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(54) **A panel system and an upper guiding member for it**

(57) A panel system comprising: a panel (1) that can be transferred and turned; an upper first guide track (4) and a lower second guide track (5), between which the panel is suspended; a first guide track part (3) coupled to the panel and arranged to follow the first guide track; an opening (16) which is provided in the first guide track and through which the first guide track part moves out of the first guide track when the first guide track part is in a predetermined location for the turning of the panel; and

a guiding member (17) fastened to the first guide track and arranged to support the panel during the turning. The panel system also comprises: a counter element (18) which is fixed to the panel and is supported against the guiding member (17) during the turning of the panel, and is also placed against the guiding member (17) to prevent the turning of the panel when the first guide track part is at the opening but is not yet placed in the predetermined position for the turning of the panel.

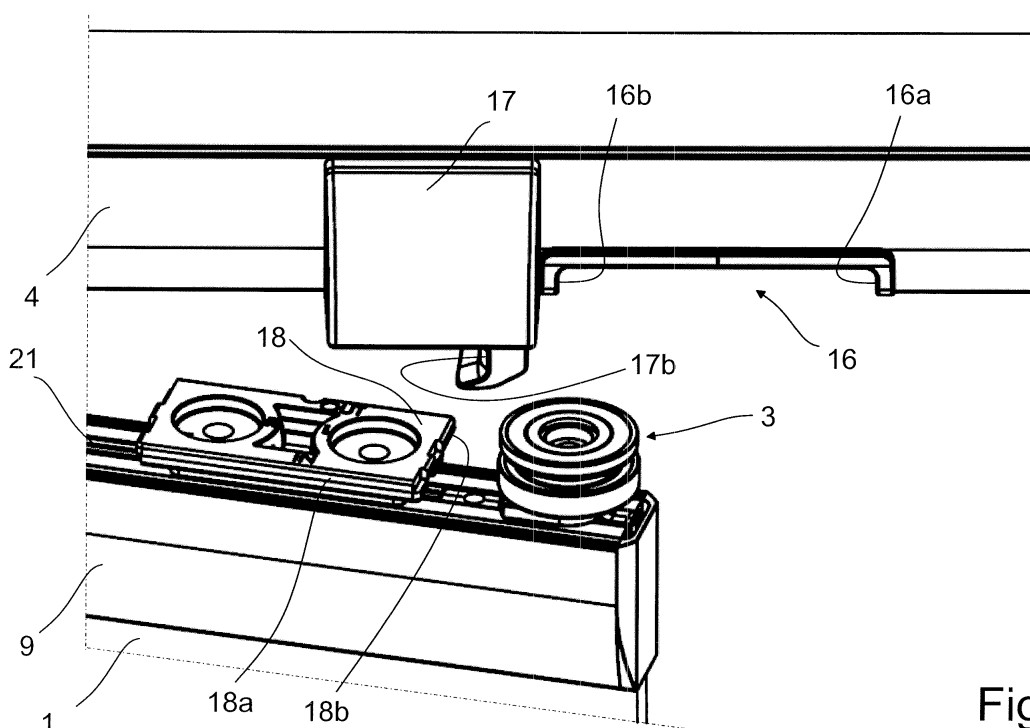


Fig. 5

Description

[0001] The invention relates to a panel system.

[0002] Balcony facilities of a building are equipped with glazing systems of prior art, which are called *e.g.* balcony glazings. The systems typically comprise an upper profile and a lower profile, or another corresponding guide track, inside which the necessary guide track parts are placed, between which, in turn, the single glass panes are suspended. The glass panes are used as panels which limit the space or protect it, for example, from weather conditions, for example on balconies or terraces, or divide the space into several parts and partition spaces, like in rooms or business facilities, in which the panels form doors and walls. Typically, the profiles extend in the horizontal direction and are fastened to the structures of the building. By means of guide track parts, single panels can be opened and closed, normally around a vertical axis of rotation, and profiles can be moved. The panels can be moved aside when they are not needed or when a larger space or passage is to be taken into use. Some known balcony glazings are presented in the publications FI-84645-B and FI-90796-B. One system for glazing a space is presented in the publication WO 97/11247. The panels can also extend down to the floor, as in the publications GB-1456283-B, FR-2545143-A and EP-0 457 286-A1.

[0003] The panels are normally separate, and openable panels comprise, at least on one edge of the panel, at its lower end and upper end, a guide track part that acts simultaneously as a hinge when the panel is turned aside. Furthermore, the panel comprises at least one guide track part, in many cases two guide track parts or guiding members which are supported to the upper profile and/or the lower profile, preventing the opening of the panel. For the separate panels, at least three guide track parts are needed, which prevent the opening of the panel and which support the panel in a straight position for the time of the transfers. When the panel is turned, the panel is supported to only two guide track parts, wherein the opening of the panel is allowed in a certain position only. In said position, the guide track parts are interlocked to the guide track parts of the adjacent opened panel, for example by means of locking and hinge mechanisms of WO 03/042482 A1, or to a locking arranged inside the upper profile. The locking prevents the upper edge of the panel from moving and letting the panel in an inclined position. In many cases, the upper profile is also provided with a guiding member with a guiding surface, to which the guide track part is supported until the locking has engaged reliably. Normally, the locking requires accurate positioning of the panel. The guiding member is placed at an opening in the upper profile, through which the guide track part comes out of the profile. The guiding member secures the effective locking by keeping the panel in the correct position for locking or unlocking. Guiding members supported to guide track parts are disclosed in documents EP 1 538 292 A2, DE 10333612 A1, US

5,272,839, and WO 03/042478 A1.

[0004] The opening in the profile must be kept as small as possible, so that the panel does not open before entering the turning position. For this reason, those guide track parts which are located closest to the opening edge of the panel, must be placed in a slightly different position in each panel, as presented in documents WO 00/79088 A1, US 5,749,172 and SE 512602 C2. The fixing point varies, because the distance between the guide track part acting as a hinge and the opening of the profile varies according to the number of panels turned aside and next to each other. Because some of the guide track parts are placed elsewhere in the panel than at the corners of the panel, turning of the panel via the profile at an angle of *e.g.* 90 degrees becomes difficult. So that the edge of the panel would not extend further than the profile during the passing via the corner, the guide track parts should always be placed in the corners of the panels, as presented in SE 509554 C2 and US 5,448,855. In this case, the advantage is that two profiles at an angle can also be placed in a corner that is limited by *e.g.* walls, or inside the railing of a balcony, wherein the panels do not hit, for example, the railing or the walls of the balcony.

[0005] If the panels are still to be opened, the opening at the edge of the profile must be enlarged in a corresponding manner, because now the guide track part of each panel is placed in a different location from the guide track part of the preceding panel. As a result, the guide track parts of the panels to be turned first come to the opening even long before the guide track parts acting as a hinge are in the location where locking is possible. Document FI 115989 B (FI 20041265 A1) discloses a long opening and a guiding member capable of supporting the panel when the roller acting as the guide track part is at the long opening. The guiding member can keep the roller inside the profile which can be arranged to support the roller and the panel. The guiding member is supported to a fillet at the upper edge of the panel, and it simultaneously prevents the turning of the panel. The turning is allowed first after a piece fastened to the fillet has passed the guiding member, because in said position of the panel, the panel is capable of being interlocked with another panel or profile. During the turning of the panel, the piece is supported to the guiding member which must first be lifted up before the panel can be turned, so that the fillet would not hit the guiding member. Document FI 115989 B discloses that the position of the piece varies in each panel, and the roller is always placed in an upper corner of the panel. On the other hand, the panel is not suitable for crossing the corner in the profile, because the lower edge of the panel is provided with a guide track part whose location varies in each panel. The lower guide track part passes via a short opening in the lower profile. The guide track part prevents the turning of the panel, or it may be arranged to support the panel in the correct position and to the lower profile, when the upper guide track part is at the long opening.

[0006] When the above-presented panel is applied for

a profile with a corner, it is not possible to use a lower guide track part which supports the panel and whose position varies. Thus, the problem is that the guiding member is supported to the panel or its fillet, which causes friction and may damage or wear the fillet which is made of aluminium and which is also visible. The fillet may be supported to the guiding member all the time when the roller is at the opening. Furthermore, the guiding member must be lifted up in some way, for example manually, to enable opening of the panel. It would be simpler to construct a guiding member which would not require active measures by the user, as the above-presented guiding members of prior art do. However, the solution should allow the provision of a long opening in the profile and the supporting of the panel even when the upper guide track part is at the opening and the above-presented piece is not simultaneously at the guiding member.

[0007] It is an aim of the invention to develop a usable panel system with its guiding members, which is simple to use and to install. The invention makes it possible to move the panel safely and to open it without extra measures for transferring the guiding member in different positions.

[0008] The panel system according to the invention is presented in claim 1.

[0009] The invention makes a very compact guiding member possible, because the large and long guiding surfaces are placed in a part that is fastened to the panel and, for example, a fillet for it. The length of said part is selected suitably, depending on the opening of the guide track. The compact size of the guiding member does not become a disturbing aesthetic factor, and it is easier to place. The piece to be fastened to the fillet is unnoticeable, irrespective of its length. The guiding member is not in contact with the fillet of the panel, wherein no wearing marks are formed on it. By altering the dimensions of the piece, it is possible to select a large opening and several openable panels without problems, and it will not be necessary to change the guiding member. The solution provides a particular advantage in that passing through the corners in the profiles during transfers will not cause any risk of the edges of the panel hitting the surrounding structures.

[0010] The invention can be applied in panels intended *e.g.* for balconies as well as in panels which partition or limit various spaces in buildings and extend down to the floor, also on balconies.

[0011] In the following, the invention will be illustrated in more detail by means of a preferred embodiment, wherein reference will also be made to the appended drawings, in which

Fig. 1 is a principle view of the panel system according to the invention,

Fig. 2 shows the operation of an example of the invention during the transfer of the panel,

Fig. 3 shows the operation of the example of Fig. 2 when the panel is in the opening position,

Fig. 4 shows the operation of the example of Fig. 2 when the panel is being opened,

Fig. 5 shows the operation of the example of Fig. 2 and the guiding member when the panel is being opened, and

Fig. 6 shows the operation of the example of Fig. 2 when the panel is being opened.

[0012] Figure 1 shows a panel according to a first example and a panel system that is simultaneously, for example, a glazing for *e.g.* balconies, or a wall limiting a space. The panel system normally comprises several successive glass panes which are movable. The panels 1 are normally rectangular, wherein they are normally in an upright position and form a closed wall or a large window when placed one after the other. They can be transferred in the direction of the guide tracks, which is typically the horizontal direction. The panels 1 can be opened into a position which is normally perpendicular to the closed position shown in Fig. 1. In the open position, the panels 1 are placed side by side close to each other, wherein they are stored, for example, on one side of the opening of a balcony in a building, where they have first been moved along the guide tracks. The upper guide track 4 and the lower guide track 5 are placed in the horizontal direction, and an upper guide track part 6 and a lower guide track part 7 are placed inside them and are simultaneously used as guiding members, between which the panels 1 are fixed from above and from below, and the panel is in the vertical plane. The guide tracks are normally profiles made of aluminium and provided with a long groove for the guide track parts. The panel 1 preferably consists of a glass pane, whose lower and upper edges are provided with fillets 8 and 9, to which the guide track parts, in turn, are fastened.

[0013] One example of the guide track parts is shown in Fig. 1, in which the principles known from WO 03/042482 A1 are applied. The panel 1 is normally provided with a fillet 9, to which a hinge pin 10 is fastened. The hinge pin 10 is shaped and unrotatable in relation to the panel 1, and a locking piece 12 is locked to the hinge pin 10. The hinge pin 10 of the guide track part 6 allows the turning of the panel 1 and its rotation around a vertical rotation axis X1 from the closed position to the open position, and *vice versa*. The rotating takes place around the hinge pin 10. The guide track part 6 is arranged on the support of a guide track 4 and is supported to it by means of, for example, horizontal rollers 11, which are normally two in number and which are fixed around the hinge pin 10. The rollers 11 support the panel 1, and by means of the rollers 11, the panel 1 moves along the guide track 4. A locking piece 13 sliding in the guide track 4 guides the movement and interlocks the different pan-

els, if necessary. The locking piece 13 remains aligned to the guide track 4, and the panel 1 is capable of turning in relation to it. In this example, the locking piece 13 is locked to the hinge pin of the guide track part of the adjacent corresponding panel. The guide track 4 is also provided with a corresponding locking piece 12, to which the first panel 1 to be turned is locked.

[0014] The structure of the guide track part 7 placed in the guide track 5 corresponds substantially to the guide track part 6. The guide track parts 6 and 7 are placed on the same vertical rotation axis X1, wherein the opening of the panel 1 is possible, and normally they are placed close to the first edge of the panel 1 and close to the corners of the panel 1.

[0015] Another upper guide track part 3, in turn, whose hinge pin 2 is fixed to the fillet 9, is placed close to the second edge of the panel 1, which is an openable edge and opposite to the first edge. The guide track part 3 is suspended by the guide track 4 and is supported to it by means of, for example, horizontal rollers 14 fixed around the hinge pin 2. The rollers 14 support the panel 1, and by means of the rollers 14, the panel 1 moves along the guide track 4. When inside the guide track 4, the rollers 14 are supported to the structure 15 inside the guide track 4, supporting the panel. The structure of the guide track part 3 may vary from the structure of the guide track part 6, and it is placed inside the guide track 4, keeping the panel 1 closed. The purpose of the guide track part 3 is to guide the openable edge of the panel 1 during the transfers, and it is placed close to the corner of the panel 1. When the guide track parts 3, 6 and 7 are close to the corners of the panel 1, the panel 1 protrudes as little as possible when the panel 1 is moved across the corner in the profile. The guide tracks 4 and 5 are then installed, for example, in the shape of a U or an L. A guide track part or a simple guide pin 20 can be placed at the lower edge of the panel 1, in the corner close to the second edge of the panel, to prevent bouncing of the panel 1. However, said guide track part or guiding pin 20 must be lifted up from the guide track 5 before opening the panel 1. The guide track 5 can also be placed lower than the floor surface. Said guide track part or guide pin 20 and the hinge pin 2 are placed on the same vertical rotation axis X2, if the panel 1 is moved across the corners of the guide track 5 and the guide track part or the guide pin 20 is lowered down.

[0016] For opening the panel 1, an opening 16 is provided at the side of the guide track 4, through which the guide track part 3 can come out of the guide track 4 for the turning. The location of the opening and its length measurement L3 are selected so that at least one guide track part 3 fixed to the panel 1 to be opened can pass via the opening 16. Thus, the panel 1 to be opened has been transferred to the opening position, in which the panel 1 is to be opened. It is a predetermined location A where the panel is to be opened and where it can be opened. The opened panels are placed next to each other, wherein the guide track part of each panel to be

opened and placed in the opening position is placed at a slightly different location in the guide track 4, wherein the opening 16 must be made longer to the right in Fig. 1, away from the guiding member 17 and the guide track part 4. The width L3 of the opening 16 is selected the greater, the more panels there are to be opened.

[0017] As the panel 1 is moved to the opening position shown in Fig. 1, where the panel 1 can be turned and opened, the guide track part 3 moves to the opening 16 before the first and second guide track parts 6, 7 are in contact with e.g. the locking piece 12. As shown in Fig. 2, the guide track part 3 is kept supported to the structures 15 of the guide track 4 so that the panel 1 is not allowed to open or to turn in an inclined position. The panel 1 is supported all the time, from the moment when the guide track part 3 is moved to the opening 16 and to the moment when the guide track part 3 is moved to the opening position, ready for turning. The panel 1 or the fillet 9 fixed to it is provided with a counter element 18 which, in turn, is placed against the guiding member 17 in the guide track 4, when the guide track 3 is in the opening 16 or just moving into the opening 16. As shown in Fig. 6, the guiding member 17 comprises a counter surface 17a which is in contact with the counter element 18 and whose length is L2. The counter element 18 also has a side surface 18a shown in Fig. 5, which is simultaneously a counter surface, along which the counter surface 17a of the guiding member 17 slides and which has a length L1, over which the guiding member 17 is in a sliding contact with the counter surface. The maximum length of the contact surface is L2. The length L1 is clearly greater than the length L2, typically multiple, for example 10 times or more, even 15 or 20 times.

[0018] The guiding member 17 extends to a distance from the guide track 4 in the direction in which the panel opens, wherein the side surface 17b of the guiding member 17 also acts as a counter surface to keep the guide track part 6 pushed against the locking piece 12 when the panel 1 is turned. The extension of the guiding member 17 is selected so long that a reliable locking is achieved. Figures 1 and 3 show a situation, in which the side surface 17b of the guiding member 17 and the end surface 18b of the counter element 18, which is simultaneously the counter surface, are placed in such a mutual position that allows the opening of the panel 1 as shown in Fig. 4. The side surface 18a of the counter element 18 is completely past the counter surface 17a, and the side surface 18a is no longer against the guiding member 17. The counter element 18 can slide against the side surface 17b of the guiding member 17 when the panel 1 is opened. Figure 5 shows a situation in which the panel 1 is locked, the counter element 18 has disengaged from the guiding member 17, and the panel 1 is turned open.

[0019] The counter element 18 has, for example, a rectangular and preferably symmetrical shape so that it can be installed in two different turning positions without disturbing the operation. The shape of the counter element 18 may vary. The corners between adjacent sides are

rounded, as necessary, to facilitate the guiding. As shown in Fig. 5, the counter element 18 is surrounded by a collar, under which the guiding member 17 is curved. Under the side surface 17b, the guiding member 17 is provided with a collar that is placed under the collar of the counter element 18, for support and guiding. The counter surfaces 17a and 17b of the guiding member 17 are transverse to each other, substantially orthogonally in the presented example, as are also the counter surfaces of the counter element 18. The guiding member 17 can also be provided with a function where the side surface 17b is allowed to swing around a vertical rotation axis, wherein it will conform to the movement of the counter element 18 better during the turning. The side surface 17 is fixed to a part that rocks in relation to the guiding member 17 and always returns to a desired position by means of e.g. a spring.

[0020] To secure unobstructed opening, a clearance H2 is always left between the guiding member 17 and the panel 1 or the fillet 9, to allow the opening of the panel 1 and to prevent the panel 1 from hitting the guiding member 17. A clearance H1 is always left between the counter element 18 and the guide track 4, to allow the opening of the panel 1 and to prevent the counter element 18 from hitting the guide track 4. The counter element 18 extends higher than the panel 1 or the fillet 9, and higher than the lowest point of the guiding member 17. The panel 1 is always supported to the guiding member 17 by means of the counter element 17 and not, for example, by means of the fillet 9. Thanks to the clearance H2, the fillet 9 is not in contact with the guiding member 17.

[0021] The length L1 of the counter element 18 and its side surface 18a depends on the length L3 of the opening 16, and they are proportional to each other, depending on the structure of the guide track part 3. For example, in case of a roller, the length L3 corresponds to the length L1 added with about a half of the diameter of the roller 14, or more. Preferably, the counter element 18 is supported against the roller 17, or they are aligned (the lengths L1 and L2 are interlaced) even before the roller 14 loses its contact with the guide track 4 at the opening 16, that is, at the front edge 16a of the opening. In the case of a roller 14, the rotation axis X2 of the roller 14 approaches the front edge 16a of the opening 16a. The more panels there are to be opened, the farther away the front edge 16a of the opening and the side surface 18a of the counter element 18 are from each other. Particularly when the roller 14 is in use, the length L1 of the side surface 18a is thus substantially the same as the length or distance L4 moved by the guide track part 3 at the opening 16, when the guide track part 3 is on its way to the opening position, starting from the front edge 16a. The length L1 may also be greater than the length L4. The length L4 is the distance passed by the rotation axis X2.

[0022] The guiding member 17 is fixed in place in the guide track 4. The distance from the end surface 18b of the counter element 18 to the front edge of the panel 1

to be opened and to the guide track parts 3 varies when the panels are each in their opening position. The counter element of each panel must be fixed to a point corresponding to the operation of Fig. 1, wherein the counter elements are placed in different locations in the different panels. The size of the guiding member 17 and the measurement L2 can be kept small when the counter element 18 is long and the measurement L1 is greater than it. The counter element 18 can be installed in an unnoticeable manner on the fillet 9 provided with a fastening groove 21, where also the guide track parts 3 and 6 are fastened. The counter element 18 and the guiding member 3 are separate parts, and their distance can be adjusted.

[0023] The invention is not restricted solely to the embodiments presented above. The shapes of the guide track, the fillets, the profiles, and the seal may vary to a desired extent.

Claims

1. A panel system comprising:

- a panel (1) that can be moved and turned,
- an upper first guide track (4) and a lower second guide track (5), between which the panel is suspended,
- a first guide track part (3) coupled to the panel and arranged to follow the first guide track,
- an opening (16) which is provided in the first guide track and through which the first guide track part moves out of the first guide track when the first guide track part is in a predetermined position for the turning of the panel, and
- a guiding member (17) fastened to the first guide track and arranged to support the panel during the turning,

characterized in that the panel system also comprises:

- a counter element (18) which is fixed to the panel and is supported against the guiding member (17) during the turning of the panel, and is also placed against the guiding member (17) to prevent the turning of the panel when the first guide track part is at the opening but is not yet placed in the predetermined position for the turning of the panel.

2. The panel system according to claim 1, **characterized in that** the counter element (18) is arranged to be placed against the guiding member (17) to prevent the turning all the time, starting from the moment when the first guide track part is placed at the opening, and ending at the moment when the first guide track part is placed at the predetermined location for turning.

3. The panel system according to claim 1 or 2, **characterized in that** the distance between the counter element (18) and the first guide track part is adjustable. 5
4. The panel system according to any of the claims 1 to 3, **characterized in that** the counter element comprises a first counter surface (18b) which is placed against the guiding member (17) during the turning, and a second counter surface (18a) which is placed against the guiding member (17) during the transfer of the panel. 10
5. The panel system according to claim 4, **characterized in that** the guiding member comprises a first counter surface (17b) which is placed against the counter element or the first counter surface (18b) of the counter element during the turning, and a second counter surface (17a) which is placed against the counter element or the second counter surface (18a) of the counter element during the transfer of the panel. 15 20
6. The panel system according to claim 4 or 5, **characterized in that** the counter element (18) comprises a substantially rectangular piece whose two adjacent side surfaces form the first counter surface (18b) and the second counter surface (18a). 25
7. The panel system according to any of the claims 4 to 6, **characterized in that** the length (L1) of the second counter surface (18a) of the counter element is greater than the length (L2) of the second counter surface (17a) of the guiding member. 30 35
8. The panel system according to any of the claims 4 to 7, **characterized in that** the length (L1) of the second counter surface (18a) of the counter element is multiple compared to the length (L2) of the second counter surface (17a) of the guiding member. 40
9. The panel system according to any of the claims 4 to 8, **characterized in that** the length (L1) of the second counter surface (18a) of the counter element is substantially equal to the length (L4) that the first guide track part moves at the opening on its way to the predetermined location for turning, or is greater than said length (L4). 45
10. The panel system according to any of the claims 1 to 9, **characterized in that** the panel structure also comprises an upper second guide track part (6) and a lower third guide track part (7), by means of which the panel is coupled to the first and the second guide tracks and which allow the opening of the panel to the side around a rotation axis (X1) extending via the second guide track part and the third guide track part. 50 55
11. The panel system according to claim 10, **characterized in that** the second and the third guide track parts comprise a locking piece (12) which is arranged to lock the panel to a predetermined location for the turning.
12. The panel system according to any of the claims 1 to 11, **characterized in that** the guiding member (17) extends to a distance from the first guide track and is arranged to support the panel during the turning until the panel is locked in a predetermined location for the turning.
13. The panel system according to any of the claims 1 to 12, **characterized in that** the panel (1) is made of glass, comprising an upper first fillet (9), to which the first and the second guide track parts and the counter element (18) are fastened, and a lower second fillet (8), to which the third guide track part is fastened.
14. The panel system according to any of the claims 1 to 13, **characterized in that** the panel structure further comprises a guiding member (20) which is coupled to the panel and is arranged to follow the second guide track and which can be lifted up from the second guide track.

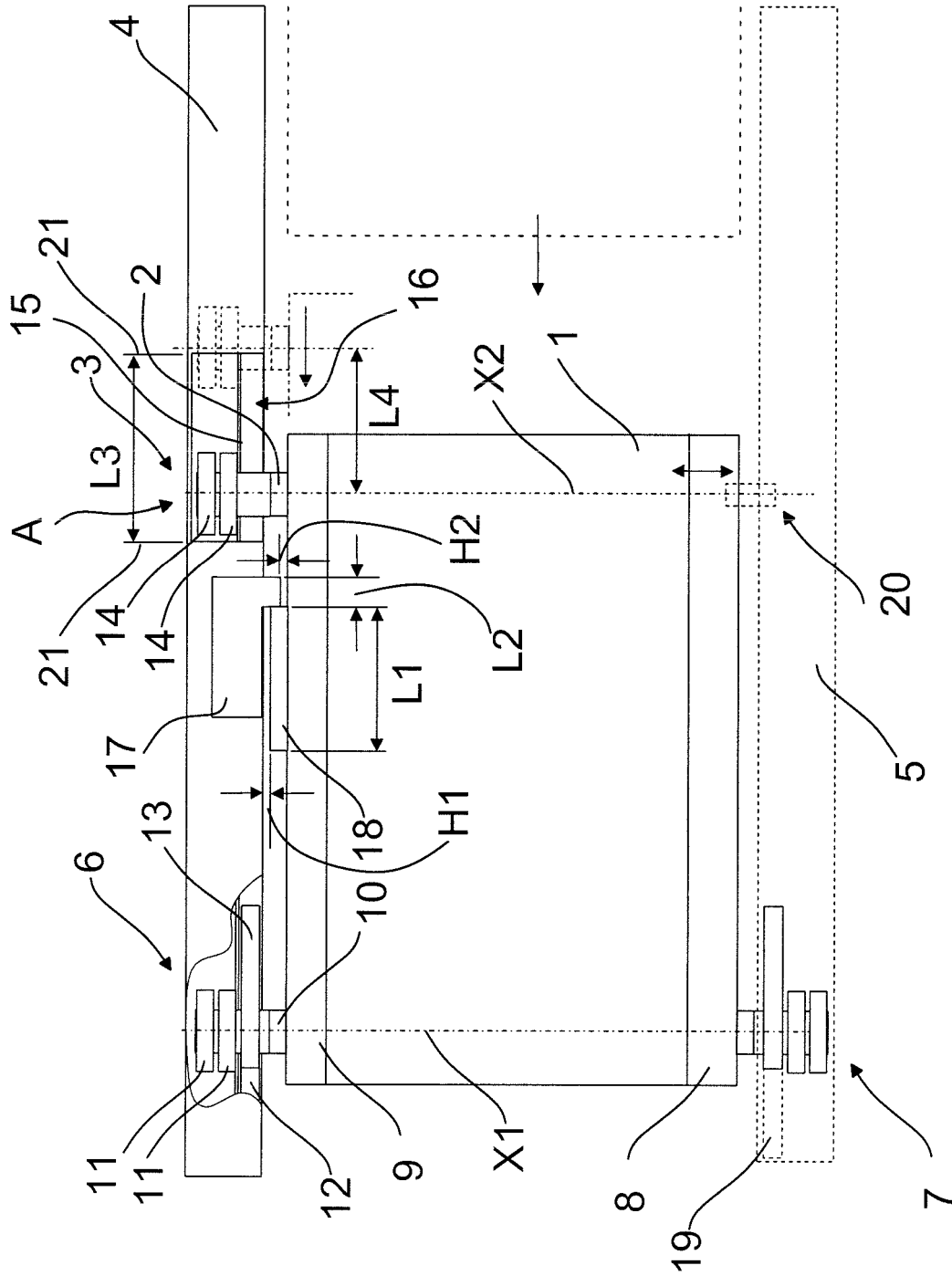


Fig. 1

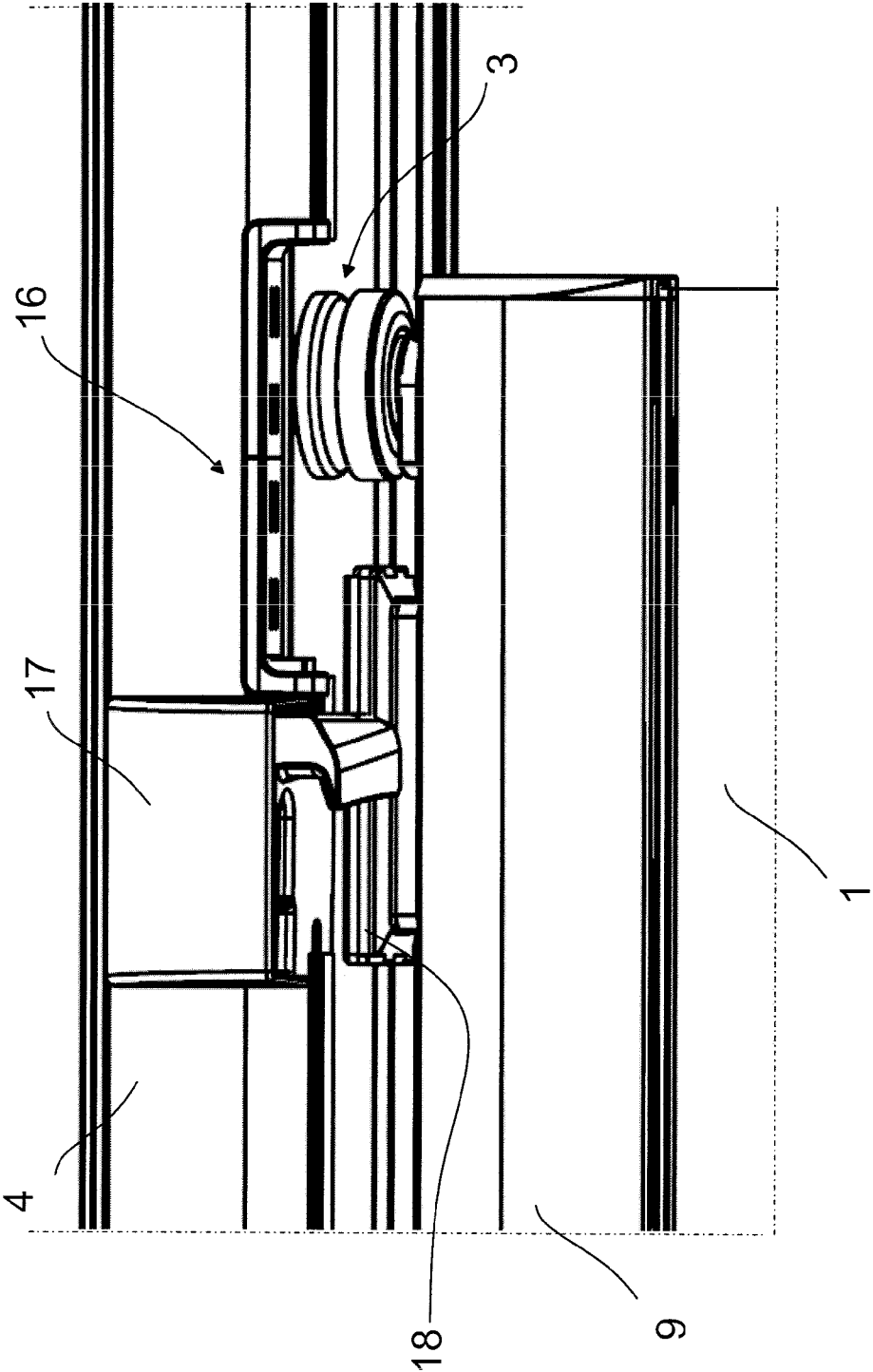


Fig. 2

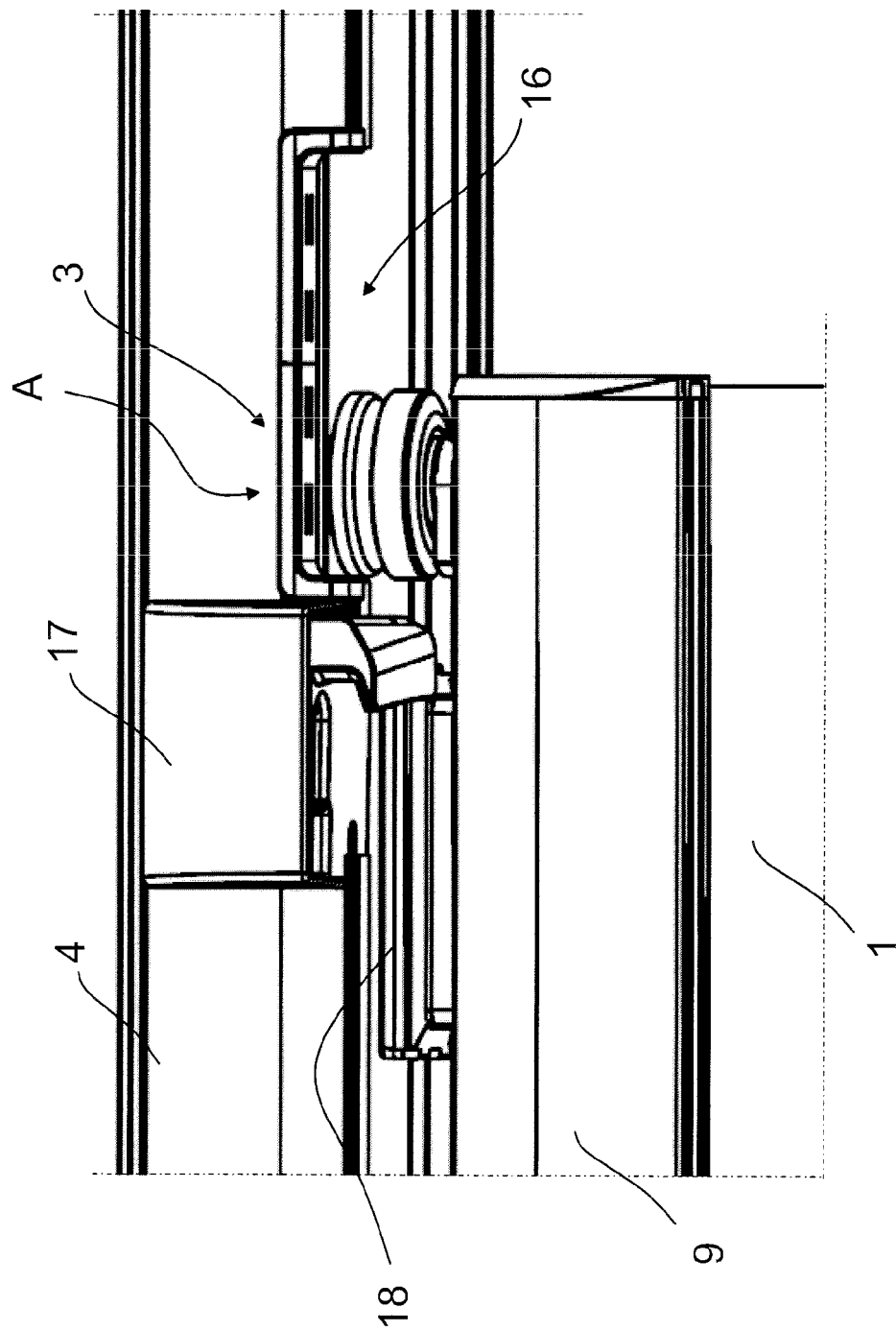


Fig. 3

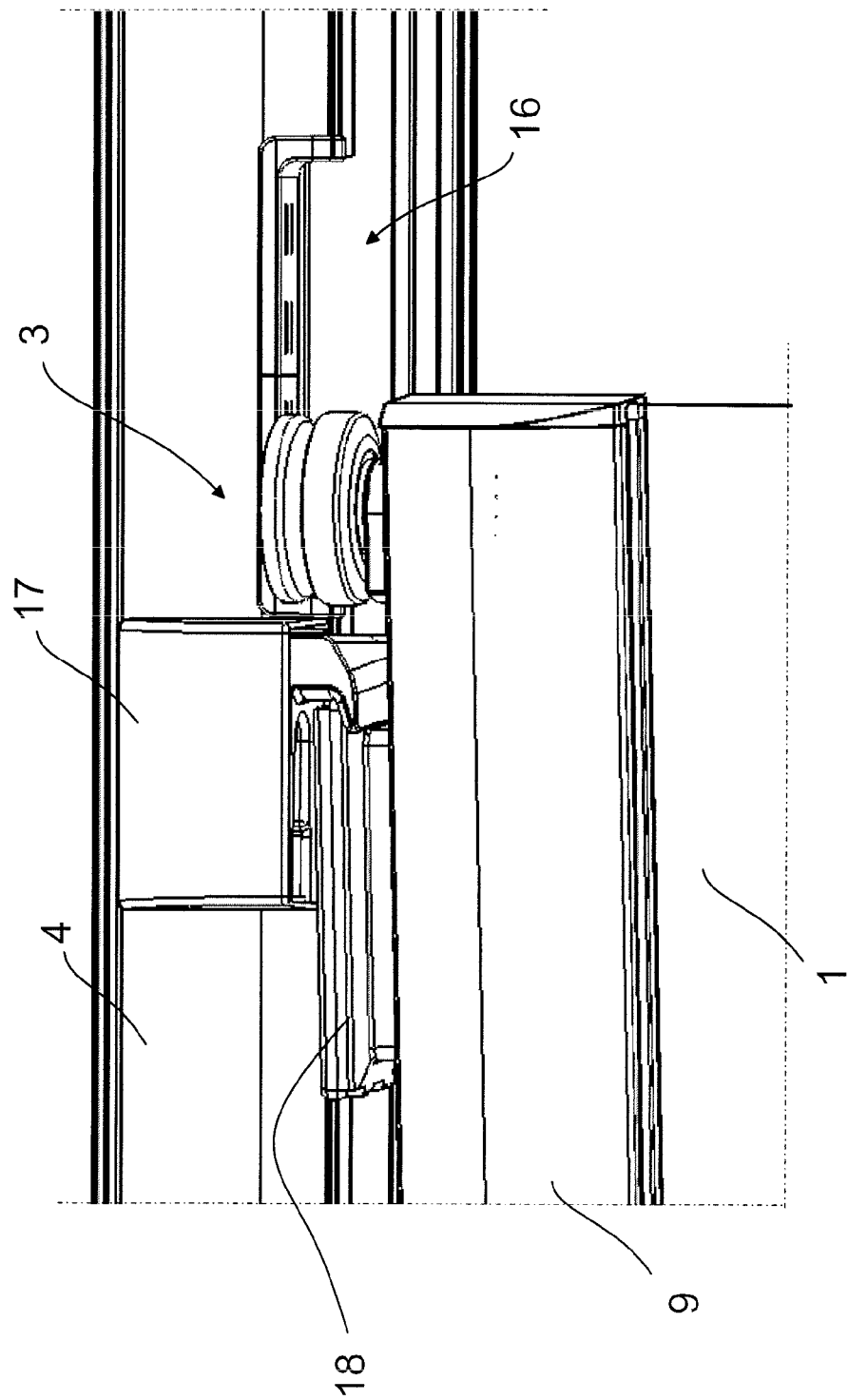


Fig. 4

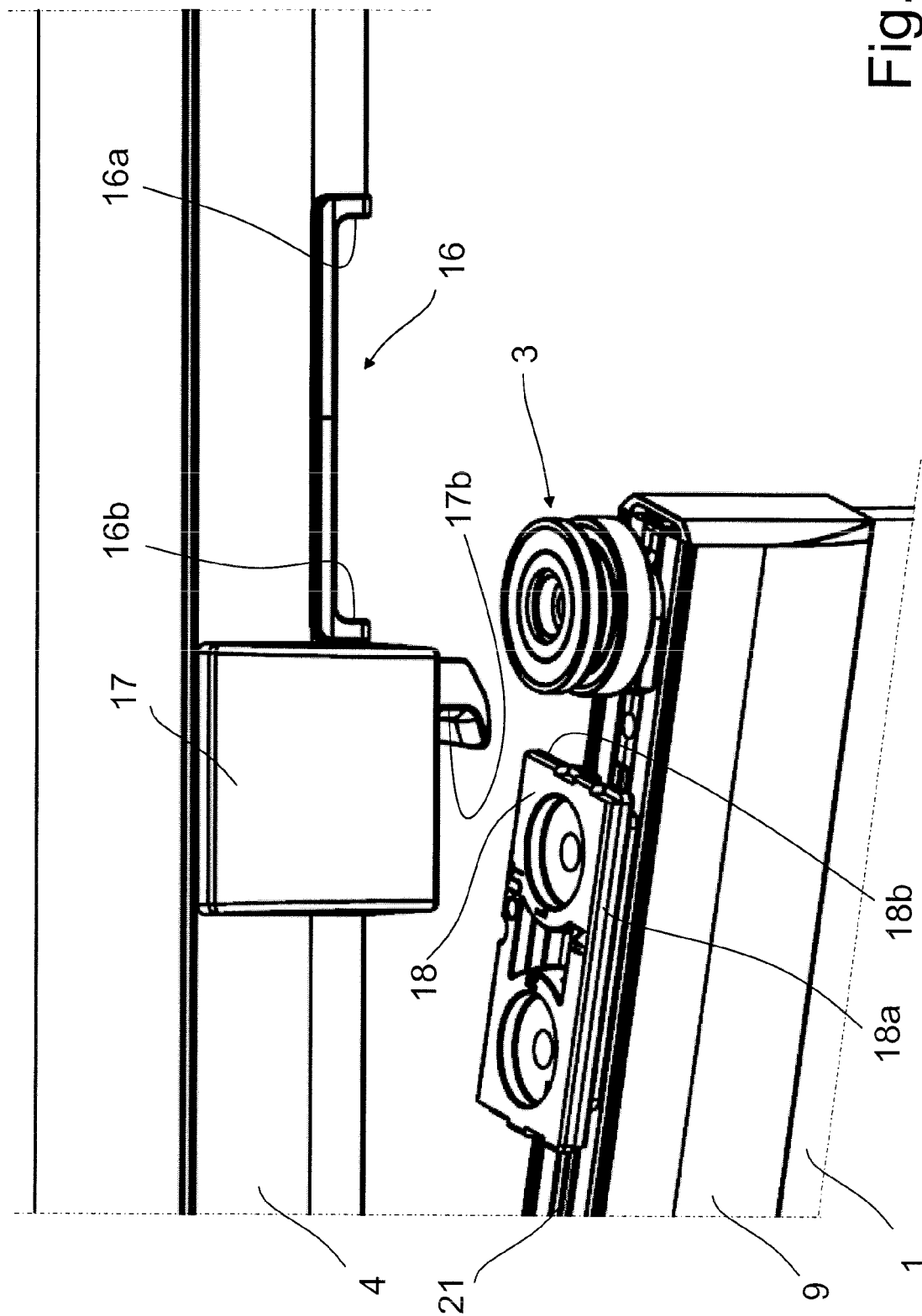


Fig. 5

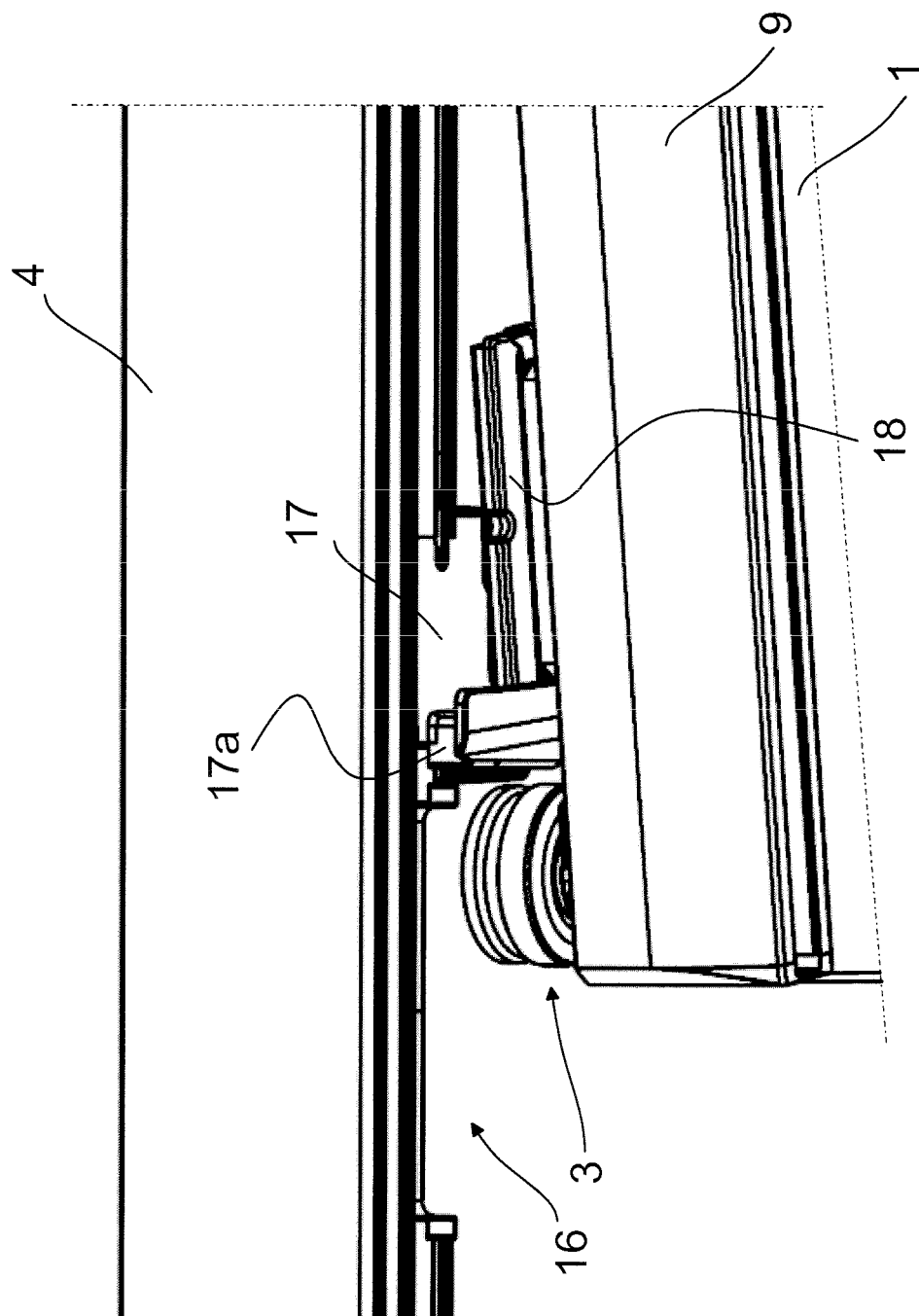


Fig. 6



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 07 39 7028

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 18 December 2007	Examiner Verdonck, Benoit
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EPO FORM 1503 03.82 (P04C01)

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

EP 07 39 7028

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