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(54) **Apparatus and method for feeding paper blanks and similar flat objects**

Vorrichtung und Verfahren zum Zuführen von Papierzuschnitten und ähnlicher flacher Objekte

Appareil et procédé pour l'alimentation de flans de papier et objets plats similaires

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Description

[0001] The present invention relates to a device and to a related method to feed flat objects. More in detail, the present invention relates to a feed device (feeder) and to a related method of use, for receiving a plurality of flat objects, for example blanks of paper material, and automatic loading thereof on conveyor means of the feeder which in turn delivers the flat objects for subsequent processing steps.

[0002] It must firstly be noted that here and hereinafter the term flat objects will be used to indicate elements having a substantially flat development, that is with two predominant dimensions relative to the third. In particular, as will be described more in detail below, the device and the method according to the present invention enable loading and feeding of blanks of paper material.

[0003] This type of device is used, for example, in machines for packaging wrapped or granular products, usually by blanks of paper material or cartons, generally preformed according to need and provided with gluing tabs and fold lines that enable the formation of a body generally having a parallelepiped shape, into which the products to be packaged are inserted. In the following description, the term "blanks" also indicates cases, i.e. blanks glued along one side to form a flat box body, not yet erected into a parallelepiped. In particular, the device according to the invention can be used as magazine-feeder of cases in packaging machines, wherein the cases are formed into boxes and the boxes are filled with the relative products.

[0004] The cases are fed to the packaging machine by means of a feeder, also known in the art as "magazine". The cases are fed in a known way to the packaging machine in a controlled manner and in relation to the travel speed of the products to be packaged.

[0005] Originally, blanks were loaded on the feeder by hand by an operator, with the need to maintain loading constant in order to avoid having to interrupt the production cycle of the packaging machine due to lack of blanks delivered by the feeder.

[0006] Today, the loading operation is carried out by automatic devices which enable loading of flat objects from the pallet on which they are located on the conveyor means of the feeder which delivers them in a continuous manner to the packaging machine.

[0007] Usually, the flat objects, and in particular the blanks of paper material, or simple cartons, are handled and loaded on the feeder stacked on top of one another, i.e. arranged side by side in correspondence of the flat surface thereof.

[0008] Document US2009/028678 discloses a device for moving a plurality of flat objects comprising a base and a support element protruding from it, in order to laterally support the flat objects.

[0009] A plurality of objects previously arranged on a receiving surface are retained by a parting element. New flat objects are transported on the base and are loaded on the receiving surface by rotating the support element to facilitate the transfer of flat objects towards objects previously transported on the receiving surface.

[0010] Once the flat objects have reached the position of contact with the parting element, the latter is lifted and moved towards the support element of the device thus allowing the support of new objects.

[0011] The document US2007/0147981 describes a device for loading flat objects, and in particular stacked flat cartons, on a feeder which in turn delivers the cartons to a packaging machine.

[0012] The device comprises a conveyor belt that delivers the stacked cartons to a loader provided with a supporting base on which the stacked cartons are placed and then transferred to the feeder connected to the packaging machine. The loader comprises clamping means of the cartons and can also be rotated in such a manner as to rotate the cartons by an angle of 90°. By doing so, the cartons are placed on the loader in horizontal position and subsequently rotated to be arranged on the conveyor means of the feeder, and in particular on the conveyor belts with which it is equipped. The loader is moved on a vertical column to reach the feeder and to at least partially follow the movement of the conveyor belts so as to reach the last carton previously loaded thereon and to release new cartons.

[0013] Release takes place by lowering the loader, the base of which passes over the conveyor belts of the feeder, loading the cartons thereon.

[0014] Although this device enables automatic loading of the cartons, it has some drawbacks both in relation to construction and use. For example, the presence of the vertical column on which the loader is moved considerably increases the overall dimensions of the device, besides making it particularly complex, and therefore more subject to breakage and maintenance. Moreover, the vertical movement of the cartons, with simultaneous rotation of the loader, slows down the movement of the device, besides requiring a considerable quantity of energy for movement thereof along the vertical column.

[0015] Another aspect that makes the device according to US'981 complex, both in terms of implementation and of use, is the need for the feeder of the loader to pass over the conveyor belts of the loader feeder to release the cartons on the conveyor belts.

[0016] For these reasons, there is the need to provide a feed device (feeder) and a method of use with different loading, movement and therefore feed of the flat objects.

[0017] The object of the present invention is to solve the problems of prior art feed devices, discussed briefly above, and to provide a device that is simple to manufacture and effective during use and which enables flat objects to be loaded automatically on the conveyor means of the feeder, or magazine, without causing slowing or interruption of the process of loading and of feeding, for example, to a packaging machine.

[0018] A further object of the present invention is to provide a device to feed flat objects which can ensure a

high speed and which can adapt to different dimensions of the flat objects to be handled, fed and conveyed by means thereof.

[0019] A further object of the present invention is to provide a feed device which simplifies loading of new flat objects on the conveyor means of the feeder, in succession, relative to those previously loaded.

[0020] These and other objects are achieved by a device to feed flat objects (feeder), according to the subject-matter of appended claim 1.

[0021] As will be described in more detail below, the present device can be used to feed flat objects such as blanks of paper material, also known as cases, also partially formed, and similar objects.

[0022] The present feed device receives a plurality of blanks which are transferred by the loading body, or loader, on the conveyor means with which the feeder, also known as magazine, is provided, which in turn delivers them, for example, to a packaging machine, not shown in the accompanying figures.

[0023] The presence of first support means enables the blanks loaded on the conveyor means to be supported, preventing them from being subjected to unwanted movements during conveying. Moreover, the presence of the first support means enables loading of the blanks on the conveyor means to be carried out in an automatic and continuous manner.

[0024] In fact, the support means are movable relative to the conveyor means to reach a position of contact with one or more flat objects conveyed. More in detail, the first support means are movable and alternate together with the lateral surface of the loader in the position of contact with the blanks conveyed, and in particular with the last of the blanks loaded on the conveyor means of the feeder.

[0025] In this way, there is always a support surface for the blanks conveyed on the conveyor means of the feed device.

[0026] According to one aspect of the present invention, exchange or alternation of the lateral surface and of the first support means in contact with one or more blanks takes place in a position of simultaneous contact of the same blank by the lateral surface and by the first support means.

[0027] In particular, the first support means reach at least one position of simultaneous contact with the same flat object conveyed on the conveyor means, together with the lateral surface of the loading body.

[0028] According to the invention, the device also comprises second support means for at least one of the flat objects which are movable relative to the conveyor means to reach at least one position of contact with one or more of the flat objects conveyed.

[0029] Advantageously, the second support means alternate in at least one position of contact with at least one blank conveyed on the conveyor means with the lateral surface of the loading body and/or with the first support means.

[0030] The presence of the second support means and their alternation in the position of contact with one or more blanks during transport, with the lateral surface and/or with the first support means makes it possible to always have a support surface for the blanks in contact therewith during the conveying step, considerably speeding up operation of the device and enabling extremely fast and accurate loading of new blanks on the conveying means, without requiring to interrupt their movement.

[0031] Also in this case, exchange or alternation of the contact with the blanks between the second support means and the first support means and/or the lateral surface of the loader preferably takes place by reaching at least one position of simultaneous contact with the same blank, together with the first support means and/or together with the lateral surface of the loader.

[0032] According to a preferred embodiment, the second support means are constrained to the loading body and are movable relative to the loading body. In this case, movement of the second support means relative to the conveyor means of the device takes place by moving the loading body.

[0033] According to a preferred embodiment, the first support means and/or the second support means and/or the lateral surface of the loading body are structured in a substantially complementary manner, to be simultaneously in contact with the same flat object, or blank, in at least one position of simultaneous contact therewith.

[0034] It must be noted that this complementary shape between these elements enables free movement and alternation thereof in the position of contact with one or more blanks conveyed, without interference between them during movement to reach the position of contact, and in particular in the position of simultaneous contact with the same blank.

[0035] An aspect of the present invention relates to a method to feed flat objects according to the subject-matter of appended claim 11.

[0036] Advantageously, the method comprises the step of moving the first support means and the lateral surface of the loading body, relative to the conveyor means, to alternate in at least one position of contact with at least one flat object conveyed on the conveyor means. In this way, there is always one element in contact with one or more conveyed blanks, and in particular the last conveyed blank which can thus be adequately supported during movement thereof on the conveyor means.

[0037] According to the invention, the feeding method comprises the step of moving the second support means relative to the conveyor means of the feeder to reach, together with the first support means and/or together with the lateral surface of the loader, at least one position of simultaneous contact with the same flat object conveyed on the conveyor means of the feeder.

[0038] In this way, it is possible to alternate, in a position of contact with one or more blanks, and in particular the last blank conveyed, the second support means with the first support means and/or with the lateral surface of

the loader. Consequently, the feeding method according to the present invention is very fast and efficient and enables continuous loading of blanks on the conveyor means, which are fed continuously while they are adequately supported during movement thereof.

[0039] These and other advantages will be apparent from the description below and from the accompanying figures, indicated here by way of non-limiting example, wherein:

- Fig. 1 shows a schematic top view of the feed device according to the present invention;
- Figs. 2A-2E show, in partial perspective views, some steps of the method for automatic loading and feeding of blanks according to one aspect of the present invention;
- Figs. 3A and 3B show partial perspective views of the second support means of the device according to the present invention, respectively in a - withdrawn position and in an extracted position.

[0040] With reference to the accompanying figures, the feed device 1 for blanks, cases and analogous flat objects 50, in the embodiment illustrated, comprises conveyor means 2 for one or more flat objects, and at least one loading body 3, in turn comprising a base element 4 and at least one lateral surface 5 to retain one or more flat objects 50.

[0041] As already stated, although particular reference is made below to blanks of paper material 50 (usually also called cases) used for packaging products, the device and the related method of use according to the present invention can be used with any other flat object, or any other object having a substantially flat shape with two predominant dimensions relative to the third.

[0042] It must also be noted that the blanks 50, or cases, can also be partially formed, or some portions of the blank can be mutually constrained, for example in such a manner as to have the lateral surface of the blank already formed. In this way, through specific means, known in the art and not described below, comprising for example suction cups, the blanks can be opened and erected, enabling insertion of the products to be packaged through the base surfaces, which are subsequently closed in such a manner as to form a wrapping generally having a parallelepiped shape.

[0043] As can be seen in the figures, the blanks 50 are generally placed side by side with one another in such a manner that the flat surface of each one is facing and placed in contact with the flat surface of the blank after it and before it in sequence. Naturally, even in the case in which the blanks are at least partially formed, they are nonetheless flattened in such a manner as to have a substantially flat shape.

[0044] The present feed device 1 receives a plurality of blanks 50 which are transferred by the loading body 3, or loader, on the conveyor means 2 with which the feeder, or magazine, is provided, which in turn delivers them, for example to a packaging machine, not shown in the accompanying figures. The feeder 1 comprises conveyor means 2 which cause movement of the blanks 50 received from the loader 3. More in detail, the conveyor means 2 comprise one or more chains, or conveyor belts, or similar movement means that convey the blanks to the point in which they are fed, for example, to the packaging machine (not shown), which is generally positioned downstream of the feeder 1.

[0045] Although only shown schematically in Fig. 1, at the end of the conveyor means 2 is an exit area in which the blanks 50 are picked up individually by specific known means, such as arms with suction cups. The exit area comprises interception means 14 of the blanks which form, for example, a section having slightly smaller dimensions relative to the dimensions of the blanks conveyed by the feeder, so as to prevent the blank from passing therethrough until the same blank has been subjected to partial deformation. Temporary deformation of the blanks required to pass through the interception means is obtained by specific extraction means (again not shown), such as an arm with suction cups, or pushers, or similar means.

[0046] The blanks 50 are moved by the conveyor means 2 until reaching the position of contact with the interception means 14, where they remain until they are picked up by the extraction means.

[0047] It must be noted that in the accompanying Figs. 2A-2E, for simplicity only some of the blanks conveyed are shown, bearing in mind that the whole of the part to the left of the direction of travel of the conveyor means of Figs. 2A-2E, is filled with other blanks, which are conveyed until coming into contact with the interception means thereof, also not shown.

[0048] In the embodiment illustrated in the figures, the conveyor means 2 comprise three chains moved by specific means, for example one or more electric motors.

[0049] The trajectory of travel of the chains is preferably rectilinear, however, the feeder 1 can naturally be structured in such a manner as to move the blanks 50 along a curvilinear trajectory, or along a trajectory that is only partly rectilinear. In the embodiment illustrated, the chains 2 move the blanks 50 in a rectilinear direction X from right to left.

[0050] Moreover, the feed device 1 comprises a loading body 3, or loader, comprising at least one base element 4 and at least one lateral surface 5 to contain the blanks 50 which are arranged thereon by known means, which generally perform transfer of the blanks from a pallet and place them on the loader. These means, not represented, can comprise a conveyor belt, or an automated robot which holds the blanks and can also cause rotation thereof before they are deposited on the loader 3.

[0051] In the embodiment described here, the blanks 50 are placed on the loader 3 in vertical position, i.e. with the flat surfaces side by side with one another, and with the flat surfaces arranged perpendicularly relative to the base element 4 of the loader 3.

[0052] The loading body 3 preferably comprises a base element 4 having a substantially flat shape and preferably formed by a flat sheet of metal material.

[0053] Moreover, the loading body 3 comprises at least one lateral surface 5 that cooperates with the base element 4 to contain and support the blanks once they have been arranged in the loader 3 for movement thereof on the conveyor means 2 of the feeder.

[0054] The lateral surface 5 is preferably oriented perpendicularly relative to the base element 4 and, according to preferred embodiments, the lateral surface 5 is constrained in a rotatable and/or translatable manner relative to the base element 4 of the loader 3.

[0055] As can easily be understood, the translation movement of the lateral surface 5, which preferably takes place along a direction parallel to the direction in which the blanks travel on the feeder, in direction X, enables variation of the width of the base element 4 in such a manner as to receive a greater number of blanks 50 which, as stated, are placed on the base element 4 vertically, or stacked vertically on one of the two lateral edges.

[0056] Rotation of the lateral surface 5 relative to the base element 4, preferably along an axis Y perpendicular to the direction X, facilitates release of the blanks on the loading body 3, by the robot or pick-up arm.

[0057] In the accompanying figures, the lateral surface 5 is illustrated in the position to retain the blanks in a substantially perpendicular position relative to the base element 4.

[0058] Rotation of the lateral surface 5 relative to the base element 4 is preferably at least equal to 90°, in such a manner that at the end of the rotation, the lateral surface 5 is coplanar with the base element 4.

[0059] Specific means 6 known for this use, such as pneumatic actuators and the like, can be used for the rotational and/or translatory movement of the lateral surface 5 relative to the base element 4.

[0060] As can be seen in the figures, the loading body 3 also comprises a retaining surface 7, which as will be seen in more detail below, is fixed. In other words, the base element 4 and the lateral surface 5 can rotate relative to the retaining surface 7. The retaining surface 7 cooperates in retaining the blanks on the loading body together with the lateral surface 5. In detail, the retaining surface 7 is arranged substantially perpendicular relative to the base element 4, and therefore parallel relative to the lateral surface 5, in the position thereof to retain the blanks, illustrated in the figures.

[0061] In this position, it is easy to see that the retaining surface 7, the lateral surface 5 and the base element 4 form a U-shaped body to retain the blanks.

[0062] The loader 3 is movable relative to the conveyor means 2 to follow the movement of the blanks 50 for at least part of their travel on the conveyor means 2 without stopping the system during loading of the blanks.

[0063] More in detail, the loader 3 is movable in a direction substantially parallel to the trajectory followed by the blanks 50 on the conveyor means 2. In the embodiment illustrated in the figures, the loader 3 is constrained movably on a rectilinear guide 8 that enables parallel movement relative to the direction X of movement of the blanks 50 by the chains of the conveyor means 2 of the feeder.

[0064] Movement of the loading body 3 relative to the conveyor means 2 enables the blanks 50 to be loaded in the desired position on the conveyor means 2. As will be better illustrated below, the blanks are loaded on the conveyor means 2 in such a manner that the new blanks 50 follow the blanks 50 previously loaded on the conveyor means 2.

[0065] Moreover, the loading body 3 is also movable between a first position to receive at least one blank which is placed on the base element 4 and a second position to load the blank or blanks 50 on the conveyor means 2 of the feeder 1. Movement between these positions takes place preferably by rotation of the loading body 3. Preferably, rotation takes place about an axis A parallel to the direction X of travel of the blanks.

[0066] During rotation, the retaining surface 7 remains fixed and the base element 4 and the lateral surface 5 rotate about the axis A, relative thereto.

[0067] In Figs. 2A, 2B and 2E, the loading body 3 is shown in the first position to receive the blanks, in which the base element 4 is arranged substantially horizontal, while in Figs. 2C and 2D, the loading body 3 is shown in the position to load the blanks 50 on the conveyor means 2, in which the base element 4, following a rotation about the axis A substantially equal to 90°, is arranged vertically.

[0068] Rotation is imparted by known means 9, such as pneumatic or electric actuators, or the like.

[0069] As can be seen in the figures, the retaining surface 7 is provided with one or more curvilinear guides 7' in which at least corresponding portions of the base element 4 engage and travel; these portions, during movement of the loader between the first and the second position and vice versa, guide the movement of the base element 4 and of the lateral surface 5 constrained thereto, in their rotation relative to the fixed retaining surface 7.

[0070] It must be noted that in the loading position, illustrated in Figs. 2C and 2D, the lateral surface 5 that rotated together with the base element 4 relative to the axis A, is in the position of contact with the flat surface S of one of the blanks 50 thus loaded on the conveyor means and prevents the blanks 50 from falling.

[0071] It must be noted that the lateral surface 5 is preferably structured in such a manner as to have several projecting elements 5a spaced by slots 5b, which, as will be seen below, enable simultaneous contact with the same blank together with first support means 10 and/or together with second support means 15 with which the device is provided.

[0072] In general, the first support means 10 and/or the second support means 15 and/or the lateral surface 5 of the loading body are structured in a substantially

complementary manner to be simultaneously in contact with the same flat object, or blank, in at least one position of simultaneous contact therewith. Moreover, it must be noted that the particular structure of these elements 5, 10 and 15 enables them to move freely without being mutually obstructed during operation of the device.

[0073] As shown in Figs. 2A and 2B, the device according to the present invention comprises a manually movable element 18, already known in the art, which is operated to momentarily perform the feeding process manually or to temporarily support one or more blanks. The element 18 comprises a flat plate which is translatable parallel relative to the direction of travel X and is also rotatable relative to an axis parallel to this direction of travel, in such a manner that the plate can be lowered into a position in which it intercepts the movement of one or more blanks on the conveyor means.

[0074] The device 1 according to the present invention also comprises first support means 10 for one or more blanks 50 which are moved on conveyor means 2. The support means 10 are movable relative to the conveyor means 2 to reach at least one position of contact with at least one blank 50.

[0075] More in detail, the first support means 10 are structured in such a manner as to comprise a surface or a projecting element capable of coming into contact with the surface S of one or more blanks to support them and prevent them from falling.

[0076] In the embodiment illustrated in the figures, the first support means 10 comprise a surface provided with projecting elements 10a alternated with slots 10b, which as will be better illustrated below, enable simultaneous contact of the same blank 50 together with the lateral surface 5 of the loading body or together with the second support means 15 with which the device is provided. The first support means 10 are movable relative to the conveyor means 2 and, in the embodiment illustrated, movement takes place on a rectilinear guide arranged parallel relative to the direction X of travel of the blanks 50 on the conveyor means 2.

[0077] Consequently, the first support means 10 are movable along a trajectory parallel relative to the direction X of travel of the blanks on the feeder. Moreover, it must be noted that although specific reference has been made to movement along a rectilinear trajectory, if the trajectory of travel of the blanks 50 on the feeder is curvilinear or only partially rectilinear, the support means 10 will be movable along a trajectory that follows the movement of the blanks on the conveyor means 2.

[0078] As stated, the first support means 10 reach at least one position of contact with one or more flat objects conveyed on the feeder, in detail, the first support means come into contact with the surface S of the last flat object loaded on the feeder.

[0079] It is clear that the first support means 10 can alternate with the lateral surface 5 of the loader 3 in the position of contact with one or more blanks, and in particular with the surface S of the last blank conveyed on the conveyor means 2. In other words, the lateral surface 5 can be replaced in the position of contact with the blank by the first support means 10 which reach this position. The exchange preferably takes place in the position in which both the elements (lateral surface 5 and first support means 10) are in contact simultaneously with the same blank, see Fig. 2D.

[0080] In this position, the projecting elements 5a of the lateral surface 5 are at least partially housed in the slots 10b of the first support means 10, while the slots 5b of the lateral surface 5 at least partially house the projecting elements 10a of the first support means 10. This enables simultaneous contact of the lateral surface 5 and of the first support means 10 with the surface of the blank 50, also enabling exchange thereof in the contact with the blank without interference.

[0081] Advantageously, loading of new blanks can take place preventing them from falling due to the presence of the lateral surface 5 or of the first support means 10 which alternate and exchange in the position in which they are both in simultaneous contact with the blank.

[0082] The feed device 1 also comprises second support means 15 for the blanks 50 conveyed on the conveyor means 2. The second support means 15 are movable relative to the feeder, and in particular relative to the conveyor means 2 to reach a position of contact with one or more blanks 50 conveyed.

[0083] Preferably, the second support means 15 come into the position of contact with the last blank conveyed, following the movement of said second support means 15 relative to the conveyor means 2. In the embodiment shown in the figures, the second support means 15 are constrained to the loading body 3 and therefore movement thereof relative to the conveyor means 2 depends on the movement of the loading body 3 along the guide 8.

[0084] Moreover, the second support means 15 are movable relative to the loading body 3 between at least one withdrawn position (shown in Fig. 3A) and at least one extracted position (shown in Fig. 3B) to reach the position of contact with a blank, in particular the last blank present on the conveyor means 2.

[0085] It must be noted that the second support means 15 can obviously be moved in an independent manner relative to the loading body 3 and therefore carry out, in an independent manner therefrom, the movement relative to the conveyor means 2, required to reach at least one position of contact with one or more blanks conveyed.

[0086] In fact, in the extracted position the second support means 15 intersect the trajectory of movement of the blanks 50 on the conveyor means 2.

[0087] In the embodiment illustrated in the figures, the second support means 15 comprise several projecting elements 15a which are constrained in a translatable manner to the loading body 3, and in particular to the fixed retaining surface 7 of this latter.

[0088] The projecting elements 15a are structured and spaced apart in such a manner that they do not interfere

during alternation in the position of contact with the blank(s) together with the first support means and/or together with the lateral surface 5 of the loading body 3.

[0089] In particular, the projecting elements 15a are structured in such a manner as to be complementary with respect to the projecting elements 10a and the slots 10b of the first support means 10 to reach the position of simultaneous contact with the same blank 50, as shown in Fig. 2A.

[0090] It is clear that the second support means 15 can alternate with the first support means 10 in the position of contact with one or more blanks, and in particular with the surface S of the last blank conveyed on the conveyor means 2. In other words, the first support means 10 can be replaced in the position of contact with the blank by the second support means 15 which reach this position. Exchange takes place preferably in the position in which both the elements (first and second support means 10 and 15) are in contact simultaneously with the same blank, see Fig. 2A.

[0091] In this way, it is possible to carry out loading of new blanks preventing them from falling due to the presence of the first or of the second support means 10 and 15 which exchange in the position in which they are both in simultaneous contact with the blank.

[0092] As can be seen in Fig. 2B, the second support means 15 remain in the position of contact with the last blank present on the conveyor means to enable loading of new blanks, while the first means 10 are moved (to the right) by a distance at least equal to the overall dimensions of the loader, to avoid interference therewith when the base element 4 is rotated to transfer the new blanks on the conveyor means 2, as shown in Fig. 2C.

[0093] Naturally, according to other possible embodiments, the first support means 10 can be structured in such a manner as to remain in contact with the last of the blanks present on the conveyor means 2 without interfering with the loading of new blanks by the loading body 3.

[0094] The device according to the present invention also comprises sensors, or similar means to detect the position of one or more blanks present on the conveyor means.

[0095] In particular, the sensor(s) enable determination of the position of the last blank conveyed on the conveyor means 2 and these data related to the position are used, preferably in an electronic control unit, to move the first and the second support means in the position of contact therewith.

[0096] In particular, in the embodiment illustrated in the figures, the second support means 15 comprise the sensors to detect the position of the blanks conveyed on the conveyor means 2, and in particular, of the last blank conveyed. In detail, the sensors are of the contact type, for example feelers that perceive contact with the surface of the blank. In detail, associated with each projecting element 15a of the second support means 15 is a moving element 15b, which, following contact with the surface of the last blank conveyed, is rotated, identifying the position thereof. These data are used to move the second support means 15, and therefore the loading body 3 on which they are mounted, for the movement relative to the conveyor means 2 until the second support means 15 and in particular the moving elements 15b associated with the projecting elements 15a reach, and maintain, the position of contact with the surface of the last blank conveyed.

[0097] Other characteristics of the feed device 1, according to the present invention, will be more apparent in relation to a brief description of the steps of the method to feed the blanks, for example to a packaging machine.

[0098] The method to feed flat objects by a feed device 1 of the type described above comprises a step in which a plurality of blanks 50 (placed side by side vertically, i. e. stacked vertically) is arranged by known means on the base element 4 of the loading body 3, when the loading element 3 is in the first position to receive the flat objects.

[0099] Subsequently, the loading body is rotated in the second position to load the blanks on the conveyor means 2 of the feeder.

[0100] Following rotation of the base element 4 about the axis A and of the lateral surface 5 constrained thereto the blanks 50 are loaded in vertical position on the conveyor means 2. In this position, as can be seen in Fig. 2C, the lateral surface 5 of the loading body 3 is in the position of contact with one of the flat objects, preventing it from falling.

[0101] The first support means 10 are moved to reach the position of simultaneous contact with the same blank together with the lateral surface 5 of the loading body, as shown in Fig. 2D. In this position the complementary shape of the projecting elements 5a and 10a and of the slots 5b and 10b, respectively of the lateral surface 5 and of the first support means, enable the position of simultaneous contact with the surface S of the last blank loaded on the conveyor means to be reached.

[0102] As shown in Fig. 2E, the lateral surface 5 is disengaged and subsequently the loading body 3 is returned, following rotation, to the first position to receive further blanks to be loaded on the feeder.

[0103] Advantageously, the lateral surface 5 of the loader 3 and the first support means 10 can alternate in the position of contact with the last of the blanks present on the conveyor means in such a manner that there is always one support for the blanks, preventing them from falling.

[0104] Alternation of the lateral surface 5 and the support means 10 in contact with the blanks preferably takes place in the position of simultaneous contact.

[0105] It must be noted that the blanks 50 present on the conveyor means 2 are held by the first support means 10 which are in contact with the last blank and the interception means positioned at the end of the conveyor means 2, not shown in the accompanying figures.

[0106] As already stated, for simplicity the accompanying figures do not show all the blanks present in the

left portion of the conveyor means which reach the interception means.

[0107] As shown in Figs. 2A and 2B, when wishing to load new blanks in such a manner as to ensure the continuous feed thereof, for example to a packaging machine located downstream of the conveyor means 2, not shown in the accompanying figures, the second support means 15 are moved, together with the loading body 3 to which they are constrained, to reach the position of contact with the surface S of the last blank conveyed, which is supported by the first support means 10.

[0108] As shown in Fig. 2A, the second support means 15 are in the extracted position in such a manner as to be able to reach the position of contact with the surface S of the blank.

[0109] Reaching of the position of contact is detected by the feelers constituted by the moving elements 15b, which enable the projecting elements 15a of the second support means 15 to approach the surface of the last blank.

[0110] In this position, the second support means 15 are simultaneously in contact, together with the first support means 10, with the surface S of the last blank 50 being conveyed.

[0111] As stated, the first and the second means 10 and 15 alternate in the position of contact with the last blank conveyed in such a manner that there is always one element supporting them, prevent them from falling.

[0112] Alternation of the first and of the second support means takes place in the position of simultaneous contact with the surface of the last blank conveyed. As stated, the first and the second means 10 and 15 are structured in such a manner that they do not interfere while approaching and withdrawing from the position of contact with the blank.

[0113] In particular they are structured to be able to reach the position of simultaneous contact, wherein in the embodiment illustrated the projecting elements 15a of the second means are at least partially housed in the slots 10b of the first support means 10, while the projecting elements 10a of the first support means 10 are housed between the projecting elements 15a of the second means 15. From this position, the first support means 10 are withdrawn, sliding toward the right relative to the conveyor means 2, and only the second support means 15 remain in the position of contact with the surface S of the blank, as shown in Fig. 2B.

[0114] The first support means 10 are moved by a distance at least equal to the overall dimensions of the loading body 3, in such a manner not to interfere with operations to load new blanks placed on the loading body 3 on the conveyor means 2.

[0115] The loading body of the device is rotated to load new blanks 50 on the conveyor means. In this position, the new blanks, and in particular the last of the new blanks 50 loaded is supported by the lateral surface 5 of the loading body , as shown in Fig. 2C.

[0116] Subsequently, the steps previously described with reference to Figs. 2D and 2E are repeated.

[0117] In particular, the first support means 10 are moved to reach the position of contact with the last of the new blanks loaded on the conveyor means 2.

[0118] In this way, the position of simultaneous contact of the first support means 10 and of the lateral surface 5 with the surface of the blank is reached (Fig. 2D).

[0119] At this point, the lateral surface 5 abandons the position of contact with the last blank loaded on the conveyor means and the loading body 3 is returned to the first position to receive new blanks, following rotation of the base element 4 together with the lateral surface relative to the axis of rotation A (see Fig. 2E). In this way, the lateral surface 4 abandons the position of contact with the blanks and only the first support means 10 are in contact with the last blank loaded on the conveyor means 2.

[0120] The blanks 50 gradually move forward on the conveyor means 2 as they are used by the packaging machine, maintained supported at the back by the second support means 10 which, with each step of feed, are moved closer to reach the position of contact with the last blank conveyed, until the base element 4 receives a new batch of blanks to be loaded, takes delivery of them, holding them with the lateral surface 5, and moves into contact with the second support means 15 (Fig. 2A) so that the first support means 10 can be released from the position of contact.

Claims

1. A feed device (1) of flat objects (50) comprising conveyor means (2) for at least one of said flat objects, and at least one loading body (3) comprising at least one base element (4) and at least one lateral surface (5) to retain said at least one flat object, said base element (4) being movable between a first position to receive at least one flat object and a second position to load at least one flat object on said conveyor means (2), further comprising first support means (10) for at least one of said flat objects (50) on said conveyor means (2), said first support means (10) being movable relative to said conveyor means (2) to reach at least one position of contact with at least one of said flat objects (50), **characterized in that** it comprises second support means (15) for at least one of said flat objects (50) on said conveyor means (2) movable relative to said conveyor means (2) to reach at least one position of simultaneous contact with the same flat object (50), together with said first support means (10).

2. The device (1) according to claim 1, wherein said first support means (10) and said at least one lateral surface (5) of said loading body (3) alternate in at least one position of contact with at least one flat object (50) conveyed on said conveyor means (2).

3. The device (1) according to claim 1, wherein said second support means (15) alternate in at least one position of contact with at least one flat object (50) conveyed on said conveyor means (2), with said at least one lateral surface (5) of said loading body (3) and/or with said first support means (10).

4. The device (1) according to any one of the preceding claims, wherein said first support means (10) and/or said second support means (15) reach at least one position of simultaneous contact with the same flat object (50) conveyed on said conveyor means (2), together with said lateral surface (5) of said loading body (3).

5. The device (1) according to any one of the preceding claims, **characterized in that** said second support means (15) are constrained to said loading body (3) and are movable relative to said loading body.

6. The device (1) according to any one of the preceding claims, **characterized in that** it comprises means (9) to rotate said base element (4) of said loading body (3) between said at least one first position to receive at least one flat object and said at least one second position to load at least one flat object on said conveyor means (2).

7. The device (1) according to any one of the preceding claims, **characterized in that** said at least one lateral surface (5) and said base element (4) of said loading body (3) are mutually constrained and oriented perpendicularly to each other, said lateral surface (5) supporting at least temporarily at least one flat object in said position to load said flat objects on conveyor means (2) of said feeder.

8. The device (1) according to any one of the preceding claims, **characterized in that** said loading body (3) is translatable relative to said conveyor means (2) in a direction substantially parallel relative to the direction (X) of travel of said flat objects (50) on conveyor means (2).

9. The device (1) according to any one of the preceding claims, **characterized in that** said first (10) and/or said second (15) support means and/or said at least one lateral surface (5) of said loading body (3) are structured in a substantially complementary manner to be simultaneously in contact with the same flat object in said at least one position of simultaneous contact.

10. The device (1) according to any one of the preceding claims, **characterized in that** it comprises at least one sensor (15b) to detect the position of at least one flat object (50) conveyed on said conveyor means (2).

11. A method to feed flat objects by a feed device (1) comprising conveyor means (2) for at least one of said flat objects (50), according to any one of the preceding claims, comprising the steps of:

a) arranging at least one of said flat objects on said base element (4) of said loading body (3) when said loading body is in said at least one first position to receive at least one flat object;
b) moving said loading body (3) to at least one second position to load at least one flat object on said conveyor means (2); said at least one lateral surface (5) of said loading body (3) being in the position of contact with at least one of said flat objects;
c) moving said first support means (10) to reach at least one position of simultaneous contact with the same flat object on said conveyor means of the feeder, together with said lateral surface (5) of said loading body;
d) moving said loading body (3) to said at least one first position to receive at least one further flat object to be loaded on said conveyor means of the feeder;
characterized in further comprising the steps of:
e) moving said second support means (15) relative to said conveyor means (2) of the feeder to reach, together with said first support means (10), at least one position of simultaneous contact with the same flat object conveyed on said conveyor means of the feeder,
f) moving said loading body (3) to said at least one second loading position of at least one flat object on said conveyor means of said feeder;
g) repeating steps c) and d).

12. The method according to claim 11, **characterized in that** said second support means (15) are constrained to said loading body and said step e) provides for moving said loading body (3) to reach together with said first support means (10) at least one position of simultaneous contact with the same flat object conveyed on said conveyor means of the feeder.

13. The method according to claim 11 or 12, wherein after performing said step e), said first support means (10) are moved to abandon the position of simultaneous contact with the flat object, said second support means (15) remaining in the position of contact with the flat object.

14. The method according to any one of the preceding claims 11 to 13, **characterized in that** it comprises the step of moving said first support means (10) and/or said second support means (15) and/or said at least one lateral surface (5) of said loading body

(3), relative to said conveyor means (2) to alternate in at least one position of contact with at least one flat object (50) conveyed on said conveyor means.

Patentansprüche

1. Eine Vorrichtung (1) zur Zuführung von flachen Objekten (50) enthaltend Fördermittel (2) für mindestens eines der flachen Objekte, und mindestens eine Ladeeinrichtung (3) enthaltend mindestens ein Basiselement (4) und mindestens eine seitliche Fläche (5), um das mindestens eine flache Objekt festzuhalten, wobei das Basiselement (4) zwischen einer ersten Position, um mindestens ein flaches Objekt zu empfangen, und einer zweiten Position, um mindestens ein flaches Objekt auf das Fördermittel (2) zu laden, beweglich ist, weiterhin enthaltend erste Stützmittel (10) für mindestens eines der flachen Objekte (50) auf dem Fördermittel (2), wobei die ersten Stützmittel (10) relativ zu dem Fördermittel (2) beweglich sind, um mindestens eine Position des Kontakts mit mindestens einem der flachen Objekte (50) zu erreichen, **dadurch gekennzeichnet, dass** zweite Stützmittel (15) enthalten sind für mindestens eines der flachen Objekte (50) auf dem Fördermittel (2), die relativ zu dem Fördermittel (2) beweglich sind, um zusammen mit den ersten Stützmitteln (10) mindestens eine Position des gleichzeitigen Kontakts mit dem gleichen flachen Objekt (50) zu erreichen.

2. Die Vorrichtung (1) gemäß Anspruch 1, wobei sich die ersten Stützmittel (10) in mindestens einer Position des Kontakts mit mindestens einem auf dem Fördermittel (2) beförderten flachen Objekt (50) mit der mindestens einen seitlichen Fläche (5) der Ladeeinrichtung (3) abwechseln.

3. Die Vorrichtung (1) gemäß Anspruch 1, wobei sich die zweiten Stützmittel (15) in mindestens einer Position des Kontakts mit mindestens einem auf dem Fördermittel (2) beförderten flachen Objekt (50) mit der mindestens einen seitlichen Fläche (5) der Ladeeinrichtung (3) und/oder mit den ersten Stützmitteln (10) abwechseln.

4. Die Vorrichtung (1) gemäß irgendeinem der vorherigen Ansprüche, wobei die ersten Stützmittel (10) und/oder die zweiten Stützmittel (15) zusammen mit der seitlichen Fläche (5) der Ladeeinrichtung (3) mindestens eine Position des gleichzeitigen Kontakts mit dem gleichen auf dem Fördermittel (2) beförderten flachen Objekt (50) erreichen.

5. Die Vorrichtung (1) gemäß irgendeinem der vorherigen Ansprüche, **dadurch gekennzeichnet, dass** die zweiten Stützmittel (15) an der Ladeeinrichtung (3) befestigt sind und relativ zu der Ladeeinrichtung beweglich sind.

6. Die Vorrichtung (1) gemäß irgendeinem der vorherigen Ansprüche, **dadurch gekennzeichnet, dass** Mittel (9) umfasst sind zum Drehen des Basiselementes (4) der Ladeeinrichtung (3) zwischen der mindestens einen ersten Position, um mindestens ein flaches Objekt zu empfangen, und der mindestens einen zweiten Position, um mindestens ein flaches Objekt auf das Fördermittel (2) zu laden.

7. Die Vorrichtung (1) gemäß irgendeinem der vorherigen Ansprüche, **dadurch gekennzeichnet, dass** die mindestens eine seitliche Fläche (5) und das Basiselement (4) der Ladeeinrichtung (3) aneinander befestigt sind und rechtwinklig zueinander ausgerichtet sind, wobei die seitliche Fläche (5) mindestens zeitweise mindestens ein flaches Objekt in der Position des Beladens der flachen Objekte auf das Fördermittel (2) der Zuführvorrichtung stützt.

8. Die Vorrichtung (1) gemäß irgendeinem der vorherigen Ansprüche, **dadurch gekennzeichnet, dass** die Ladeeinrichtung (3) relativ zu dem Fördermittel (2) in einer Richtung verschiebbar ist, die im Wesentlichen parallel zu der Bewegungsrichtung (X) der flachen Objekte (50) auf dem Fördermittel (2) ist.

9. Die Vorrichtung (1) gemäß irgendeinem der vorherigen Ansprüche, **dadurch gekennzeichnet, dass** die ersten Stützmittel (10) und/oder die zweiten Stützmittel (15) und/oder die mindestens eine seitliche Fläche (5) der Ladeeinrichtung (3) in einer im Wesentlichen sich gegenseitig ergänzenden Weise aufgebaut sind, so dass sie in der mindestens einen Position des gleichzeitigen Kontaktes gleichzeitig mit dem gleichen flachen Objekt in Kontakt sind.

10. Die Vorrichtung (1) gemäß irgendeinem der vorherigen Ansprüche, **dadurch gekennzeichnet, dass** mindestens ein Sensor (15b) enthalten ist, um die Position von mindestens einem auf dem Fördermittel (2) beförderten flachen Objekt (50) zu detektieren.

11. Ein Verfahren zum Zuführen von flachen Objekten mit Hilfe einer Vorrichtung (1) zum Zuführen enthaltend Fördermittel (2) für mindestens eines der flachen Objekte (50), gemäß irgendeinem der vorherigen Ansprüche, enthaltend die Schritte:

    a) Anordnen von mindestens einem der flachen Objekte auf einem Basiselement (4) der Ladeeinrichtung (3), wenn sich die Ladeeinrichtung in der mindestens einen ersten Position befindet, um mindestens ein flaches Objekt zu empfangen;
    b) Bewegen der Ladeeinrichtung (3) zu mindes-

tens einer zweiten Position, um mindestens ein flaches Objekt auf das Fördermittel (2) zu laden; wobei die mindestens eine seitliche Fläche (5) der Ladeeinrichtung (3) in der Position des Kontakts mit mindestens einem der flachen Objekte ist;

c) Bewegen der ersten Stützmittel (10), um zusammen mit der seitlichen Fläche (5) der Ladeeinrichtung mindestens eine Position des gleichzeitigen Kontakts mit dem gleichen flachen Objekt auf dem Fördermittel der Fördervorrichtung zu erreichen;

d) Bewegen der Ladeeinrichtung (3) zu der mindestens einen ersten Position, um mindestens ein weiteres flaches Objekt zu empfangen, das auf das Fördermittel der Zuführvorrichtung geladen werden soll;

gekennzeichnet durch die weiteren Schritte:

e) Bewegen der zweiten Stützmittel (15) relativ zu dem Fördermittel (2) der Zuführvorrichtung, um zusammen mit den ersten Stützmitteln (10) mindestens eine Position des gleichzeitigen Kontakts mit dem gleichen auf dem Fördermittel der Zuführvorrichtung beförderten flachen Objekt zu erreichen;

f) Bewegen der Ladeeinrichtung (3) zu der mindestens einen zweiten Ladeposition von mindestens einem flachen Objekt auf das Fördermittel der Zuführvorrichtung;

g) Wiederholen der Schritte c) und d).

12. Das Verfahren gemäß Anspruch 11, **dadurch gekennzeichnet, dass** die zweiten Stützmittel (15) an der Ladeeinrichtung befestigt sind und Schritt e) die Bewegung der Ladeeinrichtung (3) leistet, um zusammen mit den ersten Stützmitteln (10) mindestens eine Position des gleichzeitigen Kontaktes mit dem gleichen auf dem Fördermittel der Zuführvorrichtung beförderten flachen Objekt zu erreichen.

13. Das Verfahren gemäß Anspruch 11 oder 12, wobei nach Durchführung des Schrittes e), die ersten Stützmittel (10) bewegt werden, um die Position des gleichzeitigen Kontakts mit dem flachen Objekt zu beenden, wobei die zweiten Stützmittel (15) in der Position des Kontakts mit dem flachen Objekt verbleiben.

14. Das Verfahren gemäß irgendeinem der vorherigen Ansprüche 11 bis 13, **dadurch gekennzeichnet, dass** es den Schritt der Bewegung der ersten Stützmittel (10) und/oder der zweiten Stützmittel (15) und/oder der mindestens einen seitlichen Fläche (5) der Ladeeinrichtung (3) relativ zu dem Fördermittel (2) umfasst, um sich in mindestens einer Position des Kontakts mit mindestens einem auf dem Fördermittel beförderten flachen Objekt (50) abzuwechseln.

Revendications

1. Dispositif d'alimentation (1) d'objets plats (50) comprenant des moyens formant transporteur (2) pour au moins l'un desdits objets plats, et au moins un corps de chargement (3) comprenant au moins un élément de base (4) et au moins une surface latérale (5) pour retenir ledit au moins un objet plat, ledit élément de base (4) étant mobile entre une première position pour recevoir au moins un objet plat et une seconde position pour charger au moins un objet plat sur lesdits moyens formant transporteur (2), comprenant en outre des premiers moyens de support (10) pour au moins l'un desdits objets plats (50) sur lesdits moyens formant transporteur (2), lesdits premier moyens de support (10) étant mobiles par rapport auxdits moyens formant transporteur (2) pour atteindre au moins une position de contact avec au moins l'un desdits objets plats (50), **caractérisé en ce qu'**il comprend des seconds moyens de support (15) pour au moins l'un desdits objets plats (50) sur lesdits moyens formant transporteur (2) mobiles par rapport auxdits moyens formant transporteur (2) pour atteindre au moins une position de contact simultané avec le même objet plat (50), conjointement avec lesdits premiers moyens de support (10).

2. Dispositif (1) selon la revendication 1, dans lequel lesdits premiers moyens de support (10) et ladite au moins une surface latérale (5) dudit corps de chargement (3) alternent dans au moins une position de contact avec au moins un objet plat (50) transporté sur ledit moyen de transport (2).

3. Dispositif (1) selon la revendication 1, dans lequel lesdits seconds moyens de support (15) alternent dans au moins une position de contact avec au moins un objet plat (50) transporté sur ledit moyen de transport (2), avec ladite au moins une surface latérale (5) dudit corps de chargement (3) et/ou avec lesdits premiers moyens de support (10).

4. Dispositif (1) selon l'une quelconque des revendications précédentes, dans lequel lesdits premiers moyens de support (10) et/ou lesdits seconds moyens de support (15) atteignent au moins une position de contact simultané avec le même objet plat (50) transporté sur lesdits moyens formant transporteur (2), conjointement avec ladite surface latérale (5) dudit corps de chargement (3).

5. Dispositif (1) selon l'une quelconque des revendications précédentes, **caractérisé en ce que** lesdits seconds moyens de support (15) sont contraints sur ledit corps de chargement (3) et sont mobiles par rapport audit corps de chargement.

6. Dispositif (1) selon l'une quelconque des revendica-

tions précédentes, **caractérisé en ce qu'**il comprend des moyens (9) pour faire tourner ledit élément de base (4) dudit corps de chargement (3) entre ladite au moins une première position pour recevoir au moins un objet plat et ladite au moins une seconde position pour charger au moins un objet plat sur lesdits moyens formant transporteur (2).

7. Dispositif (1) selon l'une quelconque des revendications précédentes, **caractérisé en ce que** ladite au moins une surface latérale (5) et ledit élément de base (4) dudit corps de chargement (3) sont mutuellement contraints et orientés perpendiculairement l'un par rapport à l'autre, ladite surface latérale (5) supportant au moins temporairement au moins un objet plat dans ladite position pour charger lesdits objets plats sur les moyens formant transporteur (2) dudit dispositif d'alimentation.

8. Dispositif (1) selon l'une quelconque des revendications précédentes, **caractérisé en ce que** ledit corps de chargement (3) peut effectuer un mouvement de translation par rapport auxdits moyens formant transporteur (2) dans une direction sensiblement parallèle par rapport à la direction (X) de déplacement desdits objets plats (50) sur les moyens formant transporteur (2).

9. Dispositif (1) selon l'une quelconque des revendications précédentes, **caractérisé en ce que** lesdits premiers (10) et/ou lesdits seconds (15) moyens de support et/ou ladite au moins une surface latérale (5) dudit corps de chargement (3) sont structurés d'une manière sensiblement complémentaire pour être simultanément en contact avec le même objet plat dans ladite au moins une position de contact simultané.

10. Dispositif (1) selon l'une quelconque des revendications précédentes, **caractérisé en ce qu'**il comprend au moins un détecteur (15b) pour détecter la position d'au moins un objet plat (50) transporté sur lesdits moyens formant transporteur (2).

11. Procédé pour alimenter des objets plats par un dispositif d'alimentation (1) comprenant des moyens formant transporteur (2) pour au moins l'un desdits objets plats (50), selon l'une quelconque des revendications précédentes comprenant les étapes consistant à :

a) agencer au moins l'un desdits objets plats sur ledit élément de base (4) dudit corps de chargement (3) lorsque ledit corps de chargement est dans ladite au moins une première position pour recevoir au moins un objet plat ;
b) déplacer ledit corps de chargement (3) dans au moins une seconde position pour charger au moins un objet plat sur lesdits moyens formant transporteur (2) ; ladite au moins une surface latérale (5) dudit corps de chargement (3) étant dans la position de contact avec au moins l'un desdits objets plats ;
c) déplacer lesdits premiers moyens de support (10) pour atteindre au moins une position de contact simultané avec le même objet plat sur lesdits moyens formant transporteur du dispositif d'alimentation, conjointement avec ladite surface latérale (5) dudit corps de chargement ;
d) déplacer ledit corps de chargement (3) dans ladite au moins une première position pour recevoir au moins un autre objet plat à charger sur lesdits moyens formant transporteur du dispositif d'alimentation ;
caractérisé en ce qu'il comprend en outre les étapes consistant à :
e) déplacer lesdits seconds moyens de support (15) par rapport auxdits moyens formant transporteur (2) du dispositif d'alimentation pour atteindre, conjointement avec lesdits premiers moyens de support (10), au moins une position de contact simultané avec le même objet plat transporté sur lesdits moyens formant transporteur du dispositif d'alimentation ;
f) déplacer ledit corps de chargement (3) vers ladite au moins seconde position de chargement d'au moins un objet plat sur lesdits moyens formant transporteur dudit dispositif d'alimentation ;
g) répéter les étapes c) et d).

12. Procédé selon la revendication 11, **caractérisé en ce que** lesdits seconds moyens de support (15) sont contraints sur ledit corps de chargement et ladite étape e) propose de déplacer ledit corps de chargement (3) pour atteindre conjointement avec lesdits premiers moyens de support (10) au moins une position de contact simultané avec le même objet plat transporté sur lesdits moyens formant transporteur du dispositif d'alimentation.

13. Procédé selon la revendication 11 ou 12, dans lequel, après avoir réalisé ladite étape e), lesdits premiers moyens de support (10) sont déplacés pour quitter la position de contact simultané avec l'objet plat, lesdits seconds moyens de support (15) restant dans la position de contact avec l'objet plat.

14. Procédé selon l'une quelconque des revendications 11 à 13, **caractérisé en ce qu'**il comprend l'étape consistant à déplacer lesdits premiers moyens de support (10) et/ou lesdits seconds moyens de support (15) et/ou ladite au moins une surface latérale (5) dudit corps de chargement (3), par rapport auxdits moyens formant transporteur (2) pour alterner dans au moins une position de contact avec au

moins un objet plat (50) transporté sur lesdits moyens formant transporteur.

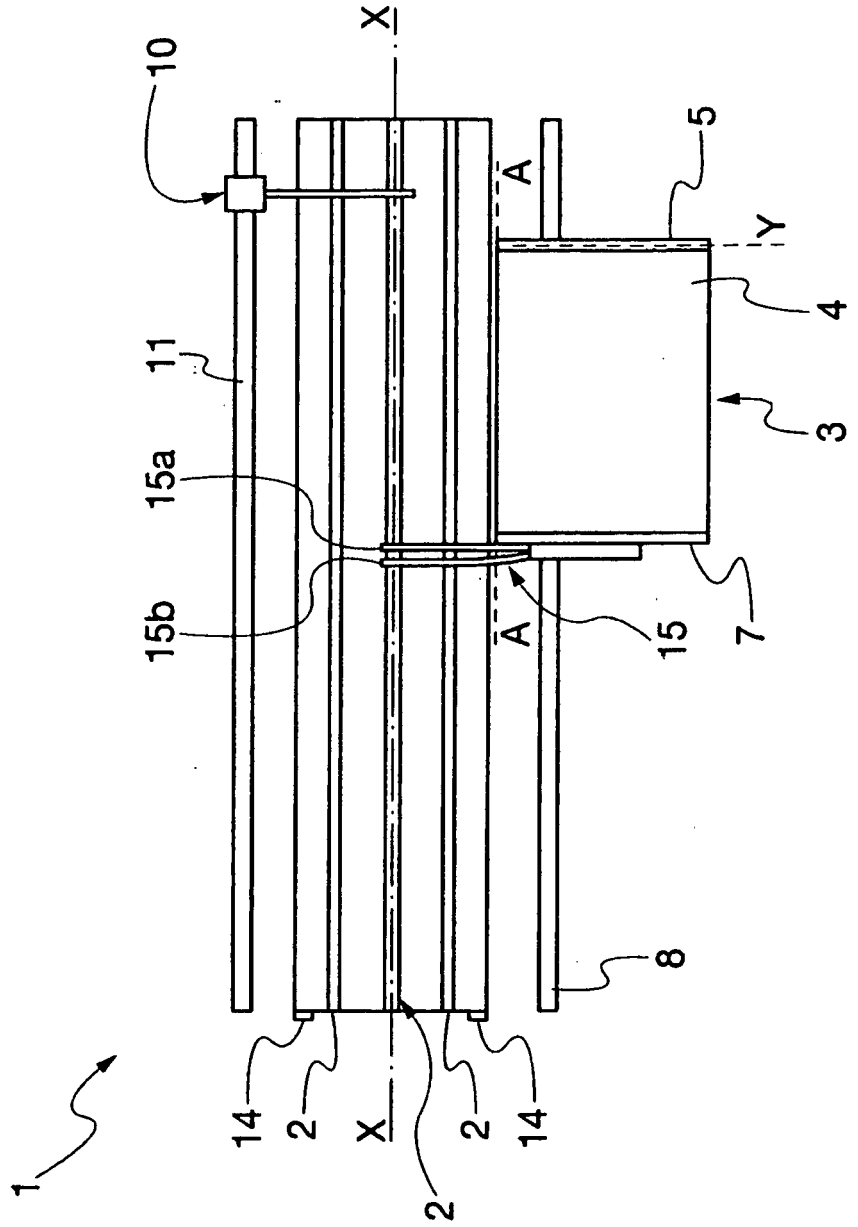

Fig. 1

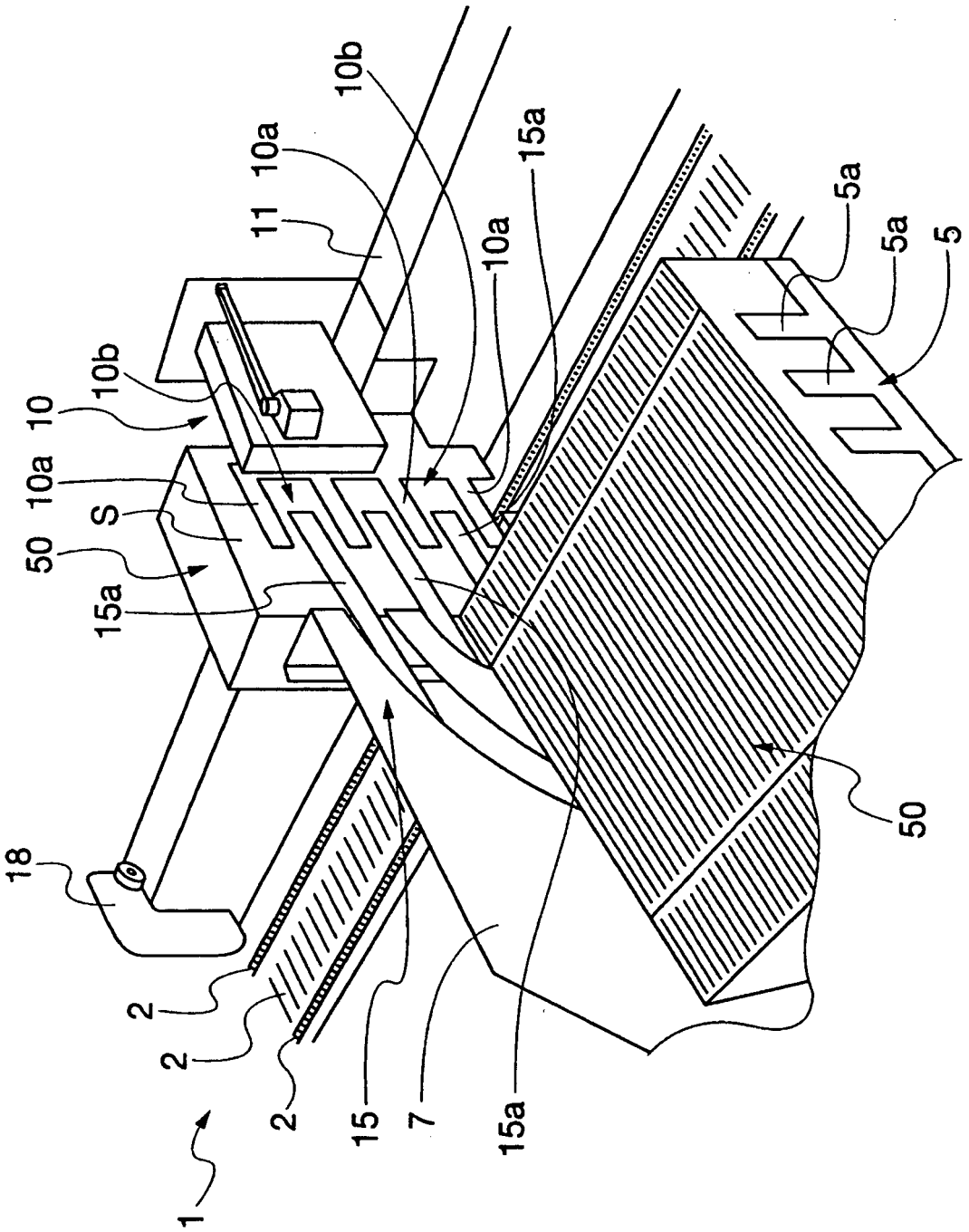

Fig. 2A

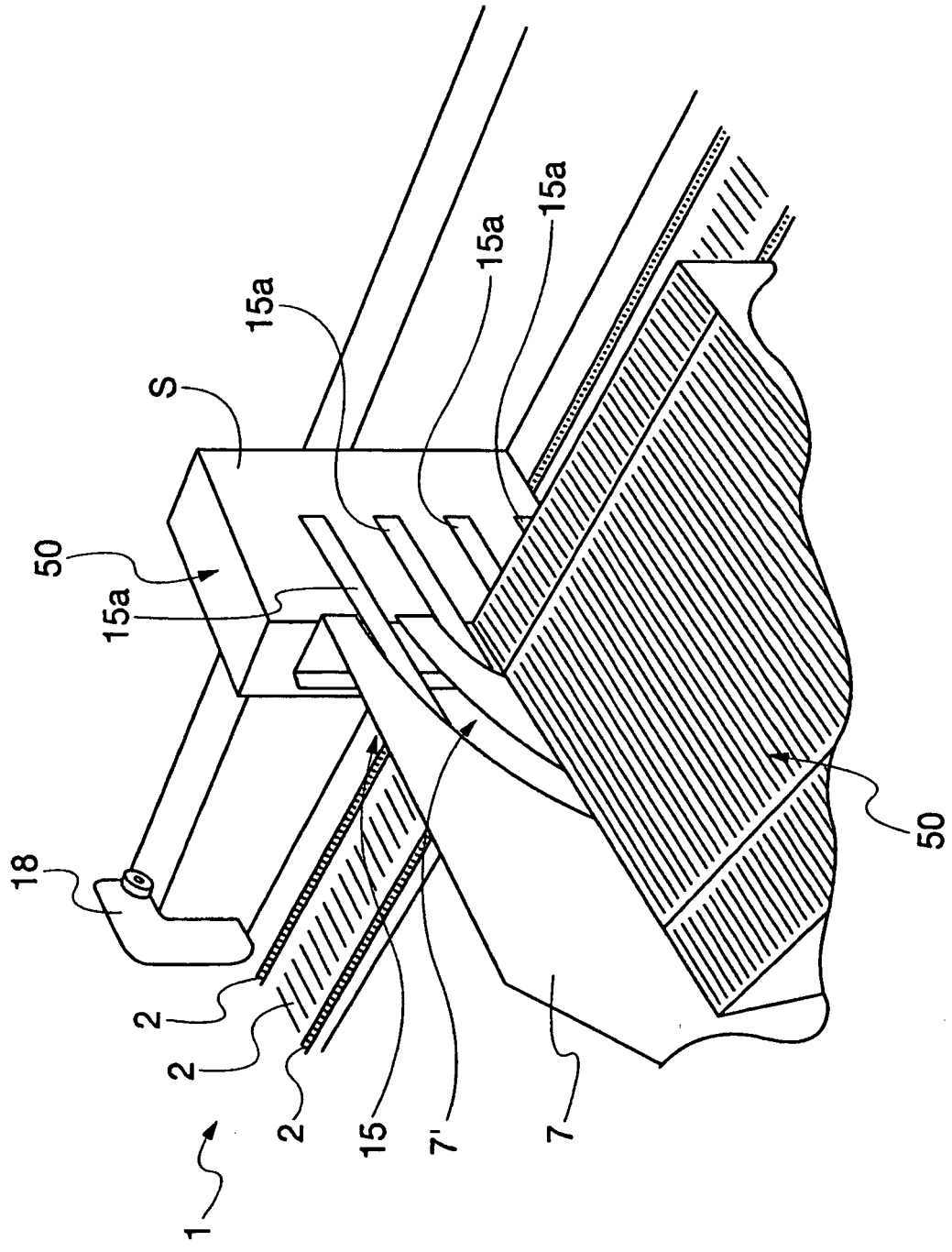

Fig. 2B

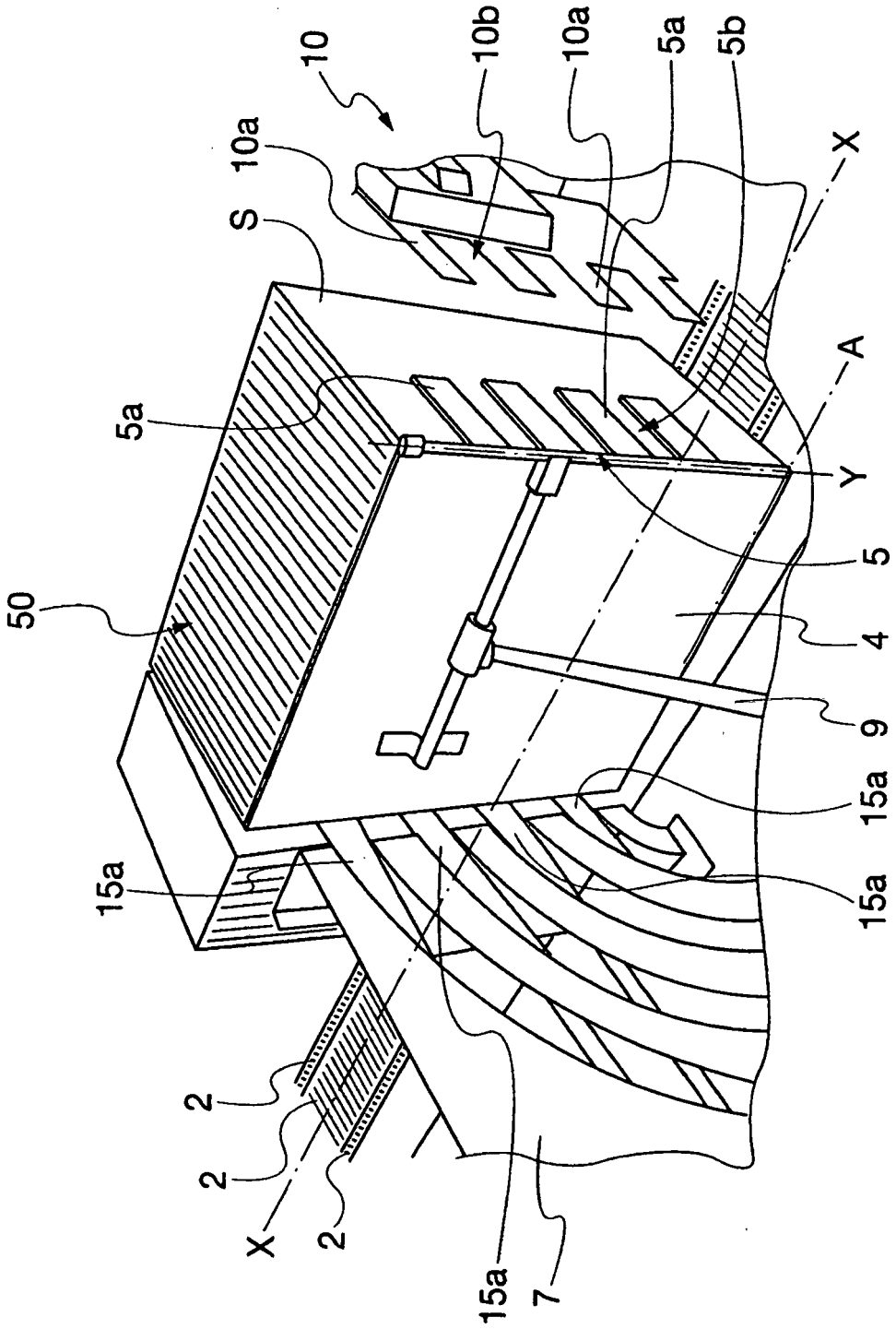

Fig. 2C

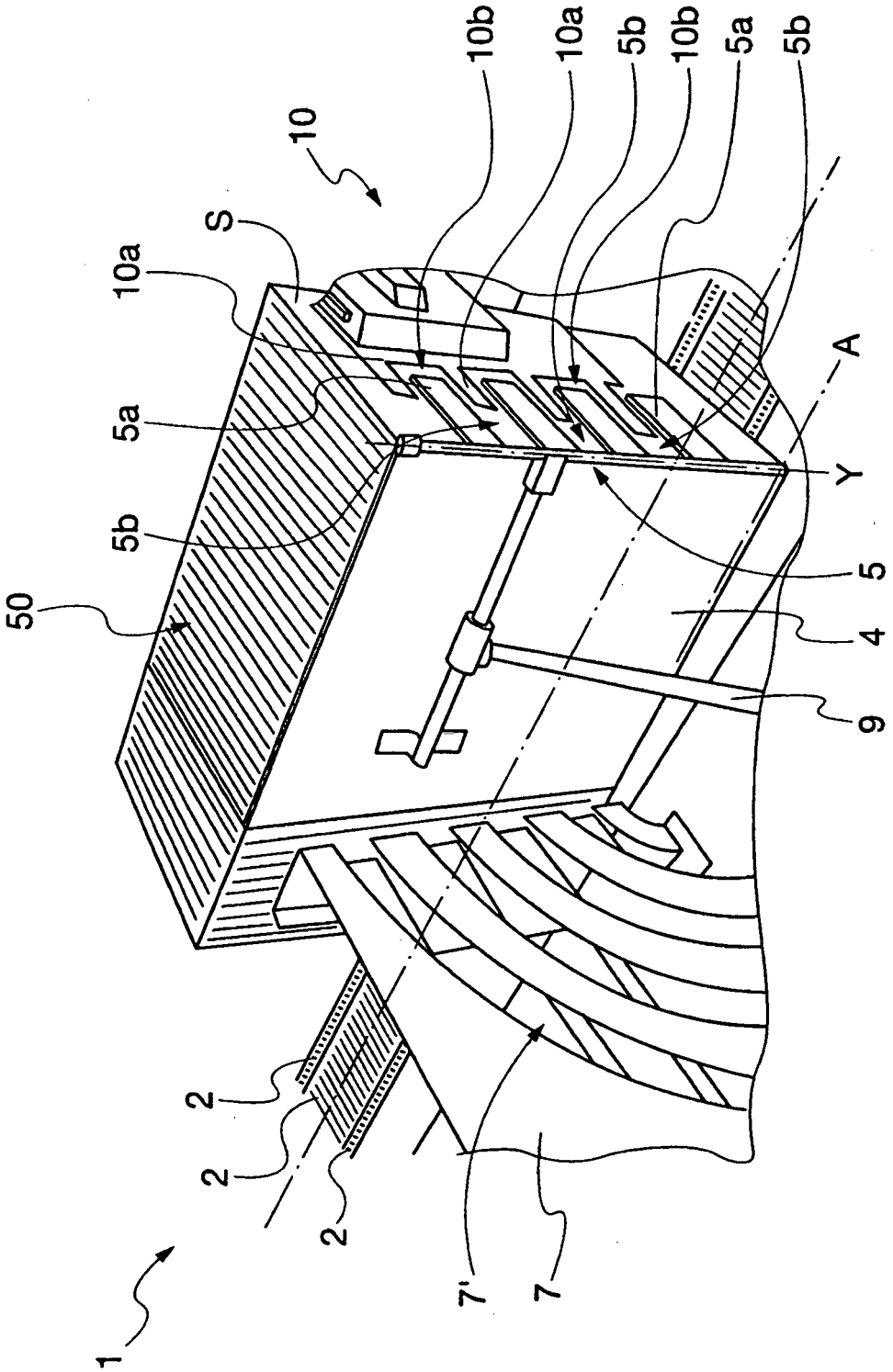

Fig. 2D

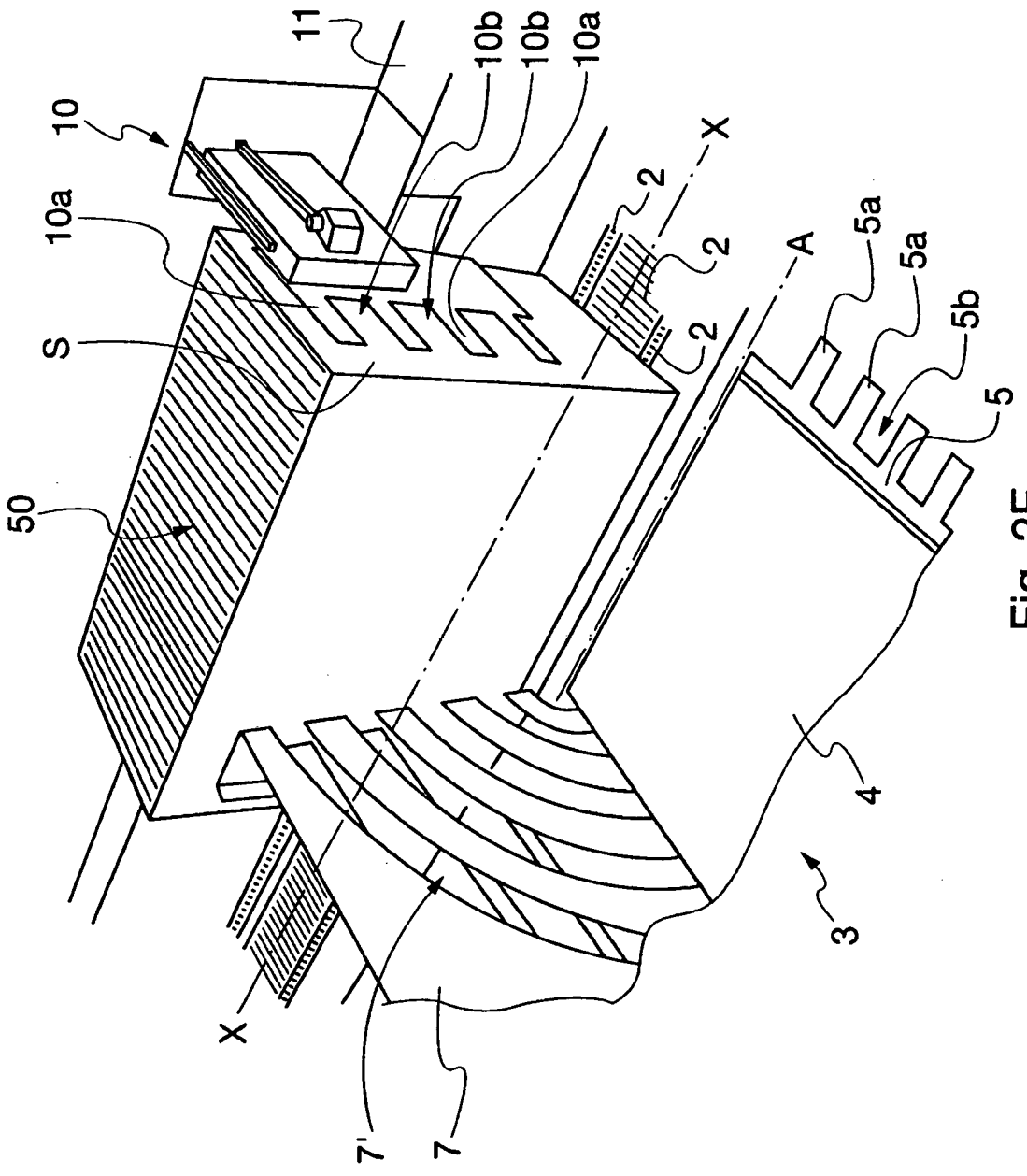

Fig. 2E

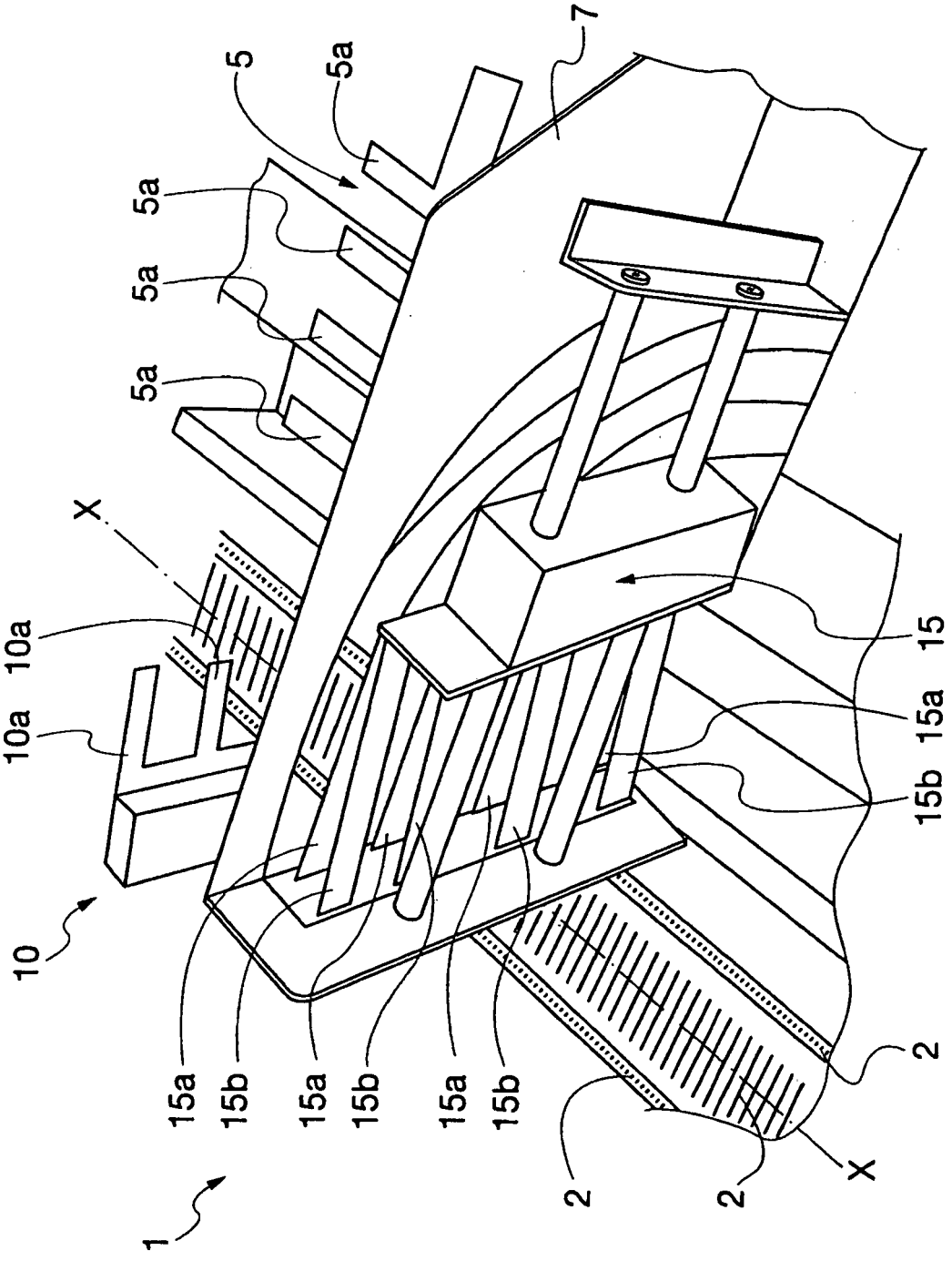
7
5
5a
5a
5a
5a
X
10a
10a
10
15
15a
15b
15a
15b
15a
15b
15a
15b
2
2
2
X
1

Fig. 3A

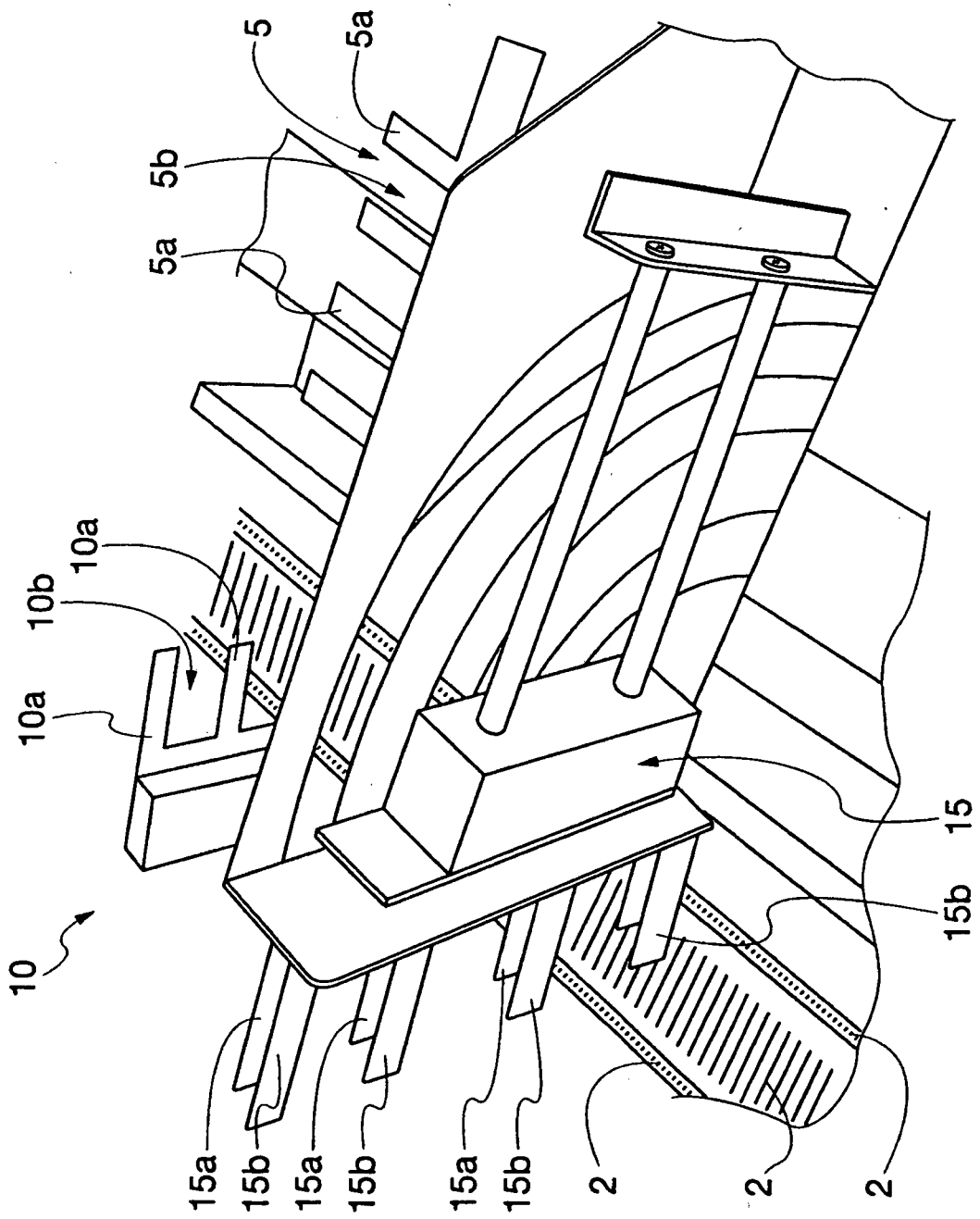

Fig. 3B

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 2009028678 A **[0008]**
- US 20070147981 A **[0011]**