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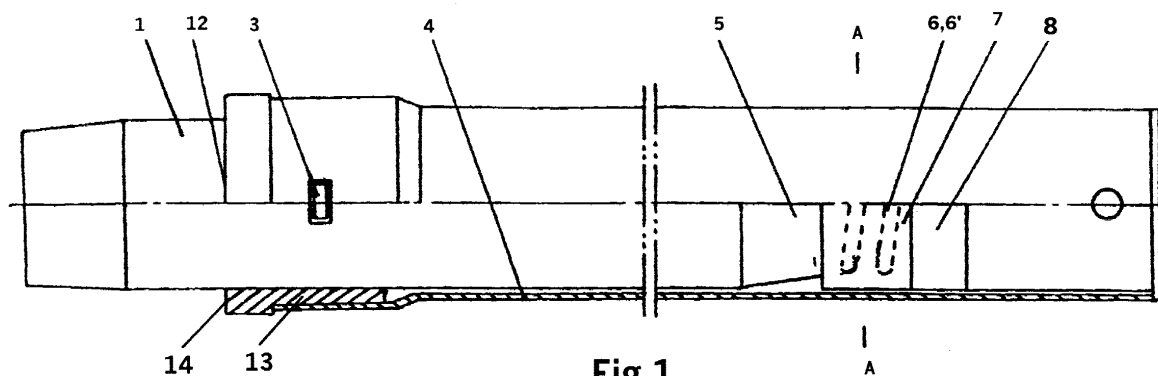
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(54) **Stepless telescopic dust collecting tube for vacuum cleaner**

(57) A stepless telescopic dust collecting tube of vacuum cleaner comprises an exterior tube (4), an interior tube (1) inserted into the chamber of exterior tube (4) and a locking device for positioning between the said exterior tube (4) and interior tube (1), wherein said locking device includes a conical tube section (5) in said interior tube 1 and a locking ring with gap fit round against the conical tube section (5). Said locking ring (7) mates

with said interior tube section (5) through the internal screw thread (6) on the inner surface and the external screw thread (6') on the outer surface respectively. Said exterior tube (4) is provided with axial guiding configuration (11) on internal tube wall, and said locking ring (7) is provided with corresponding axial guiding configuration (11') so that the axial guiding configuration 11 can slide within it. The dust collecting tube can be locked at any position, and operation is reliable and simple.



Description

TECHNICAL FIELD

[0001] The present invention relates to a telescopic dust collecting tube for vacuum cleaner, particularly to a stepless telescopic dust collecting tube for vacuum cleaner.

BACKGROUND OF THE INVENTION

[0002] In prior state of art, dust collecting tube such as published in European patent EP0293518 is a telescopic tube with its length adjusted in steps, it comprises an exterior tube and an interior tube inserted into the chamber of said exterior tube. A locking device for positioning between the said exterior and interior tubes is provided. As soon as the said locking device is released, said exterior tube and interior tube can be adjusted with respect to each other, so that the overall length of the dust collecting tube is lengthened or shortened in steps. But the said locking device is rather complicate, and adjustment in length can only be carried out in steps.

SUMMARY OF THE INVENTION

[0003] The present invention aims to provide for vacuum cleaner a stepless telescopic dust collecting tube capable of stepless adjustment.

[0004] In accordance with the purpose of present invention, the technical arrangement is as follows: the vacuum cleaner adopts a stepless telescopic dust collecting tube, which comprises an exterior tube and an interior tube inserted into the chamber of said exterior tube, and a locking device for positioning between the said exterior and interior tubes is provided. Said locking device includes a conical tube section in said interior tube and a locking ring with gap fit round against said conical tube section. Said locking ring mates with said conical interior tube section through the internal screw thread on inner surface and the external screw thread on outer surface respectively. Said exterior tube is provided with axial guiding configuration on its internal wall, and said locking ring is provided with corresponding axial guiding configuration so that the said exterior tube guiding configuration can slide within it. When the interior tube is rotated relative to the exterior tube, there is no relative rotation between the exterior tube and the locking ring, but only relative rotation between the interior tube and said locking ring occurs. In this way, the said locking ring is rotated along the screw thread on conical tube section of the interior tube and thereby can move axially on said conical tube section. In case said locking ring moves toward the big end of conical tube section, the said locking ring is expanded and pressed tightly between the interior tube and the exterior tube, then said interior tube and exterior tube are locked with respect to each other. In case said locking ring moves

toward the small end of conical tube section, the clearance between the interior tube and exterior tube is big enough to allow the interior tube to slide relatively in exterior tube for lengthening or shortening.

[0005] In view of the above described arrangement, the present invention has the following advantages in comparison with the conventional technique:

The locking device of present invention depends only on one locking ring, it is simple in construction, and the dust collecting tube can be locked at any position. The operation is reliable and simple.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] In the following the present invention is further depicted with reference to the accompanying figures:

Fig.1 is a main view of the stepless telescopic dust collecting tube for vacuum cleaner of present invention;

Fig.2 is a sectional view along direction A-A of Fig.1; Fig.3 is a schematic view of an alternate structure of stop device of the stepless telescopic dust collecting tube for vacuum cleaner of present invention.

[0007] In the drawings the reference numerals denote the parts respectively as follows:

1- interior tube; 3- fixing clasp; 4- exterior tube; 5- conical tube section of interior tube; 6- internal screw thread; 6'- external screw thread; 7- locking ring; 8- stop ring; 10- locking ring gap; 11- guiding rib; 11'- guiding groove; 12- protrusion; 13- limit ring; 14- limit ring flange; 15- sleeve.

DETAILED DESCRIPTION OF THE INVENTION

[0008] As shown in Fig.1, a dust collecting tube of vacuum cleaner comprises an exterior tube 4, an interior tube 1 inserted into the chamber of exterior tube 4 and a locking device for positioning between the said exterior tube 4 and interior tube 1. Said locking device includes a conical tube section 5 in said interior tube 1 and a locking ring 7 with gap fit round against said conical tube section 5. The conical tube section 5 is preferably provided at the tail end of the interior tube 1. The gap 10 of said locking ring 7 extends in the direction of the axis of the interior tube 1 and may occupy the whole length of locking ring wall or only part of the length of wall of locking ring 7.

[0009] The locking ring 7 has on its inner surface the internal screw thread 6, and the conical tube section 5 has on its outer surface the external thread 6' for mating with the internal screw thread 6 of locking ring 7. The locking ring 7 engages with the conical tube section 5 through internal thread 6 and are external thread 6', and are capable to rotate relatively. When the locking ring 7

is rotating relative to the conical tube section 5 to move upwards or downwards, due to the fact that the surface of conical tube section 5 is conical in shape, said gap 10 of the locking ring makes the locking ring 7 capable to expand in case the locking ring 7 moves toward the big end of conical tube section 5. Said inner wall of exterior tube 4 is provided with an axial guiding rib 11, which is inserted into axial guiding groove 11' of said locking ring 7, so that said exterior tube 4 can slide axially relative to said locking ring 7 but it can not rotate relative to each other. Alternatively such construction may be equivalently replaced by an alternate scheme, in which said locking ring 7 has a projecting rib inserted into an axial guiding groove provided on the inner wall of said exterior tube 4.

[0010] The locking ring 7 is made of elastic material, such as plastics. The dimension of conical tube section is such that the external diameter of the locking ring 7 (i.e. in natural state) is a bit smaller than the internal diameter of the exterior tube 4 while locking ring 7 is positioned at the small end (i.e. smaller diameter) of the conical tube section 5, and the external diameter of the locking ring 7 expands to a value a bit larger than the internal diameter of the exterior tube 4 while locking ring 7 is positioned at the big end (i.e. bigger diameter) of the conical tube section 5. In this way, when the locking ring 7 is rotated and moved to the small end of the conical section 5, the exterior tube 4 may slide upwards or downwards relative to the interior tube 1 by means of slide fit of the protruding guiding rib 11 with the guiding groove 11' of locking ring 7. When the exterior tube 4 is rotated relative to the interior tube 1, the slide fit of the protruding guiding rib 11 with the guiding groove 11' prohibits relative rotation between the exterior tube 4 and the locking ring 7, therefore the exterior tube 4 drives the locking ring 7 to rotate in relation to the interior tube 1 and to move upwards. Simultaneously the locking ring expands outward, and as soon as the maximum diameter of the locking ring 7 expands to a value a bit bigger than the internal diameter of the exterior tube 4, the exterior tube 4 is seized. Here, the exterior tube 4 could no longer rotate or move upwards or downwards in relation to the interior tube 1. If it is desired that exterior tube 4 is to be moved relative to the interior tube 1, the exterior tube 4 should be rotated in a direction opposite to above described mode so that the locking ring 7 follows to move downwards, and the diameter of the locking ring returns to its natural condition, and the exterior tube 4 can again be slid relative to interior tube 1. Repeating above described action, the exterior tube 4 can again be locked. Thus it can be seen that the length of dust collecting tube can be adjusted continuously without steps.

[0011] To prevent the locking ring 7 disengaging from conical tube section 5, a stop ring 8 is mounted at the small end or tail end of conical tube section 5.

[0012] Moreover, to prevent the exterior tube 4 disengaging from the tail end of the interior tube 1 while mov-

ing downwards and disengaging from the top end of the interior tube 1 while moving upwards, a limiter is provided. The limiter comprises a protruding configuration 12 provided near the top end of the interior tube, said protruding configuration 12 has several protrusions (not shown in Fig) protruding from the outer surface of interior tube 1 or a protruding ring and a limit ring 13 with a flange 14 provided at the top end of the exterior tube 4. The limit ring 13 is made of elastic material such as plastics, and the internal diameter of the limit ring is a bit smaller than the external diameter of the locking ring 7 in its natural state but a bit bigger than the external diameter of the interior tube 1. There are various modes of connection between the limit ring 13 and the exterior tube 4. As shown in Fig.1, the limit ring 13 has a fixing clasp on its outer surface, and exterior tube 4 has a corresponding opening on the wall of the top end part, the internal diameter of the top end part of the exterior tube 4 is a little bigger than its remainder part. The limit ring can be pressed into the top end of the exterior tube 4 to mate fixing clasp with the opening on the wall of the top end, and thus limit ring 13 is fixed at the top end of exterior tube 4. Or as shown in Fig.3, the limit ring 13 abuts on the top end of the exterior tube 4, and a sleeve made of elastic material such as plastics is fit round against the outer surface of both the limit ring 13 and the top end of exterior tube 4. There is one or several fixing clasps on the outer surface of the limit ring 13 and the top end of exterior tube 4 respectively which is (are) protruded into the sleeve 15. When the exterior tube 4 is moved upwards until the flange 14 of the limit ring 13 touches protrusion configuration 12 of the interior tube 1, the exterior tube 4 can no longer be moved further upwards. When the exterior tube 4 is moved downwards until the lower end of the limit ring 13 touches the upper end of the locking ring 7, the exterior tube 4 can no longer be moved further downwards. Hence, the limit ring 13 plays the role of an upper and lower limiter for the exterior tube 4.

[0013] Above described embodiment is taken only as an example for illustrating the present invention. It will be appreciated that the present invention can be carried out with various modifications and replacements without departing from the basic concept and scope of present invention by persons skilled in the art.

Claims

1. A stepless telescopic dust collecting tube of vacuum cleaner comprises an exterior tube (4), an interior tube (1) inserted into the chamber of exterior tube (4) and a locking device for positioning between the said exterior tube (4) and interior tube (1), wherein said locking device includes a conical tube section (5) in said interior tube 1 and a locking ring with gap fit round against said conical tube section (5). Said locking ring (7) mates with said interior

tube section (5) through the internal screw thread (6) on inner surface and the external screw thread (6') on the outer surface respectively. Said exterior tube (4) is provided with an axial guiding configuration (11) on the internal tube wall, and said locking ring (7) is provided with a corresponding axial guiding configuration (11') so that the exterior tube guiding configuration 11 can slide within it. 5

2. A stepless telescopic dust collecting tube of vacuum cleaner as defined in CLAIM 1, wherein the gap (10) of locking ring (7) extends axially along the whole length of locking ring (7). 10

3. A stepless telescopic dust collecting tube of vacuum cleaner as defined in CLAIM 1, wherein said conical tube section (5) is provided at the tail end of said interior tube (1). The dimension of conical tube section (5) is such that the external diameter of the locking ring (7) is a bit smaller than the internal diameter of the exterior tube (4) while locking ring (7) being positioned at the small end of conical tube section (5), and the maximum external diameter of the locking ring (7) is a bit bigger than the internal diameter of the exterior tube (4) while locking ring (7) being positioned at the big end of conical tube section (5). 15 20 25

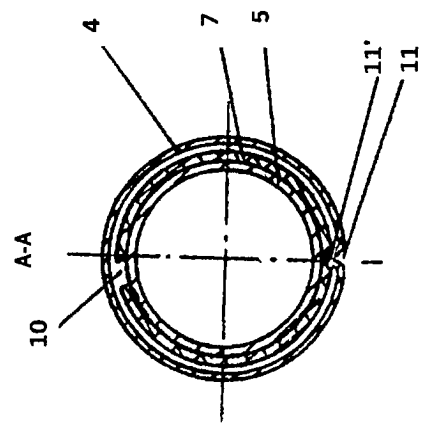
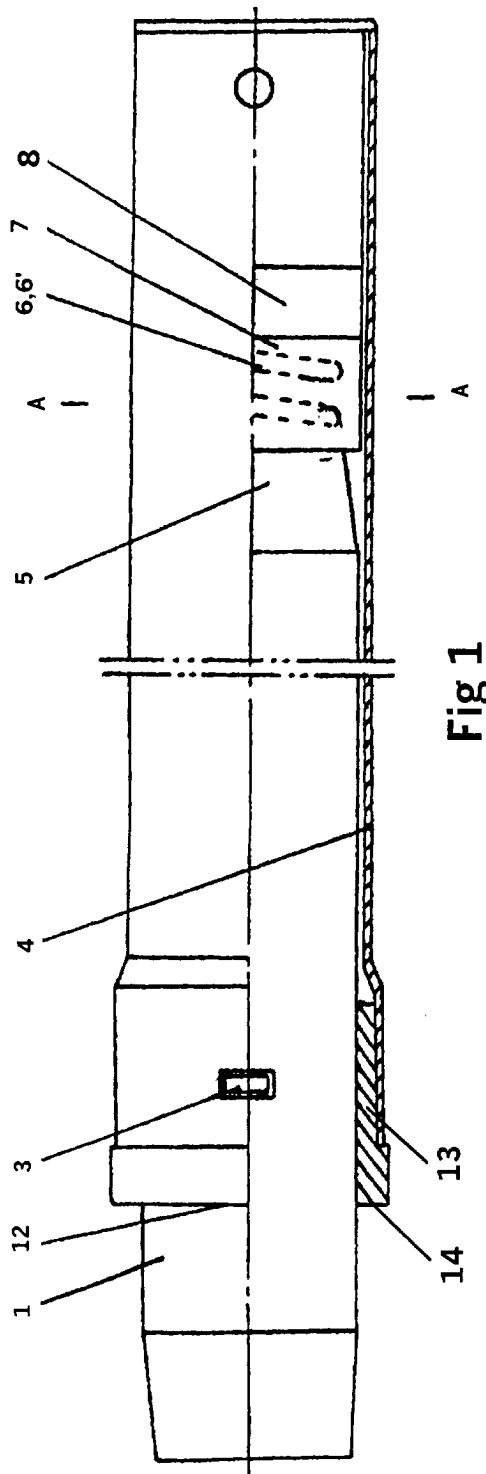
4. A stepless telescopic dust collecting tube of vacuum cleaner as defined in CLAIM 3, wherein a stop ring (8) is mounted at the tail end of conical tube section (5) to stop the locking ring (7). 30

5. A stepless telescopic dust collecting tube of vacuum cleaner as defined in CLAIM 4, wherein the locking ring (7) and the limit ring are made of plastics respectively. 35

6. A stepless telescopic dust collecting tube of vacuum cleaner as defined in CLAIM 5, wherein a limit device or limiter for limiting the exterior tube (4) within the upper and lower limits is provided. 40

7. A stepless telescopic dust collecting tube of vacuum cleaner as defined in CLAIM 6, wherein said limit device or limiter comprises a protrusion configuration (12) on outer surface near the upper end of the interior tube (1) and a limit ring (13) fixed on the top end of exterior tube (4). 45 50

8. A stepless telescopic dust collecting tube of vacuum cleaner as defined in any one of CLAIM 1-7, wherein said guiding structure (11) of the exterior tube is a guiding rib, and said guiding structure (11') of the locking ring is a guiding groove. 55



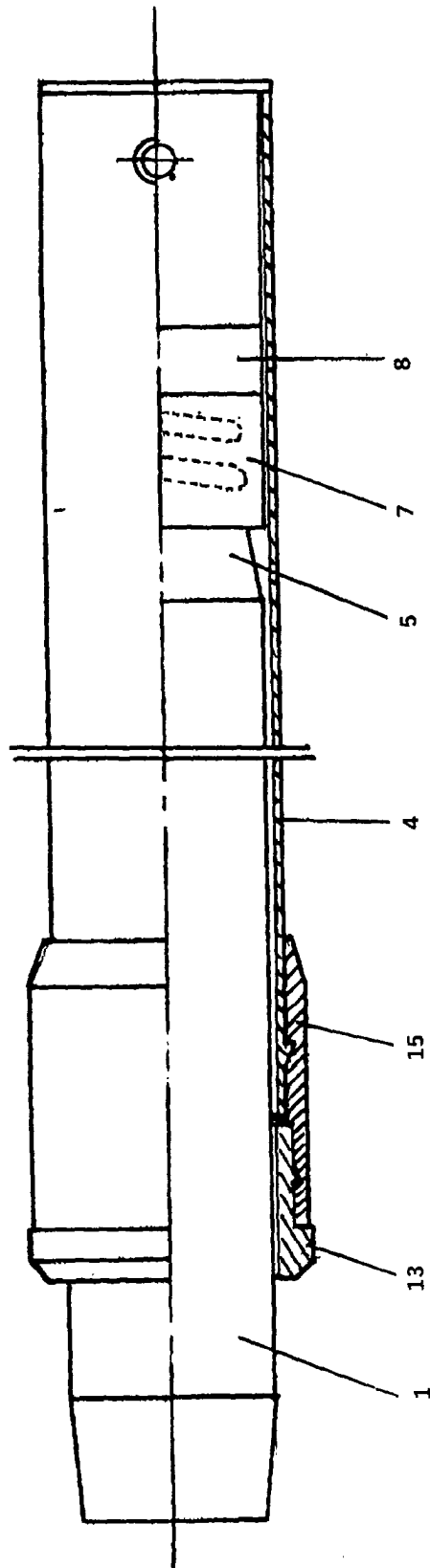


Fig 3