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(54) PROFILE FOR SEALING A WINDOW AND WINDOW COMPRSING SUCH A PROFILE AS A SEAL

(57) The invention relates to a profile for sealing a window, and a window with such a profile. The window comprises at least two substantially parallel glass sheets extending at a transversal distance to each other by interposing the profile between the at least two glass sheets along at least a part of a circumference thereof. The profile comprises as seen in cross section, a first hollow space enclosed by walls for receiving a moisture absorbent, a first wall of the first hollow space on the inner side being perforated in order to be in fluid communication with the space between the glass sheets when the seal is arranged between them. According to the invention, the profile further comprises, as seen in cross section, a second hollow chamber enclosed by walls opposite the first wall which is perforated.

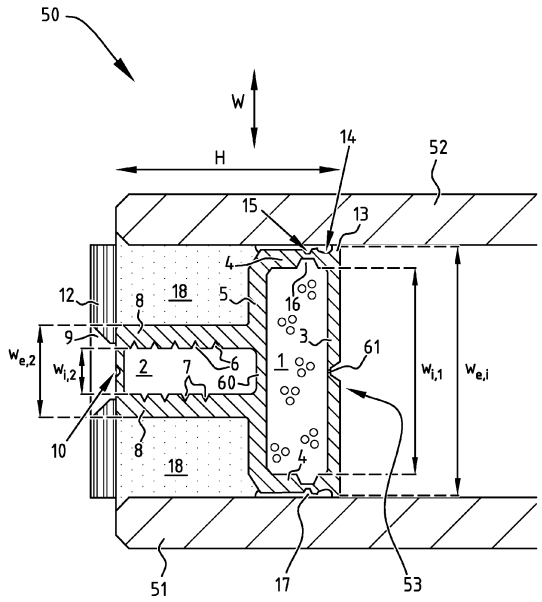

FIG. 1

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Description

[0001] The invention relates to the field of double, triple or multi-paned windows. In general, such a window comprises at least two substantially parallel glass sheets extending at a transversal distance to each other, and a seal extending along at least a part of a circumference of the window in between the glass sheets, the seal fixing the sheets with respect to each other and at the same time sealing said part of the circumference. The seal is generally made from a profile. Windows like these are known, for instance from EP 3 312 357 A1 (hereafter: EP357) and DE 3 516 875 A1 (hereafter: DE875). Both disclose profiles, also called seal, comprising as seen in cross section, a first hollow space enclosed by walls for receiving a moisture absorbent, a first wall of the first hollow space on the inner side being perforated in order to be in fluid communication with the space between the glass sheets when the seal is arranged between them.

[0002] An earlier alternative, from which the systems of EP457 and DE875 depart, is a window with a load-bearing frame, for attachment of mounting materials such as hinges etc. Such a window is known and is used in the art for instance for retrofitting existing buildings for their relatively high insulating properties. Also in new buildings, these windows find their use. To achieve the insulating properties, two parallel glass sheets are provided at a mutual spacing. Of course, more than two glass sheets may also be provided, e.g. with multiple spaces in between. In order to prevent moisture from building up in the space between the glass sheets, the space is sealed along the circumference of the glass sheets.

[0003] The windows concerned may be provided e.g. fixed in a window frame. However, some windows are placed in a window frame using hinges in order to allow opening the window. Such windows are sometimes referred to as ventilation windows, referring to the possibility of opening the windows for ventilation. While it is principally possible to fix the window in a frame, which is then provided with hinges to allow opening the window, it has become popular for aesthetic reasons and for reasons of compactness to fix hinges directly to the glass sheets of the window. Such windows require no load-bearing frame, and therefore are provided with a plastic frame for sealing the glass sheets. In order to allow fixing the hinges, holes are provided in the glass sheets themselves. It is principally possible to drill holes into glass sheets, but this is in itself a cumbersome process, requiring hardening of the glass sheets, and which therefore limits the types of glass that can be used. This in itself is a concern especially when retrofitting, because customers usually prefer to select glass sheets that look as close to the original as possible, for instance to match with other windows still present in the building.

[0004] EP357 and DE875 provide different methods of allowing attachment of mounting materials, like hinges, profiles, hinges etc. from the side of the window, thereby removing the necessity for holes in the glass sheets. In each case, the proposed concept is to provide a solid body into which a screw or bolt can be driven. EP357 for instance, proposes to provide the profile with hooks towards its outside, which form a rail for a nut or block to slide through (see fig. 2). The nut or block can be brought in the desired position by sliding, and then fixed using a bolt. DE875, a much older structure, proposes in figure 3 a separately attached block 11 which is e.g. glued to the profile. The block of DE875 is provided with pre-cut holes (as shown in figure 3) or allows self-tapping screws to be inserted.

[0005] Both these solutions suffer from some drawbacks. In particular, it is customary in automatic production of windows to provide sealing from the outside of the window along the circumference thereof. Thus, when the designs of EP357 or DE875 are used, either the space between the hooks in the case of EP357, or the pre-drilled holes of DE875, are likely to be filled with sealant too, and therefore would need to be cleaned. This is a relatively expensive and error-prone production step.

[0006] The invention at hand therefore aims to provide a profile, to be used as a window seal, which is better suited to automated manufacturing.

[0007] Such a profile is provided, with the characteristics of the preamble of claim 1, wherein the profile further comprises, as seen in cross section, a second hollow chamber enclosed by walls opposite the first wall which is perforated.

[0008] The second hollow chamber offers space for fasteners (also called fixers), such as a screw or a bolt, to engage in. By virtue of being hollow, the fasteners can protrude into the second chamber without requiring removal of material or causing damage by e.g. deformation. As such, the profile is relatively easy to fix external components to, such as hinges, locks, etc.

[0009] The second chamber being enclosed has multiple advantages. First, the enclosing walls can be used by fasteners to engage upon. Accordingly, the walls can serve to attach the hinge or other attachment to the window by using fasteners, e.g. screws or bolts. Second chamber is additional to the first chamber, which performs the fixing and/or sealing of the glass plates. Thus, by fastening in the second chamber, the sealing properties need not be at stake. The attachment (of e.g. hinges or other mounting materials) may accordingly be applied outside of a sealed space between the windows, in particular on the outside of the seal, i.e. on the free end of the window. Accordingly, the fasteners can be inserted in between the space between the glass sheets, as opposed as extending through them. As a result, no holes need to be provided in the glass sheets. The resulting window can thereby be manufactured relatively cost effectively, since hardening and drilling into the glass is not required.

[0010] Second, the enclosing wall can substantially seal the second chamber during manufacturing, so that no sealant enters it when automatically applying sealing to the window. This avoids the need to remove sealant

later, or to apply sealant precisely and selectively. As such, the profile is suited for automatic sealant application.

[0011] It is possible the enclosing wall of the second chamber is perforated. The perforation may allow easier introduction of fasteners. If the perforations are sufficiently small, they do allow easer introduction and position of fasteners, whilst at the same time still blocking sealant. Since sealant in general is rather viscous, a perforation can be chosen of a reasonable size. Depending on the sealant involved, the skilled person is able to select a perforation size that is sufficient for blocking the sealant (under the pressure at with which it is applied).

[0012] The first chamber and the second chamber may be separated, which aids in preserving the sealing capacity of the profile. The separation may be made by an intermediate wall between the two chambers. In use, the fasteners may protrude into the second chamber, but do not protrude the intermediate wall.

[0013] It is noted the profile may be of longitudinal shape, and may for instance be manufactured by extrusion. The first and second chamber being defined as seen in transversal cross section of the profile. Accordingly, the chambers being enclosed may mean that in the transversal cross section, they are enclosed. The chambers may extend along the profile in the longitudinal direction, and may for instance be open or closed on one or both longitudinal ends.

[0014] A window is also considered in this disclosure, which uses a profile thus described. The window comprises at least two substantially parallel glass sheets extending at a transversal distance to each other, and the profile as a seal extending along at least a part, preferably all, of a circumference of the window in between the glass sheets. The seal fixes the sheets with respect to each other and at the same time sealing said part of the circumference via side walls of the first chamber, the second chamber being arranged on the outside of the window at least partially between the glass sheets, the outside being defined as the side of the profile closer to the free end of the window.

[0015] A compact design of the window may be achieved if the second chamber extends at least partly in between the at least two glass sheets. In particular, the second chamber may extend entirely in between the glass sheets, meaning that in plan view the second chamber, and preferably the profile, does not protrude from between the glass sheets.

[0016] The second chamber may be defined by at least two side walls extending away from the first chamber, the side walls of the second chamber comprising a plurality of recesses on their insides along their length. The length may run in the extension direction, i.e. away from the first chamber.

[0017] The recesses allow fasteners to engage the side walls to provide a positive connection. Additionally or alternatively the recesses may reduce the likelihood of the fasteners damaging the side walls, either by making them somewhat more flexible, by offering less material in the way of the fastener, or both.

[0018] The recesses may be formed by grooves running along the length of the profile. The grooves are ideally v-shaped. Ideally, the deepest recess is at a predefined minimum distance from the first chamber, which may aid in preventing a fastener from protruding so far into the second chamber that the integrity of the first chamber is at risk. In this way, the absence of a recess near the inside of the second chamber, i.e. near the first chamber, hinders further insertion of a fastener. The predefined distance may for be larger than a optionally maximum mutual distance between recesses further towards the outside of the second chamber. The predefined distance may for instance be in the same order of magnitude as the width of the second chamber as seen in transversal cross section. In particular, the predefined distance may be at least 70%, at least 80% or at least 90% of the width. At the same time, the predefined distance may be maximally 130%, maximally 120%, or 110% of the width.

[0019] The recesses of the opposing sidewalls are arranged in a staggered pattern. In particular, no two recesses may be directly opposite to each other. The staggered pattern allows for a structurally positive connection by the fastener.

[0020] An outer wall of the second chamber opposite the first chamber may be thinned, preferably in its center, preferably by an indent, recess or groove from preferably the outside.

[0021] The thinned part may allow easier introduction of a fastener. The fastener may for instance locally break or puncture the outer wall in order to protrude into the second chamber. Additionally or alternatively, the tinned part may define a predefined position, such as the center, for the fastener to be placed. The thinned part may thus act as a guide or aim for fasteners. If the outer wall is perforated, the perforations may be placed in the thinned part of the outer wall. As an example, the thinned part may be a groove on the outside of the outer wall, which runs along the length of the profile. Optionally, perforations are made in the bottom of the groove. Ideally, the groove has a bottom and two diverging side walls, but the groove may also be v-shaped or another shape.

An exceptionally strong and/or elegant profile can be obtained, if the second chamber and the first chamber are integral with each other. The entire profile may thus be made integrally, for instance by extrusion. The first and second chamber may share a wall, along which they are connected. The shared wall may be part of the outer wall for the first chamber, and may be the inner wall for the second chamber.

[0022] The shared wall may accordingly define a separating wall between the first chamber and the second chamber. The separating wall may have a thickness that is smaller than a thickness of an outer wall of the first chamber outside the area of the second chamber.

[0023] It is advantageous if the side walls of the first

chamber comprise, on sides facing away from each other and towards the glass sheets if provided, a main face and a protrusion protruding beyond the main face.

[0024] The protrusions may provide a local abutment for the glass sheets, so that an adhesive can be preserved between the sheets and the profile outside of the protrusions. Additionally or alternatively, the protrusions may aid in keeping the adhesive in place in the depth direction of the profile. The protrusions may have a rounded shape, and may - on a side facing the outside - may be concave.

[0025] The protrusions may be placed at or near the inner side of the profile, for instance as an extension of the inner wall of the first chamber.

[0026] Further or alternatively, the side walls of the first chamber may comprise, on sides facing away from each other and towards the glass sheets if provided, a main face and one, two or more grooves. The grooves may provide a further means to hold adhesive in place.

[0027] On the other side of the walls, on the interior of the first chamber, the side walls of the first chamber comprise, on sides thus facing towards each other, a main face with a groove defined therein. The groove may facilitate production of the profile.

[0028] The first chamber may have a first internal width and a first external width, and the second chamber may have a second internal width and a second external width, each width being defined perpendicular to a longitudinal axis of the profile and perpendicular to a height direction pointing from inside to outside.

[0029] The first internal width may be larger than the second internal width. The relatively large first internal width makes sure the first chamber is relatively large, thereby increasing space available for moisture absorbent in the first chamber.

[0030] The first external width may be larger than the second external width. The relatively large first width may put the glass sheets at a distance from the second chamber, thereby creating an interspace between the second chamber and the sheets.

[0031] The interspace can be used to provide additional space for applying an adhesive. It is noted that an adhesive may be applied even without the additional space, but it has been found that given sufficient space, a suitable adhesive can satisfy certain structural requirements. For example, the adhesive may be strong enough to fix the glass sheets to each other via the seal, so that the window does not require any further means of fixing the glass sheets to each other. The adhesive may also be configured to prevent liquid, such as water from passing to and from the space in between the glass sheets. The adhesive may be referred to as a secondary sealing.

[0032] The adhesive may be a UV-resistant adhesive. Accordingly, it is no longer necessary to provide a frame around the window for protecting the seal.

[0033] A primary sealing may be made, for instance at the first chamber of the profile, using another kind of adhesive, for instance one that keeps a certain degree of flexibility, such as a butyl-based adhesive. The primary sealing may block gas, such as air, from entering or exiting the space between the glass sheets.

[0034] The adhesive of the secondary sealing may be referred to as a filler. As such, the window may further comprise a filler in the interspace.

[0035] The invention will be further elucidated with reference to the figures, in which:

Figure 1 schematically depicts a transversal cross section of a part of a window, and
Figure 2 schematically shows an exploded view of a window.

[0036] Figure 1 shows a part of a window 50 which in this case consist of two parallel glass sheets 51, 52. Only one free end of the window 50 is shown to show sufficient detail. The glass sheets 51, 52 are separated from each other, and held by a seal, which comprises a profile 53 that runs along the periphery of the glass sheet. The profile 53 is shown in cross section and has a first chamber 1 and a second chamber 2, both of which are enclosed by walls which will be discussed below. A height direction H is defined running from the center of the sheets (towards bottom of figure 1) towards their free end. The height direction runs between the inside and outside. In terms of the profile, the height and depth directions corresponds, and these terms may be used interchangeable. A width direction W is also defined, which runs transversal from one glass sheet 51 to the other 52. The height H and width W direction are both perpendicular to a longitudinal direction, in which the profile 53 extends. This direction corresponds to the view axis of figure 1.

[0037] On the inside of the profile, the first chamber has an inner wall, which is referred to herein as a first wall 3. The first wall 3 is perforated (see perforations 61) and filled with moisture absorbent. A fluid communication is possible through the perforations between the sealed space 54 between the sheets 51, 52 on the one hand, and the interior of the first chamber 1 on the other hand.

[0038] The first chamber 1 also has side walls 4, which extend in the height/depth direction H. finally an outer wall 5 (for the first chamber) is present, to completely enclose the first chamber 1. The side walls 4 are provided with protrusions 13 as extension of the first wall 3. The protrusions 13 are concave on the outside, and form a groove 14 for a primary sealant 17, such as a butyl based sealant. A further groove 15 is present for further holding the primary sealant. The primary sealant 17 may resist gas transport into and out of the sealed space 54 between the glass sheets 51, 52. The side walls 4 on the interior side are also provided with a groove 16.

[0039] The second chamber 2 is also enclosed by walls, amongst which the earlier-mentioned wall 5, which for the second chamber 2 forms an inner wall. Accordingly, that wall can also be referred to as a separating wall 5. The separating wall 5 has a local thinner section 60 in

the area of the second chamber 2. The second chamber 2 further is defined by side walls 8, and outside wall 9. The side walls 8 have multiple recesses 6, 7 on their interior side, which are staggered in the height direction H of the profile 53. Thus, recesses 6 of one side do not lie directly opposite recesses 7 of the other side. The outer wall 9 comprises a groove 10 on the outside in its center.

[0040] A countersunk bore 11 is shown in a plate 12 for illustrative purposes. A fastener (not shown) may be inserted in the bore 11 to fix the plate 12 to the profile 53. The fastener (such as a screw or bolt) can protrude through the outer wall 9 of the second chamber 2, for instance by locally puncturing the outer wall. The outer wall 9 may be provided with perforations to guide the fastener, however the perforations should be smaller than the fasteners used, in fact sufficiently small to prevent sealant from entering the second chamber 2.

[0041] The second chamber 2 is less wide than the first chamber 1, both in terms of its internal width $w_{i,2}$, $w_{i,1}$ and its external width $w_{e,2}$, $w_{e,1}$. Accordingly, an interspace 18 exists between the second chamber 2 (in particular between the side walls 8 thereof) and the glass sheets 51, 52. The interspace can be filled with a filler, which is a type of adhesive forming a secondary seal. The filler may be UV-resistant.

[0042] Although a plate 12 is shown here, various components may be mounted to the profile. Most notably, a hinge may be provided for installing the window as a frameless ventilation window. Since the hinge is attached to the profile, the glass sheets 51, 52 require no drilling.

[0043] Figure 2 shows the glass sheets 51, 52 and several profiles 53 arranged along their periphery. The profiles 53 are arranged so that they enclose a sealed space in between the sheets 51, 52. As an example, corner pieces 54 can be used to interconnect the profiles 53.

[0044] Although the invention has been described above with reference to specific examples and embodiments, the invention is not limited thereto. In fact, the invention is defined by the attached claims also.

Claims

1. Profile for sealing a window comprising at least two substantially parallel glass sheets extending at a transversal distance to each other by interposing the profile between the at least two glass sheets along at least a part of a circumference thereof, the profile comprising as seen in cross section, a first hollow space enclosed by walls for receiving a moisture absorbent, a first wall of the first hollow space on the inner side being perforated in order to be in fluid communication with the space between the glass sheets when the seal is arranged between them,
   characterized in that
   the profile further comprises, as seen in cross section, a second hollow chamber enclosed by walls opposite the first wall which is perforated.

2. Window comprising at least two substantially parallel glass sheets extending at a transversal distance to each other, and a profile according to the previous claim as a seal extending along at least a part of a circumference of the window in between the glass sheets, the seal fixing the sheets with respect to each other and at the same time sealing said part of the circumference via side walls of the first chamber, the second chamber being arranged on the outside of the window at least partially between the glass sheets, the outside being defined as the side of the profile closer to the free end of the window.

3. Profile or window according to any of the preceding claims, wherein the second chamber is defined by amongst others a, possibly perforated, outer wall facing away from the first chamber.

4. Profile or window according to any of the preceding claims, wherein the second chamber is defined by at least two side walls extending away from the first chamber, the side walls of the second chamber comprising a plurality of recesses on their insides along their length.

5. Profile or window according to the previous claim, wherein recesses of the opposing sidewalls are arranged in a staggered pattern.

6. Profile or window according to any of the preceding claims, wherein an outer wall of the second chamber opposite the first chamber is thinned, preferably in its center, preferably by an indent, recess or groove from preferably the outside.

7. Profile or window according to any of the preceding claims, wherein the second chamber and the first chamber are integral with each other.

8. Profile or window according to any of the preceding claims, wherein the profile comprises a separating wall between the first chamber and the second chamber.

9. Profile or window according to any of the preceding claims, wherein the side walls of the first chamber comprise, on sides facing away from each other and towards the glass sheets if provided, a main face and a protrusion protruding beyond the main face.

10. Profile or window according to any of the preceding claims, wherein the side walls of the first chamber comprise, on sides facing away from each other and towards the glass sheets if provided, a main face and one, two or more grooves.

11. Profile or window according to any of the preceding claims, wherein the side walls of the first chamber comprise, on sides facing towards each other, a main face with a groove defined therein.

12. Profile or window according to any of the preceding claims, wherein the first chamber has a first internal width and the second chamber has a second internal width, each width being defined perpendicular to a longitudinal axis of the profile and perpendicular to a height direction pointing from inside to outside, the first internal width being greater than the second internal width.

13. Profile or window according to any of the preceding claims, wherein the first chamber has a first external width and the second chamber has a second external width, each width being defined perpendicular to a longitudinal axis of the profile and perpendicular to a height direction pointing from inside to outside, the first external width being greater than the second external width.

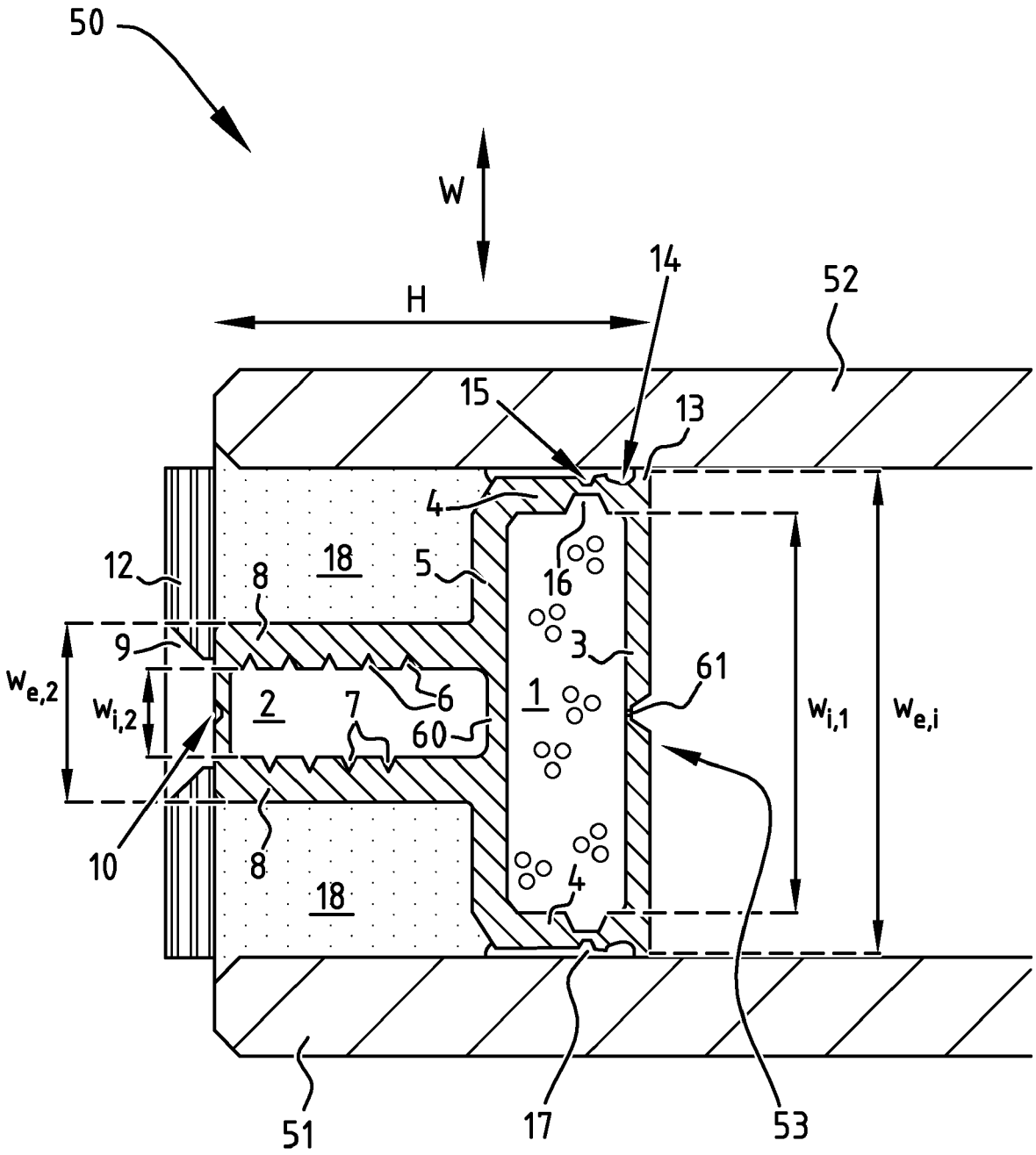
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FIG. 1

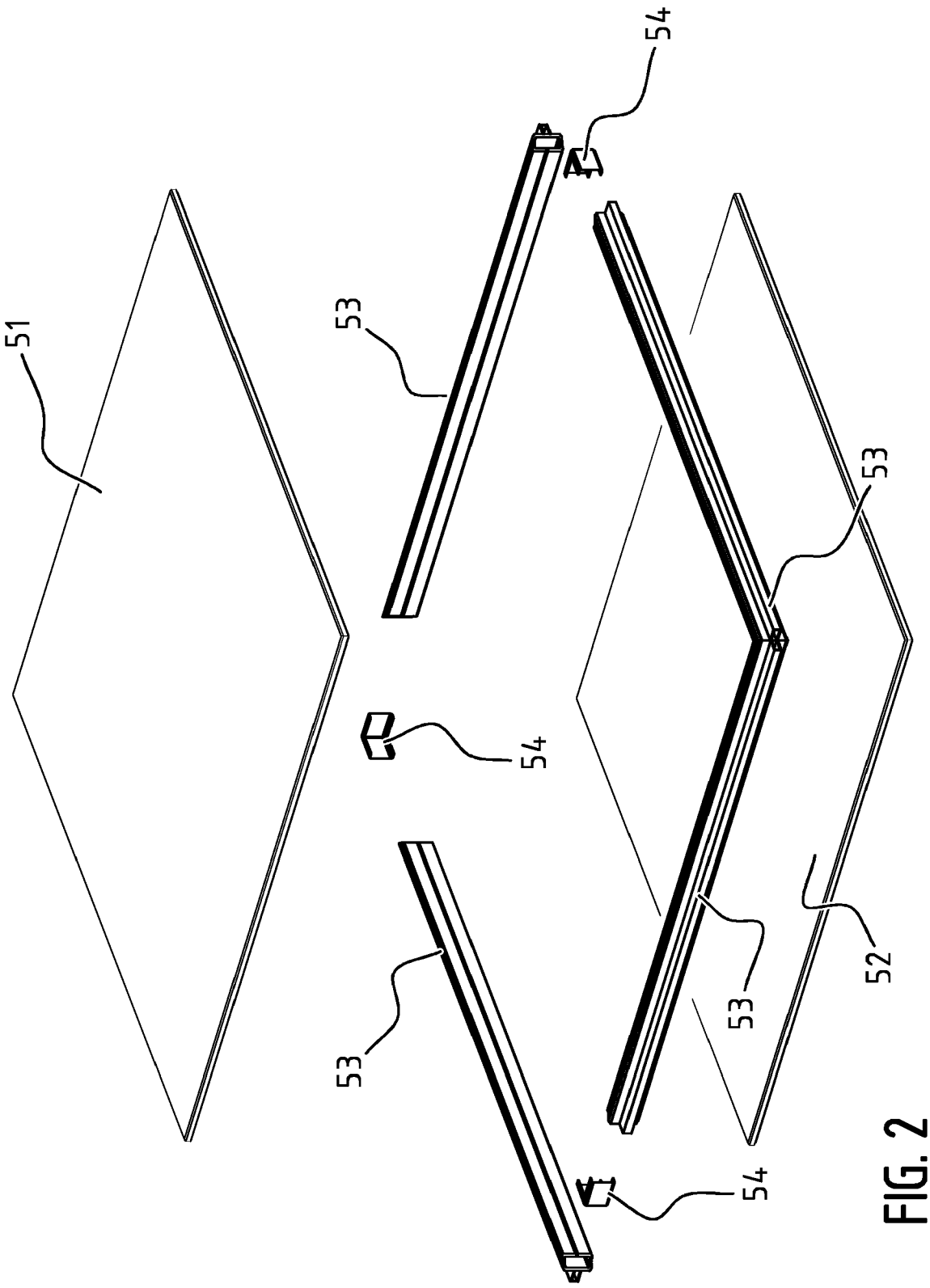

FIG. 2

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EUROPEAN SEARCH REPORT

Application Number
EP 24 19 3242

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	8 December 2024	Verdonck, Benoit

CATEGORY OF CITED DOCUMENTS

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REFERENCES CITED IN THE DESCRIPTION

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