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(54) **GAS STOVE**

(57) A gas stove (1), comprising a top sheet (8), a gas valve (5), which has an actuation stem (12) for actuating the gas valve (5), an actuation knob (16) for actuating the actuation stem (12), and a gasket (26), which is at least partly arranged between the actuation knob (16) and the top sheet (8), wherein the gasket (26) has a cone-shaped outer circumferential wall (37) that is at least partly received inside the actuation knob (16), and wherein the outer circumferential wall (37) axially and radially seals against the actuation knob (16).

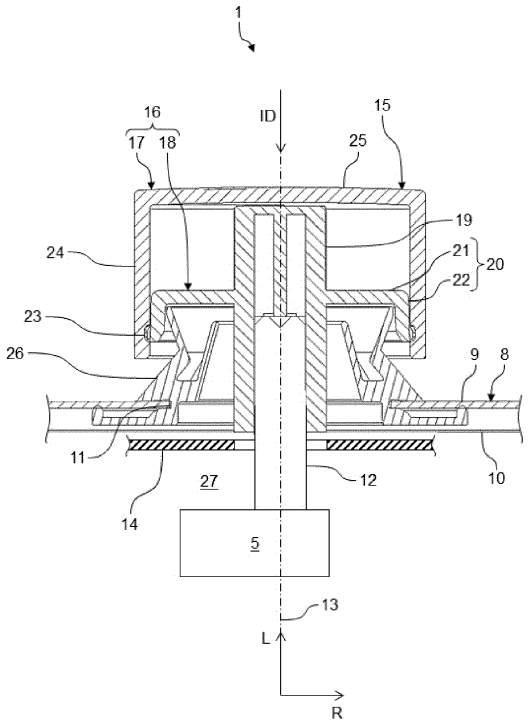

Fig. 2

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Description

[0001] The present invention relates to a gas stove.

[0002] A gas stove can comprise a gas burner and a gas valve. The gas valve is suitable for adjusting a flow of combustion gas from a main gas pipe of the gas stove to the gas burner. For actuating the gas valve, an actuation knob can be provided. Between the actuation knob and a top sheet of the gas stove can be provided a gasket. The gasket prevents liquids like water or spilled food from entering a space below the top sheet.

[0003] It is one object of the present invention to provide an improved gas stove.

[0004] Accordingly, a gas stove is provided. The gas stove comprises a top sheet, a gas valve, which has an actuation stem for actuating the gas valve, an actuation knob for actuating the actuation stem, and a gasket, which is at least partly arranged between the actuation knob and the top sheet, wherein the gasket has a cone-shaped outer circumferential wall that is at least partly received inside the actuation knob, and wherein the outer circumferential wall axially and radially seals against the actuation knob.

[0005] Due to the fact that the outer circumferential wall seals against the actuation knob radially and axially, the leak-tightness can be improved so that no liquids enter a space below the top sheet.

[0006] The gas stove can be named gas hob. The gas stove is a household appliance. For this reason, the gas stove can be named household gas stove. The top sheet can be made of steel, in particular of stainless steel. However, the top sheet can also be made of glass-ceramic or tempered glass. The top sheet has a breakthrough. The actuation stem is guided through the breakthrough. The gasket is mounted to the breakthrough and is thus at least partly received in the breakthrough. The breakthrough can be a cylindrical bore. The top sheet can be named cover sheet. The top sheet covers a cooking trough of the gas stove. The cooking trough can be a deep-drawn metal sheet.

[0007] Between the cooking trough and the top sheet is provided the afore-mentioned space which can receive an electronic board or circuit board and the gas valve. The gasket prevents liquids from entering this space. The gas valve can be mounted to the cooking trough. Preferably, the gas stove has a plurality of gas valves, actuation knobs and gaskets. Accordingly, the top sheet has a plurality of breakthroughs, wherein each gas valve has its own breakthrough. In the following, only one gas valve, only one actuation knob and only one gasket is referred to, respectively.

[0008] The actuation stem can be rotated by means of the actuation knob. The gas valve is preferably arranged below the top sheet. That means, the gas valve faces a back side of the top sheet. The actuation stem is guided through the breakthrough. In particular, the actuation stem is guided from the back side to a front side of the top sheet. The actuation stem can be rotated to adjust the flow of combustion gas from a gas main pipe to the gas burner. Depending on an angle of rotation of the actuation stem, the flow of combustion gas from the gas main pipe to a gas burner can be increased, decreased or completely blocked. The gas valve preferably is a gas regulating valve. The gas valve is suitable for regulating a stream of combustion gas from the main gas pipe to the gas burner continuously or stepwise. In particular, the gas valve is a so-called step valve.

[0009] The gasket being "at least partly" arranged between the actuation knob and the top sheet means in this context that a part or section of the gasket is placed between the actuation knob and the top sheet. This does not exclude that parts or sections of the gasket are not placed between the actuation knob and the top sheet. The gasket is flexible and can be deformed resiliently. The gasket is reversibly compressible in a longitudinal direction thereof. This means that the gasket can be compressed when pressing the actuation knob down toward the top sheet by means of a push down force. This movement can be used to ignite the gas burner. The gasket springs back to its initial geometry when the push down force is released.

[0010] Preferably, the gasket is formed integrally. "integrally" or "monolithic" in this context means that the gasket is not assembled out of a plurality of different parts, but that the gasket forms one single piece. For example, the gasket can be made from a silicone material or a thermoplastic elastomer (TPE). In particular, the gasket can be made from a thermoplastic polyurethane (TPU). Preferably, the gasket is constructed rotation-symmetric around a middle axis or axis of symmetry. As mentioned before, the gasket has the longitudinal direction that is oriented parallel to the axis of symmetry. The gasket also has a radial direction. The radial direction is oriented perpendicular to the axis of symmetry and points away from the axis of symmetry. The gasket preferably has a basic section. The outer circumferential wall protrudes from this basic section. The longitudinal direction is oriented from the basic section toward the outer circumferential wall.

[0011] "Cone-shaped" in this context means that the outer circumferential wall has the geometry of a cone, in particular of a truncated cone. This shape enables an easy deformation of the gasket. "Axially sealing" in this context means that the outer circumferential wall lies against the actuation knob and is pressed against it along the longitudinal direction. In this way, the outer circumferential wall seals against the actuation knob along the longitudinal direction. "Radially sealing" in this context means that the outer circumferential wall lies against the actuation knob and is pressed against it along the radial direction. In this way, the outer circumferential wall seals against the actuation knob along the radial direction.

[0012] According to an embodiment, the actuation knob comprises an attachment element with a disc-shaped basis and a tube-shaped sleeve, wherein the outer circumferential wall axially seals against the basis, and

wherein the outer circumferential wall radially seals against the sleeve.

[0013] The attachment element is attached to the actuation stem. The actuation knob also has a handling element that can be gripped with two fingers for controlling the gas valve. The handling element can be latched to the attachment element. The handling element and the attachment element can be injection molded parts.

[0014] According to a further embodiment, the outer circumferential wall diverges from an axis of symmetry of the gasket when seen along a longitudinal direction of the gasket.

[0015] This means, the outer circumferential wall moves toward the axis of symmetry when seen along the longitudinal direction. In this way, the cone-shaped geometry of the outer circumferential wall is generated.

[0016] According to a further embodiment, the gasket comprises a cone-shaped basic section, wherein the outer circumferential wall protrudes from the basic section along the longitudinal direction.

[0017] The basic section and the outer circumferential wall are formed integrally. The outer circumferential wall is more flexible that the basic section.

[0018] According to a further embodiment, the basic section converges toward the axis of symmetry when seen along the longitudinal direction.

[0019] This means that the outer circumferential wall diverges from the axis of symmetry and the basic section converges toward the axis of symmetry. This produces an hourglass-shape or x-shape of the gasket.

[0020] According to a further embodiment, a circumferential kink is sandwiched between the outer circumferential wall and the basic section.

[0021] The circumferential kink runs completely around the axis of symmetry. The circumferential kink serves as a flexible deflection area when compressing the gasket along the longitudinal direction. The circumferential kink connects the outer circumferential wall to the basic section.

[0022] According to a further embodiment, the basic section comprises a circumferential notch for receiving the top sheet.

[0023] The breakthrough in the top sheet engages with the circumferential notch.

[0024] According to a further embodiment, the circumferential notch comprises a first contact surface, which lies against a front side of the top sheet, and a second contact surface, which lies against a back side of the top sheet.

[0025] In this way, the gasket is sealed against the top sheet.

[0026] According to a further embodiment, the gasket comprises a disk-shaped sealing section that is attached to the basic section.

[0027] The sealing section and the basic section are formed integrally.

[0028] According to a further embodiment, the sealing section comprises a circumferential rib that lies against the top sheet.

[0029] This improves the sealing of the gasket against the top sheet. The circumferential rib lies against the back side of the top sheet and thus seals against the back side.

[0030] According to a further embodiment, the gasket comprises stiffening sections that radially stiffen the basic section.

[0031] The stiffening sections preferably stiffen the basic section. In particular, the stiffening sections produce a radial springback force that acts against a force that is induced into the gasket by a customer, for example during cleaning of the gas stove. The stiffening sections can be named spring sections or springback sections. The radial springback force preferably has a higher value than the force of the customer. The functionality of these stiffening sections is to increase the radial stiffness of the gasket and to produce a springback effect to avoid getting out of proper placement of the gasket while being manipulated by the customer.

[0032] According to a further embodiment, the gasket comprises an inner circumferential wall that protrudes from the basic section along the longitudinal direction.

[0033] Between the outer circumferential wall and the inner circumferential wall is provided a gap for collecting liquid. The inner circumferential wall serves as a second liquid barrier. The outer circumferential wall serves as a first liquid barrier.

[0034] According to a further embodiment, the inner circumferential wall is arranged within the outer circumferential wall when seen along a radial direction of the gasket.

[0035] Both circumferential walls run completely around the axis of rotation. Both circumferential walls are formed integrally together with the basic section.

[0036] According to a further embodiment, an upper edge of the outer circumferential wall is positioned above an upper edge of the inner circumferential wall when seen along the longitudinal direction.

[0037] This means that the inner circumferential wall does not lie against the actuation knob in an initial position thereof. When the actuation knob is pressed down in direction of the top sheet, the inner circumferential wall comes into contact with the actuation knob.

[0038] According to a further embodiment, the inner circumferential wall converges toward the axis of symmetry when seen along the longitudinal direction.

[0039] This means that the outer circumferential wall and the inner circumferential wall are formed opposed. The outer circumferential wall moves away from the axis of symmetry, whereas the inner circumferential wall moves toward the axis of symmetry.

[0040] Further possible implementations or alternative solutions of the invention also encompass combinations - that are not explicitly mentioned herein - of features described above or below with regard to the embodiments. The person skilled in the art may also add individual or isolated aspects and features to the most basic form of the invention.

[0041] Further embodiments, features and advantages of the present invention will become apparent from the subsequent description and dependent claims, taken in conjunction with the accompanying drawings, in which:

Fig. 1 shows a top view of one embodiment of a gas stove;

Fig. 2 shows a partial cross-sectional view of the gas stove according to Fig. 1;

Fig. 3 shows a cross-sectional view of one embodiment of a gasket for the gas stove according to Fig. 1; and

Fig. 4 shows a further cross-sectional view of the gasket according to the intersection line IV-IV of Fig. 3.

[0042] In the Figures, like reference numerals designate like or functionally equivalent elements, unless otherwise indicated.

[0043] Fig. 1 shows a schematic top view of an embodiment of a gas hob or gas stove 1. The gas stove 1 can be a household appliance or part of a household appliance. The gas stove 1 comprises a cooking trough 2. The cooking trough 2 is a deep-drawn metal sheet. The cooking trough 2 is covered by means of a cover plate or top sheet (not shown). The gas stove 1 further has at least one gas burner arrangement 3. The number of gas burner arrangements 3 is arbitrary. As Fig. 1 shows, there can be provided five gas burner arrangements 3.

[0044] Each gas burner arrangement 3 comprises a gas valve 5 which is attached to a main gas pipe 4, a gas burner 6 and a gas conduit 7 which connects the gas valve 5 to the associated gas burner 6. The gas valve 5 preferably is a gas regulating valve. The gas valve 5 is suitable for regulating a stream of combustion gas from the main gas pipe 4 to the gas burner 6 continuously or stepwise. In particular, the gas valve 5 is a so-called step valve. The gas valve 5 is preferably clamped to the main gas pipe 4.

[0045] Fig. 2 shows a partial sectional view of the gas stove 1. As mentioned afore, the gas stove 1 has a top sheet 8. The top sheet 8 covers the cooking trough 2 which is shown in Fig. 1. The top sheet 8 can be made of metal, in particular stainless steel. The top sheet 8 is a metal sheet. The top sheet 8 has a front side 9 and a back side 10. The front side 9 is averted the cooking trough 2. The back side 10 is facing the cooking trough 2. The top sheet 8 comprises a number of breakthroughs 11. The number of breakthroughs 11 is the same as the number of gas valves 5. Each gas valve 5 has its own breakthrough 11. The breakthroughs 11 are cylindrical bores. In the following only one breakthrough 11 and only one gas valve 5 will be referred to.

[0046] The gas valve 5 is arranged below the top sheet 8. That means, the gas valve 5 faces the back side 10 of the top sheet 8. The gas valve 5 has an actuation stem 12 which is guided through the breakthrough 11. In particular, the actuation stem 12 is guided from the back side 10 to the front side 9 of the top sheet 8. The actuation stem 12 can be rotated around an axis of rotation 13 to adjust the flow of combustion gas from the main gas pipe 4 to the gas burner 6. Depending on an angle of rotation of the actuation stem 12, the flow of combustion gas from the main gas pipe 4 to the gas burner 6 can be increased, decreased or completely blocked. An electronic board or circuit board 14 is arranged between the gas valve 5 and the top sheet 8. In use of the gas stove 1, the circuit board 14 has to be protected from liquids like water or spilled food. The actuation stem 12 can be guided through the circuit board 14.

[0047] The gas stove 1 further comprises an actuation arrangement 15 for actuating the gas valve 5. The actuation stem 12 can be part of the actuation arrangement 15. The actuation arrangement 15 has an actuation knob 16 which is attached to the actuation stem 12 in a torque-proof manner. "Torque-proof" in this context means that the actuation knob 16 cannot be rotated against the actuation stem 12. The actuation knob 16 is associated with the front side 9 of the top sheet 8. By means of the actuation knob 16, the gas valve 5 can be actuated. To ignite the gas burner 6, the actuation knob 16 can be pressed down in an ignition direction ID. The ignition direction ID is directed towards the front side 9 of the top sheet 8.

[0048] The actuation knob 16 has a handling element 17 which can be gripped by a user with two fingers. The handling element 17 can be an injection molded part. The handling element 17 is pot-shaped. The actuation knob 16 further has an attachment element 18 that is attached to the actuation stem 12. The attachment element 18 can also be an injection molded part. The handling element 17 and the attachment element 18 can be formed as a single part. However, the handling element 17 and the attachment element 18 can be provided as two separate parts that are clipped together. The latter is shown in Fig. 2. The handling element 17 receives the attachment element 18.

[0049] The attachment element 18 has a tube-shaped receiving section 19 for receiving the actuation stem 12. The attachment element 18 further has a connection section 20 that connects the attachment element 18 to the handling element 17. The connection section 20 engages with the handling element 17 to connect the handling element 17 to the attachment element 18. The receiving section 19 and the connection section 20 are formed integrally.

[0050] The connection section 20 has a disk-shaped basis 21, which is integrally formed with the receiving section 19, and a cylinder-shaped sleeve 22 that is formed integrally with the basis 21. The sleeve 22 is connected to the handling element 17 in a form-locking manner. "Form-locking" in this context means that the sleeve

22 engages with the handling element 17. The sleeve 22 can be latched into the handling element 17. For this purpose, the handling element 17 comprises a ring-shaped notch 23 that can receive a corresponding rib of the sleeve 22. The notch 23 is provided inside a cylinder-shaped sleeve section 24 of the handling element 17. The sleeve section 24 is frontally closed by means of a disk-shaped basic section 25 of the handling element 17. The sleeve section 24 and the basic section 25 are formed integrally. Both, the sleeve section 24 and the basic section 25 form the pot-shaped geometry of the handling element 17.

[0051] The actuation arrangement 15 further comprises a gasket 26 which is shown in a cross-sectional view in Fig. 3. The function of the gasket 26 is to prevent liquids like water or spilled food from entering a space 27 below the top sheet 8 through the breakthrough 11. The gasket 26 preferably is made of one piece. "One piece" in this context means that the gasket 26 forms a common structural component and is not made of different separate parts that are assembled to form the gasket 26. Preferably, the gasket 26 is formed monolithic or integrally. "Monolithic" or "integrally" in this context means that the gasket 26 is formed through the whole part of the same material. For example, the gasket 26 can be made from a silicone material or a thermoplastic elastomer (TPE). In particular, the gasket 26 can be made from a thermoplastic polyurethane (TPU). The gasket 26 can be an injection molded part. The gasket 26 is compressible in a longitudinal direction L thereof.

[0052] The gasket 26 is rotation-symmetrically constructed and has a middle axis or axis of symmetry 28. The longitudinal direction L is arranged parallel to the axis of symmetry 28. The gasket 26 has a cone-shaped basic section 29. A circumferential notch 30 is provided in the basic section 29. The notch 30 receives the top sheet 8. A first contact surface 31 being provided at the notch 30 lies against the front side 9 of the top sheet 8. A second contact surface 32 lies against the back side 10 of the top sheet. A disc-shaped sealing section 33 radially protrudes from the basic section 29. The sealing section 33 has a circumferential rib 34 that lies against the back side 10 of the top sheet 8.

[0053] An inner circumferential wall 35 protrudes from the basic section 29. The inner circumferential wall 35 has an upper edge 36 that runs around the axis of symmetry 28. The inner circumferential wall 35 is cone-shaped. Further, an outer circumferential wall 37 protrudes from the basic section 29. When seen along a radial direction R of the gasket 26, the inner circumferential wall 35 is arranged inside the outer circumferential wall 37.

[0054] The outer circumferential wall 37 has an upper edge 38. When seen along the longitudinal direction L, the upper edge 38 is arranged above the upper edge 36 of the inner circumferential wall 35. The outer circumferential wall 37 is cone-shaped like the basic section 29. However, when seen along the longitudinal direction L, the basic section 29 narrows along the longitudinal direction L, whereas the outer circumferential wall 37 widens. This results in an hourglass-shape or x-shape of the gasket 26. A circumferential kink 39 is sandwiched between the basic section 29 and the outer circumferential wall 37. A gap 40 is provided between the inner circumferential wall 35 and the outer circumferential wall 37. The gap 40 can be used to collect a liquid 41 like spilled water or the like.

[0055] As can be seen from Fig. 4, the gasket 26 has stiffening sections 42 to 49. The stiffening sections 42 to 49 stiffen the basic section 29. The stiffening sections 42 to 49 produce a radial springback force FS that acts against a force F that is induced into the gasket 26 by a customer. The stiffening sections 42 to 49 can be named spring sections or springback sections. The radial springback force FS has a higher value than the force F. The functionality of these stiffening sections 42 to 49 is to increase the radial stiffness of the gasket and to produce a springback effect to avoid getting out of proper placement of the gasket 26 while being manipulated by the customer. The gasket 26 has a centrally arranged breakthrough 50. The actuation stem 12 is guided through the breakthrough 50.

[0056] The function of the gasket 26 will be explained in the following. When the gasket 26 is mounted in the breakthrough 11 of the top sheet 8, the top sheet 8 is received in the notch 30 and the rib 34 lies against the back side 10 of the top sheet 8. The first contact surface 31 lies against the front side 9 of the top sheet 8 and the second contact surface 32 lies against the back side 10 of the top sheet 8. The actuation stem 12 is guided through the breakthrough 50 and the upper edge 38 of the outer circumferential wall 37 is received in the sleeve 22 of the attachment element 18 of the actuation knob 16. The gasket 26 can be compressed in the longitudinal direction L. This can be necessary for igniting the gas burner 6. In the case that liquid 41 leaks between the sleeve 22 and the upper edge 38 of the outer circumferential wall 37, the liquid 41 is stopped by the inner circumferential wall 35 so that the liquid 41 cannot reach the circuit board 14. The liquid 41 being trapped between the circumferential walls 35, 37 can then evaporate.

[0057] The stiffening sections 42 to 49 keep the gasket 26 correctly placed in the breakthrough 11 even when being manipulated by the customer during cleaning the gas stove 1, for example. Thus, the gasket 26 is designed to improve to keep its correct allocation even when being manipulated while cleaning. Since the gasket 26 remains in the correct position, it is achieved that there will be no entry of liquid 41 into the space 27. The circuit board 14 is thus protected from liquid 41. The inner circumferential wall 35 serves as an additional barrier for the liquid 41.

[0058] Although the present invention has been described in accordance with preferred embodiments, it is obvious for the person skilled in the art that modifications are possible in all embodiments.

Reference Numerals:

[0059]

1 gas stove
2 cooking trough
3 gas burner arrangement
4 main gas pipe
5 gas valve
6 gas burner
7 gas conduit
8 top sheet
9 front side
10 backside
11 breakthrough
12 actuation stem
13 axis of rotation
14 circuit board
15 actuation arrangement
16 actuation knob
17 handling element
18 attachment element
19 receiving section
20 connection section
21 basis
22 sleeve
23 notch
24 sleeve section
25 basic section
26 gasket
27 space
28 axis of symmetry
29 basic section
30 notch
31 contact surface
32 contact surface
33 sealing section
34 rib
35 inner circumferential wall
36 upper edge
37 outer circumferential wall
38 upper edge
39 circumferential kink
40 gap
41 liquid
42 stiffening section
43 stiffening section
44 stiffening section
45 stiffening section
46 stiffening section
47 stiffening section
48 stiffening section
49 stiffening section
50 breakthrough

F force
FS radial springback force
ID ignition direction
L longitudinal direction
R radial direction

Claims

1. A gas stove (1), comprising a top sheet (8), a gas valve (5), which has an actuation stem (12) for actuating the gas valve (5), an actuation knob (16) for actuating the actuation stem (12), and a gasket (26), which is at least partly arranged between the actuation knob (16) and the top sheet (8), wherein the gasket (26) has a cone-shaped outer circumferential wall (37) that is at least partly received inside the actuation knob (16), and wherein the outer circumferential wall (37) axially and radially seals against the actuation knob (16).

2. The gas stove according to claim 1, wherein the actuation knob (16) comprises an attachment element (18) with a disc-shaped basis (21) and a tube-shaped sleeve (22), wherein the outer circumferential wall (37) axially seals against the basis (21), and wherein the outer circumferential wall (37) radially seals against the sleeve (22).

3. The gas stove according to claim 1 or 2, wherein the outer circumferential wall (37) diverges from an axis of symmetry (28) of the gasket (26) when seen along a longitudinal direction (L) of the gasket (26).

4. The gas stove according to claim 3, wherein the gasket (26) comprises a cone-shaped basic section (29), wherein the outer circumferential wall (37) protrudes from the basic section (29) along the longitudinal direction (L).

5. The gas stove according to claim 4, wherein the basic section (29) converges toward the axis of symmetry (28) when seen along the longitudinal direction (L).

6. The gas stove according to claim 4 or 5, wherein a circumferential kink (39) is sandwiched between the outer circumferential wall (37) and the basic section (29).

7. The gas stove according to one of claims 4 - 6, wherein the basic section (29) comprises a circumferential notch (30) for receiving the top sheet (8).

8. The gas stove according to claim 7, wherein the circumferential notch (30) comprises a first contact surface (31), which lies against a front side (9) of the top sheet (8), and a second contact surface (32), which lies against a back side (10) of the top sheet (8).

9. The gas stove according to one of claims 4 - 8, where-

in the gasket (26) comprises a disk-shaped sealing section (33) that is attached to the basic section (29).

10. The gas stove according to claim 9, wherein the sealing section (33) comprises a circumferential rib (34) that lies against the top sheet (8).

11. The gas stove according to one of claims 4 - 10, wherein the gasket (26) comprises stiffening sections (42 - 49) that radially stiffen the basic section (29).

12. The gas stove according to one of claims 4 - 11, wherein the gasket comprises an inner circumferential wall (35) that protrudes from the basic section (29) along the longitudinal direction (L).

13. The gas stove according to claim 12, wherein the inner circumferential wall (35) is arranged within the outer circumferential wall (37) when seen along a radial direction (R) of the gasket (26).

14. The gas stove according to claim 12 or 13, wherein an upper edge of the outer circumferential wall (37) is positioned above an upper edge (36) of the inner circumferential wall (35) when seen along the longitudinal direction.

15. The gas stove according to one of claims 12 - 14, wherein the inner circumferential wall (35) converges toward the axis of symmetry (28) when seen along the longitudinal direction (L).

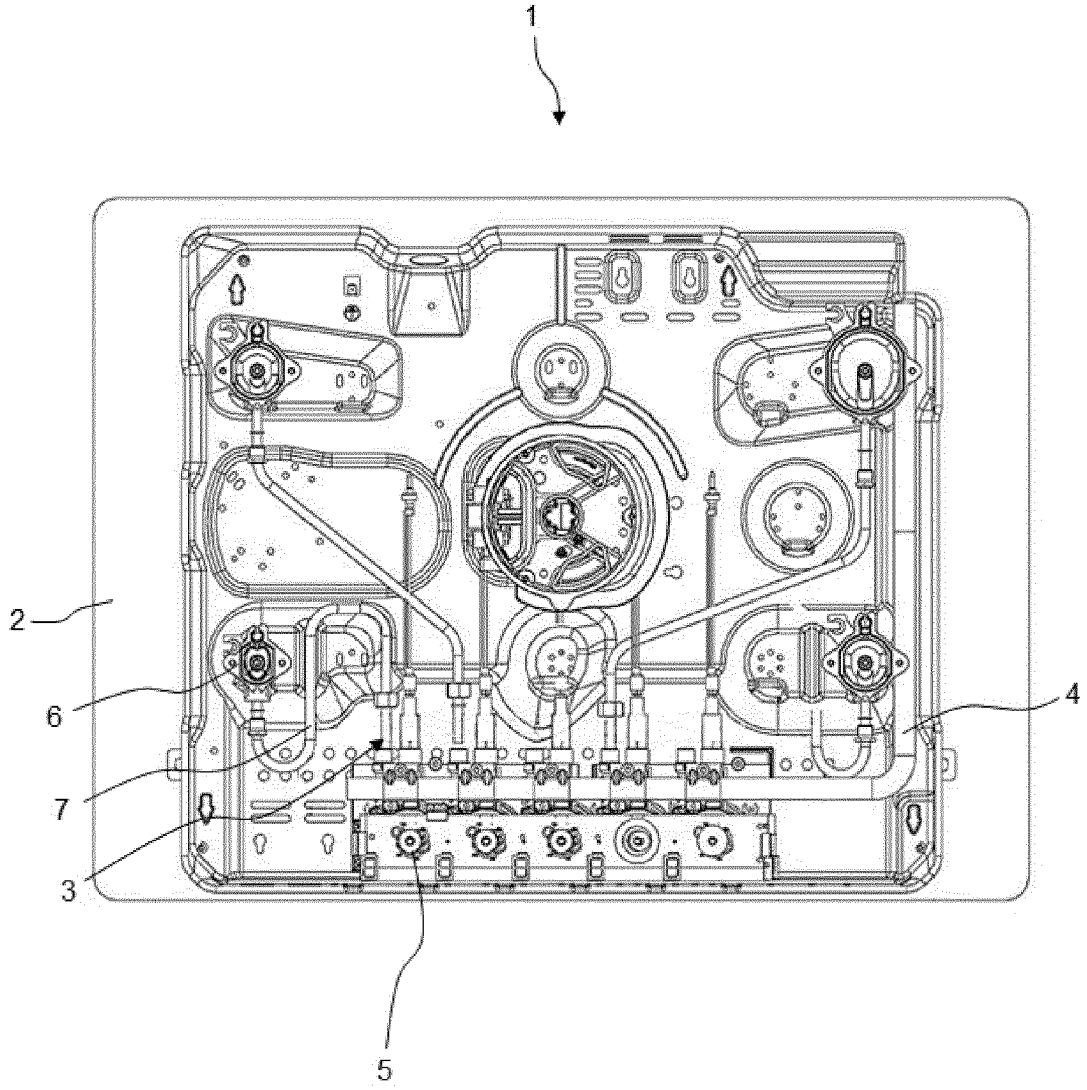

Fig. 1

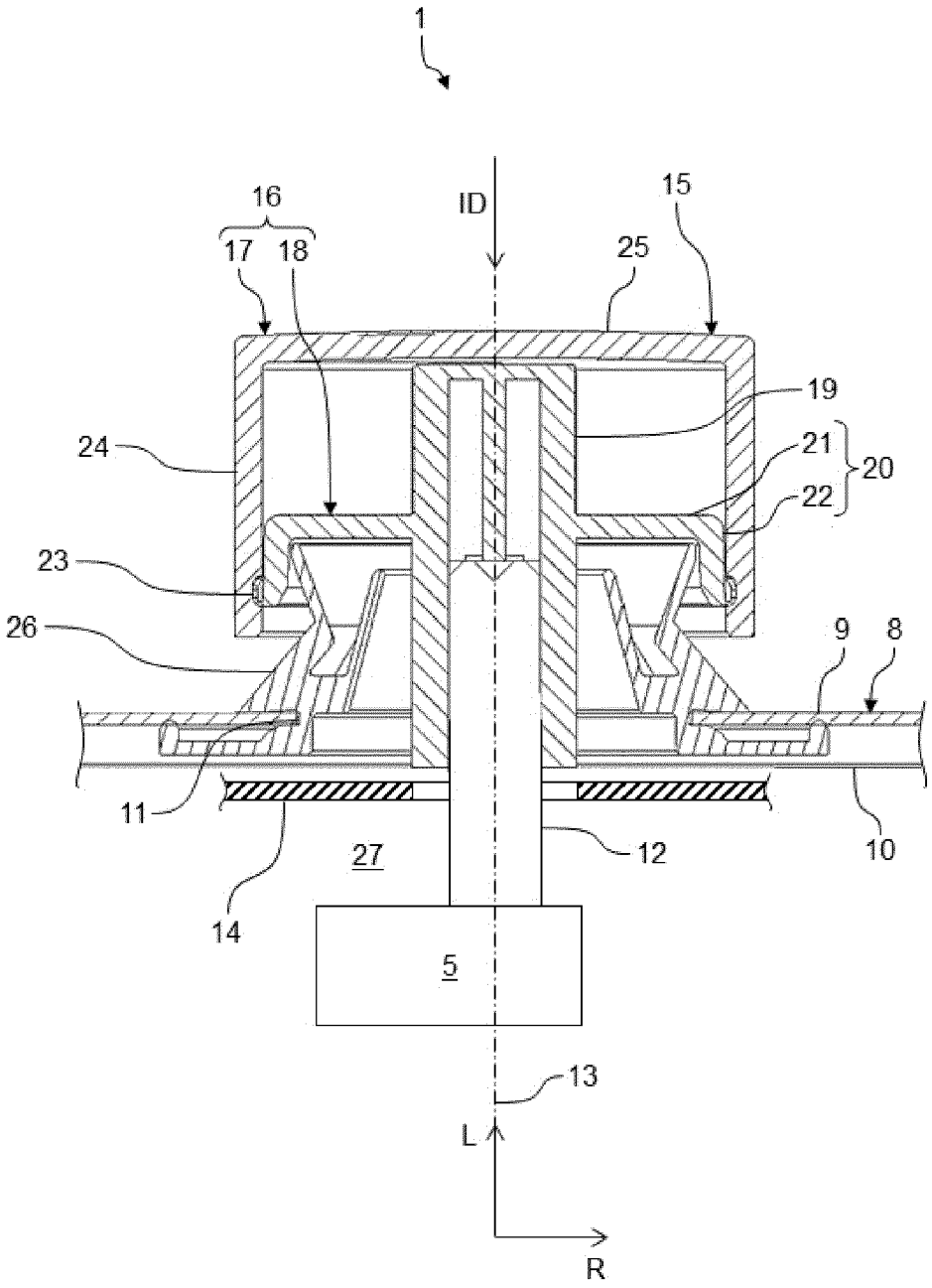

Fig. 2

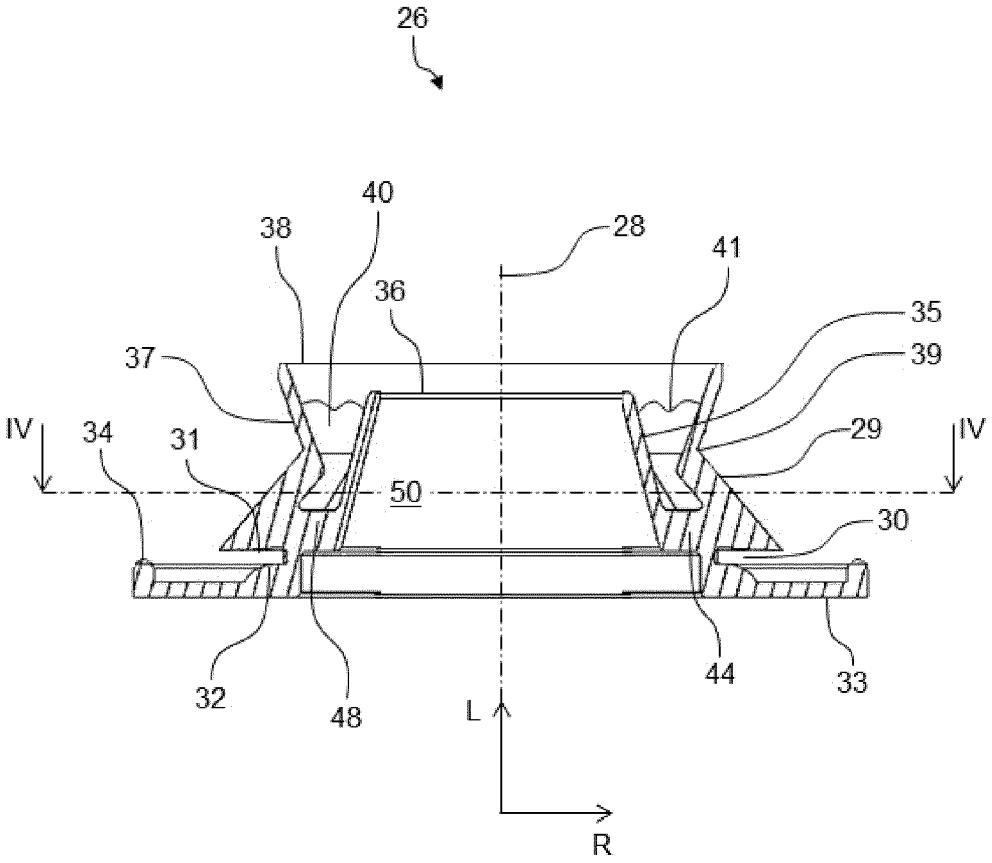

Fig. 3

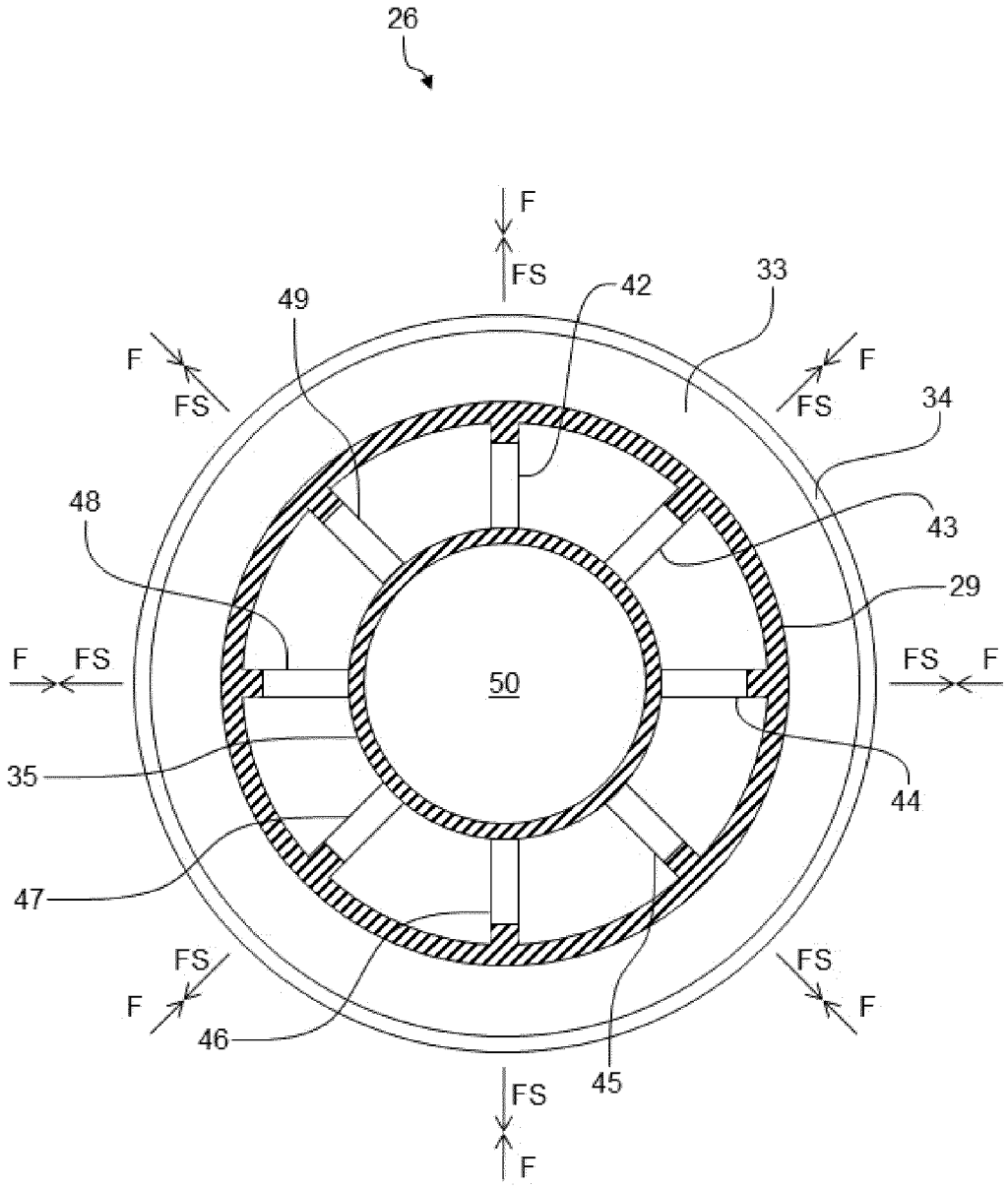
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Fig. 4

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EUROPEAN SEARCH REPORT

Application Number
EP 21 17 9556

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 A	EP 2 979 035 A1 (BSH HAUSGERÄTE GMBH [DE]) 3 February 2016 (2016-02-03) * figure 2 * * paragraph [0002] *	1-9 10-15	INV. F24C3/12 G05G25/04
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A	EP 0 327 175 A1 (BAUKNECHT HAUSGERAETE [DE]; PHILIPS NV [NL]) 9 August 1989 (1989-08-09) * figure 5 *	1-15	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	12 November 2021	Jalal, Rashwan

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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EPO FORM 1503 03.82 (P04C01)

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