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(54) **CATCHER FOR DEFECTED OR DAMAGED CIGARETTES IN A PRODUCTION LINE**

ABFANGVORRICHTUNG FÜR DEFEKTE ODER BESCHÄDIGTE ZIGARETTEN IN EINER PRODUKTIONSLINE

ATTRAPE-CIGARETTE DÉFECTUEUSE/ENDOMMAGÉE DANS UNE LIGNE DE PRODUCTION

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(72) Inventors:

- **DINC, Isa**
Torballi, Izmir (TR)
- **YILMAZ, Atila**
Torballi, Izmir (TR)

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(74) Representative: **Gülser Kinali, Zeynep**

Beta IP Consulting Limited
International House
101 King's Cross Road
London WC1X 9LP (GB)

(73) Proprietor: **DNC MAKINE TECHIZAT SERVIS INS.**

TUR. SAN. ITH. VE
IHRACAT TIC. LTD. STI.
Izmir (TR)

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Description

TECHNICAL FIELD

[0001] The invention relates to a system for detecting and catching the damaged or defected cigarettes while feeding them to a packaging machine, which are transported by a conveyor in the mass production process and come to a multiple of vibrating feeder channels at the entrance of a cigarette packaging machine through a vertical channel.

BACKGROUND

[0002] In the whole cigarette industry, the following situations occur due to defected, damaged and different cigarettes coming from different axes at the entrance of a cigarette pusher channel in a cigarette packaging machine;

- Stopping and waste caused by defected cigarette packages,
- Stopping and waste due to no cigarettes in the hopper.

These stops are among the three most common reasons for stoppages in cigarette packaging machines. Due to these stops, a production loss of 30-60 minutes is experienced on a daily basis in a machine that produces continuously for 24 hours. This period does not include other stop times (foil, label, inner body, etc.) triggered by these stops. It is known that when these are added, the stoppage time increases.

[0003] When the wastes are examined, it is seen that these stops cause an average of 6 packs (120 cigarettes) and NTM waste at each stop and start.

[0004] US3397922A discloses an apparatus conveys cigarettes from manufacturing machines to a packaging machine through dispensers, pneumatic pipe-lines, and guides. Cigarettes are fed one by one through oscillating rollers into a trough, then conveyed longitudinally by suction rollers and soft endless belts forming an air seal. They are decelerated through arcuate guides, propelled through flotation conveyer channels, and discharged into serpentine shoots equipped with photo-electric cells to control the process.

[0005] WO2012144915A1 discloses a conveyor device that utilizes a multi-belt conveyor system where the belts are forced to alternate between upward and downward movement by specially shaped input and output rollers. This method facilitates the linear arrangement of rod-like elements, such as cigarettes, and can be employed in reclaiming tobacco from cigarette waste. US4953711A discloses a testing unit placed within a cigarette magazine includes test chutes to accommodate a vertical line of cigarettes, with guide and support elements beneath facilitating a stoppage phase for testing and subsequent delivery of the tested cigarettes.

BRIEF DESCRIPTION OF THE INVENTION

[0006] In the mass production process, defected/damaged cigarettes get stuck in the vibrating/channel feeders at the entrance of the packaging machine, causing machine downtime and waste.

[0007] The invention is a defected/damaged cigarette catcher as defined in claim 1.

[0008] Therefore main objectives of this invention is to

- catch defected/damaged cigarettes coming from the back of the vertical channel cigarette line and removes them from the cigarette line before they come to packaging,
- catch the defected and vertical cigarettes in the cigarette line with the channels and sensor duo,
- use a vibrating feeding system driven with three different motors to stop the movement of the defected/damaged cigarettes from the system in terms of occupational safety,
- ensure that only proper (not defected/damaged) cigarettes are transferred to the packaging machine by closing the empty side by electropneumatically controlled directing flaps so that the cigarette flow is not interrupted after the defected/damaged cigarettes are caught in the channels.

LIST OF FIGURES

[0009]

Figure 1. Front View of the General System

Figure 2. Rear View of the General System

Figure 3. Exploded View of the System

Figure 4. Helix Roller

Figure 5. Single View of the Helix Roller

Figure 6. Detailed View of the S Channels

Figure 7. Exploded View of the Vibrating Feeder Part

Figure 8a. Directing Flaps with a Pneumatic System

Figure 8b. Directing Flaps with an Electric Motor

[0010] Equivalents of the numbers given in the figures:

1. Helix Roller
 - 1.1. Helix Roller Motor
2. Channel with an S-shaped cross-section
3. Vibrating Feeder
 - 3.1. Eccentric Driven Gear Rack
 - 3.2. Brass Bearing
 - 3.3. Eccentric Shaft
 - 3.4. Gear Rack Camshaft Drive Shaft
 - 3.5. Vibrating Feeder Gear
 - 3.6. Vibrating Feeder
 - 3.7. Drive Motor
4. Directing Flaps

- 4.1. Pneumatic Directing System
- 4.2. Electric Directing System
- 4.4. Drive Shaft
- 4.5. Shaft Connection Parts
- 4.6. Piston Fixing Parts

- 5. Product Entrance
- 6. Product Exit

DETAILED DESCRIPTION OF THE INVENTION

[0011] The aim of the system which is the subject of the invention is to minimize the downtimes that cause the production to slow down mentioned in the background section. The working principle of the system is to catch the cigarettes which are defected, damaged and coming from different axes before they come to the packaging entrance hopper and dispose of them with user intervention.

[0012] Cigarettes enter the system from a product entrance (5). The product, which has entered from the product entrance (5), passes through a multiple of channels (2) with an S-shaped cross-section perpendicular to the cigarette flow direction and a multiple of directing flaps (4) with the help of a three-section vibrating feeders (3) and reaches a hopper at the packaging entrance from a product exit (6) channel.

[0013] During operation, horizontal cigarettes coming from the back of the cigarette channel are caught by a helix roller (1) located at the entrance of the unit and thrown into a waste station. The helix roller (1) comprises cigarette-sized and claw-shaped teeth in curved form, as can be seen in Figure 4 and Figure 5. The purpose of this is to catch cigarettes trying to enter the system in a horizontal position. A helix roller motor (1.1) ensures that the helix roller (1) rotates on its own axis during operation. Thanks to this rotation, the teeth continuously perform a catching movement. Cigarettes that come vertical, means in the right position, are not caught on these teeth. Cigarettes coming in horizontal position are held by these teeth and discarded. It is important that cigarettes enter the system in a vertical position to sit in the channels (2) with an S-shaped cross-section perpendicular to the cigarette flow direction. However, horizontal and defected/damaged cigarettes that can pass through the helix (1) without being attached are stuck in the channels (2), since the channels (2) have a design that is wide enough for only proper cigarettes to pass. Cigarettes that are bent, deformed or broken in any way get stuck in these channels. A multiple of optical sensors located between each channel (2) work with the "all-or-nothing logic" and send a signal to a control system processor if there is no product in front of it for 2-5 seconds. The processor receiving the signal gives an audible and visual warning. The visual warning is in a warning light and a sound form.

[0014] In case of jamming in three or more channels, the information of the jammed channels is collected by the processor from the optical sensors. The correspond-

ing vibrating feeder (3), is also stopped by the processor and possible work accidents are prevented.

[0015] The directing flap (4), which is close to the jammed side and can be rotated, is activated by the processor to prevent the cigarette flow from being disrupted. The directing flap (4) is connected to a pneumatic directing system (4.1) with a drive shaft (4.4) and a shaft connection parts (4.5). With the detection of jamming by the processor and activation of a multiple of solenoid valves, the pneumatic directing system (4.1) move and move the directing flaps (4) towards the area where the jam occurs. Thus, the right or left movement of the directing flap (4) is provided. When the directing flap (4) stops the flow, intervention by the user becomes easier since all movement in the relevant section will be stopped. Since the bottom of the channels (2) will not be emptied, possible confusion in the lower hopper is avoided. With the removal of the jammed cigarette by the user and pressing a reset button brings the directing flap (4) back to its standard position by activating at least one of the pneumatic directing system (4.1) and electric directing system (4.2) by the processor. Thus, the flow is opened. When the reset button is pressed by the user, the vibrating feeder (3) in the jammed section is also started by the processor and the system returns to its normal working order.

[0016] The flow arrangement in the invention is divided into three zones and a vibrating feeder (3) is placed for each zone. The reason for this is that instead of stopping the entire system while the user is cleaning the jammed area, only the jammed part is stopped, preventing possible work accidents and the system continues to work over the remaining two sections.

[0017] The vibrating feeders (3) are divided into three zones, and each zone can operate independently from each other. A vibrating feeder gear (3.5) and a vibrating feeder (3.6) are moved by an eccentric driven gear rack (3.1), which is supported by a multiple of brass bearings (3.2). The eccentric driven gear rack (3.1), whose gear gap is adjusted by an eccentric shaft (3.3), is moved under the control of the processor by means of a gear rack camshaft drive shaft (3.4) and a drive motor (3.7). Thus, operating losses are minimized.

[0018] Cigarettes that complete their flow leave the system from the product exit (6) to be directed to another unit in the packaging or production line.

Claims

1. A defected/damaged cigarette catcher, arranged in a cigarette production line, wherein said catcher comprises a product entrance, a three-section vibrating feeder (3), multiple channels (2) with an S-shaped cross-section perpendicular to the cigarette flow direction, a couple of directing flaps (4), a product exit (6), wherein the catcher further comprises multiple optical sensors and a processor, wherein the flow of cigarettes after the product entrance (5)

is divided into three zones, wherein the three-section vibrating feeder (3) is correspondingly divided into three independently operated zones; wherein the channels (2) have a design that is wide enough for only proper cigarettes to pass, so that defected/damaged cigarettes are stuck in the channels (2); wherein the information of jammed channels (2) is obtained by the processor from the optical sensors; wherein the directing flaps (4) are configured upon activation by the processor to close the zone in which defected/damaged cigarettes are caught in the channels; wherein cigarettes that have completed their flow can eventually leave the catcher from the product exit (6).

2. The defected/damaged cigarette catcher of claim 1, wherein said catcher comprises a helix roller (1) configured to catch cigarettes which approach the product entrance (5) in a horizontal position.
3. The defected/damaged cigarette catcher of claim 2 wherein said helix roller (1) comprises cigarette-sized and claw-shaped teeth in curved form.
4. The defected/damaged cigarette catcher of claim 1 wherein the optical sensors are working with the "all-or-nothing logic" and are configured and to send a signal to the processor if there is no product in front of it for 2-5 seconds.
5. The defected/damaged cigarette catcher of claim 4 wherein the processor is configured to give an audible and visual warning upon receiving the signal.
6. The defected/damaged cigarette catcher of claim 1 wherein the processor is configured to collect the information of the jammed channels from the optical sensors in case of a jamming in three or more channels and stopping the corresponding vibrating feeder (3).
7. The defected/damaged cigarette catcher of claim 6 wherein the processor is configured to activate the left or right rotation of the directing flap (4), which is close to the jammed side, after receiving the jammed channel information.
8. The defected/damaged cigarette catcher of claim 7 wherein the directing flaps (4) can be activated by at least one of the pneumatic (4.1) or electric directing systems (4.2).
9. The defected/damaged cigarette catcher of claim 7 wherein the processor is configured to bring the directing flap (4) back to its standard position with the removal of the jammed cigarette and pressing the reset button by the user.

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10. The defected/damaged cigarette catcher of claim 9 wherein the processor is configured to activate the vibrating feeder (3) in the jammed section with the removal of the jammed cigarette and pressing the reset button by the user.
11. The defected/damaged cigarette catcher of claim 1 wherein the vibrating feeder (3) is placed corresponding to each zone of the flow arrangement divided into three zones.
12. The defected/damaged cigarette catcher of claim 11 wherein the corresponding vibrating feeder (3) can also be stopped by the processor.
13. The defected/damaged cigarette catcher of claim 1 wherein the vibrating feeder (3) comprises an eccentric driven gear rack (3.1), a multiple of brass bearings (3.2), an eccentric shaft (3.3), a gear rack cam-shaft drive shaft (3.4), a vibrating feeder gear (3.5), a vibrating feeder (3.6) and a drive motor (3.7) to enable each zone to operate independently of each other.

Patentansprüche

1. Auffangvorrichtung für defekte/beschädigte Zigaretten, die in einer Zigarettenproduktionslinie angeordnet ist, wobei die Auffangvorrichtung Folgendes umfasst: einen Produkteingang, eine dreigeteilte vibrierende Zuführvorrichtung (3), mehrere Kanäle (2) mit einem S-förmigen Querschnitt senkrecht zur Zigarettenflussrichtung, ein Paar von Richtklappen (4), einen Produktausgang (6), wobei die Auffangvorrichtung ferner mehrere optische Sensoren und einen Prozessor umfasst, wobei der Zigarettenfluss nach dem Produkteingang (5) in drei Zonen unterteilt ist, wobei die dreigeteilte vibrierende Zuführvorrichtung (3) entsprechend in drei unabhängig betriebene Zonen unterteilt ist; wobei die Kanäle (2) so gestaltet sind, dass nur einwandfreie Zigaretten hindurchpassen, so dass defekte/beschädigte Zigaretten in den Kanälen (2) stecken bleiben; wobei die Information über verstopfte Kanäle (2) durch den Prozessor von den optischen Sensoren erhalten wird; wobei die Richtklappen (4) bei Aktivierung durch den Prozessor so konfiguriert sind, dass sie die Zone schließen, in der defekte/beschädigte Zigaretten in den Kanälen aufgefangen werden; wobei Zigaretten, die ihren Fluss abgeschlossen haben, die Auffangvorrichtung schließlich über den Produktausgang (6) verlassen können.
2. Auffangvorrichtung für defekte/beschädigte Zigaretten nach Anspruch 1, wobei die Auffangvorrichtung eine Spiralwalze (1) umfasst, die so konfiguriert ist,

dass sie Zigaretten auffängt, die sich dem Produktengang (5) in einer horizontalen Position nähern.

3. Auffangvorrichtung für defekte/beschädigte Zigaretten nach Anspruch 2, wobei die Spiralwalze (1) zigarettengroße und klauenförmige Zähne in gebogener Form umfasst. 5
4. Auffangvorrichtung für defekte/beschädigte Zigaretten nach Anspruch 1, wobei die optischen Sensoren mit der "Alles-oder-Nichts-Logik" arbeiten und so konfiguriert sind, dass sie ein Signal an den Prozessor senden, wenn sich 2 bis 5 Sekunden lang kein Produkt davor befindet. 10
5. Auffangvorrichtung für defekte/beschädigte Zigaretten nach Anspruch 4, wobei der Prozessor so konfiguriert ist, dass er bei Empfang des Signals eine akustische und visuelle Warnung ausgibt. 15
6. Auffangvorrichtung für defekte/beschädigte Zigaretten nach Anspruch 1, wobei der Prozessor so konfiguriert ist, dass er die Information über verstopfte Kanäle von den optischen Sensoren im Falle einer Verstopfung in drei oder mehreren Kanälen sammelt und die entsprechende vibrierende Zuführvorrichtung (3) anhält. 20
7. Auffangvorrichtung für defekte/beschädigte Zigaretten nach Anspruch 6, wobei der Prozessor so konfiguriert ist, dass er nach Erhalt der Information über verstopfte Kanäle die Links- oder Rechtsdrehung der Richtklappe (4) aktiviert, die sich in der Nähe der verstopften Seite befindet. 25
8. Auffangvorrichtung für defekte/beschädigte Zigaretten nach Anspruch 7, wobei die Richtklappen (4) durch mindestens eines der pneumatischen (4.1) oder elektrischen Lenksysteme (4.2) aktiviert werden können. 30
9. Auffangvorrichtung für defekte/beschädigte Zigaretten nach Anspruch 7, wobei der Prozessor so konfiguriert ist, dass er die Richtklappe (4) durch Entfernen der eingeklemmten Zigarette und Drücken der Rücksetztaste durch den Benutzer in ihre Standardposition zurückbringt. 35
10. Auffangvorrichtung für defekte/beschädigte Zigaretten nach Anspruch 9, wobei der Prozessor so konfiguriert ist, dass er die vibrierende Zuführvorrichtung (3) im verstopften Abschnitt durch Entfernen der eingeklemmten Zigarette und Drücken der Rücksetztaste durch den Benutzer aktiviert. 40
11. Auffangvorrichtung für defekte/beschädigte Zigaretten nach Anspruch 1, wobei die vibrierende Zuführvorrichtung (3) entsprechend jeder Zone der Fluss- 45

anordnung, die in drei Zonen unterteilt ist, platziert wird.

12. Auffangvorrichtung für defekte/beschädigte Zigaretten nach Anspruch 11, wobei die entsprechende vibrierende Zuführvorrichtung (3) auch durch den Prozessor angehalten werden kann. 5
13. Auffangvorrichtung für defekte/beschädigte Zigaretten nach Anspruch 1, wobei die vibrierende Zuführvorrichtung (3) eine exzentrisch angetriebene Zahnstangenanordnung (3.1), mehrere Messinglager (3.2), eine Exzenterwelle (3.3), eine Zahnstangenanordnung-Nockenwellen-Antriebswelle (3.4), ein Vibrationsförderer-Zahnrad (3.5), einen Vibrationsförderer (3.6) und einen Antriebsmotor (3.7) umfasst, damit jede Zone unabhängig betrieben werden kann. 10

Revendications

1. Dispositif d'attrapage de cigarettes défectueuses/endommagées, agencé dans une chaîne de production de cigarettes, dans lequel ledit dispositif d'attrapage comprend une entrée de produit, un dispositif d'alimentation vibrant à trois sections (3), de multiples gorges (2) avec une section transversale en forme de S perpendiculaire à la direction d'écoulement de cigarettes, une paire de volets de guidages (4), une sortie de produit (6), dans lequel le dispositif d'attrapage comprend en outre de multiples capteurs optiques et un processeur, dans lequel l'écoulement de cigarettes après l'entrée de produit (5) est divisé en trois zones, dans lequel le dispositif d'alimentation vibrant à trois sections (3) est divisé de façon correspondante en trois zones mises en fonctionnement indépendamment ; dans lequel les gorges (2) ont une conception qui est suffisamment large pour que seules des cigarettes correctes passent, de telle sorte que des cigarettes défectueuses/endommagées sont coincées dans les gorges (2) ; dans lequel les informations de gorges bloquées (2) sont obtenues par le processeur à partir des capteurs optiques ; dans lequel les volets de guidages (4) sont configurés lors de l'activation par le processeur pour fermer la zone dans laquelle des cigarettes défectueuses/endommagées sont attrapées dans les gorges ; dans lequel des cigarettes qui ont achevé leur écoulement peuvent finir par quitter le dispositif d'attrapage depuis la sortie de produit (6). 25
2. Dispositif d'attrapage de cigarettes défectueuses/endommagées de la revendication 1, dans lequel ledit dispositif d'attrapage comprend un rouleau à hélice (1) configuré pour attraper des cigarettes qui se rapprochent de l'entrée de produit (5) dans une position horizontale. 30

3. Dispositif d'attrapage de cigarettes défectueuses/endommagées de la revendication 2, dans lequel ledit rouleau à hélice (1) comprend des dents de forme courbée, ayant la taille d'une cigarette et façonnées comme des griffes,.
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4. Dispositif d'attrapage de cigarettes défectueuses/endommagées de la revendication 1, dans lequel les capteurs optiques fonctionnent avec la « logique toutou-rien » et sont configurés pour envoyer un signal au processeur s'il n'y a aucun produit devant ceux-ci pendant 2 à 5 secondes.
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5. Dispositif d'attrapage de cigarettes défectueuses/endommagées de la revendication 4, dans lequel le processeur est configuré pour fournir un avertissement audible et visuel à la suite de la réception du signal.
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6. Dispositif d'attrapage de cigarettes défectueuses/endommagées de la revendication 1, dans lequel le processeur est configuré pour collecter les informations des gorges bloquées en provenance des capteurs optiques en cas d'un blocage dans trois, ou plus, gorges et arrêter le dispositif d'alimentation vibrant correspondant (3).
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7. Dispositif d'attrapage de cigarettes défectueuses/endommagées de la revendication 6, dans lequel le processeur est configuré pour activer la rotation à gauche ou à droite du volet de guidage (4), qui est près du côté bloqué, après la réception des informations de gorge bloquée.
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8. Dispositif d'attrapage de cigarettes défectueuses/endommagées de la revendication 7, dans lequel les volets de guidages (4) peuvent être activés par au moins un des systèmes de guidage pneumatique (4.1) ou électrique (4.2).
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9. Dispositif d'attrapage de cigarettes défectueuses/endommagées de la revendication 7, dans lequel le processeur est configuré pour remettre le volet de guidage (4) dans sa position standard avec l'enlèvement de la cigarette bloquée et lorsque l'utilisateur appuie sur le bouton de remise en marche.
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10. Dispositif d'attrapage de cigarettes défectueuses/endommagées de la revendication 9, dans lequel le processeur est configuré pour activer le dispositif d'alimentation vibrant (3) dans la section bloquée avec l'enlèvement de la cigarette coincée et lorsque l'utilisation appuie sur le bouton de remise en marche.
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11. Dispositif d'attrapage de cigarettes défectueuses/endommagées de la revendication 1, dans lequel le dispositif d'alimentation vibrant (3) est placé de façon correspondant à chaque zone de l'agencement d'écoulement divisé en trois zones.
12. Dispositif d'attrapage de cigarettes défectueuses/endommagées de la revendication 11, dans lequel le dispositif d'alimentation vibrant correspondant (3) peut également être arrêté par le processeur.
13. Dispositif d'attrapage de cigarettes défectueuses/endommagées de la revendication 1, dans lequel le dispositif d'alimentation vibrant (3) comprend une crémaillère d'engrenage (3.1) entraînée de façon excentrique, de multiples paliers en laiton (3.2), un arbre excentrique (3.3), un arbre d'entraînement à came de crémaillère d'engrenage (3.4), un engrenage de dispositif d'alimentation vibrant (3.5), un dispositif d'alimentation vibrant (3.6) et un moteur d'entraînement (3.7) pour permettre à chaque zone de fonctionner indépendamment des autres.

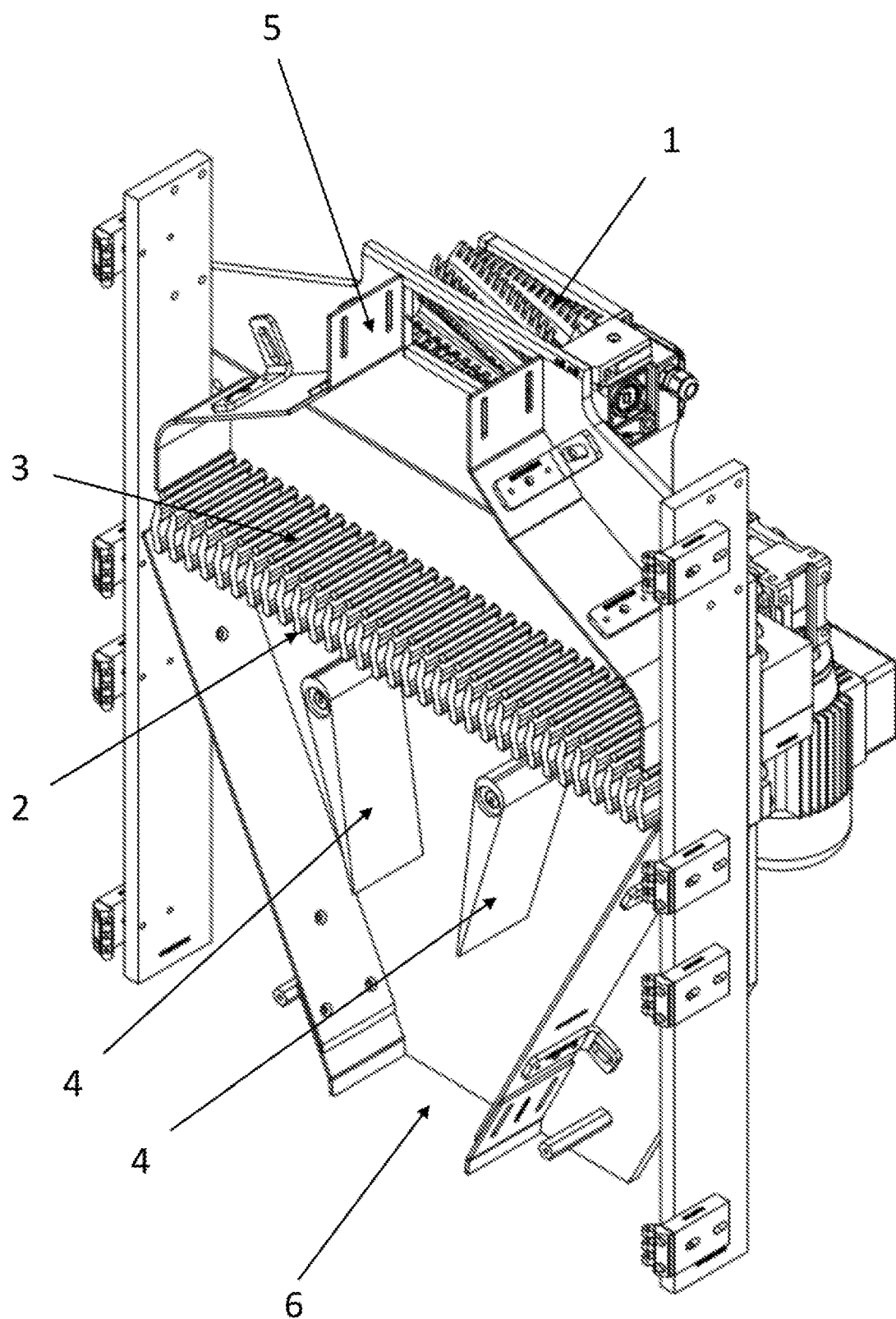


FIGURE 1

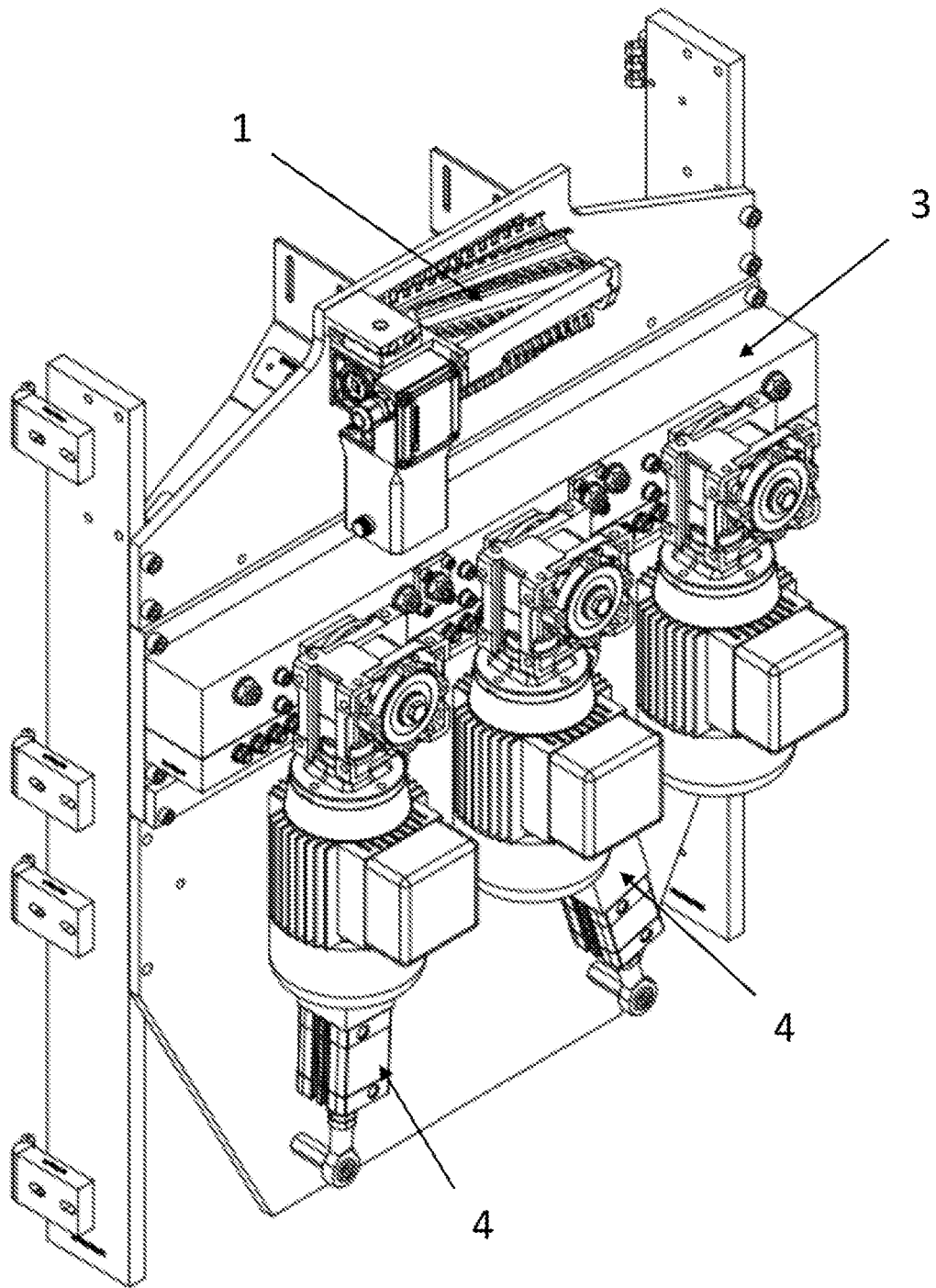


FIGURE 2

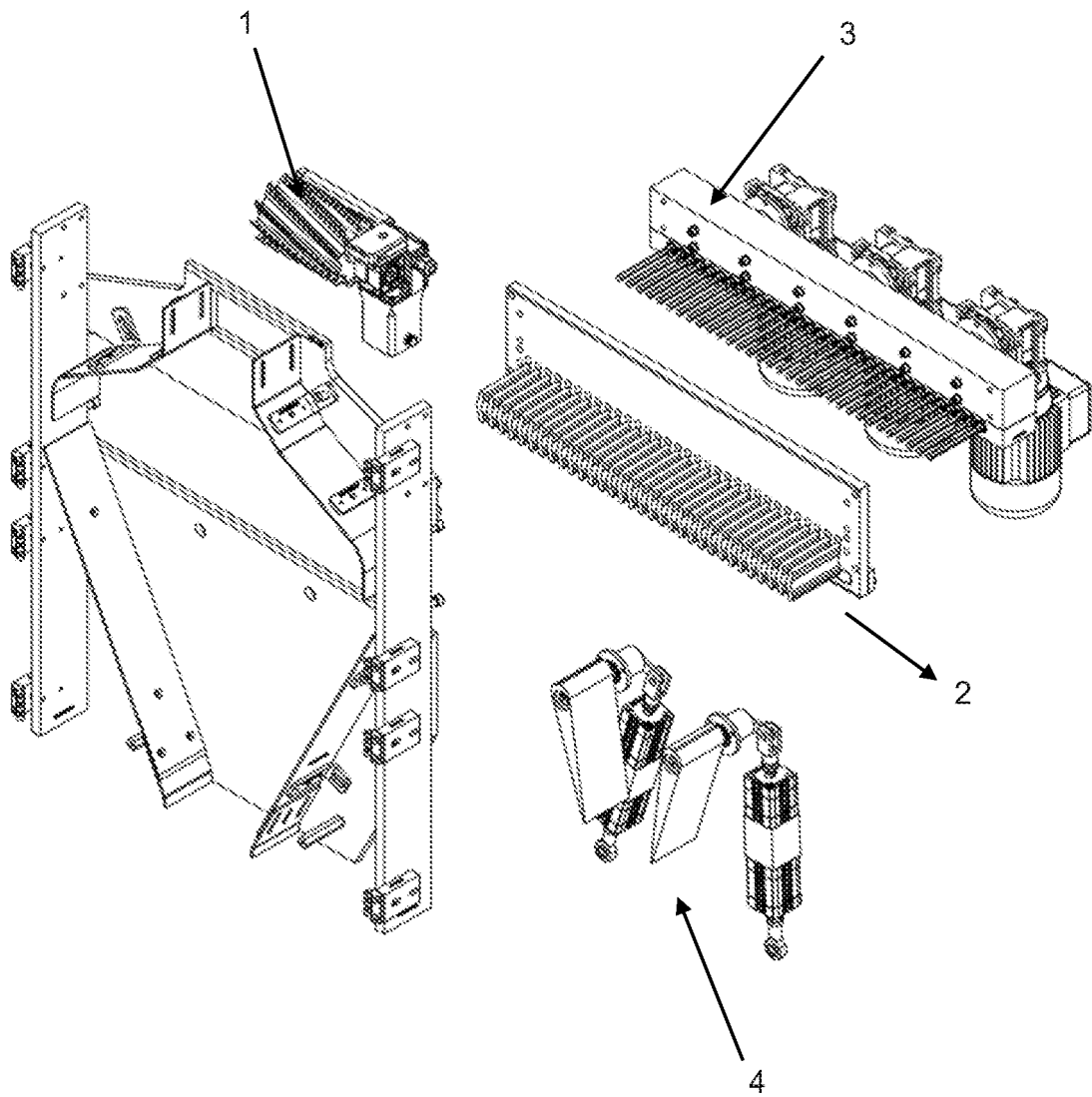


FIGURE 3

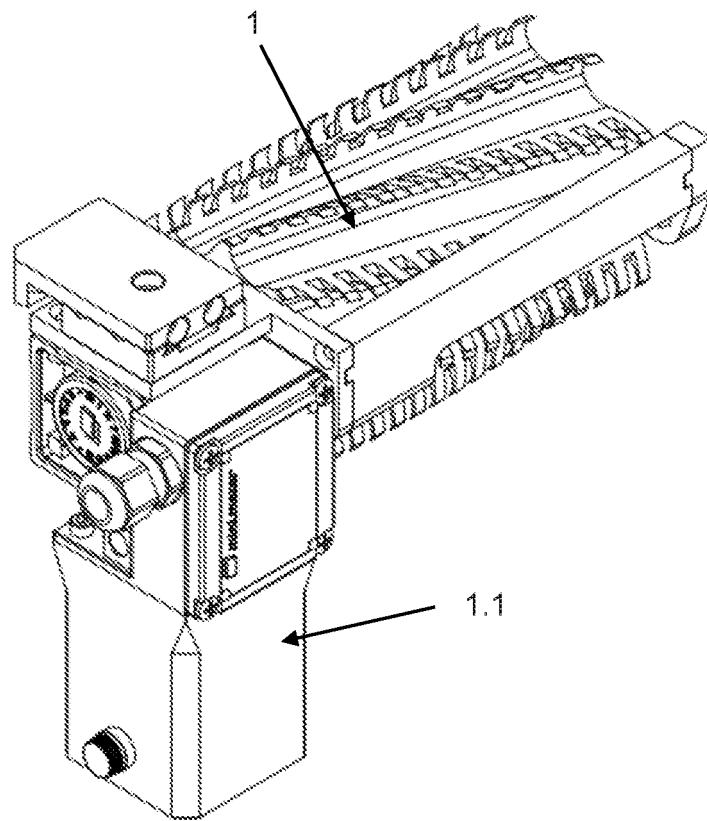


FIGURE 4

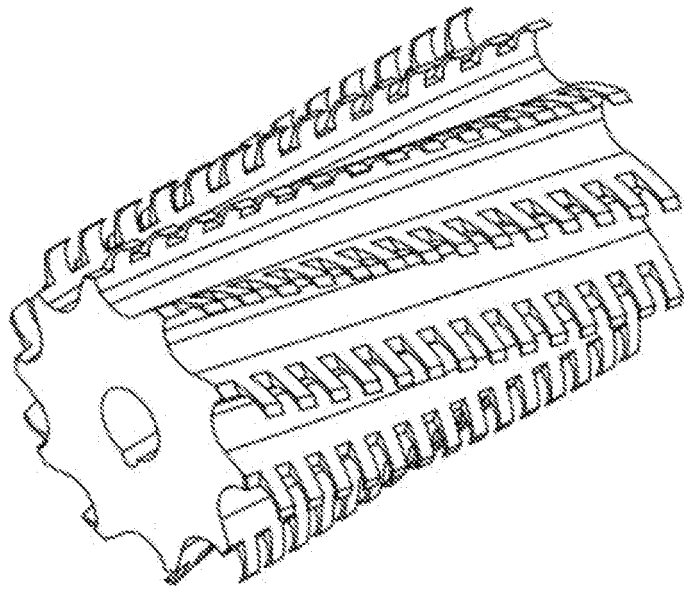


FIGURE 5

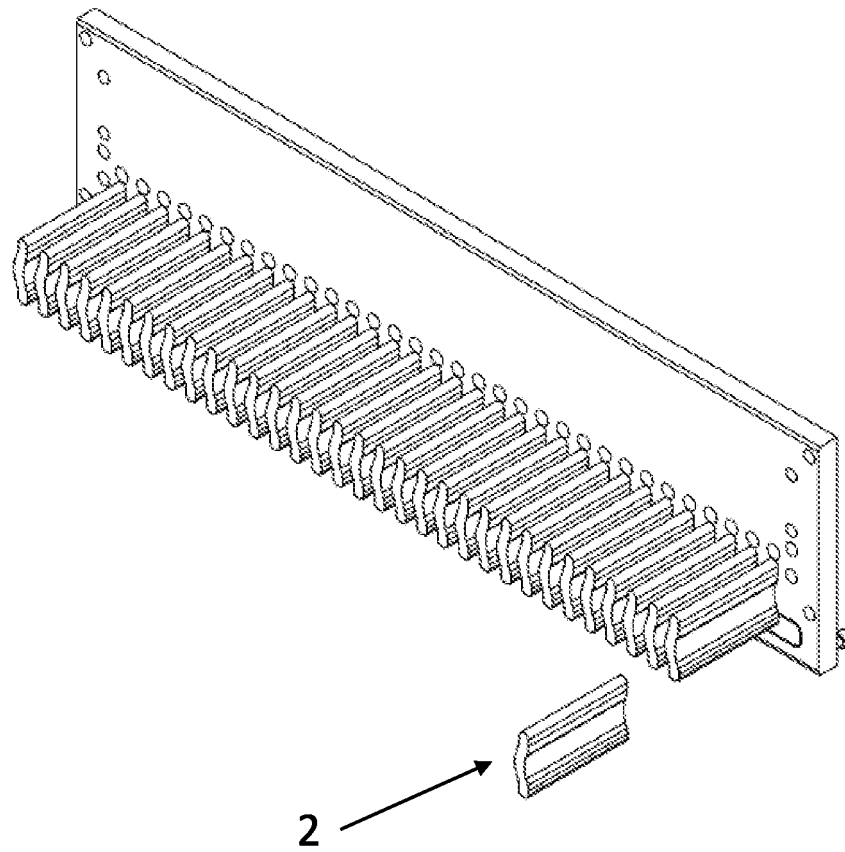


FIGURE 6

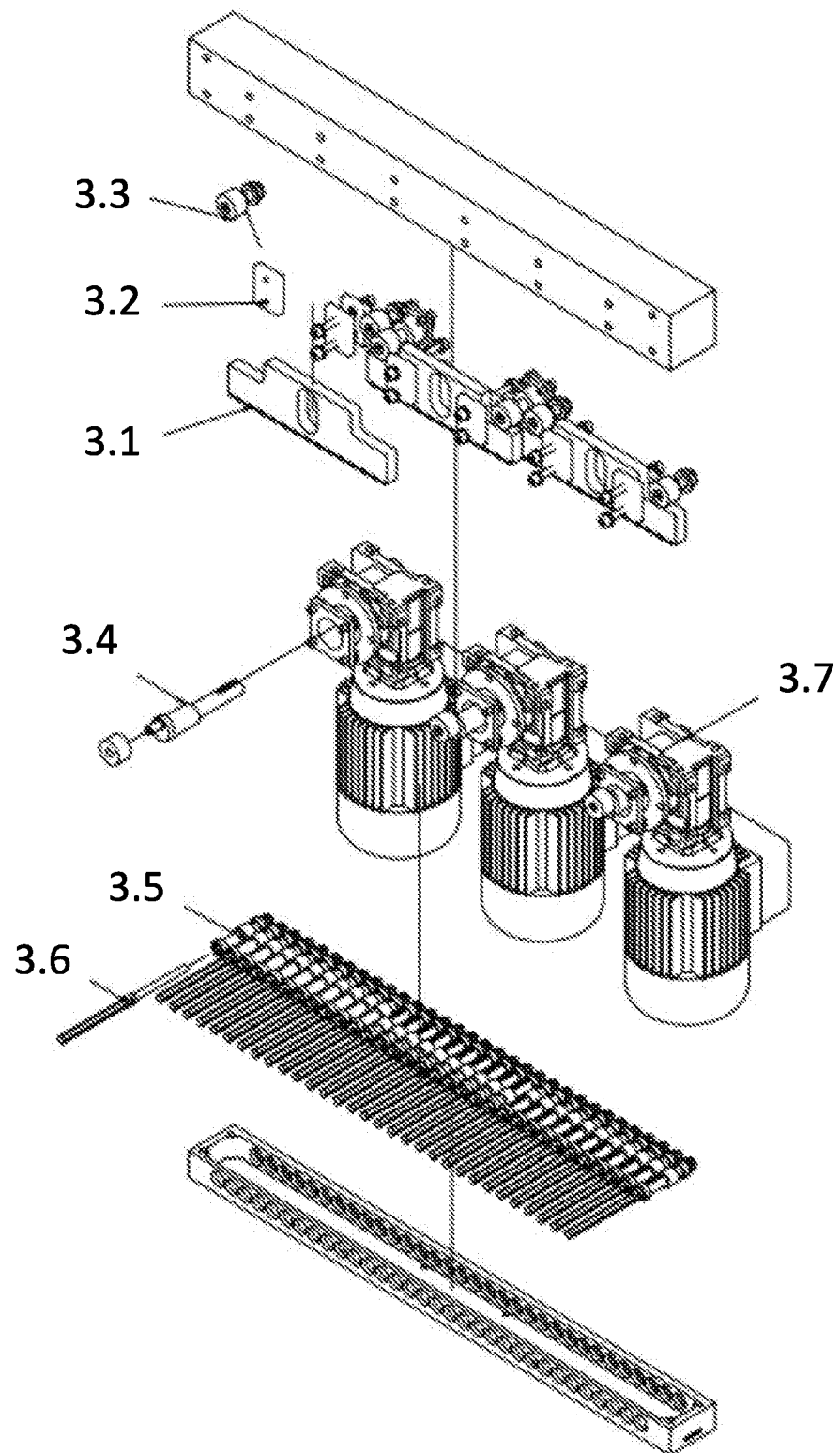


FIGURE 7

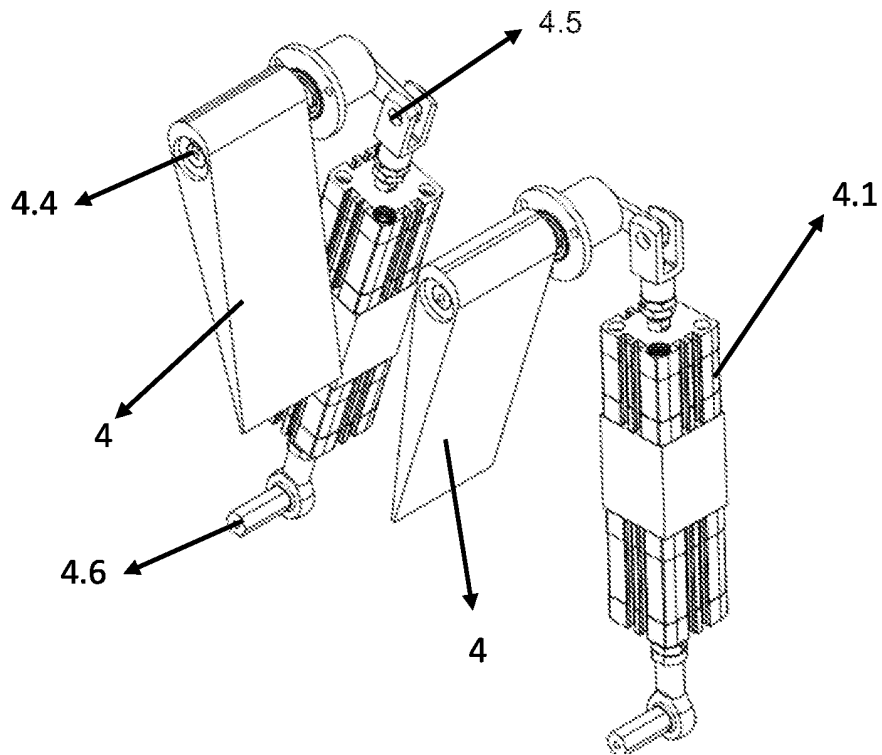


FIGURE 8a

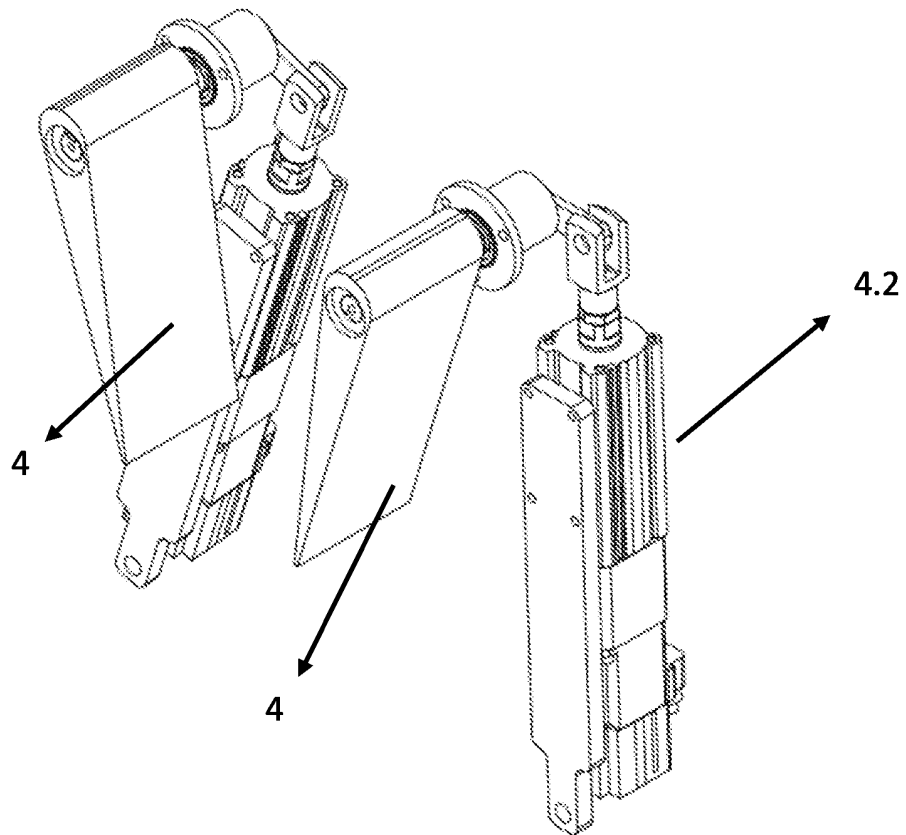


FIGURE 8b

REFERENCES CITED IN THE DESCRIPTION

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