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(54) **IGNITION SWITCH**

(57) The invention relates to an ignition switch for a gas appliance (10) comprising a housing (2) and a first and a second contact portion (3, 4) included in an interior space (2.1) of said housing (2), wherein said housing (2) comprises a flexible wall portion (2a) which at least partially confines said interior space (2.1) of said housing

(2), wherein at least one contact portion (3, 4) is operatively coupled with said flexible wall portion (2a) such that an electrical contact is achieved between the first and the second contact portion (3, 4) when deforming the flexible wall portion (2a).

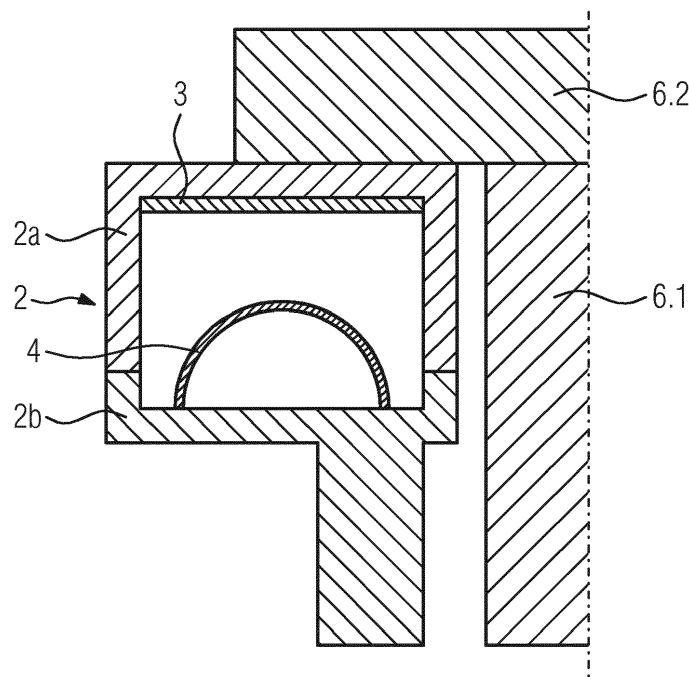


FIG 2

Description

[0001] The present invention relates generally to the field of electric switches. More specifically, the present invention relates to an ignition switch for gas appliances.

BACKGROUND OF THE INVENTION

[0002] Gas appliances comprising one or more ignition switches in order to provide a spark at a gas burner for igniting said gas burner are basically known. The ignition switch may be operatively coupled with a knob of a gas tap in order to generate an ignition spark when pressing the knob. More in detail, the ignition switch allows to close an electrical circuit in which a spark generator is provided.

[0003] German patent DE 1 429 108 C3 discloses an ignition arrangement comprising mechanical transfer elements.

[0004] German patent application DE 196 10 522 A1 discloses an ignition switching mechanism comprising a switching element which is operatively coupled with a plurality of shafts of gas taps.

[0005] Disadvantageously, known ignition switches are quite inflexible regarding their usage in different kinds of appliances and are prone to errors, malfunctions and lack of safety caused by splashed liquid and/or dirt.

SUMMARY OF THE INVENTION

[0006] It is an objective of the embodiments of the invention to provide an ignition switch for gas appliances which shows a greater degree of flexibility to be used in different assembling situations and which show a greater spillage resistance and durability. The objective is solved by the features of the independent claims. Preferred embodiments are given in the dependent claims. If not explicitly indicated otherwise, embodiments of the invention can be freely combined with each other.

[0007] According to an aspect, the invention relates to an ignition switch for a gas appliance. The ignition switch comprises a housing and a first and a second contact portion included in an interior space of said housing. Said housing comprises a flexible wall portion which at least partially confines said interior space of said housing. At least one contact portion is operatively coupled with said flexible wall portion such that an electrical contact is achieved between the first and the second contact portion when deforming the flexible wall portion.

[0008] The flexible wall portion may be formed by a reversibly elastically deformable material. Thereby, the electrical contact between the first and the second contact portion can be opened solely by means of restoring forces of the flexible wall portion itself. In other words, no spring elements are required for opening the contact.

[0009] Said ignition switch is advantageous because due to the flexible wall portion of the housing, the switching operation can be obtained by a deformation of the flexible wall portion. Thereby, the spillage resistance and

the fields of application of the ignition switch are greatly increased.

[0010] According to embodiments, the housing comprises a further wall portion, wherein said first and second contact portions are encapsulated between said flexible wall portion and said further wall portion. Preferably, the flexible wall portion and the further wall portion are connected in a fluid-tight manner, e.g. by gluing, moulding or similar connection methods. Preferably, the flexible wall portion and the further wall portion are connected without providing a gasket between said wall portions.

[0011] According to embodiments, said flexible wall portion forms an upper portion of said housing. Thereby, when pressing a knob of the gas tap, the lower portion of the knob will get in contact with the flexible wall portion and cause a deformation of the flexible wall portion.

[0012] According to embodiments, said flexible wall portion comprises a U-like or essentially U-like shape. Thereby, the legs of the U-like shaped flexible wall portion can be bent outwardly thereby enabling a physical contact between the contact portions.

[0013] According to embodiments, a contact portion is arranged at the flexible wall portion and the other contact portion is arranged at the further wall portion. Thereby, when deforming the flexible wall portion, the contact portions come closer to each other and get in physical contact.

[0014] According to embodiments, one contact portion of said first and second contact portions comprises a planar contact pad. Said planar contact portion may be provided at the flexible wall portion, specifically at the bottom portion of the U-like shaped flexible wall portion.

[0015] According to other embodiments, the planar contact pad may be provided at the further wall portion arranged opposite to the flexible wall portion.

[0016] According to embodiments, one contact portion of said first and second contact portions comprises a convexly shaped contact section, wherein the curvature of the convexly shaped contact section is provided towards the other contact portion. Thereby, an electrical contact can be achieved in a reliable way because even a deformation of the flexible wall portion which is locally limited to a certain portion of the flexible wall portion may lead to a closing of the electrical contact because said convexly shaped contact section ensures a reliable contact.

[0017] According to embodiments, the ignition switch comprises an elongated and/or bar-like shape. Thereby, the ignition switch may extend along multiple gas taps which are arranged in a row and the pressing of one knob of said gas taps ensures a switching operation of the ignition switch.

[0018] According to embodiments, the first and second contact portions are integrally formed and extend along the elongated and/or bar-like housing, specifically, along the whole or essentially the whole length of the interior space of the elongated and/or bar-like housing. Thereby, the ignition switch may comprise a single switch, specifically a micro-switch, and a switching operation caused

by one gas tap corresponding with the ignition switch causes the same switching operation than a switching operation caused by another gas tap corresponding with the ignition switch.

[0019] According to embodiments, the housing comprises two parallel branches which are distanced in a middle portion of the ignition switch by means of a gap in order to provide a passage for one or more gas tap shafts. Thereby, the one or more gas tap shafts can extend through the ignition switch and the reliability of ignition switch is further increased because switching means are provided at opposite sides of the gas tap shaft.

[0020] According to embodiments, first and second contact portions are provided in both branches or only in one branch. In other words, a pair of contact portions can be provided only at one side of the gas tap shaft or the contact portions are duplicated at both sides of the gas tap shaft.

[0021] According to embodiments, the flexible wall portion is integrally formed and extends over both branches. Thereby, the spillage resistance of the ignition switch is further improved.

[0022] According to embodiments, the further wall portion is integrally formed and extends over both branches. Thereby, the spillage resistance of the ignition switch is further improved.

[0023] According to a further aspect, the invention relates to a gas appliance comprising one or more gas taps and an ignition switch for igniting one or more gas burners, the ignition switch being configured according to any embodiment described before.

[0024] According to embodiments, the gas appliance comprises multiple gas taps, wherein the ignition switch extends along said multiple gas taps, specifically along all gas taps of the appliance. Thereby, only a single ignition switch is required which clearly reduces the assembly effort.

[0025] According to embodiments, the ignition switch is placed below one or more knobs of said one or more gas taps such that the flexible wall portion of the ignition switch is deformed when pressing at least one knob. Thereby, switching operation is obtained by a direct impact of the knob on the flexible wall portion. Alternatively, the switching operation can also be obtained by an indirect impact of the knob, e.g. by a transfer entity provided between the knob and the ignition switch.

[0026] The term "essentially" or "approximately" as used in the invention means deviations from the exact value by +/- 10%, preferably by +/- 5% and/or deviations in the form of changes that are insignificant for the function.

BRIEF DESCRIPTION OF THE DRAWINGS

[0027] The various aspects of the invention, including its particular features and advantages, will be readily understood from the following detailed description and the accompanying drawings, in which:

Fig. 1 shows an example lateral sectional view of an ignition switch arranged at a set of gas taps;

Fig. 2 shows an example lateral sectional view of an ignition switch arranged at a knob of a gas tap;

Fig. 3 shows an example lateral sectional view through the housing of an ignition switch without applying an external force;

Fig. 4 shows an example lateral sectional view through the housing of an ignition switch when applying an external force;

Fig. 5 shows an exploded view of an ignition switch with a two branch configuration;

Fig. 6 shows a gas appliance comprising an ignition switch according to fig. 5;

Fig. 7 shows a further example lateral sectional view through the housing of an ignition switch without applying an external force.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[0028] The present invention will now be described more fully with reference to the accompanying drawings, in which example embodiments are shown. However, this invention should not be construed as limited to the embodiments set forth herein. Throughout the following description similar reference numerals have been used to denote similar elements, parts, items or features, when applicable.

[0029] Fig. 1 illustrates a schematic diagram of an arrangement of an ignition switch 1 and multiple gas taps 6 which interact with said ignition switch 1 for igniting gas burners (not shown in fig. 1) which are coupled with said gas taps 6.

[0030] The ignition switch 1 is adapted to be arranged below a knob 6.2 of the gas tap 6, said knob 6.2 being coupled with a valve portion of gas tap 6 via a gas tap shaft 6.1. The arrangement of the ignition switch 1 with respect to the knob 6.2 is chosen such that, when pressing the knob 6.2, a lower surface of the knob 6.2 abuts against an upper portion of the ignition switch 1. Thereby, at least a portion of the ignition switch 1 is deformed causing a closure of an electrical contact within the ignition switch 1. Said closing of electrical contact causes an ignition spark at one or more gas burners.

[0031] As shown in Fig. 1, the ignition switch 1 may span along multiple gas taps 6. More in detail, a single ignition switch 1 may comprise a longitudinal shape and may extend across multiple gas taps 6 such that multiple knobs 6.2 of gas taps 6 can interact with the ignition switch 1 as mentioned before.

[0032] Fig. 2 shows a partial cross-sectional view of

an arrangement of a knob 6.2 and an ignition switch 1.

[0033] The ignition switch 1 comprises a housing 2. At least a portion of said housing 2 is made of a flexible material. So, in other words, the housing 2 comprises a flexible wall portion 2a made of a flexible, deformable material. Said material may be silicone, rubber, flexible plastic or a flexible, insulating composite or mixed material. In the shown embodiment, the flexible wall portion 2a forms the upper portion of the housing 2 which gets in contact with the knob 6.2. The flexible wall portion 2a may comprise a U-like shape which opens downwardly.

[0034] The housing 2 may further comprise a further wall portion 2b made of a rigid material. Said further wall portion 2b may form the lower portion of the housing 2, specifically a portion which is arranged below the flexible wall portion 2a.

[0035] The flexible wall portion 2a and the further wall portion 2b may confine an interior space 2.1 within said housing 2. In said interior space 2.1, electrical switching means including at least a first contact portion 3 and a second contact portion 4 are provided.

[0036] The flexible wall portion 2a and the further wall portion 2b may be glued, molded or otherwise firmly bonded in order to achieve a hermetically sealing of electrical switching means included within the housing 2. Specifically, the flexible wall portion 2a and the further wall portion 2b may be connected such that a fluid-tight encapsulation of the first contact portion 3 and the second contact portion 4 is achieved. Said fluid-tight encapsulation is preferably obtained without any gaskets provided between the flexible wall portion 2a and the further wall portion 2b.

[0037] As shown in Fig. 1 and 2, the first contact portion 3 is provided at the flexible wall portion 2a and the second contact portion 4 is provided at the further wall portion 2b. Thereby, due to the flexibility of the wall portion 2a, the distance d between the first and second contact portion 3, 4 can be changed when pressing the knob 6.2 and the first and second contact portion 3, 4 can get in contact with each other (which results in a closed electrical contact).

[0038] As shown in Fig. 2, the first and second contact portion 3, 4 may comprise different shapes. For example, one of the contact portions, for example the first contact portion 3 which is provided at the flexible wall portion 2a, may comprise a planar shape, whereas the other contact portion, for example, the second contact portion 4, may comprise a convex shape. More in detail, the other contact portion may comprise an upwardly oriented curvature in order to improve the electrical contact when pressing the knob 6.2.

[0039] The contact portions 3, 4 may comprise a longitudinal shape and may extend along the longitudinal axis within the housing 2. So, in other words, the contact portions 3, 4 may be integrally formed and may extend along the whole or essentially along the whole length of the interior space 2.1 of the housing 2.

[0040] Fig. 3 and 4 illustrate a cross section of an ig-

nitition switch 1 in a non-deformed and a deformed state. When applying external force to the housing 2, as indicated in Fig. 4 by means of the arrow, the flexible wall portion 2a is deformed and the contact portions are pressed against each other. Thereby a closed electrical contact is achieved which cause the generation of a spark by a spark generator.

[0041] In case of removing the external forces, the ignition switch 1 returns into the position shown in Fig. 3, i.e. the electrical contact is opened. The restoring force may be applied solely by the flexible material of the flexible wall portion 2a, i.e. no spring element is required for opening the electrical contact.

[0042] As shown in Fig. 5 and 6, the ignition switch 1 may be adapted such that one or more gas tap shafts 6.1 can be provided through the ignition switch 1. More in detail, the ignition switch 1 may comprise a first branch 2' and a second branch 2". Said branches 2', 2" may be arranged parallel or essentially parallel. Said branches 2', 2" are at least partially separated from each other such that one or more gas tap shafts 6.1 can be provided through one or more gaps 5. Said one or more gaps 5 may be arranged between said branches 2', 2".

[0043] The branches 2', 2" may be coupled by one or more bars 2.2. In the present case, the bars 2.2 may be arranged at or close to the free ends of the housing 2 of the ignition switch 1. Therefore, in the present case, the gap 5 essentially extends along the whole length of the ignition switch 1. However, the bars 2.2 could also be provided at other positions, specifically only bridging the branches 2', 2" at the further wall portion 2b.

[0044] Fig. 5 shows the components of the ignition switch 1 in closer detail. The flexible wall portion 2a and the further wall portion 2b may comprise a rectangular ring-like shape and may be adapted to form an interior space 2.1 which also comprises a rectangular ring-like shape. Each contact portion 3, 4 may comprise two legs 3.1, 4.1 being arranged parallel to each other. One leg 3.1, 4.1 is provided in the first branch 2' and the further leg 3.1, 4.1 may be provided in the second branch 2". The contact portions 3, 4 may be coupled at least at one free end of said legs 3.1, 4.1 based on a coupling portion in order to enable a common electrical contact of the legs 3.1, 4.1. Electrical wires may be provided through a passage in the housing 2 in order to enable an electrical coupling of the contact portions 3, 4.

[0045] Fig. 6 shows a gas appliance 10 including multiple gas taps 6 and an ignition switch 1 according to Fig. 5. The gas tap shafts 6.1 are provided through a gap 5 of the ignition switch 1 and the knobs 6 are provided above the flexible wall portion 2a of the ignition switch 1. The lower portion of the housing 2 may rest on a fixed portion of the gas appliance housing or a housing of the gas taps 6. Thereby, when pressing one of the knobs 6.2, the flexible wall portion 2a of the housing 2 is deformed and the contact portions 3, 4 get in contact with each other.

[0046] However, it is worth mentioning that according

to another embodiment, the ignition switch 1 does not comprise a gap 5 between a pair of branches 2', 2" but comprises a bar-like shape without any opening for passage of gas tap shafts 6.1. Such ignition switch 1 may be arranged below the one or more knobs 6.2 of the gas taps 6 in front of (similar to branch 2' in Fig. 6) or behind (similar to branch 2" in Fig. 6) the set of gas tap shafts 6.1.

[0047] Fig. 7 shows a further example embodiment of an ignition switch 1. The main difference in comparison to the embodiment according to fig. 3 and 4 is that the housing 2 is formed by flexible material which circumferentially encompasses the first and second contact portion 3, 4. So in other words, not only a portion, specifically an upper portion of the housing 2 is made of a flexible material but also a lower portion. In order to provide stability, the housing 2 may be partly inserted in a holder structure 8. Said holder structure 8 may be, for example, made of a rigid material or a material with greater shore hardness than the flexible material of the housing 2. For example, the holder structure 8 may have a U-shape in order to receive and partly encompass the housing 2. More in detail, the housing 2 may be received with a lower portion in said holder structure 8. For example, the housing 2 may be clamped, form-fitted or otherwise fixed within the holder structure 8. Based on said holder structure 8, the housing 2 is fixed within the gas appliance, specifically fixed with respect to the knob 6.2 interacting with the ignition switch 1 in which said housing 2 is included.

[0048] It should be noted that the description and drawings merely illustrate the principles of the proposed invention. Those skilled in the art will be able to implement various arrangements that, although not explicitly described or shown herein, embody the principles of the invention.

List of reference numerals

[0049]

1	Ignition switch
2	housing
2a	flexible wall portion
2b	further wall portion
2'	first branch
2"	second branch
2.1	interior space
2.2	bar
3	first contact portion
3.1	leg
4	second contact portion
4.1	leg
5	gap
6	gas tap
6.1	gas tap shaft
6.2	knob
7	gas burner
8	holder structure
10	gas appliance

D distance

Claims

1. Ignition switch for a gas appliance (10) comprising a housing (2) and a first and a second contact portion (3, 4) included in an interior space (2.1) of said housing (2), wherein said housing (2) comprises a flexible wall portion (2a) which at least partially confines said interior space (2.1) of said housing (2), wherein at least one contact portion (3, 4) is operatively coupled with said flexible wall portion (2a) such that an electrical contact is achieved between the first and the second contact portion (3, 4) when deforming the flexible wall portion (2a).
2. Ignition switch according to claim 1, wherein the housing (2) comprises a further wall portion (2b), wherein said first and second contact portions (3, 4) are encapsulated between said flexible wall portion (2a) and said further wall portion (2b) .
3. Ignition switch according to anyone of the preceding claims, wherein said flexible wall portion (2a) forms an upper portion of said housing (2).
4. Ignition switch according to anyone of the preceding claims, wherein said flexible wall portion (2a) comprises a U-like or essentially U-like shape.
5. Ignition switch according to anyone of the preceding claims, wherein a contact portion (3) is arranged at the flexible wall portion (2a) and the other contact portion (4) is arranged at the further wall portion (2b).
6. Ignition switch according to anyone of the preceding claims, wherein one contact portion (3) of said first and second contact portions (3, 4) comprises a planar contact pad.
7. Ignition switch according to anyone of the preceding claims, wherein one contact portion (4) of said first and second contact portions (3, 4) comprises a convexly shaped contact section, wherein curvature of the convexly shaped contact section is provided towards the other contact portion (3).
8. Ignition switch according to anyone of the preceding claims, comprising an elongated and/or bar-like shape.
9. Ignition switch according to claim 8, wherein the first and second contact portions (3, 4) are integrally formed and extend along the elongated and/or bar-like housing (2), specifically, along the whole or essentially the whole length of the interior space (2.1) of the elongated and/or bar-like housing (2).

- 10. Ignition switch according to anyone of the preceding claims, wherein the housing (2) comprises two parallel branches (2', 2'') which are distanced in a middle portion of the ignition switch by means of a gap (5) in order to provide a passage for one or more gas tap shafts (6.1). 5

- 11. Ignition switch according to claim 10, wherein first and second contact portions (3, 4) are provided in both branches (2', 2'') or only in one branch (2, 2''). 10

- 12. Ignition switch according to claim 10 or 11, wherein the flexible wall portion (2a) is integrally formed and extends over both branches (2', 2''). 15

- 13. Gas appliance comprising one or more gas taps (6) and an ignition switch (1) for igniting one or more gas burners (7), the ignition switch (1) being configured according to anyone of the preceding claims. 20

- 14. Gas appliance according to claim 13, comprising multiple gas taps (6), wherein the ignition switch (1) extends along said multiple gas taps (6), specifically along all gas taps (6) of the appliance (10). 25

- 15. Gas appliance according to claim 13 or 14, wherein the ignition switch (1) is placed below one or more knobs (6.2) of said one or more gas taps (6) such that the flexible wall portion (2a) of the ignition switch (1) is deformed when pressing at least one knob (6.2). 30

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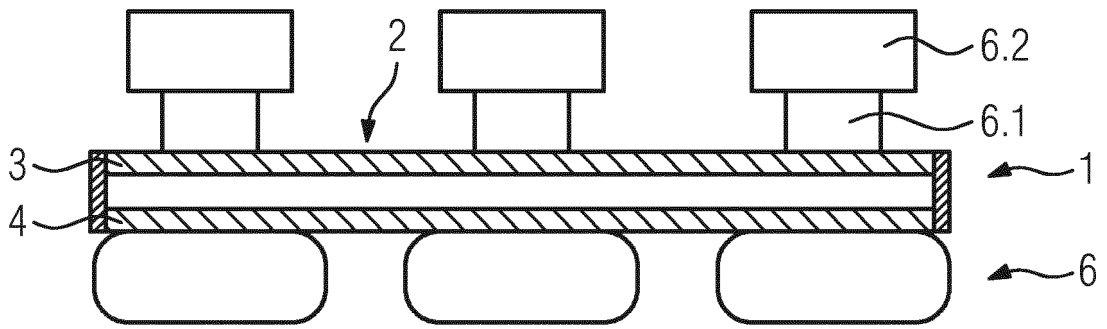


FIG 1

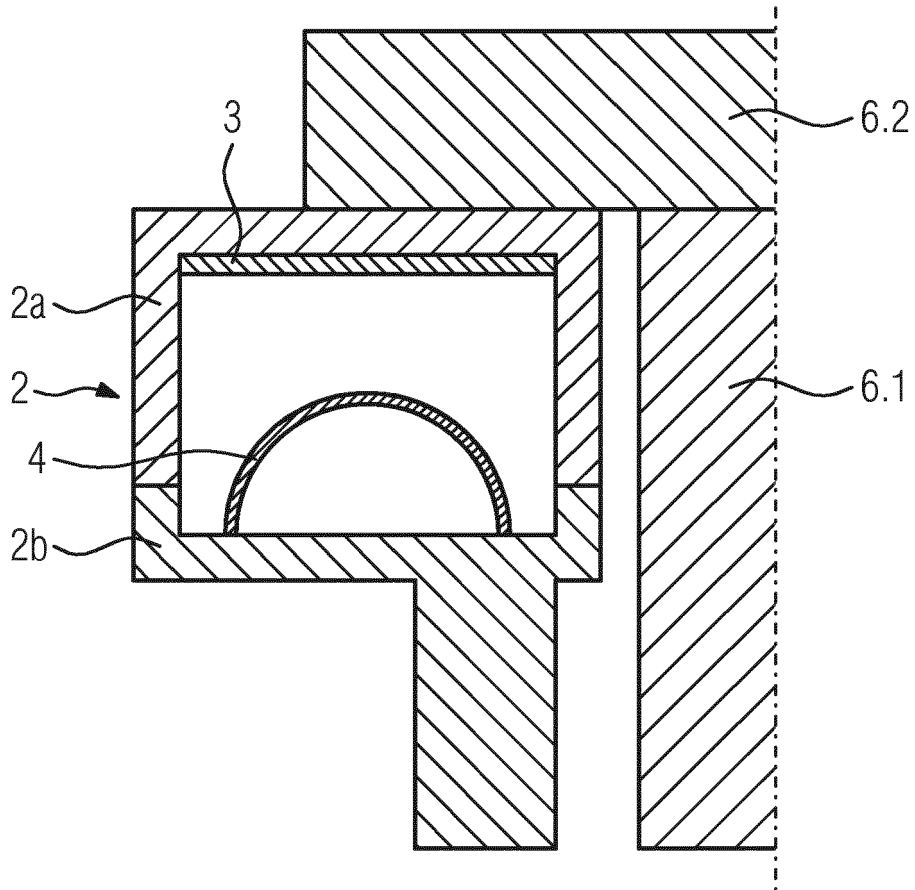


FIG 2

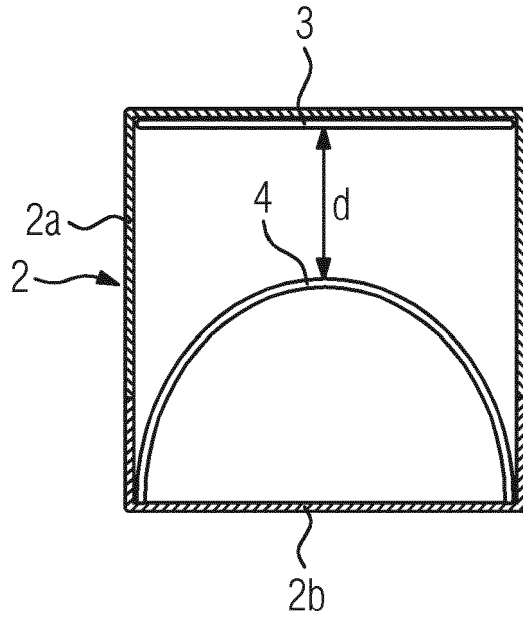


FIG 3

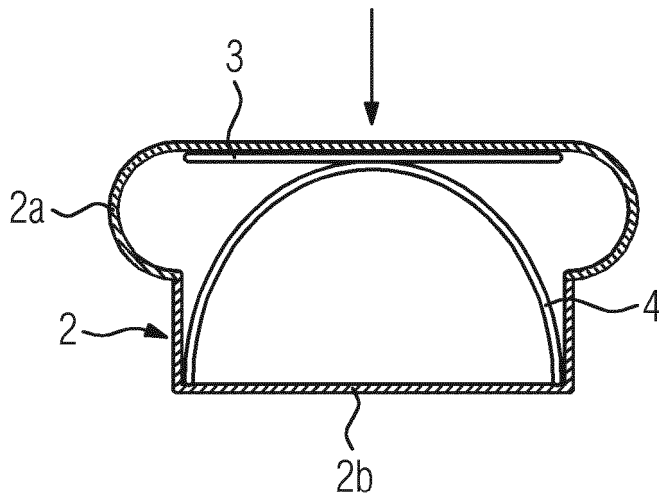


FIG 4

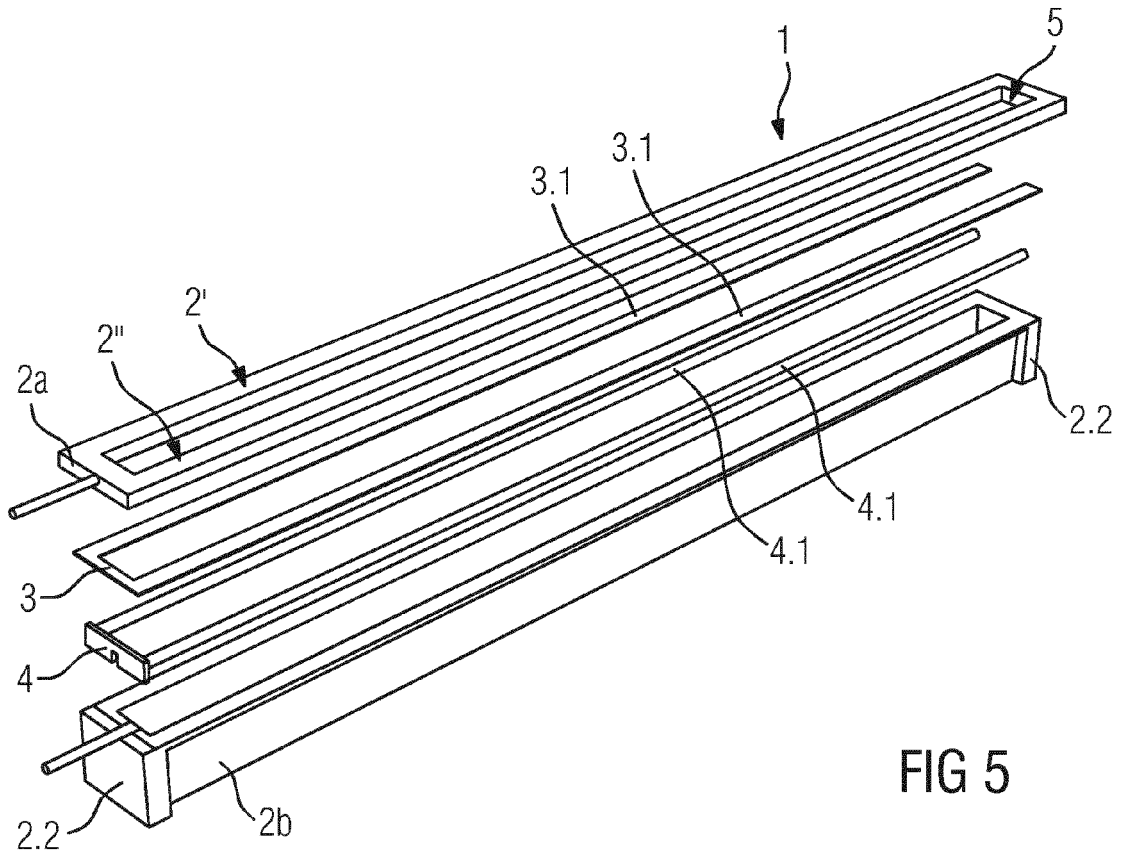


FIG 5

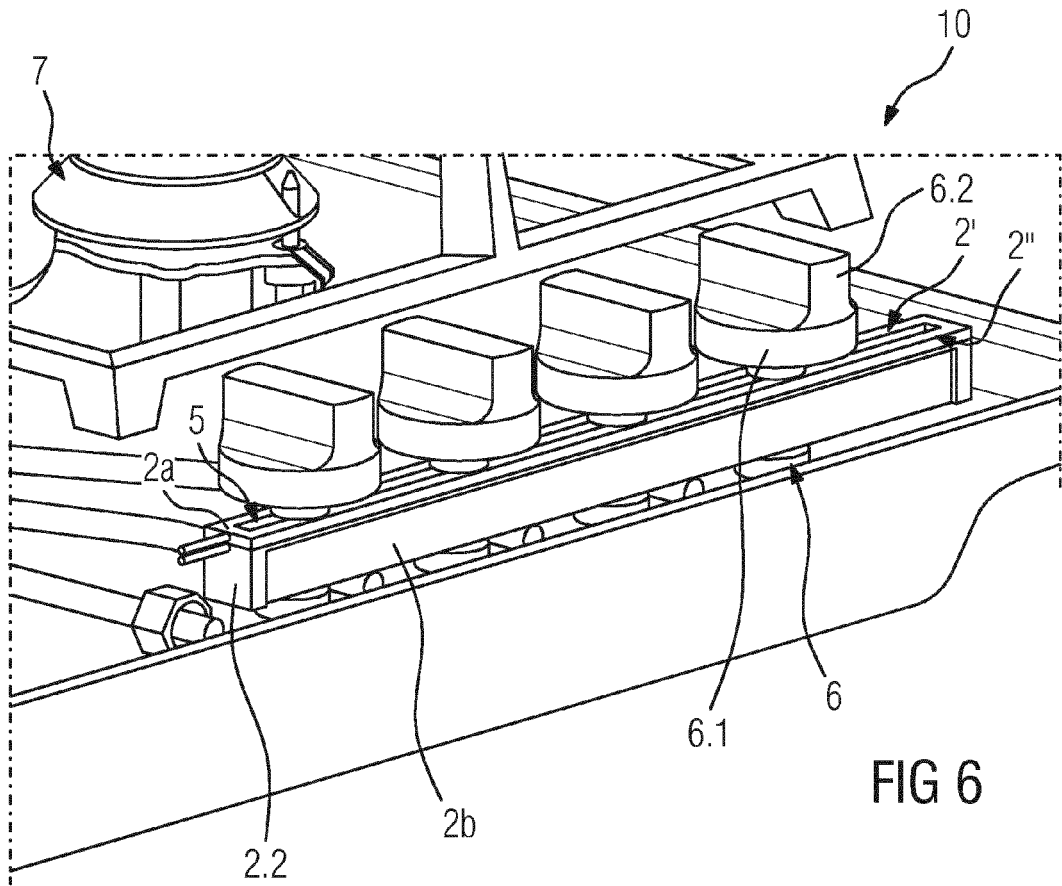
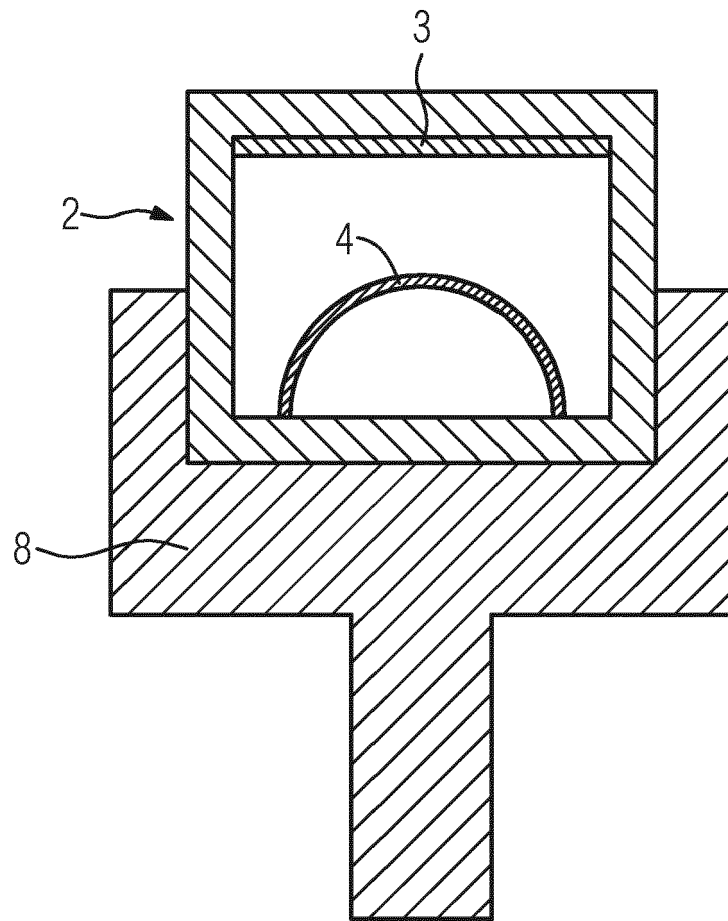


FIG 6

FIG 7





EUROPEAN SEARCH REPORT

Application Number
EP 18 17 0620

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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 0 767 475 A2 (BRIDGESTONE CORP [JP]) 9 April 1997 (1997-04-09)	1-9	INV. H01H3/14 H01H9/04 F24C3/10	
Y	* column 5, line 18 - column 6, line 9 *	13-15		
A	* figure 1 *	10-12		

X	US 2002/178574 A1 (BURGESS LESTER E [US] ET AL) 5 December 2002 (2002-12-05)	1-6,8,9		
Y	* paragraph [0058] *	13-15		
A	* figure 6 *	10-12		

Y,D	DE 196 10 522 A1 (HASCHKAMP JOACHIM [DE]; HASCHKAMP WOLFGANG [DE]) 25 September 1997 (1997-09-25) * column 2, line 9 - line 31 * * figure 1 *	13-15	TECHNICAL FIELDS SEARCHED (IPC) H01H F24C	

Y,D	DE 14 29 108 A1 (IMP WERKE GMBH) 28 November 1968 (1968-11-28) * page 4, line 11 - line 25 * * figure 1 *	13-15		

The present search report has been drawn up for all claims				
Place of search Munich		Date of completion of the search 11 October 2018	Examiner Fribert, Jan	
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ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.

EP 18 17 0620

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0767475 A2	09-04-1997	CA 2187059 A1	06-04-1997
		DE 69632372 D1	09-06-2004
		DE 69632372 T2	09-09-2004
		EP 0767475 A2	09-04-1997
		JP H09102239 A	15-04-1997
		US 5920044 A	06-07-1999

US 2002178574 A1	05-12-2002	NONE	

DE 19610522 A1	25-09-1997	DE 19610522 A1	25-09-1997
		ES 2142220 A1	01-04-2000

DE 1429108 A1	28-11-1968	BE 714220 A	16-09-1968
		DE 1429108 A1	28-11-1968
		FR 1382571 A	18-12-1964

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- DE 1429108 C3 [0003]
- DE 19610522 A1 [0004]