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(54) **FEEDER DEVICE AND METHOD FOR FEEDING A STACK OF VALUE DOCUMENTS TO A SINGLER DEVICE, SINGLER MODULE AND SYSTEM FOR PROCESSING VALUE DOCUMENTS**

(57) The invention relates to a feeder device (6) for feeding a stack (1) of value documents, in particular banknotes, to a singler device, which is configured to withdraw individual value documents from the stack (1), wherein the feeder device (6) comprises: a stop element (3) having a front side and a back side, the front side being configured to serve as a stop for a rear side of the stack (1) and to guide the stack (1) at the rear side of the stack towards the singler device; a first and a second lateral guide element (4a, 4b) provided at the front side of the stop element (3) and configured to guide the stack (1) at two lateral sides of the stack (1) towards the singler device; at least two first support elements, on which the first lateral guide element (4a) is mounted, and at least two second support elements, on which the second lateral guide element (4b) is mounted, wherein the first and second support elements are movably mounted on the stop element (3) and a respective one of the first support elements is coupled with a respective one of the second support elements such that by moving one of the lateral guide elements (4a, 4b) in a first direction, the other lateral guide element (4b, 4a) is moved in a second direction opposite to the first direction; and at least one first alignment bearing (8a) configured to guide the first lateral guide element (4a) on the stop element (3) in the first and second direction, and at least one second alignment bearing (8b) configured to guide the second lateral guide element (4b) on the stop element (3) in the first and second direction. The invention further relates to an according method, a singler device, a singler module and a system for processing value documents, in particular banknotes.

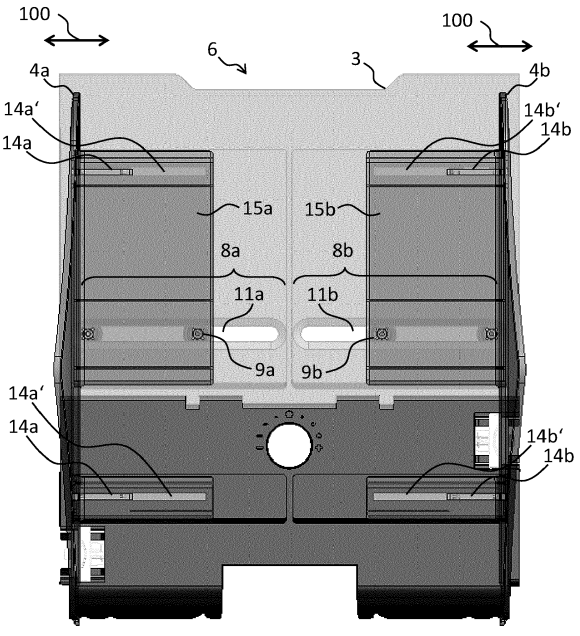

Fig. 3

EP 4 113 468 A1

Description

[0001] The invention relates to a feeder device and method for feeding a stack of value documents, in particular banknotes, to a singler device, a singler module and a system for processing value documents, in particular banknotes.

[0002] Systems for banknote processing usually comprise a feeder device, which is configured to receive a stack of banknotes and to feed and/or guide same towards a singler device, which is configured to separate individual banknotes from the stack, wherein usually the lowermost banknote of the stack is drawn from the stack. The individual banknotes are then conveyed towards one or more processing modules, which are configured to process, in particular to count and/or examine and/or sort, the banknotes.

[0003] It is an object of the invention to provide a feeder device and method for feeding a stack of value documents, in particular banknotes, to a singler device, a singler module and a system for processing value documents which are improved, in particular regarding handling, robustness and stability.

[0004] The object is achieved by a feeder device and method according to the independent claims, a singler module comprising such a feeder device and a system for processing value documents comprising such a singler module.

[0005] According to a first aspect, a feeder device for feeding a stack of value documents, in particular banknotes, to a singler device, which is configured to withdraw individual value documents from the stack, comprises: a stop element having a front side and a back side, the front side being configured to serve as a stop for a rear side of the stack and to guide the stack at the rear side of the stack towards the singler device; a first and a second lateral guide element provided at the front side of the stop element and configured to guide the stack at two lateral sides of the stack towards the singler device; at least one first support element, in particular at least two first support elements, on which the first lateral guide element is mounted, and at least one second support element, in particular at least two second support elements, on which the second lateral guide element is mounted, wherein the first and second support element are movably mounted on the stop element and the first support element, in particular a respective one of the first support elements, is coupled with the second support element, in particular a respective one of the second support elements, such that by moving one of the lateral guide elements in a first direction, the other lateral guide element is moved in a second direction opposite to the first direction; at least one first alignment bearing configured to guide the first lateral guide element on the stop element in the first and second direction; and at least one second alignment bearing configured to guide the second lateral guide element on the stop element in the first and second direction.

[0006] According to a second aspect, a singler module comprises a singler device, which is configured to withdraw individual value documents from a stack of value documents, in particular banknotes, and a feeder device according to the first aspect for feeding the stack of value documents to the singler device.

[0007] According to a third aspect, a system for processing value documents, in particular banknotes, comprises one or more processing modules configured to process, in particular to transport and/or count and/or examine and/or sort, the value documents and at least one singler module according to the second aspect.

[0008] According to a fourth aspect, a method for feeding a stack of value documents, in particular banknotes, to a singler device, which is configured to withdraw individual value documents from the stack, uses a feeder device comprising: a stop element having a front side and a back side, the front side being configured to serve as a stop for a rear side of the stack and to guide the stack at the rear side of the stack towards the singler device; two lateral guide elements provided at the front side of the stop element and configured to guide the stack at two lateral sides of the stack towards the singler device; at least one first support element, in particular two first support elements, on which the first lateral guide element is mounted, and at least one second support element, in particular two second support elements, on which the second lateral guide element is mounted, wherein the first and second support element are movably mounted on the stop element and, the first support element, in particular a respective one of the first support elements, is coupled with the second support element, in particular a respective one of the second support elements, such that by moving one of the lateral guide elements in a first direction the other lateral guide element is moved in a second direction opposite to the first direction; at least one first alignment bearing configured to guide the first lateral guide element on the stop element in the first and second direction; and at least one second alignment bearing configured to guide the second lateral guide element on the stop element in the first and second direction, wherein the method comprises the following steps: moving at least one of the lateral guide elements so as to adjust the distance between the lateral guide elements; depositing a stack of value documents between the two lateral guide elements at the front side of the stop element; and guiding the stack of value documents at the rear side of the stack along the front side of the stop element and at two lateral sides of the stack along the lateral guide elements towards the singler device.

[0009] Aspects of present disclosure are preferably based on the approach of movably mounting the first and second lateral guide element on the stop element via first and second support elements, respectively, which are coupled with each other such that the first and second lateral guide element can only move simultaneously and in opposite directions (which can also be referred to as "counter movement"), and additionally providing, for

each lateral guide element, at least one alignment bearing, which is configured to guide the respective lateral guide element on the stop element in a direction parallel to the direction of movement of the lateral guide elements. By means of the alignment bearings, an imbalance of forces acting on the first support elements, on which the first lateral guide element is mounted, and/or the second support elements, on which the second lateral guide element is mounted, is reduced or can even be avoided. Such an imbalance of forces may occur, for example, if the first and/or second lateral guide element is manually shifted by touching the respective lateral guide element and/or applying a manual force to a section of the lateral guide element which is not located in the middle between first and second support elements, respectively. The alignment bearings ensure, or at least contribute, that during the adjustment of the width of the lateral guide elements forces on the first and/or second support elements are, preferably equilaterally or equally, distributed between the first and second support elements, respectively. This allows for a smooth movement of the lateral guide elements during adjustment, so that the width between the lateral guide elements can be easily changed by manually shifting at least one of the lateral guide elements without the need of applying excessive forces to the lateral guide elements and/or the danger of breaking or deforming the lateral guide elements, even in cases where a manual force is applied close to an upper or lower end of the lateral guiding elements. Further, friction forces of the alignment bearings contribute that the lateral guide elements reliably remain at their respectively set positions, rather than moving unguided from their respectively set positions in case of vibrations. This allows for a simple, robust and stable adjustment of the width between the lateral guide elements to different sizes of stacks of value documents to be processed.

[0010] In summary, present disclosure provides a feeder device and method, singler module and system for improved handling, robustness and stability.

[0011] Preferably, the first alignment bearing comprises one or more first rollers, which are rotatably mounted on the first lateral guide element and guided in a first guide rail provided at the stop element. Alternatively or additionally, the second alignment bearing comprises one or more second rollers, which are rotatably mounted on the second lateral guide element and guided in a second guide rail provided at the stop element. In this way, guiding of the first and/or second lateral guide element, respectively, in a linear direction and distributing of forces between the support elements can be achieved in a simple and robust way.

[0012] Preferably, the first and/or second guide rail is given by an elongated aperture, in particular a slot, provided in the stop element. Alternatively or additionally, the first and/or second guide rail is provided at the back side of the stop element. In both cases, guide rails for reliably guiding of the first and/or second rollers are obtained in a simple way.

[0013] Preferably, the feeder device comprises at least two first support elements and at least two second support elements.

[0014] It is further preferred that the first alignment bearing is positioned between the first support elements, on which the first lateral guide element is mounted, and/or the second alignment bearing, on which the second lateral guide element is mounted, is positioned between the second support elements. Preferably, the first alignment bearing is positioned approximately in the middle between the first support elements and/or the second alignment bearing is positioned approximately in the middle between the second support elements. In this way, guiding of the first and/or second lateral guide element, respectively, and distributing of forces between the support elements is further improved.

[0015] Preferably, the first support element, in particular a respective one of the first support elements, is positioned relative to the second support element, in particular a respective one of the second support elements, in such a way that toothed racks provided on the respective first and respective second support elements are positioned opposite each other, and wherein the feeder device further comprises at least one gear wheel which is rotatably mounted on the stop element and engages with the toothed racks provided on the respective first and respective second support elements so as to couple the support elements with each other. This is a very robust and simple way to realize a simultaneous movement of the first and second lateral guide element in opposite directions (counter movement) so as to allow for adjusting the width between the first and second lateral guide element by manually moving only one of the lateral guide elements.

[0016] Alternatively preferred, the first alignment bearing is positioned at around the middle between the lower and upper ends of the first lateral guide element and/or the second alignment bearing is positioned at around the middle between the lower and upper ends of the second lateral guide element. Upper and lower is seen from the perspective of an operator standing in front of the operational ready feeder device.

[0017] Further advantages, features and possible applications of the present disclosure are shown in the following description in connection with figures, which show:

Fig. 1 an example of a system for processing value documents;

Fig. 2 an example of a singler module in a perspective front view;

Fig. 3 an example of a feeder device in a front view; and

Fig. 4 an example of a feeder device in a rear view.

[0018] Figure 1 shows a schematic representation of an example of a system for processing value documents, in particular banknotes. The system comprises a singler module 10 which is configured to receive at least one stack 1 of value documents, in particular banknotes, and to separate individual value documents from the stack 1.

[0019] The singler module 10 comprises a feeder device 6 having a lower support surface 2 supporting the received stack 1 from below, at least one stop element 3 serving as a stop and guide for a rear side of the stack 1, and two lateral guide elements 4 provided at the front side of the stop element 3 and configured to guide the stack 1 at two lateral sides of the stack 1. Preferably, the edges of value documents at the rear side of the stack 1 - also referred to as "lead edges" of the value documents - abut on the stop element 3.

[0020] In present example, the lower support surface 2 is slightly inclined against the horizontal direction, and the stop element 3 is slightly inclined against the vertical direction. This facilitates slipping of the received stack 1 towards the stop element 3 due to gravitation to ensure that the lead edges of the value documents abut on the stop element 3.

[0021] The singler module 10 further comprises a singler device 5 for separating or removing individual value documents from the stack 1. In present example, the singler device 5 is configured to separate the respectively lowermost value document from the stack 1. Preferably, as with present example, the singler device 5 may comprise one or more rollers and/or conveyor belts interacting such that the respectively lowermost value document is separated from the stack 1.

[0022] After separation, each individual value document is conveyed along a transport path 20 to one or more sensor units 30 which are configured to detect physical properties of the value document and to generate according sensor signals, based on which a control unit 40 controls a subsequent processing of the value document, e.g. ejection into a stacker compartment 50, 51 or destruction in a shredder 52.

[0023] Figure 2 shows a perspective front view of an example of a singler module comprising a singler device 5 and a feeder device 6, wherein the feeder device 6 comprises a lower support surface 2 for supporting a stack of value documents (not shown, see Figure 1) from below, a stop element 3 having a preferably plate-shaped structure and serving as a stop and guide for a rear side of the stack resting on the support surface 2, and two lateral guide elements 4a, 4b provided at the front side of the stop element 3 and serving as lateral guides for opposing lateral sides of the stack.

[0024] The lateral guide elements 4a, 4b are preferably designed as guide flaps or plates and are movably mounted on the stop element 3 so as to allow the lateral guide elements 4a, 4b to be moved and/or shifted in a direction (see double arrows) parallel to the plane of the stop element 3 and/or the lower support surface 2. The lateral guide elements 4a, 4b are, preferably fixedly, mounted on support elements (not shown), which are movably mounted on the back side of the stop element 3. Additionally, alignment bearings 8a, 8b are provided, which are configured to guide the lateral guide elements 4a, 4b in a direction parallel to the movement direction (see double arrows) of the lateral guide elements 4a, 4b. This will be elucidated in more detail in the following.

[0025] Figure 3 shows an example of a feeder device 6 in a front view. In present example, the first and second lateral guide element 4a, 4b is provided with two first and second mounting brackets 14a, 14b, respectively, which extend through an elongated first and second aperture 14a', 14b', respectively, in the stop element 3.

[0026] Preferably, as exemplarily shown in the figure, one of the first and second mounting brackets 14a, 14b is provided in an upper region of the respective lateral guide element 4a, 4b, whereas the other first and second mounting bracket 14a, 14b is provided in a lower region of the respective lateral guide element 4a, 4b.

[0027] Further, each of the first and second lateral guide element 4a, 4b comprises a guiding plate 15a, 15b, which is essentially perpendicular to the lateral guide elements 4a, 4b. Or in other words, the guiding plate 15a, 15b is essentially parallel to the direction of movement of the lateral guide elements 4a, 4b (see double arrows 100).

[0028] In present example, on the back side of each guiding plate 15a, 15b two first rollers 9a and two second rollers 9b, respectively, are mounted. The first and second rollers 9a, 9b are guided in and/or through a slot 11a, 11b, provided in the stop element 3. Optionally, the first and second rollers 9a, 9b can be guided in a first and second guide rail (not shown, for details see description below with respect to Figure 4), respectively, provided on the back side of the stop element 3.

[0029] The rollers 9a, 9b together with the slots 11a, 11b and the optional guide rails on the back side of the stop element 3 form a first and second alignment bearing 8a, 8b, respectively, in the sense of present disclosure, by which adverse effects resulting from a possible imbalance of forces acting on the first lateral guide element 4a and/or the second lateral guide element 4b are reduced or can even be avoided. Such an imbalance of forces may occur, for example, if the first and/or second lateral guide element 4a, 4b is manually shifted by touching the respective lateral guide element 4a, 4b and/or applying a manual force to a section of the lateral guide element 4a, 4b which is not located in the middle between the first or second mounting brackets 14a, 14b, respectively. The alignment bearings 8a, 8b help to, preferably equally, distribute forces occurring at the first and/or second mounting brackets 14a, 14b and/or at first and/or second support elements (not shown, for details see description below with respect to Figure 4), by which the lateral guide elements 4a, 4b are movably mounted on the back side of the stop element 3, between the first and/or second mounting brackets 14a, 14b and/or support elements, respectively.

[0030] This allows for a smooth movement of the lateral guide elements 4a, 4b during adjustment, so that the width between the lateral guide elements 4a, 4b can be easily changed by manually shifting at least one of the lateral guide elements 4a, 4b without the need of applying excessive forces to the lateral guide elements 4a, 4b and/or the danger of breaking or deforming the lateral guide elements 4a, 4b, even in cases where a manual force is applied close to an upper or lower end of the lateral guiding elements 4a, 4b. Further, friction forces of the alignment bearings 8a, 8b can contribute that the lateral guide elements 4a, 4b reliably remain at their respectively set positions, rather than moving uncontrolled or unguided from their respectively set positions in case of vibrations. This allows for a simple, robust and stable adjustment of the width between the lateral guide elements 4a, 4b to different sizes of stacks of value documents to be processed.

[0031] Preferably, the alignment bearings 8a, 8b are positioned approximately in the middle between the lower and upper ends of the lateral guide elements 4a, 4b, respectively.

[0032] Figure 4 shows an example of a feeder device 6 in a rear view. As can be seen from the figure, the first and second mounting brackets 14a, 14b (see also Figure 3 and the respective elucidations above) are mounted, for example by means of screws or bolts, on first and second support elements 7a, 7b, respectively, which are movably mounted on the back side of the stop element 3.

[0033] The first and second support elements 7a, 7b have an elongated shape and extend essentially parallel to the movement direction (see double arrows) of the lateral guide elements. A respective one of the first support elements 7a is coupled with a respective one of the second support elements 7b by means of toothed racks 13a, 13b provided at the first and second support element 7a, 7b, respectively, and a gear wheel 16 engaging with the respectively opposing toothed racks 13a, 13b, respectively. In this way, the first and second support elements 7a, 7b are coupled with each other such that the first and second lateral guide element 4a, 4b (see Figure 3) can only move simultaneously and in opposite directions (also referred to as "counter movement"). Advantageously, this allows the width between the first and second lateral guide element to be adjusted by manually moving only one of the lateral guide elements 4a, 4b.

[0034] As can further be seen from Figure 4, the first and second rollers 9a, 9b, which are provided on guiding plates 15a, 15b of the lateral guiding elements 4a, 4b (see Figure 3) and guided in and/or through slots 11a, 11b, are guided in guide rails 12a, 12b provided on the back side of the support element 3.

[0035] The above elucidations with respect to Figure 3 apply to Figure 4 accordingly.

[0036] In summary, the feeder device 6 disclosed herein is very robust and yet smooth-running, so that the lateral guide elements 4a, 4b can be moved easily and safely, in particular without the danger of breaking during manual adjustment by a user, while not moving automatically or uncontrollably or unguided from their respectively set positions due to vibrations of the processing system.

[0037] In a further embodiment, biased feeding is described. Biased feeding is opposed to centered feeding and means processing banknotes shifted from centered position regarding the banknote path, i.e., to the right or to the left from the middle. To achieve this the banknote guides of the feeder device, i.e., the lateral guide elements 4, are enabled to be aligned independently.

[0038] In more details, the process of changing from centered to biased feeding is as follows.

[0039] The lateral guide elements 4a, 4b are positioned symmetrically with respect to the middle or center of the banknote path and are coupled with a coupling element or the toothed racks 13a, 13b via the support elements 7a, 7b. This enables the lateral guide elements 4a, 4b to be moved or adjusted synchronously in opposite directions while remaining symmetric with respect to the middle of the banknote path. This is particularly the arrangement used for centered feeding.

[0040] In case feeding needs to be changed from centered to biased a decouple element, e.g., a knob or any other appropriate mean, is operated to disengage or decouple the support elements 7a, 7b with moving the coupling element or the toothed racks 13a, 13b into disengaged position. This enables the guide elements 4a, 4b to be moved independently in any of the directions shown with the double arrows 100 in Figure 2, to any extent.

[0041] The guide elements 4a, 4b are adjusted or moved preferably separately to the positions needed for biased feeding. A distance between the lateral guide elements 4a, 4b is preferably slightly bigger than the length of a processed banknote (measured across banknote path). The central axis of the banknote path is shifted to the left or to the right from the middle or center of the banknote path.

[0042] When the lateral guide elements 4a, 4b are adjusted for biased processing the knob or another mean is operated to engage or couple the support elements 7a,7b and to move the coupling element or the toothed racks 13a, 13b back into engaged position. This enables the lateral guide elements 4a, 4b to be moved synchronously in opposite directions while remaining symmetric with respect to the point which is shifted from the middle of banknote path. This is the preferred arrangement used for biased feeding.

[0043] To change back from biased to centered feeding the following steps are preferably performed.

[0044] The knob or another mean is operated to disengage or decouple the support elements 7a, 7b and to move the coupling element or the toothed racks 13a, 13b into disengaged position.

[0045] The lateral guide elements 4a, 4b are moved separately to the respective extreme positions within the extent allowed by the alignment bearing 8a, 8b. Either both to the middle or right guide to the right side and left

guide to the left side. This brings the lateral guide elements 4a, 4b into positions symmetric with respect to the middle or center of the banknote path.

[0046] The knob or another mean is operated to engage or couple the support elements 7a, 7b and to move the coupling element or the toothed racks 13a, 13b back into engaged position. This enables the lateral guide elements 4a, 4b to be moved or adjusted, particularly only, synchronously in opposite directions while remaining symmetric with respect to the middle of the banknote path.

[0047] The lateral guide elements 4a, 4b are adjusted to the positions needed for centered feeding. The distance between the lateral guide elements 4a, 4b is preferably slightly bigger than the length of processed banknote (measured across banknote path). The position of the banknote path is symmetric with respect to the middle or center of the banknote path.

[0048] This adjustment can be done by moving, e.g., by hand, only one of the two lateral guide elements 4a, 4b because the second one will preferably move automatically due to coupling between the support elements 7a, 7b.

Claims

1. Feeder device (6) for feeding a stack (1) of value documents, in particular banknotes, to a singler device (5), which is configured to withdraw individual value documents from the stack (1), wherein the feeder device (6) comprises:

   - a stop element (3) having a front side and a back side, the front side being configured to serve as a stop for a rear side of the stack (1) and to guide the stack (1) at the rear side of the stack towards the singler device (5),
   - a first and a second lateral guide element (4a, 4b) provided at the front side of the stop element (3) and configured to guide the stack (1) at two lateral sides of the stack (1) towards the singler device (5),
   - at least one first support element (7a), on which the first lateral guide element (4a) is mounted, and at least one second support element (7b), on which the second lateral guide element (4b) is mounted, wherein the first and second support element (7a, 7b) are movably mounted on the stop element (3) and the first support element (7a) is coupled with the second support element (7b) such that by moving one of the lateral guide elements (4a, 4b) in a first direction, the other lateral guide element (4b, 4a) is moved in a second direction opposite to the first direction, and
   - at least one first alignment bearing (8a) configured to guide the first lateral guide element (4a) on the stop element (3) in the first and second direction, and at least one second alignment bearing (8b) configured to guide the second lateral guide element (4b) on the stop element (3) in the first and second direction.

2. Feeder device (6) according to claim 1, wherein the first alignment bearing (8a) comprises one or more first rollers (9a), which are rotatably mounted on the first lateral guide element (4a) and guided in a first guide rail (11a, 12a) provided at the stop element (3).

3. Feeder device (6) according to claim 1 or 2, wherein the second alignment bearing (8b) comprises one or more second rollers (9b), which are rotatably mounted on the second lateral guide element (4b) and guided in a second guide rail (11b, 12b) provided at the stop element (3).

4. Feeder device (6) according to claim 2 or 3, wherein the first and/or second guide rail (11a, 11b) is given by an elongated aperture, in particular a slot, provided in the stop element (3).

5. Feeder device (6) according to claim 2 or 3, wherein the first and/or second guide rail (12a, 12b) is provided at the back side of the stop element.

6. Feeder device (6) according to any one of the preceding claims, wherein the feeder device (6) comprises at least two first support elements (7a) and at least two second support elements (7b), wherein the first alignment bearing (8a) is positioned between the first support elements (7a) and/or the second alignment bearing (8b) is positioned between the second support elements (7b).

7. Feeder device (6) according to any one of the preceding claims, wherein the first support element (7a) is positioned relative to the second support element (7b) in such a way that toothed racks (13a, 13b) provided on the first and respective second support element (7a, 7b) are positioned opposite each other, and wherein the feeder device (6) further comprises at least one gear wheel (16) which is rotatably mounted on the stop element (3) and engages with the toothed racks (13a, 13b) provided on the first and second support element (7a, 7b) so as to couple the support elements (7a, 7b) with each other.

8. Singler module (10) comprising a singler device (5), which is configured to withdraw individual value documents from a stack (1) of value documents, in particular banknotes, and a feeder device (6) according to any one of the preceding claims for feeding the stack (1) of value documents to the singler device (5).

9. System for processing value documents, in particular banknotes, comprising one or more processing

modules (20, 30, 40, 50 - 52) configured to process, in particular to transport and/or count and/or examine and/or sort, the value documents and at least one singler module (10) according to the preceding claim.

10. Method for feeding a stack (1) of value documents, in particular banknotes, to a singler device (5), which is configured to withdraw individual value documents from the stack (1), the method using a feeder device (6) comprising a stop element (3) having a front side and a back side, the front side being configured to serve as a stop for a rear side of the stack (1) and to guide the stack (1) at the rear side of the stack (1) towards the singler device (5), two lateral guide elements (4) provided at the front side of the stop element (3) and configured to guide the stack (1) at two lateral sides of the stack (1) towards the singler device (5), at least one first support element (7a), on which the first lateral guide element (4a) is mounted, and at least one second support element (7b), on which the second lateral guide element (4b) is mounted, wherein the first and second support element (7a, 7b) are movably mounted on the stop element (3) and the first support element (7a) is coupled with the second support element (7b) such that by moving one of the lateral guide elements (4a, 4b) in a first direction the other lateral guide element (4b, 4a) is moved in a second direction opposite to the first direction, and at least one first alignment bearing (8a) configured to guide the first lateral guide element (4a) on the stop element (3) in the first and second direction, and at least one second alignment bearing (8b) configured to guide the second lateral guide element (4b) on the stop element (3) in the first and second direction, the method comprising the following steps:

- moving at least one of the lateral guide elements (4a, 4b) so as to adjust the distance between the lateral guide elements (4a, 4b),
- depositing a stack (1) of value documents between the two lateral guide elements (4a, 4b) at the front side of the stop element (3) and
- guiding the stack (1) of value documents at the rear side of the stack (1) along the front side of the stop element (3) and at two lateral sides of the stack (1) along the lateral guide elements (4a, 4b) towards the singler device (5).

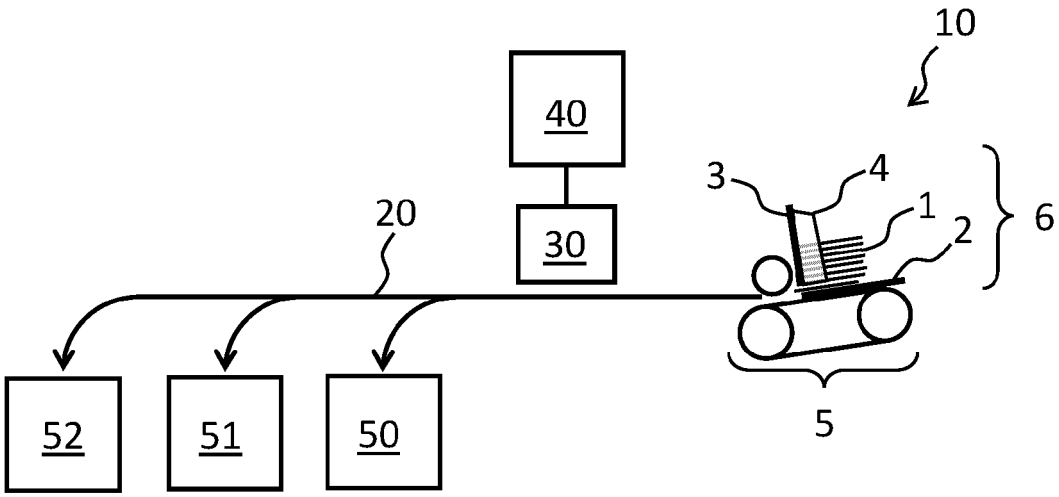

Fig. 1

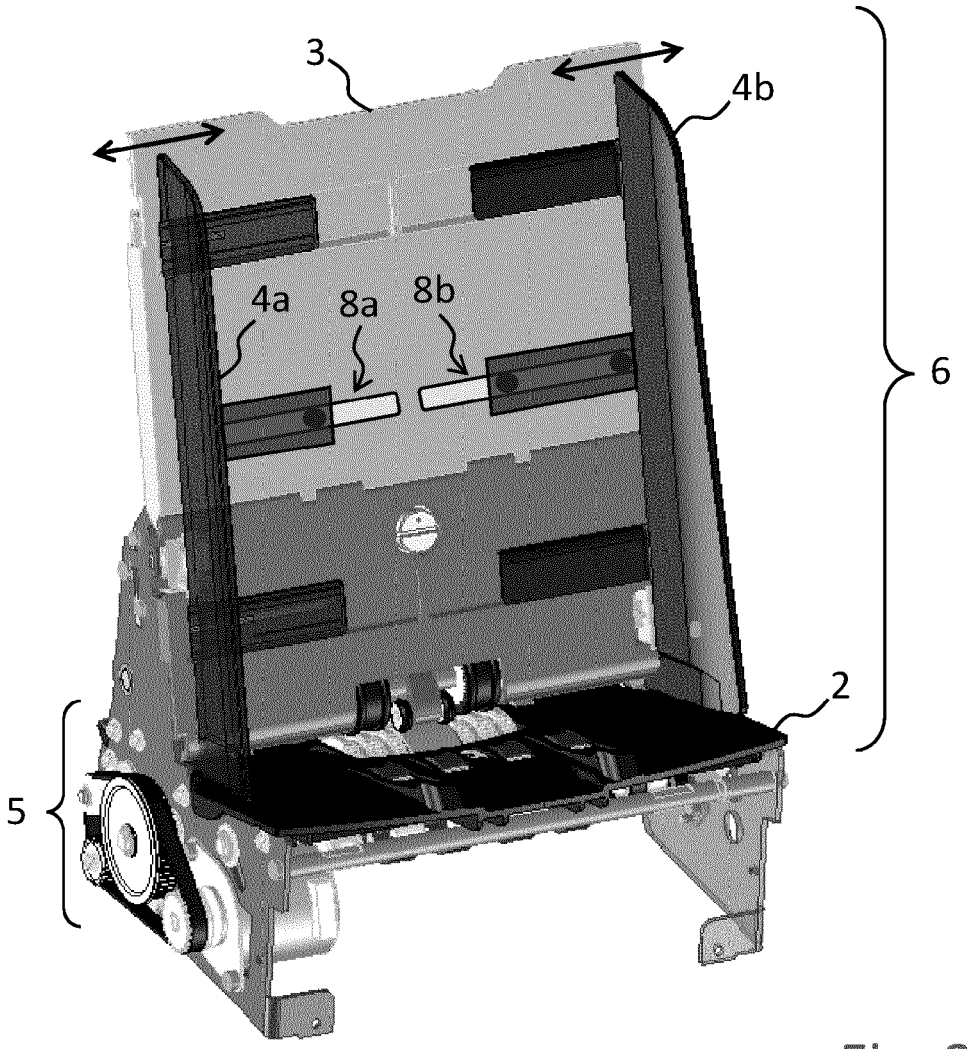

Fig. 2

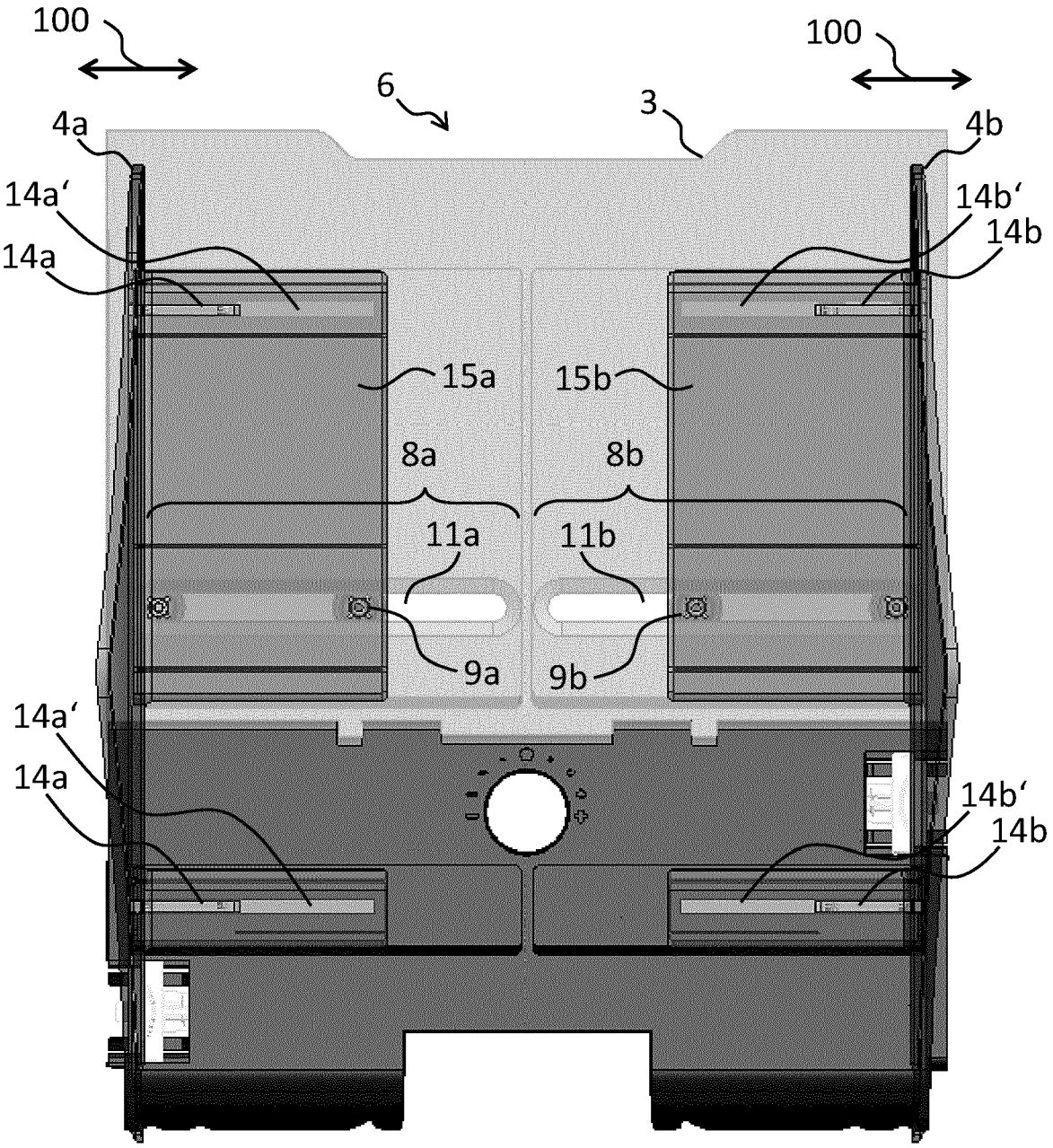
100
100
6
3
4a
4b
14a'
14b'
14a
14b
15a
15b
8a
8b
11a
11b
9a
9b
14a'
14a
14b'
14b

Fig. 3

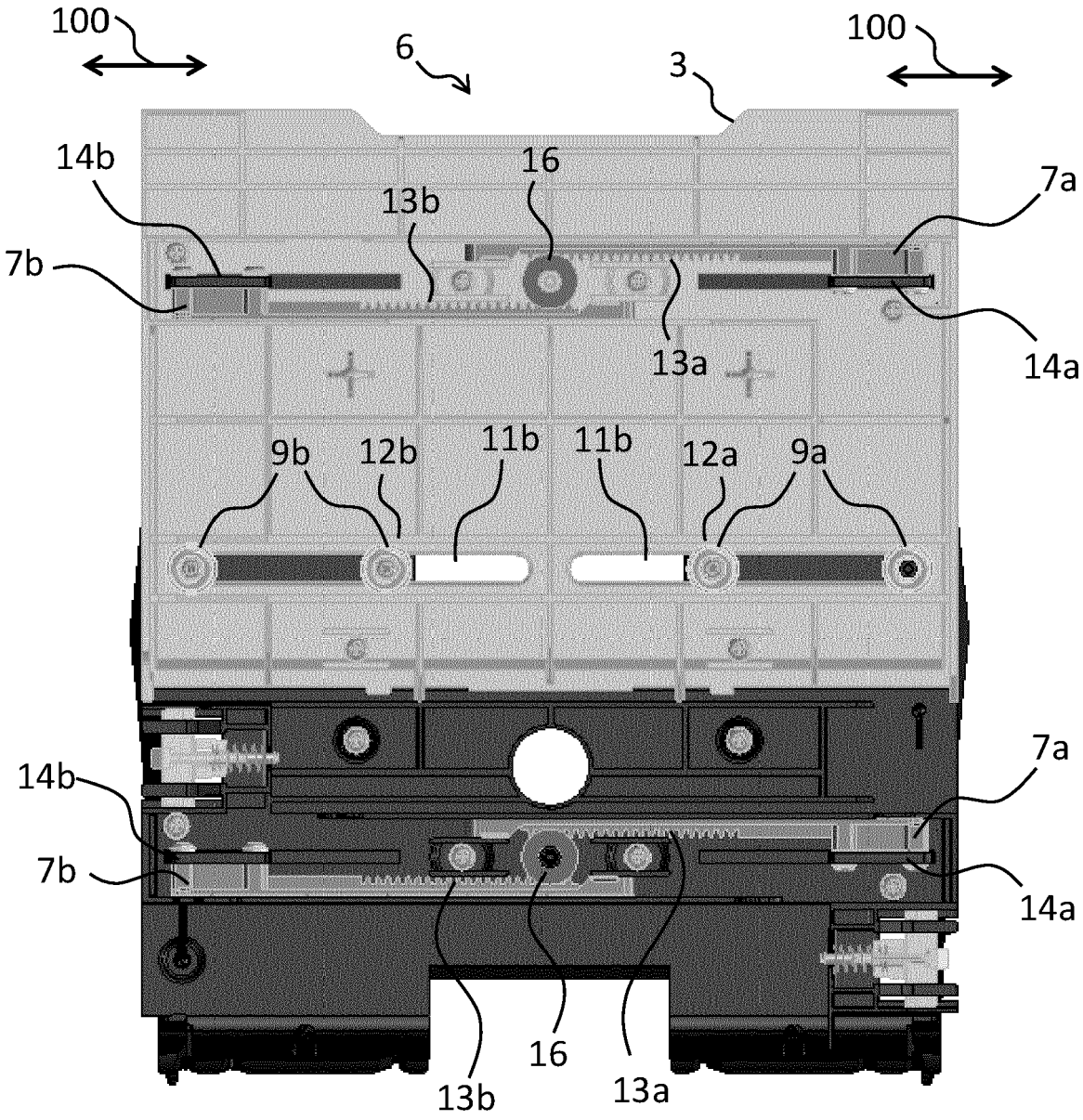
100
6
3
100
14b
16
13b
7a
7b
13a
14a
9b
12b
11b
11b
12a
9a
14b
7a
7b
14a
16
13b
13a

Fig. 4

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EUROPEAN SEARCH REPORT

Application Number
EP 21 02 0336

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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G07D
B65H

1 The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	15 December 2021	Saraceni, Alessandro

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