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(54) **Safety anchorage for inspection wells**

(57) It comprises an external support or tube (3), which is firmly secured to the wall of the manhole and an internal tube (4), provided with a set of anchorage rings (5) at its top or at a zone close to its top; in which said internal tube (4) has a smaller section than the external tube, and which can slide vertically over said support or external tube (3), from a retracted (lower) position in which this is arranged under the cover of the manhole, to a raised (upper) position, in which it emerges from the surface above said manhole cover high enough for a safety anchorage to be secured, also comprising: means for retaining and locking the internal tube (4) on the external support or tube (3) in its raised position, and a device for releasing the locking of the internal tube on the external tube.

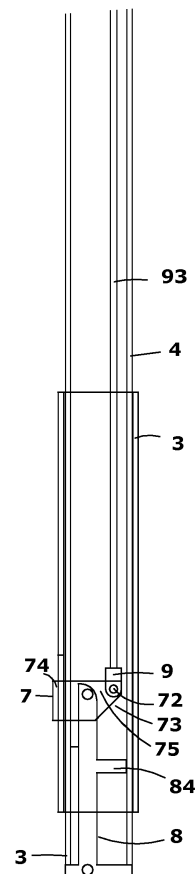


Fig. 7

Description

[0001] This invention covers a fixed, retractable safety anchorage placed on the inside of a manhole beside its mouth, and in a general sense usable for any installation down which access is required and where a protection anchorage is needed, which also comprises a retention device extending outwards.

[0002] Manholes comprise a cover, normally a cast iron lid, which is removed or opened on a hinge. The operators have to go down these manholes in order to carry out inspection, cleaning or maintenance operations in the installations to which they give access, such as water supply or sewage, electrical or telephony conduits, amongst others. To this end, the manhole normally comprises an integrated stair, held to the wall by means of bolts or anchored in the fabric.

[0003] A safety anchorage device protecting the user from any accidental falls is nevertheless needed for going down one of these manholes.

[0004] EN 795:2012 standard describes different systems of safety anchorages for different uses. In particular, a tripod is generally used for manholes. The tripod consists of a set of three arms, normally made of iron, which joint at the vertex formed at the top, this vertex having a ring for anchoring the safety harness or cord used by the operator. The tripod must normally have an anchorage to the ground to prevent this from moving. The tripod will have to be transported and installed at each manhole which is to be accessed, and must later be removed and again transported to a vehicle or finally a store.

[0005] Although tripods have proved to be satisfactory as regards the safety conditions that these provide, they have to be moved and installed. These operations take time and effort which hinder or delay the operations to be carried out by operators.

[0006] ES 2371429 describes an improved system for access to vertical underground conduits which consists of a vertical tube provided with horizontal rungs like a stair, with an extractable anti-fall safety system, and which is firmly mounted on the wall of the manhole. This is provided with rings for anchoring a carabiner snap-clip or a self-retracting lifeline, and means for locking the system, as well as an auxiliary tool for extraction and un-locking.

[0007] This invention is only applicable to manholes without a stair, and though it solves the problem of transporting the external safety item, such as the tripod, it proves expensive through being as long as the manhole is deep and also requiring removing and releasing operations which may lead to safety problems.

[0008] The invention now being proposed provides a satisfactory solution for the aforementioned problems.

Description of the invention

[0009] A safety anchorage for manholes is thus described, consisting of a retractable system inside the

manhole which comprises:

- An external support or tube, which is firmly anchored to the wall of the manhole;
- An internal tube, provided with a set of anchorage rings at the top or in an area close to its top; said internal tube can vertically slide along said external tube, from a retracted (lower) position in which this lies under the cover of the manhole, to a raised (upper) position, which emerges from the surface of said manhole opening high enough to fix a safety anchorage to this, normally over one metre, and preferably not more than 1.30 metres; it can normally reach roughly 2 metres; its minimum length will thus be roughly 1.5 m, and its maximum length 2.5 metres;
- A means of retaining and locking the internal tube on the support in its raised position, specifically a rocking lever; and
- A device for releasing the locking of the internal tube on the external tube in its raised position.

[0010] The external tube will normally consist of a rectangular or square section tube, but could also be formed of a polygonal section or C-shaped body in which each of its ends is slightly closed towards the other end.

[0011] The external tube could be provided with a set of holes for anchorage to the wall of the manhole, or, preferably, be held by means of side clamps which are anchored to the wall on both sides, and which are connected to the outer tube by welding.

[0012] The external tube has a vertical slot made in this preferably at one of its sides, in which a locking rocking lever can be inserted as a means for retaining and locking this.

[0013] The support shall be of sufficient height to absorb any play with no detriment to its function, but would advisably not be under 20 or 30 cm, as this could mean excessive swinging at the top.

[0014] The internal tube normally consists of a tube with a section similar to that of the support, but of smaller size, so that this can slide inside it. This internal tube also has a slot, also vertically positioned, at the bottom, on the same side as the support.

[0015] The internal tube is fitted with a rocking lever inside this, which is the part that ensures locking with the support.

[0016] This rocking lever is placed on the inside of said tube, and is able to emerge through the slot in the internal tube and the one in the support, so that these are both locked. The greater the thrust force, the more securely these are locked.

[0017] The rocking lever is preferably held by a support, which is joined at the bottom to the lower end of the internal tube, and at the top end holds a hinge pin of the rocking lever.

[0018] The rocking lever support will preferably be inserted in notches made in the base of the internal tube,

so that this is fully integrated in this, and both (internal tube and rocking lever support) are provided with a hole for securing by means of a pin or screw.

[0019] The support is preferably made in two parts, one on each side of the rocking lever, and in one option has a transversal piece for rear support, which prevents any play, both in insertion and when already installed.

[0020] The rocking lever is heavier at the rear (the part that does not come out of the slot) than at the front (the part that comes out of the slot) so that its natural tendency is to lie in the securing position (projecting out of the slots). This greater weight may be assisted by auxiliary items, such as a hanging weight, a spring or the weight of a rod when this is used as releasing device.

[0021] When the internal tube is retracted, this rises up towards the extended position. In this position, the rocking lever projects out of the slot, due to the imbalance of the masses in respect of its pivot point; when reaching the bottom edge of the external tube, the rocking lever is forced to turn, and through not meeting any further obstacle, goes on rotating until said rocking lever is concealed in the slot of the internal tube. After reaching the position in which the slots of this internal tube and said external tube are facing each other, a position in which there can be a stop for the sliding motion, the rocking lever, due to the torque generated by the greater weight of the rear zone, tends to seek the balance position, that is, to turn until it comes out of said slots, this movement being limited by the upper edge of the slot of the internal tube. When the internal tube drops again, the rocking lever will be fastened, locking and preventing both tubes from sliding, and in particular preventing the internal tube from moving downward. Due to the proximity between the support and the internal tube, and to the shear stress between these and the rocking lever, there will be a moment in said rocking lever which will be applied to its pivot point in the support, although the force on said pivot point is of little magnitude.

[0022] The rocking lever is hinged to a release device, which can be activated from the top, normally by pulling this. This release device will normally be connected to a rod or a cable which runs along the inside tube, which has a holding item, such as a ring, at the top. When this ring is pulled, with the internal tube lifted slightly in respect of the locking position, the rod or cable is pulled and the rocking lever is released from the locking position, by rocking the opposite way to the direction it moved for locking. This action is not possible under load, i.e. it is impossible to accidentally release the rocking lever lock, as it is absolutely necessary to lift the internal tube slightly, which cannot take place when there is a fall, in which the internal tube exerts still greater force on the rocking lever in the locking position.

[0023] The internal tube can be fitted with means for securing auxiliary items, such as a pulley-holding fork and/or a winch.

[0024] According to one particular embodiment, the rocking lever has a zone constructed with a cutaway, so

that this enables it to rotate without being hindered by the internal wall of the internal tube.

Brief description of the drawings

[0025] In order to illustrate the explanation below, we are adjoining with this descriptive report five sheets of drawings, which represent the essence of this invention in eleven figures as an example, without entailing any limitation hereto, and in which:

- Figure 1 shows a schematic perspective view of a manhole fitted with the anchorage of the invention in its extended position;
- Figure 2 shows a horizontal cross-section view of the manhole in the securing area of the extendible item, and a magnified detail of this;
- Figure 3 shows a perspective view of the lower end of an outer support or tube;
- Figure 4 shows a perspective view of the anchorage of the invention, in an extension or retraction phase;
- Figure 5 shows a perspective view of the anchorage of the invention in anchorage position, before securing the relevant retaining item;
- Figure 6 shows a perspective view of the internal anchorage and release device of the extendible mechanism, in anchorage position;
- Figure 7 shows a lateral transparent view of the mechanism of Figure 6 mounted on an extendible mechanism;
- Figure 8 shows a view similar to that of Figure 7, but in perspective;
- Figure 9 shows a perspective view of the internal anchorage and release device of the extendible mechanism, in release position;
- Figure 10 shows a lateral transparent view of the mechanism of Figure 9 mounted on an extendible mechanism;
- Figure 11 shows a view similar to the one in Figure 10, but in perspective.

[0026] The following reference numbers are used in these figures:

- 1 manhole
- 2 stair for access to the manhole
- 3 external support or tube
- 4 internal tube
- 5 anchorage rings
- 6 clamps
- 7 rocking lever, or locking part
- 8 rocking lever support
- 9 release pull
- 31 slot for the support or external tube
- 41 slot in the internal tube
- 42 notches for securing the rocking lever support
- 43 pin for securing the rocking lever support

- 61 clamp-securing screws
- 71 rocking lever support spindle
- 72 release pull spindle
- 73 rocking lever cutaway
- 74 external part of the rocking lever
- 75 internal part of the rocking lever
- 81 rocking lever support body
- 82 flanges for securing the rocking lever support in the notches (42)
- 83 pin securing hole (43)
- 84 stop for fixing the rocking lever support
- 93 release cable or rod
- 94 release cable ring

Description of the preferential embodiments

[0027] As stated, the invention consists of a safety anchorage to be used in manholes (1), normally provided with an access stair (2) for going down into this manhole. As required by the safety conditions applicable and recognised by regulations, any operator who has to go down into the manhole (1) has to be anchored to a fixed item, to prevent any fall from causing injuries. The safety anchorage of the invention comprises a support (3) which is firmly fixed to the corresponding wall or floor slab. In particular, the fixation of the support (3) shall be located on the inside of the access stair (2) (the opposite side to the part moved along). According to the preferential embodiment, the support (3) is joined to the wall by means of clamps (6) which are secured by means of fixing screws (61) and which are joined to this support (3) by welding. In spite of this, any firm fixing means is acceptable within the scope of the invention. The height of the support (3) is variable depending on the location and load to be supported, but this will normally not be under 20 cm nor over 40 cm.

[0028] Apart from this, the anchorage comprises an internal tube (4) which slides along the support (3), and which comprises a body at the top which forms or holds anchorage rings (5). In a retracted position, the internal tube (4) will be in a lower position, and its upper end will be under the height of the closure of the manhole cover (1). In this position, the support for the internal tube (4) on the support (3) will be by means of some item extending from the section of the internal tube at its top end, which in accordance with a preferential embodiment is the body forming or holding the anchorage rings (5). The top of the internal tube may also have an item for grasping this, such as an elastic strap with a handle at its top, to facilitate the extraction of this internal tube (4) to an extended position. Normally the internal tube must be able to rise up to a height over 1 m over ground level, for which reason the ideal length of said internal tube (4) shall not be under 1.40 m, but this can extend to 2 m or more within the scope of the invention. The internal tube (4) will normally have a section similar to that of the support (3), but of smaller dimensions.

[0029] The support (3) is provided with a slot (31). The

internal tube (4) is also provided with a slot (41). In the extended position the slots are in a coinciding position, allowing a locking rocking lever (7) to go through these.

[0030] In accordance with a particular embodiment, the rocking lever is held on a rocking lever support (8) on a spindle (71) common to both; the support (8) and the items that this holds are firmly joined to the internal tube (4), so that the rocking lever (7) can turn freely on this support between two extreme positions, a rest position and a release position.

[0031] The rocking lever has an external portion (74), able to project out through the slots (31) of the support (3), and (41) of the internal tube (4), this external part (74) being the one that ensures locking in the extended position, and an internal part (75). Due to the geometry of the rocking lever, the distribution of mass or to auxiliary media such as a spring or a counterweight, a torque is exerted so that the natural tendency is to lift the external part (74) and for the internal part (75) to drop. In order to be able to carry out this rotation, it has been designed for the internal part (75) to be provided with a cutaway (73) so that any interferences in its movement are avoided.

[0032] According to a specific embodiment, the internal tube is provided with notches (42) at the bottom. These notches enable the insertion of securing flanges (82) of the rocking lever support (8) without any items projecting. The rocking lever support (8) is secured to the internal tube (4) is by means of a pin (43) which goes through a securing hole (83) of said rocking lever support (8). This pin can also act as a lifting stop, to prevent the internal tube (4) from coming out accidentally while the support (3) is being handled. No such accidental exit will be able to take place under load under any circumstances, thus meaning that the lifting stop function is more of a feature for user convenience than for safety, since this stop does not intervene in the load retention. The rocking lever support (8) is also preferentially provided with a securing stop (84), to facilitate a precise adjustment in the inside of the internal tube (4) and to prevent any looseness which may have an effect on deficient operation. The rocking lever support (8) is formed in two parallel parts with the same geometry, one on each side of the rocking lever (7), with the rotating spindle (71) of said rocking lever lying between both parts.

[0033] From a retracted position, with the internal tube (4) down, said internal tube (4) is manually lifted, possibly with the help of a handle which could be joined to an elastic strap or not. When the lower edge of the support (3) reaches the rocking lever (7) this overcomes the retention of said rocking lever (7) whose external part rotates and is concealed inside the internal tube (4) through the slot (41). This means that the internal tube (4) can go on rising through the interior of the support, as far as the corresponding stop, in which position the slots (31,41) of the support (3) and internal tube (4) respectively, are aligned. In this position the rocking lever (7) is free to get out through both slots (31,41), which it will do naturally

due to the greater weight of, or force exerted downward by, its internal portion (75). Hence, with the rocking lever projecting out of the slots (31,41), the internal tube (4) can again be allowed to "drop", and will rest on the bottom part of the slot (31) of the support (3) through the rocking lever (7), which will in turn rest on the top part of the slot (41) of the internal tube (4).

[0034] In this position it is enough to connect a carabiner snap-clip of the operator's safety harness to then be able to go safely down inside of the manhole (1).

[0035] To release the retention and proceed to retract the internal tube (4) in respect of the support (3), the rocking lever is designed to have a release pull (9). This pull is placed in the internal part (75) of the rocking lever (7), preferably on a spindle (72). According to one option, the release pull (9) has a "U"-shaped cross section so that the spindle (72) is held by both side branches of this "U". The release pull is joined to a rod or cable (93), whose top end is provided with a ring (94). This ring (94) emerges from the top end of the internal tube (4) and allows the release pull to be pulled, so as to force the rocking lever (7) to rotate so that its external portion (74) is concealed inside said internal tube, and in this position this internal tube (4) can be made to drop to the retracted position, in which its top edge rests on the upper edge of the support (3). In this position the manhole cover (1) can be closed.

[0036] In the mounted position, the external part (74) of the rocking lever has an upper rotation stop at the top edge of the slot (41) of the internal tube (41), and lower rotation stop through the alignment of the spindles (71) of the rocking lever support, and (72) of the release pull.

[0037] Although the external and internal tubes will normally be closed and have a rectangular or square section, the term "tube" should be taken to include any other geometry, even open, which is compatible with the function of the invention. In this case, and insofar as this is applicable to what is described, it would also be included within the scope of the invention to invert the support and internal tube items, so that this would consist of an internal support and an external tube able to slide in respect of the internal support, with the locking means being arranged either inside the support (fixed) or in the mobile tube, on the outside.

[0038] In its emergent part the internal tube can be provided with means of anchorage for auxiliary items, such as a pulley-holder fork and/or a winch for raising or lowering materials or for rescue should this be necessary.

Claims

1. A safety anchorage for manholes, **characterised in that** this comprises the following items:

- An external support or tube (3), which is firmly secured to the wall of the manhole;
- an internal tube (4), provided with a set of anchorage rings (5) at its top or at a zone close to

its top;

in which said internal tube (4) has a smaller section than the external tube, and which can slide vertically over said support or external tube (3), from a retracted (lower) position in which this is arranged under the cover of the manhole, to a raised (upper) position, in which it emerges from the surface above said manhole cover high enough for a safety anchorage to be secured, and by also comprising:

- a means for retaining and locking the internal tube (4) on the external support or tube (3) in its raised position, and
- a device for releasing the locking of the internal tube on the external tube.

2. A safety anchorage for manholes, according to claim 1, **characterised in that** the height (length) of the support or external tube is from 20 to 40 cm.

3. A safety anchorage for manholes, according to either of claims 1 to 2, **characterised in that** the height (length) of the external tube is 1.5 to 2.5 m.

4. A safety anchorage for manholes, according to any of claims 1 to 3, **characterised in that** the means for retaining and locking the internal tube (4) on the support or external tube (3) in its high position consists of a hinged rocking lever (7) which adopts two extreme positions, one locking position, and one release position.

5. A safety anchorage for manholes, according to claim 4, **characterised in that** the rocking lever has an external part (74) and an internal part (75), and **in that** the internal part (75) exerts greater downward force than the external part (74).

6. A safety anchorage for manholes, according to claim 5, **characterised in that** the internal part (75) of the rocking lever (7) is provided with a cutaway which prevents any interference with the internal tube (4) in its rotation movement.

7. A safety anchorage for manholes, according to any of claims 5 to 6, **characterised in that** the internal part (75) of the rocking lever (7) is provided with an auxiliary weight or traction spring.

8. A safety anchorage for manholes, according to any of claims 4 to 7, **characterised in that** the support or external tube (3) is provided with a vertical slot, and **in that** the internal tube (4) is also provided with a vertical slot, so that the vertical slots are roughly horizontally aligned in an extended and locking position, in which both are crossed by an external part

(74) of the rocking lever (7).

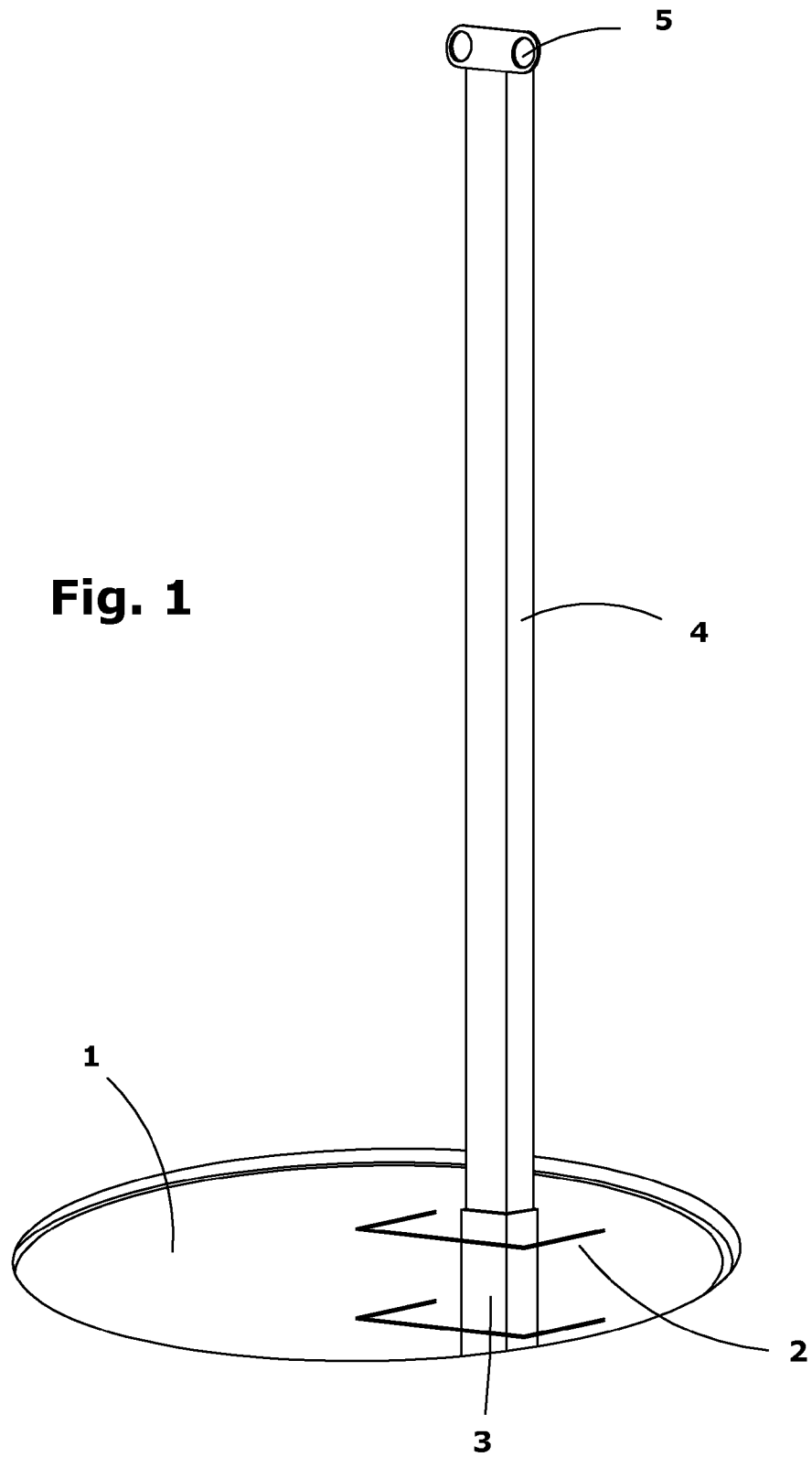
9. A safety anchorage for manholes, according to any of claims 4 to 8, **characterised in that** the internal tube (4) comprises a support for the rocking lever (8) 5 located at the bottom end of the internal tube (4), which is provided with a spindle (71) as a pivot point between this support (8) and the rocking lever (7).
10. A safety anchorage for manholes, according to claim 9, **characterised in that** the internal tube (4) comprises certain notches (42), in which securing flanges (82) for the rocking lever support (8) are placed, this rocking lever support (8) being fixed to said internal tube (4) by means of a pin (43) or screw going 10 through the fixing hole (83).
11. A safety anchorage for manholes, according to any of claims 9 to 10, **characterised in that** the rocking lever support (8) comprises a transversal part for rear support constituting a limiting stop (84). 15
12. A safety anchorage for manholes, according to any of claims 1 to 11, **characterised in that** the device for releasing the locking of the internal tube on the external tube consists of a rod or cable (93) fitted 20 with a ring (94) at its end part, which projects from the internal tube.
13. A safety anchorage for manholes, according to claims 7 and 12, **characterised in that** the auxiliary weight is constituted by the rod of the release device. 25
14. A safety anchorage for manholes, according to any of claims 1 to 13, **characterised in that** the internal tube comprises means for anchoring auxiliary items, such as a pulley-holder yolk and/or a winch. 30

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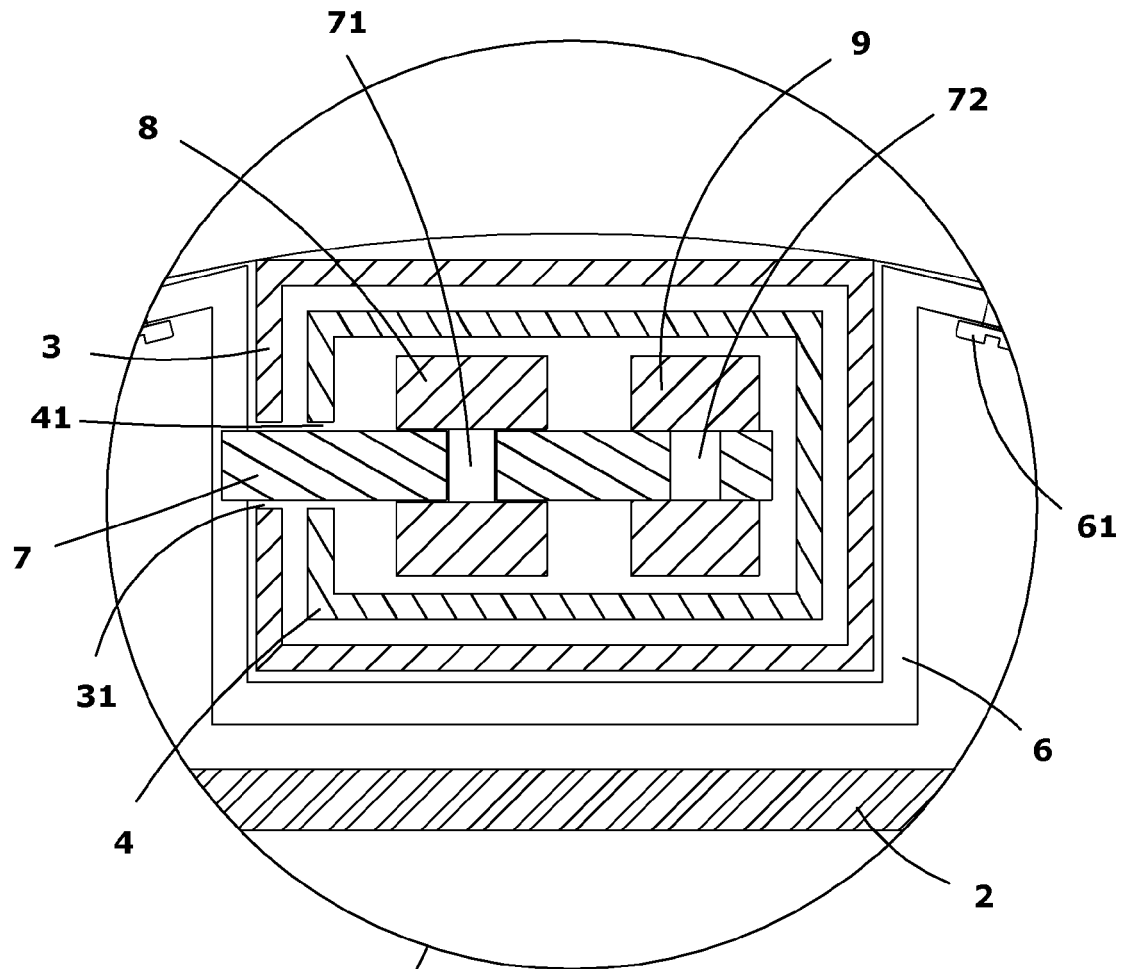


Fig. 2

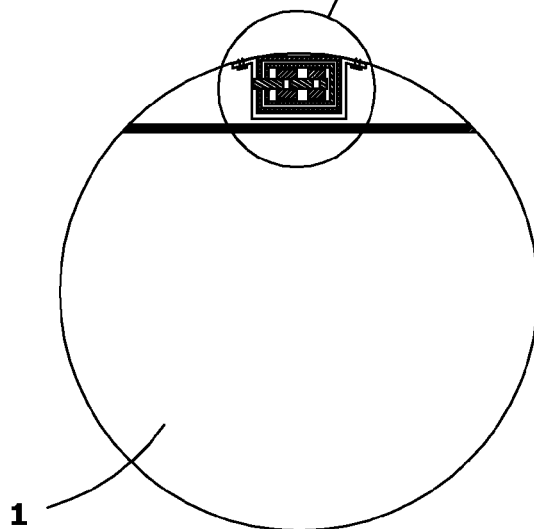
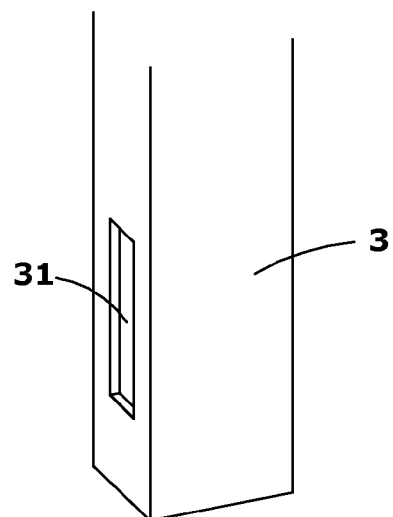


Fig. 3



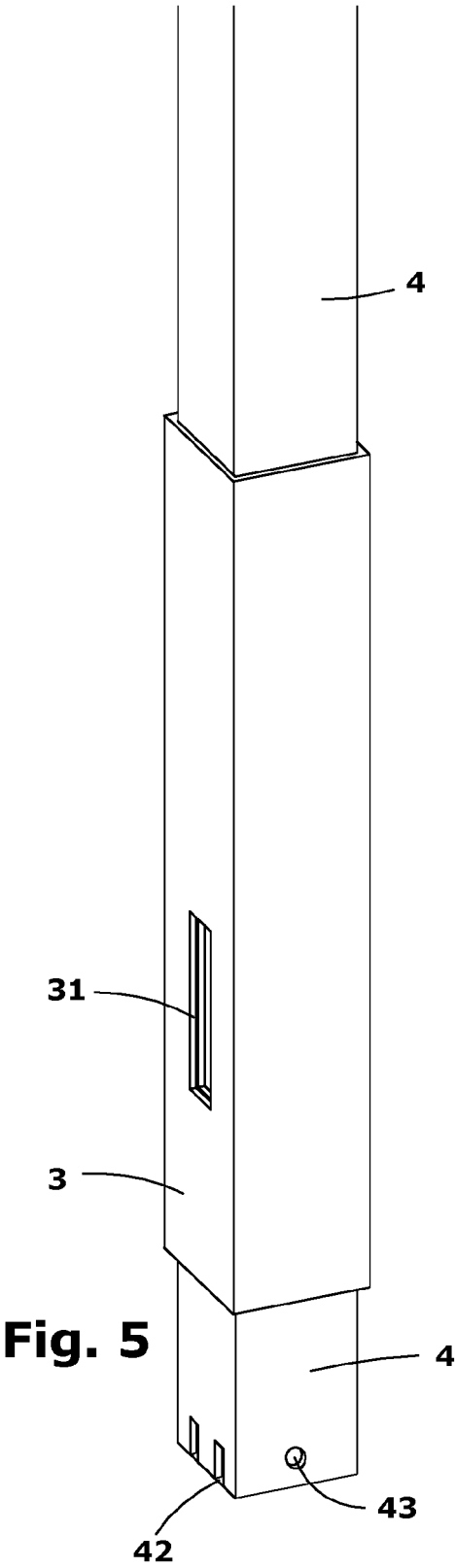
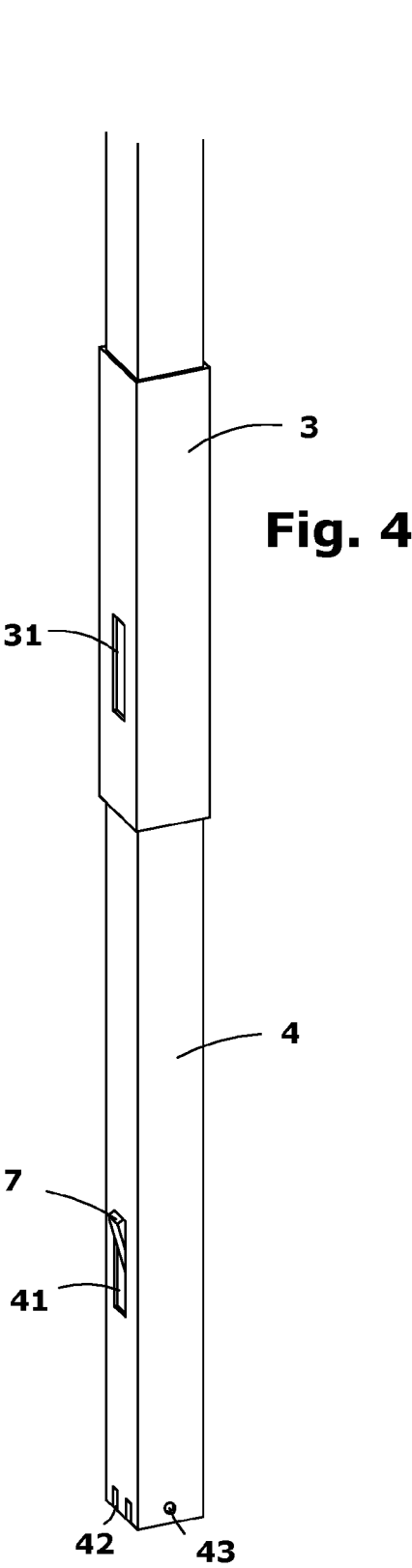


Fig. 6

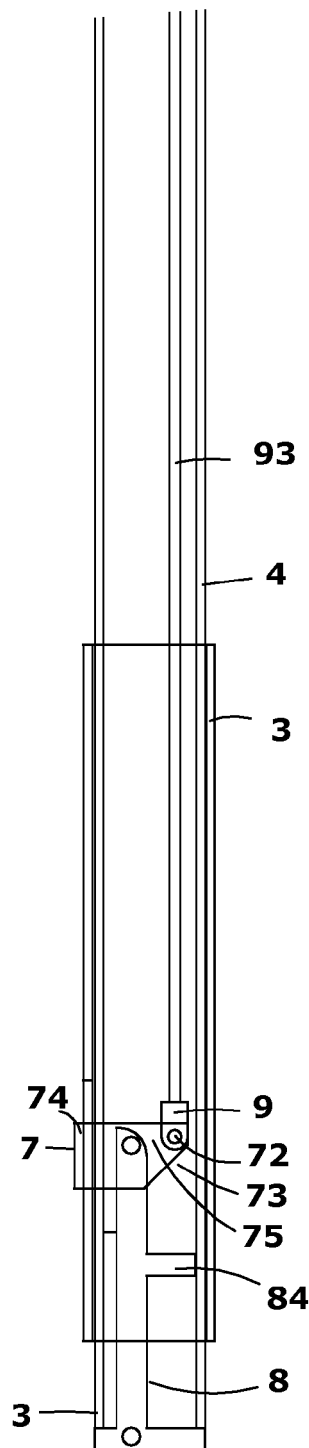
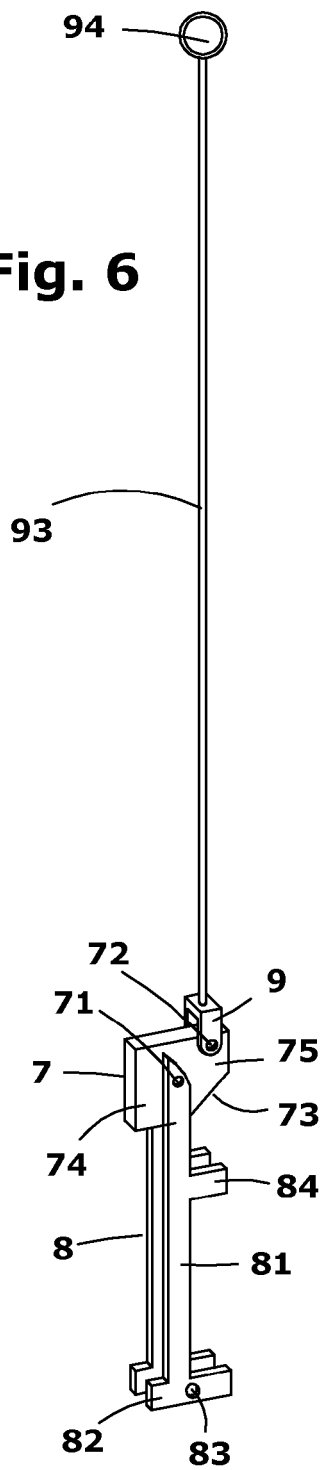
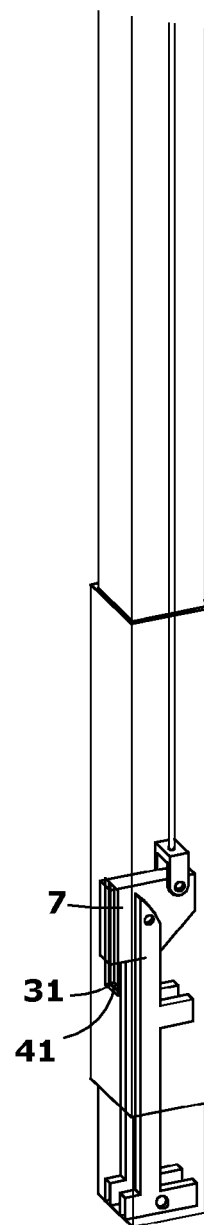


Fig. 7

Fig. 8



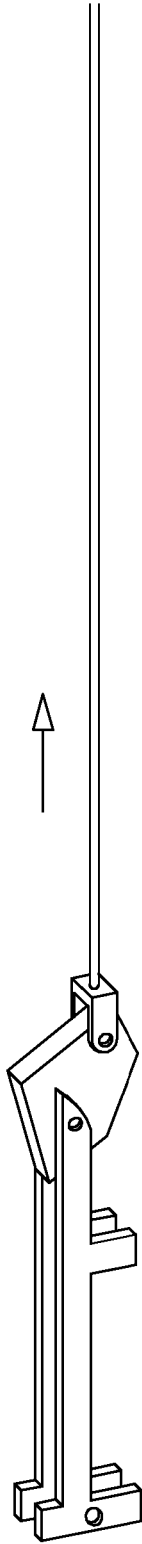


Fig. 9

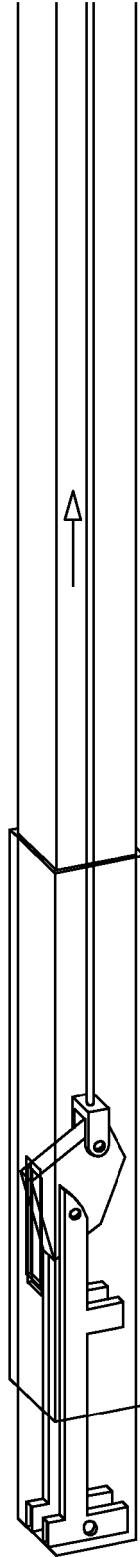


Fig. 10



Fig. 11



EUROPEAN SEARCH REPORT

Application Number
EP 14 38 2189

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	DE 298 11 997 U1 (RITTMANN HANS JUERGEN [DE]) 26 November 1998 (1998-11-26) * the whole document *	1-14	INV. E02D29/14
A,D	ES 2 371 429 A1 (SOLER TEROL ANTONIO FRANCISCO [ES]; ESPINOSA GIMENO MIGUEL) 2 January 2012 (2012-01-02) * the whole document *	1-14	
			TECHNICAL FIELDS SEARCHED (IPC)
			E02D
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 29 October 2014	Examiner Friedrich, Albert
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EPO FORM 1503 03 82 (P04C01)

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

EP 14 38 2189

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The members are as contained in the European Patent Office EDP file on
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29-10-2014

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 29811997	U1	26-11-1998	NONE
ES 2371429	A1	02-01-2012	NONE

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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