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(54) **AUTOMATIC UNLOADING LIFTING MECHANISM**

AUTOMATISCHER ENTLADEHEBEMECHANISMUS

MÉCANISME DE LEVAGE DE DÉCHARGEMENT AUTOMATIQUE

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Description

TECHNICAL FIELD

[0001] The present invention relates to the field of automatic electromechanics, in particular to an automatic unloading and lifting mechanism.

BACKGROUND

[0002] Currently, in order to make the transportation of cargo quick and convenient, an automatic unloading and lifting mechanism is used to realize the lifting and transportation of cargo. In the process of lifting and unloading of large projects, it is fully automatic controlled by the computer, after a lifting height is input at the computer control end, the lifting mechanism gradually raises the cargo box to the set height, and then the cargo box is slowly tilted forward to unload the cargo; the structure of the mechanism used in this method is complicated, the installation thereof is cumbersome, the cost is high, and the speed of lifting and unloading is slow, and thus is not suitable for small projects.

[0003] CN205366774U discloses a medicine hoisting device, the device includes: first driver part, drive mechanism, track, be used for the hopper of powder charge and contain a wheel -type structure of pulley, first driver part and drive mechanism install on the track, drive mechanism is connected to first driver part, drive mechanism connect hopper for drive under the drive of first driver part the hopper rises or descends along the track through a wheel -type structure's pulley CN205366774U discloses an automatic unloading and lifting mechanism according to the preamble of the independent claim 1.

[0004] DE9309399U1 discloses a device for horizontal swiveling, lifting and tilting of a liner casting, characterized by a U-shaped fork in which the loading box is tilted around an axis and which is firmly connected to a pallet truck, a vertical column connected to a first rotary actuator on which the pallet truck is movable, a device connected to a second rotary actuator, vertical threaded spindle with a nut in contact with the spindle and guided in the pallet truck and a coupling link which is steered with one end on the nut and with its other end on the loading box in the area between its tilting axis and its centre of gravity, so that the loading box is tilted by holding the pallet truck and raising the nut.

[0005] CN204802663U discloses a hopper promotes pouring device belongs to conveying mechanical equipment field. The utility model discloses an including translation base and hoist mechanism, translation base down-side evenly is provided with a plurality of areas universal wheel of stopping, hoist mechanism is including promoting the support, promote the chain, lift support and storage hopper, the vertical promotion pneumatic cylinder that upwards is provided with on the translation base between two promotion supports, it is provided with the axle to promote pneumatic cylinder upper end level, lift axle

both sides vertical rotation respectively are connected with the lift sprocket, it takes turns to at the lift chain to promote the chain setting, the one end that promotes the chain is connected with the fixed plate, the other end that promotes the chain is connected with the lift support, the storage hopper sets up the one side at the lift support, storage hopper below both sides connect with the outside hinge of lift support respectively, it expects the pneumatic cylinder to be provided with between storage hopper and the lift support.

SUMMARY

[0006] In order to address the above problem, the purpose of the embodiments of the present invention is to provide an automatic unloading and lifting mechanism which has the advantages of simple structure, convenient installation and low cost, and thus can greatly improve the efficiency of lifting and unloading.

[0007] The technical solutions adopted by the present invention to solve the problem are as follows

[0008] There is provided an automatic unloading and lifting mechanism, which includes: a frame, a cargo box, a motor and a transmission component arranged on the frame; the cargo box is slidably arranged on the transmission component, the transmission component is configured to drive the cargo box to move up and down, and the motor is connected to the transmission component; the cargo box is provided with a delivery port at a top of the cargo box, a discharge port at a front end of the cargo box, a bottom plate arranged to be inclined at the front end so that cargo in the cargo box slides toward the discharge port, and a turning plate hinged with and configured for blocking the discharge port of the cargo box; the frame is provided with a supporting column for supporting the turning plate to block the discharge port.

[0009] Further, a lower end of the discharge port is hinged with a lower end of the turning plate, the turning plate blocks the discharge port by turning upwardly, and forms, together with the bottom plate of the cargo box, a slideway for unloading and sliding of the cargo by turning downwardly.

[0010] Preferably, the mechanism includes a pulley arranged at a top of the supporting column.

[0011] Further, the mechanism includes a first Hall sensor at a top of the transmission component, a second Hall sensor at a bottom of the transmission component and at a same side as the first Hall sensor and a magnet on the cargo box at the same side as the first Hall sensor; the first Hall sensor and the second Hall sensor are respectively connected to the motor.

[0012] Further, the mechanism includes a weight sensor arranged in the cargo box for detecting whether there is cargo in the cargo box, and the weight sensor is connected to the motor.

[0013] Further, the transmission component comprises a first transmission shaft at a bottom of the frame, and a second transmission shaft at a top of the frame, trans-

mission between the first transmission shaft and the second transmission shaft is realized by a transmission belt.

[0014] Further, the transmission component further comprises a smooth shaft and a slider on the smooth shaft; the slider is slidably connected to the smooth shaft and fixedly connected to the cargo box.

[0015] Further, the slider is linked with the transmission belt through a clamping plate.

[0016] One or more technical solutions in the embodiments of the present invention have at least the following beneficial effects: the supporting rod can support the turning plate, so that the turning plate can block the discharge port of the cargo box; when the cargo box rises and the discharge port is at a position higher than the supporting rod, the turning plate is no longer supported by the supporting rod and opens, and the cargo slides down along a inclined bottom plate of the cargo box, thereby achieving the effect of automatic unloading; in addition, since the automatic unloading and lifting mechanism can be at least composed of a frame, a cargo box, a motor, a transmission component, and a supporting column, and the discharge port of the cargo box is hinged with a turning plate, therefore, the automatic unloading and lifting mechanism has the advantages of simple structure, convenient installation, low cost and achieving automation, which greatly improves the efficiency of lifting and unloading.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] The present disclosure will be further described below with reference to the drawings and examples.

Figure 1 is a schematic view showing a structure according to an embodiment of the present disclosure;

Figure 2 is a schematic view showing the structure in another state according to an embodiment of the present invention.

DETAILED DESCRIPTION

[0018] Referring to Figures 1 and 2, an embodiment of the present invention provides an automatic unloading and lifting mechanism, which includes a frame 100, a cargo box 300, a motor 400, and a transmission component 200 arranged at the frame 100. The cargo box 300 is slidably arranged on the transmission component 200, the transmission component 200 is configured to drive the cargo box 300 to move up and down, and the motor 400 is connected to the transmission component 200. The cargo box 300 is provided with a delivery port at a top of the cargo box 300, a discharge port at a front end of the cargo box 300, a bottom plate arranged to be inclined at the front end so that cargo in the cargo box 300 slides toward the discharge port, and a turning plate 310 hinged with and configured for blocking the discharge port of the cargo box 300. The frame 100 is provided with

a supporting column 500 for supporting the turning plate 310 to block the discharge port.

[0019] In this embodiment, the supporting column 500 is used to support the turning plate 310. When the cargo box 300 is at a position within the height range of the supporting column 500, the supporting column 500 supports the turning plate 310, and the turning plate 310 blocks the discharge port of the cargo box 300. When the cargo box 300 is at a position that exceeds the height range of the supporting column 500, the turning plate 310 is no longer supported by the supporting column 500, so that the turning plate 310 will drop and no longer block the discharge port. Since the bottom plate of the cargo box 300 is inclined, the cargo is automatically unloaded by falling from the discharge port. The automatic unloading and lifting mechanism has the advantages of simple structure, convenient installation and low cost, and is suitable for automatic lifting and unloading of small projects.

[0020] In another embodiment, a lower end of the discharge port of the cargo box 300 is hinged with a lower end of the turning plate 310, and the turning plate 310 blocks the discharge port by turning upwardly, and forms, together with the bottom plate of the cargo box 300, a slideway for unloading and sliding of the cargo by turning downwardly.

[0021] In this embodiment, when supported by the supporting column, the turning plate 310 turns upward to block the discharge port and prevent the cargo from pouring out; when not supported by the supporting column, the turning plate 310 naturally turns down and forms a slideway with the bottom plate, and the cargo are automatically unloaded along the inclined slideway under gravity. No additional power is needed during the unloading process, thus saving cost of energy.

[0022] In addition, a pulley 510 is arranged at a top of the supporting column 500. The pulley 510 makes the opening and closing of the turning plate 310 more steady and smooth. With this design, the automatic unloading of the cargo during the ascent and descent of the cargo frame 300 is completed.

[0023] In another embodiment, a first Hall sensor 610 is provided at a top of the transmission component 200, and a second Hall sensor 620 is provided at a bottom of the transmission component 200; the first Hall sensor 610 and the second Hall sensor 620 are located at a same side; a magnet 320 is provided on the cargo box 300 at the same side as the first Hall sensor 610; the first Hall sensor 610 and the second Hall sensor 620 are respectively connected to the motor 400; a weight sensor for detecting whether there is cargo in the cargo box 300 is arranged at the cargo box 300, and the weight sensor is connected to the motor 400.

[0024] The Hall sensor is a magnetic field sensor made according to the principle of the Hall effect. According to the Hall effect, the Hall voltage changes with the strength of the magnetic field, the stronger the magnetic field, the higher the voltage, the weaker the magnetic field, the lower the voltage. The Hall voltage is very small, usually

is only a few millivolts, but after being amplified by the amplifier in the integrated circuit, the voltage can be amplified enough for outputting a greater signal. To make the integrated circuit of the Hall sensor play a role of sensing, the magnetic induction intensity needs to be changed by a mechanical method.

[0025] In this embodiment, when the cargo box 300 is full of cargo, the weight thereof will increase and the weight sensor will send a signal to the controller of the motor 400, the motor 400 is controlled to rotate by the controller, thus drive the transmission component 200 to move, and so that the cargo box 300 will rise. When the cargo box 300 rises to a certain height, the magnet 320 of the cargo box 300 generates an induced magnetic field sensed by the first Hall sensor 610, and the first Hall sensor 610 sends a signal to the motor 400 for stopping the motor 400. When the unloading of the cargo box 300 is completed, the weight thereof will reduce, the weight sensor will send a signal to the motor 400, and the motor 400 is controlled to rotate reversely, so that the cargo box 300 is lowered. When the cargo box 300 descends to a certain height, the magnet 320 of the cargo box 300 generates an induced magnetic field sensed by and the second Hall sensor 620, and the second Hall sensor 620 sends a signal to the motor 400 for stopping the motor 400.

[0026] In another embodiment, the transmission component 200 includes a first transmission shaft 210 and a second transmission shaft 220, the first transmission shaft 210 is arranged at a bottom of the frame 100, and the second transmission shaft 220 is arranged at a top of the frame 100. Transmission between the first transmission shaft 210 and the second transmission shaft 220 is realized through a transmission belt 230. The transmission component 200 further includes a smooth shaft 240, and a slider 250 is provided on the smooth shaft 240. The slider 250 is slidably connected to the smooth shaft 240 and fixedly connected to the cargo box 300. The slider 250 is linked with the transmission belt 230 through a clamping plate 260. The transmission belt 230 may be any one of a belt or a rotating chain.

[0027] In this embodiment, the motor 400 drives the first transmission shaft 210 to rotate. The transmission belt 230 on the first transmission shaft 210 moves the cargo box 300 vertically along the direction of the smooth shaft 240 through the clamping plate 260 and the slider 250 to complete the action of lifting.

[0028] In another embodiment, an automatic unloading and lifting mechanism includes a frame 100, a cargo box 300, a motor 400, a transmission component 200, and a supporting column 500 for supporting the turning plate 310 to block a discharge port, the transmission component 200 is arranged at the frame 100. The cargo box 300 is slidably mounted on the transmission component 200, the transmission component 200 drives the cargo box 300 to move up and down, and the motor 400 is connected to the transmission component 200. A first Hall sensor 610 is provided at a top of the transmission

component 200, and a second Hall sensor 620 is provided at a bottom of the transmission component 200; a magnet 320 is arranged at a side of the cargo box 300 close to the Hall sensor; the first Hall sensor 610 and the second Hall sensor 620 are connected to the motor 400; a weight sensor for detecting whether there is cargo in the cargo box 300 is arranged at the cargo box 300, and the weight sensor is connected to the motor 400. The cargo box 300 is provided with a delivery port at a top of the cargo box 300, a discharge port at a front end of the cargo box 300, and a turning plate 310 hinged at a lower end of the discharge port of the cargo box 300 and configured for blocking the discharge port. The supporting column 500 is arranged on the frame 100 for supporting the turning plate 310. A pulley 510 is installed at a top of the supporting column 500.

[0029] In addition, the transmission component 200 includes a first transmission shaft 210 and a second transmission shaft 220, the first transmission shaft 210 is arranged at the bottom of the frame 100, and the second transmission shaft 220 is arranged at the top end of the frame 100. Transmission between the first transmission shaft 210 and the second transmission shaft 220 is realized through a transmission belt 230. The transmission component 200 further includes a smooth shaft 240 on which a slider 250 is provided; the slider 250 is slidably connected to the smooth shaft 240 and fixedly connected to the cargo box 300. The slider 250 is linked with the transmission belt 230 through the clamping plate 260.

[0030] In this embodiment, through the cooperation of the weight sensor, the first Hall sensor 610, and the second Hall sensor 620, stop and operation of the motor 400 are controlled, so that the transmission component 200 is controlled to drive the cargo box 300 for completing an automatic lifting. The structure of the supporting column 500 and the turning plate 310 of the cargo box 300 makes the unloading of the cargo automatically during the lifting of the cargo box 300. The automatic unloading and lifting mechanism has the advantages of simple structure, convenient installation, low cost and achieving automation, which greatly improves the efficiency of lifting and unloading.

[0031] The above are only preferred embodiments of the present invention, and the present invention is not limited to the above-mentioned embodiments, all the embodiments which can achieve the technical effects of the present invention by the same means should fall within the protection scope of the appended claims.

Claims

1. An automatic unloading and lifting mechanism, comprising: a frame (100), a cargo box (300), a motor (400) and a transmission component (200) arranged on the frame (100); wherein,

the cargo box (300) is slidably arranged on the

transmission component (200), the transmission component (200) is configured to drive the cargo box (300) to move up and down, and the motor (400) is connected to the transmission component (200);

the cargo box (300) is provided with a delivery port at a top of the cargo box (300),

characterized in that a discharge port at a front end of the cargo box (300), a bottom plate arranged to be inclined at the front end so that cargo in the cargo box (300) slides toward the discharge port, and a turning plate (310) hinged with and configured for blocking the discharge port of the cargo box (300);

the frame (100) is provided with a supporting column (500) for supporting the turning plate (310) to block the discharge port.

2. The automatic unloading and lifting mechanism of claim 1, wherein a lower end of the discharge port is hinged with a lower end of the turning plate (310), the turning plate (310) blocks the discharge port by turning upwardly, and forms, together with the bottom plate of the cargo box (300), a slideway for unloading and sliding of the cargo by turning downwardly.
3. The automatic unloading and lifting mechanism of claim 2, further comprising a pulley (510) arranged at a top of the supporting column (500).
4. The automatic unloading and lifting mechanism of claim 1, further comprising: a first Hall sensor (610) at a top of the transmission component (200), a second Hall sensor (620) at a bottom of the transmission component (200) and at a same side as the first Hall sensor (610), and a magnet on the cargo box (300) at the same side as the first Hall sensor (610), the first Hall sensor (610) and the second Hall sensor (620) being respectively connected to the motor (400).
5. The automatic unloading and lifting mechanism of claim 2, further comprising a weight sensor arranged in the cargo box (300) for detecting whether there is cargo in the cargo box (300), and the weight sensor being connected to the motor (400).
6. The automatic unloading and lifting mechanism of claim 1, wherein the transmission component (200) comprises a first transmission shaft (210) at a bottom of the frame (100), and a second transmission shaft (220) at a top of the frame (100), transmission between the first transmission shaft (210) and the second transmission shaft (220) being realized by a transmission belt (230).
7. The automatic unloading and lifting mechanism of

claim 6, wherein the transmission component (200) further comprises a smooth shaft (240) and a slider (250) on the smooth shaft (240), the slider (250) being slidably connected to the smooth shaft (240) and fixedly connected to the cargo box (300).

8. The automatic unloading and lifting mechanism of claim 7, wherein the slider (250) is linked with the transmission belt (230) through a clamping plate (260).

Patentansprüche

1. Automatischer Entlade- und Hebemechanismus, mit: einem Rahmen (100), einer Stückgut-Box (300), einem Motor (400) und einer auf dem Rahmen (100) angeordneten Transmissionskomponente (200), wobei

die Stückgut-Box (300) auf der Transmissionskomponente (200) gleitend angeordnet ist, die Transmissionskomponente (200) dafür konfiguriert ist, die Stückgut-Box (300) anzutreiben, so dass sie sich auf- und abwärts bewegt, und wobei der Motor (400) mit der Transmissionskomponente (200) verbunden ist,

die Stückgut-Box (300) eine Zufuhröffnung an einer Oberseite der Stückgut-Box (300) aufweist,

dadurch gekennzeichnet, dass

eine Entladeöffnung an einem vorderen Ende der Stückgut-Box (300), eine Bodenplatte, die derart angeordnet ist, dass sie am vorderen Ende geneigt ist, so dass die Fracht in der Stückgut-Box (300) in Richtung zur Entladeöffnung gleitet, und eine Drehplatte (310) vorgesehen sind, die mit der Stückgut-Box (300) gelenkig verbunden und dafür konfiguriert ist, die Entladeöffnung der Stückgut-Box (300) zu blockieren; und

der Rahmen (100) eine Tragsäule (500) zum Tragen der Drehplatte (310) zum Blockieren der Entladeöffnung aufweist.

2. Automatischer Entlade- und Hebemechanismus nach Anspruch 1, wobei ein unteres Ende der Entladeöffnung mit einem unteren Ende der Drehplatte (310) gelenkig verbunden ist, die Drehplatte (310) die Entladeöffnung durch Drehen nach oben blockiert und zusammen mit der Bodenplatte der Stückgut-Box (300) durch Drehen nach unten eine Gleitbahn zum Entladen der Fracht und Veranlassen einer Gleitbewegung der Fracht bildet.
3. Automatischer Entlade- und Hebemechanismus nach Anspruch 2, ferner mit einer an einer Oberseite der Tragsäule (500) angeordneten Rolle (510).

4. Automatischer Entlade- und Hebemechanismus nach Anspruch 1, ferner mit:

einem ersten Hallsensor (610) an einer Oberseite der Transmissionskomponente (200),
 einem zweiten Hallsensor (620) an einer Unterseite der Transmissionskomponente (200) und an der gleichen Seite wie der erste Hallsensor (610), und
 einem Magneten an der Stückgut-Box (300) an der gleichen Seite wie der erste Hallsensor (610),
 wobei der erste Hallsensor (610) und der zweite Hallsensor (620) jeweils mit dem Motor (400) verbunden sind.

5. Automatischer Entlade- und Hebemechanismus nach Anspruch 2, ferner mit einem in der Stückgut-Box (300) angeordneten Gewichtssensor zum Erfassen, ob sich Stückgut in der Stückgut-Box (300) befindet, wobei der Gewichtssensor mit dem Motor (400) verbunden ist.

6. Automatischer Entlade- und Hebemechanismus nach Anspruch 1, wobei die Transmissionskomponente (200) eine erste Transmissionswelle (210) an einer Unterseite des Rahmens (100) und eine zweite Transmissionswelle (220) an einer Oberseite des Rahmens (100) aufweist, wobei die Transmission zwischen der ersten Transmissionswelle (210) und der zweiten Transmissionswelle (220) durch einen Transmissionsriemen (230) realisiert ist.

7. Automatischer Entlade- und Hebemechanismus nach Anspruch 6, wobei die Transmissionskomponente (200) ferner eine glatte Welle (240) und ein Gleitelement (250) auf der glatten Welle (240) aufweist, wobei das Gleitelement (250) gleitend mit der glatten Welle (240) verbunden ist und fest mit der Stückgut-Box (300) verbunden ist.

8. Automatischer Entlade- und Hebemechanismus nach Anspruch 7, wobei das Gleitelement (250) über eine Klemmplatte (260) mit dem Transmissionsriemen (230) verbunden ist.

Revendications

1. Mécanisme de déchargement et de levage automatique, comprenant : un cadre (100), une caisse de cargaison (300), un moteur (400) et un composant de transmission (200) disposé sur le cadre (100) ; dans lequel

la caisse de cargaison (300) est disposée de manière coulissante sur le composant de transmission (200), le composant de transmission

(200) est conçu pour entraîner la caisse de cargaison (300) afin qu'elle se déplace vers le haut ou vers le bas, et le moteur (400) est connecté au composant de transmission (200) ;

la caisse de cargaison (300) est pourvue d'un orifice de livraison au sommet de la caisse de cargaison (300),

caractérisé en ce qu'un orifice de décharge à une extrémité avant de la caisse de cargaison (300), une plaque inférieure disposée pour être inclinée au niveau de l'extrémité avant de sorte que la cargaison dans la caisse de cargaison (300) coulisse vers l'orifice de décharge, et une plaque tournante (310) articulée avec et conçue pour bloquer l'orifice de décharge de la caisse de cargaison (300) ;

le cadre (100) est pourvu d'une colonne de soutien (500) pour soutenir la plaque tournante (310) afin qu'elle bloque le port de décharge.

2. Mécanisme de déchargement et de levage automatique selon la revendication 1, dans lequel une extrémité inférieure de l'orifice de décharge est articulée avec une extrémité inférieure de la plaque tournante (310), la plaque tournante (310) bloque l'orifice de décharge en tournant vers le haut, et forme, conjointement avec la plaque inférieure de la caisse de cargaison (300), une glissière pour décharger et faire coulisser la cargaison en tournant vers le bas.

3. Mécanisme de déchargement et de levage automatique selon la revendication 2, comprenant en outre une poulie (510) disposée à un sommet de la colonne de soutien (500).

4. Mécanisme de déchargement et de levage automatique selon la revendication 1, comprenant en outre : un premier capteur Hall (610) au sommet du composant de transmission (200), un second capteur Hall (620) en bas du composant de transmission (200) et du même côté que le premier capteur Hall (610), et un aimant sur la caisse de cargaison (300) du même côté que le premier capteur Hall (610), le premier capteur Hall (610) et le second capteur Hall (620) étant respectivement connectés au moteur (400).

5. Mécanisme de déchargement et de levage automatique selon la revendication 2, comprenant en outre un capteur de poids disposé dans la caisse de cargaison (300) pour détecter s'il y a une cargaison dans la caisse de cargaison (300), et le capteur de poids étant connecté au moteur (400).

6. Mécanisme de déchargement et de levage automatique selon la revendication 1, dans lequel le composant de transmission (200) comprenant un premier arbre de transmission (210) en bas du cadre

(100), et un second arbre de transmission (220) au sommet du cadre (100), la transmission entre le premier arbre de transmission (210) et le second arbre de transmission (220) étant réalisée par une courroie de transmission (230).

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7. Mécanisme de déchargement et de levage automatique selon la revendication 6, dans lequel le composant de transmission (200) comprend en outre un arbre lisse (240) et un patin (250) sur l'arbre lisse (240), le patin (250) étant connecté de manière coulissante à l'arbre lisse (240) et connecté de manière fixe à la caisse de cargaison (300).
8. Mécanisme de déchargement et de levage automatique selon la revendication 7, dans lequel la glissière (250) est liée à la courroie de transmission (230) via une plaque de serrage (260).

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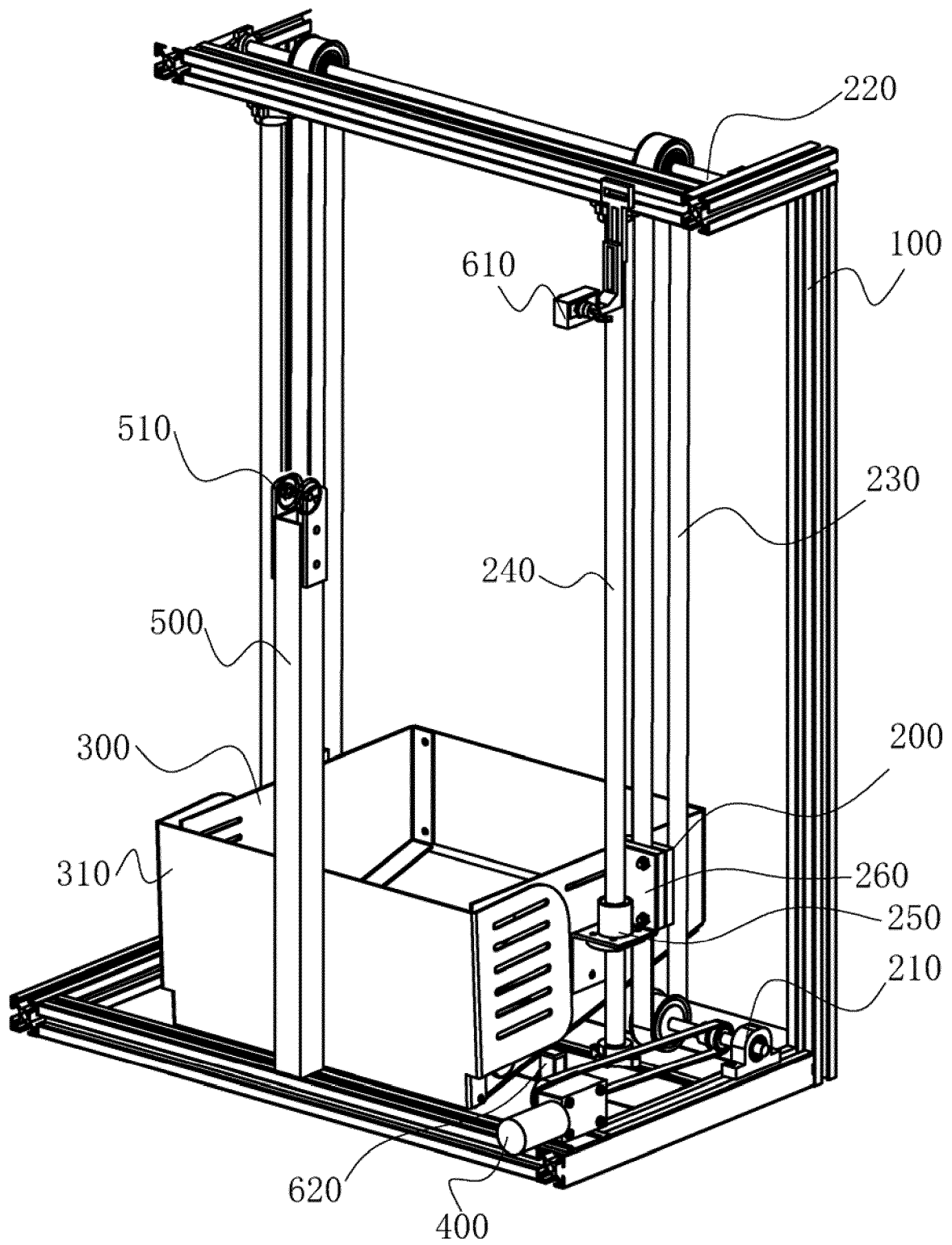


Fig.1

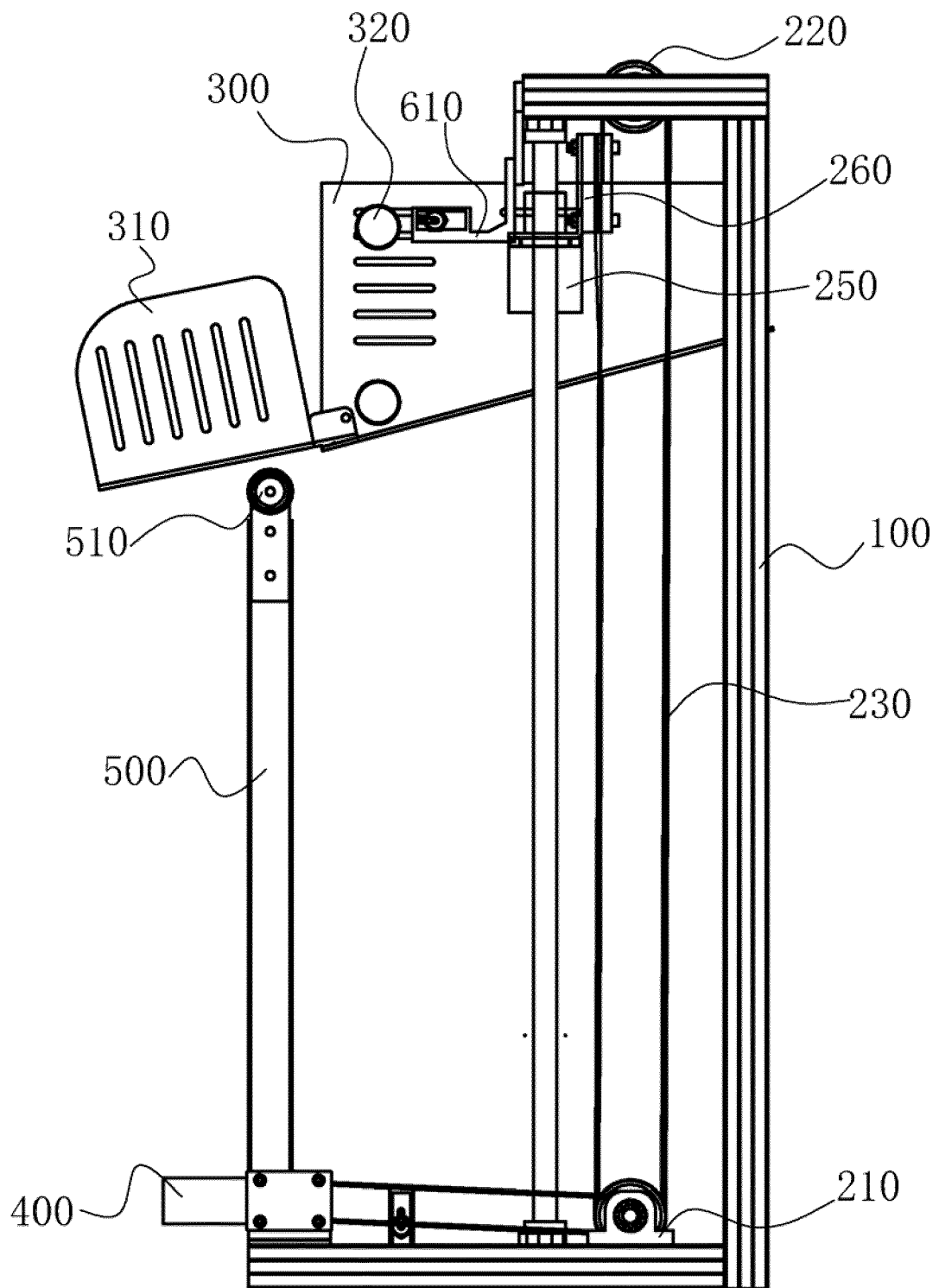


Fig.2

REFERENCES CITED IN THE DESCRIPTION

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