

DEVICE AND METHOD FOR INDIVIDUALIZING PIECE GOODS

The present invention relates to a device and a method for separating piece goods to be stored in a picking device, and in particular for separating pharmaceutical product packages to be stored in a pharmacy picking device.

In modern pharmacy picking devices, a variety of different pharmaceutical product packages are stored according to the principle of chaotic storage and, when necessary, are removed from storage using a control unit. The storage of the pharmaceutical product packages in this case is oriented according to the unoccupied storage spaces available in the picking device and, under the principle of chaotic storage, not on the type of pharmaceutical, i.e., the packages are not stored sorted in this type of storage. To store the pharmaceutical product packages, a user may deposit them, for example, on a storage belt, by means of which the pharmaceutical product packages are then moved into the picking device. With the control unit of the picking device, the pharmaceutical product packages are then picked off the storage belt and moved to and situated in a storage space predetermined by a control device. The process of storing a number of pharmaceutical product packages may be relatively time consuming, depending on the number of pharmaceutical product packages to be stored, so that it is known from the prior art to combine pharmacy picking devices with automated devices for separating piece goods. These are used to provide piece goods separated from a plurality of piece goods, which are then identified and stored.

Such devices for separating piece goods are known from the prior art. In WO 2012/167846 A1, for example, a device for separating piece goods is known, which comprises a device for conveying piece goods from a stock of piece goods to a support

surface of a collecting device. The conveyor separates the piece goods by moving an obliquely situated slider under the stock of piece goods, in order to thereby move a piece good onto the support surface. Depending on the size of the slider and on the
5 piece goods of the stock, however, it may happen that not one piece good, but two or even three piece goods are moved onto the support surface. This is also contingent on how the piece goods are oriented in the stock, i.e., whether, for example, several piece goods resting on their narrowest side surface in the stock
10 are present, which are then all moved onto the support surface with one movement of the slider. As a result, the piece goods are arbitrarily oriented on the support surface, i.e., it is not possible with the known device to provide the piece goods separately and resting on a predetermined side surface.

15 It is therefore an object of the present invention to provide a device and a corresponding method, with which it is possible to provide piece goods separately and resting on a predetermined side surface.

The object is achieved by a device according to the
20 invention and by a method according to the invention for separating piece goods to be stored in a picking device. The device according to the invention comprises a feed device for providing a plurality of non-separated piece goods in a receiving area extending in an X- and Y-direction of the device,
25 an upper 3D recording device situated in the Z-direction, orthogonal to the X- and Y-directions, above the feed device for recording 3D images of piece goods situated on the feed device in the receiving area, and a control device coupled to the upper 3D recording device for evaluating 3D images ascertained with
30 the upper 3D recording device and for determining one piece good of the plurality of piece goods to be picked up. The 3D images are evaluated using conventional image processing software with the aim of detecting different objects (namely the piece goods) in the 3D image and of establishing which piece good may be
35 picked next or is picked next. It is thus conceivable, for

example, that multiple of the plurality of piece goods rest one on top of one another, so that an underlying piece good is overlaid, for example, by an overlying piece good in such a way that only the partially overlying piece good may be picked, but
5 not the underlying piece good. Exactly how the image processing and the determination of the piece good to be picked is carried out is irrelevant for the present invention; it is possible for all approaches known to those skilled in the art, in particular, under the term "machine vision" to be used.

10 The device according to the invention further comprises a conveyor coupled to the control device having a gripping means rotatable about the Z-axis (i.e., the vertical axis) for picking a specific piece good determined by the control device from the plurality of piece goods, a deposit surface situated in the X-
15 direction downstream from the receiving area for depositing piece goods picked by the conveyor, as well as a lateral recording device for producing at least one image of a piece good picked by the conveyor. According to the invention, the control device is configured so that the at least one image
20 produced using the lateral recording device is processed in order to ascertain the dimensions of the picked piece good. If it should be established during processing that not all dimensions of the picked piece good were able to be ascertained from the image, the picked piece good is rotated by a
25 predetermined angle about the Z-axis and another image is produced, which is then processed accordingly, this process being repeated until all dimensions of the piece good are ascertained. The control unit predetermines by which angle the picked piece good is rotated, wherein this value may be a
30 permanently programmed value or results from the processing of the preceding image. The orientation of the picked piece good is ascertained based on the results of the image processing or of the dimensions of the picked piece good, and the preferred storage surface of the picked piece good is established on the
35 basis of specifications by the control device. The conveyor is

then activated by the control device as a function of the orientation and of the preferred storage surface in such a way that a picked piece good is situated on a preferred storage surface on the deposit surface.

5 The device according to the invention thus comprises not only a 3D recording device for establishing the piece good that is to be removed next from the stock, but another recording device, which creates one or multiple images of the picked piece good, wherein based on this image or these images, it is
10 possible to determine the dimensions of the picked piece good so that the orientation of the picked piece good may be ascertained. The dimensions of the picked piece good namely cannot readily be taken from the 3D image of the upper 3D detection device, since it is not ensured that the entire piece
15 good is detected by the upper 3D detection device. Furthermore, it is not routinely possible with the upper 3D recording device to ascertain the height of a piece good to be picked or of one that has been picked. By using the lateral recording device, however, it is possible to easily determine the three dimensions
20 of the picked piece good, so that the orientation of the picked piece good may be determined, i.e., for example, whether the largest bearing surface of the piece good is situated below, on the side, or on the end face of the piece good. The lateral recording device may be a 2D or 3D recording device. When using
25 a 2D recording device, the picked piece good must be rotated about the vertical axis to determine all dimensions and at least two images must then be produced and evaluated. If a 3D recording device is used, with appropriate positioning of the 3D recording device, one image may suffice to determine all
30 dimensions of the picked piece good; in such a case, however, a rotation about the Z-axis will also be regularly required.

A 3D camera may be used as a 3D recording device, for example. 3D cameras are camera systems that allow the visual representation of ranges of an entire scene. The term "3D

cameras" is intended here to encompass, in particular, the following systems:

- Stereo cameras, in which the environment is recorded simultaneously using two cameras, wherein the distance between the camera lenses usually corresponds to the distance between the human eyes. The resulting image pair may be processed in a computer (of a control device) and a depth map may thus be produced.

- Triangulation systems, in which a light source images a defined pattern on the object. A camera records this pattern from a different angle and calculates the distance or a depth map based on the distortion.

- TOF cameras (time of flight cameras), which indicate the distance by measuring transit time of the light.

- Interferometry system, which operates using interferences between a measuring beam and an object beam.

- Light field cameras, in which in addition to the brightness of a pixel, the light direction of the rays that result in a pixel is also recorded at the expense of the resolution using micro lens arrays, from which data a depth map may then be calculated.

With knowledge of the orientation of the picked piece good and taking into account a storage surface predetermined by the control device, which will routinely be the largest bearing surface of a piece good, the piece good may then be situated on precisely this storage surface on the deposit surface. Depending on the orientation of the picked piece good, it may be sufficient to simply deposit the piece good on the deposit surface, namely, when the piece good is picked on a preferred storage surface. For example, if the preferred bearing surface is provided by a side surface of the picked piece good, the piece good must be tipped after being deposited on the deposit surface, which may be done, for example, by the conveyor. For this purpose, the conveyor may be positioned next to the piece good and the piece good may then be tipped using the conveyor.

In a preferred embodiment of the device according to the invention, the lateral recording device is designed as a 3D recording device. As stated previously above, the use of a 3D recording device reduces the images necessary for detecting all dimensions after the picking has occurred - ideally, one 3D image is sufficient to ascertain all dimensions.

How exactly the conveyor is configured is contingent, in particular, on the expected dimensions and weights of the piece goods to be separated. In the case of a pharmacy picking device, these dimensions and weights are on the one hand relatively minimal, on the other hand, they are subject to relatively minimal fluctuations. In a preferred embodiment, it is therefore provided that the conveyor is designed as a suction gripper movable in the X-, Y- and Z-directions having at least one suction head rotatable about the Z-axis. The use of a suction gripper also allows such piece goods to be picked, the picking of which is otherwise prevented or hampered by unfavorably situated adjacent piece goods. The rotatability of the suction head about the Z-axis may be achieved by only the suction head itself being rotatable - alternatively, the whole suction gripper or a component carrying the suction head may be rotatable about the Z-axis and thus "also rotate" the suction head.

In order to adapt the picking of a piece good to the dimensions of the piece good itself, it is provided in a preferred embodiment of the picking device according to the invention that the suction gripper has two differently dimensioned suction heads, so that depending on the situation, it is possible to select the suction head that is best suited for the next piece good to be picked. Thus, it is conceivable that the next piece good to be determined is one having a very narrow receiving surface, which may be reasonably grasped only with a small suction head, in other cases, it is conceivable that the selection of the larger suction head is more beneficial

in order, in particular, to provide stability to the picked piece good on the suction head.

In order to be able to rapidly select between the at least two different suction heads, it is provided in one preferred embodiment of the picking device that the suction head includes
5 a rotary body, on which the suction heads are situated, wherein the rotary body is rotatable about a horizontally extending rotation axis. In a corresponding embodiment of the suction gripper, a rapid and structurally simple switch between the
10 differently dimensioned suction heads is possible.

In a preferred embodiment of the picking device according to the invention, it is provided that the deposit surface is designed to be rotatable - in this way, the deposited piece good may be even better prepared for subsequent storage or for the
15 preceding removal from the deposit surface.

The object of the invention is further achieved by a method according to claim 7. According to the invention

a) using a feed device, a plurality of non-separated piece goods are situated in a receiving area extending in an X- and Y-
20 direction,

b) at least one 3D image of the plurality of non-separated piece goods is produced using an upper 3D recording device situated in a Z-direction, orthogonal to the X- and Y-directions above the feed device,

25 c) the at least one 3D image is processed using a control device coupled to the 3D recording device for ascertaining the position of the non-separated piece goods, and it is determined which piece good of the plurality of piece goods is picked next. Once such a piece good is determined,

30 d) the piece good is picked using a gripping means of a conveyor rotatable about the Z-axis,

e) at least one image of the picked piece good is produced using a lateral recording device, coupled to the control device, and

f) the at least one image produced by the lateral recording device is processed for ascertaining the dimensions of the picked piece good,

g) wherein, if not all dimensions of the picked piece good
5 are able to be determined, the picked piece good is rotated by a predetermined angle about the Z-axis and steps e) and f) are repeated until all dimensions of the picked piece good are ascertained, and

h) based on the results of the image processing, the
10 orientation of the picked piece good is ascertained and the preferred storage surface of the picked piece good is established on the basis of specifications by the control device. Subsequently,

i) the picked piece good is moved to a deposit surface
15 situated in the X-direction downstream from the receiving area and

j) the picked piece good is situated on a preferred storage surface on the deposit surface, which has been determined in method step f).

20 As previously indicated above, it may be sufficient, depending on the orientation of the picked piece good, to deposit it as picked - this is then sufficient if the piece good has been picked on a storage surface. If this is not the case, the piece good may be repositioned after an initial placement.

25 In a preferred embodiment of the method according to the invention, it is provided that the picked piece good is situated on a storage surface by first being situated on another surface on the deposit surface and then being tipped onto the storage surface. This may be carried out simply with the conveyor, for
30 example, by moving the conveyor next to the piece good and tipping it using the conveyor.

In a preferred embodiment of the method, it is provided that a 3D image of the picked piece good is produced using the lateral recording device. In this way, the number of images that
35 are necessary for ascertaining the dimensions of the picked

piece good may be reduced. Ideally, one 3D image is sufficient for determining all three dimensions.

In order to increase the flexibility when situating the piece good on the deposit surface, it is provided in a preferred embodiment of the method that the picked piece good is rotated according to specifications of the control device about the Z-axis (i.e., the vertical axis), before being situated on the deposit surface. Thus, an optimal orientation for a subsequent storage may be achieved, wherein the "optimal" orientation may be contingent on, for example, the unoccupied spaces in the picking device.

In another preferred embodiment of the method according to the invention, the picked piece good is rotated about the Z-axis and scanned in the process by the lateral recording device for determining an identifier. If such an identifier can be ascertained, the process step of identifying the piece good, which usually follows but is not associated with the separation itself, may be skipped, which accelerates the overall storage process.

A preferred embodiment of the device according to the invention and of the method according to the invention is described below with reference to the drawings, in which:

Figures 1a and 1b show an oblique view of the preferred embodiment of the device according to the invention, wherein detection areas of the recording devices indicated in Figure 1a are omitted in Figure 1b;

Figure 2 shows another oblique view of the preferred embodiment with piece goods;

Figure 3 shows a top view of the preferred embodiment with piece goods;

Figure 4 shows the embodiment from the rear, i.e., looking at the conveyor;

Figures 5a and 5b show an oblique view and a rear view of a first process situation of the preferred embodiment of the method according to the invention;

Figures 6a and 6b show a second process situation of the preferred embodiment of the method according to the invention;

Figures 7a - 7c show front views of further process situations of the preferred embodiment of the method, namely,
5 the placement and tipping of a picked piece good on the deposit surface;

Figures 8a and 8b show side views of different process situations; and

Figure 9 shows a flow chart of the preferred embodiment of
10 the method.

Figures 1a and 1b show oblique views of a preferred embodiment of the device 1 according to the invention for separating piece goods to be stored in a picking device, wherein the piece goods may in particular be pharmaceutical product
15 packages, which are to be stored in a pharmacy or hospital picking device. The embodiment illustrated comprises a feed device 10, which in the embodiment shown comprises a conveyor belt 13 having side strips 12, which are intended to prevent piece goods from falling off. As is indicated in Figure 1b, an
20 area 11 is provided in the "left" section of the conveyor belt, this area being a receiving area 11 in which piece goods are situated, as is apparent in the following figures. The receiving area 11 extends in the X- and Y-directions of the device, wherein the X- and Y-directions define a plane. In the Z-
25 direction, which is situated orthogonal to the plane spanned by the X- and Y-directions, a 3D recording device 20 having a detection area 21 is situated above the feeding device 10, with which 3D images of the piece goods situated in the receiving area 11 are produced.

30 The embodiment of the picking device 1 according to the invention shown further comprises a guide frame 5 situated on the side of the feed device 10, on which a conveyor 40 is movably situated, which in the embodiment shown is designed as a suction gripper. The suction gripper comprises a Z-guide 43,
35 which is movable on the guide frame 5 in the X-direction. A Y-

guide 44 is movable on this Z-guide 43 in the Z-direction, wherein, in turn, a holder 45 is movable on the Y-guide 44 in the Y-direction. A rotary body 42 is fixed on the holder 45 (or on a rotary body holder 46 shown in the following figures), to which in turn two gripping means designed as suction heads are situated, as shown in greater detail with reference to the following figures.

Situated upstream from the conveyor 40 is a lateral recording device 60 having a detection area 61, and situated downstream from the feed device 10 is a deposit surface 50 for depositing piece goods picked by the conveyor 40. Finally, the picking device 1 comprises a control device 30, which is coupled via lines not shown to the upper 3D recording device 20, to the lateral recording device 60, as well as to the conveyor 40 and optionally to the feed device 10. According to the invention, the control device 30 is configured in such a way that an image produced using the lateral recording device 60 is processed for ascertaining the dimensions of the picked piece good.

The processing as well as the number of images depends on the type and functionality of the lateral recording device. If a 3D recording device is used, as is the case in the embodiment shown, it may be sufficient, with appropriate positioning of the recording device with respect to the receiving area 11, to produce merely one image of a picked piece good and to process it in order to ascertain all three dimensions. It will be routinely necessary, however, even when using a 3D recording device, to produce multiple 3D images in order to determine all dimensions. Before producing a subsequent image, the picked piece good is rotated by a predetermined angle X. In this case, the process is repeated until all three dimensions of the piece good are ascertained. If a 2D recording device is used, it is necessary in any case to produce at least two images that render the picked piece good in a different perspective. For this purpose, the piece good may be rotated, for example, 90° about the Z-axis once the first image is produced.

The orientation of the picked piece good is ascertained based on the results of the image processing, wherein it is also ascertained based on the orientation of the picked piece good where, for example, the largest bearing surface of the picked
5 piece good is situated. Depending on the arrangement of the piece good before being picked, this arrangement may represent the suction surface of the piece good (and its mating surface), although it is also possible that the side surface or the end face (relative to the X-direction of the device), is the largest
10 bearing surface of the piece good.

The preferred storage surface of the picked piece good is established based on specifications of the control device, which is able to receive these specifications from a control device of a picking device, in which the piece goods are to be stored,
15 wherein this preferred storage surface will routinely be the largest bearing surface of the picked piece good. The conveyor is then activated via the control device of the device for separating piece goods in such a way that a picked piece good is situated on a preferred storage surface on the deposit surface
20 50, this being described in greater detail with reference to the following figures.

Figures 2, 3 and 4 show an oblique view, a top view and a rear view of the preferred embodiment of the device according to the invention, wherein four piece goods are situated in the
25 receiving area 11 of the feed device 10 in Figures 2 through 4. Two of the piece goods, which are identified by the reference numeral 2, are situated free-standing in the receiving area; the piece good 2" is partially overlaid by the piece good 2', as is apparent, in particular, in the rear view of Figure 4. In the
30 rear view, the view is "from behind" over the feed device 10 in the X-direction toward the deposit surface 50, whereas in the front view, the view is from the deposit surface 50 in the X-direction toward the feed device 10. In the embodiment shown, the X-direction is determined by the transport direction of the

piece goods from the receiving area 11 to the deposit surface 50 situated downstream.

Figures 5a, 5b, 6a, and 6b each show an oblique view and a rear view of different process situations during the separation of piece goods. In the process situation shown in Figures 5a and 5b, a suction head 41a of a suction gripper is placed on an upper side surface of a piece good 3. As is apparent in Figure 5b, the suction gripper in the embodiment shown comprises a central rotary body 42, which is rotatably mounted on a rotary body holder 46 about a horizontally formed rotation axis. Two suction heads are situated on the rotary body 42, namely, the suction head 41a seated on the piece good 3 and the suction head 41b situated oppositely thereof. As is apparent in Figure 5b (and in Figure 6b), the diameter of the suction head 41a is greater than that of the suction head 41b, i.e., the suction head 41a is provided for picking larger piece goods or for placing it on larger surfaces of piece goods.

Figures 6a and 6b show a further advanced process situation in which the suction gripper on the Y-guide 44 has risen higher, wherein the piece good 3 is lifted from the receiving area 11 due to the suction effect by the suction gripper acting on the upper side surface. As can be seen from Figures 5a and 6a, as well as from the preceding figures, the piece good 3 is freely situated in the receiving area 11, so that no other piece good prevents the piece good 3 from being picked.

Figures 7a, 7b and 7c show front views of further process situations according to a preferred embodiment of the method according to the invention. In Figure 7a, the piece good 3 is set down on a deposit surface 50, namely, in the "left" portion of the deposit surface. As can be seen from Figure 7a and from the preceding figures, the largest bearing surface in the case of the piece good 3 is a lateral surface of the piece good oriented in the X-direction, and in the preferred embodiment described here, this largest lateral surface is established as the storage surface. In order to then set the piece good 3 down

on this storage surface, the conveyor 40 is moved in such a way that the suction head 41a is situated to the left of the piece good 3 in such a way that the suction head is located below the upper edge of the piece good 3. In order to move the piece good
5 onto the storage surface, the suction gripper on the Y-guide 44 is moved to the right so that the piece good 3 is tipped over using the suction head 41a. The result is that the piece good, as shown in Figure 7c, rests on the largest side surface intended as the storage surface. In this orientation, it may
10 then be moved by an operating device (not shown) to, for example, a storage belt of the picking device (also not shown), from where it is then moved to the final storage space.

Figures 8a and 8b show oblique views as a visual illustration of the process situations shown in Figures 7a and
15 7c.

A preferred embodiment of the method according to the invention for separating piece goods to be stored in a picking device is described below with reference to the flow chart of Figure 9. In a step 100, a plurality of non-separated piece
20 goods are initially provided in a receiving area 11 of a feed device 10, as described in greater detail in the preceding figures. The piece goods may be, in particular, pharmaceutical product packages which are to be stored in a pharmacy picking device after being separated using the device according to the
25 invention. Once the piece goods are provided, a 3D image of the plurality of piece goods is recorded in a step 110 using a 3D recording device (for example, a simple 3D camera) situated above the feed device. This 3D image is processed in a step 120 using a control device 30, which is coupled to the 3D recording
30 device, and the positions of the individual piece goods are ascertained. From this, the next piece good to be picked is determined, which is routinely a piece good that is not overlaid by other piece goods. In the preceding figures, this is, for example, the subsequently picked piece good 3. The previously
35 determined piece good is then picked in a step 130 using a

suction head 41a of the suction gripper, namely, on the side surface of the piece good, which is most easily reached by the suction gripper. Once the piece good has been picked, a 3D image of the picked piece good is recorded in a step 140 using a
5 laterally situated 3D recording device, which may also be a 3D camera. In a step 150, this 3D image is processed, namely, with the aim of ascertaining the dimensions of the picked piece good. In the event that it is not possible to ascertain all three dimensions based on the 3D image, the picked piece good is
10 rotated by a predetermined value about the Z-axis and another 3D image is produced, which is subjected to a corresponding processing according to step 150. This is repeated until all dimensions have been ascertained. The orientation of the piece good is determined in a step 160 on the basis of its dimensions.
15 Thus, it may be established where, for example, the largest bearing surface of the piece goods is situated. Thus, it is conceivable, for example, that the piece good is picked via a largest receiving surface, which is situated laterally or at an end face (with respect to the X-direction). Once the alignment
20 is ascertained, the preferred storage surface is established in a step 170 based on specifications by the control device. The control device of the device according to the invention is routinely coupled to a control device of the picking device in which the piece goods are to be stored and, contingent upon the
25 available storage spaces, the control device of the picking device may specify, for example, that all piece goods are to be stored in such a way that their longest side surface is to be oriented, for example, in the Y-direction. If there are no restrictions with regard to the storage space, however, it will
30 regularly be the case that the largest bearing surface of a piece good is also the preferred storage surface, since this may ensure that the piece good may be stored safely and without risk of tipping in the picking device. After or as the preferred storage surface is established, the picked piece good is moved
35 in a step 180 in the X-direction to the deposit surface 50 on

which the picked piece good is situated on the preferred storage surface in a step 190, wherein when the preferred storage surface is situated laterally, for example, the piece good is situated by using the suction gripper to tip the piece good
5 after initially being set down.

CLAIMS

1. A device (1) for separating piece goods (2) to be stored in a picking device, comprising:

5 a feed device (10) for providing a plurality of non-separated piece goods in a receiving area (11) extending in an X- and Y-direction of the device,

 an upper 3D recording device (20) situated in the Z-direction, orthogonal to the X- and Y-directions, above the feed

10 device (10) for capturing 3D images of piece goods (2, 3) situated on the feed device (10) in the receiving area (11),

 a control device (30) coupled to the upper 3D recording device (20) for evaluating 3D images produced with the upper 3D recording device (20) and for determining a piece good (3) to be

15 picked from the plurality of piece goods,

 a conveyor (40) coupled to the control device (30) having a gripping means (41a, 41b) rotatable about the Z-axis for picking a piece good (2) determined by the control device (30) from the plurality of piece goods,

20 a deposit surface (50) situated downstream from the receiving area (11) in the X-direction for depositing piece goods picked by the conveyor (40),

 a lateral recording device (60) for producing at least one image of a piece good (3) picked by the conveyor (40), wherein

25 the control device is configured so that the at least one image produced with the lateral recording device (60) is processed for ascertaining the dimensions of the picked piece good, wherein, if not all dimensions of the picked piece good are able to be determined, the picked piece good is rotated by a predetermined

30 angle about the Z-axis and another image is produced,

 and based on the results of the image processing, the orientation of the picked piece good is ascertained and the preferred storage surface of the picked piece good is established on the basis of specifications by the control

35 device,

and that the conveyor (40) is activated as a function of the orientation and of the preferred storage surface in such a way that a picked piece good is situated on a preferred storage surface on the deposit surface (50).

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2. The device (1) for separating piece goods (2) to be stored in a picking device according to claim 1, characterized in that the lateral recording device (60) is designed as a 3D recording device.

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3. The device (1) for separating piece goods (2) to be stored in a picking device according to claim 1 or 2, characterized in that the conveying device (40) is designed as a suction gripper movable in the X-, Y- and Z-directions, having at least one suction head (41a) rotatable about the Z-axis.

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4. The device (1) for separating piece goods (2) to be stored in a picking device according to claim 3, characterized in that the suction gripper has two differently dimensioned suction heads (41a, 41b).

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5. The device (1) for separating piece goods (2) to be stored in a picking device according to claim 4, characterized in that the suction gripper (40) has a rotary body (42) on which the suction heads (41a, 41b) are situated, wherein the rotary body (42) is rotatable about a horizontally extending rotation axis.

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6. The device (1) for separating piece goods (2) to be stored in a picking device according to any of claims 1 through 5, characterized in that the deposit surface (50) is rotatable.

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7. A method for separating piece goods (2) to be stored in a picking device, wherein

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a) a plurality of non-separated piece goods (2) are situated with a feed device (10) in a receiving area (11) extending in an X- and Y-direction,

b) at least one 3D image of the plurality of non-separated piece goods (2) is produced using an upper 3D recording device

(20) situated in the Z-direction, orthogonal to the X- and Y-direction, above the feeding device (10),

c) the at least one 3D image for ascertaining the position of the non-separated piece good (2) is processed using a 3D
5 recording device (20) coupled to the control device (30), and it is determined which piece good of the plurality of piece goods is picked next,

d) the piece good (3) ascertained in step c) is picked using a gripping means (41a, 41b) of a conveyor (40), which is
10 rotatable about the Z-axis,

e) at least one image of the picked piece good (3) is produced using a lateral recording device (60) coupled to the control device (30),

f) the at least one image produced using the lateral
15 recording device (60) is processed to ascertain the dimensions of the picked piece good,

g) wherein, if not all dimensions of the picked piece good are able to be determined, the picked piece good is rotated by a predetermined angle about the Z-axis and steps e) and f) are
20 repeated until all dimensions of the picked piece good are ascertained,

h) based on the results of the image processing, the orientation of the picked piece good is ascertained and the preferred storage surface of the picked piece good is
25 established on the basis of specifications by the control device,

i) the picked piece good (3) is moved to a deposit surface (50) situated downstream from the receiving area (11) in the X-direction, and

30 j) the picked piece good is situated on a preferred storage surface on the deposit surface (50).

8. The method for separating piece goods (2) to be stored in a picking device according to claim 7, characterized in that the
35 picked piece good (3) is situated on a storage surface by first being situated on another surface of the picked piece good on the deposit surface (50) and then being tipped onto the storage surface.

9. The method for separating piece goods (2) to be stored in a picking device according to claim 7 or 8, characterized in that a 3D image of the picked piece good is produced using the lateral recording device (60).

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10. The method for separating piece goods (2) to be stored in a picking device according to any of claims 7 through 9, characterized in that the picked piece good (3) is rotated about the Z-axis according to specifications of the control device
10 before being situated on the deposit surface.

11. The method for separating piece goods (2) to be stored in a picking device according to any of claims 7 through 10, characterized in that the picked piece good is rotated about the
15 Z-axis and scanned in the process by the lateral recording device for determining an identifier.