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(54) Two-part damper pin

(57) The subject washing machine (A) comprises a machine body (1); a tube (2) within said body; at least one damper (3) connected to the connection lugs (4, 4') on the body (1) and tub (2); and damper pin (5) consisting of a sleeve (6) and rod (7) within said sleeve and providing the connection of each connection lug (4, 4') to the slots (8) provided at each end of the damper (3). Once the damper pin (5) is assembled in the connection lugs (4, 4') and damper slot (8), the protrusions (65), which extend radially outward in a conical manner at one end of the sleeve, and the flange (63) at the other end become leaned against the outfacing lateral surfaces of the lugs (4, 4').

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Description

Technical Field

[0001] The present invention relates to the connection structure of a damper to the machine body and tub, said damper being used in washing machines for attenuating the vibration occurring as a result of the revolving drum.

Background Art

[0002] With respect to the background art, dampers used in washing machines are connected to the machine body and drum by means of damper pins. Such dampers are provided with annular cross-sectioned slots at both of their ends. Said damper pins are placed into these slots and into other annular cross-sectioned slots provided on the machine body and tub that cooperate with the former slots.

[0003] Concerning the published patent application US2005183472 of the background art, in this document is disclosed a damper assembly performed by means of a single-part damper pin in front-loaded washing machines. According to this application, the lower lug of the damper is connected to base lugs so that the lower lug is supported by said base lugs. Said single-part damper pin is further equipped with an elastic clips. Following the assembly thanks to the clips, the single-part damper pin's displacement is avoided on the opposite direction of assembly. The structure of the damper pin disclosed here does not allow an assembly without slack into the damper slot. Furthermore, the pin disclosed here is not resistant against flexion and therefore lacks in counterbalancing the vertical forces from the damper and so becomes flexed. Any flexion to occur on the pin leads to vibration and noise on the washing machine.

[0004] Regarding the published patent application DE102005008239, here is disclosed an apparatus for connecting the tube and machine body to the damper. This apparatus is composed of a sleeve and a pin. The sleeve is inserted to the damper slot, whereas the pin is inserted to the sleeve. The insertion of the damper pin into the sleeve is achieved by displacing it from the starting position up to the locking position, and the damper pin is fixed axially with respect to the sleeve at the locking position. The complex structure of the damper pin disclosed in this application enhances the manufacture costs. Additionally, any small axial back and forth displacements of the damper sleeve can not be avoided. Furthermore, the pin disclosed here is not resistant against flexion and therefore lacks in counterbalancing the vertical forces coming from the damper and so becomes flexed. And any flexion to occur on the pin leads to vibration and noise on the washing machine.

Brief Description of Invention

[0005] The damper pin is composed of a sleeve and a rod within said sleeve. The external surface and the interior of the sleeve are of a cylindrical formation. The interior is of a structure that extends in a lengthwise manner throughout in the sleeve. At least one cut is provided at one end of the sleeve so as to partition the sleeve to a certain amount lengthwise. At the side provided with such cuts and close to the tip are provided protrusions on each part formed by said cuts, said protrusions being formed with the external surface expanding outwards a certain amount and said protrusions surrounding the sleeve. With respect to the rod, it is a cylindrical piece formed so as to be positioned on the internal surface of sleeve.

[0006] For assembling the damper pin into the damper slot, first the sleeve is inserted into the damper slot. Since the external diameter formed by the outset protrusions at the sleeve is larger than the internal diameter of the slot, the sleeve flexes inwardly by means of said cuts as it is inserted to the slot. Once the sleeve is fastened to the slot completely, the protrusions become projected out of the slot. In this case, the sleeve becomes flexed outwardly from the side provided with said cuts. Thanks to this flexible structure of the sleeve, the external surface may also be optionally embodied so as to become jammed within the slot. Thereafter the rod is driven forward within the interior of the sleeve. With the rod becoming entirely settled in the interior, the inward flexion and the removal of the sleeve is avoided. In this manner a structure is obtained which does not flex against forces to come from the damper used for attenuating the vibrations resulting from the revolving drum within the tub.

Objective of Invention

[0007] The objective of the present invention is to provide a structure which is not flexible against forces to come from the damper.

[0008] Another objective of the present invention is to provide a two-part damper pin to facilitate the damper assembly to the tub and body of washing machines.

[0009] A further objective of the present invention is to provide an assembly of said two-part damper pin into the damper slot without slack and thus to prevent the vibrations of a revolving drum from affecting the remaining parts of the washing machine.

[0010] Yet another objective of the present invention is to avoid the loosening and removal of said two-part damper pin from the damper slot while the washing machine is running.

[0011] Yet a further objective of the present invention is to provide an inexpensive and secure damper connection.

Description of Figures

[0012] Exemplary embodiments of the subject washing machine and the two-part damper pin used in such machine are illustrated in annexed figures as described

below in brief.

Figure 1 is a front view of the interior of a washing machine.
Figure 2 is a front perspective view of the interior of a washing machine.
Figure 3 is a side view of the assembly manner of said two-part damper pin to the damper and machine's connection lug.
Figure 4 is a perspective view of the assembly manner of said two-part damper pin to the damper.
Figure 5 is a perspective view of the two-part damper pin.
Figure 6 is a normal and cross-sectional side view of said two-part damper pin.
Figure 7 is a detailed cross-sectional view of the interconnection of the sleeve and rod composing the two-part damper pin.
Figure 8 is a cross-sectional view of the full assembled form of the sleeve and rod.

[0013] The parts in said figures are individually enumerated as following.

Washing machine (A)
Machine body (1)
Tub (2)
Damper (3)
Connection lug (4, 4')
Two-part damper pin (5)
Sleeve (6)
Rod (7)
Damper slot (8)
Drum (9)
External surface (61)
Interior (62)
Flange (63)
Cut (64)
Protrusion (65)
Protrusion (66)
Front part (71)
Hole (72)
Rear part (73)
Rib (74)
Flange (75)
Flange (77)
Recession (78)

Description of Invention

[0014] The subject washing machine (A) as illustrated in Figure 1 and Figure 2 comprises a machine body (1); a tube (2) within said body; at least one damper (3) connected to the connection lugs (4, 4') on the body (1) and tub (2); and damper pin (5) providing the connection of one each end of the damper (3) to each connection lugs (4, 4').

[0015] Figure 3 illustrates from on side how a damper pin (5) is placed on the connection lugs (4, 4') and on the slot (8) provided at one end of the damper (3). In this connection manner illustrated in Figure 4 (the connection lug (4) is not shown), the below detailed sleeve (6) and the rod (7) within said sleeve (6) of the damper pin (5) are together placed on the connection lugs (4, 4') and damper slot (8).

[0016] As indicated above, the damper pin (5) as illustrated in figures 5 and 6 is composed of a sleeve (6) and a rod (7) within said sleeve. The external surface (61) and the interior (62) of said sleeve is of a cylindrical form. The interior (62) is of a structure that extends in a lengthwise manner throughout in the sleeve (6). A flange (63) is provided at one end of the sleeve (6) so as to extend outwardly and surround the sleeve (6). At the other end of said sleeve (6) is provided at least one cut (64), partitioning the sleeve (6) to a certain amount lengthwise. At the side provided with such cuts (64) and close to the tip are provided protrusions (65) on each part formed by said cuts (64), said protrusions being formed with the external surface (61) expanding outwards a certain amount and said protrusions surrounding the sleeve (6). In a similar manner, at the side provided with such cuts (64) and close to the tip are provided other protrusions (66) on each part formed by said cuts (64), said protrusions (66) being formed with the internal surface (62) expanding inwards a certain amount and surrounding the interior of said sleeve (6).

[0017] With respect to the rod (7), it has a cylindrical structure formed so as to be positioned on the internal surface (62) of the sleeve (6). One axially-extending hole (72) is provided on the front part (71) of the rod (7). And at the rear part (73) of the rod, at least one support rib (74) is positioned that is formed in a lengthwise manner. At the tip of the rear part (73) and on each rib (74) are formed at least one flange (75), producing a sidewise expansion and surrounding the rod (7). At least one recession (78) is provided at a portion close to the front part's (71) tip on the exterior of the rod (7) so as to correspond to each sleeve protrusion (66). A flange (77) formed with a small diameter augmentation is provided around the tip portion of the rod (7) and in front of the recession (78). The foremost tip of the rod (7) preceding the flange is conical to a certain extent, narrowing towards the tip. The function of this conical formation is to facilitate the rod's (7) assembly to the sleeve (6) by providing a centering guide.

[0018] In order to assembly the damper pin (5) to the connection lugs (4, 4') and damper slot (8), first the sleeve (6) of the pin (5) is assembled to the connection lugs (4, 4') and damper slot (8). In a second step, the side accommodating the rod (7) flange (77) is inserted into the interior (62) of the sleeve (6) from the side accommodating the sleeve flange (63) (as illustrated in Figure 7). Since the diameter of the rod (7) flange (77) is larger than the diameter of the sleeve (6) interior (62) so as to allow a fast insertion of the rod's (7) tip, during this first assembly the rod's (7) tip first is leaned on the interior (62), and

as long as the rod (7) is kept pushed, the rod's (7) tip advances and with each protrusion (66) settling into the respective recession (78) (illustrated in Figure 8), the assembly is completed. In this manner, thanks to the flange (77) provided on the rod (7), any spontaneous removal of the rod (7) from the sleeve is avoided.

[0019] Any further advancement of the sleeve (6) is avoided by means of the flange (63) leaning against the side surface of the connection lug (4). And any further advancement of the rod (7) is ensured by means of the rod flange (75) leaning against the side surface of the flange (63). With the rod (7) becoming entirely settled into the interior (62), the inward flexion and the removal of the sleeve (6) from the connection lugs (4, 4') and slot (8) is avoided. Even with the lugs (4, 4') and slot (8) becoming jammed between the flange (63) and conical protrusions (65), not only the radial displacement of the damper pin (5), as was indicated above, but also the axial displacement is blocked. In the backward displacement of the sleeve (6) together with the rod (7), the protrusions (65) lean against the lateral surface of the connection lug so that any unintentional removal of the damper pin (5) from the slot (8) and lugs (4, 4') is avoided.

Claims

1. A washing machine (A) comprising a machine body (1); a tube (2) within said body; at least one damper (3) connected to the connection lugs (4, 4') on the body (1) and tub (2); and damper pin (5) consisting of a sleeve (6) and a rod (7) within said sleeve and providing the connection of each connection lug (4, 4') to the slot (8) provided at each end of the damper (3), wherein
   the external surface (61) and the throughout interior (62) of said sleeve have cylindrical formations; said cylindrical rod (7) is placed into said interior (62); at least one cut (64) is formed on one end of the sleeve (6) so as to partition said sleeve (6) to a certain lengthwise extent; protrusions (65) expanding outwardly in a conical manner to a certain extent are provided on each flexible part produced by said cuts (64); and an outwardly-expanding flange (63) is provided on the other end of the sleeve (6); **characterized in that**
   protrusions (66), which the internal surface (62) produces by becoming narrowed inwards to a certain amount, are provided at the tip of each part formed by said cuts (64) on said sleeve (6); said rod (7) comprises at a side close to the tip of its front part (71) on its exterior at least one recession (78) corresponding to each sleeve protrusion (66);
   said protrusions (65) and flange (63) are leaned against the outfacing lateral surfaces of lugs (4, 4') and at least one protrusion (66) at the sleeve (6) becomes introduced or settled into the recession (78) at the rod (7), when the damper pin (5) is assembled to the connection lugs (4, 4') and damper slot (8).

2. A washing machine (A) according to Claim 1, wherein said rod (7) comprises at least one support rib (74) formed in a lengthwise manner at the rear part (73) thereof.

3. A washing machine (A) according to Claim 1, wherein a flange (77) is formed with a small diameter augmentation around the tip portion of said rod (7) in front of the recession (78).

4. A washing machine (A) according to Claim 1, wherein the foremost tip portion of said rod (7) is conical to a certain extent so as to become narrower toward the end.

5. A washing machine (A) according to Claim 1, wherein the diameter of the rod flange (77) is kept larger than the diameter of the sleeve's (6) internal surface (62) so as to ensure a tight insertion of the rod's (7) tip, in order to assemble together said sleeve (6) and rod (7), and to provide a more sound structure against damper loads.

6. A washing machine (A) according to Claim 1, wherein said rod (7) comprises on its front part (71) one hole (72) extending along the rod axis (7).

7. A washing machine (A) according to Claim 1, wherein at least one flange (75), which expands outwardly and surrounds said rod (7) is provided at the tip of the rod's (7) rear part (73).

8. A washing machine (A) according to Claim 7, **characterized in that** said rod flange (75) has a formation to lean against said sleeve flange (63).

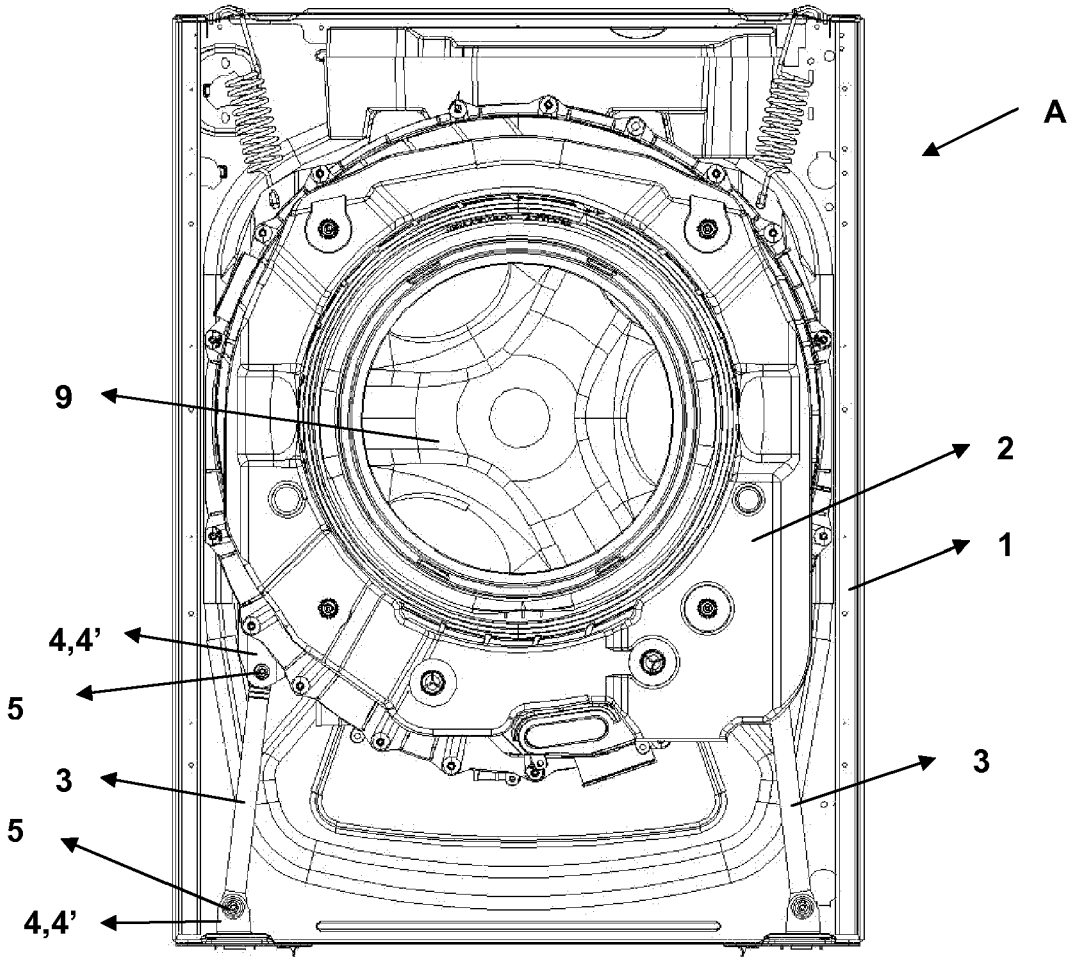


Figure – 1

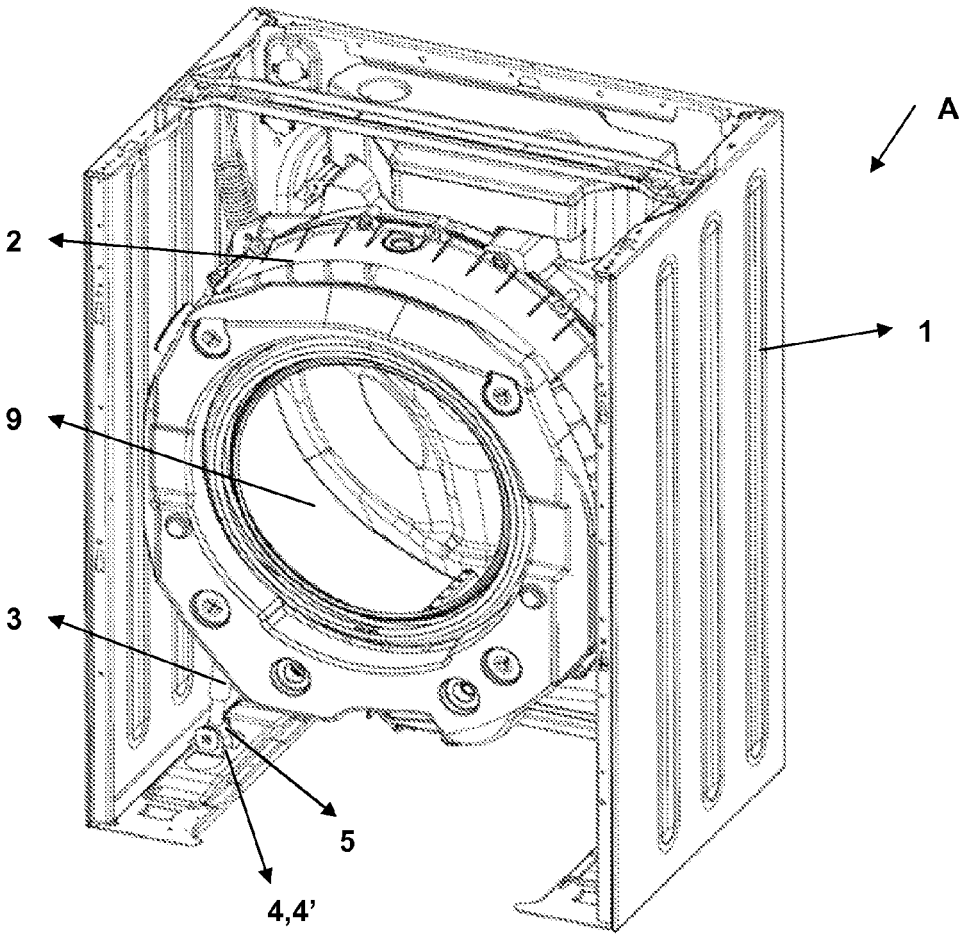
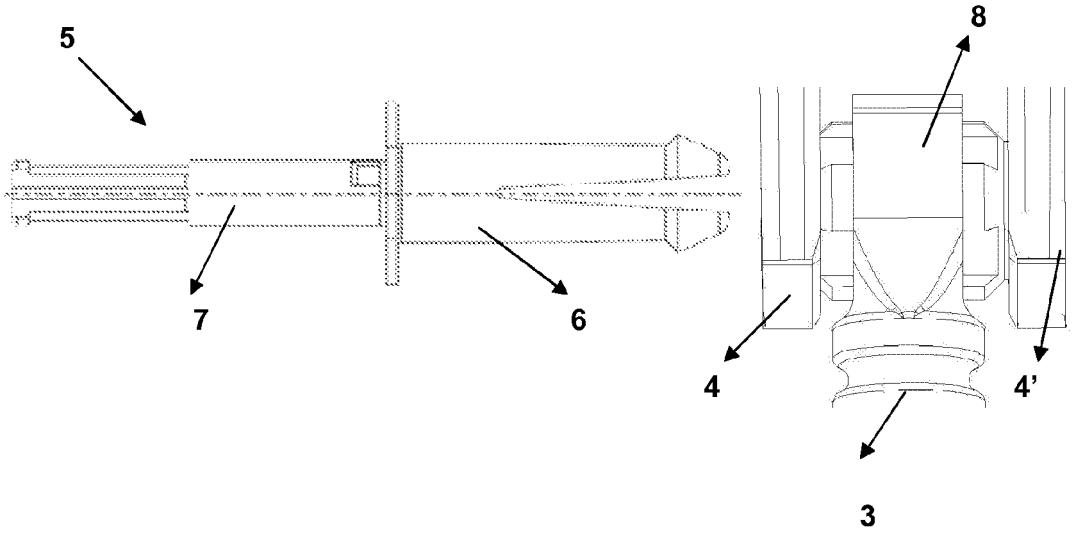


Figure – 2



Figure– 3

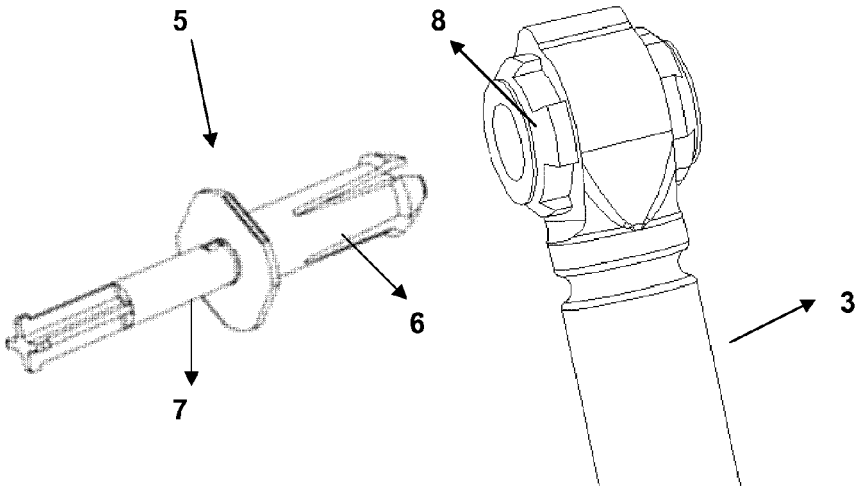


Figure – 4

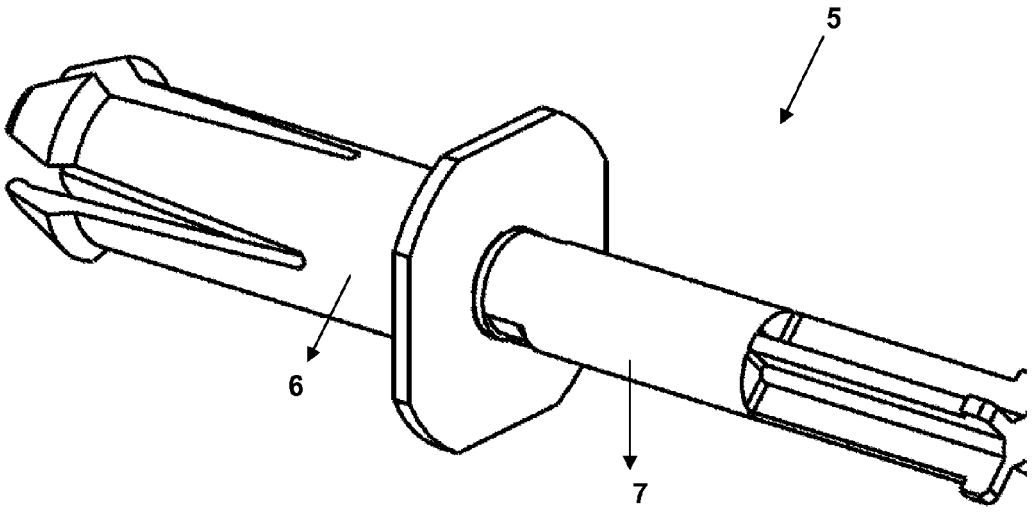


Figure – 5

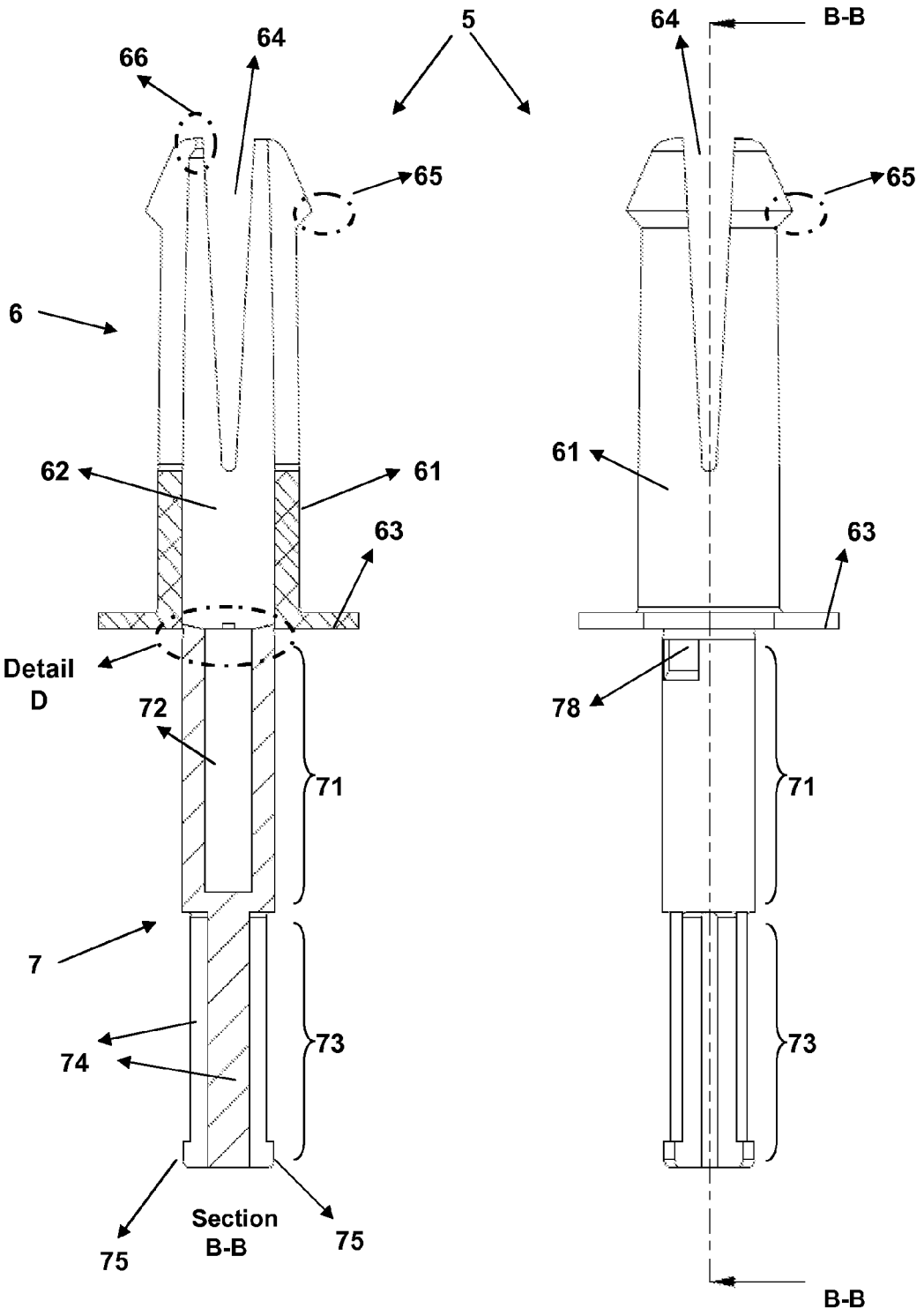

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Figure – 6

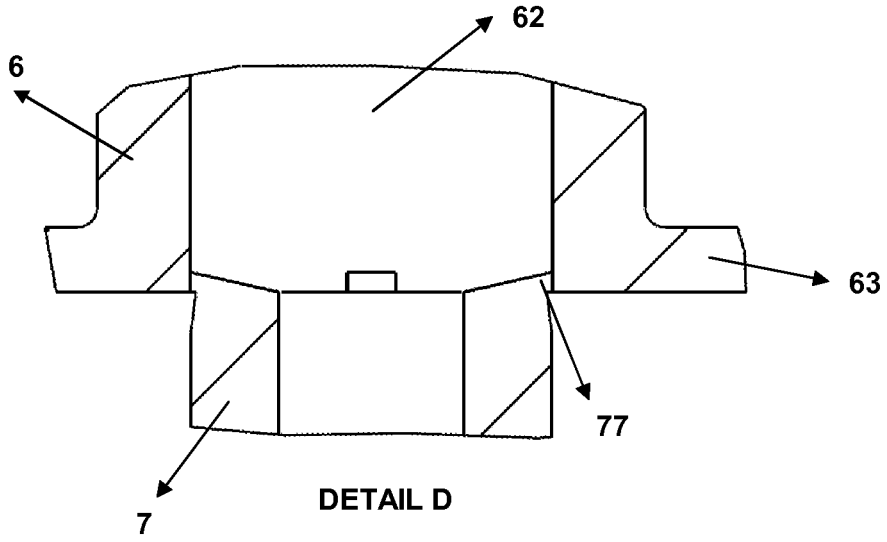

Figure – 7

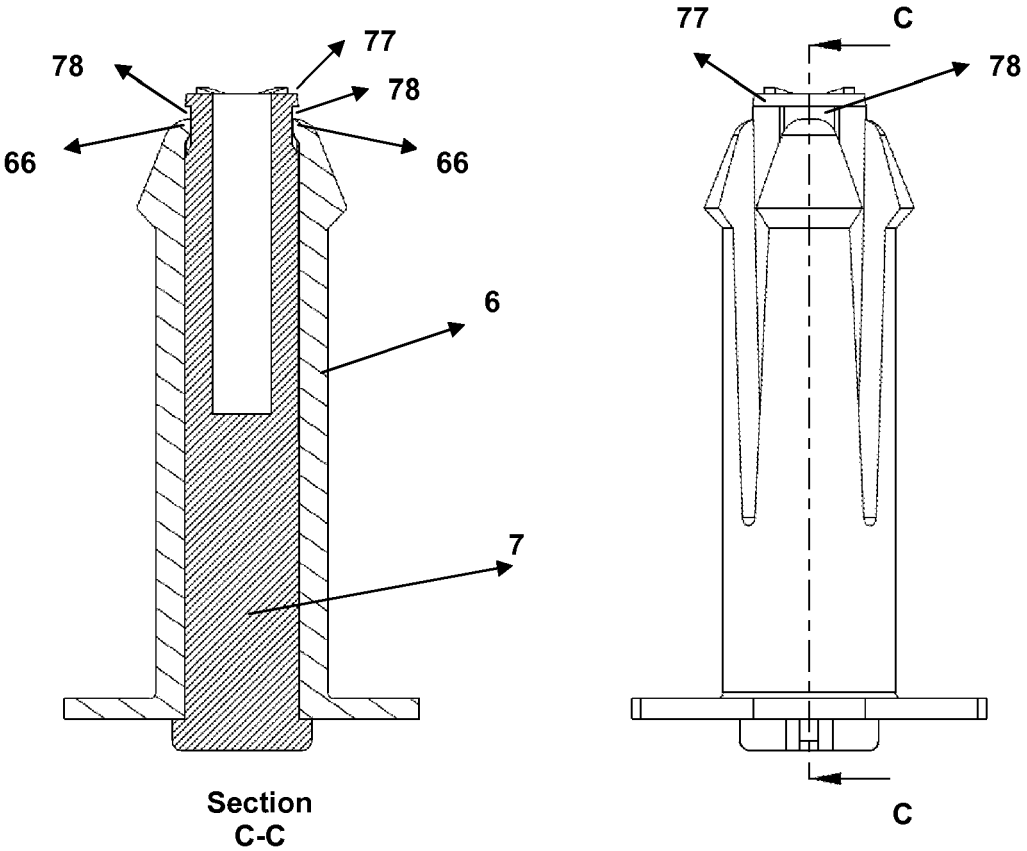

Figure - 8

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EUROPEAN SEARCH REPORT

Application Number
EP 07 12 4183

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A,D	DE 10 2005 008239 A1 (SUSPA HOLDING GMBH [DE]) 15 September 2005 (2005-09-15) * paragraphs [0020] - [0026], [0041] - [0045]; figures *	1-8	INV. D06F37/20
A	FR 482 853 A (ROUET HENRI PIERRE) 2 May 1917 (1917-05-02) * page 1, lines 33-58; figures *	1-8	
A	WO 2005/118937 A (LG ELECTRONICS INC [KR]; YOON SEONG NO [KR]; LEE BONG SANG [KR]; GONG) 15 December 2005 (2005-12-15) * the whole document *	1-8	
A	EP 0 217 234 A (ZANUSSI ELETTROMECC [IT]) 8 April 1987 (1987-04-08) * the whole document *	1-8	
A,D	US 2005/183472 A1 (CHOI KANG M [KR] CHOI KANG MO [KR]) 25 August 2005 (2005-08-25) * the whole document *	1-8	

TECHNICAL FIELDS SEARCHED (IPC)
D06F
F16B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	23 March 2009	Clivio, Eugenio

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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23-03-2009

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 102005008239 A1	15-09-2005	AT 407250 T	15-09-2008
		CN 1926276 A	07-03-2007
		EP 1740751 A1	10-01-2007
		WO 2005085510 A1	15-09-2005
FR 482853 A		NONE	
WO 2005118937 A	15-12-2005	DE 112005000095 T5	19-04-2007
		US 2007204659 A1	06-09-2007
EP 0217234 A	08-04-1987	DE 3671054 D1	13-06-1990
		IT 1187298 B	23-12-1987
US 2005183472 A1	25-08-2005	KR 20050086207 A	30-08-2005

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 2005183472 A **[0003]**
- DE 102005008239 **[0004]**