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Door and drive mechanism therefor
Tor und Antrieb dafür
Porte et commande pour cela

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References cited:
GB-A- 2 371 326
US-A- 2 774 998
US-A- 4 198 786
US-A- 5 341 598

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Description

[0001] The present invention relates to a door, in particular a sectional door, to a door system, in particular a sectional door system, a carriage for a door and a method for manufacturing a door, in particular a sectional door. The respective doors are generally formed by at least one panel which is mounted to a building structure. The connection to the building structure can be achieved either by a hinge, so that the door is hingedly mounted, or by a rail assembly, so that the door is linearly displaceable.

[0002] In order to displace the door, i.e. to open and close the door, drive means are generally provided. These drive means can be, for example, formed by a drum winding system. Such a drum winding system is known from US-A-5,335,883. For raising and lowering an overhead door, a pair of winding drums is provided at the opposite ends of a shaft, i.e. close to the distal ends of the panel-like door structure. Each of the winding drums is associated with one of a pair of cables. One end of the cables is attached to its associated winding drum and wrapped thereabout. The opposite end of each of the cables is attached to the bottom of the overhead door. Thereby, by rotation of the shaft, the cable is wound around the winding drums, whereby the door is opened.


[0004] However, these driving systems for opening and closing a door require a large space and are susceptible to malfunction due to the presence of foreign material, such as fingers, dirt, dust, ice and the like.

[0005] Following that, it is an object of the present invention to provide a door, in particular a sectional door, a door system, in particular a sectional door system, a use of a carriage for driving a door and a method for driving a door, wherein the door having a compact size and reliable is in its function.

[0006] This object is fulfilled by a door, in particular a sectional door, having the features disclosed in claim 1, a door system, in particular a sectional door system, having the features disclosed in claim 13, a use of a carriage for driving a door having the features disclosed in claim 14 and by a method for driving a door, in particular a sectional door, having the features disclosed in claim 15. Preferred embodiments are subject of the dependent subclams.

[0007] According to the invention, a door, in particular a sectional door, is provided, comprising at least one panel and at least one carriage mounted to said panel, wherein said carriage is engageable to a drive shaft being rotatable around its longitudinal axis and wherein said carriage comprises driven means having at least one rotatable element inclined relative to said longitudinal axis of said drive shaft and being engageable with said drive shaft for displacing said carriage along said longitudinal axis of said drive shaft upon rotation of said drive shaft. The door is preferably a sectional door. The sectional door can be formed of a plurality of generally horizontally extending sections or panels, each of which typically extends from one side of the door opening to the other. The top section of a panel is attached to a lower section of an adjacent panel by means of hinges. Further sections can be mounted thereto in the same manner. Basically vertically, i.e. basically perpendicular to the longitudinal extension of the panels, a drive shaft can be provided. The drive shaft can be arranged either on one side of the door or on both sides. It might be also possible, to provide more than one drive shaft on each of the sides of the door, in particular two drive shafts for driving heavy load doors. At the panel, at least one carriage is mounted. The carriage is adapted to be in contact or engagement with the drive shaft. The drive shaft is adapted to be rotatable around its longitudinal axis, wherein the drive shaft may be formed by a hollow or a massive tube. The drive shaft may be provided in any kind of geometric configuration in its cross-section, whereas a circular cross-section is preferred. A driven means is mounted to the carriage for displacing the carriage along the longitudinal axis of the drive shaft by means of rotation of the drive shaft. The driven means having at least one rotatable element or wheel or drum inclined relative to the longitudinal axis of the drive shaft. Moreover, the driven means is adapted to provide a contact between the at least one rotatable element and the drive shaft. Thus, during rotation of the drive shaft, the inclination of the rotatable element or wheel or drum will cause the carriage to be displaced or propelled along said longitudinal axis of the drive shaft. The rotatable element can be formed of any material, preferably an elastomeric material, such as a rubber or any other polymeric material. The drive shaft is preferably formed by any rigid material, such as metal or steel. If more than one rotatable element is provided, it is preferred that all rotatable element are inclined relative to the drive shaft at the same angle.

[0008] Preferably, said rotatable element is engageable with said drive shaft, so as to rotate and translate along said longitudinal axis upon rotation of said drive shaft. In other words, by rotation of the drive shaft, the rotatable element is set in movement only in a rotational manner around the axis of rotation of the rotatable element and in a translational motion along the longitudinal axis of the drive shaft. However, the rotatable element is preferably not rotatable around the axis of the drive shaft, as this could lead to a state, in which the carriage is only rotated around the longitudinal axis of the drive shaft, but not displaced along the longitudinal axis.

[0009] Preferably, the axis of rotation of the rotatable element is inclined with respect to the longitudinal axis of the drive shaft at an angle between about 10° and about 80°, preferably about 25° to about 60° and most preferably about 45°.

[0010] According to a preferred embodiment, at least two rotatable elements are provided on the carriage.
Preferably at least a pair of rotatable elements is provided, which are preferably arrangeable on substantially opposite sides of the drive shaft. In other words, the at least two rotatable elements are adapted to be brought into contact with the drive shaft on each side of the center axis of the drive shaft. Since there is one rotatable element on each side of the drive shaft, the contact between the drive shaft and the rotatable elements will be more stable and reliable, as the rotatable elements can be arranged in a position with respect to each other, in which the drive shaft is urged therebetween. Further, the carriage can be driven in the opposite direction with maintained performance, i.e. in both directions with the same driving force.

According to a preferred embodiment, said rotatable elements are provided on the carriage, so as to be radially arrangeable at the drive shaft. Advantageously, the rotatable elements are equally distributed at the carriage, so as to be equally arrangeable radially around the longitudinal axis of the drive shaft. Thereby, the contact between the drive shaft and the rotatable elements will be more stable and higher loads can be handled by the driven means.

In a preferred embodiment, the at least two rotatable elements are adapted to translate in the same direction, when the drive shaft is in rotation. Thus, canto or tilting during the movement of the carriage is omitted.

Further preferably, the rotatable elements are arranged in the substantially same plane, which is oriented substantially perpendicular to the longitudinal axis of the drive shaft. Additionally or alternatively, at least two rotatable elements are distributed over the longitudinal axis of the drive shaft, whereby the at least two rotatable elements are arranged offset in different planes, which are substantially oriented perpendicular to the longitudinal axis of the drive shaft. Thus, higher loads can be evenly distributed over the rotatable elements thereby relieving pressure on single rotatable elements.

In a further preferred embodiment, biasing means for biasing the at least one rotatable element against the drive shaft are provided. The biasing means can be provided by a specific material of the rotatable elements, e.g. by use of high elastomeric material on at least the surface of the rotatable elements, so as to ensure permanent contact between the rotatable elements and the drive shaft. Alternatively or additionally, the biasing means may be formed by one or more spring elements, e.g. a helical spring. The spring load acting on the rotatable elements is preferably adapted to compensate a certain tolerance of manufacturing by the resilience of the spring. Therefore, the propulsion is advantageously ensured independently of the accuracy of manufacturing of the drive shaft and/or the rotatable elements.

According to the invention, a door system, in particular a sectional door system, is provided, comprising a door according to the invention and at least one drive shaft, wherein the at least one carriage of the door is engageable with the drive shaft, so as to be displaceable along the longitudinal axis of the drive shaft by rotation thereof. Obviously, all features of the above-mentioned inventive door may be also employed in the door system. Thereby, a door system is provided, by which even a heavy-load door can be handled in a reliable manner.

Further, according to the invention, a use of a carriage for driving a door is provided, comprising driven means having at least one rotatable element inclined relative to a longitudinal axis of the drive shaft, which is engageable with the carriage and being rotatable around its longitudinal axis, wherein the driven means is engageable with the drive shaft for displacement of the carriage along the longitudinal axis of the drive shaft by means of rotation of the drive shaft. By rotation of the drive shaft, the inclination of the at least one rotatable element relative to the longitudinal axis of the drive shaft will cause the carriage to be propelled along the rail. Obviously, all features mentioned with respect to one of the above inventions can be also applied to the inventive use of a carriage.

Furthermore, according to the invention, a method for driving a door, in particular a sectional door, is provided, comprising the steps: providing engagement between a drive shaft and at least one rotatable element of a carriage, which is mounted or mountable to at least one panel of a door; rotating the drive shaft around its longitudinal axis, thereby displacement the carriage along the longitudinal axis of the drive shaft by means of an inclination of the at least on rotatable element relative to said longitudinal axis. Thus, by rotation of the drive shaft, the inclination of the rotatable element or wheel or drum will cause the carriage to be advantageously reliable displaced or propelled along said longitudinal axis of the drive shaft. Obviously, all features mentioned with respect to one of the above inventions can be also applied to the inventive method for driving a door.

Further a method for manufacturing a door, in particular a sectional door, can be provided, comprising the steps: Providing at least one panel and at least one carriage; mounting the carriage to the panel; and providing driven means at the carriage, wherein the driven means having at least one rotatable element inclined relative to a longitudinal axis of a drive shaft engageable
with the carriage. Thus, a door is provided, which is compact in size and reliable during its use. Obviously, all features mentioned in any of the foregoing inventions, may be also employed in this method.

[0020] The above, as well as other advantages and features of the present invention, will become readily apparent from the following detailed description of a preferred embodiment when considered in the light of the accompanying drawings in which:

Fig. 1 is a perspective view of an embodiment of the drive mechanism according to the present invention.

Fig. 2 is a partially transparent perspective view of Fig. 1.

Fig. 3 is a sectional front view of an embodiment of the inventive door system.

Fig. 4 is a sectional front view of a further embodiment of the inventive door system.

Fig. 5 is a sectional front view of a further embodiment of the inventive door system.

[0021] Fig. 1 shows a perspective view of the drive mechanism of a door according to the present invention. The driver mechanism is engageable with a drive shaft 2. The drive shaft 2 is rotatable around its longitudinal axis x, which is arranged basically perpendicular to the opening and closing direction of the door. The drive shaft 2 may be formed of any substantially rigid material, e.g. a metal shaft. It can be formed as a hollow tube or as a solid element. Preferably, a filler material may be provided within the hollow tube in order to strengthen the drive shaft 2. The outer surface of the drive shaft 2 may provided in a plain or smooth configuration, e.g. by provision of a metal tube as the drive shaft 2. However, the outer surface of the drive shaft 2 may be at least partly provided with a structure for increasing the friction. This structure could be, e.g., a knurling. Alternatively, a further structure layer for increasing the friction may provided at the drive shaft 2 by coating the surface of the drive shaft 2 with a high-frictional material. The drive shaft 2 may be also provided with a thread on its outer surface, as will be explained later. As the drive shaft 2 is adapted to transmit force by rotation thereof, it is formed by a material and in a geometric configuration that enables the drive shaft 2 to absorb or resist or be stressable to high torsional forces. Preferably, the drive shaft 2 is formed in a substantially circular cross section. However, other geometric configurations like an oval may be employed as well.

[0022] As shown in Figures 3 and 4, the door comprises at least one panel 4 for substantially closing a door opening 26 of a building structure 24. By use of the door system as a sectional door, a plurality of panels 4 are provided, which are arranged in an edge-to-edge-relationship, hingedly connected by means of hinges or the like (not shown). The sectional door may be used as a folding door, in which the door opening 26 is opened and closed by substantially horizontal movement of the door, i.e. of the door panels 4. However, preferably, the sectional door may be employed in door systems of the overhead type. In these door systems the panels 4 are moved from a vertical position, i.e. in the door opening 26, to a horizontal position, i.e. substantially perpendicular to the door opening plane. These door systems are typically employed in garages or the like.

[0023] The panels 4 can be made of wood or the like. However, preferably the panels 4 may consist of two sheet metal or plastic shells. Between these two sheet metal or plastic shells, an insulation material may be provided. This insulation can be either glued to the shells or it is introduced into the shells by foaming (e.g. PU-foam). This results in a high stability of the panels 4 combined with a low weight. The sheet metal or plastic shells may be of identical design or shape, thereby simplifying their manufacture. The connection between the sheet metal or plastic shells or elements may alternatively be achieved by means of snap connection.

[0024] At least one carriage 6 is to be mounted to the door. The carriage 6 is directly or indirectly mounted by mounting means 8 to the panel 4. Preferably, the carriage 6 is to be mounted to the end face of the panel 4 or at the vicinity thereof. As described later with reference to Figs. 3 and 4, the mounting means 8 may comprise a bolt, a shaft, a bracket or the like. The mounting means 8 may also function as an axis or axle for bearing one or more rollers 18 guiding the panel 4. Preferably, the mounting means 8 may be at least partly arranged within the thickness area of the panels 4, i.e. extend substantially in line from the end face of the panel 4 in a widthwise direction thereof. The carriage 6 comprises a carriage body 10, which preferably at least partly surrounds the drive shaft 2. However, a carriage body 10 may be provided which substantially encapsulates the drive shaft 2, i.e. by providing a hollow carriage body, e.g. a tube. The carriage body 10 is preferably formed in a polygonal cross-section (cf. Figs. 1 to 4). However, the carriage body 10 can be provided in alternate cross-sectional configurations, e.g. circular, oval, rectangular or triangular. The carriage body 10 is preferably formed by a rigid material, e.g. a metal, resin or composite structure. Alternatively, the carriage body 10 could be formed as a cage having a lattice-like structure or as a bracket. In order to drive heavy-load doors, a plurality of carriages 10 can be mounted to the panels 4. Consequently, if light-weight panels are used, the carriages 10 do not need to be mounted to each panel 4, but can be mounted alternately (e.g. to substantially every second or third panel 4).

[0025] Within the carriage body 10, i.e. at an inner side or face or surface of the carriage body 10 facing the drive shaft 2, one ore more, preferably a plurality of rotatable elements 12 is provided. The rotatable elements 12 may be formed as wheels or drums. However, also a gear-
like structure can be provided, especially if a drive shaft 2 is used having a threaded surface. The rotatable elements 12 are rotatably mounted via mounting elements 13 to the inner surface of the carriage 6. Preferably, by use of a carriage 6 having a polygonal structure, one or more rotational or rotatable elements 12 are arranged at substantially each or every second inner planar portion or surface of the carriage 6, e.g. as shown in fig. 1. Preferably, the axis y of rotation of the rotatable elements 12 is arranged substantially parallel to the respective planar portion of the carriage 6 and/or to the plane of the respective panel 4. However, a non-parallel arrangement of the axis y of rotation of the rotatable elements 12 with respect to the respective planar portion of the carriage 6 is also possible.

[0026] At least during the displacement of the carriage 6 along the longitudinal axis x of the drive shaft 2, the rotatable elements 12 are in contact or in engagement with the drive shaft 2. The rotatable elements 12 may comprise an elastomeric body or outer surface. Within the elastomeric body a resin cage could be formed for housing a bearing, so that the rotatable element 12 is rotatable mounted to the carriage 6 via the mounting elements 13. In this preferred embodiment, the forces are transmitted between the rotatable element 12 and the drive shaft 2 solely by frictional grip. However, the rotatable elements 12 may be formed in an alternative embodiment as a toothed wheel or a gear. In this embodiment, the gear is adapted to mesh with a congruent embodiment of the drive shaft 2. The rotatable elements 12 are arranged preferably tangentially at the drive shaft 2. In other words, the axis y of rotation of the rotatable element 12 is preferably arranged substantially tangentially with respect to the drive shaft 2. Thus, high frictional forces can be advantageously transmitted between the drive shaft 2 and the rotatable elements 12. However, a non-tangential arrangement of the rotatable elements 12 with respect to the drive shaft 2 is also possible.

[0027] Preferably, at least two of the rotatable elements 12 are arranged in a substantially opposite or symmetric pair-like arrangement on each side of the drive shaft 2. By this pair-like arrangement, high frictional forces can be advantageously transmitted between the drive shaft 2 and the rotatable elements 12, as the drive shaft 2 can be urged between the pair of rotatable elements 12. However, as can be seen in Figures 3 and 4, the pair of wheels 12 does not necessarily need to be arranged at opposite or symmetric sides with respect to the longitudinal axis x or centre of the drive shaft 2, but can be also arranged within a specific sector or arc of the drive shaft 2.

[0028] The rotatable elements 12 are inclined relative to the longitudinal axis x of the drive shaft 2. That is, the axis y of rotation of the rotatable elements 12 is inclined with respect to the longitudinal axis x of the drive shaft 2 at an angle \( \alpha \). Thereby, the axis y of rotation of the rotatable elements 12 is warped or skewed with respect to the longitudinal axis x of the drive shaft 2, and the angle \( \alpha \) is defined between these two skewed axes x and y. The angle \( \alpha \) is preferably between about 10° and about 80°, preferably between about 25° and about 65° and most preferably about 45°. In order to achieve the desired displacement of the carriage 6 along the longitudinal axis x of the drive shaft 2, the axis y of rotation of at least one rotatable element 12 shall not be arranged perpendicular to the longitudinal axis x or parallel thereto, i.e. not 90° or 0° with respect to the longitudinal axis x. At an arrangement of rotatable elements 12 being substantially on opposite sides of or symmetric with respect to the drive shaft 2, it is preferred that the opposing rotatable elements 12 are adapted to rotate in reverse directions, when the drive shaft 2 is in rotation. Therefore, it is ensured that the carriage 6 is advantageously driven in an even manner without canting or tilting during the displacement of the carriage 6 along the longitudinal axis x of the drive shaft 2.

[0029] The rotatable elements 12 are contacted or engaged with the drive shaft 2 during rotation of drive shaft 2. Thereby, the rotatable elements 12 are forced to rotate around their axis y of rotation and to translate along the outer surface of the drive shaft 2 substantially parallel to the longitudinal axis x of the drive shaft 2. In particular, the rotatable elements 12 substantially roll on the drive shaft 2 due to the frictional grip or engagement therebetween. Thus, longitudinal displacement or shifting or translation of the carriage 6 and thus of the panel(s) 4 mounted thereto is provided.

[0030] In order to ensure substantially permanent contact or engagement between the rotatable elements 12 and the drive shaft 2, biasing means 14 for biasing the at least one rotatable element 12 against the drive shaft 2 are preferably provided. The biasing means 14 may be formed by one or more helical springs. As can be seen in figs. 3 and 4, the biasing means 14 are preferably wound around a rod 15, which is slidably mounted (e.g. by a telescopic member) to the mounting means 8. By this sliding arrangement, the carriage 6 can be moved or biased or urged against the drive shaft 2, whereby the movement direction is preferably oriented to the centre or longitudinal axis x of or radially to the drive shaft 2. Thereby an advantageously reliable engagement or frictional grip between the drive shaft 2 and the rotatable elements 12 is provided. Additionally or alternatively, the biasing means 14 may be provided by a specific material of the rotatable elements 12, i.e. by use of a high elastomeric material on at least the surface of the wheels 12, so as to ensure permanent contact between the rotatable elements 12 and the drive shaft 2. However, the rotatable elements 12 may be also formed substantially completely of a rubber-like material. Thus, tolerances of manufacturing of the drive shaft 2 may be compensated by the resiliency of the biasing means 14. The biasing means 14 may be adapted to bias the rotatable elements 12 in a substantially normal direction to the tangent of the drive shaft 2, or - as can be seen in Figures 3 and 4 - inclined to the normal direction, i.e. not arranged tangentially at
the drive shaft 2. In a further embodiment, preferably spring-like biasing means 14 may be arranged separately at each of the rotatable elements 12. However, the biasing means 14 are preferably always adapted to press the rotatable elements 12 against the drive shaft 2.

[0031] In order to guide the carriage 6 along the longitudinal axis x of the drive shaft 2 and to prevent rotational movement of the carriage 6 around the longitudinal axis x, guiding means 16 are provided. These guiding means advantageously provide further a guiding function for the door panels 4. Figs. 3 and 4 show two embodiments of the guiding means 16.

[0032] In the embodiment shown in fig. 3, the guiding means 16 comprises at least two rollers 18. The two rollers 18 are arranged substantially perpendicular to each other. That is, their axes u and v of rotation are preferably arranged in a substantially perpendicular relationship. The rollers 18 are adapted to translate or move in a rail element 20. The rail element 20 is adapted to at least substantially encapsulate the rollers 20 in order to prevent displacement of the rollers 20 in a plane substantially normal to the translational movement direction of the rollers 20. In other words, the inner configuration of the rail element 20 is substantially adapted to the outer configuration of the rollers 20. The rail element 20 is arranged substantially following the opening and closing motion of the door, i.e. the door panels 4. By use of the door as a sectional door of the overhead type, the rail elements 20 are substantially parallel to at least the vertical arranged portion of the drive shaft 2. In order to guide the door in a substantially horizontal position, the rail element 20 also extends from the vertical position to the horizontal position. Therefore, by the rail elements 20, the position of the door or panels 4 in its opened and closed state with respect to the door opening 26 is defined.

[0033] In the embodiment shown in fig. 4, the biasing means 14 are substantially the same as the one as shown in fig. 3. However, The biasing means 14 are adjustably mounted to the mounting means 8 via a leg or shaft 17. The leg 17 at least partly houses the rod 15, which is slidable towards and away from the shaft 2, preferably substantially normal to the longitudinal axis x thereof. In the embodiment shown in fig. 4, the mounting means 8 consist of a shaft, which extends substantially parallel to the widthwise extension of the panels 4, i.e. perpendicular to the drive shaft 2. The leg 17 is preferably displaceable along the mounting means 8, in order to advantageously adjust or position the carriage 6 with respect to the shaft 2. The adjusting means 19 can comprise a pair of locking nuts 19. However, also alternative means for locking the leg 17 at a specific (predetermined or predeterminable) position with respect to the mounting means 8 can be provided. Thereby, tolerances of manufacturing and assembly of the door system can be advantageously compensated. Moreover, the leg 17 preferably has a bent configuration thus advantageously allowing a compact arrangement of the carriage 6, the guiding means 16 and the mounting means 8.

[0034] The pair of rollers 18 shown in fig. 4 differs from the embodiment shown in fig. 3 by their parallel arrangement. Thus, the axis w of rotation of the rollers 18 is preferably the same or at least parallel. The axis w of rotation of the rollers 18 can be arranged substantially parallel to the extension of the shaft-like mounting means 8 or the widthwise extension of the panels 4 or - as shown in fig. 4 - substantially perpendicular thereto. In a preferred embodiment, the axis w of rotation of the rollers 18 is substantially aligned with the axis x of rotation of the shaft 2. The rail element 20 is preferably substantially U-shaped and at least partly substantially encapsulates or houses the rollers 18. Thus, displacement of the rollers 18 in a plane basically perpendicular to the longitudinal axis x of the drive shaft 2 is prevented. The rail element 20 of both embodiments shown in figs. 3 and 4 can be directly mounted to the building structure or mounted via a fixing element 21 thereto (shown in fig. 4). Moreover, the rail may comprise one or more inclined portions 20’ being arranged at an angle different from 0° or 90° with respect to the axis w preferably so as to substantially position the rollers 18 along the direction of the axis W. The arrangement of the rail element 20 may be similar to the one as described with reference to fig. 3, i.e. at least in the vertical section (parallel to door opening 26) substantially parallel to the drive shaft 2. The panel(s) 4 may be positioned along a direction substantially normal to the plane of their outer plane (or in a thickness direction of the panel(s) 4) by one or more abutting elements 28 provided at or on the building structure 24 (e.g. by means of one or more brackets). These abutting elements 28 may be at least partly provided along the height of the door opening 26 so as to advantageously position the panel(s) 4 at an outer side thereof.

[0035] As described with reference to figs. 3 and 4, the door may be used as an overhead-type door. In this case, the drive shaft 2 and/or the rail element 20 are at least substantially vertically arranged (cf. figs. 3 and 4 seen in the horizontal format). However, the door may be also used as a preferably substantially horizontal sliding door, as shown in fig. 5. That is, the door opening 26 is closed by a substantially horizontal movement or displacement of the door panels 4. In this case, the drive shaft 2 and/or the rail element 20 are at least substantially horizontally arranged, preferably top of the door opening 26 or in the vicinity thereof (cf. “TOP” in fig. 5). Thus, the panels 4 (which are in this case arranged vertically) are supported by or suspended from the rail element 20 and/or drive shaft 2 (cf. fig. 5). That is, the panels 4 may be suspended directly by means of the carriage 10 from the drive shaft 2. However, in a preferred embodiment, the panels 4 are suspended from the rail element 20 and preferably guided thereby, wherein the door or panels 4 are driven by the drive shaft 2. Additionally or alternatively, the panels 4 can be also guided by the rail element 20 and/or driven by the shaft 2 on the bottom of the door opening 26 (not shown in fig. 5).

[0036] As can be seen in figures 3, 4 and 5, the panel
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4 may comprise one or more protection or sealing elements 22 for preventing entry of any foreign material, such as dust, dirt, ice and fingers, through the gap between the panel 4 and the rail element 20 or the building structure 24. The sealing elements 22 comprise a first portion and a second portion. The first portion is to be fixedly mounted to the panel 4, preferably extending from the end face of the panel 4 or from a distal portion thereof. The second portion is to be substantially in contact or in engagement with the rail element 20. However, the second portion of the sealing element 22 can be additionally or alternatively in contact or in engagement with the fixing element 21 or the building structure 24. Advantageously, the sealing element 22 at least partly covers thereby the rollers 18 (not shown), so that entry of foreign material from the inner side of the building is prevented. The sealing element 22 may be formed of a substantially resilient (preferably elastomeric) lip or wing or projection. Alternatively, the sealing element 22 may comprise a plurality of resilient (preferably elastomeric) pins thereby forming a substantially flexible brush (as a preferred second portion).

[0037] Thus, preferably, a door, in particular sectional door, is provided, comprising at least one panel 4 being at least partly arrangeable in at least one guiding element or guiding means 20, such as a rail 20, and one or more protection or sealing elements 22, wherein said panel 4 having guide means, such as rollers 18, being in engagement or engageable with said guiding element 20 for guiding said panel 4 during displacement along said guiding element 20, wherein said one or more protection elements 22 having a first portion and a second portion, wherein said first portion is to be fixedly mounted to said panel 4 and said second portion is to be brought substantially in contact with said guiding element 20 at least over a part of said displacement path, preferably so that said guide means 18 is substantially encapsulated or surrounded by said guiding element 20 and said protection means 22 at least along a part of the extension of the guiding element 20.

[0038] The above described embodiments of the present invention may be employed in a sectional door, in particular of the overhead type, or in other kind of doors opening in a different way such as in a horizontal manner. By this arrangement of a door having the improved drive mechanism, a reliable operation of a drive mechanism, which is compact in size, is ensured.

Reference numerals

2 drive shaft
4 panel
6 carriage
8 mounting means
10 carriage body
12 wheel
13 mounting element
14 biasing means
15 rod
16 guiding means
17 leg
18 rollers
19 adjusting means
20 rail element
21 fixing element
22 sealing element
24 building structure
26 door opening
28 abutting element(s)
u, v axis of rotation
w axis of rotation
x longitudinal axis
y axis of rotation
α angle

Claims

1. Door, in particular sectional door, comprising at least one panel (4) and at least one carriage (6) mounted to said panel (4), wherein said carriage (6) is engageable to a drive shaft (2) being rotatable around its longitudinal axis (x), characterised in that said carriage (6) comprises driven means having at least one rotatable element (12) inclined relative to said longitudinal axis (x) of said drive shaft (2) and being engageable with said drive shaft (2). The above described embodiments of the present invention may be employed in a sectional door, in particular of the overhead type, or in other kind of doors opening in a different way such as in a horizontal manner. By this arrangement of a door having the improved drive mechanism, a reliable operation of a drive mechanism, which is compact in size, is ensured.

Reference numerals

2 drive shaft
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10 carriage body
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13 mounting element
14 biasing means
15 rod
16 guiding means
17 leg
18 rollers
19 adjusting means
20 rail element
21 fixing element
22 sealing element
24 building structure
26 door opening
28 abutting element(s)
u, v axis of rotation
w axis of rotation
x longitudinal axis
y axis of rotation
α angle

Claims

1. Door, in particular sectional door, comprising at least one panel (4) and at least one carriage (6) mounted to said panel (4), wherein said carriage (6) is engageable to a drive shaft (2) being rotatable around its longitudinal axis (x), characterised in that said carriage (6) comprises driven means having at least one rotatable element (12) inclined relative to said longitudinal axis (x) of said drive shaft (2) and being engageable with said drive shaft (2). The above described embodiments of the present invention may be employed in a sectional door, in particular of the overhead type, or in other kind of doors opening in a different way such as in a horizontal manner. By this arrangement of a door having the improved drive mechanism, a reliable operation of a drive mechanism, which is compact in size, is ensured.

Reference numerals

2 drive shaft
4 panel
6 carriage
8 mounting means
10 carriage body
12 wheel
13 mounting element
14 biasing means
15 rod
16 guiding means
17 leg
18 rollers
19 adjusting means
20 rail element
21 fixing element
22 sealing element
24 building structure
26 door opening
28 abutting element(s)
u, v axis of rotation
w axis of rotation
x longitudinal axis
y axis of rotation
α angle

Claims

1. Door, in particular sectional door, comprising at least one panel (4) and at least one carriage (6) mounted to said panel (4), wherein said carriage (6) is engageable to a drive shaft (2) being rotatable around its longitudinal axis (x), characterised in that said carriage (6) comprises driven means having at least one rotatable element (12) inclined relative to said longitudinal axis (x) of said drive shaft (2) and being engageable with said drive shaft (2).
6. Door according to claim 5, characterised in that said rotatable elements (12), which are arrangeable on substantially opposite sides of said drive shaft (2), are inversely inclined and/or adapted to rotate in reverse directions upon rotation of said drive shaft (2).

7. Door according to one of the claims 4 - 6, characterised in that rotatable elements (12) are arranged at said carriage (6), so as to be radially arrangeable at said drive shaft (2).

8. Door according to one of the claims 4 - 7, characterised in that said at least two rotatable elements (12) are adapted to translate in the same direction upon rotation of said drive shaft (2).

9. Door according to one of the claims 4 - 8, characterised in that said at least two rotatable elements (12) are arranged in the substantially same plane, oriented substantially perpendicular to said longitudinal axis (x) of said drive shaft (2).

10. Door according to one of the claims 4 - 9, characterised in that at least two rotatable elements (12) are arranged at said carriage (6), so as to be distributively arrangeable on said drive shaft (2), whereby said at least two rotatable elements (12) are arranged offset in different planes, oriented substantially perpendicular to said longitudinal axis (x) of said drive shaft (2).

11. Door according to one of the preceding claims, characterised in further comprising biasing means (14) for biasing said at least one rotatable element (12) against said drive shaft (2).

12. Door according to claim 11, characterised in that said biasing means (14) are formed by one or more helical springs.

13. Doorsystem, in particular sectional door system, comprising a door according to one of the preceding claims and at least one drive shaft (2), wherein said at least one carriage (6) is in engagement with said drive shaft (2), so as to be displaceable along said longitudinal axis (x) of said drive shaft (2) by rotation thereof.

14. Use of a carriage for driving a door, characterised in that the carriage comprises driven means having at least one rotatable element (12) inclined relative to a longitudinal axis (x) of a drive shaft (2), which is engageable to said carriage (6) and being rotatable around its longitudinal axis (x), wherein said driven means is engageable with said drive shaft (2) for displacement of said carriage (6) along said longitudinal axis (x) of said drive shaft (2), when said drive shaft (2) is rotated.

15. Method for driving a door, in particular a sectional door, comprising the steps:

- providing engagement between a drive shaft (2) and at least one rotatable element (12) of a carriage (6), which is mounted or mountable to at least one panel (4) of a door; and
- rotating said drive shaft (2) around its longitudinal axis (x), thereby displacing said carriage (6) along said longitudinal axis (x) of said drive shaft (2) by means of an inclination of said at least one rotatable element (12) relative to said longitudinal axis (x).

**Patentansprüche**

1. Tor, insbesondere Sektionaltor, umfassend:
   - zumindest eine Panele (4) und zumindest einen an die Panele (4) montierten Laufwagen (6), wobei der Laufwagen (6) mit einer Antriebswelle in Eingriff bringbar ist, welche um ihre Längsachse (x) drehbar ist, dadurch gekennzeichnet, daß der Laufwagen (6) Antriebsmittel mit zumindest einem drehbaren Element (12) umfasst, das relativ zu der Längsachse (x) der Antriebswelle (2) drehbar ist und mit der Antriebswelle (2) in Eingriff bringbar ist, um den Laufwagen (6) bei einer Drehung der Antriebswelle (2) entlang der Längsachse (x) der Antriebswelle (2) zu verschieben.

2. Tor nach Anspruch 1, dadurch gekennzeichnet, daß das drehbare Element (12) mit der Antriebswelle (2) in Eingriff bringbar ist, um sich bei Drehung der Antriebswelle (2) zu drehen und entlang der Längsachse (x) zu verrücken.

3. Tor nach einem der vorangegenden Ansprüche, dadurch gekennzeichnet, daß die Drehachse (y) des drehbaren Elements (12) in Bezug auf die Längsachse (x) der Antriebswelle (2) in einem Winkel (α) zwischen etwa 10° und etwa 80°, vorzugsweise etwa 25° bis etwa 80° und am besten etwa 45° geneigt ist.

4. Tor nach einem der vorangegenden Ansprüche, dadurch gekennzeichnet, daß auf dem Laufwagen (12) mindestens zwei drehbare Elemente (12) bereitgestellt sind.

5. Tor nach Anspruch 4, dadurch gekennzeichnet, daß zumindest ein Paar drehbarer Elemente (12)
bereitgestellt ist, die vorzugsweise auf im wesentlichen entgegengesetzten Seiten der Antriebswelle (2) anordnenbar sind.

6. Tor nach Anspruch 5, dadurch gekennzeichnet, daß die drehbaren Elemente (12), die auf im wesentlichen entgegengesetzten Seiten der Antriebswelle (2) anordnenbar sind, umgekehrt geneigt sind und/oder geeignet sind, sich bei der Drehung der Antriebswelle (2) in entgegengesetzte Richtungen zu drehen.

7. Tor nach einem der Ansprüche 4 - 6, dadurch gekennzeichnet, daß die drehbaren Elemente (12) an dem Laufrad (6) angeordnet sind, um radial an der Antriebswelle (2) anordnenbar zu sein.

8. Tor nach einem der Ansprüche 4 - 7, dadurch gekennzeichnet, daß die zumindest zwei drehbaren Elemente (12) geeignet sind, bei Drehung der Antriebswelle (2) in die gleiche Richtung zu verringern.

9. Tor nach einem der Ansprüche 4 - 8, dadurch gekennzeichnet, daß die drehbaren Elemente (12) im wesentlichen in der gleichen Ebene im wesentlichen senkrecht zu der Längsachse (x) der Antriebswelle (2) angeordnet sind.

10. Tor nach einem der Ansprüche 4 - 9, dadurch gekennzeichnet, daß zumindest zwei drehbare Elemente (12) an dem Laufrad (6) angeordnet sind, um über die Längsachse (x) der Antriebswelle (2) verteuft zu sein, wobei die zumindest zwei drehbaren Elemente (12) in verschiedenen Ebenen versetzt, im wesentlichen senkrecht zu der Längsachse (x) der Antriebswelle (2) ausgerichtet angeordnet sind.

11. Tor nach einem der vorangehenden Ansprüche, dadurch gekennzeichnet, daß es ferner Vorspannmittel (14) zum Vorspannen des zumindest einen drehbaren Elements (12) gegen die Antriebswelle (2) umfaßt.

12. Tor nach Anspruch 11, dadurch gekennzeichnet, daß die Vorspannmittel (14) durch eine oder mehrere Schraubenfedern ausgebildet sind.

13. Torsystem, insbesondere Sektionaltorsystem, umfassend:

   ein Tor nach einem der vorangehenden Ansprüche und zumindest eine Antriebsachse (2), wobei zumindest ein Laufrad (6) des Tors in Eingriff mit der Antriebswelle (2) ist, um durch deren Drehung entlang der Längsachse (x) der Antriebswelle (2) verschiebbar zu sein.

14. Verwendung eines Laufradens zum Antrieben eines Tors, dadurch gekennzeichnet, daß der Laufrad (1) umfaßt:

   - Bereitstellen eines Eingriffs zwischen einer Antriebswelle (2) und zumindest einem drehbaren Element (12) auf einem Laufrad (6), der auf zumindest einer Panele (4) eines Tors montiert oder montierbar ist; und
   - Drehen der Antriebswelle (2) um ihre Längsachse (x), wo durch der Laufrad (6) mittels einer Neigung des zumindest einen drehbaren Elements (12) relativ zu der Längsachse (x) entlang der Längsachse (x) der Antriebswelle (2) verschoben wird.

15. Verfahren zum Antrieben eines Tors, insbesondere eines Sektionaltors, das die folgenden Schritte umfaßt:

   - Bereitstellen eines Eingriffs zwischen einer Antriebswelle (2) und zumindest einem drehbaren Element (12) auf einem Laufrad (6), der auf zumindest einer Panele (4) eines Tors montiert oder montierbar ist; und
   - Drehen der Antriebswelle (2) um ihre Längsachse (x), wodurch der Laufrad (6) mittels einer Neigung des zumindest einen drehbaren Elements (12) relativ zu der Längsachse (x) entlang der Längsachse (x) der Antriebswelle (2) verschoben wird.

Revendications

1. Porte, en particulier une porte sectionnelle, comprenant :

   au moins un panneau (4) et au moins un chariot (6) monté sur ledit panneau (4), dans laquelle ledit chariot (6) peut être engagé vers une tige de commande (2) pouvant tourner autour de son axe longitudinal (x), caractérisée en ce que ledit chariot (6) comprend un moyen de commande ayant au moins un élément rotatif (12) incliné relativement audit axe longitudinal (x) de ladite tige de commande (2) et pouvant être engagé avec ladite tige de commande (2) pour déplacer ledit chariot (6) le long dudit axe longitudinal (x) de ladite tige de commande (2) sur une rotation de ladite tige de commande (2).

2. Porte selon la revendication 1, caractérisée en ce que ledit élément rotatif (12) peut être engagé avec ladite tige de commande (2) de manière à effectuer une rotation et une translation le long dudit axe longitudinal (x) sur une rotation de ladite tige de commande (2).
3. Porte selon l'une des revendications précédentes, caractérisée en ce que ledit axe de rotation (y) dudit élément rotatif (12) est incliné relativement audit axe longitudinal (x) de ladite tige de commande (2) selon un angle (α) entre environ 10° et environ 80°, de préférence entre environ 25° et environ 60° et de manière la plus préférentielle sur environ 45°.

4. Porte selon l'une des revendications précédentes, caractérisée en ce qu’au moins deux éléments rotatifs (12) sont prévus sur ledit chariot (6).

5. Porte selon la revendication 4, caractérisée en ce qu’au moins une paire d’éléments rotatifs (12) est prévue, lesquels peuvent être agencés de préférence sur des côtés sensiblement opposés de ladite tige de commande (2).

6. Porte selon la revendication 5, caractérisée en ce que lesdits éléments rotatifs (12) qui peuvent être agencés sur des côtés sensiblement opposés de ladite tige de commande (2), sont inclinés inversement et/ou adaptés pour tourner dans des directions inverses sur une rotation de ladite tige de commande (2).

7. Porte selon l’une des revendications 4 à 6, caractérisée en ce que lesdits éléments rotatifs (12) sont agencés sur ledit chariot (6), de manière à pouvoir être agencés radialement au niveau de ladite tige de commande (2).

8. Porte selon l’une des revendications 4 à 7, caractérisée en ce que lesdits au moins deux éléments rotatifs (12) sont adaptés pour effectuer une translation dans la même direction sur une rotation de ladite tige de commande (2).

9. Porte selon l’une des revendications 4 à 8, caractérisée en ce que lesdits éléments rotatifs (12) sont agencés sensiblement dans le même plan et orientés sensiblement perpendiculairement audit axe longitudinal (x) de ladite tige de commande (2).

10. Porte selon l’une des revendications 4 à 9, caractérisée en ce qu’au moins deux éléments rotatifs (12) sont agencés sur ledit chariot (6) de manière à être répartis au-dessus dudit axe longitudinal (x) de ladite tige de commande (2), sachant que lesdits au moins deux éléments rotatifs (12) sont agencés en offset dans des plans différents et orientés sensiblement perpendiculairement audit axe longitudinal (x) de ladite tige de commande (2).

11. Porte selon l’une des revendications précédentes, caractérisée en ce qu’elle comprend en outre des moyens d’inclinaison (14) pour polariser ledit au moins un élément rotatif (12) à l’encontre de ladite tige de commande (2).

12. Porte selon la revendication 11, caractérisée en ce que lesdits moyens d’inclinaison (14) sont formés par un ou plusieurs ressorts hélicoïdaux.

13. Système de porte, en particulier un système de porte sectionnelle, comprenant :

   une porte selon l’une des revendications précédentes et
   au moins une tige de commande (2),
   dans laquelle ledit au moins un chariot (6) de ladite porte est en engagement avec ladite tige de commande (2) de manière à pouvoir être déplacé le long dudit axe longitudinal (x) de ladite tige de commande (2) par une rotation de celle-ci.

14. Utilisation d’un chariot pour commander une porte, caractérisée en ce que le chariot comprend :

   un moyen de commande ayant au moins un élément rotatif (12) incliné relativement à un axe longitudinal (x) d’une tige de commande (2), lequel peut être engagé vers ledit chariot (6) et pouvant tourner autour de son axe longitudinal (x),
   dans laquelle ledit moyen de commande peut être engagé avec ladite tige de commande (2) pour déplacer ledit chariot (6) le long dudit axe longitudinal (x) de ladite tige de commande (2) lorsque ladite tige de commande (2) est tournée.

15. Méthode pour commander une porte, en particulier une porte sectionnelle, comprenant les étapes suivantes :

   - fournir un engagement entre une tige de commande (2) et au moins un élément rotatif (12) d’un chariot (6) qui est monté ou qui peut être monté sur au moins un panneau (4) d’une porte ; et
   - tourner ladite tige de commande (2) autour de son axe longitudinal (x), tout en déplaçant ledit chariot (6) le long dudit axe longitudinal (x) de ladite tige de commande (2) au moyen d’une inclinaison dudit au moins un élément rotatif (12) relativement audit axe longitudinal (x).
REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 5335883 A [0002]