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(54) Retractable mast for barriers

(57) Retractable mast (1) for barriers, comprising:
- at least one fixed element (2) having an upper end (2s) and a lower end (2i), said fixed element (2) extending along a longitudinal axis (a) for a total extension (E);
- at least one sliding element (3), having an upper part (3s) and a lower part (3i), said sliding element (3) extending along said longitudinal axis (a) for a total extension (L);
- at least one gap (I) between the fixed element (2) and the sliding element (3); said gap (I) being defined from a radial distance (R), measured perpendicular with respect to said longitudinal axis (a),
the fixed element (2) and the sliding element (3) being coupled in such a way that the sliding element (3) can translate inside the fixed element (2) along said longitudinal axis (a), from a first position (p1), in which it is housed in the fixed element (2) of portion of at least 70% of its total extension (E) to a second position (p2), in which it is extracted from the fixed element (2) of a portion of at least 50% of its total extension (E).
The fixed element (2) has at least one groove (5) and said sliding element (3) has at least one guide pin (7) cooperating with said groove (5), wherein the groove (5) has at least two branches (D1, D2), one branch (D2) of the two (D1, D2) being shorter than the other branch (D1).
The retractable mast (1) also has at least one sealing device (15),interposed between the fixed element (2) and the sliding element (3); and the average radial distance (R) is less than 5 mm.

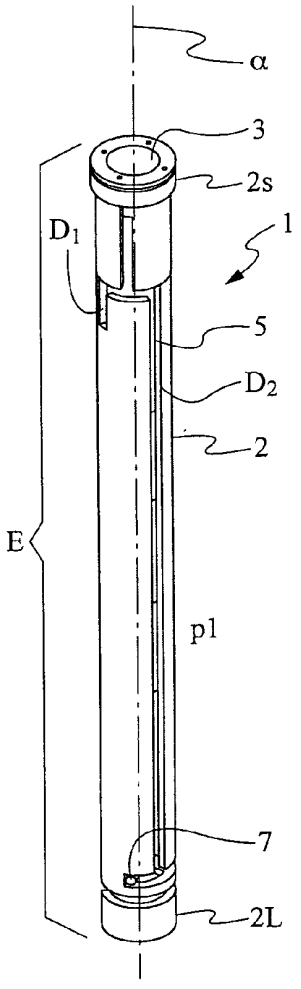

Fig. 1a

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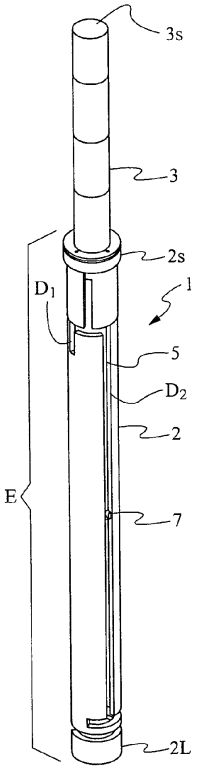

Fig. 1b

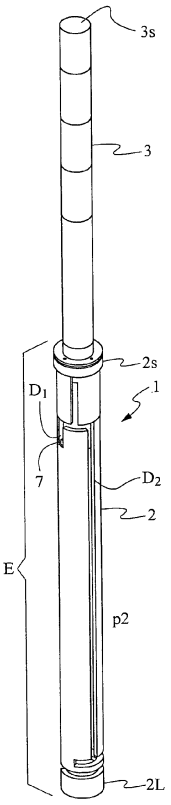

Fig. 1c

Description

[0001] The present invention relates to the field of masts for barriers and in general to retractable masts, able to be used for permitting or preventing the access to public or private places.

[0002] In general the conventional masts for barriers are made of the most rigid materials, such as cement, steel, stone or wood; their cross-section can be round or cornered, more rarely also of other shapes. These masts are rigid, made of a single piece, and, if necessary, they must be completely extracted from the anchorage to the ground.

[0003] Retractable masts are also known, and they solve many barrier problems. They are suitable for roads and squares which are freed from traffic only for limited periods of time, pedestrian areas, market squares, parking areas, garage entrances, arched gates, etc. They can be positioned in indoor or outdoor spaces and they can serve as boundary poles, barrier shafts, or as mast for barriers with ropes, bands or similar.

[0004] Typically, the retractable masts comprise two main elongated and hollow elements, the one sliding with respect to the other. In general, one of the two elements is anchored to the ground, and the other one slides from a retracted or underground position and an extracted or raised position with respect to the other element. In order to facilitate the mutual sliding of the two elements between the corresponding sliding surfaces, a space or gap is present.

[0005] Such devices are for example described in US 6,345,930 B1 and in GB 2210091A.

[0006] US 6,345,930 B1 describes a retractable column with a simple structure, made of stainless steel. This column is generally of a cylindrical shape and, when in a lowered position it is housed within a sleeve under the ground level. In an active position, the column can be grasped with a handle and manually drawn until only a lower portion is underground. The lower portion of the cylindrical column has a spiral groove, cooperating with spiral grooves present on the upper portion of the sleeve, when the little mast is turned and raised towards a suitable point. The column has a safety lock, in order to permit to the little mast to be raised from a lowered position to an active position, and a double block, preventing an easy lowering of the same by malicious people.

[0007] GB 2210091 describes a traffic column made of a base, positioned in a hole in the ground and supporting in a telescopic way a retractable and extendable element. The element can be fully retracted in the ground, or raised and positioned in a raised position with respect to the base, by means of a pin and of at least one groove cooperating with the base.

[0008] The Applicant has noted that, in general, in order to permit their mutual sliding, the two main elements of the mast have a mutual space or gap. This aspect, from one hand permits an easy and smooth mutual sliding of the two elements, and on the other hand it leads to problems of water infiltration, when such masts are generally positioned in outdoor places and environments, which are exposed to the weather. Such water or moisture infiltrations cause the formation of rust, and facilitate the corrosion, leading to a rapid decay, deterioration and aging of the portions forming the retractable mast. This makes frequent and expensive maintenance and repairing operations necessary. This leads to a reduction of the useful life of the mast, which then must necessarily be substituted at rather regular and short time intervals.

[0009] The Applicant has found that, by adopting a space of small and reduced dimensions among the mutually sliding portions of the mast and by applying at the same time a watertight device, suitably sized and positioned, it is possible to maintain a simple and smooth sliding between the parts, by preventing at the same time the penetration of water and moisture and also of other liquids into the mast.

[0010] Therefore, in its first aspect, the invention relates to a retractable mast for barriers, comprising:

- at least one fixed element, having an upper end and a lower end, said fixed element extending along a longitudinal axis a for a total extension E;
- at least one sliding element having an upper portion and a lower portion, said sliding element extending along said longitudinal axis a for a total extension L;
- at least one gap between the fixed element and the sliding element; said gap being defined by a radial distance R, perpendicularly measured with respect to said longitudinal axis a,

said fixed element and said sliding element being coupled in such a way that the sliding element can be translated in the fixed element along said longitudinal axis a, from a first position p1, in which it is housed in the fixed element, of a portion of at least 70% of its total extension, and a second position p2, in which it is extracted from the fixed element, of a portion of at least 50% of its total extension E;

said fixed element having at least one groove and said sliding element having at least one guide pin cooperating with said groove, wherein said groove has at least two branches, one of the two being shorter than the other one, characterized in that

- the retractable mast has at least one watertight device, interposed between the fixed element and the sliding element;
- the radial distance (R) is less than 5 mm.

[0011] The retractable mast also has a watertight device and a radial distance less than 5 mm between the fixed element and the sliding element. These features permit to place the mast in any inner and outer place, so avoiding water and moisture infiltrations and significantly increasing the useful lifetime of the mast and significantly reducing the maintenance costs.

[0012] The present invention, in the aforesaid aspect, can have at least one of the preferred features later described.

[0013] Conveniently, said average radial distance is less than 2 mm.

[0014] Advantageously, said sliding element has at least one relief valve, in order to permit the exit of air during the sliding of said sliding element from said second position to said first position. This permits a translating movement of the element, which is simple, linear and without interruptions, with a minimum energy consumption.

[0015] Preferably said fixed element has a duct, connecting the space with the outside of said fixed element. This permits to obtain a suitable evacuation of the air towards the outside of the mast.

[0016] Advantageously, said relief valve is positioned in the upper part of the sliding element, for more than 50% of its total extension.

[0017] Preferably, said sealing device has at least two sealing elements, placed in the upper end of said fixed element and spaced apart in the direction of the longitudinal axis. This has the advantage to further increase the sealing of the device.

[0018] In a convenient way, said fixed element has at least two housings for said at least two sealing elements.

[0019] In another preferred embodiment, said sliding element has at least one widened cross-sectional portion, placed in its lower part. This choice permits to further reduce the space between the sliding element and the fixed element, so assuring a safe blocking of the sliding element in the extracted position.

[0020] Advantageously, at said at least one widened cross-sectional portion, said radial distance (R) is less than 1 mm.

[0021] Preferably, said sliding element has, at its upper part, a first flared portion, able to cooperate with a second flared portion, corresponding to the fixed element in said first position, so that said average distal length is less than 1,5 mm. The advantage of this preferred embodiment is to permit a good blocking of the elements in the lowered position, in particular when the sliding element is completely housed inside the fixed element. At the same time a perfect levelling of the mast with the ground is obtained.

[0022] In another embodiment, said fixed element has at least one external coating element. This permits to further protect the mast from external agents in order to use the same in any kind of ground.

[0023] Advantageously, said retractable mast has a second device, interposed between said external coating element and said fixed element.

[0024] Preferably, said sliding element has a handle at its upper part, able to be manually grasped, in order to translate said sliding element with respect to said fixed element.

[0025] This permits a safe and simple grasping for translating the sliding element from a lowered to a raised position, and vice versa.

[0026] Further characteristics and advantages of the invention will be clearer from the detailed description of some preferred but non exclusive embodiments, of a retractable mast for barriers according to the present invention.

[0027] Such description is shown below with reference to the annexed drawings, given only in an indicative and therefore non limitative way, in which:

- figures 1 a, 1 b, 1 c show an embodiment of the retractable mast according to the present invention, in three different positions;
- figure 2 is a schematic, sectional view of the embodiment of the retractable mast shown in figures 1 a, 1 b, 1 c;
- figure 3 is a schematic, enlarged, sectional view of the upper portion of an embodiment of the retractable mast according to the present invention;
- figure 4a is a lateral, schematic view of an embodiment of the sliding element according to the present invention;
- figure 4b is a schematic, sectional view of the sliding element according to the present invention, of figure 4a; and
- figure 4c is a top, schematic view of the sliding element according to the present invention, of figure 4a.

[0028] With reference to figures 1-4, a retractable mast for barriers according to the present invention is identified with the numeral reference 1.

[0029] The retractable mast 1 for barriers according to the present invention has:

- at least one fixed element 2 having an upper end 2s and a lower end 2i,
- at least one sliding element 3, having an upper part 3s and a lower part 3i.

[0030] The fixed element 2 extends along a longitudinal axis a, for a total extension E.

[0031] The fixed element 2 and the sliding element 3 are coupled in such a way that the sliding element 3 can translate inside the fixed element 2 along the longitudinal axis a, from a first position p1, shown in figure 1, in which it is housed in the fixed element 2, to a second position p2, shown in figure 1 c, in which it is extracted from the fixed element 2.

[0032] Preferably, in the first position p1 the sliding element 3 is housed in the fixed element 2, for a portion equal to at least 70% of its total extension E. Still more preferably, as shown in Fig.1 a, in the first position p1 the sliding element 3 is completely housed in the fixed element 2 in order not to protrude with respect to the latter.

[0033] On the contrary, in the second position p2 the sliding element protrudes with respect to the fixed element 2 for a portion equal at least to 50% of its total

extension E.

[0034] More preferably, as shown in Fig.1c, in the second position p2 the sliding element 3 axially protrudes with respect to the fixed element 2 for a portion equal at least to 80% of its total extension.

[0035] In order to guarantee the sliding of the sliding element 3 with respect to the fixed element 2, the latter has at least one groove 5, and the sliding element 3 has at least a guide pin 7, cooperating with the groove 5.

[0036] According to an embodiment, the groove 5 has at least two branches D1, D2, one branch D2 of the two branches D1, D2 being shorter than the other branch D1.

[0037] The different extension of the two branches D1 and D2 permits to fix the sliding element in a first position p1 and in a second position p2.

[0038] In detail, when the guide pin 7 engages with the branch D2 and rests on its bottom as in fig.1a, the sliding element 3 is in the first position p1, and alternatively when the guide pin 7 is rotated and engages with the branch 2 and rests on its bottom, the sliding element 3 is in the second position p2.

[0039] The fixed element 2, as it is better shown in figure 2, is also placed with respect to the sliding element 3, in order to form a gap between the two elements, substantially for the entire extension E of the fixed element 2.

[0040] The gap I is defined by an average radial distance R between the fixed element 2 and the sliding element 3, in particular between the inner surface of the fixed element 2 and the outer surface of the sliding element 3.

[0041] For the aim of the present invention, as the average radial distance R between the fixed element 2 and the sliding element 3, the arithmetic distance must be understood between the inner surface of the fixed element 2 and the outer surface of the sliding element 3 when varying the extension of the fixed element in a position p1, each distance being measured in a plane orthogonal to the axis a.

[0042] According to an advantageous aspect of the present invention, the average radial distance R is less than 5 mm and the retractable mast 1 has at least one sealing device 15 interposed between the fixed element 2 and the sliding element 3.

[0043] Preferably, the average radial distance R is less to 2 mm.

[0044] According to a preferred embodiment, the fixed element 2 and the sliding element 3 have a cross-section, transversal to the substantially circumferential axis a and the gap has a cross-section substantially with a circumferential ring.

[0045] As better shown in figure 3, the sliding element 3 has at its upper flared part 3s a first flared portion 16, able to cooperate with a second flared portion 17 corresponding to the fixed element 2, at the first position p1.

[0046] A similar choice permits a good blocking of the sliding and fixed elements in the lowered position, in particular when the sliding element is completely housed in the fixed element. At the same time, a perfect levelling of the mast with the ground is obtained.

[0047] In particular, in the aforementioned first position p1 the first flared portion 16 can cooperate with the second flared portion 17, so that the average radial distance R of such length is less than 1,5 mm and so consistently reduces the possibility of liquids entering into the gap I.

[0048] In the embodiment shown in figures 2 and 4, the sliding element 3 has at least one portion 18 with a widened lateral portion, at its lower part 3i.

[0049] The portion 18 with the widened lateral portion permits to block the extraction of the sliding element 3 with respect to the fixed one 2, in particular when the first one has reached the first position p1 shown in figure 1 c.

[0050] This choice permits to further reduce the space between the sliding element and the fixed element, so assuring a safe blocking of the sliding element in the extracted position.

[0051] Advantageously, at said at least one portion 18 with a widened transversal section, said average radial distance R is less than 1 mm.

[0052] Such a choice permits to reduce the possibility of liquids entering into the gap I, also when the sliding element is in the second position p2.

[0053] Preferably, the portion 18 with a widened transversal section is placed at approximately 1/5 of the total extension L of the sliding element 3, starting from its lower end 3i.

[0054] In the embodiment shown in the figures, the sliding element 3 has a second portion 19 with a widened transversal portion, spaced from the portion 18 and placed at its lower end 3i.

[0055] Apart from the flared portion 16 and the portions 18,19 with a widened transversal section, the sliding element 3 has a substantially constant section.

[0056] According to an advantageous aspect of the present invention, in order to permit the exit of air during the sliding of the sliding element 3 from the second position p2 to the first position p1, and consequently a smooth mutual sliding of the two elements 2,3 the sliding element 3 has at least one relief valve 20.

[0057] Preferably, the relief valve 20 is placed in the upper part of the sliding element 3, for up to 50% of its total extension L.

[0058] As can be seen in figure 3, the relief valve 20 connects the inside of the sliding element 3 with the gap I whereas a duct 21, provided on the fixed element 2 connects the gap I with the outside of the fixed element 2.

[0059] As mentioned above, at the upper end 3s of the fixed element 2, the sealing device 15 is provided.

[0060] According to an embodiment shown in the figures, the sealing device 15 has at least two sealing elements 15', 15" placed at the upper end 3s of the fixed element 2 and axially spaced in the direction of the longitudinal axis a.

[0061] The sealing elements 15',15" made of a waterproof material seal the gap I between the fixed element 2 and the sliding element 3, while permitting the sliding of the element 3 with respect to the fixed element 2.

[0062] Preferably, the sealing elements 15', 15" have an annular extension around the sliding element 3 and are concentrically placed and axially spaced along the axis a of the fixed element 2.

[0063] For such a purpose, the fixed element 2 has at least two housings 22', 22" for the two sealing elements 15', 15"

[0064] Also the two housings 22', 22" are spaced and placed along the axis a.

[0065] The two housings 22', 22" face the gap I between the fixed element 2 and the sliding element 3.

[0066] In the embodiment shown in the figures, the fixed element 2 has at least one external coating element 23, made of plastic, able to isolate and protect the fixed element 2 from water or other liquids.

[0067] This permits to further protect the mast from external agents, and so it can be used for any type of ground.

[0068] The external coating element 23 has a cylindrical extension, but preferably it does not extend along the entire fixed element 2, but only of one portion of same, for example approximately 90% of its total extension E.

[0069] In this case, the retractable mast 1 has a second sealing device 24 interposed between said external coating element 23 and said fixed element 2.

[0070] The second sealing element 24 is placed at the upper interface between the external coating element 23 and the fixed element 2.

[0071] According to another advantageous aspect of the present invention, as it is better shown in figures 4b, 4c the sliding element 3 has a handle 25 at its upper portion 3s and in particular at the upper end of the latter.

[0072] The handle can be grasped manually, in order to translate the sliding element 3 with respect to the fixed element 2.

[0073] The handle 25 can rotate between a closed position in which it disappears in a cavity made in the upper portion 3s of the sliding element 3, and an extracted position in which it substantially arises parallel to the axis a.

[0074] In the embodiment shown in the figures, the upper portion 3 of the fixed element 3 is made of two bodies 26, 27 mutually bound by means of a thread 28.

[0075] A sealing element 29 is placed between the bodies 26,27.

[0076] The present invention has been described with reference to some embodiments. Various changes can be made to the embodiments described in detail, while remaining in the protective field of the invention, defined by the following claims.

Claims

1. A retractable mast (1) for barriers comprising:

- at least one fixed element (2), having an upper end (2s) and a lower end (2i), said fixed element (2) extending along a longitudinal axis (a) for a total extension (E);
- at least one sliding element (3) having an upper portion (3s) and a lower portion (3i), said sliding element (3) extending along said longitudinal axis (a) for a total extension (L);
- at least one gap (I) between the fixed element (2) and the sliding element (3); said gap (I) being defined by a radial distance (R), perpendicularly measured with respect to said longitudinal axis (a),

said fixed element (2) and said sliding element (3) being coupled in such a way that the sliding element (3) can be translated in the fixed element (2) along said longitudinal axis (a), from a first position (p1), in which it is housed in the fixed element (2), for a portion of at least 70% of its total extension (E), and a second position (p2), in which it is extracted from the fixed element (2), for a portion of at least 50% of its total extension (E);

said fixed element (2) having at least one groove (5) and said sliding element (3) having at least one guide pin (7) cooperating with said groove (5), wherein said groove (5) has at least two branches (D1, D2), one (D2) of the two branches (D1, D2) being shorter than the other one (D1), **characterized in that**

- the retractable mast (1) has at least one sealing device (15), interposed between the fixed element (2) and the sliding element (3); and
- the average radial distance (R) is less than 5 mm.

2. The retractable mast (1) for barriers according to claim 1, **characterized in that** said average radial distance (R) is less than 2 mm.

3. The retractable mast (1) for barriers according to claim 1 or 2, **characterized in that** said sliding element (3) has at least one relief valve (20), permitting the air exit during the sliding of said sliding element (3) from said second position (p2) to said first position (p1).

4. The retractable mast according to claim 3, **characterized in that** said fixed element (2) has a duct (21), connecting the gap (I) with the outside of said fixed element (2).

5. The retractable mast according to claim 3 or 4, **characterized in that** said relief valve (20) is placed in the upper part (3s) of the sliding element (3), more than 50% of its total extension (L).

6. The retractable mast according to one of preceding claims, **characterized in that** said sealing device (15) has at least two sealing elements (15', 15"), substantially placed at the upper end (2s) of said fixed

element (2) and axially spaced towards the longitudinal axis (a).

7. The retractable mast according to claim 6, **characterized in that** said fixed element (2) has at least two housings (22', 22") for said at least two sealing elements (15', 15").

8. The retractable mast according to any of preceding claims, **characterized in that** said sliding element (3) has at least one portion (18, 19) with a widened cross-section, placed in its lower part.

9. The retractable mast according to claim 8, **characterized in that** at said at least one portion (18, 19) with a widened cross-section, said radial distance (R) being less than 1 mm.

10. The retractable mast according to one of preceding claims, **characterized in that** said sliding element (3) has, at its upper part (3s), a first flared portion (16), able to cooperate with a second flared portion (16), corresponding to the fixed element (2) in said first position (p1), said radial distance (S) being less than 1,5 mm.

11. The retractable mast according to one of preceding claims, **characterized in that** said fixed element (2) has at least one external coating element (23).

12. The retractable mast according to claim 11, **characterized in that** said retractable mast (1) has a second sealing device (24), interposed between said external coating (23) and said fixed element (2).

13. The retractable mast according to one of preceding claims, **characterized in that** said sliding element (3) has a handle (25) at its upper end (3s), able to be manually grasped, in order to translate said sliding element (3) with respect to said fixed element (2).

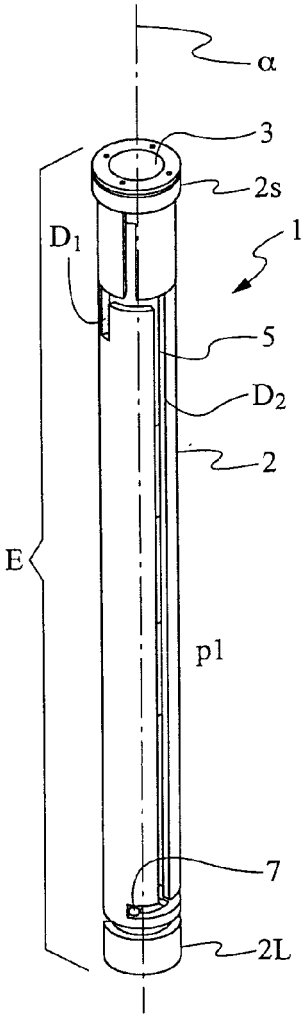

Fig. 1a

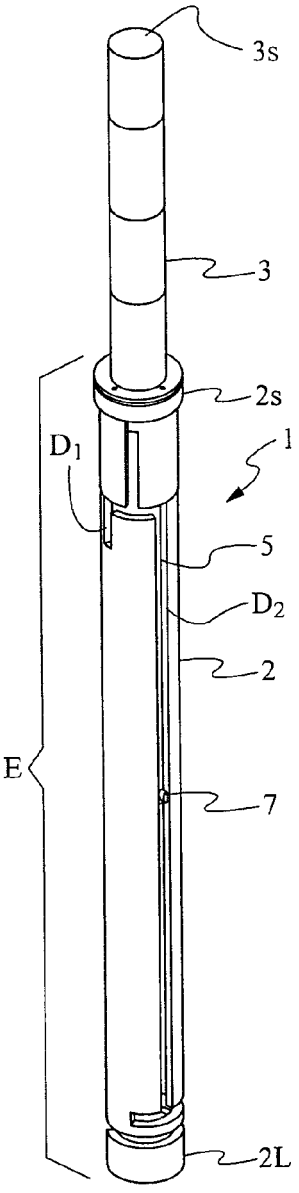

Fig. 1b

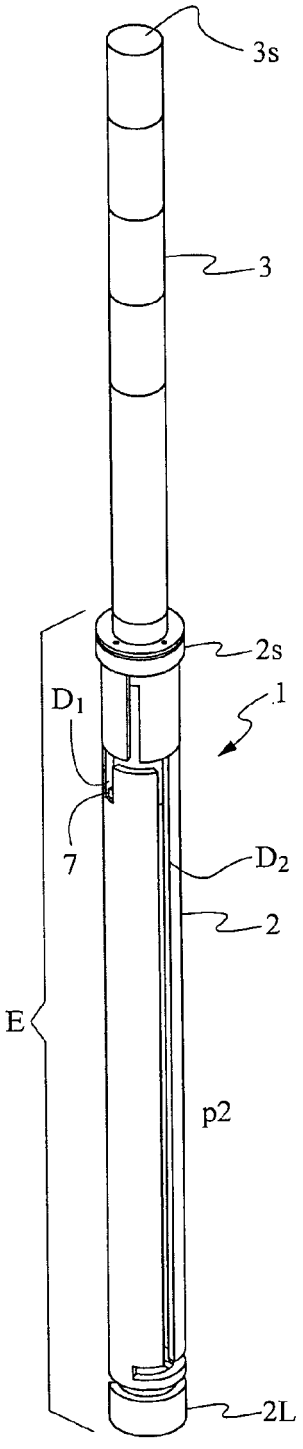

Fig. 1c

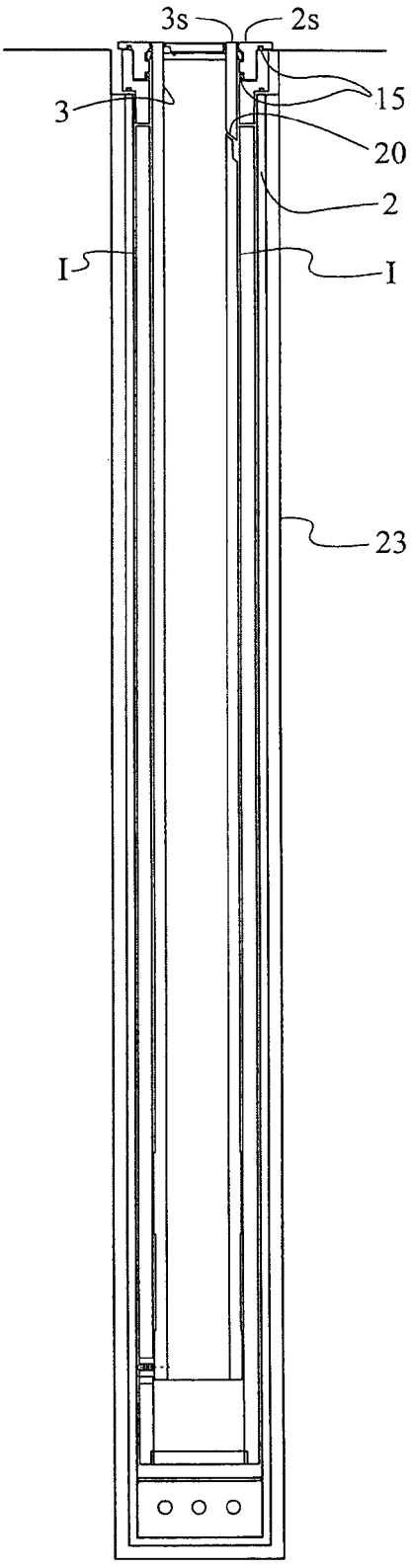

Fig. 2

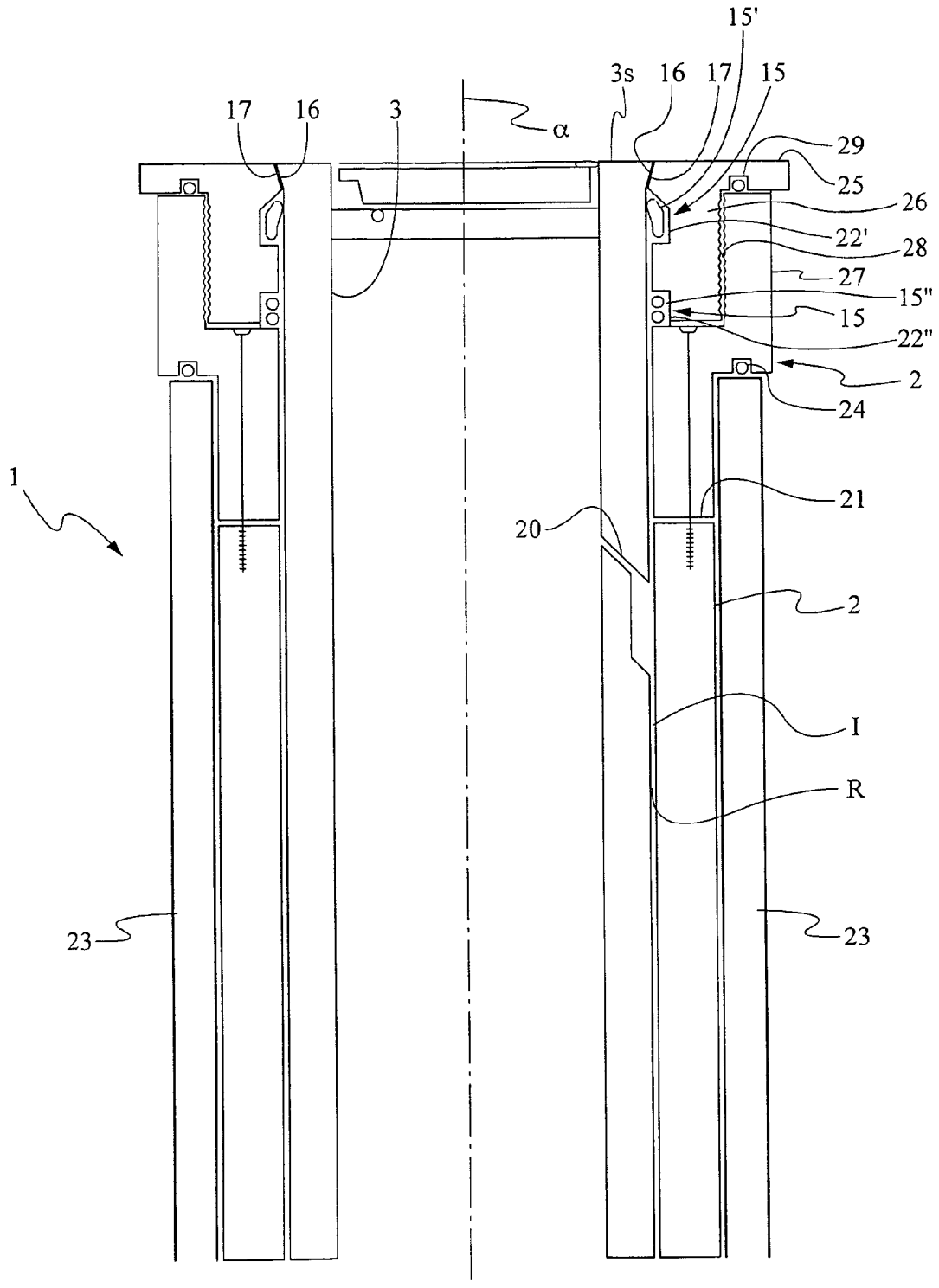

Fig. 3

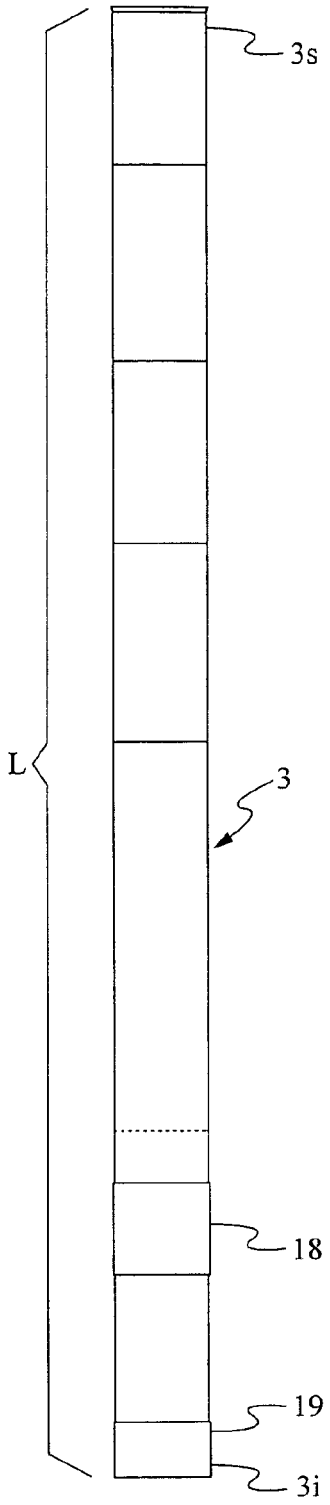

Fig. 4a

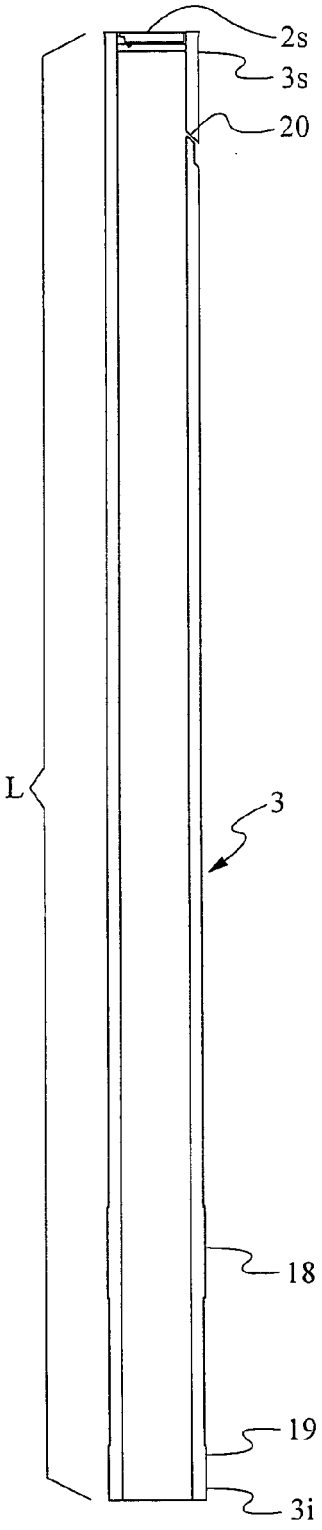

Fig. 4b

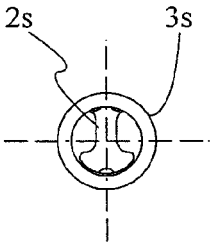

Fig. 4c

REFERENCES CITED IN THE DESCRIPTION

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- GB 2210091 A **[0005] [0007]**