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(11) **EP 0 908 596 A2**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:  
**14.04.1999 Bulletin 1999/15**

(51) Int. Cl.<sup>6</sup>: **E06B 9/13**, E06B 9/58

(21) Application number: **98118561.4**

(22) Date of filing: **01.10.1998**

(84) Designated Contracting States:  
**AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU  
MC NL PT SE**  
Designated Extension States:  
**AL LT LV MK RO SI**

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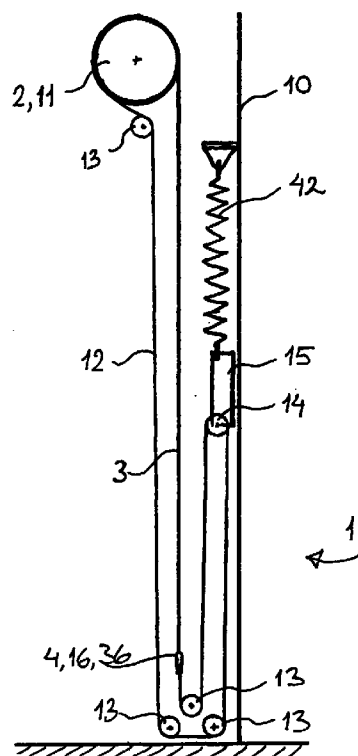
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(30) Priority: **06.10.1997 DK 114097**

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(54) **A rolling door and a frame profile therefore**

(57) The invention provides a rolling door for mounting in connection with a door opening (5) in a wall, e.g. in a storehouse, a cold store or the like, comprising two frame posts (1) for mounting at the sides of the door opening, a roller (2) arranged uppermost between the two frame posts (1), a door leaf (3) of a flexible material, preferably a curtain which is secured to the roller (2) at one end and is provided with a boom (4) at the other end, guide means (16, 21, 36) for guiding the boom (4) during rolling up and down of the door leaf (3) about the roller (2) to open and close the door, and hoisting means (6, 11-15, 22, 42) for rolling the door leaf (3) up and down, said guide and hoisting means (6, 11-16, 36, 42) being slidably arranged in their respective slide tracks (21, 22) in a frame profile (10), which exhibits a mounting face (29) for the frame profile (10) on the opposite side of the slide tracks (21, 22) disposed in parallel. Also a frame profile (10) therefor is provided. The resulting rolling door is extremely compact and therefore just requires relatively modest installation space, just as the rolling door of the invention is comparatively noiseless in operation and is not very costly in operation and manufacture.



**Fig. 2**

**EP 0 908 596 A2**

## Description

**[0001]** The present invention relates to a rolling door for mounting in connection with a door opening in a wall, e.g. in a storehouse, a cold store or the like, comprising two frame posts for mounting at the sides of the door opening, a roller arranged uppermost between the two frame posts, a door leaf of a flexible material, preferably a curtain, which is secured to the roller at one end and is provided with a boom at the other end, guide means for guiding the boom during rolling up and down of the door leaf around the boom to open and close the door, and hoisting means for rolling the door leaf up and down. The invention moreover relates to a frame profile for a frame post in such a rolling door.

**[0002]** A rolling door of such a type is used particularly in connection with internal door openings in buildings, such as storehouses, cold stores, etc., where goods are frequently transported in and out, it being possible to construct such doors with a high opening and closing rate. The rolling door is unique in being reliable in operation, as it is wear resistant and requires a minimum of maintenance. It moreover has a wide field of use and is easy to operate, which gives a smooth handling of the traffic at the work place.

**[0003]** The curtain is rolled up and down to open and close the door, respectively. It is made of a strong material with a good insulating effect so that it can offer a good protection against temperature differences as well as wind and weather. It may alternatively be made as a plurality of interconnected slats.

**[0004]** The door is installed at the opening in a wall, such as on the outer side of an inner wall. The two frame posts are mounted on the wall along the wall faces at the edge of the door opening. The roller is arranged between the two frame posts immediately above the upper edge of the opening.

**[0005]** The means for hoisting and lowering the curtain are arranged in the frame posts and are driven by a motor which is positioned uppermost at one of the posts. This motor drives a transverse shaft on which the roller is mounted, and which, at each end, has mounted thereon winding wheels for a belt pull and the curtain in the slide guide thereof. A tension spring is moreover arranged downwardly in each post in connection with the hoisting means, and this tension spring keeps the curtain stretched during hoisting as well as lowering.

**[0006]** This known type of rolling door, however, has the drawback that it takes up a good deal of space along the edge of the opening and thus protrudes much into the room. This means that the frame posts are extremely exposed to damaging impacts, such as from collisions from fork-lift trucks or the like. To prevent damage to the frame posts, a bollard is typically arranged in front of the frame posts. Also the boom may easily be bumped into, as it is seated downwardly on the curtain and thus forms the upper edge of the door opening.

**[0007]** This type of rolling door is adapted to specified

installation dimensions in the manufacture, inter alia by bending profiles for door frames. This means that it is relatively easy to mount subsequently, but also that only a limited number of standard components can be used for the construction of it.

**[0008]** The object of the invention is to provide a rolling door which has the same advantages as the known rolling doors with respect to reliability in use, etc., but which requires considerably less installation space.

**[0009]** The invention comprises a rolling door of the type mentioned in the opening paragraph in which the guide and hoisting means are slidably arranged in two parallel guide tracks in a frame profile, which moreover exhibits the mounting face for the frame posts.

**[0010]** In the already known type of rolling doors, the hoisting means are arranged externally on the guide means, which causes the frame posts to be relatively deep. However, it has been realized by the invention that the positioning of the two guides for the guide and hoisting means side by side provides a rolling door which takes up considerably less space than the known type, as the frame posts in a rolling door according to the invention are dimensionally considerably smaller and therefore just protrude half as far into the room from the wall on which they are mounted.

**[0011]** Further, the frame profile for both posts is the same. This means that the frame profiles for a door may be manufactured in arbitrary "overlengths" and subsequently be adapted to the respective installation dimensions in connection with the manufacture of the rolling door or even only when the rolling door is installed. The parts for the rolling door may be packed extremely compactly in a rolling door according to the invention, which results in an easier and less expensive transport, in particular over long distances, which makes the rolling door of the invention competitive also on far-away markets.

**[0012]** The guides for the curtain and the hoisting means are arranged side by side in the same frame profile. Furthermore, the frame profiles directly engage the wall portions of the building around the opening against which the door is mounted. This results in an extremely good vibration damping of the guide and hoisting means, which in turn leads to an effective reduction of noise in use.

**[0013]** In a preferred embodiment of the frame profile, this is made as an extruded profile, preferably of aluminium. Alternatively, the frame profile may be made of one or more profiles of stainless steel which are welded together or otherwise joined to a frame profile according to the invention.

**[0014]** Moreover, the hoisting means preferably comprise means for stretching the unrolled part of the curtain. These means comprise a winding wheel to receive a belt device and a tension spring which is positioned uppermost in each of the frame posts. The springs are hereby not subjected to any great amount of wear because of penetrating dust and dirt, as dust and dirt mainly accumulate along the floor.

**[0015]** In this embodiment, the hoisting means may moreover comprise a motor which is positioned uppermost in at least one of the frame posts, and which is connected with a centering wheel for slidable engagement in the roller, which is formed by a pipe profile with axial inner flanges which cooperate with radial corresponding recesses in the centering wheel. As the centering wheel is slidable inside the pipe profile, while the engagement between the pipe profile and the wheel is kept intact, the width of the rolling door may consequently be varied or adjusted in connection with the installation, since the wheel, at one or both sides of the pipe profile, may be moved therein for adjusting the door width.

**[0016]** The winding wheel of the stretching means is mounted on the same drive shaft as the centering wheel. This ensures that the stretching is synchronized with the hoisting means so that the stretching is constantly adapted to the height of the boom in the door, and that the stretching means do not counteract the rolling up and down of the door.

**[0017]** In a preferred embodiment of a rolling door according to the invention, the frame profile is formed with receiving flanges for piping and wiring, such as heating pipes or cables for electrical and/or pneumatic sensors. Cables in connection with e.g. the security system may hereby be concealed inside the frame profiles, just as heating may be installed in the frame posts for frost protection of the door, if so desired.

**[0018]** For reasons of safety, demands for e.g. emergency stops are made in connection with rolling doors so that individuals or machinery when passing through the door is not endangered. To meet these demands, sensors or other registration equipment connected with an emergency system for the rolling door may be mounted in the slide track on the frame profile as well as on the slide block.

**[0019]** In a further aspect of the invention, the boom is connected at each end with a slide block which is slidable in the inner slide track in the frame profile. Further, at the ends, the boom may be provided with a connecting element which is retained in a jaw arrangement on the slide blocks under spring load, which has the property that, upon a sufficiently great lateral impact on the boom, the jaws yield and release one or both connecting elements. This means that the boom when bumped into is not damaged so that it has to be exchanged, but is quite simply knocked out of position and may then be mounted again in the connecting elements at the slide blocks in the frame posts.

**[0020]** The invention also comprises a frame profile whose front side is formed with two parallel slide tracks to receive guide and hoisting means slidable in their respective tracks, and whose rear side exhibits a smooth mounting face for the frame profile.

**[0021]** Further preferred embodiments of the frame profile are defined in claims 12 to 16.

**[0022]** The invention will be described more fully

below with reference to the drawings in which

- fig. 1 shows a perspective view of a rolling door according to the invention,
- fig. 2 shows a schematic view of the hoisting and stretching mechanisms in the frame posts,
- fig. 3 shows a front view of the upper part of a frame profile in which the hoisting, stretching and drive means in connection with the rolling up and down of the curtain are mounted,
- fig. 4 shows a cross-section of a preferred embodiment of a frame profile according to the invention,
- fig. 5 shows a cross-section of a pipe profile for the roller,
- fig. 6 shows a centering wheel for engagement in the pipe profile, as shown in fig. 5,
- fig. 7 shows a cross-sectional view of a frame post for a rolling door according to the invention.

**[0023]** Figure 1 shows a rolling door which is mounted in a door opening 5 in a storehouse or the like. The rolling door comprises two frame posts 1 at each side of the door opening 5, a roller 2, a door curtain 3 fixed to the roller 2 and provided with a boom 4 at the bottom. The roller 2 is rotatably mounted in the upper part of the frame posts 1. The roller 2, which is thus positioned immediately above the upper edge 5a of the opening, may be shielded, as is indicated in fig. 1. At one of the frame posts 1, the roller is connected with drive means 6 comprising an electric motor and a gear.

**[0024]** The curtain 3 may be rolled up and down from the roller 2 to open and close the door, respectively, by activation of the hoisting means, which, together with stretching means for stretching the curtain, are arranged in the frame posts 1. It is shown in fig. 2 how the hoisting and stretching means cooperate, so that the curtain may be rolled on to or off the roller 2, without the stretching means 11, 12, 16 counteracting this rolling up or off. Fig. 2 is a schematic side view of the mechanism which is arranged in the frame posts 1. The roller 2 is present at the top, and a winding wheel 11 is positioned concentrically with it. The curtain 3 is rolled more or less onto the roller 2, as is known. A belt 12 is wound on the winding wheel 11. The belt 12 extends downwards around one preferably two stationarily positioned link rollers 12 and around a link roller 14, which is mounted on a slide block 15 slidable in the frame profile 10, and which is connected with a tension spring 43 fixed at the top to the frame profile 10. From there, the belt 12 runs around a fixedly positioned link roller 13 at the bottom in the frame post 1 and is connected with the boom 4 on the curtain 3. This belt 12 is wound around the winding wheel 11 in the opposite direction of the winding of the curtain 3 on the roller 2.

**[0025]** As a result, when the curtain 3 is rolled off the roller 2 and the boom 4 is thereby moved down to close the door, the belt 12 is simultaneously wound on to the

winding wheel 11. The belt 12 constantly keeps the curtain 2 stretched while pulling down the curtain 3. Conversely, when the curtain is rolled up, the belt 12 is wound off the winding wheel 11, said belt being constantly kept reasonably tight so as to ensure that the curtain 3 is constantly stretched. This stretching is ensured through the tension spring 42 and the link roller 14, which together with the slide block 15 may be moved in a corresponding slide track 22 in the frame profile 10, as this provides a resilient effect in the belt pull.

**[0026]** Fig. 3 shows in a front view of the upper part of a frame post 1 how the drive means are arranged with respect to the frame profile 10. The frame profile 10 exhibits two slide tracks 21, 22 in which the slide blocks 15, 16 may be moved. The slide block 16, which is slidable in the slide track 21, mounts a connecting element 36 which, with one end, extends inwardly over the other slide track 22 and is connected with the belt 12 (shown in dashed line) arranged in alignment with this slide track 22. At the other end, the connecting element 36 is provided with a coupling element 37 for coupling to the boom 4 at the bottom of the curtain 3.

**[0027]** The link roller 14 is mounted on the slide block 15. Furthermore, the block is connected with the tension spring 42. In alignment with the slide track 22, the winding wheel 11 is arranged on a transverse drive shaft 7 connected with a centering wheel 9, which engages and drives the pipe profile 8 which constitutes the roller 2. Moreover, at the opposite end, the drive shaft 7 is provided with a groove 52 by means of which the shaft 7 is connected with drive means 6 (see fig. 1), which comprise a toothed wheel, a gear which is in turn connected with the motor (not shown in the figures).

**[0028]** The section of the drive shaft 7 aligned with the slide track 22 for the belt block 15 is formed with another groove 53 to receive the winding wheel 11 on the shaft 7. The winding wheel 11 is formed with a conical inner flange in the central bore. The wheel 11 is mounted on the shaft 7 by means of a mounting element 50, which is secured to the shaft 7 by a tongue/groove connection 53 or the like, and whose conical outer side corresponds to the inner flange on the winding wheel 11. The wheel 11 is fixed to the mounting element 50 in such a manner as to ensure that it is centered on the shaft 7. When the wheel 11 is mounted, a frame flange 51 is arranged inwardly over the shaft 7 by means of which frame flange 51 the end of the wheel is shielded, and the drive arrangement may subsequently be mounted on the frame post 1.

**[0029]** Fig. 4 shows a cross-section of the frame profile 10 according to the preferred embodiment of the invention. It exhibits two slide tracks 21, 22. Between these two slide tracks defined by the flanges 23, 24, 25, 26, the frame profile 10 has a space 27. The flanges 24, 25 defining this space 27 are shaped in such a manner that the profile 10 is prepared for the installation of heating cables for frost protection of the door. This space 27 may also or alternatively be used for other types of

cables, such as electrical wires or the like.

**[0030]** The first slide track 21 is raised with respect to the second track 22, as the flanges 23, 24 protrude considerably longer forwards than the two flanges 25, 26 which define the second slide track 22. In the shown embodiment, the flange 26 is shaped in such a manner that it is suitable for receiving wiring or the like. One or both flanges 26 and 23 will be prepared for the mounting of a shield (see fig. 7).

**[0031]** Slide flanges 28 extending into the track are provided approximately in the centre of the flanges 28. These slide flanges 28 form the bottom of the slide rail for the slide block 16 which is to be guided therein. Furthermore, these flanges 28 form a cavity in the bottom of the first slide track 21 which may preferably be used for current rails which may be in sliding contact with one or more sensors provided on the slide block 16 slidable in the track 21. Other types of cable guides may of course also be provided in this cavity, e.g. in connection with the emergency system of the rolling door, where sensors (not shown) are mounted in various positions to register the positions of the curtain and of the boom and whether individuals or equipment is present in the door opening, etc. These sensors may also be mounted by means of suitable brackets on the frame profile 10 in the slide tracks 21, 22, it being just necessary to ensure that the slide blocks 15, 16 cannot collide with these brackets.

**[0032]** Figs. 5 and 6 show a cross-section of the pipe profile 8 and the centering wheel 9, respectively. As will appear from fig. 5, the pipe profile 8 is formed with a plurality of internal projections 31 in an axial direction. A plane mounting face 32 is provided between two of these projections 31 in the wall of the pipe profile 8, and the curtain 3 may be secured to this face 32 by means of a strip (not shown) which is screwed on to the pipe profile 8. The centering wheel 9, which is shown in fig. 6, is formed with a plurality of axial recesses 33 which correspond to the inwardly directed projections 31 in the pipe profile 8 in size, shape and position as well as preferably also number. Altogether, the centering wheel 9 is shaped so as to fit in the pipe profile 8, allowance having also been made for the accommodation of the mounting face 32 by forming the periphery of the wheel with an axial recess 34 between two recesses 33 on the wheel 9. The centering wheel 9 is mounted on the drive shaft 7 at the central recess 35.

**[0033]** The centering wheel 9 may be secured to the pipe profile 8, but with the embodiment concerned it has been realized by the invention that the wheel may be mounted axially slidably and still be in rotational engagement with the pipe profile 8 and thereby the roller 2.

**[0034]** Fig. 7 shows a cross-section of a frame post 1 where a shield is mounted on the frame profile 10. In the embodiment shown, the frame profile 10 - in contrast to the embodiment shown in fig. 4 - is composed of a plurality of subprofiles.

## Claims

1. A rolling door for mounting in connection with a door opening (5) in a wall, e.g. in a storehouse, a cold store or like, comprising
 

two frame posts (1) for mounting at the sides of the door opening, a roller (2) arranged uppermost between the two frame posts (1), a door leaf (3) of a flexible material, preferably a curtain, which is secured to the roller (2) at one end and is provided with a boom (4) at the other end,

guide means (16, 21, 36) for guiding the boom (4) during rolling up and down of the door leaf (3) around the roller (2) to open and close the door, and

hoisting means (6, 11-15, 22, 42) for rolling the door leaf (3) up and down,

**characterized** in that

the guide and hoisting means (6, 11-16, 36, 42) are slidably arranged in their respective slide tracks (21, 22) in a frame profile (10), which exhibits a mounting face (29) for the frame profile (10) at the opposite side of the slide tracks (21, 22) disposed in parallel.

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2. A rolling door according to claim 1, **characterized** in that the frame profile (10) is an extruded profile, preferably of aluminium.
 

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3. A rolling door according to claim 1 or 2, **characterized** in that the hoisting means comprise means for stretching the unrolled part of the door leaf (3), and that these means comprise a winding wheel (11) to receive a belt (12) in a belt pull device (13, 14, 15) and a tension spring (42) positioned uppermost in each of the frame posts (1).
 

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4. A rolling door according to claims 1-3, **characterized** in that the hoisting means comprise a motor (6) which is positioned uppermost in at least one of the frame posts (1), and which is connected with a centering wheel (9) for slidable engagement in the roller (2).
 

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5. A rolling door according to claim 4, **characterized** in that the roller (2) consists of a pipe profile (8) with axially oriented inner flanges (31) which cooperate with corresponding radial recesses (33) in the centering wheel (9).
 

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6. A rolling door according to claims 3-5, **characterized** in that the winding wheel (11) of the stretching means are mounted on the same drive shaft (7) as the centering wheel (9).
 

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7. A rolling door according to claims 2-6, **character-**
- ized** in that the frame profile (10) is formed with one or more tracks (27) or flanges (24-26, 28) for receiving piping and wiring, such as heating pipes or cables for electrical or pneumatic sensors.
8. A rolling door according to claims 2-7, **characterized** in that, at each end, the boom (4) is connected with a slide block (16) which is slidable in the inner slide track (21) in the frame profile (10).
9. A rolling door according to any one of the preceding claims, **characterized** in that sensors or other registration equipment connected with an emergency system for the rolling door is mounted in the slide track (22) on the frame profile (10) as well as on one or both slide blocks (15, 16).
10. A frame profile (10) for a frame post (1) in a rolling door according to any one of the preceding claims, **characterized** in that the front side is formed with two parallel slide tracks (21, 22) for receiving guide and hoisting means (6, 11-16, 36, 42) slidable in their respective tracks, and that the profile (10) on the rear side exhibits a plane mounting face (29) for the frame profile (10).
11. A frame profile (10) according to claim 10, **characterized** in that the two tracks (21, 22) are formed between upwardly extending flange portions (23-26), and that a space (27) is formed at least between the two tracks (21, 22) for the installation of cables, wires or the like.
12. A frame profile (10) according to claim 10 or 11, **characterized** in that the first track, which is preferably the track (21) for receiving the guide means (16) for guiding the door leaf (3), protrudes more forwards than the second track (22).
13. A frame profile (10) according to claim 12, **characterized** in that the first track (21) is formed with slide flanges (28) which divide the track (21) into a space for the slide guide and a space for cabling.
14. A frame profile (10) according to claims 10-13, **characterized** in that one or both longitudinal edges of the profile (10) are arranged in such a manner that a shield (30) may be mounted thereon, preferably in connection with one of the outermost ones of the flanges (23, 26) which contribute to defining the slide tracks (21, 22).
15. A frame profile (10) according to any one of claims 10-14, **characterized** in that the profile (10) is an extruded aluminium profile.

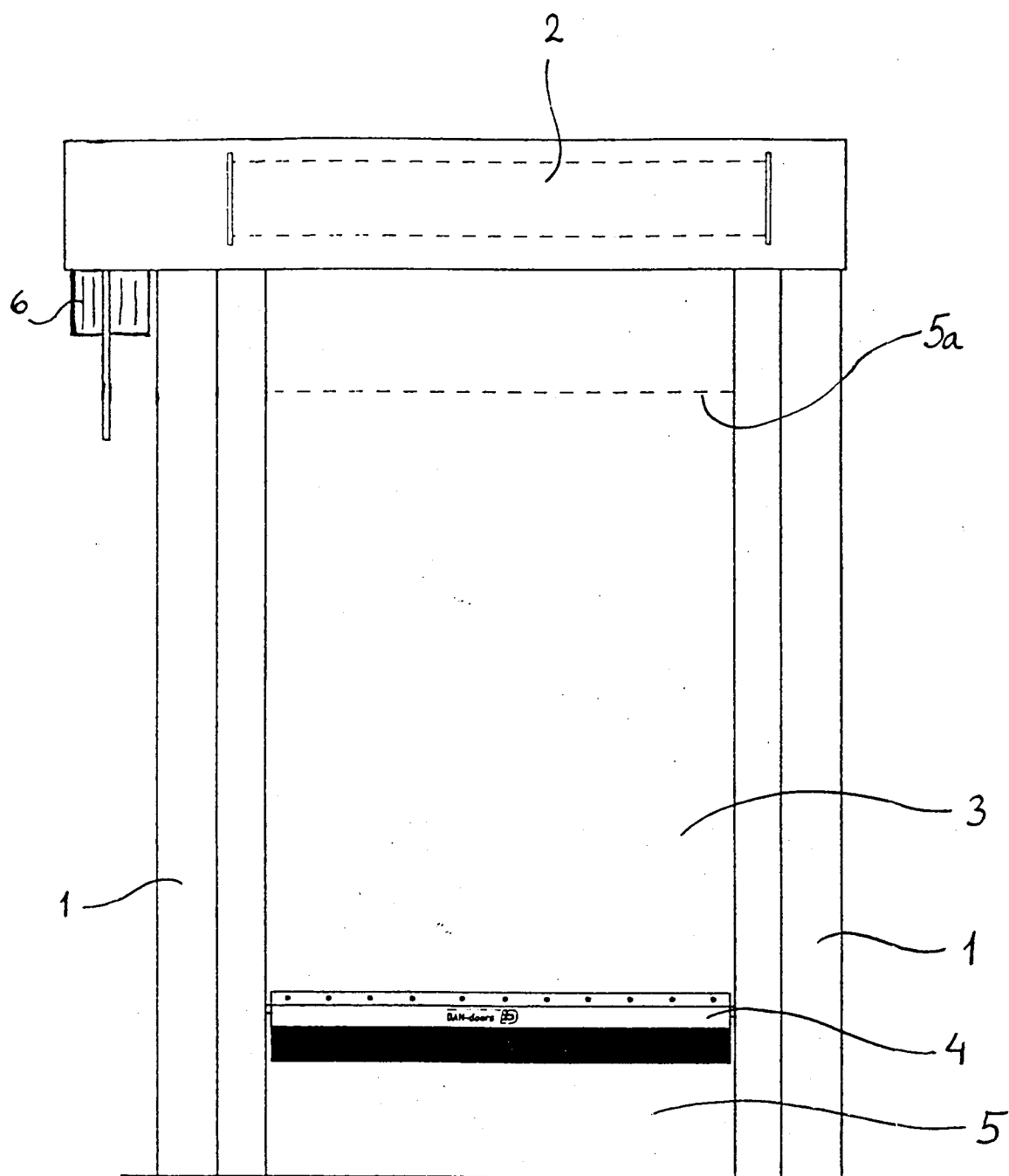


Fig. 1

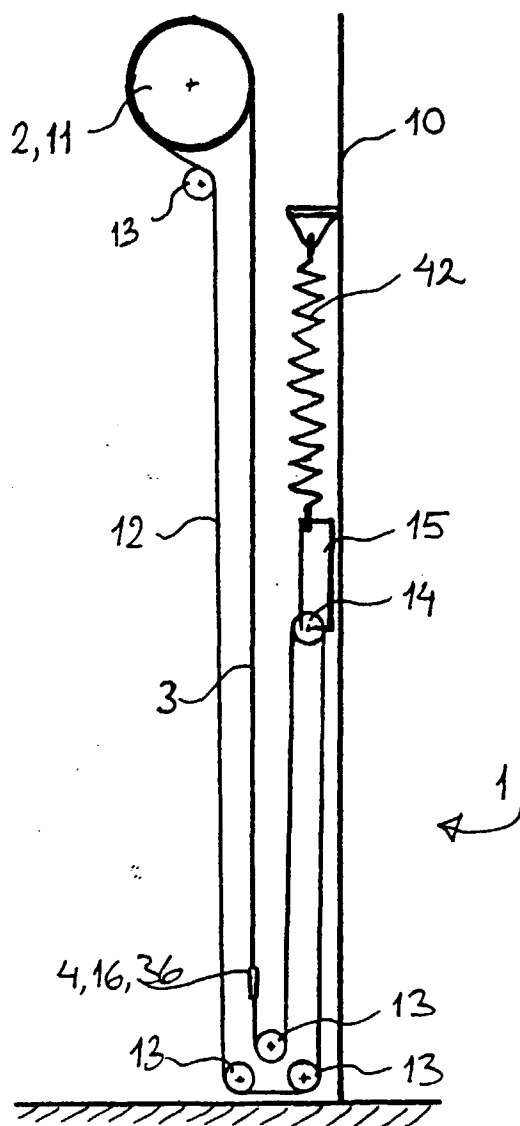
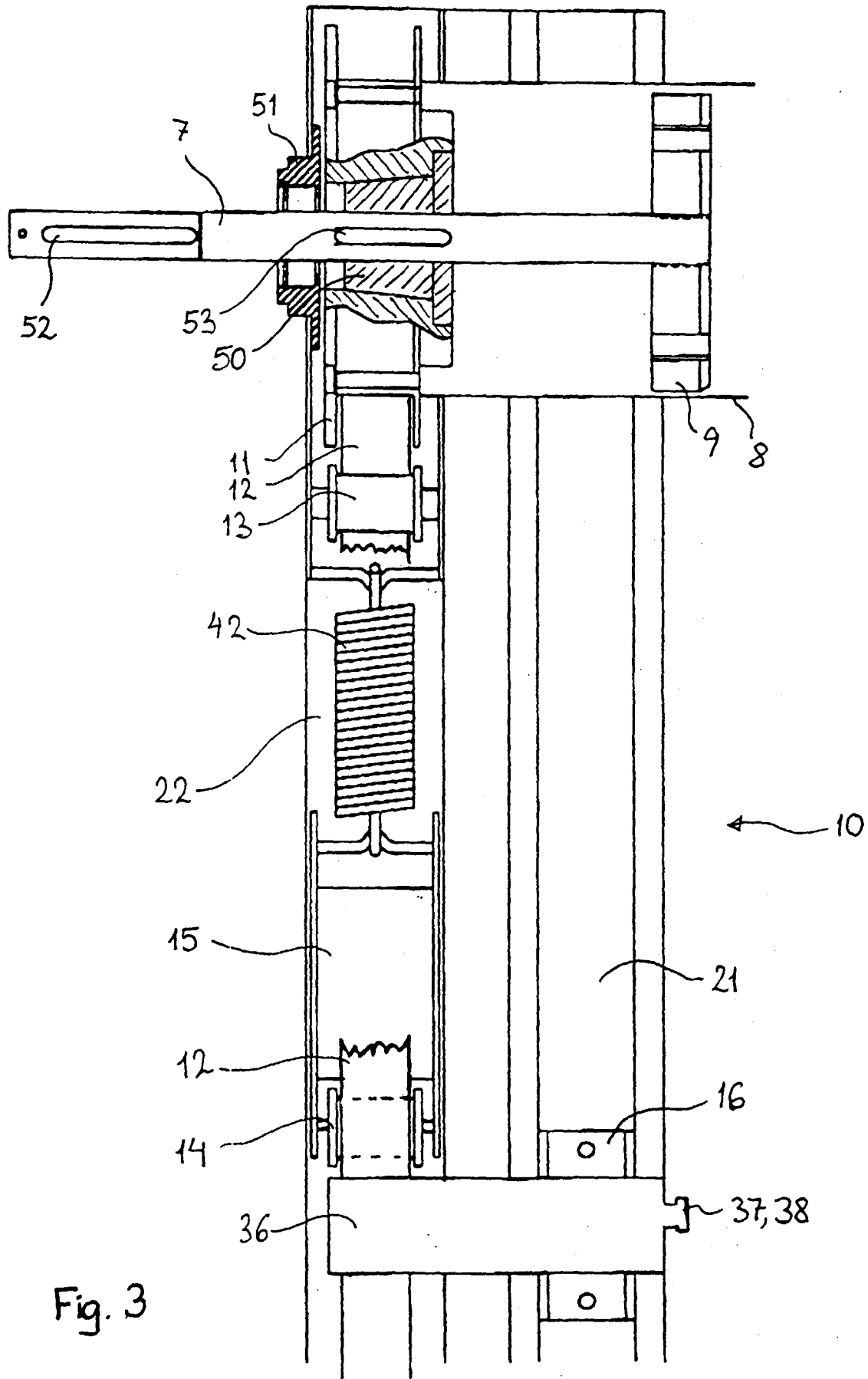
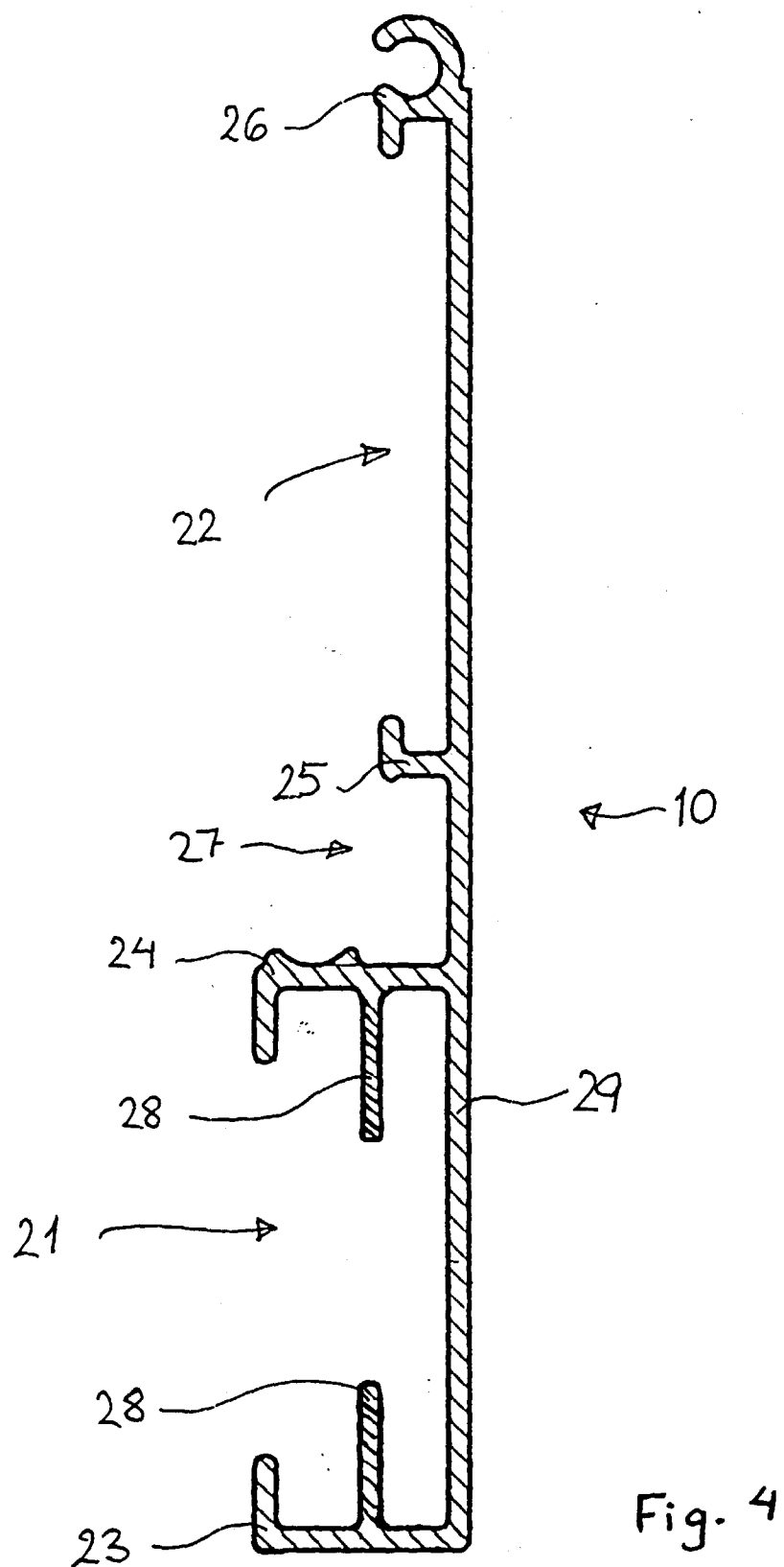


Fig. 2







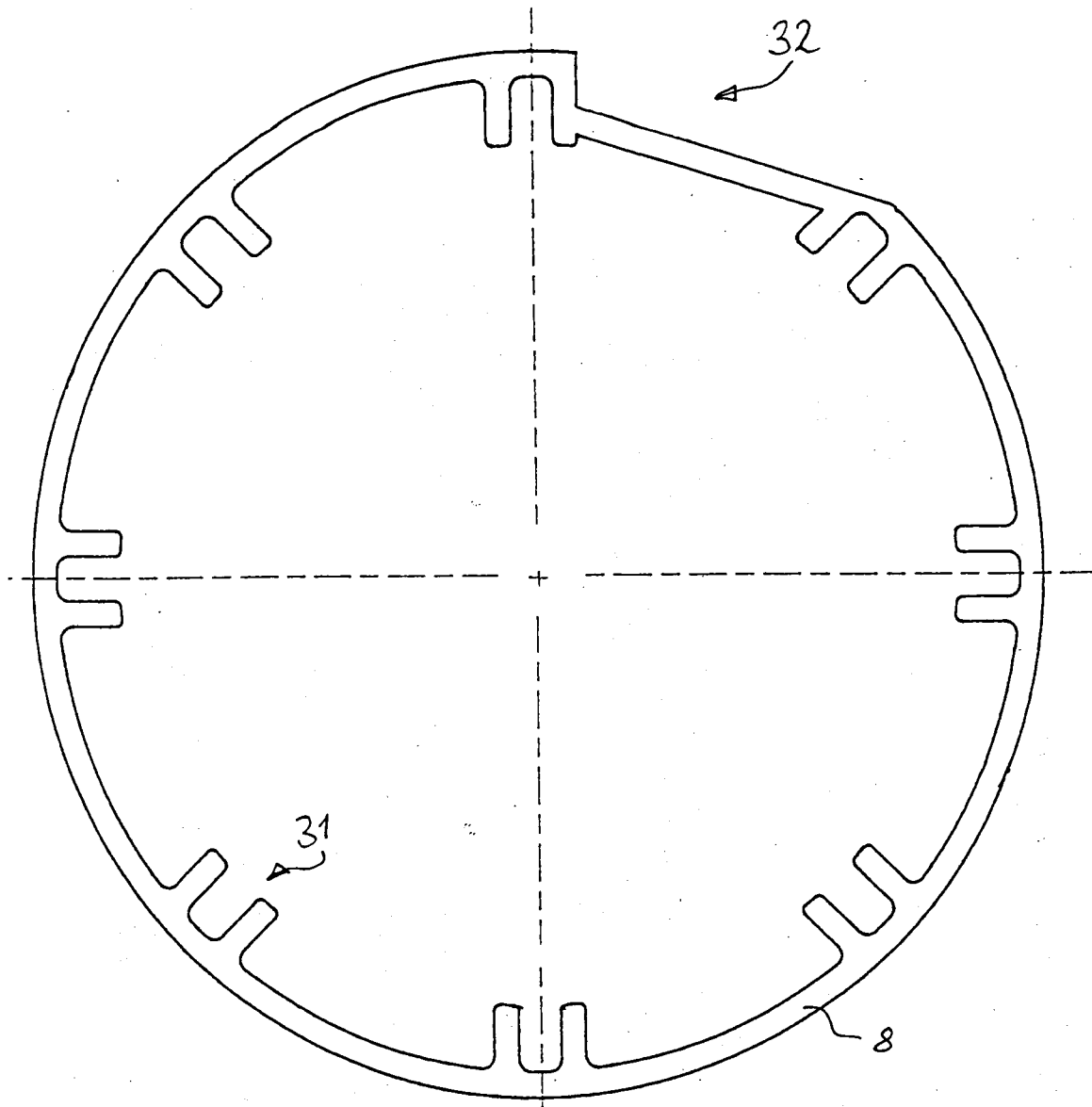


Fig. 5

