

A KIND OF INVERTING CENTRIFUGE

TECHNICAL FIELD

The invention relates to the technical field of centrifuges, in particular to a kind of
5 inverting centrifuge.

BACKGROUND TECHNOLOGY

The inverting centrifuge has received extensive attention and wide application due to its advantages such as closed operation and complete discharge. Inverting centrifuge generally
10 consists of a frame, a hollow main shaft and a drum assembly set on the frame that rotate around a horizontal axis, and a shell assembly that covers outside the drum assembly. The frame is equipped with a rotating power device that drives the rotation of the main shaft and the drum assembly. A push rod that can slide along the axis of the main shaft is provided through the main shaft. A rotating connecting piece is provided at the tail end of the push rod rotating sleeve
15 and is connected to the bag inverting power device set on the frame which drives the push rod to move horizontally. The drum assembly includes a drum bottom connected to the main shaft and a drum wall arranged on the drum bottom. One end of the push rod passes through the through hole set on the bottom of the drum and enters the inner cavity of the drum, and a pushing plate is provided at this end. Filter bag is provided on the inner side of the drum wall.
20 One end of the filter bag is set on the outer edge of the drum, and the other end is set on the pushing plate. At least three support rods are evenly distributed circumferentially near the edge on the pushing plate. The material retaining rings that match the position of the outer edge of the drum wall are detachable and set at the other end of these support rods. The main shaft drives the push rod to rotate synchronously through the transmission mechanism. The working
25 process includes: Feeding, filtration, washing, dehydration, discharging, and filter cloth

cleaning. Currently, the bag inverting drive mechanism is mostly hydraulically-driven, which is prone to leakage and contamination which is especially not allowed in high cleanliness requirements such as the pharmaceutical industry. However, for fine and highly viscous materials, with current inverting centrifuge structure, in the actual production process, there is a phenomenon that the products will solidify into solid blocks after centrifugal drying.

A kind of inverting centrifuge with the Chinese patent publication number CN106944265A includes outer shaft, inner shaft, drum, drum cover and pushing plate. Pushing plate is connected to one end of the inner shaft, between the pushing plate and the drum is the filter cloth. Outer shaft is driven by motor, An axial blind hole is provided at the other end of the inner shaft to form the oil cylinder, The piston rod in the cylinder is connected to the hydraulic oil rotary output shaft of the rotary joint. The piston divides the inner cavity of the cylinder into the inner cavity and the outer cavity. The piston rod and the hydraulic oil rotary output shaft are respectively provided with the first and second oil channels that connect the inner and outer cavities of the piston. Hydraulic oil rotary output shaft extends into the sleeve fixed on the frame. The side wall of the sleeve is successively and alternately provided with an oil discharge hole, oil passage hole one and two, and an oil discharge hole. The oil passage hole one is connected to the first oil passage or the second oil passage. The oil passage hole two is connected to the second oil passage or the first oil passage. A clutch is provided between the outer shaft and the inner shaft. However, this patent still has some shortcomings: 1. Products with high viscosity tend to adhere to the filter cloth. During dehydration, a small amount of product will pass through the filter cloth and adhere to the inner wall of the drum, causing the water passage holes on the drum to be blocked.

INVENTION CONTENT

The technical problem to be solved by this invention is: In order to solve the problem that product residues are prone to occur inside the inverting centrifuge after discharging, the present invention provides a kind of inverting centrifuge to solve the above problem.

5 The technical solution adopted by the present invention is: a kind of inverting centrifuge which includes drum, pushing plate, cylindrical filter cloth, sealing cover, said outer shaft installed on the machine frame and inner shaft installed inside the outer shaft. Outer shaft is fixed to the rear end of the drum. Said pushing plate is installed said inside drum and coaxial fixed with said inner shaft. Rear end of said cylindrical filter
10 cloth is fixed to the outer circle of said pushing plate. Front end of said cylindrical filter cloth is fixed to the front end of drum. Said sealing cover is used for sealing the front opening of drum. In middle of sealing cover inserted the feeding pipe. It also includes a filter cloth cleaning mechanism and a locking mechanism. Said filter cloth cleaning mechanism includes steel ring, annular electromagnets and coil brackets.
15 Said coil brackets is fixed at rear end of said drum. Said annular electromagnets is fixed on said coil brackets and connected to the outer side of the cylindrical filter cloth. Said steel ring is connected to said annular electromagnet by magnetic attraction and is in contact with the inner side of said cylindrical filter cloth. The diameter of said steel ring is bigger than outer diameter of pushing plate and smaller than inner diameter
20 of drum. Said locking mechanism includes a annular sealing sleeve. Said annular sealing sleeve is fixed to the front end of drum and press the front end of the cylindrical filter cloth tightly against the front edge of the drum. The outer circle of said sealing cover is clamped with the inner circle of the annular sealing sleeve.

As a preferred option, it includes a side wall cleaning mechanism. Said side wall
25 cleaning mechanism includes a connecting bracket and a circular scraper. Said

connection brackets are provided in multiple forms. The multiple connection brackets are uniformly fixed along the circumferential direction of the annular electromagnet on the outer circle of the annular electromagnet. The bottom of the annular scraper is fixed on the connection brackets, and the cutting edge of the annular scraper is slidably
5 connected with the inner wall of the drum. The outer diameter of the said annular scraper is smaller than the inner diameter of the said drum and larger than the diameter of the said steel ring.

As a preferred option, said coil support includes a guide cylinder, a guide rod and a tensioning spring. Said guide cylinder is hollow inside. One end of the guide cylinder
10 is fixed on the outer side of the rear end of the drum through a flange plate. The said guide rod is slidably installed inside the guide cylinder. The front end of the guide rod passes through the drum and is connected to the annular electromagnet, and the rear end of the guide rod is connected to the inner bottom of the guide cylinder through a tensioning spring.

As a preferred option, the inner ring of the said annular sealing sleeve is provided with a clamping ring groove and a sealing ring groove. A sealing ring is installed in the sealing ring groove. The side of the said sealing cover is provided with a accommodating opening. Lock teeth are slidably installed in the said accommodating opening. The bottom of the said lock tooth is fixed with a reset tension spring. When
15 the sealing cover rotates, the front end of the lock tooth can slide out from the accommodation opening and be inserted into the clamping ring groove.

As a preferred option, the surface of the annular sealing sleeve in contact with the sealing cover is provided with air hole. The air hole is in connection with the bottom of the sealing ring groove. The edge of the said sealing cover is fixed with a plug block.

25 The said insert block can be inserted into the said air hole.

As a preferred option, the said sealing ring adopts D-type sealing ring. The maximum diameter of the cross-section of the said sealing ring is less than the depth of the sealing ring groove. When the said insert block is inserted into the said air hole, there is a gap between the insert block and the sealing ring.

5 As a preferred option, the bottom of the pushing plate is fixed with a pressing ring. The rear end of the cylindrical filter cloth is pressed tightly to the bottom of the pushing plate through the pressing ring. When the pushing plate is fully retracted to the rear end of the drum, When the pushing plate is fully retracted to the rear end of the drum, the steel ring is sleeved on the outer ring of the push disc and located between the
10 pushing plate and the cylindrical filter cloth. Under the action of magnetic force, the steel ring and the annular electromagnet are held on the inner and outer sides of the cylindrical filter cloth.

The beneficial effects of the present invention lie in: It is equipped with a filter cloth cleaning mechanism. When the dehydration is completed and discharging is carried out, the
15 inner shaft pushes the pushing plate and the sealing cover to move towards the front end of the drum. During the movement of the pushing plate, it drives the rear end of the cylindrical filter cloth to fold and move towards the front end. During this process, the steel ring is constantly attracted by the annular electromagnet and located at the bend of the cylindrical filter cloth, that is, the longitudinal cross-section of the cylindrical filter cloth is in a "U" shape structure.
20 While, the steel ring is located at the bottom of the "U" -shaped structure and pulls the cylindrical filter cloth. When the rear end of the cylindrical filter cloth moves forward, it drives the steel ring and the annular electromagnet to move forward synchronously. The steel rings can tighten the folded cylindrical filter cloth to prevent the cylindrical filter cloth from being damaged due to irregular folding and squeezing. Meanwhile, the steel ring slides along the
25 inner ring of the cylindrical filter cloth, which can scrape off the solid products adsorbed on

the inner ring of the cylindrical filter cloth, reducing the products residue on the cylindrical filter cloth.

ILLUSTRATION DESCRIPTION

5 In order to describe more clearly the specific implementation mode of the present invention or the technical solution in the existing technology, the following will provide a brief introduction to the attached drawings required for the specific implementation mode or the description of the existing technology. Obviously, the attached drawings described below are some implementations of the present invention. For ordinary technicians in this field, without
10 making creative efforts, other drawings can also be obtained based on these drawings.

Figure 1 is a structural schematic diagram of an optimal implementation of a kind of inverting centrifuge of the present invention;

Figure 2 is a structural schematic diagram of the inner shaft of a kind of inverting centrifuge of the present invention;

15 Figure 3 is a sectional view of point A-A in Figure 2;

Figure 4 is an enlarged view of point B in Figure 3;

Figure 5 is an enlarged view of point C in Figure 3;

Figure 6 is a structural schematic diagram of the annular sealing sleeve of a kind of inverting centrifuge of the present invention;

20 Figure 7 is a structural schematic diagram of the cylindrical filter cloth of a kind of inverting centrifuge of the present invention;

Figure 8 is a structural schematic diagram of the guide rod of a kind of inverting centrifuge of the present invention;

25 Figure 9 is a structural schematic diagram of the steel ring of a kind of inverting centrifuge of the present invention.

Attached figure marking: 1. Drum; 2. Pushing plate 3. Cylindrical filter cloth 4. Sealing cover; 5. Outer shaft 6. Inner shaft 7. Feed pipe 8. Steel ring 9. Annular electromagnet 10. Coil bracket 11. Annular sealing sleeve 12. Connecting bracket 13. Annular scraper 14. Guide cylinder 15. Guide rod 16. Tensioning spring 17. Clamping ring groove 18. Sealing ring groove 19. Lock teeth 20. Reset tension spring 21. Air hole 22. Insert block 23. Clamping ring.

SPECIFIC IMPLEMENTATION METHODS

The following will describe the technical solution of the present invention clearly and completely in combination with the attached drawings. Obviously, the described implementation are part of the implementations of the present invention, not all of them.

As shown in Figures 1 to 9, this invention provides an implementation of a kind of inverting centrifuge which includes drum 1, pushing plate 2, cylindrical filter cloth 3, sealing cover 4, outer shaft 5 installed on the machine frame and inner shaft 6 installed inside the outer shaft 5. Outer shaft 5 is fixed to the rear end of the drum 1. Pushing plate 2 is installed inside drum 1 and coaxial fixed with inner shaft 6. Rear end of cylindrical filter cloth 3 is fixed to the outer circle of pushing plate 2. Front end of cylindrical filter cloth 3 is fixed to the front end of drum 1. Sealing cover 4 is used for sealing the front opening of drum 1. In middle of sealing cover 4 inserted the feeding pipe 7.

It also includes a filter cloth cleaning mechanism and a locking mechanism. Filter cloth cleaning mechanism includes steel ring 8, annular electromagnets 9 and coil brackets 10. Coil brackets 10 is fixed at rear end of drum 1. Annular electromagnets 9 is fixed on coil brackets 10 and connected to the outer side of the cylindrical filter cloth 3. Steel ring 8 is connected to annular electromagnet 9 by magnetic attraction and is in contact with the inner side of cylindrical filter cloth 3. The diameter of steel

ring 8 is bigger than outer diameter of pushing plate 2 and smaller than inner diameter of drum 1. Under the action of magnetic force, the steel ring 8 and the annular electromagnet 9 are held on the inner and outer sides of the cylindrical filter cloth 3.

Coil support 10 includes a guide cylinder 14, a guide rod 15 and a tensioning spring 16. Guide cylinder 14 is hollow inside. One end of the guide cylinder 14 is fixed on the outer side of the rear end of the drum 1 through a flange plate. The said guide rod 15 is slidably installed inside the guide cylinder 14. The front end of the guide rod 15 passes through the drum 1 and is connected to the annular electromagnet 9, and the rear end of the guide rod 15 is connected to the inner bottom of the guide cylinder 14 through a tensioning spring 16.

The working principle of the filter cloth cleaning mechanism is: When the dehydration is completed and discharging is carried out, the inner shaft pushes the pushing plate and the sealing cover to move towards the front end of the drum. During the movement of the pushing plate, it drives the rear end of the cylindrical filter cloth to fold and move towards the front end. During this process, the steel ring is constantly attracted by the annular electromagnet and located at the bend of the cylindrical filter cloth, that is, the longitudinal cross-section of the cylindrical filter cloth is in a "U" shape structure. While, the steel ring is located at the bottom of the "U"-shaped structure and pulls the cylindrical filter cloth. When the rear end of the cylindrical filter cloth moves forward, it drives the steel ring and the annular electromagnet to move forward synchronously. The steel rings can tighten the folded cylindrical filter cloth to prevent the cylindrical filter cloth from being damaged due to irregular folding and squeezing. Meanwhile, the steel ring slides along the inner ring of the cylindrical filter cloth, which can scrape off the solid products adsorbed on the inner ring of the cylindrical filter cloth, reducing the products residue on the cylindrical filter cloth.

When the annular electromagnet 9 moves forward, it can pull the guide rod 15 out of the guide cylinder 14. At this time, the tensioning spring 16 is stretched. When the discharging is completed, the inner shaft 6 drives the pushing plate 2 and the sealing cover 4 to move towards the rear end of the drum 1. The tensioning spring 16 resets, driving the annular electromagnet 9 to move backward. The annular electromagnet 9 attracts the steel ring 8 to move backward. The steel ring 8 pulls the cylindrical filter cloth 3 and moves inward into the drum 1. Therefore, whether the cylindrical filter cloth 3 moves outward or inward towards the drum 1, its bottom can always be pulled by the steel ring 8. This enables the folded cylindrical filter cloth 3 to remain flat on its surface when moving, reducing the situation where products remain in the folds and are difficult to discharge. At the same time, it can also prevent the cylindrical filter cloth 3 from being damaged due to excessive pressure at the folds.

Locking mechanism includes an annular sealing sleeve 11. Annular sealing sleeve 11 is fixed to the front end of drum 1 and press the front end of the cylindrical filter cloth 3 tightly against the front edge of the drum 1. The outer circle of said sealing cover 4 is clamped with the inner circle of the annular sealing sleeve 11.

The inner ring of the annular sealing sleeve 11 is provided with a clamping ring groove 17 and a sealing ring groove 18. A sealing ring is installed in the sealing ring groove 18. The side of the sealing cover 4 is provided with a accommodating opening. Lock teeth 19 are slidably installed in the accommodating opening. The bottom of the lock tooth 19 is fixed with a reset tension spring 20. When the sealing cover 4 rotates, the lock tooth 19 moves towards the outer ring of the sealing cover 4 under the action of centrifugal force and stretches the reset tension spring 20, then the front end of the lock tooth 19 can slide out from the accommodation opening and be inserted into the clamping ring groove 17 to realize the locking of the sealing cover 4 and the annular sealing sleeve 11. When the dehydration is completed and the sealing cover 4 needs to

be opened, the drum 1 stops rotating first. The lock tooth 19 is pulled into the accommodation opening by the reset spring. Finally, the pushing plate 2 and the sealing cover 4 are pushed out through the inner shaft 6.

The surface of the annular sealing sleeve 11 in contact with the sealing cover 4 is provided with air hole 21. The air hole 21 is in connection with the bottom of the sealing ring groove 18. The edge of the said sealing cover 4 is fixed with a plug block 22. The insert block 22 can be inserted into the said air hole 21. By squeezing the gas inside the air hole 21 through the insert block 22, the gas pressure between the sealing ring and the sealing ring groove 18 is increased, and then pressure is evenly applied to all parts of the sealing ring, enabling the sealing ring to adhere more closely to the sealing cover 4. The sealing ring adopts D-type sealing ring. The D-type sealing ring has a rectangular base cross-section, which enables it to have a larger contact area when in contact with the sealing cover 4 compared to the O-ring, thereby achieving a better axial sealing effect and allowing the sealing cover 4 to better seal the drum 1. Moreover, the D-type sealing ring can withstand greater torsional force and achieve a better sealing effect when the drum 1 and the sealing cover 4 rotate. The maximum diameter of the cross-section of the sealing ring is less than the depth of the sealing ring groove 18. When the insert block 22 is inserted into the air hole 21, there is a gap between the insert block 22 and the sealing ring to prevent the insert block 22 from pressing on the sealing ring and causing damage to the sealing ring.

Pressing ring 23 is fixed to the bottom of the pushing plate 2. The rear end of the cylindrical filter cloth 3 is pressed against the bottom of the pushing plate 2 by the pressing ring 23. When the pushing plate 2 is fully retracted to the rear end of the drum 1, the steel ring 8 is set on the outer ring of the push disc 2 and located between the pushing plate 2 and the cylindrical filter cloth 3.

Includes a side wall cleaning mechanism also. Side wall cleaning mechanism includes a connecting bracket 12 and a circular scraper 13. Connection bracket 12 are provided in multiple forms. The multiple connection brackets 12 are uniformly fixed along the circumferential direction of the annular electromagnet 9 on the outer circle of the annular electromagnet 9. The bottom of the annular scraper 13 is fixed on the connection brackets 12, and the cutting edge of the annular scraper 13 is slidably connected with the inner wall of the drum 1. The outer diameter of the annular scraper 13 is smaller than the inner diameter of the drum 1 and larger than the diameter of the steel ring 8.

The working principle of the side wall cleaning mechanism is: When the annular electromagnet 9 moves towards the outside of the drum 1, it will drive the annular scraper 13 to move along the inner wall of the drum 1 to clean it. Meanwhile, since both the annular electromagnet 9 and the annular scraper 13 are located at the outer bottom of the cylindrical filter cloth 3, the cylindrical filter cloth 3 can always remain in front of the annular scraper 13 during movement without touching it. That is, the annular scraper 13 will only clean the corresponding part of the inner wall of the drum 1 after the cylindrical filter cloth 3 detach from the drum 1. Avoid damaging the cylindrical filter cloth 3 by the annular scraper 13.

In the description of this specification, the reference terms such as "one implementation", "some implementations", "example", "specific example", or "some examples" imply that the specific features, structures, materials or characteristics described in combination with the implementation or example are included in at least one implementation or example of the present invention. In this specification, illustrative expressions of terms do not necessarily refer to the same implementations or examples. Moreover, the specific features, structures, materials or characteristics described can be combined in an appropriate manner in any one or more implementations or examples.

Based on the above ideal implementations of the present invention as inspiration, through the above description content, relevant staff members can make various changes and modifications without deviating from the technical idea of the present invention. The technical scope of this invention is not limited to the content in the specification. It must be determined

5 based on the scope of the claims.

CLAIMS

1 A kind of inverting centrifuge, includes drum(1), pushing plate(2), cylindrical filter cloth(3), sealing cover(4), said outer shaft(5) installed on the machine frame and inner shaft(6) installed inside the outer shaft(5). Outer shaft(5) is fixed to the rear end of the drum(1). Said pushing plate(2) is installed said inside drum(1) and coaxial fixed with said inner shaft(6). Rear end of said cylindrical filter cloth(3) is fixed to the outer circle of said pushing plate(2). Front end of said cylindrical filter cloth(3) is fixed to the front end of drum(1). Said sealing cover(4) is used for sealing the front opening of drum(1). In middle of sealing cover(4) inserted the feeding pipe(7). Its feature lies in: it also includes a filter cloth cleaning mechanism and a locking mechanism. Said filter cloth cleaning mechanism includes steel ring(8), annular electromagnets(9) and coil brackets(10). Said coil brackets(10) is fixed at rear end of said drum(1). Said annular electromagnets(9) is fixed on said coil brackets(10) and connected to the outer side of the cylindrical filter cloth(3). Said steel ring(8) is connected to said annular electromagnet(9) by magnetic attraction and is in contact with the inner side of said cylindrical filter cloth(3). The diameter of said steel ring(8) is bigger than outer diameter of pushing plate(2) and smaller than inner diameter of drum(1). Said locking mechanism includes a annular sealing sleeve(11). Said annular sealing sleeve(11) is fixed to the front end of drum(1) and press the front end of the cylindrical filter cloth(3) tightly against the front edge of the drum(1). The outer circle of said sealing cover(4) is clamped with the inner circle of the annular sealing sleeve(11).

2 A kind of inverting centrifuge stated in Claims 1, its characteristic includes a side wall cleaning mechanism. Said side wall cleaning mechanism includes a connecting bracket(12) and a circular scraper(13). Said connection brackets(12) are provided in multiple forms. The multiple connection brackets(12) are uniformly fixed along the circumferential direction of the annular electromagnet(9) on the outer circle of the annular electromagnet(9). The bottom of

the annular scraper(13) is fixed on the connection brackets(12), and the cutting edge of the annular scraper(13) is slidably connected with the inner wall of the drum(1). The outer diameter of the said annular scraper(13) is smaller than the inner diameter of the said drum(1) and larger than the diameter of the said steel ring(8).

5 3 A kind of inverting centrifuge stated in Claims 1, its characteristic lies: Said coil support(10) includes a guide cylinder(14), a guide rod(15) and a tensioning spring(16). Said guide cylinder (14) is hollow inside. One end of the guide cylinder(14) is fixed on the outer side of the rear end of the drum(1) through a flange plate. The said guide rod(15) is slidably installed inside the guide cylinder(14). The front end of the guide rod(15) passes through the
10 drum(1) and is connected to the annular electromagnet(9), and the rear end of the guide rod(15) is connected to the inner bottom of the guide cylinder(14) through a tensioning spring(16).

 4 A kind of inverting centrifuge stated in Claims 1, its characteristic lies: The inner ring of the said annular sealing sleeve(11) is provided with a clamping ring groove(17) and a sealing ring groove(18). A sealing ring is installed in the sealing ring groove(18).The side of the said
15 sealing cover(4) is provided with a accommodating opening. Lock teeth(19) are slidably installed in the said accommodating opening. The bottom of the said lock tooth(19) is fixed with a reset tension spring(20). When the sealing cover(4) rotates, the front end of the lock tooth(19) can slide out from the accommodation opening and be inserted into the clamping ring groove(17).

20 5 A kind of inverting centrifuge stated in Claims 1, its characteristic lies: The surface of the annular sealing sleeve(11) in contact with the sealing cover(4) is provided with air hole(21). The air hole(21) is in connection with the bottom of the sealing ring groove(18).The edge of the said sealing cover(4) is fixed with a plug block(22). The said insert block(22) can be inserted into the said air hole(21).

25 6 A kind of inverting centrifuge stated in Claims 5, its characteristic lies: The said sealing

ring adopts D-type sealing ring. The maximum diameter of the cross-section of the said sealing ring is less than the depth of the sealing ring groove(18). When the said insert block(22) is inserted into the said air hole(21), there is a gap between the insert block(22) and the sealing ring.

5 7 A kind of inverting centrifuge stated in Claims 1, its characteristic lies: The bottom of the pushing plate(2) is fixed with a pressing ring(23). The rear end of the cylindrical filter cloth(3) is pressed tightly to the bottom of the pushing plate(2) through the pressing ring(23). When the pushing plate(2) is fully retracted to the rear end of the drum(1), When the pushing plate(2) is fully retracted to the rear end of the drum(1), the steel ring(8) is sleeved on the outer
10 ring of the push disc(2) and located between the pushing plate(2) and the cylindrical filter cloth(3). Under the action of magnetic force, the steel ring(8) and the annular electromagnet (9) are held on the inner and outer sides of the cylindrical filter cloth(3)