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(54) Apparatus for sorting postal items

(57) Apparatus for sorting postal items, the apparatus comprising at least two groups of sorting compartments (107,109a,109b) and a translation mechanism, wherein a first and second group of sorting compartments move relative to each other and translate, using the translation mechanism, between a first and second working configuration.

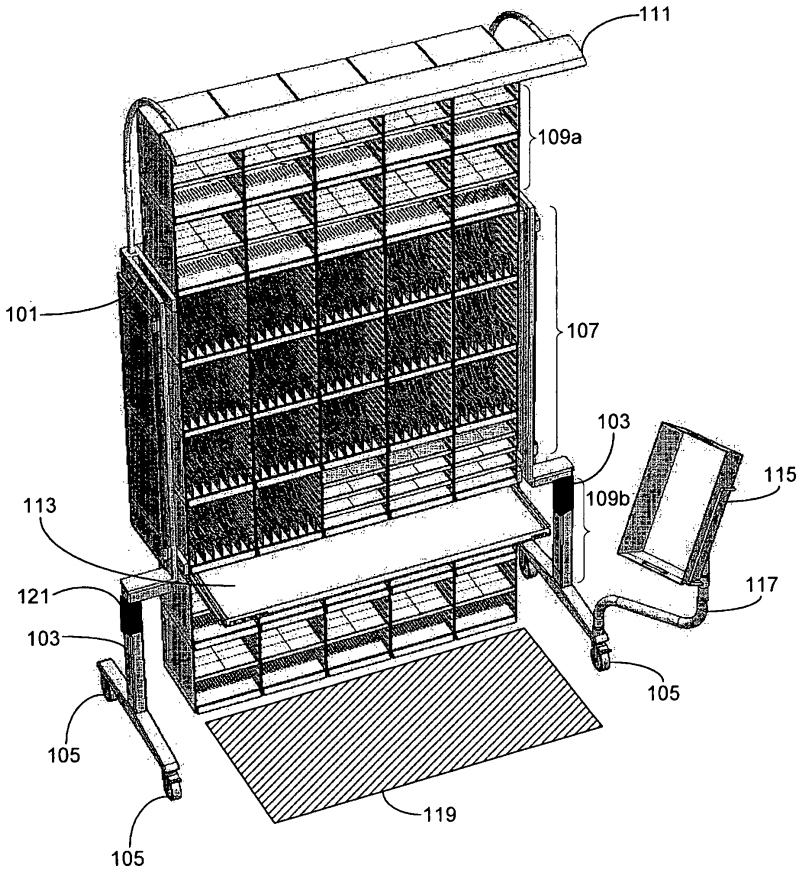

Figure 1

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Description

FIELD OF THE INVENTION

[0001] The present invention relates to apparatus for sorting postal items. In particular, the present invention relates to apparatus for sorting postal items that includes a translation mechanism for translating between a first and second configuration.

BACKGROUND

[0002] There are two main stages to hand sorting postal items, which may include, for example, letters, parcels, magazines or any other postal item whose delivery is supported by a postal delivery service.

[0003] In the first stage the postal items are sorted in a general manner. That is, the postal items are separated according to a specific mail route that a postal worker, such as a postal delivery person, is designated to carry out. For example, the postal items may be generally sorted to specific regions or suburbs of a town or city.

[0004] During the second stage of sorting, the postal items are sorted into sequence. The sequence is arranged so that the postal delivery person is able to sequentially deliver the postal items to specific addresses or delivery points in order so that delivery of the postal items on the postal route is as time and energy efficient as possible.

[0005] In postal sorting departments, the use of the available space for sorting needs to be utilised in an efficient manner in order to allow the maximum amount of throughput of postal items. In known postal sorting systems, separate areas are provided for carrying out the general sorting of postal items and for carrying out the sequential sorting of postal items. This effectively requires two substantial areas of space for the two different sorting arrangements.

[0006] This problem has been addressed in PCT application PCT/DK01/00111, publication number WO 01/60532. In this document, one suggested solution is to provide a rotating sorting section that can be rotated to provide two different sorting configurations. The first sorting configuration is for general sorting and the second sorting configuration is for sequential sorting. However, the use of available space is not fully utilised by this arrangement.

[0007] The present invention aims to overcome, or at least alleviate, some or all of the afore-mentioned problems.

SUMMARY OF THE INVENTION

[0008] In one aspect, the present invention provides apparatus for sorting postal items, the apparatus comprising at least two groups of sorting compartments and a translation mechanism, wherein a first and second group of sorting compartments move relative to each other and translate, using the translation mechanism, between a first and second working configuration.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] Embodiments of the present invention will now be described, by way of example only, with reference to the accompanying drawings, in which:

Figure 1 shows a general arrangement of a postal sorting apparatus according to an embodiment of the present invention;

Figure 2A shows a step in the conversion from a first configuration to a second configuration according to an embodiment of the present invention;

Figure 2B shows a further step in the conversion from a first configuration to a second configuration according to an embodiment of the present invention;

Figure 2C shows a further step in the conversion from a first configuration to a second configuration according to an embodiment of the present invention;

Figure 2D shows a further step in the conversion from a first configuration to a second configuration according to an embodiment of the present invention;

Figure 2E shows a step in the conversion back to the first configuration according to an embodiment of the present invention;

Figure 2F shows a further step in the conversion back to the first configuration according to an embodiment of the present invention;

Figure 2G shows a further step in the conversion back to the first configuration according to an embodiment of the present invention;

Figure 2H shows a further step in the conversion back to the first configuration according to an embodiment of the present invention;

Figure 3 shows a switch arrangement according to an embodiment of the present invention;

Figure 4A shows a translation mechanism according to an embodiment of the present invention;

Figure 4B shows further details of a translation mechanism according to an embodiment of the present invention;

Figure 4C shows further details of a translation mechanism according to an embodiment of the present invention;

Figure 5 shows a work surface according to an embodiment of the present invention;

Figure 6A shows a sorting tray in a first configuration according to an embodiment of the present invention;

Figure 6B shows a sorting tray in a second configuration according to an embodiment of the present invention;

Figure 7 shows a sorting tray with a moveable dis-

play device according to an embodiment of the present invention;

Figure 8 shows a further sorting apparatus arrangement according to an embodiment of the present invention;

Figure 9 shows a further sorting apparatus arrangement according to an embodiment of the present invention;

Figure 10A shows a further sorting apparatus arrangement in a first working configuration according to an embodiment of the present invention;

Figure 10B shows a further sorting apparatus arrangement in a second working configuration according to an embodiment of the present invention;

Figure 11A shows a side view of the sorting apparatus shown in Figure 10A;

Figure 11 B shows a side view of the sorting apparatus shown in Figure 10B;

Figure 12 shows a drive mechanism according to an embodiment of the present invention;

Figure 13 shows a further drive mechanism according to an embodiment of the present invention;

Figure 14 shows additional side compartments according to an embodiment of the present invention;

Figure 15A shows a further sorting apparatus arrangement according to an embodiment of the present invention;

Figure 15B shows a further sorting apparatus arrangement according to an embodiment of the present invention;

Figure 15C shows a further sorting apparatus arrangement according to an embodiment of the present invention;

Figure 16 shows a further sorting apparatus arrangement according to an embodiment of the present invention;

DETAILED DESCRIPTION OF THE INVENTION

[0010] The below described postal sorting apparatus is designed to sort postal products, documents and parcels for delivery to the intended destination. The apparatus contains two types of sorting apparatus in a single unit. The sorting apparatus contains a unit for general sorting and a unit for sequence sorting. When the general sorting unit is not required, the unit is stored in a position away from the sequencing unit and does not obstruct in any way access to the sequencing unit or the areas under the work surface where the operator may sit.

First Embodiment

[0011] Figure 1 shows a general arrangement of a postal sorting apparatus according to this first embodiment of the present invention.

[0012] A steel RHS (rectangular hollow section) frame 101 is provided that is used to support different elements of the sorting apparatus. Attached to the frame 101 are legs 103 with lockable caster wheels 105 attached thereto. The frame is made from steel in this embodiment. However, it will be understood that the frame could be made from any other suitable material.

[0013] The sorting apparatus includes two groups of sorting compartments providing two separate sorting areas for sorting postal items either into a specific sequence or for more general sorting.

[0014] The sorting compartments are provided as a matrix of steel compartments. As an alternative, the compartments may be made from any other suitable material. As will be explained below, plastic sorting trays are inserted into the compartments to allow an operator to sort the postal items. The sorting trays are made from polypropylene in this embodiment. However, it will be understood that any other suitable material may be used as an alternative.

[0015] A group of sequence sorting compartments 107 are provided. Also provided are a group of general sorting compartments (109a, 109b). The group of general sorting compartments is split into two separate groups, a first upper group 109a of general sorting compartments and a second lower group 109b of general sorting compartments.

[0016] In a first working configuration, the upper group 109a is arranged to be located above the group of sequence sorting compartments 107 while the lower group 109b is arranged to be located below the group of sequence sorting compartments 107. This enables an operator to carry out sequence sorting of the postal items utilising the sequence sorting compartments.

[0017] In a second working configuration, the upper and lower groups of general sorting compartments (109a, 109b) are arranged to be located in front of the group of sequence sorting compartments 107, as will be explained below, in order to enable the operator to carry out general sorting of the postal items.

[0018] Attached to the upper portion of the frame 101 is a lighting mechanism 111. This provides additional light for the operator to work in, should they need it.

[0019] A work surface 113 is provided immediately below the group of sequence sorting compartments 107. The work surface is arranged to slide out from the frame 101 to provide a surface for an operator to sort postal items on. The surface is generally used when the operator is carrying out sequential sorting of the postal items. When not required, the work surface 113 can be retracted by sliding it back underneath the group of sequence sorting compartments 107.

[0020] A box holder 115 is provided to hold containers with postal items for general sorting. The box holder 115 is located on a box holder frame 117, which forms part of the main frame 101. The box holder is used for postal items yet to be sorted in the general sorting compartments. When the general sorting is completed for the delivery office or when a general sorting compartment is full, the postal items will be cleared down and the postal delivery people will collect all the postal items for a par-

ticular delivery route from each general sorting apparatus throughout the delivery office and combine them together.

[0021] The sorting apparatus arrangement described above provides a work space 119 around the sorting compartments for the operator to work in.

[0022] Located within each side of the frame are linear actuators 121 that are arranged to provide a lifting mechanism to the frame 101 upon the depression of a switch, as will be explained in more detail below. The linear actuators 121 include gas struts for controlling the height adjustment operation.

[0023] Figures 2A to 2H show details of how to make a change from a first working configuration to a second working configuration, and back again. That is, the apparatus is changed from a sequence sorting configuration to a general sorting configuration, and back again.

[0024] Figure 2A shows the sorting apparatus in a first working configuration. This first configuration is used for the sequential sorting of postal items. In order to change to the second working configuration, the first step is for the operator to push the work surface 113 underneath the group of sequence sorting compartments 107, as indicated by the arrow 201.

[0025] In figure 2B, the apparatus is shown in an initial position just prior to when the operator starts to move the groups of general sorting compartments (109a, 109b). The operator moves the groups of general sorting compartments by either pulling the lower group of general sorting compartments 109b upwards towards the upper group of general sorting compartments in the direction of the arrow 205, or by pulling the upper group of general sorting compartments 109a down towards the lower group of general sorting compartments in the direction as shown by the arrow 207. Only one group (upper or lower) of general sorting compartments (109a, 109b) is required to be moved by the operator due to the translation mechanism, which will be explained in more detail below.

[0026] Referring to Figure 2C, the apparatus is shown as the operator continues to move either the upper or lower group of general sorting compartments in the direction of the respective arrows 205 or 207.

[0027] Figure 2D shows the apparatus arranged in the second working configuration. That is, the second working configuration enables the operator to sort postal items in a general manner using the general sorting compartments. Arm mechanisms 203 are shown that form part of the translation mechanism, as will be explained in more detail below. The upper and lower groups of general sorting compartments (109a, 109b) are positioned in front of the group of sequence sorting compartments 107 to at least partially obscure the sequence sorting compartments. The work surface 113 is pulled out from underneath the group of sequence sorting compartments 107 in the direction of the arrow 209. The work surface 113 provides support to the group of general sorting compartments.

[0028] Figure 2E shows the steps required for reconfiguring the sorting apparatus from the second working configuration back into the first working configuration. The operator first needs to push the work surface 113 underneath the group of sequence sorting compartments 107. The operator can then move either the upper or lower group of general sorting compartments (109a, 109b) towards himself as shown by arrows 211 or 213. Only one group of general sorting compartments is required to be moved by the operator as will be explained in more detail below.

[0029] Figure 2F shows the upper and lower group of general sorting compartments (109a, 109b) moving upwards and downwards respectively.

[0030] Figure 2G shows the upper and lower group of general sorting compartments (109a, 109b) in position above and below the sequence sorting compartments.

[0031] Figure 2H shows the sorting apparatus back in the first working configuration with the work surface 113 pulled out in the direction of the arrow 215.

[0032] Figure 3 shows a switch arrangement for use in this embodiment. On the underside 301 of the work surface 113 towards the right hand edge of the work surface is located an electrical switch 303 for operation of the light 111. Located directly above the light switch 303 is a label 305 identifying the switch as the light switch. The label 305 is positioned on the front edge of the work surface such that the operator can locate the light switch with ease.

[0033] Two further switches (307a, 307b) are provided on the underside of the work surface towards the left hand edge of the work surface. These are used to reset the height position of the sorting frame 101 to a height stored in memory. The two switches are connected to a control mechanism that can monitor the height of the frame by measuring a distance on the linear actuators 121. The linear actuators are controlled by a drive mechanism to change the height of the frame according to the memorised value. A further switch 309 is arranged to provide a manual control of the height of the frame 101. The switch 309 has two height adjustment operations, up and down. A label 311 is provided on the front edge of the work surface above the switches to provide the operator with an indication of where the switches are and what purpose they serve.

[0034] Figure 4A shows a translation mechanism according to this embodiment of the present invention. The translation mechanism provides a means to easily translate the group of general sorting compartments from one position to a second position.

[0035] The translation mechanism includes an arm mechanism 401. A further arm mechanism is provided on the opposite side of the apparatus and consists of a similar arrangement described below but in a mirrored format. The arm mechanism 401 includes first, second, third and fourth arcuate arms (403 a, b, c, d). The first, second, third and fourth arms are attached at one end to the frame 101 by a bearing arrangement that includes a

pin and bush. The first and second arms (403a, b) are connected at one end to the upper group of general sorting compartments, and the third and fourth arms (403c, d) are connected at one end to the lower group of general sorting components. The connection is made using a bearing arrangement, such as a pin and bush. The mirror image of this configuration is provided on the opposite side of the upper and lower groups of general sorting components.

[0036] The arm mechanism 401 also includes first and second rotational devices (405a, b), such as pulleys. The pulleys are attached to the frame at the same point as the second and third arms. The pulleys are also attached to the second and third arms such that when the pulleys rotate, the second and third arms pivot at the point of attachment. A linkage device 407, such as a cable, is provided. The cable is attached between the pulleys such that when a first pulley is caused to rotate, the cable causes the second pulley to rotate in the opposite direction. The cable is crossed over between the first and second pulley. This causes opposing movement of the upper and lower groups of general sorting compartments.

[0037] One group of general sorting compartments is counterbalanced by the other group, thus providing a mechanism that enables the operator to easily move the groups of general sorting compartments (109a, 109b).

[0038] Figure 4B shows the arm mechanism in operation. The first and second pulleys (413, 415) are shown to be moving, in a rotating manner, in opposite directions. This causes the upper and lower groups of general sorting compartments to move in the direction of the arrows (409, 411) away from each other. It will therefore be understood that moving one of the upper and lower groups of general sorting compartments in the opposite direction will cause the upper and lower groups of general sorting compartments to move towards each other.

[0039] Figure 4C shows the sorting apparatus in the first working configuration. The pulleys (413, 415) and cable 407 are no longer moving and the upper group 109a and lower group 109b of general sorting compartments are arranged above and below the group of sequence sorting compartments respectively.

[0040] Figure 5 shows the work surface 113 in more detail. The work surface includes a raised edge 501 that enables an operator to sort through postal items while reducing the chance of postal items falling off the work surface. Further, the work surface includes a rounded edge to stop the operator from injuring themselves.

[0041] Figure 6A shows a sorting tray in a first configuration according to this embodiment. A sorting tray 601 is shown when inserted inside one of the compartments forming the group of sequence sorting compartments. The sorting tray 601 is removable from the compartment. A number of vertical dividers 603 are provided for sequence sorting postal items. The vertical dividers are placed into vertically arranged slots 605.

[0042] Figure 6B shows an arrangement of sorting trays within a group of sequence sorting compartments. Again the sorting trays can be removed from the compartments. A sorting tray 607 is provided with horizontal dividers 609 located on extrusions 611 within the sorting tray 607.

[0043] The amount of postal items a delivery point would receive determines whether vertical or horizontal dividers are used in the sorting trays for sequential sorting. Some commercial customers who receive large volumes of mail and those that receive a large number of magazines or A4 size type material, for example, would have horizontal dividers whereas for most residential delivery points vertical dividers will suffice.

[0044] Figure 7 shows a sorting tray with a moveable display device. The figure shows two sorting trays (701 a, b) removed from the sorting compartments. The first sorting tray includes a display device 703a that is located at a front lower edge of the sorting tray 701 a. The display device 703a is positioned such that it is parallel to the back wall of the sorting tray. On the second sorting tray 701 b, the display device 703b is positioned such that it is at a 45 degree angle to the back wall of the sorting tray 701 b. The display device includes a display surface 705 for attaching any suitable display thereto. A slot 707 is provided on a side portion of the sorting tray to accommodate a locating portion 709 extending from the display device. The locating portion 709 locates in the slot 707 and provides the display device with limited movement through a predetermined angle. This mechanism enables an operator to adjust the display on the sorting trays depending on the configuration of the sorting apparatus so that the operator can easily see the display.

Second Embodiment

[0045] Figure 8 shows a further sorting apparatus arrangement according to a second embodiment.

[0046] The second embodiment includes all the features of the above described first embodiment. In addition, a computing device 801 is provided with a suitable interface input device, such as a keyboard or touch screen display. The computing device also includes a visual display 803. The computing device 801 is connected to a database 805. In this embodiment, the computer is connected to the database via a local area network (LAN). However, it will be understood that the computer may be connected to the database using any suitable means, whether the database is on site with the sorting apparatus or situated at a different location. For example, the database maybe located at a central headquarters and access to it may be via an Internet connection or wide area network (WAN).

[0047] The sorting apparatus also includes linear actuators 807 as shown in the first embodiment.

[0048] An operator using the sorting apparatus logs into the computer using a unique user identification, and optionally a password. Postal sorting information associated with the operator is retrieved from the database 805 and transferred to the computer 801. The information

is then displayed on the display 803. The information may include the sorting areas that the operator is responsible for. Further, the information may provide details of any redirections, mailstops or other postal related information associated with the operator's sorting actions. In this manner, the operator has an easily readable display providing relevant information about their sort task.

[0049] In addition, the computing device 801 is connected to the linear actuators via any suitable output interface. When the operator logs in to the system, a record of the desired height of the sorting apparatus frame is provided, and a value, such as a voltage, is output to the linear actuator in order to move the frame of the sorting apparatus to the desired height associated with the operator.

[0050] The height information may be recorded when the operator first logs in to the computer system. The height is first manually adjusted by using the height adjustment mechanism discussed above in the first embodiment. Once the desired height is reached, the user activates an option using the computer to store the desired height. A reading that corresponds with the current position of the linear actuators is obtained and stored in the computing device 801. Any suitable electric or electronic device can be used in tandem with the linear actuators to read, monitor and control the height position of the apparatus.

Third Embodiment

[0051] Figure 9 shows a further sorting apparatus arrangement according to a third embodiment.

[0052] The third embodiment includes all the features of the above described first embodiment. In addition, a computing device 901 is provided with a suitable interface input device, such as a keyboard or touch screen display.

[0053] Each sorting compartment 905 includes a display 903 that is connected to the computer 901. When an operator logs in to the system using a unique identification, and optionally a password, information associated with the sequential sorting of the mail items associated with that operator is displayed on the display 903 that is located on the individual sorting compartments 903. In this manner, any operator can use any sorting apparatus, and the apparatus can be automatically arranged to show information pertaining to the postal sequences that that particular operator is to sort.

Fourth Embodiment

[0054] Figure 10A shows a further sorting apparatus arrangement according to a fourth embodiment.

[0055] In this embodiment, the group of sequence sorting compartments 1001 is the same as in the above described first embodiment. However, the group of general sorting compartments 1003 is not split into two separate groups as in the first embodiment but instead consists of only one group. In a first working configuration, the group of general sorting compartments is located above the group of sequence sorting compartments, so that the operator can access the sequence sorting compartments to sort the postal items into a postal run sequence. However, it will be understood that the group of general sorting compartments may be located below the group of sequence sorting compartments.

[0056] When an operator wishes to carry out general sorting of postal items, the group of general sorting compartments is moved from the first working configuration to a second working configuration, where the group of general sorting compartments 1003 are located in front of the group of sequence sorting compartments 1001.

[0057] In this embodiment, as shown in figure 11A, an arm mechanism arrangement 1101 forming part of the translation mechanism is used that enables the group of general sorting compartments to be translated from the first working configuration to the second working configuration. Two arcuate arms are provided on each side of the group of general sorting compartments. No counterbalance is provided in this embodiment. However, it will be understood that the group of general sorting compartments may be counterbalanced by attaching a suitable weight at the appropriate point. In this embodiment, the group of general sorting compartments 1003 comes to a stop on top of the group of sequence sorting compartments to form the first working configuration, and comes to a stop adjacent the group of sequence sorting compartments to form the second working configuration as shown in figure 11B.

Further Embodiments

[0058] Figure 12 shows a drive mechanism used in sorting apparatus according to a further embodiment of the invention. This drive mechanism is an extra feature that can be included in the translation mechanism as described above in the relevant previous embodiments.

[0059] In this further embodiment, a motor 1201 is provided that includes a drive mechanism 1203 which has a drive belt 1205 connected thereto. The drive belt 1205 connects to an upper pulley 1207, which is a similar pulley to that described above in the first embodiment. A power supply 1209 is provided that operates the motor 1201 upon pressing a bi-directional switch 1211 that is located on the underside of the work surface 1213. The switch causes the drive mechanism of the motor to rotate in one of two directions depending on the direction the switch is operated. When the motor 1201 is driven, the drive mechanism 1203 rotates, which causes the drive belt 1205 to move. The movement of the drive belt 1205 causes the upper pulley 1207 to rotate. The rotating pulley 1207 is interconnected with the arm 1215, thus causing the arm to move the upper group of general sorting compartments. Further, the upper pulley is linked via a linkage device 1217 to the lower pulley. In this embodiment, the linkage device 1217 is a cable. The cable 1217 is ar-

ranged to cause the lower pulley to rotate in an opposite direction to the upper pulley and so move the lower group of general sorting compartments as described above in the first embodiment. Thus, the motor may be used to move the group of general sorting compartments automatically by operating the switch to drive the motor the desired way, rather than manually.

[0060] Figure 13 shows an alternative drive mechanism for use in a sorting apparatus where there is only a single group of general sorting compartments, i.e. the general sorting compartments are not separated into two different groups above and below the sequence sorting compartments. In this embodiment, the group of general sorting compartments is positioned towards the top of the sorting frame. However, it will be understood that the group may be positioned elsewhere on the sorting frame.

[0061] A motor 1301 is provided with a drive mechanism 1303. A drive belt 1305 is connected around the drive mechanism 1303 and the pulley 1307 in a similar way to that described above. A power supply 1309 provides power to the motor 1301 via a switch 1311 located on the underside of the work surface 1313. Operating the switch causes the motor to rotate thus driving the drive mechanism. The drive mechanism moves the drive belt, which causes the pulley to rotate. As the pulley rotates the arm 1315 moves and causes the group of general sorting compartments to move in the desired direction.

[0062] Figure 14 shows a further alternative wherein additional side compartments are provided to give an increased sequence sorting area.

[0063] A similar arrangement to that described in the first embodiment is used. A group of sequence sorting compartments 1401 are provided, with a group of general sorting compartments 1403 split and located above and below the sequence sorting compartments. A work surface 1405 is also provided. In addition, located on either side of the group of sequence sorting compartments 1401, additional side sorting compartments 1407 are provided. The additional side sorting compartments 1407 are pivotally attached to the frame of the sorting apparatus such that they can be moved to a desired position suitable for the operator. Alternatively, the additional side sorting compartments may be fixed in position

[0064] The additional side compartments arranged in side cabinets are an extension of the sequence sorting compartments to accommodate the number of delivery points required on a delivery run or route.

[0065] An alternative arrangement will now be described with reference to figures 15A, B and C for the translation mechanism for use in the above described embodiments where the group of general sorting compartments are split into an upper and lower group of general sorting compartments.

[0066] It will be understood that a mirror imaged version of the translation mechanism described below is provided on the opposite side of the apparatus.

[0067] Figure 15A shows a group of sequence sorting compartments 1501, and an upper and lower group of general sorting compartments (1503, 1505) arranged in a working configuration for sorting postal items in a general manner.

[0068] Two rotational devices (1507a, b) are provided, which in this embodiment are an upper and lower pulley. Connected between the upper and lower pulley is a linkage device 1509, which in this embodiment is a cable. The linkage device is connected between the pulleys and arranged such that the pulleys are caused to rotate in opposite directions.

[0069] Two arms are provided, an upper arm 1511 a and a lower arm 1511 b. The arms are formed from straight pieces of steel.

[0070] One end of the upper arm is pivotally connected to the frame of the sorting apparatus, and the upper pulley is connected to this end of the upper arm such that the arm and pulley move together. Also connected to the frame at this location is a first idler unit 1513a that is arranged such that it is free to rotate. At the other end of the upper arm 1511 a, which is pivotally connected to the upper group of general sorting compartments, is located a second idler unit 1513b, which is also free to rotate. An upper toothed belt 1515a is connected between the first and second idler units.

[0071] One end of the lower arm is pivotally connected to the frame of the sorting apparatus, and the lower pulley is connected to this end of the lower arm such that the arm and pulley move together. Also connected to the frame at this location is a third idler unit 1513c that is arranged such that it is free to rotate. At the other end of the lower arm 1511 a, which is pivotally connected to the lower group of general sorting compartments, is located a fourth idler unit 1513d, which is also free to rotate. A lower toothed belt 1515b is connected between the third and fourth idler units.

[0072] Figure 15B shows the position of the upper and lower groups of general sorting compartments when in mid movement from the general sorting working configuration to a sequence sorting working configuration.

[0073] Figure 15C shows the sorting apparatus resting in the sequence sorting working configuration.

[0074] It will be understood that an alternative arrangement to that described above in relation to figures 15A-C could be used wherein a similar translation mechanism to that shown in the fourth embodiment is used. That is, the same arm, idler and toothed belt mechanism could be used to control the movement of the group of general sorting compartments.

[0075] Further, it will be understood that motor mechanisms as described herein may be used as an alternative drive mechanism for the arrangement shown in Figures 15a-c.

[0076] Figure 16 shows a further embodiment of the invention. The sorting apparatus 1601 includes a group of sequence sorting compartments 1603 and upper and lower general sorting compartments (1605A, 1605B). On the right hand side of the apparatus, first, second, third

and fourth arcuate arms (1607A, B, C and D) are provided, and are attached in a similar manner to the general sorting compartments as described above in relation to Figure 12. Upper and lower rotational devices (1609A, 1609B), such as pulleys, and a linkage device 1611, such as a cable, are also attached in a similar manner as described above in relation to Figure 12. In this embodiment however, a shaft mounted geared electric motor 1613 is connected to a lower torque shaft 1615A via the pulley 1609B. An upper torque shaft 1615B is connected between the lower arcuate arms of the upper general sorting compartments. The work surface of the frame is not shown in the figure for clarity reasons, however it will be understood that it will operate in a similar manner to that described in previous embodiments.

[0077] A corresponding translation mechanism 1617 is provided on the left hand side of the apparatus, which includes four arcuate arms, two rotational devices and a linkage deice to provide support for that side of the general sorting compartments as they move.

[0078] The motor 1613 is controlled by a handheld electronic control module and can be driven in two directions to move the general sorting compartments. The control module includes a magnetic backing so that it can be easily stored by attaching it to the metal frame of the apparatus.

[0079] When the motor is operated by the user, the motor directly drives the lower torque shaft either in a clockwise or anti clockwise direction. This causes the lower general sorting compartments to be translated from one sorting configuration to another sorting configuration, as described above. Further, the motor also drives the lower rotational device 1609B, which in turn drives the linkage device 1611, which then drives the upper rotational device 1609A. When the upper rotational device 1609A rotates, the second arcuate arm 1607B is caused to move at the pivot point where it is attached to the rotational device 1609A. This movement causes the upper general sorting compartments 1605A to move in an opposite direction to the lower general sorting compartments 1605B. The upper torque shaft 1615B connected between the two lower arcuate arms attached to the general sorting compartments minimises any twist stress that would otherwise be caused without the torque shafts.

[0080] It will be understood that the embodiment described with reference to figure 16 may be adapted such that only a single group of general sorting compartments is provided on the sorting frame, those general sorting compartments being placed at any suitable position.

[0081] Further, it will be understood that the embodiment described with reference to figure 16 may be adapted such that the linkage devices are not required. For example, separate motors may be used to control the movement of the upper and lower general sorting compartments. The separate motors may be controlled via a logic control system that ensures that the upper and lower general sorting compartments are synchronised to move together and in opposite directions to sufficiently counter balance the apparatus.

[0082] Further, it will be understood that the embodiment described with reference to figure 16 may be adapted such that the shaft mounted electric motor is used in conjunction with the embodiment described with reference to figures 15A-C.

[0083] It will be understood that the embodiments of the present invention described herein are by way of example only, and that various changes and modifications may be made without departing from the scope of invention.

[0084] Further, it will be understood that, as an alternative, the work surface could be adapted such that it automatically retracts before the general sorting compartments are moved.

[0085] Further, it will be understood that, although in the above described embodiments the arms are attached at one end to the frame of the apparatus, they may also be pivotally attached to the steel compartment used for sequential sorting the postal items.

[0086] According to particular embodiments of the present invention as described above, the following advantages are provided.

[0087] One advantage of an embodiment of the present invention is that groups of sorting compartments are able to be moved from a first configuration to a second configuration in order to optimize the arrangement of sorting compartments. This enables the operator to minimise the amount of height adjustment required when using the sorting apparatus.

[0088] Further, embodiments of the present invention are particularly space efficient by providing a mechanism to move a particular group of sorting compartments when not in use to an area around the apparatus that would otherwise be unused space.

[0089] Further, the ability to move the groups of sorting compartments enables the apparatus to be compacted, therefore saving the use of valuable space in a sorting environment.

[0090] A further advantage provided by embodiments of the present invention is that the sorting module configuration is easily changeable from one working configuration to a second working configuration. In each case, the working configurations are provided such that an operative is able to work from the same work space.

Claims

1. Apparatus for sorting postal items, the apparatus comprising at least two groups of sorting compartments and a translation mechanism, wherein a first and second group of sorting compartments move relative to each other and translate, using the translation mechanism, between a first and second working configuration.

2. The apparatus of claim 1, wherein the second group

of sorting compartments comprises a third and fourth group of sorting compartments, and the third group of sorting compartments is positioned separately from the fourth group of sorting compartments when in the first working configuration and positioned adjacent to the fourth group of sorting compartments when in the second working configuration.

3. The apparatus of claim 2, wherein the third and fourth group of sorting compartments are arranged to be counterbalanced.

4. The apparatus of claim 2, wherein the third and fourth group of sorting compartments are arranged to move away from each other to translate from the second working configuration to the first working configuration.

5. The apparatus of claim 2, wherein the third and fourth group of sorting compartments are arranged to move towards each other to translate from the first working configuration to the second working configuration.

6. The apparatus of claim 1, wherein the first group of sorting compartments is arranged in a fixed position and the second group of sorting compartments is adapted to move relative to the first group between the first and second working configuration.

7. The apparatus of claim 1, wherein the translation mechanism comprises a plurality of arm mechanisms, wherein a first arm mechanism is attached to a first side of the second group of sorting compartments and a second arm mechanism is attached to a second side of the second group of sorting compartments, the first side opposing the second side.

8. The apparatus of claim 7 wherein the first arm mechanism comprises first and second arcuate arms pivotally attached at one end to the first side of the second group of sorting compartments, and the second arm mechanism comprises third and fourth arcuate arms pivotally attached at one end to the second side of the second group of sorting compartments.

9. The apparatus of claim 7, wherein the first arm mechanism comprises a first arm pivotally attached at one end to the second group of sorting compartments and the second arm mechanism comprises a second arm pivotally attached at one end to the second group of sorting compartments, wherein the first and second arms are attached to the second group of sorting compartments on opposing sides.

10. The apparatus of claim 2, wherein the translation mechanism comprises a plurality of arm mechanisms, wherein a first arm mechanism is attached to a first side of the third group of sorting compartments and further attached to a first side of the fourth group of sorting compartments, and a second arm mechanism is attached to a second side of the third group of sorting compartments and further attached to a second side of the fourth group of sorting compartments, the first side opposing the second side.

11. The apparatus of claim 10, wherein the first arm mechanism comprises a first arm pivotally attached at one end to the third group of sorting compartments and a second arm pivotally attached at one end to the fourth group of sorting compartments, and the second arm mechanism comprises a third arm pivotally attached at one end to the third group of sorting compartments and a fourth arm pivotally attached at one end to the fourth group of sorting compartments.

12. The apparatus of claim 11, wherein the first arm mechanism further comprises first and second rotational devices and a first linkage device, and the second arm mechanism comprises third and fourth rotational devices and a second linkage device, wherein the first rotational device is arranged to move with the first arm, the second rotational device is arranged to move with the second arm, the third rotational device is arranged to move with the third arm and the fourth rotational device is arranged to move with the fourth arm.

13. The apparatus of claim 12, wherein the first rotational device is attached at one end of the first arm, the second rotational device is attached at one end of the second arm, the third rotational device is attached at one end of the third arm, the fourth rotational device is attached at one end of the fourth arm, such that the first, second, third and fourth arms pivot at the point of attachment.

14. The apparatus of claim 10 wherein the first arm mechanism comprises first and second arcuate arms attached to the third group of sorting compartments and third and fourth arcuate arms attached to the fourth group of sorting compartments, and the second arm mechanism comprises fifth and sixth arcuate arms attached to the third group of sorting compartments and seventh and eighth arcuate arms attached to the fourth group of compartments.

15. The apparatus of claim 10, wherein the first arm mechanism further comprises first and second rotational devices and a first linkage device, and the second arm mechanism comprises third and fourth rotational devices and a second linkage device, wherein the first rotational device is arranged to rotate the second arcuate arm, the second rotational device is arranged to rotate the third arcuate arm, the third rotational device is arranged to rotate the sixth arcuate arm, and the fourth rotational device is arranged

to rotate the seventh arcuate arm.

16. The apparatus of claim 15, wherein the first rotational device is attached at one end of the second arm, the second rotational device is attached at one end of the third arm, the third rotational device is attached at one end of the sixth arm, the fourth rotational device is attached at one end of the seventh arm, such that the second, third, sixth and seventh arms pivot at the point of attachment.

17. The apparatus of claim 12 or 15, wherein the first linkage device is connected between the first and second rotational devices to cause the first rotational device to rotate in the opposite direction to the second rotational device, and the second linkage device is connected between the third and fourth rotational devices to cause the third rotational device to rotate in the opposite direction to the fourth rotational device.

18. The apparatus of claim 1 further comprising a work surface adapted to be extendable away from the first group of sorting compartments and further adapted to provide support to the second group of sorting compartments when in the second working configuration.

19. The apparatus of claim 1 further comprising a height adjustment mechanism to adjust the height of the first and second group of compartments.

20. The apparatus of claim 19 further comprising a linear actuator to adjust the height.

21. The apparatus of claim 1 further comprising removable sorting trays.

22. The apparatus of claim 21 wherein the sorting trays are adapted to be arranged in one of a vertical or horizontal sorting configuration.

23. The apparatus of claim 21 wherein the sorting trays comprise a display device with a moveable display surface.

24. The apparatus of claim 23 further comprising a computing device adapted to display information associated with the postal items on the display device.

25. The apparatus of claim 24 wherein the computing device is arranged to retrieve user information based on user identification input into the computing device, and the display device is arranged to display the user information.

26. The apparatus of claim 1 further comprising a display device, a computing device and a database, wherein the computing device is adapted to display information associated with the postal items on the display device.

27. The apparatus of claim 26 wherein user information is retrieved from the database by the computing device based on user identification input into the computing device, and the display device is arranged to display the user information.

28. The apparatus of claim 1 further comprising a motor arranged to directly drive the translation mechanism.

29. A method of sorting postal items using the apparatus of any of claims 1 to 28 comprising the steps of:

sorting the postal items in a sequential manner by utilising the first group of sorting compartments when the apparatus is in the first working configuration, and

sorting the postal items in a general manner by utilising the second group of sorting compartments when the apparatus is in the second working configuration.

30. The method of claim 29 further comprising the step of changing the configuration of the apparatus from the first working configuration to the second working configuration by moving the second group of sorting compartments.

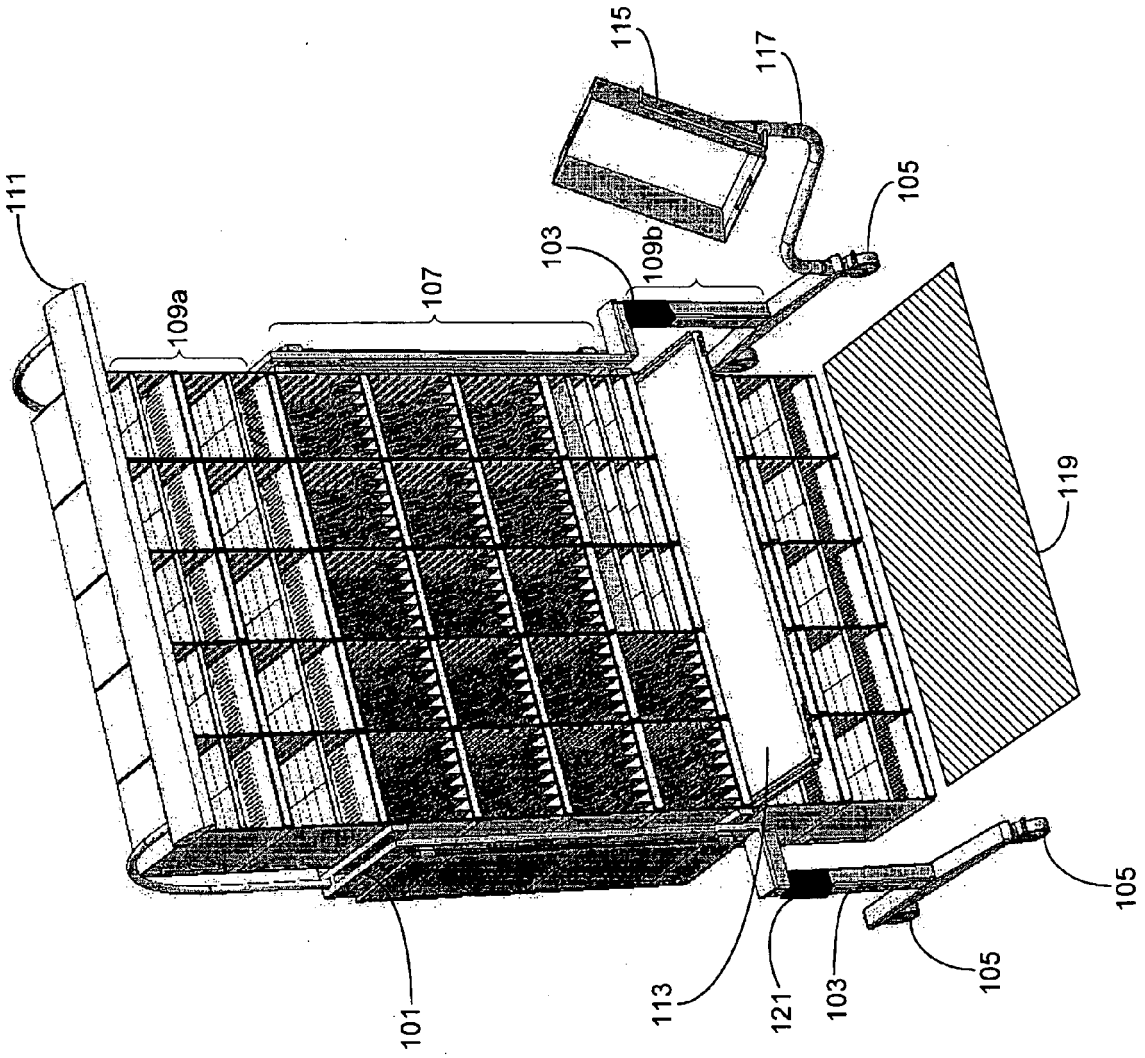


Figure 1

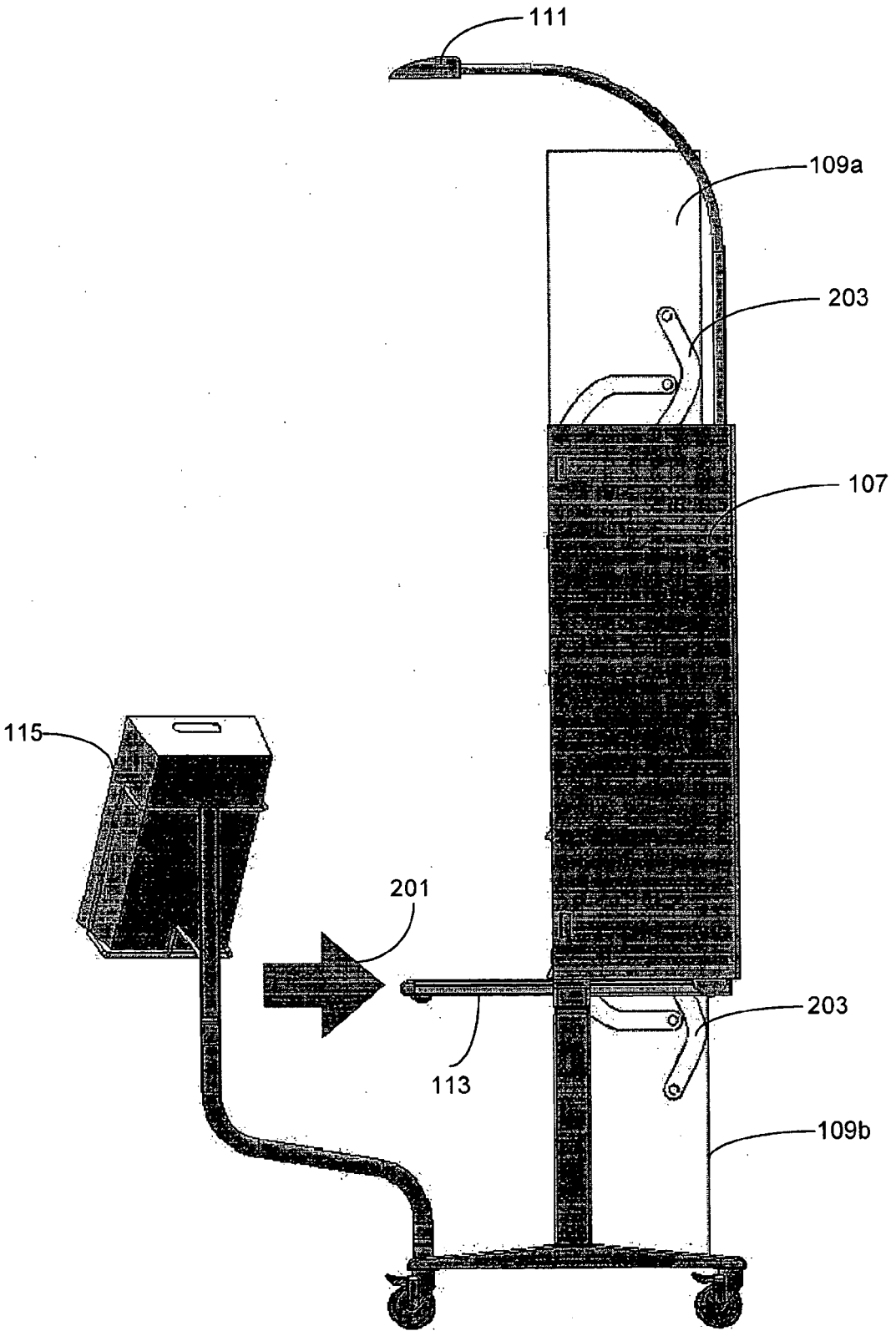


Figure 2a

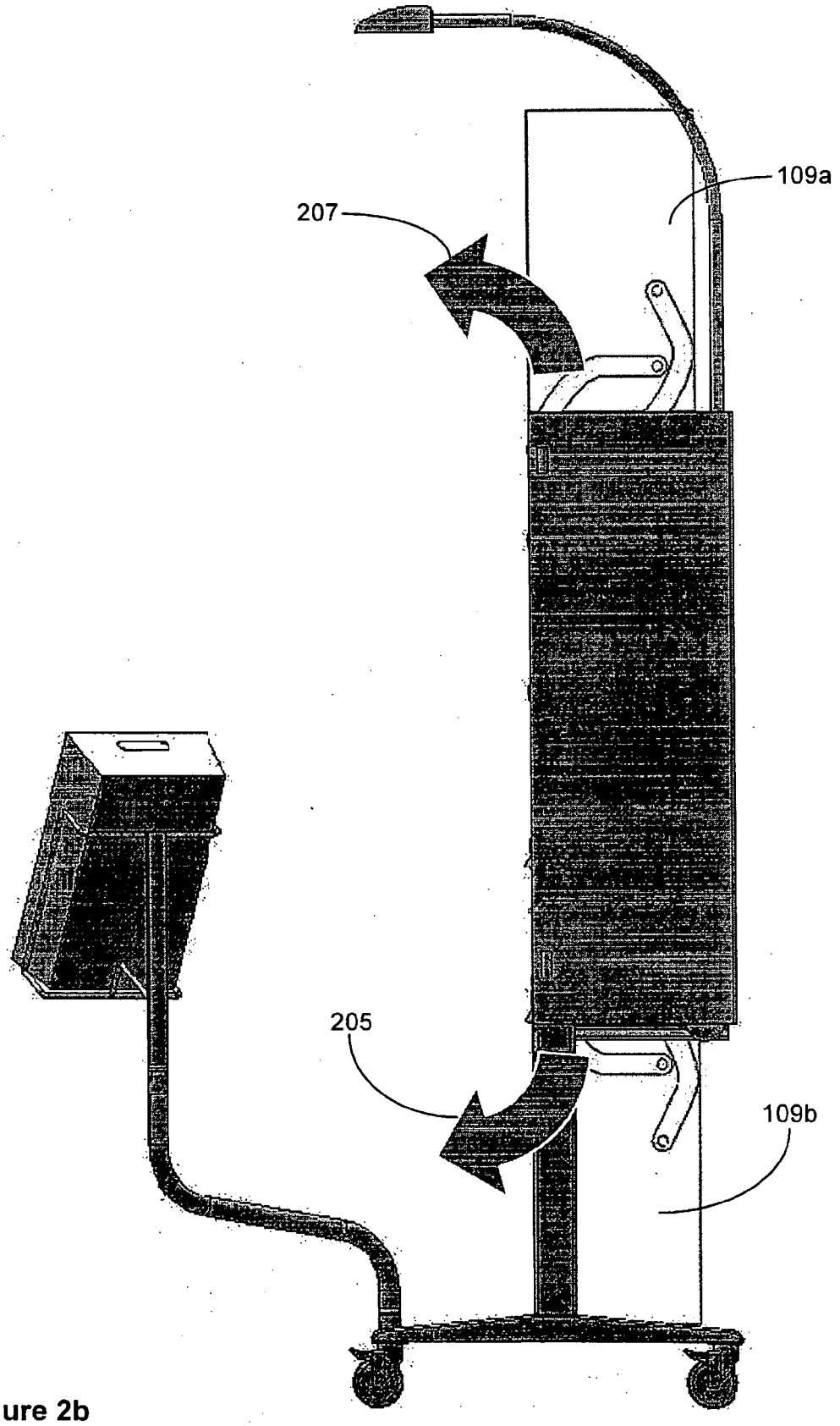


Figure 2b

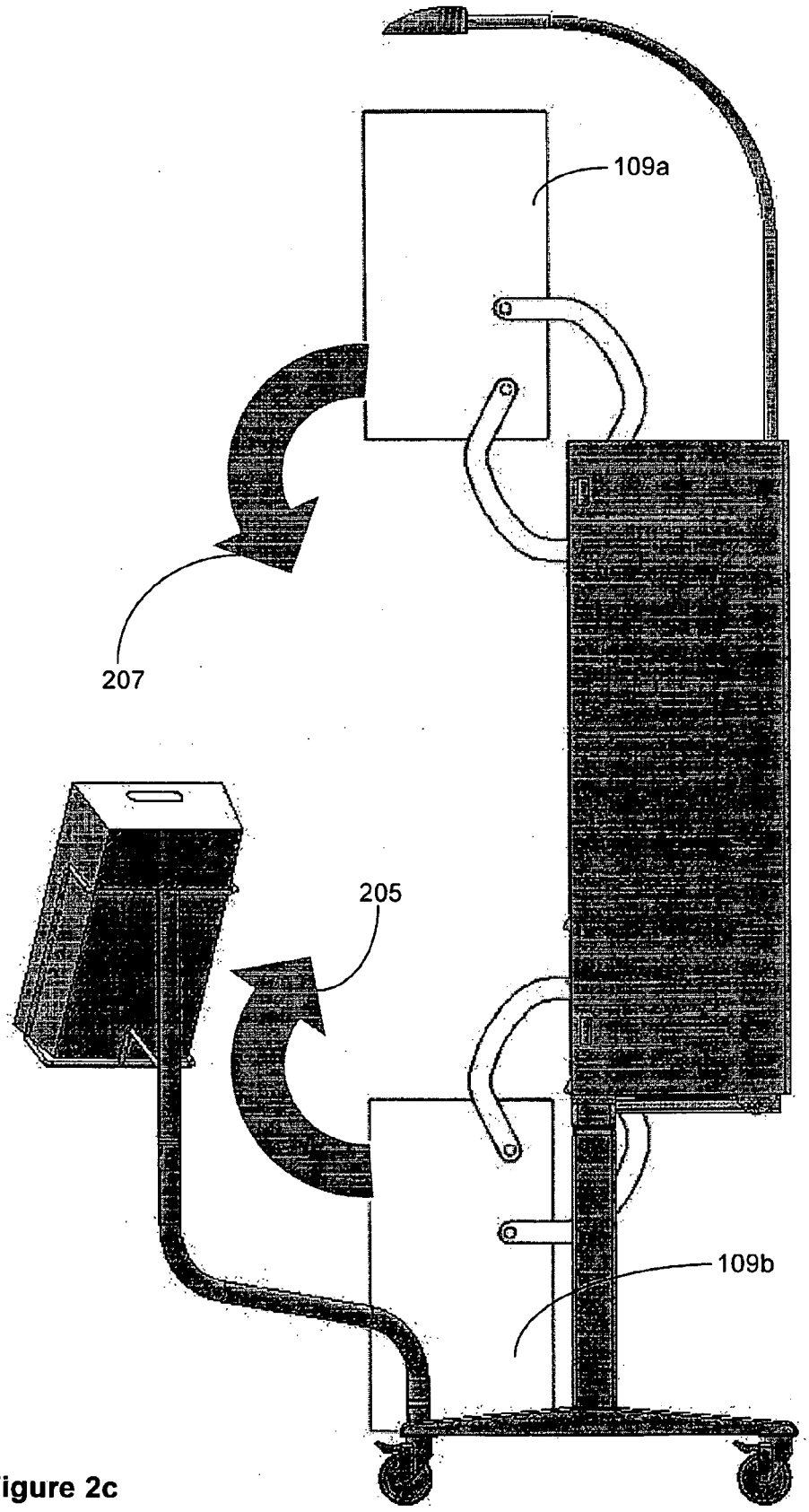


Figure 2c

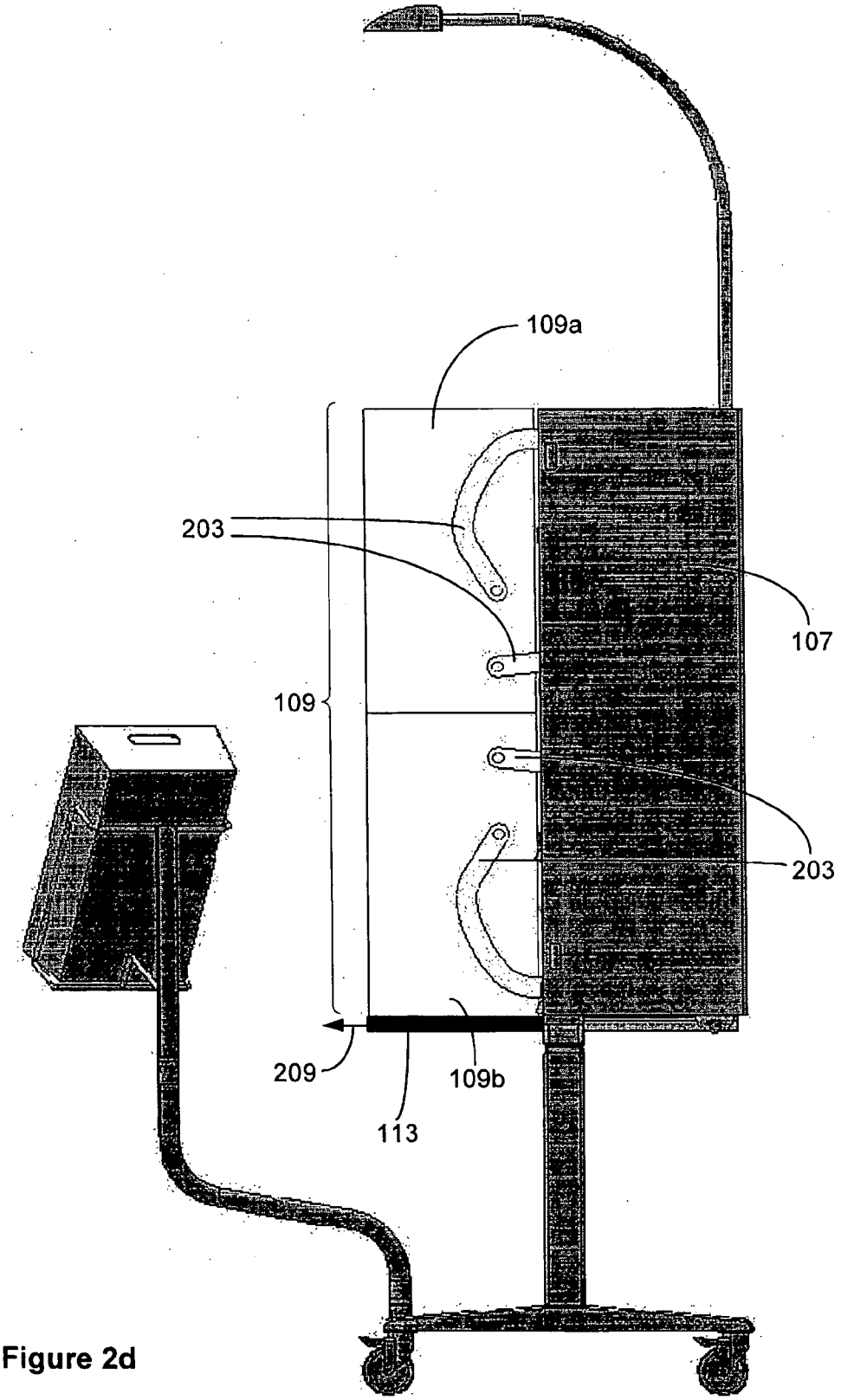


Figure 2d

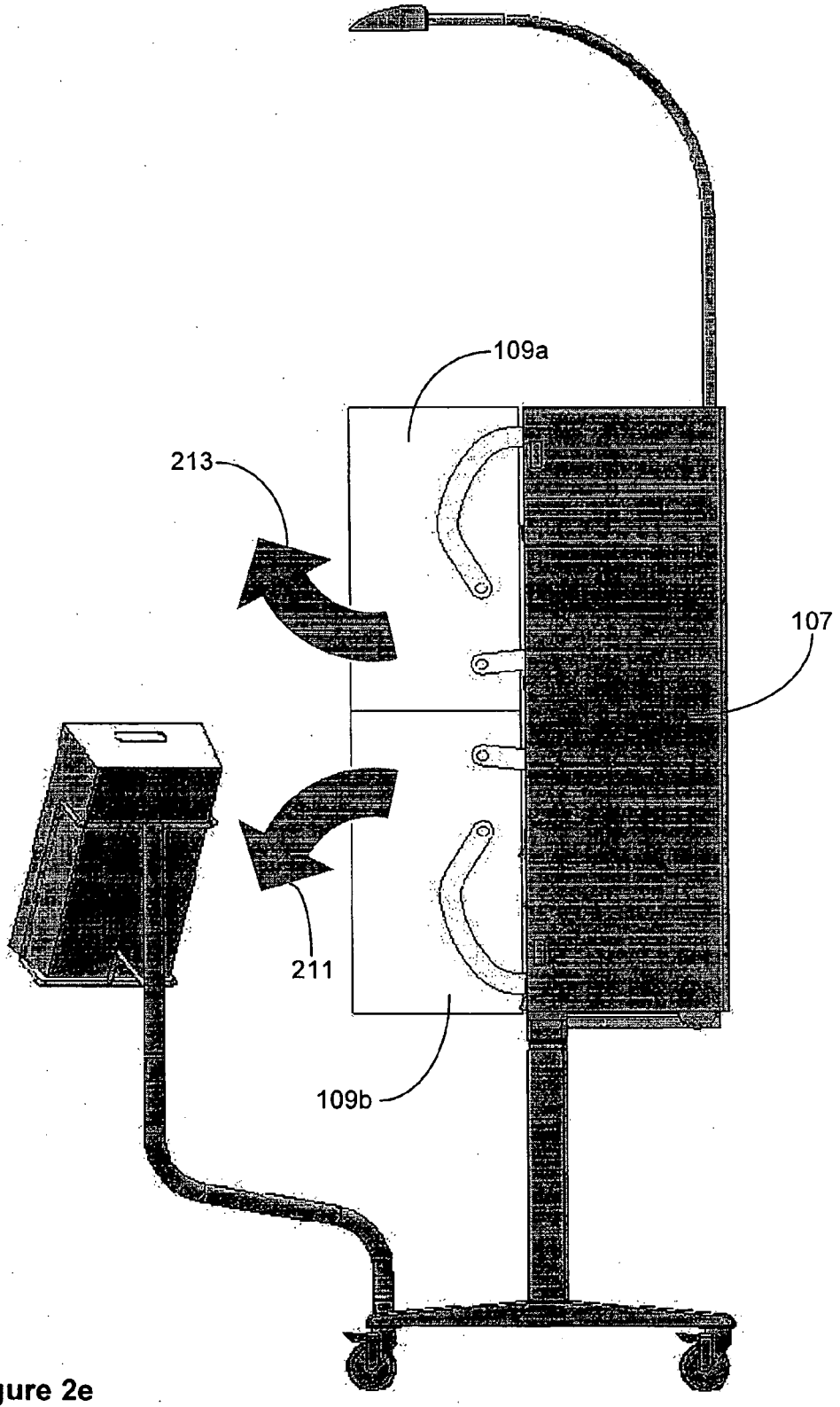


Figure 2e

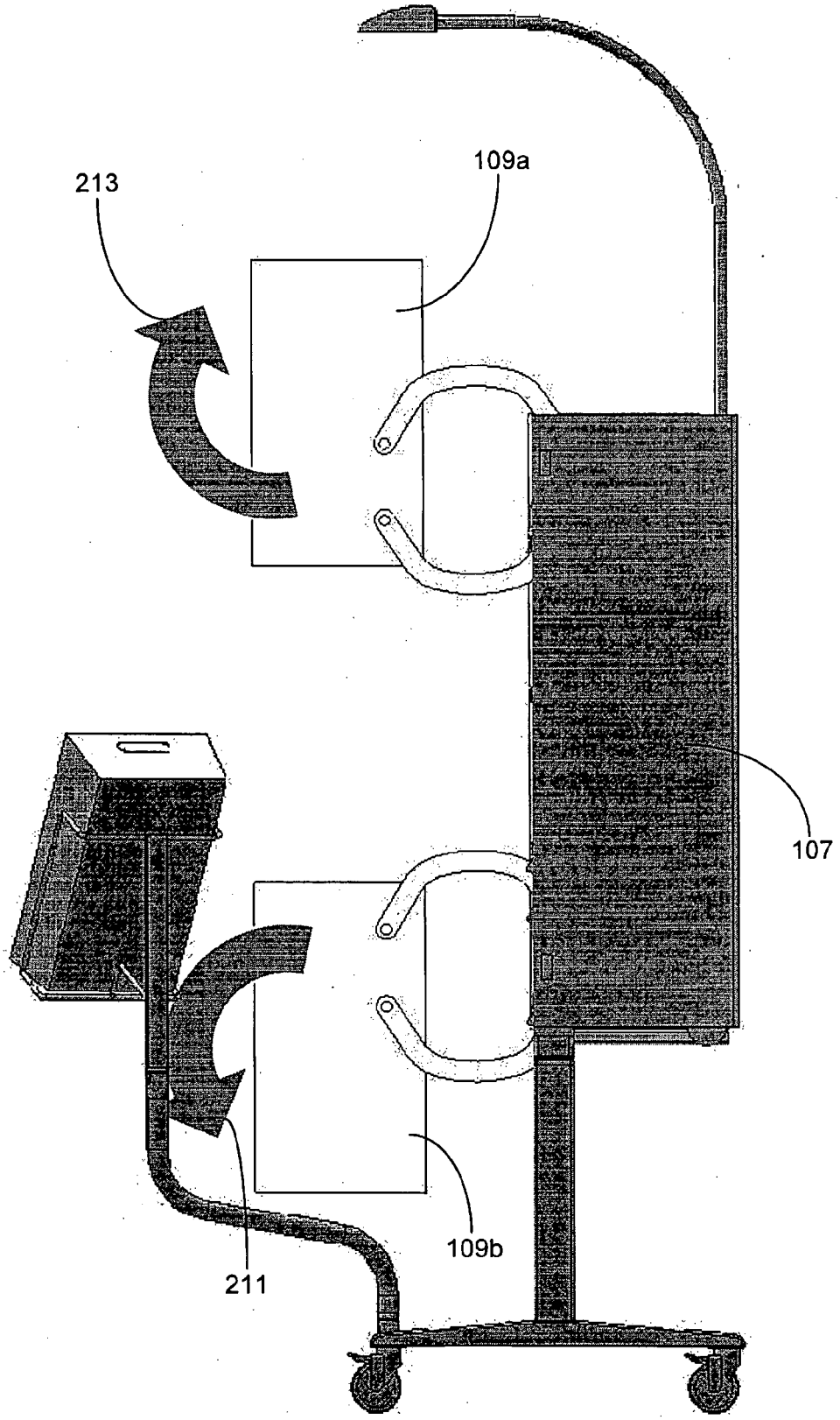


Figure 2f

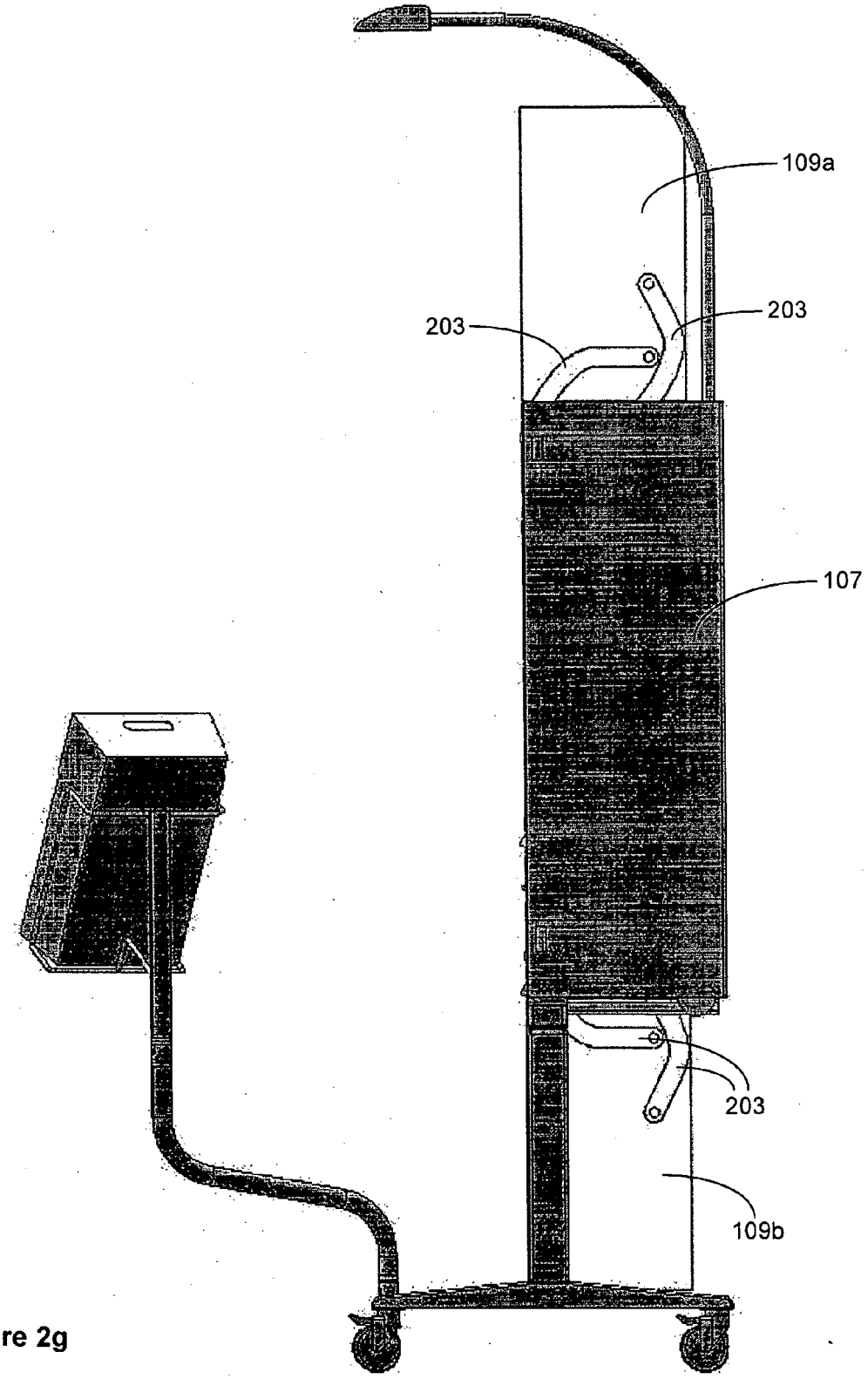


Figure 2g

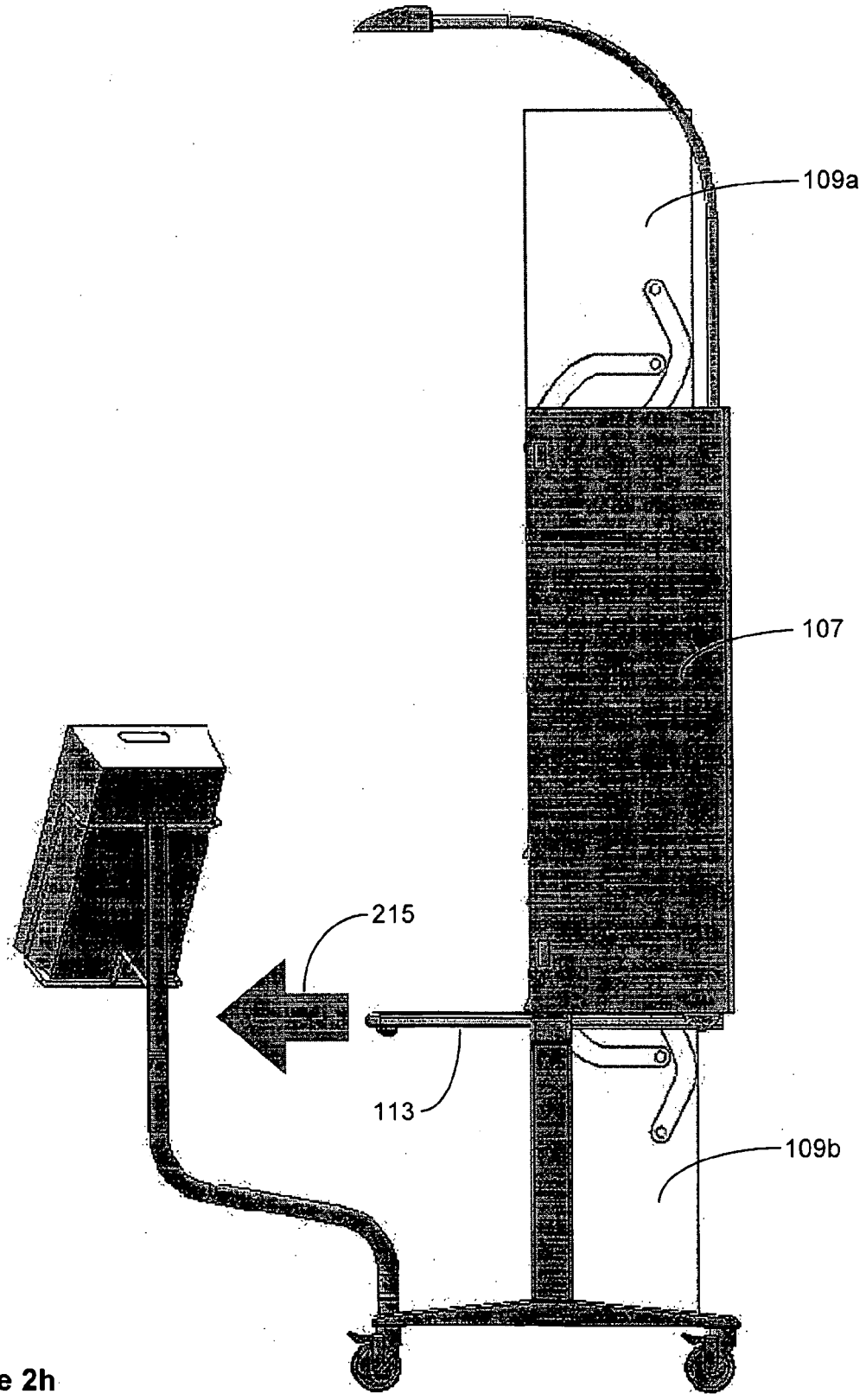


Figure 2h

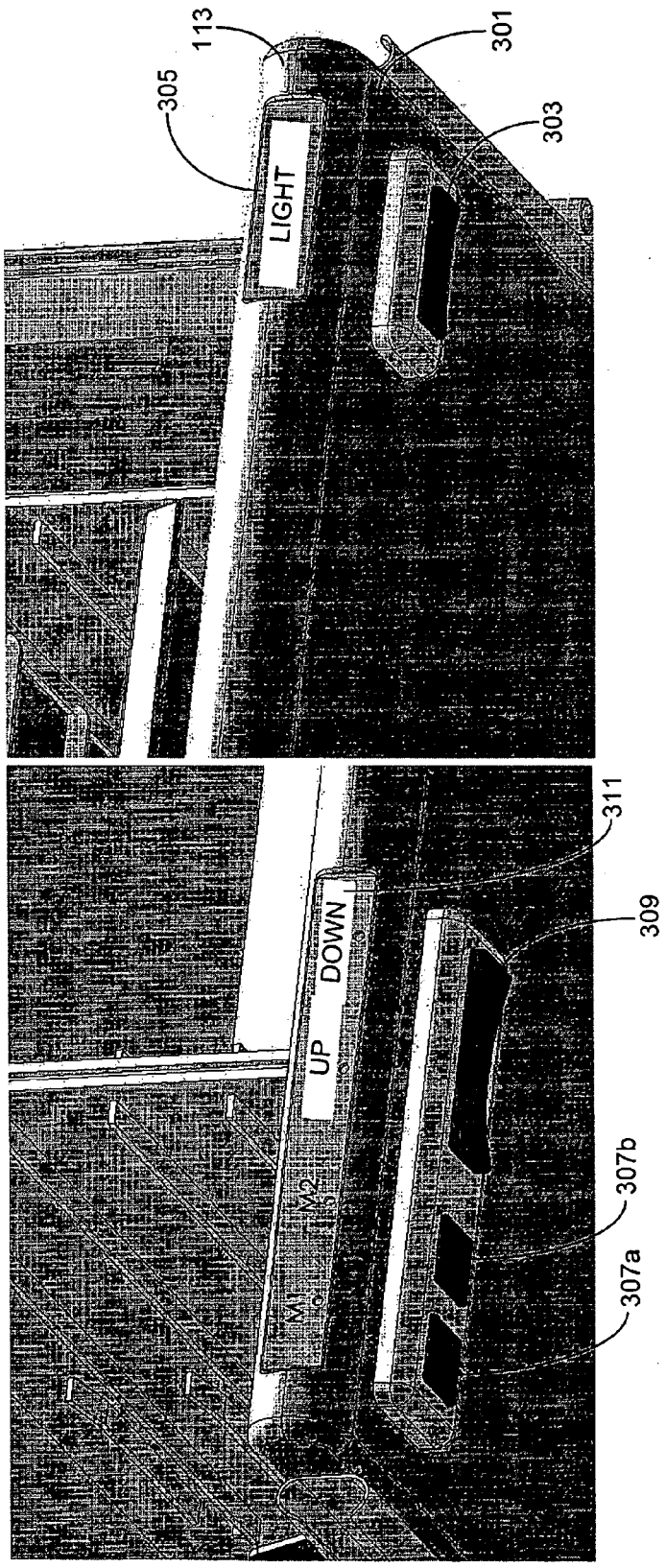


Figure 3

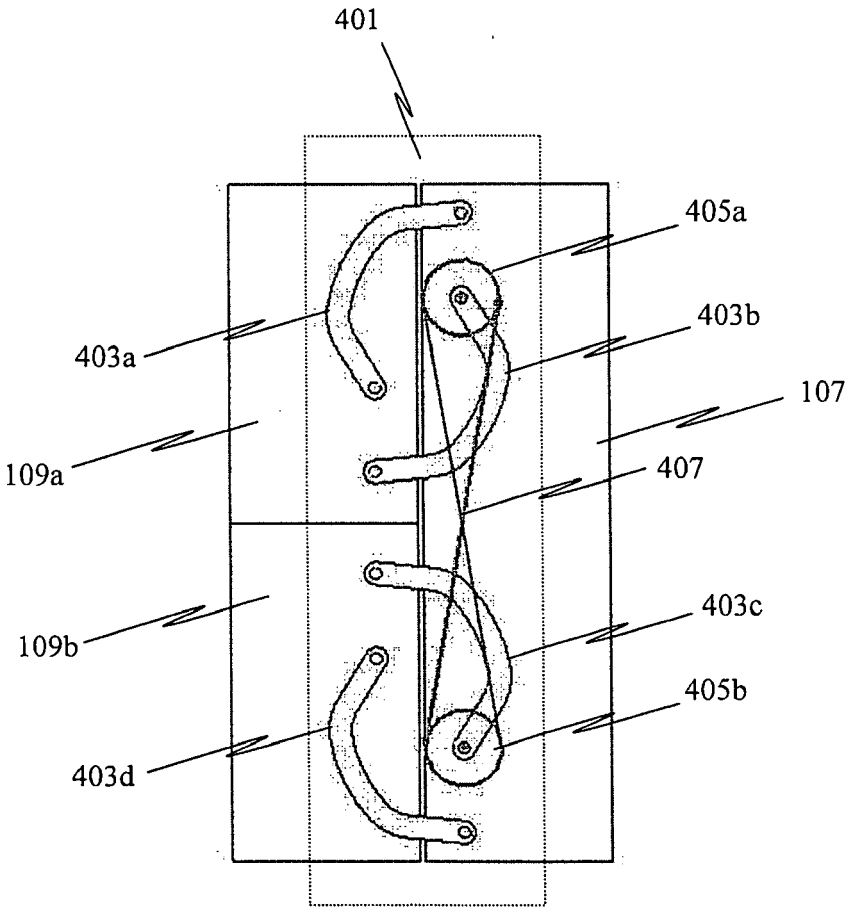


Figure 4a

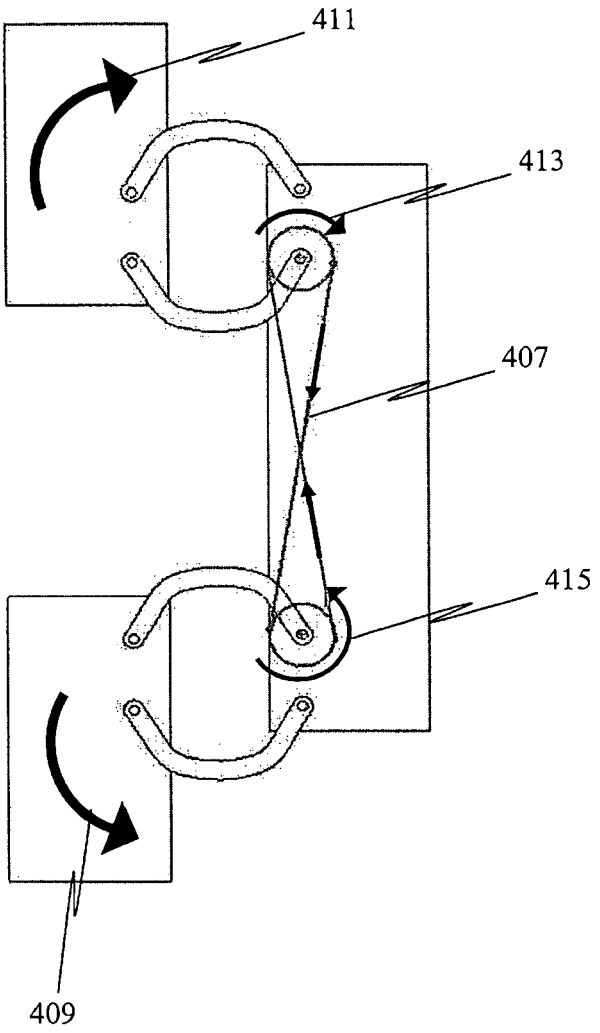


Figure 4b

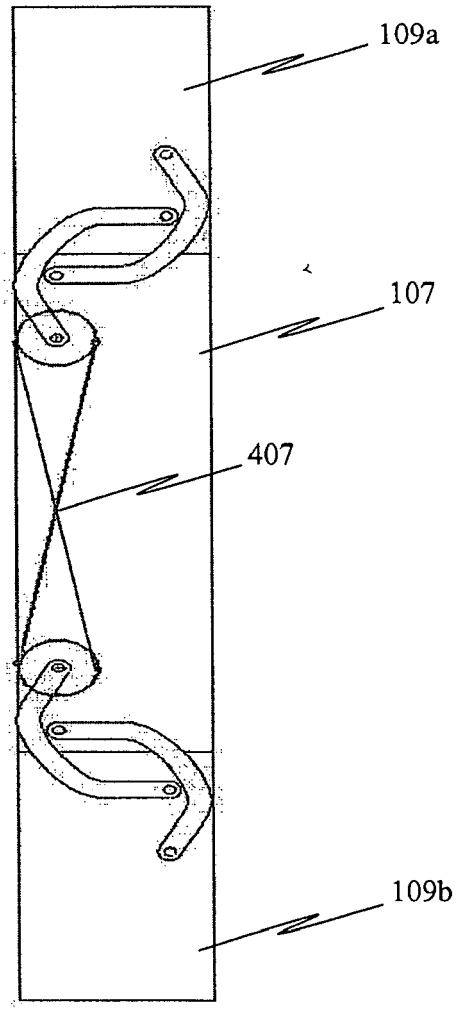


Figure 4c

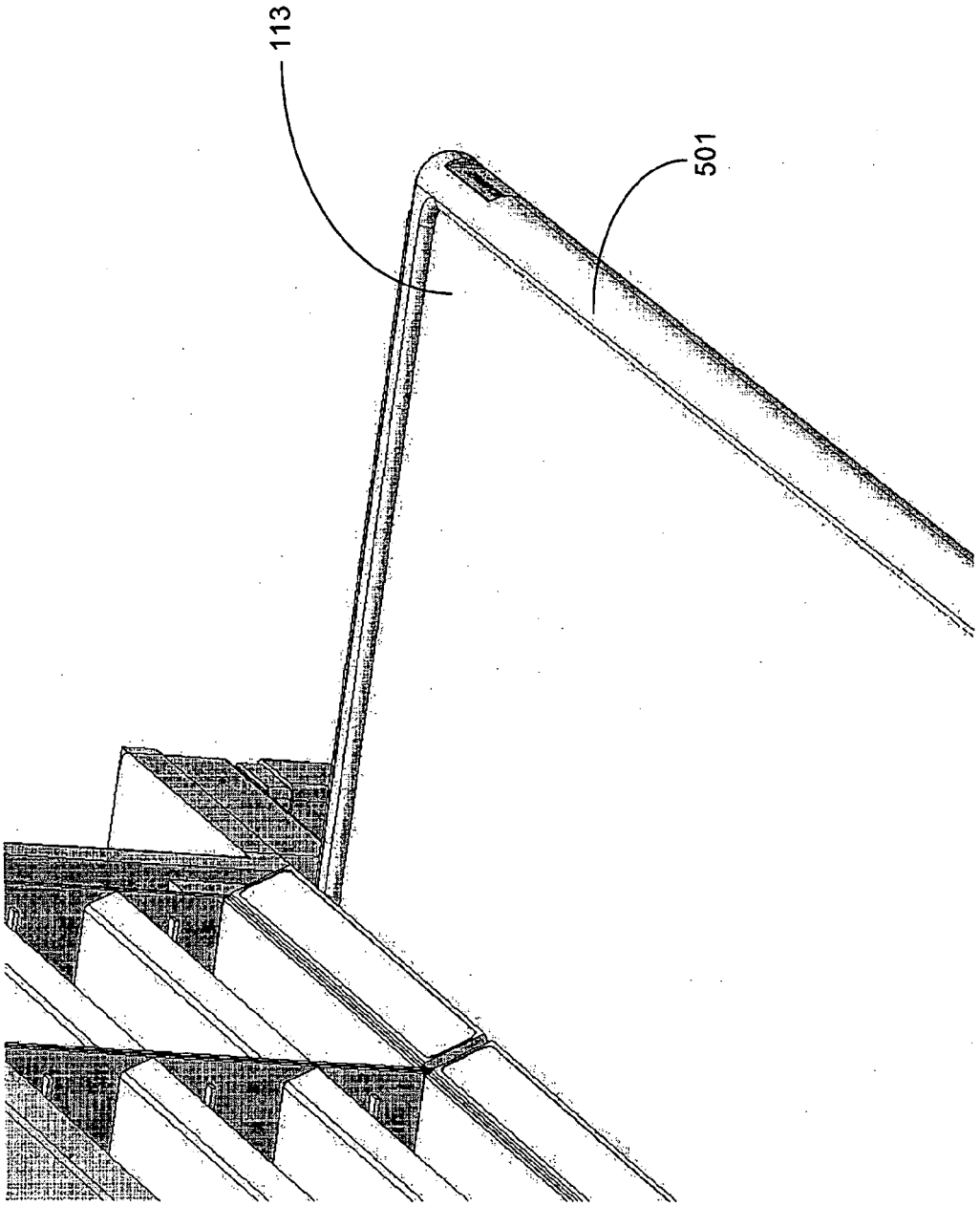


Figure 5

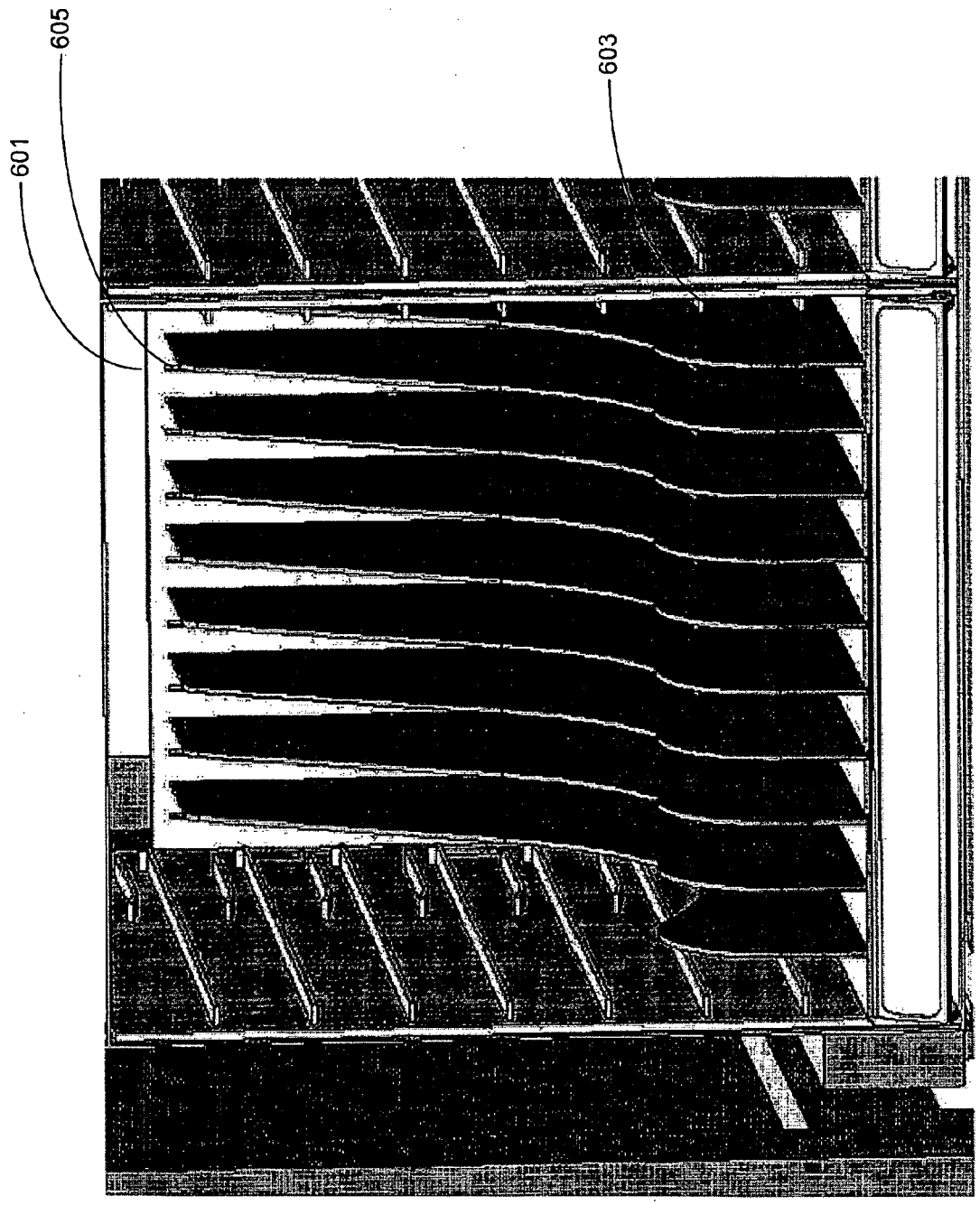


Figure 6A

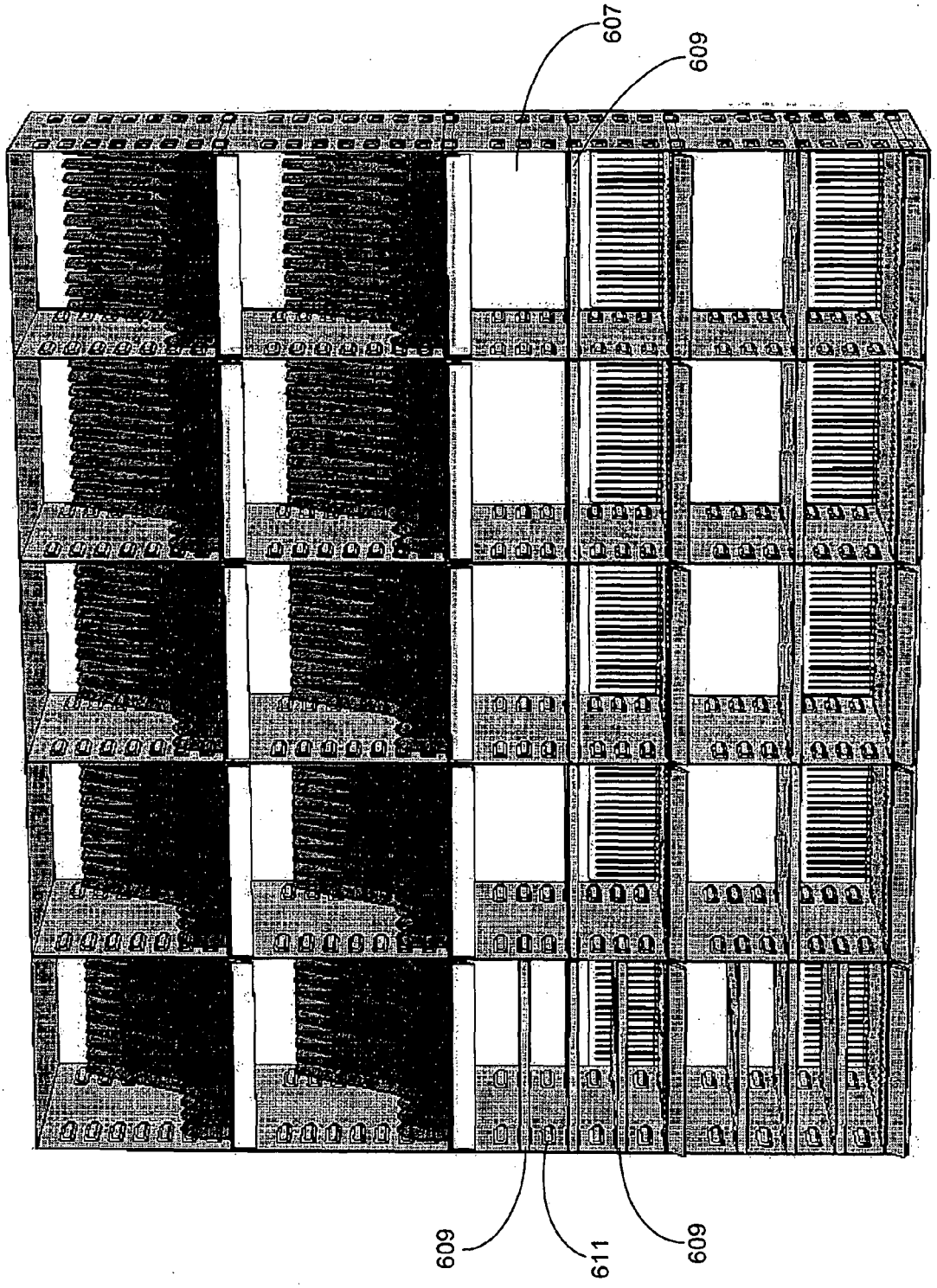


Figure 6b

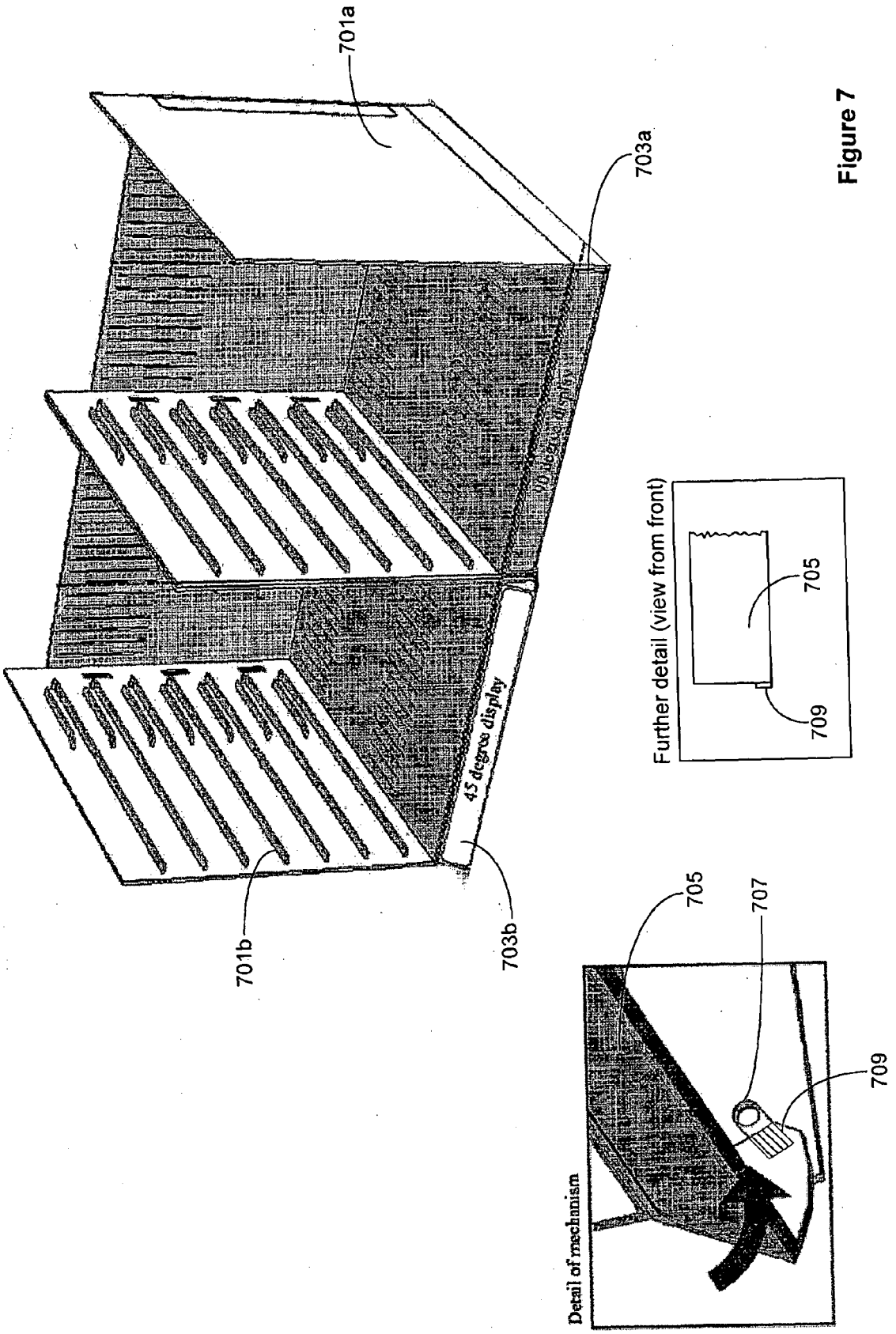

701a
703a
45 degree display
701b
703b
Further detail (view from front)
705
709
Detail of mechanism
705
707
709

Figure 7

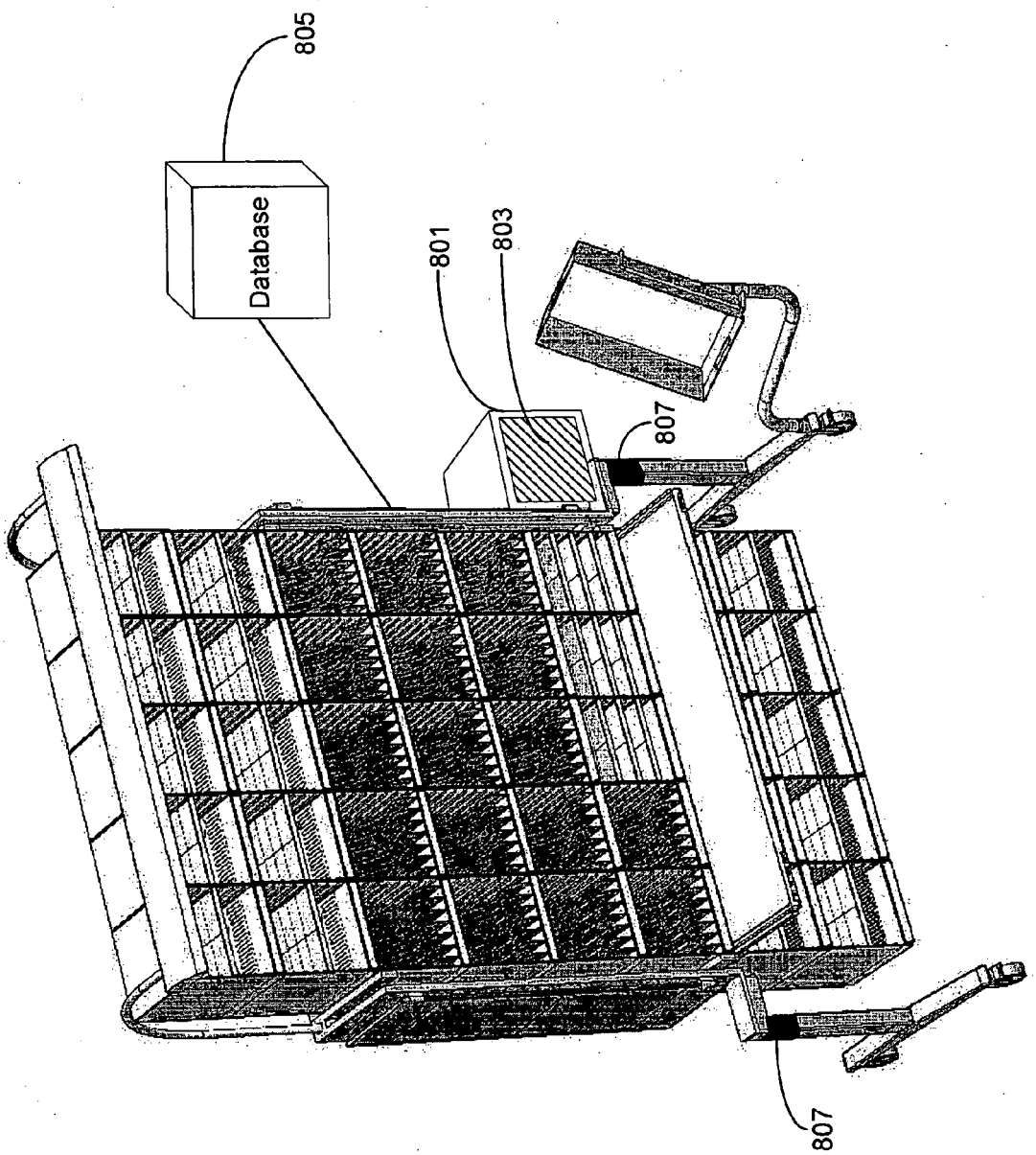


Figure 8

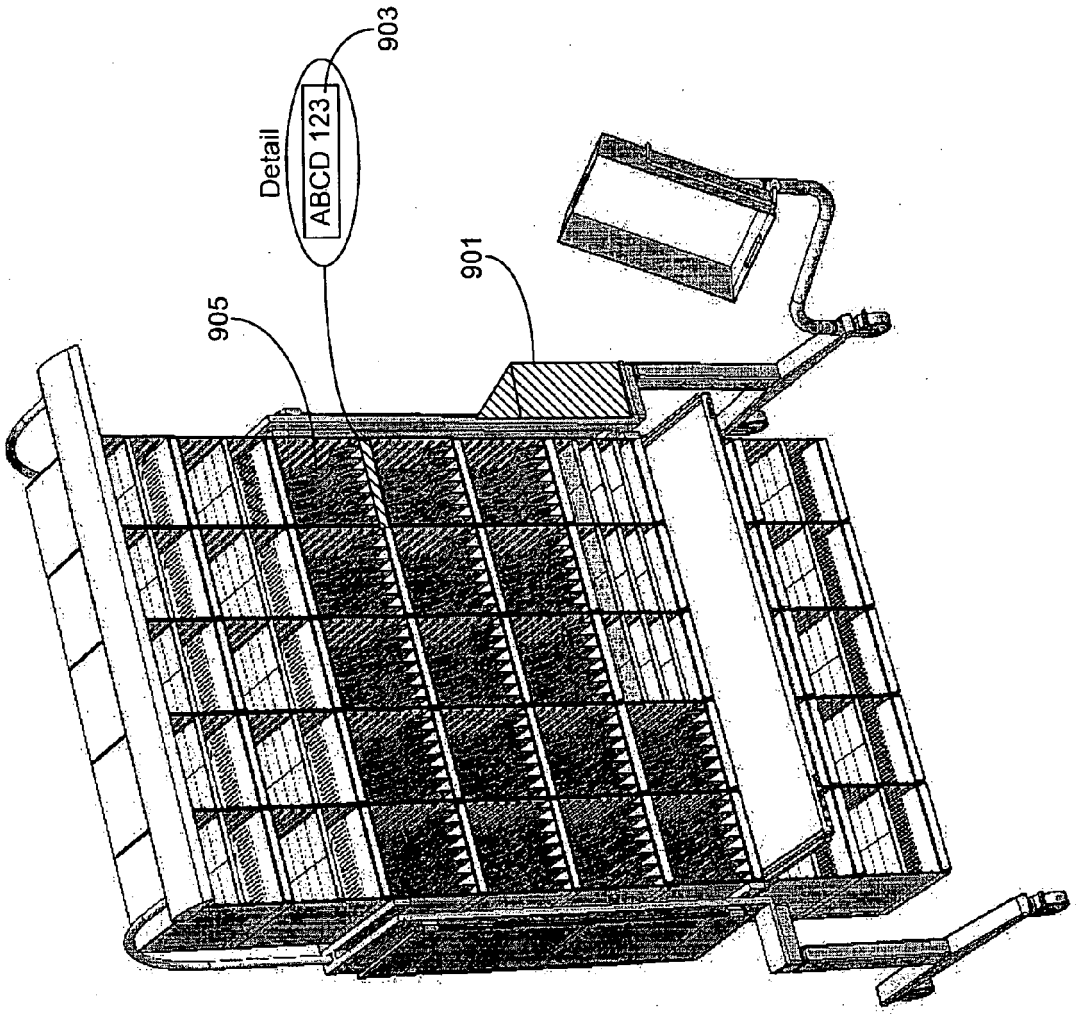


Figure 9

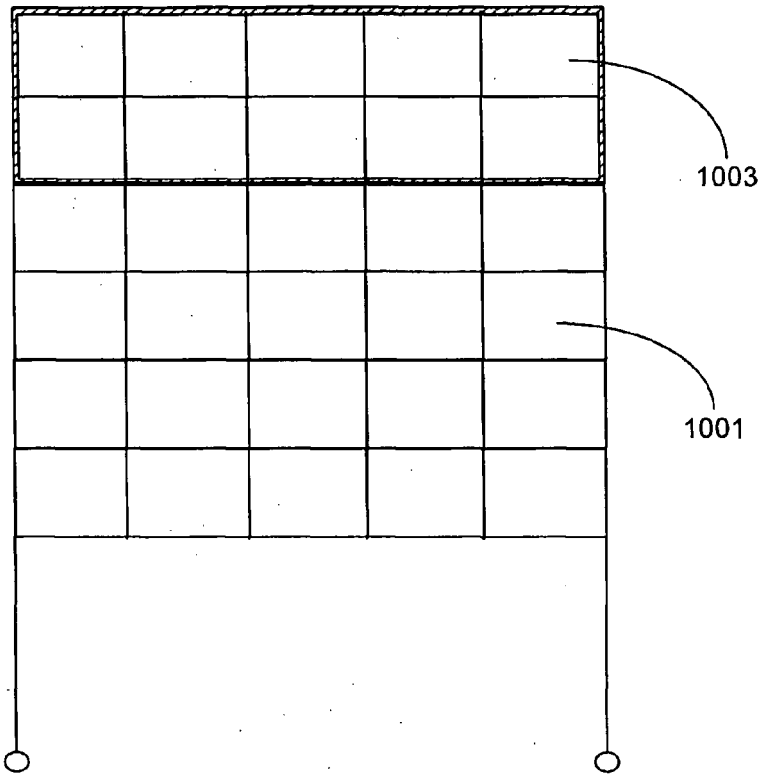


Figure 10a

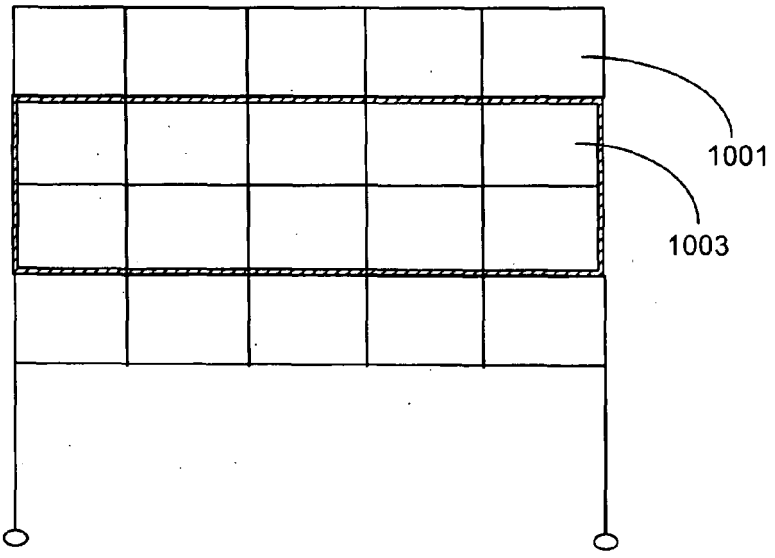


Figure 10b

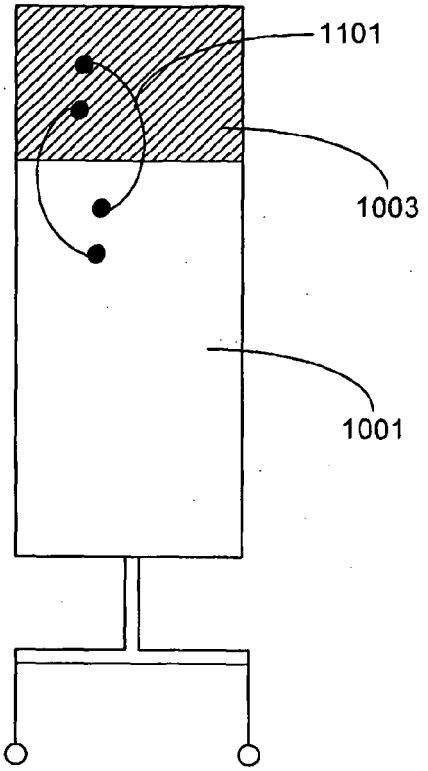


Figure 11a

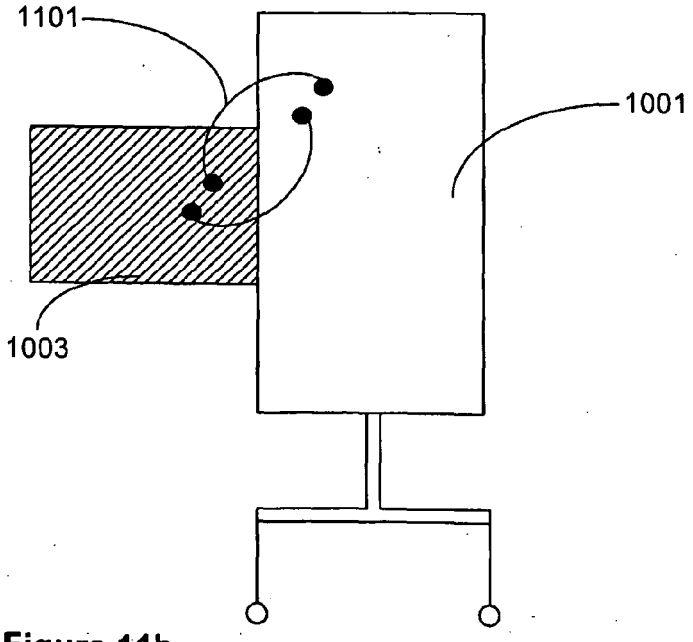


Figure 11b

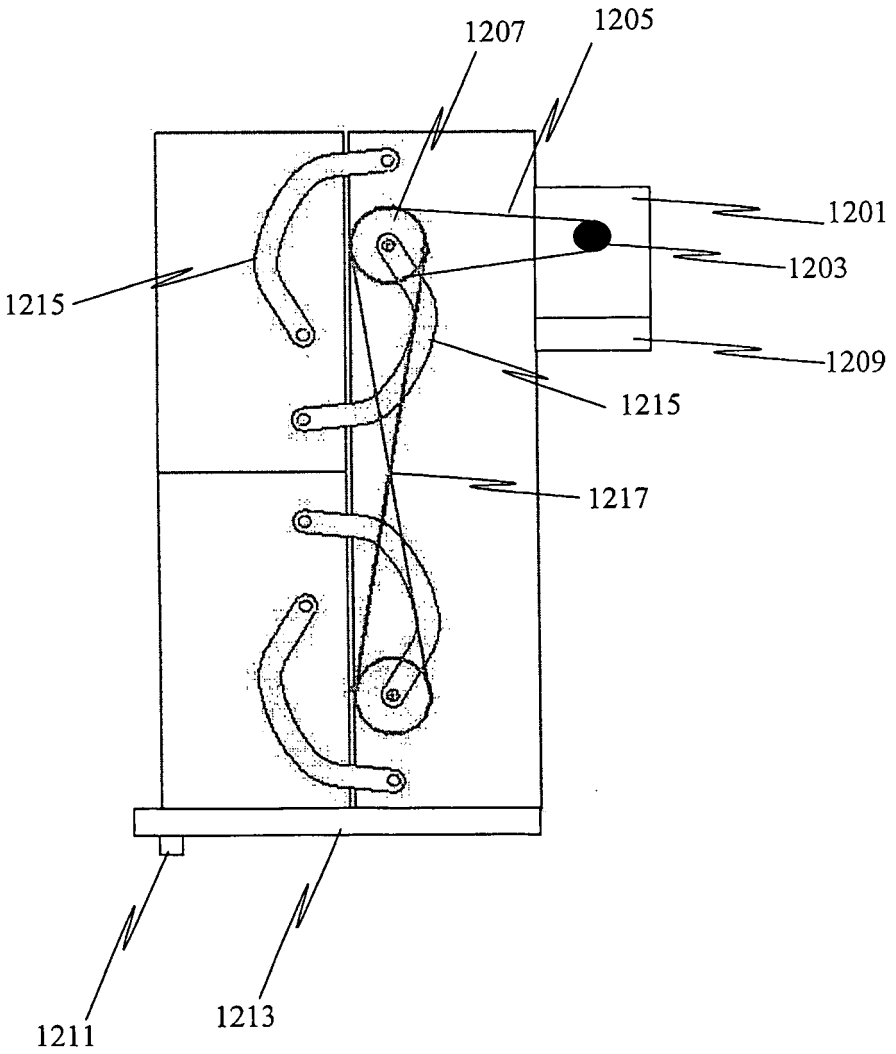


Figure 12

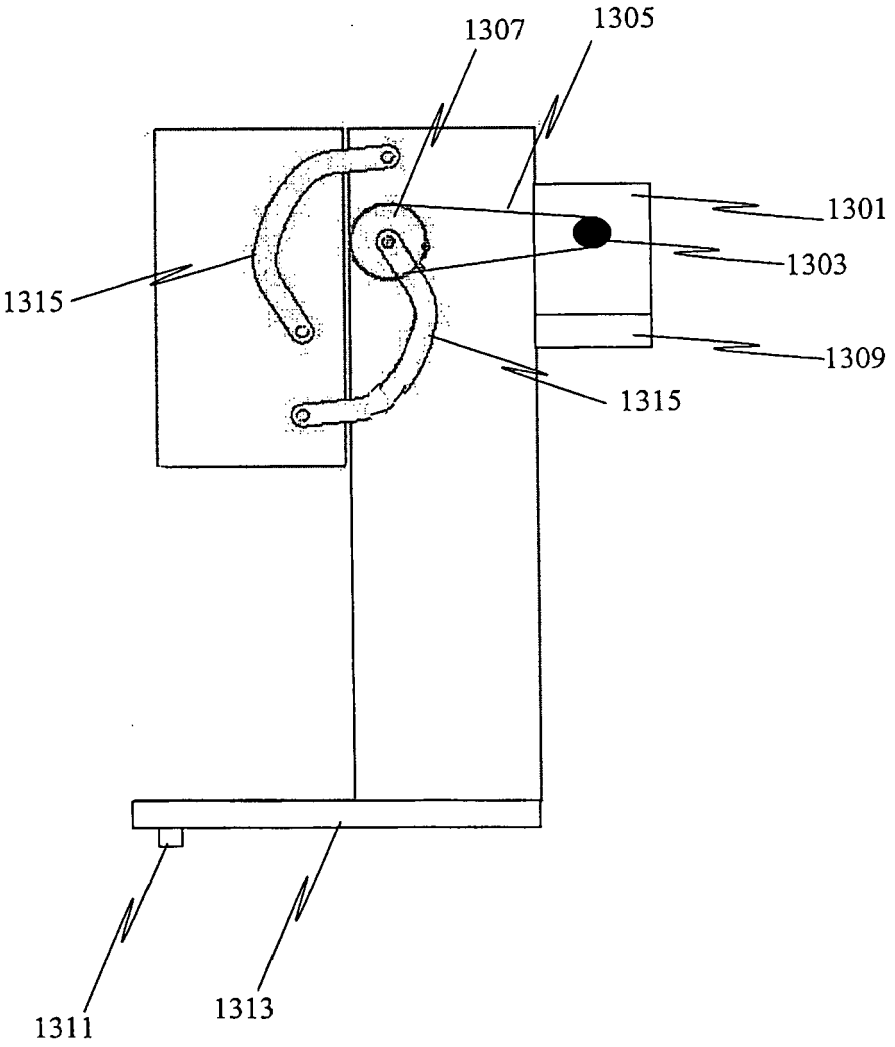


Figure 13

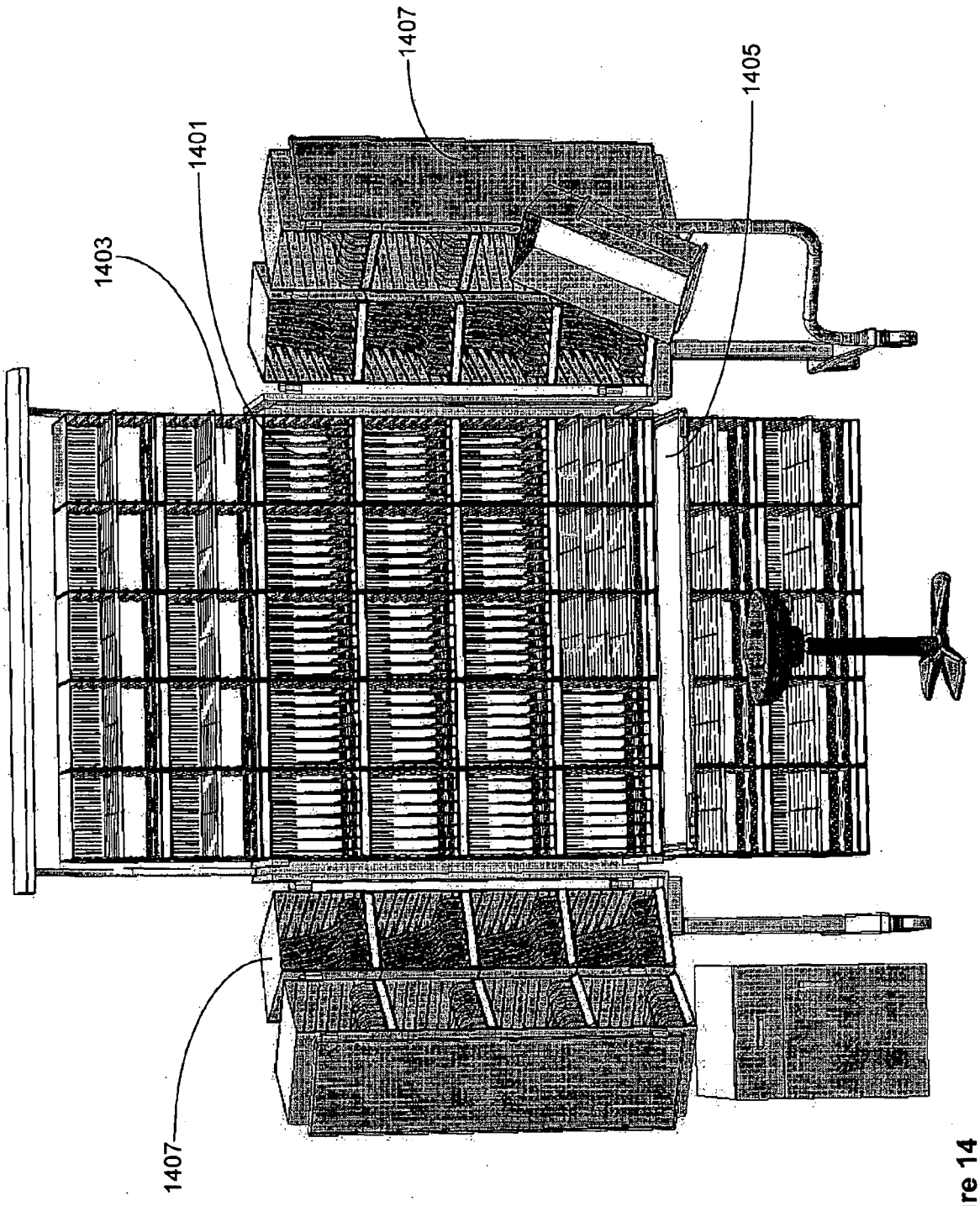
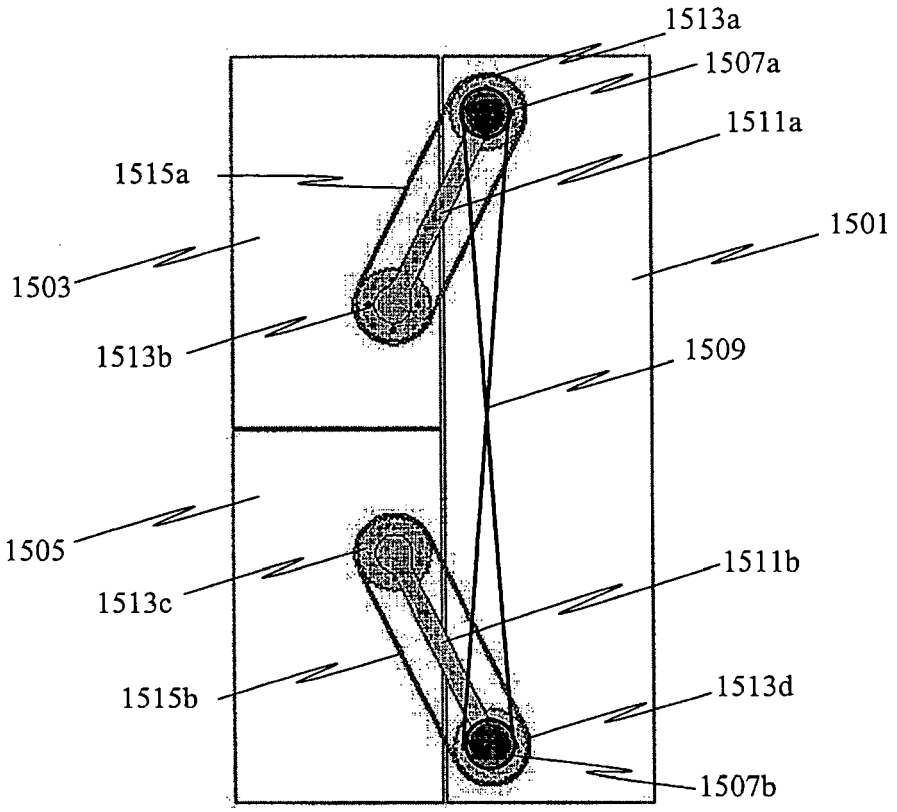


Figure 14


1513a
1507a
1511a
1515a
1501
1503
1513b
1509
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1513c
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Figure 15a

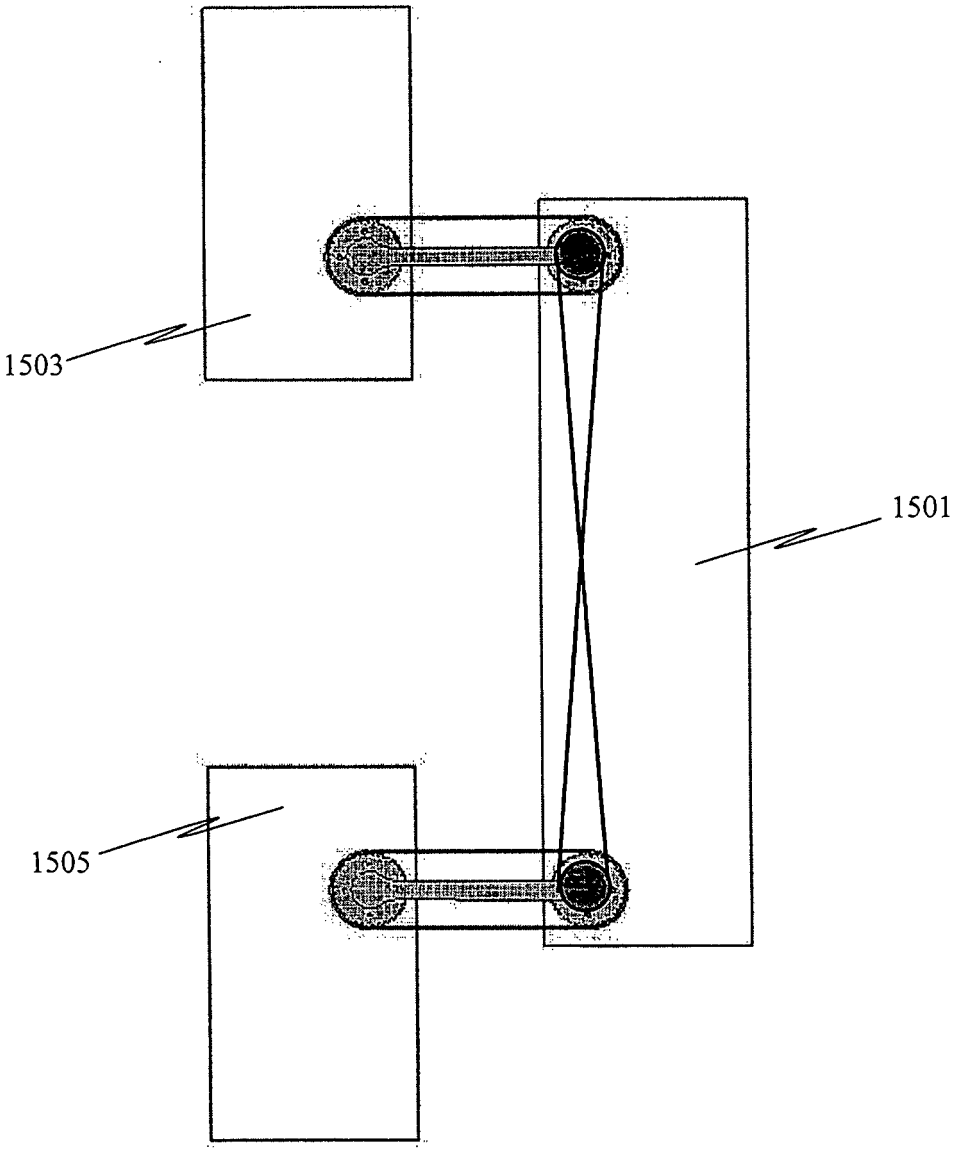

Figure 15b

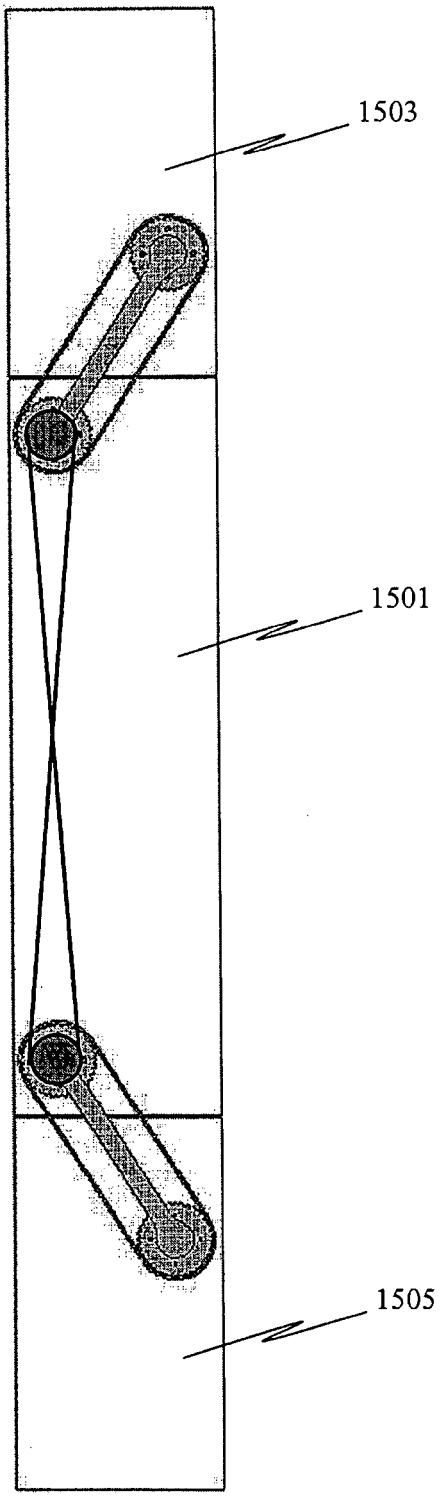

Figure 15c

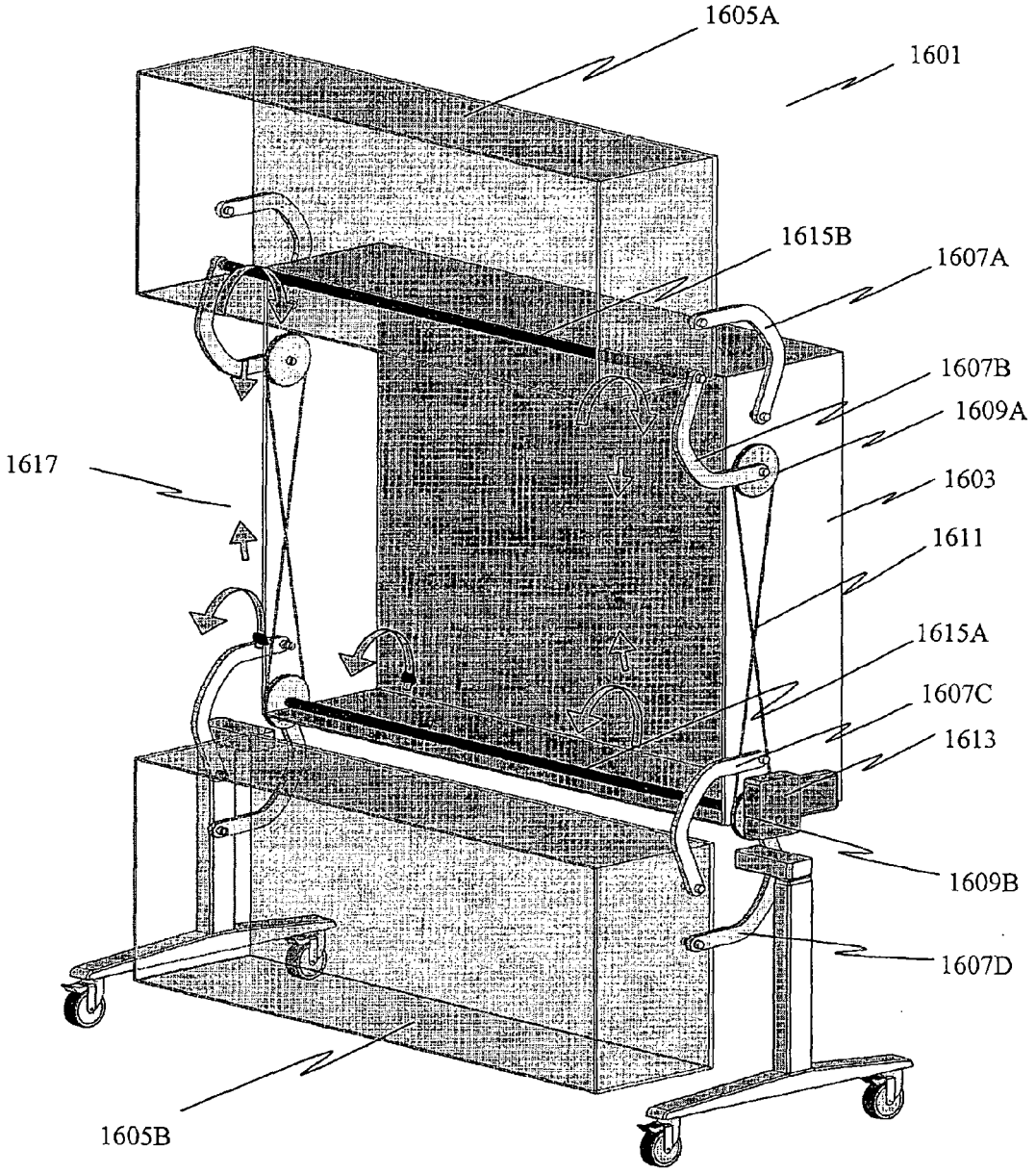
1605A
1601
1615B
1607A
1607B
1609A
1617
1603
1611
1615A
1607C
1613
1609B
1607D
1605B

Figure 16

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- DK 0100111 **[0006]**
- WO 0160532 A **[0006]**