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(54) **Sliding door with an emergency pivoting opening system**

(57) The sliding door comprises a fixed leaf (1) and a moving leaf (2) arranged to run parallel and close thereto. The moving leaf (2) has an upper edge connected to a support carriage running along an upper guide and a lower edge having a projecting journal (5) inserted to run along a lower guide (6). A hinge is arranged to allow rotation of the moving leaf in relation to said support carriage about a vertical axis aligned with said journal for an emergency pivoting opening. The fixed leaf (1) can also carry out an emergency pivoting opening with respect to a vertical axis (27) when pushed by the moving leaf. Projecting from a lower side end of one of the fixed or moving leaves (1) there is a protective stop (8, 9) facing the other moving or fixed leaf (2) to make contact therewith when leaves rub or collide.

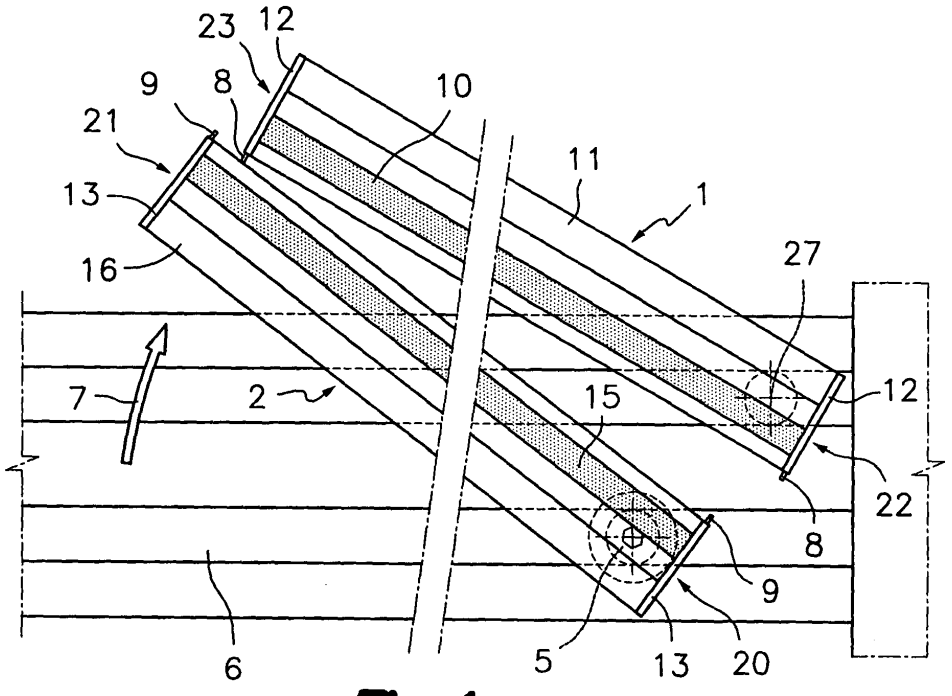

Fig.4

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Description

Technical Field

[0001] The present invention generally relates to a sliding door with an emergency pivoting opening system, and more particularly to an arrangement of plastic stop elements adapted to prevent lower horizontal carpentry elements of a fixed leaf and a moving leaf of the door from damaging one another when the moving leaf makes a normal opening or closing sliding movement or during an emergency opening pivoting movement of both leaves.

Background of the Invention

[0002] Utility Model ES-A-1046692 describes an automatic sliding door with one or two leaves provided with a panic opening system comprising the possibility of a rotation of the leaves about respective vertical axis when the leaves are pushed in a direction transverse to the sliding opening direction.

[0003] Sliding doors provided with a moving leaf and a fixed leaf are well known on the market in which the moving leaf is arranged to run parallel and close to the fixed leaf and in which the plane of the leaves is transverse to the direction of the movement of the people going through the door. The moving leaf has an upper edge connected to a support carriage arranged to run along an upper linear guide fixed to a wall or other structure and projecting from a lower edge there is a journal inserted to run in a lower linear guide fixed to a ground. The lower linear guide is parallel and opposite to said upper linear guide. The moving leaf is joined to the support carriage by means of a hinge close to a vertical edge of the moving leaf. When the moving leaf is pushed in the direction transverse to its plane, the mentioned hinge allows a rotation of the moving leaf in relation to the support carriage about a vertical rotation axis aligned with the shaft of the hinge and with the journal, thereby providing an emergency opening. The fixed leaf also has an emergency pivoting opening system, such that the fixed leaf can pivot about a vertical axis when it is pushed by the moving leaf during an emergency pivoting opening operation.

[0004] This construction has several drawbacks. First, given that the moving leaf is arranged parallel and as close as possible to the fixed leaf to obtain a better tightness between both leaves, during the sliding movement the tolerances in the allowances and the possible buckling of the panels tend to cause swinging which may cause the lower carpentry element of the moving leaf to rub against the lower carpentry element of the fixed leaf, causing mutual damage, such as scratching. Additionally, when an emergency pivoting opening operation occurs, the lower carpentry elements of the fixed and moving leaves collide together, possibly causing scratches or damage.

Disclosure of the Invention

[0005] The present invention contributes in palliating the aforementioned and other drawbacks by providing a sliding door with an emergency pivoting opening system, of the type comprising a fixed leaf and a moving leaf arranged to run parallel and close to said fixed leaf. The mentioned moving leaf has an upper edge connected to a support carriage arranged to run along an upper linear guide and a lower edge from where there projects a journal inserted to run in a lower linear guide parallel to said upper linear guide. Arranged close to a vertical edge of the moving leaf there is a hinge to allow rotation of the moving leaf in relation to said support carriage about a vertical rotation axis aligned with said hinge and with said journal for an emergency pivoting opening. Likewise, the fixed leaf also comprises an emergency pivoting opening device when it is pushed by the moving leaf. The door of the present invention is characterized in that projecting from at least one lower side end of one of the fixed or moving leaves there is at least one protective stop facing towards the other moving or fixed leaf to make contact with the same when the leaves tend to collide due to swinging in the sliding movement or due to pivoting in the rotation movement.

[0006] As is conventional, the moving leaf and the fixed leaf can be formed by respective panels with carpentry elements joined to an upper edge and a lower edge of each panel. Although it is not essential, said carpentry elements are metal carpentry elements, for example in the form of extruded aluminum profiles with caps arranged to close the open ends of the profiles. According to an exemplary embodiment, the caps are made of a plastic material and the protective stops are integral with the corresponding caps. Although a pair of protective stops located at opposite ends of the two opposing carpentry elements would be sufficient, for the sake of simplicity it is preferable that all the ends of the lower profiles of the moving leaf and of the fixed leaf have plastic caps incorporating respective protective stops. In another exemplary embodiment, a pair of protective stops are fixed on the side close to opposite ends of one of the carpentry elements, for example the carpentry element joined to the lower end of the fixed leaf. It will be understood that arrangements of the protective stops other than those described will be covered by the scope of the present invention as it is claimed.

Brief Description of the Drawings

[0007] The foregoing and other features and advantages will be better understood based on the following detailed description of exemplary embodiments with reference to the attached drawings, in which:

Figure 1 is a partial perspective view showing lower ends of a fixed leaf and a moving leaf forming part of a sliding door with an emergency pivoting opening

system according to an exemplary embodiment of the present invention;

Figure 2 is a partial end elevational view of the fixed leaf and the moving leaf of Figure 1;

Figure 3 is a sectional plan view of the door of Figure 1 with the moving leaf in normal sliding movement arrangement;

Figure 4 is a sectional plan view of the door of Figure 1 with the fixed leaf and the moving leaf in emergency pivoting movement arrangement;

Figure 5 is a partial perspective view of a fixed leaf and a moving leaf forming part of a sliding door with an emergency pivoting opening system according to another exemplary embodiment of the present invention; and

Figure 6 is a sectioned plan view of the door of Figure 5 with the moving leaf in sliding movement arrangement.

Detailed Description of Exemplary Embodiments

[0008] Referring first to Figures 1 to 4, a sliding door is partially show with an emergency pivoting opening system according to an exemplary embodiment of the present invention, which comprises a fixed leaf 1 and a moving leaf 2. For normal opening or closing operations, the moving leaf 2 is arranged to run parallel and close to the fixed leaf 1 such that, in an open position, the moving leaf is substantially adjacent to and overlapping the fixed leaf. Generally speaking, the moving leaf 2 has an upper edge (not shown) connected to a support carriage arranged to run along an upper linear guide fixed to a wall or other structure and a lower edge from where there projects a journal 5 (see Figure 2) inserted to run in a lower linear guide 6 fixed to the ground, said lower linear guide 6 being parallel and opposite to the mentioned upper linear guide (not shown). Therefore, when the moving leaf is pushed in a direction transverse to the direction of the movement of the people going through the door, the moving leaf 2 is shifted parallel to the fixed leaf 1 in the direction of the double arrow 4 (Figures 1 and 3). This opening and closing sliding movement of the moving leaf 2 parallel to leaf 1 is the normal door operation, and it is often motor-driven.

[0009] Close to a first vertical edge 20 of the moving leaf 2, between the upper end thereof and said support carriage, a hinge (not shown) is arranged which allows a rotation of the moving leaf 2 in relation to said support carriage about a vertical rotation axis aligned with said hinge and with said journal 5. Therefore, when the moving leaf is pushed in the direction of the movement of the people going through the door with a transverse force above a predetermined threshold, the moving leaf 2 makes a pivoting movement in the direction of the arrow 7 (Figure 4) to provide an emergency opening. The fixed leaf 1 also has an emergency pivoting opening system which allows a rotation of the fixed leaf 1 about a corresponding vertical rotation axis 27 (Figure 2) located close to a first vertical edge 22 of the fixed leaf 1 when a transverse force above a predetermined threshold is applied on the fixed leaf 1. The mentioned first vertical edge 22 of the fixed leaf 1 is adjacent to the first vertical edge 20 of the moving leaf 2 in an open situation. Therefore, when the moving leaf 2 starts an emergency pivoting opening movement, an area close to a second vertical edge 21 of the moving leaf 2 opposite to the first vertical edge 20 thereof collides with a second vertical edge 23 of the fixed leaf 1 opposite to the first vertical edge 22 thereof and causes a corresponding emergency pivoting opening movement of the fixed leaf 1, as shown in Figure 4.

[0010] According to the exemplary embodiment shown in Figures 1 to 4, the fixed leaf 1 comprises a panel 10 with a carpentry element 11 joined to a lower edge of the panel 10 and the moving leaf 2 comprises a panel 15 with a carpentry element 16 joined to a lower edge of the panel 15. In this exemplary embodiment, the panels 10, 15 can be, for example, made of glass and the mentioned carpentry elements 11, 16 can be metal carpentry elements, for example in the form of extruded aluminum profiles having open ends. Each of the profiles 11, 16 is conventionally provided with an upper groove adapted for engaging the respective panel 10, 15. Caps 12 are fixed on the ends of the profile 11 joined to the fixed leaf 1, for example by means of screws 14, and caps 13 are fixed on the ends of the profile 16 joined to the moving leaf 2, for example by means of screws 14. The profiles 11, 16 of the fixed and moving leaves 1, 2 are identical in terms of cross section and are arranged symmetrically with regard to a vertical mid-plane parallel to the panels 10, 15 (Figure 2). In the exemplary embodiment depicted, the lower linear guide 6 has an also symmetrical configuration with two longitudinal tracks, in one of which tracks the vertical rotation axis 27 of the fixed leaf 1 is fixed and in the other one the journal 5 of the moving leaf 2 is inserted.

[0011] For the purpose of obtaining relative tightness between both leaves, the moving leaf 2 is arranged as close as possible to the fixed leaf 1. The necessary construction tolerances in the allowances and possible buckling of the panels 10, 15 can cause, either during a normal opening-closing sliding movement or during an emergency opening pivoting movement, swinging in the fixed and moving leaves 1, 2 which can cause the carpentry element 16 of the moving leaf 2 and the carpentry element 11 of the fixed leaf 1 to rub against one another. To prevent this, the door of the present invention includes protective stops 8 laterally projecting from opposite ends of the profile 11 of the fixed leaf 1 and are facing the profile 16 of the moving leaf 2. Similarly, protective stops 9 laterally project from opposite ends of the profile 16 of the moving leaf 2 and face towards the profile 11 of the fixed leaf 1. Obviously, each end of the fixed leaf 1 and moving leaf 2 can include more than one protective stop for a redundant protection level.

[0012] In this exemplary embodiment, the protective stops 8, 9 are joined to side edges of the respective caps

12, 13. The caps 12, 13 are advantageously made of a rigid or semi-rigid plastic material which is softer than the aluminum of the profiles 11, 16, and the protective stops 8, 9 are integral with the corresponding caps 12, 13. Therefore, in the case of swinging during a normal opening or closing sliding movement, the protective stops 8, 9 come into contact with the profiles 11, 16, thereby preventing the risk that direct contact will occur between the profiles 11, 16 and that the metal of the profile 16 of the moving leaf 2 can scratch or damage the metal of the profile 11 of the fixed leaf 1 or vice versa. As is shown in Figure 4, when the moving leaf 2 rotates about the vertical axis in the direction of the arrow 7 during an emergency pivoting opening movement, the protective stop 8 made of plastic material joined to the fixed leaf 1 makes contact with the metal profile 16 of the moving leaf 2, thereby preventing any damage thereto.

[0013] For the purpose of reducing the number of different parts, all the caps 12, 13, those fixed to the profile 16 of the moving leaf 2 as well as those fixed to the profile 11 of the fixed leaf 1, are equal or symmetrical, and incorporate corresponding protective stops 8, 9, i.e. the caps 12 fixed to the profile 11 of the fixed leaf 1 incorporate protective stops 8 projecting from a side edge thereof and extending towards the profile 16 of the moving leaf 2, and the caps 13 fixed to the profile 16 of the moving leaf 2 incorporate protective stops 9 projecting from a side edge thereof and extending towards the profile 11 of the fixed leaf 1. In the exemplary embodiment shown in Figures 1 to 4, each of the protective stops 8, 9 has the form of a planar vertical flange with a rounded contour, though other configurations are possible.

[0014] Another exemplary embodiment is described below in relation to Figures 5 and 6 similar to the one described in relation to Figures 1 to 4, except that instead of the mentioned protective stops 8, 9 joined to the caps 12, 13, here there is a pair of protective stops 26 joined on the sides of the profile 11 of the fixed leaf 1 and facing the profile 16 of the moving leaf 2. These protective stops 26 are preferably made of a rigid or semi-rigid plastic material and are fixed by means of adhesive, by screws, rivets or any other means known in the art.

[0015] A person skilled in the art will be able to introduce modifications and variations in the exemplary embodiments shown and described without departing from the scope of the present invention as it is defined in the attached claims.

Claims

1. A sliding door with an emergency pivoting opening system, of the type comprising a fixed leaf (1) and a moving leaf (2) arranged to run parallel and close to said fixed leaf (1), wherein said moving leaf (2) has an upper edge connected to a support carriage arranged to run along an upper linear guide and a lower edge from where there projects a journal (5) inserted to run in a lower linear guide (6) parallel to said upper linear guide, a hinge being arranged close to a first vertical edge (20) of the moving leaf (2) to allow a rotation of the moving leaf (2) in relation to said support carriage about a vertical rotation axis aligned with said hinge and with said journal (5) for an emergency pivoting opening, the fixed leaf (1) being arranged to also carry out an emergency pivoting opening with regard to a vertical rotation axis (27) close to a first vertical edge (22) of the fixed leaf (1) when it is pushed by the moving leaf (2), **characterized in that** projecting from at least one lower side end of one of the fixed or moving leaves (1, 2) there is at least one protective stop (8, 9, 26) facing the other moving or fixed leaf (2, 1) to make contact therewith when the leaves tend to collide due to swinging in the normal opening-closing sliding movement or due to pivoting in the emergency opening rotation movement.

2. A door according to claim 1, **characterized in that** the moving leaf (2) comprises a panel (15) and a carpentry element (16) joined to a lower edge of said panel (15) and the fixed leaf (1) comprises a panel (10) and a carpentry element (11) joined to a lower edge of said panel (10), one or more of the mentioned protective stops (8, 9, 26) being joined to one and/or the other of said carpentry elements (11, 16).

3. A door according to claim 2, **characterized in that** said carpentry elements (11, 16) are metal carpentry elements in the form of extruded profiles closed at their ends by caps (12, 13), one or more of the mentioned protective stops (8, 9) being joined on the side of one or more of said caps (12, 13).

4. A door according to claim 3, **characterized in that** the caps (12, 13) are made of a plastic material and the protective stops (8, 9) are integral with the caps (12, 13).

5. A door according to claim 2, **characterized in that** one or more of said protective stops (26) are fixed on the side of one and/or of the other of said carpentry elements (11, 16).

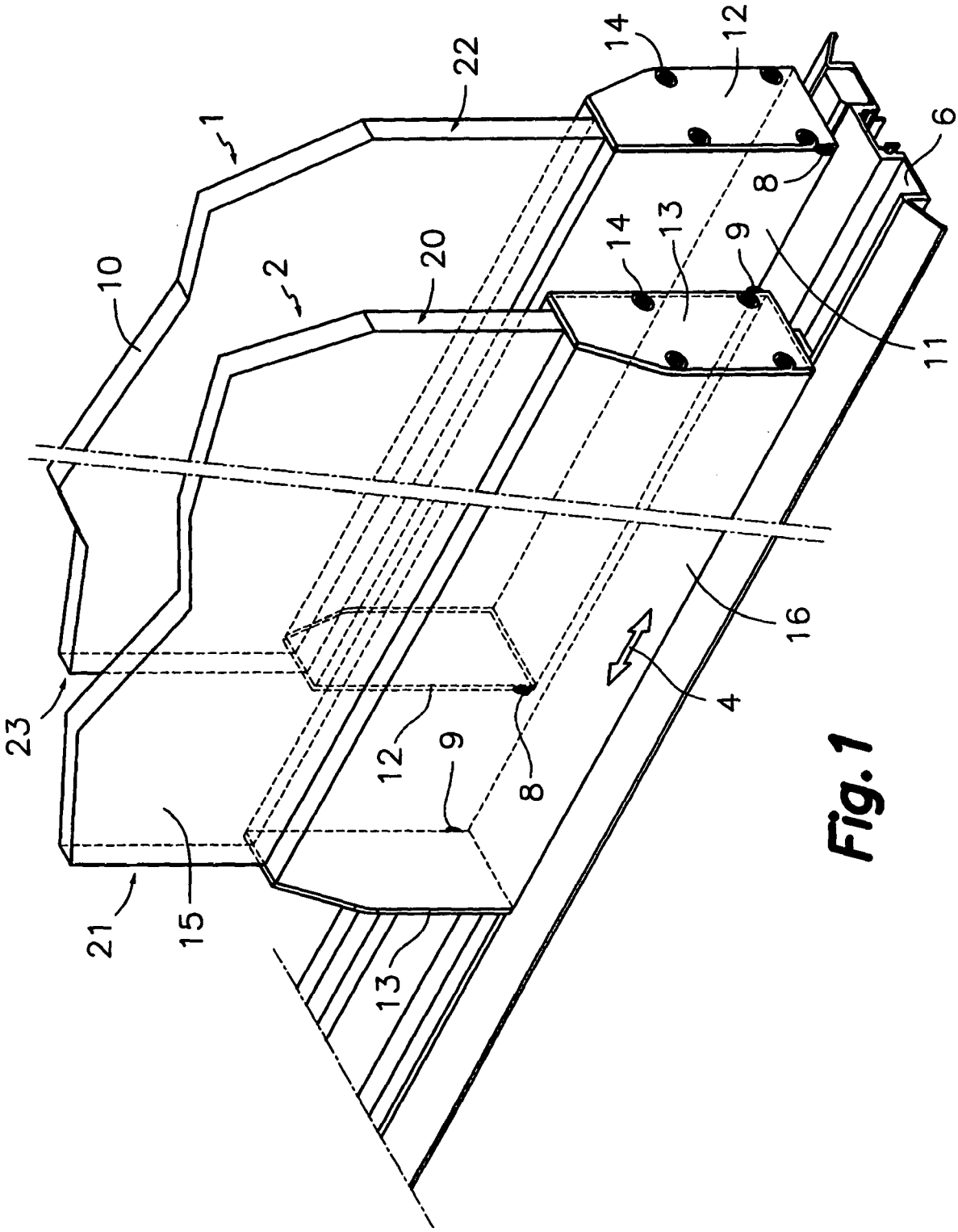

Fig. 1

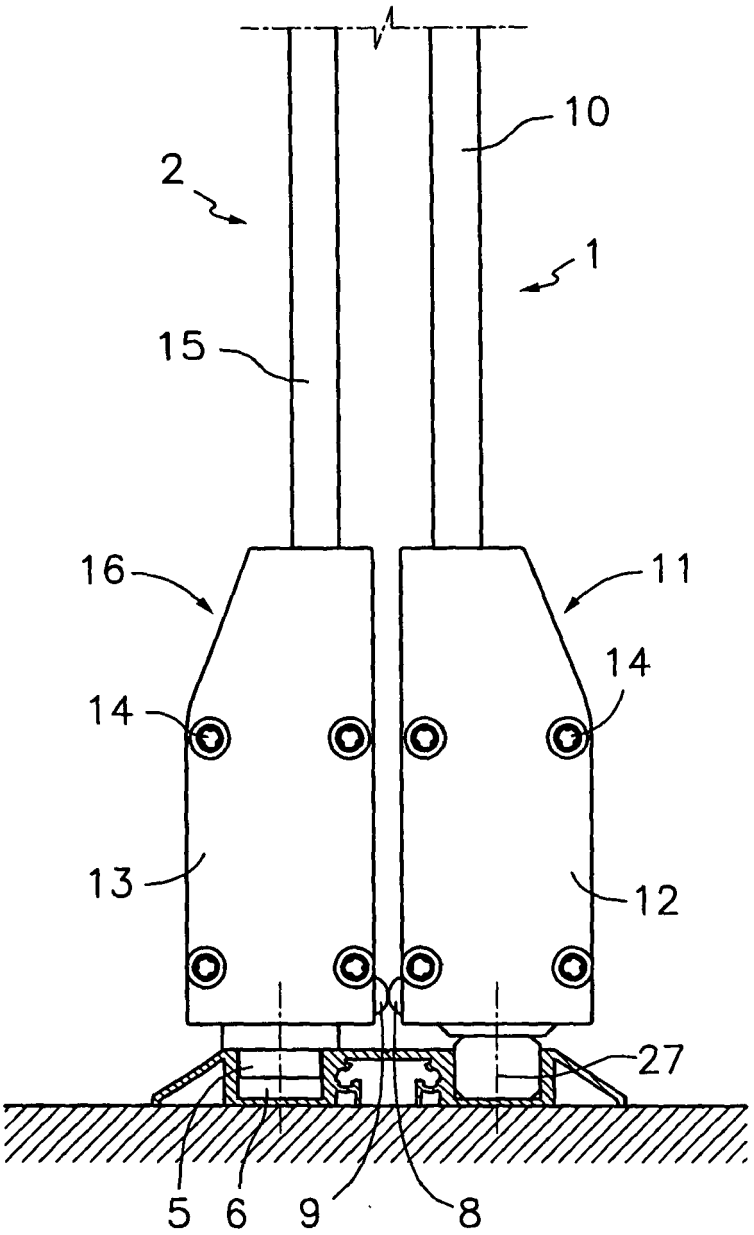

Fig.2

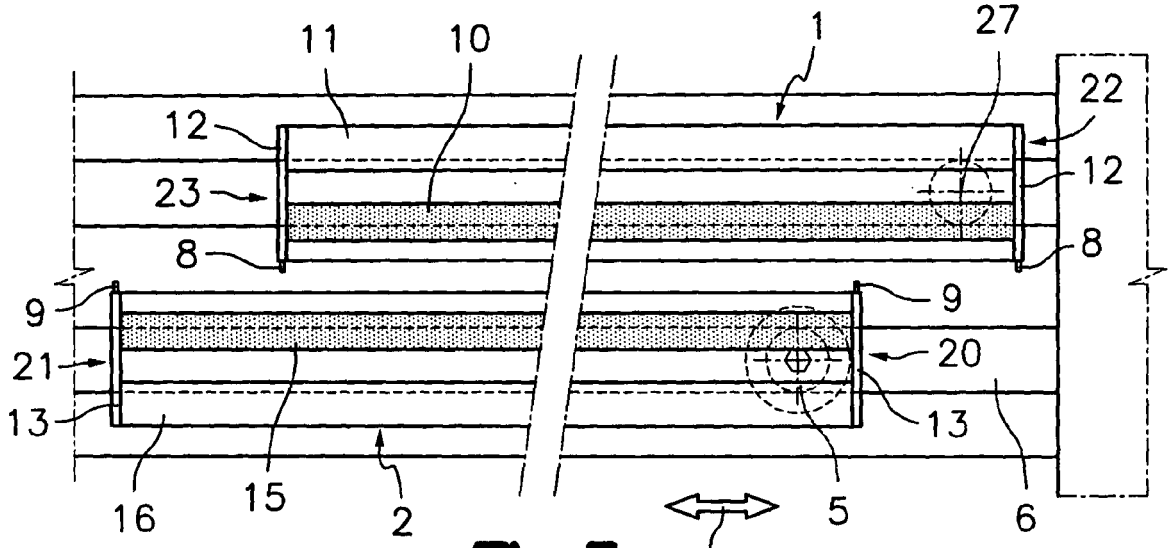
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Fig.3

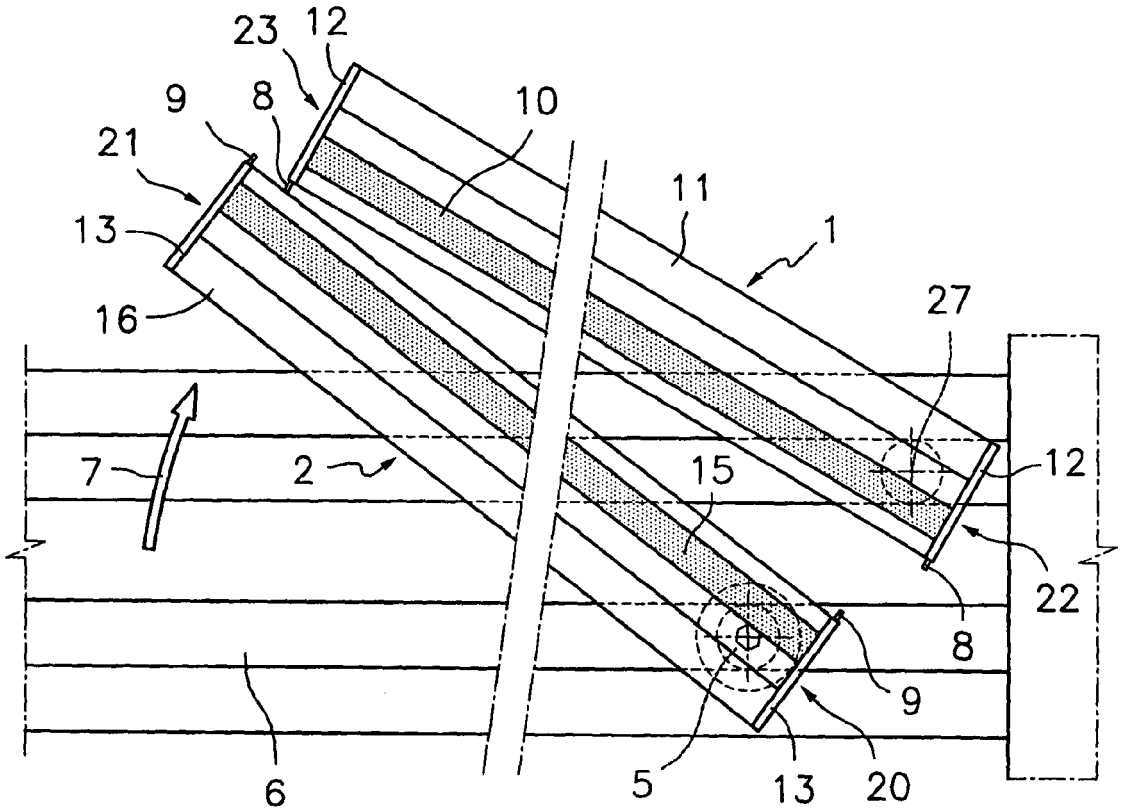
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Fig.4

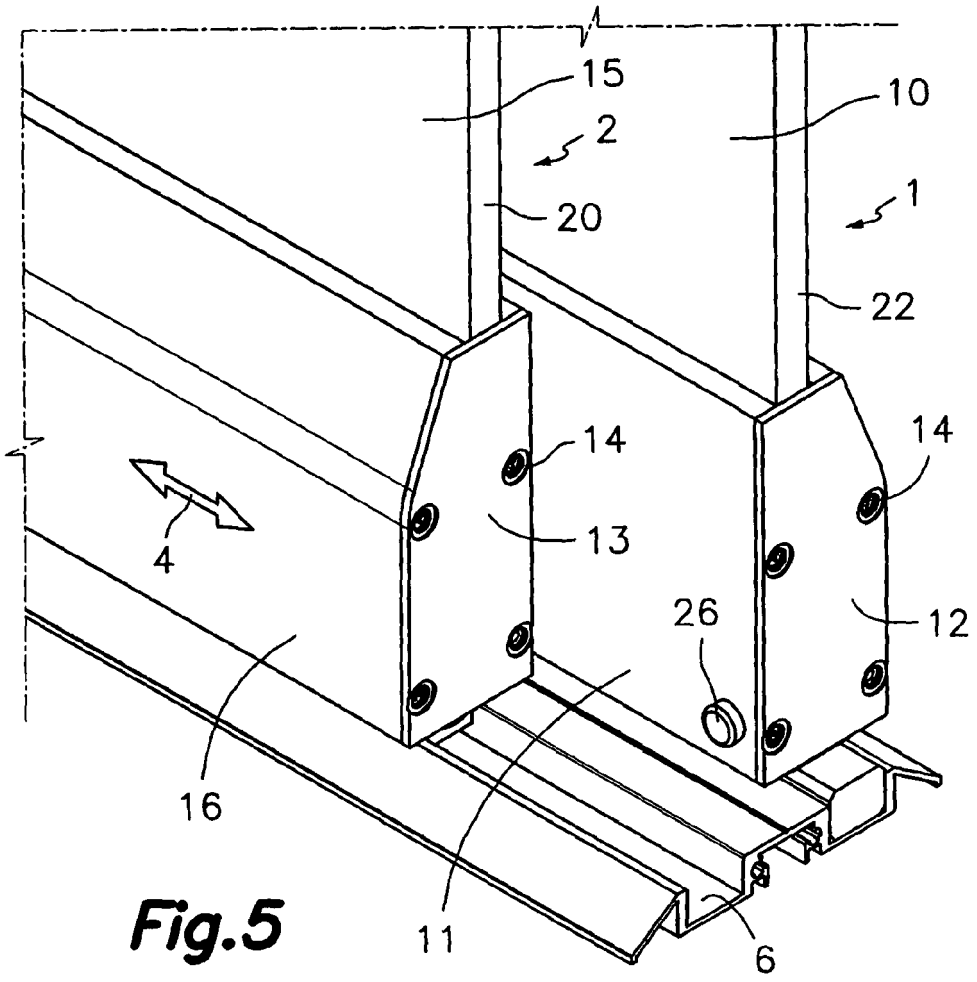
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Fig.5

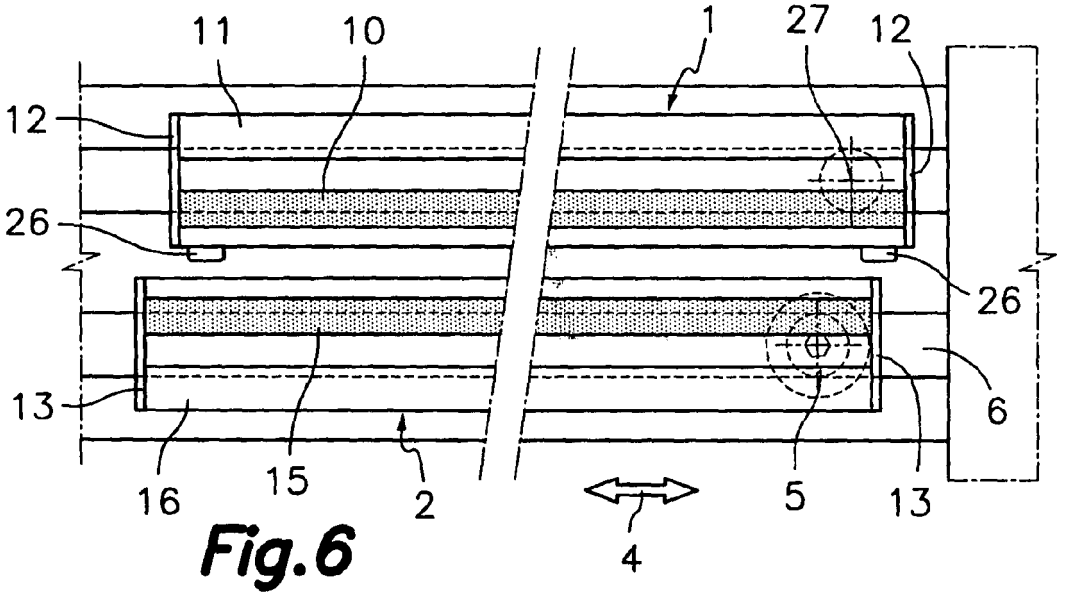
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Fig.6

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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