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(54) **Guide and closure device for sliding door for a cold room**

(57) A guide and closure device for a cold room sliding door (1) comprises an overhead guide (2) positioned to correspond with a wall (16) of said cold room in which an aperture (14) is provided onto which the door (1), movable along said guide (2) via guided support means (20) associated with the door, closes; the support means (20) comprise eccentric means (33) cooperating with counteracting means (57) rigid with the guide (2) when the door corresponds with said aperture (14), said cooperation resulting in a first movement of the door (1) parallel to itself and to the cold room wall perpendicular to this latter, said support means (20) also cooperating with ramp means (21) arranged to move the door (1) relative to the guide (2) parallel to itself in a direction perpendicular to the guide simultaneously with said first movement when the eccentric means (33) cooperate with the counteracting means (57).

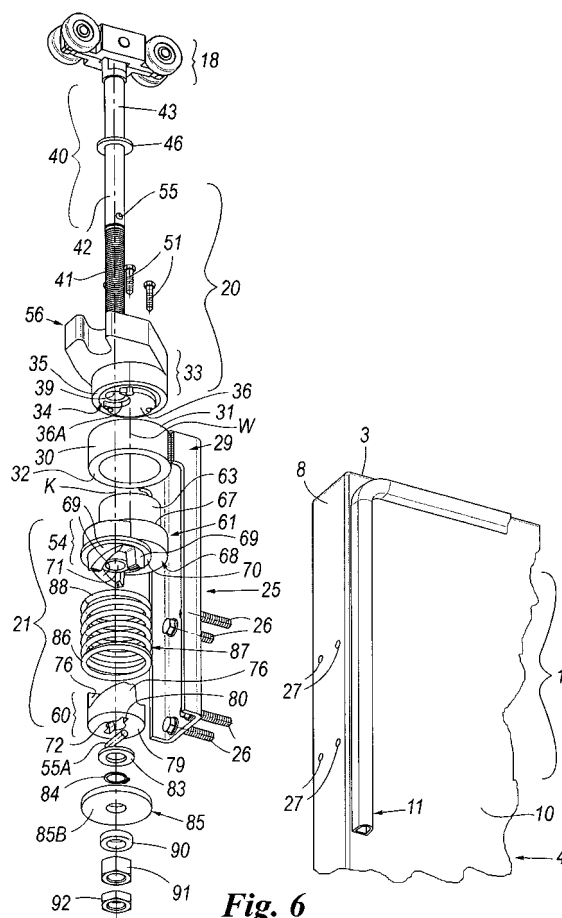


Fig. 6

Description

[0001] The present invention relates to a guide and closure device for a cold room sliding door, in accordance with the introduction to the main claim.

[0002] A cold room is known to comprise, in a wall thereof, an aperture provided with a door which can either be hinged to said wall or be moveable along an overhead guide positioned parallel to said wall, with which the door cooperates via carriages inserted into said guide.

[0003] With reference to this latter type of closure for cold rooms, the door has to approach the aperture by moving in a direction perpendicular to said wall while at the same time also moving perpendicular to the guide when it approaches the aperture to close it, or when withdrawing therefrom to release it in order to allow access to the cold room. The purpose of this is to enable the gaskets associated with the door to achieve optimal sealing against the wall.

[0004] The movement perpendicular to the guide also enables the door to be raised from a surface or floor above which it moves, to prevent any non-uniformity in the level of the floor from blocking the movement of the door, should this come into contact with it.

[0005] To achieve these movements, the overhead guide usually presents an insert comprising at least one portion having a plane inclined towards the floor and presenting a guide edge for the carriage which causes it (together with the door) to approach the wall.

[0006] This solution, although simple, means that the guide must be provided with said insert, which must have the correct dimensions to enable the door to precisely close onto the wall aperture. It follows that manufacturers of cold room guide and closure devices are required to produce inserts of different lengths depending on their use, in order to dispose the inclined plane portions and the guide edge in the correct position to enable the door to close precisely. Alternatively, the final user or installer of the guide has to cut said insert (in this case of standard length) to size and correctly position the inclined plane portion at the optimum guide point, on installing the door guide and closure device.

[0007] All this is complicated, in addition to increasing the time for producing and/or mounting the guide of said device, and increases the costs of this latter.

[0008] An object of the invention is to provide a guide and closure device for a cold room sliding door which represents an improvement over known solutions.

[0009] A particular object of the invention is to provide a device of the stated type which is of universal use, independent of the width of the cold room aperture onto which the door is required to close.

[0010] Another object of the invention is to provide a device of the stated type which is of simple installation and reliable use.

[0011] A further object is to provide a device which, precisely because of its universality, requires no intervention on the overhead guide, such as to adapt it to the

size of the cold room aperture.

[0012] These and other objects which will be apparent to the expert of the art are attained by a device in accordance with the accompanying claims.

[0013] The present invention will be more apparent from the accompanying drawings, which are provided by way of non-limiting example, and in which:

- Figures 1 and 2 are perspective views of a device of the invention associated with a sliding door shown in the open and closed position respectively;
- Figures 3 and 4 are views from above of the device of the invention shown in Figures 1 and 2 respectively;
- Figure 5 is a perspective exploded view from above, of the device of Figure 1;
- Figure 6 is a perspective exploded view from below, of the device of Figure 1; and
- Figure 7 is a longitudinal section through the device of Figures 5 and 6 when assembled.

[0014] With reference to said figures, a guide and support device for a sliding door 1 comprises an overhead guide 2 positioned at an upper end 3 of the door 1. This latter comprises a body 4 with lateral sides 7 and 8, and opposing flat faces 9 and 10. At least at the sides 7 and 8 and at the end 3, the flat face 10 presents a seal or gasket element 11 arranged to cooperate with edges 12 of an aperture 11 provided in a wall 16 of a cold room. By virtue of the gasket 11, the door is able to seal against the aperture 14, and can be withdrawn from this aperture to enable access to the cold room, by moving along the overhead guide 2 on a carriage 18 movable within this latter.

[0015] More particularly, the device of the invention comprises support means 20 carrying the carriage 18 and ramp means 21, these means 20 and 21 enabling the door 1 to move parallel to itself, in a direction perpendicular to the wall 16 and perpendicular to the guide 2 respectively, such as to enable said door to sealedly close onto the aperture 14 or to withdraw therefrom to enable access to the cold room interior.

[0016] A bracket 25 is fixed (by screws 26 cooperating with holes 27 in the respective side) along each lateral side 7 and 8. The bracket has a substantially L-shaped upper end 29 (close to the upper end 3 of the door 1) supporting an annular bush 30 projecting from the bracket and having an upper end 31 and a lower end 32. At the upper end 31 of the bush 30 a member 33 (forming part of the support means 20) is present presenting a lower face 34 having a flat perimetral edge 35 resting on said edge 31 and within which a circular sector-shaped surface 36 is present, projecting from said face 34.

[0017] A hole 39 passing through the member 33 and positioned eccentrically about the longitudinal central axis W of said member opens into the face 34 at a hollow lateral portion 36A of said surface 36. Positioned within the eccentric hole 39 there is a shaft 40 having a first

threaded portion 41, a second intermediate portion 42 and a third end portion 43 opposite the portion 41 and separated from the second portion by a collar 46 projecting laterally from the shaft. This collar 46 rests on a recessed upper face 47 of the member 33, into which other

[0018] The portion 43 of the shaft 40 carries the corresponding carriage 18, while the portion 42 presents a hole 55 to contain a pin 55A, the function of which is described hereinafter.

[0019] The member 33 presents a laterally projecting fork 56 cooperating with actuator means for moving the door relative to the wall 16 such as to move the door onto the aperture 14 or to withdraw it therefrom. These actuator means are for example a corresponding counteracting member 57 rigid with the guide 2. This member is carried by a bracket 58 which can be welded directly to the guide 2 or be rigidly secured thereto by an embracing element 160 mounted movable on said guide and fixed in a suitable position thereon in any known manner, for example by screws (not shown). The guide 2 comprises two elements 160 positioned apart by a distance substantially equal to that of the access width of the aperture 14. Their cooperation with the fork 56 of the members 33 provided on both lateral faces 7, 8 of the door 1 enables the door 1 to be made to approach the wall 16 by movement parallel to itself and by cooperation between said forks and said counteracting members 57, this cooperation resulting in rotation of each member 33 about the shaft 40, this rotation being eccentric about the central axis W of said member and hence of the corresponding bush 30, and which enables the door to move parallel to itself towards the wall 16, i.e. in a direction perpendicular to this latter.

[0020] As stated, the member 33 is fixed by screws 51 to the first ramp member 54, this latter cooperating with a second ramp member 60 to enable the door to move parallel to itself and perpendicular to the guide 2.

[0021] More particularly, the first ramp member 54 comprises a body 61 having a portion 63 to be inserted into the bush 30. On the body 61, at the base of the portion 63, a step is hence present on which the lower end 33 of the bush 30 rests.

[0022] The portion 63 presents a first recessed free end defining the upper free face 64 of the member 54; the cavity 64A of this end or face 64 has a shape corresponding to that of the surface 36 of the said member 33 and presents on one side a projection 66 of shape corresponding to the hollow lateral portion 36A of said surface 36. In this manner, this latter sits in the cavity 64A and is engaged therewith by a form fit which, together with the presence of the screws 51, renders the member 54 rigid with the member 33.

[0023] The first ramp member 54 comprises a peripheral collar or step 67 on which the bush 30 rests. From an end face 68 opposing the face 64, a structure projects

comprising inclined planes and/or ramps 69 and positioned to the inside of said face, which hence comprises a flat part 70. The structure comprising ramps 69 bounds a through hole 71 of the member 54 to receive the shaft 40.

[0024] This latter also penetrates through a hole 72 of the second ramp member 60 presenting an upper end 7 with a plurality of upper ramps 76 arranged to cooperate with the ramps 69 of the member 54, and a second flat end 79 into which the hole 72 opens and where there also opens a recess 80 of elongate shape having its axis perpendicular to that of the hole 72 (coinciding with the axis K of the shaft 40 eccentric to the axis W of the member 33). This hole houses the pin 55A inserted into the hole 55 of the shaft 40 to render the second ramp member 60 rigid with this latter and static relative to the first ramp member 54 (rigid with the member 33 and movable therewith about the shaft 40, which is fixed).

[0025] The pin 55A is locked in the recess 80 by a washer 83 and retaining ring 84 mounted on the portion 42 of the shaft 40. On this latter an annular disc 85 is also mounted having opposing flat faces 85A and 85B. A first end 86 of a spring 87 surrounding the entire second ramp member 60 rests on the face 85A, its second end 88 resting on the flat part 70 of the face 68 of the first ramp member 54.

[0026] A thrust bearing 90 acts on the second (lower) face 85B of the disc and is urged against this face by a nut 91 and locking nut 92 screwed into the threaded portion 41 of the shaft 40. The nut and locking nut (replaceable by a self-locking nut) can be positioned at various levels along the end 41 of the shaft, to enable the disc 85 to be positioned at greater or lesser closeness to the second ramp member 60. The result of this is that the spring 87 can be compressed to a greater or lesser extent between said disc and the first ramp member 54; in this manner the preload of said spring can be modified such that it is able to exert a greater or lesser thrust on the first member 54 and hence on the bush 30, this thrust contributing to raising the door parallel to itself towards the guide 2 at the commencement of opening.

[0027] The function of the spring is hence to facilitate opening of the door 1 by overcoming part of its weight, which is made to act entirely on the shaft 40 via the bearing 90 with the disc 85 and the retaining ring 84 with the washer 83, and via the second ramp member 60. The spring overcomes part of the weight of the door by thrusting it towards the guide 2, this thrust being adjustable by the nut 90 and locking nut 91. Hence the door weight does not completely bear on the ramp member 60 and on the ramp member 54, with the result of considerably facilitating the rotation of the ramp member 54 relative to the fixed ramp member 60 at the commencement of door opening (raising).

[0028] During use, assuming the door to be initially open (situation corresponding to the position of the ramp members 54 and 60 shown in Figure 7), the door is slid along the guide 2 until its sides 7 and 8 arrive in proximity

to the counteracting members 57. At this point the forks 56 of the members 33 of the support means 20 enter into cooperation with said counteracting means to cause said members 33 to rotate about the shaft 40 with the continuing movement of the door along the guide.

[0029] By virtue of the eccentricity of the shaft to the axis W of the members 33, these undergo a rotation about the shaft which moves the door 1 parallel to itself towards the aperture 14 in the wall 16, said movement taking place in a direction perpendicular to this latter.

[0030] Simultaneously, as the first ramp member 54 is rigid with the member 33 and the second ramp member is rigid with the (fixed) shaft 40, there is also a relative movement between these members with a mutual movement of the ramps 69 and 76 one on the other. In this manner, said members which are initially separated approach each other such that the ramps mutually co-penetrate and the members 54 and 60 compact. Consequently the door, resting via the bush 30 on the first ramp member 54, is lowered relative to the guide, to move perpendicular to it and parallel to itself.

[0031] The combination of this movement simultaneously with that of the approach to the door 16 results in the door closing onto the aperture 14. This is achieved without providing for anything to be associated with the guide 2, which can hence be a simple standard profile bar of any length.

[0032] The entire door movement hence derives from members associated with the door itself, their position on the door not depending on the width of the aperture 14. Having constructed the door 1, the means 20 and 21 defining the device of the invention can hence be associated with it without any further action on the guide 2 or on said means.

[0033] The door is evidently opened by the means 20 and 21 undergoing movements opposite to the aforedescribed, these movements being evident from the aforegoing description and hence not further described.

[0034] The device of the invention is easily positioned on the door, this being a rapid operation not requiring intervention on the overhead guide.

[0035] One embodiment of the invention has been described. Others are however possible in the light of the foregoing and are to be considered as falling within the scope of the following claims. For example, the actuator means for moving the door relative to the wall 16 and to the aperture 14 can be an electro-piston associated preferably with the top 3 of the door 1, cooperating with each fork 56 and activated by a switch operated manually or automatically (for example by position sensors sensing when the door is positioned at the aperture 14). Alternatively, these actuator means can be at least one pneumatic or hydraulic piston.

Claims

1. A guide and closure device for a cold room sliding

door (1), said device comprising an overhead guide (2) within which guided support means (20) slide, associated with the door, said guide being positioned to correspond with a wall (16) of said cold room in which an aperture (14) is provided onto which the door (1), movable along said guide (2), closes, **characterised in that** the support means (20) comprise a member (18) slidable within said overhead guide (2) and eccentric means (33) movable about a shaft (40) rigid with the door and carrying said slidable member (18), said eccentric means (33) cooperating with actuator means (57), fixed to the guide (2), when the door corresponds with said aperture (14), said cooperation resulting in a first movement of the door (1) parallel to itself and to the cold room wall perpendicular to this latter, said support means (20) being made rigid with the door (1) by means of a fixing element (25) and also presenting ramp means (21) disposed on said shaft (40) and comprising a first ramp member (54) rigid with the eccentric means and a second ramp member (60) fixed to the shaft (40) carrying the slidable member (18), said ramp members (54, 60) having at least one ramp (69, 76) projecting from opposing end faces (68, 75) and mutually cooperating to further move the door (1) relative to the guide (2) parallel to itself in a direction perpendicular to the guide simultaneously with said first movement when the eccentric means (33) cooperate with the actuator means, said movements of the door (1) along two mutually perpendicular directions taking place simultaneously, to cause the door (1) to close or to open the aperture (14) of said wall (16).

2. A device as claimed in claim 1, **characterised in that** the eccentric means comprise a member (33) presenting a fork projecting laterally therefrom and arranged to cooperate with a fixed counteracting member (57) rigid with the guide (2) and defining the actuator means, said member rotating eccentrically about the shaft (40) carrying a carriage (18) defining the member movable along said guide (2), said member (33) being rigid with the first ramp member (54), itself rigid with the element (25) fixing said support means to the door (1), said shaft (40) being fixed relative to the member (33).

3. A device as claimed in claim 2, **characterised in that** the fixing element (25) is rigid with a corresponding side (7, 8) of the door (1) and presents a bush (30) projecting from the door (1), a portion (63) of the first ramp member (54) rigid with the forked (56) member (33) being inserted into said bush.

4. A device as claimed in claim 1, **characterised in that** the first ramp member (54) presents a first free end or end face (64) having a cavity (64A) arranged to receive as a form fit an end surface (36) of the

member (33) with fork (56), said first end face being positioned on a portion (63) of said ramp member (54) inserted into said bush (30) of the fixing element (25), said first ramp member (54) comprising a perimetral collar (67) on which a first free end (32) of said bush (30) rests, a second free end (31) of said bush resting on a flat perimetral edge (35) of the member (33) with fork (56), said first ramp member (54) comprising a through hole (71) to receive the fixed shaft (40).

5. A device as claimed in claim 1, **characterised in that** the second ramp member presents a through hole (72) to receive the fixed shaft (40), into its second end (79) there opening a recess (80) with its axis perpendicular to said through hole (72) and transverse to this latter, a member (55A) being inserted into said recess for coupling and fixing the second ramp member (60) to said shaft (40).

6. A device as claimed in claim 5, **characterised in that** said coupling and fixing member is a pin (55A) inserted into a transverse hole (55) of the shaft (40).

7. A device as claimed in claim 1, **characterised in that** the shaft (40) rigid with the door and fixed relative thereto comprises, external to the second ramp member (60), a first threaded terminal portion (41) on which a disc (85) is mounted, on said threaded portion (41) there being screwed at least one nut (91) able to modify the position of the disc (85) and of the second ramp member (60) on the shaft (40).

8. A device as claimed in claim 7, **characterised in that** a thrust bearing (90) is positioned between said nut (91) and the disc (85), the nut (91) cooperating with a locking nut (92), said nut and locking nut being able to be replaced by a self-locking nut.

9. A device as claimed in claim 7, **characterised in that** the fixed shaft comprises an intermediate second portion (42) presenting the transverse hole (55) and a third portion (43), both non-threaded, the third portion being the end portion carrying the carriage (18).

10. A device as claimed in claim 1, **characterised by** comprising thrust means (87) associated with the shaft (40) rigid with the door and arranged to intervene on opening the door (1), to facilitate its movement, said means (87) acting on support means (20) with an adjustable thrust which tends to move the door towards the guide (2).

11. A device as claimed in claims 7 and 10, **characterised in that** the thrust means are a spring (87) having a first end (86) acting on the disc and a second end (88) acting on the first ramp member (54), the elastic

thrust of the spring (87) being able to be modified, on the basis of the door weight, by moving the disc (85) along the fixed shaft (40) by acting on the nut (91) screwed onto the threaded portion (41) of said shaft, this enabling the force for opening the door (1) to be reduced.

12. A device as claimed in claim 1, **characterised in that** the actuator means (57) are alternatively electromechanical, pneumatic or hydraulic.

13. A device as claimed in claim 1, **characterised in that** the door (1) presents two support means (20), each of which is associated with a corresponding side (7, 8) of the door by a respective fixing element (25).

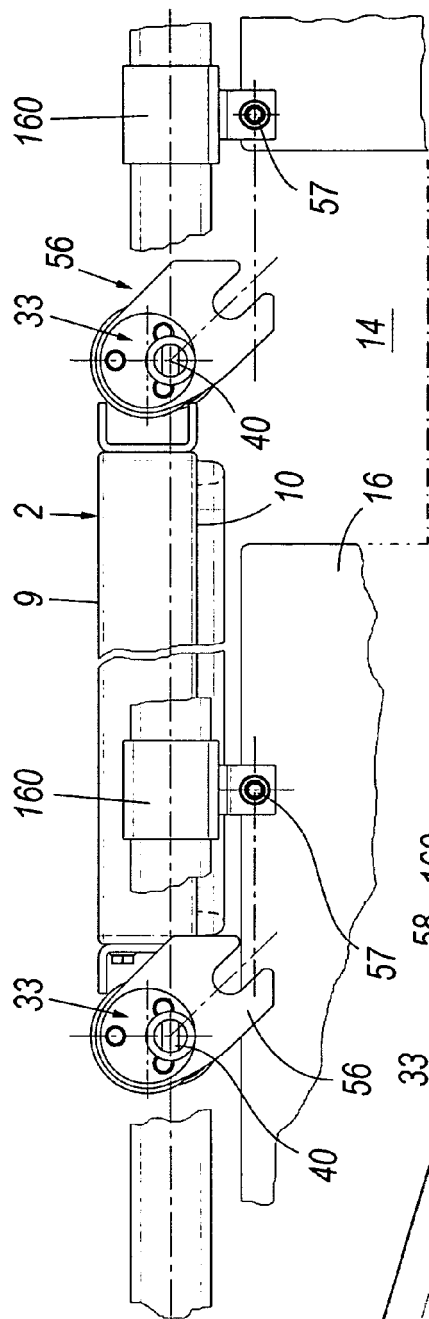


Fig. 1

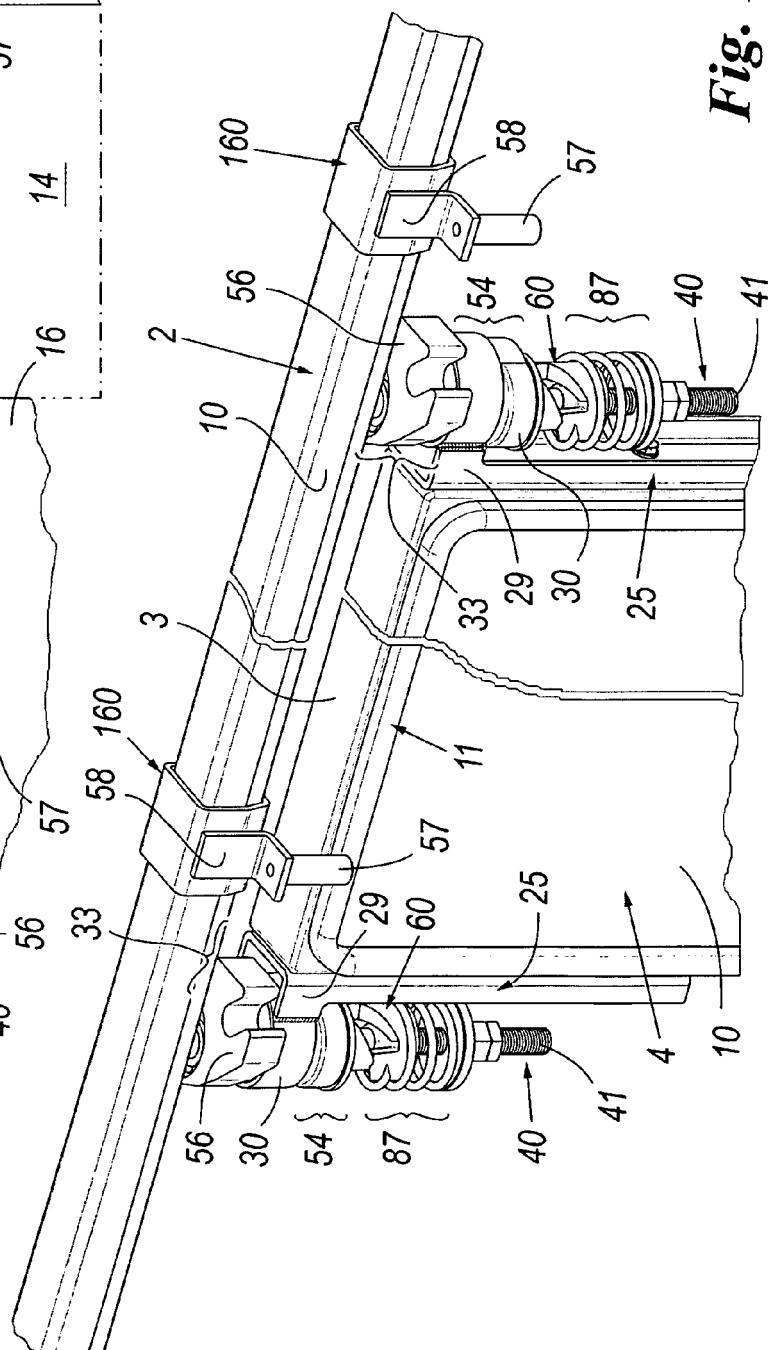
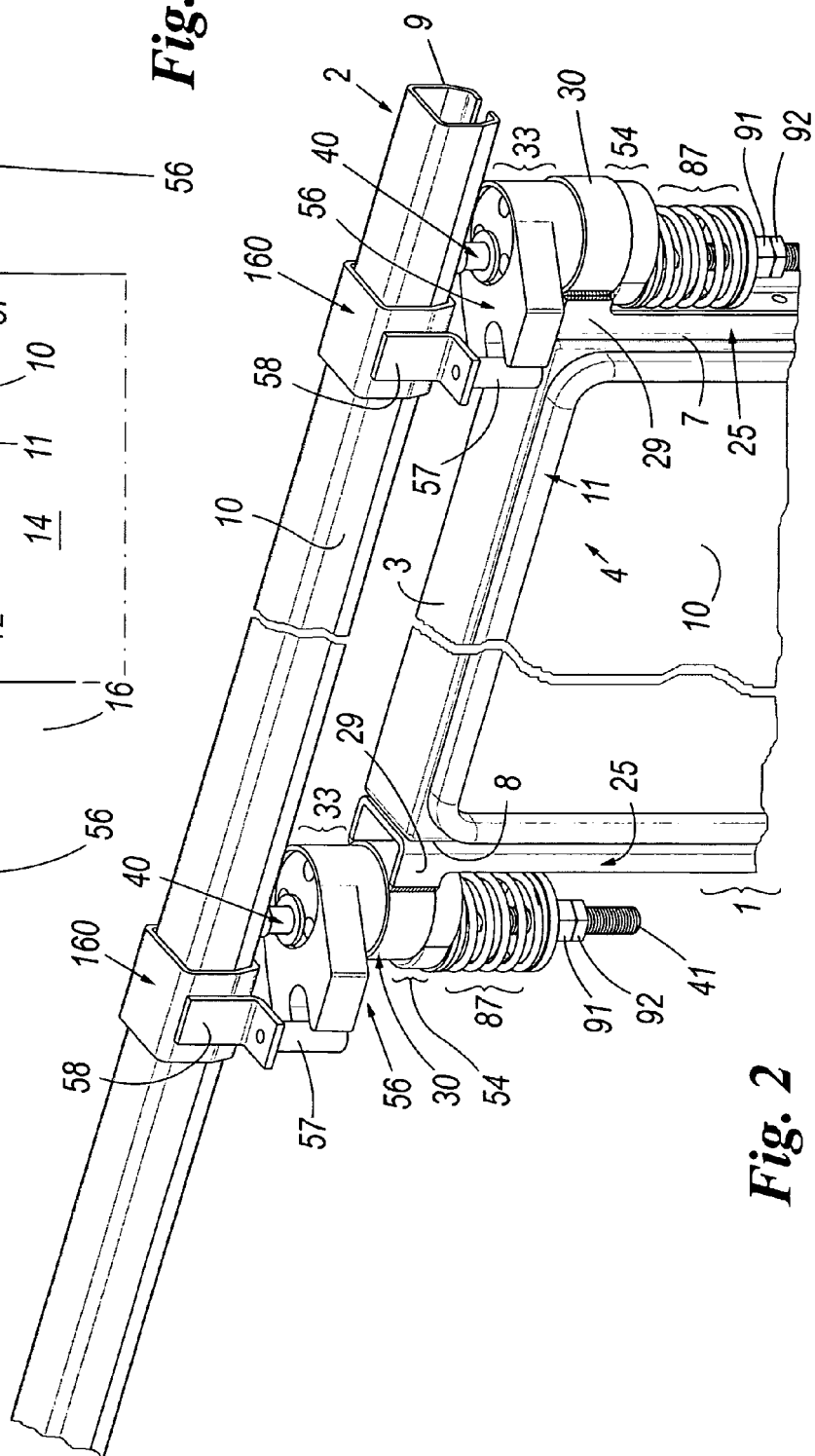
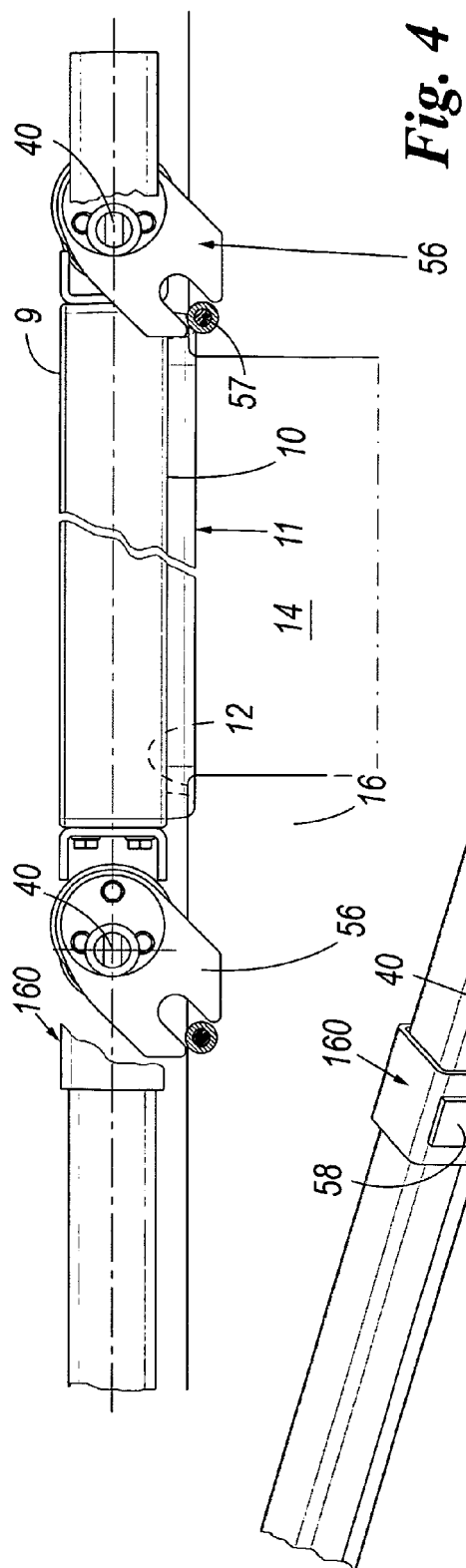


Fig. 3



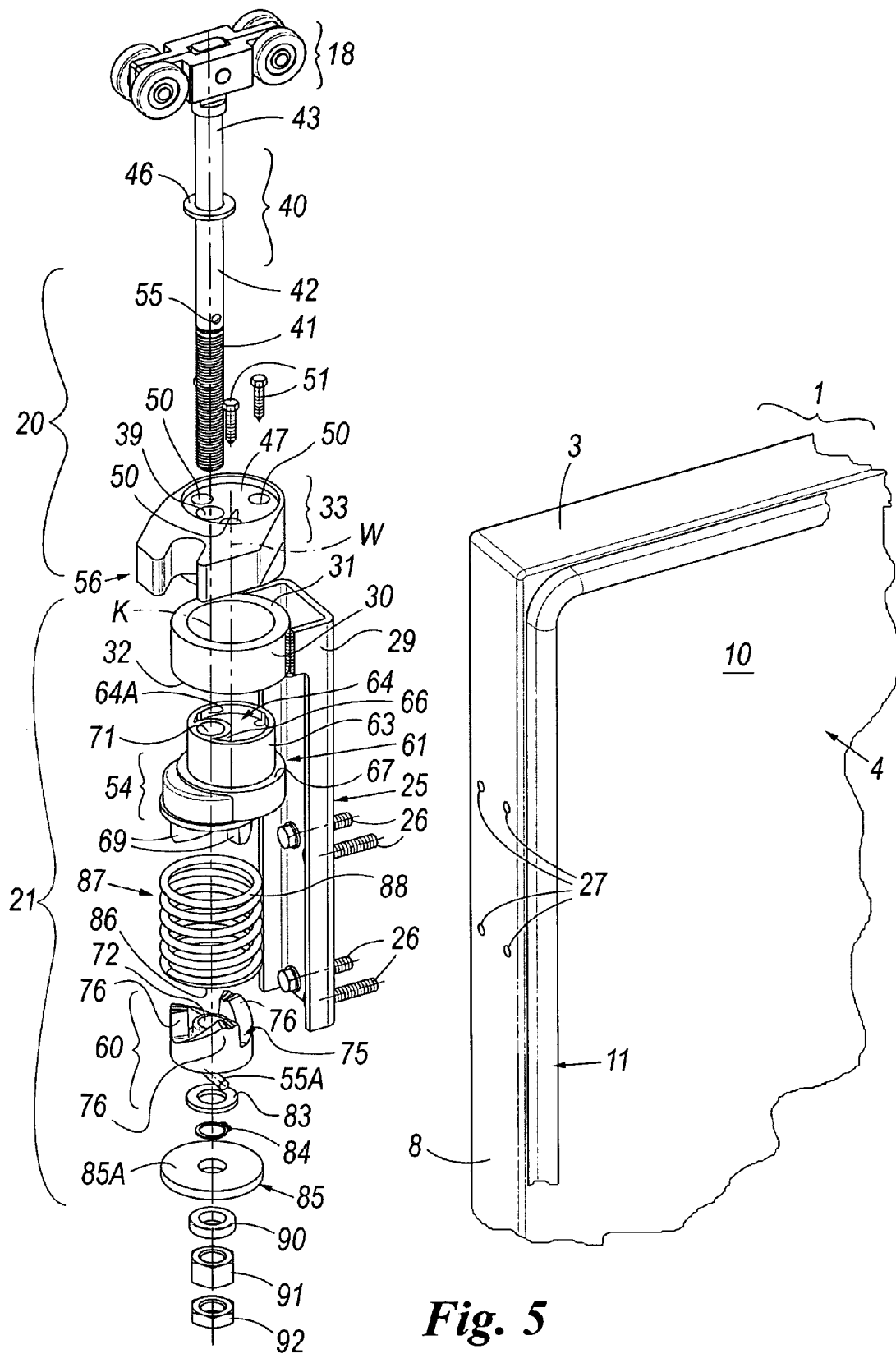


Fig. 5

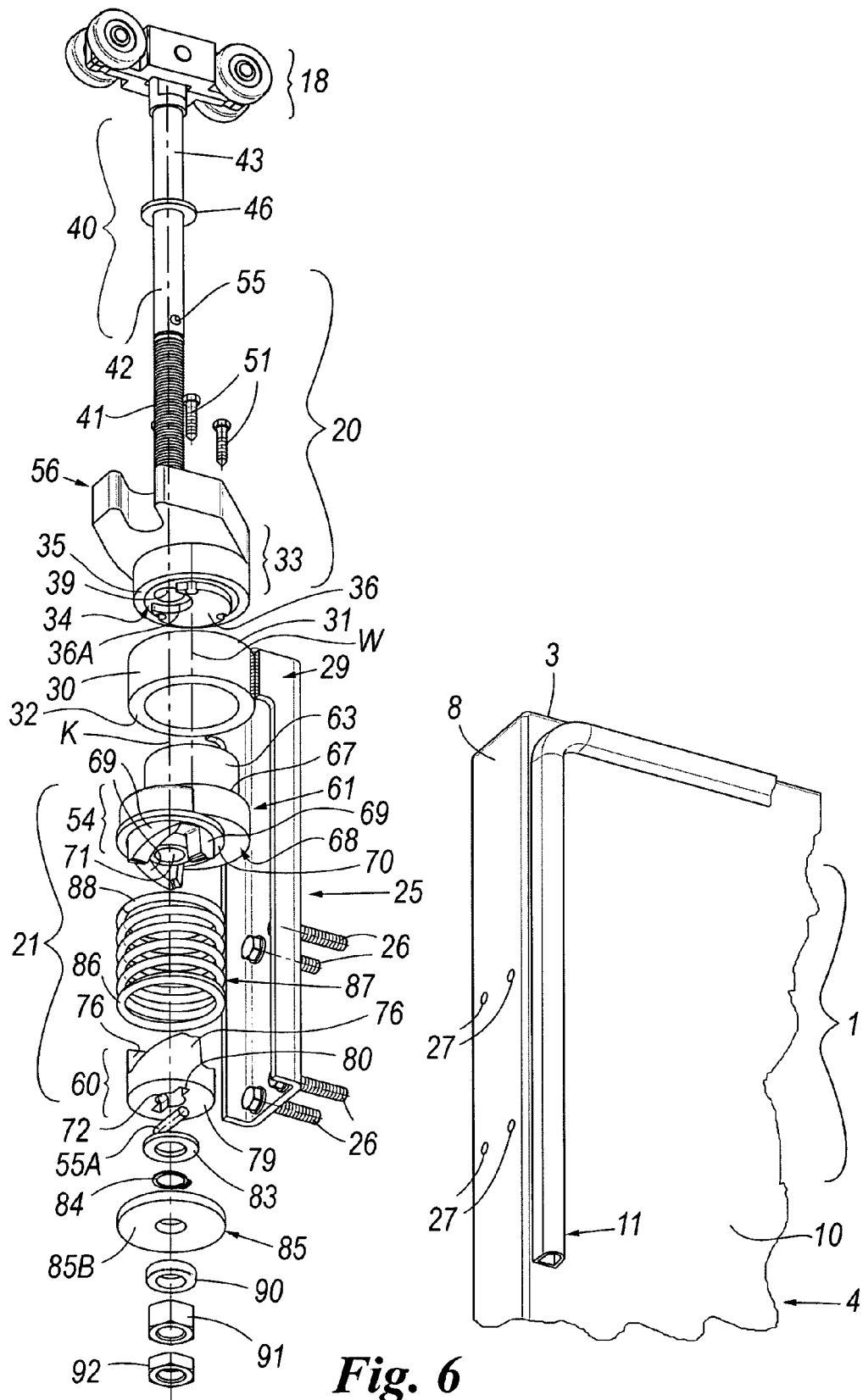
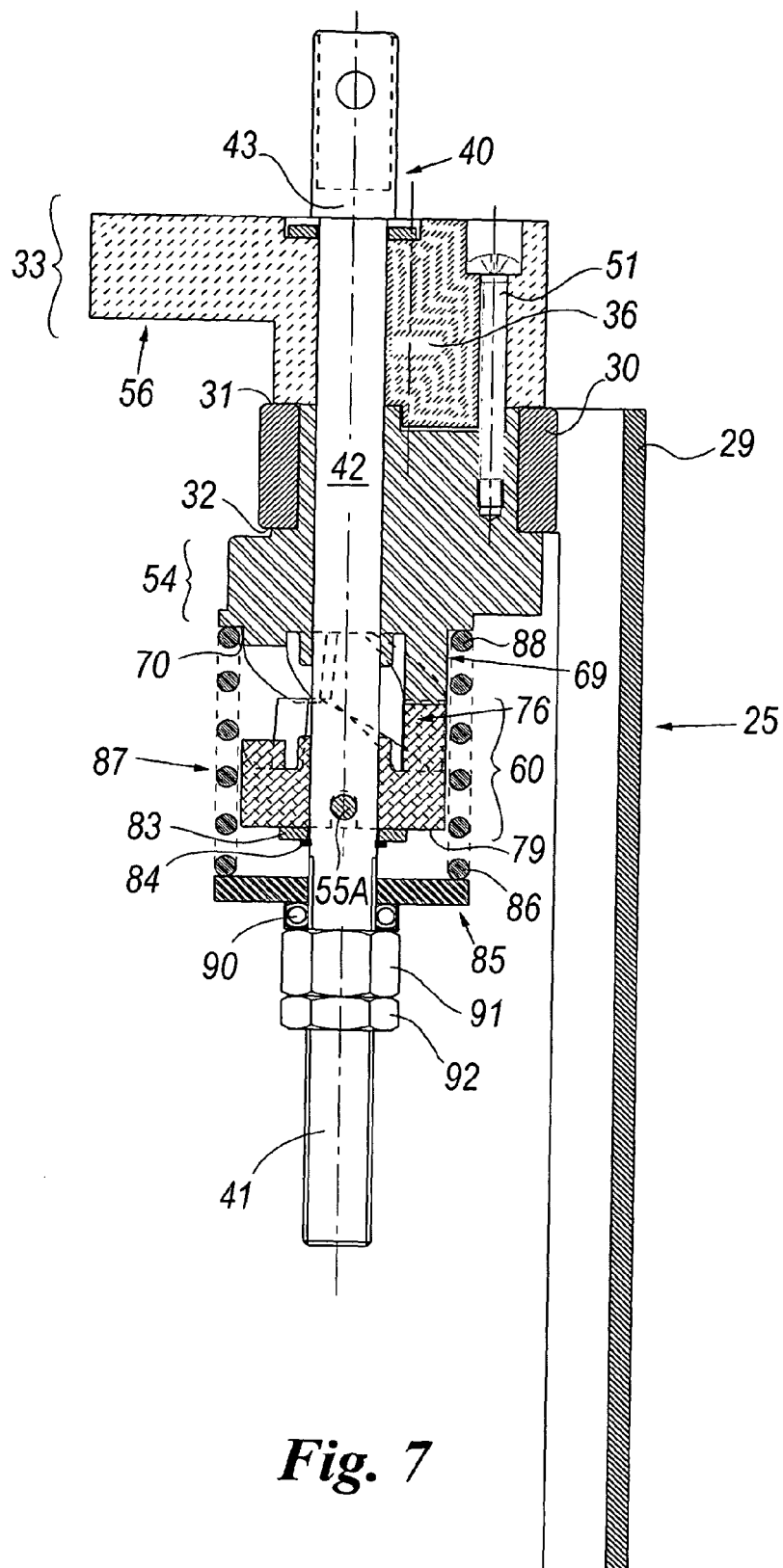


Fig. 6





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Application Number
EP 10 16 9110

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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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