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(54) TOP COVER AND PACKAGE SYSTEM

ABDECKUNG UND VERPACKUNGSSYSTEM

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Description

[0001] The present invention relates to a top cover and a package system comprising said top cover.

[0002] Articles like bottles or jars are often transported in stacks on pallets. Normally, the articles are arranged in layers on the pallet. Between each layer of articles an intermediate layer (i.e. a so-called layer pad) is disposed. Accordingly, the upper layer of articles stabilizes the layer of articles below. However, the topmost layer of articles cannot be stabilized by a further layer of articles. Therefore, the topmost layer of articles is normally covered by a specific cover sheet (also known as top cover or top cap) to stabilize it. However, the known cover sheets do not always stabilize the top layer of articles satisfactorily. In particular, when the pallet is processed and thus moved, the known sheets may shift with respect to the layer of articles and, thus, do not cover all of the articles in the topmost layer of articles. As a result, the sheet cannot properly stabilize the upper layer of articles. In addition, vibrations may be caused by the moving process and might provoke that articles fall off the layer. Moreover, if the top cover does not sufficiently cover the topmost layer, a step of wrapping a foil around the stack can destabilize the topmost layer of articles. In addition, if the stack is exposed to different or varying temperatures, the intermediate layers may deform and the layer of articles may be destabilized. This can result in the articles falling off when the foil is removed. Further, the articles may have different heights which may be caused by different moulds used to manufacture the articles and/or by a deformation of a layer pad on which the articles are positioned. In addition, there are known top covers made from cardboard- and designed to be used only once. In addition, a top cover made of cardboard is prone to failure in case the layer gets wet, for example. However, it would be advantageously to provide top covers that not only sufficiently stabilizes the topmost layer of articles, but that are also reusable and easy to transport.

[0003] Therefore, it is an object of the present invention to provide a top cover for covering a layer of articles that stabilizes the layer of articles and a package system that are reusable and easy to transport.

[0004] US 3 446 341 A discloses a package for fragile components including a pair of plastic plates provided on opposite sides of a fragile component.

[0005] The present invention solves the problem by providing a top cover having the features of claim 1 and a package system having the features of claim 15.

[0006] According to one aspect of the present invention a top cover for covering a layer of articles, preferably a palletized layer of articles, is provided, comprising:

a main body having a substantially plate-like shape, a first surface and a second surface, wherein the first surface and the second surface are arranged substantially opposite to each other,
a holding element is arranged or arrangeable at the first surface, and
wherein the holding element comprises a base member and a brush member,
wherein the brush member has a plurality of protrusions protruding from the base member in a first direction extending from the first surface to the second surface.

[0007] In an intended use, the top cover may be placed on top of a layer of articles (e.g. on a topmost layer of articles) such that the main body and/or the holding element comes in contact with the articles of the layer. Plate-like shape may mean that the main body has a small thickness as compared to the length of its edges perpendicular to the thickness direction. The first surface may be facing the articles of the layer of articles, during the intended use. Accordingly, the first surface may be referred to as the bottom surface of the main body. On the other hand, the second surface which is opposite to the first surface may be facing away from the articles, during intended use. Accordingly, the second surface may be referred to as the top surface of the main body. The first direction extending from the first surface to the second surface may be the thickness direction. For example, the first direction may be oriented so as to be perpendicular to the first surface and/or the second surface. Further, a first plane defined by the first surface and a second plane defined by the second surface may intersect with each other. Preferably, the first plane and the second plane intersect with each other by an angle smaller than 20°. Thus, the main body may have different thicknesses at one edge as compared to the other. Hence, the main body may be adapted to different dimensions of articles (e.g. to different heights of articles). Alternatively, the first plane and the second plane may be parallel to each other. Accordingly, the top cover may be easily stackable onto another top cover, for example.

[0008] The main body may be configured so as to provide contact between the main body and the articles. Therefore, the main body may be substantially flat, in particular, the first surface may be substantially flat. The contact between the main body and the articles may provide a frictional connection between the articles and the top cover. That is, the frictional contact may prevent that the articles move with respect to the top cover. Therefore, the articles may be prevented from falling off the layer. For example, the main body may be flexible so as to provide contact with each article of the layer even if the articles do not have exactly the same height. As a result, the main body may hold the articles by frictional contact even if the articles may have different sizes and/or are placed on an uneven base (e.g. on an uneven layer pad).

[0009] The main body may be sized so as to have essentially the same outer contour as the layer pad and/or a pallet on which the articles are provided and which is used for transporting of the articles. The main body may have a rectangular shape such that the main body may have two edges longer than the other two edges. Pref-

erably, in a top view, the main body may have a size of 800 mm x 1000 mm (Euro-Size), 1000 mm x 1200 mm (industry size) or 1120 mm x 1420 mm (CAN size). However, the main body may also have an individual size for customized package formats. In the following, the direction in which the longer edges of the main body extend is referred to as the depth direction and the direction in which the shorter edges of the main body extend is referred to as the width direction.

[0010] In addition to the above outlined frictional connection between the main body and the articles, the top cover may additionally hold the articles by providing the holding element. Therefore, the holding element may be arranged at the main body so as to hold the articles in place, preferably the outermost row of articles. The holding element may be configured to hold the articles due to both a positive locking and a frictional connection. That is, the holding element may prevent the articles from falling off the layer. In other words, the top cover of the present invention may hold the articles in place by both the main body (frictional contact) and by the holding element (positive locking and frictional contact). The holding element may be a stripe like element which may have a substantially rectangular shape as seen in the first direction. Accordingly, the holding element may have a length and a width, wherein the length may be longer than the width, preferably, at least 8 times longer than the width. Accordingly, an appropriate section of the first surface may be covered by the holding element so as to hold the outermost row of articles, while at the same time the holding element is compact.

[0011] The holding element may be arranged at the main body by gluing and/or welding. That is, the holding element may be in direct contact with the main body. In other words, the holding element may be arranged at the main body without any gap or cavity between the holding element ant the main body. Alternatively, the holding element and the main body may be an integral element. Accordingly, the top cover may be produced by injection molding (i.e. may be produced in one manufacturing process). Further, the holding element may hold the articles in place by a combination of frictional contact and positive locking. In more detail, the protrusions provided at the brush member may be configured to be engaged with the articles of the layer. Therefore, the articles may be held in position (i.e. in a positive locking manner). In addition, the protrusions may be configured to be aligned and/or adapted to the articles so as to increase the contact surface between the top cover and the articles. Accordingly, the frictional contact between the articles and the top cover may be increased. Therefore, the protrusions may be configured so as to be flexible. For example, due to geometrical configurations and/or the material of which the protrusions are made of. The protrusion may extend away from the main body so as to come in contact with the articles in the intended use of the top cover. Each protrusion may have a mounting end at which it is mounted to the base member and a tip end being spaced apart from the base member. The length of the protrusion between the mounting end and the tip end may be referred to as the extension of the protrusion or the length of the protrusion. The mean extension of the protrusion may be about 5 mm. The protrusions may have different extensions. For example, the protrusions arranged farther away from the center of the main body may have a bigger extension as compared to the protrusions arranged closer to the center of the main body. In particular, the extension of the protrusions may rise from the protrusions being arranged closest to the center of the main body to the protrusions arranged farthest from the center of the main body. For example, the extension may rise from 3 mm to 8 mm. In this case the protrusions may be protected from being damaged in the stacked position in which the top cover may be placed on another top cover, for example, and the protrusions may be deformed. In other words, in case the protrusions may have a different extensions, the protrusions may be drawn aside without being damaged due to overlapping of several protrusions. At the same time, the protrusion may sufficiently hold the articles in place.

[0012] Further, the first direction may extend through the mounting end and the tip end of one or of each protrusion. The protrusions may be made of a flexible material such that the tip end may be displaced with respect to the mounting end. For example, the tip end may be displaced with respect to the mounting end if the top cover is placed on top of a layer of articles. That is, the tip end of each protrusion may be pushed away by articles of the layer if the top cover is placed on top of the layer. Accordingly, the protrusions may be aligned to the articles so as securely hold them in place (refer to the above outlined). Preferably, at least one of the protrusions may have a ratio of its circumference in a cross section perpendicular to the first direction to its length of between 0.8 to 1.5, preferably between 1.0 to 1.3. The first range provides the effect that the protrusions may be appropriately deflected by the articles so as to provide the holding function. Further, it was found that in the second range the protrusions have a sufficiently high rigidity so as to hold even heavier articles in place (e.g. articles made of glass). For example, the protrusions may be formed as pins, respectively. Alternatively, the protrusions may be formed as a carpet member or an artificial grass member, for example. Further, the protrusions may have a circular cross section perpendicular to the first direction. The protrusions may be arranged in a stacked manner as seen in a second direction and/or in a third direction, wherein the first and second directions are perpendicular to the first direction and to each other. Accordingly, the top of the articles which have mostly a circular shape may be appropriately surrounded by the protrusions so as to stabilize the articles. Moreover, the protrusions and/or the base member may be made of a material having a higher coefficient of friction so as to further increase the friction between the articles and the holding element.

[0013] Further, the protrusions may be inclined with

respect to the base member and/or to the main body. Preferably, the protrusions are inclined towards a center of the main body by an angle between 65° and 90°, preferably between 70° and 75°. In this case, the articles may be prevented from tilting away from the center of the main body. Thus, the articles may be properly held. Further, the protrusions may be easily deformed in a predefined manner (i.e. due to their inclination) such that the risk may be reduced that protrusion overlap with one another in case the top cover is placed on articles or on a plane, for example. Further, a buckling of the protrusions may be avoided such that the durability of the protrusions may be prolonged. Furthermore, the protrusions may have an improved holding property for the articles as the protrusion may not be bent outwards (with respect to the center of the main body) so easily. Alternatively, the protrusions may be arranged at the base member so as to be perpendicular to the base member. In this case, the holding element may be easily manufactured and the top cover may be easily assembled because all protrusions may have the same orientation independent of their position at the main body.

[0014] The base member may at least partly surround the brush member (e.g. the base member may be provided at two sides of the brush member). That is, the base member may form a shoulder. In other words, the base member may form two shoulders parallel to the edge at which the holding element is provided. The two shoulders may sandwich the brush element in a direction perpendicular to said edge and the first direction. Accordingly, the protrusions of the brush member may be protected by the base member (e.g. in the case the top cover is stacked on top of other top covers or a plane). Further, the base member may statically stabilize the brush member and hold it in the appropriate position at the first surface of the main body. Accordingly, it may be secured that the brush member is in a position so as to securely hold the outermost row of articles of the layer of articles. Moreover, the holding element provided at the main body may statically stabilize the main body so as du reduce the deformation of the main body. In particular, the base member may be configured and/or arranged so as to stabilize the main body.

[0015] Moreover, the top cover may have two conditions. The first condition may be a condition in which the protrusions are not deflected, deformed or displaced and may be referred to as the initial position. The second condition may be a condition in which the top cover is placed on top of a layer of articles or on a flat surface such that at least some of the protrusions are deflected, deformed or displaced with respect to their initial position. The second condition may be referred to as the stacked position. All of the protrusions may have the same extension (i.e. length) in the first direction, in the initial position. Accordingly, the manufacturing of the brush member may be facilitated. Alternatively, the protrusions may have different lengths in the first direction. In this case there may be realized regionally differing holding properties. For example, in a marginal section of the holding element, the protrusions may have a longer length in the first direction (i.e. in the initial position) as compared to a middle section of the holding element. In particular, the protrusions positioned closer to the center of the main body may have a smaller length as compared to the protrusions positioned closer to the edge of the layer pad. Preferably, the length of the protrusions may be successively increased from the inside to the outside. Therefore, articles may be prevented from falling off the layer of articles especially in the marginal sections where this is likely to happen. The base member and the brush member may be formed as an integral member. Accordingly, the holding element may be manufactured in one processing step. In addition, the base member and the brush member may have homogenous material properties due to a homogeneous molecular structure. Alternatively, the base member and the brush member may be formed separately and of different materials so as to provide the base member with an increased rigidity as compared to the brush member. In this case, the base member may stabilize the main body. Accordingly, the top cover may be stored in a rack-like magazine without being excessively bent.

[0016] The holding element may extend along at least one edge of the main body, preferably along each edge of the main body so as to form a frame-shaped element. In addition, the main body may comprise a flap arranged at at least one of the edges of the main body. The flap may extend from the first side of the main body while being inclined towards the center of the main body. That is, an angle between the flap and the main body may be smaller than 90°, provided that the flap is inclined towards the center of the main body. The center of the main body may be the barycenter of the main body. The flap may additionally hold the articles in a positive locking manner. The flap may be made of a flexible material, preferably of the same material as the main body. Accordingly, the flap may be adapted to the articles. That is, the articles may be stabilized by the main body (i.e. frictional contact), by the holding member (frictional contact and positive locking) and by the flap (i.e. positive locking). As a result, it can be ensured that the articles remain in place.

[0017] Moreover, the holding element may be a separate element which may be mounted (i.e. may be arrangeable) to the main body.

[0018] Preferably, each protrusion is formed as a substantially air tight duct.

[0019] That is, the protrusions may be air tight ducts protruding from the base member being filled with air. Substantially air tight may mean that the ducts are configured such that an air pressure within the ducts rises if the duct is deformed by an external force (e.g. by being in contact with an article). Further, the ducts may be provided in duct regions (also referred to as tiles), wherein the ducts of one duct region may be connected with one another so as to allow air to flow through the ducts of one duct region. In case an article comes in contact with the

duct, the duct deforms at the contact position so as to adapt its shape to the article. Then, the air pressure inside the duct rises dependent on the deformation. Thus, the duct changes its shape so as to adapt itself to the article (due to the risen air pressure inside the duct). The ducts may be configured as houses, for example. Accordingly, the contact surface between the articles and the holding element may be increased because the articles may be partly surrounded by the protrusions (e.g. sank into it) once the layer pad is positioned onto the articles. In addition, due to the adapted form of the ducts to the articles, a supporting of the articles in a positive locking manner is possible. Preferably, there are provided 35 to 55 duct regions per meter edge length of the main body. Accordingly, the outer row of articles may be sufficiently held in place. Preferably, each duct region may have a duct having a H-shaped form or a double H-shaped form in a plan view, wherein the center rib may extend parallel to the outer edge of the main body. Accordingly, the duct may be deformed by one article or more articles without negatively affecting an adjacent article. Thus, the stabilization of the layer of articles may be further improved.

[0020] Preferably, the base member comprises a recess section, and wherein the brush member is provided in the recess section.

[0021] That is, the brush member may be recessed with respect to the base member in the first direction. In the following the holding element is described as depicted in a cross section defined by the first direction and a second direction perpendicular to the first direction and to the edge of the main body at which the holding element may be provided. However, the description is analogously applicable to the holding element being arranged at other edges of the main body. In more detail, the base member may define a plane that is substantially parallel to the first surface of the main body. Substantially parallel may mean that the plane is considered to be parallel including manufacturing tolerances of up to 2%. Accordingly, the top cover may be easily stackable. Alternatively, the plane defined by the base member may be inclined with respect to the first surface. Preferably, the plane defined by the base member may extend through the center of the main body (i.e. the plane may be inclined inwards). This provides the effect that the outer section of the base member has a larger thickness in the first direction as an inner section of the base member. Thus, the articles may be reliably prevented from falling off the layer.

[0022] In addition, due to the recess section, a space is created in which the protrusions may be retreated in case the top cover is placed on a flat surface (e.g. on top of another top cover). Accordingly, the protrusions may be protected from being damaged due to being excessively bend and compressed. On the other hand, the articles may protrude partly into the recess section so as to come in contact with the brush member.

[0023] Preferably, the recess section is recessed at least by an extension of one of the protrusions perpendicular to the first direction in an initial position.

[0024] That is, the recess section may be recessed with respect to the rest of the base member. In other words, the recess section may be recessed at least by the diameter of each pin. In more detail, the base member may have a surface orthogonal to the first direction with respect to which the recess section may be recessed. Accordingly, the base member may form a convexity that is open to the first direction. The distance with which the recess section may be recessed with respect to the base member may be referred to as depth of the recess section. In particular, in case the recess section is recessed at least by the extension of the protrusions perpendicular to the first direction, the protrusions may be protected from being damaged while at the same time a relatively thin configuration of the top cover is obtained. The extension of one protrusion perpendicular to the first direction may be a diameter of one protrusion, preferably the diameter of the protrusion having the maximal diameter among all protrusions. That is, the protrusion may be received by the recess so as to avoid a decollation of the protrusions in case the top cover is positioned on a plane. Further, the recess section may be recessed at least by 0.5 times a mean extension of the protrusions in the first direction. Accordingly, the protrusions may be sufficiently protected even if a lot of protrusions are provided. The extension may be the distance between the mounting end and the tip end of each protrusion. The mean value of a mean extension may be the arithmetic mean of the extensions of all protrusions.

[0025] Preferably, the brush element comprises a bar extending between the protrusions perpendicular to the first direction. The bar may further protect the protrusion from being damaged by articles extending into the convexity formed by the recessed base member. The bar may extend from an inner side of the convexity to the outer side of the convexity with respect to the center of the main body. The protrusion of the bar from the brush element may be smaller than the depth of the recess section. Accordingly, an additional protection for the protrusions may be provided against articles extending into the convexity. In addition, it could be ensured that the articles are properly held by the protrusions. Therefore, the durability of the top cover may be increased. It should be noted that the bar may be provided alternatively or additionally to the shoulder formed by the base member. In a preferred embodiment, the holding element has two shoulders formed parallel to each other and parallel to the respective edge of the top cover at which the holding element is provided. Between this two shoulders the brush member may be provided.

[0026] Preferably, a cavity is formed between the holding element and the main body, wherein the cavity is preferably positioned between the brush member and the main body.

[0027] Preferably, the cavity is formed by the holding element and the main body. Further, the cavity may be positioned opposite to the brush member in the first di-

rection. That is, if the brush member is deformed in the first direction, the deformation of the brush member may be compensated by the cavity provided between the brush member and the main body. That is, the brush member may evade an object that is pushed against the brush element so as to be not damaged. Accordingly, the protrusions may be further protected from being damaged (e.g. being sheared off). In particular, if a further pallet with articles is placed on top of the top cover, the brush member may be protected from being damaged. As a result, the durability of the top cover may be significantly increased.

[0028] Preferably, the holding element is made of a flexible material, preferably Polyurethane, Polyethylene, Polypropylene or Thermoplastic elastomer.

[0029] Accordingly, the holding element may have an appropriate flexibility so as to be adapted to the articles to be held in place. In addition, the above defined materials have a sufficient tearing strength such that the protrusions and/or the base member is not damaged in case the articles apply a load thereon in a direction perpendicular to the first direction. In addition, the above materials allow the top cover to be hygienically washable. Therefore, the top cover may be reused.

[0030] In order to provide a sufficient flexibility, the main body may be made of a thermoplastic material. For example, the main body may be made of Polypropylene, Polyethylene or a Thermoplastic elastomer. In particular, the material may have an E-module of between 200 to 1800 N/mm^2. It was found that in the above range of the E-module, the flexibility of the main body is sufficient so as to adapt the main body to different heights of articles so as to come in contact with the articles of the layer, while at the same time the main body is rigid enough to be smoothly used in an automated process. Preferably, the E-module of the material is between 1300 to 1800 N/mm^2. In this range a high durability of the top cover is secured.

[0031] In addition, the top cover may be made of a material that is physiologically harmless and biologically inert. As a result, the top cover may be also used in the food industry. Further, the material may have a density of between 0.7 g/cm^3 to 1.1 g/cm^3. This range of density provides the best resistance against inadvertent deformation of the main body, while at the same time a low grammage of the main body is secured. For example, the top cover may have a coating in order to provide physiologically harmless and biologically inert properties. The coating may comprise nano particles. Further, each coating may be used that provides physiologically harmless and biologically inert properties while the friction between the layer pad and the articles is not reduced.

[0032] Preferably, the protrusions are spaced from each other at least by a mean extension of the protrusions, preferably at least by 1.5 the mean extension of the protrusions, in the first direction in an initial position.

[0033] That is, the protrusions may be spaced apart from each other by the above defined values in a direction perpendicular to the first direction. In particular, the mounting end of the protrusions may be spaced apart from each other in the above range. By providing the first range, there may be provided an optimal density of protrusions at the brush member such that each article having a standardized size and material thickness (e.g. bottles or jars) may be sufficiently be in contact with the protrusions. By providing the second range, it may be ensured that if the protrusions are deflected, adjacent protrusions do not interfere with each other. Accordingly, a relatively thin top cover in the first direction may be provided. As a result, the top cover may be favorable stackable in a space saving manner.

[0034] Preferably, each protrusion has a circular shape in a cross-section perpendicular to the first direction, wherein the diameter of each protrusion is between 0.1 to 0.5 times a mean extension of the protrusions in the first direction in an initial position.

[0035] Accordingly, the protrusions may have the same flexible behavior in each direction perpendicular to the first direction. Thus, the articles may be smoothly held by frictional contact in any direction. Especially, in the above defined range, the tearing strength in relation to the flexibility of the protrusions is in an optimal range so as to sufficiently held heavier articles such as bottles or jars made of glass without being damaged by the articles. Further, due to the rounded surface of each protrusion, each protrusion may be adapted to articles to be held so as to increase the contact area between the articles and the holding element. Further, the protrusions may have different cross sections (e.g. different diameters) along their extension. That is, the protrusions may be thicker at their mounting end as compared to their tip end. Accordingly, the protrusions may be securely fixed to the brush member while they are sufficiently bendable.

[0036] Preferably, the holding element has a mounting portion via which the holding element is attached to the main body and the mounting portion is positioned closer to a center of the main body than the brush element.

[0037] The center of the main body may be the barycenter of the main body. That is, in a cross-section perpendicular to the first direction and the edge of the main body at which the holding element is provided, the holding element may be connected to the main body at only one single portion (i.e. the mounting portion). In other words, a tip end of the holding element opposite to the mounting portion in a direction perpendicular to the first direction may not be connected or fixed to the main body. Accordingly, the tip end may hang down (i.e. may be spaced apart from the main body) due to gravity once the top cover is lifted up, for example. That is, a part of the holding element may hang down away from the main body in the initial position if the top cover is not placed on a plane, for example. In addition, the brush member may be also spaced apart from the main body in the first direction. As a result, during the process of putting the top cover onto the layer of articles, a contact between the outer row of articles and the holding element at an early stage may

be ensured (i.e. the brush member may come in contact with the outer row of articles first before other articles may come in contact with the top cover). Thus, the process of positioning the top cover on top of the articles may be further improved and executed in a highly secured manner. Further, the tip end of the holding element may describe an arc shaped curve by being bend away from the main body (e.g. by its own weight) with the mounting portion as a virtual fulcrum. Accordingly, the holding element may apply a force component onto the outer row of articles that is perpendicular to the first direction. Therefore, the articles may be slightly pushed towards the center of the layer and thus the support of the articles may be further improved. Further, the mounting portion may be configured such that the holding element is not excessively spaced apart from the main body. In particular, the mounting portion may be configured such that the holding element is spaced apart from the main body so as to not exceed an angle of 20° between the holding element (i.e. its main extension perpendicular to the first direction) and the main body. Thus, it may be ensured that the top cover may be smoothly put on top of a layer of articles.

[0038] Preferably, the holding element has a tip member being positioned farther away from the center of the main body than the brush member.

[0039] That is, the tip member may be arranged at the tip end of the holding element. Accordingly, the tip member may be function as an additional weight of the holding element, which pulls the holding element away from the main body with the mounting portion as a virtual fulcrum (i.e. due to gravity). In other words, the holding element may be arranged like a cantilever arm. Accordingly, the holding element may hang down from the main body, in particular the outer section of the holding element (i.e. the tip end of the holding element). Hence, the articles of the layer may be securely held by the holding element. In addition, a force component essentially parallel to the main body may be applied onto the outer row of articles of the layer of articles. Thus, the layer of articles may be held in position even if it is shaken or vibrated. In addition, the tip member, the base member and the brush member may be formed as an integral element. Thus, the microstructure of the holding element may be homogenous so as to provide a constant flexibility of the holding element. Therefore, the holding force applied on the articles may be highly homogeneous and the articles may thus be securely held by the top cover.

[0040] Preferably, the tip member has a thickness in the first direction of at least 2 times the thickness of the base member in the first direction.

[0041] Accordingly, due to the ratio between the thickness of the base member and the thickness of the tip member, the weight of the tip member may be optimally matched to the stiffness of the base member to urge the holding element down (i.e. to space the outer part of the holding element apart from the main body), especially without exceeding the above defined maximal deviation of the holding element. In this case, the tip member and the holding element may be made of the same material.

[0042] Preferably, the tip member protrudes from the main body perpendicular to the first direction at least 2 times the thickness of the tip member in the first direction.

[0043] The geometrical configuration ensures a sufficient weight of the tip member so as to deflect the tip end of the holding element. Thus, a sufficient bending of the holding element may be provided. This ensures sufficient contact between the holding element and the articles.

[0044] Preferably, the tip member forms a flush surface with the second surface of the main body.

[0045] Accordingly, there may be stacked a further top cover on top of the top cover. In other words, the top cover may be easily stackable in a space saving manner.

[0046] Preferably, a ratio of the thickness of the main body and the thickness of the base member is between 0.5 to 2.5, preferably between 1.0 to 2.2.

[0047] That is, the thicknesses may be measured in the first direction. Preferably, the holding element is provided only partly at the first surface of the main body. In the first range, the flexibility of the main body and of the holding element is matched such that both may be appropriately adapted to the articles. The second range provides the advantage that the holding element may statically stabilize the main body so as to ensure a long durability of the top cover. The top cover may have a maximum thickness in the first direction of 20 mm in the initial position, preferably of 15°mm. In the first range, the top cover may be designed in a compact manner. In the second range, the top cover may be washed in conventional (i.e. existing) washing lines. Preferably, the top cover may have a maximum thickness of between 10 mm to 12 mm in the initial position. In this range the optimal balance between flexibility and robustness of the top cover may be attained.

[0048] Preferably, the holding element is provided in a marginal region of the main body.

[0049] As described above, the holding element may be arranged in a frame-shaped manner at the main body. Thus, the outer row of articles may be stabilized which in turn may stabilize the whole layer of articles. Accordingly, the layer of articles may be stabilized in a highly efficient manner.

[0050] According to a further aspect of the present invention there is provided a package system, comprising:

at least one layer of articles forming a load, and
the above-described top cover covering the layer of articles.

[0051] Accordingly, a stack of layers of articles is provided which is covered by the above-described top cover. Between each layer of articles, a layer pad may be provided.

[0052] Individual features of the above defined embodiments may be rearranged or exchanged with other features so as to form new embodiments. All advantages

and modification of said features are analogously applicable to the new embodiments. In the following the present invention will be explained in detail with reference to the enclosed figures. However, the detailed explanation of embodiments is provided for better understanding and is not intended to limit the scope of the present invention to the embodiments described in the following.

Fig. 1 is a schematic and perspective view of a top cover according to an embodiment of the present invention.

Fig. 2 is a sectional view of a part of the top cover according to the embodiment of the present invention.

Fig. 3 is a side-view of a part of the top cover according to the embodiment of the present invention in an initial position.

Fig. 4 is a side-view of a part of the top cover according to the embodiment of the present invention in a stacked position.

Fig. 5 is a perspective view of the top cover according to the embodiment of the present invention in the intended use.

Fig. 6 is a perspective view of the top cover according to the embodiment of the present invention in the intended use.

Fig. 7 is a schematical and perspective view of a top cover according to another embodiment of the present invention.

Fig. 8 is a schematical and perspective view of the top cover according to the embodiment of the present invention.

Fig. 9 is a perspective view of the top cover according to the embodiment of the present invention in the intended use.

Fig. 10 is a perspective view of a top cover according to another embodiment of the present invention.

[0053] **Fig. 1** is a schematical and perspective view of a part of a top cover 1 according to an embodiment of the present invention. The top cover 1 includes a main body 2 having a first surface 3 and a second surface 4. The main body 2 is an essentially plate-like sheet, being relatively thin with respect to the length of its edges. Between the first surface 3 and the second surface 4, a first direction d1 extends (refer to Fig. 2). In the present embodiment, the first direction d1 extends along a thickness direction of the main body. That is, the thickness direction is oriented perpendicular to the first surface 3 and to the second surface 4. Further, the top cover 1 includes a holding element 10 which is arranged at the first surface 3 of the main body 2. In operation or during the intended use of the top cover 1, the top cover 1 is placed with its first surface 3 on top of a layer of articles so as to cover the layer of articles. Accordingly, the holding element 10 which is arranged at the first surface 3 faces the articles of the layer. The holding element 10 comprises a base member 11 and a brush member 12. The base member 11 is a rectangular element extending along an edge of the main body 2 at which it is arranged. In the present embodiment, the base member 11 may provide a connection between the holding element 10 and the main body 2. In more detail, the base member 11 includes a mounting portion 6, at which the base member (and thus, the holding element 10) is mounted to the main body 2. In other words, the holding element 10 forms a lever arm in a direction perpendicular to the first direction d1 and to the edge of the main body 2 at which the holding element 10 is provided. The brush element 12 has a plurality of protrusions 13 which are in the present embodiment formed in a pin-like shape. Each protrusion 13 is spaced apart from an adjacent protrusion 13 by 5 mm to 6 mm. In addition, each protrusion protrudes from the base member by approximately 5 mm in the first direction d1. Each protrusion 13 has a circular cross section perpendicular to the first direction d1 and a diameter of 1 mm. Between the brush element 13 and the main body 2, a cavity 5 is formed. This cavity is configured to absorb a deformation of the brush member 13 which may occur if the brush member 13 is pushed in the first direction d1. Further, the brush member 13 is arranged at the holding element 10 so as to be recessed with respect to the base member 11. That is, the base member 11 may have a recess section 14, in which the brush member 12 is arranged. Therefore, the protrusions 13 may be completely accommodated within the recess section 14 in case the top cover 11 is positioned on a plane, such that the protrusions 13 are deflected. The holding element 10 is made of a flexible material. Accordingly, the holding element 10 may be deformed such that it hangs down from the main body 2 so as have an arc shape in the sectional view (e.g. in as sectional view as depicted in Fig. 2). As a result, the holding element 10 may be sufficiently be in touch with articles of the layer so as to securely hold them in place.

[0054] **Fig. 2** is a sectional view of the top cover 1 depicted in Fig. 1. The sectional view of Fig. 2 is defined by the first direction d1 and a direction perpendicular to the first direction d1 and to the edge of the main body 2 at which the holding element 10 is arranged. In addition, the holding element 10 comprises a tip member 7 which is arranged at the holding element 10 at the outmost position of the holding element 10. The tip member 7 may function as an additional weight, so as to push the holding element 10 away from the main body 2 in the first direction d1. Therefore, the holding element 10 could be provided which is able to come in contact with the articles in a

reliable manner. In other words, in a direction starting from the mounting portion 6 of the holding element 10 the following features are provided in the following order perpendicular to the first direction: the base member 11, the brush member 12 and the tip end 7 (in Fig. 2 from the left side to the right side). Accordingly, the holding element 10 may be designed as a lever arm so as to be deviated away from the main body 2. In more detail, a distance between the mounting portion 6 and the beginning of the brush member 13 (that is, the extension of the base member 11 perpendicular to the first direction) is approximately 30 mm. Then, the extension in the same direction of the brush member 13 is between 40 mm - 45 mm. Lastly, the extension of the tip member 7 in the same direction is approximately 15 mm. All values provided above are to be measured in the initial position (is to be described in the following). Consequently, an optimal adaption property of the holding element 10 to the articles of the layer may be provided. Further, in the present embodiment, the base member 11 and the main body 2 have the same thickness in the first direction d1.

[0055] **Fig. 3** is a side-view of a part of the top cover 1 according to the present embodiment. The top cover 1 depicted in Fig. 3 is in an initial position. That is, the protrusions 13 of the brush member 12 are not deflected or bend due to being in contact with any surface or article. Further, the thickness of the base member 11 and the region of the mounting portion 6 is approximately the same as the thickness of the main body 2 in the same direction. Further, the tip member 7 forms a plane surface with the second surface 4 of the main body 2. Accordingly, the top cover 1 has a flat second surface 4 (that is, a top surface) such that further articles or pallets may be stacked on top of the top cover 1. The material of the holding element 10 may be one of polypropylene, polyethylene, polyurethane or thermoplastic elastomers. In addition, the material of the main body 2 may be a different material as compared to the material of the holding element 10. In more detail, the holding element 10 is provided in a marginal region of the main body 2. In other words, the holding element 10 is provided in a frame-like shape at the first surface 3 of the main body 2. That is, the holding element 10 is arranged at the first surface 3 of the main body 2 such that at least the outer row of articles on which the top cover 1 is to be placed comes in contact with the holding element 10. Preferably, it is sufficient to only hold the outmost row of articles. Then, the outmost articles support the further articles provided inside of the outmost articles. Accordingly, a top cover 1 could be provided which improves the efficiency of manufacturing the top cover 1 and of using the top cover 1.

[0056] **Fig. 4** corresponds to Fig. 3 with the difference that in Fig. 4 the top cover 1 is depicted in a stacked manner. In other words, the top cover 1 of Fig. 4 is pressed onto a relatively flat surface (for example, onto another top cover 1). Further, in the stacked position, the protrusions 13 are deflected so as to be accommodated within the recess section 14. In addition, the brush member 12 may be deformed so as to extend into the cavity 5 formed between the holding element 10 and the main body 2. Therefore, the protrusion 13 may be prevented from being damaged or cut off.

[0057] **Fig. 5** is a perspective view of the top cover 1 in operation. That is, top cover 1 in Fig. 5 is positioned on top of a layer of articles. The articles in this case are bottles. As can be seen in Fig. 5, some of the protrusions 13 protrude into an opening of each bottle. Some other protrusions 13 are arranged around the bottles. As a result, the bottle is sufficiently held by the protrusions 13 due to an increased contact surface between the protrusions 13 and the bottle. In case, the bottle is tilted, the protrusions arranged around the bottle will prevent the bottle from being moved with respect to the brush member 12. Further, the top cover 1 of the present embodiment does not have the tip member 7. That is, the holding element 10 is completely arranged within the outer contour of the main body 2 in a top view of the top cover 1. Moreover, in the present case there is no cavity provided between the holding element 10 and the main body 2. That is, the holding element 10 is directly arranged at the main body 2.

[0058] In **Fig. 6,** a perspective view of the top cover 1 in an intended use is depicted. As in Fig. 5, in Fig. 6 the top cover 1 is arranged on top of a layer of articles. It could be seen, that the brush member 12 is only provided so as to be in contact with the outmost row of articles. That is, the articles provided further inside of the outer row of articles are not in contact with the brush member 12, but are also supported by the outmost row of articles and are in contact with the main body 2.

[0059] **Fig. 7** shows a further embodiment of the present invention. Further, in Fig.7 a holding element 10 is schematically and perspectively depicted from below. The present embodiment differs from the above-described embodiments in that the protrusions 13 are formed as air tight ducts. Further, the ducts are deformable. Accordingly, if the duct is deformed due to being in contact with an article, for example, the air pressure within the duct rises and deforms the duct so as to adapt the duct to the form of the article. In the present embodiment, the ducts are arranged parallel to each other. Further, the ducts are oriented in a direction perpendicular to the edge of the main body 2 at which the holding element 10 is arranged. The ducts are spaced apart from each other by approximately 13 mm. Accordingly, each article of the layer may be in contact with at least one individual duct. In addition, each duct may have an extension along the edge of the main body 2 at which the holding element 10 is provided of approximately 7,5 mm. In the present embodiment each duct is individually provided. That is, the ducts have no connection between one another.

[0060] **Fig. 8** shows a further embodiment of the present invention. The present embodiment corresponds to the embodiment depicted in Fig. 7 with the difference, that the ducts are provided in a specific pattern. That is, in the present embodiment, a plurality of duct regions

may be provided, wherein in each duct region the duct is arranged in a double H-shaped pattern. Accordingly, the articles may be securely held by the holding element 10 regardless which shape the articles have.

[0061] **Fig. 9** shows the embodiment depicted in Fig. 8 in an intended use. In more detail, the top cover 1 is placed on top of a row of articles. The articles, deform the protrusions 13 (i.e. the ducts) such that the ducts are adapted to the shape of the articles, respectively.

[0062] **Fig. 10** shows a further embodiment of the present invention. In the present embodiment the top cover 1 has the holding element 10 as described in connection with Fig. 1 to 6 or as described in connection with Fig. 7 to 9. In addition, the top cover 1 of the present embodiment has a flap 8 arranged at an edge of the main body 2, so as to be inclined towards the center of the main body 2 (the center of the main body 2 may be the barycenter of the main body 2), so as to additionally hold the articles in a positive locking manner. By combining the holding element 10 with the flap 8, a highly efficient top cover 1 may be provided which may be in a position to hold heavy articles in place. In addition, the flap 8 may have holes, such that during a washing process, water may be easily discharged through the holes. Further, the flap 8 may be arranged at the base member 11. According to a further embodiment not depicted in the figures the flap may be arranged at the tip member or the base member of the holding element 10. The flap 8 may be an integral part of the holding element 10.

Reference sign

[0063]

1	top cover
2	main body
3	first surface
4	second surface
5	cavity
6	mounting portion
7	tip member
8	flap
10	holding element
11	base member
12	brush member
13	protrusion
14	recess section
D1	first direction
d2	depth direction
d3	width direction

Claims

1. A top cover (1) for covering a layer of articles, preferably a palletized layer of articles, comprising:

a main body (2) having a substantially plate-like shape, a first surface (3) and a second surface (4), wherein the first surface (3) and the second surface (4) are arranged substantially opposite to each other, and

a holding element (10) is arranged or arrangeable at the first surface (3),

wherein the holding element (10) comprises a base member (11) and a brush member (12), and

wherein the brush member (12) has a plurality of protrusions (13) protruding from the base member (11) in a first direction (d1) extending from the first surface (3) to the second surface (4).

2. Top cover (1) according to claim 1, wherein each protrusion (13) is formed as a substantially air tight duct.

3. Top cover (1) according to claim 1 or 2, wherein the base member (11) comprises a recess section (14), and wherein the brush member (12) is provided in the recess section (14).

4. Top cover (1) according to claim 3, wherein the recess section (14) is recessed at least by an extension of one of the protrusions (13) perpendicular to the first direction in an initial position in which the protrusions (13) are not deflected, deformed or displaced.

5. Top cover (1) according to any one of the preceding claims, wherein a cavity (5) is formed between the holding element (10) and the main body (2), wherein the cavity (5) is preferably positioned between the brush member (12) and the main body (2).

6. Top cover (1) according to any one of the preceding claims, wherein the holding element (10) is made of a flexible material, preferably Polyurethane, Polyethylene, Polypropylene or Thermoplastic elastomer.

7. Top cover (1) according to any one of the preceding claims, wherein the protrusions are spaced from each other at least by a mean extension of the protrusions, preferably at least by 1.5 the mean extension of the protrusions, in the first direction in an initial position in which the protrusions (13) are not deflected, deformed or displaced.

8. Top cover (1) according to any one of the preceding claims, wherein each protrusion (13) has a circular shape in a cross-section perpendicular to the first direction (d1), wherein the diameter of each protrusion (13) is between 0.1 to 0.5 times a mean extension of the protrusions (13) in the first direction (d1) in an initial position in which the protrusions (13) are not deflected, deformed or displaced.

9. Top cover (1) according to any one of the preceding claims,

wherein the holding element (10) has a mounting portion (6) via which the holding element (10) is attached to the main body (11), and
wherein the mounting portion (6) is positioned closer to a center (C) of the main body (2) than the brush member (12).

10. Top cover (1) according to any one of the preceding claims, wherein the holding element (10) has a tip member (7) being positioned farther away from the center (C) of the main body (2) than the brush member (13).

11. Top cover (1) according to claim 10, wherein the tip member (7) has a thickness in the first direction (d1) of at least 2 times the thickness of the base member (11) in the first direction (d1).

12. Top cover (1) according to claim 10 or 11, wherein the tip member (7) protrudes from the main body (2) perpendicular to the first direction (d1) at least 2 times the thickness of the tip member (7) in the first direction (d1).

13. Top cover (1) according to any one of the preceding claims, wherein a ratio of the thickness of the main body (2) and the thickness of the base member (11) is between 0.5 to 2.5, preferably between 1.0 to 2.2.

14. Top cover (1) according to any one of the preceding claims, wherein the holding element (10) is provided in a marginal region of the main body (2).

15. Package system, comprising:

at least one layer of articles forming a load, and the top cover (1) according to any one of the preceding claims, covering the layer of articles.

Patentansprüche

1. Obere Abdeckung (1) zum Abdecken einer Lage von Gegenständen, vorzugsweise einer palettierten Lage von Gegenständen, umfassend:

einen Hauptkörper (2) mit einer im Wesentlichen plattenförmigen Gestalt, einer ersten Oberfläche (3) und einer zweiten Oberfläche (4), wobei die erste Oberfläche (3) und die zweite Oberfläche (4) im Wesentlichen einander gegenüberliegend angeordnet sind, und
ein Halteelement (10), das an der ersten Oberfläche (3) angeordnet ist oder angeordnet werden kann,
wobei das Halteelement (10) ein Basiselement (11) und ein Bürstenelement (12) umfasst, und wobei das Bürstenelement (12) eine Vielzahl von Vorsprüngen (13) aufweist, die in einer ersten Richtung (d1), die sich von der ersten Oberfläche (3) zur zweiten Oberfläche (4) erstreckt, aus dem Basiselement (11) herausragen.

2. Obere Abdeckung (1) nach Anspruch 1, wobei jeder Vorsprung (13) als ein im Wesentlichen luftdichter Kanal ausgebildet ist.

3. Obere Abdeckung (1) nach Anspruch 1 oder 2, wobei das Basiselement (11) einen Ausnehmungsabschnitt (14) aufweist und wobei das Bürstenelement (12) in dem Ausnehmungsabschnitt (14) vorgesehen ist.

4. Obere Abdeckung (1) nach Anspruch 3, wobei der Ausnehmungsabschnitt (14) in einer Ausgangsstellung, in der die Vorsprünge (13) nicht ausgelenkt, verformt oder verschoben sind, zumindest durch eine Verlängerung eines der Vorsprünge (13) senkrecht zur ersten Richtung ausgespart ist.

5. Obere Abdeckung (1) nach einem der vorhergehenden Ansprüche, wobei zwischen dem Halteelement (10) und dem Hauptkörper (2) ein Hohlraum (5) ausgebildet ist, wobei der Hohlraum (5) vorzugsweise zwischen dem Bürstenelement (12) und dem Hauptkörper (2) angeordnet ist.

6. Obere Abdeckung (1) nach einem der vorhergehenden Ansprüche, wobei das Halteelement (10) aus einem flexiblen Material ist, vorzugsweise Polyurethan, Polyethylen, Polypropylen oder thermoplastischem Elastomer.

7. Obere Abdeckung (1) nach einem der vorhergehenden Ansprüche, wobei die Vorsprünge in einer Ausgangsposition, in der die Vorsprünge (13) nicht ausgelenkt, verformt oder verschoben sind, in der ersten Richtung mindestens um eine mittlere Ausdehnung der Vorsprünge, vorzugsweise mindestens um das 1,5-fache der mittleren Ausdehnung der Vorsprünge, voneinander beabstandet sind.

8. Obere Abdeckung (1) nach einem der vorhergehenden Ansprüche, wobei jeder Vorsprung (13) in einem Querschnitt senkrecht zur ersten Richtung (d1) eine kreisförmige Form aufweist, wobei der Durchmesser jedes Vorsprungs (13) zwischen dem 0,1- bis 0,5-fachen einer mittleren Erstreckung der Vorsprünge (13) in der ersten Richtung (d1) in einer Ausgangsposition liegt, in der die Vorsprünge (13) nicht ausgelenkt, verformt oder verschoben sind.

9. Obere Abdeckung (1) nach einem der vorhergehen-

den Ansprüche, wobei das Halteelement (10) einen Befestigungsabschnitt (6) aufweist, über den das Halteelement (10) an dem Grundkörper (11) befestigt ist, und wobei der Befestigungsabschnitt (6) näher an einer Mitte (C) des Hauptkörpers (2) angeordnet ist als das Bürstenelement (12).

10. Obere Abdeckung (1) nach einem der vorhergehenden Ansprüche, wobei das Halteelement (10) ein Spitzenelement (7) aufweist, das weiter von der Mitte (C) des Hauptkörpers (2) entfernt ist als das Bürstenelement (13).

11. Obere Abdeckung (1) nach Anspruch 10, wobei das Spitzenelement (7) eine Dicke in der ersten Richtung (d1) von mindestens dem Zweifachen der Dicke des Basiselements (11) in der ersten Richtung (d1) aufweist.

12. Obere Abdeckung (1) nach Anspruch 10 oder 11, wobei das Spitzenelement (7) senkrecht zur ersten Richtung (d1) um mindestens das Zweifache der Dicke des Spitzenelements (7) in der ersten Richtung (d1) aus dem Hauptkörper (2) herausragt.

13. Obere Abdeckung (1) nach einem der vorhergehenden Ansprüche, wobei das Verhältnis zwischen der Dicke des Hauptkörpers (2) und der Dicke des Basiselements (11) zwischen 0,5 und 2,5, vorzugsweise zwischen 1,0 und 2,2, liegt.

14. Obere Abdeckung (1) nach einem der vorhergehenden Ansprüche, wobei das Halteelement (10) in einem Randbereich des Grundkörpers (2) vorgesehen ist.

15. Verpackungssystem, umfassend:

mindestens eine Lage von Gegenständen, die eine Ladung bilden, und
die obere Abdeckung (1) nach einem der vorhergehenden Ansprüche, die die Lage von Gegenständen abdeckt.

Revendications

1. Couvercle supérieur (1) destiné à recouvrir une couche d'articles, de préférence une couche d'articles palettisée, comprenant :

un corps principal (2) ayant une forme sensiblement plate, une première surface (3) et une seconde surface (4), la première surface (3) et la seconde surface (4) étant disposées sensiblement à l'opposé l'une de l'autre, et
un élément de retenue (10) qui est disposé ou peut être disposé sur la première surface (3),
dans lequel l'élément de retenue (10) comprend un élément de base (11) et un élément formant brosse (12), et
l'élément formant brosse (12) comporte une pluralité de protubérances (13) qui font saillie à partir de l'élément de base (10) dans une première direction (d1) s'étendant de la première surface (3) à la seconde surface (4).

2. Couvercle supérieur (1) selon la revendication 1, dans lequel chaque protubérance (13) est réalisée sous forme de conduit sensiblement étanche à l'air.

3. Couvercle supérieur (1) selon la revendication 1 ou 2,
dans lequel l'élément de base (12) comprend une section d'évidement, et l'élément formant brosse (12) est prévu dans la section d'évidement (14).

4. Couvercle supérieur (1) selon la revendication 3, dans lequel la section d'évidement (14) est évidée au moins sur une extension de l'une des protubérances (13) perpendiculaire à la première direction dans une position initiale, dans laquelle les protubérances (13) ne sont pas défléchies, déformées ou déplacées.

5. Couvercle supérieur (1) selon l'une des revendications précédentes, dans lequel une cavité (5) est formée entre l'élément de retenue (10) et le corps principal (2), la cavité (5) étant de préférence positionnée entre l'élément formant brosse (12) et le corps principal (2).

6. Couvercle supérieur (1) selon l'une des revendications précédentes, dans lequel l'élément de retenue (10) est réalisé en un matériau souple, de préférence en polyuréthane, polyéthylène, polypropylène ou élastomère thermoplastique.

7. Couvercle supérieur (1) selon l'une des revendications précédentes, dans lequel les protubérances sont espacées les unes des autres d'au moins une extension moyenne des protubérances, de préférence d'au moins 1,5 fois l'extension moyenne des protubérances, dans la première direction, dans une position initiale dans laquelle les protubérances (13) ne sont pas défléchies, déformées ou déplacées.

8. Couvercle supérieur (1) selon l'une des revendications précédentes, dans lequel chaque protubérance (13) a une forme circulaire dans une section transversale perpendiculaire à la première direction (d1), le diamètre de chaque protubérance (13) étant compris entre 0,1 et 0,5 fois une extension moyenne des protubérances (13) dans la première direction (d1), dans une position initiale dans laquelle les protubérances (13) ne sont pas défléchies, déformées ou

déplacées.

9. Couvercle supérieur (1) selon l'une des revendications précédentes,

dans lequel l'élément de retenue (10) comporte une partie de montage (6) par laquelle l'élément de retenue (10) est fixé au corps principal (11), et la partie de montage (6) est positionnée plus près d'un centre (C) du corps principal (2) que l'élément formant brosse (12).

10. Couvercle supérieur (1) selon l'une des revendications précédentes, dans lequel l'élément de retenue (10) comprend un élément de pointe (7) positionné plus loin du centre (C) du corps principal (2) que l'élément formant brosse (13).

11. Couvercle supérieur (1) selon la revendication 10, dans lequel l'élément de pointe (7) a une épaisseur dans la première direction (d1) d'au moins 2 fois l'épaisseur de l'élément de base (11) dans la première direction (d1).

12. Couvercle supérieur (1) selon la revendication 10 ou 11,
dans lequel l'élément de pointe (7) dépasse du corps principal (2) perpendiculairement à la première direction (d1) d'au moins 2 fois l'épaisseur de l'élément de pointe (7) dans la première direction (d1).

13. Couvercle supérieur (1) selon l'une des revendications précédentes, dans lequel un rapport entre l'épaisseur du corps principal (2) et l'épaisseur de l'élément de base (11) est compris entre 0,5 et 2,5, de préférence entre 1,0 et 2,2.

14. Couvercle supérieur (1) selon l'une des revendications précédentes, dans lequel l'élément de retenue (10) est prévu dans une zone marginale du corps principal (2).

15. Système d'emballage comprenant

au moins une couche d'articles formant une charge, et
le couvercle supérieur (1) selon l'une des revendications précédentes, recouvrant la couche d'articles.

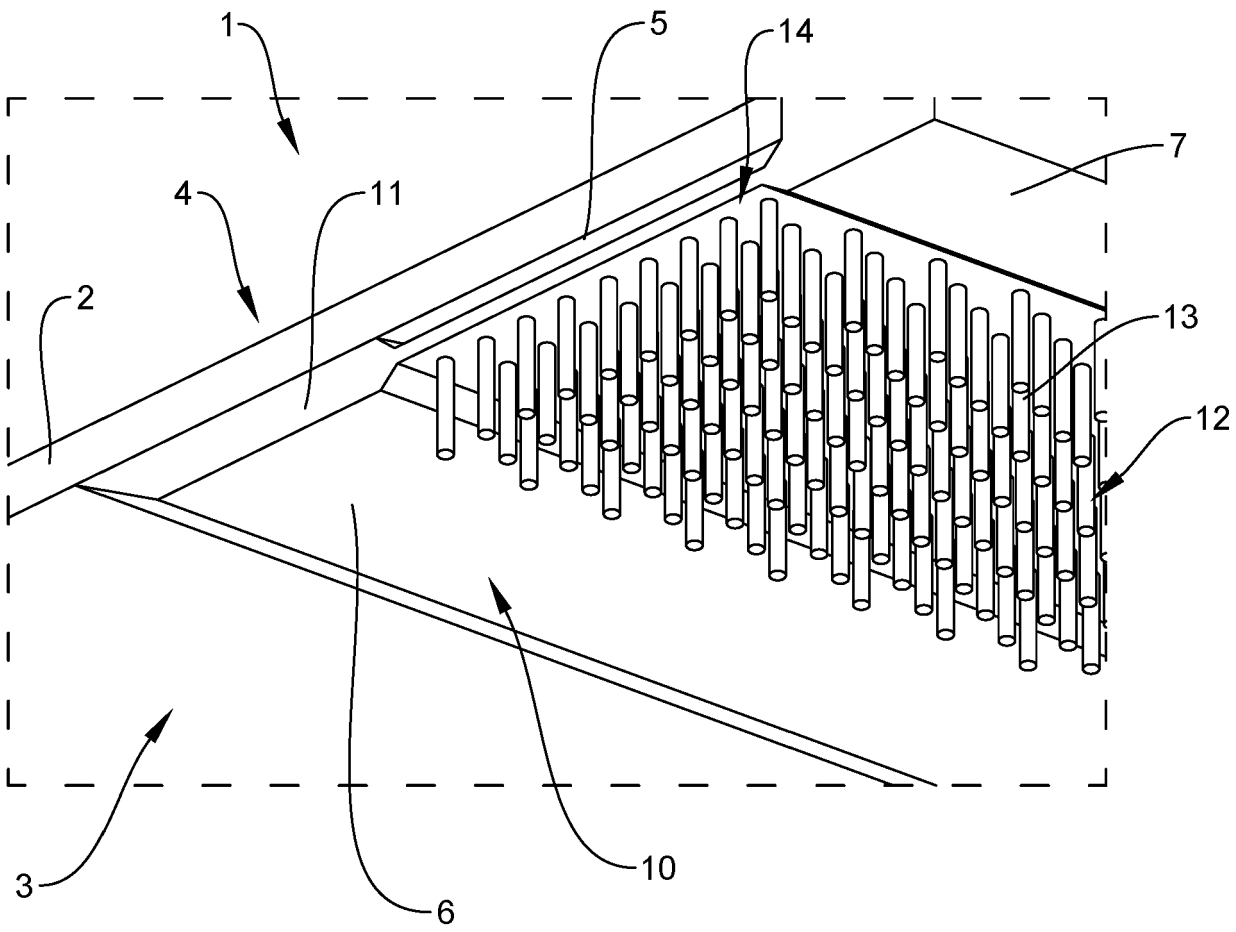


FIG. 1

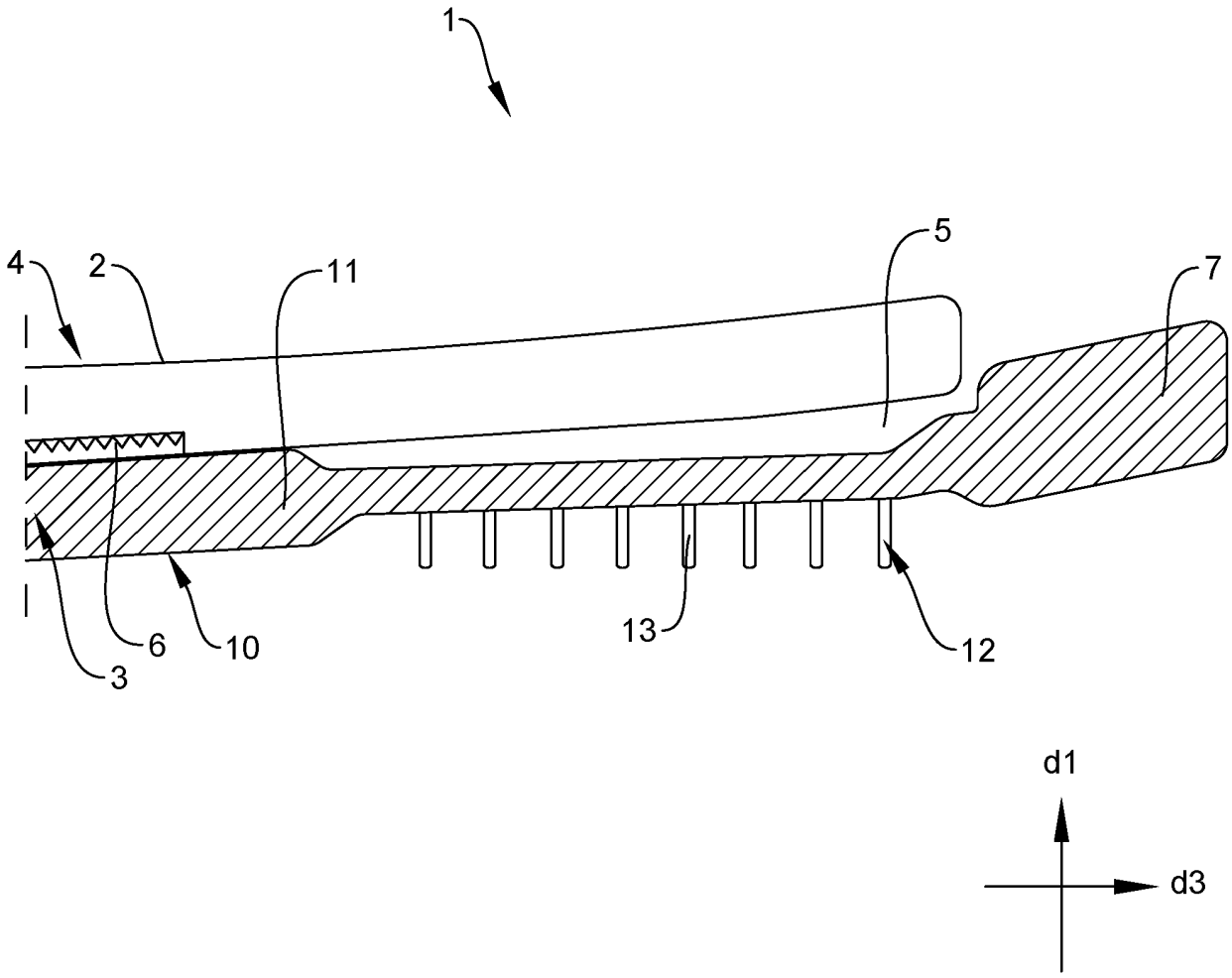
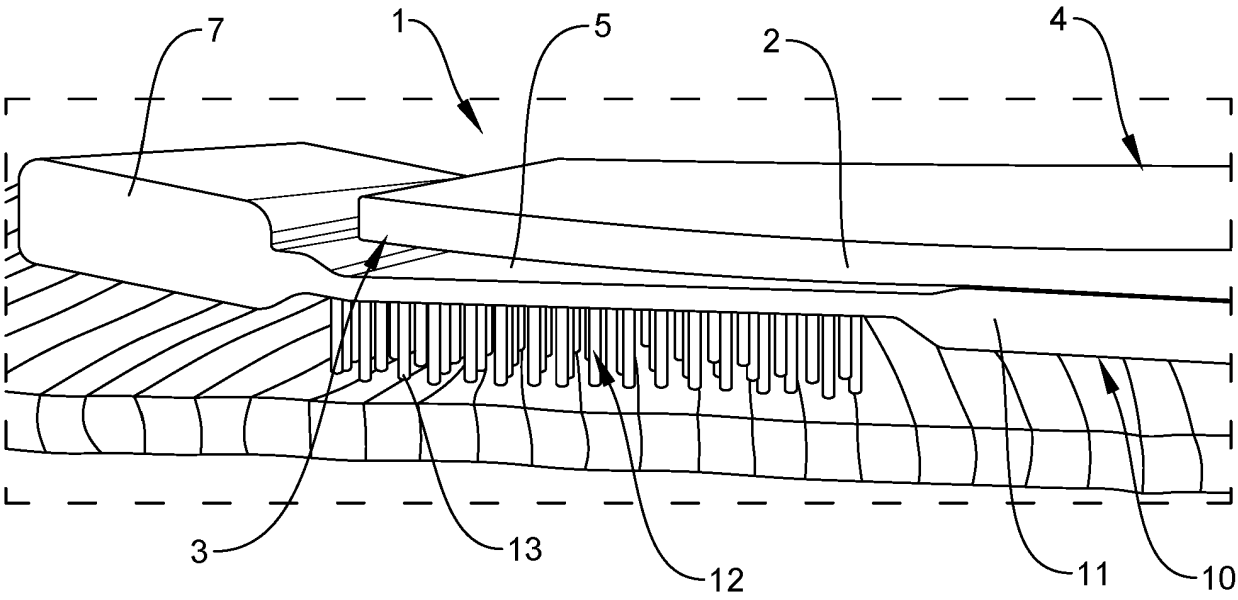


FIG. 2



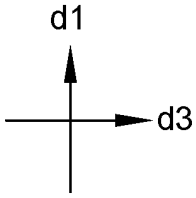


FIG. 3

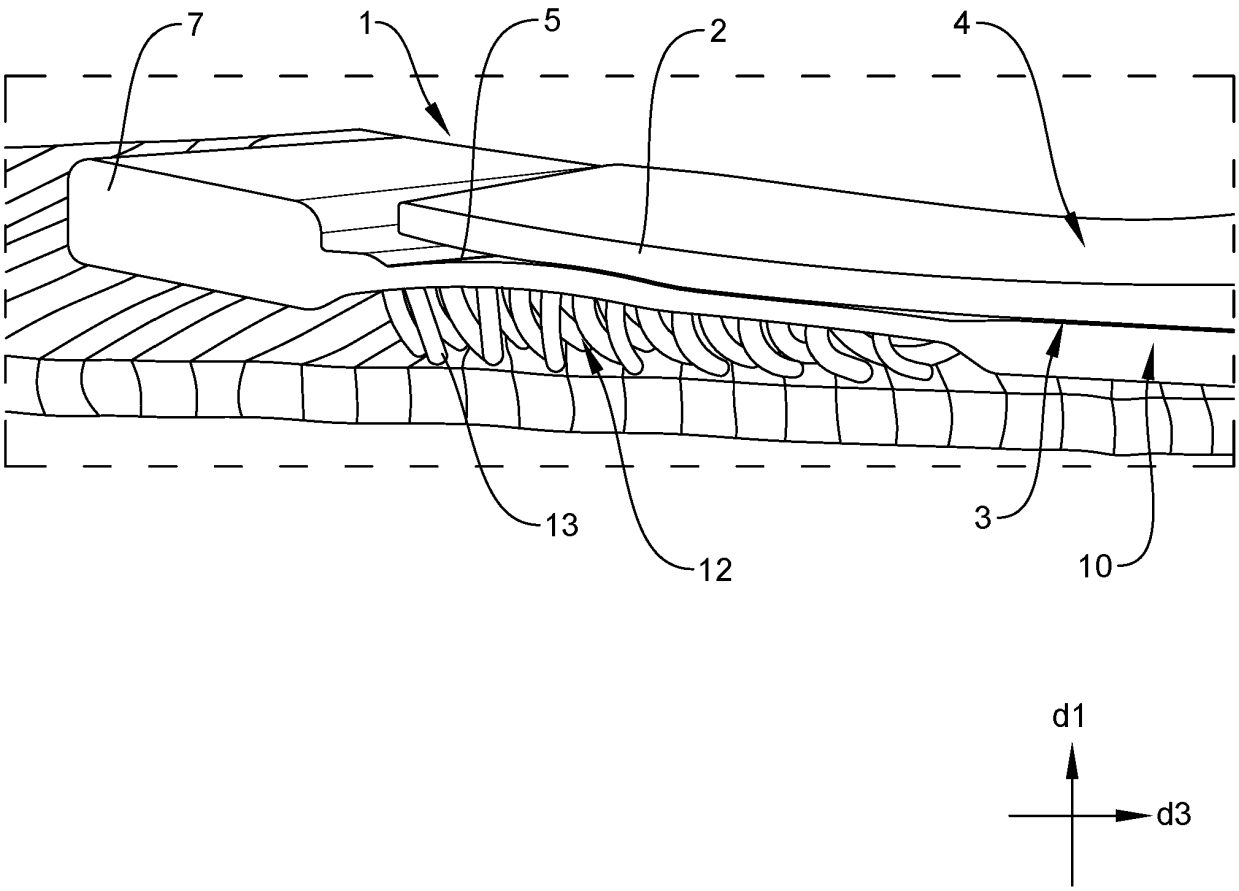


FIG. 4

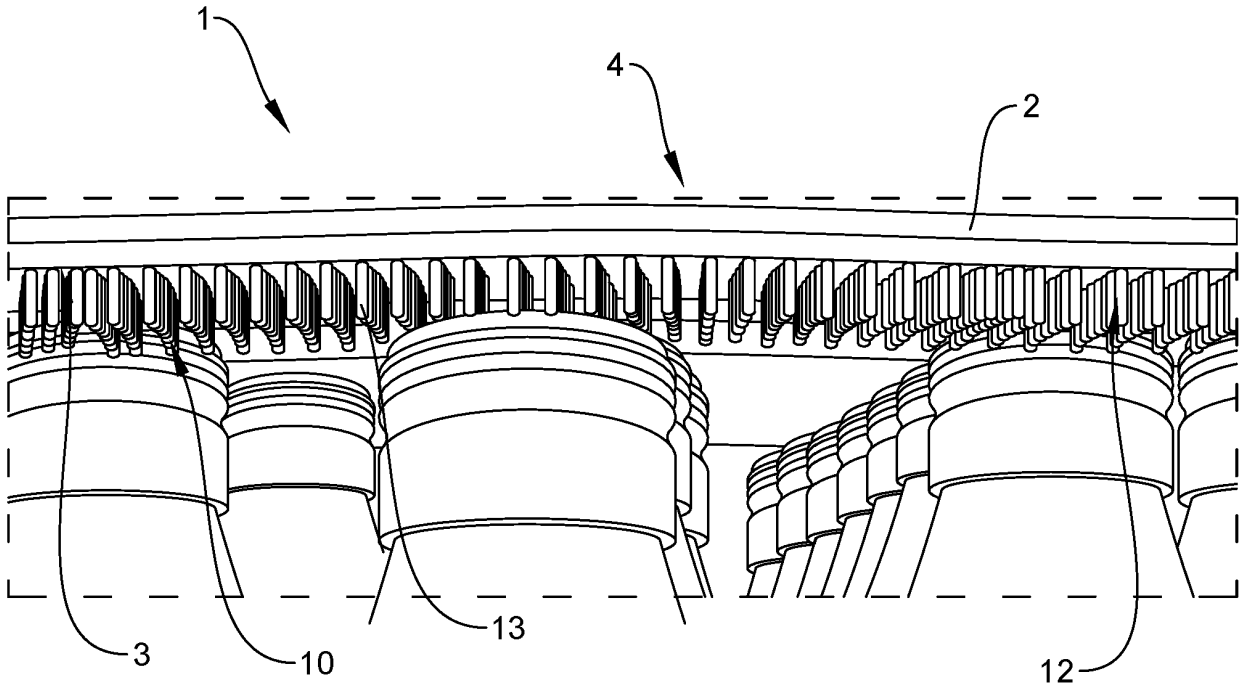


FIG. 5

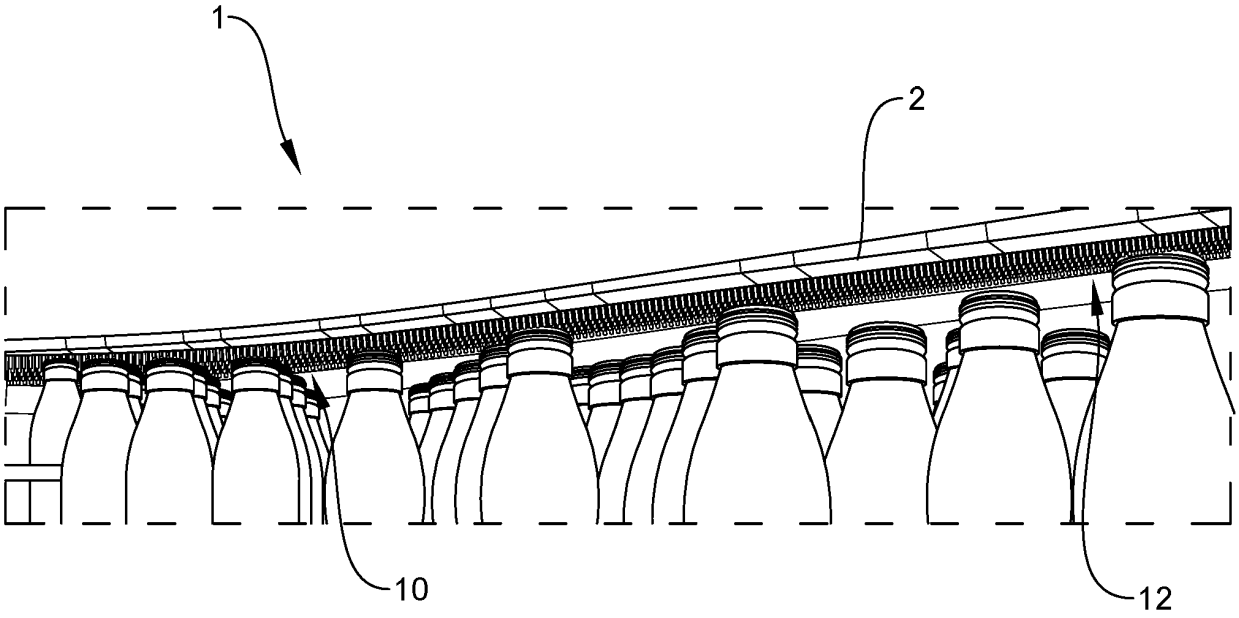


FIG. 6

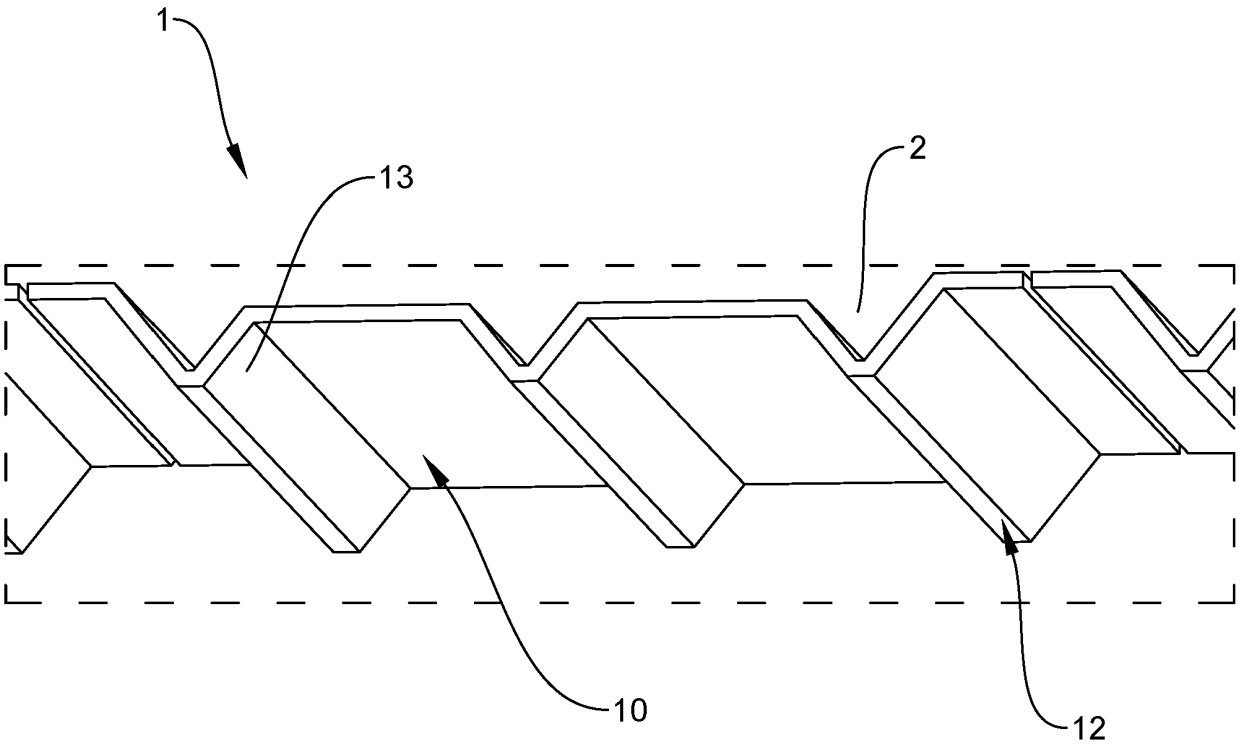


FIG. 7

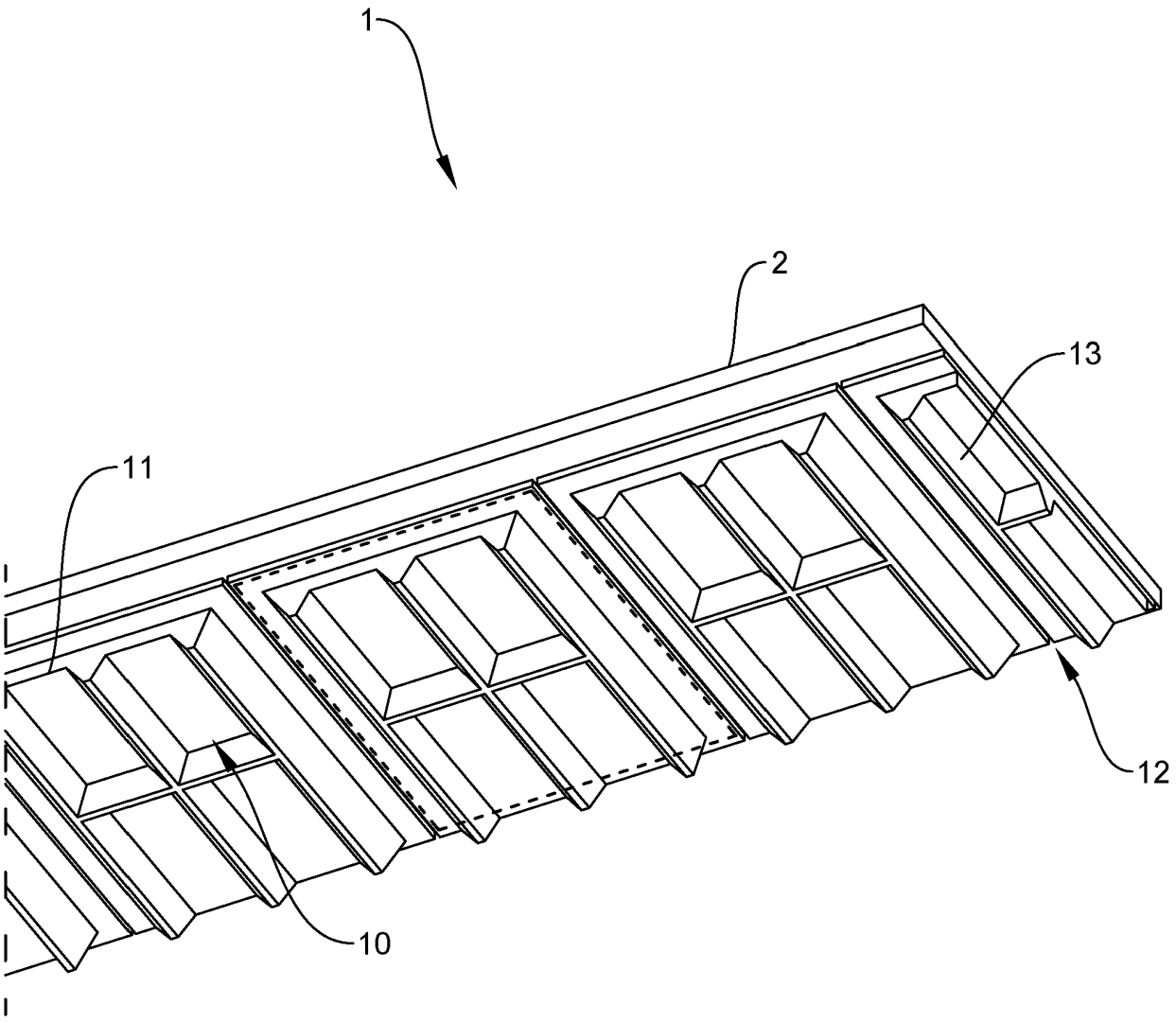


FIG. 8

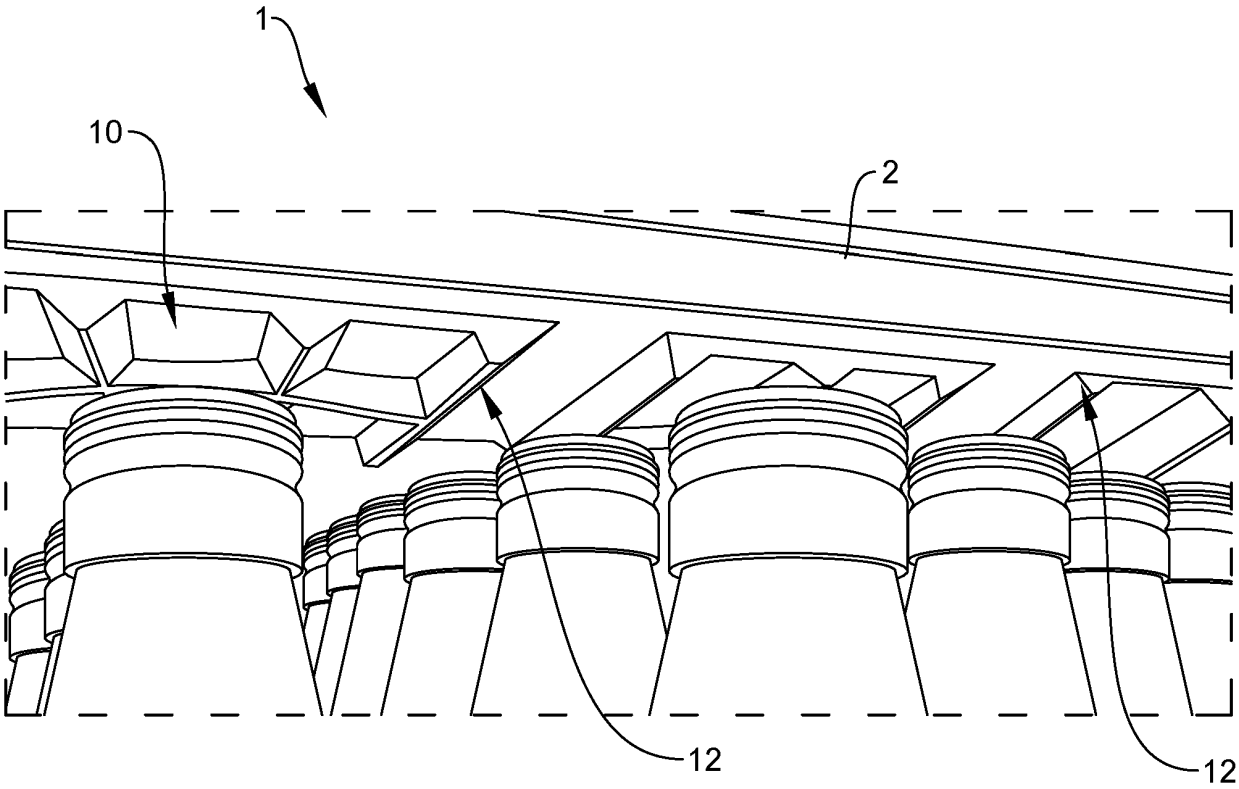


FIG. 9

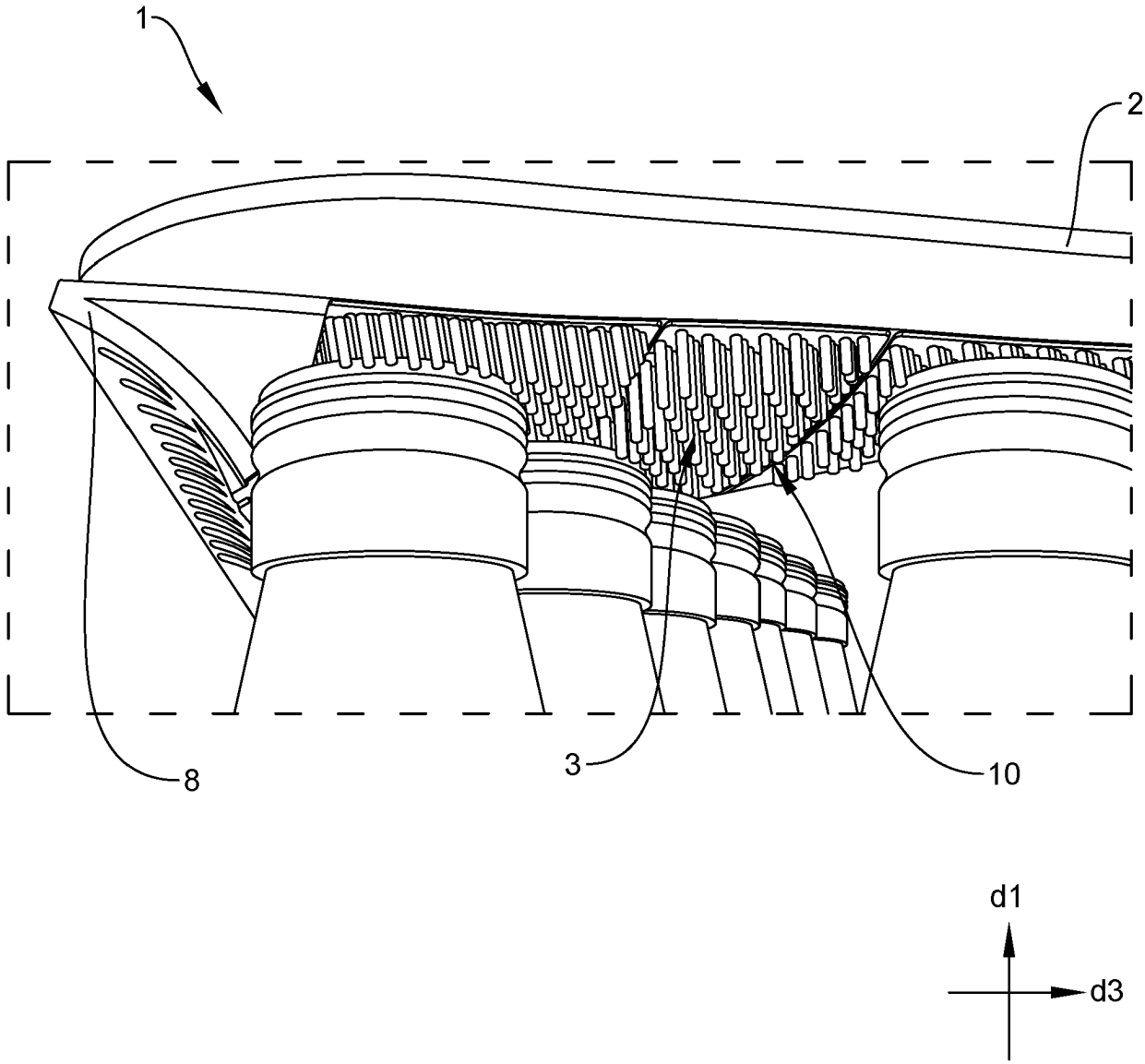


FIG. 10

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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