(19) DANMARK

(10) DK/EP 2500294 T3

(12) Oversættelse af europæisk patentskrift

Patent- og Varemærkestyrelsen

(51) Int.Cl.: *B 65 G 1/08 (2006.01)* *B 65 G 1/02 (2006.01)* *B 65 G 13/00 (2006.01)* *B 65 G 47/88 (2006.01)*

(45) Oversættelsen bekendtgjort den: **2015-09-07**

(80) Dato for Den Europæiske Patentmyndigheds bekendtgørelse om meddelelse af patentet: **2015-07-22**

(86) Europæisk ansøgning nr.: **12001371.9**

(86) Europæisk indleveringsdag: **2012-03-01**

(87) Den europæiske ansøgnings publiceringsdag: **2012-09-19**

(30) Prioritet: **2011-03-16 DE 202011004045 U**

(84) Designerede stater: **AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR**

(73) Patenthaver: **AQS Logistic Systems GmbH, Siemensstraße 5, 57290 Neunkirchen, Tyskland**

(72) Opfinder: **Schmale, Erhard, Kiefernweg 11, 34479 Breuna-Wettesingen, Tyskland**

(74) Fuldmægtig i Danmark: **Zacco Denmark A/S, Arne Jacobsens Allé 15, 2300 København S, Danmark**

(54) Benævnelse: **Rullebane til transport af stykgods, f.eks. paller eller kasser**

(56) Fremdragne publikationer:
**EP-A2- 1 897 823**
**EP-B1- 0 164 527**
**DE-A1- 3 129 318**
**DE-A1- 4 413 475**
**FR-A1- 2 564 809**
**US-A- 5 213 189**

**Description**

The invention relates to a roller conveyor for transporting piece goods, for example pallets or crates, with at least one roller track for receiving at least one separation member and a ramp device, wherein the ramp device is disposed at the removal-side end of the roller track, wherein the ramp device is connectable to the separation member by way of a coupling, wherein the separation member is disposed on the roller track so that it is swivelable about an axis between a passing position and a blocking position.

According to one variant, a roller conveyor is characterized by two roller tracks extending parallel to one another, wherein the tracks have a plurality of successively arranged rollers, on which the piece goods, e.g. a pallet, run along. Another roller track, which is also equipped with successively arranged rolls, can be disposed in the middle as reinforcement. As a variant, a roller conveyor can be provided, in which single longitudinal rollers are provided in the form of cylinders successively arranged in a track, which have the same width as the piece goods, i.e. in particular as a pallet. In order to slow down the pallet, for example, a roller track has several spaced-apart braking rollers or braking cylinders, including in this variant. The braking rollers not only carry out a braking of the pallets, but also allow implementing a separation of the pallets through an appropriate arrangement of the braking rollers.

In the invention, both devices are included in the term “roller conveyor”, wherein, in the following, the term “roller track” is used to describe a roller conveyor with a plurality of such tracks; or the roller conveyor consists of a single track of longitudinal cylinders.

Such roller conveyors fall into the category of so-called “gravity conveyors”, which means that the roller conveyors are disposed in a certain angle to the

horizontal, which causes the piece goods located thereon to slide, on their own, on the rollers, from the feed side to the removal side. The single piece goods, and here more specifically the pallets, can have a considerable weight. On the removal side, it must be ensured that the piece goods separately come to rest on the limit-stop located at the end of the roller conveyor, in order to avoid the formation of back pressure caused by upcoming additional pallets. In this context, it is now also known to separate the pallets on the roller conveyor. This means that a so-called separation device is provided upstream of the removal side, approximately at a distance of one length of a pallet, which separates a forward pallet from the other subsequent pallets. The known separation device operates as described in the following. A so-called ramp device is located on the removal side of the roller track of a roller conveyor. The ramp device has a ramp flap, which is flapped into the horizontal under the weight of a pallet. Furthermore, the ramp device has a coupling rod, wherein the coupling rod is connected to a separation device. The connection is such that when a pallet stands on the ramp device, a separation member of the separation device is moved into the vertical position, the so-called blocking position, by way of the coupling rod and stops the subsequent pallet. If the pallet lined up at the limit stop at the removal-side end is removed, for example by a forklift, the ramp flap raises again. The consequence thereof is that the separation member is flapped down by the coupling rod, so that the path of the subsequent pallet in the direction of the removal side is cleared. The passing position of the separation member is maintained until the pallet that has passed the separation member again swivels the ramp flap.

It has already been mentioned in this regard that the roller tracks or the roller track of a roller conveyor has a certain number of braking rollers that depends on the inclination angle and on the weight of the piece goods transported thereon, in order to reduce the speed at which the discrete pallets run along the roller conveyor. It is commonly provided that the roller

track has a plurality of braking rollers behind the separation device, i.e. in the direction of the feed side, whereas the roller track after the separation device, i.e. in the direction of the removal side, does not have any or at least less braking rolls. The consequence thereof is that the pallet after the separation device runs considerably faster than the pallet before the separation device. Furthermore, the consequence thereof is that the pallet, that has passed the separation device, arrives relatively quickly in the area of the ramp flap and of the limit stop located there, with the consequence that due to forced coupling of the ramp flap with the separation device, respectively the separation member, the separation member is transferred by the coupling rod into the blocking position. The roller conveyor behind the separation device, i.e. in the direction of the feed side, is configured in such a manner that the pallets located there run so slowly that they only get into the area of the separation member once the separation member has been swivelled back into the blocking position.

The use of a roller conveyor designed in this manner becomes problematic when the pallets transported on the roller conveyor considerably exceed or fall below an authorized length. When the pallets are considerably shorter, the following happens:

The pallet passes the separation member. However, the pallet is now so short that the time until it gets onto the ramp flap and can bring the separation member into the blocking position has become substantially longer. This means that the subsequent pallet has potentially already passed the separation member or is located directly above the separation member when the separation member is brought into the blocking position. If the subsequent pallet has already passed the separation member, two pallets are now lined up on the removal side, the possible consequence thereof being that the second pallet blocks the raising of the separation member, precisely because it is still located above the separation member.

Or, the front pallet gets onto the ramp member at a moment, in which the second subsequent palled is located above the separation member. In both cases, the result will be that the separation device will be tensioned, which can potentially lead to a destruction or damage to the separation device. The same can happen when the pallets exceed a certain length. Then, there is a risk that the pallet already stands on the ramp flap with its front end, while the rear end is still in the area of the separation device. In that case also, the separation device may be damaged or destroyed.

The separation device is also blocked when the subsequent pallet runs too fast, e.g. when one or several braking rollers are not operable.

DE 31 29 318 A1 and EP 0 164 527 B1 both disclose a device for separating pallets on a roller conveyor. Here, the roller conveyor has a control flap at its end, which is connected to a separation device by way of a lever mechanism. The separation device comprises a toggle lever assembly with an arresting lever for blocking a pallet, wherein the toggle lever assembly is brought into a position above the dead centre by the lever mechanism when the arresting lever is in the blocking position. The lever mechanism comprises a rod on which a spring is mounted. The control flap is connected to the rod by an angled lever in such a manner that the toggle lever can be brought into the position above the dead centre by way of the angled lever against the force of the spring on the rod.

EP 1 897 823 A2 discloses a live storage rack with a separating device. Here, a stop element controlled by a connecting member is provided. The connecting member is connected to a control lug arrangement by way of an actuation rod. The control lug arrangement is swivelable into the plane of the live storage rack when loaded, for example by a pallet. Thereby, the connecting member is then displaced, with the consequence that the stop element is brought by the connecting member into the blocking position.

Under certain circumstances removing e.g. a pallet can lead to tensions in the separating device.

Therefore, the problem underlying the invention is to provide that, irrespective of the length of the piece goods transported on the roller conveyor, the separation member is transferable into the blocking position when the roller conveyor is free in that area. This means more specifically that damage or destruction of the separation device as a whole is to be prevented.

In order to solve the problem, the invention provides that when the ramp device is unloaded after a piece good has passed, the separation member independently transfers into the blocking position, that the coupling member has an arresting eye with which the separation member engages in the blocking position, wherein the separation member has a long hole for being received by the axis, wherein the separation member is swivelably mounted on the axis so as to be displaceable parallel to the longitudinal axis of the separation member. At this point, it must be pointed out again that the prior art provides a rigid connection between the ramp device, i.e. the ramp flap, and the separation member, insofar as the swiveling motion of the separation member into the passing position as well as the upward swiveling motion of the separation member into the blocking position is quasi force-controlled. Due to the fact that, after the ramp flap has been raised due to removal of the pallet placed on it, the separation member is autonomously transferrable into the blocking position, i.e. completely independently from the position of the coupling rod, it is now no longer possible for the size, respectively the length of the pallet to influence the operability of the roller conveyor as such. This means that the core of the invention consists in transferring the separation member into the blocking position and into the passing position without any forced-control; rather, the mere swiveling motion of the separation member is to occur independently

from the position of the ramp flap and therefore also independently from the position of the coupling rod, the separation member in fact still taking up a blocking position that depends on the position of the ramp flap.

In this context, it is provided in detail that the separation member is configured as a finger, wherein the separation member is received by the roller track so that it is swivellable around the axis. This axis can hereby engage with the two legs of the U-shaped frame of a roller track, wherein several such separation members can moreover be provided in such a U-shaped frame.

According to a particular feature of the invention, the separation member is transferrable into the blocking position under the load of a spring device. From this, it is clear that the separation member, i.e. for example the finger, is swivellable, by the lined up pallet, against the force of a spring, into the passing position, i.e. into a position substantially parallel to the roller track, and subsequently, after the pallet has passed, swivels into a position perpendicular to the roller track, i.e. the blocking position, due to the spring load. In order to arrest the blocking member in the blocking position, it is provided, according to a particular feature of the invention, that the ramp device is connected to the separation member by way of a coupling member, wherein the coupling member has an arresting eye with which the separation member engages in the blocking position. From this, the following becomes clear:

The coupling member, which is more specifically designed as a coupling rod, is connected to the ramp device, configured for example in the shape of a ramp flap. The coupling rod is moved against the force of a spring by to the swiveling motion of the ramp flap. In the area of the separation member, the coupling member, designed as a coupling rod, has the already mentioned arresting eye. When the ramp flap is in a position, in which it is

swivelled toward the roller track, the arresting eye is located in a position under the separation member, in such a manner that the separation member is held in the blocking position, when engaged with the arresting eye. This means that when the pallet rests on the ramp device, the separation member is held in the blocking position by the coupling member, in form of the coupling rod, connected to the ramp device, namely because the separation member is engaged in the arresting eye of the coupling rod. If the palled is now removed, the coupling member, which is under the load of a tension spring, is pulled into a position, which makes it possible to substantially freely swivell the separation member. The swiveling motion of the separation member is then caused by the pallet lined up at the separation member, due to the weight exerted by the pallet onto the separation member.

According to the invention, it is furthermore provided that the separation member is connected to the axis by way of a long hole. The long hole extends parallel to the longitudinal axis of the separation member. This must be seen against the following background:

Assuming, with regard to the following considerations, that the ramp flap is swivelled, and thus that, for example, a pallet rests on the ramp flap. In this state, the separation member is in the blocking position since it has engaged with the arresting eye of the coupling rod. Assuming now, that the pallet is removed at the removal side, the ramp flap swivels upward, with the consequence that the coupling rod with the arresting eye takes up a position relative to the separation member, in which the separation member is transferred into the substantially horizontal passing position by the effects of a force exerted by a subsequent pallet. This is known per se and has also been described. The pallet, which runs over the separation member and thus maintains the separation member in the passing position, encounters the ramp flap at some point and swivels the ramp flap in the

direction of the roller conveyor. The consequence thereof is that the coupling rod with the arresting eye is already transferred into the engagement position for receiving the separation member, although the separation member is still in the horizontal position. This is the case for example, when the pallet has a length for which the distance between the ramp flap on the one hand and the separation device on the other hand has not been designed, as has already been explained elsewhere. If the pallet now standing on the ramp flap and still reaching into the area of the separation device is removed, or to be more precise, pulled off the roller conveyor, as soon as the pallet releases the separation member, the coupling rod with the arresting eye still being in the blocking position, the separation member will nevertheless take up the locking position, namely due to the fact that when impacting on the coupling rod behind the arresting eye, when viewed in the direction of the feed side, the blocking member can deviate upwards along the long hole and then still get into the arresting eye. The separation member thus “scrapes” with its end along the edge of the arresting eye into the arresting eye and is then held in the arresting eye. The immediate consequence thereof is that when the ramp flap is subsequently pressed down, for whatever reason, the separation member can still be transferred into the blocking position and thus block the run of the next pallet, with the consequence that the separation member only releases the run of this pallet when the forward pallet has really left the removal side. With regard to the movement of the separation member, it must be remembered that it is loaded by a spring, which, on the one hand, pulls the separation member into the blocking position but at the same time also into the direction of the arresting eye.

In the following, the invention is exemplarily described in more detail based on the drawings:

Fig. 1 shows a perspective view of the roller conveyor with three roller tracks, wherein a pallet stands on the ramp device;

Fig. 2 shows a representation according to fig. 1, in which the pallet is removed and wherein the ramp flap of the ramp device is swivelled upward;

Fig. 3 shows a sectional lateral view of a representation of a roller track according to fig. 2, with an incoming pallet;

Fig. 3a shows the detail “x” in a magnified representation;

Fig. 4 shows a lateral view of the roller track according to figure 3 with a pallet lined up at the limit stop;

Fig. 4a shows the detail “y” in a magnified representation;

Fig. 5 shows the roller track from above;

Fig. 6 to Fig. 8 show the mode of operation of the separation device with a pallet that is too long ;

Fig. 9 shows the separation member in the transition from the edge of the arresting eye into the arresting eye when the ramp flap is swung down.

In the representations according to fig. 1 to fig. 9, the roller conveyor is labelled 1. The roller conveyor comprises several roller tracks 1a with rollers 2, as well as braking rollers 3 disposed between the rollers 2. The ramp device 10 is located at the removal-side end 4 on each roller track.

The ramp device 10 comprises respectively one ramp flap 11, which flaps in the direction of the arrow 13 toward the roller track when the pallet 20 comes to rest on the ramp device. In the following, reference will be made to fig. 3 (fig. 3a), fig. 4 (fig. 4a) and fig. 5 for a more detailed description of the operation mode of the device. In fig. 3, the pallet 20 runs over the separation member labelled 30. As can be gathered from the drawing, the separation member 30 is swivelably mounted on an axis 31 in the roller track 1a. In order to be received by the axis 31, the separation member has a long hole 32 extending parallel to the longitudinal axis of the separation member 30, so that the separation member is received by the axis 31 so as to be displaceable in the direction of the double arrow 35 (fig. 3a). A spring 40 is linked to the lower end, which ensures that the separation member 30 is swivelled in the direction of the arrow 38 but, in doing so, is always pulled downward, i.e. in the direction of the coupling rod 16. This is accomplished by deflecting the spring downward around a bolt 36. The ramp device labelled 10 with the ramp flap 11 is mounted in the roller track so as to be swivelable in the direction of the arrow 13. The ramp flap 11 is connected to the coupling rod 16 by a traction member 14 (fig. 3). The coupling rod 16 extends from the traction member 14 up into the area of the separation member 30. In the area of the separation member 30, the coupling rod 16 features the arresting eye 16a, as can be seen in fig. 5 but also in figs 3a, 4a. In addition, the coupling rod 16 is subjected to the load of the spring 18, in such a manner that when the ramp flap 11 swivels in the direction of the arrow 13, the spring 18 is deflected, i.e. tensioned, since the coupling rod moves in the direction of the arrow 60 (fig. 5).

The operation mode of the device with a pallet of normal length will now be explained in more detail based figs. 3, 3a and 4, 4a. In fig. 3, a pallet 20 moves over the separation member 30 in the direction of the limit stop labelled 50 on the removal side. The ramp flap 11 is in the swivelled-up position. The separation member 30 is held in the swivelled-down position

by the pallet, while it runs over the separation member. This means that when the pallet runs over the separation member 30, the separation member is held in the swivelled-down position by the pallet in accordance with fig. 3. The swivelling motion of the separation member 30 takes place against the force of the spring 40. Once the pallet 20 has passed the separation member 30, as shown in fig. 4, the pallet is located at the limit stop 50 and directly above the ramp device 10 with the ramp flap 11. This means that the ramp device 11 is swivelled in the direction of the arrow 13, wherein, in this position, the coupling rod 16 has been displaced in the direction of the arrow 60. Hereby, the arresting eye 16a reaches a position according to fig. 4 or fig. 4a, in which the separation member 30 swivels into the arresting eye 16a due to the force of the spring 40, as can be clearly seen in fig. 4a. The rear edge 16b of the arresting eye is located right next to the separation member 30, with the consequence that when the next pallet 21 runs onto the separation member 30, the separation member 30 presses against this edge 16b (fig. 3a, fig. 4a). Only once the front pallet 20 is removed, and the ramp flap 11 thus swivels into the position of fig. 3, the coupling rod is displaced in the direction of the arrow 61 due to the tension spring 18; in this situation, the separation member still protrudes into the arresting eye 16a, but the arresting eye has been displaced so far that when the next pallet abuts against the separation member 30, the separation member clears the path by being transferred into the position of fig. 3.

Looking at figs. 6 to 8 and fig. 9, one can see the following:

The pallet 20, which now runs over the roller conveyor, is a little longer than expected. In fig. 7, it can be seen that the pallet 20 stands over the separation member 30, although the pallet rests against the limit stop at its front end. Usually, in this position, the separation member 30 would be free and would be able to move into the blocking position. However, as has

already been explained, this is prevented by the pallet standing on it. In the prior art, the separation member, respectively the separation device as a whole was tensioned against the pallet and against the roller bar due to the forced coupling of the separation member with the ramp device via the coupling rod. It is obvious that this would lead to damage to the device. Assuming, in the following, that the pallet is lifted over the limit stop 50 and pulled off via the ramp device, the separation member 30 is released at some point. Due to the force of the spring 40 the separation member 30 is then transferred into the blocking position. However, in that moment, the coupling rod with the arresting eye is in the blocking position, since the ramp flap is swivelled down, since, as has already been explained, the pallet is still standing on the ramp flap. The separation member 30 designed as a finger, would now not enter the arresting eye, as is necessary to be able to take up the blocking position. Rather, the separation member 30 would rest on the rear edge of the arresting eye 16a on the coupling rod 16. Due to the fact that the separation member 30 has a long hole 32, the separation member 30 can now move upward relative to the axis 31, with the consequence that it can engage with the arresting eye 16a over the edge of the coupling rod and then remain in the blocking position. The separation member then blocks the path of the next pallet. The path of the separation member 30 over the edge of the arresting eye of the coupling rod 16 into the arresting eye into the arresting position of the coupling rod can be clearly seen in fig. 9.

With the separation device according to the invention, it is also achieved that for example the middle roller track can be shortened on the removal side, in order to allow the operating personnel to more easily step between the roller tracks when goods must be removed from the pallets or when the pallets are pulled off over the limit stops of the roller bars. This is due to the fact that there is no more forced-control of the separation member by the ramp device, which means that even when a pallet already stands on the

ramp flap of the middle roller bar, the movement of the separation member is only limited by the pallet itself but not by the coupling rod, as is the case in the prior art. In this regard, if the middle roller bar can be shortened, the risk of injury to the personnel stepping between the two outer roller bars is substantially lower.

Reference number:

| | |
|---|---|
| 1 | roller conveyor |
| 1a | roller track |
| 2 | roller |
| 3 | braking roller |
| 4 | removal-side end |
| 10 | ramp device |
| 11 | ramp flap |
| 13 | arrow |
| 14 | traction member |
| 16 | coupling rod |
| 16a | arresting eye |
| 16b | rear edge |
| 18 | tension spring |
| 20 | pallet |
| 21 | pallet |
| 30 | separation member |
| 31 | axis |
| 32 | long hole |
| 35 | double arrow (fig. 9) |
| 36 | bolt |
| 38 | arrow |
| 40 | spring |
| 50 | limit stop |
| 60 | arrow |
| 61 | arrow |

## Patentkrav

**1.** Rullebane (1) til transport af stykgods, f.eks. paller eller kasser, med mindst en skinne (1a) til optagelse af mindst et separationselement (30) og en rampeindretning (10), hvor rampeindretningen (10) er anbragt ved udtagelsesenden (4) af rulleskinnen (1a), hvor rampeindretningen (10) kan bringes i forbindelse med separationselementet (30) ved hjælp af et sammenkoblingselement (krav 5), hvor separationselementet (30) er anbragt på rulleskinnen (1a), så det kan svinge omkring en akse (31) (krav 3) mellem en passereposition og en spærreposition,
**kendetegnet ved,**
**at** separationselementet (30) ved en aflastet rampeindretning, efter at en stykvare har passeret, går over i spærrepositionen af sig selv,
**at** sammenkoblingselementet (16) har et låseøje (16a), som separationselementet i spærrepositionen griber ind i, hvor separationselementet (30) har et langhul (32) til optagelse gennem aksen (31), hvor separationselementet (30) er lejret svingbart på aksen (31), så det kan forskydes parallelt med separationselementets (30) længdeakse.

**2.** Rullebane (1) ifølge krav 1, **kendetegnet ved, at** separationselementet (30) er udformet som en finger.

**3.** Rullebane (1) ifølge et af de foregående krav, **kendetegnet ved, at** separationselementet (30) kan overføres til spærrepositionen under belastningen fra en fjederindretning (40).

**4.** Rullebane (1) ifølge et af de foregående krav, **kendetegnet ved, at** sammenkoblingselementet (16) er udformet som en koblingsstang.

**5.** Rullebane (1) ifølge et af de foregående krav, **kendetegnet ved, at** sammenkoblingselementet (16) står fjederbelastet (18) i forbindelse med rampeindretningen (10).

**6.** Rullebane (1) ifølge et af de foregående krav, **kendetegnet ved, at** rampeindretningen (10) har en rampeklap (11).

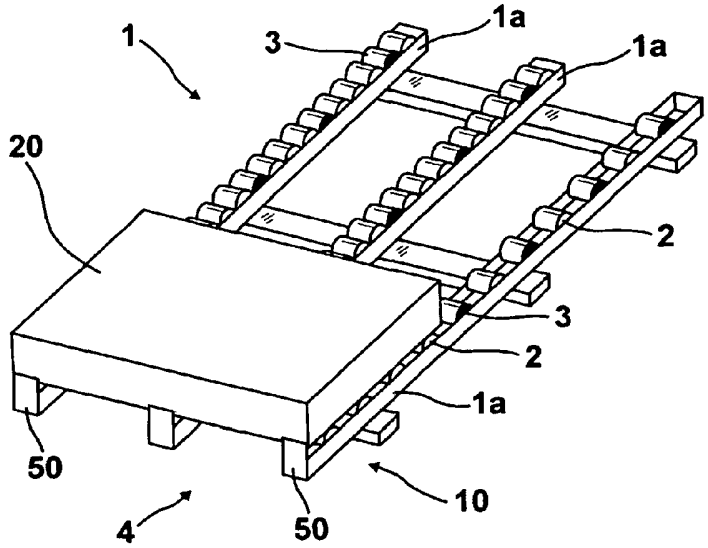



Fig. 1

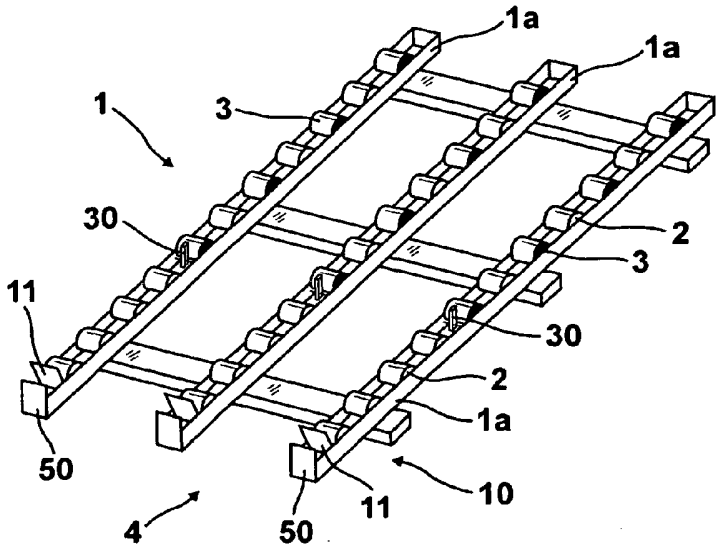



Fig. 2

Fig. 3

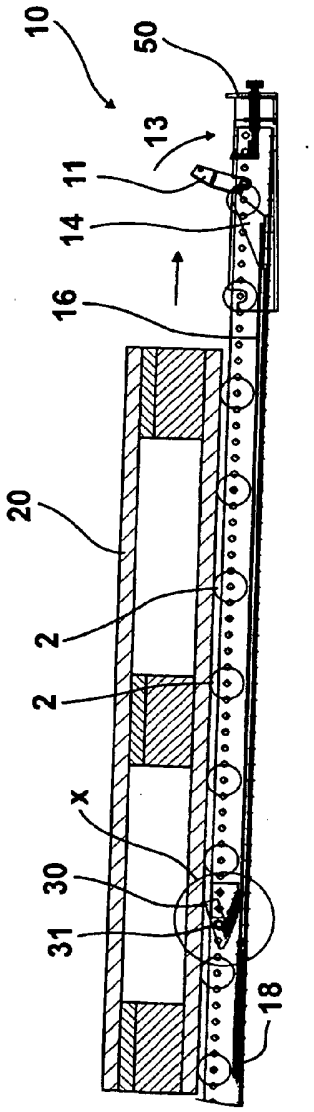
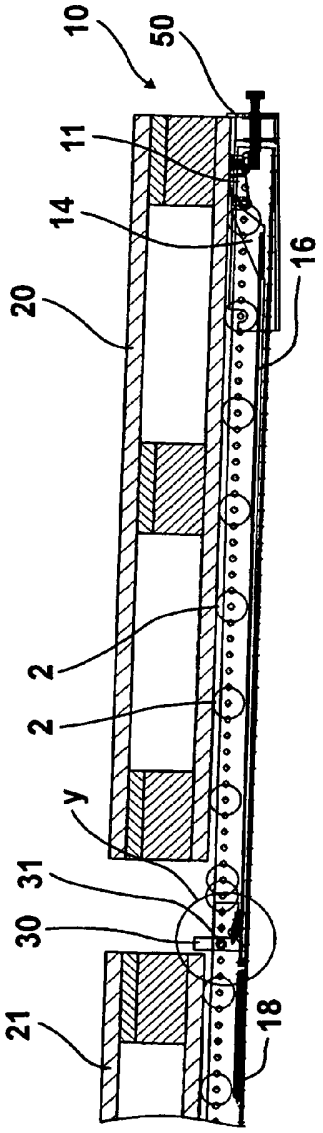



Fig. 4



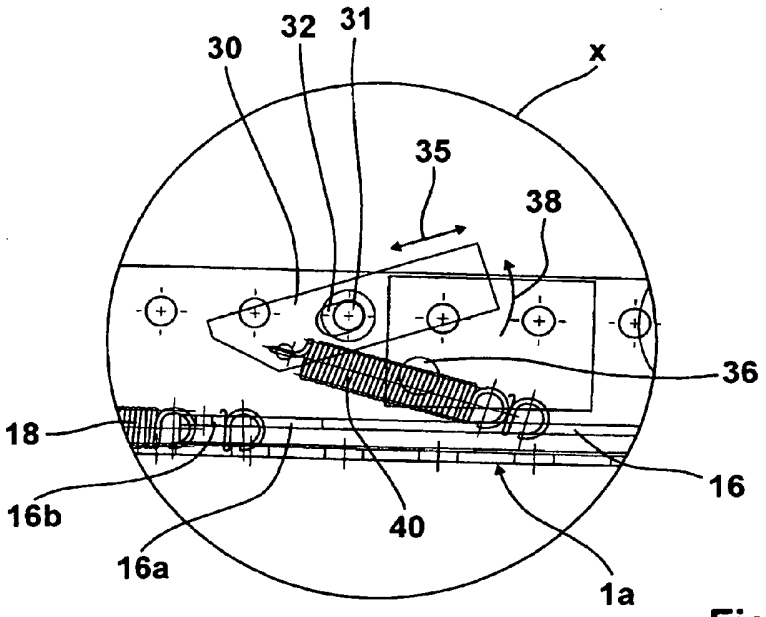

30
32
31
x
35
38
36
18
16
16b
40
16a
1a

Fig. 3a

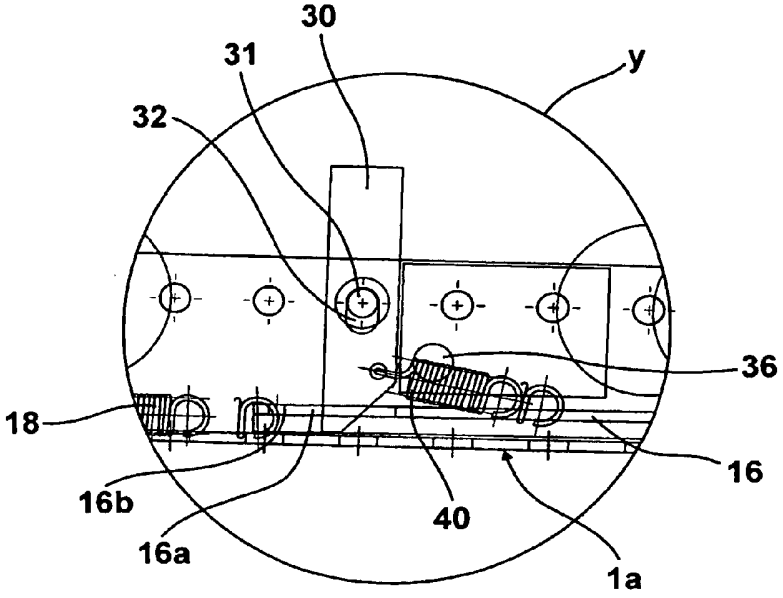

30
31
y
32
36
18
16
16b
40
16a
1a

Fig. 4a

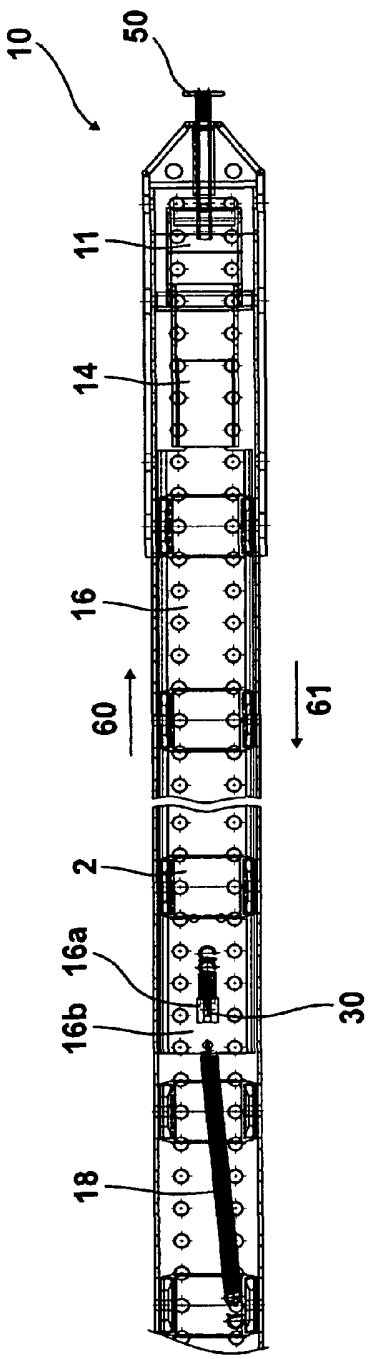



Fig. 5

Fig. 6

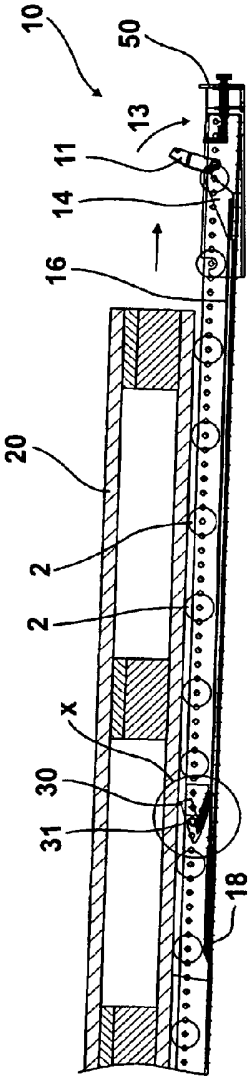



Fig. 7

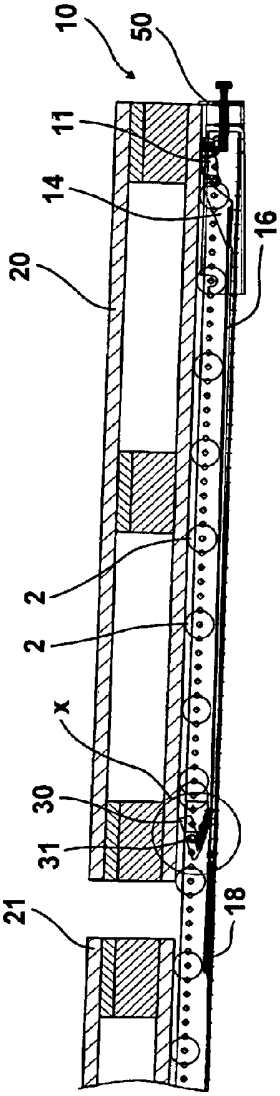
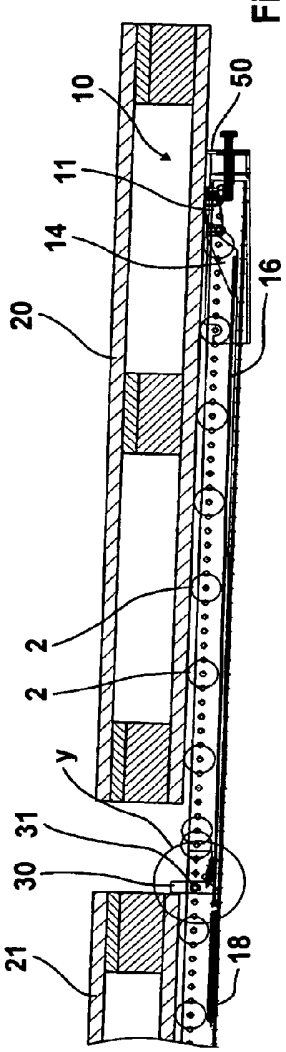



Fig. 8



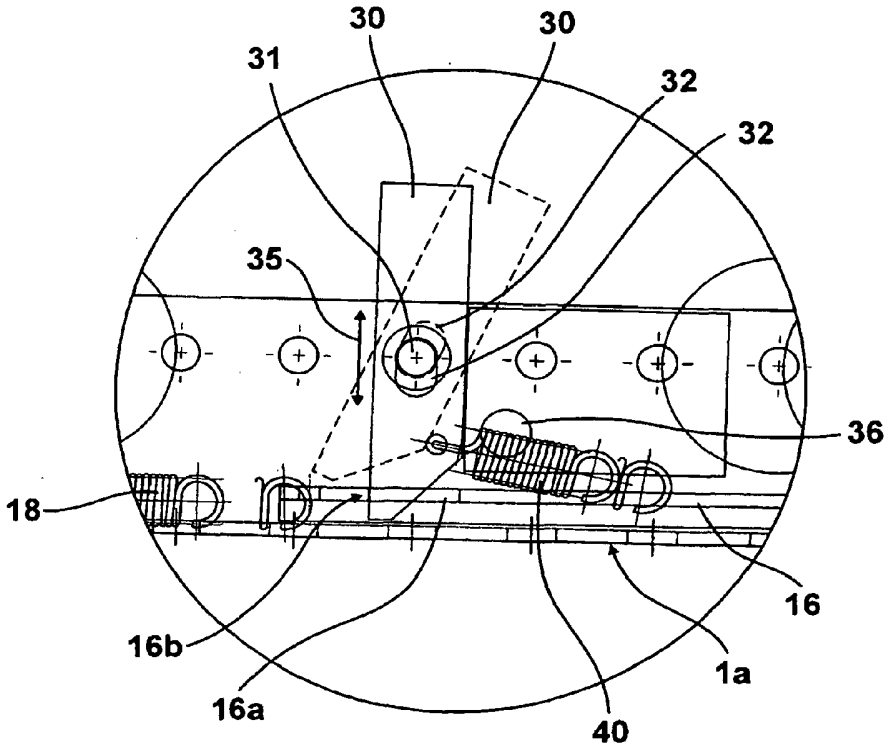



Fig. 9