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- **KONG, Xin Xian**
5656 AE Eindhoven (NL)
- **LEE, Chen-Shiang**
5656 AE Eindhoven (NL)
- **RAMIREZ, Rico Paolo Ochoa**
5656 AE Eindhoven (NL)

(71) Applicant: **Koninklijke Philips N.V.**
5656 AG Eindhoven (NL)

(74) Representative: **de Haan, Poul Erik et al**
Philips International B.V.
Philips Intellectual Property & Standards
High Tech Campus 5
5656 AE Eindhoven (NL)

(72) Inventors:
• **PANG, Yen Leng**
5656 AE Eindhoven (NL)

(54) **GARMENT CARE DEVICE WITH COMPARTMENT CONTAINING A CHEMICAL COMPOUND ADAPTED TO REDUCE THE DEPOSITION OF SCALE**

(57) The invention relates to a garment care device (100) comprising a mobile unit (101) comprising a first steam generator (S1), a base (102) comprising a water tank (103), and a cord (104) for connecting the base (102) and the mobile unit (101). The base (102) further comprises a water circuit for carrying water from the water tank (103) to the first steam generator (S1) via the cord (104), and a compartment (105) being fluidly arranged along the water circuit allowing water to pass through the compartment (105). The compartment (105) contains a chemical compound (106) soluble in water and adapted to reduce the deposition of scale in the water circuit downstream of the compartment (105).

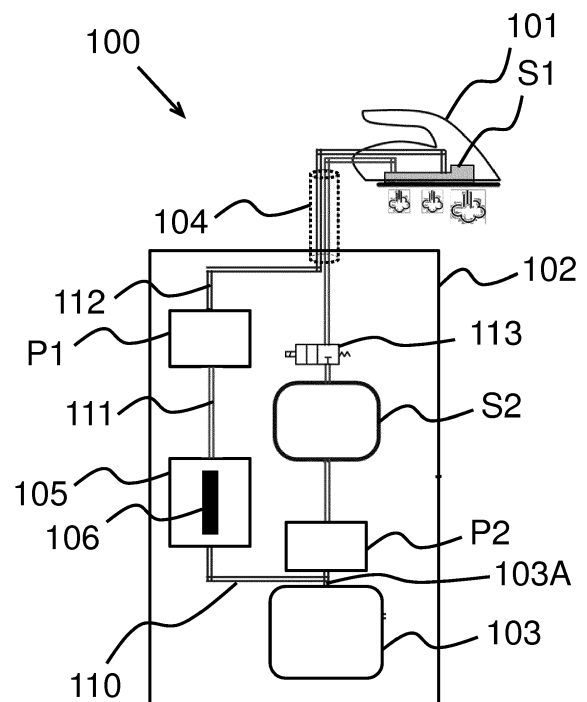


FIG.2

Description

FIELD OF THE INVENTION

[0001] The invention relates to a garment care device with a compartment containing a chemical compound adapted to reduce the deposition of scale.

[0002] The invention may be used in the field of garment care.

BACKGROUND OF THE INVENTION

[0003] In the published patent WO2019122275A, in order to mitigate scorching risk arising from exposing fabrics to high temperature, a fast-cooling function was devised. In the implementation of the fast cooling function in a boiler-type pressurized steam generator, water is introduced via a secondary water circuit with a secondary pump from the water tank directly into the steam generator of the iron. This implementation exposes several parts of the water circuit, such as the water tube at the hose cord region and the water inlet at the steam generator, to high temperatures due to the proximity with components at elevated temperatures.

[0004] The high temperature experienced by the components containing water coming from the tank, in turn, increases the rate of release and deposit of calcium carbonate (CaCO_3) from the water, commonly referred to as scale or calc, at these localized regions.

OBJECT AND SUMMARY OF THE INVENTION

[0005] It is an object of the invention to propose a garment care device that avoids or mitigates above-mentioned problems.

[0006] The invention is defined by the independent claims. The dependent claims define advantageous embodiments.

[0007] To this end, the garment care device according to the invention comprises a garment care device comprising a mobile unit comprising a first steam generator, a base comprising a water tank, a cord for connecting the base and the mobile unit.

[0008] The base further comprises:

- a water circuit for carrying water from the water tank to the first steam generator via the cord,
- a compartment being fluidly arranged along the water circuit allowing water to pass through the compartment, the compartment containing a chemical compound soluble in water and adapted to reduce the deposition of scale in the water circuit downstream of the compartment.

[0009] To prevent the build-up of scale caused by exposure of water to high temperatures in a water circuit connected to steam chamber, such as a base steam generator connected to an iron, chemical means or chemical

agent for reducing deposition of scale are proposed to be arranged in the water circuit, upstream of the regions at risk.

[0010] Active ingredient in those means/agent for reducing deposition of scale - for example Phosphonate - is slowly released into the water and binds to calc-forming ion (e.g. calcium, magnesium) to modify the crystal structure of scale. Modified structure is more easily broken and flushed out during flow of the water or calc-clean process. This can be achieved when the active ingredient is in a ppm level.

[0011] Detailed explanations and other aspects of the invention will be given below.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] Particular aspects of the invention will now be explained with reference to the embodiments described hereinafter and considered in connection with the accompanying drawings, in which identical parts or sub-steps are designated in the same manner:

Fig. 1 depicts a first embodiment of a device according to the invention,

Fig. 2 depicts a second embodiment of a device according to the invention,

Fig. 3 depicts a partial top view of a device according to the invention,

Fig. 4A depicts a first chemical compound used in a device according to the invention having a first flat structure,

Fig. 4B depicts a second chemical compound used in a device according to the invention having a flat structure,

Fig. 4C depicts a compartment used in a device according to the invention for containing the chemical compound as depicted in Fig.4A and Fig.4B,

Figs. 5A-5B-5C depict various views of a holder used in a device according to the invention for containing the chemical compound as depicted in Fig.4A and Fig.4B,

Figs. 6A-6B-6C depict various arrangements of holders used in a device according to the invention for containing a chemical compound,

Figs. 7A-7B-7C depict various arrangements of inlets and outlets of a compartment used in a device according to the invention for containing a chemical compound,

Fig. 8 depicts a three-dimensional exploded view of a compartment used in a device according to the invention for containing a chemical compound,

Fig. 9 depicts various two-dimensional views of a compartment as depicted in Fig.8,

Figs. 10A-10B depict specific embodiments of compartments used in a device according to the invention for containing a chemical compound.

DETAILED DESCRIPTION OF THE INVENTION

[0013] Fig.1 depicts a first embodiment of a device according to the invention,

[0014] The garment care device 100 comprises a mobile unit 101 comprising a first steam generator S1.

[0015] The garment care device 100 comprises a base 102 comprising a water tank 103, a cord 104 for connecting the base 102 and the mobile unit 101.

[0016] The base 102 further comprises a water circuit for carrying water from the water tank 103 to the first steam generator S1 via the cord 104.

[0017] The base 102 further comprises also comprises a compartment 105 being fluidly arranged along the water circuit allowing water to pass through the compartment 105. The compartment 105 contains a chemical compound 106 soluble in water and adapted to reduce the deposition of scale in the water circuit downstream of the compartment 105.

[0018] More particularly, in this first embodiment, the water circuit comprises:

- A water pipe 107 arranged between the water tank 103 and a water pump P1,
- A water pipe 108 arranged between the first water pump P1 and the compartment 105,
- A water pipe 109 arranged between the compartment 105 and the first steam generator S1: this water pipe 109 extends partly in the base and partly in the cord 104.

[0019] In this first embodiment, the compartment 105 is thus arranged between the first water pump P1 and the first steam generator S1.

[0020] The chemical compound helps reducing the deposition of scale in the internal surfaces of the water circuit, such as the water pipe 109 and the first steam generator S1.

[0021] For example, the chemical compound comprises phosphonate, or any other chemicals having similar effects on calcium carbonate contained in water.

[0022] Fig.2 depicts a second embodiment of a device according to the invention. This embodiment differs from the embodiment of Fig.1 in that the compartment 105 and the first water pump P1 are reversed along the water circuit.

[0023] More particularly, in this second embodiment, the water circuit comprises:

- A water pipe 110 arranged between the water tank 103 and the compartment 105
- A water pipe 111 arranged between the compartment 105 and the first water pump P1,
- A water pipe 112 arranged between the first water pump P1 and the first steam generator S1: this water pipe 112 extends partly in the base and partly in the cord 104.

[0024] In this second embodiment, the compartment 105 is thus arranged between the water tank 103 and the first water pump P1.

[0025] Preferably, the mobile unit 101 is a steam iron (as illustrated) for treating textiles or garments, such as removing wrinkles.

[0026] Alternatively, the mobile unit is a steamer head (not shown) for treating textiles or garments, such as removing wrinkles.

[0027] Preferably, as illustrated, the base 102 further comprises a second steam generator S2 supplied in water by a second pump P2 from the water tank 103, for generating steam carried from the base 102 to the mobile unit 101 via the cord 104.

[0028] The second steam generator S2 is intended to generate a flow of steam to the mobile unit 101 for treating garments. An actuatable valve 113 is controlled to deliver this flow of steam.

[0029] Preferably, the second steam generator S2 corresponds to a pressurized boiler.

[0030] For the embodiment of Fig.1, the compartment 105 could experience high pressure when the valve 113 opens to release steam through the cord 104 and the first steam generator S1. The water circuit might experience high pressure during testing to meet product standards such as the over pressure tests as described in IEC 60335-2-3 Clause 22.7. As a result, in case where the compartment 105 is not designed to withstand this high pressure, a check valve 106 is arranged at the exit of the compartment 105. In other words, a check valve 106 is arranged between the compartment 105 and the first steam generator S1. The check valve allows water to flow from the first water pump P1 in direction of the first steam generator S1, but prevents pressure build-up and damage in the compartment 105 caused by flow of water or steam from the first steam generator S1.

[0031] It is noted that for the embodiment of Fig.2, the check valve might not be required as the same effect is achieved without an additional check valve but with the functionality of the first water pump P1 itself which usually contains a check valve internally.

[0032] Fig.3 depicts a partial top view of a device 100 according to the invention, as illustrated by Fig.2.

[0033] The water tank 103, which is preferably detachable from the base 102, fluidly interfaces with the base 102 via the connector 103A. The water that flows in the water circuit is represented by dotted line. From the connector 103A, water flows along the water circuit in direction of the compartment 105, passes inside the compartment 105 containing the chemical compound 106, exits the compartment 105, passes inside the first pump P1, and is directed towards the first steam generator S1.

[0034] Fig.4A depicts a first chemical compound used in a device according to the invention having a first flat structure FS1, while Fig.4B depicts a second chemical compound used in a device according to the invention having a second flat structure FS2.

[0035] The chemical compound 106 forms at least one

substantially flat structure with a main surface (S).

[0036] For example, the flat structure FS1 is a parallelepiped of small thickness. For example, the flat structure FS2 is a cylinder of small height (i.e. forming a pill, a pellet, a disc).

[0037] Moreover, the compartment 105 is adapted to direct water passing through the compartment 105 in a main direction (D) substantially parallel to the main surface (S).

[0038] The combination of having the chemical compound 106 forming a substantially flat structure, together with the compartment 105 directing the water, results in that the chemical compound is slowly diffused in water passing through the compartment 105. This is illustrated by Fig.4C depicting a compartment used in a device according to the invention for containing the chemical compound as depicted in Fig.4A and Fig.4B,

[0039] Preferably, the compartment 105 comprises at least one holder for holding the at least one substantially flat structure.

[0040] Figs.5A-5B-5C depict various views of a holder H1 used in a device according to the invention for containing the chemical compound as depicted in Fig.4A and Fig.4B.

[0041] The holder H1 is adapted to hold a pair of chemical compounds having a flat cylindrical shape, such as the flat structure FS2 illustrated in Fig.4B. The pills are encased in a moulded plastic frame. The holder H1 has two lateral sides covered by a mesh 502 in order to hold the pills in place, allow a contact with water passing through the compartment 105, and prevent broken off pieces of the pill from affecting the components downstream the water circuit.

[0042] Alternatively (not shown), this mesh can also be placed across the outlet of the holder. Although functional, this may impact the flow resistance across the Anti-Calc Pills Holder, as pieces of the pill can get stuck in the mesh over time, resulting in lower flow rates.

[0043] Preferably, the pills can be separated by a pin 503 to hold the pill in place and ensure a certain space in-between pills. Indeed, would pills are in contact with each other, they could stick together, resulting in less surface area for dissolving.

[0044] More generally, the design, formulation and number of pills are determined such that the release rate of chemical compound allows water flowing downstream holder to contain sufficient amount of active ingredient (for example Phosphonate) so that the pill(s) is able to last for a couple of years lifetime. As a result, user does not need to change the pills for life of the product.

[0045] Preferably, the first water pump P1 has a flow rate of less than 20 g/mn.

[0046] This flow rate contributes that the flow of water exiting the compartment 105 has a concentration of phosphonate to be between 0.2ppm to 30ppm, preferably 0.5 ppm.

[0047] The amount of chemical compound in the compartment 105 can also be determined by the number of

holders implemented.

[0048] Figs.6A-6B-6C depict various arrangements of holders (H1, H2, H3, H4) used in a device according to the invention for containing a chemical compound.

5 **[0049]** Preferably, the at least one holder comprises a plurality of holders (H1, H2, H3, H4) arranged parallel to each other to form a two-dimensional array, as illustrated in Fig.6A.

10 **[0050]** Preferably, the plurality of holders comprises two holders (H1, H2) arranged parallel to each other, as illustrated in Fig.6B.

[0051] Preferably, the plurality of holders comprises two holders (H1, H3) arranged aligned with each other along a same direction, as illustrated in Fig.6C.

15 **[0052]** The way the plurality of holders is arranged may also depend on the mechanical constraints in the device, such as the size and internal space.

[0053] Figs.7A-7B-7C depict various arrangements of inlets and outlets of a compartment 105 used in a device according to the invention for containing a chemical compound.

20 **[0054]** The compartment 105 comprises a water inlet W1 oriented in a first direction (D1) and a water outlet W2 oriented in a second direction (D2).

25 **[0055]** Depending on the mechanical constraints in the device, such as the size, internal space, position of other elements in the device relative to the compartment 105, the water inlet W1 and the water outlet W2 are arranged according to anyone of the following arrangements:

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- the first direction (D1) and the second direction (D2) are substantially parallel compared to the main direction (D), as illustrated in Fig.7A, or
 - at least one of the first direction (D1) and the second direction (D2) is tilted compared to the main direction (D), as illustrated in Fig.7B and Fig.7C. By "tilted", it is meant an angle in the range +/- [5;90] degrees.
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[0056] Fig.8 depicts a three-dimensional exploded view of a compartment 105 used in a device according to the invention for containing a chemical compound 106, while Fig.9 depicts various two-dimensional views of a compartment as depicted in Fig.8.

40 **[0057]** The compartment 105 is adapted to contain two holders H1, H2. The holder H2 is preferably same as the holder H1 described above. So in total, the compartment 105 contains a chemical compound 106 of four pills. The two holders H1, H2 are arranged in parallel. A top cover CC closes the compartment 105 and also ensures a water tight sealing with gasket G. The water inlet W1 and the water outlet W2 are arranged as illustrated in Fig.7C with direction (D1) and (D2) being substantially perpendicular to the main direction (D). In this implementation, a wall WW1 is arranged at the water inlet W1 so that water is directed on the side of the container, resulting in that water will flow along the main direction (D) inside the compartment 105.

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[0058] Figs.10A-10B depict specific embodiments of

compartments 105 used in a device according to the invention for containing a chemical compound.

[0059] Those embodiments are such that the compartment 105 is adapted to maintain a level of water sufficient high to keep the chemical compound 106 immersed in water, even after the first water pump P1 has stopped. To this end, anyone of the following arrangements can be implemented:

- as illustrated in Figs. 10A, the water outlet W2 is arranged higher than a top surface (TS1) of the at least one holder H1, or
- as illustrated in Figs. 10B, the water outlet W2 is arranged lower than the top surface (TS1) of the at least one holder H1, and the compartment 105 further comprises an internal additional wall WW2 forming barrier for water and being arranged in front the water outlet W2.

[0060] By maintaining a level of water sufficient high in the compartment 105, the chemical compound is always immersed in water, which allows a continuous diffusion of chemical compound in water, even when the first water pump P1 was stopped. This thus ensures that when the first water pump P1 is actuated, water which flows out of the compartment 105 already contains sufficient amount of diffused chemical compound that will prevent the deposit of carbonate calcium downstream the water circuit.

[0061] The above embodiments as described are only illustrative, and not intended to limit the technique approaches of the present invention. Although the present invention is described in details referring to the preferable embodiments, those skilled in the art will understand that the technique approaches of the present invention can be modified or equally displaced without departing from the protective scope of the claims of the present invention. In the claims, the word "comprising" does not exclude other elements or steps, and the indefinite article "a" or "an" does not exclude a plurality. Any reference signs in the claims should not be construed as limiting the scope.

Claims

1. Garment care device (100) comprising a mobile unit (101) comprising a first steam generator (S1), a base (102) comprising a water tank (103), a cord (104) for connecting the base (102) and the mobile unit (101), wherein the base (102) further comprises:

- a water circuit for carrying water from said water tank (103) to said first steam generator (S1) via said cord (104),
- a compartment (105) being fluidly arranged along said water circuit allowing water to pass through said compartment (105), said compart-

ment (105) containing a chemical compound (106) soluble in water and adapted to reduce the deposition of scale in said water circuit downstream of said compartment (105).

2. Garment care device as claimed in claim 1, wherein said water circuit further comprises a first water pump (P1), and wherein said compartment (105) is arranged between said water tank (103) and said first water pump (P1).
3. Garment care device as claimed in claim 1, wherein said water circuit comprises a first water pump (P1), and wherein said compartment (105) is arranged between said first water pump (P1) and said first steam generator (S1).
4. Garment care device as claimed in claim 3, further comprising a check valve (106) arranged between said compartment (105) and said first steam generator (S1).
5. Garment care device as claimed in anyone of the preceding claims, wherein said chemical compound (106) forms at least one substantially flat structure (FS1, FS2) with a main surface (S), said compartment (105) being adapted to direct water passing through said compartment (105) in a main direction (D) substantially parallel to said main surface (S).
6. Garment care device as claimed in claim 5, wherein said compartment (105) comprises at least one holder (H1, H2, H3, H4) for holding said at least one substantially flat structure (FS1, FS2).
7. Garment care device as claimed in claim 6, wherein said at least one holder (H1, H2, H3, H4) comprises a plurality of holders arranged parallel to each other to form a two-dimensional array.
8. Garment care device as claimed in claim 7, wherein said plurality of holders comprises two holders (H1, H2) arranged parallel to each other.
9. Garment care device as claimed in claim 7, wherein said plurality of holders comprises two holders (H1, H3) arranged aligned with each other.
10. Garment care device as claimed in claim 5, wherein said compartment (105) comprises a water inlet (W1) oriented in a first direction (D1) and a water outlet (W2) oriented in a second direction (D2), wherein said water inlet (W1) and said water outlet (W2) are arranged according to anyone of the following arrangements:
 - said first direction (D1) and second direction (D2) are substantially parallel compared to said

main direction (D), or
 - at least one of said first direction (D1) and said second direction (D2) is tilted compared to said main direction (D).

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11. Garment care device as claimed in anyone of the preceding claims, wherein said first water pump (P1) has a flow rate below 20 g/mn.

12. Garment care device as claimed in claim 6, wherein said compartment (105) is adapted to maintain a level of water sufficient high to keep the chemical compound (106) immersed in water by anyone of the following arrangements:

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- said water outlet (W2) is arranged higher than a top surface (TS1) of said at least one holder, or
 - said water outlet (W2) is arranged lower than said top surface (TS1) of said at least one holder, the compartment (105) further comprising an internal additional wall (WW2) forming barrier for water and being arranged in front said water outlet (W2).

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13. Garment care device as claimed in anyone of the claims 1 to 12, wherein said mobile unit (101) is a steam iron (101).

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14. Garment care device as claimed in claim 13, wherein the base (102) further comprises a second steam generator (S2) supplied in water by a second pump (P2) from the water tank (103), for generating steam carried from said base (102) to said mobile unit (101) via said cord (104).

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15. Garment care device as claimed in anyone of the claims 1 to 12, wherein said mobile unit (101) is a steamer head.

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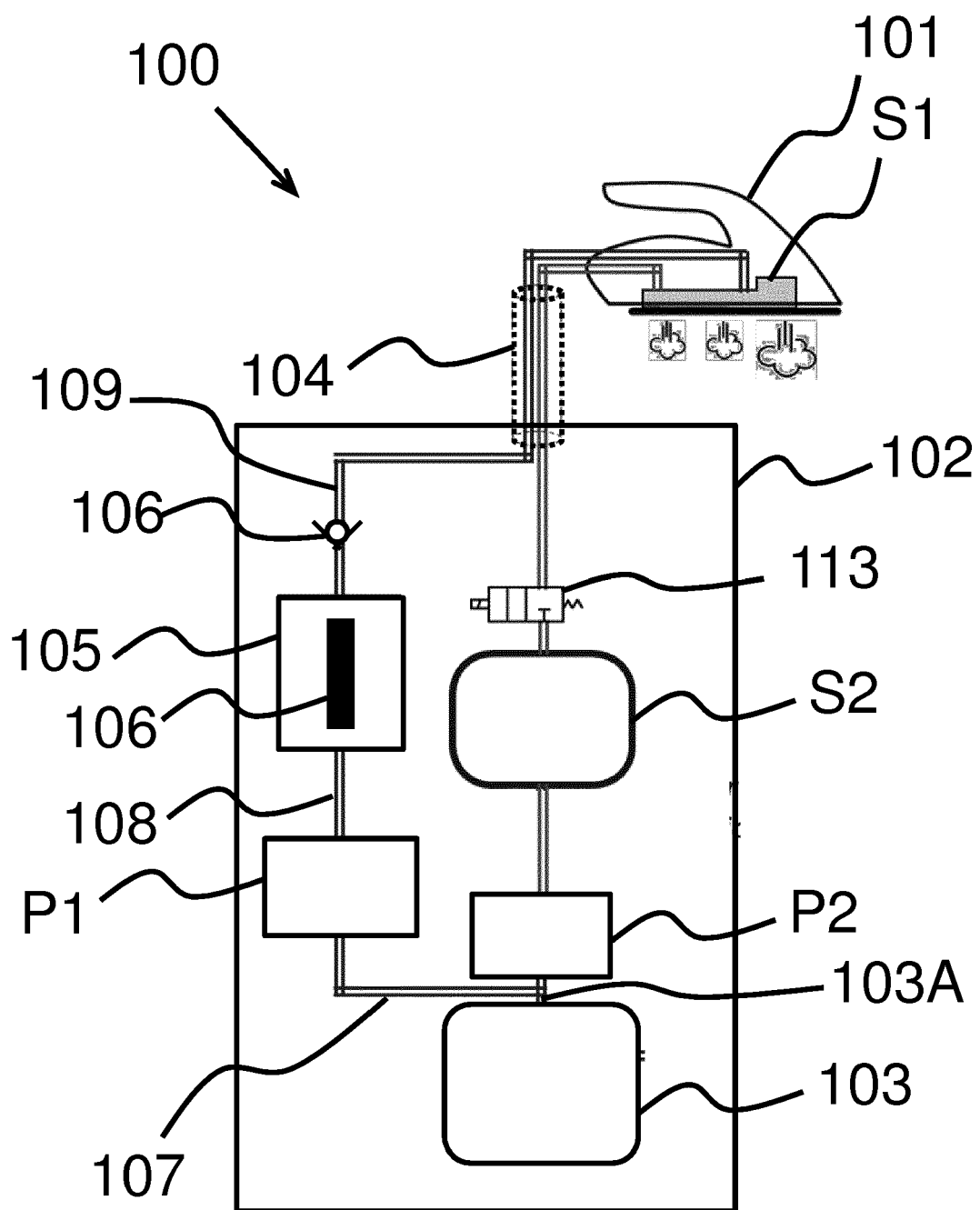


FIG.1

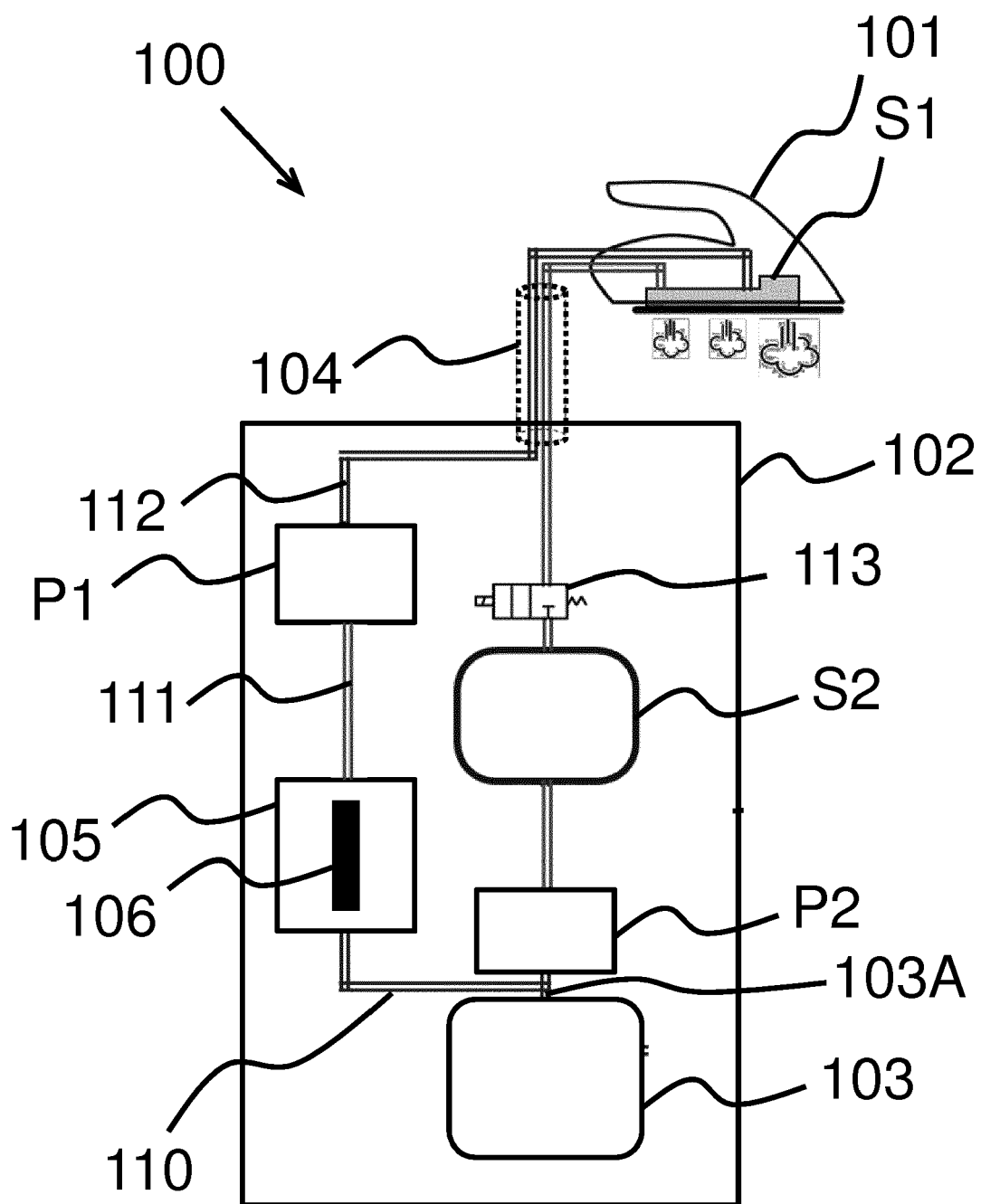


FIG.2

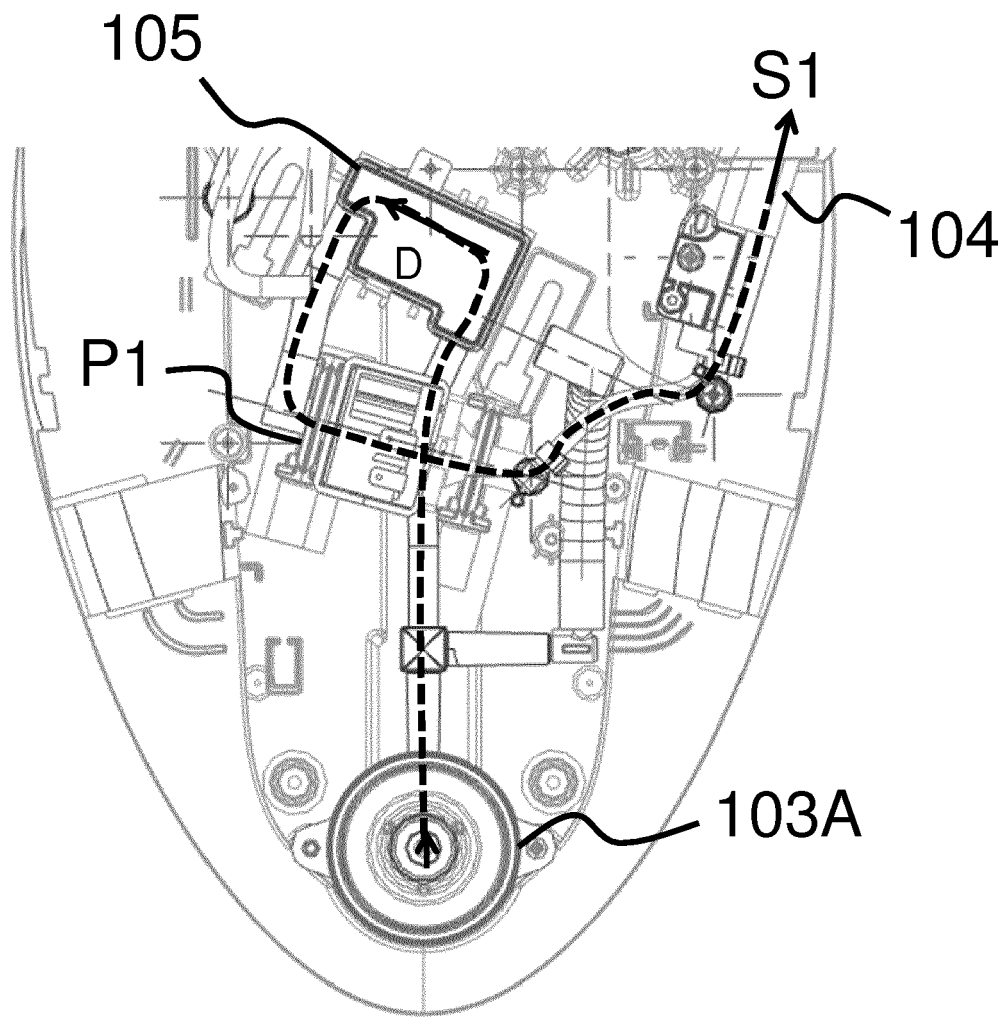
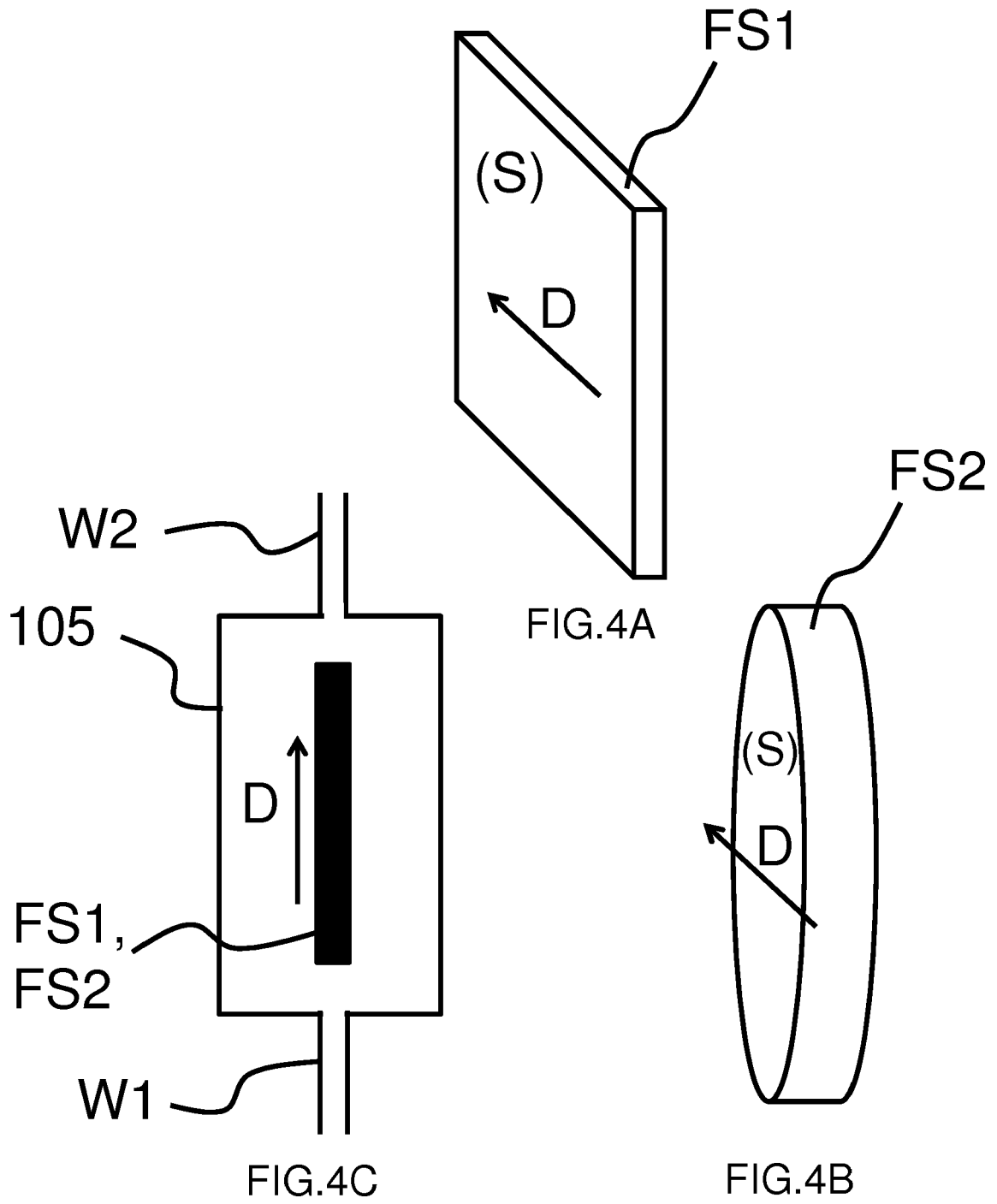


FIG.3



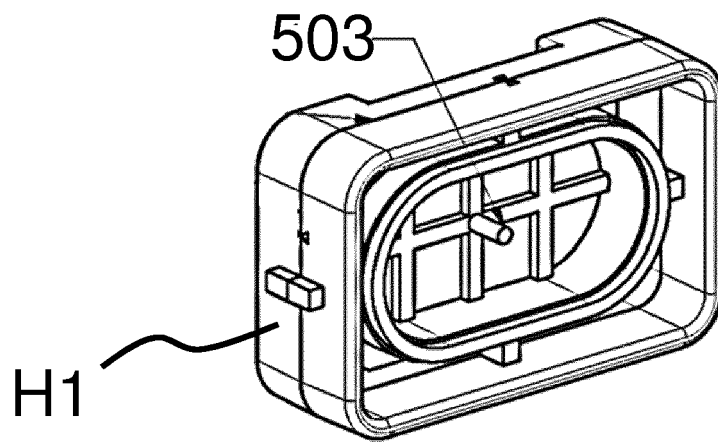


FIG. 5A

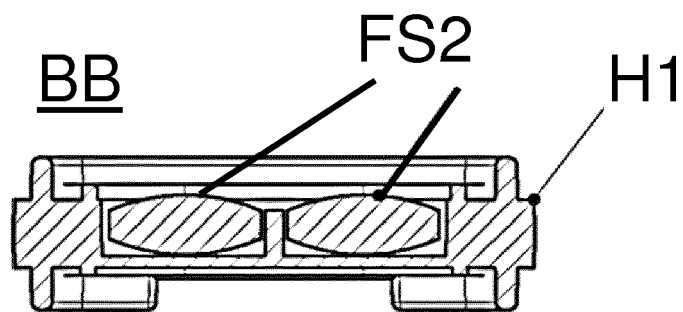


FIG. 5B

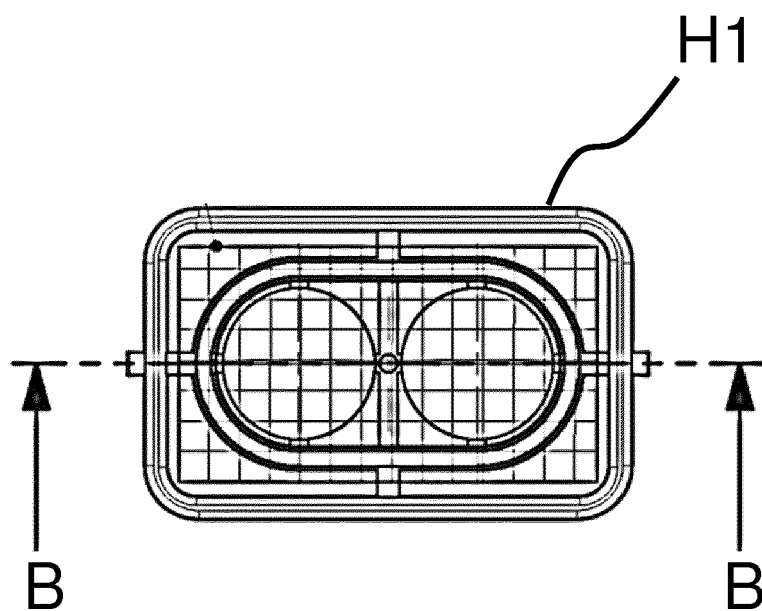


FIG. 5C

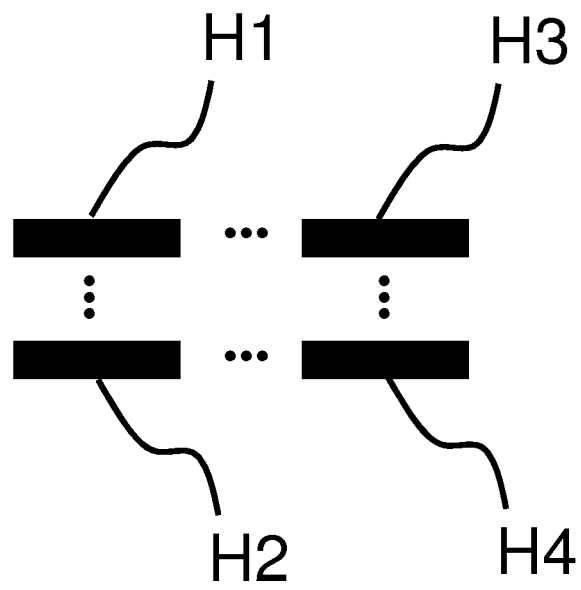


FIG.6A

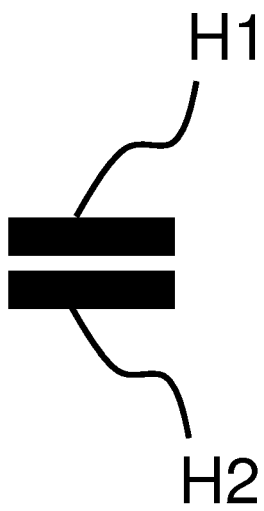


FIG.6B

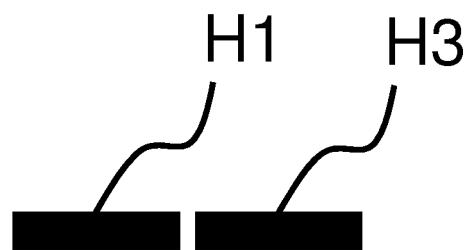


FIG.6C

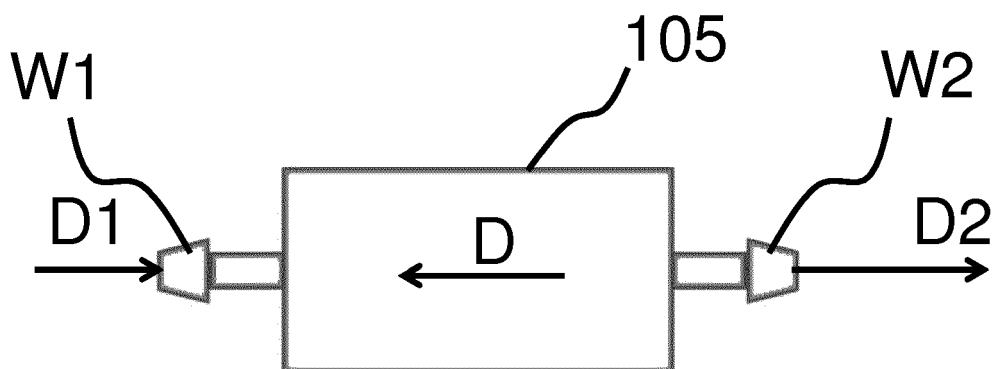


FIG. 7A

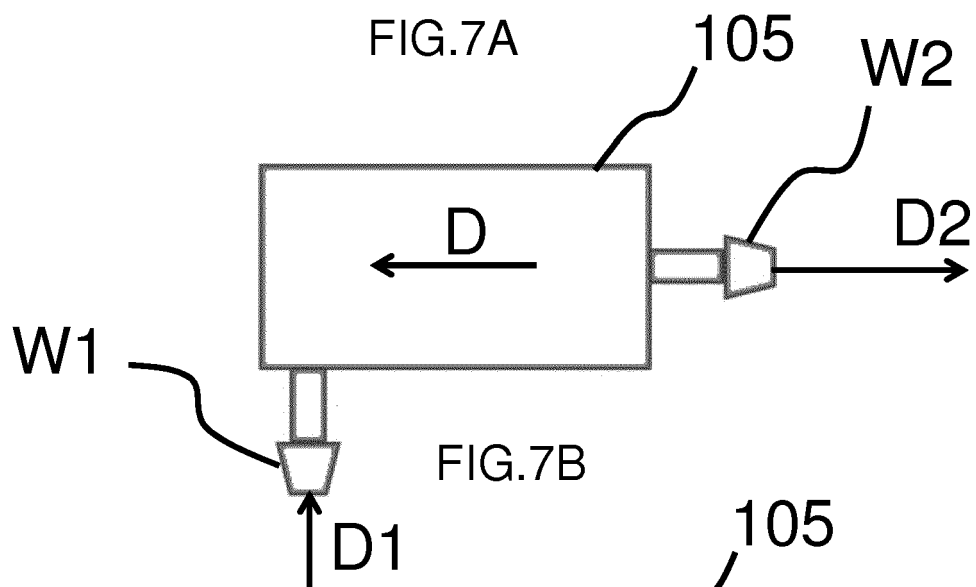


FIG. 7B

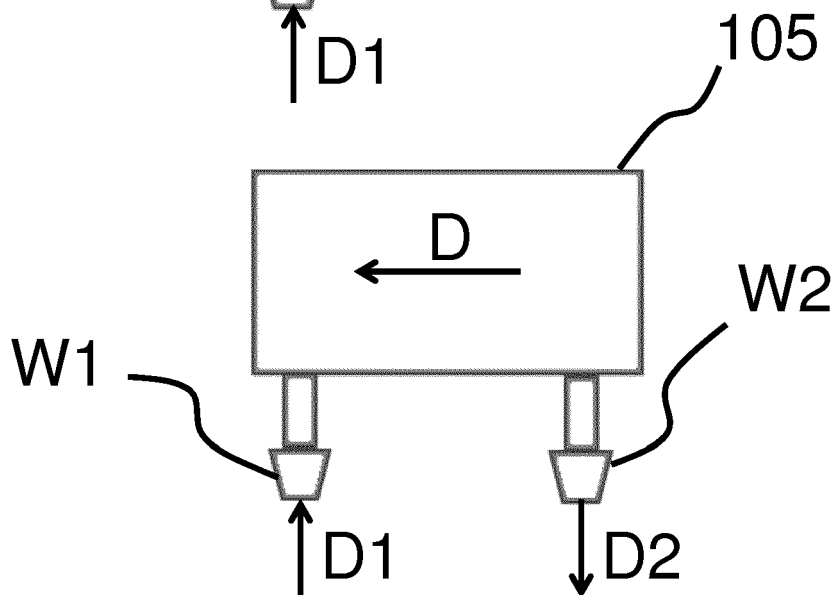


FIG. 7C

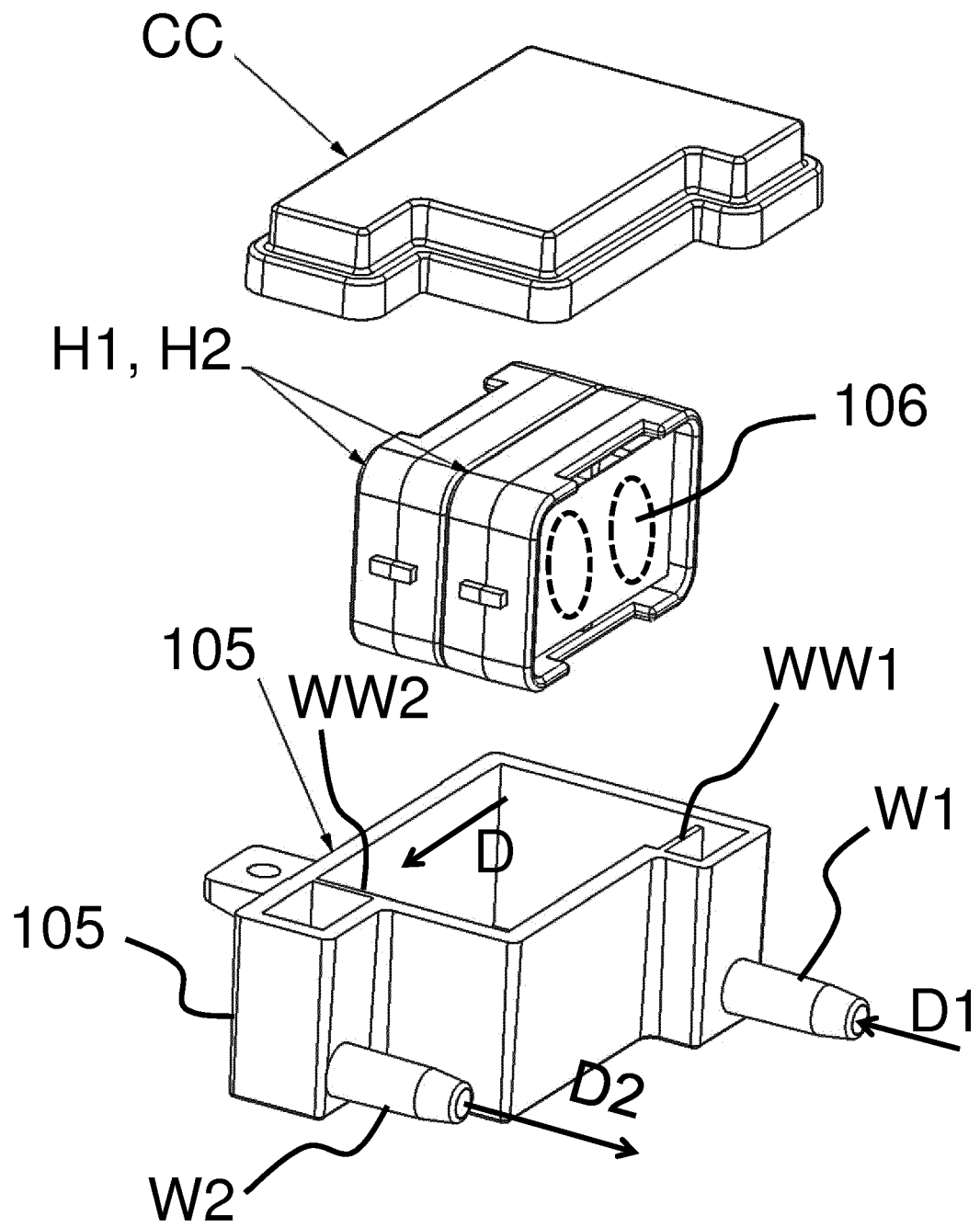


FIG.8

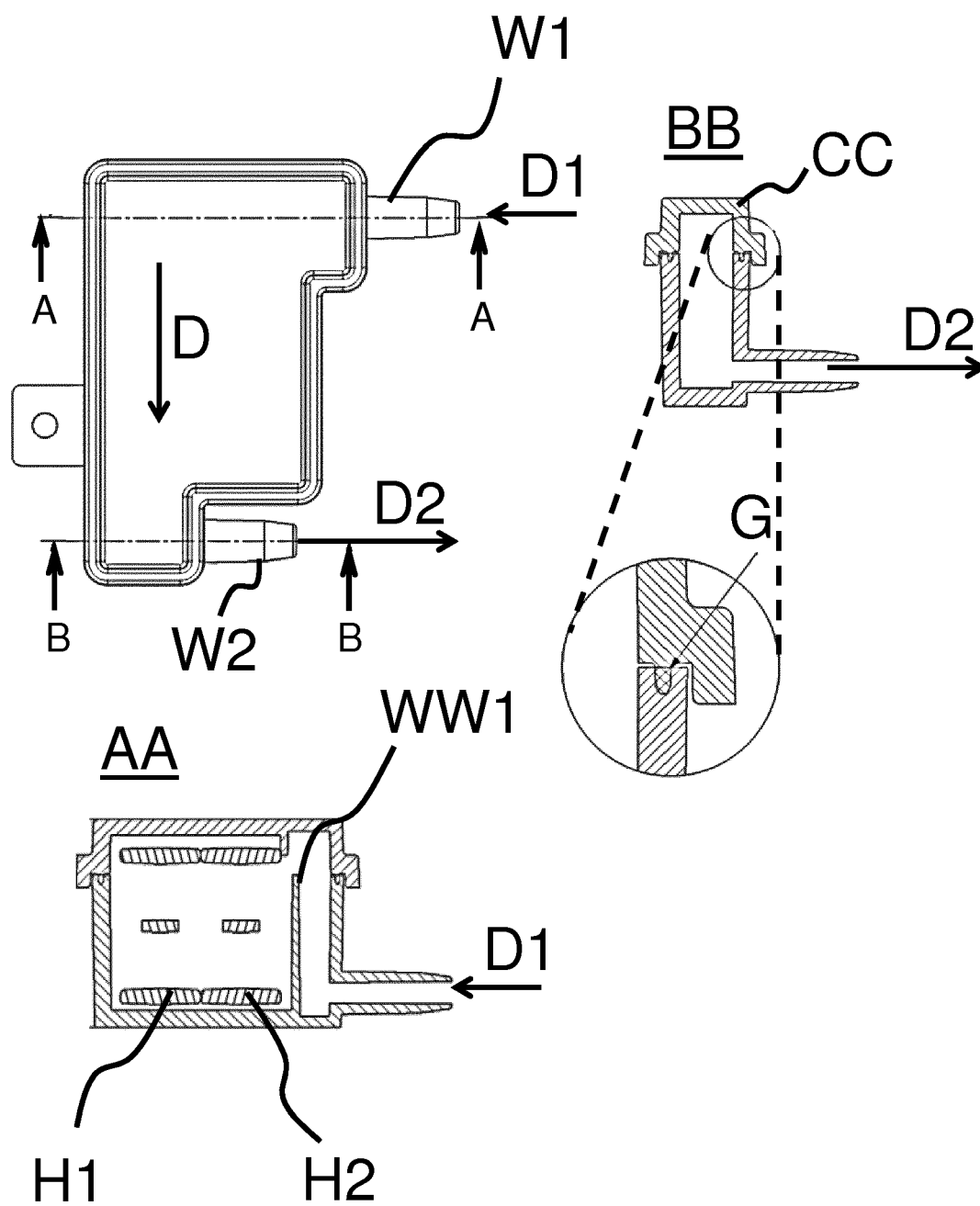


FIG.9

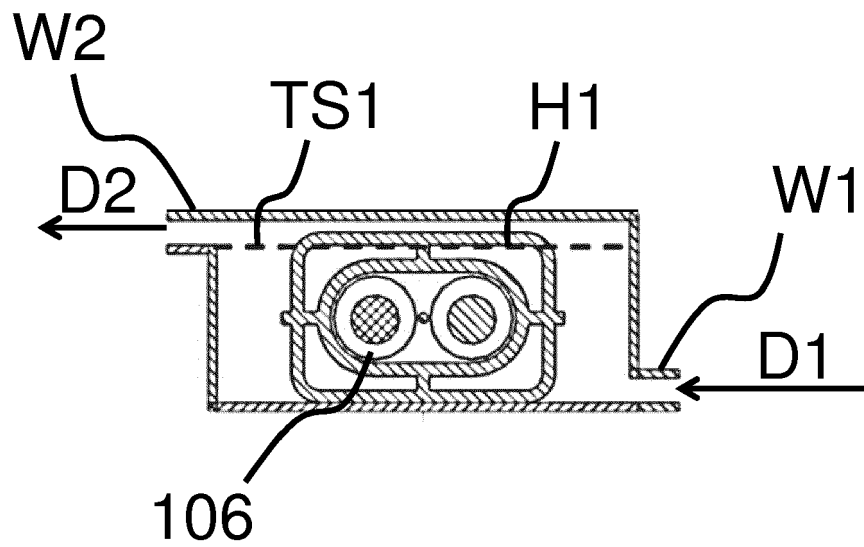


FIG.10A

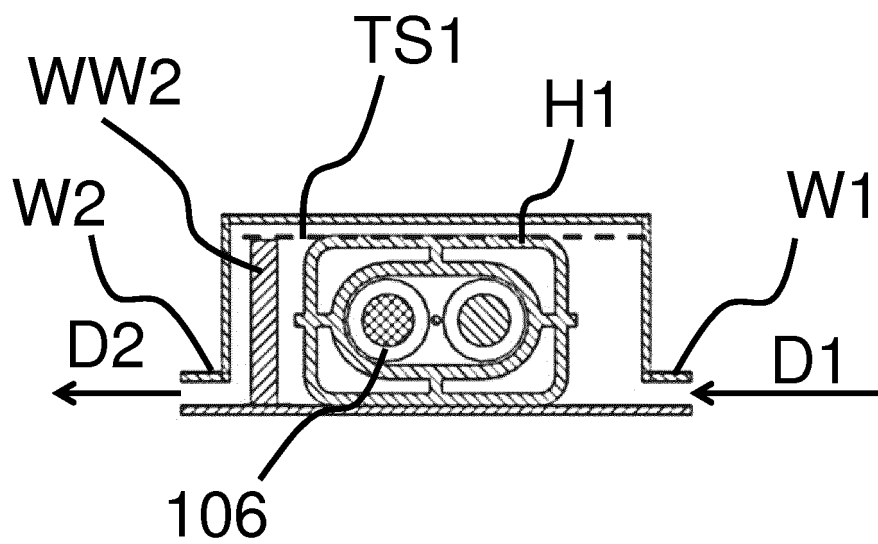


FIG.10B



EUROPEAN SEARCH REPORT

Application Number
EP 19 19 4227

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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)
Y	EP 0 785 303 A1 (SEB SA [FR]) 23 July 1997 (1997-07-23)	1-11, 13-15	INV. D06F75/10
A	* column 4, lines 7-19 * * column 5, line 41 - column 6, line 53 * * figure 1 *	12	D06F75/12
Y	EP 3 051 019 A1 (TENACTA GROUP SPA [IT]) 3 August 2016 (2016-08-03)	1-3, 5-11, 13-15	
A	* paragraph [0009] - paragraph [0015] * * paragraph [0022] *	12	
Y	EP 3 418 440 A1 (SEB SA [FR]) 26 December 2018 (2018-12-26)	1-3, 5-11, 13-15	
A	* paragraph [0032] * * paragraph [0060] *	12	
Y	DE 196 14 511 C1 (ROWENTA WERKE GMBH [DE]) 23 January 1997 (1997-01-23)	4	
	* figure 1 *		
			TECHNICAL FIELDS SEARCHED (IPC)
			D06F
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 7 February 2020	Examiner Bermejo, Marco
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 19 19 4227

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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ORM P0459

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0785303	A1	23-07-1997	DE 69704723 D1 13-06-2001
			DE 69704723 T2 06-12-2001
			EP 0785303 A1 23-07-1997
			ES 2157543 T3 16-08-2001
			FR 2743823 A1 25-07-1997
			US 5743034 A 28-04-1998

EP 3051019	A1	03-08-2016	NONE

EP 3418440	A1	26-12-2018	CN 109137438 A 04-01-2019
			CN 208815319 U 03-05-2019
			EP 3418440 A1 26-12-2018
			FR 3067725 A1 21-12-2018

DE 19614511	C1	23-01-1997	DE 19614511 C1 23-01-1997
			FR 2747403 A1 17-10-1997
			IT MI970805 A1 13-10-1997

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- WO 2019122275 A [0003]