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(54) A spring device for a support rod, in particular for curtains

(57) A spring device for a support rod (5), in particular for curtains, in which said rod comprises a first tubular element (3) and a second tubular element (4), said second tubular element (4) being arranged to be inserted into and to slide at least partially telescopically within said first element (3) such as to enable the rod length to be adjusted, said device comprising a spring (1) to be inserted into the rod (5) and arranged to exert an axial elastic force (F1, F2) which causes one tubular element of the rod to withdraw from the other, an element (2) for adjusting the spring (1) being provided comprising a body (7) having a first elongate portion (7A) presenting a spiral shaped seat (8) shaped to be able to house in its interior a plurality of turns of the spring (1), said body (7) being arranged to be at least partially housed in an end portion (4B) of said second tubular element (4), said body (7) enabling the length of that portion of the spring (1) projecting from said second tubular element (4) to be adjusted, to be then inserted into the other tubular element (3).

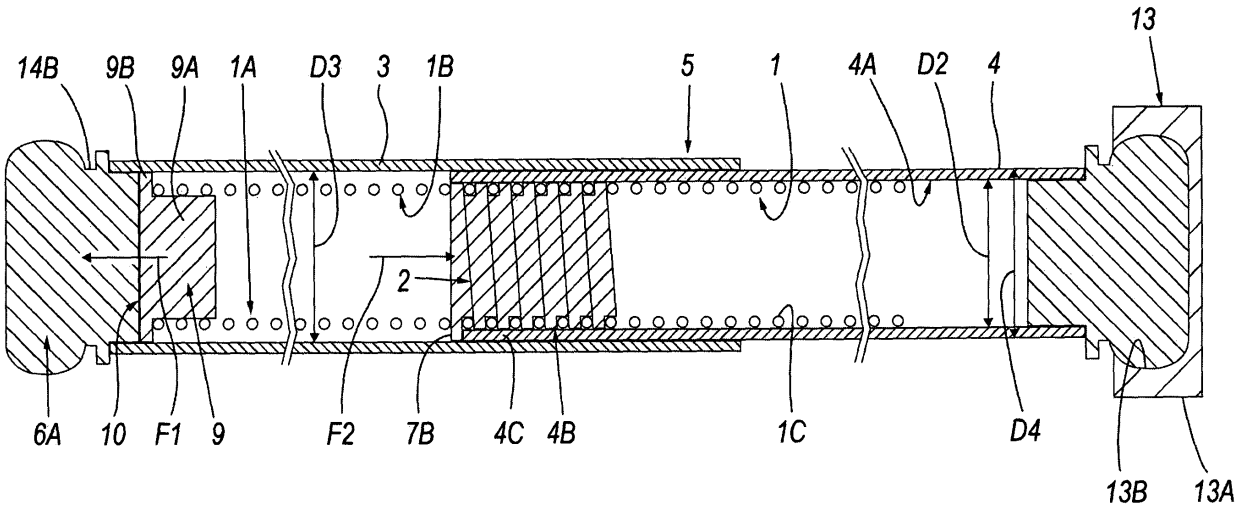

Fig. 1

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Description

[0001] The present invention relates to a spring device for a support rod, in particular for curtains, in which said rod comprises a first and a second tubular element, said first tubular element being adapted to be inserted into and to slide telescopically within said second element such as to be able to adjust the rod length, said device comprising a spring to be inserted into the rod and arranged to exert an axial elastic force which withdraws one tubular element of the rod from the other, in this manner enabling the rod to be engaged between two opposing vertical elements, for example of a window frame, and to maintain the rod associated with said elements by virtue of the thrust action exerted by the spring. In the present context the rod is always described with reference to its use in connection with a window frame, the writer emphasizing that although this use is preferred it is merely quoted as an example, the rod being usable in a plurality of different ways usual for the expert of the art.

[0002] Known spring devices generally comprise a simple lengthy spring arranged to abut against the opposing ends of the two tubular elements of the rod when this is in its maximum extension. The drawback of this solution is related to the fact that when the rod is to be used with a length less than the maximum, the spring exerts on the two tubular elements an elastic force which increases as the rod length decreases, making it not always easy to connect the rod to the window.

[0003] Spring devices for telescopic curtain rods are known which enable the force exerted by the spring to be adjusted on the basis of the required rod length.

[0004] DE1153139 describes an adjustment device provided with an adjustment element comprising a body arranged to cooperate with one end of a spring, which is wound within the interior of said body. This device does not enable standard springs to be used but only springs with ends of smaller diameter than the remaining part of the spring. Moreover, to adjust the spring force for the required rod length, the body of the adjustment element has to be moved each time into different positions within the rod, this latter operation being complicated and laborious.

[0005] US2006/054288 describes an adjustment device having an adjustment element comprising a bar shaped body arranged to cooperate with an end portion of a spring, which engages with a projecting tooth provided at a first end of said bar. The other end of this bar projects from the rod to support a foot for connecting the rod to a window frame. This bar is an essential element in the support structure for the rod into which it is inserted. The bar is of elongate shape, extending from that rod end comprising the foot for connecting the rod to the window frame, to the interior of the rod itself, this bar because of its length and its support function negatively affecting both the total weight of the rod and its overall cost.

[0006] US2079267 describes an adjustment device provided with an adjustment element comprising a threaded bar which, together with a tubular element within which said bar can telescopically slide, forms the support structure for the rod itself. On the threaded bar a spring is provided presenting an end portion of reduced diameter in order to be able to engage the thread of the bar, while the remaining part of the spring has a greater diameter and does not engage said thread but projects from said bar. This device does not enable standard springs to be used but only springs with ends of smaller diameter than the remaining part of the spring.

[0007] An object of the present invention is to provide a spring device which overcomes the aforesaid drawbacks and in particular enables the force exerted by the spring on the tubular rod elements to be easily and quickly adjusted as the overall length of the rod varies.

[0008] A further object is to provide an easily assembled device of reduced weight and dimensions having a small number of components.

[0009] A further object is to provide a device which can be used to promote in retail outlets a curtain support system with a reduced number of components compared with known systems of the same type, and in particular a system which allows the curtain support rods and the spring device to be sold separately, so leaving to the user, based on requirements, the decision of whether to purchase and use only the rods without the spring device or both the rods and the spring device.

[0010] These and other objects which will be apparent to the expert of the art are attained by a spring device in accordance with the characterising part of the accompanying claims.

[0011] The present invention will be more apparent from the accompanying drawings, which are provided by way of non-limiting example and in which:

Figure 1 is a schematic longitudinal section through a device according to the invention incorporated into a rod,

Figure 2A, B show a perspective schematic view of two components thereof,

Figure 3 is an exploded perspective view thereof in combination with the two tubular rod elements,

Figures 4A and 4B show respectively a front view of two rod support brackets associated with two vertical elements of a window frame, and a schematic perspective view of the two brackets and the rod,

Figures 5 and 6 show two enlarged views of the rod ends associated with two different fixing means.

[0012] With reference to Figures 1-3, a device of the invention comprises a spring 1 and an adjustment element 2 for the spring 1. The spring 1 is to be inserted into two tubular elements 3 and 4 which, when telescopically inserted into each other, form a rod 5 the length of which can be adjusted at will.

[0013] In order to be able to be inserted into the tubular elements 3 and 4, the spring 1 has a diameter D1 less than the inner diameter D2 and D3 of said two tubular

elements. These latter are of usual type and present a first tubular element 3 with its inner diameter D3 slightly greater than the outer diameter D4 of the other tubular element 4, such that this latter can slide without slack inside the first tubular element and in this manner enable the total length of the rod to be adjusted.

[0014] The spring 1 must have a length L1 substantially equal to the minimum length of possible utilization of the rod. In all cases the spring length L1 must be at least equal to the length L2 of the first tubular element 3 plus at least a portion of the second tubular element L3 given that, as explained hereinafter, an end 1A of the spring 1 must always remain abutting against a closure plug 6A of a free end 3A of the tubular element 3 and must exert thereon a determined axial elastic force F1 directed towards said plug, and another portion of the spring must engage with the adjustment element 2 inserted into one end 4A of the other tubular element 4.

[0015] The adjustment element 2 has a body comprising a first elongate portion 7A presenting a spiral shaped seat 8 shaped to be able to house in its interior a plurality of turns of the spring 1 (as shown in Figure 1). Means 20 are provided to lock the first portion 7A to the inner wall 4A of an end portion 4B of the second tubular element 4 once said first portion has been inserted into said end portion. Preferably the means 20 provide for shaping and dimensioning the portion 7A such that it can be forcibly inserted into and remain locked by interference against the inner wall 4A of an end portion 4B of the second tubular element 4. Alternatively, provision could be made to slightly deform the outer wall of the end portion of the tubular element 4 in which the portion 7A of the body 7 of the adjustment element 1 is inserted, such that said portion becomes locked.

[0016] According to the invention the outer diameter D1 of the spring is less than the external dimensions D5 of said first portion 7A of the body 7, so as not to come into contact with and not to interfere with the inner wall 4A of the tubular element 4 and enable the spring 1 to be rotated when said first portion 7A of the body 7 is locked to said end portion 4B of the first tubular element 5 to be able consequently to adjust the length of that spring portion projecting from the tubular element 4, as described in detail hereinafter. The body 7 also presents at one end a portion 7B arranged to abut against the edge 4C of the end of the second tubular element 4, into which said body 7 is inserted, to hence prevent axial movements of said body towards the interior of said tubular element 4 as a consequence of the force exerted by the spring.

[0017] Preferably the device of the invention also comprises an abutment element 9 to be associated with the free end 1A of the spring 1 inserted into the first tubular element 3. The element 9 presents a cylindrical portion 9A to penetrate into the spring, and a head 9B to act as the abutment for the spring 1 when inserted into the tubular element 3 and to always ensure optimal support for the end of the spring 1 against the wall 10 of the closure plug 6A of the tubular element 3.

[0018] The device of the invention operates as follows: firstly the adjustment element 2 is associated with the spring 1 by screwing the body 7 of said element into the spring, and positioning it such that the spring is divided into two parts about said body, namely a part (1B Figure 1) of greater length to be inserted into the first tubular element 3 and a part (1C) to be inserted into the other tubular element 4.

[0019] The body 7 of the adjustment element 2 and the portion 1C of the spring 1 are then forcibly inserted into the end portion of the tubular element 4, which then has to be inserted into the other tubular element 3 such that the abutment portion 7B of the body 7 abuts against the edge 4B of said end of the tubular element 4. In this situation the body 7 is locked to the tubular element 4 while the spring 1 is able to rotate relative to said tubular element 4.

[0020] At this point by screwing the spring 1 outwards or inwards relative to the adjustment element 2, the spring 1 can be made to always abut against the plug 6A which closes the other tubular element 3 whatever the total length of the rod 5 chosen by the final user, i.e. whatever portion of the tubular element 4 is inserted into the other tubular element 3.

[0021] Again by virtue of the device of the invention, whatever the total length of the rod 5, the force F1 exerted by the spring on the tubular element 3 and the opposing force F2 exerted on the other tubular element 4 are substantially the same, in that on varying the rod length, the length of that part of the spring inserted into the tubular element 3 can be adjusted such that on varying the rod length, an always equal spring portion is compressed, hence an always equal force F1, F2 is exerted. When the rod 5 and the spring 1 have been adjusted such as to have available a rod of the required length, the rod can be associated with two generic opposing support structures, preferably the two opposing vertical elements 11A, B of the window frame 12. For this purpose, fixing means of known type can be used. However, according to a further aspect of the invention, to associate the aforedescribed rod with the vertical elements 11A, B, the rod comprises particular fixing means 13 and 14 enabling the rod to be removably secured to said two vertical elements. According to the invention, these fixing means are separate pieces, separate from the constituent pieces of the rod, and comprise connection members 13A and 14A arranged to cooperate with counter-connection members 13B, 14B provided at the rod end. More particularly, in a first embodiment, the fixing means comprise two brackets 15 arranged to rest against the mutually opposing uprights of the vertical elements 11A" B of the window frame 12 and to remain secured to said uprights by the action exerted by the spring 1 of the rod 5, and to space said rod from said uprights by a distance T (Figure 4B). According to the invention, each of the brackets 15 presents as its connection member 14A to the rod 5 an element 16 shaped such as to form a removable connec-

tion with the rod counter-members 13B which, advantageously, are formed as a suitably shaped portion of the closure plugs 6A, B of the tubular elements 3 and 4 forming the rod 5, in which said connection prevents the brackets from moving about the rod longitudinal axis A relative to the rod when these are mutually engaged. More particularly, each of the plugs 6A, B comprises a recessed slot 17 between the adjacent portions 18A, B of the plug; in the example said slot is of circular cross-section. The element 16 of each bracket 15 has an upperly open seat 19 presenting an upper portion 10A enabling it to be inserted into the slot 17 of the plugs 6A, 6B and a lower portion 19B enabling said slot to be housed without slack, such that the plug portions 18A, B adjacent to said slot 17 are in contact with the external walls 16A of the element 16, to prevent bracket movements about the longitudinal axis A of the rod 5. Each of the brackets 15 presents a pair of walls 15A, B disposed at 90° to each other, such that when the rod 5 is connected to the bracket, one 15A of these two walls is perpendicular to the rod, while the other 15B is parallel to the rod. The element 16 is also advantageously of wall form and is integral with and extends from the two walls 15A, B, such as to be perpendicular to the rod 5 and have the seat 19 open upwards. By virtue of the particular shape of the aforedescribed brackets 15, once the length of the rod 5 has been suitably adjusted and the spring 1 set, the brackets are associated with the rod ends (by virtue of the particular shape of the plugs 6A, B and the bracket elements 16), to then connect the whole assembly by making the pairs of bracket walls 15A, B abut against the edges of the opposing vertical elements 11A, B of the window 12 and which remain in this position by the axial thrust exerted by the spring present in the rod 5.

[0022] The connection members 13A of the other fixing means 13 according to the invention are of plug shape and present a hollow seat 17, hemispherical in the example, arranged to be forcibly mounted over the counter-connection members 13B fixed to the ends of the rod 5 and shaped in the form of a head having the same shape and dimensions, but in positive form, as the seat 17, i.e. hemispherical as in the example. The connection members 13 also present a substantially flat wall perpendicular to the longitudinal axis A of the rod, or of the plug 13A of the rod 5. The members 13A are advantageously made of an elastically deformable material such as rubber or a similar plastic material, to be able to be forcibly mounted over the heads 13B. By virtue of the particular form of the aforedescribed fixing means, once the length of the rod 5 has been suitably adjusted and the spring 1 set, the members or plugs 13A are associated with the counter-members or heads 13B of the rod 5, and the assembly is then put in place such that the flat walls 18 of the plugs 13A abut against the opposing flat walls of the vertical elements 11A, B of the window frame 12 and remain in that position by virtue of the axial thrust exerted by the spring present in the rod 5. It should be noted that both the aforedescribed fixing means 13, 14 can also be used with spring rods of known type, or with rods having spring devices different from that previously described and/or rods provided with springs having no spring adjustment element.

[0023] The inventive combination relative to the rod fixing means 13 and 14 and the adjustment device for the spring 1 results in an extremely versatile curtain support system comprising a plurality of components which can be used in a multiplicity of different ways according to the requirements of the final user, who may decide to purchase only the components necessary to satisfy requirements. For example, a user may decide to purchase only the rod without the spring device or fixing means, or the rod with the spring device and fixing means of bracket type, or the rod with the spring device and fixing means of plug type, or just one of the two fixing means (bracket or plug type) if for example the user already possesses a known rod of spring type. In this manner, because of the combinability of the rod components and accessories, at retail outlets the public can be offered a curtain support system comprising a plurality of different types of rods occupying only an extremely small display space, the user being able to modify the purchased rod according to requirements.

[0024] Finally it should be noted that the aforedescribed embodiments have been provided by way of example only, and that numerous variants are possible, all falling within the same inventive concept, for example relative to variants in the form of the brackets 14, of the plugs 13 and of the end heads of the rod 5, and/or a use of the rods to support elements other than curtains.

[0025] Finally it should be noted that the invention also provides a further embodiment in which the body 7 is formed without being dimensioned to enable it to be forcibly inserted and locked by interference against the inner wall 4A of the end portion 4B of the second tubular element 4. In this variant the body 7 again comprises a spiral shaped seat to accommodate a few turns of the spring but, as it is no longer locked to the inner wall of the tubular element 4, to adjust the length of the spring portion emerging from the element 4 the combination formed by the spring and the body has to be extracted then, while holding the body 7 fixed between the fingers, the spring is rotated until it attains the required length, after which the combination is again inserted into the tubular element 4. In this variant, the body 7 comprises only the abutment 7B, but not the means for locking the body 7 against the inner wall of the end portion 4B of the second tubular element 4.

Claims

1. A spring device for a support rod (5), in particular for curtains, in which said rod comprises:

   - a first tubular element (3) and a second tubular element (4),

- said second tubular element (4) presenting a first end portion (4B) to be inserted into and to slide at least partially telescopically within said first element (3) such as to enable the rod length to be adjusted, and a second end portion which is not inserted into and does not slide within said first element (3),
- said device comprising a spring (1) to be inserted into the rod (5) and arranged to exert an axial elastic force (F1, F2) which causes one tubular element of the rod to withdraw from the other,
- for adjusting the spring (1), an element (2) comprising a body (7) having a first elongate portion (7A) presenting a spiral shaped seat (8) shaped to be able to house a plurality of turns of the spring (1),
- said body (7) being arranged to be at least partially housed in an end portion (4B) of said second tubular element (4),
- said body (7) enabling the length of that portion of the spring (1) projecting from said second tubular element (4) to be adjusted, to be then inserted into the other tubular element (3),

characterised in that:

- the body (7) is at least partially housed only in the first end portion (4B) of said second tubular element (4), which is arranged to be inserted into and to slide at least partially telescopically within said first element (3),
- said spiral shaped seat (8) is provided on an outer face of said elongate first portion (7A) of said body (7),
- the outer diameter (D1) of the spring is less than the external dimensions (D5) of said outer face of said elongate first portion (7A) of the body (7), so as not to come into contact with and not to interfere with the inner wall (4A) of said first end portion (4B) of the second tubular element (4) and enable the spring (1) to be rotated when said body (7) is housed in said first end portion (4B),
- said elongate first portion (7A) houses a plurality of those turns of the spring (1) provided in an intermediate portion of said spring (1) included between the ends of said spring.

2. A device as claimed in claim 1, **characterised in that** the body (7) of the adjustment element (2) for the spring (1) presents at an end thereof a portion (7B) arranged to abut against the edge (4C) of the first end portion (4B) of the second tubular element (4) into which said body (7) is inserted, to hence prevent axial movements of said body (7) towards the interior of said second tubular element (4) by the action of the elastic force exerted by the spring (1) when the rod (5) is assembled.

3. A device as claimed in claim 1, **characterised by** comprising means (20) for locking the body (7) against the inner wall (4A) of the first end portion (4B) of the second tubular element (4) once the first portion (7A) of the body (7) and the spring associated therewith have been at least partially inserted into said first end portion (4B) of the tubular element (4), the outer diameter (D1) of the spring (1) being such as not to interfere with said inner wall (4A) of the tubular element (4), to hence enable the spring (1) to be rotated when said first portion (7A) is locked against said end portion (4B) of the second tubular element (4) and hence be able to adjust the length of that portion of the spring (1) projecting from said second tubular element (4) which is to be inserted into the other tubular element (3).

4. A device as claimed in claim 3, **characterised in that** the means for locking the first portion (7A) against the inner wall (4A) of the first end portion (4B) of said second tubular element (4) are such that the first portion (7A) of the body (7) of the adjustment element is shaped and dimensioned, at least for a part thereof, such as to be able to be forcibly inserted and locked against the inner wall (4A) of the end portion (4B) of sais second element (4) by interference, and **in that** the spring (1) has an external diameter (D1) less than the external dimension (D5) of said first portion (7A) such that said spring does not interfere with said inner wall (4A) of the tubular element (4) and permits to rotate the spring (1) when said first portion (7A) is blocked with said end portion (4B) of said second tubular element (4).

5. A device as claimed in claim 1, **characterised by** comprising an abutment element (9) to be associated with the free end (1A) of the spring (1) inserted into the first tubular element (3), and to ensure an always optimal support for the end of the spring (1) against a closure element (6A) for the free end of said first tubular element (3).

6. A device as claimed in claim 1, **characterised in that** the adjustment element (2) for the spring (1) is formed as a single piece.

7. A device as claimed in claim 1, **characterised by** being formed from only two components, namely the adjustment element (2) and the spring (1).

8. A device as claimed in claim 1, **characterised in that** the body (7) is substantially of cylindrical shape.

9. A support rod in particular for curtains, in which said rod (5) comprises:

- a first tubular element (3) and a second tubular element (4),
- said second tubular element (4) presenting a first end portion (4B) to be inserted into and to slide at least partially telescopically within said first element (3) such as to enable the rod length to be adjusted, and a second end portion which is not inserted into and does not slide within said first element (3),
- and a spring device for said rod comprising:
- a spring (1) to be inserted into the rod (5) and arranged to exert an axial elastic force (F1, F2) which causes one tubular element of the rod to withdraw from the other,
- for adjusting the spring (1), an element (2) comprising a body (7) having a first elongate portion (7A) presenting a spiral shaped seat (8) shaped to be able to house a plurality of turns of the spring (1),
- said body (7) being arranged to be at least partially housed in an end portion (4B) of said second tubular element (4),
- said body (7) enabling the length of that portion of the spring (1) projecting from said second tubular element (4) to be adjusted, to be then inserted into the other tubular element (3),

characterised in that said device has the technical characteristics claimed in at least one of the preceding claims 1-8.

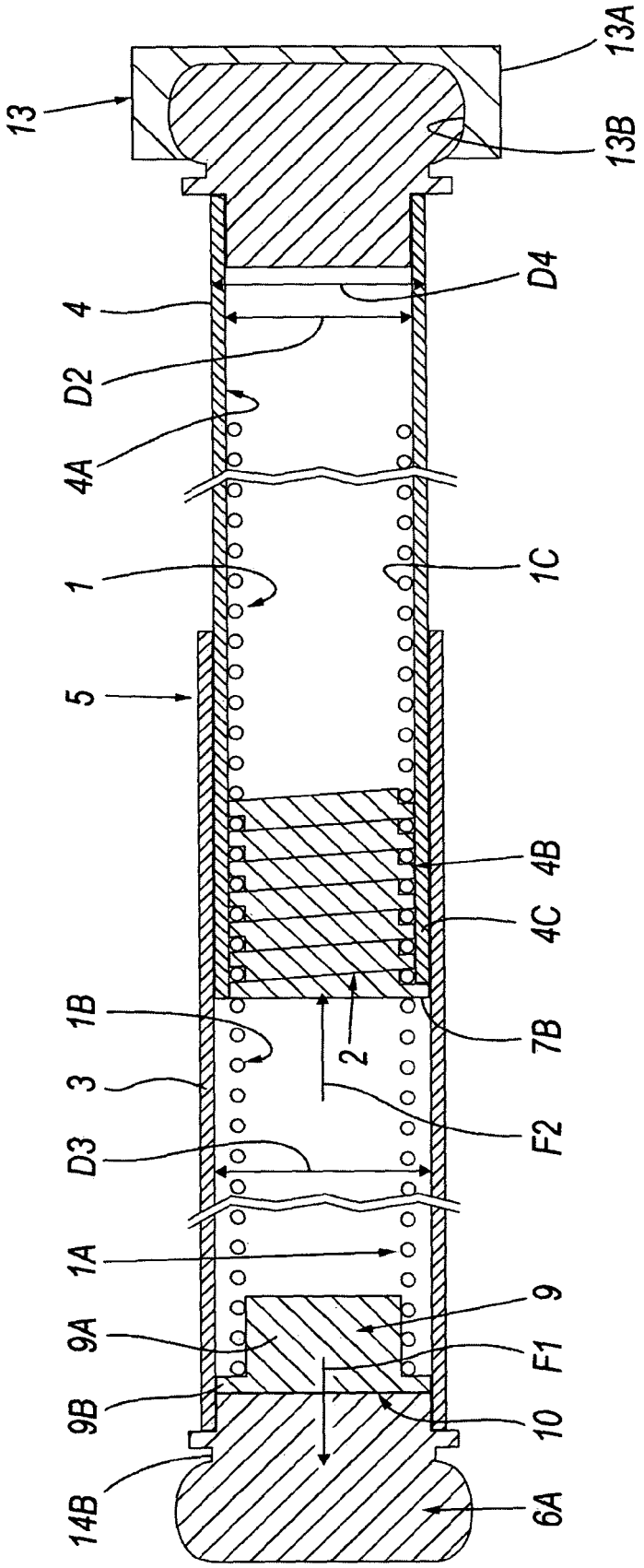


Fig. 1

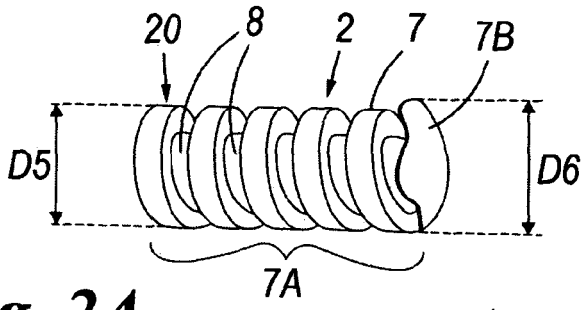


Fig. 2A

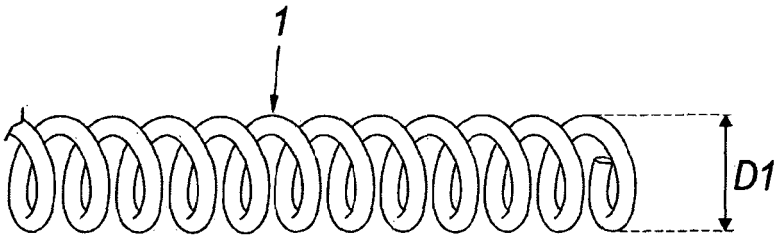


Fig. 2B

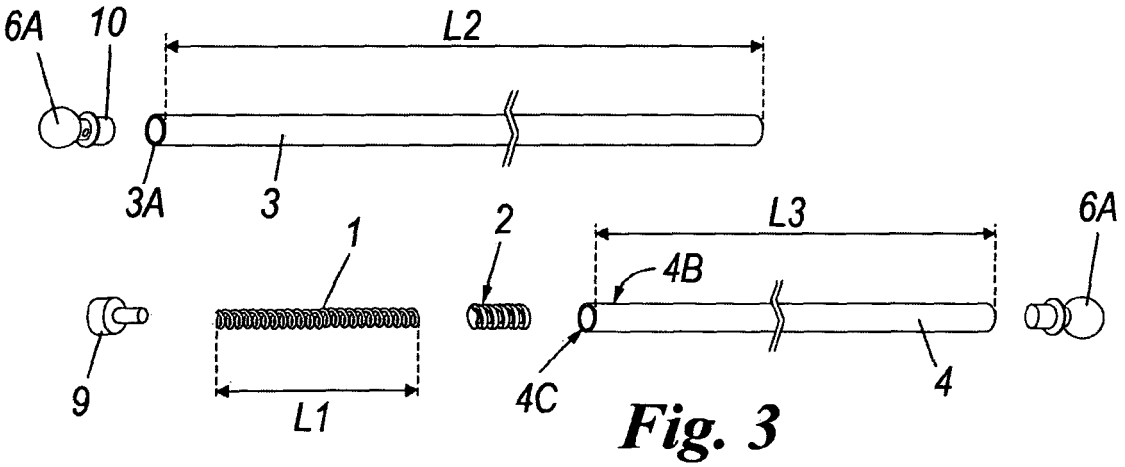


Fig. 3

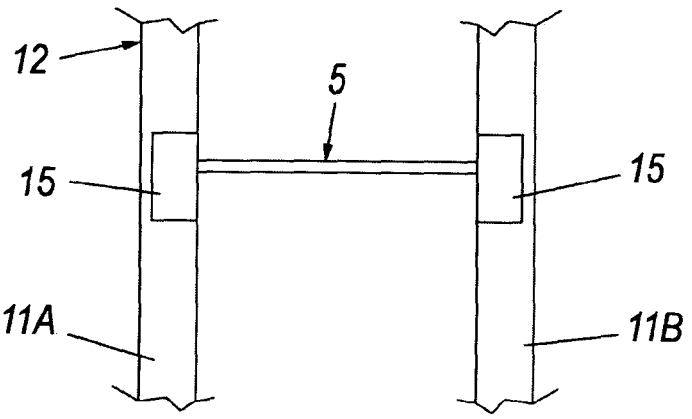
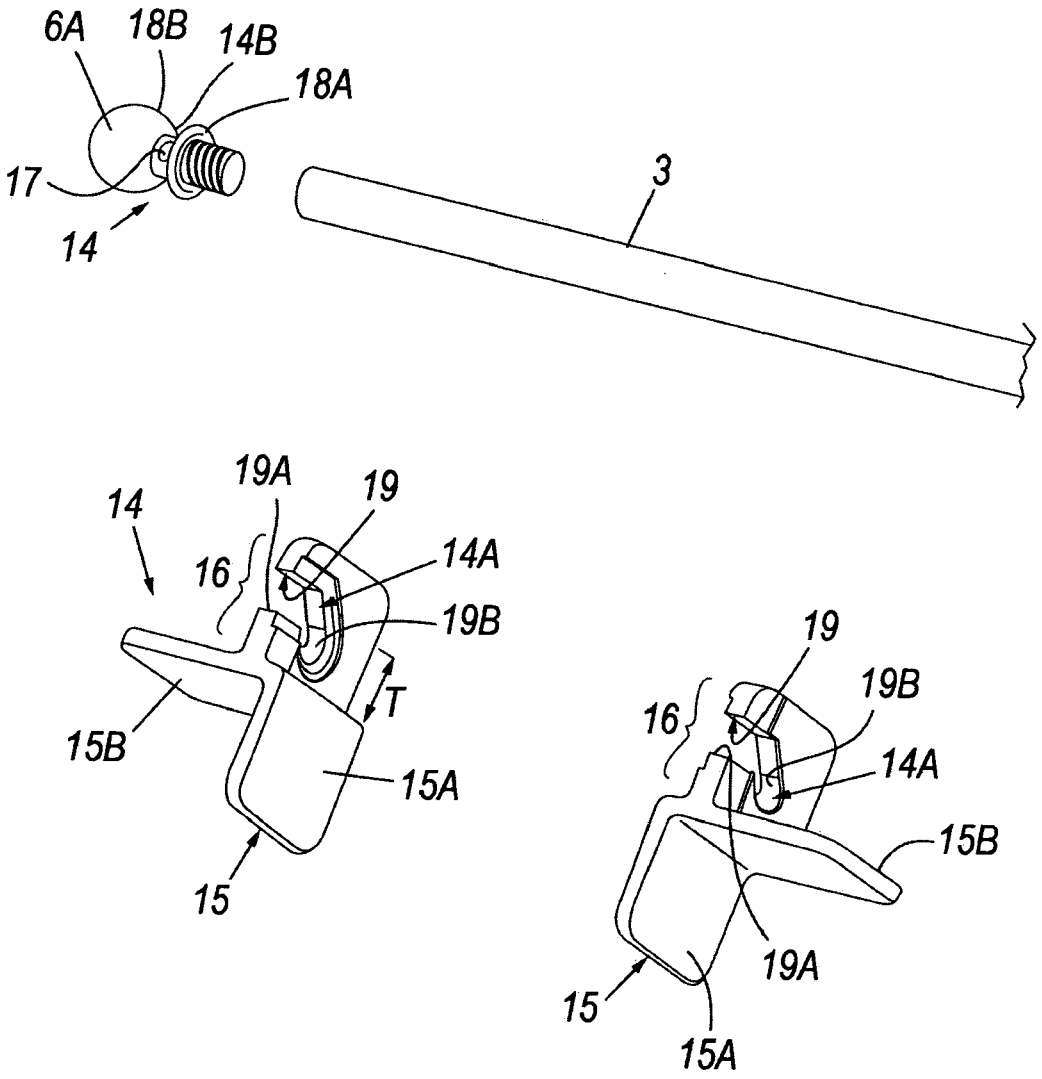


Fig. 4A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18B
14B
18A
17
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19A
19
14
16
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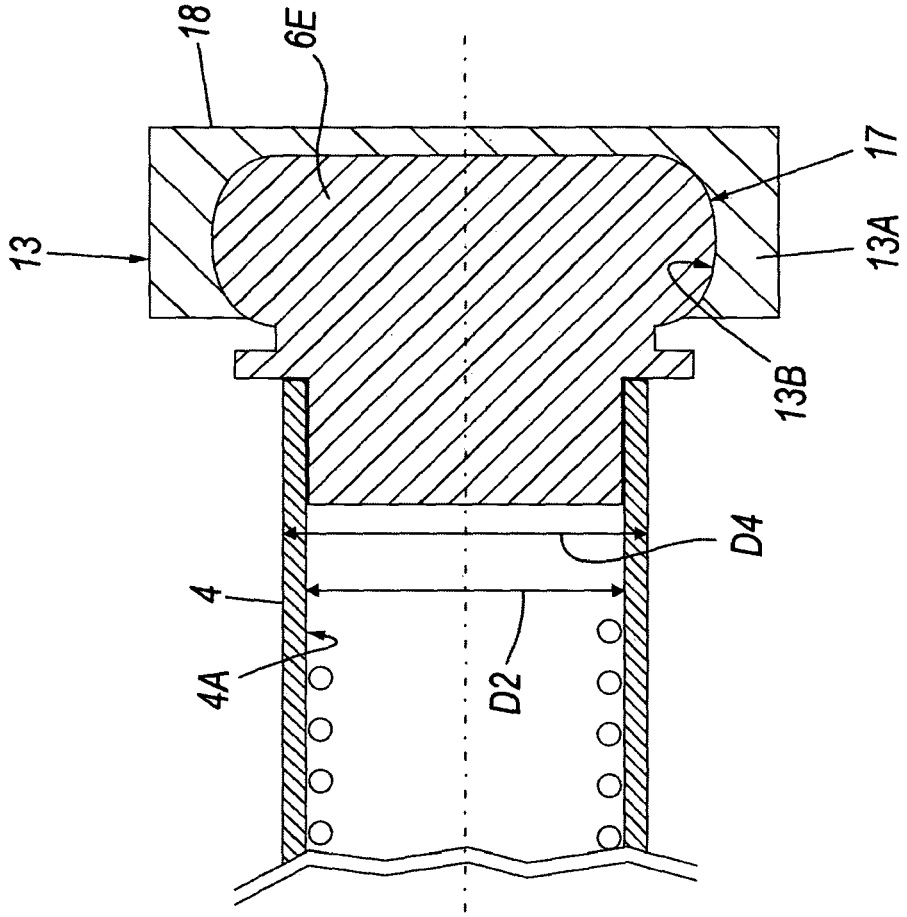
Fig. 4B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13
17
13A
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D4
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4A
D2

Fig. 6

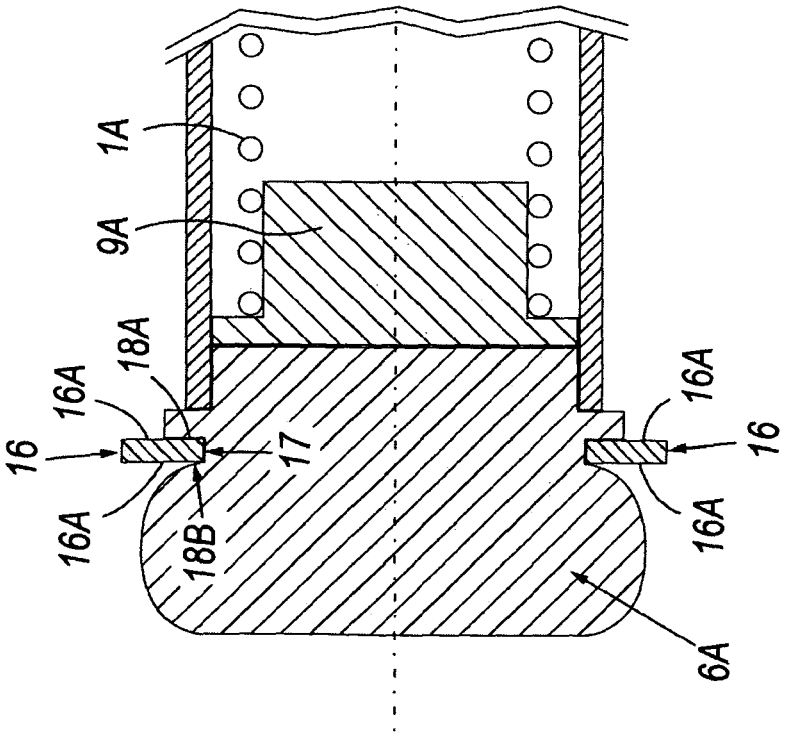
1A
9A
18A
16A
16
17
18B
16A
16A
16
16A
6A

Fig. 5

REFERENCES CITED IN THE DESCRIPTION

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