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(71) Applicant: **Advanced Mechanical Solutions Srl**
**60131 Ancona (IT)**

(72) Inventor: **PELIZZA, Francesco**
**Ancona (IT)**

(74) Representative: **IP Sextant s.r.l.**
**Via A. Salandra, n.18**
**00187 Rome (IT)**

## (54) WASHING SYSTEM FOR A TELESCOPIC SHAFT

(57) A washing system (1) configured for washing an external surface of one or more telescopic elements that make up a telescopic shaft (2) to which the washing system (1) can be connected, in which such washing system (1) comprises nozzles (15) through which to deliver a washing liquid under pressure which, in turn, are directed towards a central axis (3) of the telescopic shaft (2) to uniformly deliver jets of washing liquid against a surface exterior of each of the one or more telescopic elements included in the telescopic shaft (2), during their movement between an extracted or retracted position.

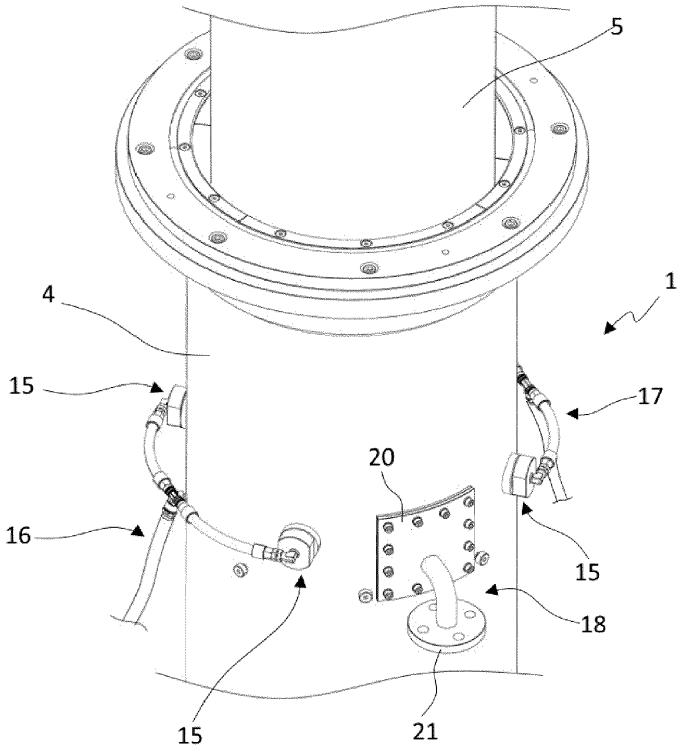


*FIG.2*

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## Description

**[0001]** The present invention relates to a washing system for washing one or more movable telescopic elements included in a telescopic shaft.

**[0002]** In particular, the washing system is configured to wash each of the telescopic elements that make up the shaft itself externally during their relative movement between an extracted position and a retracted position.

**[0003]** Furthermore, the present invention relates to a telescopic shaft comprising a fixed telescopic element and one or more telescopic elements movable in succession with respect to a fixed telescopic element itself, as well as a similar washing system.

**[0004]** In the maritime field, the construction of a telescopic shaft comprising one or more telescopic elements, slidingly movable with respect to each other and with respect to a base, fixed, telescopic element, and driving members operatively connected to these telescopic elements, to selectively control their movement between extracted configuration and a retracted configuration is known.

**[0005]** The driving members can be configured as a multistage telescopic piston, especially in the case where the telescopic shaft has large dimensions where the term large dimensions refers to the extension of the shaft along a direction of movement of the telescopic elements.

**[0006]** The telescopic piston is positioned within the individual telescopic elements which, in this respect, are each configured as a hollow cylindrical element.

**[0007]** Generally, such a telescopic shaft comprises a base telescopic element, which is fixedly constrained to a structure, a top telescopic element and a plurality of intermediate telescopic elements interposed between the base telescopic element and the top telescopic element.

**[0008]** With the exception of the base telescopic element, the other telescopic elements can be moved reciprocally with each other, as well as with respect to the base telescopic element, in order to be able to be extracted or retracted.

**[0009]** The use of a telescopic shaft can be foreseen along the deck of a boat, for example to support a signalling or lighting device, which can be moved between a retracted position and an extracted position relative to the deck itself. Such a telescopic shaft has lengths in the order of a few meters, even more than ten meters if desired.

**[0010]** The closing sequence of such a telescopic shaft, i.e. the sequence with which the individual movable telescopic elements are moved from an extended configuration to a retracted configuration, is mainly determined by two factors such as the movement of the telescopic actuator and the friction between the individual telescopic elements.

**[0011]** The latter is determined by guide and sealing elements interposed between the individual telescopic elements, configured as guide bushings, as well as by the weight of the telescopic elements themselves.

**[0012]** These guide and sealing elements also define a seal between the individual telescopic elements to prevent liquids or impurities from infiltrating between one telescopic element and the next.

**[0013]** To ensure a correct closing sequence it is necessary to carry out frequent maintenance of the telescopic shaft, by washing and greasing the individual telescopic elements as well as the gaskets placed between them in correspondence with the guide bushings. By means of this maintenance it is possible to control the friction between the telescopic elements to keep it within a pre-established value.

**[0014]** In the event that, for example, the telescopic shaft comprises three telescopic elements movable with respect to a base telescopic element, namely a bottom telescopic element, an intermediate telescopic element and a top telescopic element, a correct closing sequence initially involves the return of the bottom telescopic element inside the base telescopic element, then of the intermediate telescopic element inside the bottom telescopic element and, finally, of the top telescopic element inside the intermediate telescopic element.

**[0015]** If maintenance is not carried out correctly or with a pre-established frequency, variable friction may arise, with respect to pre-established values, at the telescopic element/guide bushing interface.

**[0016]** This variation in the friction between the telescopic elements can lead to undesired variations in the closing sequence with respect to the one described previously, up to determining problems of falling of the free telescopic elements, i.e. those telescopic elements which are not connected directly to the telescopic actuator.

**[0017]** In fact, if the first telescopic element that is returned should be the top telescopic element, this would continue its movement towards the bottom telescopic element until reaching the mechanical collision against the intermediate telescopic element. The actuating members, continuing in the returning sequence, would tend to retract the top telescopic element, to which they are connected, together with the intermediate telescopic element. However, the latter, being disconnected from the actuating members, could fall due to the effect of gravity during the return action of the top telescopic element, until it collides with the bottom telescopic element.

**[0018]** It appears evident that a similar returning sequence of the telescopic elements of a telescopic shaft is uncontrolled and the repetition of collisions between the individual telescopic elements can cause their damaging and the malfunction of the telescopic shaft.

**[0019]** US 2173095 discloses a telescopic shaft that can be installed at the bow of a boat to support a light signalling device.

**[0020]** DE 202011050508U1 discloses a telescopic shaft comprising operating members of the screw-nut type for synchronizing the extraction and return movement of the individual telescopic elements which make

up the telescopic shaft.

**[0021]** These embodiments of telescopic shafts are not without the drawbacks disclosed regarding the state of the traditional art.

**[0022]** CN 110894862 describes a telescopic system without any washing device.

**[0023]** FR3068274, on the other hand, describes a robot that can be moved on the ground for washing street lighting shafts, i.e. shafts without mutually movable telescopic elements.

**[0024]** In the field the need is felt to ensure effective operation of a telescopic shaft with reference to the ability to carry out correct maintenance in a practical and easy way on the surfaces of the individual telescopic elements which are moved relative to each other, to ensure effective sliding and, to consequently, an effective movement of the entire telescopic shaft between an extended and a retracted position and vice versa.

**[0025]** In particular, there is a need to remove any excess grease, dirt or foreign substances in general from the external surface of the individual telescopic elements to keep the friction coefficient of these surfaces within a pre-established value, ensuring correct handling of the individual telescopic elements of the telescopic shaft.

**[0026]** The object of the present invention is to allow the cleaning of the external surfaces of each of the one or more movable telescopic elements that make up a telescopic shaft in a simple, efficient and economic way, in order to maintain a value of the relative friction between these one or more several movable elements within a pre-established interval so as to allow effective and correct movement of the telescopic shaft.

**[0027]** A further object of the present invention is to ensure effective removal of dirt or any polluting agents present along the outer surface of each of the one or more movable telescopic elements that make up a telescopic shaft, to ensure effective reciprocal sliding. In particular, the removal of solid particles of dirt or debris, jamming, can scratch the movable telescopic elements themselves. For this reason it is necessary to remove them.

**[0028]** Another object of the present invention is to ensure effective disposal of any polluting elements removed from the outer surface of one or more movable telescopic elements, outside the telescopic shaft.

**[0029]** The specific object of the invention is a washing system configured for washing an external surface of one or more movable telescopic elements which make up a telescopic shaft to which the washing system is connected, wherein the telescopic shaft comprises a base telescopic element which is fixed and at least one telescopic element movable with respect to the base telescopic element along a central axis, the washing system comprising nozzles through which to deliver a washing liquid under pressure, wherein the nozzles are directed towards the central axis of the telescopic shaft for uniformly delivering jets of washing liquid against an outer surface of the telescopic elements included in the telescopic shaft, a drain duct through which the washing liquid is drained, wherein the drain duct is positioned below the nozzles along the central axis to collect, by gravity, the washing liquid dispensed by the nozzles.

**[0030]** According to another aspect of the invention, the drain duct can be in fluid communication with a gap delimited along the telescopic shaft in an interposed position between a fixed base telescopic element and one or more movable telescopic elements.

**[0031]** According to a further aspect of the invention, the telescopic shaft may include a bottom guide internal member removably connected within the base telescopic member, wherein the bottom guide internal member is annular configured and positioned interposed in the airtight gap delimited along the telescopic shaft.

**[0032]** According to an additional aspect of the invention, the inner bottom guide element may comprise at least one sealing ring which extends outwards i.e. facing inward and/or outward of the telescopic base element, wherein the bottom guide member defines a seal between the base telescopic member and a movable telescopic member of the telescopic shaft fitted along the base telescopic member.

**[0033]** According to another aspect of the invention, the washing system can comprise a first supply branch which mutually connects at least two nozzles to each other and, in turn, to a main supply line and a second supply branch which mutually connects further at least two nozzles to each other and, in turn, to a main supply line to which the first supply branch is connected.

**[0034]** According to a further aspect of the invention, the discharge duct can be in fluid communication with the interspace through a through discharge opening delimited in the base telescopic element.

**[0035]** According to an additional aspect of the invention, the exhaust duct can have a first flanged end, for the connection, of the removable type, with the base telescopic element and a second flanged end, opposite to the first flanged end, in which the second flanged end is configured for connection to an exhaust circuit.

**[0036]** According to another aspect of the invention, the washing system can comprise a lid for sealing a delimited inspection opening passing through the telescopic base element.

**[0037]** According to a further aspect of the invention, the internal bottom guide element can be positioned along the base telescopic element at the through drain opening.

**[0038]** According to an additional aspect of the invention, the internal bottom guide element can be positioned flush or in such a way as to face at least partially inside the overall dimensions of the through drain opening.

**[0039]** Moreover, another object of the invention is a telescopic shaft comprising a central axis, a fixed base telescopic element, for connecting the telescopic shaft to a housing and support seat delimited in a boat, and at least one telescopic element slidingly movable with respect to the base telescopic element along the central

axis, wherein the at least one movable telescopic element is operatively connected to drive members, wherein the telescopic shaft comprises a previously described washing system.

**[0040]** The advantages offered by the washing system for the telescopic shaft according to the invention are evident.

**[0041]** In particular, the washing system according to the invention allows to clean the external surface of each of the one or more movable telescopic elements during the sequence of their extraction starting from a retracted configuration towards an extracted configuration or vice versa.

**[0042]** Furthermore, the washing system according to the invention can be implemented in telescopic shaft for boats of the traditional type, devoid of any system for washing the external surface of one or more movable telescopic elements which make up the telescopic shaft, thus allowing to reach even in them the same advantages pursued by the washing system according to the present invention.

**[0043]** The present invention will now be described, for illustrative but not limiting purposes, according to its preferred embodiments, with particular reference to the Figures of the attached drawings, in which:

Figure 1 shows a side sectional view of a telescopic shaft comprising a washing system according to the invention;

Figure 2 shows a detailed perspective view of some components of the washing system according to the invention connected to a telescopic shaft;

Figure 3 shows a perspective view from another angle of some components of the washing system according to the invention connected to a telescopic shaft;

Figure 4 shows a detailed bottom view of some components of the washing system according to the invention connected to a telescopic shaft;

Figure 5 shows a detailed cross-sectional view of some components of the washing system according to the invention connected to a telescopic shaft;

Figure 6 shows a detailed cross-sectional view, from another point of view, of some components of the washing system according to the invention connected to a telescopic shaft.

**[0044]** The washing system 1 according to the invention is configured to selectively wash the outer surface of movable telescopic elements included in a telescopic shaft 2 to which it is connected.

**[0045]** With reference to the preferred embodiment illustrated in the attached Figures, in the following description reference will be made to a washing system 1 operatively connected to a telescopic shaft 2, wherein said telescopic shaft 2 comprises a fixed telescopic element 4 and three movable telescopic elements 5, 6, 7 movable with respect to the latter, while understanding that alternative embodiments are possible wherein the telescopic shaft 2 comprises a lower or greater overall number of movable telescopic elements.

**[0046]** For example, alternative embodiments of the invention comprise a telescopic shaft 2 in turn comprising a fixed telescopic element and a single movable telescopic element or a fixed telescopic element and two movable telescopic elements or a fixed telescopic element and four or more movable telescopic elements.

**[0047]** In particular, the washing system 1 is operatively connected to the telescopic shaft 2 in a position such as to face the inside of the telescopic shaft 2, for washing the external surface of each movable telescopic element included in the telescopic shaft 2 itself.

**[0048]** In particular, the washing of the external surface of one or more movable telescopic elements takes place during its/their movement in the extracted position or in the retracted position depending respectively on the need to move the telescopic shaft 2 between an extracted position and a retracted position.

**[0049]** A telescopic shaft 2 comprising a fixed base telescopic element 4 and one or more movable telescopic elements with respect to this as well as a washing system 1 is also an object of the invention.

**[0050]** According to a preferred embodiment, the washing system 1 is used in a telescopic shaft 2 which has a high extension along a central axis 3, wherein such central axis 3 defines a direction of movement for the telescopic shaft 2 itself (see Figure 1).

**[0051]** Preferably, the telescopic shaft 2 comprises a fixed base telescopic element 4, for connecting the telescopic shaft 2 to a housing and support seat delimited in a boat, not shown in detail in the accompanying Figures, and three movable telescopic elements movable between them and relative to the base telescopic element 4.

**[0052]** More precisely, with reference to the embodiment illustrated in the attached Figure 1, the telescopic shaft 2 comprises a bottom telescopic element 5, an intermediate telescopic element 6 and a top telescopic element 7.

**[0053]** The telescopic shaft 2 comprises top guide elements interposed between each of the telescopic elements included in the telescopic shaft 2 itself.

**[0054]** As better described below, each of the top guide elements is connected to a top portion of a respective one among the telescopic elements, acting as a guide.

**[0055]** Furthermore, each of the top guide elements comprises an internal annular sealing element which prevents the entry of any liquids or debris into a gap between one telescopic element and the next.

**[0056]** The function and conformation of the guide elements are considered to be within the reach of a person skilled in the art and, therefore, their description will be limited to those characteristics which are useful for understanding the present invention.

**[0057]** With reference to the preferred embodiment illustrated in the attached Figure 1, the telescopic shaft 2 comprises a base guide element 8, which guides the rel-

ative movement of the bottom telescopic element 5 with respect to the base telescopic element 4, an element bottom guide 9, which guides the relative movement of the intermediate telescopic element 6 with respect to the bottom telescopic element 5 and an intermediate guide element 10 which guides the relative movement of the top telescopic element 7 with respect to the at least one element intermediate telescopic 6.

**[0058]** If the telescopic shaft 2 comprises two or more intermediate telescopic elements 6, there will be respective intermediate guide elements, not shown in the attached Figures and similarly configured to the previously described guide elements 8, 9 and 10, each interposed between a first intermediate guide element 6 and the next.

**[0059]** The base guide element 8 is configured as an annular element to be constrained, by means of a removable connection, for example bolted or with screws or the like, to a top portion of the base telescopic element 4.

**[0060]** The basic guide element 8 is therefore visible and accessible from the outside of the telescopic shaft 2.

**[0061]** Similarly, the bottom guide element 9 and the intermediate guide element 10 are each configured as an annular element removably connected, respectively, to a top portion of the bottom telescopic element 5 and to a top portion of the intermediate telescopic element 6.

**[0062]** The telescopic shaft 2 then comprises internal guide elements, each positioned at a bottom portion of the movable telescopic elements, in an interposed position between one telescopic element and the next.

**[0063]** The internal guide elements collaborate synergistically with the guide elements to keep the individual movable telescopic elements aligned with each other and ensure their relative sliding along the central axis 3.

**[0064]** The conformation and function of each of the internal guide elements are considered to be within the reach of a person skilled in the art and, therefore, their description will be limited to those characteristics which are useful for understanding the present invention.

**[0065]** In detail, the telescopic shaft 2 comprises an internal bottom guide element 11, connected in a removable way, for example by means of screws or a bolted connection or similar, to the telescopic base element 4.

**[0066]** The telescopic shaft 2 also comprises an internal intermediate guide element 12 which is removably connected to a bottom portion of the intermediate telescopic element 6 and an internal top guide element 13 which is removably connected to a portion bottom of the top telescopic element 7.

**[0067]** In more detail, the internal bottom guide element 11 is positioned interposed in a gap delimited between the base telescopic element 4 and the bottom telescopic element 5.

**[0068]** Similarly, the internal intermediate guide element 12 is positioned interposed in a gap delimited between the intermediate telescopic element 6 and the bottom telescopic element 5, while the internal top guide element 13 is positioned along a gap delimited between the intermediate telescopic element 6 and the top telescopic element 7.

**[0069]** Each of the internal guide elements 11, 12 and 13 comprises a respective seal to ensure a seal between the individual telescopic elements.

**[0070]** In this regard, it should be noted that each of the internal bottom guide element 11, the at least one intermediate internal guide element 12 and the internal top guide element 13 comprises at least one sealing ring which protrudes outwards, that is to say towards the inside and/or outside of the telescopic shaft 2, defining at least a seal between one telescopic element and the next in a manner within the reach of a person skilled in the art.

**[0071]** The bottom telescopic element 5, the intermediate telescopic element 6 and the top telescopic element 7 can be moved relative to each other and with respect to the base telescopic element 4 through driving members 14.

**[0072]** Preferably, the driving members 14 are of the hydraulic type and have a multi-stage telescopic piston, with hydraulic actuation, according to methods within the reach of the person skilled in the art, which will not be described in detail (see Figures 5 and 6 wherein only a section of the piston of the driving members 14 is shown, i.e. a portion of an extension which is included in these driving members 14).

**[0073]** In other words, the driving members 14 comprise a plurality of extensions which are configured to selectively command the extraction or withdrawal of the bottom telescopic element 5, of the intermediate telescopic element 6 and of the top telescopic element 7 to which are operationally connected.

**[0074]** The driving members 14 are positioned inside the telescopic shaft 2, along an internal cavity of each of the individual telescopic elements previously indicated.

**[0075]** The telescopic shaft 2 comprises a connection joint, not shown in detail in the attached Figures, for the connection between the top end of the driving members 14 and that of the top telescopic element 7, to allow movement of the top telescopic element 7, the intermediate telescopic element 6 and the bottom telescopic element 5.

**[0076]** The connecting joint will not be further described below as it does not form a specific object of the invention.

**[0077]** With reference to the embodiment illustrated in the attached Figure 1, the base telescopic element 4 is constrained at its top portion and at its central portion to respective decks of a boat by means of flange connections (in the attached Figure 1 the decks have been intentionally omitted), while understanding that alternative embodiments are possible wherein the points of constraint of the base telescopic element 4 to the support structure are positioned in a different way or are in a different number to that described above in function of specific use requirements.

**[0078]** The telescopic shaft 2 comprises guide elements, not shown in the attached Figures, interposed

between two successive telescopic elements, in which these guide elements are configured to prevent relative rotation between the single telescopic elements and ensure their effective translation along the central axis 3 in a manner within the reach of a person skilled in the sector which, therefore, will not be further described.

**[0079]** The washing system 1 comprises a plurality of nozzles 15 connected to the telescopic shaft 2 and oriented towards the central axis 3.

**[0080]** The nozzles 15 are preferably positioned coplanar to each other.

**[0081]** According to a preferred embodiment, the nozzles 15 are positioned equidistant from each other, i.e. with a circular symmetry around the central axis 3.

**[0082]** The individual nozzles 15 are configured to deliver a washing liquid under pressure against the outer surface of the individual telescopic elements included in the telescopic shaft 2 itself, in order to keep it clean and thus ensure its effective sliding or, in other words, to maintain its relative coefficient of friction within a predetermined range of values, such as to ensure effective relative sliding between the movable telescopic elements, avoiding their jamming.

**[0083]** According to a preferred embodiment, the washing system 1 comprises four nozzles 15, which are connected in mutual fluid communication in pairs (see for example Figure 4).

**[0084]** According to this preferred embodiment, the washing system 1 comprises a first pair of nozzles 15 and a second pair of nozzles 15.

**[0085]** It is understood that alternative embodiments are possible, not illustrated in the attached Figures, comprising a greater or lesser number of nozzles, connected to each other in fluid communication in pairs or in a different way, even within the framework of a solution configured to uniformly dispense jets of washing liquid against the external surface of each of the movable telescopic elements.

**[0086]** According to the preferred embodiment illustrated in the attached Figures, each of the nozzles 15 has an opening angle of 120° so that the washing system 1 is capable of delivering a substantially uniform jet of washing liquid along the entire diameter of each of the telescopic elements included in the telescopic shaft 2.

**[0087]** It is understood that alternative embodiments are possible wherein each of the nozzles 15 has an opening angle greater or less than 120° according to the total number of nozzles 15 included in the washing system 1.

**[0088]** The washing system 1 comprises a first supply branch 16 which reciprocally connects two nozzles 15 to each other and, in turn, to a main supply line and a second supply branch 17 which reciprocally connects the other two nozzles 15 to each other and, in turn, to a main supply line to which the first supply branch 16 is also connected.

**[0089]** It is understood that according to alternative embodiments, not shown in the attached figures, the washing system 1 comprises a different number of supply branches for mutually connecting single nozzles 15 according to specific use requirements.

**[0090]** The washing system 1 comprises a pump connected in delivery with the nozzles 15, to allow the delivery of a washing liquid under pressure (preferably water) through the same.

**[0091]** It is understood that the washing system 1 is configured to be operationally connected to a possible pump present in the boat wherein the washing system 1 itself is installed, without therefore requiring the installation of a specific pump to feed a washing liquid in pressure to the nozzles 15. Alternatively, the washing system 1 comprises a pump, not shown in the attached Figures, to feed the washing liquid under pressure to the nozzles 15.

**[0092]** With reference to the embodiment illustrated in the attached figures, the nozzles 15 are shown connected to the telescopic shaft 2 through respective supports passing through the base telescopic element 4, so that each of the nozzles 15 has one or more delivery outlets positioned inside the base telescopic element 4, facing the central axis 3, while the supply branches of the washing liquid to the nozzles 15 are positioned externally to the base telescopic element 4 (see for example Figures 2 and 3).

**[0093]** In particular, the delivery mouths of the nozzles 15 are interposed along a gap delimited between the base telescopic element 4 and the remaining telescopic elements included in the telescopic shaft 2.

**[0094]** More precisely, with reference to the preferred embodiment illustrated in the attached Figures, the nozzles 15 are positioned along the base telescopic element 4 so as to be able to selectively face each of the bottom telescopic element 5, the intermediate telescopic element 6 and the top telescopic element 7, according to the position assumed by them during their movement along the central axis 3.

**[0095]** The nozzles 15 are each configured to deliver at least one respective jet of washing liquid along an annular washing band delimited along a portion of the outer surface of each of the movable telescopic elements included in the telescopic shaft 2, by way of non-limiting example, along a portion of the outer surface of the bottom telescopic element 5 or of the intermediate telescopic element 6 or of the top telescopic element 7.

**[0096]** As mentioned, the bottom telescopic element 5, the intermediate telescopic element 6 and the top telescopic element 7 can each be moved relative to the base telescopic element 4 and therefore, relative to the annular washing band defined by the nozzles 15.

**[0097]** In this way, even if the nozzles 15 are constrained to the base telescopic element 4 in a fixed position, it is possible to wash substantially the entire external surface of each of the movable telescopic elements included in the telescopic shaft 2, which is extracted relative to the basic telescopic element 4.

**[0098]** The washing system 1 comprises a drain through which the washing liquid dispensed by the washing system 1, together with any dirt and/or debris re-

moved from the external surface of the movable telescopic elements 5, 6 and 7 are drained.

**[0099]** In particular, the drain is installed at the nozzles 15, in a position below them along the central axis 3 so as to be able to collect by fall the washing liquid dispensed by the washing system 1, as a result of gravity, and allowing it to coming out from the telescopic shaft 2.

**[0100]** In particular, by the term "lower" it is intended to indicate that the drain is installed along the base telescopic element 4 in an interposed position between a bottom portion of the base telescopic element 4 itself and the nozzles 15.

**[0101]** The drain comprises a discharge duct 18 in fluid communication with the gap delimited between the base telescopic element 4 and the other telescopic elements of the shaft 2, through a discharge passing through opening 19 delimited by the base telescopic element 4 (see Figures 5 and 6).

**[0102]** The discharge duct 18 has a first flanged end 20, for connection, of the removable type, with the base telescopic element 4 and a second flanged end 21, opposite to the first, for connection to a discharge circuit not shown in the enclosed Figures, through which to discharge the washing liquid.

**[0103]** In more detail, the first flanged end 20 is connected to the outer surface of the base telescopic element 4 by means of a removable connection, screws or bolts (see Figures 2 and 5) which are sealed, i.e. able to ensure a seal between the base telescopic element 4 and the first flanged end 20 itself.

**[0104]** It should be noted that the internal bottom guide element 11 defines a movable bottom seal which prevents the washing liquid from reaching the bottom end of the base telescopic element 4, i.e. a bottom end of the telescopic shaft 2.

**[0105]** The internal bottom guide element 11 defines an inner seal for the telescopic shaft 2 for the washing liquid dispensed from the nozzles and allows, directly or indirectly, to convey the washing liquid dispensed from the nozzles 15 and any debris removed towards the discharge duct 18, to promote their exit from the telescopic shaft 2.

**[0106]** In particular, the internal bottom guide element 11 is positioned along the base telescopic element 4 at the discharge passing through opening 19.

**[0107]** With reference to a preferred embodiment illustrated in detail in the attached Figure 5, the internal bottom guide element 11 is positioned flush or substantially flush with the discharge passing through opening 19. In this position, since the internal element bottom 11 is at a height flush with or higher than the bottom edge of the discharge passing through opening 19, it ensures the complete outflow of the washing liquid and any debris, avoiding the formation of stagnation of liquid inside the base telescopic element 4.

**[0108]** It is understood that according to an alternative embodiment not shown in the attached Figures, the internal bottom guide element 11 is positioned below the discharge passing through opening 19, possibly spaced from it.

**[0109]** Optionally, the washing system 1 comprises a closing lid 22 for sealing a inspection opening 23 delimited passing through the base telescopic element 4.

**[0110]** According to a preferred embodiment, the inspection opening 23 is positioned along the central axis 3 substantially at the same height as the discharge passing through opening 19, i.e. substantially at the same distance at which the discharge passing through opening 19 is also located with respect to a bottom portion of the telescopic shaft 2, or in other words to a bottom portion of the base telescopic element 4.

**[0111]** Preferably, the inspection opening 23 is made in a position diametrically opposite to the discharge passing through opening 19, while understanding that alternative embodiments are possible in which the inspection opening 23 is positioned in a different way with respect to what was previously described.

**[0112]** The inspection opening 23 delimits an access gap through which to access the inside of the cavity delimited between the base telescopic element 4 and the other telescopic elements included in the telescopic shaft 2, to inspect its interior and, if necessary be able to remove any debris so as to keep free the access to the discharge passing through opening 19 and the subsequent discharge duct 18.

**[0113]** The closing lid 22 is connected in a removable way to the base telescopic element 4 through a connection of the removable and sealed type, similarly to what is described in relation to the connection between the first flanged end 20 and the base telescopic element 4, to which reference is made.

**[0114]** By way of example, a gasket element is provided in an interposed position between the closing lid 22 and the base telescopic element 4, in a manner within the reach of a person skilled in the art.

**[0115]** The connection points of the discharge duct 18 along the telescopic base element 4 have the same arrangement (layout) as those for the connection of the closing lid 22 to the base telescopic element 4 itself. In other words, the first flanged end 20 of the exhaust duct 18 can be positioned at the inspection opening 23 and connected there and the closing lid 22 can be connected to the base telescopic element 4 at the discharge passing through opening 19 without requiring any modification to the base telescopic element 4.

**[0116]** Therefore, according to the space available along the telescopic shaft 2 or in its vicinity, for the installation of the washing system 1, the discharge duct 18 and the closing lid 22 can be inverted with each other, i.e. the discharge duct 18 can be connected at the inspection opening 23 and the closing lid 22 can be connected at the discharge passing through opening 19.

**[0117]** With reference to what has been described above, it is evident that the washing system 1 according to the invention is capable of achieving the set objects.

**[0118]** The washing system 1 is configured to be in-

stalled on board of a telescopic shaft 2, to clean the external surface of the individual movable telescopic elements included in the telescopic shaft 2 itself, both while maintaining the telescopic shaft 2 in position and during their movement between an extended position and a retracted position.

**[0119]** The washing system 1, in fact, has a high operating flexibility, allowing to keep clean the external surface of the individual movable elements included in the telescopic shaft 2 during their movement as well as to remove any debris that may accumulate in the gap between the base telescopic element 4 and the at least one or more movable telescopic elements included in the telescopic shaft 2. In particular, the removal of debris can take place both with the telescopic shaft 2 in motion and with the telescopic shaft 2 in position fixed.

**[0120]** The washing system 1 according to the invention has a simple structure and can be easily implemented in a telescopic shaft of the traditional type, to allow the external surfaces of the individual movable telescopic elements included in this telescopic shaft to be kept clean and therefore functional.

**[0121]** In order to be able to install the washing system 1 in a telescopic shaft of the traditional type, without a similar washing system 1 according to the invention, it is sufficient to make installation seats for the nozzles 15, the discharge duct 18 and possibly the cover closure 22, if present, along the base telescopic element 4, thus requiring a limited number of modifications.

**[0122]** As previously described, according to an alternative embodiment not shown in the attached Figures, the telescopic shaft 2 comprises a base telescopic element 4 and a single movable telescopic element, which corresponds to the bottom telescopic element 5. According to another embodiment of embodiment not shown in the attached Figures, the telescopic shaft 2 comprises a base telescopic element 4 and two movable telescopic elements, which can correspond to the bottom telescopic element 5 and to the intermediate telescopic element 6.

**[0123]** According to a further embodiment not shown in the attached Figures, the telescopic shaft 2 comprises a base telescopic element 4 and four or more movable telescopic elements, which can correspond to the bottom telescopic element 5, to the top telescopic element 7 and two or more intermediate telescopic elements 6.

**[0124]** It should be noted that in each of the alternative embodiments previously described, the washing system 1 is installed in the telescopic shaft 2 according to the same methods described in relation to the preferred embodiment illustrated in the attached Figures.

**[0125]** As regards the individual guide elements, their number and positioning can be deduced from what has been described in relation to the preferred embodiment to which reference is made.

**[0126]** With reference to the above, it is clear that the washing system 1 according to the invention is easy and flexible to use as it can be used in a telescopic shaft 2 regardless of the total number of movable telescopic elements included in the telescopic shaft 2 itself.

**[0127]** In the foregoing the preferred embodiments have been described and variants of the present invention have been suggested, but it should be understood that those skilled in the art will be able to make modifications and changes without thereby departing from the relative scope of protection, as defined by the claims attached.

## Claims

1. Washing system (1) configured for washing an external surface of one or more movable telescopic elements that make up a telescopic shaft (2) to which said washing system (1) is connected, wherein said telescopic shaft (2) comprises a fixed base telescopic element (4) and at least one movable telescopic element with respect to said base telescopic element (4) along a central axis (3), said washing system (1) being **characterized in that** it comprises nozzles (15) through which to deliver a washing liquid under pressure, wherein said nozzles (15) are directed towards said central axis (3) to uniformly deliver jets of washing liquid against an external surface of said one or more movable telescopic elements comprised in said telescopic shaft (2), a discharge duct (18) through which to drain said washing liquid, wherein said discharge duct (18) is connected to said base telescopic element (4) and positioned below said nozzles (15) along said central axis (3), said discharge duct (18) being configured to discharge the washing liquid dispensed by said nozzles (15).

2. Washing system (1) according to claim 1, wherein said discharge duct (18) is in fluid communication with a gap delimited along said telescopic shaft (2) in a position interposed between said base telescopic element (4) fixed and one or more of said movable telescopic elements.

3. The washing system (1) according to claim 1 or 2, wherein said telescopic shaft (2) comprises an internal bottom guide element (11) removably connected within said telescopic base element (4), wherein said internal bottom guide element (11) is annular in configuration and positioned hermetically interposed in said interspace delimited along said telescopic shaft (2).

4. The washing system (1) according to claim 3, wherein said inner bottom guide element (11) comprises at least one outwardly protruding sealing ring, facing inward and/or outward of said telescopic base element (4), wherein said inner bottom guide element (11) defines a seal between said telescopic base element (4) and a movable telescopic element of said telescopic shaft (2) fitted along said element basic

telescopic (4).

**5.** Washing system (1) according to claim 1, comprising a first supply branch (16) which reciprocally connects at least two nozzles (15) to each other and, in turn, to a main supply line and a second supply branch (17) which mutually connects further at least two nozzles (15) to each other and, in turn, to a main supply line to which said first supply branch (16) is connected.

**6.** Washing system (1) according to claim 2, wherein said discharge duct (18) is in fluid communication with said cavity through a discharge passing through opening (19) delimited in said base telescopic element (4).

**7.** Washing system (1) according to claim 1 or 2, wherein said discharge duct (18) has a first flanged end (20), for connection, of the removable type, with said base telescopic element (4) and a second flanged end (21), opposite said first flanged end (20), wherein said second flanged end (21) is configured for connection to a discharge circuit.

**8.** Washing system (1) according to claim 1, comprising a closing lid (22) for sealing a delimited inspection opening (23) passing through said base telescopic element (4).

**9.** Washing system (1) according to claim 6, wherein said internal bottom guide element (11) is positioned along said base telescopic element (4) at said discharge passing through opening (19).

**10.** Washing system (1) according to claim 9, wherein said internal bottom guide element (11) is positioned flush or so as to face at least partially inside the space occupied by said discharge passing through opening (19).

**11.** Telescopic shaft (2) comprising a central axis (3), a fixed base telescopic element (4), configured to connect said telescopic shaft (2) to a housing and support seat delimited in a boat, and at least one element slidingly movable telescopic element with respect to said base telescopic element (4) along said central axis (3), wherein said at least one movable telescopic element is operatively connected to driving members (14) for their movement along said central axis (3), wherein said telescopic shaft (2) comprises a washing system (1) according to any one of claims 1 to 10.

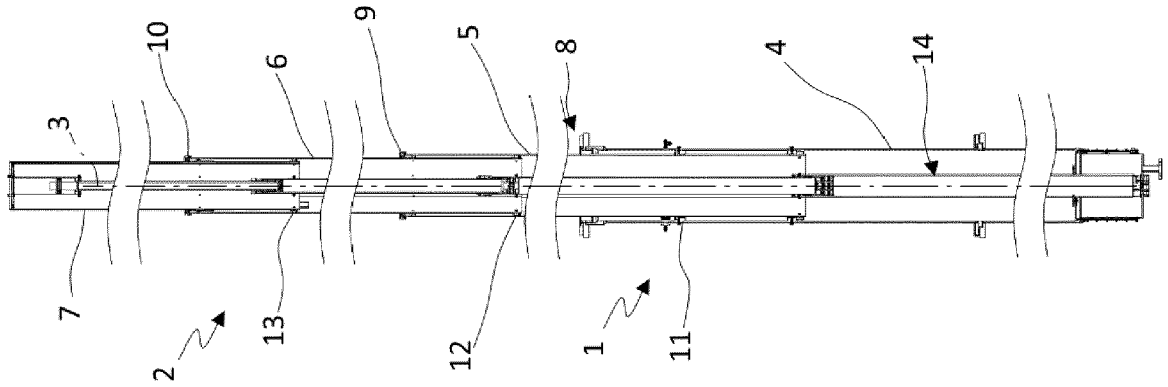


FIG.1

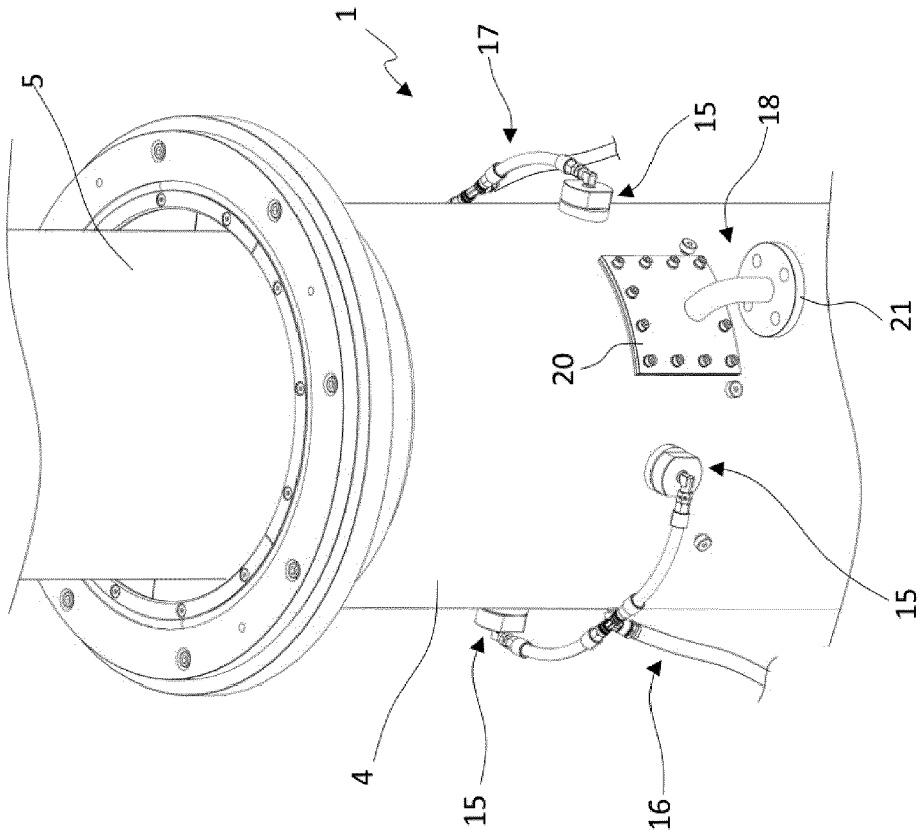


FIG.2

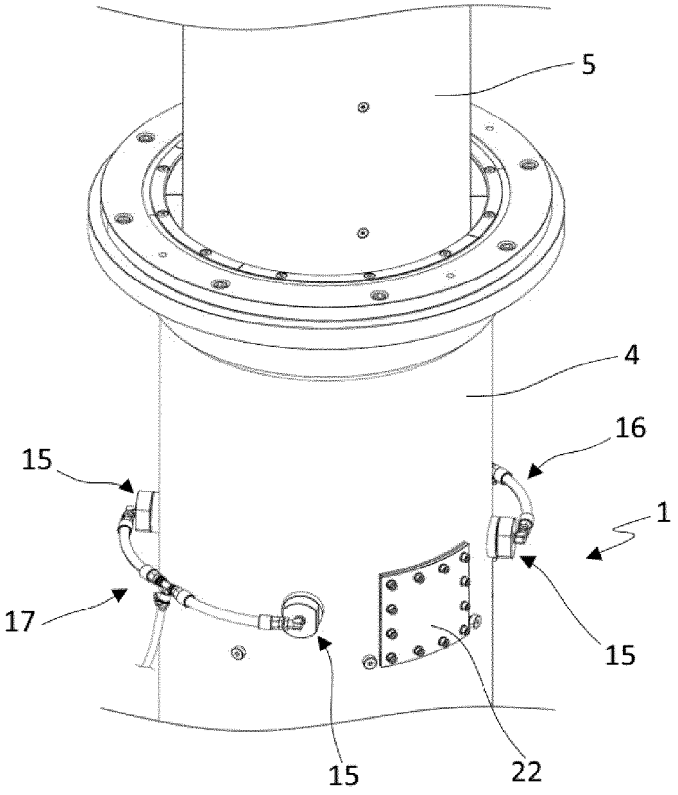


FIG.3

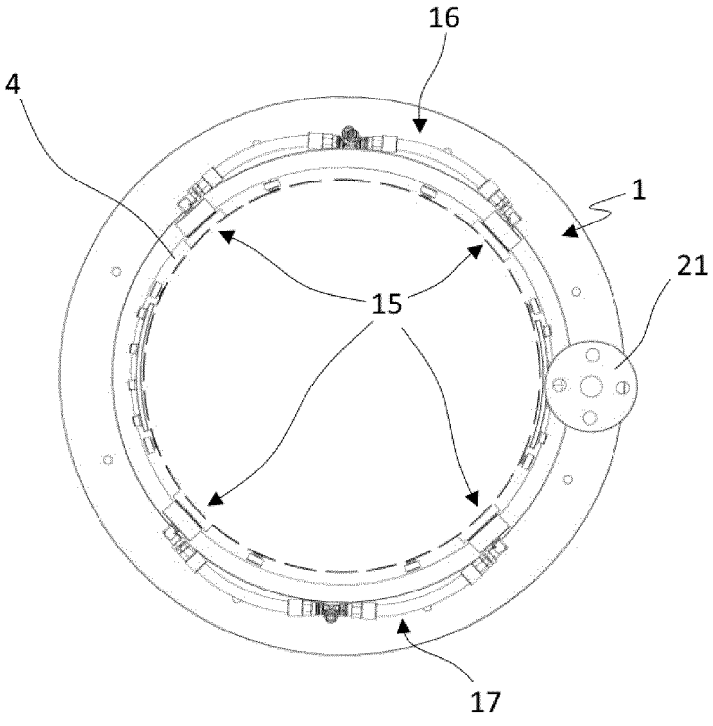


FIG.4

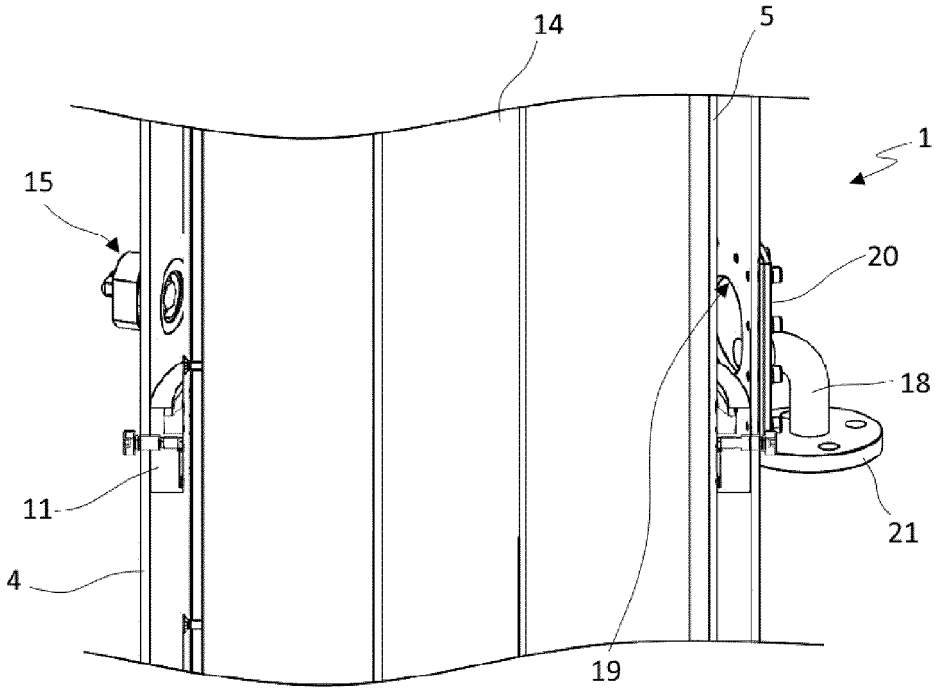


*FIG.5*

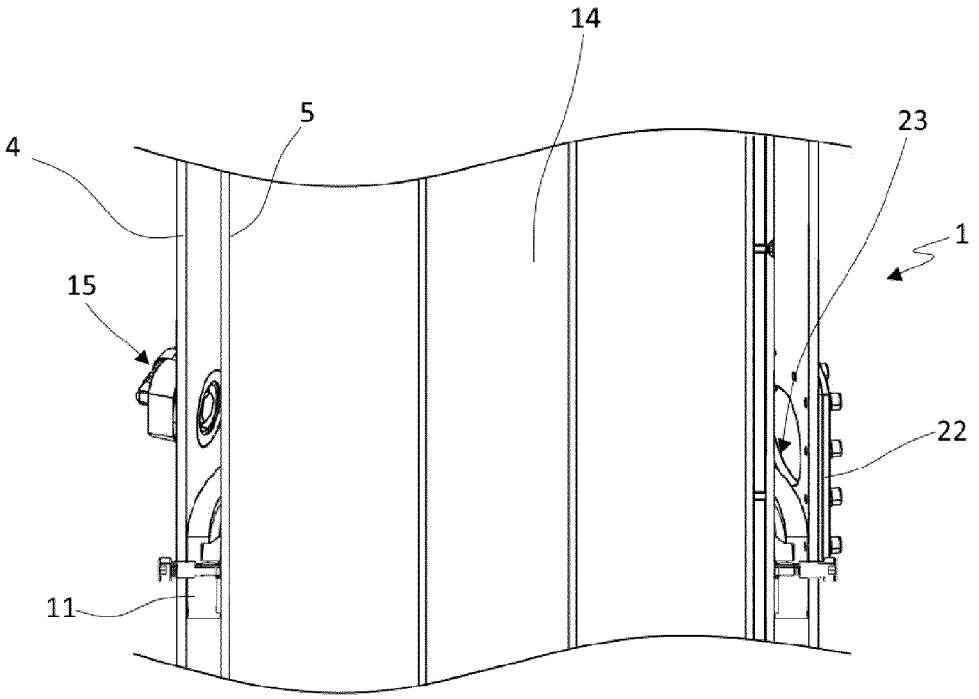


*FIG.6*

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# EUROPEAN SEARCH REPORT

Application Number
EP 23 18 4653

## 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,D | FR 3 068 274 A1 (SPIE CITYNETWORKS [FR]) 4 January 2019 (2019-01-04)<br>* page 1, line 3 - line 22 *<br>* page 6, line 32 - page 7, line 14 *<br>* figures 1, 2, 4 * | 1-11 | INV.<br>B08B3/02<br><br>ADD.<br>B60Q1/26 |
| A | US 9 339 670 B1 (BURNHAM ROBERT J [US] ET AL) 17 May 2016 (2016-05-17)<br>* column 2, line 55 - column 3, line 49 *<br>* figures 1-5, 8 * | 1-11 | |
| A,D | CN 110 894 862 A (FOSHAN DINGKE TECH DEVELOPMENT CO LTD)<br>20 March 2020 (2020-03-20)<br>* paragraph [0003] - paragraph [0009] *<br>* paragraph [0012] - paragraph [0021] *<br>* figures 1, 3, 6 * | 1-11 | |

TECHNICAL FIELDS SEARCHED (IPC)

B08B

The present search report has been drawn up for all claims

| Place of search | Date of completion of the search | Examiner |
|---|---|---|
| The Hague | 1 December 2023 | Wiedenhöft, Lisa |

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01-12-2023

| Patent document cited in search report | Publication date | Patent family member(s) | Publication date |
|---|---|---|---|
| FR 3068274 A1 | 04-01-2019 | NONE | |
| US 9339670 B1 | 17-05-2016 | NONE | |
| CN 110894862 A | 20-03-2020 | NONE | |

EPO FORM P0459

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


- US 2173095 A **[0019]**
- DE 202011050508 U1 **[0020]**
- CN 110894862 **[0022]**
- FR 3068274 **[0023]**