



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
17.05.2017 Bulletin 2017/20

(51) Int Cl.:
B63B 27/14 (2006.01)

(21) Application number: **16196774.0**

(22) Date of filing: **01.11.2016**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
MA MD

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(30) Priority: **13.11.2015 IT UB20155552**

(54) **TILTABLE AND RETRACTABLE GANGWAY FOR BOATS**

(57) A tiltable and retractable gangway for boats has a box-like load-bearing structure (1), inside which a longitudinally movable carriage (7) is lockable in a desired position, a gangway tilting part (29) in the form of a tube hinged with the carriage (7) and a gangway retractable part (34). The carriage (7) has inside at least one linear

actuator (16) provided with a rod (17) carrying at its free end a wedge member (20) having a horizontal upper surface (22s) and a lower surface (22i) tapering upwards in contact with the carriage (7) and the gangway tilting part (29) respectively, to establish and change the inclination of the gangway tilting part (29).

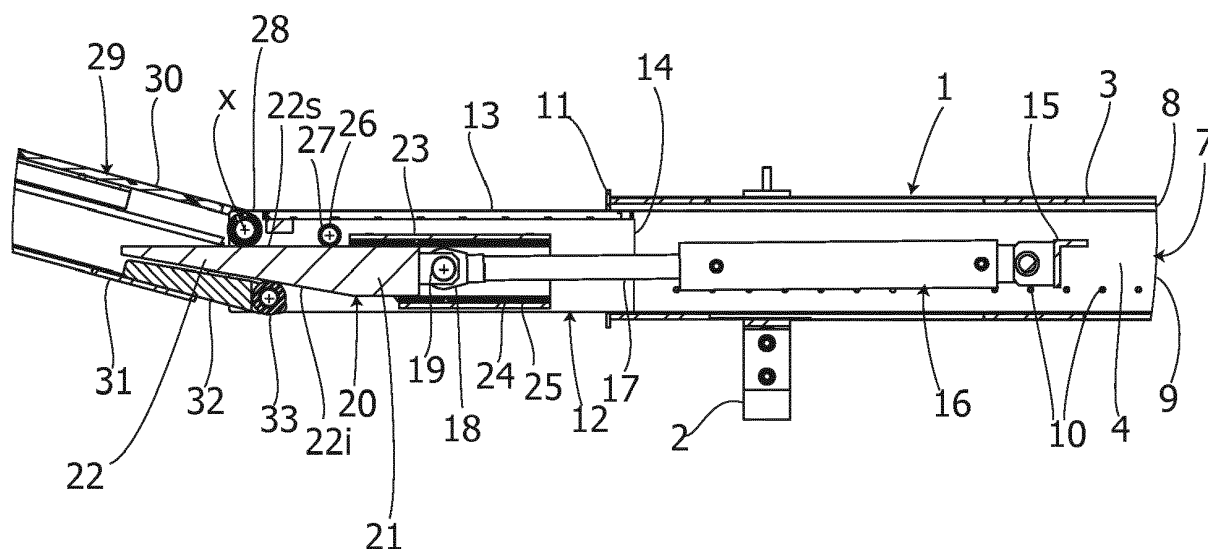


Fig. 4

Description

[0001] The present invention relates to a tiltable and retractable gangway for boats, namely a boarding bridge for the passage between a boat and a quay and vice versa, for embarkation and disembarkation of people. The boats that can use such a gangway are especially yachts, but the gangway could be usefully mounted on ships.

[0002] Usually, these gangways are installed in a boat's stern area as boats are commonly moored with their stern facing the quay.

By way of example, a yacht has a point of embarkation and disembarkation at its stern. The walking floor of the quay can be at the same height of the yacht's gangway or higher or lower than it. To allow the passage, a common gangway must be cantilevered beyond the boat transom, the gangway being suitably inclined and resting on the quay. This requires the use of more people.

Gangways that are extended, retracted and variously inclined by mechanical actuators already exist. Examples of these mechanically assisted gangways are described for example in US 4,224,709, US 4,455,703 and US 4,551,877. These documents essentially describe transfer bridges not really intended for boats, but useful for connecting two different walking floors. In particular, US 4,455,703 describes an adjustable dockboard for bridging the gap between a loading dock and a truck. In particular, such a dockboard includes a ramp and an extension plate which is telescoped into the ramp when not in use. When the dockboard is raised by a spring assembly in order to engage the bed of the truck, the extension plate is moved outward from the ramp and is provided with a carriage which absorbs the forces exercised on the extension plate by the bed of the truck.

The arrangements described in the documents cited above are not suitable to be installed on boats for several obvious reasons, among which their considerable bulk. WO2008/153498 describes a movable transom of a boat. The movable transom is hinged inferiorly so to transform in a gangway that is variously tiltable by hydraulic cylinders. The transom can be adjusted from a vertical closure position to a tilted position for resting on a quay in order to permit the passage of people. It should be easily understood that the gangway described in WO2008/153498 is not useful for boats having a fixed transom. WO2014/077694 relates to a transfer system for transferring persons and/or goods from a ship. The transfer system comprises a pedestal, an integrated gangway crane connected to the pedestal, and an actuator acting between the pedestal and the integrated gangway crane configured for rotating the integrated gangway crane relative to the pedestal. The transfer system described in WO2014/077694 is not useful for boats.

[0003] One object of the present invention is to provide a gangway having a tilting part to compensate for differences in height between the quay and a deck of a moored boat.

Another object of the invention is to provide a tiltable and retractable gangway for a boat having a fixed transom. Another object of the invention is to provide a tiltable gangway having a very low encumbrance so that it can be installed also on small boats.

The objects specified are substantially achieved by a tiltable and retractable gangway for boats, the gangway comprising a box-like load-bearing structure, inside which longitudinally movable are a carriage lockable in a desired position, a gangway tilting part in the form of a tube hinged with the carriage and a gangway retractable part. The carriage has inside at least one linear actuator provided with a rod carrying at its free end a wedge member having a horizontal upper surface and a lower surface tapering upwards in contact with the carriage and the gangway tilting part respectively to establish and change the inclination of the gangway tilting part.

[0004] Further features and advantages of the present invention will become more apparent from the indicative, and therefore non-limiting, description of a preferred embodiment of a tiltable and retractable gangway for boats, as illustrated in the accompanying drawings in which:

- Figure 1 is a perspective view of a gangway according to the present invention, with a tilting part rotated upwards;
- Figure 2 is a partial top plan view of the gangway in Figure 1;
- Figure 3 is a cross-section view obtained according to the lines A-A in Figure 2;
- Figure 4 is an enlarged view of a detail in Figure 3; and
- Figures 5 and 6 are enlarged views similar to that of Figure 4, but with a tilting part horizontal and rotated downwards, respectively.

[0005] Reference is made initially to Figures 1 to 3, which are a perspective view of the gangway according to the present invention, a partial top plan view and a longitudinal cross-section respectively, of the same. Indicated therein as 1 is a box-like load-bearing structure, shown only in part, being fastened in a stern zone (not shown) of the boat, by means of brackets generally indicated as 2 or in another useful fashion. The box-like load-bearing structure 1 has an upper wall 3 acting as a walking floor of the gangway, and side walls 4. Formed in the side walls 4 are longitudinal slits 5 and through holes 6. Mounted inside the box-like load-bearing structure 1 is a hydraulic cylinder (not shown) for conventionally extracting and retracting a movable part of the gangway formed by a gangway tilting part 29 and a gangway retractable part 34.

[0006] Referring to Figure 4, which is an enlarged detail of Figure 3, there is shown that a carriage 7 is longitudinally movable within the box-like load-bearing structure 1 thanks to the above mentioned hydraulic cylinder. The carriage 7, which is connected to said gangway tilting part 29, can be shaped in a cross section view as an

inverted U with a core 8 facing the upper wall 3 of the box-like load-bearing structure 1, and wings 9 directed vertically downwards. Formed in the wings 9 of the carriage 7 are through holes 10 that are equally spaced like the through holes 6 formed in the facing side walls 4 of the box-like load-bearing structure 1. The carriage 7 can be blocked inside the box-like load-bearing structure in the desired position by inserting at least a pin in through holes 6 and 10 when they are concentric. The box-like load-bearing structure 1 has at the front an abutment element 11 for preventing the exit of the carriage 7 from the box-like load-bearing structure 1. Integral in front with the carriage 7 is a section 12 which is also shaped as an inverted U in a cross-section view with a core 13 and wings 14 directed vertically downward.

Welded inside the carriage 7 is a crosspiece 15 on which at least one hydraulic cylinder or other equivalent actuator 16, for example electrical, is fixed; the hydraulic cylinder 16 has a piston rod 17 terminating with an eye 18. Inserted in the eye 18 is a pivot 19 on which a wedge member 20 is hinged. The wedge member 20 has a longitudinal cross-section with a rectangular zone 21 facing the eye 18 and an area 22 in the form of a rectangular trapezoid facing the opposite side. Further, indicated as 22s and 22i are upper and lower surfaces, respectively, of the part of the wedge member 20 corresponding to the area 22 in the form of a rectangular trapezoid.

Welded on the wings 14 of section 12 are two parallel rails, the top one 23 and the bottom one 24, acting as a constraint for the displacement of the wedge member 20 in the longitudinal direction y of the gangway. The parallel rails 23 and 24 are coated with an antifriction material 25. In addition to the parallel rails 23 and 24, a roller 26 is suitably mounted on a pin 27 for slidably engaging superiorly the wedge member 20 and help the latter to withstand bending stresses applied. Further, provided on the outer end, or pivoting end, of the section 12 is a hinge 28 for the gangway tilting part 29 according to the present invention. The hinge 28 embodies a pivot axis x that is transverse to the longitudinal axis y of the gangway. The hinge 28 is provided on the section 12 in proximity to its core 13. Thanks to the fact that the section 12 has an inverted U-shaped cross-section, the gangway tilting part 29 can be rotated downwards without any interpenetration with the section 12, as will be seen later.

The gangway tilting part 29 is substantially a gangway portion made with a tubular element having a top side 30 which is also the walking floor and a bottom side 31 opposite the first one. The gangway tilting part 29 engages, in the vicinity of its top side 30, the hinge 28 in its end facing the outer end of the section 12. Cantilevered in the bottom side 31 of the gangway tilting part 29 and facing the hinge 28 is a shaped plate 32. The shaped plate 32 has an inner end and an outer end projecting from the gangway tilting part 29. This outer end bears a roller 33 by a spindle. The shaped plate 32 is tapered from the outer end to the inner end thereof. The arrangement described above is such that the wedge member

20 is in permanent contact with the hinge 28 of the carriage 7 in its upper surface 22s and with the roller 33 of the gangway tilting part 29 in its lower surface 22i.

As shown in Figure 1, the gangway tilting part 29 has at least one retractable part 34 to increase the overall length of the gangway in a conventional manner and therefore not further described.

To use the gangway according to the present invention, the tilting part 29 is extracted by means of the carriage 7 which advances inside the box-like load-bearing structure 1 by the actuation of the hydraulic cylinder not shown. The carriage 7 is blocked in the desired position depending on the desired overhang for the gangway.

With reference to Figures 1 to 4, there is shown the gangway tilted upward at 15° to the horizontal. With the carriage 7 in its blocked position, the hydraulic cylinder 16, or a pair of hydraulic cylinders, is fed to advance the wedge member 20 carried by its rod 17 to the end of its stroke. The wedge member 20 moves longitudinally being guided by the parallel rails 23, 24 internally fixed to the section 12. As shown in figure 4 in cross-section view, the area 22 in the form of a rectangular trapezoid of the wedge member 20 is located permanently between the hinge 28 of the section 12 and the shaped plate 32 fixed on the bottom side 31 of the gangway tilting part 29. The forward movement of the wedge member 20 causes the movement downwards of the roller 33 supported by the shaped plate 32, and a consequent rotation upwards of the gangway tilting part 29. The above mentioned tilting of 15° depends on the taper of the area 22 in the form of a rectangular trapezoid of the wedge member 20 and, correspondingly, of the shaped plate 32. Obviously, a different tilting may be obtained with a different conformation of those parts.

In the embodiment described, the angle of the gangway tilting part 29 can be reduced up to 0° by moving the wedge member 20 by means of a retraction of the piston within the hydraulic cylinder 16. This is shown in Figure 5 which is a view similar to that in figure 4. In Figure 5, the wedge member 20 is retracted until the cores 13 and the top side 30 of the section 12 and the tilting part 29 respectively, are coplanar.

It should be evident that, as shown in Figure 6, similar to Figures 4 and 5, the further retraction of the piston and, hence, of the wedge member 20 determines a rotation downwards, e.g. of 10°, due to the contrast of the constraints created by the hinge 28 and by the roller 33.

The features of the invention may vary in the scope of protection defined by the attached claims.

Claims

1. A tiltable and retractable gangway for boats, the gangway comprising:

a box-like load-bearing structure (1), inside which a longitudinally movable carriage (7) is

lockable in a desired position,
 a gangway tilting part (29) in the form of a tubular
 element hinged with the carriage (7) in a pivoting
 end thereof, and
 a gangway retractable part (34),
characterized in that the carriage (7) has inside
 at least one linear actuator (16) provided with a
 rod (17) carrying at its free end a hinged wedge
 member (20) having a horizontal upper surface
 (22s) and a lower surface (22i) tapering upwards
 that are in contact with the carriage (7) and the
 gangway tilting part (29) respectively, to estab-
 lish and change the inclination of the gangway
 tilting part (29).

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2. The gangway according to claim 1, wherein the car-
 riage (7)

- comprises an inverted U-shaped section (12)
 with a core (13) and wings (14),
- is able to protrude out of the box-like load-bear-
 ing structure (1),
- is provided internally with upper and lower rails
 (23, 24), for the longitudinal sliding of the wedge
 member (20), and a hinge (28) in the vicinity of
 the core (13), in which the gangway tilting part
 (29) is pivoted, the upper surface (22s) of the
 wedge member (20) being in contact with the
 hinge (28).

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3. The gangway according to claim 2, wherein arranged
 between the hinge (28) and the upper rail (23) is a
 further roller (26) to support stresses in the sliding
 of the wedge member (20).

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4. The gangway according to claim 2, wherein the tu-
 bular element of the gangway tilting part (29) has a
 top side (30) near said pivoting end of the carriage
 (7), and a bottom side (31), cantilevered in which, in
 front of said pivoting end of the carriage (7), is a
 shaped plate (32) bearing a roller (33) by a shaft, so
 that the wedge member (20) is interposed between
 the hinge (28) and the roller (33) with which the lower
 surface (22i) of the wedge (20) is in contact.

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5. The gangway according to claim 2, wherein the up-
 per and lower rails (23, 24) are coated with an anti-
 friction material (25).

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Fig. 1

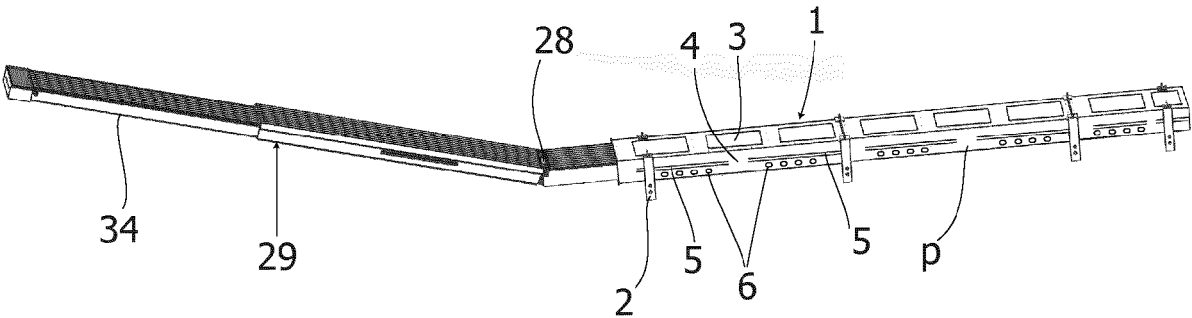


Fig. 2

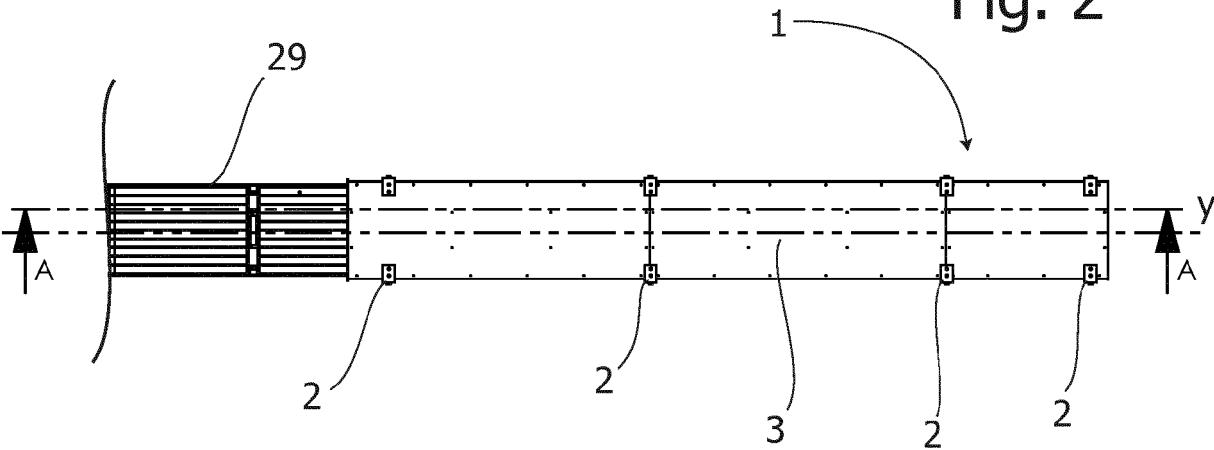


Fig. 3

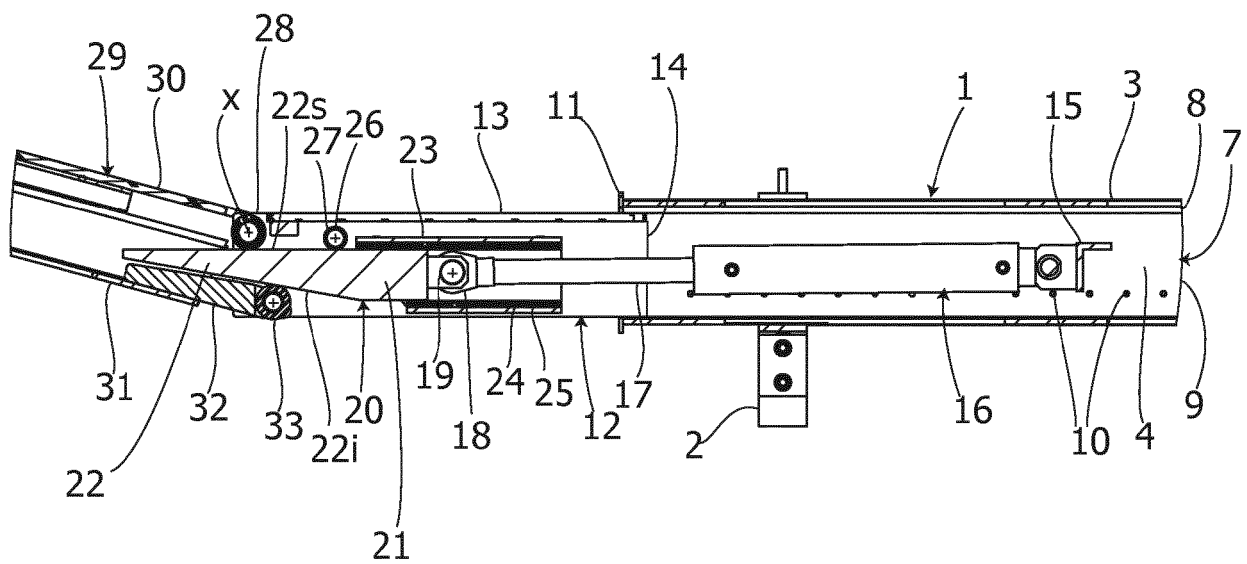
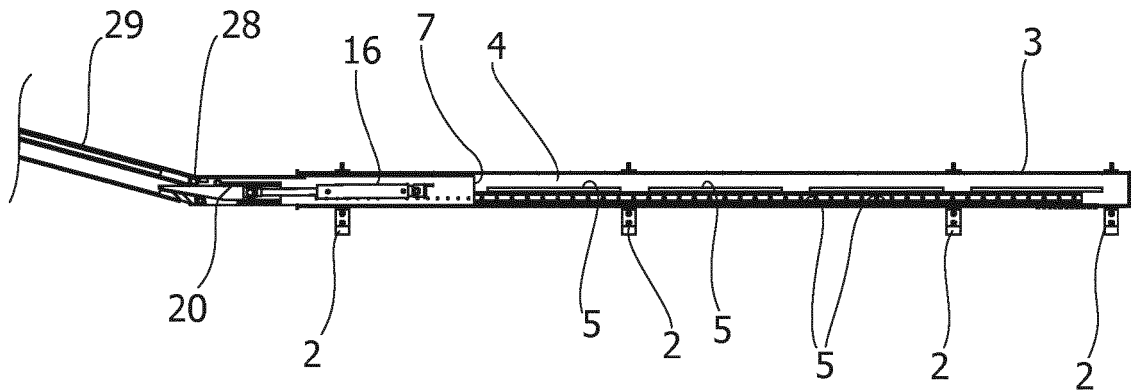


Fig. 4

Fig. 5

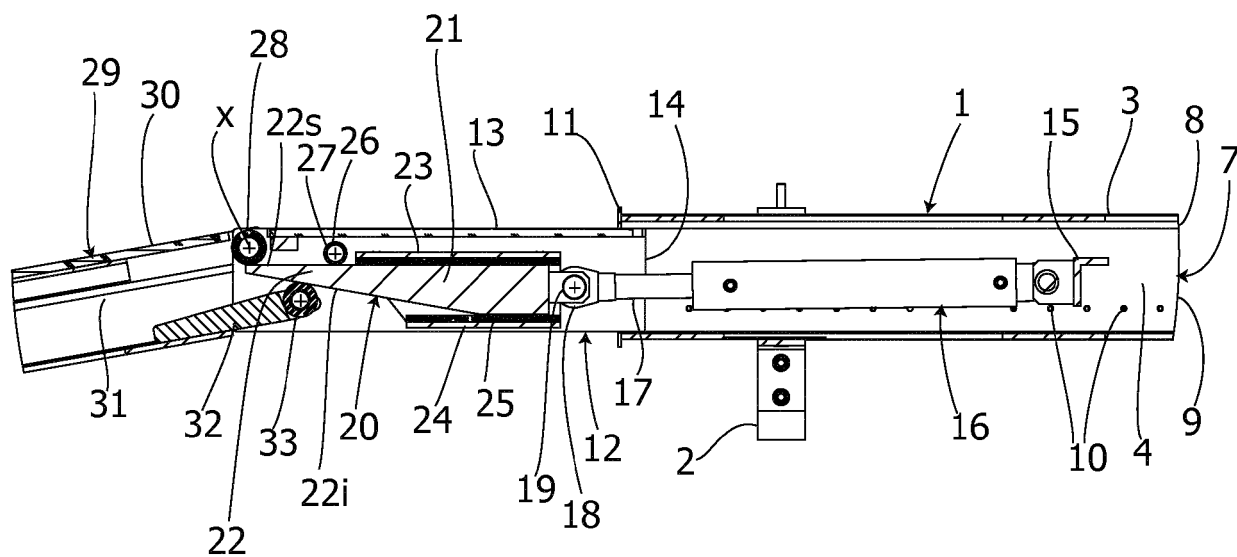
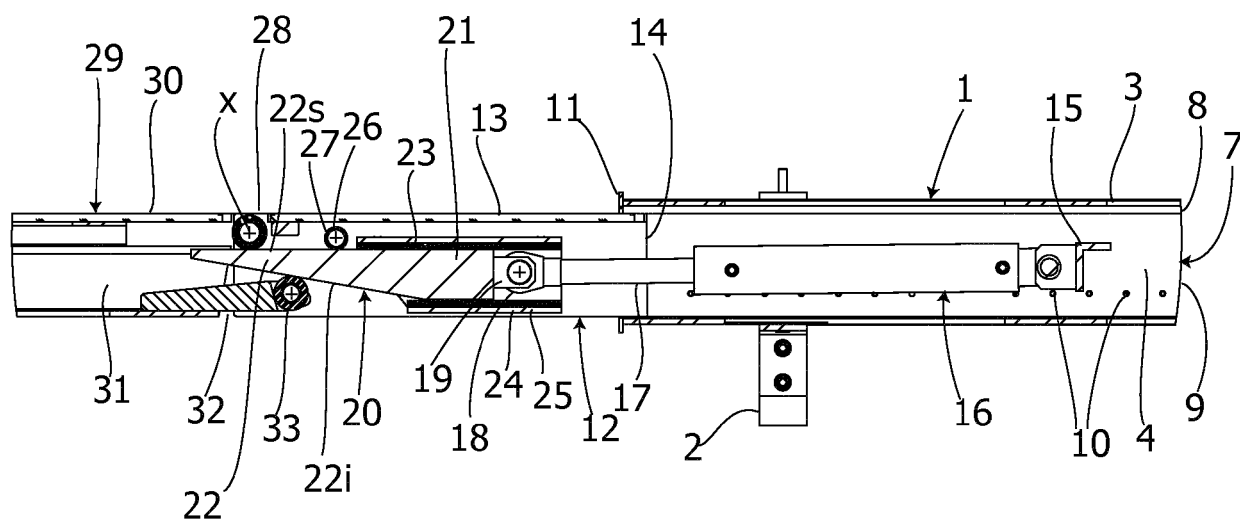


Fig. 6



EUROPEAN SEARCH REPORT

 Application Number
 EP 16 19 6774

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EPO FORM 1503 03.82 (P04C01)

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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 2 March 2017	Examiner Brumer, Alexandre
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			

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

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