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(54) **Glass-frame-combination as well as window and door provided with the glass-frame-combination**

(57) A window pane frame combination 1 comprises two conventional double glazed insulation window panes 9. These window panes are retained by a frame 17 which is formed into one whole in that fold formed steel profiles are welded together. Part of the profiles is present in between the window panes, which part forms an air chamber 19 which functions as a spacer. The air chamber comprises two side walls 23 facing the window panes and to which the insulation window panes 9 are fixed by means of a bonding agent 25. The frame with the insulation window panes thus constitutes a constructive whole.

By bonding the window panes to a frame manufactured as one whole, a rigid self-supporting construction is obtained which can furthermore be manufactured in a simple and cost-effective manner.

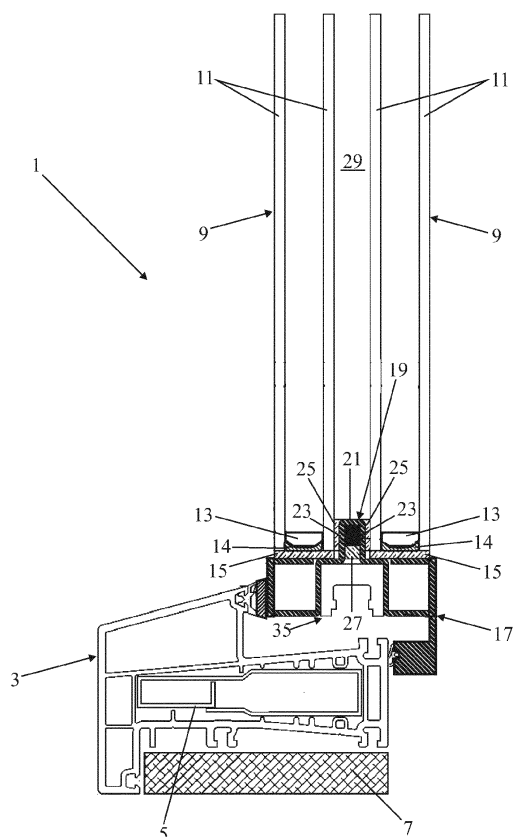


FIG. 1

Description

Field of the invention

[0001] The invention relates to a window pane frame combination comprising at least two parallel window panes spaced from each other, as well as a frame present along the periphery of the window panes, which frame forms a whole in combination with the window panes, which window panes comprise each one or more glass sheets and an air space is situated in between the window panes, which frame is constituted by a profile part of which is situated in between the window panes and forms a chamber which comprises an inner wall bounding on the air space and having openings, as well as two side-walls facing the window panes, which chamber is at least partly open on the side opposite to the inner wall and is closed by means of a vapour barrier, where a dehydrating agent is present in the chamber and where a vapour barrier is present between the peripheral side of the window panes and the frame, and where a bonding layer is present between the side walls of the chamber and the window panes by means of which bonding layer the window panes are sealed to the frame and are rigidly positioned relative to the frame. A dehydrating agent (for example silica gel) is introduced in the air space between the window panes so as to condition this air space.

State of the art

[0002] A window pane frame combination of this type is known from EP-A-1 052 362. In this known window pane frame combination the frame is assembled from four frame segments which each form one side of the frame and are connected together. The frame segments are extruded sections which are connected together after which the window panes are bonded to them. The window panes then add to the rigidity of the construction. Extruded sections are generally relatively hard to connect together and are generally made of expensive materials.

Summary of the invention

[0003] It is an object of the invention to provide a window pane frame combination of the type defined in the opening paragraph, which can both be manufactured both in a simpler and more cost-effective manner and is more rigid than the known window pane frame combination. For this purpose, the window pane frame combination according to the invention is **characterized in that** the frame is comprised of a single segment. By bonding the window panes to a frame made of one segment, a rigid, self-supporting construction is obtained which can furthermore be manufactured in a simple and cost-effective manner. In this way the frame with the insulation panes forms a constructive whole that is more rigid than that of the known window pane frame combination in which extruded sections are connected together into an

aggregate whole consisting of various segments and not consisting of one segment. Extruded sections are made of a material that is hard to weld or cannot be welded at all. If these extruded sections were still to be welded together, it would be a more expensive manufacturing method than securing non-extruded sections together. In addition, only more expensive materials (at any rate more expensive than steel) can be extruded.

[0004] It is observed that from DE-A-20 41 038 is known a window pane frame combination in which the frame consists of a segment to which the window panes are bonded and a further segment which functions as a supporting segment. This is contrasted with the window pane frame combination according to the invention in which the carrying capacity is obtained from the combination of the frame and the window panes installed in it.

[0005] It is further observed that in US-A-2 173 649 a window pane frame combination is disclosed consisting of a frame with window panes installed in it. The frame segments are here connected together by means of corner pieces and are not fitted together into one aggregate part. The window panes are not bonded to the frame either so that there is not mention of a strong, rigid structure. As a result, this known window pane frame combination is considerably less rigid than the combination according to the invention.

[0006] The frame may be made of a composite material. However, the frame is preferably comprised of four steel profiles which are welded together into one whole. Steel is a relatively cost-effective material which can be welded in a simple and cost-effective manner and then forms a robust whole.

[0007] The profiles are preferably fold formed from strips or shaped according to an equivalent technique. Fold forming is an industrial designing technique in the field of metal working. During a fold forming operation plate material is converted from a two-dimensional scale to a three-dimensional scale. Fold forming is effected by means of bending of the plate material and is a relatively cost-effective shaping technique.

[0008] The window pane frame combination described above is pre-eminently suitable for manufacturing fire-resistant constructions because the frame is extremely suitable for being made of fire-resistant material like steel. For this reason, in an advantageous embodiment the window panes are preferably fire-resistant window panes.

[0009] As a result of the bonding layer the window and frame assembly forms a more robust whole than the known combination in which the window panes are not fixed relative to the frame by means of bonding but by means of clamping via glazing beads. The bonding layer in the combination according to the invention is constituted, for example, by an adhesive layer that also seals hermetically. As a result, the window pane frame combination according to the invention is more stable than the known combination.

[0010] The window pane frame combination according

to the invention constitutes one constructive whole, so that it can be installed straight into an opening in a wall and can be connected to a rough buck secured to the wall or may form part of a window or door in which case the window pane frame combination is arranged as a fixed or as a tilt-and-turn window. Thanks to the self-supporting construction of the window-pane frame combination, a window frame customarily used in practice which accommodates window panes may be omitted, so that the insulation value of the entire window, window pane or door is high because the window pane segment has a higher insulation value than the window frame segment.

[0011] The window panes may comprise single glass or double glass units where the glass sheets may be comprised of a single glass sheet, layered glass, safety glass or fire-resistant glass.

[0012] An embodiment of the window pane frame combination according to the invention is **characterized in that** the frame is provided with means by which the frame can be mounted directly to a window frame and is either or not turnable.

[0013] These means may be constituted by strips of the frame located on the rims of the frame, which strips do not abut the window panes and function as connecting elements by which the window pane frame combination can be mounted to a rough buck.

[0014] The means may also be constituted by an open, further chamber in the frame in which hinges and locks can be positioned. The hinges and locks are thus not mounted to a separate framework in which the window pane frame combination is installed, but directly in the window pane frame combination.

[0015] A further embodiment of the window pane frame combination according to the invention is **characterized in that** the window pane frame combination comprises a third window pane and the frame comprises a further segment that forms a further chamber.

[0016] The invention furthermore relates to a window and a door comprising a fixed or movable frame, where a window pane frame combination according to the invention is located in the frame.

[0017] The invention further relates to a method of manufacturing a window pane frame combination according to the invention, comprising the manufacture of a frame as well as bonding the window panes to the frame during the manufacture of the frame or once the frame has been manufactured. With regard to the method the invention is **characterized in that** the frame is made of four frame segments which are fastened to each other to become a whole. The frame segments are preferably welded together into a whole. Welding the frame segments produces an extremely strong junction, so that the frame segments may be regarded as one whole.

[0018] The frame segments are preferably fold formed from strips, preferably from steel strips.

Brief description of the drawings

[0019] The invention will be described hereinbelow in more detail based on examples of embodiment of the window pane frame combination according to the invention represented in the drawing figures, in which:

Fig. 1 shows a first embodiment of the window pane frame combination according to the invention used in a casement window or door;

Fig. 2 shows a second embodiment of the window pane frame combination according to the invention used in a fixed window or door;

Fig. 3 shows a third embodiment of the window pane frame combination according to the invention used in a glassless window (rough buck) as a fixed or turnable part; and

Fig. 4 shows a fourth embodiment of the window pane frame combination according to the invention shaped like a fire-resistant structure used in a glassless window (rough buck) as a fixed or turnable part.

Detailed description of the drawings.

[0020] Fig. 1 shows a first embodiment of the window pane frame combination according to the invention. The window pane frame combination 1 can turn in a frame 3 provided with a rigidizing steel sleeve 5. The frame 3 is fixed to a rough buck 7 which forms the boundary of a construction present in a wall. The window pane frame combination 1 has two conventional double glazed insulation window panes 9. The insulation window pane 9 per se is constituted by the glass sheets 11 with the sleeve-shaped spacers 13 in between which are filled with a dehydrant agent (for example silica gel), while the air space in between the spacers 13 and the periphery of the glass sheets 11 is filled with kit 14. The air space between insulation window panes 9 and the frame 17 along the periphery is sealed with a further kit layer 15.

[0021] The two insulation window panes 9 are retained by a frame 17 in parallel with each other and spaced apart. This frame forms a framework within which the window panes 9 are located and is constituted by a steel profile forming a whole, part of which is located in between the window panes and forms an open chamber 19. This chamber functions as a spacer between the window panes and has an inner wall 21 adjacent to the air space and provided with openings, as well as two side walls 23 facing the window panes. The window panes 9 are attached to the side walls of the chamber by means of a bonding layer 25. The bonding layer is a glue compound having strong adhesive properties, so that the window pane is rigidly fixed to the frame and at the same time forms a hermetic sealing. The frame is constituted by four straight profile segments which are welded together with their ends into one aggregate unit.

[0022] The chamber 19 does not have a wall on the side opposite to the inner wall. On this side the air space

in the chamber is sealed by a further kit layer 27. The chamber contains a dehydrant agent (for example silica gel) for rendering the air space 29 between the window panes 9 free from moist and maintaining it in this condition. This air space 29 thus forms an extra insulation layer as a result of which the complete window has a high insulation value. If the frame is arranged as an extruded profile, the chamber may be closed by a wall though, opposite to the inner wall. There is no need to apply a further kit layer then.

[0023] The frame 17 has a further, open chamber 35 in which hinges and locks can be positioned.

[0024] Fig. 2 shows a second embodiment of the window pane frame combination according to the invention. All component parts that are similar to or have the same function as the corresponding component parts of the first embodiment shown in Fig. 1 are indicated by the same reference numerals. This window pane frame combination 37 is fixedly attached to the frame 3 and is secured by screws 38. The frame 17 has a simpler structure and here too part of it forms a chamber against which the window panes are bonded by means of a bonding layer 25 and which is filled with a dehydrant agent (silica gel). A spacer strip or kit strip 39 is present between the window pane frame combination 37 and the frame 3.

[0025] Fig. 3 shows a third embodiment of the window pane frame combination according to the invention. All component parts that are similar to or have the same function as the corresponding component parts of the first embodiment shown in Fig. 2 are indicated by the same reference numerals. This window pane frame combination 41 is fixedly secured to a rough buck in a wall, where no extra frame is located between the window pane frame combination 41 and the rough buck 7. The frame 17 comprises strips 43 which border on the rims 45 of the frame. These strips 43 do not rest against the window panes 9 and have openings through which screws 47 are projecting by which the frame 17 is secured to the rough buck 7. In lieu of securing the frame directly to the rough buck it may also be mounted pivotably to the rough buck by means of hinges fixed to one of the strips.

[0026] Fig. 4 shows a fourth embodiment of the window pane frame combination according to the invention. All component parts that are similar to or have the same function as the corresponding component parts of the third embodiment shown in Fig. 3 are indicated by the same reference numerals. This window pane frame combination 51 constitutes a fire-resistant construction and is fixedly secured to a rough buck in a wall, where no extra window frame is present in between the window pane frame combination and the rough buck 7. This window pane frame combination 51 has three window panes, of which a first window pane 53 comprises two glass sheets where one of the glass sheets 55 is layered with a foil in between the glass sheets (or a tempered type of glass as an alternative) and a spacer sleeve 13 filled with silica gel in between the glass sheets 55 and

57. A second window pane 59 is constituted by a likewise layered glass sheet with foil in between the glass sheets (or a tempered type of glass as an alternative), and the third window pane 61 is constituted by a thick fire-resistant glass plate. Between the three window panes there are air spaces 29 which form extra insulation layers. The window panes are spaced apart by two chambers 19 which are constituted by segments of the frame 17. The frame is assembled from four straight segments which are first installed around the window panes and then welded together by their ends into one closed whole. Before the frame segments are placed against the window panes, first a bonding layer 25 is applied to the frame segments and/or the window panes. Layers of kit 15 are then applied between the peripheral edges of the window panes 53, 59 and 61 and the frame 17. This fire-resistant construction of the window pane frame combination shown in Fig. 4 may also be applied to the situations shown in Figs. 1, 2 and 3.

[0027] Albeit the invention has been described in the foregoing based on the drawing figures, it should be observed that the invention is not by any manner or means restricted to the embodiment shown in the drawing figures. The invention also extends to all embodiments deviating from the embodiment shown in the drawing figures within the scope defined by the claims.

Claims

1. A window pane frame combination comprising at least two parallel window panes spaced from each other, as well as a frame present along the periphery of the window panes, which frame forms a whole in combination with the window panes, which window panes comprise each one or more glass sheets and an air space is situated in between the window panes, which frame is constituted by a profile part of which is situated in between the window panes and forms a chamber which comprises an inner wall bounding on the air space and having openings, as well as two sidewalls facing the window panes, which chamber is at least partly open on the side opposite to the inner wall and is closed by means of a vapour barrier, where a dehydrating agent is present in the chamber and where a vapour barrier is present between the peripheral side of the window panes and the frame, and where a bonding layer is present between the side walls of the chamber and the window panes by means of which bonding layer the window panes are sealed to the frame and are rigidly positioned relative to the frame, **characterized in that** the frame is comprised of a single segment.
2. A window pane frame combination as claimed in claim 1, **characterized in that** the frame is comprised of four steel profiles which are welded together into one whole.

3. A window pane frame combination as claimed in claim 1 or 2, **characterized in that** the profiles are fold formed from strips.
4. A window pane frame combination as claimed in claim 3, **characterized in that** the window panes are fire-resistant window panes.
5. A window pane frame combination as claimed in any one of the preceding claims, **characterized in that** the frame is provided with means by which the frame can be mounted directly to a window frame and is either or not turnable.
6. A window pane frame combination as claimed in claim 5, **characterized in that** the means are constituted by frame strips present on the ridges of the frame, which are not adjacent to the window panes and function as connecting elements by which the window pane frame combination can be fixed to a rough buck.
7. A window pane frame combination as claimed in claim 5, **characterized in that** the means are constituted by an open, further chamber in the frame in which chamber hinges and locks can be positioned.
8. A window pane frame combination as claimed in any one of the preceding claims, **characterized in that** the window pane frame combination comprises a third window pane and the frame comprises a further element that constitutes a further chamber.
9. A window comprising a fixed or movable window frame, **characterized in that** a window pane frame combination as claimed in any one of the previous claims is installed in the frame.
10. A door comprising a fixed or movable door frame, **characterized in that** a window pane frame combination according to the invention is installed in the door frame.
11. A method of manufacturing a window pane frame combination as claimed in any one of the previous claims 1 to 8, comprising the manufacture of a frame as well as bonding window panes to the frame during the manufacture of the frame or once the frame has been manufactured, **characterized in that** the frame is manufactured from four frame segments which are fixed together into a whole.
12. A method as claimed in claim 11, **characterized in that** the frame segments are welded together.
13. A method as claimed in claim 11 or 12, **characterized in that** the frame segments are fold formed from strips.
14. A method as claimed in claim 13, **characterized in that** the frame segments are fold formed from steel strips.

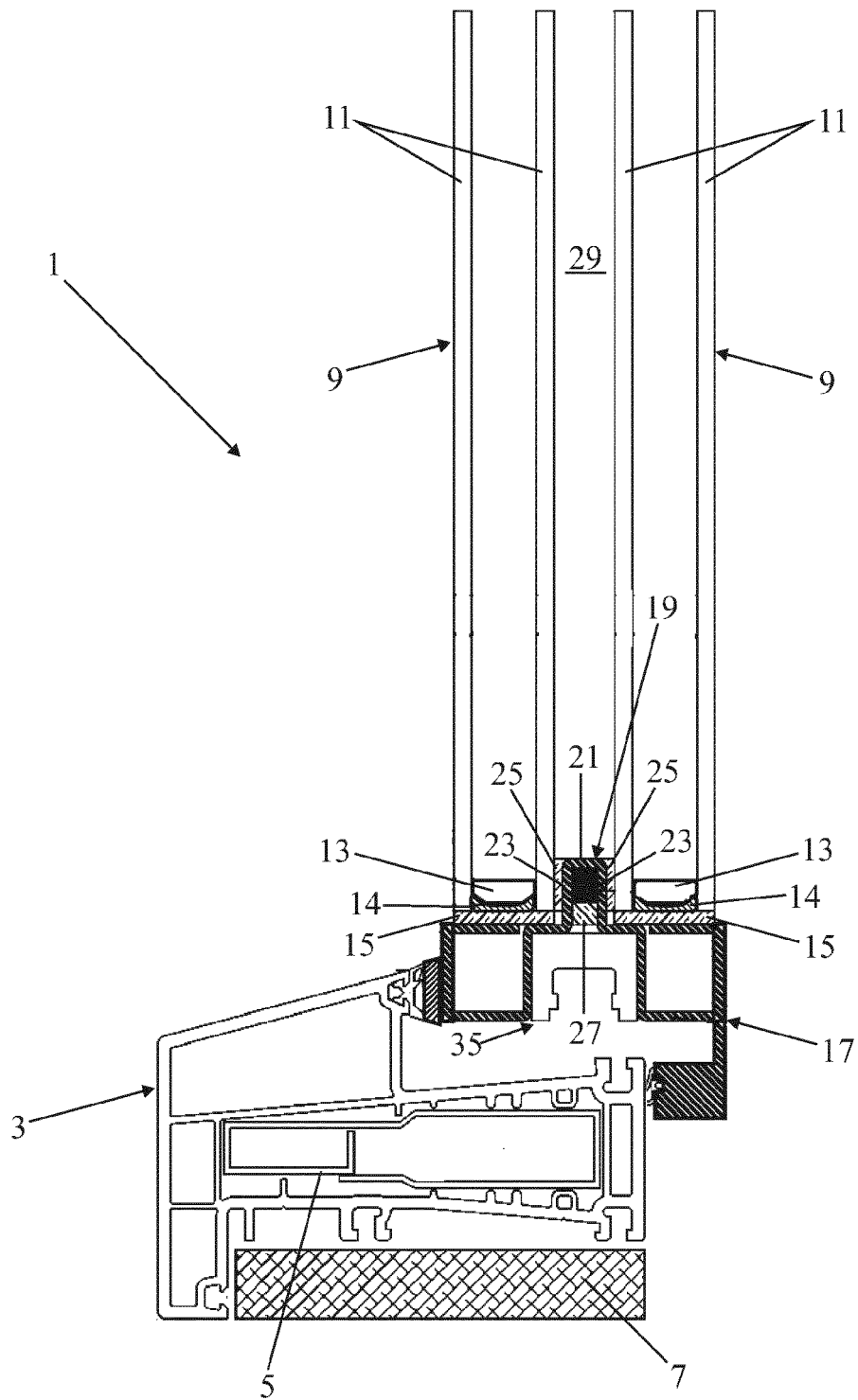


FIG. 1

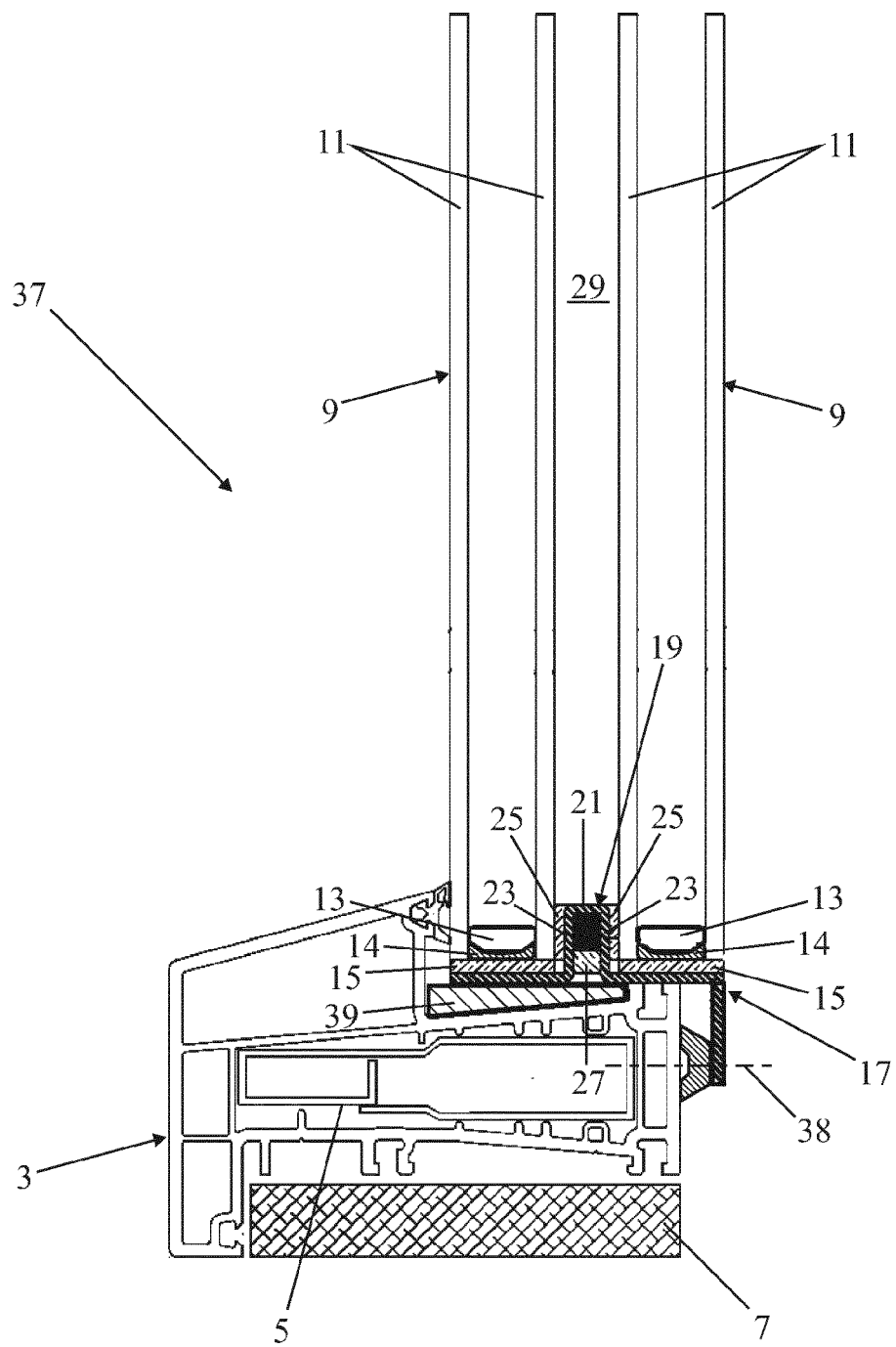


FIG. 2

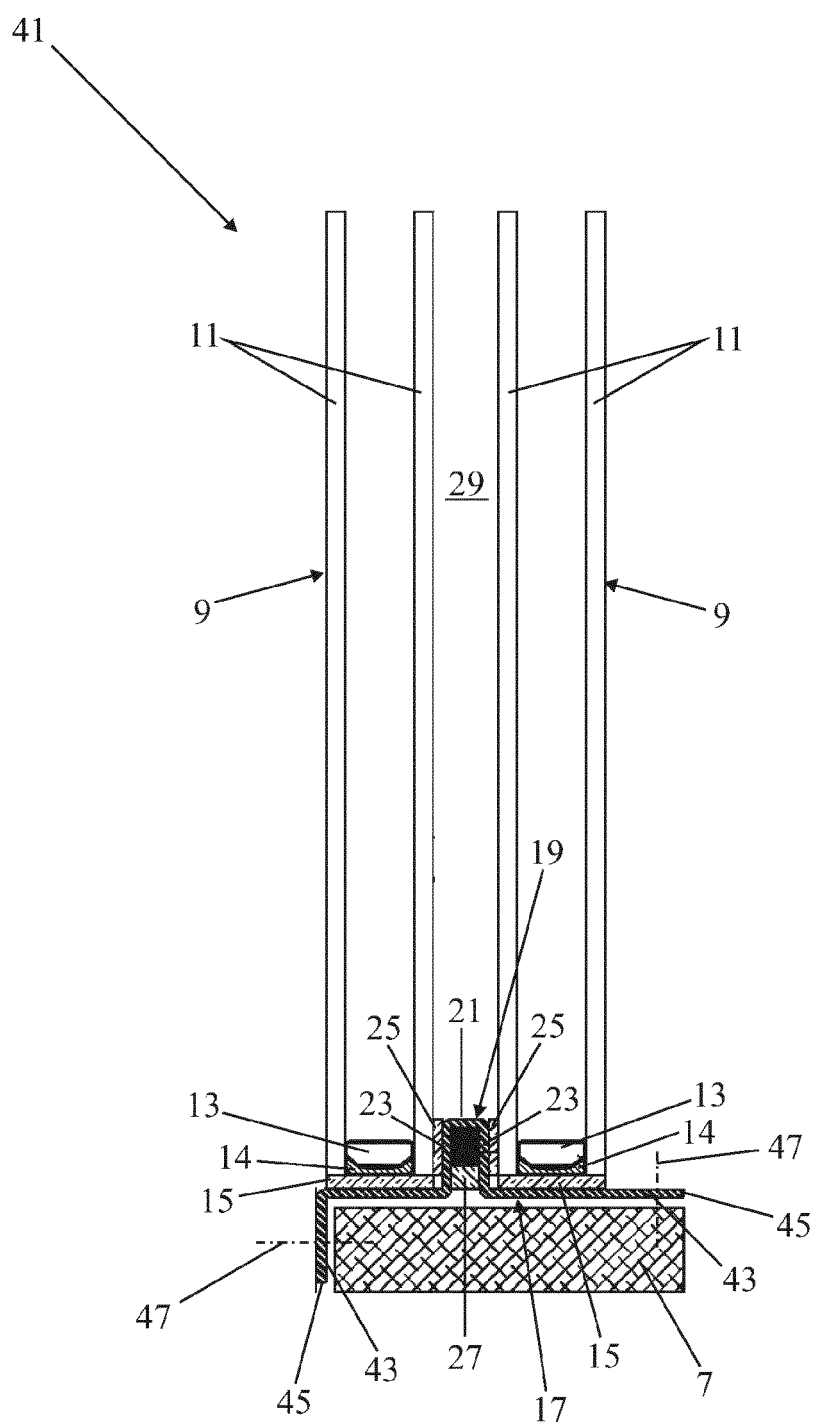


FIG. 3

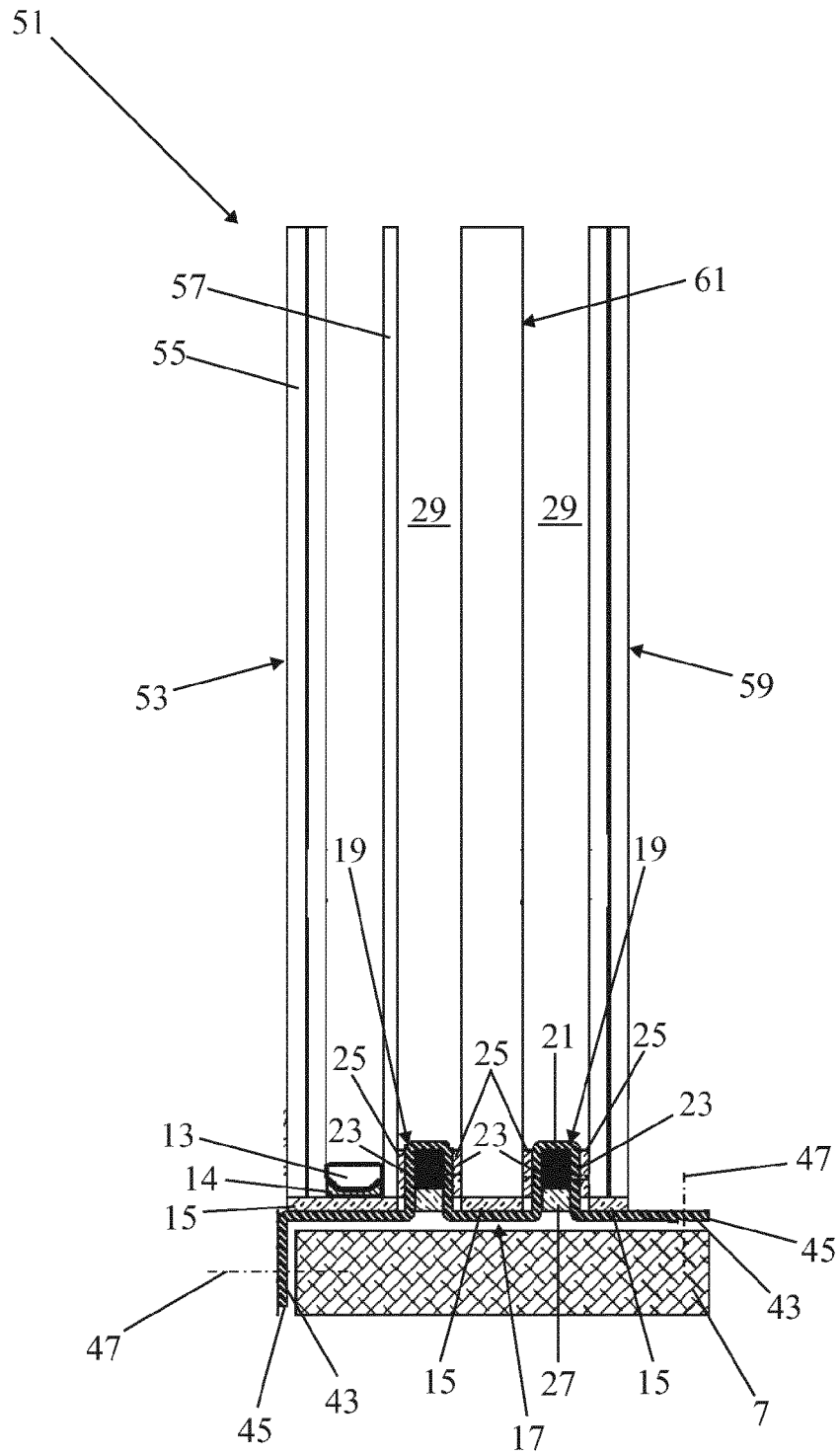


FIG. 4

REFERENCES CITED IN THE DESCRIPTION

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