(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 762 453 B1

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
16.02.2011 Bulletin 2011/07

(51) Int Cl.:
B61D 19/02 *(2006.01)*

(21) Application number: **05019645.0**

(22) Date of filing: **09.09.2005**

(54) **Door arrangement for a vehicle**

Türanordnung für ein Fahrzeug

Agencement d'une porte pour un véhicule

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC NL PL PT RO SE SI SK TR

(43) Date of publication of application:
14.03.2007 Bulletin 2007/11

(73) Proprietor: **Bombardier Transportation GmbH**
13627 Berlin (DE)

(72) Inventors:
- **Klamka, Heinz, Dr.**
  16761 Henningsdorf (DE)
- **Künzel, Thomas**
  16727 Velten (DE)
- **Prockat, Jan, Dr.**
  12559 Berlin (DE)

(74) Representative: **Cohausz & Florack**
Patent- und Rechtsanwälte
Partnerschaftsgesellschaft
Bleichstraße 14
40211 Düsseldorf (DE)

(56) References cited:
DE-A1- 3 529 667 **DE-A1- 3 710 451**

Note: Within nine months of the publication of the mention of the grant of the European patent in the European Patent Bulletin, any person may give notice to the European Patent Office of opposition to that patent, in accordance with the Implementing Regulations. Notice of opposition shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

EP 1 762 453 B1

Printed by Jouve, 75001 PARIS (FR)

Description

[0001] The invention relates to a door arrangement for a vehicle, in particular for a rail vehicle, comprising a door frame section defining a door opening, at least a first door leaf element movable in a translational first closing direction from an open position to a closed position, and a sealing arrangement sealing an elongated first gap. The first gap, in the closed position of the first door leaf element, is formed between the door frame section and the first door leaf element and extends along the first closing direction. The sealing arrangement comprises a first sealing surface located at the first door leaf element and an associated second sealing surface located at the door frame section. The first sealing surface and the second sealing surface, in the closed position of the first door leaf element, extend over at least the entire length of the first gap along the first closing direction and contacting each other to seal the first gap.

[0002] For passenger doors of railway vehicles different kinds of sealing concepts have been developed. The respective sealing concept, among others, depends on the closing kinematics of the door, e.g. on the fact if a sliding door or a sliding plug door is chosen. While sliding doors are of rather simple design and, thus, very reliable, they usually imply slight disadvantages regarding their noise isolation properties. This is due to the fact that sliding doors during opening and closing translationally move in a plane. Since conventional elastic contact seals, such as rubber seals or the like, would not withstand the permanent friction at the upper and lower edges of the door (extending parallel to the closing direction of the door) for acceptable amount of time, these upper and lower edges are sealed mostly just by brushes or some kind of labyrinth seal. Obviously, this concept only provides poor performance in terms of sealing against water and/or noise ingress.

[0003] To solve this sealing problem with sliding doors it has been proposed to use inflatable seals that are inflated and, thus, pressed against a mating surface only when the door is in a closed position. Such sealing arrangements are known, for example, from US 4,150, 509 and AT 400 426 B. While these solutions may provide improved sealing properties, it is obvious that they add considerable complexity to the system and, thus, are rather costly to implement and operate.

[0004] Another approach to fulfill ambitious requirements regarding noise isolation has been to use sliding plug doors. These sliding plug doors, at the end of the closing movement, perform an additional movement transverse to the closing direction in order to bring the door into contact with conventional elastic seals.

[0005] While the noise reduction properties of these sliding plug doors, in general, are clearly superior to the ones of conventional sliding doors, due to their more complex kinematics, they are more expensive and slightly less reliable. Furthermore, the more complex closing kinematics require longer closing and opening times. Thus, it becomes increasingly difficult to meet the closing time requirements during rush hours, without risking to trap passengers and thus triggering a time consuming re-opening routine. Thus, in other words, the sliding plug doors face severe problems in meeting the rapid passenger flow requirements during rush hours in public mass transportation systems, such as subways or the like.

[0006] It is thus an object of the present invention to provide a door arrangement that, at least to some extent, overcomes the above disadvantages. It is a further object of the present invention to provide a door arrangement that provides, in a simple manner, good sealing properties while, at the same time, allowing fast opening and closing of the door.

[0007] The above objects are achieved, starting from a door arrangement according to the preamble of claim 1, by the features of the characterizing part of claim 1.

[0008] The invention is based on the technical teaching that it is possible to achieve good sealing properties and fast opening and closing of the door in a simple manner if mating sealing surfaces of the sealing arrangement extending along the closing direction of the sliding door leaf are inclined with respect to the closing direction in a wedge-like manner. Thus, according to the invention, the first sealing surface and the second sealing surface are at least section-wise inclined with respect to the first closing direction.

[0009] This inclination allows to arrange the mating sealing surfaces on the door frame section and on the door leaf such that they come into contact only in the end phase - even only at the very end - of the translational closing movement of the door leaf. This provides the advantage that only a short sliding contact occurs while, at the same time and depending on the inclination, a considerable contact pressure may be achieved leading to a tight and reliable sealing of the closed door that is comparable to the one of sliding plug doors. Due to the adjustably short sliding contact, only few wear is to be expected such that conventional simple elastic sealing materials, such as rubber etc., may be used.

[0010] There is no need for any complex closing kinematics but the tight sealing may be achieved by a simple translational closing movement. These very simple linear kinematics allow for fast opening and closing of the door leaf and, thus, to meet the increasingly demanding requirements with respect to rapid passenger flow.

[0011] Further advantages of the invention lie within the contact situation that may be achieved. On the one hand, there is the well defined contact situation that arises by simply pressing against each other two inclined sealing surfaces. Thus, other than with known sealing concepts, the sealing effect is not resulting from a considerably varying reaction force provoked by bending a part of the sealing profile (e.g. brush hairs or rubber lips). On the other hand, there is the ability to adjust the contact force, i.e. the sealing force, acting between the sealing surfaces. This may be done by adjusting the position and/or the inclination of the sealing surfaces.

[0012] Usually, the first sealing surface is facing in the first closing direction while the second sealing surface is facing in a direction opposite to the first closing direction. Thus, in other words, a first surface normal of the first sealing surface pointing away from the first sealing surface has a component directed in the first closing direction and a second surface normal of the second sealing surface pointing away from the second sealing surface has a component directed opposite to the first closing direction.

[0013] At least one of the sealing surfaces may be formed by a component of the door leaf element or the door frame section, i.e. integrated into the door leaf element or the door frame section. However, preferably, the sealing arrangement comprises a first sealing device and a second sealing device, the first sealing device being located at the first door leaf element and providing the first sealing surface and the second sealing device being located at the door frame section and providing the second sealing surface. Thus, all components may be easily manufactured, assembled and adjusted at a later stage.

[0014] The inclination of the sealing surfaces may be provided in any suitable way. In a preferred embodiment of the door arrangement according to the invention having a very simple design, the first sealing device comprises at least one substantially wedge-shaped first sealing element providing the first sealing surface and/or the second sealing device comprises at least one substantially wedge-shaped second sealing element providing the second sealing surface.

[0015] The mating parts of the sealing surfaces may have different inclinations with respect to the first closing direction that adapt to each other due to elastic deformation when they are pressed against each other. Furthermore, the inclination of the sealing surfaces may continuously or intermittently vary over the length of the gap to be sealed along the closing direction. Preferably, at least a first part of the first sealing surface and an associated second part of the second sealing surface have substantially the same first inclination with respect to the first closing direction, the first inclination being substantially constant. Thus, good and uniform contact may be achieved.

[0016] In some embodiments of the door arrangement according to the invention which are preferred due to their simple design, the mating sealing surfaces have a substantially constant inclination and extend over the entire length (along the closing direction) of the gap to be sealed along the first closing direction. Thus, preferably, the first part of the first sealing surface and the second part of the second sealing surface, in the closed position of the first door leaf element, extend over substantially the entire length of the first gap along the first closing direction.

[0017] In further embodiments of the door arrangement according to the invention, the first sealing surface and the second sealing surface are stepped along the first closing direction. Thus, the contact conditions and the sealing force profile may be adjusted to the particular needs. Preferably, at least a third part of the first sealing surface and an associated fourth part of the second sealing surface have substantially the same second inclination with respect to the first closing direction, the second inclination being substantially constant and different from the first inclination.

[0018] The respective sealing surface may be a simple planar or section-wise planar surface. To enhance the sealing properties, the mating sealing surfaces may be designed to form, in a direction transverse to the closing direction, a toothed or labyrinth-like arrangement with one or more protrusions, such as lips or the like, on one sealing surface engaging mating grooves on the other sealing surface. Thus, preferably, at least one of the first sealing surface and the second sealing surface has an elongated first protrusion extending along the first closing direction and the other one of the first sealing surface and the second sealing surface has an elongated first groove extending along the first closing direction, the first protrusion, in the closed position of the first door leaf element, engaging the first groove.

[0019] The closing kinematics of the door arrangement may be of any suitable design. In particular, the invention is not restricted to applications where a door is opened and closed in a conventional manner by shifting it along a longitudinal axis of a vehicle. Preferably, the first door leaf element has a height direction extending within a door leaf plane defined by the first door leaf element and the first door leaf element has a normal direction extending substantially perpendicular to the door leaf plane, the first closing direction extending substantially parallel to the door leaf a plane and transverse to the height direction.

[0020] With preferred embodiments of the door arrangement according to the invention, the first sealing surface and the second sealing surface are inclined with respect to the normal direction. Thus, in other words, the contact or sealing force acting between the first sealing surface and the second sealing surface has a component acting along the normal direction.

[0021] With further preferred embodiments of the door arrangement according to the invention, the first sealing surface and the second sealing surface are inclined with respect to the height direction. Thus, in other words, the contact or sealing force acting between the first sealing surface and the second sealing surface has a component acting along the height direction. This embodiment has the advantage that this component of the contact or sealing force acting along the height direction may be easily compensated by a further force acting on the door leaf element such that this component has not to be taken by the guiding mechanism for the door leaf element. For example, this component may act against the gravitational force acting on the door leaf element or against a further contact or sealing force component acting on the door leaf element and resulting from at least one further sealing surface pairing.

[0022] It will be appreciated that the design with the inclination to the normal direction and the design with the inclination to the height direction may be combined if desired. In other words, among others, a design may be chosen showing a first sealing surface and a second sealing surface being inclined with respect to the height direction and the normal direction.

[0023] The first gap may be located at any suitable location around the area of the door opening. Preferably, the first gap extends in the area of an upper end of the first door leaf element since, here, the invention develops its beneficial effects to a high extent. This is due to the fact that the implementation of complicated closing kinematics poses considerable problems in this area such that the simple kinematics according to the invention are very advantageous.

[0024] It will be appreciated that the invention may show combined closing kinematics, e.g. sliding kinematics in the area of the first gap combined with sliding plug kinematics in the area of a remote second gap to be sealed.

[0025] With preferred embodiments of the door arrangement according to the invention, a second gap between the door frame section and the door leaf element is sealed in a similar manner to the first gap via sealing surfaces inclined with respect to the closing direction. Thus, preferably, the sealing arrangement is sealing an elongated second gap, the second gap, in the closed position of the first door leaf element, being formed between the door frame section and the first door leaf element and extending along the first closing direction. The sealing arrangement comprises a third sealing surface located at the first door leaf element and an associated fourth sealing surface located at the door frame section. The first sealing surface and the second sealing surface, in the closed position of the first door leaf element, extend over at least the entire length of the second gap along the first closing direction and contact each other to seal the second gap. The third sealing surface and the fourth sealing surface, again, are at least section-wise inclined with respect to the first closing direction. Again, usually, the third sealing surface is facing in the first closing direction while the fourth sealing surface is facing in a direction opposite to the first closing direction.

[0026] Preferably, to achieve a simple design, the sealing arrangement comprises at least one substantially wedge-shaped third sealing element providing the third sealing surface and/or the sealing arrangement comprises at least one substantially wedge-shaped fourth sealing element providing the fourth sealing surface.

[0027] Similar to the first sealing surface pairing sealing the first gap, at least a fifth part of the third sealing surface and an associated sixth part of the fourth sealing surface have substantially the same third inclination with respect to the first closing direction, the third inclination being substantially constant.

[0028] Furthermore, similar to certain embodiments of the first sealing surface pairing, that the third sealing surface and the fourth sealing surface are stepped along the first closing direction.

[0029] Furthermore, similar to certain embodiments of the first sealing surface pairing with interlocking sealing surfaces, at least one of the third sealing surface and the fourth sealing surface has an elongated second protrusion extending along the first closing direction and the other one of the third sealing surface and the fourth sealing surface has an elongated second groove extending along the first closing direction, the first protrusion, in the closed position of the first door leaf element, engaging the second groove.

[0030] Similar to certain embodiments of the first sealing surface pairing, the third sealing surface and the fourth sealing surface are inclined with respect to the normal direction. Additionally or alternatively, similar to further embodiments of the first sealing surface pairing, the third sealing surface and the fourth sealing surface are inclined with respect to the height direction.

[0031] With certain preferred embodiments of the invention, where both the first sealing surface and the third sealing surface are inclined with respect to the height direction, the first sealing surface and the third sealing surface are facing in the same direction. Thus, for example the contact or sealing force components acting in both gaps along the height direction may act against the gravitational force acting on the door leaf element. Thus they may be compensated by the gravitational force and do not additionally load the guiding mechanism of the door leaf element. In this case, for example, both, the first sealing surface and the third sealing surface may face upward.

[0032] With certain other preferred embodiments of the invention, where both the first sealing surface and the third sealing surface are inclined with respect to the height direction, the first sealing surface and the third sealing surface are facing in opposite directions, e.g. towards or away from each other. Here, the contact or sealing force components acting in both gaps along the height direction may act against each other and even compensate each other such that they do not additionally load the guiding mechanism of the door leaf element.

[0033] The second gap may be arranged at any suitable location. Preferably, the second gap extends in the area of a lower end of the first door leaf element. With other embodiments, the first and second gap are located on opposite sides of the first door leaf element. Then, for example, said first gap extends in the area of an inner face said first door leaf element and said second gap extends in the area of an outer face of said first door leaf element and in the area of said first gap. With such a double sided arrangement and sealing surfaces inclined to the normal direction, a compensation of the contact or sealing force components acting in both gaps in the normal direction may be achieved.

[0034] It will be appreciated that the invention may of course also be applied to door arrangements with more than one door leaf element. The sealing surfaces of the

further door leaf elements may be designed in a similar manner to the ones of the first door leaf element. In particular, two door leaf elements contacting in a contact plane may be provided with sealing surfaces arranged in mirror symmetry with respect to this contact plane.

[0035] Thus, similar to the first door leaf element, preferably, a second door leaf element is provided, the second door leaf element being movable in a translational second closing direction from an open position to a closed position, and the sealing arrangement is sealing an elongated third gap, the third gap, in the closed position of the second door leaf element, being formed between the door frame section and the second door leaf element and extending along the second closing direction.

[0036] Similar to the first door leaf element, preferably, the sealing arrangement comprises a fifth sealing surface located at the second door leaf element and an associated sixth sealing surface located at the door frame section, the fifth sealing surface and the sixth sealing surface, in the closed position of the second door leaf element, extending over at least the entire length of the third gap along the second closing direction and contacting each other to seal the third gap, the fifth sealing surface and the sixth sealing surface being at least section-wise inclined with respect to the second closing direction.

[0037] Furthermore, similar to the first door leaf element, preferably, the sealing arrangement is sealing an elongated fourth gap, the fourth gap, in the closed position of the second door leaf element, being formed between the door frame section and the second door leaf element and extending along the second closing direction.

[0038] Similar to the first door leaf element, preferably, the sealing arrangement comprises a seventh sealing surface located at the second door leaf element and an associated eighth sealing surface located at the door frame section, the seventh sealing surface and the eighth sealing surface, in the closed position of the second door leaf element, extending over at least the entire length of the fourth gap along the second closing direction and contacting each other to seal the fourth gap, the seventh sealing surface and the eighth sealing surface being at least section-wise inclined with respect to the second closing direction.

[0039] The first closing direction may have any suitable relation to the second closing direction. Preferably, the first closing direction is substantially opposite to the second closing direction, since, thus, a very simple configuration is achieved.

[0040] Preferably, at least one of the sealing surfaces is formed on an elastic sealing device. The elasticity may be provided by the material of the sealing surface itself or by other suitable resilient means supporting the respective sealing surface. Thus, it is possible to compensate for misalignments and to allow greater tolerance ranges.

[0041] The invention further relates to a vehicle, in particular a rail vehicle, with a door arrangement according to any one of the preceding claims.

[0042] Further embodiments of the present invention will become apparent from the dependent claims and the following description of a preferred embodiment of the invention which refers to the appended figures. It is shown in:

Figure 1 a schematic partial representation of a preferred embodiment of an door arrangement for a rail vehicle according to the invention;

Figure 2 a schematic partially sectional view of the door arrangement of Figure 1 along line II-II of Figure 1 in a closed position;

Figure 3 a schematic partially sectional view of the door arrangement of Figure 1 along line II-II of Figure 1 in an opened position;

Figure 4 a schematic partially sectional view of a further preferred embodiment of an door arrangement for a rail vehicle according to the invention along line IV-IV of Figure 5 in a closed position;

Figure 5 a schematic partially sectional view of the door arrangement of Figure 4 along line V-V of Figure 4 in a closed position;

Figure 6 a schematic partially sectional view of a modification of the door arrangement of Figure 4 along line VI-VI of Figure 5;

Figure 7 a schematic partially sectional view of a further modification of the door arrangement of Figure 4 along line IV-IV of Figure 5.

[0043] In the following a first preferred embodiment of a door arrangement 101 for a rail vehicle 102 according to the invention will be described with reference to Figures 1 to 3. Figure 1 shows a schematic representation the door arrangement 1 while Figures 2 and 3 are schematic partially sectional views of the door arrangement of Figure 1 along line II-II of Figure 1 in a closed and opened position.

[0044] The door arrangement 101 is a sliding door arrangement and comprises a first door leaf element 103 and a second door leaf element 104 that are moveable along a translational first closing direction 105 and a translational second closing direction 106, respectively, from the opened position shown in Figure 3 to the closed position shown in Figure 2.

[0045] The first door leaf element 103 and the second door leaf element 104 close an opening 102.3 defined by a door frame section 102.2 of a car body 102.1 of the vehicle 102. However, it will be appreciated that the door frame section, with other embodiments of the invention, may also be formed by a separate door frame mounted

to the car body.

[0046] The first door leaf element 103 has a height direction 103.1 extending within a first door leaf plane defined by the first door leaf element 103 and a normal (or transverse) direction 103.2 extending substantially perpendicular to the door leaf plane. The first closing direction 105 extends substantially parallel to the door leaf plane and transverse to the height direction 103.1.

[0047] A sealing arrangement 107 is provided sealing, among others, a first gap 108 located at an upper edge on an inner face of the first door leaf element 103 between the first door leaf element 103 and the door frame section 102.2. To this end, the sealing arrangement 107 comprises a first sealing device 109 mounted to the first door leaf element 103 and a corresponding second sealing device 110 mounted to the door frame section 102.2.

[0048] The first sealing device 109 is a wedge shaped elastic rubber element having a first sealing surface 109.1 that extends over the entire length of the first gap 108 along the first closing direction 105. The first sealing surface 109.1 is a planar surface that has a constant first inclination with respect to the first closing direction 105 and with respect to the transverse direction 103.2 of the first door leaf element 103.

[0049] The second sealing device 110 is a wedge shaped elastic rubber element having a second sealing surface 110.1 that extends over the entire length of the first gap 108 along the first closing direction 105. The second sealing surface 109.1 is a planar surface that also has the constant first inclination with respect to the first closing direction 105 and with respect to the transverse direction 103.2 of the first door leaf element 103.

[0050] The first sealing surface 109.1 is facing in the first closing direction 105 while the second sealing surface is facing in a direction opposite to the first closing direction 105. Thus, a first surface normal of the first sealing surface 109.1 pointing away from the first sealing surface 109.1 has a component directed in the first closing direction 105 and a second surface normal of the second sealing surface 110.1 pointing away from the second sealing surface 110.1 has a component directed opposite to the first closing direction 105.

[0051] It will be appreciated that, with other embodiments of the invention, the first and second sealing surface may have different inclinations with respect to the first closing direction. In this case, the inclination difference may be compensated by elastic deformation occurring within at least one of the first and second sealing device.

[0052] As can be seen from Figure 3, in the opened position, the first sealing surface 109.1, in the transverse direction 103.2, is located at a distance from the second sealing surface 110.1. As the first door leaf element 103 is moved along the first closing direction 105, due to the inclination of the first sealing surface 109.1 and the second sealing surface 110.1, these surfaces approach each other and contact each other only at the end part of the closing movement. As can be seen from Figure 2, in the closed position, the first sealing surface 109.1 is then firmly pressed against the second sealing surface 110.1 to seal the first gap 108.

[0053] The sealing arrangement 107 further seals a second gap 111 located at a lower edge of the first door leaf element 103 between the first door leaf element 103 and the door frame section 102.2. To this end, the sealing arrangement 107 comprises a third sealing device 112 mounted to the first door leaf element 103 and a corresponding fourth sealing device 113 mounted to the door frame section 102.2.

[0054] The third sealing device 112 and the fourth sealing device 113 are arranged and designed in the same manner as the first sealing device 109 and the second sealing device 110 (only shifted along the height direction 103.1 towards the lower edge). Thus, it is here referred to the above explanations. Again, the third sealing device 112 is a wedge shaped elastic rubber element having a third sealing surface that extends over the entire length of the second gap 111 along the first closing direction 105. The third sealing surface is a planar surface that again has the constant first inclination with respect to the first closing direction 105 and with respect to the transverse direction 103.2 of the first door leaf element 103.

[0055] The fourth sealing device 113 is a wedge shaped elastic rubber element having a fourth sealing surface that extends over the entire length of the second gap 111 along the first closing direction 105. The fourth sealing surface is a planar surface that also has the constant first inclination with respect to the first closing direction 105 and with respect to the transverse direction 103.2 of the first door leaf element 103.

[0056] However, it will be appreciated that, with other embodiments of the invention, the third and fourth sealing surface may also have a different inclination than the first and second sealing surface.

[0057] In the opened position, the third sealing surface, in the transverse direction 103.2, is located at a distance from the fourth sealing surface. As the first door leaf element 103 is moved along the first closing direction 105, due to the inclination of the first and second sealing surface, these surfaces approach each other and contact each other only at the end part of the closing movement. Thus, in the closed position, the third sealing surface is then firmly pressed against the fourth sealing surface to seal the second gap 111.

[0058] The second door leaf element 104 is arranged symmetrically to its contact plane 114 with the first door leaf element 103. To seal the third and fourth gaps corresponding to the first and second gap 108 and 111, the sealing arrangement 107 comprises corresponding fifth to eighth sealing devices having corresponding mating fifth to eighth sealing surfaces that are identical with the first to fourth sealing surfaces of the first to fourth sealing devices. However, it will be appreciated that, with other embodiments of the invention, the fifth to eighth sealing devices may differ from the first to fourth sealing devices. In particular, the fifth to eighth sealing surfaces may differ

from the first to fourth sealing surfaces.

[0059] The lateral gap 115.1 is sealed by lateral sealing devices that extend in the height direction 103.1 and continue the respective sealing surfaces of the adjacent first and third sealing devices and the second and fourth sealing device, respectively. Thus, these lateral sealing devices as well have planar sealing surfaces that are inclined with respect to the first closing direction 105 and with respect to the normal direction 103.2 of the first door leaf element 103. The lateral gap 115.2 at the second door leaf element 104 is sealed by corresponding lateral sealing devices.

[0060] To compensate for the components of the sealing or contact forces acting in the normal direction 103.2 on the door leaf elements, further sealing devices in mirror symmetric arrangement with respect to the door leaf element plane may be provided on the outer face of the door leaf elements 103, 104 as it is indicated in Figure 3 by the dashed contours 116. Thus, the guiding mechanism (not shown) of the door leaf elements 103 and 104 may be relieved from the reaction forces resulting from these sealing or contact force components.

[0061] Figures 4 to 6 show a further preferred embodiment of a door arrangement 201 for a rail vehicle 202 according to the invention.

[0062] The door arrangement 201, again, is a sliding door arrangement and comprises a first door leaf element 203 and a second door leaf element 204 that are moveable along a translational first closing direction 205 and a translational second closing direction 206, respectively, from the opened position to the closed position shown in Figure 4.

[0063] The first door leaf element 203 and the second door leaf element 204 close an opening 202.3 defined by a door frame section 202.2 of a car body 202.1 of the vehicle 202. However, it will be appreciated that the door frame section, with other embodiments of the invention, may also be formed by a separate door frame mounted to the car body.

[0064] The first door leaf element 203 has a height direction 203.1 extending within a first door leaf plane defined by the first door leaf element 203 and a normal (or transverse) direction 203.2 extending substantially perpendicular to the door leaf plane. The first closing direction 205 extends substantially parallel to the door leaf plane and transverse to the height direction 203.1.

[0065] A sealing arrangement 207 is provided sealing a first gap 208 located at an upper edge of the first door leaf element 203 between the first door leaf element 203 and the door frame section 202.2. To this end, the sealing arrangement 207 comprises a first sealing device 209 mounted to the first door leaf element 203 and a corresponding second sealing device 210 mounted to the door frame section 202.2.

[0066] The first sealing device 209 is a wedge shaped elastic rubber element having a first sealing surface 209.1 that extends over the entire length of the first gap 208 along the first closing direction 205. The first sealing surface 209.1 is a planar surface that has a constant first inclination with respect to the first closing direction 205 and with respect to the height direction 203.1 of the first door leaf element 203.

[0067] The second sealing device 210 is a wedge shaped elastic rubber element having a second sealing surface 210.1 that extends over the entire length of the first gap 208 along the first closing direction 205. The second sealing surface 210.1 is a planar surface that also has the constant first inclination with respect to the first closing direction 205 and with respect to the height direction 203.1 of the first door leaf element 203.

[0068] The first sealing surface 209.1 is facing in the first closing direction 205 while the second sealing surface is facing in a direction opposite to the first closing direction 205. Thus, a first surface normal of the first sealing surface 209.1 pointing away from the first sealing surface 209.1 has a component directed in the first closing direction 205 and a second surface normal of the second sealing surface 210.1 pointing away from the second sealing surface 210.1 has a component directed opposite to the first closing direction 205.

[0069] It will be appreciated that, here as well, with other embodiments of the invention, the first and second sealing surface may have different inclinations with respect to the first closing direction. In this case, the inclination difference may be compensated by elastic deformation occurring within at least one of the first and second sealing device.

[0070] As can be seen from the dashed contour 217 of Figure 4 (indicating an opened position of the first and second door leaf element 203 and 204, respectively), in the opened position, the first sealing surface 209.1, in the height direction 203.2, is located at a distance from the second sealing surface 209.1. As the first door leaf element 203 is moved along the first closing direction 205, due to the inclination of the first and second sealing surface 209.1 and 210.1, these surfaces approach each other and contact only at the end part of the closing movement. As can be seen from Figure 4, in the closed position, the first sealing surface 209.1 is firmly pressed against the second sealing surface 210.1 to seal the first gap 208.

[0071] The first sealing device 209 and the second sealing device 210 have the same dimension in the normal direction 203.2 but are slightly offset along the normal direction 203.2. Thus, during the sliding movement, there is no friction between the first sealing device 209 and the door frame section 102.2 as well as between the second sealing device 210 and the first door leaf element 203.

[0072] The sealing arrangement 207 further seals a second gap 211 located at a lower edge of the first door leaf element 203 between the first door leaf element 203 and the door frame section 202.2. To this end, the sealing arrangement 207 comprises a third sealing device 212 mounted to the first door leaf element 203 and a corresponding fourth sealing device 213 mounted to the door frame section 202.2.

[0073] The third sealing device 212 and the fourth sealing device 213 are designed in the same manner as the first sealing device 209 and the second sealing device 210. The third sealing device 212 and the fourth sealing device 213 are arranged to be mirror symmetric, with respect to a central horizontal plane 217, to the first sealing device 209 and the second sealing device 210. Thus, it is here referred to the above explanations.

[0074] Again, the third sealing device 212 is a wedge shaped elastic rubber element having a third sealing surface 212.1 that extends over the entire length of the second gap 211 along the first closing direction 205. The third sealing surface 212.1 is a planar surface that again has the constant first inclination with respect to the first closing direction 205 and with respect to the height direction 203.1 of the first door leaf element 203.

[0075] The fourth sealing device 213 is a wedge shaped elastic rubber element having a fourth sealing surface 213.1 that extends over the entire length of the first gap 208 along the first closing direction 205. The fourth sealing surface 213.1 is a planar surface that also has the constant first inclination with respect to the first closing direction 205 and with respect to the height direction 203.1 of the first door leaf element 203.

[0076] However, it will be appreciated that, with other embodiments of the invention, the third and fourth sealing surface may also have a different inclination than the first and second sealing surface.

[0077] In the opened position, the third sealing surface 212.1, in the normal direction 203.2, is located at a distance from the fourth sealing surface 213.1. As the first door leaf element 203 is moved along the first closing direction 205, due to the inclination of the first and second sealing surface, these surfaces approach each other and contact only at the end part of the closing movement. Thus, in the closed position, the third sealing surface 212.1 is then firmly pressed against the fourth sealing surface 213.1 to seal the second gap 211.

[0078] The first sealing surface 209.1 and the third sealing surface 212.1 face in opposite directions, here towards each other. This provides for a mutual compensation of the components of the sealing or contact forces acting in the height direction 203.1 on the first door leaf element 203. Thus, the guiding mechanism (not shown) of the door leaf element 203 may be relieved from the reaction forces resulting from these sealing or contact force components.

[0079] It will be appreciated that, with other embodiments of the invention, the first sealing surface and the third sealing surface may face in the same direction, e.g. upwards. This provides for a compensation of the components of the sealing or contact forces acting in the height direction on the first door leaf element with the gravitational force acting on the first door leaf element. Thus, the guiding mechanism (not shown) of the door leaf element may be relieved from the reaction forces resulting from these sealing or contact force components.

[0080] The second door leaf element 204 is arranged symmetrically to its contact plane 214 with the first door leaf element 203. to seal the third and fourth gaps corresponding to the first and second gap 208 and 211, the sealing arrangement 207 comprises corresponding fifth to eighth sealing devices having corresponding mating fifth to eighth sealing surfaces that are identical with the first to fourth sealing surfaces of the first to fourth sealing devices. However, it will be appreciated that, with other embodiments of the invention, the fifth to eighth sealing devices may differ from the first to fourth sealing devices. In particular, the fifth to eighth sealing surfaces may differ from the first to fourth sealing surfaces.

[0081] The lateral gap 215.1 is sealed by sealing devices 219, 220 that extend in the height direction 203.1 and continue the respective sealing surfaces of the adjacent first and third sealing devices and the second and fourth sealing device, respectively. The lateral gap 215.2 at the second door leaf element 204 is sealed by corresponding lateral sealing devices.

[0082] Figure 6 shows a section through a sealing arrangement 307 of a further preferred embodiment of a door arrangement for a rail vehicle according to the invention. This embodiment; in its basic design and functionality, largely corresponds to the door arrangement 201 of Figures 4 and 5, such that it will here only be referred to the differences. In particular, the sealing arrangement 307 replaces the sealing arrangement 207 of Figures 4 and 5 such that the reference numerals of Figures 4 and 5 will be used for identical components.

[0083] As can be seen from Figure 6, showing a section corresponding to section VI - VI of Figure 5 (shown clockwise rotated by 90°), the first and second sealing surfaces 309.1 and 310.1 have mating longitudinal protrusions 310.2 and grooves 309.2 extending along the entire length of the first and second sealing surfaces 309.1 and 310.1 in the closing direction, that extends perpendicularly to the drawing plane of Figure 6.

[0084] It will be appreciated that, with other embodiments of the invention, the first and second sealing surface may have another number of mating longitudinal protrusions and grooves of different cross section.

[0085] Figure 7 shows a section through a further sealing arrangement 407 of a further preferred embodiment of a door arrangement for a rail vehicle according to the invention. This embodiment, in its basic design and functionality, largely corresponds to the door arrangement 201 of Figures 4 and 5, such that it will here only be referred to the differences. In particular, the sealing arrangement 407 replaces the sealing arrangement 207 of Figures 4 and 5 such that the reference numerals of Figures 4 and 5 will be used for identical components.

[0086] As can be seen from Figure 7 showing a section corresponding to section IV - IV of Figure 5, the first sealing device 409 and the second sealing device 410 are provided with stepped first and second sealing surfaces 409.1 and 410.1, respectively. The first and second sealing surfaces 409.1 and 410.1 have parts 409.3, 410.3 with a first inclination and parts 409.4, 410.4 with a sec-

ond inclination with respect to the closing direction 205 and the height direction 203.1 .

[0087] It will be appreciated that, with other embodiments of the invention, the first and second sealing surfaces may have another number of differently inclined parts and/or another number of different inclinations as well as different inclinations. Furthermore, the sealing surfaces may have inclinations that, at least section-wise, vary continuously.

[0088] Furthermore, it will be appreciated that, with other embodiments of the invention, the varying inclination may be combined with the mating protrusions and grooves described in the context of the previous embodiment.

[0089] In the foregoing, the invention has been described with embodiments in the context of rail vehicles. However, it will be appreciated that the invention may also be used in the context of any other type of vehicles.

Claims

1. Door arrangement for a vehicle, in particular for a rail vehicle, comprising:

   - a door frame section (102.2; 202.2) defining a door opening (102.3; 202.3),
   - at least a first door leaf element (103; 203) movable in a translational first closing direction (105; 205) from an open position to a closed position and
   - a sealing arrangement (107; 207; 307; 407) sealing an elongated first gap (108; 208);
   - said first gap (108; 208), in said closed position of said first door leaf element (103; 203), being formed between said door frame section (102.2; 202.2) and said first door leaf element (103; 203) and extending along said first closing direction (105; 205);
   - said sealing arrangement (107; 207; 307; 407) comprising a first sealing surface (109.1; 209.1; 309.1; 409.1) located at said first door leaf element (103; 203) and an associated second sealing surface (110.1; 210.1; 310.1; 410.1) located at said door frame section (102.2; 202.2);
   - said first sealing surface (109.1; 209.1; 309.1; 409.1) and said second sealing surface (110.1; 210.1; 310.1; 410.1), in said closed position of said first door leaf element (103; 203), extending over at least the entire length of said first gap (108; 208) along said first closing direction (105; 205) and contacting each other to seal said first gap (108; 208);

   characterized in that

   - said first sealing surface (109.1; 209.1; 309.1; 409.1) and said second sealing surface (110.1; 210.1; 310.1; 410.1) are at least section-wise inclined with respect to said first closing direction (105; 205).

2. Door arrangement according to claim 1, **characterized in that** said first sealing surface (109.1; 209.1; 309.1; 409.1) is facing in said first closing direction (105; 205) while said second sealing surface (110.1; 210.1; 310.1; 410.1) is facing in a direction opposite to said first closing direction (105; 205).

3. Door arrangement according to claim 1 or 2, **characterized in that**

   - a first surface normal of said first sealing surface (109.1; 209.1; 309.1; 409.1) pointing away from said first sealing surface (109.1; 209.1; 309.1; 409.1) has a component directed in said first closing direction (105; 205) and
   - a second surface normal of said second sealing surface (110.1; 210.1; 310.1; 410.1) pointing away from said second sealing surface (110.1; 210.1; 310.1; 410.1) has a component directed opposite to said first closing direction (105; 205).

4. Door arrangement according to any one of the preceding claims, **characterized in that**

   - said sealing arrangement (107; 207; 307; 407) comprises a first sealing device (109; 209) and a second sealing device (110; 210);
   - said first sealing device (109; 209) being located at said first door leaf element. (103; 203) and providing said first sealing surface (109.1; 209.1; 309.1; 409.1);
   - said second sealing device (110; 210) being located at said door frame section (102.2; 202.2) and providing said second sealing surface (110.1; 210.1; 310.1; 410.1).

5. Door arrangement according to claim 4, **characterized in that**

   - said first sealing device (109; 209) comprises at least one substantially wedge-shaped first sealing element providing said first sealing surface (109.1; 209.1; 309.1; 409.1)

   and/or

   - said second sealing device (110; 210) comprises at least one substantially wedge-shaped second sealing element providing said second sealing surface (110.1; 210.1; 310.1; 410.1).

6. Door arrangement according to any one of the preceding claims, **characterized in that** at least a first part (409.3) of said first sealing surface (109.1; 209.1; 309.1; 409.1) and an associated second part (410.3) of said second sealing surface (110.1; 210.1; 310.1; 410.1) have substantially the same first inclination with respect to said first closing direction (105;

205), said first inclination being substantially constant.

7. Door arrangement according to claim 6, **characterized in that** said first part of said first sealing surface (109.1; 209.1; 309.1) and said second part of said second sealing surface (110.1; 210.1; 310.1), in said closed position of said first door leaf element, extend over substantially the entire length of said first gap (108; 208) along said first closing direction.

8. Door arrangement according to claim 6, **characterized in that** said first sealing surface (409.1) and said second sealing surface (410.1) are stepped along said first closing direction (205).

9. Door arrangement according to claim 6 or 8, **characterized in that** at least a third part (409.4) of said first sealing surface (409.1) and an associated fourth part (410.4) of said second sealing surface (410.1) have substantially the same second inclination with respect to said first closing direction (205), said second inclination being substantially constant and different from said first inclination.

10. Door arrangement according to any one of the preceding claims, **characterized in that**

- at least one of said first sealing surface (309.1) and said second sealing surface (310.1) has an elongated first protrusion (310.2) extending along said first closing direction (205) and
- the other one of said first sealing surface (309.1) and said second sealing surface (310.1) has an elongated first groove (309.2) extending along said first closing direction (205);
- said first protrusion (310.2), in said closed position of said first door leaf element (203), engaging said first groove (309.2).

11. Door arrangement according to any one of the preceding claims, **characterized in that**

- said first door leaf element (103; 203) has a height direction (103.1; 203.1) extending within a door leaf plane defined by said first door leaf element (103; 203) and
- said first door leaf element (103; 203) has a normal direction (103.2; 203.2) extending substantially perpendicular to said door leaf plane;
- said first closing direction (105; 205) extending substantially parallel to said door leaf plane and transverse to said height direction (103.1; 203.1).

12. Door arrangement according to claim 11, **characterized in that** said first sealing surface (109.1) and said second sealing surface (110.1) are inclined with respect to said normal direction (103.2).

13. Door arrangement according to claim 11 or 12, **characterized in that** said first sealing surface (209.1; 309.1; 409.1) and said second sealing surface (210.1; 310.1; 410.1) are inclined with respect to said height direction (203.1).

14. Door arrangement according to any one of the preceding claims, **characterized in that** said first gap (108; 208) extends in the area of an upper end of said first door leaf element (103; 203).

15. Door arrangement according to any one of the preceding claims, **characterized in that**

- said sealing arrangement (107; 207; 307; 407) is sealing an elongated second gap (111; 211);
- said second gap (111; 211), in said closed position of said first door leaf element (103; 203), being formed between said door frame section (102.2; 202.2) and said first door leaf element (103; 203) and extending along said first closing direction (105; 205);
- said sealing arrangement comprising a third sealing surface (212.1) located at said first door leaf element (203) and an associated fourth sealing surface (213.1) located at said door frame section (202.2);
- said third sealing surface (212.1) and said fourth sealing surface (213.1), in said closed position of said first door leaf element (103; 203), extending over at least the entire length of said second gap (111; 211) along said first closing direction (105; 205) and contacting each other to seal said second gap (111; 211);
- said third sealing surface (212.1) and said fourth sealing surface (213.1) being at least section-wise inclined with respect to said first closing direction (105; 205).

16. Door arrangement according to claim 15, **characterized in that** said third sealing surface (212.1) is facing in said first closing direction (105; 205) while said fourth sealing surface (213.1) is facing in a direction opposite to said first closing direction (105; 205).

17. Door arrangement according to claim 15 or 16, **characterized in that**

- said sealing arrangement (107; 207; 307; 407) comprises at least one substantially wedge-shaped third sealing element providing said third sealing surface (212.1)
and/or
- said sealing arrangement (107; 207; 307; 407) comprises at least one substantially wedge-

shaped fourth sealing element providing said fourth sealing surface (213.1).

18. Door arrangement according to any one of claims 15 to 17, **characterized in that** at least a fifth part of said third sealing surface (212.1) and an associated sixth part of said fourth sealing surface (213.1) have substantially the same third inclination with respect to said first closing direction (105; 205), said third inclination being substantially constant.

19. Door arrangement according to claim 18, **characterized in that** said third sealing surface and said fourth sealing surface are stepped along said first closing direction.

20. Door arrangement according to any one of claims 15 to 19, **characterized in that**

- at least one of said third sealing surface and said fourth sealing surface has an elongated second protrusion extending along said first closing direction and
- the other one of said third sealing surface and said fourth sealing surface has an elongated second groove extending along said first closing direction;
- said first protrusion, in said closed position of said first door leaf element, engaging said second groove.

21. Door arrangement according to any one of claims 15 to 20, **characterized in that**

- said first door leaf element (103; 203) has a height direction (103.1; 203.1) extending within a door leaf plane defined by said first door leaf element (103; 203) and
- said first door leaf element (103; 203) has a normal direction (103.2; 203.2) extending substantially perpendicular to said door leaf plane;
- said first closing direction (1.05; 205) extending substantially parallel to said door leaf plane and transverse to said height direction (103.1; 203.1).

22. Door arrangement according to claim 21, **characterized in that** said third sealing surface and said fourth sealing surface are inclined with respect to said normal direction (103.2).

23. Door arrangement according to claim 21 or 22, **characterized in that** said third sealing surface (212.1) and said fourth sealing surface (213.1) are inclined with respect to said height direction (203.1).

24. Door arrangement according to claim 23, **characterized in that** said first sealing surface and said third sealing surface are facing in the same direction.

25. Door arrangement according to claim 23, **characterized in that** said first sealing surface (212.1) and said third sealing surface (212.1) are facing in opposite directions.

26. Door arrangement according to any one of claims 15 to 25, **characterized in that** said second gap (111; 211) extends in the area of a lower end of said first door leaf element (103; 203).

27. Door arrangement according to any one of claims 15 to 25, **characterized in that**

- said first gap extends in the area of an inner face of said first door leaf element (103; 203) and
- said second gap extends in the area of an outer face of said first door leaf element and in the area of said first gap.

28. Door arrangement according to any one of the preceding claims, **characterized in that**

- a second door leaf element (104; 204) is provided, said second door leaf element (104; 204) being movable in a translational second closing direction (106; 206) from an open position to a closed position, and
- said sealing arrangement (107; 207; 307; 407) is sealing an elongated third gap;
- said third gap, in said closed position of said second door leaf element, being formed between said door frame section (102.2; 202.2) and said second door leaf element (104; 204) and extending along said second closing direction (106; 206).

29. Door arrangement according to claim 28, **characterized in that**

- said sealing arrangement (107; 207; 307; 407) comprises a fifth sealing surface located at said second door leaf element (104; 204) and an associated sixth sealing surface located at said door frame section (102.2; 202.2);
- said fifth sealing surface and said sixth sealing surface, in said closed position of said second door leaf element (104; 204), extending over at least the entire length of said third gap along said second closing direction (106; 206) and contacting each other to seal said third gap;
- said fifth sealing surface and said sixth sealing surface being at least section-wise inclined with respect to said second closing direction (106; 206).

30. Door arrangement according to claim 28 or 29, **char-**

acterized in that

- said sealing arrangement (107; 207; 307; 407) is sealing an elongated fourth gap;
- said fourth gap, in said closed position of said second door leaf element (104; 204), being formed between said door frame section (102.2; 202.2) and said second door leaf element (104; 204) and extending along said second closing direction (106; 206).

31. Door arrangement according to claim 30, **characterized in that**

- said sealing arrangement (107; 207; 307; 407) comprises a seventh sealing surface located at said second door leaf element (104; 204) and an associated eighth sealing surface located at said door frame section (102.2; 202.2);
- said seventh sealing surface and said eighth sealing surface, in said closed position of said second door leaf element (104; 204), extending over at least the entire length of said fourth gap along said second closing direction (106; 206) and contacting each other to seal said fourth gap;
- said seventh sealing surface and said eighth sealing surface being at least section-wise inclined with respect to said second closing direction (106; 206).

32. Door arrangement according to any one of claims 28 to 31, **characterized in that** said first closing direction (105; 205) is substantially opposite to said second closing direction (106; 206).

33. Door arrangement according to any one of the preceding claims, **characterized in that** at least one of said sealing surfaces (109.1, 110.1; 209.1, 210.1; 309.1, 310.1; 409.1, 410.1) is formed on an elastic sealing device (109, 110; 209, 210).

34. Vehicle, in particular rail vehicle, with a door arrangement (101; 201) according to any one of the preceding claims.

Patentansprüche

1. Türanordnung für ein Fahrzeug, insbesondere ein Schienenfahrzeug, umfassend:

- einen Türrahmenabschnitt (102.2; 202.2), der eine Türöffnung (102.3; 202.3) definiert,
- wenigstens ein erstes Türblattelement (103; 203), das in einer translatorischen ersten Schließrichtung (105; 205) aus einer offenen Position in eine geschlossene Position bewegbar ist, und
- eine Dichtungsanordnung (107; 207; 307; 407), die einen länglichen ersten Spalt (108; 208) abdichtet;
- wobei der erste Spalt (108; 208) in der geschlossenen Position des ersten Türblattelements (103; 203) zwischen dem Türrahmenabschnitt (102.2; 202.2) und dem ersten Türblattelements (103; 203) gebildet ist und entlang der ersten Schließrichtung (105; 205) verläuft;
- wobei die Dichtungsanordnung (107; 207; 307; 407) eine an dem ersten Türblattelement (103; 203) befindliche erste Dichtungsfläche (109.1; 209.1; 309.1; 409.1) und eine assoziierte, an dem Türrahmenabschnitt (102.2; 202.2) befindliche zweite Dichtungsfläche (110.1; 210.1; 310.1; 410.1) aufweist,
- wobei die erste Dichtungsfläche (109.1; 209.1; 309.1; 409.1) und die zweite Dichtungsfläche (110.1; 210.1; 310.1; 410.1) in der geschlossenen Position des ersten Türblattelements (103; 203) auf wenigstens der gesamten Länge des ersten Spalts (108; 208) entlang der ersten Schließrichtung (105; 205) verlaufen und einander zum Abdichten des ersten Spalts (108; 208) berühren,

dadurch gekennzeichnet, dass

- die erste Dichtungsfläche (109.1; 209.1; 309.1; 409.1) und die zweite Dichtungsfläche (110.1; 210.1; 310.1; 410.1) wenigstens abschnittsweise zur ersten Schließrichtung (105; 205) geneigt sind.

2. Türanordnung nach Anspruch 1, **dadurch gekennzeichnet, dass** die erste Dichtungsfläche (109.1, 209.1; 309.1; 409.1) in die erste Schließrichtung (105; 205) weist, während die zweite Dichtungsfläche (110.1; 210.1; 310.1; 410.1) in eine der ersten Schließrichtung (105; 205) entgegengesetzte Richtung weist.

3. Türanordnung nach Anspruch 1 oder Anspruch 2, **dadurch gekennzeichnet, dass**

- eine erste Flächennormale der ersten Dichtungsfläche (109.1; 209.1; 309.1; 409.1), die von der ersten Dichtungsfläche (109.1; 209.1; 309.1; 409.1) weg zeigt, eine Komponente hat, die in die erste Schließrichtung (105; 205) gerichtet ist,
- eine zweite Flächennormale der zweiten Dichtungsfläche (110.1; 210.1; 310.1; 410.1), die von der zweiten Dichtungsfläche (110.1; 210.1; 310.1; 410.1) weg zeigt, eine Komponente hat, die entgegen der ersten Schließrichtung (105; 205) gerichtet ist.

4. Türanordnung nach einem der vorhergehenden An-

sprüche, **dadurch gekennzeichnet, dass**

- die Dichtungsanordnung (107; 207; 307; 407) eine erste Dichtungsvorrichtung (109; 209) und eine zweite Dichtungsvorrichtung (110; 210) umfasst;
- wobei die erste Dichtungsvorrichtung (109; 209) sich an dem ersten Türblattelement (103; 203) befindet und die erste Dichtungsfläche (109.1; 209.1; 309.1; 409.1) bereitstellt;
- wobei die zweite Dichtungsvorrichtung (110; 210) sich an dem Türrahmenabschnitt (102.2; 202.2) befindet und die zweite Dichtungsfläche (110.1; 210.1; 310.1; 410.1) bereitstellt.

5. Türanordnung nach Anspruch 4, **dadurch gekennzeichnet, dass**

- die erste Dichtungsvorrichtung (109; 209) wenigstens ein im Wesentlichen keilförmiges erstes Dichtungselement aufweist, das die erste Dichtungsfläche (109.1; 209.1; 309.1; 409.1) bereitstellt,
und/oder
- die zweite Dichtungsvorrichtung (110; 210) wenigstens ein im Wesentlichen keilförmiges zweites Dichtungselement aufweist, das die zweite Dichtungsfläche (110.1; 210.1; 310.1; 410.1) bereitstellt.

6. Türanordnung nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** wenigstens ein erster Teil (409.3) der ersten Dichtungsfläche (109.1; 209.1; 309.1; 409.1) und ein assoziierter zweiter Teil (410.3) der zweiten Dichtungsfläche (110.1; 210.1; 310.1; 410.1) im Wesentlichen die gleiche erste Neigung in Bezug auf die erste Schließrichtung (105; 205) haben, wobei die erste Neigung im Wesentlichen konstant ist.

7. Türanordnung nach Anspruch 6, **dadurch gekennzeichnet, dass** der erste Teil der ersten Dichtungsfläche (109.1; 209.1; 309.1) und der zweite Teil der zweiten Dichtungsfläche (110.1; 210.1; 310.1) in der geschlossenen Position des ersten Türblattelements auf im Wesentlichen der gesamten Länge des ersten Spalts (108; 208) entlang der ersten Schließrichtung verlaufen.

8. Türanordnung nach Anspruch 6, **dadurch gekennzeichnet, dass** die erste Dichtungsfläche (409.1) und die zweite Dichtungsfläche (410.1) entlang der ersten Schließrichtung (205) gestuft sind.

9. Türanordnung nach Anspruch 6 oder 8, **dadurch gekennzeichnet, dass** wenigstens ein dritter Teil (409.4) der ersten Dichtungsfläche (409.1) und ein assoziierter vierter Teil (410.4) der zweiten Dichtungsfläche (410.1) im Wesentlichen die gleiche zweite Neigung in Bezug auf die erste Schließrichtung (205) haben, wobei die zweite Neigung im Wesentlichen konstant und von der ersten Neigung verschieden ist.

10. Türanordnung nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass**

- wenigstens eine der ersten Dichtungsfläche (309.1) und der zweiten Dichtungsfläche (310.1) einen länglichen ersten Vorsprung (310.2) aufweist, der entlang der ersten Schließrichtung (205) verläuft, und
- wenigstens die andere der ersten Dichtungsfläche (309.1) und der zweiten Dichtungsfläche (310.1) eine längliche erste Nut (309.2) aufweist, die entlang der ersten Schließrichtung (205) verläuft;
- wobei der erste Vorsprung (310.2) in der geschlossenen Position des ersten Türblattelements (203) in der ersten Nut (309.2) in Eingriff ist.

11. Türanordnung nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass**

- das erste Türblattelement (103; 203) eine Höhenrichtung (103.1; 203.1) aufweist, die in einer Türblattebene verläuft, die von dem ersten Türblattelement (103; 203) definiert wird, und
- das erste Türblattelement (103; 203) eine Normalrichtung (103.2; 203.2) aufweist, die im Wesentlichen lotrecht zu der Türblattebene verläuft;
- wobei die erste Schließrichtung (105; 205) im Wesentlichen parallel zu der Türblattebene und quer zu der Höhenrichtung (103.1; 203.1) verläuft.

12. Türanordnung nach Anspruch 11, **dadurch gekennzeichnet, dass** die erste Dichtungsfläche (109.1) und die zweite Dichtungsfläche (110.1) zu der Normalrichtung (103.2) geneigt sind.

13. Türanordnung nach Anspruch 11 oder 12, **dadurch gekennzeichnet, dass** die erste Dichtungsfläche (209.1; 309.1; 409.1) und die zweite Dichtungsfläche (210.1; 310.1; 410.1) zu der Höhenrichtung (203.1) geneigt sind.

14. Türanordnung nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** der erste Spalt (108; 208) im Bereich eines oberen Endes des ersten Türblattelements (103; 203) verläuft.

15. Türanordnung nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass**

- die Dichtungsanordnung (107; 207; 307; 407) einen länglichen zweiten Spalt (111; 211) abdichtet;
- wobei der zweite Spalt (111; 211) in der geschlossenen Position des ersten Türblattelements (103; 203) zwischen dem Türrahmenabschnitt (102.2; 202.2) und dem ersten Türblattelement (103; 203) gebildet wird und entlang der ersten Schließrichtung (105; 205) verläuft;
- wobei die Dichtungsanordnung eine an dem ersten Türblattelement (203) befindliche dritte Dichtungsfläche (212.1) und eine assoziierte, an dem Türrahmenabschnitt (202.2) befindliche vierte Dichtungsfläche (213.1) aufweist;
- wobei die dritte Dichtungsfläche (212.1) und die vierte Dichtungsfläche (213.1) in der geschlossenen Position des ersten Türblattelements (103; 203) auf wenigstens der gesamten Länge des zweiten Spalts (111; 211) entlang der ersten Schließrichtung (105; 205) verlaufen und einander zum Abdichten des zweiten Spalts (111; 211) berühren;
- wobei die dritte Dichtungsfläche (212.1) und die vierte Dichtungsfläche (213.1) wenigstens abschnittsweise zu der ersten Schließrichtung (105; 205) geneigt sind.

16. Türanordnung nach Anspruch 15, **dadurch gekennzeichnet, dass** die dritte Dichtungsfläche (212.1) in die erste Schließrichtung (105; 205) weist, während die vierte Dichtungsfläche (213.1) in eine der ersten Schließrichtung (105; 205) entgegengesetzte Richtung weist.

17. Türanordnung nach Anspruch 15 oder 16, **dadurch gekennzeichnet, dass**

- die Dichtungsanordnung (107; 207; 307; 407) wenigstens ein im Wesentlichen keilförmiges drittes Dichtungselement aufweist, das die dritte Dichtungsfläche (212.1) bereitstellt,
und/oder
- die Dichtungsanordnung (107; 207; 307; 407) wenigstens ein im Wesentlichen keilförmiges viertes Dichtungselement aufweist, das die vierte Dichtungsfläche (213.1) bereitstellt.

18. Türanordnung nach einem der Ansprüche 15 bis 17, **dadurch gekennzeichnet, dass** wenigstens ein fünfter Teil der dritten Dichtungsfläche (212.1) und ein assoziierter sechster Teil der vierten Dichtungsfläche (213.1) im Wesentlichen die gleiche dritte Neigung in Bezug auf die erste Schließrichtung (105; 205) haben, wobei die dritte Neigung im Wesentlichen konstant ist.

19. Türanordnung nach Anspruch 18, **dadurch gekennzeichnet, dass** die dritte Dichtungsfläche und die vierte Dichtungsfläche entlang der ersten Schließrichtung gestuft sind.

20. Türanordnung nach einem der Ansprüche 15 bis 19, **dadurch gekennzeichnet, dass**

- wenigstens eine der dritten Dichtungsfläche und der vierten Dichtungsfläche einen länglichen zweiten Vorsprung aufweist, der entlang der ersten Schließrichtung verläuft, und
- wenigstens die andere der dritten Dichtungsfläche und der vierten Dichtungsfläche eine längliche zweite Nut aufweist, die entlang der ersten Schließrichtung verläuft;
- wobei der erste Vorsprung in der geschlossenen Position des ersten Türblattelements mit der zweiten Nut in Eingriff ist.

21. Türanordnung nach einem der Ansprüche 15 bis 20, **dadurch gekennzeichnet, dass**

- das erste Türblattelement (103; 203) eine Höhenrichtung (103.1; 203.1) aufweist, die in einer Türblattebene verläuft, die von dem ersten Türblattelement (103; 203) definiert wird, und
- das erste Türblattelement (103; 203) eine Normalrichtung (103.2; 203.2) aufweist, die im Wesentlichen lotrecht zu der Türblattebene verläuft;
- wobei die erste Schließrichtung (105; 205) im Wesentlichen parallel zu der Türblattebene und quer zu der Höhenrichtung (103.1; 203.1) verläuft.

22. Türanordnung nach Anspruch 21, **dadurch gekennzeichnet, dass** die dritte Dichtungsfläche und die vierte Dichtungsfläche zu der Normalrichtung (103.2) geneigt sind.

23. Türanordnung nach Anspruch 21 oder 22, **dadurch gekennzeichnet, dass** die dritte Dichtungsfläche (212.1) und die vierte Dichtungsfläche (213.1) zu der Höhenrichtung (203.1) geneigt sind.

24. Türanordnung nach Anspruch 23, **dadurch gekennzeichnet, dass** die erste Dichtungsfläche und die dritte Dichtungsfläche in die gleiche Richtung weisen.

25. Türanordnung nach Anspruch 23, **dadurch gekennzeichnet, dass** die erste Dichtungsfläche (212.1) und die dritte Dichtungsfläche (212.1) in einander entgegengesetzte Richtungen weisen.

26. Türanordnung nach einem der Ansprüche 15 bis 25, **dadurch gekennzeichnet, dass** der zweite Spalt (111; 211) im Bereich eines unteren Endes des ersten Türblattelements (103; 203) verläuft.

27. Türanordnung nach einem der Ansprüche 15 bis 25, **dadurch gekennzeichnet, dass**

- der erste Spalt im Bereich einer inneren Seitenfläche des ersten Türblattelements (103; 203) verläuft und
- der zweite Spalt im Bereich einer äußeren Seitenfläche des ersten Türblattelements und im Bereich des ersten Spalts verläuft.

28. Türanordnung nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass**

- ein zweites Türblattelement (104; 204) bereitgestellt ist, wobei das zweite Türblattelement (104; 204) in einer translatorischen zweiten Schließrichtung (106; 206) aus einer offenen Position in eine geschlossene Position bewegbar ist, und
- die Dichtungsanordnung (107; 207; 307; 407) einen länglichen dritten Spalt abdichtet
- wobei der dritte Spalt in der geschlossenen Position des zweiten Türblattelements zwischen dem Türrahmenabschnitt (102.2; 202.2) und dem zweiten Türblattelement (104; 204) gebildet wird und entlang der zweiten Schließrichtung (106; 206) verläuft.

29. Türanordnung nach Anspruch 28, **dadurch gekennzeichnet, dass**

- die Dichtungsanordnung (107; 207; 307; 407) eine an dem zweiten Türblattelement (104; 204) befindliche fünfte Dichtungsfläche und eine assoziierte, an dem Türrahmenabschnitt (102.2; 202.2) befindliche sechste Dichtungsfläche aufweist;
- wobei die fünfte Dichtungsfläche und die sechste Dichtungsfläche in der geschlossenen Position des zweiten Türblattelements (104; 204) auf wenigstens der gesamten Länge des dritten Spalts entlang der zweiten Schließrichtung (106; 206) verlaufen und einander zum Abdichten des dritten Spalts berühren;
- wobei die fünfte Dichtungsfläche und die sechste Dichtungsfläche wenigstens abschnittsweise zu der zweiten Schließrichtung (106; 206) geneigt sind.

30. Türanordnung nach Anspruch 28 oder 29, **dadurch gekennzeichnet, dass**

- die Dichtungsanordnung (107; 207; 307; 407) einen länglichen vierten Spalt abdichtet;
- wobei der vierte Spalt in der geschlossenen Position des zweiten Türblattelements (104; 204) zwischen dem Türrahmenabschnitt (102.2; 202.2) und dem zweiten Türblattelement (104; 204) gebildet wird und entlang der zweiten Schließrichtung (106; 206) verläuft.

31. Türanordnung nach Anspruch 30, **dadurch gekennzeichnet, dass**

- die Dichtungsanordnung (107; 207; 307; 407) eine an dem zweiten Türblattelement (104; 204) befindliche siebte Dichtungsfläche und eine assoziierte, an dem Türrahmenabschnitt (102.2; 202.2) befindliche achte Dichtungsfläche aufweist;
- wobei die siebte Dichtungsfläche und die achte Dichtungsfläche in der geschlossenen Position des zweiten Türblattelements (104; 204) auf wenigstens der gesamten Länge des vierten Spalts entlang der zweiten Schließrichtung (106; 206) verlaufen und einander zum Abdichten des vierten Spalts berühren;
- wobei die siebte Dichtungsfläche und die achte Dichtungsfläche wenigstens abschnittsweise zu der zweiten Schließrichtung (106; 206) geneigt sind.

32. Türanordnung nach einem der Ansprüche 28 bis 31, **dadurch gekennzeichnet, dass** die erste Schließrichtung (105; 205) der zweiten Schließrichtung (106; 206) im Wesentlichen entgegengesetzt ist.

33. Türanordnung nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** wenigstens eine der Dichtungsflächen (109.1, 110.1; 209.1, 210.1; 309.1, 310.1; 409.1, 410.1) an einer elastischen Dichtungsvorrichtung (109, 110; 209, 210) ausgebildet ist.

34. Fahrzeug, insbesondere ein Schienenfahrzeug, mit einer Türanordnung (101; 201) nach einem der vorhergehenden Ansprüche.

Revendications

1. Arrangement de porte pour un véhicule, en particulier pour un véhicule ferroviaire, comprenant:

- une section de cadre de porte (102.2 ; 202.2) définissant une ouverture de porte (102.3 ; 202.3),
- au moins un premier élément de battant de porte (103 ; 203) mobile dans une première direction de fermeture translationnelle (105 ; 205) à partir d'une position ouverte vers une position fermée et
- un arrangement de scellement (107 ; 207 ; 307 ; 407) scellant un premier intervalle allongé (108 ; 208) ;

- ledit premier intervalle (108 ; 208), dans ladite position fermée dudit premier élément de battant de porte (103 ; 203), étant formé entre ladite section de cadre de porte (102.2 ; 202.2) et ledit premier élément de battant de porte (103 ; 203) et s'étirant le long de ladite première direction de fermeture (105 ; 205) ;
- ledit arrangement de scellement (107 ; 207 ; 307 ; 407) comprenant une première surface de scellement (109.1 ; 209.1 ; 309.1 ; 409.1) située au niveau du premier élément de battant de porte (103 ; 203) et une seconde surface de scellement associée (110.1 ; 210.1 ; 310.1 ; 410.1) située au niveau de ladite section de cadre de porte (102.2 ; 202.2) ;
- ladite première surface de scellement (109.1 ; 209.1 ; 309.1 ; 409.1) et ladite seconde surface de scellement (110.1 ; 210.1 ; 310.1 ; 410.1), dans ladite position fermée dudit premier élément de battant de porte (103 ; 203), s'étirant sur au moins toute la longueur dudit premier intervalle (108 ; 208) le long de ladite première direction de fermeture (105 ; 205) et entrant en contact l'une avec l'autre pour sceller ledit premier intervalle (108 ; 208) ;

caractérisé en ce que

- ladite première surface de scellement (109.1 ; 209.1 ; 309.1 ; 409.1) et ladite seconde surface de scellement (110.1 ; 210.1 ; 310.1 ; 410.1); au moins en sections, sont inclinées par rapport à ladite première direction de fermeture (105 ; 205).

2. Arrangement de porte selon la revendication 1, **caractérisé en ce que** ladite première surface de scellement (109.1 ; 209.1 ; 309.1 ; 409.1) est orientée dans ladite première direction de fermeture (105 ; 205) tandis que ladite seconde surface de scellement (110.1 ; 210.1 ; 310.1 ; 410.1) est orientée dans une direction opposée à ladite première direction de fermeture (105 ; 205).

3. Arrangement de porte selon la revendication 1 ou 2, **caractérisé en ce que**

- une première normale de surface de ladite première surface de scellement (109.1 ; 209.1 ; 309.1 ; 409.1) s'éloignant de la première surface de scellement (109.1 ; 209.1 ; 309.1 ; 409.1) a une composante dirigée dans ladite première direction de fermeture (105 ; 205) et
- une seconde normale de surface de ladite seconde surface de scellement (110.1 ; 210.1 ; 310.1 ; 410.1) s'éloignant de la seconde surface de scellement (110.1 ; 210.1 ; 310.1 ; 410.1)a une composante dirigée à l'opposé de ladite première direction de fermeture (105 ; 205).

4. Arrangement de porte selon une quelconque des revendications précédentes, **caractérisé en ce que**

- ledit arrangement de scellement (107 ; 207 ; 307 ; 407) comprend un premier dispositif de scellement (109 ; 209) et un second dispositif de scellement (110; 210) ;
- ledit premier dispositif de scellement (109 ; 209) étant situé au niveau du premier élément de battant de porte (103; 203) et fournissant ladite première surface de scellement (109.1 ; 209.1 ; 309.1 ; 409.1) ;
- ledit second dispositif de scellement (110 ; 210) étant situé au niveau de ladite section de cadre de porte (102.2 ; 202.2) et fournissant ladite seconde surface de scellement (110.1 ; 210.1 ; 310.1 ; 410.1).

5. Arrangement de porte selon la revendication 4, **caractérisé en ce que**

- ledit premier dispositif de scellement (109 ; 209) comprend au moins un premier élément de scellement substantiellement en forme de coin fournissant ladite première surface de scellement (109.1 ; 209.1 ; 309.1 ; 409.1)

et/ou

- ledit second dispositif de scellement (110 ; 210) comprend au moins un second élément de scellement substantiellement en forme de coin fournissant ladite seconde surface de scellement (110.1 ; 210.1 ; 310.1 ; 410.1).

6. Arrangement de porte selon une quelconque des revendications précédentes, **caractérisé en ce qu'**au moins une première partie (409.3) de ladite première surface de scellement (109.1 ; 209.1 ; 309.1 ; 409.1) et une seconde partie associée (410.3) de ladite seconde surface de scellement (110.1 ; 210.1 ; 310.1 ; 410.1) ont substantiellement la même première inclinaison par rapport à ladite première direction de fermeture (105 ; 205), ladite première inclinaison étant substantiellement constante.

7. Arrangement de porte selon la revendication 6, **caractérisé en ce que** ladite première partie de ladite première surface de scellement (109.1 ; 209.1 ; 309.1) et ladite seconde partie de ladite seconde surface de scellement (110.1 ; 210.1 ; 310.1), dans ladite position fermée dudit premier élément de battant de porte, s'étirent sur substantiellement toute la longueur dudit premier intervalle (108 ; 208) le long de ladite première direction de fermeture.

8. Arrangement de porte selon la revendication 6, **caractérisé en ce que** ladite première surface de scellement (409.1) et ladite seconde surface de scellement (410.1) sont étagées le long de ladite première

direction de fermeture (205).

9. Arrangement de porte selon la revendication 6 ou 8, **caractérisé en ce qu'**au moins une troisième partie (409.4) de ladite première surface de scellement (409.1) et une quatrième partie associée (410.4) de ladite seconde surface de scellement (410.1) ont substantiellement la même seconde inclinaison par rapport à ladite première direction de fermeture (205), ladite seconde inclinaison étant substantiellement constante et différente de ladite première inclinaison.

10. Arrangement de porte selon une quelconque des revendications précédentes, **caractérisé en ce que**

- au moins l'une de ladite première surface de scellement (309.1) et ladite seconde surface de scellement (310.1) a une première saillie allongée (310.2) s'étirant le long de ladite première direction de fermeture (205) et
- l'autre de ladite première surface de scellement (309.1) et ladite seconde surface de scellement (310.1) a une première rainure allongée (309.2) s'étirant le long de ladite première direction de fermeture (205) ;
- ladite première saillie (310.2), dans ladite position fermée dudit premier élément de battant de porte (203), venant en prise avec la première rainure (309.2).

11. Arrangement de porte selon une quelconque des revendications précédentes, **caractérisé en ce que**

- ledit premier élément de battant de porte (103 ; 203) a une direction en hauteur (103.1 ; 203.1) s'étirant dans un plan de battant de porte défini par ledit premier élément de battant de porte (103 ; 203) et
- ledit premier élément de battant de porte (103 ; 203) a une direction normale (103.2 ; 203.2) s'étirant substantiellement de manière perpendiculaire audit plan de battant de porte ;
- ladite première direction de fermeture (105 ; 205) s'étirant substantiellement de manière parallèle audit plan de battant de porte et transversale à ladite direction en hauteur (103.1 ; 203.1).

12. Arrangement de porte selon la revendication 11, **caractérisé en ce que** ladite première surface de scellement (109.1) et ladite seconde surface de scellement (110.1) sont inclinées par rapport à ladite direction normale (103.2).

13. Arrangement de porte selon la revendication 11 ou 12, **caractérisé en ce que** ladite première surface de scellement (209.1 ; 309.1 ; 409.1) et ladite seconde surface de scellement (210.1 ; 310.1 ; 410.1) sont inclinées par rapport à ladite direction en hauteur (203.1).

14. Arrangement de porte selon une quelconque des revendications précédentes, **caractérisé en ce que** ledit premier intervalle (108 ; 208) s'étire dans la zone d'une extrémité supérieure dudit premier élément de battant de porte (103 ; 203).

15. Arrangement de porte selon une quelconque des revendications précédentes, **caractérisé en ce que**

- ledit arrangement de scellement (107 ; 207 ; 307 ; 407) scelle un second intervalle allongé (111 ; 211) ;
- ledit second intervalle (111 ; 211), dans ladite position fermée dudit premier élément de battant de porte (103 ; 203), étant formé entre ladite section de cadre de porte (102.2 ; 202.2) et ledit premier élément de battant de porte (103 ; 203) et s'étirant le long de ladite première direction de fermeture (105 ; 205) ;
- ledit arrangement de scellement comprenant une troisième surface de scellement (212.1) située au niveau dudit premier élément de battant de porte (203) et une quatrième surface de scellement associée (213.1) située au niveau de ladite section de cadre de porte (202.2) ;
- ladite troisième surface de scellement (212.1) et ladite quatrième surface de scellement (213.1), dans ladite position fermée dudit premier élément de battant de porte (103 ; 203), s'étirant sur au moins toute la longueur dudit second intervalle (111 ; 211) le long de ladite première direction de fermeture (105 ; 205) et entrant en contact l'une avec l'autre pour sceller ledit second intervalle (111 ; 211);
- ladite troisième surface de scellement (212.1) et ladite quatrième surface de scellement (213.1), au moins en sections, étant inclinées par rapport à ladite première direction de fermeture (105 ; 205).

16. Arrangement de porte selon la revendication 15, **caractérisé en ce que** ladite troisième surface de scellement (212.1) est orientée dans ladite première direction de fermeture (105 ; 205) tandis que ladite quatrième surface de scellement (213.1) est orientée dans une direction opposée à ladite première direction de fermeture (105 ; 205).

17. Arrangement de porte selon la revendication 15 ou 16, **caractérisé en ce que**

- ledit arrangement de scellement (107 ; 207 ; 307 ; 407) comprend au moins un troisième élément de scellement substantiellement en forme de coin fournissant ladite troisième surface de

scellement (212.1)
et/ou
- ledit arrangement de scellement (107 ; 207 ; 307 ; 407) comprend au moins un quatrième élément de scellement substantiellement en forme de coin fournissant ladite quatrième surface de scellement (213.1).

18. Arrangement de porte selon une quelconque des revendications 15 à 17, **caractérisé en ce qu'**au moins une cinquième partie de ladite troisième surface de scellement (212.1) et une sixième partie associée de ladite quatrième surface de scellement (213.1) ont substantiellement la même troisième inclinaison par rapport à ladite première direction de fermeture (105 ; 205), ladite troisième inclinaison étant substantiellement constante.

19. Arrangement de porte selon la revendication 18, **caractérisé en ce que** ladite troisième surface de scellement et ladite quatrième surface de scellement sont étagées le long de ladite première direction de fermeture.

20. Arrangement de porte selon une quelconque des revendications 15 à 19, **caractérisé en ce que**

- au moins l'une de ladite troisième surface de scellement et ladite quatrième surface de scellement a une seconde saillie allongée s'étirant le long de ladite première direction de fermeture et
- l'autre de ladite troisième surface de scellement et ladite quatrième surface de scellement a une seconde rainure allongée s'étirant le long de ladite première direction de fermeture ;
- ladite première saillie, dans ladite position fermée dudit premier élément de battant, venant en prise avec la seconde rainure.

21. Arrangement de porte selon une quelconque des revendications 15 à 20, **caractérisé en ce que**

- ledit premier élément de battant de porte (103 ; 203) a une direction en hauteur (103.1 ; 203.1) s'étirant dans un plan de battant de porte défini par ledit premier élément de battant de porte (103 ; 203) et
- ledit premier élément de battant de porte (103 ; 203) a une direction normale (103.2 ; 203.2) s'étirant substantiellement de manière perpendiculaire audit plan de battant de porte ;
- ladite première direction de fermeture (105 ; 205) s'étirant substantiellement de manière parallèle audit plan de battant de porte et transversale à ladite direction en hauteur (103.1 ; 203.1).

22. Arrangement de porte selon la revendication 21, **caractérisé en ce que** ladite troisième surface de scellement et ladite quatrième surface de scellement sont inclinées par rapport à ladite direction normale (103.2).

23. Arrangement de porte selon la revendication 21 ou 22, **caractérisé en ce que** ladite troisième surface de scellement (212.1) et ladite quatrième surface de scellement (213.1) sont inclinées par rapport à ladite direction en hauteur (203.1).

24. Arrangement de porte selon la revendication 23, **caractérisé en ce que** ladite première surface de scellement et ladite troisième surface de scellement sont orientées dans la même direction.

25. Arrangement de porte selon la revendication 23, **caractérisé en ce que** ladite première surface de scellement (212.1) et ladite troisième surface de scellement (212.1) sont orientées dans des directions opposées.

26. Arrangement de porte selon une quelconque des revendications 15 à 25, **caractérisé en ce que** ledit second intervalle (111 ; 211) s'étire dans la zone d'une extrémité inférieure dudit premier élément de battant de porte (103 ; 203).

27. Arrangement de porte selon une quelconque des revendications 15 à 25, **caractérisé en ce que**

- ledit premier intervalle s'étire dans la zone d'une face interne dudit premier élément de battant de porte (103 ; 203) et
- ledit second intervalle s'étire dans la zone d'une face externe dudit premier élément de battant de porte et dans la zone dudit premier intervalle.

28. Arrangement de porte selon une quelconque des revendications précédentes, **caractérisé en ce que**

- un second élément de battant de porte (104 ; 204) est fourni, ledit second élément de battant de porte (104 ; 204) étant mobile dans une seconde direction de fermeture translationnelle (106 ; 206) à partir d'une position ouverte vers une position fermée, et
- ledit arrangement de scellement (107 ; 207 ; 307 ; 407) scelle un troisième intervalle allongé ;
- ledit troisième intervalle, dans ladite position fermée dudit second élément de battant, étant formé entre ladite section de cadre de porte (102.2 ; 202.2) et ledit second élément de battant de porte (104 ; 204) et s'étirant le long de ladite seconde direction de fermeture (106 ; 206).

29. Arrangement de porte selon la revendication 28, **caractérisé en ce que**

- ledit arrangement de scellement (107 ; 207 ; 307 ; 407) comprend une cinquième surface de scellement située au niveau dudit second élément de battant de porte (104 ; 204) et une sixième surface de scellement associée située au niveau de ladite section de cadre de porte (102.2 ; 202.2) ;
- ladite cinquième surface de scellement et ladite sixième surface de scellement, dans ladite position fermée dudit second élément de battant de porte (104 ; 2034), s'étirant sur au moins toute la longueur dudit troisième intervalle le long de ladite seconde direction de fermeture (106 ; 206) et entrant en contact l'une avec l'autre pour sceller ledit troisième intervalle ;
- ladite cinquième surface de scellement et ladite sixième surface de scellement, au moins en sections, étant inclinées par rapport à ladite seconde direction de fermeture (106 ; 206).

30. Arrangement de porte selon la revendication 28 ou 29, **caractérisé en ce que**

- ledit arrangement de scellement (107 ; 207 ; 307 ; 407) scelle un quatrième intervalle allongé ;
- ledit quatrième intervalle, dans ladite position fermée dudit second élément de battant de porte (104 ; 204), étant formé entre ladite section de cadre de porte (102.2 ; 202.2) et ledit second élément de battant de porte (104 ; 204) et s'étirant le long de ladite seconde direction de fermeture (106 ; 206).

31. Arrangement de porte selon la revendication 30, **caractérisé en ce que**

- ledit arrangement de scellement (107 ; 207 ; 307 ; 407) comprend une septième surface de scellement située au niveau dudit élément de battant de porte (104 ; 204) et une huitième surface de scellement associée située au niveau de ladite section de cadre de porte (102.2 ; 202.2) ;
- ladite septième surface de scellement et ladite huitième surface de scellement, dans ladite position fermée dudit second élément de battant de porte (104 ; 204), s'étirant sur au moins toute la longueur dudit quatrième intervalle le long de ladite seconde direction de fermeture (106 ; 206) et entrant en contact l'une avec l'autre pour sceller ledit quatrième intervalle ;
- ladite septième surface de scellement et ladite huitième surface de scellement, au moins en sections, étant inclinées par rapport à ladite seconde direction de fermeture (106 ; 206).

32. Arrangement de porte selon une quelconque des revendications 28 à 31, **caractérisé en ce que** ladite première direction de fermeture (105 ; 205) est substantiellement opposée à ladite seconde direction de fermeture (106 ; 206).

33. Arrangement de porte selon une quelconque des revendications précédentes, **caractérisé en ce qu'**au moins une desdites surfaces de scellement (109.1, 110.1 ; 209.1, 210.1 ; 309.1, 310.1 ; 409.1, 410.1) est formée sur un dispositif de scellement élastique (109, 110 ; 209, 210).

34. Véhicule, en particulier véhicule ferroviaire, avec un arrangement de porte (101 ; 201) selon une quelconque des revendications précédentes.

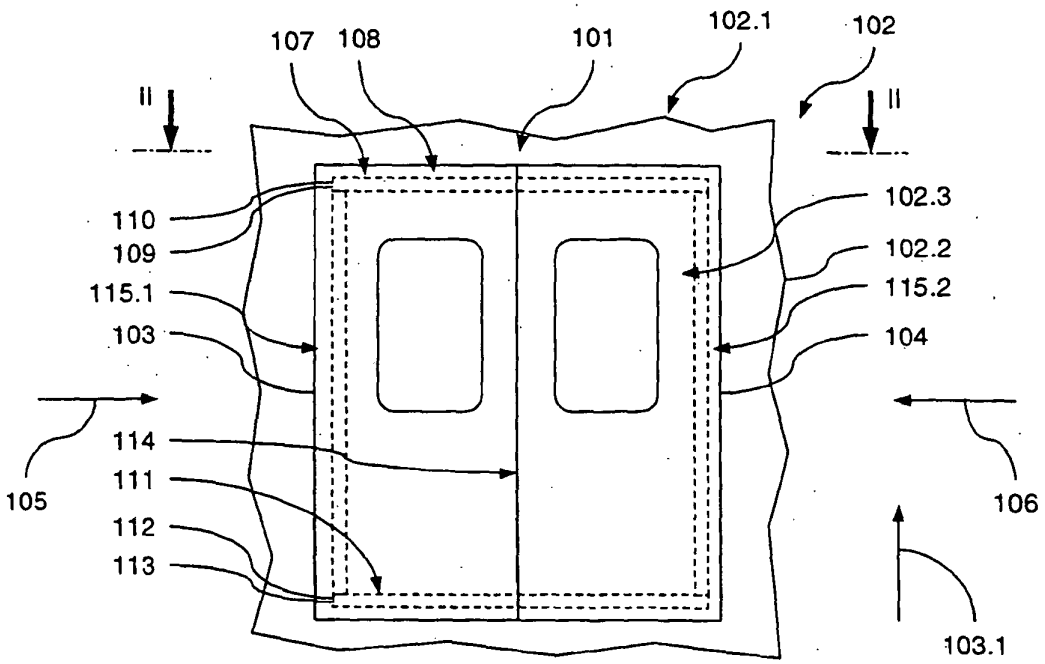


Fig. 1

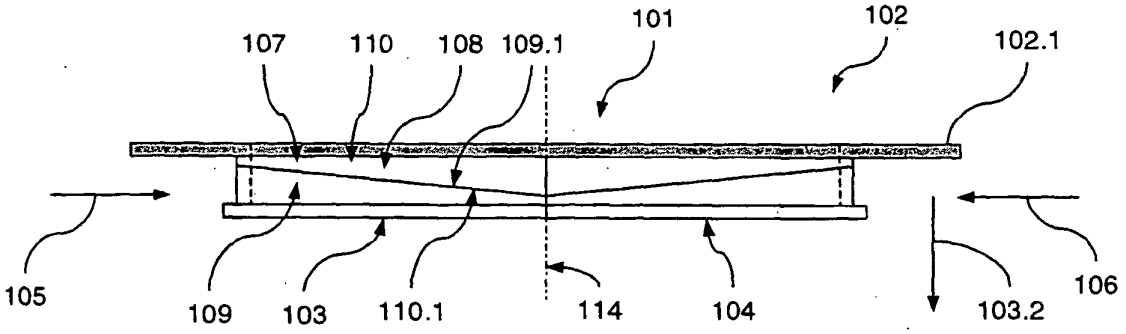


Fig. 2

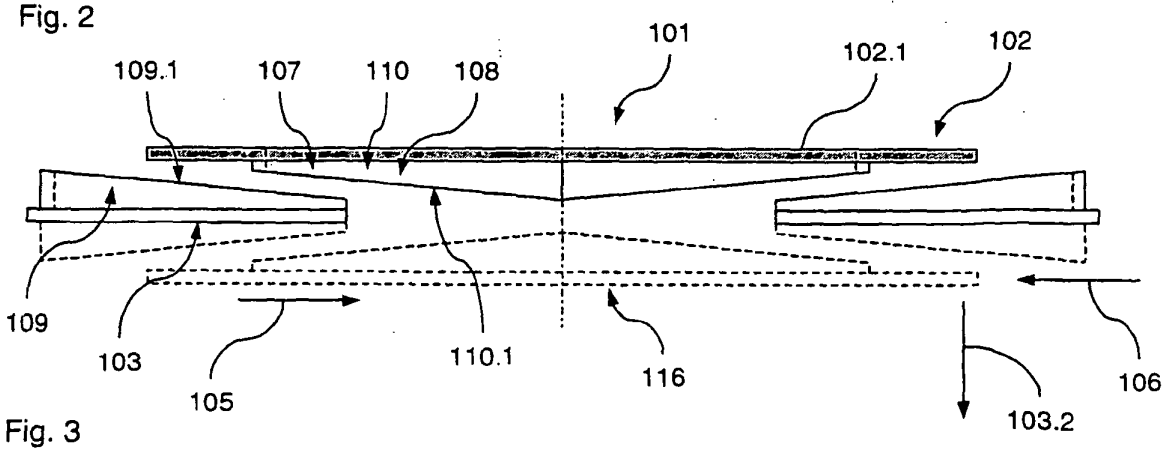


Fig. 3

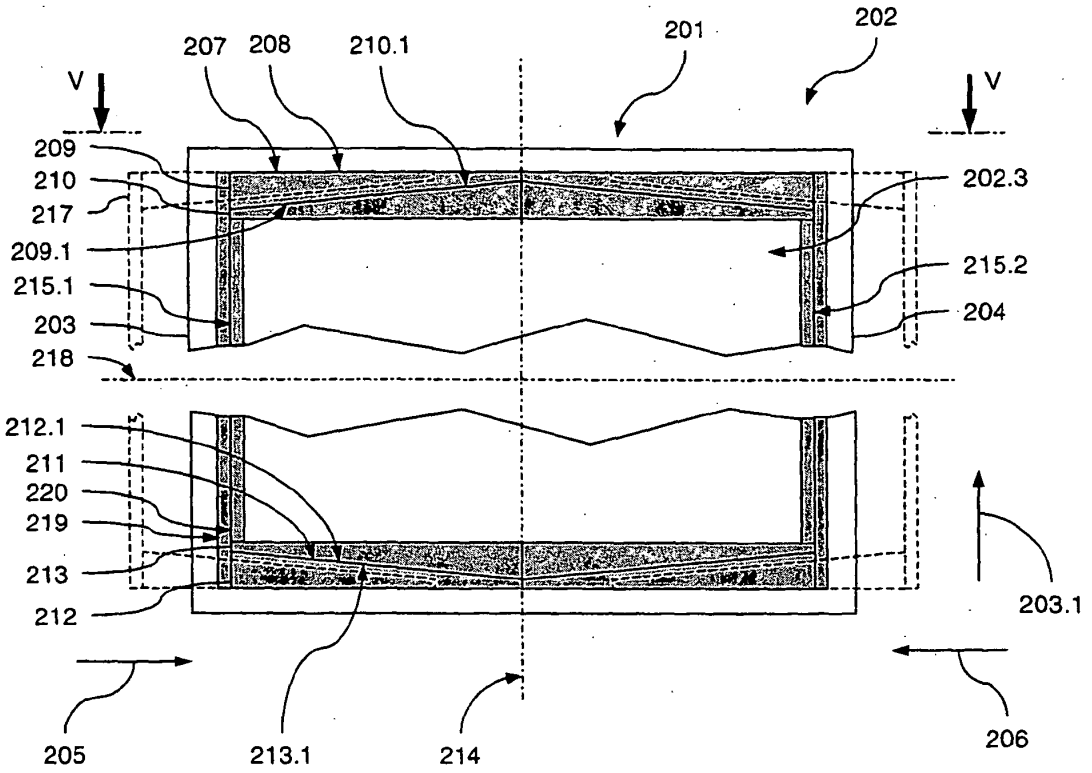

V
207
208
210.1
201
202
V
209
210
217
209.1
215.1
203
218
202.3
215.2
204
212.1
211
220
219
213
212
203.1
205
213.1
214
206

Fig. 4

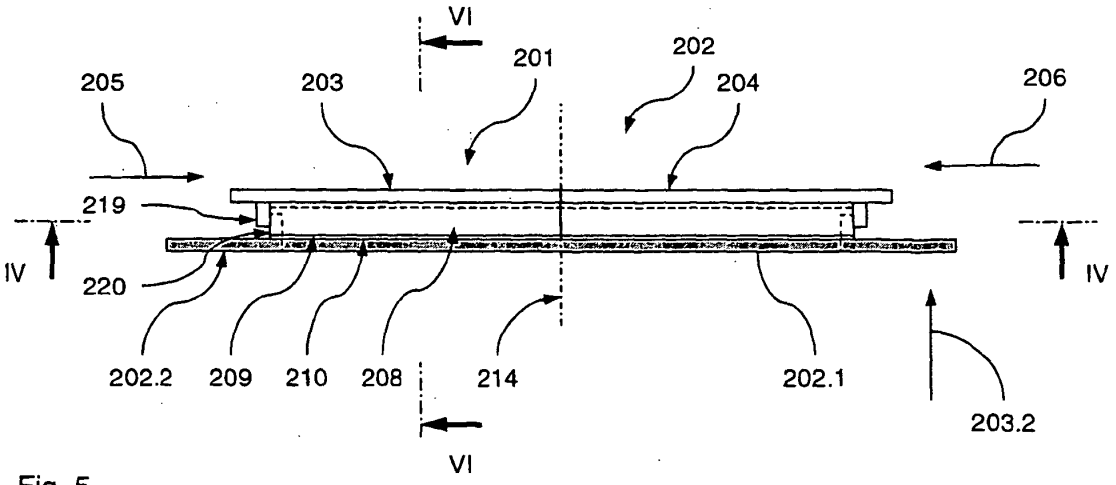

VI
201
202
205
203
204
206
219
IV
IV
220
202.2
209
210
208
214
202.1
203.2
VI

Fig. 5

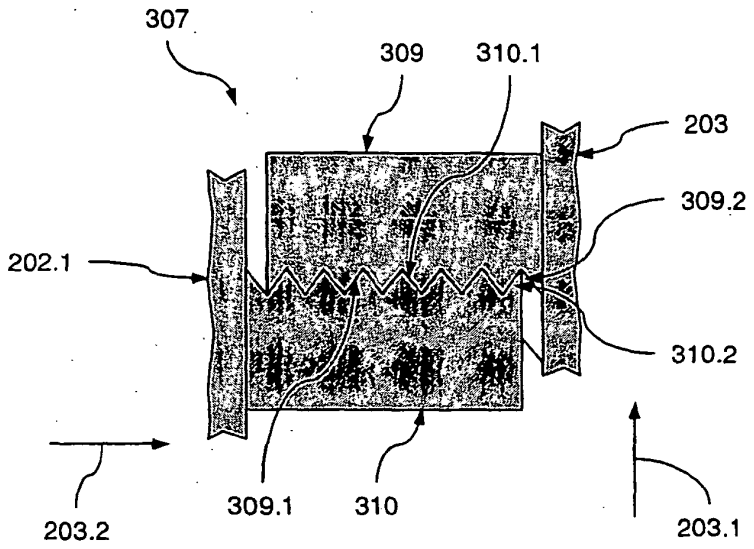

307
309
310.1
203
309.2
202.1
310.2
309.1
310
203.2
203.1

Fig. 6

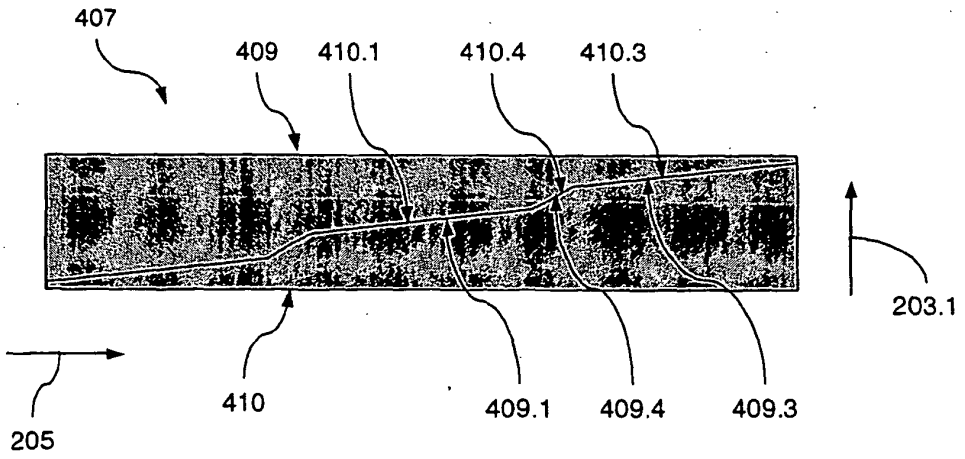

407
409
410.1
410.4
410.3
203.1
410
409.1
409.4
409.3
205

Fig. 7

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- US 4150509 A **[0003]**
- AT 400426 B **[0003]**