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(54) **A STRUCTURAL GLAZING SYSTEM**

(57) The invention relates to an insulation glass unit fastening element of a structural glazing system for fastening at least two insulation glass units. The fastening element comprises a headless screw element configured to be screwed into a frame profile, a fastener comprising two holding arms and an opening arranged around the screw element, and which holding arms are inserted into grooves of the insulation glass unit elements, and a mounting nut for engaging the holding arms of the fastener to the grooves. The invention further relates to a structural glazing system and a method for fixing at least two insulation glass units to a frame profile by at least one insulation glass unit fastening element.

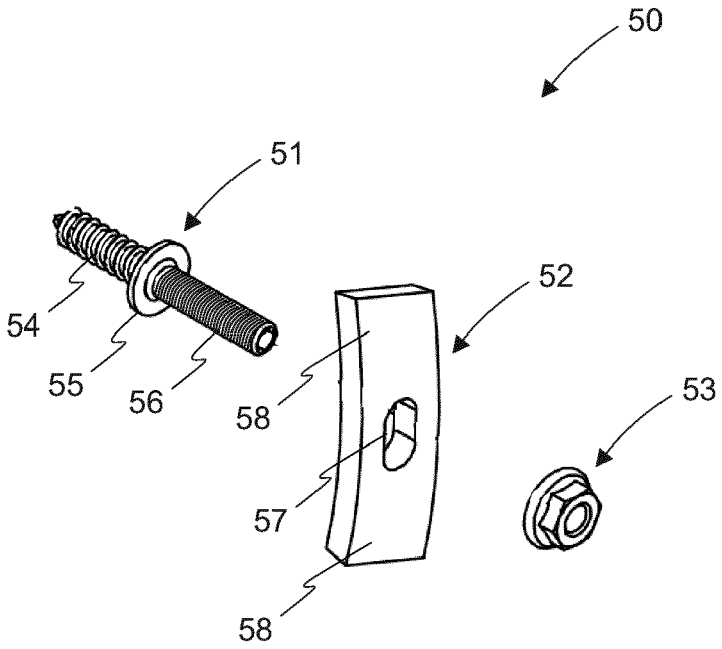

Fig. 5

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Description

Technical field

[0001] The present invention relates to a structural glazing system, an insulation glass unit fastening element for attaching glass units to a frame profile for forming a structural glazing system and to a method for attaching insulation glass units to a frame profile by an insulation glass unit fastening element for forming a structural glazing system.

Background

[0002] Structural glazing systems are types of curtain wall systems consisting of glass units that are fixed, for example, bonded or anchored back to a supporting structure without the use of continuously gasketed aluminium pressure plates or caps. The glass units can be comprised of monolithic, laminated, dual-glazed or even triple-glazed insulating glass units (IGUs) that are connected to the supporting structure fixed to the walls. The supporting structure may be, for example, horizontal and/or vertical aluminium profile.

[0003] Different kinds of fixing means can be used for attaching/fixing insulation glass units to a supporting structure, but problems can be caused by different heights of insulation glass units of i.e. size tolerances of insulation glass units can vary significantly in terms of attachment. This means that fixing means configured to fix glass units or IGUs of certain height to the supporting structure are not long enough or they are too long for fixing glass units or IGUs to the supporting structure correctly in order to ensure a good building practice. When a construction worker is attaching glass units or IGUs, she/he needs to hand pick a fixing means that has the most suitable length among fixing means of different lengths. This makes the building of structural glazing systems slow and increase costs. It may also make the fixing of glazing systems undesirable, for example from moisture point of view, when the fixing means having the most suitable length is selected by a construction worker in a construction site, because the selected fixing means may still not have such a length that is the best possible or it may not even be suitable for fixing just those glass units or IGUs in question.

Summary

[0004] Now there has been invented an improved method and technical equipment implementing the method, by which the above problems are alleviated. Various aspects of the invention include an insulation glass unit fastening element, a structural glazing system and a method, which are characterized by what is stated in the independent claims. Various embodiments of the invention are disclosed in the dependent claims.

[0005] The aspects of the disclosed embodiments relate an insulation glass unit fastening element, a structural glazing system and a method. According to a first aspect, there is provided an insulation glass unit fastening element of a structural glazing system for fastening at least two insulation glass units comprising at least one groove provided on at least sections of the edge of the insulation glass unit to a frame profile. The insulation glass unit fastening element comprises a headless screw element configured to be screwed into a screw groove of the frame profile through the space between two adjacent insulation glass unit elements, a fastener comprising two holding arms and an opening between two holding arms, wherein the opening is configured to be arranged around the screw element, and which fastener is then configured to be moved along the screw element towards the frame profile until the fastener is aligned with the grooves so that the holding arms are rotatable into the grooves of the insulation glass unit elements, and a mounting nut configured to be rotated to the screw element for engaging the holding arms of the fastener to the grooves.

[0006] According to an example, the screw element comprises a mounting support that is a screwing stopper arranged to prevent screwing of the headless screw element too deep to the screw groove. According to an example, the mounting nut is configured to be tightened against the mounting support so that the fastener remains between the mounting support and the mounting nut. According to an example, the fastener is a plate-like element.

[0007] According to a second aspect, there is provided structural glazing system comprising a frame profile comprising a screw groove, at least two insulation glass units comprising at least one groove provided on at least sections of the edge of the insulation glass unit, at least one insulation glass unit fastening element for fixing said at least two insulation glass units to the frame profile and comprising a headless screw element, a fastener and a mounting nut. The screw element is screwed into the screw groove through the space between two adjacent insulation glass units. The fastener comprises two holding arms and an opening arranged around the screw element. The fastener is aligned with the grooves by moving it along the screw element and the holding arms are inserted into the grooves. The mounting nut is used for engaging the holding arms of the fastener to the grooves by rotating it to the screw element.

[0008] According to an example, the frame profile is fixed to a wall of a building. According to an example, the frame profile further comprises seals onto which said at least two insulation glass units are fixed. According to an example, the screw element comprises a mounting support, which is a screwing stopper arranged to prevent screwing of the headless screw element too deep to the screw groove. According to an example, the mounting nut is configured to be tightened against the mounting support so that the fastener remains between the mounting support and the mounting nut. According to an ex-

ample, the fastener is a plate-like element.

[0009] According to a third aspect, there is provided a method for fixing at least two insulation glass units comprising at least one groove provided on at least sections of the edge of the insulation glass unit to a frame profile comprising a screw groove by at least one insulation glass unit fastening element comprising a headless screw element, a fastener and a mounting nut for forming a structural glazing system. The method comprises: screwing the headless screw element into a screw groove of the frame profile through the space between two adjacent insulation glass unit elements, moving the fastener comprising two holding arms and between two holding arms an opening arranged around the screw element along the screw element towards the frame profile until the fastener is aligned with the grooves, inserting the holding arms into the grooves of the insulation glass unit elements by rotating the fastener, and rotating the mounting nut to the screw element for engaging the holding arms of the fastener to the grooves.

Brief description of the drawings

[0010] In the following, various embodiments of the invention will be described in more detail with reference to the appended drawings, in which

Fig. 1a-1c show a fixing process of an insulation glass unit fastening element to a frame profile of a structural glazing system according to an example embodiment;

Fig. 2a shows a perspective view of a structural glazing system before an insulation glass unit fastening element is fixed to a frame profile according to an example embodiment;

Fig. 2b shows a perspective view of the structural glazing system of Fig. 2a after the insulation glass unit fastening element is fixed to the frame profile, and wherein part of the other insulation glass unit is removed, according to an example embodiment;

Fig. 3a shows a front view of a part of a structural glazing system, wherein an insulation glass unit fastening element is fixed to a frame profile, according to an example embodiment;

Fig. 3b shows a cross-sectional view of the part of the structural glazing system of Fig. 3a along the line A-A according to an example embodiment;

Fig. 3c shows a cross-sectional view of the part of the structural glazing system of Fig. 3a along the line A-A according to an example embodiment;

Fig. 4 shows a fixing method of an insulation glass unit fastening element to a frame profile according to an example embodiment; and

Fig. 5 shows an exploded view of an insulation glass unit fastening element according to an example embodiment.

Detailed description

[0011] Structural glazing systems i.e. façades are types of curtain wall systems consisting of a plurality of insulation glass units fixed i.e. attached next to each other in horizontal and vertical directions. Insulation glass units are fixed, for example, bonded or anchored back to a supporting structure that may be called a frame profile by fixing means without the use of frames, for example continuously gasketed aluminium pressure plates or caps or some other structures, like glazing beads, arranged on the surface of the glass i.e. on the exterior. However, in some structural glazing systems exterior may be partially framed.

[0012] The insulation glass units may be comprised of monolithic, laminated, dual-glazed or triple-glazed insulating glass units (IGUs) or facade glazing. The back side of insulation glass units is configured to be connected to a frame profile that is fixed to a wall of a building. The frame profile may be formed of, for example, horizontal and/or vertical aluminium profiles, beams or frames. An insulation glass unit may be attached to the building by mechanically attaching the inner glass of the insulation glass unit that is toward the wall of the building to the frame profile by fixing means, the outer and middle glass are bonded on top of the inner glass by glue. Or an insulation glass unit may be mechanically attached to the frame profile from the groove between the middle and the outer glass, the outer glass is bonded by glue on top of the middle glass.

[0013] As above explained, insulation glass units may be attached to a frame profile(s), which is/are already attached to a wall(s) of a building, by mechanical fixing means. The insulation glass units are fixed against the seal or seals arranged on the surface of the frame profile. But if insulation glass units are not fixed to the frame profile using correct tightness i.e. they are attached to the frame profile too loose, it is possible that, for example moisture, air and/or water flows/comes in the structural glazing system in an undesirable manner and causes problems for the building and/or the structure of the structural glazing system. Whereas, if an insulating glass unit is attached to the frame profile too tightly, it can cause stress on the glass and as a result of which the glass may break.

[0014] Tolerances in heights of insulation glass units

cause challenges when fixing the insulation glass units to the correct tightness. But also tolerances of other parts of structural glazing system can cause problems during installation. Tolerances can be divided to manufacturing tolerances and installation tolerances depending on the reason that caused the tolerance; manufacturing or installation. For example, an installation tolerance of an insulating glass unit may be, for example +-1mm. Whereas, manufacturing tolerance of thickness of a seal may be, for example +-0.5mm.

[0015] Different manufacturing and/or installation tolerances can then cause a change or changes in the theoretical length of the fixing means of insulation glass units, which then may lead to a situation, wherein the length of the fixing means arranged to be used for fixing is not suitable for attaching insulation glass unit(s) to the frame profile, at least not in the correct tightness in terms of seal(s) and moisture, air and/or water.

[0016] For the above mentioned reasons it is preferable if the fixing means is suitable for fixing insulation glass units with varying heights, but there is also a need for fixing means for which correct tightening torque can be used. It may be difficult to reliably determine the correct tightening torque of a fastening screw if existing fastening means is used, because when the screw is screwed into a screw groove in a frame profile, tolerance of the groove width and variations in the friction between the screw and the screw groove make correct determination unreliable.

[0017] However, by a fixing means of the present invention i.e. an insulation glass unit fastening element it is possible to fix/attach insulation glass units having different or varying heights to a frame profile and to use correct i.e. appropriate and adequate tightening torque for fixing them in order to form a structural glazing system having correctly attached insulation glass units so that, for example, moisture, air and/or water cannot move in the structural glazing system in an undesirable manner and cause problems for the building and/or the structural glazing system.

[0018] The insulation glass unit fastening element of the present invention comprises a headless screw element, a fastener and a mounting nut. The screw element is configured to be screwed into a screw groove of a frame profile through the space between two adjacent insulation glass units. Each insulation glass unit may comprise at least one groove provided on at least sections of the edge of the insulation glass unit or the groove may have a size of the whole length of the edge. The headless screw element may be made of metal, for example, stainless steel. The fastener is a plate-like element comprising two holding arms and an opening i.e. a perforation between those two holding arms. The fastener may be made of metal, for example, stainless steel. For attaching two insulation glass units, first and second insulation glass units, to the frame profile, the opening of the fastener is configured to be inserted around the screw element and the fastener is configured to be moved/slid along the screw element towards the frame profile until the fastener is aligned with at least one groove provided at least on the sections of the edge of the insulation glass units. And, when the fastener is aligned with grooves of two adjacent insulation glass units, the fastener is rotated around the headless screw element so that the first holding arm rotates and inserts into the groove of the first insulation glass unit and the second holding arm rotates and inserts into the groove of the second insulation glass unit. The mounting nut is then used for engaging the holding arms of the fastener to the grooves by rotating and tightened it to the headless screw element. The mounting nut may be made of metal, for example, stainless steel. The correct tightening torque for the mounting nut can be reliably determined, because parts of an insulation glass unit fastening element are always the same size with respect to each other, and there are, for example no manufacturing tolerances in the parts. Tolerances of insulation glass units do not affect this tightening.

[0019] Figure 1a shows a fixing process of an insulation glass unit fastening element to a frame profile 11 of a structural glazing system 10 according to an example embodiment. Insulation glass units of the structural glazing system 10 are not shown in figures 1a-1c. Only a headless screw element 13 part of the insulation glass unit fastening element is shown in figure 1a.

[0020] The figure 1a shows a phase of the fixing process before the headless screw element 13 is fixed i.e. screwed to a screw groove 12 of the frame profile 11. Seals 16 fixed onto an outer surface of the frame profile 11 i.e. onto that surface of the frame profile 11 onto which insulation glass units are configured to be attached are also shown.

[0021] Figure 1b shows a phase of the fixing process after the headless screw element 13 of the insulation glass unit fastening element is inserted to the screw groove 12 and screwed in place and after an opening of a fastener 14 of the insulation glass unit fastening element is arranged around the headless screw element 13, but before the fastener 14 is rotated to the grooves of the not shown insulation glass units i.e. the fastener 14 is still in a vertical i.e. the first position.

[0022] Figure 1c shows a phase of the fixing process after the fastener 14 is rotated and inserted to the grooves of the not shown insulation glass units i.e. rotated from the vertical position to the horizontal position i.e. from the first position to the second position, and the mounting nut 15 is rotated and tightened to the headless screw element 13 for engaging holding arms 14a, 14b of the fastener 14 to the not shown grooves and the not shown insulation glass units to the frame profile 11.

[0023] Figure 2a shows a perspective view of a structural glazing system 20 before an insulation glass unit fastening element is fixed to a frame profile 25 for attaching insulating glass units to the frame profile according to an example embodiment. A headless screw element 21, a fastener 22 and a mounting nut 23 of the insulation glass unit fastening element are shown in exploded view.

[0024] The screw element 21 is configured to be screwed into a screw groove 26 through the space between two adjacent insulation glass units 24, wherein the space has an elongated form in a first direction, which in this example is vertical, but it may also be horizontal. The fastener 22 comprises two holding arms and an opening between two holding arms. The opening and the fastener 22 is configured to be inserted around the screw element 21 and then the fastener 22 is configured to be moved (in a position in which it fits to the space between the insulation glass units 24) along the screw element 21 towards the frame profile 25 until the fastener 22 is in the space between the insulation glass units 24 and aligned with grooves 27 (shown in image 2b) of insulation glass units 24 so that the fastener 22 can be rotated in order to insert the holding arms into the grooves 27 of the insulation glass unit elements 22, one holding arm to a groove 27 of both insulation glass units 24 i.e. they are rotated from the first position to the second position. In this embodiment, from the vertical position to the horizontal position. The mounting nut is arranged to be rotated to the screw element 21 for engaging the holding arms of the fastener 22 to the grooves 27 of insulation glass units 24 and for engaging the insulation glass units 24 to the frame profile 25.

[0025] Figure 2b shows a perspective view of the structural glazing system 20 of figure 2a after the insulation glass unit fastening element is fixed to the frame profile 25 for attaching insulation glass units 24 to the frame profile 25. A part of the other insulation glass unit 24 is removed from the figure for the sake of providing additional information.

[0026] In figure 2b, the screw element 21 is screwed into the screw groove 26 through i.e. via the space between two adjacent insulation glass units 24. The opening of the fastener 22 is placed around the screw element 21. The fastener 22 is then moved along the screw element until the fastener 22 is aligned with grooves 27 of the insulation glass units 24. The fastener 22 is then rotated so that holding arms are rotated and inserted into the grooves 27 of the insulation glass unit elements 24, one holding arm to a groove 27 of both insulation glass units 24. After this, the mounting nut 23 is rotated to the screw element 21 acting as a mating bolt for the mounting nut 23 for fastening the headless screw element 21, fastener 22 and mounting nut 23 together and for engaging the holding arms of the fastener 22 to the grooves 27 of the insulation glass units 24 and the insulation glass units 24 to the frame profile 25.

[0027] Figure 3a shows a front view of a part of a structural glazing system 30, wherein an insulation glass unit fastening element is fixed to a frame profile 37 (shown in image 3b) according to an example embodiment. As can be seen from figure 3a, a headless screw element 31 is screwed to a screw groove 35 of the frame profile 37, holding arms of a fastener 32 are arranged to grooves 37 and a mounting nut 33 is used for fastening headless screw element 31, fastener 32 and mounting nut 33 together and for engaging the holding arms of the fastener 32 to the grooves 39 (shown in image 3b) of the insulation glass units 34 for attaching the insulation glass units 34 against the frame profile 37.

[0028] Figure 3b shows a cross-sectional view of the part of the structural glazing system of figure 3a along the line A-A. As can be seen from figure 3b, the frame profile 37 is fixed to a wall 38. The insulation glass units 34 comprising an inner glass 34a, a middle glass 34b, and outer glass 34c are attached/fixed by using the insulation glass unit fastening element against seals 36 fixed to the opposite surface of the frame profile 37 than the wall 38, and the holding arms of the fastener 32 of the insulation glass unit fastening element are engaged to the grooves 39 of the insulation glass units 34. In this example embodiment of figure 3b, the insulation glass unit 34 is attached to the frame profile 37 by attaching the inner glass 34a of the insulation glass unit 34 to the frame profile 37 by the insulation glass unit fastening element i.e. holding arms of the fastener 32 are arranged to the grooves 39 between the inner glass 34a and the middle glass 34b. The outer glass 34c and middle glass 34b are bonded on top of the inner glass 34a by glue.

[0029] Figure 3c shows a cross-sectional view of the part of the structural glazing system of figure 3a along the line A-A. As can be seen from figure 3c, the insulation glass unit 34 is again attached/fixed against seals 36 by the insulation glass unit fastening element, and the holding arms of the fastener 32 are arranged and engaged to the grooves 39 of the insulation glass units 34. In this example embodiment of figure 3c, the insulation glass unit 34 is attached to the frame profile 37 by attaching the inner glass 34a and the middle glass 34b to the frame profile 37 by the insulation glass unit fastening element i.e. holding arms of the fastener 32 are arranged to the grooves 39 between the middle glass 34b and the outer glass 34c i.e. the insulation glass unit 34 is mechanically attached to the frame profile 37 from the grooves between the middle glass 34b and the outer glass 34c. The outer glass 34c is bonded on top of the middle glass 34b by glue.

[0030] Fig. 4 shows a method 40 for fixing at least two insulation glass units comprising at least one groove provided on at least sections of the edge of the insulation glass unit to a frame profile comprising a screw groove by at least one insulation glass unit fastening element comprising a headless screw element, a fastener and a mounting nut, for forming a structural glazing system. In step 41, the headless screw element is screwed into a screw groove of the frame profile through the space between two adjacent insulation glass unit elements. In step 42, the fastener comprising two holding arms and an opening arranged around the screw element is moved along the screw element towards the frame profile until the fastener is aligned with the grooves. In step 43, the holding arms are inserted into the grooves of the insulation glass unit elements by rotating the fastener. In step 44, the mounting nut is rotated to the screw element for

engaging the holding arms of the fastener to the grooves.

[0031] Figure 5 shows an exploded view of parts of an insulation glass unit fastening element 50 according to an example embodiment. The insulation glass unit fastening element 50 comprises a headless screw element 51, fastener 52 and mounting nut 53.

[0032] The headless screw element 51 is a type of fastener corresponding to a bolt because it takes a mounting nut 53 on the other side and it does not thread directly into a frame profile as a screw would be. The headless screw element 51 is typically made of metal and comprises a helical ridge, i.e. a male thread that is an external thread. The headless screw element 51 fastens to a frame profile by digging in and wedging into material of the frame profile when turned, while the thread cuts grooves in the frame profile that may help pull fastened materials together and prevent pull-out.

[0033] The first end of the headless screw element 51 arranged to be screwed into a screw groove of the frame profile as above explained is a screw part 54. The second end of the headless screw element 51 arranged to receive a mounting nut 53 is a nut part 56 and it also comprises a helical ridge.

[0034] Between the screw part 54 and nut part 56, there is a mounting support 55 that is a plate-like section arranged on a middle part or around the middle part of the screw element 51. The idea of the mounting support 55 is to be a screwing stopper that prevents screwing of the headless screw element 51 too deep into the frame profile and its screw groove i.e. screwing stops when the mounting support 55 is against the frame profile. The mounting support 55 may also support the fastener 52 and act as a counterpart, when the mounting nut 53 is tighten against the fastener 52 (and the mounting support 55) i.e. the mounting nut 53 may be tightened against the mounting support 55 so that the fastener 52 remains between the mounting support 55 and the mounting nut 53. However, it also possible that the mounting nut 53 is not tightened against the mounting support 55, but just against the inner glass or middle glass of an insulation glass unit and a space remains between the mounting support 55 and the mounting nut 53 when the mounting nut 53 is tightened on its place. The fastener 52 is a plate-like elongated element typically made of metal. The fastener 52 comprises an opening 57 for the headless screw element 51 in the middle part of the fastener 52 i.e. there is a hole i.e. a perforation in the center area of the fastener 52. The first end and second end of the fastener 52 are called holding arms 58. When the screw element 51 is inserted to the space between the insulation glass units, the fastener 52 is inserted to the same space, so that the opening 57 is placed around the screw element 51, until the holding arms 58 are aligned with the grooves arranged to sides of the insulation glass units. When aligned with those grooves, the fastener 52 is rotated so that holding arms 58 inserts to the grooves of the insulation glass units to be engaged on place by the mounting nut 53.

[0035] The mounting nut 53 is a type of fastener with a threaded hole and made of metal. The mounting nut 53 is going to be used in conjunction with the screw element 51 to fasten parts of the insulation glass unit fastening element 50 together and at the same time for fastening insulation glass units to the frame profile. The mounting nut 53 and the screw element 51 are kept together by a combination of their threads' friction (with slight elastic deformation), a slight stretching of the screw element 51, and compression of the parts to be held together.

[0036] It is obvious that the present invention is not limited solely to the above-presented embodiments, but it can be modified within the scope of the appended claims.

Claims

1. An insulation glass unit fastening element of a structural glazing system for fastening at least two insulation glass units comprising at least one groove provided on at least sections of the edge of the insulation glass unit to a frame profile, the insulation glass unit fastening element comprises:

   a headless screw element configured to be screwed into a screw groove of the frame profile through the space between two adjacent insulation glass unit elements,
   a fastener comprising two holding arms and an opening between two holding arms, wherein the opening is configured to be arranged around the screw element, and which fastener is configured to be moved along the screw element towards the frame profile until the fastener is aligned with the grooves so that the holding arms are rotatable into the grooves of the insulation glass unit elements, and
   a mounting nut configured to be rotated to the screw element for engaging the holding arms of the fastener to the grooves.

2. An insulation glass unit fastening element according to claim 1, wherein the screw element comprises a mounting support that is a screwing stopper arranged to prevent screwing of the headless screw element too deep to the frame profile.

3. An insulation glass unit fastening element according to claim 1 or 2, wherein the mounting nut is configured to be tightened against the mounting support so that the fastener remains between the mounting support and the mounting nut.

4. An insulation glass unit fastening element according to claim 1, 2 or 3, wherein the fastener is a plate-like element.

5. A structural glazing system comprising:

a frame profile comprising a screw groove,
at least two insulation glass units comprising at least one groove provided on at least sections of the edge of the insulation glass unit,
at least one insulation glass unit fastening element for fixing said at least two insulation glass units to the frame profile and comprising a headless screw element, a fastener and a mounting nut, which screw element is screwed into the screw groove through the space between two adjacent insulation glass units, and which fastener comprises two holding arms and an opening arranged around the screw element, and wherein the fastener is aligned with the grooves and the holding arms are inserted into the grooves, and wherein the mounting nut is used for engaging the holding arms of the fastener to the grooves by rotating it to the screw element.

6. A structural glazing system according to claim 5, wherein the frame profile is fixed to a wall of a building.

7. A structural glazing system according to claim 5 or 6, wherein the frame profile further comprises seals onto which said at least two insulation glass units are fixed.

8. A structural glazing system according to any of claims 5 to 7, wherein the screw element comprises a mounting support, which is a screwing stopper arranged to prevent screwing of the headless screw element too deep to the screw groove.

9. A structural glazing system according to claim 8, wherein the mounting nut is configured to be tightened against the mounting support so that the fastener remains between the mounting support and the mounting nut.

10. A structural glazing system according to any of claims 5 to 9, wherein the fastener is a plate-like element.

11. A method for fixing at least two insulation glass units comprising at least one groove provided on at least sections of the edge of the insulation glass unit to a frame profile comprising a screw groove by at least one insulation glass unit fastening element comprising a headless screw element, a fastener and a mounting nut, for forming a structural glazing system, the method comprises:

screwing the headless screw element into a screw groove of the frame profile through the space between two adjacent insulation glass unit elements,
moving the fastener comprising two holding arms and between two holding arms an opening arranged around the screw element, along the screw element towards the frame profile until the fastener is aligned with the grooves,
inserting the holding arms into the grooves of the insulation glass unit elements by rotating the fastener, and
rotating the mounting nut to the screw element for engaging the holding arms of the fastener to the grooves.

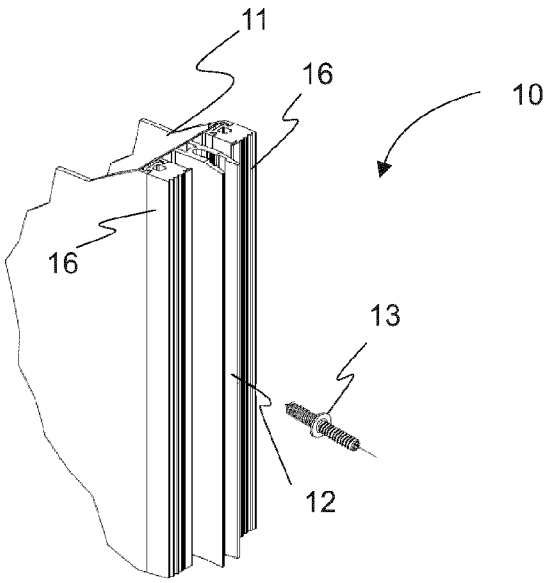

Fig. 1a

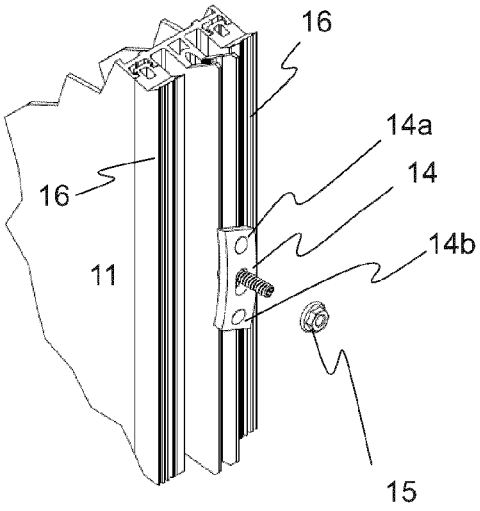

Fig. 1b

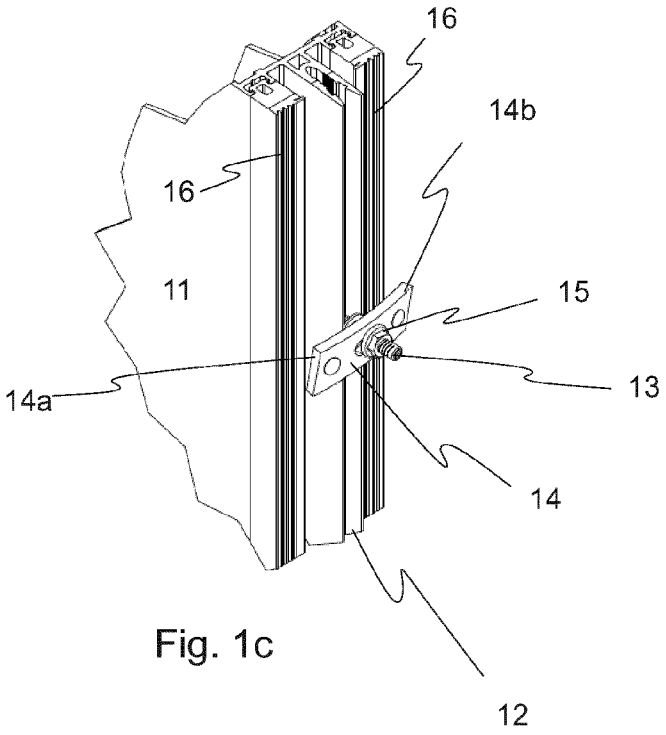

Fig. 1c

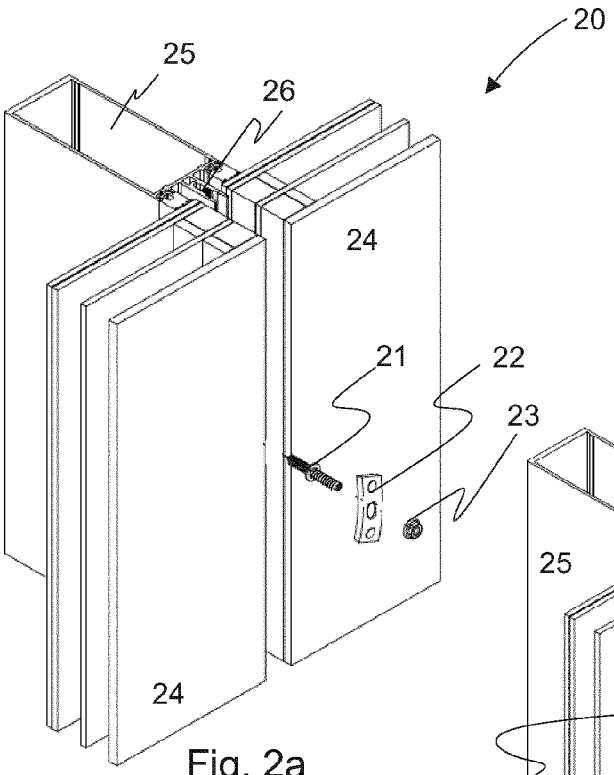

Fig. 2a

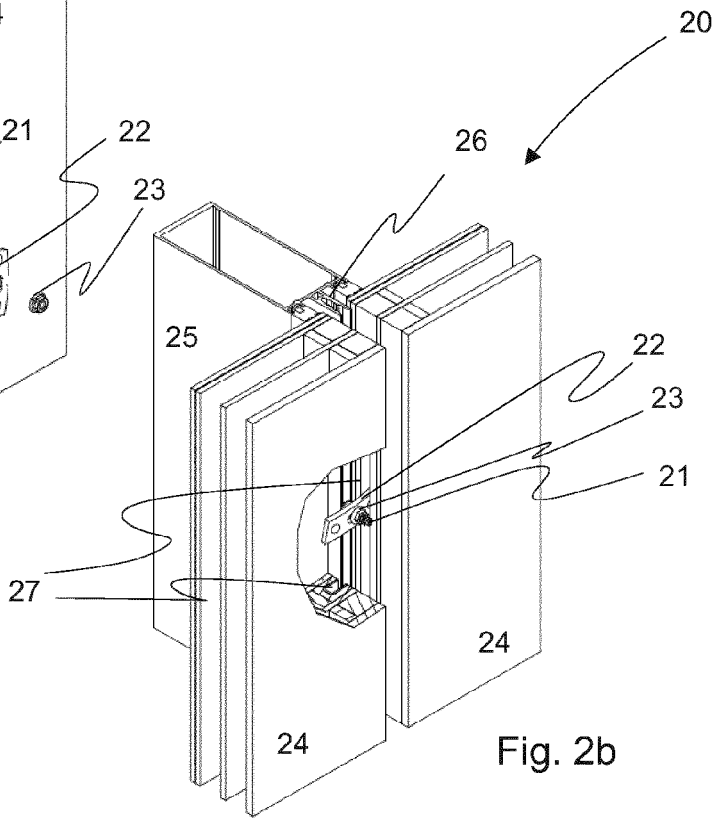

Fig. 2b

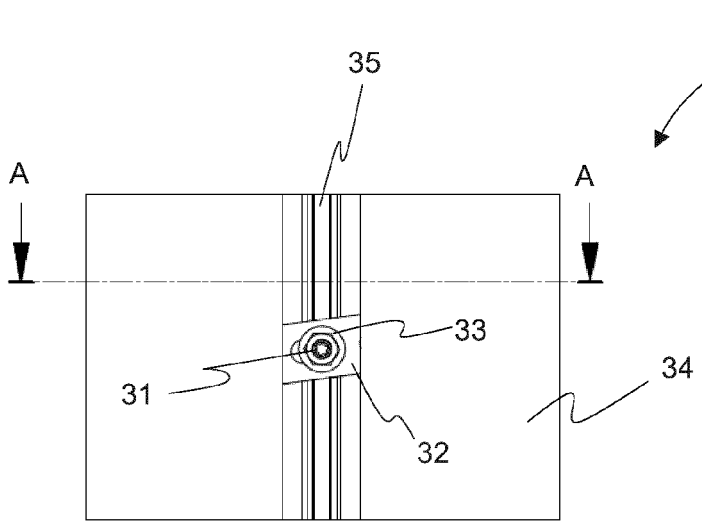

Fig. 3a

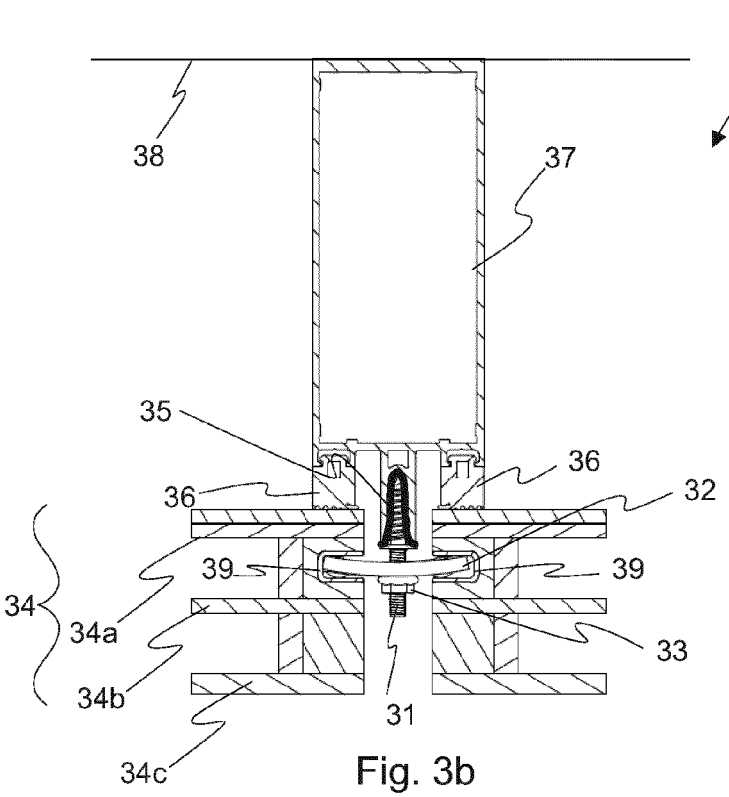
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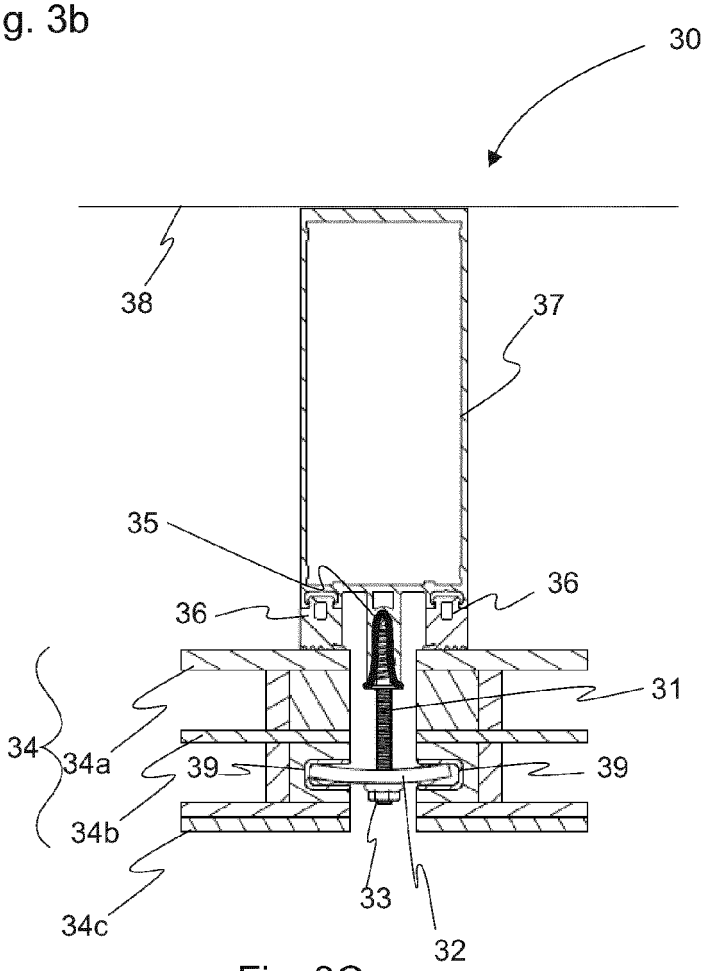
Fig. 3b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34b
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34c
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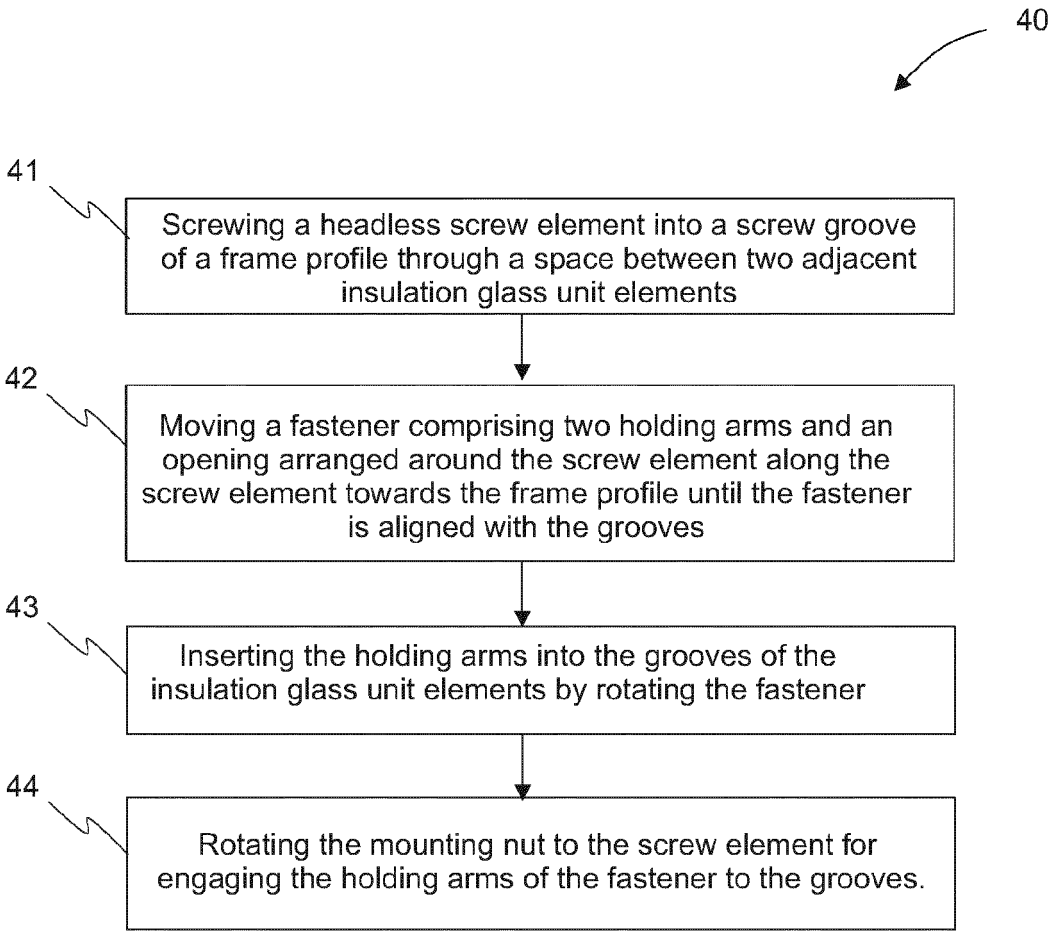
Fig. 3C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41
Screwing a headless screw element into a screw groove of a frame profile through a space between two adjacent insulation glass unit elements
42
Moving a fastener comprising two holding arms and an opening arranged around the screw element along the screw element towards the frame profile until the fastener is aligned with the grooves
43
Inserting the holding arms into the grooves of the insulation glass unit elements by rotating the fastener
44
Rotating the mounting nut to the screw element for engaging the holding arms of the fastener to the grooves.

Fig. 4

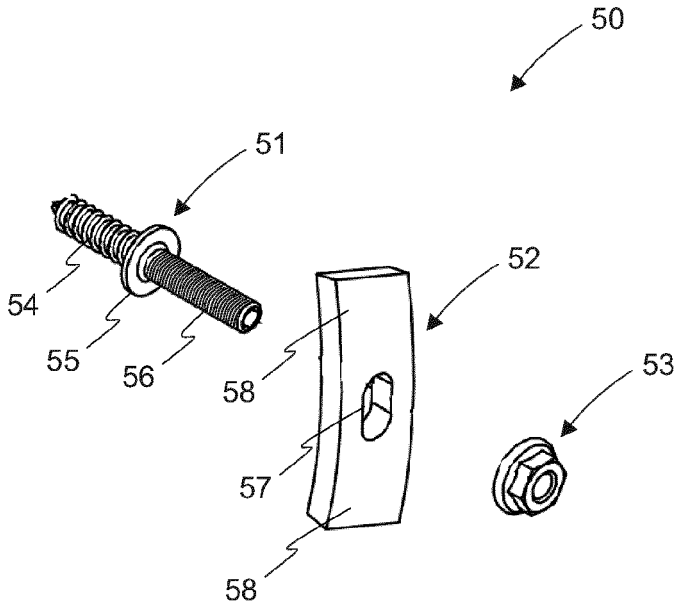
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Fig. 5

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EUROPEAN SEARCH REPORT

Application Number
EP 20 16 9284

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 0 715 051 A1 (EBERSPAECHER J [DE]) 5 June 1996 (1996-06-05) * column 3, line 1 - column 4, line 25; figures 1,2 *	1-11	INV. E06B3/54

TECHNICAL FIELDS SEARCHED (IPC)

E06B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	3 September 2020	Verdonck, Benoit

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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03-09-2020

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		EP 0715051 A1	05-06-1996

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