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(72) Inventors:
• **Ghijs, Ludo**
9700 Oudenaarde (BE)
• **JENNIS, Dirk**
8800 ROESELARE (BE)

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(74) Representative: **Hostens, Veerle et al**
KOB NV
Patents
President Kennedypark 31 C
8500 Kortrijk (BE)

(71) Applicant: **Argent Alu nv**
9770 Kruishoutem (BE)

(54) **Combined rolling device for a sliding door mechanism and method for mounting a sliding door mechanism**

(57) The present invention relates to a combined rolling device for a sliding door mechanism (1), comprising a trolley (2), which is rollable in a support profile (4) and is fastenable to a sliding door leaf (5), and a pulling and damping device (3) for pulling the trolley (2) into an end position and damping this pull-in motion, which pulling and damping device is hinge-connected to the trolley (2),

by a hinge shaft (7) roughly at right angles to the running direction.

In addition, the present invention relates to a method for mounting a sliding door mechanism (1), wherein, when a rolling device of this type is fitted in the support profile (4), the pulling and damping device (3) is tilted with respect to the trolley (2).

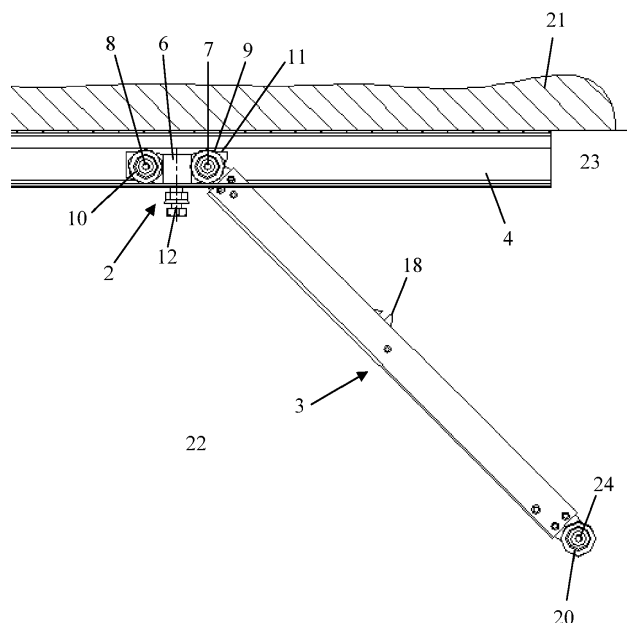


Fig. 3

Description

[0001] The present invention relates to a combined rolling device for a sliding door mechanism, comprising:

- a trolley, which can be rollably fitted in a support profile of the sliding door mechanism and can be fastened to a sliding door leaf of the sliding door mechanism for the rollable suspension of this sliding door leaf from this support profile;
- and a pulling and damping device for, on the one hand, pulling the trolley into an end position and, on the other hand, damping the pull-in motion of the trolley, wherein this pulling and damping device can be fitted along with the trolley rollably in the support profile.

[0002] In addition, the present invention relates to a method for mounting a sliding door mechanism comprising a support profile, a sliding door leaf, and a rolling device having a trolley for the rollable suspension of the sliding door leaf in the support profile and having a pulling and damping device for, on the one hand, pulling the trolley into an end position and, on the other hand, damping the pull-in motion of the trolley, wherein this pulling and damping device can be fitted along with the trolley rollably in the support profile.

[0003] The present invention is used in sliding door mechanisms in which it is wished, on the one hand, to bring the sliding door leaf during closing and/or opening, shortly before the end position, reliably into this end position by pulling it from a defined distance from the end position into this end position, and in which, on the other hand, it is simultaneously wished to avoid a hard abutment in the end position and, for this purpose, to damp the end motion of the sliding door leaf. For this purpose, these sliding door mechanisms are provided with a pulling and damping device. Several constructions of pulling and damping devices of this type are already known.

[0004] In order to hide a pulling and damping device of this type from view, it is in specific constructions fitted, along with the trolley, rollably in the support profile. The trolley and the pulling and damping device then together form a combined rolling device, to which the present invention relates. This is already known, for example, from DE 20 2007 014 567 U1, or from EP 2 217 782 B1.

A problem with sliding door mechanisms is that it is often wished to mount the support profile in a limited space in an opening, so that the trolley, and now also the pulling and damping device, can barely be fitted into the support profile or removed herefrom once the support profile is mounted.

The pulling and damping device from EP 2 217 782 B1 is constructed narrower than the pass-through opening of the support profile so as to enable the combined rolling device, following mounting of the support profile, to nevertheless be brought in and out of the support profile. For this purpose, however, an opening next to the support

profile, which opening is larger than the length of the trolley, is required. By the length of the trolley is meant the dimension thereof along the running direction of the trolley.

[0005] The object of the present invention is to provide a rolling device, a sliding door mechanism comprising a rolling device of this type, and a method for mounting a sliding door mechanism of this type, wherein a rolling device of this type can be fitted on a yet more limited space in the support profile and, for this purpose, only an opening next to the support profile, which opening is smaller than the length of the trolley, is required.

[0006] This object of the invention is achieved by providing a combined rolling device for a sliding door mechanism, comprising:

- a trolley, which can be rollably fitted in a support profile of the sliding door mechanism and can be fastened to a sliding door leaf of the sliding door mechanism for the rollable suspension of this sliding door leaf from this support profile;
- and a pulling and damping device for, on the one hand, pulling the trolley and, on the other hand, damping the pull-in motion of the trolley, wherein this pulling and damping device can be fitted along with the trolley rollably in the support profile and is hinge-connected to the trolley, by a hinge shaft roughly at right angles to the running direction of the trolley.

[0007] By the running direction of the trolley is meant the direction in which this can roll forward when fitted in a support profile.

As a result of the hinged provision of the pulling and damping device on the trolley, the rolling device can be inserted at very short distance into a support profile, so that, subject to the provision of a more limited space than was hitherto possible, the rolling device can be brought in and out of the support profile at any time.

[0008] Preferably, the trolley in a rolling device according to the present invention comprises at least one wheel and a rotation axle about which this wheel is rollably disposed, wherein the trolley, with the aid of this wheel, is rollable in the support profile and wherein the rotation axle of this wheel is the hinge shaft by which the pulling and damping device is connected to the trolley. In this way, the pulling and damping device can be hinge-connected to the trolley in a simple and compact manner. No additional hinge shaft needs to be provided. The pre-existing rotation axle is sufficient to be able to fasten the pulling and damping device articulately to the trolley.

In a particular embodiment of this type, the trolley comprises at least four wheels, of which two wheels are rollable about the said rotation axle and two wheels are rollable about a second rotation axle disposed parallel to the first-named rotation axle. When a sliding door leaf is suspended from a trolley of this type having four such wheels, care is typically taken to ensure that the forces which are transmitted to the support profile are more

evenly transmitted to the support profile than when it is suspended from a trolley which typically comprises fewer wheels. In addition, a trolley can also, for example, be provided with guide wheels for the lateral guidance of the trolley in a support profile.

[0009] A rolling device according to the present invention can also preferably comprise a limit element for limiting the hinge motion of the pulling and damping device with respect to the trolley. With the aid of a limit element of this type, care can be taken to ensure that the trolley and the pulling and damping device which are together fitted in a support profile can no longer pivot with respect to each other under the influence of gravity. This is particularly advantageous because care can thus be taken to ensure that the rolling device always rests on the support profile on all wheels, which wheels are disposed one behind the other according to the length direction of this support profile. The rolling device can no longer lift up to the level of the hinge shaft. The noise during rolling of the rolling device is hereby heavily limited. Moreover, care is hereby taken to ensure that the pulling and damping device always remains at a certain height in the support profile, so that an activator which is provided to activate the operation of the pulling and damping device shortly before the end position can act reliably upon this pulling and damping device in order to activate this same. The trolley of an embodiment of this type can comprise, for example, in the direction of the pulling and damping device, a nose, as the said limit element for limiting the hinge motion of the pulling and damping device with respect to the trolley.

[0010] The support profile of a rolling device according to the present invention will typically comprise a pass-through opening, which extends in the longitudinal direction of the support profile and in this longitudinal direction is limited, on at least one side, by a running surface for fitting of the trolley rollably thereon. Preferably, this pass-through opening is limited on two sides by a running surface, so that the forces which are exerted on this support profile, when a sliding door leaf is suspended from a trolley which is fitted in this support profile and when the trolley is displaced in this support profile, can be more evenly distributed over the support profile. The support profile then typically has a roughly C-shaped opening, wherein the opening between the legs of the C-shape, during the suspension of the support profile, is directed downwards and forms the said pass-through opening. When the support profile comprises a said pass-through opening, the pulling and damping device is preferably constructed narrower than this pass-through opening, so that this pulling and damping device can be fitted in the support profile through this pass-through opening.

[0011] A first specific embodiment of a rolling device according to the present invention comprises at least one guide wheel, which, at an end remote from the end by which the pulling and damping device is hinge-connected to the trolley, is rollably fastened to the pulling and damping device, for guiding this pulling and damping device

during rolling of the trolley in the support profile.

[0012] A second specific embodiment of a rolling device according to the present invention comprises a second trolley, which, at an end remote from the end by which the pulling and damping device is hinge-connected to the first-named trolley, is hinge-connected to the pulling and damping device.

[0013] The object of the present invention is also achieved by providing a sliding door mechanism, comprising a support profile, a sliding door leaf and a rolling device according to the present invention.

[0014] In addition, the object of the present invention is also achieved by providing a method for mounting a sliding door mechanism comprising a support profile, a sliding door leaf and a rolling device having a trolley for the rollable suspension of the sliding door leaf in the support profile and having a pulling and damping device for, on the one hand, pulling the trolley into an end position and, on the other hand, damping the pull-in motion of the trolley, wherein this pulling and damping device can be fitted, along with the trolley, rollably in the support profile, wherein this method is provided for mounting a sliding door mechanism according to the present invention, wherein, when the rolling device is fitted in the support profile, the pulling and damping device is angled with respect to the trolley, wherein the trolley is first fitted in the support profile and wherein the trolley is rolled in the support profile, wherein the pulling and damping device is tilted through the pass-through opening with respect to the trolley until these extend coaxially in the support profile.

[0015] In a first specific method according to the present invention, which is provided for mounting a sliding door mechanism comprising a rolling device having a said guide wheel, during rolling of the trolley in the support profile, wherein the pulling and damping device is tilted with respect to the trolley until these extend coaxially in the support profile, the trolley is rolled in the support profile in such a way that the guide wheel too is fitted in the support profile.

[0016] In a second specific method according to the present invention, which is provided for mounting a sliding door mechanism comprising a rolling device having a said second guide wheel, after the trolley has been rolled in the support profile, wherein the pulling and damping device is tilted with respect to the trolley until these extend coaxially in the support profile, the trolley is rolled forward in the support profile, wherein the second trolley is tilted with respect to the pulling and damping device until the pulling and damping device and the second trolley extend coaxially in the support profile.

[0017] The present invention is now explained more fully on the basis of the following detailed description of a rolling device, a sliding door mechanism and a method for mounting a sliding door mechanism according to the present invention. The aim of this description is solely to provide illustrative examples and indicate further advantages and particularities of the present invention, and

thus cannot be interpreted as a limitation of the scope of the invention or of the patent rights claimed in the claims.

[0018] In this detailed description, reference is made by means of reference numbers to the hereto appended drawings, wherein:

- Figure 1 represents a detail of a sliding door mechanism according to the present invention at the level of its rolling device partially in elevation, and at the level of the rolling device in longitudinal section, wherein the rolling device is fitted in the support profile;
- Figure 2 represents in more detail a part of the diagram from Figure 1 at the level of the hinge-connection between the trolley and the pulling and damping device;
- Figure 3 represents in longitudinal cross section and partially in elevation how the rolling device of the sliding door mechanism from Figure 1 can be fitted in the support profile.

[0019] The depicted sliding door mechanism (1) comprises a sliding door leaf (5), and a support profile (4) in which the sliding door leaf (5) can be rollably suspended. In order to suspend the sliding door leaf (5) in the support profile (4), on top of the sliding door leaf (5) are mounted coupling elements (13), in which a widening on the bottom of a downhanging shaft (12) of a trolley (2) can be detachably fastened. The trolley (2) can in turn be rollably fastened in the support profile (4). By fitting of the trolley (2) in the support profile (4) and by suspension of the sliding door leaf (5) from the trolley (2), the sliding door leaf (5) can thus be rollably suspended in the support profile (4). This sliding door leaf (5) is then displaceable from an open position, in which it frees an opening (22), into a closed position, in which it closes off the said opening (22).

[0020] In Figures 1 and 2 it can be seen how the sliding door leaf (5) is suspended with the aid of a herein installed coupling element (13) from the downhanging shaft (12) of the depicted trolley (2). In Figure 3, the sliding door leaf (5) is not yet suspended from the depicted trolley (2).

[0021] The depicted trolley (2) comprises four wheels (9, 10), by which it can be rolled in the guide profile (4). This trolley (2) could also however, like known other trolleys (2), comprise more or fewer wheels (9, 10). Two (9) of the wheels (9, 10) of the depicted trolley (2) are rollable about a first rotation axle (7), and the two other (10) of the wheels (10) are rollable about a second rotation axle (8), which is disposed parallel to the first rotation axle (7). The support profile (4) has a roughly C-shaped cross section, wherein, following suspension of the support profile (4), the opening between the legs of the C-shape is directed downwards and forms a pass-through opening. This pass-through opening is demarcated on both sides with a running surface, on which a wheel (9, 10) of the said wheel pairs (9, 10) is respectively rollably fitted, when the trolley (2) is rollably fitted in this support profile

(4). The hinge shafts (7, 8) herein extend roughly at right angles to the longitudinal direction of the support profile (4).

[0022] Hinge-fastened to the first rotation axle (7) of the first-named wheels (9) of the trolley (2) is a pulling and damping device (3). To the end of the pulling and damping device (3), remote from the end by which the pulling and damping device (3) is hinge-connected to the trolley (2), are fastened two guide wheels (20) having a same rotation axle (24). In this way, the trolley (2) and the pulling and damping device (3) together form a rolling device, which can be rollably fitted in the support profile (4).

[0023] The pulling and damping device (3) comprises a spring (17) for pulling the trolley (2) into an end position and a damper (16) for damping this pulling motion. In the support profile (4) is disposed an activator (14), which comprises at a certain distance from the end position a hook element (25), for hooking onto a hook-in element (18) of the pulling and damping device (3), which, on the one hand, is connected to the spring (17) of the pulling and damping device (3) and, on the other hand, is connected to the damper (16) of the pulling and damping device (3). The hook-in element (18) is guided in a guide groove (19) of the pulling and damping device (3). When it is desired to close off the opening (22) with the sliding door leaf (5), this will be moved into the end position as depicted in Figures 1 and 2. The spring (17) is here tensioned and the damper (16) extended, and the hook-in element (18) is here located on the side of the pulling and damping device (3) adjoining the trolley (2), i.e. the end position (26). When the hook-in element (18) comes close to the activator (14), the hook element (25) of the activator (14) will hook into the hook-in element (18) and pull this out of its end position (26) in the guide groove (19). Under the influence of the spring force of the spring (17), the pulling and damping device (3), and thus also the trolley (2), is pulled towards the end position. The damper (16) hereupon damps this pulling motion. At the end of the pulling motion, the front side of the trolley (2) butts against a resilient stop element (15), which is fastened in the activator (14). Conversely, when it is wished to open the opening (22) and the sliding door leaf (5) is here pulled away from the end position (26), the activator (4) will hold the hook-in element (18) in place until the hook-in element (18) is pulled back into its end position (26) in the guide groove (19) and will there unhook the hook element (25) of the activator (14) from the hook-in element (18) of the pulling and damping device. When the hook-in element (18) is pulled in the guide groove (19) into its end position (26), the spring (17) is slackened and the damper (16) is retracted.

[0024] In order to fit the rolling device (2, 3) in the support profile (4) after the support profile (4) has been mounted, it is sufficient, as depicted in Figure 3, to provide next to the support profile (4) an opening (23) which is shorter than the length of the trolley (2). Firstly, via this opening (23), the foremost wheels (10) of the trolley (2)

will be fitted in the support profile (4), whereupon the rest of the rolling device (2, 3) which comes after these wheels (10) hangs down with respect to these wheels (10). The main body (6) of the trolley (2) is constructed narrower than the width of the pass-through opening in the support profile (4), so that the main body (6) of the trolley (2) can subsequently be tilted in the support profile (4). The foremost wheels (10) of the trolley (2) are rolled forward in the support profile (4), and the rearmost wheels (9) of the trolley (2) are likewise fitted in the support profile (4). The pulling and damping device (3) is here tilted at an angle with respect to the trolley (2), so that these do not extend coaxially. After this, the trolley (2) is rolled forward in the support profile (4). The pulling and damping device (3) is constructed narrower than the pass-through opening in the support profile (4) and is tilted with respect to the trolley (2), so that it is placed through the pass-through opening in the support profile (4) until the trolley (2) and the pulling and damping device (3) extend coaxially. After this, the guide wheels (20) are also fitted in the support profile (4). In the reverse direction, the rolling device (2, 3) can be drawn in a same manner back out of the support profile (4).

[0025] When the rolling device (2, 3) and an additional trolley (not depicted) are fitted in the support profile (4), the opening (23) next to the support profile (4) can be closed off with a piece of trim (not depicted). After this, the sliding door leaf (5) can also be suspended from the downhanging shafts (12) of the trolleys (2).

[0026] As can be seen in Figures 1 and 2, the hinge motion of the pulling and damping device (3) with respect to the trolley (2) is limited with the aid of a nose (11) on the trolley (2). As a result, the pulling and damping device (3), when this extends coaxially with the trolley (2), cannot be tilted further upwards. When a sliding door leaf (5) is then suspended from the trolley (2), it pulls the trolley (2) downwards under the influence of gravity, so that all wheels of the trolley (2) are pulled against the running surfaces of the support profile (4). Since the pulling and damping device (3) cannot be tilted further upwards, then the guide wheels (20) too are pulled against the running surface of the support profile (4) and cannot lift up during rolling of the rolling device.

Claims

1. Combined rolling device for a sliding door mechanism (1), comprising:

- a trolley (2), which can be rollably fitted in a support profile (4) of the sliding door mechanism (1) and can be fastened to a sliding door leaf (5) of the sliding door mechanism (1) for the rollable suspension of this sliding door leaf (5) from this support profile (4);
- and a pulling and damping device (3) for, on the one hand, pulling the trolley (2) into an end

position (26) and, on the other hand, damping the pull-in motion of the trolley (2), wherein this pulling and damping device (3) can be fitted along with the trolley (2) rollably in the support profile (4);

characterized in that this pulling and damping device (3) is hinge-connected to the trolley (2), by a hinge shaft (7) roughly at right angles to the running direction of the trolley (2).

2. Rolling device according to Claim 1, **characterized in that** the trolley (2) comprises at least one wheel (9) and comprises a rotation axle (7) about which this wheel (9) is rollably disposed, wherein the trolley (2), with the aid of this wheel (9), is rollable in the support profile (4), and **in that** the rotation axle (7) of this wheel (9) is the hinge shaft (7) by which the pulling and damping device (3) is connected to the trolley (2).

3. Rolling device according to Claim 2, **characterized in that** the trolley (2) comprises at least four wheels (9, 10), of which two wheels (9) are rollable about the said rotation axle (7) and two wheels (10) are rollable about a second rotation axle (8) disposed parallel to the first-named rotation axle (7).

4. Rolling device according to one of the preceding claims, **characterized in that** this rolling device comprises a limit element (11) for limiting the hinge motion of the pulling and damping device (3) with respect to the trolley (2).

5. Rolling device according to Claim 4, **characterized in that** the trolley (2) comprises, in the direction of the pulling and damping device (3), a nose (11), as the said limit element (11) for limiting the hinge motion of the pulling and damping device (3) with respect to the trolley (2).

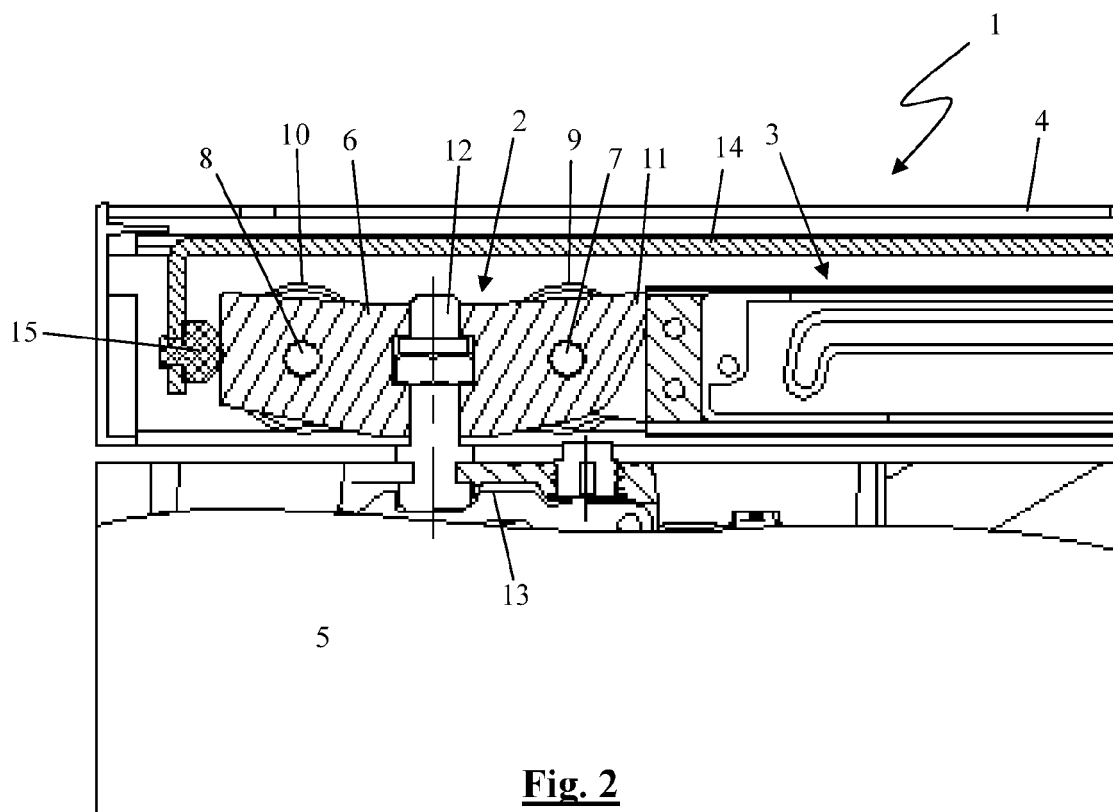
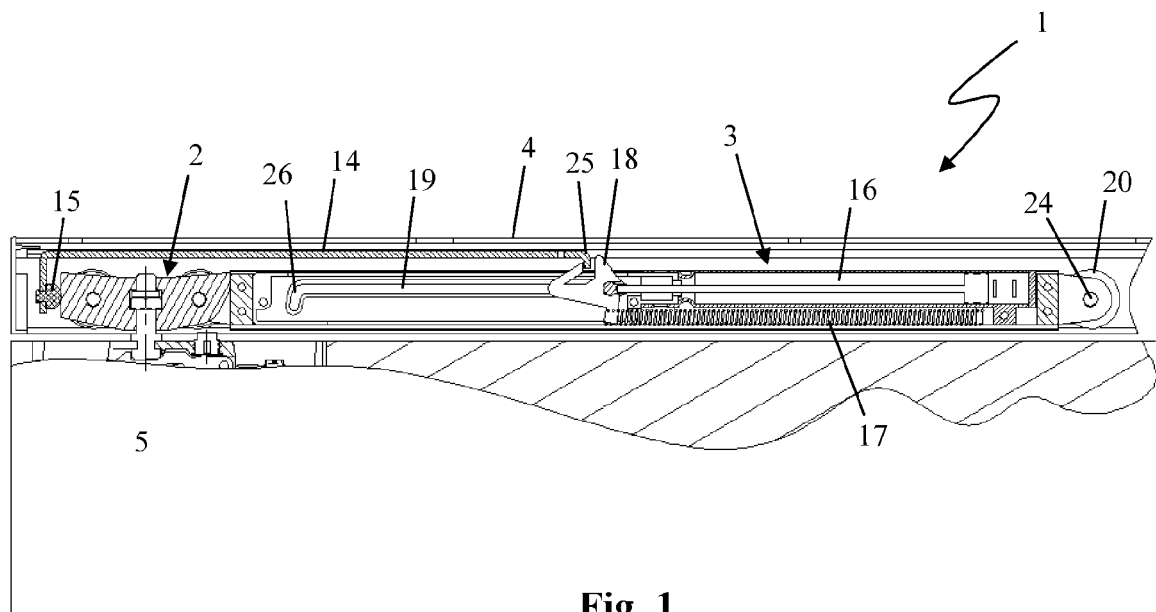
6. Rolling device according to one of the preceding claims, **characterized in that** the support profile (4) comprises a pass-through opening, which extends in the longitudinal direction of the support profile (4) and in this longitudinal direction is limited, on at least one side, by a running surface for fitting of the trolley (2) rollably thereon, and **in that** the pulling and damping device (3) is constructed narrower than this pass-through opening.

7. Rolling device according to one of the preceding claims, **characterized in that** this rolling device comprises at least one guide wheel (20), which, at an end remote from the end by which the pulling and damping device (3) is hinge-connected to the trolley (2), is rollably fastened to the pulling and damping device (3), for guiding this pulling and damping de-

vice (3) during rolling of the trolley (2) in the support profile (4).

8. Rolling device according to one of Claims 1 to 6, **characterized in that** this rolling device comprises a second trolley, which, at an end remote from the end by which the pulling and damping device (3) is hinge-connected to the first-named trolley (2), is hinge-connected to the pulling and damping device (3). 5 10
9. Sliding door mechanism (1) comprising a support profile (4), a sliding door leaf (5), and a rolling device having a trolley (2) for the rollable suspension of the sliding door leaf (5) in the support profile (4) and having a pulling and damping device (3) for, on the one hand, pulling the trolley (2) into an end position and, on the other hand, damping the pull-in motion of the trolley (2), wherein this pulling and damping device (3) can be fitted along with the trolley (2) rollably in the support profile (4), **characterized in that** this rolling device is a rolling device according to one of the preceding claims. 15 20
10. Method for mounting a sliding door mechanism (1) comprising a support profile (4), a sliding door leaf (5), and a rolling device having a trolley (2) for the rollable suspension of the sliding door leaf (5) in the support profile (4) and having a pulling and damping device (3) for, on the one hand, pulling the trolley (2) into an end position and, on the other hand, damping the pull-in motion of the trolley (2), wherein this pulling and damping device (3) can be fitted along with the trolley (2) rollably in the support profile (4), **characterized in that** this method is provided for mounting a sliding door mechanism (1) according to Claims 6 and 9, and **in that**, when the rolling device is fitted in the support profile (4), the pulling and damping device (3) is angled with respect to the trolley (2), **in that** the trolley (2) is first fitted in the support profile (4), and **in that** the trolley (2) is rolled in the support profile (4), wherein the pulling and damping device (3) is tilted through the pass-through opening with respect to the trolley (2) until these extend coaxially in the support profile (4). 25 30 35 40 45
11. Method according to Claim 10, **characterized in that** this method is provided for mounting a sliding door mechanism (1) comprising a rolling device according to Claim 7, and **in that**, during rolling of the trolley (2) in the support profile (4), wherein the pulling and damping device (3) is tilted with respect to the trolley (2) until these extend coaxially in the support profile (4), the trolley (2) is rolled in the support profile (4) in such a way that the guide wheel (20) too is fitted in the support profile (4). 50 55
12. Method according to Claim 10, **characterized in**

that this method is provided for mounting a sliding door mechanism (1) comprising a rolling device according to Claim 8, and **in that**, after the trolley (2) has been rolled in the support profile (4), wherein the pulling and damping device (3) is tilted with respect to the trolley (2) until these extend coaxially in the support profile (4), the trolley (2) is rolled forward in the support profile (4), wherein the second trolley is tilted with respect to the pulling and damping device (3) until the pulling and damping device (3) and the second trolley extend coaxially in the support profile (4).



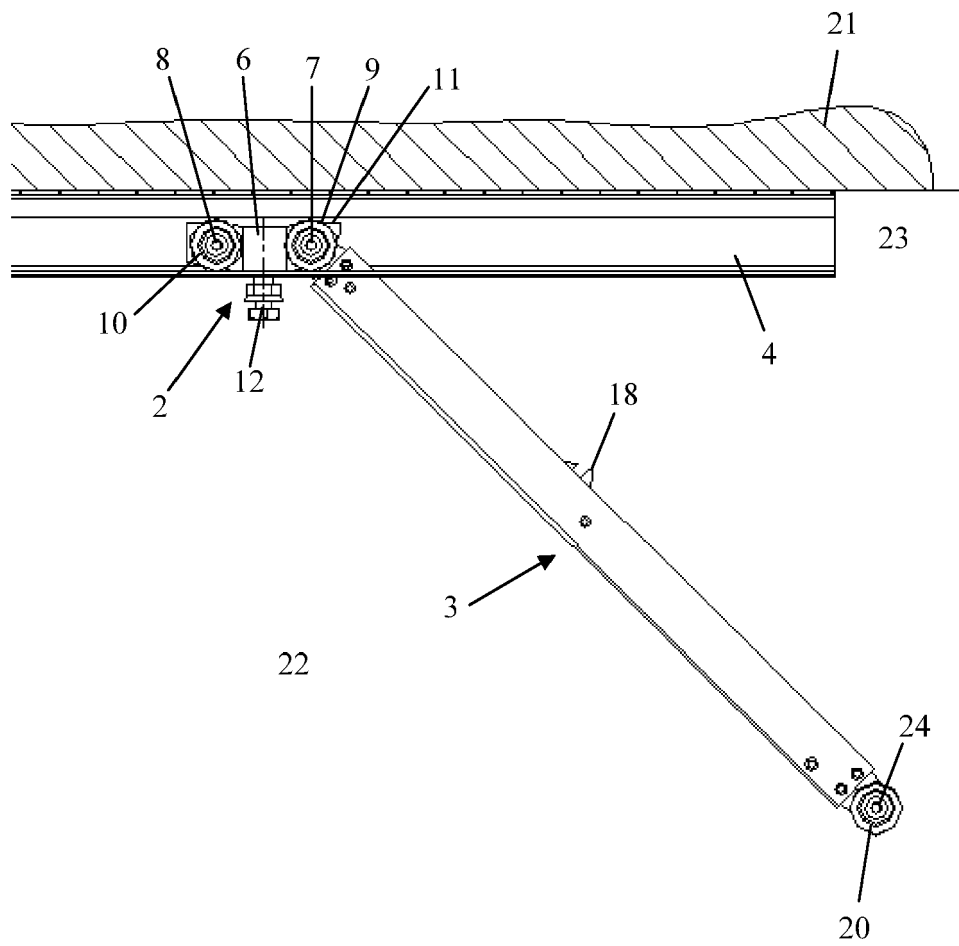


Fig. 3



EUROPEAN SEARCH REPORT

Application Number
EP 14 19 9309

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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 19 February 2015	Examiner Berote, Marc
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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