(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 3 623 524 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
18.03.2020 Bulletin 2020/12

(51) Int Cl.:
D06F 39/14 *(2006.01)* *D06F 39/02* *(2006.01)*

(21) Application number: **19196113.5**

(22) Date of filing: **09.09.2019**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

(30) Priority: **17.09.2018 IT 201800008657**

(71) Applicant: **Candy S.p.A.**
20900 Monza, Monza e Brianza (IT)

(72) Inventors:
- **FUMAGALLI, Aldo**
  20900 Monza, Monza e Brianza (IT)
- **BERETTA, Fabio**
  20900 Monza, Monza e Brianza (IT)
- **LANCIAPRIMA, Silvestro**
  20900 Monza, Monza e Brianza (IT)

(74) Representative: **Leihkauf, Steffen Falk**
Jacobacci & Partners S.p.A.
Via Senato, 8
20121 Milano (IT)

(54) DOOR-HINGE ASSEMBLY IN A WASHING MACHINE

(57) A door-hinge assembly (1) in a washing machine (2) having a housing (3) which forms a laundry loading opening (4), wherein the door-hinge assembly (1) comprises: a door (5) configured to close the laundry loading opening (4), a hinge (6) comprising one or more first hinge bodies (7) which are fixedly connected to the housing (3) and one or more second hinge bodies (8) connected to the door (5), wherein said one or more first hinge bodies (7) are pivotally connected to said one or more second hinge bodies (8) about a single hinge axis (9), so as to obtain a pivoting connection, about the hinge axis (9), between said door (5) and said housing (3); characterized in that it comprises one or more first channels (10) formed inside said one or more first hinge bodies (7), and one or more second channels (11) formed inside said one or more second hinge bodies (8) and connected to said one or more first channels (7) in one or more corresponding pivoting coupling interfaces (12) about said hinge axis (9), so as to obtain one or more continuous ducts (13) extending from the housing (3) through the hinge (6) up to the door (5).

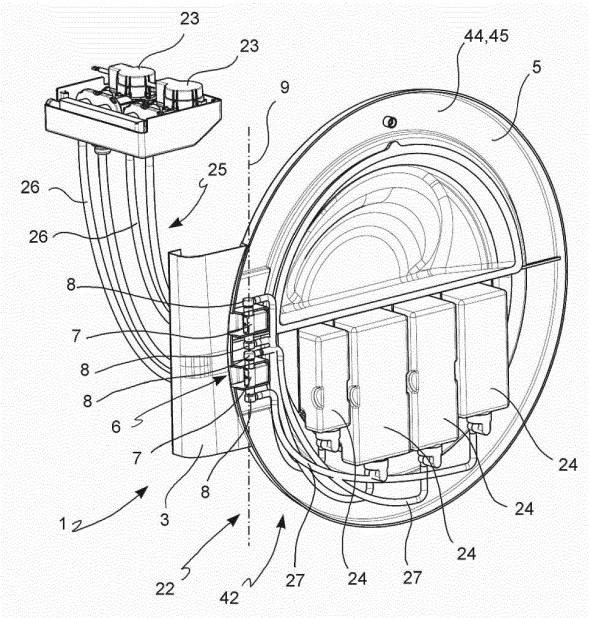

FIG. 3

EP 3 623 524 A1

Description

[0001] The present invention relates to a door-hinge assembly for a washing machine and to a washing machine with the door-hinge assembly.

[0002] Washing machines comprising a supporting and housing structure, inside which a washing tub is housed provided with an opening which can be closed by a door hinged to the supporting and housing structure are known. A basket to accommodate the laundry to be washed is rotationally arranged inside the washing tub.

[0003] These washing machines comprise a hydraulic system for feeding mains water to the washing tub and a detergent dispensing system with one or more detergent tanks which contain detergent or the other treatment substances (liquid or powder) for a single washing cycle (single-dose containers) or for a plurality of washing cycles (multi-dose containers).

[0004] The hydraulic and detergent dispensing systems may comprise one or more pumps and ducts for conveying water and for dosing and dispensing detergent.

[0005] In order to make the most of the space available in the washing machine, it is known and desirable to position some components of the detergent dispensing system, e.g. the detergent containers and/or the dosing pump, inside the door of the washing machine.

[0006] This implies the need to extend hydraulic ducts and/or electrical wires (to operate the dosing pump or the selection valves) from the housing into the door and vice versa.

[0007] Due to the hinged connection of the door to the housing and its frequent opening and closing movements, the hydraulic ducts and/or electrical wiring between the housing and the door are difficult to implement and subject to undesired stresses. For example, it has been suggested to extend the hydraulic ducts and/or electrical wires close to the door hinge, near which the distance and relative movement between door and housing are reduced.

[0008] The duct and wiring solutions close to the hinge known to the inventors require foldable, bulky ducts and wiring to accommodate the relative movement and to provide the necessary protection. These solutions known to the inventors are expensive, not very reliable in the long term and structurally complex.

[0009] Therefore, it is the object of the present invention to provide a door-hinge assembly for washing machine, having features such as to improve the conduction of fluids between the housing of the washing machine and the door and/or to improve the electrical wiring between the housing of the washing machine and the door.

[0010] It is a specific object of the invention to provide a door-hinge assembly for washing machine, having features such as to allow a reliable and protected conduction of fluids.

[0011] It is a further specific object of the invention to provide a door-hinge assembly for washing machine, with features such as to allow a reliable and protected electrical wiring.

[0012] It is a further specific object of the invention to provide a door-hinge assembly for washing machine which also implements a hydraulic conveying device or a channel for electrical wiring, which is structurally simple, compact and robust.

[0013] These and other objects are achieved by a door-hinge assembly for washing machine according to claim 1 and by a washing machine unit with said door-hinge assembly.

[0014] The dependent claims relate to advantageous and preferred embodiments.

[0015] According to an aspect of the invention, a door-hinge assembly is suggested in a washing machine having a housing which forms a laundry loading opening, in which the door-hinge assembly comprises:

- a door configured to close the laundry loading opening,
- a hinge comprising one or more first hinge bodies which are fixedly connected to the housing and one or more second hinge bodies connected to the door, wherein said one or more first hinge bodies are pivotally connected to said one or more second hinge bodies about a single hinge axis, so as to obtain a pivoting connection, about the hinge axis, between said door and said housing,

characterized in that it comprises

- one or more first channels formed inside said one or more first hinge bodies, and
- one or more second channels formed inside said one or more second hinge bodies and connected to said one or more first channels in one or more corresponding pivoting coupling interfaces about said hinge axis, so as to obtain one or more continuous ducts extending from the housing through the hinge up to the door.

[0016] The continuous ducts thus created provide a hydraulic connection for conveying liquid detergent and/or rinsing water, and/or a channel for the passage of electrical wires, not subject to unforeseen deformations, protected from the external environment, compact and not encroaching on the space of other components of the washing machine.

[0017] According to another aspect of the invention, the one or more rotary coupling interfaces isolate the interior of the first and second channels from the external environment in a liquid-tight manner, e.g. by means of an elastomeric sealing ring between a respective first and second channel.

[0018] This allows the first and second hinge bodies to be used directly as hydraulic pipes and, in the case of electrical wiring, it protects the electrical wires extended in the first and second channels from moisture or drops of water which frequently occur at the laundry loading opening.

[0019] In order to better understand the invention and appreciate its advantages, some non-limiting embodiments will be described below by way of example with reference to the accompanying drawings, in which:

- figure 1 is a diagrammatic section view of a washing machine according to an embodiment of the invention;
- figure 2 is a diagrammatic section view of a detergent dispensing system of a washing machine according to an embodiment of the invention;
- figure 3 is an axonometric view of a door-hinge assembly according to an embodiment of the invention, in which the door is in closing position;
- figure 4 is an axonometric view of the door-hinge assembly in figure 3, in which the door is in opening position;
- figure 5 is an exploded view of some functional components of the door-hinge assembly and a detergent dispensing system according to an embodiment;
- figure 6 is a detailed view of a hinge of the door-hinge assembly according to an embodiment,
- figure 7 is an enlarged view of a detail of the hinge shown in figure 6,
- figure 8 is a diagrammatic section view of a detail of the door-hinge assembly according to an embodiment of the invention;
- figure 9 is a diagrammatic section view of a detail of the door-hinge assembly according to a further embodiment of the invention;
- figure 10 is a diagrammatic top view of a detail of the door-hinge assembly according to an embodiment;
- figure 11 is a diagrammatic side view of the detail in figure 10,
- figure 12 is an exploded view of the hinge of the door-hinge assembly according to an embodiment,
- figures 13 and 17 show an assembling sequence of the door-hinge assembly according to an embodiment.

[0020] With reference to the figures, a door-hinge assembly for/in a washing machine 2 of the type having a housing 3 which forms a laundry loading opening 4, is indicated by the reference numeral 1 as a whole.

[0021] The door-hinge assembly 1 comprises a door 5 configured to close the laundry loading opening 4 and a hinge 6.

[0022] The hinge 6 comprises one or more first hinge bodies 7 which are fixedly connected or connectable to the housing 3 and one or more second hinge bodies 8 connected to the door 5.

[0023] The one or more first hinge bodies 7 are pivotally connected to said one or more second hinge bodies 8 about a single hinge axis 9, so as to (be able to) obtain a pivoting connection, about the hinge axis 9, between the door 5 and one or more first hinge bodies 8 and, therefore, the housing 3.

[0024] The door-hinge assembly 1 comprises one or more first channels 10 formed inside said one or more first hinge bodies 7, and one or more second channels 11 formed inside said one or more second hinge bodies 8.

[0025] The one or more second channels 11 are connected to said one or more first channels 10 in one or more corresponding pivoting coupling interfaces 12 about the hinge axis 9, so as to obtain one or more continuous ducts 13 extending from the one or more first hinge bodies 8 or the housing 3 through the hinge 6 up to the door 5.

[0026] The continuous ducts 13 thus created provide a hydraulic connection for conveying liquid detergent and/or rinsing water and/or a channel for the passage of electrical wires. The hydraulic connection or wire duct thus created is not subject to unplanned deformations, is protected from the outside environment, is compact and does not encroach upon the space of the other components of the washing machine 2.

[0027] According to an embodiment, the one or more rotary coupling interfaces 12 isolate in a liquid-tight manner the interior of the first and second channels 10, 11 from the outside environment, e.g. by means of an elastomeric sealing ring 14 between a respective first channel 10 and second channel 11.

[0028] This allows the first and second hinge bodies 7, 8 to be used directly as hydraulic pipes and, in the case of electrical wiring, protects the electrical wires extended in the first and second channels 10, 11 from moisture or drops of water which frequently occur at the laundry loading opening 4.

Description of the geometry of the hinge bodies 7, 8

[0029] According to an embodiment of the invention, the first channel 10 of the first hinge body 7 extends from a first inlet end 16 to a first outlet end 15. Similarly, the second channel 11 of the second hinge body 8 extends from a second inlet end 18 to a second outlet end 17. The first outlet end 15 is integrally and firmly connected or connectable to the housing 3. The first inlet end 18 is integrally and firmly connected or connectable to the door 5. The first inlet end 16 is pivotally connected to the second outlet end 17 at the pivoting coupling interface 12,.

[0030] According to an embodiment, at least one of the first hinge bodies 7 forms a first base portion 28 extending transversely with respect to the hinge axis 9 and connected or connectable to the housing 3 and forming the first outlet ends 15 of the first channels 10, as well as a plurality of first branch portions 29 which either extend or bifurcate from the first base portion 28 (at a first branch zone 30 of the first hinge body 7) in a substantially parallel or concentric direction with respect to the hinge axis 9 and which are connected to the one or more second hinge bodies 8 and form the first inlet end or ends 16 of the first channel or channels 10.

[0031] According to an embodiment, two first branch portions 29 extend from a first base portion 28 in mutually opposite directions, respectively.

[0032] According to a further embodiment, the first base portion 28 is bent as an elbow, e.g. with an angle from 60° to 120°, preferably about 90°, around a bending axis 31 parallel to the hinge axis 9, so as to form a first leg 35 and a second leg 36 **(Figures 6 and 7).**

[0033] This facilitates the use of the hinge 6 with thicker doors 5 and reconciles the structural requirements of hinge 6 with the requirements of fluid conduction or protection of electrical wires.

[0034] According to an embodiment, the one or more second hinge bodies 8 form a second base portion 32, extending substantially parallel to the hinge axis 9 and forming the second inlet end 17 of the second channel 11, and connected to the first hinge body 7, as well as a second branch portion 33, which extends from the second base portion 32 (at a second branch area 34 of the second hinge body 8) in a transverse direction to the hinge axis 9 and which is connected to the door 5 and forms the second inlet end or ends 18 of the second channel or channels 11.

[0035] According to an embodiment, the first and second hinge bodies 7 and 8 are configured (shaped and positioned) so that, with the door 5 in closing position:

- the first branch portions 29 of the first hinge body 7, and
- the second base portions 32 and the second branch portions 33 of the second hinge body 8, and
- the hinge axis 9

lie in the same plane, preferably parallel to the plane of the door 5,
while the first base portion 28 of the first hinge body 7 extends at least partly transversely with respect to the hinge axis 9.

[0036] This configuration is very compact and allows the creation of an external surface in sight of the door 5 parallel to the front face of the housing 3.

[0037] According to an embodiment, the second inlet end 18 of the second channels 11 forms an externally tapered frusto-conical connector 37 with a circumferential undercut or circumferential step, e.g. adapted to a hydraulic connection by snapping or interference with a pipe inside the door 5.

[0038] According to a further embodiment, the hinge 6 also comprises one or more third hinge bodies 21 pivotally connected to the one or more first hinge bodies 7 (e.g. by the interposition of a bearing 49 or a bushing, figures 12, 16) about the hinge axis 9 and permanently connected to door 5, so as to create an auxiliary rotating connection about the hinge axis 9 between the door 5 and the one or more first hinge bodies 7 and, consequently, the housing 3, e.g. for the purpose of structurally strengthening the hinge 6. This allows, for example, to optimize the second hinge body 8 for dimensioning and positioning continuous ducts 13 independently from the structural function of the hinge 6 and to optimize the third hinge body 21 for dimensioning and structural positioning, regardless of the function of the hinge 6 as a hydraulic duct or as a channel for electrical wires.

[0039] According to an embodiment, the one or more third hinge bodies 21 comprise a box-like profile **(figures 3, 4, 10, 11),** e.g. open or closed, e.g. metal or plastic, which box-like profile forms:

- hinge seats 40 which pivotally accommodate corresponding hinge portions (e.g. the aforesaid branch portions 29) of the first hinge body 7, and
- a cavity 41 which at least partially accommodates and envelops (the first base portion 28 of) the first hinge body 7.

[0040] This reconciles the requirements of compactness, protection and robustness of the hinge 6.

[0041] According to an embodiment, the one or more third hinge bodies 21 comprise a first half-shell 43 and a second half-shell 43' which jointly define the hinge bodies 40 and, possibly, the cavity 41, connected to each other so as to embrace the first hinge body 7. Advantageously, the first half-shell 43 forms part of a first portion 45 of a frame 44 of the door 5 and the second half-shell 43' forms part of a second portion 45' of the frame 44 which can be connected to the first portion 45 to form the frame 44 of the door 5 (figures 1, 2, 3, 11 and sequence of figures 13 - 17).

[0042] According to an embodiment (figures 5, 6), the hinge 6 further comprises a single mounting plate 19, which is integral or formed in one piece with all the first hinge bodies 7 and provided with two mounting holes 20 for mounting the door-hinge assembly 1 to the housing 3.

[0043] This facilitates the pre-assembly of the hinge-door assembly 1 and the assembly of the washing machine 2 and reduces the number of connecting parts.

[0044] According to a further embodiment (figures 5, 6), the hinge 6 or washing machine 2 further comprises an auxiliary plate 46 which can be connected to the single mounting plate 19 and which supports a plurality of hydraulic connectors 47, e.g. hydraulic elbow connectors, each having a first end which can be connected (e.g. by means of a male-female insertion) to one of the first channels 10 and a second end which can be connected to a pipe arranged outside the door 5.

[0045] The auxiliary plate 46 groups together and supports in the desired positions a plurality of or all the hydraulic connections (washing machine side) to be connected to the door-hinge assembly 1, thereby facilitating a pre-assembly of the hydraulic system 42 and/or of the detergent dispensing system 22 of the washing machine 2.

[0046] According to an advantageous embodiment, the hydraulic connectors 47 are supported in the auxiliary plate 46 with the possibility of position adjustment, e.g. by guided housing inside one or more adjustment slots 48 formed in the auxiliary plate 46.

[0047] This allows a versatile use of the same type of auxiliary plate 46 for different door-hinge assemblies with

different center distances between the first channels 10.

Description of channel 10, 11 geometry

[0048] According to an embodiment, the first channels 10 comprise at least one channel free from branches or are all without branches (figure 8).

[0049] For example, the first base portion 28 of the first hinge body 7 can form two or more first outlet ends 15 of two or more corresponding first channels 10 and the first branch portions 29 each can form only one of the first inlet ends 16, respectively. The two or more first channels 10 can thus extend individually each in one of the first branch portions 29 and together in parallel in the first base portion 28.

[0050] According to an alternative embodiment, the first channels 10 may comprise at least one channel with a Y-shaped branch **(figure 9).** In this case, the first channel 10 may have only a first inlet end 16 and a plurality of first outlet ends 15, or only a first outlet end 15 and a plurality of first inlet ends 16.

[0051] This allows, for example, the distribution of a single inlet flow to a plurality of different uses, e.g. to a plurality of valves or dosing pumps or detergent compartments. This also allows the use of a larger number of portions of the hinge 6 to define a larger number of different ducts 13.

[0052] According to a preferred embodiment, the hinge 6 comprises two hinge units, in which each hinge unit comprises:

- a single first body hinge 7 forming two first channels 10 therein,
- two second hinge bodies 8 forming a single second channel 11 therein, respectively, and in which each of the first two channels 10 is respectively connected to only one of the two second channels 11, in order to create two continuous channels 13 which are distinct and extend from the housing 3 through the hinge 6 up to the door 5.

[0053] Advantageously, said two continuous ducts 13 are mutually separate and independent. Therefore, each of the continuous ducts 13 can be used to convey different treatment substances without the risk of undesirable mixing. Furthermore, the separate continuous ducts 13 can be used for different purposes, e.g. a first continuous duct 13 can be used as a hydraulic duct for detergents and/or rinsing water and a second continuous duct 13 can be used as a channel for the passage of electrical wires.

Detailed description of the washing machine 2

[0054] According to an embodiment, a washing machine 2 comprises a housing 3 which forms a laundry loading opening 4 and the door-hinge assembly 1 connected to the housing 3.

[0055] The washing machine 2 further comprises:

a washing tub 38 arranged in the housing 3 and forming a tub opening at the loading opening 4,
a laundry basket 39 pivotally arranged inside the washing tub 38 and having a basket opening formed at the loading opening **(figure 1).**

[0056] The washing machine 1 further comprises a hydraulic system 42 for feeding mains water to the washing tub 38 and a detergent dispensing system 22 for dosing and/or conveying detergent into the washing tub 38, in which at least one of the either the hydraulic system 42 or the detergent dispensing system 22 is connected to the one or more first channels 10 and second channels 11 of the door-hinge assembly 1, e.g. in flow communication or through a passage of electrical cables.

[0057] According to an embodiment, the detergent delivery system 22 comprises one or more dosing pumps 23 located in housing 3 outside the door 5, and one or more detergent tanks or compartments 24 located inside the door 5, or vice versa, in which the dosing pump(s) 23 and the detergent tanks or compartments 24 are connected in flow communication (ducts 25, 26, 27) by means of the one or more first channels 10 and second channels 11 of the door-hinge assembly 1.

[0058] Obviously, those skilled in art may make further changes and variations to the door-hinge assembly 1 and to the washing machine 2 described herein without departing from the scope of protection of the invention, as defined in the following claims.

Claims

1. A door-hinge assembly (1) in a washing machine (2) having a housing (3) forming a laundry loading opening (4), wherein the door-hinge assembly (1) comprises:

- a door (5) configured to open and close the laundry loading opening (4);
- a hinge (6) comprising one or more first hinge bodies (7) which are fixedly connectable to the housing (3) and one or more second hinge bodies (8) connected to the door (5);

wherein said one or more first hinge bodies (7) are pivotally connected to said one or more second hinge bodies (8) about a hinge axis (9), so as to obtain a pivoting connection, about the hinge axis (9), between said door (5) and said housing (3); **characterized in that** it comprises:

- one or more first channels (10) formed inside said one or more first hinge bodies (7),
- one or more second channels (11) formed inside said one or more second hinge bodies (8)

and connected to said one or more first channels (7) in one or more pivoting coupling interfaces (12), so as to obtain one or more continuous ducts (13) extending from the housing (3) through the hinge (6) up to the door (5).

2. A door-hinge assembly (1) according to claim 1, wherein:

- the first channel (10) of the first hinge body (7) extends from a first inlet end (16) to a first outlet end (15);
- the second channel (11) of the second hinge body (8) extends from a second inlet end (18) to a second outlet end (17);
- the first outlet end (15) is connected fixed and stationary with the housing (3);
- the second inlet end (18) is connected to the door (5);
- the first inlet end (16) is pivotally connected, at the pivoting coupling interface (12), to the second outlet end (17).

3. A door-hinge assembly (1) according to claim 2, wherein at least one of the first hinge bodies (7) forms:

- a first base portion (28) extending transversely with respect to the hinge axis (9) and connected to the housing (3) and forming the first outlet ends (15) of the first channels (10), as well as
- a plurality of first branch portions (29) extending from the first base portion (28) in a substantially concentric direction with respect to the hinge axis (9) and which are connected to the second hinge bodies (8) and form the first inlet ends (16) of the first channels (10),

wherein at least one of the second hinge bodies (8) forms:

- a second base portion (32) extending substantially parallel to the hinge axis (9) and forming the second inlet end (17) of the second channel (11) and connected to the first hinge body (7), as well as
- a second branch portion (33), extending from the second base portion (32) in a direction transverse to the hinge axis (9) and which is connected to the door (5) and forms the second inlet end (18) of the second channel (11).

4. A door-hinge assembly (1) according to any one of the preceding claims, wherein the hinge (6) further comprises one or more third hinge bodies (21) pivotally connected to the first hinge bodies (7) about the hinge axis (9) and fixedly connected to the door (5), so as to obtain an auxiliary pivoting connection, about the hinge axis (9), between the door (5) and the one or more first hinge bodies (7).

5. A door-hinge assembly (1) according to claim 4, wherein said third hinge body (21) comprises a box-like profile forming:

- hinge seats (40) which pivotally accommodate corresponding hinge portions (29) of the first hinge body (7), and
- a cavity (41) which at least partially accommodates a base portion (28) of the first hinge body (7).

6. A door-hinge assembly (1) according to claim 5, wherein the third hinge body (21) comprises a first half-shell (43) and a second half-shell (43') connected to each other so as to embrace the first hinge body (7) and defining together the hinge seats (40) and the cavity (41).

7. A door-hinge assembly (1) according to claim 6, wherein the first half-shell (43) forms part of a first portion (45) of a frame (44) of the door (5) and the second half-shell (43') forms part of a second portion (45') of the frame (44) which is connectable to the first portion (45) to form the frame (44) of the door (5).

8. A door-hinge assembly (1) according to one of claims 3 to 7, wherein two first branch portions (29) extend from a first base portion (28), respectively, in opposite directions.

9. A door-hinge assembly (1) according to one of claims 3 to 8, wherein the first base portion (28) is bent at an angle from 60° to 120° about a bending axis (31) parallel to the hinge axis (9).

10. A door-hinge assembly (1) according to one of claims 2 to 9, wherein the second inlet end (18) of the second channels (11) forms an externally tapered frusto-conical connector (37) with a circumferential undercut for a hydraulic connection to a pipe inside the door (5).

11. A door-hinge assembly (1) according to any one of the preceding claims, wherein the continuous channels (13) are devoid of branches.

12. A door-hinge assembly (1) according to one of claims 3 to 13, wherein the first base portion (28) of the first hinge body (7) forms two or more first outlet ends (15) of two or more first channels (10) and the first branch portions (29) each form only one of the first inlet ends (16), respectively.

13. A door-hinge assembly (1) according to any one of the preceding claims, wherein the pivoting coupling

interface (12) comprises an elastomeric sealing ring (14) interposed between the first channel (10) and the second channel (11).

14. A door-hinge assembly (1) according to any one of the preceding claims, comprising:

- a mounting plate (19) which is integral with all the first hinge bodies (7) and provided with mounting portions (20) for mounting the door-hinge assembly (1) to the housing (3),
- an auxiliary plate (46) which is connectable to the mounting plate (19) and which supports a plurality of hydraulic connectors (47) each having a first end which can be connected to one of the first channels (10) and a second end which can be connected to a pipe arranged outside the door (5).

15. A door-hinge assembly (1) according to claim 14, wherein the hydraulic connectors (47) are supported in the auxiliary plate (46) with adjustable positioning.

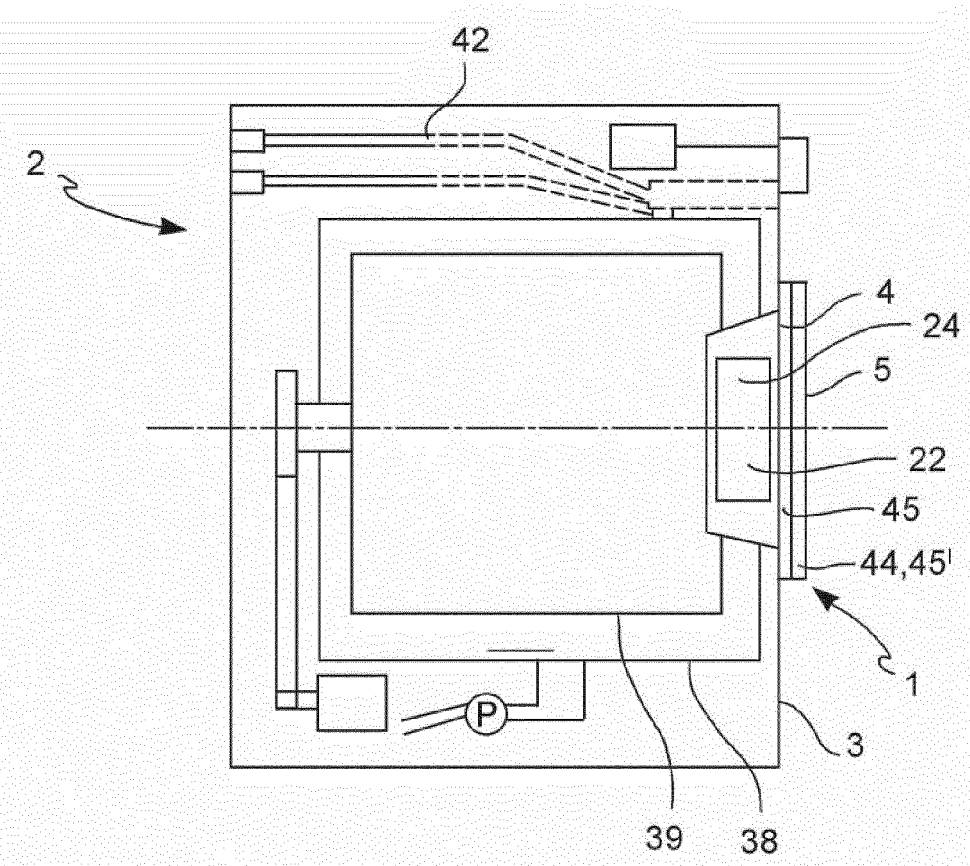

FIG. 1

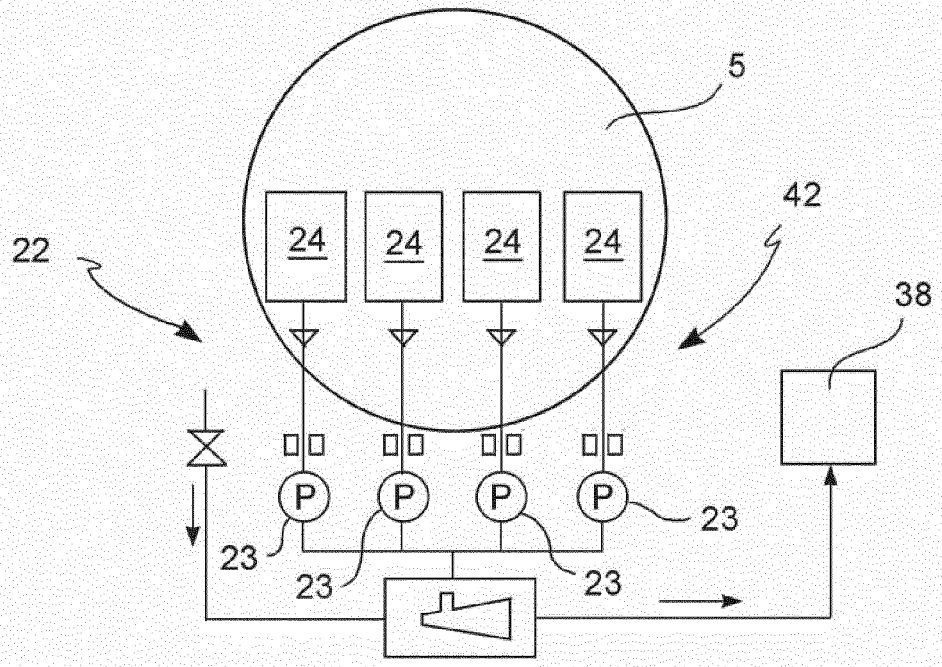

FIG. 2

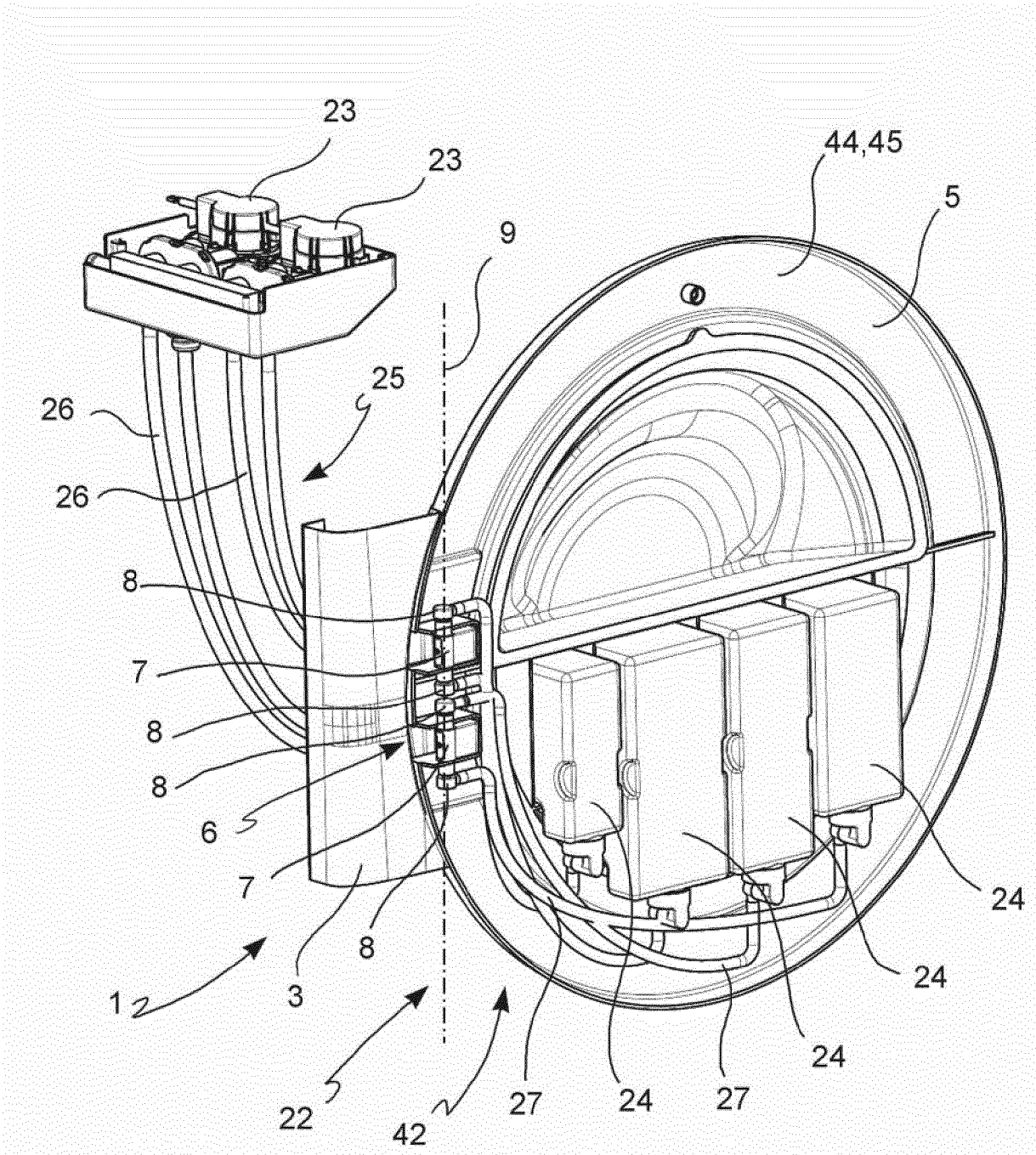

FIG. 3

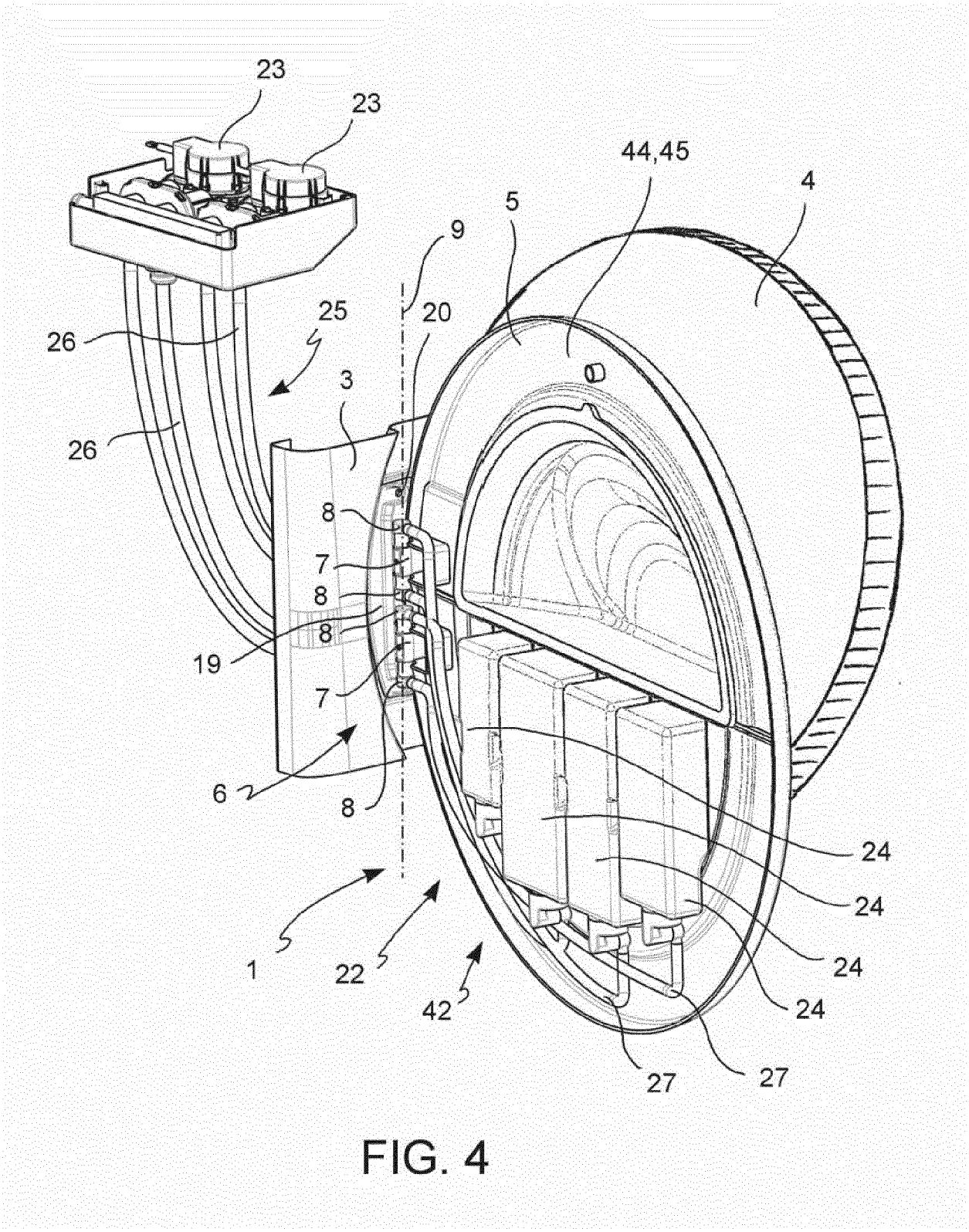

FIG. 4

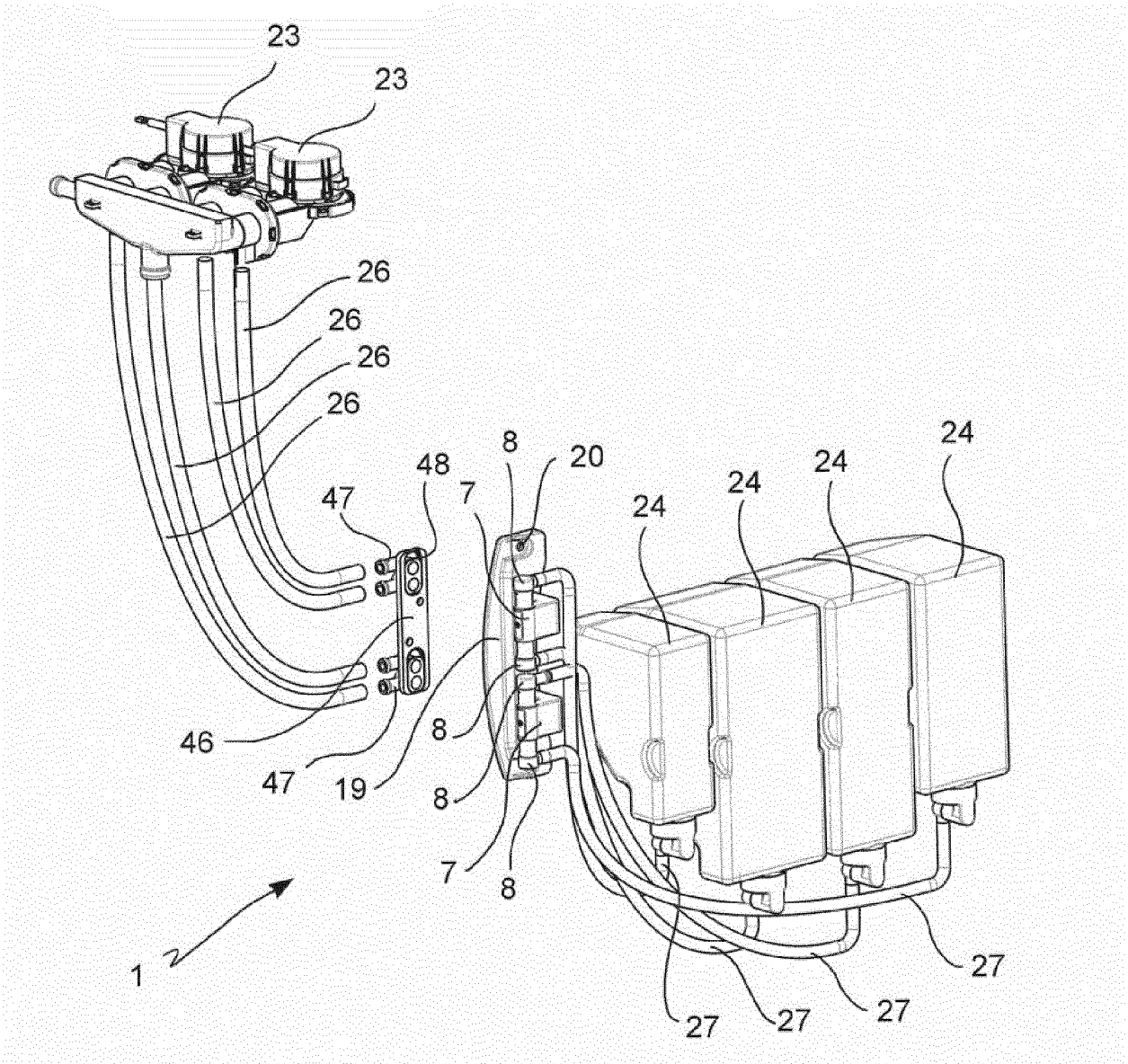

FIG. 5

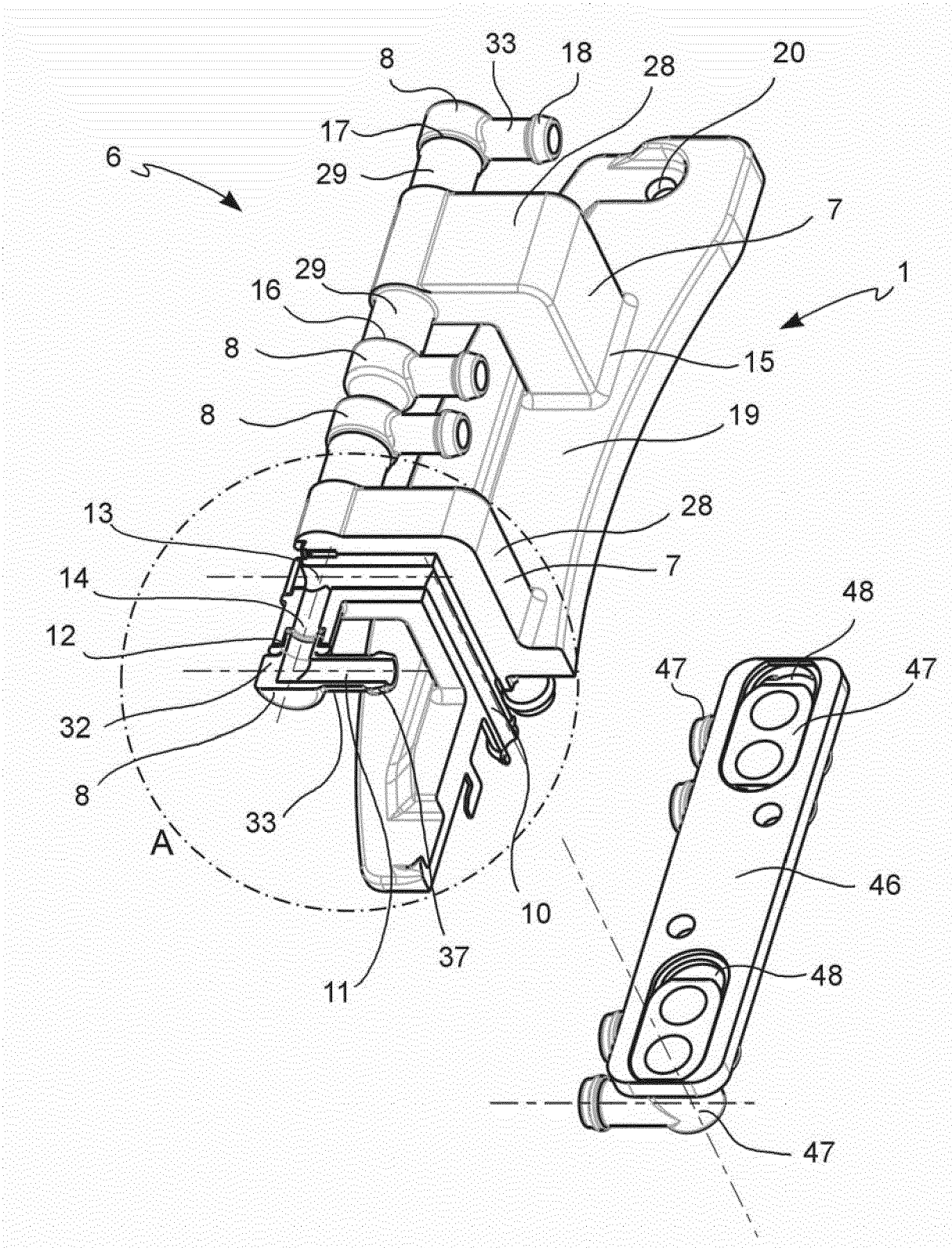
8
33
18
28
20
17
6
29
7
29
1
16
8
15
8
19
13
28
14
7
48
12
47
47
32
8
33
A
46
10
37
48
11
47

FIG. 6

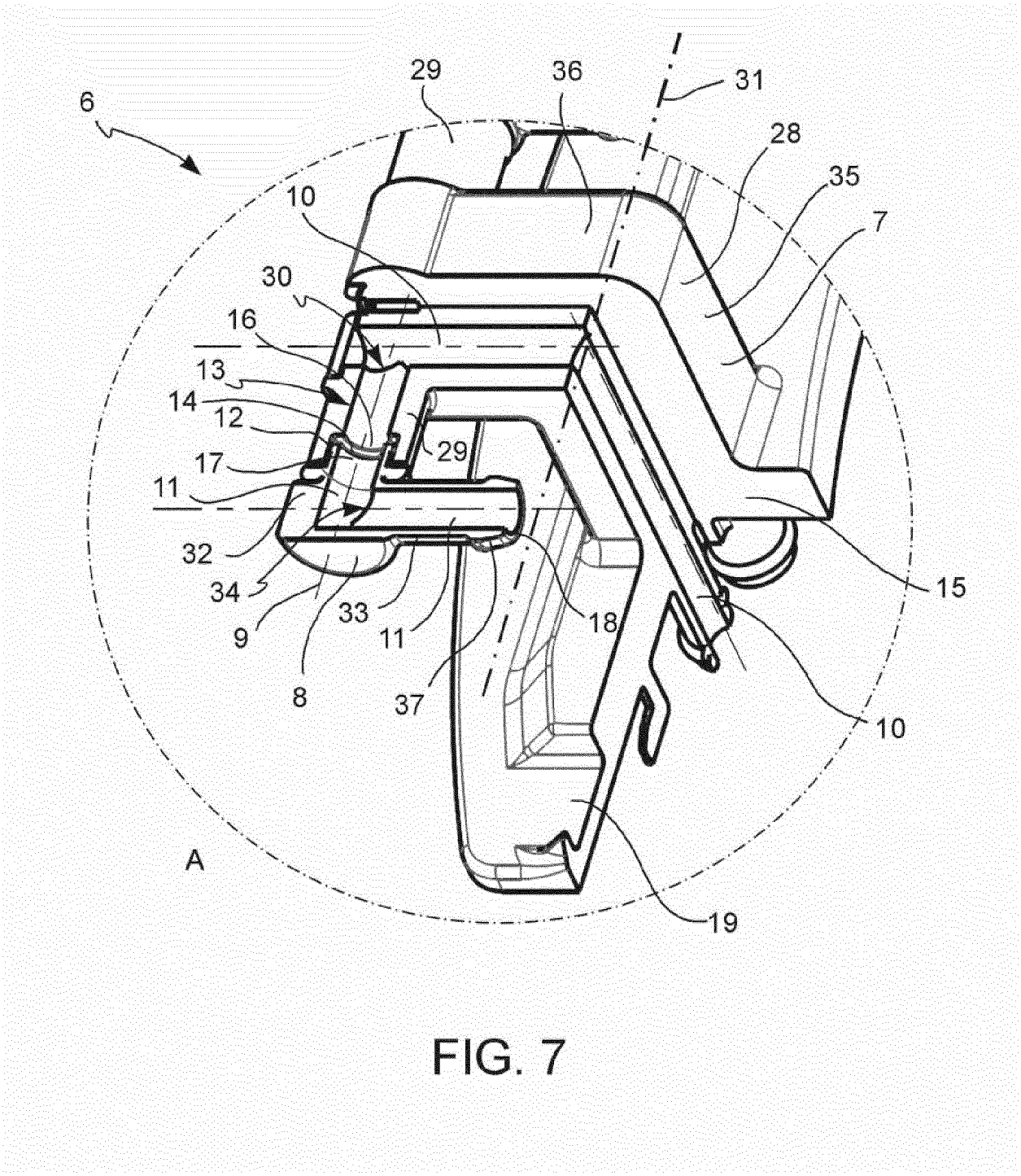
6
29
36
31
28
35
7
10
30
16
13
14
12
29
17
11
32
34
9
33
11
18
15
8
37
10
A
19

FIG. 7

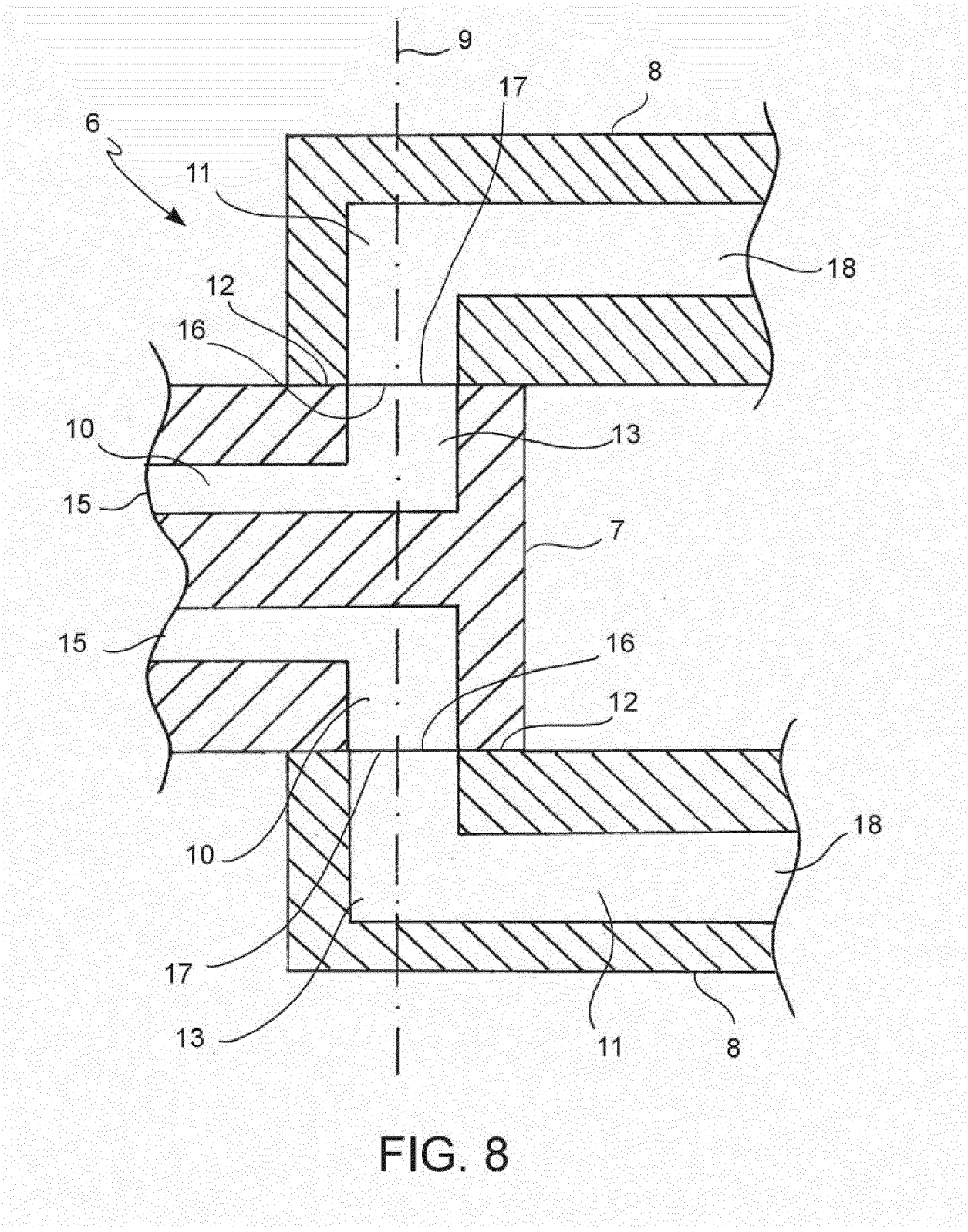

FIG. 8

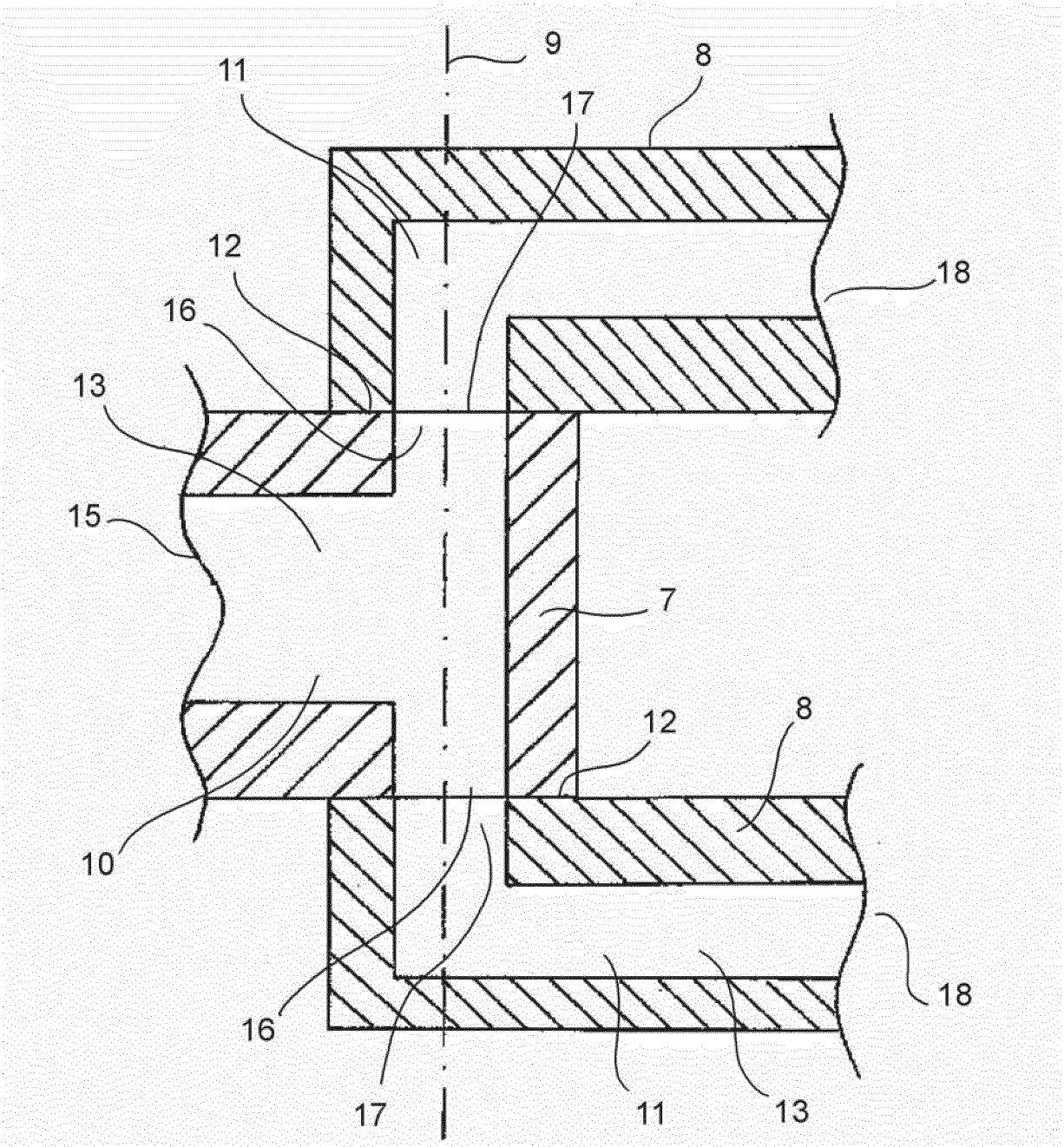

FIG. 9

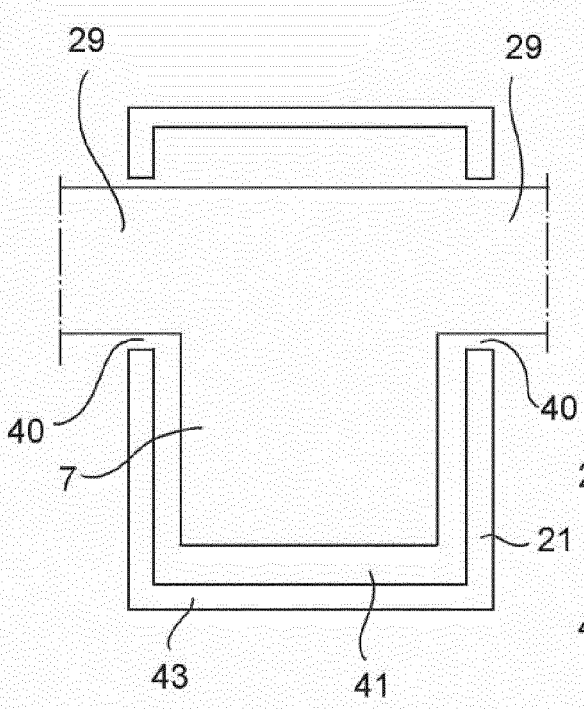

FIG. 10

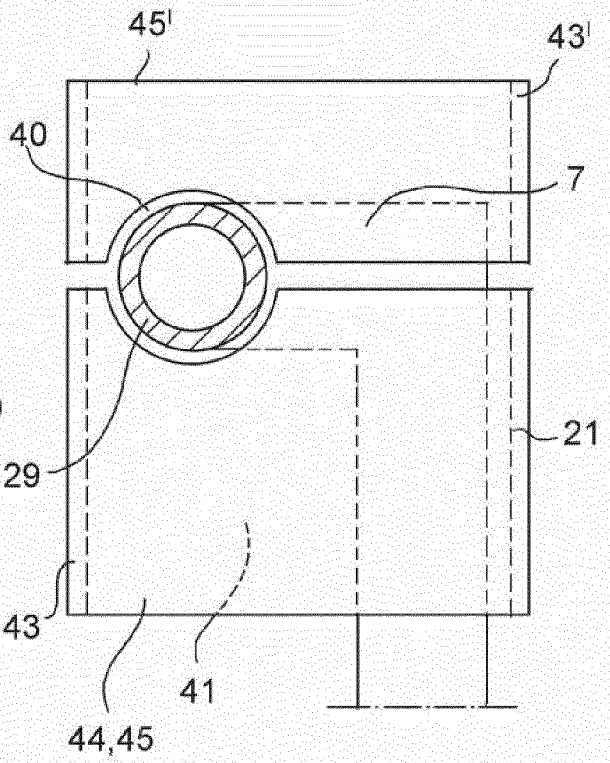

FIG. 11

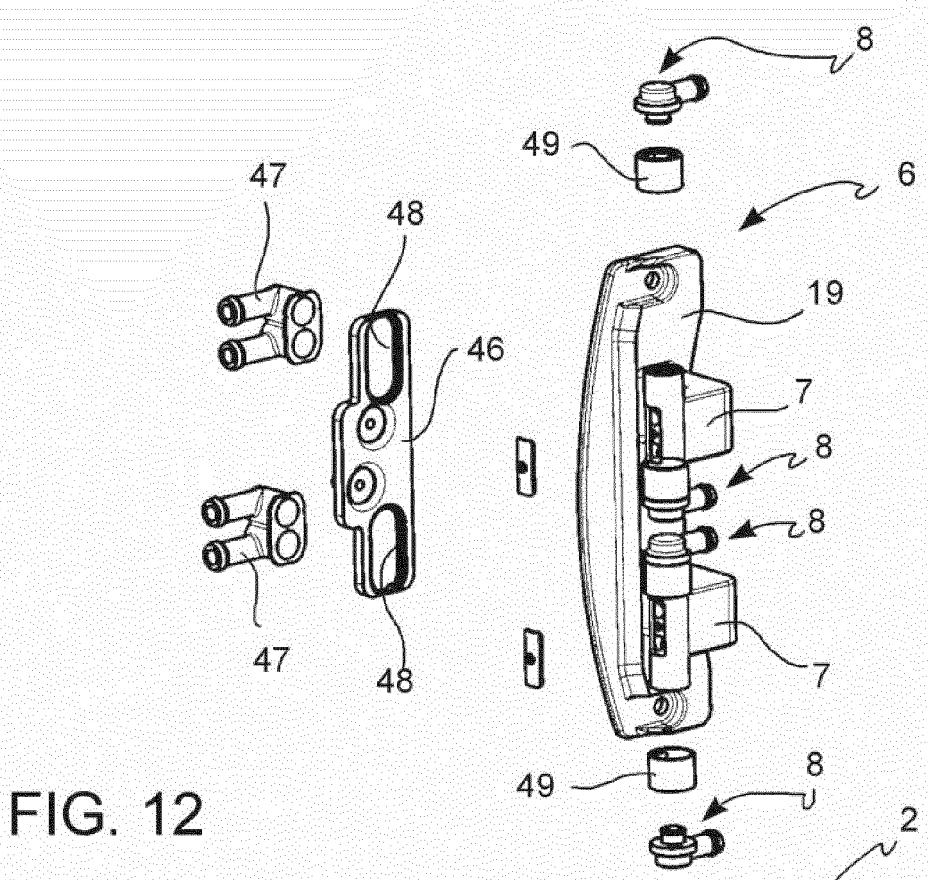

FIG. 12

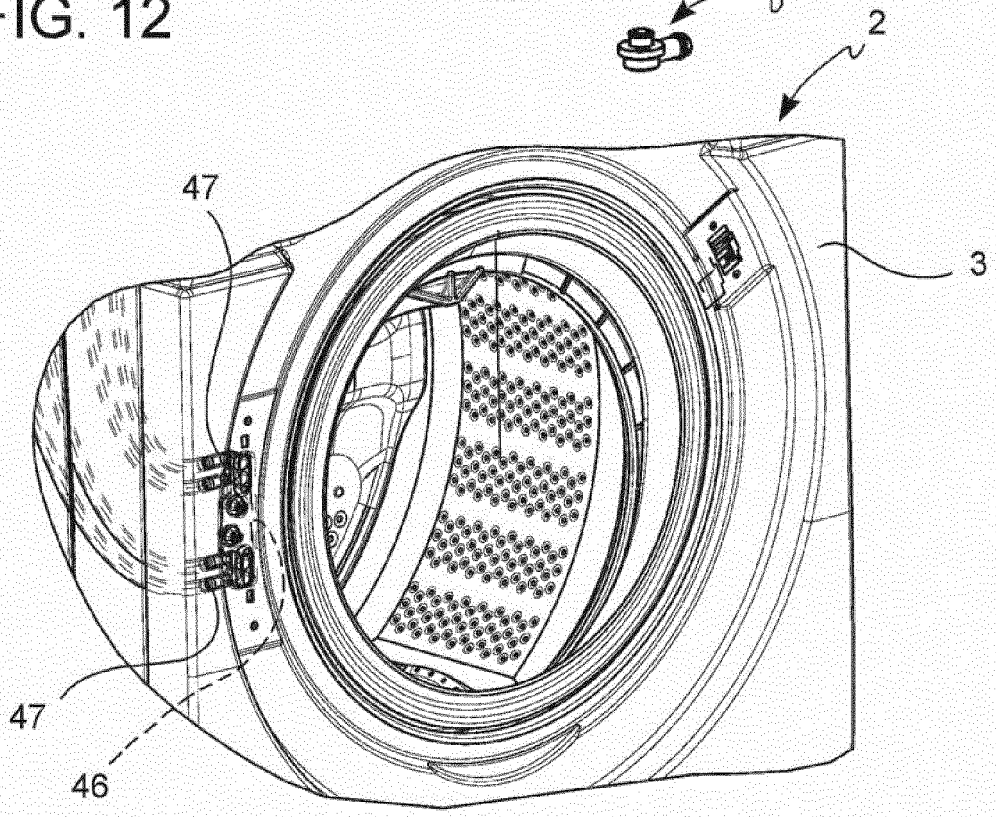

FIG. 13

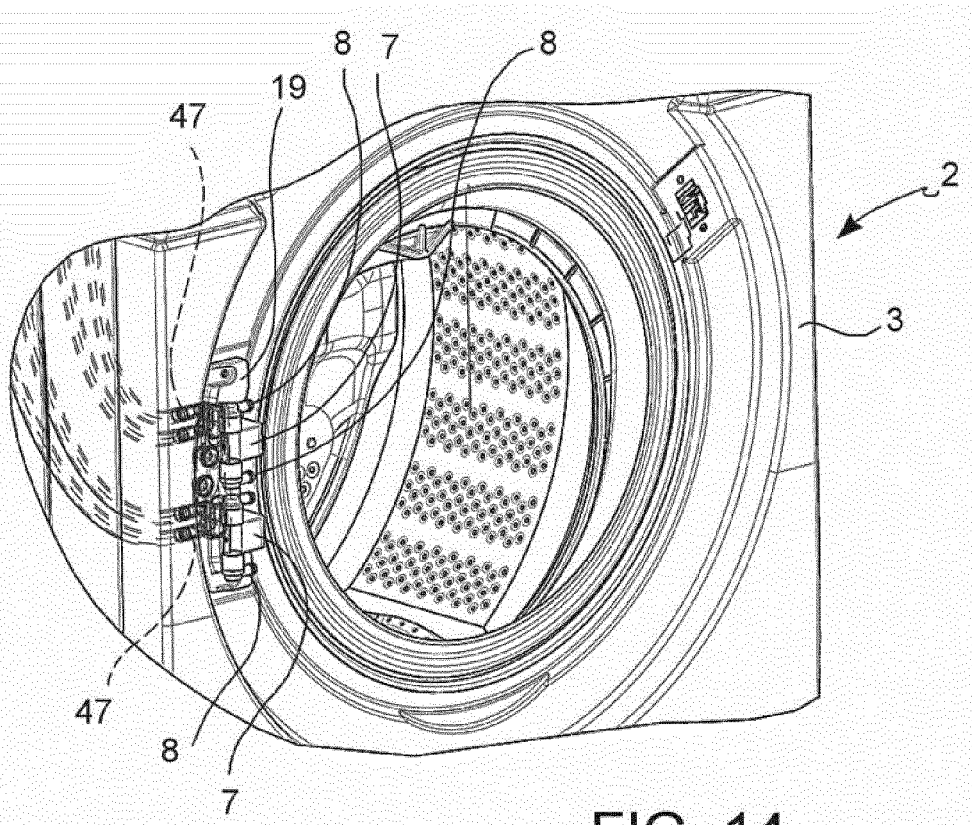

FIG. 14

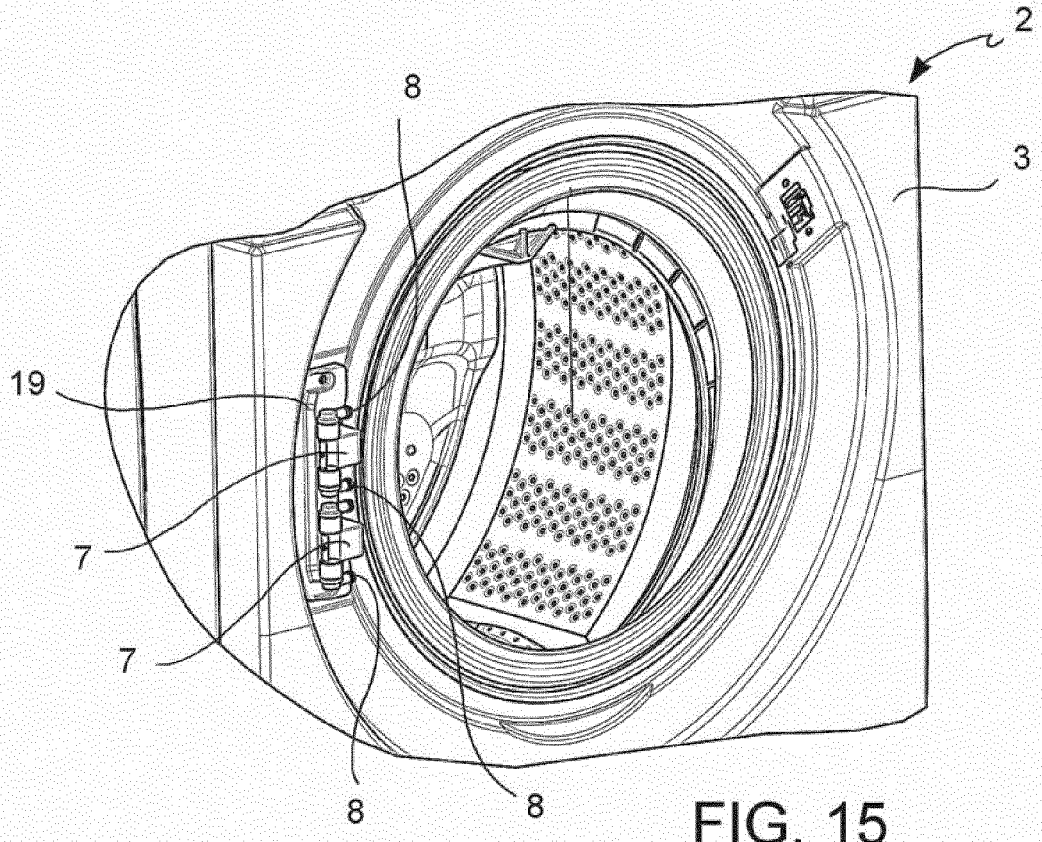

FIG. 15

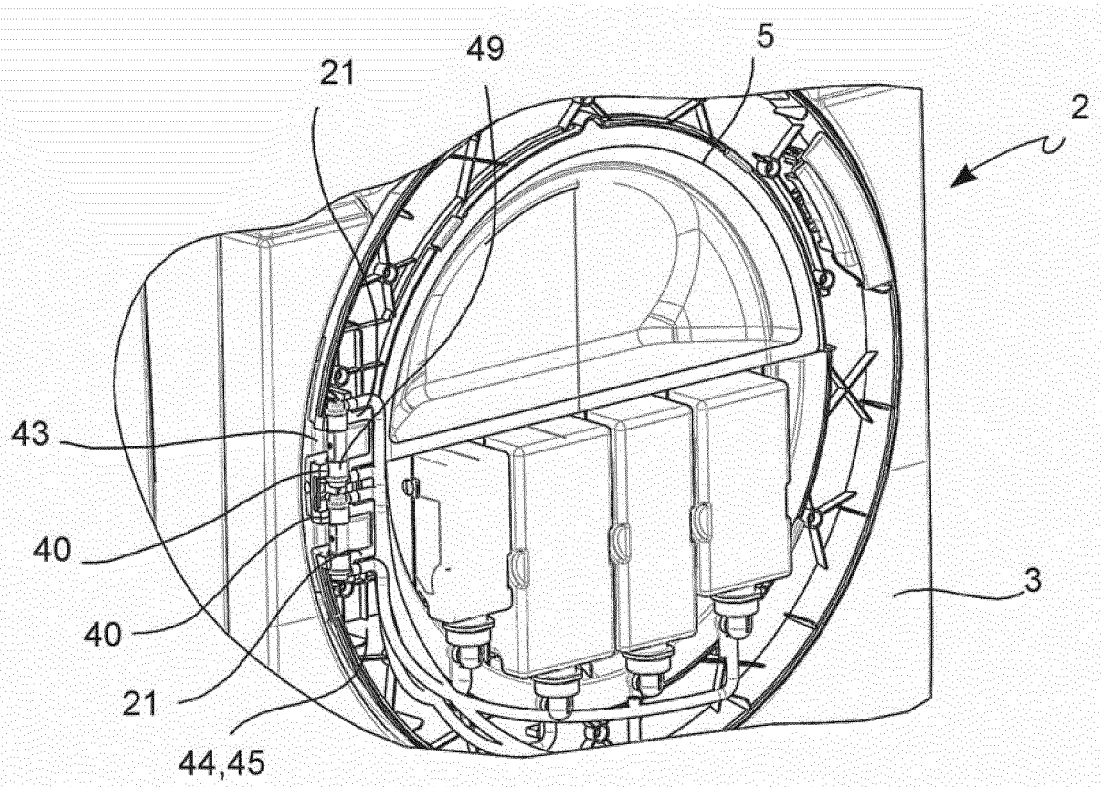

FIG. 16

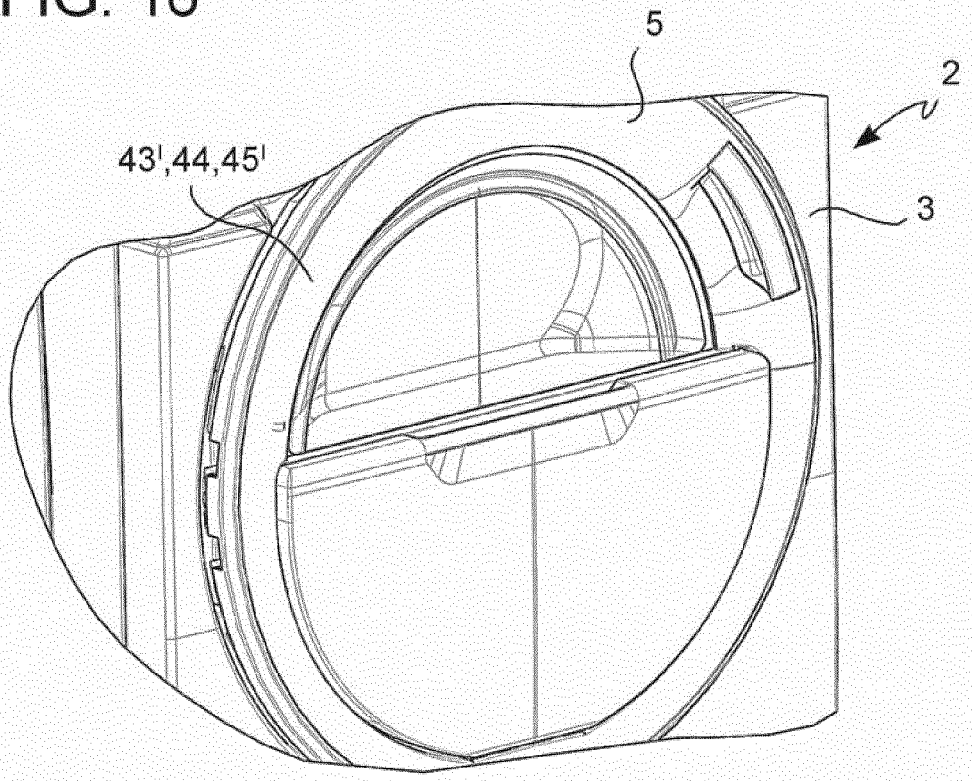

FIG. 17

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 19 19 6113

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	WO 2010/125538 A1 (INDESIT CO SPA [IT]; AMATI LUCIO [IT] ET AL.) 4 November 2010 (2010-11-04)	1,2,13	INV. D06F39/14
A	* page 3, line 12 - line 30; figure 1 * * page 4, line 27 - page 6, line 17; figure 2 * * page 7, line 9 - line 13; figure 4 *	3-12,14, 15	ADD. D06F39/02
X	EP 3 321 411 A1 (WHIRLPOOL CO [US]) 16 May 2018 (2018-05-16)	1,2	
A	* paragraph [0008] - paragraph [0019]; figures 1-3, 4A, 4B *	3-15	
A	EP 3 263 757 A1 (SAMSUNG ELECTRONICS CO LTD [KR]) 3 January 2018 (2018-01-03) * paragraph [0183] - paragraph [0194]; figures 18-21 *	1-15	
A	EP 3 165 666 A1 (LG ELECTRONICS INC [KR]) 10 May 2017 (2017-05-10) * paragraph [0033] - paragraph [0045]; figure 1 * * paragraph [0070] - paragraph [0094]; figures 3A, 5A *	1-15	TECHNICAL FIELDS SEARCHED (IPC) D06F
A	DE 22 61 275 A1 (SAN GIORGIO ELETTRODOMESTI) 2 May 1974 (1974-05-02) * page 3, line 30 - page 5, line 7; figures 1-3 *	1-15	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	12 November 2019	Sabatucci, Arianna

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 6113

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

12-11-2019

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2010125538 A1	04-11-2010	EP 2425047 A1	07-03-2012
		ES 2533529 T3	10-04-2015
		IT 1394005 B1	17-05-2012
		WO 2010125538 A1	04-11-2010
EP 3321411 A1	16-05-2018	EP 3321411 A1	16-05-2018
		US 2018135219 A1	17-05-2018
		US 2019226272 A1	25-07-2019
EP 3263757 A1	03-01-2018	CN 107532365 A	02-01-2018
		EP 3263757 A1	03-01-2018
		EP 3533919 A1	04-09-2019
		KR 20160103882 A	02-09-2016
		US 2018038040 A1	08-02-2018
		WO 2016137156 A1	01-09-2016
EP 3165666 A1	10-05-2017	CN 106032637 A	19-10-2016
		CN 206070193 U	05-04-2017
		EP 3165666 A1	10-05-2017
		US 2017121886 A1	04-05-2017
		WO 2017078348 A1	11-05-2017
DE 2261275 A1	02-05-1974	BE 799027 A	31-08-1973
		DE 2261275 A1	02-05-1974
		ES 419729 A1	01-05-1976
		GB 1427420 A	10-03-1976
		IT 969759 B	10-04-1974
		US 3883201 A	13-05-1975

EPO FORM P0459

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