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(54) **Handrail for a fire-fighting rescue cage**

(57) The present invention relates to a handrail (12) for a fire-fighting rescue cage, characterized by two elements (28,30) to be joined with one another, each of these elements (28,30) being disposed at an end portion of one of two handrail sections (18,20) to be joined. One of these elements (28,30) is formed as a sleeve (30) and the other is formed as a shaft end portion to be slidably inserted into a joining end (36) of said sleeve (30) along one guiding axis (A) of the sleeve (30). One of said two elements (28,30) is turnable around said guiding axis (A) with respect to the other element. A first element of said two elements (28,30) comprises a radial protrusion (38) and a second element comprises a recess (40) for engaging said protrusion (38). The recess (40) comprises an insertion portion (42) extending from a joining end (36) of said second element along said guiding axis (A) and a notch (44) extending from the insertion portion (42) in a circumferential direction around said guiding axis (A). The handrail (12) further comprises a biasing member (52) for biasing said second element with respect to said first element in a circumferential direction around said guiding axis (A) against the extension direction of said notch (44).

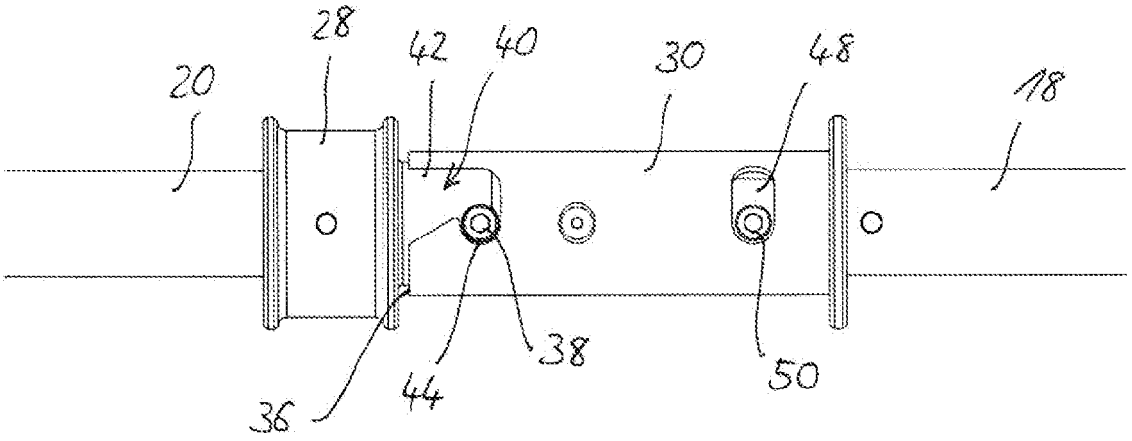

Fig. 3

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Description

[0001] The present invention relates to a handrail for a fire-fighting rescue cage.

[0002] Rescue cages of this kind are usually mounted at the top of a ladder set of a fire-fighting vehicle to be lifted and positioned in a suitable operating position. The rescue equipment of such rescue cages includes, for example, water monitors for fire extinguishing purposes that are to be operated by rescue workers located inside the cage. One important function of rescue cages is to accommodate persons to be rescued and to bring them safely to the ground.

[0003] These cages have to fulfill a large number of safety requirements, that are partially prescribed by law regulations of the several countries in which such rescue cages are operated. One of these requirements is to provide safety means to prevent persons from falling out of the cage. This requirement is fulfilled by a closed handrail mounted on top of the walls of the rescue cage and encircling the whole cage. Another requirement is, however, that the cage can be left by the accommodated persons at any time. For this reason the handrail must be provided to be opened. Usually such an opening portion of the handrail is located at the rear wall of the cage, leading to the ladder at which the cage is suspended.

[0004] For these reasons the closing mechanism of the handrail must be provided to be opened easily, for example, with only one free hand. On the other hand, the handrail must keep its closed position reliably without any danger to be opened accidentally. The known handrails of rescue cages do not fulfill these conflicting requirements and do not satisfy one of these two aspects. Either the cage can easily be opened but does not keep its closed position reliably, or it can be locked safely in its closed state but the locking mechanism can only be opened by force with both hands, for example.

[0005] It is therefore an object of the present invention to provide a handrail for rescue cages of the above kind that can be opened easily but comprises a locking mechanism that keeps the locked state with no danger of being opened unintentionally.

[0006] This object is achieved by a handrail for a fire-fighting rescue cage comprising the features of claim 1.

[0007] The handrail according to the present invention comprises two elements to be joined with one another. Each of these elements is disposed on an end portion of one of two handrails section that are to be joined to close the handrail completely and safely.

[0008] One of these two elements is formed as a sleeve, while the respective other element is a shaft end portion that can be slidably inserted into a joining end of the sleeve in a translatory movement, i. e. along one guiding axis of the sleeve. One of these elements mentioned before is turnable around this guiding axis with respect to the other element.

[0009] A first element of these two elements comprises a radial protrusion, while the remaining second element comprises a recess for engaging said protrusion. The recess comprises an insertion portion extending from a joining end of the second element along the guiding axis and a notch extending from this insertion portion in a circumferential direction about the guiding axis. While the protrusion can be inserted along the insertion portion into the recess, it can be locked inside the recess by means of the notch by a turning movement around the guiding axis so that the protrusion slides into the notch and is caught there.

[0010] In this position the two elements are joined and cannot be released simply by a sliding movement in opposite directions along the guiding axis. The two elements rather have to be turned with respect to each other so that the protrusion can slide out of the notch against its extension direction and is then free to be pulled out of the recess axially along the guiding axis. This is a combined movement that can be performed by turning the turnable element with regard to the other element by one hand, followed by a pulling movement in the axial direction. Although this combination of movements can be simply performed, even in a confusing rescue situation by an unexperienced user, there is no danger that the locking mechanism, represented by the engagement of the protrusion and the recess, can be opened unintentionally. This is mainly due to the fact that the protrusion can only be moved out of the notch by applying a torque to the turnable element before pulling out of the recess.

[0011] The handrail according to the present invention further comprises a biasing member for biasing the second element with respect to the first element in a circumferential direction around the guiding axis against the extension direction of the notch. This biasing member can be represented by a spring, for example, that biases the element comprising the recess in the direction to let the protrusion slide into the notch. The biasing member is therefore another securing means to assure that the protrusion is safely held within the notch without the danger of sliding out accidentally.

[0012] According to one preferred embodiment of the present invention, the turnable element of the two elements is mounted on an end portion of a first handrail section that is mounted in a rotation proof manner.

[0013] According to another preferred embodiment, the non-turnable element of the two elements is arranged on an end portion of a second handrail section, at least one of said first and second handrail sections being slidable along the guiding axis.

[0014] Preferably the second element is provided as the sleeve, and the first element is provided as the shaft end portion to be slidably inserted into a joining end of the sleeve along the guiding axis of the sleeve, said protrusion protruding radially outwards on the periphery of the shaft end portion, and the recess being formed as a cut-out in the mantle of the sleeve.

[0015] More preferably, the sleeve is provided as the turnable element arranged on an end portion of the first handrail section, and the shaft end portion is provided as

a rotation proof element, wherein the biasing member is provided as a torsion spring wound around the end portion of the first handrail section within said sleeve.

[0016] According to this embodiment, the sleeve is mounted turnably on the end portion of the first handrail section that is mounted in a rotation proof manner. The sleeve can be turned with respect to this torque-proof end portion against the biasing force of the torsion spring. When released, the sleeve is turned in a circumferential direction around the guiding axis against the extension direction of the notch of its recess within the mantle of the sleeve. The protrusion, that is provided on the periphery of the shaft end portion as the second element, is then caught within the notch automatically when it is completely taken into the insertion portion of the recess. This means that a certain torque must be applied to the sleeve to let the protrusion slide out of the notch into a position where it can simply be pulled out of the insertion portion of the recess, separating both elements. With this pulling movement, the first and second handrail sections slide laterally along the guiding axis to leave a free access portion that can be crossed by the user. According to another preferred embodiment, the handrail comprises tube members arranged to support said first and second handrail sections, each of said first and second handrail sections being accomodated in one respective tube member to be slidable along said guiding axis, both first and second handrail sections being fully extracted from their respective tube members in the joined state of the two elements.

[0017] These and other features and advantages of the present invention will be apparent from the following description with respect to the accompanying drawings, wherein:

Fig. 1 is a perspective view of a rear wall of a fire fighting rescue cage, comprising a handrail as one embodiment of the present invention;

Fig. 2 shows the rear wall of a fire fighting rescue cage from Fig. 1 in an opened position;

Fig. 3 is a view of the handrail of the fire fighting rescue cages of Fig. 1 and 2 in detail;

Fig. 4 shows the handrail of Fig. 3 in a view wherein the inner parts of the opening/closing mechanism are visible; and

Fig. 5 shows the handrail of Fig. 3 and 4 in an opened position.

[0018] The construction shown in Fig. 1 represents a rear wall 10 of a fire fighting rescue cage, comprising an upper handrail 12 to prevent persons located in the rescue cage from falling out. The handrail 12 extends along the whole width of the rear wall 10 in a horizontal direction over a left frame 14 and a right frame 16 that represent constructional parts of the rear wall 10, respectively. Between these left and right frames 14,16, there is a free space 17 shown in Fig. 1. This space 17 can accommodate another wall portion comprising, for example, the revolving door that can be opened by a user and closes automatically. However, such a door is not part of the present invention, and its description will be omitted here for the sake of simplicity.

[0019] The handrail 12 extends over both frames 14,16 and the spacing 17 therebetween. In its intermediate section spanning over a free spacing, the handrail 12 comprises an opening mechanism to open the handrail 12 so that a person can pass the spacing and the revolving doors located therein. In Fig. 2, the handrail 12 is shown in its opened state.

[0020] In this open state, a first handrail section 18 connected to the right frame 16 and a second handrail section mounted to the left frame 14 (see Fig. 1) are separated by sliding these first and second handrail sections 18,20 axially along a guiding axis A into opposite directions into respective supporting tube members 22,24 that are arranged to accommodate the first and second handrail sections 18,20, respectively, over both frames 14,16. In the open state in Fig. 2, the first and second handrail sections 18,20 are accommodated completely in their supporting tube members 22,24. Within the supporting tube members 22,24, the first and second handrail sections 18,20 are held in a rotation proof manner so that they can slide along the guiding axis A but cannot be turned around this axis A.

[0021] In the closed state of the handrail 12, the first and second handrail sections 18,20 are connected by a locking mechanism 26 that is explained in more detail with respect to Fig. 3 to 5. It is noted that in the connected state, both handrail sections 18, 20 are fully extracted from their respective tube members 22, 24 and can be stopped from falling out of their respective tube members 22, 24 by suitably stopping means (not shown). The locking mechanism 26 comprises two elements, namely a first element 28 being integrally formed with the end of the second handrail section 20 (shown on the left side in Fig. 3) and a second element 30 being provided as a sleeve mounted in a turnable manner at the end portion of the first handrail section 18. The turning mechanism of this sleeve 30 with respect to a first handrail section 18 will be described later. The sleeve 30 can be turned around the guiding axis A on which the first and second handrail section 18 and 20 are slidable in opposite directions. The first element 28 is formed as a shaft end portion comprising a section 32 with enlarged diameter with respect to the second handrail section 20 and a section 34 at the end of the second handrail section 20 with the same diameter as the remaining main part of the second handrail section 20, so that the section 32 with enlarged diameter is thicker than the section 34 and the remaining second handrail section 20.

[0022] The first element 28 is provided to be slidably inserted into the sleeve 30 so that its end section 34 slides into a joining end 36 of the sleeve 30 until the joining end 36 abuts the section 32 with enlarged diameter. On its outer peripheral surface, the end section 34 of the first element 28 is provided with a radial protrusion 38 in form

of the head of a screw bolt that is inserted into the end section 34 in a direction perpendicular to the guiding axis A. On the other hand, the mantle of the sleeve 30 is provided with a cut-out 40 forming a recess for engaging the protrusion 38. This recess 40 comprises an insertion portion 42 extending from the joining end 36 of the sleeve 30 in the axial direction towards the first handrail section 18. Along its extension direction, the insertion portion 42 narrows so that it has a wide insertion end to make it easier to introduce the protrusion 38 when sliding into the recess 40. At the end of the recess 40 on the side of the first handrail section 18, the recess 40 comprises a notch 44 extending from the insertion portion 42 in the circumferential direction of the sleeve 30 around the guiding axis A. When the protrusion 38 has reached the end of the insertion portion 42, it can be inserted into the notch 44 by turning the sleeve 30 in a circumferential direction opposite to the extension direction of the notch 44. In the present embodiment, the notch 44 extends downwards in the circumferential direction, and the protrusion 38 can be caught in the notch 44 by turning the sleeve 30 upwardly. Fig. 3 shows the state wherein the protrusion 38 lies safe within the notch 44 so that it blocks a sliding movement of the first and second handrail section 18 and 20 along the guiding axis A. This blocking can only be released by turning the sleeve 30 downwards, so that the protrusion 38 is free again to slide out of the recess 40 along the insertion portion 42 out of the joining end 36 of the sleeve 30.

[0023] At its end portion on the side of the first handrail section 18 to which the sleeve 30 is fixed, the sleeve 30 comprises an elongated hole 46 extending in a circumferential direction within the mantle of the sleeve 30. An end section 48 of the first handrail section 18, onto which the sleeve 30 is turnably attached, is provided with a radial protrusion 50 in form of the head of a screw bolt that is inserted into this end section 48 in a direction perpendicular to the guiding axis A. This protrusion 50 lies within the elongated hole 46 to delimit the turning end positions of the sleeve 30. That is, the sleeve 30 can only be turned around the guiding axis A between a position wherein the protrusion 50 lies within one end of the elongated hole 46 and another position wherein the protrusion 50 lies with in the opposite end of the elongated hole 46. One of these positions is shown in Fig. 3. As can be taken from Fig. 4, a torsion spring 52 is wound around the end section 48 within the sleeve 30. This torsion spring 52 is disposed axially between a flange portion 54 on the end section 48 of the first handrail section 18 with enlarged diameter with respect to the end section 48 and an inner ring-shaped fixing member 56 fixed at the inner peripheral surface of the sleeve 30 by a screw bolt 58 extending through the mantle of the sleeve 30 into the fixing member 56. That is, the flange portion 54 is fixed to the first handrail section 18 that is supported in a rotation proof manner, while the fixing member 56 is fixed to the sleeve 30 and turns together with the sleeve 30 around the end section 48. One end of the torsion spring 52 is fixed to the fixing member 56, while its other end is fixed to the flange portion 54 (not shown). The torsion spring 52 biases the sleeve 30 around the guiding axis A against the extension direction of the notch 44. That is, in the position in Fig. 3, the sleeve 30 is biased to keep the protrusion 38 safe in the end of the notch 44. The locking can only be released by turning the sleeve 30 against the biasing force of the torsion spring 52 downwards so that the protrusion 38 can slide out of the notch to be pulled along the insertion portion 42 of the recess 40 along the guiding axis A.

[0024] The disassembled state of the first element 28 and the sleeve 30 as the second element is shown in Fig. 5. In this released state, both handrail sections 18,20 can slide back into their supporting tube members 22,24. To be connected again, the first and second handrail sections 18,20 slide toward each other so that the protrusion 38 can slide again into the insertion portion 42 of the recess 40, and the protrusion 38 is caught within the notch 44 to be held by the biasing force of the torsion spring 52, as described above.

Claims

1. Handrail (12) for a fire-fighting rescue cage, **characterized by** two elements (28, 30) to be joined with one another, each of these elements (28, 30) being disposed at an end portion of one of two handrail sections (18, 20) to be joined,one of said two elements (28, 30) being formed as a sleeve (30) and the other of these two elements (28, 30) being formed as a shaft end portion to be slidably inserted into a joining end (36) of said sleeve (30) along one guiding axis (A) of the sleeve (30),one of said two elements (28, 30) being turnable around said guiding axis (A) with respect to the other element, wherein a first element of said two elements (28, 30) comprises a radial protrusion (38) and a second element of said two elements (28, 30) comprises a recess (40) for engaging said protrusion (38), said recess (40) comprising an insertion portion (42) extending from a joining end (36) of said second element along said guiding axis (A) and a notch (44) extending from the insertion portion (42) in a circumferential direction around said guiding axis (A), said handrail (12) further comprising a biasing member (52) for biasing said second element with respect to said first element in a circumferential direction around said guiding axis (A) against the extension direction of said notch (44).

2. Handrail according to claim 1, **characterized in that** the turnable element of said two elements (28, 30) is mounted on an end portion of a first handrail section (18) that is mounted in a rotation proof manner.

3. Handrail according to claim 2, **characterized in that**

a non-turnable element of said two elements (28, 30) is arranged on an end portion of a second handrail section (20),
at least one of said first and second handrail sections (18, 20) being slidable along said guiding axis (A).

4. Handrail according to one of claims 1 to 3, **characterized in that** said second element is provided as the sleeve (30), and said first element is provided as the shaft end portion to be slidably inserted into a joining end (36) of said sleeve (30) along one guiding axis (A) of the sleeve (30), said protrusion (38) protruding radially outwards on the periphery of the shaft end portion, and said recess (40) being formed as a cut-out in the mantle of the sleeve (30).

5. Handrail according claim 4 in connection with claims 2 and 3, **characterized in that** said sleeve (30) is provided as the turnable element arranged on an end portion of said first handrail section (18), and said shaft end portion is provided as a rotation proof element, wherein said biasing member (52) is provided as a torsion spring wound around the end portion of said first handrail section (18) within said sleeve (30).

6. Handrail according one of the preceding claims, **characterized by** tube members (22, 24) arranged to support said first and second handrail sections (18, 20),each of said first and second handrail sections (18, 20) being accomodated in one respective tube member (22, 24) to be slidable along said guiding axis (A), both first and second handrail sections (18, 20) being fully extracted from their respective tube members (22, 24) in the joined state of the two elements (28, 30).

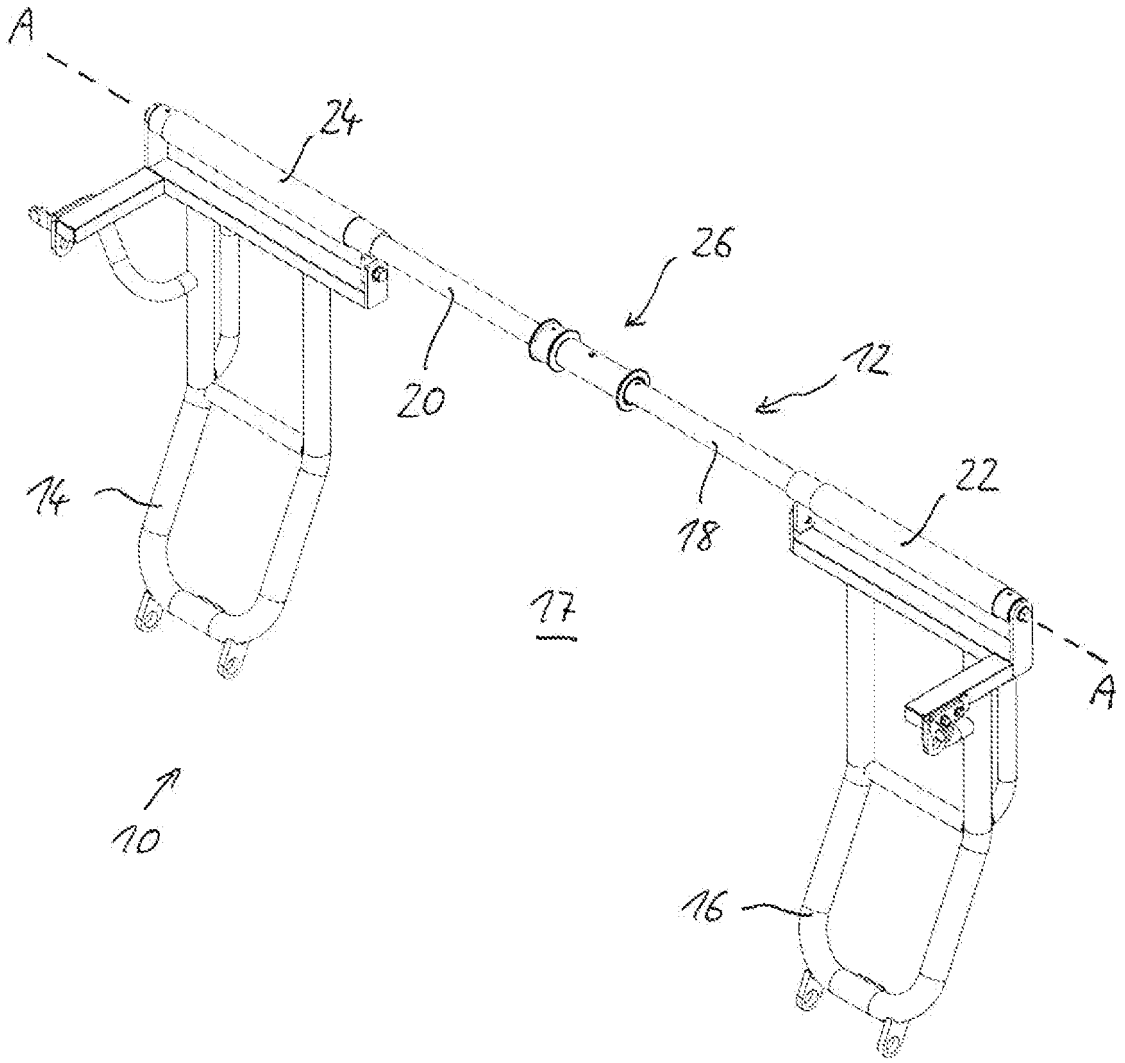

Fig. 1

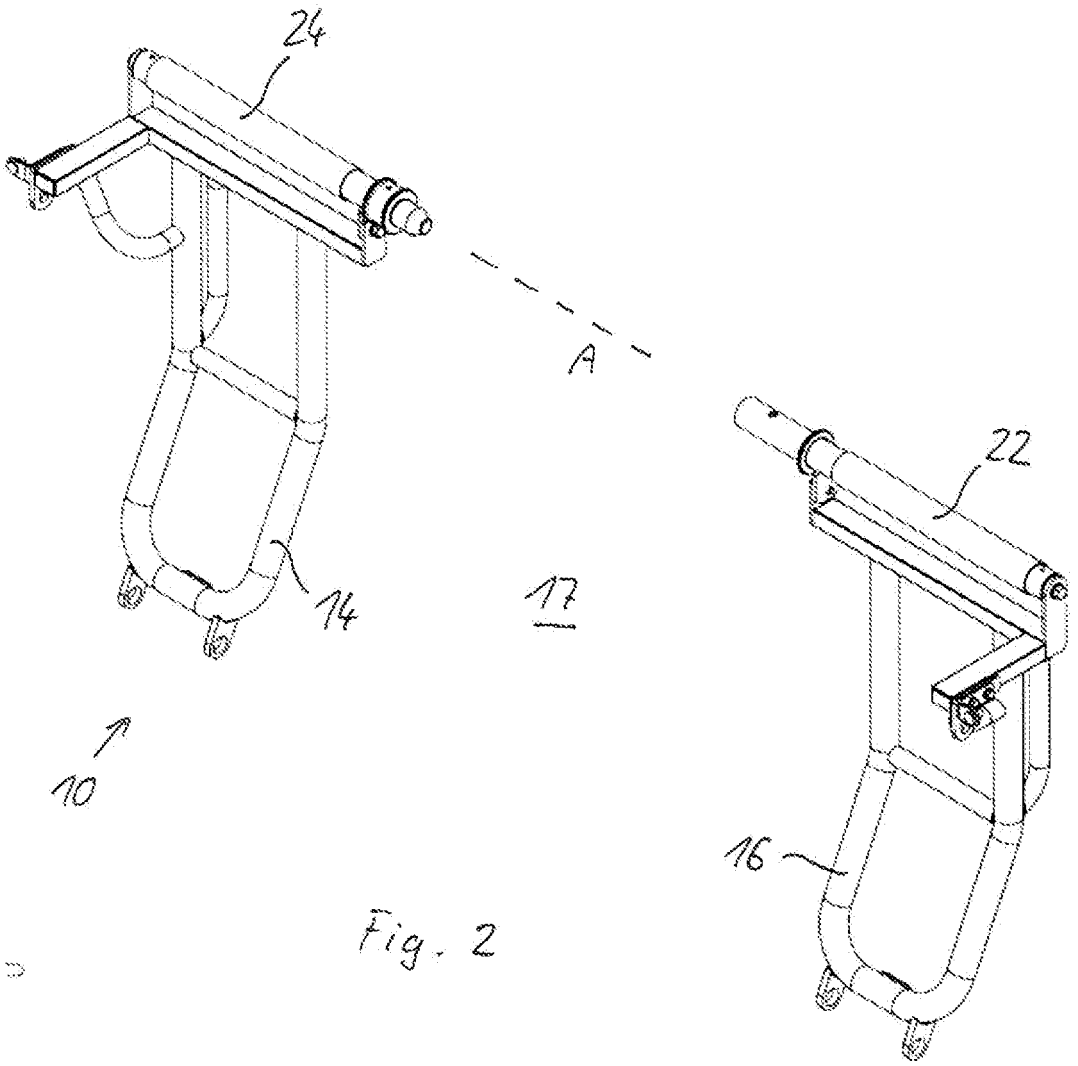

Fig. 2

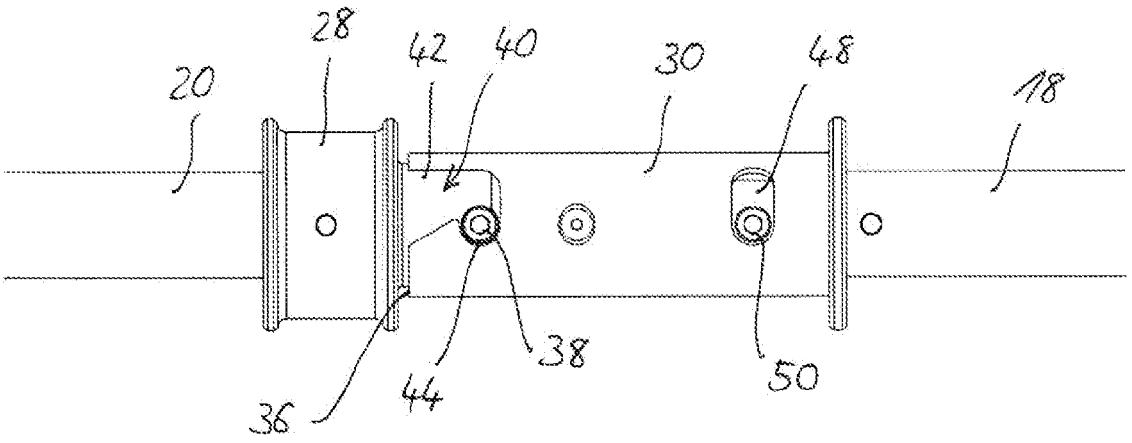

Fig. 3

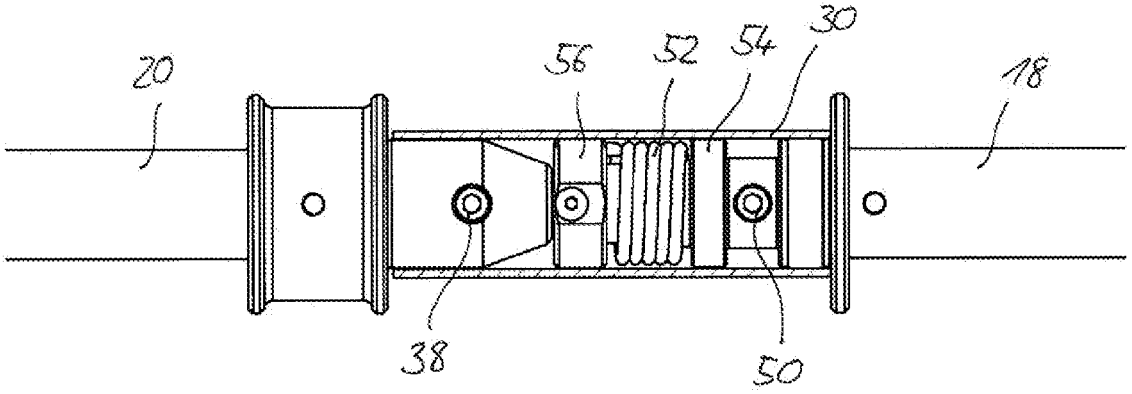

Fig. 4

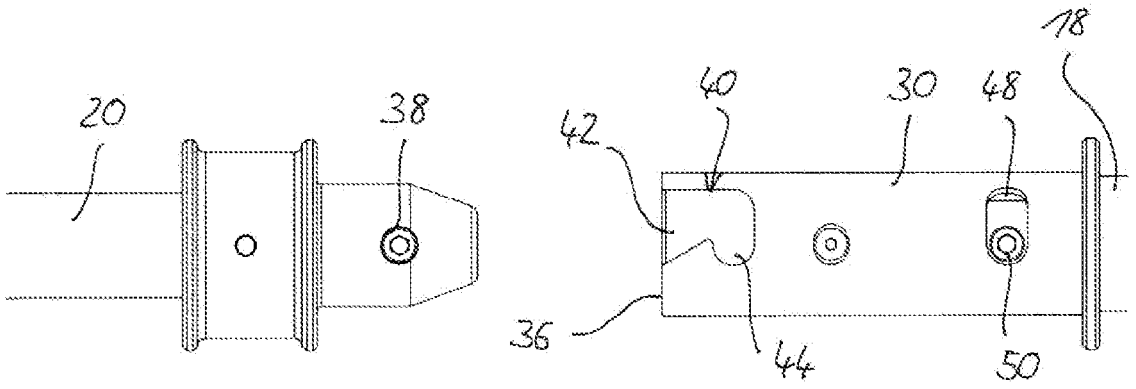

Fig. 5

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EUROPEAN SEARCH REPORT

Application Number
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TECHNICAL FIELDS SEARCHED (IPC)

B66F
F16B
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	30 September 2010	Rupcic, Zoran

CATEGORY OF CITED DOCUMENTS

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