



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
09.02.2011 Bulletin 2011/06

(51) Int Cl.:
D06F 37/26 (2006.01)

(21) Application number: **10170843.6**

(22) Date of filing: **27.07.2010**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO SE SI SK SM TR
Designated Extension States:
BA ME RS

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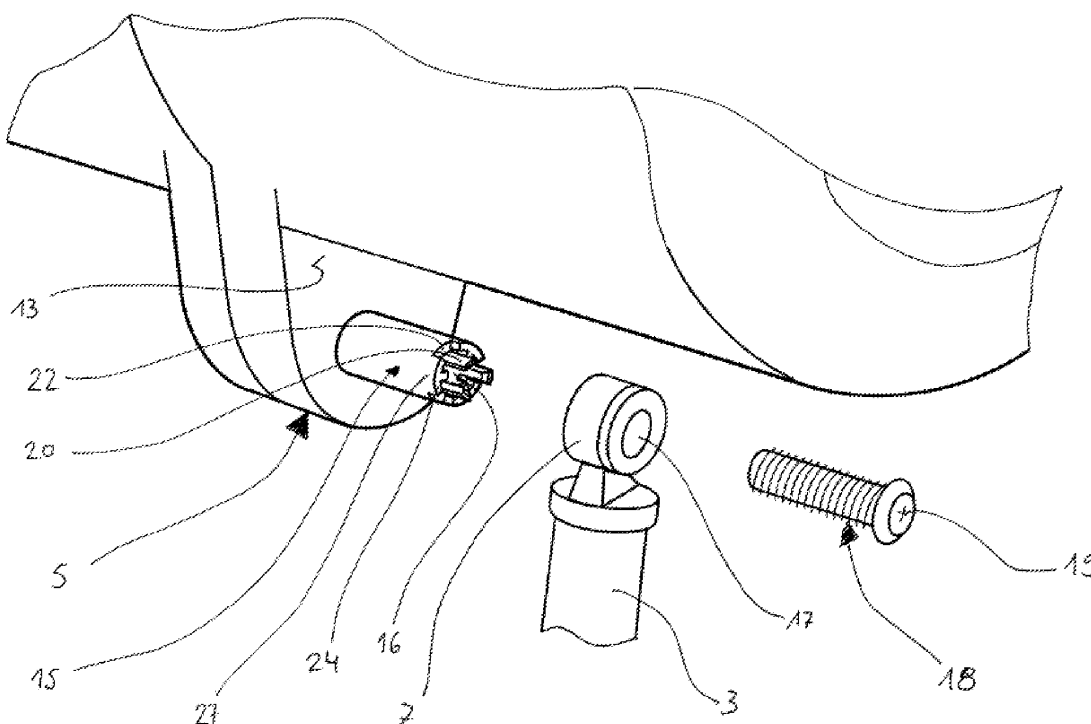
(30) Priority: **07.08.2009 ES 200930574**

(54) **Washing machine comprising a supporting element and a suspension device**

(57) The invention relates to a washing machine with a washing tub 1 comprising: at least one supporting element 5, to which a fixing arm 7 of a suspension device 3 is fixable, wherein said supporting element 5 and said fixing arm 7 define a set comprising a first element 5, 7 and a second element 5, 7 wherein said first element 5, 7 has a joining rod 5 with a rod end 27, and wherein said second element 5, 7 has a mounting perforation 17 with said joining rod 15 led through said mounting perforation

17 and said rod end 27 protruding from said mounting perforation 17, and wherein a securing member 18 is provided such that it is connectable to the rod end 27 to secure a joint between the first element 5, 7 and the second element 5, 7. Said rod end 27 has at least a pin 20 which is deformable by the securing member 18, and that, in a state in which the securing member 18 is connected to the rod end 27, extends beyond the mounting perforation 17 section, thereby blocking a demounting of said joint.

FIG.3



Description

[0001] The present invention relates to a washing machine with a washing tub comprising: at least one supporting element, to which a fixing arm of a suspension device is fixable, wherein said supporting element and said fixing arm define a set comprising a first element and a second element wherein said first element has a joining rod with a rod end, and wherein said second element has a mounting perforation with said joining rod led through said mounting perforation and said rod end protruding from said mounting perforation, and wherein a securing member is provided such that it is connectable to the rod end to secure a joint between the first element and the second element.

[0002] Generally, washing machine washing tubs that are made from plastic are provided on their outer perimeter with fixing points where device components and/or balancing weights can be fixed.

[0003] Thus, a washing machine of the type with a washing tub that has at least one supporting element to which a fixing arm of a shock absorber or suspension device is fixable for absorbing the vibrations of the washing tub during the washing process and suspend the washing tub is known from EP 0 933 463 A1. The supporting element of the washing tub has a connecting bolt that is led through a fixing notch or a mounting perforation of the fixing arm of the device. Moreover, a fixing screw is provided as a securing member to fasten the fixing arm to the connecting bolt. Specifically, a plastic bushing is interposed between the fixing notch and the connecting bolt to make this secure. The plastic bushing has an annular rim that radially overlaps both the fixing arm of the device and partially the connecting bolt. To secure the device in the washing tub, the fixing screw is screwed into a through-hole in the hollow cylindrical connecting bolt, through which the head of the screw fastens the fixing arm of the device to the supporting element of the washing tub through the annular rim of the plastic bushing. The fixing or fastening of the device to the washing tub is thus realized with numerous components, in other words, with a costly assembly of a number of separate components.

[0004] The object of the present invention is to provide a washing machine with a washing tub to which the suspension device can be fixed with an assembly technique that is easy and reliable.

[0005] The object is achieved with a washing machine with a washing tub comprising: at least one supporting element, to which a fixing arm of a suspension device is fixable, wherein said supporting element and said fixing arm define a set comprising a first element and a second element wherein said first element has a joining rod with a rod end, and wherein said second element has a mounting perforation with said joining rod led through said mounting perforation and said rod end protruding from said mounting perforation, and wherein a securing member is provided such that it is connectable to the rod end

to secure a joint between the first element and the second element. Further, said rod end has at least a pin which is deformable by the securing member, and that, in a state in which the securing member is connected to the rod end, extends beyond the mounting perforation section, thereby blocking a demounting of said joint.

[0006] Preferred embodiments of the present invention are recited in the dependent claims as well as in the subsequent description.

[0007] According to the invention the rod end has at least one pin that is deformable by the securing member, and that in a state in which the securing member is connected to the rod end, extends beyond the mounting perforation section, thereby blocking its removal between the fixing arm and the supporting element. In this way, no additional separate components need be used for the fixing or fastening of the suspension device to the washing tub; specifically, washers between the fixing arm and the securing member for fixing or fastening the suspension device that takes place easily with respect to the assembly technique with a reduced number of components. Moreover, for the purpose of customer service, the retaining joint with the pin can easily be checked from the outside, or can be loosened with a tool, and can be reassembled using a washer if necessary.

[0008] According to the invention, placement of the joining rod and the mounting perforation on the two elements defined by the supporting element and the fixing arm is a matter of choice. Yet it is a preferred embodiment of the invention wherein the joining rod is assigned to the supporting element and the mounting perforation is assigned to the fixing arm.

[0009] To further ensure that the suspension device is fixed to the washing tub without any undue play, it is preferable if the fixing arm of the device is superimposed in a press fit on the joining rod. Thus, for example, the external diameter of the joining rod can be slightly larger than the diameter of the mounting perforation into which the joining rod is introduced.

[0010] In the assembly configuration, the supporting element has a stop element, and in the state in which the device is fixed to the washing tub by the joining rod, the fixing arm is between the stop element and the pin from the rod end. The stop element can be any wall or any element that can limit the movement of the fixing arm in the direction of insertion. The pin in turn limits the movement of the fixing arm in the direction opposite to that of insertion, i.e. during removal, the relative motion of the fixing arm of the device and the supporting element will be reduced to rotational movement of one with respect to the other with the joining rod as the axis of rotation.

[0011] With respect to the technique used, it is preferable for the joining rod of the supporting element to be configured integrally as a single component with the washing tub. In this case, it is especially preferred if the washing tub is formed together with the joining rod of the supporting element as a single component by injection-molding from a uniform plastic material. Especially ad-

vantageous is the formation from polypropylene plastic or polypropylene mixed with talc and another plastic, but which maintains sufficient flexibility so that the pins of the rod do not separate from the rod end.

[0012] The shape of the rod end has a bottom surface in which a rod orifice is formed and from which projects at least one pin. The spacing between the bottom surface and the stop element is preferably the same distance as the width of the fixing arm so that there is no relative movement between the stop element and the pin once it is bent. The bent pin is preferably bent over the bottom surface.

[0013] The securing member is connectable to the rod orifice from where the pin can be bent without spacing problems.

[0014] The rod end has at least one turret that is shorter than the pin that projects from the bottom surface on the side of the pin, and which limits the movement of the securing member in its insertion into the rod orifice so that it does not crush or break the pin.

[0015] The rod end has two turrets, one on each side of the pin, directing the bending movement of the pin in its deformation and limiting the movement of the pin so that it reaches the required mounting position.

[0016] In relation to this type of assembly, at least one pin is arranged at the edge of the rod orifice and is bent by the securing member outwards from the orifice center when the member is connected to the rod orifice.

[0017] The securing member has a head that rests on the turrets when connected to the rod orifice, thereby bending the pin between the turrets.

[0018] In an advantageous improvement, the rod end has at least three pins around the rod orifice that are sufficient to block the movement of the fixing arm in the direction of removal. Nevertheless, one or two pins could be sufficient. If there are two or more pins, it is preferable for them to be spaced angularly as far from each other as possible, thus covering a greater radius for blocking removal of the fixing arm in the connecting rod.

[0019] An especially easy way to ensure this with respect to the assembly technique is provided if the securing member is a screwable screw in the rod orifice.

[0020] The Figures of the attached drawing are described briefly in the following, to be referred to in detail to describe a preferred embodiment of the present invention.

[0021] In the drawing, there are shown:

Fig. 1 A cutaway perspective view of a washing tub with a device that has been mounted in same;

Fig. 2 A perspective view of the washing tub with the device mounted in same according to Figure 1;

Fig. 3 A detailed view of Figure 1;

Fig. 4 A detailed perspective view of the supporting element of the washing tub as in Figure 1;

Fig. 5 A detailed side view of the supporting element of the washing tub as in Figure 4;

Fig. 6 A cross-sectional view of the supporting element of the washing tub as in Figure 5;

Fig. 7 A detailed side view of the supporting element of the washing tub with the device mounted in same;

Fig. 8 A cross-sectional view of the supporting element of the washing tub with the device mounted in same as in Figure 6.

Figure 1 shows a cutaway view in perspective of a washing tub or barrel 1, two devices 3 that in this case are shock absorbers, and two securing members 18 such as screws with head 19 for fixing the shock absorbers to the washing barrel. The washing tub 1 shown is manufactured as a single component from polypropylene plastic with talc by injection molding with supporting elements 5 formed in same. The fixing arm 7 of device 3 is fixable to each supporting element 5. The supporting elements 5 are configured as joining rods 15 used as balance beams that project from stop element 13 in washing tub 1, which are insertable into mounting perforations 17 of fixing arm 7. According to the definition given above, the embodiment shown defines the supporting element 5 to be a first element 5 carrying joining rod 15, and the fixing arm 7 to be the second element carrying the mounting perforation 17.

Figure 2 shows a perspective view of the mounted elements of Figure 1, washing tub 1 with shock absorbers 3 mounted on supporting elements 5 and securing members 18 fixed by screws to supporting elements 5.

Figure 3 shows a magnified view of the portion of Figure 1 in which a supporting element 5 with its joining rod 15 that projects from stop element 13 of washing tub 1, and which is perforated with rod orifice 16, is seen in more detail. At the free end, joining rod 15 has bottom surface 22 from which project three pins 20 arranged at the edge of rod orifice 16 and three turrets 24 arranged between pins 20. In a pre-assembly position, fixing arm 7 of suspension device 3 is shown with its mounting perforation 17 that is insertable into joining rod 15, and securing member 18 with its head that is screwable into rod orifice 16.

Figure 4 shows a magnified view of supporting element 5 from Figure 3 in which its joining rod 15 that projects from stop element 13 of washing tub 1 and which is perforated with a rod orifice 16 is seen in more detail. At the free end of rod 27, joining rod 15 has a bottom surface 22 from which project three

pins 20 with bevel 21 in their tips arranged at the edge of rod orifice 16, and three turrets 24 arranged between pins 20.

Figure 5 shows a side view of supporting element 5 from Figure 4 in which joining rod 15 that projects from stop element 13 of washing tub 1 is seen. At the free end of rod 27, joining rod 15 has a bottom surface 22 from which project three pins 20 with bevel 21 in their tips arranged at the rim of rod orifice 16, and three turrets 24 arranged between pins 20.

Figure 6 shows a cross-sectional view of supporting element 5 from Figure 5 in which joining rod 15 that projects from stop element 13 of washing tub 1 and which is perforated with a rod orifice 16 is seen. At the free end of rod 27, joining rod 15 has a bottom surface 22 from which project three pins 20 with bevel 21 in their tips arranged at the edge of rod orifice 16, and three turrets 24 arranged between pins 20.

Figure 7 shows a side view of supporting element 5 from Figure 4 in which fixing arm 7 of device 3 is inserted into joining rod 15 until it contacts stop element 13 of washing tub 1. Securing member 18 is inserted into the free rod end that protrudes from fixing arm 7 until its head 19 rests on turrets 24, bending pins 20 outwards such that the tips of the pins extend beyond the diameter of the mounting perforation of the fixing arm and block its removal. During the insertion process, head 19 of securing member 18 comes into contact with the tip of pin 20 where it meets bevel 21 that faces it to facilitate the pin sliding by the bevel and bending correctly outwards from the rod orifice. Pins 20 have a width equal to or slightly less than the spacing between turrets 24 so that the rotation of the head does not drag against them while rotating, which could produce incorrect pin bending.

Figure 8 shows a side cross-sectional view of supporting element 5 in which fixing arm 7 of device 3 is inserted into joining rod 15 until it contacts stop element 13 of washing tub 1, as in Figure 7. Mounting perforation 17 of the fixing arm has silent block 23 made of rubber that contacts joining rod 15 to reduce the noise that can be produced by friction. Securing member 18 is inserted into the free end of rod 27 that protrudes from fixing arm 7 until its head 19 rests on turrets 24, bending pins 20 outwards such that the tips of the pins extend beyond the diameter of the mounting perforation of the fixing arm and block its removal. During the insertion process, head 19 of securing member 18 comes into contact with the tip of pin 20 where it meets bevel 21 that faces it to facilitate the pin sliding along the bevel and bending correctly outwards from the rod orifice.

LIST OF REFERENCE NUMERALS

[0022]

5	1	Washing tub
	3	Suspension device
	5	Supporting element
	7	Fixing arm
	13	Stop element
10	15	Joining rod
	16	Rod orifice
	17	Mounting perforation
	18	Securing member
	19	Head
15	20	Pin
	21	Bevel
	22	Bottom surface
	23	Silent block
	24	Turret
20	27	Rod end

Claims

- 25 1. Washing machine with a washing tub (1) comprising:

at least one supporting element (5), to which a fixing arm (7) of a suspension device (3) is fixable, wherein said supporting element (5) and said fixing arm (7) define a set comprising a first element (5, 7) and a second element (5, 7) wherein

said first element (5, 7) has a joining rod (15) with a rod end (27), and wherein said second element (5, 7) has a mounting perforation (17) with said joining rod (15) led through said mounting perforation (17) and said rod end (27) protruding from said mounting perforation (17), and wherein a securing member (18) is provided such that it is connectable to the rod end (27) to secure a joint between the first element (5, 7) and the second element (5, 7), **characterized in that** said rod end (27) has at least a pin (20) which is deformable by the securing member (18), and that, in a state in which the securing member (18) is connected to the rod end (27), extends beyond the mounting perforation (17) section, thereby blocking a demounting of said joint.
- 40 2. Washing machine according to claim 1, **characterized in that** the mounting perforation (17) of the fixing arm (7) is superimposed in a press fit on the joining rod (15).
- 45 3. Washing machine according to one of the preceding claims, **characterized in that** the supporting element (5) has a stop element (13), and the fixing arm

(7), in a state in which the suspension device (3) is fixed to the washing tub (1) at the joining rod (15), is arranged between the stop element (13) and the pin (20) of the rod end (27).

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4. Washing machine according to one of the preceding claims, **characterized in that** the joining rod (15) of the supporting element (5) is configured integrally and in one piece with the washing tub (1) as an injection moulding part of a plastic material. 10
5. Washing machine according to one of the preceding claims, **characterized in that** the rod end (27) has a bottom surface (22), on which a rod orifice (16) is made and from which the at least one pin (20) is projected. 15
6. Washing machine according to claim 5, **characterized in that** the rod end (27) has at least one turret (24) of a length shorter than the pin (20), which projects from the bottom surface (22) next to the pin. 20
7. Washing machine according to claim 6, **characterized in that** the rod end (27) has two turrets (24), one on each pin's side. 25
8. Washing machine according to one of the preceding claims, **characterized in that** the securing member (18) is connectable into the rod orifice (16). 30
9. Washing machine according to one of claims 5 to 8, **characterized in that** the at least one pin (20) is arranged at the edge of the rod orifice (16) and is bent by the securing member (18) outwards from the orifice centre when the member is connected into the rod orifice (16). 35
10. Washing machine according to one of claims 6 to 9, **characterized in that** the securing member (18) has a head (19) which, when it is connected into the rod orifice (16), rests on the turrets (24), thereby bending the pin (20) between the turrets (24). 40
11. Washing machine according to one of claims 5 to 10, **characterized in that** the rod end (27) has at least three pins (20) around the rod orifice (16). 45
12. Washing machine according to one of the preceding claims, **characterized in that** the securing member (18) is a screw screwable into the rod orifice (16). 50

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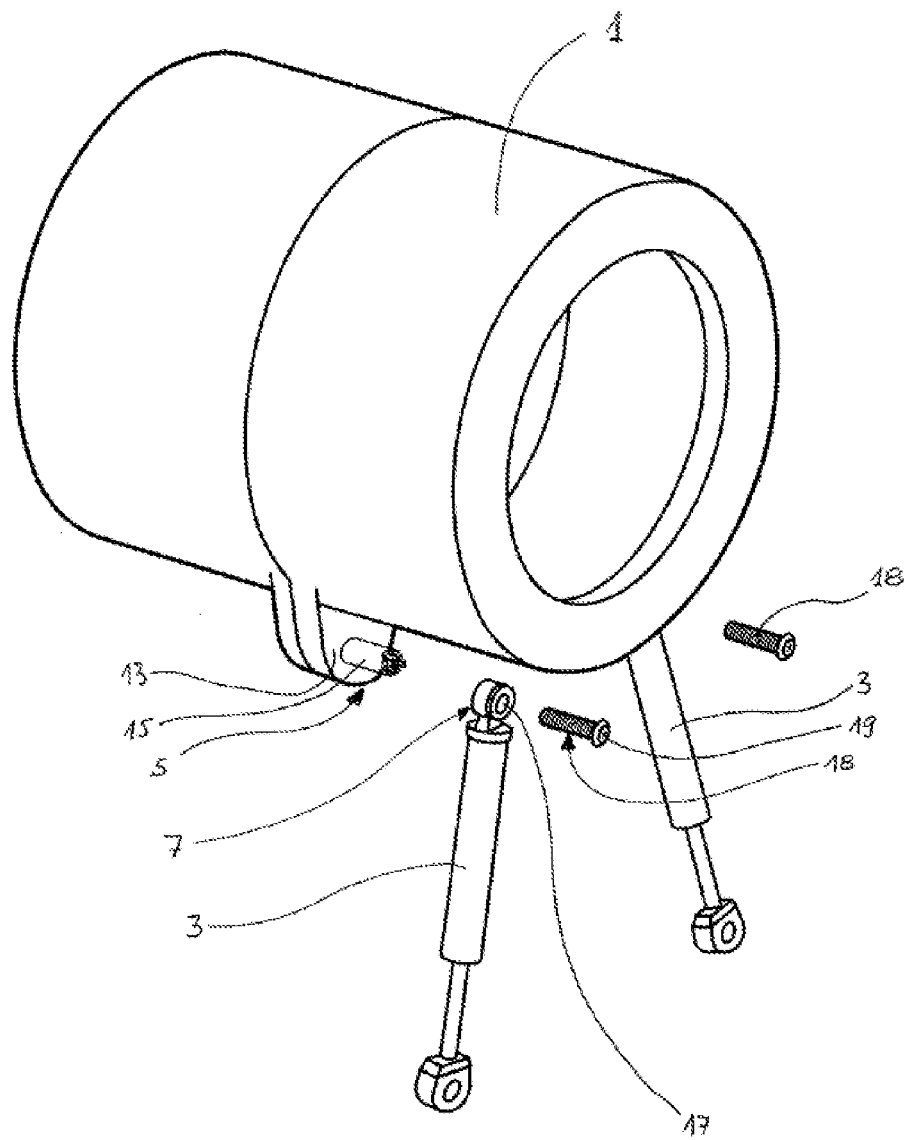


FIG. 1

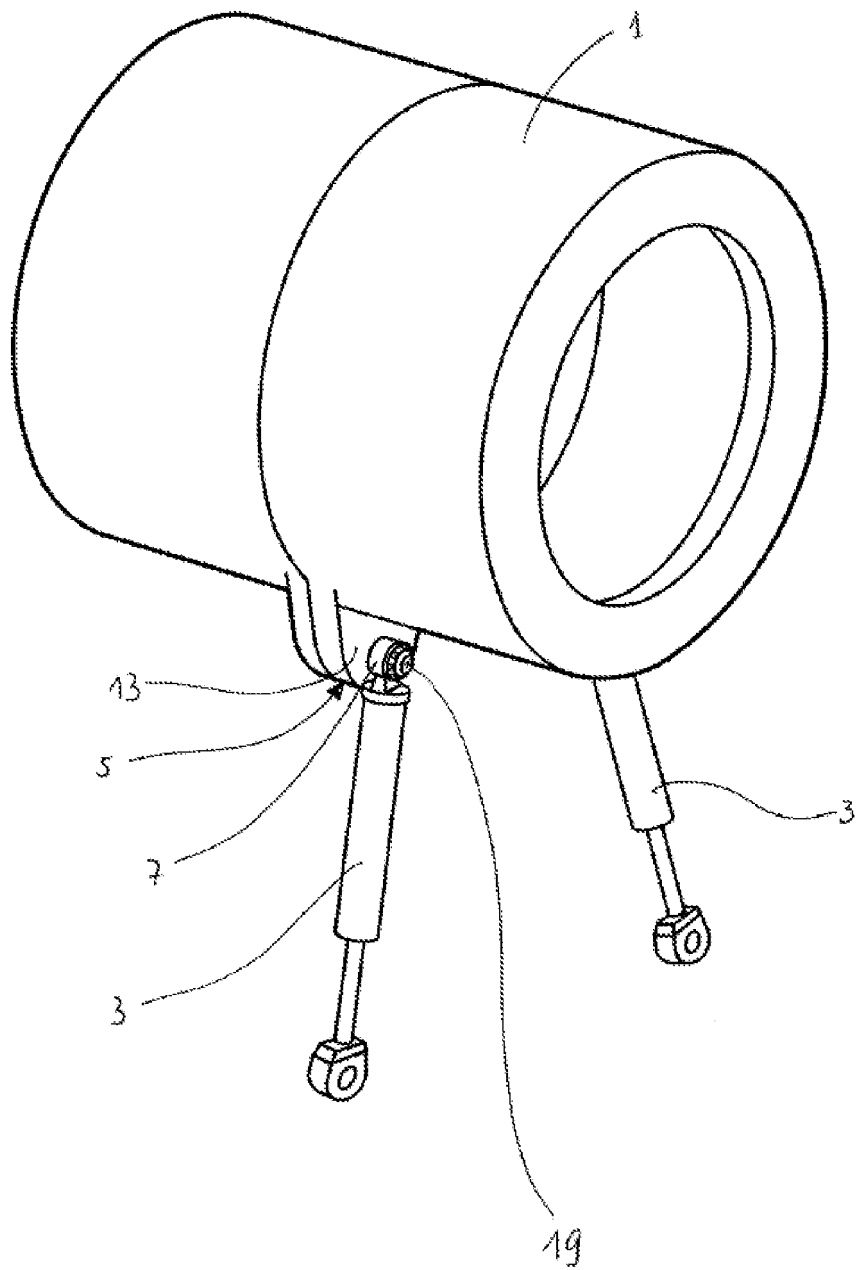
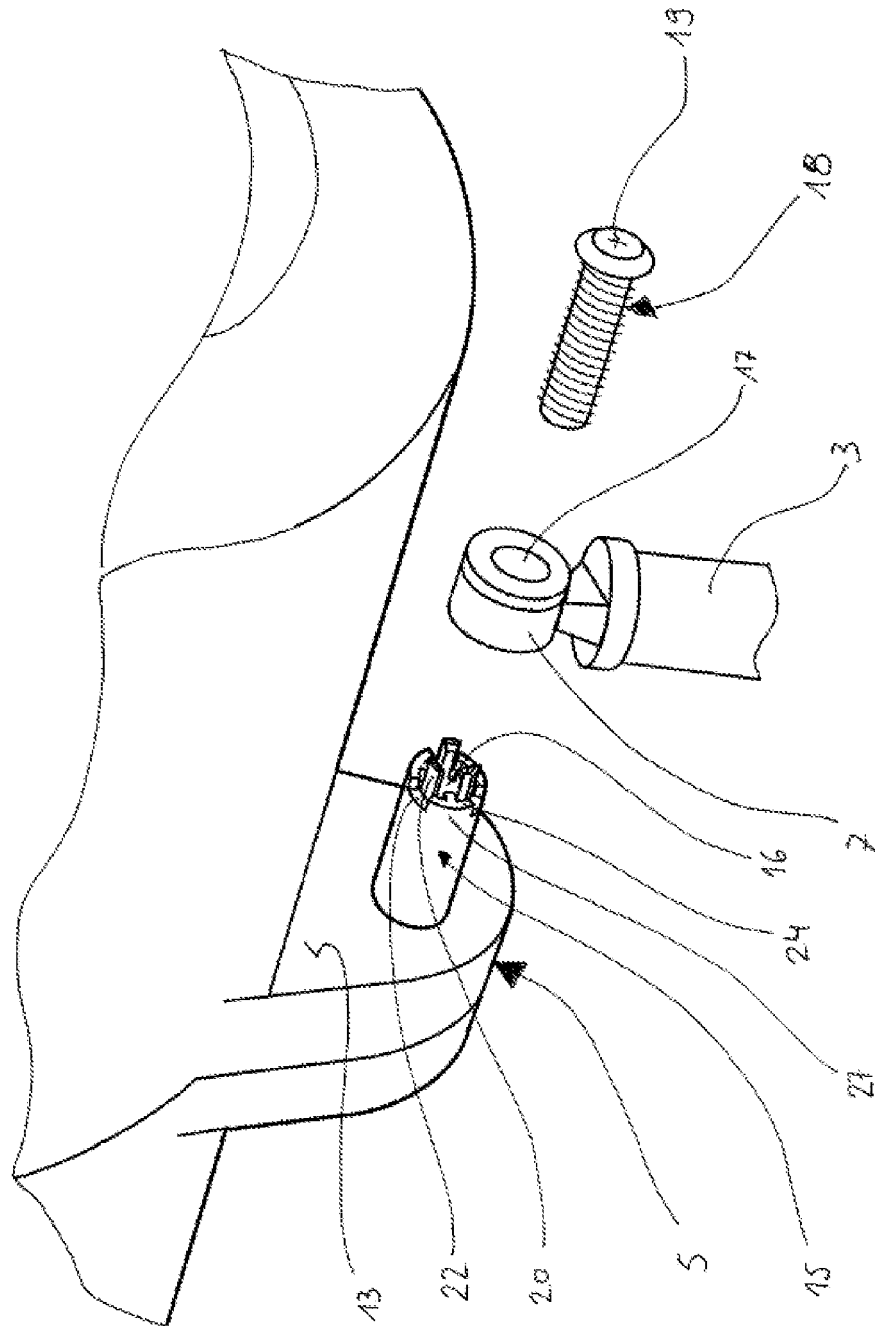


FIG. 2

FIG. 3



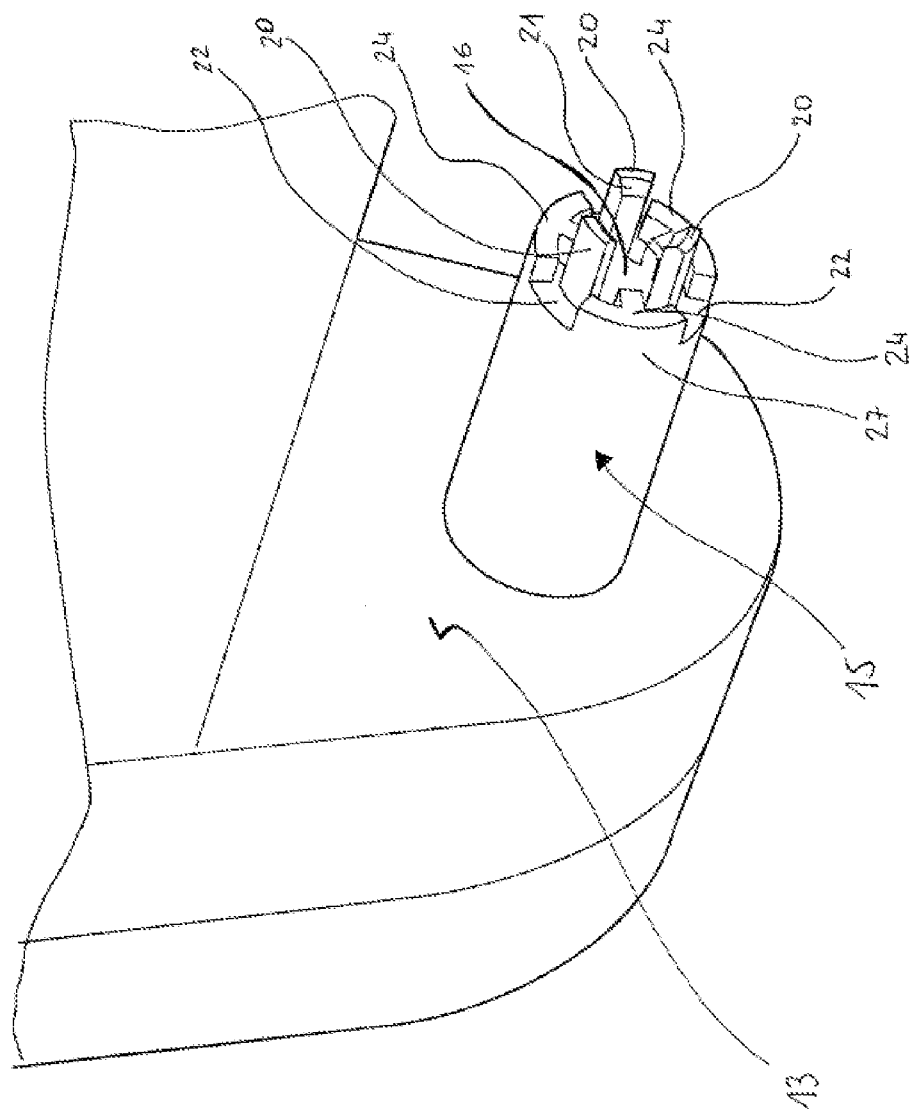
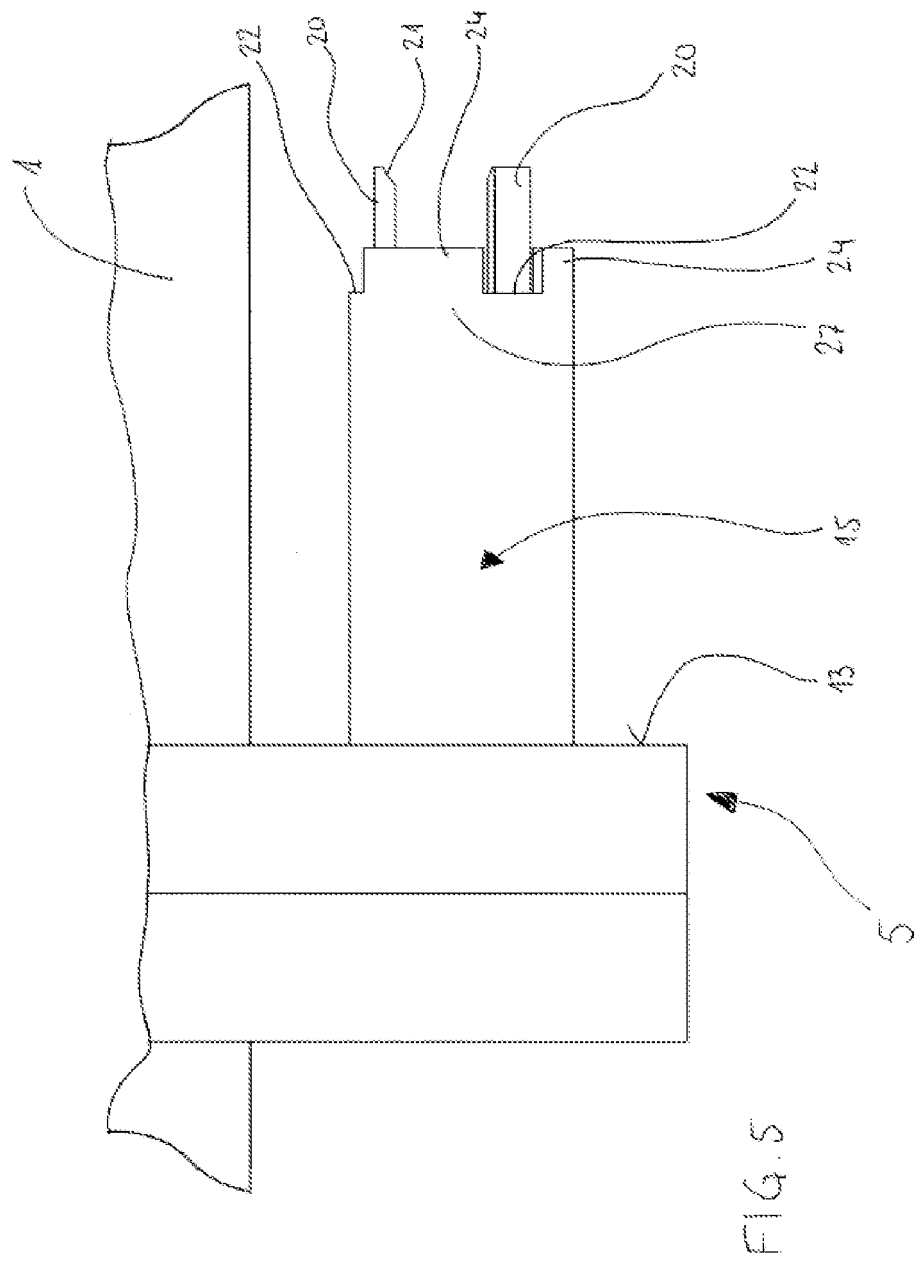


FIG. 4



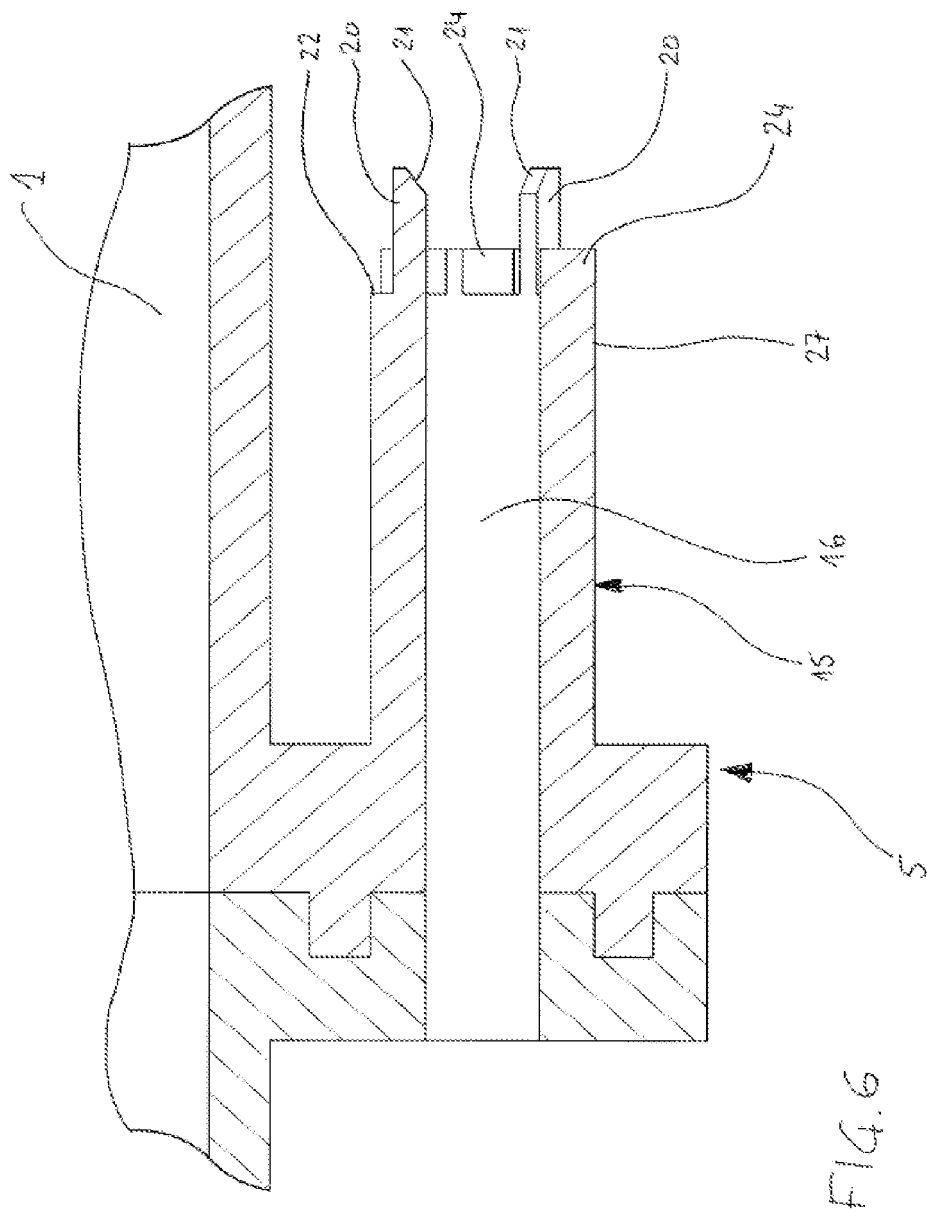


FIG. 6

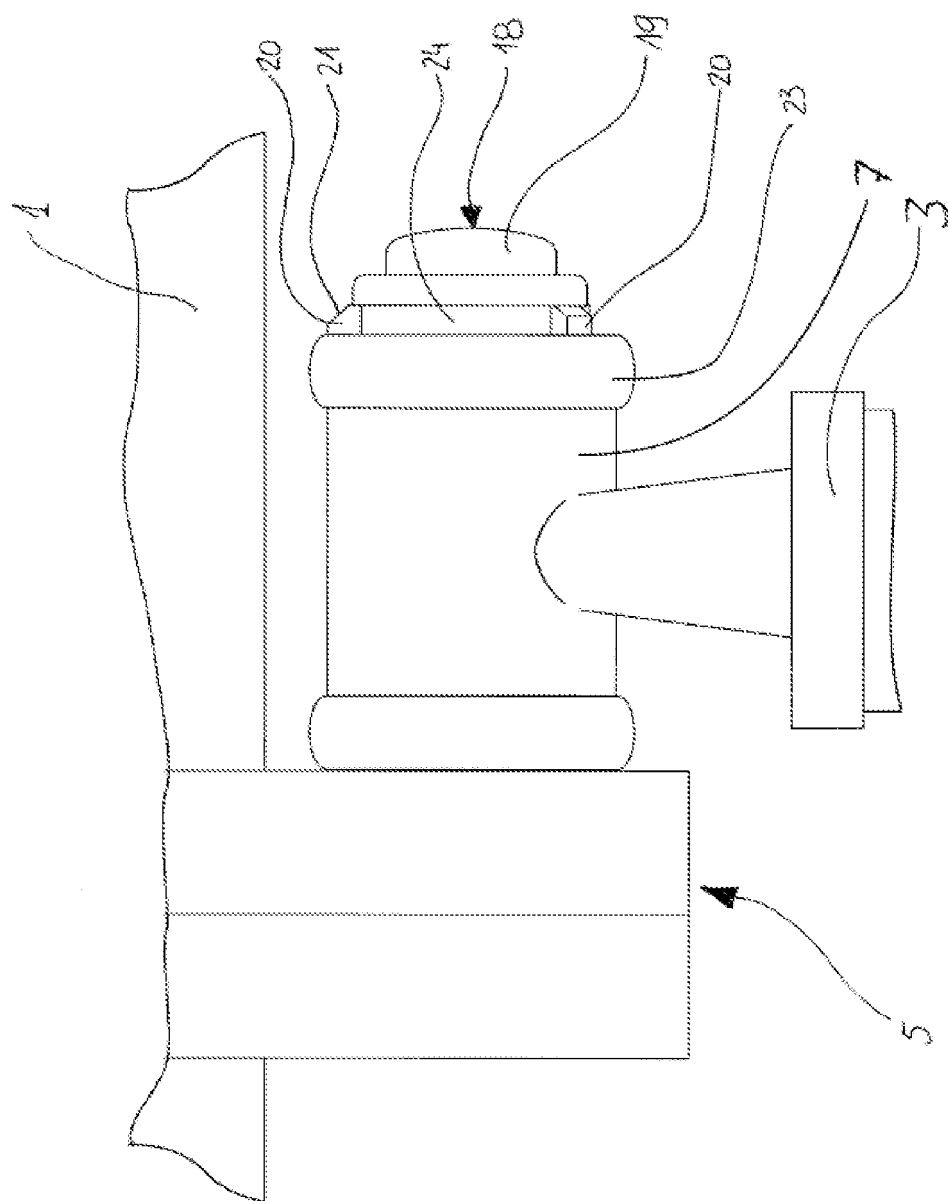
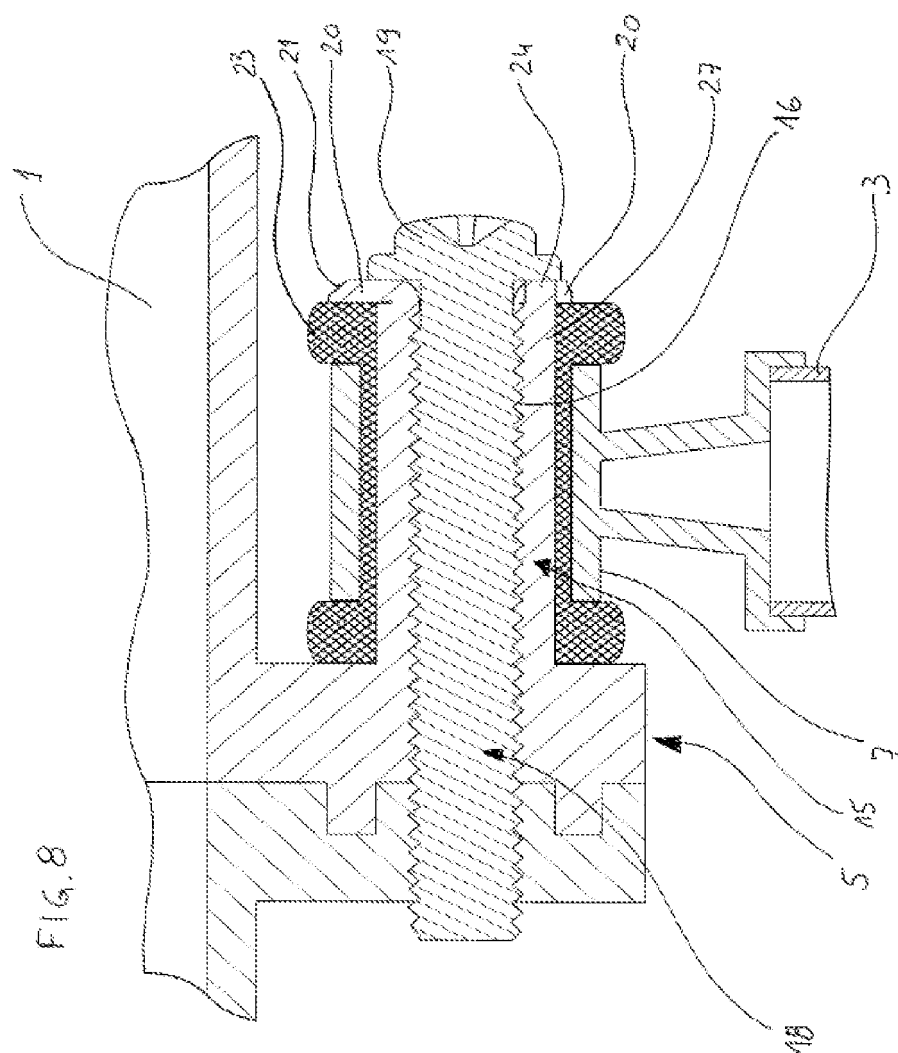


FIG. 7





EUROPEAN SEARCH REPORT

Application Number
EP 10 17 0843

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
			D06F
Place of search		Date of completion of the search	Examiner
Munich		20 October 2010	Hannam, Martin
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EPO FORM 1503 03/82 (P04/C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 10 17 0843

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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REFERENCES CITED IN THE DESCRIPTION

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