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(54) AN IMPROVED DUNNAGE ASSEMBLY

(57) A dunnage assembly for reducing or preventing movement of items during transportation, is provided comprising first and second panels, arranged substantially parallel and aligned. Each of the first and second panels having least one recess and at least one elongate spacer element received in respective recesses of the first and second panels, such that the at least one spacer element holds the first panel apart from the second panel, and wherein a width of the dunnage assembly between respective first and second panels is configurable by choosing a length of the at least one spacer element.

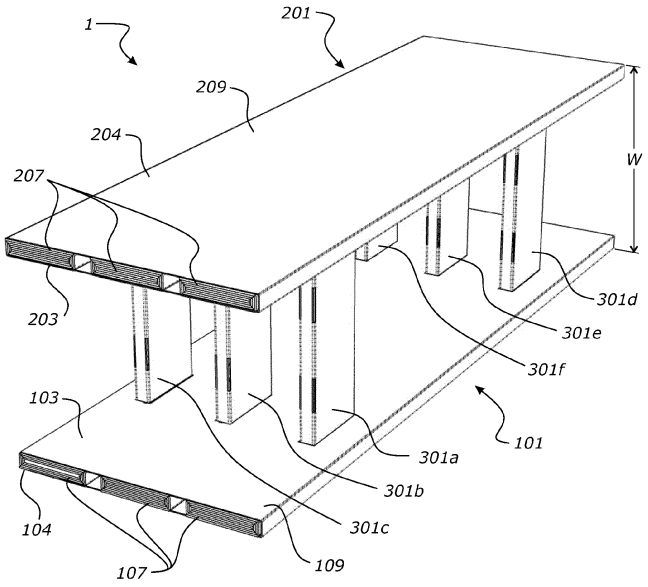

FIGURE 1

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Description

FIELD OF THE INVENTION

[0001] This invention relates to a dunnage assembly, a kit of parts for a dunnage assembly, and a method for assembling a dunnage assembly.

BACKGROUND OF THE INVENTION

[0002] When transporting goods, it is important to protect the goods from damage during transit. The general term for material used to protect goods during transit is 'dunnage'. Dunnage can take various forms, including fixed structures that are used to fill gaps between items, to reduce or prevent movement of the items during transit. Commonly used dunnage elements for this purpose include steel rachet stays, plastic or polystyrene elements, and air bags.

[0003] Steel stays are relatively expensive and bulky. They are not width-adjustable, so additional stays may be required when filling a larger gap. Air bags typically comprise plastic film and are not readily reusable or recyclable.

[0004] It would be desirable to provide an alternative dunnage solution that can readily adjusted to accommodate differently sized gaps, while preferably being environmentally friendly and relatively inexpensive.

[0005] In this specification, where reference has been made to external sources of information, including patent specifications and other documents, this is generally for the purpose of providing a context for discussing the features of the present invention. Unless stated otherwise, reference to such sources of information is not to be construed, in any jurisdiction, as an admission that such sources of information are prior art or form part of the common general knowledge in the art.

[0006] For the purpose of this specification, where method steps are described in sequence, the sequence does not necessarily mean that the steps are to be chronologically ordered in that sequence, unless there is no other logical manner of interpreting the sequence.

[0007] It is an object of the present invention to provide a dunnage assembly which overcomes or at least partially ameliorates some of the abovementioned disadvantages or which at least provides the public with a useful choice.

BRIEF DESCRIPTION OF THE INVENTION

[0008] According to a first aspect the invention broadly comprises a dunnage assembly for reducing or preventing movement of items during transportation, comprising:

a first panel and a second panel, the first and second panels each having a first side, a second side substantially opposite the first side, and at least one recess extending from the first side into the panel;

at least one elongate spacer element received in respective recesses of the first and second panels, such that the at least one spacer element holds the first panel apart from the second panel;

wherein a width of the dunnage assembly between respective second sides of the first and second panels is adjustable by changing a length of the at least one spacer element.

[0009] According to another aspect a major axis of the at least one spacer element is substantially perpendicular to a major axis of the first panel and a major axis of the second panel.

[0010] According to another aspect the at least one spacer element has a cross-sectional shape and the respective recesses have a corresponding shape.

[0011] According to another aspect the cross-sectional shape of the spacer element and the corresponding shape of the recesses is a rectangle or a square.

[0012] According to another aspect the at least one spacer element and the respective recesses are sized to have an interference fit to hold the spacer element in the respective recesses.

[0013] According to another aspect the dunnage assembly comprises a plurality of elongate spacer elements and the first and second panels each comprise a plurality of recesses for receiving the plurality of elongate spacer elements.

[0014] According to another aspect the first and second panels each comprise one or more inner panel members for providing strength and rigidity to the first and second panels.

[0015] According to another aspect the first and second panels each comprise three to five inner panel members.

[0016] According to another aspect the inner panel members are formed from a folded corrugated cardboard material, such that the inner panel members comprise a plurality of layers of corrugated cardboard material.

[0017] According to another aspect an adhesive is applied between the layers of the inner panel member.

[0018] According to another aspect the first and second panels each comprise a panel cover formed from a solid cardboard material, the panel cover extending around at least three sides of the panel.

[0019] According to another aspect the inner panel members are spaced apart from each other, and the panel cover wraps around the inner panel members and holds them in a spaced apart configuration.

[0020] According to another aspect the panel cover is secured to the inner panel members using an adhesive.

[0021] According to another aspect the recesses extend through a first side of the panel cover, but not in an opposed second side.

[0022] According to another aspect the recesses extend into the underlying inner panel members.

[0023] According to another aspect the first and second panels each comprise at least two recesses per inner

panel member, the recesses spaced apart along the length of each inner panel member.

[0024] According to another aspect the first and second panels are aligned parallel to each other, and the recesses in the first and second panels are located symmetrically such that corresponding recesses in the first and second panels face each other.

[0025] According to another aspect the at least one spacer element comprises at least one line of weakness for enabling a portion of the spacer element to be removed prior to assembly with the first and second panels, in order to adjust the width of the dunnage assembly.

[0026] According to another aspect the spacer element comprises an inner spacer member for providing strength and rigidity to the spacer element, the inner spacer member formed from a folded corrugated cardboard material, such that the inner spacer member comprises a plurality of layers of corrugated cardboard material.

[0027] According to another aspect an adhesive is applied between the layers of the inner spacer member.

[0028] According to another aspect the spacer element further comprises a spacer cover formed from a solid cardboard material, the spacer cover extending around at least three sides of the spacer element.

[0029] According to another aspect the spacer cover is secured to the inner spacer member using an adhesive.

[0030] According to another aspect the at least one line of weakness is provided in the inner spacer member.

[0031] According to another aspect the spacer cover comprises at least one printed line that is aligned with the line of weakness in the inner spacer member.

[0032] According to another aspect the spacer element comprises a plurality of lines of weakness spaced apart from each other along the length of the spacer element.

[0033] According to another aspect the lines of weakness are spaced between about 50 mm and about 200 mm apart from each other.

[0034] According to another aspect the lines of weakness are spaced between about 100 mm and about 150 mm apart from each other.

[0035] According to another aspect the lines of weakness are spaced about 100 mm apart from each other.

[0036] According to another aspect the invention broadly comprises a kit of parts for a dunnage assembly, comprising:

a first panel and a second panel, the first and second panels each having a first side, a second side substantially opposite the first side, and at least one recess extending from the first side into the panel;
at least one elongate spacer element adapted to be received in respective recesses of the first and second panels, the at least one spacer element adapted to hold the first panel apart from the second panel;
wherein the first panel, second panel, and elongate spacer element are arranged such that a width of the dunnage assembly between respective second sides of the first and second panels is adjustable by changing a length of the at least one spacer element.

[0037] According to another aspect the at least one spacer element comprises at least one line of weakness for enabling a portion of the spacer element to be removed, such that a length of the spacer element is adjustable.

[0038] According to another aspect the invention broadly comprises a method for assembling a dunnage assembly, comprising:

providing a first panel and a second panel, the first and second panels each having a first side, a second side substantially opposite the first side, and at least one recess extending from the first side into the panel;
selecting at least one elongate spacer element having a suitable length for achieving a desired width of the dunnage assembly between respective second sides of the first and second panels;
introducing a first end of the spacer element into the recess of the first panel, and introducing a second end of the spacer element into the recess of the second panel, such that the spacer element holds the first panel apart from the second panel.

[0039] According to another aspect the at least one spacer element comprises at least one line of weakness, and the step of selecting at least one elongate spacer element comprises adjusting a length of the spacer element by removing a portion of the spacer element along the line of weakness.

[0040] According to another aspect the elongate spacer element is introduced into the recesses in the respective panels at an angle that is substantially perpendicular to a major axis of the first panel and a major axis of the second panel.

[0041] According to another aspect a plurality of elongate spacer elements are introduced into respective recesses in the first and second panels.

[0042] Other aspects of the invention may become apparent from the following description which is given by way of example only and with reference to the accompanying drawings.

[0043] As used herein the term "and/or" means "and" or "or", or both.

[0044] As used herein "(s)" following a noun means the plural and/or singular forms of the noun.

[0045] The term "comprising" as used in this specification and claims means "consisting at least in part of". When interpreting statements in this specification and claims which include that term, the features, prefaced by that term in each statement, all need to be present but other features can also be present. Related terms such as "comprise" and "comprised" are to be interpreted in the same manner.

BRIEF DESCRIPTION OF THE DRAWINGS

[0046] The invention will now be described by way of example only and with reference to the drawings in which:

Figure 1	shows a perspective view of a dunnage assembly.
Figure 2	shows an exploded perspective view of the dunnage assembly.
Figure 3	shows a perspective view of a spacer element of the dunnage assembly, with the spacer element broken into two parts along a line of weakness.
Figure 4	shows a schematic plan illustration of dunnage assemblies used in a shipping container.
Figure 5	shows a plan view of a blank for an inner panel member.
Figure 6	shows a plan view of a blank for a panel cover.
Figures 7A-E	show assembly of a panel from the blanks of figures 5 and 6.
Figure 8	shows a plan view of a blank for an inner spacer member.
Figure 9	shows a plan view of a blank for a spacer cover.
Figures 10A-C	show assembly of a spacer element from the blanks of figures 8 and 9.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[0047] According to various aspects of the present invention as illustrated in figures 1-10, there is provided a dunnage assembly 1 for placing between items during transportation. It will be appreciated that these figures illustrate the general principles of construction, and that the invention is not limited to the precise configurations, or applications illustrated and described.

[0048] The dunnage assembly 1 of the present invention is configured to be placed in a gap between items, or in a gap between an item or items and a wall of a transportation means, such as a shipping container or a truck. It is anticipated that the dunnage assembly 1 can be useful for reducing or preventing movement of a wide variety of goods during transportation. The dunnage assembly 1 comprises first and second panels 101, 201 and spacer elements 301, which are formed primarily from cardboard products. The panels 101, 201 and spacer elements 301 may be flat-packed and assembled on site.

[0049] Referring to figures 1 and 2, the dunnage assembly 1 has a first panel 101 and a second panel 201. In the embodiment shown, the second panel 201 has substantially the same features and functionality as the first panel 101, unless described otherwise. Like numbers indicate like parts, with the addition of 100.

[0050] The first and second panels 101, 201 are generally planar, each having a first side 103, 203. The first and second panels 101, 201 each have a second side 104, 204 substantially opposite their respective first side 103, 203. Each of the first and second panels 101, 201 have at least one recess 105a-f, 205a-f extending from the first side 103, 203 into the panel. The second sides 104, 204 are configured to bear on an external structure, such as an item being shipped or a wall of a transportation means.

[0051] At least one elongate spacer element 301 is received in respective recesses 105, 205 of the first and second panels 101, 201, such that the at least one spacer element 301 holds the first panel 101 apart from the second panel 201. A first end 303 of the spacer element 301 is received in the recess 105 of the first panel 101. A second end 304 of the spacer element 301 is received in the recess 205 of the second panel 201. Preferably, the dunnage assembly 1 comprises a plurality of elongate spacer elements 301a-f, each having respective first ends 303a-f and second ends 304a-f. Preferably, the first and second panels 101, 201 each comprise a plurality of recesses 105a-f, 205a-f for receiving the plurality of elongate spacer elements 301a-f. The elongate spacer elements 301a-f are configured to transfer load applied to the second sides 104, 204 of the panels 101, 201 when the dunnage assembly 1 is in use.

[0052] Referring to figures 1 and 2, the first and second panels each have a substantially rectangular cross-section. The first and second panels 101, 201 are aligned parallel to each other. The recesses 105a-f, 205a-f in the first and second panels 101, 201 are preferably located symmetrically such that corresponding recesses 105a-f, 205a-f in the first and second panels 101, 201 face each other. Preferably, a major axis B of the at least one spacer element 301a-f is substantially perpendicular to a major axis A_1 of the first panel 101 and a major axis A_2 of the second panel 201. The major axes A_1, A_2, of the first and second panels 101, 201 extend through the centre of the panels 101, 201 parallel to a longest side of the panels 101, 201. The major axis B of the at least one spacer element 301a-f extends through the centre of the spacer element 301a-f parallel to a longest side of the spacer element 301a-f.

[0053] In the illustrated embodiment, the dunnage assembly 1 comprises six spacer elements 301a-f and six respective recesses 105a-f, 205a-f in each of the panels 101, 201. In alternative embodiments, any suitable number of spacer elements and corresponding recesses may be used. For example, the dunnage assembly 1 may comprise 2, 3, 4, 5, 7, 8 or 9 spacer elements 301 and corresponding recesses 105, 205. In the embodiment shown, the spacer elements 301a-f have a rectangular cross-section, and the recesses 105a-f, 205a-f have a corresponding rectangular shape. In alternative embodiments, the cross-section of the spacer elements 301 may be any suitable shape, and the recesses 105, 205 may have a suitable corresponding shape. For example, the spacer elements 301 may have a substantially circu-

lar cross-section, and the recesses 105, 205 may have a corresponding substantially circular shape. Alternatively, the spacer elements 301 may have a substantially square cross-section, and the recesses 105, 205 may have a corresponding substantially square shape. In a preferred configuration, the spacer element 301 and the respective recesses 105, 205 are sized to have an interference fit to hold the spacer element 301 in the respective recesses 105, 205.

[0054] A width W of the dunnage assembly 1 between respective second sides 104, 204 of the first and second panels 101, 201 is adjustable by changing a length of the at least one spacer element 301a-f.

[0055] Figure 3 shows a detailed view of a preferred spacer element 301. The at least one spacer element 301 may comprise at least one line of weakness 302 for enabling a portion of the spacer element 301 to be removed prior to assembly with the first and second panels 101, 201. This enables the width W of the dunnage assembly 1 to be more easily adjusted.

[0056] Figure 4 schematically illustrates how the dunnage assemblies 1a, 1b may be used to fill a gap between items 3, or a gap between items 3 and a wall 7, in a shipping container 5. A first dunnage assembly 1a having a first width W_1 is positioned in a gap between items 3 and a wall 7 of the shipping container. The wall 7 may include a door. A second dunnage assembly 1b having a second width W_2 is positioned in a gap between items 3. The second width W_2 is smaller than the first width W_1. A single panel 101 is also used to fill a small gap between items. It will be appreciated that any suitable combination of dunnage assemblies 1 having suitable widths may be used.

[0057] The first and second panels 101, 201 each comprise one or more inner panel members 107, 207 for providing strength and rigidity to the first and second panels 101, 201. The first and second panels 107, 207 each preferably further comprise a panel cover 109, 209. Preferably, the panel cover 109, 209 extends around at least three sides of the panel 101, 201. In an embodiment, the panel cover 109, 209 extends around all four sides of the first and second panels 101, 201. In the embodiment shown, the first and second panels 101, 201 each comprise three inner panel members 107, 207. In alternative embodiments, any suitable number of inner panel members 107, 207 may be used, such as four or five inner panel members 107, 207. In an embodiment, the first and second panels 101, 201 may comprise a single inner panel member 107, 207.

[0058] In the preferred configurations, the inner panel member 107, 207 is formed from a folded sheet of material, such that the inner panel member 107, 207 comprises a plurality of layers of material, to build up the thickness of the inner panel members 107, 207 to fill the space between the first side 103, 203 and second side 104, 204 of the panels 101, 201.

[0059] In the embodiment shown, the inner panel members 107, 207 are spaced apart from each other, and the panel cover 109, 209 wraps around the inner panel members 107, 207 and holds them in a spaced apart configuration. The gaps between the inner panel members 107, 207 may provide air vents that allow air to flow through the panels 101, 201. The air vents in the dunnage assembly 1 may minimise interruption of airflow within the transportation means.

[0060] Preferably, the recesses 105, 205 extend into the underlying inner panel members 107, 207. Preferably, the first and second panels 107, 207 each comprise at least two recesses 105, 205 per inner panel member 107, 207, the recesses 105, 205 spaced apart along the length of each inner panel member 107, 207. Preferably, the recesses 105, 205 extend through more than half of the layers of the inner panel members 107, 207. In the embodiment shown, the recesses 105, 205 extend through all of the layers of the inner panel members 107, 207.

[0061] Figure 5 shows an exemplary blank 401 for the inner panel members 107, 207. The blank 401 comprises a plurality of major faces 403a-i, and a plurality of minor faces 405a-f. Preferably, the first three major faces 403a-c form a centre portion of the inner panel members 107, 207 and are not separated by minor faces. Minor faces 405a-f are positioned between the rest of the major faces 403c-i. In the embodiment shown, each of the major faces 403a-i comprises slots 407, that form recesses 105, 205 when blank 401 is assembled into an inner panel member 107, 207. In the embodiment shown, the recesses 105, 205 extend through the entire thickness of the inner panel members 107, 207 when the blank 401 is assembled into an inner panel member 107, 207. In alternative embodiments, some of the major faces 403a-i may not comprise any slots 407, such that the recesses 105, 205 extend partially through the inner panel members 107, 207 when the blank 401 is assembled into an inner panel member 107, 207.

[0062] Adjacent faces 403a-i, 405a-f are separated by fold lines 409, to assist with folding the blank 401. The fold lines 409 may comprise score-lines, perforations, cuts, slots or any suitable combination thereof. The width of the faces are suitably sized so that the blank 401 can be folded into an inner panel member 107, 207 having a substantially rectangular cross-section. The width of the outer major faces 403d-i and the width of the minor faces 405a-f increases further away from the inner major faces 403a-c. It will be appreciated that any suitable combination of major and minor faces could be used.

[0063] Figure 6 shows an exemplary blank 451 for the panel covers 109, 209. The blank 451 for the panel covers 109, 209 comprises a first side 453 corresponding to the first side 103, 203 of the respective first and second panels 101, 201, an opposed second side 455 corresponding to the second side 104, 204 of the respective first and second panels 101, 201, and a third side 457 that joins the first and second sides 453, 455.

[0064] Slots 459 are provided in the first side 453 of the blank 451. The slots 459 have substantially the same

shape and spacing as the slots 407 in the blank 401 for the inner panel member. As such, the recesses 105, 205 extend through the first side 453 of the panel cover 109, 209 and into the inner panel members 107, 207, but do not extend through the opposed second side 455 of the panel cover 109, 209 when the panels 101, 201 are assembled from the blanks 401, 451.

[0065] The first, second and third sides 453, 455, 457 are separated by fold lines 461, to assist with folding the blank. The fold lines 461 may comprise score-lines, perforations, cuts, slots, or any suitable combination thereof.

[0066] Figures 7A-E illustrate assembly of the panels 101, 201 from the blanks 401, 451.

[0067] Referring to figure 7A, the first major face 403a is folded towards the second major face 403b, and the second major face 403b is folded towards the third major face 403c to form a centre portion of the inner panel member 107, 207. In the embodiment shown, the first, second and third major faces 403a-c are folded together in a generally 'Z'-shaped configuration. This is a preferred configuration as the 'Z'-shaped 'fan fold' may provide a squarer fold edge. However, other configurations are also envisaged.

[0068] Referring to figure 7B, the remaining faces are folded around the centre portion such that the fourth major face 403d is folded towards the first major face 403a, the fifth major face 403e is folded towards the third major face 403c, the sixth major face 403f is folded towards the fourth major face 403d and so on. Respective slots 407 in the major faces 403a-i are aligned with each other as the blank 401 is folded. The folded blank 401 forms an inner panel member 107, 207 as shown in figure 7C.

[0069] Referring to figure 7D, the inner panel members 107, 207 are then assembled with a panel cover 109, 209. The inner panel members 107, 207 are spaced apart from each other and secured to the panel cover 109, 209 using any suitable adhesive, as discussed in more detail below. The inner panel members 107, 207 are positioned such that the slots 407 in the inner panel members 107, 207 align with the slots 459 in the first side 453 of the outer cover 109, 209, to form the recesses 105, 205. The assembled inner panel members 107, 207 and panel cover 109, 209 forms the first and second panels 101, 201 as shown in figure 7E.

Spacer element

[0070] Figure 3 shows a spacer element 301. The spacer element 301 comprises an inner spacer member 305 for providing strength and rigidity to the spacer element 301. The spacer element 301 further comprises a spacer cover 307. Preferably, the spacer cover 307 extends around at least three sides of the spacer element 301. In an embodiment, the spacer cover 307 extends around all four sides of the spacer element 301.

[0071] In the preferred configurations, the inner spacer member 305 is formed from a folded sheet of material, such that the inner spacer member 305 comprises a plurality of layers of material. In an alternative configuration, the inner spacer member 305 may be formed from a solid material, such as a solid reel core. In some embodiments, the inner spacer member 305 may be hollow. In some embodiments, the inner spacer member 305 does not comprise a spacer cover.

[0072] At least one line of weakness 302 is preferably provided in the inner spacer member 305. In some preferred embodiments, the at least one line of weakness 302 is also provided in the spacer cover 307. In an alternative embodiment, the spacer cover 307 comprises at least one printed line that is aligned with a line of weakness in the inner spacer member 305. The at least one line of weakness 302 extends substantially perpendicular to the major axis B of the spacer element 301.

[0073] The at least one line of weakness 302 is weak enough that the inner spacer member 305 can be readily broken along the line of weakness 302 by a user without the need for specialist tooling, but strong enough that the inner spacer member 305 will not fail across the line of weakness 302 with the dunnage assembly 1 is in use. In embodiments where the line of weakness is not present in the spacer cover 307, the spacer cover 307 may help to maintain the structural integrity of the spacer element 301 in use. In these embodiments, the user would need to first cut through the spacer cover 307 at the appropriate location (as indicated by printed lines, for example), before breaking the underlying inner spacer member 305 along the line of weakness 302.

[0074] In the illustrated embodiment, the spacer element 301 comprises a plurality of lines of weakness 302 spaced apart from each other along the length of the spacer element 301. In an embodiment, the lines of weakness are spaced about 100 mm apart from each other. In an alternative embodiment, any suitable spacing may be used, for example a spacing of 50 mm, 100 mm, 150 mm or 200 mm.

[0075] Figure 8 shows an exemplary blank 501 for the inner spacer member 301. Similar to the blank 401 for the inner panel members 101, 201 described above, the blank 501 for the inner spacer member 301 comprises a plurality of major faces 503a-i, and a plurality of minor faces 505a-f. Preferably, the first three major faces 503a-c form a centre portion of the inner spacer member 305 and are not separated by minor faces. Minor faces 505a-f are positioned between the rest of the major faces 503c-i.

[0076] Adjacent faces 503a-i, 505a-f are separated by fold lines 507, to assist with folding the blank 501. The fold lines 507 may comprise score-lines, perforations, cuts, slots or any suitable combination thereof. The width of the faces are suitably sized so that the blank 501 can be folded into an inner spacer member 305 having a substantially rectangular cross-section. The width of the outer major faces 503d-i and the width of the minor faces 505a-f increases further away from the inner major faces 503a-c. It will be appreciated that any suitable combination of major and minor faces could be used.

[0077] The blank 501 also comprises perforated lines 509. The perforated lines 509 extend perpendicular to the fold lines 507, such that they form the lines of weakness 302 in the inner spacer member 305 when the blank 501 is folded into the inner spacer member 305. The perforated lines 509 may comprise score-lines, perforations, cuts, slots or any suitable combination thereof. Preferably, the lines of weakness 509 comprises perforations.

[0078] Figure 9 shows an exemplary blank 551 for the spacer cover 307. The blank 551 for the spacer cover 307 comprises a first side 553, an opposed second side 555, and a third side 557 that joins the first and second sides 553, 555.

[0079] The first, second and third sides 553, 555, 557 are separated by fold lines 559, to assist with folding the blank. The fold lines 559 may comprise score-lines, perforations, cuts, slots, or any suitable combination thereof.

[0080] Figures 10A-E illustrate assembly of the spacer element 301 from the blanks 501, 551.

[0081] Referring to figure 10A, the first major face 503a is folded towards the second major face 503b, and the second major face 503b is folded towards the third major face 503c to form a centre portion of the inner spacer member 305. In the embodiment shown, the first, second and third major faces 503a-c are folded together in a generally 'Z'-shaped configuration. This is a preferred configuration as the 'Z'-shaped 'fan fold' may provide a squarer fold edge. However, other configurations are also envisaged.

[0082] Referring to figure 10B, the remaining faces are folded around the centre portion such that the fourth major face 503d is folded towards the first major face 503a, the fifth major face 503e is folded towards the third major face 503c, the sixth major face 503f is folded towards the fourth major face 503d and so on. The folded blank 501 forms an inner spacer member 305 as shown in figure 7C.

[0083] The inner spacer member 305 is then assembled with a spacer cover 307 to form the spacer element as shown in figure 10C.

Materials/general construction principles

[0084] Preferably, the inner panel members 107, 207 and/or the inner spacer members 305 are formed from a folded corrugated cardboard material, such that the inner panel members comprise a plurality of layers of corrugated cardboard material. In alternative embodiments, any other suitable material may be used. Preferably, the panel covers 109, 209 and/or the spacer covers 307 are formed from a solid cardboard material. The solid cardboard material may comprise laminated paper sheets. However, any other suitable material may be used.

[0085] Preferably, hot melt glue, PVA glue or any other suitable adhesive known to a person skilled in the art is applied between adjacent faces as the inner panel member blank 401 and inner spacer member blank 501 are folded, so that the folded blanks 401, 501 form strong, rigid structures. In other words, the adhesive is applied between the layers of inner panel members 107, 207 and the inner spacer members 305.

[0086] Preferably, the panel covers 109, 209 and/or spacer cover 307 are secured to the respective inner panel members 107, 207 or inner spacer members 305 using hot melt glue, PVA glue, or any other suitable adhesive known to a person skilled in the art.

[0087] In preferred configurations, the blanks 401, 451, 501, 451 are cut using a CNC machine. In preferred configurations, the inner panel member blank 401 and inner spacer member blank 501 are folded using a CNC folding machine. Optionally, the panel covers 109, 209 and spacer cover 307 are secured to the respective inner panel members 107, 207 and inner spacer member 305 by hand. Optionally, the panel covers 109, 209 and spacer cover 307 are secured to the respective inner panel members 107, 207 and inner spacer member 305 using a machine-automated process.

[0088] In an embodiment, a kit of parts for a dunnage assembly 1 is provided. The kit of parts comprises a first panel 101 and a second panel 201, the first and second panels 101, 201 each having a first side 103, 203, a second side 104, 204 substantially opposite the first side 103, 203, and at least one recess 105, 205 extending from the first side 103, 203 into the panel 101, 201, substantially as described above.

[0089] The kit of parts also comprises at least one elongate spacer element 301 adapted to be received in respective recesses 105, 205 of the first and second panels 101, 201, the at least one spacer element 301 adapted to hold the first panel 101 apart from the second panel 201, substantially as described above. The first panel 101, second panel 201, and elongate spacer element 301 are arranged such that a width W of the dunnage assembly 1 between respective second sides 104, 204 of the first and second panels 101, 201 is adjustable by changing a length of the at least one spacer element 301.

[0090] The at least one spacer element 301 may comprise at least one line of weakness 302 for enabling a portion of the spacer element 301 to be removed, such that a length of the spacer element 301 is adjustable, substantially as described above. Alternatively, the kit of parts may comprise a range of spacer elements having different lengths, and at least one spacer element having an appropriate length may be selected from the range of spacer elements. Alternatively, at least one spacer element may be cut, or broken to an appropriate length.

[0091] A method for assembling a dunnage assembly, will now be described.

[0092] A first panel 101 and a second panel 201 each having at least one recess 105, 205 as described above are provided. At least one elongate spacer element 301 having a suitable length for achieving a desired width W of the dunnage assembly 1 between respective second sides 104, 204 of the first and second panels 101, 201 is selected. A first end 303 of the spacer element 301 is introduced into the recess 105 of the first panel 101, and

a second end 304 of the spacer element 301 is introduced into the recess 205 of the second panel 201, such that the spacer element 301 holds the first panel 101 apart from the second panel 201.

[0093] In preferred configurations, the at least one spacer element 301 comprises at least one line of weakness 302 as described above, and the at least one elongate spacer element 301 is selected by adjusting a length of the spacer element 301 by removing a portion of the spacer element along the line of weakness 302. In alternative configurations, a spacer element having an appropriate length may be selected from a range of spacer elements having different lengths. In alternative configurations, a spacer element may be cut or broken to an appropriate length.

[0094] Preferably, the elongate spacer element 301 is introduced into the recesses 105, 205 in the respective panels 101, 201 at an angle that is substantially perpendicular to a major axis of the first panel and a major axis of the second panel.

[0095] In an embodiment, the spacer element 301 is secured in the recesses 105, 205 using hot melt glue, PVA glue or any other suitable adhesive. Additionally or alternatively, the spacer element 301 and the respective recesses 105, 205 are sized such that the spacer element 301 is held in place in the recesses 105, 205 by friction. For example, the spacer element 301 and the respective recesses 105, 205 may be sized to have an interference fit.

[0096] Preferably, a plurality of elongate spacer elements 301a-f are introduced into respective recesses 105a-f, 205a-f in the first and second panels 101, 201.

[0097] Preferred embodiments of the invention have been described by way of example only and modifications may be made thereto without departing from the scope of the invention.

CLAUSES

[0098]

1. A dunnage assembly for reducing or preventing movement of items during transportation, comprising:

a first panel and a second panel, the first and second panels each having a first side, a second side substantially opposite the first side, and at least one recess extending from the first side into the panel;

at least one elongate spacer element received in respective recesses of the first and second panels, such that the at least one spacer element holds the first panel apart from the second panel;

wherein a width of the dunnage assembly between respective second sides of the first and second panels is adjustable by changing a length of the at least one spacer element.

2. The dunnage assembly according to clause 1, wherein a major axis of the at least one spacer element is substantially perpendicular to a major axis of the first panel and a major axis of the second panel.

3. The dunnage assembly according to clause 1 or 2, wherein the at least one spacer element has a cross-sectional shape and the respective recesses have a corresponding shape.

4. The dunnage assembly according to clause 3, wherein the cross-sectional shape of the spacer element and the corresponding shape of the recesses is a rectangle or a square.

5. The dunnage assembly according to any one of the preceding clauses, wherein the at least one spacer element and the respective recesses are sized to have an interference fit to hold the spacer element in the respective recesses.

6. The dunnage assembly according to any one of the preceding clauses, wherein the dunnage assembly comprises a plurality of elongate spacer elements and the first and second panels each comprise a plurality of recesses for receiving the plurality of elongate spacer elements.

7. The dunnage assembly according to any one of the preceding clauses, wherein the first and second panels each comprise one or more inner panel members for providing strength and rigidity to the first and second panels.

8. The dunnage assembly according to clause 7, wherein the first and second panels each comprise three to five inner panel members.

9. The dunnage assembly according to clause 7 or clause 8, wherein the inner panel members are formed from a folded corrugated cardboard material, such that the inner panel members comprise a plurality of layers of corrugated cardboard material.

10. The dunnage assembly according to clause 9, wherein an adhesive is applied between the layers of the inner panel member.

11. The dunnage assembly according to any one of clauses 7 to 10, wherein the first and second panels each comprise a panel cover formed from a solid cardboard material, the panel cover extending around at least three sides of the panel.

12. The dunnage assembly according to clause 11, wherein the inner panel members are spaced apart

from each other, and the panel cover wraps around the inner panel members and holds them in a spaced apart configuration.

13. The dunnage assembly according to clause 11 or clause 12, wherein the panel cover is secured to the inner panel members using an adhesive.

14. The dunnage assembly according to any one of clauses 11 to 13, wherein the recesses extend through a first side of the panel cover, but not in an opposed second side.

15. The dunnage assembly according to any one of clauses 7 to 14, wherein the recesses extend into the underlying inner panel members.

16. The dunnage assembly according to any one of clauses 7 to 15, wherein the first and second panels each comprise at least two recesses per inner panel member, the recesses spaced apart along the length of each inner panel member.

17. The dunnage assembly according to any one of the preceding clauses, wherein the first and second panels are aligned parallel to each other, and the recesses in the first and second panels are located symmetrically such that corresponding recesses in the first and second panels face each other.

18. The dunnage assembly according to any one of the preceding clauses, wherein the at least one spacer element comprises at least one line of weakness for enabling a portion of the spacer element to be removed prior to assembly with the first and second panels, in order to adjust the width of the dunnage assembly.

19. The dunnage assembly according to clause 18, wherein the spacer element comprises an inner spacer member for providing strength and rigidity to the spacer element, the inner spacer member formed from a folded corrugated cardboard material, such that the inner spacer member comprises a plurality of layers of corrugated cardboard material.

20. The dunnage assembly according to clause 19, wherein an adhesive is applied between the layers of the inner spacer member.

21. The dunnage assembly according to clause 20, wherein the spacer element further comprises a spacer cover formed from a solid cardboard material, the spacer cover extending around at least three sides of the spacer element.

22. The dunnage assembly according to clause 21, wherein the spacer cover is secured to the inner spacer member using an adhesive.

23. The dunnage assembly according to any one of clauses 20 to 22, wherein the at least one line of weakness is provided in the inner spacer member.

24. The dunnage assembly according to clause 23, wherein the spacer cover comprises at least one printed line that is aligned with the line of weakness in the inner spacer member.

25. The dunnage assembly according to any one of clauses 20 to 24, wherein the spacer element comprises a plurality of lines of weakness spaced apart from each other along the length of the spacer element.

26. The dunnage assembly according to clause 25, wherein the lines of weakness are spaced between about 50 mm and about 200 mm apart from each other.

27. The dunnage assembly according to clause 26, wherein the lines of weakness are spaced between about 100 mm and about 150 mm apart from each other.

28. The dunnage assembly according to clause 27, wherein the lines of weakness are spaced about 100 mm apart from each other.

29. A kit of parts for a dunnage assembly, comprising:

a first panel and a second panel, the first and second panels each having a first side, a second side substantially opposite the first side, and at least one recess extending from the first side into the panel;
at least one elongate spacer element adapted to be received in respective recesses of the first and second panels, the at least one spacer element adapted to hold the first panel apart from the second panel;
wherein the first panel, second panel, and elongate spacer element are arranged such that a width of the dunnage assembly between respective second sides of the first and second panels is adjustable by changing a length of the at least one spacer element.

30. The kit of parts according to clause 29, wherein the at least one spacer element comprises at least one line of weakness for enabling a portion of the spacer element to be removed, such that a length of the spacer element is adjustable.

31. A method for assembling a dunnage assembly,

comprising:

providing a first panel and a second panel, the first and second panels each having a first side, a second side substantially opposite the first side, and at least one recess extending from the first side into the panel;
selecting at least one elongate spacer element having a suitable length for achieving a desired width of the dunnage assembly between respective second sides of the first and second panels;
introducing a first end of the spacer element into the recess of the first panel, and introducing a second end of the spacer element into the recess of the second panel, such that the spacer element holds the first panel apart from the second panel.

32. The method according to clause 31, wherein the at least one spacer element comprises at least one line of weakness, and the step of selecting at least one elongate spacer element comprises adjusting a length of the spacer element by removing a portion of the spacer element along the line of weakness.

33. The method according to clause 31 or clause 32, wherein the elongate spacer element is introduced into the recesses in the respective panels at an angle that is substantially perpendicular to a major axis of the first panel and a major axis of the second panel.

34. The method according to any one of clauses 31 to 33, wherein a plurality of elongate spacer elements are introduced into respective recesses in the first and second panels.

Claims

1. A dunnage assembly for reducing or preventing movement of items during transportation, comprising:

a first panel and a second panel, the first and second panels each having a first side, a second side substantially opposite the first side, and at least one recess extending from the first side into the panel;
at least one elongate spacer element received in respective recesses of the first and second panels, such that the at least one spacer element holds the first panel apart from the second panel;
wherein a width of the dunnage assembly between respective second sides of the first and second panels is adjustable by changing a length of the at least one spacer element.

2. The dunnage assembly according to claim 1, wherein a major axis of the at least one spacer element is substantially perpendicular to a major axis of the first panel and a major axis of the second panel.

3. The dunnage assembly according to claim 1 or 2, wherein the at least one spacer element has a cross-sectional shape and the respective recesses have a corresponding shape.

4. The dunnage assembly according to any one of the preceding claims, wherein the at least one spacer element and the respective recesses are sized to have an interference fit to hold the spacer element in the respective recesses.

5. The dunnage assembly according to any one of the preceding claims, wherein the dunnage assembly comprises a plurality of elongate spacer elements and the first and second panels each comprise a plurality of recesses for receiving the plurality of elongate spacer elements.

6. The dunnage assembly according to any one of the preceding claims, wherein the first and second panels each comprise one or more inner panel members for providing strength and rigidity to the first and second panels,
preferably the inner panel members are formed from a folded corrugated cardboard material, such that the inner panel members comprise a plurality of layers of corrugated cardboard material.

7. The dunnage assembly according to claim 6, wherein the first and second panels each comprise a panel cover formed from a solid cardboard material, the panel cover extending around at least three sides of the panel, and wherein the inner panel members are spaced apart from each other, and the panel cover wraps around the inner panel members and holds them in a spaced apart configuration,
preferably the recesses extend through a first side of the panel cover, but not in an opposed second side.

8. The dunnage assembly according to any one of the preceding claims, wherein the first and second panels are aligned parallel to each other, and the recesses in the first and second panels are located symmetrically such that corresponding recesses in the first and second panels face each other.

9. The dunnage assembly according to any one of the preceding claims, wherein the at least one spacer element comprises at least one line of weakness for enabling a portion of the spacer element to be removed prior to assembly with the first and second panels, in order to adjust the width of the dunnage

assembly.

10. The dunnage assembly according to claim 9, wherein the spacer element comprises an inner spacer member for providing strength and rigidity to the spacer element, the inner spacer member formed from a folded corrugated cardboard material, such that the inner spacer member comprises a plurality of layers of corrugated cardboard material.

11. The dunnage assembly according to claim 10, wherein the spacer element further comprises a spacer cover formed from a solid cardboard material, the spacer cover extending around at least three sides of the spacer element.

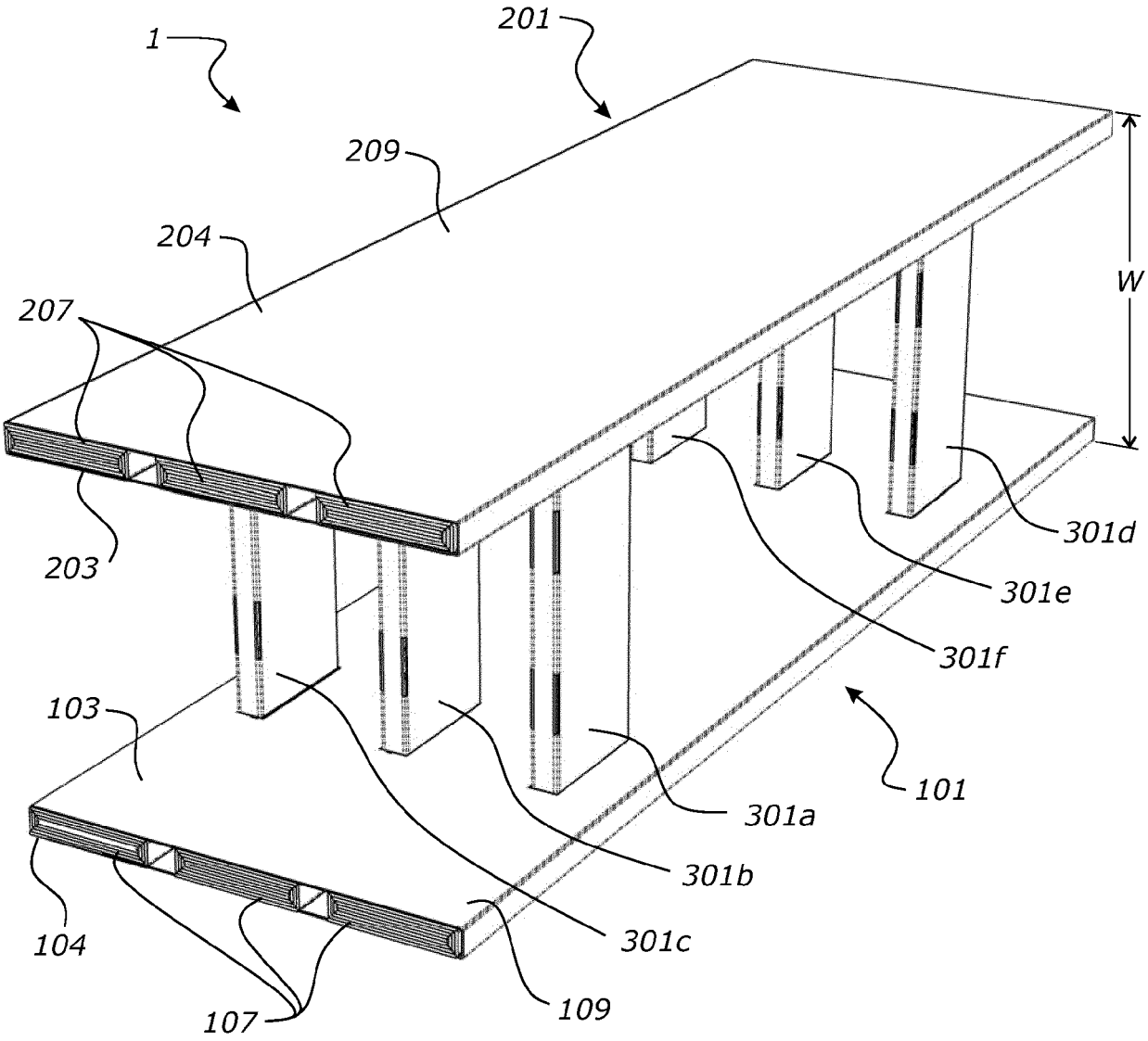
12. The dunnage assembly according to claim 11, wherein the spacer cover comprises at least one printed line that is aligned with the line of weakness in the inner spacer member.

13. The dunnage assembly according to claims 11 to 12, wherein the spacer element comprises a plurality of lines of weakness spaced apart from each other along the length of the spacer element.

14. A method for assembling the dunnage assembly of claims 1 to 13, comprising:

providing the first panel and second panel, with a second side substantially opposite the first side;
selecting at least one elongate spacer element having a suitable length for achieving a desired width of the dunnage assembly between respective second sides of the first and second panels;
introducing a first end of the spacer element into the recess of the first panel, and introducing a second end of the spacer element into the recess of the second panel, such that the spacer element holds the first panel apart from the second panel.

15. The method according to claim 14, wherein the at least one spacer element comprises at least one line of weakness, and the step of selecting at least one elongate spacer element comprises adjusting a length of the spacer element by removing a portion of the spacer element along the line of weakness.


1
201
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W
203
301d
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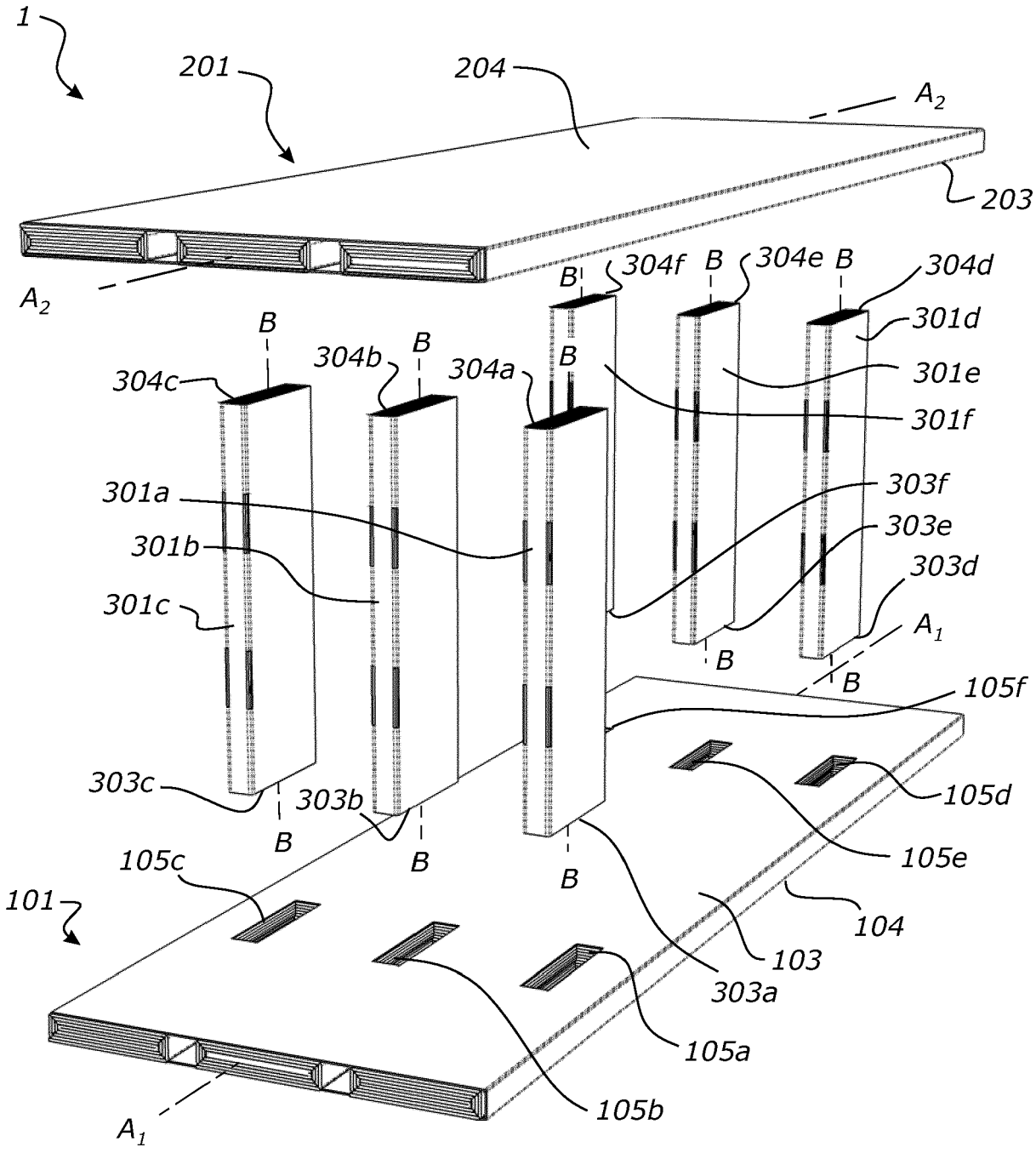
104
301c
109
107

FIGURE 1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A_1

FIGURE 2

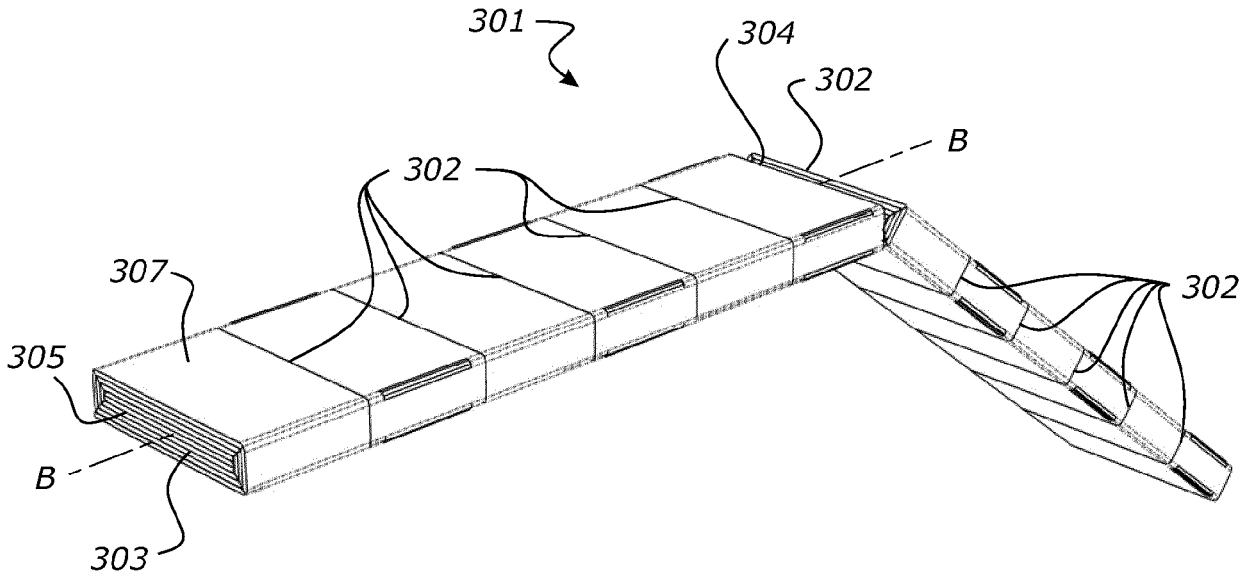


FIGURE 3

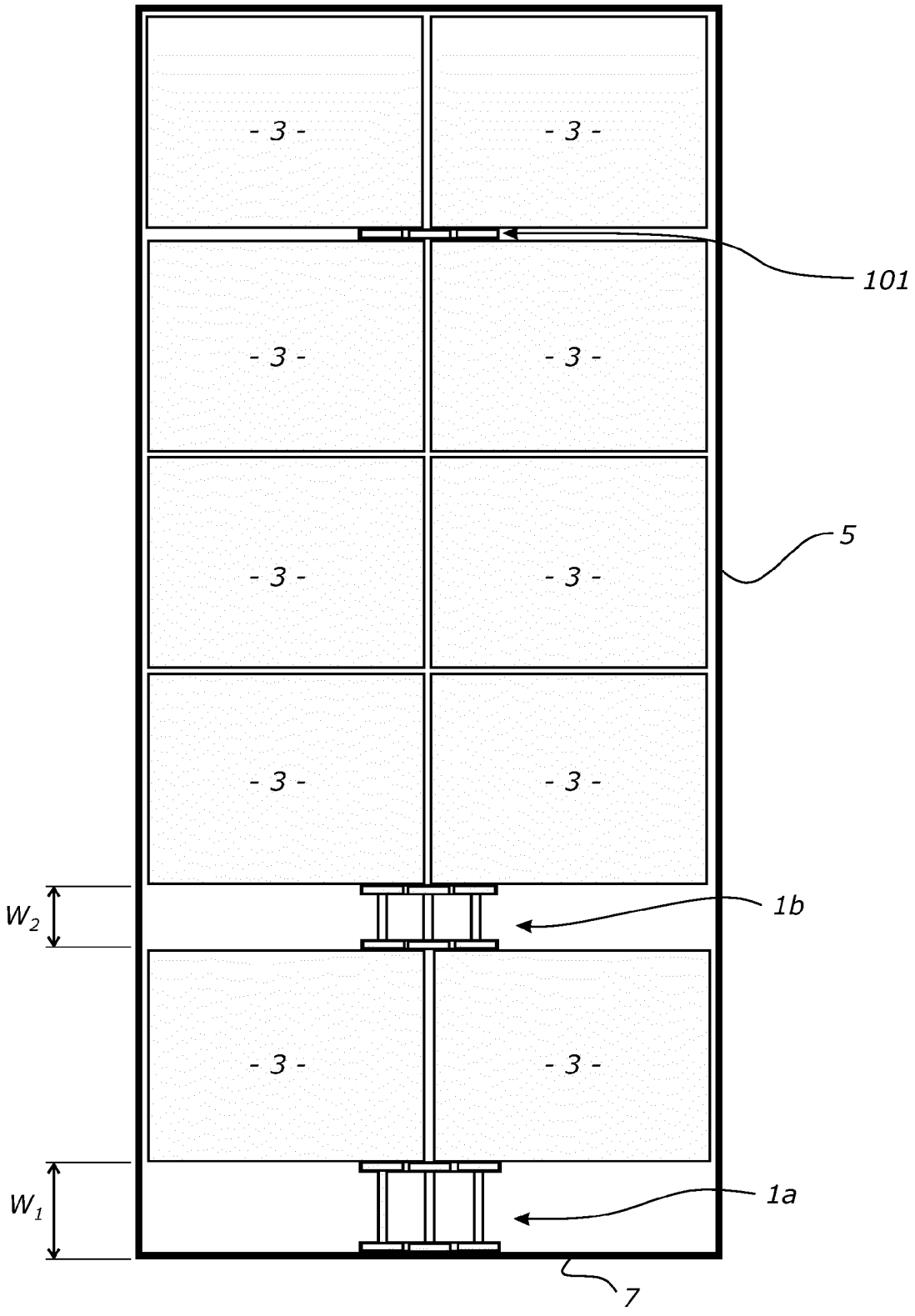
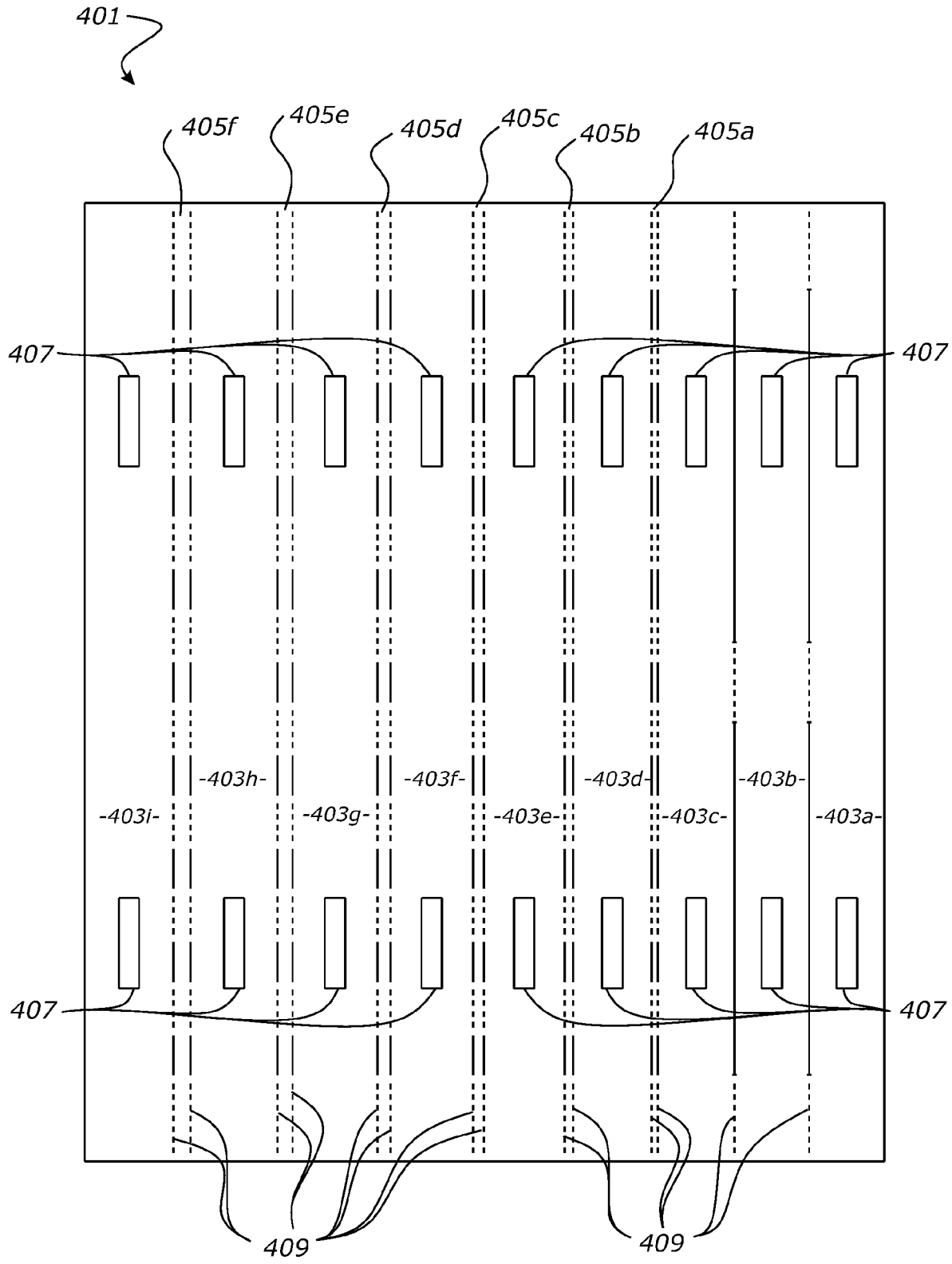


FIGURE 4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409

FIGURE 5

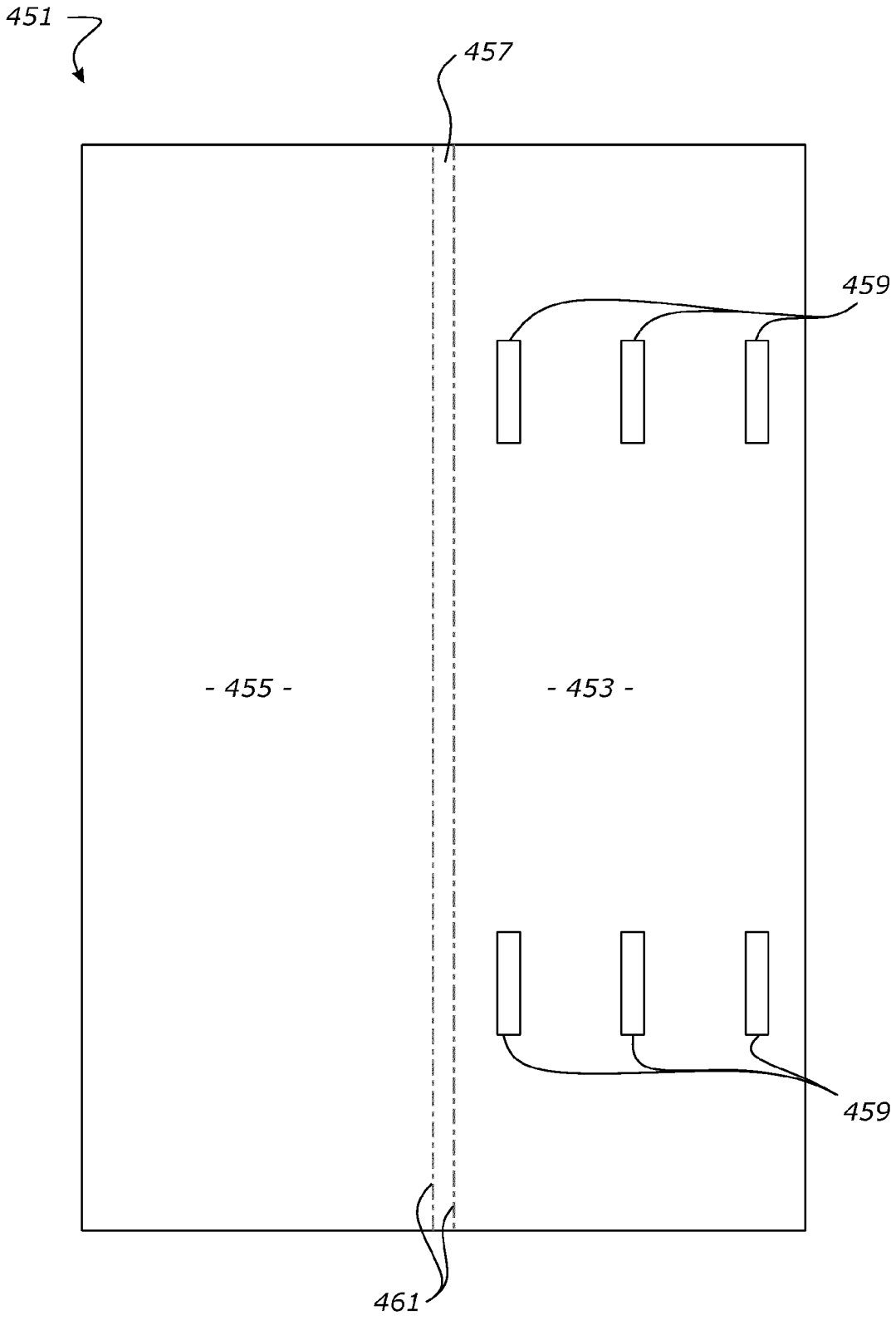


FIGURE 6

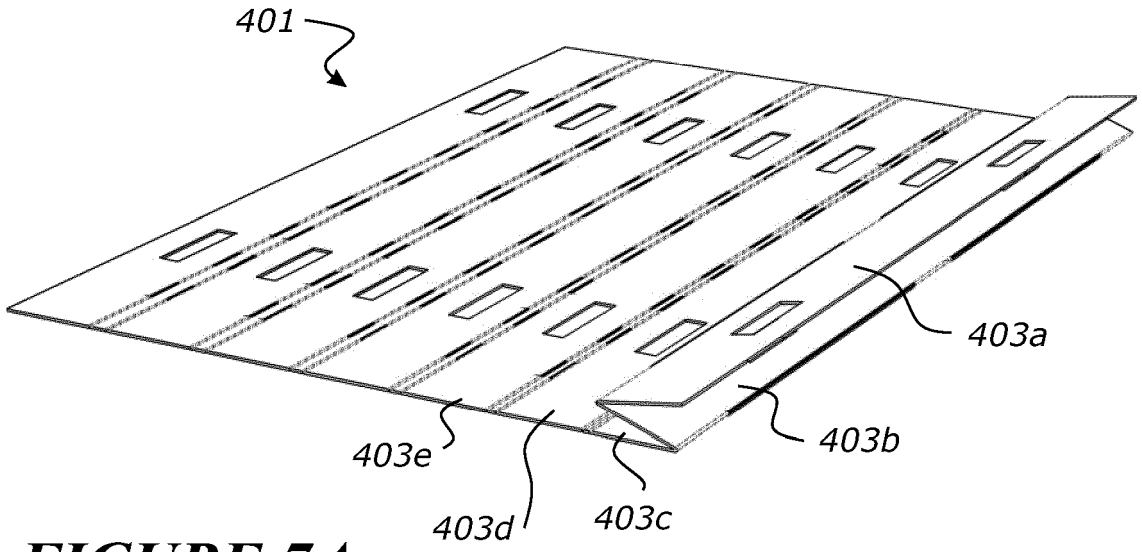


FIGURE 7A

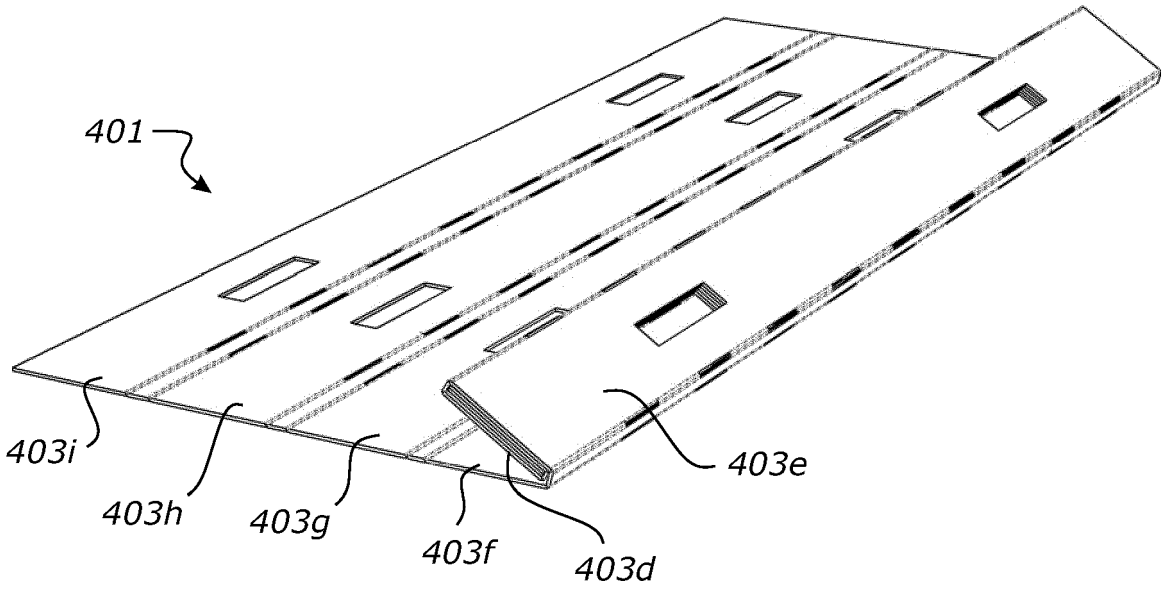


FIGURE 7B

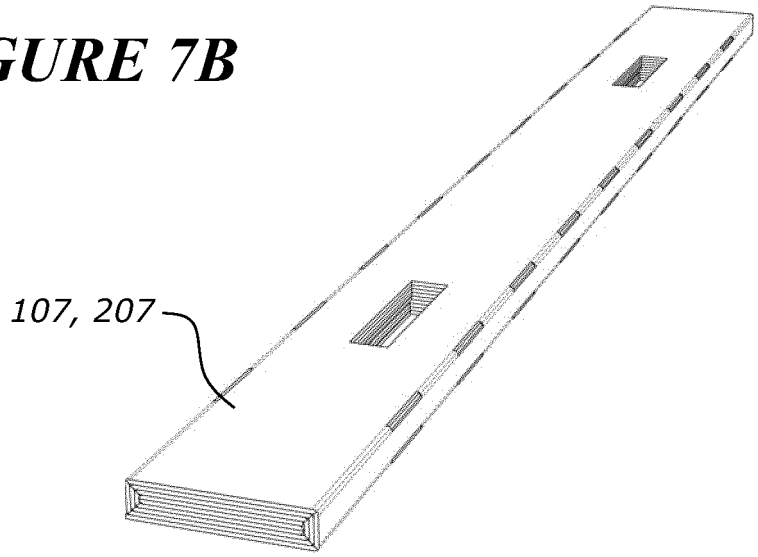


FIGURE 7C

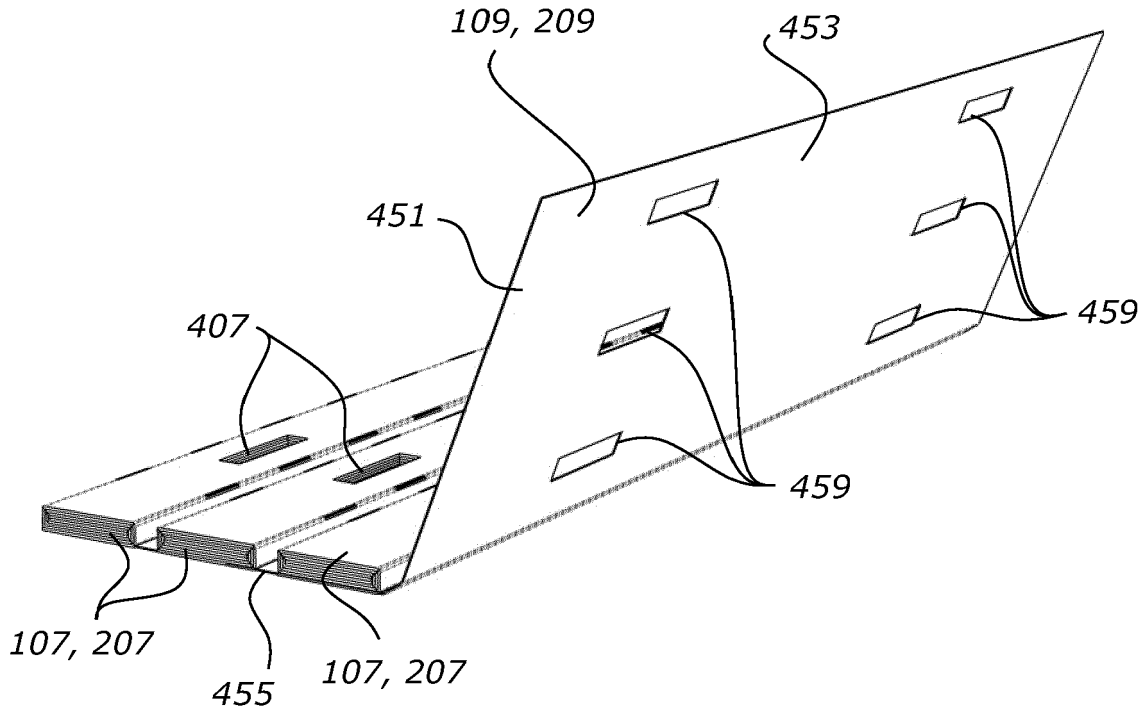


FIGURE 7D

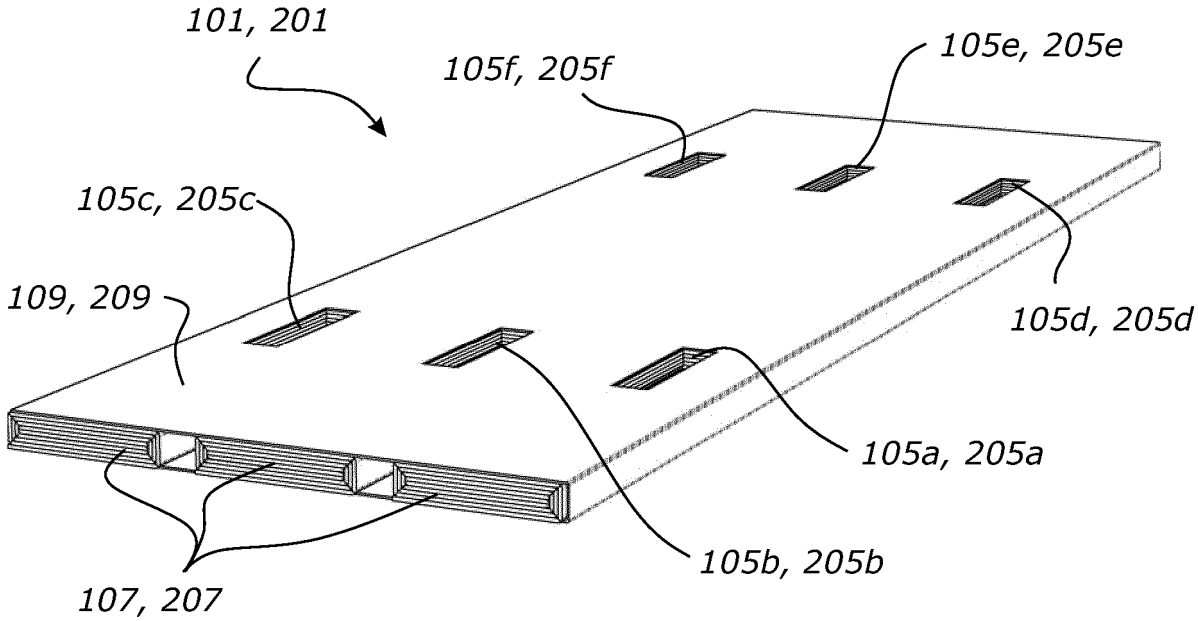
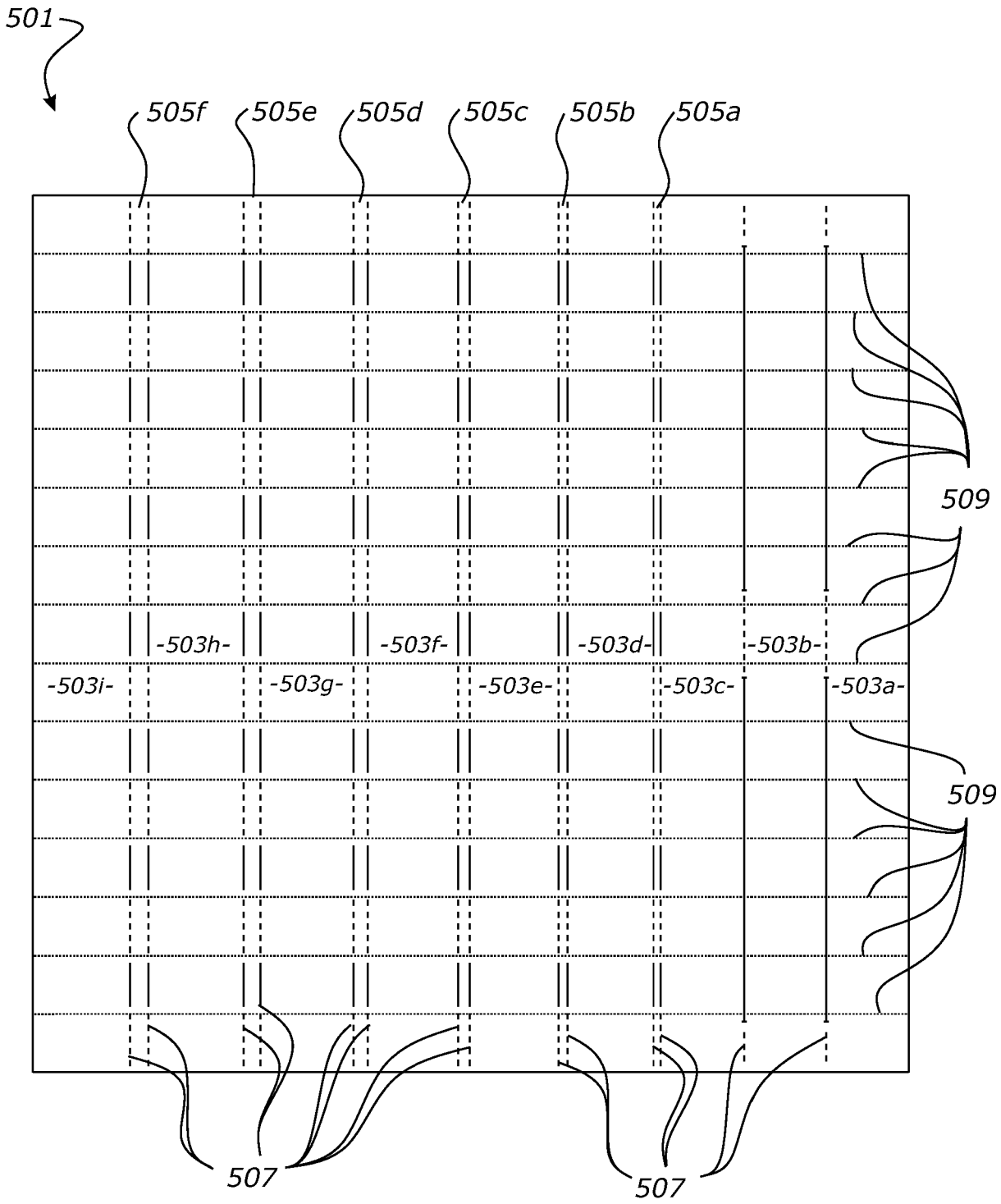


FIGURE 7E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505f
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505d
505c
505b
505a
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509
507
507

FIGURE 8

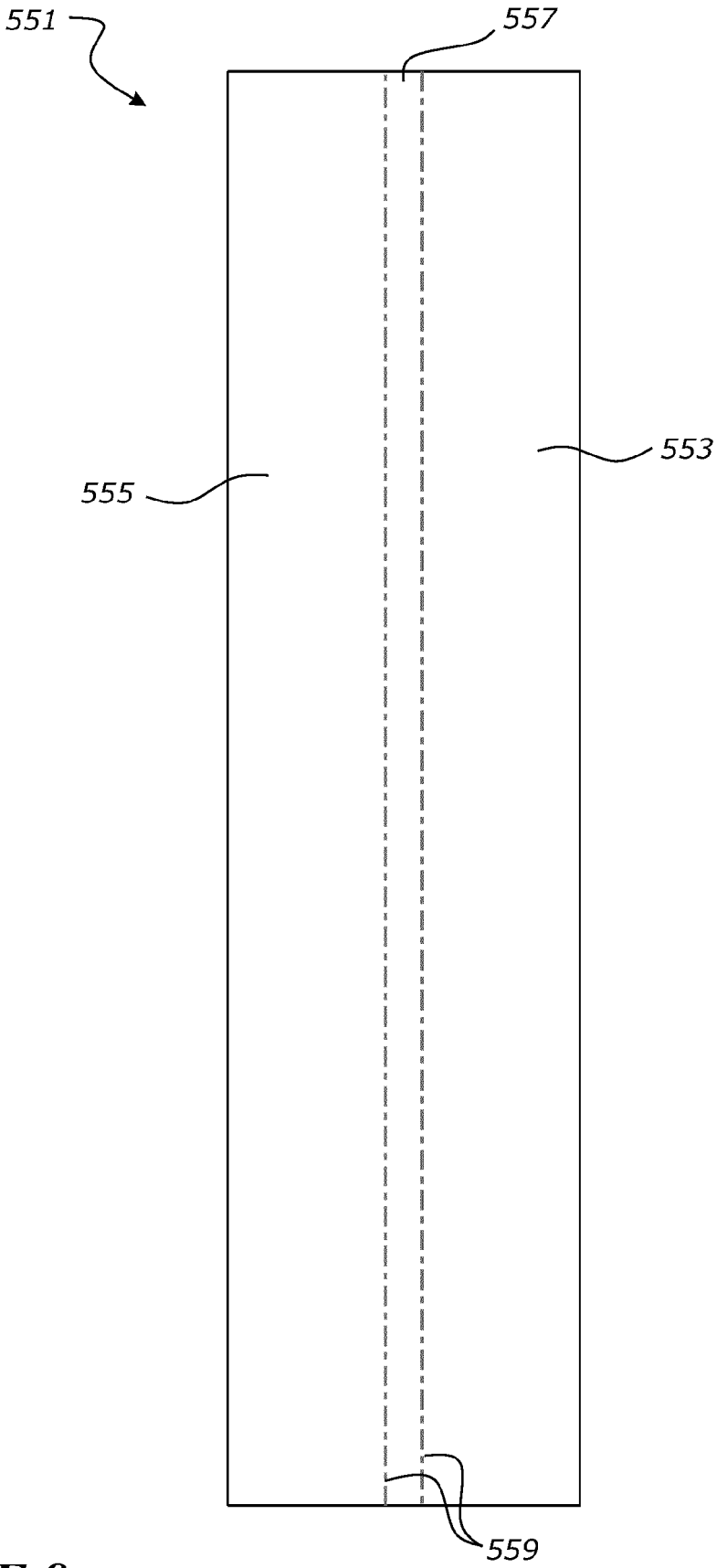

FIGURE 9

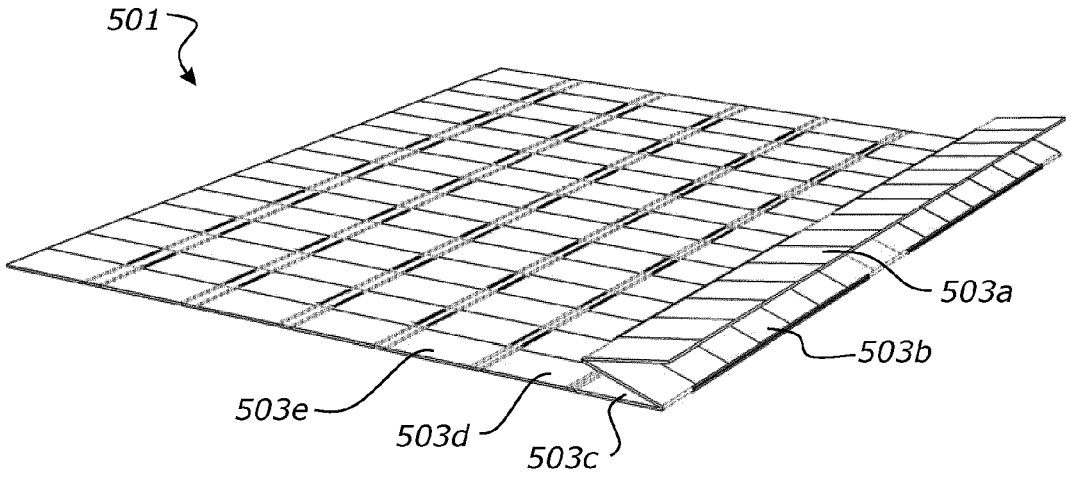

FIGURE 10A

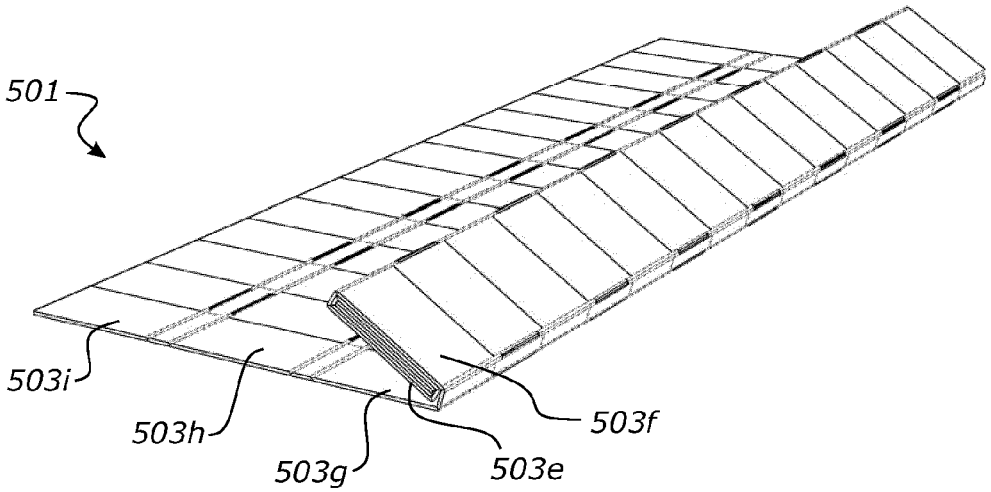

FIGURE 10B

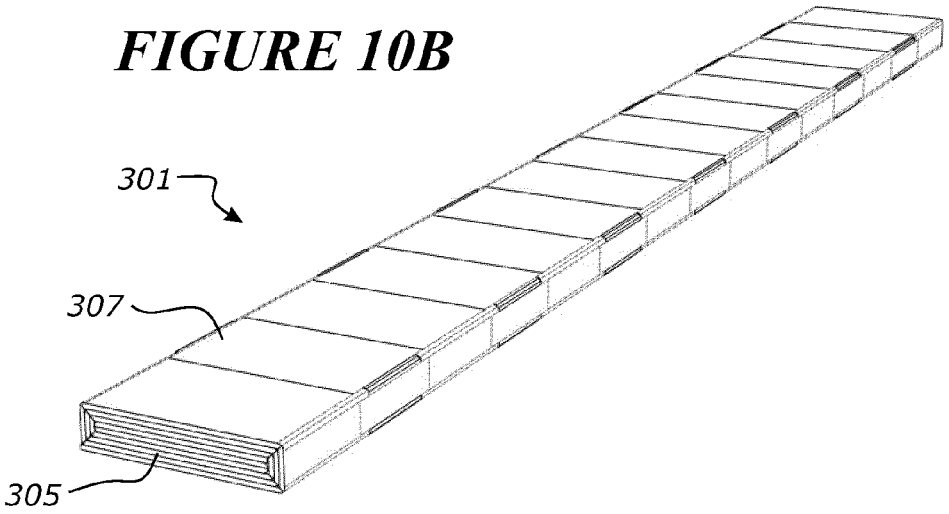

FIGURE 10C

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EUROPEAN SEARCH REPORT

Application Number
EP 22 21 3746

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X A	US 5 850 922 A (FRASER RONALD A [US]) 22 December 1998 (1998-12-22) * column 2, line 63 - column 5, line 11; figures 13-15 *	1-5,8,9, 14,15 6,7, 10-13	INV. B65D5/50 B65D81/05
X	FR 2 819 491 A1 (EMIN LEYDIER [FR]) 19 July 2002 (2002-07-19) * page 2, line 17 - page 3, line 30; figure 3 *	1-15	
X A	EP 1 044 891 A1 (HITACHI SHIPBUILDING ENG CO [JP]; YOKOYAMA SANKOH CO LTD [JP]) 18 October 2000 (2000-10-18) * paragraph [0038] - paragraph [0073]; figure 1 *	1,2,6,8 3-5,7, 9-15	
A	US 2 742 219 A (ANTWERPEN LLOYD D VAN) 17 April 1956 (1956-04-17) * column 1, line 66 - column 2, line 61; figures 2-4 *	7,11	

TECHNICAL FIELDS SEARCHED (IPC)

B65D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	8 May 2023	Lämmel, Gunnar

CATEGORY OF CITED DOCUMENTS

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08-05-2023

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82