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A feeding device for coal mine shotcreting machine

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2020103316 09 Nov 2020

ABSTRACT

A feeding device for shotcrete machine, which comprises a moving frame mounted on the mine car, on which a telescopic frame is arranged. A radial material throwing mechanism is arranged above the telescopic frame, and a spiral material lifting mechanism is arranged on the radial material throwing mechanism. The lower end of the spiral material lifting mechanism is hinged with three conical spiral material taking mechanisms which revolve around its axis and rotate at 120 degrees, and one side of the radial material throwing mechanism is provided with a worm gear drive mechanism for lifting the spiral material lifting mechanism, while the other side is provided with a batching mechanism which is connected with the gear power of the worm gear drive mechanism. The feeding device integrates batching and feeding into a whole, and can directly complete the on-site batching and feeding of the slurry used by the shotcrete machine at the underground tunneling working face, thus solving the problems of long-distance transportation and early solidification of the prepared aggregate during transportation, omitting the manual stirring process, and greatly improving the speed and quality of shotcrete support. It has advantages of compact structure, convenient disassembly and assembly, high working efficiency and stable pulp composition.

2020103316 09 Nov 2020

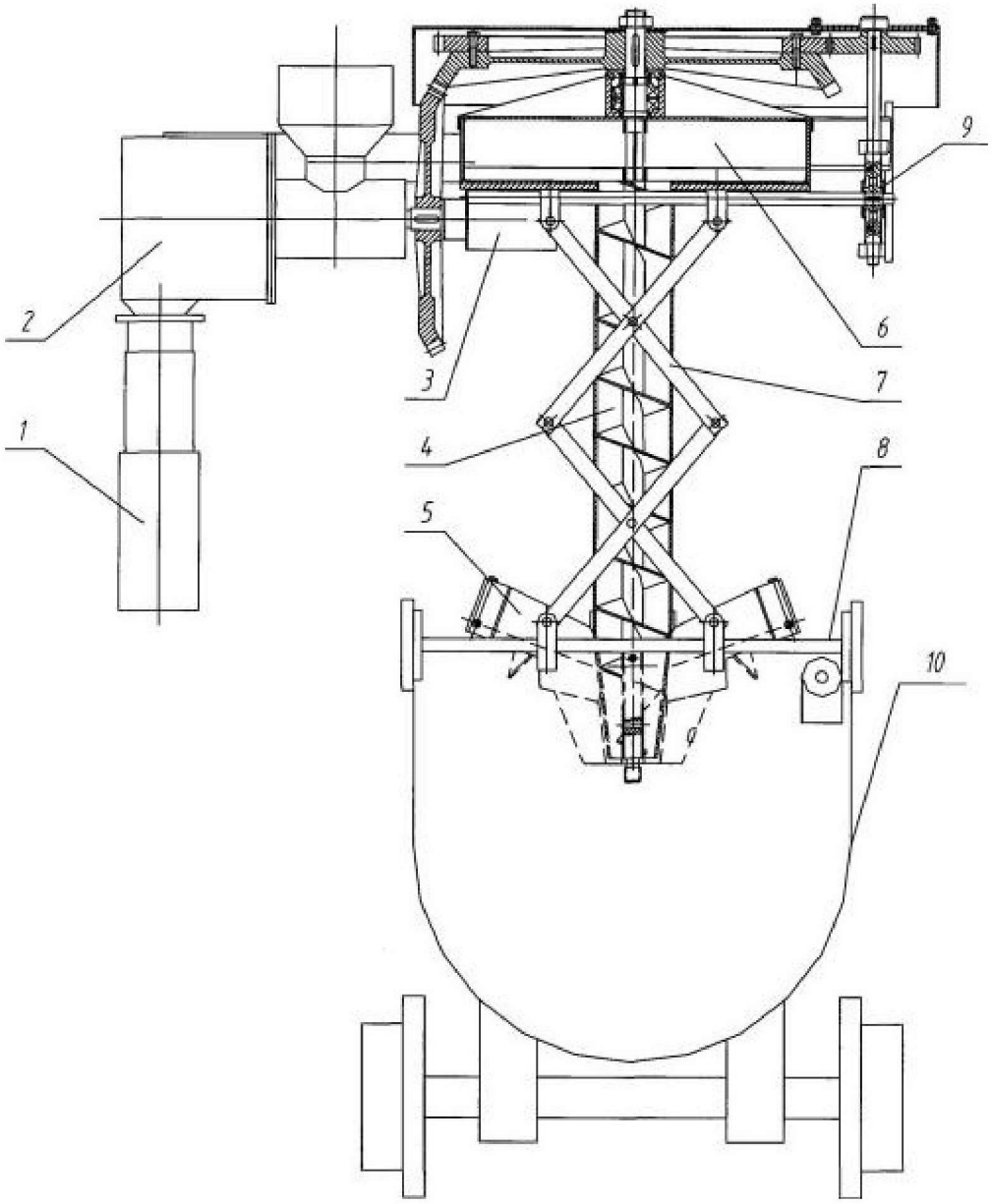


Figure 1

2020103316 09 Nov 2020

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PATENT SPECIFICATION

FOR THE INVENTION ENTITLED:-

A feeding device for coal mine shotcreting machine

The invention is described in the following statement:-

2020103316 09 Nov 2020

A feeding device for coal mine shotcreting machine

TECHNICAL FIELD

The invention relates to a material feeding device, in particular to a material feeding device of a shotcrete machine which is suitable for supporting a mine rock roadway.

BACKGROUND

Shotcrete support technology has not only become the main form of mine rock roadway support, but also a widely used lining technology in the fields of transportation, water conservancy and urban subway. However, due to the lack of suitable mechanical equipment in this process, the jet machine is mainly fed manually at present, which has high labor intensity and low work efficiency.On the other hand, because the tunneling faces under the well are scattered and the roadway space is narrow, dry-mixed bone materials are often prepared by mixing stations on the ground during infrastructure construction, and then transported to each tunneling face by harvesters. Because the tunneling faces are usually far away from the shaft, the aggregates configured on the ground will solidify in advance during regular transportation, and it is necessary to mix materials manually when using them, which is laborious and time-consuming, seriously affecting the speed of support construction and the quality of shotcreting. For this reason, researchers have developed several models, such as chain bucket feeder, negative pressure suction machine and wet spray extrusion pump. However, due to complex

2020103316 09 Nov 2020

structure, inconvenient use and difficulty in pigging or transportation, they have not achieved successful application.

SUMMARY

The purpose of the invention is to overcome the shortcomings of the prior art, and to provide a shotcreting machine feeding device with compact structure, easy disassembly, time-saving and labor-saving, and good effect.

The technical scheme adopted by the invention to solve the technical problem is as follows: it comprises a mobile frame erected on a tramcar, a telescopic frame is arranged on the mobile frame, a radial throwing mechanism is arranged on the upper part of the telescopic frame, a spiral lifting mechanism is arranged on the radial throwing mechanism, and the lower end of the spiral lifting mechanism is hinged with three rotating and self rotating rotating axes of the spiral lifting mechanism at the same time. One side of the radial throwing mechanism is provided with a worm gear driving mechanism to lift the spiral lifting mechanism; the other side is provided with a transmission mechanism connected with the gear of the worm gear transmission mechanism and a batching mechanism connected with the power mechanism; The lower part of the batching mechanism is provided with a discharge telescopic cylinder.

The moving frame consists of two pairs of rollers symmetrically placed on two side walls of the mine car and two connecting shafts connecting the two pairs of rollers; The material throwing mechanism consists of a material barrel with an inner hole in the

2020103316 09 Nov 2020

middle, material mixing blades arranged in a cross-shaped asymmetric row in the material barrel, and a material barrel cover arranged on the feeding barrel; The spiral lifting mechanism consists of a stirring shaft, spiral blades arranged on the stirring shaft and a spiral shell arranged outside the spiral blades; The conical spiral material taking mechanism consists of a conical shell tube, a material taking screw obliquely fixed on the conical shell tube and an outer shell blade arranged at the head of the conical shell tube; The transmission mechanism consists of a wind motor and an air cylinder; The worm gear transmission mechanism consists of a screw fixed below the material throwing mechanism, a worm bearing seat arranged on the screw, a worm wheel arranged on the worm bearing seat and a worm matched with the worm wheel; The batching mechanism consists of a batching bin and a large spiral blade and a small spiral blade which are sequentially arranged in the batching bin, and the large spiral blade and the small spiral blade are arranged on the same shaft directly driven by the power mechanism.

The feeding device disclosed by the invention integrates batching and feeding into a whole, which can directly complete on-site batching and feeding of slurry used by a shotcrete machine on an underground tunneling working face, solves the problems of long-distance transportation and early solidification of prepared aggregate during transportation.It saves the working procedure of manual stirring, and greatly improves the speed and quality of shotcrete support. Moreover, it has compact structure, small size, convenient disassembly and assembly, stable pulp composition, good working effect and high production efficiency, and has wide practicability in the technical field

2020103316 09 Nov 2020

BRIEF DESCRIPTION OF THE FIGURES

Fig. 1 is the front structural diagram of the present invention;

Fig. 2 is the left structural diagram of the present invention;

Fig. 3 is the structural diagram of the worm gear transmission mechanism of the present invention;

Fig. 4 is the top view of the material taking mechanism of the present invention;

Fig. 5 is the sectional structural diagram taken along line a-a of Fig. 4;

Fig. 6 is the structural diagram of the displacement device of the present invention;

Fig. 7 is the structural diagram of the material throwing machine of the present invention;

Fig. 8 is the top structural view of Fig. 7;

Fig. 9 is the structural diagram of the batching mechanism of the present invention.

Components in the drawings: 1-discharging telescopic cylinder; 2-batching mechanism; 3-power mechanism; 4-spiral lifting mechanism; 5-conical spiral fetching mechanism; 6-radial throwing mechanism; 7-telescopic frame; 8-moving frame; 9- worm gear transmission mechanism; 10- mine car; 2-1-large spiral blade; 2-2— small spiral blade; 4-1— stirring shaft; 4-2— spiral blade; 4-3— spiral shell; 5-1— material taking screw; 5-2— cone shell tube; 5-3— outer blade of shell; 6-1— bucket cover; 6-2—

2020103316 09 Nov 2020

mixing blade; 6-3— bucket; 9-1— worm; 9-2— worm gear; 9-3— screw; 9-4— worm bearing seat.

DESCRIPTION OF THE INVENTION

The embodiments of the present invention will be further described with reference to the accompanying drawings:

The feeding device of the shotcrete machine shown in Fig. 1 is composed of a discharging telescopic cylinder 1, a batching mechanism 2, a power mechanism 3, a screw lifting mechanism 4, a conical screw material taking mechanism 5, a radial material throwing mechanism 6, a telescopic frame 7 and a moving frame 8. The moving frame 8 is composed of two pairs of rollers symmetrically placed on both sides of the mine car 10 and two connecting shafts connecting the two pairs of rollers. The telescopic frame 7 is symmetrically arranged on the two connecting shafts of the moving frame 8 through a moving sleeve and can move along the connecting shafts. A radial material throwing mechanism 6 is arranged above the telescopic frame 7, and the material throwing mechanism 6 is composed of a material barrel 6-3 with an inner hole in the middle, material mixing blades 6-2 arranged in a cross-shaped asymmetric arrangement in the material barrel 6-3, and a material barrel cover 6-1 arranged on the upper material barrel 6-3.The radial material throwing mechanism 6 is installed at the upper end of the main shaft of the spiral material lifting mechanism 4, which is composed of a stirring shaft 4-1, a spiral blade 4-2 arranged on the stirring shaft 4-1 and a spiral shell 4-3 arranged outside the spiral blade 4-2. The stirring shaft 4-1 of the spiral lifting

2020103316 09 Nov 2020

mechanism 4 passes through the bucket 6-3 of the radial throwing mechanism 6 and is connected with the transmission gear, and a bearing set is arranged between the transmission gear and the bucket 6-3. The lower end of the spiral lifting mechanism 4 is hinged with three conical spiral material taking mechanisms 5 which revolve around the axis of the spiral lifting mechanism 4 and rotate at 120 degrees. The conical spiral material taking mechanism 5 consists of a conical shell tube 5-2, a material taking screw 5-1 obliquely fixed on the conical shell tube 5-2 and an outer shell blade 5-3 arranged at the head of the conical shell tube 5-2. One side of the radial material throwing mechanism 6 is provided with a worm gear transmission mechanism 9 for lifting the vertical spiral material lifting mechanism 4. The worm gear transmission mechanism 9 is composed of a screw 9-3 fixed below the material throwing mechanism 6, a worm bearing seat 9-4 arranged on the screw 9-3, a worm gear 9-2 arranged on the worm bearing seat 9-4 and a worm 9-1 matched with the worm gear 9-2. On the other side of the radial throwing mechanism 6, a power mechanism 3 connected with a worm gear transmission mechanism 9 and a batching mechanism 2 connected with the power mechanism 3 are arranged, and a discharging telescopic cylinder 1 is arranged below the batching mechanism 2. The batching system 2 consists of a batching bin and a large spiral blade 2-1 and a small spiral blade 2-2 which are sequentially arranged in the batching bin, and the large spiral blade 2-1 and the small spiral blade 2-2 are arranged on the same shaft directly driven by the power mechanism 3. The power mechanism 3 is composed of an air motor and an air cylinder to solve the explosion-proof problem used underground. The wind motor of the power mechanism 3 drives the batching mechanism 2 and drives the bevel gear drive screw lifting mechanism 4 to rotate, and drives the

2020103316 09 Nov 2020

worm gear drive mechanism 9 through the cylindrical gear fixedly connected with the bevel gear.

Working process: transporting shotcrete aggregate (yellow sand and gravel) to the heading face by mine car 10, installing the feeding device on the mine car, then starting the power mechanism 3 to drive the wind motor power to the main shaft of the screw lifting mechanism 4 by bevel gear, and drive the conical screw material taking mechanism 5 to pull the aggregate into the lower end of the screw lifting mechanism 4. Then transporting the aggregate upward by the screw lifting mechanism 4 to the radial material throwing mechanism 6, and the aggregate enters the distribution bin of the batching mechanism 2 under the action of the material throwing mechanism 6. At the same time, cement and accelerator are added from the hopper of the batching mechanism 2. The cement and accelerator which are proportional to aggregate are sent to the batching bin by the small spiral blade 2-2 in the dosing machine mechanism 2 directly driven by the wind motor, which are stirred and mixed evenly with aggregate by the large spiral blade 2-1. Then they are fed to the shotcrete machine by the discharge telescopic cylinder 1. With the continuous feeding of the spiral feeding mechanism 4, the worm gear transmission mechanism 9 connected with the spiral feeding mechanism 4 drives the telescopic frame 7 to move downwards, and the moving frame 8 reciprocates along both sides of the mine car 10 under the action of the air cylinder until the aggregate in the mine car is emptied.

2020103316 09 Nov 2020

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. The feeding device for a shotcrete machine, which is characterized by comprising a moving frame (8), wherein the moving frame (8) is provided with a telescopic frame (7), a radial material throwing mechanism (6) is arranged above the telescopic frame (7), and a spiral material lifting mechanism (4) is arranged on the radial material throwing mechanism (6). The lower end of the spiral material lifting mechanism (4) is hinged with a simultaneous spiral material lifting mechanism. One side of the radial material throwing mechanism (6) is provided with a worm gear transmission mechanism (9) for lifting the straight spiral material lifting mechanism (4), while the other side is provided with a power mechanism (3) connected with the worm gear transmission mechanism (9) and a batching mechanism (2) connected with the power mechanism (3), and a discharging telescopic cylinder (1) is arranged below the batching mechanism (2).

2. The feeding device of shotcrete machine according to claim 1, which is characterized in that the moving frame (8) consists of two pairs of rollers symmetrically riding on both sides of the mine car (10) and two connecting shafts connecting the two pairs of rollers.

3. The feeding device of the shotcrete machine according to claim 1, which is characterized in that the material throwing mechanism (6) consists of a material barrel (6-3) with an inner hole in the middle, material mixing blades (6-2) arranged in a cross-shaped asymmetric arrangement in the material barrel (6-3), and a material barrel cover (6-1) arranged on the upper material barrel (6-3)

2020103316 09 Nov 2020

4. The feeding device of shotcrete machine according to claim 1, characterized in that the screw lifting mechanism (4) is composed of a stirring shaft (4-1), a screw blade (4-2) arranged on the stirring shaft (4-1) and a screw shell (4-3) arranged outside the screw blade (4-2).

5. The feeding device of shotcrete machine according to claim 1, characterized in that the conical spiral material taking mechanism (5) consists of a conical shell tube (5-2), a material taking screw (5-1) obliquely fixed on the conical shell tube (5-2) and an outer shell blade (5-3) arranged at the head of the conical shell tube (5-2).

6. The feeding device of the shotcrete machine according to claim 1, characterized in that the power mechanism (3) consists of an air motor and an air cylinder.

7. The feeding device of shotcrete machine according to claim 1, characterized in that the worm gear transmission mechanism (9) consists of a screw (9-3) fixed below the material throwing mechanism (6), a worm bearing seat (9-4) arranged on a screw (9-3), a worm wheel (9-2) arranged on a worm bearing seat (9-4) and a worm (9-1) matched with the worm wheel (9-2).

8. The feeding device of the shotcrete machine according to claim 1, characterized in that the batching mechanism (2) is composed of a batching bin and a large spiral blade (2-1) and a small spiral blade (2-2) which are sequentially arranged in the batching bin, and the large spiral blade (2-1) and the small spiral blade (2-2) are directly driven by the power mechanism (3).

2020103316 09 Nov 2020

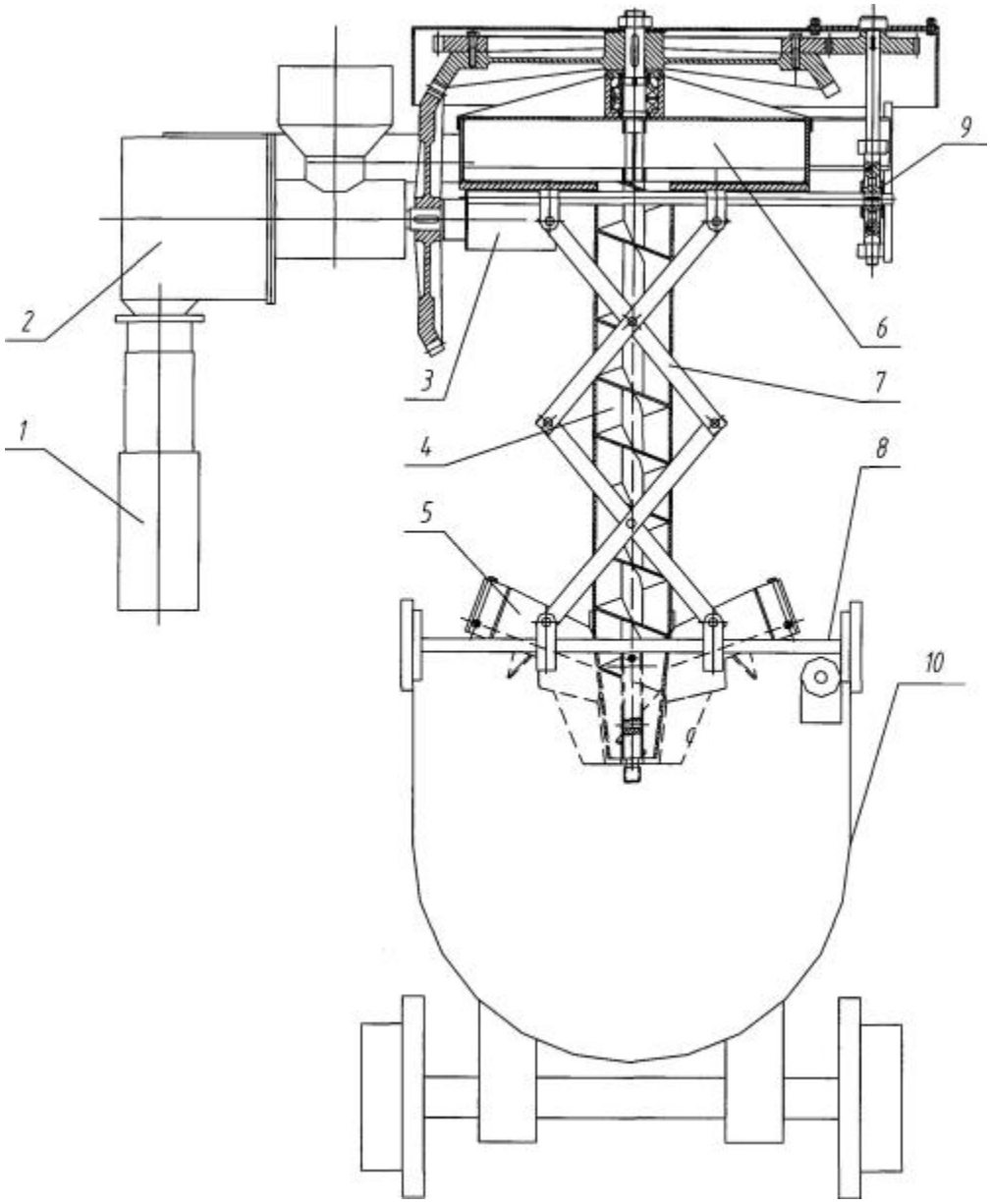


Figure 1

2020103316 09 Nov 2020

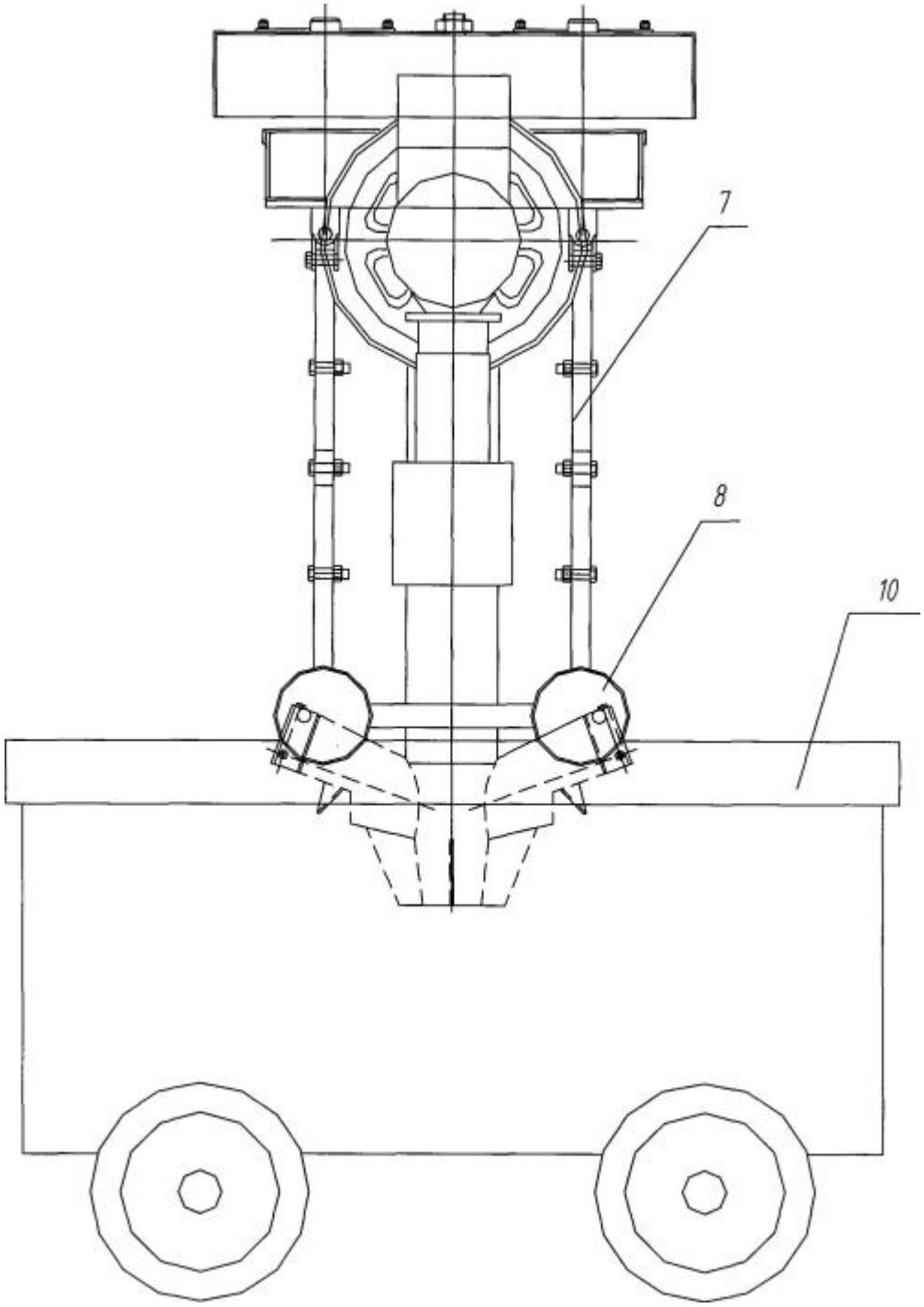


Figure 2

2020103316 09 Nov 2020

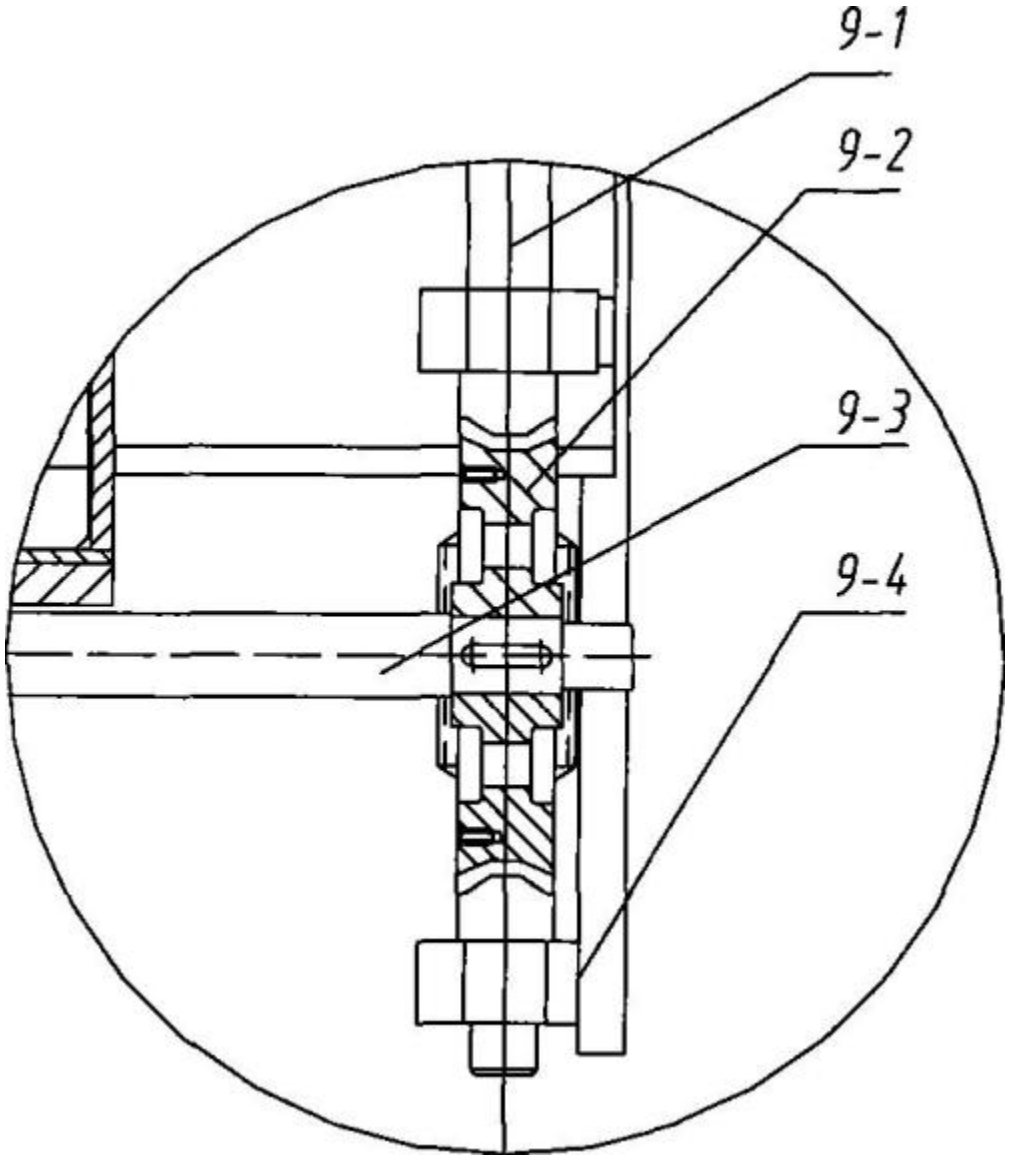


Figure 3

2020103316 09 Nov 2020

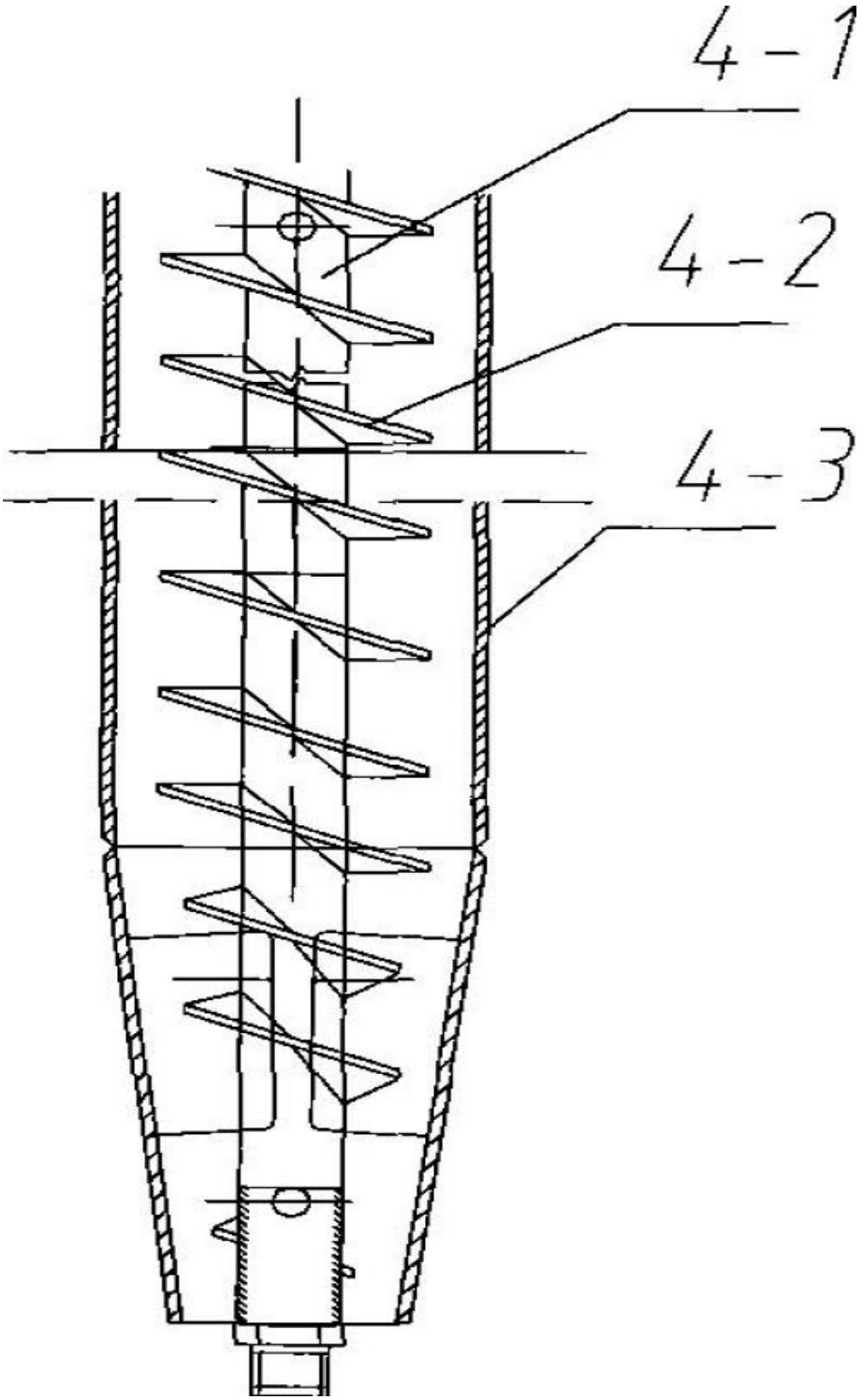


Figure 4

2020103316 09 Nov 2020

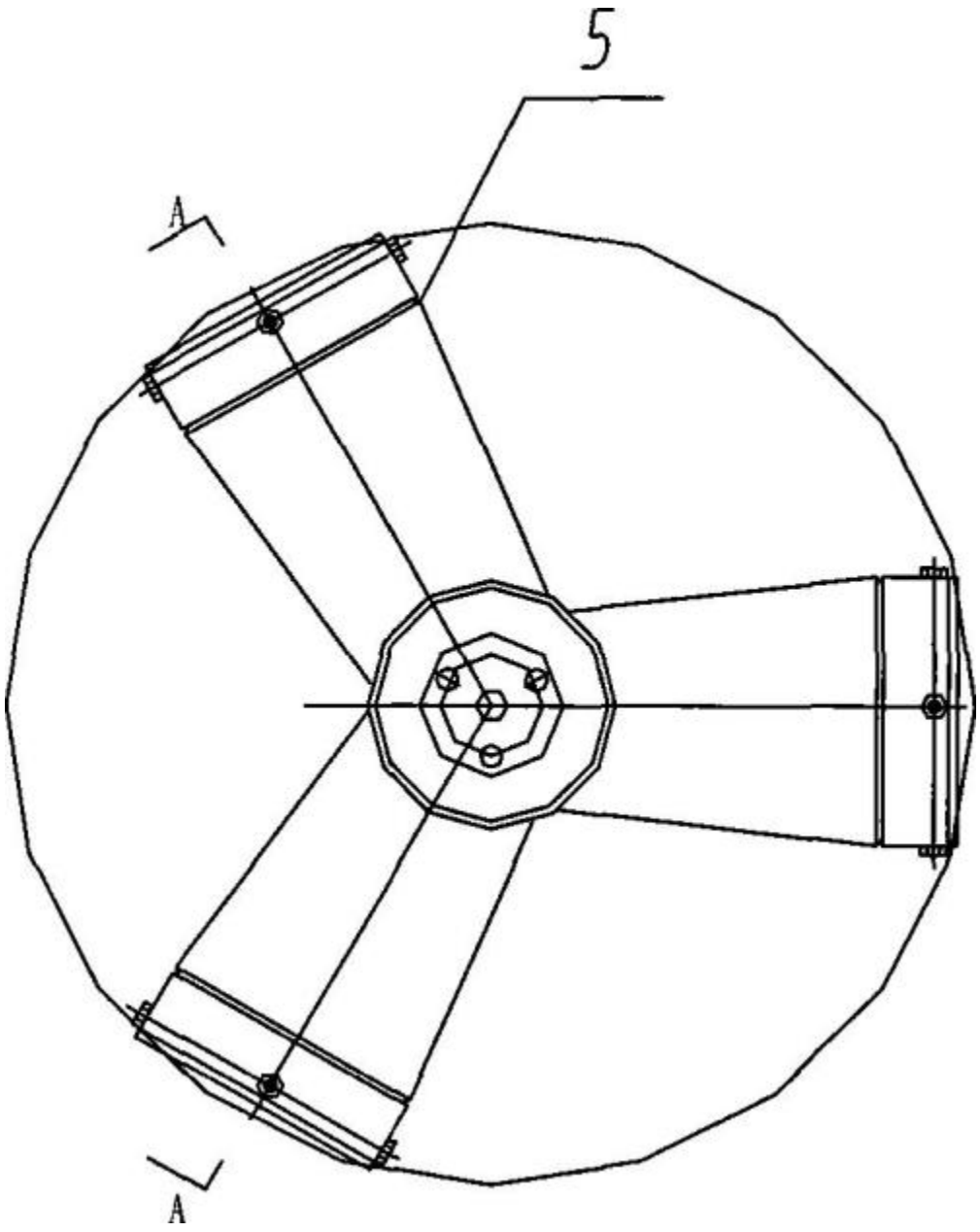


Figure 5

2020103316 09 Nov 2020

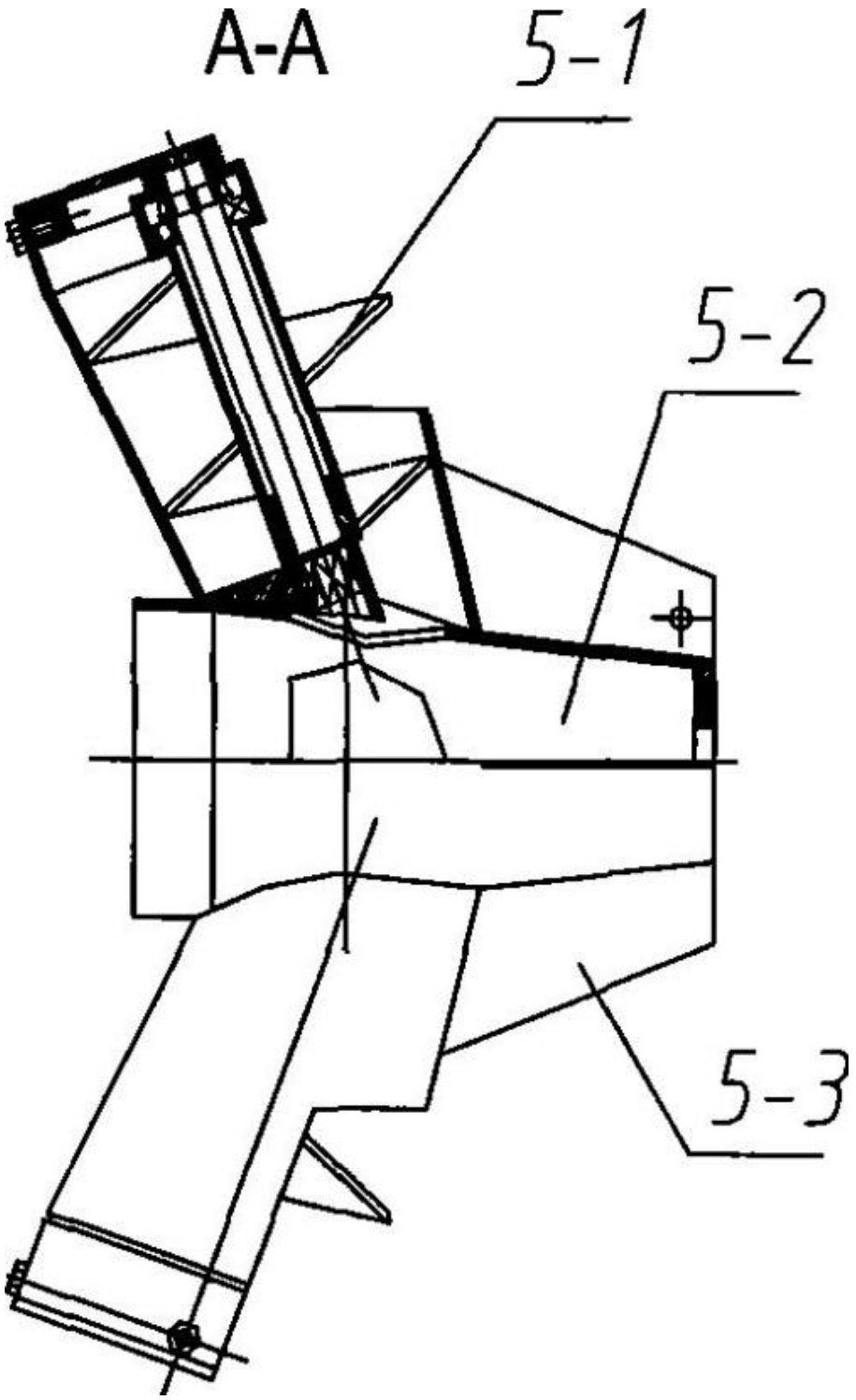


Figure 6

2020103316 09 Nov 2020

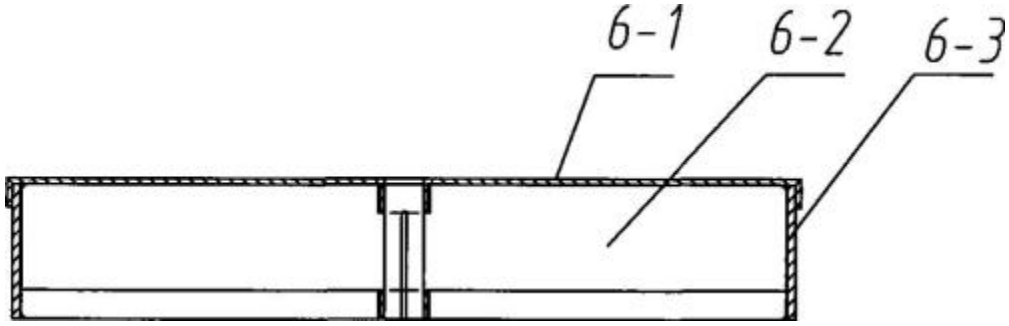


Figure 7

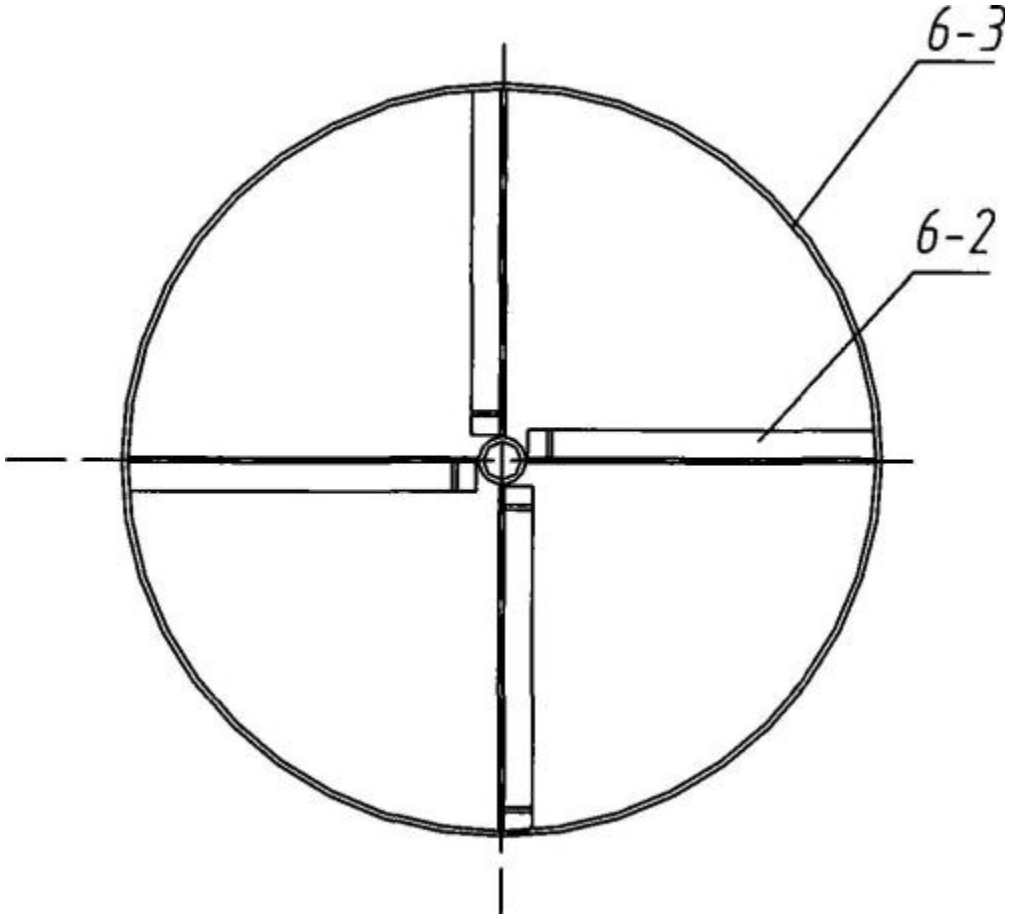


Figure 8

2020103316 09 Nov 2020

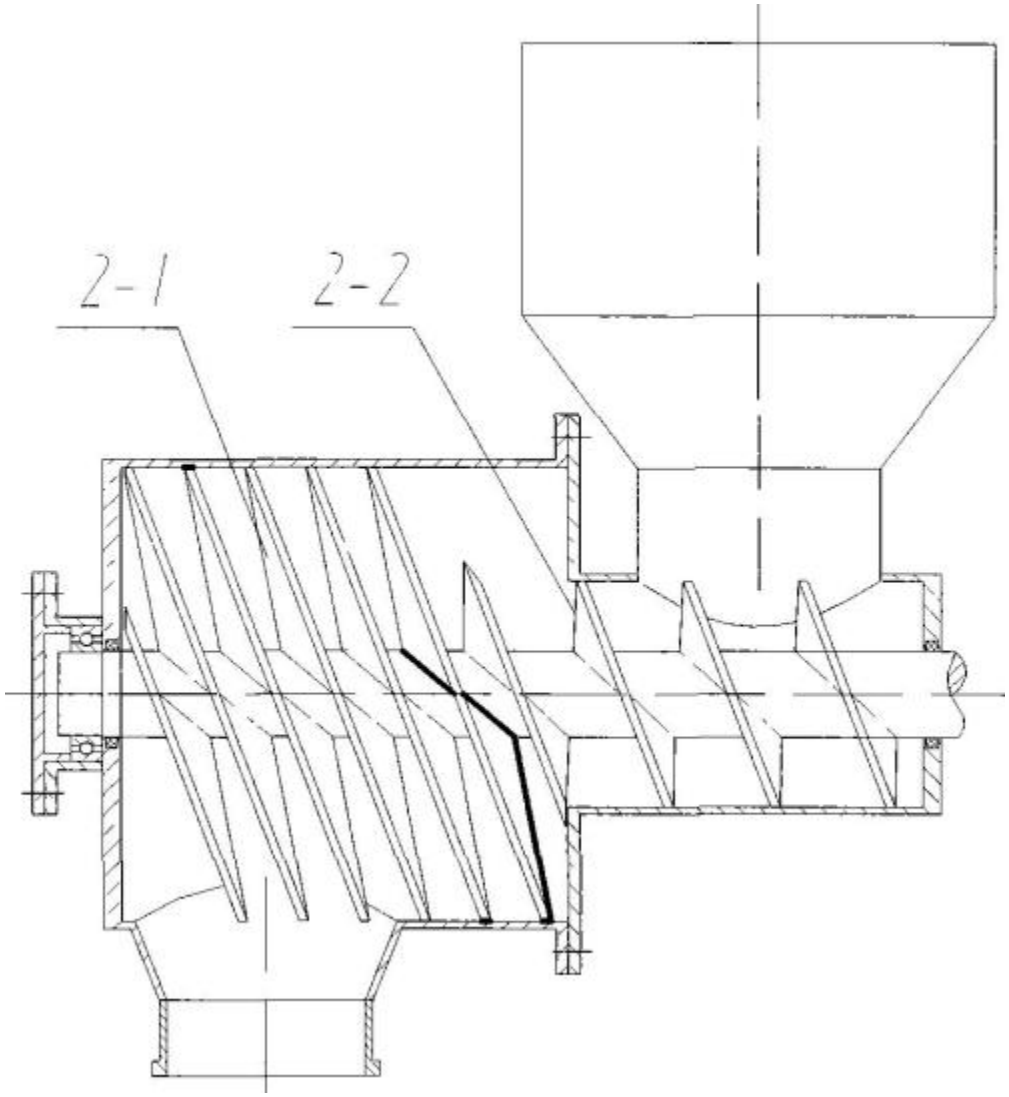


Figure 9