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(54) Curtain wall element

(57) A structural element 20 for a curtain wall system, in particular a unitized curtain wall system, comprises two half-elements 30,31 (for example of extruded aluminium) that are interconnected by a plurality of seals to prevent water ingress. The half-elements 30,31 are joined together along an axis normal to the plane of the glass panels 21 forming the wall in such a way that the seals interconnecting the half-elements 30,31 are disposed on opposing sides of the axis. A plurality of transverse wall members 30d,31d are also provided to divide the structural element 20 into at least three chambers in a direction along the axis.

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Description

[0001] This invention relates to a curtain wall element, and in particular to a structural element for a unitized curtain wall system having improved protection against water ingress.

[0002] Curtain walls are common in many major construction projects. A curtain wall is an exterior wall of a building formed mainly of glass panels within a framework of vertical and horizontal structural elements that support the glass panels and hold them in place. Conventionally the structural elements have an elongate box-like construction and are normally formed of a material that is both strong and light such as extruded aluminium. In a unitized curtain wall system the curtain wall is formed by units that are pre-fabricated in a factory prior to installation.

[0003] For ease of production the structural elements are normally formed from two elongate half-profiles that are joined together to form the elongate box-like structure. However, since the structural elements are located at the junctions between glass panels, and since by symmetry the two halves of the box-like construction are substantially identical and thus the join between the two halves is along a central axis, the join between the two halves of the box-like structural elements is located in the same plane as the junction between the glass panels and is thus exposed to the outside of the building and to the effects of weather.

[0004] This design therefore immediately causes problem in severe weather, especially rain, in that there is the potential for rainwater to pass through the curtain wall by means of the exposed junction between the two halves of the box-like structural element. This is particularly true in regions of the world where extreme weather conditions such as typhoons and tropical storms are commonplace. In such weather conditions heavy rain may be accompanied by driving winds which can severely aggravate the problem. Providing a means for preventing water ingress through the structural element is therefore essential.

[0005] Fig. 1 shows in section one exemplary prior design. Fig. 1 shows a section through a structural element that is located between two glass panels 1. Each glass panel 1 comprises a sealed double-glazed element having inner and outer glass panels 1a,1b separated by setting blocks 2. In this prior design the structural element comprises two parts, a first part 3 located between the glass panels and a second larger part 4 connected to the first part 3 by a plurality of fixing members 5. Both the first and second parts 3,4 are formed from two half-profiles 3a,3b and 4a,4b which are identical and symmetrically disposed about an axis X-X extending normal to the glass panels, ie the plane of the wall. The first part 3 is open at a mouth 5 and therefore rain can enter the first part 3. To prevent ingress of water further into the structural element a seal 5 is provided at the junction of the two parts 3,4 of the structural element. Furthermore the two halves 4a,4b of the second part are interconnected by sealing members 6,7 arranged along the axis X-X.

[0006] Fig.2 shows in section another known design. In this design the structural element 10 comprises two half-elements 10a,10b that come together to form a single structural element divided into two chambers 11,12 along the axis X-X. The chambers are divided by a wall 13 a part 13a of which is formed extending from half 10a, and the other part 13b of which extends from half 10b. Wall part 13a is formed with an extension 13c that overlies the distal end of wall part 13b and between parts 13b and 13c is formed a tongue and groove seal 14. Wall part 13b is also formed with an extending L-shaped portion 13d that shields the approach to this seal. A similar seal 15 is formed between the two half-elements 10a,10b at the end of the second chamber 12.

[0007] In the design of Fig.2, although the structural element is still open between the two glass panels, the combination of dividing the element into two chambers, providing two seals, and designing the first seal to be partly shielded such that water must take a convoluted path before reaching the seal, all serve to improve the performance of the structural element in terms of preventing water ingress. However the design is relatively complex and difficult to assemble, and small deviations from tolerances of the components can cause the seals to be not properly effective. Furthermore the design still fails to meet the highest standards required for extreme weather conditions such as typhoons and tropical rainstorms.

[0008] According to the present invention there is provided a structural element for a curtain wall, said element comprising two half-elements that are joined together along an axis extending normal to the plane of the wall, said half elements being interconnected by a plurality of seals, said seals being located on alternating sides of said axis, wherein the element is divided by interconnecting wall members into at least three chambers along the said axis.

[0009] Providing the seals on alternating sides of the axis means that there is no direct route for wind-driven water to pass through the seals, this contrasts with the prior design of Fig.1 where the seals we located in a line directly on the axis, and even Fig.2 where the seals are located along one line only just offset from the axis.

[0010] Preferably the seals are provided at the ends of the interconnecting wall members. The seals may take any desired form, but in one simple embodiment they may comprise a tongue formed on the respective half-element and which may engage a corresponding groove formed at the end of an interconnecting wall element.

[0011] According to another aspect of the present invention there is provided a structural element for a curtain wall, said element comprising two half-elements

that are joined together along an axis extending normal to the plane of the wall, said half-elements being interconnected by a plurality of transverse wall member that divide the interior of said element into at least three chambers along the said axis.

[0012] An embodiment of the invention will now be described by way of example and with reference to the accompanying drawings, in which:-

Fig.1 is a section through a structural element for a curtain wall according to one example of the prior art,

Fig.2 is a section through a structural element for a curtain wall according to another example of the prior art,

Fig.3 is a section through a structural element for a curtain wall according to an embodiment of the present invention, and

Figs.4 and 5 are enlarged detailed views showing seals joining half-elements.

[0013] Referring firstly to Fig.3 there is shown in section a structural element 20 for a curtain wall. The structural element 20 is of a type of which a plurality are adapted to be fixed horizontally and vertically to form a framework for supporting large glass panels or windows that form the major part of the area of the surface wall. In Fig.3 the structural element 20 is shown at the junction of two glass panels 21 each of which comprise double-glazing units having inner and outer panels of glass 21a,21b separated by spacer elements 22, and with a sealant 23 being provided between the glass panels 21 and the structural element 20. It will be understood, however, that the nature of the glass panels and the manner in which they are fixed to the structural element do not form part of this invention and can be of any conventional form.

[0014] Structural element 20 is in the form of an elongate tubular member formed of a suitably strong lightweight material such as extruded aluminium. Structural element 20 is formed from two half-profiles 30,31 which are joined together and which are substantially identical save for differing numbers and locations of transverse wall members as will be described in more detail below. The two half-structural elements 30,31 are joined together in a manner to be described below and are disposed symmetrically about an axis X-X that extends normal to the plane of the wall and bisects the gap between the two glass panels 21. Relative to this axis X-X each half-element 30,31 comprises a first long section 30a,31a parallel to axis X-X, an end section 30b,31b at right angles to axis X-X at the ends of the long sections 30a,31a distal from the glass panels 21, and glass engaging and supporting parts 30c,31c that form an L-shape that engage and support the glass panels 21, with the sealant 23 being provided therebetween. The manner in which the two half-structural elements 30,31 are interconnected and joined together will now be described. The half-structural elements 30,31 are connected in two places along the axis X-X, these locations being at the two ends of the structural element 20, that is to say one connection is made between the engaging and supporting parts 30c,31c at the end adjacent the glass panels 21, and the other connection is made at the opposite end of the structural element 20 between the end sections 30b,31b. These two connections are identical and comprise a water-tight seal to prevent water ingress. The structure of these two connections is shown in more detail in Fig.4. Each half-element 30,31 has fixed thereto an elastomeric gasket member 40,41 formed with a T-shaped member 42 that engages a corresponding slot 43 formed on each half-element. One gasket member 40 is formed with a tongue 45, and the other is formed with a corresponding groove 46 which receives tongue 45. It will be understood, however, that the precise structure of the seal is not critical to the working of this invention.

[0015] Notwithstanding the fact that these connections are designed to be watertight, the possibility remains that under extreme weather conditions such as a typhoon or tropical storm rain be driven through the seals provided at the opposed ends of the structural member 20. Therefore, to provide additional protection against water ingress, the half-elements 30,31 are each provided with transverse chamber defining members 30d,31d. Transverse members 30d,31d extend across the width of the structural member 20 in a direction at right angles to the axis X-X and divide the interior of the structural member 20 into a number of chambers along the X-X axis.

[0016] In the embodiment of Fig.3 half-element 30 is provided with two transverse members 30d that extend across the width of the structural member 20 and are connected to the opposite half-element 31 through a sealing means shown in more detail in Fig.5. An elastomeric gasket 60 is secured to the half-element 31 and is formed with a T-shaped member 61 that engages in a corresponding locking groove 62 formed in an expanded width portion 63 of the transverse member 30d. Between the two transverse members 30d is located a similar transverse member 31d formed on the other half-element 31 and which extends towards the first half-element 30 and which is connected to the first half-element 30 with a corresponding seal. The provision of these transverse members has a number of important advantages.

[0017] Firstly, the transverse members divide the space of the interior of the structural member 20 into a number of chambers along the X-X axis. These chambers progressively reduce the air pressure that in extreme weather conditions can cause water to be driven through the seals of existing designs. The number of chambers can be varied. In the embodiment of Fig.3 there are three transverse members defining a total of four chambers, but by varying the number of transverse members the number of chambers can be

varied. For effective prevention of water, ingress however there should be at least three chambers, ie at least two transverse members. More chambers are possible however. For example five chambers could be formed by providing four transverse members (two on each half-element).

[0018] Secondly, because as one goes along the X-X axis the transverse members extend from opposite sides, ie from alternating half-elements, the seals are provided on alternating sides of the X-X axis. This means firstly that the seals are not provided along the X-X axis itself and so are far less vulnerable to directly wind driven rain, and secondly because the seals alternate from one side of the structural element to the other, any rain that is to pass through these seals must also alternate in direction from one side of the structural element to the other.

[0019] The result is a configuration for the structural element that provides substantially better protection against water ingress (especially from wind driven rain) than existing designs. Further more the design is simple and easy to assemble and does not require the half-elements to be fabricated to abnormally high tolerances.

Claims

1. A structural element for a curtain wall, said element comprising two half-elements that are joined together along an axis extending normal to the plane of the wall, said half-elements being interconnected by a plurality of seals, said seals being located on opposing sides of said axis, wherein said element is divided by interconnecting transverse wall members into at least three chambers along the axis.

2. A structural element as claimed in claim 1 wherein the seals are provided at the ends of said transverse wall members.

3. A structural element as claimed in claim 2 wherein each said transverse wall member extends from one half-element towards the other half-element to which it is connected by a said seal, and wherein said transverse wall members extend from alternating half-elements sequentially along the axis such that said seals alternate between one side of the axis and the other.

4. A structural element as claimed in any preceding claim wherein said element is provided with further seals at opposed ends of said element.

5. A structural element as claimed in claim 4 wherein said further seals are located on the said axis.

6. A structural element for a curtain wall, said element comprising two half-elements that are joined together along an axis extending normal to the plane of the wall, said half-elements being interconnected by a plurality of transverse wall members that divide the interior of said element into at least three chambers along the said axis.

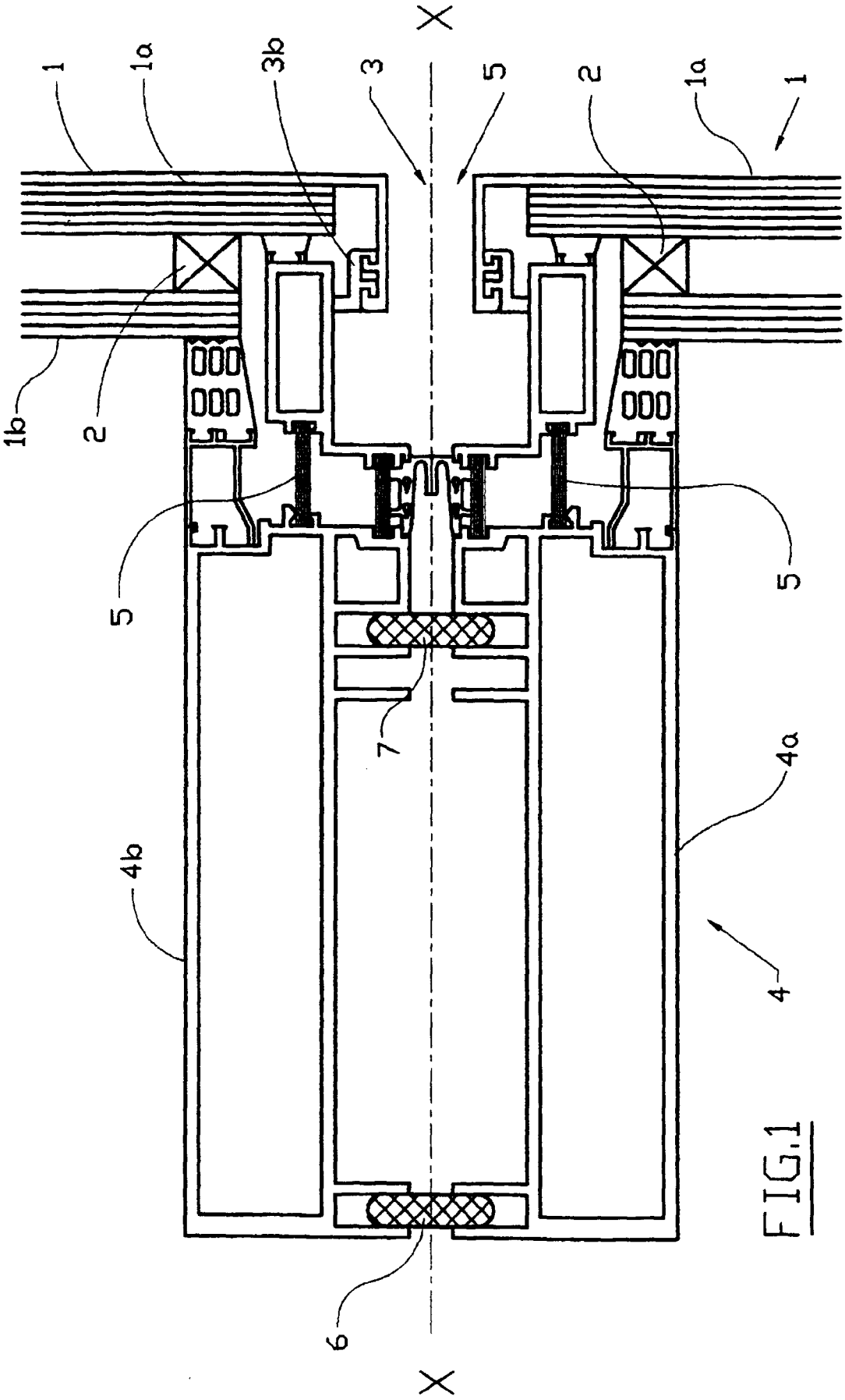

FIG.1

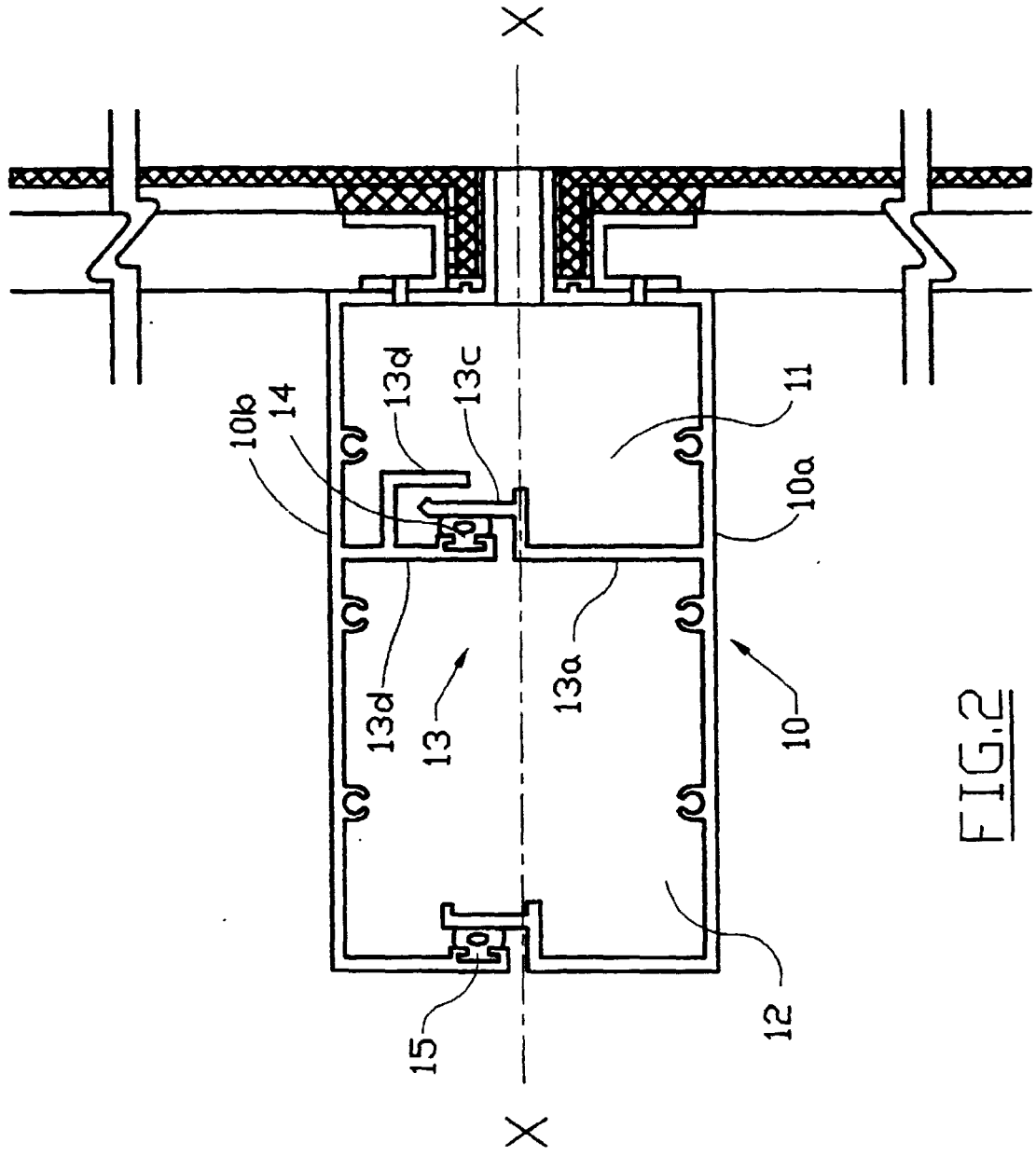

FIG.2

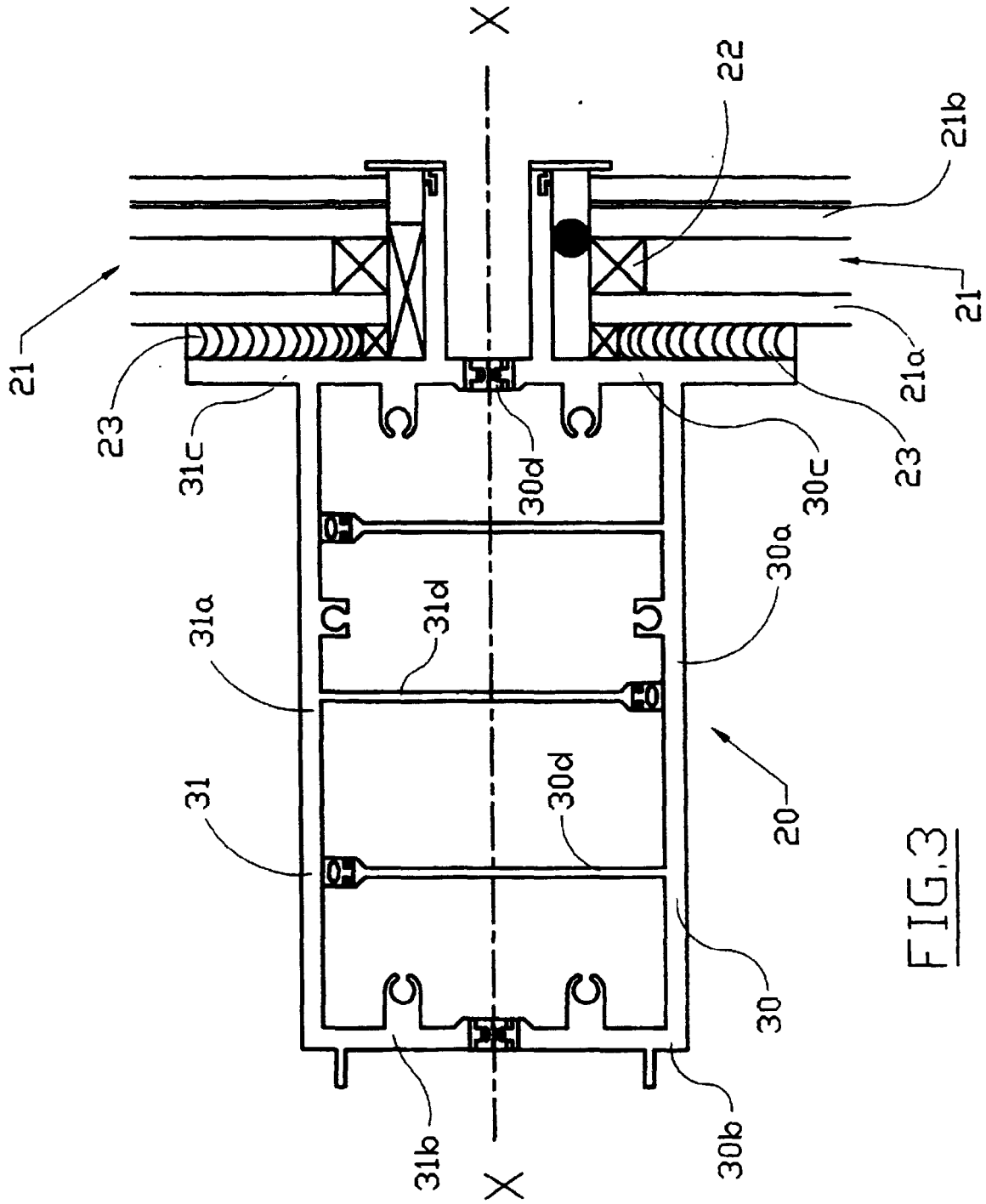
X
22
21b
21
21
21a
23
31c
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FIG.3

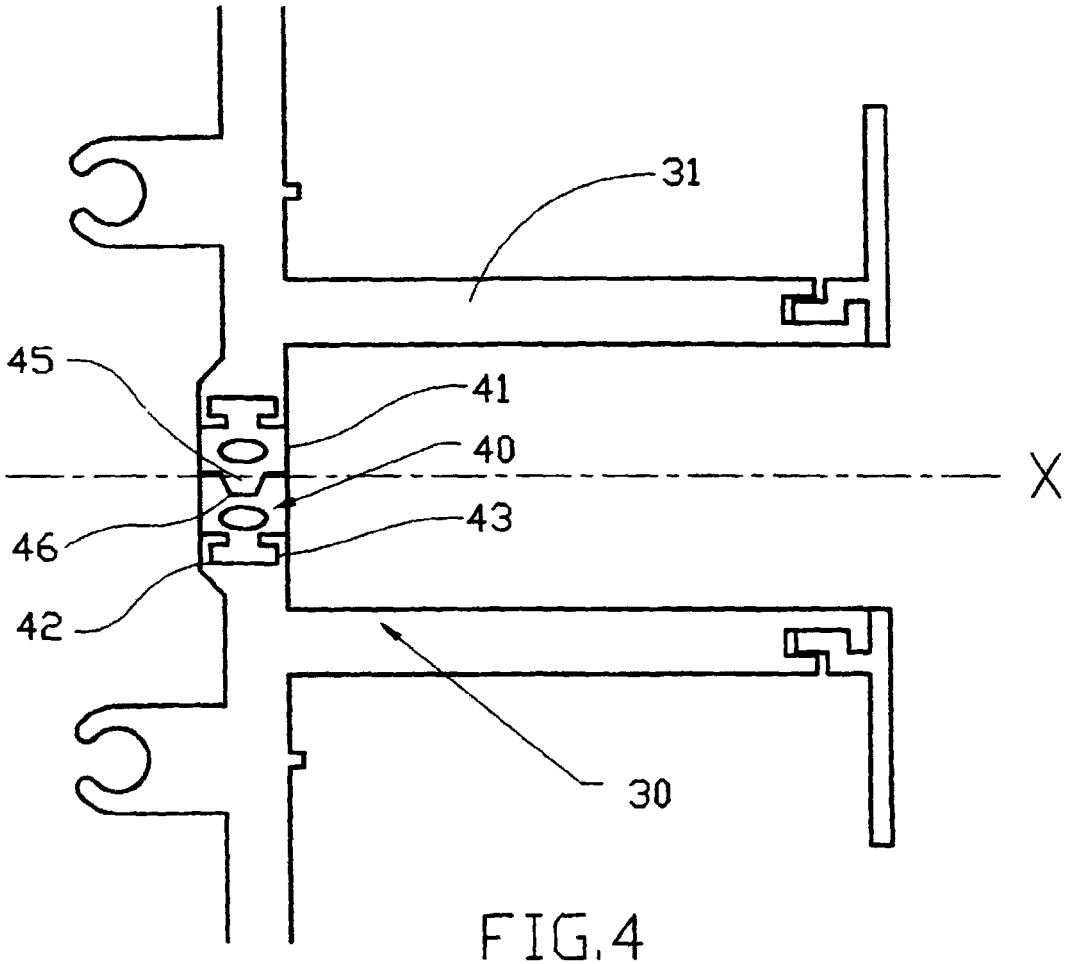

FIG.4

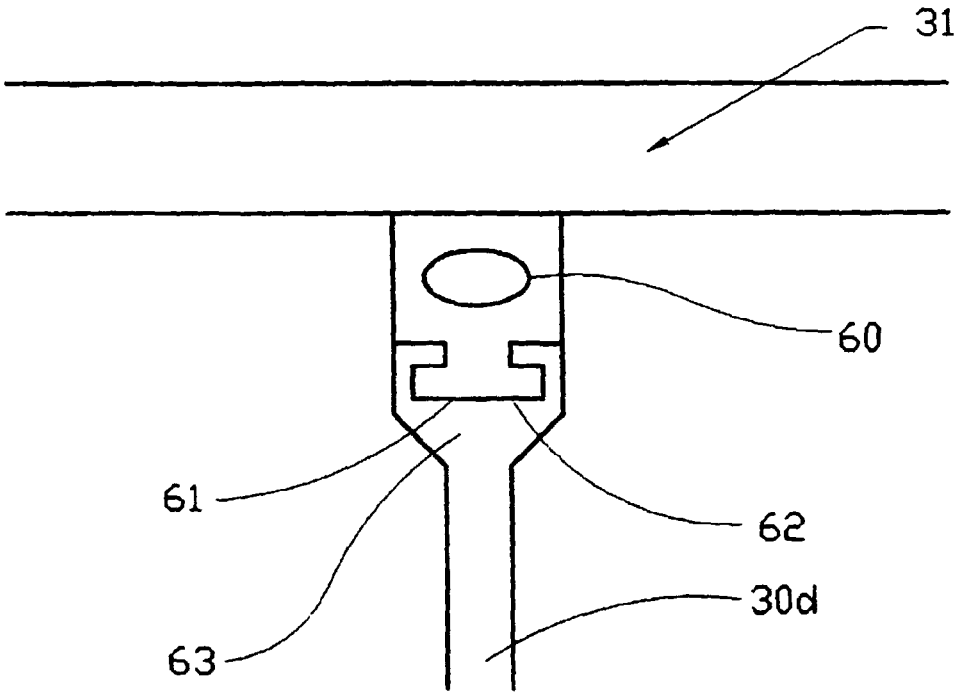

FIG.5