



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
20.11.2013 Bulletin 2013/47

(51) Int Cl.:
E05F 15/16 (2006.01)

(21) Application number: **13167669.4**

(22) Date of filing: **14.05.2013**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME

(71) Applicant: **Assa Abloy Entrance Systems AB**
261 22 Landskrona (SE)

(72) Inventor: **Brunner, Maximilian**
84079 Bruckberg (DE)

(74) Representative: **Aurell, Henrik**
Zacco Sweden AB
P.O. Box 4289
203 14 Malmö (SE)

(30) Priority: **14.05.2012 SE 1250492**

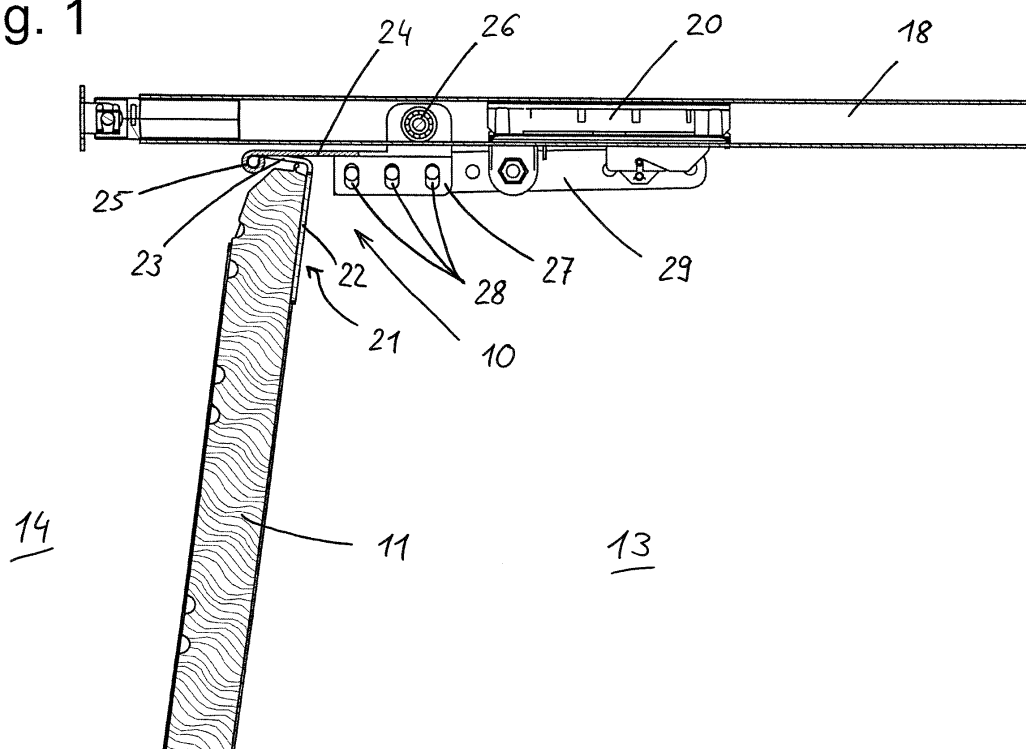
(54) **Hinge mechanism for connecting a door panel to a door driving device**

(57) The invention relates to a hinge mechanism (10) for connecting a door panel (11) to a door driving device, comprising a fitting (21) having an attachment section (22) for attachment to an inside surface of a door panel (11), and a lever section (23) which is adapted to extend above an upper edge of the door panel (11) in an out-

wards direction; a bracket (24) for attachment to a driving mechanism, and a hinge (25) connecting the fitting (21) and the bracket (24) rotatably about a hinge axis, the hinge (25) being located at the outside end of the lever section (23).

Further, the invention relates to a door panel driving arrangement having such a hinge mechanism.

Fig. 1



Description

[0001] The invention relates to hinge mechanism for connecting a door panel to a door driving device, and a door panel driving arrangement.

Background of the invention

[0002] Doors, such as sectional doors or up-and-over doors, are usually opened and closed via guiding rails provided at each side of the door, which extend vertically for holding the door in its closed state by means of rollers which are attached to the sides of the doors and guided in the guiding rails. When opening the doors, the rollers follow the vertical part of the rails which continue in a deflection curve and finally in a horizontal part which is located below the ceiling for holding the opened door in parallel to and below the ceiling. For the uppermost roller, usually a second pair of rails has to be provided which lacks of the curved and the vertical part and is provided for pulling in the upper edge of the door panel during an initial opening of the door. Those opening arrangements of the state of the art usually require a lintel of a certain height. However, nowadays trend is going towards garages and buildings with a very low or even without a lintel. Therefore, there is a need for door opening solutions adapted for those needs.

[0003] DE 40 03 218 A1 describes that in prior sectional doors, the guiding rails have to change over from their vertical extension to a horizontal extension below the ceiling, wherein the deflection curve at the transition section has a certain radius. According to this document, this is especially problematic if the lintel height is low. As a solution, the document proposes to construct the uppermost section of the door at its upper area without a roller which would usually be guided in a guiding rail, but to provide a overhead roller instead, which rolls onto an angled bracket which is connected to a door case, in order to properly close the upper edge of the uppermost door panel. On one side, the roller is connected to the uppermost section of the door panel, and on the other side the roller is connected with the sled of the door actuating mechanism via a driving rod which is moved in a further rail at a side area of the door. However, due to the necessity of a second rail for the actuating mechanism, there is still a certain lintel height required.

Summary of the invention

[0004] It is an object of the present invention to lower or eliminate the required space needed below the ceiling when installing doors.

[0005] This object is solved with a hinge mechanism and a door driving arrangement according to claims 1 and 7. Advantageous further developments are subject of the dependent claims.

[0006] According to an embodiment of the invention, a hinge mechanism for a door driving device is provided.

The hinge mechanism comprises a fitting having an attachment section for attachment to an inside surface of a door panel, and a lever section which is adapted to extend above an upper edge of the door panel in an outwards direction; a bracket for attachment to a driving mechanism, and a hinge connecting the fitting and the bracket rotatably about a hinge axis, the hinge being located at the outside end of the lever section. This embodiment provides the benefit that the installation of a door case and the door requires only a low lintel or even no lintel at all. This embodiment provides the possibility to operate the opening and closing of the door by coupling a motor to the door via a hinge positioned on the outside of the door panel. This positioning of the hinge and the resulting movement of the upper edge of the uppermost door panel achieves that the door panel can be moved only a few millimeters below the rail which is guiding a driving sled. This provides a larger head room with a cheap design solution. The invention can be used with all sectional doors and overhead doors. A further benefit is that this embodiment only requires one track on each side of the door, in contrast to door systems of the state of the art, which require one track on each side for guiding the uppermost door panel and another track on each side for guiding the remaining door panels.

[0007] In this specification the term "above" includes the arrangement of something which is above (with a clearance in between) and which is directly above (in contact) something.

[0008] The term "inside surface" refers to a surface of the door panel which is facing towards the inside of a room that is closed by the door, in a state in which the door is closed. The term "outside surface" refers to a surface of the door panel which is facing towards the outside of the room that is closed by the door, in a state in which the door is closed.

[0009] The term "outwards direction" refers to a direction from the inner surface of the door panel to the outer surface of the door panel. Please note that this also includes the directions outside the door panel itself, such as a parallel direction above the door panel.

[0010] The term "outside end of the lever section" refers to the end of the lever section facing outwards, i.e. facing towards the outside of the room that is closed by the door, in a state in which the door is closed.

[0011] According to another embodiment of the invention, the hinge axis is positioned in the area of an upper outside edge of the door panel. Preferably, the distance between the upper outside edge and the hinge axis is smaller than 10mm, more preferably smaller than 5mm, more preferably smaller than 4mm, more preferably smaller than 3mm, more preferably smaller than 2mm and more preferably smaller than 1 mm.

[0012] The term "upper outside edge" refers to an upper edge of the outside surface of the door panel.

[0013] According to another embodiment of the invention, the lever section and the attachment section are perpendicular to each other.

[0014] According to yet another embodiment of the invention, the lever section and the bracket are substantially parallel to each other in a closed state of the door panel, and form an angle on the inside with the hinge axis as a center when the door panel is opened.

[0015] According to another embodiment of the invention, the bracket is adapted to be connected to a sled of the driving mechanism.

[0016] According to another embodiment of the invention, the bracket is shiftable in parallel to a driving rail which is guiding the sled.

[0017] According to a further embodiment of the invention, the bracket is provided with bearings for guiding the bracket in a rail of the driving mechanism.

[0018] According to a yet further embodiment of the invention, a door panel driving arrangement is provided. The door panel driving arrangement comprises a door panel; a driving mechanism, and a hinge mechanism according to one of the above mentioned embodiments. This door panel driving arrangement provides the same advantages that were already mentioned above in connection with the hinge mechanism.

[0019] According to a further embodiment, the door panel driving arrangement comprises a door having more than one door panels which are rotatably connected with each other, wherein the hinge mechanism is attached to an uppermost one of the door panels.

[0020] According to a yet further embodiment, the driving mechanism comprises a motor, a sled and a driving rail for guiding the sled.

[0021] It is explicitly intended that the teaching of this invention covers any combination of the above described embodiments.

[0022] These and other embodiments are described in more detail with reference to the accompanying drawings.

Brief description of the Figures

[0023]

Fig. 1 is a detailed view of a hinge mechanism for a door driving device according to an embodiment of the invention;

Fig. 2 shows the hinge mechanism of Fig. 1 and a further door panel;

Fig. 3 shows an overview of an entire door panel driving arrangement including a door, a driving mechanism and the hinge mechanism of Fig. 1;

Fig. 4 shows the hinge mechanism of Fig. 1 in the same perspective as Fig. 1 in more detail, and

Fig. 5 is a three-dimensional view of the hinge mechanism of Fig. 1.

Detailed description of embodiments

[0024] Below, an embodiment of the hinge mechanism 10 is described in more detail with reference to the above mentioned Figures 1 to 5, in which same reference numerals denote same parts.

[0025] The present invention can be used for opening and closing sectional doors, side sectional doors, up-and-over doors, having a drive mechanism or actuator of preferably an automatic type. An upper door panel 11 is illustrated, which forms together with a plurality of further door panels 12 a sectional door. This sectional door is provided for opening and closing an entrance into a room. Thus, the surface of the door or door panel facing to the inside 13 of this room when the door is closed is referred to as inside surface, and the surface of the door or door panel facing to the outside 14 when the door is closed is referred to as outside surface in this specification. Naturally, when the door is opened and arranged below the ceiling, the inside surface is facing downwards and the outside surface is facing the ceiling. All door panels 12, except the upper door panel 11, are provided at their side edges with rollers 15 which are guided in a rail 16 which is provided on both sides of the door. The rail 16 has a vertical part which is provided in parallel and on both sides of the closed door and a horizontal part which is provided below and in parallel to a ceiling 17 for holding the door below the ceiling 17 in an opened position. The horizontal and vertical parts of the rail 16 are connected via an arch having the shape of a quarter circle. Directly attached to the ceiling 17 or with a clearance in between and below the ceiling 17 there is provided a driving rail 18. The driving rail 18 is provided in parallel to the guiding rails 16 and positioned substantially in the middle of the door, or preferably offset from the middle by a certain extent in order not to interfere with a lock of the door which is usually extending vertically in the middle of the door. The driving rail 18 is provided on its end, facing away from the door, with a driving motor 19 for actuating the opening and closing movement of the door via a driving sled 20 moved by the driving motor 19 and guided in the driving rail 18.

[0026] The upper door panel 11 is connected with the driving sled 20 via the hinge mechanism 10 which is explained in the following. The hinge mechanism 10 comprises a fitting 21 having an attachment section 22 and a lever section 23, and a bracket 24. The fitting 21 and the bracket 24 are rotatably connected via a hinge 25 for rotation about a hinge axis. The attachment section 22 is supposed to be mounted to the inside surface of the upper door panel 11 in an upper middle area of the upper door panel 11. The fitting 21 is formed as an angle plate, such that the lever section 23 is perpendicular to the attachment section 22 and projecting from the attachment section 22 in an outwards direction, which is the direction from the inside surface of the door panel 11 towards the outside surface of the door panel 11. Instead of the attachment section 22 and the lever section 23 being per-

pendicular, their angle can deviate for example ± 20 degrees, ± 15 degrees, ± 10 degrees, ± 5 degrees, or some angle in between these values from perpendicular. At the outside end of the lever section 23 is bent downwards in a rounded form such that the outside end has a tubular shape. The bracket 24 has a flat horse shoe shape at one end, wherein one outside end of the horse shoe shape is bent downwards in a rounded form such that this outside end has a tubular shape corresponding to the tubular shape formed at the outside end of the lever section 23. However, it is also possible that both outside ends of the horse shoe shape are bent downwards in a rounded form to form a tubular shape at both ends. The tubular shaped end of the lever section 23 is arranged in between the outside ends of the horse shoe shape. Then a bolt or a pin is stuck through all of the tubular shaped ends in order to form the hinge 25.

[0027] Alternatively, the lever section 23 of the fitting 21 can be formed in the shape of a horse shoe such that an outer end (end which is facing to the outside) of the bracket 24 is arranged in between the outer ends (the horse shoe ends) of the lever section. The outer ends would be provided with the tubular shape for forming the hinge as described above. Or in other words, the connected sections of the fitting and the bracket are interchanged compared to the above described embodiment. This alternative provides the same functionality and might be even cheaper to manufacture.

[0028] The end of the bracket 24, which is opposite to the hinge 25, is provided with two projections extending towards the ceiling 17. At these projections, two ball bearings 26 are attached. The ball bearings 26 comprise a set of bearing balls, an inner ring and an outer ring, as well known. The outer rings of these ball bearings 26 are guided in the driving track 18. Further, the end of the bracket 24, which is opposite to the hinge 25, is provided with two projections 27, which extend away from the ceiling 17. These two projections 27 are provided with three holes 28 for attaching a driving rod 29, which has a flat longitudinal shape. The driving rod 29 is provided with pins which fit into the holes 28 and thus connect the driving rod 29 with the bracket 24. The center of the driving rod 29 and the end which is opposite to the pins are connected with the sled 20. Thus, the connection between the sled 20 and the driving rod 29, and the connection between the driving rod 29 and the bracket 24 transmits the force for opening and closing the door. Due each of these two connections having more than one connection point, the bracket 26 is kept non-rotatably with respect to the guiding track 18 and shifted in parallel to the guiding rail 18, preferably only allowed to be shifted in parallel to the guiding rail 18. In this embodiment, the bracket 24 is formed of two pieces having a mirror-inverted shape (with respect to a plane along the driving rail 18 and perpendicular to the ceiling 17). The fitting 21 is formed monolithically in this embodiment.

[0029] It is explicitly intended that the teaching of this invention covers any combination of the above described

aspects of this embodiment.

[0030] While the invention has been illustrated and described in detail in the drawings and foregoing description, such illustration and description are to be considered illustrative or exemplary and not restrictive and it is not intended to limit the invention to the disclosed embodiment. The mere fact that certain measures are recited in mutually different dependent claims does not indicate that a combination of these measures cannot be used advantageously. Any reference signs in the claims should not be construed as limiting the scope of the invention.

15 Claims

1. Hinge mechanism (10) for connecting a door panel (11) to a door driving device, comprising:

a fitting (21) having an attachment section (22) for attachment to an inside surface of the door panel (11), and a lever section (23) which is adapted to extend above an upper edge of the door panel (11) in an outwards direction;

a bracket (24) for attachment to a driving mechanism, and

a hinge (25) connecting the fitting (21) and the bracket (24) rotatably about a hinge axis, the hinge (25) being located at the outside end of the lever section (23).

2. Hinge mechanism (10) according to claim 1, wherein the hinge axis is positioned in the area of an upper outside edge of the door panel (10).

3. Hinge mechanism (10) according to one of the preceding claims, wherein the lever section (23) and the attachment section (22) are perpendicular to each other.

4. Hinge mechanism (10) according to one of the preceding claims, wherein the lever section (23) and the bracket (24) are substantially parallel to each other in a closed state of the door panel (11), and form an angle on the inside with the hinge axis as a center when the door panel (11) is opened.

5. Hinge mechanism (10) according to one of the preceding claims, wherein the bracket (24) is adapted to be connected to a sled (20) of the driving mechanism.

6. Hinge mechanism (10) according to claim 5, wherein the bracket (24) is shiftable in parallel to a driving rail (18) which is guiding the sled (20).

7. Hinge mechanism (10) according to one of the preceding claims, wherein the bracket (24) is provided

with bearings (26) for guiding the bracket (24) in a rail (18) of the driving mechanism.

8. Door panel driving arrangement, comprising:

a door panel (11);
a driving mechanism, and
a hinge mechanism (10) according to one of the preceding claims.

5

10

9. Door panel driving arrangement according to claim 8, comprising a door having more than one door panels (11, 12) which are rotatably connected with each other, wherein the hinge mechanism (10) is attached to an uppermost one (11) of the door panels (11, 12).

15

10. Door panel driving arrangement according to claim 8 or 9, wherein the driving mechanism comprises a motor (19), a sled (20) and a driving rail (18) for guiding the sled (20).

20

25

30

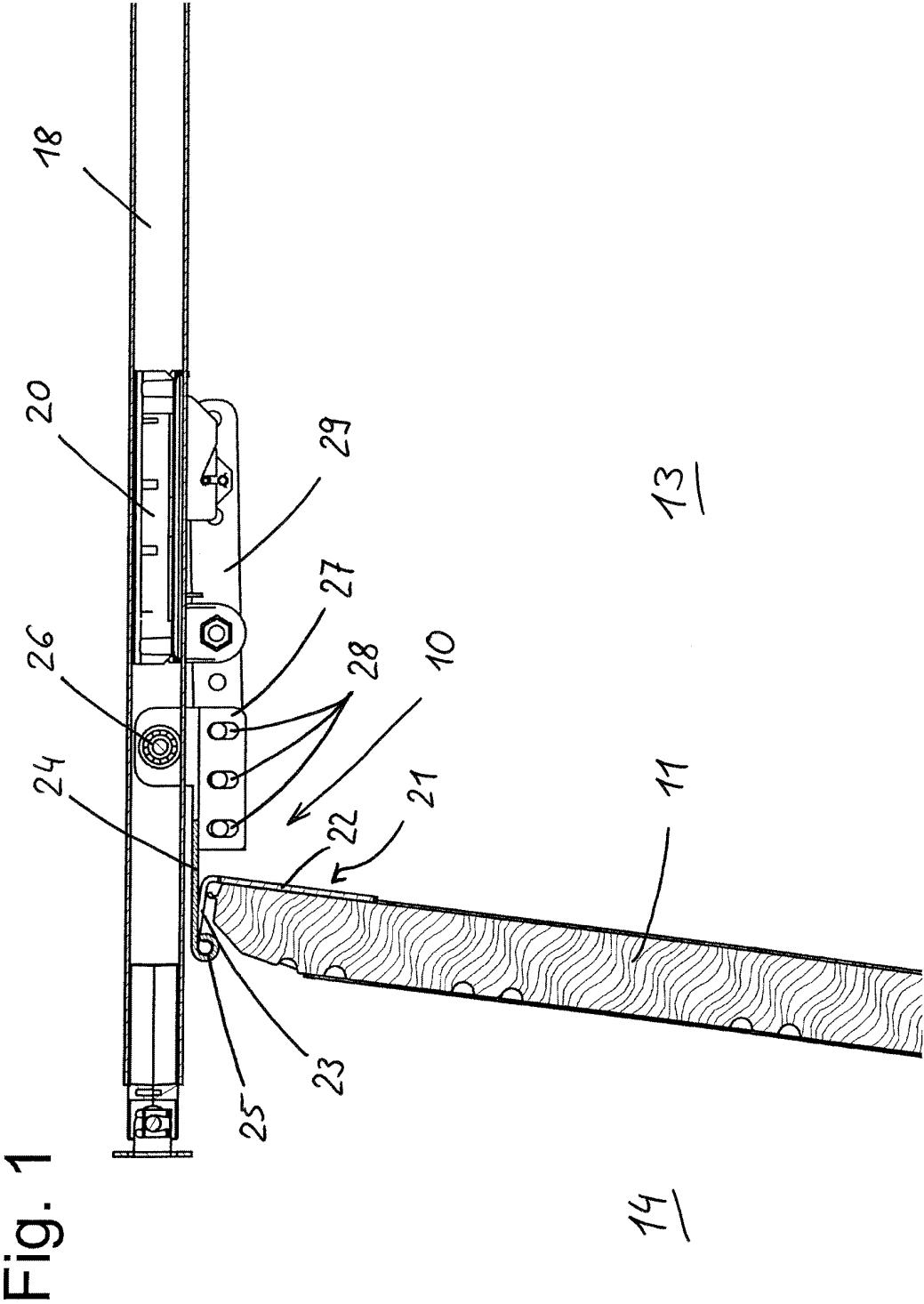
35

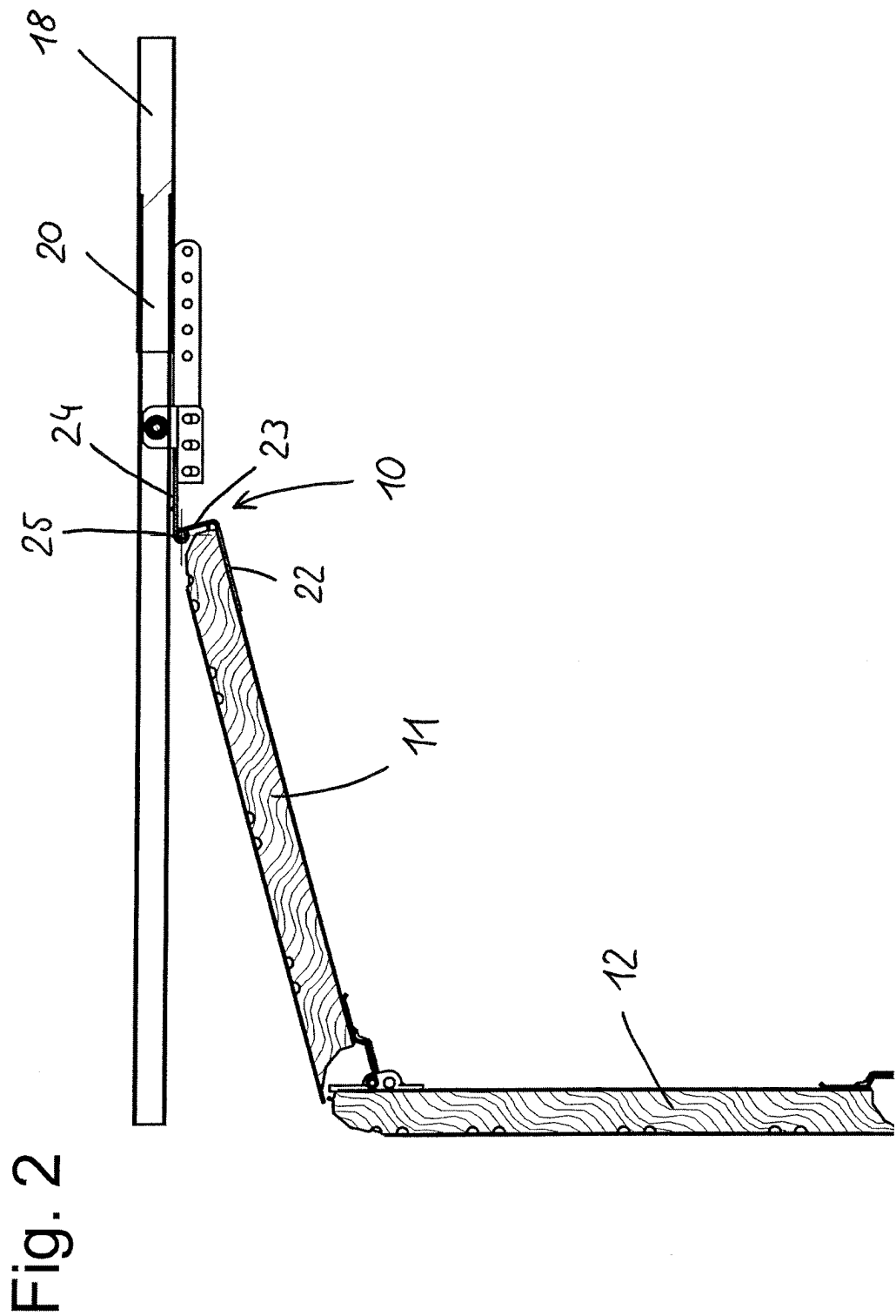
40

45

50

55





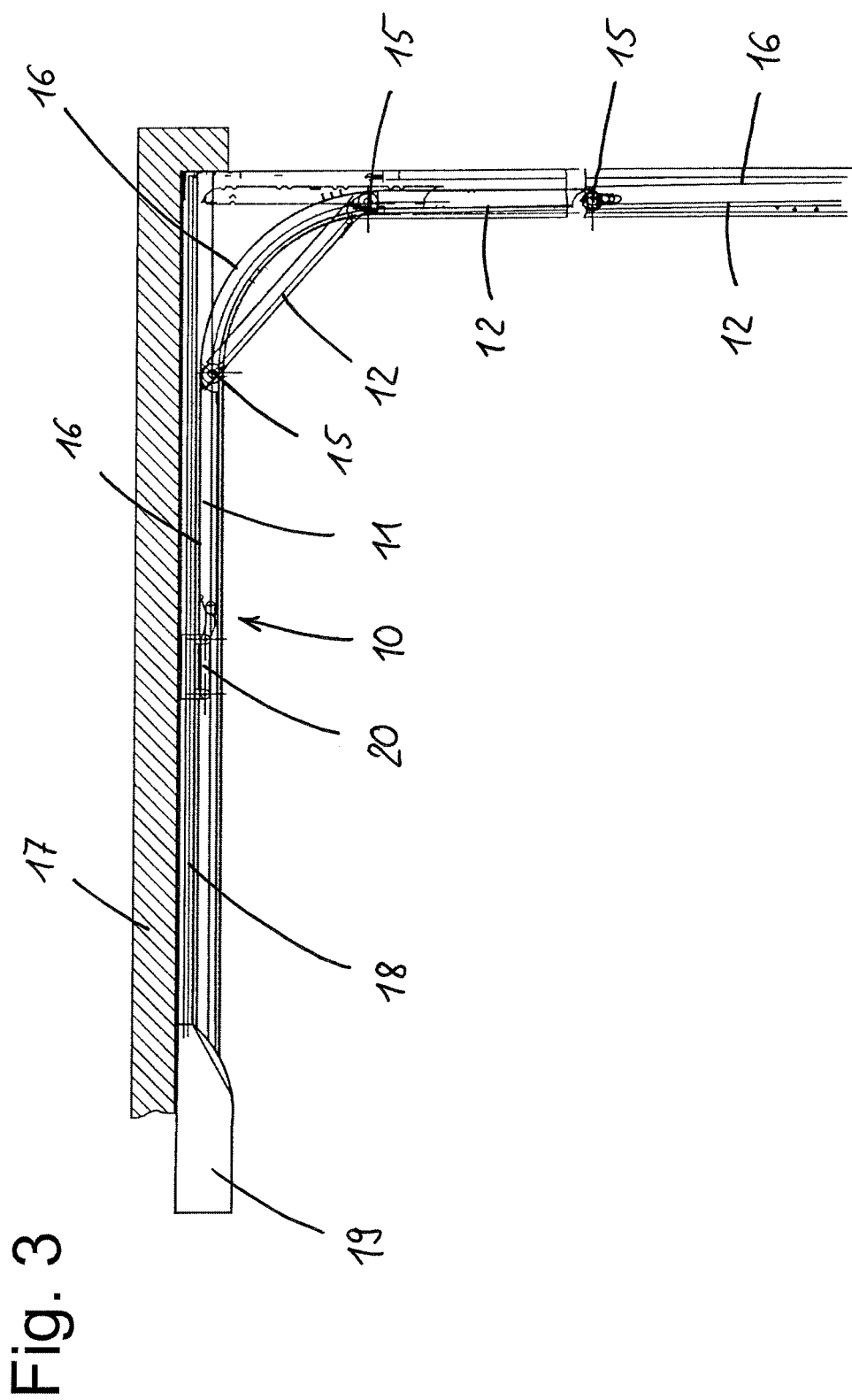


Fig. 4

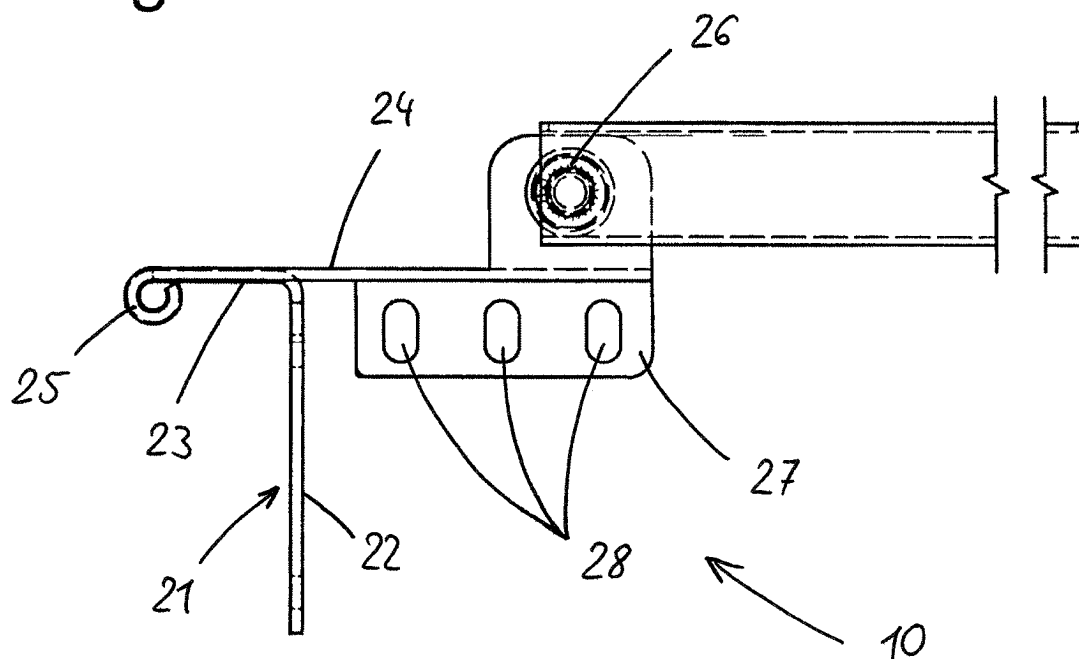
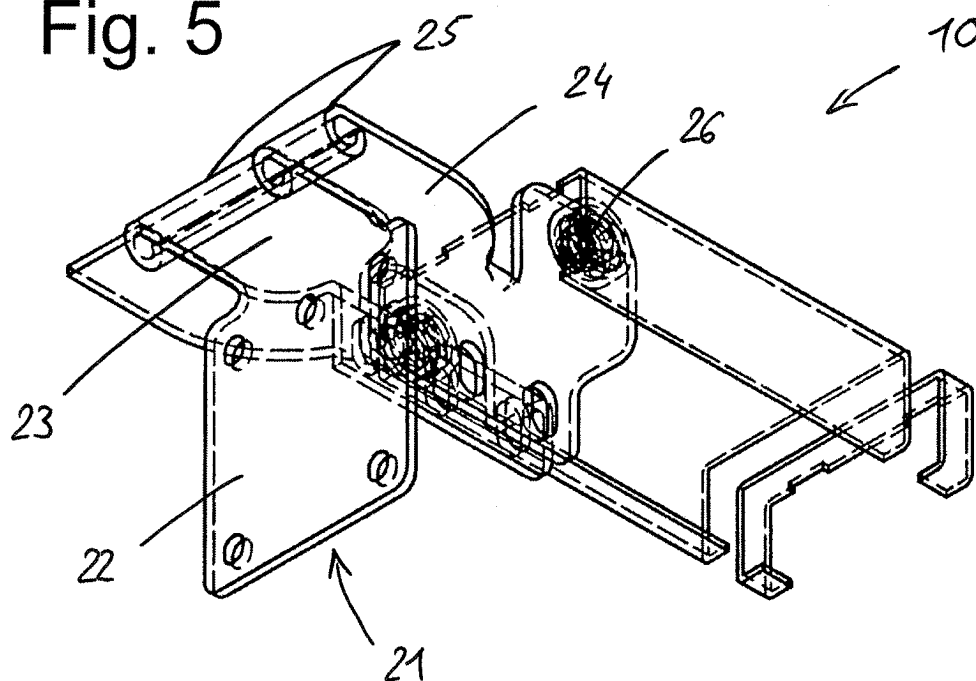


Fig. 5



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

- DE 4003218 A1 [0003]