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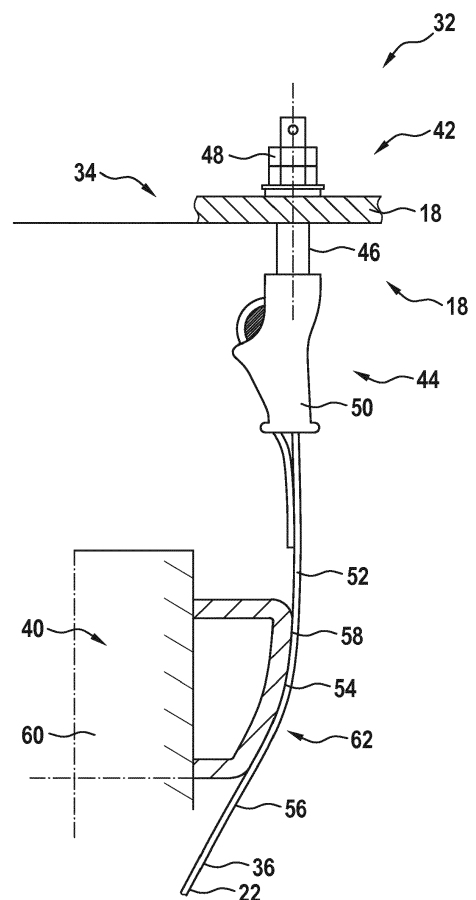
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(54) **FIX POINT ASSEMBLY FOR ELEVATOR**

(57) A fix point assembly (32) for a traction medium (22) of an elevator system (10) comprises an end connection (34) for connecting the traction medium (22) to an elevator shaft (14), the end connection (34) comprising a shaft fixation part (42) to be fixedly attached to the elevator shaft (14) and a traction medium fixation part (44) for fixedly attaching an end (36) of the traction medium (22), the traction medium (22) attached with one end (36) to the traction medium fixation part (44) and a deflection means (40) for the traction medium (22), attached to the shaft (14) and comprising a rounded deflection surface (54). The traction medium (22) is guided around the deflection surface (54), such that a first part (52) of the traction medium (22) between the deflection means (40) and the traction medium fixation part (44) runs in a specific direction and such that a second part (56) of the traction medium (22) running away from the deflection means (40) is movable in different directions inclined with respect to the specific direction.

**Fig. 2**



## Description

**[0001]** The present invention relates to a fix point assembly for a traction medium of an elevator as well as to an elevator system.

**[0002]** Elevator systems usually have an elevator cabin or elevator car that is vertically movable in a shaft with a drive. The elevator car may be connected via a traction medium, such as a rope or belt, to the drive, which moves the traction medium running over a pulley attached to the elevator cabin. From the elevator cabin, the traction medium may run to a fix point substantially at a similar height as the drive.

**[0003]** Elevator systems with one pulley on top of the elevator cabin and a V-shaped suspension may need a fix point which is adapting to the angle between the traction medium and a vertical direction depending on the position of the elevator cabin in the shaft. For example, the traction medium may be connected to an end connection, which is pivot-mounted at the fix point.

**[0004]** There may be a need for a simpler and more flexible fixation of a traction belt, which takes different angles to a vertical direction during movement of an elevator cabin.

**[0005]** Such a need may be met with the subject-matter of the independent claims. Advantageous embodiments are defined in the dependent claims.

**[0006]** Ideas underlying embodiments of the present invention may be interpreted as being based, inter alia, on the following observations and recognitions.

**[0007]** A first aspect of the invention relates to a fix point assembly for a traction medium of an elevator. With the fix point assembly, one end of the traction medium, such as a traction belt or a traction rope, may be suspended in an elevator shaft. For example, the traction medium may run down from a drive to an elevator cabin, around a pulley and up to the fix point assembly, such that is substantially V-shaped between the drive and the fix point assembly.

**[0008]** According to an embodiment of the invention, the fix point assembly comprises an end connection for connecting the traction medium to an elevator shaft, the end connection comprising a shaft fixation part to be, at least indirectly, fixedly attached to the elevator shaft and a traction medium fixation part for fixedly attaching an end of the traction medium, wherein the traction medium is attached with one end to the traction medium fixation part. For example, the shaft fixation part may comprise a rod that is secured, for example screwed, to the shaft or to a further member secured to the shaft, such as a platform. In particular, the shaft fixation part is not movable with respect to the shaft or the further member.

**[0009]** The traction medium fixation part may comprise a bracket, which holds an end of the traction medium. For example, the bracket holding the end of the traction medium and the shaft fixation part may be interconnected with a rod. The traction medium fixation part is, at least indirectly, fixedly attached to the shaft via the shaft fixa-

tion part and/or is not movable with respect to the shaft and/or the further member to which the shaft fixation part is fixedly attached.

**[0010]** Furthermore, the fix point assembly comprises a deflection means for the traction medium, attached, at least indirectly, to the shaft and comprising a rounded deflection surface, wherein the traction medium is guided around the deflection surface, such that a first part of the traction medium between the deflection means and traction medium fixation part runs in a specific direction and such that a second part of the traction medium running away from the deflection means is movable in different directions inclined with respect to the specific direction. For example, the end connection may be always in upright position while the traction medium is deflecting. In such a way, the movement of the traction medium with respect to a vertical direction may be provided by bending the traction means around the rounded deflection surface. In particular, the deflection is performed by the traction medium and not the end connection. Since the traction medium is usually designed to bare millions of bends during lifetime, the fix point assembly may not influence the use time of the traction medium.

**[0011]** Furthermore, a force from the traction medium acting on the end connection may be directed always in the same direction, such as a vertical direction, independent from the direction of the traction medium beyond the deflection means.

**[0012]** According to an embodiment of the invention, the deflection surface is unmovable with respect to the end connection. For example, the deflection means may be fixedly attached to the shaft. In this case, some of the force from the traction medium applied to the end connection may be absorbed in the deflection means due to friction.

**[0013]** According to an embodiment of the invention, the deflection means comprises a formed body providing the deflection surface. Such a body may be a metal plate that may be bent in such a way that the rounded deflection surface is formed.

**[0014]** According to an embodiment of the invention, the rounded deflection surface is coated with a friction reducing coating. For example, when a sensor for measuring the force on the traction means is attached to the end connection, it may be undesirable that force is removed by the deflection means. In particular, the above mentioned metal plate may be coated with the friction reducing coating.

**[0015]** To reduce friction forces, the rounded deflection surface may be designed, such that it is movable in the extension direction of the traction means.

**[0016]** According to an embodiment of the invention, the deflection means comprises a pulley providing the rounded deflection surface. The pulley may have an axis oriented parallel to the direction in which the traction medium is deflected.

**[0017]** According to an embodiment of the invention, the deflection means comprises a rotatable cylinder seg-

ment providing the rounded deflection surface. Such a cylinder segment may be seen as a segment of a pulley. The rotatable cylinder segment may have an axis oriented parallel to the direction in which the traction medium is deflected.

**[0018]** According to an embodiment of the invention, the fix point assembly further comprises a horizontal platform to be attached to the elevator shaft, wherein the end connection is connected with the shaft connection part to the horizontal platform and wherein the deflection means is attached below the end connection with the elevator shaft. In such a way, the first part of the traction medium between the deflection means and the end connection may run vertically. The second part, on the other side of the deflection means, may be deflected in different directions. Many elevator systems comprise such horizontal platform, which also carries the drive of the elevator.

**[0019]** A further aspect of the invention relates to an elevator system, which comprises an elevator cabin vertically movable in a shaft, a traction medium for moving the elevator cabin and a drive for transporting the traction medium. The traction medium may run over a pulley driven by the drive, may run down to the elevator cabin, may be deflected by a pulley attached to the elevator cabin and may run up to a hanger assembly as described in the above and in the following.

**[0020]** In such a way, the traction medium may provide a V-shaped suspension for the traction medium, where the opening angle of the V changes with the position of the elevator cabin in the shaft. The changing angle may be compensated by the fix point assembly. In particular, the traction medium may be inclined with respect to a vertical direction between the elevator cabin and the fix point assembly and/or the traction medium may be inclined with respect to a vertical direction between the elevator cabin and the drive.

**[0021]** According to an embodiment of the invention, the drive and the fix point assembly are attached to a horizontal platform in the elevator shaft. The fix point assembly may be provided on substantially the same height in the shaft as the drive.

**[0022]** According to an embodiment of the invention, the traction medium is running over solely one pulley attached to the elevator cabin. In particular in systems, where only one pulley is attached to the middle of the roof of the elevator cabin, there may be a strong inclination of the traction medium, when the elevator cabin is near a top of the shaft, i.e. near the drive and/or near the fix point assembly.

**[0023]** According to an embodiment of the invention, at an end opposite to an end connected to the fix point assembly, the traction medium is fixedly attached to a horizontal platform in the elevator shaft, runs down to a counter weight and runs up to the drive. When moving the elevator cabin, the drive moves the traction medium between a part connected to the counter weight and a part connected to the cabin. At the side of the counter

weight, the traction medium runs substantially parallel to the vertical direction.

**[0024]** According to an embodiment of the invention, the traction medium in the form of a traction belt is twisted between the drive and the elevator cabin. When the traction means is a traction belt with a profiled side, this twist ensures that the profiled side is facing the pulley of the elevator cabin and the drive. It has to be noted that in this case, the profiled side also may face the rounded deflection surface of the deflection means.

**[0025]** In the following, advantageous embodiments of the invention will be described with reference to the enclosed drawings. However, neither the drawings nor the description shall be interpreted as limiting the invention.

Fig. 1 shows a side view of an elevator system according to an embodiment of the invention.

Fig. 2 shows a side view of a fix point assembly according to an embodiment of the invention.

Fig. 3 shows a side view of a part of a fix point assembly according to a further embodiment of the invention.

Fig. 4 shows a side view of a part of a fix point assembly according to a further embodiment of the invention.

**[0026]** The figures are only schematic and not to scale. Same reference signs refer to same or similar features.

**[0027]** Fig. 1 shows an elevator system 10, which comprises an elevator cabin 12 vertically movable in a shaft 14 along rails 16, which are attached to the shaft 14. The elevator system 10 furthermore comprises a horizontal platform 18, which is attached at a top end of the shaft 14 and on which a drive 20 is provided. The elevator cabin 12 is moved by the drive 20 with the aid of a traction medium 22. For example, the drive 20 is positioned on a side of the shaft 14.

**[0028]** At one end 24, the traction medium 22 is fixedly attached to the horizontal platform 18, with a first end connection 26. The first end connection 26 may be positioned near the drive 20 and/or below the drive 20.

**[0029]** From the end connection 26, the traction medium 22 runs down to a counter weight (not shown) in a vertical direction and, from there, runs up to the drive 20, again in the vertical direction. After that, the traction medium 22 runs over a pulley 28 driven by the drive 20, runs down to the elevator cabin 12, is there deflected by a pulley 30 attached to the elevator cabin 12 and runs up to a fix point assembly 32 with a further end connection 34 for the traction medium 22.

**[0030]** At the other end 36, the traction medium 22 is fixedly attached to the horizontal platform 18, with the second end connection 34.

**[0031]** When the traction medium 22 is a traction belt, it may comprise a twisted part 38, which is twisted be-

tween the drive 20 and the elevator cabin 12. A belt may comprise a profiled side and due to the twisted part 38, the profiled side may face both pulleys 28, 30.

**[0032]** Since the traction medium 22 is running over solely one pulley 30 attached to the elevator cabin 12, which pulley 30 is attached to a middle of elevator cabin 12 and/or since the fix point assembly 32 is fixedly attached to the platform 18 opposite to the drive 20 in the shaft 14, the traction medium is inclined with respect to the vertical direction between the elevator cabin 12 and the drive 20 and the traction medium 22 inclined with respect to the vertical direction between the elevator cabin 12 and the fix point assembly 32. These inclinations are dependent on the position of the elevator cabin 12 in the shaft.

**[0033]** The fix point assembly 32 has a deflection means 40, which is used for compensating the different inclinations.

**[0034]** Fig. 2 shows the fix point assembly of Fig. 1 in more detail. The end connection 34 comprises a shaft fixation part 42, which is fixedly attached to the platform 18 and a traction medium fixation part 44 for fixedly attaching the end 36 of the traction medium 22. The shaft fixation part comprises a rod 46, which may be screwed with a nut 48 to the platform 18. The rod 46 runs in the vertical direction. The traction medium fixation part 44 comprises a bracket 50, in which a loop of the traction medium 22 is clamped, such that after the traction medium fixation part 44, the traction medium 22 runs in the vertical direction.

**[0035]** The deflection means 40 is attached below the end connection 34, such that a first part 52 of the traction medium 22, which runs in the vertical direction, meets a rounded deflection surface 54 of the deflection means 40. From top to bottom, the deflection surface 54 is firstly substantially parallel with the vertical direction and then becomes more and more inclined with respect to the vertical direction. In such a way, the traction medium 22 in a second part 56 below the deflection means 40 may meet the deflecting surface 54 from below with different inclination angles, without changing the vertical direction of the first part 52.

**[0036]** In Fig. 2, the deflection means 40 comprises a rounded body 58, which provides the deflection surface 54. This body 58 may be directly attached to a holding member 60 attached to the shaft 14. The body 58 may be a rounded plate 58 and/or may be formed of metal and/or plastics. In any cases, the deflection surface 54 is unmovable fixated with respect to the shaft 14, i.e. may not move, when the traction medium 22 is moving.

**[0037]** The rounded deflection surface 58 may be coated with a friction reducing coating 62. In such a way, a force of the traction medium 22 onto the end connection is nearly not reduced by the deflection means 40. This may be beneficial, when a sensor for monitoring the traction medium 22, which sensor may be connected to the end connection 34, is used.

**[0038]** Fig. 3 shows an alternative deflection means 40

that may be used with the fix point assembly of Fig. 2. In Fig. 3, the rounded deflection surface 54 is provided by a pulley 64 rotatable about an axis 66, which is horizontally aligned.

**[0039]** As shown in Fig. 4, it is also possible to use a rotatable cylinder segment 68 instead of the pulley 64 for providing the rounded deflection surface 54.

**[0040]** Both the pulley 64 and the rotatable cylinder segment 68 may comprise a rounded deflection surface 54 complementary to a profile of a profiled belt.

**[0041]** Finally, it should be noted that the term "comprising" does not exclude other elements or steps and the "a" or "an" does not exclude a plurality. Also elements described in association with different embodiments may be combined. It should also be noted that reference signs in the claims should not be construed as limiting the scope of the claims.

#### List of reference signs

#### **[0042]**

|    |                                 |
|----|---------------------------------|
| 10 | elevator system                 |
| 12 | elevator cabin                  |
| 14 | elevator shaft                  |
| 16 | rail                            |
| 18 | horizontal platform             |
| 20 | drive                           |
| 22 | traction medium                 |
| 24 | end of traction medium          |
| 26 | end connection                  |
| 28 | pulley                          |
| 30 | pulley                          |
| 32 | fix point assembly              |
| 34 | end connection                  |
| 36 | end of traction medium          |
| 38 | twisted part of traction medium |
| 40 | deflection means                |
| 42 | shaft fixation part             |
| 44 | traction medium fixation part   |
| 46 | rod                             |
| 48 | nut                             |
| 50 | bracket                         |
| 52 | first part of traction medium   |
| 54 | rounded deflection surface      |
| 56 | second part of traction medium  |
| 58 | rounded body/metal plate        |
| 60 | holding member                  |
| 62 | friction reducing coating       |
| 64 | pulley                          |
| 66 | axis                            |
| 68 | rotatable cylinder segment      |

#### **Claims**

1. A fix point assembly (32) for a traction medium (22) of an elevator system (10), the fix point assembly

(32) comprising:

an end connection (34) for connecting the traction medium (22) to an elevator shaft (14), the end connection (34) comprising a shaft fixation part (42) to be, at least indirectly, fixedly attached to the elevator shaft (14) and a traction medium fixation part (44) for fixedly attaching an end (36) of the traction medium (22);  
the traction medium (22) attached with one end (36) to the traction medium fixation part (44);  
a deflection means (40) for the traction medium (22), attached, at least indirectly, to the shaft (14) and comprising a rounded deflection surface (54);

wherein the traction medium (22) is guided around the deflection surface (54), such that a first part (52) of the traction medium (22) between the deflection means (40) and the traction medium fixation part (44) runs in a specific direction and such that a second part (56) of the traction medium (22) running away from the deflection means (40) is movable in different directions inclined with respect to the specific direction.

2. The fix point assembly (32) of claim 1, wherein the deflection means (40) comprises a formed body (58) providing the deflection surface (54), which is unmovable fixated with respect to the shaft (14).
3. The fix point assembly (32) of claim 2, wherein the formed body (58) comprises a metal plate.
4. The fix point assembly (32) of one of the preceding claims, wherein the deflection means (40) comprises a pulley (64) providing the rounded deflection surface (54).
5. The fix point assembly (32) of one of the preceding claims, wherein the deflection means (40) comprises a rotatable cylinder segment (68) providing the rounded deflection surface (54).
6. The fix point assembly (32) of one of the preceding claims, wherein the rounded deflection surface (54) is coated with a friction reducing coating (62).
7. The fix point assembly (32) of one of the preceding claims, wherein the fix point assembly (32) further comprises a horizontal platform (18) to be attached to the elevator shaft (14);

wherein the end connection (34) is connected with the shaft connection part (42) to the horizontal platform (18);

wherein the deflection means (40) is attached below the end connection (34) with the elevator shaft (14); wherein the first part (52) of the traction medium (22) between the deflection means (40) and the end connection (34) runs in a vertical direction.

8. The fix point assembly (32) of one of the preceding claims, wherein the traction medium (22) is a traction belt.

9. An elevator system (10), comprising:

an elevator cabin (12) vertically movable in a shaft (14);  
a traction medium (22);  
a drive (20) for transporting the traction medium (22);  
a fix point assembly (32) according to one of the preceding claims;

wherein the traction medium (22) runs over a pulley (28) driven by the drive (20), runs down to the elevator cabin (12), is deflected by a pulley (30) attached to the elevator cabin (12) and runs up to the fix point assembly (32).

10. The elevator system (10) of claim 9, wherein the drive (20) and the fix point assembly (32) are attached to a horizontal platform (18) in the elevator shaft (14).
11. The elevator system (10) of claim 9 or 10, wherein between the elevator cabin (12) and the fix point assembly (32), the traction medium (22) is inclined with respect to a vertical direction; and/or wherein between the elevator cabin (12) and the drive (20), the traction medium (22) is inclined with respect to a vertical direction.
12. The elevator system (10) of one of claims 9 to 11, wherein the traction medium (22) is running over solely one pulley (30) attached to the elevator cabin (12).
13. The elevator system (10) of one of claims 9 to 12, wherein at an end (24) opposite to an end (36) connected to the fix point assembly (32), the traction medium (22) is fixedly attached to a horizontal platform (18) in the elevator shaft (14), runs down to a counter weight and runs up to the drive (20).
14. The elevator system (10) of one of claims 9 to 13, wherein the traction medium (22) in the form of a traction belt is twisted between the drive (20) and the elevator cabin (12).

15. The elevator system (10) of one of claims 9 to 14,  
wherein the drive (20) and the fix point assembly (32)  
are attached to a horizontal platform (18) in the ele-  
vator shaft (14);  
wherein the end connection (34) of the fix point as- 5  
sembly (32) is connected with the shaft connection  
part (42) to the horizontal platform (18);  
wherein the deflection means (40) is attached below  
the end connection (34) with the elevator shaft (14);  
wherein the first part (52) of the traction medium (22) 10  
between the deflection means (40) and the end con-  
nection (34) runs vertically;  
wherein the deflection means comprises a formed  
body (58) providing the deflection surface (54), which  
formed body (58) is unmovable attached to the ele- 15  
vator shaft (14).

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Fig. 1

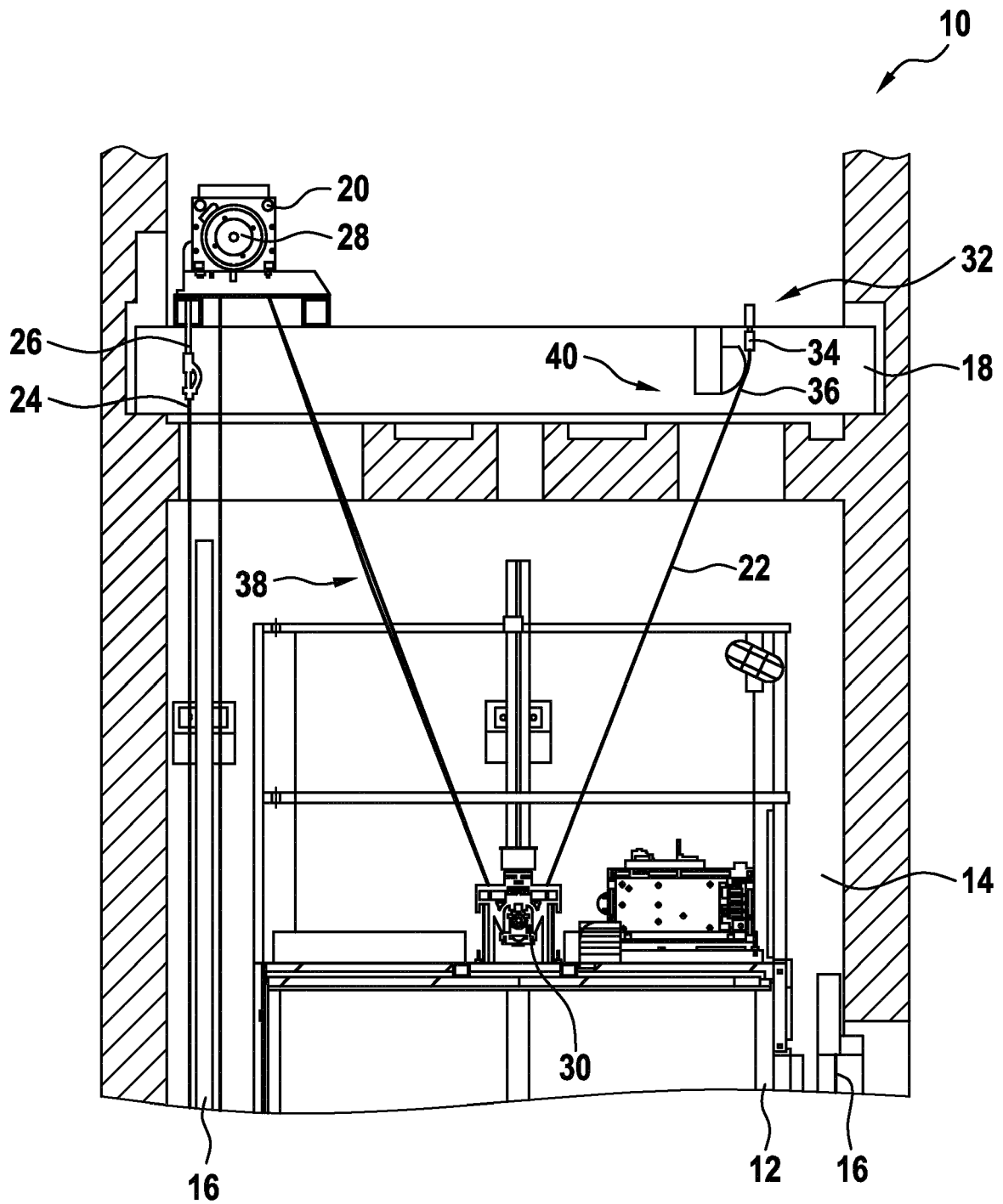
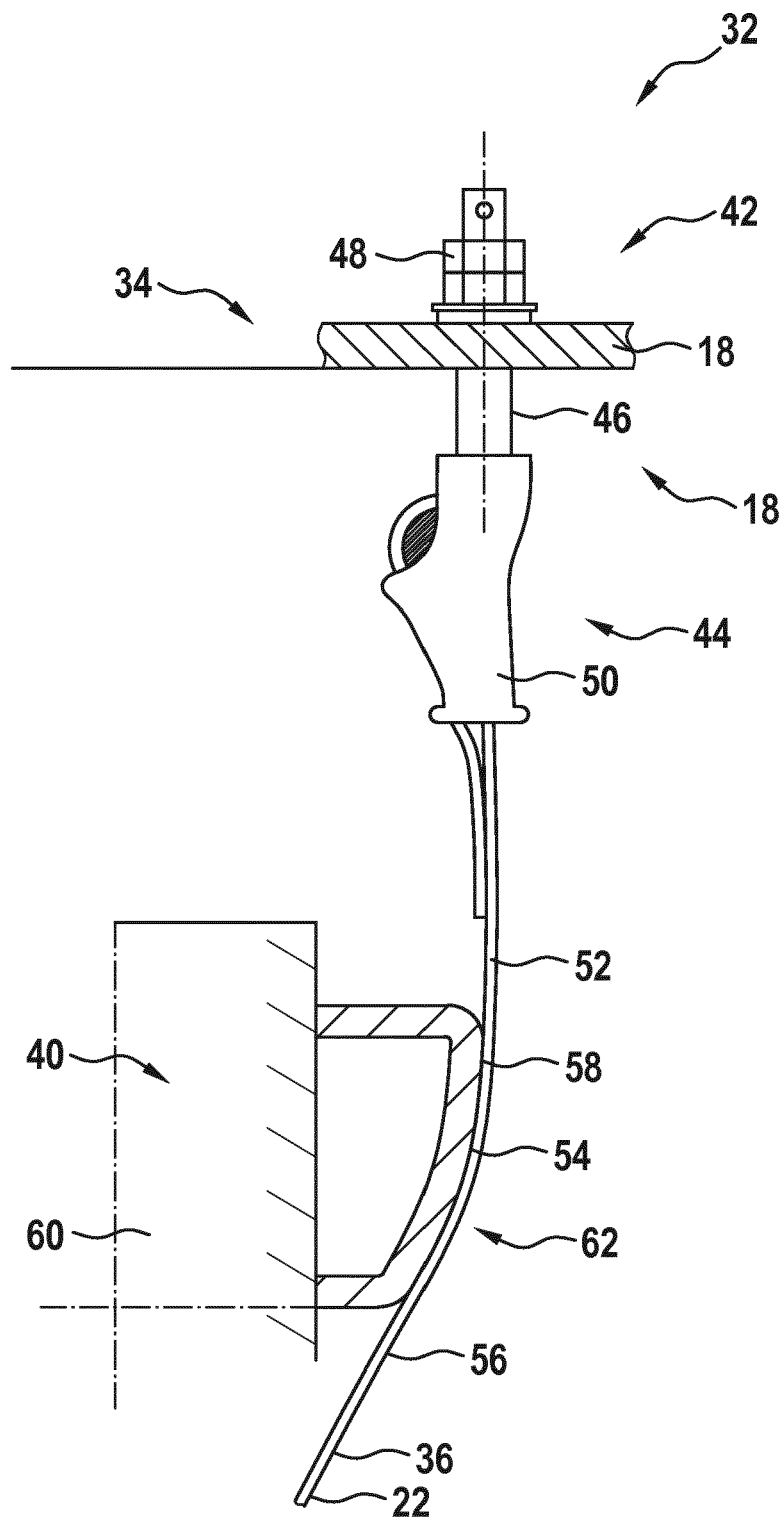
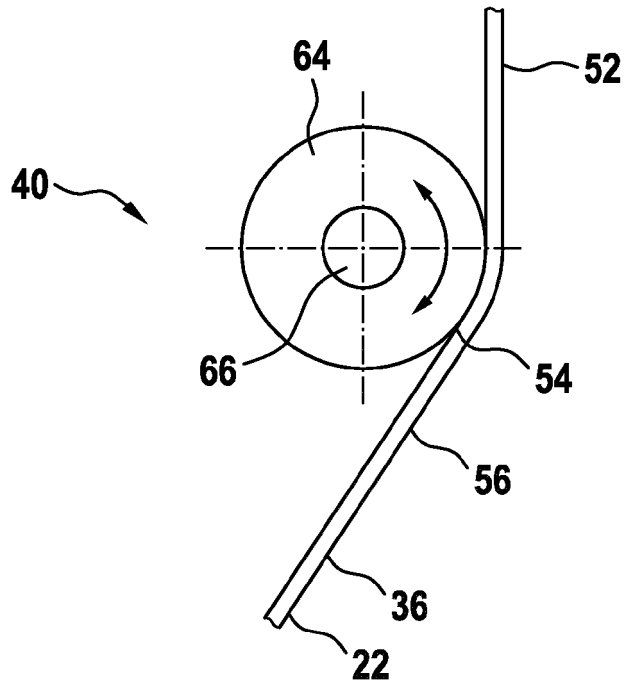


Fig. 2

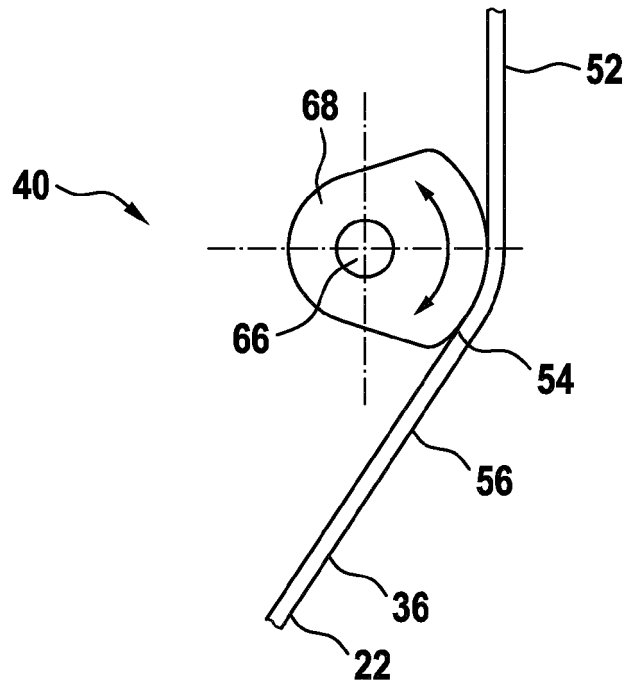




**Fig. 3**



**Fig. 4**





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 Application Number  
 EP 16 19 2254

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| DOCUMENTS CONSIDERED TO BE RELEVANT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                         |                                  |                                         |
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**ANNEX TO THE EUROPEAN SEARCH REPORT  
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