



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
28.09.2011 Bulletin 2011/39

(51) Int Cl.:
B65D 5/50 (2006.01) B65D 81/05 (2006.01)

(21) Application number: **10157713.8**

(22) Date of filing: **25.03.2010**

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

(72) Inventors:
• **Westkamp, Harald**
45527 Hattingen (DE)
• **Timmermanns, Guido**
52072 Aachen (DE)

(71) Applicant: **3M Innovative Properties Company**
Saint Paul, MN 55133-3427 (US)

(74) Representative: **Bergen, Katja**
3M Deutschland GmbH
OIPC
Carl-Schurz-Strasse 1
41453 Neuss (DE)

(54) **Packaging element**

(57) The invention refers to a packaging element to protect articles against damage and/or shock during storage/transit having side walls, that are attached to each other over integral hinges enabling erection of the ele-

ment. At least one side wall comprises at least one shock absorbing projection and/or recess that is pivotally attached to a side wall of the packaging element and at least one side wall comprises an opening.

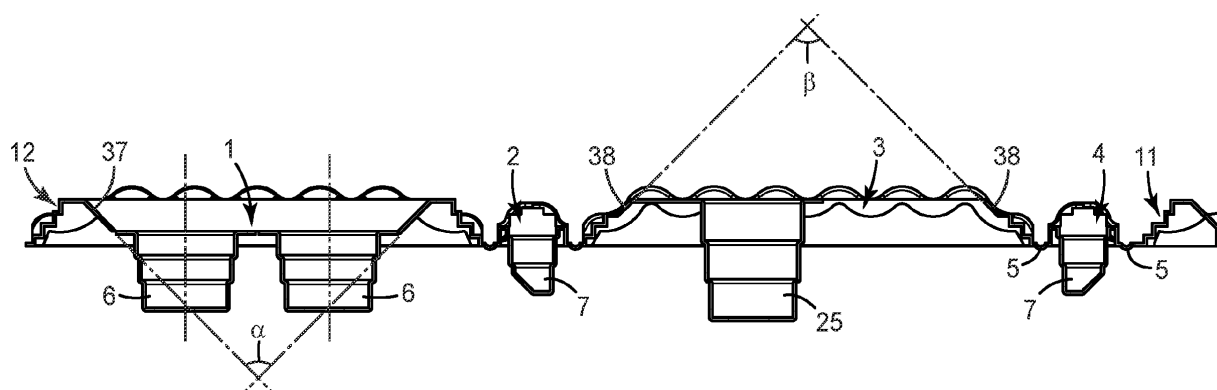


FIG. 7

Description

[0001] The invention relates to a packaging element that helps to protect articles, e.g. electronic articles, such as for example flat screens, against damage and/or shock during storage/transport.

[0002] It is known to use expanded Polystyrene cushions for protection of articles during storage and/or transport. Either a kind of case with recesses shaped to receive the product is made out of Polystyrene. Or a carton box is filled with little Polystyrene cushions to fill the space between the carton box and the articles.

[0003] WO 2005/118423 (Protective Packaging Systems Ltd.) describes a packaging case for enclosing articles to protect them against damage and shock during storage and transport. The packaging case has several walls which are of sheet material and comprise recesses for strengthening the walls. Furthermore the walls abut edge-to-edge one with another, wherein the abutting edges of the walls are each formed with ridges and grooves that nest with one another ridge-within-groove when in mutual abutment.

[0004] US 5,806,683 (Gregory W. Gale) also describes a packaging case for enclosing articles, e.g. bottles, to protect them against damage and/or shock with side walls that provide shock absorbing structures. The structures are pyramid-shaped and have recesses therein adapted to the shape of the product to be packaged.

[0005] There is a need for a packaging element that is environmentally compatible. In particular, there is a need for a packaging element that is recyclable, has a relatively small volume and may be produced in a production process that demands only a small amount of energy. Furthermore there is a need for a packaging element that may easily be adapted to different geometries of diverse products.

[0006] The present invention provides a packaging element that helps to protect articles against damage and/or shock during storage/transport having side walls, that are attached to each other over integral hinges enabling erection of the element. At least one side wall comprises at least one shock absorbing projection and/or recess, wherein at least one projection and/or recess is pivotally attached to a side wall of the packaging element and wherein at least one side wall comprises an opening.

[0007] The packaging element according to the invention provides several walls that are attached to each other over integral hinges enabling erection of the element. The packaging element may be made out of one piece with the advantage of saving costs during production of the packaging element since it does not have to be assembled. The integral hinges may be for example living hinges.

[0008] The packaging element according to the invention may be erected to become a packaging element having a certain shape. Depending on the product to be packaged as well as on the circumstances of packaging - product will be stored/transported in a box, in a bag etc. - the

shape of the packaging element may vary. The possibility of erecting the element instead of providing a solid element has the advantage of providing a product with a small volume, with storing advantages. The shock absorbing projection and/or recess (impact absorbers) are also part of the one piece packaging element according to the invention. Projection and/or recess do not need to be attached or assembled to the packaging element.

[0009] At least one projection and/or recess is pivotally attached to a side wall of the packaging element. Because of that feature the packaging element according to the invention may be adapted to the shape and/or size of the product to be packaged very easily. The opening in at least one of the side walls may have the advantage that the product to be packaged does not have to be positioned completely inside the erected packaging element. It is possible to position parts of the product outside the packaging element and parts of it inside of the packaging element. In other words it is possible to position the packaging element on parts of a product, e.g. on an edge of a product with the advantage of an easy adaption of the packaging element to several different kind of products.

[0010] If the product to be packaged and to be protected is for example a flat screen, it is possible to take four packaging elements according to the invention and position them on each edge of the flat screen. The impact absorbers in the shape of a projection and/or a recess may than be positioned between the flat screen itself and for example a box in which the flat screen will be packaged. If the packaging element with its projection and/or recess is adapted to the size and the shape of the flat screen as well as to the box, the four packaging elements prevent movement of the flat screen within the box and they may also absorb energy from a potential impact. The four packaging elements have a relative small volume and therewith provide a contribution to environment protection, since the amount of energy that is needed to produce the four packaging elements according to the invention is relatively small.

[0011] According to one embodiment of the invention the packaging element is made by thermoforming. It is also possible to make it out of sheet material via a moulding process. The moulding process may be an injection moulding process. It may be made in one piece. The materials that may be used for making the packaging element according to the invention are for example Polyolefins or Polyester or any other mouldable resilient plastic materials.

[0012] According to another embodiment of the invention the packaging element may have at least one shock absorbing projections and/or recess that have a circular and/or an oval configuration with a diameter that decreases with its height. The configuration may also be squared, triangular or have any other reasonable shape. The decreasing diameter of the projections and/or recesses helps to provide a packaging element with a structure that has very good properties during a possible impact

since the decreasing diameter allows the structure to fold in a controlled way thereby absorbing energy and protecting the packaged product. The diameter may decrease stepwise in order to provide a packaging element that may be deformed in an elastically way. Such a shape may easily be produced with a moulding process and offers a simple predetermined folding structure. The decreasing diameter may also have any other kind of shape such as for example a continuous decreasing diameter with predetermined folding structures such as vertical rips.

[0013] The packaging element according to the invention may have side walls that are arranged as the side walls of a cuboid-shaped figure in the erected state. It may have four side walls that are connected over three living hinges with each other wherein the living hinges may be arranged parallel to each other. The two missing side walls of the cuboid-shaped figure may be composed of flanges that extend from the four side walls described above. A packaging element in the shape of a cuboid has the advantage of being easily adapted to the circumstances of packaging, such as to additional boxes etc.. The packaging element according to the invention may also have other shapes in its erected state such as for example the shape of a cuboid with six equal side walls (cube) or even a prism with any reasonable shape as base such as for example a triangle as base.

[0014] The side walls of the packaging element may abut edge-to-edge with one another. This feature helps to stabilise the packaging element in its erected state and also provides the possibility to create additional energy absorbing structures within the packaging element.

[0015] The packaging element may have flanges that extend from the side walls and have edge-to-edge abutments that are formed with ridges and groves that nest with one another in the erected state of the packaging element. The flanges of the side walls may compose additional side walls in the erected state of the packaging element, extending perpendicular to the side walls from which they extend. These additional side walls help to stabilise the packaging element in its erected state and also provide the possibility to create additional energy absorbing structures within the packaging element.

[0016] The ridges and groves of the packaging element according to the invention may be arranged parallel to each other. Such a structure may absorb energy in the possible case of an impact because it may fold in a predetermined manner and thereby deform in a controlled way.

[0017] According to a further embodiment of the invention at least one side wall has a rectangular cut-out. The rectangular cut-out is one possibility to realise an opening in a side wall. As described above the opening in at least one of the side walls may have the function that the product to be packaged does not have to be positioned completely inside the erected packaging element. It is possible to position parts of the product outside the packaging element and parts of it inside of the packaging element.

In other words, it is possible to position the packaging element on parts of a product, e.g. on an edge of a product. Depending on the shape of the product to be protected the opening may also have any other kind of shape besides a rectangular cut-out, for example a round or oval cut-out, a triangular cut-out etc.. The cut-out may even extend into the flanges that extend from the side walls described above.

[0018] The packaging element according to the invention may further have a H-shaped cut-out in at least one of the side walls. The H-shaped cut-out may be arranged around two projections and/or recesses functioning as impact absorbers thereby providing a simple solution for a pivotal attachment of these impact absorbers to a side wall. Such pivotally attached impact absorber provides a very simple solution of adapting the packaging element according to the invention to the product to be packed. If a side wall provides for example two projections arranged next to each other and a H-shaped cut-out is arranged such around the projections that three sides of each projection are cut out and each projection is only attached over one side with the side wall. This remaining side may be used as a hinge thereby providing a pivotal attachment of the projection to the side wall. The cut-out may have any other reasonable shape, such as for example an U-shaped cut-out in at least one side wall. The U-shaped cut-out may be used to provide a pivotal attachment of one projection and/or recess to a side wall. The cut-outs may have any other shape such as for example a C-shape.

[0019] The packaging element according to the invention may have at least one projection and/or recess that is angled. As described above the shock absorbing projections and/or recess may have a configuration with a decreasing diameter. The projection and/or recess may further have a flat top. According to this embodiment of the invention this flat top is at least partially angled relative to the side wall the projection and/or recess extends of. In other words, the flat top has a direction or orientation that stands with an angle relative to the side wall the projection and/or recess extends of.

[0020] The packaging element according to the invention may provide a rectangular cut-out and an H-shaped cut-out that are arranged on two different side walls that are arranged parallel to each other in the erected state of the packaging element. As described above an opening in one of the side walls provides the possibility to position parts of a product outside the packaging element and parts of it inside of the packaging element or to position the packaging element on parts of the product. Having a H-shaped cut-out with two pivotally attached projections and/or recesses opposite of an opening provides further the possibility to orientate the projections and/or recesses in a way that fits perfectly to the product to be packed and protected. Coming back to the example of the product being a flat screen, it is possible to take four packaging elements according to the invention and position them on each edge of the flat screen. Depending

on the size of the packaging elements according to the invention the edges may enter the packaging element on one side through the rectangular opening and leave the packaging element through the H-shaped cut-out thereby pivoting the projections and/or recesses within the H-shaped cut-outs around their remaining connection with the side wall they extend from. In this scenario the projections and/or recesses provide impact absorbers to at least two sides of the flat screen that are perfectly adapted to the shape of the flat screen since they abut with it. The rectangular cut-out as well as the H-shaped cut-out may have a size that is adapted to the flat screen. Since there are a lot of flat screens that have a rectangular shape it is possible to use one size of packaging element for several similar products.

[0021] The packaging element according to the invention may further provide a H-shaped cut-out and an U-shaped cut-out that are arranged on two different side walls that are arranged parallel to each other in the erected state of the packaging element. As described above an opening in one of the side walls provides the possibility to position parts of a product outside the packaging element and parts of it inside of the packaging element or to position the packaging element on parts of the product. Having a H-shaped cut-out with two pivotally attached projections and/or recesses opposite of an U-shaped cut-out provides the possibility to arrange several projections and/or recesses on top of each other and to orientate them in a way that fits perfectly to the product to be packed and protected.

[0022] According to another embodiment of the invention angled projections and/or recesses may be arranged on side walls that extend at approximately 90° with respect to the side walls with cut-outs in the erected state of the packaging element. Such projections and/or recesses may provide additional impact absorbers that - with their angled top - may be adapted to each packaging situation by designing the angled projection and/or recess such that it fits into a space between the product to be packaged and a box or the like the product is packaged.

[0023] The invention will now be described in more detail with reference to the following Figures exemplifying particular embodiments of the invention:

- Fig. 1 a side view of one embodiment of the packaging element according to the invention out of a moulded sheet from which the packaging element can be erected by folding;
- Fig. 2 a plan view of the packaging element according to Figure 1;
- Fig. 3 a side view of the packaging element according to Figure 1 along arrow A in Figure 1;
- Fig. 4 a sectional view of the packaging element according to Figure 1 along the line B-B in Figure

2;

- Fig. 5 a side view of another embodiment of the packaging element according to the invention out of a moulded sheet from which the packaging element can be erected by folding;
- Fig. 6 a plan view of the packaging element according to Figure 4;
- Fig. 7 a sectional view of the packaging element according to Figure 5 along the line C-C in Figure 6;
- Fig. 8 a three dimensional view of the erected packaging element according to Figure 1 together with the article to be protected;
- Fig. 9 a side view of the packaging element and the article of Figure 7 in a carton box;
- Fig. 10 a sectional view of the packaging element according to Figure 1 in the erected state along the line B-B in Figure 2;
- Fig. 11 a three dimensional view of the erected packaging element according to figure 4 and 5 as well as a three dimensional view of the erected packaging element according to figures 1 to 3 together with the article to be protected and
- Fig. 12 a sectional view of the packaging element according to Figure 5 along the line C-C in Figure 6 in the erected state.

[0024] Herein below various embodiments of the present invention are described and shown in the drawings wherein like elements are provided with the same reference numbers.

- [0025]** Figure 1 is a side view of one embodiment of the packaging element according to the invention. The packaging element according to the invention may be made out of a moulded sheet. In Figure 1 the packaging element is shown in an unfolded state. Side walls 1, 2, 3, and 4 are lying side by side. They are connected with one another over living hinges 5. The hinges 5 may have the shape of a bending line. Side wall 1 provides two projections 6 of circular, conical shape functioning as impact absorbers. The conical shape of the projections 6 is achieved by three steps in the outer diameter of the projections 6. Side walls 2 and 4 also provide projections 7 of oval (see Figure 2) conical shape also functioning as impact absorbers. The conical shape of these projections 7 is achieved by two steps in the outer diameter of the projections 7. The projections 7 of the side walls 2 and 4 bevel such that a part of the top 8 of the projections 7 are oriented in an angle relative to the orientation of the side walls 2 and 4. This feature enables the packaging

element to also absorb energy coming from a certain angle as will be explained with reference to Figure 11. The angle of the tops 8 of the two projections 7 on side walls 2 and 4 are the same but they are oriented in opposite directions.

[0026] One side of the packaging element shown in Figure 1 has a latch element 9 that is linked to side wall 4 over a living hinge 5. The latch element 9 has a step like fixing structure 11 that corresponds with a similar structure 12 on the opposite side of the packaging element on side wall 1. During erection of the element it will be folded at its living hinges 5 from a flat form shown in Figure 1 into the form shown in Figures 8 to 12. The four side walls 1, 2, 3 and 4 are then positioned with an angle of 90° relative to each other. In that situation the side wall 1 engages with side wall 4 and the latch element 9 is used to attach the two walls 1 and 4 at each other.

[0027] The walls 1 to 4 have flanges 13, 14, 15 and 16 (see also Figure 2) that stand up on two opposite sides of the side walls 1 to 4. The flanges 13, 14, 15 and 16 have ridges and grooves, that are arranged parallel to each other, for enhanced rigidity and they come into conformal edge-to-edge abutment with one another when the packaging element is erected. In other words they nest with one another in the erected state of the packaging element. The flanges 13 and 15 have a serpentine profile and have ridges 17 with intervening grooves 18 running along their edges. On one side the side walls 1 and 3 provide flanges 13 and 15 with four ridges 17 and on the opposite side the side walls 1 and 3 have only three ridges 17. This asymmetric structure takes into account that one side of the product to be packed may have projecting structures. The flanges 14 and 16 have a single-hump serpentine profile.

[0028] Figure 2 is a plan view of the packaging element according to Figure 1 with its four side walls 1, 2, 3 and 4 lying side by side. The four side walls 1, 2, 3 and 4 are connected with each other over living hinges 5 so that the packaging element according to the invention may be erected by folding into a cuboid-shaped figure. A latch element 9 is linked to side wall 4 over a living hinge 5. The latch element 9 has a step like fixing structure 11 that corresponds with a similar structure 12 on the opposite side of the packaging element on side wall 1. During erection of the element it will be folded at its living hinges 5 from a flat form shown in Figure 1 into the form shown in Figures 8 to 12. The four side walls 1, 2, 3 and 4 are then positioned with an angle of 90° relative to each other. In that situation the step wise fixing structure 11 on the latch element 9 engages with the step wise fixing structure 12 on side wall 1 and the latch element 9 is used to attach the two walls 1 and 4 at each other.

[0029] All side walls 1, 2, 3 and 4 provide upper and lower flanges 13, 14, 15, and 16. The flanges 13, 14, 15 and 16 have ridges 17 and grooves 18 that are arranged parallel to each other thereby providing a structure that is able to absorb energy during a possible impact. The upper flanges 13, 14, 15 and 16 have more ridges 17

and grooves 18 than the lower flanges 13, 14, 15 and 16. The flanges 13, 14, 15 and 16 have edge-to-edge abutments that nest with each other when the packaging element is erected. Therefore the ridges 17 and grooves 18 of the flanges 13 and 15 are arranged staggered to the ridges 17 and grooves 18 of the flanges 14 and 16.

[0030] Side wall 1 has two impact absorbers 6 in the shape of conical projections. Both impact absorbers 6 have the same size. They each have a stepped diameter with three steps. This structure also provides the possibility to absorb energy during a possible impact. The two impact absorbers 6 are embedded into an H-shaped cut-out 19 such that they are both placed on a squared base 21 that lie next to each other. Three sides of each base 21 are positioned next to the H-shaped cut-out 19 so that each base 21 is connected with the side wall 1 over a living hinge structure 22 that is positioned at the forth side of each the squared base 21. The living hinge structures 22 are positioned at opposite sides of the bases 21. The described structures provides the possibility to pivot the impact absorbers 6 around an axis lying in a straight through the living hinge structure 22 as can be seen in the Figures 8 to 12. The two described impact absorbers 6 may be pivoted in opposite directions. By this feature the packaging element according to the invention may be adapted to the shape of the product to be packed and protected as will be described with reference to these Figures. The living hinge structures 22 are positioned at portions of side wall 1 that incline from the H-shaped cut-out 19. These inclining portions of side wall 1 are oriented essentially parallel to side walls of the product to be packed and protected when the packaging element is brought in connection with the product. With such a shape the risk that sharp edges come in contact with the product is minimized.

[0031] Side walls 2 and 4 each have an impact absorber 7 in the shape of an oval conical projection. Both impact absorbers 7 have the same size. They each have a stepped diameter with two steps. And they each have a top 8 that is partly angled relative to the orientation of the side walls 2 and 4. The angle of the tops 8 of the two projections 7 on side walls 2 and 4 are the same but they are oriented in opposite directions.

[0032] Side wall 3 has an integrated rectangular cut-out or opening 23. In the erected state of the packaging element according to the invention the opening 23 and the pivotally attached projections 6 are positioned on side walls 1 and 3 that are parallel to each other in the erected state of the packaging element. The function of this opening 23 will be described with reference to Figures 8 to 12.

[0033] Figure 3 is a side view of the packaging element according to Figure 1 along arrow A in Figure 1. Impact absorber 6 with its three steps projects from side wall 1. Impact absorber 7 with its two steps is projecting behind impact absorber 6. On the opposite side of side wall 1 flanges 13 with ridges 17 and grooves 18 with a serpentine profile are arranged. Through the grooves 18 if the flanges 13 the staggered ridges 17 of the flanges 14 of

side wall 2 can be seen.

[0034] Figure 4 is a sectional view of the packaging element according to Figure 1 along the line B-B in Figure 2. As in Figure 1 can be seen the side walls 1, 2, 3 and 4 that are lying side by side and that are connected with one another over living hinges 5. Side wall 1 provides two projections 6 of circular, conical shape functioning as impact absorbers. The conical shape of the projections 6 is achieved by three steps in the outer diameter of the projections 6. Side walls 2 and 4 also provide conical projections 7 with two steps in their outer diameter. The projections 7 of the side walls 2 and 4 bevel such that a part of the top 8 of the projections 7 are oriented in an angle relative to the orientation of the side walls 2 and 4. The hatched line in Figure 4 indicates the level of the packaging element at the cut edge on line B-B in Figure 2. In the area of the two projections 6 on side wall 1 the packaging element provides two beveled areas 37. These areas 37 stand with an angle of approximately 90° relative to each other. In the area of the rectangular cut-out 23 on side wall 3 the packaging element provides two bevelled areas 38. These areas 38 stand with an angle β of approximately 90° relative to each other. The areas 37 bevel into the opposite direction as the areas 38. The function of these areas 37 and 38 will be described in more detail with reference to Figure 10. The corresponding fixing structures 11 and 12 can also be seen in Figure 4.

[0035] Figure 5 is a side view of another embodiment of the packaging element according to the invention out of a moulded sheet from which the packaging element can be erected by folding. Figure 6 is a plan view of the packaging element according to Figure 5. The embodiment shown in Figures 5 and 6 differs from that shown in Figures 1 and 2, in that the side wall 3 provides, instead of the opening 23, an U-shaped cut-out 24 around an impact absorber 25 with a circular conical shape with a stepped diameter as the impact absorbers 6 on side wall 1. Impact absorber 25 is also arranged on a base 26 with a squared shape. Three sides of the squared base 26 are not connected to the side wall 3 since they are lying next to the U-shaped cut-out 24. A fourth side of the base 26 is connected with the side wall 3 over a living hinge 27 allowing pivoting of the impact absorber 25 relative to the side wall 3 and therewith to the whole packaging element. The additional impact absorber 25 provides a further possibility of adapting the packaging element to the product to be packed and protected as well as to the packaging situation as will be described in detail with reference to Figure 11.

[0036] Figure 7 is a sectional view of the packaging element according to Figure 5 along the line C-C in Figure 6. As in Figure 5 can be seen the side walls 1, 2, 3 and 4 that are lying side by side and that are connected with one another over living hinges 5. Side wall 1 provides two projections 6 of circular, conical shape functioning as impact absorbers. The conical shape of the projections 6 is achieved by three steps in the outer diameter

of the projections 6. Side walls 2 and 4 also provide conical projections 7 with two steps in their outer diameter. The projections 7 of the side walls 2 and 4 bevel such that a part of the top 8 of the projections 7 are oriented in an angle relative to the orientation of the side walls 2 and 4. Side wall 3 provides a projection 25 of circular, conical shape functioning as impact absorber. The conical shape of this projection 25 is achieved by three steps in the outer diameter. The hatched line in Figure 7 indicates the level of the packaging element at the cut edge on line C-C in Figure 5. In the area of the two projections 6 on side wall 1 the packaging element provides two beveled areas 37. These areas 37 stand with an angle α of approximately 90° relative to each other. In the area of the projection 25 and U-shaped cut-out 24 on side wall 3 the packaging element provides two bevelled areas 38. These areas 38 stand with an angle β of approximately 90° relative to each other. The areas 37 bevel into the opposite direction as the areas 38. The function of these areas 37 and 38 will be described in more detail with reference to Figure 10. The corresponding fixing structures 11 and 12 can also be seen in Figure 4.

[0037] Figure 8 is a three dimensional view of the erected packaging element according to Figure 1 together with the article to be protected. The article to be protected is a flat screen 31. The upper left edge - build by a horizontal oriented upper bar 32 and a vertical oriented side bar 33, enclose a monitor 34 - is shown in Figure 9 with a packaging element according to the invention put onto it such that parts of the flat screen 31 are arranged inside of the packaging element and parts of the flat screen 31 are arranged outside of the packaging element. The packaging element is erected - in other words folded along its hinges 5 - and has a cuboid shape. The cuboid has six side walls, four of them are build by the side walls 1, 2, 3 and 4 and two of them are build by the flanges 13, 14, 15 and 16 of the side walls 1, 2, 3 and 4 that abut each other with their corresponding serpentine profiles. Side wall 1 lies opposite of side wall 3, side wall 2 lies opposite side wall 4 and the two side walls that are build by the flanges 13, 14, 15 and 16 lie opposite of each other.

[0038] The edge of the flat screen 31 is pushed through the opening 23 of the side wall 3 and further through the H-shaped cut-out 19 of side wall 1 thereby pivoting the impact absorbers 6 of side wall 1 around their hinges 22. Each of the side walls 1, 2, 3 and 4 are positioned with an angle of 45° relative to the upper bar of the flat screen. The two sides walls of the packaging element that are built up by the flanges 13, 14, 15 and 16 are arranged parallel to the monitor 34 of the flat screen 31. The two bases 21 of the impact absorbers 6 lie along the horizontal oriented upper bar 32 and the vertical oriented side bar 33 such that the bases 21 abut the bars 32 and 33 and that the impact absorbers 6 project in a direction away from them. Each of the impact absorbers 6 provides protection of the flat screen 31 from possible impacts coming from above or from the side. The flanges 13, 14, 15 and 16 building the two additional side walls of the

packaging element provide protection against possible impacts coming from a direction perpendicular to the monitor 34 or the opposite direction from behind the flat screen 31.

[0039] Figure 9 a side view of the packaging element and the article of Figure 11 in a carton box 35. All impact absorbers 6, 7, 25 have a top or at least parts of a top - an angled one 8 or a flat one - that is parallel to the inner side of the box 35 and contacts it. All impact absorbers 6, 7, 25 are positioned between flat screen 31 and box 35. Two of them, the impact absorbers 6, 7 may damp possible impacts from above and from the side. The front and the rear side of the flat screen 31 are protected by the side walls of the packaging element that are build by the flanges 13, 14, 15 and 16.

[0040] Figure 10 is a sectional view of the packaging element according to Figure 1 in the erected state along the line B-B in Figure 2. This view shows how the product to be packed and protected - here the flat screen 31 - and the packaging element according to the invention interact with each other. In other words, this view shows where the packaging element contacts the flat screen 31. In the erected state of the packaging element the beveled areas 37 and 38 of the side walls 1 and 3 are each positioned in a plane thereby providing two contact surfaces for the flat screen 31. The two contact surfaces enclose an angle of approximately 90° as the beveled areas 37 and 38 do and provide a contact surface for the upper bar 32 and the side bat 33.

[0041] The following is a description of the parts of the packaging element one would pass if walking along the outer surface of the flat screen 31 beginning at point D in the direction of arrow E. In the first section of the walk one would pass a step like structure of side wall 4 leading into the beveled area 38. The beveled area 38 terminates at the rectangular cut-out 23. In the following section of the walk one would pass the beveled area 37 of side wall 1 up to the living hinge structure 22. Behind the living hinge 22 the base 21 would be passed with the impact absorber 6 projecting therefrom. The base 21 lies in the same plane as the beveled area 37 providing additional contact surface for the flat screen 31. After passing the impact absorber 6 and another part of the base 21 the packaging element ends. Further following the outer surface of the flat screen 31 one would have to pass the edge of the flat screen 31 and then meet the packaging element again at another base 21 with another impact absorber 6. After passing a small part of the base 21 one would reach another living hinge structure 22 that leads into the beveled area 37. Behind the beveled area 37 one would reach the beveled area 38 of side wall 4. The two beveled areas 37 and the base 21 provide another contact surface for the flat screen 31. After passing another step like structure of side wall 4 the packaging element ends again.

[0042] 39 indicates the cutting edges of the rectangular cut-out 23 and the H-shaped cut-out 19. The cutting edges 39 are oriented parallel to the flat screen 31 thereby

ensuring that the flat screen 31 does not get any scratches from sharp edges.

[0043] Figure 11 is a three dimensional view of the erected packaging element according to Figure 5 and 6 as well as a three dimensional view of the erected packaging element according to Figures 1 to 4 together with the article to be protected. A packaging element according to the invention may be positioned on each edge of the flat screen 31 thereby protecting all sides of the flat screen 31 as described above. No other product protecting packaging elements are necessary. Impact absorber 25 and impact absorber 6 lie on top of each other. Their bases 21 and 26 touch each other as well as the hinges 22 and 27. The impact absorbers 6 and 25 project in opposite directions from their bases 21 and 26. The impact absorber 25 touches the flat screen 31 with its top thereby moving the packaging element parallel to the upper bar 32 of the flat screen 31 such that impact absorbers 6 and 7 may contact a inside of a not shown box 35 thereby hiding and protecting additional elements, like a separate stand, 36 of the flat screen 31.

[0044] Figure 12 is a sectional view of the packaging element according to Figure 5 along the line C-C in Figure 6 in the erected state. This view shows how the product to be packed and protected - here the flat screen 31 - and another embodiment of the packaging element according to the invention interact with each other. In other words, this view shows where the packaging element contacts the flat screen 31. In contrast to the embodiment shown in Figure 10 the beveled areas 37 and 38 of the side walls 1 and 3 that are each positioned in a plane provide only one contact surfaces for the flat screen 31. The other contact surface for the flat screen 31 is provided by the additional projection 25 of side wall 4. The two contact surfaces - first one build by the beveled areas 37 and 38 the other build by the projection 25 - enclose an angle of approximately 90°. Projection 25 with its base 25 lies opposite of projection 6 with its base 21. The two bases 26 and 21 are orientated parallel to each other and touch each other. The living hinge structures 22 and 27 of the bases 21 and 26 are positioned offset of each other. This embodiment of the packaging element according to the invention provides more space next to the flat screen 31 indicated by the arrow d in Figure 12 that can be used for additional elements that may be packed together with the flat screen 31 such as for example a separate stand (see Figure 11).

[0045] 39 indicates the cutting edges of the U-shaped cut-out 24 and the H-shaped cut-out 19. The cutting edges 39 are oriented parallel to the flat screen 31 thereby ensuring that the flat screen 31 does not get any scratches from sharp edges.

Claims

1. Packaging element to protect articles against damage and/or shock during storage/transit having side

walls (1, 2, 3, 4), that are attached to each other over integral hinges (5) enabling erection of the element, wherein at least one side wall (1) comprises at least one shock absorbing projection and/or recess (6, 7, 25),

characterized in that at least one projection and/or recess is pivotally attached to a side wall of the packaging element and

in that at least one side wall comprise an opening (19, 23, 24).

2. Packaging element according to claim 1, **characterized in that** it is made by thermoforming.

3. Packaging element according to claim 1 or 2, **characterized in that** the shock absorbing projection and/or recess (6, 7, 25) has a circular and/or oval configuration with a diameter that decreases with its height.

4. Packaging element according to any of the preceding claims, **characterized in that** the side walls (1, 2, 3, 4) are arranged as cuboid in the erected state.

5. Packaging element according to any one of the preceding claims, **characterized in that** the side walls (1, 2, 3, 4) abut edge-to-edge with one another.

6. Packaging element according to any one of the preceding claims, **characterized in** flanges (13, 14, 15, 16) that extend from the side walls (1, 2, 3, 4) and have edge-to-edge abutments that are formed with ridges (17) and groves (18) that nest with one another.

7. Packaging element according to any one of the preceding claims, **characterized in that** the ridges (17) and groves (18) are arranged parallel to each other.

8. Packaging element according to any one of the preceding claims, **characterized in that** at least one side wall (3) has a rectangular cut-out (23).

9. Packaging element according to any one of the preceding claims, **characterized in that** at least one side wall (1) has an H-shaped cut-out (19).

10. Packaging element according to any one of the preceding claims, **characterized in that** at least one side wall (3) has an U-shaped cut-out (24).

11. Packaging element according to any one of the preceding claims, **characterized in that** at least one projection (7) and/or recess is angled.

12. Packaging element according to claim 8 and 9, **characterized in that** the rectangular cut-out (23) and the H-shaped cut-out (19) are arranged on two dif-

ferent side walls (1, 3) that are arranged parallel to each other in the erected state of the packaging element.

5 13. Packaging element according to claim 8 and claim 10, **characterized in that** the H-shaped cut-out (19) and the U-shaped cut-out (25) are arranged on two different side walls (1, 3) that are arranged parallel to each other in the erected state of the packaging element.

10 14. Packaging element according to any of the claims 8 and 11, **characterized in that** angled projections and/or recesses (7) are arranged on side walls (2, 4) that extend at an angle of approximately 90° relative to the side walls (1, 3) with cut-outs in the erected state of the packaging element.

20

25

30

35

40

45

50

55

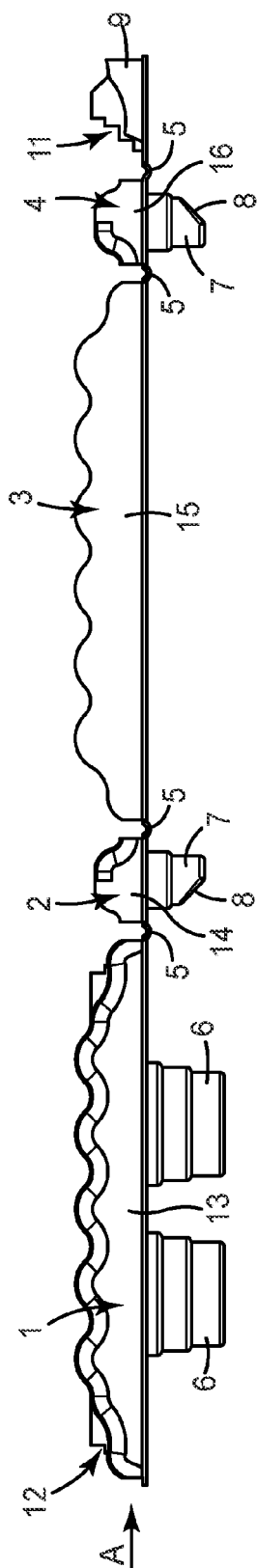


FIG. 1

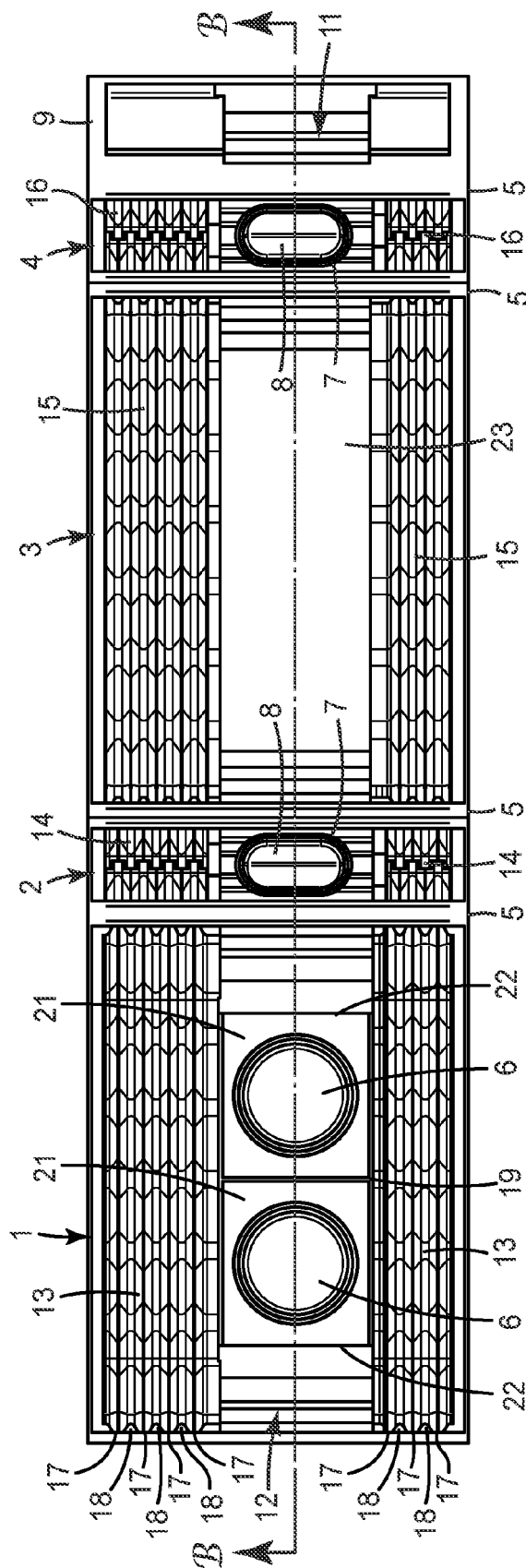


FIG. 2

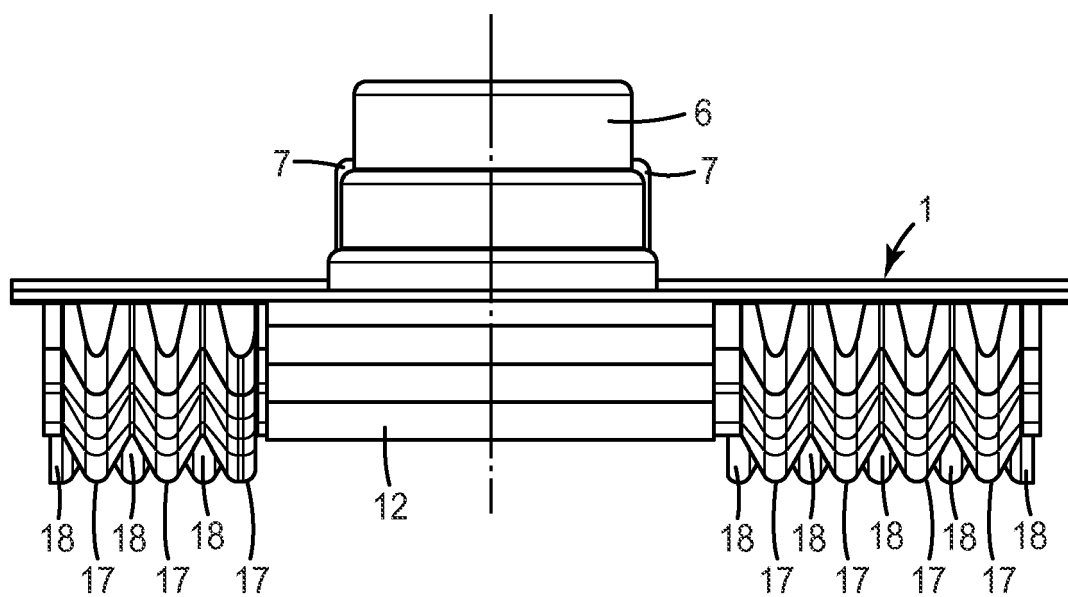
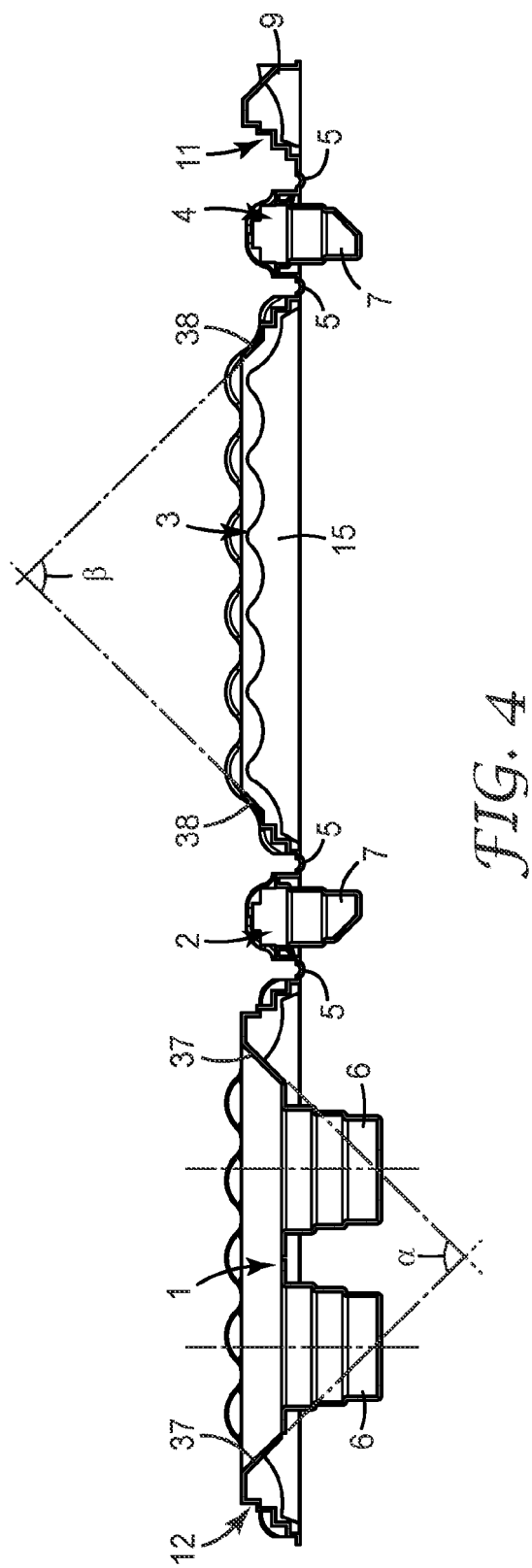


FIG. 3



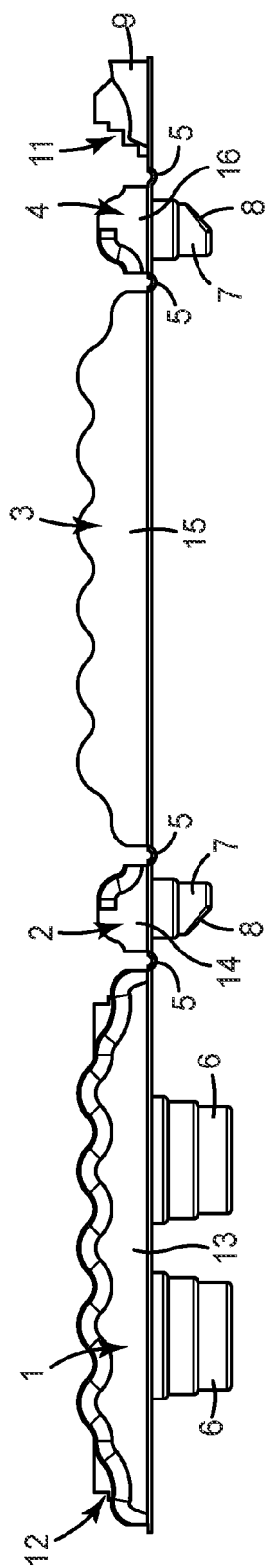


FIG. 5

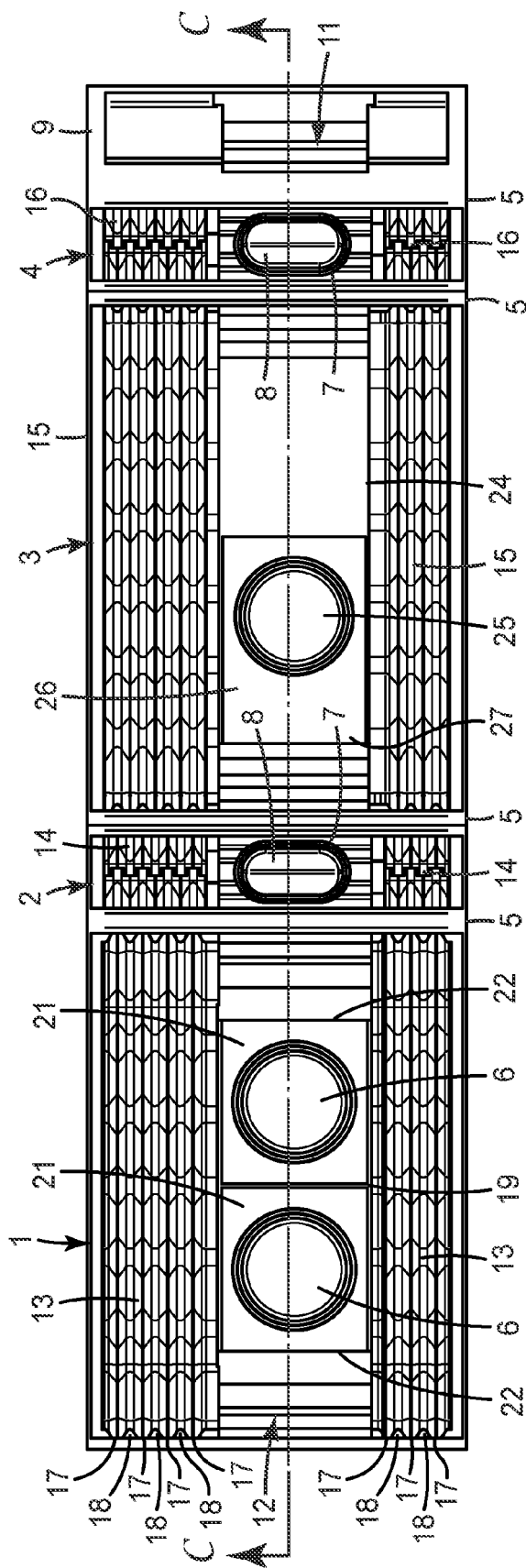


FIG. 6

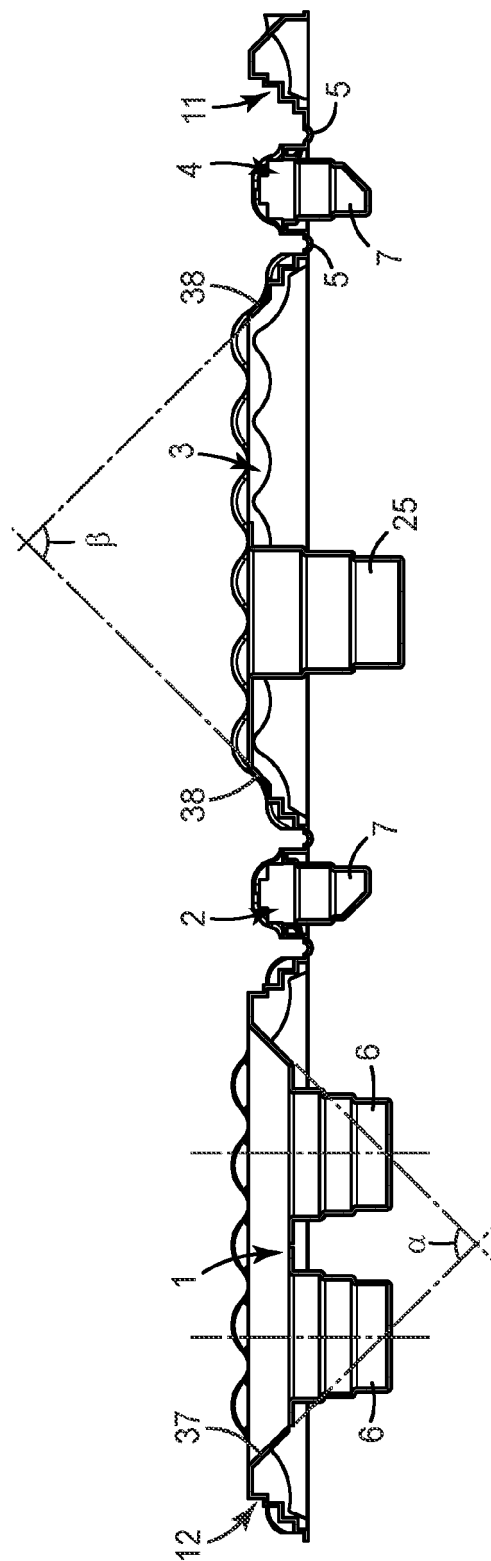


FIG. 7

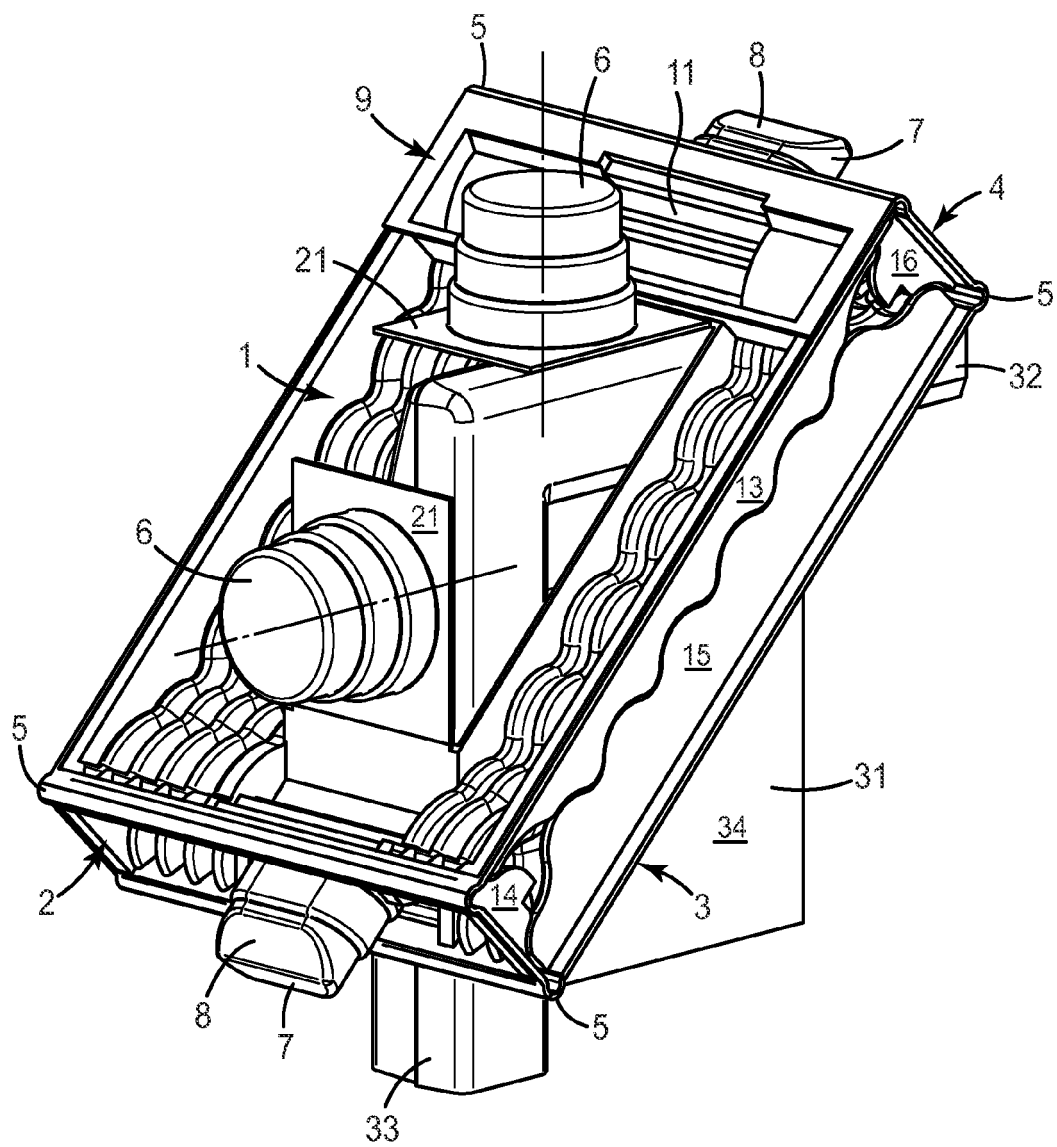


FIG. 8

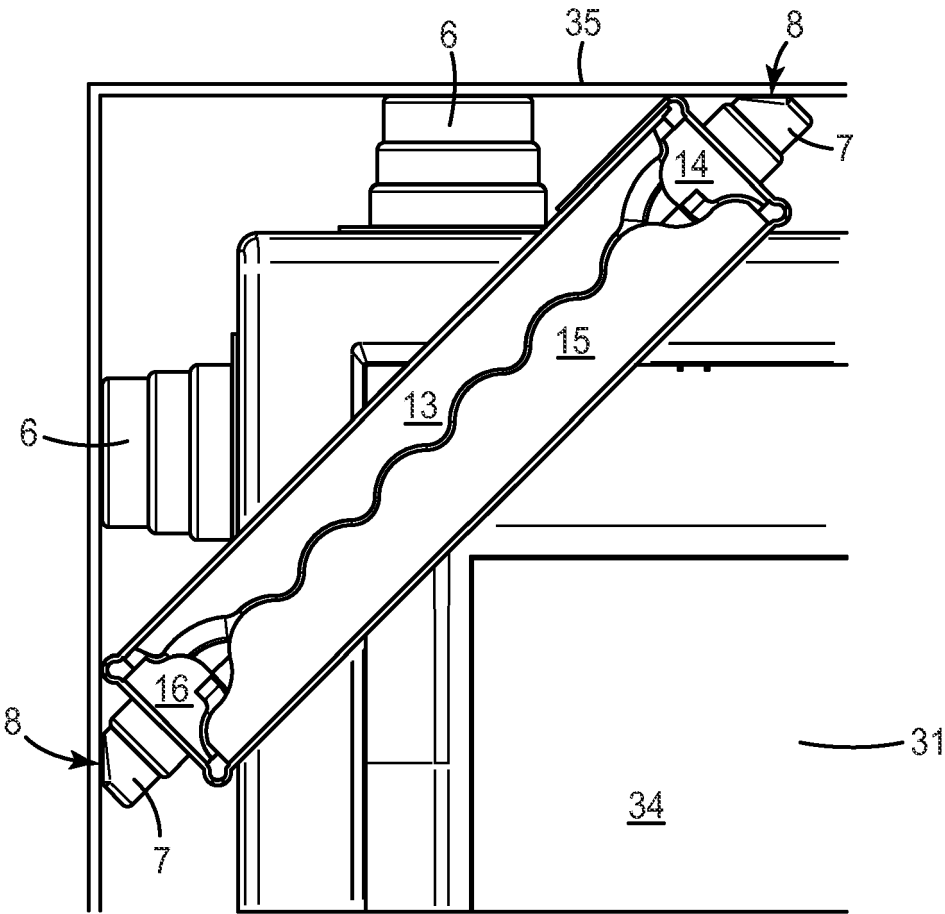
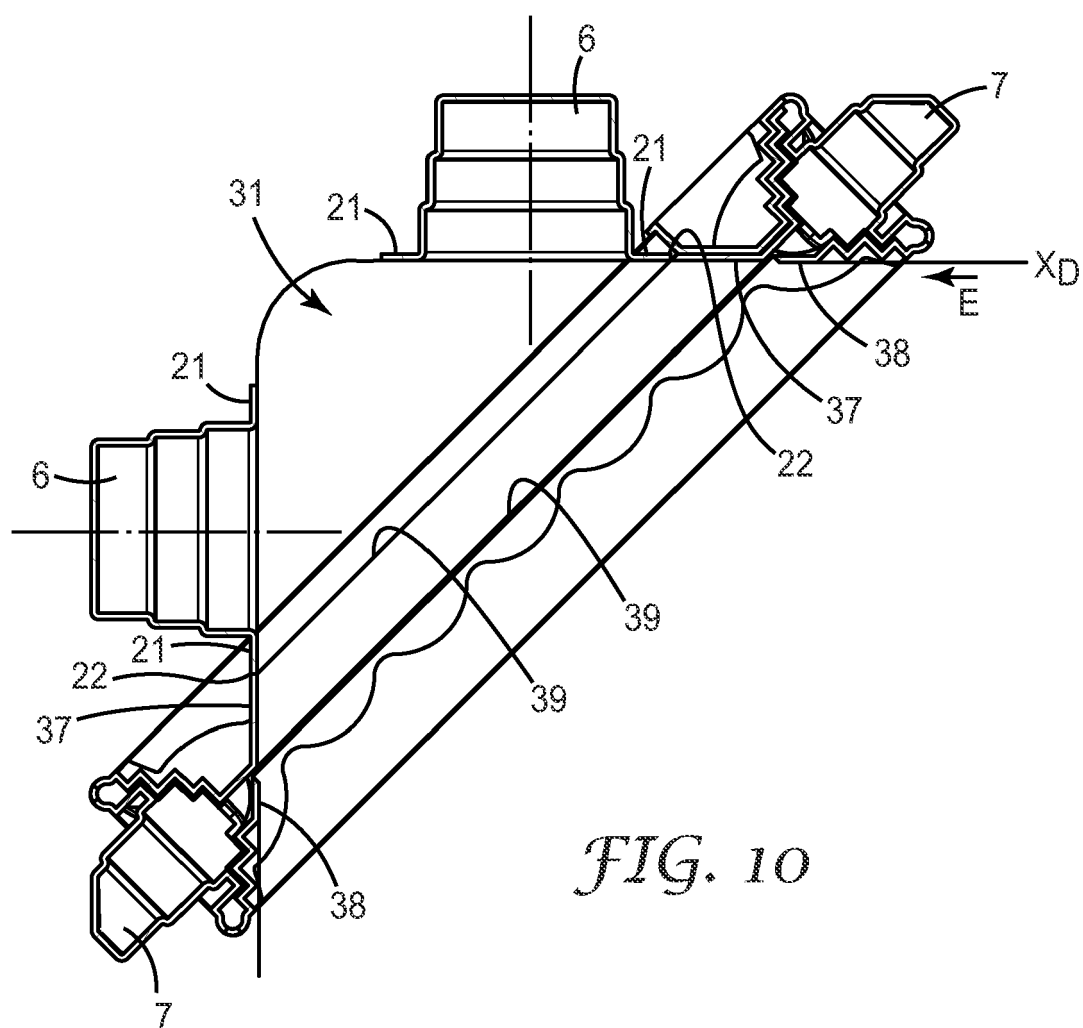
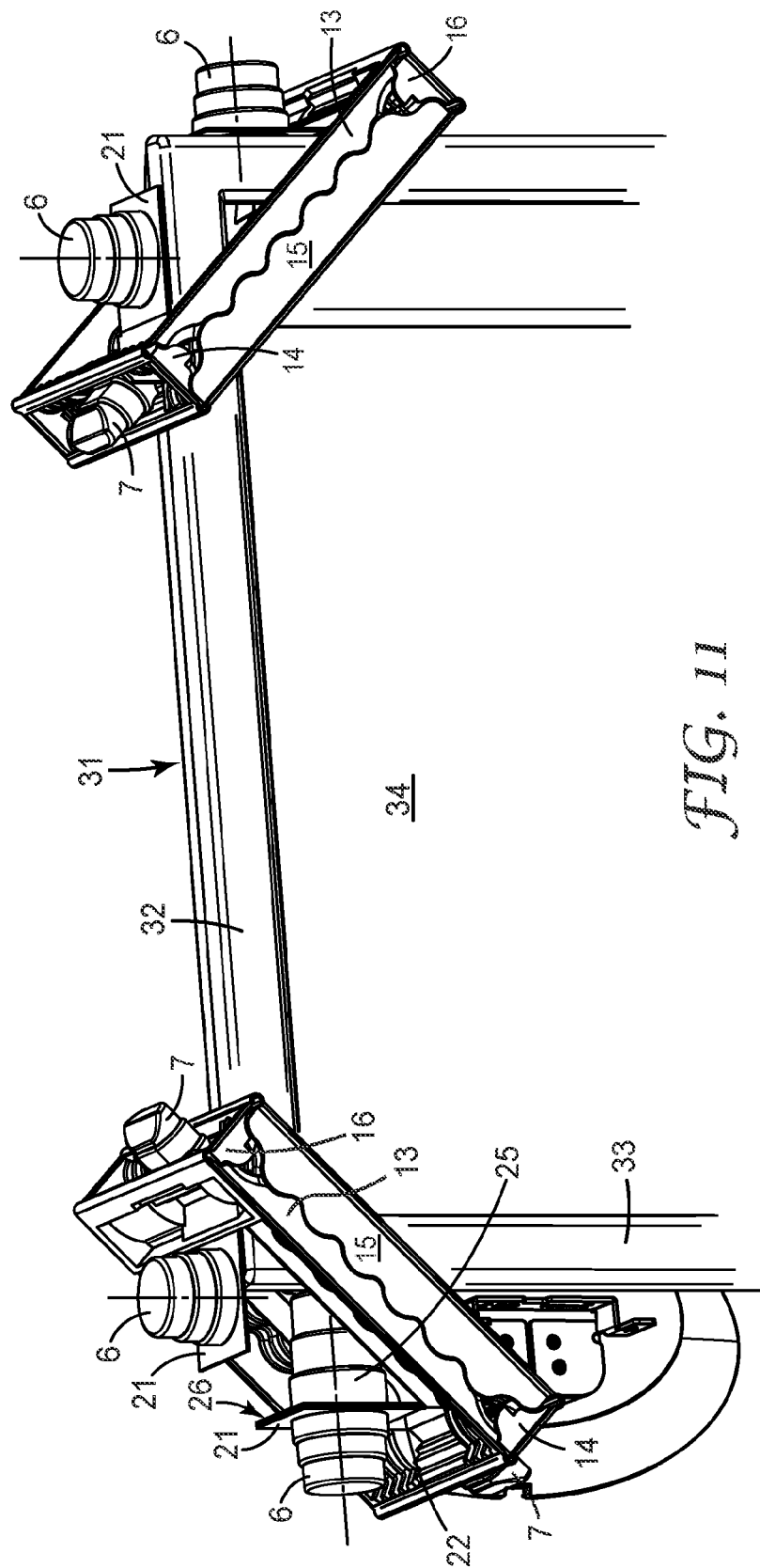


FIG. 9





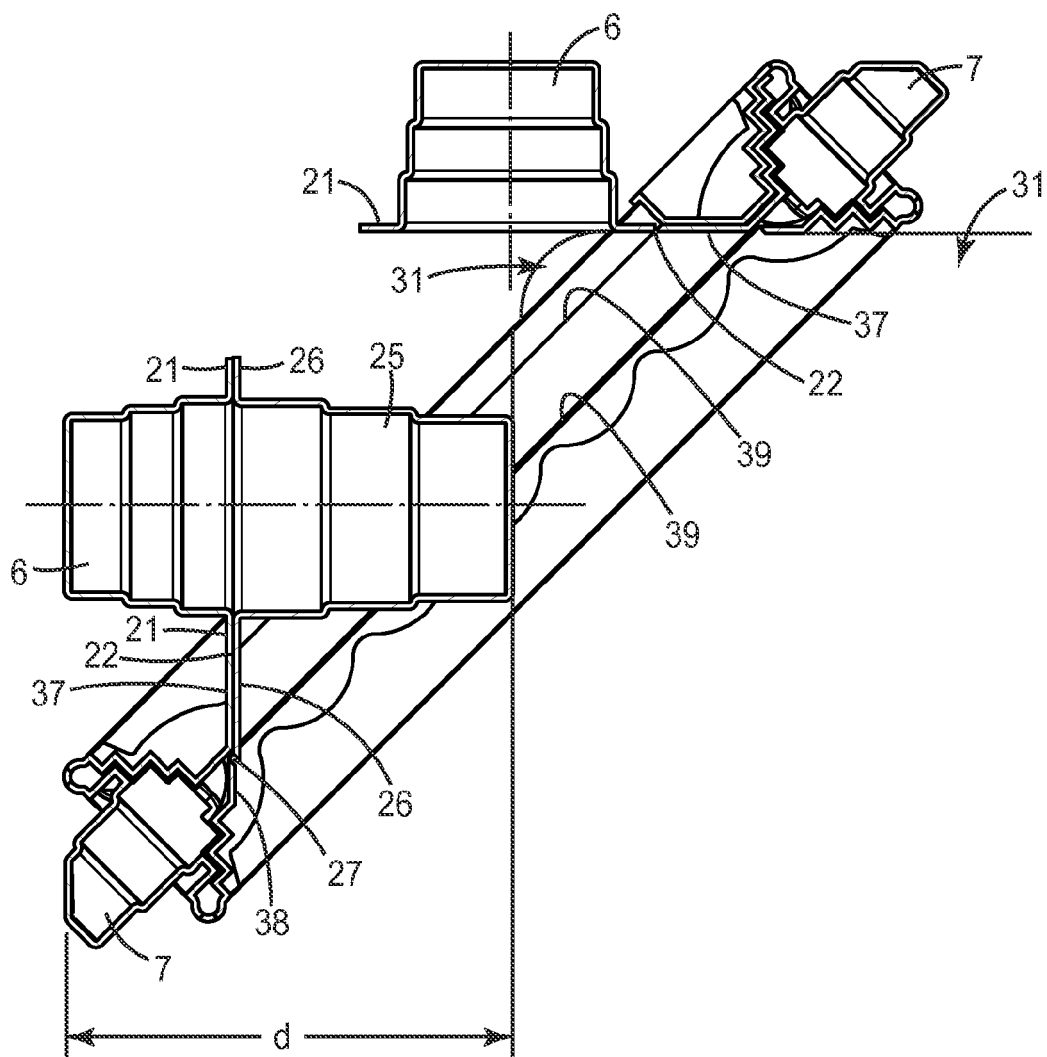


FIG. 12



EUROPEAN SEARCH REPORT

Application Number
EP 10 15 7713

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	GB 2 262 510 A (CHUOH PACK INDUSTRY CO LTD [JP]) 23 June 1993 (1993-06-23) * page 2, line 14 - page 3, line 24; claims 1,2; figures 1-9 *	1,4,5, 8-11	INV. B65D5/50 B65D81/05
A	JP 7 076371 A (HITACHI TELECOMM TECH) 20 March 1995 (1995-03-20) * abstract; figures 1,10-12 *	1-14	
			TECHNICAL FIELDS SEARCHED (IPC)
			B65D
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 21 July 2010	Examiner Janosch, Joachim
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

1
EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 10 15 7713

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

21-07-2010

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
GB 2262510 A	23-06-1993	DE 4235371 A1	24-06-1993
		FR 2685299 A1	25-06-1993
		JP 2056480 C	23-05-1996
		JP 5338642 A	21-12-1993
		JP 7023164 B	15-03-1995
		US 5322168 A	21-06-1994

JP 7076371 A	20-03-1995	JP 3149074 B2	26-03-2001

EPO FORM P0459

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

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- WO 2005118423 A [0003]
- US 5806683 A, Gregory W. Gale [0004]