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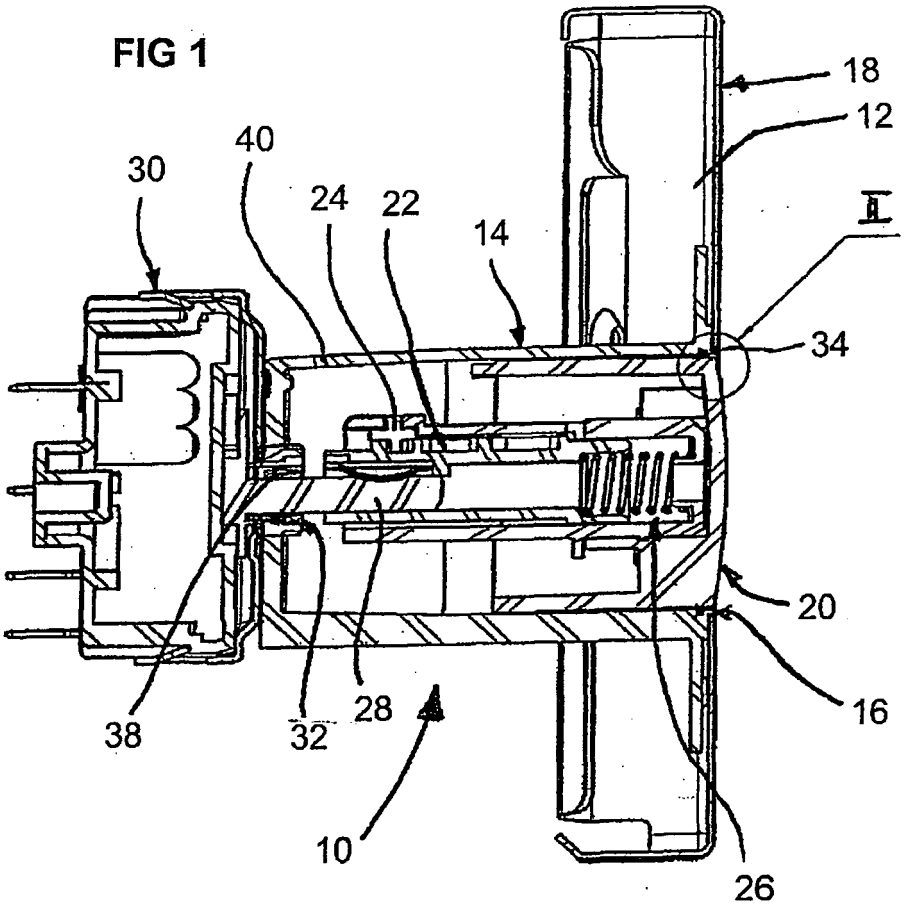
(54) **Knob**

(57) The present invention relates to a knob (10), in particular to a rotary control knob for an appliance, such as an oven, a dish washer, a cooker, a dryer, etc, wherein the knob (10) is provided with a damping mechanism.

FIG 1



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Description

TECHNICAL FIELD

[0001] The present invention relates to a knob, in particular to a rotary control knob for an appliance, such as an oven, a dish washer, a cooker, a dryer, etc.

BACKGROUND TECHNOLOGY

[0002] Knobs for controlling one or more functions of appliances are already known in many different designs.

[0003] One possible design of such a knob is disclosed in DE-A-199 51 422. This knob is designed as a rotary control knob and comprises a housing having a grip receiving hole; a grip inserted in the housing through the grip receiving hole, whereas the grip is movable within the housing between a countersunk position and an operating position by means of a countersinking mechanism; unlockable locking means for holding the grip in the countersunk position; and returning means in form of a spring for returning the grip from the countersunk position to the operating position after unlocking the locking means. In order to slow down the returning movement of the grip from the countersunk position to the operating position, a damper is provided, which counteracts the returning force of the spring. The damper is provided as a conventional hydraulic or pneumatic damper and comprises a cylinder and a displacement element. The cylinder is stationary held within the housing of the knob. The displacement element is fixed to the grip, such that it follows the movement of the grip, and is received and guided in the cylinder in such a manner, that a negative pressure is created within the internal space defined between the displacement element and the cylinder when the grip is moved. In this manner, the above-mentioned damping force is provided. However, the arrangement of a conventional damper increases the total number of components of the knob. This leads to higher production and installation costs.

[0004] Starting from the above mentioned prior art technology it is an object of the present invention to provide a knob, in particular a rotary control knob, which has an alternative configuration in order to reduce the total number of components and thus the production and installation costs.

DISCLOSURE OF THE INVENTION

[0005] This object is solved by providing a knob according to claim 1. The dependent claims refer to individual embodiments of the present invention.

[0006] The present invention provides a knob comprising a housing having a grip receiving hole; a grip inserted in the housing through the grip receiving hole, whereas the grip is axially movable within the housing between a countersunk position and an operating position by means of a countersinking mechanism; unlockable locking means for holding the grip in the countersunk position; and returning means for returning the grip from the countersunk position to the operating position after unlocking the locking means. According to the present invention, the knob further comprises sealing means, which are provided between the housing and the grip for providing an air tight seal; and at least one venting opening, which is formed in the housing, whereas the cross section of the at least one venting opening is chosen in such a manner, that a predetermined air flow rate is entering or leaving the housing when moving the grip between the countersunk position and the operating position. In other words, the housing for receiving the grip forms the cylinder of a damper, and the grip, which is received within the housing, forms the displacement element of a damper, whereas the damping force of this damper is adjustable by choosing the size of the venting hole. Accordingly, it is not necessary to install a conventional damper as a seperate component. Thus, the total number of components as well as the production and installation costs can be reduced.

[0007] Preferably, the knob is a rotary control knob, whereas the grip is rotatably arranged within the housing and is coupled with a shaft of a control unit in its operating position, said control unit serves for controlling a predetermined function of an appliance.

[0008] The shaft is preferably inserted in the housing through a shaft receiving hole, whereas, in a preferred embodiment, a second air tight sealing means is provided in the gap defined between the housing and the shaft. Accordingly, air cannot penetrate or leave the interior of the housing through the gap. As an alternative, the housing and the shaft can be connected and/or sealed by a screw connection. Furthermore, other connection techniques can be applied.

[0009] The sealing means are preferably formed as a sealing lip and/or as a sealing having a V-shaped cross section. Such sealing means have proved to be very appropriate for providing an air tight seal.

[0010] The first sealing means are preferably fixed to the housing or to the grip or to a separate element. If a separate element is used, said separate element is advantageously formed as a disc, which is inserted in the housing and fixed to the housing or to a part of the countersinking mechanism.

[0011] The sealing means are preferably made from plastic material, in particular polyoxymethylene or Teflon, silicone or rubber.

[0012] Moreover, the present invention provides a control panel of an appliance, in particular domestic appliance, comprising a knob of the above mentioned kind.

[0013] Furthermore, the present invention provides an appliance, in particular a domestic appliance, comprising a knob or a control panel as defined above.

BRIEF DESCRIPTION OF THE ACCCOMPANYING DRAWINGS

[0014] The detailed configuration, features and advantages of the present invention will become apparent in the course of the following description with reference to the accompanying drawings.

FIG. 1 is a sectional view showing a first embodiment of a knob according to the present invention, which is received in a control panel of a domestic appliance and connected to a control unit for controlling a function of the appliance;

FIG 2 is an enlarged view of the circular section II in FIG 1;

FIG 3 is a sectional view of a second embodiment of a knob according to the present invention, which is received in a control panel of a domestic appliance and connected to a control unit for controlling a function of the appliance;

FIG 4 is an enlarged view of the circular section IV in FIG 3;

FIG 5 is a sectional view of a third embodiment of a knob according to the present invention, which is received in a control panel of a domestic appliance and connected to a control unit for controlling a function of the appliance;

FIG 6 is an enlarged view of the circular section VI in FIG 5;

FIG 7 is a sectional view of a fourth embodiment of a knob according to the present invention, which is received in a control panel of a domestic appliance and connected to a control unit for controlling a function of the appliance;

FIG 8 is an enlarged view of the circular section VIII in FIG 7;

FIG 9 is a sectional view of a fifth embodiment of a knob according to the present invention, which is received in a control panel of a domestic appliance and connected to a control unit for controlling a function of the appliance;

FIG 10 is an enlarged view of the circular section X in FIG 9.

BEST MODE FOR CARRYING OUT THE INVENTION

[0015] Below, embodiments of the present invention will be described with reference to the FIGs. In the FIGs, like parts or portions are denoted by like reference numerals, and redundant description will be omitted.

[0016] FIGs 1 and 2 show a first embodiment of a knob 10 according to the present invention, which is received in a control panel 12 of a domestic appliance, such as an oven, a dish washer, a washing machine, a dryer, etc. The knob 10 comprises a housing 14, which is fixed to the control panel 12 in a torque proof manner. The housing 14 is formed with a grip receiving hole 16, which opens towards the front face 18 of the control panel 12. A grip 20 is inserted in the grip receiving hole 16 of the housing 14 and is coupled to a countersinking mechanism 22 in such a manner, that the grip 20 is axially movable within the housing 14 between a countersunk position (shown in FIG 1) and an operating position, in which the grip projects from the front face 18 of the control panel 12. Moreover, the knob 10 comprises an unlockable locking means 24 for holding the grip 16 in the countersunk position. Furthermore, returning means 26 are provided in the form of a spring for returning the grip 20 from the countersunk position to the operating position after unlocking the locking means 24. The countersinking mechanism 22 is coupled to a shaft 26 of a control unit 30 for controlling a predetermined function of the appliance. The shaft 26 is inserted through a shaft receiving hole 32, which is formed within housing 14 opposite to the grip receiving hole 16.

[0017] In order to adjust the function of the appliance controlled by the control unit 30, a user pushes the grip 20 towards the control unit 30 for a start, in order to unlock the locking means 24 holding the grip 20 in the countersunk position shown in FIG 1. Thereafter, the grip 20 is automatically transferred to its operating position by the return force of the returning means 26. Thereafter, the user can turn the grip 20 to the left right in order to perform an adjustment of the assigned function. This rotary motion is transferred to the control unit 30 by means of the shaft 28, what leads to an adjustment of the function controlled by the control unit 30. The general design of the grip 20, of the countersinking mechanism 22, of the locking means 24, of the returning means 26, of the shaft 28 and of the control unit 30 is known to a person skilled in the art. Accordingly, these components are not described in further detail herein.

[0018] The housing 14 is constructed in an essentially air tight manner. For this purpose a first sealing means 34 in the form of a sealing ring having a V-shaped cross section is inserted in a circumferential grove 36 formed along the inner diameter of the housing 14 close to the front face 18 of the control panel 12, such that the sealing means provides an air tight seal between the housing 14 and the grip 20. Moreover, a second sealing means 38, which can also be designed as a screw connection, can be arranged within the shaft receiving hole 32 for providing an air tight seal between the housing 14 and the shaft 28. Accordingly, air cannot enter or leave the housing 14 through the grip receiving hole 16 or the shaft receiving hole 32. Only a venting hole 40, which is formed in the housing 14, allows a passing of air during the axial move-

ment of the grip 20 between the countersunk position and the operating position. More precisely, air is pushed out of the interior space of the housing 14 when moving the grip 20 from the operating position towards the countersunk position, and air is suncked in through the venting hole 40, when the grip 20 is moved from the countersunk position towards the operating position. Accordingly, a damping force is created during the axial movement of the grip 20, whereas the flow rate of air flowing through the venting hole 40 and thus the strength of the damping force is determined by the cross section or size of the venting hole 40. Therefore, the damping force can be varied by changing the cross section of the venting hole 40.

[0019] Due to the air tight design of the housing 14 and the arrangement of the venting hole 40, the provision of a conventional damper as a seperate component is omitted. Thus, the total number of components of the knob 10 can be reduced. Accordingly, the production and installation costs can be decreased.

[0020] FIGs 3 and 4 show a knob 50 according to a second embodiment of the present invention. The design of the knob 50 essentially corresponds to the one of the knob 10 shown in FIGs 1 and 2. However, the first sealing means 34 is not fixed to the housing 14 but inserted in a circumferential groove 52 formed close to the free end 54 of the cup-shaped grip 20 in order to provide the air tight seal between the housing 14 and the grip 20.

[0021] FIGs 5 and 6 show a knob 60 according to a third embodiment of the present invention. The knob 60 comprises a housing 62, which is fixed to the backside of a control panel 64 in a torque proof manner. The housing 62 comprises a grip receiving hole 66 facing towards the control panel 64. The grip 68 is inserted in the housing 62 through the grip receiving hole 66 and coupled to a countersinking mechanism 70 in such a manner, that the grip 68 is axially movable between the countersunk position and an operating position. This movement of the grip 68 is guided by a sliding bushing 72, which is fixed to the control panel 64 and surrounds the outer diameter of the grip 68. Moreover, the knob 60 comprises an unlockable locking means 74 for holding the grip 68 in the countersunk position. Furthermore, a returning means 76 in the form of a spring is coupled to the grip 68 in order to push the grip 68 from the countersunk position to the operating position after unlocking the locking means 74. The countersinking mechanism 70 is coupled to a control unit 78 by means of a shaft 80, which extends into the inner space of the housing 62 through a shaft receiving hole 82 formed in the housing 62. In order to seal the grip receiving hole 66 in an air tight manner, a disc shaped element 84 is fixed to the outer diameter of the countersinking mechanism 70 in a position close to the free end 86 of the cup-shaped grip 68 arranged in its countersunk position. At the circumferential side of the disc shape element 84 a circumferential grove 88 is formed, which receives a ring-shaped first sealing means 90 that abuts against the inner diameter of the housing 62. Moreover, a second sealing means 92, which can also be designed as a screw connection, can be arranged between the housing 62 and the shaft 80 in order to provide an air tight seal between these components. For providing the above-mentioned damping effect, a venting hole 94 is formed through the wall of the housing 62 to form a connection between the interior space of the housing 62 and the environment.

[0022] FIGs 7 and 8 show a knob 100 according to a fourth embodiment of the present invention. The design of the knob 100 is very similar to the one of the knob 60 shown in FIGs 5 and 6. However, the air tight sealing of the grip receiving hole 66 provided by means of the disc shape element 84, the groove 88 and the first sealing means 90, is replaced by a first sealing means 102, which is fixed to the free end 104 of the cup-shaped housing 106, said first sealing means 102 sealing the ring-shaped space between the housing 106 and the knob 60.

[0023] FIGs 9 and 10 show a knob 110 according to a fifth embodiment of the present invention. The design of the knob 110 essentially corresponds to the one of the knob 100 shown in FIGs 7 and 8. However, the ring-shaped sealing means 112 is,pressed against the free end 104 of the housing 106 by means of a clamping ring 114 for sealing the ring-shaped space between the housing and the grip.

[0024] The embodiments according to FIGs 7 and 8 as well as according to FIGs 9 and 10 are, with respect'to their functionality, similar to the embodiments according to FIGs 1 and 2. The control panels ,64 in embodiments according to FIGs 5, 7 and 9 are preferably glas panels.

[0025] List of reference numerals

10	knob
12	control panel
14	housing
16	grip receiving hole
18	front face
20	grip
22	countersinking mechanism
24	locking means
26	returning means
28	shaft
30	control unit
32	shaft receiving hole
34	first sealing means
36	groove
38	second sealing means
40	venting hole
50	knob
52	groove
54	free end
60	knob
62	housing
64	control panel
66	grip receiving hole
68	grip
70	countersinking mechanism

72 sliding bushing
74 locking means
76 returning means
78 control unit
80 shaft
82 shaft receiving hole
84 disc shaped element
86 free end
88 groove
90 first sealing means
92 second sealing means
94 venting hole
100 knob
102 first sealing means
104 free end
106 housing
110 knob
112 first sealing means
114 planting ring

Claims

1. Knob (10; 50; 60; 100; 110) comprising

- a housing (14; 62; 106) having a grip receiving hole (16; 66),
- a grip (20;, 68) inserted in the housing (14; 62; 106) through the grip receiving hole (16; 66), said grip (20; 68) being axially movable within the housing (14; 62; 106) between a countersunk position and an operating position by means of a countersinking mechanism,
- unlockable locking means (24; 74) for holding the grip (20; 68) in the countersunk position, and
- returning means (26; 76) for returning the grip (20; 68) from the countersunk position to the operating position after unlocking the locking means,

characterized in that

- first sealing means (34; 90; 102; 112) are provided between the housing (14; 62; 106) and the grip (20; 68) for providing an air tight seal, and
- at least one venting opening (40; 94) is formed in the housing (14; 62; 106), whereas the cross section of the at least one venting opening (40; 94) is chosen in such a manner that a predetermined air flow rate is entering or leaving the housing (14; 62; 106) when moving the grip (20; 68) between the countersunk positon and the operating position.

2. Knob (10; 50; 60; 100; 110) according to claim 1, **characterized in that** the knob (10; 50; 60; 100; 110) is a
rotary control knob, whereas the grip (20; 68) is rotatably arranged and is coupled with a shaft (28; 80) of a control unit (30; 78) in its operating position.

3. Knob (10; 50; 60; 100; 110) according to claim 2, **characterized in that** the shaft (28; 80) is inserted in the housing (14; 62; 106) through a shaft receiving hole (32; 82), whereas preferably a second air tight sealing means (38; 92) is provided in the gap defined between the housing (14; 62; 106) and the shaft (28; 80) and/or whereas preferably the housing (14; 62; 106) and the shaft (28; 80) are connected and/or sealed by a screw connection or by another connection technique.

4. Knob (10; 50; 60; 100; 110) according to one of the foregoing claims, **characterized in that** the sealing means (34, 38, 90, 92, 102, 112) are formed as a sealing lip and/or as a sealing having a V-shaped cross section.

5. Knob (10; 50; 60; 100; 110) according to one of the foregoing claims, **characterized in that** the first sealing means (34; 90; 102; 112) is fixed to the housing (14; 62; 106) or to the grip (20; 68) or to a separate element (84).

6. Knob (60) according to claim 5, **characterized in that** the separate element (84) is a disc, which is fixed to the housing or to a part of the countersinking mechanism (22; 70).

7. Knob (10; 50; 60; 100; 110) according to one of the foregoing claims, **characterized in that** the sealing means (34, 38, 90, 92, 102, 112) are made from plastic material, in particular polyoxymethylene or Teflon, silicone or rubber.

8. Control panel (12) of an appliance, in particular domestic appliance, comprising a knob (10; 50; 60; 100; 110) according to one of the foregoing claims.

9. Appliance, in particular domestic appliance, comprising a knob (10; 50; 60; 100; 110) according to one of the claims 1 to 7 or a control panel (12) according to claim 8.

FIG 1

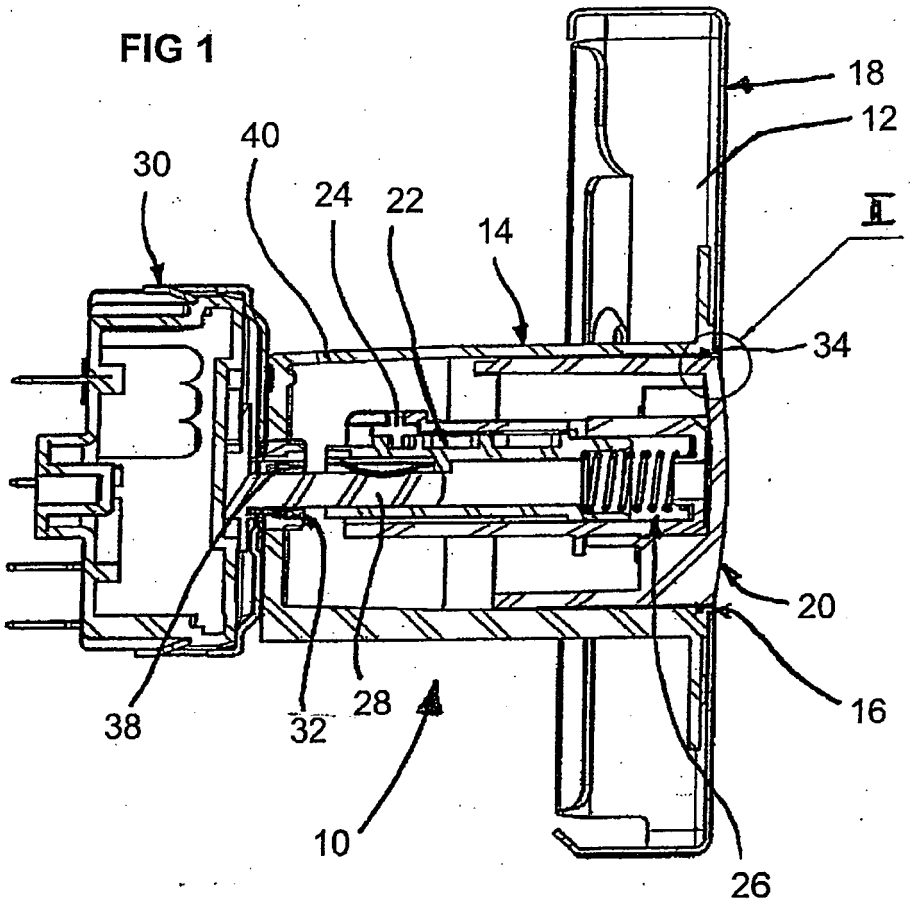


FIG 2

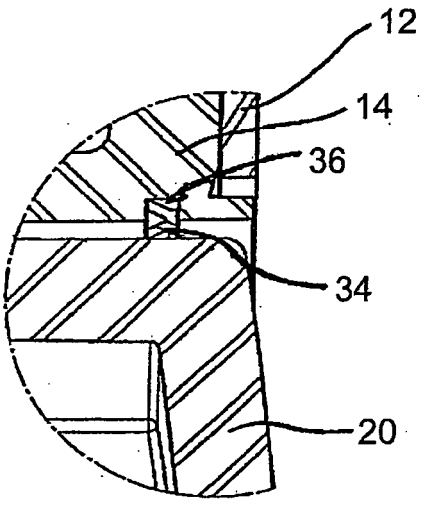


FIG 3

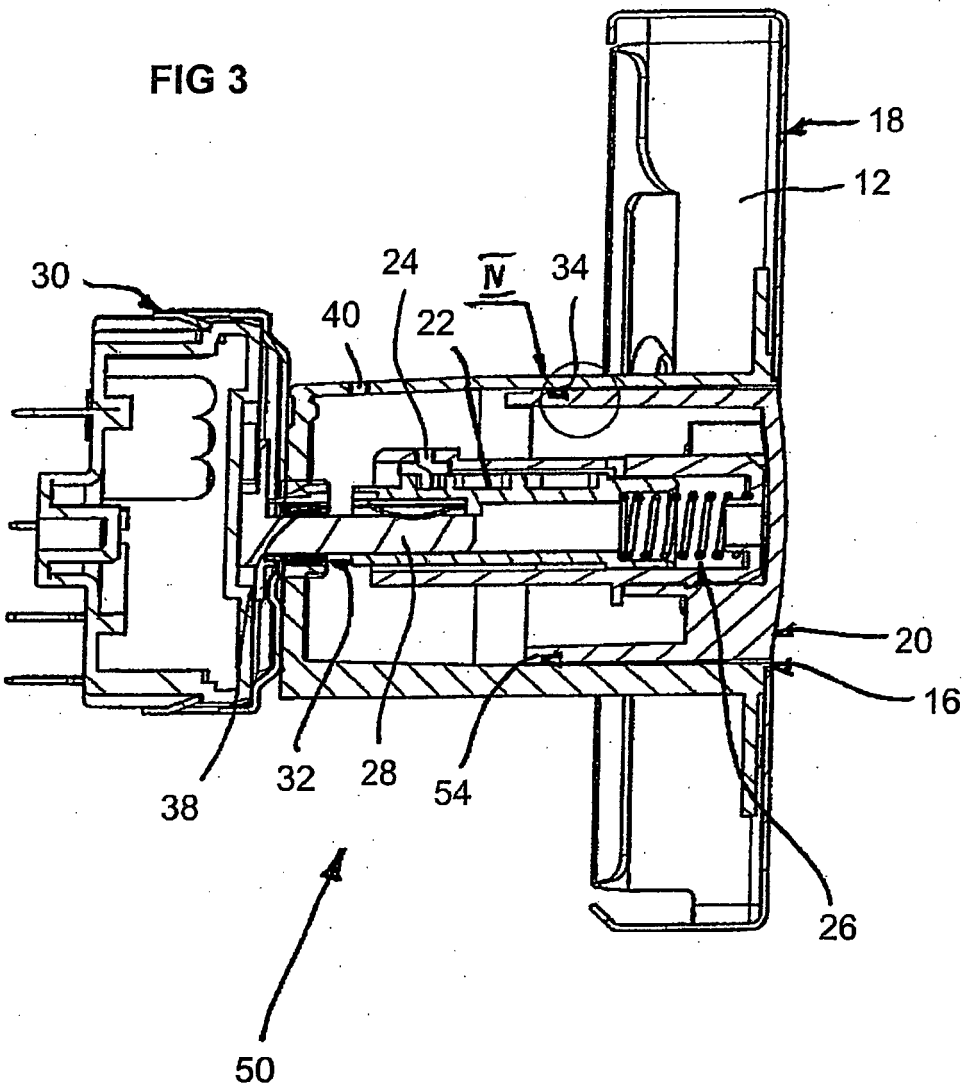


FIG 4

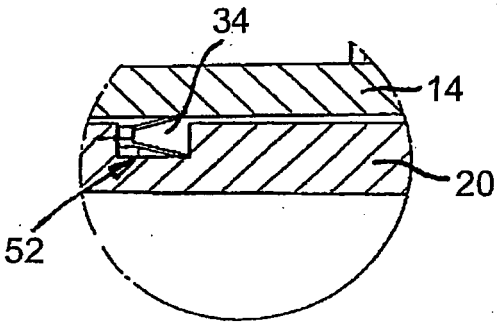


FIG 5

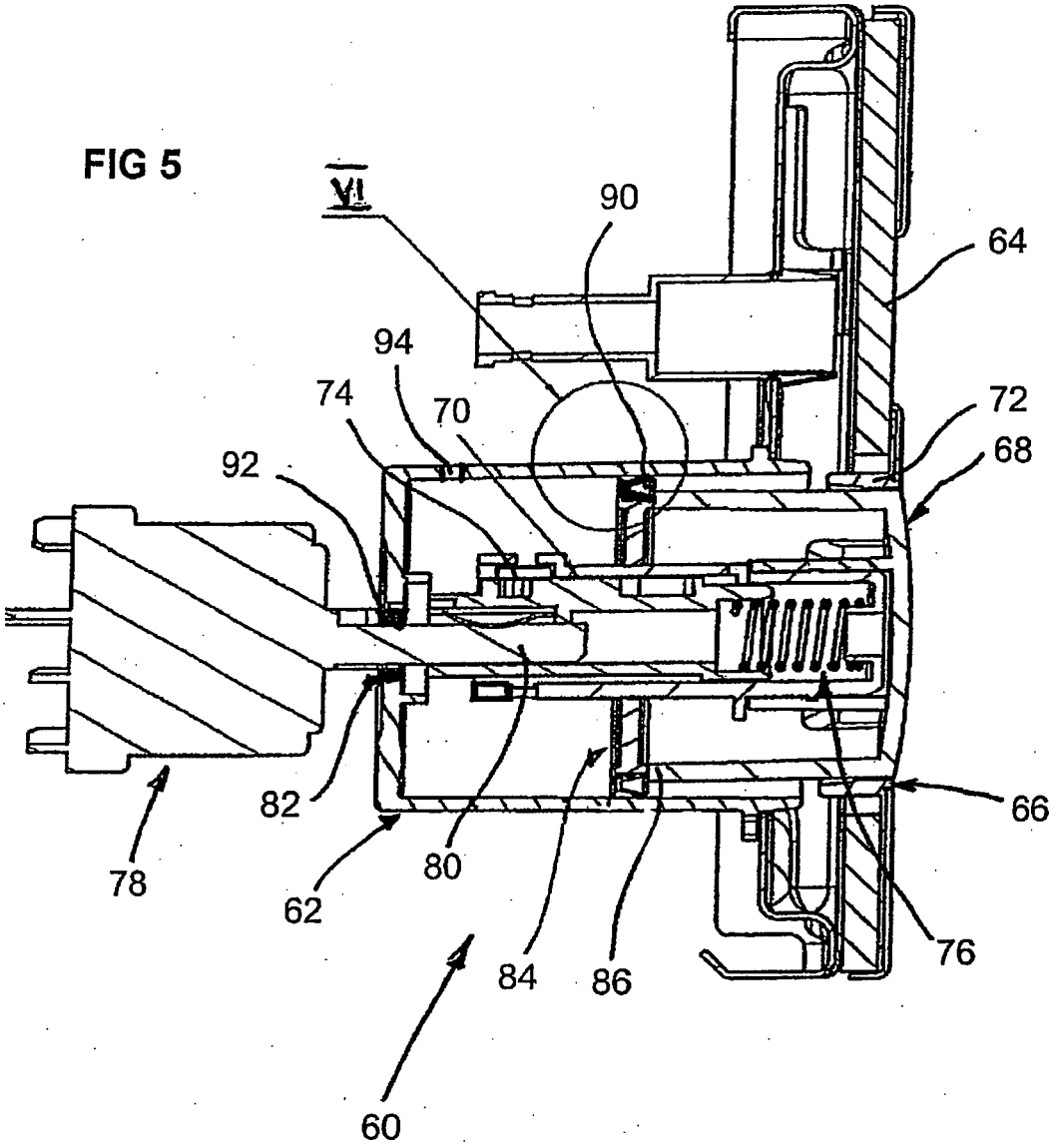


FIG 6

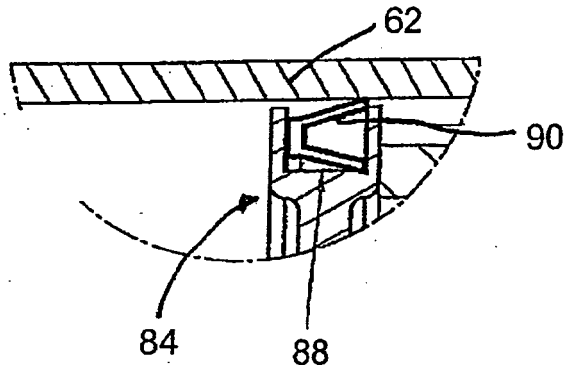


FIG 7

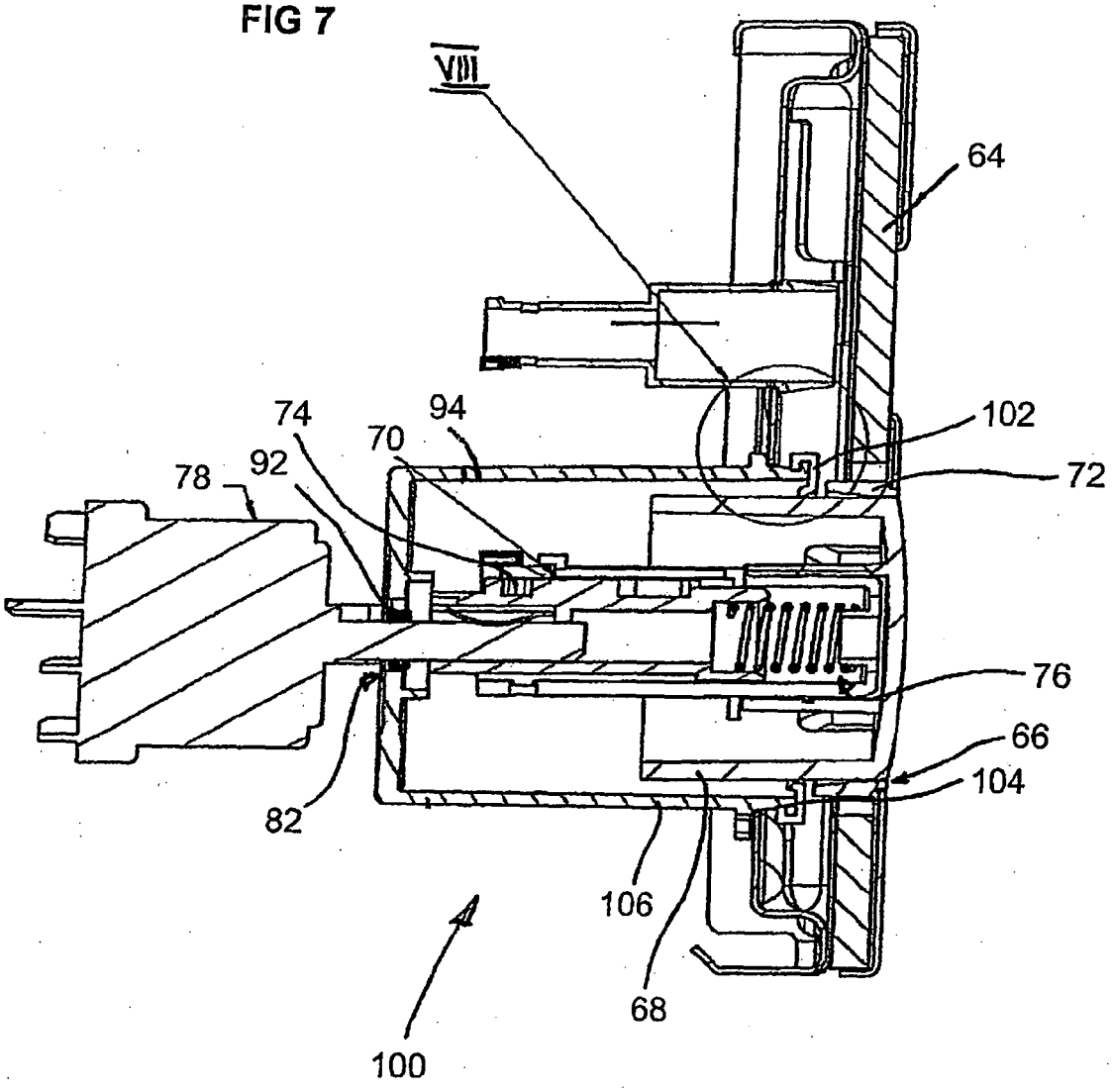


FIG 8

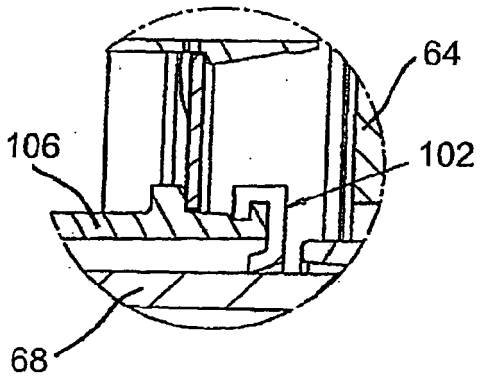


FIG 9

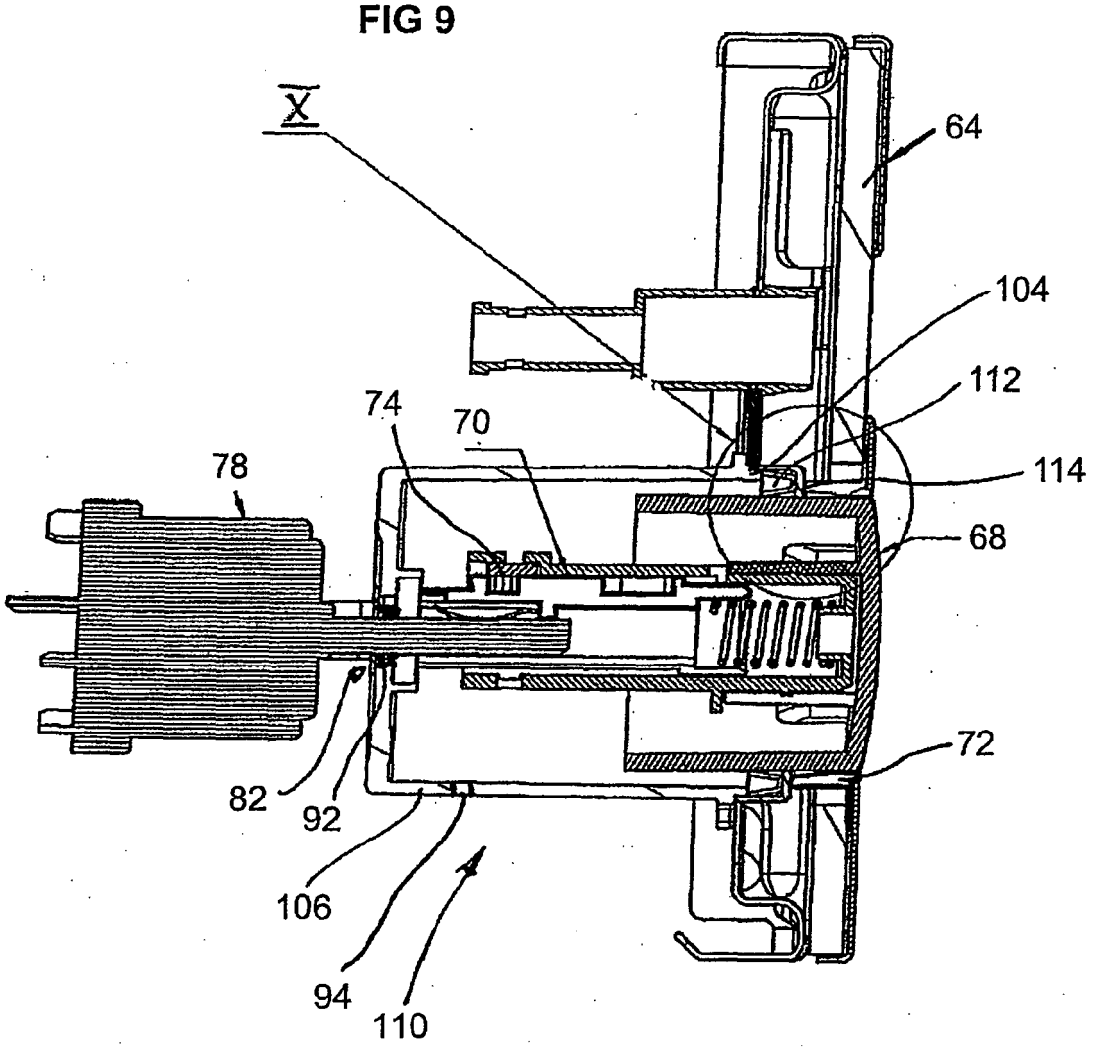
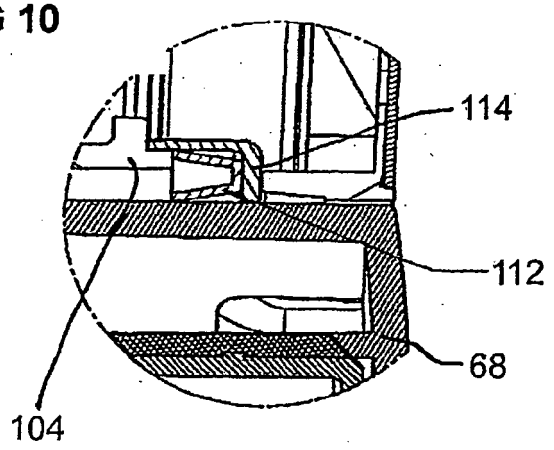


FIG 10



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EUROPEAN SEARCH REPORT

Application Number
EP 09 00 4151

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	EP 1 471 547 A2 (ITW IND COMPONENTS SRL [IT]) 27 October 2004 (2004-10-27) * paragraph [0010] - paragraph [0031]; figures *	1-9	INV. G05G1/08 G05G5/03 G05G25/04
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TECHNICAL FIELDS SEARCHED (IPC)
G05G

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	18 June 2009	Popescu, Alexandru

CATEGORY OF CITED DOCUMENTS

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1 EPO FORM 1503 03.82 (P04C01)

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18-06-2009

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

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