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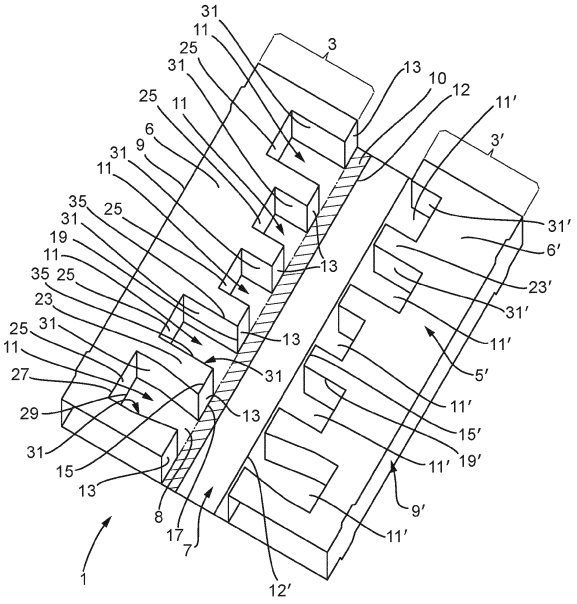
(54) **PRODUCT SUPPORT**

(57) A machine erectable product support (1) comprises at least one product support defining structure (3) including a top panel (5) a bottom panel (7) and a longitudinal side wall panel (9). The product support defining structure (3) defines, in the erected product support (1), one or more product locating pockets (11). The top panel (5) comprises cutlines and foldlines (15, 17) defining a plurality of hinge panels (13) hingedly attaching a first portion (6) of the top panel (5) to a second portion (8) of the top panel (5) to enable the first portion (6) to be rotated relative to the second portion (8) to erect the product support defining structure (3) during erection of the product support (1). The bottom panel (7) comprises one or more openings, each opening being registered with a respective portion of the top panel (5) when the product support defining structure (3) is in a flat configuration to facilitate erection of the product support.

Fig. 1



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Description

TECHNICAL FIELD

[0001] The present invention relates to a machine erectable product support, made of cardboard, paperboard or other lightweight foldable sheet material. The invention also extends to a method of erecting the product support. The present invention is particularly, although not exclusively, directed to a product support which may be inserted into an outer package to locate one or more products in a desired position relative to an outer package in use.

BACKGROUND

[0002] It is often necessary to be able to locate certain products in a desired position within an outer package. For example, this may particularly important where multiple products are located within a single package e.g. a multi-pack. It may be necessary to locate product(s) within the package so as to enable them to be viewable by a user from the exterior of the package e.g. such that they are aligned with window(s) in the package. Various types of product may be presented in this manner, including, but not limited to, food item(s), such as confectionary, or cosmetic products. One example of such a package would be a seasonal selection pack.

[0003] Some challenges may be involved in ensuring that product(s) remain aligned relative to the package after assembly within the package throughout shipping and until the product(s) are ultimately removed from the package by a user.

[0004] Previously, products have been located in a desired position within an outer package using a moulded plastic product support. However, for environmental reasons, there is a growing need to provide packaging which is more easily recyclable, and which may avoid the use of plastic. In other arrangements, products have been located within a package using a product support formed of cardboard or paperboard, and integral with the outer package. Such a product support may automatically erect itself when the outer package is erected, or may require manual erection. The product is then loaded into the product support with the product support already within the outer package. It has been recognised that such arrangements may not be suitable for high speed, high volume machine erection.

[0005] The Applicant has realised that there is a need for a machine erectable product support made of cardboard, paperboard or other lightweight foldable sheet material.

SUMMARY

[0006] From a first aspect, the present invention provides a machine erectable product support made from cardboard, paperboard or other lightweight foldable sheet material comprising:
at least one product support defining structure comprising:

a top panel comprising a first portion for providing an upper support section of the product support defining structure in the erected product support, and a second portion for providing a lower section of the product support defining structure in the erected product support;
a bottom panel for providing a base of the product support defining structure in the erected product support, wherein the second portion of the top panel is secured to the bottom panel;
and a longitudinal side wall panel;
wherein the product support defining structure defines, in the erected product support, one or more product locating pockets;
wherein the top panel comprises outlines and foldlines defining a plurality of hinge panels hingedly attaching the first portion of the top panel to the second portion of the top panel to enable the first portion to be rotated relative to the second portion to erect the product support defining structure during erection of the product support;
wherein each hinge panel is connected at one end about a foldline to the first portion of the top panel and at the other end about a foldline to the second portion of the top panel;
wherein the bottom panel comprises one or more openings, each opening being registered with a respective portion of the top panel when the product support defining structure is in a flat configuration, whereby an erecting pin of an erecting machine may be inserted from the underside of the bottom panel through the opening to contact the portion of the top panel to assist in rotating the first portion of the top panel relative to the second portion of the top panel to erect the product support defining structure during erection of the product support.

[0007] From a further aspect, the present invention provides a method as set forth in claim 15.

[0008] In accordance with the invention, a product support is provided, which may be readily erected by a machine. The product support comprises at least one product support defining structure.

[0009] The product support defining structure defines, in an erected state of the product support, one or more product locating pockets, and includes a top panel and a bottom panel. The top panel includes a first portion which provides an upper support section of the product support defining structure in the erected product support and a second portion for providing a lower section of the product support defining structure in the erected product support. The top panel defines a plurality of hinge panels hingedly attaching the first and second portions to one another.

[0010] The erectable product support is converted from an initial flat configuration to an erected i.e. 3-dimensional configuration during erection. The erection may take place as part of an overall process in which the product support is filled with product and assembled with an outer package.

[0011] Erection of the product support involves converting the or each product support defining structure thereof from an initial flat configuration to an erected i.e. 3-dimensional configuration i.e. erecting the or each product support defining structure. Erection of the product support may involve other steps e.g. the erection of other components. In the erected product support, the or each product support defining structure is erect. In a flat configuration of the product support, the or each product support defining structure is in a flat configuration. Where multiple product support defining structures are provided, each will be erected during erection of the product support. In the embodiments illustrated herein, individual product support defining structures are erected simultaneously. However, it will be appreciated that this need not be the case provided that ultimately all product support defining structures present are erected during erection of the product support. For example, product support defining structures may be erected sequentially, or in groups, wherein each product support defining structure in a group is erected simultaneously, with the groups of product support defining structures being erected sequentially etc.

[0012] During erection of the product support, the hinge panels enable the first portion of the top panel to be rotated relative to the second portion to convert the product support defining structure from a flat configuration to an erected configuration. The bottom panel includes one or more openings, each registered with a respective portion of the top panel. During erection of the product support, an erecting pin of an erecting machine may be inserted through the opening to contact the top panel to facilitate rotation of the first portion relative to the second portion. Thus, the one or more openings facilitate erection of the product support defining structure and hence facilitate erection of the product support. It will be appreciated that the pins need not be used through the full extent of the rotation of the first portion of the top panel involved in converting the product support defining structure from a flat configuration to a final erected configuration. For example, the pins may only be used over an initial portion of the rotation of the first portion of the top panel during erection of the product support defining structure in some embodiments. Once rotation has commenced, and the hinge panels have started to hinge about their respective foldlines, it may be possible to complete the rotation without the assistance of the pins. The pins may also be used to retain the product support in its erected configuration during loading of product, for example, where the sheet material is particularly flexible.

[0013] The product support defining structure includes a longitudinal side wall panel which provides a longitudinal sidewall of the erected product support. The longitudinal sidewall panel may be connected to an outer edge of the top panel and an outer edge of the bottom panel along respective foldlines. The longitudinal sidewall panel extends along an outer side edge of the product support in the erected product support. The longitudinal sidewall panel may be straight or of another shape e.g. curved or undulating.

[0014] The erectable product support comprises longitudinal ends and longitudinal end edges. The longitudinal end edges are separated by the longitudinal sidewall. The product support also defines a transverse direction.

[0015] The second portion of the top panel may be secured to the bottom panel in any suitable manner. The second portion of the top panel is superposed on e.g. contacts the bottom panel. The second portion may be attached to the bottom panel over at least a portion of an area in which the top panel is superposed e.g. contacts the bottom panel. The at least a portion of the area may be a single region of attachment or may comprise a plurality of discrete regions of attachment. The second portion of the top panel may be attached to the bottom panel intermittently or continuously within the or each region of attachment. For example, where an adhesive attachment is used, adhesive may be provided using an intermittent or continuous pattern within the or each region of attachment. Thus, it will be appreciated that adhesive may be applied in any suitable location(s) in order to provide a secure attachment between the second portion of the top panel and the bottom panel. Other forms of attachment may be used e.g. heat sealing. For example, this may be achieved using a heat seal varnish or other coating applied to surfaces of one or both of the top panel and bottom panel.

[0016] The second portion of the top panel provides a lower section of the product support defining structure in the erected product support. The lower section is a lower section relative to the upper section defined by the top panel which provides an upper support section of the product support defining structure in the erected product support. Thus the lower section may be seen as recessed relative to the upper portion when the erected product support is viewed from above. The lower section defines at least a part of the interior of the product support.

[0017] The second portion of the top panel may be of any suitable configuration. The second portion may extend into the or each product locating pocket e.g. to form a bottom thereof. The second portion may be continuous or discontinuous. The second portion preferably comprises a section extending continuously in the longitudinal direction of the product support e.g. a continuous longitudinal strip. The section preferably extends to an inner edge of the top panel. The section may be located adjacent the inner edge of the top panel. In embodiments the section may be in the form of a continuous longitudinal strip located adjacent, and extending to, the inner edge of the top panel. This may facilitate securing of the second

portion to the bottom panel.

[0018] The outlines and foldlines provided in the top panel may be provided in any suitable configuration, depending upon the number, configuration and arrangement of product(s) to be supported, and hence the number, configuration and arrangement of product locating pockets to be provided by the product support defining structure. For example, a outline may be curved, straight, or may include both curved and straight sections. Combinations of different configurations of outline may be used in the plurality of cutlines. Additional outlines and/or foldlines may be present in the product support and/or in a portion thereof providing the product support defining structure.

[0019] In preferred embodiments the cutlines defining the plurality of hinge panels comprise a plurality of cutlines, each defining an edge of one or more of the hinge panels i.e. in both the flat and erected configurations of the product support. A cutline may define an edge of one or two of the hinge panels. Each edge extends between the respective ends of the hinge panel i.e. the ends connected by foldlines to the first and second portions of the top panel respectively. In the erected product support, at least some, and optionally each of the plurality of cutlines may also each define an edge of a product locating pocket of the product support defining structure. As discussed in more detail below, different cutlines may define the edges of the same or different product locating pockets where multiple pockets are provided. It will be appreciated that the product support may or may not comprise additional cutlines which do not define an edge of one or more of the hinge panels and/or an edge of one or more of the product locating pockets of a product support defining structure thereof.

[0020] During erection of the product support, each hinge panel hinges about the foldline connecting the hinge panel to the first portion of the top panel to enable the first portion of the product support defining structure to be rotated relative to the second portion. Each hinge panel may hinge about the foldline connecting the hinge panel to the first portion of the top panel into a position in which the hinge panel is upstanding from the second portion of the top panel. The sidewall panel may hinge about a foldline connecting the sidewall panel to the bottom panel into a position in which it is upstanding from the bottom panel. By "upstanding" it is not required that a hinge panel necessarily is perpendicular to the second portion. In the erected product support, at least some of the hinge panels may be inclined. For example, depending upon the desired appearance of the product support and/or the type of product to be located, it may be desirable for at least some of the walls of the pockets to be inclined. Thus, a hinge panel forming a wall of a pocket may be inclined in some embodiments.

[0021] During erection, the first portion of the product support defining structure is rotated relative to the second portion to a position in which it is located above the second portion. The hinge panels may assist in maintaining the first portion located spaced above the second portion in the erected product support. The first portion may be rotated relative to the second portion from a first position in which the first and second portions are substantially co-planar i.e. in a flat configuration of the product support defining structure (or product support) to a second position in which the first portion is located above the second portion.

[0022] In embodiments in which a cutline additionally defines an edge of one of the one or more product locating pockets, the edge of the product locating pocket defined by the cutline may be of any desired and suitable shape. For example, the edge may be straight or curved. This may depend upon the configuration of the product to be located. The shape of the edge of the product locating pocket portion may correspond to a shape of an edge of a product with which the product support is to be used. It will be appreciated that, when product(s) are inserted in the product support, at least at times, a product need not necessarily contact the edge of the product locating pocket, or at least not along the entire length of the edge of the product locating pocket e.g. if a straight edged product is used with a curved product locating pocket edge, and/or, where a pocket has inclined walls, depending upon a depth to which a product is inserted in the product locating pocket etc. The product locating pocket edge will still provide a stop to limit the movement of the product relative to the product support and hence act to locate the product.

[0023] In embodiments, the or each product locating pocket edge forms part of an inner edge of the first portion of the top panel which provides the upper support section of the product support defining structure in the erected product support. Each hingeline connecting a hinge panel to the first portion of the top panel may also form part of the inner edge of the first portion of the top panel. In embodiments the inner edge may consist of each product locating pocket edge and the foldlines connecting the hinge panels to the first portion of the top panel.

[0024] The bottom panel comprises one or more openings, each being registered with a respective portion of the top panel when the product support defining structure is in a flat configuration. Each opening enables an erecting pin of an erecting machine to be inserted from the underside of the bottom panel through the opening to contact the portion of the top panel associated with the opening.

[0025] It will be appreciated that the opening(s) may be of any suitable shape or configuration, e.g. depending upon the portion of the top panel to be engaged e.g. where this is a hinge panel, the shape of the hinge panel, the number and arrangement of openings provided, and/or the shape and configuration of the erecting pins to be used.

[0026] The or each opening may be registered with any desired part of the top panel to assist in rotation of the first portion thereof relative to the second portion to erect the product support defining structure during erec-

tion of the product support. By "registered" with, it is meant that the opening is sufficiently aligned with and underlies the portion of the top panel at least when the product support in in a flat configuration to enable a pin to be inserted through the opening from the underside of the bottom panel to contact the portion and assist in rotation of the portion. The opening will be registered with the portion of the top panel to enable a pin inserted therethrough to contact the portion during at least a part of the rotation of the portion involved in erecting the product support defining structure, although may not be registered with i.e. underlie the portion in the final erected product support. For example, in embodiments described below in which the portion is a hinge panel, the opening may no longer be aligned with the hinge panel such that a pin extended therethrough would contact the hinge panel, when the product support defining structure is in the final erected state.

[0027] In preferred embodiments, a plurality of the openings is provided. The openings may be regularly spaced. For example one or more openings may be provided associated with each product locating pocket, or with alternate pockets etc. In some embodiments, the openings may comprise a plurality of openings disposed in one or more clusters, each cluster comprising a plurality of openings, the openings in the cluster being registered with portions of the top panel in a respective region of the top panel. For example, a plurality of such clusters may be provided, spaced along a longitudinal direction of the bottom panel with the openings in the respective clusters being registered with respective regions of the top panel spaced along the longitudinal direction thereof. The most appropriate arrangement of the openings (for example, in embodiments, the number of openings in each cluster, and the number and spacing of the clusters) may be selected as desired to provide a suitable degree of assistance in erecting the product support defining structure e.g. depending upon factors such as the position of the pocket(s) of the product support defining structure e.g. the relative dimension and/or spacing thereof, where applicable, the sheet material used etc.

[0028] The or each portion of the top panel with which a respective opening is registered may be any suitable and desired such portion. The portion may be a hinge panel or a portion of the first portion of the top panel. In embodiments, one or more openings is provided, each being registered with a portion of the top panel, wherein at least one opening is provided registered with a respective hinge panel of the top panel and/or at least one opening is provided registered with a portion of the first portion of the top panel. Preferably a plurality of openings is provided in the or each such location, each being registered with a respective portion of the first portion of the top panel.

[0029] In some preferred embodiments the one or more openings of the bottom panel comprise one or more openings (and preferably a plurality thereof), each being registered with a respective one of one of the hinge panels when the product support defining structure is in a flat configuration, whereby an erecting pin of an erecting machine may be inserted from the underside of the bottom panel through the opening to contact the hinge panel to rotate the hinge panel about the foldline connecting the hinge panel to the first portion of the top panel to assist in rotating the first portion of the top panel relative to the second portion of the top panel to erect the product support defining structure during erection of the product support. In these embodiments, additional openings may or may not be provided associated with other portions of the top panel.

[0030] In these embodiments it is not necessary that an opening corresponds exactly in shape and size to the associated hinge panel provided that it is sufficiently registered with the hinge panel to allow contact to be made with the hinge panel, and to allow a suitable configured erecting pin to extend through the opening to rotate the hinge panel during at least a portion of the rotation of the hinge panel involved in erection of the product support defining structure.

[0031] In these embodiments the bottom panel may comprise an opening in respect of each hinge panel, or in respect of only some of the hinge panels. Preferably, whether or not an opening is provided in respect of each hinge panel, the bottom panel comprises a plurality of openings, each registered with a respective one of the hinge panels. The openings in respect of different hinge panels may be of the same or differing shapes and sizes. For example, where the hinge panels vary in shape and size, the openings may similarly vary in shape and size e.g. to approximately correspond to the shape and size of the hinge panels.

[0032] Wherever the openings are provided, e.g. whether associated with hinge panel(s) and/or the first portion of the top panel, where multiple openings are provided, the openings may be associated respective ones of the one or more pockets of the product support, or otherwise. For example, openings may be associated with hinge panels separating the pockets and/or defining walls thereof, and/or may be associated with the first portion of the top panel in a manner not specifically associated with individual pocket(s) e.g. at the longitudinal ends thereof. Where openings are provided associated with respective ones of the pockets, they need not be provided associated with each pocket present.

[0033] In any of the embodiments of the invention, an opening may be completely surrounded by the material of the bottom panel i.e. such that the bottom panel extends around the entire perimeter of the opening. However, this need not be the case. For example, for an opening located at a longitudinal end edge of the bottom panel, the bottom panel may extend around only a portion of the perimeter of the opening, with the opening being in the form of a notch in the longitudinal end edge of the bottom panel.

[0034] In embodiments the product support is config-

ured such that, when erected, the product support defining structure defines one or more product locating pockets along the longitudinal direction of the product support. In embodiments in which the cutlines comprise a plurality of cutlines, wherein each cutline of the plurality of cutlines defines an edge of one or more of the hinge panels and also defines an edge of a product locating pocket of the product support defining structure, each product locating pocket may be defined between adjacent ones of the plurality of hinge panels and may include product locating pocket edges (i.e. first and second product locating pocket edges) defined by the cutlines (i.e. first and second cutlines) which define the edges of the hinge panels on either side of the product locating pocket between which the product locating pocket is defined.

[0035] Thus, in embodiments the support is configured such that, when erected, the product support defining structure defines one or more product locating pockets along the longitudinal direction of the product support, each product locating pocket being defined between adjacent ones of the plurality of hinge panels, and including product locating pocket edges defined by cutlines of the product support defining structure, which cutlines define the edges of the hinge panels on either side of the product locating pocket between which hinge panels the product locating pocket is defined.

[0036] It will be appreciated that a pocket may be located with any desired and suitable orientation, and may be of any desired size and shape. Each product locating pocket may extend generally in a transverse direction.

[0037] For each product locating pocket, one edge of each of the (adjacent) hinge panels between which the product locating pocket is defined, may be defined by one of the cutlines of the product support defining structure. In embodiments the opposed edge of the hinge panel may be defined by another one of the cutlines, or by a (longitudinal) end edge of the top panel. For example, if the hinge panel is located at an end of the product support, such that there is a product locating pocket on only one side thereof, the edge of the hinge panel on the opposite side thereof may be provided by an end edge of the top panel. However, other arrangements may be envisaged.

[0038] The or each product locating pocket may comprise a sidewall, the sidewall being provided by one of the hinge panels. The sidewall thus connects the first and second sections of the top panel. The sidewall may be a longitudinal sidewall. Such a sidewall may inhibit transverse movement of a product located in the pocket. A longitudinal sidewall may extend generally in the longitudinal direction of the product support, and may extend parallel to the longitudinal sidewall of the product support defining structure, or at any desired and suitable angle thereto. A given pocket may comprise one or more sidewall provided by a hinge panel, and, in some embodiments, includes only one such sidewall e.g. a longitudinal sidewall. The most suitable sidewall configuration for a pocket will depend upon factors such as; the type of product, the desired arrangement of the product relative to the support, and the depth at which the product is to be held etc. For example, an inclined sidewall (whether or not a longitudinal sidewall) may be used to control the point at which the bottom of a product will contact the sidewall, and hence the depth at which the product will be held within the pocket. It is envisaged that where multiple products of differing configurations are to be held by the product support, angling of the sidewalls of the pockets may enable products of differing dimensions to be held at differing depths within the pockets, so that the top surfaces of the products all lie in the same level.

[0039] The one or more product locating pockets may be defined between hinge panels of a set of one or more of the plurality of hinge panels provided by the product support defining structure. Thus, the set of the plurality of hinge panels may separate adjacent product locating pockets from one another or separate end pockets from an end of the product support. A product locating pocket will be defined between (longitudinally) adjacent ones of the hinge panels. Any given one of the set of hinge panels may define a side of a product locating pocket on one or both sides thereof, depending upon the number of pockets present. These hinge panels may be referred to as "pocket defining hinge panels". This set of hinge panels may be referred to as a "first" set to distinguish them from any further set of hinge panels present. The set of hinge panels may comprise a plurality of hinge panels. In some embodiments, an opening in the bottom panel may be provided in respect of at least some (i.e. one or more or a plurality of), and optionally each hinge panel of this set of hinge panels. This set of hinge panels may extend longitudinally along the product support e.g. in a row. The foldlines connecting the hinge panels of this set to the second portion of the top panel may optionally be laterally aligned with one another. The hinge panels of this set may, in the erected product support, optionally be laterally aligned with one another.

[0040] Unless the context demands otherwise herein, a reference to at least "some" of a set of objects e.g. openings encompasses one or more or a plurality i.e. a single one, or a plurality of the specified objects e.g. openings.

[0041] In embodiments in which the or each product locating pocket comprises a (or one or more) sidewall, the (or each) sidewall of each product locating pocket may be provided by one of a set of one or more of the plurality of hinge panels. This set of hinge panels may be referred to as a "second" set to distinguish them from any further set of hinge panels present. The hinge panels of this set may be referred to as "sidewall defining hinge panels". The set may comprise a plurality of the hinge panels. An opening in the bottom panel may be provided in respect of at least some, and optionally each hinge panel of this set of hinge panels. The hinge panels of this set may extend longitudinally along the product support e.g. in a row. The foldlines connecting the hinge panels of this set to the second portion of the top panel may

optionally be laterally offset relative to one another. The hinge panels of this set may optionally, in the erected product support, be laterally offset with respect to one another. This may enable products of differing length to be accommodated. However, in other embodiments the foldlines and hinge panels may be laterally aligned with each other.

[0042] The first (pocket defining) or second (sidewall defining) sets of hinge panels may, in embodiments, each be a subset of the plurality of hinge panels provided by the product support defining structure. There may or may not be additional hinge panels present in the product support defining structure.

[0043] The bottom panel may comprise first and second rows of openings, wherein the openings of the first row are associated with the hinge panels of the first subset of hinge panels, and the second row of openings is associated with the hinge panels of the second subset of hinge panels.

[0044] Where first (pocket defining) and second (sidewall defining) sets of hinge panels are provided, the first set of hinge panels may be located inboard of the second set of hinge panels. Inboard may refer to the hinge panels being located further from the edge of the product support defined by the longitudinal side wall panel.

[0045] In embodiments the one or more product locating pockets are defined between hinge panels of a first subset of the plurality of hinge panels provided by the product support defining structure, and each product locating pocket comprises a sidewall provided by one of a second subset of the plurality of hinge panels provided by the products support defining structure. The first and second subsets may thus be referred to as pocket defining and sidewall defining subsets of hinge panels respectively. An opening in the bottom panel may be provided in respect of at least some, or each hinge panel of the first and/or second subsets of hinge panels.

[0046] The product support may be configured such that in the flat (i.e. the flat configuration of the product support), the cutlines of the product support includes a plurality of cutlines each comprising a first portion defining an edge of one of the first subset of hinge panels and a second portion defining an edge of one of the second subset of hinge panels, wherein the second portion, in the erected product support, defines at least a portion of the edge of a product locating pocket. The first and second portions define edges respectively of ones of the first and second subsets of hinge panels associated with the product locating pocket having an edge defined by the second portion. The cutline may include a further portion providing a further portion of the edge of the product locating pocket.

[0047] It will be appreciated that where both the first and second subsets of the hinge panels are present, an opening in the bottom panel may be provided in respect of one or more, (e.g. one or more or a plurality of), or each hinge panel of either or both of the first and second subsets of hinge panels. Depending upon the configuration of the product support, strength of materials, type of machine used etc., it may not be necessary to provide opening(s) in respect of both subsets of hinge panels in order to facilitate erection of the product support. Preferably an opening in the bottom panel is provided at least in respect of at least some (e.g. one or more or a plurality of) or each hinge panel of the second subset of hinge panels. It will also be appreciated that is not necessary for an opening to be provided in respect of each hinge panel of the first or second subset of hinge panels, provided that a sufficient number is provided to facilitate machine erection. This may depend upon the configuration of the product support, strength of materials, type of machine used etc.

[0048] It will be appreciated that the number and location of openings provided associated with hinge panels of either of the first or second subsets of hinge panels may vary, and may be selected e.g. based upon the degree of assistance required during erection of the support, the type of material used, the relative positions and sizes of the pockets etc. Of course, even where hinge panels corresponding to the first and/or second subsets of hinge panels are present, it is not necessary that any opening is provided registered with a hinge panel, and the opening(s) may instead be registered with portion(s) of the first portion of the top panel.

[0049] In some embodiments, an opening in the bottom panel is provided in respect of each hinge panel of the plurality of hinge panels of the product support defining structure.

[0050] Where openings are provided associated with at least some of the first and/or second subsets of hinge panels, additional opening(s) may or may not be provided registered with other portion(s) of the top panel e.g. the first portion thereof.

[0051] In any of the embodiments of the invention, the first portion of the top panel may, in the erected product support, define a continuous longitudinal strip. Where the one or more openings of the bottom panel comprises one or more openings registered with the first portion of the top panel, the one or more openings may include one or more openings registered with respective portions of such a strip defined by the first portion of the top panel. The openings may be disposed in clusters registered with regions e.g. at each end of the strip and/or at locations therebetween.

[0052] The respective foldline connecting each one of the set of pocket defining hinge panels to the first portion of the top panel may connect the hinge panel to a finger defined by the first portion of the top panel.

[0053] The first portion of the top panel may, in the erected product support, comprise an outer region and a plurality of fingers, each finger extending from the outer region inward to a top of a one of the pocket defining hinge panels i.e. one of the second subset of hinge panels. The fingers may separate adjacent pockets where multiple pockets are provided, or separate an end pocket from an end edge of the product support. Each finger

may be defined between cutlines associated with the pockets on either side thereof where present, or between a pocket and an end of the product support.

[0054] In embodiments in which the first portion of the top panel comprises an outer region and a plurality of fingers in the erected product support, where the one or more openings of the bottom panel comprises one or more openings registered with the first portion of the top panel, the one or more openings may include one or more openings registered with the outer region of the top panel. The outer region may comprise a continuous longitudinal strip as previously described.

[0055] In embodiments, where the second portion of the top panel comprises a continuous longitudinal strip located adjacent, and extending to, an inner edge of the top panel, the strip may be located between the foldlines connecting the pocket defining hinge panels to the second portion of the top panel and the inner edge of the top panel, or, in the erected product support, between the bottom of the or each pocket defining hinge panel and the inner edge of the top panel. The strip may be located inboard of each of the pocket defining hinge panels, and indeed, inboard of any hinge panel of the product support defining structure.

[0056] In accordance with any of the embodiments, for each pocket, there may be two cutlines defining an edge thereof. The edges defined in this way may be separated by a foldline connecting a hinge panel providing a sidewall of the pocket to the first portion of the top panel.

[0057] Where multiple pockets are provided, the pockets may be of regular or irregular size and shape. This may depend upon the configuration of the products to be located therein. The side edge of different pockets may be of the same or different lengths.

[0058] The product support defining structure may include additional components. Furthermore, the pockets need not be configured in the exemplary manners described above.

[0059] In some embodiments the cutlines in the top panel may define, for one or more of the one or more product locating pockets defined by the product support defining structure, one or more panels, or optionally a net, for supporting the base of a product inserted in the pocket. Such structure may be provided in addition to other pocket defining structure described herein.

[0060] Preferably the product support is configured such that, when erected, the product support defining structure defines a plurality of product locating pockets along the longitudinal direction of the product support.

[0061] The product support may comprise one or more of the product support defining structures. In preferred embodiments, a pair of the product support defining structures are provided, one on each longitudinal side thereof. For example, they may be provided on opposite sides of a longitudinal centreline of the product support. However, such an arrangement is only exemplary, and multiple product support defining structures may be arranged in any desired manner e.g. end to end, offset or aligned with one another etc.

[0062] Where multiple product support defining structures, they may be of the same or different construction, and each may include any or all of the features described herein. The product support defining structures may be described as first and second such structures having first and second ones of any of the features described herein. In some embodiments, a pair of product support defining structures are provided which are mirror images of one another about a longitudinal centreline.

[0063] The or each product locating pocket defined by the product support defining structure on one side of the product support may be (longitudinally) aligned with a corresponding product locating pocket of the product support defining structure on the other side of the product support for supporting opposed ends or sides of a product extending (transversely) therebetween. However, such arrangements are merely exemplary.

[0064] Where multiple product support defining structures are provided, they may share components. For example, they may have a common bottom panel. The bottom panel may then provide a base of the product support. Where a product supporting structure e.g. net or one or more panels is provided, such structure may extend across the pockets associated with different product support defining structures e.g. for supporting opposed ends or sides of a product.

[0065] The product support may be of a single piece construction. The erectable product support may be formed from a blank of sheet material, preferably a single piece blank.

[0066] In embodiments the (first) product support defining structure of the erectable product support is formed by folding a blank having first, second and third panels, the third panel being located between the first and second panels, wherein the first panel is folded over and secured to the second panel, and wherein the first panel provides the top panel, the second panel provides the bottom panel and the third panel provides the longitudinal sidewall panel of the product support defining structure in the erectable product support.

[0067] Where the erectable product support comprises a further product support defining structure, the blank may further comprise fourth and fifth panels, the fourth panel being located between the second and fifth panels, wherein the fifth panel is folded over and secured to the second panel, and wherein the fifth panel provides the top panel, the second panel provides the bottom panel and the fourth panel provides the longitudinal sidewall panel of the further product support defining structure in the erectable product support. Thus first and second portions of the second panel may provide the bottom panel of each of the product support defining structures.

[0068] The second panel may provide a center portion of the blank with the first and third, and fourth and fifth panels being side portions of the blank.

[0069] However, it is not a requirement that the product support is of a single piece construction. For example,

the product support could be formed from two pieces joined together e.g. one providing the top panel, and one providing the bottom panel (with the sidewall also being provided with one of the pieces). A seam between multiple pieces may be located in any position. Furthermore, where a single piece construction is used, with side portions of a blank being folded over a centre portion, the side portions need not be joined to the center portion such that their side edges are on either side of, or coincident with a longitudinal centerline thereof, but could be joined thereto along any line, e.g. offset from a central longitudinal axis, or at differing distances from the longitudinal axis. An asymmetric arrangement may be used.

[0070] The present invention extends to a method of erecting the product support in accordance with any of the embodiments described.

[0071] The method comprises, for at least some, (and preferably the or each) of the one or more openings in the bottom panel of the or each product support defining structure, inserting a respective erecting pin of an erecting machine from the underside of the bottom panel therethrough to contact the portion of the top panel associated with the opening, and using the pin to assist in rotating the first portion of the top panel relative to the second portion of the top panel to erect the product support defining structure during erection of the product support. Where the portion of the top panel is a hinge panel, the pin may rotate the hinge panel associated with the opening about the foldline connecting the hinge panel to the first portion of the top panel to assist in rotating of the first portion of the top panel relative to the second portion thereof to erect the product support defining structure during erection of the product support.

[0072] One pin is used in respect of each opening of the bottom panel used in the erection process. It is envisaged that only some, but preferably all of the openings present in the bottom panel are used in the erection process i.e. a pin is inserted therethrough.

[0073] The pin(s) may be used during rotation of the first portion (and, in embodiments hinge panel) over the full extent of rotation involved in erecting the product support defining structure or only over a portion e.g. an initial portion thereof.

The pins are preferably simultaneously inserted through each opening used (and preferably each opening in the bottom panel of the or each product support defining structure).

[0074] The pin(s) may be mounted on a forming element so as to be upstanding therefrom. The pins may be mounted in a pattern corresponding to the positions of the openings of a product support with which they are to cooperate. For example, an array of pins may be provided, including first and second rows of pins for cooperating with first and second rows of the openings in the bottom panel. The first and second rows of openings may be associated with the first and second subsets of hinge panels, for a given product support defining structure, in embodiments.

[0075] The step of inserting the pins through the openings may comprise pressing the erectable product support onto a (or the above mentioned) forming element having upstanding pins mounted thereon. The pressing may be achieved in any suitable manner. In embodiments the pressing is performed using a tool including one or more portions for insertion into respective ones of the one or more product locating pockets defined by the product support.

[0076] In embodiments the or each erection pin is a tapered pin. The pin tapers toward its top. A tapered pin may define at least one axially extending inclined surface. The pin may define such a surface on one or more e.g. two opposed sides thereof. This may facilitate insertion of the pin through an aperture. The pin may be relatively easily inserted before more closely engaging a sidewall of the aperture on one or both sides thereof. This may provide a camming type action. The inclined surface(s) may ensure that the pin continues to contact the portion of the top panel as the top panel starts to rotate.

[0077] The method may further comprise locating one or more product in the product support once erected. The product may be of any type e.g. confectionary, cosmetics etc. Where more than one product is inserted, the products may be of the same or different types and/or configurations. The or each product may be located such that an end or side of each respective product is located in a respective one of the pockets of the product support defining structure. Where a pair of product support defining structures are provided, the or each product may extend between opposed pockets of the product support defining structures, with opposed ends of the product located in each of the pockets. Such arrangements are, however, merely exemplary.

[0078] The method may further comprise supporting the erected product support on the erection pin(s) during loading of the product.

[0079] The method may further comprise inserting the loaded product support into an outer package. Thus, the support is loaded with product before being inserted in the package in contrast to previous arrangements in which a support, integral with a package, was erected at the same time as the package was erected, and then loaded with product in situ. The present invention may facilitate loading of product.

[0080] The product support may, for example, may be inserted into the top end of an outer package.

[0081] The present invention extends to an erected product support in accordance with any of the aspects or embodiments of the invention having one or more products located therein, and/or inserted in an outer package. Thus the invention extends to an outer package having the product support, of any of the aspects or embodiments of the invention described herein, inserted therein.

[0082] References to an opening in the bottom panel being provided in respect of a portion of the top panel e.g. hinge panel refer to there being an opening regis-

tered with the respective portion of the top panel e.g. hinge panel.

[0083] References herein to a longitudinal sidewall or direction of the product support or product support defining structure should not be construed as requiring the support or structure to be elongate, although, in embodiments, the longitudinal direction corresponds to a longer dimension of the support or structure.

[0084] References to top or upper, or bottom or lower, should not be construed as providing any limitation regarding the intended orientation of the product support or structure in use i.e. when located in an outer package, although typically the top or upper side will be the top or upper side when a product is loaded and the support or structure inserted in an outer package in use.

[0085] The product support is made from a foldable sheet material such as paperboard or cardboard, or even a plastics material. The material may be chosen as desired. The arrangements described herein may facilitate erection of a product support formed from a lightweight foldable plastics material, avoiding the need to use plastics forming tools. However, in some embodiments, the foldable sheet material is preferably a non-plastics material. This may provide a more environmentally friendly support.

[0086] A fold line as referred to herein refers to any line about which components have been folded. The fold line may comprise a line of weakness, crease line and/or perforations. If not explicitly stated, and unless inconsistent therewith, any connection described herein may be about a fold line.

The present invention in accordance with any of its further aspects or embodiments may include any of the features described in reference to other aspects or embodiments of the invention to the extent it is not mutually inconsistent therewith.

[0087] Features of embodiments of the invention are set forth in the dependent claims.

BRIEF DESCRIPTION OF DRAWINGS

[0088] Some preferred embodiments of the invention will now be described by way of example only with reference to the accompanying drawings, in which:

Figure 1 illustrates an erected product support in accordance with a first embodiment of the invention;
Figure 2 illustrates a blank for providing an erectable product support for providing the erected product support of Figure 1;
Figure 3 illustrates the erectable product support of Figure 1 during erection;
Figure 4 illustrates the product support of Figure 1 from the underside indicating the direction of movement of pins during erection;
Figure 5 illustrates an erected product support in accordance with a second embodiment of the invention;
Figure 6 illustrates a blank for providing an erectable product support for providing the erected product support of Figure 5;
Figure 7 illustrates the product support of Figure 5 from the underside indicating the direction of movement of pins during erection;
Figure 8 illustrates the product support of Figure 1 with product loaded therein;
Figure 9 illustrates the product support of Figure 5 with product located therein;
Figure 10 schematically illustrates a process for erecting the product support of Figure 1;
Figure 11 is a cross sectional view illustrating the cooperation between the forming pins, the upper tool and the support;
and Figure 12 illustrates an alternative arrangement of the openings in the bottom panel which may be used in embodiments of the invention.

DETAILED DESCRIPTION

[0089] Some preferred embodiments of the invention will now be described by way of example only.

[0090] With reference to Figures 1-5, a first embodiment of an erectable product support in accordance with the invention will be described.

[0091] Figure 1 shows the erected product support 1. The product support 1 is made from a foldable sheet material such as paperboard or cardboard.

[0092] The product support is erected from a flat configuration. Figure 2 illustrates a blank for providing the flat erectable product support and Figure 3 illustrates the erectable product support once assembled from the blank. Figure 3 illustrates the erectable product support in a configuration between its initial flat state and the erected state in order to facilitate understanding of certain features of the invention.

[0093] The product support 1 includes a first product support defining structure 3 on one longitudinal side thereof, and a second product support defining structure 3' on the other longitudinal side thereof. In the illustrated embodiment the product support defining structures 3, 3' are mirror images of one another about the longitudinal centreline of the product support 1. However, it will be appreciated that this need not be the case. Erecting the product support involves erecting each of the product support defining structures.

[0094] The features of the product support defining structure 3 will now be described. The product support defining structure 3' is of identical construction. The corresponding features of the product support defining structure 3' will be denoted using the same reference numerals as those of the structure 3, annotated by a " ' " sign. Not all features are labelled in respect of both structures, and some features are not visible in both structures as shown in Figure 1.

[0095] The product support defining structure 3 has a top panel 5 and a bottom panel 7 and a sidewall 9. In this

embodiment the bottom panel 7 is shared by the product support defining structures 3, 3'. The bottom panel 7 provides a base of the product support.

[0096] The top panel 5 includes a first portion 6 defining an upper support section of the product support and a second portion 8 providing a lower section of the product support. The second portion of the top panel includes a continuous longitudinal strip 10 extending to an inner edge 12 of the top panel. The strip 10 is shown as a hatched area for ease of illustration. This strip is merely a notional part of the second portion.

[0097] The second portion of the top panel is adhesively secured to the bottom panel 7. This is facilitated by the longitudinal strip 10. Any suitable adhesive pattern may be used, and the adhesive need not extend over the entire area over which the second portion extends. Other attachment mechanisms e.g. heat sealing may alternatively be used.

[0098] The product support defining structure 3 defines a plurality of product locating pockets 11 along the longitudinal direction thereof. The pockets 11' of the product support defining structure 3' are aligned with those of the product support defining structure 3 for locating the opposed ends of a product extending transversely therebetween. In this embodiment the second portion extends into the base of each pocket 11.

[0099] It will be appreciated that the second portion of the top panel need not be continuous along the length of the product support as shown, and need not extend into the pockets. For example, the second portion might be defined by tabs extending from the base of each of the flaps 13, and may be absent in other areas e.g. between the pockets and/or within the pockets.

[0100] A first subset of upstanding hinge panels 13 connect the first portion 6 of the top panel to the second portion 8 of the top panel 5. For ease of illustration, certain features will be labelled only in relation to one of the hinge panels 13. Each hinge panel 13 is connected at its top by a foldline 15 to the first portion of the top panel and is connected at the bottom about a foldline 17 to the second portion of the top panel. The pockets 11 are defined between side edges 19 of adjacent ones of the hinge panels 13. Each hinge panel 13 is located at the end of a finger 23 extending from an outboard region of the first region 9 of the top panel. The opposed edges of the fingers 23 provide side edges 35 of the pockets 11.

[0101] A second subset of upstanding hinge panels 25 provide (longitudinal) sidewalls for the pockets 11. Each of the hinge panels 25 is connected along respective hingelines 27, 29 at the top and bottom thereof to the first portion and the second portion of the product support. An opening 31 is defined extending between the sidewall provided by hinge panel 25 and the hinge panel 13 on each side of a pocket.

[0102] The bottom panel includes an opening (not visible in Figure 1) associated with each hinge panel 13, which extends toward the outer edge of the product support from the foldline 17 at the base of the hinge panel 13. This is used in the erection of the product support as described below. This opening underlies the finger 23 in the erected product support.

[0103] While the hinge panels 25 are shown as perpendicular to the base of the product support, this need not be the case. For example, inclined hinge panels may provide inclined sidewalls for the pockets. The sidewalls may be inclined so as to reduce the length of the pocket (i.e. in the transverse direction of the product support) with increasing depth. This may result in products being support midway between the top and the bottom of the pocket, depending upon the dimensions of the product. Such arrangements could be used to enable products of differing dimensions to be supported at differing depths, so that the tops of all products were level.

[0104] The blank for providing the product support 1 will now be described by reference to Figure 2.

[0105] The blank includes a first panel 42 which provides the bottom panel 7 of the erectable product support, a second panel 44 for providing the sidewall 9 and a third panel 46 for providing the top panel 5 of the first product support defining structure 3. Corresponding panels 44' and 46' are provided for the second product support defining structure 3', with the bottom panel provided by panel 42 being shared. The panels are connected to one another along foldlines.

[0106] The panel 42 includes rows of openings 50, 50'.

[0107] The panel 46 includes a plurality of cutlines 52. A first portion 53 of each cutline will define a side edge 19 of one of the hinge panels 13. A second portion 54 of the cutline will define a side edge 35 of one of the pockets 11. The first and second portion 53, 54 are defined on either side of the foldline 70.

[0108] The panel 46 also includes foldlines 59, 58. These foldlines provide the foldlines 29, 27 at the bottom and top of the hinge panels 25 respectively. Thus, the panels 60 between the foldlines 59, 58 will provide the hinge panels 25 corresponding to side walls of the pockets.

[0109] At least a part of the second portion 54 also defines the side edge of one of the hinge panels 60 which provide a side wall 25 of a pocket 11. For some of the deeper pockets, a longer cutline is used, such that the second portion 54 may be subdivided into a portion 55 which defines an edge of a hinge panel 60 and a connecting portion 57 extending between the portion 55 and the first portion 53.

[0110] The panel 46 also includes foldlines 70, 72 between which panels 74 are defined. The foldlines 70, 72 provide the foldlines 15, 17 at the top and bottom of the hinge panels 19 of the product support, which are provided by the panels 74.

[0111] It will be appreciated that the configuration and number of foldlines and cutlines may vary depending upon the number and configuration of pockets to be provided in the product support.

[0112] Panel 46' includes corresponding cutlines and foldlines.

[0113] In order to assemble the erectable product support, the panel 46 is folded about foldline 82 over the panel 44 and the panel 42 in the direction of the arrow. A longitudinal strip 84 at the outboard edge of the panel 46 is adhesively attached to the panel 42 inboard of the row of openings 50, between the openings and a centreline of the blank 40. The strip 84 provides the strip 10 in the product support. Regions 86 of panel 46 which define a base of the pockets in the product support may also be adhesively attached to the panel 42.

[0114] The regions which are superposed on and secured to the panel 42, and which will provide the second portion 8 of the top panel 7 in the product support, are indicated with hashed lines. Adhesive may be applied to any part of this region to provide an appropriate securement. Of course, other forms of attachment may alternatively be used e.g. heat sealing. In the case of heat sealing, a heat seal varnish or other coating may be applied to the region denoted with hashed lines to allow heat sealing to be achieved over this region.

[0115] When the blank has been folded in this way, each one of the openings 50 is registered with a one of the panels 74 which will provide a hinge panel 13 of the product support to enable an erecting pin to be inserted through the opening 50 from an underside of the panel 42.

[0116] The panel 46' is similarly folded about foldline 82' and secured to the panel 42 between the row of openings 50' and the centreline. This will result in each one of the openings 50' being registered with a one of the panels 74'.

[0117] Figure 3 illustrates the erectable product support obtained, with certain of the features of the product support labelled. In order to erect the product support, an erecting pin of an erecting machine is inserted from the underside of the bottom panel 7 through each respective one of the openings 50 so as to engage the hinge panel 13 overlying the opening 50 and thus cause the hinge panel to rotate into an upstanding position. This results in the first portion 6 of the product support defining structure rotating relative to the second portion 8. Simultaneously erecting pins will be inserted through the openings 50' associated with the product support defining structure 3' to cause rotation of the first portion 6' relative to the second portion 8'. In this way the erectable product support is converted from a flat configuration to the erected configuration of Figure 1.

[0118] Figure 4 illustrates the erected product from the underside, showing the openings 50 through which pins may be inserted in the direction of the arrows.

[0119] A second embodiment of a product support in accordance with the invention will be described by reference to Figures 5-7.

[0120] Figure 5 shows the erected product support. The product support 100 includes product support defining structures 103, 103' on either side thereof. The product support and product support defining structures are of the same general type as in the earlier embodiment, and like components are given like reference numerals incremented by 100. In this case, each product support defining structure defines only two pockets 111 along the longitudinal direction. The top panel 105 again defines a first portion 106 providing the upper section of the product support and a second portion 107 providing a lower section thereof. First and second sets of hinge panels 113, 125 are provided corresponding to the panels 13 and 25 in the earlier embodiment. Openings 131, 131' are defined along the sides of the pockets.

[0121] This embodiment differs from the earlier embodiment in the number and shape of product locating pockets defined. The side edges 135 of the pockets are curved in this embodiment.

[0122] Figure 6 shows the blank from which the erectable product support 100 is made. As in the earlier embodiment, the erectable product support is provided by folding panel 146 over one side of panel 144 and panel 142, and panel 146' over the other side of panel 142 and panel 144'. Adhesive or heat sealing may be provided in the hatched area as in the earlier embodiment.

[0123] Figure 7 shows the erected product support from the underside. As may be seen more clearly in Figures 6 and 7, a further difference is that, in addition to the openings 150 which are registered with the hinge panels 113 when the product support is in the flat, a second set of openings 170 is provided registered with the hinge panels 125. Thus, there are first and second rows of openings including the openings 150 and 170 in respect of the hinge panels 113 and 125 respectively (and similarly 150' and 170' in respect of the second product support defining structure).

[0124] Figure 7 illustrates the erected product support of the second embodiment showing the openings 150 and 170, and illustrating the direction of insertion of the pins.

[0125] Figures 8 and 9 illustrate the erected product supports of Figures 1 and 5 respectively with product 200, 300 located therein. It will be seen that in the embodiment of Figure 8, opposed ends 202, 204 of each product is located in the opposed pockets 111, 111' defined by the product support defining structures 3, 3'.

[0126] The product may be any desired product, whether confectionary or other food products, or cosmetics etc. The product support may be used to locate products for insertion in a variety pack or advent calendar, for example.

[0127] It will be appreciated that the embodiments shown in Figures 1-4 and 5-7 are merely exemplary. For example, a pocket may define more than one sidewall. A net may be provided which may support a product when located in the product support in use. For example, this may extend between the opposed pockets of the first and second product support defining structures of either embodiment. In either embodiment, the sidewall(s) of a pocket may be inclined.

[0128] In the embodiments described, the inner edges of the top panel of each product support defining means are located either on the longitudinal centreline (first em-

bodiment), or spaced laterally therefrom by the same amount (second embodiment). Of course the edges may be provided in any suitable position. It is not necessary for multiple product support defining structures to be mirror images of one another about the longitudinal centreline.

[0129] Furthermore, while the product supports are shown as being formed from a single piece blank, this is not essential, and a multi-piece arrangement may be used, including seam(s) in any location. In embodiments using a single piece blank, folding need not occur in the position shown.

[0130] It is not necessary for there to be a pair of product support defining structures. For example, a single structure, or more than two structures may be used, disposed in any desired orientation and/or position relative to one another. Multiple product support defining structures need not be of the same appearance of construction.

[0131] A method of erecting the product support of the embodiment of Figures 1-4 will now be described by reference to Figures 10 and 11. A robotic arm 300, or any suitable mechanism, is used to pick up the erectable product support 1 in its flat configuration from a feeder 290 including a stack of the product supports in the flat e.g. a magazine feeder or similar. Figure 10 schematically shows the top blank being removed from the pile and then held by the robotic arm. The robotic arm includes a tool 301 at its distal end having portions shaped to extend into the portions of the support which will provide the when in the erect configuration. The robotic arm 300 locates the flat product support 1 on a forming plate 302 having a plurality of upstanding pins, arranged in two rows (including pins 304 and 304' respectively). The forming plate is one of a series of such plates which are conveyed along a machine direction of the processing line.

[0132] The pins 304 are registered with the openings 50, and the pins 304' with the openings 50'. The product support is pressed down on to the forming element 302 by the tool 301 as shown in Figure 10, urging the pins into the openings. The pins 304 engage the hinge panels 13 through the openings 50 and cause the hinge panels 13 to rotate facilitating rotation of the first portion 6 of the top panel relative to the second portion 8 of the product support defining structure 3. Likewise, pins 304' engage the hinge panels 13' through the openings 50' and cause the panels 13' to rotate to facilitate rotation of the first portion 6' of the second product support defining structure 3' relative to the second portion 8'. In this way, the product support is erected.

[0133] As may be more clearly seen in Figure 11, which is a transverse cross sectional view showing the product support being pressed on to the forming plate, the pins are tapered, having an outer inclined surface 305, 305'. This may facilitate insertion of the pins, and helps maintain contact of the pins with the hinge panels as the panels start to rotate. Figure 11 shows the support once fully erected on the pins, with the hinge panels 13,13' upstanding.

[0134] Returning to Figure 10, the tool 301 releases the product support, and the product support travels along the production line in the direction of the arrow, supported on the forming plate 302, with the pins still located in the openings 50, 50'.. The product is loaded into the product support in the manner shown in Figure 8, and schematically illustrated in Figure 10.

[0135] The product support loaded with product is then removed from the forming plate 302 and inserted into an end of an outer package 308.

[0136] It is envisaged that in alternative embodiments, pins may be used only to provide an initial part of the rotation of the applicable hinge panels. Once movement about the applicable foldlines has commenced, it may be possible to remove the pins, and then complete erection without the pins being present. Thus, loading of the product and insertion of the support into a product may also be achieved without the product being supported on the pins.

[0137] Erection of the product support in accordance with the embodiment of Figures 5-7 proceeds in a similar manner. Here, the pins on the forming plate will need to define a pattern corresponding to the openings in the bottom panel, i.e. including pins in the corresponding positions to openings 170 and 170' as well as 150 and 150'. Pins will extend through openings 150, 150' to engage the hinge panels 113 and 113' and the additional pins will extend through openings 170, 170' to engage hinge panels 125 and 125' to rotate the panels and hence facilitate rotation of the first portions 106, 106' of the first and second product support defining structures relative to the second portion 108, 108' thereof to erect the product support. Loading of the product support and insertion into the package proceed as in the earlier embodiment.

[0138] It will be appreciated that it is not necessary to provide one opening for each hinge panel, for either the sets of hinge panels for providing hinge panels 13, 13' (or 113, 113') or the set of hinge panels for providing hinge panels 25, 25' (or 125, 125'). Openings may be provided for only a subset of either one or both of the sets of hinge panels. The number of openings required will depend upon factors such as the number and configuration of the pockets, the material used for the product support etc., and the amount of assistance required to erect the product support.

[0139] In addition to, or instead of providing openings registered with hinge panels of the product support, one or more openings may be provided at other openings. For example, the openings may be provided in clusters registered with parts of the first portion 6, 6' or 116, 116' of the product support 1, 100.

[0140] Figure 12 illustrates one such arrangement by reference to the product support 1 earlier described. In addition to, or alternatively to the openings 50, 50', another set of openings may be provided in the bottom panel 7 to result in pins engaging portions of the underside of

the first section 6, 6' of the top panel in each of the product support defining structures. For example, the portions may result in the pins engaging portions 251 of the first portion as shown by the dots in Figure 12 (for ease of reference showing the locations only in respect of the second product support defining structure 3'). The locations on the top panel with which the openings are registered may define clusters along the length of the product support section as illustrated. In the illustrated embodiment, the openings are associated with an outer portion of the first portion which defines a continuous longitudinal strip i.e. outboard of the fingers 23, 23' denoted by the hatched region. However, this need not be the case. There also need not be more than one cluster, or indeed, more than one pin/opening at each position along the length of the product. It will be understood that the openings should be located appropriately in the bottom panel such that they will engage portions corresponding to those portions of the top panel indicated in Figure 12 when the product support in in the flat configuration. Corresponding openings may be provided to enable pins to engage the first product support defining structure in corresponding locations (although not illustrated in Figure 12).

[0141] Similarly, alternative or additional openings for providing corresponding pin locations may be provided associated with the first portion of the top panel in the embodiment of Figure 5-7 or any other embodiment.

[0142] In general, the openings of a product support defining structure may be arranged to enable pins to contact the top panel, whether a hinge panel or first section defined thereby, in any locations to facilitate erection, which may generally be around each, or a subset of the pockets defined by the product support defining structure, but need not be e.g. may be at either end of the first section etc.

List of exemplary embodiments;

[0143] For the avoidance of doubt, the numbering of the embodiments below refers to the numbering of the embodiments in this list of embodiments.

Embodiment 1. A machine erectable product support made from cardboard, paperboard or other lightweight foldable sheet material comprising:
at least one product support defining structure comprising:

a top panel comprising a first portion for providing an upper support section of the product support defining structure in the erected product support, and a second portion for providing a lower section of the product support defining structure in the erected product support;
a bottom panel for providing a base of the product support defining structure in the erected product support, wherein the second portion of the top panel is secured to the bottom panel;
and a longitudinal side wall panel;
wherein the product support defining structure defines, in the erected product support, one or more product locating pockets;
wherein the top panel comprises cutlines and foldlines defining a plurality of hinge panels hingedly attaching the first portion of the top panel to the second portion of the top panel to enable the first portion to be rotated relative to the second portion to erect the product support defining structure during erection of the product support;
wherein each hinge panel is connected at one end about a foldline to the first portion of the top panel and at the other end about a foldline to the second portion of the top panel;
wherein the bottom panel comprises one or more openings, each opening being registered with a respective portion of the top panel when the product support defining structure is in a flat configuration, whereby an erecting pin of an erecting machine may be inserted from the underside of the bottom panel through the opening to contact the top panel to assist in rotating the first portion of the top panel relative to the second portion of the top panel to erect the product support defining structure during erection of the product support.

Embodiment 2. The product support of embodiment 1 wherein the one or more openings of the bottom panel comprise a plurality of openings disposed in one or more clusters, each cluster comprising a plurality of openings, the openings within each cluster being registered with portions of the top panel in a respective region of the top panel.

Embodiment 3. The product support of any one of the preceding embodiments wherein at least one opening is provided registered with a respective hinge panel of the top panel.

Embodiment 4. The product support of any one of the preceding embodiments wherein at least one opening is provided registered with a portion of the first portion of the top panel.

Embodiment 5. The product support of any one of the preceding embodiments wherein the cutlines comprise a plurality of cutlines, each defining an edge of one or more of the hinge panels.

Embodiment 6. The product support of embodiment 5 wherein each one of at least some of the plurality of cutlines further defines, in the erected product support, an edge of one of the one or more product locating pockets.

Embodiment 7. The product support of any one of the preceding embodiments wherein the product support is configured such that, when erected, the product support defining structure defines one or more product locating pockets along the longitudinal direction of the product support, each product locating pocket being defined between adjacent ones of the plurality of hinge panels, and including product locating pocket edges defined by cutlines of the product support defining structure, which cutlines define the edges of the hinge panels on either side of the product locating pocket.

Embodiment 8. The product support of embodiment 7 wherein, for each product locating pocket, one edge of each of the hinge panels between which the product locating pocket is defined is defined by a one of the cutlines of the product support defining structure, and the opposed edge of the hinge panel is defined by another one of the cutlines of the product support defining structure or by an end edge of the top panel.

Embodiment 9. The product support of any one of the preceding embodiments wherein the or each product locating pocket further comprises a sidewall, the sidewall being provided by one of the plurality of hinge panels of the product support defining structure, optionally wherein the sidewall is a longitudinal sidewall.

Embodiment 10. The product support of any one of the preceding embodiments wherein the one or more product locating pockets are defined between hinge panels of a first subset of the plurality of hinge panels provided by the product support defining structure, and wherein a sidewall of each product locating pocket is provided by one of a second subset of the plurality of hinge panels provided by the product support defining structure, wherein an opening in the bottom panel is provided in respect of at least some of the hinge panels of the first and/or second subsets of hinge panels.

Embodiment 11. The product support of embodiment 10 wherein the product support defining structure comprises a plurality of cutlines, which, in the flat configuration of the product support defining structure, each comprise a first portion defining an edge of one of the first subset of hinge panels and a second portion defining an edge of one of the second subset of hinge panels, wherein the second portion, in the erected product support, defines at least a portion of the edge of a product locating pocket.

Embodiment 12. The product support of embodiment 10 or embodiment 11 wherein the first portion of the top panel, in the erected product support, comprises an outer region and a plurality of fingers, each finger extending from the outer region inward to a top of the second subset of hinge panels.

Embodiment 13. The product support of any one of the preceding embodiments wherein the product support is configured such that, when erected, the product support defining structure defines a plurality of product locating pockets along the longitudinal direction of the product support.

Embodiment 14. The product support of any one of the preceding embodiments wherein the second portion comprises a continuous longitudinal strip.

Embodiment 15. The product support of embodiment 14 wherein the continuous longitudinal strip is located adjacent, and extends to, an inner edge of the top panel.

Embodiment 16. The product support of any one of the preceding embodiments wherein the first portion of the top panel comprises a continuous longitudinal strip, wherein the one or more openings includes one or more openings registered with respective portions of the longitudinal strip.

Embodiment 17. The product support of any one of the preceding embodiments wherein the erectable product support comprises a pair of said product support defining structures, one on each longitudinal side thereof.

Embodiment 18. The product support of embodiment 17 wherein the or each product locating pocket defined by the product support defining structure on one side of the product support is aligned with a corresponding product locating pocket of the product support defining structure on the other side of the product support for supporting opposed ends or sides of a product extending therebetween.

Embodiment 19. The product support of any one of the preceding embodiments wherein the support is of a single piece construction.

Embodiment 20. The product support of any one of the preceding embodiments wherein the erectable product support is formed from a blank of sheet material, preferably a single piece blank.

Embodiment 21. A method of erecting the product support of any one of the preceding embodiments comprising

for at least some of the one or more openings in the bottom panel of the or each product support defining structure, inserting a respective erecting pin of an erecting machine from the underside of the bottom

panel therethrough to contact the portion of the top panel associated with the opening, and using the pin to assist in rotating the first portion of the top panel relative to the second portion of the top panel to erect the product support defining structure during erection of the product support.

Embodiment 22. The method of embodiment 21 further comprising locating one or more product in the product support and then inserting the product support in an outer package.

Embodiment 23. The method of embodiment 22 further comprising supporting the product support on the erection pins during loading of the product.

Embodiment 24. The method of any one of embodiments 21 to 23 wherein the erection pins define at least one axially extending tapered surface.

Embodiment 25. The method of any one of embodiments 21 to 24 wherein the step of inserting the pins through the openings comprises pressing the erectable product support onto a forming element having upstanding pins mounted thereon.

Embodiment 26. The method of embodiment 25 wherein the pressing is performed using a tool including one or more portions for insertion into respective ones of the one or more product locating pockets defined by the product support.

Claims

1. A machine erectable product support made from cardboard, paperboard or other lightweight foldable sheet material comprising:
at least one product support defining structure comprising:

a top panel comprising a first portion for providing an upper support section of the product support defining structure in the erected product support, and a second portion for providing a lower section of the product support defining structure in the erected product support;
a bottom panel for providing a base of the product support defining structure in the erected product support, wherein the second portion of the top panel is secured to the bottom panel;
and a longitudinal side wall panel;
wherein the product support defining structure defines, in the erected product support, one or more product locating pockets;
wherein the top panel comprises cutlines and foldlines defining a plurality of hinge panels hingedly attaching the first portion of the top panel to the second portion of the top panel to enable the first portion to be rotated relative to the second portion to erect the product support defining structure during erection of the product support;
wherein each hinge panel is connected at one end about a foldline to the first portion of the top panel and at the other end about a foldline to the second portion of the top panel;
wherein the bottom panel comprises one or more openings, each opening being registered with a respective portion of the top panel when the product support defining structure is in a flat configuration, whereby an erecting pin of an erecting machine may be inserted from the underside of the bottom panel through the opening to contact the top panel to assist in rotating the first portion of the top panel relative to the second portion of the top panel to erect the product support defining structure during erection of the product support.

2. The product support of claim 1, wherein the second portion of the top panel is adhesively secured to the bottom panel or wherein the second portion of the top panel is secured to the bottom panel using heat sealing.

3. The product support of claim 1 or claim 2 wherein the second portion of the top panel extends into the or each product locating pocket.

4. The product support of any preceding claim wherein the second portion comprises a continuous longitudinal strip; optionally wherein the continuous longitudinal strip is located adjacent, and extends to, an inner edge of the top panel.

5. The product support of any preceding claim wherein at least one opening is provided registered with a respective hinge panel of the top panel.

6. The product support of any preceding claim wherein at least one opening is provided registered with a portion of the first portion of the top panel; and/or wherein the first portion of the top panel comprises a continuous longitudinal strip, wherein the one or more openings includes one or more openings registered with respective portions of the longitudinal strip.

7. The product support of any preceding claim wherein the or each product locating pocket further comprises a sidewall, the sidewall being provided by one of the plurality of hinge panels of the product support defining structure, wherein the sidewall is a longitudinal sidewall.

8. The product support of any preceding claim wherein

the cutlines comprise a plurality of cutlines, each defining an edge of one or more of the hinge panels; optionally wherein each one of at least some of the plurality of cutlines further defines, in the erected product support, an edge of one of the one or more product locating pockets.

9. The product support of any preceding claim wherein the product support is configured such that, when erected, the product support defining structure defines one or more product locating pockets along the longitudinal direction of the product support, each product locating pocket being defined between adjacent ones of the plurality of hinge panels, and including product locating pocket edges defined by cutlines of the product support defining structure, which cutlines define the edges of the hinge panels on either side of the product locating pocket;
optionally wherein, for each product locating pocket, one edge of each of the hinge panels between which the product locating pocket is defined is defined by a one of the cutlines of the product support defining structure, and the opposed edge of the hinge panel is defined by another one of the cutlines of the product support defining structure or by an end edge of the top panel.

10. The product support of any preceding claim wherein the one or more product locating pockets are defined between hinge panels of a first subset of the plurality of hinge panels provided by the product support defining structure, and wherein a sidewall of each product locating pocket is provided by one of a second subset of the plurality of hinge panels provided by the product support defining structure, wherein an opening in the bottom panel is provided in respect of at least some of the hinge panels of the first and/or second subsets of hinge panels.

11. The product support of claim 10 wherein the product support defining structure comprises a plurality of cutlines, which, in the flat configuration of the product support defining structure, each comprise a first portion defining an edge of one of the first subset of hinge panels and a second portion defining an edge of one of the second subset of hinge panels, wherein the second portion, in the erected product support, defines at least a portion of the edge of a product locating pocket.

12. The product support of claim 10 or claim 11 wherein the first portion of the top panel, in the erected product support, comprises an outer region and a plurality of fingers, each finger extending from the outer region inward to a top of the second subset of hinge panels; and/or wherein the product support is configured such that, when erected, the product support defining structure defines a plurality of product locating pockets along the longitudinal direction of the product support.

13. The product support of any preceding claim wherein the one or more openings of the bottom panel comprise a plurality of openings disposed in one or more clusters, each cluster comprising a plurality of openings, the openings within each cluster being registered with portions of the top panel in a respective region of the top panel.

14. The product support of any preceding claim wherein the support is of a single piece construction; and/or wherein the erectable product support is formed from a blank of sheet material, preferably a single piece blank.

15. A method of erecting the product support of any preceding claim comprising
for at least some of the one or more openings in the bottom panel of the or each product support defining structure, inserting a respective erecting pin of an erecting machine from the underside of the bottom panel therethrough to contact the portion of the top panel associated with the opening, and using the pin to assist in rotating the first portion of the top panel relative to the second portion of the top panel to erect the product support defining structure during erection of the product support.

Fig. 1

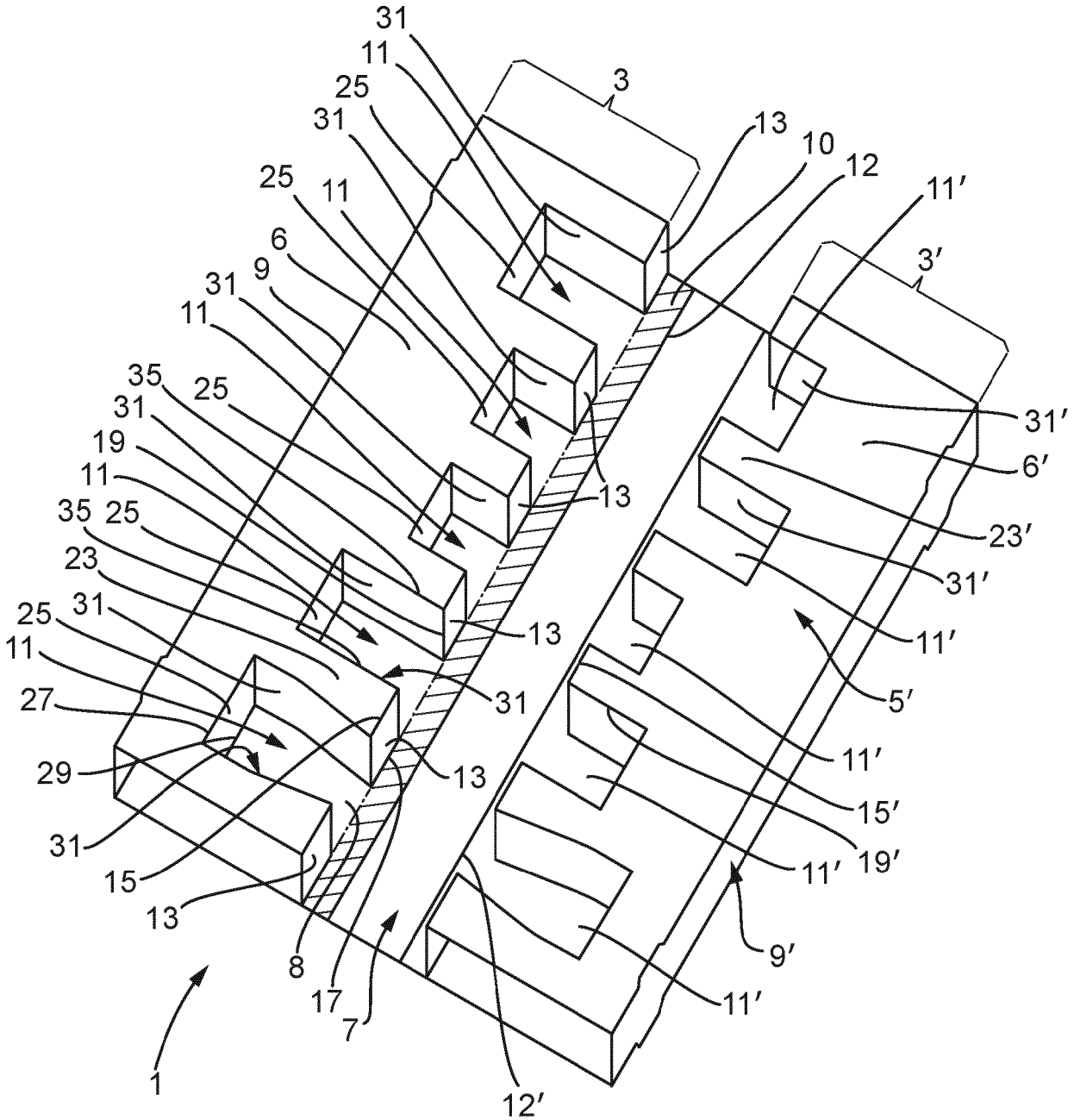
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Fig. 2

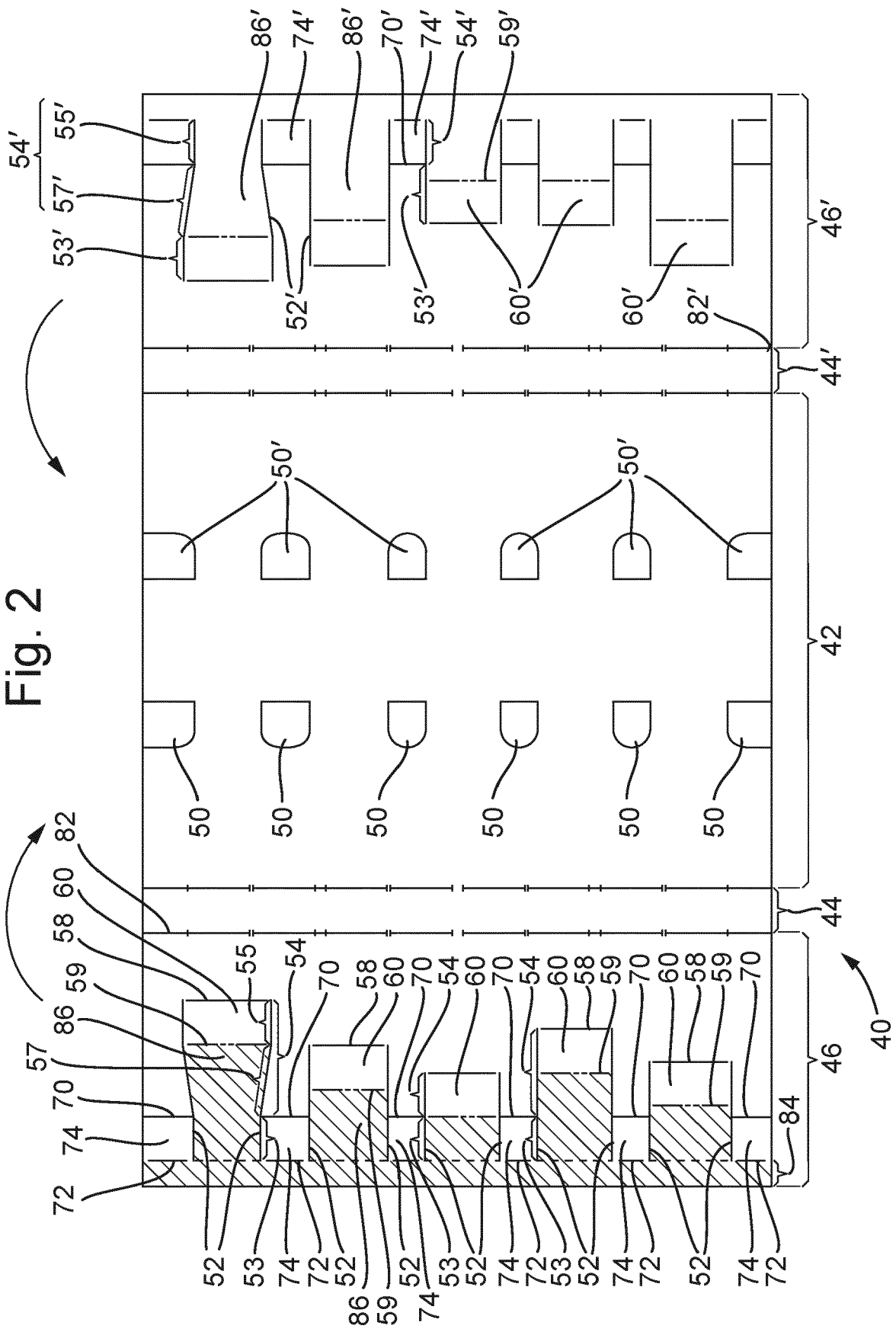
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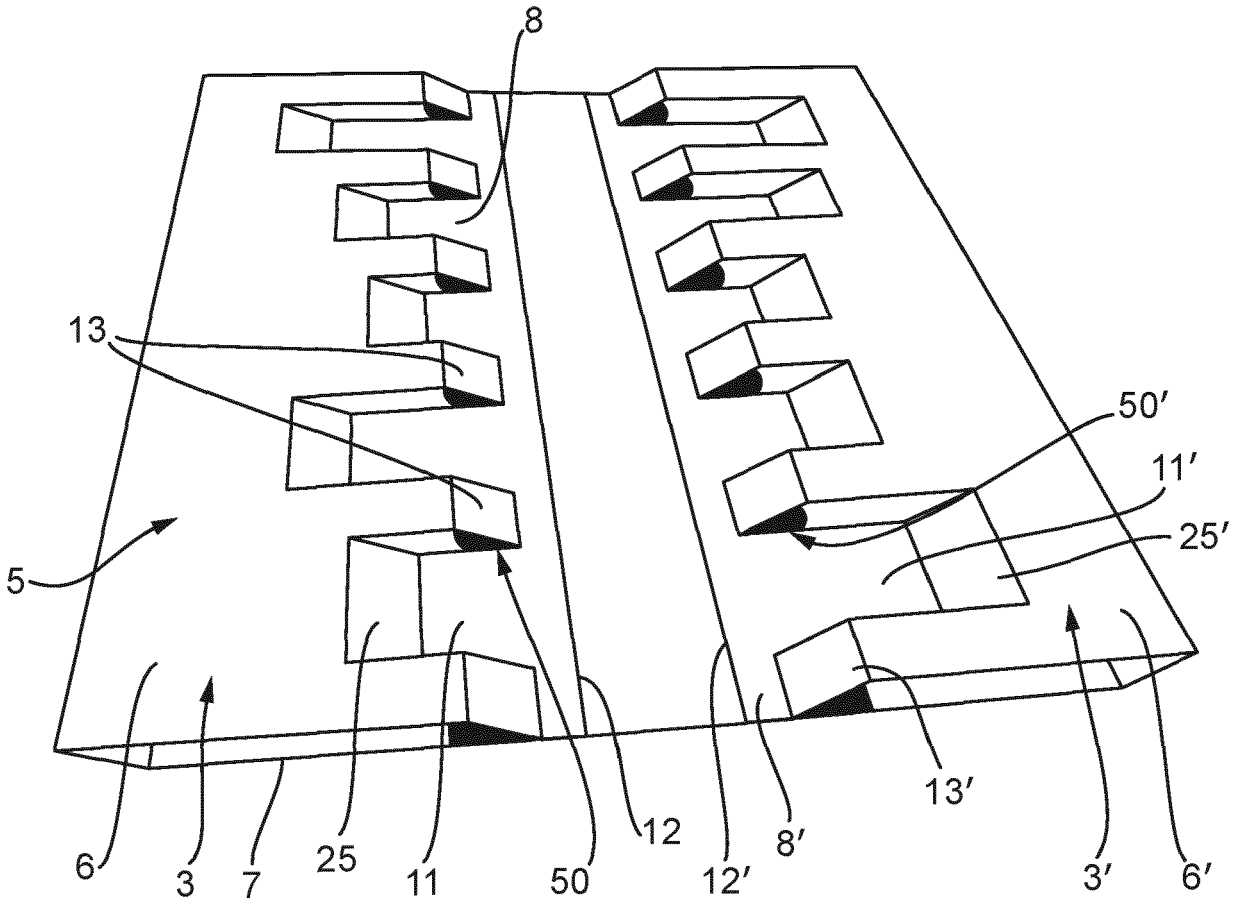
Fig. 3



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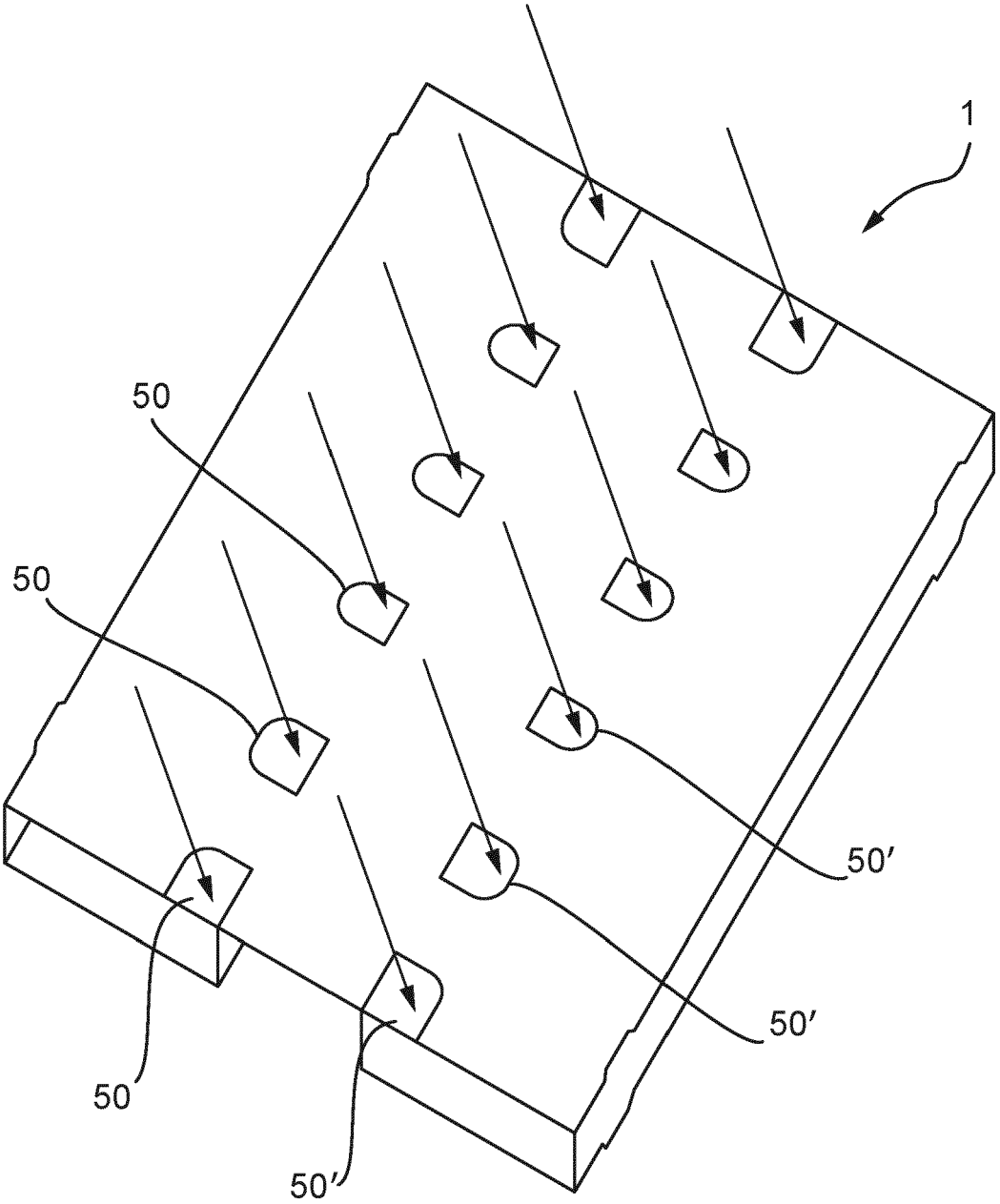

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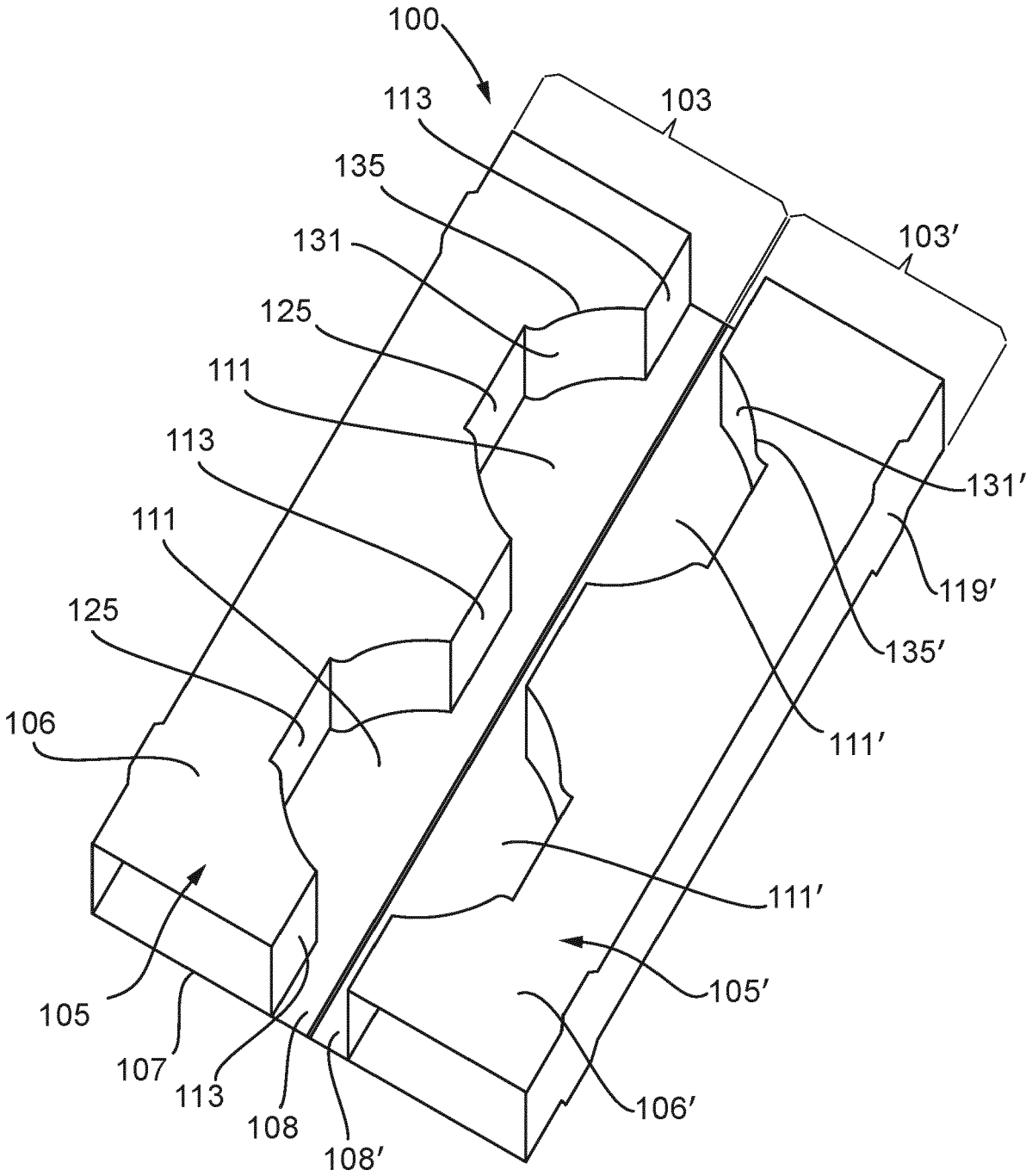
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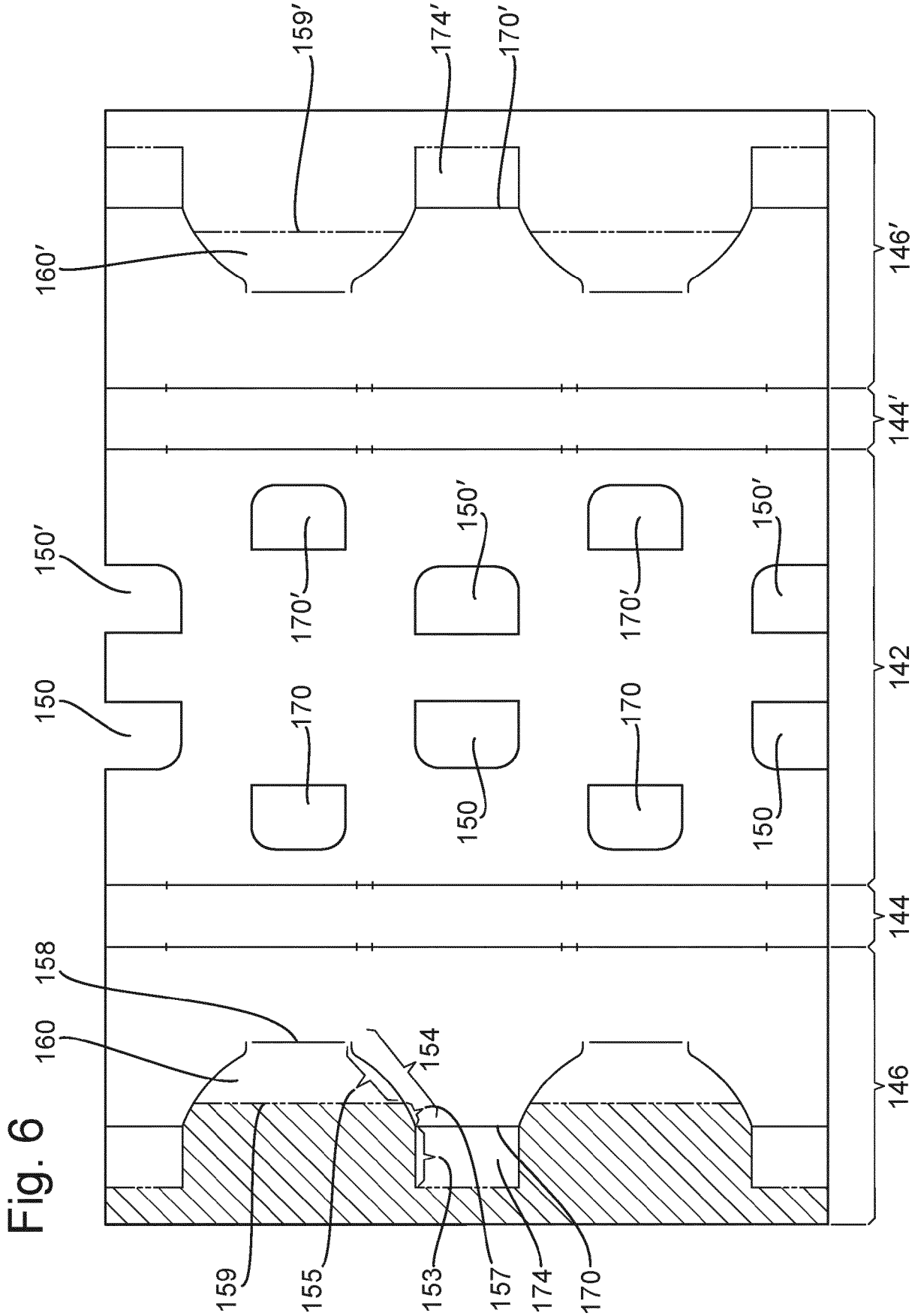
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Fig. 6

Fig. 7

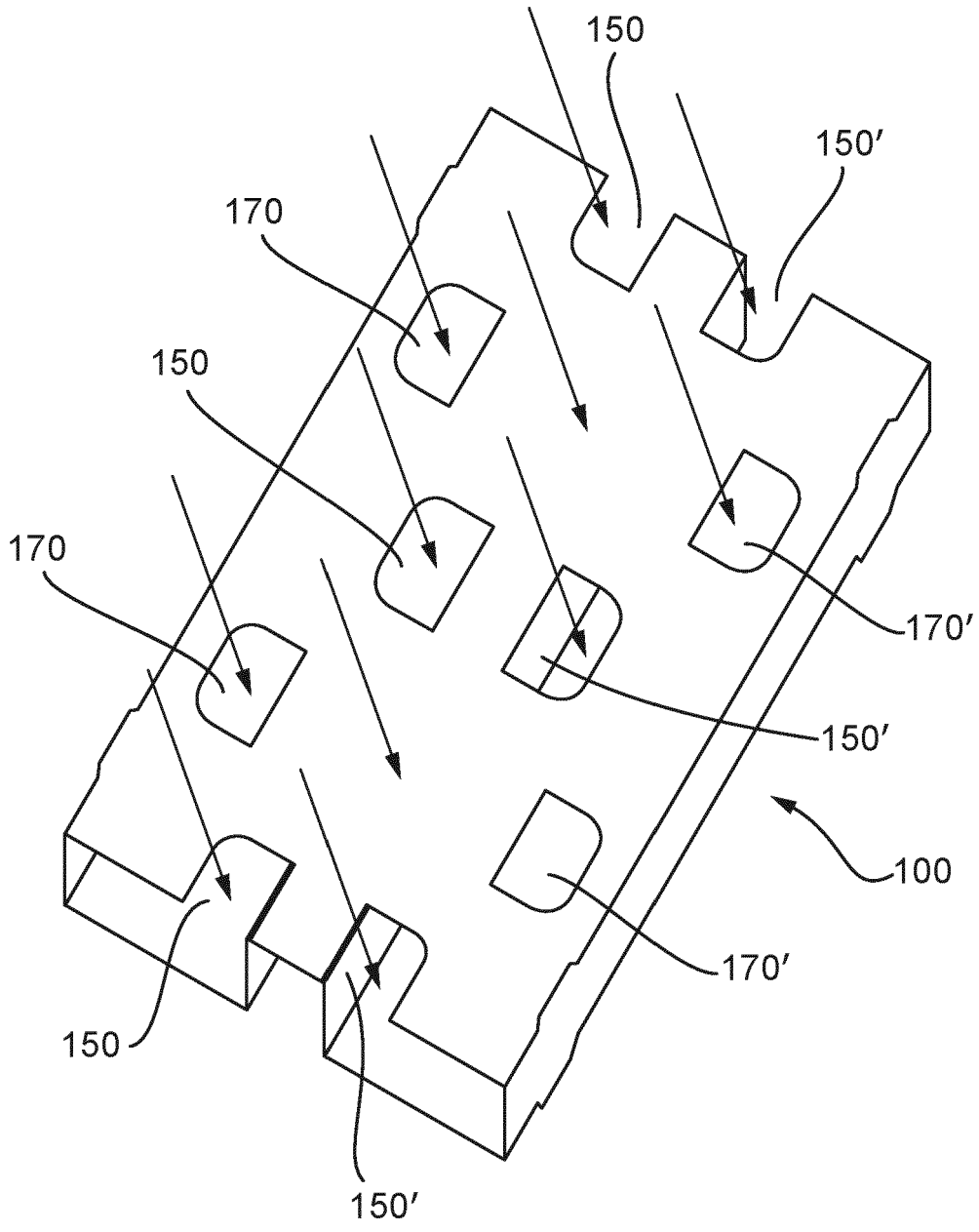


Fig. 8

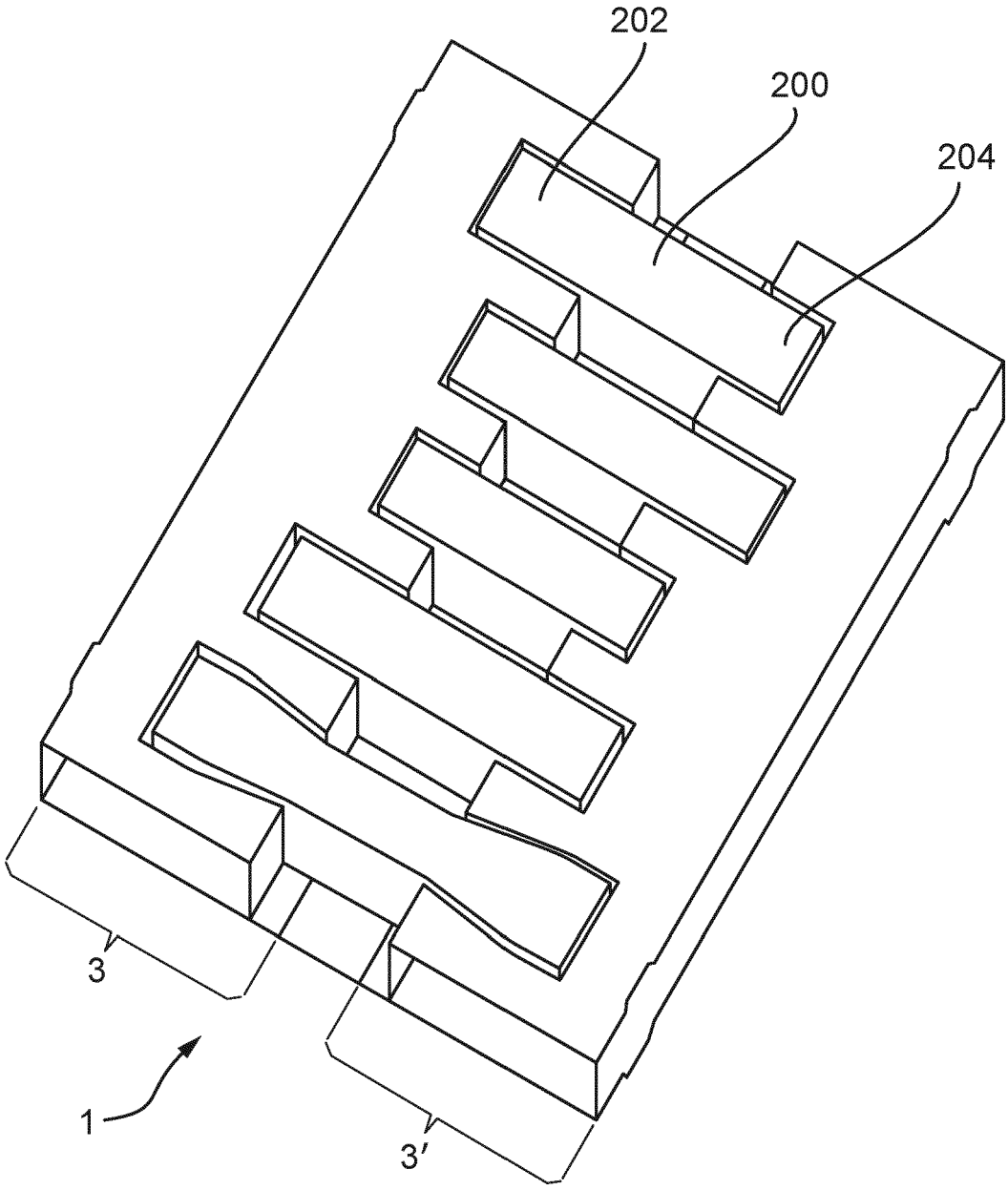


Fig. 9

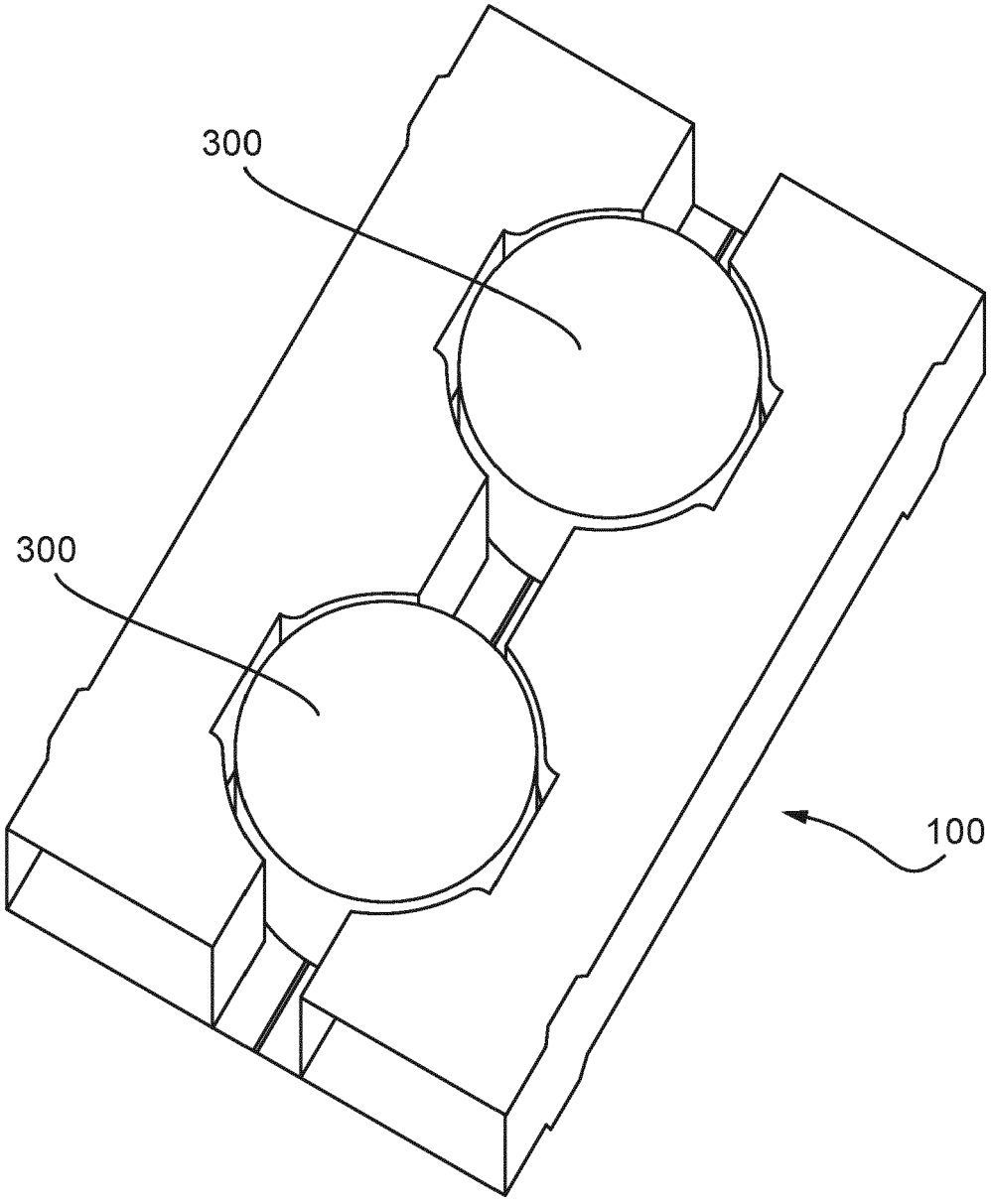


Fig. 10

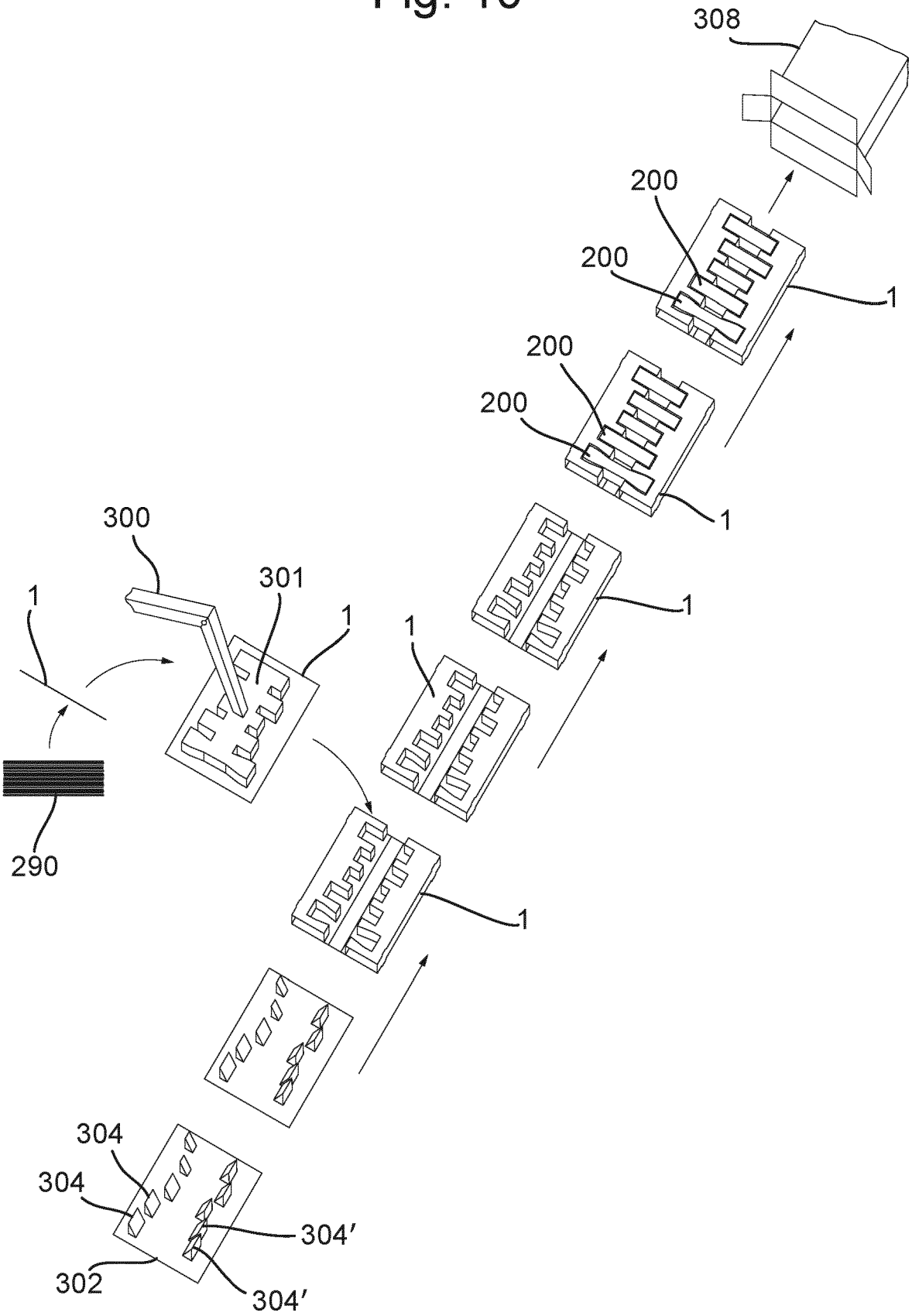


Fig. 11

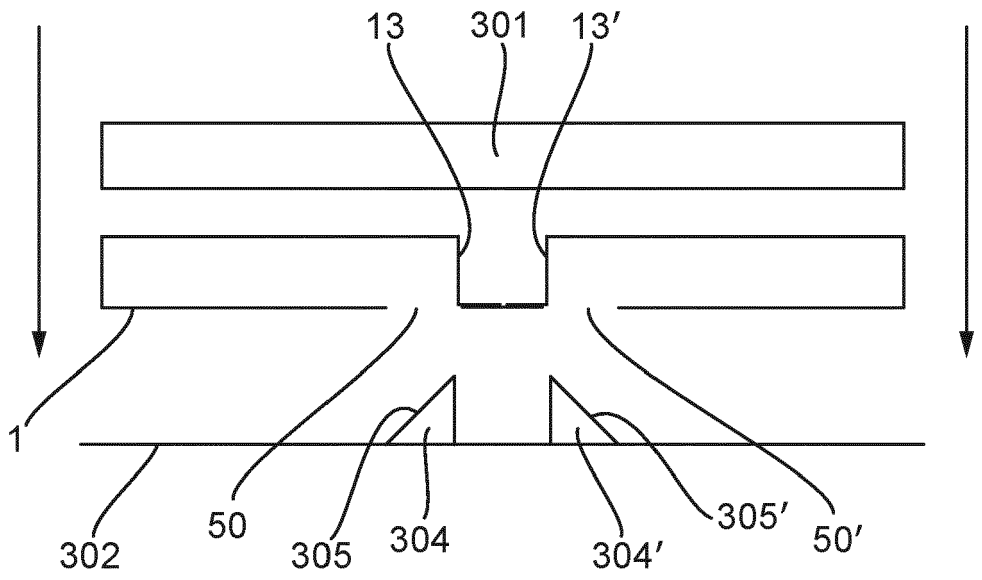
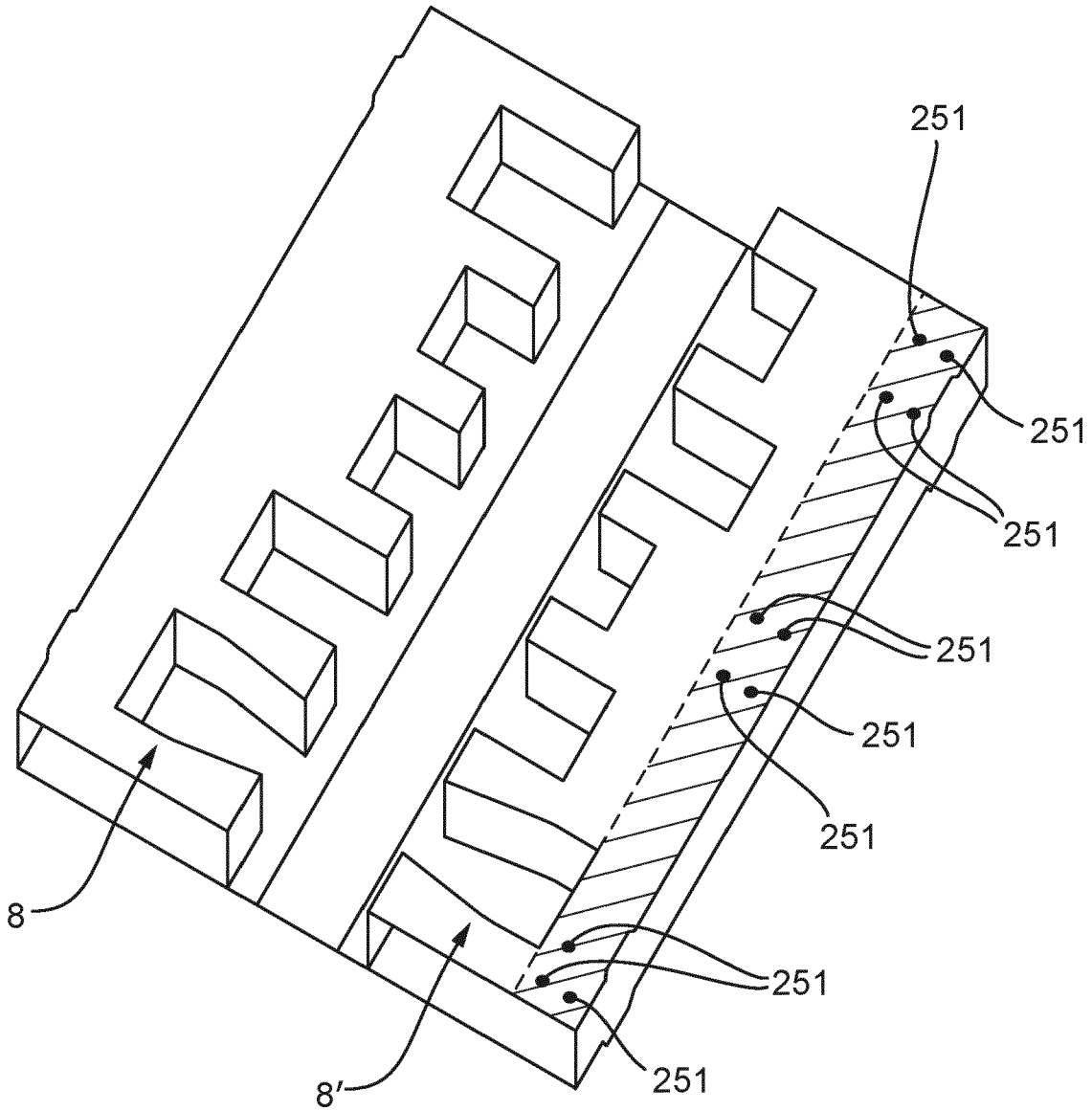


Fig. 12



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EUROPEAN SEARCH REPORT

Application Number
EP 20 15 1797

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 Y	EP 2 594 506 A1 (MARCHESINI GROUP SPA [IT]) 22 May 2013 (2013-05-22) * paragraphs [0032] - [0035], [0080]; figures 3-9 *	1-3,5-15 1,2,4-9, 13-15	INV. B65D5/50 B65D71/72
Y	US 6 474 473 B2 (INT PAPER CO [US]) 5 November 2002 (2002-11-05) * column 2, lines 13-19; figures 1-10 *	1,2,4-9, 13-15	
A	EP 2 610 194 A1 (MARCHESINI GROUP SPA [IT]) 3 July 2013 (2013-07-03) * paragraphs [0053] - [0054]; figures 3-6 *	1,15	
A	FR 2 902 410 A1 (SMURFIT KAPPA FRANCE SAS SOC P [FR]) 21 December 2007 (2007-12-21) * page 5, line 4 - page 6, line 8 * * figures 1-3 *	1,15	

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B65D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	30 March 2020	Leijten, René

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30-03-2020

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