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(54) **SYSTEM FOR DOORS AND WINDOWS AND CURTAIN WALLS**

(57) A system for all-glass doors and windows and/or curtain walls, especially suitable for being used in both indoor and outdoor environments in civil and/or industrial and/or commercial and/or religious contexts, for realizing load-bearing elements of frameworks and frames for doors, windows, fixed or movable glass panels or curtain walls, comprising a structure with sides formed by a profile or composition of profiles (12, 14, 32, 34, 57) with at least one of said sides made of glass or another transparent material, the profile or composition of profiles extending longitudinally and forming load-bearing structures

tures for the frames of doors and windows or curtain walls and assembled to define a monobloc with the glazing of the door or window or façade and suitable for containing actuation means for opening/closing doors or windows or glass partitions and/or for integrating and/or containing electric/electronic devices for comfort and security, interactivity with the user and aesthetic character such as video cameras, displays, sensors, probes, presence detecting devices suitable for activating security systems, lighting sources, photovoltaic devices, touch-screen devices, circuits or heating/cooling devices.

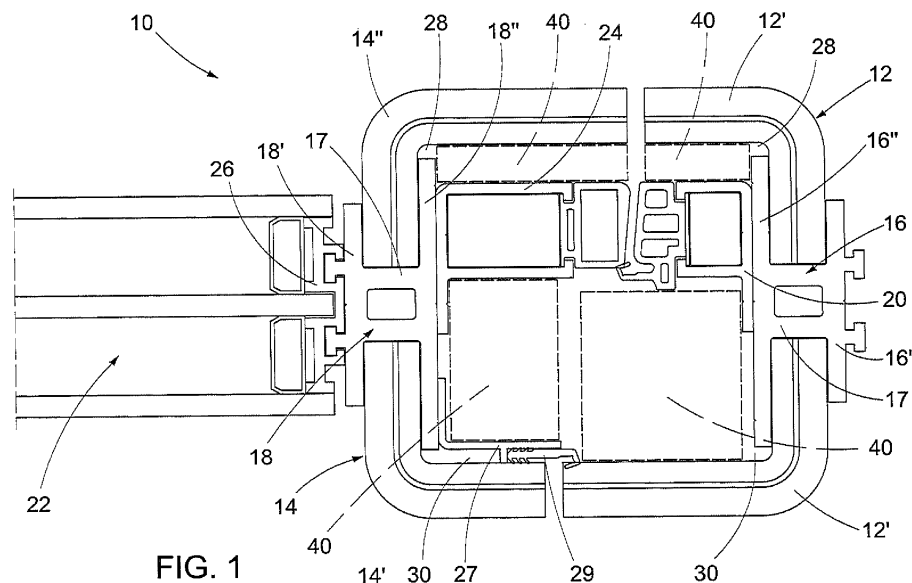


FIG. 1

Description

[0001] The present invention relates to a system for doors and windows frames and/or curtain walls.

[0002] More specifically, the present invention relates to a structure for doors and windows frames and/or curtain walls, especially suitable for being used for applications in both indoor and outdoor environments in civil and/or industrial and/or business and/or religious contexts for providing frameworks and frames for supporting doors, windows, fixed or movable glass panels, or also curtain walls.

[0003] As is known, in recent times the use of glass is increasingly spreading, especially in the architectural field, not only as a suitable material for making panes for doors or windows or façade cladding and typically associated with metal or wooden frames, but also for making structural elements; this is in order to increase the concept of transparency, optimizing room lighting as well as the aesthetic aspect and, at the same time, obtain less division between external and internal space.

[0004] Referring to the manufacture of frames for window or door structures, the current tendency is to make frames and structural parts in wood or in suitable metal materials, such as aluminium or its alloys, or in PVC, and to try to reduce the width of the frame to give more space to the glass panels so as to create an 'all-glass' effect and, at the same time, improve light admittance into rooms.

[0005] Document WO2009/141714 describes a structure or framework for building use (portico) that combines glass and wood; this structure comprises linear elements that can be used in both a horizontal and vertical position, including wooden beams on the side of which glass panes are positioned and glued to said wooden beams by means of structural adhesives. This document also describes a process for producing a combined wood-glass structure that comprises the steps of positioning wooden parts, gluing a first side glass and a second side glass and a drying step of not less than 48 hours suitable for allowing complete and optimal adherence of the glass pane to the wooden parts.

[0006] Document EP0816622 describes a window of the type with double glazing, triple glazing or similar, which comprises an inner metal frame (typically in steel) placed in front of an outer additional frame and connected to it in a permanent manner or by connection elements and sealing material; the frame also comprises suitable grooves or recesses for receiving fastenings, water drainage elements and similar.

[0007] Document DE102007005412 refers to glass structural element used for partitions or doors and comprising two glass sheets separated from each other by means of a spacer element, characterized in that at least one metal perimeter installation frame is arranged between the two sheets of glass for receiving and anchoring fastening elements of the interlocking element type, locks and similar.

[0008] The object of the present invention is to provide a structure for doors and windows and/or curtain walls in glass or a transparent material.

[0009] More specifically, the object of the present invention is to provide a structure for the frames of doors and windows and/or curtain walls made of glass or another suitable transparent material for internal and external application and such as to allow the insertion of electric/electronic devices such as cameras, lighting sources, motion sensors and similar devices designed to ensure personal comfort and security.

[0010] A further object of the invention is to provide a structure for the frames of doors, windows or similar, and/or building façades, of simple and easy assembly, flexible with regard to configuration and reconfiguration, suitable for constituting a monobloc with central glazing and also such as to ensure optimal technical specifications combined with excellent aesthetics.

[0011] A further object of the invention is to provide a suitable structure to enable the elimination of visible parts in metal or opaque materials.

[0012] A further object of the invention is to provide a transparent structure for 'all-glass' doors and windows or curtain walls, suitable for increasing the entry of light so as to optimize room lighting.

[0013] A further object of the present invention is to create a sustainable system thanks to the integration of solar/photovoltaic technologies to produce clean energy and the use of ecological, recyclable and reusable materials.

[0014] A further object of the present invention is to make a system for doors and windows and/or curtain walls available to users that is designed to ensure a high level of resistance and reliability over time, and also such that it can be easily and inexpensively manufactured.

[0015] These and other objects are achieved by the system of the invention having the characteristics set forth in claim 1.

[0016] According to the invention, a system for all-glass doors and windows frames and/or curtain walls is provided, especially suitable for being used in both indoor and outdoor environments in civil and/or industrial and/or commercial and/or religious contexts, for realizing load-bearing elements of frameworks and frames for doors, windows, fixed or movable glass panels or curtain walls, constituted by a structure in glass or where, for at least one of the two sides, the profiles or composition of profiles for the fixed and/or movable part are made of glass or another transparent material, defining an open conformation (shape). These profiles extend longitudinally and form load-bearing structures for the frames of doors and windows or curtain walls, said profiles being assembled to define a monobloc with the glazing of the door or window or façade, defining an inner volume, and suitable for containing opening/closing actuation means for doors or windows or glass wall panels and/or for integrating and/or containing electric/electronic devices for comfort and security, interactivity with the user and aesthetic character,

such as video cameras, displays, sensors, probes, presence detecting devices suitable for activating security systems, lighting sources, touch-screen devices, circuits, photovoltaic devices or heating/cooling devices.

[0017] Advantageous embodiments of the invention are revealed by the dependent claims.

[0018] The constructional and functional characteristics of the structure for doors and windows and/or curtain walls of the present invention may be better understood from the detailed description that follows and which refers to the accompanying drawings, which represent preferred and non-limitative embodiments and in which:

Figure 1 schematically shows a cross-sectional view along a horizontal plane of the system for doors and windows and/or curtain walls of the invention according to a first embodiment;

Figure 2 schematically shows a cross-sectional view along a horizontal plane of the system of the invention according to a second embodiment;

Figure 3 schematically shows a cross-sectional view along a horizontal plane of an application example of the system of the invention used for making the frame of a hinged door;

Figure 4 schematically shows a cross-sectional view along a horizontal plane of the hinged door in Figure 3 equipped with opening/closing mechanisms;

Figure 5 schematically shows a cross-sectional view along a horizontal plane of the system of the invention for making a window;

Figure 6 schematically shows a cross-sectional view along a horizontal plane of the system of the invention for making a sliding door or window; and

Figure 7 schematically shows a cross-sectional view along a horizontal plane of the system of the invention for making a curtain wall.

[0019] With reference to the figures mentioned and considering Figure 1 in particular, the system for doors and windows and/or curtain walls of the invention, indicated as a whole by reference numeral 10, is shown in accordance with a first embodiment of the 'thermal break' type, i.e. provided with suitable elements to interrupt the continuity of the frame's structure, as shown hereinafter, to ensure better sealing against heat dispersion and solve the thermal bridge problem.

[0020] This system basically comprises a composition of profiles 12 defining a fixed or stop frame suitable for being connected to a pre-walled counterframe (not shown in Figure) or directly fastened to the façade or wall and a composition of profiles 14 defining a movable frame that constitutes the opening part of the door or window and that comprises one or more sashes or leaves and is coupled to the fixed or stop frame depending on the specific opening technology.

[0021] Each of the two compositions of profiles 12 and 14 defining the fixed or stop frame and the movable frame has a discontinuous or broken configuration and com-

prises a pair of opposing profiles 12', 12" and 14', 14", respectively, made of a transparent material, typically but not exclusively glass (single material in monolithic form, in non-monolithic form or multiple materials), extending longitudinally, with a basically L-shaped cross-section and joined together to define a substantially a U-shaped profile.

[0022] The mentioned profiles 12', 12" and 14', 14" of the fixed frame and the movable frame can have a same or different edge length in section, in this way defining an open, U-shaped configuration, the parallel arms of which have the same or different lengths.

[0023] With specific reference to the section along a horizontal plane in Figure 1, profiles 12' and 12" of the composition of profiles 12 defining the fixed frame and profiles 14' and 14" of the composition of profiles 14 defining the movable frame, joined as described above, define the load-bearing elements or jambs-stiles (uprights) of the frame for a door or window or similar; the head-rails of these fixed and movable frames (not indicated in the figure) have the same constructional characteristics of the jambs-stiles and are therefore not described any further.

[0024] Profiles 12' and 12" of the fixed frame are joined together, to define a U-shape, by means of a 'thermal break' junction component 16 made of a material of low thermal conductivity, also transparent and suitable for interrupting the continuity of the profile of said fixed frame.

[0025] Likewise, profiles 14' and 14" of the movable frame are joined together, to define a U-shape, by means of a 'thermal break' junction component 18 (entirely similar to junction component 16) made of a material of low thermal conductivity, also transparent and suitable for interrupting the continuity of the profile of said movable frame.

[0026] Junction component 16 and junction component 18 extend for the entire longitudinal extension of said profiles.

[0027] Said junction component 16 and junction component 18 are H-shaped with an outer portion 16' and 18', respectively, facing outwards from and perpendicular to the transparent profiles of the fixed/movable frame and an inner portion 16" and 18" inwardly facing said profiles, said portions being parallel to each other and joined by an intermediate portion 17 to define two opposite compartments for housing end portions of profiles 12' and 12" of the composition of profiles 12 defining the fixed frame and profiles 14' and 14" of the composition of profiles 14 defining the movable frame; said profiles are fastened to the junction components mechanically or with adhesives or in another known manner.

[0028] The internal volume of each composition of profiles 12 or 14 forming, respectively, the fixed frame and the movable frame, is suitable for housing optional electric/electronic devices 40 such as, for example, cameras or video cameras, presence detecting devices suitable for activating security systems, lighting sources (especially of the LED type), photovoltaic and similarly known

devices or, in addition, touch-screen devices and heating/cooling devices.

[0029] In alternative embodiments, some electronic devices can be integrated into the profiles.

[0030] With reference to junction component 16 of the fixed frame, the outer portion 16' is designed for fastening to a counterframe, while the inner portion 16" is designed for the fastening and stabilization of internal containment elements 20 suitable for housing insulation and mechanisms defined and described hereinafter.

[0031] Similarly, the outer portion 18' of the junction component 18 is designed to fasten a central glazed panel 22, defined by a glass panel for example, by means of mechanical retaining elements 26, while the inner portion 18" is designed to fasten and stabilize internal containment elements 24 having the same function as the above-described internal containment elements 20.

[0032] Internal containment elements 20 and internal containment elements 24 subdivide the internal volume, defined by each composition of profiles defining the two fixed and movable frames, into a first partition 28 and a second partition 30 (positioned at the side of said internal containment elements) into which the possible electric/electronic devices 40 described above can be inserted.

[0033] The inner portion 18" of the junction component 18 of the movable frame supports, at the second partition 30, an optional angle bracket 27 for supporting a seal or stop element 29 between the movable frame and the fixed frame.

[0034] With reference to Figure 2, the system for doors and windows of the invention, indicated as a whole by reference numeral 10', is schematized according to an alternative embodiment to the preferred one described in detail in the foregoing and in which 'thermal break' components are not used.

[0035] In particular, the system 10' comprises a profile 32 defining a fixed frame suitable for being joined to a pre-walled counterframe (not shown in the figure) or directly fastened to the façade or to a wall, and a profile 34 defining a movable frame constituting the openable part of the door/window, which comprises one or more sashes or leaves, made of a transparent material, typically but not exclusively glass (single material in monolithic form, in non-monolithic form or multiple materials), continuous and extending longitudinally with a U-shaped section and coupled/placed alongside each other to define a substantially quadrangular section to form the jambs-stiles (up-rights) or heads-rails (transverse beams) of the door/window; the parallel arms of each of said profiles 32 and 34 can be equal or different depending on the characteristics of the jamb-stile or head-rail that it is intended to make.

[0036] As described with reference to the 'thermal break' embodiment 10, inside the profile 32 of the fixed frame and the profile 34 of the movable frame, an internal containment element 20 and an internal containment element 24 are respectively present for housing insulation and mechanisms, for example, for operating/moving a

sash or leaf and for subdividing the internal volume, defined by the two fixed and movable frames, into a first partition 28 and a second partition 30 in which the above-considered electric/electronic devices 40 can be inserted.

[0037] As described above, some electric/electronic devices can also be integrated into the profiles.

[0038] The profile 34 of the movable frame, on the opposite side with respect to that facing in the direction of profile 32, supports a mechanical retaining element 26' for a panel 36 of glass (central glazed panel) or another suitable material.

[0039] Inside the profile 34 of the movable frame, at the second partition 30, a possible angle bracket 27 is fastened for supporting a seal or stop element 29 placed between the movable frame and the fixed frame.

[0040] Figure 4 shows, along a horizontal section plane, the structure of the invention according to the 'thermal break' embodiment used for making a hinged door.

[0041] This hinged door structure comprises two opposite and parallel jambs-stiles 10 formed by profiles in glass or another transparent material, as described with reference to the Figures 1 and 2, where one of the jambs-stiles comprises an opening/closing mechanism 50 housed in the internal containment element 20 of the fixed frame 12 and in the internal containment element 24 of the movable frame 14 and operated by a handle 52 or knob and the other jamb-stile is, instead, equipped with a hinge mechanism 56 that enables the rotation of the movable frame with respect to the fixed one for the opening/closing movement of a sash or leaf, including the central glazed panel 22, as indicated by the arrow X.

[0042] Figure 5 shows, always along a horizontal section plane, the structure of the invention used for making a window.

[0043] As in the typical construction technique for window frames, the fixed frame and the movable frame lie on different planes set at a distance dependent on the specific constructional characteristics of the window and with the lateral end portions of profiles 12" of the fixed frame and 14' of the movable frame equipped with seals or equivalently similar sealing and insulation means 58.

[0044] By way of example, Figure 6 shows, along a horizontal section plane, the structure of the invention used in a lift and slide window configuration, particularly suitable for making large glazed surfaces.

[0045] The lift and slide system comprises two sashes 22 and 22' parallel to each other and fastened to the respective movable frames, sliding one with respect to the other to approach/make contact with or move away from the corresponding fixed frames.

[0046] Figure 7 shows the utilization of the system of the invention for making an external curtain wall or an internal wall made completely of glass or another transparent material.

[0047] With reference to Figure 7, the curtain wall is defined by sheets or panels 21, in glass (laminated double-glazing or similar) or an equivalently known transpar-

ent material, separated by an interposed pillar 61, also in glass or another transparent material, arranged in a direction perpendicular to the plane on which said sheets or panels 21 lie; the coupling between said panels with the interposed pillar is implemented via the system of the invention according to that specified below.

[0048] The coupling between the glass panels 21 and the pillar 61 is implemented via one or more coupling elements 64 fitted on the pillar 61 at one of its end portions protruding externally with respect the panels 21 and equipped with retaining and clamping elements 66 designed to engage with the side edges of said sheets or panels; in particular, Figure 7 shows the retaining and clamping elements 66 being defined by eccentrics that hook onto the side edges of the sheets and implement clamping by means of a screw 67.

[0049] The one or more coupling elements 64 are preferably arranged equidistant from each other.

[0050] The structure of the invention is fitted the so-defined assembly, said structure being defined by a composition of profiles 57 that comprises a pair of opposing profiles 59 and 59' entirely similar to the previously described profiles 12', 14' or 12", 14" and coupled together at two opposite ends to define a C-shape, by means of a junction component 60 similar to junction component 16 or 18 described with reference to the structure for doors and windows in the 'thermal break' configuration, with said profiles 59 and 59' fastened to the sheets or panels 21 and the pillar 61 as specified below.

[0051] In particular, the ends of the profiles 59 and 59', opposite to those engaged by the junction component 60, are in contact with the sheets or panels 21 through the interposition of butyl sheaths/seals and/or adhesives, while a lower front of a lower portion 60" of the junction component 60 is fastened, mechanically and/or by gluing, to an upper front of the coupling element 64.

[0052] The upper portions 60' of the junction component 60, protruding externally with respect to the two profiles 59 and 59' is covered by a covering element 70, so as to hide it from view and render the whole more aesthetically pleasing and uniform.

[0053] This covering element 70 define a shield, made of a transparent, opaline or translucent material and having the function of enabling the diffusion of light emitted, for example, from a lighting source housed in the upper portion 60' of the junction component 60; in fact, the shape of the upper portion 60' allows the possible insertion of a thin plate designed to aid heat dissipation for a LED strip that can be connected to it or directly to the upper portion 60'.

[0054] In alternative embodiments, the above-described composition of profiles 57 can be replaced by a single, continuous-section profile, similar to the other configurations.

[0055] The space comprised between one coupling element 64 and the next is used for the insertion and housing of electric/electronic devices for comfort and security, such as cameras or video cameras, presence detecting

devices suitable for activating security systems, lighting sources, photovoltaic devices or heating/cooling devices, as previously described with specific reference to Figures 1 to 6.

[0056] Some electric/electronic devices can also be integrated into profiles 59 and 59'.

[0057] Furthermore, depending on the specific constructional and stylistic requirements, the edge length in section of profiles 59 and 59' (or of the single profile in the case of a continuous structure) can be different to enable making curtain walls in which the glass panels are arranged on different planes that are parallel to each other.

[0058] As can be seen from that described and illustrated in detail in the foregoing, the advantages that can be obtained with the system of the invention are evident.

[0059] The system for doors and windows and/or curtain walls of the invention has the noteworthy advantage of associating aesthetical and practical-manufacturing aspects; in fact, the glass profiles can be the same or different with regard to cross-sectional perimeter dimensions (such as profiles 12 and 12" for example), so as to give rise to different geometric and/or dimensional configurations of jambs-stiles/heads-rails (uprights/transverse beams) in a simple and straightforward manner, thus giving rise to a very flexible structure with regards to configuration and, furthermore, enabling an 'all-glass' solution in which the glass/glazing constitutes a monobloc with the structure of the door/window.

[0060] A further advantage is the fact that the system of the invention enables reducing the number of warehouse stocked components, with consequent saving of the associated costs.

[0061] A further advantage is the fact that by being made of glass or another suitable transparent material, the system for doors and windows or for curtain walls of the invention allows receiving light through the entire surface of the door/window or curtain wall and not only the sheet defining the glazed area.

[0062] A further advantage is represented by the fact that the transparency of the system for doors and windows and/or curtain walls enables the insertion of security systems of the type using presence detection sensors, cameras/video cameras or, similarly, enables the insertion of lighting sources (for example, LED (Light Emitting Diode), both neutral and coloured) suitable for creating not only aesthetic effects but also light sources inside a room (a safety function in the case of a power blackout for example), with said electric/electronic devices that can also be integrated into the profiles.

[0063] A further advantage is the fact that the system of the invention enables housing or integrating photovoltaic devices that, with a view to an environmental sustainability, can be used to produce clean energy, used for powering devices incorporated in the structure of the invention.

[0064] Always from the viewpoint of sustainability, a further advantage is represented by the fact that the sys-

tem of the invention is made of ecological, recyclable and/or reusable materials.

[0065] Although the invention has been described in the foregoing with particular reference to one embodiment given by non-limitative way of example, in the light of the foregoing description, numerous modifications and variants will appear evident to a person skilled in the field. The present invention is thus understood to encompass all modifications and variants that fall within the scope of the claims that follow.

Claims

1. A system for all-glass doors and windows and/or curtain walls, especially suitable for being used in both indoor and outdoor environments in civil and/or industrial and/or commercial and/or religious contexts, for realizing load-bearing elements of frameworks and frames for doors, windows, fixed or movable glass panels or curtain walls, **characterized in that** it comprises a transparent structure with sides formed by a profile or composition of profiles (12, 14, 32, 34, 57) defining an open conformation, with at least one of the sides made of glass or another transparent material, the profile or composition of profiles extending longitudinally and forming load-bearing structures, of the upright and transverse beam type, for the frames of doors and windows or curtain walls and assembled to define a monobloc with the glazing of the door or window or façade and defining an inner volume, and suitable for containing actuation means for opening/closing doors or windows or glass partitions and/or for integrating and/or containing electric/electronic devices for comfort and security, interactivity with the user and aesthetic character, such as video cameras, displays, sensors, probes, presence detecting devices suitable for activating security systems, lighting sources, photovoltaic devices, touch-screen devices, circuits or heating/cooling devices.
2. The system according to claim 1, **characterized in that** the profile (12, 14, 32, 34, 57) has a continuous U-shaped section, said profile being constituted by a material in monolithic or non-monolithic form or by multiple materials.
3. The system according to claim 1, **characterized in that** the composition of profiles (12, 14, 32, 34, 57) has a discontinuous or broken section defined by two opposing profiles (12', 12", 14', 14", 59', 59") with an L-shaped section, joined at two end portions by means of an H-shaped junction component (16, 18), made of a low thermal conductivity material and comprising an outer portion (16', 18') and an inner portion (16", 18") parallel to each other, joined by an intermediate portion (17) to define two opposite compart-

ments suitable for the insertion of the end portions of two profiles (12', 12", 14', 14", 59', 59"), said profiles being constituted by a material in monolithic or non-monolithic form or by multiple materials.

4. The system according to claims 2 and 3, **characterized in that** the profiles (12', 12", 14', 14", 59', 59") have the same edge length in section.
5. The system according to claims 2 and 3, **characterized in that** the profiles (12', 12", 14', 14", 59', 59") have different edge lengths in section.
6. The system according to one or more of the preceding claims, **characterized in that** internal containment elements (20, 24) suitable for housing insulation or mechanical opening/closing actuation means are fixed internally to the at least one profile or composition of profiles (12, 14, 32, 34).
7. The system according to claim 6, **characterized in that** the internal containment elements (20, 24) are fixed to the inner portion (16", 18") of the junction components (16, 18).
8. The system according to claim 6 or 7, **characterized in that** said internal containment elements subdivide the internal volume into a first partition (28) and a second partition (30) arranged externally to said internal containment elements (20, 24) and suitable for housing electric/electronic devices.
9. The system according to one or more of the preceding claims, **characterized in that** the electrical/electronic devices are integrated in the profile or composition of profiles (12, 14, 32, 34, 57).
10. Use of the system according to any one of claims 1 to 9 for the realization of doors and windows made of glass or another transparent material, comprising a fixed or stop frame defined by a profile or composition of profiles (12, 32) in glass or another transparent material designed to be fastened to a pre-walled counterframe or directly fastened to the façade or wall and a movable frame defined by a profile or combination of profiles (14, 34) in glass or another transparent material that constitutes the opening part of the door/window comprising a glass sash (22, 36).
11. Use of the structure according to any one of claims 1 to 9 for the realization of a load-bearing element for a curtain wall made of glass or another transparent material comprising slabs or panels (21) in glass or another transparent material joined by means of a coupling element (64) fixed to said slabs by means of clamping and retaining elements and fitted on a pillar (61) in glass or another transparent material

perpendicularly interposed between said panels (21), the load-bearing element being defined by a profile or composition of profiles (57) in glass or another transparent material fitted on said coupling element (64) and with its ends in contact with a surface of the panels (21) through interposed seals.

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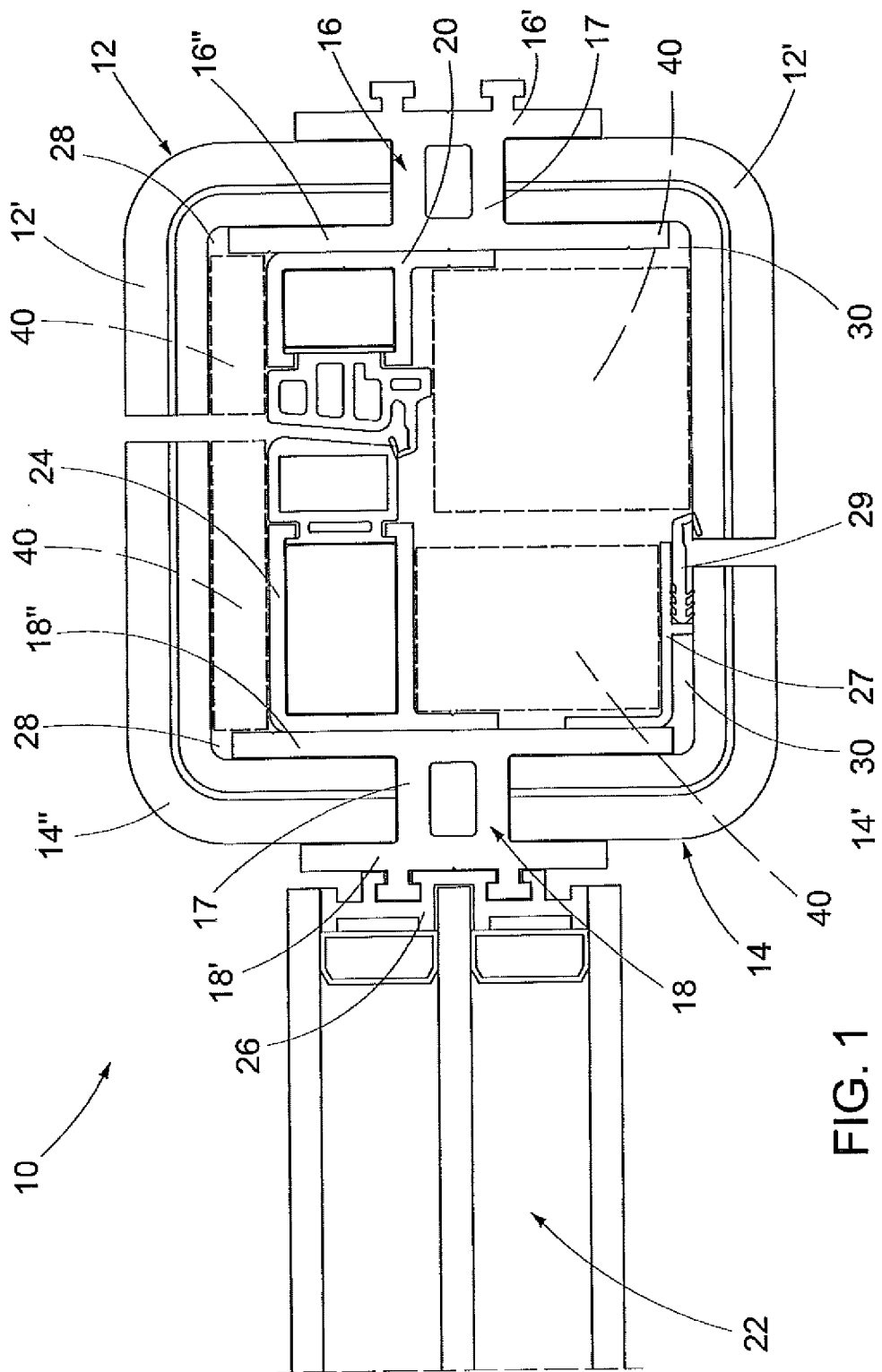
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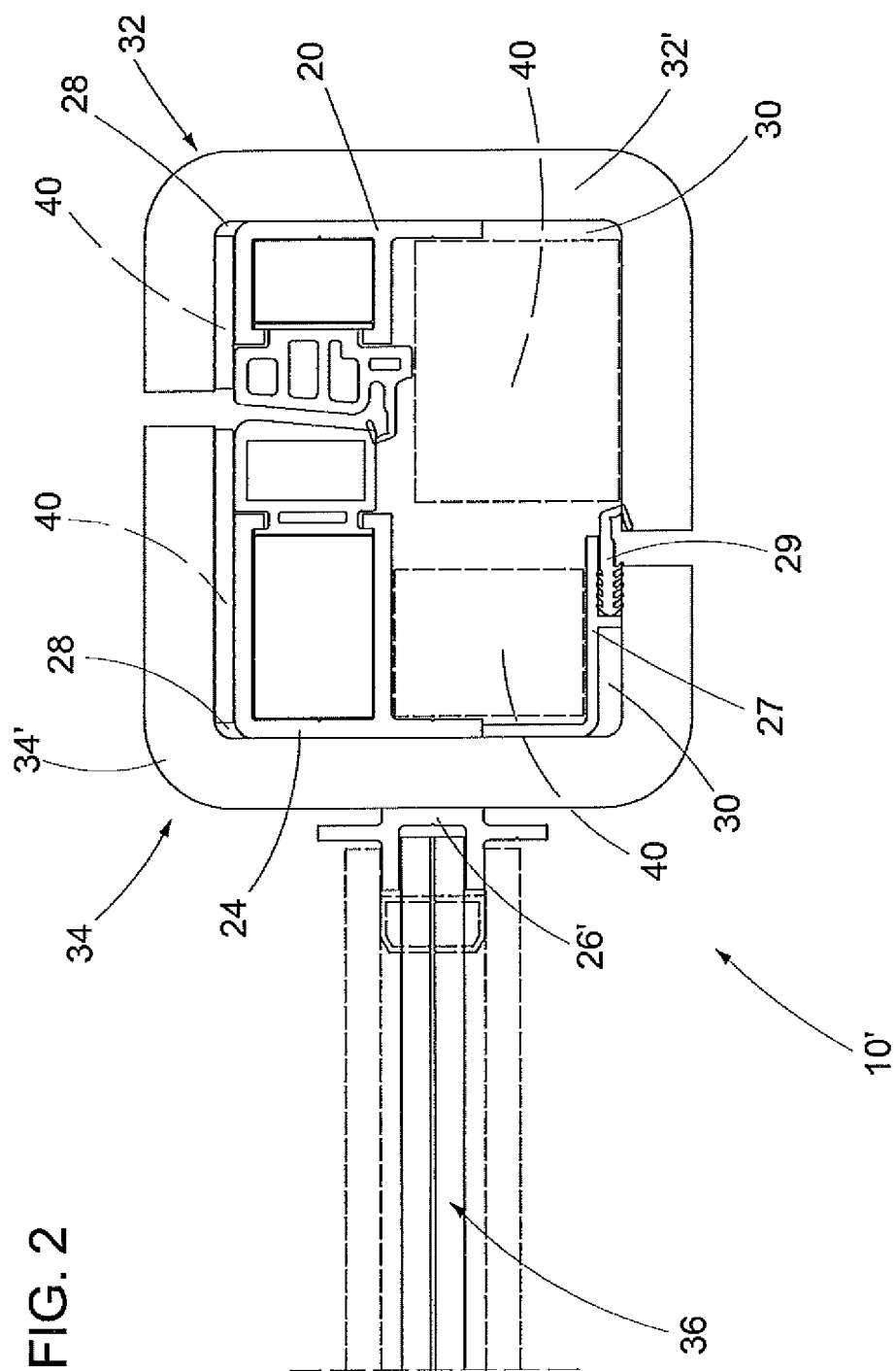


FIG. 2

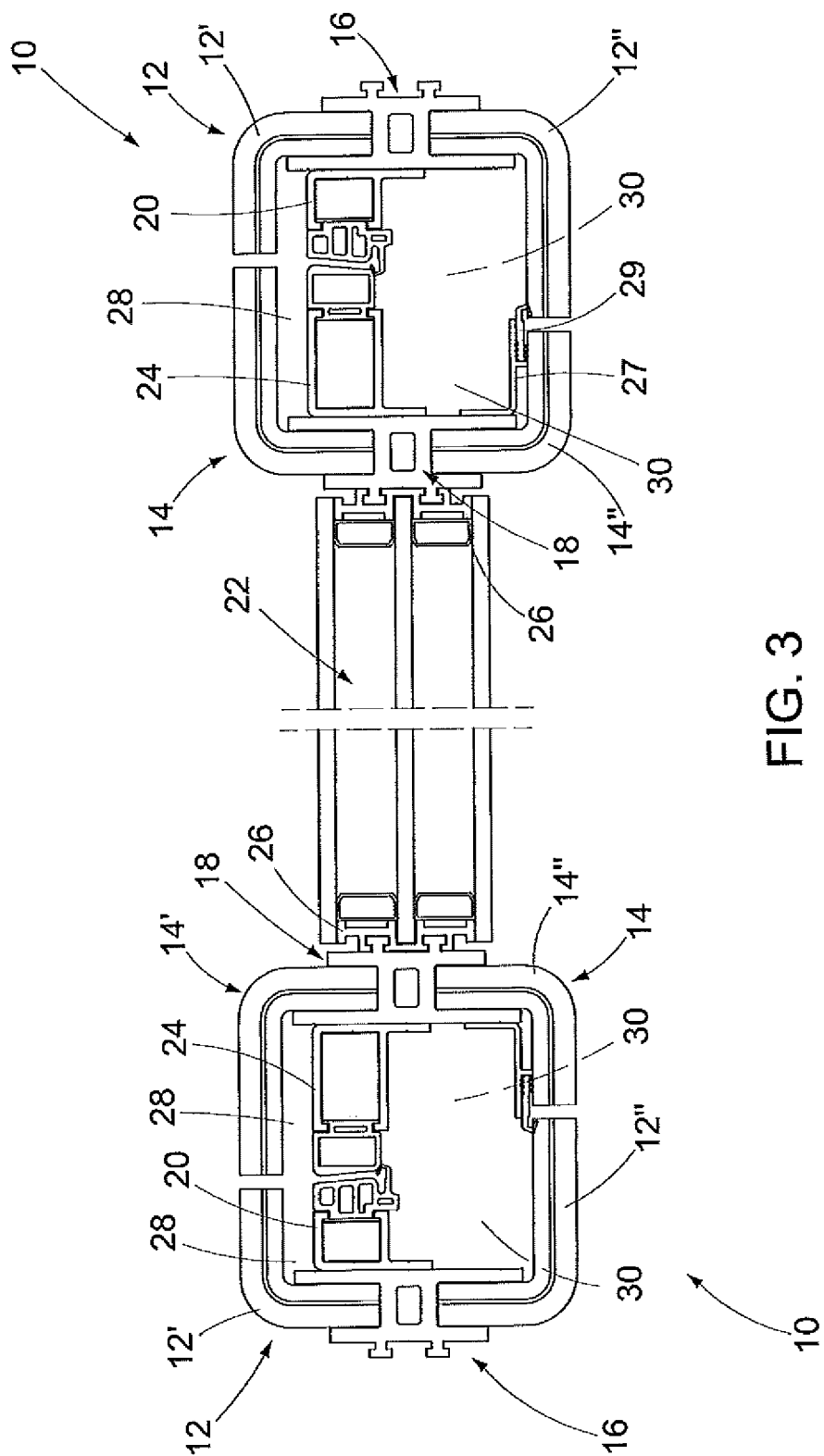


FIG. 3

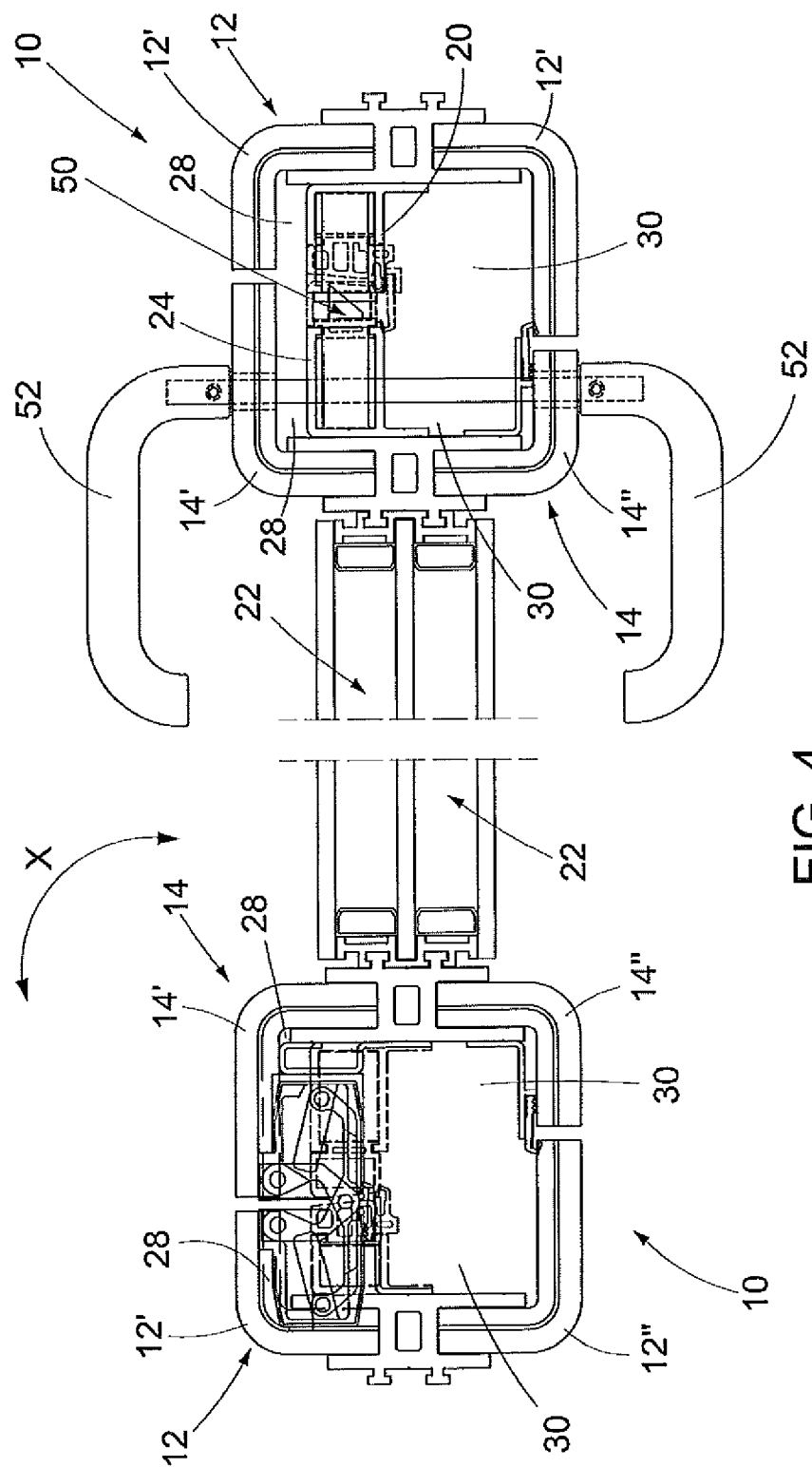


FIG. 4

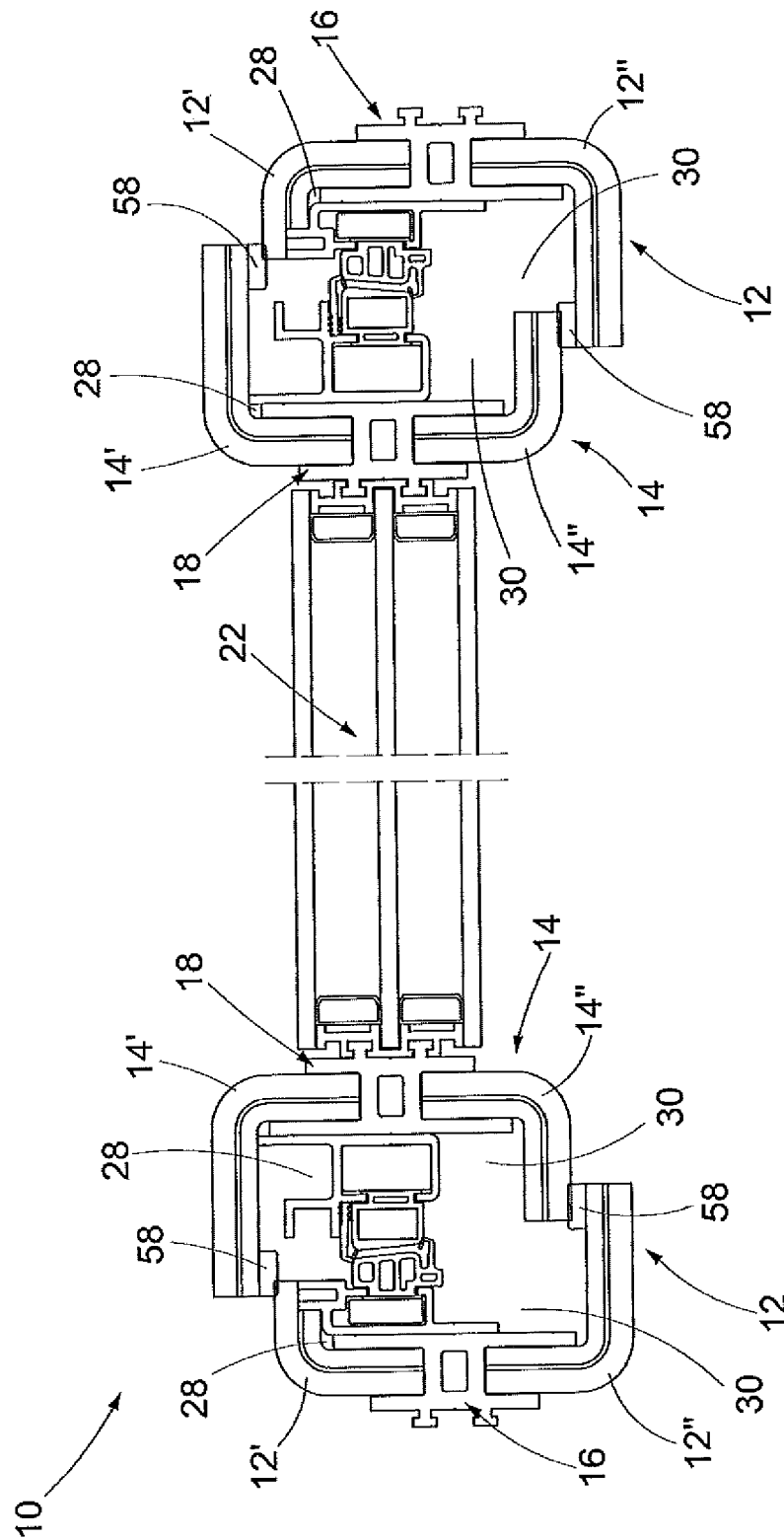


FIG. 5

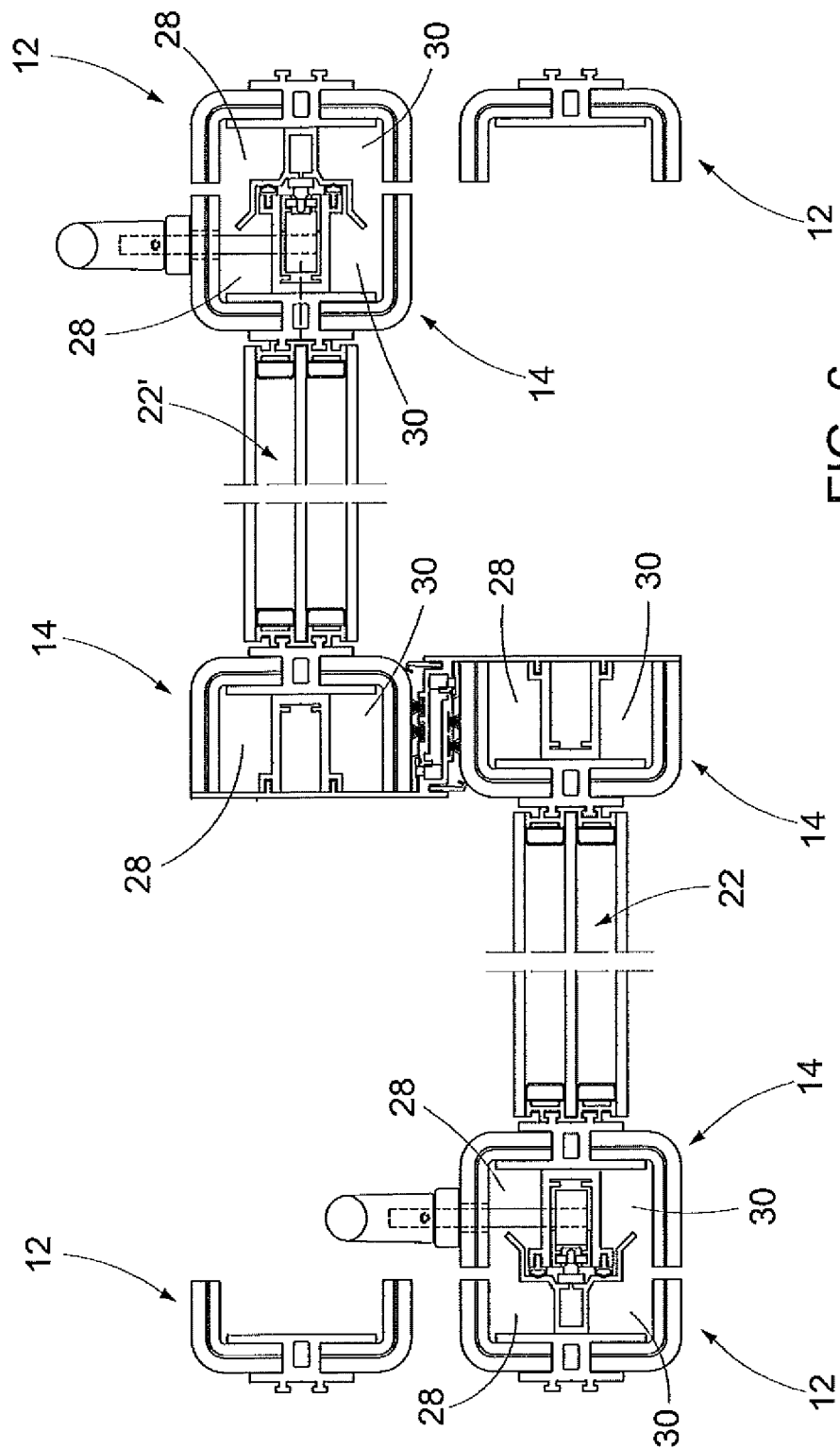


FIG. 6

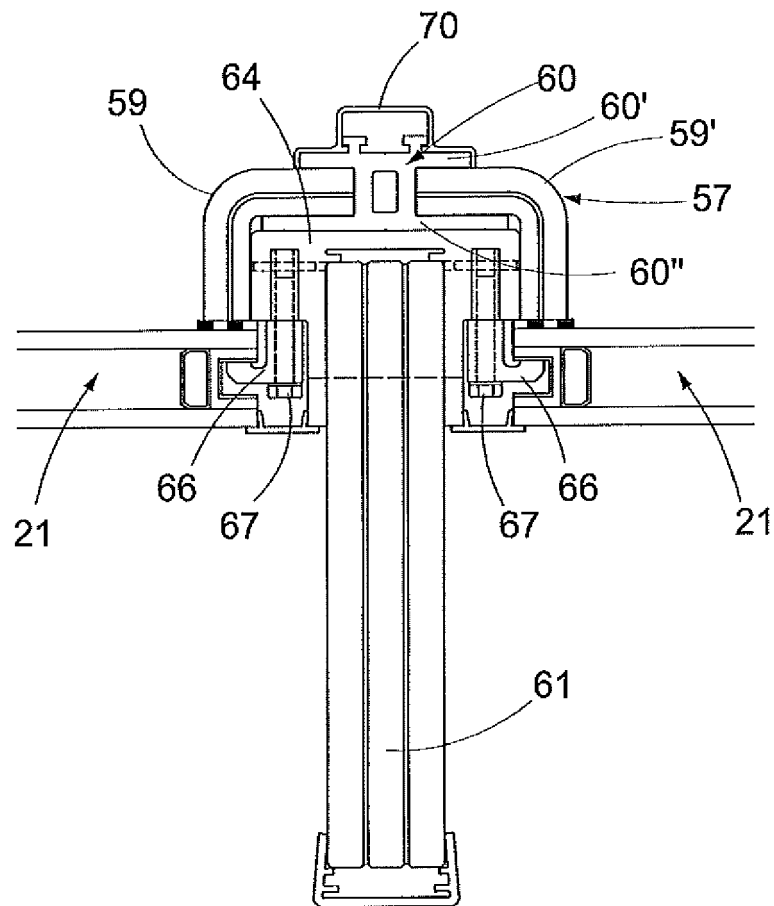


FIG. 7



EUROPEAN SEARCH REPORT

Application Number
EP 15 17 7894

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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 2009/141714 A2 (UNIV DO MINHO [PT]; DOMINGOS DA SILVA TEIXEIRA S A [PT]; BOTAS PEQUENO) 26 November 2009 (2009-11-26) * paragraphs [0042] - [0078] * -----	1-11	INV. E04B1/30 E06B3/30 E06B3/02 E06B3/08
X	EP 0 816 622 A2 (SCHWARZER ERICH [DE]) 7 January 1998 (1998-01-07) * column 3, line 40 - column 4, line 34; claims; figure 3 * -----	1-11	
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			TECHNICAL FIELDS SEARCHED (IPC)
			E04B E06B
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 4 January 2016	Examiner Hellberg, Jan
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 15 17 7894

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REFERENCES CITED IN THE DESCRIPTION

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