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(72) Inventors:
• **White, Darren**
Norwich, Norfolk NR14 7SA (GB)
• **Waterman, Peter**
Dereham, Norfolk NR20 3AL (GB)

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(74) Representative: **Sanderson & Co.**
34 East Stockwell Street
Colchester, Essex CO1 1ST (GB)

(71) Applicant: **Glazing Vision Limited**
Diss
Norfolk IP22 4NX (GB)

(54) **Elongate seal**

(57) An elongate seal (100) for sealing a gap comprises an elongate first section (102) for attachment to one of a sliding frame and a static frame and an elongate second section (104) for slidably contacting the other of the sliding frame and static frame. Resilient spaced-apart elongate first and second side walls (106, 108) each span between the first and second sections (102, 104). The spacing of the first and second side walls (106, 108) is lesser part-way between the first and second sections (102, 104) than at those sections. When installed, the spacing between the first and second side walls (106, 108) reduces on the first and second sections (102, 104) moving towards one another and increases on the first and second sections (102, 104) moving away from one another. The elongate seal (100) accommodates variations in the sliding and static frames. This improves the sealing effect provided by the seal, and facilitates movement of the sliding frame over the static frame.

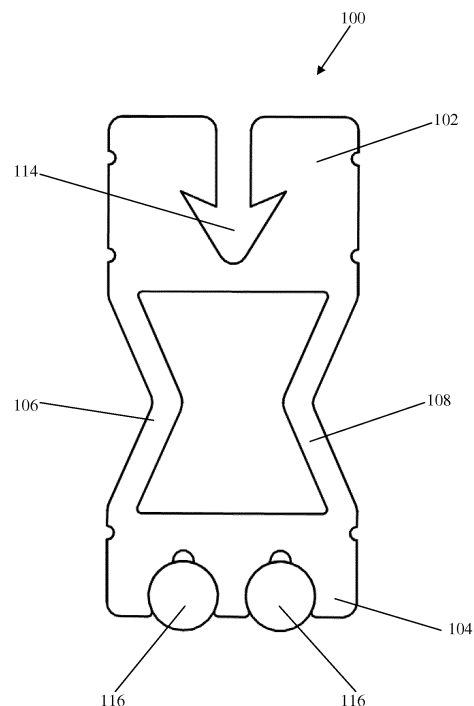


FIG. 2

Description

[0001] The present invention relates to an elongate seal for sealing a gap between a sliding frame and a static frame of a sliding window or door unit. The invention relates particularly, but not exclusively, to sliding window units in the form of roof lights.

[0002] Sliding window or door units typically have a static frame, which is installed in the structure of a building, and a sliding frame, which comprises the sliding window or door. The sliding frame can be slid from an open position in which an opening through the static frame is exposed to a closed position in which the sliding frame fully engages with the static frame so as to cover the opening with the window or door.

[0003] When a sliding frame is in its closed position, gaps may exist between the longitudinal and transverse edges of the sliding frame and the static frame. It is often desirable to seal such gaps properly, for example to prevent the ingress of water and cold air in bad weather and/or to prevent the egress of smoke or an up-draught in the event of a fire.

[0004] It is known to provide elongate seals to seal the gaps between the longitudinal and transverse edges of the sliding frame and the static frame. However, the known seals do not always provide a sufficient seal where there are variations in the frames, which may for example be caused by imprecise manufacturing or warping under load. Furthermore, the known seals can often impede the movement of the sliding frame by introducing friction between the sliding frame and the static frame.

[0005] It is a principal aim of this invention to provide an elongate seal for sealing a gap between a sliding frame and a static frame of a sliding window or door unit that addresses the above problems of known seals.

[0006] Thus, according to the invention there is provided an elongate seal for sealing a gap between a sliding frame and a static frame of a sliding window or door unit, the seal comprising:

an elongate first section for attachment to one of the sliding frame and static frame;
 an elongate second section for slidably contacting the other of the sliding frame and static frame, the second section being spaced from the first section;
 and
 resilient spaced-apart elongate first and second side walls each spanning between the first and second sections, the spacing of the first and second side walls being lesser part-way between the first and second sections than at said sections, and when installed the spacing between the first and second side walls reduces on the first and second sections moving towards one another in use and increases on the first and second sections moving away from one another in use.

[0007] The invention accordingly provides an elongate

seal having first and second elongate spaced-apart side walls, where those side walls are resilient and are spaced from one another to a greater or lesser extent in accordance with the spacing between the first and second sections. This can, for example, accommodate variations in the sliding and static frames caused by imprecise manufacturing or warping under load. This can in turn improve the sealing effect provided by the seal and facilitate movement of the sliding frame over the static frame.

[0008] In preferred embodiments, the seal comprises rubber material, such as ethylene propylene diene monomer (EPDM). Although other materials could be used, these preferred embodiments provide an elongate seal that is suitably resilient and flexible whilst also being particularly durable.

[0009] The first section discussed above may have a profiled groove for receiving and retaining a similarly profiled projection of the one of the sliding frame and static frame. This feature allows the first section to be easily fitted to the one of the sliding frame and static frame. In particularly preferred embodiments, the profile facilitates attachment of the seal to the one of the sliding frame and static frame and then resists detachment of the seal from the one of the sliding frame and static frame. For example, the profile may be that of an arrowhead.

[0010] In some embodiments, the gap to be sealed is between a longitudinal edge of the sliding frame and the static frame, i.e. an edge that runs substantially parallel to the direction in which the sliding frame slides. In these embodiments, the second section discussed above preferably comprises one or more structures of a different material to the main body of the elongate seal for contacting the other of the sliding frame and static frame. The one or more structures are preferably partially embedded within the main body of the elongate seal. The one or more structures may comprise one or more (e.g. two) elongate rods. The rods may have a regular or irregular cross-section, for example a cross-section that is substantially circular, square, oblong, rectangular, etc.. Alternatively, the one or more structures may comprise one or more elongate sheets mounted on the main body of the elongate seal. In particularly preferred embodiments, the one or more structures comprise a relatively lower friction and/or harder wearing material than the main body of the elongate seal, such as PTFE. In this way, the part of the second section in contact with the other of the sliding frame and static frame is more durable to frictional contact and/or the movement of the sliding frame is further facilitated.

[0011] In other embodiments, the gap to be sealed is between a transverse edge of the sliding frame and the static frame, i.e. an edge that runs substantially perpendicular to the direction in which the sliding frame slides. In these embodiments, the second section discussed above preferably comprises one or more (e.g. two) resilient elongate wipers that project outwardly from the seal. In particularly preferred embodiments, each wiper has opposed first and second faces, the first face contacting

the other of the sliding frame and static frame when the sliding frame is slid in a closing direction and the second face contacting the other of the sliding frame and static frame when the sliding frame is slid in an opening direction. In this way, the seal can move with a low amount of friction in both the opening direction and the closing direction, whilst still providing an effective seal.

[0012] When transitioning from a first state in which the first face of each of the wipers contacts the other of the sliding frame and static frame to a second state in which the second face of each of the wipers contacts the other of the sliding frame and static frame, the spacing between the first and second side walls preferably reduces as the spacing between the first and second sections reduces. This can, for example, facilitate the "pivoting" of the wiper from its position in the first state to its position in the second state and vice versa, and therefore facilitate the reversal of direction of the sliding frame.

[0013] Where there are two wipers, a first of the wipers preferably projects from a part of the seal that is adjacent to the first side wall and a second of the wipers preferably projects from a part of the seal that is adjacent to the second side wall. The direction of projection of the first wiper is preferably parallel to the direction of projection of the second wiper. In use, when the sliding frame is moved to the closed position, the first of the wipers will contact the other of the sliding frame and static frame prior to the second of the wipers contacting the other of the sliding frame and static frame. In preferred embodiments, the first side wall flexes prior to the second side wall flexing so as to accommodate the delay in the second wiper contacting the other of the sliding frame and static frame.

[0014] Similarly, in use, when the sliding frame is moved towards the opened position, the second of the wipers will lose contact with the other of the sliding frame and static frame prior to the first of the wipers losing contact with the other of the sliding frame and static frame. In preferred embodiments, the second side wall extends prior to the first side wall extending to accommodate the delay in the first wiper losing contact with the other of the sliding frame and static frame.

[0015] One or more of the seals described above preferably forms part of a sliding window or door unit, such as a roof light. In particularly preferred embodiments, the sliding window or door unit comprises two longitudinal seals as described above and one transverse seal as described above.

[0016] By way of example only, specific embodiments of elongate seals of this invention will now be described in detail with reference being made to the accompanying drawings in which:-

Figure 1 is a perspective view of an elongate seal according to a first embodiment of the invention;
Figure 2 is a cross-sectional view of the elongate seal of Figure 1;
Figure 3 shows the elongate seal of Figures 1 and

2 when installed between a sliding frame and a static frame;

Figure 4 is a perspective view of an elongate seal according to a second embodiment of the invention; and

Figure 5 is a cross-sectional view of the elongate seal of Figure 4.

[0017] Figure 1 is a perspective view of an elongate seal 100 for the longitudinal edge of a sliding frame of a roof light. The main body of the elongate seal 100 in this embodiment is formed from ethylene propylene diene monomer (EPDM) by an extrusion process.

[0018] Figure 2 is a cross-sectional view of the elongate seal 100 of Figure 1. In this embodiment, the elongate seal 100 comprises an elongate first section 102 for attachment to a sliding frame of a roof light and an elongate second section 104 for contacting a static frame of the roof light. However, in other embodiments, the first section 102 may be attachable to the static frame and the second section 104 may be contactable with the sliding frame.

[0019] The elongate seal 100 further comprises a resilient elongate first side wall 106 and a resilient elongate second side wall 108 that span between the first section 102 and the second section 104 of the elongate seal 100. The spacing of the first and second side walls 106, 108 is lesser part-way between the first and second sections 102, 104 than at those sections. This means that, in use, the spacing between first and second side walls 106, 108 reduces on the first and second sections 102, 104 moving towards one another and increases on the first and second sections 102, 104 moving away from one another. This allows the elongate seal 100 to accommodate variations in the structure of the frames.

[0020] The first section 102 of the elongate seal 100 has a profiled groove 114 for receiving and retaining a similarly profiled projection of the sliding frame. In this embodiment, the profile of the groove 114 is that of an arrowhead.

[0021] The second section 104 of the elongate seal 100 comprises two PTFE structures in the form of rods 116 for contacting the static frame over which the seal 100 slides. The rods 116 are partially embedded within the main body of the elongate seal 100 and provide a harder wearing and lower friction surface for contacting the static frame.

[0022] Figure 3 shows the elongate seal 100 when installed between a sliding frame 120, which comprises a window 122, and a static frame 118 of the roof light. The sliding frame 120 comprises the profiled projection 124 that is received and retained by the profiled groove of the elongate seal 100. The static frame 118 comprises a substantially planar surface 126 that is contacted by the rods of the elongate seal 100.

[0023] Figure 4 is a perspective view of an elongate seal 200 for the transverse edge of a sliding frame of a roof light. The elongate seal 200 in this embodiment is

again formed from ethylene propylene diene monomer (EPDM) by an extrusion process.

[0024] Figure 5 is a cross-sectional view of the elongate seal 200 of Figure 4. In this embodiment, the elongate seal 200 comprises a first elongate section 202 for attachment to a sliding frame of a roof light and a second elongate section 204 for contacting a static frame of the roof light. However, in other embodiments, the first section 202 may be attachable to the static frame and the second section 204 may be contactable with the sliding frame.

[0025] The elongate seal 200 further comprises a resilient elongate first side wall 206 and a resilient elongate second side wall 208 that span between the first section 202 and the second section 204 of the elongate seal 200. The spacing of the first and second side walls 206, 208 is lesser part-way between the first and second sections 202, 204 than at those sections. This means that, in use, the spacing between the first and second side walls 206, 208 reduces on the first and second sections 202, 204 moving towards one another and increases on the first and second sections 202, 204 moving away from one another. As discussed above, this allows the elongate seal 200 to accommodate variations in the structure of the frames.

[0026] The first section 202 of the elongate seal 200 has a profiled groove 214 for receiving and retaining a similarly profiled projection of the sliding frame. In this embodiment, the profile of the groove 214 is again that of an arrowhead.

[0027] In this embodiment, the second section 204 of the elongate seal 200 comprises two elongate wipers 216 for contacting the static frame over which the seal 200 slides. The wipers 216 each comprise a first face 218 and a second face 220. The first faces 218 contact the static frame when the sliding frame is slid in a closing direction (i.e. to the left when looking at Figure 5) and the second faces 220 contact the static frame when the sliding frame is slid in an opening direction (i.e. to the right when looking at Figure 5). The wipers 216 maintain a seal whilst also allowing the elongate seal 200 to move easily in both the opening direction and the closing direction.

[0028] In use, when transitioning from a first state in which the first faces 218 of the wipers 216 contact the static frame to a second state in which the second faces 220 of the wipers 216 contact the static frame, the spacing between the first and second side walls 206, 208 reduces as the spacing between the first and second sections 202, 204 reduces. This allows the wipers 216 to "pivot" easily from the first state to the second state, thereby facilitating a reversal in the sliding direction of the sliding frame.

[0029] Also in use, when the sliding frame is moved to the closed position, a first of the wipers 216 contacts the static frame prior to a second of the wipers 216 contacting the static frame. The first side wall 206 flexes prior to the second side wall 208 flexing to accommodate this. Sim-

ilarly, in use, when the sliding frame is moved towards the opened position, the second of the wipers 216 loses contact with the static frame prior to the first of the wipers 216 losing contact with the static frame. The second side wall 208 extends prior to the first side wall 206 extending to accommodate this.

Claims

1. An elongate seal for sealing a gap between a sliding frame and a static frame of a sliding window or door unit, the seal comprising:

an elongate first section for attachment to one of the sliding frame and static frame;
an elongate second section for slidably contacting the other of the sliding frame and static frame, the second section being spaced from the first section; and
resilient spaced-apart elongate first and second side walls each spanning between the first and second sections, the spacing of the first and second side walls being lesser part-way between the first and second sections than at said sections, and when installed the spacing between the first and second side walls reduces on the first and second sections moving towards one another in use and increases on the first and second sections moving away from one another in use.

2. An elongate seal as claimed in claim 1, wherein the seal comprises rubber material.

3. An elongate seal as claimed in claim 1 or 2, wherein the first section has a profiled groove for receiving and retaining a similarly profiled projection of the one of the sliding frame and static frame.

4. An elongate seal as claimed in claim 3, wherein the profile is that of an arrowhead.

5. An elongate seal as claimed in any one of the preceding claims, wherein the second section comprises one or more structures of a different material to the main body of the elongate seal for contacting the other of the sliding frame and static frame.

6. An elongate seal as claimed in claim 5, wherein the one or more structures are partially embedded within the main body of the elongate seal.

7. An elongate seal as claimed in claim 5 or 6, wherein the one or more structures comprise a relatively lower friction and/or harder wearing material than the main body of the elongate seal.

8. An elongate seal as claimed in claim 5, 6 or 7, wherein the one or more structures comprises one or more rods.
9. An elongate seal as claimed in any one of claims 1-4, wherein the second section comprises one or more resilient elongate wipers that project outwardly from the seal. 5
10. An elongate seal as claimed in claim 9, wherein the one or more wipers have opposed first and second faces, the first face contacting the other of the sliding frame and static frame when the sliding frame is slid in a closing direction and the second face contacting the other of the sliding frame and static frame when the sliding frame is slid in an opening direction. 10 15
11. An elongate seal as claimed in claim 10, wherein, when transitioning from a first state in which the first face of each of the one or more wipers contacts the other of the sliding frame and static frame to a second state in which the second face of each of the one or more wipers contacts the other of the sliding frame and static frame, the spacing between the first and second side walls reduces as the spacing between the first and second sections reduces. 20 25
12. An elongate seal as claimed in claim 9, 10 or 11, wherein the one or more resilient elongate wipers comprises two wipers, a first of the wipers projecting from a part of the seal that is adjacent to the first side wall and a second of the wipers projecting from a part of the seal that is adjacent to the second side wall. 30 35
13. A sliding window or door unit comprising one or more elongate seals as claimed in any one of the preceding claims.
14. A sliding window or door unit comprising one or more elongate seals as claimed in any one of claims 5-8 and/or one or more elongate seals as claimed in any one of claims 9-12. 40
15. A sliding window or door unit as claimed in claim 13 or 14, wherein the sliding window or door unit is a roof light. 45

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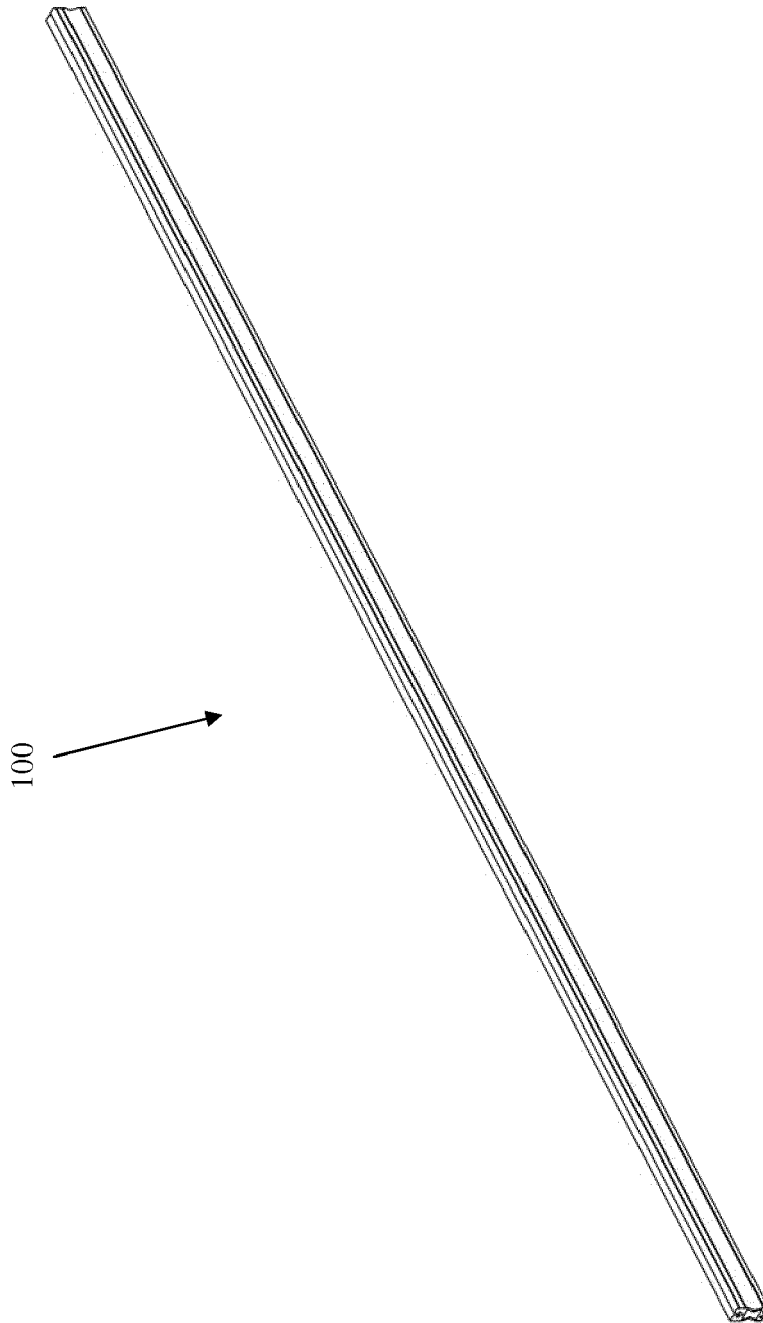


FIG. 1

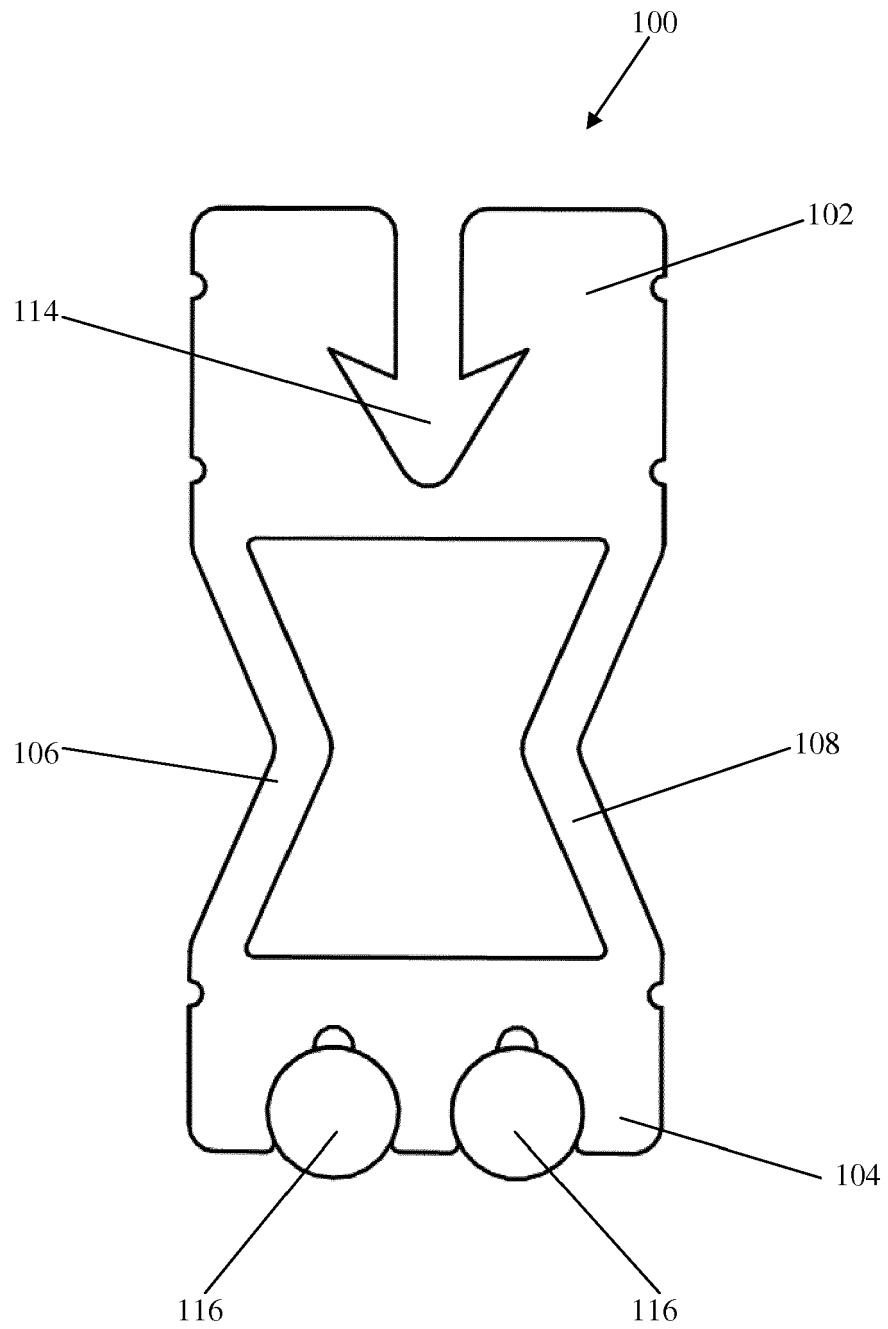


FIG. 2

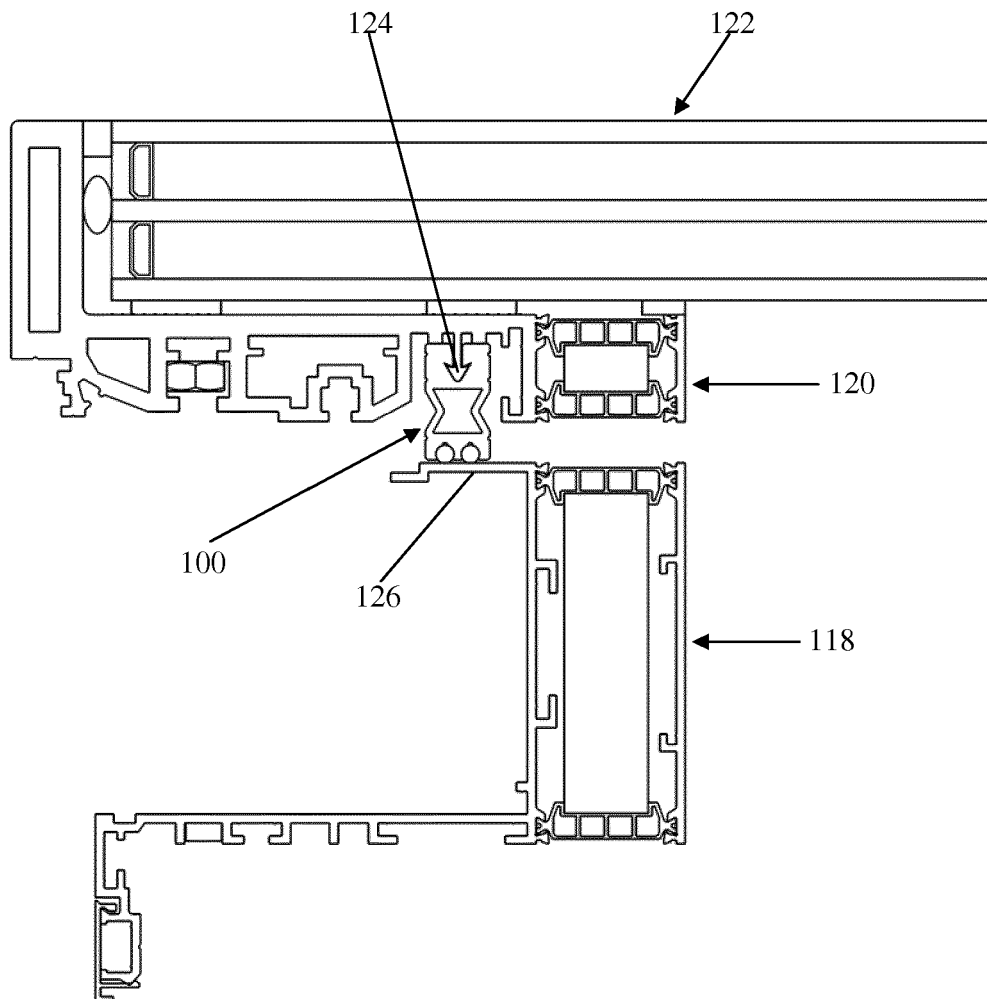


FIG. 3

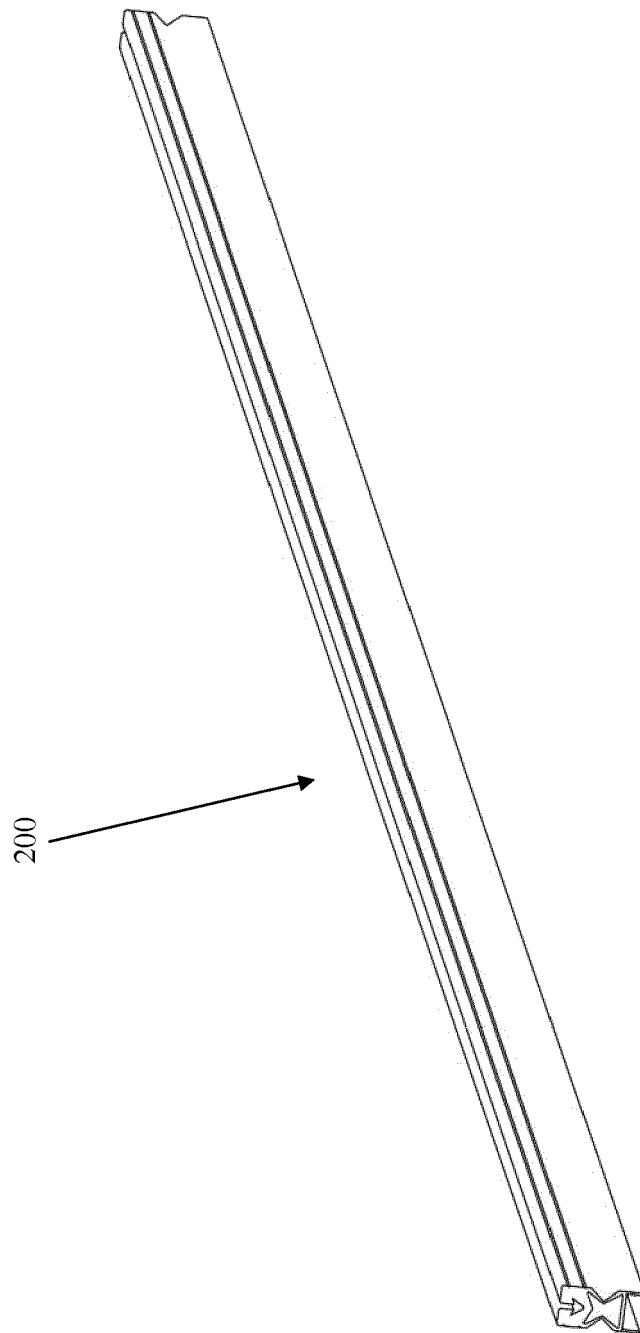


FIG. 4

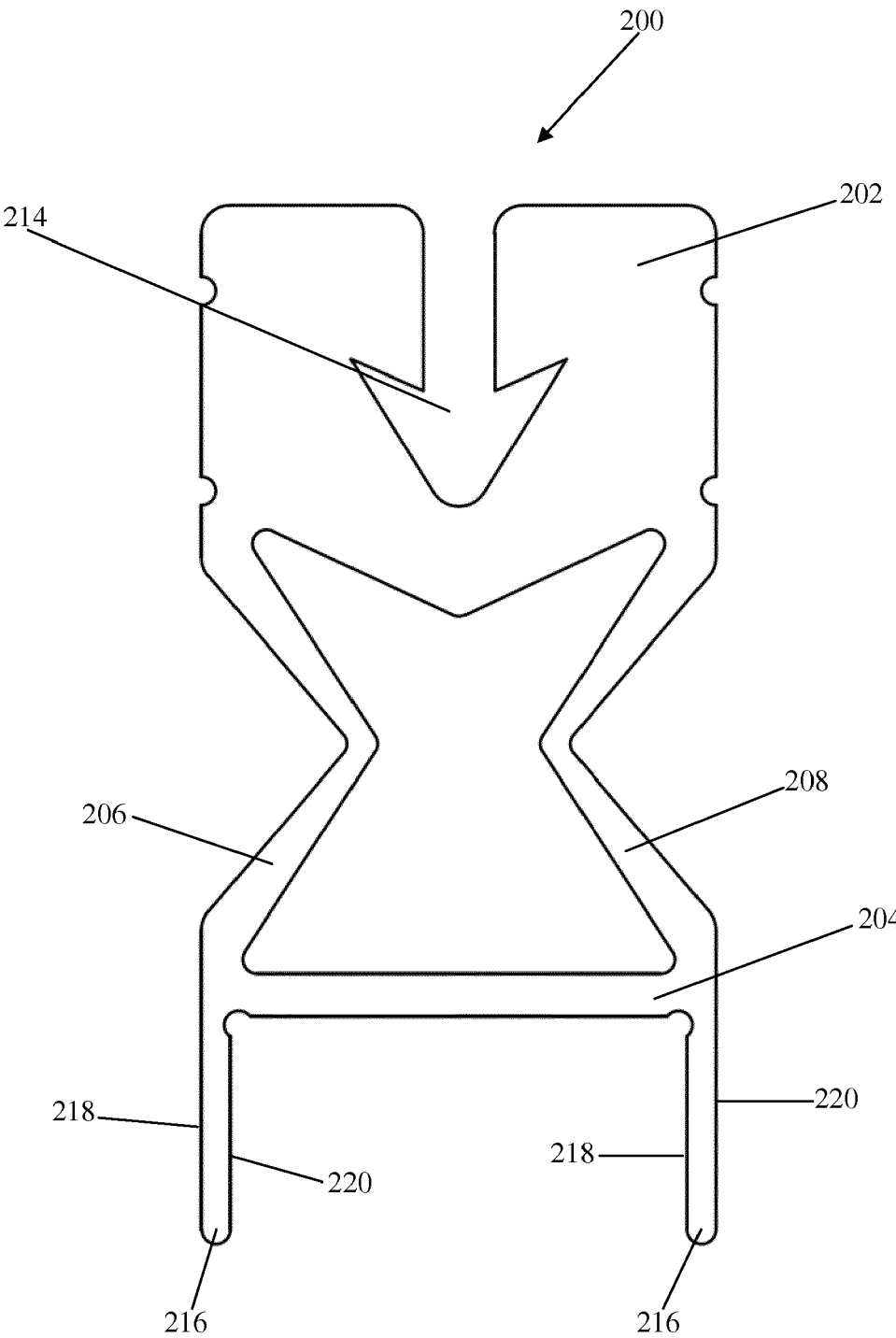


FIG. 5



EUROPEAN SEARCH REPORT

Application Number
EP 14 18 8958

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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 18 March 2015	Examiner Cornu, Olivier
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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