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(54) **A METHOD AND AN APPARATUS FOR EMPTYING VARIOUS TYPES OF TRAYS FILLED WITH ROD LIKE ARTICLES OF THE TOBACCO INDUSTRY, AND CONVERTING UNIT DESIGNED TO CHANGE TRAY'S CONFIGURATION**

VERFAHREN UND VORRICHTUNG ZUM ENTLEEREN VERSCHIEDENER ARTEN VON SCHRAGEN, DIE MIT STABARTIGEN ARTIKELN DER TABAKINDUSTRIE GEFÜLLT SIND, UND UMWANDLUNGSEINHEIT ZUR ÄNDERUNG DER KONFIGURATION DER SCHRAGEN

PROCÉDÉ ET APPAREIL PERMETTANT DE VIDER DIVERS TYPES DE RÉCIPIENTS REMPLIS D'ARTICLES EN FORME DE TIGE DE L'INDUSTRIE DU TABAC ET UNITÉ DE CONVERSION DESTINÉE À CHANGER LA CONFIGURATION DU RÉCIPIENTS

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EP 3 484 313 B1

Description

[0001] The object of the invention is a method and an apparatus for emptying of a tray of different types filled with rod like articles of the tobacco industry, and a converting unit designed to change the tray configuration.

[0002] Tobacco industry's factories manufacture various articles for smoking. Both finished and semi-finished products made at successive production stages may be jointly referred to as rod like articles which may be transported on conveyors or in trays. Plastic trays which are used for all types of rod like articles, among others for cigarettes, cigarillos, cigars and filter material rods, are commonly used in the tobacco industry. Plastic trays have the shape of a cuboid without two adjacent walls, i.e. these are trays having four walls. Plastic trays are rigid and are used for temporary storage and transport of rod like articles on the premises of tobacco factories. Cardboard trays designed as five-wall trays are commonly used for the transport of filter rods outside the factory premises. Cardboard trays have thinner walls, are less rigid and easily deformable, with one swinging wall. Filling of a five-wall tray takes place after opening of a tray i.e. after swinging the swinging wall. After the filling, the tray must be closed i.e. the swinging wall must be turned to its original position. The same swinging wall is swung in order to empty the tray. In the transport time, the filled tray is covered with a lid in order to protect the rods collected inside. The apparatuses for unloading of four-wall and five-wall trays are essentially similarly built, however, the mechanisms of the apparatus must be differently adjusted for each type of tray, moreover, one of the walls of the five-wall tray must be swung before unloading. The type and the physical parameters of unloaded rod like articles also influence the unloading process. The object of the invention is a machine adapted to empty the trays of two types with different configurations, the five-wall tray being the tray of the first type and the four-wall tray being the tray of the second type. The four-wall tray may be made of any material.

[0003] An apparatus for emptying of five-wall cardboard trays is known from the patent EP1118543B1. A differently built apparatus for emptying of five-wall cardboard trays is known from the publication WO2015033264A1. Apparatus for emptying of four-wall trays are known from the documents GB2043603A, EP1086628B1, US3759408A, EP1656841A1, and US3298549. Prior art does not reveal any apparatus adapted to unloading various types of trays and provided with a unit designed to change the trays configuration. According to the solution known from the document GB2148853A, a cardboard five-wall tray intended to be emptied is placed in a plastic four-wall tray whereas after placing it in the plastic tray, one wall of the five-wall tray is manually swung. Trays, which are put together and secured from separation by means of a special holder holding the swung wall, are placed on a tray unloader.

[0004] The object of the invention is an apparatus for emptying of two types of trays for rod like articles of the tobacco industry, while the five-wall tray being the tray of the first type and the four-wall tray being the tray of the second type, the apparatus is provided with a filled tray station of the first type or the second type, a turning unit designed to turn the filled tray of the first type or the second type, a lifting unit designed to lift the turning unit, a station for emptying of the tray of the first or the second type, a station for empty trays of the first or the second type, a control system controlling the subassemblies of the apparatus. The apparatus according to the invention further comprises a converting unit being adapted to change the configuration of the tray of the first type into a configuration corresponding to the configuration of the tray of the second type. The converting unit is adapted to change the configuration of the tray of the first type into a configuration corresponding to the configuration of the tray of the second type when the tray of the first type is delivered for unloading, and to maintain the configuration of the tray of the second type when the tray of the second type is delivered for unloading, the converting unit is further provided with a linearly operating lifting mechanism designed to lift the hinged wall and the connecting members and a linearly operating pressing mechanism designed to press the hinged wall and the connecting members to other walls of the tray, and further the turning unit is adapted to add to the rotation of the tray a translation transversely to the axis of the rotation shaft, and in a direction with a tangent component to the rotation.

[0005] The manufacturers of articles for smoking who process semi-finished products stored in various trays in the production process may reduce the expenditure on the machinery because the apparatus according to the invention may unload both plastic and cardboard trays, whereas no additional parts are required to adapt the machine to any type of tray.

[0006] The apparatus according to the invention is further characterised in that the turning unit designed to turn the filled tray has a holding mechanism provided with gripping members designed to hold the tray and adapted to move the tray transversely to the axis of the shaft of the turning unit.

[0007] The apparatus according to the invention is further characterised in that the holding mechanism is attached to a linear guide designed to move the tray transversely to the axis of the shaft of the turning unit. The apparatus according to the invention is further characterised in that the gripping members comprise lateral grippers, a bottom gripper, and a sliding cover.

[0008] The apparatus according to the invention is further characterised in that the apparatus is provided with a lifting unit designed to lift the filled tray from the filled tray station.

[0009] The apparatus according to the invention is further characterised in that the converting unit is an opening unit designed to swing a hinged wall of the tray of the first type.

[0010] The apparatus according to the invention is further characterised in that the opening unit designed to swing

the hinged wall of the tray of the first type is situated above the lifting unit designed to lift the filled tray.

[0011] The apparatus according to the invention is further characterised in that the apparatus is provided with a tray type detection unit.

[0012] The object of the invention is also a method for emptying of two types of trays with different configuration for rod like articles of the tobacco industry while the five-wall tray being the tray of the first type and the four-wall tray being the tray of the second type, wherein the filled tray of the first type or the second type is placed on the filled tray station, the filled tray of the first type or the second type is conveyed along the filled tray station, the filled tray of the first type or the second type is gripped by means of the turning unit, the filled tray of the first type or the second type is lifted, the filled tray of the first type or the second type is turned by means of the turning unit, the filled tray of the first type or the second type is placed in the filled tray emptying station, the empty tray of the first type or the second type is conveyed to the empty trays station, the empty tray of the first type or the second type is received from the empty trays station. The method according to the invention is characterised in that after the delivery of the filled tray of the first type the converting unit is activated, the configuration of the tray of the first type is converted to a configuration corresponding to the configuration of the tray of the second type, whereas the configuration of the tray of the first type is changed into a configuration corresponding to the configuration of the tray of the second type when the tray of the first type is delivered for unloading, and the configuration of the tray of the second type is maintained when the tray of the second type is delivered for unloading, moreover during the turning of the filled tray a translation transversely to the axis of the rotation shaft, and in a direction with a tangent component to the rotation is added.

[0013] Due to the use of the machine according to the invention, the operator does not have to take any further action apart from placing the trays on the filled trays station and swinging the hinged wall. Thus the operator is not additionally engaged, in terms of time, in operating the apparatus according to the invention.

[0014] The method according to the invention is further characterised in that during the turning of the filled tray the filled tray is moved away transversely to the axis of the shaft of the turning unit.

[0015] The method according to the invention is further characterised in that before the tray is gripped by the turning unit, the filled tray is lifted on the lifting unit designed to lift filled trays.

[0016] The object of the invention is also a converting unit designed to change the configuration of the tray of the first type having at least one hinged wall provided with connecting members designed to connect the hinged wall with other walls of the tray into a configuration corresponding to the configuration of the tray of the second type not having a swinging wall, provided with pushing members designed to lift the hinged wall and the connecting members, and with pressing members designed do press the hinged wall and the connecting member to other walls of the tray. The unit according to the invention is characterised in that the unit is further provided with a linearly operating lifting mechanism designed to lift the swinging wall and the connecting members, and a linearly operating pressing mechanism designed to press the hinged wall and the connecting members to other walls of the tray.

[0017] The unit according to the invention is further characterised in that the lifting mechanism is built of at least two actuators provided with pushing members.

[0018] The unit according to the invention is further characterised in that the pressing mechanism is built of at least two actuators provided with pressing members.

[0019] The tray emptying apparatus according to the invention allows for the operation of the machine with various types of trays. As a result, the operator does not have to make a time-consuming change of machines configuration, and it is not necessary to store a set of parts required to change the configuration of the machine. The conversion of the tray takes place without extending the machine operation time.

[0020] The object of the invention was shown in detail in a preferred embodiment in a drawing in which:

Fig. 1	shows a filled four-wall tray (of the second type) in a perspective view, with the front side of the tray being visible,
Fig. 2	shows the filled five-wall tray (of the first type) in a configuration of the tray of the second type in a perspective view, with the front side of the tray being visible,
Fig. 2a	shows the filled five-wall tray (of the first type) in a configuration of the tray of the second type in a perspective view, with the back side of the tray being visible,
Fig. 2b	shows the filled five-wall tray (of the first type) in a configuration of the tray of the second type in a perspective view, with the front side of the tray being visible,
Fig. 3	shows a tray emptying machine in a side view,
Fig. 3a	shows a turning unit and a tray lifting unit in a view from the back of the machine,
Fig. 3b	shows a converting unit and the tray of the first type in a view from the back of the machine,
Fig. 3c	shows the converting unit and the tray of the first type in a side view,
Fig. 3d	shows pressing members of the converting unit and a tray of the first type in a top view,
Fig. 3e	shows the pressing members of the converting unit and the tray of the first type in a top view,
Fig. 4	shows the tray emptying machine in a side view,

Fig. 5	shows a handling module in a side view,
Fig. 6	shows the tray emptying machine in a side view, with the turning unit being shown in several working positions,
Fig. 7	shows the paths of movement of the four-wall tray - of the second type,
Fig. 8	shows the paths of movement of the four-wall tray - of the second type,
Fig. 9	shows the paths of movement of the five-wall tray - of the first type,
Fig. 10	shows the paths of movement of the five-wall tray - of the first type,
Fig. 11, 12, 13 and 14	show successive phases of movement of the turning unit.

[0021] In this description, the invention will be described with reference to a four-wall tray 3 shown in a simplified way in Fig. 1 and to a five-wall tray 13 shown in Fig. 2. Both trays were shown as filled in upright position, i.e. in such position in which the filled trays are placed in the filled trays station of the filled tray emptying machine. The filled space of the trays was marked by shading with lines, with only several examples of rod like articles R lying at the bottom of the tray. In such upright position, the filled trays are placed by the operator onto the filled trays station, whereas the operator holds the tray by the sidewalls in such a way that he can see the tray contents. Such expressions as upper, bottom, lateral and back will refer to the position of the trays shown in Figs. 1 and 2, with the front side, left lateral side and upper side of each tray being visible therein. The four-wall tray 3 has a bottom wall 3B on which its stands, a back wall 3A and two lateral walls, a left lateral wall 3L and a right lateral wall 3R, whereas the designation of the sides refers to the position in which the tray can be seen by the operator putting a filled tray onto the filled trays station, with the open front side 3G of the trays 3 being directed towards him. The filling and the emptying of the tray takes place through the open side 3T.

[0022] Four-wall trays may be made of plastic or other suitable material ensuring an adequate rigidity and are usually designed for multiple uses.

[0023] The five-wall tray 13 has a bottom wall 13B on which it stands, a back wall 13A and two lateral walls, a left lateral wall 13L and a right lateral wall 13R. The five-wall tray 13 has a swinging upper wall 13T' which is designated as self-aligning relative to the back wall 13A of the tray 13 with which it is connected along the edge 13E. The upper wall 13T' has two swinging lugs 13FL and 13FR which, for the transport time, are inserted into a slot in the corresponding lateral walls 13L and 13R. After putting the filled five-wall tray 13 onto the filled trays station, the operator lifts the upper wall 13T' so that the swinging lugs 13FL and 13FR pull out of the walls 13L and 13R and loosely hang down on the side outside the lateral walls 13L and 13R. Figs. 2a and 2b show the five-wall tray 13 at a later stage the emptying cycle of the five-wall tray 13 in an open configuration identical with the configuration of the four-wall tray. The upper wall 13T' is swung so as to allow emptying the five-wall tray 13 through the upper open side 13T of the five-wall tray. The filling of the five-wall tray 13 also takes place through the upper side 13T. Similar to the four-wall tray 3, the operator puts the five-wall tray 13 onto the filled trays station while holding the five-wall tray 13 with the open side 13G directed towards him.

[0024] Five-wall trays 13 may be made of cardboard or other cheap material, are usually softer than the four-wall trays and are usually designed for a single use.

[0025] The tray 3, 13 emptying machine 1 described below, being a tray unloader, is adapted to empty both rigid four-wall trays jest 3 and less rigid five-wall trays 13 without the necessity of changing the machine configuration. For the sake of simplicity, the units belonging to the tray emptying machine 1 according to the invention were shown in Fig. 3 in simplified terms without the drive mechanisms; the outer contour of the machine was shown with a broken line. The tray emptying machine 1 is provided with a filled trays station 2 onto which the filled four-wall trays 3 or five-wall trays 13 to be unloaded are placed by the operator. The filled trays station 2 may be designed as a conveyor 4 provided with two conveyor belts for the conveyance of trays 3, 13; the trays 3, 13 may also be conveyed by means of chains having links with a flat bearing surface. From the filled trays station 2, the trays 3, 13 are fed as first filled trays 3', 13' in order to deliver them for unloading, whereas a plurality of filled trays 3, 13 is collected on the filled trays station 2. The feeding of the first filled tray 3', 13' from all filled trays 3, 13 standing in the station 2 may take place after the lifting of all filled trays 3, 13 from the conveyor 4 except for the first tray 3', 13' which is transported by the conveyor 4. The lifting of the trays 3, 13 may take place by means of a lifting device 4A with whose movement the lowering of a locking device 4B is coupled, which allows the first filled tray 3', 13' transported by the conveyor 4 to pass through. After the feeding of the first filled tray 3', 13', the lifting device 4A is lowered, the trays 3, 13 lifted earlier by the lifting device 4A are put onto the conveyor 4, and the locking device 4B is lifted. The filled trays station 2 is provided with lateral guides 4C situated on two sides of the trays 3, 13 conveyed along the filled trays station 2. The lateral guides 4C are convergently positioned in the feeding direction i.e. from the back part 2A to the front part 2B of the filled trays station 2, whereas the convergence of the lateral guides 4C may be adjusted depending on the kind of the tray 3, 13, for example on the rigidity of the tray 3, 13. Moreover, the lateral guides 4C may be positioned at different heights also depending on the kind of the tray 3, 13, especially on the rigidity of lateral walls of the tray 3, 13 and on the shape of lateral walls of the trays 3, 13. The filled trays station 2 may be provided with an adjustable support element 5; the adjustment of position of the support element 5 is required to allow stopping the filled tray 3, 13 at a place from which it may be easily collected or lifted. Due to the difference in rigidity, the four-wall tray 3 and the five-wall tray 13 may require a different position of the adjustable support

element 5. The filled tray 3, 13 is placed by the operator in the back part 2A of the filled trays station 2. In the front part 2B of the filled trays station 2, a lifting unit 6 designed to lift the filled tray 3, 13 is situated. The lifting unit 6 may be embodied as a lift designed to lift filled trays from the conveyor 4 of the filled trays 3, 13 station 2, with the mechanism of the lifting unit 6 being situated below the conveyor belts of the conveyor 4.

[0026] The tray emptying machine 1 is provided with two opening units 21L, 21R (Fig. 3) designed to open the upper wall 13T' of the five-wall tray 13. The opening units 21L, 21R have for example rotational working elements 22L and 22R (Fig. 3a) which swing the upper wall 13T'. The five-wall tray 13 shown in Fig. 2 has a configuration hereinafter referred to as the configuration of the first type while the four-wall tray 3 shown in Fig. 1 has a configuration hereinafter referred to as the configuration of the second type. It is possible to convert the five-wall tray 13 from the configuration of the first type to the configuration of the second type by swinging the wall 13T' and pressing the same to the wall 13A, and then pressing the lugs 13FL and 13FR to the lateral walls 13L and 13R, respectively. The five-wall tray 13 may be gripped by the turning unit 10 only after the conversion of the five-wall tray to the configuration of the second type. The opening unit 21L and the opening unit 21R together constitute a converting unit which changes the tray configuration from the configuration of the first type (i.e. the tray with the fifth wall covering the inside of the tray) to a configuration corresponding to the tray configuration of the second type (i.e. the four-wall tray in which the inside of the tray is not covered by the fifth wall).

[0027] The lifting unit 6 designed to lift the filled trays 3, 13 is provided with brackets 7A, 7B and 7C shown in Fig. 3a. In order to avoid the tray deformation, at the time of lifting the filled tray 3, 13 is supported at several points on interconnected brackets 7A, 7B and 7C which may be inclined towards the front part 1A of the tray emptying machine 1. At the time of lifting by the lifting unit 6, the tray 3, 13 is held by movable lateral clamping members 8L and 8R which in case of five-wall trays 13 made of cardboard have the task of eliminating the risk of deformation of the five-wall trays 13 and displacement (falling down) of rod like articles R in the upper corners of the five-wall tray 13. The lateral clamping members 8L and 8R may be moved for example by pneumatic actuators 9, whereas the position of the clamping members 8L and 8R requires adjustment according to the rigidity and the overall dimensions of the trays 3, 13 used. In case of four-wall trays 3 it is not necessary to exert pressure on the sidewalls 3L, 3R of the tray 3 and in this case the clamping members 8L and 8R constitute limiters of movement in the horizontal direction. The lifting of the tray 3, 13 by the lifting unit 6 may be accomplished by any linear movement mechanism with electric or pneumatic drive. The lifting unit 6 lifts the filled tray 3, 13 to a height at which the turning unit 10 may grip the filled tray 3, 13. The turning unit 10 is adapted to turn the filled tray 3, 13 before unloading it at the filled tray emptying station 23. The turning unit 10 may be designed as stationary at a specific height or may be moved in the vertical direction by the lifting unit 11. The lowering of the turning unit 10, and then the lifting of the filled tray 3, 13 by the turning unit directly from the filled trays 3, 13 station 2 is also possible, and it will be described in more detail below in this description.

[0028] Figs. 3b, 3c, 3d, 3e show an alternative converting unit designed to open the five-wall tray. Fig. 3b shows the tray 13 which has been lifted by the lifting unit 6 in a view from the back of the machine. The converting unit 21 comprises actuators 31L and 31R which are provided with pushing members 32L and 32R attached to piston rods of the actuators 31L and 31R. The pushing members 32L and 32R are used to swing the wall 13T' together with the lugs 13F in the axis passing through the edge 13E. The actuators 31L and 31R are inclined relative to the walls 13L and 13R in order to enable the pushing members to act on the surface of the wall 13T'. As a result of the action of the actuators 31L and 31R, the upper wall 13T' of the tray 13 in the configuration of the first type is swung as shown in Fig. 3c. The actuators 31L and 31R are in the pulled-out position, and the pushing members 32L and 32R abut against the wall 13T'. The task of the actuators 33L and 33R is to further bend the wall 13T' and the lugs 13FL and 13FR. The pushing members 34L and 34R are attached to piston rods of the actuators 33L and 33R, whereas Fig. 3d shows the position of the pushing members 34L and 34R before bending the wall 13T' and the lugs 13FL and 13FR, and Fig. 3e after bending thereof. The pushing member 34L is attached to the actuator 33L and is used to bend the wall 13T' so that it abuts against the wall 13A, and to bend the lug 13FL so that it abuts against the wall 13L. The pushing member 34R is attached to the actuator 33R and is used to bend the wall 13T' so that it abuts against the wall 13A, and to bend the lug 13FR so that it abuts against the wall 13R. The actuator 33L with the pressing member 34L and the actuator 33R with the pressing member 34R constitute a pressing mechanism 34 designed to press the self-aligning wall 13T' to the wall 13A and the connecting members in the form of the lugs 13FL and 13FR to the walls 13L and 13R of the tray 13. The lifting mechanism 32 and the pressing mechanism 34 constitute a converting unit 35 being at the same time an opening unit. In another embodiment, the pushing members 34L and 34R may be attached to the turning unit 10, for example to the body 14, then the bending of the wall 13T' and the lugs 13FL and 13FR takes place during the lowering of the turning unit 10.

[0029] The tray emptying machine 1 is provided with the filled tray emptying station 23 (Fig. 4) in the front part 1A of the machine underneath which the conveyor 24 receiving the rod like articles R unloaded from the trays 3, 13 is situated. In the back part 1B of the tray emptying machine 1, an empty trays station 25 is situated. The empty trays station 25 may be designed as a conveyor or an empty trays store. The empty trays station 25 is provided with a receiving unit 28 comprising a self-aligning shelf 26 with a support 27. On the shelf 26, which has been pulled out, the empty tray 3, 13 carried by the turning unit 10 after emptying at the filled tray emptying station 23 is placed. The backward movement of

the shelf 26 with the support 27 towards the back part 1B of the machine 1 causes a displacement of all empty trays 3, 13 collected at the station 25.

[0030] The tray emptying machine 1 of Fig. 4 comprises the converting unit 21 situated at such height above the conveyor 4 of the filled trays station 2 which makes it possible to change the configuration for the tray 13' being on the conveyor 4. For such embodiment of the machine, after feeding the filled tray 13 in the configuration of the first type, its configuration is converted to the configuration of the second type, and then the tray 13 is lifted by the lifting unit 6 or is taken by the lowered turning unit 10. The control system is adapted to activate the converting unit 21 when the machine is loaded with trays in the configuration of the first type. In case of feeding of the four-wall tray 3 onto the tray emptying machine 1 the converting unit remains in an inactive state. It is also possible to convert a tray of the first type to the configuration of a tray of the second type after the tray 13 has been lifted by the lifting unit 6.

[0031] The tray emptying machine 1 is provided with a controller 40 shown in Fig. 3 connected with individual units of the machine 1. The machine 1 control system comprises a detection unit 41 designed to detect the type of tray placed on the filled trays station 2. Depending on the type of trays placed on the station 2, the activation of the converting unit 21, 35 may take place. The converting unit 21, 35 may be in an active state irrespective of the type of fed tray because its working elements act on the walls of the five-wall tray in the configuration of the first type, and do not act on the walls of the four-wall tray in the configuration of the second type.

[0032] Fig. 5 shows the turning unit 10 which is attached to a rotating shaft 12 with the axis of rotation 12A on a slide 11A of the lifting unit 11. The turning unit 10 is provided with a main support element 14 on which the back wall 3A, 13A of the four-wall 3 or five-wall tray 13, respectively, is supported. The turning unit 10 is provided with gripping members designed to grip the tray jest 3, 13, namely at least one bottom gripper 15L, 15R designed to hold up the bottom wall 3B, 13B of the tray 3, 13, at least one pair of lateral grippers 16L, 16R designed to grip the lateral walls 3L, 3R, 13L, 13R of the tray 3, 13 and a damper 18 designed to cover the rod like articles R being in the tray, with the gripping members being attached to a holding mechanism 10A designed to hold the tray 3, 13 in the turning unit 10 during the handling of the tray 3, 13. The turning unit 10 and the lifting unit 11 constitute a handling unit 19. The handling of the tray 3, 13 is to be understood as the lifting of the tray 3, 13 by the lifting unit 11 and the turning of the tray 3, 13 by the turning unit 10 as well as the moving of the tray 3, 13 on the holding mechanism 10A away from the axis 12A of the shaft 12 of the turning unit 10. In addition, during the execution of the tray 3, 13 emptying cycle it is possible to freely combine the functions of tray 3, 13 lifting, turning and moving from the axis of rotation 12A.

[0033] The embodiment in Fig. 3a shows a pair of self-aligning bottom grippers 15L, 15R designed to support the bottom wall 3B, 13B of the tray 3, 13, respectively. A greater number of bottom grippers may be required for less rigid trays 3, 13 and in case of heavy rod like articles R. The embodiment shows lateral grippers 16L and 16R designed in the shape of longitudinal slats constituting clamping members. The shape of the lateral grippers 16L, 16R may depend on the shape of the surface of lateral walls of the tray 3, 13, with the five-wall trays 13 having smooth lateral walls, whereas the four-wall trays 3 are ribbed and may have additional projections. The lateral grippers 16L, 16R may be moved by means of pneumatic actuators 17 and may act on the tray 3, 13 as clamping members eliminating the deformation of lateral walls of the tray 3L and 3R, and 13L and 13R, respectively. The position of the clamping members 16L and 16R requires an adjustment of the tray 3, 13 holding position according to the rigidity and overall dimensions of the trays 3, 13 used. The damper 18 which is slidably fastened to the guide 18A of the holding mechanism 10A in the turning unit 10 and is moved by means of any not shown drive unit with linear motion, for example a pneumatic or electric drive unit, is used to cover the rod like articles R in the tray 3, 13. The holding mechanism 10A comprises the lateral grippers 16L, 16R, the self-aligning bottom grippers 15L, 15R, the damper 18 and their drive elements attached to the body 14, for example designed as a plate which constitutes the main support element for the tray. The holding mechanism 10A is attached to the linear guide 10B which is connected with the rotating shaft 12 with the axis of rotation 12A. The holding mechanism 10A may be moved along the guide 10B by means of any not shown drive mechanism so as to ensure the movement of the holding mechanism 10A transversely to the axis 12A of the shaft 12. The holding mechanism 10A has the task to change the distance of the tray 3, 13 from the axis 12A of the rotating shaft 12. The combination of rotational movement of the tray 3, 13 with the linear movement allows any handling of the tray 3, 13 during the transport thereof to the unloading position at the tray 3, 13 emptying station 23. In addition, it is possible to start the rotational movement of the turning unit 10 in any phase of lifting movement of the lifting unit 11.

[0034] Fig. 6 shows the tray emptying machine 1 with its units in characteristic positions, the lifting unit 6 was shown in the bottom position and marked with a solid line and in the upper position 6' marked with a broken line. The turning unit 10 in the bottom position is shown with a solid line; in this position, the tray 3, 13 is transferred from the lifting unit 6. The turning unit 10 in the upper position 10' was shown with a broken line. The rotational movement of the turning unit 10 may start in the upper position 10', it may also start before reaching the upper position 10' i.e. already during the lifting by the lifting unit 11. The turning unit 10 in the position just before the start of unloading of the tray 3, 13 was shown with a broken line and marked as 10". The receiving unit 28 of the empty trays station 25 shown with a solid line is in a waiting position, i.e. in the retracted position in which it does not receive empty trays. The receiving unit 28 shown with a broken line is in the tray receiving position and is marked as 28'.

[0035] Fig. 7 shows the path of movement 70 of the four-wall tray 3, whereas the successive stages of tray movement were shown with reference to the point situated in the middle of the back wall of the tray. The path of movement 70 connecting successive characteristic points taken by the midpoints of the tray passing through the areas of operation of individual mechanisms was shown with a thick broken line. At the filled trays station 2, the filled four-wall tray 3 passes through successive positions from point A to B. The filled four-wall tray 3 from the point B is moved to the position controlled by the support element 5 or the lifting unit 6 and stops at the point C. The lifting unit 6 starts the upward movement and lifts the four-wall tray 3, and causes an inclination of the filled four-wall tray 3 by several degrees; the position of the four-wall tray 3 after the inclination is marked as C'. During the upward movement the tray 3 is held by the clamps 8L and 8R. The lifting unit 6 ends the upward movement when the four-wall tray 3 has reached the point D. The turning unit 10 grips the four-wall tray 3 with the lateral grippers 15L and 16R and the self-aligning supports 15L and 15R, and the damper 18 covers the rod-like articles R collected in the tray. The lifting unit 6 is lowered. Then the turning unit 10 together with the gripped four-wall tray 3 is lifted by the lifting unit 11 i.e. by the handling unit 19 so that the tray 3 reaches the point E. From the point E starts the rotational movement of the turning unit 10, whereas the turning unit 10 is shown with a broken line. After the start of rotational movement of the turning unit 10 starts the movement of the holding mechanism 10A together with the four-wall tray 3 in order to increase the distance of the tray from the axis of the shaft of the turning unit 10. The movement of the holding mechanism 10A takes place transversely to the axis 12A of the rotating shaft 12. Depending on the kind of tray and rod like articles, the movement of the holding mechanism 10A may be started in any phase of the rotational movement. As a result of combination of the rotational movement of the turning unit 10 and the movement of the holding mechanism 10A, the four-wall tray 3 will be moved from the point E to the point F on a nearly elliptical path or a path consisting of elliptical sections. The path of movement on which the filled four-wall tray 3 is moved may comprise circular sections and a plurality of elliptical sections, whereas the shape of the path of movement depends on physical parameters of rod like articles R, primarily on their weight. At the point F, the four-wall tray 3 is swung by several degrees from the vertical direction before the start of unloading of the four-wall tray 3. During the transport of the tray from the point F to G, at the filled tray emptying station 23 the damper 18 is retracted and the unloading of the rod-like articles R from the four-wall tray 3 onto the conveyor 24 is started. After the partial unloading of the rod-like articles R from the four-wall tray 3, the four-wall tray 3 may be received by the handling unit 19 because the four-wall tray 3 all the time remains gripped by the holding unit 10A of the turning unit 10. Alternatively, the four-wall tray 3 may remain at the point G in the unloading position until it has been completely emptied. When receiving the empty tray 3, first the tray 3 moves in the vertical direction in the section G-H and then in the section of the path H-J and it is delivered to the receiving unit 28 of the empty trays station 25. The section H-J runs above because when receiving the tray after partial unloading of the tray the section G-H must be rectilinear and vertical. The section H-J of the path of movement may be similar to the path section E-F or overlap it (when receiving the tray after it has been completely emptied). The movement of the tray 3 on the section H-J may be accomplished by another unit than the turning unit 10 of the handling unit 19. Further the empty four-wall tray 3 is moved to the point K by the receiving unit 28 and further along the empty trays station 25 to the point L from where it is collected by the operator. The displacement of empty trays from the point K to L is forced by the movement of the receiving unit 28 related to received successive empty trays.

[0036] The transported rod like articles R require gentle treatment and the lowest possible mechanical loads. Due to different weight of rod like articles, the tray unloader mechanisms are subjected to various loads. The loads affect in particular the mechanisms of the turning unit 10. During the handling of the tray 3, 13 the rod like articles R contained in it may move to a certain degree relative to the tray 3, 13.The movement of the rod like articles R relative to the tray 3, 13 should be eliminated or at least limited because it may result in the ends of rod like articles R being damaged. Tests have proven that an optimal distribution of accelerations to which the rod like articles R are subjected and of loads of mechanisms of the turning unit 10 may be achieved by starting the rotational movement of the turning unit 10 around the axis 12A before the end of lifting by the lifting unit 11.

[0037] Fig. 8 shows a modified path of movement 80 of the four-wall tray 3 wherein the rotational movement of the turning unit 10 starts at the point M, where the moving of the four-wall tray 3 away from the axis of rotation 12A by moving the mechanisms holding the four-wall tray 3 starts at a point on the section E-N, whereas the moving of the tray 3 may start on the section M-N. Independent mechanisms of rotational movement of the turning unit 10 and linear movement of the mechanism 10A holding the tray make it possible to freely shape the course of the path of movement of the four-wall tray 3.

[0038] Fig. 9 and Fig. 10 show a path of movement 90, 100 of the five-wall tray 13, whereas similarly as in case of the four-wall tray 3 the successive stages of tray movement were shown with reference to a point being the midpoint of the back wall of the tray 13. After putting the five-wall tray 13 on the filled trays station 2, the machine operator preliminarily swings the upper wall 13T'. The path of movement connecting successive characteristic points taken by the midpoint of back wall of the five-wall tray 13 was shown with a thick broken line. The passage from the point A to C is accomplished in the same way as in case of the four-wall tray 3. The lifting unit 6 lifts the five-wall tray 13 to the point D. In this position, the converting unit (for example 21L and 21R) swings the wall 13T' in order to make the later unloading of the five-wall

tray 13 possible. The turning unit 10 grips the five-wall tray 13 with the lateral clamps 16L and 16R and the self-aligning supports 15L and 15R, and the damper 18 covers the rod like articles R collected in the five-wall tray 13. The further part of the path of movement of the five-wall tray 13 (i.e. a tray in the configuration of the first type) runs similarly as in case of the four-wall tray 3 (i.e. a tray of the second type).

[0039] Tests have shown that an optimal distribution of accelerations to which the rod like articles R are subjected and of loads of mechanisms of the turning unit 10 may be achieved by starting the rotational movement around the axis 12A before reaching the point E. Fig. 10 shows the modified path of movement 100 of the five-wall tray 13 wherein the rotational movement of the turning unit 10 starts at the point P, where the moving of the tray 3 away from the axis of rotation 12A by moving the holding mechanism 10A starts at a point on the section E-S, whereas the moving of the tray 13 may start on the section P-S. In case of five-wall trays 13 the path of movement 100 of the tray may be modified by initial lifting of the tray 13 on the section H-U, and then gentle lowering of the tray on the section U-J, with the lifting of the empty tray 13 being steeper than in case of the four-wall tray 3. Such path of movement of the five-wall tray 13 proved to be more favourable because five-wall trays 13 made of cardboard without rod like articles R inside are more prone to deformations caused by the pressure of lateral clamping members.

[0040] Figures 11 to 14 show successive phases of rotation of the turning unit 10 during which the tray 3, 13 is moved away from the axis 12A of the shaft 12 of the turning unit 10, whereas the distance d1-4 between the back wall of the tray and the axis 12A of the shaft 12 gradually increases from d1 to d4. The distance d1-4 is increased by moving the holding mechanism 10A on the guide 10B. The initial minimum distance between the back wall of the tray and the axis 12A of the shaft 12 shown in Fig. 11 is defined as d1. The final maximum distance between the back wall of the tray and the axis 12A of the shaft 12 is defined as d4, whereas $d1 < d2 < d3 < d4$ where d2 and d3 are successive intermediate distances between the back wall of the tray 3, 13 and the axis 12A.

Claims

1. An apparatus (1) for emptying of two types of trays with different configurations for rod like articles (R) of the tobacco industry, while a five-wall tray being the tray of the first type (13) and a four-wall tray being the tray of the second type (3) the apparatus is provided with

   a filled tray station (2) of the first type or the second type,
   a turning unit (10) designed to turn the filled tray of the first type (13) or the second type (3), a lifting unit (11) designed to lift the turning unit (10),
   a station (23) for emptying of the filled tray of the first (13) or the second type (3),
   a station (25) for empty trays of the first or the second type,
   a control system (40) controlling the subassemblies of the apparatus,
   a converting unit (21, 35) being adapted to change the configuration of the tray of the first type (13) into a configuration corresponding to the configuration of the second type (3), whereas
   the converting unit (21, 35) is adapted to change the configuration of the tray of the first type (13) into a configuration corresponding to the configuration of the tray of the second type (3) when the tray of the first type (13) is delivered for unloading, and to maintain the configuration of the tray of the second type (3) when the tray of the second type (3) is delivered for unloading, **characterised in that**,
   the converting unit (21, 35) is further provided with a linearly operating lifting mechanism (32) designed to lift the hinged wall (13T') and the connecting members (13FL, 13FR), and
   a linearly operating pressing mechanism (34) designed to press the hinged wall (13T') and the connecting members (13FL, 13FR) to other walls of the tray (13L, 13R, 13A).

2. The apparatus as in claim 1 **characterised in that** the turning unit (10) designed to turn the filled tray has a holding mechanism (10A) provided with gripping members designed to hold the tray (3, 13) and adapted to move the tray (3, 13) transversely to the axis (12A) of the shaft (12) of the turning unit (10).

3. The apparatus as in claim 2 **characterised in that** the holding mechanism (10A) is attached to a linear guide (10B) designed to move the tray transversely to the axis (12A) of the shaft (12) of the turning unit (10).

4. The apparatus as in claim 2 or 3 **characterised in that** the gripping members comprise lateral grippers (16L, 16R), a bottom gripper (15L, 15R), and a sliding cover (18).

5. The apparatus as in claim 1 **characterised in that** the apparatus (1) is provided with a lifting unit (6) designed to lift the filled tray (3, 13) from the filled tray station (2).

6. The apparatus as in any of the claims 1 to 5 **characterised in that** the converting unit (21, 35) is an opening unit designed to swing the hinged wall (13T') of the tray of the first type (13).

7. The apparatus as in claim 6 **characterised in that** the opening unit (21, 35) designed to swing the hinged wall (13T') of the tray of the first type (13) is situated above the lifting unit (6) designed to lift the filled tray (3, 13).

8. The apparatus as in any of the claims 1 to 7 **characterised in that** the apparatus (1) is provided with a tray type detection unit (41).

9. A method for emptying two types of trays with different configurations, for rod like articles (R) of the tobacco industry, while a five-wall tray being the tray of the first type (13) and a four-wall tray being the tray of the second type (3) wherein

the filled tray of the first type (13) or the second type (3) is placed on the filled tray station (2),
the filled tray of the first type (13) or the second type (3) is conveyed along the filled tray station (2),
the filled tray of the first type (13) or the second type (3) is gripped by means of the turning unit (10),
the filled tray of the first type (13) or the second type (3) is lifted,
the filled tray of the first type (13) or the second type (3) is turned by means of the turning unit (10),
the filled tray of the first type (13) or the second type (3) is placed in the filled tray emptying station (23),
the empty tray of the first type (13) or the second type (3) is conveyed to the empty tray station (25),
the empty tray of the first type (13) or the second type (3) is received from the empty tray station (25),
characterised in that
after the delivery of the filled tray of the first type (13) the converting unit (21, 35) is activated,
the configuration of the tray of the first type (13) is converted to a configuration corresponding to the configuration of the tray of the second type (3), whereas the configuration of the tray of the first type (13) is changed into a configuration corresponding to the configuration of the tray of the second type (3) when the tray of the first type (13) is delivered for unloading, and the configuration of the tray of the second type (3) is maintained when the tray of the second type (3) is delivered for unloading,
moreover the configuration of the tray is changed with a linearly operating lifting mechanism (32) designed to lift the hinged wall (13T') and the connecting members (13FL, 13FR), and
a linearly operating pressing mechanism (34) designed to press the hinged wall (13T') and the connecting members (13FL, 13FR) to other walls of the tray (13L, 13R, 13A).

10. The method as in claim 9 **characterised in that** during the turning of the filled tray, the filled tray (3, 13) is moved away transversely to the axis (12A) of the shaft (12) of the turning unit (10).

11. The method as in claim 9 or 10 **characterised in that** before the tray (3, 13) is gripped by the turning unit (10), the filled tray (3, 13) is lifted on the lifting unit (6) for lifting filled trays.

12. A converting unit (21, 35) designed to change the configuration of the tray of the first type (13) having at least one hinged wall (13T') provided with connecting members (13FL, 13FR) designed to connect the hinged wall with other walls (13L, 13R) of the tray (13) into a configuration corresponding to the configuration of the tray of the second type (3) not having a hinged wall,
provided with

pushing members (22L, 22R, 32L, 32R) designed to lift the hinged wall (13T') and the connecting members (13FL, 13FR), and
pressing members (22L, 22R, 34L, 34R) designed to press the hinged wall (13T') and the connecting members to other walls (13L, 13R, 13A) of the tray (13),
characterised in that
the unit (21, 35) is further provided with a linearly operating lifting mechanism (32) designed to lift the hinged wall (13T') and the connecting members (13FL, 13FR), and
a linearly operating pressing mechanism (34) designed to press the hinged wall (13T') and the connecting members (13FL, 13FR) to other walls of the tray (13L, 13R, 13A).

13. The unit as in claim 12 **characterised in that** the lifting mechanism (32) comprises at least two actuators (31L, 31R) provided with the pushing members (32L, 32R).

14. The units as in claim 12 or 13 **characterised in that** the pressing mechanism (34) comprises at least two actuators (33L, 33R) provided with the pressing members (34L, 34R).

Patentansprüche

1. Die Vorrichtung (1) zum Entleeren von zwei Arten von Tabletten mit unterschiedlichen Konfigurationen für stabförmige Artikel (R) der Tabakindustrie, während ein fünfwandiges Tablett das Tablett des ersten Typs (13) ist und das vierwandige Tablett (3) ist das Tablett des zweiten Typs (3), ist die Vorrichtung versehen mit
eine gefüllte Tablett Station (2) des ersten Typs oder des zweiten Typs,
eine Wendeeinheit (10) zum Wenden des gefüllten Tabletts des ersten Typs (13) oder des zweiten Typs (3),
eine Hebeeinheit (11) zum Heben der Wendeeinheit (10)
und eine Station (23) zum Entleeren des gefüllten Tabletts des ersten (13) oder des zweiten Typs (3),
eine Tablett Station (25) für leere Tablette der ersten oder der zweiten Art,
ein Steuersystem (40), die Unterbaugruppen der Vorrichtung zu steuern,
eine Umwandlungseinheit (21, 35), die dazu eingerichtet ist, Konfiguration des Tabletts des ersten Typs (13) in eine Konfiguration entsprechend der Konfiguration des zweiten Typs (3) zu ändern, wobei
eine Umwandlungseinheit (21, 35), die dazu eingerichtet ist, Konfiguration des Tabletts des ersten Typs (13) in eine Konfiguration entsprechend der Konfiguration des zweiten Typs (3) zu ändern, wobei das Tablett des ersten Typs (13) wird zum Entladen und zum Beibehalten der Konfiguration des zweiten Typs (3) angeliefert, wenn das Tablett des zweiten Typs (3) zum Entladen angeliefert wird
ist **dadurch gekennzeichnet, dass**
die Umwandlungseinheit (21, 35) ist mit einem linear arbeitenden Hebemechanismus (32) entwickelt, um die Klappwand (13T) und die Verbindungselemente (13FL, 13FR), und einem linear arbeitenden Pressmechanismus (34), der dazu bestimmt ist, die Klappwand (13T) und die Verbindungselemente (13FL, 13FR) an andere Wände des Tabletts (13L, 13R, 13A) zu pressen.

2. Die Vorrichtung nach Anspruch 1 ist **dadurch gekennzeichnet, dass** die Wendeeinheit (10) zum Wenden von den gefüllten Tabletten einen Haltemechanismus (10A) mit Greifelementen versehen ist, um das Tablett (3, 13) zu halten, und geeignet ist, das Tablett (3, 13) quer zur Achse (12A) der Welle (12) der Wendeeinheit (10) zu bewegen.

3. Die Vorrichtung nach Anspruch 2 ist **dadurch gekennzeichnet, dass** der Haltemechanismus (10A) an eine Linearführung (10B) angebracht ist, zum Bewegen von Tablette quer zur Achse (12A) der Welle (12) von der Wendeeinheit (10).

4. Die Vorrichtung nach Anspruch 2 oder 3 ist **dadurch gekennzeichnet, dass** die Greifelemente umfassen Seitengreifer (16L, 16R) und Bodengreifer (15L, 15R) und eine Schiebeabdeckung (18) umfassen.

5. Die Vorrichtung nach Anspruch 1 ist **dadurch gekennzeichnet, dass** die Vorrichtung (1) mit einer Hubeinheit (6) versehen ist, die gefüllte Tablette (3, 13) aus der gefüllten Tablett Station zu heben (2).

6. Die Vorrichtung nach einem der Ansprüche 1 bis 5, **dadurch gekennzeichnet, dass** die Umwandlungseinheit (21, 35) eine Klappwand (13T') des Tabletts des ersten Typs (13) ist.

7. Die Vorrichtung nach Anspruch 6 ist **dadurch gekennzeichnet, dass** die Öffnungseinheit (21, 35) zum Schwenken von Klappwand (13T') des Tabletts des ersten Typs (13) oberhalb der Hubeinheit (6) zum Heben des gefüllten Tabletts (3, 13) angeordnet ist.

8. Die Vorrichtung, wie in einem der Ansprüche 1 bis 7 ist **dadurch gekennzeichnet, dass** die Vorrichtung (1) mit einem Tablett-Typ-Erfassungseinheit (41) vorgesehen ist.

9. Die Verfahren zum Entleeren von zwei Arten von Tabletten mit unterschiedlichen Konfigurationen für stabförmige Artikel (R) der Tabakindustrie, während ein fünfwandiges Tablett das Tablett des ersten Typs (3) ist und das vierwandige Tablett (3) ist das Tablett des zweiten Typs (3)
worin

das gefüllte Tablett des ersten Typs (13) oder des zweiten Typs (3) auf der gefüllten Tablett Station (2) platziert ist,
das gefüllte Tablett des ersten Typs (13) oder des zweiten Typs (3) entlang der gefüllte Tablett Station (2)

transportiert wird,
das gefüllte Tablett des ersten Typs (13) oder des zweiten Typs (3) mittels der Wendeeinheit (10) gegriffen wird,
das gefüllte Tablett des ersten Typs (13) oder des zweiten Typs (3) angehoben wird,
das gefüllte Tablett des ersten Typs (13) oder des zweiten Typs (3) mittels der Wendeeinheit (10) gedreht wird,
das gefüllte Tablett des ersten Typs (13) oder des zweiten Typs (3) in der gefüllten Entleerung-Tablett Station (23) angeordnet ist,
das leere Tablett des ersten Typs (13) oder des zweiten Typs (3) auf die leere Tablett Station (25) gefördert wird,
das leere Tablett des ersten Typs (13) oder des zweiten Typs (3) von der leeren Tablett Station (25) empfangen wird,
ist dadurch gekennzeichnet, dass
nach der Abgabe des Tabletts (13) des ersten Typs die Umwandlungseinheit (21, 35) aktiviert wird, die Konfiguration des Tabletts des ersten Typs (13) wird in eine Konfiguration umgewandelt, die der Konfiguration des Tabletts des zweiten Typs (3) entspricht, wohingegen die Konfiguration des Tabletts des ersten Typs (13) wird in eine Konfiguration geändert, die der Konfiguration des Tabletts des zweiten Typs (3) entspricht, wenn das Tablett des ersten Typs (13) zum Entladen geliefert wird und die Konfiguration des Tabletts des zweiten Typs (3) beibehalten wird, wenn das Tablett des zweiten Typs (3) zum Entladen geliefert wird, darüber hinaus wird die Konfiguration des Tabletts durch einen linear arbeitenden Hebemechanismus (32) geändert, der zum Anheben der Klappwand (13T) und der Verbindungselemente (13FL, 13FR) ausgelegt ist, sowie durch einen linear arbeitenden Pressmechanismus (34), der zum Drücken der Klappwand (13T) und die Verbindungselemente (13FL, 13FR) mit anderen Wänden des Tabletts (13L, 13R, 13A).

10. Die Verfahren nach Anspruch 9 ist **dadurch gekennzeichnet, dass** beim Wenden des gefüllten Tabletts, wird das gefüllte Tablett (3, 13) quer zur Achse (12A) der Welle (12) der Wendeeinheit (10) wegbewegt.

11. Die Verfahren nach Anspruch 9 oder 10 ist **dadurch gekennzeichnet, dass** vor dem Greifen des Tabletts (3, 13) durch die Wendeeinheit (10) das gefüllte Tablett (3, 13) an die Hubeinheit (6) angehoben wird, um gefüllte Tabletts anzuheben.

12. Eine Umwandlungseinheit (21, 35) zu Änderung der Konfiguration vom Tabletts des ersten Typs (13) mit mindestens einer Klappwand (13T'), die mit Verbindungselementen (13FL, 13FR) versehen ist, die dazu bestimmt sind, die Klappwand mit anderen Wänden (13L, 13R) des Tabletts (13) in einer Konfiguration zu verbinden, die der Konfiguration des Tabletts des zweiten Typs (3) ohne Klappwand entspricht,
versehen mit

Druckelementen (22L, 22R, 32L, 32R) zum Anheben der Klappwand (13T) und der Verbindungselemente (13FL, 13FR), und
Druckelemente (22L, 22R, 34L, 34R) zum Drücken der Klappwand (13T') und der Verbindungselemente auf andere Wände (13L, 13R, 13A) des Tabletts (13),
dadurch gekennzeichnet, dass
die Einheit (21, 35) ist mit einem linear arbeitenden Hebemechanismus (32) entwickelt, um die Klappwand (13T) und die Verbindungselemente (13FL, 13FR), und einem linear arbeitenden Pressmechanismus (34), der dazu bestimmt ist, die Klappwand (13T) und die Verbindungselemente (13FL, 13FR) an andere Wände des Tabletts (13L, 13R, 13A) zu pressen.

13. Die Einheit nach Anspruch 12 ist **dadurch gekennzeichnet, dass** der Hubmechanismus (32) mindestens mit zwei Betätigungselementen (31L, 31R), die mit den Druckelementen (32L, 32R), versehen ist.

14. Die Einheiten, wie in Anspruch 12 oder 13 ist **dadurch gekennzeichnet, dass** der Pressmechanismus (34) zumindest zwei Aktuatoren (33L, 33R) umfasst, die mit den Druckelementen (34L, 34R) versehen sind.

Revendications

1. Appareil (1) pour vider deux types de plateaux avec des configurations différentes pour des articles en forme de tige (R) de l'industrie du tabac, en ce qu'un plateau à cinq parois est le plateau du premier type (13) et le plateau à quatre parois est le plateau du second type (3),
l'appareil est pourvu
d'une station de plateau remplie (2) du premier type ou du second type,

d'une unité de retournement (10) destinée à faire tourner le plateau rempli du premier type (13) ou du second type (3),
d'une unité de levage (11) destinée à soulever l'unité de retournement (10),
d'une station (23) pour vider le plateau rempli du premier (13) ou du second type (3),
d'une station (25) pour vider les plateaux du premier ou second type,
d'une commande (40) commandant les sous-ensembles du dispositif,
une unité de conversion (21, 35) étant adaptée pour changer la configuration du plateau du premier type (13) en une configuration correspondant à la configuration du second type (3), tandis que
l'unité de conversion (21, 35) est adaptée pour changer la configuration du plateau du premier type (13) en une configuration correspondant à la configuration du plateau du second type (3) lorsque le plateau du premier type (13) est livré pour déchargement, et pour maintenir la configuration du plateau du second type (3) lorsque le plateau du second type (3) est livré pour déchargement
caractérisée en ce que,
l'unité de conversion (21, 35) est en outre munie d'un mécanisme de levage à commande linéaire (32) conçu pour soulever la paroi articulée (13T) et les éléments de liaison (13FL, 13FR), et un mécanisme de pression à commande linéaire (34) conçu pour presser la paroi articulée (13T) et les éléments de liaison (13FL, 13FR) sur les autres parois du plateau (13L, 13R, 13A).

2. Appareil selon la revendication 1, **caractérisé en ce que** l'unité de retournement (10) destinée à faire tourner le plateau rempli comporte un mécanisme de maintien (10A) muni d'éléments de préhension destinés à maintenir le plateau (3, 13) et adaptés pour déplacer le plateau (3, 13) transversalement à l'axe (12A) de l'arbre (12) de l'unité de retournement (10).

3. Appareil selon la revendication 2, **caractérisé en ce que** le mécanisme de maintien (10A) est fixé à un guide linéaire (10B) conçu pour déplacer le plateau transversalement à l'axe (12A) de l'arbre (12) de l'unité de retournement (10).

4. Appareil selon la revendication 2 ou 3, **caractérisé en ce que** les éléments de préhension comprennent des pinces latérales (16L, 16R), une pince inférieure (15L, 15R), et un couvercle coulissant (18).

5. Appareil selon la revendication 1, **caractérisé en ce que** l'appareil (1) est muni d'une unité de levage (6) conçue pour soulever le plateau rempli (3, 13) de la station de plateau rempli (2).

6. Appareil comme dans l'une quelconque des revendications 1 à 5, **caractérisé en ce que** l'unité de conversion (21, 35) est une unité d'ouverture destinée à basculer la paroi articulée (13T') du plateau du premier type (13).

7. Appareil selon la revendication 6, **caractérisé en ce que** l'unité d'ouverture (21, 35) destinée à basculer la paroi articulée (13T') du plateau du premier type (13) est située au-dessus de l'unité de levage (6) destinée à soulever le plateau rempli (3, 13).

8. Appareil comme dans l'une quelconque des revendications 1 à 7, **caractérisé en ce que** l'appareil (1) est muni d'une unité de détection (41) du type de plateau.

9. Procédé pour vider deux types de plateaux de configurations différentes, pour des articles en forme de tige (R) de l'industrie du tabac, un plateau à cinq parois étant le plateau du premier type (13) et un plateau à quatre parois étant le plateau du second type (3)
dans lequel

le plateau rempli du premier type (13) ou du second type (3) est placé sur la station de plateau rempli (2),
le plateau rempli du premier type (13) ou du second type (3) est transporté le long de la station de plateau rempli (2),
le plateau rempli du premier type (13) ou du second type (3) est saisi au moyen de l'unité de retournement (10),
le plateau rempli du premier type (13) ou du second type (3) est soulevé,
le plateau rempli du premier type (13) ou du second type (3) est tourné au moyen de l'unité de retournement (10),
le plateau rempli du premier type (13) ou du second type (3) est placé dans la station de vidage de plateau rempli (23),
le plateau vide du premier type (13) ou du second type (3) est acheminé vers la station de plateau vide (25),
le plateau vide du premier type (13) ou du second type (3) est reçu de la station de plateau vide (25),
caractérisé en ce que
après la livraison du plateau rempli du premier type (13), l'unité de conversion (21, 35) est activée, la configuration

du plateau du premier type (13) est convertie en une configuration correspondant à la configuration du plateau du second type (3), tandis que la configuration du plateau du premier type (13) est modifiée en une configuration correspondant à la configuration du plateau du second type (3) lorsque le plateau du premier type (13) est livré pour déchargement, et la configuration du plateau du second type (3) est maintenue lorsque le plateau du second type (3) est livré pour le déchargement, de plus la configuration du plateau est modifiée avec un mécanisme de levage à commande linéaire (32) conçu pour soulever la paroi articulée (13T) et les éléments de liaison (13FL, 13FR), et un mécanisme de pression à commande linéaire (34) conçu pour appuyer la paroi articulée (13T) et les éléments de liaison (13FL, 13FR) sur les autres parois du plateau (13L, 13R, 13A).

10. Procédé selon la revendication 9, **caractérisé en ce que** pendant le retournement du plateau rempli, le plateau rempli (3, 13) est déplacé transversalement à l'axe (12A) de l'arbre (12) de l'unité de retournement (10).

11. Procédé selon la revendication 9 ou 10, **caractérisé en ce qu'**avant que le plateau (3, 13) ne soit saisi par l'unité de retournement (10), le plateau rempli (3, 13) est soulevé sur l'unité de levage (6) pour soulever des plateaux remplis.

12. Unité de conversion (21, 35) destinée à modifier la configuration du plateau du premier type (13) ayant au moins une paroi articulée (13T') munie d'éléments de liaison (13FL, 13FR) destinés à relier la paroi articulée à d'autres parois (13L, 13R) du plateau (13) dans une configuration correspondant à la configuration du plateau du second type (3) ne comportant aucune paroi articulée,
doté

d'éléments poussoirs (22L, 22R, 32L, 32R) conçus pour soulever la paroi articulée (13T) et les éléments de liaison (13FL, 13FR), et
des éléments de pressage (22L, 22R, 34L, 34R) destinés à presser la paroi articulée (13T') et les éléments de liaison vers les autres parois (13L, 13R, 13A) du plateau (13),
caractérisé en ce que
l'unité (21, 35) est en outre munie d'un mécanisme de levage à commande linéaire (32) conçu pour soulever la paroi articulée (13T) et les éléments de liaison (13FL, 13FR), et d'un mécanisme de pression à commande linéaire (34) conçu pour pousser la paroi articulée (13T) et les éléments de liaison (13FL, 13FR) vers d'autres parois du plateau (13L, 13R, 13A).

13. Unité selon la revendication 12, **caractérisée en ce que** le mécanisme de levage (32) comprend au moins deux actionneurs (31L, 31R) munis des organes de poussée (32L, 32R).

14. Les unités selon la revendication 12 ou 13, **caractérisées en ce que** le mécanisme de pressage (34) comprend au moins deux actionneurs (33L, 33R) munis des éléments de pressage (34L, 34R).

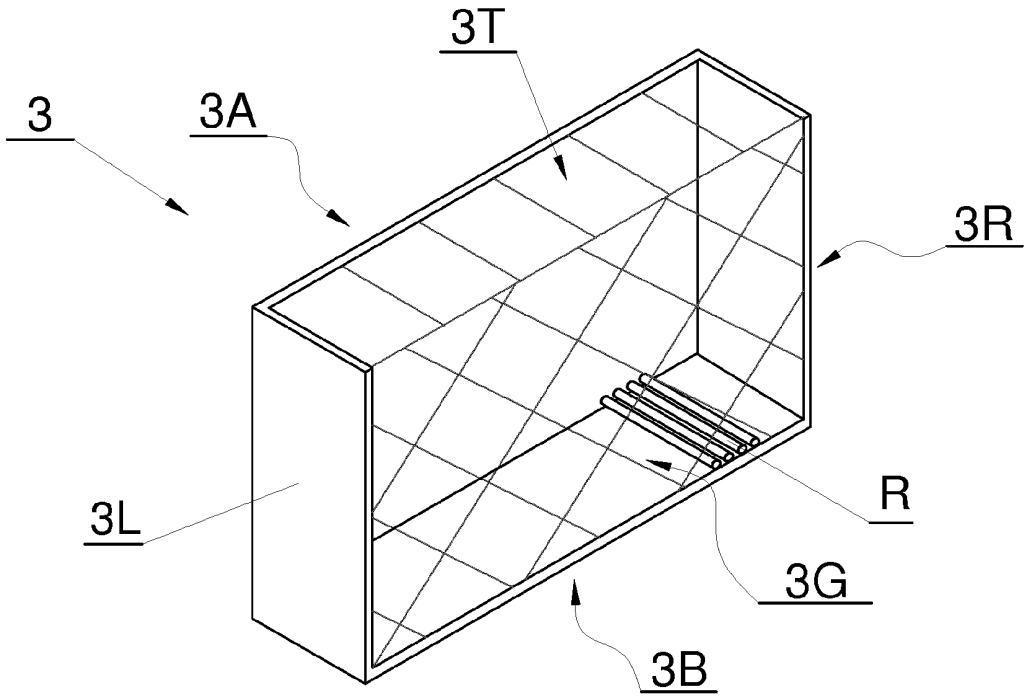

Fig. 1

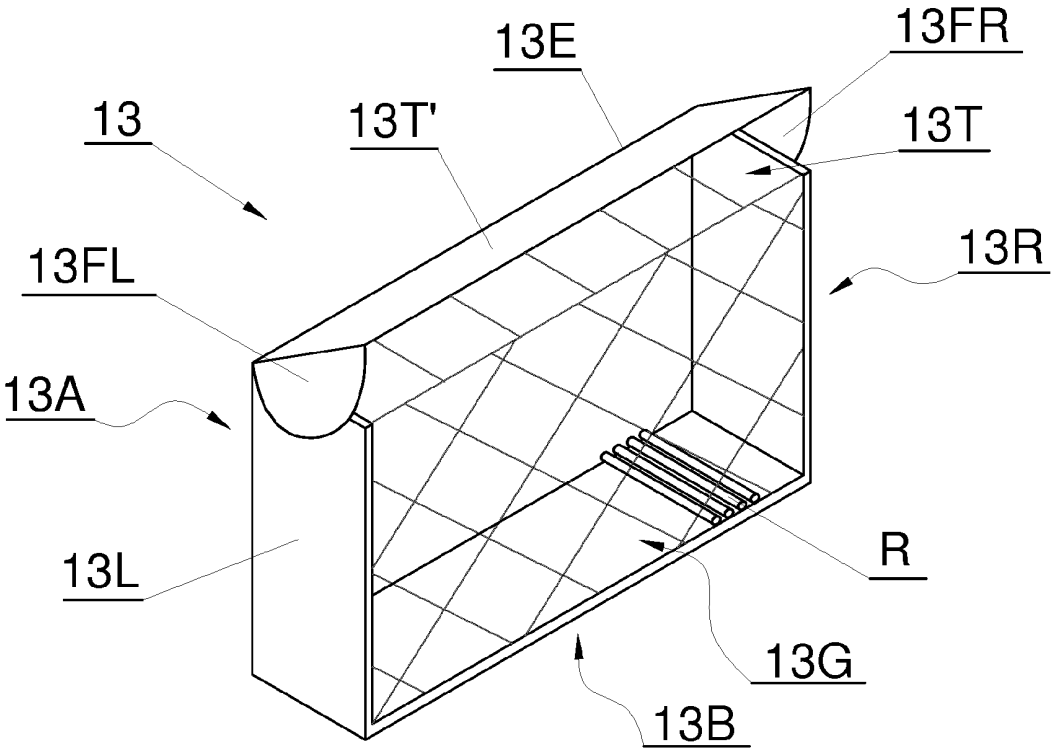

Fig. 2

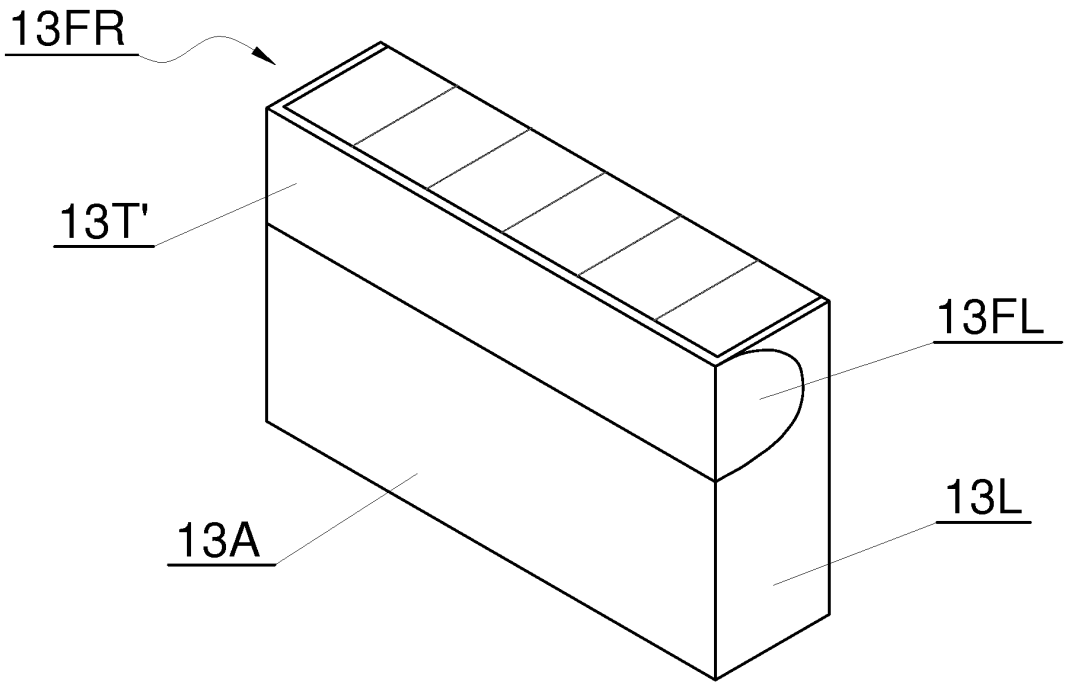
13FR
13T'
13FL
13L
13A

Fig. 2a

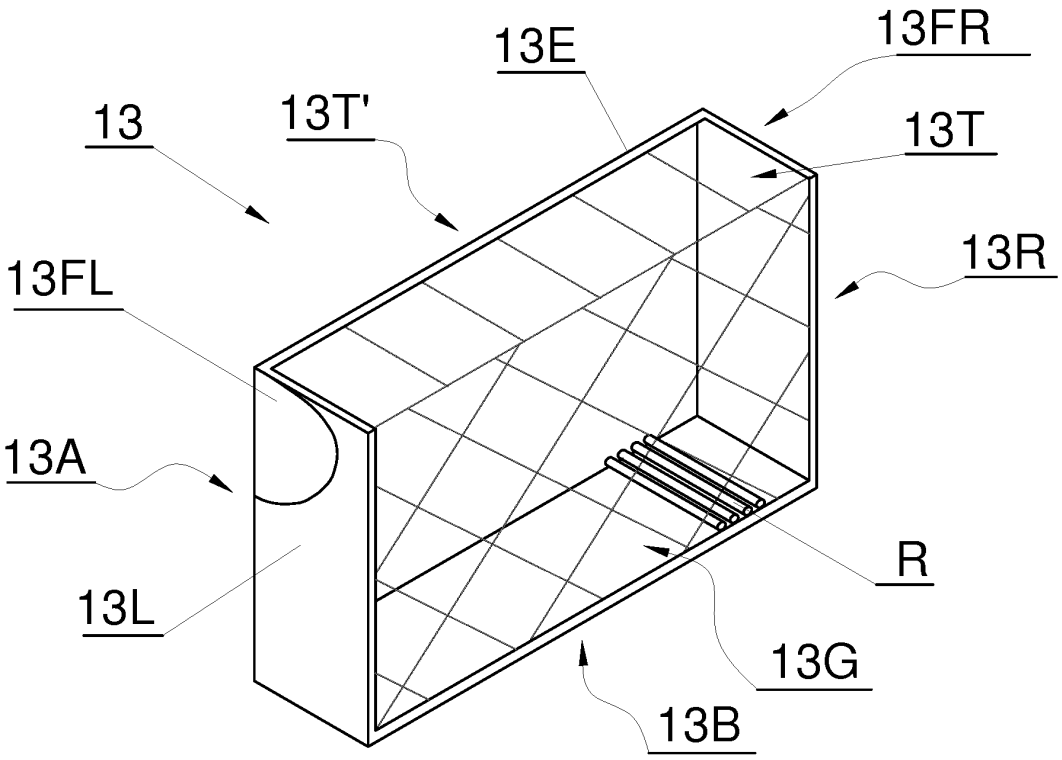
13E
13FR
13
13T'
13T
13R
13FL
13A
R
13L
13G
13B

Fig. 2b

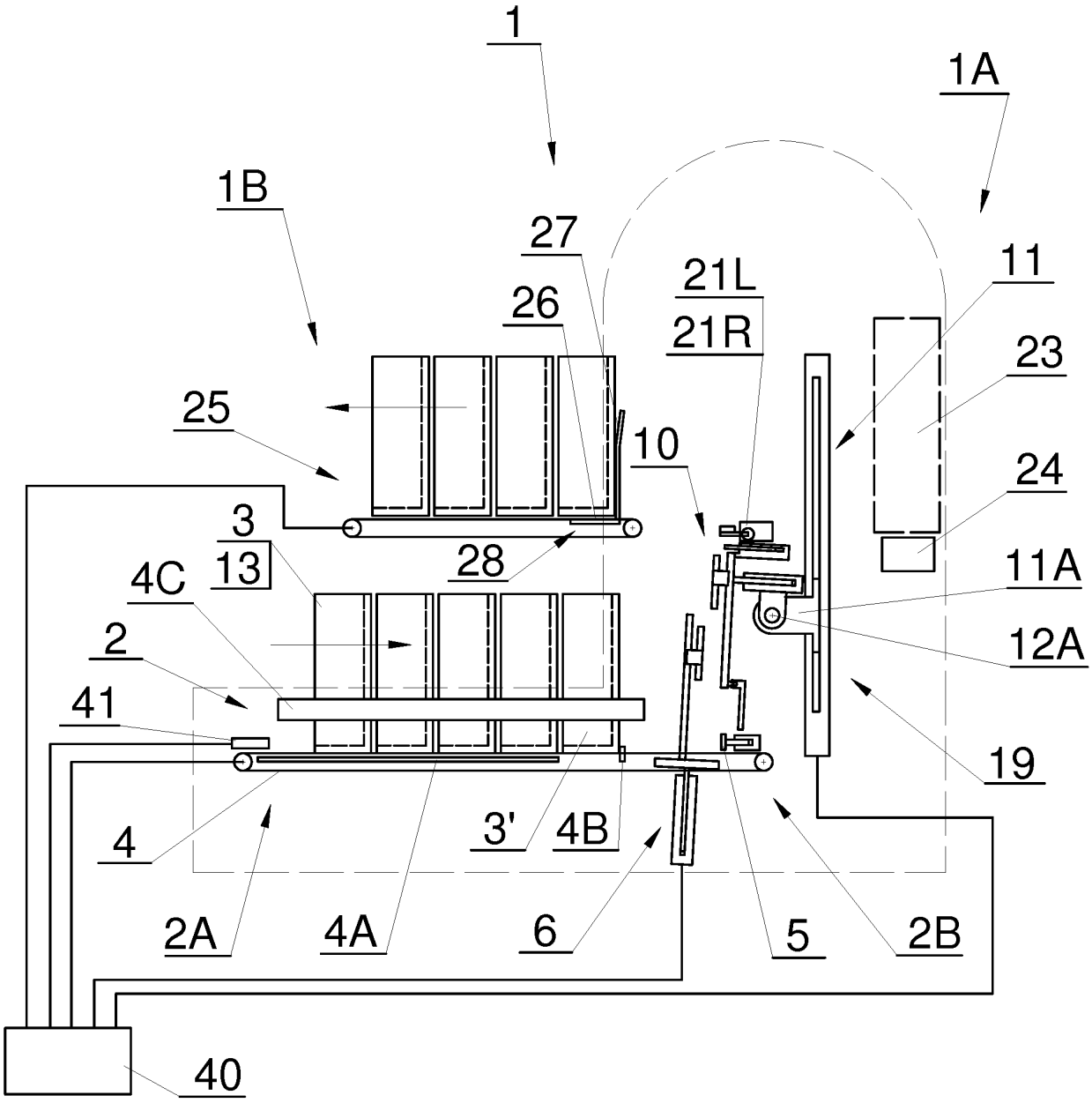
1
1A
1B
27
21L
11
26
21R
23
25
10
24
3
28
11A
13
4C
12A
2
41
19
4
3'
4B
2A
4A
6
5
2B
40

Fig. 3

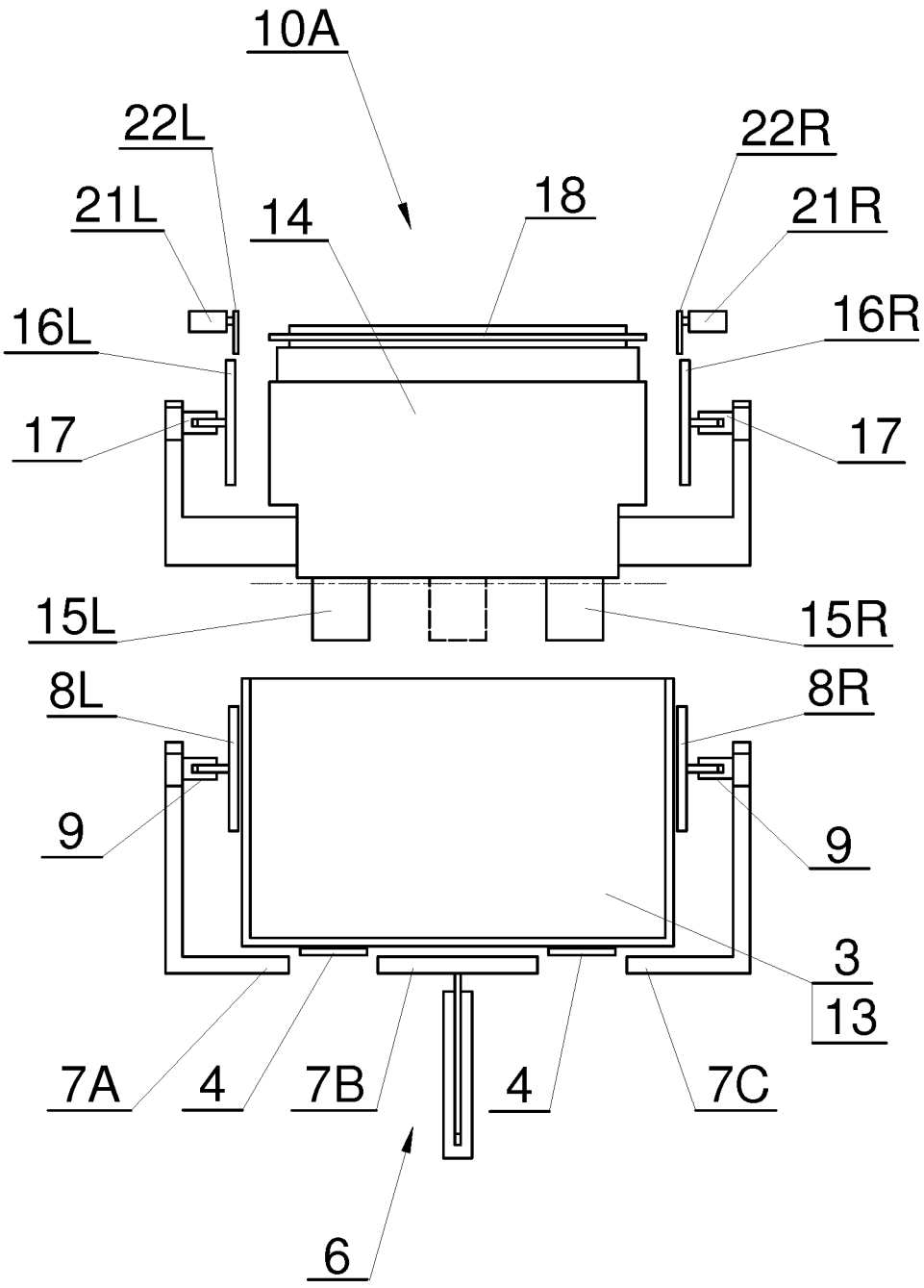
10A
22L
22R
21L
14
18
21R
16L
16R
17
17
15L
15R
8L
8R
9
9
3
13
7A
4
7B
4
7C
6

Fig. 3a

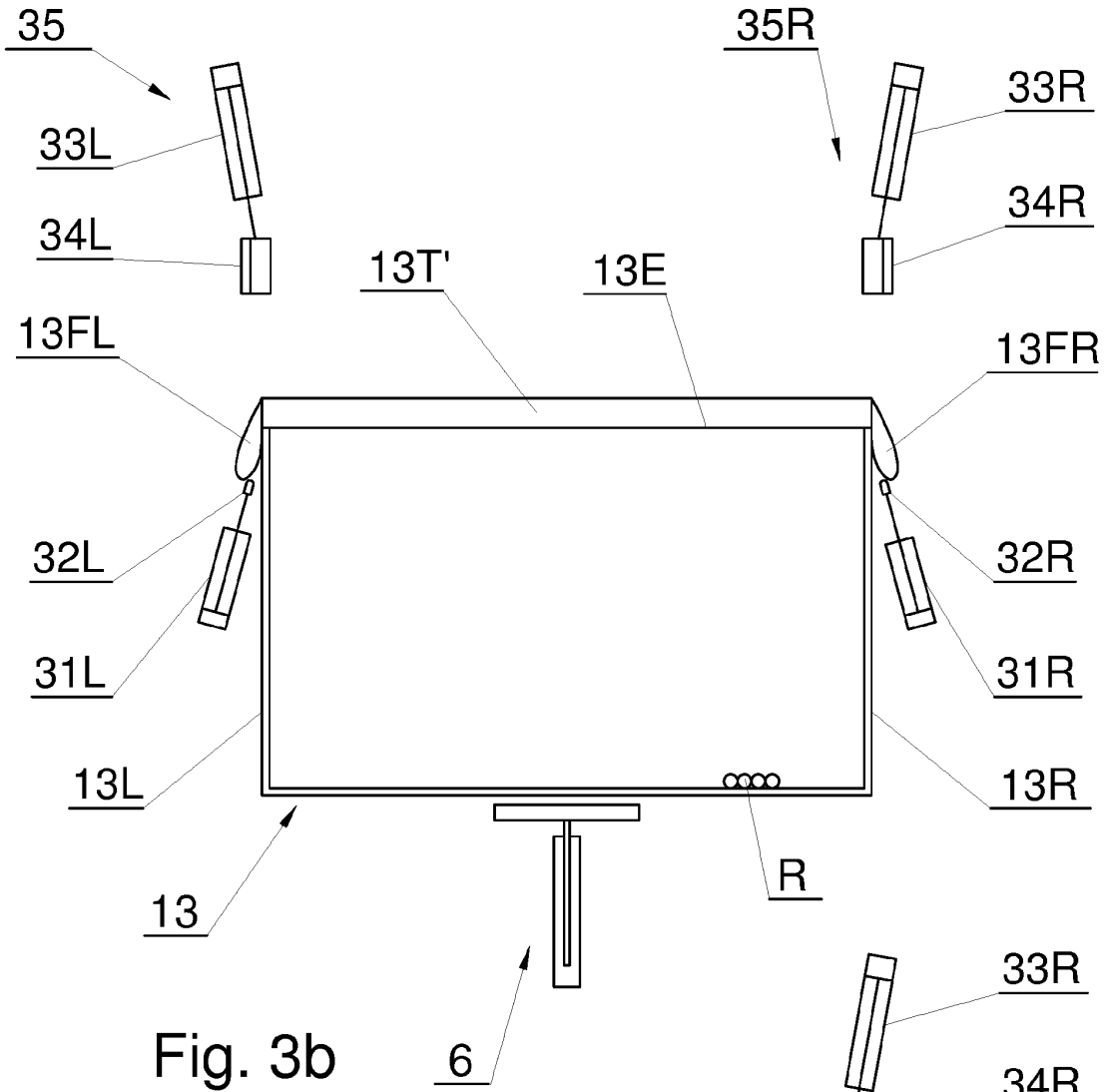
35
35R
33R
33L
34R
34L
13T'
13E
13FL
13FR
32L
32R
31L
31R
13L
13R
13
R
6

Fig. 3b

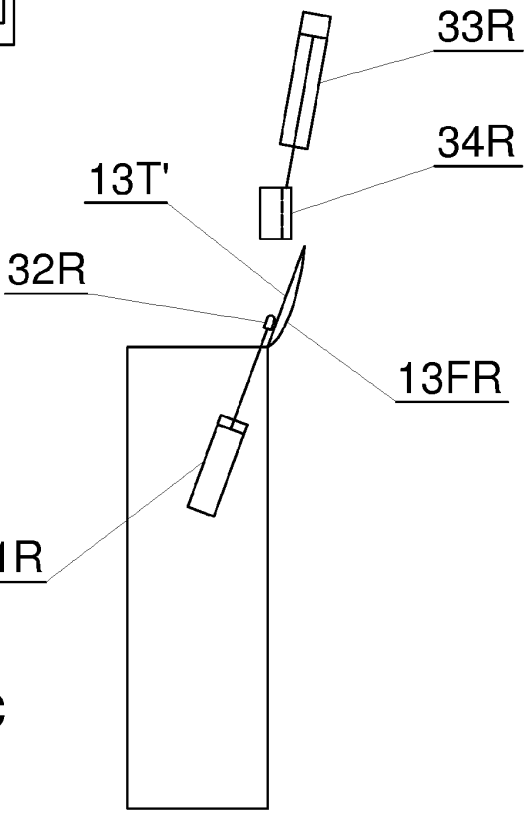
33R
34R
13T'
32R
13FR
31R

Fig. 3c

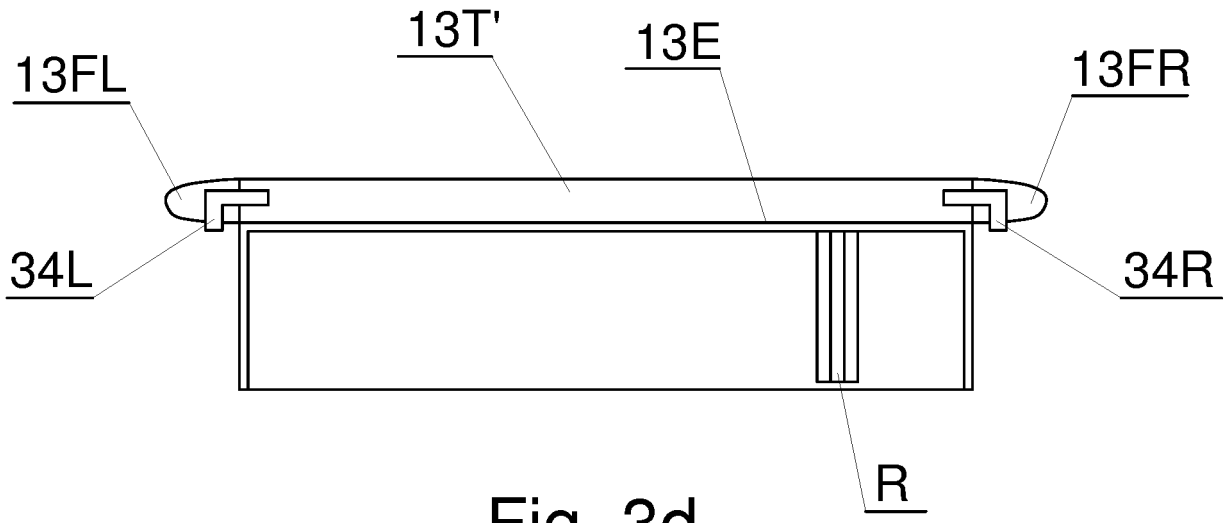

Fig. 3d

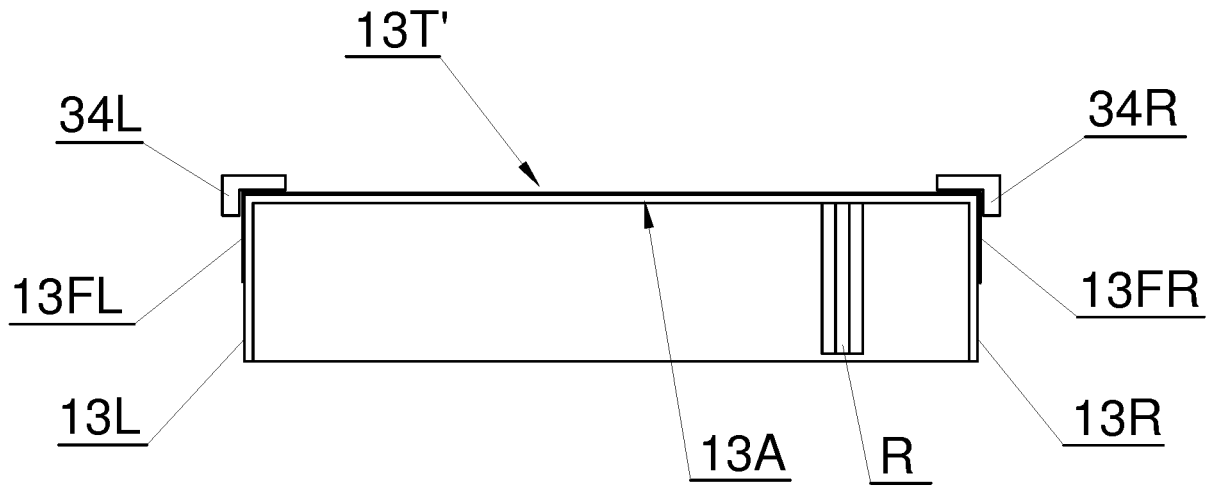

Fig. 3e

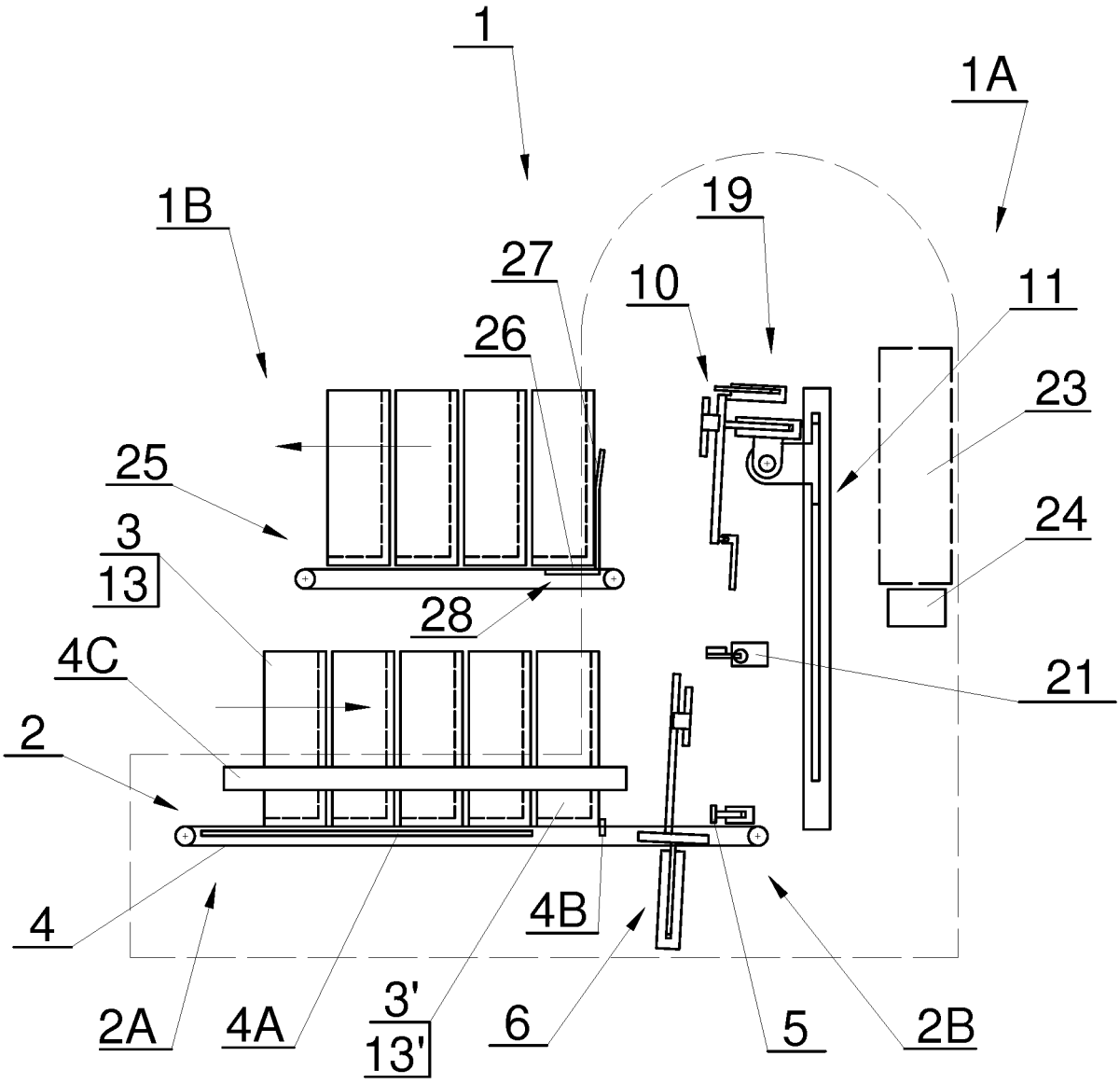

Fig. 4

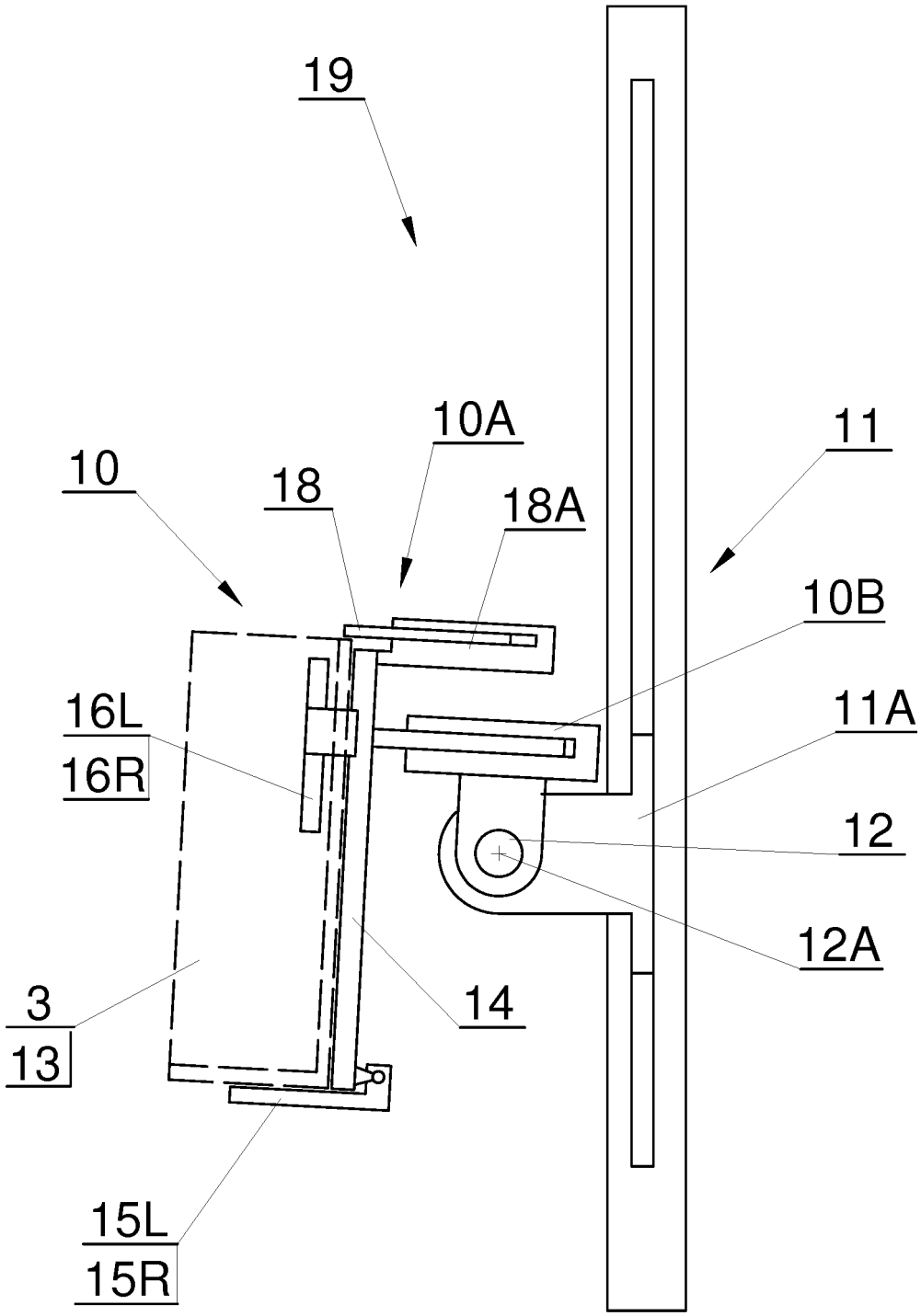

Fig. 5

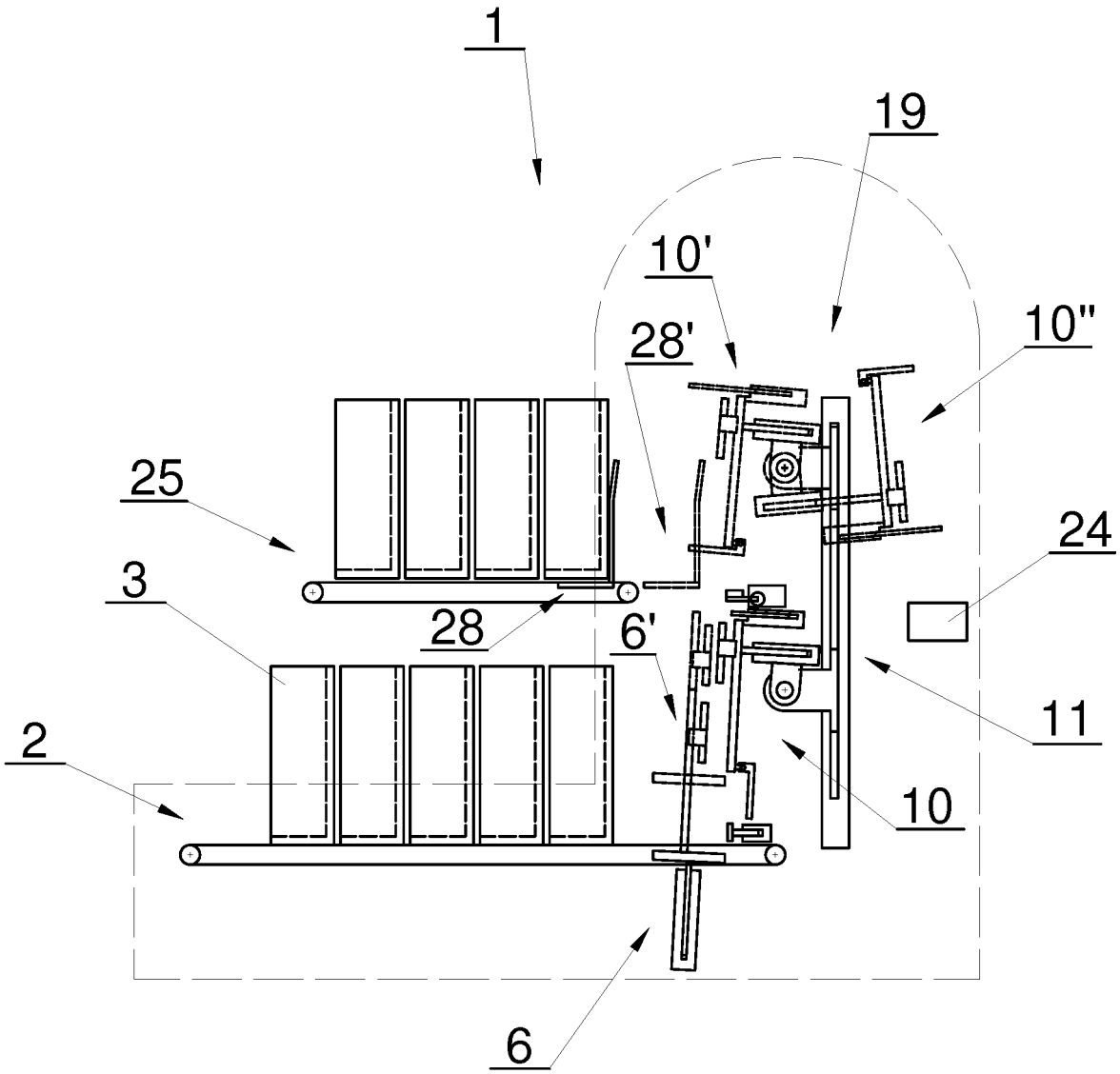

Fig. 6

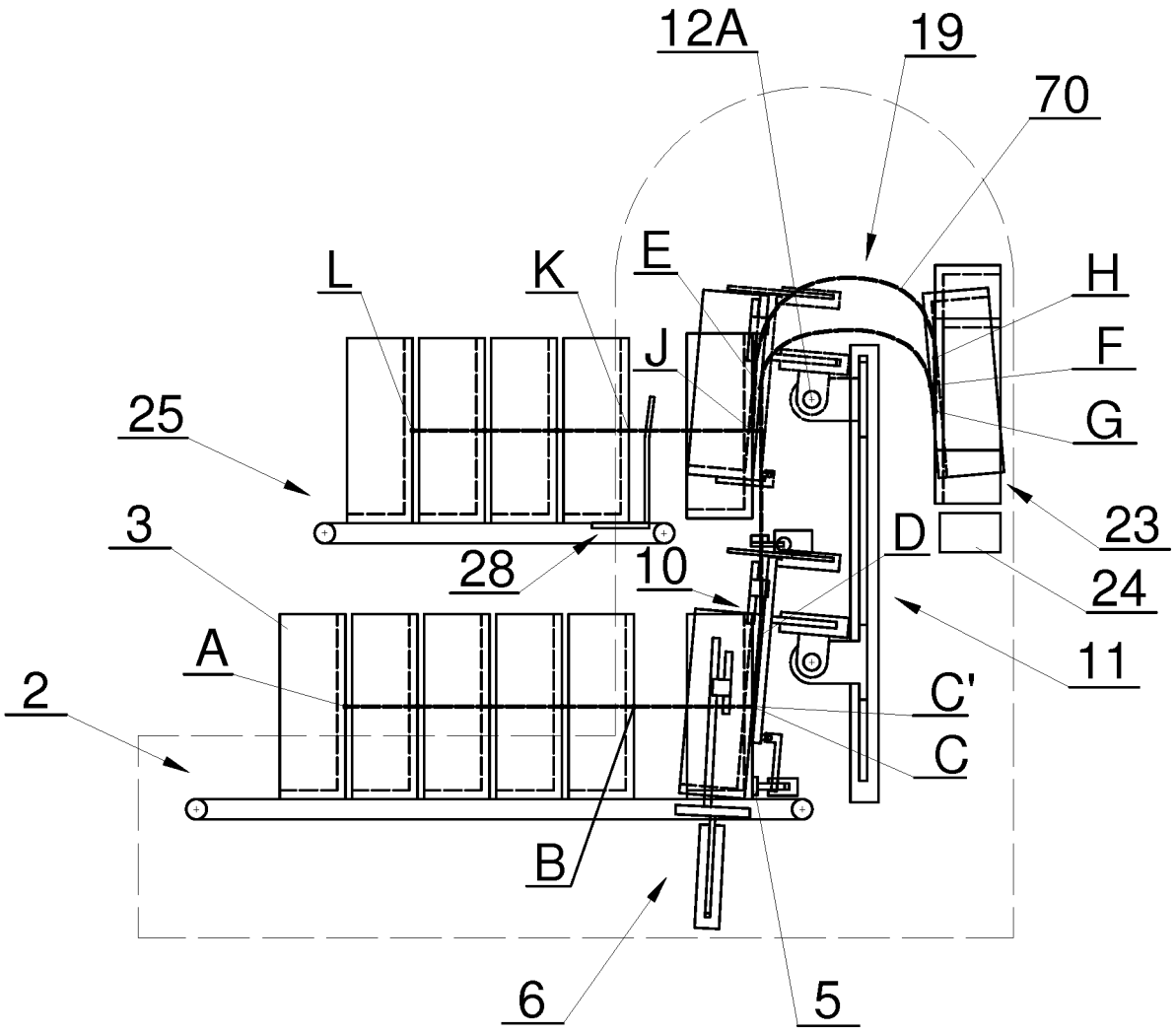

Fig. 7

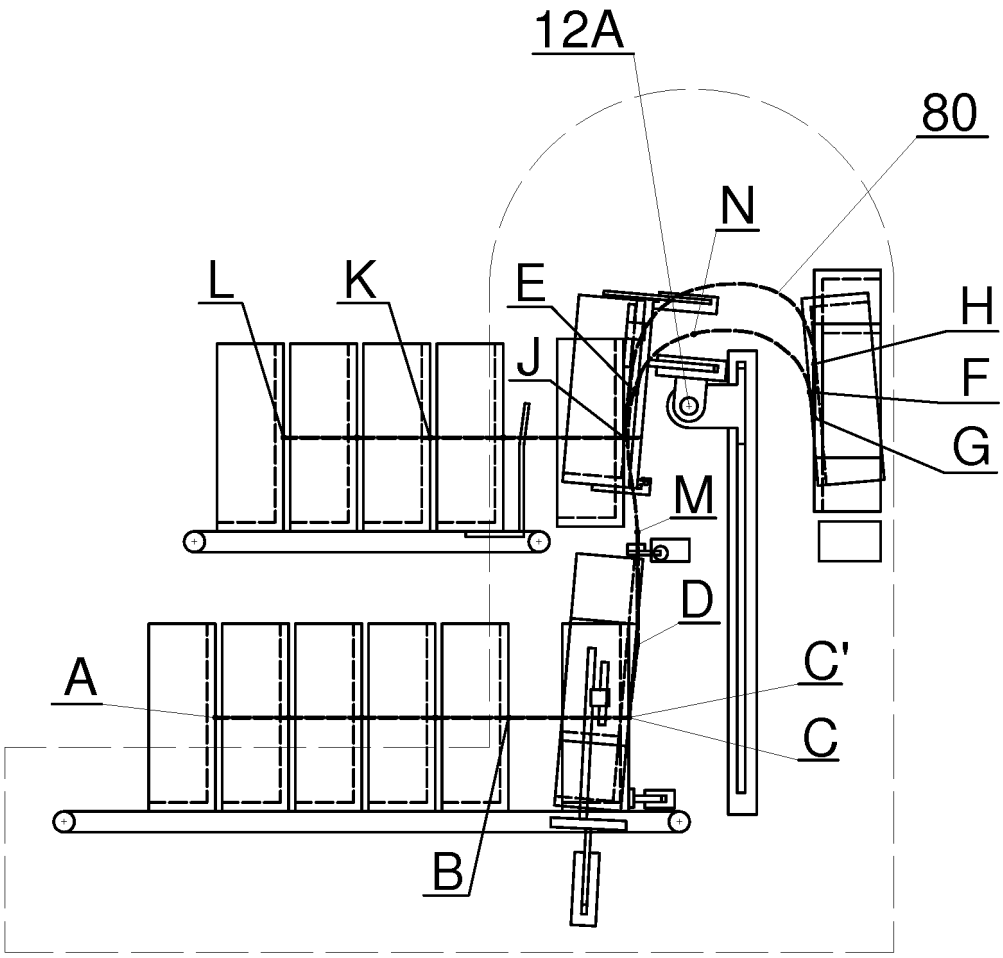

Fig. 8

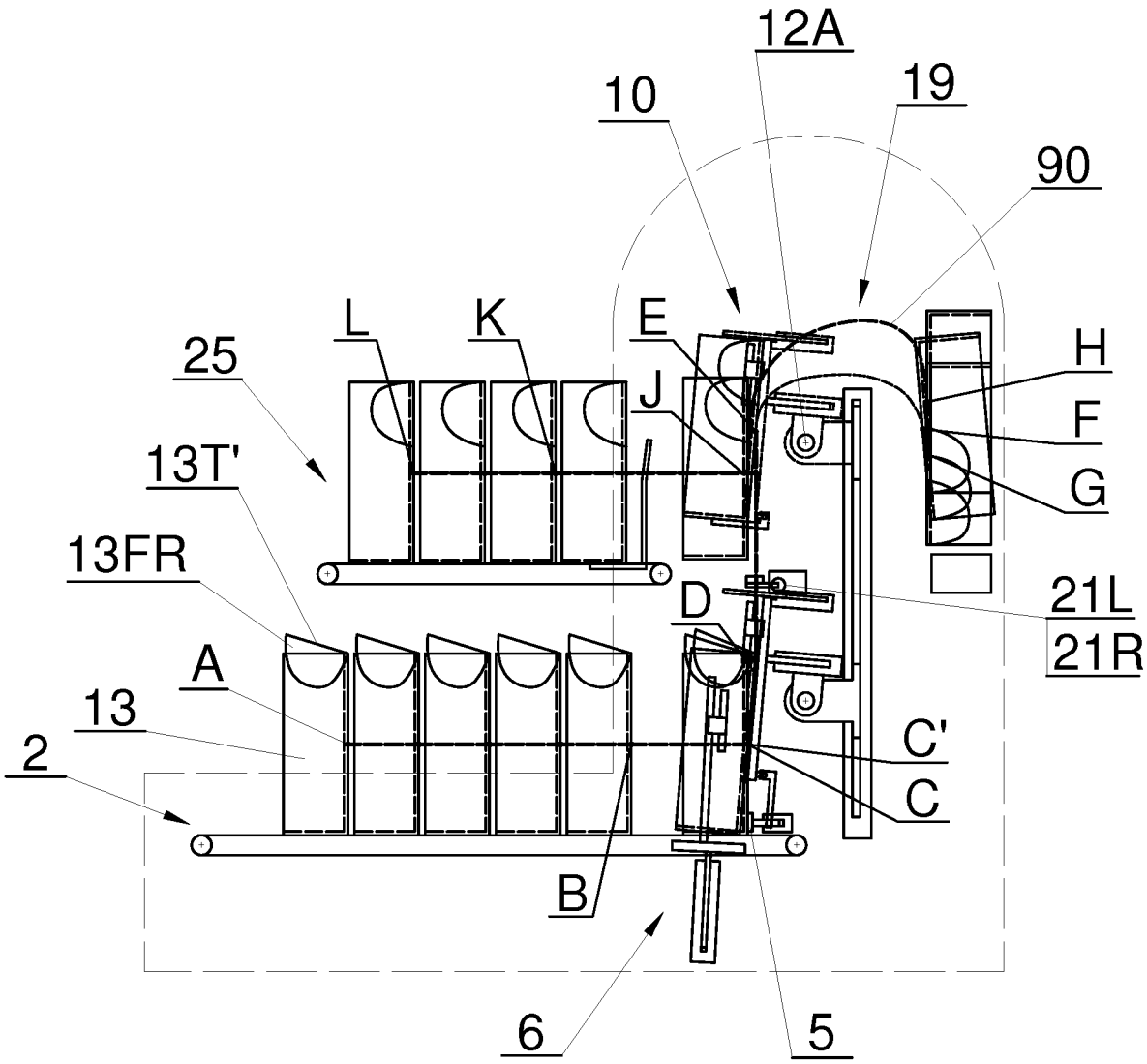

Fig. 9

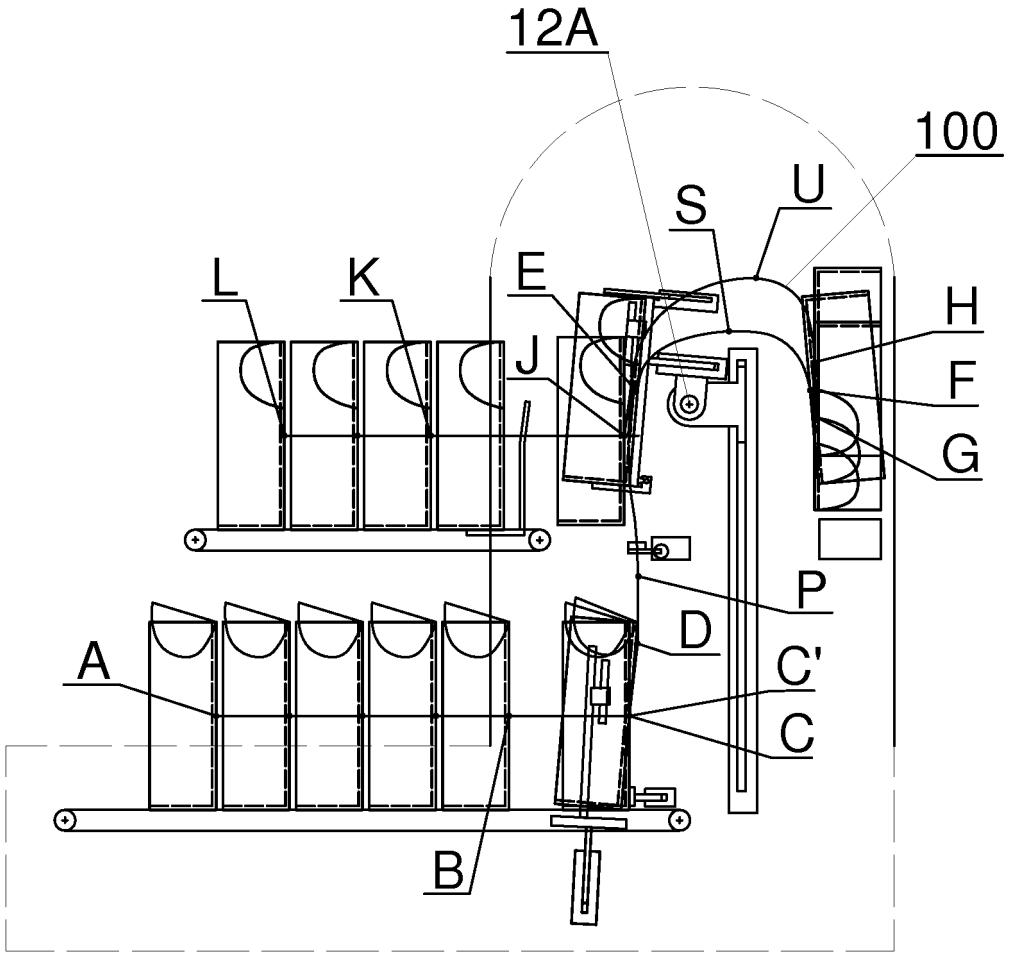

Fig. 10

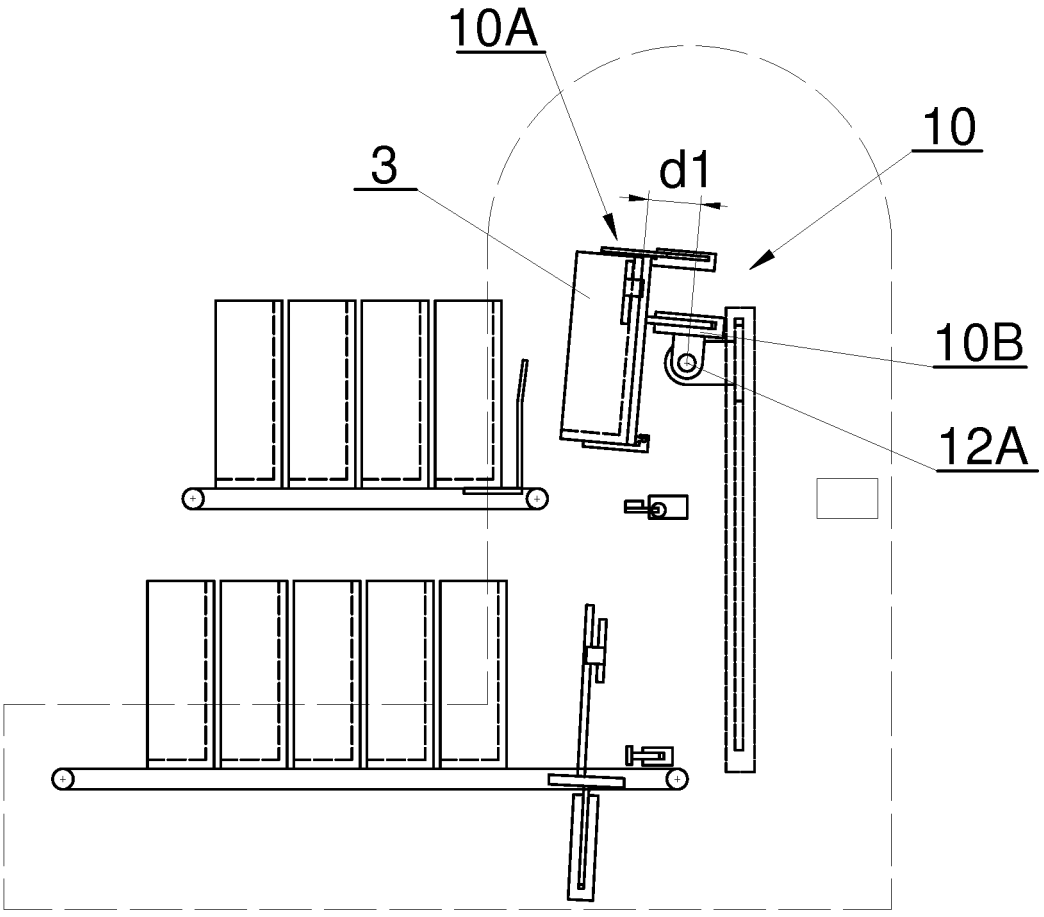

Fig. 11

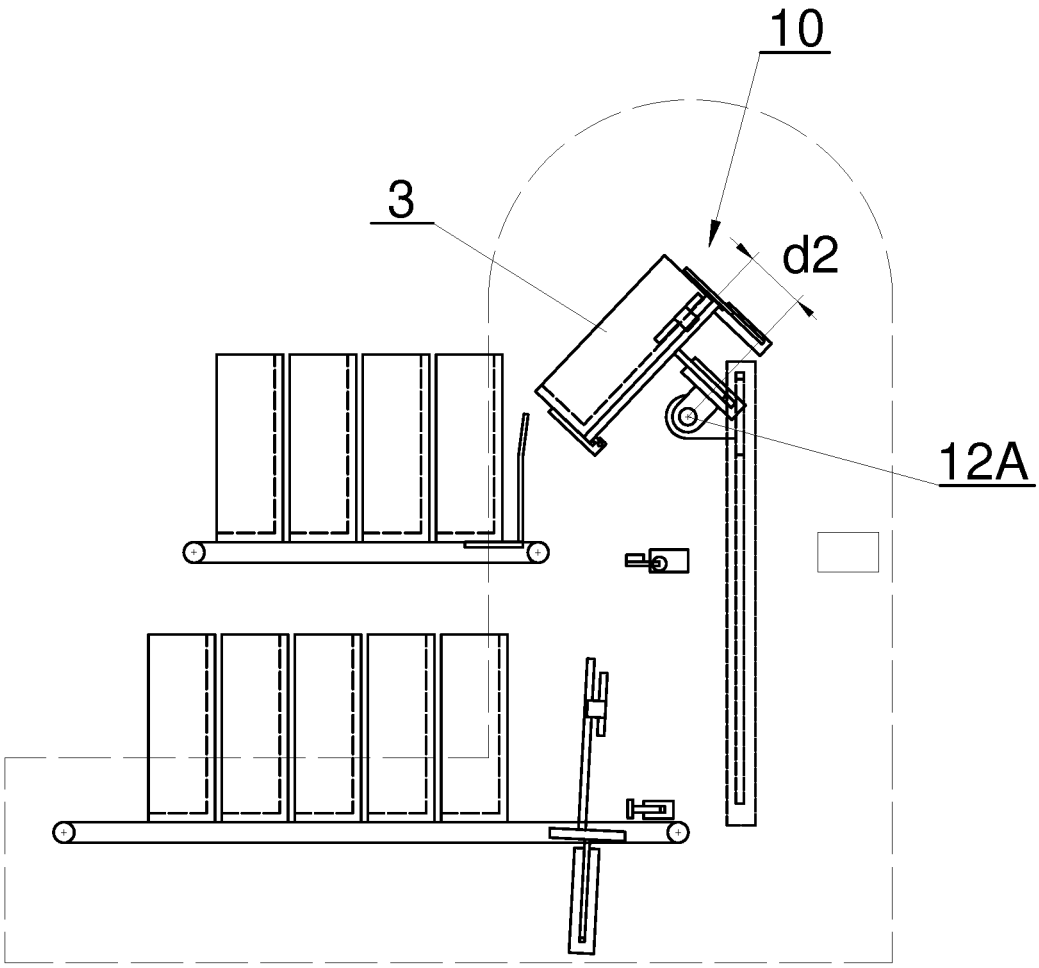

Fig. 12

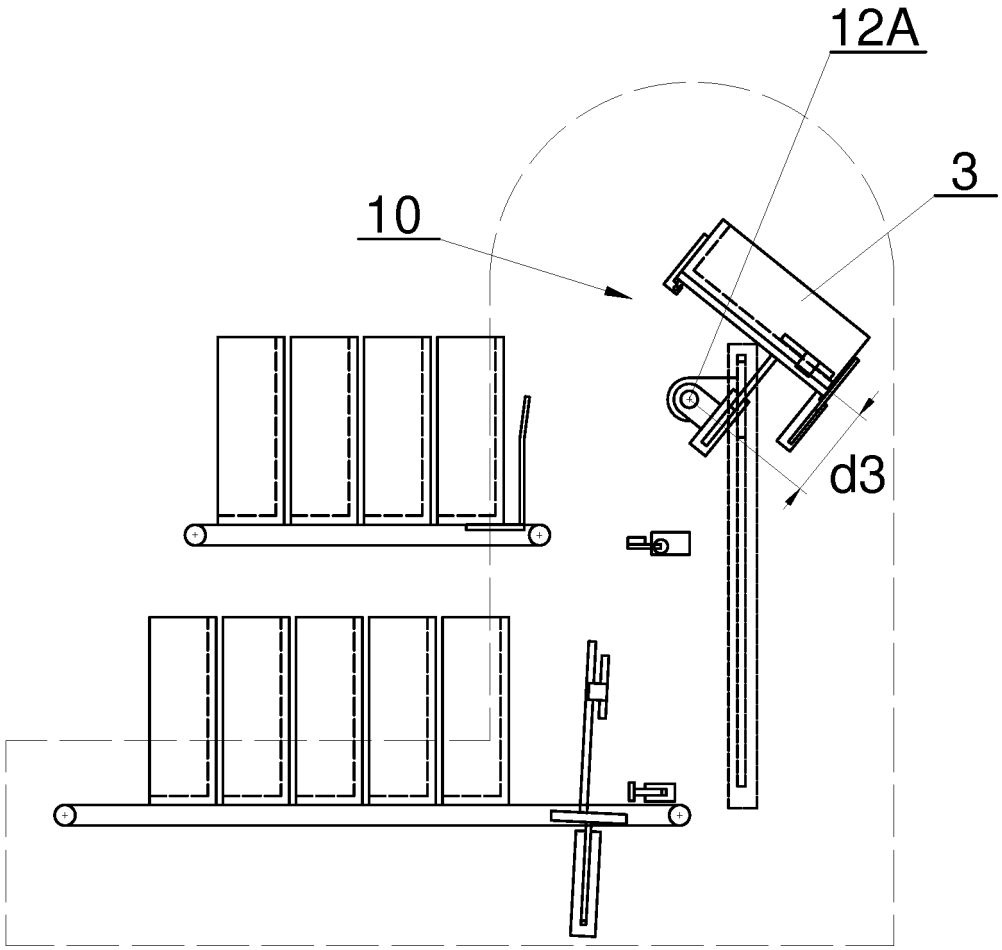

Fig. 13

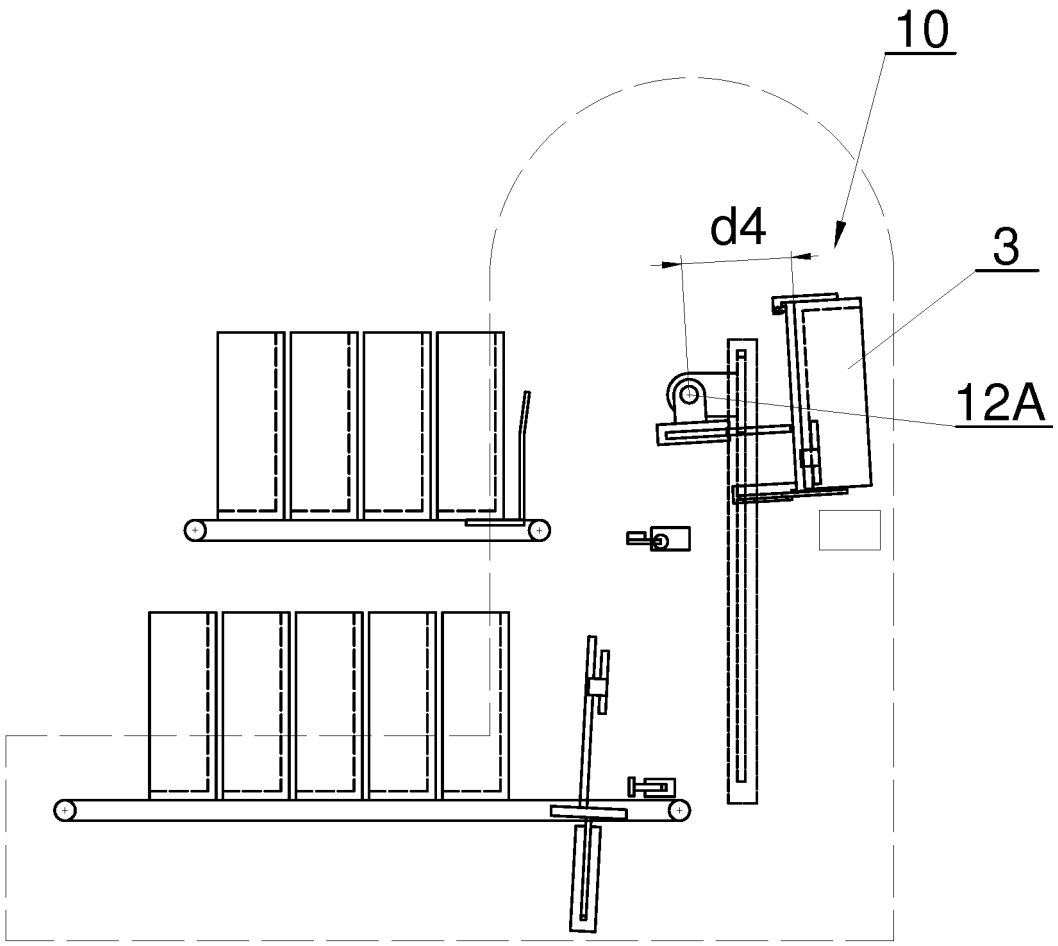

Fig. 14

REFERENCES CITED IN THE DESCRIPTION

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