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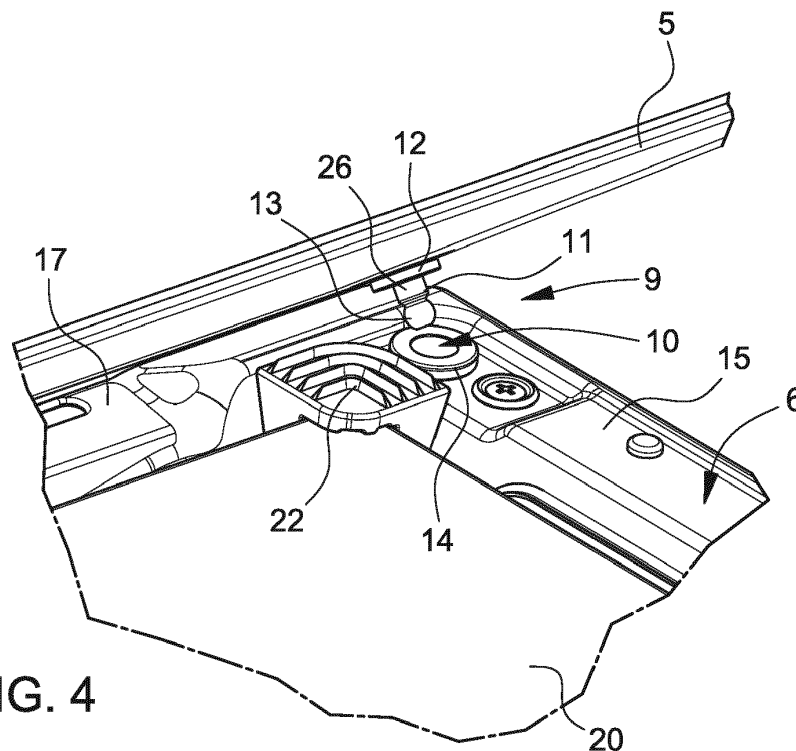
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(54) **DOOR OF AN OVEN AND OVEN COMPRISING SAID DOOR**

(57) A door of an oven with a heatable cavity has an outer panel (4) at least partially transparent; an inner panel (5) at least partially transparent and placed, in use, between the outer panel (4) and the heatable cavity (2) at a distance from the outer panel (4); a support frame

(6) configured to support the inner panel (5) and the outer panel (4) and which can be coupled to the oven (1); and a releasable snap lock coupling device (9) configured to selectively couple/uncouple the inner panel (5) to/from the frame (6).



**FIG. 4**

**Description**CROSS-REFERENCE TO RELATED APPLICATIONS

**[0001]** This Patent Application claims priority from Italian Patent Application No. 10202000023188 filed on October 1st, 2020.

TECHNICAL FIELD

**[0002]** The present invention relates to a door of an oven and an oven comprising said door.

**[0003]** In particular, the present invention relates to a door of an oven for cooking food, typically used in household kitchens or in the catering sector.

BACKGROUND ART

**[0004]** Generally, an oven comprises a heatable cavity, inside which the food being cooked is housed, and a door configured to open and close the heatable cavity.

**[0005]** As is known, one of the main functions of the oven door is to avoid loss of heat from the cavity, and at the same time to allow the cooking of the food to be checked visually.

**[0006]** Moreover, the oven door must be suitably insulated thermally to avoid excessive heating of the external surface of the door.

**[0007]** Therefore, currently known doors comprise a frame and a plurality of panels made at least partly of transparent material and arranged on the frame at a certain distance from each other so as to form a gap between each panel to ensure adequate thermal insulation and avoid loss of heat from the cavity.

**[0008]** During cooking, the inner panel facing the heatable cavity gets dirty easily and it is therefore sometimes advisable to remove the inner panel from the door in order to proceed with an effective and complete cleaning.

**[0009]** Documents WO 2012/089455, WO 2012/089478 and FR 2,934,671 teach how to couple/uncouple the inner panel to/from the door frame by means of a coupling device comprising two pins and two seats shaped to provide a snap lock coupling with the respective pins.

**[0010]** Document DE 198,53,758 describes a further solution for coupling an inner panel to a frame of an oven door.

**[0011]** A disadvantage of currently known oven doors is that the operations of removal and subsequent assembly of the inner panel are complex and often produce "noises" which can make the user fear of damaging some components, causing the user to be distrustful of carrying out said operations if necessary.

DISCLOSURE OF INVENTION

**[0012]** The object of the present invention is to provide an oven door which mitigates the drawbacks of the prior

art in a simple and cheap way.

**[0013]** In particular, it is an object of the present invention to provide a door for an oven which is simple to manufacture and allows the inner panel to be removed in a simple and reliable manner.

**[0014]** In accordance with the present invention, there is provided a door of an oven with a heatable cavity; the door comprising:

- 10 - an outer panel at least partially transparent;
- an inner panel at least partially transparent and placed, in use, between the outer panel and the heatable cavity at a distance from the outer panel;
- a support frame configured to support the inner panel and the outer panel and which can be coupled to the oven; and
- 15 - a releasable snap lock coupling device configured to selectively couple/uncouple the inner panel to/from the frame; the coupling device comprising at least one pin coupled to one of the frame and the inner panel, and at least one cap, provided with a seat substantially complementary to the pin and coupled to the other of the frame and the inner panel; the at least one pin and the at least one seat being shaped so as to realize a self-centering guided coupling;
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the coupling device comprising four caps, which are arranged at the corners of the quadrangular-shaped frame; and four pins, which are arranged near the perimeter edge of the inner panel, so as to mate with the caps arranged on the frame; each cap of the coupling device being made of polymeric material.

**[0015]** Thanks to the present invention, the operations of removal and assembly of the inner panel are simple since the coupling between the inner panel and the frame is guided by the structure of the coupling device.

**[0016]** In greater detail, the at least one cap of the coupling device is made of a first polymeric material; and the at least one pin is made of a second polymeric material, other than the first polymeric material.

**[0017]** In this way, it is possible to avoid worrying metallic "noises" that can induce the user to give up the operations of removal and assembly of the inner panel for fear of damaging the door.

**[0018]** In particular, the at least one cap is coupled to the frame and the at least one pin is coupled to the inner panel.

**[0019]** In this way, the coupling between each pin and the respective cap allows the inner panel to be gradually engaged to and disengaged from the frame in a particularly noiseless manner.

**[0020]** In particular, the at least one pin has a head having, at least in part, a substantially spherical profile.

**[0021]** In this way, each pin can be easily engaged to and disengaged from the respective cap.

**[0022]** In particular, each pin has a circular flat base

and an intermediate portion placed between the head and the base; the base being glued to the inner panel, preferably by means of a quick-curing adhesive.

**[0023]** In this way, each pin can be fastened to the inner panel in a quick and durable manner.

**[0024]** In particular, the intermediate portion has a narrowing shaped to allow each pin to be snapped on/off to/from the respective cap, so as to provide a releasable coupling between the frame and the inner panel.

**[0025]** In particular, the inner panel has an internal face facing, in use, the oven, and an external face facing, in use, the frame; each circular flat base being glued to the external face of the inner panel.

**[0026]** In particular, each hollow seat has a substantially hemispherical cavity so as to house the substantially spherical head of the respective pin.

**[0027]** In particular, each cap is press-fitted into the frame.

**[0028]** In this way, it is possible to manufacture each cap separately from the frame and then apply each cap to the frame.

**[0029]** In particular, the first polymeric material is a silicone material and the second polymeric material is a plastic material, preferably transparent.

**[0030]** In this way, it is possible to ensure a coupling between each pin and the respective cap that does not generate any suspicious noise that may cause the user to think that they have damaged some component.

**[0031]** In particular, the frame is shaped like a quadrangular frame; each cap being arranged at the corners of the frame; each pin being arranged near the perimeter edge of the inner panel.

**[0032]** In this way, it is possible to ensure a stable coupling between the inner panel and the frame, and at the same time keep each pin at a distance from the portion of the inner panel directly facing the heatable cavity of the oven, i.e., directly exposed to the high temperatures of the heatable cavity of the oven, thus preserving the polymeric material of the pins and the adhesive used.

**[0033]** In particular, the frame comprises two lateral supports and two transverse elements rigidly connected to the lateral supports; at least two lateral portions of the inner panel being configured to rest on the respective lateral supports, so as to adequately support the inner panel and allow a visual check of the contents of the oven through the panels even when the oven door is in the closed position.

**[0034]** In particular, the door comprises at least one further panel at least partially transparent and arranged between the outer panel and the inner panel and supported by the frame at a distance from the inner panel and the outer panel; in particular, each further panel being coupled to the frame by means of respective releasable snap lock coupling devices.

**[0035]** When the door is closed, the at least one further panel allows thermal insulation to be optimized and heat loss to be reduced.

**[0036]** Another object of the present invention is to pro-

vide an oven which mitigates the drawbacks of the prior art.

**[0037]** In accordance with the present invention, there is provided an oven comprising the door as described above and a heatable cavity selectively closed by the door.

**[0038]** In this way, food can be cooked in the oven, and if necessary, the inner panel can be removed from the door, the inner panel and the internal surface of the outer panel can be cleaned, and the inner panel can be lodged back into the door in a simple, quick and safe manner.

#### BRIEF DESCRIPTION OF THE DRAWINGS

**[0039]** Further features and advantages of the present invention will be apparent from the following description of a non-limiting embodiment thereof, with reference to the figures of the accompanying drawings, wherein:

- Figure 1 is a schematic representation of an oven in accordance with the present invention;
- Figure 2 is a perspective view, with parts removed for clarity, of a door of the oven of Figure 1;
- Figures 3 and 4 are perspective views, with parts removed for clarity, of respective details of the door of Figure 2;
- Figures 5 and 6 are cross-section views, with parts removed for clarity, of a detail of the door of Figure 2 in respective operating configurations.
- Figures 7 and 8 are side elevation views, with parts removed for clarity, of respective details of the door of Figure 2; and
- Figure 9 is a further perspective view, with parts removed for clarity, of the door of Figure 2.

#### BEST MODE FOR CARRYING OUT THE INVENTION

**[0040]** With reference to Figure 1, with reference number 1 is indicated as a whole an oven, particularly used for cooking food in household kitchens or in the catering sector, without thereby limiting the wide range of possible applications of the present invention.

**[0041]** The oven 1 can find further fields of application, for example the oven 1 can be used for cooking or heating objects in the industrial sector.

**[0042]** The oven 1 comprises a heatable cavity 2 (schematically shown by a dashed line) and a door 3 configured to selectively open and close the heatable cavity 2.

**[0043]** With reference to Figure 2, the door 3 comprises an outer panel 4 at least partially transparent; an inner panel 5 at least partially transparent and placed between the outer panel 4 and the heatable cavity 2 (Figure 1) at a distance from the outer panel 4; a support frame 6 configured to support at least the outer panel 4 and the inner panel 5; and two hinge assemblies 7 (Figures 6 and 7) fixed to the frame 6 and configured to couple the door 3 to the oven 1 (Figure 1).

**[0044]** The outer panel 4 and the inner panel 5 are

substantially rectangular in shape and are made at least partly of glass.

**[0045]** In greater detail, the outer panel 4 is provided with a handle 8, configured to facilitate the opening and closing of the door 3.

**[0046]** With reference to Figures 3, 4, 5 and 6, the door 3 comprises a releasable snap lock coupling device 9 made of polymeric material and configured to selectively couple/uncouple the inner panel 5 to/from the frame 6.

**[0047]** Preferably, the coupling device 9 is a snap lock device.

**[0048]** In particular, the coupling device 9 comprises at least one pin 11 coupled to the inner panel 5, and at least one cap 14, provided with a seat 10 having a shape substantially complementary to the pin 11 and coupled to the frame 6. Each one pin 11 and the at least one seat 10 are shaped so as to provide a self-centering guided coupling.

**[0049]** In accordance with an alternative embodiment, not shown in the attached figures, the at least one pin 11 is coupled to the frame 6, and the at least one cap 14 is coupled to the inner panel 5.

**[0050]** In accordance with a non-limiting embodiment of the present invention, the first polymeric material is a silicone material and the second polymeric material is a transparent plastic material. In accordance with alternative embodiments, any other polymeric material, which is suitable to allow each pin 11 to be snapped on/off to/from the respective cap 14 and can ensure a substantially noiseless coupling free from suspicious noises that may cause the user to think that they have damaged some components, may be used to manufacture each cap 14 and each pin 11.

**[0051]** Each pin 11 has a circular flat base 12 glued to the inner panel 5, preferably by means of a quick-curing adhesive, a head 13 having, at least in part, a substantially spherical profile, and an intermediate portion 26 placed between the head 13 and the base 12.

**[0052]** With reference to Figures 5 and 6, each intermediate portion 26 has a narrowing 27 shaped to selectively snap each pin 11 on/off to/from the respective cap 14.

**[0053]** Each seat 10 has a substantially hemispherical cavity 28 preceded by a narrow passage 29 and a chamfer 30 to provide a form fit with the head 13 of the respective pin 11 and cooperate with the intermediate portion 26 of the respective pin 11 to selectively retain the head 13 of each pin 11 in the seat 10 of the respective cap 14.

**[0054]** Advantageously, each chamfer 30 has the function of facilitating the centring of each pin 11 with respect to the respective seat 10.

**[0055]** In the non-limiting example of the present invention described and illustrated herein, each cap 14 is press-fitted into the frame 6.

**[0056]** With reference to Figure 7, the frame 6 is shaped like a quadrangular frame. In particular, the frame 6 comprises two lateral supports 15 and two transverse elements 16 and 17 rigidly connected to the lateral sup-

ports 15. In greater detail, the lateral supports 15 and the transverse elements 16 and 17 are transverse bars preferably made of metallic material.

**[0057]** The lateral supports 15 have respective seats 18, each of which is configured to house a respective hinge assembly 7 and arranged at a lower end of the lateral support 15. The transverse element 16 is connected to said lower ends of the lateral supports 15, whereas the transverse element 17 is connected to respective upper end portions of the lateral supports 15, so as to form the rectangular frame together with the transverse element 16 and the lateral supports 15.

**[0058]** In the example described and illustrated herein, the coupling device 9 comprises four caps 14, which are arranged at the corners of the quadrangular-shaped frame 6. In greater detail, two caps 14 are arranged on respective lateral supports 15, at the upper ends of the respective lateral supports 15. The other two caps 14 are arranged on the transversal element 16, near the opposite ends of the transversal element 16.

**[0059]** With reference to Figure 8, the coupling device 9 comprises four pins 11, which are arranged near the perimeter edge of the inner panel 5, so as to mate with the caps 14 arranged on the frame 6.

**[0060]** The inner panel 5 has an internal face 24 (Figures 2 and 3) facing, in use, the oven 1, and an external face 25 facing, in use, the frame 6. The circular flat base 12 is glued to the external face 25 of the inner panel 5.

**[0061]** Moreover, at least two lateral portions 19 of the external face 25 of the inner panel 5 are configured to rest on the respective lateral supports 15.

**[0062]** With reference to Figure 9, the door 3 comprises a panel 20 and a panel 21, at least partially transparent and arranged in an interspace between the outer panel 4 and the inner panel 5 (Figure 1), at a distance from each other.

**[0063]** In greater detail, the panels 20 and 21 are substantially rectangular in shape and made, at least partly, of transparent material.

**[0064]** Furthermore, the frame 6 comprises at least one fastening element 22, which is fixed to the frame 6 (Figures 3, 4 and 5) and configured to house at least a portion of the panels 20 and 21.

**[0065]** In the non-limiting example of the present invention described and illustrated herein, the fastening elements 22 are four and arranged at the corners of the quadrangular-shaped frame 6.

**[0066]** In particular, each fastening element 22 comprises two seats 23 spaced apart from each other so as to keep the panels 20 and 21 at a distance from each other.

**[0067]** In accordance with one embodiment, not shown in the accompanying drawings, each panel 20, 21 is coupled to the frame 6 by means of respective further coupling devices 9. In particular, the door 3 comprises further caps, each of which is coupled to a respective fastening element 22; and further pins coupled to each panel 20, 21 so as to mate with the respective caps.

**[0068]** In use and with reference to Figure 1, when the user finds it necessary to remove the inner panel 5 from the door 3, for example in order to effectively clean the inner panel 5, the user opens the door 3 completely so as to arrange the door 3 horizontally. Next, the user grabs the lower end of the inner panel 5 arranged above the transversal element 16 (Figure 5) and pulls said lower end upwards. In this way, as shown in Figure 3, the pins 11 arranged at said lower end are disengaged from the respective caps 14, allowing the inner panel 5 to be tilted with respect to the frame 6.

**[0069]** As a result of said tilting, as shown in Figures 4 and 6, the pins 11 arranged at the transversal element 17 are also disengaged from the respective caps 14, allowing complete removal of the inner panel 5 from the frame 6.

**[0070]** To assemble the inner panel 5 onto the frame 6, the user opens the door 3 completely and then arranges the inner panel 5 above the frame 6 so that each pin 11 mates with the respective cap 14.

**[0071]** By applying a slight pressure on the inner panel 5, the user pushes the inner panel 5 against the frame 6 so that each pin 11 engages with each cap 14.

**[0072]** It is understood that variations may be made to the present invention without however departing from the scope of protection of the appended claims.

## Claims

1. A door of an oven with a heatable cavity; the door (3) comprising:

- an outer panel (4) at least partially transparent;
- an inner panel (5) at least partially transparent and placed, in use, between the outer panel (4) and the heatable cavity (2) at a distance from the outer panel (4);
- a support frame (6) configured to support the inner panel (5) and the outer panel (4) and which can be coupled to the oven (1); and
- a releasable snap lock coupling device (9) configured to selectively couple/uncouple the inner panel (5) to/from the frame (6); the coupling device (9) comprising at least one pin (11) coupled to one of the frame (6) and the inner panel (5), and at least one cap (14), provided with a seat (10) substantially complementary to the pin (11) and coupled to the other of the frame (6) and the inner panel (5); the at least one pin (11) and the at least one seat (10) being shaped so as to realize a self-centering guided coupling;

the coupling device (9) comprising four caps (14), which are arranged at the corners of the quadrangular-shaped frame (6); and four pins (11), which are arranged near the perimeter edge of the inner panel (5), so as to mate with the caps (14) arranged on the

frame (6);  
each cap (14) of the coupling device (9) being made of polymeric material.

2. The door as claimed in claim 1, wherein the at least one cap (14) of the coupling device (9) is made of a first polymeric material; and the at least one pin (11) is made of a second polymeric material, other than the first polymeric material.
3. The door as claimed in any one of the foregoing claims, wherein the at least one cap (14) is coupled to the frame (6) and the at least one pin (11) is coupled to the inner panel (5).
4. The door as claimed in any one of the foregoing claims, wherein the at least one pin (11) has a head (13) having, at least in part, a substantially spherical profile.
5. The door as claimed in claim 4, wherein each pin (11) has a circular flat base (12) and an intermediate portion (26) placed between the head (13) and the base (12); the base (12) being glued to the inner panel (5), preferably by means of a quick-curing adhesive.
6. The door as claimed in claim 5, wherein the intermediate portion (26) has a narrowing (27) shaped to allow each pin (11) to be snapped on/off to/from the respective cap (14).
7. The door as claimed in claim 5 or 6, wherein the inner panel (5) has an internal face (24) facing, in use, the oven (1), and an external face (25) facing, in use, the frame (6); each circular flat base (12) being glued to the external face (25) of the inner panel (5).
8. The door as claimed in any one of the foregoing claims, wherein each seat (10) has a substantially hemispherical cavity (28).
9. The door as claimed in any one of the foregoing claims, wherein each cap (14) is press-fitted into the frame (6).
10. The door as claimed in any one of the claims 2 to 9, wherein the first polymeric material is a silicone material and the second polymeric material is a plastic material preferably transparent.
11. The door as claimed in any one of the foregoing claims, wherein the frame (6) is shaped like a quadrangular frame; each cap (14) being arranged at the corners of the frame (6); each pin (11) being arranged near the perimeter edge of the inner panel (5).

12. The door as claimed in claim 11, wherein the frame (6) comprises two lateral supports (15) and two transverse elements (16, 17) rigidly connected to the lateral supports (15); at least two lateral portions (19) of the inner panel (5) being configured to rest on the respective lateral supports (15). 5
13. The door as claimed in any one of the foregoing claims, and comprising at least one further panel (20; 21) at least partially transparent and arranged between the outer panel (4) and the inner panel (5) and supported by the frame (6) at a distance from the inner panel (5) and the outer panel (4); in particular, each further panel (20; 21) being coupled to the frame (6) by means of respective further releasable snap lock coupling devices (9). 10 15
14. An oven; the oven (1) comprising the door (3) as claimed in any one of the foregoing claims and a heatable cavity (2) selectively closed by the door (3). 20

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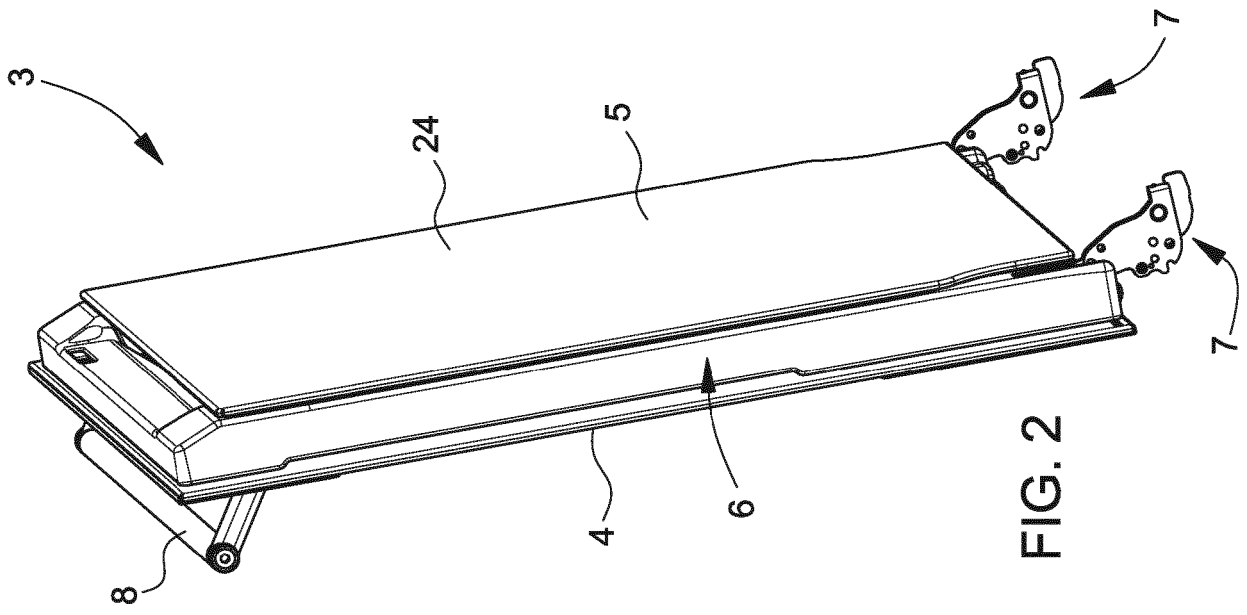


FIG. 2

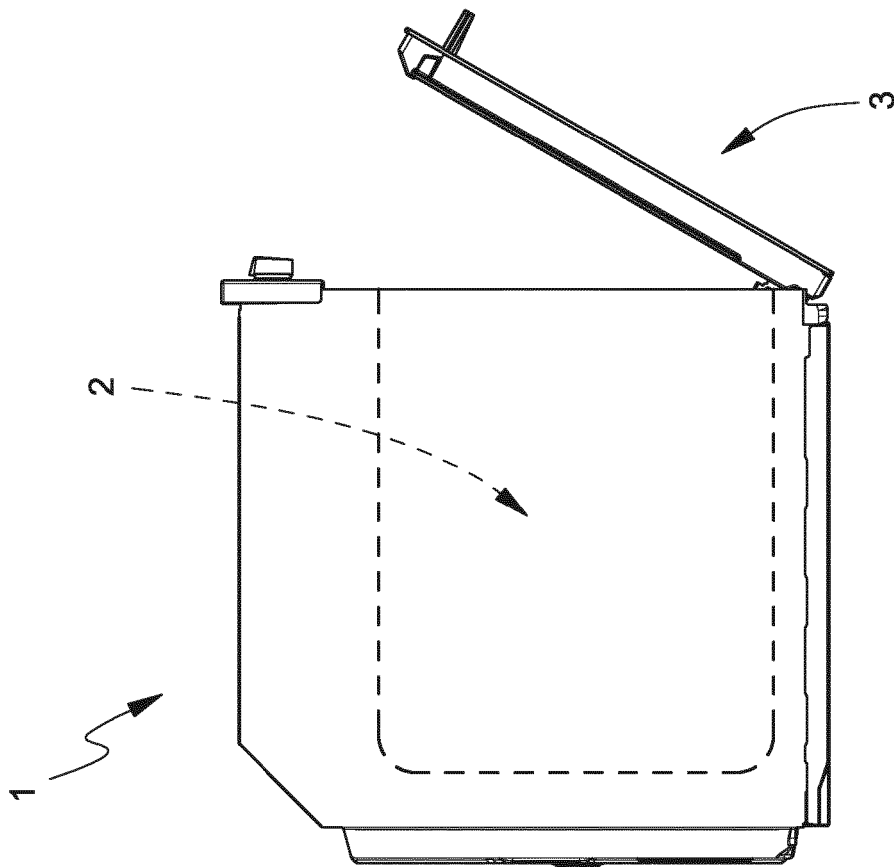
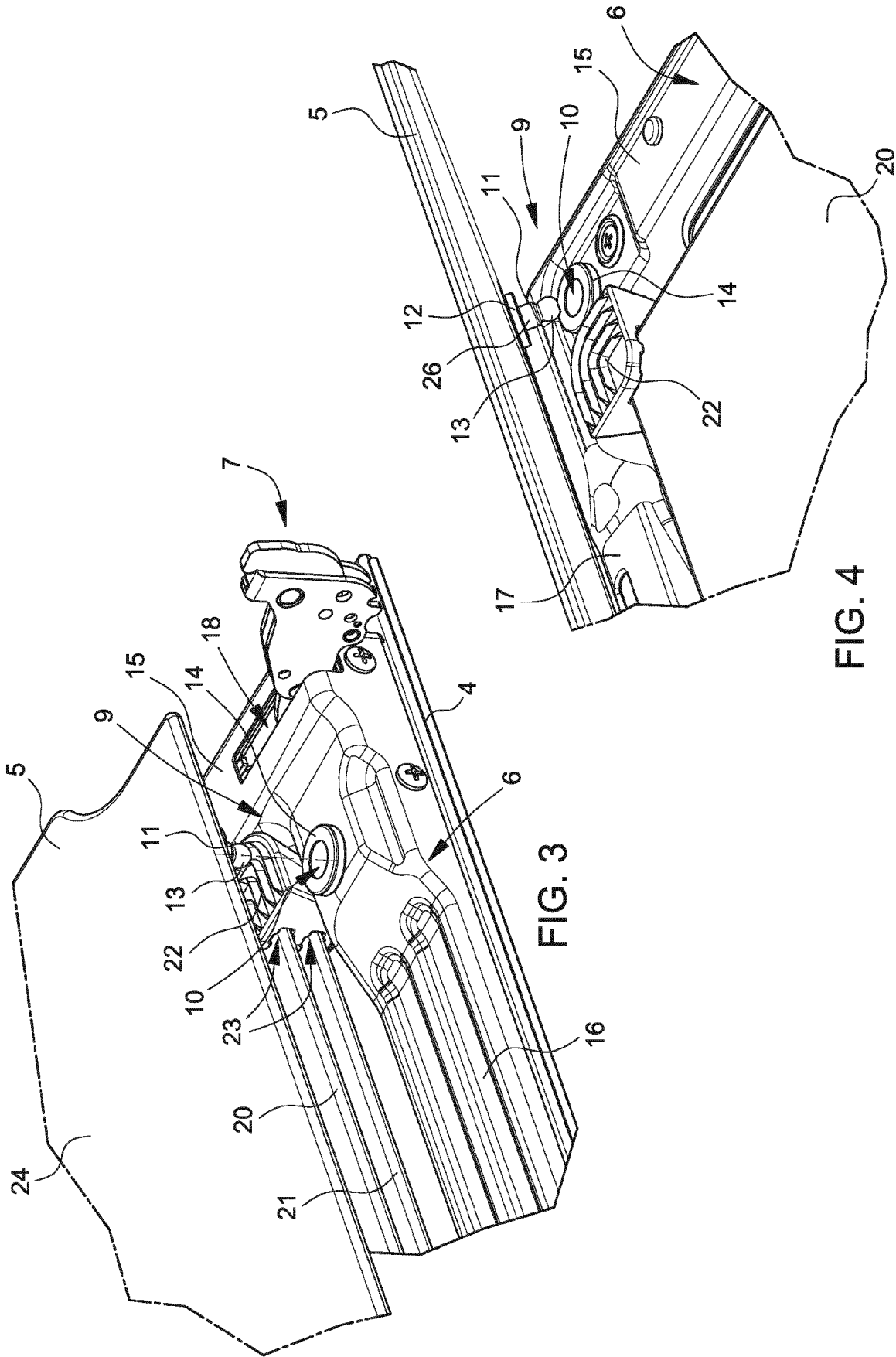


FIG. 1



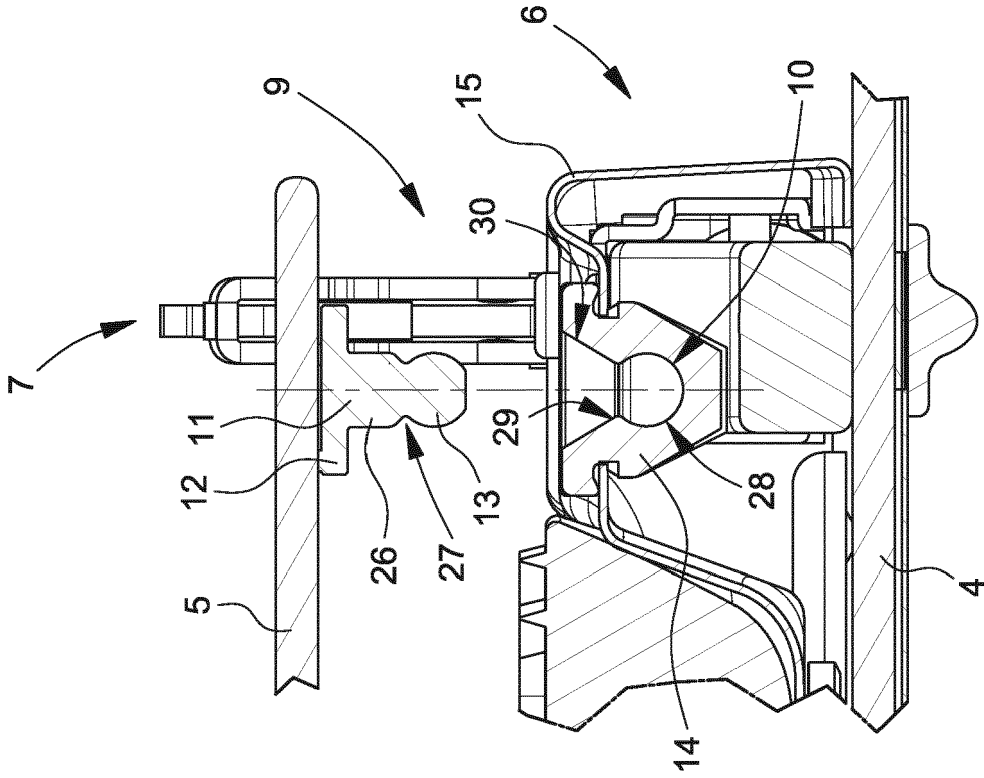


FIG. 6

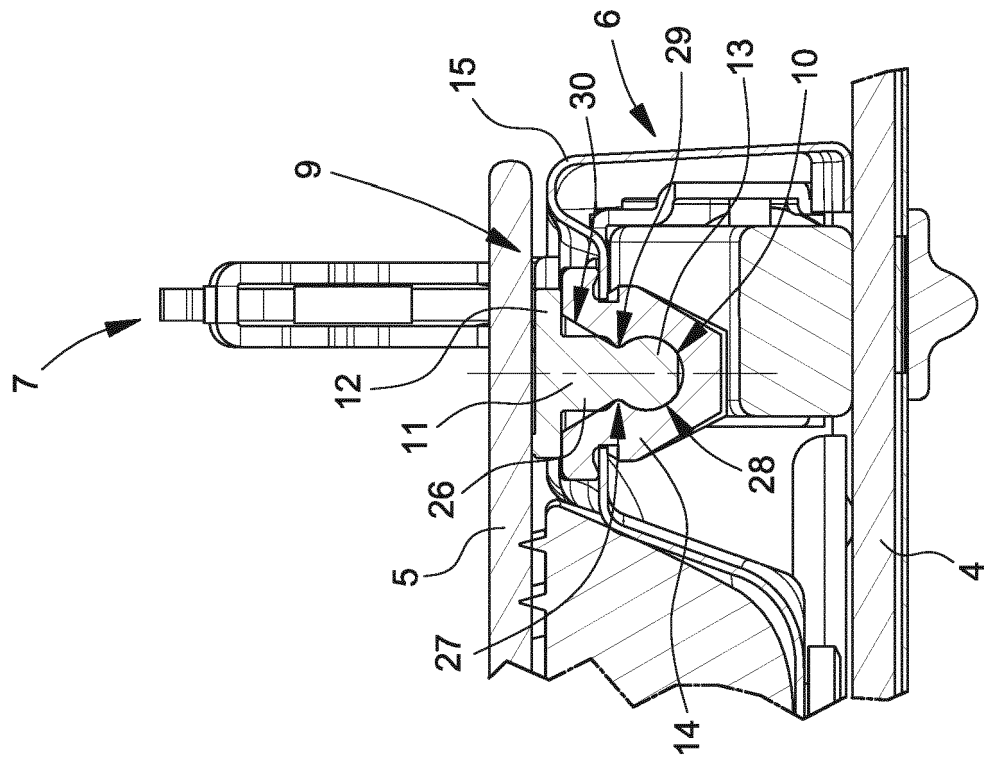
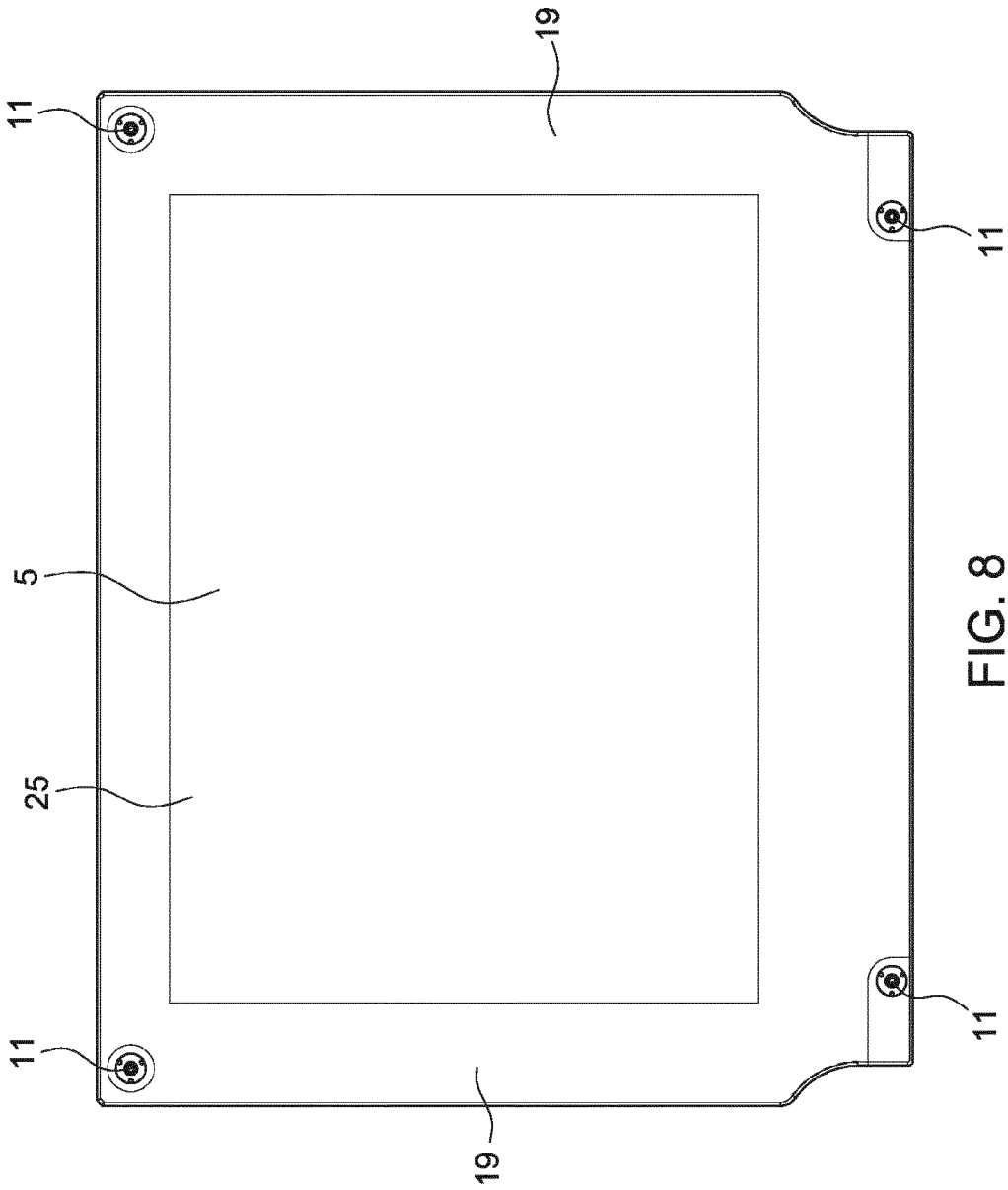
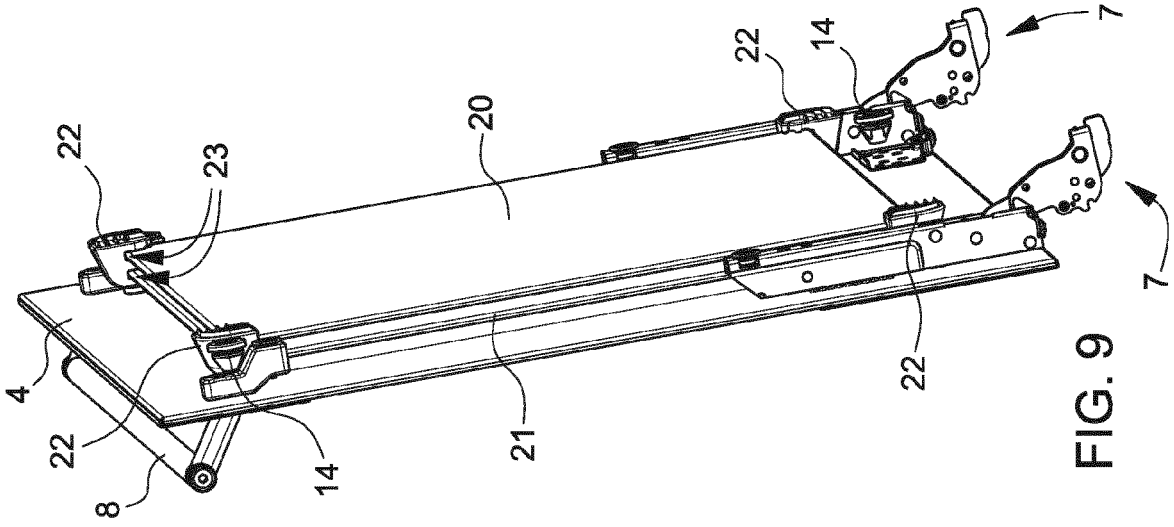


FIG. 5







EUROPEAN SEARCH REPORT

Application Number  
EP 21 20 0596

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2 The present search report has been drawn up for all claims

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Place of search <b>The Hague</b>	Date of completion of the search <b>25 January 2022</b>	Examiner <b>Fest, Gilles</b>
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EPO FORM 1503 03:82 (P04C01)

CATEGORY OF CITED DOCUMENTS  
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ANNEX TO THE EUROPEAN SEARCH REPORT  
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