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(54) PLATFORM LIFT

(57) Rail (2) for a platform lift (1), comprising a tubular section (21), in particular for supporting rollers (65) of a platform lift carrier (61); a rack section (22) having first positive engagement means (23), in particular for engaging with second positive engagement means (33) of a platform lift drive (3);

wherein the rail (2) defines a curved direction of travel (D), characterized in that the tubular section (21) defines an inner area (21i), and that the rack section (22) is located at least partially, in particular fully, within the inner area (21i).

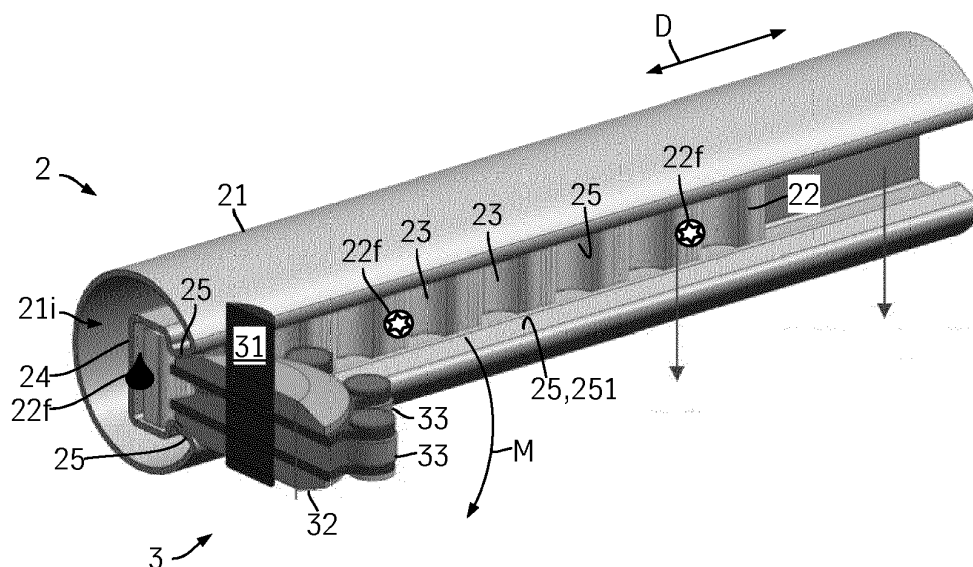


Fig. 3

EP 4 086 213 A1

Description

[0001] The invention refers to a platform lift. The platform may comprise a seat. In particular the platform lift is a stairlift having a seat.

[0002] In conventional rails for platform lifts a tubular section and a rack section are bended in separate processes. Afterwards the tubular section and the rack section are joint by welding, which means to double the required works and causes often a lack of accuracy at the end of the joining process.

[0003] The position of the external rack section in the lower part of the tube has a huge impact in the visual appearance of the rail, once this is installed on the staircase. As the engagement between pinion and rack section is not smooth enough, an important quantity of grease is applied during maintenance. This usually generates claims from the customers, since the greased rack section is visible and easy accessible. If the engagement between pinion and rack section is not accurate, a significant wear is produced in the rack section during the life span of the stairlift.

[0004] It is an object of the present invention to provide improvements to the generic platform lifts. The object of the invention is solved by the subject of the main claims; embodiments are subject of the subclaims and the description.

[0005] The position of the rack section in the inner area of the tubular section provides the following advantageous aspects:

The new solution allows to simplify the manufacturing process by 3D bending the tubular section and the rack section simultaneously, which means that production time is drastically reduced. Alternatively the rack section can be attached to the tubular section without being bended before. In both cases the separate bending step of the rack is obsolete; also obsolete is the risk of any mismatches between the separately bended rack section and the tubular section.

[0006] In the proposed design, the rack section is hidden in the inner area and therefore a visual impact of the rack for the user is reduced.

[0007] The mechanical performance is improved. Different configurations for the rack are proposed, from rack holes directly trimmed on the tube, to a wear-resistant plastic rack bolted to the tube. Main characteristic is that bending process can be carried out in a single stage.

[0008] In addition the rack section is much closer to the center of the tubular section, what means that the pitch distortion when bending is minimal. In an embodiment the pitch distortion can be zero.

[0009] Depending on the selected rack type, different pinions can be used. In a more conservative approach, same pinion than the one used nowadays could be utilized. On the other hand, a more ambitious idea is to use a rolling pinion system, which means that no lubrication at all is required. This is a major step towards client satisfaction as maintenance tasks can be drastically re-

duced and the rail presents much cleaner aspect.

[0010] The invention is explained in more detail by means of the figures, the figures show:

- 5 figure 1 a conventional platform lift in two embodiments, to which the invention can be applied;
- figure 2 a rack section of the conventional platform lifts according to figure 1 in cross section and side view;
- 10 figures 3-6 an inventive rail in different embodiments;
- 15 figure 7 an inventive stairlift comprising an inventive rail.

[0011] Figure 1 shows exemplary embodiments of a generic platform lifts 1, to which the invention can be applied. In figure 1a a platform lift 1 for the use with a wheelchair is shown. The platform 63 therefore comprises a kind of lifting ramp, which can travel along a direction of travel D from a first landing area 4 to a second landing area 5. The direction of travel D is defined by a rail 2, and is defined in main by the course of an existing stairway 9 in a house or outside of a house. An alternative embodiment is shown in figure 1b wherein the platform 63 comprises a seat. Here the platform lift is a stairlift with chair.

[0012] The rail of the platform has a curved shape, which at last partially deviates from a straight line; thus a direction of travel D will change at least once during the course of the rail 2. There may be changes in the direction D in top view and in side view.

[0013] The rail 2 may comprise a plurality of separate rail segments 2S, which are joined together at rail connections 2C.

[0014] The platform 63 is part of a driving unit 6, which further comprises a carrier 61. The carrier has non shown rollers, which roll along the rail 2. For driving the carrier first positive engagements means 23 (only shown in detail in figure 1b) are provided on the rail 2, which cooperates with driving means, in particular a driven pinion (not shown), of the carrier 61. A balancing system 62 is provided on the drive unit 6, to keep the platform 63 always in a horizontal orientation, even if the inclination of the rail 2 varies during its course.

[0015] Figure 2 shows a conventional rail (cross section and side view). The rail 2 comprise a tubular section 21 and a rack section 22. The tubular section and the rack section are bended accordingly before joining. The bended rack section 12 is joined to an outer surface of the bended tubular section by welding (see weld seam 28). The rack section 22 comprises said engagement means 23. Here the engagement means have the shape of holes in the rack section, into which the driven pinion can engage. Alternative the rack section can have the shape of a gear rack.

[0016] Figures 3 to 6 show an inventive rail 2 of an inventive stairlift. The rail can be used in a stairlift as described in figure 1, where the inventive rail replaces the rail shown in figure 2. Figure 7 shows such a stairlift having a an inventive rail as shown in figure 3. Alternatively the rail can be designed in a manner as shown in figures 4-6. In main the description of a generic platform lift of figure 1 is fully applicable to the stairlift of figure 7.

[0017] The rail 2 has a tubular section 21. The tubular section 21 provides a support for rollers 65 of the stairlift carrier 61. The tubular section 21 defines an inner area 21i; in other words, the tubular 21 section is hollow. A rack section 22 is located within the inner area 21i of the tubular section 21. The rack section 22 has first positive engagement means 23.

[0018] Attached to a carrier 61 of the platform lift a drive 3 is provided. The drive 3 has a drive gear 32 with second positive engagement means 33. The drive gear 32 is connected via a drive shaft 31 to a drive motor (non-shown).

[0019] The second engagement means 33 are in rolling engagement with the first positive engagement means 23 so as to transfer a drive force between the drive and the rail 2. Several types of drive gears 32 can be used in the drive 3. The drive gear 32, in particular the second positive engagement means 33 of the drive gear 32, are adapted to match with the first positive engagement means 23.

[0020] A rack carrier 24 is provided within the inner area 21i. The rack carrier 24 provides mechanical support for the rack section 22 within the inner area 21i. The rack section 22 is attached to the rack carrier 24. The rack carrier 24 is fixed to the tubular section 21 by means of a connector 25. The connector 25 extends radially between the inner area 21 and the tubular section 21.

[0021] The connector 25 in combination with the drive gear 32 serves also for providing support surfaces 251 for supporting a tilting momentum M issued by the carrier. Herby it is ensured that the carrier dos not tilt around the tubular section 21.

[0022] Figures 3 to 6 show different embodiments of the rail 2, which individual distinguishing features are described below.

[0023] Figure 3 shows a rack section 22 which is in particular made from metal, plastic and/or an elastomer compound. In particular the rack section 22 can comprise a rubber block chain.

[0024] The rack section 22 may comprise a bending stiffness which is lower than the bending stiffness of the rack carrier.

[0025] Figure 4 shows a racks section 22 which is made from a metal strip. The metal strip provides easy bendability. Along the direction of travel D the sheet metal has a high tensile strength.

[0026] Figure 5 shows a rack section 22 which is made of an chain, having a plurality of separate chain elements. The chain elements are held flexible to each other so that the chain has nearly no bending stiffness at all. The chain easily follows the bended shape of the rack carrier 24.

The chain may be a commercially available chain.

[0027] Figure 6 shows a rack section 22 which is made in one piece with the rack carrier 24. Thereby the rack carrier 24 is provided with holes which constitute the first positive engagement means 23. Consequently, by bending the rack carrier 24 the rack section 22 is bended at the same time.

[0028] The following description refers to the embodiments of figures 3 to 5. The cross section of the rack carrier 24 is complementary to the cross section of the rack section 22.

[0029] In principle the complementary relationship allows, that the rack section 22 is movable along the direction of travel D within the rack carrier 24. This is important during the bending process in case the rack section 22 is bended together with the rack carrier. The general movability of the rack section 22 within the rack carrier may be restrained by separate fixing means 22f. A suitable fixing mean 22f can be a screw, a weld connection or an adhesive joint set at discrete points along the direction of travel D (shown in figure 3, also exemplary for the embodiments of figures 4 and 5). In particular an adhesive joint can be placed at an end of a rail segment.

[0030] The complementary relationship between the cross sections of the rack carrier 24 and the rack section 22 allows in an embodiment, that the rack section is fixedly held within the rack carrier in any directions perpendicular to the direction of travel D, so the rack section 22 cannot escape sideways out of the rack carrier 24.

[0031] The rack section is in particular attached to the tubular section 21 before bending. By bending the tubular section 21 also the rack section 22 gets bended. Alternatively, the tubular section 21 and the rack carrier 24 are bended before attaching the rack section 22 to the tubular section 21 and the rack carrier 24. In the latter case the rack section is in particular flexible in shape as e.g. in the embodiment of figure 5.

[0032] For attaching the rack section 22 to the rack carrier 24, the rack section 22 is introduced at an end of the rack carrier 24. Afterwards the rack section 22 is slid within the rack carrier 24 along the direction of travel D, until the rack section 22 is full introduced within the rack carrier 24.

[0033] For better illustration the figures 3 to 6 show merely straight lined part of rail. The illustration is also applicable for a curved and/or twisted part of the rail.

List of reference signs

[0034]

1	platform lift
2	rail
2S	rail segment
2C	rail connection
21	tubular section
21i	inner area of tubular section
22	rack section

22f fixing means
 23 first engagement means
 24 rack carrier
 25 connector
 251 support surface
 28 weld seam
 3 drive
 31 drive shaft
 32 drive gear
 33 second engagement means
 4 first landing area
 5 second landing area
 6 drive unit
 61 carrier
 62 balancing system
 63 platform
 65 rollers
 9 stairway
 D direction of travel
 M tilting momentum

Claims

1. Rail (2) for a platform lift (1), comprising
 a tubular section (21), in particular for supporting rollers (65) of a platform lift carrier (61);
 a rack section (22) having first positive engagement means (23), in particular for engaging with second positive engagement means (33) of a platform lift drive (3); wherein the rail (2) defines a curved direction of travel (D),
characterized in
that the tubular section (21) defines an inner area (21i),
and that the rack section (22) is located at least partially, in particular fully, within the inner area (21i).
2. Rail (2) according to claim 1,
characterized in
that rack section (22) is supported by a rack carrier (24).
3. Rail (2) according to claim 2,
characterized in
 the rack carrier (24), viewed in direction of travel (D), has a cross section which is complementary to a cross section of the rack section (22).
4. Rail (2) according to any claims 2 or 3,
characterized by
 fixing means (22f), adapted to fix the position of the rack section (22) along the direction of travel (D) relative to the rack carrier (24),
 in particular the fixing means (22f) are set at discrete locations in particular along the direction of travel (D).
5. Rail (2) according to any of claims 2 to 4,

characterized in

that the rack carrier (24) is made in one piece with the tubular section (21).

- 5 6. Rail (2) according to any of the preceding claims,
characterized in that
 that the rack section (22) has a bending stiffness which is lower than a bending stiffness of the tubular section (21) and/or of the rack carrier (24).
- 10 7. Rail (2) according to any of the preceding claims,
characterized in
that the rack section (22) is made in one piece with the tubular section (21).
- 15 8. Rail (2) according to any of the preceding claims,
characterized in
that the rack section (22) and/or the rack carrier (24) are connected to the tubular section (21) by a connector (25) extending radially between the tubular section (21) and the rack section (22) and/or the rack carrier (24),
 in particular the connector (25) is made from one piece with at least one of the tubular section (21), the rack section (22), the rack carrier (24);
 in particular the rack carrier (24) is connected to the tubular section (22) by two radially extending connectors (25), wherein the radially extending connectors (25) defines an opening, through which the drive gear (32) of the drive (3) can extend.
- 20 9. Rail (2) according to any of the preceding claims,
characterized in
that the tubular section (21) and/or the rack carrier (24) is made from metal, in particular a metal strip of sheet metal, or made from an extruded profile.
- 25 10. Rail (2) according to any of the preceding claims,
characterized in
 comprising a support surface (251) adapted to support a tilting momentum (M) issued by a carrier of the platform lift.
- 30 11. Method of manufacturing a rail (2) for a platform lift (1), in particular a rail according to any of the preceding claims, the rail (2) comprising:
 a tubular section (21), in particular for supporting rollers of a platform lift carrier (61);
 a rack section (22) having first positive engagement means (23), in particular for engaging with second positive engagement means (33) of a platform lift drive (3), the method comprising the following steps:
 providing a tubular section (21), to which a rack carrier (24) is attached, in particular wherein the tubular section (21) initially has
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a straight shape;
bending and/or twisting the tubular section
and the rack carrier (24) at the same time
so that the tubular sections (21) defines a
curved direction of travel (D) which deviates 5
from a straight shape and wherein the
shape of the rack carrier (24) follows the
bended shape of the tubular section (21).

12. Method according the preceding claim, comprising 10
the following step:
attaching the rack section (22) to the rack carrier (24)
before bending the tubular section (21).

13. Method according to claim 10, comprising the follow- 15
ing step:
attaching the rack section (22) to the rack carrier (24)
after bending the tubular section (21).

14. Method according the preceding claim, comprising 20
the following step:

attaching the rack section (22) to the rack carrier
(24), wherein the rack section (22) is introduced
in to the rack carrier (24) by sliding insertion 25
along the direction of travel (D),
fixing the inserted rack section (22) against
movement in direction of travel (D).

15. Platform lift (1), in particular stairlift, having a rail (2) 30
according to any of claims 1 to 9.

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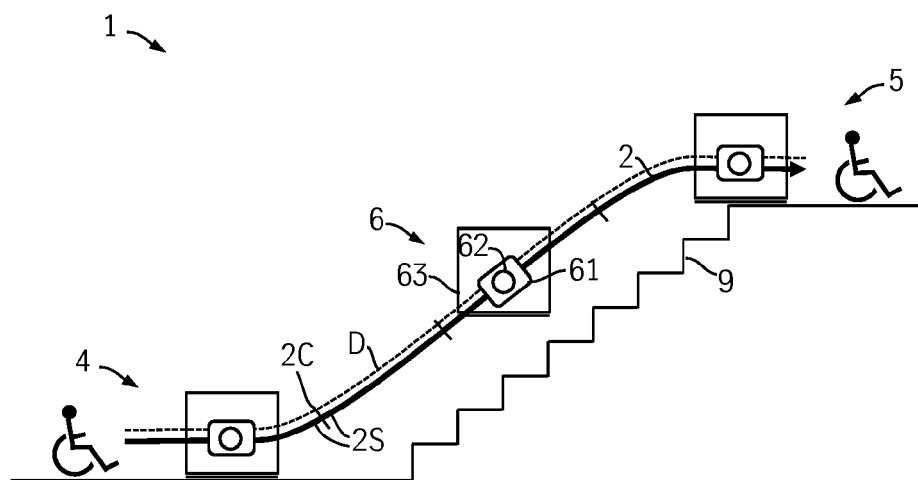
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a)



b)

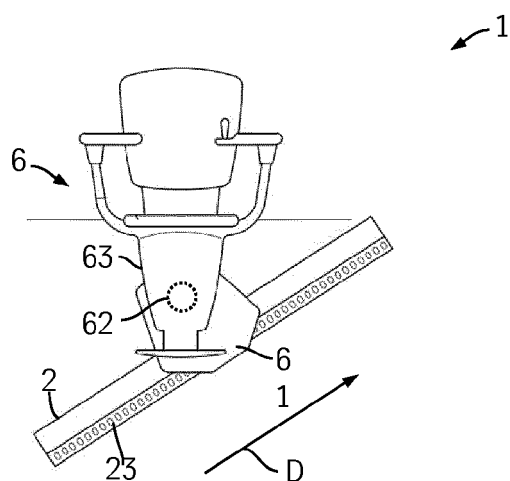
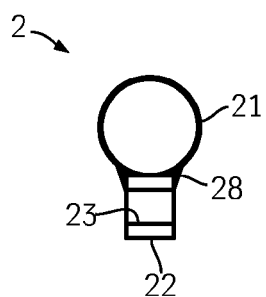


Fig. 1

a)



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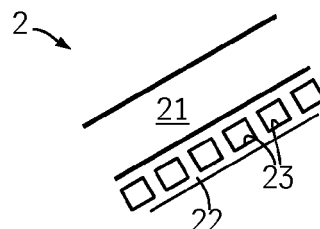


Fig. 2

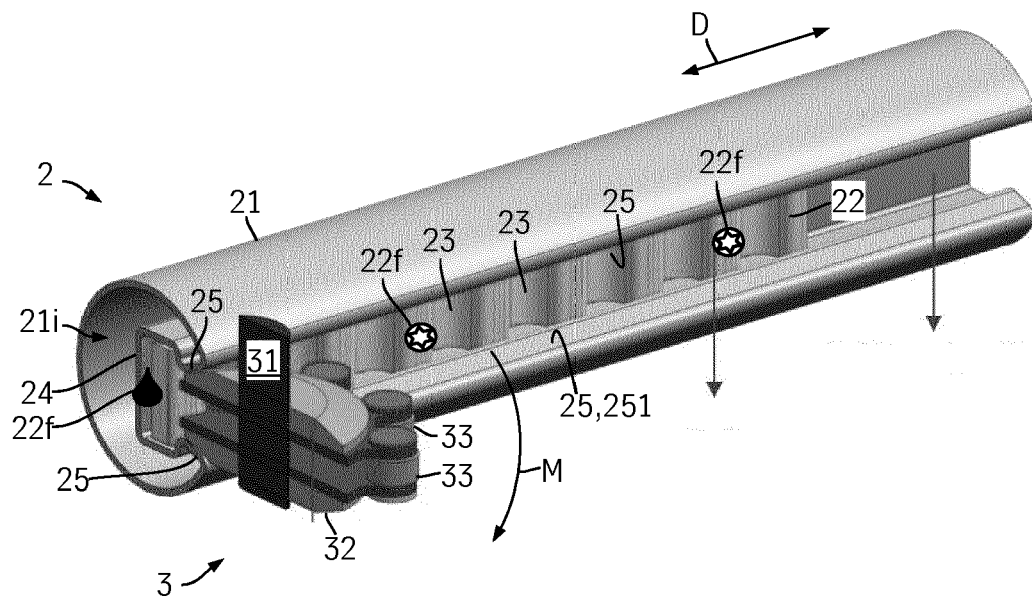


Fig. 3

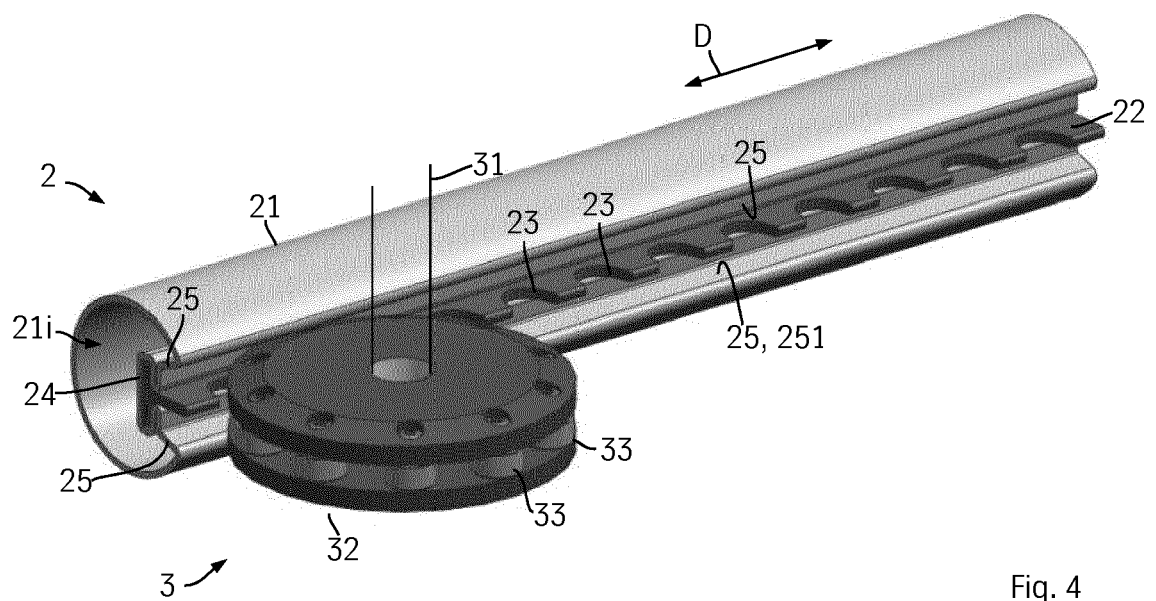


Fig. 4

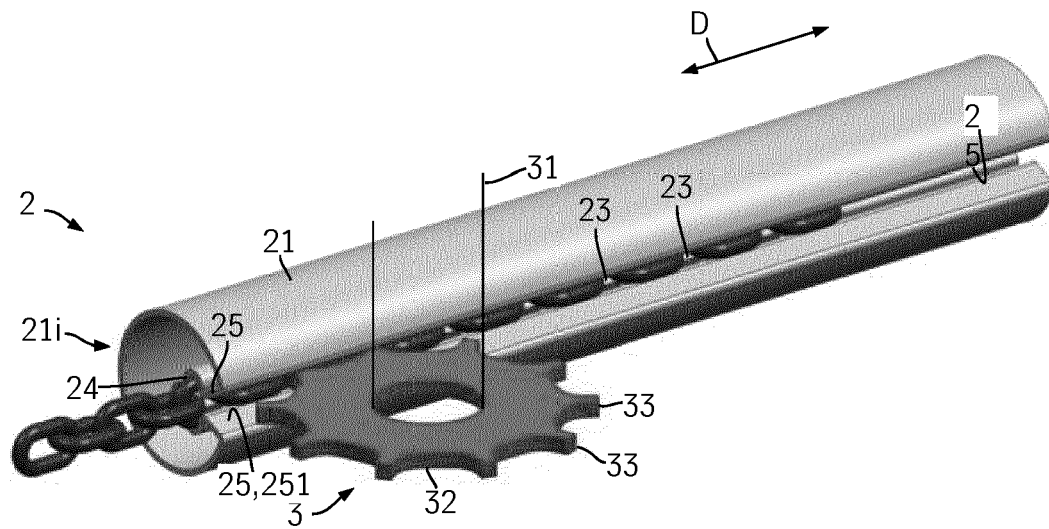


Fig. 5

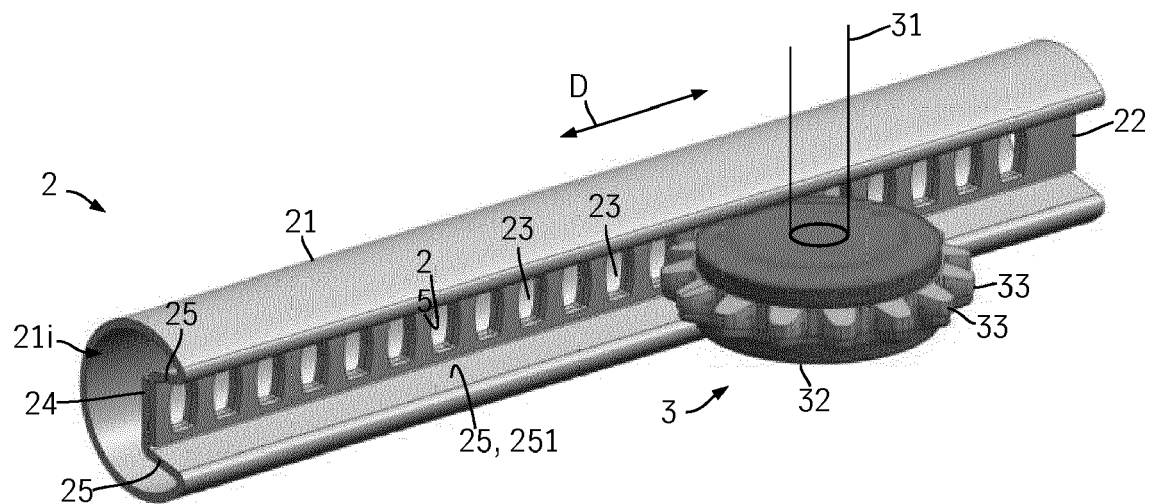


Fig. 6

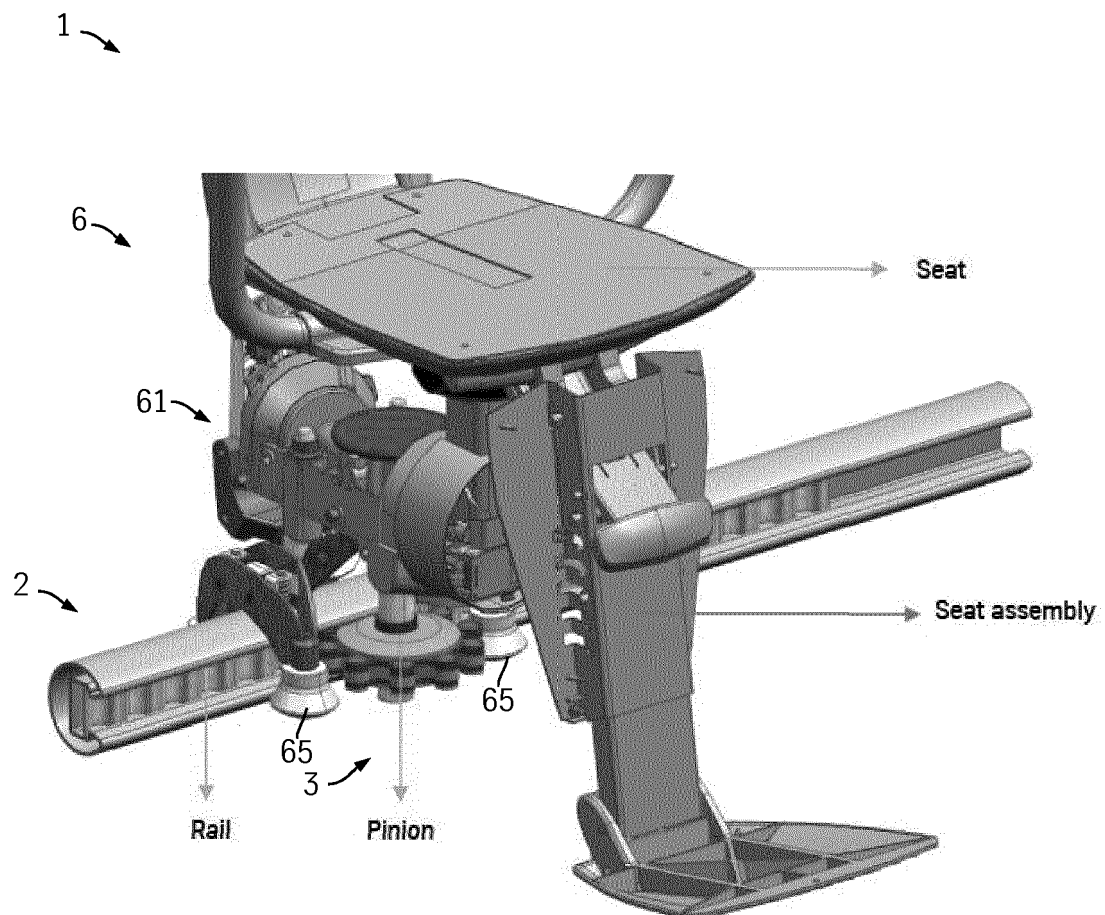


Fig. 7



EUROPEAN SEARCH REPORT

Application Number
EP 21 38 2404

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 6 332 512 B1 (MURANAKA MASARU [JP]) 25 December 2001 (2001-12-25) * figures 1,3,4,5,6,7 *	1-15	INV. B66B9/08
X	WO 2020/243233 A1 (BRUNO INDEPENDENT LIVING AIDS INC [US]) 3 December 2020 (2020-12-03) * figures 1,3,4,7,8,10 *	1-6,8-15	
X	DE 38 20 055 C1 (RICHTER H) 5 October 1989 (1989-10-05) * paragraphs [0011], [0012], [0014], [0015]; figures 1,2 *	1-6,8-15	
			TECHNICAL FIELDS SEARCHED (IPC)
			B66B
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 17 September 2021	Examiner Severens, Gert
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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

EP 21 38 2404

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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17-09-2021

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 6332512 B1	25-12-2001	AU 763727 B2	31-07-2003
		CN 1253111 A	17-05-2000
		JP 4275246 B2	10-06-2009
		JP 2000198641 A	18-07-2000
		US 6332512 B1	25-12-2001

WO 2020243233 A1	03-12-2020	NONE	

DE 3820055 C1	05-10-1989	DE 3820055 C1	05-10-1989
		DK 24590 A	30-01-1990
		EP 0374236 A1	27-06-1990
		JP H03500637 A	14-02-1991
		US 5066834 A	19-11-1991
		WO 8912595 A1	28-12-1989
