(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 2 311 737 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
20.04.2011 Bulletin 2011/16

(51) Int Cl.:
B65B 27/08 *(2006.01)* ***B65B 35/50*** *(2006.01)*
B65G 57/03 *(2006.01)*

(21) Application number: **09172852.7**

(22) Date of filing: **13.10.2009**

(84) Designated Contracting States:
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 SE SI SK SM TR
Designated Extension States:
AL BA RS

(71) Applicant: **Schur Packaging Systems AB**
575 22 Eksjö (SE)

(72) Inventors:
- **Sthaalros, Ulrik**
8700, Horsens (DK)
- **Karlsson, Tomas**
573 36, Tranås (SE)
- **Gustavsson, Stefan**
57833, Aneby (SE)

(74) Representative: **Nielsen, Leif et al**
Patrade A/S
Fredens Torv 3A
8000 Aarhus C (DK)

(54) Transfer of bundles into a transport unit

(57) A method and apparatus for moving stacks (27) of bundles (12) into a transport unit (9), comprising
- moving bundles (12) of printed matter on a conveyor (4) and into a collector (5), the collector (5) having a vertically moving collector platform (6),
- receiving on the collector platform (6) single bundles (12) from the conveyor (4) and accumulating the bundles (12) one on top of the other into a stack (27) resting on the collector platform (6),
- lifting the entire stack (27) off the collector platform (6) by a first lift (13a, 13b) and upward into an elevated position above the collector (5),
- moving the stack (27) from the first lift (13a, 13b) onto a second lift (8),
- lowering the stack (27) by the second lift (8) into a transport unit (9).

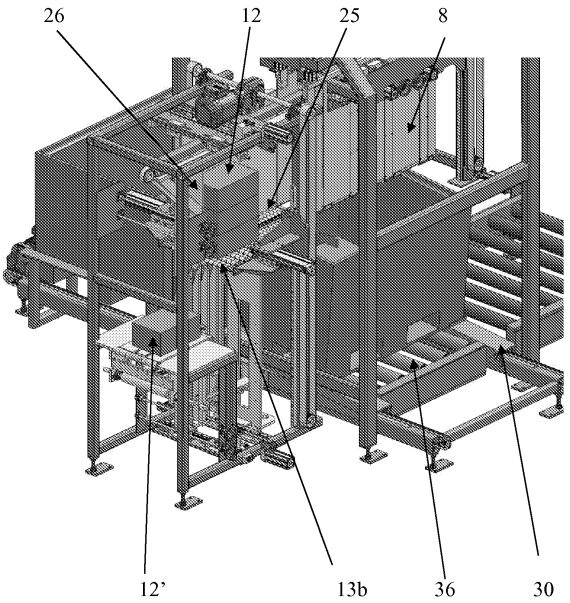

FIG. 3e

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Description

FIELD OF THE INVENTION

[0001] The present invention relates to a method and apparatus for stacking bundles of printed matter from a conveyor and into a transport unit, such as a box.

BACKGROUND OF THE INVENTION

[0002] Citations, such as newspapers, magazines, journals, and catalogues are typically packed automatically in boxes, which then are transported to the place of destination, for example for manual distribution to people's home address. The bundles may be ordered in the box in accordance with certain routes for delivery.

[0003] The packing into the boxes has to be done carefully in order not to damage the foils in which the citations are wrapped but also efficiently in order to perform the packing at high speed. Thus, there is an ongoing aim to improve the art in the field.

DESCRIPTION / SUMMARY OF THE INVENTION

[0004] It is therefore the object of the invention to provide improvements for stacking printed matter into transport units, such as boxes. This purpose is achieved with a system for packing stacks of printed matter into boxes according to the following.

[0005] A conveyor, preferably a horizontal belt conveyor, is arranged for moving bundles of printed matter, for example foil-wrapped bundles newspapers, journals, magazines, or letters, into a collector. The collector has a vertically moving collector platform for receiving single bundles from the conveyor and for accumulating the bundles one on top of the other into a stack resting on the collector platform, until the entire stack is lifted upwards off the collector platform by a first lift and into an elevated position above the collector. From the first lift, the stack is moved, preferably horizontally, onto a second lift. The second lift lowers the stack into a transport unit, for example a box. For example, the accumulation of bundles is performed the following way. When a first bundle arrives at the collector, the upper edge of the collector platform is adjusted to be in approximate level with the conveyor such that the bundle can be easily moved from the conveyor onto the collector platform. The term approximate level is used to cover the situation, where the upper edge is in level with the conveyor or slightly lower, for example between 1 and 8 centimetres, than the level of the conveyor. As data for the height of the first bundle is stored in a control unit of the apparatus, the control unit causes the collector platform to be lowered by a distance equal to the height of the first bundle. When the second bundle arrives at the collector, the upper surface of the first bundle on the collector platform is adjusted to be in approximate level with the conveyer for smooth transport of the second bundle from the conveyor to the top of the first bundle. By repeating the procedure, a third bundle and, possibly, further bundles of equal or different heights can be stacked on top of each other until a stack is complete. Completeness of a stack may be determined in accordance with selected parameters, for example number of bundles, height of the stack, and/or weight of the stack.

[0006] In a preferred embodiment, the collector platform is a collector grid having collector fingers extending laterally from a central grid part, for example in a fish-bone-like configuration.

[0007] Advantageously, the first lift has a pair of lifting grids, each with a number of lifting fingers, preferably with lifting rollers on these lifting fingers. The lifting fingers of the lifting grids are spaced and positioned relative to the interspaced collector fingers of the collector grid in order for the lifting fingers to be able to move through the spaces between the collector fingers. When a stack of bundles has been collected on the collector grid, the lifting grids are moved upwards and take over the stack by lifting it off the collector grid.

[0008] For example, the lifting grids are supported on first, horizontal profiles for moving the lifting grids laterally in and out of the collector and are supported on second, vertical profiles for moving the lifting grids in a vertical direction. A lifting cycle for lifting grids may then be

1) lifting the pair of lifting grids to lift off the stack upwards off the collector platform
2) removing the stack from the lifting grids,
3) spacing the lifting grids to a greater mutual distance,
4) lowering the lifting grids along a vertical path outside the collector,
5) reducing the distance between the lifting grids by running the lifting grids into the collector below the collector grid for start of a new cycle.

[0009] Preferably, the accumulation in the collector of subsequently arriving bundles into a new stack is started, while the first lift is on the way up to the elevated position above the collector. This way, dead time is avoided. For the same reason, the lowering of the stack or stacks into the transport unit by the second lift may preferably be performed during the time it takes to accumulate further bundles in a stack in the collector.

[0010] In a further embodiment, the second lift may accumulate a plurality of stacks, for example a row of stacks, before the stacks are lowered simultaneously into the transport unit.

[0011] In order for the lowering of the stack or stacks into the transport unit in a safe way, the transport unit may be inclined, as the stack would then tend to lean against an inclined side wall of the transport unit with a reduced risk of toppling. In order for the second lift to place the stack or stacks properly into the inclined transport unit, the second lift is also inclined correspondingly in a tilting frame before lowered in the transport unit.

[0012] In order for the second lift to receive new stacks, it is then returned into a non-inclined orientation, for example into an orientation, where the sidewalls of the lift are vertically oriented.

[0013] In a preferred embodiment, the lift has two parallel side walls the mutual distance of which is adjustable. For example, the walls can be moved laterally on rails in order to change their mutual distance and adjust it to the lateral dimension of the stacks.

[0014] In a further embodiment, the walls of the second lift are provided with flaps extending transversely from the side walls in order to support the stacks of bundles. The flaps may be rotatably hinged and prevented from rotation in the stack-supporting state by a blocking mechanism. Advantageously, the blocking mechanism may be releasable by a release mechanism which is integrated in the side walls. For example, the release mechanism comprises a vertically oriented plate which is slidingly integrated in the side wall and plane with the surface of the side wall. By moving the plate in a vertical direction, the blocking mechanism is activated or deactivated.

[0015] Bundles are typically rectangular, thus, they have a longitude length and a lateral width. The collector is configured to receive bundles in a longitudinal orientation, which is an orientation where the longitude of the bundle is parallel to the conveying direction, or in a lateral orientation, which is when the longitude of the bundle is normal to the conveying direction.

[0016] In order for the collector to be adjusted to the dimensions of the bundle, the distance between guiding side walls of the collector can be adjusted.

[0017] Furthermore, the conveyor can be adjusted relatively to the collector with respect to the distance between the conveyer and the bundles in the collector in order to take into account the size and the lateral or longitudinal orientation of the bundle. For example, the conveyor can be elongated or contracted by displacing in the longitudinal direction of the conveyor a support profile supporting part of the conveyor. The movement of the support profiled may be performed pneumatically or hydraulically, or by motorised actuators. Optionally, the conveyor has belts, of which the central belt is supported by the support profile, and the length of the central belt can be adjusted by longitudinally displacing the support profile.

SHORT DESCRIPTION OF THE DRAWINGS

[0018] The invention will be explained in more detail with reference to the drawing, where

FIG. 1 is a overview illustration of two opposite views a) and b) of the apparatus ac- cording to the invention when it is covered by panels;

FIG. 2 is a lateral side view of the apparatus;

FIG. 3 is a perspective view on the apparatus towards the collector a) towards the collector without bundles, b) with laterally oriented bundles, c) with laterally oriented bundles in a closer perspective with some of the apparatus parts removed, d) with longitudinally oriented bundles, e) with a stack lifted to an ele- vated height, e) in a perspective view on the apparatus towards the second lift and the boxes;

FIG. 4 is an end view illustrating the lowering of the lift, where in a) the lift is in an elevated position, b) the lift is lowered into the box, c) the flaps are opened to release the stacks, d) the lift is withdrawn upwards;

FIG. 5 a) is a perspective view of the lift, b) is a perspective view of part of the side wall of the lift, and c) is a side view of part of the lift wall with released flaps;

FIG. 6 illustrates a pre-station for lateral measurement and weighting of the bundles,

FIG. 7 illustrates a pre-station for measurement of the height of the individual bun- dles.

DETAILED DESCRIPTION / PREFERRED EMBODIMENT

[0019] FIG. 1a show an apparatus according to the invention when covered by panels of different kinds. FIG. 1b show the apparatus, when the panels 2 are removed. FIG. 2 illustrated the apparatus from the side. The main features of the apparatus will be explained in the following.

[0020] With reference to FIG. 2, bundles of printed matter enter the apparatus 1 from the left into a conveyor station 3 on a conveyor 4 in order to be transported into collector station 5 to be placed on a collector platform 6. The collector platform 6 is vertically movable such that it is gradually lowered when bundles are moved into the collector station. Once, the stack of bundles has or exceeds a predetermined height, the bundles are moved upwards in order to be pushed by a pusharm 7 from the left to the right in the figure onto a lift 8. The lift 8 accumulates a row of stacks and lowers these into a box 9.

[0021] The sequence of transporting bundles into the collector, transferring them in stacks to the lift is explained in greater detail with reference to FIGs. 3a-3f. The lowering of the lift into the box is explained with reference to FIG. 4a-4c.

[0022] FIG. 3a illustrated the apparatus before bundles enter the collector station. The collector station 5 at the end of conveyer 4 has on each of two opposite sides vertical sets 10a, 10b of guiding rods for guiding and confining the bundles in a vertical direction. These set 10a, 10b of guiding rods are supported by guiding rails 11 for moving the guiding rods 10a, 10b laterally in order to adjust the distance between the two sets 10a, 10b of guiding rods to the size of the bundles.

[0023] As illustrated in FIG. 3b, the distance between the sets 10a, 10b of guiding rods can be adjusted to the length of the bundles 12, if these are fed in a transverse orientation into the collector station 3; or the distance

between the two sets 10a, 10b of guiding rods can be adjusted more narrow, if the bundles are fed in a longitudinal orientation into the collector station 5, as illustrated in FIG 3d.

[0024] The term longitudinal is used for directions parallel to the transport direction of the conveyor 4, whereas the term transverse or lateral is used when being normal to the direction of the transport of the bundles 12 on the conveyor 4.

[0025] As best illustrated in FIG. 3c and FIG. 3d, where the second set 10b of guiding rods have been removed for illustrational purpose, the two sets of guiding rods cooperate with a back plate 18 that serves as an end stop for the movement of the bundles 12. This back plate 18 is stationary such that the position of the front end 19 of the bundles depends on the orientation and size of the bundles 12.

[0026] With reference to FIG 3c, in order to adjust the conveyor 4 to the size and the lateral or longitudinal orientation of the bundles 12, the conveyor 4 can be elongated or contracted by displacing in the longitudinal direction of the conveyor 4 a support profile 16 supporting part of the conveyor 4. In the illustrated case, the conveyor 4 has belts, of which the central belt 17 is supported by the support profile 16, and the length of the central belt 17 can be adjusted by longitudinally displacing the support profile 16. For example, this longitudinal displacement can be done by a pneumatic, hydraulic or motorised actuator 37.

[0027] FIG. 3c illustrates the collector platform 6 in the form of a collector grid 6 supporting the bundles 12a, 12b, 12c. The collector grid 6 has collector fingers 14 extending laterally from a central grid part. For example, the collector grid 6 can be provided in a fishbone-like configuration. The collector grid 6 is fastened to a flange 15 to roll or slide along a vertical rail for vertical displacement of the collector grid 6. When a first bundle 12a of a bundle stack arrives on the conveyor 4 of the conveyor station 3, the upper edge of the conveyer grid 6 is adjusted to be in level with the conveyor 4, and the bundle 12a is conveyed onto the conveyor grid 14. As data for the height of the first bundle 12a is stored in a control unit of the apparatus, the control unit causes the conveyor grid 6 to be lowered by a distance equal to the height of the first bundle 12. When the second bundle 12b arrives at the conveyor station, the upper surface 19 of the first bundle 12a on the collector grid 6 is adjusted to be in level with the conveyer 4 for smooth transport of the second bundle 12b from the conveyor 4 onto the top of the first bundle 12b. By repeating the procedure, a third bundle 12c and further bundles of equal or different heights can be stacked on top of each other until a stack is complete.

[0028] In order to provide data for the height of the bundles 12 and, thus, for the collected stack on the collector grid 6, a first pre-station upstream of the conveyor 4 may be provided for measuring the height of the bundles arriving at the conveyor 4. Such a first pre-station 22 is illustrated in FIG. 7. The first pre-station comprises a roller table 20 on which a calibrated height measurement system 21 is installed. The height measurement system provides data for the height of the bundle by measuring the distance between the upper surface 19 of the bundle 12 and a reference position.

[0029] FIG. 3a also shows a pair of lifting grids 13a, 13b. The lifting grids have a number of fingers with rollers on these fingers. The lifting grids 13a, 13b are supported on first, horizontal profiles 24 for moving the lifting grids 13a, 13b laterally in and out of the collector station 3 with the fingers in and out in the interspaces between the guiding rods 10a, 10b. In addition, the lifting grids 13a, 13b are supported on second, vertical profiles 35 for moving the lifting grids 13a, 13b in a vertical direction.

[0030] Whereas FIG. 3a shows the lifting grids 13a, 13b in a lifted and outwardly contracted position, FIG. 3c shows the lifting grids 13a, 13b in a bottom position and mutually narrow positioning. The fingers 23 of the lifting grids 13a, 13b are spaced and positioned relative to the interspaced fingers 14 of the collector grid 6 in order for the lifting grid fingers 14 to be able to move through the spaced between the collector fingers 14. When a stack of bundles 12 has been collected on the collector grid 6, the lifting grids 13a, 13b are moved upwards and take over the stack by lifting it from the collector grid 6.

[0031] While the stack of bundles 12 is being lifted upwards, the collector grid 6 is moving back to the position, where its upper edge coincides with the surface of the conveyor 4 in order to receive the next bundle 12' as illustrated in FIG. 3e. The height adjustment of the emptied collector grid 6 and the lifting of the stack of bundles 12 are advantageously performed simultaneously in order to optimize the efficiency of the system. While the collector is collecting bundles in a new stack on the collector grid 6, the previous stack is moved upwards and moved into the next processing unit, which is described in the following with reference to FIG. 3e.

[0032] FIG. 3e illustrates the situation, where the lifting grids 13a, 13b are lifted to an elevated position, where the roller fingers of the lifting grids 13a, 13b are in level with a transport platform 25. The transport platform 25 has rows of rollers much like the rollers on the fingers of the lifting grids. The platform is better illustrated in FIG. 3f. As seen in FIG. 3e, a push-arm 26 is provided for pushing the stack from the lifting grid 13a, 13b onto the transport platform 25 and further onto the lift 8.

[0033] In FIG. 3f, only one wall 28b of the lift 8 is shown for sake of illustration, although the lift 8 has a wall on both sides of the stacks 27a, 27b, 27c. As it clearly appears, the length of the lift 8 is longer than the longitudinal dimension of the bundles 12, such that more than one stack 27a, 27b, 27c can be accumulated in the lift 8.

[0034] The lift 8 is explained in greater detail in FIG. 5a. The lift 8 has two parallel side walls 28a, 28b which can be moved laterally on rails 39 in order to change their mutual distance and adjust the lift 8 to the lateral dimension of the stacks 27. The distance may be adjusted au-

tomatically or, alternatively, manually, for example, by spindles driven by the illustrated rotation handles 38.

[0035] The walls 28a, 28b are provided with flaps 29a, 29b extending transversely from the side walls 28a, 28b in order to support the stacks of bundles 12. As illustrated in greater detail in FIG 5b and FIG. 5c, the flaps 29a, 29b are rotatably hinged in hinges 30. The flaps are prevented from rotation in the normal state by a blocking mechanism 31, but the blocking mechanism 31 can be released by a release mechanism 32 which is integrated in the side wall 28b. In one practical embodiment, the release mechanism 32 comprises a vertically oriented plate 33 which is slidingly integrated in the side wall and plane with the surface of the side wall. By moving the plate in a vertical direction, the blocking mechanism 31 is activated or deactivated.

[0036] Once the flaps 29a, 29b have been released and rotated from a lateral stack-supporting orientation to an orientation parallel with the side walls 28a, 28b as illustrated in FIG. 5c, the stacks are released into a box 9 for transportation of the stacks. In order for the flaps to get back into the lateral orientation, an external mechanism (not shown) is used to rotate the flaps back so that these can be blocked again in the lateral orientation. For example, this external mechanism is a horizontally sliding arm which by its sliding movement passes the downwardly hanging flaps and pushes them back into their lateral orientation, where the blocking mechanism activates and holds the flaps 29a, 29b in this lateral, horizontal orientation.

[0037] With reference to FIG. 3f as a starting position of the lift, the lifting of the stacks 27a, 27b, 27c is explained in greater detail with reference to FIGs, 4a-4d. In FIG. 3f, the lift is in a vertical orientation with the support flaps 29a, 29b in a lateral and horizontal orientation for receiving the stacks 27a, 27b, 27c from horizontal platform 25. For receiving the stacks, a box 9 is placed underneath the lift 8.

[0038] FIG. 4 as shows the apparatus 1 in an end-view. The boxes 9 are provided on sliders 30 that are adjusted to an inclination relatively to the frame 32 of the apparatus 1. The supporting sliders 30 are moved into the packing space 31, while the box 9 is in this inclined orientation. In order for the lift 8 to match this inclined orientation of the box 9, it is tilted from its vertical orientation into a corresponding inclined orientation. In this inclined orientation, the lift 8 is lowered along the inclined direction, which is possible as the lift 8 is slidably arranged in a tiltable frame 32.

[0039] As illustrated in FIG. 5a and 5b, the side walls 28a, 28b of the lift 8 are thin and have a smooth surface, especially, due to the release mechanism being integrated in the walls. This implies that the lift 8 when lowering the stacks 27 into the box 9, as illustrated in FIG. 4b, can be placed with its side wall 28a very near to the side wall 33 of the box 9. Being placed so near and inclined to the side wall 33 of the box 9 the stacks 27 are prevented from toppling when the lift 8 is retracted. Thus, the inclined orientation gives a larger degree of safety when packing stacks 27 into boxes 9.

[0040] FIG. 4c illustrates the situation, where the flaps 29a, 29b have been released and rotated to an orientation parallel with the side walls 28a, 28b of the lift 8, and the stacks 27 have dropped onto the bottom 34 of the box 9. The lift 9 is then withdrawn again in the inclined upward direction, as illustrated in FIG. 4d, before it is tilted back to the vertical orientation for receiving the next stacks from the platform 25.

[0041] Preferably, the length of the lift matches the length of the box 9 in order for the lift to fill the box sequentially with an entire row of stacks 27. When one row has been placed in a box 9, the box 9 is moved by a distance about equal to the width of the row of stacks 27 in order to receive a new row of stacks 27.

[0042] Preferably, the width of the row of stacks 27 is programmed beforehand such that the distance to move the box 9 is performed automatically in relation to this programming. For example, the programming can be performed after measurement of the lateral widths of the stacks in a second pre-station. An example of such a pre-station is illustrated in FIG. 6. This second pre-station 40 comprises a table 41 with two oppositely positions measuring plates 42a, 42b, which can be moved towards the bundle when the bundle is transported through the second pre-station 40 before reaching the conveyor station 3. The second pre-station 40 has a conveyor belt 43 for controlled transport of the bundles 12 through the station 40. A bundle is received by the belt 43 in the second pre-station 40 and transported to the centre of the station 40, and the plates 42a, 24b are driven towards the bundle 12 in order to measure its lateral dimension. The second-pre station 40 may also be configured to measure the weight of the bundles 12 passing the station 40 in order to provide data to a control unit of the apparatus, the data not only being data indicative of the lateral dimension of the bundles but also of the weight.

[0043] Until the next row of stacks 27a, 27b, 27c has been accumulated in the lift 8, the box 9 is moved with the supports 30 to be ready for receiving a new row of stacks 27 beside the earlier row. The thin and smooth walls 28a, 28b of the lift 8 with the fact of the inclination, where stacks 27 are unlikely to topple, allows placement of the rows of stacks very close to each other. For an efficient placement in the box adds the fact that the bundles 12 may be placed optionally with the longest side laterally or longitudinally in the box. For example, in a box, some rows may be placed with the stacks in a longitudinal configuration and some rows with the stacks in a lateral configuration. Thus, highly efficient packaging can be achieved by the synthesis of

- inclination of the box 9 and lift 8,
- thin and smooth walls 28a, 28b of the lift 8
- optional selection of a longitudinal or lateral orientation of the stacks due to the adjustment properties of the collector station 5 and the lift 8

[0044] When all the intended stacks 27 have been placed in the box 9, the box 9 is removed at a right angle relative with the way in which it has entered the apparatus 1. When the box 9 has been received in the apparatus in a direction normal to the longitudinal direction of the apparatus and has been filled, it leaves the apparatus again, as illustrated best in FIG. 3e, along the longitudinal direction of the apparatus. This way, the box does not have to be removed in the same way as it has entered, and the boxes can be brought into the apparatus sequentially in a row of boxes, one closely following the other. For removing the box 9, the supporters 30 are lowered, and the box 30 rests on the transversal rollers 36 allowing easy removal of the box 9 from the apparatus 1. While the box 9 is rolling on the rollers 36 from the apparatus, the supporters 30 are at the same time moving for picking up the next box 9'.

[0045] This perpendicular change of direction has the advantage that the boxes 9 mainly are transported on only one side of the apparatus. For example, when the apparatus is placed in the corner of a hall, the boxes 9 may enter the hall through a passage in the first wall near the corner and may leave the hall through an opening in a second wall near the same corner. The boxes 9 are only entering the hall a short distance and do not have to travel through the entire hall and take up space from the hall. This adds to the versatility and efficiency of a system employing the apparatus according to the packing apparatus 1.

[0046] In order for the bundles to be fed into the collector station 5 and the lift 8 in a longitudinal or lateral orientation, a third pre-section may be provided with a turntable; or the turntable may be integrated in the first pre-station 22 or the second pre-station 40. In the pre-stations for measuring the width, weight and/or height, the flow of bundles 12 is typically stopped for a short moment in order to perform the measurements, why a horizontal rotation on a turntable does barely add processing time to the flow of bundles 12, if such a turntable is integrated in such pre-station for measurements.

Claims

1. A method for moving stacks (27, 27a, 27b, 27c) of bundles (12) into a transport unit (9), the method comprising

   - moving bundles (12) of printed matter on a conveyor (4) and into a collector (5), the collector (5) having a vertically moving collector platform (6),
   - receiving on the collector platform (6) single bundles (12) from the conveyor (4) and accumulating the bundles (12) one on top of the other into a stack (27) resting on the collector platform (6),
   - lifting the entire stack (27) off the collector platform (6) by a first lift (13a, 13b) and upward into an elevated position above the collector (5),
   - moving the stack (27) from the first lift (13a, 13b) onto a second lift (8),
   - lowering the stack (27) by the second lift (8) into a transport unit (9).

2. A method according to claim 1, wherein the accumulation of bundles (12) on the collector platform (6) is performed in a repeating sequence with the steps of

   - adjusting the collector platform (6) to be in approximate level with the conveyor (4) and moving a first bundle (12a) from the conveyor onto the collector platform (6),
   - lowering the collector platform (6) by a distance equal to the height of the first bundle (12) in order to adjust the upper surface of the first bundle (12a) to be in approximate level with the conveyer (4),
   - transporting the second bundle (12b) from the conveyor (4) onto the top of the first bundle (12a),
   - repeating the procedure until a stack (27) is obtained according to predetermined parameters.

3. A method according to claim 1 or 2, wherein the collector platform (6) is a collector grid (6) having collector fingers (14) extending laterally from a central grid part, and wherein the first lift has a pair of lifting grids (13a, 13b), each with a number of lifting fingers (23) spaced and positioned relative to the inter-spaced collector fingers (14) in order for the lifting fingers (23) to be able to move through the spaces between the collector fingers (14), wherein the method comprises moving the lifting grids (13a, 13b) upwards with the lifting fingers (23) moving through the space between the collector fingers (14) and thereby lifting the stack (27) off the collector fingers (14).

4. A method according to claim 3, wherein the lifting grids (13a, 13b) are supported on first, horizontal profiles (24) for moving the lifting grids (13a, 13b) laterally in and out of the collector (5) and are supported on second, vertical profiles (35) for moving the lifting grids (13a, 13b) in a vertical direction, wherein the method comprises

   - lifting the pair of lifting grids (13a, 13b) to lift the stack (27)upwards off the collector grid (6),
   - removing the stack (27) from the lifting grids (13a, 13b),
   - spacing the lifting grids (13a, 13b) to a greater mutual distance,
   - lowering the lifting grids (13a, 13b) along a vertical path outside the collector (5),

- reducing the distance between the lifting grids (13a, 13b) by running the lifting grids (13a, 13b) into the collector (5) below the collector grid (6) for start of a new cycle.

5. A method according to any preceding claim comprising starting accumulation in the collector (6) of subsequently arriving bundles (12) into a new stack (27) simultaneously when the first lift (13a, 13b) is on the way up to the elevated position above the collector (5).

6. A method according to any preceding claim comprising lowering the stack (27) or stacks (27a, 27b, 27c) into the transport unit (9) by the second lift (8) during the time it takes to accumulate further bundles (12) in a stack (27) in the collector (5).

7. A method according to any preceding claim comprising accumulating a row of stacks (27a, 27b, 27c) before lowering the stacks (27a, 27b, 27c) into the transport unit (9).

8. A method according to any preceding claim comprising inclining the transport unit (9) and the second lift (8) before lowering the second lift (8) into the transport unit (9).

9. A method according to any claim 8 further comprising readjusting the second lift (8) from the inclined orientation to a vertical orientation before receiving new stacks (27).

10. A method according to any preceding claim comprising adjusting the conveyor (4) relatively to the collector (5) by elongating or contracting a conveyor belt (17) and performing the adjustment by displacing in the longitudinal direction of the conveyor (4) a support profile (16) supporting part of the conveyor (4).

11. An apparatus for a method according to any preceding claims, wherein the apparatus has a second lift (8) with side walls (28a, 28b) provided with flaps (19a, 29b) extending transversely from the side walls (28a, 28b) in order to support the stacks (27) of bundles (12), wherein the flaps (29a, 29b) are rotatably hinged in hinges (30) and prevented from rotation in the stack-supporting state by a blocking mechanism, wherein the blocking mechanism is releasable by a release mechanism that comprises a vertically oriented plate (33) which is slidingly integrated in the side wall (28a, 28b) and plane with the surface of the side wall (28a, 28b).

FIG. 1a

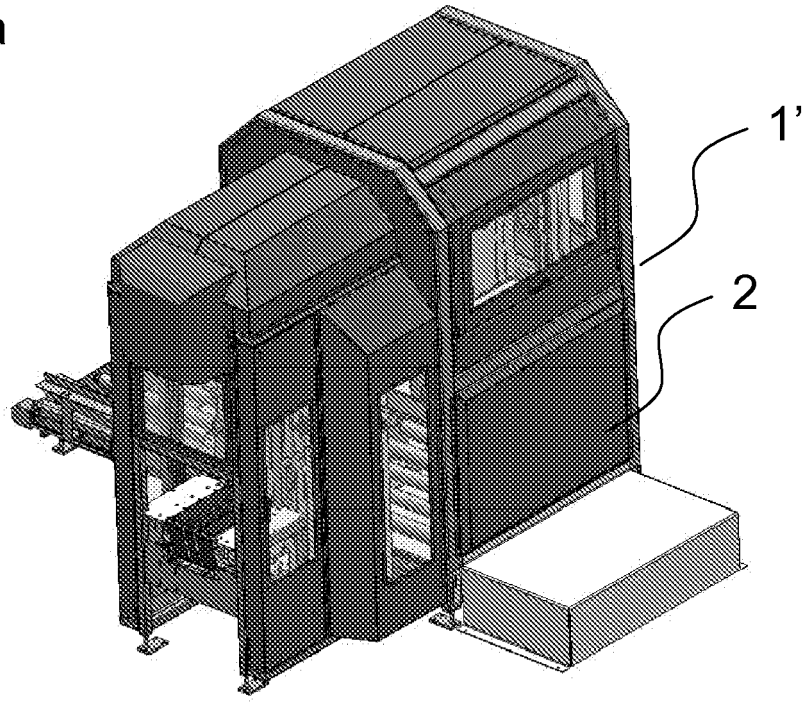
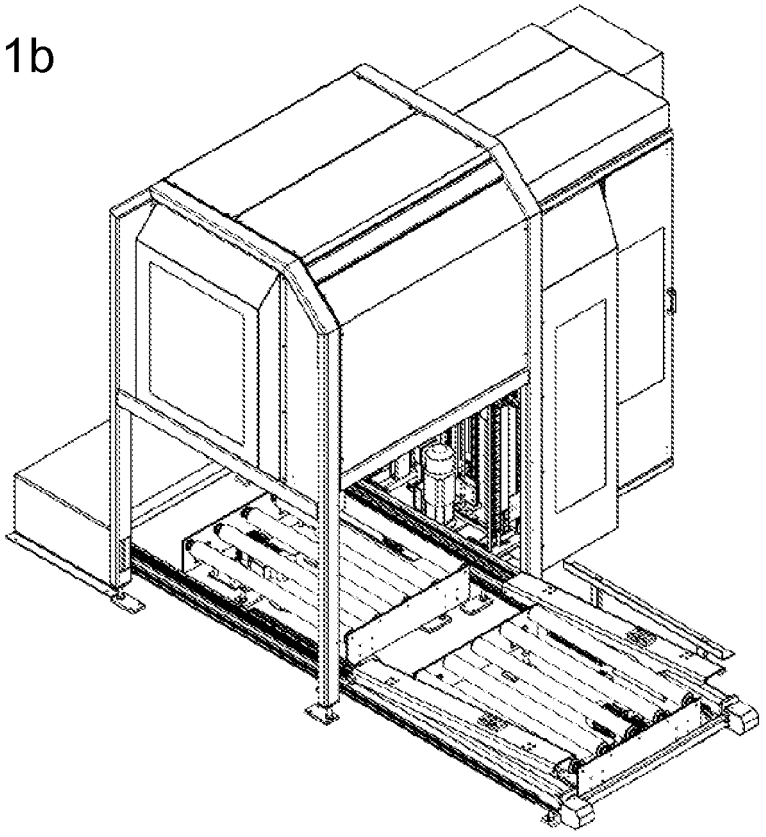


FIG. 1b



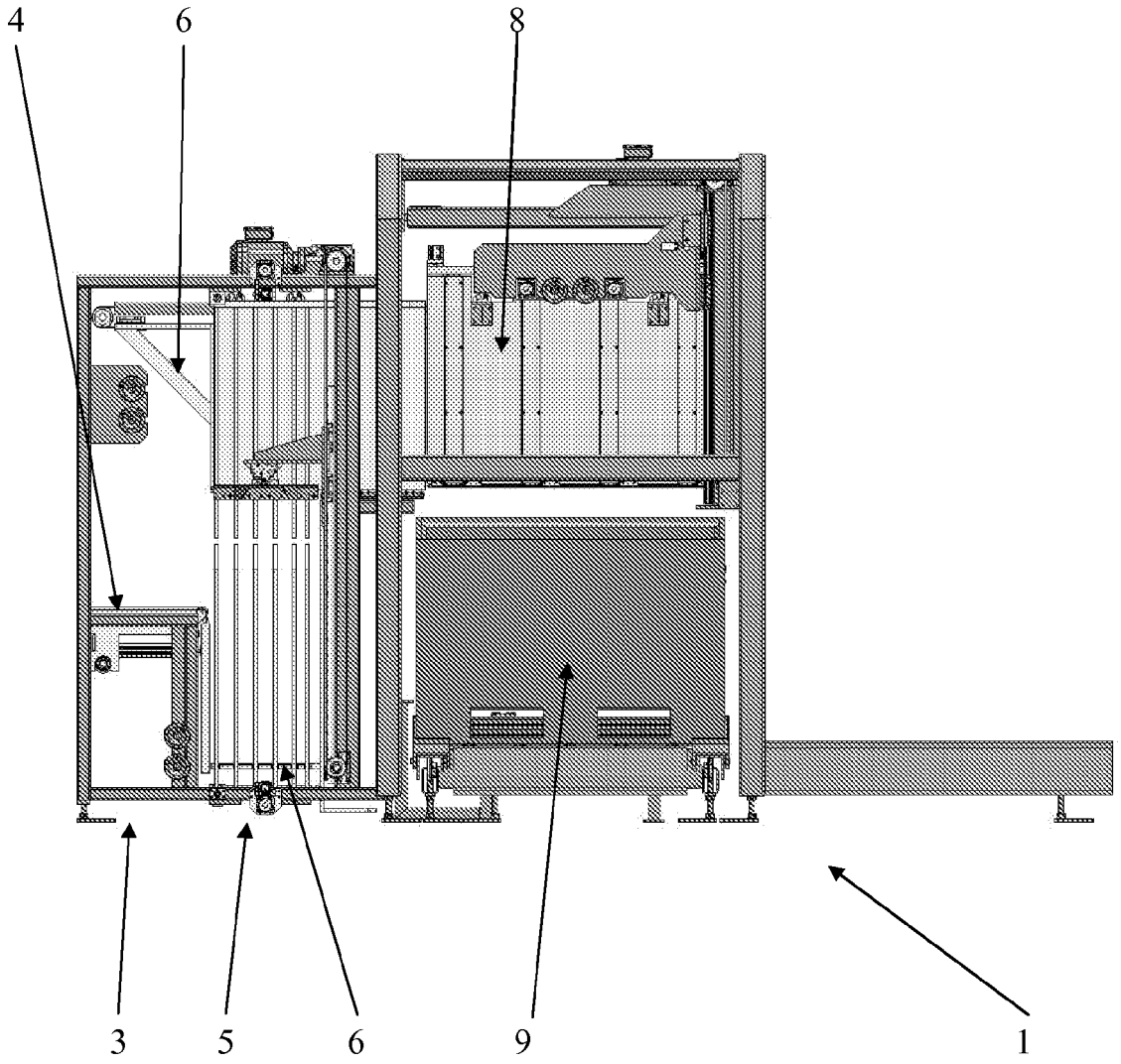


FIG. 2

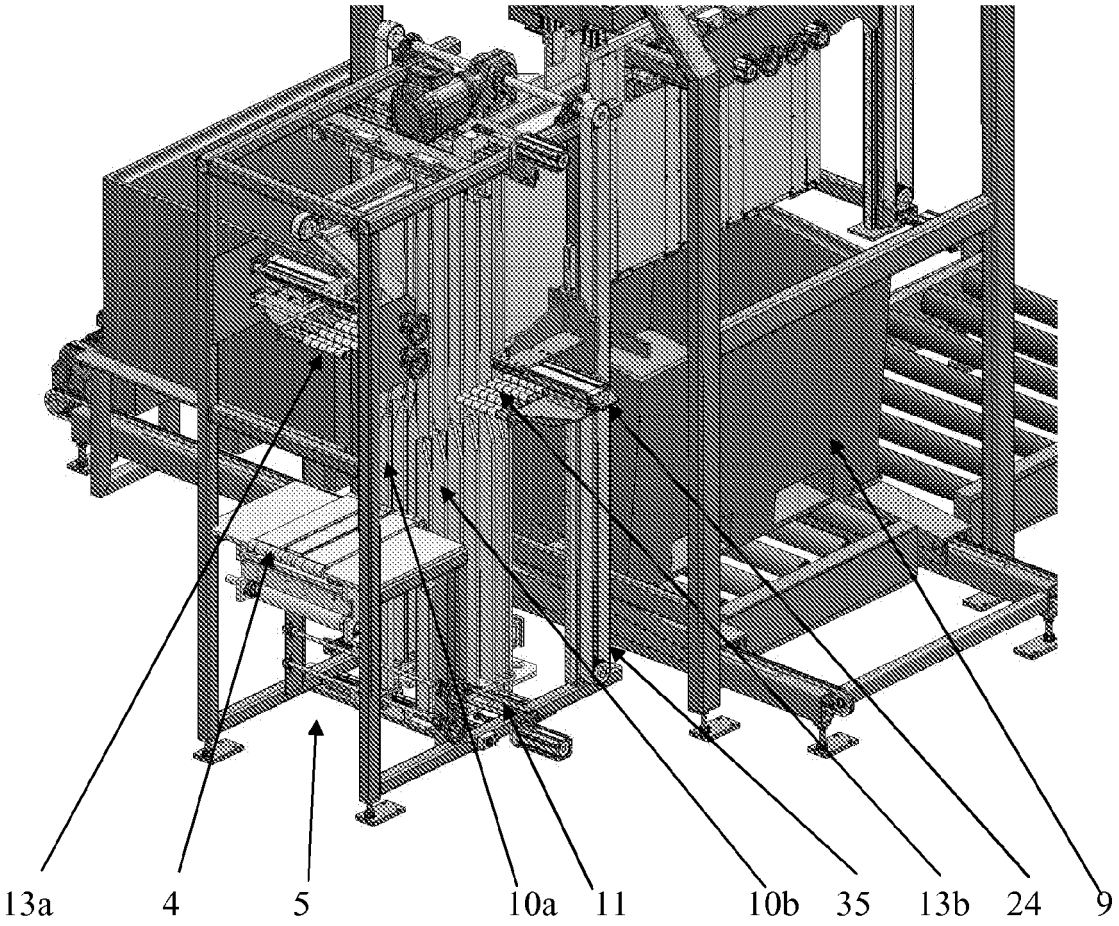


FIG. 3a

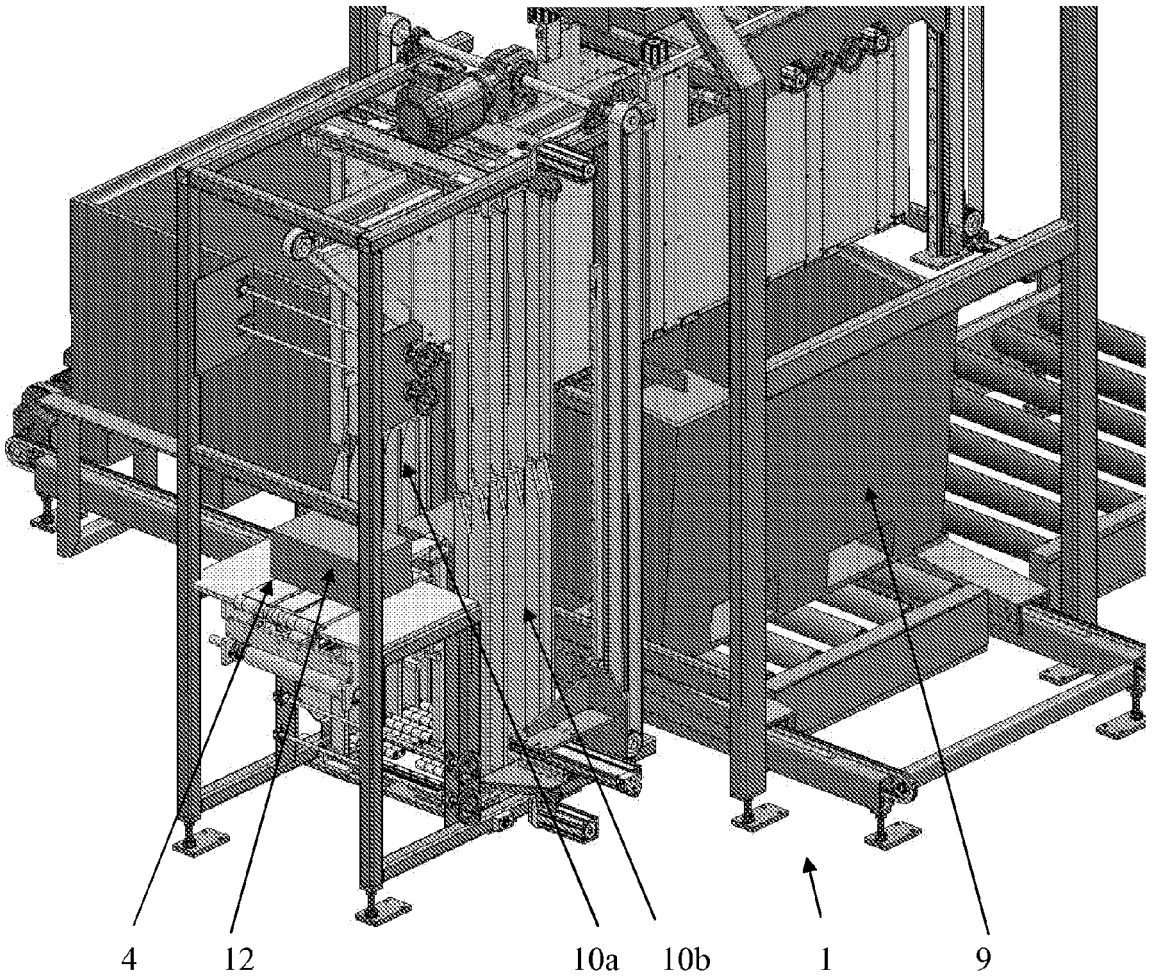


FIG. 3b

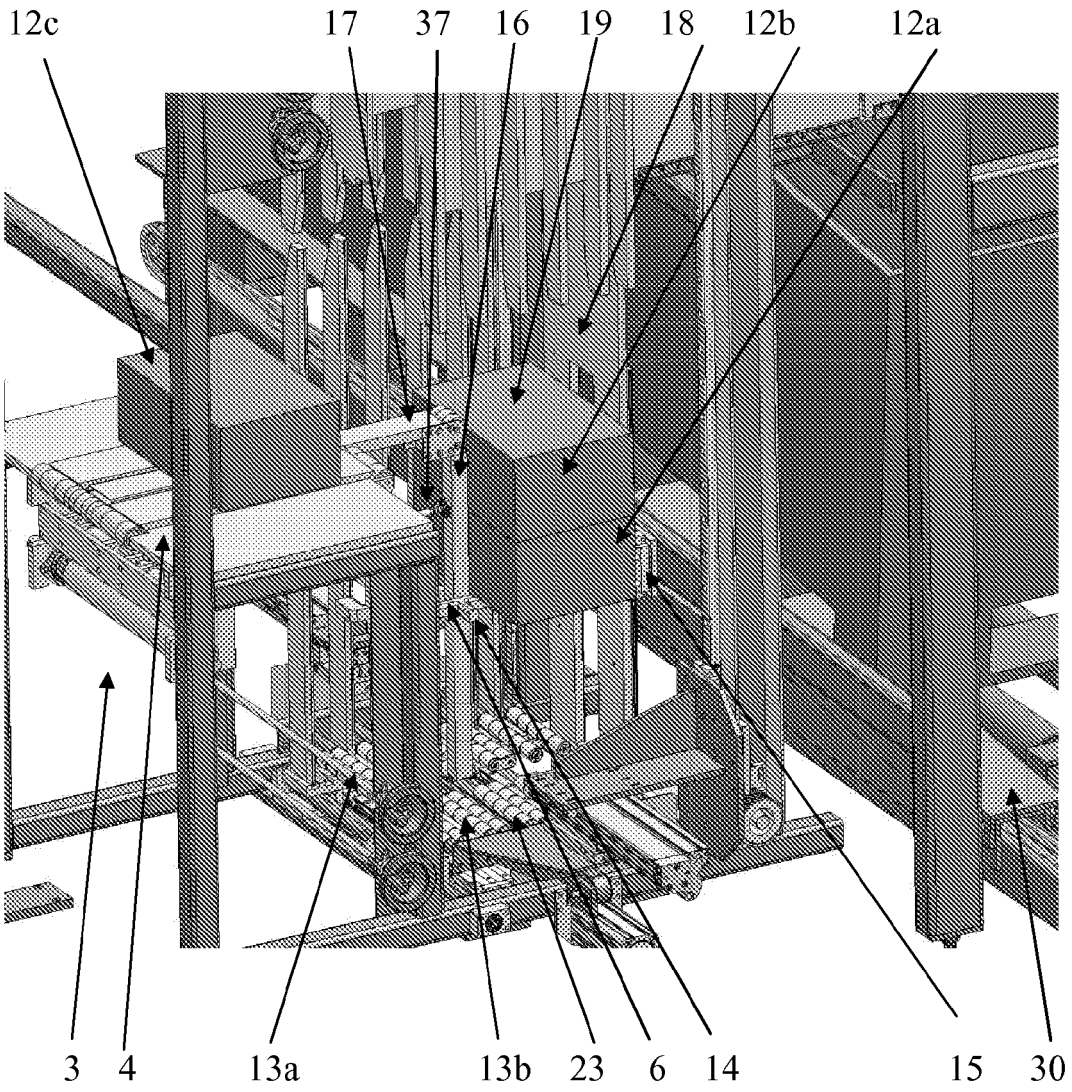


FIG. 3c

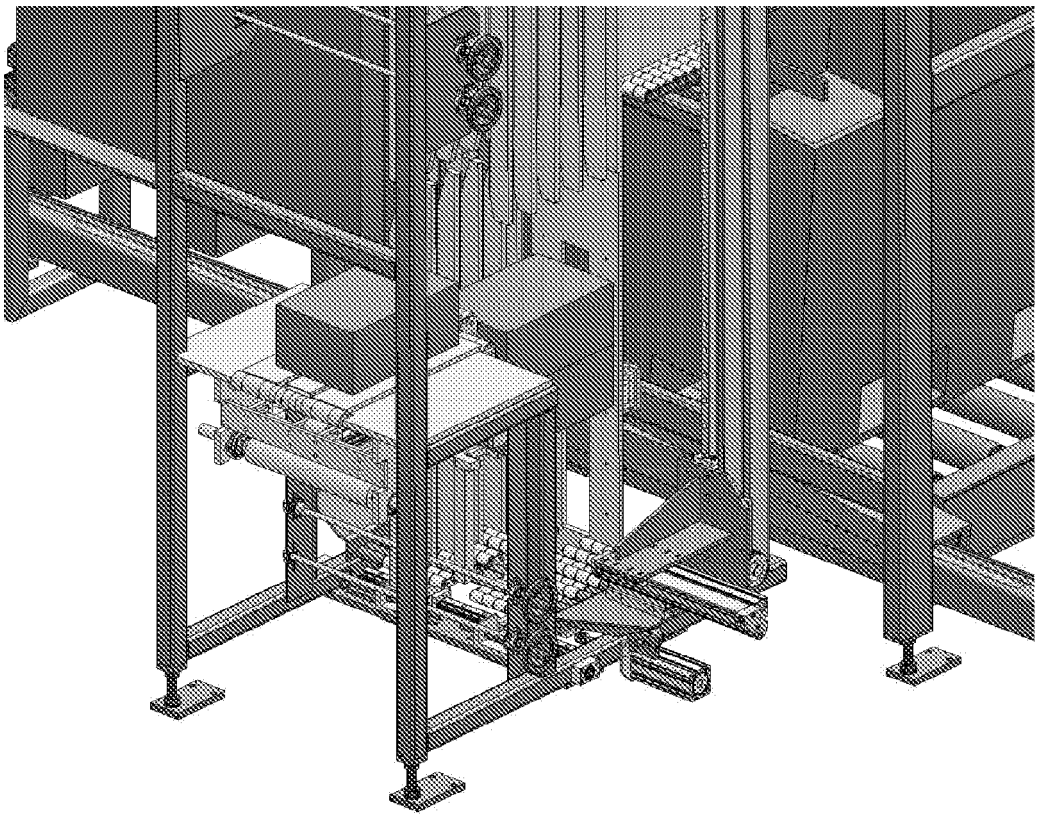


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FIG. 3d

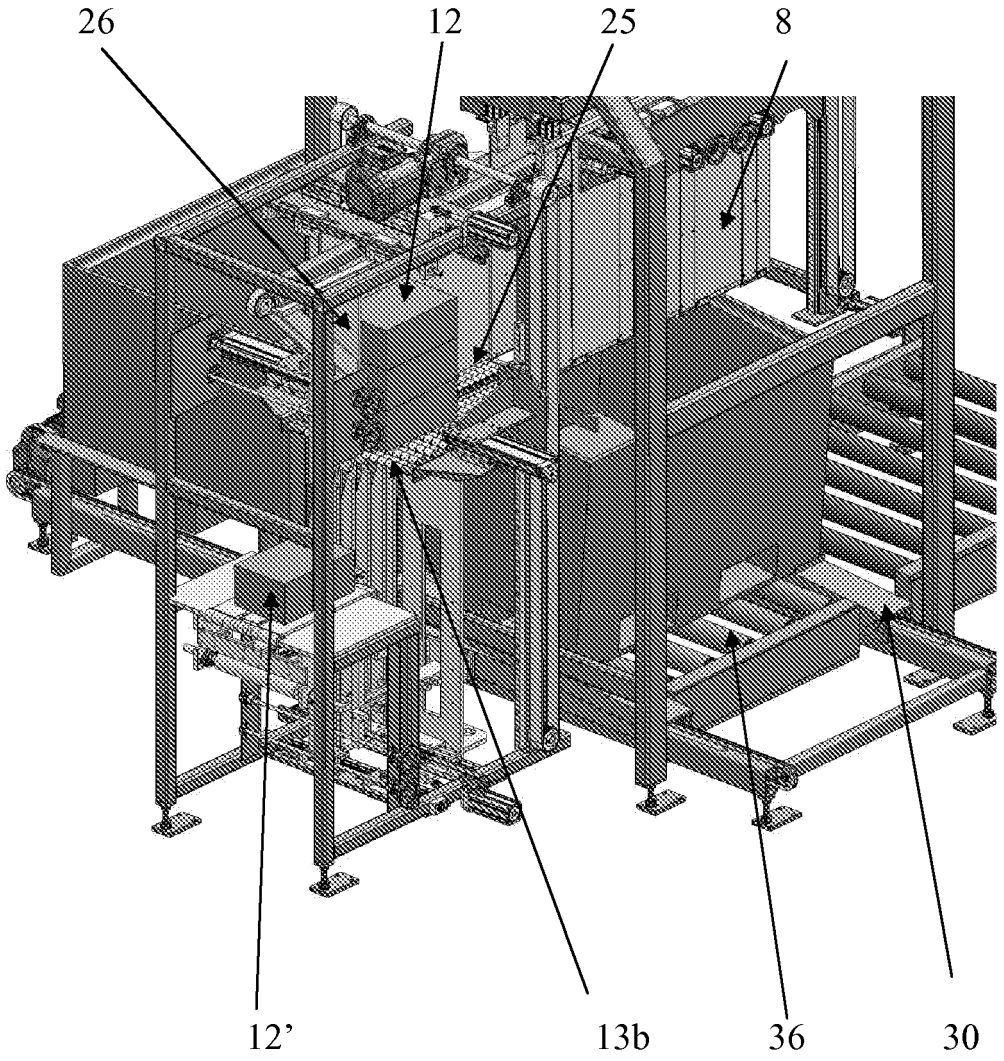


FIG. 3e

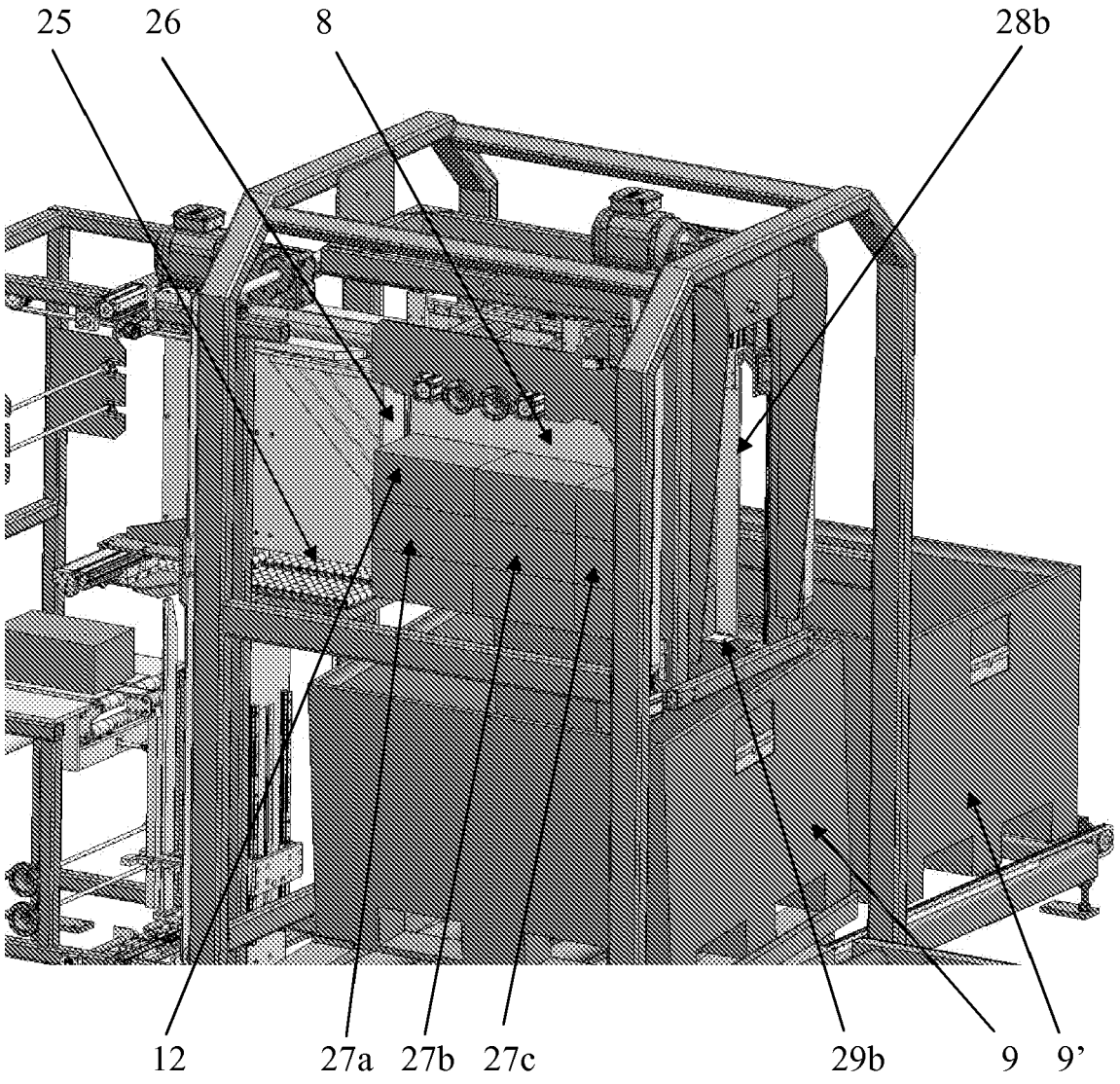


FIG. 3f

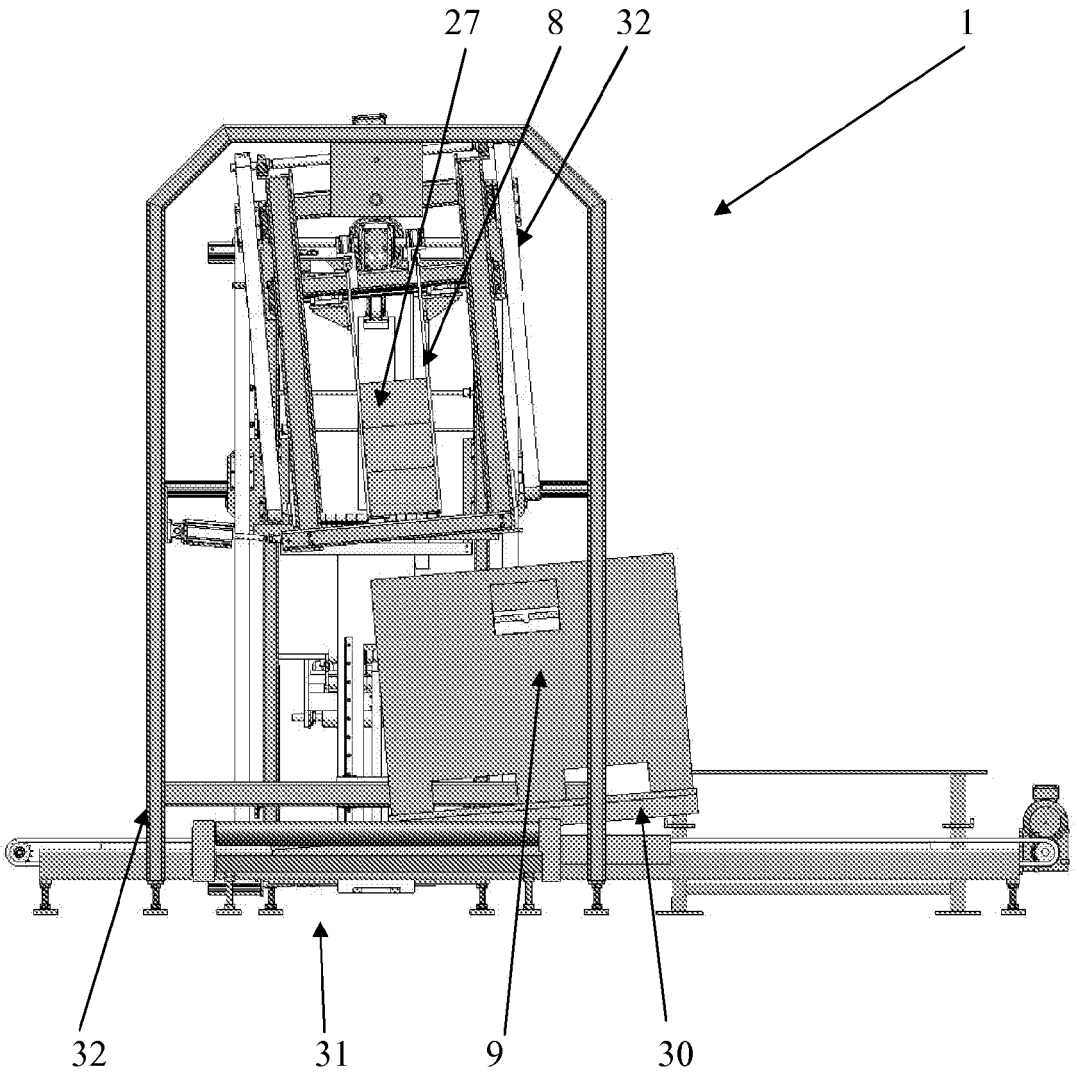


FIG. 4a

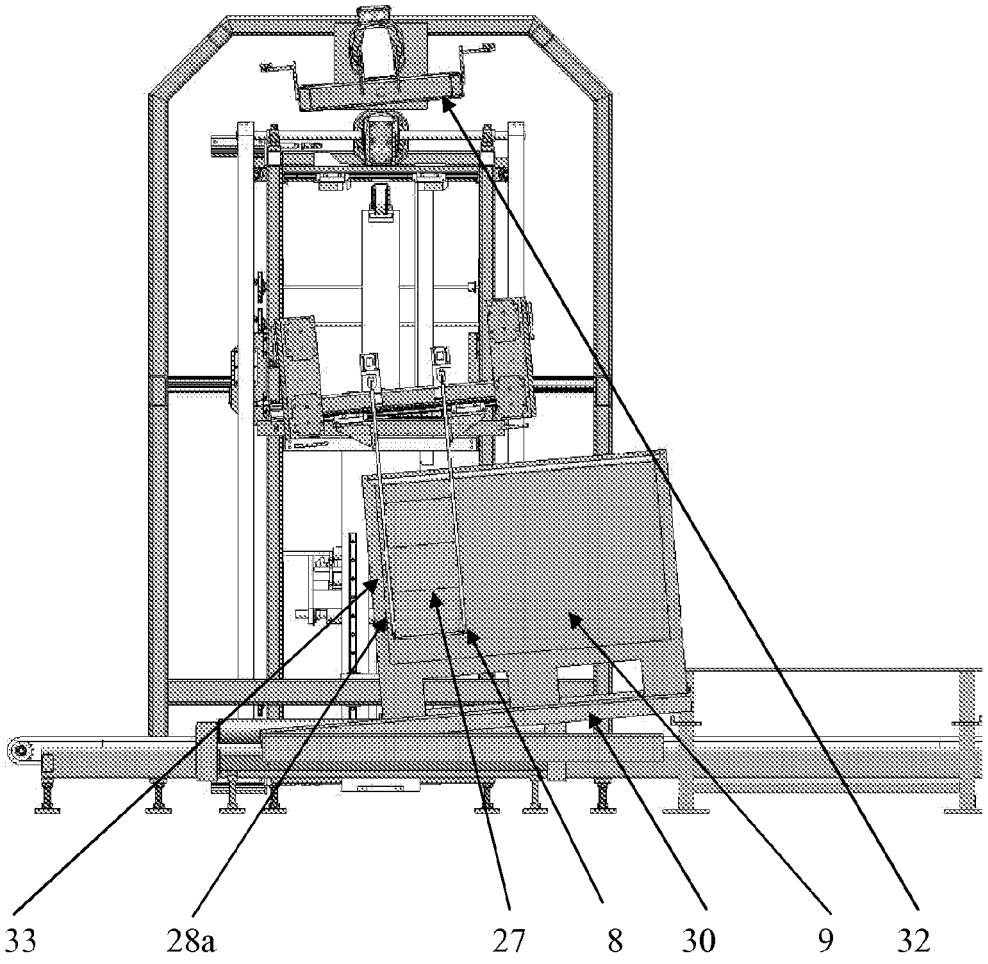


FIG. 4b

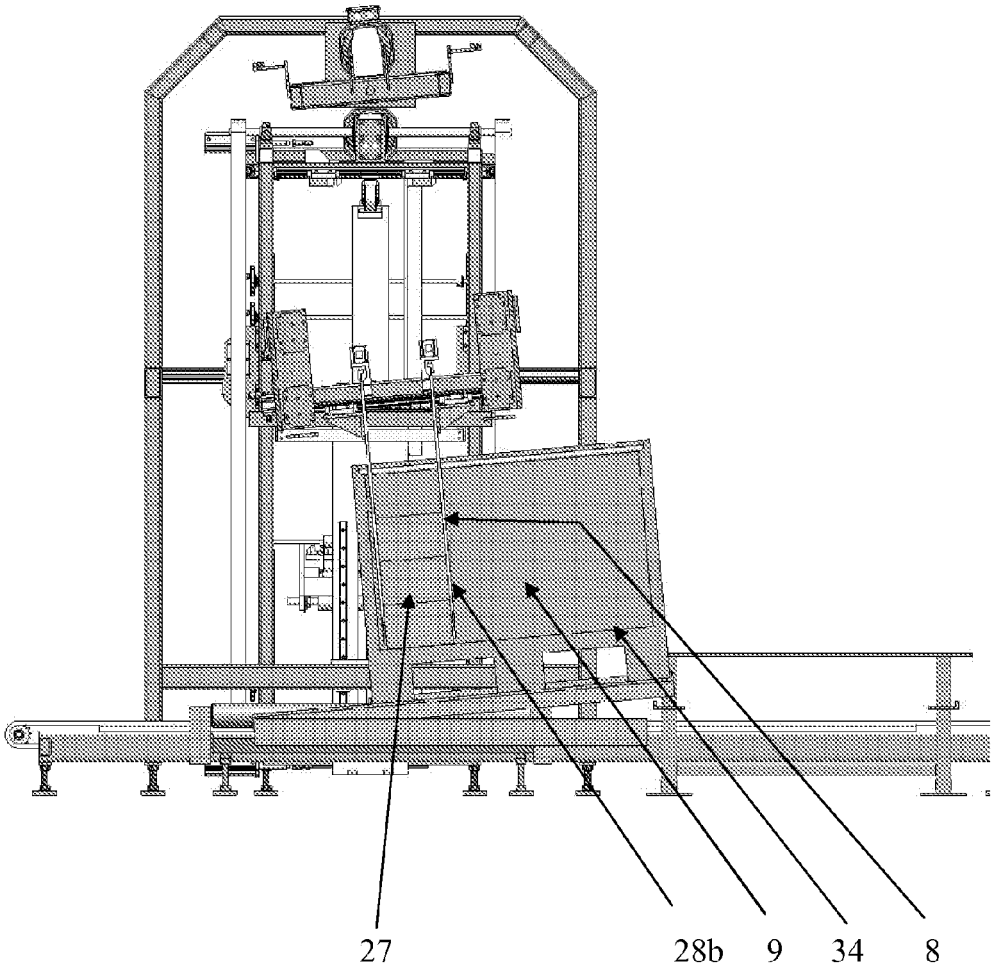


FIG. 4c

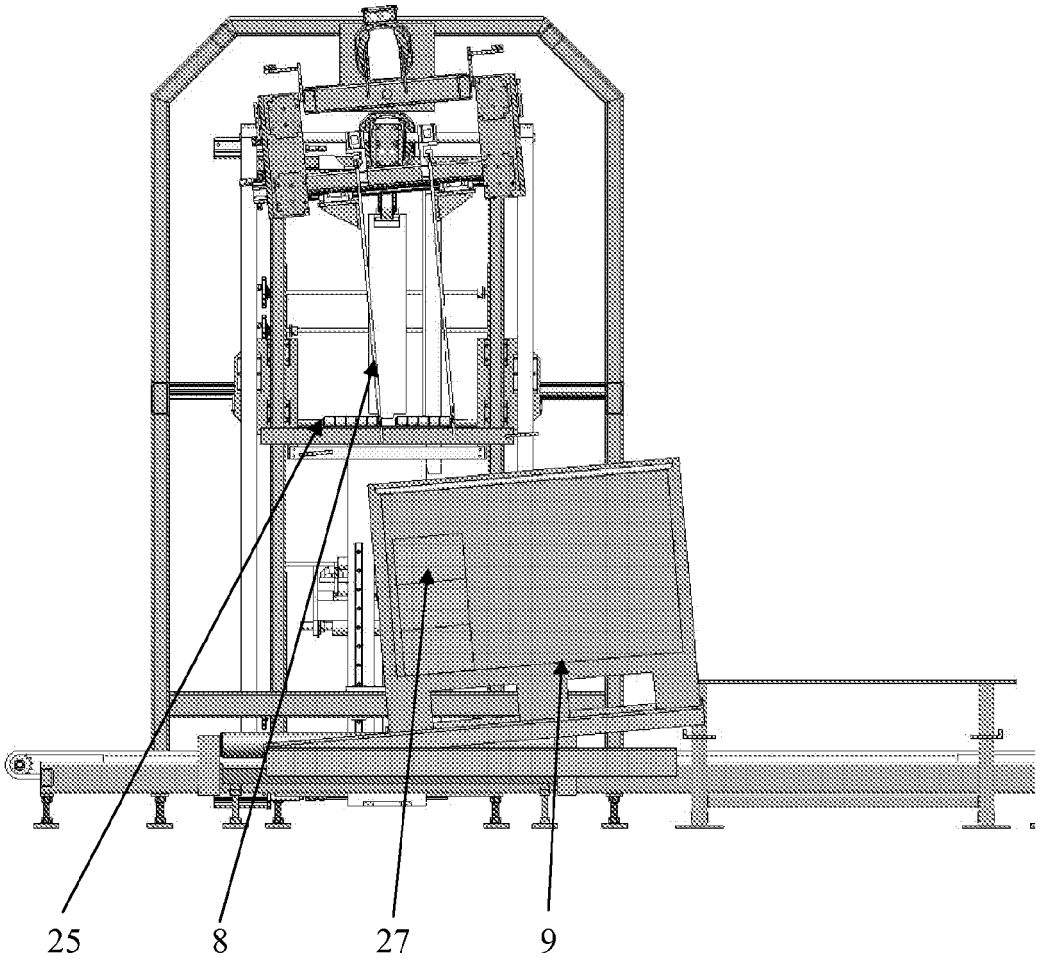


FIG. 4d

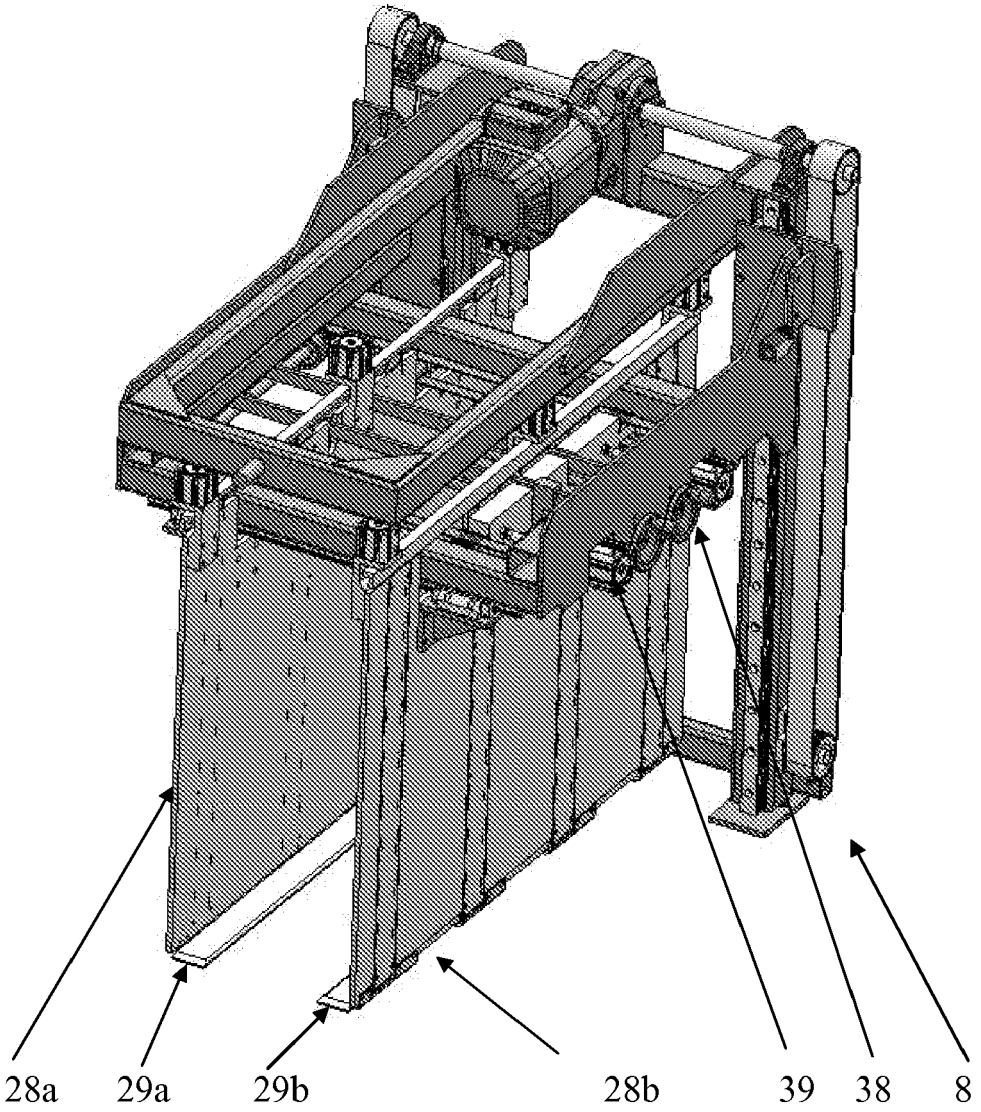
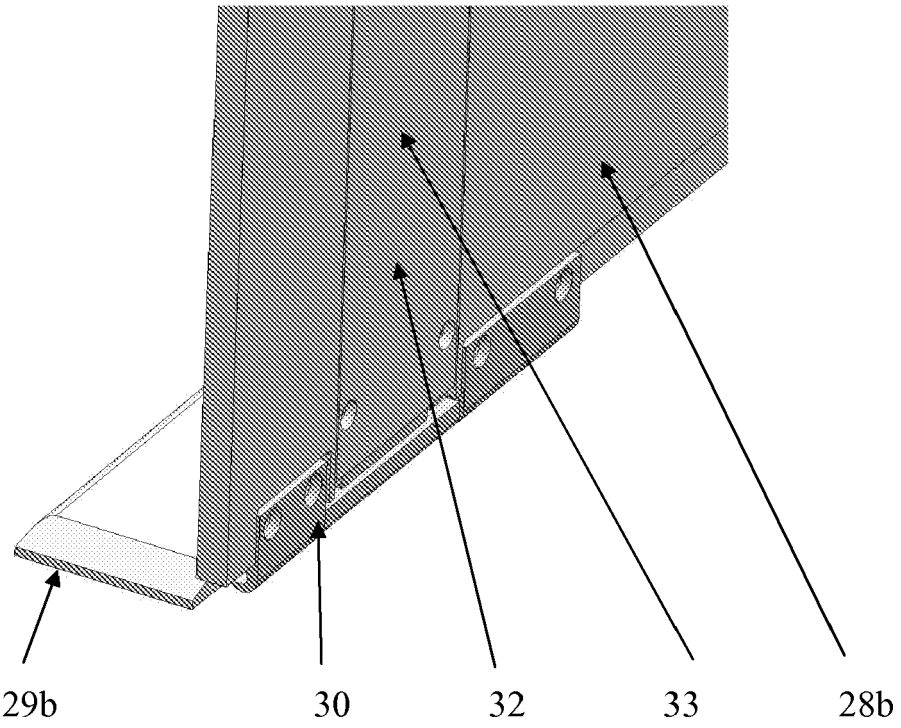


FIG. 5a

FIG. 5b



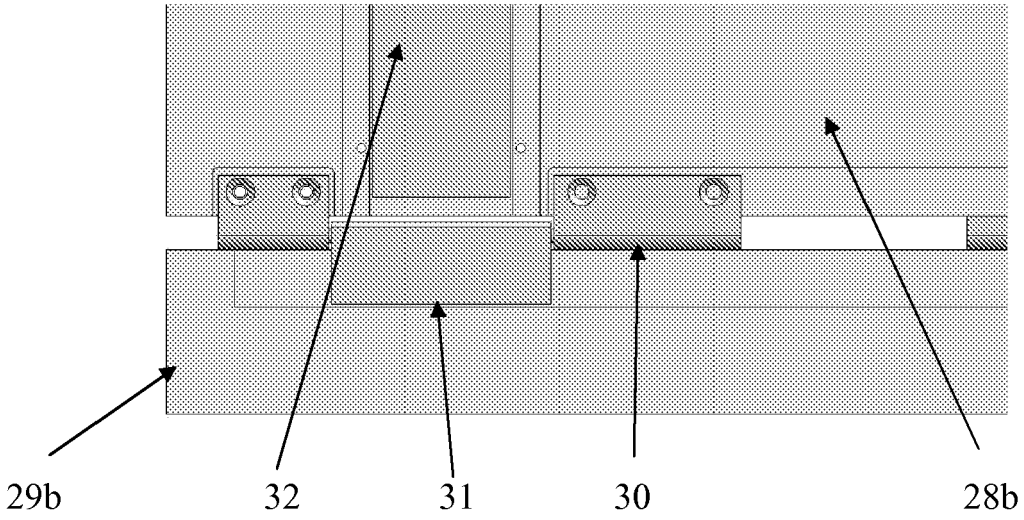


FIG. 5c

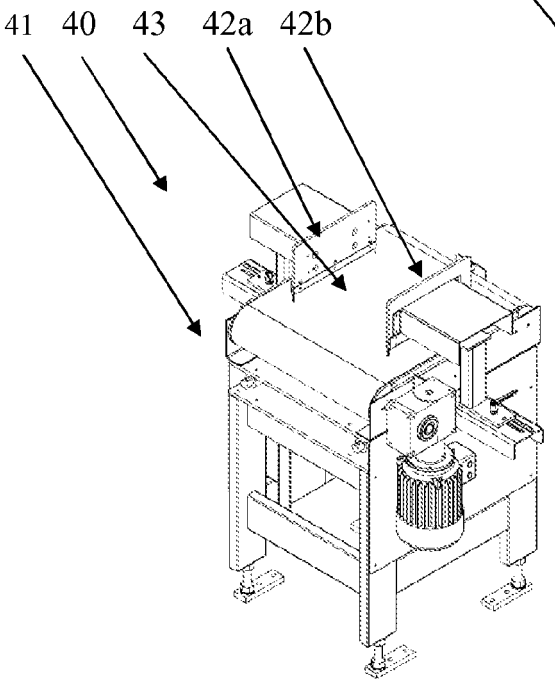


FIG. 6

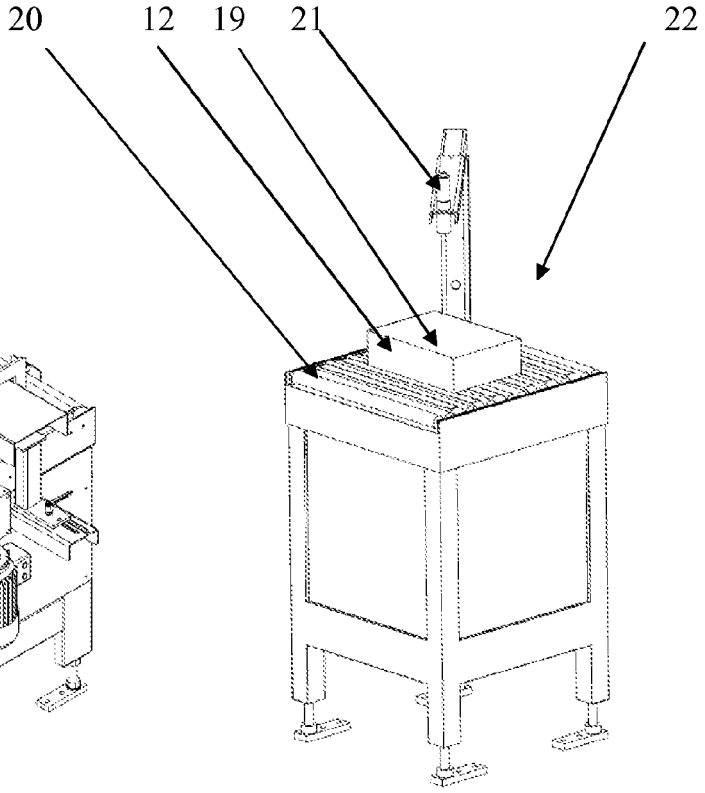


FIG. 7

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EUROPEAN SEARCH REPORT

Application Number
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	12 April 2010	Jagusiak, Antony

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