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(71) Applicant: **VKR Holding A/S**
2970 Hørsholm (DK)

(72) Inventor: **Andersen, Erik**
2970 Hørsholm (DK)

(74) Representative: **AWA Denmark A/S**
Strandgade 56
1401 Copenhagen K (DK)

(54) **A PACKED ROOF WINDOW**

(57) A packed roof window, where the roof window is contained in a cardboard box, where packaging components are arranged inside the cardboard box, and where the packaging components are used for protecting and retaining components of the roof window. All packaging components are made from paper-based materials.

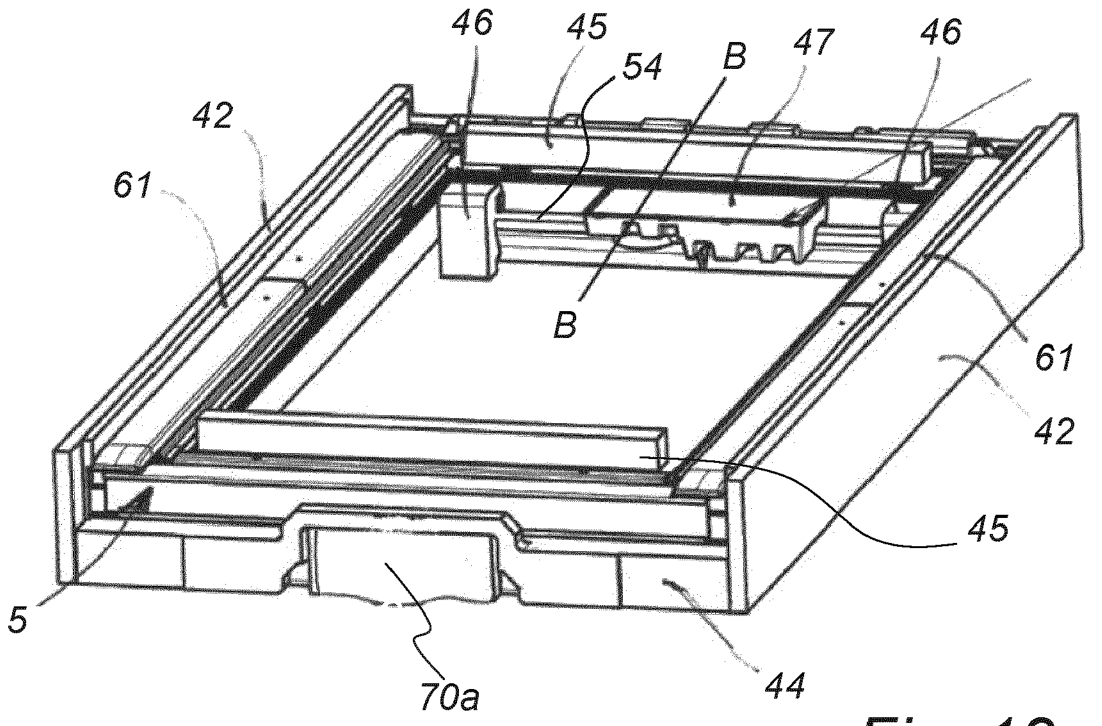

Fig. 18

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Description

Technical Field

[0001] The present invention relates to a packed roof window, where the roof window is contained in a cardboard box, and where packaging components are arranged inside the cardboard box are used for protecting and retaining components of the roof window.

Background Art

[0002] When installing roof windows in a roof it is vital to ensure that both the roof window itself and the joint between the roof window and the roof structure is properly weather proofed. This is ensured by the use of coverings and flashing, which covers the roof window and the joint, respectively. Covering members and flashing members are usually made from sheet metal, which combines the advantages of low weight and high weather resistances, but which is sensitive to damages caused by deformation and scratching. Flashing members are typically provided in a separate packaging, but at least some of the covering members are typically pre-attached to the roof window. To protects these and other sensitive components, such as the pane of the roof window, blocks of expanded polystyrene or similar shock absorbing material are arranged inside the cardboard box. These blocks may prevent deformation of the cardboard box, thereby preventing that excessive loads affect the roof window, and/or keep components of the roof window in their intended positions within the box. Other components may be retained in boxes or plastic bags or attached to the cardboard box by means of an adhesive or a glue. One example of a packed roof window, where these principles are used, is known from EP2748071B1.

[0003] While this packaging has 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, which has a smaller climate footprint, while maintaining a good protection of the roof window during transportation.

[0005] This and further objects are achieved with a packed roof window of the kind mentioned in the introduction, which is furthermore characterised in that all packaging components are made from paper-based materials, which consist of a least 95% paper by weight.

[0006] While paper is 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.

[0007] The packaging components may comprise small amount of non-paper material, such as glue or adhesive, used for example for giving them a desired shape or for attachment to other items; coatings for giving them desired surface properties; mixed in polymers serving as reinforcement or for making them weldable; etc.. These non-paper materials, however, cannot constitute more than a maximum of 5% by weight of the packaging component, and it is preferred that these materials are biodegradable.

[0008] The blocks of shock absorbing material have previously been made from expanded polystyrene (EPS), while bags and boxes have been made from polyethylene (PE) or polypropylene (PP). These materials are cheap, light-weight, and can be sufficiently soft to not course abrasive damage to other components of the roof window during handling and transportation in the packed state. The use of EPS and other polymers, however, requires that the packaging material will have to be separated in different fractions for recycling. The paper-based packaging components on the other hand 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.

[0009] Some paper-based materials may have poorer properties than EPS and other polymers when it comes to abrasion, but this may be compensated for by arranging a paper-based slip sheet between the packaging component and potentially sensitive components of the roof window, such as the pane or a painted surface of the sash. Likewise, smudging should be avoided, either by testing the material chosen for the packaging components or by using a slip sheet.

[0010] Another potential advantage of using packaging components made from a paper-based material is that they may be biologically degradable. Light-weight packaging items, such as plastic wrappings, films, and EPS, are easily caught by wind when installing a roof window 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 paper-based packaging component does little harm.

[0011] The packaging components may include one or more components chosen from the group consisting of: blocks of paper-based shock absorbing material, paper bags, paper ribbons, cartons, and retainers made from folded cardboard.

[0012] In one embodiment using blocks of paper-based shock absorbing material the cardboard box is of a rectangular configuration having two major sides and four minor sides extending between of the two major sides, and the 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 roof 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 and that the corners of the window pane are highly sensitive, put high requirements on the shock absorbing material used at the corners of such a packed product.

[0013] In one embodiment at least one block of shock absorbing material is arranged between components of the roof window. 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.

[0014] In one embodiment at least one block of shock absorbing material is arranged on a component of the roof window. As one example a block may be arranged on a pane of a roof 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 roof 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.

[0015] In one embodiment one or more blocks of paper-based shock absorbing material comprises a honeycomb material, possibly being made entirely from a honeycomb material. Honeycomb materials provide a combination of strength and deformability, which make them particularly well suited for use between heavy products and the cardboard box, and/or for preventing a deformation of the cardboard box.

[0016] 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. Cell size may vary, typically between 8 mm and 30 mm, and a cover layer may be provided on one or both sides. 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.

[0017] 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 26 mm.

[0018] Each cover layer and/or intermediate layer will typically be a sheet of paper or cardboard, typically having a weight of 100-250 g/m^2.

[0019] 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.

[0020] In one embodiment, a single honeycomb layer having a cell size of 14 mm and a height of 20 mm has cover layers on both sides, and both the honeycomb structure and the cover layers are made from paper with a weight of 140 g/m^2. In a second embodiment, a single honeycomb layer having a cell size of 22 mm and a height of 40 mm has cover layers on both sides, and both the honeycomb structure and the cover layers are made from paper with a weight of 140 g/m^2. The honeycomb materials of these two embodiments have shock absorbing properties, which are comparable to those of EPS as will explained further below with reference to the drawing. In a third embodiment, a single honeycomb layer having a cell size of 14 mm and a height of 40 mm has cover layers on both sides, and both the honeycomb material and the cover layers are made from paper with a weight of 120 g/m^2. This material is expected to have properties comparable to the second embodiment as the smaller cells will make the structure stronger, while the use of a thinner paper will make the structure weaker. For purposes where a softer material is needed, such as for packaging smaller and/or light-weight windows a cell size of 26 mm has been found to provide good results, the other dimensions being as described above.

[0021] In one embodiment at least one block of shock absorbing material is made from moulded paper pulp, preferably a high bulk moulded paper pulp. Moulded pulp can be given virtually any desired shape but has limited strength. It thus particularly lends itself to applications, where the block of shock absorbing material needs to a have 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.

[0022] 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.

[0023] 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.

[0024] 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.

[0025] 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.

[0026] Common to all of the embodiments mentioned above is that the elasticity will be lower than for a corresponding block of EPS, as paper has a relatively 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 is very rarely exposed to excessive force more than ones.

[0027] Turning now to packaging components in the form of paper bags, these have the potential advantage that the bag may at the same time retain items and prevent scratching of components of the roof window. Thereby one bag may potentially replace both an EPS block and a protective film, thus potentially reducing either the total material consumption or the number of separate pieces of packaging material to be manufactured and recycled. A reduction of the number of separate pieces of packaging material may in turn reduce the risk of them being lost or forgotten.

[0028] In one embodiment a collection of components contained in a paper bag comprises mounting brackets. Mounting brackets are typically made of metal and may damage other components if provided loose in the box. This is avoided by providing them in a paper bag.

[0029] In one embodiment a collection of components contained in a paper bag comprises sealing and/or insulating components. One or more of these components may be provided in a compressed state, thereby reducing their size in the packed state and potentially allowing the use of a smaller cardboard box. The compression may be achieved by wrapping and tightening a sheet of paper around the components. Sides of this sheet of paper may subsequently be interconnected so that a paper bag is formed, or the compressed component(s) including the sheet of paper may be arranged in a paper bag, possibly together with other non-compressed components.

[0030] In one embodiment a collection of components contained in a paper bag comprises electronic components, such as wires, photovoltaic elements, sensors, batteries, or remote controls. Electronic components typically comprise parts, which are easily damaged. By providing them in a paper back they are protected from being scratched and may be kept in place so that the risk of them becoming displaced in the packaging is reduced. A shock absorbing material may be provided inside the bag or arranged on the electronic components before they are arranged in the bag. Such a shock absorbing material is preferably also paper-based. For further protection, an electronic component may be arranged in its own paper bag before being put in the paper bag with the other components of the collection.

[0031] In one embodiment a collection of components contained in a paper bag comprises fasteners, such as screws, nails, or clamps. Fasteners typically have sharp ends, which may scratch other components, and easily lost if provided loose. This is avoided by providing them in a paper bag. Fasteners intended for different purposes may be provided in separate bags.

[0032] In one embodiment two or more paper bags each containing a collection of components are interconnected. This may help maintain the intended position of each paper bag inside the cardboard box during handling and transportation. The interconnection of the bags may be established as a part of the creation of the bag, or by a subsequent interconnection of separate bags. By arranging separate bags in an open cardboard box and interconnecting them before closing the box, the bags may be filled independently, possibly at different locations. Ones interconnected they will act as one bag, helping retain the components in an intended position inside the cardboard box. It is also possible to connect one or more bags to the cardboard box thereby achieving similar advantages.

[0033] In one embodiment a first paper bag containing a collection of components is provided inside a second paper bag containing a collection of components. This may provide an additional protection of the components, and/or may reduce the risk of error in the installation of the roof window by preventing access to the collection of components inside the first bag until the second bag has been opened and emptied.

[0034] The paper bag or bags may be closed by folding, by means of mechanical fasteners, such as stables, or by means of glue or an adhesive. Also, or alternatively, a paper bag may be made wholly or partially of a heatsealable paper, so that the bag can be closed by heating the paper, for example by welding.

[0035] Turning now to packaging components in the form of cartons, a carton may in one embodiment be arranged along a frame of the roof window between the frame and the cardboard box. In this position the carton may contribute to keeping the roof window in an intended position inside the cardboard box and/or to protecting the roof window in case the package is dropped or handled roughly. It may thus replace at least some of the shock absorbing material, which is traditionally used for this purpose.

[0036] In one embodiment, a carton is arranged on the pane of the roof window between the pane and the cardboard box, possibly with a slip sheet between the carton and the pane to avoid scratching the pane. Traditionally shock absorbing material is arranged on the side of the pane, which is intended to face the exterior in the mounted state of the roof window to protect both the pane and covering members on the sash and/or frame of the roof window, which typically project above the surface of the pane. The carton may reduce or eliminate the need for such shock absorbing material while at the same time retaining other components of the roof window.

[0037] In one embodiment, a carton is attached to a handle bar of the roof window adapted for use in opening and closing the roof window. In packed roof windows such handle bars are often arranged in a disengaged state to make the roof window take up as little space as possible and a fixation member in the form of a specially shaped block of EPS is used to keep the handle bar in place during handling and transportation of the packed roof window. A carton attached to the handle bar may replace the EPS block, while at the same time serving to retain other components of the roof window.

[0038] In one embodiment a carton is attached to the cardboard box. This may allow the carton to retain components in an intended positioning within the cardboard box. Alternatively, or as a supplement, the carton may have a size and/or shape matching an inner dimension of the cardboard box so that the carton is prevented from moving in at least one direction.

[0039] A carton may be attached to the cardboard box, to another carton or to a component of the roof window by means of a glue or an adhesive. Alternatively, or as a supplement, mechanical fasteners, such as staples or a hook-and-loop type fastener, such as Velcro®, may be used. Alternatively, or as a supplement, attachment may be achieved by providing the carton with a physical structure allowing it to engage with a component of the product. One example of this is a hook-shaped projection on the carton engaging with a handle bar of the roof window.

[0040] The cartons mentioned above may in principle contain any component, but is particularly considered advantageous for sensitive components, which may be damaged by contact with other components.

[0041] One example of sensitive components is electronic components, such as wires, photovoltaic elements, sensors, batteries, or remote controls, which will often have limited strength.

[0042] It may also be advantageous to arrange components, which are likely to cause damage to other components, in a carton. One example of such components is mounting brackets for connecting a roof window to a roof structure as they are relatively heavy and often with sharp edges or corners. Another example is fasteners, such as screws, nails, or clamps, which have sharp ends and which can move around in the cardboard box if not retained due to the small size.

[0043] A carton can also be used for keeping one or more components in a folded and/or compressed state. Examples of components, which can advantageous be delivered in a folded state, are wires and cables. Examples of components, which can advantageous be delivered in a compressed state, are sealing strips and insulating components, thereby reducing their size and the packed state and potentially allowing the use of a smaller cardboard box.

[0044] A shock absorbing material may be provided inside the carton.

[0045] It is presently considered particularly advantageous to provide components, which are to be used on the interior side of the roof window, in a carton or bag provided on the interior side of the pane, for example attached to a ventilation flap or handle bar. Examples of such components are a remote control for operating the roof window once installed, and a vapour barrier, which is used to seal the joint between the roof window and the roof structure, wall or sealing on the interior side.

[0046] Turning now to packaging components in the form of paper ribbons, these may in one embodiment be used for retaining a component in relation to the cardboard box. By attaching them to the cardboard box using a paper ribbon, components are prevented from moving too much around in the box, thus reducing the risk of them being jammed between other component, and the possibility for contact with other components, which might result in scratches, is also reduced. Another potential advantage of retaining components using a paper ribbon is that the need for blocks of shock absorbing material may be reduced, leading to a reduction of the amount of material used.

[0047] In one embodiment a paper ribbon is used for retaining a component in relation to one or more other components, for example by attaching a smaller component, such as a fastener or a sealing element, to a larger component.

[0048] In one embodiment a collection of fasteners, such as screws, nails, or clamps, are interconnected by a paper ribbon. This not only reduces the risk of one or more fasteners being lost. The paper ribbon may also be used as a holder facilitating use of the fasteners as will be described with reference to the drawing.

[0049] In one embodiment a paper ribbon is used for retaining a component in a folded state. Examples of components, which may advantageously be provided in a folded state are wires, cables, sealing strips, insulating members, underroof collars, and vapour barriers. Such components may be provided on their own or form part of a larger component, one example being a wire connected to a motor unit. In that case the wire may be folded and retained in this state by a ribbon surrounding the folded wire only, or the folded wire may be attached to the motor unit by means of a paper ribbon thereby retaining it in the folded state.

[0050] In one embodiment a paper ribbon is used for retaining a component in a compressed state. This particularly applies to sealing and insulating components, which are typically made of compressible and elastic materials. By compressing them their size is reduced, potentially allowing the use of a smaller cardboard box. The compression may be achieved by wrapping and tightening a paper ribbon around the components, or an already compressed component may be retained in the compressed state by applying a paper ribbon.

[0051] In one embodiment a paper ribbon is used for attaching packaging material, preferably a shock absorbing material, to a component. As an example, a block of a shock absorbing material may be arranged on the pane of the roof window and be kept there by a paper ribbon attached to two opposite sides of the frame of the roof window, spanning the pane. As another example, blocks of a shock absorbing material arranged around the frame of a roof window as described above may be attached to each other by means of one or more paper ribbons. As a further example, a component may be attached to a block of shock absorbing material using a paper ribbon, thereby preventing the component from moving unintentionally within the cardboard box simply by effectively becoming larger, but is it also possible to attach the block of shock absorbing material to the cardboard box thereby achieving an indirect attachment of the component to the cardboard box. As a still further example, a block of shock absorbing material may be used for keeping a folded component such as a wire or cable in a desired configuration, for example by being arranged between the sections of the folded component so that sharp bents are avoided.

[0052] In one embodiment a paper ribbon is used for attaching a bag or a carton containing a first component to a second component. As an example, a paper bag containing fasteners intended for connecting a mounting bracket to a roof window and/or a roof structure can be attached to the mounting bracket. As another example, a carton containing a remote control for activating a motor of a roof window may be attached to the roof window by means of a paper ribbon.

[0053] In one embodiment a paper ribbon is used for attaching a bag or a carton containing a first component to a bag or a carton containing a second component. This may provide the advantage of keeping smaller bags and cartons together, so that they are more easily located inside a larger cardboard box, and/or allowing subcomponents to be packaged individually and put together on demand. As an example, the need for insulating components may be different depending on the climate zone in which a roof window is to be used, and the relevant product for a particular delivery can then be combined with for example a carton containing an electronic component before being put into the cardboard box.

[0054] The paper ribbon can be simple strip of material, which is attached to itself, to the cardboard box, and/or to another item by an adhesive or glue, by one or more mechanical fasteners, and/or by physical engagement, such as a by tying a knot. The paper ribbon may also be a paper tape, i.e. a strip of paper provided with an adhesive or a glue on one or both sides, either a continuous layer or as local depositions. The adhesive may be a pressure sensitive adhesive. The glue may be a dry glue activated by exposure to water.

[0055] The paper ribbon may be provided with local or continuous reinforcements, for example in the form of fibres integrated in the paper or additional material applied on a surface of the ribbon.

[0056] While in the above embodiments the collections of components have been described as comprising components of a particular type made from the same or like materials, it is to be understood that a collection of components may comprise components of different types. As an example, mounting brackets and the fasteners intended for attaching them to a roof window and/or a roof structure may be provided as a collection of components. As another example, insulating components and sealing components to be arranged in parallel with each other along a side of a roof window may be provided as a collection of components.

[0057] Turning now to packaging components in the form of retainers made from folded cardboard, such a retainer may in one embodiment be a ventilation flap retainer.

[0058] A ventilation flap typically forms part of a roof window further comprising a sash carrying a pane, a frame, a set of hinges allowing the sash to swing or rotated in relation to the frame, and a locking assembly for locking the sash in relation to the frame, where the locking assembly is operable by moving the ventilation flap, where in the first and second positions, the sash is locked in relation to the frame, and in a third position of the ventilation flap, the sash is moveable in relation to the frame. Such a window will typically be centre-hung, and the ventilation flap will be located at a top sash member intended to be at the top of the roof window in the mounted state. The ventilation flap may be connected to a sash or frame of the roof window by means of one or more hinges, and may be an elongate member extending along a member of the sash or frame, in parallel therewith, typically extending over substantially the entire width or height of the roof window. A handle may be provided on the ventilation flap for ease of operation. If the ventilation flap is an elongate member, the handle may be in the form of a rail or bar extending in parallel therewith and having substantially the same length as the ventilation flap.

[0059] In one embodiment, a ventilation flap retainer is arranged between the ventilation flap and a sash or frame of the roof window. Roof windows are often delivered with the ventilation flap in a disengaged state where it has been swung away from the frame and/or sash of the roof window towards the pane in order to make it take up less space, thereby allowing the use of a smaller cardboard box. A ventilation flap retainer arranged between the ventilation flap and a sash or frame of the roof window keeps the ventilation flap in this position, preventing it from moving towards the sash or frame during handling and transportation of the packed roof window.

[0060] In one embodiment, a ventilation flap retainer is arranged between the ventilation flap and a pane of the roof window. Such a ventilation flap retainer prevents a ventilation flap provided in a disengaged state from moving further towards the pane than intended, thus for example preventing it from pounding at the pane and potentially coursing damage during handling and transportation of the packed roof window.

[0061] One ventilation flap retainer may extend from the pane to the cardboard box.

[0062] In one embodiment, the ventilation flap retainer is arranged between the ventilation flap and the cardboard box. This too will contribute to keeping the ventilation flap in the intended position during handling and transportation of the packed roof window.

[0063] In one embodiment, where the roof window comprises a handle on the ventilation flap, the ventilation flap retainer is attached to the handle. This arrangement of the ventilation flap retainer is particularly advantageous in embodiments, where the ventilation flap retainer is intended for being arranged between the ventilation flap and pane and/or between the ventilation flap and the cardboard box.

[0064] It is also, or alternatively, possible to attach items to a ventilation flap retainer, for example using a glue, an adhesive, a paper tape or a paper ribbon. Small items such as fasteners may be arranged in a paper bag, which is attached to the ventilation flap retainer. Screws may even be attached to a ventilation flap retainer by simply being screwed into it.

[0065] Attachment of the ventilation flap retainer may be achieved by providing it with a physical structure allowing it to engage with the handle, such as one or more hook-shaped projections. These may be formed by folding the material of the ventilation flap retainer.

[0066] A shock absorbing material may be provided on the ventilation flap retainer. Such a shock absorbing material is preferably also made from a paper-based material.

[0067] Common to all embodiments is that each packaging components may for example be made from a material chosen from the group consisting of: moulded pulp, folded cardboard, folded corrugated cardboard, multilayer corrugated cardboard, cardboard profile, and honeycomb material, preferably a having a cell size of 22 mm and being made from paper with a weight of 140 g/m^2 and having a height of 20-40 mm.

[0068] Moulded pulp, folded cardboard, or folded corrugated cardboard is considered advantageous for applications where the strength requirement is limited. Moulded pulp can be given virtually any desired shape, and it is thus advantageous for applications, where the packaging component needs to have a complex three-dimensional shape, but items made from moulded pulp are generally characterized by large dimensionally tolerances. Folded cardboard and folded corrugated cardboard on the other hand can be given less complex shapes but may have higher strength and smaller tolerances. Furthermore, folded cardboard and folded corrugated cardboard can easily be reshaped by folding, unfolding and possibly refolding in another configuration.

[0069] Multi-layer corrugated cardboard, cardboard profile, and honeycomb material is less flexible when it comes to shape but are stronger and potentially also have a higher elasticity.

[0070] One packaging component may serve several purposes. In one embodiment a carton made from folded cardboard or folded corrugated cardboard and containing components for use when installing or operating the roof window may also be used as a ventilation flap retainer.

[0071] In one embodiment, one or more packaging components are configured for serving a secondary purpose after having been removed from the roof window.

[0072] As an example, a ventilation flap retainer may be configured for serving a secondary purpose after having been removed from the ventilation flap or handle. One example of such a secondary purpose is that the ventilation flap retainer is configured for being attached to a corner of a sash of the roof window after being removed from the ventilation flap. The sash of a roof window is often removed before mounting the window frame in an opening in a roof structure, and the sash then needs to be put down, for example on a floor. When doing so, particularly the corners of the sash are in danger of being scratched or smudged. As substantially the entire sash may be visible in the use state of the roof window, the possibility for protecting it without increasing the material consumption is clearly advantageous. The ventilation flap retainer is preferably attached to a corner of the sash before detaching the sash from the window frame. The attachment to the corner of the sash may for example be achieved by inserting the corner of the sash or a projection thereon into a recess in the ventilation flap retainer or vice versa. When the ventilation flap retainer is made from folded cardboard or folded corrugated cardboard, it may be foldable into two different configurations, one suited for retaining the ventilation flap and one suitable for sash corner protection. For this purpose, the ventilation flap retainer may have matching flaps and recesses allowing it to be retained in one or more folded states.

[0073] As another example, a packaging component made from moulded pulp may be re-shaped by being compressible or by being provided with one or more weak zones allowing a section of the packaging component to be broken off.

[0074] Still further examples are the use of a paper bag for collecting packaging components no longer in use and the use of a carton as a temporary toolbox.

[0075] Information about an intended secondary use of packaging component, about the installation of the roof window, or about items contained in or attached to a packaging component may be printed on the packaging component. Alternatively, a sticker with such information may be attached to the packaging component.

Brief Description of Drawings

[0076] 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 exploded view of a roof window with packaging material and a carton containing a collection of components,
Fig. 3 corresponds to Fig. 2 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 roof window are also seen,
Fig. 4 is a perspective view of a roof window corresponding to substantially to that shown in Fig. 3,
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 shows test data for loads affecting a packed roof window when dropped on a side,
Fig. 8 shows test data for loads affecting a packed roof window when dropped on a corner,
Fig. 9 shows test data for two consecutive drops of packed roof windows,
Fig. 10 is a perspective view showing a packed roof window being dropped on a corner,
Figs 11-13 show blocks of shock absorbing material made from honeycomb material,
Fig. 14 is a perspective view of a lower end of a roof window with honeycomb material arranged along outer sides of the window frame and on the pane,
Fig. 15 is a perspective view of a roof window with cardboard profiles arranged along the side frame members,
Fig. 16 is a perspective view of the lower end of a roof window with a folded cardboard member arranged along the bottom frame member and multilayer corrugated cardboard along the side frame members, and
Fig. 17 shows seven cross-sectional views of the lower end of a roof window with a folded cardboard member arranged along the bottom frame member.
Fig. 18 corresponds to Fig. 3 but with a paper bag,
Fig. 19 corresponds to Fig. 5, but where the blocks of shock absorbing material have been replaced with paper bags,
Fig. 20 is a perspective view of an upper end of a roof window with packaging material corresponding to substantially to that shown in Fig. 3, where a carton containing a collection of components is positioned on the pane,
Fig. 21 is a perspective view of an upper end of a roof window with packaging material corresponding to substantially to that shown in Fig. 3 seen from the opposite side of the pane, and where a carton containing a collection of components has replaced a piece of packaging material,
Figs 22 and 23 show details of an alternative to the carton in Fig. 21,
Fig. 24 is perspective view of a piece of packaging material corresponding to that shown at the bottom of the roof window in Fig. 4 and carton arranged in a cavity therein,
Fig. 25 is a perspective view of an alternative to the piece of packaging material shown in Fig. 24,
Fig. 26 is a perspective view of another alternative to the piece of packaging material shown in Fig. 9 with a carton arranged in a cavity therein,
Fig. 27 is a perspective view of a lower end of a roof window with packaging material corresponding to substantially to that shown in Fig. 3, where some of the packaging material is retained by paper ribbons,
Fig. 28 is a perspective view of a cable retained by a paper ribbon,
Fig. 29 is a sketch of an underroof collar retained in a folded state by a paper ribbon,
Fig. 30 shows a detail,
Figs 31 and 32 are perspective views of collections of screws retained by paper ribbons,
Fig. 33 is a perspective view showing the use of the paper ribbon in Fig. 31 as a holder,
Fig. 34 is a perspective view of a roof window with blocks of shock absorbing packaging material arranged around it and with ventilation flap retainers attached to a handle,
Fig. 35 corresponds to a cross-section along the line A-A in Fig. 34, but showing a different embodiment arranged in a cardboard box,
Fig. 36 is a perspective view of another embodiment corresponding to the detail marked B in Fig. 34.
Fig. 37 is a top view of a ventilation flap retainer made from cardboard in an unfolded state,
Fig. 38 is a perspective view of the ventilation flap retainer in Fig. 37 in a folded state,
Figs 39a-39c is a sequence of drawings showing the simultaneous folding and attachment of the ventilation flap retainer in Figs 37-38 to the handle of roof window in Fig. 3,
Fig. 40 is top view of the ventilation flap retainer in Figs 37-39 in a different folded state,
Fig. 41 is a perspective view of the folded ventilation flap retainer in Fig. 40 attached to a corner of a window sash,
Fig. 42 is a perspective view of another embodiment of a ventilation flap retainer made from folded corrugated cardboard,
Fig. 43 is a perspective view of another embodiment of a ventilation flap retainer made from a honeycomb material,
Fig. 44 is a front view of another ventilation flap retainer in an unfolded state,
Fig. 45 is a perspective view of the ventilation flap retainer in Fig. 44 in a folded state,
Fig. 46a-46b are perspective views of the attachment of the ventilation flap retainer in Figs 44-45,
Fig. 47 is a perspective view of the ventilation flap

retainer in Figs 44-45 in an attached state,

Fig. 48 is a top view of another ventilation flap retainer in an unfolded state,

Fig. 49 is a perspective view of the ventilation flap retainer in Fig. 48 in an attached state,

Fig. 50 is a perspective view of the ventilation flap retainer in Fig. 48 attached to another roof window,

Fig. 51a-51d are perspective views of different stages of assembly and attachment of a carton serving as ventilation flap retainer, and

Fig. 52 is a perspective view of another carton adapted for serving as a ventilation flap retainer attached to a handle of a roof window.

Description of Embodiments

[0077] 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.

[0078] It is to be understood that the cardboard box 1 shown in Fig. 1 is merely an example, and that the cardboard box may have another shape to better fit the shape and dimensions of the roof window.

[0079] 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.

[0080] Figs 2 and 3 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.

[0081] 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 roof window. The block 43 may also represent a component of a roof window product, such as a top covering element, or a collection of components, for example a collection of smaller components arranged inside a cavity of a top covering element.

[0082] 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.

[0083] 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.

[0084] In Fig. 3 the pane has been shown as transparent 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.

[0085] Turning first 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.

[0086] 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.

[0087] 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.

[0088] 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.

[0089] An example of the use of honeycomb structures is shown in Fig. 4, 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 roof window meet.

[0090] 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/m^2. 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 show 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 show 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 rest after being dropped.

[0091] 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.

[0092] 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.

[0093] 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 roof window is dropped again 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 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.

[0094] 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 tests and that real life drops of windows may result in different force patterns.

[0095] Turning now to Figs 11-15 alternative blocks of shock absorbing materials based on honeycomb materials are shown.

[0096] 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 structure 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.

[0097] 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.

[0098] 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.

[0099] Fig. 14 shows a block 44 of shock absorbing material corresponding to the one shown in Fig. 7. The overall structure and function are a 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.

[0100] 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.

[0101] 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.

[0102] Alternatives to the honeycomb materials are shown in Figs 16-18.

[0103] 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.

[0104] 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.

[0105] 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 polyurethan 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.

[0106] Turning now to Fig. 18, which corresponds to Fig. 3, the block 44 extending along a bottom frame member 52 makes room for a paper bag 70a containing a collection of components. As the paper bag 70a is kept securely in place in the block 44, it may suitably contain a collection of relatively fragile components such as electronic components, such as wires, photovoltaic elements, sensors, batteries, or remote controls. A collection of metal components such as mounting brackets could also be provided in paper bag 70a, as such components may cause damage to other components if not kept in place in the cardboard box.

[0107] Turning now to Fig. 19 the blocks 43, 45, 46 of shock absorbing material at the top frame member 55 shown in Fig. 5 have been replaced by paper bags 70b, 70c, 70d respectively. Each of the paper bags 70b-d contain a collection of components. The paper bag 70b is arranged to extend at least partly along an outwardly facing surface of the top frame member 55 and can suitably comprise insulating components and flashing components. The paper bag 70b can further comprise shock-absorbing paper material, whereby the paper bag 70b can provide some protection for the roof window. Paper bags similar to paper bag 70b may replace shock absorbing blocks 42 of Fig 3. They could also replace only part of the shock absorbing blocks 42. Similarly, the paper bag 70c arranged on the window pane may also comprise shock absorbing paper material to provide some protection for the roof window, similarly to the block 45. The paper bag 70d is seen to have been attached to the handle bar 54 to keep the paper bag from sliding around with the roof window during transport and handling of the packed roof window. This bag could for example contain a vapour barrier, which is to be used for sealing the joint between the roof window and the roof structure, in which it is mounted, on the interior side.

[0108] As mentioned above with reference to Fig. 3, the carton 62 is accommodated within the cavity 44a and will be positioned between the window frame of the roof window and the cardboard box in the packed state, thus being prevented from moving around in the cardboard box during handling and transportation. The carton 62 is protected by the block 44 of shock absorbing material, and it may suitably contain a collection of relatively fragile components, for example electronic components, such as wires, cables, photovoltaic elements, sensors, batteries, or remote controls. A collection of metal components such as mounting brackets could also be provided in carton 62, as such components are preferably kept securely in place in the cardboard box to prevent them from damaging other components of the roof window products when handling and transporting the packed product.

[0109] Fig. 20 shows an upper end of a roof window 5 corresponding substantially to the roof window shown in Fig. 4. As can be seen a paper ribbon 7 is here used to retain a block 45 of shock absorbing material relative to the roof window 5 and further to retain a carton 63. The carton 63 is arranged on the window pane 53 and contains a collection of components for use in installing the roof window, such as an underroof collar, or covering or flashing components. When the packed roof window of Fig. 20 is contained in a cardboard box, the carton 63 will be located between the pane 53 and the cardboard box. The carton 63 is made from cardboard and has a lid 63a which is longer than the remaining sides of the carton 63, allowing the lid 63a to extend across the block 45 and in between the roof window 5 and block 43 of shock absorbing material extending along the top frame member of the roof window. The paper ribbon 7 attaches the lid 63a to the block 45, thereby retaining the carton 63 in relation to the roof window 5. If necessary, a slip sheet (not shown) of paper material can be arranged between the carton 63 and the pane 53 to prevent the carton from scratching the pane.

[0110] Referring now to Fig. 21 which shows the upper end of a roof window corresponding to substantially to that shown in Fig. 4 but seen from the side, which is intended to be the interior side in the mounted state of the roof window. A carton 64 containing a collection of components has replaced the blocks 46, 47 of shock absorbing material of the embodiment of Fig. 4. The carton 64 is attached to the handle bar 54 and has the dual purpose of retaining the handle bar 54, keeping it in an intended position in relation to the pane 53 and the cardboard box in the packed state, and of containing a collection of components. The carton 64 attaches to the handle bar 54 by a physical structure of the carton, namely a recess 641 provided across the carton, which recess is configured for engaging the handle bar 54 and has projections 642 for improving the attachment. The carton 64 is in this embodiment made from corrugated cardboard.

[0111] Details of another embodiment of the carton 64 are shown in Figs 22-23, Fig. 22 showing the carton seen in a direction substantially parallel to the handle bar 54 when mounted as in Fig. 21. In this embodiment the projections 642 are located on the opposite side of the recess 641, but their function is the same.

[0112] The shape of the recess matches the cross-sectional shape of the handle bar of the roof window as best seen Fig. 22. In this case the shape is adapted for use with a VELUX roof window, but other windows may require a different shape of the recess.

[0113] The side wall 643 of the carton defining the end of the recess 641 consists of three layers of cardboard as best seen in Fig. 23, whereas the parts of the carton extending along the length of the recess 641, including the projections 642, only comprise a single layer. This provides a combination of relative strength and stiffness, which facilitate attachment, detachment and possibly reattachment of the carton 64. As is well-known to the skilled person, cartons 64 as shown in Figs 21-23 are often used for containing remote controls, manuals and like items, which are not to be used by the installer of the roof window, but by the end user. Such cartons are typically removed by the installer during installation of the roof window and then reattached afterwards. At that time the handle bar 54 has been moved from the delivery position shown in Fig. 21 to a position further from the pane and closer to the sash and frame, and the carton is attached with the opposite side facing the pane, so that it is easily accessible to the end user. The embodiment of the recess 641 and projections 642 shown in Figs 21-23 facilitates this reattachment of the carton.

[0114] Referring now to Figs 24-26, which show details of blocks 44 of shock absorbing material, for extending along a bottom frame side member of the roof window in the packed state and for accommodating a carton 62 as described above with reference to Fig. 3.

[0115] In the embodiment of Fig. 24, the block 44 of shock absorbing material is provided with recesses 44b at opposite sides of the cavity 44a. These recesses 44b allows an installer to easily retrieve the carton 62 from the block 44 by putting his finger into the recess and lifting the side carton.

[0116] Fig. 25 shows an alternative block 44' of shock absorbing material, where two of the corners of the cavity 44a have been bevelled to facilitate insertion and retrieval of the carton 62.

[0117] Fig. 26 shows yet another alternative block 44" of shock absorbing material having both recesses 44b and bevelled corners.

[0118] Returning now to Fig. 4 an example of paper ribbons 7 being used to retain packaging material components in relation to a roof window product is seen. The roof window related product is here embodied by the roof window 5 and the packaging material retained thereto are the shock absorbing blocks 45. The blocks 45 of shock absorbing material arranged on the pane 53 is attached to the side liners 61 by paper ribbons 7, thereby retaining the blocks 45 in relation to the roof window 5. The paper ribbons 7 are in this embodiment a paper tape, which adheres to the blocks 45 and liners 61. It is to be understood that similar paper ribbons may also be used for attaching or retaining other blocks of shock absorbing material, for example at the corners where the blocks 42, 43, 44 extending along the sides, top and bottom of the roof window, meet. One of the paper ribbons of Fig. 4 further retains an installation guide in between the block 45 and the window pane 53. In this embodiment, the shock absorbing blocks 42-45 are made from paper and comprise honeycomb structures, to provide shock absorption.

[0119] Fig. 27 shows a lower end of a roof window 5 with packaging material components 44, 45, 61 corresponding substantially to the roof window shown in Fig. 3. Like in Fig. 4 a paper ribbon 7 in the form of a paper tape retains the block 45 relative to the roof window 5 and to the liners 61. Furthermore, additional paper ribbons 7 connect liners 61 and block 44 to each other, thereby retaining them in the shown positions relative to the roof window 5.

[0120] Returning now to Fig. 20, an upper end of a roof window 5 corresponding to substantially to the roof window shown in Fig. 3 is seen. As can be seen a paper ribbon 7 is here used to retain shock absorbing block 45 to the roof window 5 and at the same retain a carton 63. The paper ribbon 7 retains the block 45 in the same manner as in Fig. 27. The carton 63 is positioned on the window pane 53 and contains a collection of components for use in installing the roof window, such as a vapour barrier collar or flashing components. The carton 63 is made from cardboard and has a lid 63a which is longer than the remaining sides of the carton 63, allowing the lid 63a to extend across the block 45 and in between the roof window 5 and block 43. The paper ribbon 7 attaches the lid 63a to the block 45, thereby retaining the carton 63 in relation to the roof window 5.

[0121] Fig. 28 shows an example of a folded component being retained by a paper ribbon 7, preventing the cable from unfolding. The folded component is here embodied by the cable 64 of a rain-sensor. The paper ribbon 7 is here a strip of paper or cardboard arranged around the folded cable as a loop.

[0122] Fig. 29 shows a paper ribbon 7 being used for retaining an underroof collar 66 in a folded state. The paper ribbon is here provided with printed information 71 informing for example about the intended use of the underroof collar. Furthermore, the ribbon here has a weakening 72 in the form of perforations allowing the ribbon to be more easily broken at this place, thus facilitating unfolding of the underroof collar in the intended way.

[0123] Fig. 30 shows a paper ribbon 7 is used for retaining a tool 67 for use in the installation of a roof window product in relation to the cardboard box 2. In this case the tool 67 is a torque bit, but other tools may be attached in the same way.

[0124] Fig. 31 and 32 show examples of collections of fasteners 65 each being retained by a paper ribbon 7. In Fig. 31 the fasteners 65 are three screws and the paper ribbon 7 a strip of cardboard, and in Fig. 32 the paper ribbon is paper tape. In both cases the screws are interconnected by the paper ribbon 7.

[0125] The embodiment of Fig. 31 has the advantage that the paper ribbon 7 can also be used as a holder by an installer as shown in Fig. 33, where one of the screws is used for attaching a mounting bracket.

[0126] In the embodiment of Fig. 32 the fasteners 65 are retained in between two pieces of paper tape. In an alternative embodiment, a single piece of paper tape interconnecting the collection of fasteners can be attached to the cardboard box or to another item.

[0127] Turning now to Fig. 34, this figure is largely identical to Fig. 3 except for different reference number having been used. In the following the numbering in Fig. 34 will be referred to.

[0128] Fig. 34 shows a centre-hung roof window 1 comprising a frame 11 and a sash 12 carrying a pane 13 is shown. The roof window can be opened and closed and brought into an intermediate ventilation position by operating a handle bar 14 connected to ventilation flap 15, which is in turn connected to a locking assembly (not visible in Fig. 1) configured for locking the sash in relation to the frame. In the state shown in Fig. 1, the handle bar and the ventilation flap are, however, shown in a state, where they are disengaged from the locking assembly to make the roof window take up less room during storage and transportation. To prevent the disengaged handle bar and ventilation flap from moving too much during handling and transportation, ventilation flap retainers 21, 22 are attached to the handle bar 14.

[0129] A set of blocks 41-45 of shock absorbing material are arranged around a frame 11 of the roof window and on the pane 13. These blocks of shock absorbing material are intended to protect the roof window as described above and will not be described in further detail here.

[0130] Turning now to Fig. 35, which corresponds to a cross-section along the line A-A in Fig. 34, only without the ventilation flap retainer 21, the roof window 1 has been arranged in a cardboard box 3. As may be seen, the ventilation flap retainer 22 hooks over the handle bar 14 and extends from the interior side 131 of the pane 13 to the section 31 of the cardboard box extending in parallel therewith. In this way the ventilation flap retainer not only retains the handle bar and the ventilation flap to which the handle bar is connected but also contributes to preventing deformation of the cardboard box, thus protecting the roof window as such. In a similar manner the block 45 of insulating material provided on the exterior side 132 of the pane 13 keeps a distance between the pane and the section 32 of the cardboard box extending along it.

[0131] A further ventilation flap retainer 23 is seen between the ventilation flap 15 and the top frame member 111 of the roof window 1 in Fig. 35, extending into the ventilation passage 151. This ventilation flap retainer may both retain the ventilation flap and support the top sash member 121 of the roof window.

[0132] Turning now to Fig. 36, which corresponds to the detail marked B in Fig. 34 but seen from the interior side of a roof window 1 and showing a carton 24 instead of the ventilation flap retainer 21 made from moulded pulp. Here it is seen that both the handle bar 14 and the ventilation flap 15 are elongate extending in parallel with the top sash member 121 and extending over substantially the entire width of the roof window. This need not be the case, but the ventilation flap should be able to cover the entire opening of the ventilation passage 151, which in this case is divided into a series of openings by a grate-like structure 152.

[0133] As may be seen the ventilation flap retainers 22, 23, which were shown in Fig. 35, are both made from folded cardboard and the carton 24 attached to the handle bar 14 also serves as a ventilation flap retainer. The ventilation flap retainers 22, 23 may be made from recycled unbleached cardboard, and so may the carton 24, but as the carton contains items to be used in the installation or operation of the roof window, it may be advantageous to make it from white cardboard to make draw attention to it, ensuring the items inside are not unintentionally discarded.

[0134] The ventilation flap retainer 22 is shown in more detail in Fig. 37-39, Fig. 37 showing the retainer in an unfolded state and Fig. 38 showing it in the folded state also seen in Fig. 36. A bone-shaped cut-out 221 is configured for attachment of the handle bar 14 of the roof window, and fold lines 222 extend perpendicular to the longest dimension of the cut-out. As shown in Figs 39a-39c the ventilation flap retainer 22 is attached to the handle bar 14 by first arranging the unfolded or slightly folded ventilation flap retainer on top of the handle bar so that the straight section 2211 of the cut-out extends in parallel with the handle bar. When then folding the ventilation flap retainer 22 along the fold lines 222, the straight sections 2211 passes over the handle bar, which becomes arranged in the wider end sections 2212 of the cut-out 221. The slight elasticity of the cardboard at the fold lines 222, which urges the ventilation flap retainer 22 back towards the unfolded state, now presses the ends of the cut-out 221 against the handle bar 14, as may also be seen in Fig. 36, keeping it in place.

[0135] When the roof window has been unpacked, the ventilation flap retainer 22 is no longer needed and may be removed. At the same time the sash of the roof window often needs to be removed to facilitate installation of the frame in the roof structure, and the ventilation flap retainer may then be folded further and used for protecting the sash. The further folded ventilation flap retainer is shown in Fig. 40, and the further folded ventilation flap retainer attached to a corner of the sash is seen in Fig. 41. As is best seen in Fig. 41, the ventilation flap retainer 22 remains folded at the original fold lines 222 and is further folded along a secondary folding line 223, which is located at the indentation 2231 seen in Figs 37-38 and extending in parallel with the original fold lines 222. The ventilation flap retainer is fixated in the further folded state by folding the V-shaped sections 224, and the cut-out 221 now fits over a projecting edge 122 of the sash of the roof window as shown in Fig. 41. The cut-out 221 is preferably slightly smaller than the projecting edge 122 of the sash, so that the further folded ventilation flap retainer 22 is kept in place on the sash by friction.

[0136] In this embodiment the V-shaped sections 224 are delimited by premade cuts in the material, but it is also possible to use weak zones, which can be interrupted when the V-shaped sections are to be used, or printed lines indicating where to cut the cardboard.

[0137] Furthermore, information 225 about the intended use of the ventilation flap retainers 22 may be printed on its surface as shown in Fig. 37.

[0138] Two alternative ventilation flap retainers 22 are shown in Figs 42 and 43. In Fig. 42 the ventilation flap retainer 22 is pre-folded with a pipe-shape cross-sectional shape instead of the U-shape resulting from the folding shown in Figs 39a-39c, and in Fig. 43 the ventilation flap retainer 22 is made from a honeycomb material. Both of these ventilation flap retainers are stronger and more stable than the one in Figs 36-39, but not immediately useable for sash corner protection.

[0139] Turning now to Figs 44-47, the further ventilation flap retainer 23 arranged between the ventilation flap 15 and the top frame member of the roof window 1 and extending into the ventilation passage 151 is shown in more detail. Two fold lines 232 separate two wing sections 233 from a centre section 234. The wing sections are configured for being inserted into the ventilation passage 151 as shown in Fig. 46a-46b and the centre section is configured for abutting the ventilation flap 15 as shown in Fig. 47.

[0140] The shape and size of the further ventilation flap retainer 23 will depend on the design of the roof window. Particularly the shape of the ventilation passage 151 and hence the shape and position of the wing sections 233 may therefore need to be different from what is shown in Figs 44-47.

[0141] An alternative to the ventilation flap retainer 23 shown in Figs 44-47 is shown in Figs 48-50. This ventilation flap retainer 23' is folded along fold lines 232 so that the cut-out 231 at the centre gets a T-shape fitting over the bracket assembly 153 connecting the ventilation flap 15 to the locking assembly 154 (only visible in Fig. 50) of the roof window. At the same time other cut-outs 236 and recesses 237, which overlap in the folded state, fit over the grate-like structure 152 at the entrance to the ventilation passage 151, and the elasticity resulting from the folding keeps the ventilation flap retainer 23' in place. A further recess 235 allows the ventilation flap retainer to also be used with an electrically operated window comprising a further bracket 155 attached to the ventilation flap as shown in Fig. 50.

[0142] The shape and size of this ventilation flap retainer 23' too will depend on the design of the roof window. Particularly the shape of the cut-outs 236 and recesses 235, 237 may need to be different from what is shown, the further recess 235 need not be present in all embodiments.

[0143] Instead of removing material at cut-outs 236 it is possible to bend back flaps of material such that they project along the surface of the grate-like structure 152 in the mounted state. This may contribute to keeping the ventilation flap retainer 23 in place.

[0144] Compared to the embodiment in Figs 44-47, the embodiment in Figs 48-50 has proven to be stronger and more stable in use.

[0145] Common to the embodiments shown in Figs. 36-42 and 44-50 is that cardboard or corrugated cardboard has been used. These materials are considered advantageous due to the combination of low price and high precision in dimensions, but other paper-bases materials may be used. The fold lines 222, 232 may be predefined by printed lines, compressed lines or weak zones in the material, for example by the cardboard being partially cut through along the intended fold lines.

[0146] Turning now to Figs. 51a-51d, showing how a cardboard blank is folded into a carton 24 and attached to the handle bar 14 of a roof window. This carton may serve both to hold items for use in the installation or operation of the roof window and as a ventilation flap retainer. It corresponds to the one shown in Fig. 36, except for having a slightly different shape. Fig. 36 is seen from the interior side of the roof window, whereas the Figs 51c-51d are seen from the exterior side of the roof window.

[0147] As is best seen in Fig. 36, the carton 24 engages with the interior side of the pane 13, but does not project above the handle bar in the opposite direction. It is, however, possible to make the carton bigger so that it could potentially extend out to the cardboard box 3 in the same way as the ventilation flap retainer 22 in Fig. 35. An example of such a bigger carton 24' is shown in Fig. 52.

Claims

1. A packed roof window, where the roof window is contained in a cardboard box, where packaging components are arranged inside the cardboard box, and where the packaging components are used for protecting and retaining components of the roof window, **characterised in that**
all packaging components are made from paper-based materials, which consist of a least 95% paper by weight.

2. A packed roof window according to claim 1, wherein all packaging components are made from paper-based materials, which consist of a least 97% paper by weight.

3. A packed roof window according to claim 1 or 2, wherein all non-paper materials in the packaging components are biodegradable.

4. A packed roof window according to one or more of the preceding claims, wherein said packaging components include one or more components chosen from the group consisting of: blocks of paper-based shock absorbing material, paper bags, paper ribbons, cartons, and retainers made from folded cardboard.

5. A packed roof window according to claim 4, wherein one or more blocks of paper-based shock absorbing material comprises a honeycomb material.

6. A packed roof window according to claim 4, wherein a carton contains components for use when installing or operating the roof window.

7. A packed roof window according to claim 4, wherein the roof window comprises a ventilation passage and a ventilation flap, said ventilation passage extending from an interior side of the roof window to an exterior side of the roof window, said ventilation flap being provided on the interior side of the roof window and being moveable being a first position, where the ventilation passage is open, and a second position, where it covers the ventilation passage, and wherein one or more retainers made from folded cardboard include a ventilation flap retainer provided on or at the ventilation flap to prevent it from unintentional movement.

8. A packed roof window according to one or more of the preceding claims, wherein one or more packaging components are configured for serving a secondary purpose after having been removed from the roof window.

9. A packed roof window according to one or more of the preceding claims, wherein the packaging components are made from one or more materials chosen from the group consisting of: moulded pulp, folded cardboard, folded corrugated cardboard, multilayer corrugated cardboard, cardboard profile, and honeycomb material, preferably a having a cell size of 22-26 mm and being made from paper with a weight of 120-240 g/m^2 and having a height of 20-40 mm.

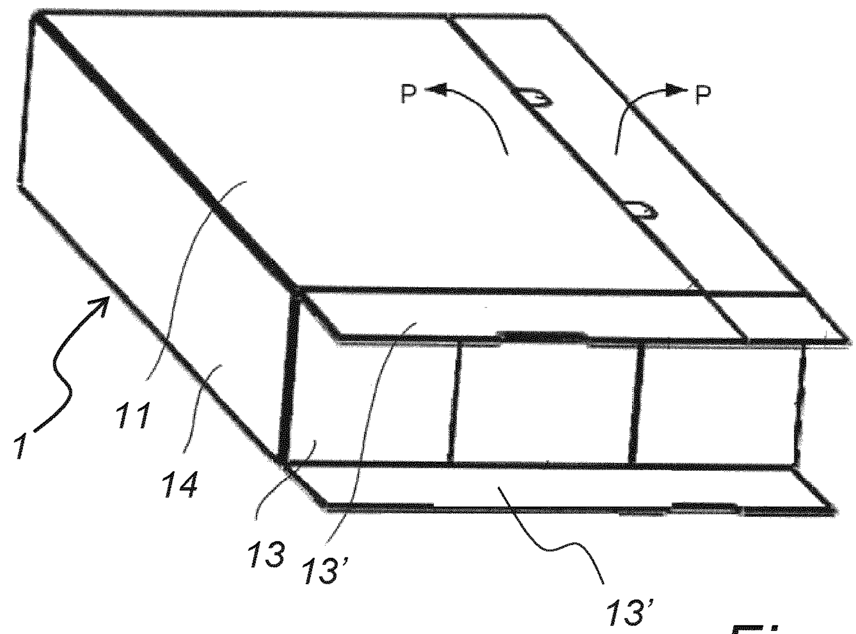


Fig. 1

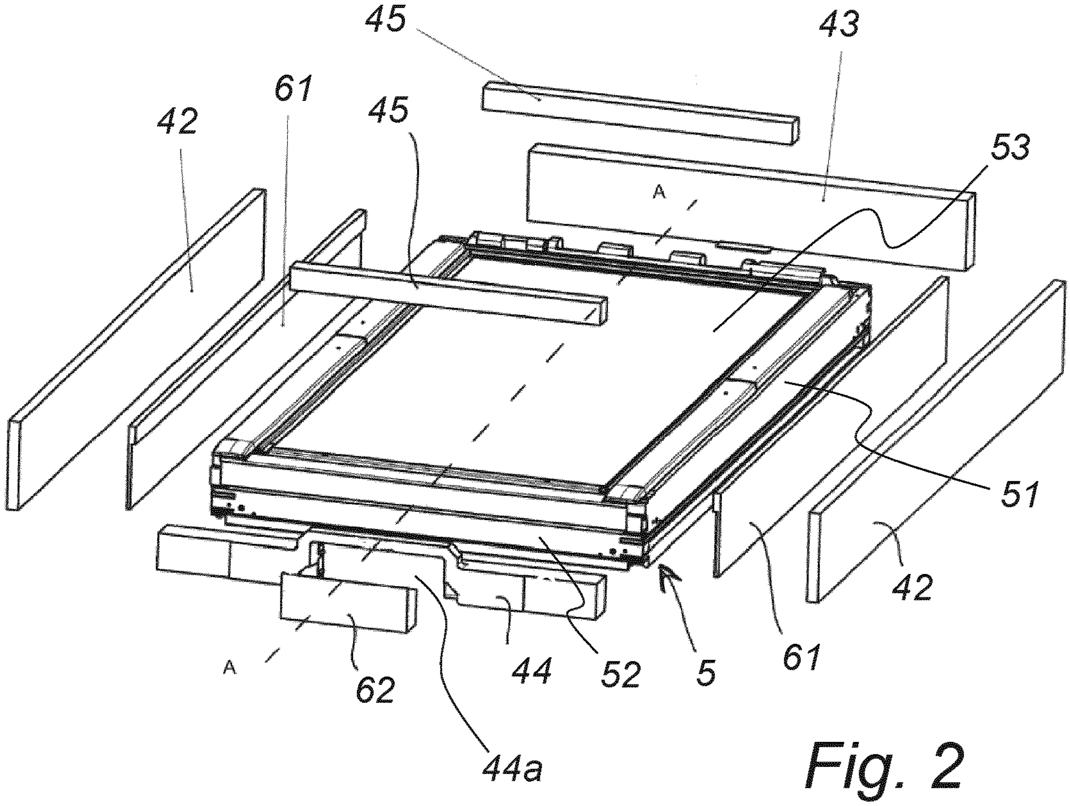


Fig. 2

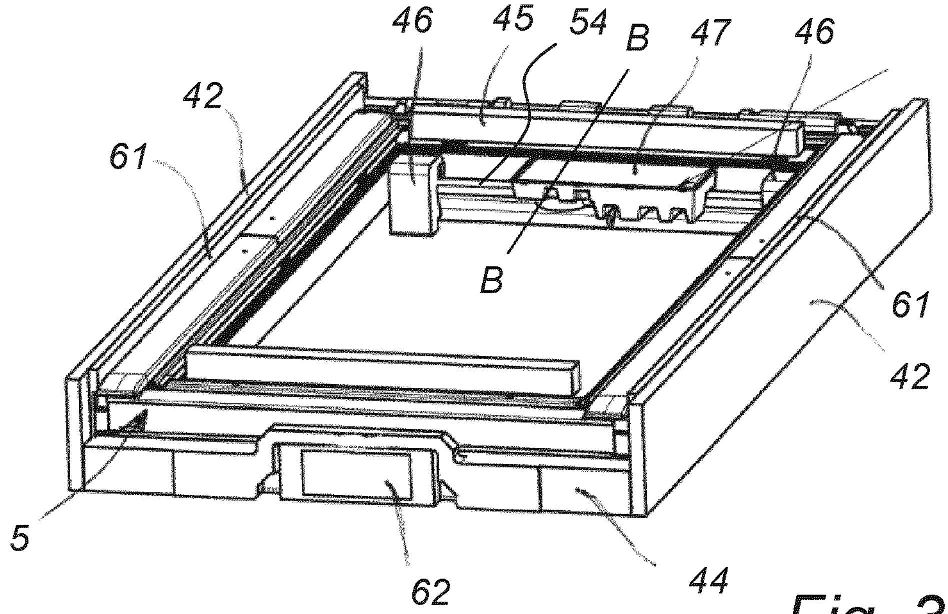


Fig. 3

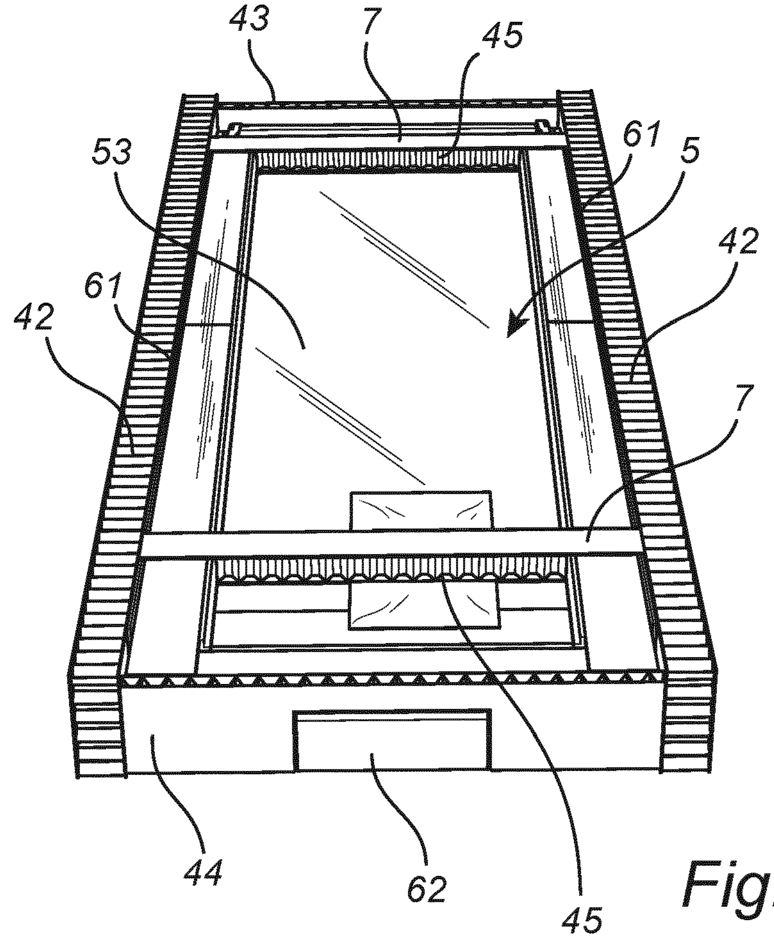


Fig. 4

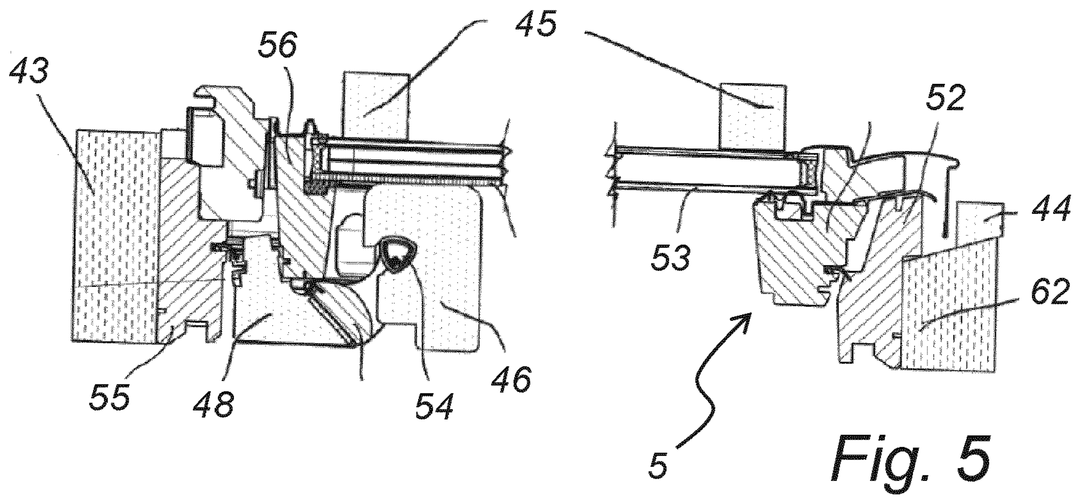


Fig. 5

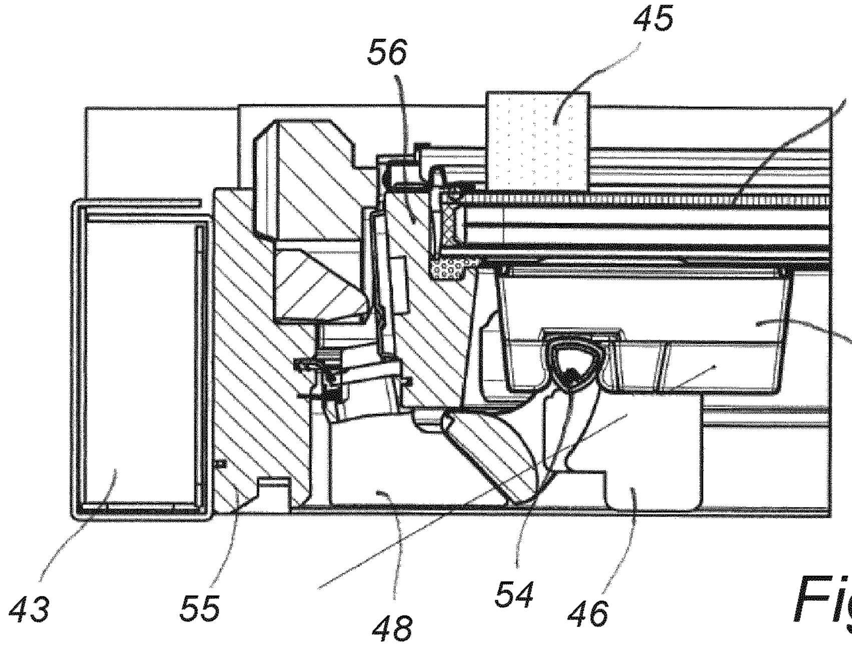


Fig. 6

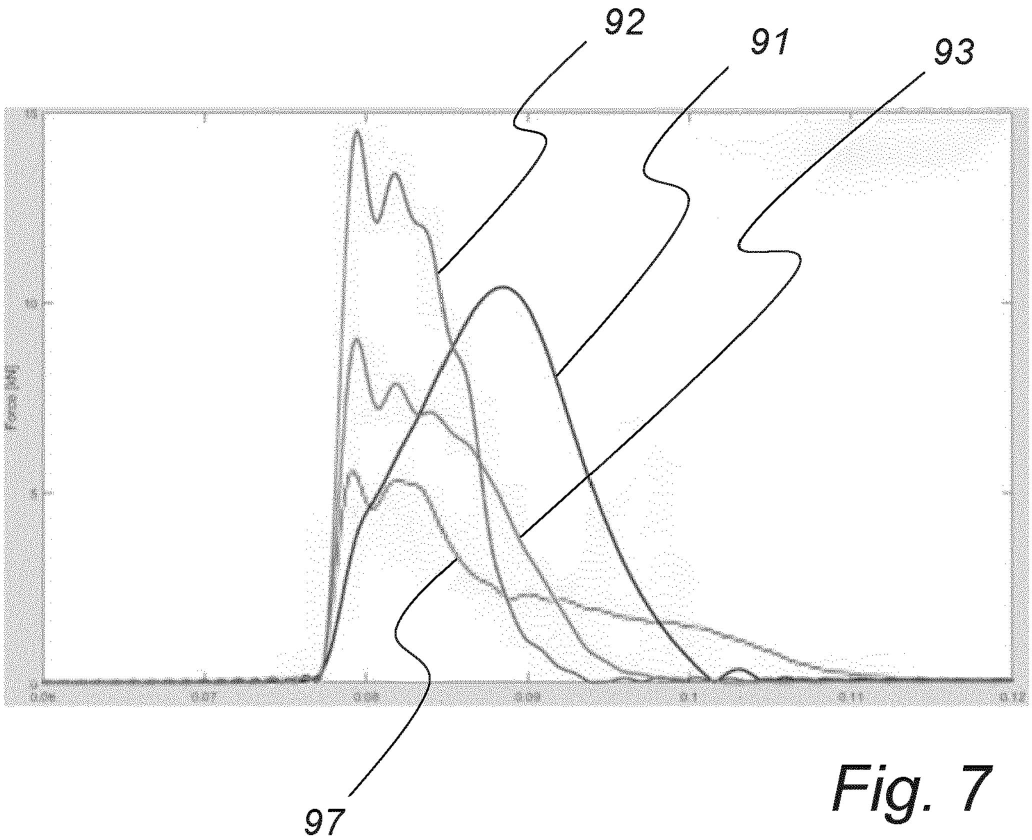


Fig. 7

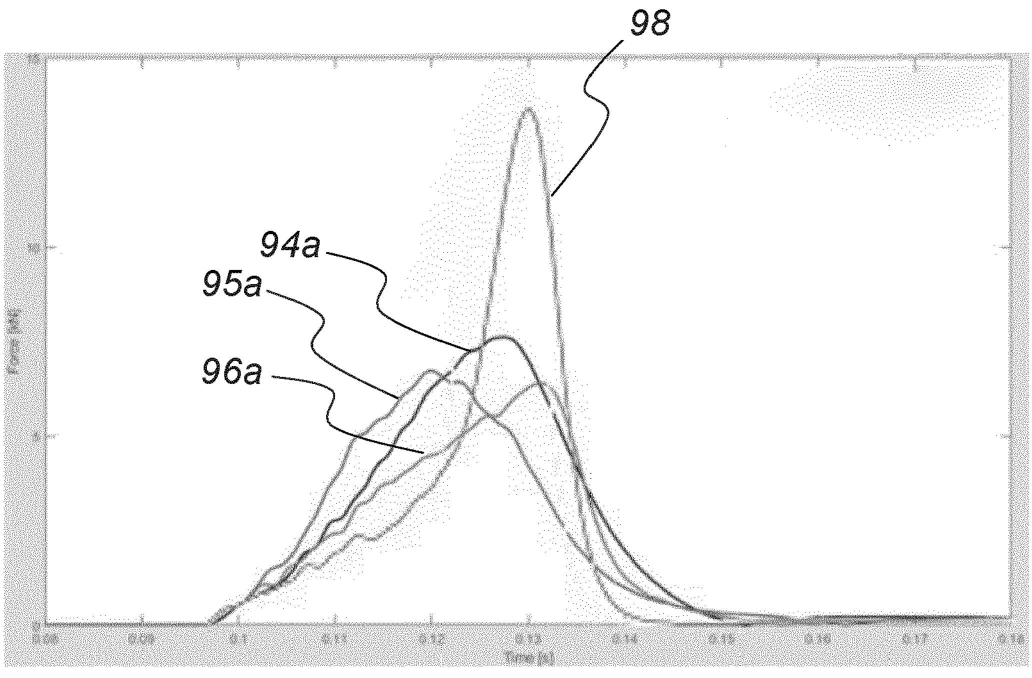
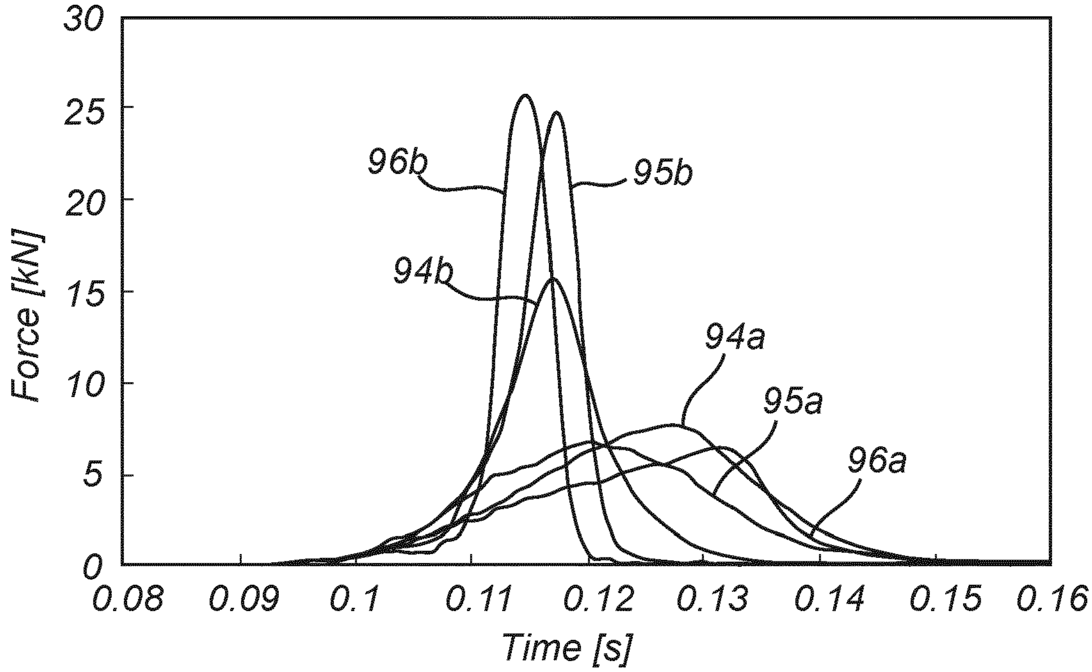


Fig. 8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25
20
15
10
5
0
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0.09
0.1
0.11
0.12
0.13
0.14
0.15
0.16
Time [s]
96b
95b
94b
94a
95a
96a

Fig. 9

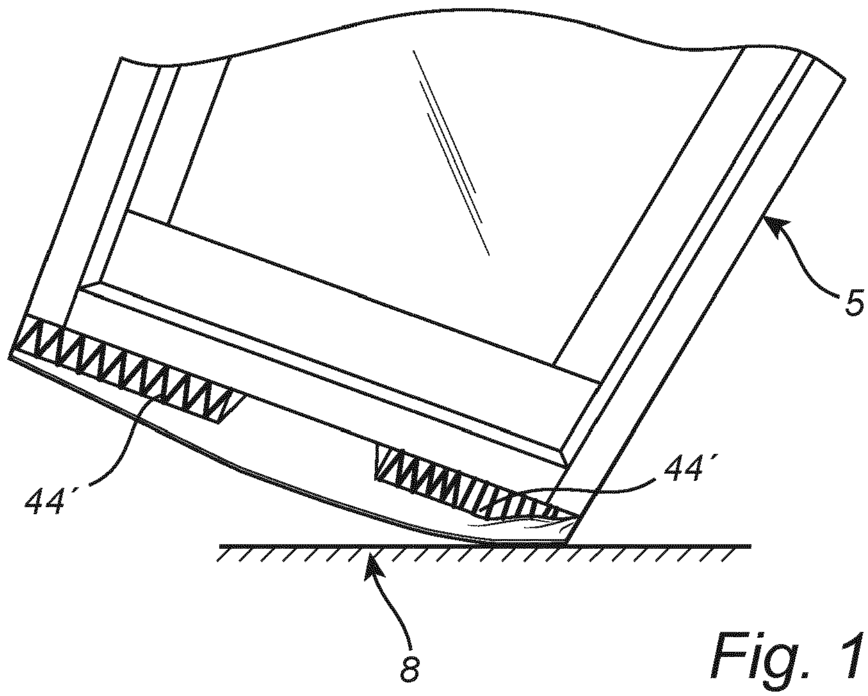

5
44´
44´
8

Fig. 10

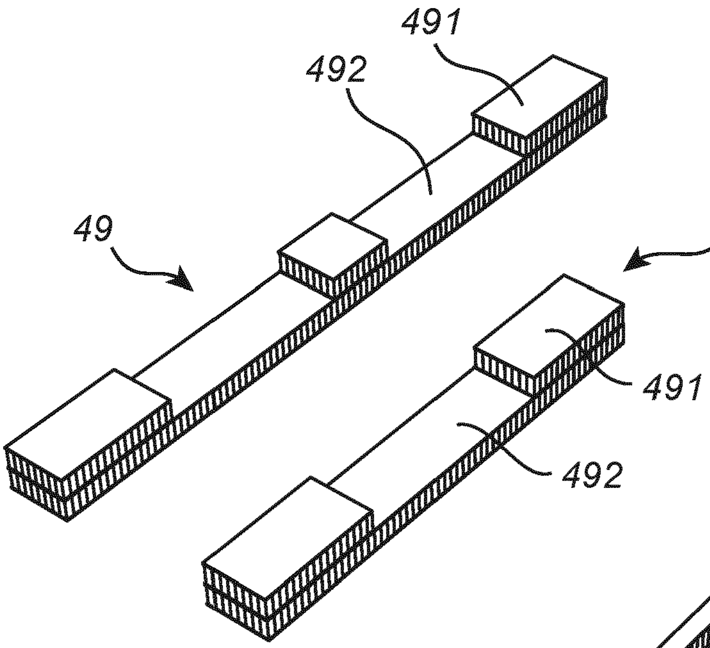


Fig. 11

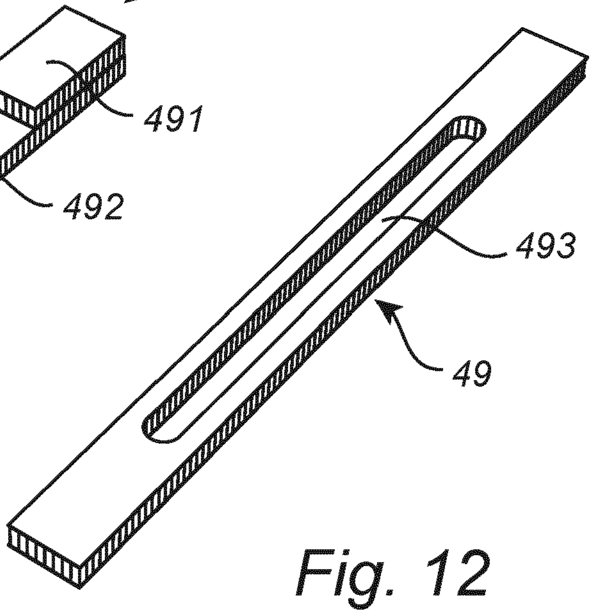


Fig. 12

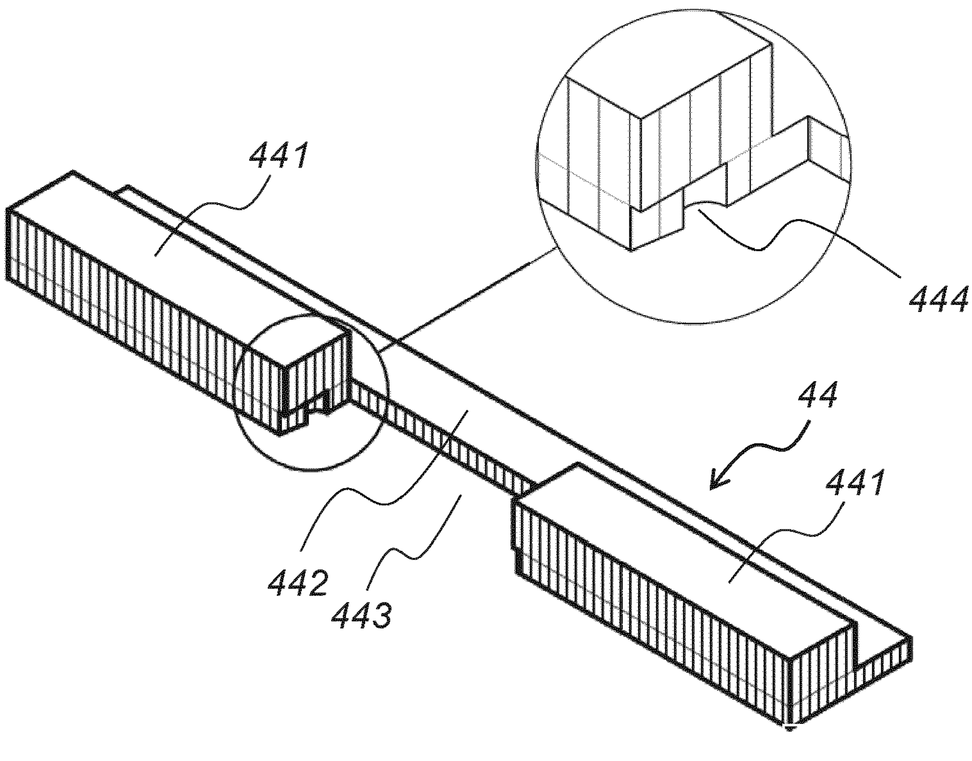


Fig. 13

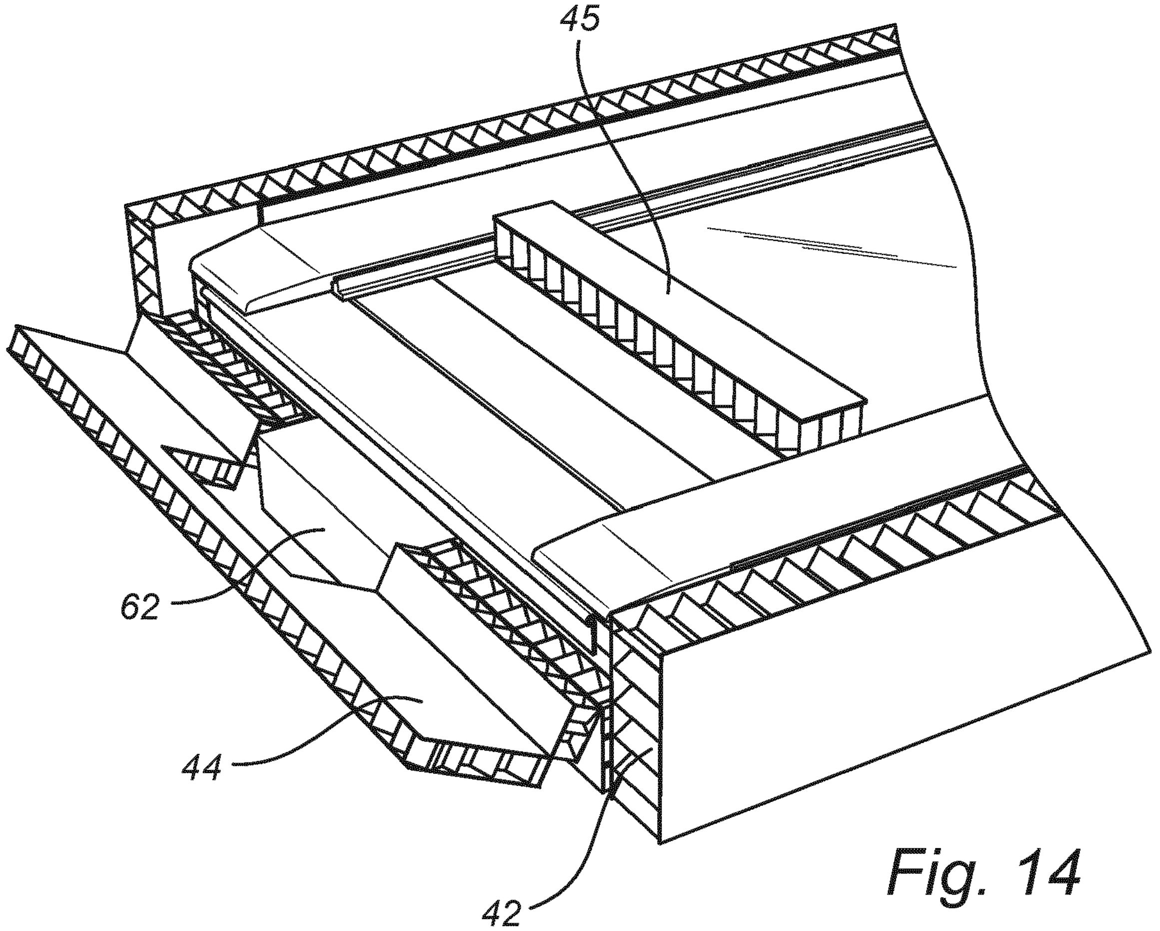


Fig. 14

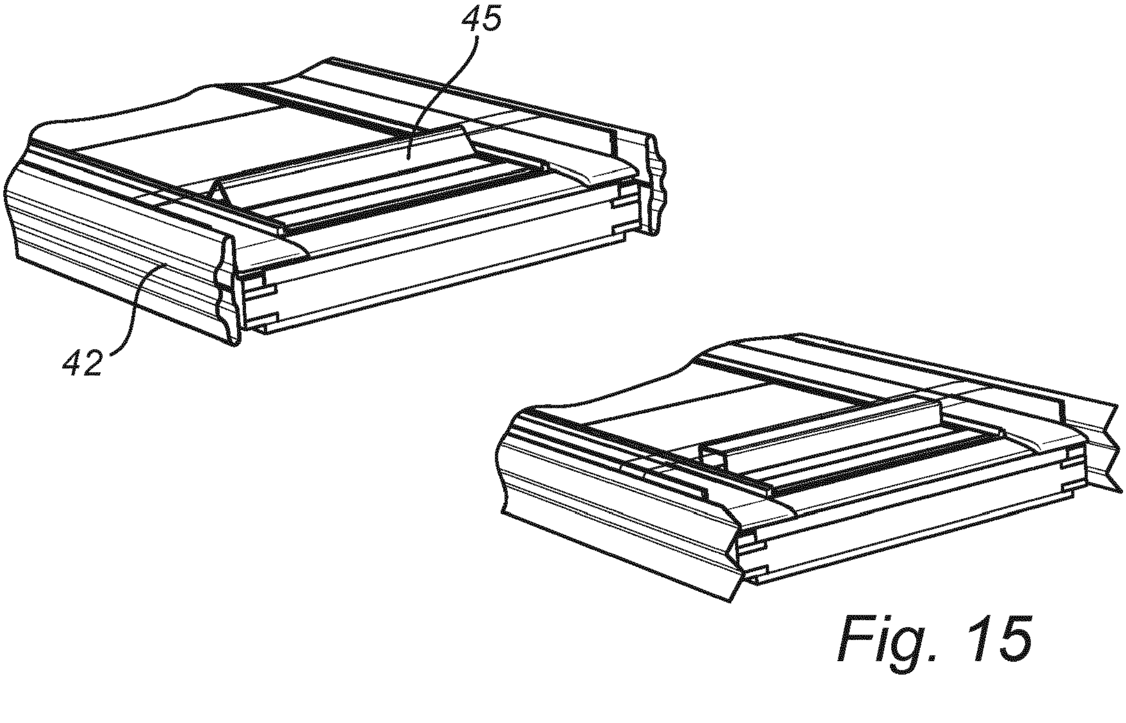


Fig. 15

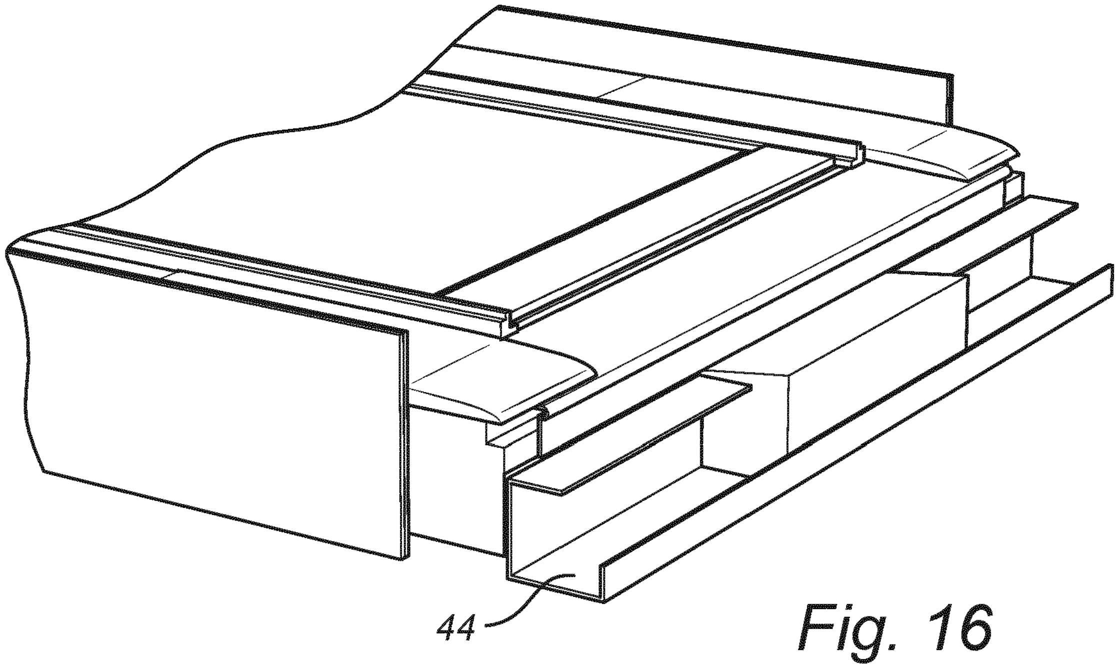


Fig. 16

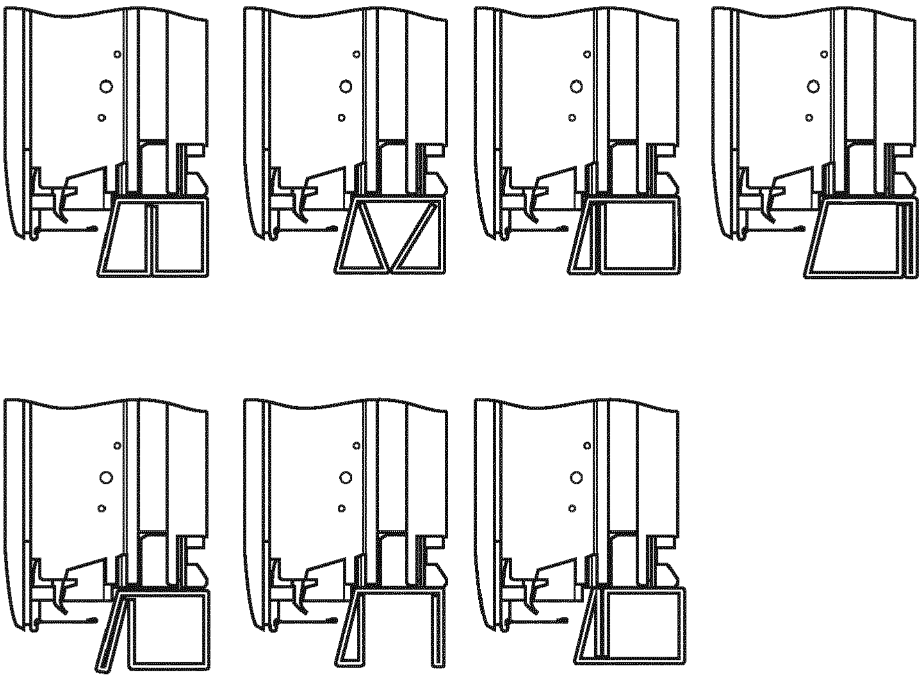
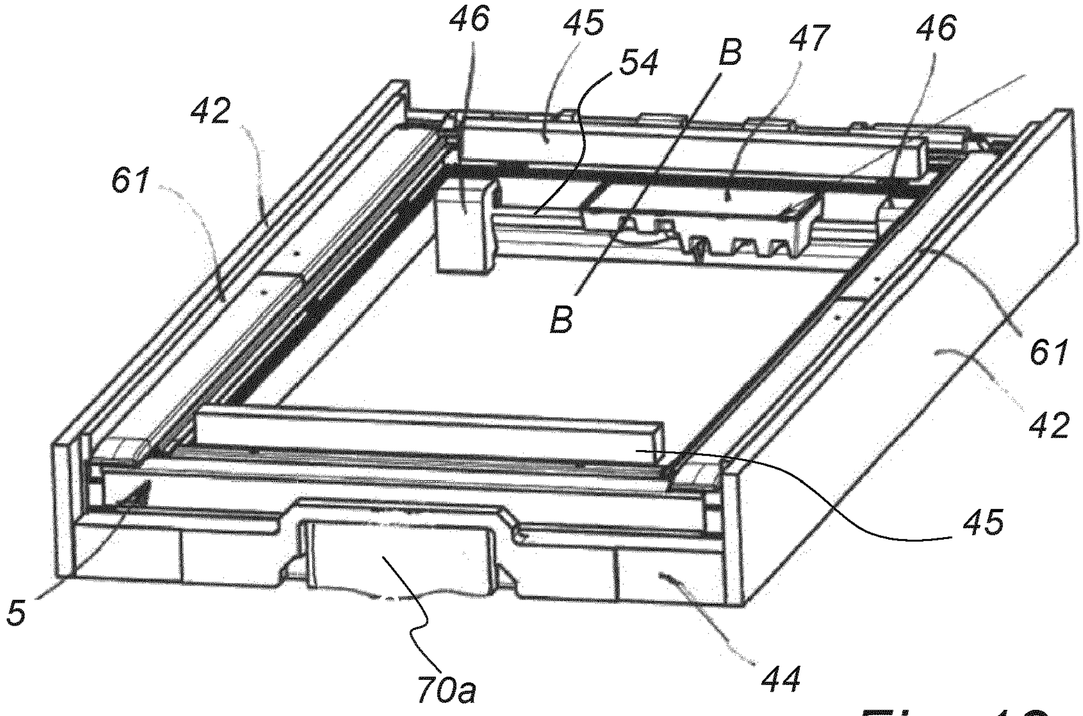


Fig. 17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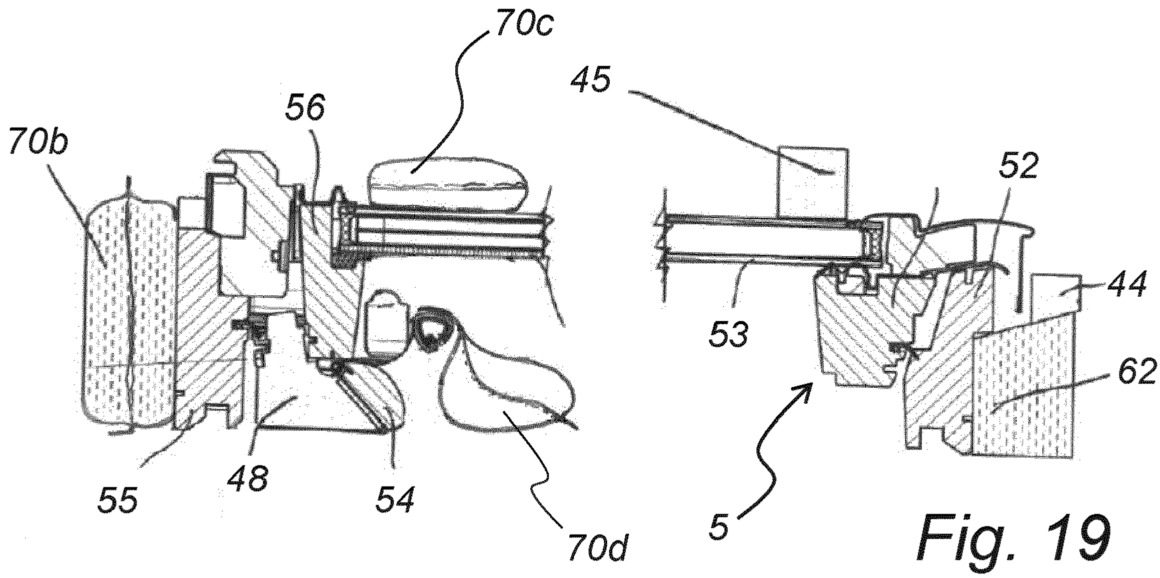
45
54
B
47
46
42
61
B
61
42
45
5
70a
44

Fig. 18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48
54
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70d

Fig. 19

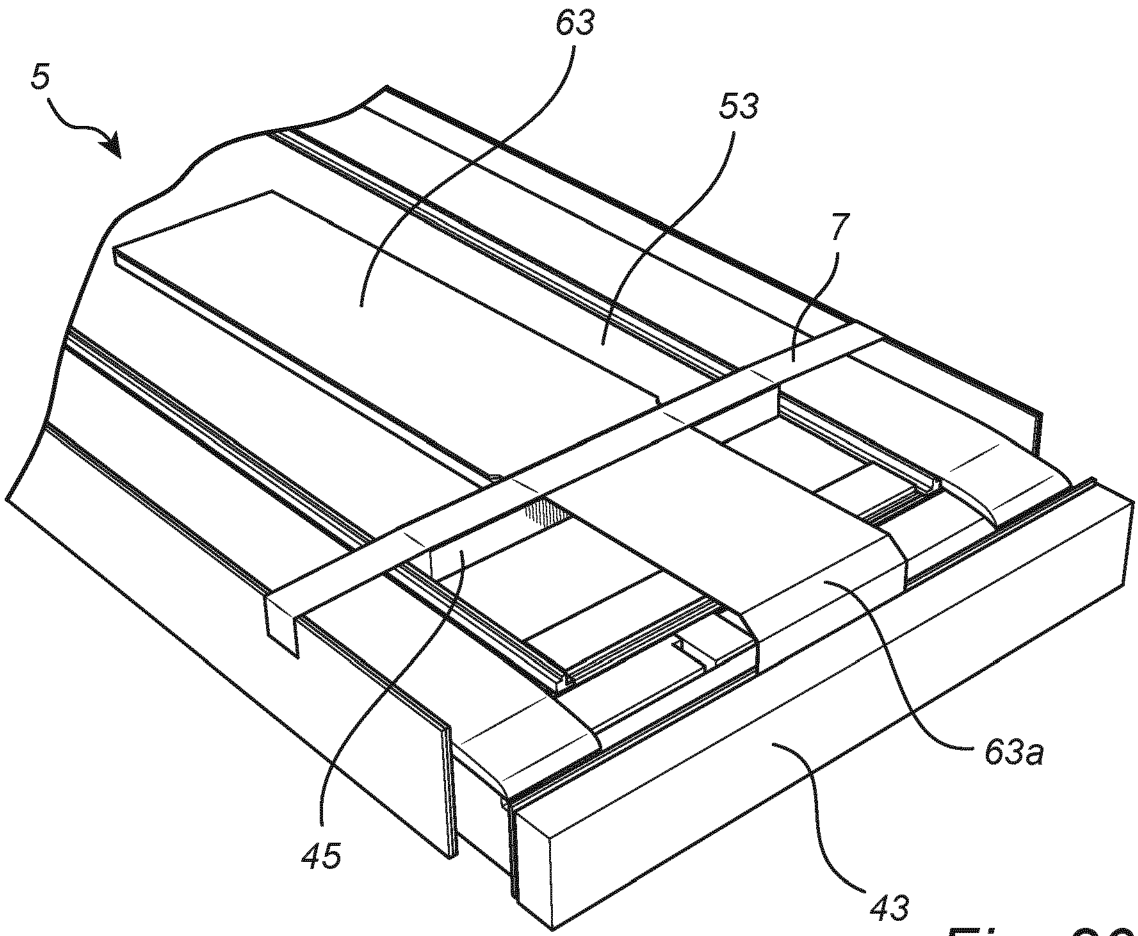

Fig. 20

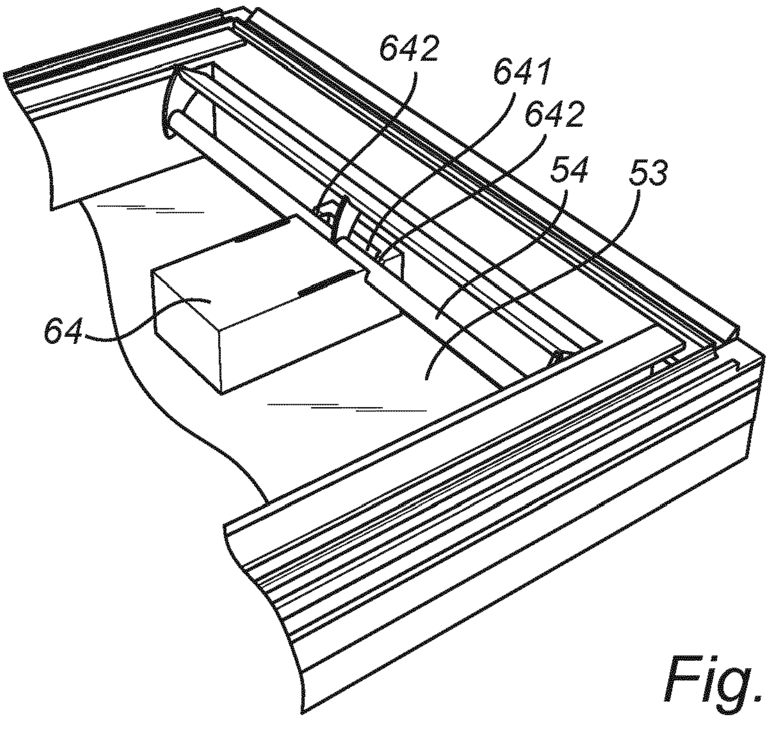

Fig. 21

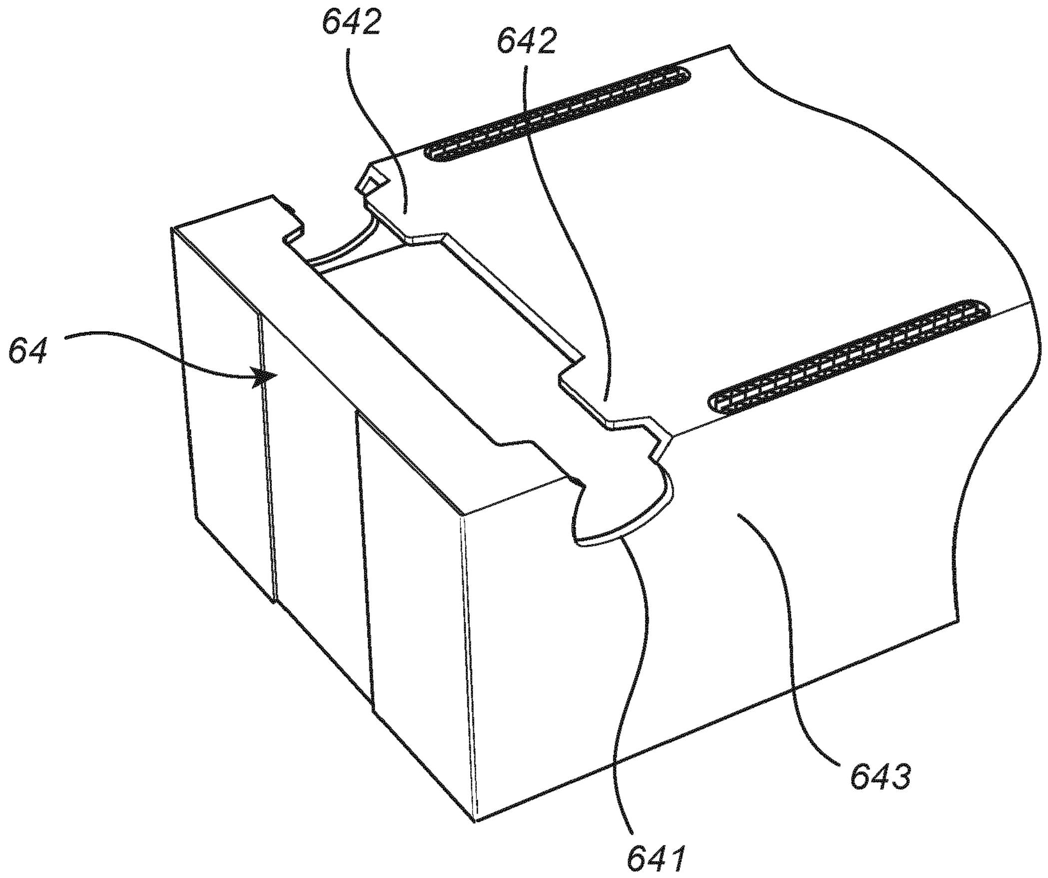

Fig. 22

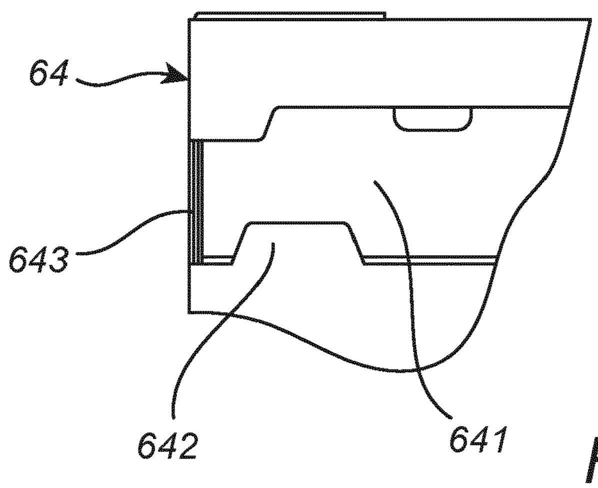

Fig. 23

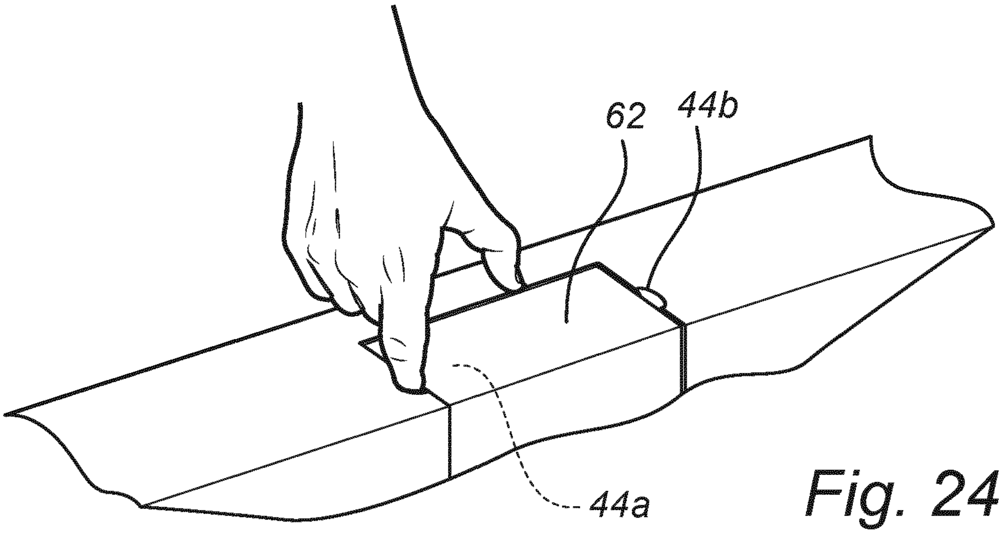

Fig. 24

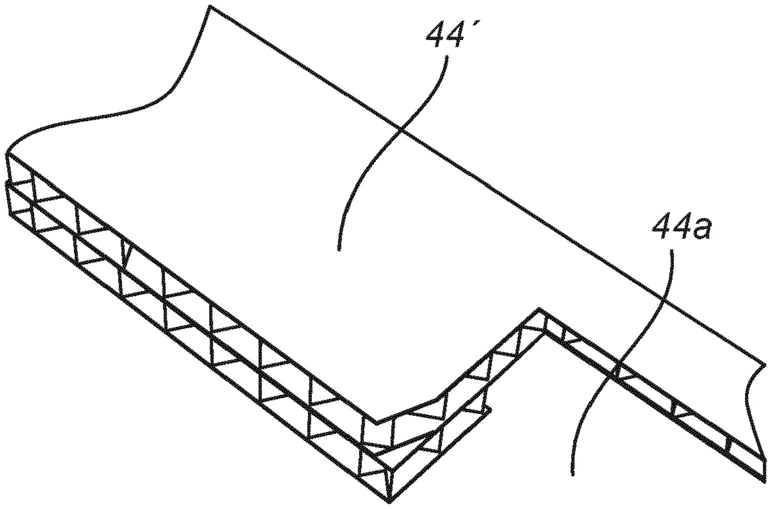

Fig. 25

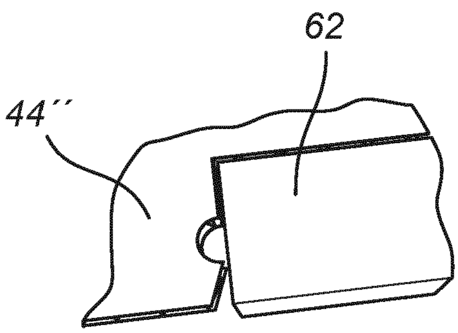

Fig. 26

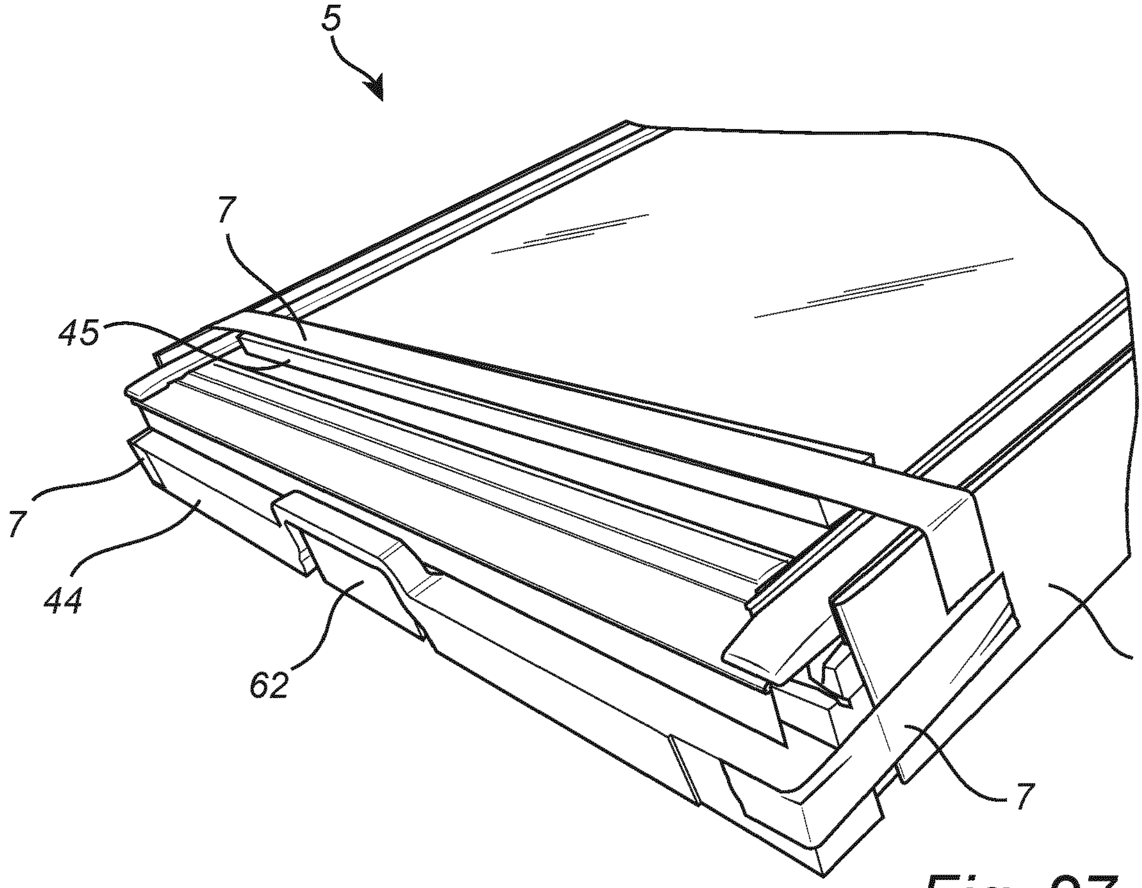

Fig. 27

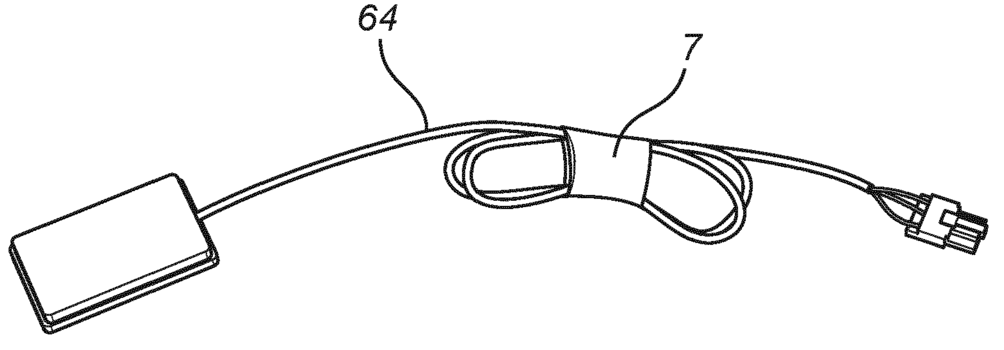

Fig. 28

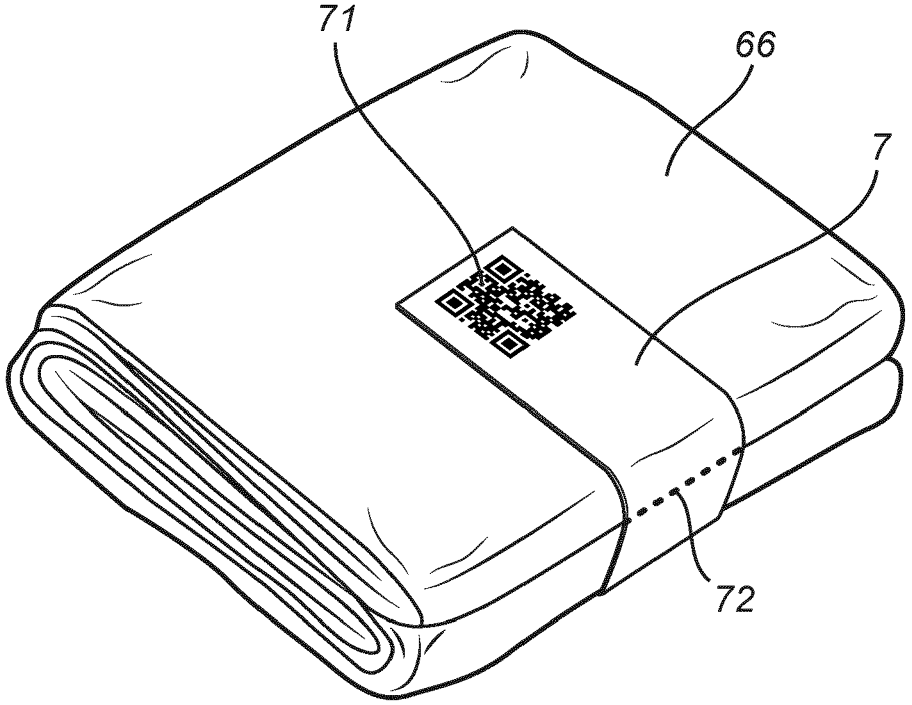

Fig. 29

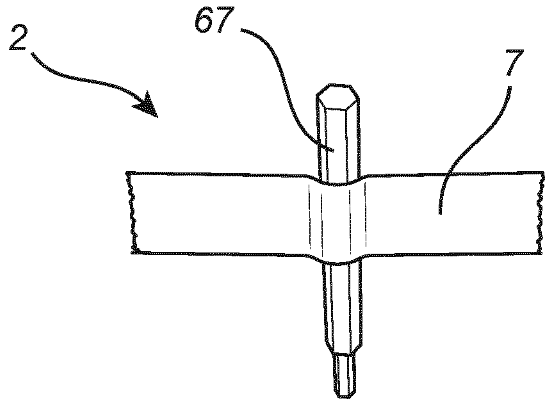

Fig. 30

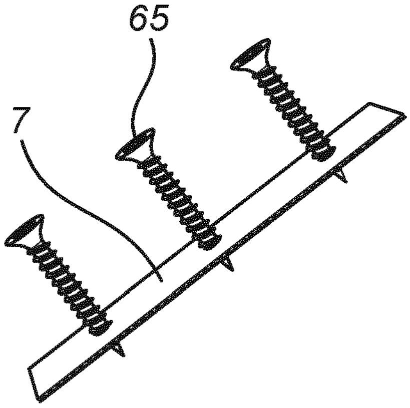

Fig. 31

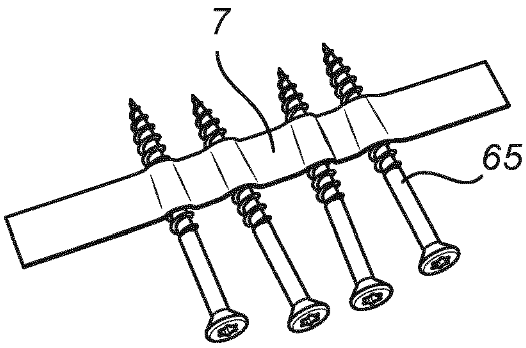

Fig. 32

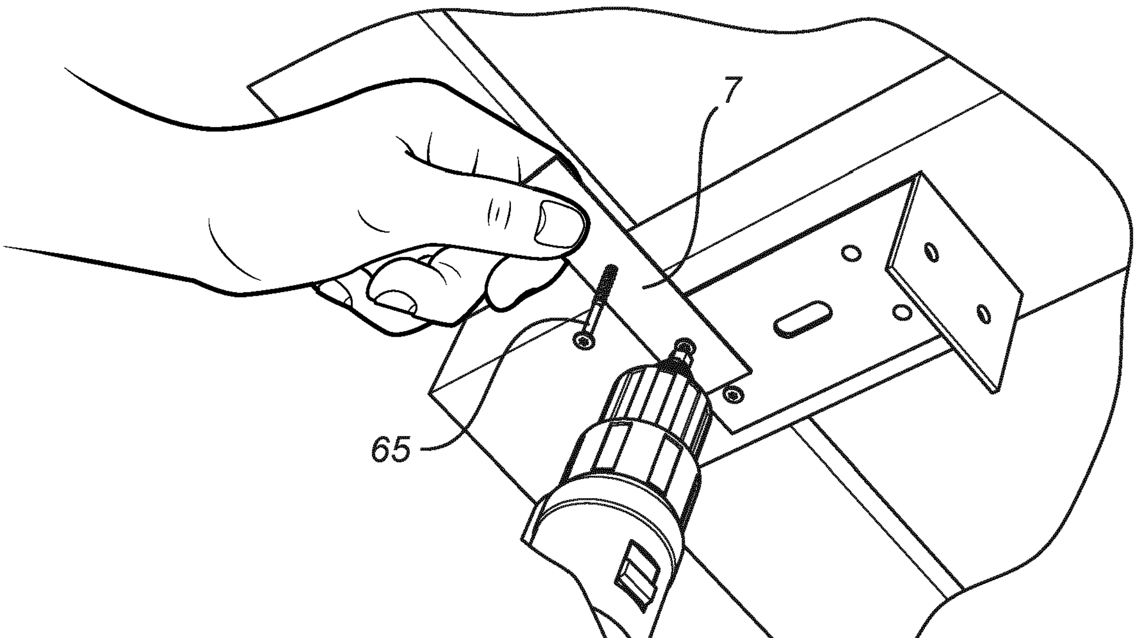

Fig. 33

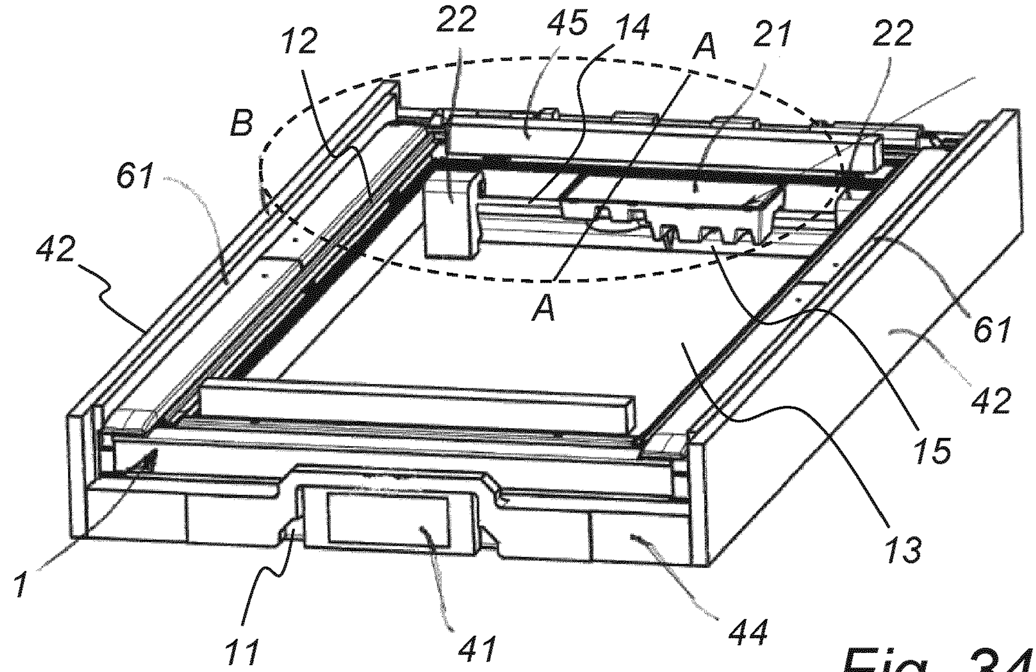
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Fig. 34

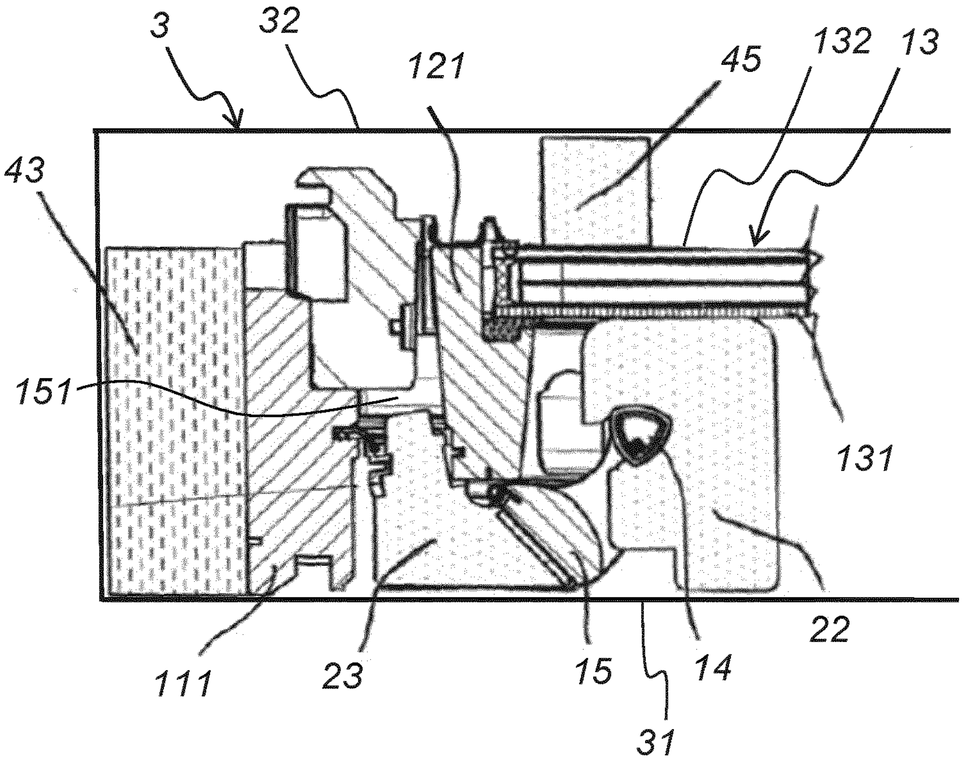
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Fig. 35

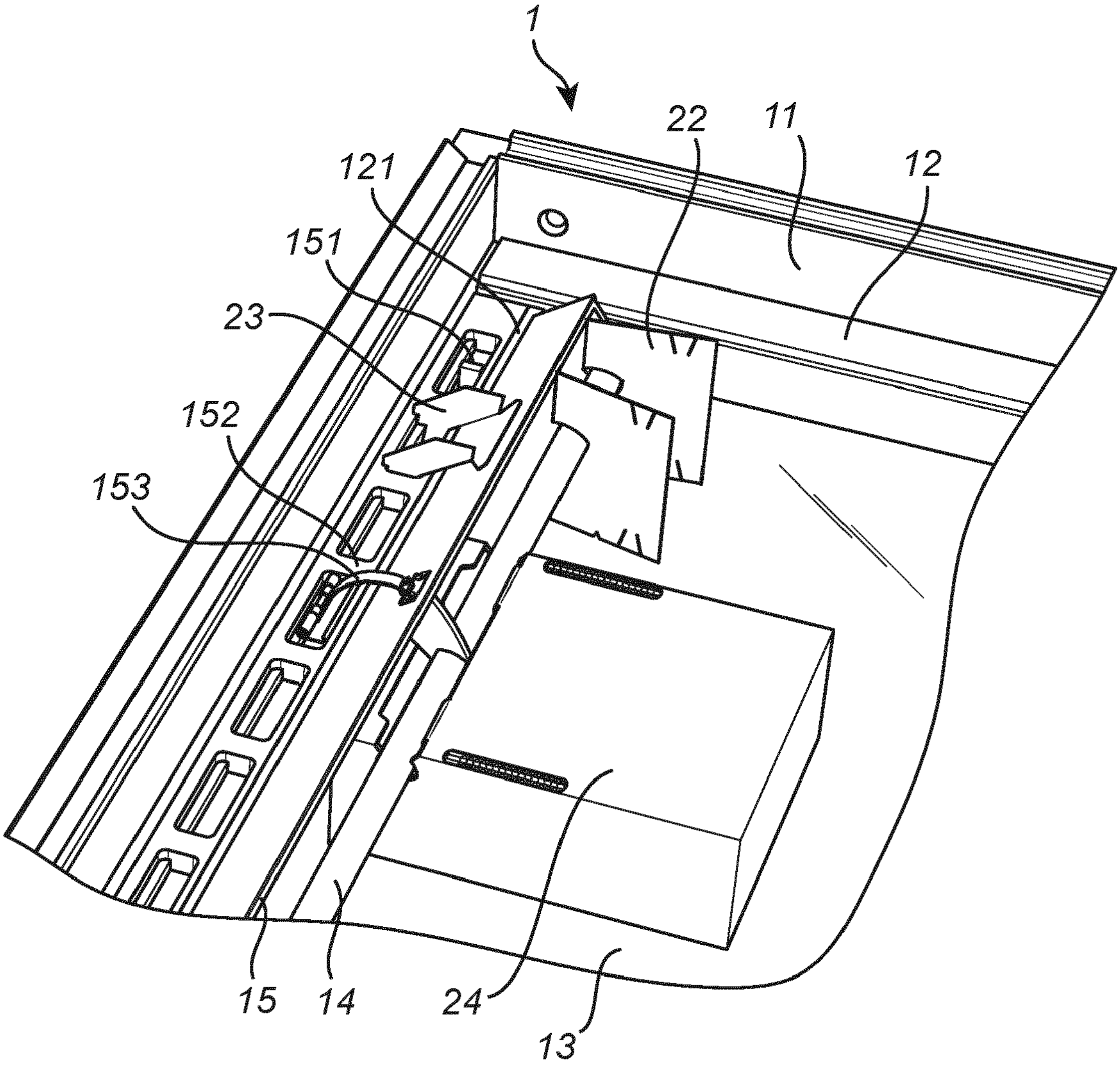

Fig. 36

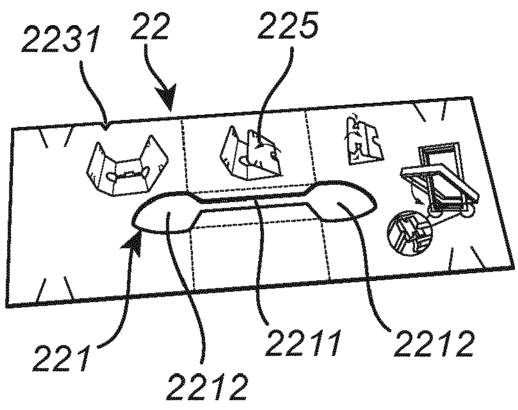

Fig. 37

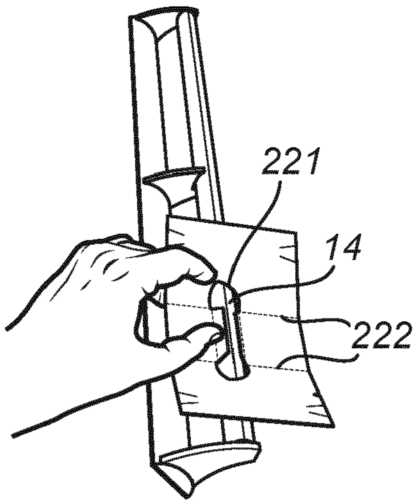

Fig. 39a

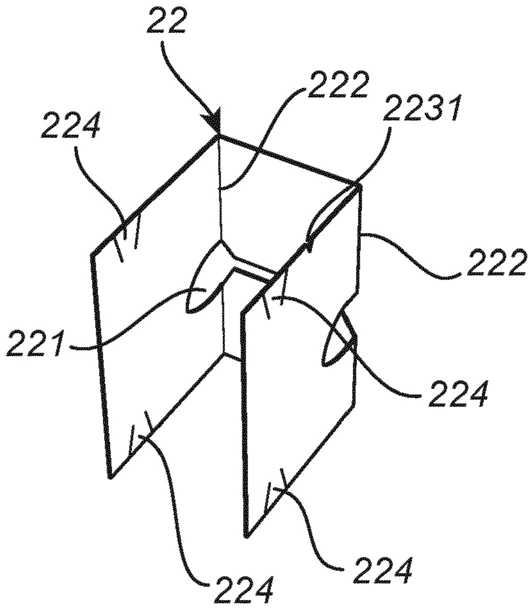

Fig. 38

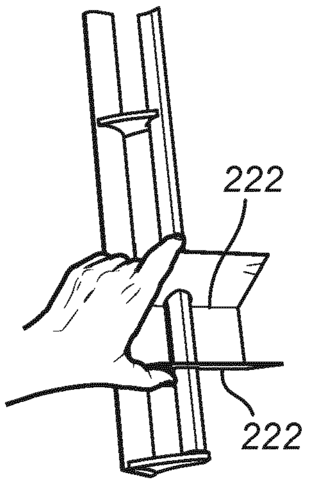

Fig. 39b

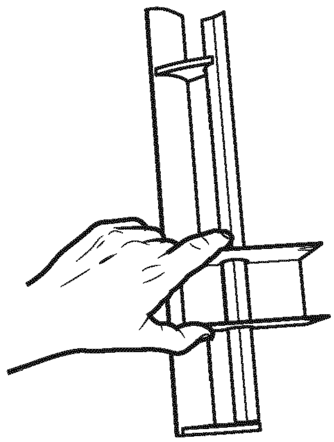

Fig. 39c

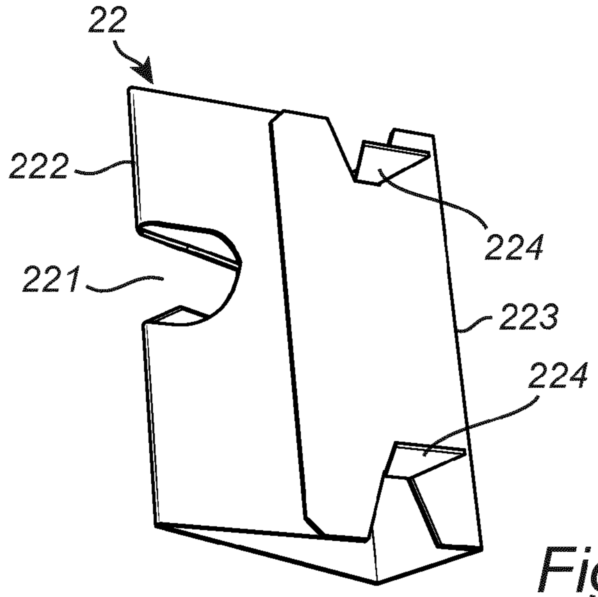

Fig. 40

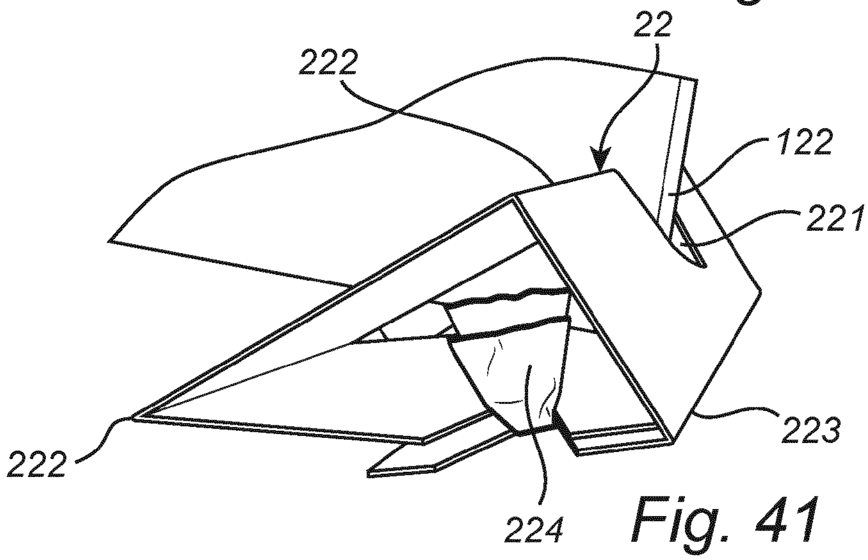

Fig. 41

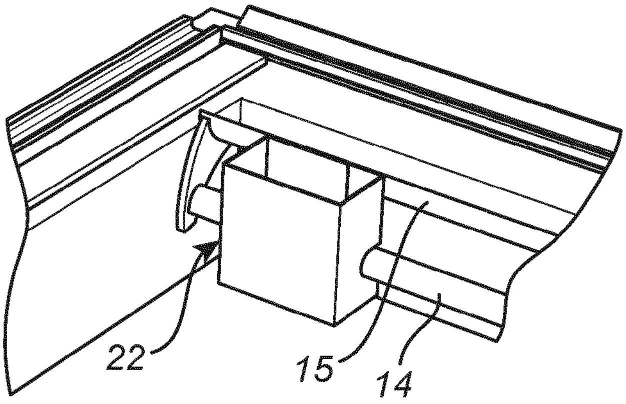

Fig. 42

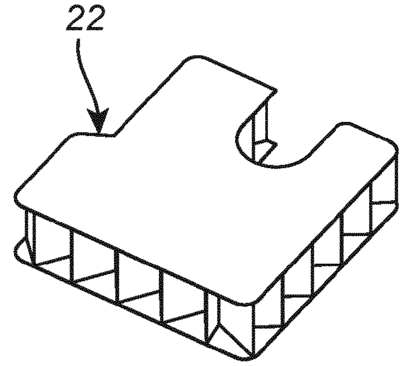

Fig. 43

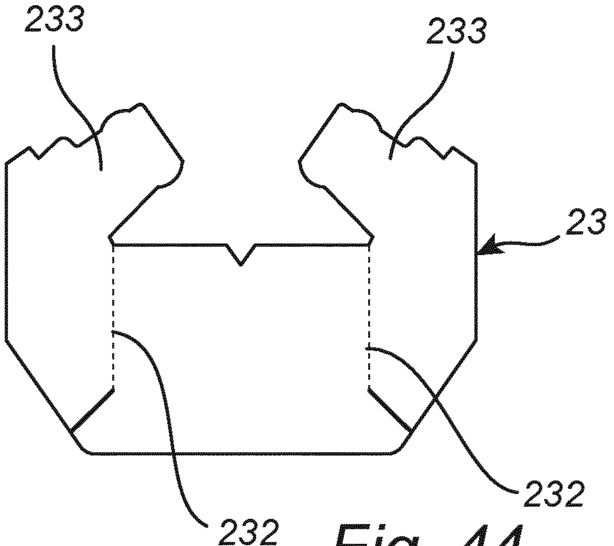

Fig. 44

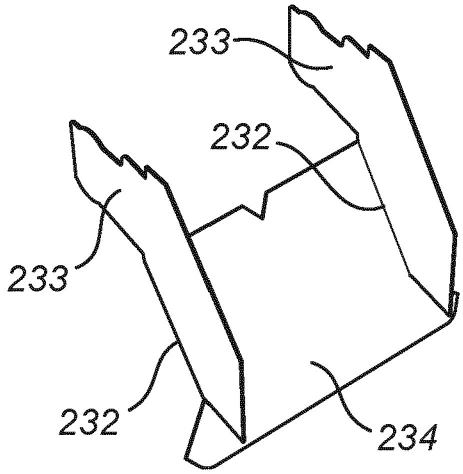

Fig. 45

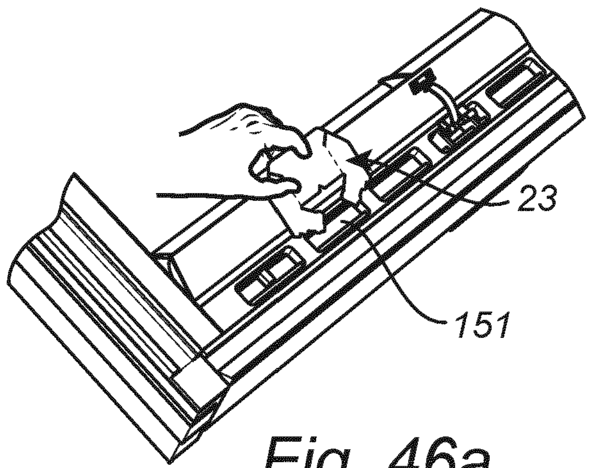

Fig. 46a

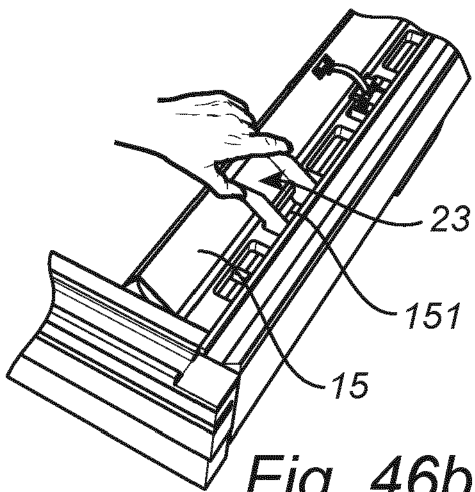

Fig. 46b

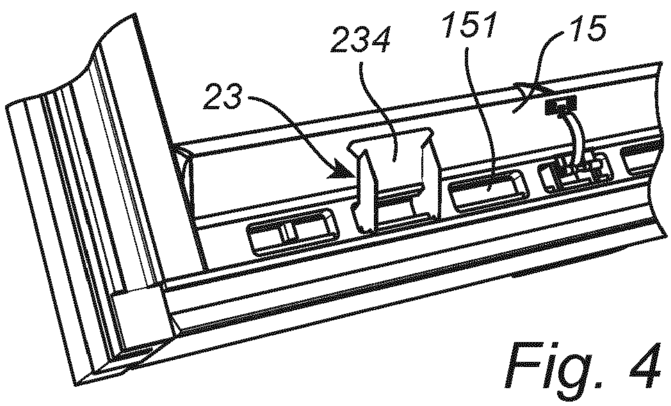

Fig. 47

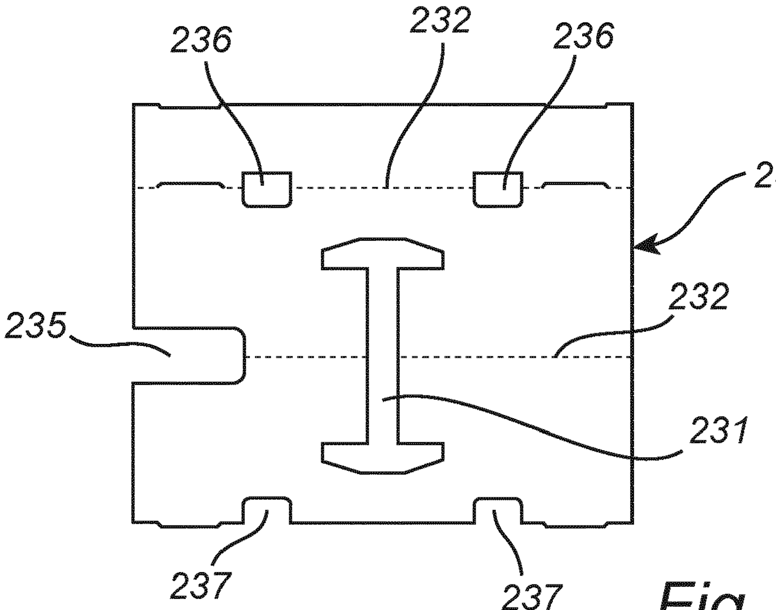

Fig. 48

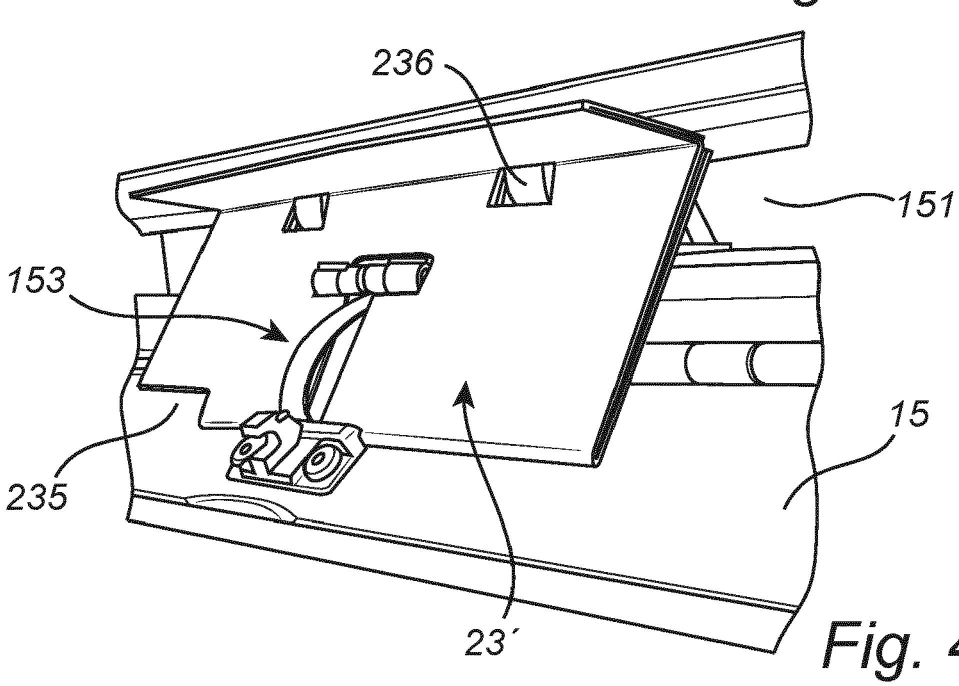

Fig. 49

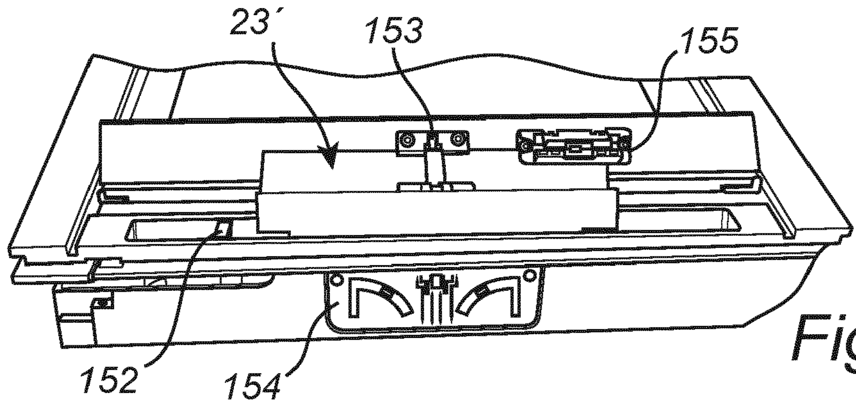

Fig. 50

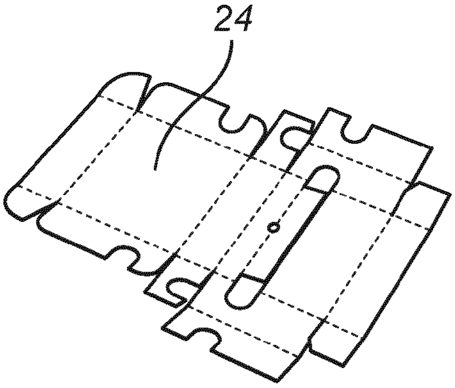

Fig. 51a

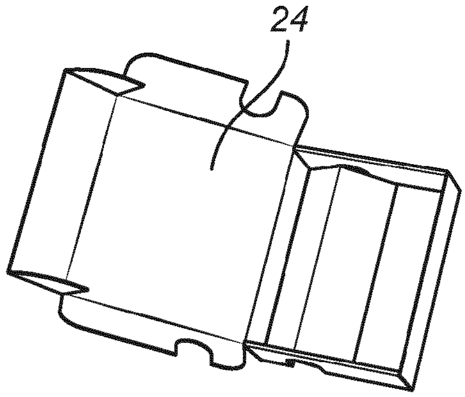

Fig. 51b

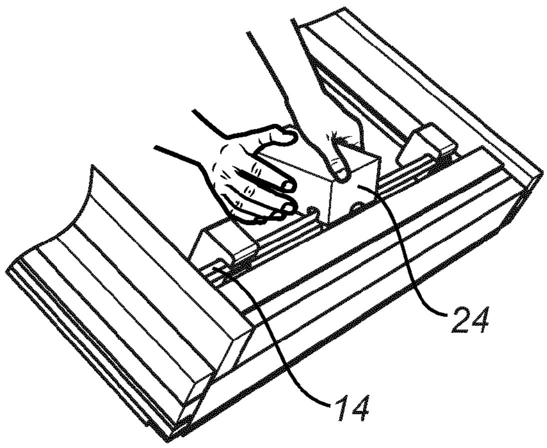

Fig. 51c

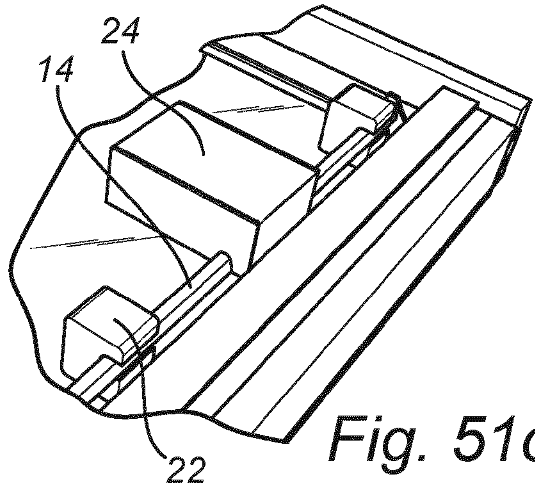

Fig. 51d

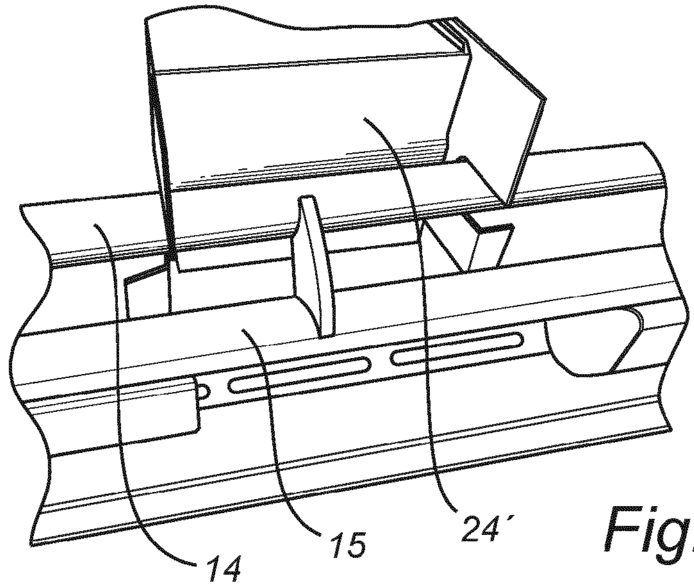

Fig. 52

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- EP 2748071 B1 **[0002]**