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(54) **Warm edge curtain kit for insulating glasses**

(57) A warm edge curtain kit for insulating glasses, comprising a plurality of spacer elements (3a,3b,3c) connected together so as to define a closed structure integrated in an insulating glass (A), a curtain group (5), comprising a box (6) and a curtain body (7), housed inside said closed structure defined by said spacer elements

(3a,3b,3c), each of said spacer elements (3a,3b,3c) being made from plastic material and comprising at least one respective metallic insert (14) at least partially embedded inside it, at least one of said spacer elements (3c) comprising connection means (17) to said box (6) of said curtain (5).

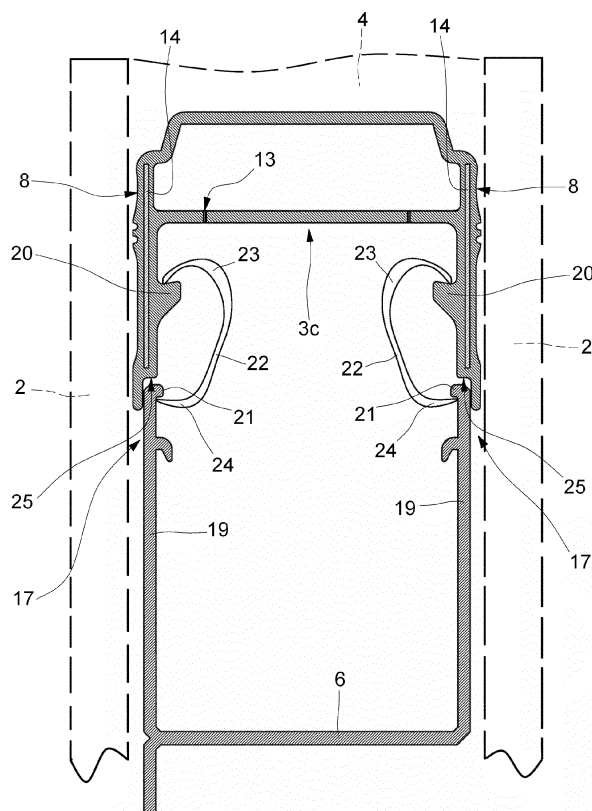


FIG. 6

Description

TECHNICAL FIELD OF THE INVENTION

[0001] The present invention concerns a warm edge curtain kit for insulating glasses.

STATE OF THE ART

[0002] As known, insulating glasses, also called double glazing, consist of two or more flat panes of glass joined together, at the perimeter, by a spacing frame, made from metallic material, polymeric or mixed, and separated by a layer of air or of gas, for example argon, krypton, xenon.

[0003] The spacing frame is shaped so that moisture-absorbing salts can be housed inside it, preventing the appearance of condensation in the volume comprised between the panes of glass.

[0004] Seals are normally applied both between the spacing frame and the panes of glass, and outside of the panes themselves at their perimeter edge.

[0005] Some of the insulating glasses must be specifically made to also house a curtain kit inside them, for example of the Venetian blind, roller blind, plissè type, etc., which moves between the two panes of glass. In the case in which it is wished to house a curtain kit inside the insulating glass, it is necessary to join the support box of the curtain, which also houses the controls of the curtain itself inside it, to at least three spacer elements, connected together through angle joints, so as to define the perimeter frame to which the panes of glass will then be fixed.

[0006] Currently, to make insulating glasses with curtain kit spacer elements are used consisting of extruded aluminium profiles having a thickness of 0,70 - 0,80 mm, sufficient to withstand the stresses generated by a curtain kit during the steps of assembly, testing and coupling with the glasses, i.e. its own weight and the dynamic actions due to its raising and lowering movements (testing step).

[0007] The aluminium spacer elements not associated with a curtain kit, on the other hand, have a much lower thickness - between 0,20 mm and 0,35 mm - that would not allow the aforementioned stresses to be withstood. At the same time, one of the greatest requirements in the field of the production of insulating glasses is currently that of limiting the linear thermal transmittance of windows and doors, through which, according to some estimations, about 50% of the heat energy produced inside buildings is lost.

[0008] The spacer elements made from extruded aluminium of the type described above, i.e. suitable for supporting a curtain kit, do not allow good results to be obtained in this sense due to their high metallic thickness, since aluminium is a good heat conductor.

[0009] In order to limit the thermal transmittance of insulating glasses, on the market there are currently so-

called warm edge spacer elements, which indeed limit the transmission of heat to the outside with respect to conventional spacer elements.

[0010] However, none of the warm edge spacer elements currently available on the market is adaptable to known curtain kits to be inserted inside insulating glasses. More specifically, none of the known warm edge spacer elements has characteristics such as to be able to withstand the stresses generated by a curtain kit during assembly, testing and the different coupling steps with the glasses.

[0011] For greater clarity, hereafter let us consider the characteristics of two families of warm edge spacers currently widely available on the market.

[0012] The spacer elements of both families are made up of one metal part and one plastic part that houses the moisture-absorbing salts, and that conducts heat much less well than the metallic part.

[0013] According to a first family, the spacer elements comprise a metallic U-shaped profile and a plastic profile that is also U-shaped, coupled together to form a closed tube with the metallic profile going on top of the plastic one and facing outwards.

[0014] The spacer elements of this first family have the metallic part that has a thickness of no more than 0,10 mm (otherwise it would lose the special warm edge characteristics), which, if made from stainless steel, is sufficient to give rigidity to the element but is not sufficient to withstand the stresses of the curtain kit. The thickness of the plastic part is also consequently quite small and not such as to be able to contribute to increasing the strength of the element. The spacer elements belonging to a second known family comprise a rigid tube made from plastic material to which a metallic layer is applied, made from stainless steel or aluminium, having a small thickness - for example 0,03 mm - which does not have the function of stiffening the plastic tube, but only of constituting a gas-impermeable barrier.

[0015] Indeed, the use of plastic materials - which on the one hand, as stated, limits thermal transmittance - does not provide satisfactory results in terms of permeability to gases: indeed, plastic materials have micropores through which the gases contained inside the insulating glass can escape, or through which air and water vapour can penetrate inside the insulating glass.

[0016] For this reason it is necessary to also associate a metallic part, which on the other hand is impermeable to gases, with the plastic part.

[0017] In order for the barrier against the escape of gases to be effective, the metallic part must extend from one glass pane to the other, touching them both without solution of continuity.

[0018] As a result of this, therefore, the metallic part forms a true thermal bridge, which increases thermal transmittance: in order to limit it, low thicknesses of the metallic part are used.

[0019] The manufacturers of insulating glasses, therefore, are faced with the need to make spacer elements

that have low thermal transmittance - i.e. of the warm edge type - are not permeable to gases and have strength characteristics such as to be able to be coupled with any curtain kit to be housed inside the glass.

[0020] It should also be considered that the insulating glasses made with normal metallic spacer elements have a very large weight, which can even reach 5 kg in the case of large-sized glasses.

[0021] Basically, no known spacer elements currently available on the market allow all of these requirements to be met simultaneously.

PURPOSES OF THE INVENTION

[0022] The technical task of the present invention is to improve the state of the art.

[0023] In such a technical task, a purpose of the present invention is to devise a warm edge curtain kit for insulating glasses with low thermal transmittance and at the same time that is able to constitute a bearing element for curtains of various kinds.

[0024] This task and such purposes are all accomplished by the warm edge curtain kit for insulating glasses according to the attached claim 1.

[0025] The dependent claims refer to preferred and advantageous embodiments of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS.

[0026] These and further advantages will become clearer to any man skilled in the art from the following description and from the attached drawings, given as a non-limiting example, in which:

figure 1 is an exploded axonometric view of a curtain kit according to the present invention, integrated in an insulating glass;

figure 2 is a section of the spacer element of the insulating glass according to the invention;

figure 3 is a section of the spacer element of the insulating glass according to the invention, in another embodiment;

figure 4 is a section of the spacer element of the insulating glass, in yet another embodiment;

figure 5 is a section of the spacer element of the insulating glass, in yet another embodiment;

figure 6 is a section of the insulating glass according to the invention, comprising the spacer element illustrated in figure 5;

figure 7 is a section of the insulating glass according to the invention, in another embodiment;

figure 8 is a section of the insulating glass according to the invention, in yet another embodiment;

figure 9 is a section of the insulating glass according to the invention, in a further embodiment;

figure 10 is a section of the spacer element of the glass of figure 9, in a step of its assembly.

EMBODIMENTS OF THE INVENTION.

[0027] With reference to figure 1, an insulating glass that houses a warm edge curtain kit 1 according to the present invention is wholly indicated with A.

[0028] The curtain comprised in the aforementioned kit 1 can be of any type, for example Venetian blinds, roller blinds, plissé, etc., as will be made clearer hereafter.

[0029] The insulating glass A comprises two opposite panes of glass 2.

[0030] The curtain kit 1 according to the invention comprises a plurality of spacer elements 3a,3b,3c.

[0031] In a *per sé* known way, the panes of glass 2 insulate between them, together with the spacer elements 3a,3b,3c arranged at the perimeter edges of the panes of glass 2 themselves, a laminar volume inside which a gas is contained, such as argon, krypton, xenon, or other gases suitable for the present application.

[0032] The spacer elements 3a,3b,3c are connected together so as to define a closed structure integrated in an insulating glass.

[0033] The spacer elements 3a,3b,3c can be connected together through angle elements that are known in the field.

[0034] The coupling between spacer elements 3a,3b,3c and panes of glass 2 is carried out using insulating materials 4 of the type known in the field, for example butyl and the like.

[0035] Typically, the curtain kit 1 comprises four spacer elements 3a,3b,3c, arranged along the perimeter edges of the panes of glass 2.

[0036] In particular, the curtain kit 1 comprises a lower spacer element 3a, two side spacer elements 3b and an upper spacer element 3c.

[0037] The curtain kit 1 also comprises a curtain group, wholly indicated with 5, for example a Venetian blind, or a curtain of another type.

[0038] The curtain group 5 is housed inside the closed structure defined by said spacer elements 3a,3b,3c.

[0039] In greater detail, the curtain group 5 is housed inside the laminar volume defined between the panes of glass 2.

[0040] The curtain group 5 comprises a box 6 and an actual curtain body 7.

[0041] The box 6 houses the members for moving the curtain body 7, which can be of any type, for example manual, automatic, etc.

[0042] According to an aspect of the present invention, the curtain group 5 is fixed to the upper spacer element 3c, as will be described more clearly hereafter.

[0043] Each of the spacer elements 3a,3b,3c of the curtain kit 1 is made from plastic material.

[0044] For example, each of the spacer elements 3a, 3b,3c can be made from a material selected from PVC, polypropylene, and the like, or a mixture thereof, or in any case any other plastic material suitable for the present application.

[0045] The use of such a plastic material makes it possible to substantially reduce the thermal transmittance of each spacer element 3a,3b,3c with respect to the spacer elements of conventional insulating glasses, made from aluminium, and suitable for supporting a curtain kit.

[0046] Each spacer element 3a,3b,3c comprises two respective opposite side faces 8 for coupling with the two respective panes of glass 2.

[0047] The coupling between each spacer element 3a, 3b,3c and the panes of glass 2 is carried out with gluing materials of the type known in the field, and in any case that do not constitute the object of the present invention.

[0048] Moreover, each spacer element 3a,3b,3c comprises an outward-facing surface 9 of the insulating glass A and an inward-facing surface 10 of the glass itself A, opposite one another.

[0049] Each spacer element 3a,3b,3c also comprises an inner housing 11.

[0050] The inner housing 11 is intended to receive moisture-absorbing salts 12, or other similar substances.

[0051] Each spacer element 3a,3b,3c comprises, at the inward-facing surface 10, microperforations 13 that place the inner housing 11 in communication with the volume of gas enclosed by the panes of glass 2, i.e. so as to make the moisture-absorbing salts 12 container in the inner housing 11 itself effective.

[0052] According to an aspect of the present invention, at least one of the spacer elements 3a,3b,3c of the curtain kit 1 comprises at least one metallic insert 14 embedded inside it.

[0053] In greater detail, preferably all of the spacer elements 3a,3b,3c of the curtain kit 1 comprise a respective metallic insert 14 embedded inside it.

[0054] The metallic insert 14 is at least partially embedded inside each spacer element 3a,3b,3c, at at least one of the side faces 8.

[0055] The metallic insert 14 could, however, have any other arrangement, for example along the longitudinal faces, or in any other area, in relation to the specific requirements.

[0056] In the embodiment represented in figure 1, there is a single metallic insert 14 at one of the side faces 8.

[0057] In greater detail, the metallic insert 14 is arranged parallel to a side face 8.

[0058] The metallic insert 14 is made from a material selected from stainless steel, iron, aluminium, and the like, or in any case any other metallic material suitable for the present application.

[0059] The metallic insert 14, suitably sized, contributes to increasing the strength of the respective spacer element 3a,3b,3c, in other words it allows the latter to become a bearer, i.e. able to withstand the stresses due to the presence of a curtain group 5, both static ones, due to the weight, and dynamic ones during testing, i.e. due to the lifting and lowering movement, as will be made clearer hereafter.

[0060] Moreover, the metallic insert 14, since it is sunk in the respective spacer element 3a,3b,3c, does not in-

fluence the thermal transmission of the entire spacer element 3a,3b,3c itself, i.e. it does not in any way constitute a thermal bridge between the two panes of glass 2.

[0061] Figure 2 illustrates a detailed section of the insulating glass A according to the invention at one of the spacer elements 3a,3b,3c of the curtain kit 1, for example the upper spacer element 3c.

[0062] In this particular embodiment, the metallic insert 14 is completely embedded in the aforementioned upper spacer element 3c.

[0063] In other embodiments, not represented in the figures, the metallic insert 14 could also partially poke outside of the respective spacer element 3a,3b,3c, still without constituting a thermal bridge between the two panes of glass 2.

[0064] Moreover, the arrangement of the metallic insert 14 within the respective spacer element 3a,3b,3c, as well as its shape and size, can be whatever, in relation to the specific application requirements, without any particular limitation.

[0065] For example, the metallic insert 14 could have a complex section instead of rectangular, with variations in thickness, curves, bends, etc., for example it could be made with an L or U-shaped section or something else.

[0066] Furthermore, the metallic insert 14 could consist of many separate portions, both longitudinally along the respective spacer element 3a,3b,3c, and in section. According to another aspect of the present invention, each spacer element 3a,3b,3c of the curtain kit 1 comprises at least one respective side fin 15.

[0067] The side fin 15 at least partially defines one of the opposite side faces 8 of the respective spacer element 3a,3b,3c, as illustrated in figure 2.

[0068] In the embodiment represented, the metallic insert 14 is at least partially incorporated inside the aforementioned side fin 15.

[0069] In other embodiments, the metallic insert 14 could not be incorporated inside the side fin 15.

[0070] The dimensions of the side fin 15 and its shape can clearly be whatever, in relation to the specific application requirements.

[0071] The presence of at least one side fin 15 in the respective spacer element 3a,3b,3c allows multiple technical advantages to be obtained.

[0072] Firstly, it contributes to increasing the strength of the respective spacer element 3a,3b,3c, since it can house a portion of the metallic insert 14 inside it. Secondly, the at least one side fin 15 contributes to optimising the diffusion of light through the insulating glass A, for example because it obscures the perimeter edges of the glass itself when the curtain is completely lowered.

[0073] Thirdly, the at least one side fin 15 constitutes an optimal sliding surface of the plates - or other elements - of the curtain body 7, since often such plates, made from painted aluminium, could touch the fin 15 of the respective spacer element 3a,3b,3c producing noise or squealing due to sliding, which actually regularly occurs with conventional spacer elements, for example those

made from extruded aluminium.

[0074] Fourthly, the at least one side fin 15 made from plastic material limits the formation of dust, in the case in which there is rubbing with removal of particles of material by sliding of the curtain body 7, which actually regularly occurs with conventional spacer elements, for example those made from extruded aluminium.

[0075] It is thus not necessary to apply teflon film and the like as occurs in known profiles.

[0076] Each of the spacer elements 3a,3b,3c of the curtain kit 1 according to the present invention also comprises at least one metallic, or metalized plastic, film 16, coupled with the respective spacer element 3a,3b,3c itself at its outward-facing surface 9.

[0077] In greater detail, the metallic, or metalized plastic, film 16 is coupled with the respective spacer element 3a,3b,3c through a medium/high density polyurethane glue.

[0078] The metallic film 16 constitutes an effective barrier against the escape of the gas contained in the insulating glass A or the penetration of air inside it. The use of high density polyurethane glue, as well as being more ecological than other glues, contributes to making the barrier for the gases.

[0079] Finally, it should be noted that the box 6 of the curtain group 5 can be fixed to the upper spacer element 3c through suitable connection means, which can be of any type.

[0080] The mechanical characteristics of each spacer element 3a,3b,3c, and in particular in this case of the upper spacer element 3c, make it possible to effectively support the curtain group 5 without any risk of deformation or instability of the structure.

[0081] It has thus been seen how the invention achieves the proposed purposes.

[0082] The spacer elements 3a,3b,3c of the curtain kit 1 according to the invention make it possible to effectively withstand the mounting of a curtain group 5 inside the insulating glass A itself, since each of them possesses a suitably reinforced cross section thanks to the presence of at least one metallic insert 14.

[0083] In particular, each of the spacer elements 3a, 3b,3c can reliably and safely withstand both static stresses, i.e. the weight of the curtain group 5 itself, and dynamic stresses, due to the raising and lowering of the curtain body 7, without any risk of deformations or collapse.

[0084] Moreover, each spacer element 3a,3b,3c makes it possible to keep the thermal transmittance within desired values, since it does not in any way constitute a substantial thermal bridge between the two panes of glass 2.

[0085] Moreover, as stated, the presence of at least one side fin 15 in which the metallic insert 14 is embedded also makes it possible to obtain the important advantages described earlier.

[0086] Figure 3 illustrates another embodiment of the curtain kit 1 according to the present invention.

[0087] Each spacer element 3a,3b,3c of the curtain kit 1 according to the embodiment of figure 3 is totally identical to that of figure 2 apart from the fact that each spacer element 3a,3b,3c comprises, in this case, two side fins 15 that respectively define the two opposite side faces 8 of the respective spacer element 3a,3b,3c itself.

[0088] At the two side fins 15 there are two respective metallic inserts 14, in a totally analogous way to what was described for the previous embodiment.

[0089] The presence of two side fins 15 instead of one, with two respective metallic inserts 14, makes it possible to further increase the strength of the respective spacer element 3a,3b,3c, in a totally intuitive way, by making it symmetrical and thus more stable and balanced from the point of view of the loads that can be applied.

[0090] Moreover, the presence of two side fins 15 makes the respective spacer element 3a,3b,3c perfectly symmetrical also from the point of view of the diffusion of light through the insulating glass A. Furthermore, the presence of two side fins 15 provides a better guide for the sliding of the curtain body 7 inserted inside the insulating glass A.

[0091] Also in this case, the box 6 of the curtain group 5 can be fixed to the upper spacer element 3c through suitable connection means, which can be of any type.

[0092] Yet another embodiment of the curtain kit 1 according to the present invention is illustrated in figure 4.

[0093] In this embodiment each of the spacer elements 3a,3b,3c lacks side fins.

[0094] Two metallic inserts 14 are foreseen completely embedded inside each of the spacer elements 3a,3b,3c, at the side faces 8.

[0095] The metallic inserts 14 could also partially poke out from the respective spacer element 3a,3b,3c, provided that they do not constitute a thermal bridge between the panes of glass.

[0096] This embodiment constitutes a simplified version of the curtain kit according to the invention, whilst still keeping its main characteristics and its main technical advantages.

[0097] Also in this embodiment, the box 6 of the curtain group 5 can be fixed to the upper spacer element 3c through suitable connection means, which can be of any type.

[0098] Yet another embodiment of the curtain kit 1 according to the present invention is illustrated in figures 5,6.

[0099] In particular, figure 5 represents one of the spacer elements 3a,3b,3c of the curtain kit 1, for example the upper spacer element 3c.

[0100] Figure 6, on the other hand, represents a detailed section of the insulating glass A assembled at the upper spacer element 3c of the curtain kit 1.

[0101] In this embodiment of the invention, at least the upper spacer element 3c of the curtain kit 1 comprises a pair of opposite fins 15, like in the embodiment of figure 3.

[0102] Moreover, at least the upper spacer element 3c of the curtain kit 1 comprises connection means 17 to

the box 6 of the curtain group 5.

[0103] The box 6 of the curtain group 5, in a *per se* known way, has a substantially U-shaped cross section, so as to define an inner volume 18 in which the means for moving the curtain body 7 are housed.

[0104] The box 6 thus comprises two opposite side walls 19 that define the aforementioned inner volume 18.

[0105] The box 6 can for example be made from aluminium, or from another material.

[0106] The means for moving the curtain body 7 can be of any type, and in any case do not constitute the object of the present invention.

[0107] In greater detail, the connection means 17 are suitable for connecting the fins 15 of the upper spacer element 3c with the side walls 19 of the box 6.

[0108] The aforementioned connection means 17 comprise, for each of the fins 15 of the upper spacer element 3c, a respective upper projection 20 facing inwards.

[0109] The shape of the upper projection 20 of each of the fins 15 can be whatever.

[0110] The aforementioned connection means 17 also comprise, for each of the side walls 19 of the box 6, a respective lower projection 21 facing inwards.

[0111] The shape of the lower projection 21 of each of the side walls 19 can also be whatever.

[0112] The connection means 17 also comprise at least one pair of hooks 22.

[0113] Each of the hooks 22 comprises two ends 23,24, able to be respectively engaged in the upper projection 20 of one of the fins 15 of the upper spacer element 3c and in the lower projection 21 of the corresponding side wall 19 of the box 6.

[0114] In this way, each of the fins 15 is autonomously connected to the corresponding side wall 19 of the box 6.

[0115] Each of the fins 15 comprises a respective recess 25 in which the end of the corresponding side wall 19 of the box 6 engages.

[0116] In this way, as illustrated in figure 6, an optimal connection is made between the two parts without slits or other mounting imperfections.

[0117] The pairs of hooks 22 can be of any number, in relation to the specific assembly requirements.

[0118] For example, it is possible to use a single pair of hooks 22 extending longitudinally sufficiently to ensure a correct connection between the parts, or it is possible to use many pairs of hooks 22 with shorter longitudinal extension.

[0119] The presence of the metallic inserts 14 in the upper spacer element 3c makes it possible to give it the mechanical strength sufficient to correctly support the box 6 without deformations or other instability.

[0120] Figure 7 illustrates another embodiment of the curtain kit 1 according to the present invention.

[0121] Also in this embodiment, the upper spacer element 3c of the curtain kit 1 comprises a pair of opposite fins 15.

[0122] In this embodiment, the connection means 17

of the upper spacer element 3c to the box 6 of the curtain group 5 comprise, for each of the fins 15, a housing 26 foreseen substantially at the end of the fin 15 itself.

[0123] The connection means 17 also comprise, for each of the side walls 19 of the box 6, a respective lower projection 21 facing inwards, totally similar to that of the embodiment of figures 5,6.

[0124] The lower projection 21 of each of the side walls 19 is suitable for engaging in the corresponding housing 26 of the upper spacer element 3c.

[0125] Such engagement can preferably be of the removable type, so as to easily disconnect the parts when necessary.

[0126] Each housing 26 has a configuration substantially matching that of the corresponding lower projection 21 of the corresponding side wall 19 of the box 6.

[0127] In greater detail, each housing 26 is defined by two parallel extensions 27 of the respective fin 15, one of which, the most inner one, is bent so as to define a support surface for the corresponding lower projection 21.

[0128] Of course, the configuration of the housings 26 and of the corresponding lower projections 21 can also be different from the one represented.

[0129] The connection between the two parts is quick and easy, by lateral insertion.

[0130] Also here, the presence of the metallic inserts 14 makes it possible to give the upper spacer element 3c the optimal mechanical characteristics to reliably support the curtain group 5.

[0131] Another embodiment of the curtain kit 1 according to the present invention is illustrated in figure 8.

[0132] Also in this embodiment, the upper spacer element 3c of the curtain kit 1 comprises a pair of opposite fins 15.

[0133] In this embodiment, the connection means 17 of the upper spacer element 3c to the box 6 of the curtain group 5 comprise, for each of the fins 15, a respective enlarged end portion 28.

[0134] The shape and size of such an enlarged end portion 28 can of course be whatever.

[0135] The connection means 17 also comprise, for each of the side walls 19 of the box 6, a respective seat 29 foreseen at the end section of the same side wall 19. The seat 29, in section, has a shape matching that of the enlarged end portion 28.

[0136] The enlarged end portion 28 of each of the fins 15 is suitable for engaging in the corresponding seat 29 of the corresponding side wall 19 of the box 6.

[0137] Such engagement can preferably be of the removable type, so as to easily disconnect the parts when necessary.

[0138] Also in this embodiment, the presence of the metallic inserts 14 makes it possible to give the upper spacer element 3c the optimal mechanical characteristics to reliably support the curtain group 5.

[0139] Also in this embodiment, assembly takes place quickly and easily, by lateral insertion.

[0140] A further embodiment of the curtain kit 1 according to the present invention is illustrated in figures 9,10. Also in this embodiment, the upper spacer element 3c of the curtain kit 1 comprises a pair of opposite fins 15. In this embodiment, the upper spacer element 3c and the box 6 are made in a single body.

[0141] In greater detail, one of the fins 15 of the upper spacer element 3c is permanently connected to one of the side walls 19 of the box 6, i.e. in practice they constitute a single wall.

[0142] The connection means 17 of the upper spacer element 3c to the box 6 comprise an articulation area 30 foreseen between the fin 15 and the side wall 19 that are permanently connected.

[0143] The articulation area 30 in turn consists, in practice, of a weakening of the continuous wall that joins the fin 15 of the upper spacer element 3c to the side wall 19 of the box 6, said weakening only allowing a rotation between the two parts.

[0144] Moreover, the connection means 17 comprise, at the other of the fins 15 and at the other of the side walls 19, two respective removably couplable elements 31,32. This means that the box 6 can be made entirely from the same material from which the upper spacer element 3c is made, i.e. plastic material.

[0145] Such a single body is openable, thanks to the removably couplable elements 31,32, so as to be able to access the means for moving the curtain body 7 housed inside. This solution makes it possible to obtain high performance from the thermal point of view with respect to the use of normal aluminium boxes.

[0146] This is a very advantageous solution also from the point of view of assembly, since the step of connecting the upper spacer element 3c to the box 6 of the curtain group 5, which can often be rather laborious, is substantially simplified.

[0147] The removably couplable elements 31,32, in this embodiment, comprise a lower projection 21 foreseen in the side wall 19 of the box 6, and a housing 26 foreseen in the corresponding fin 15 of the upper spacer element 3c.

[0148] These are elements that are totally similar to those of the embodiment of figure 7.

[0149] The elements 31,32 can be snap-engaged in one another.

[0150] Of course, the removably couplable elements 31,32 can also be of a different type, without limitations.

[0151] Instead of the articulation area 30, there could be an actual hinge that joins two separate parts, i.e. one of the fins 15 of the upper spacer element 3c and the side wall 19 of the box 6.

[0152] It should be specified that in all of the embodiments according to figures 1-8 of the curtain kit 1, the lower and side spacer elements 3a, 3b should be considered to be structurally identical, or substantially identical, to the upper spacer element 3c.

[0153] In other embodiments of the invention not represented in the figures, however, the curtain kit 1 can

comprise spacer elements 3a,3b,3c that are different from each other, for example it can comprise an upper spacer element 3c of a certain configuration and side and lower spacer elements 3b, 3a of another type.

[0154] In greater detail, the spacer elements 3a,3b,3c foreseen in the various embodiments of the invention described can be variously combined, without any limitation, in relation to the specific application requirements.

[0155] Finally, it should be noted that the metallic inserts 14 can also act as electrical conductors for certain applications.

[0156] The present invention has been described according to preferred embodiments, but equivalent variants can be devised without departing from the scope of protection offered by the following claims.

Claims

1. Warm edge curtain kit for insulating glasses, **characterised in that** it comprises a plurality of spacer elements (3a,3b,3c) connected together so as to define a closed structure integrated in an insulating glass (A), a curtain group (5), comprising a box (6) and a curtain body (7), housed inside said closed structure defined by said spacer elements (3a,3b,3c), each of said spacer elements (3a,3b,3c) being made from plastic material and comprising at least one respective metallic insert (14) at least partially embedded inside it, at least one of said spacer elements (3c) comprising connection means (17) to said box (6) of said curtain group (5).
2. Curtain kit according to claim 1, wherein said metallic insert (14) is embedded in the respective spacer element (3a,3b,3c) at at least one of its side or longitudinal faces (8).
3. Curtain kit according to the previous claim, wherein each of said spacer elements (3a,3b,3c) comprises at least one side fin (15) that at least partially defines one of said side faces (8).
4. Curtain kit according to the previous claim, wherein said metallic insert (14) is at least partially incorporated inside said side fin (15).
5. Curtain kit according to the previous claim, wherein each of said spacer elements (3a,3b,3c) comprises two respective side fins (15) that respectively define said opposite side faces (8), each of said side fins (15) having a respective metallic insert (14) at least partially incorporated in it.
6. Curtain kit according to the previous claim, wherein said connection means (17) are suitable for connect-

ing each of said side fins (15) with the side walls (19) of said box (6).

7. Curtain kit according to the previous claim, wherein said connection means (17) comprise, for each of said fins (15) and side walls (19), an upper projection (20) of each of said fins (15) facing inwards, a lower projection (21) of each of said side walls (19) facing inwards, and a hook (22) engaged in said upper projection (20) and in said lower projection (21). 5
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8. Curtain kit according to claim 6, wherein said connection means (17) comprise, for each of said fins (15) and side walls (19), a housing (26) foreseen substantially at the end of said fin (15), and a lower projection (21) of said side wall (19) able to be removably engaged in said housing (26). 15
9. Curtain kit according to claim 6, wherein said connection means (17) comprise, for each of said fins (15) and side walls (19), an enlarged portion (28) of said fin (15) and a seat (29) foreseen in the end section of said side wall (19), said enlarged portion (28) being able to be removably engaged in said seat (29). 20
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10. Curtain kit according to claim 6, wherein said connection means (17) comprise an articulation area (30) that permanently connects one of said fins (15) with one of said side walls (19) of said box (6), and two removably couplable elements (31,32) respectively foreseen at the other of said fins (15) and at the other of said side walls (19). 30
11. Curtain kit according to the previous claim, wherein said upper spacer element (3c) and said box (6) are made in a single body of plastic material. 35
12. Curtain kit according to one of the previous claims, wherein each of said spacer elements (3a,3b,3c) is made from a material selected from PVC, polypropylene, and the like, or a mixture thereof. 40
13. Curtain kit according to one of the previous claims, wherein said metallic insert (14) is made from a material selected from stainless steel, aluminium, and the like. 45
14. Curtain kit according to one of the previous claims, wherein said spacer elements (3a,3b,3c) comprise respective metallic coating films (16) that act as a barrier against the escape of gas. 50

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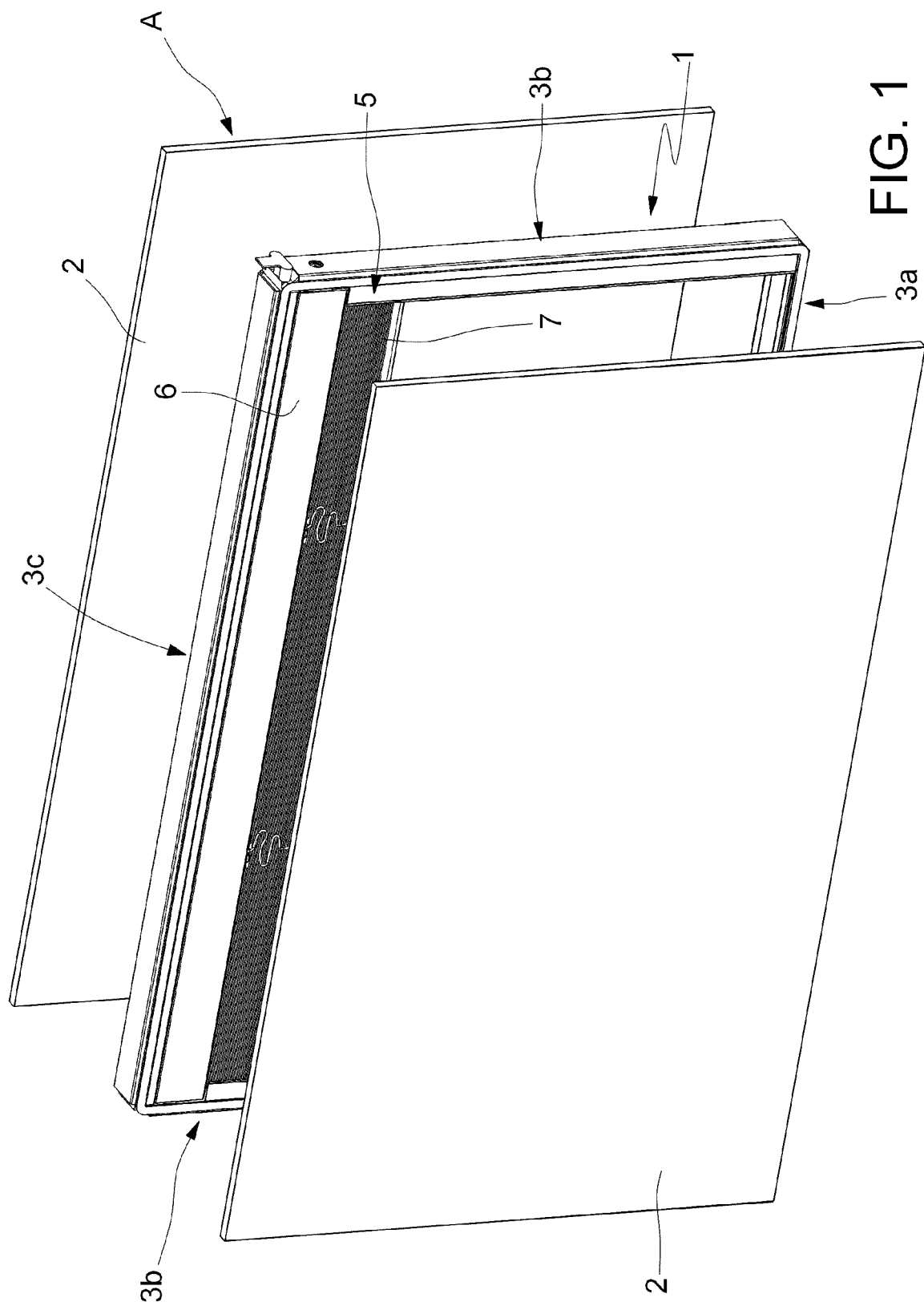


FIG. 1

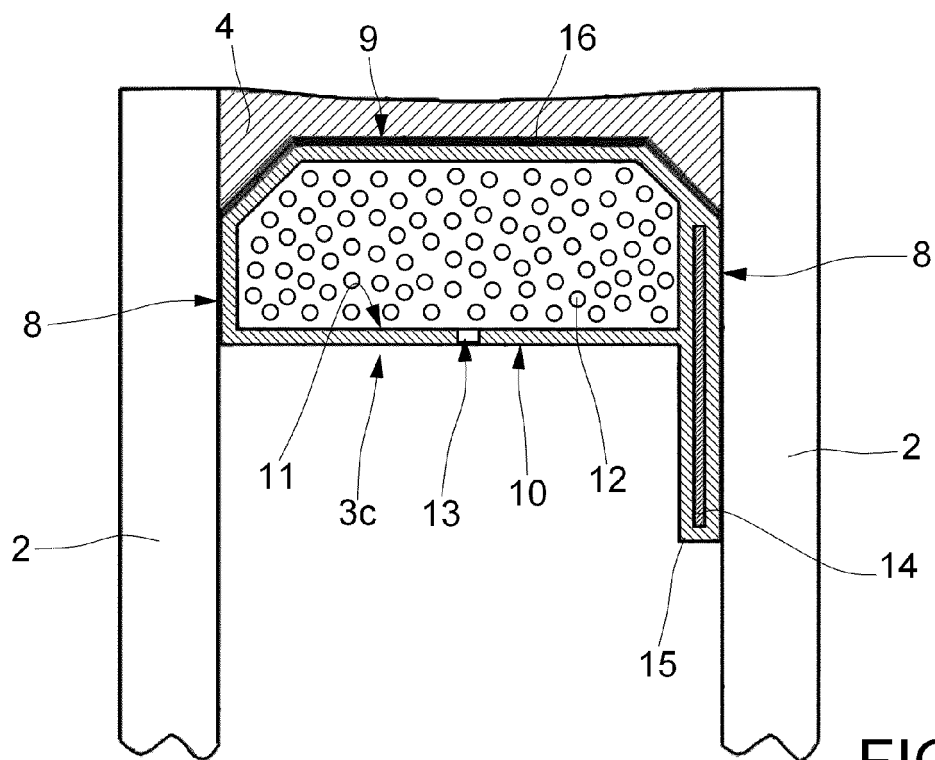


FIG. 2

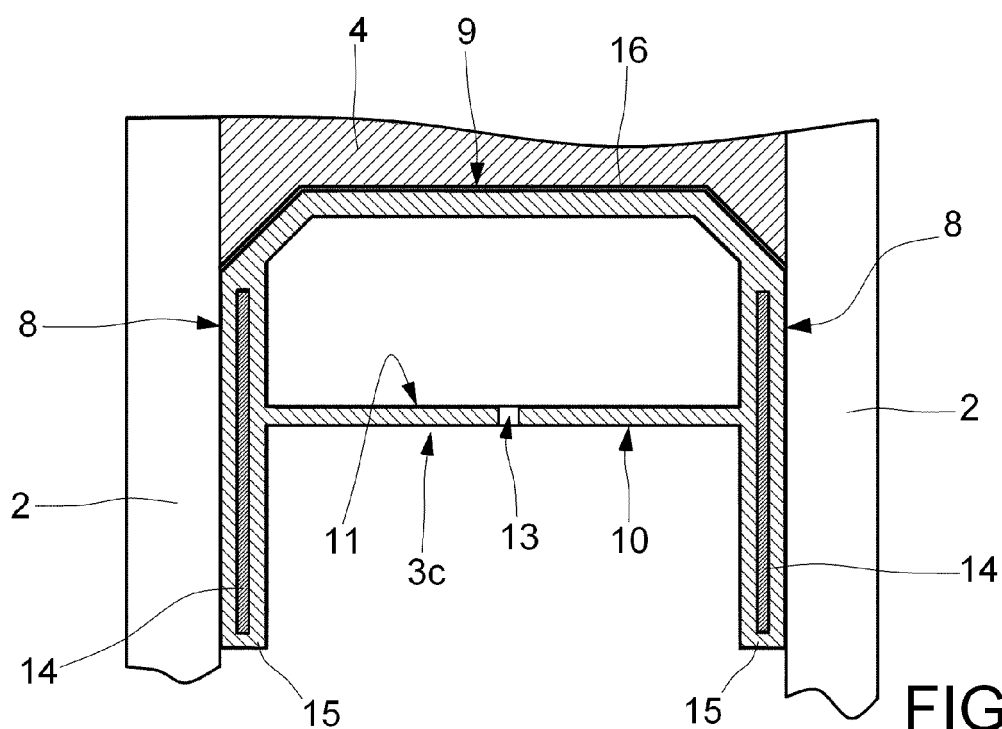


FIG. 3

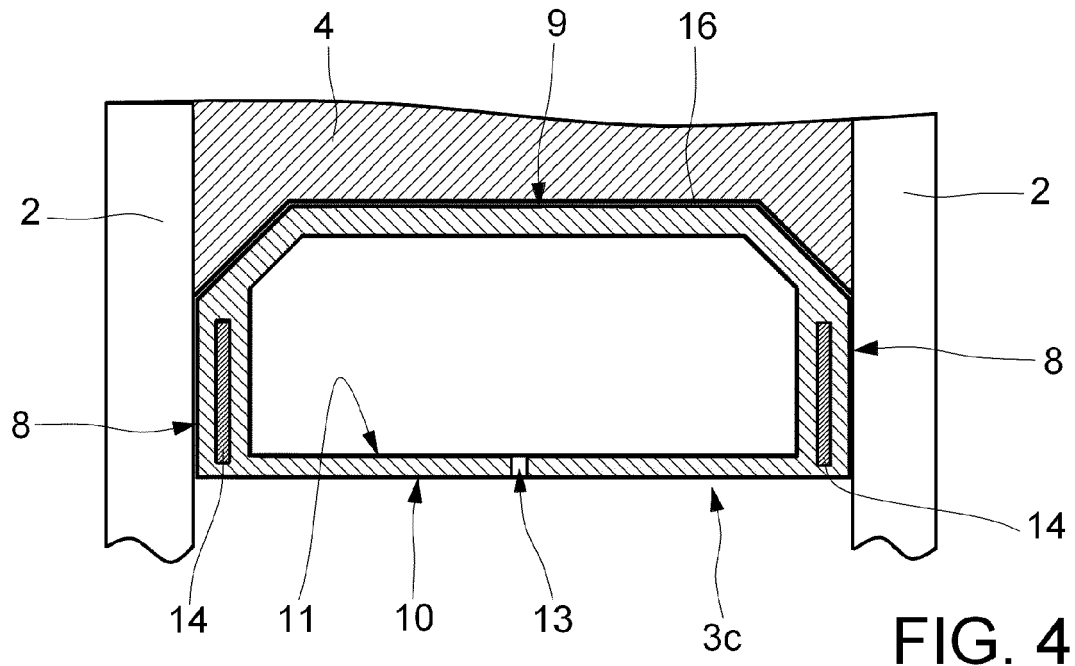


FIG. 4

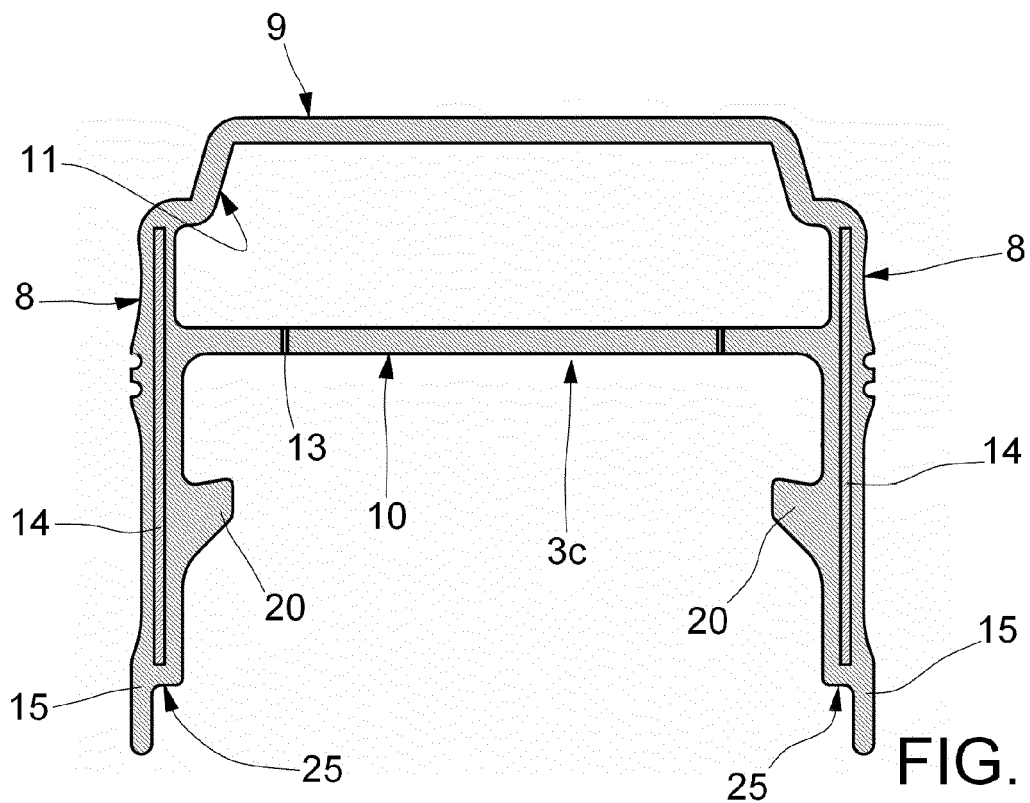


FIG. 5

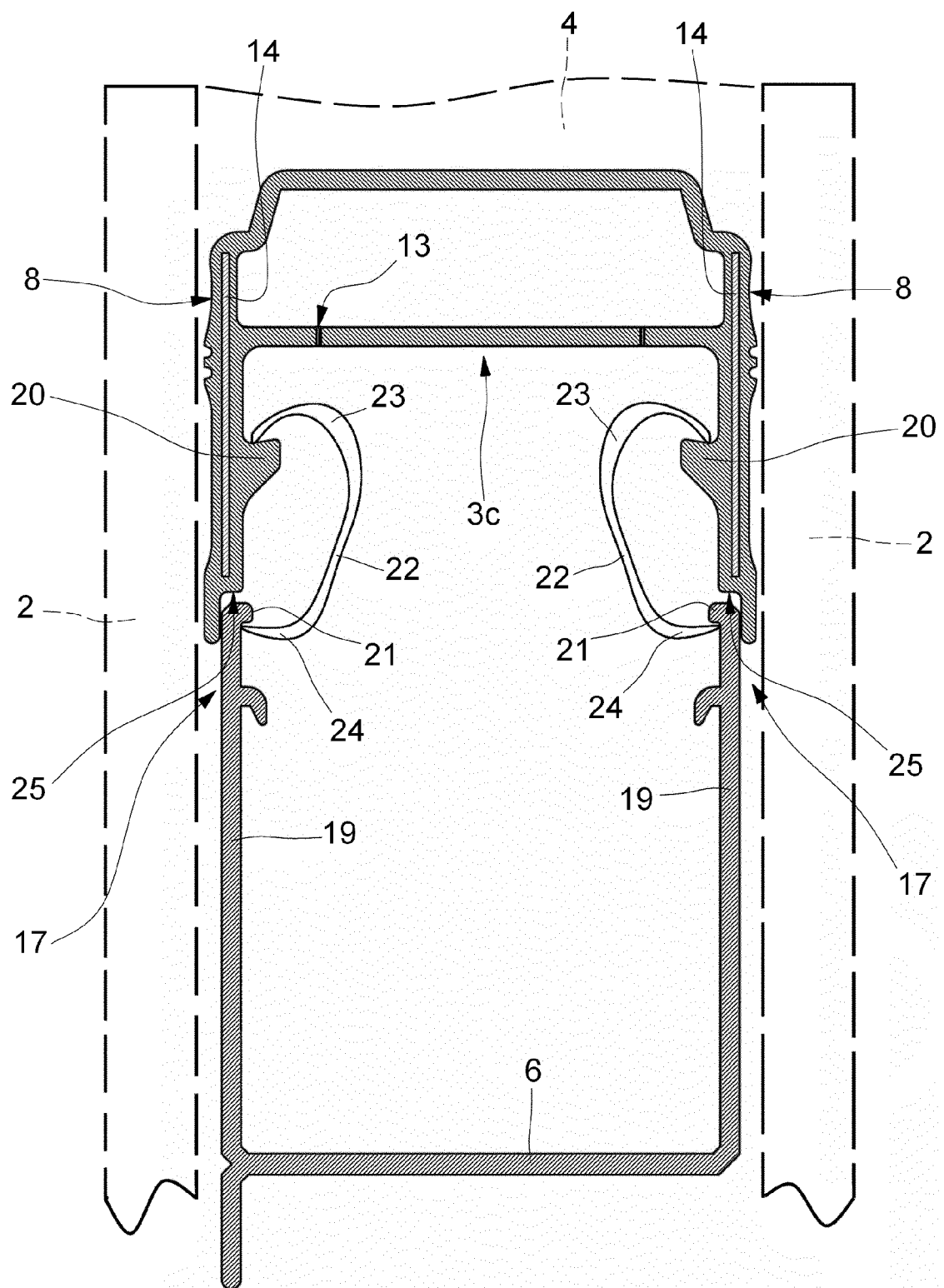


FIG. 6

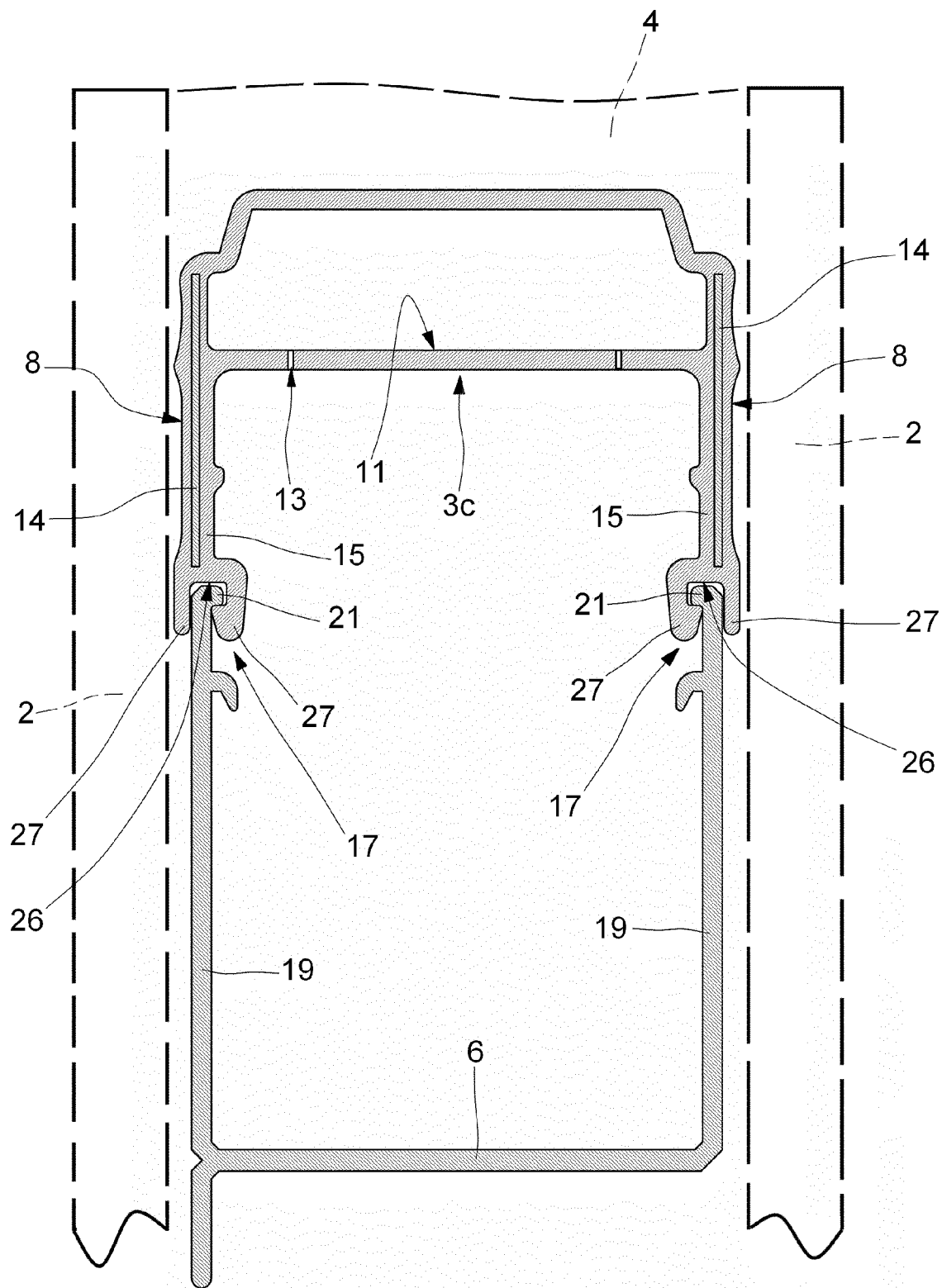
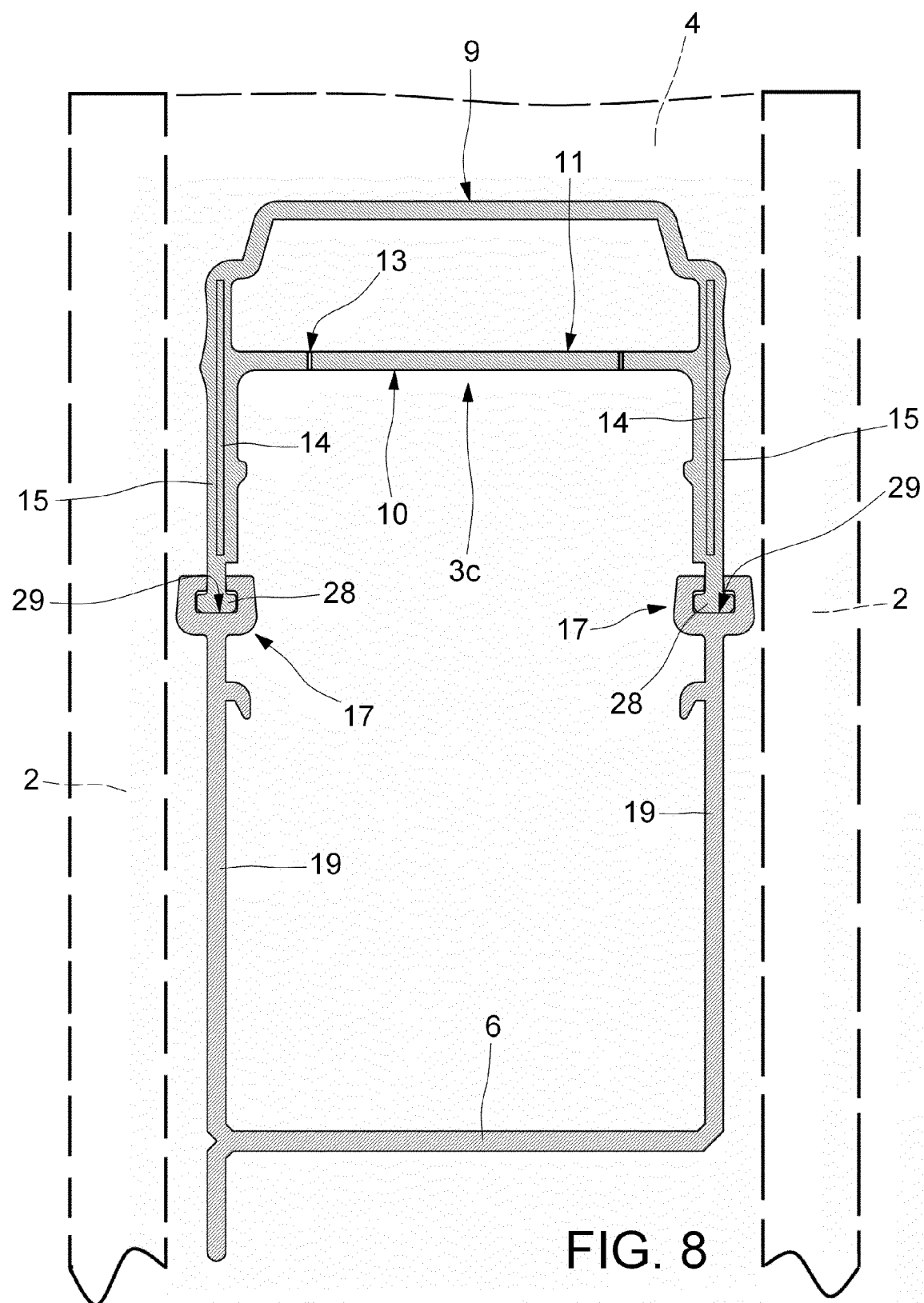


FIG. 7



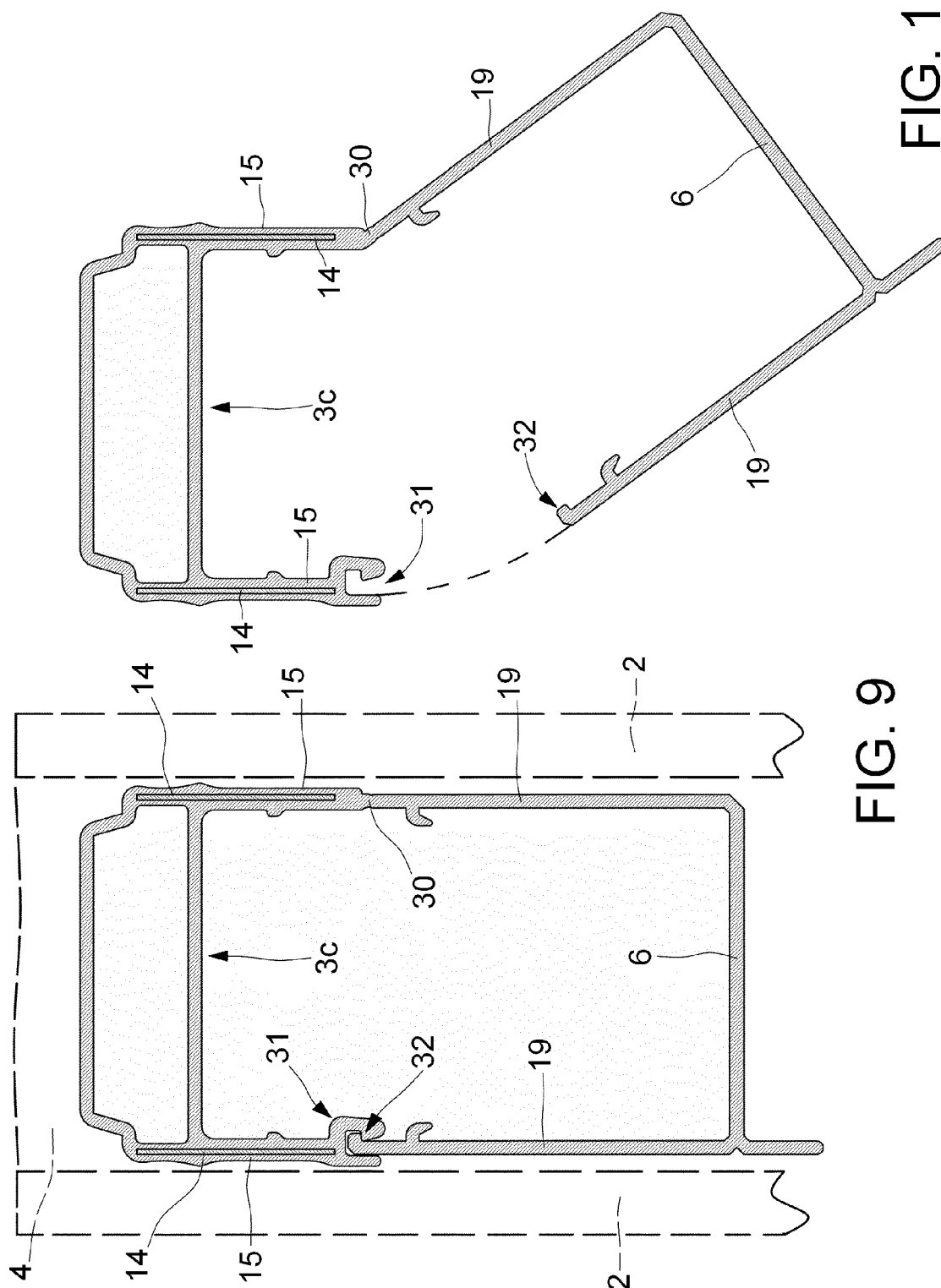


FIG. 9

FIG. 10