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The present invention relates to a method for storing a plurality of identical piece goods, in particular pharmaceutical packages, in a picking device.

Automated picking devices are often used in pharmacies to be able to store pharmaceutical packages in a space-saving manner. In the known picking devices suitable for pharmacies, pharmaceutical packages may be stored randomly, i.e. the pharmaceutical packages are not stored in predetermined storage spaces in the device, but in whatever storage spaces where there is just enough space available. Superfluous empty space can thus be avoided and the number of pharmaceutical packages stored per m^2 area can be significantly increased. Random storage is regularly used for such pharmaceuticals and pharmaceutical packages with lower output frequencies (so-called slow-movers).

For pharmaceuticals or pharmaceutical packages with high output frequencies, sorted storage in shaft systems is regularly used, in which a plurality of identical pharmaceutical packages are stored and at the end of which a release device is arranged. If one pharmaceutical arranged in a storage shaft is required, only one release device must be released in order to issue a pharmaceutical package. If a pharmaceutical that is stored randomly is required, this must be picked up and retrieved from its storage location using an operator unit. Retrieving a randomly stored pharmaceutical package takes more time so that a combination of random and sorted storage is common, in particular with picking devices with increased general retrieval frequency.

Irrespective of whether only a random or sorted storage, or a combination of both storage types is used, it is common for a plurality of pharmaceutical packages of the same pharmaceutical are to be stored in the picking device. In known methods, the pharmaceutical packages are either placed individually on a storage device and moved into the picking device one after another, or a plurality of identical pharmaceutical packages is placed on a support surface of a storage device. A control unit of the picking device is then manually informed of the number of stored pharmaceutical packages and the start of the storage is thus initiated. The known methods take up a lot of time (storage

one after another) or are error-prone (providing the wrong number of placed pharmaceutical packages).

DE 102 25 332 A1, for example, discloses a storage buffer for a picking device. This comprises a plurality of storage surfaces on which unsorted piece goods can be placed as desired. Using a camera system, the area and the arrangement of the piece goods are determined and with a transfer process for determining an identifier placed on the piece goods, the height of the piece goods is finally detected. With the storage buffer, the piece goods are thus measured and identified. DE 102 25 332 A1 discloses a method for storing a plurality of piece goods in a picking device with at least one rack row, at least one storage device, a control unit and an operator unit coupled to the control unit, wherein a plurality of piece goods is arranged in a support area of a storage device, wherein the piece goods are moved along a storage device in a removal area of the storage device, a gripping apparatus of the operator unit is moved in the removal area, the piece goods are grabbed by the gripping apparatus and moved from the removal area onto the support table over an end-face edge of the support table of the operator unit, and wherein piece goods data and size data of the piece goods detected by at least one sensor system are determined.

The object of the present invention is thus to provide a method with which a plurality of identical piece goods can be stored in a time-saving manner and with a reduced error rate.

The object is achieved by a method according to claim 1. In the method according to the invention for storing a plurality of identical piece goods in a picking device with at least one rack row, at least one storage device, a control unit and an operator unit coupled to the control unit, a plurality of identical piece goods is arranged on a support surface of a storage device and it is detected whether a final piece goods articles arranged on the support surface. Once this has been detected, the piece goods are moved along a storage direction into a removal area of the storage device, wherein the storage direction corresponds to the movement direction of a storage device into the picking device.

If the piece goods are arranged in the removal area, a gripping apparatus of the operator unit is moved into this removal area so that the gripping apparatus can grip the piece goods and the piece goods are grabbed with the gripping apparatus and moved from the

removal area onto this support table over an end-face edge of the support table of the operator unit.

The piece goods can be removed and stored immediately after the movement into the picking device of the storage device. However, it may also come about that the piece goods are first buffered on the removal device in their respective removal area, i.e. that a large number of piece goods (i.e. a plurality of groups of identical piece goods) are gathered on a storage device before the piece goods are moved from their respective removal area by the operator unit.

According to the invention, the number of piece goods arranged in the support area is determined based on the piece goods and size data of the piece goods determined with at least one sensor system, and after it has been determined that a final piece goods article has been arranged on the support area.

After the final piece goods article has been placed, the piece goods data are detected and the position or the size of the piece goods and their arrangement in relation one another, i.e. whether four piece goods are arranged next to each other as a group or are separated from one another, can be determined. These data are detected with a sensor system suitable for this, for example a combination of light grids or a camera system, and can comprise a plurality of any sensors known to the person skilled in the art.

On the basis of the piece goods data and the size data of the piece goods known by the control unit, the control unit can clearly detect the number of placed piece goods, irrespective of the type of arrangement of the piece goods to one another.

According to the invention, it is no longer necessary to transmit the number of placed piece goods to the control unit before starting the storage. The storage of piece goods is thus sped up and the risk of errors is reduced since manual input of the number of piece goods to be stored can be omitted.

It is essential for the invention that the number is determined with a corresponding sensor system after the placement of the final piece goods. Exactly where and how this is carried out is not essential for the invention.

In one embodiment, the piece goods can be detected by a support area system associated with the support area before the piece goods are moved along the storage device into the removal area. A corresponding procedure has the advantage that the exact number of piece goods is known at an early point in the storage process and thus there is enough time to determine the optimal process (for example the location of the removal area, which is not a fixed area but may be chosen depending on the later storage location). For example, a camera system associated with the support area or a combination of light grids can be used as the support area sensor system to detect the piece goods data.

In one embodiment, the piece goods data can be detected by a storage sensor system associated with a storage device with the movement of the piece goods along the storage direction or after the movement of the piece goods into the removal area. A corresponding embodiment has the advantage that the piece goods are detected inside the device where there are fewer interfering signals. Both of the above-mentioned methods for detecting piece goods can also be combined to increase security when detecting the quantity (a deviation between the number detected by the two sensor systems then indicates an error).

In one embodiment, the piece goods can be detected by a removal area sensor system associated with a removal area with the movement of the piece goods on the support table. In this embodiment, the number of piece goods is only determined relatively late in the storage process; however, it can be ensured that exactly the number of piece goods that have also been stored later is detected. For example, it is conceivable that during the movement of the piece goods into the removal area, one may slip such that it cannot be grabbed by the gripping device and moved onto the support table. A corresponding piece goods articles not “counted” in this embodiment. A further advantage of this embodiment is that a very simply formed sensor system can be used; if necessary, one sensor that measures the incident light amount may be sufficient.

In this embodiment, the piece goods data of the moved piece goods or the corresponding signal from the sensor system may show, for example, at which point in time one piece goods article is moved over the face-end edge of the support table. Using the size data of the piece goods to be stored, the movement speed of the gripping apparatus (or the respective current motor position) and the piece goods data or corresponding signals, the control unit can determine the number of piece goods moved onto the support table so that manual input of the number of piece goods is not necessary.

In this embodiment, the exact arrangement of the piece goods is not significant, i.e. the piece goods can be placed directly one on top of another, or there could be any distance between the piece goods. The movement of the gripping apparatus into the removal area of the storage device is always carried out such that it is ensured that all piece goods to be stored are grabbed and moved onto the support table. When moving the piece goods from the removal area onto the support table, it is also irrelevant whether the exact arrangement of the piece goods is kept the same or whether these are pushed together before the actual movement on the support table, i.e. any gaps between the piece goods are closed during or after grabbing and before moving onto the support table. For example, this is the case if the gripping apparatus has gripper jaws in which one or both gripper jaws are moved towards one another by a pivoting movement in the “front” section so that a V-shaped gripping profile is formed. During this movement of the gripping apparatus or gripper jaws out of the removal area in the direction of the support table, the piece goods article furthest from the end-face edge is first gripped or grabbed and moved in the direction of the support table until the first piece goods article hits the second piece goods article and this also moves in the direction of the support table. In this type of storage, there is a gap-free sequence of plurality of piece goods.

In such a case the sensor detects only the movement of an object passing by, specifically a group of four piece goods, for example. Knowing the dimensions or piece goods data regarding the piece goods, the movement speed or the current motor position of the gripping apparatus and the signals or storage information delivered from the sensor means that the control unit can explicitly determine that the group moved onto the support table comprises four piece goods.

To exactly calculate the number of moved piece goods, it is essential that the control unit has size data (i.e. the dimensions/measurements of a single piece good) regarding the piece goods to be stored. If a large number of identical piece goods are to be stored, it is possible, for example, that before storing this large number of piece goods, the size data regarding the piece goods to be stored is detected once and this data is referred back to for every storage process, i.e. the size data is not determined again before every storage process.

However, if new size data regarding the new piece goods to be stored is provided when the type of piece goods articles changed, this can lead to a failure of the automatic determination of the number of piece goods to be stored.

Internally, the size data are usually linked to identification information relating to the piece goods. This identification is important for the storage and the later retrieval since the control unit must be clearly informed of which piece goods articles stored at which storage location (whether random storage on a rack row or sorted storage in a storage shaft). However, identification information going beyond the size data is not essential for the simple determination of the number of piece goods.

The identification information is usually provided on the piece goods themselves or their outer packaging. However, it may be that the identification information provided does not include the size data of the piece goods to be stored. For example, in the case of pharmaceuticals, it is not yet common for the identification associated with the package to include size data regarding the package.

To avoid the case of miscalculation described above, it may be provided in one embodiment that identification information is provided to the control unit before moving the piece goods. Thus, it is possible to proceed such that new identification information is provided before each new storage process. However, this is not necessary if a large number of identical piece goods is to be stored, so this “requirement” for providing new identification information can be switched off manually or controlled by the control unit.

As already noted above, it may be that there is no size data available for the piece goods to be stored (since new identification information may not include this and the data have not yet been provided or acquired). To avoid the size data having to be input manually, in a preferred embodiment, it is provided that before a new storage process, the control unit checks whether size data are available for the piece goods to be stored and if this is not the case, a user is asked to place a single piece, the size data of which is detected and saved, together with identification information regarding the piece good. After the size data has been detected, the rest of the piece goods to be stored can be placed and stored. A corresponding embodiment simplifies the storage of "new" piece goods since the detection of the size data is automated and the error rate is thus reduced.

Detecting that a final piece goods article has been arranged on a support surface can, for example, be carried out in that a use operates suitable input means, for example a foot pedal or a press button. To further speed up and simplify the storage process, in a preferred embodiment it is provided that the arrangement of the final piece goods of the plurality of piece goods to be stored initiates the storage. Thus, in this preferred embodiment, the placement of a piece goods articles detected in a detection area of a support detection sensor associated with a support surface. Thus, in this embodiment, it is no longer necessary, after placing the final piece good, to carry out another action; placement in the detection area of the support detection sensor initiates the movement of the piece goods to the removal area.

As long as the picking device has a support area sensor system, in a preferred embodiment it is provided that arranging a final piece goods article in a support area is detected by the support area sensor system. The sensor system is then configured such that, on the one hand, the piece goods to be placed can be detected and, on the other hand, that a piece goods article is arranged in a determined detection area. Advantageous, a sensor system for detecting the positioning of the piece goods in relation to one another and the positioning of at least one piece goods article in the detection area is used and the use of a second sensor is thus avoided.

As already explained, the gripping apparatus is always moved far enough into the removal area that it is ensured that all piece goods are moved out of the removal area onto the

support table. In a special embodiment of the method according to the invention, not only the placement as such, but the exact placement location of the final piece goods article is determined, and using the placement location the movement of the gripping apparatus into the removal area is controlled. The placement location can be determined by a special sensor system or a sensor system already available. Knowing the exact placement location of the final piece goods article is thus makes it possible to control the exact penetration depth of the gripping apparatus in the removal area. Thus, in this embodiment it is not necessarily required to always move the gripping apparatus completely into the removal area, so that the movement of the piece goods out of the removal area onto the support table is further sped up.

The application further discloses a picking device. The picking device comprises at least one rack row with at least one rack with a plurality of shelves arranged above one another. The piece goods to be stored can be stored randomly on the shelves or in the storage shafts formed on the shelves. The picking device further comprises at least one storage device with a support surface for receiving piece goods to be stored, wherein after arrangement on the support surface these are moved into the picking device by means of the storage device. In addition, the picking device comprises an operator unit coupled to a control unit with a support table for receiving one or more piece goods, wherein the support table has an end-face edge associated with a storage device. The operator unit further comprises a gripping apparatus with which piece goods can be grabbed in the removal area of a storage device and moved from the storage device onto the support table over the end-face edge. The picking device further comprises at least one sensor system coupled to the control unit with which piece goods can be detected and transmitted to the control unit, wherein the control unit is formed such that the number of identical piece goods arranged in the support are can be determined on the basis of piece goods data and on the basis of size data regarding the piece goods.

Due to the use of the above-mentioned sensor system, with which piece goods can be detected, the control unit is able to automatically determine the number of moved piece goods on the basis of the signals or the piece goods data sent from the sensor system, or by using additional data. Details of this have already been set out with reference to the method according to the invention.

In one example of the picking device, a sensor system is formed as a support area sensor system, with which piece goods data relating to the piece goods arranged in the support area can be detected.

In one example, a sensor system is formed as a storage sensor system, with which piece goods data can be detected during the movement of the piece goods along the storage direction or after the movement of the piece goods into the removal area.

In one example, a sensor system is formed as a removal area sensor system associated with a removal area, with which piece goods data can be detected during the movement of the piece goods onto the support table.

A release device is coupled to the control unit, the actuation of which initiates storage of the piece goods, wherein during this storage the piece goods are moved from the support area into the removal area by means of a storage device. The release device can, for example, be formed as a foot pedal or a simple press button, the actuation of which initiates the storage. However, in a preferred embodiment, it is provided that the release device is formed as a support detection sensor associated with a support area of a storage device, which detects if a piece goods article or a section of a piece goods article has been placed in the detection area. In this example, no additional actions need to be performed after the placement of the final piece goods article in order to initiate the storage of the placed piece goods. The placement of the final piece goods article in the detection area initiates the storage so that the storage itself can be carried out more quickly.

If the picking device comprises a support area sensor system, in a preferred embodiment it is provided that the release device is supplied by the support area sensor system, i.e. that the functionality of the release device is also performed by the support area sensor system, and the number of components and the costs of the device can thus be reduced.

The sensor system for detecting the movement of piece goods over the end-face edge of the support table can be arranged on any component in the area of the removal area as long as it is ensured that the movement of a piece goods article over the end-face edge

can be detected with the sensor system. However, in a preferred embodiment it is provided that the sensor system itself is arranged on the end-face edge of the support table. Thus, it is ensured that the sensor system is always ideally positioned with regard to the piece goods to be stored, and it can thus be ensured that this can detect their movement over the end-face edge, regardless of the condition of the piece goods.

In the following, the device and the method according to the invention will be described in more detail with reference to the attached drawing, wherein:

Fig. 1 shows a perspective view of a first example of the picking device;
Fig. 2 shows a detailed view of the front region of the first example;
Fig. 3 shows a top view of the first example;
Fig. 4 shows a detailed view of the operator unit;
Figs. 5a – 5e show different stages of the method according to the invention;
Fig. 6 shows an exemplary sensor system, and
Figs. 7a and 7b schematically show the signals and sensors when moving piece goods over the sensor.

Fig. 1 shows a perspective representation of a first example of a picking device 1. The picking device 1 comprises a framework structure 2, on which a plurality of casing elements 3 is placed. For the sake of clarity, a number of cladding elements and some elements of the framework structure 2 have been omitted. The picking device 1 comprises a first rack row 10 with a plurality of racks, which each comprise a plurality of shelves 12 arranged above one another extending in a horizontal plane (wherein in Fig. 1 only three shelves 12 are shown; further shelves are arranged above, below and next to those shown). The individual racks 11 of the first rack row 10 are formed of shelf units 13 and a plurality of the above-mentioned shelves 12. In the embodiment shown, all front edges (loading edges) of the shelves are arranged in a vertical plane, which simplifies the storage and retrieval of piece goods or pharmaceutical packages into and out of the shelves. The shelves shown are formed for a random storage of pharmaceutical packages.

In the example of the picking device shown, a second rack row 10’ is provided opposite the first rack row 10, which is only indicated for the sake of clarity; only individual

elements of the framework structure for this rack row and a shelf 12' with a storage shaft 14 for sorted storage are shown.

In the example shown, the picking device comprises two storage devices 20, 30, which are arranged above one another and are integrated into the first rack row 10 so that shelves 12 are provided above and below the two storage devices 20, 30. The storage devices 20, 30 project out of the front of the picking device and comprise a support area 21, 31 in this projecting part on which pharmaceutical packages can be placed for storage. In Fig. 1, three identical pharmaceutical packages 6 are arranged in the support area 21 of the upper storage device 20.

An operator unit 50 that can travel horizontally and vertically on a guide, and which will be described in more detail with reference to Figs. 3 and 4, is provided between the shown first rack row and second shelf that is only indicated. This operator unit can travel along a horizontal guide 55 that is only indicated and a vertical guide 56 in a lane between the rack rows.

A retrieval device 40 is also arranged in the picking device which in the embodiment shown is formed as a conveyer belt and is indicated between the second rack row and the right-hand outer wall of the picking device. Pharmaceutical packages which are moved onto the retrieval device are moved into a removal area 41 of the retrieval device via the retrieval device. The pharmaceutical packages can reach the retrieval device by being moved onto the retrieval device with the operator unit 50, for example, possibly with the interposition of an auxiliary retrieval path (not shown). In tilted storage shafts, the pharmaceutical packages can easily be moved onto the retrieval device by releasing a release device arranged at an end of the storage shaft. In such a case, the pharmaceutical packages simply fall under the force of gravity onto the retrieval device.

Finally in Fig. 1, a control unit 70 is arranged in the front area of the picking device which is coupled to the operator unit, the sensors and sensor systems and usually the storage devices and the retrieval device. In the centre of the front area of the picking device, a door opening 4 is provided by means of which the device can be accessed for maintenance purposes and in the event of power outages.

Fig. 2 shows a detailed view of the front area of the first example of the picking device, wherein in this view the support area of the storage device 20, 30 in particular can be seen. In Fig. 2, two identical pharmaceutical packages 6 are arranged in the support area 31 of the lower storage device 30.

A support area sensor system 200, 300 is arranged above each support area of a storage device. For example, this can be a combination of light grids or a camera/combination of cameras for the sensor system, by means of which piece goods data can be determined, i.e. data relating to the location of piece goods on the respective support area. Irrespective of the exact design of the support area support sensor system, this can also be used to detect the placement of a pharmaceutical package 6 in a detection area 23, possibly with exact determination of the location of the placement (in relation to the width of the storage device 20). An exemplary sensor system will be described in more detail in a subsequent figure.

In the support area sensor system 200, an alternative support detection sensor 24 is indicated in the “left-hand” area, with which the above-mentioned functions can be carried out if in an embodiment no support area sensor system or one without the above-mentioned functions have been installed.

If a piece goods article has been placed in a detection area 23, 33, or at least partially projects into the detection area, the control unit 70 transmits a corresponding signal. How far a pharmaceutical package has to project into a detection area in order for an above-mentioned signal to be triggered can be set using the control unit or the support detection sensor or sensor system itself.

In Fig. 2, an input and/or output device 5 is also indicated above the storage device 20, with which information regarding the pharmaceutical packages to be stored is shown and/or can be provided.

Fig. 3 shows a top view of the first example of the picking device, wherein most of framework structure 2 has been omitted for the sake of clarity. On the left-hand side, the

storage device 20 can be seen, which leads out of an outer area with the support area 21 into the picking device. Four identical pharmaceutical packages 6 are arranged in a removal area 25 of the storage device 20. In this representation it can also be seen that the storage device is integrated into the first rack row 10, since shelves 12 and shelf units 13 are indicated in the "upper" area above the storage device 20. On the "right-hand" side, the retrieval device 40 can be seen with the removal area 41, and the second rack row 10' that is only indicated is joined to the inside the picking device. The operator unit 50 which can travel horizontally and vertically is arranged between the first rack row 10 and the second rack row 10', wherein the horizontal guide 55 normally extends over the entire length of the picking device and can reach all shelves of the device with the operator unit. The operator unit 50 comprises a support table 51 with an end-face edge 52, over which pharmaceutical packages are pulled onto the support table 51 with a gripping apparatus 60.

In Fig. 3, a storage sensor system 250 is also indicated between the removal area 25 and the support area 21, with which the piece goods data relating to piece goods moved in the storage direction to the removal area are detected. The exact design of the sensor system depends on exact requirements and structural circumstances. Thus, the use of a camera system or a combination of light grids is also conceivable here, wherein the sensor system is not limited to the two above-mentioned embodiments but any sensor systems that are able to transmit the required piece goods data, i.e. the exact placement of the piece goods, can be used.

Fig. 4 shows a detailed view of the operator unit. The gripping apparatus 60 of the operator unit 50 in the form shown comprises two gripper jaws 61a, 61b, which can pivot with two pivot joints 62a, 62b such that the points 63a, 63b of the gripper jaws 61a, 61b can be moved towards and away from one another, without the base of the gripper jaws 61a, 61b being substantially moved. The entire gripping apparatus 60 can be moved over the support table 51 into the removal area 25 of the retrieval device 20, grab the pharmaceutical packages 6 in the removal area and pull these over the end-face edge 52 of the support table 51 over a sensor 80 arranged in the removal area and/or over two sensors 81a, 81b on the end-face edge of the support table 52, wherein the sensors generate a signal with the movement of the pharmaceutical packages over these and

transmit this signal to the control unit. In the embodiment shown, a sensor 80 is arranged on the removal area 25, i.e. on the storage device 20, a two sensors 81a, 81b are arranged on the end-face edge of the support table. This arrangement only represents one possible arrangement of the sensors. It is also possible only to use one sensor in the removal area or the end-face edge of the support table. The exact number and configurations of sensors is not decisive; the important thing is that the movement of the pharmaceutical packages from the removal area to the support table can be exactly detected by a sensor.

Figs. 5a-e show different stages in the storage of a plurality of identical piece goods or pharmaceutical package. For simplification, the components that are important for the individual method steps are represented schematically.

Fig. 5a shows a storage device 20 with a support area 21 and a detection area 23 of a support detection sensor (not shown). Three identical piece goods or pharmaceutical packages 6 are arranged spaced apart from one another in the support are 21, wherein the “upper” pharmaceutical package projects into the detection area 23.

The projection of the upper pharmaceutical package into the detection area 23 is detected by the support detection sensor (not shown) associated with the detection are 23 and determined by the control unit. Subsequently, the piece goods or pharmaceutical packages 6 are moved in to a removal area 25 with the storage device 20, as can be seen in Fig. 5b.

The removal area is a section within the picking device, on which the gripping apparatus for moving the pharmaceutical packages from a storage device grips the support table of the operator unit, in which the gripping apparatus is moved into this removal area. The removal area is not an area with a “fixed location” within the picking device, but may vary depending on the position of the operator unit or the placement location of the piece goods to be stored, for example.

As already indicated, the gripping apparatus may have two clamping or gripper jaws, which can be pivoted, for example. Alternatively, it is also conceivable that the two

clamping jaws are arranged pivotably parallel to one another and the pharmaceutical packages are clamped or gripped by pivoting of one or both of the clamping jaws.

In Fig. 5c, the two above-mentioned variants, specifically the two pivotable clamping jaws and the clamping jaws that can move in parallel are indicated in one figure, wherein in both representations the clamping jaws 61a, 61b are not yet completely closed, i.e. the pharmaceutical package(s) has/have not yet been grabbed. Regardless of the type of clamping jaws used, a free space 7 is provided between the pharmaceutical packages 6 (as arranged in this example). However, the pharmaceutical packages may also be arranged on the support area 21 without a free space between them as a group of a plurality of pharmaceutical packages. In the embodiment shown, a sensor 80 is associated with the removal area 25, which can detect a movement of the piece goods onto the support table 51. With the movement of the pharmaceutical packages over the sensor, this generates a signal (or a signal change) which is transmitted to the control unit and on the basis of this signal or the position information regarding the pharmaceutical packages corresponding to this signal, the control unit can determine the number of pharmaceutical packages that have moved by using additional data (see Figs. 6a, 6b).

From the representation in Fig. 5c, the clamping jaws 61a, 61b of the gripping apparatus can be closed enough that the upper pharmaceutical package in the left-hand representation and all pharmaceutical packages in the right-hand representation can be clamped or gripped. If the packages are now moved in the direction of the support table 51, as is indicated in Fig. 5d, initially only the “upper” pharmaceutical package is moved in the pivotable clamping jaws (left-hand section of Fig. 5d) in such a way that the free space 7 between the upper and central pharmaceutical packages is closed. The group of the two pharmaceutical packages is then moved with further movement of the clamping jaws towards the support table 51 to the “lower” pharmaceutical package, resulting in a group of three pharmaceutical packages adjacent to and spaced apart from one another.

The situation is different with the pharmaceutical packages that are gripped by the gripping apparatus with the clamping jaws that can be pivoted in parallel, as is shown in the right of Fig. 5d. Due to the parallel pivoting of one or both of the clamping jaws 61a, 61b, all pharmaceutical packages, which have the same dimensions due to the identical

nature of the pharmaceutical packages, are gripped at the same time so that when the clamping jaws are moved towards the support table 51, there is no movement of the pharmaceutical packages towards one another, i.e. the free space 7 between the pharmaceutical packages remains in place.

In Fig. 5e, the "result" of the gripping movement can be seen. In the left-hand representation with the pivotable clamping jaws 61a, 61b, the three pharmaceutical packages are moved as a group without gaps onto the support table 51. In the right-hand representation with the clamping jaws that can be pivoted in parallel, the pharmaceutical packages are moved corresponding to their original placement on the support table 51, i.e. there is always a free space 7 between the pharmaceutical packages.

Fig. 6 shows an exemplary sensor system 200, which can be used as a support area sensor system 200, 300 or as a storage sensor system 250, 260. The sensor system is a light grid or a combination of two light grids 210, 230 and 220, 240, comprising a horizontal light grid 210, 230 with a plurality of light sources 211 and receivers 231 and a vertical light grid 220, 240 also with a plurality of light sources 221 and receivers 241. Light beams 212, 222 are emitted from the light sources 211, 221 and received by the receivers 231, 241. The piece goods are determined based on which light beams reach a receiver.

In the embodiment shown, the light grids seem to be arranged at the same height in relation to the movement direction of the piece goods; however, practically, this is not the case. The light grids are at least so far removed from one another that the light beams do not disrupt the grid.

Alternatively, a sensor system can be realised by a camera system, wherein the data (images) captured by the camera system are subject to image processing, which provides the required piece goods data.

Figs. 7a and 7b illustrate the signal sent from the sensor 80 dependent on the movement of the pharmaceutical packages onto the support table 51, wherein (in this embodiment) the X-axis shows the time axis and the Y-axis shows the signal intensity. In this embodiment, it is assumed that the sensor simply measures the light intensity incident

thereon. In other embodiments, other sensors, for example movement sensors, can be used.

Fig. 7a illustrates the movement of the groups made of three pharmaceutical packages over the sensor 80. As can be seen, the intensity of the light detected by the sensor decreases at a point in time t1 and increases again at a point in time t2. On the basis of the duration Δt12 (t2-t1), the number of signal changes (position information of the pharmaceutical packages), the movement speed of the clamping jaws and the identification information relating to the pharmaceutical packages, the control unit can automatically determine the number of pharmaceutical packages that have moved.

In Fig. 7a, an intensity change is only detected for a time interval t1/t2, and using further information it can be determined that three pharmaceutical packages have been moved onto the support table. The situation is different if the pharmaceutical packages are not pushed or pulled together into a group, but are moved over the sensor with free spaces 7 between the pharmaceutical packages. This is illustrated in Fig. 7b, where a reduction in the light intensity is detected at three points in time t1, t3, t5 and an increase in light intensity is detected at three points in time t2, t4, t6, wherein the time period of the reduced light intensity corresponds to a movement of a pharmaceutical package over the sensor. On the basis of this information Δt12 (t2-t1), Δt34 (t4-t3) and Δt56 (t6-t5), the movement speed of the clamping jaws and the identification information relating to the pharmaceutical packages, the number of pharmaceutical packages can be explicitly determined.

Patentkrav

1. Fremgangsmåde til lagring af et stort antal identiske genstande i en kommissioneringsindretning (1) med
mindst en reolrække (10), mindst en lagringsindretning (20, 30), en styreindretning (70) og en med styreindretningen (70) koblet betjeningsenhed (50), idet
flere identiske genstande anbringes i et afsætningsområde (21, 31) i en lagringsindretning (20, 30),
det registreres, at en sidste genstand er blevet anbragt i et afsætningsområde (21, 31),
genstandene, så snart dette er registreret, bevæges langs en lagringsretning til et udtagningsområde (25, 35) i lagringsindretningen (20, 30),
en gribeindretning (60) i betjeningsenheden (50) bevæges ind i udtagningsområdet (25, 35),
genstandene gribes med gribeindretningen (60) og bevæges fra udtagningsområdet (25, 35) ud på et afsætningsbord (51) over en rand (52) ved enden af afsætningsbordet (51) i betjeningsenheden (50), idet antallet af i afsætningsområdet (21, 31) anbragte genstande bestemmes på grundlag af med mindst et sensorsystem (80, 81a, 81b, 200, 300, 250, 260) registrerede genstandsdata og størrelsesdata for genstandene, efter at det er registreret, at en sidste genstand er blevet anbragt i afsætningsområdet (21, 31).

2. Fremgangsmåde ifølge krav 1, **kendetegnet ved, at** genstandsdataene bestemmes af et afsætningsområde-sensorsystem (200, 300), der er tilordnet et afsætningsområde (21, 31), inden genstandene bevæges langs lagringsindretningen ind i udtagningsområdet (25, 35).

3. Fremgangsmåde ifølge krav 1 eller 2, **kendetegnet ved, at** genstandsdataene bestemmes af et lagrings-sensorsystem (250, 260), der er tilordnet en lagringsindretning (20, 30),
ved bevægelsen af genstandene langs lagringsretningen eller
efter bevægelsen af genstandene ind i udtagningsområdet (25, 35).

4. Fremgangsmåde ifølge et af kravene 1 - 3, **kendetegnet ved, at**
genstandsdataene bestemmes af et udtagningsområde-sensorsystem (80, 81a,

81b), der er tilordnet et udtagningsområde (25, 35), ved bevægelsen af genstandene ud på afsætningsbordet (51).

5. Fremgangsmåde ifølge et af kravene 1 - 4, **kendetegnet ved, at** identifikationsinformationer sendes til styreindretningen (70) inden afsætning af genstande i afsætningsområdet (21, 31).

6. Fremgangsmåde ifølge krav 5, **kendetegnet ved, at** styreindretning (70) kontrollerer, om der foreligger størrelsesdata for de genstande, der skal lagres, og der, såfremt dette ikke er tilfældet, sendes en opfordring til en bruger om at afsætte en enkelt genstand, hvis størrelsesdata registreres og lagres sammen med identifikationsinformationer om genstanden.

7. Fremgangsmåde ifølge et af kravene 1 - 6, **kendetegnet ved, at** anbringelsen af en sidste genstand i et afsætningsområde (21, 31) registreres, idet anbringelsen af en genstand i et registreringsområde (23, 33) for en afsætningsregistreringssensor (22, 32), der er tilordnet et afsætningsområde (21, 31), registreres.

8. Fremgangsmåde ifølge krav 2 - 7, **kendetegnet ved, at** anbringelsen af en sidste genstand i et afsætningsområde (21, 31) bestemmes af afsætningsområde-sensorsystemet (200, 300).

9. Fremgangsmåde ifølge et af kravene 1 - 8, **kendetegnet ved, at** lagringsstedet for den sidste genstand bestemmes, og gribeindretningens (60) bevægelse ind i udtagningsområdet (25, 35) styres ved hjælp af lagringsstedet.

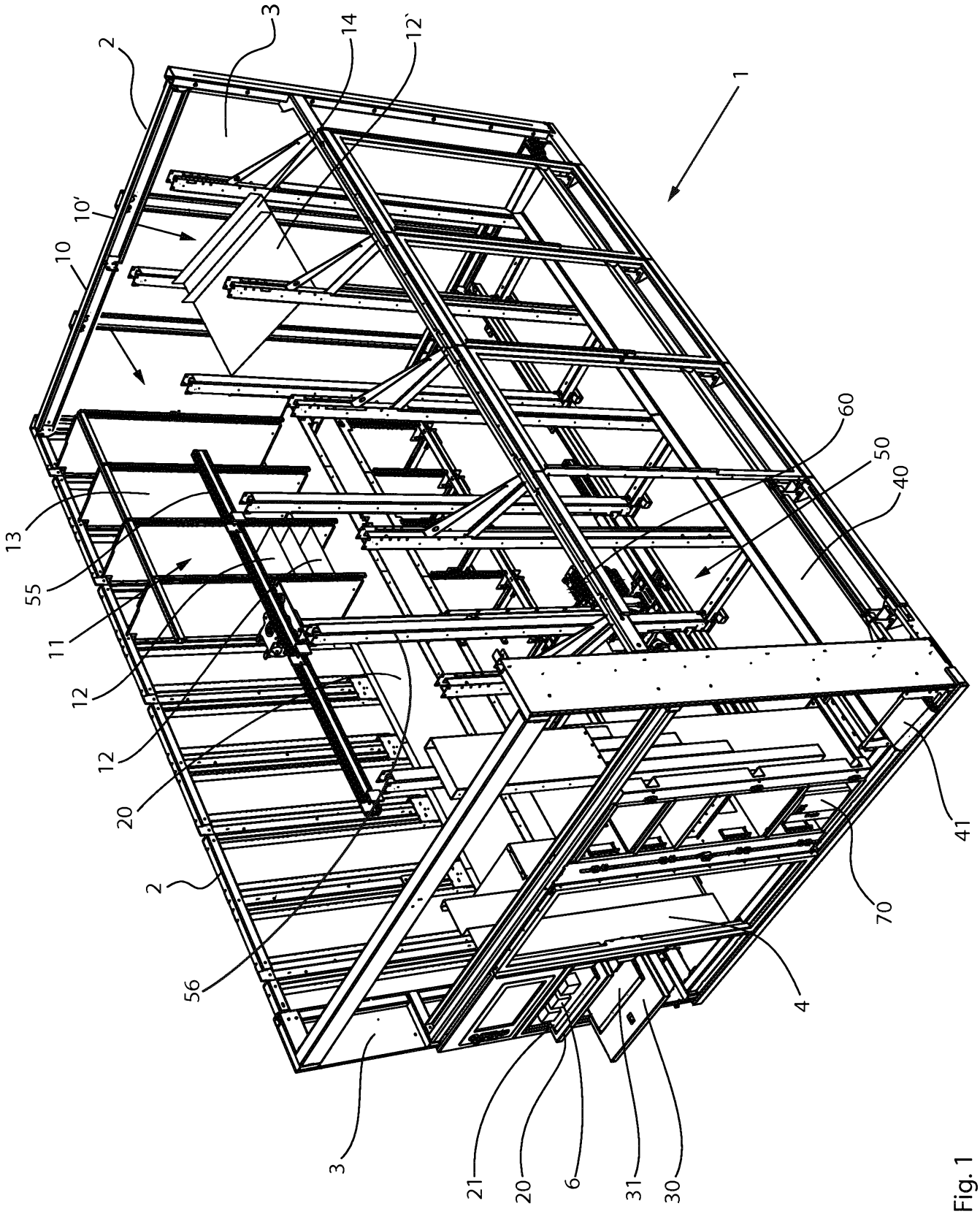

Fig. 1

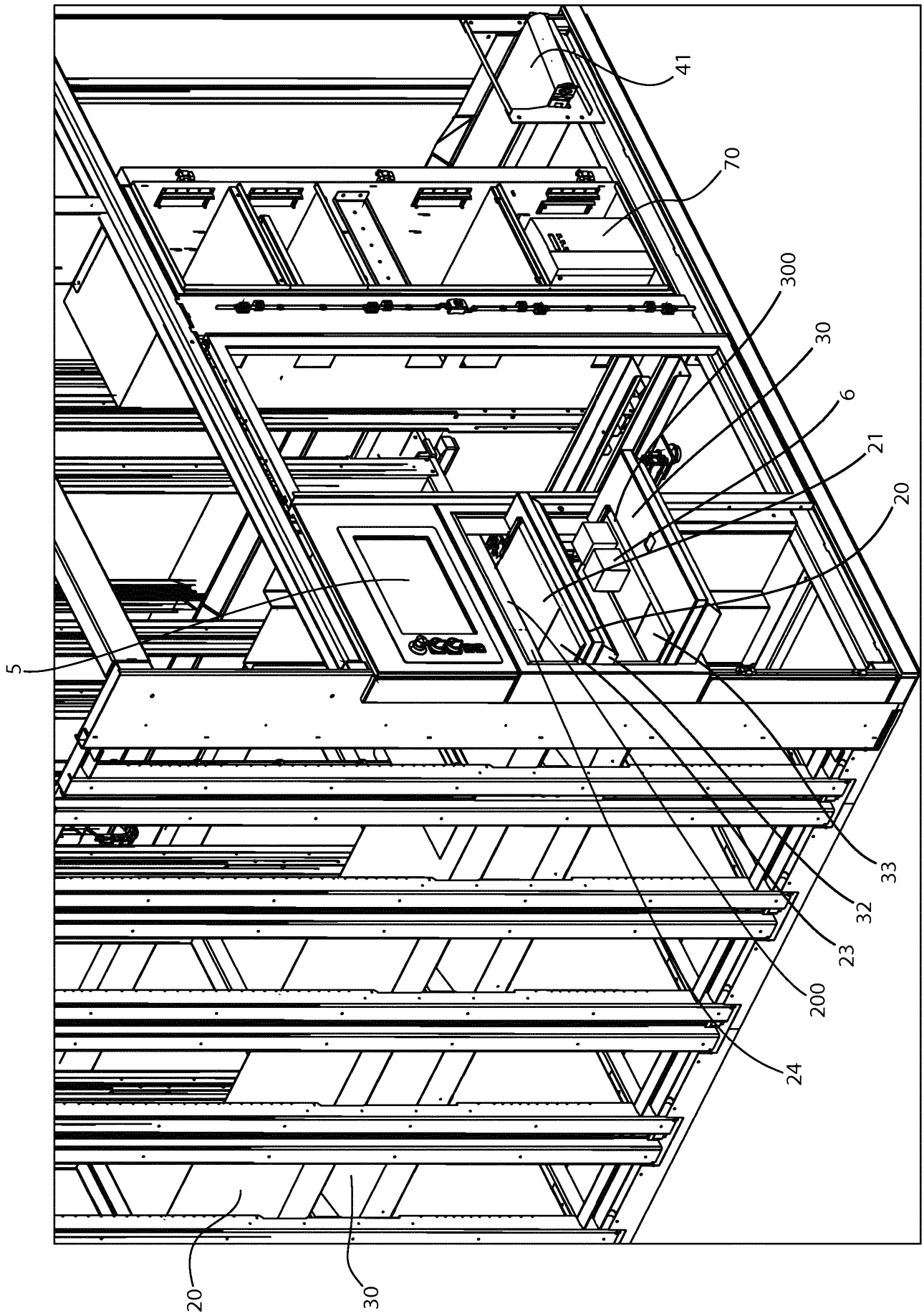

Fig. 2

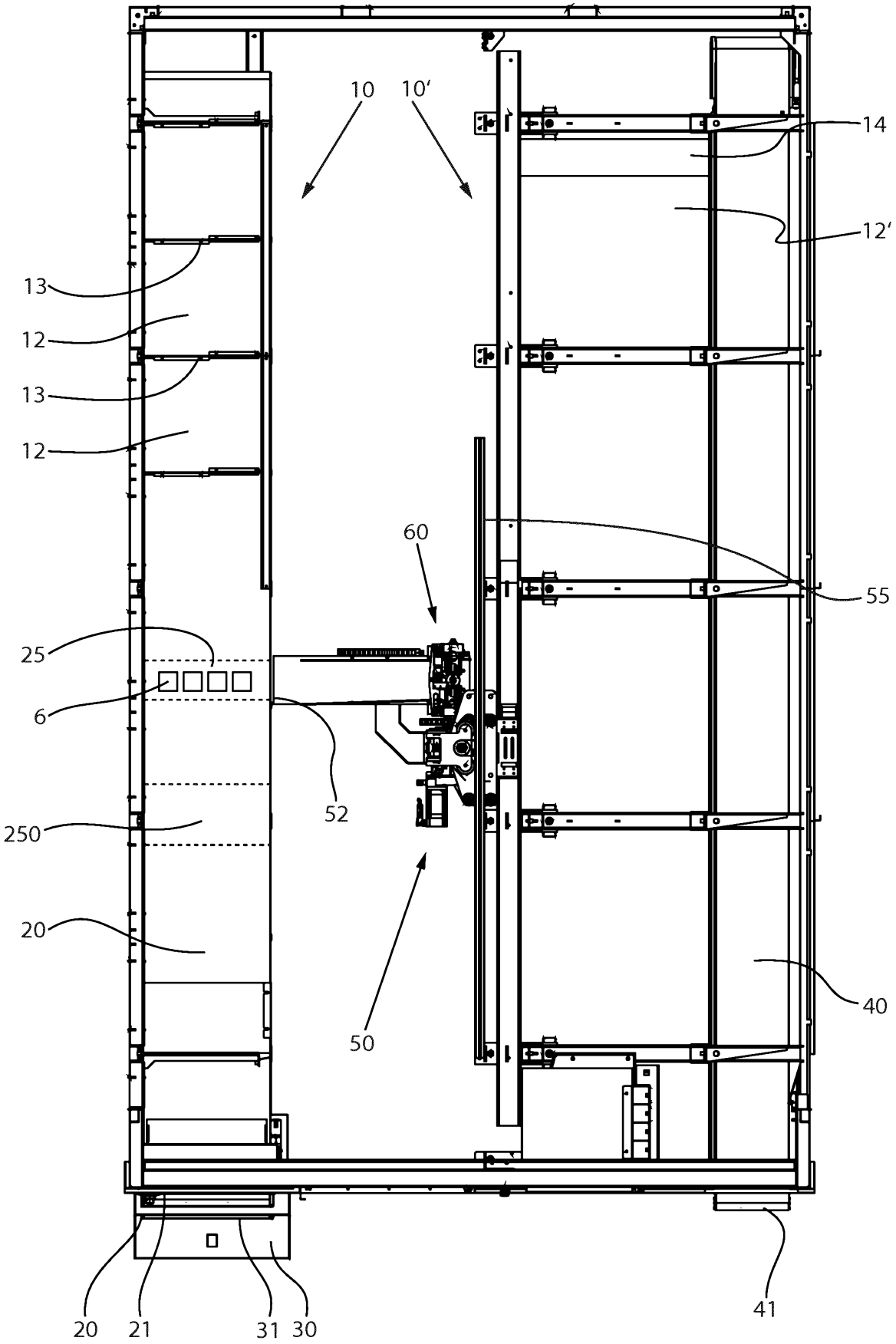

Fig. 3

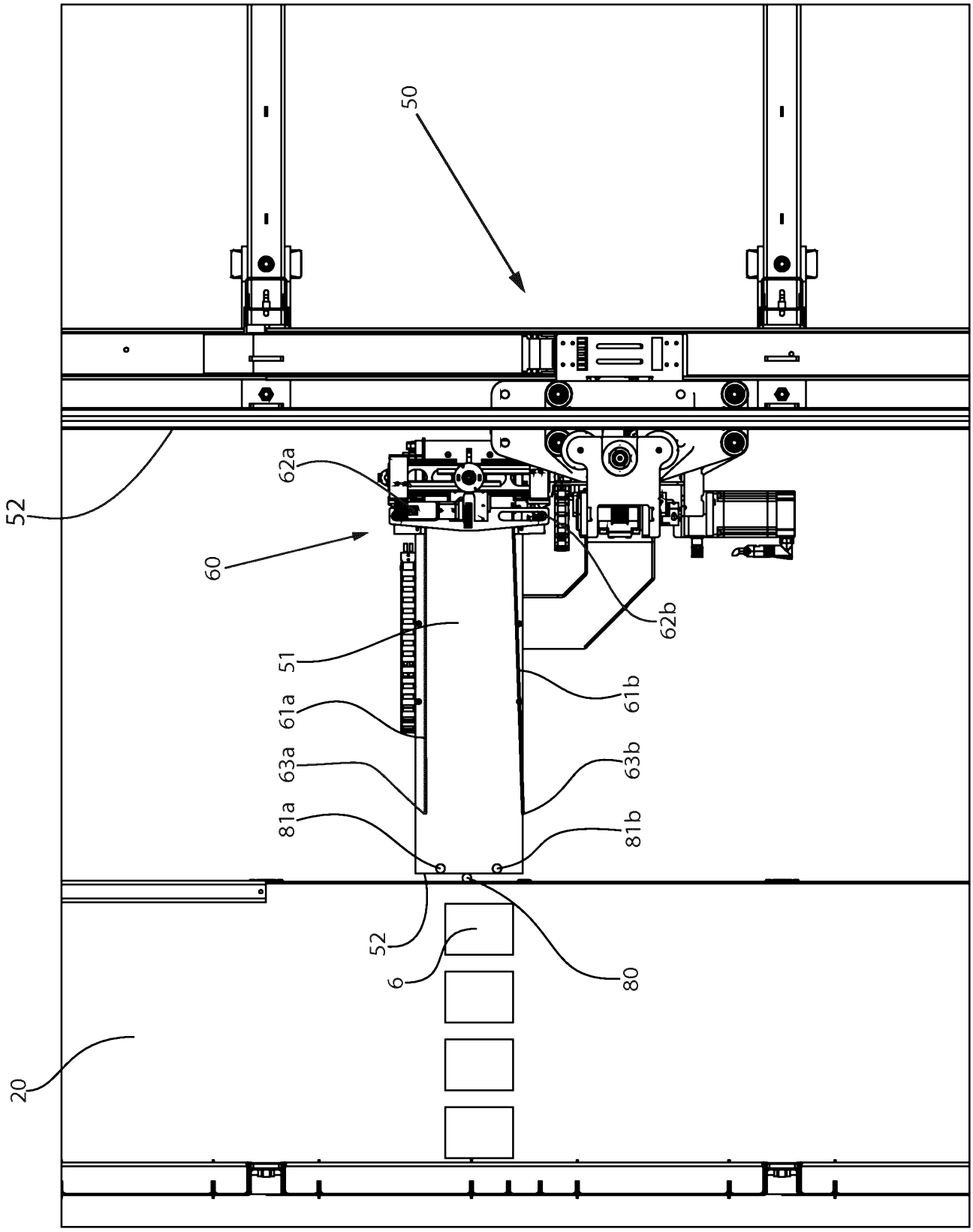

Fig. 4

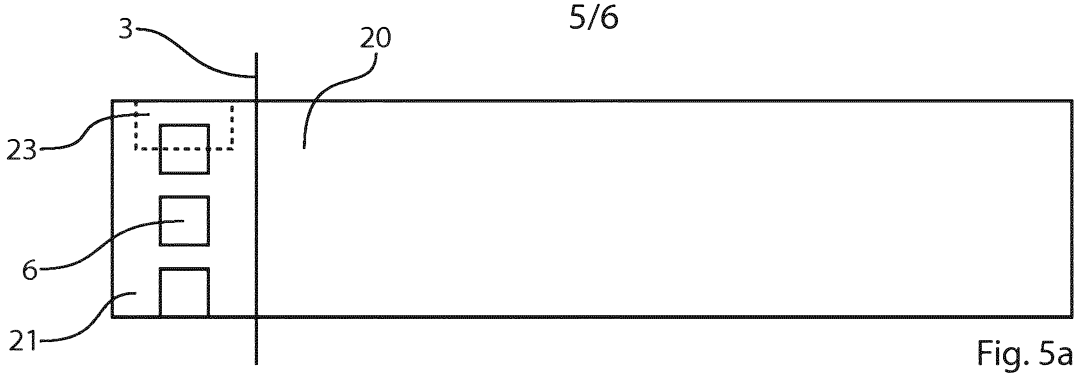

Fig. 5a

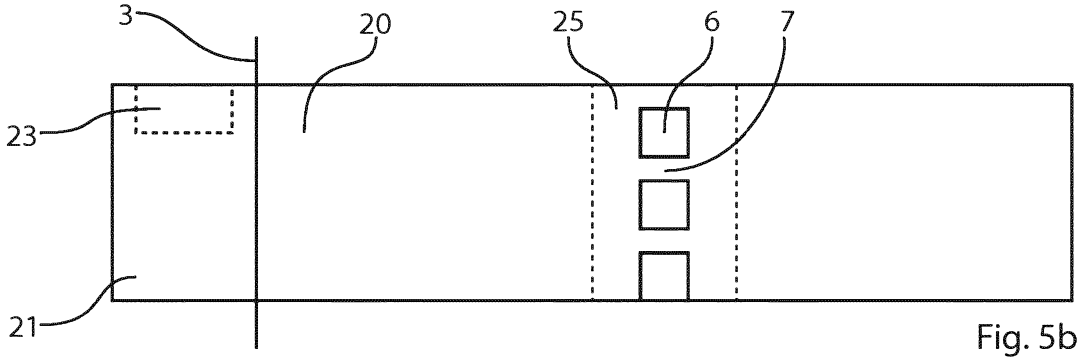

Fig. 5b

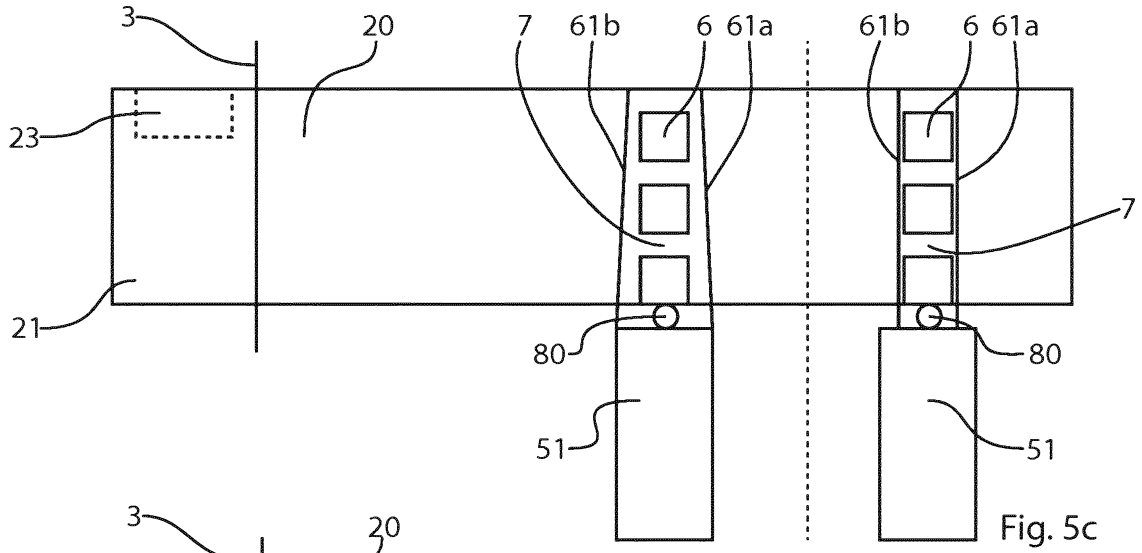

Fig. 5c

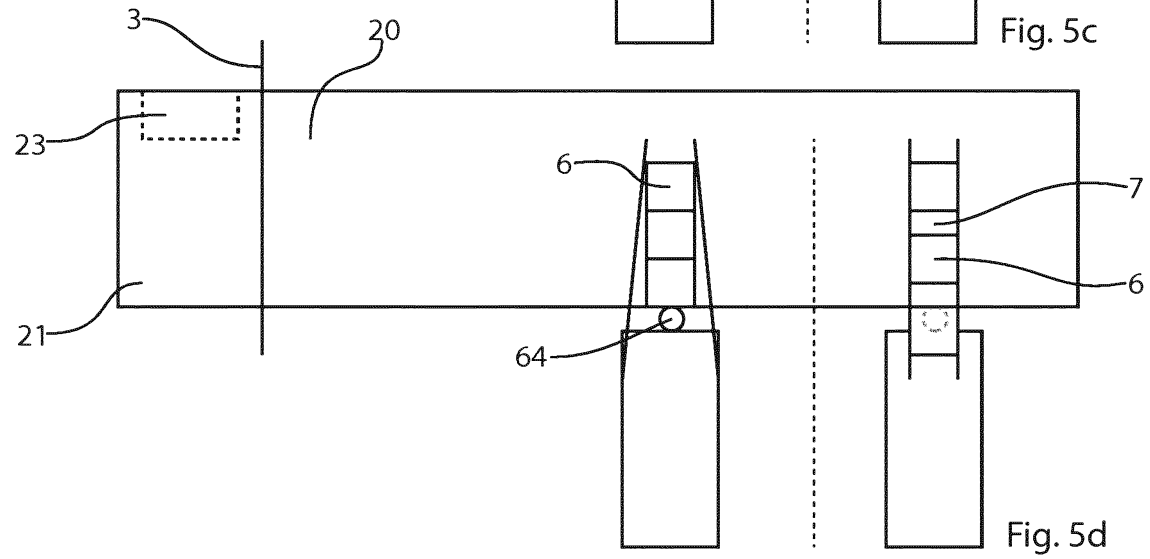

Fig. 5d

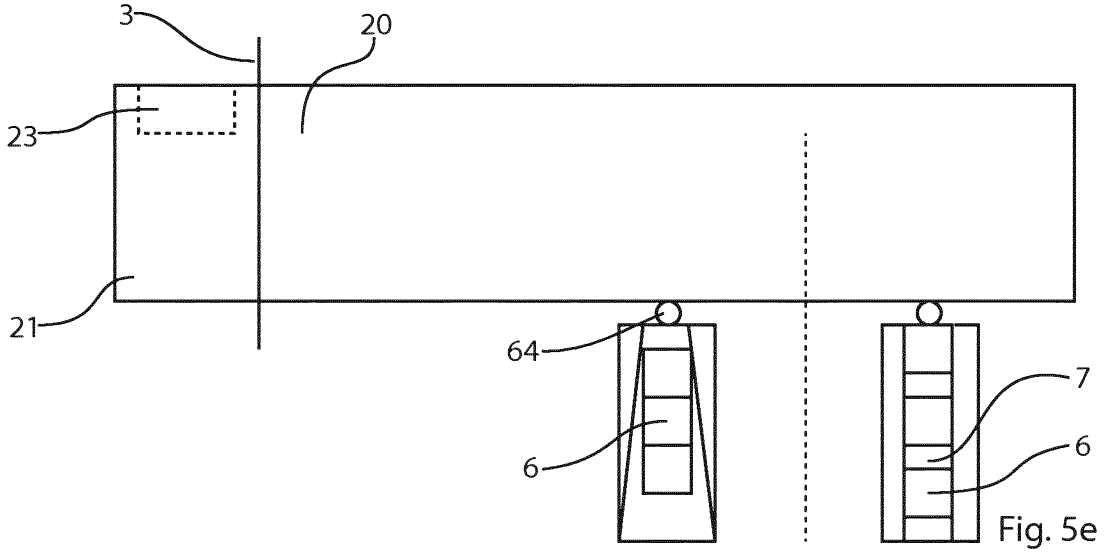

Fig. 5e

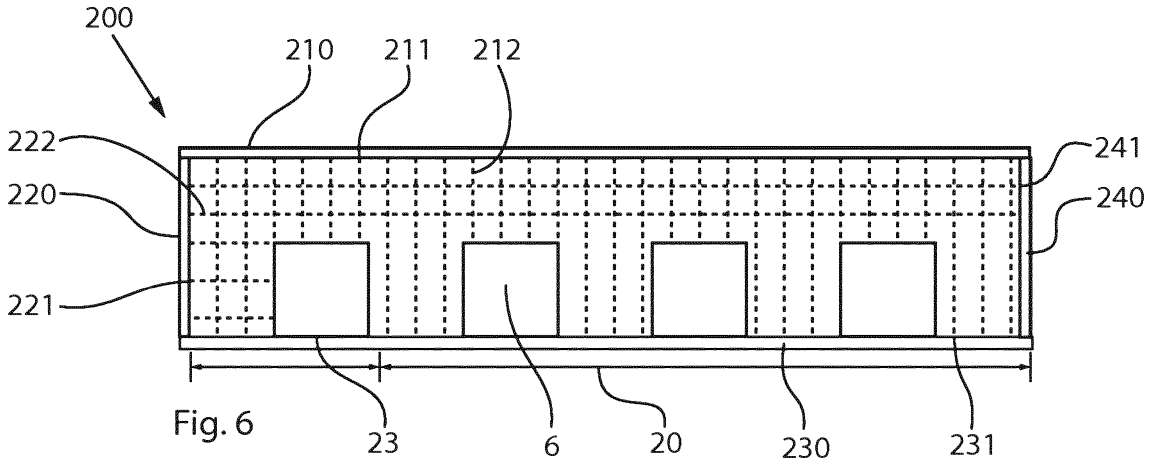

Fig. 6

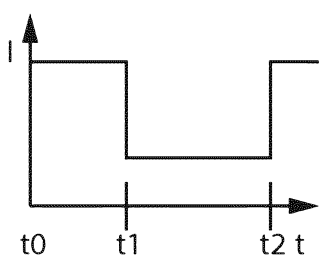

Fig. 7a

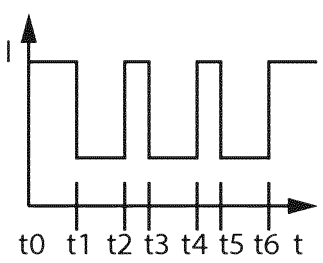

Fig. 7b