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(54) **METHOD OF ASSEMBLING A SEMI-FINISHED PRODUCT FOR MAKING A SPRING MATTRESS AND RELATED MACHINE**

(57) Described is a method of assembling a semi-finished product (1) for making a spring mattress (100), comprising the steps of preparing a pack (2) of springs having a substantially parallelepiped shape and having four side faces (5); preparing four longitudinal members (6) each intended to join a respective said side face (5) of said pack (2) of springs, applying an adhesive on a

joining surface of each of said four longitudinal members (6) and/or on each of said side faces (5) of said pack (2) of springs, joining said approach surface of each of said four longitudinal members (6) to said respective side face (5) of said pack (2) of springs to glue them together in a stable fashion.

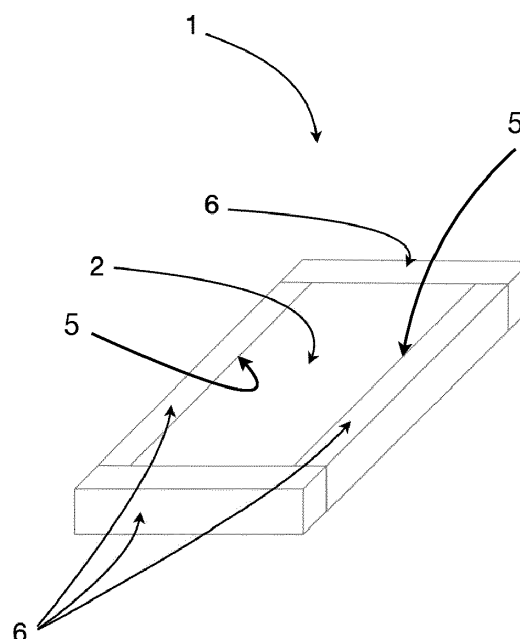


Fig.1

Description

[0001] This invention relates to a method of assembling a semi-finished product for making a spring mattress.

[0002] The invention also relates to a machine for assembling a semi-finished product for making a spring mattress. The term "spring mattress" means a mattress which comprises inside it a plurality of springs, also called a pack of springs, generally held together, for example, by a textile casing or by metallic or plastic connecting elements.

[0003] As well as comprising the pack of springs the spring mattress also comprises at least one lower sheet made of resilient material, an upper sheet made of resilient material and a plurality of side faces, called longitudinal members, which are also made of resilient material.

[0004] Currently, the spring mattresses are made with strictly manual or semi-automatic procedures which consist in the following series of operating steps.

[0005] Firstly, the lower sheet is prepared and the pack of springs is positioned centrally on this.

[0006] The lower sheet extends for a greater area than the pack of springs in such a way as to leave free a peripheral strip on the lower sheet and allow the subsequent positioning of the above-mentioned longitudinal members on the strip.

[0007] The longitudinal members are glued on the lower sheet and are positioned only resting on the pack of springs.

[0008] At this point, the upper sheet is positioned for closing the mattress with any overlapping of any further sheets with different resilience or other characteristics, known as "comfort layers".

[0009] The prior art processes for making spring mattresses have major drawbacks.

[0010] A first major drawback is the fact that the operation for positioning the longitudinal members on the lower sheet can only be currently performed manually or with robotized arms which are both highly complex and expensive.

[0011] A further drawback is due to the fact that the step of pressing the longitudinal members on the lower sheet, since the glued surface has quite reduced dimensions (that is to say, the lower surface of just the longitudinal members), is more difficult to apply and the possibility of varying the position or the lack of glue on them is not uncommon.

[0012] The aim of the invention is therefore to provide a method of assembling a semi-finished product for making a spring mattress which is able to overcome the above-mentioned drawbacks of the prior art.

[0013] In particular, the aim of the invention is to provide a method for assembling a semi-finished product for making a spring mattress which allows the process for producing any spring mattress to be made automated, advantageously using the systems suitable for making mattresses of the superposed sheet type.

[0014] A further aim of the invention is to provide a machine for assembling a semi-finished product for making a spring mattress which is both practical to use and simple and economical to produce and which allows the above-mentioned semi-finished product to be produced without the need for manual interventions in the positioning of the various constituent components.

[0015] According to the invention, these aims and others are achieved by a method of assembling a semi-finished product for making a spring mattress and relative machine having the technical characteristics described in the accompanying claims.

[0016] The technical features of the invention, with reference to the above-mentioned aims, are clearly described in the appended claims and its advantages are apparent from the detailed description which follows, with reference to the accompanying drawings which illustrate purely non-limiting example embodiments of the invention, in which:

- Figure 1 shows, in a schematic axonometric view, an embodiment of a semi-finished product for making a spring mattress made in accordance with a method according to the invention,
- Figure 2 shows, in a schematic axonometric view, an embodiment of a mattress comprising the semi-finished product of Figure 1,
- Figure 3 shows an embodiment of a machine according to the invention and
- Figures 4 to 10 show the machine of Figure 3 in the various manufacturing steps of a semi-finished product for making a spring mattress.

[0017] The method of assembling a semi-finished product 1 for making a spring mattress according to the invention comprises the following steps:

- providing a pack 2 of springs having a substantially parallelepiped shape and having four side faces 5;
- preparing four longitudinal members 6 each of which is designed to join to a respective side face 5 of the pack 2 of springs,
- applying an adhesive on a joining surface of each of the four longitudinal members 6 and/or on each of the side faces 5 of the pack 2 of springs,
- joining the joining surface of each of the four longitudinal members 6 to the respective side face 5 of the pack 2 of springs to glue them stably.

[0018] As shown in Figures 1 and 2, the numeral 1 denotes a semi-finished product for making a spring mattress 100 made in accordance with a method according to the invention, hereinafter also referred to simply as semi-finished product 1.

[0019] The term semi-finished product 1 means a part or component designed to constitute a mattress 100 with the addition of a lower sheet and an upper sheet.

[0020] The semi-finished product 1 made according to

the method according to the invention comprises a pack 2 of springs substantially having the shape of a parallelepiped and having a lower face, an upper face and four side faces 5.

[0021] In detail, the four side faces 5 are the faces interposed between the upper and lower faces.

[0022] The semifinished product 1 also comprises four longitudinal members 6 each shaped to be arranged close to a respective side face 5 of the pack 2 of springs. Depending on the dimensions of the mattress, the longitudinal members 6 have different lengths in pairs.

[0023] The method provides for the joining of the four longitudinal members 6 in a stable manner with a relative joining surface, that is to say, the one facing the pack 2 of springs, to the respective side face 5 of the pack 2 of springs.

[0024] Advantageously, the four longitudinal members 6 define in their entirety a rectangular frame of the pack 2 of springs, as shown in Figure 1.

[0025] The longitudinal members 6 are glued to the pack 2 of springs for example using acrylic water-based adhesives or polychloroprene.

[0026] A further type of gluing is carried out using hot-melt adhesives.

[0027] Depending on the type of glue used, the application step can take place:

- only on the joining surface of the longitudinal members 6,
- only on the side face 5 of the spring pack 2 or
- on both.

[0028] As shown in Figure 1, the longitudinal members 6 and the pack 2 of springs form, once the gluing operations have been performed, a single body having a sheet-like shape. The single body can be easily moved as a whole in the subsequent production steps of the mattress 100. Advantageously, the method according to the invention further comprises, before the step of joining the longitudinal members 6 to the pack 2 of springs, a step of applying an adhesive on a respective end portion of at least one longitudinal member 6 and a step of joining this end portion to the joining surface of an adjacent longitudinal member 6.

[0029] According to the embodiment illustrated in the drawings, the end portion is glued to the joining surface of an adjacent longitudinal member 6.

[0030] Further solutions (not shown in the drawings) are possible, for example, by making the longitudinal members 6 with their ends cut at 45°.

[0031] The single body formed by the pack 2 of springs and by the four longitudinal members 6 therefore has each single element glued on all the elements adjacent to it and this makes it possible to obtain an optimised structural strength.

[0032] This strength is particularly useful when, once the semi-finished product 1 has been joined with a respective upper and/or lower sheet to form a mattress

100, the user sits, for example, on the edge of the bed engaging that specific area of the mattress 100.

[0033] The gluing of the longitudinal member 6 to the corresponding side face 5 of the pack 2 of springs confers a clearly superior stability and drastically reduces the mechanical stress of the upper sheet which is coupled to complete the mattress 100.

[0034] The pack 2 of springs has a main plane of extension, with a direction according to a direction perpendicular to the plane (the height of the pack 2 of springs) substantially equal to the dimension of the longitudinal members 6 in the same direction (the height of the longitudinal members 6).

[0035] Further embodiments also possible in which the pack 2 of springs is higher than the height of the longitudinal members in order to create a sort of "convexity" of the surface in the central zone of the mattress 100.

[0036] The pack 2 of springs may be both of the type comprising bagged springs and of the type with non-bagged springs. If the pack 2 comprises springs contained in respective bags the inner surface of the longitudinal members 6 (that is, the one facing towards the pack 2) is glued on the bags of springs.

[0037] If, on the other hand, the pack 2 of springs comprises springs made of wire-like material without these being inserted inside respective bags, the inner surface of the longitudinal members 6 is glued directly on the springs, that is to say, on the wire-like material of the springs.

[0038] Also in the case of a pack 2 of springs comprising faux springs made of resilient materials similar to expanded polyurethane, the longitudinal members 6 can be glued directly on their surface.

[0039] Figure 2 shows, on the other hand, a mattress 100 comprising at least one lower sheet 101, at least one upper sheet 102 and a semi-finished product 1 made according to a method according to the invention and glued to the lower sheet 101 and to the upper sheet 102. Advantageously, the lower sheet 101 and the upper sheet 102 have a main plane of extension and on it a surface of the same area as said semi-finished product 1 (that is to say, the sum of the area of the pack 2 of springs and that of the four longitudinal members 6 joined together with the pack 2).

[0040] In order to obtain an adequate structural strength of the mattress 100 the semi-finished product 1 is glued to the lower sheet 101 and to the upper sheet 102 at least by means, respectively, of the lower and upper surface of the longitudinal members 6.

[0041] Advantageously, the method according to the invention further comprises, after the step of applying an adhesive on one or both of the joining surface of the longitudinal members and/or of the side face 5 of the pack 2 of springs, a step of pressing each of the four longitudinal members 6 on the respective side face 5 of the pack 2 of springs.

[0042] The step of applying an adhesive to the joining surface of the individual longitudinal members 6 and/or

to the side faces 5 of the pack 2 of springs advantageously takes place by spraying or spreading.

[0043] This step of applying an adhesive takes place in the storage station of the longitudinal members 6 and of the pack 2 of springs or directly in the assembly station of the same, or in the path between the first and the second.

[0044] Figure 3 shows an embodiment solution of a machine 10 for assembling a semi-finished product 1 for manufacturing a spring mattress 100 according to the invention.

[0045] The machine 10 comprises an assembly station 12 and a rotation station 11.

[0046] The assembly station 12 is designed for joining the pack 2 of springs with the respective longitudinal members 6. For this purpose, the machine 10 comprises mobile approaching means 13, 14 inside the assembly station 12 and configured both to join the longitudinal members 6 to the pack 2 of springs and to centre the semi-finished product 1 with respect to the assembly station 12 during the assembly operations.

[0047] According to an embodiment, the approaching means 13, 14 comprise linear actuators movable on the work surface of the assembly station in the same direction with concordant or opposite directions.

[0048] Advantageously, the rotation station 11 is operatively connected to the assembly station 12 in such a way as to create a common work surface.

[0049] The machine 10 also comprises, at the work surface of the assembly station 12, first handling means 15, for example at least one motorized roller, designed to move the semi-finished product 1, during the various processing stages, from the assembly station 12 to the rotation station 11.

[0050] Conversely, in order to move the semi-finished product 1 from the rotation station 11 to the assembly station 12, the rotation station 11 comprises respective second handling means 16, for example at least one motorized roller.

[0051] The transport of the pack 2 of springs and of the individual longitudinal members 6 from the respective storage station (not shown in the drawings) inside the assembly station 12 is carried out by suitable gripping and handling means, also not shown in the figures, comprising for example a sliding carriage arranged above the machine 1 and perpendicular to the same or through motorized arms or any other system suitable for moving resilient material.

[0052] Figures 4-10 show some of the main steps for producing a semi-finished product 1 by means of a machine 10 (and a method) according to the invention.

[0053] In detail, Figure 4 shows the alignment of the pack 2 of springs on one side of the machine 1 by means of the action of the approaching means 14 which push the pack 2 of springs against the approach means 13.

[0054] Once the pack 2 of springs has been aligned against the approach means 13, the approach means 14 retracts leaving space for the insertion of the first longitudinal member 6a.

tudinal member 6a.

[0055] The longitudinal member 6a is positioned between the approach means 14 and the pack 2 of springs. Subsequently, the approach means 14 are actuated by joining the longitudinal member 6a to the pack 2 of springs.

[0056] As said in relation to the method, the contact surfaces between the longitudinal members 6 and the pack 2 of springs are previously bonded at the storage station or in the assembly station 12 or in the path between the first and the second.

[0057] With reference to Figure 6, the same operation has also been carried out for the second longitudinal member 6b and the pack 2 is arranged in contact with the approach means 14.

[0058] At this point, advantageously, the pack 2 of springs is moved to the centre of the assembly station 12.

[0059] With reference to Figure 7, the pack 2 of springs (joined in a stable manner to the longitudinal members 6a and 6b) is moved, through the action of the first handling means 15, to the rotation station 11.

[0060] In the rotation station 11, through suitable rotation means 17, the pack 2 of springs is rotated by 90° and subsequently returned to the assembly station 12 through the action of the second handling means 16.

[0061] With reference to Figures 8, 9 and 10, the joining of the third 6c and of the fourth 6d longitudinal member is repeated in the same way as described with regard to the first 6a and the second 6b longitudinal members.

[0062] Once the assembly of the semi-finished product 1 (Figure 10) has been completed, it can be moved to the subsequent processing stations for making the mattress 100.

[0063] The method and the machine 10 for assembling a semi-finished product 1 for making a spring mattress 100 according to the invention overcome the drawbacks of the prior art and achieve important advantages.

[0064] A first advantage consists in the fact that following the assembly of the semi-finished product 1, the subsequent processing steps suitable for the production of the spring mattress 100 can be carried out by using a system for the production of mattresses with superposed sheets of the conventional type.

[0065] In fact, from a point of view of production process, the semi-finished product 1 can be managed as a single sheet. This is very advantageous in terms of productivity since with a single type of production plant (machines designed for processing sheets) it is possible to produce both the main types of mattresses (with springs and sheets). This is made possible mainly by the fact that a semi-finished product 1 made according to the invention can be manipulated as if it were an actual sheet.

[0066] In detail, the pack 2 of springs and the respective four side longitudinal members 6 once glued together form a single body with a sheet-like shape, and therefore, which can be processed and manipulated as if it were an actual sheet of foamy material (memory or the like).

[0067] When the longitudinal members 6 are glued and

pressed onto the lower sheet 101 they are not single elements (and therefore very mobile with respect to their position) but are all constrained together with the pack 2 of springs, resulting in, to all intents and purposes, a single sheet-like body.

[0068] A further advantage of the invention consists in the fact that once a semi-finished product 1 has been made it is possible to associate various types of lower and/or upper sheets by gluing.

[0069] From a production point of view, this advantage is very important since the manufacturer can decide whether to produce and store a plurality of semi-finished products 1 all having the same mechanical properties and associating on each of them, depending on the requirements of the individual mattress 100 being produced, different types of lower and/or upper sheets each time.

[0070] In short, the semi-finished product 1 according to the invention constitutes the central element around which the manufacturer then decides to make a multiplicity of mattresses 100 having strength characteristics (overall hardness and softness) which are variable as a function of the mechanical characteristics of the lower and/or upper sheet which is subsequently glued to the semi-finished product 1.

Claims

1. A method of assembling a semi-finished product (1) for making a spring mattress (100), comprising the following steps:
 - providing a pack (2) of springs having a substantially parallelepiped shape and having four side faces (5);
 - preparing four longitudinal members (6) each designed to join to a respective said side face (5) of said pack (2) of springs,
 - applying an adhesive on a joining surface of each of said four longitudinal members (6) and/or on each of said side faces (5) of said pack (2) of springs,
 - joining said matching surface of each of said four longitudinal members (6) to said respective side face (5) of said pack (2) of springs to glue them stably and form a single body with a sheet-like shape.
2. The method according to claim 1 further comprising, following the step of applying an adhesive, a step of pressing each of said four longitudinal members (6) onto said side face (5) of said pack (2) of springs.
3. The method according to any one of the preceding claims further comprising, before the joining step, a step of applying an adhesive on a respective end portion of at least one longitudinal member (6) and a step of joining said end portion to said inner surface of an adjacent longitudinal member.
4. The method according to any one of the preceding claims, wherein said step of preparing said pack (2) of springs comprises the step of picking up a pack (2) of springs from a storage station and moving it to an assembly station.
5. The method according to any one of the preceding claims, wherein said step of preparing four longitudinal members (6) comprises the step of picking up at least one of said longitudinal members (6) from a storage station and moving it to an assembly station.
6. The machine (10) for assembling a semi-finished product (1) for making a spring mattress (100) comprising:
 - an assembly station (12) configured to join a pack (2) of springs with respective four longitudinal members (6), said assembly station (12) comprising first handling means (15) for moving said pack (2) of springs,
 - a rotation station (11) configured to rotate said pack (2) of springs lying on a work surface, said rotation station (11) comprising rotation means (17) configured to rotate said pack (2) of springs and second handling means (16) for moving said pack (2) of springs,
 - approach means (13, 14) arranged on said assembly station (12) and movable inside it, said means being configured to join said longitudinal members (6) to said pack (2) of springs by moving them,
 - means for applying an adhesive on said longitudinal members (6) and/or on said pack (2) of springs.
7. The machine (10) according to claim 6 wherein said rotation station (11) is operatively connected to said assembly station (12) in such a way as to create a single common work surface.
8. The machine (10) according to claim 6 or 7 wherein said approach means (13, 14) comprise linear actuators.
9. The machine (10) according to any one of claims 6 to 8, wherein said first (15) and said second (16) handling means comprise at least one motorized roller.
10. A spring mattress (100) comprising:
 - at least one lower sheet (101),
 - at least one upper sheet (102) and
 - a semi-finished product (1) made according to

a method according to any one of claims 1 to 5,
said semi-finished product (1) being glued to
said lower sheet (101) and to said upper sheet
(102).

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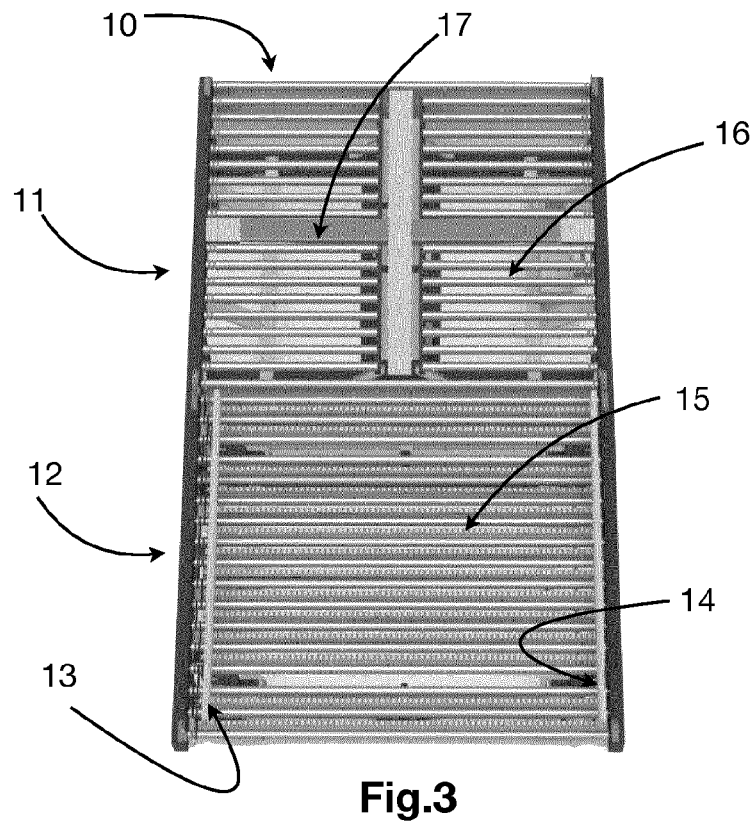
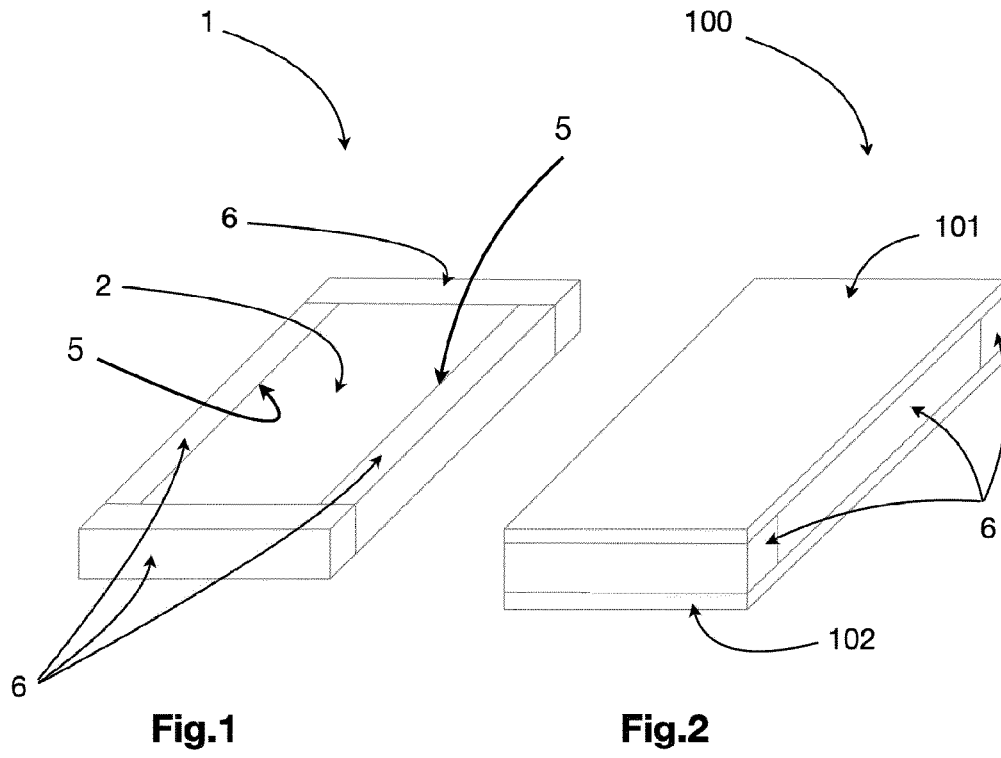
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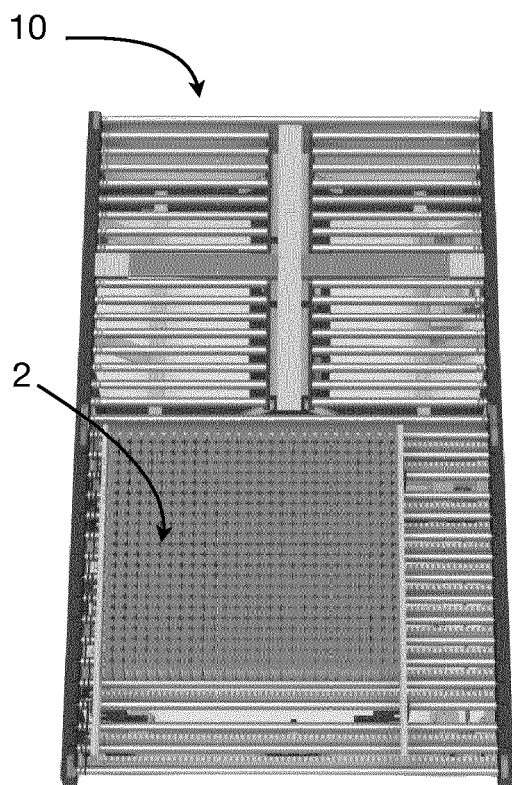


Fig. 4

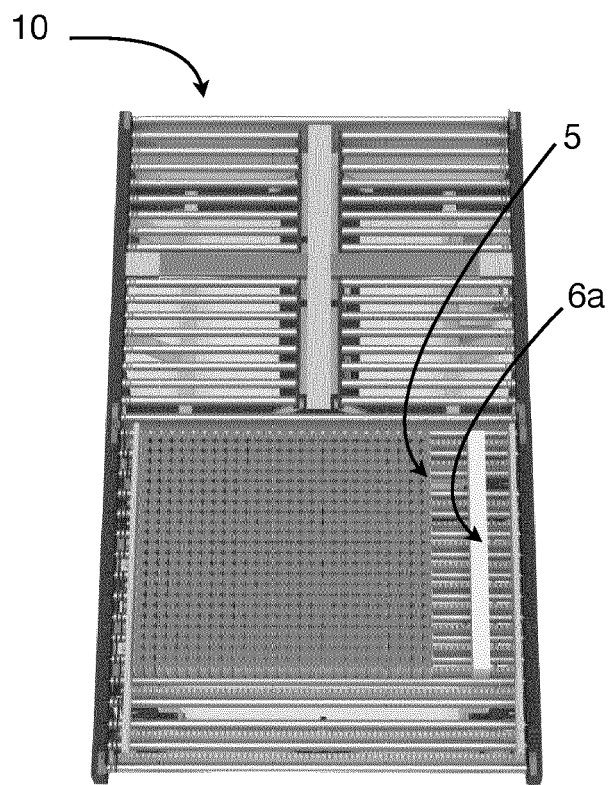


Fig. 5

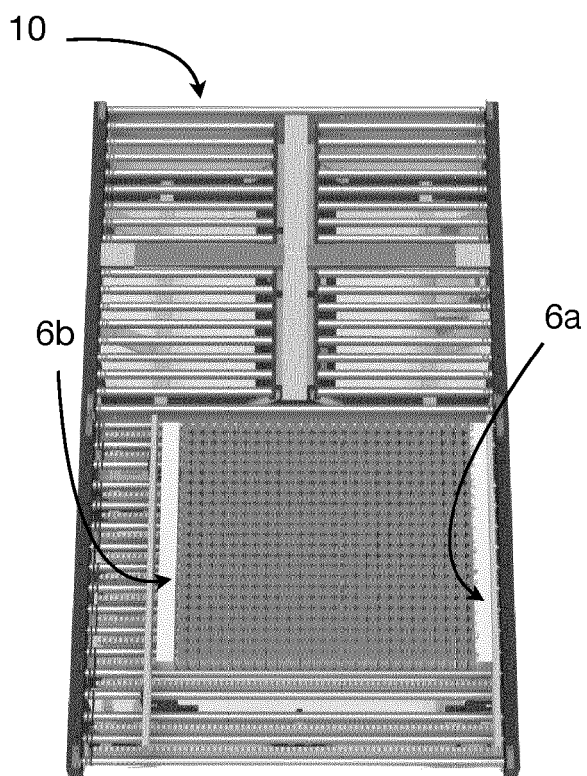


Fig. 6

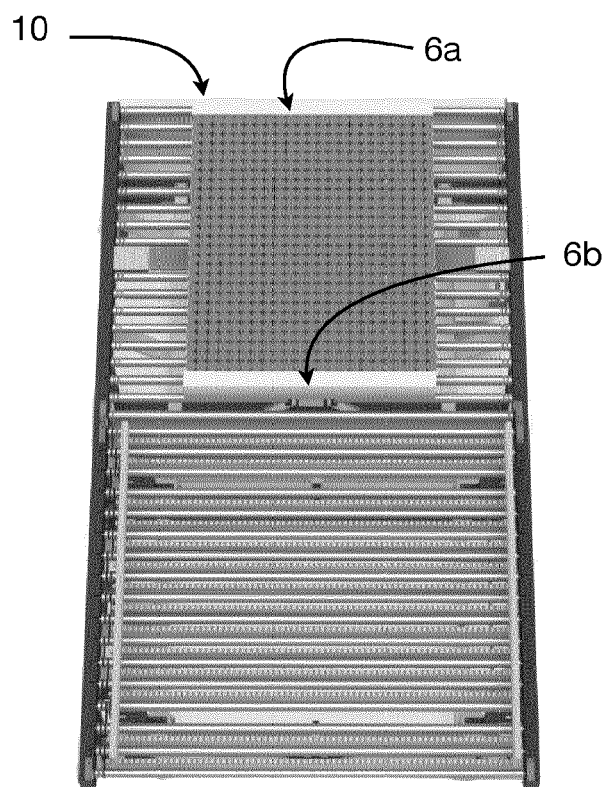


Fig. 7

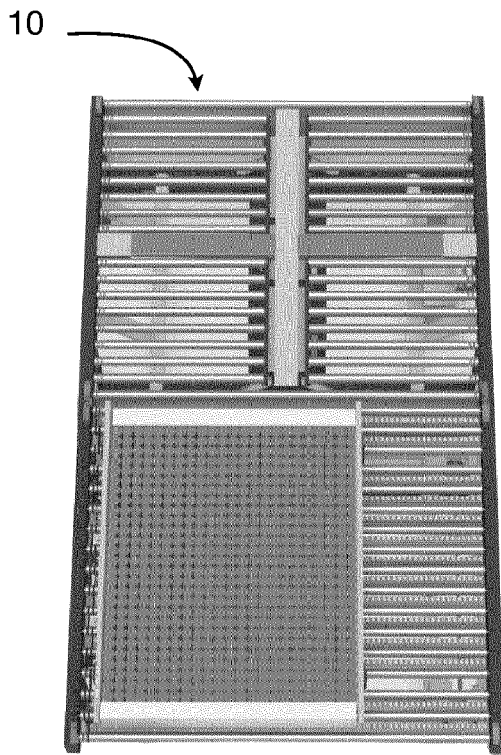


Fig. 8

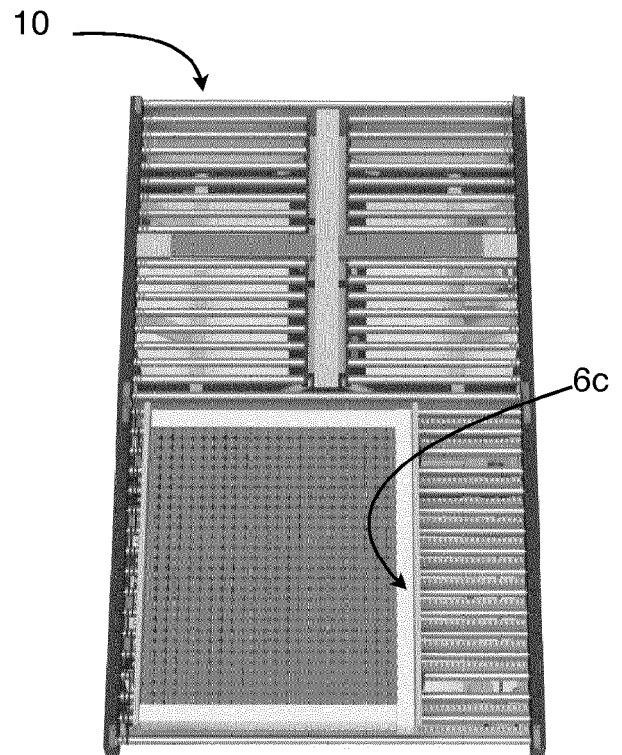


Fig. 9

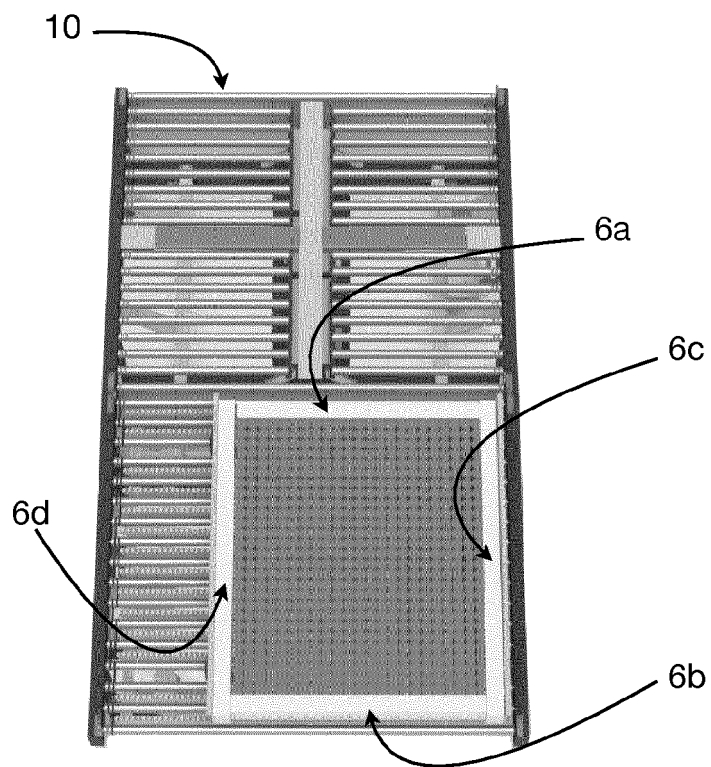


Fig. 10



EUROPEAN SEARCH REPORT

Application Number

EP 22 18 8510

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EPO FORM 1503 03.82 (P04C01)

DOCUMENTS CONSIDERED TO BE RELEVANT			
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A	* column 2, lines 24-29; figures 1-4 *	6-9	A47C27/06
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			TECHNICAL FIELDS SEARCHED (IPC)
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The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
The Hague		11 January 2023	Melo Sousa, Filipe
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

**ANNEX TO THE EUROPEAN SEARCH REPORT
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5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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