(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 2 644 546 B1

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
29.10.2014 Bulletin 2014/44

(51) Int Cl.:
B65H 31/06 *(2006.01)* ***B07C 3/00*** *(2006.01)*

(21) Application number: **13161493.5**

(22) Date of filing: **27.03.2013**

(54) **Stacker for a machine for sorting postal articles, and machine for sorting postal articles provided with such a stacker**

Stapler für eine Maschine zum Sortieren von Postsendungen, und Maschine zum Sortieren von Postsendungen mit solch einem Stapler

Empileur pour une machine de tri d'articles postaux, et machine de tri d'articles postaux dotée d'un tel empileur

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR

(30) Priority: **27.03.2012 IT TO20120276**

(43) Date of publication of application:
02.10.2013 Bulletin 2013/40

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Description

[0001] The present invention relates to a stacker for a machine for sorting postal articles.

[0002] Postal articles can be sorted by machines that have a plurality of output stackers, each of which accumulates the sorted postal articles so as to form a stack in a respective housing. These housings are accessible from the above and, when substantially full, are emptied by a robotized system or by hand, see e.g. US 2 778 638 A. In particular, the stacks of postal articles are transferred to containers or trays to be transported to their respective destinations.

[0003] In some sorting machines, the stackers are arranged on two levels, at different heights. In solutions of this type, the stackers on the upper level at least partially overlay the stackers on the lower level and therefore, due to the space they occupy, make picking stacks of postal articles from the lower level stackers difficult, especially if this picking is performed by hand. In fact, the operator, especially if of above-average height, must bend down in order to entirely see the postal articles in the lower level stacker and to pass his/her arm beneath the upper level stacker when he/she must pick these articles.

[0004] To resolve this problem, the upper level stackers are usually shorter and, in consequence, can accommodate a smaller number of postal articles with respect to the lower level stackers, so as to obstruct emptying the lower stackers as little as possible.

[0005] In addition, the upper level stackers are sometimes moved towards the inside of the machine in order to overlap lower level stackers as little as possible. As a rule, the capacity of the upper level stackers is reduced in this case as well, otherwise the operator, hindered by the lower level, would have to stretch his/her limbs too much and lean forwards to reach the upper level.

[0006] The need is therefore felt to perfect the above-described known solutions, so as not to excessively reduce the accumulation capacity of the upper level stackers, and so that the emptying of the lower level is as ergonomic as possible.

[0007] The object of the present invention is that of providing a stacker for a machine for sorting postal articles, that enables the above-described needs to be met in a simple and inexpensive manner.

[0008] According to the present invention, a stacker for a machine for sorting postal articles is provided, as defined in claim 1.

[0009] The present invention also relates to a machine for sorting postal articles, as defined in claim 9.

[0010] The invention shall now be described with reference to the attached drawings, which illustrate a non-limitative embodiment, where:

- Figure 1 is a perspective view of a preferred embodiment of the stacker according to the present invention, for a machine for sorting postal articles shown with parts removed for clarity;
- Figure 2 is a side view of the sorting machine in Figure 1, with parts sectioned along a vertical section plane;
- Figure 3 is a perspective view from above, on an enlarged scale, of the stacker of the present invention; and
- Figure 4 is an enlargement of a detail of Figure 2.

[0011] In Figure 1, reference numeral 1 indicates, as a whole, a sorting machine (partially illustrated) comprising a structure 2 and a conveyor system 3, of known type and not described in detail, which is supported by the structure 2 and is controlled so as to sort a series of postal articles towards a plurality of stackers. In particular, the sorting is performed as a function of the addresses or delivery destinations indicated on the postal articles. The stackers are arranged side by side and on two levels, which are parallel to a horizontal direction D. As shown in Figure 2, the upper level stackers are arranged at a greater height and are indicated by reference numeral 5, while the lower level stackers are indicated by reference numeral 6 and, preferably, are made according to the known art.

[0012] Each stacker 6 is aligned with an above respective stacker 5 along a horizontal direction E, orthogonal to direction D.

[0013] The inlets to the stackers 5 are substantially aligned in a vertical direction with the inlets of the stackers 6, so as to allow an operator 7 (Fig. 2), even if of below-average height, to easily reach the postal articles on the upper level.

[0014] The stackers 5 and 6 accumulate the sorted post and are manually emptied by the operator 7, or by means of a robotized system, not illustrated, when the filling level of the stackers 5 and 6 reaches a given threshold and/or at predetermined time intervals.

[0015] The upper level stackers 5 are all the same, and therefore the following disclosure will refer to just one of them. According to what shown in Figures 3 and 4, the stacker 5 comprises a base 10 defining a lower plane 11 of a housing 12 able to accommodate a stack of postal articles (not illustrated). These postal articles are transferred by the conveyor system 3 in a known manner and not described in detail and are stacked in the housing 12 whilst vertically arranged, i.e. with a lower edge resting on the plane 11.

[0016] The conveyor system 3 comprises a roller device 14, of known type, which is configured to stack the postal articles along an axis 15 orthogonal to direction D. In the particular example illustrated, the axis 15 is slightly inclined with respect to horizontal direction E. The housing 12 has an inlet 16, defining an area where the postal articles are inserted, one at a time, by the roller device 14, with an orientation orthogonal to axis 15.

[0017] The stacker 5 comprises a movable shoulder 20, which is aligned with the inlet 16 along axis 15, to define the front end of the housing 12, i.e. the end opposite to the inlet 16. The movable shoulder 20 has a face

21 orthogonal to axis 15 and defining a support for the first postal article of the stack, is preferably made with a blade-like shape and is known in the jargon as a "knife". The movable shoulder 20 is connected to a guide 22 (fig. 3) parallel to axis 15, so that it can move along axis 15 with respect to the structure 2 according to the amount of postal articles stacked in the housing 12. In particular, two end-of-stroke elements are provided: one to define a rest position (shown with unbroken lines in Figure 4), where the movable shoulder 20 is located at the inlet 16, and the other to define a forward position (shown with broken lines in Figure 4), where the movable shoulder 20 is located at a front end 25 of the base 10.

[0018] The movable shoulder 20 is connected to the guide 22 by a support 26 comprising: a slide 27 engaging the guide 22; an arm 28 extending upwards with respect to the slide 27; and a connection device 29 that couples the movable shoulder 20 to the arm 28 and enables the movable shoulder 20 to be raised with respect to its normal position where it is aligned with the inlet 16. In this way, the movable shoulder 20 can be moved away from the stack resting on the plane 11. Preferably, the connection device 29 is defined by a hinge having a rotation axis 30 parallel to axis 15.

[0019] The stacker 5 further comprises a stop surface 31, which is substantially vertical and is arranged is a fixed position at the front end 25 of the base 10. In particular, when the movable shoulder 20 is located in its forward position, the stop surface 31 is vertically between the plane 11 and the movable shoulder 20 (Figure 3). Preferably, the stop surface 31 is defined by a handle 32, which can be gripped to longitudinally translate a front portion 10a of the base 10 with respect to a rear portion 10b of the base 10.

[0020] Indeed, according to the present invention, the base 10 is of the extensible type, and autonomously lengthens according to the number of stacked postal articles in the housing 12. In particular, the rear portion 10b is fixed with respect to the structure 2, while the front portion 10a is coupled to a guide device 33 so that it can translate parallel to axis 15 between a retracted end-of-stroke position, where it is close to the inlet 16, and a forward end-of-stroke position, where it is spaced apart from the inlet 16.

[0021] Preferably, the guide device 33 is arranged beneath the plane 11 and, in particular, comprises two guide members 34 parallel to axis 15 and transversally set apart from each other. As shown in Figure 4, each guide member 34 comprises a rod 35, fixed with respect to one of the parts 10a or 10b, and a metal tube 36, which is fixed with respect to the other of the two parts 10a or 10b and is slidingly engaged by the respective rod.

[0022] Still with reference to Figure 3, parts 10a and 10b conveniently have a comb-like or fork-like shape, so as to have respective fingers 37 and 38 that are parallel to axis 15, alternate with each other parallel to direction D and engaged so as to slide in seats defined by the fingers 38 or 37 of the other part 10b or 10a. Preferably, the shapes and sizes and the maximum translation of the fingers 37 and 38 are such as to avoid gaps in the plane 11 in all operating positions of the front portion 10a.

[0023] According to a preferred aspect of the present invention, the stacker 5 comprises a return device 40 (Figures 2 and 4) exerting an elastic action that tends to automatically return the front portion 10a towards the inlet 16, i.e. towards its retracted end-of-stroke position. Preferably, the stacker 5 also comprises a return device 41, exerting an elastic action on the support 26 that tends to automatically return the movable shoulder 20 towards the inlet 16, i.e. towards its rest position. In particular, the return devices 40 and/or 41 are defined by belt or cable devices.

[0024] According to a preferred aspect of the present invention, the guide 22 is fixed with respect to the front portion 10a and the end-of-stroke element defining the forward position of the movable shoulder 20 is also fixed with respect to the front portion 10a.

[0025] In the particular embodiment shown, this end-of-stroke element is a check plate that is placed at the end of the guide 22 and enables the base 10 to automatically lengthen as a function of the stacked postal articles in the housing 12. In fact, the creation of the stack of postal articles first makes the movable shoulder 20 translate towards its forward position against the action of return device 41, while return device 40 keeps the front portion 10a in its retracted end-of-stroke position. When the movable shoulder 20 arrives to its end of stroke, the stacking of further postal articles makes the movable shoulder 20 and the front portion 10a move as one against the action of the return devices 40 and 41, until the front portion 10a reaches its forward end-of-stroke position.

[0026] Advantageously, as shown in Figure 3, the guide 22 is arranged laterally and/or constitutes part of one of the fingers 37, and/or the guide members 34 are aligned with the fingers 38.

[0027] To pick the postal articles, the movable shoulder 20 can be raised, leaving the stack on the stop surface 31. At this point, the return device 41 returns the support 26 with the movable shoulder 20 back towards the inlet 16, so as to give free access to the housing 12. The stack of postal articles can then be picked and transferred to a container or tray (not illustrated).

[0028] Preferably, during removal of the postal articles from the housing 12, an interlock (not illustrated) keeps the front portion 10a at a standstill with respect to the rear portion 10b. When this interlock is, automatically or manually, deactivated, the return device 40 automatically returns the front portion 10a to its retracted end-of-stroke position. Lastly, the movable shoulder 20 must be returned to the position aligned with the inlet 16, for the further stacking of postal articles.

[0029] With reference to Figure 2, immediately after having emptied stacker 5, it is possible to easily empty the underlying stacker 6. In fact, when stacker 5 is empty, namely when the base 10 is arranged in a minimal length

configuration, stacker 6 protrudes forwards along direction E, i.e. in the opposite direction to the position of the conveyor system 3, with respect to the front end 25 of stacker 5. In this configuration, the space occupied by stacker 5 is quite modest. The operator 7 can therefore access stacker 6 in an ergonomic manner, as it is not necessary to bend down or perform particular manoeuvres to grasp the postal articles housed in stacker 6.

[0030] Thus, from the foregoing, it is evident how stacker 5 allows access to the underlying stacker 6 without any difficulty, yet at the same time it can have a relatively high accumulation capacity thanks to the fact that the base 10 is of the extensible type. In particular, stackers 5 have a capacity substantially equal to that of stackers 6 when the bases 10 are arranged in a maximum length configuration.

[0031] The fact of making the base 10 in two parts enables achieving a relatively simple solution and of maintaining stable support on the plane 11 despite the elongation of the base 10. The characteristics of the guide 22 and, in particular, of the end-of-stroke element defining the forward position of the movable shoulder 20 permit obtaining high compactness and, at the same time, simple and automatic operation for lengthening the base 10. The special constructional characteristics of parts 10a and 10b of the guide device 33 and of the support 26 also permit obtaining high compactness and, at the same time, extreme simplicity in the use and/or in the assembly of the various components.

[0032] Finally, from the foregoing, it is evident that modifications and variants can be made to the stacker 5 and to the machine 1 described with reference to the attached figures without departing from the scope of the present invention, as defined in the appended Claims.

[0033] In particular, the base 10 could include a different system for rendering it extensible; or parts 10a and 10b could have different shapes from those illustrated by way of example.

[0034] The return devices 40 and/or 41 could be absent and, for example, be replaced by friction or snap-action retention devices that impede the translation of the front portion 10a and the movable shoulder 20, without exerting any return action towards the inlet 16, for which return to the inlet 16 must be performed by intentionally pushing after emptying the housing 12.

[0035] Furthermore, the movable shoulder 20 could have a slide independent of that of the front portion 10a: in this case, for example, the elongation of the base 10 could start when the stack of postal articles makes contact with the stop surface 31.

[0036] In addition, the return devices 40 and 41 could be of a different type from the belt ones, indicated by way of example; and/or the guide device 33 could be shaped differently and/or arranged in a different position with respect to the illustrated preferred embodiment.

Claims

1. A stacker (5) for a machine for sorting postal articles; the stacker comprising:

   - a base (10) having a plane (11) defining a support for a lower edge of said postal articles;
   - an inlet (16) for stacking postal articles along a longitudinal axis (14) on said plane (11);
   - a movable shoulder (20), which is aligned with said inlet (16) along said longitudinal axis (14) at least during stacking;

   said base (10) comprising a fixed rear portion (10b) and a front portion (10a), said front portion being coupled to first guide means (33) so that said front portion can translate in a direction parallel to said longitudinal axis (15) between a retracted end-of-stroke position, where it is close to said inlet (16), and a forward end-of-stroke position, where it is spaced apart from said inlet (16); shoulder means being provided to automatically translate said front portion (10a) as a function of the amount of stacked postal articles;
   characterized by comprising second guide means (22) that guide a translation of said movable shoulder (20) along said longitudinal axis (15) from said inlet (16) with respect to said front portion (10a) and said rear portion (10b) as a function of the amount of stacked postal articles.

2. The stacker according to Claim 1, **characterized in that** said shoulder means comprise an end-of-stroke element, which is fixed with respect to a front end (25) of said front portion (10a) and defines, for said movable shoulder (20), a forward position, in which said movable shoulder (20) is located at said front end (25).

3. The stacker according to Claim 1 or 2, **characterized in that** said shoulder means comprise a handle (32) arranged in a fixed position at a front end (25) of said front portion (10a).

4. The stacker according to any of the preceding Claims, **characterized by** comprising elastic means (40) exerting an action that tends to bring said front portion (10a) towards its retracted end-of-stroke position.

5. The stacker according to any of the preceding Claims, **characterized in that** said second guide means (22) are fixed with respect to said front portion (10a).

6. The stacker according to any of the preceding Claims, **characterized in that** said rear portion (10b) and said front portion (10a) comprise respective fin-

gers (38, 37) which are parallel to said longitudinal axis (15) and are alternated.

7. The stacker according to Claim 6, **characterized in that** said second guide means (22) form part of one of said fingers (37).

8. The stacker according to any of the preceding Claims, **characterized in that** said first guide means (33) are arranged below said plane (11).

9. A machine for sorting postal articles, comprising a lower level of stackers (6) and an upper level of stackers (5); the upper level stackers (5) being made according to any of the preceding Claims.

10. The sorting machine according to Claim 9, **characterized in that** the stackers (5) of the upper level have inlets which are substantially aligned in a vertical direction with respective inlets of the lower level stackers (6).

11. The sorting machine according to Claim 9 or 10, **characterized in that** the lower level stackers (6) project forwards with respect to the bases (10) of the upper level stackers (5) when said bases (10) are arranged in a minimal length configuration.

12. The sorting machine according to any of claims 9 to 11, **characterized in that** the upper level stackers (5) have a capacity substantially equivalent to that of the lower level stackers (6) when the bases (10) of the upper level stackers are arranged in a maximum length configuration.

Patentansprüche

1. Ein Stapler (5) für eine Maschine zum Sortieren postalischer Artikel, wobei der Stapler beinhaltet:

- eine Basis (10), die eine Ebene (11) hat, welche eine Auflage für einen unteren Rand der postalischen Artikel definiert,
- einen Einlass (16) zum Stapeln postalischer Artikel entlang einer Längsachse (14) auf der Ebene (11),
- eine bewegbare Schulter (20), die zu dem Einlass (16) entlang der Längsachse (14) zumindest während des Stapelns ausgerichtet ist,

wobei die Basis (10) einen festen hinteren Abschnitt (10b) und einen vorderen Abschnitt (10a) beinhaltet, wobei der vordere Abschnitt an erste Führungsmittel (33) gekoppelt ist, so dass sich der Vorderabschnitt in einer Richtung parallel zu der Längsachse (15) zwischen einer zurückgezogenen Hubendposition, an welcher dieser zu dem Einlass (16) benachbart ist, und einer vorwärtigen Hubendposition, an welcher dieser von dem Einlass (16) entfernt beabstandet ist, translatorisch bewegen kann, wobei Schultermittel zum automatischen translatorischen Bewegen des vorderen Abschnitts (10a) als eine Funktion der Menge der gestapelten postalischen Artikeln vorgesehen sind,
dadurch gekennzeichnet, dass er zweite Führungsmittel (22) beinhaltet, welche eine Translation der bewegbaren Schulter (20) entlang der Längsachse (15) von dem Einlass (16) mit Bezug zu dem vorderen Abschnitt (10a) und dem hinteren Abschnitt (10b) als eine Funktion der Menge der gestapelten postalischen Artikeln führen.

2. Der Stapler gemäß Anspruch 1, **dadurch gekennzeichnet, dass** die Schultermittel ein Hubendelement beinhalten, welches mit Bezug zu einem vorderen Ende (25) des vorderen Abschnitts (10a) befestigt ist, und welches für die bewegbare Schulter (20) eine vorwärtige Position definiert, in welcher sich die bewegbare Schulter (20) an dem vorderen Ende (25) befindet.

3. Der Stapler gemäß Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** die Schultermittel ein Bedienteil (32) beinhalten, das in einer festen Position an einem vorderen Ende (25) des vorderen Abschnitts (10a) angeordnet ist.

4. Der Stapler gemäß einem der vorangehenden Ansprüche, **dadurch gekennzeichnet, dass** dieser ein elastisches Mittel (40) beinhaltet, welches eine Wirkung ausübt, die dazu tendiert, den vorderen Abschnitt (10a) zu dessen zurückgezogener Hubendposition zu bringen.

5. Der Stapler gemäß einem der vorangehenden Ansprüche, **dadurch gekennzeichnet, dass** die zweiten Führungsmittel (22) mit Bezug zu dem vorderen Abschnitt (10a) befestigt sind.

6. Der Stapler gemäß einem der vorangehenden Ansprüche, **dadurch gekennzeichnet, dass** der hintere Abschnitt (10b) und der vordere Abschnitt (10a) jeweilige Finger (38, 37) beinhalten, welche zu der Längsachse (15) parallel sind und alternierend sind.

7. Der Stapler gemäß Anspruch 6, **dadurch gekennzeichnet, dass** die zweiten Führungsmittel (22) einen Teil von einem der Finger (37) bilden.

8. Der Stapler gemäß Anspruch einem der vorangehenden Ansprüche, **dadurch gekennzeichnet, dass** die ersten Führungsmittel (33) unter der Ebene (11) angeordnet sind.

9. Eine Maschine zum Sortieren postalischer Artikel,

welche ein unteres Niveau an Staplern (6) und ein oberes Niveau an Staplern (5) beinhaltet, wobei die Stapler (5) des oberen Niveaus gemäß einem der vorangehenden Ansprüche gebildet sind.

10. Die Sortiermaschine gemäß Anspruch 9, **dadurch gekennzeichnet, dass** die Stapler (5) des oberen Niveaus Einlässe haben, welche zu jeweiligen Einlässen der Stapler (6) des unteren Niveaus in einer vertikalen Richtung näherungsweise ausgerichtet sind.

11. Die Sortiermaschine gemäß Anspruch 9 oder 10, **dadurch gekennzeichnet, dass** die Stapler (6) des unteren Niveaus mit Bezug zu den Basen (10) der Stapler (5) des oberen Niveaus vorwärts auskragen, wenn die Basen (10) in einer Konfiguration einer minimalen Länge angeordnet sind.

12. Die Sortiermaschine gemäß einem der Ansprüche 9 bis 11, **dadurch gekennzeichnet, dass** die Stapler (5) des oberen Niveaus eine Kapazität haben, welche zu derjenigen der Stapler (6) des unteren Niveaus näherungsweise gleich ist, wenn die Basen (10) der Stapler des oberen Niveaus in einer Konfiguration maximaler Länge angeordnet sind.

Revendications

1. Empileur (5) pour une machine de tri d'articles postaux ; l'empileur comprenant :

une base (10) ayant un plan (11) définissant un support pour un bord inférieur desdits articles postaux ;
une entrée (16) pour empiler les articles postaux le long d'un axe longitudinal (14) sur ledit plan (11) ;
un épaulement mobile (20) qui est aligné avec ladite entrée (16) le long dudit axe longitudinal (14) au moins pendant l'empilement ;
ladite base (10) comprenant une partie arrière fixe (10b) et une partie avant (10a), ladite partie avant étant couplée aux premiers moyens de guidage (33) de sorte que ladite partie avant peut effectuer un mouvement de translation dans une direction parallèle audit axe longitudinal (15) entre une position de fin de course rétractée, dans laquelle elle ferme ladite entrée (16) et une position de fin de course avant, dans laquelle elle est espacée de ladite entrée (16) ;
des moyens d'épaulement étant prévus pour translater automatiquement ladite partie avant (10a) en fonction de la quantité d'articles postaux empilés ;
caractérisé en ce qu'il comprend des seconds moyens de guidage (22) qui guident une translation dudit épaulement mobile (20) le long dudit axe longitudinal (15) à partir de ladite entrée (16) par rapport à ladite partie avant (10a) et ladite partie arrière (10b) en fonction de la quantité d'articles postaux empilés.

2. Empileur selon la revendication 1, **caractérisé en ce que** lesdits moyens d'épaulement comprennent un élément de fin de course qui est fixe par rapport à une extrémité avant (25) de ladite partie avant (10a) et définit, pour ledit épaulement mobile (20), une position vers l'avant, dans laquelle ledit épaulement mobile (20) est positionné au niveau de ladite extrémité avant (25).

3. Empileur selon la revendication 1 ou 2, **caractérisé en ce que** lesdits moyens d'épaulement comprennent une poignée (32) agencée dans une position fixe au niveau d'une extrémité avant (25) de ladite partie avant (10a).

4. Empileur selon l'une quelconque des revendications précédentes, **caractérisé en ce qu'**il comprend des moyens élastiques (40) exerçant une action qui a tendance à amener ladite partie avant (10a) vers sa position de fin de course rétractée.

5. Empileur selon l'une quelconque des revendications précédentes, **caractérisé en ce que** lesdits seconds moyens de guidage (22) sont fixes par rapport à ladite partie avant (10a).

6. Empileur selon l'une quelconque des revendications précédentes, **caractérisé en ce que** ladite partie arrière (10b) et ladite partie avant (10a) comprennent des doigts (38, 37) respectifs qui sont parallèles audit axe longitudinal (15) et alternés.

7. Empileur selon la revendication 6, **caractérisé en ce que** lesdits seconds moyens de guidage (22) font partie de l'un desdits doigts (37).

8. Empileur selon l'une quelconque des revendications précédentes, **caractérisé en ce que** lesdits premiers moyens de guidage (33) sont agencés au-dessous dudit plan (11).

9. Machine de tri d'articles postaux, comprenant un niveau inférieur d'empileurs (6) et un niveau supérieur d'empileurs (5) ; les empileurs (5) du niveau supérieur étant réalisés selon l'une quelconque des revendications précédentes.

10. Machine de tri selon la revendication 9, **caractérisée en ce que** les empileurs (5) du niveau supérieur ont des entrées qui sont sensiblement alignées dans une direction verticale avec des entrées respectives des empileurs (6) du niveau inférieur.

11. Machine de tri selon la revendication 9 ou 10, **caractérisée en ce que** les empileurs (6) du niveau inférieur font saillie vers l'avant par rapport aux bases (10) des empileurs (5) du niveau supérieur, lorsque lesdites bases (10) sont agencées dans une configuration de longueur minimum.

12. Machine de tri selon l'une quelconque des revendications 9 à 11, **caractérisée en ce que** les empileurs (5) du niveau supérieur ont une capacité sensiblement équivalent à celle des empileurs (6) du niveau inférieur, lorsque les bases (10) des empileurs du niveau supérieur sont agencées dans une configuration de longueur maximum.

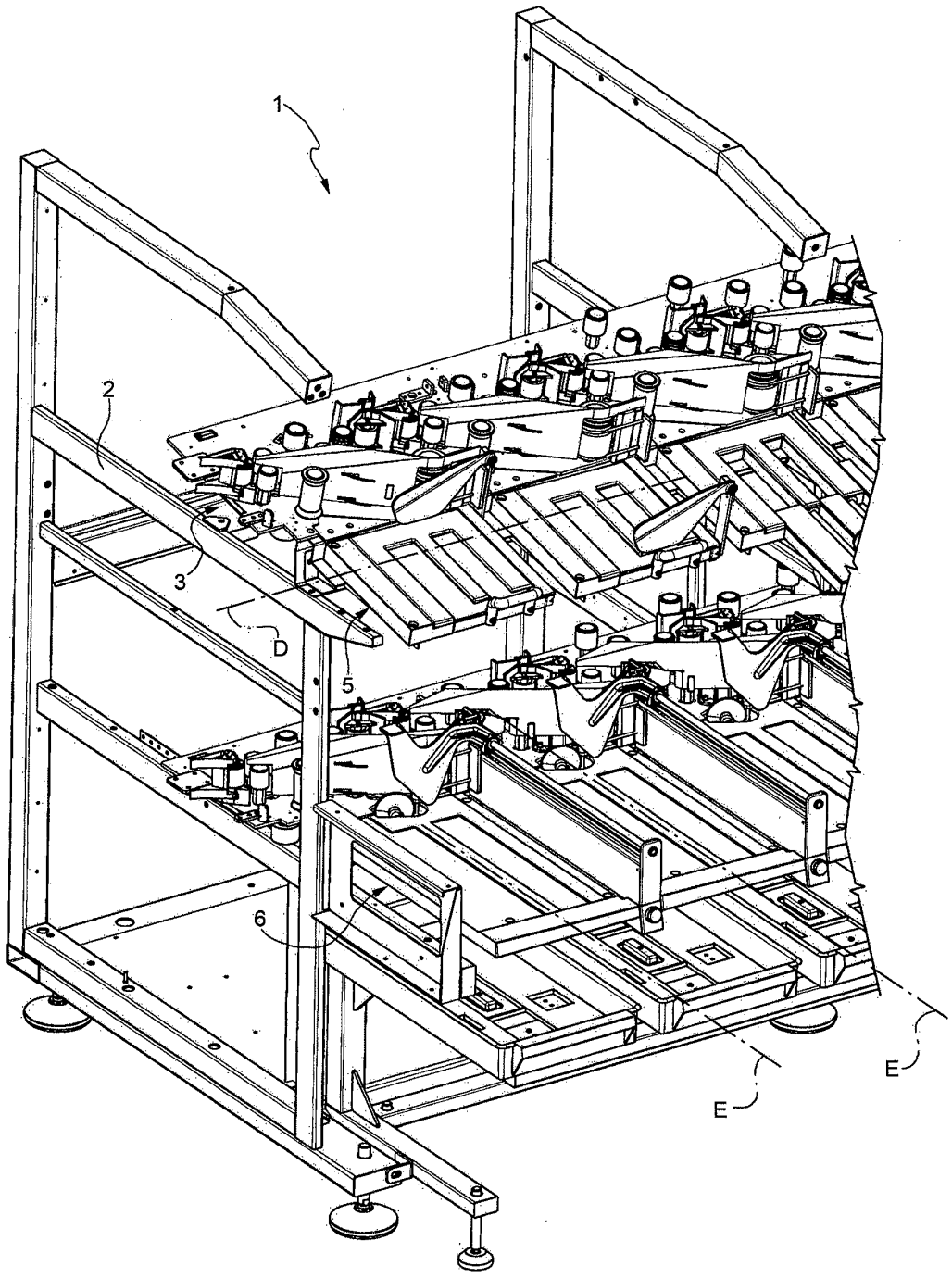

FIG. 1

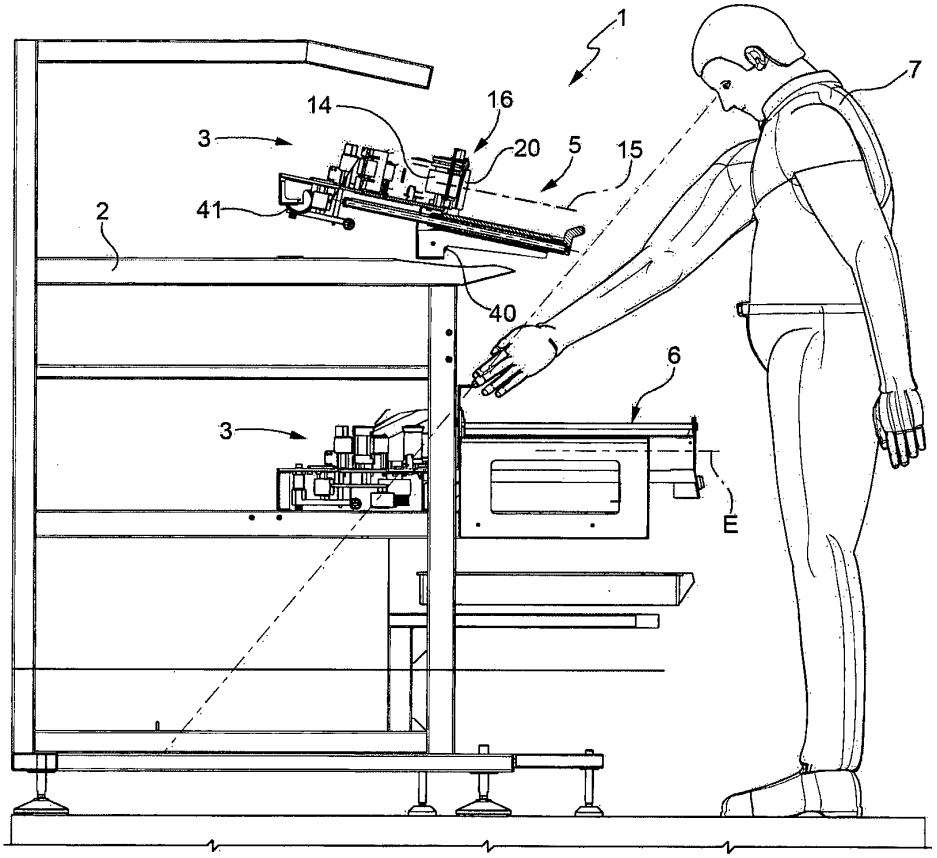
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FIG. 2

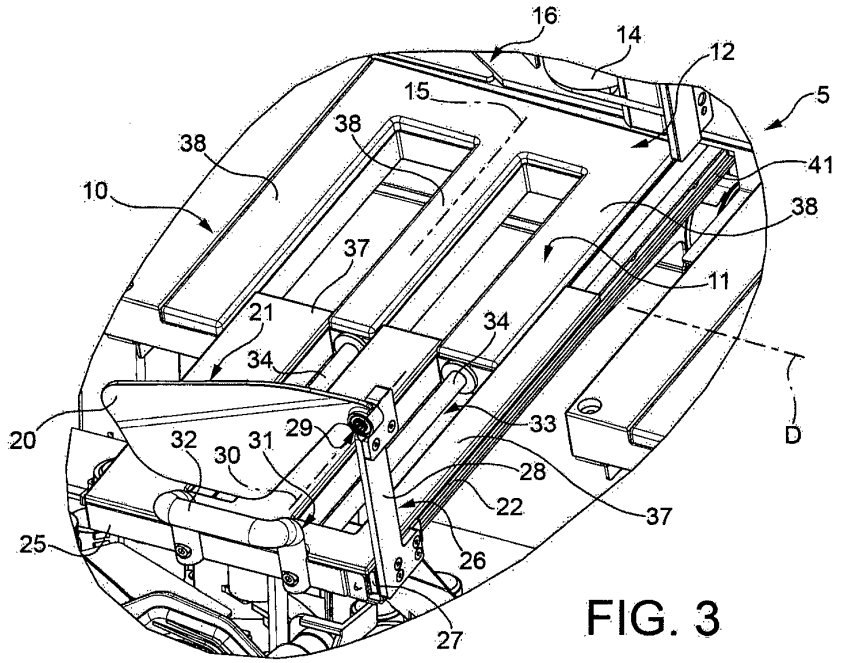
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FIG. 3

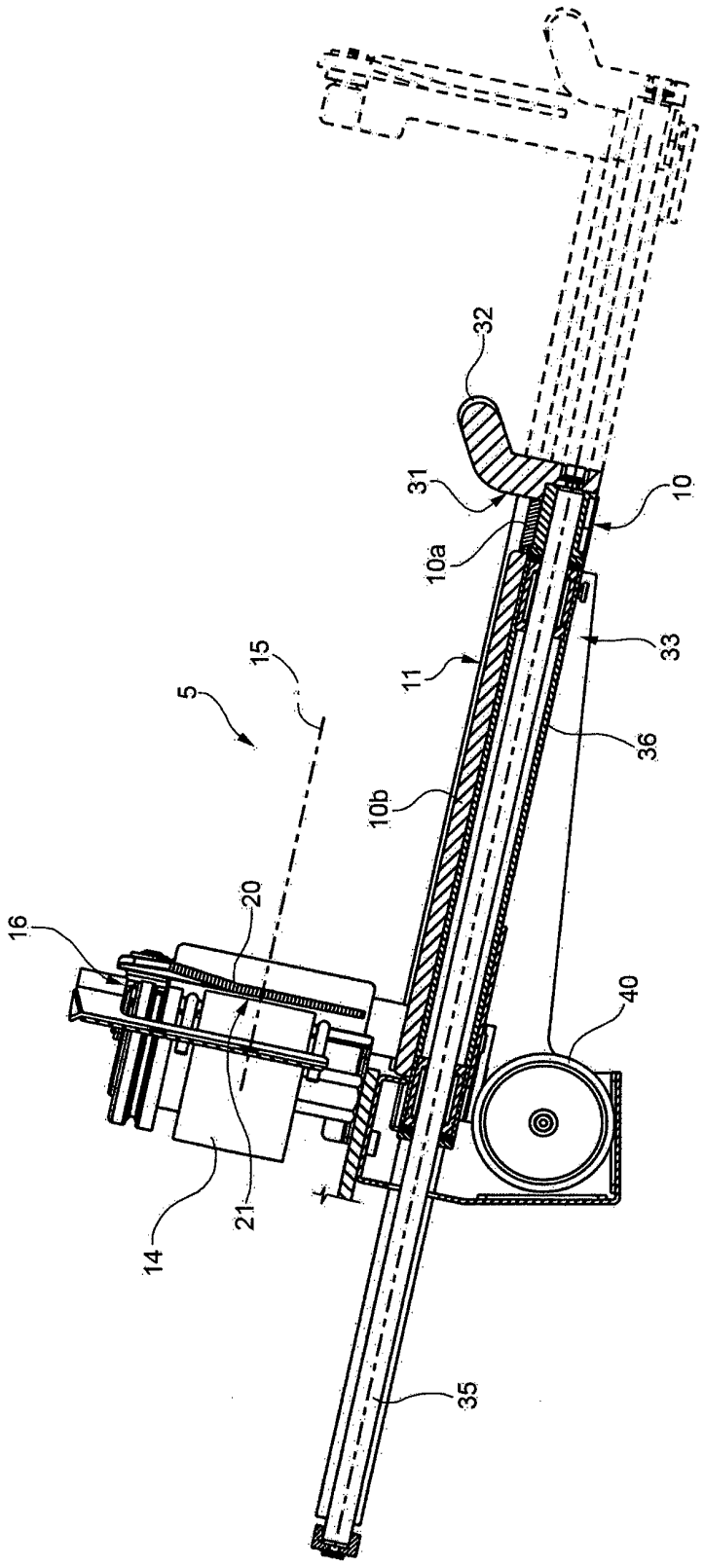

FIG. 4

REFERENCES CITED IN THE DESCRIPTION

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