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(54) Door with one or more sliding panels

(57) The present invention relates to a door with one or more sliding panels for installation in supermarkets, shopping centres, leisure centres, meeting halls and similar areas, wherein, on reception of a signal indicating the presence of the user in the proximity of the doorway, the door panels open sideways in relation to the open space of the doorway itself. Said door is of the type which during the opening action, performs a combined translation and rotation motion around a vertical axis, moving to a perpendicular and parallel position in relation to the doorjamb. Said door is characterised in that each panel is pivoted at the upper part of its external edge to a bracket having the dual function of bearing the weight of the panel as well as moving said panel to activate the automatic opening/closing action of the door.

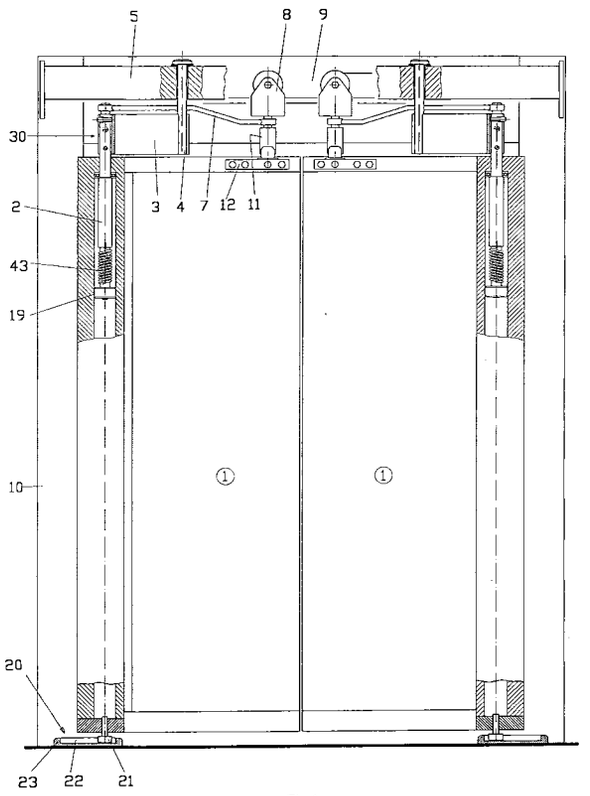

Fig.1

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Description

[0001] The present finding relates to a door with one or more sliding panels according to the general description in claim 1.

[0002] In buildings open to the public such as supermarkets, shopping centres, leisure centres, meeting halls and similar areas, sliding panel doors are often installed, wherein on reception of a signal indicating the presence of a user in proximity to the doorway, the panels open by sliding sideways into hollow cavities on each side of the space left open in the doorway.

[0003] Firstly, these doors present the disadvantage that the side cavities must be constructed to house the sliding of the door panels; and moreover, in the case of panic inside the building caused by fire for example, the electricity supply can be blocked at the same time, creating a very dangerous situation for users since it is practically impossible to open said doors which are generally made of glass, adding a further danger of serious injury to users once the glass is broken.

[0004] In order to eliminate these problems, doors have been constructed that are adapted with means contrived so that during opening action, the panels perform a combined translation and rotation motion around a vertical axis, bringing the panels to a perpendicular and parallel position in relation to the door jamb.

[0005] In this manner it is not necessary to effectuate side cavities for the sliding doors; and moreover it is possible to devise anti-panic devices able to open the door panels immediately, even in the absence of the electrical supply, by means of a simple pressure on the panel surface facing the interior of the building where the doors are mounted.

[0006] As an example, reference is made to patent document n° IT 01253768, containing a description of a door with sliding panels having a rotative-translative movement and wherein each one of the panels is mounted to pivot at its edge on a vertical rod having the vertical ends bent at a horizontal angle to form a "C" shaped structure, and wherein said two ends are pivoted respectively, the upper end being attached to the fixed structure of the door, and the lower end to the base of said door.

[0007] Although said constructive solution resolves the problems described above, it provokes others, such as the necessity for hollowing out cells in the flooring to house the end of the rod, thus creating difficulties in installation and problems for the user.

[0008] The aim of the present finding is to construct a door with one or preferably two sliding panels, of the type with combined rotation-translation movement, having the characteristics that make it more functional in relation to other similar doors known to the art.

[0009] According to the present finding, this can be obtained by determining that each panel is mounted to pivot at the upper part of its external edge on a bracket which has the dual function of bearing the weight of the door panel as well as moving it in a rotation-translation manner to create the automatic opening/closing action of the door.

[0010] Said bracket is mounted with motorised means able to rotate the bracket alternatively on a horizontal plane towards the interior or the exterior respectively during the opening and closing action of the door panel.

[0011] Said motorised means are basically composed of a carriage that runs in a longitudinal direction and with an alternative motion on the upper transom of the door, associated with a connecting rod that transmits said alternative rectilinear motion to the aforesaid bracket, providing it with an alternative rotating angular motion that determines the opening/closing action of the supported panel.

[0012] The finding also relates to means adapted to permit door opening caused by pressure from the inside in the case of panic, and to return the door to normal functioning condition after emergency opening.

[0013] These and other characteristics of the finding will be described below and illustrated in detail with reference to a preferred embodiment, provided purely as an example and by no means limitative, and to the appended drawings wherein:

- Figure 1 (drawing I) shows a front view of the door in closed position;
- Figures 2, 3, and 4, (drawing II) show a horizontal plane view of the door in three different working positions;
- Figure 5 (drawing III) shows the front view of the upper part and the means for moving the door panels;
- Figure 6 (drawing IV) shows a cross-section along the line VI-VI of figure 5;
- Figure 7 shows a cross-section view along the line VII-VII in figure 5;
- Figure 8 (drawing V) shows a plane view of the door in emergency opening position.

[0014] Figure 1 shows the door according to the finding, composed of two panels 1, preferably constructed in glass, being supported at the upper external edge by a pin 2 anchored inside a bracket 3 which is in turn supported and mounted to pivot by means of a pin 4 on the fixed beam 5 that comprises an integral part of the bearing structure, identified throughout by the numeral 6.

[0015] The bracket 3 is connected by means of a connecting rod 7, to a sliding carriage 8, using means known in the art and not illustrated, to the transom 9 attached to the uprights 10 of the bearing structure 6.

[0016] A block 11 is connected with carriage 8 to support the strip 12 equipped with connecting means 13 that

maintain the panel attached to the carriage under normal door opening/closing working conditions, while permitting their reciprocal release, in case of necessity.

[0017] As can be seen in figures 2 to 4, from a functional point of view, when the doors are closed with both door panels 1 reciprocally aligned, the carriage 8 is positioned on the most internal part of the panel and the connecting rod 7 is aligned with the panel positioned underneath (Refer to figure 2).

[0018] When the carriage 8 moves in a sideways direction, the internal eye 14 of the connecting rod 7, splined idly on the pin 15, integral with the said carriage, is forced to follow the carriage movement, while the external eye 16 of the same connecting rod, hinged idly on pin 2 of the bracket 3, forms a joint in the articulated bracket/connecting rod system 17, and is therefore forced to follow a circular path that determines the rotation-translation movement of the panel 1 fixed underneath, until it brings the panel sideways to a position that is perpendicular with its previous position, and in this manner parallel to the doorjamb formed by upright 10 (Refer to figures 3 and 4).

[0019] The reverse actions towards the centre of the doorway by the two opposed articulated systems 17, move the two door panels 1 to a position perpendicular with the doorjamb, thus returning the door to closed position.

[0020] Again, from a functional point of view, it is conceived in the finding that the regular movement of panel 1, responsible for maintaining the panel always in a perfectly vertical position, is guaranteed by a small roller 19 located at the lower end of pin 2, and mounted in a slightly eccentric position in relation to said pin axis, as well as a guide device 20 located in the lower part of the panel itself and preferably composed of a ratchet 21, positioned coaxially with the axis of the panel support pin 2, and engaged to slide in a guide 22 channelled in a plate 23 applied to the flooring or the door base.

[0021] From a constructive viewpoint, such as that shown in figures 5 and 6, in the finding a micrometrical adjustment system is conceived for setting the panel position during door assembly to ensure perfect closure.

[0022] Said micrometrical adjustment system, identified throughout by the numeral 30, is applied to the upper part of the support pin 2 and acts on bracket 3, where as well as plug 31, inserted loosely in the corresponding hole in the same pin to support and anchor the door panel to the bracket, there is also a pair of screws 32 and a threaded headless screw 33, reciprocally arranged in a perpendicular position to each other, which when tightened, as can be easily seen in figures 5 and 6, can move the panel on two vertical planes that are reciprocally perpendicular and pass through the axis of the aforesaid pin, thus adjusting the position of the door panel.

[0023] As well as the automatic opening of the door according to the manner described above, a manual door-opening mode is also possible for emergency situations that demand the immediate evacuation of the building, closed towards the exterior by the door according to this finding.

[0024] This is made possible by the special reciprocal connection system between panel 1 and carriage 8 which, as stated previously, can be opened by pressure applied to the panel when the door is in closed position.

[0025] As can be seen in figures 5 and 7, this action is made possible by means of said connecting system 13 composed of magnets 40 inserted in the strip 12, that are attracted by ferromagnetic elements 41, applied to the edge of the panel.

[0026] Advantageously, in the finding the metal element 41 is composed of a screw so that in this manner, very slight screwing action can modify the thickness of the magnetic gap 42 and therefore adjust the intensity of the force of attraction.

[0027] When the connection means 13 is released thanks to the thrust applied to the panel when the door is in closed position, panel 1 is free to rotate around the "X" axis of the support pin 2, in the same manner as a normal swing-door, to open completely thus permitting the users to exit from the building (Refer to figure 8).

[0028] A torsion spring 43 is axially mounted on pin 2 and attached to the panel. Said spring has a dual function adapted to adjust the panel opening action, as well as maintaining the door in open position during the emergency opening stage.

[0029] Lastly, in the finding the panel 1 emergency movement is conceived to be received by a sensor 50 applied to the block 11 element, and provides for deactivating the electrical circuits during the emergency exit stage, and to reactivate the circuits on return to normal function.

[0030] Therefore it is evident that by means of a device according to the present finding, a particularly strong and reliable structure is available for the user, simple and rapid to assemble, and able to deal with any emergency conditions that may occur in the building closed by said door, with extreme ease.

[0031] Obviously other embodiments exist that differ from that described, in relation to the size, use, characteristics and components of said door, however while remaining within the context of the claims defined hereunder.

Claims

1. DOOR WITH ONE OR MORE SLIDING PANELS, for installation in supermarkets, shopping centres, leisure centres, meeting halls and similar areas, wherein, on reception of a signal indicating the presence of the user in the proximity of the doorway, the door panels open sideways in relation to the open space of the doorway itself, of the type which during the opening action, performs a combined translation and rotation motion around a vertical axis, moving to a perpendicular and parallel position in rela-

tion to the doorjamb, said door being **characterised in that** each panel is mounted to pivot by means of a pin at the upper part of its external edge on a bracket having the dual function of supporting the panel and moving said panel to activate the automatic opening/closing action of the door.

2. DOOR according to claim 1 **characterised in that** motorised means act on the bracket, being able to rotate said bracket alternatively on a horizontal plane towards the interior or the exterior, respectively during the opening and closing stage of the panel.

3. DOOR according to claim 1 **characterised in that** said motorised means for panel movement are composed of a carriage that slides in a longitudinal direction and with alternative action on the upper transom of the door, a connecting rod being attached to said carriage to transmit the alternative rectilinear motion of the aforesaid carriage to the bracket of the panel, thus providing the panel with an alternative angular rotative motion.

4. DOOR according to claim 3 **characterised in that** means are conceived to permit the opening of the door by pressure from the interior in the case of panic, and to return it to normal function conditions after the door has been opened in emergency conditions.

5. DOOR according to one or more of the previous claims **characterised in that** the two panels (1) are supported in the upper external part by a pin (2) that is fixed to a bracket (3) which in turn is supported and mounted to pivot by means of a pin (4) on the fixed beam (5) that comprises an integral part of the supporting structure (6), said bracket being connected by means of a connecting rod (7) to a sliding carriage (8) on a transom (9) fixed to the uprights (10) of the support structure.

6. DOOR according to claim 5 **characterised in that** associated with the carriage (8) is a block (11) that supports a strip (12) equipped with connecting means (13) that maintain the panel integral with said carriage, under normal door opening/closing function conditions, while permitting reciprocal release in case of necessity.

7. DOOR according to claim 6 **characterised in that** the internal eye (14) of the connecting rod (7) splined idly on the pin (15) of the carriage (8) is engaged to follow said carriage, while the external eye (16) of the same connecting rod, hinged idly on the pin (2) of the bracket (3) forms the joint of the articulated bracket/connecting rod (17) and therefore it is engaged to follow a curved path that generates the rotation-translation motion of the panel (1) underneath it.

8. DOOR according to claim 7 **characterised in that** a small roller is conceived to be (19) located at the lower end of the support pin (2) and mounted in a slightly eccentric position in relation to the axis of said pin.

9. DOOR according to claim 8 **characterised in that** a guide device (20) is conceived to be located in the lower part of the door panel, composed of a ratchet (21) that is coaxial with the axis of the support pin (2) of said panel and engaged to slide in a guide (22) channelled in a plate (23) applied to the flooring or the base of the door.

10. DOOR according to one or more of the previous claims **characterised in that** a micrometrical adjusting device is conceived (39) for application on the upper part of the support pin (2) and that acts on the bracket (3).

11. DOOR according to claim 10 **characterised in that** the micrometrical adjusting device (30) comprises a plug (31) inserted loosely in the corresponding hole in the pin (2) and that is adapted to support and anchor the panel (1) to the bracket (3), as well as a pair of screws (32) and a threaded headless screw (33), arranged reciprocally perpendicular, in such a manner so that when tightened, they are able to move the panel on two vertical reciprocally perpendicular planes and by passing through the axis of said pin, they adjust the position of the panel itself.

12. DOOR according to one or more of the previous claims **characterised in that** the attachment means (13) is composed of magnets (40) inserted in the strip (12) that are attracted by the ferromagnetic elements (41) applied to the edge of the panel (1), and said elements comprising a threaded element in such a manner that if screwed very slightly, it is possible to modify the thickness of the magnetic gap (42)and therefore adjust the intensity of the force of attraction.

13. DOOR according to one or more of the previous claims **characterised in that** a torsion spring (43) is inserted between the support pin (2) and the rod supported by said pin, which acts during the emergency opening action.

14. DOOR according to one or more of the previous claims **characterised in that** a sensor (50)is applied on the block (11), said sensor being adapted to read the emergency opening action of the panel (1) in order to deactivate the electrical circuits, as well as reactivate said circuits on return to normal door function.

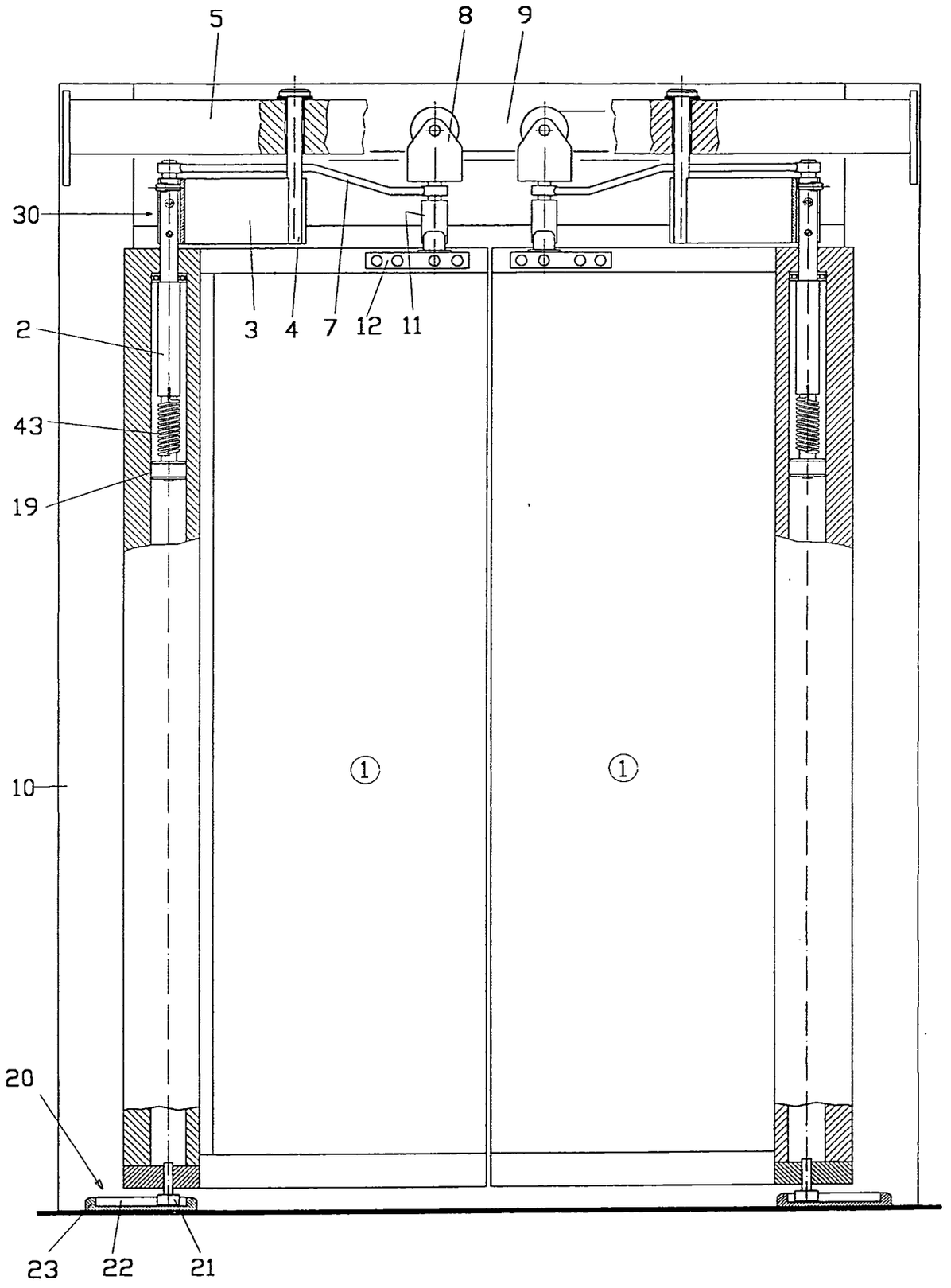

Fig.1

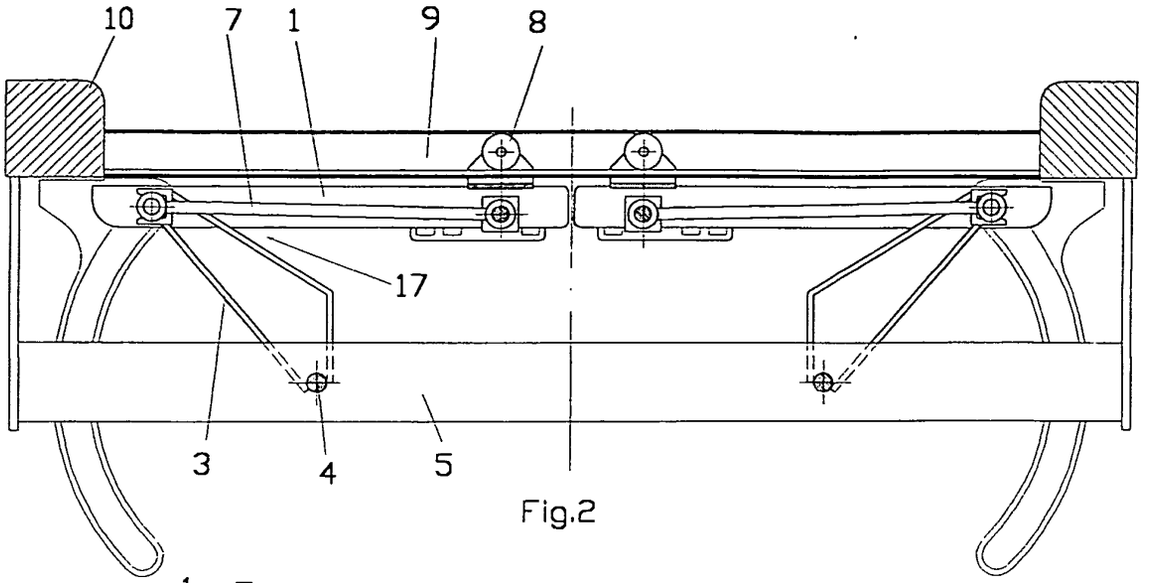

Fig.2

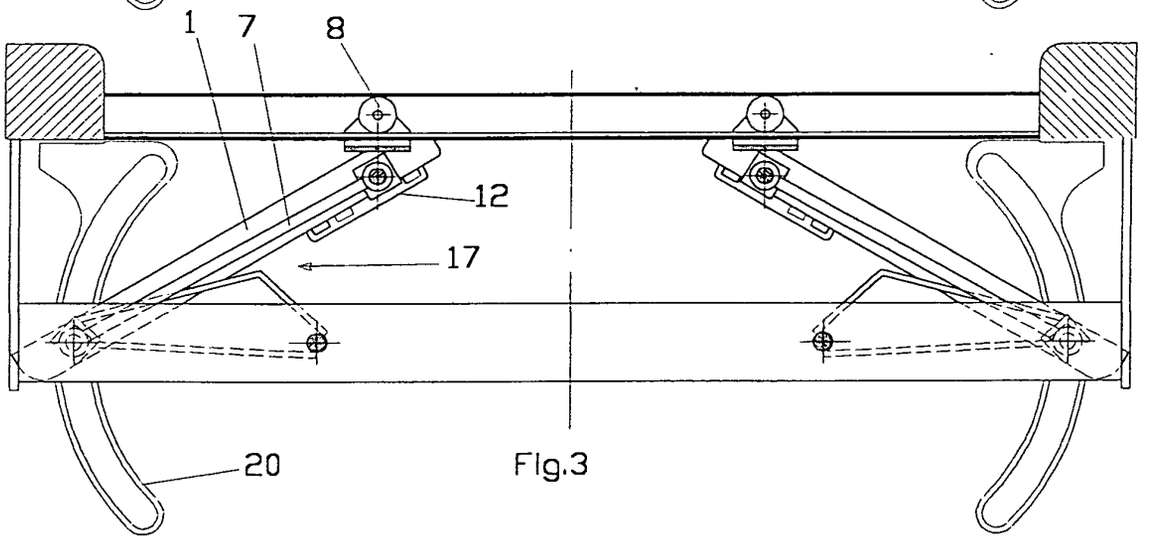

Fig.3

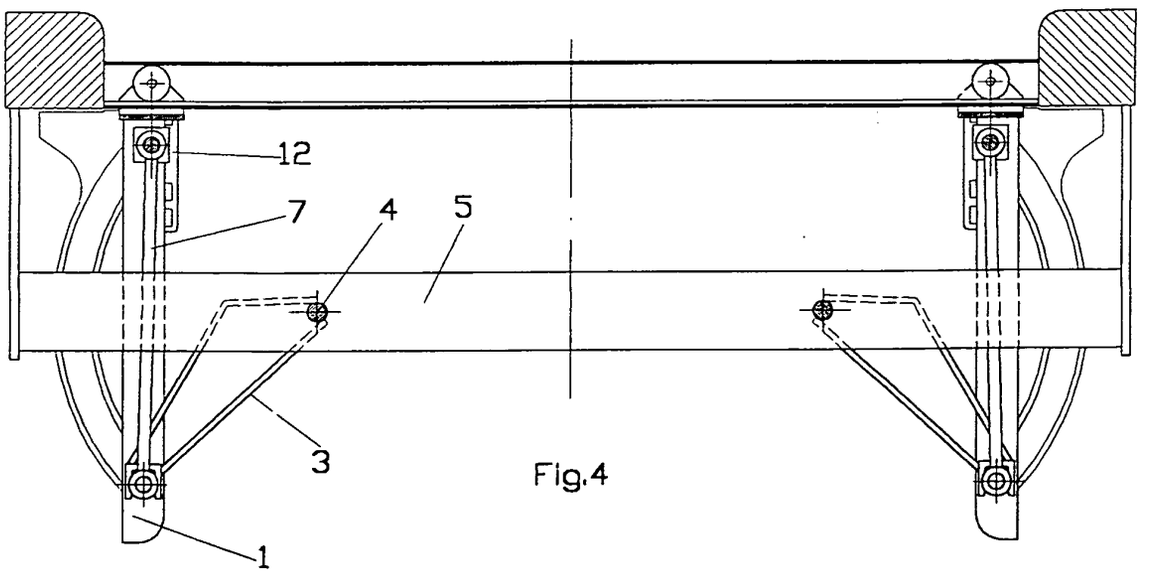

Fig.4

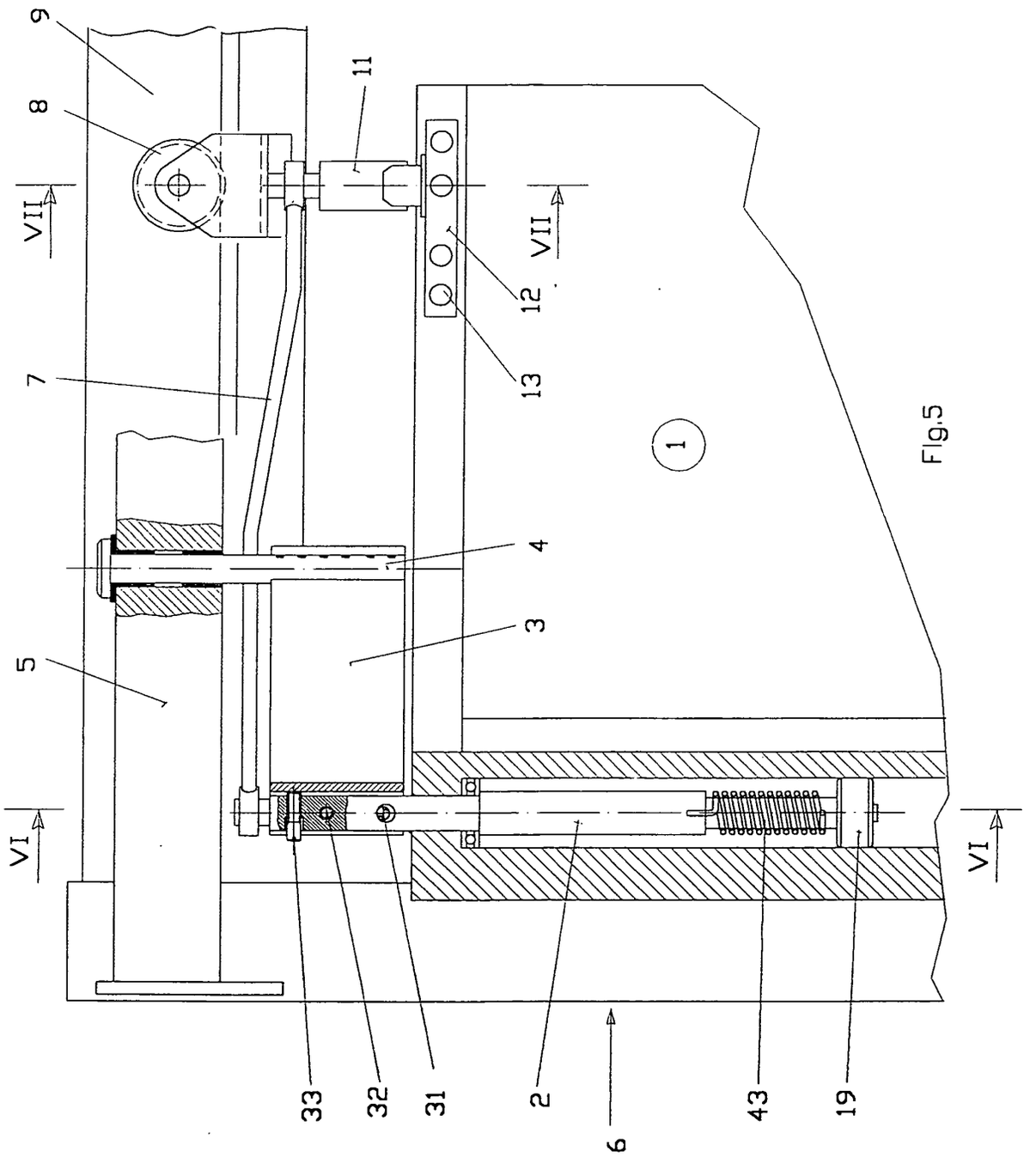

Fig.5

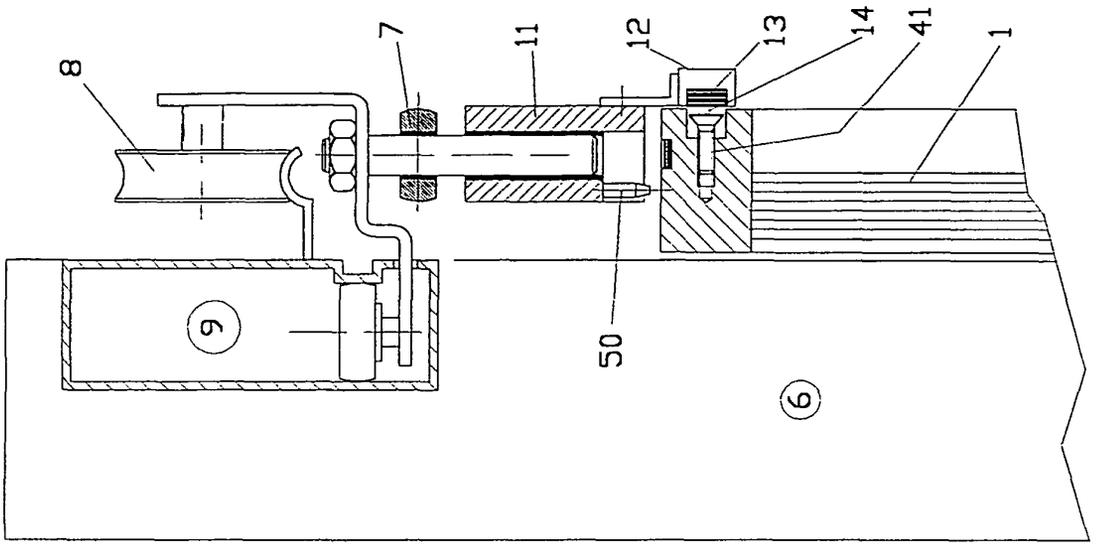

Fig.7

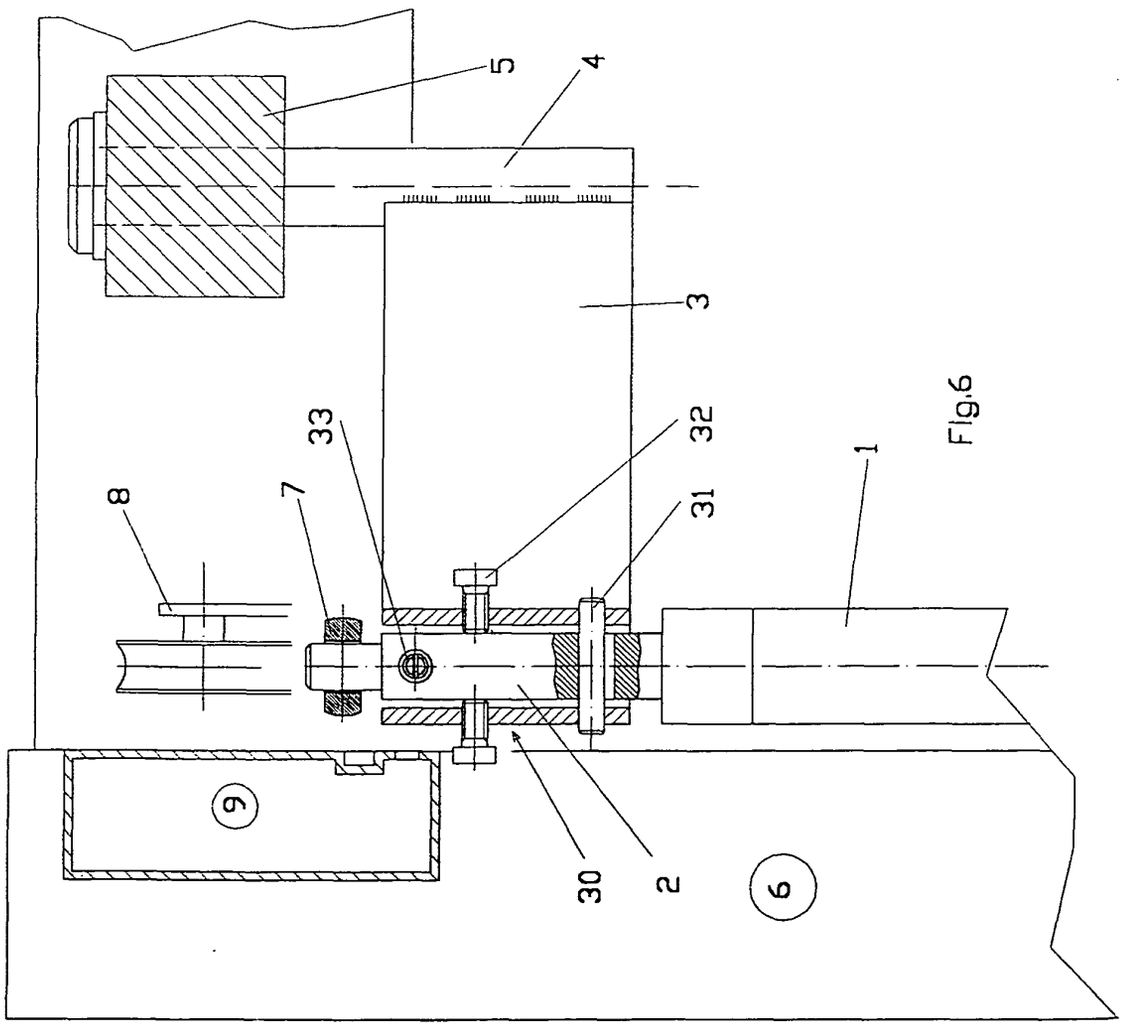

Fig.6

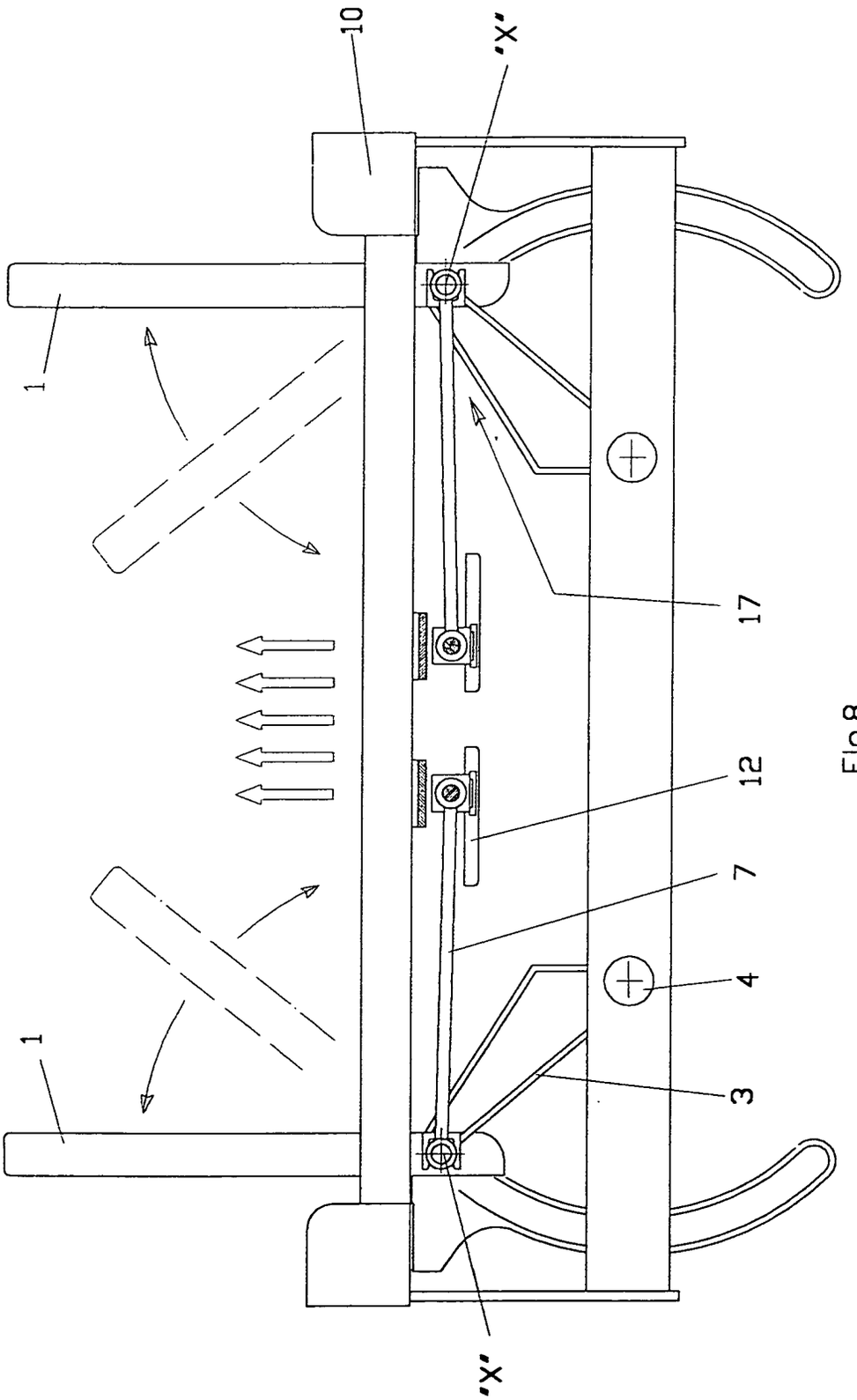

Fig.8