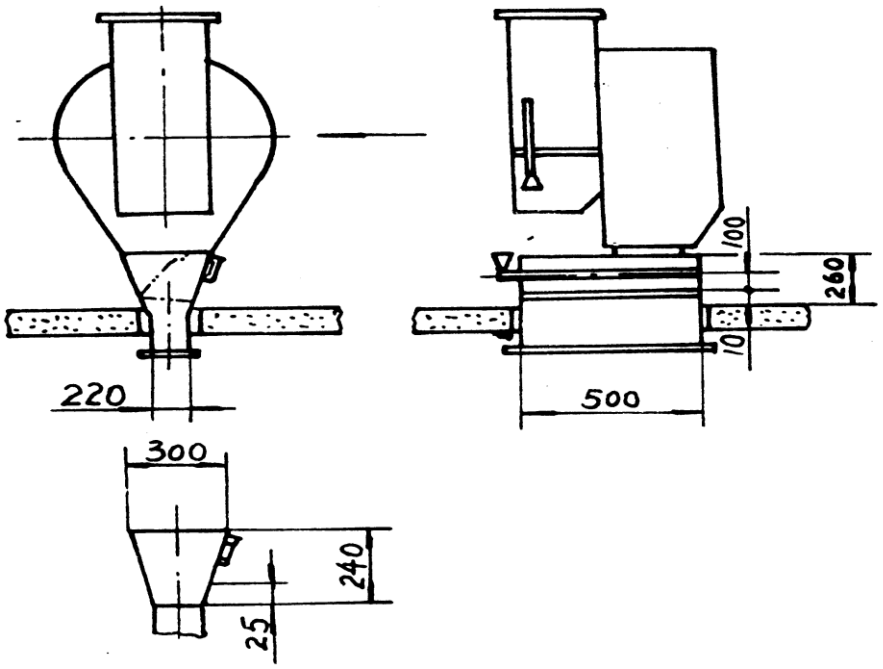


Fig.10 Feed outlet

4.1.5 Steam should be injected in when the machine is working. See Figure 11 and Table 2 for the steam piping system. The steam is generated by the boiler. Galvanized pipe can be used as the steam pipe connecting with the conditioner. Moisture separator should be installed in the steam piping line to prevent the

condensate from entering the conditioner. Relief valve must be installed to ensure that the steam pressure is not too high but stable. Steam is required to be supersaturated and with high temperature and less moisture content.

4.1.6 Oil and molasses adding system can be installed according to the user's requirements, however, oil and molasses must be atomized and added not exceeding 3%. Otherwise, it will adversely affect the pelleting effect.

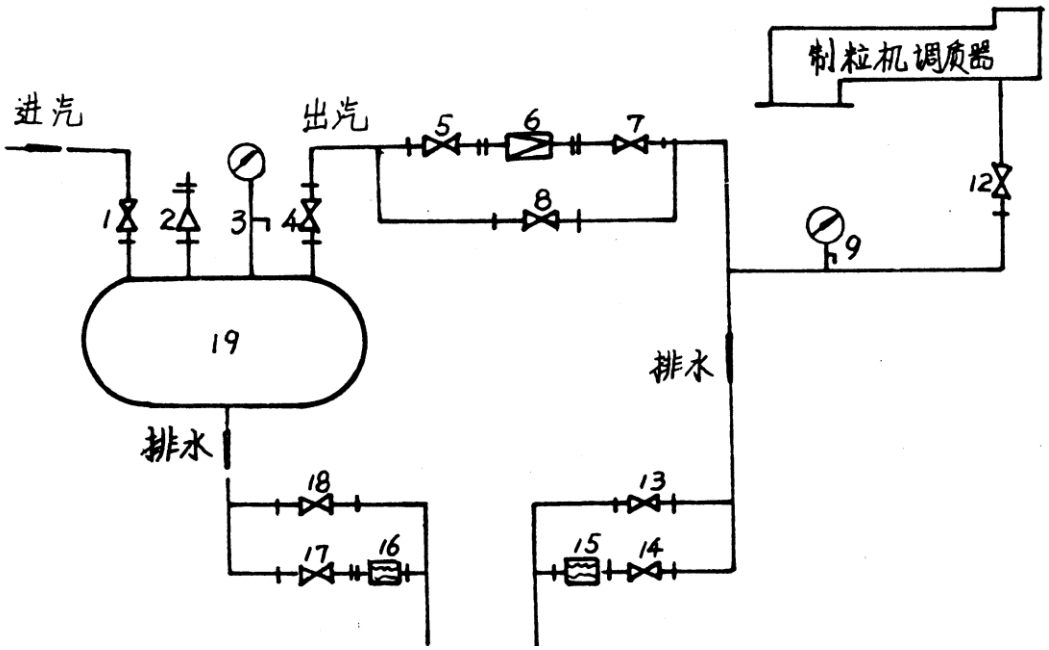


Fig.11 Steam pipeline process flow

Note:All steam pipes must be cleaned before they are put into use, and they must be cleaned after long-term use to remove impurities in the pipe and protect pipeline accessories such as pressure reducing valve and valve

Table 2

No.	Code	Description	Qty	Remark
1	1.4.5.7	Stop valve	6	
2	13.14.17.18	Stop valve	4	
3	2	Safe valve	1	
4	3.9	Gauge cock	2	Pressure: 0.1-1MPa
5	6	Regulator	1	Output Pressure: 0.05-0.4 MPa
6	15.16	Steam trap	2	
7	19	Big Air Bag	1	
8		Steel Flange	8	Pressure: 1.6MPa
9		Steel Flange	10	Pressure: 1.6MPa
10		Inside and Outside Screw	1	

4.2 Adjustment of die-roller clearance (see Figure 12)

Open the pellet chamber door, screw eight fastening bolts off the feed cone and remove feed cone and remove feed cone to clear away the accumulated feed on the inside surface of die (1) and outside surface of rollers (3). First loosen the cover fixing bolt (2) and then loosen the retaining nut (6) and twist the adjusting screw (7) to make adjusting gear to turn. Make adjustment according to the arrow direction of roller adjusting gear. When the clearance becomes smaller, adjust to the opposite direction; when the clearance becomes bigger, if it is checked that the adjustment cannot be carried out in the shown direction, that mans rollers are

wrongly assembled and must be reassembled correctly. It is very important to control the clearance between die and roller. Too small clearance will severely wear rollers and die; too big clearance will result in difficulty of pelleting. Generally, proper clearance is 0.05-0.3mm. judge through visual inspection and take it as appropriate that rollers just touch the surface of die and rotation of die can just drive rollers to turn round without feed. Attention, do not forget to screw the retaining nut and lock screw on after the adjustment of clearance between die and roller.

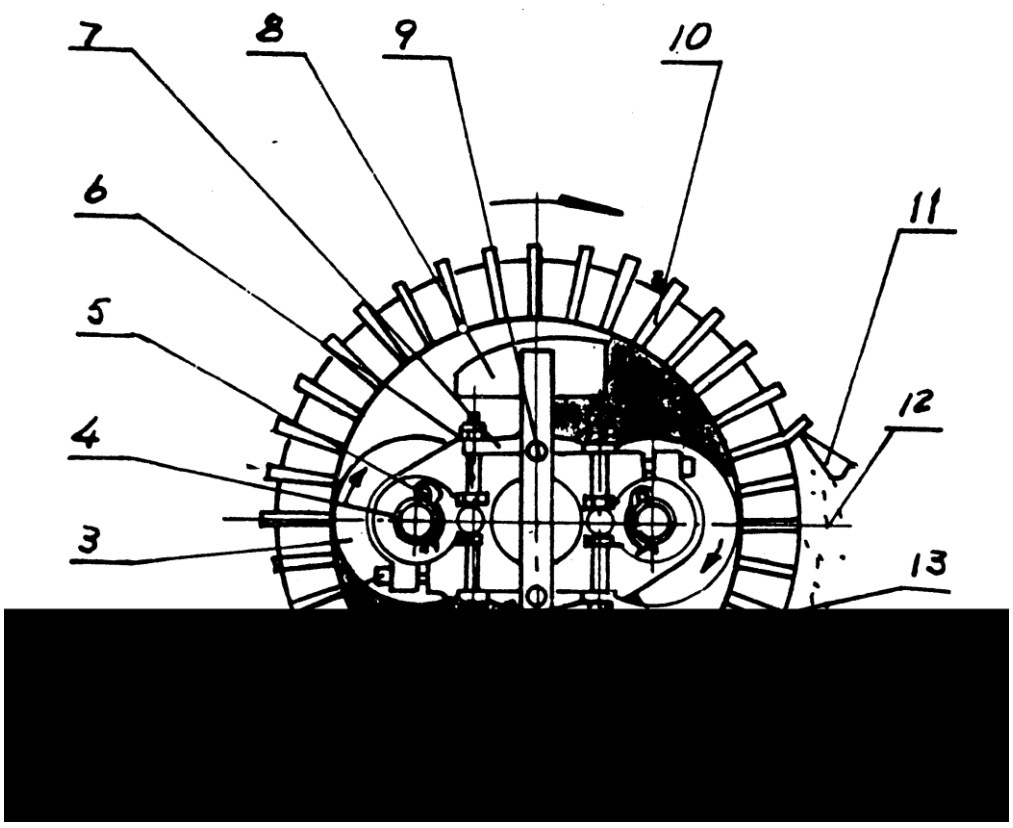


Figure 12 PELLET CHAMBER WORKING PRINCIPLE

1. Die 2. Fixing Bolt 3. Roller 4. Roller Shaft 5. Retaining Pin 6. Retaining Nut 7. Adjusting Screw 8. Deflector 9. Deflector Screw 10. Clearance-adjusting Wheel 11. Knife 12. Pellet Feed 13. Pelleting Area

4.2.2 Knife Adjustment (See Figure 13)

Pellets with different diameter have different length, generally, pellet length is 1.5-3 times longer than pellet diameter. To make adjustment, loosen the lock

handle (11) on the knife post (7) first, pull out knife post, and loosen the lock handle on the positioning bushing (13), set the positioning bushing at a proper place according to the graduation of knife post, then lock the positioning bushing and move the knife post to make the positioning bushing and fixing sleeve touch (8), and lock the knife post handle. Note that distance between knife and the surface of die cannot be smaller than 3mm to avoid the touch of knife and die.

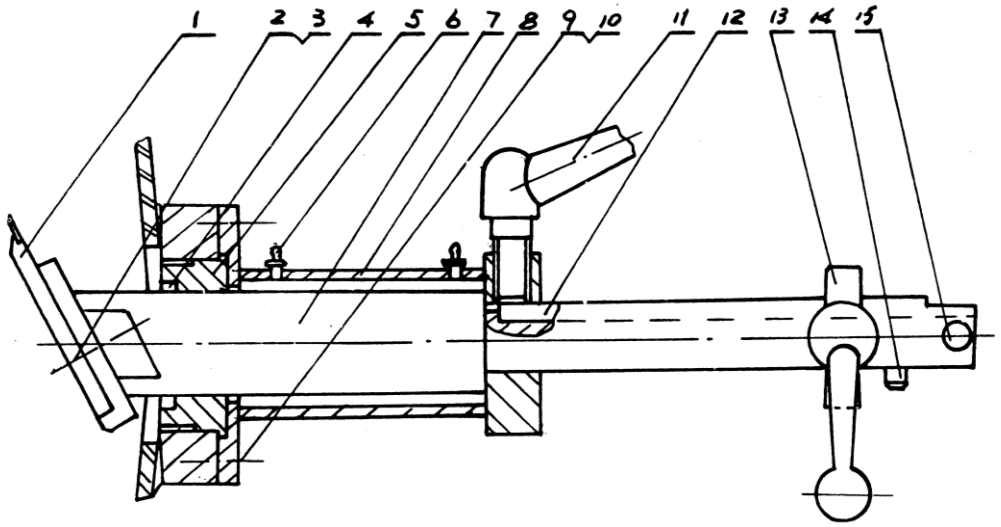


Figure 13 KNIFE ASSEMBLY STRUCTURE

1. Knife 2. Bolt 3. Washer 4. Copper Sleeve 5. Sleeve 6. Oil Cup 7. Knife Post 8. Bushing 9. Bolt 10. Washer 11. Lock Handle 12. Key 13. Positioning Bushing 14. Screw 15. Knife Handle

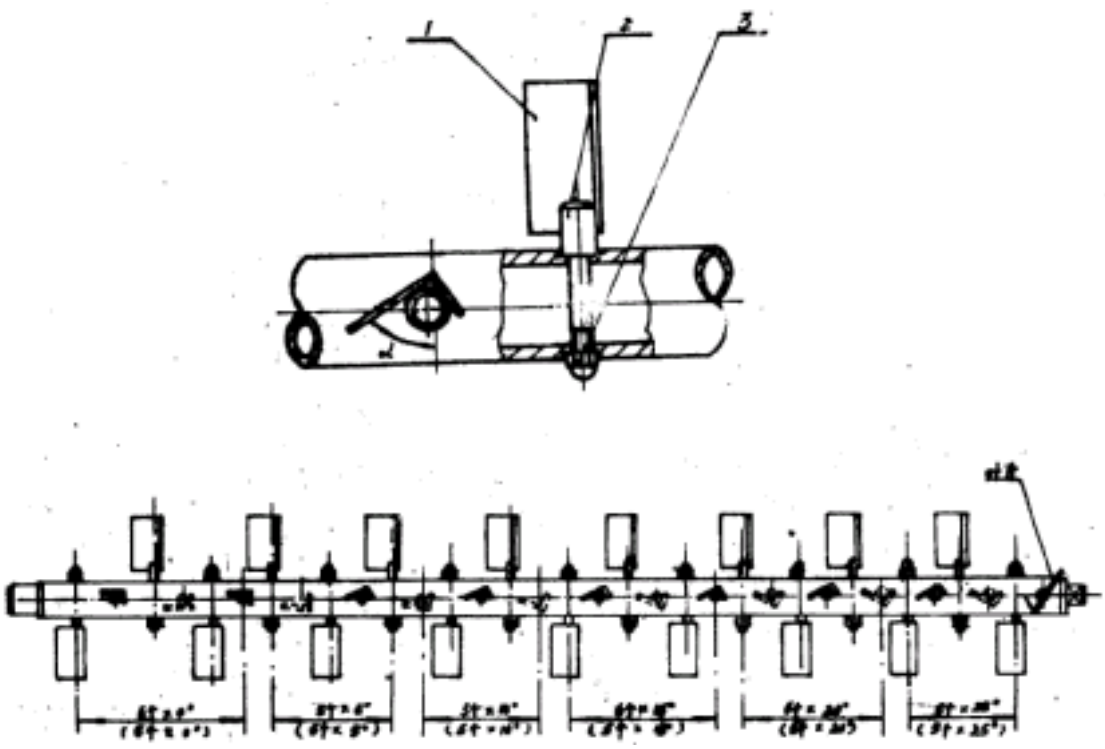
4.2.3 Adjustment of Rotation Speed of Feeder

The rotation speed of feeder determines the conveying volume of feeder. The conveying volume of feeder can be effectively controlled by changing the rotation speed of feeder to meet the pelleting capacity. During the normal operation, the pelleting capacity is affected by many factors, such as material quality, steam quality and voltage fluctuation. Therefore, when one of the factors changes, the conveying rate of feeder should be varied accordingly so that the machine is working normally all the time. Frequency-conversion speed-adjusting motor is used for the feeder. Turn the speed-adjuster of the controller to change the rotation speed of feeder. During the normal operation, observe the change of working current of main motor when adjusting the feeder speed. The working current of the main motor should not exceed the rated value indicated on the

marking plate of main motor.

4.2.4 Adjustment of Mixer (Conditioner) Paddle Angle

The conditioner paddle angle affects the material filling coefficient in the conditioner and the conditioning time of the material. Adjust the paddle angle to control the material conditioning time according to the production requirements and material quality and the filling coefficient in the conditioner. When the paddle angle (See Figure 14) is larger, the filling coefficient is smaller and the conditioning time is shorter; vice versa.



Note:The size in the brankets is SZLH350 Pellet Mill

1. Blade 2.Bolt 3.Cat nut

Fig.14 Blade angle installation sketch of the conditioner

lightly the fastening screw (3) of the paddle, pull the paddle with a spanner or knock the paddle with a wooden hammer to increase or reduce the angle. Fasten all the nuts after adjusting. Only after carefully checking that nothing is loosened can it be replaced.

4.3 Trial run

After the installation of the machine, a trial run is required firstly. The steps for trial

run are as following:

4.3.1 Check that all the fasteners of each part are reliable, especially inside the pellet chamber.

4.3.2 Fill in grease according to the lubrication diagram. The grease can be filled into the roller after turning on the machine.

4.3.3 Check that the clearance between die and rollers is appropriate.

4.3.4 Check the level of the lubricant in the box. The normal level degree is 80-95%.

4.3.5 Check that there is no foreign matters inside the feeder, conditioner and pellet chamber.

4.3.6 Check that the steam supplying system is normal and the steam pressure is 0.1-0.4Mpa.

4.3.7 Start the main part of the machine to check that the die turns clockwise and there is no abnormality.

4.3.8 Check the limit switch. Power should be able to be turned off when you push the limit switch.

4.3.9 Turn on the main parts of the machine for 20 minutes and stop. Check that the fasteners of each part are tight and that there is no oil leakage at the seals or abnormal conditions.

4.3.10 Turn on the feeder motor and the conditioner motor respectively and make trial run without loading to check the rotation direction and abnormal noise. If there is material in the hopper, the discharge opening should be closed first before starting the feeder motor. To start the feeder motor, start the asynchronous motor of speed-adjusting motor first, then turn on the power of controller and the indication lamps, adjust the speed-adjusting controller. The data on gauge for the rotation speed rises gradually. Adjust the rotation speed to a certain value and make it suitable according to requirements.

4.3.11 Restart the main machine. Make a trial pelleting with a little greasy material (e.g. green bran). When making a trial pelleting, you can feed the material through the inspection door of feed chute. Try your best to feed evenly till most holes can produce pellets.

4.3.12 Only after the trial run of all parts of the machine is normal can you start formal production. Whenever abnormality at any step is found, remove it at once. Don’t make pellet mill run for a long time without feed. It will result in the wear of

die and rollers due to the excess surface touch.

Warning: Do not place any object (including hand) into the pellet mill when the pellet mill is running.

5. USE CONDITIONS, OPERATION AND SAFETY RULES

5.1 Use Conditions

Follow the conditions below when operating the pellet mill:

5.1.1 The pellet mill should be installed in a room or and open shed with ambient temperature of 5-40℃.

5.1.2 The equipment in front of and behind the pellet mill should match each other.

5.1.3 The working voltage should be stable with deviation not more than +-5%.

5.1.4 The moisture of mash material should not be more than 15% before it enters the machine.

5.1.5 The pressure and temperature of supplied steam should be in accordance with the stipulations of this manual.

5.1.6 Galvanometer and operation switch should be installed on the site of pellet mill for the convenience of observation and operation.

5.2 Operation

5.2.1 Starting Steps

Make preparation as indicated in items from 4.3.1 to 4.3.9 and make sure that all parts of the machine are all right. After that, start the machine according to the following steps.

5.2.1.1 Turn on the main motor.

5.2.1.2 Turn on the conditioner motor and the feeder motor, adjust the feeder to the lowest rotation speed.

5.2.1.3 Adjust steam pressure and let the condensate water out of the steam pipe.

5.2.1.4 Open the discharging door and open the admission valve at the same time. Slightly adjust the rotational speed of feeder motor. After pellet is produced, gradually adjust the rotational speed of feeder and steam adding volume to a proper level.

5.2.1.5 Adjust knife to make the pellet length appropriate.

5.2.1.6 Further adjust the rotational speed of feeder to make the working current reach the rated current value, and relevantly adjust the steam flow to make the

temperature and humidity appropriate.

5.2.2 Points for Attention

5.2.2.1 For the unskilled operator, when carrying out the step of 5.2.1.4, you can open the pellet chamber door or adopt the external discharging system to make the initial feed not enter the pellet chamber but fall on the ground. When you feel by hand that steam content and conditioning temperature are proper, that is, when you firmly grasp the feed, it can shape into a ball, and when you loosen your grip, it can fall apart, that means the conditioning effect is good. At this moment, let the feed enter the pellet chamber for pelleting.

5.2.2.2 After it runs normally, observe the current of the main part of machine at every time, adjust the feeing volume and admission volume in time according to the current fluctuation and open the inspection door of feed chute to observe the conditioning quality of material and discharging condition at every time. If material is found too dry or too wet, and the current of the main part of machine rises suddenly resulting in the overload running, pull out the external discharging handle for outside discharging.

5.2.3 Stopping Steps

Follow the stipulated sequence to stop the machine without lowering your guard to avoid the equipment accident caused by wrong operation.

5.2.3.1 Close the discharging door

5.2.3.2 Adjust feeder to the lowest rotation speed and gradually close the steam valve.

5.2.3.3 When seeing no feed from the inspection door, turn off the feeder motor and conditioner motor.

5.2.3.4 Feed the greasy feed through the inspection door to fill up the die holes.

5.2.3.5 Turn off the main motor.

5.2.3.6 After the main part of machine stops, open the pellet chamber to remove accumulated feed inside.

5.2.3.7 Remove the impurities on the magnet.

5.3 Safety Rules

5.3.1 There should not be foreign matters such as stone, iron impurity and flaxen thread in the mash material.

5.3.2 Turn on the main motor first when starting the machine; turn off the feeder motor first when stopping the machine.

5.3.3 Feed the greasy feed before turning off the main motor, because the pelleted greasy feed is loose and not easy to block the die holes. This should be done even more, especially when the machine will be left unused for a long time.
5.3.4 Remove the accumulated feed in the pellet chamber after stopping the machine.
5.3.5 Operate strictly in accordance with the operation steps and safety rules. It's not allowed to overload so as to prevent the machine failure caused by wrong operation.
5.3.6 During operation, it's not allowed to open the pellet chamber door to avoid body injury.
5.3.7 Don't stretch out your hands into the inspection door for receiving the feed or other action. To receive the feed, the self-made special-purpose tool should be used.
5.3.8 When adjusting the knife, make sure that distance between knife and outer diameter of die is not shorter than 3mm.
5.3.9 When any abnormal condition is found or machine failure occurs, the normal stopping steps should be followed. After stopping the machine, check it and remove the trouble. Only after everything is normal can you go on with your work.
5.3.10 To obtain good quality pellets and high output, besides every driving part of the machine should run normally and there should be a good feed formula, the most important thing is to adjust the rotation speed of feeder and steam volume correctly to make the main motor work under the rated current and meanwhile ensure proper temperature and humidity for the material conditioned. Different formula has different requirements on the steam adding volume, thus operator should try his best to find out and accumulate experience and control flexibly by feeling and eyesight. In addition, basically stable steam pressure should be ensured and pressure fluctuation cannot be larger than 0.05Mpa generally.

6. COMMON TROUBLESHOOTING

Item	Trouble	Cause	TROUBLESHOOTING
1	Raw material can enter the pellet chamber normally, but pellet cannot be produced.	1) Die holes block. 2) Too much or too little moisture. 3) Too big roller clearance. 4) Deflector is damaged.	1) Clear die holes with corresponding drill. 2) Adjust steam volume correctly. 3) Adjust roller clearance. 4) Replace deflector.
2	No raw materials enter the pellet chamber.	1) Hopper bridges. 2) It blocks in the feeder.	1) Break the lump. 2) Remove feeder screw for cleaning.
3	Friction plate is invalid.	Hard foreign materials enter the pellet chamber.	Clear away the foreign materials.
4	Main part of machine cannot be started.	1) The accumulated materials in the pellet mill are not cleared away. 2) There is trouble with circuit.	1) Clear away the accumulated materials. 2) Fix the circuit breakdown.
5	Roller moves up and down.	Butterfly spring on rear gland of main shaft loses effectiveness, or gland fasteners loosen.	1) Tighten the fasteners. 2) Replace butterfly spring.

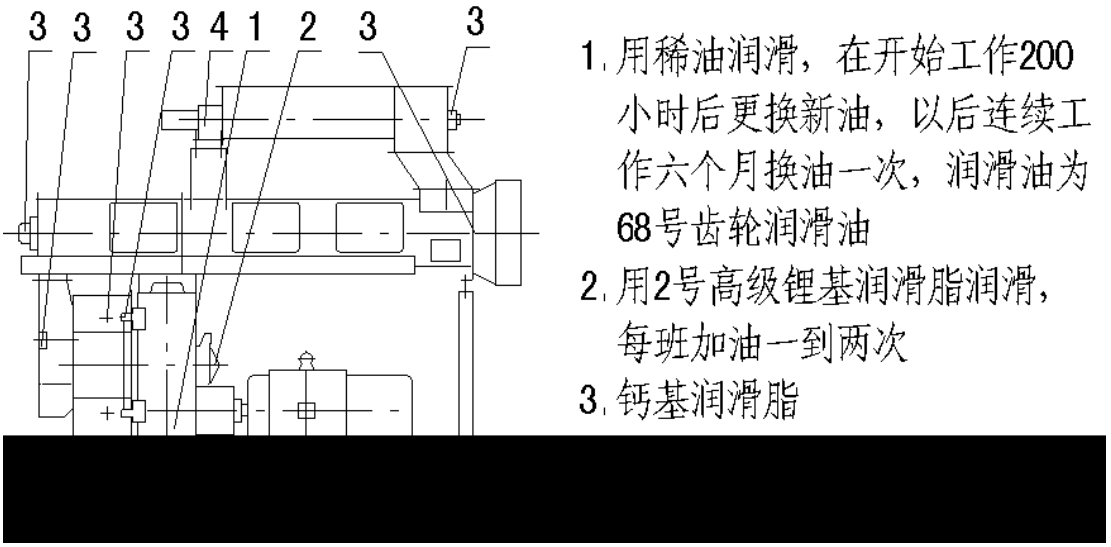
6	Noise and vibration are serious.	1) Bearing is worn and loses its effectiveness. 2) Die or roller wears seriously. 3) Clearance between die and rollers are too small. 4) There are foreign materials in the mixer and feeder. 5) Small hard foreign materials enter the die holes.	1) Replace the bearing. 2) Replace die and rollers. 3) Adjust the clearance. 4) Pull out feeder shaft or mixer shaft for cleaning. 5) Clear away the foreign materials in die holes.
7	Output does not meet the requirements.	1) Moisture is not proper. 2) There is problem with raw material formula. 3) Fineness of raw material is not proper. 4) Pellet are too hard. 5) Current does not reach the rated value.	1) Adjust steam volume rationally. 2) Change raw material formula. 3) Improve the quality of meal material. 4) Replace die and reduce effective length of die holes. 5) Increase the rational speed of feeder screw, material flow and steam flow properly.
8	Pellet is too soft.	Die specification is not suitable to feed formula.	If formula cannot be changed, use the die with large effective length for die holes.
9	Oil leaks.	Oil seal is damaged.	Replace oil seal.

7. MAINTENANCE AND REPAIR

7.1 Routine Maintenance

7.1.1 Strictly follow the lubrication diagram (See Figure 15) to inject lube to each lubrication point. Add high temperature resistant grease from the rear of the main shaft for the roller.

1. Lubricate with dilute oil, renew it after 200 hours' working and then change it



every 6 months;(Use #68 machine oil)

2. No.2 high-grade lithium radical lube. (Inject once or twice every shift).
3. Calcium radical lube.

Fig.15 lubrication chart

7.1.2 Check that the bolts, screws and deflectors in the pellet chamber are tight before operating the machine.

7.1.3 Check the distance between knife and die every shift to make sure that it's not shorter than 3mm.

7.1.4 Check the clearance between the rollers and die and adjust rationally to ensure an identical clearance before starting the machine.

7.1.5 Check every time that there is no leakage and change the oil seal in time.

7.1.6 Keep the outside surface of the machine clean.

7.1.7 Inject about 30g lube to each roller bearing every four hours. Inject 50g lube to the main shaft bearing every 8-10 hours.
7.1.8 Check the oil level of the main driving box every shift. The normal oil level degree is 80-95%.
7.2 Regular Check and Maintenance
7.2.1 Check the tightness of all connection parts every week.
7.2.2 Clean the feeder screw and conditioner once a week. It's also necessary to clean when the machine will be lain idle for a short term.
7.2.3 Replace oil for the gearbox and the reducer after the initial run of 500 hours, and replace oil once every half a year (about 1000 hours) of continuous operation.
7.2.4 Disassemble and clean the bearings of feeder shaft, conditioner shaft and inject new oil every half a year.
7.2.5 Check the wear of die wear ring and driving key every week and replace in time.

7.3 Die Replacement Method
When the inner surface of die wear seriously or pellet diameter need to be changed, it's necessary to replace die. The replacing steps are as following:
7.3.1 Open the pellet chamber door
7.3.2 Loosen feed cone and eight screws to remove feed cone.

7.3.3 Adjust the clearance between die and rollers to be not less than 0.5mm. Remove 3 high strength bolts connecting clamp and quill flange, and then pull out die.
7.3.4 To mount die, follow the sequence opposite to the above steps and note that die notch should align with die driving key on the transmission wheel.
7.3.5 Carefully get rid of filth and impurities at every positioning face of die before mounting the die.
7.3.6 Trial run of new die
Holes of new die had been polished before it left the factory, but the precision of the die holes is still low. To reach the highest output, it's necessary to polish with materials. Die holes were polished with material (ingredient: 2/3 greasy feed and 1/3 fine sand make up 50kg mixture for 15-30 minutes trial run of new die) before

it left the factory, but it's still necessary to be polished properly with materials.

Use the greasy feed (material with oil) for running first. After it's confirmed that all die holes can produce pellets (at least 95% of holes produce pellets), mix materials with higher friction for pelleting and recycle repeatedly for not less than 15 minutes.

7.4 Roller Replacement

Roller is also an easily-worn part. It should be replaced when it is worn seriously. The removing steps for rollers are as following (See Figure 6):

7.4.1 Open the pellet chamber door and remove feed cone and deflector.

7.4.2 Remove the retaining pin and roller adjusting gear, loosen the fasteners of front roller support and remove the front roller support.

7.4.3 Remove roller assembly from main shaft.

7.4.4 Straighten the stop clip of retaining ring on lock nut to screw off lock nut.

7.4.5 Hit the left side of roller shaft with wooden hammer and remove it from its right end.

7.4.6 Remove the glands on both sides.

7.4.7 Disassemble the spring retaining rings on both sides and take out the oil splash collar.

7.4.8 Hit the outer ring and spacer out of two bearings with special-purpose bush and hammer.

7.4.9 Check the use conditions of bearing and other parts. Replace bearing or other parts according to the damage degree.

7.4.10 Clean the full set of roller assembly and assemble roller according to the steps opposite to the above steps. Note that, when tightening the nut, control the tightening degree of bearing to a degree, not too tight or too loose. Generally it is proper that roller turns without axial motion when you keep turning manually.

7.5 Removal and Cleaning of Feeder Shaft

According to the requirements of Item 7.2.2, the inside of feeder should be cleared regularly. To clear, pull out the shaft according to the following methods:

7.5.1 Loosen the cap nut at the right end cap of feeder (See Figure 4).

7.5.2 Remove end cap, bearing with housing and feeder shaft together from the right end.

7.5.3 When mounting after the clearing, align the square tenon at the end of feeder shaft with the square hole of driving shaft of the feeder reducer, (The

square hole can be seen from the caplug and the inside of square hole is coated with a little edible oil), meanwhile mount the fastening bolts of end cap and tighten them.

7.6 Assembling and Disassembling of Conditioner

a. Loose the fixing bolts of the guard and remove the guard.
b. Adjust the bolts to loose the belt and remove the belt.
c. Remove the belt pulley and motor belt pulley with proper “puller” and remove the key.
d. Remove the bearings with housing at both sides.
e. Loose the bolts and remove the right end cover.
f. Pull the mixer shaft out to the left side.

To assemble the mixer, follow the steps opposite to the above.

Clean the conditioner through the big door of the shell.

7.7 Disassembling and Assembling of Driving Key

Replace the deformed or loosened die driving key mounted on the quill flange in time after being used for some time. As shown in Figure 16, tighten the purpose-made key-disassembling support onto the thread in the middle of driving key with a M12x70 bolt, and pull out the driving key through the thread hole at both ends of support with two M16x80 bolts. To assemble, key should be aligned to its position.

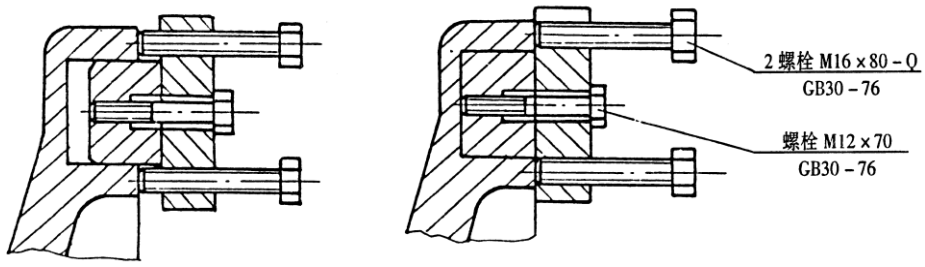


Fig.16 The installation and removal of the driving key of the die ring

7.8 Die Repairing

When the inner surface of die wear seriously and the reverse taper of die hole wears to flat, the inner surface of die can be ground. When mounting, try best to ensure the coaxial degree and vertical degree of die mounting datum plane and inner hole. After repairing the inner surface, ream a 35-50℃ taper hole at the inlet of die hole with hard alloy drill. (See Figure 17)

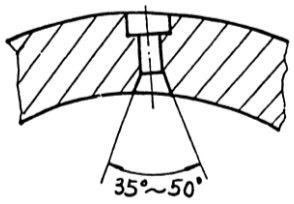


Fig. 17 die orifice

8. Manual Lubricating Pump Structure and Application

To lubricate parts such as roller bearing more conveniently and reliably, a manual lubricating pump is mounted in the rear of gearbox.

8.1 This system mainly consists of Model SB-M manual lubricating pump, oil distributor, oil intake shaft, oil intake shaft sleeve, fixing housing and pipeline accessories. (See Figure 18)

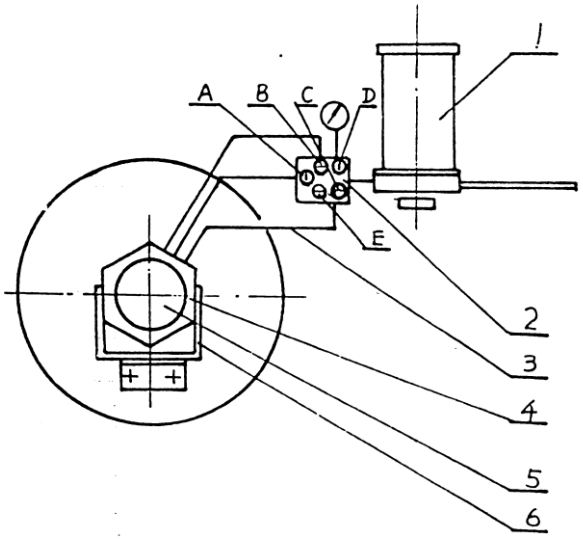


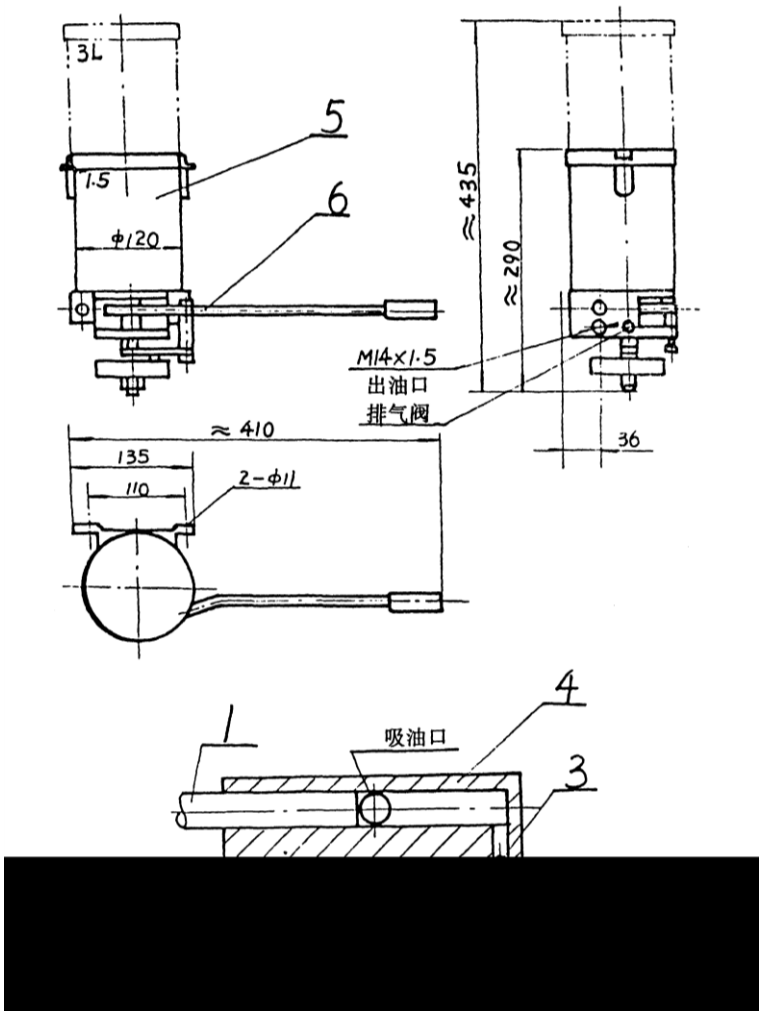
Figure 18 Manual Oil Adding and Lubricating System of SZLH350 Pellet Mill

1. Manual Oil Pump 2. Distributor 3. Pipeline Accessories 4. Oil Intake Shaft Sleeve 5. Oil Intake Shaft 6. Fixing Housing

A. Lubricating Thread Plug of Main Shaft Bearing B. Lubricating Thread Plug of Left Roller Bearing (as viewed forward from the main motor end) C. Lubricating Thread Plug of Right Roller Bearing D. Pressure Gauge Thread plug E. Reserve Thread Plug

(The indicated positions: A, B, C, E are in “off” position, D in “on” position.

8.2 Lubricating Pump Structure and Working Principle



Model SB-M manual lubricating pump is a type using lubricant. See Figure 19 for its structure. It consists of oil tank, pump body, piston, handle, wiper and exhaust valve.

Fig. Manual oil pump

When in operation, pull handle to make piston (1) move left. Oil absorption port is

opened and lubricant is absorbed into the empty cavity of piston. In the meantime, piston (2) moves right and lubricant is pressed to push slide valve (3) upward and open oil outlet to press lubricant out, thus bearings of main shaft or rollers are lubricated through pipeline distributor.

When pulled constantly, handle drives wiper to turn clockwise. Wiper wipes lubricant off oil tank wall and lubricant is pressed into the oil absorption port through mixer. When lubricant in pump contains air, the exhaust valve can be loosened for exhausting. The maximum working pressure of this pump is 30Mpa. Oil supply is 2ml for every stroke. The volume of oil tank is 1.5L.

8.3 Structure and Working Principle of Oil Distributor

This oil distributor has 5 lubricating points and mainly consists of pump body and thread plug (See Figure 20). There are “on” and “off” directional marks on the thread plug. Oil supplying is realized by changing the thread plug which the small oil port of thread plug correspond to the oil port of valve body. When using a certain lubricating point, the others should be in “off” position.

The improved distributor adopts the three points progressive type distributor. Each lubricating point is fitted with a pressure gauge for indicating and it is unnecessary to adjust thread plug. The feature of this distributor is that, if one oil port doesn’t drain oil, the other two will not drain oil; if on oil port can drain oil, the other two will drain oil simultaneously.

Figure 20 Oil Distributor

1. Valve Body 2. Thread Plug

8.4 Application and Maintenance

8.4.1 Lubricant filled into oil tank must be fresh and clean with its needle-density not lower than 265 and drop point not lower than 120℃ at 25℃. No.2 Li radical lube (needle-density is 265-295 and drop point is 175℃ at 25℃) is recommended.

8.4.2 To prevent lubricant from remaining air while filling lubricant, lubricant must be pounded and fill up whole oil tank.

8.4.3 Prior to lubrication, adjust the thread plug of pressure gauge on the oil

distributor to “on” position, meanwhile make a certain lubricating thread plug in “on” position. Pull the handle of manual pump to left and right limit position (the turning angle is about 75%) and observe if pointer of pressure gauge flickers. If pointer does not flicker, loosen the exhaust valve in manual lubricating pump and pull handle constantly till air is exhausted. Then tighten the exhaust valve or directly open oil tank cover, pound lubricant with accessory tools till pointer of pressure gauge flickers while pulling handle and is maintained in a certain pressure range. That means oil can be normally supplied.

8.4.4 When lubricating, make the thread plug of pressure gauge on the oil distributor always in “on” position and the reserve thread plug in “off” position. The other three lubricating points A, B, C should be lubricated one by one. For example, when lubricating line A, A must be in “on” position, and B, C must be in “off” position; when lubricating line B, B must be in “on” position and A, C must be in “off”position. All lubricating points will be lubricated by this means. The progressive type oil distributor can ensure that three points are lubricated simultaneously without any operation.

8.4.5 Under the circumstances of normal operation of pellet mill, lubricate once every 3 hours for every point. For each point, handle needs to be pulled more than five times (10g).

8.4.6 When obvious gap forms after normal operation of 400 hours, lubricant should be filled up and pounded.

8.4.7 During the normal application, the distributing condition of lubricant in oil tank should be checked often and lubricant should be pounded in time to get rid of air.

8.4.8 If lubricating pump is left unused for a long time, lubricant in oil tank is easy to be dry and hard and should be cleaned out in time. Fill fresh lubricant again for next application.

8.4.9 Clean the diversion valve in manual pump regularly. Time depends on the cleanness of lubricant.

8.4.10 If you want to check the lubricating effect, remove the roller assembly in the pellet chamber, connect the corresponding lubricating thread plug on the oil distributor, pull the handle of lubricating pump to see if lubricant oozes from the bearing hole of roller shaft.

8.4.11 When lubricating system fails and needs maintenance, remove lubricating

system, install three oil fittings at the rear end of main shaft and lubricate with grease gun.

9. Rules for Transportation, Storage and Maintenance

9.1 During transportation, when hoisting and loading the machine, pay attention to the package marks of transportation and storage, especially the mark of center of gravity on the package box. Don’t dump or hit or convert the machine.

9.2 When installing and hoisting the machine, fasten rope to the hoisting stakes available on the machine base. Do not fasten rope to other positions for hoisting and never make rope touch the external fragile parts and avoid the rub on paint surface.

9.3 When unfolding the package box, check the outside components of pellet mill, and sort and count the components, the spare parts and documents according to the container loading plan.

9.4 When the machine will be left unused for a long time, it should be stored properly. When it is stored outdoors, there should be facilities preventing rain, sun and water accumulation. When it is stored indoors, there should be fine ventilation and facilities preventing damp and dust.

9.5 See Figure 21 for hoisting.

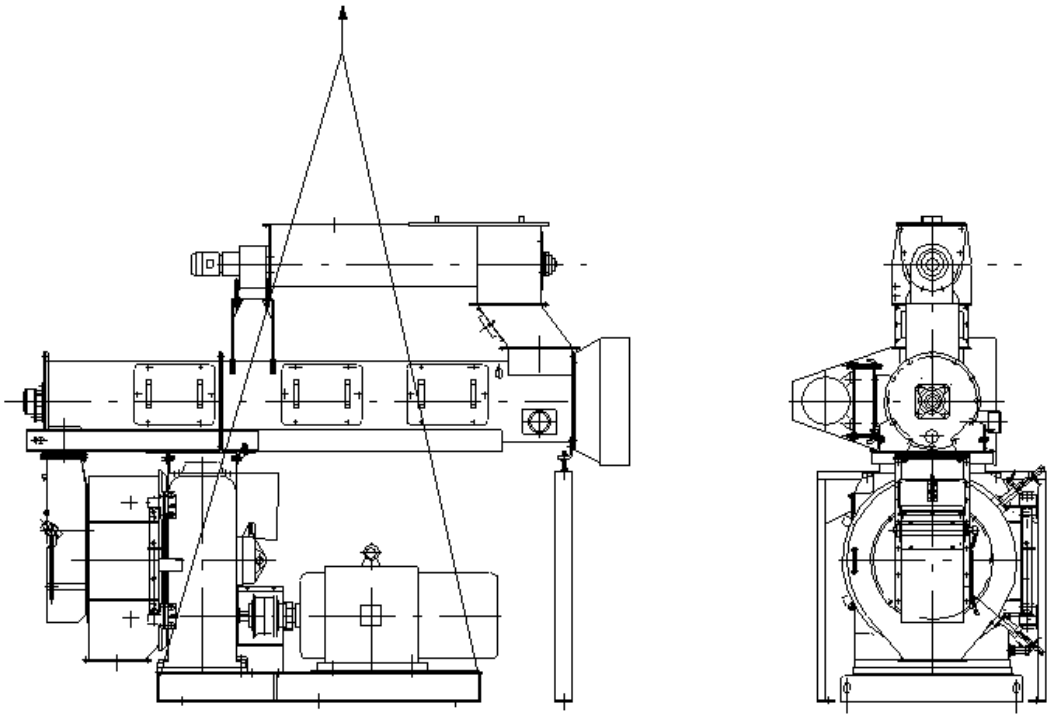


Fig.21 Hoisting

10. LIST OF MAIN VULNERALE PARTS

Item	Code	Description	Qty/Unit	Mounting Parts
1	.1.3-7	Die	1	Pellet Chamber
2	.1.3-37	Roller	2	Pellet Chamber
3	.1.3-35	Roller Shaft	2	Pellet Chamber
4	.1.3-39	Fastening Screw	1	Driving Wheel
5	.1.3-5	Wear Ring	1	Pellet Chamber
6	.1.3-25	Driving Key	1	Pellet Chamber

7	.1.2.2-1	Knife	2	Knife Post Assembly
8	.1.3.2	Deflector	1	Pellet Chamber
9		Bearing with Housing	1	Feeding Reducer
10		Bearing with Housing	2	Conditioner
11		Bearing	1	Main Gearbox (Rear End of Pinion Shaft)
12		Bearing	1	Main Gearbox (Rear End of Quill Shaft)
13		Bearing	1	Main Gearbox (Front End of Pinion Shaft)
14		Bearing	1	Main Gearbox (Main Shaft)
15		Bearing	1	Main Gearbox (Front End of Quill Shaft)
16		Bearing	4	Pellet Chamber (Roller)
17		Oil Seal	1	Main Gearbox (Front End of Quill Shaft)
18		Oil Seal	1	Main Gearbox (Rear End of Quill Shaft)
19		Oil Seal	1	Main Gearbox (Rear End of Pinion Shaft)
20		Oil Seal	1	Main Gearbox (Left Side)
21		Clamp	2	Main Gearbox (Front and Rear End of Pinion Shaft)
22		Clamp	1	Main Gearbox (Main Cover)
23		Clamp	1	Main Gearbox (Main Shaft Splined Hub)
24		Clamp	1	Main Gearbox (Quill Shaft Cover)
25		Clamp	1	Main Gearbox (Main Shaft Cover)
26		Clamp	1	Main Gearbox (Main Shaft Splined Hub)
27		Round Nut	2	Pellet Chamber (Roller Shaft)

28		Retaining Washer	2	Pellet Chamber (Roller Shaft)
29		Retaining Ring	4	Pellet Chamber (inside Roller)
30		Shaft Retaining Ring	2	Pellet Chamber (inside Roller)
31		Butterfly Spring	7	Main Gearbox (Main Cover)

Warranty period: 1 year warranty from the date of sale of this product (except vulnerability parts)In case any quality shortage and damage are found out, we will supply free repair. If not quality shortage and damage, we will supply parts and service that are not cost-free.

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