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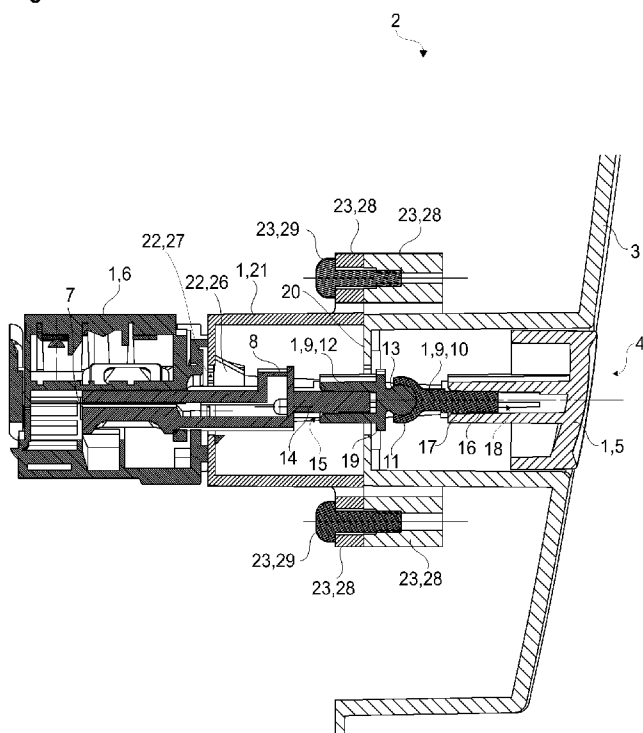
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- (54) Title: PUSH-BUTTON ASSEMBLY AND HOUSEHOLD APPLIANCE HAVING THE SAME

Fig. 1



- (57) Abstract: The present invention relates to a push-but-
ton assembly (1) for use in a household appliance (2) which
comprises a panel (3) that includes a recess (4) for slidably
accommodating a push-button (5). The push-button as-
sembly (1) comprises a switch unit (6) which is disposed
onto the rear side of the panel (3), wherein the switch unit
(6) includes a switch (7) and a spring-loaded plunger (8) for
activating/deactivating the switch (7); and the push-button
(5) which is adapted for accommodation inside the recess
(4). The push-button (5) is releasably connectable to the
plunger (8). The push-button assembly (1) of the present in-
vention further comprises a ball-and-socket joint (9) which
is disposed between the push-button (5) and the switch unit
(6). The ball-and-socket joint (9) is adapted to releasably
connect the push-button (5) to the plunger (8).

Description**PUSH-BUTTON ASSEMBLY AND HOUSEHOLD APPLIANCE HAVING THE SAME**

- [0001] The present invention relates to a push-button assembly for use in a household appliance.
- [0002] Household appliances such as laundry washers, laundry dryers, dishwashers, ovens and the like are commonly known in the art. A household appliance is commonly provided with a push-button which is slidably accommodated inside a recess in the control panel. The push-button is generally operatively connected to the spring-loaded plunger of a switch unit which is disposed onto the rear side of the panel. When the user pushes the push-button, the plunger activates/deactivates the switch of the switch unit. Various functions can be allocated to the switch so as to enable the user to operate the household appliance.
- [0003] A common problem with the prior art push-button assemblies is that when the switch unit is inclined and/or misaligned with respect to the push-button for one reason or another, then the push-button which is operatively connected to the plunger cannot be correctly centered inside the recess, and is forced towards the lateral walls of the recess. In such cases the push-button cannot be conveniently operated by the user due to the increased frictional forces. Moreover, due to the decentering of the push-button, the appearance of the household appliance is degraded. The customer satisfaction easily decreases because of the inferior quality and the complaints increase.
- [0004] DE 197 03 394 C1 discloses a household appliance which has a prior art bush-button assembly.
- [0005] An objective of the present invention is to provide a push-button assembly and a household appliance having the same which solves the aforementioned problems of the prior art in a cost effective way and which has an improved assemblage and an improved operability and usability.
- [0006] This objective has been achieved by the push-button assembly as defined in claim 1, and the household appliance as defined in claim 11. Further achievements have been attained by the subject-matters respectively

defined in the dependent claims.

- [0007] The push-button assembly of the present invention further comprises a ball-and-socket joint which is disposed between the push-button and the switch unit. The ball-and-socket joint is adapted to releasably connect the push-button to the plunger of the switch unit.
- [0008] A major advantageous effect of the present invention is that by virtue of the ball-and-socket joint the push-button can be prevented from becoming decentered inside the recess even when the switch unit is inclined and/or slightly misaligned. Thereby, the push-button can be protected from excessive mechanical stress and can be smoothly operated. Another major advantageous effect of the present invention is that the risk that the appliance has an inferior quality can be eliminated or reduced as much as possible. Thereby, the customer satisfaction can be increased.
- [0009] In an embodiment, the ball-and-socket joint includes a couple of members which comprise the ball and the socket respectively. These members can be releasably disposed between the plunger and the push-button during the assemblage. This embodiment is particularly advantageous as the switch unit, the ball-and-socket joint, and the push-button can be serially coupled to each other during the assemblage. These members may be each provided with a shaft or alternatively with a receiving slot so that they can be slidably coupled to the plunger and the push-button by way of insertion. Similarly the plunger and the push-button may be each provided with a counterpart receiving slot or alternatively with a counterpart shaft. Of course, other type of couplings known to those skilled in the art can be used. Thereby, the assemblage can be facilitated.
- [0010] In another embodiment, the ball-and-socket joint includes a stopper. This embodiment is particularly advantageous as the stopper protects the switch unit from excessive mechanical stress when the user pushes the push-button. The stopper also facilitates the assemblage of the ball-and-socket joint. The stopper may be provided onto one of the members of the ball-and-socket joint. The stopper may be arranged to abut against a section of the panel, in particular the rear wall of the recess.
- [0011] In another embodiment, the switch unit is releasably supported by a

separate mounting seat. This embodiment is particularly advantageous as the switch unit can be secured against misalignment relative to the recess in the panel. In particular, the switch unit can be secured against rotation and bending under the tension exerted by the associated electric cables. This embodiment is also particularly advantageous as the mounting seat can be flexibly adjusted in accordance with the size and shape of switch unit to be used. The mounting seat may be deattachably attached to the rear side of the panel by a screw connection. The switch unit can be mounted to the mounting seat by a snap connection.

- [0012] Of course, other type of connections known to those skilled in the art can be alternatively used.
- [0013] In another embodiment, the push-button can be slidably mounted into the recess from the front of the panel by means of a snap connection. This embodiment is particularly advantageous as the assemblage of the pushbutton assembly is further facilitated.
- [0014] Additional features and additional advantageous effects of the push-button assembly and the household appliance of the present invention will become more apparent with the detailed description of the embodiments with reference to the accompanying drawings in which:
- [0015] Figure 1 – is a schematic horizontal sectional partial view of a household appliance which has a push-button assembly according to an embodiment of the present invention;
- [0016] Figure 2 – is a schematic vertical sectional partial view of the household appliance of Fig. 1;
- [0017] Figure 3 – is a schematic exploded perspective partial view of the household appliance of Fig. 1.
- [0018] The reference signs appearing on the drawings relate to the following technical features.
1. Push-button assembly
 2. Household appliance
 3. Panel
 4. Recess
 5. Push-button

6. Switch unit
7. Switch
8. Plunger
9. Ball-and-socket joint
10. 1st member
11. Socket
12. 2nd member
13. Ball
14. Shaft
15. Slot
16. Shaft
17. Hub
18. Slot
19. Stopper
20. Rear wall
21. Mounting seat
22. Snap connection
23. Screw connection
24. Slot
25. Hook
26. Claw
27. Opening
28. Lug
29. Screw

[0019] The push-button assembly (1) is suitable for use in a household appliance (2).

[0020] The household appliance (2) comprises a panel (3) which includes a recess (4) for slidably accommodating a push-button (5).

[0021] The push-button assembly (1) comprises a switch unit (6) which is disposed onto the rear side of the panel (3), wherein the switch unit (6) includes a switch (7) and a spring-loaded plunger (8) for activating/deactivating the switch (7); and the push-button (5) which is adapted for accommodation inside the recess (4). The push-button (5) is

releasably connectable to the plunger (8).

- [0022] The push-button assembly (1) of the present invention further comprises a ball-and-socket joint (9) which is disposed between the push-button (5) and the switch unit (6). The ball-and-socket joint (9) is adapted to releasably connect the push-button (5) to the plunger (8).
- [0023] The household appliance (2) of the present invention further comprises the push-button assembly (1).
- [0024] In an embodiment, the ball-and-socket joint (9) comprises a first member (10) and a second member (12). The first member (10) has a socket (11). The second member (12) has a ball (13) that is adapted to engage with the socket (11). In this embodiment, the first member (10) is adapted for releasable engagement with the push-button (5). The second member (12) is adapted for releasable engagement with the plunger (8).
- [0025] In another embodiment, the plunger (8) and the first member (10) each has a respective shaft (14, 16). In this embodiment, the second member (12) has a receiving slot (15) which is adapted to receive the shaft (14) of the plunger (8). And the push-button (5) comprises a hub (17) which has a receiving slot (18) that is adapted to receive the shaft (16) of the first member (10).
- [0026] In another embodiment, the ball-and-socket joint (9) comprises a stopper (19) which is adapted to restrict the rearward movement of the first member (10) and the second member (12) at the position where the switch (7) is activated/deactivated by the plunger (8).
- [0027] In another embodiment, the stopper (19) is adapted to abut against the rear wall (20) of the recess (4) in the panel (3) at the position where the switch (7) is activated/deactivated by the plunger (8).
- [0028] In another embodiment, the stopper (19) is disposed onto the second member (12).
- [0029] In another embodiment, the push-button assembly (1) further comprises a mounting seat (21) for releasably supporting the switch unit (6). In this embodiment, the mounting seat (21) is detachably attachable immediately onto the rear wall (20) of the recess (4) in the panel (3).
- [0030] In another embodiment, the push-button assembly (1) further comprises a

snap connection (22) for mounting the switch unit (6) to the mounting seat (21).

- [0031] In another embodiment, the snap connection (22) comprises one or more snap-in claws (26), and one or more counterpart snap openings (27). In this embodiment, the snap-in claws (26) are disposed onto the switch unit (6). In addition, the snap openings (27) are disposed onto the mounting seat (21).
- [0032] In another embodiment, the push-button assembly (1) further comprises a screw connection (23) for attaching the the mounting seat (21) immediately onto the rear wall (20) of the recess (4) in the panel (3).
- [0033] In another embodiment, the screw connection (23) comprises screws lugs (28) and screws (29). In this embodiment, two lugs (28) are disposed on the mounting seat (21). And two counterpart lugs (28) are disposed onto the rear side of the panel (3). The lugs (28) are joined with the screws (29) in order to secure the mounting seat (21) in place.
- [0034] In another embodiment, the recess (4) has one or more guiding snap slots (24). In this embodiment, the push-button (5) comprises one or more counterpart snap-in hooks (25) for slidably engaging with the respective guiding snap slots (24) when the push-button (5) is pushed into the recess (4) from the front of the panel (3).
- [0035] A major advantageous effect of the present invention is that by virtue of the ball-and-socket joint (9) the push-button (5) can be prevented from becoming decentered inside the recess (4) even when the switch unit (6) is inclined and/or slightly misaligned. Thereby, the push-button (5) can be protected from excessive mechanical stress and can be smoothly operated. Another major advantageous effect of the present invention is that the risk that the appliance (2) has an inferior quality can be eliminated or reduced as much as possible. Other advantageous effects of the present invention can be taken from the aforementioned embodiments.

Claims

1. A push-button assembly (1) for use in a household appliance (2) comprising a panel (3) which includes a recess (4) for slidably accommodating a push-button (5), the push-button assembly (1) comprising a switch unit (6) which is disposed onto the rear side of the panel (3), wherein the switch unit (6) includes a switch (7) and a spring-loaded plunger (8) for activating/deactivating the switch (7); and the push-button (5) which is adapted for accommodation inside the recess (4), wherein the push-button (5) is releasably connectable to the plunger (8), the push-button assembly (1) being **characterized in that** a ball-and-socket joint (9) which is disposed between the push-button (5) and the switch unit (6), wherein the ball-and-socket joint (9) is adapted to releasably connect the push-button (5) to the plunger (8).
2. The push-button assembly (1) according to claim 1, **characterized in that** the ball-and-socket joint (9) comprises a first member (10) which has a socket (11); and a second member (12) which has a ball (13) which is adapted to engage with the socket (11), wherein one of the first member (10) and the second member (12) is adapted for releasable engagement with the push-button (5), and wherein the other one of the first member (10) and the second member (12) is adapted for releasable engagement with the plunger (8).
3. The push-button assembly (1) according to claim 2, **characterized in that** the plunger (8) has a shaft (14), and the second member (12) has a receiving slot (15) which is adapted to receive the shaft (14) of the plunger (8); and the first member (10) has a shaft (16), and the push-button (5) comprises a hub (17) which has a receiving slot (18) that is adapted to receive the shaft (16) of the first member (10).
4. The push-button assembly (1) according to claim 2 or 3, **characterized in that** the ball-and-socket joint (9) comprises a stopper (19) which is adapted to restrict the rearward movement of the first member (10) and the second member (12) at the position where the switch (7) is activated/deactivated by the plunger (8).
5. The push-button assembly (1) according to claim 4, **characterized in that** the stopper (19) is adapted to abut against the rear wall (20) of the recess (4) in

the panel (3) at the position where the switch (7) is activated/deactivated by the plunger (8).

6. The push-button assembly (1) according to claim 4, **characterized in that** the stopper (19) is disposed onto the second member (12).
7. The push-button assembly (1) according to claim 1, **characterized in that** a mounting seat (21) for releasably supporting the switch unit (6), wherein the mounting seat (21) is detachably attachable immediately onto the rear wall (20) of the recess (4) in the panel (3).
8. The push-button assembly (1) according to claim 7, **characterized in that** a snap connection (22) for mounting the switch unit (6) to the mounting seat (21).
9. The push-button assembly (1) according to claim 7, **characterized in that** a screw connection (23) for attaching the the mounting seat (21) immediately onto the rear wall (20) of the recess (4) in the panel (3).
10. The push-button assembly (1) according claim 1, wherein the recess (4) has one or more guiding snap slots (24), the push-button assembly (1) being **characterized in that** the push-button (5) comprises one or more snap-in hooks (25) for engaging with the respective guiding snap slots (24) when the push-button (5) is pushed into the recess (4) from the front of the panel (3).
11. A household appliance (2) comprising a panel (3) which includes a recess (4) for slidably accommodating a push-button (5), the household appliance (2) being **characterized in that** the push-button assembly (1) as defined in claim 1.

Fig. 1

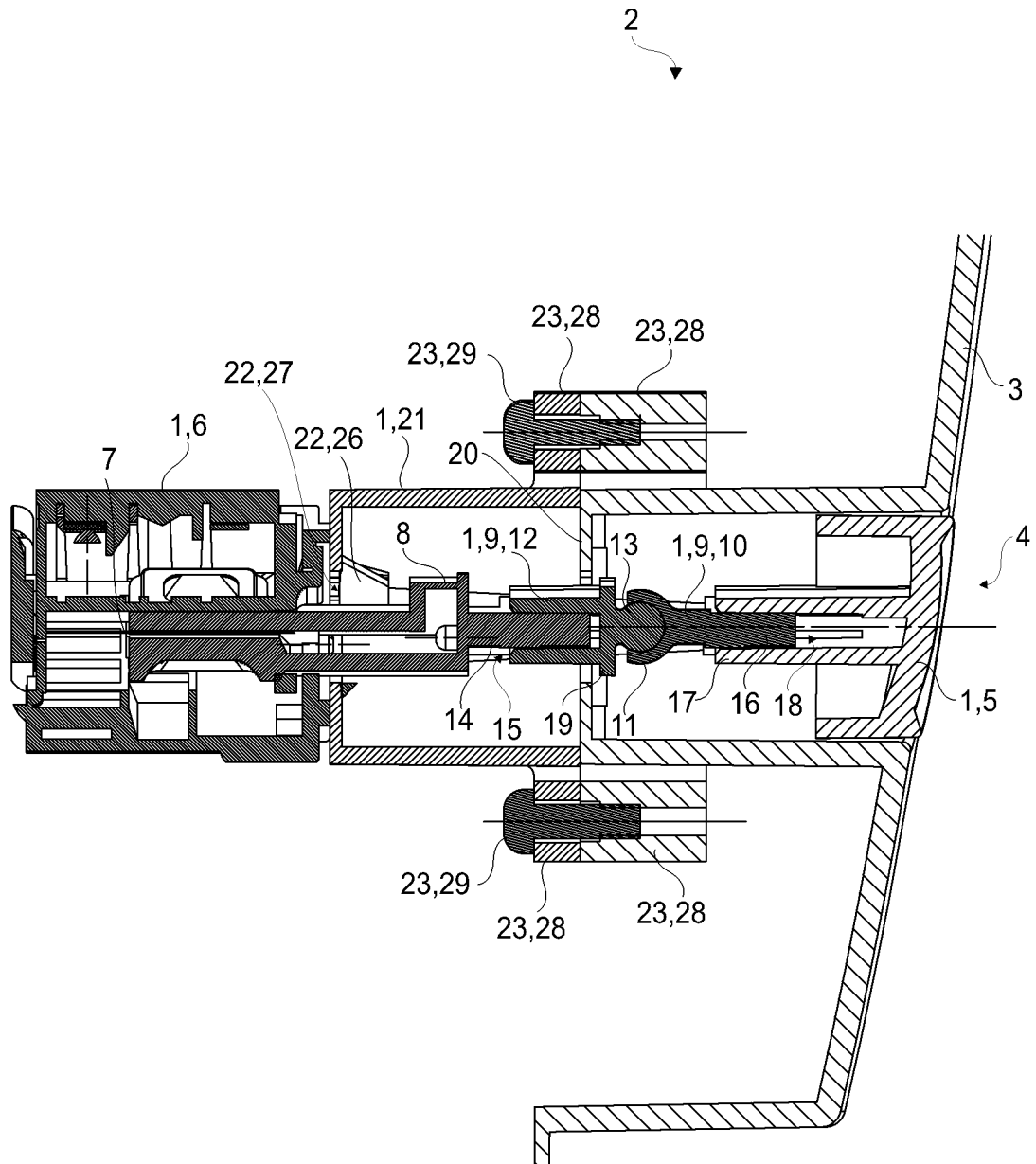


Fig. 2

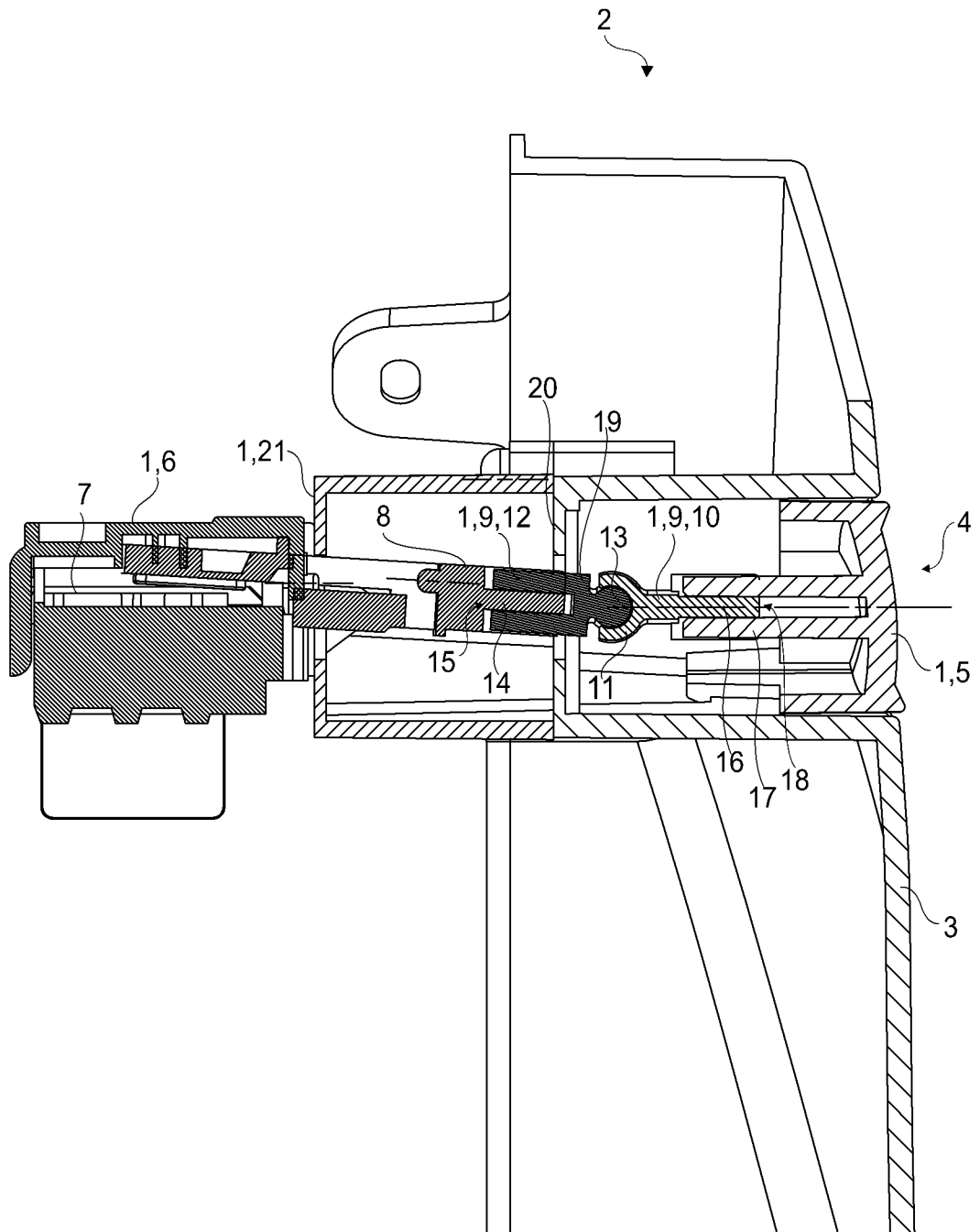
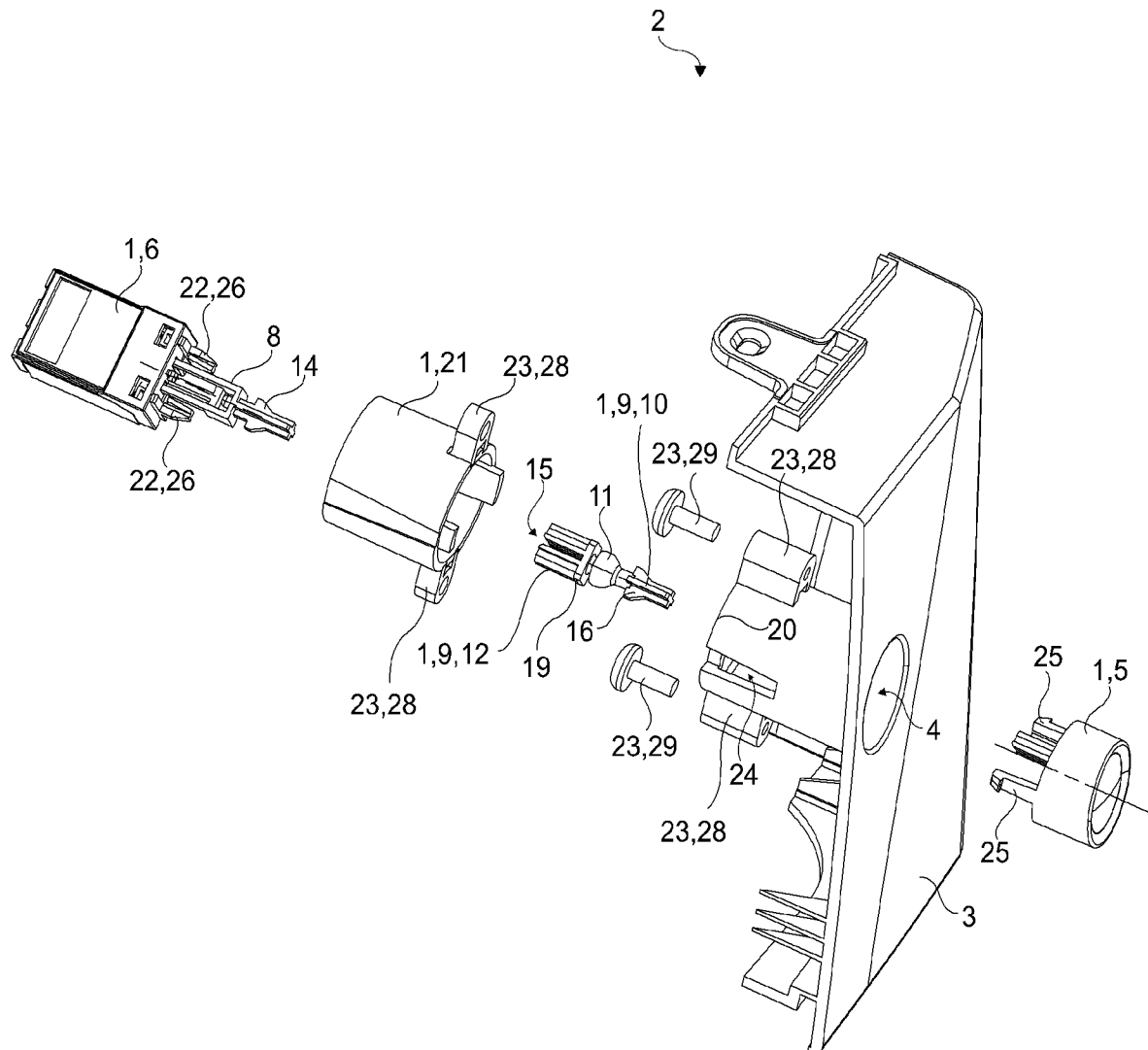


Fig. 3



INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2015/059838

A. CLASSIFICATION OF SUBJECT MATTER
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ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
G05G

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 1 255 082 A2 (BSH FABRICACION SA [ES]) 6 November 2002 (2002-11-06)	1-3,7-11
A	paragraph [0056] - paragraph [0062]; figures 1,3,4,17,18	4-6
X	DE 33 10 496 A1 (BBC BROWN BOVERI & CIE [DE]) 27 September 1984 (1984-09-27)	1-3,7-11
A	figure 8	4-6



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents :

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2015/059838

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 1255082	A2	06-11-2002	AT 412142 T 15-11-2008
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