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(54) **Title:** BELT WINDING AND UNWINDING DEVICE FOR BELT CONVEYOR

(54) **发明名称**: 一种用于带式输送机的胶带收放装置

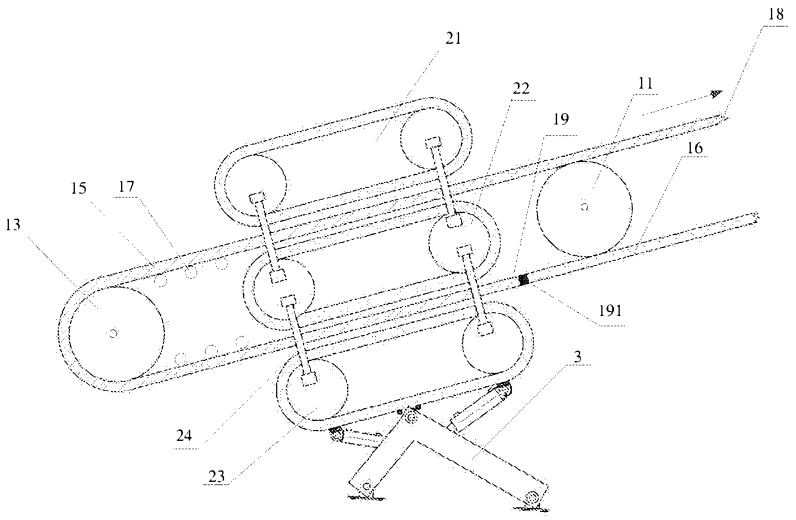

图 2

(57) **Abstract:** A belt winding and unwinding device for a belt conveyor, comprising a base (3), mounting frames (4), an upper track disk (21), a middle track disk (22), and a lower track disk (23). The mounting frames (4) are symmetrically fixed on two sides of the base (3). The upper, middle and lower track disks are all horizontally provided between the symmetrical mounting frames (4) and are symmetrically arranged at upper, middle and lower parts. The lower track disk (23) is fixedly connected between the symmetrical mounting frames (4). The middle track disk (22) is movably connected between the symmetrical mounting frames (4), and vertically slides along the symmetrical mounting frames (4) under the braking of a first braking device so that the lower track disk (23) and the

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middle track disk (22) form a first clamping device configured to clamp a belt. The upper track disk (21) is movably connected between the symmetrical mounting frames (4), and vertically slides along the symmetrical mounting frames (4) under the braking of a second braking device so that the upper track disk (21) and the middle track disk (22) form a second clamping device configured to clamp a belt. The upper, middle and lower track disks are all provided with driving components configured to drive tracks to rotate.

(57) 摘要：一种用于带式输送机的胶带收放装置，包括底座（3）、安装架（4）、上履带盘（21）、中履带盘（22）和下履带盘（23）；其中，底座（3）两侧对称固定有安装架（4）；上、中、下履带盘均横向设置于对称的安装架（4）之间且呈上中下对称分布；下履带盘（23）固定连接于对称的安装架（4）之间，中履带盘（22）活动连接于对称的安装架（4）之间、且在第一制动装置的制动下沿对称的安装架（4）纵向滑动，使下履带盘（23）和中履带盘（22）形成配置为夹紧胶带的第一夹紧装置；上履带盘（21）活动连接于对称的安装架（4）之间、且在第二制动装置的制动下沿对称的安装架（4）纵向滑动，使上履带盘（21）和中履带盘（22）形成配置为夹紧胶带的第二夹紧装置；上、中、下履带盘均设有配置为驱动履带转动的驱动部件。

BELT WINDING AND UNWINDING DEVICE FOR BELT CONVEYOR

CROSS-REFERENCE TO RELATED APPLICATIONS

The present application is proposed based on Chinese Patent Application No. 201710015116.6 filed on January 9, 2017, and claims priority to the Chinese Patent Application, which is incorporated herein by reference in its entirety.

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to a coal production apparatus, and in particular, to a belt winding and unwinding device for a belt conveyor.

Description of Related Art

A belt conveyor is an extremely important large-sized apparatus in coal production, is irreplaceable in production in a coal mine, and is an extremely important link for achieving coal conveyance from a working face to the ground. A belt of the belt conveyor is a carrier for carrying and conveying coal. However, used for a long period of time, the belt is scratched on its surface due to friction between the belt surface and coal materials and friction between the belt and pulleys; even corrosion and fracture occurs in a steel rope, bringing a potential safety hazard to belt operation. Therefore, to guarantee secure and stable operation of the belt, it is necessary to replace the belt regularly. As the coal transportation volume increasingly grows, the volume and weight of the belt also increase accordingly. Additionally, conditions around the belt conveyor are complicated. Thus, replacement of the belt is complicated and arduous.

Generally, a use status of the belt conveyor in coal production is shown in FIG. 1. A drive pulley 11 and an unloading device 12 are positioned on the ground, and a redirecting pulley 13 and a loading device 14 are positioned on a working face. The working face is generally lower than the ground. Coal is loaded into the loading device 14, and then is conveyed to the unloading device 12 by rotation of a belt 15, so

as to deliver the coal from the working face to the ground. To enhance the carrying capacity of the belt 15, several support rollers 17 are provided beneath the belt 15. In an actual situation, a belt conveyor for coal production is not provided with any support roller 17 or provided with few support rollers 17 near the drive pulley 11.

Patent publication No. CN104016168A discloses "a belt replacement method of a belt winding and unwinding device for a belt conveyor". The method includes: after a belt conveyor is turned off, cutting a belt, connecting one end of the belt to a new belt, and passing the other end thereof through a gap between an upper track disk and a lower track disk of the belt winding and unwinding device; starting a hydraulic pump station and driving a hydraulic cylinder, so that the upper track disk presses against the lower track disk, to tightly press the belt; and afterwards, starting a hydraulic motor, driving rotation of tracks to move the belt, winding the belt with a winder and simultaneously laying the new belt.

In the foregoing patent, the whole belt is in a slack condition because the belt winding and unwinding device tightly presses the belt on only one side. Under gravity, the belt clings to the support rollers; and the belt between two support rollers is pulled down, which enhances the friction and wastes the energy source. As shown in FIG. 1, the belt conveyor used in coal production has one end on the upper position and the other end on the lower position. During belt replacement, when the belt on one end is moved downwards, the downward movement gets easy under the gravity of the belt on this side. However, in the foregoing patent, because the belt is in a slack condition, the gravity of the belt cannot be fully used, wasting the energy source.

Therefore, there is an urgent need for a belt winding and unwinding device applicable to coal production and capable of saving the energy source.

SUMMARY OF THE INVENTION

Technical Problem

In view of this, embodiments of the present invention are intended to provide a belt winding and unwinding device for a belt conveyor, which is applicable to coal production and can save the energy source.

Technical Solution

To achieve the foregoing objective, the technical solutions of the embodiments of the present invention are implemented as follows:

The embodiments of the present invention provide a belt winding and unwinding device for a belt conveyor, which includes: a base, mounting frames, an upper track disk, a middle track disk, and a lower track disk.

The mounting frames are symmetrically fixed on two sides of the base; and the upper, middle, and lower track disks are all horizontally provided between the symmetrical mounting frames and are symmetrically arranged at upper, middle, and lower parts.

The lower track disk is fixedly connected between the symmetrical mounting frames; the middle track disk is movably connected between the symmetrical mounting frames, and vertically slides along the symmetrical mounting frames under the braking of a first braking device so that the lower track disk and the middle track disk form a first clamping device configured to clamp a belt. The upper track disk is movably connected between the symmetrical mounting frames, and vertically slides along the symmetrical mounting frames under the braking of a second braking device so that the upper track disk and the middle track disk form a second clamping device configured to clamp the belt.

The upper, middle, and lower track disks are all provided with driving components configured to drive tracks to rotate.

In the foregoing solutions, a horizontal support column is fixed on each of the two sides of the upper track disk, and upper slide slots which accommodate the support columns of the upper track disk are vertically made on the mounting frames; a horizontal support column is fixed on each of the two sides of the middle track disk, and middle slide slots which accommodate the support columns of the middle track disk are vertically made on the mounting frames; and the upper slide slots are symmetrical to the middle slide slots at upper and lower parts.

In the foregoing solutions, a horizontal support column is fixed on each of the

two sides of the lower track disk, and positioning holes through which the support columns of the lower track disk run are made on the mounting frames; the support columns are fixed in the positioning holes via bolts; and the positioning holes are symmetrical to the middle slide slots at upper and lower parts.

In the foregoing solutions, the first braking device is a hydraulic cylinder; a piston rod of the hydraulic cylinder is connected to the support columns of the lower track disk; and a cylinder barrel of the hydraulic cylinder is connected to the support columns of the middle track disk.

In the foregoing solutions, the second braking device is a hydraulic cylinder; a piston rod of the hydraulic cylinder is connected to the support columns of the upper track disk; and a cylinder barrel of the hydraulic cylinder is connected to the support columns of the middle track disk.

In the foregoing solutions, the lower portion of the upper track disk is provided with bearing wheels; the upper portion and the lower portion of the middle track disk are both provided with bearing wheels; and the upper portion of the lower track disk is provided with bearing wheels.

In the foregoing solutions, the driving components which drive tracks to rotate are hydraulic motors.

In the foregoing solutions, the base includes a short leg assembly, a long leg assembly, and support parts;

a first end of the short leg assembly and a first end of the long leg assembly are connected to each other via an axis pin, and a joint between them is provided with a third support part configured to fix the mounting frames; a second end of the short leg assembly is connected to a first grounded support seat via an axis pin; and a second end of the long leg assembly is connected to a second grounded support seat via an axis pin; and

the short leg assembly is connected to one end of a first hydraulic cylinder via an axis pin, and the other end of the first hydraulic cylinder is connected, via an axis pin, to a first support part configured to fix the mounting frames; the long leg assembly is

connected to one end of a second hydraulic cylinder via an axis pin, and the other end of the second hydraulic cylinder is connected, via an axis pin, to a second support part configured to fix the mounting frames.

Advantageous Effect

A belt winding and unwinding device for a belt conveyor provided in the embodiments of the present invention includes an upper track disk, a middle track disk, and a lower track disk. The lower track disk and the middle track disk form a first clamping device configured to clamp a belt, and the upper track disk and the middle track disk form a second clamping device configured to clamp the belt. The upper, middle, and lower track disks are all provided with driving components configured to drive tracks to rotate. In use, two ends of the belt are passed through the first clamping device and the second clamping device respectively. One of the clamping devices is controlled to clamp one end of the belt, and the driving component on this clamping device is started and the clamping device is rotated to tighten the belt. Then, the other of the clamping devices is controlled to clamp the other end of the belt. In this way, during belt replacement, the belt is tightened and does not cling to support rollers, and the belt between two support rollers is not pulled down, thus reducing friction. Further, due to friction reduction, the belt can easily move, such that the gravity of a section of the belt that moves downwards counteracts the gravity of a section of the belt that moves upwards. Thus, the belt winding and unwinding device in the embodiments of the present invention only needs to overcome the friction, in order to complete belt replacement. Obviously, the belt winding and unwinding device in the embodiments of the present invention can save the energy source.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic structural diagram of a belt conveyor for coal production in the prior art;

FIG. 2 is a schematic diagram of a first working status of a belt conveyor in an embodiment of the present invention;

FIG. 3 is a schematic diagram of a second working state of the belt conveyor in an embodiment of the present invention;

FIG. 4 is a schematic diagram of a lateral projection of the belt conveyor in an embodiment of the present invention;

FIG. 5 is a schematic structural diagram of mounting frames in an embodiment of the present invention;

FIG. 6 is a schematic diagram of an orthographic projection of the belt conveyor in an embodiment of the present invention; and

FIG. 7 is a schematic structural diagram of a base in an embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

Embodiments of the present invention provide a belt winding and unwinding device for a belt conveyor, as shown from FIGs. 2 to 6. The belt winding and unwinding device includes a base 3, mounting frames 4, an upper track disk 21, a middle track disk 22, and a lower track disk 23.

The mounting frames 4 are symmetrically fixed on two sides of the base 3. The upper, middle, and lower track disks 21, 22, and 23 are all horizontally provided between the symmetrical mounting frames 4 and are symmetrically arranged at upper, middle, and lower parts.

In an actual situation, there may be a plurality of mounting frames 4 as required.

As an alternative embodiment, as shown in FIG. 6, two mounting frames 4 are symmetrically fixed on two sides of the base 3 respectively. The two mounting frames 4 integrally function as a support structure for the upper, middle, and lower track disks 21, 22, and 23.

The lower track disk 23 is fixedly connected between the mounting frames 4. The middle track disk 22 is movably connected between the symmetrical mounting frames 4, and vertically slides along the symmetrical mounting frames 4 under the braking of

a first braking device so that the lower track disk 23 and the middle track disk 22 form a first clamping device configured to clamp a belt. The upper track disk 21 is movably connected between the symmetrical mounting frames 4, and vertically slides along the symmetrical mounting frames 4 under the braking of a second braking device so that the upper track disk 21 and the middle track disk 22 form a second clamping device configured to clamp the belt. The upper, middle, and lower track disks 21, 22, and 23 are all provided with driving components configured to drive tracks to rotate.

Because the upper, middle, and lower track disks 21, 22, and 23 are symmetrically arranged at upper, middle, and lower parts, the first clamping device and the second clamping device can tightly clamp the belt.

To enable both the upper track disk 21 and the middle track disk 22 to vertically slide along the mounting frames 4, a plurality of slide mechanisms, such as rails, slide rails, guide rails, or the like, may be symmetrically vertically disposed on inner sides of both the two mounting frames 4. Accordingly, corresponding slide parts are disposed on two sides of both the upper track disk 21 and the middle track disk 22, thus realizing vertical sliding along the rails, slide rails, or guide rails. Alternatively, a plurality of slide grooves or guide grooves may be disposed symmetrically vertically on inner sides of both the two mounting frames 4, and horizontal support columns on two sides of both the upper track disk 21 and the middle track disk 22 are placed into these slide grooves or guide grooves, thus realizing vertical sliding along the slide grooves or guide grooves. Alternatively, the mounting frames 4 may be several guide shafts, the two sides of both the upper track disk 21 and the middle track disk 22 are sleeved on the guide shafts via guide sleeves, thus realizing vertical sliding along the guide shafts.

The lower track disk 23 is fixedly connected between the two symmetrical mounting frames 4. Therefore, by the vertical sliding of the middle track disk 22, the first clamping device is adjusted to release or tightly press the belt. Because the upper track disk 21 and the middle track disk 22 both can vertically slide, by the vertical sliding of either the upper track disk 21 or the middle track disk 22, the second clamping device can be adjusted to release or tightly press the belt.

FIG. 2 shows a first working status in which the belt winding and unwinding device implements belt replacement, where belt replacement steps are as follows:

Step 1: Halt the machine. Operation of the belt conveyor is stopped, and a power drive unit is separated from the belt, such that the belt gets slack.

Step 2: The belt near the drive pulley 11 on the ground is cut to obtain a first end 19 and a second end 18. The belt winding and unwinding device is installed. The first end 19 is passed through the first clamping device, and is then connected to a new belt 16 by using a connector 191. The second end 18 is passed through the second clamping device, and is then connected to a winder. In an actual application, in case of short length, the second end 18 may be connected to a dedicated connecting belt before the connection to the winder.

Step 3: The second braking device is braked, such that the second clamping device tightly presses the second end 18. The driving component on the upper track disk 21 and/or the middle track disk 22 is started to drive the upper track disk 21 and the middle track disk 22 to rotate, so as to tighten the belt 15. The first braking device is braked, such that the first clamping device tightly presses the first end 19. In this case, the belt gets taut.

Step 4: The driving components on the upper, middle, and lower track disks 21, 22, and 23 are started to drive the upper, middle, and lower track disks 21, 22, and 23 to rotate, so as to wind the belt 15 into the winder. Simultaneously, the new belt 16 is mounted on the belt conveyor. It can be seen from this step that, because the upper, middle, and lower track disks 21, 22, and 23 rotate at the same speed, the belt 15 and the new belt 16 in combination are tightened uniformly.

Step 5: The connector 191 is dismounted, the belt 15 and the new belt 16 are separated, and two ends of the new belt 16 are connected by vulcanization, and then the conveyor is put into a trial operation in an unloaded manner.

In step 3, the belt 15 in a tightened condition does not cling to the support rollers, and the belt between two support rollers is not pulled down, thus reducing friction and saving the energy source. Moreover, in step 4, because the belt can rotate easily, the

gravity of a section of the belt that moves downwards counteracts the gravity of a section of the belt that moves upwards. Thus, the belt winding and unwinding device only needs to overcome the friction, further saving the energy source.

FIG. 3 shows a second working status in which the belt winding and unwinding device implements belt replacement, where belt replacement steps differ from those shown in FIG. 2 in the following aspects. First, in step 2 of the second working status, the belt near the drive pulley 11 on the ground is cut to obtain a first end 19 and a second end 18; the belt winding and unwinding device is installed; the first end 19 is passed through the first clamping device, and is then connected to a winder; and the second end 18 is passed through the second clamping device, and is then connected to a new belt 16 by using a connector 191; and in an actual application, in case of short length, the first end 19 may be connected to a dedicated connecting belt before the connection to the winder. Secondly, in step 3, the first braking device is braked, such that the first clamping device tightly presses the first end 19; the driving component on the middle track disk 22 and/or the lower track disk 23 is started to drive the middle track disk 22 and the lower track disk 23 to rotate, so as to tighten the belt 15; and the second braking device is braked, such that the second clamping device tightly presses the second end 18. In this case, the belt gets taut.

In the prior art, after separation of the old and new belts, the new belt is in a slack condition, and needs to be tightened before connecting two ends of the new belt by vulcanization. The operation is complicated. In contrast, in step 5 in the embodiment of the present invention, as shown in FIGs. 2 and 3, when the belt 15 and the new belt 16 are separated, the new belt 16 is still tightened. Therefore, the two ends of the new belt 16 can be directly connected by vulcanization, without the need to additionally tighten the new belt 16; and it is only required to dismount the belt winding and unwinding device after the two ends are vulcanized, achieving an easy operation.

In the embodiment of the present invention, as show in FIGs. 4, 5, and 6, a horizontal support column is fixed on each of the two sides of the upper track disk 21, and upper slide slots 41 which accommodate the support columns of the upper track disk 21 are vertically made on the mounting frames 4. A horizontal support column is fixed on each of the two sides of the middle track disk 22, and middle slide slots 42

which accommodate the support columns of the middle track disk 22 are vertically made on the mounting frames 4. The upper slide slots 41 are symmetrical to the middle slide slots 42 at upper and lower parts.

As shown in FIG. 6, the two mounting frames 4 are both provided with the upper slide slots 41. The horizontal support columns on the two sides of the upper track disk 21 are passed through the upper slide slots 41 respectively. Thus, the two upper slide slots 41 provide a support structure for the upper track disk 21, and the upper track disk 21 can vertically slide along the upper slide slots 41. To avoid transverse shaking of the upper track disk 21, it may be required that the support columns and the upper slide slots 41 cooperate with each other. This is also true for the middle track disk 22 and the middle slide slots 42.

Because the upper slide slots 41 are symmetrical to the middle slide slots 42 at upper and lower parts, the upper track disk 21 is also symmetrical to the middle track disk 22 at upper and lower parts.

In the embodiment of the present invention, a horizontal support column is fixed on each of the two sides of the lower track disk 23, and positioning holes 43 through which the support columns of the lower track disk 23 run are made on the mounting frames 4. The support columns are fixed in the positioning holes 43 via bolts. The positioning holes 43 are symmetrical to the middle slide slots 42 at upper and lower parts.

Herein, because the support columns of the lower track disk 23 are fixed in the positioning holes 43 via the bolts, the lower track disk 23 can be detached from the two mounting frames, to facilitate delivery and assembly. Because the positioning holes 43 are symmetrical to the middle slide slots 42 at upper and lower parts, the middle track disk 22 is also symmetrical to the lower track disk 23 at upper and lower parts.

In the embodiment of the present invention, the first braking device may be a hydraulic cylinder. A piston rod of the hydraulic cylinder is connected to the support columns of the lower track disk 23, and a cylinder barrel of the hydraulic cylinder is connected to the support columns of the middle track disk 22.

As an alternative embodiment, there are two support columns on the two sides of both the middle track disk 22 and the lower track disk 23. On each mounting frame 4, there are two slide slots 42 and two positioning holes 43, and there are also two hydraulic cylinders connecting the middle track disk 22 and the lower track disk 23.

In actual use, by extension and retraction of the piston rod of the hydraulic cylinder between the middle track disk 22 and the lower track disk 23, the first clamping device can be controlled to release or tightly press the belt.

In the embodiment of the present invention, the second braking device is a hydraulic cylinder. A piston rod of the hydraulic cylinder is connected to the support columns of the upper track disk 21, and a cylinder barrel of the hydraulic cylinder is connected to the support columns of the middle track disk 22.

As an alternative embodiment, there are two support columns on the two sides of both the upper track disk 21 and the middle track disk 22. On each mounting frame 4, there are two upper slide slots 41 and two middle slide slots 42, and there are also two hydraulic cylinders connecting the upper track disk 21 and the middle track disk 22.

In actual use, by extension and retraction of the piston rod of the hydraulic cylinder between the upper track disk 21 and the middle track disk 22, the second clamping device can be controlled to release or tightly press the belt.

In the embodiment of the present invention, the lower portion of the upper track disk 21 is provided with bearing wheels; the upper portion and the lower portion of the middle track disk 22 are both provided with bearing wheels; and the upper portion of the lower track disk 23 is provided with bearing wheels.

Because the upper track disk and the middle track disk need to cooperate to tightly press the belt, the lower portion of the upper track disk and the upper portion of the middle track disk are both provided with the bearing wheels, in order to achieve a desired tight-pressing effect. Likewise, the middle track disk and the lower track disk need to cooperate to tightly press the belt, the lower portion of the middle track disk and the upper portion of the lower track disk are both provided with the bearing wheels, in order to achieve a desired tight-pressing effect.

In the embodiment of the present invention, the driving components which drive tracks to rotate and provided on the upper, middle, and lower track disks 21, 22, and 23 may be hydraulic motors.

In the embodiment of the present invention, a first end of a short leg assembly 32 and a first end of a long leg assembly 33 are connected via an axis pin, and the joint is provided with a third support part 34 configured to fix the mounting frames. A second end of the short leg assembly 32 is connected to a first grounded support seat 31 via an axis pin, and a second end of the long leg assembly 33 is connected to a second grounded support seat 35 via an axis pin.

In actual use of the support seats, as shown in FIG. 7, the short leg assembly 32 and the long leg assembly 33 need to be splayed, and stand on the ground via the first grounded support seat 31 and the second grounded support seat 35. The base 3 forms a support structure by using the short leg assembly 32 and the long leg assembly 33. The long leg assembly 33 is longer than the short leg assembly 32. Thus, when they are splayed, an included angle between the short leg assembly 32 and the ground is greater than that between the long leg assembly 33 and the ground. Therefore, the gravity borne by the base mostly acts upon the short leg assembly 32, such that the base stays stable.

To form a more stable structure, a cement foundation may be poured on the ground, and the first grounded support seat 31 and the second grounded support seat 35 are fixed on the cement foundation.

The short leg assembly 32 is connected to one end of a first hydraulic cylinder 38 via an axis pin, and the other end of the first hydraulic cylinder 38 is connected, via an axis pin, to a first support part 36 configured to fix the mounting frames. The long leg assembly 33 is connected to one end of a second hydraulic cylinder 39 via an axis pin, and the other end of the second hydraulic cylinder 39 is connected, via an axis pin, to a second support part 37 configured to fix the mounting frames.

As shown in FIG. 7, three support parts, namely, the first support part 36, the second support part 37, and the third support part 34, are provided on the base. The mounting frames are supported by the three support parts, and angles of the mounting

frames can be adjusted by using the first hydraulic cylinder 38 and the second hydraulic cylinder 39.

As an alternative embodiment, to facilitate assembly and manufacture, the mounting frame 4 can be disassembled into three parts: an upper mounting frame, a middle mounting frame, and a lower mounting frame. Bolts may be used to connect the upper mounting frame and the middle mounting frame, and connect the middle mounting frame and the lower mounting frame. The upper mounting frame is provided with upper slide slots 41 through which the support columns of the upper track disk 21 pass; the middle mounting frame is provided with middle slide slots 42 through which the support columns of the middle track disk 22 pass; and the lower mounting frame is provided with positioning holes 43 through which the support columns of the lower track disk 23 pass. The upper, middle, and lower mounting frames are all provided with brake plates 25.

As an alternative embodiment, for safety reasons, a cover plate 44 may be provided above two mounting frames, and is fixed to the two mounting frames via bolts.

Preferred embodiments of the present invention are described above, and are not intended to limit the protection scope of the present invention.

Industrial applicability

During belt replacement for the belt winding and unwinding device in the embodiments of the present invention, the belt is tightened and does not cling to the support rollers, and the belt between two support rollers is not pulled down, thus reducing friction. Further, due to friction reduction, the belt can easily move, such that the gravity of a section of the belt that moves downwards counteracts the gravity of a section of the belt that moves upwards. Thus, the belt winding and unwinding device in the embodiments of the present invention only needs to overcome the friction, in order to complete belt replacement. Obviously, the belt winding and unwinding device in the embodiments of the present invention can save the energy source.

CLAIMS

What is claimed is:

1. A belt winding and unwinding device for a belt conveyor, comprising: a base, mounting frames, an upper track disk, a middle track disk, and a lower track disk, wherein

the mounting frames are symmetrically fixed on two sides of the base; the upper, middle, and lower track disks are all horizontally provided between the symmetrical mounting frames and are symmetrically arranged at upper, middle, and lower parts;

the lower track disk is fixedly connected between the symmetrical mounting frames; the middle track disk is movably connected between the symmetrical mounting frames, and vertically slides along the symmetrical mounting frames under the braking of a first braking device so that the lower track disk and the middle track disk form a first clamping device configured to clamp a belt; the upper track disk is movably connected between the symmetrical mounting frames, and vertically slides along the symmetrical mounting frames under the braking of a second braking device so that the upper track disk and the middle track disk form a second clamping device configured to clamp the belt; and

the upper, middle, and lower track disks are all provided with driving components configured to drive tracks to rotate.

2. The belt winding and unwinding device for a belt conveyor according to claim 1, wherein a horizontal support column is fixed on each of two sides of the upper track disk, and upper slide slots which accommodate the support columns of the upper track disk are vertically made on the mounting frames; a horizontal support column is fixed on each of two sides of the middle track disk, and middle slide slots which accommodate the support columns of the middle track disk are vertically made on the mounting frames; and the upper slide slots are symmetrical to the middle slide slots at upper and lower parts.

3. The belt winding and unwinding device for a belt conveyor according to claim 2, wherein a horizontal support column is fixed on each of two sides of the lower track disk, and positioning holes through which the support columns of the lower track disk run are made on the mounting frames; the support columns are fixed in the positioning holes via bolts; and the positioning holes are symmetrical to the middle slide slots at upper and lower parts.

4. The belt winding and unwinding device for a belt conveyor according to claim 3, wherein the first braking device is a hydraulic cylinder; a piston rod of the hydraulic cylinder is connected to the support columns of the lower track disk; and a cylinder barrel of the hydraulic cylinder is connected to the support columns of the middle track disk.

5. The belt winding and unwinding device for a belt conveyor according to claim 2 or 3, wherein the second braking device is a hydraulic cylinder; a piston rod of the hydraulic cylinder is connected to the support columns of the upper track disk; and a cylinder barrel of the hydraulic cylinder is connected to the support columns of the middle track disk.

6. The belt winding and unwinding device for a belt conveyor according to claim 1, wherein lower portion of the upper track disk is provided with bearing wheels; upper portion and lower portion of the middle track disk are both provided with bearing wheels; and upper portion of the lower track disk is provided with bearing wheels.

7. The belt winding and unwinding device for a belt conveyor according to claim 1, wherein the driving components which drive tracks to rotate are hydraulic motors.

8. The belt winding and unwinding device for a belt conveyor according to claim 1, wherein the base comprises a short leg assembly, a long leg assembly, and support parts;

a first end of the short leg assembly and a first end of the long leg assembly are connected via an axis pin, and a joint between them is provided with a third support

part configured to fix the mounting frames; a second end of the short leg assembly is connected to a first grounded support seat via an axis pin; and a second end of the long leg assembly is connected to a second grounded support seat via an axis pin; and

the short leg assembly is connected to one end of a first hydraulic cylinder via an axis pin, and the other end of the first hydraulic cylinder is connected, via an axis pin, to a first support part configured to fix the mounting frames; the long leg assembly is connected to one end of a second hydraulic cylinder via an axis pin, and the other end of the second hydraulic cylinder is connected, via an axis pin, to a second support part configured to fix the mounting frames.

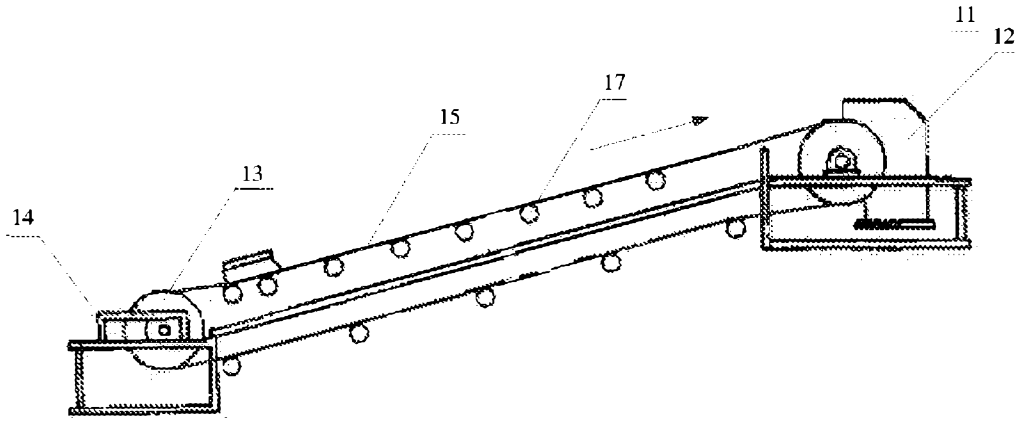

FIG.1

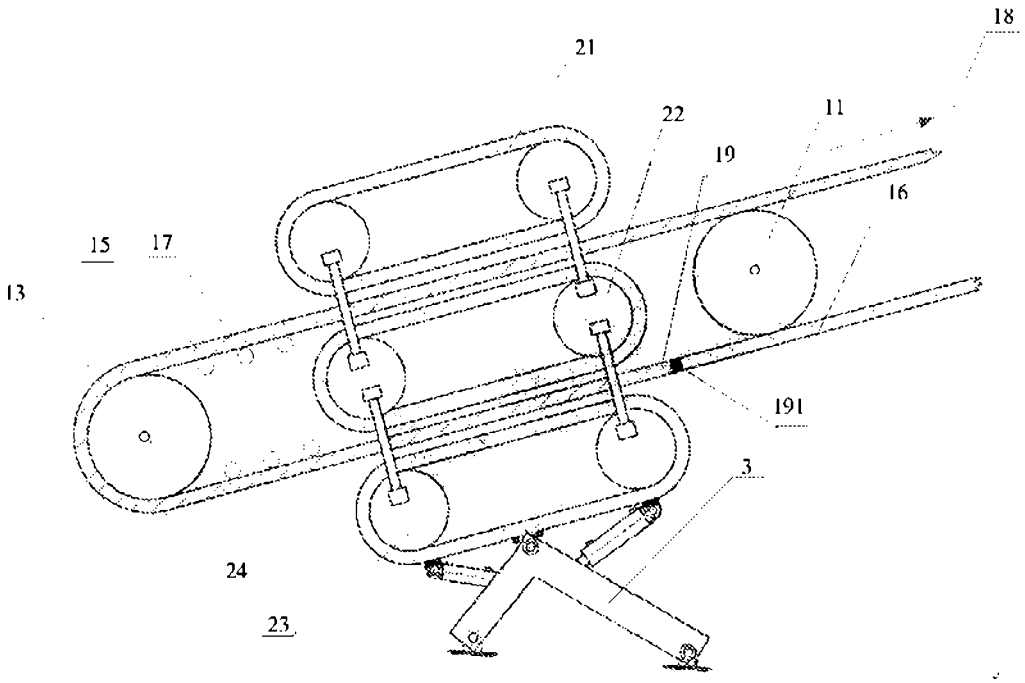

FIG.2

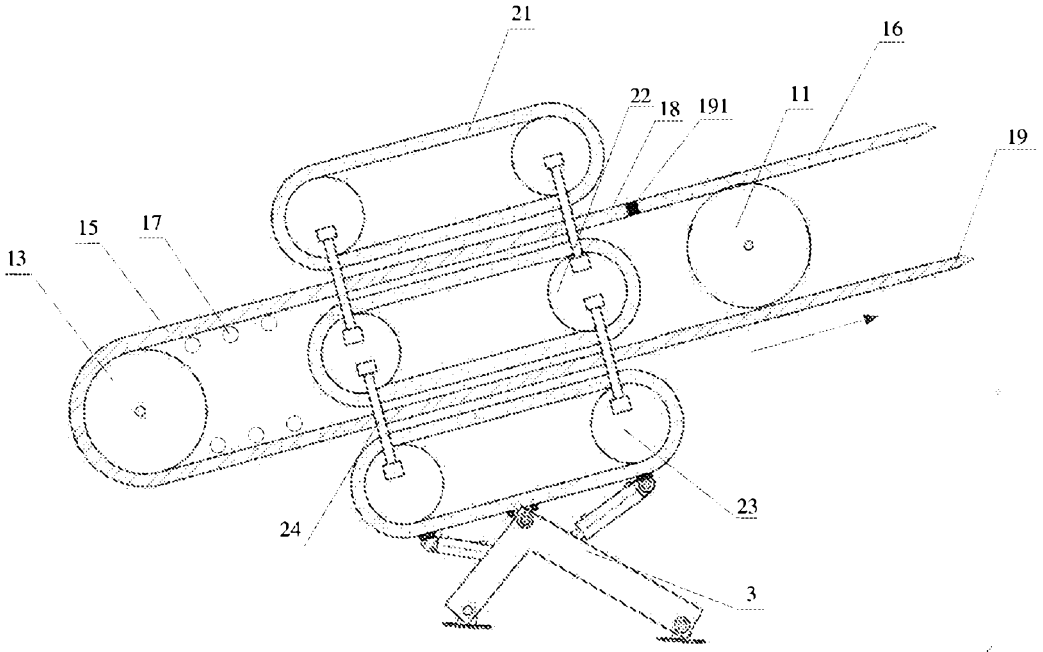

FIG.3

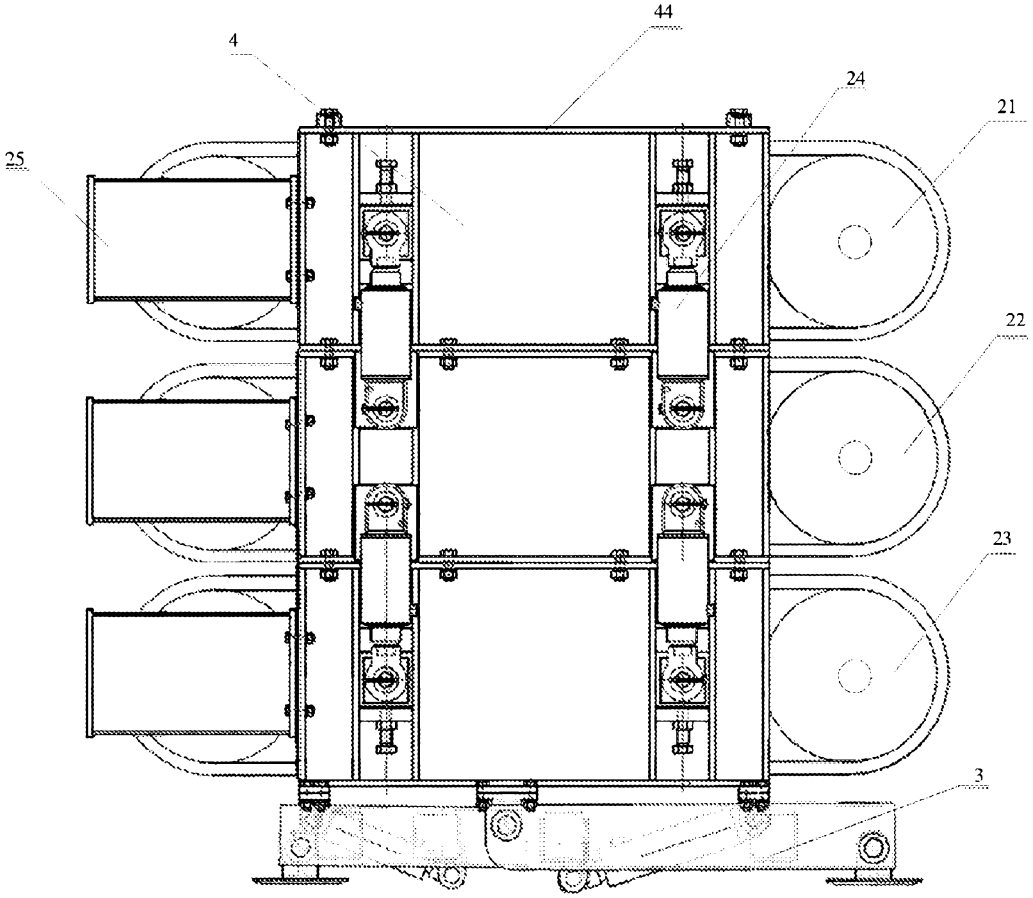

FIG.4

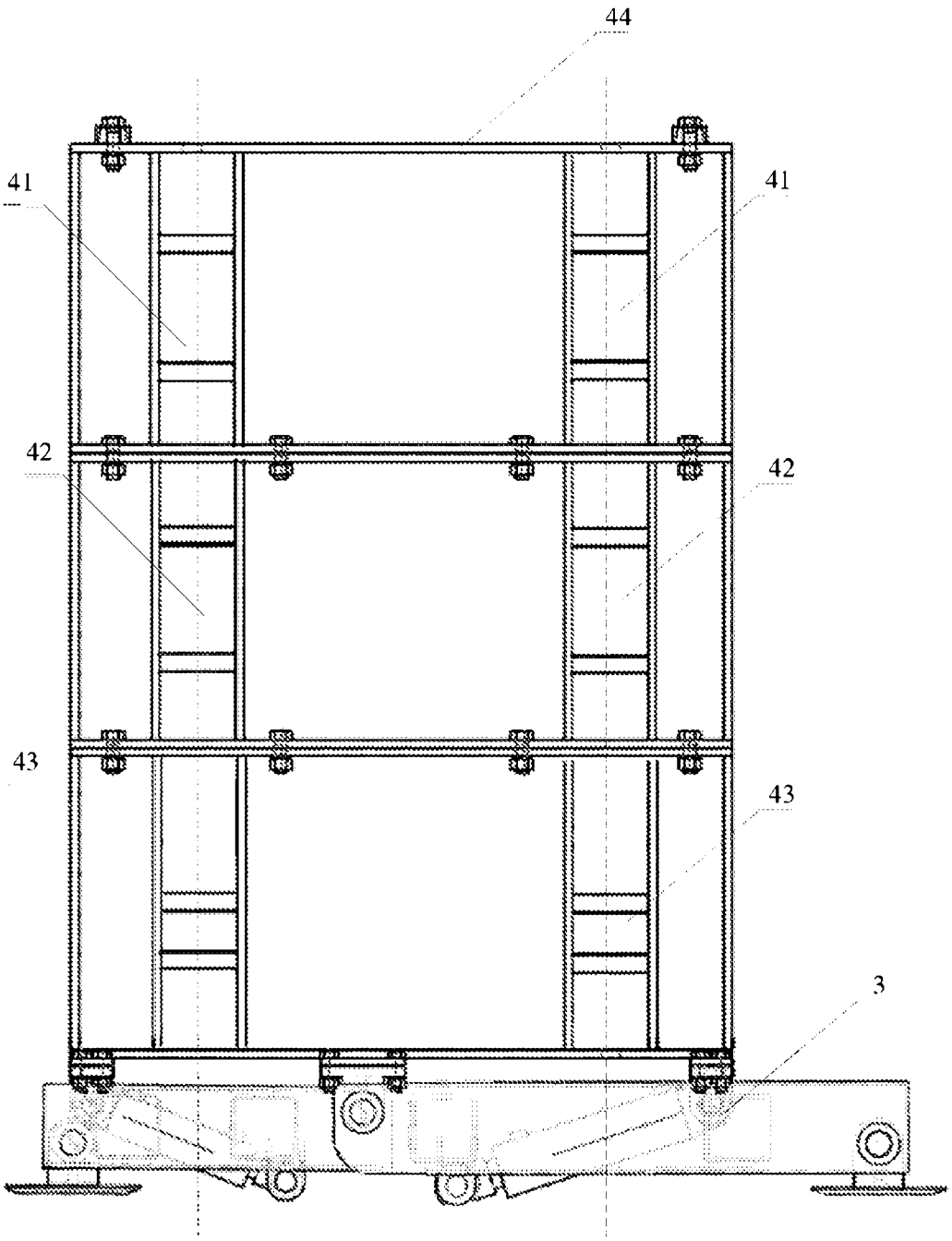

FIG.5

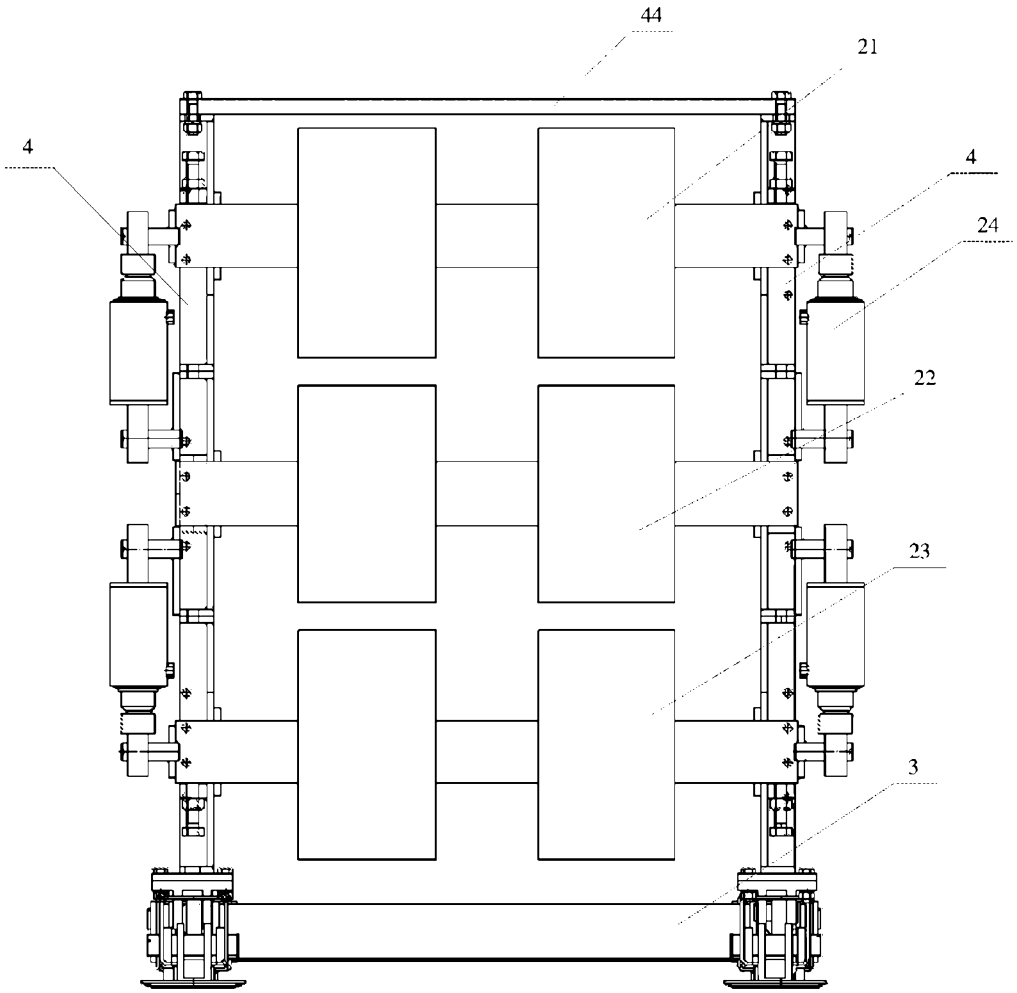

FIG.6

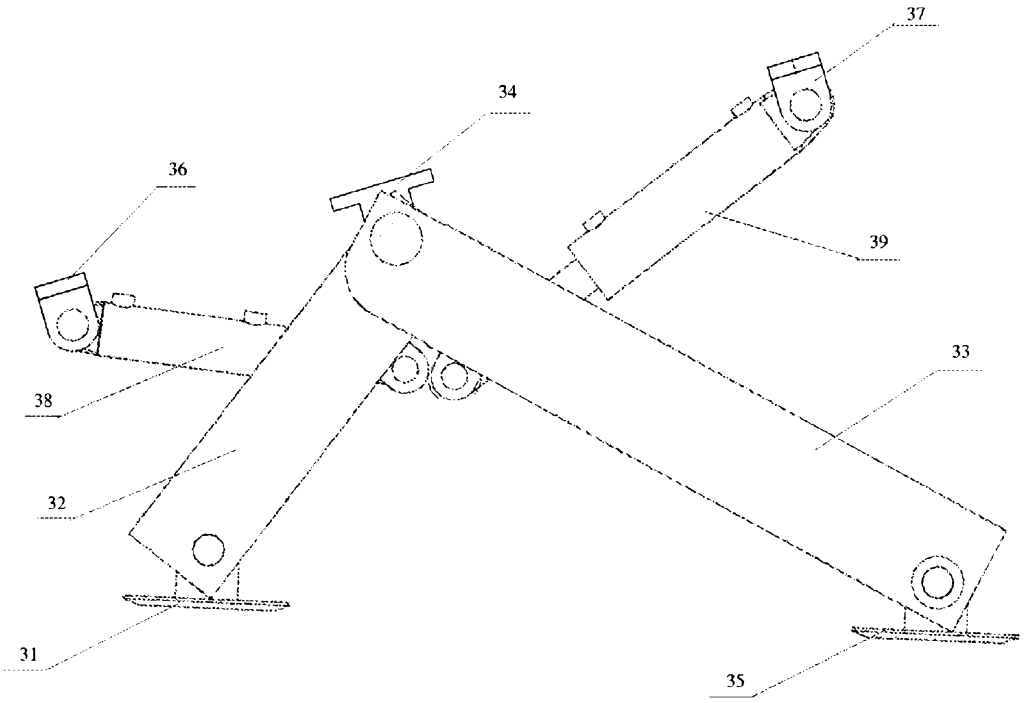

FIG.7