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(54) Laundry washing machine for household use comprising a pin for coupling at least one shock-absorbing element to an oscillating assembly, and pin thereof

(57) The present invention relates to a laundry washing machine (1) for household use comprising a cabinet (2) and a suspension system that keeps an oscillating assembly (3) suspended inside the cabinet (2), said suspension system comprising at least one shock-absorbing element (6), which is coupled to the oscillating assembly (3) through an upper mount (7S) comprising:
- a first end portion (61) of the shock-absorbing element (6),
- at least one fin (30) of the oscillating assembly (3),
- a pin (10) adapted to be inserted into a hole (30F) of said at least one fin (30) and into a bushing (61B) of said first end portion (61) of the shock-absorbing element (6).

The invention is characterized in that said pin (10) is made of metallic material, in particular sheet steel.

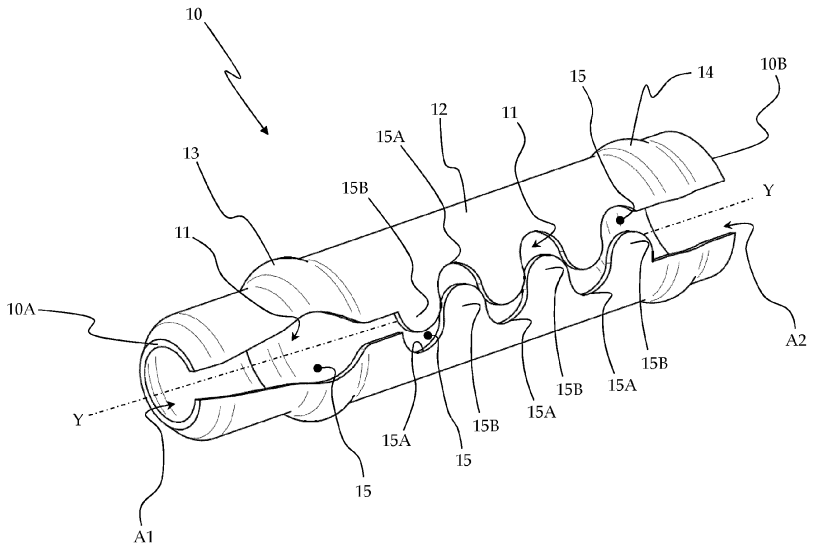

Fig. 3

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Description

[0001] The present invention relates to a laundry washing machine for household use according to the preamble of claim 1.

[0002] The present invention further relates to a pin for coupling at least one shock-absorbing element to an oscillating assembly of a laundry washing machine for household use.

[0003] The invention applies to the field of laundry washing machines for household use; it must be pointed out that, for the purposes of the present invention, such definition may refer to washing machines, clothes dryers, washing/drying machines and any other type of machine suitable for treating textile items.

[0004] As is known in the art, laundry washing machines for household use comprise a cabinet inside of which an oscillating assembly is kept suspended by means of a suspension system comprising at least one shock-absorbing element, which is coupled to said oscillating assembly through an upper mount comprising a pin adapted to be inserted into a hole of at least one fin of the oscillating assembly and into a bushing of a first end portion of the shock absorbing element.

[0005] Said oscillating assembly comprises, in a known manner, a wash tub within which a drum is made to rotate about an axis, the latter being typically horizontal or substantially horizontal; in such known washing machines, a door closes the load opening through which the laundry items to be washed and/ or dried can be placed into the drum.

[0006] In order to secure the shock-absorbing element to the oscillating assembly, in particular to the wash tub, said pin is inserted into a pair of fins or ridges of said oscillating assembly, in particular of the wash tub, and into a bushing of one end of the shock-absorbing element.

[0007] Said pin is usually made of plastic material and has elastic properties, so that it can be easily inserted into the pair of fins and into the bushing of said end of the shock-absorbing element, while at the same time ensuring an adequate locking between the pin itself and the shock-absorbing element.

[0008] However, the solution known in the art and described above has a few drawbacks.

[0009] In fact, said pin is subject to considerable mechanical stresses, which cause it to wear and to undergo permanent deformation, in particular due to the effect known as "plastic creep".

[0010] It must be pointed out that said mechanical stresses go along with, and are frequently increased by, thermal stresses caused by overheating due to friction between the material of the shock-absorbing element and the material of the pin.

[0011] As a consequence, the deformations undergone by the pin impair the locking of the pin to the respective shock-absorbing element, thus inevitably impairing the performance of the washing machine.

[0012] It is also clear that these problems become proportionally worse as the dimensions of the oscillating assembly grow, also in terms of total weight and load of said oscillating assembly, particularly during the operation of the washing machine.

[0013] In this frame, it is the main object of the present invention to provide a laundry washing machine for household use comprising a pin for coupling a shock-absorbing element to the oscillating assembly, which can overcome the above-mentioned drawbacks.

[0014] In particular, it is one object of the present invention to realize the laundry washing machine and said pin in such a way as to prevent the mechanical and thermal stresses to which the pin is subjected from causing the latter to undergo wear and permanent deformation.

[0015] It is another object of the present invention to realize the laundry washing machine and said pin in such a way as to ensure an optimal and lasting locking between the pin and the respective shock-absorbing element.

[0016] It is a further object of the present invention to realize the laundry washing machine and said pin in such a way as to achieve optimal performance of the laundry washing machine, also regardless of the dimensions of the oscillating assembly and of the total weight and/or load of said oscillating assembly, in particular during the operation of the laundry washing machine.

[0017] Said objects are achieved by the present invention through a laundry washing machine for household use, in particular a washing or washing/ drying machine or a clothes dryer comprising a pin for coupling at least one shock-absorbing element to an oscillating assembly, and a pin thereof, incorporating the features set out in the appended claims, which are an integral part of the present description.

[0018] Further objects, features and advantages of the present invention will become apparent from the following detailed description and from the annexed drawings, which are supplied by way of non-limiting example, wherein:

- Fig. 1 shows a sectional view of a front-loading laundry washing machine according to the present invention;
- Fig. 2a shows a perspective view of a portion of the laundry washing machine of the present invention according to a first embodiment thereof;
- Fig. 2b shows a sectional view of the portion of the laundry washing machine of Fig. 2a;
- Fig. 3 shows a perspective view of a first embodiment of a detail of the laundry washing machine of the present invention;
- Fig. 4a shows a perspective view of a portion of the laundry washing machine of the present invention according to a second embodiment thereof;
- Fig. 4b shows a sectional view of the portion of the laundry washing machine of Fig. 4a;
- Fig. 5a shows a perspective view of a second em-

bodiment of a detail of the laundry washing machine of the present invention;

- Fig. 5b shows a partially sectional view of the detail of Fig. 5a;
- Fig. 5c shows a side view of the detail of Figs. 5a and 5b.

[0019] For clarity, in the present description the same reference numerals will be used for designating identical or equivalent items shown in the annexed drawings.

[0020] Fig. 1 shows a sectional view of a front-loading laundry washing machine 1 for household use according to the present invention.

[0021] In the present description, the term "laundry washing machine" will encompass washing machines, clothes dryers, washing/drying machines and any other type of machine suitable for treating textile items.

[0022] The laundry washing machine 1 comprises a cabinet 2 inside of which an oscillating assembly (designated as a whole by reference numeral 3) is kept suspended.

[0023] Said oscillating assembly 3 comprises, in a known manner, a wash tub 3A within which a drum 3B is made to rotate.

[0024] In particular, the drum 3B is rotated about a first axis X; preferably, as can be seen in Fig. 1, the first axis X of the drum 3B is horizontal or substantially horizontal. Said first axis X may be slightly inclined, e.g. at least partially raised towards a load opening 4 of the cabinet 2; this makes it easier for a user to load laundry items into the drum 3B. It is however clear that the drum 3B may also be positioned differently inside the wash tub 3A.

[0025] The laundry items to be washed and/or dried are placed into the drum 3B through said load opening 4, which can then be closed by a door 5 that comprises:

- un porthole cup 5A, preferably made of transparent material,
- a frame 5B for supporting said porthole cup 5A, said porthole cup 5A preferably projecting from the frame 5B in the direction of the first axis X. While observing Figs. 2a and 2b, one can also notice that the laundry washing machine 1 is equipped with a suspension system that keeps the oscillating assembly 3 suspended inside the cabinet 2, said suspension system comprising at least one shock-absorbing element 6 coupled to the oscillating assembly 3 through an upper mount 7S.

[0026] Preferably, as shown also in Figs. 1 and 2a, the shock-absorbing element 6 is coupled to the cabinet 2 through a lower mount 7I.

[0027] It is apparent that, for the purposes of the present invention, words such as "upper", "lower" and the like refer herein to a situation in which the shock-absorbing element 6 is in the operating condition, i.e. coupled to the cabinet 2 and/or to the oscillating assembly 3.

[0028] Furthermore, the suspension system of the laundry washing machine 1 may also comprise additional elements (not shown in the drawings, since they are known in the art), which cooperate with the shock-absorbing element 6 for the purpose of keeping the oscillating assembly 3 suspended inside the cabinet 2.

[0029] As can be seen in Figs 2a to 3, said upper mount 7S comprises:

- a first end portion 61 of the shock-absorbing element 6,
- at least one fin or ridge 30 of the oscillating assembly 3,
- a pin 10 adapted to be inserted into a hole 30F of said at least one fin 30 and into a bushing 61B of said first end portion 61 of the shock-absorbing element 6.

[0030] In particular, in Fig. 2b it can be seen that said upper mount 7S comprises a pair of fins 30, each one including a hole 30F adapted to receive the pin 10, said end portion 61 of the shock-absorbing element 6 being positioned between said pair of fins 30; the holes 30F and the bushing 61B are schematically shown in Fig. 2b by means of dashed lines.

[0031] In accordance with the present invention, said pin 10 is made of metallic material, in particular sheet steel.

[0032] Preferably, the pin 10 is shaped like a substantially cylindrical tube; in particular, it comprises a cavity 11 delimited by a body 12 having a first end 10A and a second end 10B.

[0033] The particular provision of the pin 10 according to the present invention allows to substantially eliminate any mechanical and/or thermal stresses incurred by said pin 10, especially during the operation of the laundry washing machine 1; consequently, this provision will prevent the pin 10 from undergoing any permanent deformation.

[0034] It is therefore apparent that the provision of the pin 10 according to the present invention ensures an optimal and lasting locking between said pin 10 and the shock-absorbing element 6, thereby avoiding a possible decrease in the performance of the laundry washing machine 1 which might occur should the pin 10 undergo deformation and/or come off.

[0035] In addition, the provision of the pin 10 according to the present invention allows to obtain optimal performance from the laundry washing machine 1, also regardless of the dimensions of the oscillating assembly 3 and of the total weight and/or load of said oscillating assembly 3, in particular during the operation of the laundry washing machine 1.

[0036] The pin 10 comprises a first protrusion 13 projecting from the body 12 of the pin 10, in particular said first protrusion 13 being positioned near the first end 10A of the pin 10. Said first protrusion 13 prevents the first end 10A of the pin 10 from passing in an undesired man-

ner through the hole 30F of said at least one fin 30 and through the bushing 61B of said first end portion 61 of the shock-absorbing element 6; as a result, said first protrusion 13 prevents the pin 10 from coming out of the hole 30F and/or the bushing 61B, and also acts as an abutment element for the pin 10 against the surface of said at least one fin 30.

[0037] Furthermore, the pin 10 comprises a second protrusion 14 projecting from the body 12 of the pin 10, in particular said second protrusion 14 being positioned near the second end 10B of the pin 10.

[0038] The second protrusion 14 prevents the second end 10B of the pin 10 from passing in an undesired manner through the hole 30F of said at least one fin 30 and through the bushing 61B of said first end portion 61 of the shock-absorbing element 6; as a result, also the second protrusion 14 prevents the pin 10 from coming out of the hole 30F and/or the bushing 61B, and acts as an abutment element for the pin 10 against the surface of said at least one fin 30.

[0039] It emerges from the above that, in an operating condition of the pin 10 (i.e. a condition in which the pin 10 allows the oscillating assembly 3 to be associated with the shock-absorbing element 6), the portion of the body 12 between the first protrusion 13 and the second protrusion 14 is inserted in the hole 30F of said at least one fin 30 and in the bushing 61B of said first end portion 61 of the shock-absorbing element 6.

[0040] In a preferred embodiment, the pin 10 comprises a cut-out 15 (shown in Fig. 3) extending in the body 12, in particular in a main direction of extension substantially parallel to a second axis Y (shown by means of a dashed-dotted line in Fig. 3) of the pin 10; the cut-out 15 allows to increase the degree of flexibility and elasticity of the pin 10, so that it can be more easily inserted into the hole 30F of said at least one fin 30 and into the bushing 61B of said first end portion 61 of the shock-absorbing element 6.

[0041] Preferably, the cut-out 15 is so formed as to join a first aperture A1 associated with the first end 10A of the pin 10 to a second aperture A2 associated with the second end 10B of the pin 10; this provision allows to make the pin 10 sufficiently flexible and elastic, so as to simplify the insertion thereof into the hole 30F and into the bushing 61B.

[0042] The provision of said first protrusion 13 and/or second protrusion 14 allows to create a pin 10 which is so realized that, advantageously, it can only be removed from the hole 30F of said at least one fin 30 and from the bushing 61B of said first end portion 61 of the shock-absorbing element 6 following a compression action exerted on the body 12 of the pin 10 by a user; said compression action to be exerted on the body 12 is also facilitated by the cut-out 15 that extends in the body 12 of the pin 10.

[0043] In a preferred embodiment, said cut-out 15 has a curvilinear extension; in fact, the edges of said cut-out 15 have at least one notch 15A facing at least one substantially complementary convex portion 15B, in particular in the section comprised between the first protrusion 13 and the second protrusion 14; as can be seen in Fig. 3, said at least one notch 15A and said at least one convex portion 15B have rounded profiles.

[0044] Said at least one notch 15A and at least one convex portion 15B counter a possible torsion of the body 12 of the pin 10, in particular while inserting said pin 10 into the hole 30F and into the bushing 61B or while removing it. In fact, such torsion of the body 12 might damage the pin 10.

[0045] The edges of said cut-out 15 preferably have a plurality of notches 15A facing a plurality of substantially complementary convex portions 15B.

[0046] Also in the second embodiment of the present invention shown in Figs. 4a and 4b, one can notice that the laundry washing machine 1 is equipped with a suspension system that keeps the oscillating assembly 3 suspended inside the cabinet 2, said suspension system comprising at least one shock-absorbing element 6 coupled to the oscillating assembly 3 through an upper mount 7S.

[0047] Preferably, as shown also in Figs. 1 and 4a, also in said second embodiment the shock-absorbing element 6 is coupled to the cabinet 2 through a lower mount 7I.

[0048] It is apparent that, also in regard to the second embodiment, words such as "upper", "lower" and the like refer to a situation in which the shock-absorbing element 6 is in the operating condition, i.e. coupled to the cabinet 2 and/or to the oscillating assembly 3.

[0049] Furthermore, the suspension system of the laundry washing machine 1 may also comprise additional elements (not shown in the drawings, since they are known in the art), which cooperate with the shock-absorbing element 6 for the purpose of keeping the oscillating assembly 3 suspended inside the cabinet 2.

[0050] As can be seen in Figs 4a to 5c, said upper mount 7S comprises:

- a first end portion 61 of the shock-absorbing element 6,
- at least one fin or ridge 30 of the oscillating assembly 3,
- a pin 100 made of plastic material and adapted to be inserted into a hole 30F of said at least one fin 30 and into a bushing 61B of said first end portion 61 of the shock-absorbing element 6.

[0051] In particular, in Fig. 4b it can be seen that said upper mount 7S comprises a pair of fins 30, each one including a hole 30F adapted to receive the pin 100, said end portion 61 of the shock-absorbing element 6 being positioned between said pair of fins 30; the holes 30F and the bushing 61B are schematically shown in Fig. 4b by means of dashed lines.

[0052] In accordance with the present invention, said pin 100 comprises a reinforcing element 200 made of

metallic material.

[0053] Said reinforcing element 200 is shown in Fig. 5b and represented in Fig. 5c as a dashed component.

[0054] Preferably, the metallic material of the reinforcing element 200 is spring steel, that is, steel which will elastically deform under load without undergoing any plastic deformation, i.e. steel having high fatigue strength.

[0055] Said reinforcing element 200 may be inserted into a cavity 110 of the pin 100. As an alternative, said reinforcing element 200 may be associated with the pin 100 by moulding the plastic material of the pin 100 over the reinforcing element 200.

[0056] Preferably, the reinforcing element 200 has a substantially annular shape, in particular said reinforcing element 200 being associated with the pin 100 in a manner such that its axis substantially corresponds to a second axis YY of the pin 100 (said second axis YY being shown in Figure 5b).

[0057] The particular provision of the reinforcing element 200 according to the present invention allows to realize the pin 100 in such a way as to substantially eliminate any mechanical and/or thermal stresses incurred by said pin 100, especially during the operation of the laundry washing machine 1; consequently, this provision will prevent the pin 100 from undergoing any permanent deformation.

[0058] It is therefore apparent that the provision of the reinforcing element 200 ensures an optimal and lasting locking between the pin 100 and the shock-absorbing element 6, thereby avoiding a possible decrease in the performance of the laundry washing machine 1 which might occur should the pin 100 undergo deformation and/or come off.

[0059] In addition, the provision of the reinforcing element 200 according to the present invention allows to design said pin 100 in such a way as to obtain optimal performance from the laundry washing machine 1, also regardless of the dimensions of the oscillating assembly 3 and of the total weight and/or load of said oscillating assembly 3, in particular during the operation of the laundry washing machine 1.

[0060] In a preferred embodiment, the reinforcing element 200 has a cut-out 210 extending lengthwise for at least a portion of said reinforcing element 200; said cut-out 210 provides the reinforcing element 200 with a higher degree of elasticity, which may become particularly useful while inserting the pin 100 into the hole 30F of said at least one fin 30 and into the bushing 61B of said first end portion 61 of the shock-absorbing element 6. As can be seen in Fig. 3b, the cut-out 210 extends substantially parallel to the second axis YY of the pin 100.

[0061] The annexed drawings also show that said pin 100 has a substantially ogival shape, so that it can be more easily inserted into the hole 30F of said at least one fin 30 and into the bushing 61B of said first end portion 61 of the shock-absorbing element 6.

[0062] In particular, the pin 100 has a body 120 which comprises the cavity 110 and which is so realized as to have increasing outer dimensions starting from a first end 100A up to a second end 100B.

[0063] Preferably, the second end 100B of the pin 100 comprises a protrusion 130 projecting from the body 120 of the pin 100. Said protrusion 130 prevents the second end 100B of the pin 100 from passing in an undesired manner through the hole 30F of said at least one fin 30 and through the bushing 61B of said first end portion 61 of the shock-absorbing element 6; as a result, said protrusion 130 prevents the pin 100 from coming out of the hole 30F and or the bushing 61B, and also acts as an abutment element for the pin 100 against the surface of said at least one fin 30.

[0064] The pin 100 according to the present invention may then comprise at least one tooth 140, in particular of the elastic type, which allows to prevent the pin 100 from coming off when it has been inserted into the hole 30F of said at least one fin 30 and into the bushing 61B of said first end portion 61 of the shock-absorbing element 6.

[0065] The tooth 140 comprises:

- a tang 140A connected to the body 120 of the pin 100;
- a rise 140B protruding from the body 120 of the pin 100, in particular said rise 140B being separated from the body 120 of the pin 100 by a slot 120F;
- an inclined surface 14C adapted to join and connect the tang 140A to the rise 140B.

[0066] Preferably, said tooth 140 is positioned near the first end 100A of the pin 100. It is therefore apparent that the tooth 140 according to the present invention has been so conceived as to be able to flex and at least partially enter the cavity 110 of the pin 100 while inserting said pin 100 into the hole 30F of said at least one fin 30 and into the bushing 61B of said first end portion 61 of the shock-absorbing element 6. In particular, the flexing of the tooth 140 is caused by contact occurring between the inclined surface 140C and the rise 140B and the inner surface of said hole 30F and of said bushing 61B; when said contact ends, the tooth 140 returns into its original position thanks to the elastic properties of the tang 140A.

[0067] Moreover, the shape of the tooth 140 prevents the pin 100 from undesirably coming out of the hole 30F of said at least one fin 30 and the bushing 61B of said first end portion 61 of the shock-absorbing element 6; in fact, the rise 140B acts as an abutment element for the pin 100 against the surface of said at least one fin 30 when the pin 100 is inserted into the hole 30F of said at least one fin 30 and into the bushing 61B, since the pin 100 can only be removed following a pressure exerted by a user in order to flex the tooth 140 and cause it to at least partially enter the cavity 110 of the pin 100.

[0068] It emerges from the above that, in an operating condition of the pin 100 (i.e. a condition in which the pin 100 allows the oscillating assembly 3 to be associated with the shock-absorbing element 6), the portion of the

body 120 comprised between the protrusion 130 and the tooth 140 is inserted in the hole 30F of said at least one fin 30 and in the bushing 61B of said first end portion 61 of the shock-absorbing element 6.

[0069] In a preferred embodiment, the pin 100 comprises a cut-out 150 (shown in Fig. 5c) extending at least partially in the body 120, in particular substantially parallel to said second axis YY of the pin 100; the cut-out 150 provides a higher degree of flexibility and elasticity of the pin 100, so that it can be more easily inserted into the hole 30F of said at least one fin 30 and into the bushing 61B of said first end portion 61 of the shock-absorbing element 6.

[0070] In order to avoid making the pin 100 excessively flexible and elastic, said cut-out 150 preferably does not reach the first end 100A of the pin 100, the surface of which will be, as a result, continuous with respect to that of the body 120.

[0071] The pin 100 further comprises a plurality of reliefs 160 positioned near the edges of the cut-out 150; said reliefs 160 counter a possible torsion of the body 120 of the pin 100, in particular while inserting said pin 100 into the hole 30F and into the bushing 61B or while removing it.

[0072] Preferably, said cut-out 150 is positioned on the body 120 of the pin 100 on a side opposite to the tooth 140.

[0073] The advantages of a laundry washing machine 1 for household use and of the pin 10, 100 thereof in accordance with the present invention are apparent from the above description.

[0074] In particular, such advantages include the fact that the particular realization of the pin 10 according to the first embodiment (shown in Figures 2a to 3) of the present invention allows to substantially eliminate any mechanical and/or thermal stresses incurred by said pin 10, especially during the operation of the laundry washing machine 1; consequently, such a realization will prevent the pin 10 from undergoing any permanent deformation.

[0075] It is therefore apparent that the provision of the pin 10 according to the first embodiment of the present invention ensures an optimal and lasting locking between it and the shock-absorbing element 6, thereby avoiding a possible decrease in the performance of the washing machine 1 which might occur should the pin 10 undergo deformation and/or come off.

[0076] In addition, the peculiar realization of the pin 10 in accordance with the first embodiment of present invention allows to obtain optimal performance from the laundry washing machine 1, also regardless of the dimensions of the oscillating assembly 3 and of the total weight and/or load of said oscillating assembly 3, in particular during the operation of the laundry washing machine 1.

[0077] As concerns the realization of the pin 100 in accordance with the second embodiment (shown in Figures 4a to 5c) of the present invention, such advantages include the fact that the special provision of the reinforcing element 200 allows to realize the pin 100 in such a way as to substantially eliminate any mechanical and/or thermal stresses incurred by said pin 100, especially during the operation of the laundry washing machine 1; consequently, such a provision will prevent the pin 100 from undergoing any permanent deformation.

[0078] It is therefore apparent that the provision of the reinforcing element 200 ensures an optimal and lasting locking between the pin 100 and the shock-absorbing element 6, thereby avoiding a possible decrease in the performance of the laundry washing machine 1 which might occur should the pin 100 undergo deformation and/or come off.

[0079] In addition, the peculiar realization of the pin 100 and of the reinforcing element 200 in accordance with the second embodiment of present invention allows to obtain optimal performance from the laundry washing machine 1, also regardless of the dimensions of the oscillating assembly 3 and of the total weight and/or load of said oscillating assembly 3, in particular during the operation of the laundry washing machine 1.

[0080] Another advantage of the laundry washing machine 1 according to both embodiments of the present invention is that the pin 10, 100 is realized in such a way that, advantageously, it can only be removed from the hole 30F of said at least one fin 30 and from the bushing 61B of said first end portion 61 of the shock-absorbing element 6 upon definite actions carried out by a user; in fact, the particular shape of the pin 10, 100 will prevent it from undesirably coming out of the hole 30F and the bushing 61B.

[0081] The laundry washing machine for household use and the pins described herein by way of example may be subject to many possible variations without departing from the novelty spirit of the inventive idea; it is also clear that in the practical implementation of the invention the illustrated details may have different shapes or be replaced with other technically equivalent elements.

[0082] For example, the pin 10, 100 according to the present invention may also be used for coupling the shock-absorbing element 6 to the cabinet 2 through the lower mount 7I.

[0083] In such an embodiment, the pin 10, 100 can be inserted into a second hole 300F (shown in Figures 2a and 4a) of at least one second fin 300 (also shown in Figures 2a and 4a) connected to the cabinet 2, and into a bushing (not shown in the drawings) of a second end portion 62 of the shock-absorbing element 6.

[0084] It can therefore be easily understood that the present invention is not limited to the above-described laundry washing machine for household use and the pin thereof, but may be subject to many modifications, improvements or replacements of equivalent parts and elements without departing from the inventive idea, as clearly specified in the following claims.

Claims

1. A laundry washing machine (1) for household use, of the type comprising a cabinet (2) and a suspension system that keeps an oscillating assembly (3) suspended inside the cabinet (2), said suspension system comprising at least one shock-absorbing element (6) which is coupled to the oscillating assembly (3) through an upper mount (7S) comprising:

   - a first end portion (61) of the shock-absorbing element (6),
   - at least one fin (30) of the oscillating assembly (3),
   - a pin (10) adapted to be inserted into a hole (30F) of said at least one fin (30) and into a bushing (61B) of said first end portion (61) of the shock-absorbing element (6),

   said laundry washing machine (1) being **characterized in that** said pin (10) is made of metallic material, in particular sheet steel.

2. A laundry washing machine (1) according to claim 1, **characterized in that** said pin (10) is shaped like a substantially cylindrical tube.

3. A laundry washing machine (1) according to one or more of the preceding claims, **characterized in that** said pin (10) comprises a cavity (11) delimited by a body (12) having a first end (10A) and a second end (10B), said pin (10) comprising a first protrusion (13) and a second protrusion (14) projecting from the body (12) of the pin (10), in particular said first protrusion (13) being positioned near the first end (10A) of the pin (10) and said second protrusion (14) being positioned near the second end (10B) of the pin (10).

4. A laundry washing machine (1) according to one or more of the preceding claims, **characterized in that** the pin (10) comprises a cut-out (15) extending in the body (12) along a main direction of extension substantially parallel to a second axis (Y) of the pin (10), in particular said cut-out (15) being so formed as to join a first aperture (A1) associated with the first end (10A) of the pin (10) to a second aperture (A2) associated with the second end (10B) of the pin (10), and so as to have a curvilinear extension.

5. A laundry washing machine (1) according to claim 4, **characterized in that** the edges of said cut-out (15) have at least one notch (15A) facing at least one substantially complementary convex portion (15B) in the section comprised between the first protrusion (13) and the second protrusion (14), in particular said at least one notch (15A) and said at least one convex portion (15B) having rounded profiles.

6. A laundry washing machine (1) according to claim 5, **characterized in that** the edges of said cut-out (15) have a plurality of notches (15A) facing a plurality of substantially complementary convex portions (15B).

7. A laundry washing machine (1) for household use, of the type comprising a cabinet (2) and a suspension system that keeps an oscillating assembly (3) suspended inside the cabinet (2), said suspension system comprising at least one shock-absorbing element (6) which is coupled to the oscillating assembly (3) through an upper mount (7S) comprising:

   - a first end portion (61) of the shock-absorbing element (6),
   - at least one fin (30) of the oscillating assembly (3),
   - a pin (100) made of plastic material, adapted to be inserted into a hole (30F) of said at least one fin (30) and into a bushing (61B) of said first end portion (61) of the shock-absorbing element (6),

   said laundry washing machine (1) being **characterized in that** said pin (100) comprises a reinforcing element (200) made of metallic material, in particular spring steel.

8. A laundry washing machine (1) according to the preceding claim, **characterized in that** said reinforcing element (200) is inserted into a cavity (110) of the pin (100).

9. A laundry washing machine (1) according to one or more of the preceding claims 7 and 8, **characterized in that** said reinforcing element (200) is associated with the pin (100) by moulding the plastic material of the pin (100) over the reinforcing element (200).

10. A laundry washing machine (1) according to one or more of the preceding claims 7 to 9, **characterized in that** said reinforcing element (200) has a substantially annular shape, in particular said reinforcing element (200) being associated with the pin (100) in a manner such that its axis substantially corresponds to a second axis (YY) of the pin (100).

11. A laundry washing machine (1) according to one or more of the preceding claims 7 to 10, **characterized in that** said reinforcing element (200) has a cut-out (210) extending lengthwise for at least a portion of said reinforcing element (200).

12. A laundry washing machine (1) according to one or more of the preceding claims 7 to 11, **characterized in that** said pin (100) has a substantially ogival shape, in particular said pin (100) comprising a body

(120) which comprises the cavity (110) and which is so realized as to have increasing outer dimensions starting from a first end (100A) up to a second end (100B), in particular said second end (100B) comprising a protrusion (130) projecting from the body (120) of the pin (100).

13. A laundry washing machine (1) according to one or more of the preceding claims 7 to 12, **characterized in that** the pin (100) comprises at least one tooth (140), in particular of the elastic type, which allows to prevent the pin (100) from coming off when it has been inserted into the hole (30F) of said at least one fin (30) and into the bushing (61B) of said first end portion (61) of the shock-absorbing element (6), said tooth (140) comprising:

- a tang (140A) connected to the body (120) of the pin (100);
- a rise (140B) protruding from the body (120) of the pin (100), in particular said rise (140B) being separated from the body (120) of the pin (100) by a slot (120F);
- an inclined surface (14C) adapted to join and connect the tang (140A) to the rise (140B).

14. A laundry washing machine (1) according to one or more of the preceding claims, **characterized in that** said pin (100) comprises a cut-out (150) extending at least partially in the body (120), in particular substantially parallel to a second axis (YY) of the pin (100), and a plurality of reliefs (160) positioned near the edges of said cut-out (150), in particular said cut-out (150) being positioned on the body (120) of the pin (100) on a side opposite to the tooth (140).

15. A pin (10, 100) for coupling an oscillating assembly (3) to at least one shock-absorbing element (6) of a laundry washing machine (1) for household use, in particular a washing or washing/ drying machine, according to one or more of the preceding claims 1 to 14.

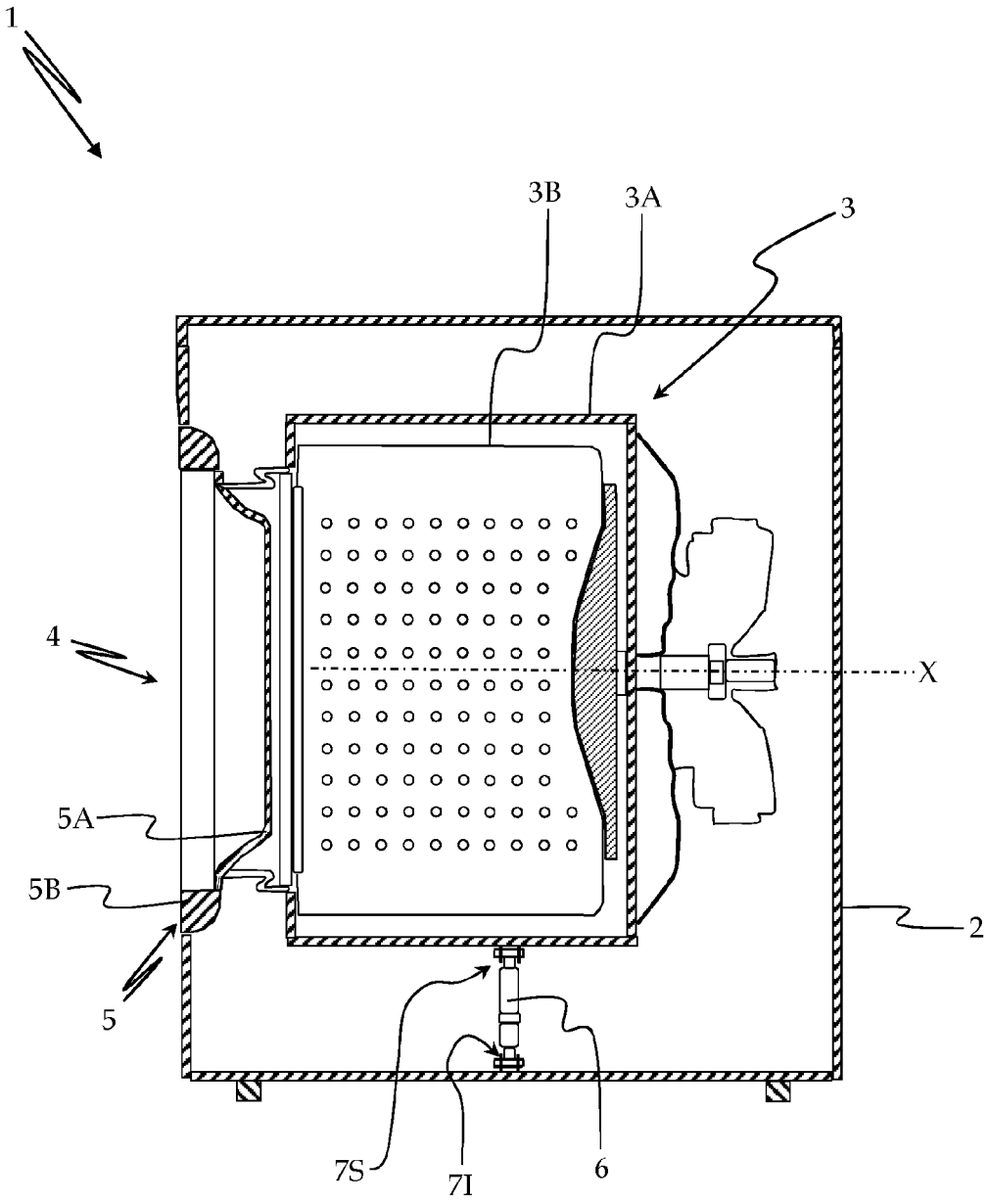

Fig. 1

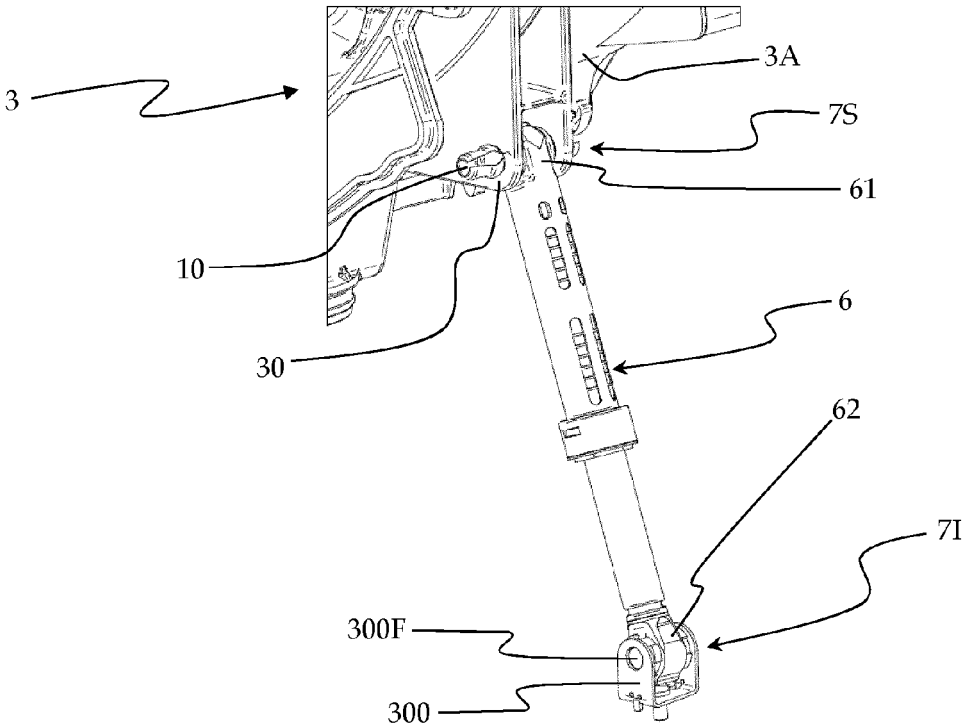

Fig. 2a

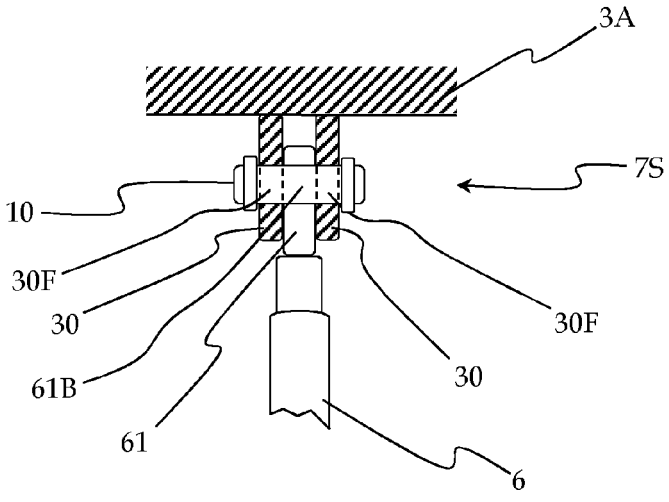

Fig. 2b

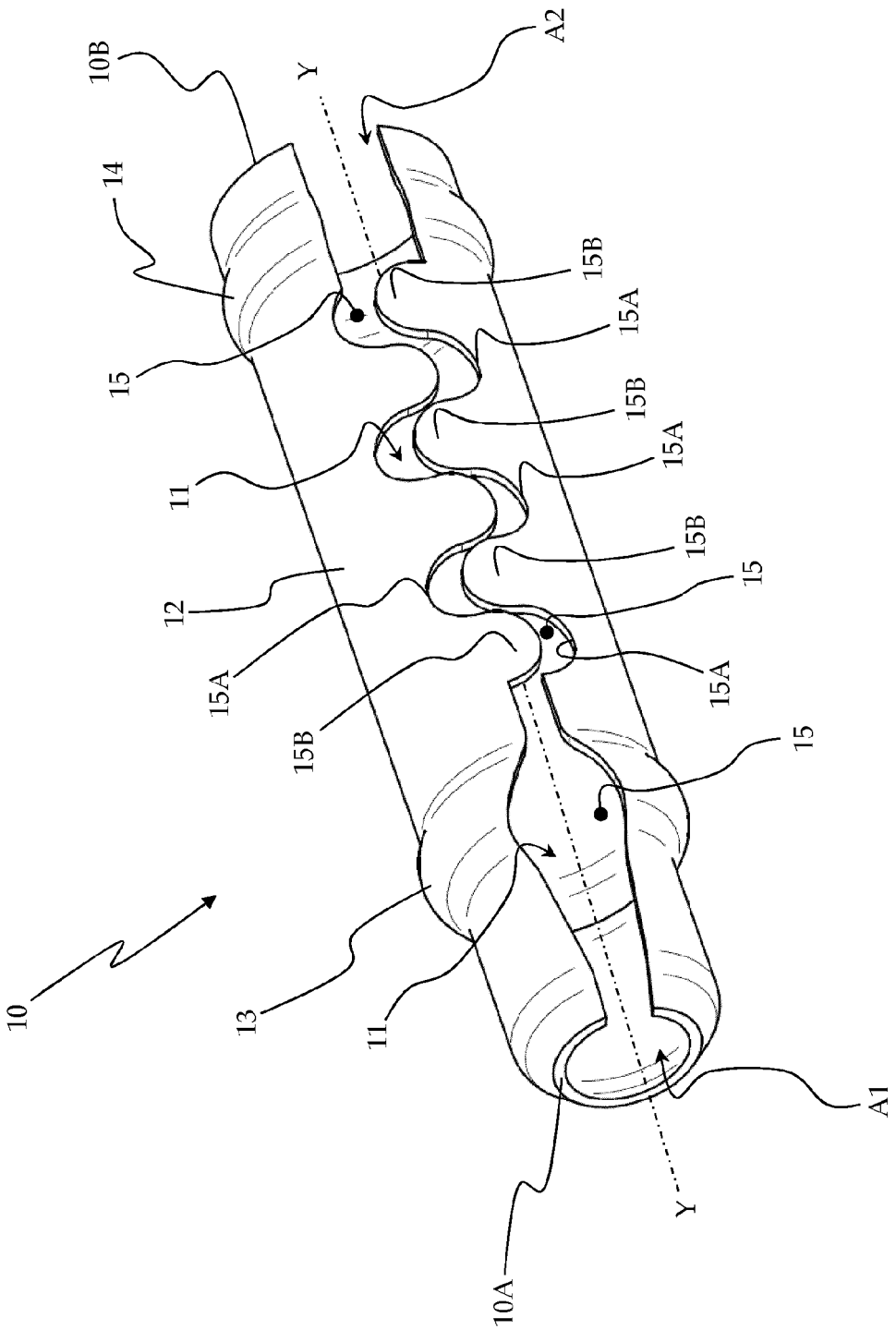

Fig. 3

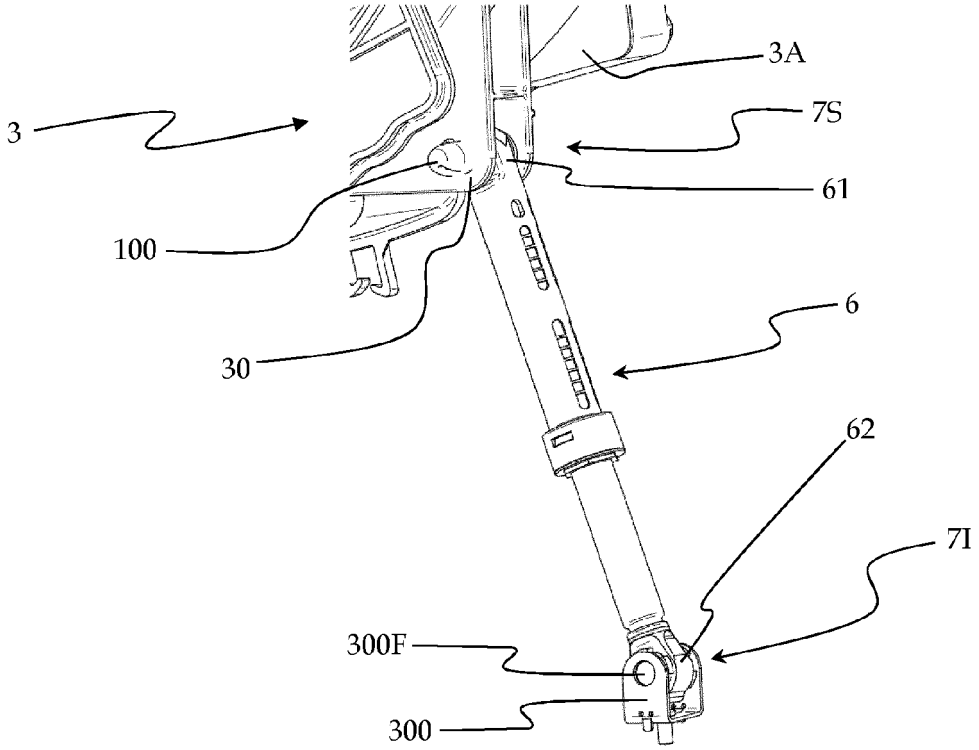

Fig. 4a

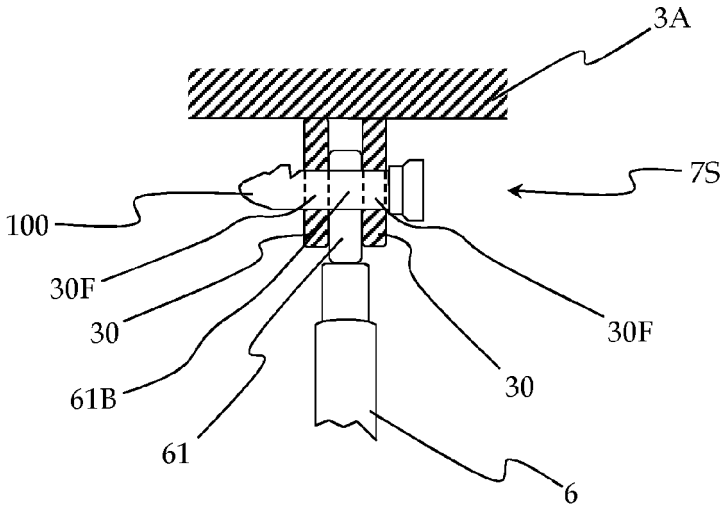

Fig. 4b

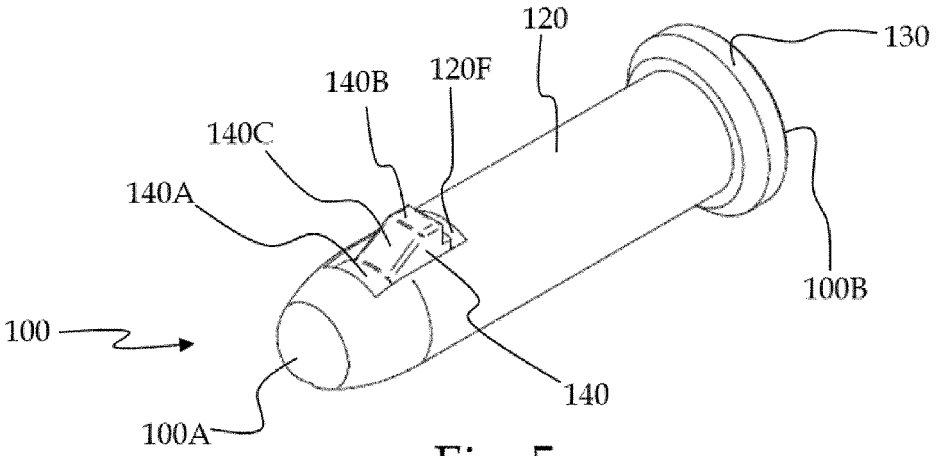

Fig. 5a

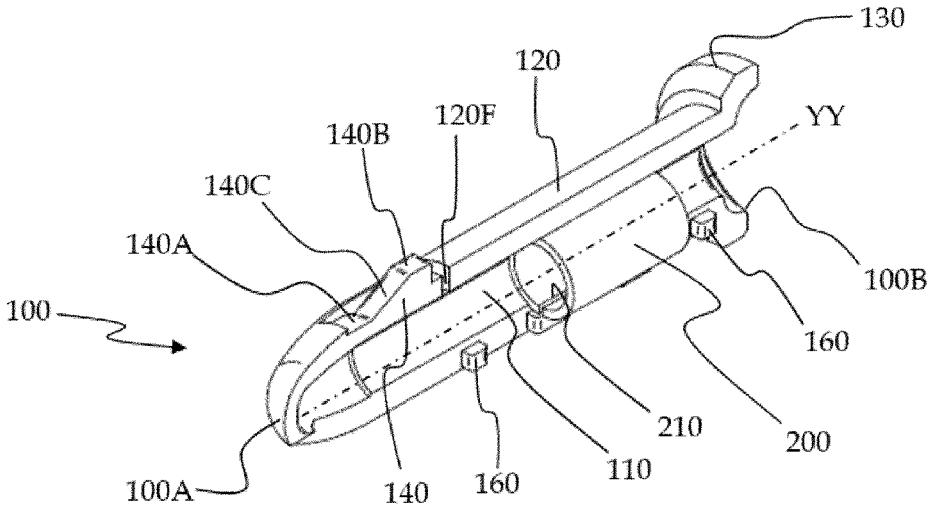

Fig. 5b

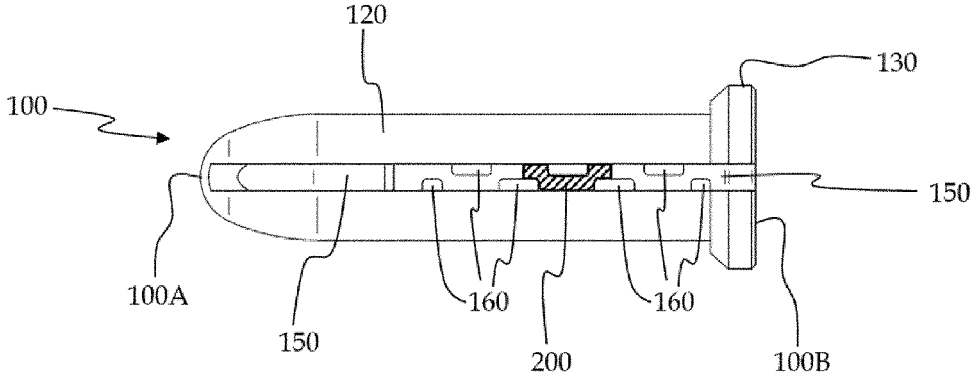

Fig. 5c

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EUROPEAN SEARCH REPORT

Application Number
EP 13 19 2810

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Y	US 2005/183472 A1 (CHOI KANG M [KR] CHOI KANG MO [KR]) 25 August 2005 (2005-08-25) * paragraph [0026] - paragraph [0027]; figures 1-3, 4a, 4b * -----	13	
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D06F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	16 April 2014	Diaz y Diaz-Caneja

CATEGORY OF CITED DOCUMENTS

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