

(51) Int Cl.:
A47L 15/42 (2006.01)

(22) Date of filing: 19.11.2008

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(30) Priority: 23.11.2007 IT TO20070842

a predetermined threshold level reached by the water in said container (10) and for sending a signal when said level is reached. This sensor device includes a radiation emitter (12) and an associated radiation receiver (14).

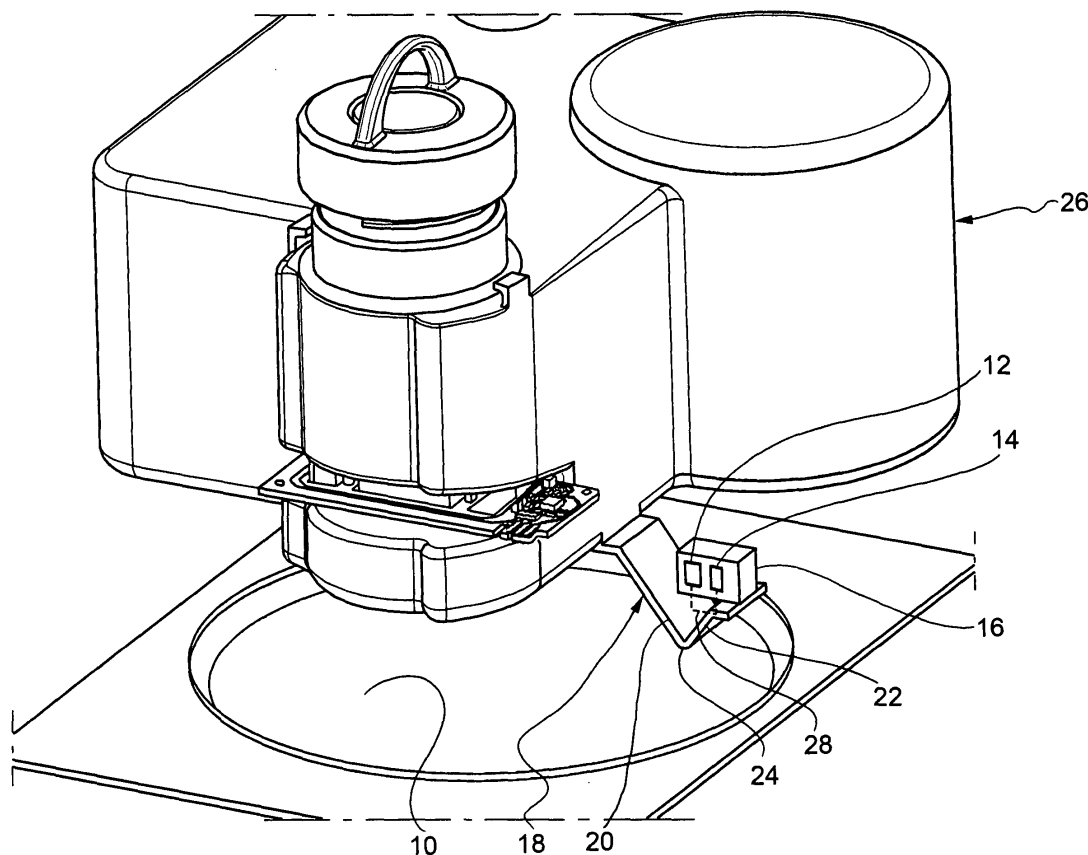


FIG. 1

Description

[0001] The present invention relates to a dishwasher provided with an anti-flood safety system.

[0002] According to a known art, such a safety system comprises a container for collecting escaped water, in which there is fitted a floating member which can operate a switch when the water accumulating in the container reaches a predetermined level. In its turn, the switch activates a pump, either directly or indirectly by means of a timer card, to discharge the water contained in the wash chamber.

[0003] However, this known system cannot provide completely satisfactory accuracy in operation, since the force that must be exerted by the floating member to trigger the switch may vary over a rather wide tolerance range. Furthermore, a system of this kind is rather bulky and expensive.

[0004] The object of the present invention is therefore to overcome the drawbacks of the known art.

[0005] According to the invention, this object is achieved by means of a dishwasher provided with an anti-flood safety system comprising:

- a container for collecting escaped water, and
- a sensor device for detecting a predetermined threshold level reached by the water in said container, and for sending a signal when said level is reached, said sensor device including a radiation emitter and an associated radiation receiver.

[0006] The signal generated by the sensor device may be, for example, an acoustic and/or optical alarm signal, or a signal which is used, either directly or indirectly by means of a PCB (printed circuit board) which is typically present in a dishwasher, to cause the activation of a pump in order to discharge the water contained in the wash chamber.

[0007] According to the invention, the use of a sensor device based on the emission and reception of radiation provides a satisfactory accuracy of operation, which is markedly greater than that offered by a mechanical system.

[0008] Further advantages and characteristics of the present invention will be made clear by the following detailed description, which refers to the attached drawings provided by way of non-limiting example, in which:

Figure 1 is a schematic perspective representation of the components of a safety system of a dishwasher according to the invention,

Figure 2 is a cut-away perspective representation of a safety system of a dishwasher according to a variant embodiment of the invention,

Figure 3 is a cut-away perspective representation, taken from a different angle, of the safety system of the dishwasher of Figure 2,

Figure 4 is a schematic perspective representation

of a safety system of a dishwasher according to another embodiment of the invention, and

Figure 5 shows an enlarged view of part of what is illustrated in Figure 4.

[0009] A dishwasher is provided with an anti-flood safety system comprising (Fig. 1) a container 10, located on the base of the dishwasher, for collecting escaped water, and a sensor device which can detect a predetermined threshold level reached by the water in the container 10 and which can send a signal when this level is reached.

[0010] The sensor device, of a known type, includes a radiation emitter 12 and an associated radiation receiver 14, which are incorporated in a single supporting casing 16 located above the inner cavity of a dihedral formation 18 having a first wing 20 and a second wing 22, which meet at a vertex 24 pointing towards the base of the chamber 10. For example, the emitter 12 can be a light-emitting diode and the receiver 14 can be a phototransistor. The dihedral formation 18 is an appendage of a water decalcifying device 26 of a conventional type, which is provided in the dishwasher for softening the water supplied thereto.

[0011] The arrangement of the various components of the sensor device is such that the radiation emitted by the emitter 12 undergoes an initial reflection from the first wing 20 and another reflection from the second wing 22, being finally reflected towards the receiver 14 (see the path shown in broken lines and identified by the reference numeral 28). The extent of these reflections is affected by the presence or absence of escaped water in the container 10 between the wings 20 and 22 of the dihedral formation 18. Consequently, as soon as a significant quantity, corresponding to a predetermined threshold level, has accumulated in this area, the sensor device sends a signal which is used to cause the activation of a discharge pump (not shown in Figure 1), either directly or indirectly. This safety system has a very high accuracy of operation and is also economical, since it does not require moving parts such as a floating member, and can easily be incorporated in a conventional decalcifying device or, if necessary, in the well of the dishwasher.

[0012] Figures 2 and 3 show an alternative embodiment of the invention, in which numbers identical to those used in the preceding figure indicate identical or equivalent parts.

[0013] In this case, the anti-flood safety system comprises a floating member 30 located in the collecting container 10. The member 30 has a disc-like body, with a bar 32 projecting vertically upwards from the central part of this body. The water level sensor device includes a radiation emitter 12 and an associated radiation receiver 14, which are electrically connected to a PCB 34 on opposite sides of the bar 32. The PCB 34 is also electrically connected to another radiation emitter 36 and another radiation receiver 38 forming part of a device for sensing the level of salt in a corresponding reservoir 40 of the

decalcifying device 26, of the type usually provided in conventional dishwashers. The reservoir 40 is provided with a plug 42 and has an insulated compartment 44 in which is located an LED device 46 which is also electrically connected to the PCB 34. The emitters 12 and 36 can be light-emitting diodes, for example, while the receivers 14 and 38 can be phototransistors.

[0014] The accumulation of water in the container 10 due to a possible escape causes the floating member 30 to rise with its associated bar 32, which, when a predetermined threshold level is reached, intercepts the path of the radiation from the emitter 12 to the receiver 14. The sensor device consequently sends a signal which is used to cause the activation of a discharge pump, either directly or indirectly.

[0015] The operating principle of the device for sensing the salt level in the reservoir 40 is substantially similar. In this case also, the presence or absence of salt between the emitter 36 and the receiver 38 affects the amount of radiation received by the latter, in such a way that a signal is sent when the level of salt falls below a predetermined level. This signal can be used, in particular, to switch on the LED device 46 and illuminate the plug 42 of the reservoir 40, in order to attract the user's attention when the door of the dishwasher is opened at the end of a wash cycle.

[0016] During the operation of the dishwasher, the LED device 46 can also serve to monitor the correct operation of a rotor (not shown in the drawings) which rotates within the wash chamber above the plug 42.

[0017] As mentioned, the safety system of this second embodiment of the invention requires the presence of the floating member 30, although the rising movement of this member which causes the signal to be sent is not opposed by any external element. This avoids the inaccuracies of the known devices, in which the floating member has to overcome the resistance of a mechanical opposing member, which can vary over a rather wide tolerance range. Furthermore, the PCB 34, which is already present in the dishwasher, and which is also used for other functions such as the monitoring of the salt level in the corresponding reservoir 40, is used as the electronic part of the sensor device of this additional safety system according to the invention. It is therefore still possible to simplify the structure and reduce the costs.

[0018] Figures 4 and 5 show another embodiment of the invention, in which numbers identical to those used in the preceding figure 1 indicate identical or equivalent parts.

[0019] In this case, the dihedral formation is not an appendage of the water decalcifying device 26, but is the base portion of a freestanding component 44 which is inserted into the housing which is typically occupied by the floating member in a conventional device. The component 44 takes the form of a hollow stem with a flange 46 projecting radially from its upper end, and acts as a stop to prevent downward sliding before the device 26 has been fitted in the dishwasher. It should be noted that,

when the device 26 with the component 44 has been fitted in the dishwasher, the vertex 24 of the dihedral formation 18 is in contact with the base of the container 10 for collecting the escaped water.

[0020] The operating principle and the structure of the sensor device including an emitter 12 and a receiver 14 are not different from those described previously with reference to Figure 1.

[0021] The embodiment shown in Figures 4 and 5 has the advantage of making it possible to take up any slack which may develop in the assembly of the dishwasher between the decalcifying device 26 and the container 10 which is fixed to the base.

[0022] Clearly, provided that the principle of the invention is retained, the details of construction and the forms of embodiment can be varied widely from what has been described purely by way of example, without departure from the scope which has been claimed.

Claims

1. Dishwasher provided with an anti-flood safety system comprising:
 - a container (10) for collecting escaped water, and
 - a sensor device for detecting a predetermined threshold level reached by the water in said container (10), and for sending a signal when said level is reached, said sensor device including a radiation emitter (12) and an associated radiation receiver (14).
2. Dishwasher according to Claim 1, in which said sensor device is of the static type, not comprising any moving parts.
3. Dishwasher according to Claim 1 or 2, in which said radiation emitter (12) and radiation receiver (14) are incorporated in a single supporting casing (16) located above the inner cavity of a dihedral formation (18) whose vertex (24) points towards the base of said collecting chamber (10).
4. Dishwasher according to Claim 3, in which said dihedral formation (18) is an appendage of a water decalcifying device (26).
5. Dishwasher according to Claim 1, additionally comprising a floating member (30) which is located within said collecting chamber (10) and which has a bar (32) protruding from it, said radiation emitter (12) and radiation receiver (14) being electrically connected to a PCB (34) on opposite sides of said bar (32), in such a way that the raising of said bar (32) caused when the water accumulated in the chamber (10) reaches the threshold level causes the sensor device

to send said signal.

6. Dishwasher according to Claim 5, in which the rising movement of the floating member (30) with the associated bar (32) is not opposed by any external element. 5

7. Dishwasher according to Claim 5 or 6, in which said PCB (34) is also electronically connected to another radiation emitter (36) and another radiation receiver (38) forming part of a device for sensing the level of salt in a corresponding reservoir (40) of a decalcifying device (26), said salt level sensor device being capable of detecting a predetermined threshold level reached by the salt in said reservoir (40), and of sending a signal when said level is reached. 10
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8. Dishwasher according to Claim 7, in which said salt reservoir (40) is provided with a plug (42) and has a compartment (44) in which is located an LED device (46) which is electrically connected to said PCB (34) and which can illuminate said plug (42) when it receives from the salt level sensor device the signal caused by the reaching of the threshold level. 20
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9. Dishwasher according to Claim 8, in which said LED device (46) also has the function of monitoring the correct operation of a rotor which rotates in the wash chamber above said plug (42). 30

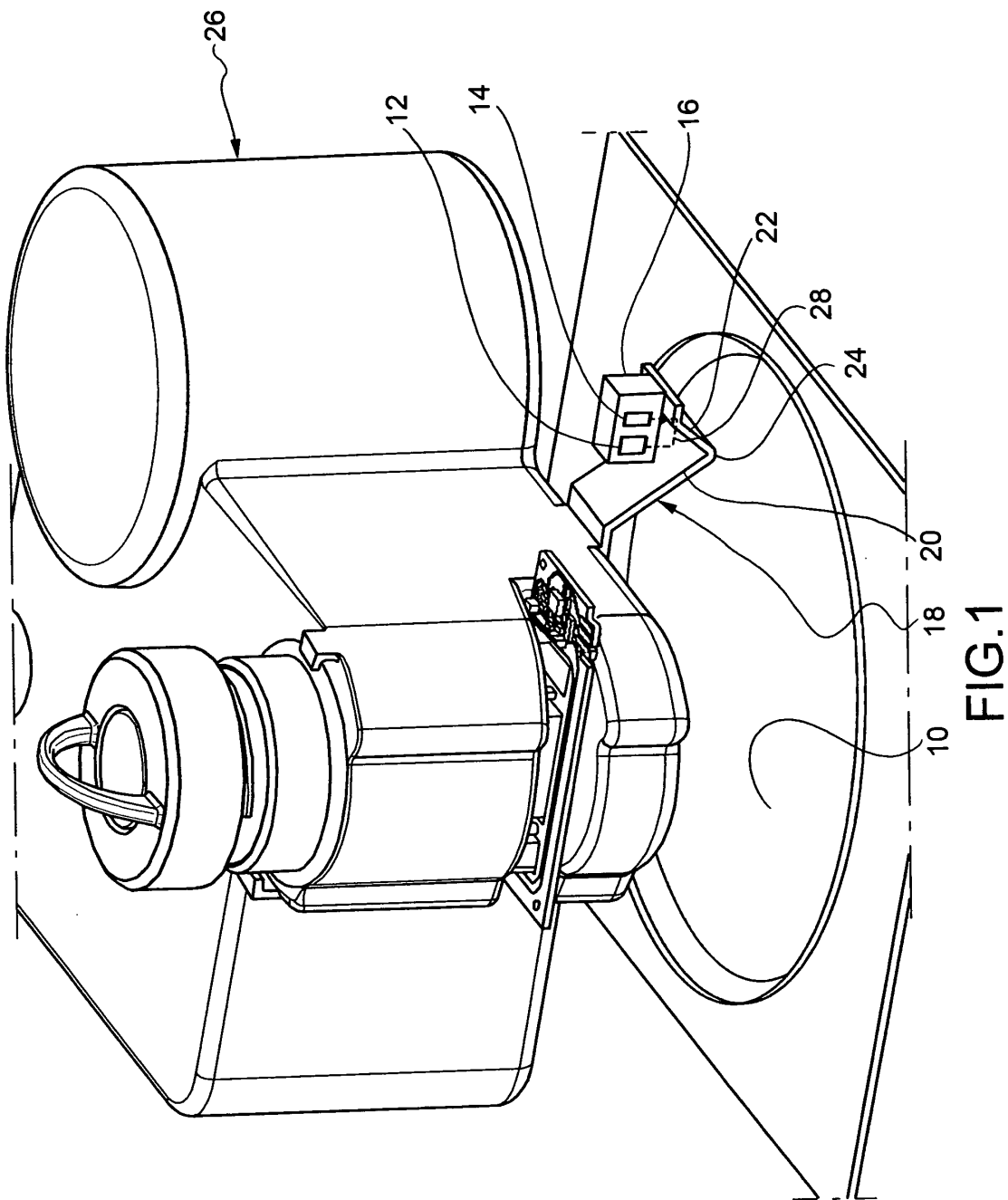
10. Dishwasher according to any one of the preceding claims, in which said radiation emitter (12) and radiation receiver (14) forming part of the sensor device of the anti-flood safety system are, respectively, a light-emitting diode and a phototransistor. 35

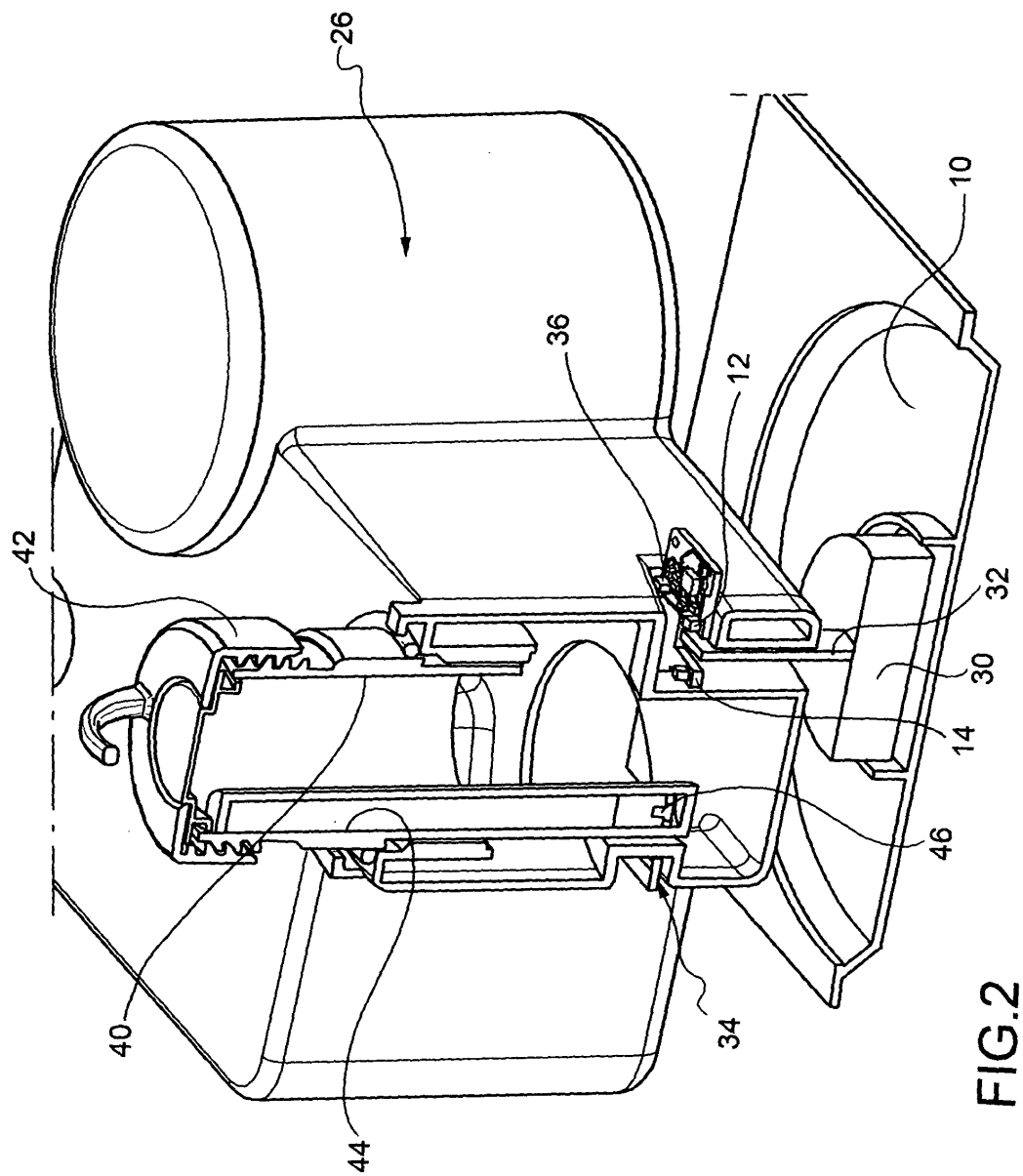
11. Dishwasher according to any one of the preceding Claims 7 to 10, in which said additional radiation emitter (36) and radiation receiver (38) forming part of the salt level sensor device in the reservoir (40) of the decalcifying device (26) are, respectively, a light-emitting diode and a phototransistor. 40

12. Dishwasher according to Claim 3, in which said dihedral formation (18) is the base portion of a component (44) in the shape of a hollow stem. 45

13. Dishwasher according to Claim 12, in which the vertex (24) of said dihedral formation (18) is in contact with the base of the container (10). 50

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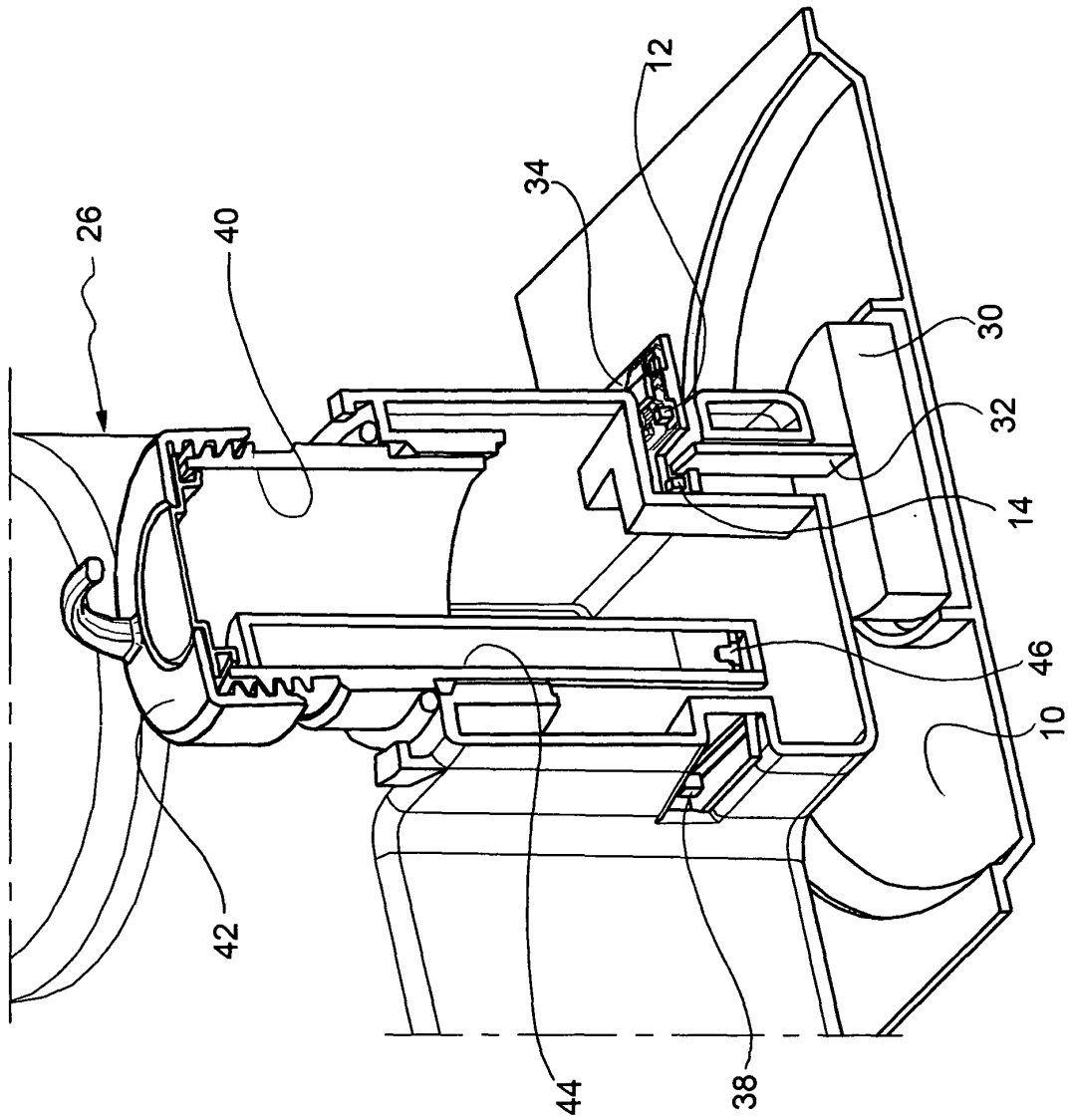


FIG. 3

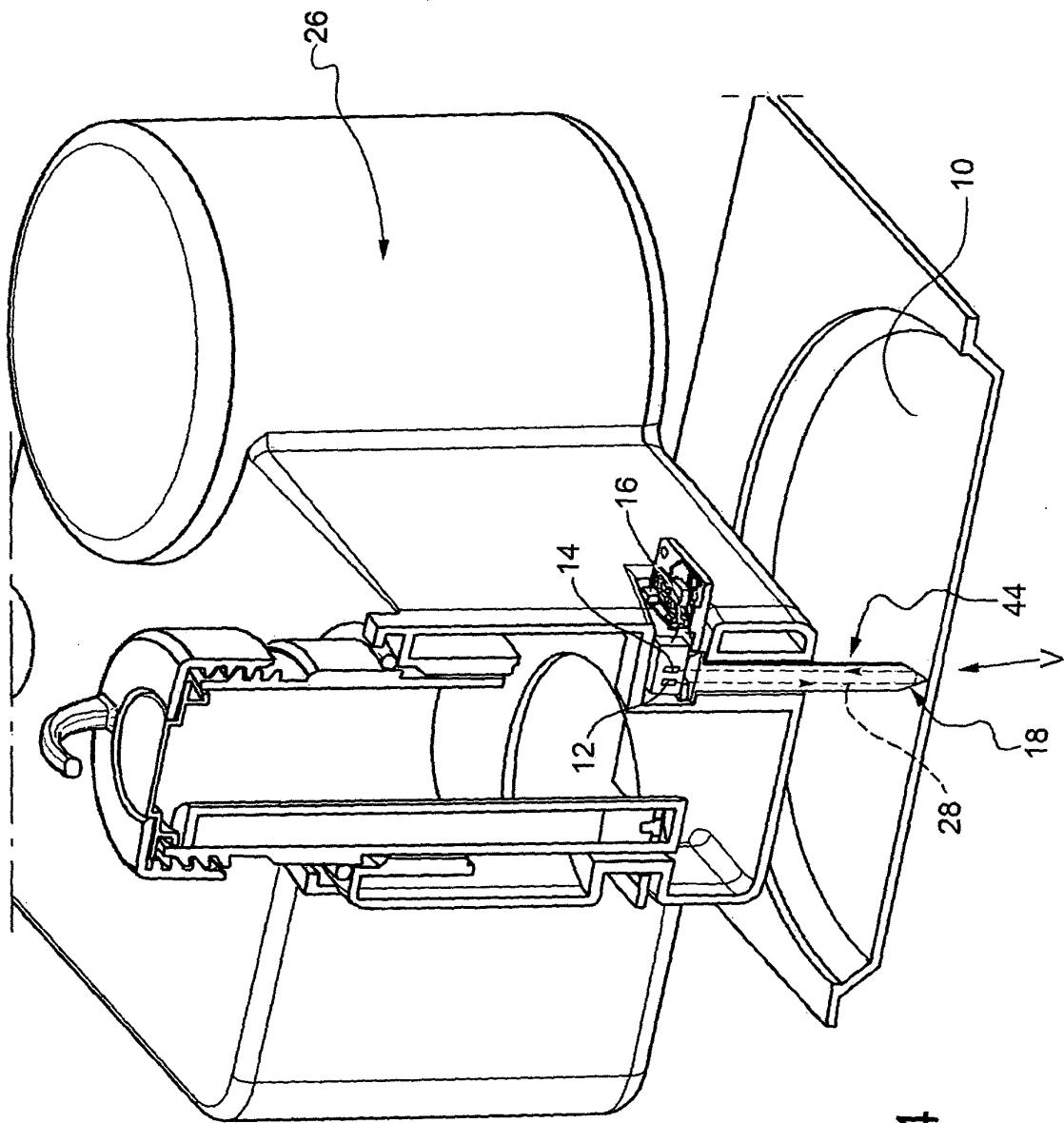


FIG.4

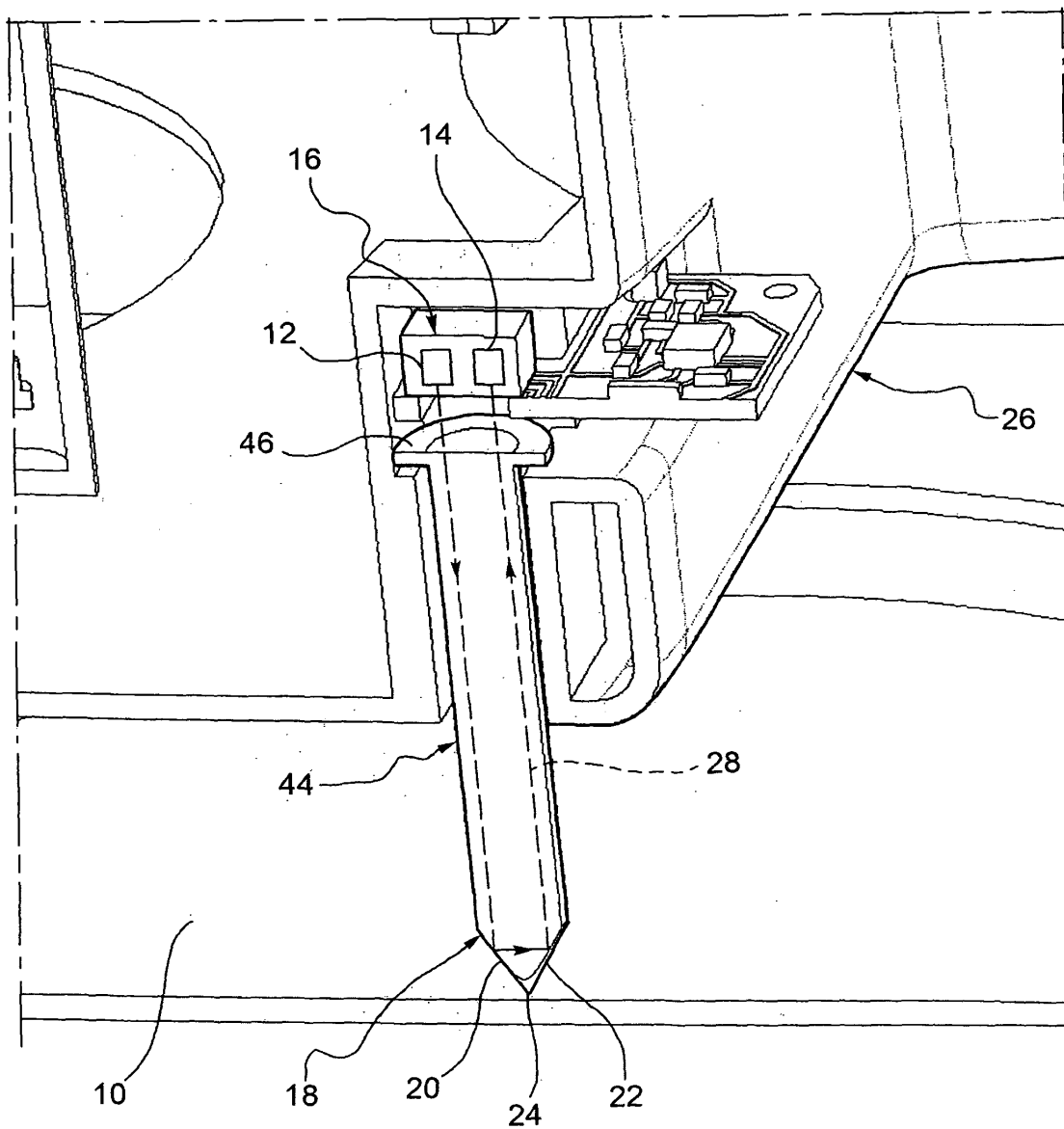


FIG.5



EUROPEAN SEARCH REPORT

 Application Number
 EP 08 42 5734

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y	DE 32 41 460 A1 (BOPP WERNER) 10 May 1984 (1984-05-10) * page 8 - page 10; figure 1 * -----	1-13	INV. A47L15/42
Y	DE 199 45 925 A1 (BSH BOSCH SIEMENS HAUSGERAETE [DE]) 29 March 2001 (2001-03-29) * column 1, line 18 - line 25 * * column 1, line 33 - line 55 * * column 3, line 2 - column 4, line 14; figure 1 * -----	1-13	
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A	EP 1 336 369 A (MIELE & CIE [DE]) 20 August 2003 (2003-08-20) * abstract; figure 2 * -----	1-13	
A	GB 2 354 098 A (RAE CARLTON ASHLEY [GB]) 14 March 2001 (2001-03-14) * abstract; figure 1 * -----	1-13	TECHNICAL FIELDS SEARCHED (IPC) A47L D06F
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 11 March 2009	Examiner Hannam, Martin
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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EP 08 42 5734

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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