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(54) **Elevator for vending machines**

(57) The present invention relates to an elevator for vending machines comprising a flat vertical chassis with two longitudinal guide profiles and an end transverse bridge; two pairs of gear wheels that are coaxial and coplanar to one another in twos, which are assembled in the guide profiles, two endless belts assembled between each pair of gear wheels, and a horizontal transverse tray assembled between coinciding sections of the two belts. The wheels of each pair of gear are connected by means of a shaft connected to a gear motor featuring an encoder. The tray has on its sides two freely rotating rear wheels located at different heights, housed in the guide profiles. The guide profiles have a lower stop and a front mouth located above the stop through which the lower wheels exit when the said wheels rest in the mentioned stops, causing the tray to swivel to a lower vertical overturning unloading position. The chassis furthermore has upper and lower microswitches to define the travel of the tray.

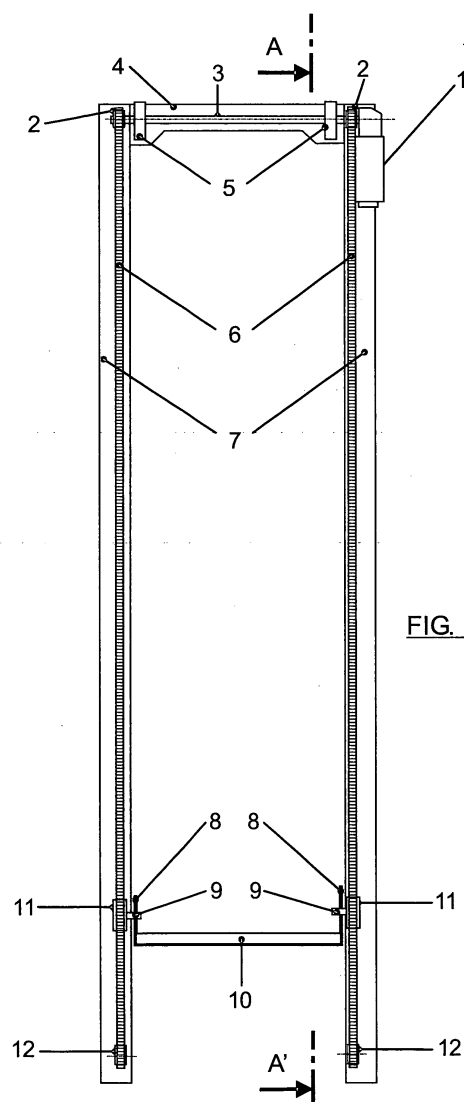


FIG. 1

Description

Field of the Invention

[0001] The present invention relates to an elevator for vending machines and more specifically for vending machines in which the products to be expended are located on different levels.

[0002] The machine of the invention is designed as a means to transport each product in the machine selected by the buyer from the level where it is located in the storage area of the machine to a lower freely accessible collection chamber from where it is withdrawn by the buyer or user.

Background of the Invention

[0003] Vending or automatic vending machines comprise a storage area in which the products to be sold are located. The storage area is generally subdivided into levels in which the products to be expended are distributed, being able to arrange products of different kinds in each level or even different products on each level.

[0004] These machines are usually provided with means for horizontally moving on each floor the product selected by the buyer until it is located out of the level and reaches an empty space through which they fall until reaching a lower freely-accessible chamber from where the-buyer can withdraw the demanded product.

[0005] The described constitution has the problem that the units of the selected product freely fall from the level on which they are located until reaching the lower chamber, being struck and possible becoming damaged. This problem is greater the higher the machine is and the more rigid the container which contains the product is. For example, in beverage container vending machines each extracted unit undergoes a strong blow when it falls on the bottom of the lower chamber, being able to cause problems when opening the container, when it contains a carbonated beverage, and even damaging the product when the container containing it is not rigid.

Description of the Invention

[0006] The object of the present invention is to eliminate the problem set forth by means of an elevator, designed as a unit or module to be assembled in vending machines, attached to the storage area containing the products to be expended and freely communicated therewith. The purpose of this elevator is to receive the product demanded by a user from the level on which it is located, transport it to the lower delivery chamber such that said produce reaches the lower chamber without undergoing blows. Therefore the dropping of the product from the level on which it is located in the storage area to the lower chamber takes place in a controlled manner without being struck.

[0007] Due to the aforementioned circumstance, the

elevator of the invention is especially indicated for being assembled in cold beverage vending machines which beverages may incorporate or may be contained in fragile or deformable containers.

[0008] In addition, the elevator of the invention is especially indicated for being assembled in cold beverage vending machines, which beverages may be carbonated or may be contained in fragile or deformable containers.

[0009] In addition, the elevator of the invention is designed as an independent unit which can be assembled in newly built or pre-existing vending machines.

[0010] In summary, the elevator of the invention is designed as a mechanical vertical transport system responsible for collecting the product at a certain height, the level in which the selected product is located, and placing it at another lower height, the lower chamber.

[0011] According to the present invention the elevator for vending machines comprises: a flat vertical chassis formed by two longitudinal guide profiles and an end transverse bridge; two pairs of coaxial and coplanar gear wheels assembled in twos on the guide profiles, close to their ends; two endless belts assembled between coplanar gear wheels, and a horizontal transverse tray assembled between corresponding sections of the two belts.

[0012] The pair of coaxial gear wheels close or adjacent to the bridge of the chassis is connected by means of a shaft extending beyond one of the gear wheels by a portion connected to a gear motor featuring an encoder.

[0013] Each of the sides of the tray has two rear wheels located at different heights. The wheels of either side are housed in the guide profiles of the frame and can roll along such profiles between upper and lower end positions. The tray moves in the horizontal position from the upper end position until reaching the lower end position, whereas when it reaches said lower position the tray occupies a tilted unloading position.

[0014] The two guide profiles of the chassis of the elevator have a lower stop the lower wheels of the sides of the tray will abut against when such tray reaches its lower end position. Above these stops the guides have a front mouth through which the upper wheel of each side of the tray will exit when the lower wheel is supported in the stops. This will cause the tray to swing from the horizontal transport position to a tilted unloading position when the transported product will be dropped into the lower chamber.

[0015] When a buyer selects a certain product the gear motor starts to operate, which causes the vertical movement of the tray. The position the tray is in and the movement such tray must perform from this position until it is located at the level in which the selected product is located is known by means of the encoder of the motor. Then the horizontal pusher will move the product out of the level where it is located until placing it in the tray. When this operation has concluded, the elevator will again start to move downwards until the tray reaches the lower end position in which it will be tilted so as to drop the product on the lower chamber. At this time it is verified

if the product has fallen and if not the cycle is repeated up to three times successively to detect the fall and delivery of the product.

[0016] The chassis of the elevator will be provided with upper and lower microswitches which will stop the gear motor when it reaches the upper and lower end positions.

[0017] For the tray to be easily overturned and reach the lower end position, the lateral rear wheels of said tray run behind the rear section of the endless belt, the tray being connected to said rear sections of the belts by means of flanges located at a height comprised between the two lateral wheels of the side of the tray. The tray is linked to the flanges according to a horizontal drag shaft on which the tray swivels when it reaches the lower end position.

[0018] The tray is further provided on its sides with respective freely rotating rollers that, when the tray reaches the lower end position, are intended to rest on respective cams having a curved convex profile immediately under the lower front mouth of the guides and which are used to drive the swiveling of the tray when the latter reaches the lower end position.

[0019] The guide profiles of the frame can have a U-shaped section with the openings opposite one another, the wheels of the tray running between the parallel branches of said profiles. The front mouth will be made in the front branch of the profiles.

[0020] The connection between the shaft of the gear motor and the shaft of the gear wheels can be done by means of an Oldham coupling system, whereby achieving transmission of the movement between the two shafts even though there may be a possible misalignment between them.

[0021] The transverse bridge connecting the two guide profiles of the chassis will be located in the upper part and the pair of coaxial gear wheels connected by means of a shaft is also located in the upper part of the chassis. The other two gear wheels, located in the lower part of the chassis, can be assembled thereon by means of tension devices which allow regulating the tension of the gear tooth belts.

Brief Description of the Drawings

[0022] The attached drawings show a non-limiting embodiment with the aid of which the constitution and operation of the elevator of the invention will be better understood.

[0023] In the drawings:

Figure 1 is a front elevational view of an elevator constituted according to the invention.

Figure 2 is a side elevational view of the elevator of Figure 1.

Figure 3 is a vertical section according to section line III-III of Figure 1.

Figure 4 is a schematic depiction of the kinematic chain of the elevator of the invention.

Figure 5 shows in detail the position of the upper microswitch.

Figure 6 shows in detail the position of the lower microswitch.

Figure 7 is a cross section of the elevator taken according to section line VII-VII of Figure 1.

Detailed Description of an Embodiment

[0024] Figures 1 to 3 show an elevator constituted according to the invention, comprising a flat vertical chassis formed by two parallel guide profiles, with reference number 1, and by an end transverse bridge with reference number 2. Four gear wheels are assembled in this frame, said wheels having reference numbers 3 to 6. The upper wheels 3 and 4 are coaxial to one another, as are the lower gear wheels 5 and 6. The upper wheel 3 and the lower wheel 5 are coplanar, as are upper wheel 4 and lower wheel 6. Respective endless belts 7 are assembled between gear wheels 3 and 5 and between gear wheels 4 and 6.

[0025] The two upper gear wheels 3 and 4 are connected by means of a shaft 8 assembled on bearings 9. This shaft 8 extends beyond the gear wheel in a section connected to a gear motor 10 featuring an encoder.

[0026] A transverse tray 11 is assembled between the rear sections of the endless belt 7 by means of flanges 12 which can also be used as elements for joining the ends of the endless belts 7 to close them. The tray 11 has on its sides arms 13 which are connected to the flanges 12 through the aligned shafts 14 of said flanges and defining a pivot shaft for the tray 11, as will be explained below.

[0027] The endless belt 7 will be geared so as to ensure its coupling on the gear wheels 3 to 6.

[0028] As can be seen in Figure 3, each of the side arms 13 of the tray 11 has two, vertically aligned, freely rotating rear wheels 15 and 16 which slide over the longitudinal guides 1 of the frame. As best seen in Figure 7, these guides can be constituted by opposite U-shaped profiles in which the wheels 15 and 16 which can roll in these profiles are housed.

[0029] In this constitution, the gear wheels 3 and 4 are trailer wheels through the shaft 8 connected to the gear motor 10, whereas the lower gear wheels 5 and 6 are change of direction wheels. These lower gear wheels 6 can be assembled in the chassis by means of tension devices 17 which will allow regulating the initial tension of the endless belts 7.

[0030] By actuating the gear motor 10 the endless chain 7 is moved in either direction, and therefore the tray 11 is moved up or down.

[0031] Figure 4 depicts the kinematic chain corresponding to this movement, in which the tray 11 with its arms 13 appears, using a continuous line, in an intermediate position, whereas the dotted lines represents the tray in different positions, between an upper end position 11'-13' and a lower end position 11'', 13'', the tray always

running between these two end situations in the horizontal position.

[0032] As can be seen in Figure 4, the guides 1 are limited at the bottom portion by a stop 18 against which the lower freely rotating wheel 16 of the arms 13 of the tray abuts when the tray reaches the lower end- position 11". Above this stop 18 the front wall 19 of the guides 1 has an opening 20 located at a height coinciding with the upper wheel 15 of the arms 13 of the tray when the latter reaches the lower end position 13".

[0033] With this arrangement, when the tray 11 reaches the lower end position 11", since the endless belts 7 continue to drag said tray downwards, the progressive overturning of said tray occurs, the tray swiveling around the connection shaft 14 connected to the flanges 12, being tilted successively until reaching a final vertical position 11"-13". To drive this tray swiveling movement the guides 7 have at the lower part respective cams having a curved convex profile 22 on which the pivot shaft 14 of the tray 11 rests.

[0034] As can be seen in Figure 5, the chassis of the elevator incorporates at the upper part in one of the guides 1 a microswitch 23 which the corresponding arm 13 of the tray will strike against when such tray reaches the upper end position 11' so as to cause the gear motor 10 to stop.

[0035] As can be seen in Figure 6, also in the lower part of the chasses, in one of the guides 1, there is assembled a lower microswitch 24 which a freely rotating roller 25 assembled in one of the arms 13 of the tray 11 will strike against and be actuated.

[0036] When the elevator of the invention is assembled in a machine, the first time it is connected the tray 11 will search for the upper end 11' and lower end 11" position. The encoder of the gear motor 10 counts the total pulses to recognize the type of machine and path. From this operation, the control of the machine knows the position of the elevator at all times. It is necessary to manually define the position of the different levels or shelves of the machine that the elevator is installed in due to the machine philosophy in which the system is assembled.

[0037] As described, the elevator has a lower overturning position at the end of which there is a rest position, in addition to as many other intermediate positions as there are shelves in the machine.

[0038] The rest position corresponds to the lower overturning limit which has reference number 11'" in Figure 4. When the customer requests a service and the system starts up, the gear motor 10 will rotate, actuating the endless belts and vertically moving the tray 11 to the product collection position, at the level or shelf the product is located in. This point had to be previously defined, as it is different for each shelf. The swiveling of the tray 12 in the lower part is caused, as has been described, by the friction of the freely rotating wheel 25 on the cam 22. The positioning is controlled by the encoder of the gear motor 10.

[0039] The product will be deposited on the tray by a

system for extracting or pushing the corresponding shelf or level, having a known constitution. When the product is located on the tray, the latter moves down to the lower end position with reference number 11" in Figure 4, at which time the lower wheel 16 of the arm 13 of the tray rests against the lower stop 18 and the upper wheel 15 projects through the opening 20. The system pivots on the lower wheel 16 due to the pushing that the endless belts 7 continue to carry out. The swiveling of the tray is guided by the support of the shaft 14 on the cam 22 until reaching the lower vertical positions 11'", which is detected by the microswitch 24 which the freely rotating shaft 25 strikes against, Figure 6. At this time the product falls into a lower freely accessible chamber from where it can be withdrawn by the user. At this time the system awaits a new actuation cycle.

[0040] As can be seen in Figures 2 and 3, to ensure the dragging and overturning of the tray 11, the freely rotating wheels 15 and 16 of the arms 13 are located behind the rear section of the belt 7 that the tray is fixed to, whereas the shaft 14 for fixing the tray to the flanges 12 is located between the wheels 15 and 16, in front of said wheels.

Claims

1. An elevator for packaged product vending machines, **characterized in that** it comprises a flat vertical chassis formed by two longitudinal guide profiles and an end transverse bridge; two pairs of gear wheels that are coaxial and coplanar to one another in twos, which are assembled in the guide profiles close to their ends, two endless belts assembled between every two coplanar gear wheels; and a horizontal transverse tray assembled between coinciding sections of the two belts; the coaxial pair of gear wheels of which adjacent to the bridge are connected by means of a shaft extending beyond one of the gear wheels in a portion connected to a gear motor featuring an encoder; and the tray of which has on its sides two freely rotating rear wheels located at different heights, which are housed in the guide profiles of the frame and can roll therein between upper and lower end positions, said guide profiles having a lower stop that the lower wheels of the tray strike in their lower end position, and a front mouth located above the stop through which the lower wheels of the tray exit when the lower wheels rest in the mentioned stops, causing the tray to swivel to a lower vertical overturning unloading position; the chassis furthermore having upper and lower microswitches which stop the gear motor when the trays reach the aforementioned vertical upper and lower end positions.
2. An elevator according to claim 1, **characterized in that** the rear wheels of the sides of the tray run behind the rear section of the endless belts and the tray

is connected to said rear sections of the belt by means of respective flanges located at a height comprises between the two side wheels of each side of the trays, the tray being linked to the flanges according to a horizontal drag shaft.

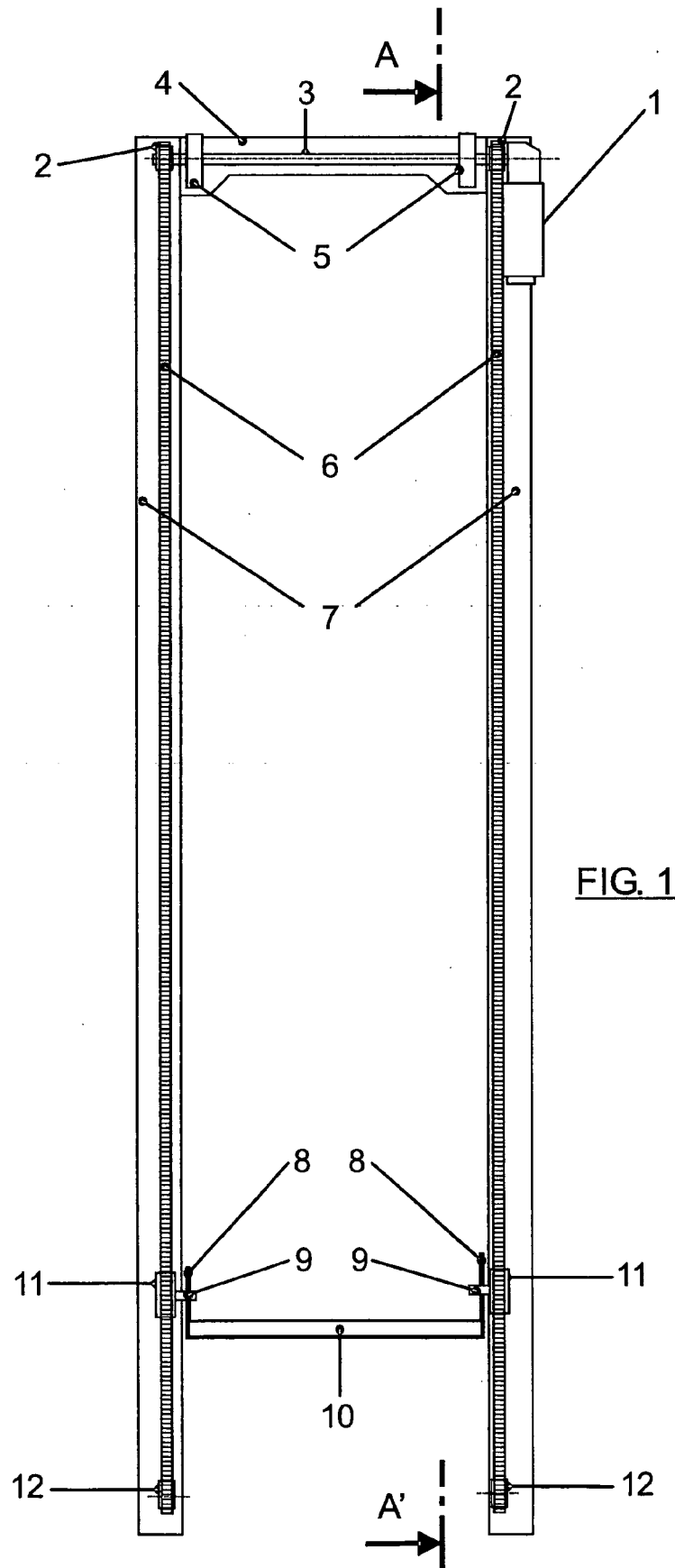
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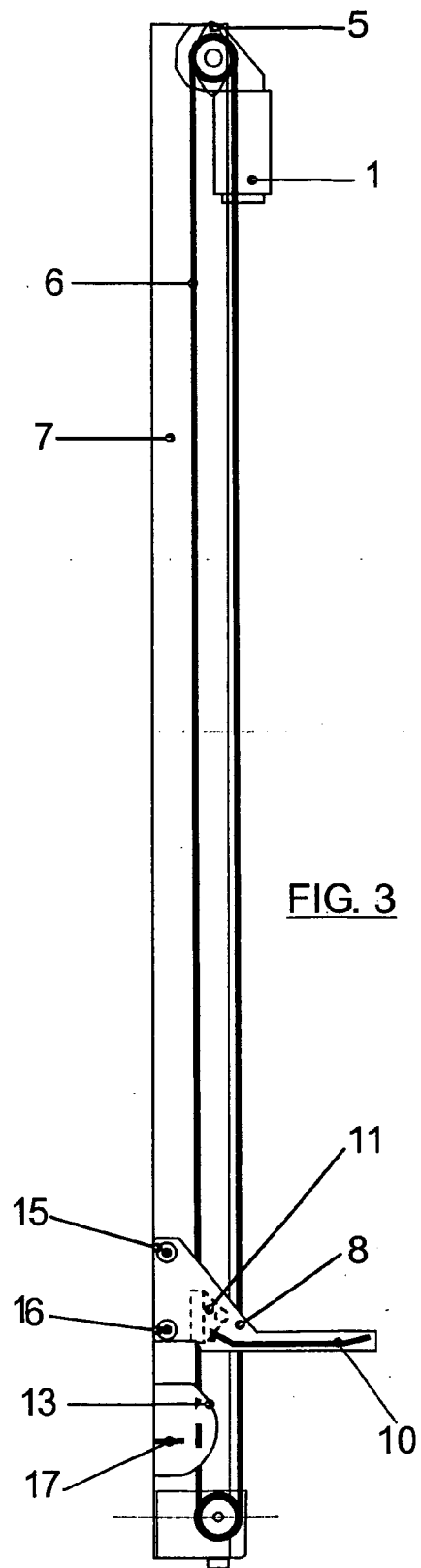
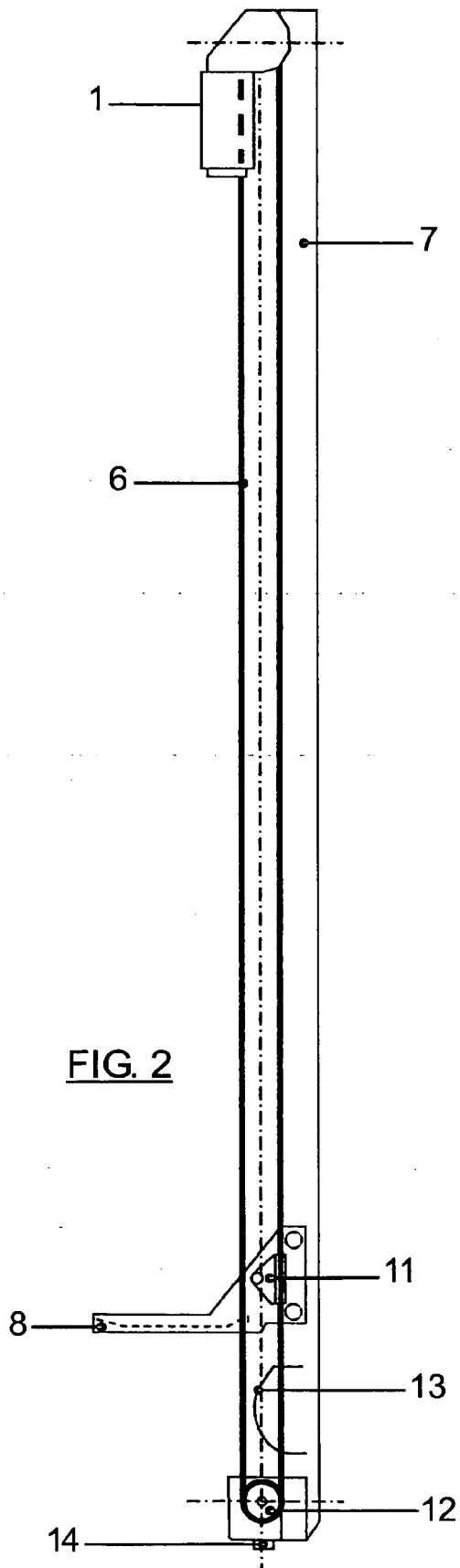
3. An elevator according to claim 1, **characterized in that** the guide profiles have under and after their lower front mouth respective cams having a curved convex profile on which the shafts linking the flanges connected with the endless belts rest and roll during the swiveling of said tray when the latter reaches the lower end position. 10
4. An elevator according to claim 1, **characterized in that** the guide profiles of the frame have a U-shaped section with the openings opposite one another, the wheels of the tray between the parallel branches of said profile and the front mouth being made in the front branch. 15
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5. An elevator according to claim 1, **characterized in that** the tray is formed by a plate having fixed to the transverse edges thereof two side arms which have the aforementioned freely rotating wheels and are connected to the flanges fixing them to the belts by means of respective aligned pivots defining the horizontal drag shaft and the pivot shaft of the tray. 25
6. An elevator according to claim 1, **characterized in that** the microswitch is actuated by one of the arms of the tray when the latter reaches its upper end position. 30
7. An elevator according to claim 1, **characterized in that** one of the arms of the tray has an outer freely rotating roller striking the lower microswitch for its actuation at the end of the overturning of the tray when the latter reaches the vertical unloading position. 35
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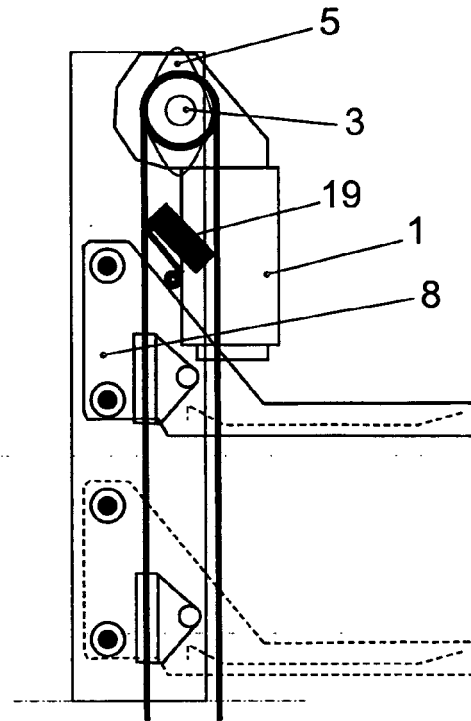
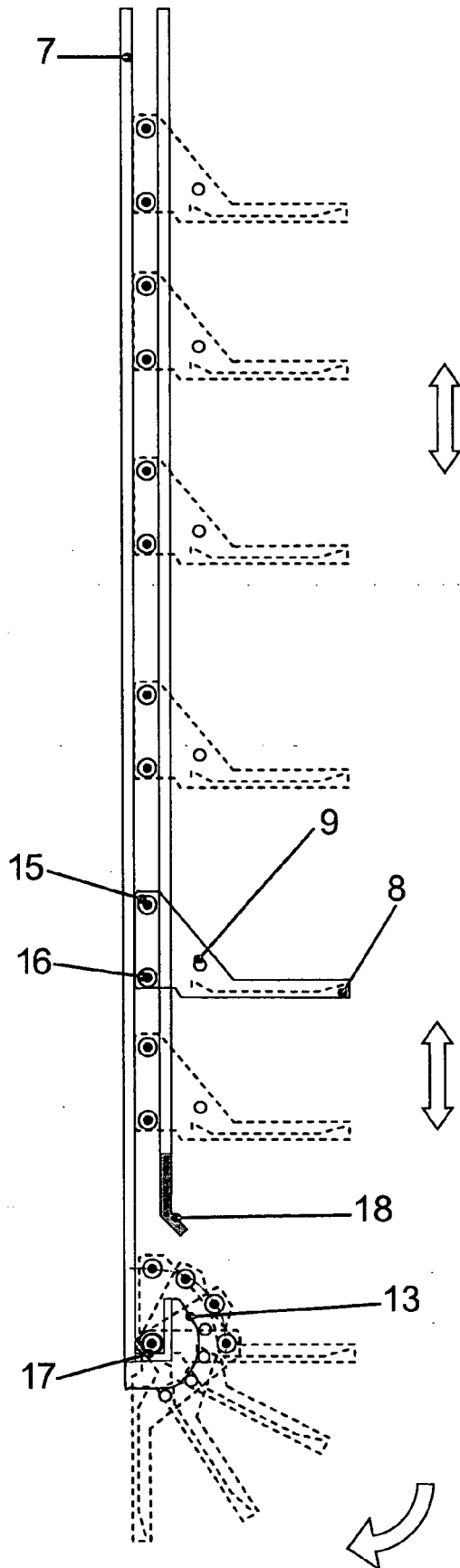


FIG. 5

FIG. 4

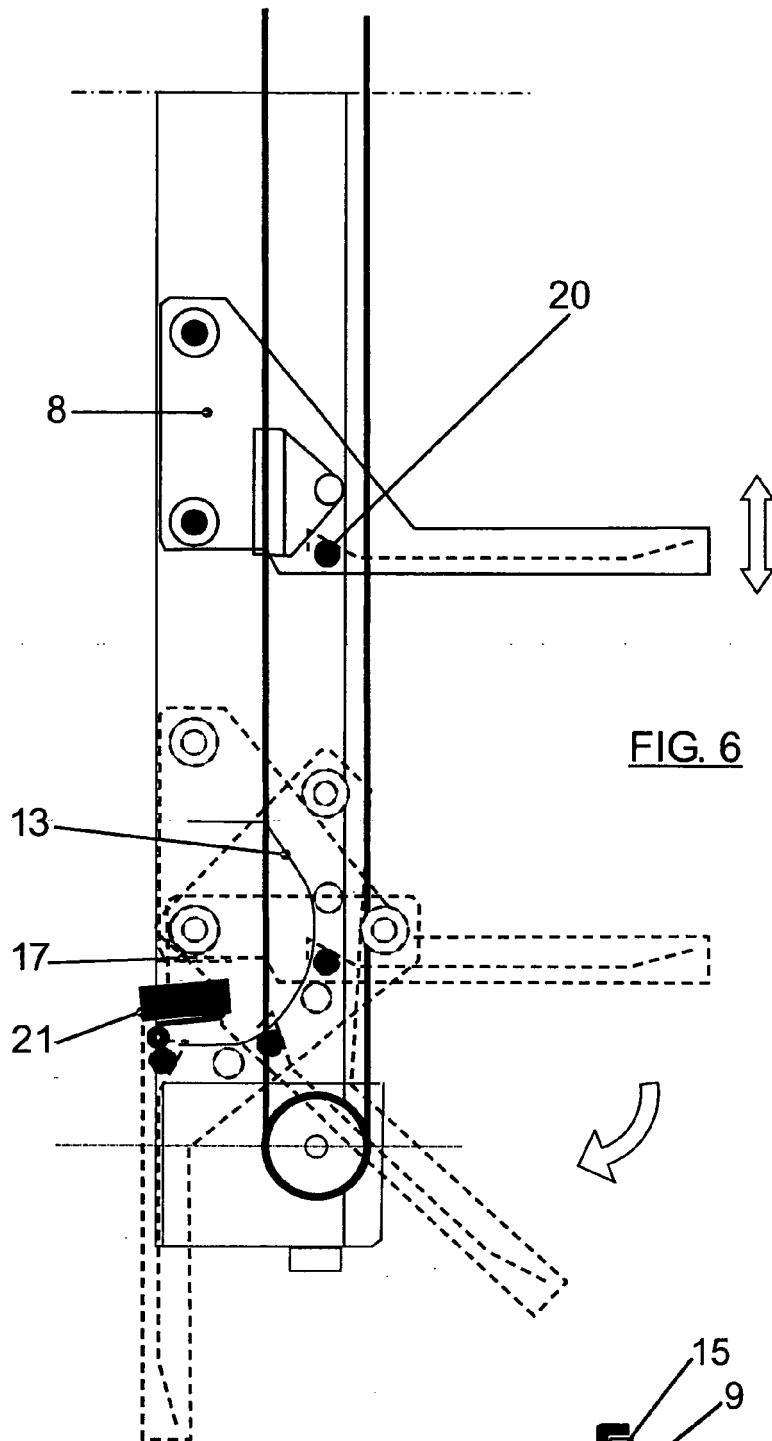


FIG. 6

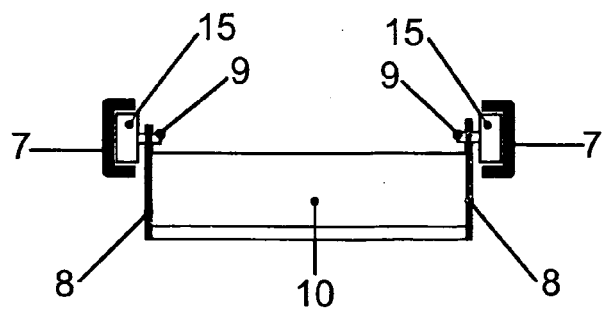


FIG. 7



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 07 38 0030

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 1 460 595 A (OHG F LLI MANEA S R L [IT]) 22 September 2004 (2004-09-22) * the whole document *	1-7	INV. G07F11/26
A	EP 0 866 430 A (SANDEN CORP [JP]) 23 September 1998 (1998-09-23) * column 4, line 27 - column 8, line 5; figures 1-4,7 *	1-7	
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			TECHNICAL FIELDS SEARCHED (IPC)
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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 3 July 2007	Examiner Rachkov, Vassil
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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 07 38 0030

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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03-07-2007

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