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(71) Applicant: **OMEC S.p.A.**
21055 Gorla Minore (Varese) (IT)

(72) Inventor: **Canale, Stefano**
21055 GORLA MINORE (VA) (IT)

(74) Representative: **Colombo, Stefano Paolo et al**
MARCHI & PARTNERS S.r.l.
Via G.B. Pirelli, 19
20124 Milano (IT)

(54) **Metal tube for a vacuum cleaner, shaped with an engaging means for a suction tool or for a connection device**

(57) A metal tube of an extension for a vacuum cleaner or the like is described. The metal tube is configured to be coupled to a tool, another tube or a connection device. The metal tube comprises, on a sidewall thereof and in the proximity of an end thereof, a recess extending in a radial direction towards the interior of the tube. The recess has a closed bottom and sidewalls which connect the closed bottom to the sidewall of the tube. One of said sidewalls is substantially perpendicular to a longitudinal axis of the tube.

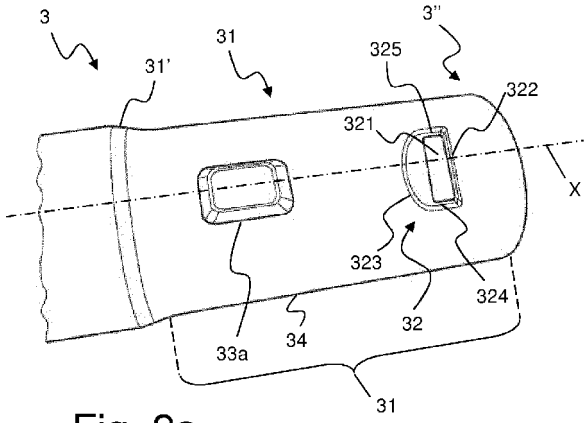

Fig. 2a

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Description

[0001] The present invention relates generally to the sector of electric household appliances. More specifically, the present invention relates to a metal tube for an electric household appliance such as a vacuum cleaner or the like. Even more specifically, the present invention relates to a metal tube for a vacuum cleaner, shaped with an engaging means for a suction tool or for a connection device. The tube may be for example a tube of a telescopic extension.

[0002] For the purposes of the present invention, the term "vacuum cleaner" will be used with a broader meaning so as to include all appliances, for professional or domestic use, which perform cleaning by means of suction. Therefore, the term "vacuum cleaner" will comprise a standard vacuum cleaner, an electric broom, a so-called heavy-duty drum vacuum cleaner and a steam dispensing and suction appliance. During the course of the present description reference will be made mainly to telescopic extensions, but the present invention is not limited to the tubes of such extensions.

[0003] Telescopic extensions for electric household appliances are known, for example, from EP 1,092,383, EP 0,520,534, EP 0,987,976 and WO 2007/112839 in the name of the same Applicant. These telescopic extensions comprise typically an inner tube and an outer tube slidable sealingly one inside the other.

[0004] Depending on the direction of suction, in a telescopic extension an input end and an output end are defined. The input end is typically connected in a removable manner to a suction tool such as a so-called cleaning brush or a suction nozzle. The brush passes over the surface to be cleaned and sucks up solids and/or liquids such as dust, dirt, crumbs or water. The material sucked up from the ground enters into the telescopic extension through the input end and exits from the telescopic extension through the output end. The latter is typically connected in a removable manner to another tube, for example a rigid or flexible spiral tube in turn connected to a suction unit.

[0005] More particularly, depending on the suction direction, an input end and an output end are also defined for the inner tube and outer tube. In fact, the input end of the inner tube corresponds to the input end of the telescopic extension and the output end of the outer tube coincides with the output end of the telescopic extension.

[0006] In some telescopic tubes a connection device is used to connect in a removable manner the input end of the inner tube to the suction tool. A similar connection device may be used to connect in a removable manner the output end of the outer tube to the tube connected to the suction unit. The connection devices may be typically made of a plastic material. These connection devices are fitted, respectively, onto the inner tube and the outer tube in the vicinity of their ends.

[0007] Each connection device is removably fixed to the respective tube. In particular, a reversible engaging system is envisaged for preventing removal of the connection device.

[0008] The engaging system comprises a fixing tooth projecting from the inner surface of the connection device and a window cut in the side surface of the inner and/or outer tube of the telescopic extension. The tooth is configured to engage with the window, preventing extraction of the connection device and rotation thereof with respect to the tube onto which it is fitted.

[0009] Disadvantageously, the presence of the open window, cut in the surface of the tube, does not ensure an air-tight seal between the tube and the connection device. Since the seal is not air-tight, air escapes through the window. This escaping air has the effect of worsening the suction performance of the vacuum cleaner. In principle this poorer performance could be compensated for by increasing the suction power and therefore the electric power consumed by the vacuum cleaner. This increase is however undesirable since it is desirable that the electric power consumption of an electric household appliance should be as low as possible.

[0010] Therefore, the object of the present invention is to provide a metal tube of an electric household appliance, for example a tube of a telescopic extension for a vacuum cleaner, where the hermetic seal between the tube and the connection device fitted onto it is optimized.

[0011] According to a first aspect, the present invention provides a metal tube of an extension (for example a telescopic extension) for a vacuum cleaner or a similar electric household appliance. The metal tube is configured to be coupled to a tool, another tube or a connection device. The metal tube comprises, on a sidewall thereof and in the proximity of an end thereof, a recess extending in a radial direction towards the interior of said tube. The recess has a closed bottom and sidewalls which connect the closed bottom to the sidewall. A sidewall of the recess is substantially perpendicular to a longitudinal axis of the tube. Advantageously, the metal tube may further comprise, in the proximity of its second end, a projection, said projection projecting in a radial direction towards the exterior of said metal tube. The projection provides an advantageous means for blocking the rotation of the connection device. For instance, the rotation between the tube and a nozzle is advantageously prevented.

[0012] Preferably the sidewall of the recess substantially perpendicular to the longitudinal axis of the tube forms a radius of curvature of less than 0.5 mm with the sidewall of the metal tube. Preferably, the radius of curvature is comprised between about 0.1 mm and about 0.3 mm.

[0013] Preferably, the closed bottom is substantially flat and of substantially rectangular shape.

[0014] Preferably, the closed bottom has a length less than or equal to a radius of said metal tube in the proximity of its end. More preferably, the length is comprised between about 60% and about 80% of the radius.

[0015] Preferably, the closed bottom has a width less than or equal to about 50% of the radius. More preferably,

the width is comprised between about 20% and about 30% of the radius. Preferably, the projection has a longitudinal axis and such axis is arranged in a position longitudinally aligned with an axis of said recess along a direction parallel to said longitudinal axis of the metal tube.

[0016] The metal tube may comprise a further projection for providing a still more reliable arrangement for blocking the rotation between a tool (for instance a nozzle) and a metal tube.

[0017] The further projection may extend radially opposed from said other projection.

[0018] According to a second aspect, the present invention provides an assembly of a metal tube as mentioned above and a connection device fitted on the metal tube, wherein the connection device comprises a tooth, said tooth, when the connection device is fitted on the metal tube, engaging with the recess so as to prevent the connection device from being removed from the metal tube.

[0019] The present invention will emerge more clearly from the following detailed description, provided by way of a non-limiting example, to be read with reference to the accompanying drawings in which:

- Figure 1 shows a telescopic extension according to an embodiment of the present invention;
- Figures 2a, 2b and 2c are, respectively, a perspective view, a longitudinally sectioned view and a cross-section along the plane C-C of the output end of the outer tube; Figure 2d is a plan view of the recess of the outer tube;

- Figures 3a and 3b are two views of the tubular element of the connection device according to an embodiment of the invention; and
- Figures 4a, 4b, 4c and 4d are four views of the element for engagement and disengagement of the connection device.

[0020] Figure 1 shows a telescopic extension 1 according to an embodiment of the present invention.

[0021] The telescopic extension 1 comprises an inner tube 2, an outer tube 3, a sleeve 4, a constraining device (not shown in Figure 1), a push-slider (not shown in Figure 1) and an operating pushbutton 5.

[0022] The inner tube 2 has a first end (or input end) 2' and a second end (or output end), not shown in the Figure. The output tube 3 has a first end (or input end) 3' and a second end (or output end) 3". The telescopic extension 1 therefore has as input end the input end 2' of the inner tube 2 and as output end the output end 3" of the outer tube 3.

[0023] The inner tube 2 has a substantially circular cross-section. Its outer surface comprises an axial groove 20 with a bottom wall 21 in which a row of notches 22 of predefined shape is formed.

[0024] The inner tube 2 and outer tube 3 are slidable sealingly one inside the other. A seal, not shown, is arranged between inner tube 2 and outer tube 3.

[0025] The inner tube 2 and outer tube 3 are made, for example, of chrome-plated or externally painted sheet steel. The inner tube 2 and outer tube 3 are formed by annularly closing steel strips and longitudinally welding their edges.

[0026] The sleeve 4 is fixed inside the outer tube 3 at its input end 3'. The constraining device, for example a cylinder piece, and the push-slider are movably supported inside the sleeve 4. The operating pushbutton 5 is operationally connected to the push-slider. The push-slider cooperates with the constraining device via elastic means, which are also housed inside the sleeve 4, and in particular forces the constraining device to remain inside a notch 22 of the inner tube 2 so as to lock the inner tube 2 inside the outer tube 3.

[0027] The operating pushbutton 5 is in turn configured to disengage the push-slider from the constraining device so as to leave the constraining device free to move radially and come out from the notch 22 of the inner tube 2. In this way the inner tube 2 is disengaged from the outer tube 3 and may be slid relative to the outer tube 3 in order to adjust the length of the extension 1.

[0028] The telescopic extension 1 preferably also comprises a first connection device 6a fitted onto the output end 3" of the outer tube 3 and a second connection device 6b fitted onto the input end 2' of the inner tube 2. In other embodiments it could comprise a single connection device. In other embodiments it could comprise no connection devices.

[0029] The two connection devices 6a, 6b have the function of connecting to the telescopic extension 1, respectively, a tube (for example a hose) in turn connected to a suction unit and a suction tool, such as a cleaning brush or a suction nozzle.

[0030] Figures 2a and 2b show the output end 3" of the outer tube 3. At this output end 3", the outer tube 3 changes from a maximum radius RMAX to a minimum radius RMIN via a short transition section 31'. The radius RMAX may be comprised for example between 1.2 cm and 2.4 cm. The minimum radius RMIN may be comprised for example between 1 cm and 2 cm. Downstream of the transition section there is an end section 31. The end section 31 may have a constant radius RMIN or a radius which decreases slightly as far as the open end of the outer tube 3. The end section 31 has a longitudinal axis X and a substantially circular cross-section.

[0031] The end section 31 of the outer tube 3 preferably has, on the outer surface of its sidewall 34, in the proximity of the output end 3", a recess 32. The recess 32 is inset, namely it projects radially inwards. The recess 32 comprises a closed bottom 321. Preferably the closed bottom 321 of the recess 32 is substantially flat and of substantially rectangular shape.

[0032] As shown in Figures 2a, 2b and 2c, the recess 32 is bounded by sidewalls 322, 323, 324 and 325. The wall 322 lies substantially in a plane perpendicular to the

longitudinal axis X of the outer tube 3 and acts as a longitudinal retaining wall for the connection device 6a, as will be clarified below. The wall 323 is longitudinally opposite to the wall 322 and acts as a guide surface for the connection device 6a when it is fitted onto the outer tube 3. The recess 32 is completed by the walls 324 and 325.

[0033] The longitudinal retaining wall 322 is connected at the top to the outer surface of the outer tube 3 with a small radius of curvature, preferably less than 0.5 mm. More preferably, the radius of curvature is comprised between about 0.1 mm and 0.3 mm. For example, the radius of curvature may be equal to about 0.1 mm, 0.2 mm, 0.3 mm or 0.4 mm.

[0034] Preferably, the wall 323 is inclined with respect to the axis X at an angle α preferably less than about 45°.

[0035] Figure 2d shows a plan view of the closed bottom 321 of the recess 32. The closed bottom 321 has a length LMAX and a width LMIN.

[0036] The Applicant has carried out various tests to determine the optimum length LMAX and width LMIN of the closed bottom 321. The dimensions of the closed bottom 321 must in fact be such as to ensure optimum retention of a tooth of the connection device 6a, as will be clarified below. Moreover, the dimensions of the closed bottom 321 must ensure that the longitudinal retaining wall 322 does not have too great a height which would be difficult to implement in practice. At the same time this height must not be too small because in this case it would not ensure retention of the tooth of the connection device 6a.

[0037] The Applicant has verified that the optimum dimensions of the closed bottom 321 are obtained when the length LMAX of the bottom 321 is less than or equal to the minimum radius RMIN of the outer tube 3. Preferably, the width LMIN of the bottom 321 must be less than or equal to about 50% of the minimum radius RMIN of the outer tube 3. Preferably, the length LMAX of the bottom 321 is about 90% less than the minimum radius RMIN. More preferably, the length LMAX of the bottom 321 is comprised between about 60% and about 80% of the minimum radius RMIN. Preferably, the width LMIN of the bottom 321 is about 40% less than the minimum radius RMIN. More preferably, the width LMIN of the bottom 321 is comprised between about 20% and about 30% of the minimum radius RMIN.

[0038] The recess 32 is preferably formed by means of cold deformation of the sheet metal of the outer tube 3.

[0039] Moreover, the end section 31 comprises at least one projection projecting in a radial direction towards the exterior of the outer tube 3. In the embodiment shown in Figures 2a and 2b, the end section 31 comprises a first projection 33a and a second projection 33b. Preferably, the first projection 33a is formed in a position longitudinally aligned with the recess 32 along a direction parallel to the longitudinal axis X. Moreover, the first projection 33a and the second projection 33b are preferably in positions diametrically opposite with respect to the longitudinal axis X. Preferably, the first projection 33a and the second projection 33b have a parallelepiped form with sidewalls which are slightly inclined and rounded corners.

[0040] In an entirely similar manner, the inner tube 2 shown in Figure 1, in the proximity of its input end 2', may also comprise a recess and projections (not shown in Figure 1) similar to the recess 32 and the projections 33a, 33b described above. Therefore, a detailed description thereof will be omitted.

[0041] In an embodiment of the present invention, the connection device 6a comprises a tubular element 7, shown in Figures 3a and 3b, and an engaging and disengaging element 8, shown in Figures 4a, 4b, 4c and 4d.

[0042] The tubular element 7 comprises a first portion 71 which is substantially cylindrical and a second tapered portion 72 with a substantially frusto-conical shape. The second tapered portion 72 is configured to be connected with interference, for example, to a tube in turn connected to a suction unit, as will be described in greater detail below.

[0043] The first portion 71 preferably has, at its free end, at least one recess which extends longitudinally inside the tubular element 7. In the embodiment shown in Figures 3a and 3b, the inner surface of the first portion 71 has a first recess 73a and a second recess 73b which extend longitudinally inside the tubular element 7. The two recesses 73a, 73b are arranged in diametrically opposite positions. Opposite each of these longitudinal recesses 73a, 73b the outer surface of the tubular element 7 preferably has a respective protrusion 74a, 74b.

[0044] Moreover, the first portion 71 comprises a window 75 formed in its thickness. The window 75 is preferably longitudinally aligned with the protrusion 74a corresponding to the first recess 73a. The window 75 has a substantially rectangular shape.

[0045] Moreover, the first portion 71 preferably comprises, on its outer surface, a seat 76 situated on one of the transverse sides of the window 75, in particular on the side of the window 75 opposite to the tapered portion 72. The seat 76 has substantially the form of a parallelepiped which is hollow at the top and is configured to seat a fulcrum of the engaging and disengaging element, as will be described in greater detail hereinbelow.

[0046] The engaging and disengaging element 8 shown in Figures 4a, 4b, 4c and 4d comprises a central lever body 81, a helical spring 82 and a cover piece 83.

[0047] The central body 81 comprises a blind hole 84 inside which the helical spring 82 is seated. Moreover, the central body 81 comprises a tooth 85 with a substantially parallelepiped shape and a fulcrum 86. In the embodiment shown, the fulcrum 86 comprises a pair of teeth 86 with a semi-circular shape. The teeth 86 perform the function of a pivot, as will be explained in greater detail hereinbelow. The central body 81 has finally a wall 87 on which it is possible to exert a pressure in order to raise the tooth 85.

[0048] The outer surface of the wall 87 has knurlings 88 configured to facilitate gripping of the engaging and disengaging device 8 by a user.

[0049] Both the tubular element 7 and the central body 81 of the engaging and disengaging element 8 and its cover piece 83 are made of a plastic material.

[0050] In order to fit the connection device 6a onto the telescopic extension 1, for example onto the output end 3" of the outer tube 3, the tubular element 7 is firstly fitted onto the end section 31 of the outer tube 3. In particular, the free end of the first substantially cylindrical portion 71 of the tubular element 7 is moved towards the output end 3" and the tubular element 7 is slid onto the end section 31 so that the first recess 73a engages with the first projection 33a and the second recess 73b engages with the second projection 33b. In this way, advantageously, the tubular element 7 may slide in the longitudinal direction on the outer tube 3, but may not rotate relative thereto. Moreover, once the projections 33a, 33b of the outer tube 3 have engaged with the recesses 73a, 73b, the window 75 is located substantially opposite the recess 32 of the outer tube 3. At this point, the central body 81 of the engaging and disengaging element 8 is mounted on the tubular element 7 so that the teeth 86 engage inside the seat 76 and the tooth 85 also engages with the window 75 and the underlying recess 32. Moreover, the cover piece 83 is fixed to the tubular element 7 so that the spring 82 presses between the inner surface of the cover piece 83 and the bottom of the blind hole 84. In this way, by means of the action of the spring 82, the tooth 85 is kept inside the recess 32.

[0051] The edge of the tooth 85 therefore comes up against the longitudinal retaining wall 322, which is perpendicular to the bottom 321, so as to prevent extraction of the connection device 6a from the outer tube 3. In this way, advantageously, the connection device 6a and the outer tube 3 are firmly locked together. In other words, the connection device 6a may not slide in the longitudinal direction along the end section 31 of the outer tube 3 nor rotate relative thereto.

[0052] Once the connection device 6a has been engaged with the outer tube 3 it is then possible to connect thereto another tube suitable for connecting the extension 1 to a suction unit, by inserting with an interference fit one end of this tube into the second tapered portion 72 of the tubular element 7.

[0053] In order to disengage the connection device 6a from the outer tube 3, a user presses the wall 87 of the engaging and disengaging element 8 against the tubular element 7 in the direction indicated by the arrow marked by the letter "A" in Figure 4a. By performing a pivoting action about the fulcrum 86, the tooth 85 is raised. By maintaining then a pressure on the engaging and disengaging element 8 in the direction indicated by the arrow "A", the connection device 6a may be slid in a longitudinal direction on the tapered portion 31 of the outer tube 3 and may be extracted from the tube itself.

[0054] In a manner entirely similar to that described above, the connection device 6b may be engaged with and disengaged from the inner tube 2 at its input end 2'. Once the connection device 6b has been engaged with the inner tube 2 it is possible to connect thereto a suction tool, by inserting with interference the end of this tool into the second tapered portion 72 of the tubular element 7.

[0055] Advantageously, the presence of the recess 32 with the closed bottom and wall 322 which forms a small radius with the outer surface of the outer tube 3 allows stable locking together of the connection device 6a and the outer tube 3. In fact, the wall 322 perpendicular to the bottom of the recess 32 ensures locking of the tooth 85 of the connection device 6a so as to prevent the latter from being extracted in the longitudinal direction from the outer tube 3. Moreover the presence of the projections 33a, 33b on the outer tube 3 also prevents rotation of the connection device 6a with respect to the outer tube 3. Moreover, advantageously, the closed recess 32 allows engagement of the connection device 6a with the outer tube 3 without air escaping from the tube itself. The hermetic seal between the outer tube 3 and the connection device 6a is therefore optimized. This ensures maximum suction efficiency and at the same time minimizes the power consumption of the electric household appliance (for example vacuum cleaner) which comprises the telescopic extension 1.

[0056] Moreover, advantageously, when a user detaches the suction tool (for example a brush or a suction nozzle) from the inner tube 2 and directly uses the inner tube 2 for the suction operation (for example in locations which are difficult to reach with a brush or nozzle), the presence of the closed recess 32 ensures that air does not escape from the inner tube 2. This helps ensure maximum suction efficiency and at the same time minimizes the power consumption in any operating condition of the electric household appliance which comprises the telescopic extension 1.

Claims

1. A metal tube (3) of an extension (1) for a vacuum cleaner or the like, said metal tube (3) being configured to be coupled to a tool, another tube or a connection device (6a), wherein said metal tube (3) comprises, on a sidewall thereof (34) and in the proximity of an end (3") thereof, a recess (32) extending in a radial direction towards the interior of said tube (3), said recess (32) having a closed bottom (321) and sidewalls (322, 323, 324, 325) which connect said closed bottom (321) to said sidewall (34) of the tube (3), wherein one (322) of said sidewalls (322, 323, 324, 325) is substantially perpendicular to a longitudinal axis (X) of said tube (3), wherein said metal tube (3) further comprises, in the proximity of said end (3"), a projection (33a), said projection (33a) projecting in a radial direction towards the exterior of said metal tube (3).

2. The metal tube (3) according to claim 1, wherein said one (322) of said sidewalls (322, 323, 324, 325)

forms a radius of curvature of less than 0.5 mm with said sidewall (34) of the metal tube (3).

3. The metal tube (3) according to claim 2, wherein said radius of curvature is comprised between about 0.1 mm and about 0.3 mm.

4. The metal tube (3) according to any one of the preceding claims, wherein said closed bottom (321) is substantially flat and of substantially rectangular shape.

5. The metal tube (3) according to claim 4, wherein said closed bottom (321) has a length (LMAX) less than or equal to a radius (RMIN) of said metal tube (3) in the proximity of its said end (3").

6. The metal tube (3) according to claim 5, wherein said length (LMAX) is comprised between about 60% and about 80% of said radius (RMIN).

7. The metal tube (3) according to claim 5 or 6, wherein said closed bottom (321) has a width (LMIN) less than or equal to about 50% of said radius (RMIN).

8. The metal tube (3) according to claim 7, wherein said width (LMIN) is comprised between about 20% and about 30% of said radius (RMIN).

9. The metal tube (3) according to any one of the preceding claims, wherein said projection (33a) has a longitudinal axis and such axis is arranged in a position longitudinally aligned with an axis of said recess (32) along a direction parallel to said longitudinal axis (X) of the metal tube (3).

10. The metal tube (3) according to any one of the preceding claims, further comprising a further projection (33b).

11. The metal tube (3) according to claim 10, wherein said further projection (33b) extends radially opposed from said projection (33a).

12. An assembly of a metal tube (3) according to any one of the preceding claims and a connection device (6a) fitted on said metal tube (3), wherein said connection device (6a) comprises a tooth (85), said tooth (85), when said connection device (6a) is fitted on said metal tube (3), engaging with said recess (32) so as to prevent the connection device (6a) from being removed from the metal tube (3).

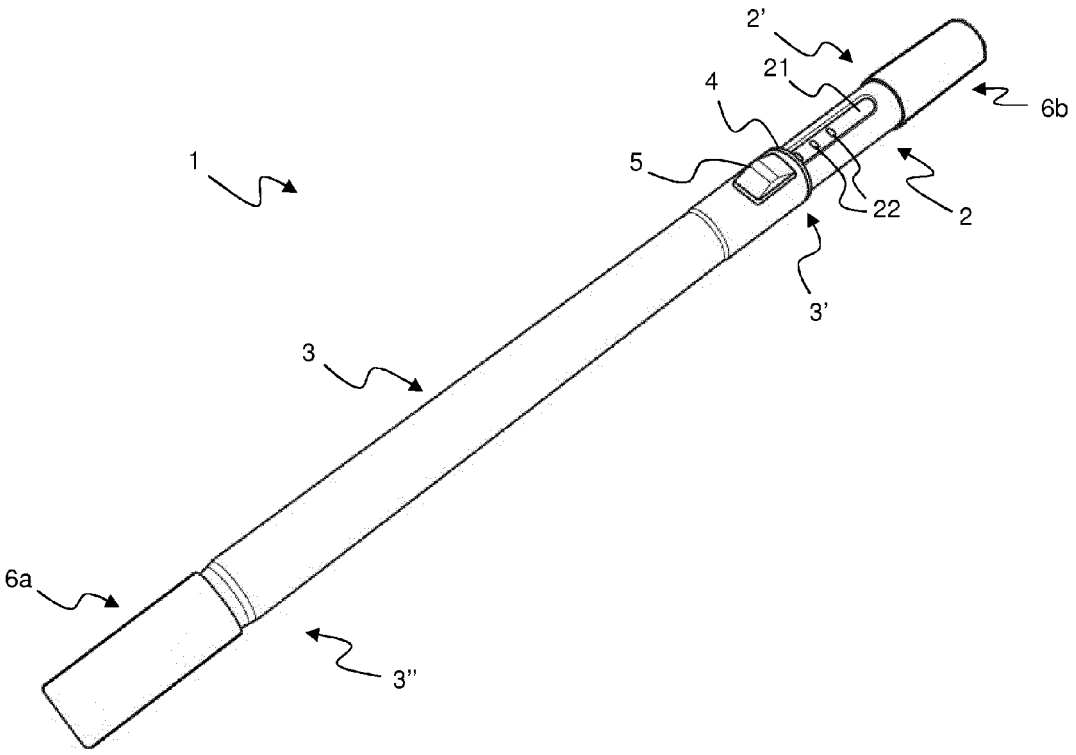

Fig. 1

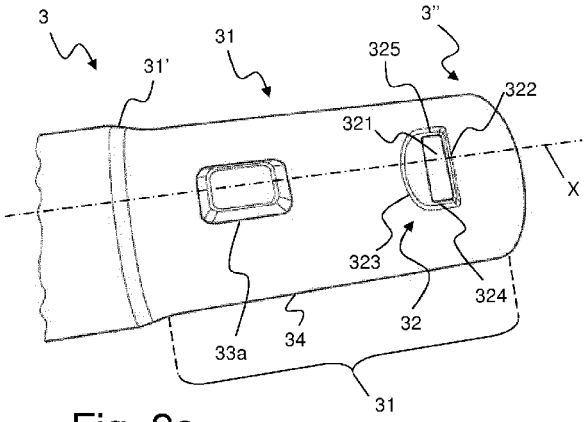

Fig. 2a

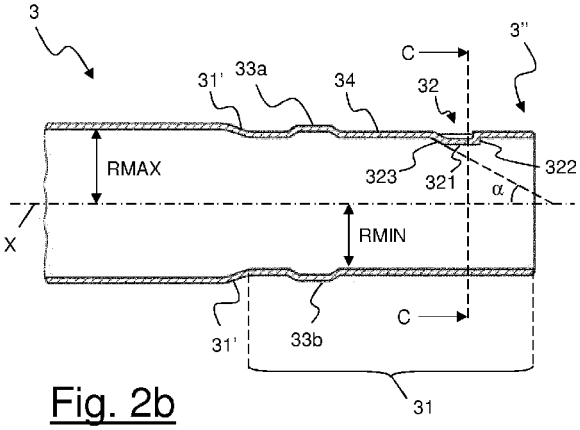

Fig. 2b

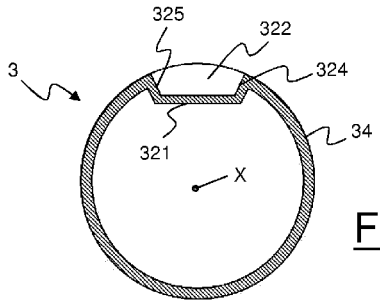

Fig. 2c

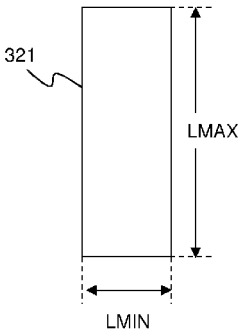

Fig. 2d

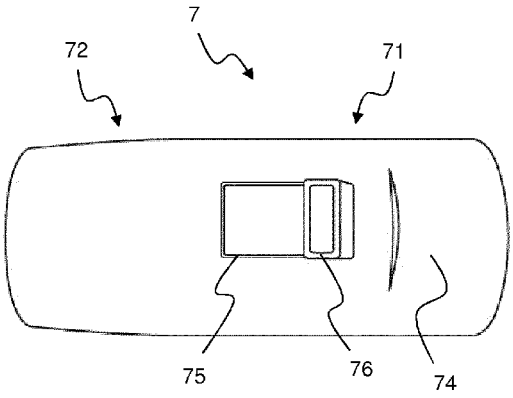

Fig. 3a

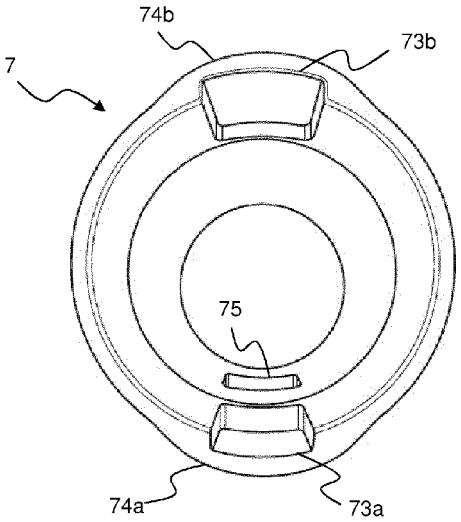

Fig. 3b

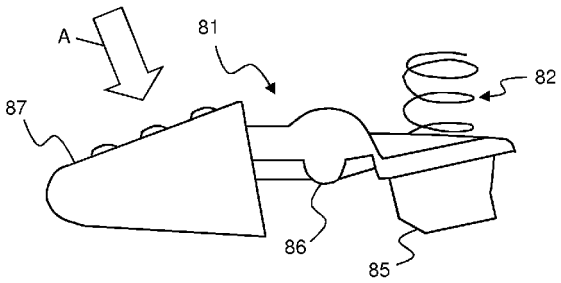

Fig. 4a

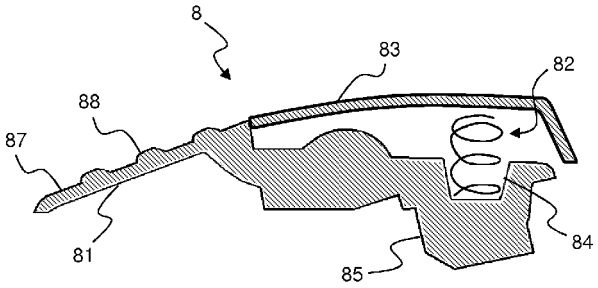

Fig. 4b

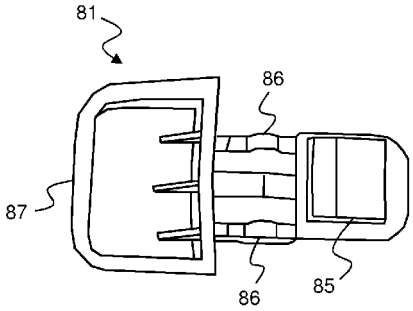

Fig. 4c

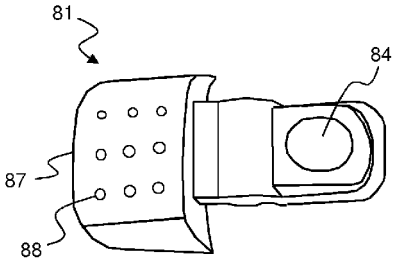

Fig. 4d

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European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 12 17 7236

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 20 2005 020121 U1 (FISCHER ROHRTECHNIK GMBH [DE]) 9 March 2006 (2006-03-09) * paragraph [0008] * * paragraph [0011] * * paragraph [0071] - paragraph [0081]; figures 1-3 *	1-12	INV. A47L9/24
A	DE 299 09 219 U1 (FROH CARL GMBH [DE]) 2 September 1999 (1999-09-02) * abstract; figure 2 *	1-12	
A	DE 197 20 003 A1 (ZELMER [PL] ZELMER RZESZOW [PL]) 30 April 1998 (1998-04-30) * abstract; figure 3 *	1-12	
			TECHNICAL FIELDS SEARCHED (IPC) F16L A47L

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	27 November 2012	Hubrich, Klaus

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 202005020121 U1	09-03-2006	NONE	
DE 29909219 U1	02-09-1999	NONE	
DE 19720003 A1	30-04-1998	DE 19720003 A1	30-04-1998
		FR 2755000 A1	30-04-1998
		PL 316742 A1	11-05-1998

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Patent documents cited in the description

- EP 1092383 A **[0003]**
- EP 0520534 A **[0003]**
- EP 0987976 A **[0003]**
- WO 2007112839 A **[0003]**