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from the support beam (8) towards a direction that the landing side surface of the first (2) and second (3) door panel faces to provide fixing points (11) for the landing door assembly (1) which are located outside of the elevator shaft (6) for attachment of the landing door assembly (1) to a wall (12) separating the landing platform (4) from an elevator shaft (6).



Description**BACKGROUND OF THE INVENTION****FIELD OF THE INVENTION**

[0001] This invention relates to a landing door assembly and to a method of producing a landing door.

DESCRIPTION OF PRIOR ART

[0002] Previously there is known an elevator installation where the elevator car is provided with a first and a second door panel which slide aside once the elevator has stopped at a floor. In addition, this known elevator installation includes a landing door assembly, with a first and second door panel that slide aside with the first and second door panel of the elevator car.

[0003] A drawback involved with the known landing door assembly is that the first and second door panel are attached to slide along a support beam which is attached to an inner side of a wall in the elevator shaft. In praxis this means that the installation of the landing door assembly is done from the elevator shaft, which is not possible before the elevator car has been installed and can be used in the installation process of the landing door assembly. This is a great disadvantage, because while a new building is being built, the elevator car is in praxis installed at a relatively late stage.

[0004] Additionally, as only one elevator car is available, though there is one landing door assembly to install at each floor where the elevator car has a landing, the installation process becomes slow in the previously known solution.

SUMMARY OF THE INVENTION

[0005] An object of the present invention is to solve the above mentioned drawback and to provide a solution which simplifies installation. This object is achieved with the landing door assembly and the method for producing a landing door according to independent claims 1 and 7.

[0006] Use of attachment brackets that extend transversally outwards from the support beam towards the direction of the landing side makes it possible to provide fixing points for the door assembly in the attachment brackets at a location which is outside of the elevator shaft during mounting. Consequently, it is no longer necessary to carry out the installation of the landing door assembly from the inside of the elevator shaft, but instead it can be done from the landing side of the wall that separates the elevator shaft from the landing platform. This significantly speeds up and simplifies the installation work.

BRIEF DESCRIPTION OF DRAWINGS

[0007] In the following the present invention will be de-

scribed in closer detail by way of example and with reference to the attached drawings, in which

Figure 1 illustrates installation of a landing door assembly,

Figure 2 illustrates the landing door assembly of Figure 1 once the installation is complete,

Figures 3 to 5 illustrate a first embodiment of a top track for the landing door assembly of Figure 1, Figures 6 to 8 illustrate a second embodiment of a top track for the landing door assembly of Figure 1, and

Figure 9 illustrates a sill for the landing door assembly of Figure 1.

DESCRIPTION OF AT LEAST ONE EMBODIMENT

[0008] Figures 1 to 2 illustrates installation of a landing door assembly 1 and also a method for producing a landing door.

[0009] In Figure 1 a landing door assembly 1 has been produced to include a first 2 and a second 3 door panel which both have a landing 4 side surface 5 and a shaft surface facing the elevator shaft 6.

[0010] The landing door assembly 1 further comprises a top track 7 with a support beam 8 to which the first and second door panel 2 and 3 are attached to slide along a longitudinal 9 direction of the support beam 8. To provide easy sliding, the top track is preferably provided with rolls. Attachment brackets 10 extending transversally outwards from the support beam 8 towards a direction that the landing side surfaces 5 of the first and second door 2 and 3 panel faces have been arranged to the landing door assembly 1 to provide fixing points 11 for the door assembly outside of the elevator shaft 6 in the wall 12 that separates the landing platform from the elevator shaft. Via these attachment brackets 10, the landing door assembly can be attached to the wall 12 from the landing platform 4 such that the support beam 8 and the landing door panels 2 and 3 are located in the elevator shaft 6.

[0011] In the illustrated example a sill 13 is provided to the landing door assembly 1 to receive a lower part of the first and second door 2 and 3, as illustrated in more detail in Figure 8. Attachment brackets 10, which are similar to the attachment brackets extending from the support beam 8, have been provided to extend from the sill 13 towards a direction that the landing side surfaces 5 of the first and second door panel 2 and 3 faces.

[0012] In order to facilitate that the landing door assembly can be preassembled at a factory before delivery to the installation site, an additional covering plate 14 has in the example of Figure 1 been attached to the landing door 1 assembly via screws 15, for instance. This plate 14 may be of plywood, for instance, and it works only as a protective cover which assists in keeping the parts of the landing door assembly attached to each other during transportation and to ensure that no damage is accidentally caused to the landing side surface of the first and

second door panel 2 and 3 prior to the moment when the elevator is installed and taken into use.

[0013] In Figure 1 it is also by way of example assumed that the method for producing the landing door involves mounting of the landing door assembly 1 by means of a specially made trolley 16 which can be used by the person installing the landing door assembly 1 for transportation and also for adjusting the landing door assembly in exactly the correct position at the opening in the wall 12 before attaching the landing door assembly 1 to the wall 12 via the fixing points 11 provided by the brackets 10. In this way the installation can simply be made by one single person only. Additionally, irrespectively if a trolley or covering plate as previously explained is used or not, the landing door assembly 1 can in any case be installed to the opening in the wall 12 such that the entire installation process is done from the landing platform 4 which makes the installation very simple and fast. Simultaneous installation of landing door assemblies can therefore be made by different persons at different floors of a building.

[0014] Figure 2 illustrates the landing door assembly 1 of Figure 1 once the installation is complete. At this stage the covering plate 14 (if used) has been removed to reveal the landing side surfaces 5 of the first 2 and second 3 door panel. Additionally the frames 27 and the lintel 17 have been mounted to cover the area (gap) between the wall 12 and the first 2 and second 3 door panel. The frames may also in some implementations contain the necessary electrical devices.

[0015] Figures 3 to 5 illustrate a first embodiment of a top track 7 for the landing door assembly of Figure 1. Figure 3 illustrates the top track 7 as assembled, Figure 4 shows an end view of the top track 7 and the attachment brackets 10 and Figure 5 illustrates attachment of the support beam 8 as seen from the shaft side of the wall 12.

[0016] As explained in connection with Figures 1 and 2, the top track 7 is provided with a support beam 8 to which the first and second door panel are attached to slide in the longitudinal direction 9 of the support beam 8. In this embodiment the support beam 8 is provided with a first support profile 18 to which a first hanger section 20 is slidably attached. The first door panel 2 is attached to this first hanger section 20. Similarly, the support beam 8 is provided with a second support profile 19 to which a second hanger section 21 is slidably attached. The second door panel 3 is attached to this second hanger section 21.

[0017] In this example the first support profile 18 and the second support profile 19 are arranged on opposite sides of the same support beam 8. This means that the first hanger section 20 slides on the shaft side of the beam 8 while the second hanger section 21 slides on the landing side of the beam 8. Both hanger sections can thereby slide a distance which is almost equal to the length of the support beam 8. An advantage obtained with such a solution is that though support beam 8 is relatively short, the first and second door panel 2 and 3

can slide a relatively long distance where the sum of the distance that the door panels can slide is longer than the support beam 8. This is advantageous as installation of the landing door assembly can be made from the landing platform through a relatively narrow opening in the wall 12. In praxis the top track 7 can be installed in an opening which is only about 20 mm wider than the length of the entire top track. This is enough for mounting the top track with the support beam 8, and the first and second door panel 2 and 3 can slide a sufficient distance to completely cover the opening and to completely reveal the opening depending on whether the elevator car is located at this floor or not.

[0018] Figures 3 to 5 also illustrate details of the attachment brackets 10. In the illustrated embodiment the attachment brackets are provided with end plates 22 to provide fixing points 11 in the attachment brackets at a location facilitating attachment to the side of the wall 12 that is on the outside of the elevator shaft. In praxis these end plates 22 contact the landing side surface of the wall 12 such that attachment screws can be used at the fixing points 11 to attach the attachment brackets to the wall. However, the attachment brackets 10 must not necessarily have end plates 22 in all embodiments. In case brackets without such end plates are used, attachment of the brackets to the wall may be implemented instead by means of screws which are attached to the short edge surface 23 of the door opening, for instance. Also in this case the fixing points used for carrying out the attachment are located outside of the elevator shaft.

[0019] Due to the fact that the thickness of the wall 12 may vary at different installation sites, the attachment brackets are preferably adjustable for different wall thicknesses. In the illustrated example, this has been done by utilizing attachment brackets which are provided with overlapping parts 24 and 25 that can be attached to each other in different mutual overlapping positions by means of bolts and nuts, for instance.

[0020] From Figure 5 one can observe that once the support beam 8 is attached by the attachment brackets 10, the support beam is located in the elevator shaft, in other words entirely on the shaft side of the wall 12. In praxis also the first and second door panels are at this stage located in the elevator shaft. Once the first and second door are opened, they slide along the shaft side of the wall 12.

[0021] The landing door assembly 1 is in the illustrated example not provided with any drive unit, such as electric motor, that moves the first and second door panels between the open and closed position. Instead the doors of the elevator car are provided with such a drive unit, and additionally, with engagement means that engage with the first and second door panels. Consequently, once the elevator car has arrived to the landing door assembly, the first and second door panels slide aside simultaneously and together with the doors of the elevator car.

[0022] Figures 6 to 8 illustrate a second embodiment

of a top track 7' for the landing door assembly of Figure 1. The embodiment of Figures 6 to 8 is very similar to the embodiment explained in connection with Figures 3 to 5. Therefore the embodiment of Figures 6 to 8 is in the following explained mainly by pointing out the differences between these embodiments.

[0023] Also in the second embodiment the top track 7' is provided with a first hanger section 20' and with a second hanger section 21'. However, the first and second hanger sections are differently shaped than in the previous embodiment. Due to this the first hanger section 20' slides along the support beam 8 (in the illustrated example on top of the support beam) while the second hanger section 21' slides along the first hanger section 20'. This results in a "telescopic" structure, where the distance that the second hanger section 21' and the second door panel 3 attached to it travels is almost double the length of the support beam 8. This can be seen from Figures 7 and 8, where Figure 7 illustrates the first 2 and second 3 door panels in the closed position, while Figure 8 illustrates the first and second door in the open position.

[0024] Figure 9 illustrates a sill 13 for the landing door assembly 1 of Figure 1. The sill 13 receives a lower part of the first 2 and second 3 door panel to ensure that the door panels slide sideways in a controlled manner. In the illustrated example sliding shoes 26 are arranged to the first 2 and second door panels 3 to be in contact with the sill 13. Such sliding shoes are preferably manufactured of a material which provides a sufficiently low friction between the sliding shoes and the sill.

[0025] It is to be understood that the above description and the accompanying figures are only intended to illustrate the present invention. It will be obvious to a person skilled in the art that the invention can be varied and modified without departing from the scope of the invention.

Claims

1. A landing door assembly (1), comprising:

a first (2) and a second (3) door panel each having a landing side surface (5) and a shaft (6) side surface, and
a support beam (8) to which the first (2) and second (3) door panels are attached to slide along a longitudinal direction (9) of the support beam (8), **characterized in that** the door assembly comprises:
attachment brackets (10) extending transversally outwards from the support beam (8) towards a direction that the landing side surface (5) of the first (2) and second door panel (3) faces to provide fixing points (11) for the landing door assembly which are located outside of the elevator shaft for attachment of the landing door assembly (1) to a wall (12) separating the land-

ing platform (4) from an elevator shaft (6).

2. A landing door assembly according to one of claim 1, wherein the landing door assembly comprises a sill (13) receiving a lower part of the first and the second door, and attachment brackets (10) extending transversally outwards from the sill (13) towards a direction that the landing side surface (5) of the first (2) and second (3) door panel faces to provide fixing points (11) for the landing door assembly (1) which are located outside of the elevator shaft for attachment of the landing door assembly (1) to the wall (12).
3. A landing door assembly according to claim 1 or 2, wherein the attachment brackets (10) are provided with overlapping parts (24, 25) configured be attached to each other in different mutual overlapping positions for providing a length adjustment for a distance that the attachment brackets (10) extend outwards from the support beam (8) or sill (13).
4. A landing door assembly according to claim 3, wherein the brackets are provided with end plates (22) for contacting the landing side surface of the wall (12) at the fixing points (11).
5. A landing door assembly according to one of claims 1 to 4, wherein the support beam is provided with a first support profile (18) and with a second support profile (19), a first hanger section (20) is slidably attached to the first support profile (18) and the first door (2) is attached to the first hanger section (20), and a second hanger section (21) is slidably attached to the second support profile (19) and the second door panel (3) is attached to the second hanger section (21).
6. A landing door assembly according to one of claims 1 to 4, wherein a first hanger section (20') is slidably attached to the support beam (8) and the first door (2) is attached to the first hanger section, and a second hanger section (21') is slidably attached to the first hanger section (20') and the second door panel (3) is attached to the second hanger section (21').
7. A method for producing a landing door to an opening in a wall (12) separating a landing platform (4) from an elevator shaft (6), **characterized in that** the method comprises:
slidably attaching a first (2) and a second (3) door panel having a landing side surface (5) and a shaft side surface to a support beam (8), arranging attachment brackets (10) to extend

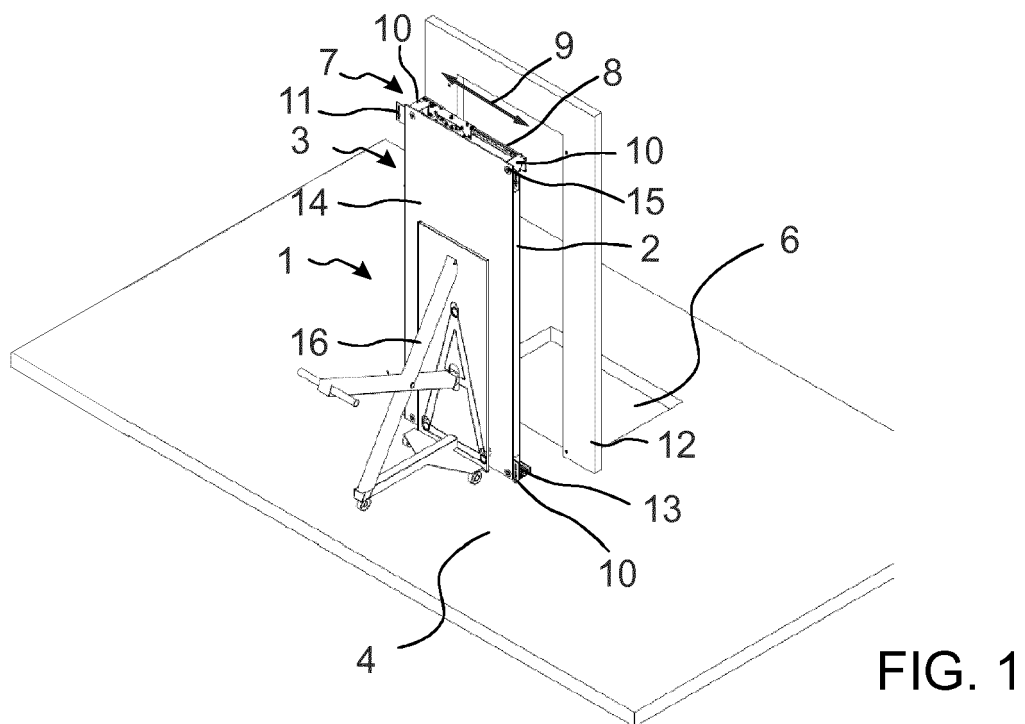
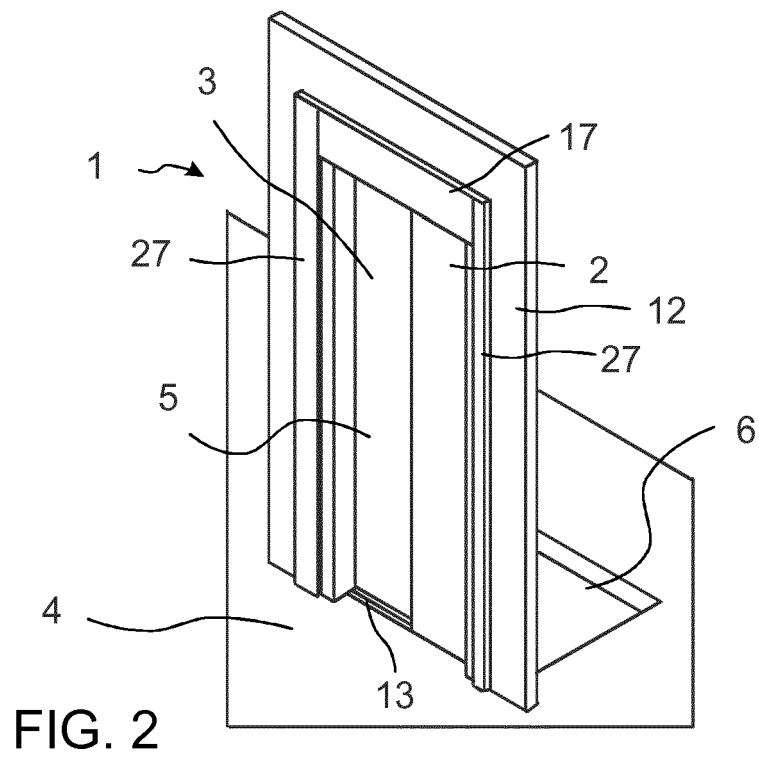
transversally outwards from the support beam (8) towards a direction that the landing surface (5) of the first (2) and second (3) door panel faces,

arranging from the landing platform (4) side of the wall (12) the support beam (8) with the first (2) and second door panel (3) in the opening of the wall (12) in a position where the doors are located on the elevator shaft (6) side of the wall, and attaching the attachment brackets (10) to the wall (12).

8. The method according to claim 7, wherein the method comprises:

providing a sill (13) to receive a lower part of the first (2) and the second (3) door panel, providing the sill (13) with attachment brackets (10) to extend transversally outwards from the sill (13) towards a direction that the landing surface (5) of the first and second door faces, and attaching the attachment brackets (10) extending from the sill (13) to the wall (12) .

9. The method according to claim 7 or 8, wherein the attachment brackets (10) are provided with end plates (22) for contacting the landing side surface of the wall (12), and the attaching is carried out by attaching the attachment brackets via the end plates to the landing side surface of the wall (12).



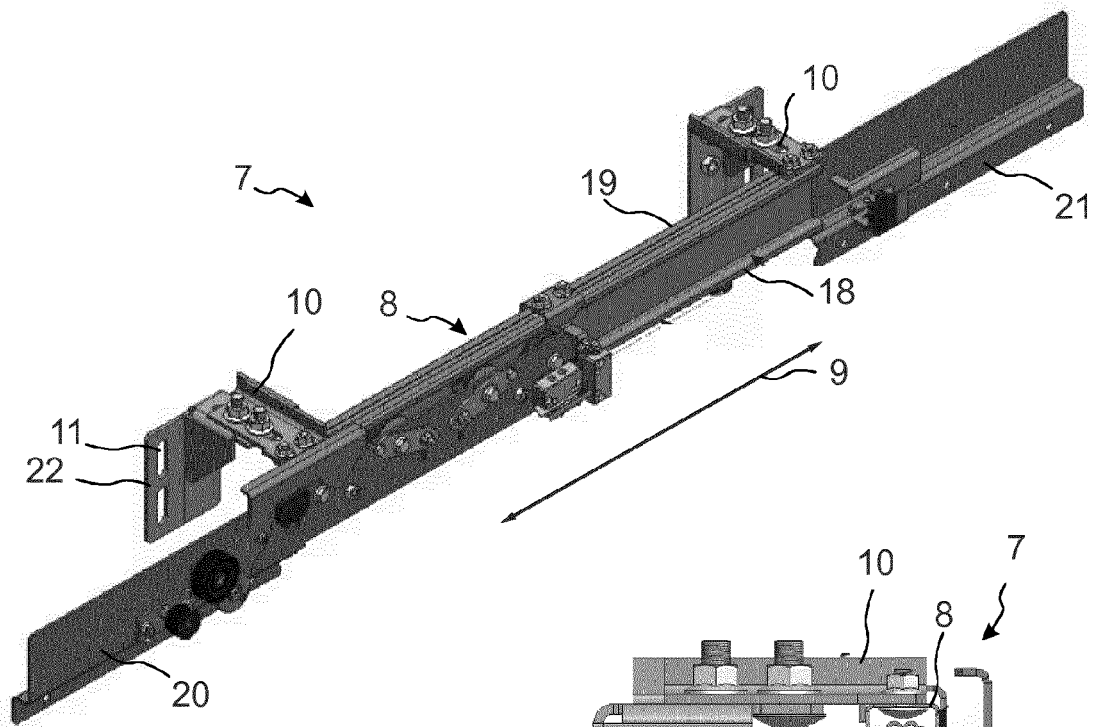


FIG. 3

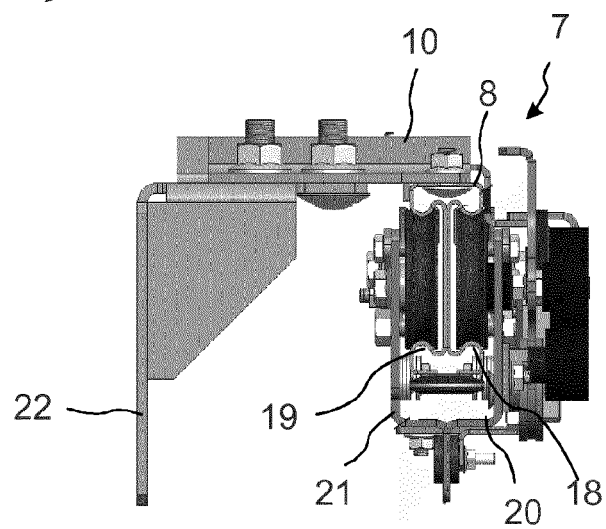


FIG. 4

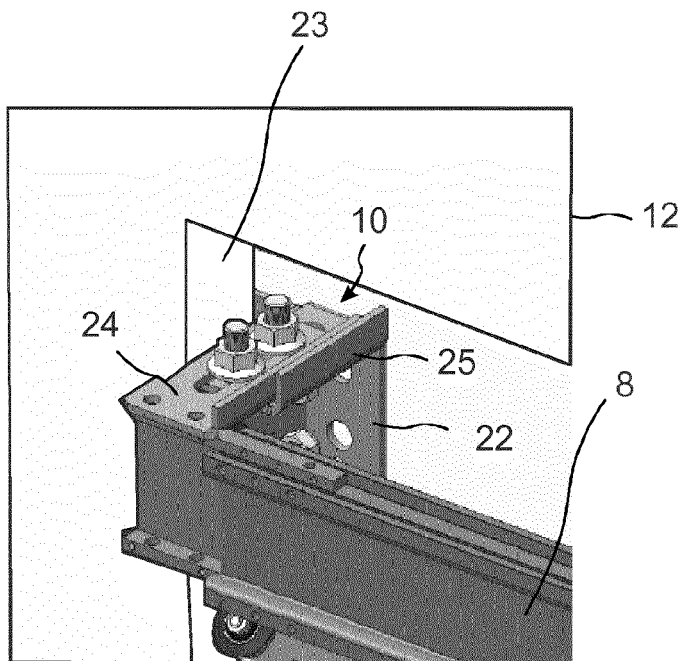


FIG. 5

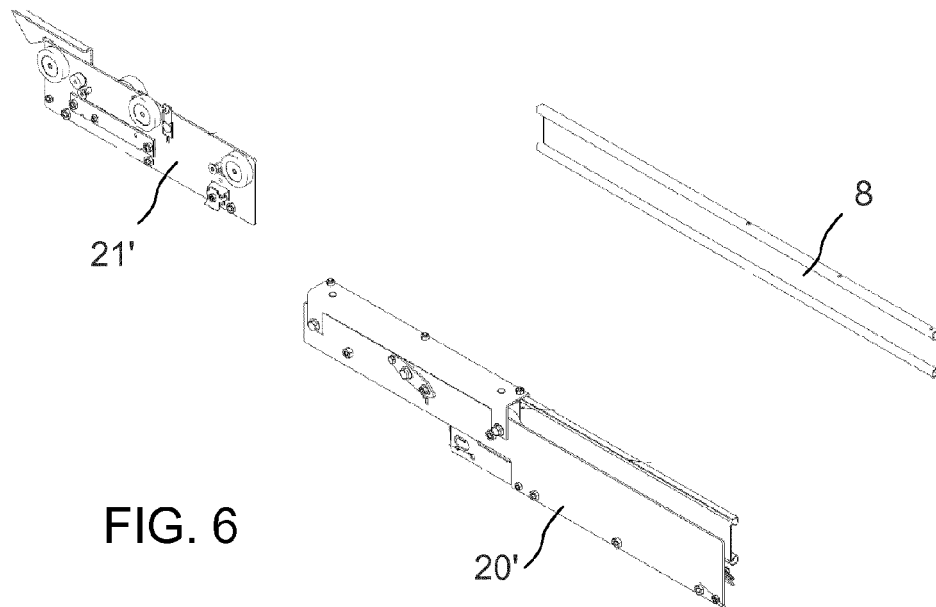


FIG. 6

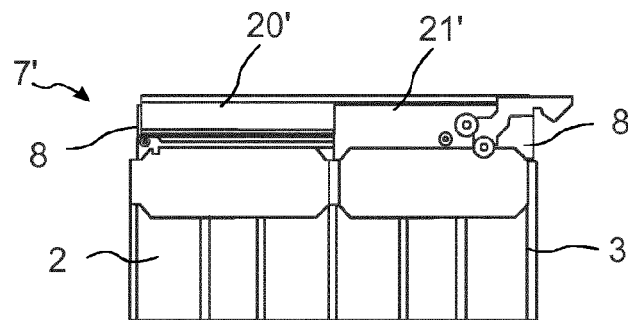


FIG. 7

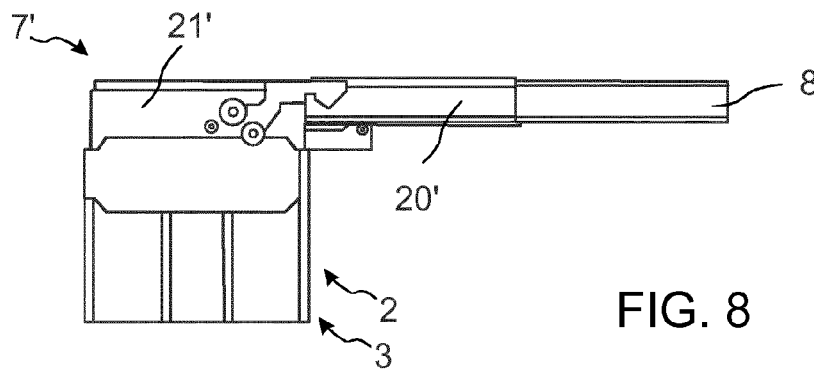


FIG. 8

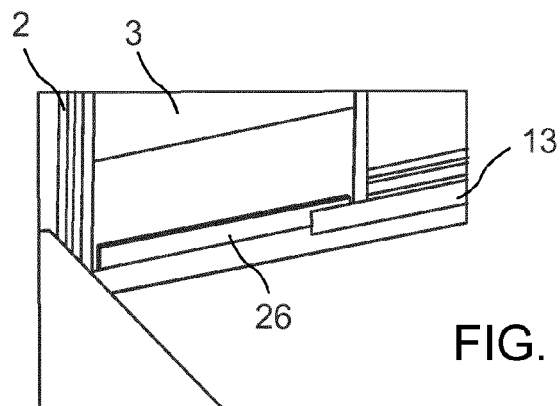


FIG. 9



EUROPEAN SEARCH REPORT

Application Number
EP 18 17 7458

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DOCUMENTS CONSIDERED TO BE RELEVANT				
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)	
X	JP H04 133990 A (MITSUBISHI ELECTRIC CORP) 7 May 1992 (1992-05-07)	1,5-7	INV. B66B13/30	
Y	* figures 1-4 *	2,8		
A	* paragraphs [0001] - [0003] *	3,4,9		
Y	US 6 938 380 B2 (FRIEDMAN HAROLD S [US] ET AL) 6 September 2005 (2005-09-06) * abstract; figures 2-4 *	2,8		
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A	JP 2008 179460 A (MITSUBISHI ELECTRIC CORP) 7 August 2008 (2008-08-07) * figures 1-14 *	1-9		
The present search report has been drawn up for all claims				
Place of search		Date of completion of the search		Examiner
The Hague		19 December 2018		Dogantan, Umut H.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document				

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

EP 18 17 7458

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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19-12-2018

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