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(54) A PACKED ROOF WINDOW PRODUCT

(57) A packed roof window product (3) comprising a plurality of differently sized roof window related product components (31, 32) contained in a cardboard box (1) is disclosed. At least one block (41) of a shock absorbing

material is arranged to protect one or more product components, said the shock absorbing material (41) being a paper-based cell-structure, such as honeycomb material.

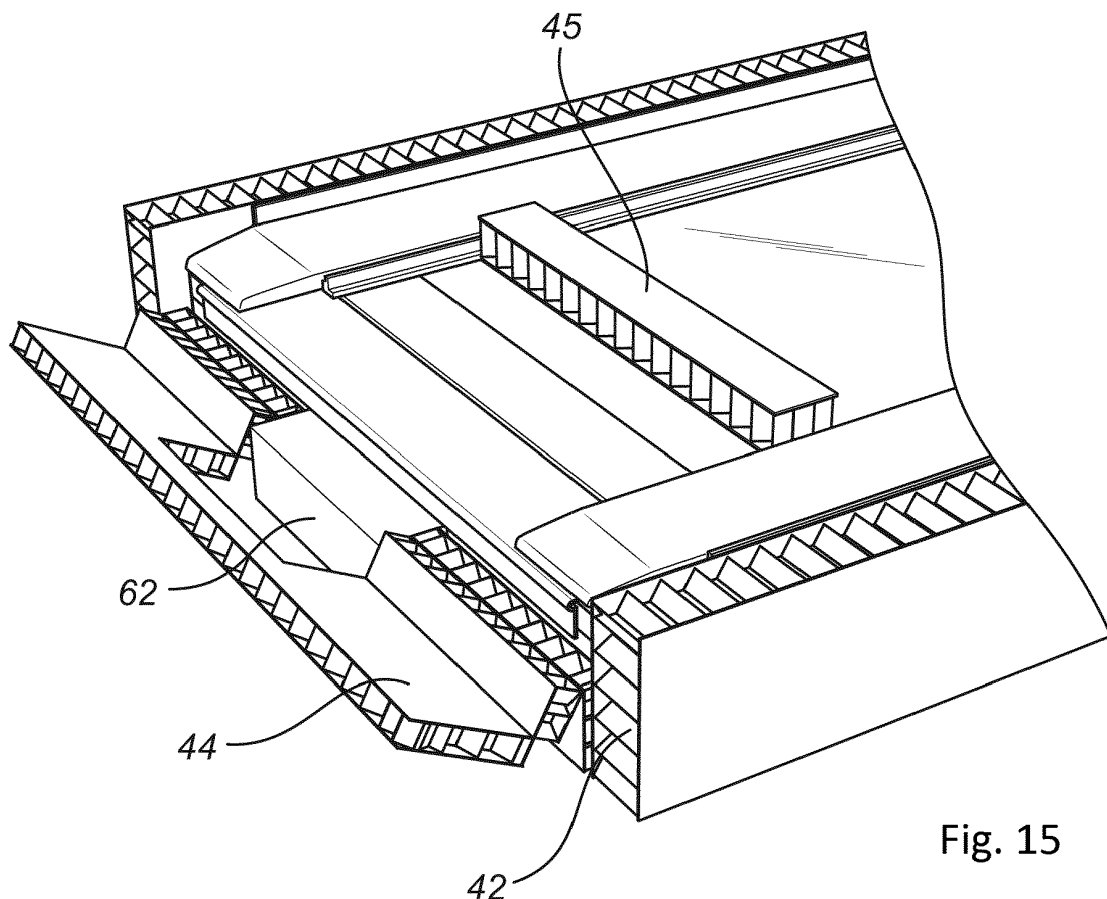


Fig. 15

EP 4 089 023 A2

Description

Technical Field

[0001] The present invention relates to a packed roof window product comprising a plurality of differently sized roof window related product components contained in a cardboard box, where at least one block of a shock absorbing material is arranged to protect one or more product components.

Background Art

[0002] When installing windows in a roof it is vital to ensure that the roof window itself is securely attached to the roof structure and that the joint between the roof window and the roof structure is properly weather proofed. It is therefore important that all components of roof window products, such as the roof window itself or a flashing assembly for a roof window, are used and are used in the right way. To facilitate this, the components are typically arranged in the box in an intended order of use and small components, such as screws, are kept in plastic bags. Furthermore, blocks of expanded polystyrene are used for protecting the product and/or for keeping the components in the intended position within the box. An example of a packed roof window, where these principles are used, is known from EP2748071B1 and an example of a packed flashing assembly for a roof window is known from EP1710163B1.

[0003] While these packaging have worked very well, there is an ever-increasing demand for delivering products that are more environmentally friendly.

Summary of Invention

[0004] With this background, it is an object of the invention to provide a packed roof window product, which has a smaller climate footprint, without increasing the risk of errors in the installation of the product and maintaining a good protection of the product during transportation. It is noted that "roof window product" is intended to cover not only a roof window, but also products associated with the installation of a roof window, such as flashing assemblies, and products intended for being installed on a roof window, such as shutters.

[0005] This and further objects are achieved with a packed roof window product of the kind mentioned in the introduction, which is furthermore characterised in that the shock absorbing material is a paper-based cell-structure and comprising at least one block of shock absorbing material made from a honeycomb material having a cell size of 22-26 mm and being made from paper with a weight of 140 g/m² and having a height of 20-40 mm.

[0006] Traditionally small components have been attached to the box or to larger components, for example by means of an adhesive, to prevent them becoming displaced during handling and transportation of the packed

product, and/or they have been wrapped in plastic, thereby also preventing them from scratching or otherwise damaging other components. Larger components have been kept in place by matching the size of the cardboard box, by fitting into a space between other components or between another component and the cardboard box, and/or by blocks of shock absorbing material, typically expanded polystyrene (EPS). The use of polymers, such as EPS, when packaging roof window products in cardboard boxes requires that after unpacking the packaging material will have to be separated in different fractions for recycling purposes. This, unfortunately, does not always happen. By using a paper-based cell-structure, the shock absorbing material belongs to the same fraction as the cardboard box, which considerably increases the likelihood of the packaging material being recycled instead of just being disposed of as combustible waste and reduces the risk of recycled material being polluted by other materials.

[0007] Another advantage of using a paper-based cell-structure is that it may be biologically degradable. Lightweight packaging items such as blocks of EPS are easily caught by wind when installing a roof window product on a roof of building and may easily end up in nature or other places where it cannot be collected by the installer. While it is of course not the intention to leave packaging material behind, a biodegradable paper-based cell-structure does little harm.

[0008] Honeycomb materials comprise an array of hollow cells, which are hexagonal in shape and columnar, being delimited by thin walls extending in a height direction of the material, and a cover layer may be provided on one or both sides to close the cells. Cell size typically vary between 8 mm and 30 mm, but in the prior art only honeycomb material with cell sizes of up to 20 mm have been considered suitable for packaging. The cell size is measured perpendicular to the height direction from the centre of one of the six sides of the hexagon to the centre of the opposite side.

[0009] Honeycomb materials provide a combination of strength and deformability, and the specific honeycomb material according to claim 1 has now by experiments been proven particularly well suited for use between heavy products, such as a roof window, and the cardboard box, and/or for preventing a deformation of the cardboard box. Details of the experiments will be given below.

[0010] A honeycomb material absorbs energy by deformation and should thus neither be so soft that it fully deforms nor so stiff that it does not deform. When used for packaging roof window products, this means that a differentiation of honeycomb quality and thickness may be needed to compensate for smaller/lighter windows creating less impact and thereby not deforming the honeycomb to same level as larger windows. A differentiation of the energy absorbing properties of the honeycomb material may be achieved by using different paper qualities for the formation of the cells, by using different paper

qualities for the cover layer(s), by using different cell sizes, and/or or by using different cell heights.

[0011] Two or more layers of honeycomb material may be arranged on top of each other and may be connected by an intermediate layer, which will typically be a sheet of paper or cardboard. The cell size may vary between layers. In one embodiment the cells of one layer have a diameter of 10 mm and the cells of the other layer have a diameter of 25 mm.

[0012] Each cover layer and/or intermediate layer will typically be a sheet of paper or cardboard, typically having a weight of 100-200 g/m².

[0013] A layer of a honeycomb material typically has a height between 10 mm and 100 mm, and in multi-layer structures the layers may have different heights.

[0014] In one embodiment, a single honeycomb layer having a cell size of 22 mm and a height of 40 mm is covered by cover layers on both sides, and both the honeycomb material and the cover layers are made from paper with a weight of 140 g/m². The honeycomb materials of this embodiment has shock absorbing properties, which are comparable to those of EPS as will explained further below with reference to the drawing. For the packaging of roof windows where the frame is made primarily from polyurethane the use of a honeycomb material with a height of 40 mm made of paper with a weight of 140 g/m² and outer paper liners with a weight of 120 g/m² along the minor sides of the cardboard box have been found to provide good results. For small window sizes with a pane length of less than 1 m, a cell size of 26 mm has been found to provide good results, while larger windows with a pane length of more than 1 m have been found to be better protected with a cell size of 22 mm. Results, however, also depend on factors such as the length-to-width ratio of the roof window frame.

[0015] Generally speaking, smaller cells will make the honeycomb structure stronger, while the use of a thinner paper will make the structure weaker. Before commencing the experiments leading to the present invention, it was expected that smaller cells would be needed for protecting heavy items, such as roof windows, as suppliers of honeycomb materials generally recommended cell sizes below 20 mm for all packaging purpose. It therefore required considerable experimentation to arrive at the conclusion that the specific cell size range of 22-26 mm was in fact optimal as shock absorbing material in packaging roof windows.

[0016] Experiments have also been made with differentiating the energy absorbing properties of the honeycomb material by using cover layers of different qualities, keeping other properties identical. These experiments have shown that for windows having a total width measured along the bottom of the window of less than 0,9 m, a honeycomb material with a cell size of 22 mm made from paper with a weight of 140 g/m² and with cover layers made of paper with a weight of 120 g/m² provide good results. For larger windows having a total width measured along the bottom of the window of more than 0,9 m sat-

isfactory result where achieved by making the cover layer of thicker paper with a weight of up to 280 g/m².

[0017] As mentioned above, protection may not be needed along the longer sides of the packed roof windows with a frame made from wood, but for large windows having a length of more than 1,3 m such protection may be needed. A honeycomb material with a thickness 20-30 mm, 26 mm cells made of paper with a weight of 140g/m², and outer paper liners with a weight of 120g/m² has been found to work well for this purpose.

[0018] When the packed roof windows are to be stacked, the shock absorbing material extending along the bottom of the window frame will typically carry a relatively high load. It is then considered advantageous that the cell size is down to 10 mm to provide additional strength.

[0019] In one embodiment the cardboard box is of a rectangular configuration having two major sides and four minor sides extending between of the two major sides, and blocks of shock absorbing material are arranged at the four minor sides. This may for example be advantageous in packagings containing roof windows with glass panes, which have a high risk of being dropped or handled in a rough way due to the weight and size of the packed product. The blocks of shock absorbing material will be arranged between the cardboard box and the product and thus reduce the potential impact on the roof window. To provide optimal protection, the blocks of shock absorbing material need to have both strength and elasticity or deformability. For a packed roof window, elasticity or deformability is of particular importance for impacts along the sides of the window, whereas strength is of particular importance at the corners, where the energy of the impact is concentrated on a smaller area of the roof window. Moreover, the fact that the frame of the roof window will typically have joints at the corners put high requirements on the shock absorbing material used at the corners of such a packed product.

[0020] The need for shock absorbing material at the four minor sides depends for example of the material use for the frame of the window and on the size of the window. In windows with a frame made from wood it is often possible to do with shock absorbing material only at the top and bottom of the window, i.e. the shorter of the minor sides. In windows with a frame made primarily from polyurethane the corners of the frame are typically more sensitive than in windows with a frame made from wood.

[0021] For packed roof windows where the pane projects over the frame of the window, for example where the pane is a so-called stepped pane with one layer of glass projecting over the other(s), the shock absorbing material may need to be configured for protecting the edge or corners of the pane.

[0022] Shock absorbing material at two or four minor sides of a cardboard box of a rectangular configuration may also contribute to the strength of the packaging, thus contributing to its stability when several packed roof window products are stacked on top of each other during

storage or transportation. In choosing the honeycomb material, the need for stack stability may be taken into consideration. If, the packed roof window product is to be stored in a stacked configuration in places, where humidity may be high, a stronger honeycomb material may be chosen to compensate for any potential strength reduction resulting from moisture absorption.

[0023] In one embodiment the cardboard box is of a rectangular configuration having two major sides and four minor sides extending between of the two major sides, and at least one block of shock absorbing material is arranged at a distance from all of the four minor sides. This may for example be advantageous in packagings containing flashing assemblies and other sensitive roof window products, where a deformation of the cardboard box caused by pressure applied to on for the major sides might result in damages to the product inside. This may for example occur if a heavy item is put on top of the packaging during storage of transportation or if the packaging is squeezed between other items. The block of shock absorbing material will hinder a deformation of cardboard box as it will carry at least a part of the load applied to the major side of the packaging. The effect is particularly pronounced if the block has substantially the same height as the space available inside the cardboard box. The minor sides of the cardboard box and any divisions provided inside it will also contribute to preventing deformation and the block of a shock absorbing material will therefore be particularly advantageous when arranged at a distance from these.

[0024] In one embodiment at least one block of shock absorbing material is arranged between components of the roof window product. Such a block may be used for keeping the components in an intended position within the cardboard box and/or for preventing or reducing contact between components, thus for example preventing one component from damaging another, for example by scratching it. Such a block may at the same time prevent deformation of the cardboard box as described above.

[0025] In one embodiment at least one block of shock absorbing material is arranged on a component of the roof window product. As one example a block may be arranged on a pane of a window to keep a distance between the cardboard box and the pane, thus potentially both preventing scratching of the pane and loads being applied directly to the pane. As another example, a block of shock absorbing material may be arranged on a handle bar of a window to prevent it from moving or at least reducing movement during handling and transportation. As a still further example, a block may be arranged on a component, which smaller in height than the distance between the major sides of the cardboard box, thus preventing or reducing movement of the component and possibly even resulting in the component being pressed against a major side of the packaging.

[0026] In one embodiment at least one block of shock absorbing material is made from moulded pulp, preferably a high bulk moulded pulp. Moulded pulp can be given

virtually any desired shape, limited only by the need for demoulding, but has limited strength. It thus particularly lends itself to applications, where the block of shock absorbing material needs to have a complex shape but will not be subject to high loads, such as for example a block of shock absorbing material configured for being attached to a handle bar of window and keeping it in place.

[0027] In one embodiment at least one block of shock absorbing material is made from multi-layer corrugated cardboard, i.e. several layers of corrugated cardboard arranged on top of each other and interconnected by a glue or adhesive. This material has many of the same advantages as the honeycomb material, even though the shock absorbing properties is usually poorer, depending on factors such as the number of layers and the properties of the paper used.

[0028] In one embodiment at least one block of shock absorbing material is made from folded corrugated cardboard. This provides a cheap block of material, and even though the strength is low compared to a honeycomb material, the weight to strength ratio may also be comparably low.

[0029] In one embodiment at least one block of shock absorbing material is made from a cardboard profile. As an example, the cardboard profile may be a cardboard tube, which has been deformed so that the surface is undulating, thereby providing elasticity. Undulating shapes arranged so that the force is applied in parallel with the plane of the cardboard before profiling are generally considered advantageous.

[0030] The cardboard profiles as well as folded corrugated cardboard and blocks made from moulded pulp may be hollow, and it is generally to be understood that hollows, cavities, and discontinuities in the material may contribute to providing desired properties to the blocks of shock absorbing material.

[0031] Common to all of the embodiments mentioned above is that the elasticity will be lower than for a block of EPS as paper has a low elasticity. Instead the paper-based blocks of shock absorbing material rely on a non-elastic deformation. This is considered acceptable as a packaging containing a roof window product is very rarely exposed to excessive force more than ones.

[0032] It is to be understood that while paper and cardboard are usually made from wood-fibres, other plant fibres including fibres originating from straw, bamboo, bagasse, esparto, other grasses, hemp, flax, and cotton may also be used, including combinations of different types of fibres. In Europe, up to 5% of alternative materials, such as the glue or adhesive, is acceptable, but a maximum of 3% is recommended.

Brief Description of Drawings

[0033] In the following description embodiments of the invention will be described with reference to the schematic drawings, in which

Fig. 1 is a perspective view of a cardboard box containing a packed roof window product,

Fig. 2 is a perspective view of a packed flashing assembly,

Fig. 3 is a perspective exploded view of a roof window with packaging material and a carton containing a collection of components,

Fig. 4 corresponds to Fig. 3 but showing the packaging material and the carton in the positions, in which they will be located when inside a cardboard box as the one in Fig. 1, and where elements underneath the pane of the window are also seen,

Fig. 5 is a cross-section along the line A-A in Fig. 3, Fig. 6 is a cross-section in another embodiment corresponding to a cross-section along the line B-B in Fig. 4,

Fig. 7 is a photo of a roof window corresponding to substantially to that shown in Fig. 4,

Fig. 8 shows test data for loads affecting a packed roof window when dropped on a side,

Fig. 9 shows test data for loads affecting a packed roof window when dropped on a corner,

Fig. 10 shows test data for two consecutive drops of packed roof windows,

Fig. 11 is a photo showing a packed roof window being dropped on a corner,

Figs 12-14 show blocks of shock absorbing material made from honeycomb material,

Fig. 15 is a photo of a lower end of a roof window with honeycomb material arranged along outer sides of the window frame and on the pane,

Fig. 16 is a photo of a roof window with cardboard profiles arranged along the side frame members,

Fig. 17 is a photo of the lower end of a roof window with a folded cardboard member arranged along the bottom frame member and multi-layer corrugated cardboard along the side frame members, and

Fig. 18 shows seven cross-sectional views of the lower end of a roof window with a folded cardboard member arranged along the bottom frame member.

Description of Embodiments

[0034] Referring initially to Fig. 1, a cardboard box 1 for containing a roof window product comprising a plurality of differently sized roof window related product components is shown. In this embodiment the cardboard box is of a rectangular configuration having two major sides 11 and four minor sides 13, 14 extending between of the two major sides (only one of the major sides and two of the minor sides being visible in this view). The shorter of the minor sides 13 is here shown in a partially assembled state. In the assembled state the side sections 13' will extend perpendicular to the major side 11. In this embodiment the cardboard box is configured for being opened as illustrated by the arrows P. This type of cardboard box is typically used for heavy products such as roof windows with glass pane.

[0035] Another cardboard box 2 packed with a flashing assembly 3, which is typically less heavy and consisting of a larger number of components is shown in Fig. 2. This cardboard box is also of a rectangular configuration having two major sides 21, 22 and four minor sides 23, 24 extending between of the two major sides.

[0036] It is to be understood that the cardboard boxes 1, 2 shown in Figs 1 and 2 are merely two examples, and that the cardboard box may have another shape to better fit the shape and dimensions of the roof window product.

[0037] Likewise, it is to be understood that in the following the same reference numbers will be used for elements having substantially the same function, even if not identical.

[0038] In Fig. 2 four blocks 41 of a shock absorbing material are arranged between components 31, 32 of the roof window product 3 to protect them from damage, which might result from component moving violently around in the cardboard box during handling or transportation. Flashing assemblies are particularly sensitive to damages caused by deformation but should also be protected from scratching as it might make the product aesthetically unacceptable.

[0039] The fact that the blocks 41 of a shock absorbing material are arranged at a distance from all of the four minor sides 23, 24 of the cardboard box 2 in Fig. 2 and has substantially the same height of the minor sides 23, 24 entails that the major side 21, which in this embodiment serves as a lid, is prevented from moving towards the other major side 22, at least at the location of the blocks 41. This means that the risk of the components of the flashing assembly being exposed to excessive loads, if for example something heavy is put on top of the packed flashing assembly, is considerably reduced.

[0040] Figs 3 and 4 show how blocks 42-47 of shock absorbing material are arranged around and on a roof window 5 before being arranged in a cardboard box as the one shown in Fig. 1.

[0041] Rectangular blocks 42, 43 of shock absorbing material extend along side frame members 51 and a top frame member of the window frame of the roof window 5, and liners 61 made from cardboard compensate for irregularities in the shape of the sides of the window. A block 44 of a more complex shape extends along a bottom frame member 52 and makes room for a cardboard carton 62 containing smaller components, such as mounting brackets and/or fasteners. These four blocks 42-44 of shock absorbing material will be arranged at the four minor sides of the cardboard box 1 in the packed state of the roof window 5.

[0042] The pane 53 is protected by two elongate blocks 45 of shock absorbing material, which are arranged on the pane, so that they will be located between the roof window 5 and the major side 11 of the cardboard box 1 in the packed state. A paper liner (not shown) may be provided between the elongate blocks 45 and the pane 53 to protect the pane from scratching.

[0043] In Fig. 4 the pane has been shown as transpar-

ent so that additional blocks 46, 47 of shock absorbing material arranged on a handle bar 54 of the roof window product are seen. These blocks 46, 47 serve to retaining the handle bar, keeping it in an intended position in relation to the pane 53 and to the cardboard box in the packed state, and may further be used for containing smaller components such as wires and/or a remote control.

[0044] Turning now to Fig. 5 an additional block 48 of shock absorbing material is seen between the handle bar 54 and a top frame member 55 of the roof window 5. This block supports a top sash member 56 of the roof window.

[0045] Also visible in Fig. 5 are the cross-sections of blocks 43, 44, 45, 46 and 48 (47 has been left out). These are all of a uniform structure, being made either from a honeycomb material, multi-layer corrugated cardboard, or moulded pulp. The item 62 described as a cardboard carton above has here also been shown as a block of shock absorbing material, which could be the case if the room provided by the carton was not needed.

[0046] Turning now to Fig. 6 the block 43 of shock absorbing material extending along the top frame member 55 is made from folded corrugated cardboard, and the block 47 is made from moulded pulp, both having a hollow centre.

[0047] The blocks 41-48 of shock absorbing material are all made from paper or paper pulp and forming a cell-structure, either in the form of small randomly positioned cell within a moulded pulp or as larger evenly distributed cells in a multi-layer corrugated cardboard or in a honeycomb structure.

[0048] An example of the use of honeycomb structures is shown in Fig. 7, where the embodiment of the blocks 42-45 of shock absorbing material are all made of honeycomb material arranged with the its height direction extending away from the roof window 5 so that it will extend from the roof window to towards the cardboard box in the packed state. The blocks 45 of shock absorbing material arranged on the pane 53 is attached to the side liners 61 by paper ribbons and it is to be understood that paper ribbon or paper tape may also be used for attaching or interconnecting other blocks of shock absorbing material, for example at the corners where the blocks 42, 43, 44 extending along the sides and the top and bottom of the window meet.

[0049] Turning now to Figs 8-9, the effect of using three different types of shock absorbing material is shown. One is the honeycomb material shown in Fig. 7, which has a height of 40 mm and a cell size of 22 mm and is made from paper with a weight of 140 g/m². The other two are a corresponding honeycomb material, only with a cell diameter of 14 mm, and expanded polystyrene (EPS), which is the material used at present. The data in Fig. 8 shows force as a function of time a roof window is tipped from a position resting on a bottom frame member so that it drops on a side frame member, and the data in Fig. 9 shows the force as a function of time when the roof window is dropped onto a corner of the window frame.

In both cases force was measure by a weighing cell in the support surface on which the roof window comes to rests after being dropped.

[0050] In Fig. 8 the graph 91 illustrates the use of EPS as the shock absorbing material, the graph 92 illustrates the use of the honeycomb material with a cell size of 14 mm, the graph 93 illustrates the use of the honeycomb material with a cell size of 22 mm, and the graph 97 illustrates the use of the honeycomb material with a cell size of 26 mm. As may be seen, the graphs representing the use of honeycomb materials are steeper at the beginning than the one representing the use of EPS. This is due to the fact the honeycomb materials deform permanently but is not of particular relevance to the protection of the roof window. The maximum force affecting the window frame on the other hand is of great importance. When using the honeycomb material with a cell size of 14 mm, which is the honeycomb material most commonly used for packaging purposes, the maximum force is about 50% higher than when using EPS. The honeycomb material with a cell size of 22 mm on the other hand provides comparable protection with respect to the maximum impact force and for this use the honeycomb material with a cell size of 26 mm has better shock absorbing properties than the EPS.

[0051] In Fig. 9 the graph 94a illustrates the use of EPS as the shock absorbing material, the graph 95a illustrate the use of the honeycomb material with a cell size of 14 mm, the graph 96a illustrate the use of the honeycomb material with a cell size of 22 mm, and the graph 98 illustrate the use of the honeycomb material with a cell size of 26 mm. As may be seen, the honeycomb materials with cell sizes of 14 mm and 22 mm render results, which are comparable to the use of EPS, but the honeycomb material with a cell size of 26 mm stands out as considerably poorer with maximum loads being about 50% higher than with the EPS. This is due to the fact that with the drop on the corner of the window frame, the loads are concentrated on a smaller area of the shock absorbing material, resulting in a complete collapse of some of the cells of the honeycomb material.

[0052] In Fig. 10 the graphs 94a, 94b illustrate the force affecting the window frame when the shock absorbing material is EPS, the graphs 95a, 95b illustrate the use of the honeycomb material with a cell size of 14 mm, and the graphs 96a, 96b illustrate the use of the honeycomb material with a cell size of 22 mm. The a-graphs show data for a first drop, while the b-graphs show data for a second drop on the same corner of the window frame. As may be seen, the a-graphs are comparable, the primary difference being in the timing. Both honeycomb materials thus provide a protection of window frame, which is equal to that provided by EPS. When the window is dropped once more on the same corner, however, the deformation of the shock absorbing material resulting from the first drop, means that the shock absorbing capacity is considerably reduced. This applies to all three materials, but is most pronounced in the honeycomb ma-

materials, which have a lower elasticity than the EPS. For both honeycomb materials the force affecting the window frame in the second drop is about 50% higher than with the EPS. The risk of a packed roof window being dropped twice on the same corner, however, is low and the residue protection provided by the honeycomb material is therefore presently considered acceptable in view of the advantages gained.

[0053] In combination, the experiments resulting in the data presented in Figs 8-10 have led to the realization that the honeycomb material with a cell size of 22 mm provides good and adequate protection of the roof window of the most commonly used sizes. It is noted that the data presented in Figs 8-10 are based on data obtained from standardized laboratory test that real life drops of windows may result in different force patterns.

[0054] Turning now to Figs 11-15 alternative blocks of shock absorbing materials based on honeycomb materials are shown.

[0055] In Fig. 11 the shock absorbing material has been provided as two discrete blocks 44', one at each corner, thereby providing protection where it is most needed. Each block is composed of two layers of honeycomb material arranged on top of each other. The intermediate layer between the two honeycomb layers will limit deformation as the walls of the two honeycomb material of the two layers are not directly interconnected. A two-layer honeycomb may thus provide advantages with respect to second drops, but as these are rare, the added cost associated with the use of such a material may not be acceptable. This applies to all embodiment with a two-layer honeycomb, not only the one shown in Fig. 11. However, as the bottom of a roof window is often sensitive to impact loads and as a packed roof window will often be arranged resting on this side during handling, storage, and transportation, the use of two-layer honeycomb materials is currently considered expedient at this particular location.

[0056] In Fig. 12 two blocks 49 of shock absorbing material are shown, each comprising small separate blocks 491 attached to a longer carrier block 492. The small blocks are intended to be in contact with a window frame in the same way as in Fig. 11 and the carrier block contributes both to a positioning of the small blocks and to the shock absorbing properties.

[0057] In Fig. 13 the block of shock absorbing material 49 is provided with a pre-compressed zone 493 allowing the block to fit over a projection on a window frame or on another component of a roof window product, possibly contributing to positioning a product or component of a product inside the cardboard box.

[0058] Fig. 14 shows a block 44 of shock absorbing material corresponding to the one shown in Fig. 7. The overall structure and function are described with reference to Fig. 12, the block 44 having two separate blocks 441 attached to a longer carrier block 442 and both being made from a honeycomb material. In use the separate blocks project underneath a bottom covering member of

the roof window and they are therefore hidden in Fig. 7. Here the separate blocks 441 have a height of 40 mm and the carrier block 442 has a height of 19 mm, but the materials are otherwise identical. Both have a cell size of 10 mm to allow stacking of the packed roof windows.

[0059] At the centre of the block 44 a recess 443 in the carrier block 442 makes room for another packaging component, such as the cardboard carton 62 shown in Fig. 7, and in this embodiment a smaller recess 444 is provided to facilitate removal of the carton by making room for a person's finger.

[0060] In Fig. 15 a honeycomb material is cut almost entirely through along two lines, leaving only the cover layer on one side, so that the material may be folded, thereby creating a three-layer honeycomb material 44.

[0061] Alternatives to the honeycomb materials are shown in Figs 16-18.

[0062] In Fig. 16 cardboard profiles 42 in the form of cardboard tubes deformed into an undulating shape have been arranged along the side members of the window frame, and an L-shaped cardboard profile 45 has been arranged on the pane. These shapes provide the cardboard profiles with elasticity in addition to their deformability and hence good shock absorbing properties.

[0063] Figs 17 and 18 show different embodiments of folded corrugated cardboard serving as blocks of shock absorbing material. These are simple and cheap to manufacture compared to a honeycomb material and are preferably used with roof window products or components thereof, which are not highly sensitive to impact force.

[0064] It is noted that roof windows having an all wooden frame as the one shown in Fig. 17 is less sensitive than roof windows, where the window frame has an outer layer of polyurethane or a similar polymer, as polyurethane usually has a lower elasticity than wood. For the same reason, a block of shock absorbing material, such as a block of honeycomb material, used at a wooden window frame may be thinner than the corresponding block of shock absorbing material used at a polyurethane frame.

List of reference numerals

[0065]

1	Cardboard box
11	Major side
13	Minor side
13'	Section of minor side
14	Minor side
2	Cardboard box
21	Major side
22	Major side
23	Minor side
24	Minor side
3	Flashing assembly
31	Component
32	Component

41-49	Blocks of a shock absorbing material	
441	Block of a shock absorbing material	
442	Carrier block	
443	Recess	
444	Recess	
491	Block of a shock absorbing material	
492	Carrier block	
493	Pre-compressed zone	
5	Roof window	
51	Side frame member	
52	Bottom frame member	
53	Pane	
54	Handle bar	
55	Top frame member	
56	Top sash member	
61	Side liner	
62	Carton	
7	Paper ribbon	
8	Surface	
91-98	Graphs	
P	Opening of box	

Claims

1. A packed roof window product comprising a plurality of differently sized roof window related product components contained in a cardboard box, where at least one block of a shock absorbing material is arranged to protect one or more product components, **characterised in that** the shock absorbing material is a paper-based cell-structure and comprising at least one block of shock absorbing material made from a honeycomb material having a cell size of 22-26 mm and being made from paper with a weight of 140 g/m² and having a height of 20-40 mm. 30
2. A packed roof window product according to claim 1, wherein the plurality of differently sized roof window related product components contained in the cardboard box includes a roof window. 40
3. A packed roof window product according to claim 1 or 2, wherein the cardboard box is of a rectangular configuration having two major sides and four minor sides extending between of the two major sides, and where blocks of shock absorbing material are arranged at the four minor sides. 45
4. A packed roof window product according to one or more of the preceding claims, wherein the cardboard box is of a rectangular configuration having two major sides and four minor sides extending between of the two major sides, and where at least one block of shock absorbing material is arranged at a distance from all of the four minor sides. 50

5. A packed roof window product according to one or more of the preceding claims, wherein at least one block of shock absorbing material is arranged between components of the roof window product. 5
6. A packed roof window product according to one or more of the preceding claims, wherein at least one block of shock absorbing material is arranged on a component of the roof window product. 10
7. A packed roof window product according to one or more of the preceding claims, wherein at least one block of shock absorbing material is made from moulded pulp. 15
8. A packed roof window product according to one or more of the preceding claims, wherein at least one block of shock absorbing material is made from multi-layer corrugated cardboard. 20
9. A packed roof window product according to one or more of the preceding claims, wherein at least one block of shock absorbing material is made from folded corrugated cardboard. 25
10. A packed roof window product according to one or more of the preceding claims, wherein at least one block of shock absorbing material is made from a cardboard profile. 30

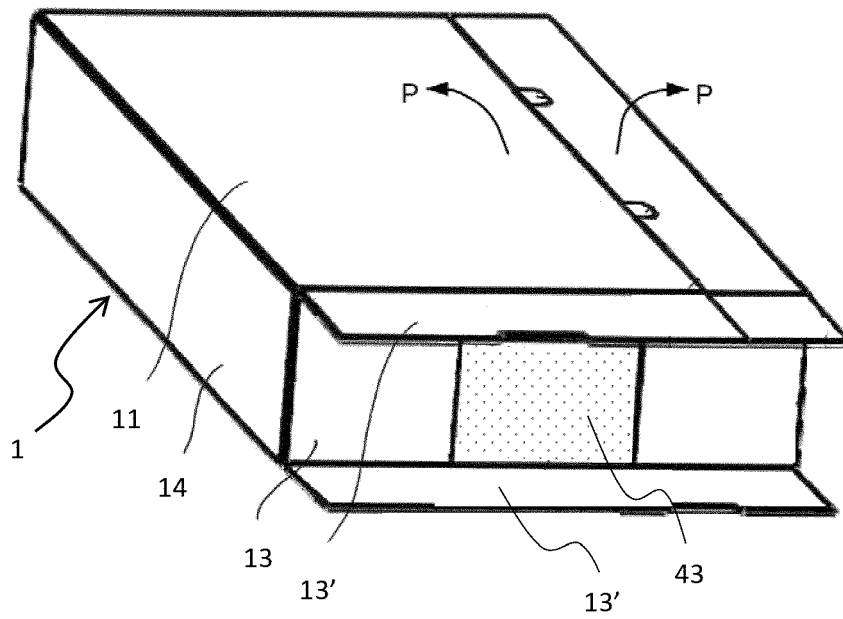


Fig. 1

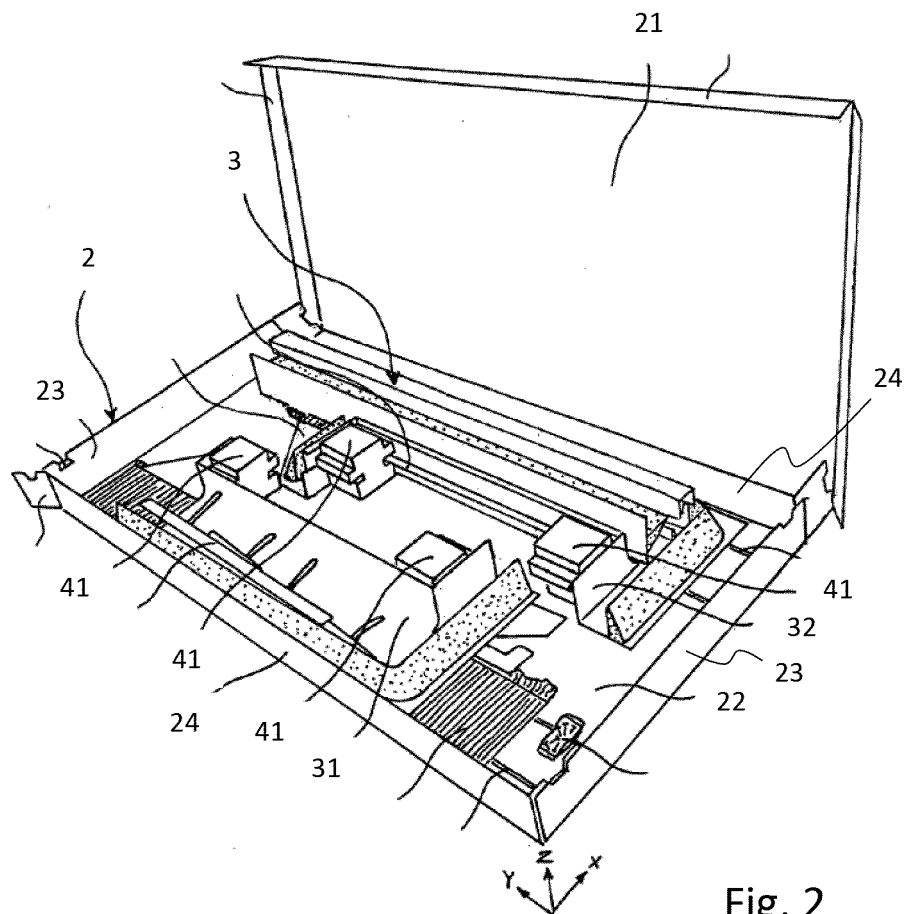


Fig. 2

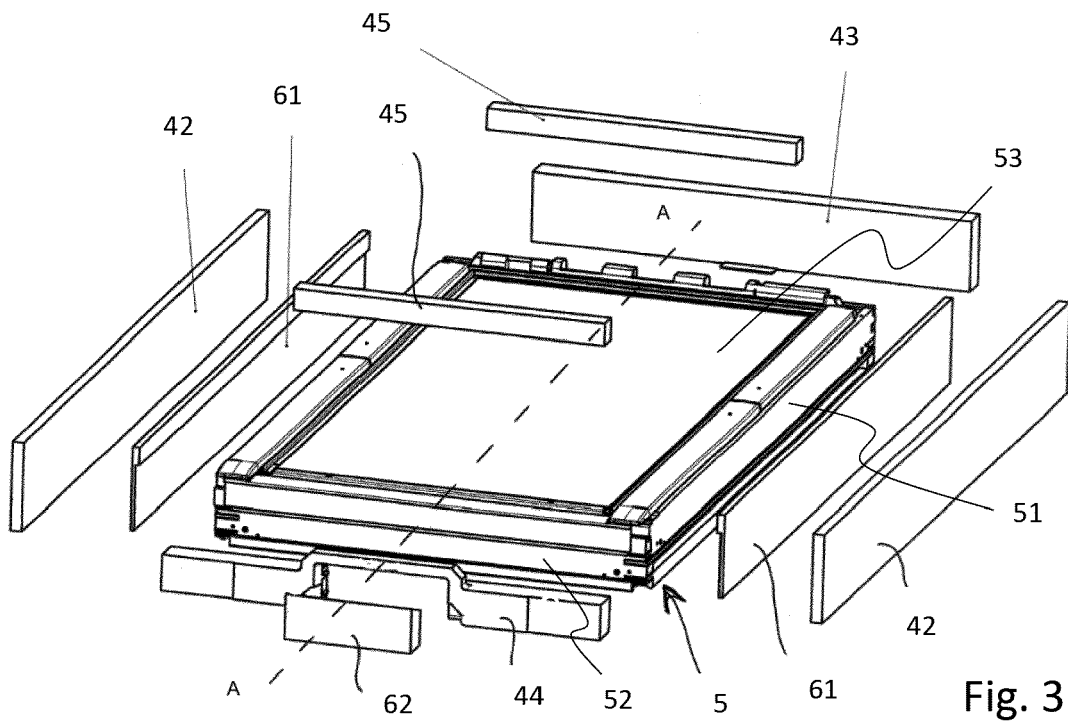


Fig. 3

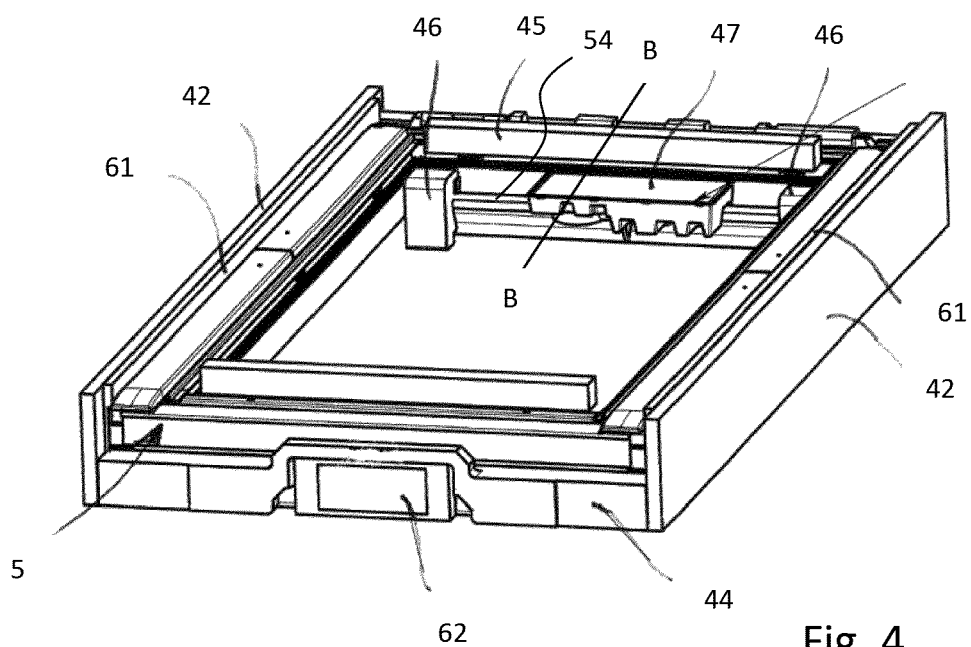
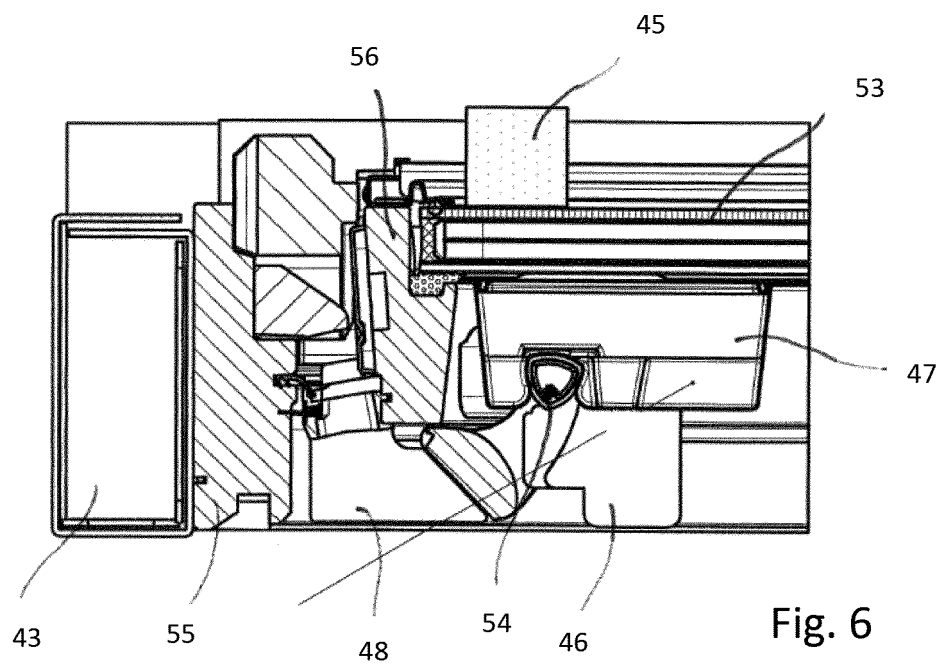
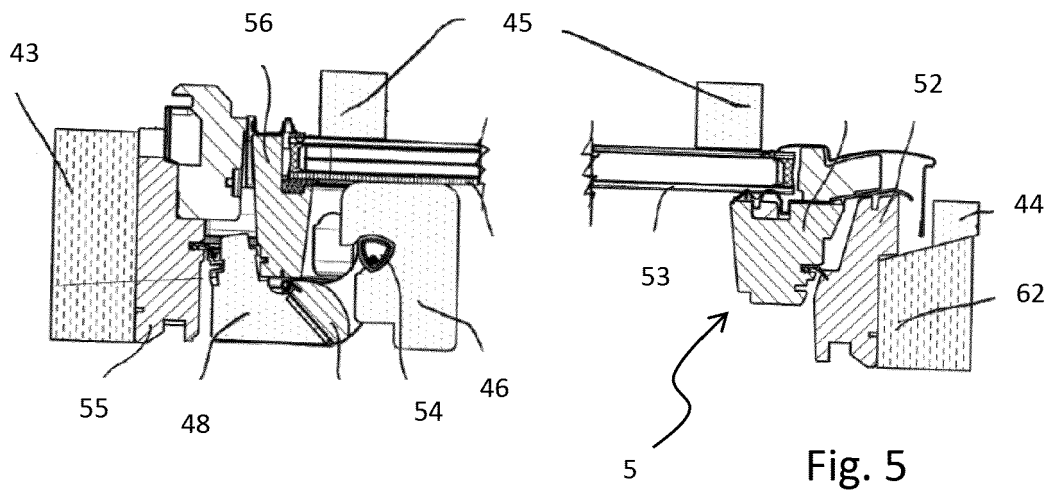


Fig. 4



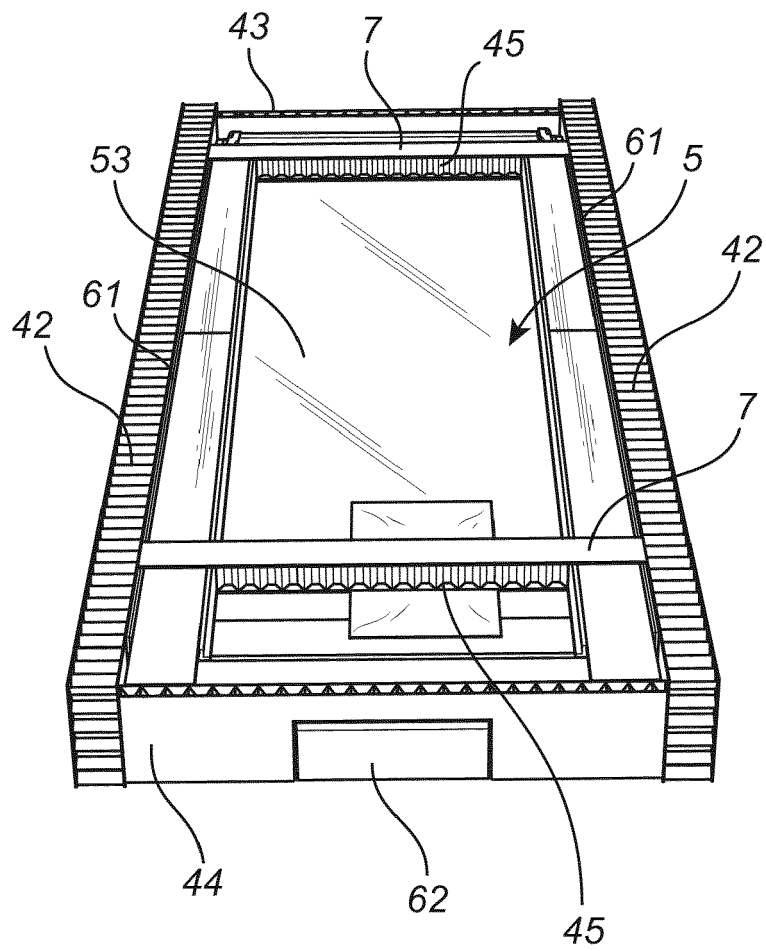


Fig. 7

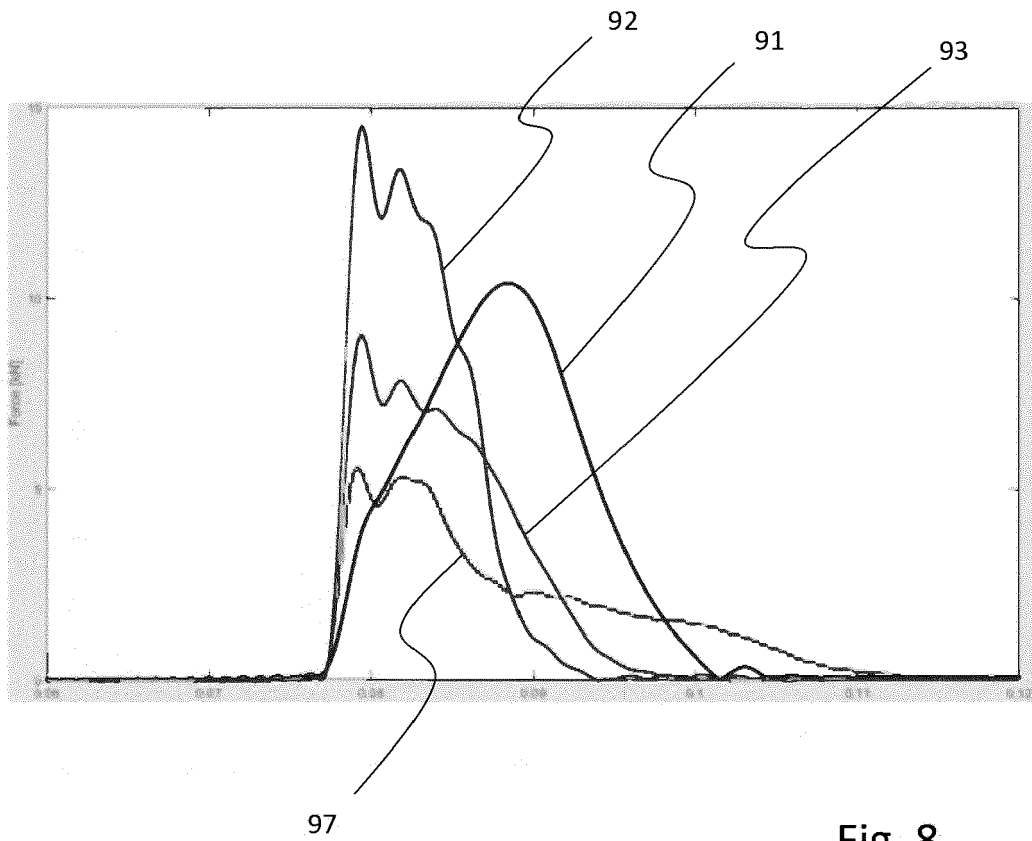


Fig. 8

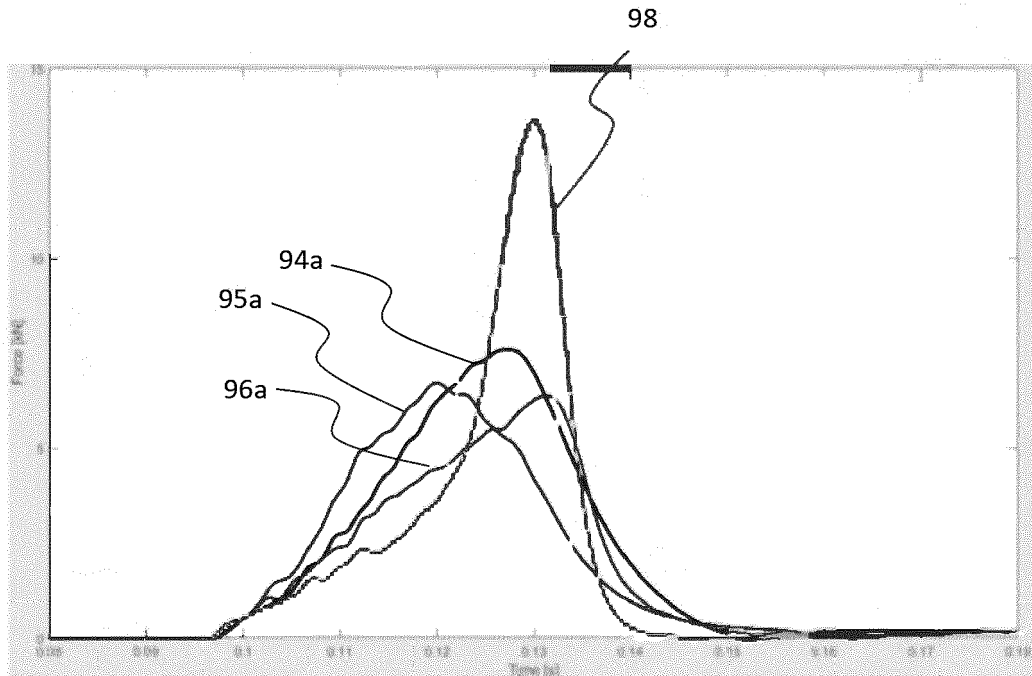


Fig. 9

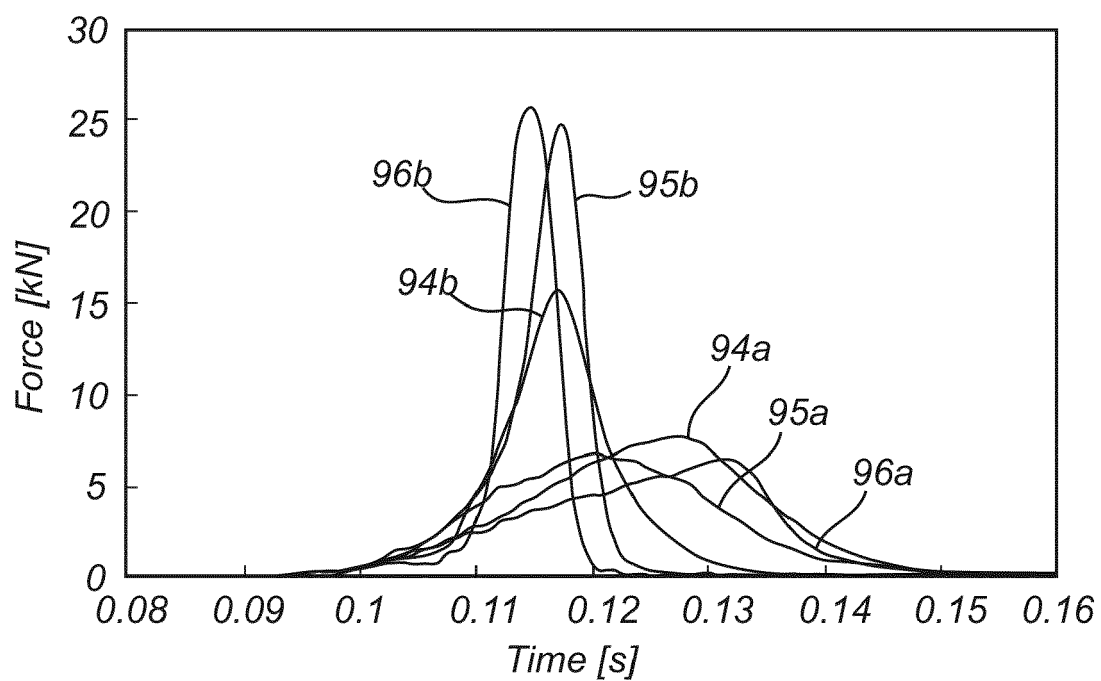


Fig. 10

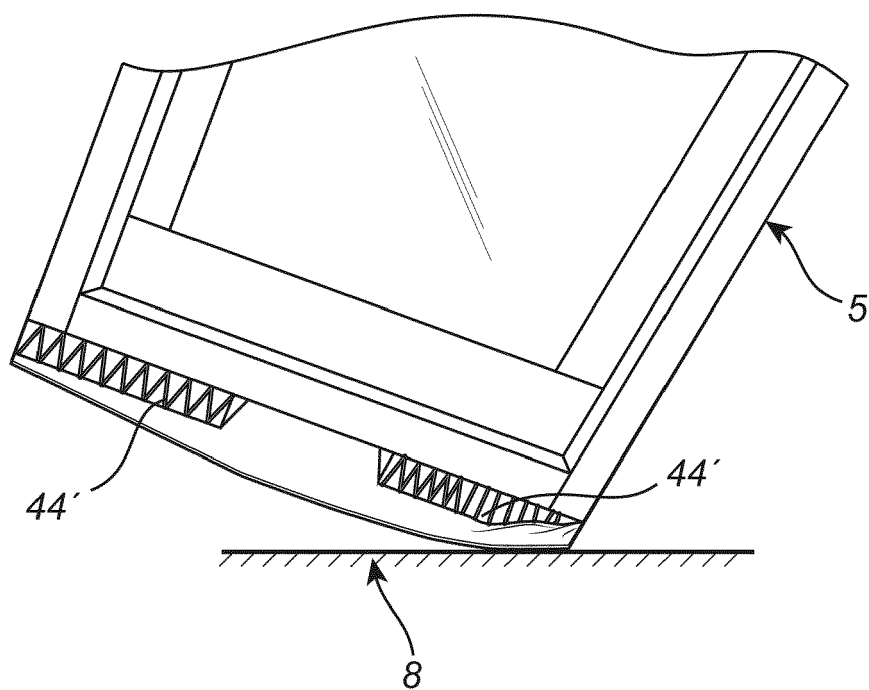


Fig. 11

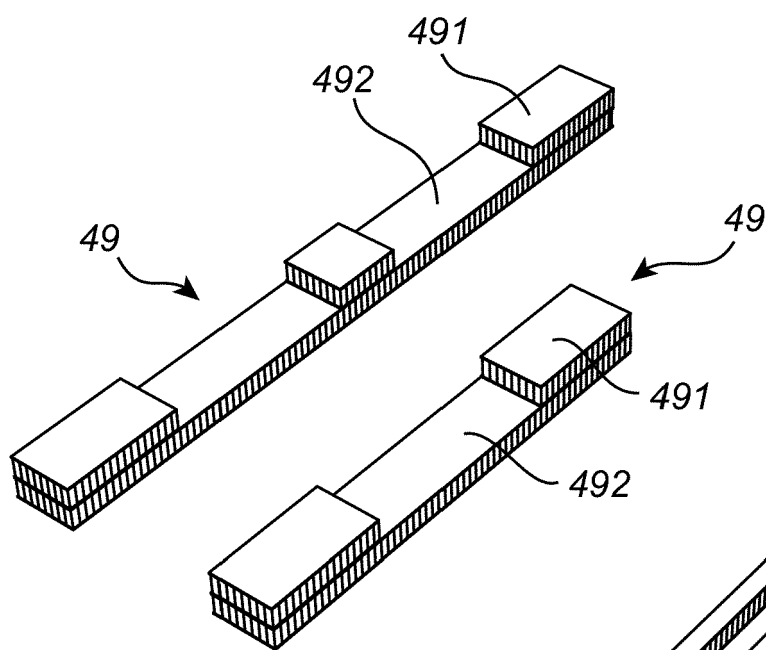


Fig. 12

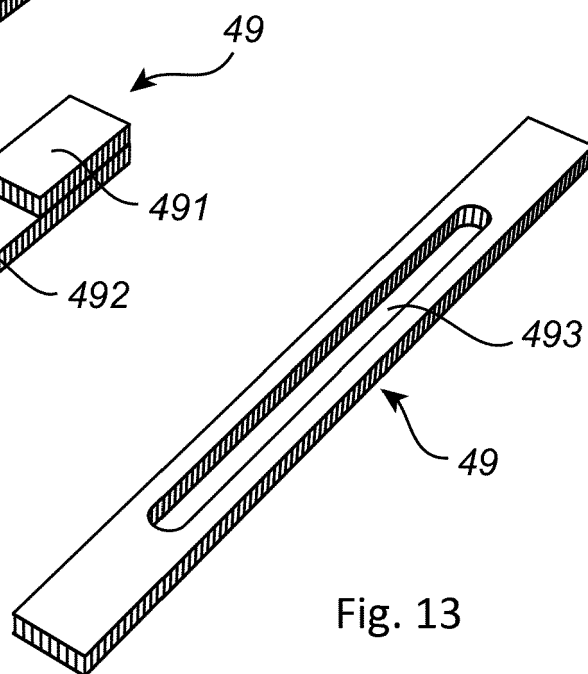


Fig. 13

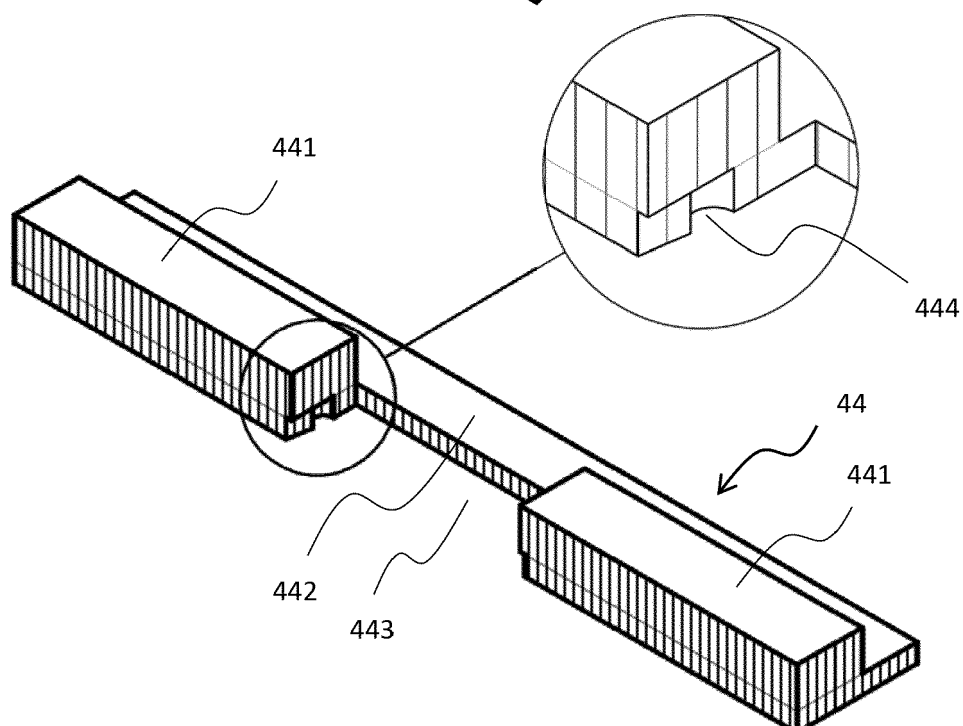


Fig. 14

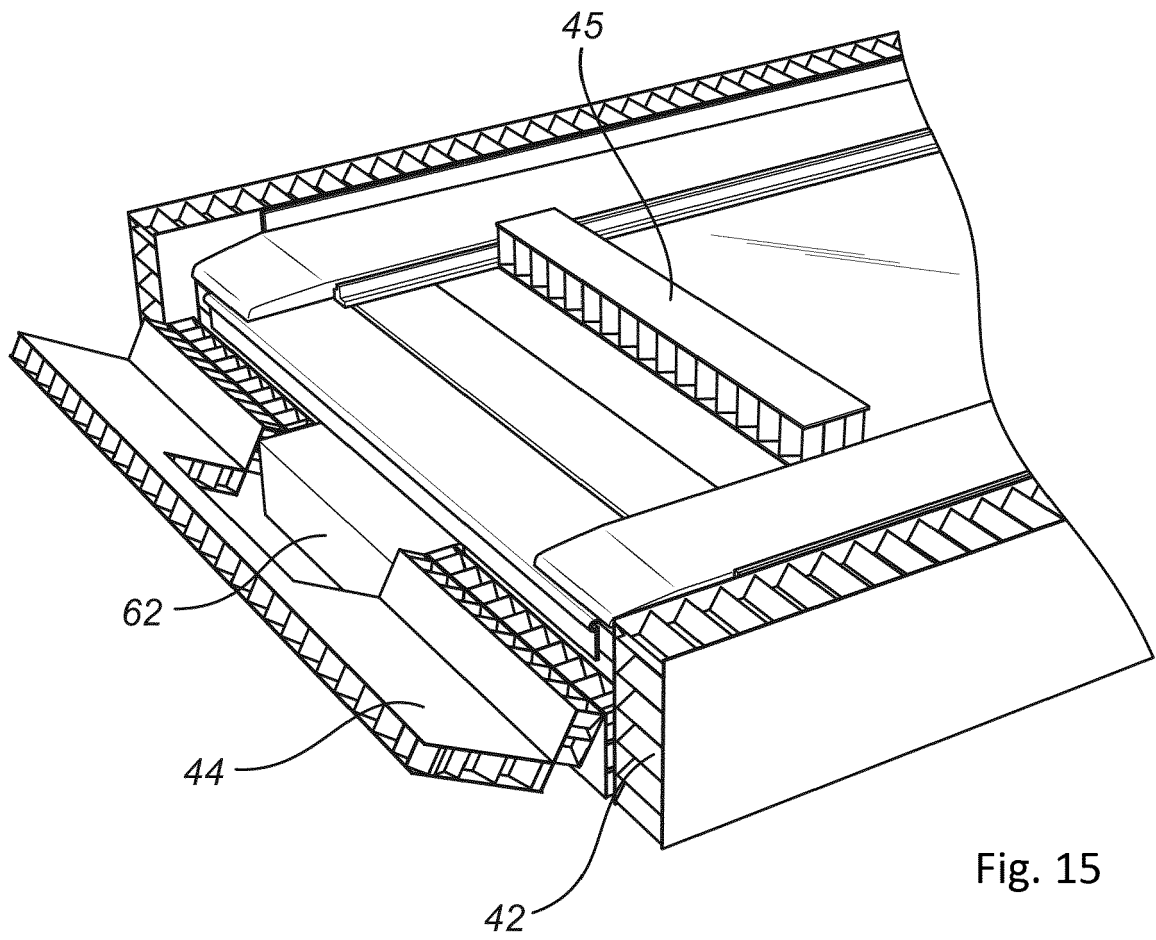


Fig. 15

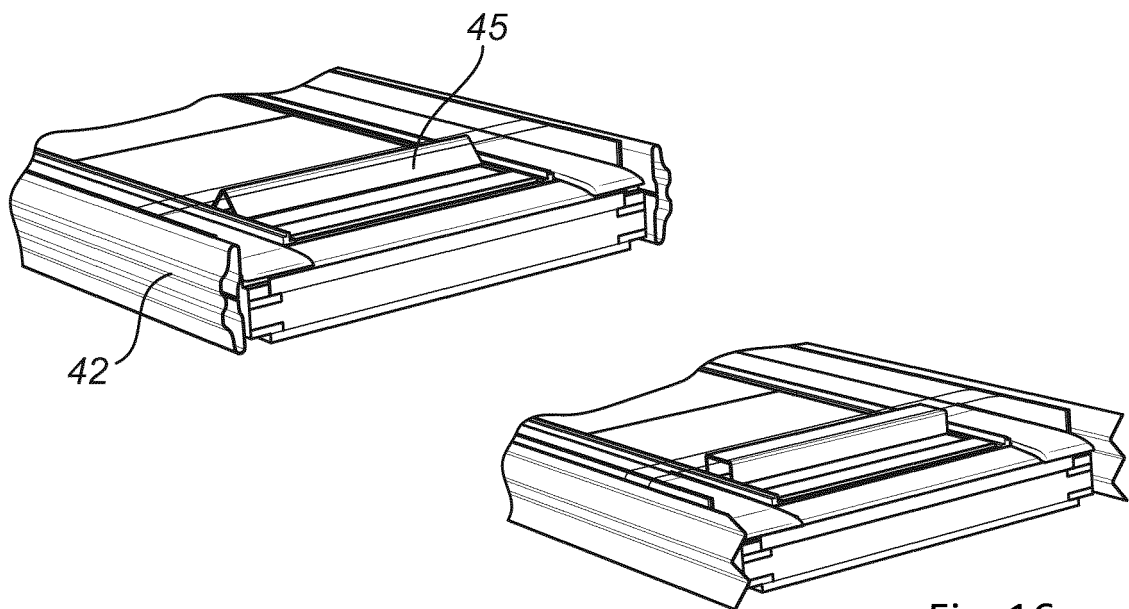


Fig. 16

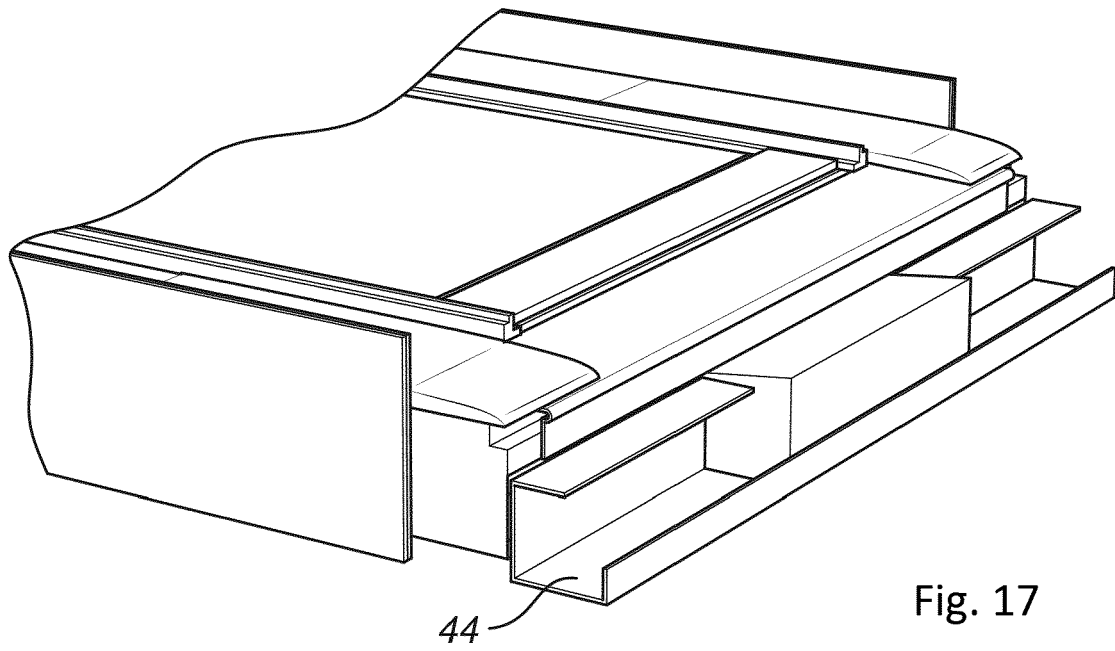


Fig. 17

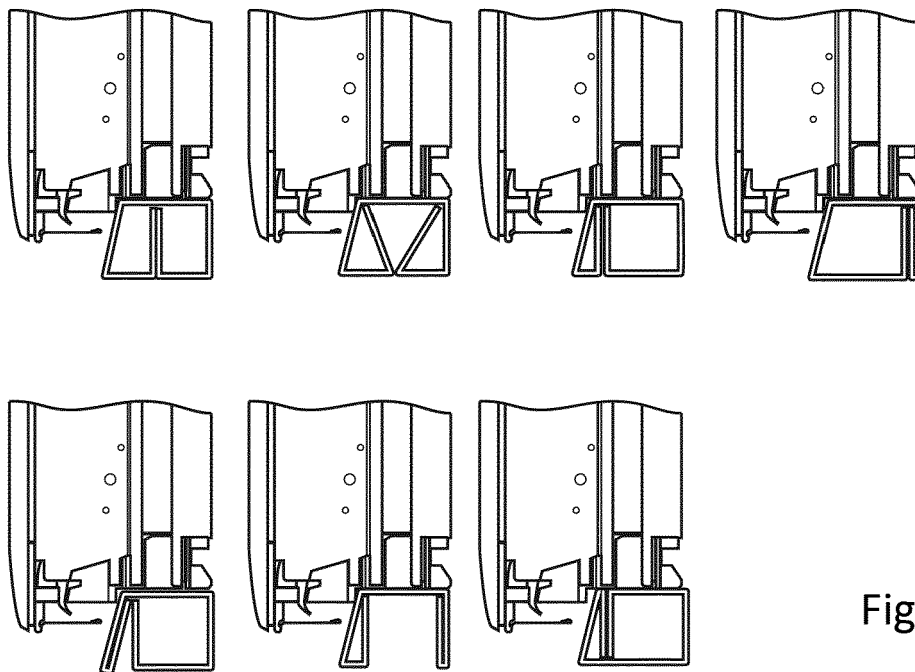


Fig. 18

REFERENCES CITED IN THE DESCRIPTION

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