



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
02.02.2022 Bulletin 2022/05

(51) International Patent Classification (IPC):
E06B 1/60 (2006.01)

(21) Application number: **20188943.3**

(52) Cooperative Patent Classification (CPC):
E06B 1/60; E06B 2003/26321

(22) Date of filing: **31.07.2020**

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

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(54) **A GLAZING ASSEMBLY SET AND A METHOD OF MOUNTING THEREOF IN A BUILDING FRAME**

(57) A glazing assembly set comprising at least one insulating glazing to be mounted in a framework and a hook-and-loop fastening sheet complex provided on the framework of the insulated glazing for enabling mounting of the insulated glazing on a building frame in an opening of a building structure is disclosed. The hook-and-loop fastening sheet complex of the invention comprises a first and second sheet of fabric, each having an inner face and an outer face. The inner faces of the first and second sheet of fabric include a plurality of loops and hooks, respectively that comprise the first and second

attachment means of the first and second sheet of fabric, respectively. The hook-and-loop fastening sheet complex is separable, with a mating hook-and-loop fastening between the inner faces of respectively the first sheet of fabric and the second sheet of fabric, adapted to provide a mechanical seal, with advantageously some acoustic and intumescent properties, between the building frame and the framework in which the insulating glazing is to be mounted when complementary loops and hooks of the inner faces of the hook-and-loop fastening sheet complex are engaged.

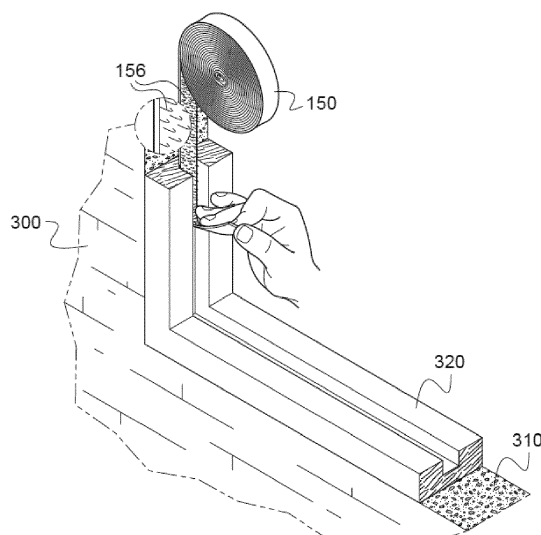


FIG. 3

DescriptionTechnical Field

5 **[0001]** The present invention relates, in general to a glazing assembly set for mounting an insulated glazing in a building frame, and more particularly to a hook-and-loop fastening sheet complex that enables mounting the insulated glazing in an opening of the building frame to provide a mechanical seal between the building frame and the framework in which the insulating glazing is to be mounted and further to a method of mounting thereof.

10 Background

[0002] Bonding an insulated glazing into a building structure often requires cleaning the surface of the framework housing the insulating glazing to remove contaminants, applying a primer to the area of the framework to which an adhesive is to be applied and then applying the adhesive generally to the periphery of the framework. Thereafter, the insulated glazing with the adhesive applied thereto is placed into a building frame in an opening of a building structure with the adhesive disposed between the building frame and the framework housing the insulating glazing. The adhesive is cured over a period of time to hold the insulated glazing in place. Thus the conventional practice of mounting an insulated glazing is cumbersome, time consuming and is often done by unskilled labors often necessitating additional bonding, caulking etc.

20 **[0003]** In an office or apartment, windows are one of the main causes of heat loss in cold weather and glass being a rigid, inelastic material is a bad conductor of sound and therefore reflects noise. Thus a traditional single pane window does relatively little to actually prevent noise from entering the home. Adjusting thickness of the glass panes, adding interlayers between the glazing and increasing spacing between the glazing panels are some of the known ways of achieving acoustic benefits. While these approaches are very effective, costs associated with them are relatively huge.

25 **[0004]** A further concern associated with windows is that the window pane is inherently vulnerable to impact and is further liable to break. Therefore, once the window pane is damaged, replacing the damaged or the broken glass pane of the window becomes equally complex and expensive as that of installing a new window unit. The above is also true when the insulated glazing units reach the end of their lifespan and need a replacement.

30 **[0005]** Thus notwithstanding all the existing technology there is still a need in the market place for simpler installation methods for mounting glazing units involving less labor, time and skill. Further this is a need in the market place for simpler ways of demounting and replacing a damaged glazing with minimal effort by a lay person. There is also a need in the market place for acoustically and mechanically improved installations that eliminate additional attention and care. Additionally, there is still a need in the market place for methods that readily mount a glazing unit in a building frame resulting in flush clean finish and one that can be readily removed or replaced when desired.

35 **[0006]** Hook-and-loop fasteners (commonly known as Velcro®) have been widely used in window applications across building windows and automotive windows. Examples of various means of using these fasteners are set forth below in summation:

[0007] The invention FR2279921 relates to an improved secondary glazing system that is relatively inexpensive and easy to fit comprising a primary frame attached to a secondary glazing panel. The secondary glazing panel is attached to the primary frame by releasable fastening means which can be strips of hook-and-loop fasteners.

40 **[0008]** The invention JP2003074265 relates to an inexpensive and simple method of providing a second glazing panel and a winding device to the existing sash window in order to provide heat insulation and light blocking effect as that provided by the double glazed window units. The winding device comprising the film or a laminate consisting the film is secured to the existing window pane using a retractable Velcro®.

45 **[0009]** The invention GB2330857 relates to a glazing system comprising a primary frame attached thereto a secondary glazing panel made of plastics or glass, where the panel is attached to the primary frame by releasable means such as fabric hook-and-loop fastening strips.

[0010] The invention US2015027017 relates to a flexible picture frame comprising a frame portion having a viewing window that holds the glazing panel behind it thereby protecting a user's photograph from damage. The frame further comprises of a backing mat that includes a fastening mechanism such as Velcro® for attaching the frame to the backing mat and enclose the glazing panel and the photograph.

50 **[0011]** In each of these prior art references, the hook-and-loop fasteners have been used for mounting either a secondary glazing or a blind/curtain to an existing frame or an additional frame structure but not for mounting an insulated glazing in a building opening. Thus the hook-and-loop fastener have been placed between the glass panel or the blind and the frame but were never explored as an alternative to the traditional way of mounting insulated glazing in a building opening.

55 **[0012]** In the present invention, the use of the hook-and-loop fasteners for mounting an insulated glazing into a building frame is foreseen as an effective alternative to the conventional manner of installations presently done and an inexpensive,

simple, effective way of providing an improved mounting of insulated glazing units. Use of the hook-and-loop fasteners provide for easy mounting and dismounting at the end of their lifespan without much ado.

[0013] Thus the present invention discloses a glazing assembly set comprising at least one insulating glazing to be mounted in a framework, and a hook-and-loop fastening sheet complex for mounting the insulated glazing in a building frame. The hook-and-loop fastening sheet complex is adapted to be placed between and contacting the building frame of a building opening and the framework housing the insulating glazing. The sheet complex is separable, with a mating hook-and-loop fastening providing a mechanical seal between the building frame and the framework in which the insulating glazing is to be mounted.

Summary of the Invention

[0014] The main objective of the present invention particularly is to provide a mechanical seal between the building frame and the framework in which the insulating glazing is to be mounted using a hook-and-loop fastening sheet complex. The other objective of the present invention is to provide a simple method for mounting insulated glazing units involving less labor, time and skill. Yet another objective of the present invention is to provide for an easy manner for demounting and replacing a damaged glazing or a glazing at the end of its lifespan with minimal effort by a layman.

[0015] According to the invention, a glazing assembly set comprises :

- at least one insulating glazing to be mounted in a framework;
- a hook-and-loop fastening sheet complex comprising: a first sheet of fabric having an inner face including a plurality of loops, each loop comprising a first attaching means and an outer face including a first adhesive layer; and a second sheet of fabric having an inner face and an outer face, wherein the inner face of the second sheet of fabric includes a plurality of hooks, each hook comprising a second attaching means for individually attaching said hooks directly to the loops of the inner face of the first sheet of fabric and the outer face of the second sheet of fabric including a second adhesive layer, wherein the first adhesive layer of the sheet complex is adapted to be attached with the framework and the second adhesive layer of the sheet complex is adapted to be attached to a building frame of a building opening.

[0016] The glazing assembly set comprises at least one insulating glazing to be mounted in a framework and a hook-and-loop fastening sheet complex attached to the framework of the insulated glazing unit. The hook-and-loop fastening sheet complex comprises a first sheet of fabric and a second sheet of fabric. The first and second sheet of fabric each include an inner face and an outer face. The inner face of the first sheet of fabric consists of a plurality of loops, each loop comprising a first attaching means. The inner face of the second sheet of fabric consists of a plurality of hooks, each hook comprising a second attaching means.

[0017] The outer faces respectively of the first sheet of fabric and second sheet of fabric include a first adhesive layer and a second adhesive layer. The first adhesive layer of the sheet complex is adapted to be attached with the framework and the second adhesive layer of the sheet complex is adapted to be attached to a building frame of a building opening. The first and second attaching means respectively of the first sheet of fabric and second sheet of fabric individually attach directly to each other when complementary loops and hooks of the inner faces of the hook-and-loop fastening sheet complex are engaged. Thus the mounting of the insulated glazing onto the building frame of the building opening is facilitated.

[0018] According to another feature, the sheet complex is separable, with a mating hook-and-loop fastening between the inner faces of respectively the first sheet of fabric and the second sheet of fabric, adapted to provide a mechanical seal between the building frame and the framework in which the insulating glazing is to be mounted when complementary loops and hooks of the inner faces of the hook-and-loop fastening sheet complex are engaged.

[0019] The separable mating of the hook-and-loop fastening between the inner faces of respectively the first sheet of fabric and the second sheet of fabric provide a mechanical seal between the building frame and the framework in which the insulating glazing is mounted.

[0020] The first and second adhesive layers respectively of the first sheet of fabric and second sheet of fabric further comprise first and second liner peelably attached to the first and second adhesive layers, respectively. The first and second liner protect the first and second adhesive layers, respectively when not in use and before the commencement of the mounting activity of the insulated glazing in the building frame of a building opening.

[0021] According to another feature, the hook-and-loop fastening sheet complex is made from one or more of materials selected from the group consisting of carbon, glass, polyamide 66, polyester, aramid fibers or from their blends thereof.

[0022] According to another feature, the first and/or second sheet of fabric is made from fibers selected from the group consisting of cellulose fibers, leaf fibers, seed fibers or plant fibers. Cellulose fibers can be one of bast fibers, flax, hemp, jute, kenaf or ramie fibers. Leaf fibers can be one of abaca, banana, pineapple or sisal fiber. Seed fibers can be one of coir, cotton or kapok fibers which result is a sustainable solution and recyclable in itself. Plant fibers can be one of

banana, coir, flax, hemp, jute, pineapple or sisal fibers.

[0023] According to another feature, the first sheet of fabric and second sheet of fabric are made of the same or different materials outlined above.

[0024] According to another feature, the first sheet of fabric is made from carbon and aramid fiber blend.

[0025] According to another feature, the second sheet of fabric is made from polyamide 66. For example, the first sheet of fabric is made from a blend of carbon and aramid fibers while the second sheet of fabric is made from polyamide 66. Such a hybrid hook-and-loop fastening sheet complex exhibit superior performance compared to sheet complexes that are made of only polyamide 66 or only from blends of carbon and aramid fibers. In one other example, the first sheet of fabric and second sheet of fabric can be made from blends of aramid fibers and glass. In a preferred embodiment, the first and second sheet of fabrics are made from a blend of carbon and aramid fibers.

[0026] According to another feature, the present invention proposes the impregnation of specialized polymers into the hook-and-loop fastening sheet complex in order to enhance the performance of the hook-and-loop fastening portions and achieve improved mechanical resistance and acoustic property. The sheet complex is impregnated with intumescent polymers that provide intumescent sealing property against fire, smoke, air and water. Such impregnation of polymers can be done during sizing or knitting or weaving of one or both of the first sheet of fabric and second sheet of fabric of the hook-and-loop fastening sheet complex of the present invention. Thus the use of loop and hook fasteners impregnated with specific optimized polymers provide a mechanical seal between the building frame and the framework in which the insulating glazing is mounted, said seal having also acoustic and/or intumescent properties.

[0027] According to another feature, the first and/or second sheet of fabric is impregnated with polymers selected from a group of copolymers consisting of carboxylated styrene-butadiene copolymer, vinyl acetate-vinylester-based copolymers, vinyl acetate-ethylene copolymer, acrylic ester-styrene copolymer, acrylic-polyurethane copolymers or polypropylene. In a preferred embodiment, the sheet complex of the present invention is impregnated with vinyl acetate-ethylene copolymer.

[0028] According to another feature, the sheet complex is impregnated with the polymers having a glass transition temperature varying from -15°C to $+20^{\circ}\text{C}$. It results in an acoustic improvement when the hooks are engaged with the loops.

[0029] According to another feature, the first and/or second sheet of fabric is impregnated with vinyl acetate-ethylene copolymer.

[0030] According to another feature, when the hooks are engaged with the loops, the sheet complex provides a tear resistance ranging from about 200 N/cm to 400 N/cm.

[0031] According to another feature, the glazing assembly set according to the present invention comprises a sash within the framework.

[0032] Another objective of the present invention is a method for mounting an insulated glazing in a building frame present in a building opening, using a glazing assembly set as described above, the method comprising the steps of :

- mounting the insulating glazing into a framework,
- attaching the first adhesive layer of the first sheet of fabrics onto the vertical and horizontal parts of the framework;
- attaching the second adhesive layer of the second sheet of fabrics onto the building frame by abutting the second adhesive layer to be flush with the building frame, and
- mounting the framework onto the building frame by engaging together the complementary loops and hooks of the inner faces of the hook-and-loop fastening sheet complex to form a mechanical seal between the building frame and the framework. Such seal may also have some acoustic and/or intumescent properties.

[0033] According to another feature, in said method a first liner, respectively a second liner is removed from the first adhesive layer, respectively the second adhesive layer, before attaching the first and the second adhesive layers of the sheet of fabrics onto the framework or, respectively, the building frame.

[0034] According to another feature, said method comprises dismantling the insulated glazing from the building frame by pulling away the first sheet of fabric from the second sheet of fabric.

[0035] Other features and aspects of this disclosure will be apparent from the following description and the accompanying drawings. The figures and the description of the invention which follow will make it possible to understand what was the technical problem to be solved and how it has arrived at in the solution according to the invention is to provide.

Brief Description of the Drawings

[0036] Embodiments are illustrated by way of example and are not limited to those shown in the accompanying figures.

FIG. 1 illustrates an insulated glazing attached with the first sheet of fabric of the hook-and-loop fastening sheet complex, according to another embodiment of the present invention;

FIG. 2A illustrates a cross-sectional view of a hook-and-loop fastening sheet complex, according to one embodiment of the present invention;

FIG. 2B illustrates an isometric view of the hook-and-loop fastening sheet complex, according to one embodiment of the present invention;

FIG. 3 illustrates a building frame in an opening of a building structure attached the second sheet of fabric, according to one embodiment of the present invention; and

FIG. 4 illustrates the insulated glazing mounted in a building frame in an opening of a building structure using the sheet complex, according to one embodiment of the present invention.

FIG. 5 illustrates a cross sectional view of **FIG. 4** taken along the lines indicated in **FIG. 4**.

[0037] Skilled artisans appreciate that elements in the figures are illustrated for simplicity and clarity and have not necessarily been drawn to scale. For example, the dimensions of some of the elements in the figures may be exaggerated relative to other elements to help to improve understanding of embodiments of the invention.

Detailed Description

[0038] Wherever possible, the same reference numbers will be used throughout the drawings to refer to the same or similar parts. Embodiments disclosed herein are related to a hook-and-loop fastening sheet complex for mounting an insulated glazing on a building frame in an opening of a wall structure.

[0039] A glazing assembly set according to the present invention comprises of an insulating glazing which is to be mounted in a framework and a hook-and-loop fastening sheet complex that enables mounting of the framework housing the insulating glazing in a building opening. The invention relates to an insulating glazing of any type and said insulating glazing is mounted on a framework using any conventional means. One type of such insulated glazing 200 is used for the teaching of the present invention.

[0040] **FIG. 1** illustrates an insulated glazing 200 that is intended to be mounted in an opening of a wall structure, that is on a building frame arranged in the wall opening. The insulated glazing 200 illustrated in the figure is a double glazing. However, the insulated glazing could be, for example, a triple glazed unit. The insulated glazing 200 comprises a pair of glass panels 210 spaced apart from each other by a spacer and mounted in a rectangular framework 220 formed by a pair of left and right longitudinal frames 220a, 220b, and an upper transverse frame 220c and a lower transverse frame 220d. The upper transverse frame 220c and lower transverse frame 220d are connected to the longitudinal frames 220a, 220b at upper and lower positions of the longitudinal frames, respectively.

[0041] Further the insulated glazing 200 comprises a first sheet of fabric 110 of the hook-and-loop fastening sheet complex 100 (also referred as sheet complex 100) attached to each of the frames 220a, 220b, 220c and 220d of the framework 220. The hook-and-loop fastening sheet complex 100 is proposed by the present invention to enable the mounting of the insulated glazing 200 on the building frame 320 present in an opening of a wall structure. The sheet complex 100 is not intended to be visible post installation and thus is attached to be flush with the edges of the frames 220a, 220b, 220c and 220d of the framework 220.

[0042] In some embodiments of the present invention, the insulated glazing 200 further comprises of a sash within the framework 220 (sash not shown in figure). The sheet complex 100 of the present invention can be used with any window type including but not limited to openable window, sliding window, fixed window, casement window, hung window, awning window, hopper window and tilt-turn window, as long as the framework of the window is compatible with the hook-and-loop fastening sheet complex 100 of the present invention. In all embodiments of the present invention, the sheet complex 100 of the present invention is cut-to-size to match the shape and dimension of the framework of any given insulated glazing and hence can be used with any type of glazing unit having any framework shape including but not limited to eyebrow, circle-top, quarter arch, full circle, octagon and any geometric shaped glazing. However, as an example embodiment, the insulated glazing unit 200 illustrated in **FIG. 1** has a rectangular framework.

[0043] The hook-and-loop fastening sheet complex 100 as illustrated in **FIG. 2A** comprises of a first sheet of fabric 110 and a second sheet of fabric 150. The first sheet of fabric 110 comprises of an inner face 112 facing the second sheet of fabric 150 and an outer face 114 which is away from the second sheet of fabric 150. The inner face 112 of the first sheet of fabric 110 includes a plurality of loops 116. Each of the loops 116 comprise a first attachment means. The outer face 114 of the first sheet of fabric 110 includes a first adhesive layer 118.

[0044] Likewise, the second sheet of fabric 150 comprises an inner face 152 and an outer face 154. The inner face 152 of the second sheet of fabric 150 faces the inner face 112 of the first sheet of fabric 110 while the outer face 154 of the second sheet of fabric 150 faces away from the first sheet of fabric 110. The inner face 152 of the second sheet of fabric 150 includes a plurality of hooks 156 which in turn comprise a second attachment means. The second attachment means causes each of the hooks 156 of the second sheet of fabric 150 to directly and individually attach to the loops 116 of the first sheet of fabric 110. The outer face 154 of the second sheet of fabric 150 includes a second adhesive layer 158.

[0045] The first and second sheet of fabric 110, 150 are separable, mating hook-and-loop fastening portions that provide a mechanical seal there between surfaces when engaged, said seal having advantageously also acoustic and intumescent properties. The hook-and-loop fastening sheet complex 100 further comprises of a first liner 120 of the first sheet of fabric 110 overlying the first adhesive layer 118 and a second liner 160 of the second sheet of fabric 150 overlying the second adhesive layer 158. In all embodiments of the first liner 120 and second liner 160 are peelably attached to the first adhesive layer 118 and second adhesive layer 158, respectively.

[0046] Referring to **FIG. 2B**, the first sheet of fabric 110 and second rigid sheet of fabric 150 of the hook-and-loop fastening sheet complex 100 of the present invention is shown with their first attachment means and their second attachment means, respectively pressed together. The first attachment means provided in the loops comprised in the first sheet of fabric 110 contact and lock with second attachment means provided in the hooks comprised in the second sheet of fabric 150 when pressed together. Thus, in one embodiment of the present invention, when the first sheet of fabric 110 is attached to the framework 220 of the insulated glazing 200 and the second sheet of fabric 150 is attached to the building frame 320 by means of their first adhesive layer 118 and their second adhesive layer 158, respectively the insulated glazing 200 can be mounted in the building frame 320 in an opening of a building structure or wall by pressing together the loops 116 and the hooks 156 of the sheet complex 100.

[0047] The above described embodiment illustrated in **FIG. 1**, shows the first sheet of fabric 110 being applied to the right longitudinal frame 220c of the framework 220. The first liner 120 of the first sheet of fabric 110 is peeled away from the first adhesive layer 118 thereby making the first adhesive layer 118 available to be attached to the transverse frame 220d. The first sheet of fabric 110 is attached to the left and right longitudinal frames 220a, 220b; and the upper and lower transverse frames 220c, 220d such that the first sheet of fabric 110 is flush with the framework 220. The sheet complex 100 of the present invention are cut-to size and individually attached to each of the frames 220a, 220b, 220c and 220d of the framework 220. The first attachment means provided in the loops comprised in the first sheet of fabric 110 is left exposed for bonding with the second attachment means provided in the hooks comprised in the second sheet of fabric 150.

[0048] Likewise, the second sheet of fabric 150 of the hook-and-loop fastening sheet complex 100 of the present invention is attached to the building frame 320 provided in an opening of a wall structure in a building is illustrated in **FIG. 3**. A wall 300 in a building structure is depicted to have an opening 310 within which is fixed a building frame 320 for receiving the insulated glazing 200. The building frame 320 are conventionally made of wood. However, the building frame 320 can be one that is made of any such material as vinyl, aluminum, fiberglass, steel, PVC etc., As is known the height and width of the building frame 320 in the opening 310 of the wall 300 mirrors the structural dimension of the framework 220. The building frame 320 generally feature a groove for receiving the insulated glazing.

[0049] The second liner 160 of the second sheet of fabric 150 is peeled away from the second adhesive layer 158 for making the second adhesive layer 158 available to be attached to the building frame 320. Post which the second sheet of fabric 150 is attached to the building frame 320 (within the groove) using the second adhesive layer 158 in such a way that the second sheet of fabric 150 remains flush with the building frame 320. Such an arrangement provides a seamless and aesthetically pleasant finish to the mounted insulated glazing 200.

[0050] In an alternative embodiment of the present invention, the first and second sheets of fabric 110, 150 can be attached interchangeably on the framework 220 and building frame 320. That is, the first sheet of fabric 110 can be attached to the building frame 320 and the second sheet of fabric 150 can be attached to the framework 220 of the insulated glazing 200 and such an embodiment is also encompassed within the scope of the present invention.

[0051] In optional embodiments, the loops 116 of the first sheet of fabric 110 and hook 156 of the second sheet of fabric 160 can be protected by a sacrificial plastic films (not shown in figure) that electrostatically adheres to the loops 116 and hook 156. The sacrificial plastic films serve the purpose of protecting the exposed loops 116 and hooks 156 until the commencement of the mounting procedures. This optional embodiment is envisioned for scenarios where the insulated glazing is provided with one of the sheet of fabrics of the sheet complex 100 at the manufacturing site and the other sheet of fabric of the sheet complex 100 is attached to a building frame in an installation site. For which case, the sacrificial plastic films are applied for protecting the exposed loops 116 and hooks 156 until the time the insulating glazing is transported to the installation site and the installation procedure is commenced.

[0052] For either of the above described embodiments, the method of mounting the insulated glazing 200 in the building frame 320 of a building opening comprises the following steps: the insulating glazing i.e., the two glass panels 210 are first mounted within the framework 220 formed by a pair of left and right longitudinal frames 220a, 220b, and an upper transverse frame 220c and a lower transverse frame 220d. The insulated glazing 200 thus obtained is then attached with the first adhesive layer 118 of the first sheet of fabric 110 onto the longitudinal and transverse frames of the framework 220. The second adhesive layer 158 of the second sheet of fabric 150 is attached onto the building frame 320 by abutting the second adhesive layer 158 to be flush with the building frame 320 and finally the insulated glazing 200 is mounted onto the building frame 320 by engaging together the complementary loops 116 and hooks 156 of the inner faces 112, 152 of the hook-and-loop fastening sheet complex 100 to form a mechanical seal between the building frame and the framework. Thus the insulated glazing 200 mounted in the building frame 320 is illustrated in **FIG. 4** of the present invention.

[0053] In yet another embodiment of the present invention, the insulated glazing 200 can be attached with the hook-and-loop fastening sheet complex 100 as a whole i.e., the first sheet of fabric 110 and the second sheet of fabric 150 are engaged and attached to the insulated glazing 200. In such an embodiment, the first adhesive layer 118 of the first sheet of fabric 110 is used for attaching the hook-and-loop fastening sheet complex 100 to the framework of the insulated glazing. In this specific embodiment the first sheet of fabric 110 and second sheet of fabric 150 are pressed together and the second adhesive layer 158 by means of which the insulated glazing 200 will be mounted in the building frame 300 is protected by the releasable second liner 160.

[0054] When said insulated glazing 200 reaches an installation site, the releasable second liner 160 is peeled away from the second adhesive layer 158 of the second sheet of fabric 150 overlying each of the frames 220a, 220b, 220c and 220d of the framework 220 and the insulated glazing 220 is mounted in the building frame 300 by contacting the second adhesive layer 158 of the second sheet of fabric 150 with the building frame 320.

[0055] The loops 116 and hooks 156 of the hook-and-loop fastening sheet complex 100 when pressed together lock with one another to establish a mechanical seal between the building frame 320 and the insulated glazing framework 220. This is shown in **FIG. 5**. The engaged loops 116 and hooks 156 further provide greatly improved resistance to separation of the two sheets of fabrics 110, 150 thus enhancing the stability of the assembly.

[0056] In one example embodiment, the first sheet of fabric 110 is made from a blend of carbon and aramid fibers while the second sheet of fabric 150 is made from polyamide 66. In one other example embodiment, the first sheet of fabric 110 and second sheet of fabric 150 can be made from blends of aramid fibers and glass. In a preferred embodiment, the first and second sheet of fabrics 110, 150 are made from a blend of carbon and aramid fibers.

[0057] Thus the use of loop-and-hook fastening sheet complex of the present invention reduces time, skill and complexity associated with the conventional means of mounting insulated glazing and further provides an equally simple way for dismounting the insulated glazing for replacement during damage or end of life of the window unit. The dismounting of the installed insulated glazing of the present invention is initiated by introducing a blade or any other convention cutting tool between the matted loops 116 and hook 156 to open the locks established between them by shearing. Following which the insulated glazing can be pulled almost parallel to the bonding plane and easily removed from the building frame 320.

Example

Tear Resistance

[0058] The tear resistance of the first sheet of fabric 110 and the second sheet of fabric 160 of the present invention was tested by ISO standard 13934-1:2013 to test engagement levels of the first and second sheet of fabrics of the sheet complex. For experimental purposes, the first and second sheet of fabrics were made from polyamide. The polyamide sheet of fabric used as the comparative sample was made from a woven tufted fabric in which the cut threads were evenly distributed, with a short dense pile, giving it a distinctive soft feel. The force at which the separation of the first and second sheet of fabrics of the present invention occur was measured and compared to that of a polyamide loop strip available in the market. The results of the testing are provided in table 1.

Table 1: Tear Resistance Testing Results

Material	First sheet of Fabric		Second sheet of Fabric	
	Polyamide (Invention)	Polyamide (Comparative)	Polyamide (Invention)	Polypropylene (Invention)
Force of Breaking	210 N/cm	55 N/cm	210 N/cm	350 N/cm

[0059] The tear resistance of the loop-and-hook fasteners proposed in the present invention is far superior to the conventional loop-and-hook fasteners available in the market (due to its week mechanical attachment) and hence the use of these fasteners provide an effective means of mounting insulated glazing in building structures.

[0060] It will be evident that the invention has application to a wide variety of framed structures in addition to the insulated glazing illustrated, for example windows of buildings and vehicles. The use of the invention for mounting of frameless glazing units are also envisioned within the scope of this present invention.

[0061] While the present invention has been described with reference to particular embodiments thereof, it will be understood that numerous modifications may be made by those skilled in the art without actually departing from the scope of the invention. Therefore, the appended claims are intended to cover all such equivalent variations as come within the true spirit and scope of the invention.

Claims

1. A glazing assembly set comprising:

at least one insulating glazing to be mounted in a framework 220; and
a hook-and-loop fastening sheet complex 100 comprising:

a first sheet of fabric 110 having an inner face 112 including a plurality of loops 116, each loop 116 comprising a first attaching means and an outer face 114 including a first adhesive layer 118; and
a second sheet of fabric 150 having an inner face 152 and an outer face 154, wherein the inner face 152 of the second sheet of fabric 150 includes a plurality of hooks 156, each hook 156 comprising a second attaching means for individually attaching said hooks 156 directly to the loops 116 of the inner face 112 of the first sheet of fabric 110 and the outer face 154 of the second sheet of fabric 150 including a second adhesive layer 158,

wherein the first adhesive layer 118 of the sheet complex 100 is adapted to be attached with the framework 220 and the second adhesive layer 158 of the sheet complex 100 is adapted to be attached to a building frame 320 of a building opening 310.

2. The glazing assembly set according to claim 1, wherein the sheet complex 100 is separable, with a mating hook-and-loop fastening between the inner faces 112, 152 of respectively the first sheet of fabric 110 and the second sheet of fabric 150, adapted to provide a mechanical seal between the building frame 320 and the framework 220 in which the insulating glazing is to be mounted when complementary loops and hooks of the inner faces 112, 152 of the hook-and-loop fastening sheet complex 100 are engaged.

3. The glazing assembly set according to claim 1 or 2, wherein the first and second adhesive layers 118, 158 respectively of the first sheet of fabric 110 and second sheet of fabric 150 further comprise first and second liner 120, 160 peelably attached to the first and second adhesive layers, respectively.

4. The glazing assembly set according to any one of the previous claims, wherein the first and/or second sheet of fabric is made from carbon, glass, polyamide 66, polyester or aramid fibers or from their blends thereof.

5. The glazing assembly set according to any one of claims 1 to 3, wherein the first and/or second sheet of fabric is made from fibers selected from the group consisting of cellulose fibers, leaf fibers, seed fibers or plant fibers.

6. The glazing assembly set according to any one of the claims 1 to 3, wherein the first sheet of fabric 110 is made from carbon and aramid fiber blend.

7. The glazing assembly set according to any one of the claims 1 to 4, wherein the second sheet of fabric 150 is made from polyamide 66.

8. The glazing assembly set according to any one of the claims 1 to 7, wherein the first and/or second sheet of fabric is further impregnated with polymers selected from carboxylated styrene-butadiene copolymer, vinyl acetate-vinylester-based copolymers, vinyl acetate-ethylene copolymer, acrylic ester-styrene copolymer, acrylic-polyurethane copolymers or polypropylene.

9. The glazing assembly set according to any one of the previous claims wherein the sheet complex is further impregnated with polymers having a glass transition temperature varying from -15° C to +20° C resulting in an acoustic improvement when the hooks are engaged with the loops.

10. The glazing assembly set according to claim 8, wherein the first and/or second rigid sheet of fabric is impregnated with vinyl acetate-ethylene copolymer.

11. The glazing assembly set according to any one of the previous claims, further comprising a sash within the framework 220.

12. The glazing assembly set according to any one of the previous claims wherein the sheet complex 100, when the hooks 156 are engaged with the loops 116, provides a tear resistance ranging from about 200 N/cm to 400 N/cm.

13. A method for mounting an insulated glazing 200 in a building frame 320 of a building opening 310 using a glazing assembly set according to any one of the claims 1 to 12, the method comprising the steps of:

mounting the insulating glazing into a framework 220,

attaching the first adhesive layer 118 of the first sheet of fabrics 110 onto the vertical and horizontal parts of the framework 220;

attaching the second adhesive layer 158 of the second sheet of fabrics 150 onto the building frame 320 by abutting the second adhesive layer 158 to be flush with the building frame 320; and

mounting the framework 220 onto the building frame 320 by engaging together the complementary loops 116 and hooks 156 of the inner faces 112, 152 of the hook-and-loop fastening sheet complex 100 to form a mechanical seal between the building frame 320 and the framework 220.

14. The method of claim 13, in which the first liner 120, respectively the second liner 160, is removed from the first adhesive layer 118, respectively the second adhesive layer 158, before attaching the first and second adhesive layers of the sheet of fabrics onto the framework 220 or, respectively, the building frame 320.

15. The method according to any one of the claims 13 to 14, further comprising dismounting the insulated glazing 200 from the building frame 320 by pulling away the first sheet of fabric 110 from the second sheet of fabric 150.

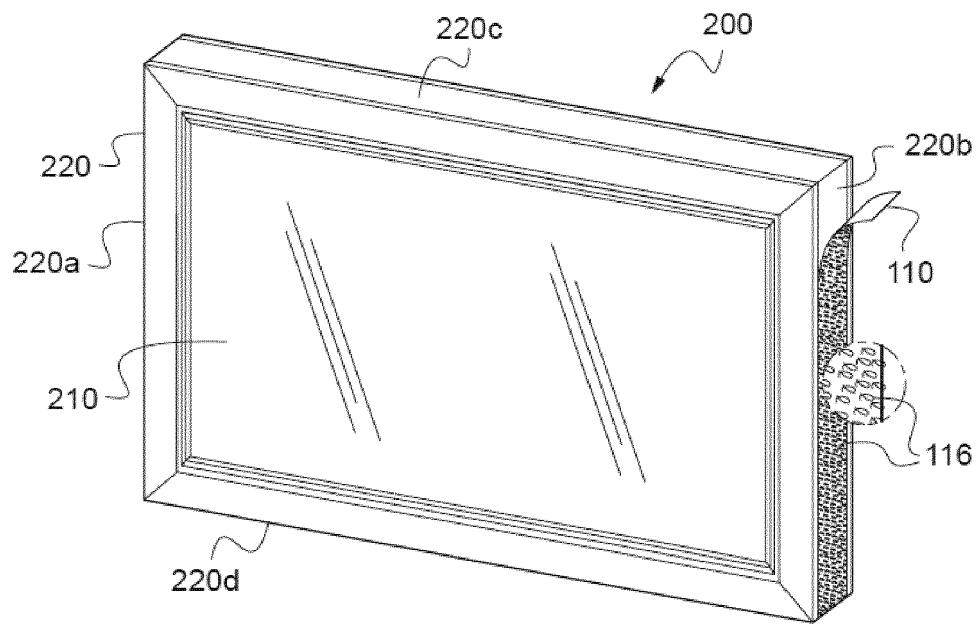


FIG. 1

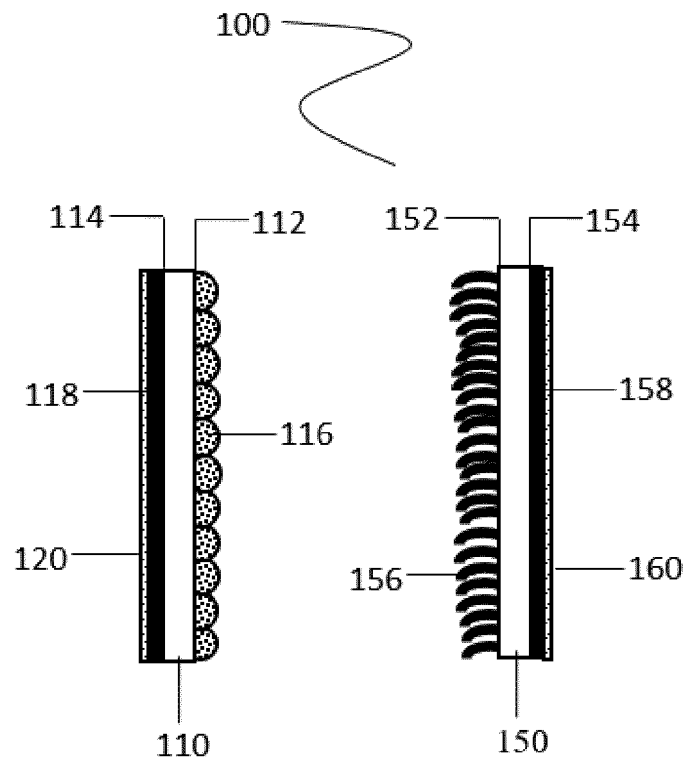


FIG. 2A

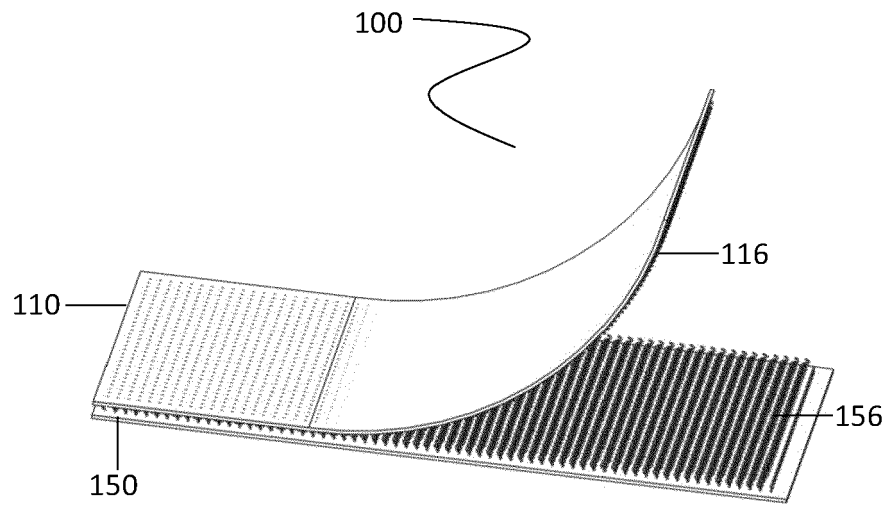


FIG. 2B

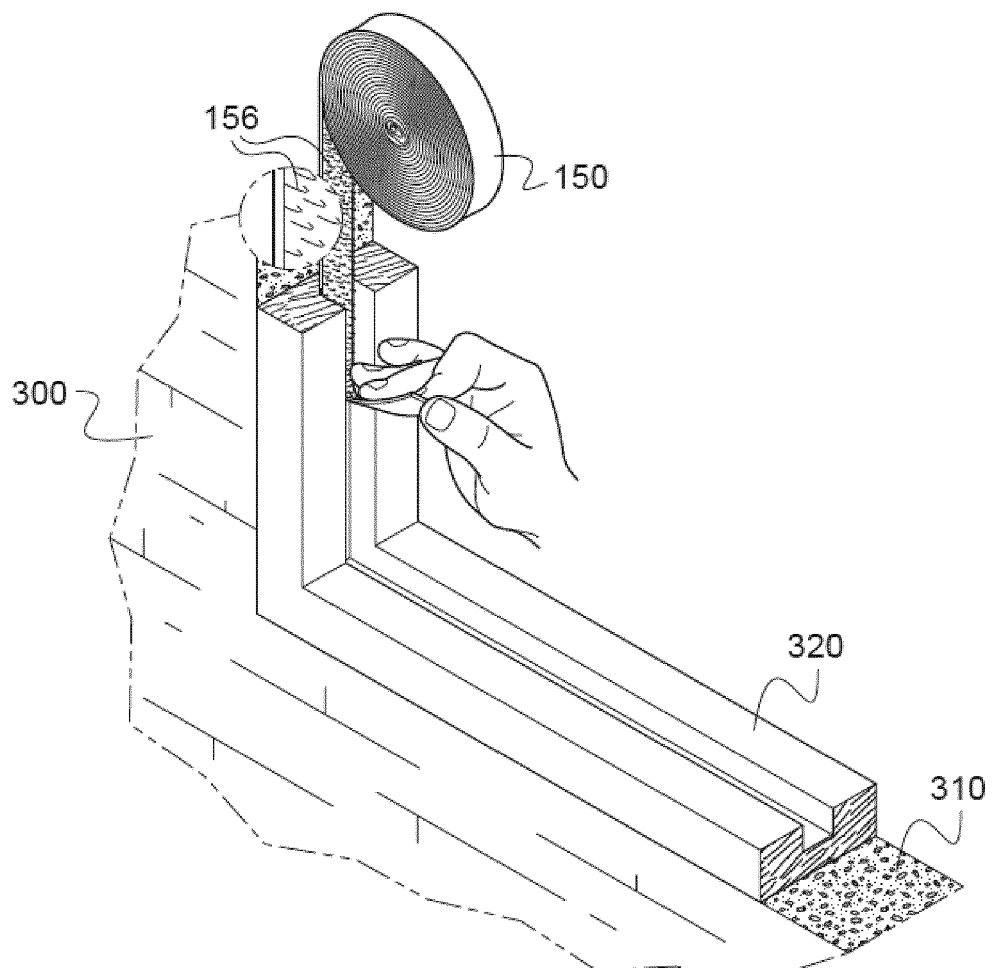


FIG. 3

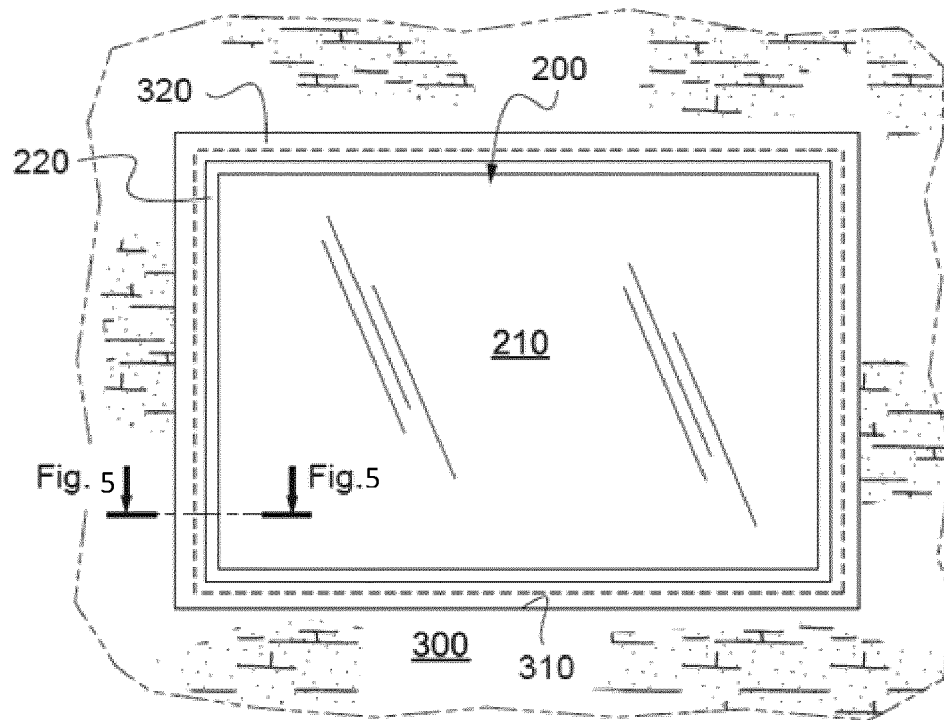


FIG. 4

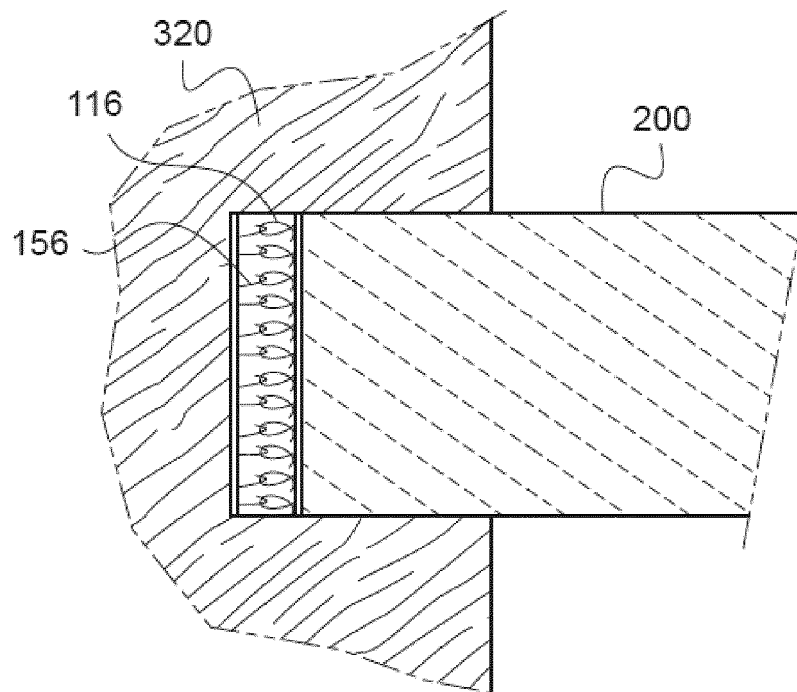


FIG. 5



EUROPEAN SEARCH REPORT

Application Number
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			E06B
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 15 December 2020	Examiner Verdonck, Benoit
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