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(54) Handrail for a fire fighting rescue cage

(57) The invention relates to a handrail (32) for a fire-fighting rescue cage (10). This handrail (32) is characterized by an opening section (34) that can be opened by a pivoting movement around a pivoting axis (A). The opening section (34) comprises a bar (36) that is disposed in an approximately horizontal plane in a closed position and a hinge bearing (44) for pivotably attaching an end of said bar (36) to a frame element (46) of said handrail (32). The hinge bearing (44) comprises a pivoting axis (A) being inclined downwardly with respect to said plane and extending outwardly from the framework (14) of said cage (10).

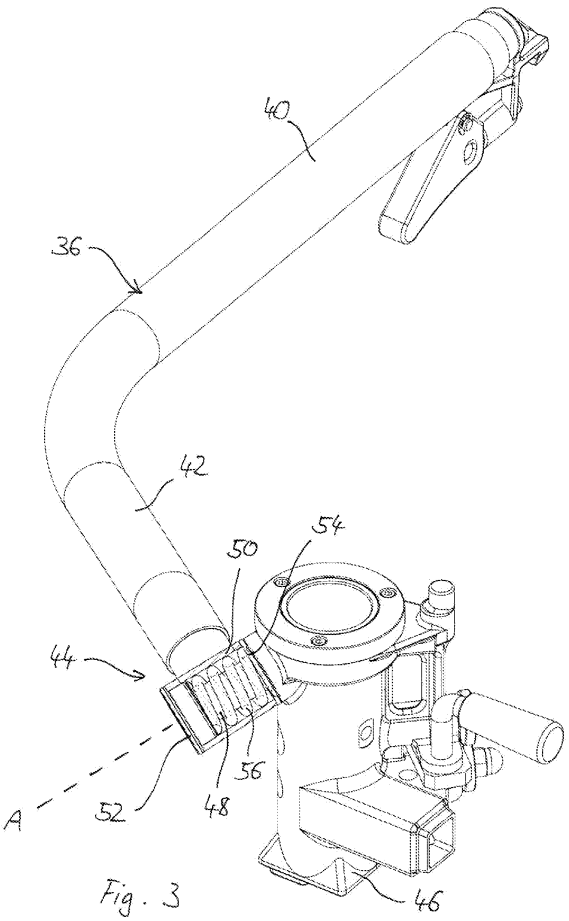

Fig. 3

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Description

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

[0002] Rescue cages that are mounted on top of ladder sets of fire-fighting vehicles for accomodating persons in a rescue situation. Such cages must fulfil certain safety requirements. One of these requirements is that a person accommodated in the rescue cage must be prevented from falling out accidently. For this reason modern rescue cages are provided with a continuous handrail running over the top of the walls of the framework of the cage. On the other hand, it should be possible to leave the cage whenever it is necessary. Therefore it should be possible to open the handrail, so that a person inside the cage can cross the handrail and move out.

[0003] The respective opening portion of the handrail must be prevented from being opened unintentionally to keep its securing function. However, opening the handrail should be easily performed effortless even by an inexperienced user. In particular care should be taken that no part of the handrail is in the way when the person leaves the cage, so the opened handrail should not interfere with the opening representing the escape passageway from the cage. There are certain prescriptions that for safety reasons the handrail should only be opened in an inward or upward direction. These requirements can hardly be fulfilled by handrails according to the state of the art. To be opened towards an inward direction has some disadvantages because the opening section easily interferes with the user.

[0004] It is therefore an object of the present invention to provide a handrail for a fire-fighting rescue cage that keeps the handrail secure in its closed position without any danger of being opened accidently but can be opened easily when desired, without any parts interfering with the passage opened in the handrail. It is another object of the present invention to provide a handrail that can only be opened in an upward direction without interfering with a user.

[0005] This object is achieved by a handrail for a fire-fighting rescue cage comprising the features of claim 1.

[0006] The handrail according to the present invention comprises an opening section that can be opened by a pivoting movement around a pivoting axis. This opening section comprises a bar that is disposed in an approximately horizontal plane in a closed position of the handrail. This bar is attached to a frame element of the handrail by a hinge bearing. The hinge bearing comprises the pivoting axis, which is inclined downwardly with respect to the plane in which the bar is located in the closes state and extending outwardly from the framework of said cage.

[0007] Because of this inclination and outwardly directed arrangement of the pivoting axis, the bar can be pivoted from its closed state into an opened upright state wherein it does not block the free passage that is now provided in the opened state of the handrail. When the bar is turned over around the pivoting axis, there is no danger of any interference with a person crossing the exit of the cage. There is also no danger that the bar falls back into its closed position accidently. Although it can keep its closed position because of its own weight, the opening section can be opened easily even by inexperienced users in a rescue situation.

[0008] According to a preferred embodiment of the present invention, said bar comprises two sections being angled with respect to each other, both sections lying in a horizontal plane in the closed position.

[0009] This embodiment is especially suited for arranging the opening section at one corner of the rescue cage, wherein a bending between these two sections can be arranged over the corner of the framework of the cage.

[0010] Preferably said pivoting axis lies within a vertical plane that encloses an angle between about 120° and about 140° with at least one adjacent wall of the cage.

[0011] According to another preferred embodiment, said hinge bearing is disposed at a corner of the rescue cage, and an end section of the bar lies approximately parallel to a first wall of the cage in the closed position and approximately parallel to a second wall of the cage in the opened position. According to another preferred embodiment, the hinge bearing comprises an inner shaft portion being fixed to the frame element and extending outwardly therefrom in a downwardly inclined direction, and a sleeve being supported pivotally on said shaft portion and being fixed to said bar.

[0012] Preferably said hinge bearing further comprises a flange being attached to the end of the inner shaft portion, said flange being press-held against an outer end of said sleeve to pinch the sleeve between the flange and the frame element. In this arrangement the sleeve can be held in its angular pivoting position by the friction between the flange and the frame element, respectively and the end faces of the sleeve. This friction holds all the parts being turnable with respect to each other in their turning position. However, the turning movement is not completely blocked so that the bar can still be pivoted at the hinge bearing into any desired position that is held automatically when no force by the user acts on the bar. That is, the flange for pressing the sleeve against the frame element represents a mechanism to hold the bar in its turning position.

[0013] Preferably said hinge bearing further comprises a friction disk arranged between an inner end of said sleeve and the frame element.

[0014] This friction disk increases the friction between the sleeve and the frame element, so that the bar can only be moved against this increased friction. The friction can be such that the bar keeps any angular position when no torque is applied to the bar.

[0015] According to another preferred embodiment, the hinge bearing further comprises a spring arranged concentrically within the sleeve to bias said flange against the outer end of the sleeve.

[0016] These and other objections, advantages and

features of the present invention will be become more apparent from the following description with respect to the accompanying drawings.

Fig. 1 is a perspective view of a fire-fighting rescue cage comprises a handrail as one embodiment of the present invention;

Fig. 2 shows the fire-fighting rescue cage from Fig. 1 with the handrail according to one embodiment of the present invention in the opened state;

Fig. 3 is a detailed view of the opening section of this embodiment of the handrail for fire-fighting rescue cage according to Figs. 1 and 2; and

Fig. 4 is a top view of the opening section of the handrail according to this embodiment of the present invention according to Fig. 3.

[0017] Fig. 1 shows a fire-fighting rescue cage generally denoted by reference number 10. This rescue cage 10 is provided to be suspended on top of a ladder set that is carried by a fire-fighting vehicle. Together with the ladder set, the rescue cage 10 can be lifted into an operating position. The fire-fighting rescue cage 10 comprises numerals elements as fire-fighting equipment, for example, a water monitor and control elements for moving the rescue cage 10 at an operating stand located inside the cage 10. These elements have no further relation to the teaching of the present invention, and a description thereof will be omitted.

[0018] The rescue cage 10 comprises a flat rectangular bottom 12 and a framework 14 rising from this bottom 12, said framework 14 comprising four cage walls, namely a front wall 16 comprising a front plate, a right side wall 18, a left side wall 20 and back wall 22. The back wall 22 comprises a passage way 24 for leaving the rescue cage 10 through door wings 26 that can be opened by a person inside the cage and close automatically. Another passageway 28 is located at a front right corner of the cage 10 where the front wall 16 and the right wall 18 meets. This passageway 28 is also closed by doors 30 that can be opened or closed by a user.

[0019] On top of the walls 16,18,20,22 of the framework 14 of the cage 10, a handrail 32 is disposed that encloses the top opening of the cage 10 completely. At the locations where the passageways 24,28 of the cage 10 are disposed, this handrail 32 can be opened. The opening mechanism for the first passageway 24 at the rear wall 22 of the cage 10 will not be described here. On the front right corner of the cage 10, an opening section 34 is provided that can be opened easily by a user but keeps its closed position when no force acts on the opening section.

[0020] The opening section 34 of the handrail 32 is formed by a tubular bar 36 that lies in the same plane as the remaining bars 38 fixed on top of the walls 16,18,20,22, forming the remains of the handrail section 32. This plane is disposed approximately horizontal in an operation position of the cage 10. The bar 36 comprises two bar sections, namely a first section 40 lying in the same vertical plane as the front wall 16 and being disposed on the same axis as the section of the handrail 32 that is fixed on top of this front wall 16, and a second section 42 that connects the first section 40 with a hinge bearing 44 for pivotably attaching an end of the bar 36 to a pillar-shaped frame element of the handrail 32. The construction of this hinge bearing will be described further in greater detail.

[0021] The hinge bearing 44 is arranged such that the bar 36 can be lifted and turned from the closed position in Fig. 1 to their open position in Fig. 2, wherein the bar 36 does not longer block the passage way 28 at the right front corner of the cage 10. In this open position, there is no danger that the bar 36 falls accidently back into its closed position. The first section 40 of the bar 36 is then pointing backwards in an upright direction, standing approximately parallel to the right wall 18 of the cage 10 (or being inclined slightly inwards in the direction of the right rear corner of the cage 10). Any interference with a person crossing the passageway 28 is avoided in this position of the bar 36.

[0022] The mechanism of the hinge bearing 44 is described in greater detail with reference to Fig. 3. This figure shows the opening section 34, i.e. the bar 36 in the closed position according to Fig. 1 from another perspective. Both sections 40,42 of the bar 36 lie in the same horizontal plane, being angled with respect to each other and enclosing an angle of approximately 120°. By the hinge bearing 44, the second section 42 of the bar 36 is connected to a pillar-shaped frame element 46 of the framework 14 of the cage 10. From the frame element 46, a shaft portion 48 extends outwardly with respect to the construction of the cage 10, the axis of this shaft portion 48 being inclined downwardly. This axis, marked by reference A in Fig. 3, represents the pivoting axis of the hinge bearing 44 around which the bar 36 can be turned into its open position. Onto this shaft portion 48, a sleeve 50 is supported pivotably to be turned around the pivoting axis A. The outer peripheral surface of the sleeve 50 is fixed to the second section 42 of the bar 36. That is, a torque can be applied at the bar 36 and transmitted to the sleeve 50 to be turned around the pivoting axis A of the inner shaft portion 48. The pivoting axis A lies within a vertical plane that encloses an angle of about 135° with the adjacent front wall 16 and the side wall 18 of the cage 10.

[0023] The hinge bearing 44 further comprises a disc-shaped flange 52 being attached to the end of the inner shaft portion 48 and being press-held against the outer end face of the sleeve 50. More precisely, the flange 52 is biased with a predetermined biasing force along the pivoting axis A against the respective end face of the sleeve 50 so that the sleeve 50 in pinched between the flange 52 and the end face of the frame element 46. This biasing force is such that the turning movement of the bar 36 is not blocked but the bar 36 keeps any desired turning position when operated by a user. This is due to

the friction between the contact phases of the flange 52 and the sleeve 50, on one hand, and the sleeve 50 and the frame element 46. Between the sleeve 50 and the frame element 46, a ring-shaped friction disk 54 is provided that increases the friction between the sleeve 50 and the frame element 46.

[0024] The bar 36 can only be moved, i.e. turned around the hinge bearing 44 against this friction.

[0025] The biasing force to press the sleeve 50 together with the flange 52 against the friction disk 54 and the frame element 46 is provided by a spring 56 that is disposed inside the sleeve 50 and wound around the inner shaft portion 48 to be arranged concentrically within the sleeve 50. This spring 56 is fixed, on one hand, to the frame element and with its other end to the flange 52 to pull the flange 52 along the pivoting axis A in the direction of the frame element 46. The free end of the bar 36, that is, the first section 40 can be provided with a locking means to connect the free end of the bar 36 to the framework 14 and to the remaining fixed section of the handrail 32 that is not shown in Fig. 3.

[0026] Fig. 4 further shows a top view of the opening section of Fig. 3, demonstrating the angular arrangement of the two sections 40 and 42 of the bar 36.

Claims

1. Handrail (32) for a fire-fighting rescue cage (10), **characterized by** an opening section (34) that can be opened by a pivoting movement around a pivoting axis (A), said opening section (34) comprising a bar (36) that is disposed in an approximately horizontal plane in a closed position and a hinge bearing (44) for pivotably attaching an end of said bar (36) to a frame element (46) of said handrail (32), said hinge bearing (44) comprising a pivoting axis (A) being inclined downwardly with respect to said plane and extending outwardly from the framework (14) of said cage (10).

2. Handrail according to claim 1, **characterized in that** said bar (36) comprises two sections (40, 42) being angled with respect to each other, both sections (40, 42) lying in a horizontal plane in the closed position.

3. Handrail according to claim 1 or 2, **characterized in that** said pivoting axis (A) lies within a vertical plane that encloses an angle between about 120° and about 140° with at least one adjacent wall (16, 18) of the cage (10).

4. Handrail according to one of claims 1 to 3, **characterized in that** said hinge bearing (44) is disposed at a corner of the rescue cage (10), and an end section (40) of said bar (36) lies approximately parallel to a first wall (16) of the cage in the closed position and approximately parallel to a second wall (18) of the cage in the opened position.

5. Handrail according to one of claims 1 to 4, **characterized in that** said hinge bearing (44) comprises an inner shaft portion (48) being fixed to the frame element (46) and extending outwardly therefrom in a downwardly inclined direction, and a sleeve (50) being supported pivotably on said shaft portion (48) and being fixed to said bar (36).

6. Handrail according to one of claim 5, **characterized in that** said hinge bearing (44) further comprises a flange (52) being attached to the end of the inner shaft portion (48), said flange (52) being press-held against on outer end of said sleeve (50) to pinch the sleeve (50) between the flange (52) and the frame element (46).

7. Handrail according to claim 6, **characterized in that** said hinge bearing (44) further comprises a friction disk (54) arranged between an inner end of said sleeve (50) and the frame element (46).

8. Handrail according to one of claim 6 or 7, **characterized in that** said hinge bearing (44) further comprises a spring (56) arranged concentrically within the sleeve (50) to bias said flange (52) against the outer end of said sleeve (50).

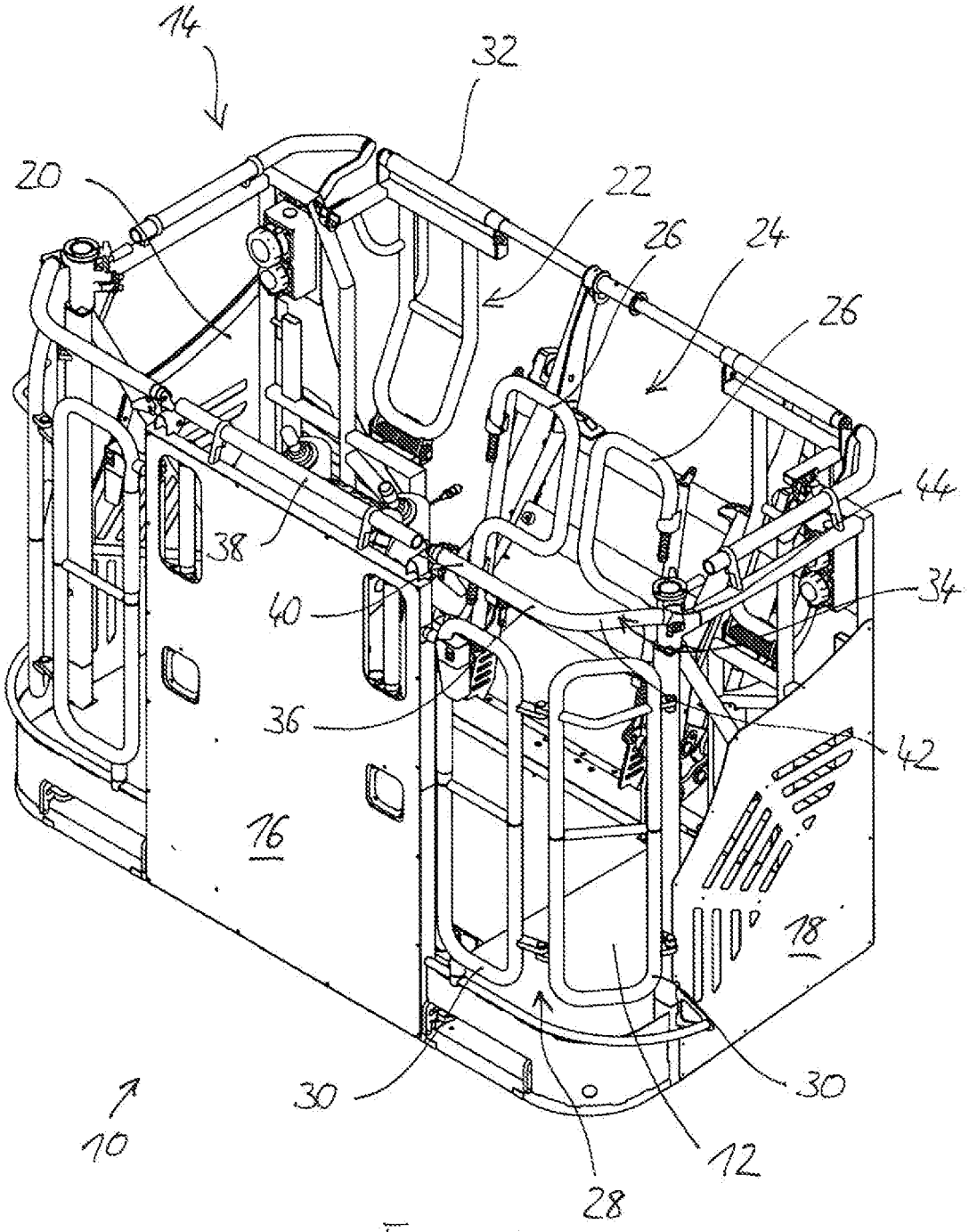

Fig. 1

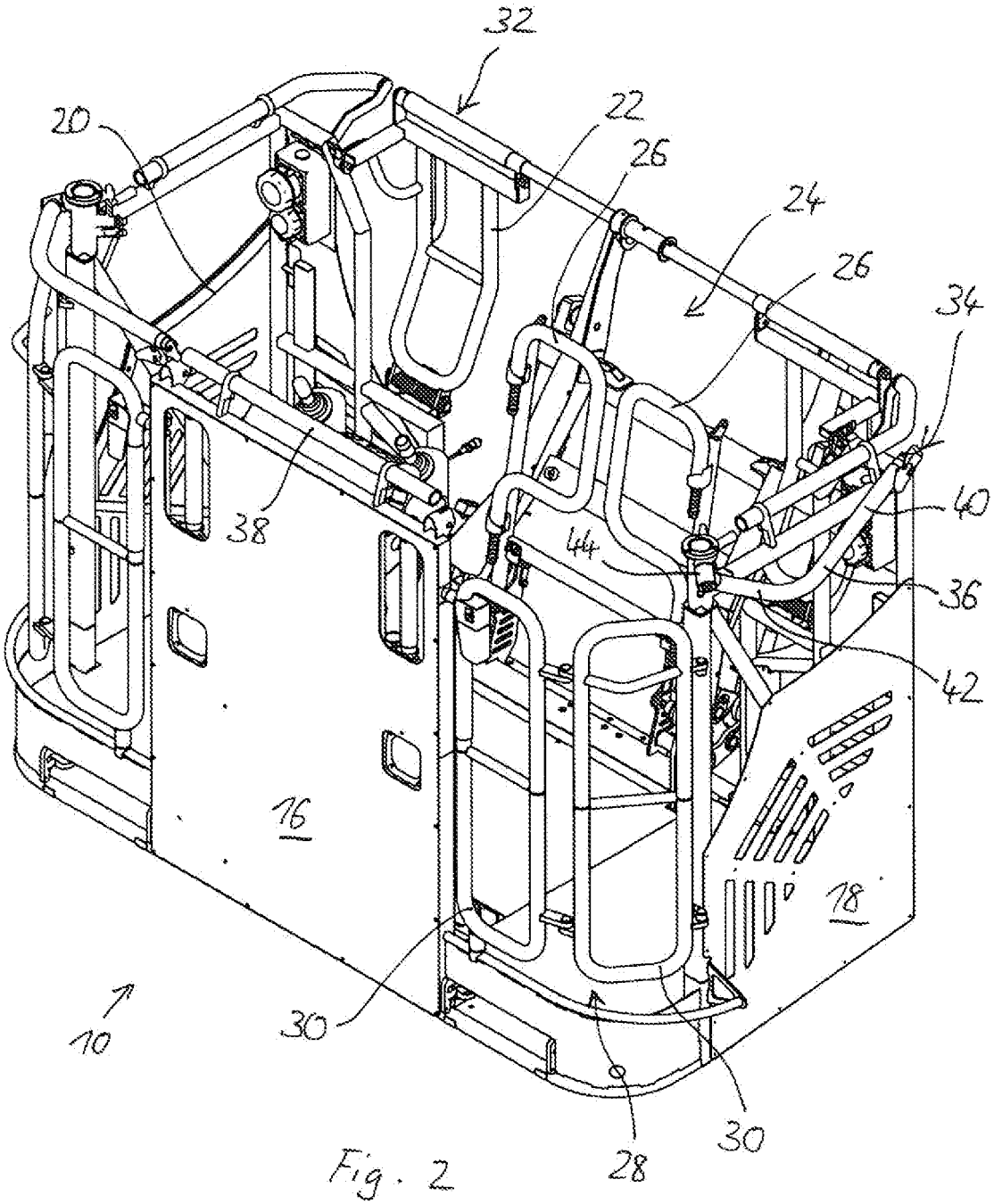

Fig. 2

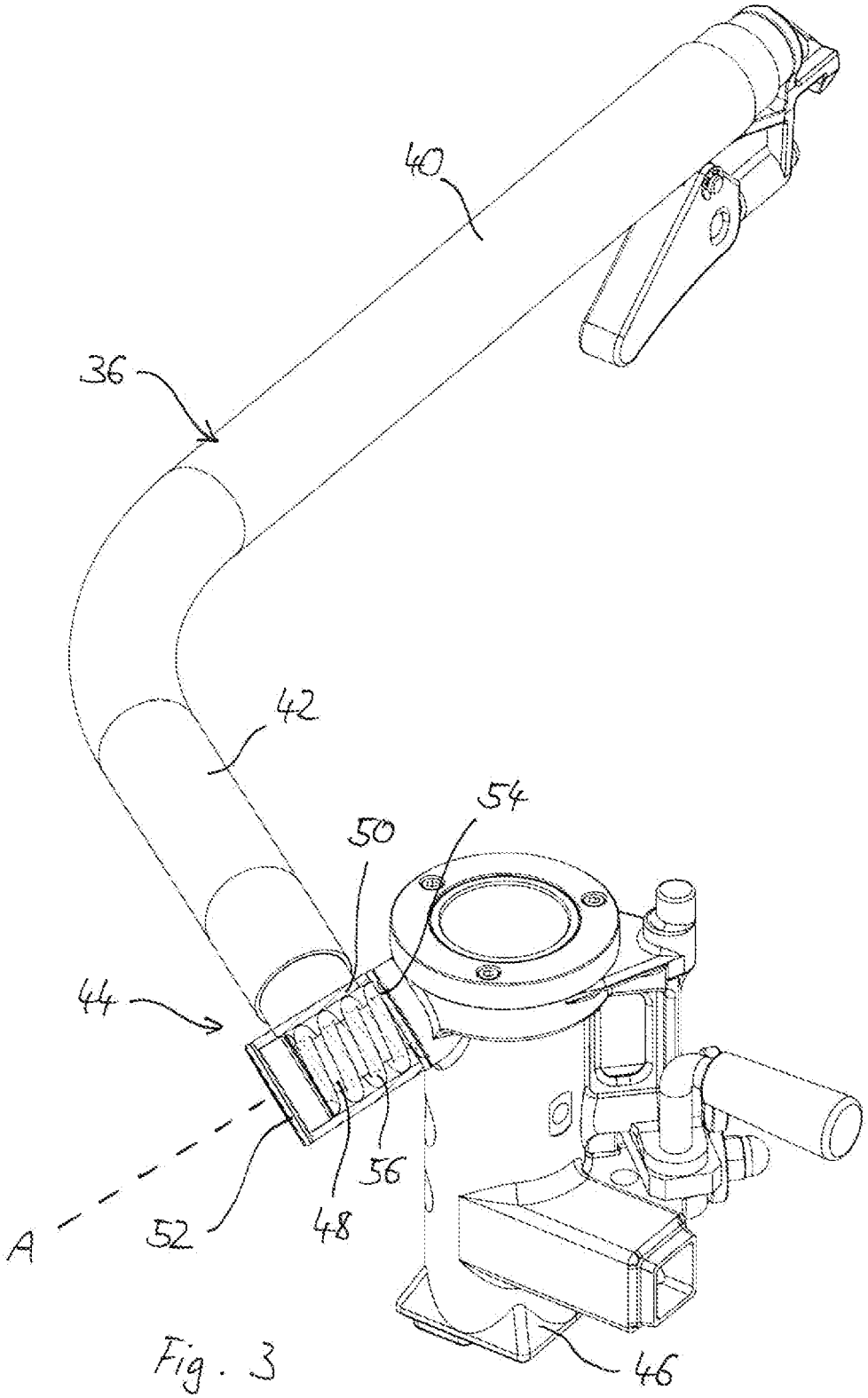

Fig. 3

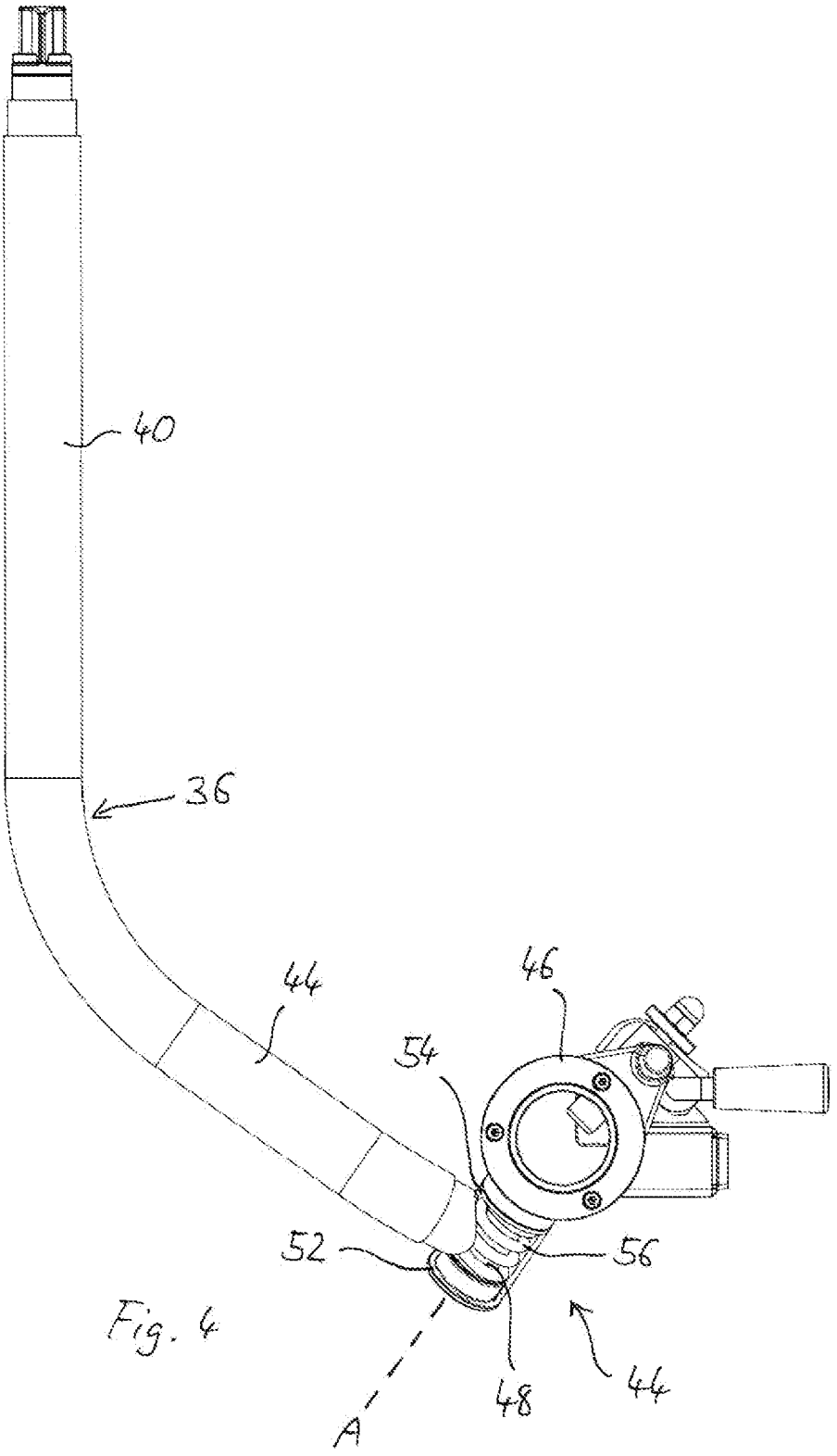

Fig. 4

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EUROPEAN SEARCH REPORT

Application Number
EP 10 15 9591

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 2002/100637 A1 (STRINGER MATTHEW D [US] ET AL) 1 August 2002 (2002-08-01) * the whole document *	1-5	INV. B66F11/04
A	EP 1 666 100 A2 (IVECO MAGIRUS [DE]) 7 June 2006 (2006-06-07) * abstract; figure 1 *	1	
A	US 6 145 619 A (RISSER PHILIP E [US]) 14 November 2000 (2000-11-14) * abstract; figures 1-7 *	1	
A	US 4 650 036 A (MATSUDA MASAKO [JP]) 17 March 1987 (1987-03-17) * abstract; figure 3 *	1	

TECHNICAL FIELDS SEARCHED (IPC)

B66F
A62B
E06C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	24 September 2010	Rupcic, Zoran

CATEGORY OF CITED DOCUMENTS

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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 10 15 9591

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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24-09-2010

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