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(54) **Tank-basket group for a washing machine, washer dryer or dryer**

(57) A tank-basket group (3, 4, 13, 14) for a washing machine (1), washer dryer or dryer machine comprises a washing tank (3) having a support wall (12), a clothes basket (4) arranged inside the washing tank (3) and having a back wall (6) rotatably connected to the support wall (12) of the washing tank (3), a driving pulley (13) arranged outside the washing tank (3) and connected in a way such as to rotate with the back wall (6) of the clothes basket (4), a shaft (14) projecting from the back wall (6) of the basket (4) and rotatably received in a support seat (15) in the support wall (12), in which the shaft (14) has a back end (17) facing outwards from the tank (3) and connected to the pulley (13).

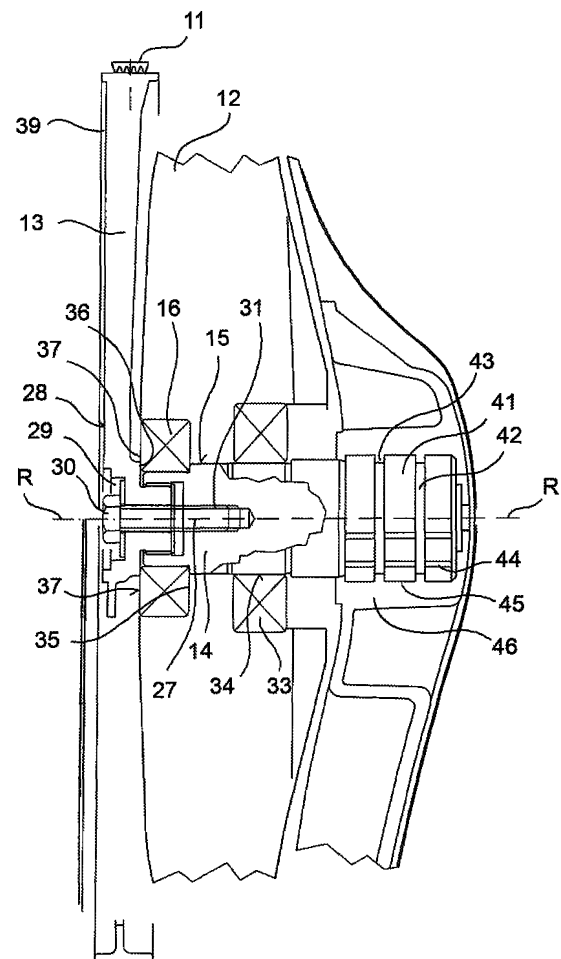


FIG. 2

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Description

[0001] The present invention refers to a tank-basket group for a washing machine, dryer or washer dryer.

[0002] Known washing machines comprise an outer housing, a washing tank arranged inside the outer housing and suitable for containing the lye, as well as a perforated clothes basket, arranged rotatably inside the washing tank and defining inside a space for containing the clothes to be washed. In front-loading washing machines and washer dryers, the clothes basket is usually made up of a back wall through which the basket is rotatably fixed inside the tank, a front wall defining a loading opening through which it is possible to access the inside of the basket and a side wall that is perforated so as to allow the exchange of lye between the washing tank and the inside of the basket.

[0003] In top-loading washing machines, the clothes basket is usually made up of a back wall and a front wall, through which the basket is rotatably fixed inside the tank, as well as a generally cylindrical and perforated side wall to allow the exchange of lye between the washing tank and the inside of the basket, in which the side wall defines a loading opening through which it is possible to access the inside of the basket.

[0004] In order to make the basket rotate inside the washing tank, known washing machines comprise a motor and a belt drive that transmits the rotary motion of the motor to a pulley arranged outside the washing tank and that is connected so as to rotate as a unit with the clothes basket.

[0005] Thanks to the rotational movement of the basket, the clothes are agitated and rolled around in the lye and the lye itself is pulled upwards in rotation by the basket from which it falls on the clothes which are completely soaked and softened, so as to transfer the impurities to the washing and rinsing lye.

[0006] However, in known washing machines and washer dryers, the rotary support of the clothes basket in the back wall of the washing tank, which must withstand high mechanical stresses in particular during the centrifuging of the clothes, and the positioning and connection of the pulley in the same position are very bulky so that a part of the depth of the outer housing cannot be exploited to contain clothes to be washed and/or dried.

[0007] The purpose of the present invention is therefore that of proposing a tank-basket group for washing machines, washer dryers or dryers having characteristics such as to reduce the bulk that cannot be used for containing clothes.

[0008] Within the main purpose, a particular purpose of the invention is that of proposing a tank-basket group having an overall depth that is smaller for the same depth of the clothes basket.

[0009] These and other purposes are achieved with a tank-basket group for washing machines, washer dryers or dryers, the tank - basket group comprising:

- a washing tank suitable for containing the lye and having a support wall,
- a clothes basket arranged inside the washing tank, the clothes basket having a back wall that is rotatably connected to the support wall of the washing tank,
- a driving pulley arranged outside the washing tank and connected so as to rotate together with the back wall of the clothes basket,
- a shaft projecting along a rotation axis from the back wall of the basket and rotatably received in a support seat formed in the support wall of the tank, said shaft having a back end facing outwards from the tank, in which
- the pulley comprises a male fixing portion projecting along a rotation axis towards the tank,
- the back end of the shaft forms a tubular wall with an outer surface that forms a first bearing housing that receives a first bearing and an inner surface defining a female pulley seat that receives the male fixing portion of the pulley axially in the thickness of the support wall of the tank.

[0010] Thanks to the housing of the male fixing portion of the pulley in the thickness of the support wall of the tank, axial space is saved making it possible to increase the axial depth of the basket and therefore to increase the load of clothes for the same outer dimensions of the household appliance.

[0011] In order to better understand the invention and to appreciate its advantages, hereafter, we shall describe some embodiments given as an example and not for limiting purposes, with reference to the attached figures, in which:

[0012] figure 1 is a schematic view, in vertical section, of a washing machine according to an embodiment of the invention;

[0013] figure 2 is a schematic view, in vertical section, of a detail of a tank-basket group of the washing machine in figure 1;

[0014] figure 3 is a longitudinal section view of a portion of a support shaft of the tank-basket group according to an embodiment;

[0015] figure 4 is a front view of the support shaft in figure 3;

[0016] figure 5 is a longitudinal section view of a connection portion of a pulley of the tank-basket group according to an embodiment;

[0017] figure 6 is a front view of the connection portion in figure 5.

[0018] With reference to the figures, a washing machine, washer dryer or dryer is wholly indicated with reference numeral 1. The machine 1 comprises an outer housing 2, a washing tank 3 arranged inside the outer housing 2 and suitable for containing the lye, as well as a perforated clothes basket 4, arranged inside the washing tank 3 in a rotatable manner around a rotation axis R and defining a space 5, on the inside, for containing the clothes to be washed and/or dried. The clothes basket 4

can be made up of a back wall 6 through which the basket 4 is rotatably fixed to a support wall 12 of the tank 3, a front wall 7 defining a loading opening 9 through which it is possible to access the inside of the basket 4 and a side wall 8 that is perforated so as to allow the exchange of lye between the washing tank 3 and the inside of the basket 4 (Figure 1).

[0019] Alternatively, in top-loading washing machines, the clothes basket 4 is usually made up of a back wall 6 and a front wall 7, through which the basket is rotatably fixed to opposite support walls 12 of the tank 3, as well as a side wall 8 generally cylindrical and perforated so as to allow the exchange of lye between the washing tank and the inside of the basket, in which the side wall defines a loading opening (not illustrated) through which it is possible to access the inside of the basket.

[0020] In order to make the basket 4 rotate inside the washing tank 3, the machine 1 comprises a motor 10 and a drive 11, for example a belt drive, which transmits the rotary motion of the motor 10 to a pulley 13 arranged outside the washing tank 3 and connected so as to rotate as a unit with the clothes basket 4.

[0021] The tank 3 - basket 4 group also comprises a support shaft 14 that extends parallel to the rotation axis R and projects from the back wall 6 of the basket 4 towards the outside of the basket. The shaft 14 is rotatably received, through at least a first bearing 16, in a support seat 15 formed in the support wall 12 of the tank 3, and comprises a back end 17 facing outwards from the tank 3.

[0022] The pulley 13 comprises a male fixing portion 18 extending parallel to the rotation axis R and projecting towards the tank 3 or, in other words, from outside of the tank towards the inside. The back end 17 of the shaft 14 forms a tubular wall 19 with a radially outer surface 20 (with reference to the rotation axis R) that forms a first bearing housing 21 that receives the first bearing and a radially inner surface 22 that defines a female pulley seat 23 formed inside the back end 17 of the shaft 14.

[0023] The female pulley seat 23 receives the male fixing portion 18 of the pulley 13 axially in the thickness of the support wall 12 of the tank 3 (Figure 2).

[0024] Thanks to the housing of the male fixing portion of the pulley in the thickness of the support wall of the tank, axial space is saved allowing the axial depth of the basket to be increased and therefore the clothes load is increased for the same outer dimensions of the household appliance.

[0025] In accordance with an embodiment, the male fixing portion 18 of the pulley 13 extends axially in the area of the first bearing 16.

[0026] The inner surface 22 of the pulley seat 23 can be profiled, for example notched through a plurality of longitudinal grooves 25 and even the male fixing portion 18 of the pulley 13 can form an outer surface 24 with a matching shape, for example notched and suitable for engaging the inner surface 22 through a shape coupling rotating as a unit around the rotation axis R.

[0027] In accordance with an embodiment, the profil-

ing, for example notching 25 of the pulley seat 23 extends axially completely inside the axial extension of the first bearing 16.

[0028] This advantageously makes it possible to use the same axial space both for the rotatable connection and the vertical support of the basket to the tank, as well as for the connection of the pulley so as to rotate as a unit with the clothes basket.

[0029] The male fixing portion 18 can also comprise an axial hole, preferably central, that receives a locking screw 27 and that opens into a back surface 28 opposite the tank 3, in a back cavity 29 having an axial width and depth such as to at least partially receive a nut or a head 30 of the locking screw 27.

[0030] In accordance with an embodiment, the back cavity 29 has an axial depth greater than 2/3 of the axial height of the head 30 or of the nut of the locking screw 27.

[0031] Preferably, the back cavity 29 completely receives the head 30 or the nut of the locking screw 27, so that the screw does not project axially out from the back cavity 29.

[0032] Thanks to this configuration, the locking screw remains completely inside the axial bulk of the pulley and makes it possible to bring the tank-basket group, with the pulley, closer to the outer housing 2 of the washing machine 1.

[0033] The locking screw 27 can be screwed in an internally threaded locking hole 31, formed in a bottom 32 of the pulley seat 23.

[0034] In accordance with an embodiment, it is foreseen for there to be a second bearing 33 fitted onto an annular surface 34 of the shaft 14 between the first bearing 16 and the back wall 6 of the basket 4 and, similarly to the first bearing 16, the second bearing 33 is also received in the support seat 15 of the tank 3, through an outer ring. Advantageously, the locking hole 31 extends axially up to inside the area of the second bearing 33.

[0035] The shaft 14 can also comprise an outer shoulder 35 facing outwards from the tank 3 and preferably configured as a circumferential step that axially defines the first bearing housing 21 on a front side. On the other side, the pulley 13 forms a clamping surface 36 that is preferably annular and substantially perpendicular to the rotation axis R, said clamping surface 36 facing towards the tank 3 and being suitable for engaging a back surface 37 of the first bearing 16 to clamp the first bearing 16 axially against the outer shoulder 36 of the shaft 14, when the male fixing portion 18 is locked in the female pulley seat 23.

[0036] In order to obtain a single support between the clamping surface 36 and the first bearing 16 and in order to reduce the axial bulk of the pulley-shaft connection, the first bearing 16 projects axially beyond the back end 17 of the shaft 14.

[0037] The second bearing 33 preferably has an inner diameter that is greater with respect to the internal diameter of the first bearing 16, so that the outer shoulder 35 can be obtained through just the processing of the first

bearing housing and without further reduction of diameter of the shaft at the annular surface 34. This configuration also makes it possible to have an easy assembly of the tank-basket group through the insertion of the shaft 14 from inside of the tank into the support seat 15 with the bearings 16, 33 already mounted.

[0038] In accordance with a preferred embodiment, the axial depth D38 of the pulley seat 23 is greater than half of the axial distance D40 between a back edge 39 of the pulley 13 (meant as the furthest back surface or portion of the pulley) and its clamping surface 36 in contact with the first bearing 16.

[0039] Even more preferably, the ratio between the axial depth D38 of the pulley seat and the aforementioned axial distance D40 is of between $D38 / D40 = 0.75$ to 1.25, obtaining an optimal exploitation of the available axial space, taking into account the vertical support requirements, the moments of cantilevered support of the basket, stress due to the centrifugal forces and the twisting coupling between the pulley and the basket.

[0040] A frontal end 41 of the shaft 14 is anchored to the back wall 6 of the basket 4 so that the shaft 14 rotates with the basket 4. In accordance with an embodiment, the front end 41 can comprise circumferential anti-extraction grooves 42 engaged by corresponding circumferential protuberances 43 of the back wall 6 and/or longitudinal anti-rotation grooves 44 engaged by corresponding longitudinal protuberances 45 of the back wall 6. For such a purpose, the back wall 6 of the basket can comprise an anchoring body 46 and the front end 41 of the shaft is embedded in the anchoring body 46 during its formation through moulding.

[0041] Further variants and/or additions are well within the capabilities of the man skilled in the art, without for this reason departing from the scope of protection defined in the attached claims.

Claims

1. A tank-basket group (3, 4, 13, 14) for a washing machine (1), washer dryer or dryer, the tank - basket group comprising:

- a washing tank (3) suitable for containing the lye and having a support wall (12),
- a clothes basket (4) arranged inside the washing tank (3), the clothes basket (4) having a back wall (6) that is rotatably connected to the support wall (12) of the washing tank (3),
- a driving pulley (13) arranged outside the washing tank (3) and connected in a way such as to rotate with the back wall (6) of the clothes basket (4),
- a shaft (14) parallel to the rotation axis (R) projecting from the back wall (6) of the basket (3) and rotatably received in a support seat (15) formed in the support wall (12) of the tank (3),

said shaft (14) having a back end (17) facing outwards from the tank (3),

characterised in that

- the pulley (13) comprises a male fixing portion (18) extending parallel to the rotation axis (R) and projecting towards the tank (3),
- the back end (17) of the shaft (14) forms a tubular wall (19) with an outer surface (20) that forms a first bearing housing (21) that receives a first bearing (16) and an inner surface (22) defining a female pulley seat (23) that receives the male fixing portion (18) of the pulley (13) axially in the thickness of the support wall (12) of the tank (3).

2. Tank-basket group according to claim 1, wherein the male fixing portion (18) of the pulley (13) extends axially in the area of the first bearing (16).
3. Tank-basket group according to any one of the previous claims, wherein the inner surface (22) of the pulley seat (23) is notched and the male fixing portion (18) forms an outer surface (24) that is notched and is suitable for engaging with the inner surface (22) through shape coupling rotating as a unit.
4. Tank-basket group according to any one of the previous claims, wherein the notching (25) of the pulley seat (23) extends axially completely inside the axial extension of the first bearing (16).
5. Tank-basket group according to any one of the previous claims, wherein the male fixing portion (18) comprises a hole (26) that receives a locking screw (27) and the pulley (13) forms, in a back surface (28) opposite the tank (3), a back cavity (29) for receiving a nut or a head (30) of the locking screw (27).
6. Tank-basket group according to claim 5, wherein the back cavity (29) has an axial depth greater than $2/3$ of the axial height of the head (30) or of the nut of the locking screw (27).
7. Tank-basket group according to claim 5, wherein the back cavity (29) completely receives the head (30) or the nut of the locking screw (27), so that it does not axially protrude outside from the back cavity (29).
8. Tank-basket group according to any one of the previous claims, wherein the shaft (14) comprises an internally threaded locking hole (31), said locking hole (31) being formed in a bottom (32) of the pulley seat (23) and being suitable for receiving a locking screw (27).
9. Tank-basket group according to claim 8, comprising:

a second bearing (33) fitted onto an annular surface (34) of the shaft between said first bearing (16) and the back wall (6) of the basket, wherein said locking hole (31) extends axially up to inside the area of the second bearing (33).

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10. Tank-basket group according to any one of the previous claims, wherein said shaft (14) comprises an outer shoulder (35) facing outwards from the tank (3) and axially defining the first bearing housing (21), wherein the pulley (13) forms an annular clamping surface (36) substantially perpendicular to the rotation axis (R) and facing towards the tank (3), said clamping surface (36) being suitable for engaging with a back surface (37) of the first bearing (16) to lock the first bearing (16) axially against the outer shoulder (35) of the shaft, when the male fixing portion (18) is locked in the female pulley seat (23). 10 15
11. Tank-basket group according to any one of the previous claims, wherein said first bearing (16) projects axially beyond the back end (17) of the shaft (14). 20
12. Tank-basket group according to any one of the previous claims, comprising a second bearing (33) fitted onto an annular surface (34) of the shaft (15) between said first bearing (16) and the back wall (6) of the basket (4), wherein said second bearing (33) has an internal diameter that is greater than the internal diameter of the first bearing (16). 25 30
13. Tank-basket group according to any one of the previous claims, wherein an axial depth (D38) of the pulley seat (23) is greater than half of the axial distance (D40) between a back edge (39) of the pulley and its clamping surface (36) in contact with the first bearing (16), preferably the ratio (D38/D40) between the axial depth (D38) and the axial distance (D40) is of between 0.75 to 1.25. 35 40
14. Tank-basket group according to any one of the previous claims, wherein said shaft (14) comprises a front end (41) anchored to the back wall (6) of the basket (4) so that the shaft rotates with the basket, said front end (41) comprising: 45
 - anti-extraction circumferential grooves (42) engaged by corresponding circumferential protuberances (43) of the back wall,
 - longitudinal anti-rotation grooves (44) engaged by corresponding longitudinal protuberances (45) of the back wall. 50
15. Washing machine (1), washer dryer or dryer, comprising a tank basket group according to any one of the previous claims. 55

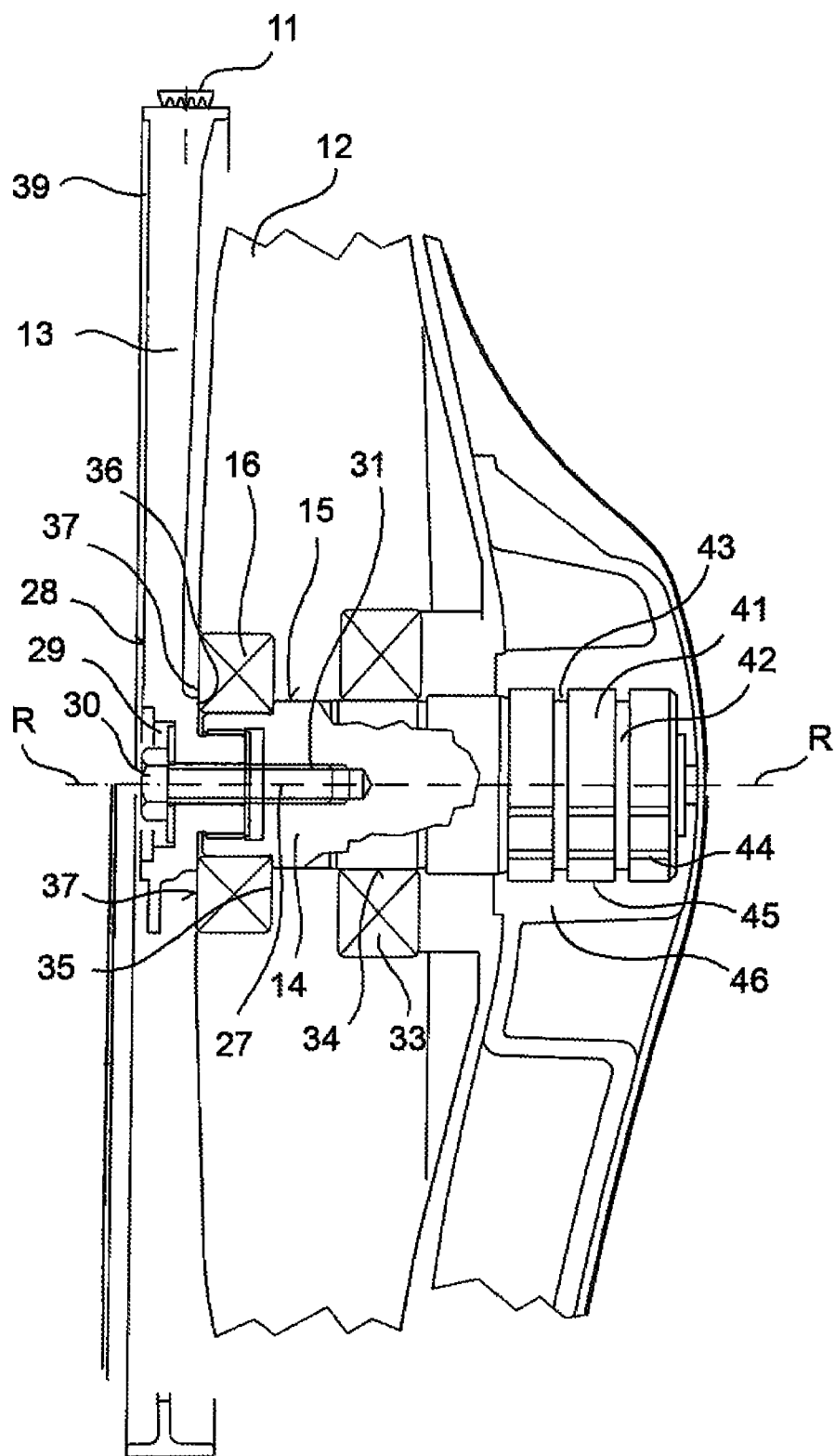


FIG. 2

FIG. 3

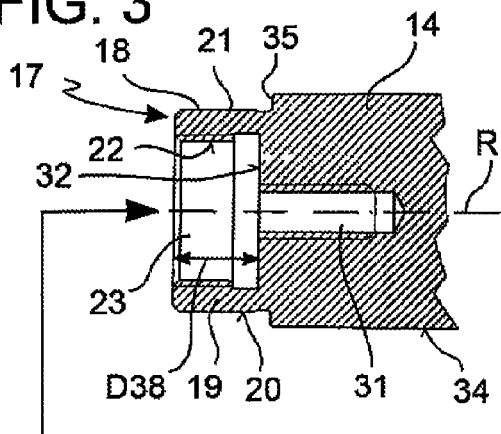


FIG. 4

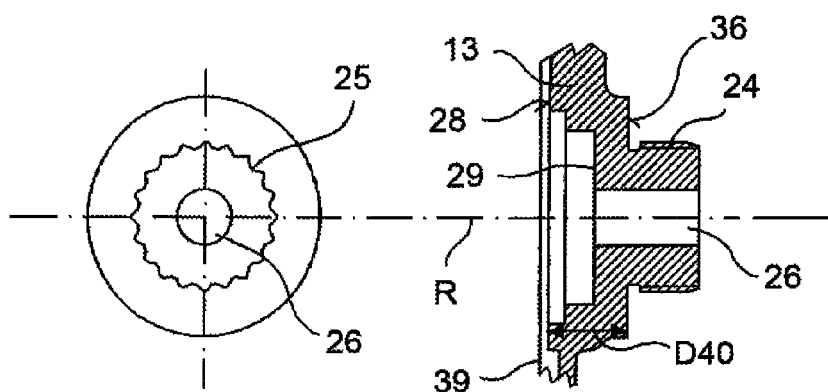
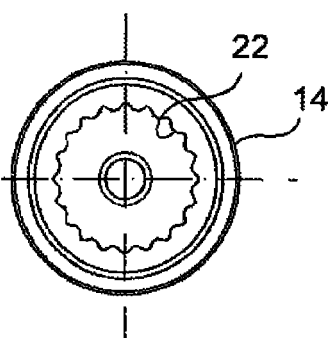


FIG. 6

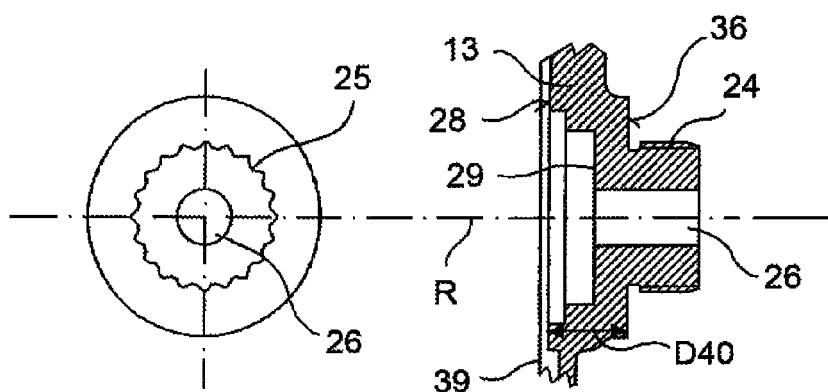


FIG. 5

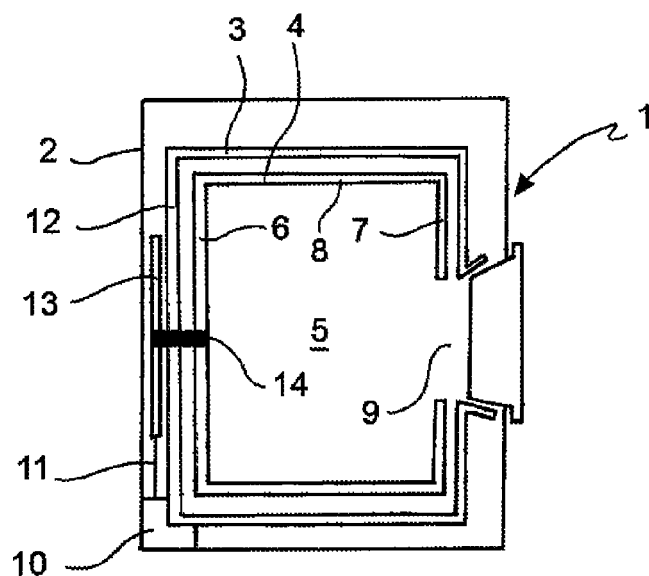


FIG. 1



EUROPEAN SEARCH REPORT

Application Number
EP 10 42 5264

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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 11 February 2011	Examiner Weinberg, Ekkehard
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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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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