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(54) **A WASHING MACHINE HAVING A CLAMPING RING**

WASCHMASCHINE MIT EINEM KLEMMRING

MACHINE À LAVER POSSÉDANT UN COLLIER DE SERRAGE

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(56) References cited:

EP-A1- 1 990 457 DE-A1- 10 031 170
DE-U1- 8 806 037 DE-U1- 29 716 968

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Description

[0001] The present invention relates to a clamping ring for clamping the bellows to the front wall of a front loaded washing machine. The clamping ring incorporates a spring retainer for establishing a more secure clamping of the bellows.

[0002] A front loaded washing machine typically has a drum which rotates in a tub and which has a front opening for allowing loading and unloading laundry to the washing machine. Sealing between the tub and the front wall of the washing machine is provided by a resilient bellows which is annularly fixed in between the tub and the inside of the front wall of the washing machine. The resilient bellows shall be sufficiently flexible to withstand vibrations occurring during rotation of the drum.

[0003] The bellows is tubular in shape and is annularly attached to the inside of the front wall of the washing machine through use of a clamping ring. The clamping ring has a perimeter which is equal or slightly smaller than the perimeter of the groove to which it will be securely mounted for fixing the bellows on the inside of the front wall. In order to compensate for initial mounting, the clamping ring has a spring which extends for allowing the initial mounting of the clamping ring. Once the clamping ring is put in place, the spring then automatically retracts and provides that the bellows is kept in place during the service life of the machine.

[0004] A clamping ring of conventional type is already disclosed in the state of art European patent application number EP1990457. The machine has a housing and an oscillating lye container respectively provided with a circular housing opening and a circular lye container opening. A bellow connecting the openings is placed over a bend section that rotates around an opening. An imposed region cooperates with a clamping unit formed as a clamping ring and a rotating sealing lip for the door opening is arranged in the region.

[0005] In German patent document number DE8806037 discloses another clamping ring conventionally used for fixing bellows to the front wall of a front loaded washing machine. The clamping ring has a helical spring which extends during initial mounting of the ring. For securing the bellows, tension spring is used within a wire bracket. During expansion of the tensioning spring, an overextension of the fastening ring may occur, eventually resulting in a reduced biasing force.

[0006] The applicant has become aware that there may be cases where the bellows steps out of its place if the user swiftly pulls out a washed laundry and part of that laundry gets stuck with part of the bellows. In such cases, maintenance of the washing machine becomes mandatory since sealing can no longer be maintained. For proper operation of the washing machine, the bellows shall be in its place and securely bound to the tub at one end and to the front wall of the machine at the other end. This latter is secured by the spring connecting the two ends of the clamping ring. If however, the biasing force of the

spring is somehow exceeded by removal of a laundry which partly stuck with the bellows, the clamping ring may fail to keep the bellows in place and consequently the machine going out of service.

[0007] It should also be noted that the spring is subject to metal fatigue in time and may fail to tightly pull both ends of the clamping ring as required. It is clear that after the predetermined service period, the spring would not pull both ends of the clamping spring as tightly as it could on the first days of its service. Therefore, an older washing machine is subject to a higher risk as the clamping ring may even more easily deform and fail to keep the bellows in its place. Although the spring is a risk factor, its use is essential as the perimeter of the clamping ring shall necessarily be extended during the first mounting of the bellows to the machine.

[0008] A conventional clamping ring (4') incorporating a tension spring (5') already found in the prior art is demonstrated in Fig. 2. The tension spring (5') is required for allowing initial mounting of the bellows on the inside of the front wall of a washing machine. The perimeter of the groove in which the clamping ring (4') is mounted is usually equal to or larger than the perimeter of the clamping ring (4') in order to firmly attach the bellows in place. Therefore, before the initial mounting of the bellows, the overall length i.e. the perimeter of the clamping ring (4') shall be extended and to this end, a spring (5') is conventionally used to attach the two ends of the clamping ring (4'). This solution not only allows for an interim expansion of the perimeter of the clamping ring (4') but also for maintaining firm attachment of the clamping ring (4') to hold the bellows in place during the service life of the washing machine.

[0009] As is already explained the spring (5') is subject to metal fatigue in time and may fail to pull both ends of the clamping ring (4') sufficiently tight. Furthermore, there may be cases where especially during the unloading of the washed laundry, part of the laundry may stuck with the bellows and the bellows may be forced by the user to step out of its place. In such cases, the clamping ring (4') changes its generally circular shape and deforms, as already shown in Fig. 3. The broken line in Fig. 3 resembles the normal clamping ring (4') when sitting normally in its position whereas the solid line demonstrates the deformed form of the clamping ring (4') when forced to change its shape. It should be noted that the spring (5') is not arc shaped and instead it appears to be linear in the deformed form as already illustrated in Fig. 3. The linear form of the spring (5') is quite natural since the helical spring would always tend to keep linear if it is not forced to remain arc shaped. The present invention proposes that the spring (5') shall maintain its arc shaped form even when the clamping ring (4') is in its deformed shape.

[0010] It is an object of the present invention to provide a clamping ring which would solve the problems incurred in the clamping means of the prior art mentioned above. The present invention aims to provide a clamping ring

which would securely keep the bellows attached to the inside of the front wall of the washing machine.

[0011] A washing machine having a body with a front wall, a drum which rotates in a tub and which has a drum opening for loading and unloading laundry is disclosed. The washing machine further comprises a resilient bellows annularly attached to the tub at its first end and to the front wall at its second end for sealing the drum opening. A clamping ring is used for clamping the bellows to the inner side of said front wall of said washing machine and a tension spring is used for attaching the first and second ends of the clamping ring. The clamping ring comprises a spring retainer having a first stopper for delimiting the one end of said clamping ring and a second stopper for delimiting the other end of said clamping ring. The second stopper has a gap for introduction and removal of the other end of the clamping ring.

[0012] The body of said spring retainer may be made arc shaped whose center of radii (C) corresponds to the center of the drum opening. Likewise, the profile of the spring retainer may be arc shaped in the direction of the primary axis of the clamping ring in order to better encapsulate the clamping ring. The spring retainer may be made of plastic or metal.

[0013] Accompanying drawings are given in simplified form solely for the purpose of exemplifying the present invention and cannot be considering as limiting the scope of protection defined in the appended claims.

Fig. 1 shows perspective view of a washing machine from which the front door is removed for showing the bellows.

Fig. 2 shows a clamping ring and a spring found in the prior art.

Fig. 3 shows the clamping ring of Fig. 2 in deformed form.

Fig. 4 shows the spring retainer according to the present invention.

Fig. 5 shows a close up of the spring retainer according to the present invention.

Fig. 6 shows the profile of the spring retainer in the direction of the primary axis of the clamping ring according to the present invention

[0014] The list of reference numerals used in the appended drawings are as follows;

- 1) Washing machine
- 2) Front wall
- 3) Bellows
- 4) Clamping ring
- 5) Spring
- 6) Spring retainer
- 7) First stopper
- 8) Second stopper
- 9) Gap
- 10) Drum opening

[0015] Perspective view of a front loaded washing machine (1) is shown in Fig. 1. The drum opening (10) is used for loading and unloading laundry from the washing machine (1). The front door is removed from Fig. 1 in order to better reveal the bellows (3) which is typically made like a sealing collar for sealing the drum opening (10).

[0016] The clamping ring (4) according to the present invention is illustrated in Fig. 4. Accordingly, the clamping ring (4) has a spring retainer (6) in which the spring (5) is delimited in both longitudinal directions of the clamping ring (4). The delimitation takes place once the clamping ring (4) fixes the bellows (3) in place. The spring retainer (6) has a first stopper (7) and a second stopper (8) which delimits the movement of the ends of the clamping ring (4) once mounting is completed.

[0017] The spring retainer (6) has an arc shaped body for maintaining the spring (5) as an arc when the clamping ring (4) is mounted in its place. As shown in Fig. 5, the center of the arc (C) shall be the center point (C) of the drum opening (10) and the radii (r) of the arc shall be the radius of the drum opening (10). Under these conditions the spring retainer (6) shall not deform the perfect circular shape of the clamping ring (4) as illustrated in Fig. 2.

[0018] The profile of the spring retainer (6) body is also arc shaped in the longitudinal direction of the clamping ring (4). The term longitudinal direction of the clamping ring (4) is meant to correspond to the primary axis of the clamping ring (4) which forms a full circle as illustrated in Fig. 2. The arc shaped body profile of the spring retainer (6) is made to partly encapsulate the spring (5) in order to limit the depth wise movement of the clamping ring (4) as shown in Fig. 4 and Fig. 6. The depth wise direction is the direction towards the inside of the drum of the washing machine (1).

[0019] The spring retainer (6) has a first stopper (7) at its first end and a second stopper (8) at its second end. The body of the spring retainer (6) is circular in between the first stopper (7) and the second stopper (8) and its center of the radii corresponds substantially to the center of the drum opening (10). The first stopper (7) is used to limit the movement of the clamping ring (4) counter clockwise whereas the second stopper (8) is used to limit the movement of the clamping ring (4) in the clockwise direction.

[0020] The second stopper (8) has a gap (9) as shown in Fig. 4 and Fig. 5. This gap (9) is used to finally insert the spring (5) and the clamping ring (4) in place upon completion of the installation of the bellows (3) in its place. Once the installation is complete, the spring (5) is retracted and completely contained within the spring retainer (6). Both ends of the clamping ring (4) is also contained within the spring retainer (6), the first stopper (7) and the second stopper (8) prevent movement of the clamping ring (4) in both directions along the circle formed by the clamping ring (4). The first stopper (7) and the second stopper (8) prevent any possible loosening of the clamping ring (4) so that even if the spring (5) is subject to metal

fatigue in time, resulting in reduced biasing force, the clamping ring (4) would still hold the bellows (3) in place. Assuming that part of the unloaded laundry gets stuck with the bellows (5), the force applied by the user would not lead the bellows (3) from stepping out of its location since both first stopper (7) and second stopper (8) would not allow loosening of the clamping ring (4).

[0021] If assuming that the washing machine (1) needs maintenance which requires removal of the bellows (3), the service personnel would first need to remove the clamping ring (4) out of the spring retainer (6) through the gap (9) found on the second stopper (8). After removal of one of the ends of the clamping ring (4), the spring (5) would extend to a certain extent after which the other end of the clamping ring (4) would become loose and eventually the bellows (3) would be demounted. Once the service personnel completes its job, the one end of the clamping ring (4) should be bound by the first stopper (7) and thereafter the other end of the clamping ring (4) shall be inserted into the spring retainer (6) and bound by the second stopper (8), hence resulting in firm attachment of the bellows (3) in its place.

Claims

1. A washing machine (1) having a body with a front wall (2),
a drum which rotates in a tub and which has a drum opening (10) for loading and unloading laundry,
a resilient bellows (3) annularly attached to the tub at its first end and to the front wall (2) at its second end for sealing the drum opening (10),
a clamping ring (4) for clamping the bellows (3) to the inner side of said front wall (2) of said washing machine (1),
a tension spring (5) attaching the both ends of said clamping ring (4) **characterized in that** the clamping ring (4) comprises;
a spring retainer (6) having a first stopper (7) for delimiting the first end of said clamping ring (4) and a second stopper (8) for delimiting the second end of said clamping ring (4), and
said second stopper (8) is equipped with a gap (9) for introduction and removal of the second end of said clamping ring (4).
2. A washing machine (1) as claimed in Claim 1 wherein the body the said spring retainer (6) is arc shaped whose center of radii (C) corresponds to the center of the drum opening (10).
3. A washing machine (1) as claimed in Claim 1 wherein the profile of said spring retainer (6) is arc shaped in the direction of the primary axis of said clamping ring (4).
4. A washing machine (1) as claimed in Claim 1 wherein

the spring retainer (6) is made of plastic.

Patentansprüche

1. Waschmaschine (1), aufweisend einen Gehäusekörper mit einer Stirnwand (2),
eine Trommel, die sich in einem Waschbehälter dreht und eine Trommelöffnung (10) zum Laden und Entladen von Wäsche aufweist,
einen elastischen Balg (3), der an seinem ersten Ende ringförmig am Waschbehälter angebracht ist und an seinem zweiten Ende an der Stirnwand (2) angebracht ist, um die Trommelöffnung (10) abzudichten,
einen Klemmring (4) zum Festklemmen des Balgs (3) an der Innenseite der Stirnwand (2) der Waschmaschine (1),
eine Spannfeder (5), die die beiden Enden des Klemmrings (4) anbringt,
dadurch gekennzeichnet, dass der Klemmring (4) Folgendes umfasst:

einen Federhalter (6) mit einem ersten Anschlag (7) zum Begrenzen des ersten Endes des Klemmrings (4) und einem zweiten Anschlag (8) zum Begrenzen des zweiten Endes des Klemmrings (4), und
wobei der zweite Anschlag (8) mit einem Spalt (9) ausgestattet ist, um das zweite Ende des Klemmrings (4) einzuführen und zu entfernen.
2. Waschmaschine (1) nach Anspruch 1, wobei bei dem Gehäusekörper der Federhalter (6) die Form eines Bogens aufweist, dessen Radienmittelpunkt (C) mit dem Mittelpunkt der Trommelöffnung (10) übereinstimmt.
3. Waschmaschine (1) nach Anspruch 1, wobei das Profil des Federhalters (6) in der Richtung der Primärachse des Klemmrings (4) bogenförmig ist.
4. Waschmaschine (1) nach Anspruch 1, wobei der Federhalter (6) aus Kunststoff hergestellt ist.

Revendications

1. Un lave-linge (1) présentant un corps avec une paroi avant (2),
un tambour qui tourne dans une cuve et qui présente une ouverture de tambour (10) pour le chargement et déchargement du linge,
un soufflet élastique (3) qui est attaché de manière annulaire à la cuve à sa première extrémité et à la paroi avant (2) à sa deuxième extrémité pour boucher l'ouverture de tambour (10),
un anneau de serrage (4) pour serrer le soufflet (3) au côté intérieur de ladite paroi avant (2) dudit lave-

linge (1),
un ressort de tension (5) qui attache les deux extré-
mités dudit anneau de serrage (4) **caractérisé en**
ce que l'anneau de serrage (4) comprend
un dispositif de retenue de ressort (6) présentant une 5
première butée (7) pour délimiter la première extré-
mité dudit anneau de serrage (4) et une deuxième
butée (8) pour délimiter la deuxième extrémité dudit
anneau de serrage (4), et
ladite deuxième butée (8) est équipée d'un vide (9) 10
pour l'introduction et le retrait de la deuxième extré-
mité dudit anneau de serrage (4).

2. Un lave-linge (1) selon la Revendication 1 où le corps
dudit ressort de tension (6) est en forme d'arc dont 15
le centre des rayons (C) correspond au centre de
l'ouverture de tambour (10).
3. Un lave-linge (1) selon la Revendication 1 où le profil
dudit ressort de tension (6) est en forme d'arc dan 20
la direction de l'axe principal dudit anneau de serra-
ge (4).
4. Un lave-linge (1) selon la Revendication 1 où le dis-
positif de retenue de ressort (6) est produit de plas- 25
tique.

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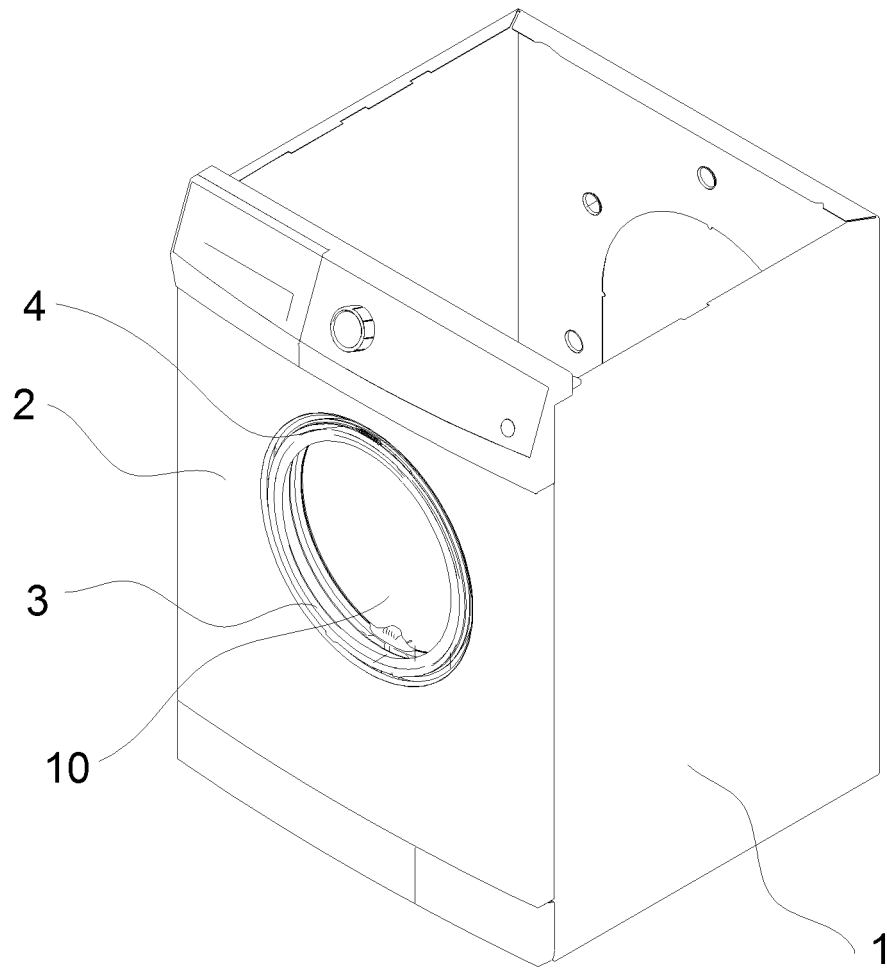


Fig. 1

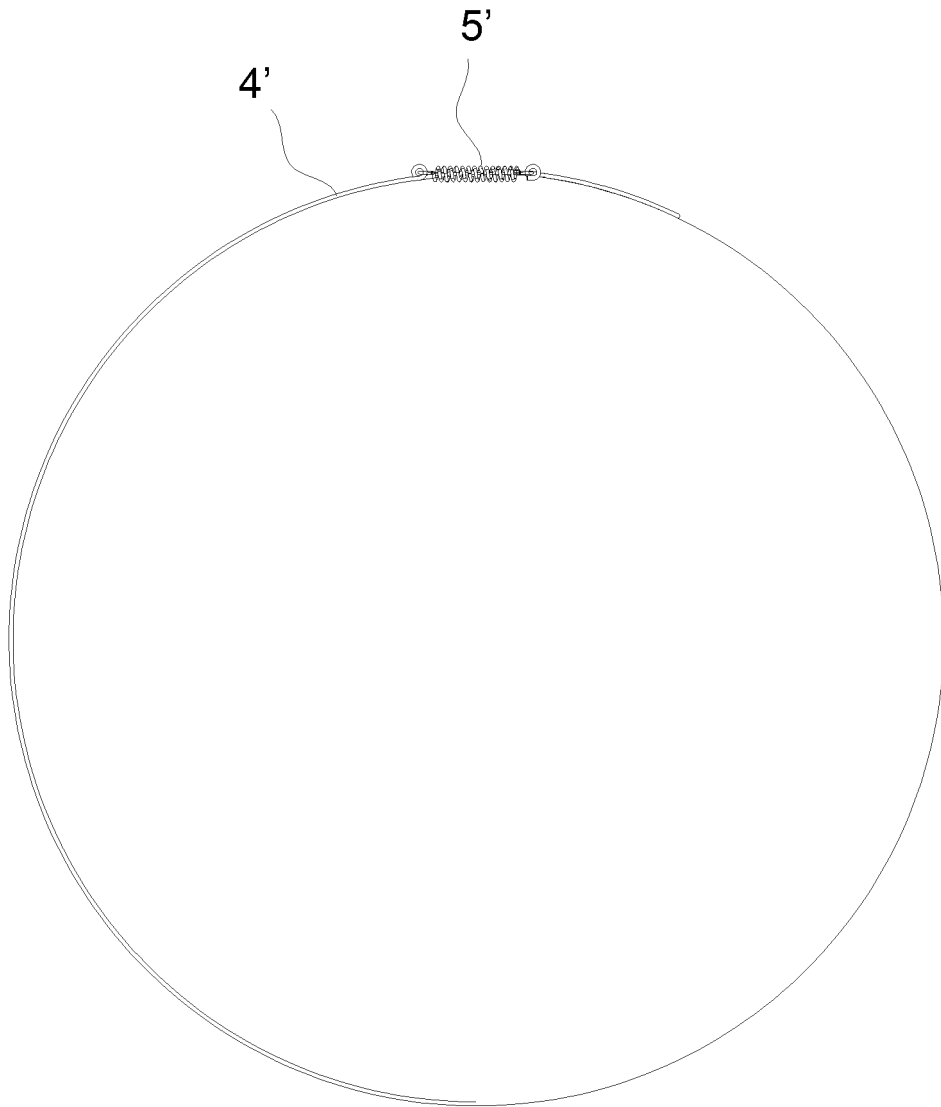


Fig. 2 PRIOR ART

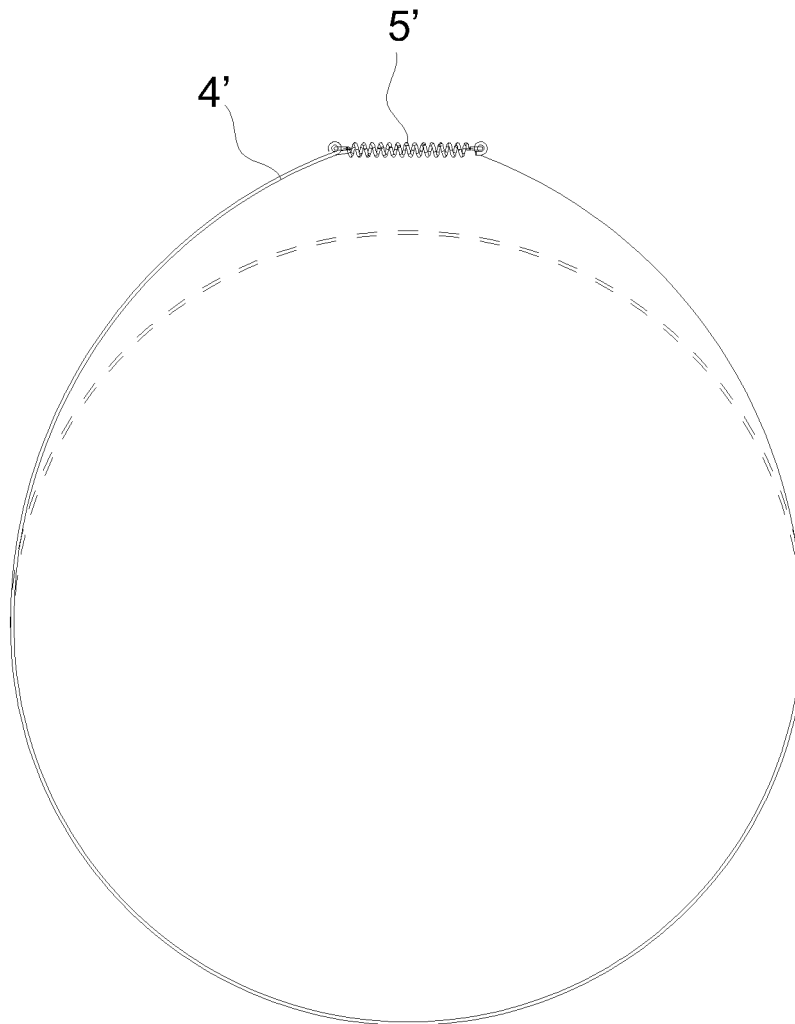


Fig. 3 PRIOR ART

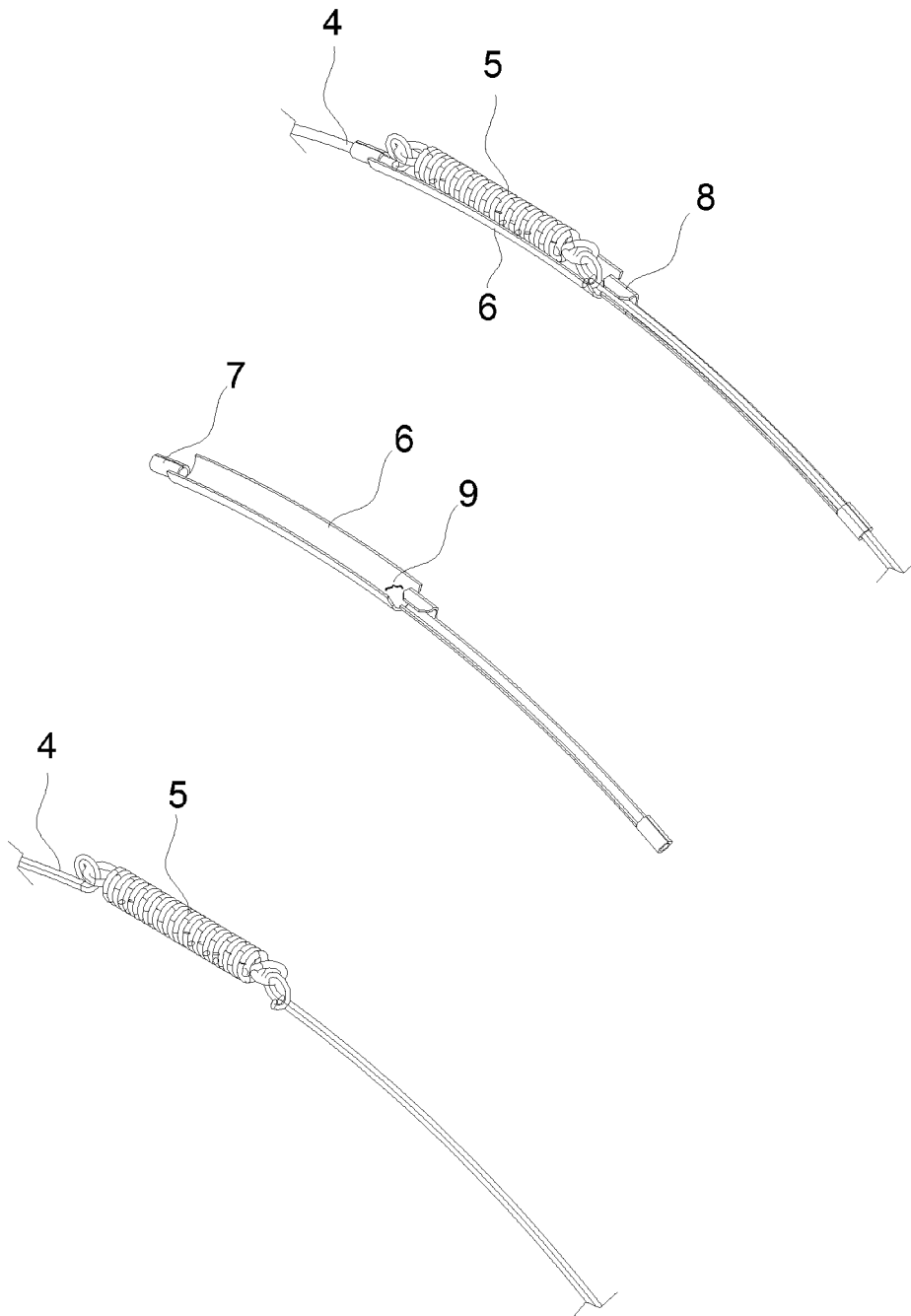
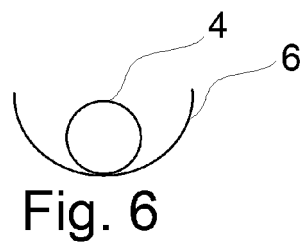
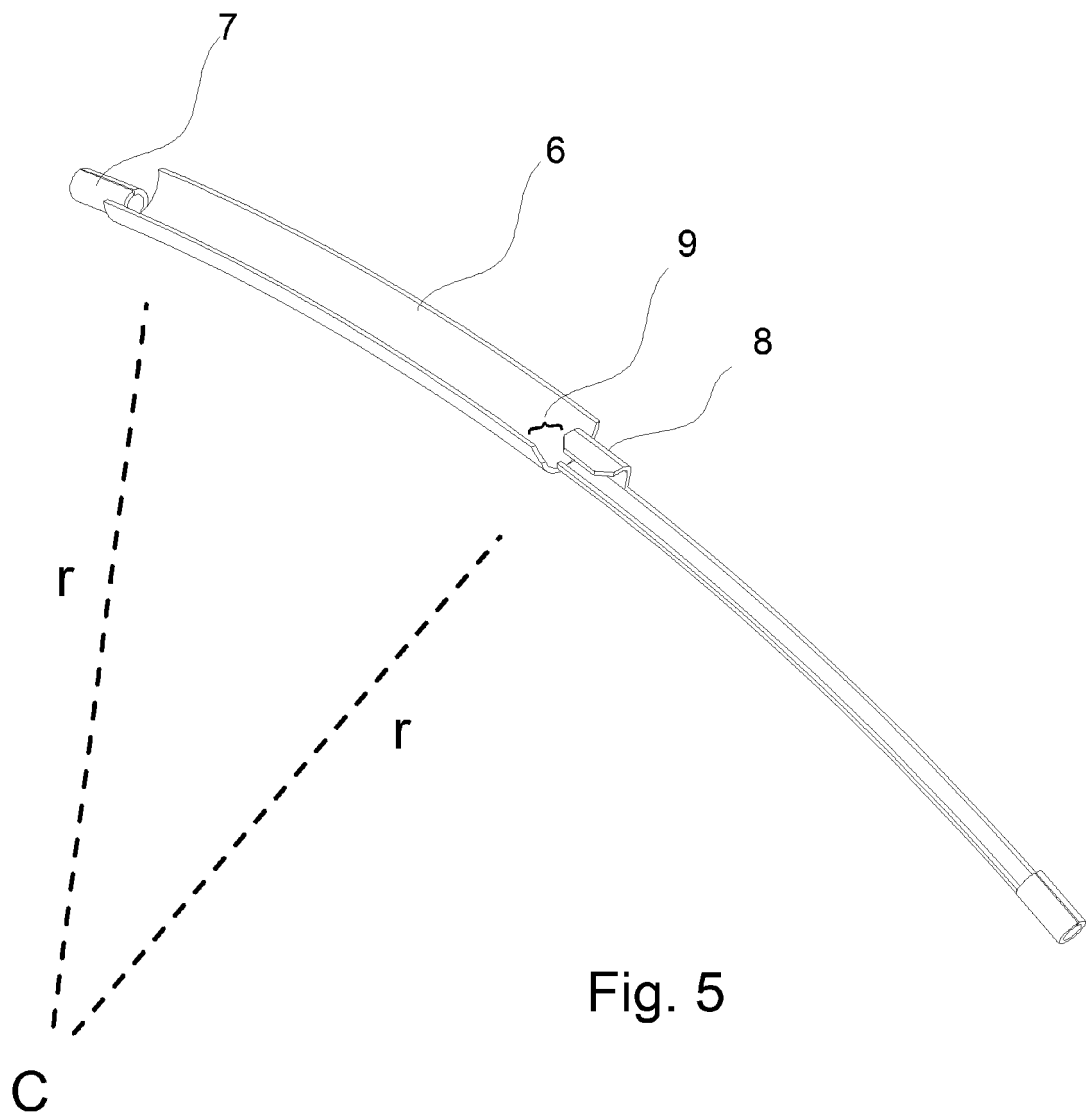


Fig. 4



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- EP 1990457 A [0004]
- DE 8806037 [0005]