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(54) **SPACER FOR A MULTIPLE GLAZING UNIT AND A MULTIPLE GLAZING**

(57) A spacer (1) for a multiple glazing unit comprising: a desiccant insert (3) comprising a desiccant material (31) interspaced between a top cover (32) and a bottom cover (33) ; and a flexible spacer profile (2) arranged to form a groove which can receive and partially enclose the desiccant insert (3); wherein the flexible spacer profile (2) comprises a groove bottom (21) and two opposing groove walls (22a,23a,22b,23b) and defines a centerline (5) perpendicular to the grove bottom (21) around which centerline (5) the spacer (1) is substantially symmetrical; the two opposing groove walls (22a,23a,22b,23b) each comprises a first wall section (23a,23b) arranged substantially perpendicular to the groove bottom (21) and substantially parallel to the centerline (5), and a curved wall section (22a,22b) interspaced between the groove bottom (21) and the respective first wall section (23a,23b); wherein each curved wall section (22a,22b) extends away from the centerline (5) yet is curved towards the centerline over most or all of its extension; and wherein the desiccant insert (3) is affixed to the groove bottom (21) such that the desiccant insert is received and partially enclosed by the groove formed by the flexible spacer profile (2). Further there is disclosed a multiple glazing unit comprising the spacer of the invention.

It is intended that Figure 2 is published with the application.

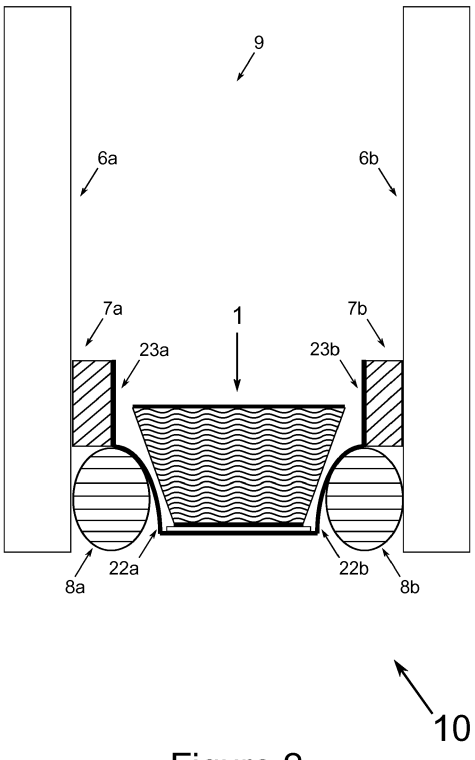

Figure 2

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Description

FIELD

[0001] The present invention relates to a spacer for a multiple glazing unit, a method of manufacturing the spacer and a glazing unit comprising the spacer

BACKGROUND

[0002] In the field of insulating glazing units or multilayered glazing units also including insulating windows, in particularly multilayered windows, it is customary to assemble two or more glass sheets face-to-face at a small spacing thus creating an insulating gas space between the glass sheets. When assembled, the glass sheets are kept apart by the aforementioned small spacing typically using adequately sized spacers in combination with flexible seals of mastic and with air- and water tight diffusion seals, where the spacers are positioned at the perimeter of the windows.

[0003] It is however a recurring problem that such multilayered windows are deformed when subjected to influencing force loads such as e.g. climatic (thermic) or wind loads. This places a significant strain on the ability to maintain the insulating gas space between the glass sheets of the windows. In particular, as the deformations are not limited to the central surfaces of the window sheets but rather can also occur at the perimeter of the window sheets; this places the tightness of the aforementioned seals at risk, in particular if the spacers applied are not able to change their conformations in response to the movements of the window sheets.

[0004] In recent years, accordingly, there has been significant activity into the development of flexible spacers which are able to accommodate at least a part of the movements of the window sheets under force loads in order to improve the life time of the insulating window. In particular where such insulating windows comprise at least 3 layers or have been manufactured in accordance with modern low energy loss standards, the flexibility of the glass sheet spacers have become of increased significance.

[0005] It has also become customary to combine the aforementioned spacers with a range of desiccant materials, wherein the desiccant material in the assembled window is facing the interior of the window, i.e. the insulating gas space, and wherein the desiccant material is in fluid contact with the gas of the gas space. Such a construction permits the desiccant material to absorb any such moisture which, despite the presence of the air- and moisture tight seals, still manages to enter the insulating gas space.

[0006] In US 5,640,815 to Chinzi, in US 2002/0073530 to Ferri, in US 2007/0077376 to Mamiya, and in US 2013/0305656 to Ripoche a range of spacers comprising a flexible spacer profile and a desiccant are described. In the spacers of the prior art, the flexible spacer profiles are manufactured from thin metal sheets (bands) which are integrally folded to manufacture a spring-like, flexible spacer profile which can receive and contain the desiccant in fixed association with the spacer profile.

[0007] However, when manufacturing such spacers comprising a flexible spacer profile and desiccant, it is a drawback of the prior art spacers to their applicability, that due to manufacturing limitations, design compromises must be made between an optimized flexibility of the spacer profile and the ability to apply the desiccant during production and to contain the desiccant during assembly and use of the insulating window.

[0008] The present inventors have now surprisingly realized that when following the instructions of the present disclosure a spacer comprising a flexible spacer profile and desiccant can be constructed, which spacer is easy to manufacture, yet surprisingly flexible and capable of working in conjunction with the glass sheets of an insulating window comprising the spacer of the invention.

SUMMARY OF THE INVENTION

[0009] To this effect there is herewith disclosed in a first aspect a spacer (1) for a multiple glazing unit comprising: a desiccant insert (3) comprising a desiccant material (31) interspaced between a top cover (32) and a bottom cover (33); and a flexible spacer profile (2) arranged to form a groove which can receive and partially enclose the desiccant insert (3); wherein the flexible spacer profile (2) comprises a groove bottom (21) and two opposing groove walls (22a,23a,22b,23b) and defines a centerline (5) perpendicular to the grove bottom (21) around which centerline (5) the spacer (1) is substantially symmetrical; the two opposing groove walls (22a,23a,22b,23b) each comprises a first wall section (23a,23b) arranged substantially perpendicular to the groove bottom (21) and substantially parallel to the centerline (5), and a curved wall section (22a,22b) interspaced between the groove bottom (21) and the respective first wall section (23a,23b); wherein each curved wall section (22a,22b) extends away from the centerline (5) yet is curved towards the centerline over most or all of its extension; and wherein the desiccant insert (3) is affixed to the groove bottom (21) such that the desiccant insert is received and partially enclosed by the groove formed by the flexible spacer profile (2).

[0010] Further there is disclosed in a second aspect a multiple glazing unit (10) comprising: two vitreous material sheets (6a,6b) positioned in a face-to-face, spaced apart relationship and defining a gas space (9) therebetween and a peripheral edge; at least one spacer (1) as defined according to the first aspect and embodiments thereof disposed between the two vitreous material sheets (6a,6b), along the entire peripheral edge thereof, for maintaining the gas space (9) therebetween; wherein a primary seal (7a,7b) comprising a poly-iso-butylene based adhesive is disposed respectively on each vitreous material sheet (6a,6b) for affixing each respective

first wall section (23a,23b) to each respective vitreous material sheet (6a,6b); and a secondary seal (8a,8b) comprising a mastic is disposed respectively on each vitreous material sheet (6a,6b) for affixing each respective curved wall section (22a,22b) to each respective vitreous material sheet (6a,6b).

BRIEF DESCRIPTION OF THE DRAWINGS

[0011]

Figure 1: Cross-section of a spacer for a multiple glazing unit according to the invention.

Figure 2: Cross-section of a multiple glazing unit according to the invention.

Figure 3: A production line for manufacturing a spacer according to the invention.

DETAILED DESCRIPTION

[0012] As is customary in the art; the spacer (1) of the invention comprises as described above two main elements, a flexible spacer profile (2) and a desiccant insert (3). The spacer itself is a construct which is extremely elongated in one direction in order to be adaptable to the periphery of a multiple glazing unit. As will be detailed below, the spacer in principle can be of any length in the one extremely elongated direction. In Figure 1 there is detailed a cross-section of spacer according to the present invention wherein it is to be understood that the out of paper direction corresponds to the one extremely elongated direction.

[0013] In a first aspect and embodiment of the invention there is disclosed a spacer (1) for a multiple glazing unit comprising: a desiccant insert (3) comprising a desiccant material (31) interspaced between a top cover (32) and a bottom cover (33); and a flexible spacer profile (2) arranged to form a groove which can receive and partially enclose the desiccant insert (3); wherein the flexible spacer profile (2) comprises a groove bottom (21) and two opposing groove walls (22a,23a,22b,23b) and defines a centerline (5) perpendicular to the grove bottom (21) around which centerline (5) the spacer (1) is substantially symmetrical; the two opposing groove walls (22a,23a,22b,23b) each comprises a first wall section (23a,23b) arranged substantially perpendicular to the groove bottom (21) and substantially parallel to the centerline (5), and a curved wall section (22a,22b) interspaced between the groove bottom (21) and the respective first wall section (23a,23b); wherein each curved wall section (22a,22b) extends away from the centerline (5) yet is curved towards the centerline over most or all of its extension; and wherein the desiccant insert (3) is affixed to the groove bottom (21) such that the desiccant insert is received and partially enclosed by the groove formed by the flexible spacer profile (2).

[0014] The desiccant insert (3) for use with the invention comprises a desiccant material (31) interspaced between a top cover (32) and a bottom cover (33). Preferably the desiccant insert (3) is manufactured as a single continuous unit which has a single dimension which is extremely elongated in one direction in order to be adaptable to the periphery of a multiple glazing unit. As will be detailed below, the spacer in principle can be of any length in the one extremely elongated direction.

[0015] It is contemplated that the desiccant material (31) for use comprised in the desiccant insert (3) preferably shall comprise a zeolite and/or a silica gel. In a preferred embodiment the desiccant material is a woven material comprising a zeolite and/or a silica gel.

[0016] It is further contemplated that the top cover (32) and/or the bottom cover (33) for use comprised in the desiccant insert (3) preferably shall be manufactured from a poly-ester. It is possible to dispense with the top cover (32) and the bottom cover (33) from the spacer (1), or just one or the other cover. However, these embodiments are not preferred in general for being unsuitable for automated multiple glazing unit assembly.

[0017] In general, and as is known in the art, when multiple glazing units are automatically assembled in a production line, the dimension of the top cover (32) perpendicular to the aforementioned centerline serves to maintain constructional stability of the spacer during adhesion of the spacers to the vitreous sheets, such that the spacers do not become unwantedly compressed with loss of spring-like properties as a result.

[0018] When the desiccant insert (3) has been assembled, e.g. as a continuous roll of desiccant material (31) sandwiched between the top (32) and the bottom cover (33), it can be supplied with an adhesive on the bottom cover (33) in e.g. a continuous process during assembly and directly mounted on the groove bottom (21) of the flexible spacer profile (2) by roll pressing the flexible spacer profile (2) and desiccant insert (3) together thereby affixing these parts together (cf. Figure 3). The adhesive will then form an adhesive layer (4) between the groove bottom (21) and the bottom cover (33) but does not in itself contribute to the desired spacer properties.

[0019] In Figure 1, the desiccant insert (3) is depicted as a trapezoid construct with the shorter of the two parallel sides of the trapezoid construct serving as bottom and comprising the bottom cover (33) in contact with adhesive and groove bottom (21). Due to the presence of the curved wall sections (22a,22b) comprised in the flexible spacer profile (2) such an orientation and shape of the desiccant insert (3) serves to maximize the content of the desiccant insert (3) received inside the groove formed by the flexible spacer profile (2). However, this geometric shape is, while representing a preferred embodiment, merely exemplary for most uses where the amount of desiccant material received inside the groove is not an issue of concern.

[0020] When the spacer is unperturbed by external forces the desiccant material (31) is not in contact with

the flexible spacer profile (2) over at least a part of the desiccant insert (3). Thereby it is assured that any moisture present in a gaseous phase surrounding the desiccant material (31) in the assembled spacer and/or multiple glazing unit (10) of the invention can interact with the desiccant material and become absorbed.

[0021] According to the invention a flexible spacer profile (2) is arranged to form a groove which can receive and partially enclose the desiccant insert (3). This is detailed schematically in Figure 1 where the desiccant insert (3) can be seen received and partially enclosed by the flexible spacer profile (2).

[0022] The flexible spacer profile (2) comprises a groove bottom (21) and two opposing groove walls (22a,23a,22b,23b) and defines a centerline (5) perpendicular to the grove bottom (21) around which centerline (5) the spacer (1) and flexible spacer profile (2), is substantially symmetrical. It is the purpose of the flexible spacer profile (2) to counter the movement of the vitreous material sheets (6a,6b) when these are moved due to an influencing force. The groove bottom serves to give stability against compression and expansion of the spacer (1), and in an embodiment, the groove bottom (21) is corrugated for increased mechanical strength.

[0023] The two opposing groove walls (22a,23a,22b,23b) each comprises a first wall section (23a,23b) arranged substantially perpendicular to the groove bottom (21) and substantially parallel to the centerline (5), and a curved wall section (22a,22b) interspaced between the groove bottom (21) and each respective first wall section (23a,23b). In some embodiments the first wall sections (23a,23b) can form an angle to the centerline (5) which does not exceed 25°, but preferably does not exceed 10°.

[0024] It is advantageous that the first wall sections (22a,22b) shall be substantially parallel to the centerline (5) such that compression of the spacer (1) is transferred to the flexible spacer profile (2) over a substantial portion of the first wall sections (22a,22b). This effect is lost if the first wall sections form angles to the centerline (5) which are too open.

[0025] It is a particular feature of the present invention that the flexible spacer profile (2) shall comprise curved wall sections (22a,22b) interspaced between the groove bottom (21) and each first wall section (23a,23b); wherein each curved wall section (22a,22b) extends away from the centerline (5) yet is curved towards the centerline over most or all of their extension. Thereby the flexible spacer profile (2) is endowed with additional flexibility over the flexible spacer profiles of the prior art and a spacer (1) enabled with improved properties of movement for moving with the movement of the vitreous material sheets (6a,6b) when these are moved due to an influencing force; while at the same time, the open groove shape of the flexible spacer profile (2) asserts the option for easy assembly of flexible spacer profile (2) and desiccant insert (3).

[0026] A further, and important, advantage of the curved shape of the curved wall sections (22a,22b) is; that the forces acting on the aforementioned first wall sections (23a,23b) are improvedly transferred via the curvature of the curved wall sections into the groove bottom (21) and therefrom into the wall of a window opening comprising an installed multiple glazing unit (10) of the invention.

[0027] In the spacers of the prior art (to the extent of knowledge to the present inventors) the groove walls of the spacers of the prior art are substantially linear in nature, even when made up from two or more groove wall sections in connection. Thereby a significant force transport between two opposing vitreous sheets is retained, being transferred via the spacers of the prior art. By following the teachings given herein, this transport can be reduced or minimized.

[0028] In the context of the present disclosure the term curved towards shall be taken to mean that if an imaginary line is drawn from the contact line of the groove bottom (21) with a curved wall section (22a,22b) to the contact line of the first wall section (23a,23b) interspaced by that same curved wall section (22a,22b), then most or all of that same curved wall section (22a,22b) is closer by projection to the centerline (5) than the imaginary line drawn. In order to obtain the benefits of the invention, more than half (i.e. most) of the curved wall sections (22a,22b) shall be curved as described.

[0029] Advantageously, the flexible spacer profile (2) is a metal spacer profile, preferably a metal spacer profile comprising aluminum or comprising stainless steel. The flexible spacer profile (2) is preferably formed integral by bending a single metal plate from a continuous source (88) of spacer profile material (89); and the flexible spacer profile (2) preferably has a dimension of length which does not exceed 0.2 mm, preferably does not exceed 0.1 mm. The width of the spacer profile material (89) should preferably not exceed 50 mm and thus the dimension of length which does not exceed 0.2 mm becomes the thickness of the spacer profile material (89). Suitable continuous sources (88) of spacer profile material (89) could be a roll of spacer profile material (89), e.g. a roll of stainless steel having a width not exceeding 50 mm and a thickness not exceeding 0.2 mm.

[0030] In a second aspect of the present invention, as exemplary detailed in Figure 2, there is further disclosed a multiple glazing unit (10) comprising: two vitreous material sheets (6a,6b) positioned in a face-to-face, spaced apart relationship and defining a gas space (9) therebetween and a peripheral edge; at least one spacer (1) as defined previously disposed between the two vitreous material sheets (6a,6b), along the entire peripheral edge thereof, for maintaining the gas space (9) therebetween; wherein a primary seal (7a,7b) comprising a poly-isobutylene based adhesive is disposed respectively on each vitreous material sheet (6a,6b) for affixing each respective first wall section (23a,23b) to each respective vitreous material sheet (6a,6b); and a secondary seal (8a,8b) comprising a mastic is disposed respectively on

each vitreous material sheet (6a, 6b) for affixing each respective curved wall section (22a,22b) to each respective vitreous material sheet (6a,6b).

[0031] Such multiple glazing units are commonly known in the art as detailed above, however due to the presence of the spacer (1) of the present invention a number of advantages are achieved over multiple glazing units of the prior art by the multiple glazing unit (10) of the present invention. In particular, with the spacer (1) of the invention improved lifetime of the multiple glazing unit (10) is obtained as the spacer (1) of the invention is better at accommodating the forces influencing the vitreous material sheets (6a,6b) and hence in preserving the gas seal between exterior and the mentioned gas space (9) of the multiple glazing unit (10).

[0032] As can be gathered from Figure 2, it is not intended that there shall be physical contact between the flexible spacer profile (2) and the vitreous material sheets (6a,6b). In the absence of such contact thermal bridging across the seal is minimized as both poly-iso-butylene based adhesive and mastics are good thermal insulators.

[0033] As is customary in the art, the poly-iso-butylene (PIB) adhesive is located adjacent the gas space (9) such that an improved moisture seal can be obtained. The mastics as is customary in the art are furthest from the gas space (9) and, contrary to the poly-iso-butylene, are not in contact with the gas comprised in the gas space (9). In a preferred embodiment the gas space (9) comprises argon and in another preferred embodiment the mastic is selected from polyurethane, polysulfide, and/or silicone mastics.

[0034] In Figure 2 the secondary seals (8a,8b) have been depicted as independent of each other. However, as is customary in the art, the secondary seals can be coalesced into a single secondary sealing layer of mastic. This is possible as long as this single secondary sealing layer of mastic comprises two thongs serving the same function as the secondary seals (8a,8b) depicted in the figure.

[0035] As is customary in the art, a multiple glazing unit (10) of the invention may further comprise at least one extra vitreous material sheet (6a,6b) and at least one further spacer (1) as detailed herein, wherein the spacer (1) is mounted along an entire peripheral edge of the vitreous material sheets (6a,6b) using further primary (7a,7b) and secondary seals (8a,8b) thereby creating at least one further gas space (9) in the multiple glazing unit (10).

[0036] In Figure 3 there is disclosed a manufacturing line (80) for manufacturing a spacer (1) according to the invention in accordance with the below disclosed method of manufacturing a spacer (1) according to the invention.

[0037] Hence there is disclosed in a third aspect of the invention; a method of continuously manufacturing a spacer (1) according to the invention comprising: a) providing a continuous source (88) of spacer profile material (89) and a continuous source (87) of desiccant insert (3); b) applying at a position along said manufacturing line (80) said desiccant insert (3) onto said spacer profile material (89) from said continuous source (87) of desiccant insert (3); c) providing said spacer profile material (89) to a first roll forming section (81) where, in a first roll forming operation a first curved wall section (22a,22b) is formed, and to a second roll forming section (82) where a second and opposite curved wall section (22a,22b) is formed in a second roll forming operation; d) and providing said spacer profile material (89) to a first (83), a second (84), a third (85), and a fourth (86) bending sections where, in respective bending operations, respective bends between said first wall section (23a,23b), said curved wall sections (22a,22b) and said groove bottom (21) are formed.

[0038] As such, roll forming (81,82) and bending (83,84,85,86) operations are well known in the art and the skilled person is considered to be capable of designing a manufacturing line (80) capable of executing the above method once it has been disclosed to him.

[0039] It is intended that the desiccant insert (3) shall be applied onto the spacer profile material (89) prior to roll forming (81,82) and bending (83,84,85,86), but this requirement can be relaxed, as e.g. shown in Figure 3, in some embodiments albeit at some extra effort.

[0040] Advantageously, the desiccant insert (3) is manufactured prior to manufacture of the spacer (1), and can therefore be supplied to the manufacturing process for the spacer (1) continuously, e.g. from a roll of desiccant insert (3). In order to apply the desiccant insert (3) onto the spacer profile material (89) it suffices to bring them firmly into contact, e.g. by press contacting the components between rollers, in the presence of the aforementioned adhesive (4), and this combined product is then fed to the roll forming (81,82) and bending (83,84,85,86) sections for forming the spacer as detailed above.

[0041] The embodiment shown in Figure 3, however, relates to a situation where a the desiccant insert (3) is applied after a first curved wall section (22a,22b) has been manufactured in the spacer profile material (89). Thereby the first curved wall section (22a,22b) can e.g. serve as positioning guide for the desiccant insert (3) for increased precision in the positioning of the desiccant insert (3), but as mentioned, at increased complexity of manufacturing.

[0042] In a fourth and final aspect of the invention there is disclosed a manufacturing line (80) for manufacturing a spacer (1) according to any of the claims 1 to 9 comprising a first roll forming section (81) and a second roll second roll forming section (82); a first (83), a second (84), a third (85), and a fourth (86) bending sections; where, in said manufacturing line (80), a continuous source (88) of spacer profile material (89) and a continuous source (87) of desiccant insert (3) are provided; at a position along said manufacturing line (80) said desiccant insert (3) is applied onto said spacer profile material (89) from said continuous source (87) of desiccant insert (3); said spacer profile material (89) is provided to a first

roll forming section (81) where, in a first roll forming operation a first curved wall section (22a,22b) is formed, and to a second roll forming section (82) where a second and opposite curved wall section (22a,22b) is formed in a second roll forming operation; and said spacer profile material (89) is provided to a first (83), a second (84), a third (85), and a fourth (86) bending sections where, in respective bending operations, respective bends between said first wall section (23a,23b), said curved wall sections (22a,22b) and said groove bottom (21) are formed.

CLOSING COMMENTS

[0043] The term "comprising" as used in the claims does not exclude other elements or steps. The term "a" or "an" as used in the claims does not exclude a plurality. A single processor or other unit may fulfill the functions of several means recited in the claims.

[0044] Although the present invention has been described in detail for purpose of illustration, it is understood that such detail is solely for that purpose, and variations can be made therein by those skilled in the art without departing from the scope of the invention.

Claims

1. A spacer (1) for a multiple glazing unit comprising:

- a desiccant insert (3) comprising a desiccant material (31) interspaced between a top cover (32) and a bottom cover (33); and
- a flexible spacer profile (2) arranged to form a groove which can receive and partially enclose said desiccant insert (3);

wherein

- said flexible spacer profile (2) comprises a groove bottom (21) and two opposing groove walls (22a,23a,22b,23b) and defines a centerline (5) perpendicular to said grove bottom (21) around which centerline (5) said spacer (1) is substantially symmetrical;
- said two opposing groove walls (22a,23a,22b,23b) each comprises a first wall section (23a,23b) arranged substantially perpendicular to said groove bottom (21) and substantially parallel to said centerline (5), and a curved wall section (22a,22b) interspaced between said groove bottom (21) and said respective first wall section (23a,23b); and

wherein

- each curved wall section (22a,22b) extends away from said centerline (5) yet is curved towards said centerline over most or all of its extension; and
- said desiccant insert (3) is affixed to said groove bottom (21) such that said desiccant insert is received and partially enclosed by said groove formed by said flexible spacer profile (2).

2. A spacer (1) according to claim 1, wherein said first wall section (23a,23b) forms an angle to said centerline (5) not exceeding 25°, preferably not exceeding 10°.

3. A spacer (1) according to either claim 1 or claim 2, wherein said flexible spacer profile (2) is a metal spacer profile, preferably a metal spacer profile comprising aluminum or comprising stainless steel.

4. A spacer (1) according to any of the preceding claims, wherein said flexible spacer profile (2) is formed integral by bending a single metal plate.

5. A spacer (1) according to any of the preceding claims, wherein said flexible spacer profile (2) has a dimension of length which does not exceed 0.2 mm, preferably does not exceed 0.1 mm.

6. A spacer (1) according to any of the preceding claims, wherein said groove bottom (21) is corrugated.

7. A spacer (1) according to any of the preceding claims, wherein said desiccant material (31) comprises a zeolite and/or a silica gel and/or said desiccant material is a woven material comprising a zeolite and/or a silica gel.

8. A spacer (1) according to any of the preceding claims, wherein said top cover (32) and/or said bottom cover (33) is manufactured from a poly-ester.

9. A spacer (1) according to any of the preceding claims wherein said desiccant insert (3) is affixed to said groove bottom (21) using an adhesive (4).

10. A multiple glazing unit (10) comprising:

- two vitreous material sheets (6a,6b) positioned in a face-to-face, spaced apart relationship and defining a gas space (9) therebetween and a peripheral edge;
- at least one spacer (1) as defined according to any of the claims 1 to 9 disposed between said two vitreous material sheets (6a,6b), along the entire peripheral edge thereof, for maintaining said gas space (9) therebetween;

wherein

- a primary seal (7a,7b) comprising a poly-isobutylene based adhesive is disposed respectively on each vitreous material sheet (6a,6b) for affixing each respective first wall section (23a,23b) to each respective vitreous material sheet (6a,6b); and
- a secondary seal (8a,8b) comprising a mastic is disposed respectively on each vitreous material sheet (6a,6b) for affixing each respective curved wall section (22a,22b) to each respective vitreous material sheet (6a,6b).

11. A multiple glazing unit (10) according to claim 10, further comprising at least one extra vitreous material sheet (6a,6b) and at least one further spacer (1) according to any of the claims 1 to 9, and mounted along an entire peripheral edge thereof using further primary (7a,7b) and secondary seals (8a,8b) to create at least one further gas space (9) in said multiple glazing unit.

12. A multiple glazing unit (10) according to either claim 10 or claim 11, wherein said gas space (9) comprises argon and/or said mastic is selected from polyurethane, polysulfide, and/or silicone mastics.

13. A method of continuously manufacturing a spacer (1) according to any of the claims 1 to 9 comprising:

a) providing a continuous source (88) of spacer profile material (89) and a continuous source (87) of desiccant insert (3);
b) applying at a position along said manufacturing line (80) said desiccant insert (3) onto said spacer profile material (89) from said continuous source (87) of desiccant insert (3);
c) providing said spacer profile material (89) to a first roll forming section (81) where, in a first roll forming operation a first curved wall section (22a,22b) is formed, and to a second roll forming section (82) where a second and opposite curved wall section (22a,22b) is formed in a second roll forming operation; and
d) providing said spacer profile material (89) to a first (83), a second (84), a third (85), and a fourth (86) bending sections where, in respective bending operations, respective bends between said first wall section (23a,23b), said curved wall sections (22a,22b) and said groove bottom (21) are formed.

14. A method according to claim 13, wherein said spacer profile material (89) and said desiccant insert (3) are adhered using an adhesive (4) prior to entering said first roll forming section (81).

15. A manufacturing line (80) for manufacturing a spacer (1) according to any of the claims 1 to 9 comprising a first roll forming section (81) and a second roll second roll forming section (82); a first (83), a second (84), a third (85), and a fourth (86) bending sections; where, in said manufacturing line (80),

a) a continuous source (88) of spacer profile material (89) and a continuous source (87) of desiccant insert (3) are provided;
b) at a position along said manufacturing line (80) said desiccant insert (3) is applied onto said spacer profile material (89) from said continuous source (87) of desiccant insert (3);
c) said spacer profile material (89) is provided to a first roll forming section (81) where, in a first roll forming operation a first curved wall section (22a,22b) is formed, and to a second roll forming section (82) where a second and opposite curved wall section (22a,22b) is formed in a second roll forming operation; and
d) said spacer profile material (89) is provided to a first (83), a second (84), a third (85), and a fourth (86) bending sections where, in respective bending operations, respective bends between said first wall section (23a,23b), said curved wall sections (22a,22b) and said groove bottom (21) are formed.

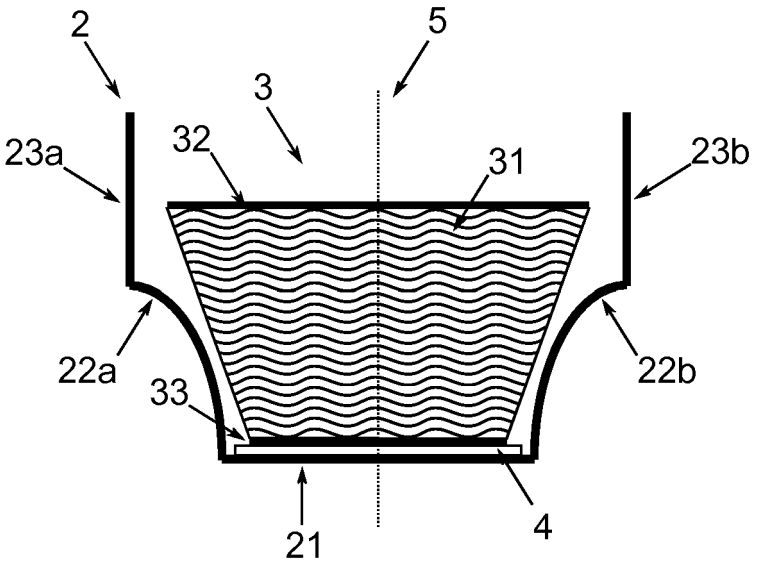

Figure 1

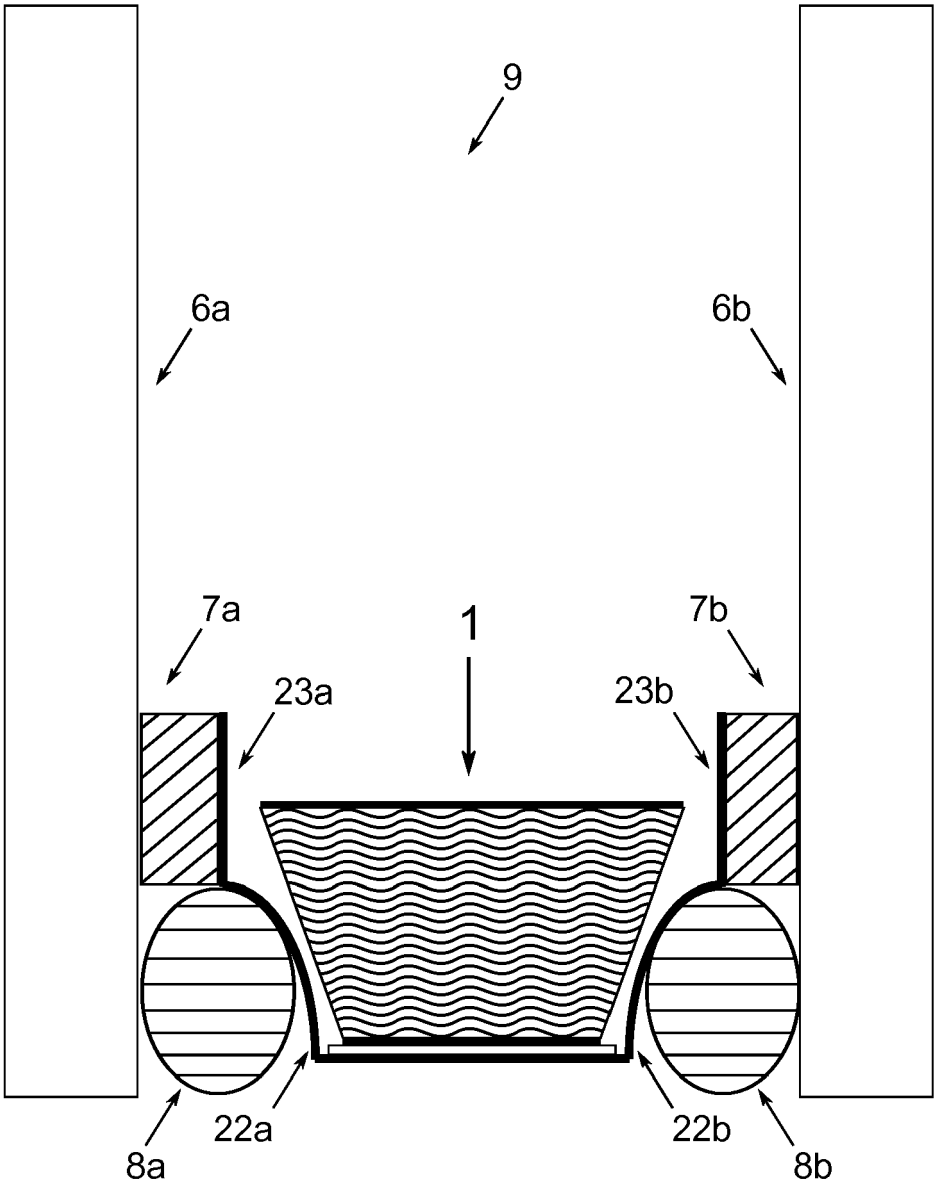

Figure 2

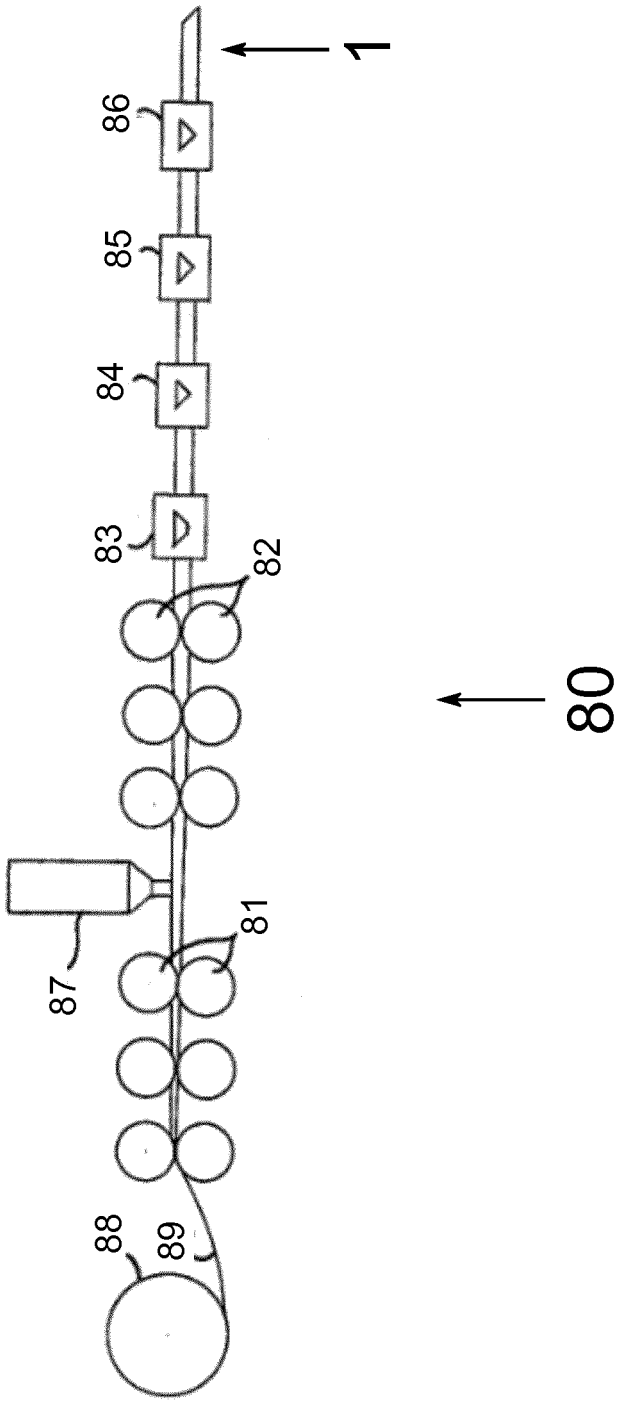

Figure 3

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EUROPEAN SEARCH REPORT

Application Number
EP 15 20 2524

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	WO 2005/075783 A1 (LENHARDT KARL [DE]) 18 August 2005 (2005-08-18) * the whole document *	1-15	INV. E06B3/663
X	EP 0 223 511 A2 (INDAL LTD [CA]) 27 May 1987 (1987-05-27) * the whole document *	1-15	

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	28 November 2016	Cobusneanu, D

CATEGORY OF CITED DOCUMENTS

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28-11-2016

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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