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(54) **Anti-flooding safety system for electrical household washing appliances**

(57) Anti-flooding safety system for an electrical household washing appliance comprising a microswitch (10) provided with a push-button (16), a support (12) of said microswitch (10) and an actuating member (14) of the push-button (16), associated to the support (12) and apt to floating on possible leaked water, said actuating floating member (14) comprises a bell-shaped lower portion located within a housing (34) done in the support (12), and an upper portion that, in absence of leaked water, has a surface which keeps pressed the push-button (16) which is turned upwards, whereas, in presence of leaked water, it disengages itself from the push-button (16) and releases it.

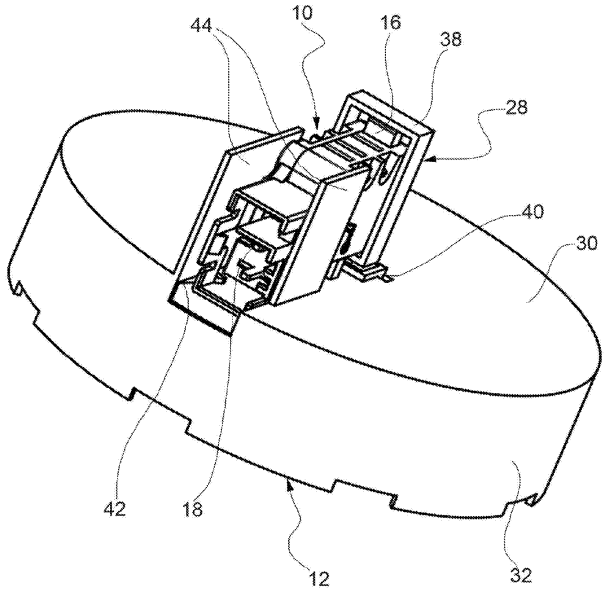

FIG.6

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Description

[0001] The present invention relates to an anti-flooding safety system for electrical household washing appliances, in particular dishwashers and washing machines.

[0002] In more detail, such a safety system — which is typically located in the lowest part of the machine, referred to as the bottom basin — comprises a microswitch provided with a push-button, a support of said microswitch and an actuating member of said push-button, associated to said support and apt to floating on possible leaked water which has leaked from internal tubing or other hydraulic components of the machine.

[0003] Conventionally, the floating member is produced in the form of a convex body made of expanded polystyrene and is located within an internal cavity of the support, which is shaped like a bell and therefore comprises a horizontal wall, from whose outer edge a transverse wall protrudes downwards.

[0004] In particular, the accumulation of leaked water in the bottom basin lifts up the floating member, which knocks against the push-button of the microswitch, which protrudes from a central aperture in the horizontal wall of the support so as to tower above the floating member.

[0005] The push-button thereby changes the configuration of the microswitch, which, in turn, brings about the activation of appropriate safety measures, such as the closure of the supply of mains water, the actuation of the drainage pump for evacuating the leaked water which has collected in the bottom basin, and so on.

[0006] This safety system has a number of disadvantages linked primarily to the need to use a floating member made of expanded polystyrene or similar low-density materials.

[0007] The latter are indeed relatively expensive and very difficult to mould into articles having high dimensional precision, and this makes it difficult to produce the anti-flooding system with the required tolerances. In addition, the density of the expanded materials may vary within sizeable ranges, so that the weight of a floating member of a certain volume, which has a marked influence on the operation of the system, may vary unforeseeably when it is made of these materials.

[0008] On the other hand, the floating members made of expanded materials are fragile, and are therefore subjected to damage when they come into contact with other components of the anti-flooding system during assembly; they are also soft, and are therefore subjected to the risk of becoming blocked when the system is being handled as it is being transported and mounted in the relative washing machine.

[0009] WO-2005/115 216 describes an anti-flooding system having the features indicated in the preamble of claim 1, which follows. This system has a floating member, devoid of internal cavities, which interacts with respective push-buttons, both turned downwards, of two different microswitches by means of an intermediate element, or a lever associated to (in particular hinged on) the support of the microswitches.

[0010] DE-100 14721 A1 describes an anti-flooding device comprising a composite floating member which also includes a magnetic element apt to actuating a switch.

[0011] It is therefore an object of the present invention to obviate the disadvantages described above.

[0012] This object is achieved by an anti-flooding system of the type indicated in the introduction of the present description, in which the abovementioned actuating floating member comprises a bell-shaped lower portion and also an upper portion that, in absence of leaked water, has a surface which keeps pressed said push-button which is turned upwards, whereas, in presence of leaked water, it disengages itself from said push-button and releases it.

[0013] The anti-flooding system of the invention therefore operates in a way which is inverse with respect to conventional anti-flooding systems, that is pressing the push-button of the microswitch in normal conditions and releasing it in the case of water leakage. In particular, the actuating floating member, which has a bell-shaped lower portion (which is therefore hollow or empty internally), interacts with a single push-button of a single microswitch, pressing it directly downwards in absence of leaked water, without the interposition of any intermediate element.

[0014] The actuating member is provided with the floating properties by the bell or overturned glass shape of the lower portion thereof. Indeed, the internal cavity thereof, even in the presence of leaked water, cannot be filled completely by the latter, and therefore the trapped air generates a hydrostatic thrust which is sufficient to allow floating and therefore to bring about a relative movement of the member with respect to the support, so as to actuate the push-button of the microswitch assembled to the latter.

[0015] As a result, according to the present invention, it is not necessary to produce the actuating floating member from a low-density material. On the contrary, this can be produced from non-expanded plastics material with the required dimensional precision and weight, while simultaneously ensuring a strength which is such that the member can resist the assembly operations without being damaged. In addition, during operation, the sliding of the floating member within the support takes place with low friction so as to reduce the risk of blockage. Finally, the cost for producing such a floating member is less than that for producing a conventional floating member made of expanded polystyrene.

[0016] Other advantages and features of the present invention will become apparent from the following detailed description, which is given purely by way of non-limiting example and with reference to the accompanying drawings, in which:

Figure 1 is a partially exploded perspective view of an anti-flooding safety system of the invention in nor-

mal configuration, that is in absence of water leakages,

Figure 2 is an exploded perspective view of components of the safety system shown in Figure 1,

Figures 3-5 show successive steps of the process for assembling the safety system shown in the preceding figures, and

Figure 6 is a perspective view showing the safety system of the invention in operative configuration, that is in presence of water leakages.

[0017] An anti-flooding safety system for an electrical household washing appliance comprises (Figures 1 and 2) a microswitch 10, a support 12 of the microswitch 10 and an actuating member 14 of the latter.

[0018] The microswitch 10 is a component which is conventional per se and comprises a substantially parallelepiped body, from one end of which an actuating push-button 16 protrudes upwards (Figure 6), and which, at the opposite end, has the electrical contacts 18 for connection to the electrical circuit of the electrical household appliance.

[0019] The actuating member 14 is a monolithic piece of plastics material and comprises (Figure 2) a lower portion and an upper portion. In turn, the lower portion is shaped like a bell or an overturned glass and therefore comprises a bottom wall 20 of circular shape, from whose edge a transverse wall 22 protrudes downwards. The bottom wall 20 is also provided with circumferentially spaced radial reinforcing ribs 24. On the other hand, the upper portion comprises a pin 26 which extends from the centre zone of the upper face of the bottom wall 20 of the lower portion and supports a substantially rectangular frame-shaped element 28.

[0020] The support 12 comprises a substantially circular horizontal wall 30, from whose edge a transverse wall 32 protrudes downwards, whereby a hollow housing 34 is defined within which the lower portion of the floating member 14 is housed. The horizontal wall 30 has a centre slot 36 whose shape substantially corresponds to the one of the upper side 38 of the frame-shaped element 28, and cavities 40 located in correspondence with the centre portion of the two longer sides of the slot 36. The horizontal wall 30 also has an oblong opening 42 flanked by vertical walls 44 which protrude upwards and retain the microswitch 10 and to which is associated a cover 46 protecting the microswitch.

[0021] To mount the safety system described above, the actuating member 14 is positioned (Figure 2) below the support 12 and the lower portion thereof is inserted into the hollow housing 34 (cf. arrow 48), ensuring that the frame-shaped element 28 is aligned with the correspondingly shaped slots 36, in such a manner that it can pass through the latter and protrude fully above the upper face of the horizontal wall 30 of the support 12 (Figure 3).

[0022] Then, the entire actuating member 14 is rotated about the pin 26, in such a manner that the lower side 50 of the frame-shaped element 28, after a 90° rotation, is arranged in the cavities 40 transversely with respect to the slot 36, and the member 14 is thus held by the support 12 (Figure 4).

[0023] The lower side of the microswitch 10 is then inserted (cf. arrow 52 in Figure 5) into the oblong opening 42 of the horizontal wall 30 and enclosed laterally by the walls 44, and the insertion operation is continued until the push-button 16 is positioned below the upper side 38 of the frame-shaped element 28, whose lower face constitutes a surface which normally keeps said push-button pressed.

[0024] Finally, the cover 46 protecting the microswitch 10 is associated to the vertical walls 44 (Figure 1). In embodiments of the invention which are not shown in the figures, the vertical walls may instead be connected at the top by a horizontal wall acting as a roof for protecting the microswitch.

[0025] At the end of the operations described above, the safety system is thus assembled completely and is ready to be positioned in the bottom basin of an electrical household appliance. In normal conditions (Figure 1), that is in absence of leaked water, the lower face of the upper side 38 of the frame-shaped element 28 therefore keeps the push-button 16 of the microswitch 10 pressed.

[0026] Vice versa, when leaked water starts to collect in the bottom basin, the actuating member 14 floats thereon. Indeed, the air which remains trapped in the internal cavity of the lower portion generates a hydrostatic thrust which is sufficient to allow floating of the member 14, which moves, in particular lifts up, with respect to the support 12 which supports the microswitch 10 (Figure 6). As a result, the side 38 of the frame-shaped element 28 disengages from the push-button 16 and releases it. The configuration of the microswitch 10 thus changes and, in a manner known per se, commands suitable safety countermeasures, such as the closure of the supply of mains water, the actuation of the drainage pump for evacuating the leaked water which has collected in the bottom basin, and so on.

[0027] Clearly, without departing from the principle of the invention, the details of construction and the embodiments may differ considerably from those described purely by way of example, without thereby departing from the scope claimed.

Claims

1. Anti-flooding safety system for an electrical household washing appliance, comprising a microswitch (10) provided with a push-button (16), a support (12) of said microswitch (10) and an actuating member (14) of said push-button (16), associated to said support (12) and apt to floating on possible leaked water, and comprising a lower portion located within a housing (34) done in said support (12),
said system being **characterized in that** said lower portion is shaped like a bell, and said actuating float-

ing member (14) also comprises an upper portion that, in absence of leaked water, has a surface which keeps pressed said push-button (16) which is turned upwards, whereas, in presence of leaked water, it disengages itself from said push-button (16) and releases it.

2. System according to claim 1, wherein said floating member (14) is a monolithic piece of plastics material.

3. System according to claim 1 or 2, wherein said upper portion of the floating member (14) comprises a pin (26) protruding from the lower portion and supporting a frame-shaped element (28), whose upper side (38) contains said surface which keeps the push-button (16) pressed.

4. System according to any one of the previous claims, wherein said lower portion of the floating member (14) comprises a bottom wall (20) of circular shape, from whose edge a transverse wall (22) protrudes downwards.

5. System according to claim 4, wherein said bottom wall (20) is provided with circumferentially spaced radial reinforcing ribs (24).

6. System according to any one of the previous claims 3 to 5, wherein said support (12) comprises a substantially circular horizontal wall (30), from whose edge a transverse wall (32) protrudes downwards, whereby a hollow housing (34) is defined within which the lower portion of the floating member (14) is housed, said horizontal wall (30) having a centre slot (36) whose shape substantially corresponds to the one of the upper side (38) of said frame (28), and cavities (40) located in correspondence with sides of said slot (36).

7. System according to claim 6, wherein said horizontal wall (30) has an opening (42) flanked by vertical walls (44) which protrude upwards and retain said microswitch (10).

8. System according to claim 7, wherein a cover (46) protecting said microswitch (10) is associated to said vertical walls (44).

9. System according to any one of the previous claims, wherein said actuating floating member (14) interacts with a single push-button (16) of a single microswitch (12).

10. System according to any one of the previous claims, wherein said bell-shaped lower portion of the actuating floating member (14) is hollow internally.

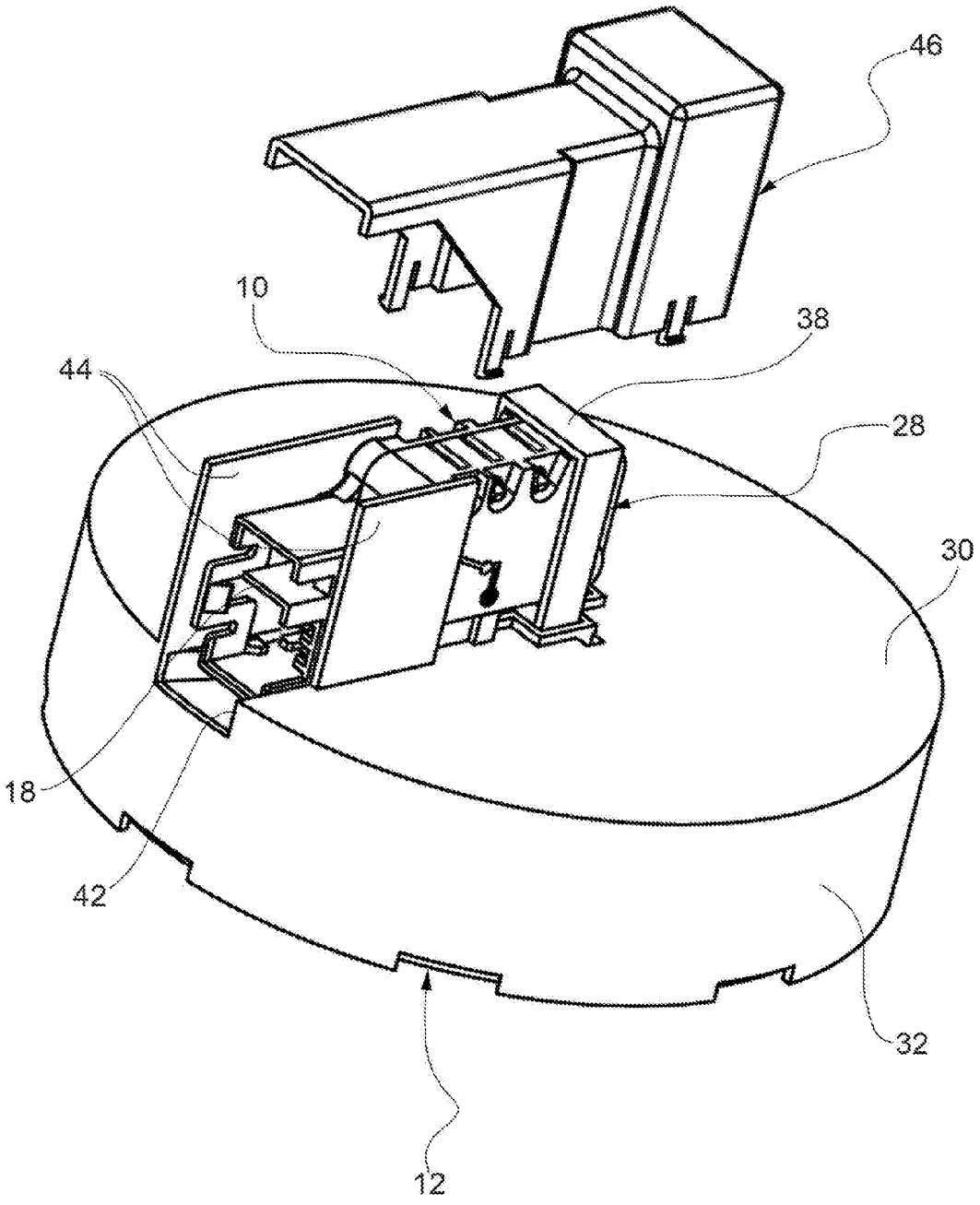

FIG.1

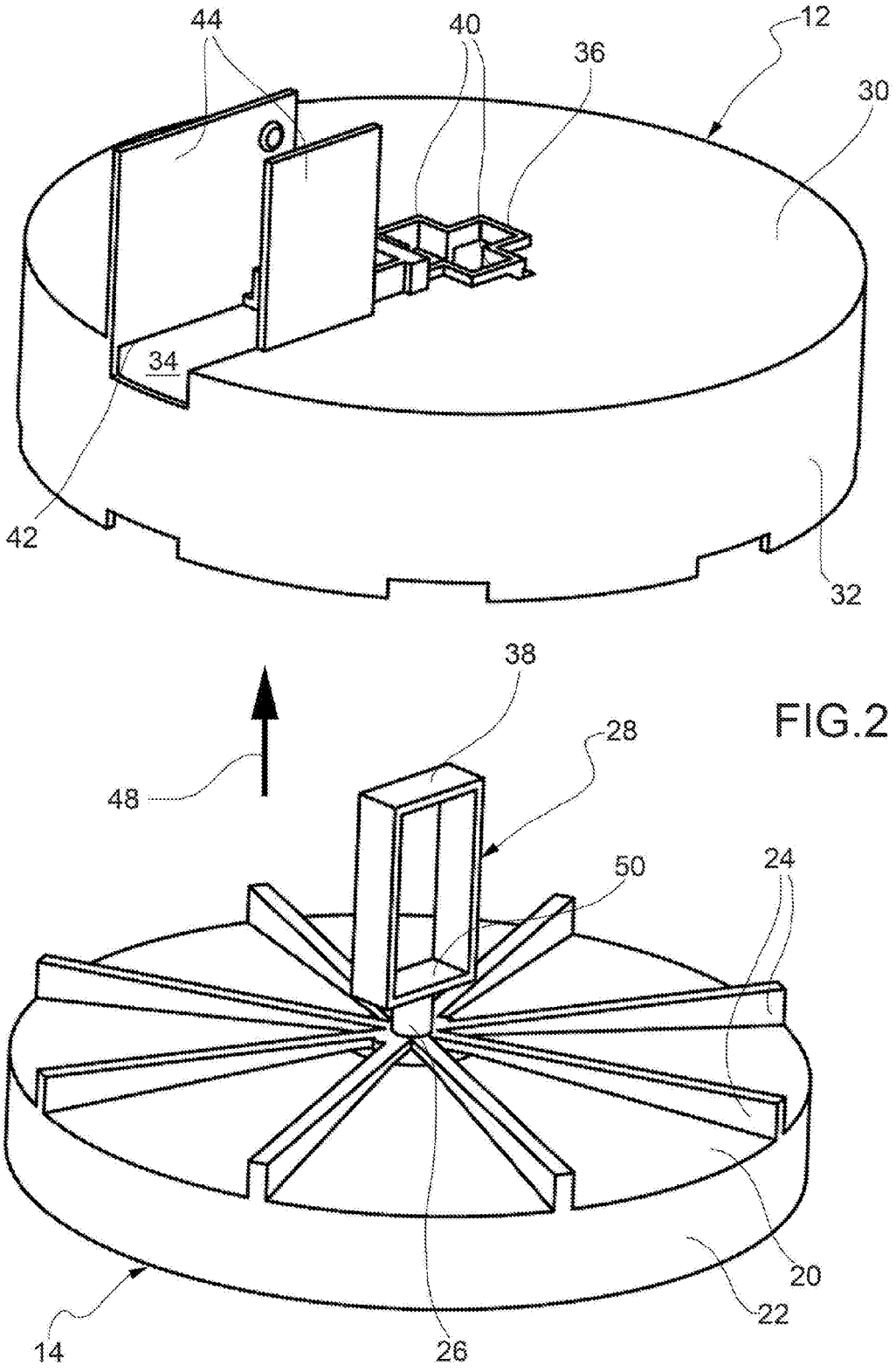

FIG.2

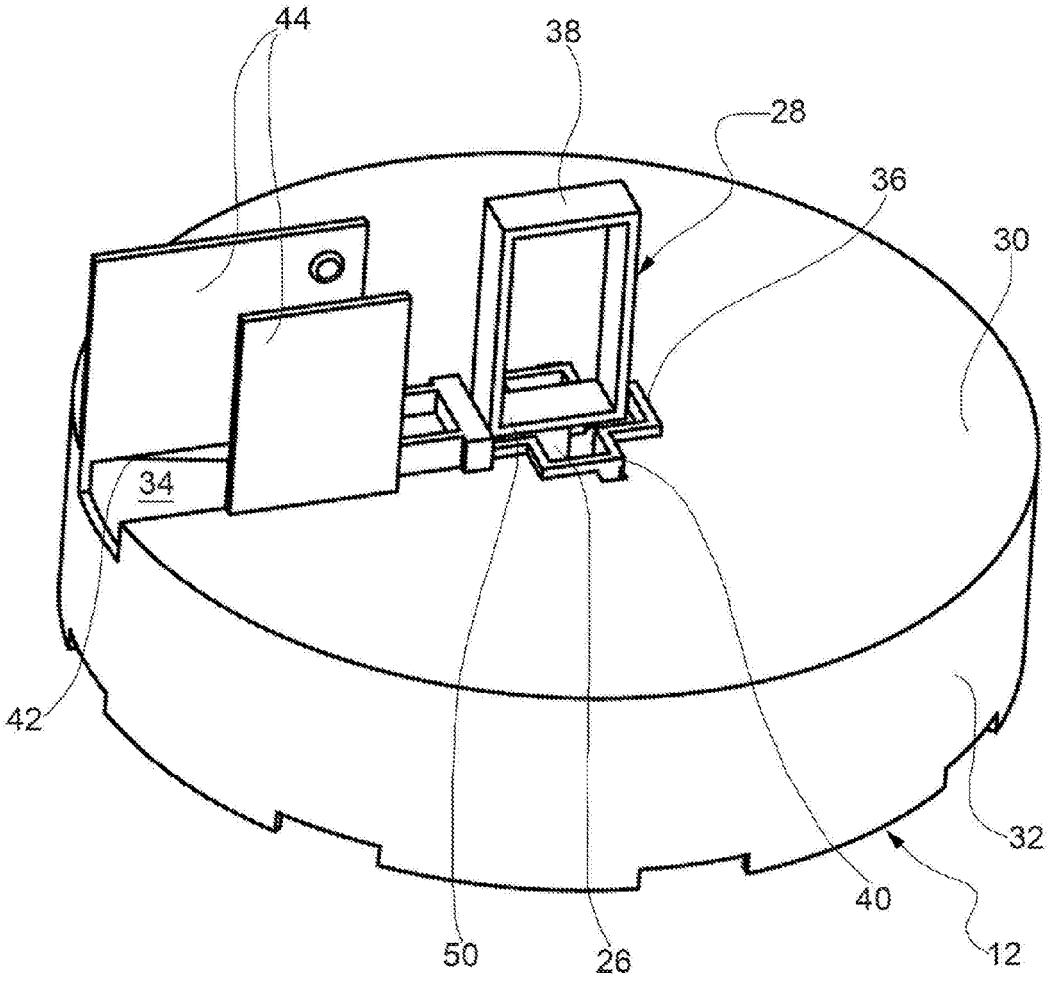

FIG.3

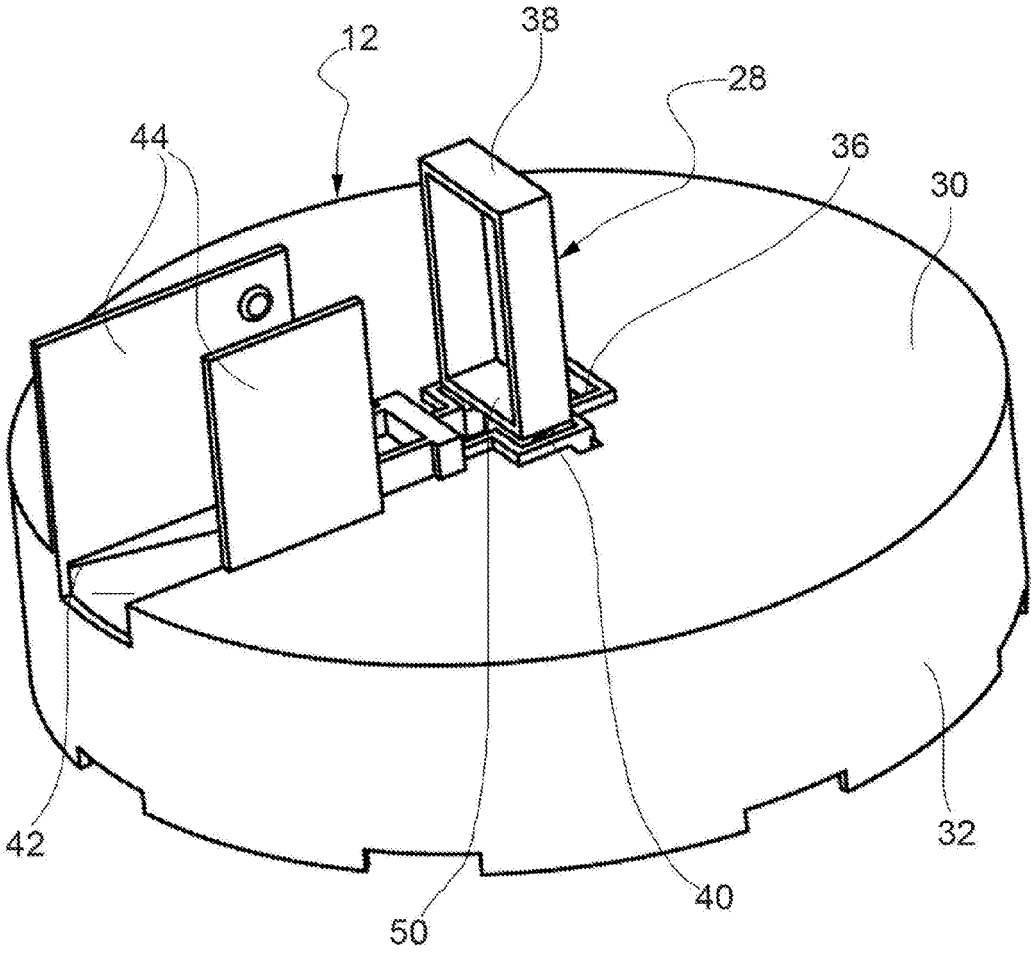

FIG.4

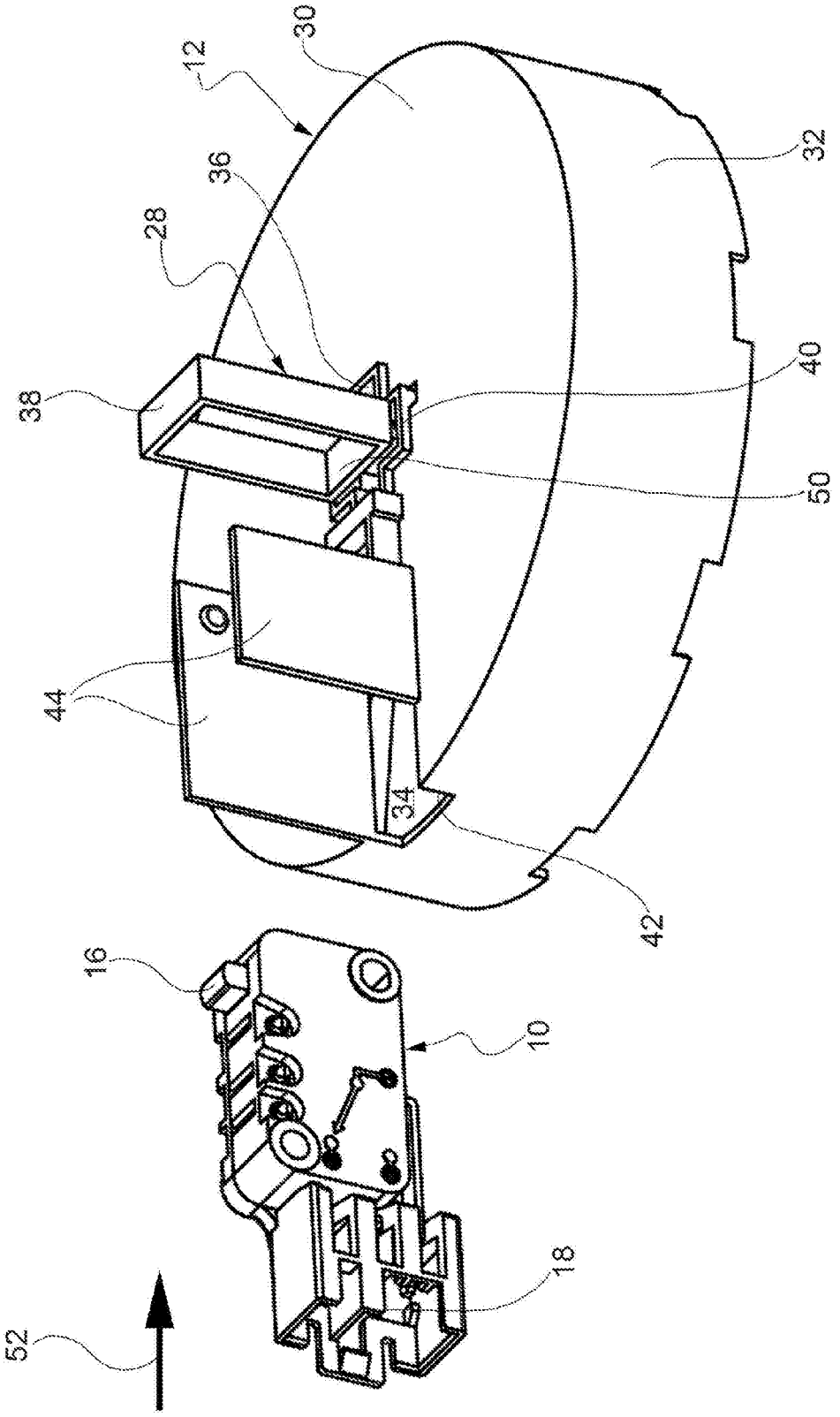

FIG.5

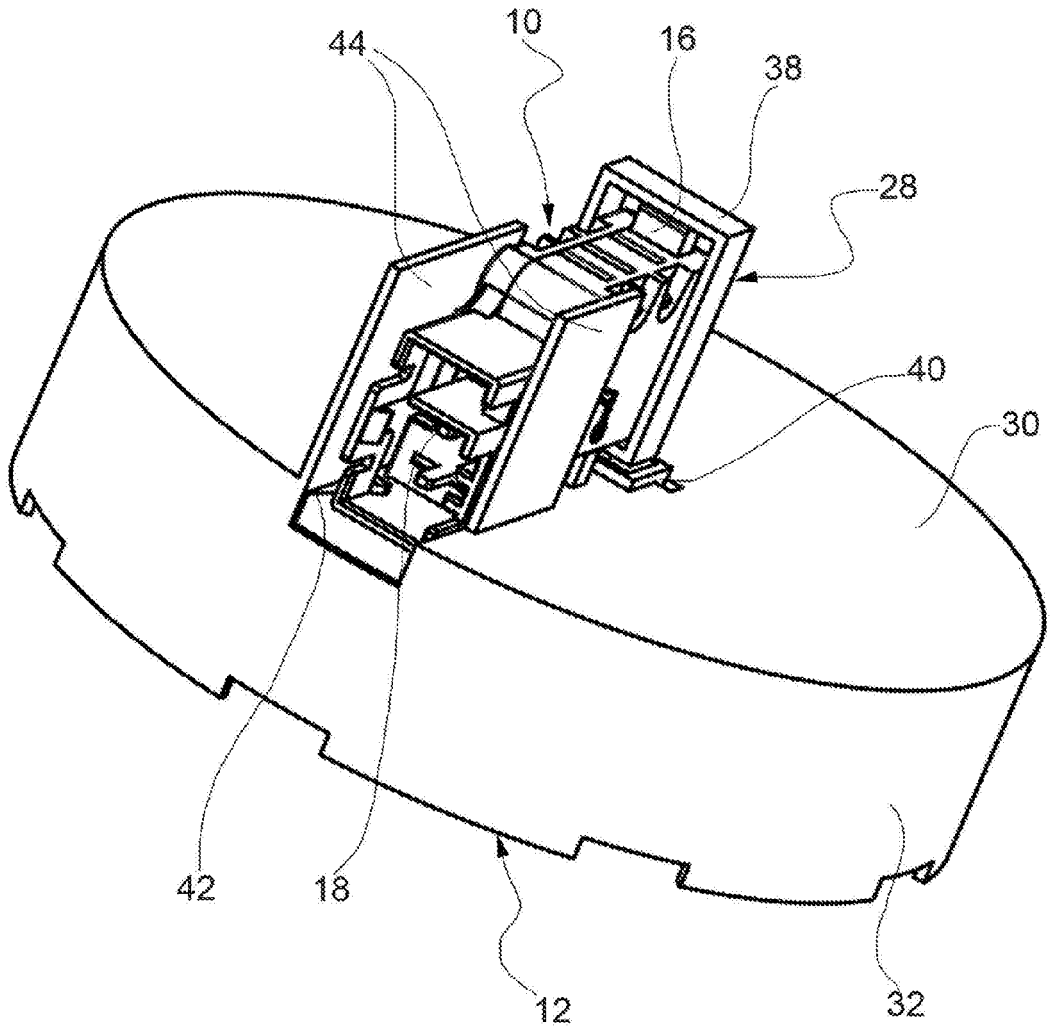

FIG.6

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EUROPEAN SEARCH REPORT

Application Number
EP 11 17 8591

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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

Place of search	Date of completion of the search	Examiner
Munich	4 November 2011	Clivio, Eugenio

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