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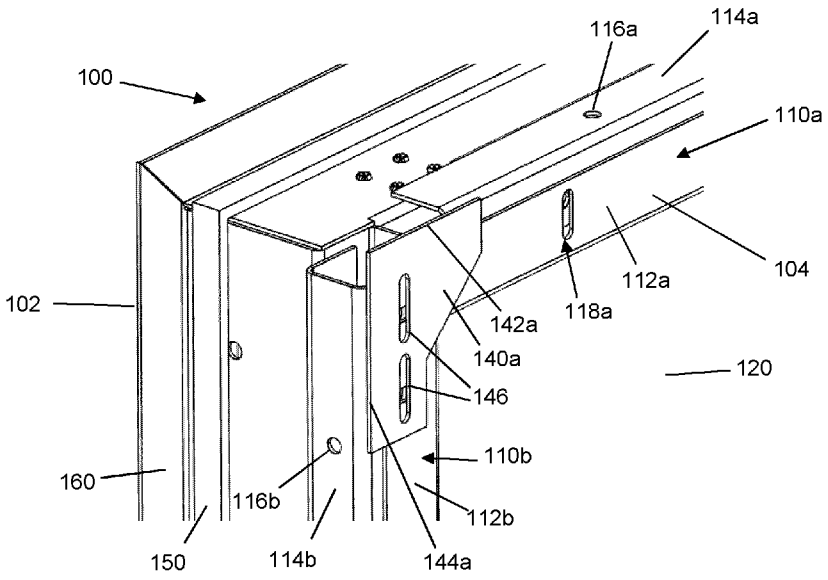

Figure 5A

(57) Abstract: An access panel frame (100) for fitting into an opening (170, Fig. 1D) in, for example, a wall (108, Fig. 1C), wherein the opening is defined by a plurality of sides. The frame (100) comprises a plurality of elongate expandable members (110a-d), each expandable member (110a-d) comprising a moveable portion (114) and a corresponding fixed portion (112). Each moveable portion (114) is arranged parallel to its corresponding fixed portion (112) and is configured to slide in a direction substantially perpendicular to a length of the corresponding fixed portion (112) in order to expand the expandable member (110a-d) such that, when the frame (100) is placed in the opening, the expandable member (110a- d) closes a gap (172, Fig. 1D) between the frame (100) and a respective side of the opening. This allows the access panel frame to provide improved fire resistance.

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Access Panel Frame

The present disclosure relates to a frame for an access panel and a method of installing such a panel. In particular, the disclosure relates to a frame for an access panel that is easy to install and has improved fire resistance.

Access panels are used to provide closable access to a concealed item or region. They are commonly used in buildings to protect and provide access to, for example, plumbing or electrical equipment. Access panels typically comprise a frame and a door or a cover. The door is secured to the frame, and the frame is installed within an opening in, for example, a wall, ceiling, or floor. The frame and the door collectively close the opening to prevent the spread of fire and/or smoke through the opening. The frame and the door may also close the opening to prevent people gaining access to the concealed item or region.

In order to facilitate installation, the frame of an access panel is typically smaller than the opening into which it is to be installed. This leaves gaps between the sides of the frame and the sides of the opening.

In existing access panels, the frame is placed into the opening and packers are wedged into the gaps between the frame and the opening, so as to support the frame within the opening. Mastic may then be applied to fill any remaining gaps between the frame, the opening, and the packers. Packers are blocks, strips or shims of material, and are often made of a flammable material, such as wood or plastic. Using packers to install an access panel frame may, therefore, reduce the fire resistance of the access panel. Although fire-resistant packers are available, the use of such packers is at the discretion of the installer. As such, manufacturers may be unable to guarantee the fire resistance of an access panel at the point of sale.

There is therefore a need for an access panel that provides improved fire resistance.

Summary

In accordance with a first aspect of the disclosure, there is provided an access panel frame as defined in claim 1.

The frame is configured to fit into an opening that is defined by a plurality of sides. The frame comprises a plurality of elongate expandable members, each expandable member comprising a moveable portion and a corresponding fixed portion. Each moveable portion is arranged parallel to its corresponding fixed portion. Each moveable portion is configured to slide (or otherwise move) in a direction substantially perpendicular to a length of the corresponding fixed portion in order to expand the expandable member such that, when the frame is placed in the opening, the expandable member closes a gap between the frame and a respective side of the opening.

The access panel frame (which may be referred to herein simply as a 'frame') may be for fitting into an opening in a planar structure, such as a wall, ceiling or floor. The frame may comprise a front side and a rear side. The front side is the side from which, typically, the access panel will be accessed. The rear side is the side on which the area to be accessed is located. The frame may be for receiving a door. The frame may define an aperture for receiving the door. Features facing towards or away from the aperture are understood to face inwards or outwards with respect to the perimeter of the frame, respectively. By 'door', it is meant any substantially planar component that is suitable to close the aperture within the frame. A door in this context may otherwise be referred to as a cover.

The door may provide a cover for the opening such that, when the door is in a closed position, the opening is inaccessible through the aperture of the frame and, when the door is in an open position, the opening is accessible through the aperture of the frame. The door may be secured to the frame by way of a hinge mechanism, sliding mechanism, or other opening mechanism known in the art. The access panel frame may be a riser door frame. In such a case, the door may be a riser door.

The elongate expandable members may define the aperture of the frame. Each elongate expandable member may have a length that is the same as, or similar to, the length of the respective side of the opening. Alternatively, each elongate expandable member may have a length that is shorter than the length of the respective side of the opening. In the latter case, the frame may comprise more than one expandable member for each side of the opening.

Advantageously, by closing the gap between the frame and the sides of the opening, the expandable members provide a smoke-tight and/or fire-resistant seal between the frame and the opening. The expandable members thereby remove the need for packers to fill the gap between the frame and the opening. By removing the need for packers, the access panel frame described herein has improved fire resistance over commonly used access panel frames.

The access panel frame may comprise an expandable member for each side of the opening and/or for each side of the frame. Advantageously, this provides a smoke tight and/or fire-resistant seal around most, or all, of the perimeter of the frame.

In some embodiments, the frame may further comprise a jack configured to bias the frame towards a first side of the opening, when the frame is placed in the opening.

Advantageously, the jack may comprise a way of levelling the frame. In other words, actuation of the jack in order to bias the frame towards a first side of the opening may comprise levelling the frame relative to the opening. The jack may be integrated with the frame. More specifically, the jack may be integrated with one of the expandable members. The jack may be configured to bias the frame towards a first side of the opening that is substantially opposite to the side corresponding to the expandable member into which the jack is integrated.

In some embodiments, the jack may be configured to force a moveable portion of one of the expandable members apart from the corresponding fixed portion, thereby biasing the frame towards the first side of the opening.

Forcing the moveable portion apart from the fixed portion may comprise expanding the expandable member. Advantageously, by using the moveable portion as part of the jack, a greater surface area is provided against which to bias the frame. This prevents undue pressure being placed in localised points along the side of the opening that is opposite the first side. Advantageously, the jack provides greater ease of installation and reduces the time taken to install the access panel frame. The jack may also provide a simple way in which to level the frame, as well as a simple way in which to locate the frame within the centre of the opening.

In some embodiments, the jack may comprise a threaded hole and a corresponding threaded fastener. The threaded hole may be located on one of the expandable members. Advancing the threaded fastener into the threaded hole may cause the threaded fastener to bias the frame towards the first side of the opening.

The threaded fastener may be a bolt. When the threaded fastener is advanced into the threaded hole, a tip of the threaded fastener may abut the moveable portion, thereby forcing the moveable portion apart from the corresponding fixed portion.

In some embodiments, the jack may comprise a plurality of threaded holes and a plurality of corresponding threaded fasteners. The plurality of threaded holes may be disposed at differing locations along the length of the expandable member.

Each of the plurality of threaded holes may be substantially separated from each other. Advantageously, a plurality of threaded holes disposed at differing locations along the length of the expandable member can be used to level the frame.

For example, the jack may comprise a first threaded hole and a second threaded hole that are located substantially symmetrically on either side of the mid-point of the length of the expandable member. The jack may comprise a third threaded hole located between the first and second threaded holes.

In some embodiments, the moveable portion and the fixed portion may have complementary cross-sectional shapes, such that one of the moveable portion and the fixed portion can nest within the other of the moveable portion and the fixed portion.

The expandable member may be formed of one of the moveable portion and the fixed portion being nested within the other. The moveable portion may nest within the fixed portion. Alternatively, the fixed portion may nest within the moveable portion. Advantageously, by one portion nesting within the other, the expandable member may be formed with substantially no gap between the portions. This, in turn, allows the frame to provide a smoke-tight and/or fire resistant seal with the opening. Advantageously, by forming an expandable member of a moveable portion and a fixed portion in a nested arrangement, the frame can be installed faster and more easily.

The moveable portion may have a substantially C-shaped cross-section. Alternatively, the moveable portion may have a substantially T-shaped cross-section. The fixed portion may have a substantially C-shaped cross-section. Alternatively, the fixed portion may have a substantially T-shaped cross-section. It will be understood that other possible arrangements of such cross-sections (e.g. C-C, C-T, T-C) may comprise complementary cross-sectional shapes.

In some embodiments, the moveable portion and the fixed portion may each comprise a C-shaped cross-section. One of the moveable portion and the fixed portion may be located within the other such that the expandable member has a substantially box-shaped cross-section.

A C-shaped cross-section may comprise an open face and three closed faces. Advantageously, the box-shaped cross-section may allow the expandable member to be load-bearing. The box-shaped cross-section may be formed of two opposing C-shaped cross-sections. More specifically, one of the moveable portion and the fixed portion may be nested in the other, such that the open faces of each portion have mutually opposing orientations. The open face of the moveable portion may face towards the aperture of the frame, and the open face of the fixed portion may face away from the aperture of the frame. Alternatively, the open face of the moveable portion may face away from the aperture of the frame, and the open face of the fixed portion may face towards the aperture of the frame.

In some embodiments, each of the expandable members may comprise a securing means to allow the moveable portion to be secured to a side of the opening.

The securing means may be located on a closed face of the moveable portion. The closed face may face away from the aperture of the frame. The securing means may comprise a threaded or unthreaded hole located on the moveable portion. The securing means may further comprise a threaded screw that can be advanced through the hole, thereby to secure the moveable portion to the side of the opening. It will be appreciated that other means of securing the moveable portion to the side of the opening may be possible, such as: a nut and bolt arrangement; an adhesive; or a mechanical connector.

In some embodiments, each of the expandable members may comprise a locking means to allow the moveable portion to be secured to the fixed portion, thereby retaining the expandable member in the expanded configuration.

The locking means may be located on a closed face of the moveable portion. The locking means may be located on a corresponding closed face of the fixed portion. The closed faces may be on the rear side of the frame. The locking means may comprise a threaded or unthreaded hole located on the moveable portion and a threaded or unthreaded hole located on the fixed portion. The locking means may comprise a bolt for advancing through both holes to secure the moveable portion to the fixed portion. It will be appreciated that other means of securing the moveable portion to the fixed portion may be possible, such as: a nut and bolt arrangement; an adhesive; or a mechanical connector. Advantageously, by having a locking means, the expandable member may be retained in an expanded configuration after installation of the frame.

In some embodiments, the plurality of expandable members may be arranged in an end-to-end arrangement, defining a plurality of corners of the frame, each corner located at the intersection of the ends of a first expandable member and a second expandable member. Each corner of the frame may comprise a corner plate.

The corner plate may be secured to one of the first or second expandable members. The corner plate may be secured to a first end of the expandable member, the first end being proximal to the intersection. Advantageously, the corner plate corner plate can close a gap between the end of the expandable member and a side of the opening, thereby improving the fire resistance and/or smoke resistance of the frame.

In some embodiments, each corner plate may be moveably secured to the first expandable member or to the second expandable member such that the corner plate can be moved in a direction parallel to the first expandable member and in a direction parallel to the second expandable member.

In some embodiments, each corner plate may comprise a first sealing edge, wherein the first sealing edge is parallel to a length of the first expandable member. The first

sealing edge may be configured to abut the side of the opening corresponding to the first expandable member.

In some embodiments, each corner plate may comprise a second sealing edge, wherein the second sealing edge is parallel to a length of the second expandable member. The second sealing edge may be configured to abut the side of the opening corresponding to the second expandable member.

Advantageously, the first and second sealing edges close the gap between the ends of the expandable members and the opening. This allows substantially the whole of the gap between the frame and the opening to be closed.

In some embodiments, the frame may be square or rectangular and is for fitting into a square or rectangular opening, wherein the opening is defined by four straight sides. The frame may comprise four expandable members arranged into a square or rectangle.

Each intersection may define a right-angle. Each corner may be a right-angle. The corner plate may comprise a right-angle. The sealing edge of the corner plate may be perpendicular to a length of the expandable member to which it is secured.

In some embodiments, the frame may comprise an intumescent strip around a perimeter of the frame.

Advantageously, the intumescent strip may provide further improved fire resistance. Alternatively or additionally, the frame may comprise a sealing strip. The sealing strip may be an acoustic sealing strip. An acoustic sealing strip is a component (e.g., a length of suitable material) that is configured to attenuate sound waves or other vibrations passing around the sides of the access panel frame and/or through the access panel itself. The sealing strip may be a draught sealing strip. A draught sealing strip is a component (e.g., a length of a suitable material) that is configured to reduce or eliminate air flow around the sides of the access panel frame. The sealing strip may be non-intumescent. More generally, an acoustic sealing strip or a draught sealing strip need not have any fire-resistant or smoke-resistant properties.

In some embodiments, each moveable portion may comprise an intumescent strip.

Advantageously, by providing an intumescent strip on each moveable portion, the closing of the gap between the expandable member and the respective side of the opening is improved. More specifically, the intumescent strip may provide an enhanced sealing effect between the frame and the opening, particularly in the event of a fire. Alternatively or additionally, each moveable portion may comprise a sealing strip, as described above.

Alternatively or additionally, mastic may be used in conjunction with the frame and the moveable portions in order to provide a seal. The mastic may be applied around the perimeter of the frame. The mastic may be applied to each moveable portion. The mastic may be intumescent or non-intumescent mastic. Intumescent mastic may be used for frames that should provide a fire resistant seal. Non-intumescent mastic may be used for frames for which fire resistance is not required. The non-intumescent mastic may instead be chosen to have other sealing properties, for example improved acoustic sealing properties, or improved draught sealing properties.

The access panel frame may further comprise a border. The border may comprise a plurality of perforations. The border may comprise a mesh. The mesh may allow, once the frame has been installed, plaster to be applied over the border. The mesh may allow the plaster to pass through the border and adhere to a surface (for example, a wall) beneath the border.

In accordance with a second aspect of the disclosure, there is provided an access panel assembly, as defined in claim 17.

The access panel assembly comprises an access panel frame as described herein, and a door configured to be secured to the access panel frame to provide an openable access to an opening. The access panel assembly may comprise any of the features or advantages described herein with reference to the access panel frame. The access panel assembly may also be referred to herein as an ‘access panel’.

In accordance with a third aspect of the disclosure, there is provided a method of installation of an access panel frame as defined in claim 18.

The method comprises locating the access panel frame in the opening, and expanding the expandable members by sliding (or otherwise moving) each moveable portion in the direction substantially perpendicular to the length of the corresponding fixed portion, thereby closing a gap between the frame and the sides of the opening. The method and access panel frame may comprise any of the features or advantages described herein.

In some embodiments, the method may comprise operating a jack to bias the frame towards a first side of the opening.

Operating a jack may comprise forcing the moveable portion of one of the expandable members apart from the corresponding fixed portion. Operating a jack may comprise advancing a threaded fastener into a threaded hole on one of the expandable members of the access panel frame, thereby causing the threaded fastener to bias the frame towards a first side of the opening.

In some embodiments, the method may comprise fastening, by a securing means of the access panel frame, the moveable portion to a side of the opening.

In some embodiments, the method may comprise fastening, by a locking means of the access panel frame, the moveable portion to the fixed portion.

The method may further comprise releasing the jack after fastening the securing means and/or after fastening the locking means. Releasing the jack may comprise removing the threaded fastener of the jack from the threaded hole.

In some embodiments, the method may comprise moving a corner plate of the access panel frame such that a sealing edge of the corner plate abuts a side of the opening.

Brief Description of the Drawings

Exemplary embodiments will now be described with reference to the Figures, in which:

Figure 1A is a front perspective view of an access panel frame;

Figure 1B is a front perspective view of an access panel assembly comprising the access panel frame of Figure 1A;

Figure 1C is a front view of the access panel frame of Figure 1A fitted into a wall;

Figure 1D is a rear view of the access panel frame of Figures 1A and 1C fitted into a wall;

Figure 2A shows an expandable member in a compressed configuration;

Figure 2B shows the expandable member of Figure 2A in an expanded configuration;

Figure 3 is a magnified rear perspective view of a corner of the access panel frame of Figures 1A, 1C and 1D, with expandable members in a compressed configuration;

Figure 4 is a magnified rear perspective view of the corner of the access panel frame of Figures 1A, 1C and 1D, with expandable members in an expanded configuration and with a corner plate in a first position;

Figure 5A is a magnified rear perspective view of the corner of the access panel frame of Figures 1A, 1C and 1D, with expandable members in an expanded configuration and with a corner plate in a second position;

Figure 5B is a magnified rear view of the corner of the access panel frame of Figures 1A, 1C and 1D, with expandable members in an expanded configuration and with a corner plate in a second position;

Figure 6A is a magnified rear perspective view of one of the expandable members of the access panel frame of Figures 1A, 1C and 1D, with the expandable member in a compressed configuration;

Figure 6B is a magnified rear perspective view of one of the expandable members of the access panel frame of Figures 1A, 1C and 1D, with the expandable member in an expanded configuration;

Figure 7 shows a method of installing a frame into an opening; and

Figure 8 shows a method of levelling a frame using a jack.

Detailed Description

Figures 1A-1D depict an access panel frame 100, or simply 'frame' 100, for fitting into an opening 170 in a wall, ceiling, floor, door, or other planar structure 108. In particular, Figure 1A shows the frame 100 in isolation, Figure 1B shows the frame 100 with a door 106 fitted, and Figures 1C and 1D show the frame 100 fitted into the opening 170.

The frame 100 is configured to receive a door 106 (as shown in Figure 1B), such that the door 106is supported by the frame 100. When fitted into the opening 170, the frame 100 and door provide openable and closable access to a concealed region from an accessible region, via the opening 170. The frame 100 may comprise a front side 102 and a rear side 104. It is understood that references herein to the front side 102 refer to the side of the frame 100 nearest to the accessible region (i.e. the region from which the user approaches the frame) and references to the rear side 104 refer to the side of the frame 100 nearest to the concealed region (i.e. the region to which the user wishes to gain access). References herein to the front side and the rear side are for clarity with respect to the Figures and such references are not intended to be limiting. Preferably, the frame 100 may be fitted into the opening 170 such that any fixings (e.g. screw holes, locking means, securing means) are hidden from view (i.e. facing the concealed region). However, it will be appreciated that the frame 100 could be fitted into the opening 170 such that any fixings are facing the accessible region.

In general, the frame 100 may be symmetrical and so the front side 102 and the rear side 104 may be structurally indistinguishable. Alternatively, the frame 100 may be asymmetrical and so the front side 102 and the rear side 104 are structurally different. For example, as shown in Figures 1A and 1C, the front side 102 may comprise a border 160, as described in more detail below with reference to Figure 3.

In Figure 1A, the frame 100 is depicted from the front side 102 of the frame 100. The frame 100 is depicted as rectangular. However, it will be understood that the frame may be square or have another polygonal shape.

The frame 100 comprises a plurality of expandable members. In the example shown in Figure 1A, the frame 100 comprises four expandable members 110a-d. The expandable members 110a-d may define the shape and dimensions of the frame 100. The expandable members 110a-d may be arranged in an end-to-end arrangement, defining a plurality of corners of the frame 100. Each corner may be located at the intersection of the ends of the expandable members 110a-d. The expandable members 110a-d may define an aperture 120 of the frame 100. The aperture 120 may provide a user with access through the frame 100. The aperture 120 may be configured to receive a door.

Figures 2A and 2B depict an expandable member 110 in greater detail. The expandable member 110 comprises a fixed portion 112 and a moveable portion 114. The moveable portion 114 may nest within the fixed portion 112, as shown in Figures 2A and 2B. Alternatively, the fixed portion 112 may nest within the moveable portion 114. By 'nest', it means that one of the fixed portion 112 and the moveable portion 114 may at least partially fit within the other of the fixed portion 112 and the moveable portion 114. The fixed portion 112 may be fixed relative to the frame 100. In particular, the fixed portion 112 may be fixed relative to the fixed portions of the other expandable members 110 of the frame 100.

The moveable portion 114 is moveable relative to the fixed portion 112. When the frame 100 is fitted into an opening, but before the frame 100 is secured to the opening, the moveable portion 114 may be moveable relative to the opening.

The moveable portion 114 may be arranged substantially parallel to its corresponding fixed portion 112. The moveable portion 114 may be configured to slide in a direction X that is substantially perpendicular to a length of its corresponding fixed portion 112. The moveable portion 114 may be continuously slideable. Advantageously, the moveable portion 114 being continuously slideable may allow the frame 100 to be fitted into openings of various sizes. In other words, the expandable member 110 may be

expanded by varying amounts, allowing the exact amount of expansion to be chosen and/or dictated by the size of the opening.

Sliding the moveable portion 114 in the direction X may expand the expandable member 110. Expanding the expandable member 110 may comprise transitioning the expandable member from a compressed configuration (shown in Figure 2A) to an expanded configuration (shown in Figure 2B). The compressed configuration may comprise the moveable portion 114 being fully inserted into the fixed portion 112. However, it will be understood that the expanded configuration does not define an exact position of the moveable portion 114 relative to the fixed portion 112. Instead, by 'expanded configuration' it is meant that the moveable portion 114 has moved any distance away from the fixed portion 112, such that the expandable member 110 is not in the compressed configuration. The expanded configuration may require that the fixed portion 112 and the moveable portion 114 are still at least partially nested. The fixed portion 112 and the moveable portion 114 being at least partially nested may allow the fixed portion 112 and the moveable 114 to be secured to each other when in the expanded configuration. The function and purpose of the expandable members 110 will be described in more detail with reference to Figures 3-5B.

The fixed portion 112 and the moveable portion 114 may comprise complementary cross-sectional shapes. The complementary cross-sectional shapes may allow the moveable portion 114 to nest within the fixed portion 112, as seen in Figures 2A and 2B, or may allow the fixed portion 112 to nest within the moveable portion 114. The fixed portion 112 may comprise a substantially C-shaped cross-section. The moveable portion 114 may comprise a substantially C-shaped cross-section. The C-shaped cross-section may comprise an open face and three closed faces. The moveable portion 114 may be dimensioned such that it fits within the fixed portion 112. It will be understood that the cross-sectional shape need not be C-shaped. The cross-sections need only be arranged such that one of the moveable portion or the fixed portion may nest within the other.

Any or all of the expandable members 110a-110d may comprise the features of expandable member 110. For example, the expandable members 110a-d may comprise fixed portions 112. The expandable members 110a-d may comprise moveable portions 114.

The frame 100 may comprise a jack 130. The jack 130 is configured to bias the frame towards a first side of the opening 170. The jack 130 may be integrated with one of the expandable members 110a-d. The first side of the opening 170 may be substantially opposite the expandable member 110a-d into which the jack 130 is integrated. For example, in Figure 1A, the jack 130 is depicted as integrated with expandable member 110c. Therefore, in Figure 1A, the jack 130 will bias the frame towards a first side of the opening 170 that corresponds to expandable member 110a.

The jack 130 may comprise one or more threaded holes 132. For example, the jack 130 may comprise two threaded holes 132, as seen in Figures 1, 6A, and 6B. The threaded holes 132 may be positioned at different locations along the length of an expandable member 110a-d. For example, a threaded hole 132 may be positioned at either side of a mid-point along the length of an expandable member 110a-d. Continuing this example, each threaded hole may be substantially equidistant from the mid-point of the expandable member 110a-d. The threaded holes 132 may be located on the fixed portion 112 of the expandable member 110a-d. The moveable portion 114 corresponding to the fixed portion 112 may comprise no holes corresponding to the threaded holes 132. The jack 130 may further comprise one or more threaded members (not shown), such as screws or bolts. Each of the threaded members may correspond to one of the threaded holes 132. The functionality of the jack 130 will be described in more detail below with reference to Figures 6A and 6B.

Turning to Figure 3, further features of the expandable members 110a-d may be seen. Specifically, expandable members 110a and 110b are depicted. However, expandable members 110c and 110d may possess the same or corresponding features to those described with respect to expandable members 110a, 110b.

As can be seen in Figure 3, each of the expandable members 110a-d may comprise a securing means 116. The securing means 116 may be configured for securing the moveable portion 114 to a side of the opening. The securing means 116 may be partially or entirely integrated with the moveable portion 114. The securing means 116 may comprise a threaded or unthreaded hole located on the moveable portion 114. The securing means 116 may comprise a threaded screw for advancing through the hole. Alternatively, the securing means 116 may comprise any other suitable fastener,

such as a nut and bolt arrangement, a clip, an adhesive, or a mechanical connector. The securing means 116 may comprise a corresponding access hole (not shown) in the fixed portion 112. The corresponding access hole may allow a user to access the part of the securing means that is located on the moveable portion 114.

Each of the expandable members 110a-d may comprise a locking means 118. The locking means 118 may be configured for securing the moveable portion 114 to the fixed portion 112. The locking means 118 may be partially integrated with the moveable portion 114 and partially integrated with the fixed portion 112. The locking means 118 may comprise a threaded or unthreaded hole 119 located on the moveable portion 114. The locking means 118 may comprise a corresponding hole 119' located on the fixed portion 112. The corresponding hole 119' may be elongate, with a length perpendicular to the length of the expandable member 110a-d. The length of the corresponding hole 119' may allow the moveable portion 114 to be secured to the fixed portion 112 at varying amounts of expansion of the expandable member 110a-d (see Figures 3-5B). The locking means 118 may comprise a screw or bolt for advancing through the threaded or unthreaded hole 119 and the corresponding hole 119'. Alternatively, the locking means 118 may comprise any other suitable fastener, such as a nut and bolt arrangement, a clip, an adhesive, or a mechanical connector.

As can also be seen in Figure 3, the frame 100 may further comprise one or more corner plates 140a-d. Each corner plate 140a-d may be located at a corner of the frame 100, where the corner is at the intersection of a first expandable member and a second expandable member. In Figure 3 specifically, corner plate 140a is depicted at a corner defined by the intersection of a first expandable member 110a and a second expandable member 110b. Corner plates 140b-d may possess the same or corresponding features to those described with respect to corner plate 140a.

The corner plates 140a-d may be substantially L-shaped. The corner plates 140a-d may comprise a first sealing edge 142. The first sealing edge 142 may be parallel to the first expandable member (expandable member 110a in Figures 3-5B). The corner plates 140a-d may comprise a second sealing edge 144. The second sealing edge 144 may be parallel to the second expandable member (expandable member 110b in Figures 3-5B). The first sealing edge 142 may be perpendicular to the second sealing edge 144.

The corner plates 140a-d may be secured to first expandable member and/or the second expandable member. In Figure 3, corner plate 140a is depicted as being secured to expandable member 112b (the second expandable member). More specifically, each of the corner plates 140a-d may be secured to a fixed portion 112 of the expandable members 110a-d.

The corner plates 140a-d may be moveably secured such that the corner plate 140a-d can be moved in a direction parallel to the first expandable member 110b and in a direction parallel to the second expandable member 112b. The corner plates 140a-d may be moveably secured to an expandable member by securing holes 146 on the corner plate 140a-d and by securing holes 148 on the expandable member 110a-d. The securing holes 146 on the corner plate 140a-d may be elongate in a first direction. The securing holes 148 on the expandable member 110a-d may be elongate in a second direction. The first direction may be perpendicular to the second direction. The securing holes 146 on the corner plates 140a-d intersect the securing holes 148 on the expandable members 110a-d. Thus, the corner plates 140a-d can move in two directions (i.e. in a plane parallel to the first direction and the second direction). The corner plates 140a-d may be moveably secured by a screw or bolt.

As can also be seen in Figure 3, the frame 100 may further comprise a border 160. The border 160 may be a polygonal unitary component. Alternatively, the border 160 may comprise a plurality of separate components, each component forming a side of the border. For example, the border 160 as shown in the Figures may comprise four separate components. The border 160 may be a separate component to the rest of the frame 100 and may be secured to the frame during the manufacturing or installation process. Alternatively, the border 160 may be integrated with one or more other components of the frame. More specifically, the border 160 may be integrated with the fixed portions 112 of the expandable members 110a-d. For example, each side of the border 160 may be integral with the fixed portion 112 corresponding with that side of the frame. Advantageously, this reduces the number of components of the frame 100, thereby reducing the manufacturing time and complexity. The border 160 may comprise a plurality of perforations (not shown). The plurality of perforations may be formed through the front side 102 of the border 160. The border 160 may comprise a mesh.

The frame 100 may comprise an intumescent strip 150. As shown in Figure 3, the intumescent strip 150 may be located around a perimeter of the frame 100. The intumescent strip 150 is intended to create a seal between the frame 100 and the opening 170 into which the frame 100 is fitted. Advantageously, the intumescent strip 150 may provide a fire resistant seal. In known access panel frames, it is common for an installer to apply intumescent mastic during installation. However, the application of intumescent mastic may vary between installers. For example, some installers may apply more mastic than others, or some installers may apply uneven layers of mastic. This means that the fire resistance of an installed frame is unknown. The use of an intumescent strip 150 can provide uniform fire resistance that is not dependent on the installer. Therefore, the fire resistance of the frame 100 is improved and is better known.

Alternatively or additionally, the frame may comprise an intumescent strip on some or all of the moveable portions 114. Advantageously, the use of intumescent strips on the moveable portions 114 provides an improved fire-resistant seal between each moveable portion 114 and the opening 170 (as described in greater detail below). While it has been described that an intumescent strip may be used, it is also possible that other types of strip could be used in addition to or instead of an intumescent strip. For example, the frame may instead be adapted to provide improved acoustic and/or draught sealing, in which case a strip that seals against sound (or other vibrations) and/or draughts may be provided.

A method 200 of installing the frame 100 into an opening will now be described with reference to Figures 3-5B and Figure 7.

Figure 3 illustrates expandable members 110a and 110b in a compressed position as described above. In the compressed position, the moveable portion 114 may be completely or mostly located within the fixed portion 112 of the expandable member 110a-d. The method may comprise, prior to installation of the frame 100 into an opening, fastening 202 (e.g. tightening or securing) the locking means 118 such that all of the moveable portions 114 are secured within their respective fixed portions 112. In other words, prior to installation, the moveable portions 114 may be secured to the fixed portions 112 such that they do not freely move into the expanded configuration.

The method may comprise, prior to installation of the frame 100 into an opening 170, checking 204 whether the frame 100 is of appropriate size to be fitted into the opening 170. By an 'appropriate size' it is meant that the frame 100 is similarly sized to the opening 170, is not larger than the opening 170, and is not substantially smaller than the opening 170. It is understood that access panel frames are typically smaller than the openings into which they are to be fitted in order to aid installation. The method comprises locating 206 the frame 100 in the opening 170. Locating the frame 100 in the opening 170 may comprise locating the frame 100 in the opening with the rear side 104 facing into the opening 170 (towards the concealed region) and the front side facing out of the opening 170 (towards the accessible region and the installer). When the frame 100 is located in the opening 170, a gap 172 (see Figure 1D) will typically exist between the expandable members 110a-d and the sides of the opening 170. The gap 172 may comprise a single continuous gap around the perimeter of the frame 100. Alternatively, the gap 172 may comprise one or more separated gaps at various positions around the perimeter of the frame 100.

The method may comprise unfastening 208 the securing means 116. By 'unfastening the securing means', it is meant that each of the securing means 116 is adjusted such that the frame 100 may be placed in the opening 170 without the securing means 118 interfering with the sides of the opening 170. Unfastening the securing means 116 may comprise retracting or loosening a threaded screw. The securing means 116 may be unfastened prior to the frame 100 being located in the opening 170.

The method may comprise unfastening 210 the locking means 118. By 'unfastening the locking means', it is meant that each of the locking means 118 is adjusted such that each of the moveable portions 114 is moveable with respect to the corresponding fixed portion 112. Unfastening the locking means 118 may comprise retracting or loosening a threaded screw. The locking means 118 may be unfastened after the frame 100 is located in the opening 170.

The method may comprise operating 212 the jack 130 to bias the frame 100 towards a first side of the opening 170. Operating the jack 130 may comprise performing some or all of the method of levelling the frame 100 using the jack 130, as described in greater detail below, with reference to Figures 6A and 6B.

The method comprises expanding 214 the expandable members 110a-d. Expanding the expandable members 110a-d may comprise sliding each moveable portion 114 in the direction substantially perpendicular to the length of the corresponding fixed portion 110a-d. Sliding each moveable portion 114 may comprise fastening the moveable portion 114 to a side of the opening 170. In other words, the moveable portion 114 may slide concurrently with the process of fastening the moveable portion 114 to the side of the opening 170. For example, if fastening the moveable portion 114 comprises tightening or advancing a screw, then the tightening of the screw will cause the moveable portion 114 to slide towards the side of the opening 170. Alternatively, the expandable members 110a-d may comprise a biasing mechanism that biases the moveable portions 114 away from the fixed portions 112, thereby biasing the expandable members 110a-d into the expanded configuration.

The method may comprise fastening 216 the moveable portion 114 to a side of the opening 170. The fastening the movable portion 114 may comprise fastening the securing means 116. By 'fastening the securing means', it is meant that each of the securing means 116 is adjusted such that each of the moveable portions 114 is secured to a respective side of the opening 170. Fastening the securing means 116 may comprise advancing or tightening a threaded screw. The securing means 116 may be fastened after the frame 100 is located in the opening 170.

Fastening the securing means 116 may cause the moveable portions 114 to slide in the direction substantially perpendicular to the length of the corresponding fixed portion 112. After sliding the moveable portions 114, the expandable members 110a-d may be considered to be in an expanded configuration.

Figure 4 illustrates expandable members 110a, 110b in the expanded configuration. As can be seen in Figure 4, expanding the expandable members 110a-d may close some or all of the gap or gaps between the frame 100 and the sides of the opening 170. In doing so, the expandable members 110a-d remove the requirements for packers. This improves the fire resistance of the frame 100 and improves the certainty of the known fire resistance of the frame 100. In other words, since no additional, potentially flammable, components (e.g. packers) are required for installation, the fire resistance is improved and may be better known by the manufacturer and the end-user.

Furthermore, the ease of installation is improved in that no additional components are required to ensure that the frame fits snugly within the opening 170.

The method may comprise fastening 218 the locking means 118. By 'fastening the locking means', it is meant that each of the locking means 118 is adjusted such that each of the moveable portions 114 is fixed with respect to the corresponding fixed portion 112. Fastening the locking means 118 may comprise advancing or tightening a threaded screw. The locking means 118 may be fastened after the moveable portions 114 are fastened to the sides of the opening 170. Advantageously, fastening the locking means 118 may retain the expandable members 110a-d in an expanded configuration after installation of the frame 100.

Depending on the arrangement of the expandable members 110a-d, some gaps may remain around the perimeter of the frame 110 even after all of the expandable members 110a-d have been expanded into the expanded configuration. More specifically, as indicated by circle 180, a gap may remain at each corner of the frame 100. The gap may be formed at the intersection of two expandable members 110a-d. Advantageously, the corner plates 140a-d may mitigate or remove the effect of the gaps at the corners.

The method may comprise moving 220 a corner plate 140a-d such that a sealing edge 142, 144 of the corner plate abuts a side of the opening 170. The method may comprise moving the corner plate 140a-d in a direction parallel to the length of the expandable member 110a-d to which it is secured. The method may comprise moving the corner plate 140a-d in a direction perpendicular to the length of the expandable member 110a-d to which it is secured.

For example, as shown in Figures 5A and 5B, the corner plate 140a has been moved parallel to expandable member 110b (upwards in Figures 5A and 5B) and perpendicular to expandable member 110b (leftwards in Figures 5A and 5B). As shown most clearly in Figure 5B, the sealing edge 142a may be parallel and level with moveable portion 114a and the sealing edge 144a may be parallel and level with moveable portion 114b. Advantageously, the corner plates 140a-d seal the gaps at the corners of the frame 100. Advantageously, after moving the corner plates 140a-d, a complete seal is formed between the frame 100 and the opening 170.

A method 300 of levelling the frame 100 using a jack 130 will now be described with reference to Figures 6A, 6B, and 8. The method may be performed after the frame 100 is located 302 in an opening. The frame 100 may be located in an opening 170 according to the method as described above.

The method may comprise advancing 304 threaded fasteners (not shown) through the threaded holes 132. In Figures 6A and 6B, the threaded fasteners may be advanced through the threaded holes 132 as schematically depicted by arrows A. Upon advancing, the threaded fasteners may abut the moveable portion 114. The moveable portion 114 may have no corresponding holes to the threaded holes 132, therefore the threaded fasteners may not pass through the moveable portion 114. In particular, in Figures 6A and 6B, the threaded fasteners abut the moveable portion 114c.

As the threaded fasteners are advanced, the threaded fasteners may force 306 the moveable portion 114 apart from the corresponding fixed portion 112. In Figure 6B, moveable portion 114c is seen moving in direction B relative to the fixed portion 112c. The moveable portion 114 may abut a side of the opening 170 corresponding to the moveable portion 114. This may cause the frame 100 to move in a direction C opposite to direction B. The frame 100 may thereby be biased 308 towards a side of the opening 170 that is substantially opposite to the side corresponding to the expandable member 110a-d in which the jack 130 is integrated. For example, in Figure 6B, the frame 100 is biased towards the side of the opening 170 corresponding to expandable member 110a, which is substantially opposite the side of the opening 170 corresponding to expandable member 110c, in which the jack 130 is integrated.

In the case of a square or rectangle (as depicted in the Figures), the relevant sides of the opening 170 are exactly opposite. However, it will be understood that in other geometries (e.g. other polygonal shapes of the frame and opening), the jack 130 may bias the frame in a direction that is towards a side that is only substantially opposite. While the Figures depict the jack 130 to be located on a “bottom” side of the frame, and the frame 100 being biased towards a “top” side of the frame, it will be understood that this need not be the case. For example, if the frame 100 is mounted horizontally (e.g. in a ceiling) then the jack 130 may bias the frame in a horizontal direction.

The method may further comprise removing 312 the threaded fasteners. The threaded fasteners may be removed after fastening 310 the moveable portion 114 to the side of the opening 170. The threaded fasteners may be removed after fastening the moveable portion 114 to the corresponding fixed portion 112. Once the moveable portion 114 is fastened to the corresponding fixed portion 112, the threaded fasteners are no longer required to bias the frame, since the fastening of the moveable portion 114 to the corresponding fixed portion 112 retains the expandable member 110a-d in the expanded configuration.

It will be understood that any features, functions, or advantages described with respect to the above-mentioned examples of an access panel frame may be applied to the above-mentioned examples of methods and/or access panel assemblies, and vice versa.

CLAIMS:

1. An access panel frame for fitting into an opening, wherein the opening is defined by a plurality of sides, the frame comprising a plurality of elongate expandable members, each expandable member comprising a moveable portion and a corresponding fixed portion, wherein each moveable portion is arranged parallel to its corresponding fixed portion and is configured to slide in a direction substantially perpendicular to a length of the corresponding fixed portion in order to expand the expandable member such that, when the frame is placed in the opening, the expandable member closes a gap between the frame and a respective side of the opening.

2. The access panel frame according to claim 1 further comprising a jack configured to bias the frame towards a first side of the opening, when the frame is placed in the opening.

3. The access panel frame according to claim 2, wherein the jack is configured to force a moveable portion of one of the expandable members apart from the corresponding fixed portion, thereby biasing the frame towards the first side of the opening.

4. The access panel frame according to claim 2 or claim 3, wherein the jack comprises a threaded hole and a corresponding threaded fastener, wherein the threaded hole is located on one of the expandable members, and wherein advancing the threaded fastener into the threaded hole causes the threaded fastener to bias the frame towards the first side of the opening.

5. The access panel frame according to claim 4, wherein the jack comprises a plurality of threaded holes and a plurality of corresponding threaded fasteners, wherein the plurality of threaded holes are disposed at differing locations along the length of the expandable member.

6. The access panel frame according to any of the preceding claims, wherein the moveable portion and the fixed portion have complementary cross-sectional shapes

such that one of the moveable portion and the fixed portion may nest within the other of the moveable portion and the fixed portion.

7. The access panel frame according to claim 6, wherein the moveable portion and the fixed portion each comprise a C-shaped cross-section, and wherein one of the moveable portion and the fixed portion is located within the other such that the expandable member has a substantially box-shaped cross-section.

8. The access panel frame according to any of the preceding claims, wherein each of the expandable members comprises a securing means to allow the moveable portion to be secured to a side of the opening.

9. The access panel frame according to any of the preceding claims, wherein each of the expandable members comprises a locking means to allow the moveable portion to be secured to the fixed portion, thereby retaining the expandable member in the expanded configuration.

10. The access panel frame according to any of the preceding claims, wherein the plurality of expandable members are arranged in an end-to-end arrangement, defining a plurality of corners of the frame, each corner located at the intersection of the ends of a first expandable member and a second expandable member, and wherein each corner of the frame comprises a corner plate.

11. The access panel frame according to claim 10, wherein each corner plate is moveably secured to the first expandable member or to the second expandable member such that the corner plate can be moved in a direction parallel to the first expandable member and in a direction parallel to the second expandable member.

12. The access panel frame according to claim 11, wherein each corner plate comprises a first sealing edge, wherein the first sealing edge is parallel to a length of the first expandable member, and wherein the first sealing edge is configured to abut the side of the opening corresponding to the first expandable member.

13. The access panel frame according to claim 11 or claim 12, wherein each corner plate comprises a second sealing edge, wherein the second sealing edge is parallel to

a length of the second expandable member, and wherein the second sealing edge is configured to abut the side of the opening corresponding to the second expandable member.

14. The access panel frame according to any of the preceding claims, wherein the frame is square or rectangular and is for fitting into a square or rectangular opening, wherein the opening is defined by four straight sides, and wherein the frame comprises four expandable members arranged into a square or rectangle.

15. The access panel frame according to any of the preceding claims further comprising an intumescent strip around a perimeter of the frame.

16. The access panel frame according to any of the preceding claims, wherein each moveable portion comprises an intumescent strip.

17. An access panel assembly comprising:

an access panel frame according to any of the preceding claims; and

a door configured to be secured to the access panel frame to provide an openable access to an opening.

18. A method of installation of an access panel frame into an opening defined by a plurality of sides, wherein the frame comprises a plurality of elongate expandable members, each expandable member comprising a moveable portion and a corresponding fixed portion, wherein each moveable portion is arranged parallel to its corresponding fixed portion and is configured to slide in a direction substantially perpendicular to a length of the corresponding fixed portion, wherein the method comprises:

locating the access panel frame in the opening; and

expanding the expandable members by sliding each moveable portion in the direction substantially perpendicular to the length of the corresponding fixed portion, thereby closing a gap between the frame and the sides of the opening.

19. The method of installation according to claim 18 further comprising:

operating a jack to bias the frame towards a first side of the opening.

20. The method of installation according to claim 18 or 19 further comprising:

fastening, by a securing means of the access panel frame, the moveable portion to a side of the opening.

21. The method of installation according to any one of claims 18 to 20 further comprising:

fastening, by a locking means of the access panel frame, the moveable portion to the fixed portion.

22. The method of installation according to any one of claims 18 to 21 further comprising:

moving a corner plate of the access panel frame such that a sealing edge of the corner plate abuts a side of the opening.

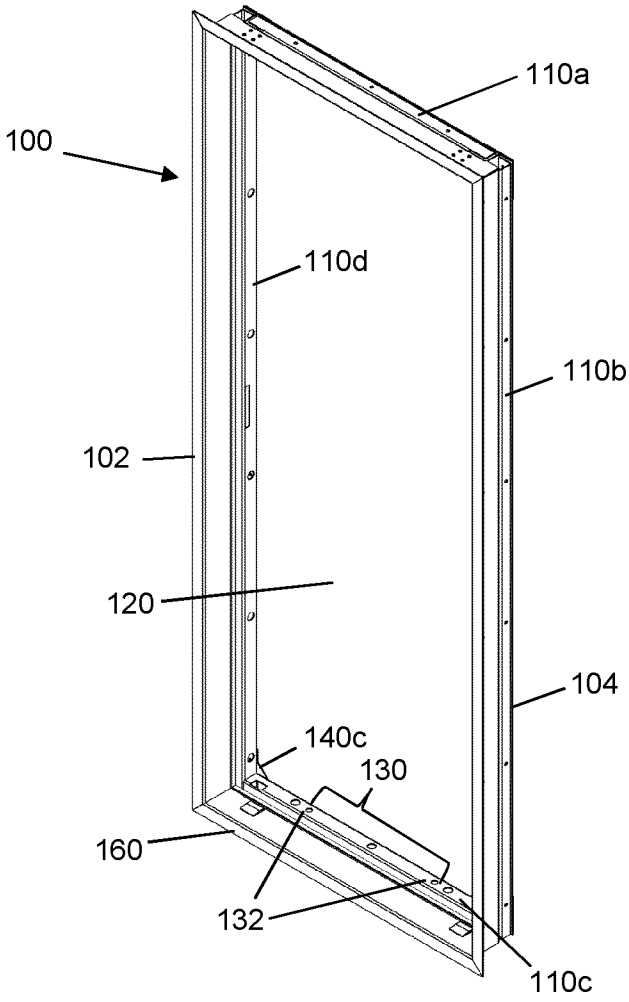

Figure 1A

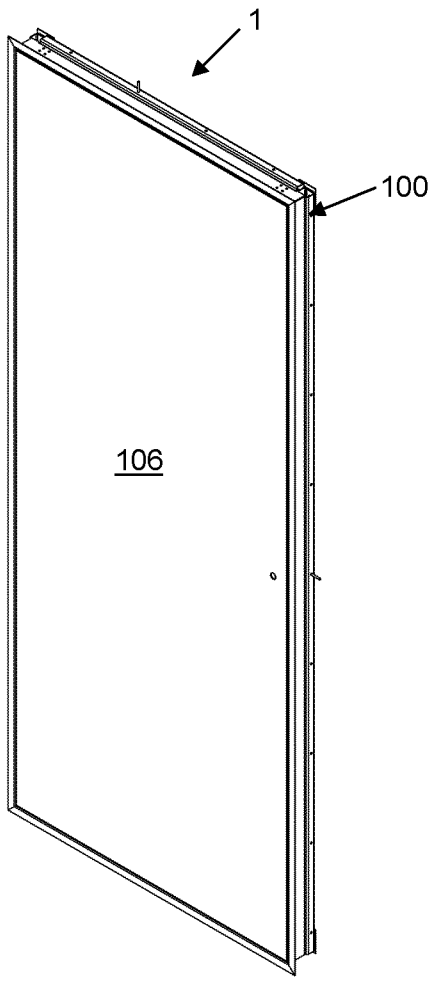

Figure 1B

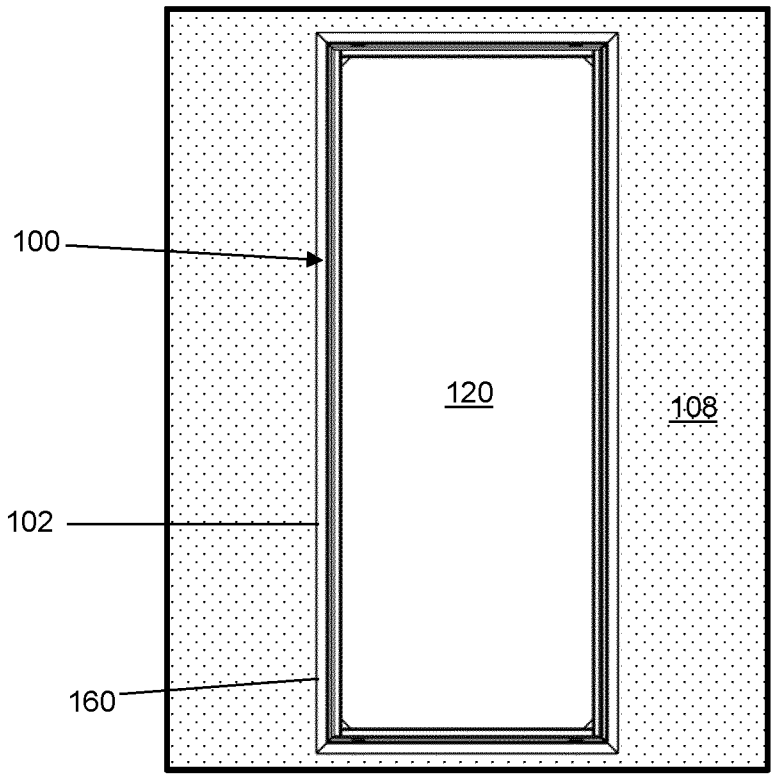

Figure 1C

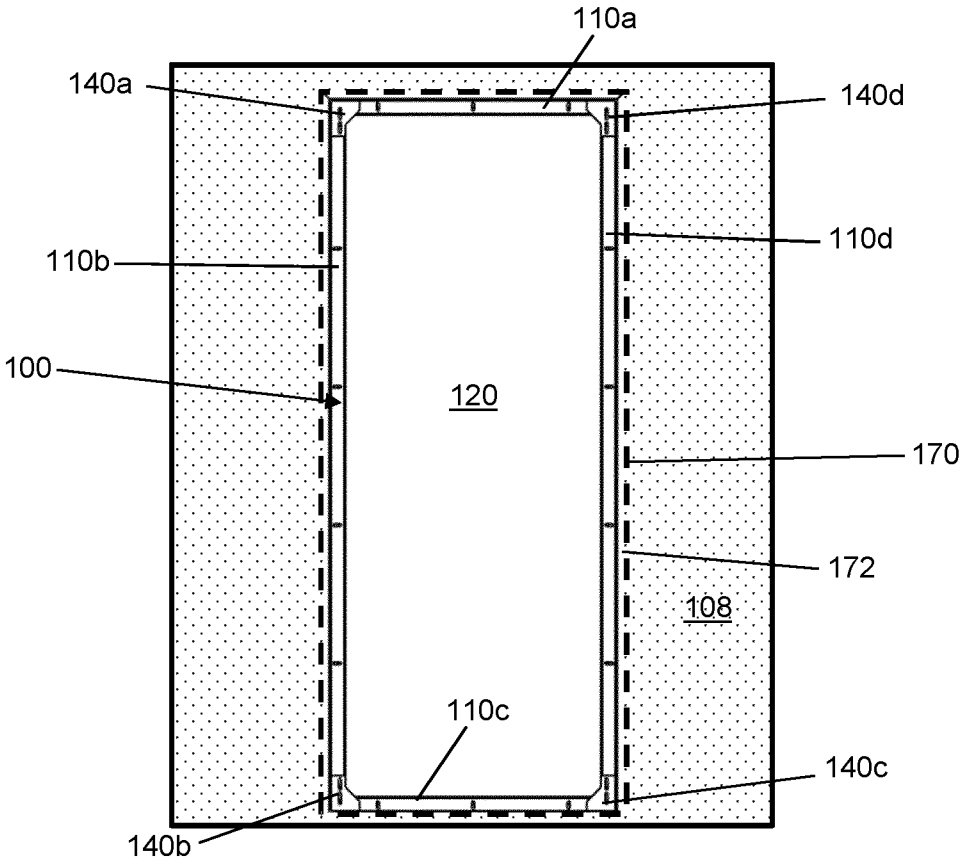

Figure 1D

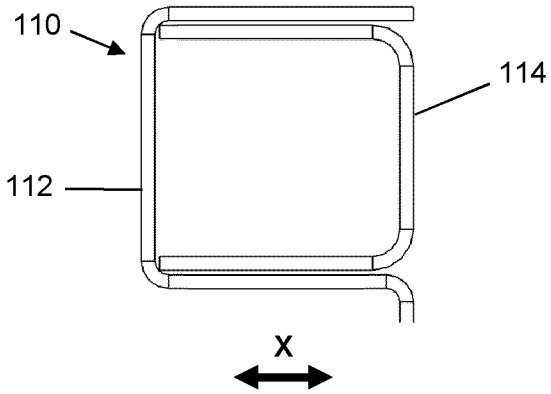

Figure 2A

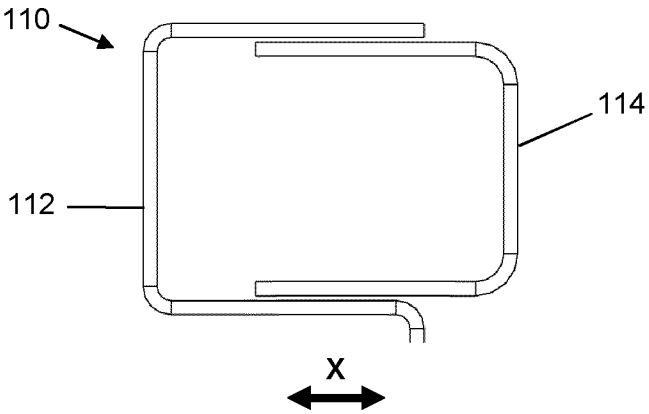

Figure 2B

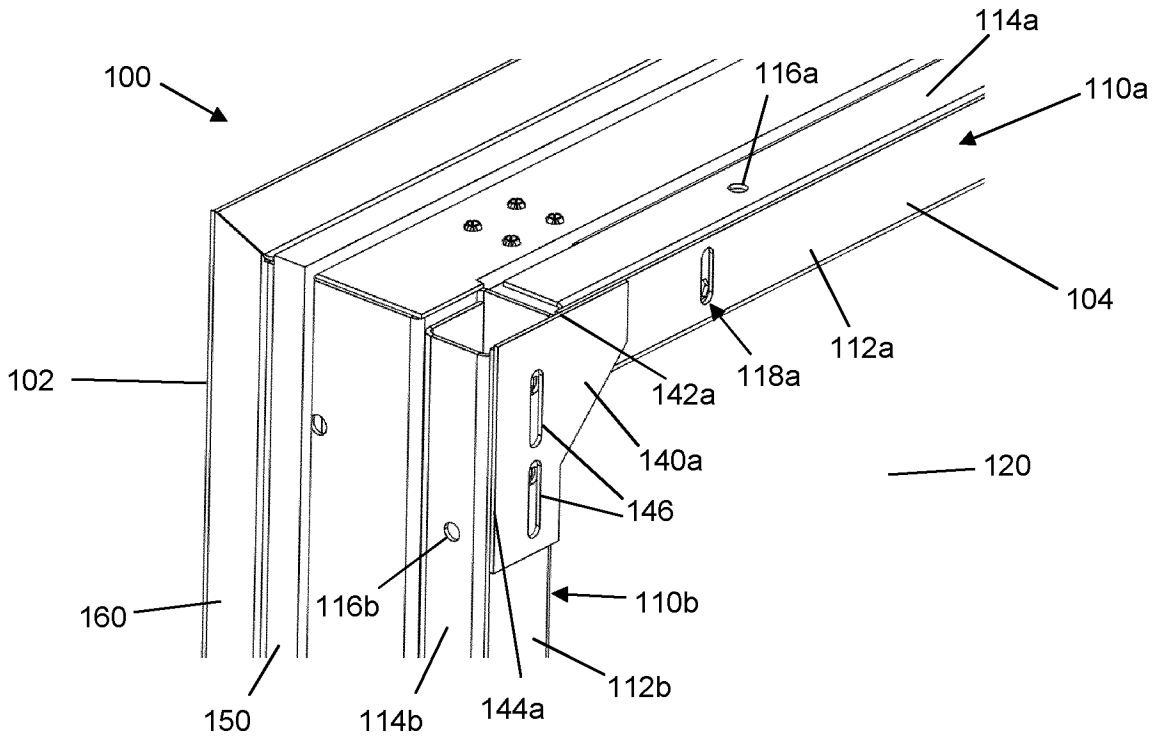

Figure 3

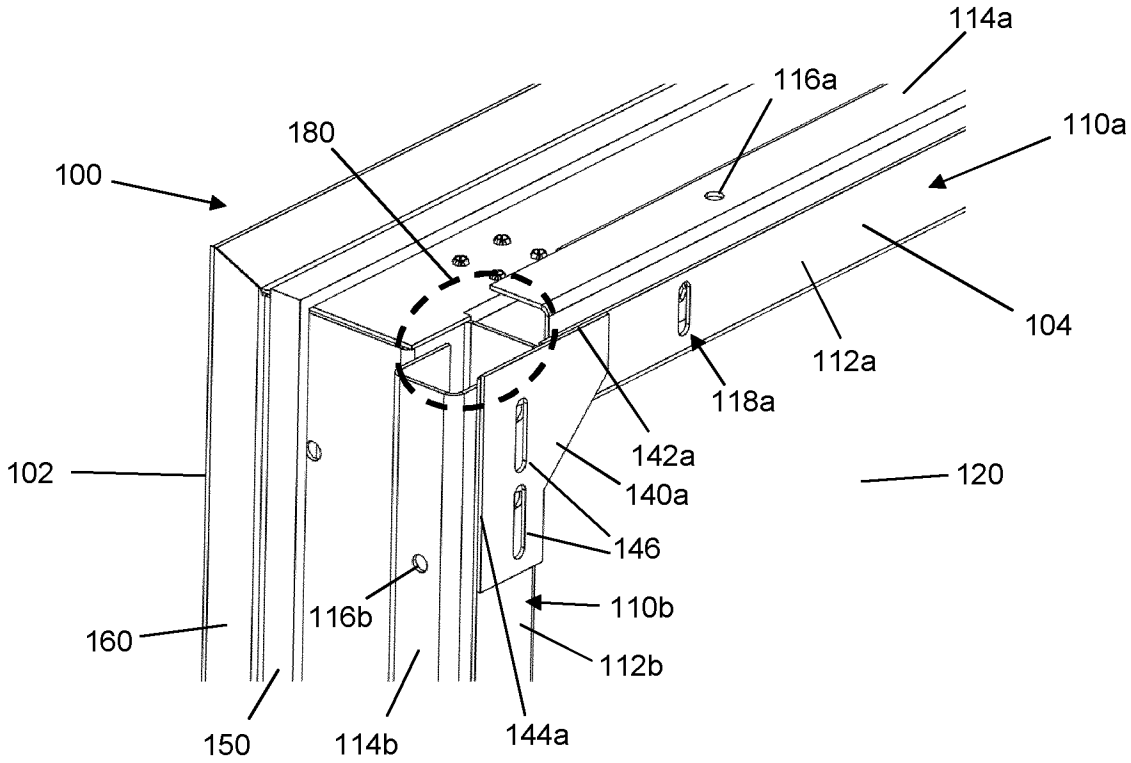
114a
116a
180
110a
100
104
112a
118a
142a
102
120
140a
146
116b
110b
160
112b
150
114b
144a

Figure 4

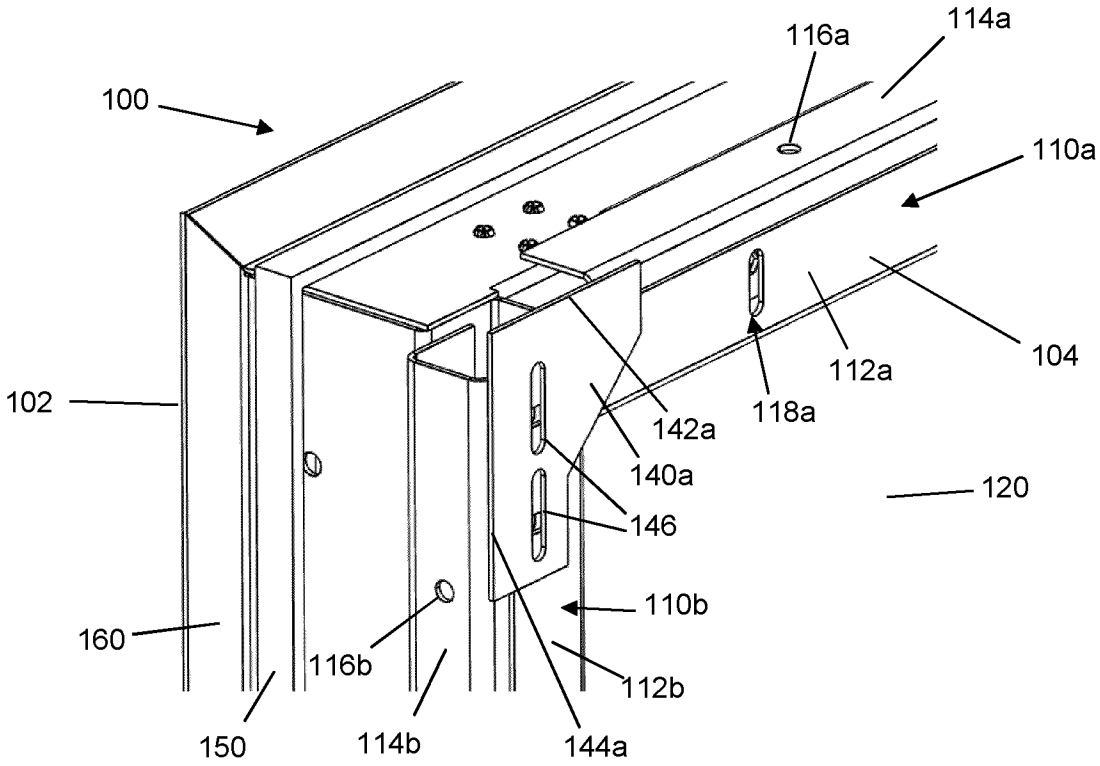

Figure 5A

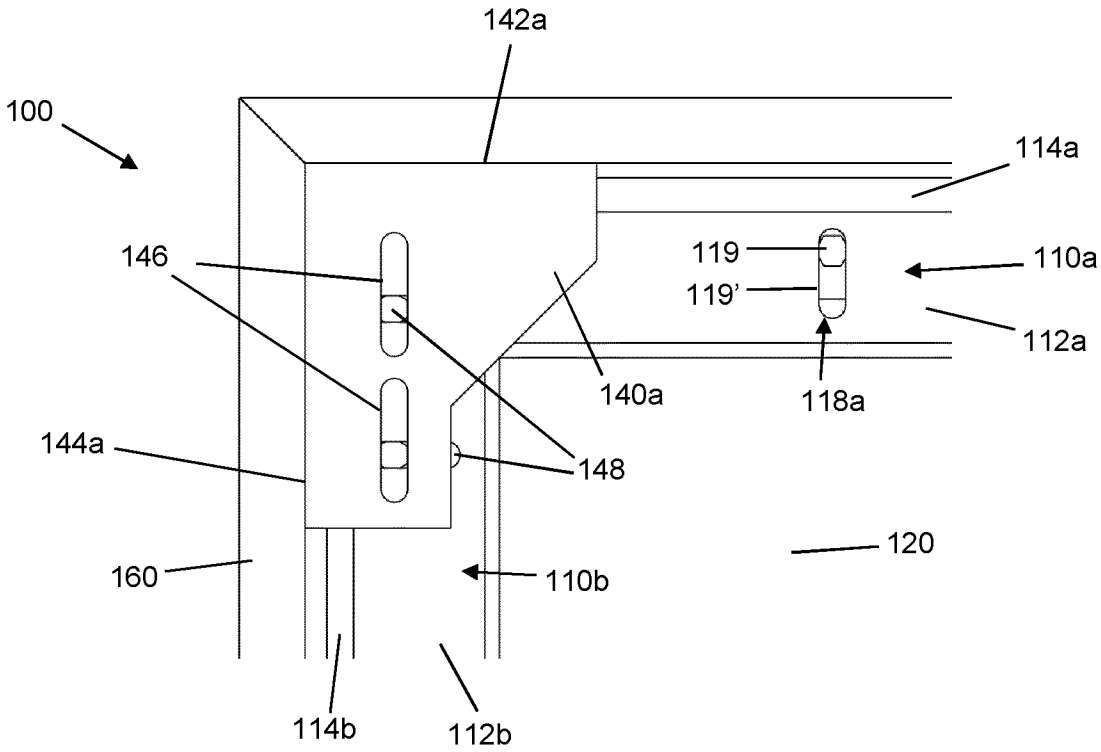

Figure 5B

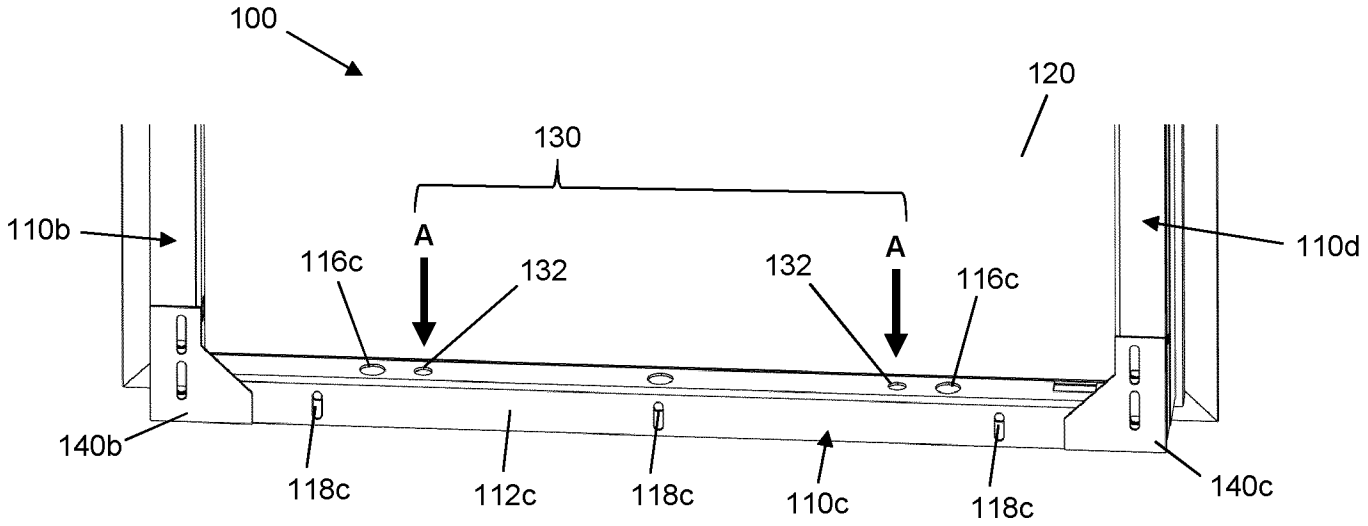

Figure 6A

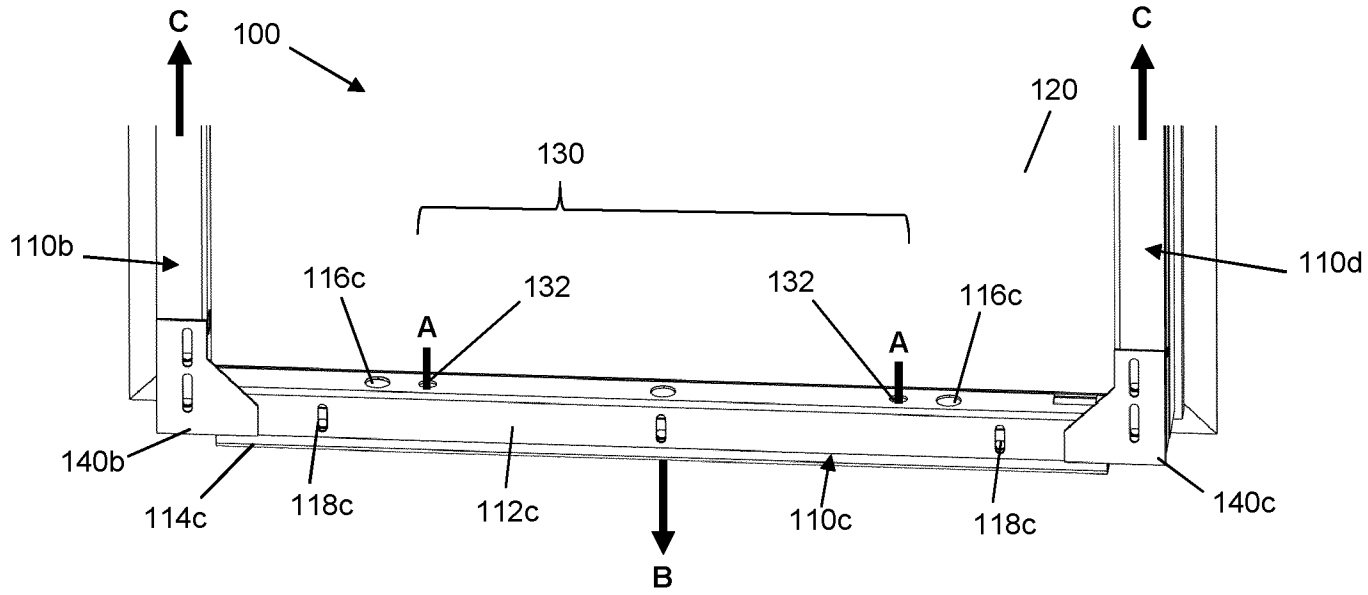

Figure 6B

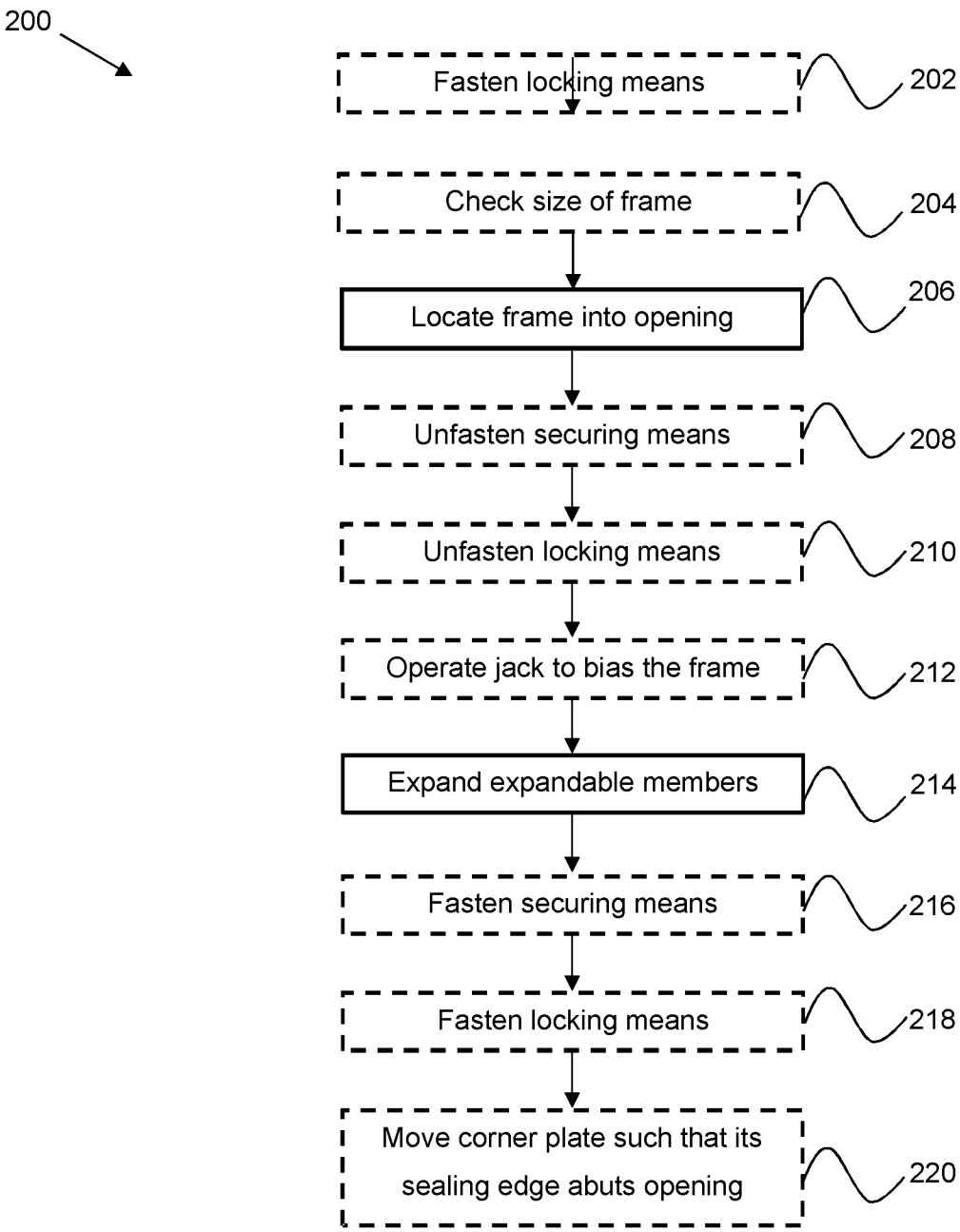
200
Fasten locking means
202
Check size of frame
204
Locate frame into opening
206
Unfasten securing means
208
Unfasten locking means
210
Operate jack to bias the frame
212
Expand expandable members
214
Fasten securing means
216
Fasten locking means
218
Move corner plate such that its sealing edge abuts opening
220

Figure 7

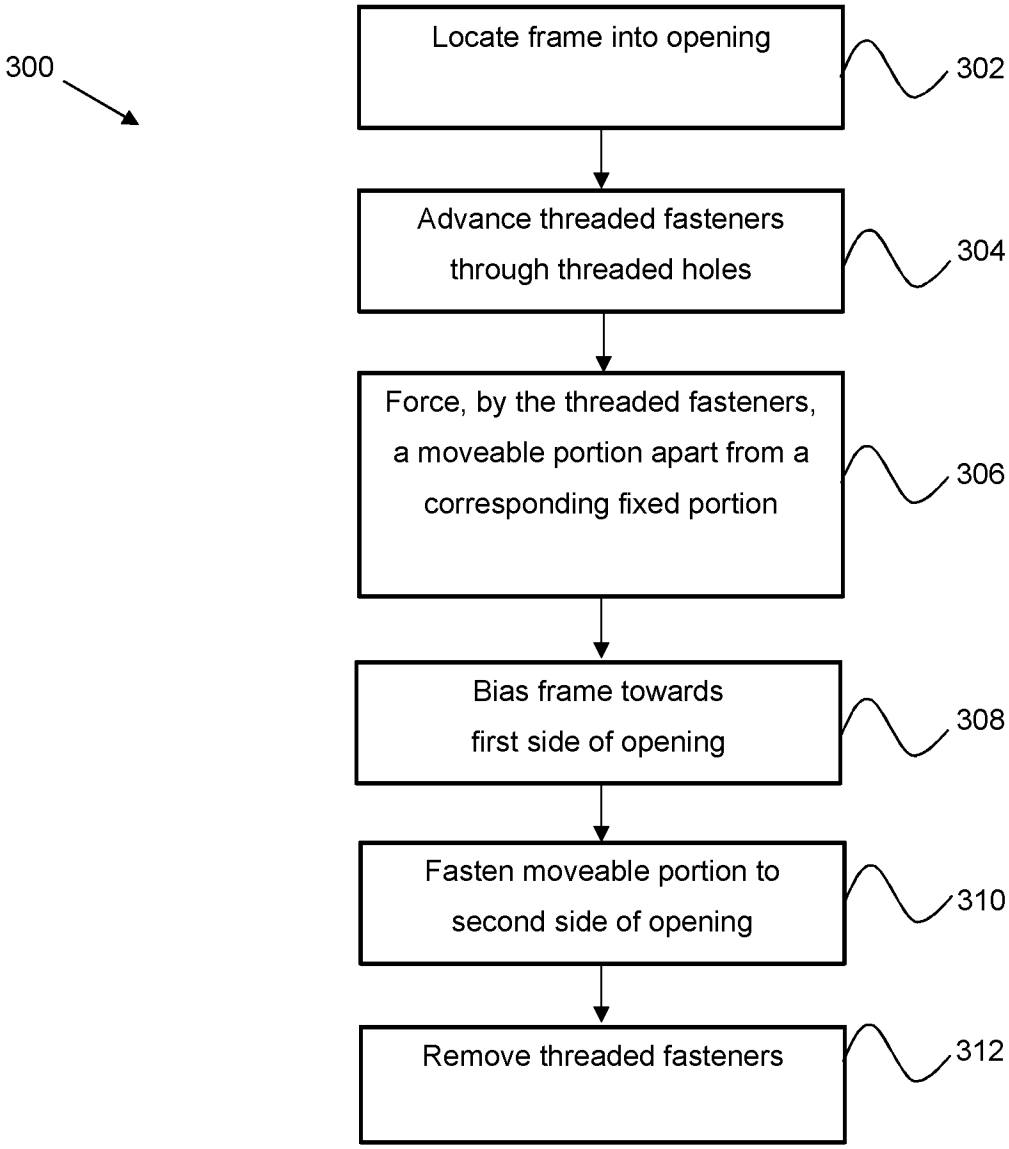
300
Locate frame into opening
302
Advance threaded fasteners through threaded holes
304
Force, by the threaded fasteners, a moveable portion apart from a corresponding fixed portion
306
Bias frame towards first side of opening
308
Fasten moveable portion to second side of opening
310
Remove threaded fasteners
312

Figure 8

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2021/081782

A. CLASSIFICATION OF SUBJECT MATTER
INV. E06B1/08 E06B1/18 E06B1/60 E06B3/70 E04F19/08
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
E06B E04F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2017/031543 A1 (UNILINE AUSTRALIA LTD [AU]) 2 March 2017 (2017-03-02) paragraph [0032]; figure 5	1-22
X	US 3 553 891 A (CASEBOLT RALPH T ET AL) 12 January 1971 (1971-01-12) figures 1, 2	1-22
X	GB 2 214 550 A (TENERET LTD [IE]) 6 September 1989 (1989-09-06) page 8, paragraph FIRST; figures 1-4D	1-22
X	US 8 776 459 B1 (THEOPHILUS MORGAN F [US]) 15 July 2014 (2014-07-15) figures 2, 3	1-22

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance;; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance;; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
26 January 2022	11/02/2022

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Cobusneanu, D

1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/EP2021/081782

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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		CN 108291421 A	17-07-2018
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