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(54) A drum type washing machine

(57) A drum type washing machine comprises a tub having a wall for holding washing water therein, a metal drum rotatably arranged inside the tub, and at least a shaft passed through the tub and connected to the drum by means of a metal flange-shaped device. Between the metal drum and the flange-shaped device there are provided shaped portions allowing a passage of water and/or air between the flange-shaped device and the drum.

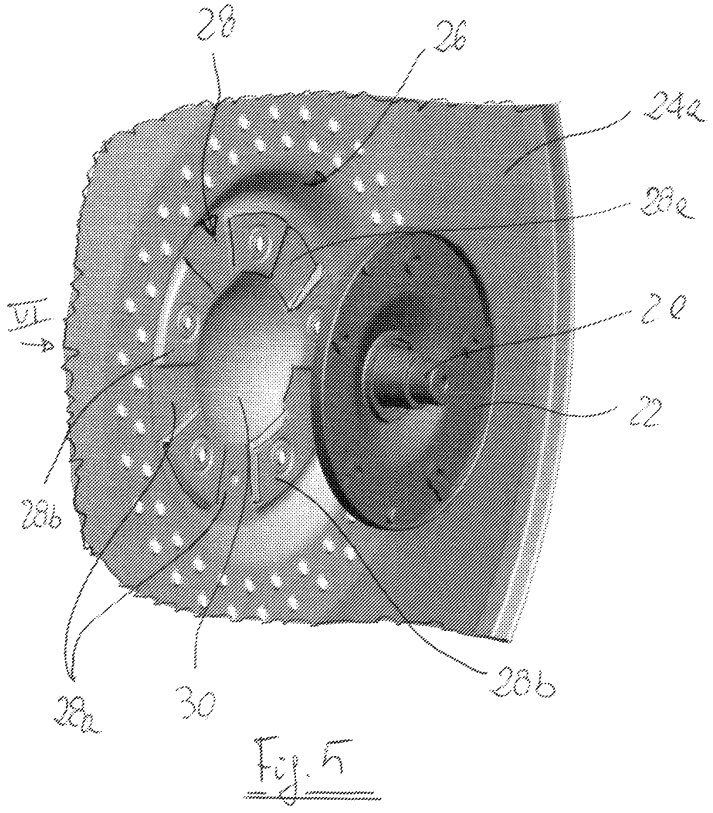

Fig. 5

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Description

[0001] The present invention relates to a drum type washing machine. More particularly, the present invention relates to a washing machine comprising a tub having a wall for holding washing water therein, a metal drum rotatably arranged inside the tub, and at least a shaft passed through the tub and connected to the drum by means of a metal flange-shaped device.

[0002] In the above type of washing machines, either top-loading or front loading washing machines, the tub is provided with at least a ball or roller bearing supporting the shaft, and one of the shaft is connected to the drum also for transmission of a driving power from a motor to the drum, such motor driving the shaft by means of a belt and pulley system or a direct drive system.

[0003] In order to increase the reliability of the washing machine, also in view of the modern trend to increase the dimension of the drum and spinning speed of the washing machine, both the drum and the flange-shaped device are made of metal. In order to reduce the overall cost of the washing machine, the metal of the drum (usually stainless steel) is different from the metal of the flange-shaped device (usually aluminium or aluminium alloy), particularly because with aluminium the process of die casting is much less expensive than a metal working of the flange.

[0004] The difference between the metals used for the drum and the flange has created unexpected problems of severe corrosion of the flange and its integral shaft due to the direct contact with the metal of the drum, without adequate ventilation or cleaning of the contact zone. The mechanism of such corrosion is not entirely known for the time being and it could derive from the growing, in an anaerobic environment, of a sort of bio layer which corrodes progressively the less resistant metal (for instance the aluminium).

[0005] It is an object of the present invention to provide a washing machine of the above type which does not present the above corrosion problem.

[0006] Such problem is solved thanks to the features listed in the appended claims.

[0007] According to the invention, channel shaped portions are created between the flange-shaped device and the drum in order to allow air ventilation and circulation of water in the contact zone between flange and drum. Tests carried out by the applicant have shown that the above corrosion problem have been completely solved by the peculiar geometry of the connection area between the flange and the drum.

[0008] It is to be understood that both the foregoing description and the following detailed description of the present invention are exemplary and explanatory and are intended to provide further explanation of the invention claimed.

[0009] Exemplary embodiments of the invention will now be described by reference to the accompanying drawings, in which:

- figure 1 is a perspective section view of a top-loading washing machine according to the present invention;
- figure 2 is an enlarged view of a detail of figure 1;
- figure 3 is a perspective section view of the drum used in the washing machine of figure 1;
- figure 4 is an enlarged view of a detail of figure 3;
- figure 5 is an exploded view of the detail of figure 4, in a preassembled configuration;
- figure 6 is a perspective view of the detail of the drum of figure 5, seen from the direction VI;
- figure 7 is a perspective view of a portion of the drum according to a second embodiment of the invention;
- figure 8 is an enlarged detail of the flange shown in figure 7; and
- figure 9 is a section view taken along line IX-IX of figure 7.

[0010] A top-loading washing machine 10 has a metal structure 12 with a door 12a supporting a plurality of detergent dispensers D. The metal structure 12 supports a plastic tub 14 in which water and detergent can be load in a known manner. The tub presents two roll bearings 16 which rotatably support two shafts 18, 20 centrally fixed to or integral with circular flanges 22 made of aluminium alloy. One of the shaft, the shaft 20 in the drawings, is connected to a pulley (not shown) for being driven by an electric motor (not shown) supported by the tub 14. Each flange 22 is centrally fixed to a side wall 24a of a drum 24 made of stainless steel. In detail, each flange 22 is fixed to a lowered central portion 26 of the drum 24 by means of rivets 28 or similar fastening devices. Of course the drum 24 is provided with an inner door (not shown) that, in the loading or unloading condition of the washing machine, faces the outside door 12a.

[0011] Figure 5 shows the shape of the central portion 26 of each side wall 24a of the drum 24. Such portion 26 is provided with a ring area 28 having a plurality of lowered portions 28a defined by raised portions 28b against which the flange 22 is in contact. At the centre of the ring area 28 there is a dome-shaped zone 30 detached from the flange 22. It is clear that when the drum is seen from the outside (as in figure 6) the lowered portions 28a are seen as raised portions, and vice versa. The channels created between the flanges 22 and the lowered portions 28 allows a ventilation and cleaning (by means of water) of the connection and contact zone between the flange 22 and the drum 24.

[0012] Figures 7-9 show a second embodiment of the invention, where similar components are indicated with the same references used for the first embodiment. In figure 7 each side wall 24a of the drum 24 is provided with a plurality of radial lowered portions 34 which start from the dome central zone 30 and end further beyond a central flange 36, which in this embodiment is shaped like a spider or star with a conical disc-shaped central portion 36a and a plurality of tongues 36b with holes 38 for fixing the rivets connecting the flange 36 to the drum 24. As it is clear from figure 9, the lowered radial portions

34 (which by the way are very easy to be realized by metal dieing and contribute to increase the stiffness of the drum) define gaps 40 between the flange 36 and the drum wall 24a, allowing good ventilation and preventing a corrosion of the flange and the shaft thereof.

[0013] Even if in the above embodiments the channel portions are obtained by shaping the surface of the drum walls 24a, it is clear that also the solutions in which such channel portions are obtained by shaping the flanges are within the scope of the invention as well.

Claims

1. A drum type washing machine comprising a tub (14) having a wall for holding washing water therein, a metal drum (24, 24a) rotatably arranged inside the tub (14), at least a shaft (18, 20) passed through the tub and connected to the drum (24, 24a) by means of a metal flange-shaped device (22, 36), **characterized in that** between the metal drum (24, 24a) and the flange-shaped device (22, 36) are provided shaped portions (28a, 34) allowing a passage of water and/or air between the flange-shaped device (22, 36) and the drum (24).

2. A drum type washing machine according to claim 1, wherein said shaped portions (28a, 34) are provided on the drum (24, 24a).

3. A drum type washing machine according to claim 2, wherein the zone (28) of the drum (24, 24a) where the flange-shaped device (22) is connected to the drum (24, 24a) is ring-shaped with a plurality of lowered areas (28a) detached from the flange-shaped device (22).

4. A drum type washing machine according to claim 2, wherein the drum (24, 24a) is provided with radial lowered areas (34) allowing said passage of water and/or air.

5. A drum type washing machine according to claim 3, wherein the flange-shaped device (22) is a disc with a central integral shaft (18, 20).

6. A drum type washing machine according to claim 4, wherein the flange-shaped device (36) has a central conical disc-shaped portion (36a) and a plurality of outside tongues (36b) for fixing the flange-shaped device (36) to the drum (24, 24a).

7. A drum type washing machine according to claim 4 and 6, wherein the radial lowered areas (34) extend beyond the central conical disc-shaped portion (36a) of the flange-shaped device (36).

8. A drum type washing machine according to any of the preceding claims, wherein the metal of the drum (24, 24a) is different from the metal of the flange-shaped device (22, 36).

9. A drum type washing machine according to claim 8, wherein the drum (24, 24a) is made of stainless steel and the flange-shaped device (22, 36) is made of aluminium or aluminium alloy.

10. A drum type washing machine according to any of the preceding claims, wherein the washing machine is a top-loading machine with two shafts (18, 20).

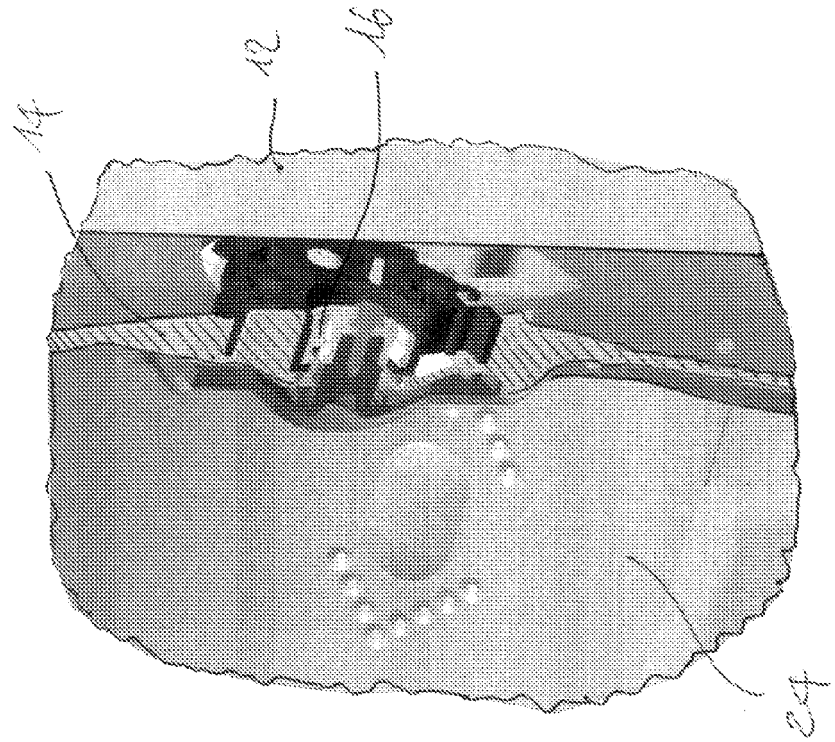

Fig. 2

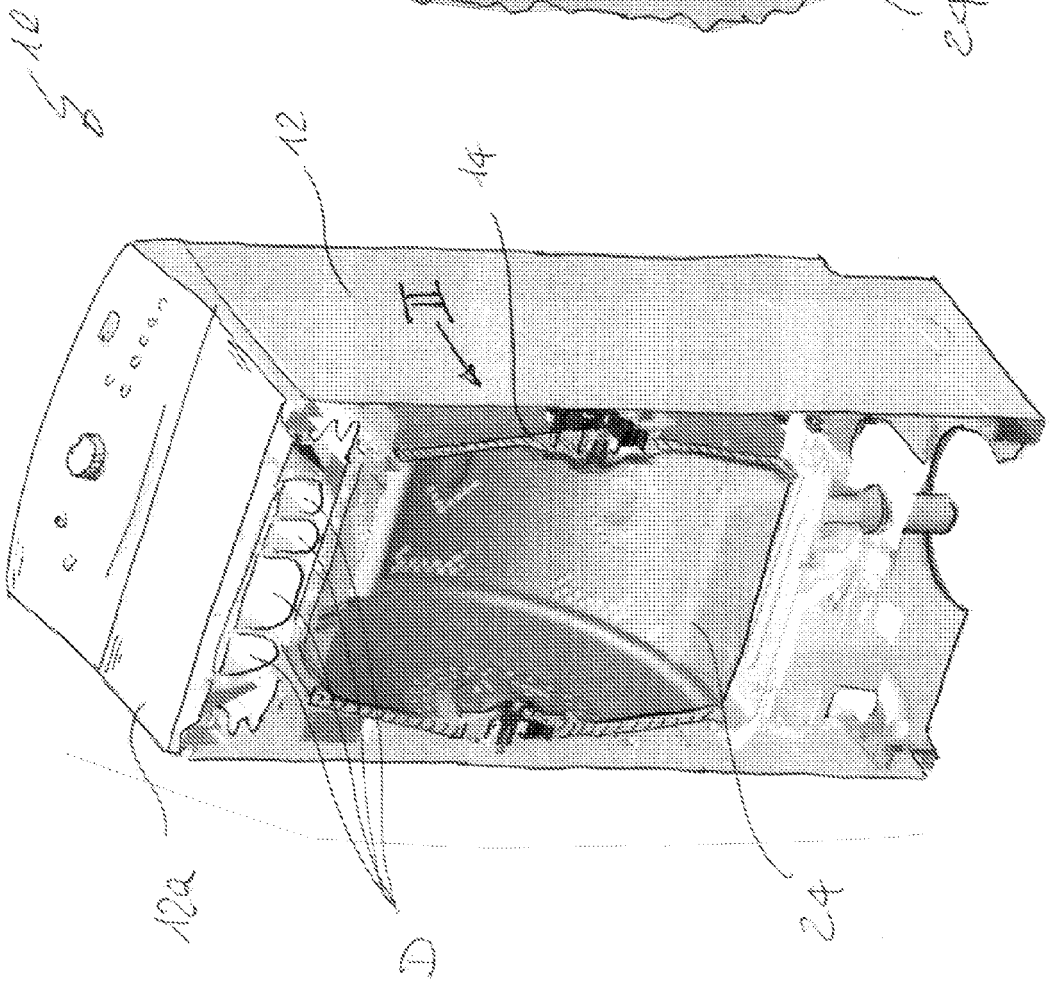

Fig. 1

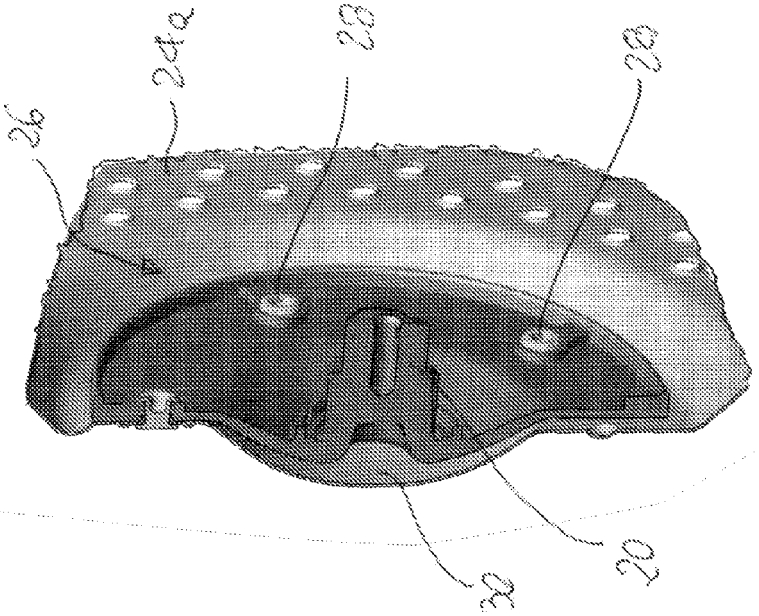

Fig. 4

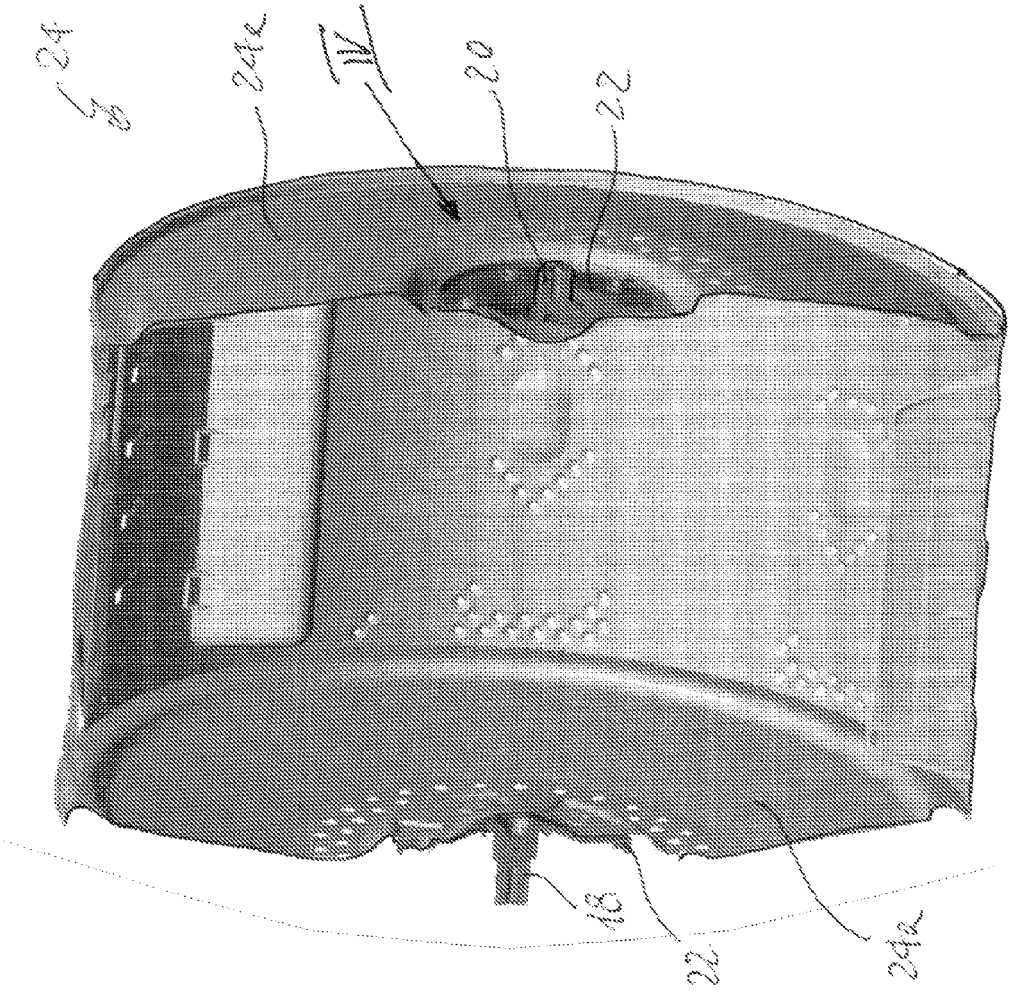

Fig. 3

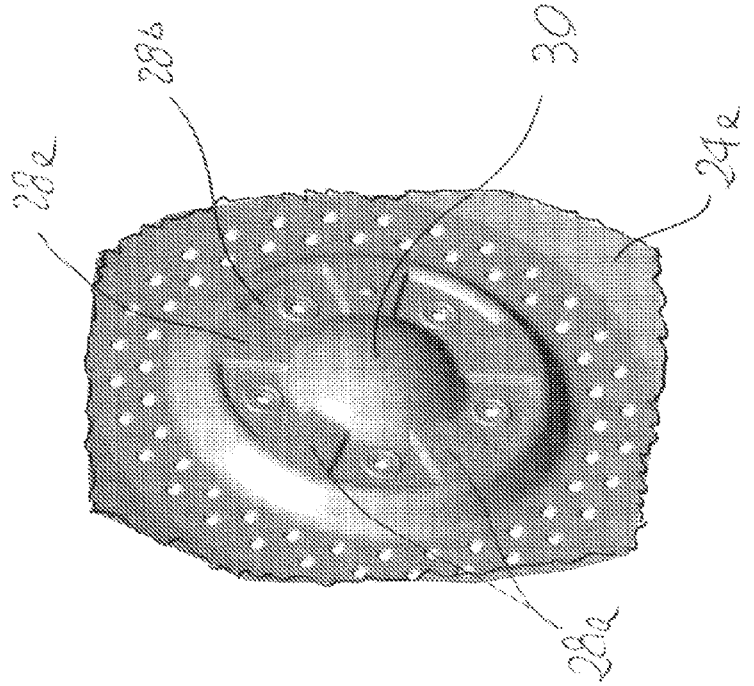

Fig. 6

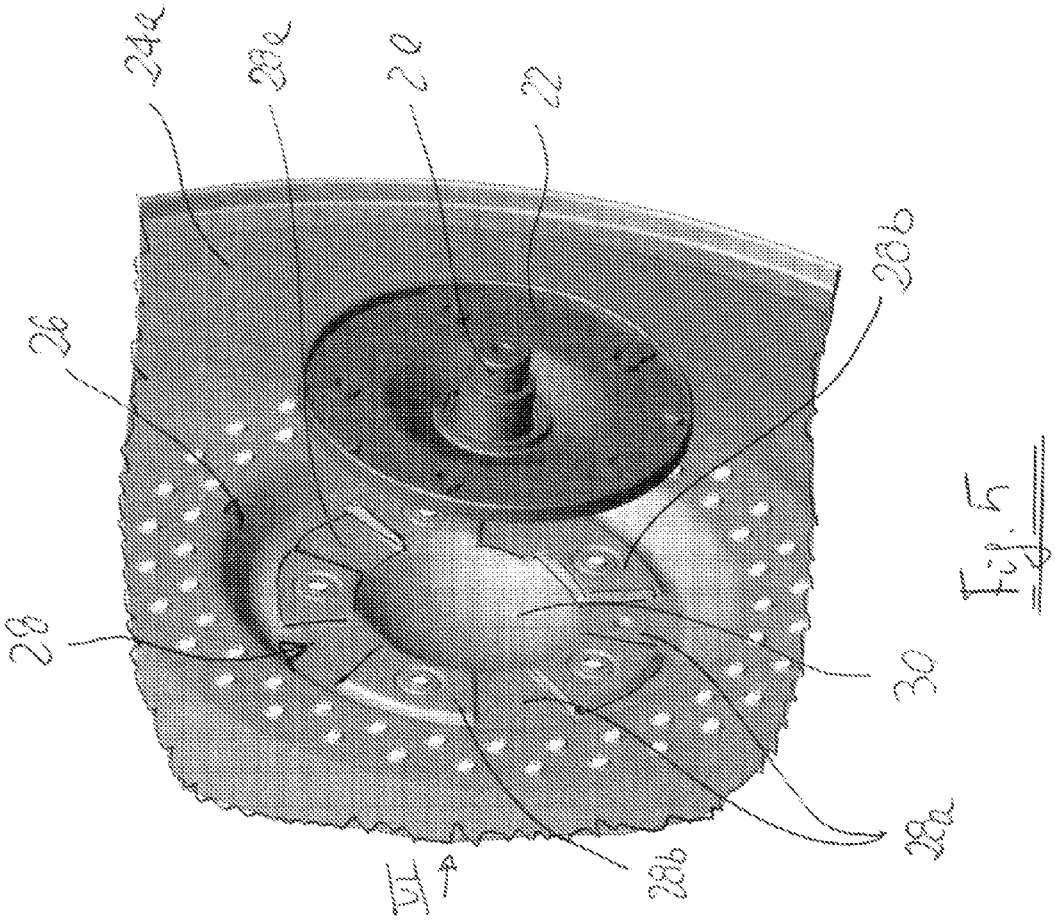

Fig. 5

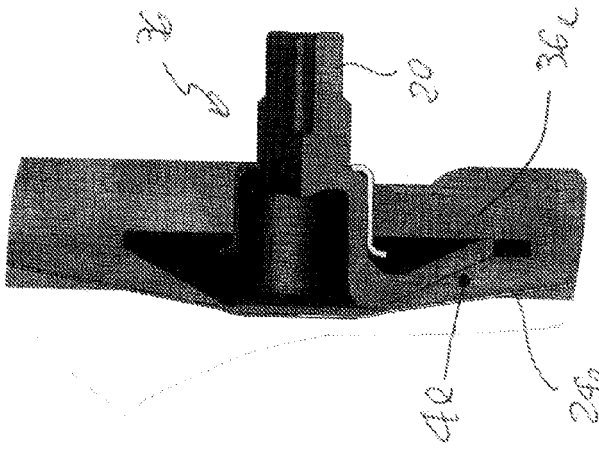

Fig.9

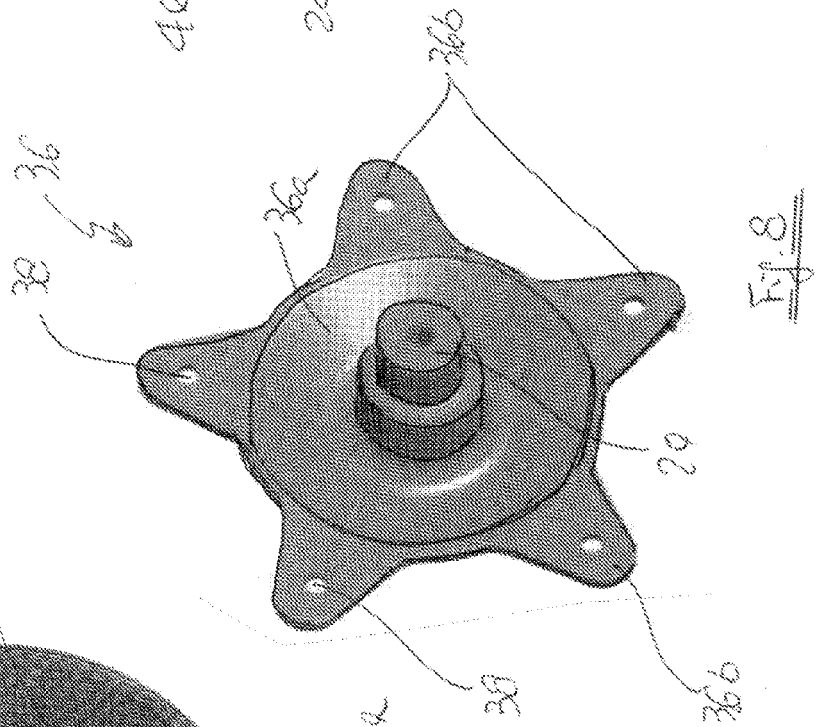

Fig.8

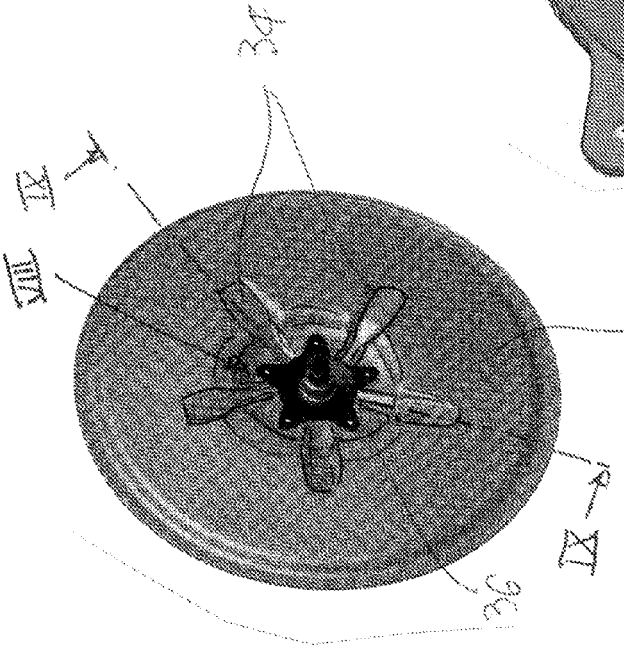

Fig.7

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EUROPEAN SEARCH REPORT

Application Number
EP 08 16 1403

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	WO 03/080915 A (ARCELIK AS [TR]; OEZTUERK UMUT ESAT [TR]; YILDIRIM IBRAHIM [TR]) 2 October 2003 (2003-10-02) * page 8, paragraph 4; claim 1; figure 12a *	1-10	INV. D06F37/04
A	US 1 635 578 A (HOWE WINTHROP K) 12 July 1927 (1927-07-12) * claim 1; figure 1 *	1-10	

TECHNICAL FIELDS SEARCHED (IPC)

D06F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	20 January 2009	Dupuis, Jean-Luc

CATEGORY OF CITED DOCUMENTS

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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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20-01-2009

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82