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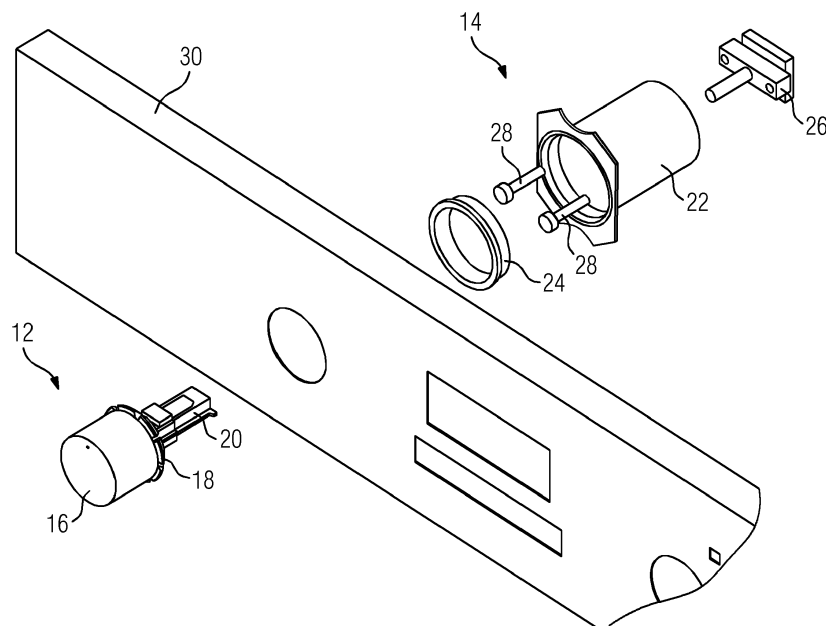
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(54) **PUSH-IN PUSH-OUT CONTROL KNOB FOR A DOMESTIC APPLIANCE**

(57) The present invention relates to a push-in-push-out control knob (10) for a domestic appliance, in particular for a cooking appliance. The push-in-push-out control knob (10) is attached or attachable at a cut-out in a control panel (30) of the domestic appliance. The push-in-push-out control knob (10) comprises an outer component (12) and an inner component (14). The outer component (12) is arranged or arrangeable at a front side of the control panel (30). The inner

component (14) is arranged or arrangeable at a rear side of the control panel (30). The inner component (14) includes a housing (22) and a ring (24). The ring (24) is arranged or arrangeable within a front opening of the housing (22), so that the ring (24) is form-fit with said front opening. The outer component (12) includes a support element (18) engaging or engageable behind the ring (24).

FIG 11



Description

[0001] The present invention relates to a push-in-push-out control knob for a domestic appliance. In particular, the present invention relates to a push-in-push-out control knob for a cooking appliance. Further, the present invention relates to a domestic appliance.

[0002] A push-in-push-out control knob is arranged within a control panel of a domestic appliance. The push-in-push-out control knob is counter-sunk in the control panel, when said push-in-push-out control knob is not in use. In contrast, the push-in-push-out control knob protrudes out of the control panel, when said push-in-push-out control knob is in use. Usually, the push-in-push-out control knob is rotatable in the protruding state.

[0003] FIG 17 illustrates a schematic exploded perspective view of the push-in-push-out control knob 10 according to the prior art. The push-in-push-out control knob 10 comprises a proper control knob 32, a guiding ring 34, a housing 22 with a flange and a switch mechanism 26. The push-in-push-out control knob 10 is assembled at the control panel 30 of the domestic appliance from the front side. However, the push-in-push-out control knob 10 wobbles, when it is gripped by the user.

[0004] FIG 18 illustrates a schematic exploded perspective view of a further push-in-push-out control knob 10 according to the prior art. The push-in-push-out control knob 10 comprises the proper control knob 32, the guiding ring 34, the housing 22 with flange, a rear knob part 36 and the switch mechanism 26. The push-in-push-out control knob 10 is assembled at the control panel 30 of the domestic appliance from the rear side. However, the assembling of the push-in-push-out control knob 10 at the control panel 30 is complex, since other control knobs are assembled from the front side of the control panel 30.

[0005] It is an object of the present invention to provide a push-in-push-out control knob for a domestic appliance, which reduces wobbling and is assembled by low complexity.

[0006] The object is achieved by the push-in-push-out control knob for a domestic appliance according to claim 1.

[0007] According to the present invention a push-in-push-out control knob for a domestic appliance, in particular for a cooking appliance, is provided, wherein:

- the push-in-push-out control knob is attached or attachable at a cut-out in a control panel of the domestic appliance,
- the push-in-push-out control knob comprises an outer component and an inner component,
- the outer component is arranged or arrangeable at a front side of the control panel,
- the inner component is arranged or arrangeable at a rear side of the control panel,
- the inner component includes a housing and a ring,
- the ring is arranged or arrangeable within a front

opening of the housing, so that the ring is form-fit with said front opening, and

- the outer component includes a support element engaging or engageable behind the ring.

[0008] The core of the present invention is the ring in the front opening of the housing, which is engaged from behind by the support element. The ring reduces wobbling of the push-in-push-out control knob. Further, the push-in-push-out control knob is assembled by low complexity, since the outer component is arranged at the front side of the control panel, while the inner component is arranged at the rear side of the control panel.

[0009] Preferably, the support element includes at least two snap-in hooks for engaging behind the ring, wherein said snap-in hooks form an enlarging of the support element.

[0010] Further, the support element may include at least two wings extending along a push direction of the push-in-push-out control knob, wherein at least one snap-in hook is formed at a rear distal end of said wing.

[0011] In particular, a plurality of snap-in hooks extends around the circumference of the support element and forms the enlarging of said support element.

[0012] Moreover, the outer component may include a spring mechanism providing a force for pressing the support element, particularly the snap-in hooks, against the ring.

[0013] Additionally, the inner component may include a switch mechanism, wherein preferably said switch mechanism is connected or connectable to the spring mechanism of the outer component. For example, the switch mechanism is a switch, a thermostat, an encoder or any input command device.

[0014] Preferably, the outer component includes a cap element enclosing partially the support element, so that the cap element and the support element form a control knob.

[0015] For example, the cap element is made of metal or plastics.

[0016] Alternatively, the support element may form a control knob.

[0017] Further, the push-in-push-out control knob may be rotatable around a rotation axis perpendicular to the plane of the control panel, wherein the push-in-push-out control knob is moveable along said rotation axis between a protruding state and a countersunk state.

[0018] In particular, the wings form a cylindrical surface of the support element and extend parallel to the rotation axis of the push-in-push-out control knob.

[0019] Preferably, the push-in-push-out control knob is attachable at a circular cut-out in the control panel of the domestic appliance, wherein the diameter of the ring is marginally bigger than the diameter of said circular cut-out. There is radial tolerance between the push-in-push-out control knob and the circular cut-out in the control panel.

[0020] Furthermore, the present invention relates to a

domestic appliance, in particular a cooking appliance, wherein the domestic appliance comprises at least one push-in-push-out control knob mentioned above.

[0021] Further, the domestic appliance may comprise at least one control panel including at least one cut-out, wherein the push-in-push-out control knob is attached or attachable at said cut-out in the control panel of the domestic appliance.

[0022] Moreover, the diameter of the cut-out in the control panel may be marginally smaller than the diameter of the ring of the push-in-push-out control knob, wherein preferably the cut-out in the control panel is circular.

[0023] Novel and inventive features of the present invention are set forth in the appended claims.

[0024] The present invention will be described in further detail with reference to the drawing, in which

FIG 1 illustrates a schematic perspective view of an outer component of a push-in-push-out control knob according to a preferred embodiment of the present invention,

FIG 2 illustrates a schematic exploded perspective view of the outer component of the push-in-push-out control knob according to the preferred embodiment of the present invention,

FIG 3 illustrates a schematic perspective view of another example of the outer component of the push-in-push-out control knob according to the preferred embodiment of the present invention,

FIG 4 illustrates a schematic exploded perspective view of the other example of the outer component of the push-in-push-out control knob according to the preferred embodiment of the present invention,

FIG 5 illustrates a schematic perspective view of an inner component of the push-in-push-out control knob according to the preferred embodiment of the present invention,

FIG 6 illustrates a schematic exploded perspective view of the inner component of the push-in-push-out control knob according to the preferred embodiment of the present invention,

FIG 7 illustrates a schematic perspective view of another example of the inner component of the push-in-push-out control knob according to the preferred embodiment of the present invention,

FIG 8 illustrates a schematic exploded perspective view of the other example of the inner component of the push-in-push-out control knob ac-

cording to the preferred embodiment of the present invention,

FIG 9 illustrates a schematic sectional side view of the push-in-push-out control knob assembled in a control panel according to the preferred embodiment of the present invention,

FIG 10 illustrates a schematic perspective view of the push-in-push-out control knob assembled in the control panel according to the preferred embodiment of the present invention,

FIG 11 illustrates a schematic exploded perspective view of the push-in-push-out control knob assembled in the control panel according to the preferred embodiment of the present invention,

FIG 12 illustrates a schematic sectional side view of the push-in-push-out control knob assembled in the control panel according to the preferred embodiment of the present invention,

FIG 13 illustrates a schematic perspective view of the outer component of the push-in-push-out control knob according to the preferred embodiment of the present invention,

FIG 14 illustrates a schematic exploded perspective view of the outer component of the push-in-push-out control knob according to the preferred embodiment of the present invention,

FIG 15 illustrates a schematic perspective view of a cap element and a support element of the push-in-push-out control knob according to the preferred embodiment of the present invention,

FIG 16 illustrates a further schematic perspective view of the cap element and the support element of the push-in-push-out control knob according to the preferred embodiment of the present invention,

FIG 17 illustrates a schematic exploded perspective view of the push-in-push-out control knob according to the prior art, and

FIG 18 illustrates a schematic exploded perspective view of a further push-in-push-out control knob according to the prior art.

[0025] FIG 1 illustrates a schematic perspective view of an outer component 12 of a push-in-push-out control knob 10 according to a preferred embodiment of the present invention.

[0026] The outer component 12 of the push-in-push-out control knob 10 comprises a cap element 16, a support element 18 and a spring mechanism 20. The cap element 16 is substantially cylindrical and includes a closed face side and an open face side. The support element 18 is also substantially cylindrical and includes a plurality of elastic wings. Said wings extend on the curved surface and along the symmetry axis of the support element 18. Each wing includes a snap-in hook at the distal end of said wing. The snap-in hooks form an enlarging of the support element 18. Said enlarging extends in circumferential direction of the support element 18. Except the enlarging the support element 18 is completely enclosed by the cap element 16. The spring mechanism 20 is partially received by the cap element 16 and the support element 18.

[0027] FIG 2 illustrates a schematic exploded perspective view of the outer component 12 of the push-in-push-out control knob 10 according to the preferred embodiment of the present invention.

[0028] The structures of the support element 18 and spring mechanism 20 are clarified in FIG 2. The spring mechanism 20 is partially received by the cap element 16. The support element 18 is pressed between said spring mechanism 20 and cap element 16. In this example, the cap element 16 is made at least partially of metal, while the support element 18 is made of plastics. Preferably, the frontal part of the cap element 16 as shown in the left region of figure 2 is formed as a frontal cap while the remaining part of the cap element 16 can be made of plastics and can be adapted to receive said frontal cap, wherein the frontal cap can be made of plastics or preferably of metal. Alternatively, the support element 18 may be provided without wings. Still in alternative, the wings can be embodied directly on the cap element and the support element 18 can be left away.

[0029] FIG 3 illustrates a schematic perspective view of another example of the outer component 12 of the push-in-push-out control knob 10 according to the preferred embodiment of the present invention. The outer component 12 in FIG 3 is similar as the outer component 12 of FIG 1 and 2. However, the cap element 16 in FIG 3 is made of plastics.

[0030] FIG 4 illustrates a schematic exploded perspective view of the other example of the outer component 12 of the push-in-push-out control knob 10 according to the preferred embodiment of the present invention. The outer component 12 in FIG 4 includes the cap element 16 made of plastics.

[0031] FIG 5 illustrates a schematic perspective view of an inner component 14 of the push-in-push-out control knob 10 according to the preferred embodiment of the present invention.

[0032] The inner component 14 comprises a housing 22 and a ring 24. Further, the inner component 14 comprises a switch mechanism 26, which is not shown in FIG 5. Substantially, the housing 22 is a pipe section with a flange. The ring 24 is enclosed by said flange. The flange

is attachable at a rear side of a control panel 30. In this example, the flange is attachable at a rear side of a control panel 30 made of metal. Alternatively, the inner component 14 may be formed as a single-piece part.

[0033] FIG 6 illustrates a schematic exploded perspective view of the inner component 14 of the push-in-push-out control knob 10 according to the preferred embodiment of the present invention. The structure and size of the ring 24 is clarified in FIG 6.

[0034] FIG 7 illustrates a schematic perspective view of another example of the inner component 14 of the push-in-push-out control knob 10 according to the preferred embodiment of the present invention.

[0035] The inner component 14 comprises the housing 22 and the ring 24. Moreover, the inner component 14 comprises the switch mechanism 26, which is not shown in FIG 7. The housing 22 is substantially formed as pipe section with flange. The ring 24 is enclosed by said flange. In this example, the flange is attachable at a rear side of a control panel 30 made of glass. Alternatively, the inner component 14 may be formed as a single-piece part.

[0036] FIG 8 illustrates a schematic exploded perspective view of the other example of the inner component 14 of the push-in-push-out control knob 10 according to the preferred embodiment of the present invention. The flange of the housing is attachable at the rear side of the control panel 30 made of glass.

[0037] FIG 9 illustrates a schematic sectional side view of the push-in-push-out control knob 10 assembled in the control panel 30 according to the preferred embodiment of the present invention. The push-in-push-out control knob 10 is assembled in a circular cut-out of the control panel 30.

[0038] The first component 12 of the push-in-push-out control knob 10 is assembled from the front side of the control panel 30, while the second component 14 of the push-in-push-out control knob 10 is assembled from the rear side of said control panel 30.

[0039] The flange of the housing 22 is aligned at the rear side of said control panel 30. The switch mechanism 26 is arranged inside said housing 22. The spring mechanism 20 is arranged substantially inside the cap element 16 and the support element 18. The ring 24 is enclosed by the front portion of the housing 22. The cap element 16 and the support element 18 form factually a single-piece part.

[0040] The cap element 16 and the support element 18 penetrate the ring 24, so that the snap-in hooks of the support element 18 engage with the rear portion of said ring 24. The support element 18 engages behind the ring 24. The force provided by the spring mechanism 20 presses the snap-in hooks of the support element 18 against the rear portion of the ring 24. By this way the wobbling of the push-in-push-out control knob 10 is reduced.

[0041] The properties of the ring 24 provide a self-adjusting arrangement of the cap element 16 and the sup-

port element 18 in the cut-out of the control panel 30.

[0042] FIG 10 illustrates a schematic perspective view of the push-in-push-out control knob 10 assembled in a control panel 30 according to the preferred embodiment of the present invention.

[0043] The first component 12 of the push-in-push-out control knob 10, i.e. the cap element 16 and the support element 18, is arranged at the front side of the control panel 30, while the second component 14 of the push-in-push-out control knob 10, i.e. the housing 22 and the switch mechanism 26, is arranged at the rear side of said control panel 30. The ring 24 and the spring mechanism 20 are arranged within the cut-out of the control panel 30.

[0044] FIG 11 illustrates a schematic exploded perspective view of the push-in-push-out control knob 10 assembled in the control panel 30 according to the preferred embodiment of the present invention.

[0045] The cap element 16, the support element 18 and the spring mechanism 20 of the push-in-push-out control knob 10 are assembled from the front side of the control panel 30. In contrast, the housing 22, the ring 24 and the switch mechanism 26 of the push-in-push-out control knob 10 are assembled from the rear side of said control panel 30.

[0046] The switch mechanism 26 is fixed at the housing 22 by screws 28. The ring 24 is inserted into the front portion of the housing 22 as shown in FIG 5 and 7. The second component 14 of the push-in-push-out control knob 10 is aligned at the rear side of the cut-out in the control panel 30, while the first component 12 of the push-in-push-out control knob 10 is aligned at the front side of said cut-out in the control panel 30.

[0047] The cap element 16 and the support element 18 penetrate the ring 24 in the cut-out in the control panel 30, so that the snap-in hooks of the support element 18 engage with the rear portion of said ring 24. The force provided by the spring mechanism 20 presses the snap-in hooks of the support element 18 against the rear portion of the ring 24, so that the wobbling of the push-in-push-out control knob 10 is reduced.

[0048] FIG 12 illustrates a schematic sectional side view of the push-in-push-out control knob 10 assembled in the control panel 30 according to the preferred embodiment of the present invention.

[0049] The housing 22 is aligned at the rear side of the control panel 30. The switch mechanism 26 is arranged at said housing 22. The spring mechanism 20 is arranged substantially inside the cap element 16 and the support element 18. The ring 24 is behind the cut-out in the control panel 30.

[0050] The cap element 16 and the support element 18 penetrate the ring 24. The snap-in hooks of the support element 18 are engaged with the rear portion of said ring 24. The force provided by the spring mechanism 20 presses the snap-in hooks of the support element 18 against the rear portion of the ring 24.

[0051] FIG 13 illustrates a schematic perspective view of the outer component 12 of the push-in-push-out control

knob 10 according to the preferred embodiment of the present invention.

[0052] The outer component 12 of the push-in-push-out control knob 10 comprises the cap element 16, the support element 18 and the spring mechanism 20. The cap element 16 is substantially cylindrical and includes one closed face side and one open face side. The cap element 16 encloses the support element 18 completely except the snap-in hooks. The snap-in hooks form the enlarging of the support element 18. Said enlarging extends circumferentially around the outer component 12 of the push-in-push-out control knob 10. The spring mechanism 20 is partially received by the cap element 16 and the support element 18.

[0053] FIG 14 illustrates a schematic exploded perspective view of the outer component 12 of the push-in-push-out control knob 10 according to the preferred embodiment of the present invention.

[0054] The structures of the support element 18 and spring mechanism 20 are clearly shown in FIG 14. The spring mechanism 20 is partially received by the support element 18. In turn, the support element 18, except the snap-in hooks, is received by the cap element 16.

[0055] FIG 15 illustrates a schematic perspective view of a cap element 16 and a support element 18 of the push-in-push-out control knob 10 according to the preferred embodiment of the present invention.

[0056] FIG 16 illustrates a further schematic perspective view of the cap element 16 and the support element 18 of the push-in-push-out control knob according to the preferred embodiment of the present invention.

[0057] FIG 15 and 16 clarify that the cap element 16 and the support element 18 form a control knob. Alternatively, the cap element 16 and the support element 18 are formed as a single-piece part.

[0058] FIG 17 illustrates a schematic exploded perspective view of the push-in-push-out control knob 10 according to the prior art. The push-in-push-out control knob 10 comprises a proper control knob 32, a guiding ring 34, a housing 22 with flange and a switch mechanism 26. The push-in-push-out control knob 10 is assembled at the control panel 30 of the domestic appliance from the front side. Said push-in-push-out control knob 10 wobbles, when it is gripped by the user.

[0059] FIG 18 illustrates a schematic exploded perspective view of a further push-in-push-out control knob 10 according to the prior art. The push-in-push-out control knob 10 comprises the proper control knob 32, the guiding ring 34, the housing 22 with flange, a rear knob part 36 and the switch mechanism 26. The push-in-push-out control knob 10 is assembled at the control panel 30 of the domestic appliance from the rear side. The assembling of said push-in-push-out control knob 10 at the control panel 30 is complex, since other control knobs are assembled from the front side of the control panel 30.

[0060] Although an illustrative embodiment of the present invention has been described herein with reference to the accompanying drawings, it is to be under-

stood that the present invention is not limited to that precise embodiment, and that various other changes and modifications may be affected therein by one skilled in the art without departing from the scope or spirit of the invention. All such changes and modifications are intended to be included within the scope of the invention as defined by the appended claims.

List of reference numerals

[0061]

10	push-in-push-out control knob
12	outer component
14	inner component
16	cap element
18	support element
20	spring mechanism
22	housing
24	ring
26	switch mechanism
28	screw
30	control panel
32	control knob
34	guiding ring
36	rear knob part

Claims

1. A push-in-push-out control knob (10) for a domestic appliance, in particular for a cooking appliance, wherein:

- the push-in-push-out control knob (10) is attached or attachable at a cut-out in a control panel (30) of the domestic appliance,
- the push-in-push-out control knob (10) comprises an outer component (12) and an inner component (14),
- the outer component (12) is arranged or arrangeable at a front side of the control panel (30),
- the inner component (14) is arranged or arrangeable at a rear side of the control panel (30),
- the inner component (14) includes a housing (22) and a ring (24),
- the ring (24) is arranged or arrangeable within a front opening of the housing (22), so that the ring (24) is form-fit with said front opening, and
- the outer component (12) includes a support element (18) engaging or engageable behind the ring (24).

2. The push-in-push-out control knob according to claim 1,
characterised in that
the support element (18) includes at least two snap-in hooks for engaging behind the ring (24), wherein

said snap-in hooks form an enlarging of the support element (18).

3. The push-in-push-out control knob according to claim 2,

characterised in that

the support element (18) includes at least two wings extending along a push direction of the push-in-push-out control knob (10), wherein at least one snap-in hook is formed at a rear distal end of said wing.

4. The push-in-push-out control knob according to claim 2 or 3,

characterised in that

a plurality of snap-in hooks extends around the circumference of the support element (18) and forms the enlarging of said support element (18).

5. The push-in-push-out control knob according to any one of the preceding claims,

characterised in that

the outer component (12) includes a spring mechanism (20) providing a force for pressing the support element (18), particularly the snap-in hooks, against the ring (24).

6. The push-in-push-out control knob according to any one of the preceding claims,

characterised in that

the inner component (14) includes a switch mechanism (26), wherein preferably said switch mechanism (26) is connected or connectable to the spring mechanism (20) of the outer component (12).

7. The push-in-push-out control knob according to claim 6,

characterised in that

the switch mechanism (26) is a switch, a thermostat, an encoder or any input command device.

8. The push-in-push-out control knob according to any one of the preceding claims,

characterised in that

the outer component (14) includes a cap element (16) enclosing partially the support element (18), so that the cap element (16) and the support element (18) form a control knob, wherein preferably said cap element (16) is made at least in part of metal or plastics, still preferably wherein the cap element (16) is made of plastics and is adapted to receive a frontal cap that can be made of plastics or of metal.

9. The push-in-push-out control knob according to any one of the claims 1 to 7,

characterised in that

the support element (18) forms a control knob.

10. The push-in-push-out control knob according to any one of the preceding claims,
characterised in that
 the push-in-push-out control knob (10) is rotatable around a rotation axis perpendicular to the plane of the control panel (30), wherein the push-in-push-out control knob (10) is moveable along said rotation axis between a protruding state and a countersunk state. 5
11. The push-in-push-out control knob according to any one of the claims 3 to 10,
characterised in that
 the wings form a cylindrical surface of the support element (18) and extend parallel to the rotation axis of the push-in-push-out control knob (10). 10 15
12. The push-in-push-out control knob according to any one of the preceding claims,
characterised in that
 the push-in-push-out control knob (10) is attachable at a circular cut-out in the control panel (30) of the domestic appliance, wherein the diameter of the ring (24) is marginally bigger than the diameter of said circular cut-out. 20 25
13. A domestic appliance, in particular a cooking appliance,
characterised in that
 the domestic appliance comprises at least one push-in-push-out control knob (10) according to any one of the preceding claims. 30
14. The domestic appliance according to claim 13,
characterised in that
 the domestic appliance comprises at least one control panel (30) including at least one cut-out, wherein the push-in-push-out control knob (10) is attached or attachable at said cut-out in the control panel (30) of the domestic appliance. 35 40
15. The domestic appliance according to claim 14,
characterised in that
 the diameter of the cut-out in the control panel (30) is marginally smaller than the diameter of the ring (24) of the push-in-push-out control knob (10), wherein preferably the cut-out in the control panel (30) is circular. 45 50 55

FIG 1

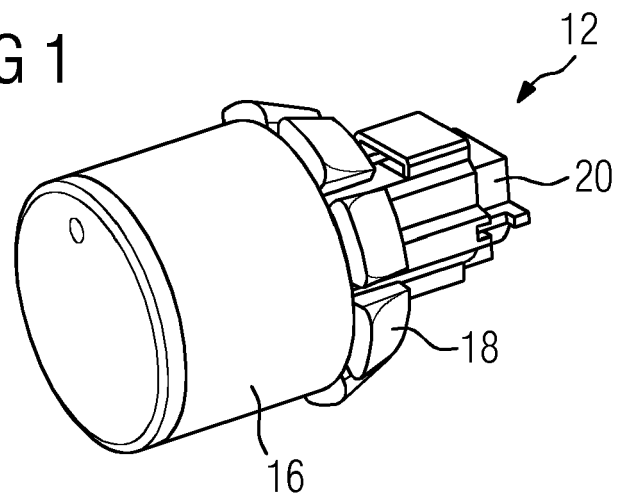


FIG 2

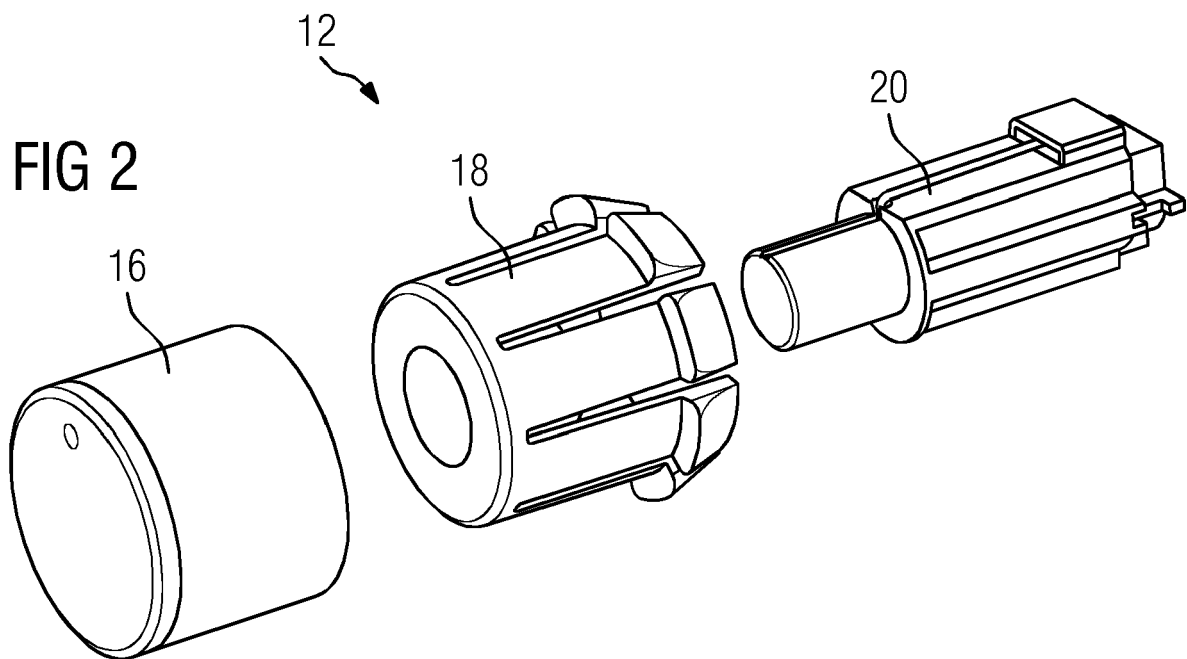


FIG 3

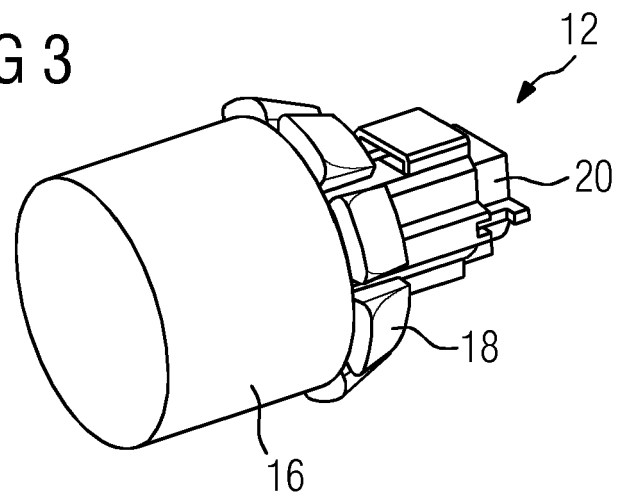


FIG 4

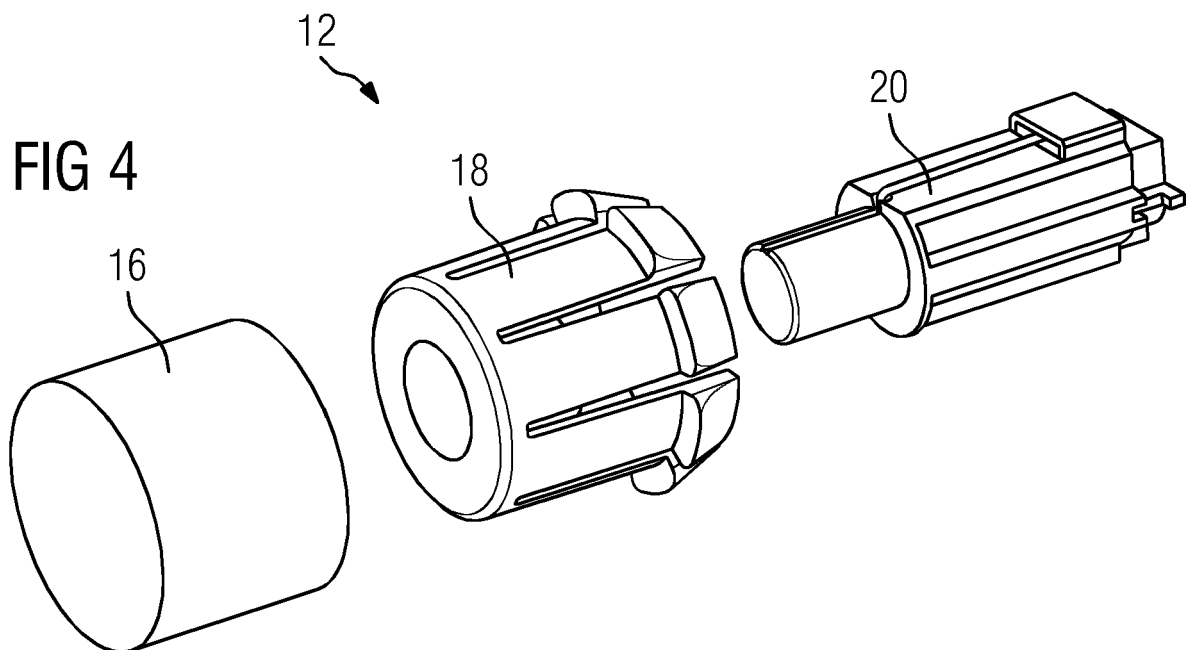


FIG 5

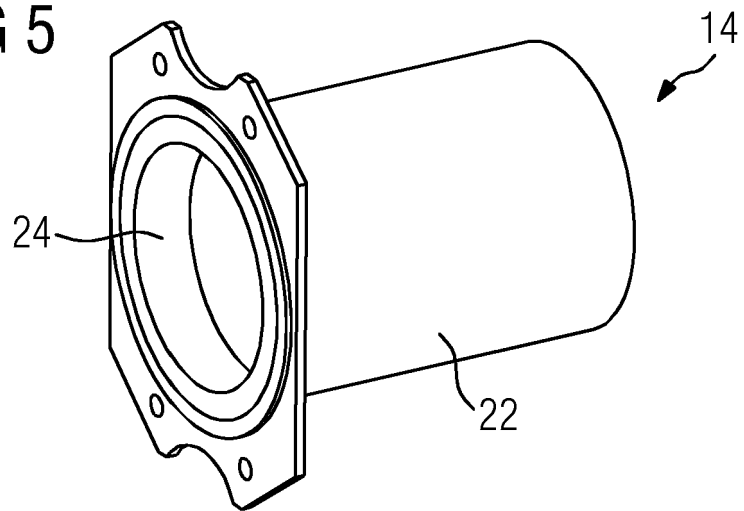


FIG 6

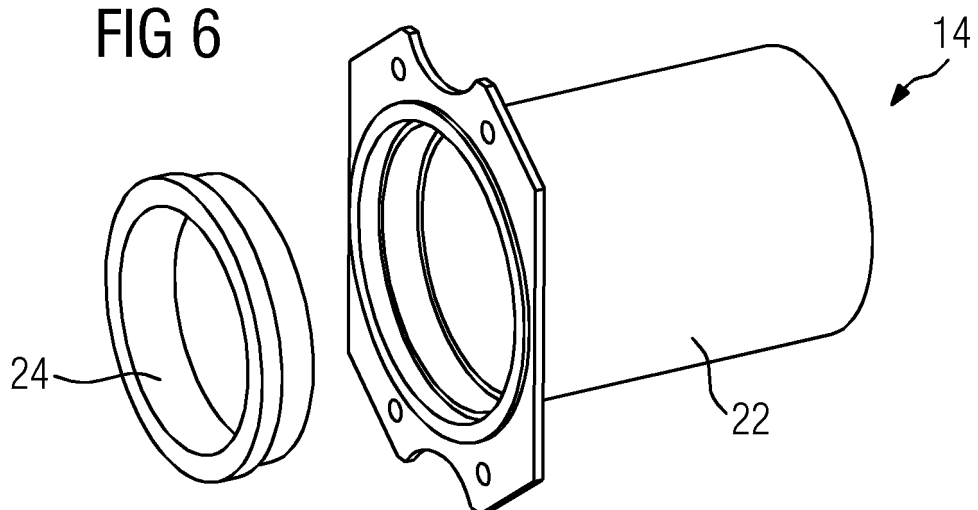


FIG 7

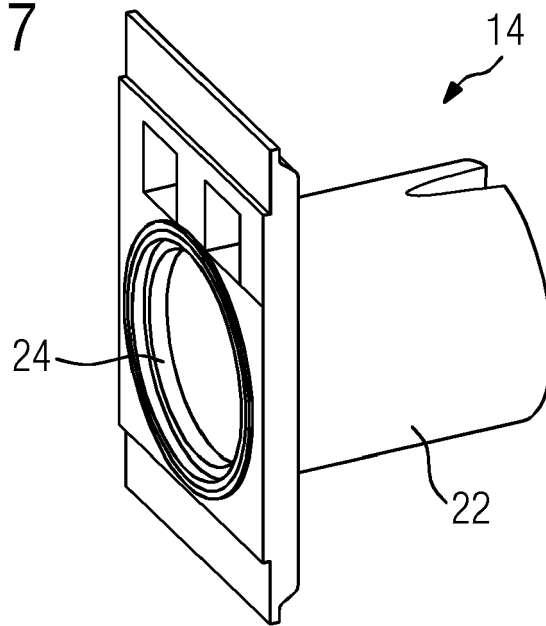


FIG 8

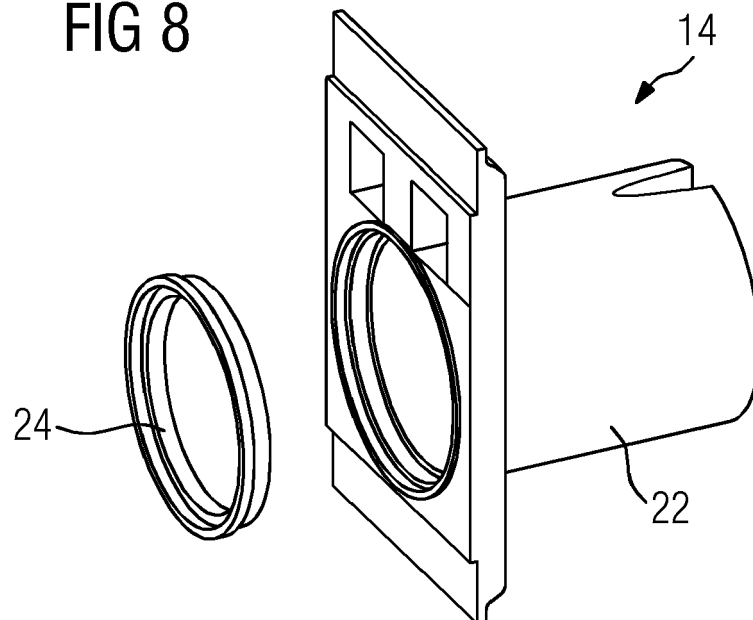


FIG 9

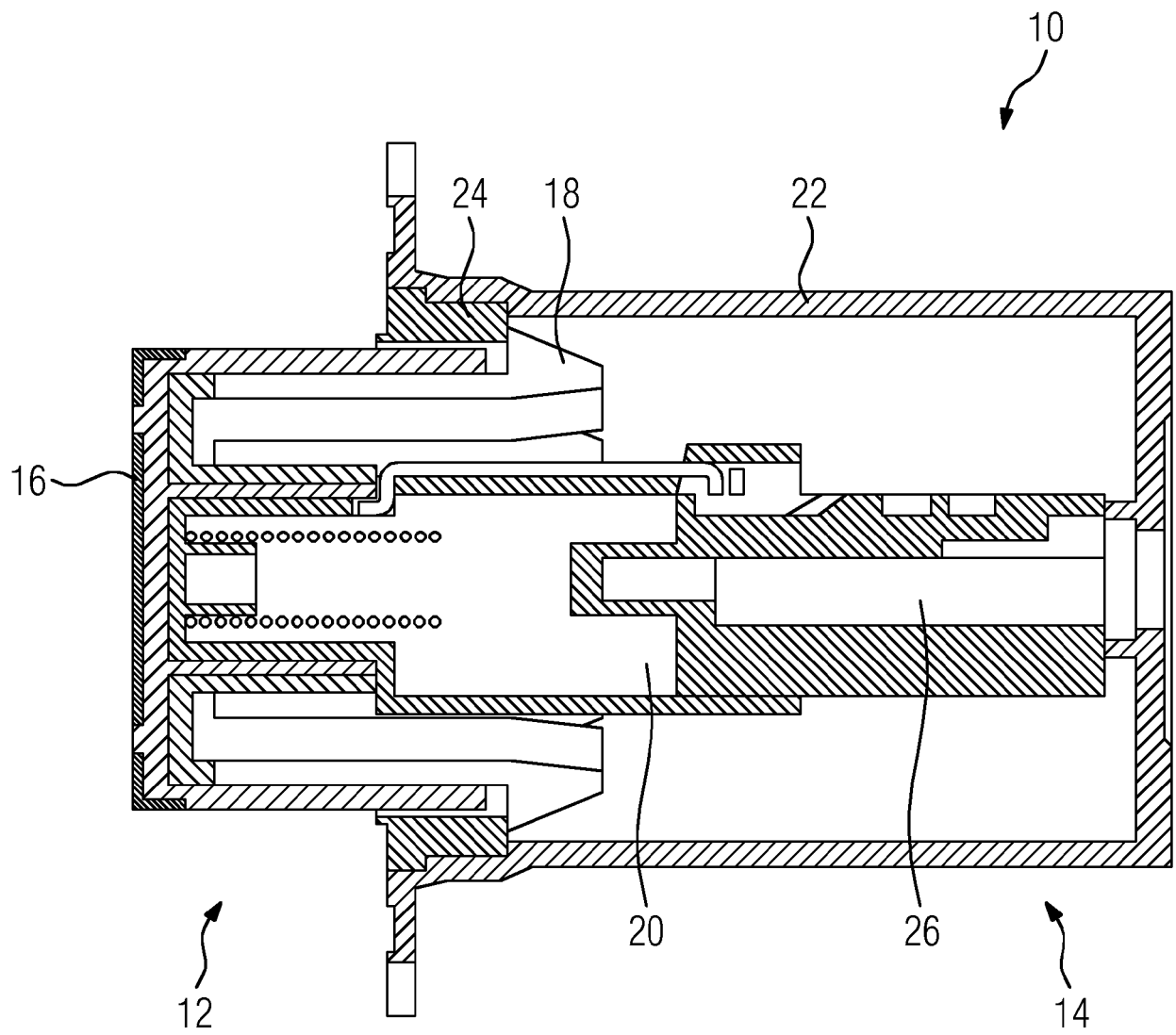


FIG 10

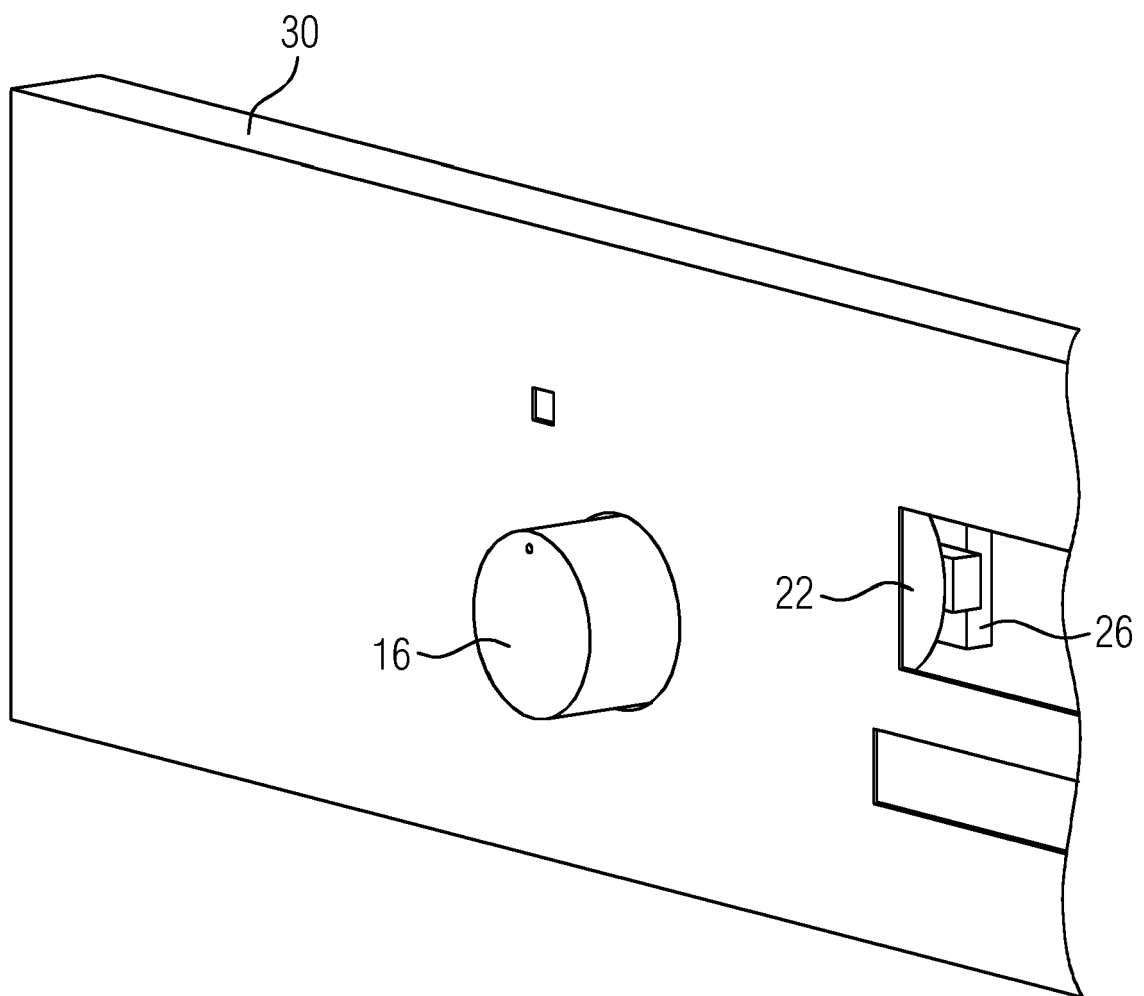


FIG 11

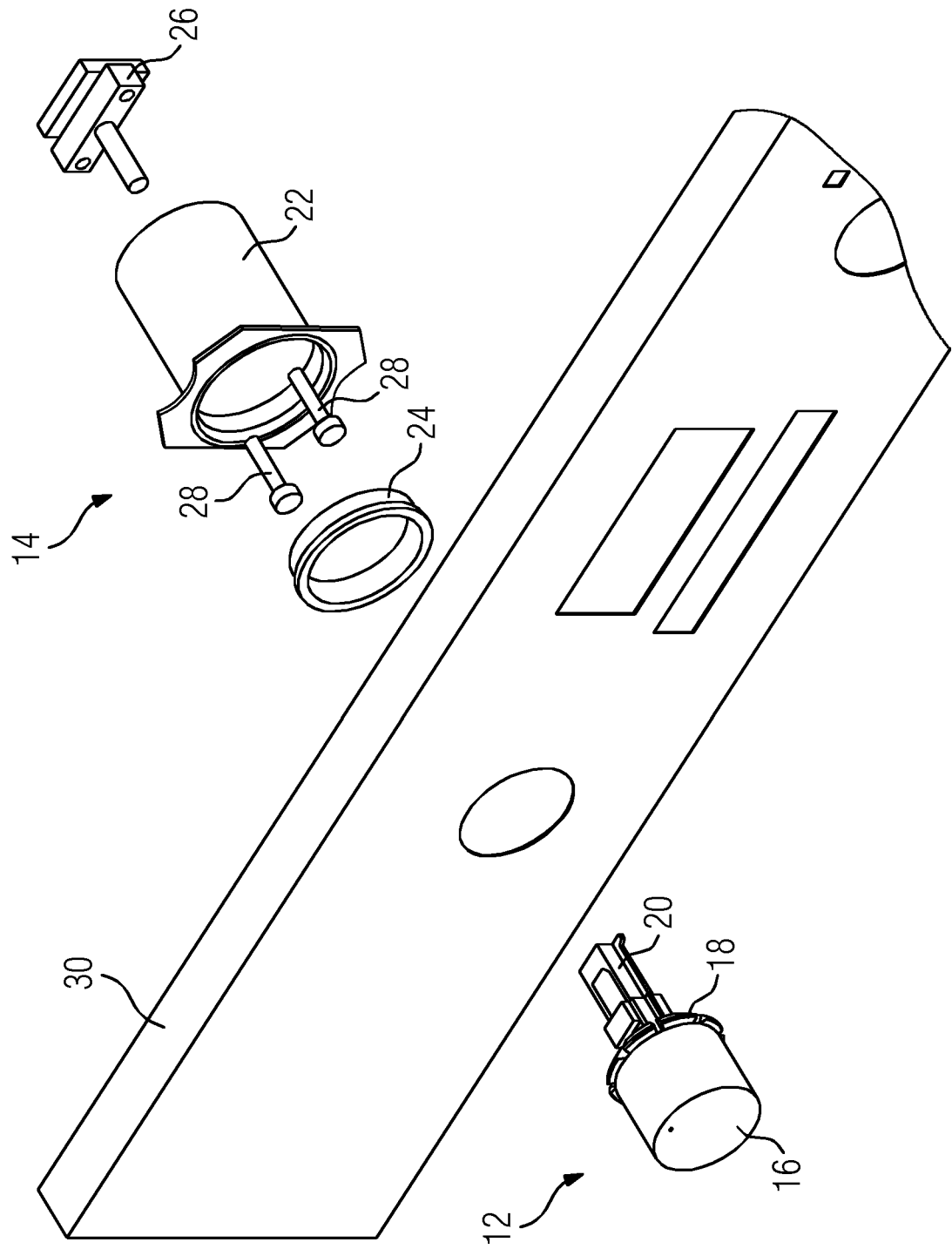


FIG 12

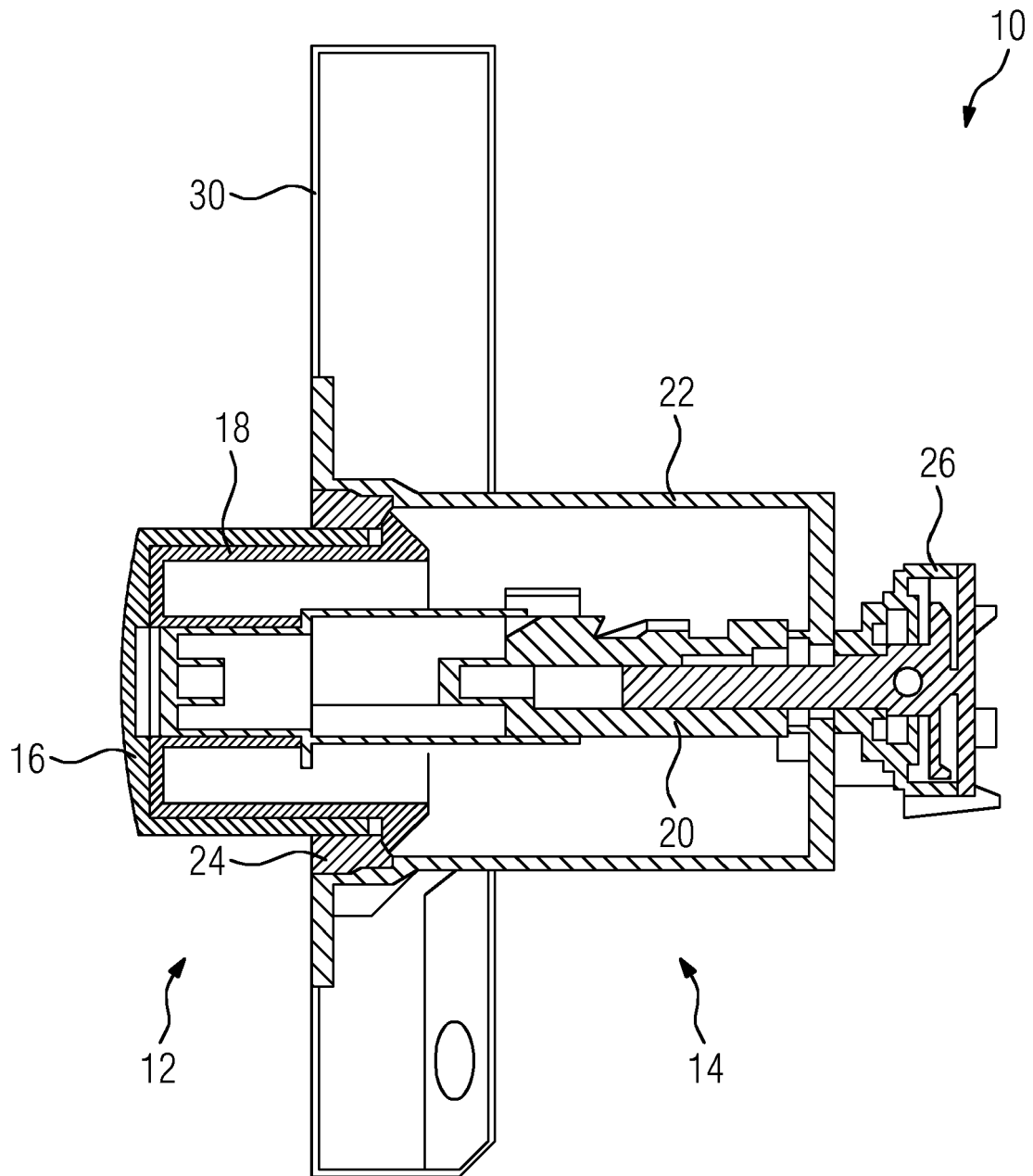


FIG 13

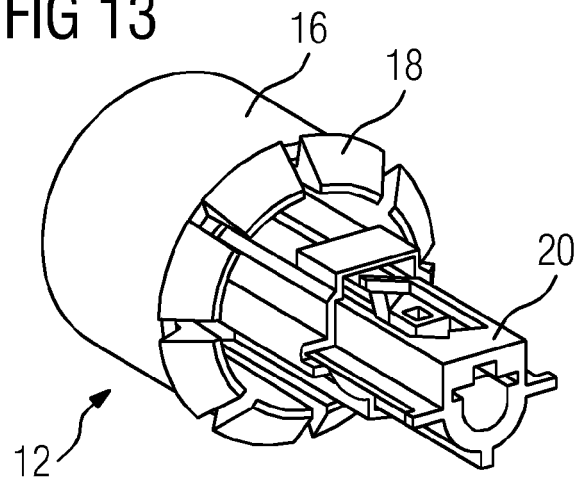


FIG 14

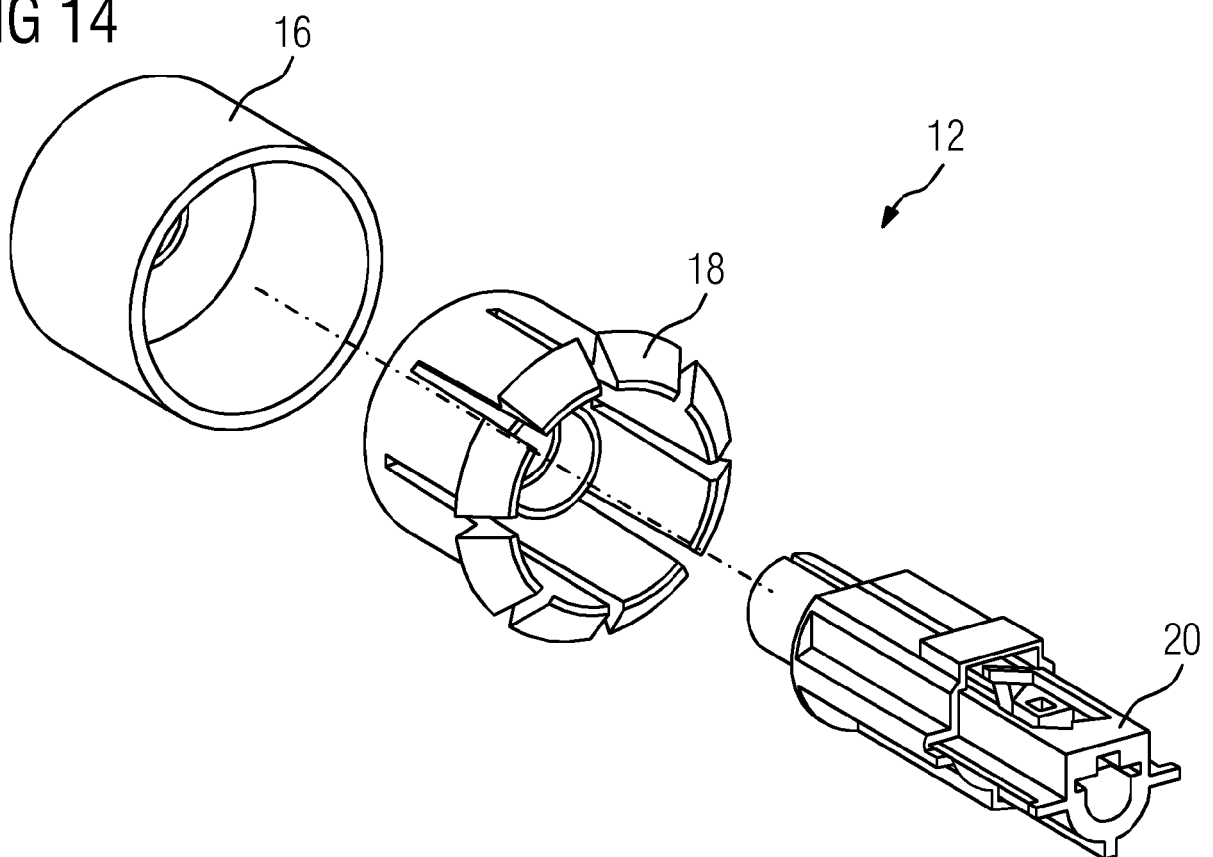


FIG 15

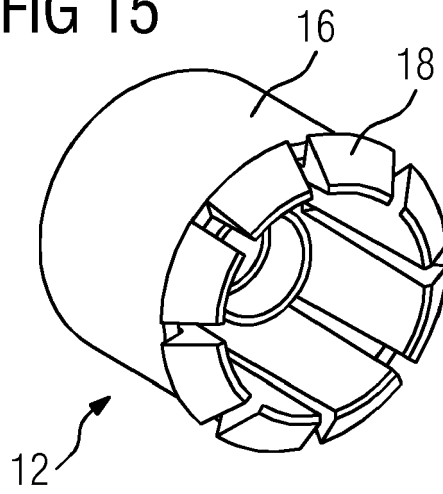


FIG 16

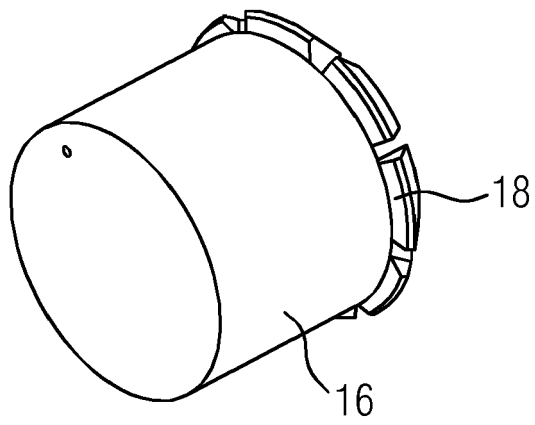


FIG 17

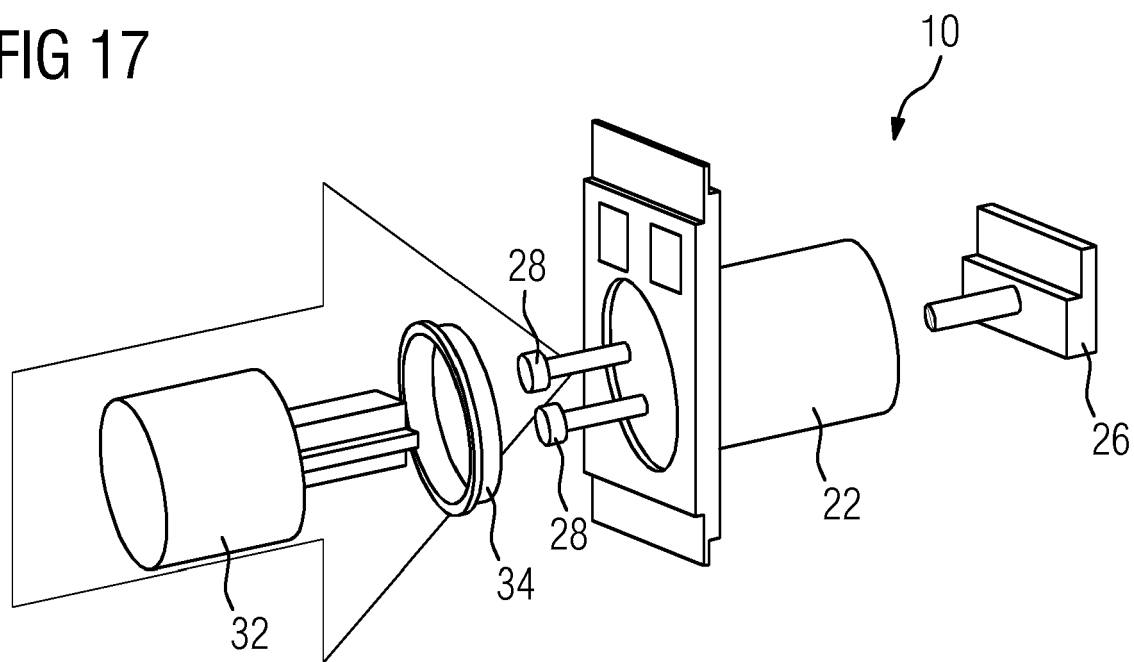
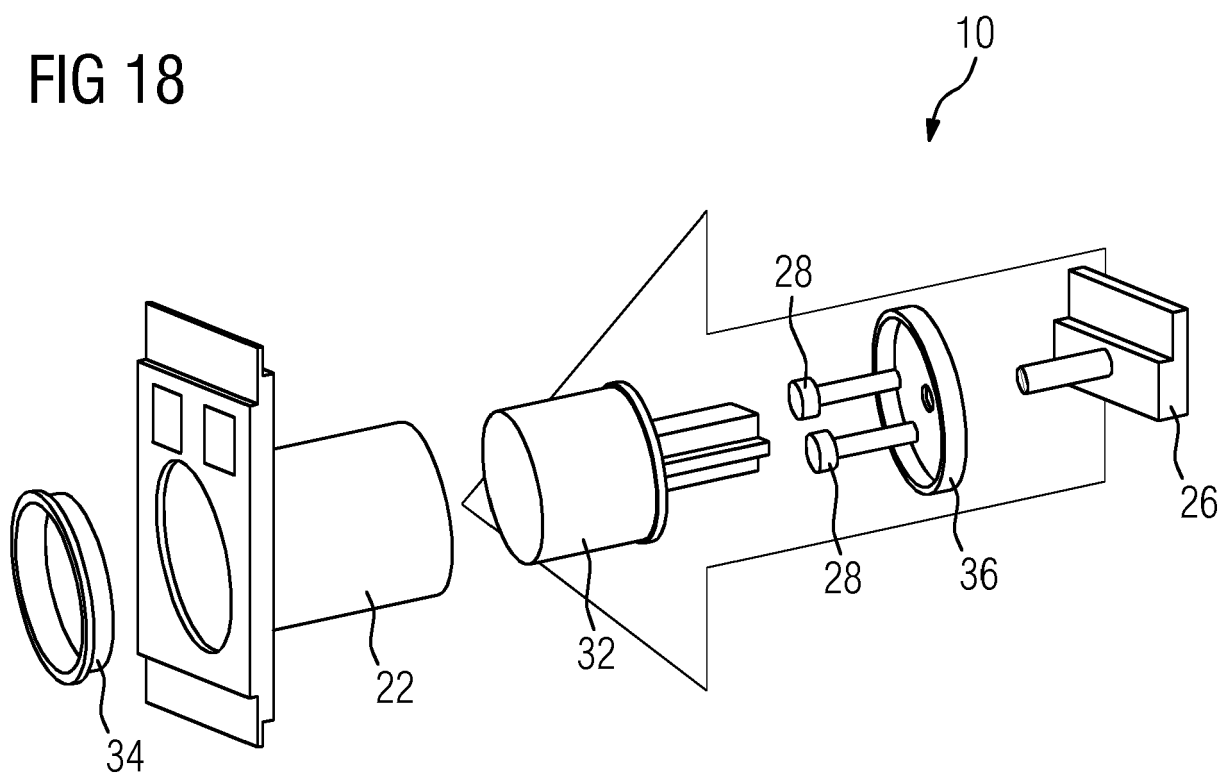


FIG 18





EUROPEAN SEARCH REPORT

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Place of search The Hague		Date of completion of the search 25 April 2019	Examiner Jalal, Rashwan
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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