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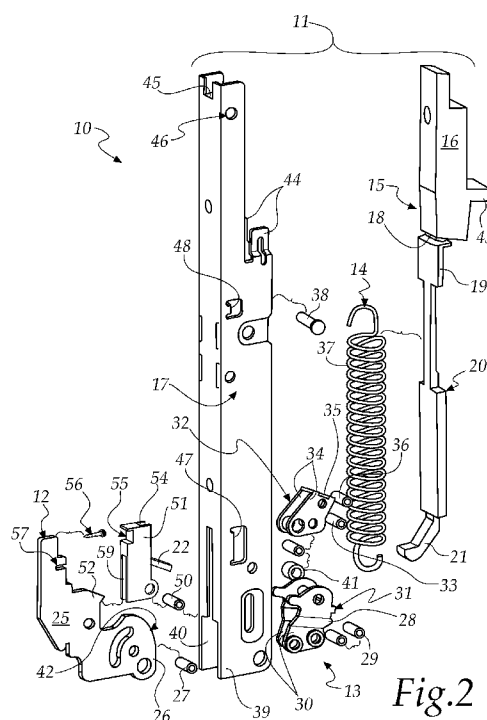


Fig.2

(57) Abstract: Hinge (10, 110) for doors of kitchen ovens, of the type comprising a first arm (11, 111) to be associated with a door for closing a chamber of an oven, and a second arm (12, 112), articulated to the first arm (11, 111), to be associated with the structure of the oven (53, 153), between the first arm (11, 111) and the second arm (12, 112) there being interposed a kinematic mechanism (13, 113) which is adapted to actuate elastic means (14, 114) for the facilitated closing of the door, between the first arm (11, 111) and the second arm (12, 112) there also being interposed means (15, 115) for slowing the closing movement of the door which act continuously between 40° and 0°, the hinge (10, 110) such as to render the second arm integral with the structure of the oven (53, 153).



HINGE FOR DOORS OF KITCHEN OVENS

The present invention relates to a hinge for doors of kitchen ovens.

Hinges for oven doors or doors of other similar apparatuses are generally constituted by a first arm, to be associated with the door for closing the chamber of the oven, and by a second arm, to be associated with
5 the structure of the oven, and articulated to the first arm.

Interposed between the first and the second arm is a kinematic mechanism designed to interact with elastic means for the facilitated closing and opening of the door, while at the same time ensuring the rotation of the
10 second arm with respect to the first arm with a controlled movement, thus ensuring positions of stable equilibrium for the door, both in the configuration of being closed on the chamber of the oven and in the configuration of being open, as well as in any intermediate positions.

Also known, and increasingly widespread, are hinges for kitchen
15 ovens which are provided with systems for slowing the closing stroke of the door, which are designed to prevent the sudden impact of the door against the body of the oven caused by the action of the elastic means for the facilitated closing of the door against the body of the oven.

Such systems for slowing the closing stroke of the door are however
20 not capable of preventing the bump of the tilting door against the structure of the oven and they cause a rebound of the door, with closing in two stages, when it is slammed by forceful closing pushes or if it is applied to doors that have considerable masses.

In fact the doors of ovens are increasingly often made with types of
25 glass that are capable of insulating the structure from the surrounding environment and preventing scalding in the event of contact. This results in the use of increasingly heavy materials with major effects on the extent of the closing bump and of the consequent rebound.

Finally, in the event of immediate release of the door, these known
30 systems for slowing are not capable of intervening effectively for small

opening angles of the door.

In the sector of production of hinges for ovens, one of the main problems is linked to the structural complexity of these hinges for slowing the travel of the door; this complexity inevitably has repercussions on the production costs, both in terms of components and in terms of assembly times.

The aim of the present invention is to provide a hinge for doors of kitchen ovens that is capable of overcoming the above mentioned drawbacks.

10 Within this aim an object of the invention is to provide a hinge for doors of kitchen ovens that is capable of preventing the closing bump between a tilting door and the structure of the oven and the subsequent rebound with an antibounce system.

Another object of the invention is to provide a hinge that is capable of slowing the closing of the door in the event of immediate release of the door, even for opening angles comprised between 0° and 10° .

Another object of the invention is to provide a hinge that is structurally simple and easy and cheap to assemble.

Another object of the invention is to provide a hinge that is easy to disassemble by virtue of a system that is agile and pleasant to look at.

Another object of the invention is to provide a hinge that can be easily installed even on existing ovens.

This aim and these and other objects which will become better apparent hereinafter are achieved by a hinge for doors of kitchen ovens according to claim 1, completed by the subsequent claims.

Further characteristics and advantages of the invention will become better apparent from the detailed description that follows of a preferred, but not exclusive, embodiment of the hinge according to the invention, which is illustrated for the purposes of non-limiting example in the accompanying drawings wherein:

- Figure 1 is a cross-sectional view of a hinge according to the invention, in a first embodiment thereof;

- Figure 2 is an exploded view of the hinge in Figure 1;

- Figure 3 is a detail of the hinge in Figure 1;

5 - Figure 4 is a partially cross-sectional overall view of a hinge according to the invention, in a second embodiment;

- Figure 5 is an exploded overall view of part of the hinge in Figure 4;

- Figure 6 is a detail of the hinge in Figure 4;

10 - Figures 7 and 8 show two different steps of the application of the hinge in Figure 4.

With reference to the above figures, a hinge for doors of kitchen ovens according to the invention, in a first embodiment, is generally designated with the reference numeral 10.

Such hinge 10 is of the type comprising a first arm 11 to be associated
15 with a door for closing a chamber of an oven, and a second arm 12, articulated to the first arm 11, to be associated with the structure of the oven 53.

Interposed between the first arm 11 and the second arm 12 is a kinematic mechanism 13 which is adapted to actuate elastic means 14 for
20 the facilitated closing of the door, between the first arm 11 and the second arm 12 there also being interposed means 15 for slowing the closing movement of the door.

A peculiarity of the invention consists in that the means 15 for slowing the closing movement of the door comprise a container of a fluid-
25 operated damper 16 which is affixed to a containment body 17, which is part of the first arm 11.

The fluid-operated damper 18 contained in the container 16 is actuated by a first contoured end 19 of a transmission element 20, which can be shifted with respect to the containment body 17.

30 The second contoured end 21 of the transmission element 20 is

designed to slide in contact with a pusher portion 22, with a predefined and fixed angle of inclination, of an integrated element 51, which is in turn connected to the second arm 12.

Such pusher portion 22 is adapted to correspond to the portion 52 of
5 the second arm 12.

The transmission element 20 and the pusher portion 22 are arranged on the respective first arm 11 and second arm 12 so that the second contoured end 21 of the transmission element 20 and the pusher portion 22 meet for a preset angle for slowing between the door and the facade of the
10 oven.

The antibounce system 58 is made up of:

- a screw 56 which makes the second arm 12 and a portion of the body of the oven 53 integral;
- a seat 55, inside the integrated element 51, designed to
15 accommodate the head of such screw;
- a seat 59 adapted to contain the corresponding portion of the arm 12;
- a seat-guide 54 for the guided and slowed sliding of the contoured end 21;
- two threaded holes: one 57 on the second arm 12 and one on the
20 portion of the body of the oven 53, which will later match up.

In the first embodiment described herein of the hinge 10 according to the invention, which is to be understood as a non-limiting example of the invention, the containment body 17 of the first arm 11 is provided by a profile which is predominantly longitudinally extended and is substantially
25 U-shaped in cross-section, with openings, holes and folds designed for the mounting of the kinematic mechanism 13, of the elastic means 14, and of the means for slowing 15; these should be understood as being of known type.

The second arm 12 is constituted by:

- 30 - a plate of sheet metal having a first portion 25 for coupling to the

body of an oven in which the hinge 10 is installed,

- a second portion 26 for hinging to the first arm 11, by way of a tubular pin 27 and corresponding first locking rivet, and for hinging for a first element 28 of the kinematic mechanism 13, by way of a second rivet
5 29,

- the portion 57 of the antibounce system, which makes it possible to couple the four components together.

The kinematic mechanism 13 comprises the second portion 26 of the second arm 12, which is pivoted as mentioned to the containment body 17,
10 the mentioned first element 28, which is composed of two opposing contoured plates 30 which are joined by a rear joining bridge 31 and are hinged to the second portion 26 with the second rivet 29 and to a second element 32 of the kinematic mechanism 13 with a third rivet 33.

The second element 32 is also defined between two opposing
15 contoured plates 34 which are joined by a bridge 35, and a fourth rivet 36 for coupling the elastic means 14 is fixed between such contoured plates 34.

The elastic means 14 takes the form, for example, of a helical traction spring 37 interposed between the fourth rivet 36, lower, and a fifth rivet 38, upper, which is fixed transversely to the side walls 39 and 40 of the
20 containment body 17.

The second element 32 also carries a roller 41 for sliding on a cam-like curved edge 42 defined on the second part 26 of the second arm 12.

The container of the fluid-operated damper 16 is fixed to the containment body 17 by simple interlocking, it being arranged with a rear
25 lower portion thereof 43 on two corresponding resting flaps 44 which are defined on the side walls 39 and 40 of the containment body 17, and locked in an upper region by an extraction-preventing abutment tab 45 which is provided centrally on the central wall of the containment body 17 and/or by a lateral stud 46.

30 The container of the fluid-operated damper 16 is therefore locked

without the use of rivets or other locking elements, but only by way of conveniently contoured portions of the containment body 17 itself.

The transmission element 20 is constituted by a flat bar which is arranged so as to slide between two pairs of symmetrical guide tabs, a first
5 pair of lower tabs 47 and a second pair of upper tabs 48, both of which are defined on the side walls 39 and 40 of the containment body 17.

The second contoured end 21 of the transmission element 20 is inclined with respect to the arrangement of the flat central part, so as to protrude from the space occupation of the containment body 17, available
10 for contact with the pusher portion 22.

The pusher portion 22 is constituted by a plate-shaped appendage.

The integrated element 51 is fixed to the second arm 12 by way of the rivet 50.

The second contoured end 21 of the transmission element 20
15 encounters the plate that defines the pusher portion 22 at an angle for slowing 24 between the door and the facade of the oven which is comprised between 40° and 0° and is preferably 10° .

The contact between the second end 21 and the pusher portion 22 continues until the door abuts against the body of the oven.

20 Such angle makes it possible to optimally dampen the impact of closing the door of the oven, designated with the reference numeral 52, against the body of that oven, a portion of which is shown schematically in the figures and is designated therein with the reference numeral 53.

Figure 1 shows the hinge 10 according to the invention in the
25 configuration in which the door 52 is closed on the body of the oven 53.

In the final step of closing the door of the oven, while the integrated element 51, as shown, dampens the impact, the antibounce system 58 prevents its "rebound effect", keeping the arm 12 and the body of the oven 53 mutually integral.

30 Figures 4 to 8 show a hinge for doors of kitchen ovens according to

the invention in a second embodiment and is designated with the reference numeral 110.

Such hinge 110 is of the type comprising a first arm 111 to be associated with a door for closing the chamber of an oven, not shown in the figures, and a second arm 112, articulated to the first arm 111, to be associated with the structure 153 of the oven.

Interposed between the first arm 111 and the second arm 112 is a kinematic mechanism 113 which is adapted to actuate elastic means 114 for the facilitated closing of the door.

Between such first arm 111 and such second arm 112 there are also interposed means 115 for slowing the closing movement of the door.

A peculiarity of the invention consists in that the means 115 for slowing the closing movement of the door comprise a container 116 of a fluid-operated damper 118 which is affixed to a containment body 117, which is part of the first arm 111, and the damper 118 contained therein.

The fluid-operated damper 118 contained in the container 116 is actuated by a transmission element 120, which is in a single piece with the body 116 for containing the damper, and can translate with respect to the containment body 117 of the first arm 111.

The transmission element 120 has a contoured end 121 which is designed to slide in contact with a pusher portion 122, with a predefined and fixed angle of inclination, of an integrated element 151, which is in turn connected to the second arm 112.

The integrated element 151 is made of plastic material.

The pusher portion 122 is integral with the integrated element 151 with a preferred angle of inclination with respect to a vertical in the configuration for use.

This pusher portion 122 is adapted to correspond to the portion 152 of the second arm 112.

The transmission element 120 and the pusher portion 122 are

arranged on the respective first arm 111 and second arm 112 so that the contoured end 121 of the transmission element 120 and the pusher portion 122 meet for a preset angle for slowing between the door and the facade of the oven.

5 One of the peculiarities of the invention consists of the method of associating the second arm 112 with the structure 153 of the oven.

The second arm 112 has an arc-shaped appendage 160.

The integrated element 151 has two mutually opposite and coaxial holes 161, oval in profile, each one on a corresponding side wall 162 of the
10 element 151.

Such holes 161 are adapted for the insertion of a translating pin 163.

This pin 163 has two widened ends which allow them sufficient play to translate within the holes 161, without exiting completely therefrom.

The pin 163 can slide by virtue of the profile of the holes 161.

15 The appendage 160 of the second arm 112 is adapted for the insertion of the pin 163, in order to generate an interference and clamp the second arm 112 to the structure 153 of the oven.

The integrated element 151 is fixed to the second arm 112 by way of the rivet 150.

20 The second arm 112 has an end 165, substantially parallel to the appendage 160, which is adapted to be inserted in a corresponding hole 166 of the structure 153 of the oven.

The second arm 112 also has a recess 164, on the opposite edge to that from which the integrated element 151 extends, which is adapted to
25 generate an interference with the structure 153 of the oven.

With reference to Figures 6 to 8, to install a hinge 110 on the structure 153 of an oven:

- the end 165 of the second arm 112 is introduced into the hole 166 of the structure 153 of the oven, by inserting the recess 164, of the second arm
30 112, into the lower edge of the hole 166, thus producing an interference

between the two,

- the integrated element 151 is rotated about the rivet 150 in order to put it into contact with the structure 153 of the oven, according to the direction of the arrow 167,

- 5 - the pin 163 is translated, according to the direction of the arrow 168, in order to produce an interference with the appendage 160 and obtain the affixing of the hinge 110 to the oven.

It should be noted that, with the presence of the translating pin 163 and of the arc-shaped appendage 160 on the second arm 112, the door can
10 be installed on and/or removed from the oven very quickly and without the need for tools.

With reference to all the figures, the hinge 110 comprises an antibounce system 158 which is made up of:

- the translating pin 163 of the integrated element 151 and the
15 appendage 160 of the second arm 112, which render the second arm 112 integral with a portion of the body of the oven 153;

- the two holes 161 of the element 151, which are adapted for the insertion of the translating pin 163;

- a seat 159, of the integrated element 151, which is adapted to
20 contain the corresponding portion of the arm 112;

- a seat-guide 154 for the guided and slowed sliding of the contoured end 121.

In the embodiment described herein of the hinge 110 according to the invention, which is to be understood as a non-limiting example of the
25 invention, the containment body 117 of the first arm 111 is provided by a profile which is predominantly longitudinally extended and is substantially U-shaped in cross-section, with openings, holes and folds designed for the mounting of the kinematic mechanism 113, of the elastic means 114, and of the means for slowing 115; these should be understood as being of known
30 type.

The second arm 112 comprises:

- a plate of sheet metal having a first portion 125 for coupling to the body of an oven in which the hinge 110 is installed,

- a second portion 126 for hinging to the first arm 111, by way of a tubular pin 127 and corresponding first locking rivet, and for hinging for a first element 128 of the kinematic mechanism 113, by way of a second rivet 129.

The kinematic mechanism 113 comprises:

- the second portion 126 of the second arm 112,
- the first element 128, which is composed of two opposing contoured plates 130 which are joined by a rear joining bridge 131 and are hinged to the second portion 126 with the second rivet 129 and to a second element 132 of the kinematic mechanism 113 with a third rivet 133.

The second element 132 is also defined between two opposing contoured plates 134 which are joined by a bridge 135, and a fourth rivet 136 for coupling the elastic means 114 is fixed between such contoured plates 134.

The elastic means 114 are constituted, for example, by a helical traction spring 137 interposed between the fourth rivet 136, lower, and a fifth rivet 138, upper, which is fixed transversely to the side walls 139 and 140 of the containment body 117.

The second element 132 also carries a roller 141 for sliding on a cam-like curved edge 142 defined on the second part 126 of the second arm 112.

The container 116 of the fluid-operated damper 118 is fixed to the containment body 117 by simple interlocking, it being inserted with a rear portion thereof 143 in contact with two corresponding resting flaps 144 which are defined on the side walls 139 and 140 of the containment body 117, and locked in an upper region by an extraction-preventing abutment rivet 169, in contact with the damper 118. Such extraction-preventing rivet 169 passes through two corresponding through holes 170 each of which is

provided on one of the side walls 139 and 140 of the containment body 117.

The abutment rivet 169 also acts as a stroke-limit for the fluid-operated damper 118.

The transmission element 120 is constituted by a flat bar, which is in a single piece with the container 116 of the fluid-operated damper 118, and which is arranged so as to slide between two pairs of symmetrical guide tabs, a first pair of lower tabs 147 and a second pair of upper tabs 148, both of which are defined on the side walls 139 and 140 of the containment body 117.

10 The contoured end 121 of the transmission element 120 is inclined with respect to the arrangement of the flat central part, so as to protrude from the space occupation of the containment body 117, available for contact with the pusher portion 122.

The pusher portion 122 is flat and inclined with respect to the direction of extension of the side walls 162 of the integrated element 151.

The second contoured end 121 of the transmission element 120 encounters the pusher portion 122 at an angle for slowing between the door and the facade of the oven which is comprised between 40° and 0° and is preferably 10° .

20 The contact between the second end 121 and the pusher portion 122 continues until the door abuts against the body of the oven.

Such angle makes it possible to optimally dampen the impact of closing the door of the oven, not shown in the figures, against the body of that oven, a portion of which is shown schematically in the figures and is designated therein with the reference numeral 153.

Figure 4 shows the hinge 110 according to the invention in the configuration in which the door is closed on the body of the oven 153.

In the final step of closing the door of the oven, while the integrated element 151, as shown, dampens the impact, the antibounce system 158 prevents its "rebound effect", keeping the arm 112 and the body of the oven

153 mutually integral.

In practice it has been found that the invention fully achieves the intended aim and objects.

In particular, with the invention a hinge has been provided which, by virtue of the peculiar means for slowing the closing movement of the door, makes it possible for the door to approach the body of the oven without the “rebound effect” and without any audible sound being emitted, differently to what occurs with conventional hinges, in which the closing movement concludes with a clearly audible impact.

In particular, with the invention a hinge has been provided that is structurally simple and easy and cheap to assemble, by virtue of the limited number of components and mounting elements, which are almost exclusively rivets; in particular the fluid-operated damper is associated with the containment body of the first arm without using rivets or other affixing elements.

The positioning in the door makes the hinge according to the invention simpler to disassemble if needed than conventional hinges mounted in the body of the oven.

The hinge according to the invention can be easily installed even on existing ovens.

The invention, thus conceived, is susceptible of numerous modifications and variations, all of which are within the scope of the appended claims. Moreover, all the details may be substituted by other, technically equivalent elements.

In practice the components employed, and the contingent dimensions and shapes, may be any according to requirements and to the state of the art.

The disclosures in Italian Patent Applications No. 102017000083115 and No. 102018000006985 from which this application claims priority are incorporated herein by reference.

Where technical features mentioned in any claim are followed by

reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

CLAIMS

1. A hinge (10, 110) for doors of kitchen ovens, of the type comprising a first arm (11, 111) to be associated with a door for closing a chamber of an oven, and a second arm (12, 112), articulated to the first arm (11, 111), to be associated with the structure (153) of the oven, between the first arm (11, 111) and the second arm (12, 112) there being interposed a kinematic mechanism (13, 113) which is adapted to actuate elastic means (14, 114) for the facilitated closing of the door, between said first arm (11, 111) and said second arm (12, 112) there also being interposed means (15, 115) for slowing the closing movement of said door, said hinge (10, 110) being characterized in that it comprises an antibounce system (58, 158), being integral with said second arm (12, 112) and interposed between said first arm (11, 111) and said second arm (12, 112).

2. The hinge (10, 110) according to claim 1, characterized in that said means (15, 115) for slowing the closing movement of the door comprise a container (16, 116) of a fluid-operated damper (18, 118) which is fixed to a containment body (17, 117) which is part of said first arm (11, 111), the fluid-operated damper (18, 118) contained in said container (16, 116) being actuated by a first contoured end (19, 119) of a transmission element (20, 120), which can translate with respect to said containment body (17, 117), the second contoured end (21, 121) of said transmission element (20, 120) being designed to slide in contact with a pusher portion (22, 122) which is associated with an integrated element (51, 151) with a predefined and fixed angle of inclination, said transmission element (20, 120) and said pusher portion (22, 122) being arranged on the respective first arm (11, 111) and second arm (12, 112) so that said second contoured end (21, 121) of said transmission element (20, 120) and said pusher portion (22, 122) meet for a preset angle for slowing between the door and the facade of the oven.

3. The hinge (10, 110) according to claim 1, characterized in that said containment body (17, 117) of the first arm (11, 111) is provided by a profile

which is predominantly longitudinally extended and is substantially U-shaped in cross-section, with openings, holes and folds designed for the mounting of the kinematic mechanism (13, 113), of the elastic means (14, 114), and of the means for slowing (15, 115).

5 4. The hinge (10, 110) according to one or more of the preceding claims, characterized in that said elastic means (14, 114) are constituted by a helical traction spring (37, 137), which is interposed between a lower rivet (36, 136), which is moved by said kinematic mechanism (13, 113), and an upper rivet (38, 138), which is fixed transversely to the side walls (39, 40,
10 139, 140) of the containment body (17, 117).

 5. The hinge (10) according to one or more of the preceding claims, characterized in that said container of the fluid-operated damper (16) is fixed to the containment body (17) by simple interlocking, it being arranged with a rear lower portion thereof (43) on two corresponding resting flaps
15 (44) which are defined on the side walls (39, 40) of the containment body (17), and locked in an upper region by an extraction-preventing abutment tab (45) which is provided centrally on the central wall of said containment body (17).

 6. The hinge (10) according to claim 5, characterized in that said
20 container of the fluid-operated damper (16) is affixed to the containment body (17), being locked in an upper region by a stud (46).

 7. The hinge (10, 110) according to one or more of the preceding claims, characterized in that said transmission element (20, 120) is constituted by a flat bar which is arranged so as to slide between two pairs
25 of symmetrical guide tabs, a first pair of lower tabs (47, 147) and a second pair of upper tabs (48, 148), both of which are defined on the side walls (39, 40, 139, 140) of the containment body (17, 117).

 8. The hinge (10, 110) according to one or more of the preceding claims, characterized in that said second contoured end (21, 121) of the
30 transmission element (20, 120) is inclined with respect to the arrangement

of the flat central part, so as to protrude from the space occupation of the containment body (17, 117), available for contact with the pusher portion (22, 122).

9. The hinge (10, 110) according to one or more of the preceding
5 claims, characterized in that said pusher portion (22, 122) is integral with the integrated element (51, 151) with a preferred angle of inclination with respect to a vertical in the configuration for use.

10. The hinge (10, 110) according to one or more of the preceding claims, characterized in that said second contoured end (21, 121) of said
10 transmission element (20, 120) and said pusher portion (22, 122) are arranged so that said second contoured end (21, 121) of said transmission element (20, 120) encounters the pusher portion (22, 122) at an angle for slowing (24) between the door and the facade of the oven which is comprised between 40° and 0° and is preferably 10°.

15 11. The hinge (10, 110) according to one or more of the preceding claims, characterized in that said integrated element (51, 151) is affixed to said second arm (12, 112) by way of a rivet (50, 150).

12. The hinge (10, 110) according to one or more of the preceding claims, characterized in that said integrated element (51, 151) is provided
20 with a seat (54, 154) which is adapted for the guided and slowed sliding of said contoured end (21, 121).

13. The hinge (10) according to one or more of the preceding claims, characterized in that said integrated element (51) has a shape that is adapted to render the element (56) invisible.

25 14. The hinge (10) according to one or more of the preceding claims, characterized in that said integrated element (51) has a shape that is adapted to lock the hinge in the open position during operations to assemble and disassemble the door.

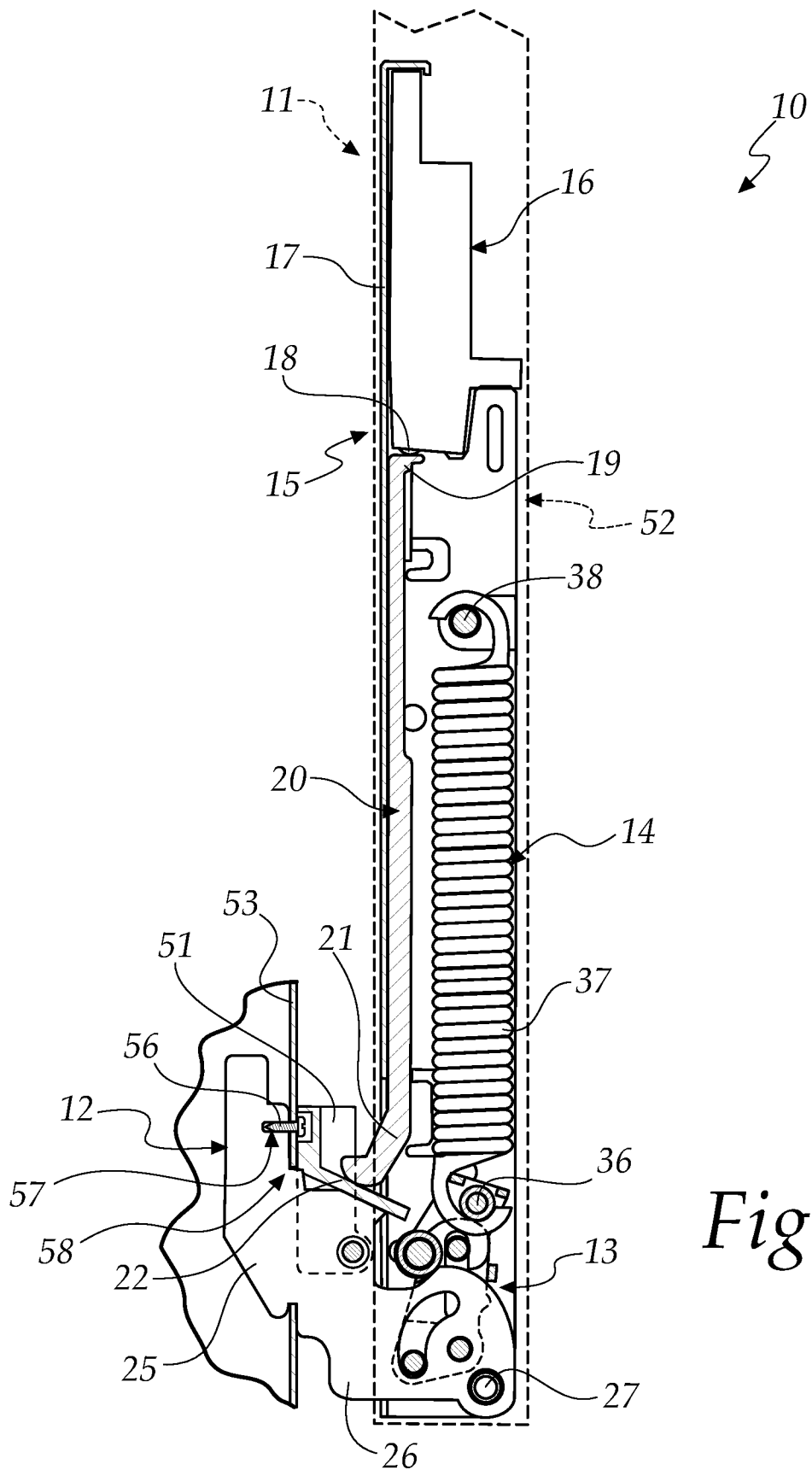
15. The hinge (110) according to one or more of the preceding claims,
30 characterized in that said second arm (112) is provided with a curved

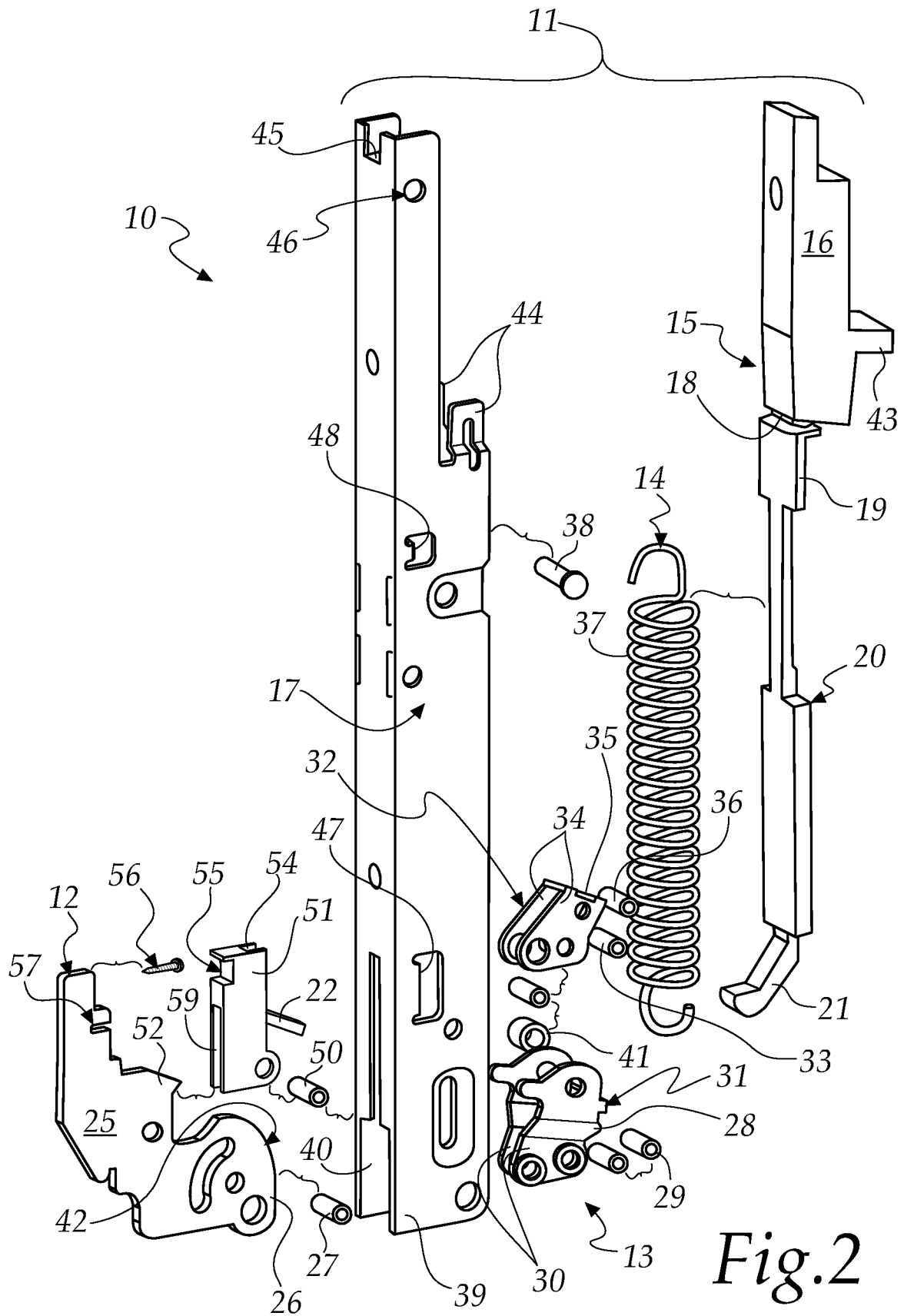
appendage (160), said integrated element (151), connected to said second arm (112), having two corresponding through holes (161), said holes (161) being adapted for the insertion of a translating pin (163), said appendage (160) of said second arm (112) being adapted for the insertion of said
5 translating pin (163), for the generation of an interference between said second arm (112) and said structure (153) of the oven.

16. The hinge (110) according to one or more of the preceding claims, characterized in that said antibounce system (158) comprises:

- said translating pin (163) of said integrated element (151),
- 10 - said appendage (160) of said second arm (112),
- said two holes (161) of said element (151), which are adapted for the sliding of said translating pin (163),
- a seat (159) of said integrated element (151), said seat (159) being adapted to contain a corresponding portion of said second arm (12),
- 15 - a seat-guide (154), for the guided and slowed sliding of said contoured end (121), said seat-guide (154) being present in said integrated element (151).

17. The hinge (110) according to one or more of the preceding claims, characterized in that said container (116) of said fluid-operated damper
20 (118) is fixed to said containment body (117) by simple interlocking, it being inserted with a rear portion thereof (143) in contact with two corresponding resting flaps (144) which are defined on the side walls (139, 140) of said containment body (117), and locked in an upper region by an extraction-preventing abutment rivet (169), in contact with said damper
25 (118), said extraction-preventing rivet (169) passing through two corresponding through holes (170) each of which is provided on one of said side walls (139, 140) of said containment body (117).





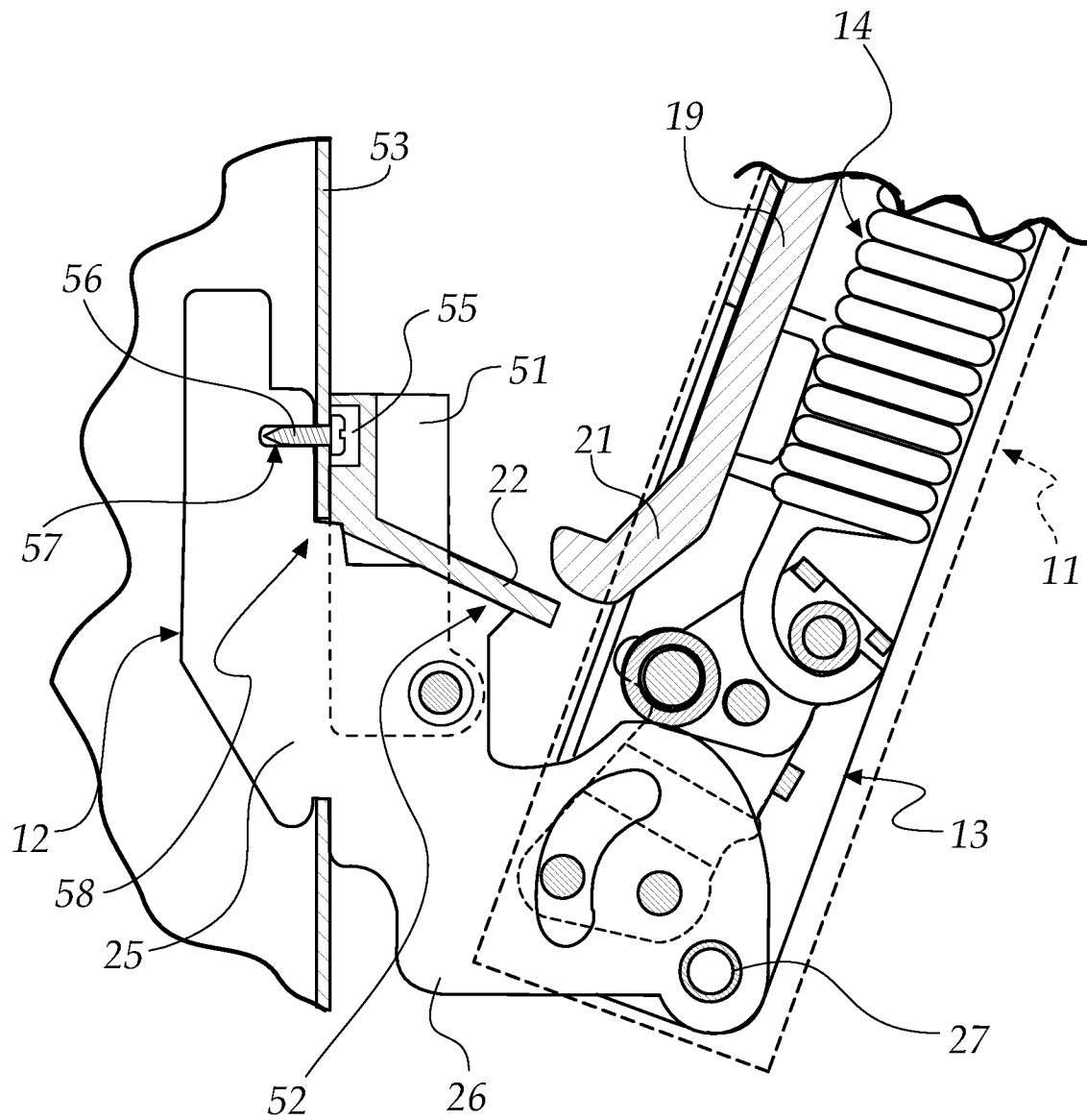
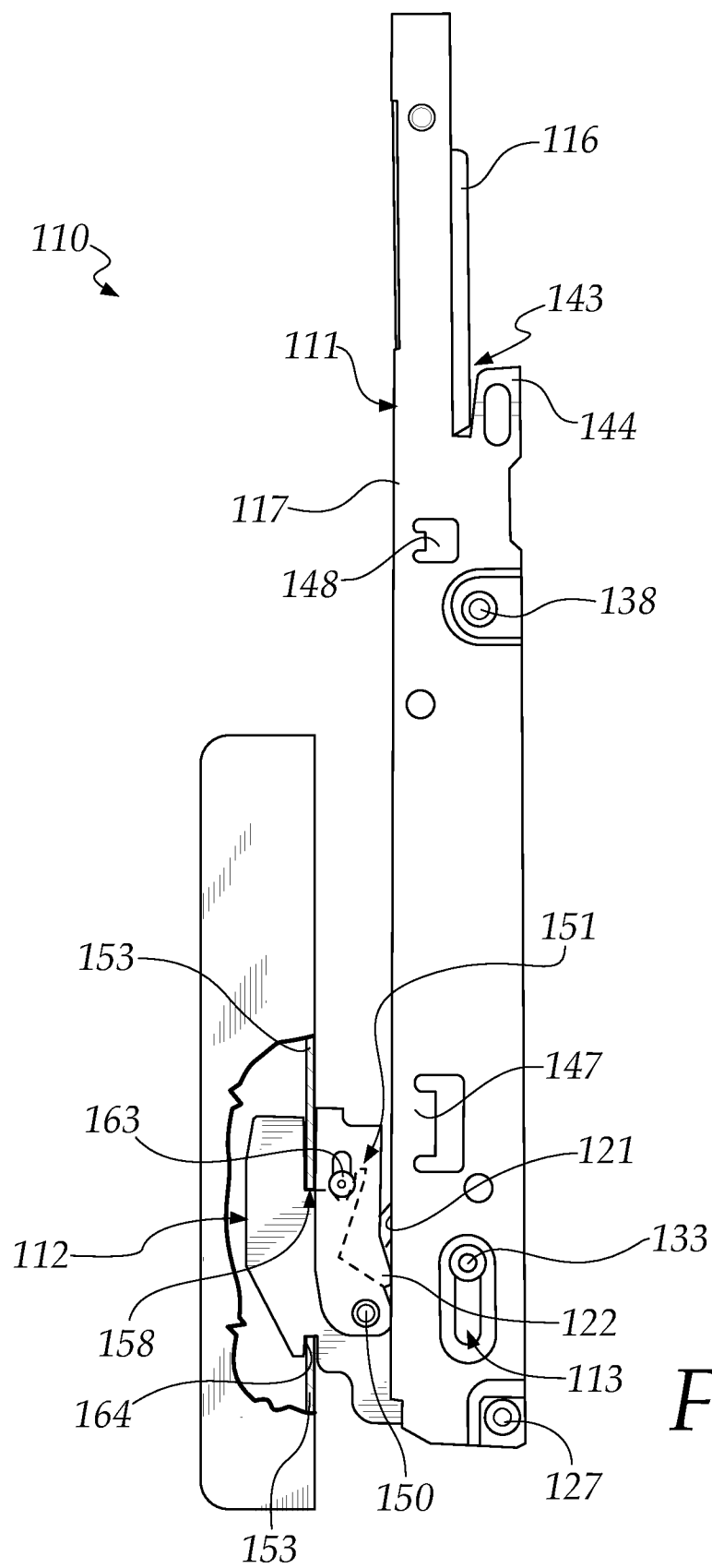
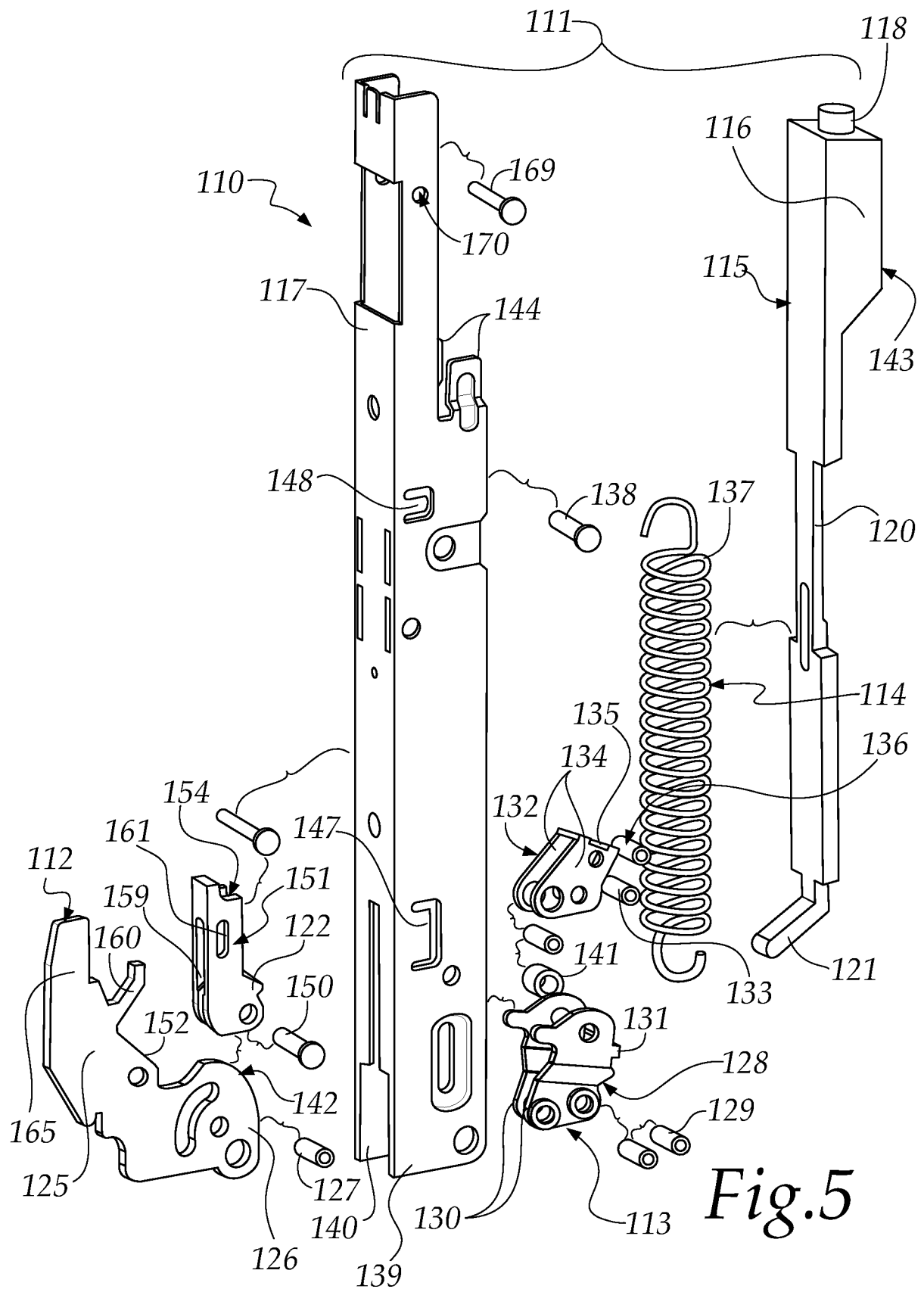


Fig.3

*Fig. 4*



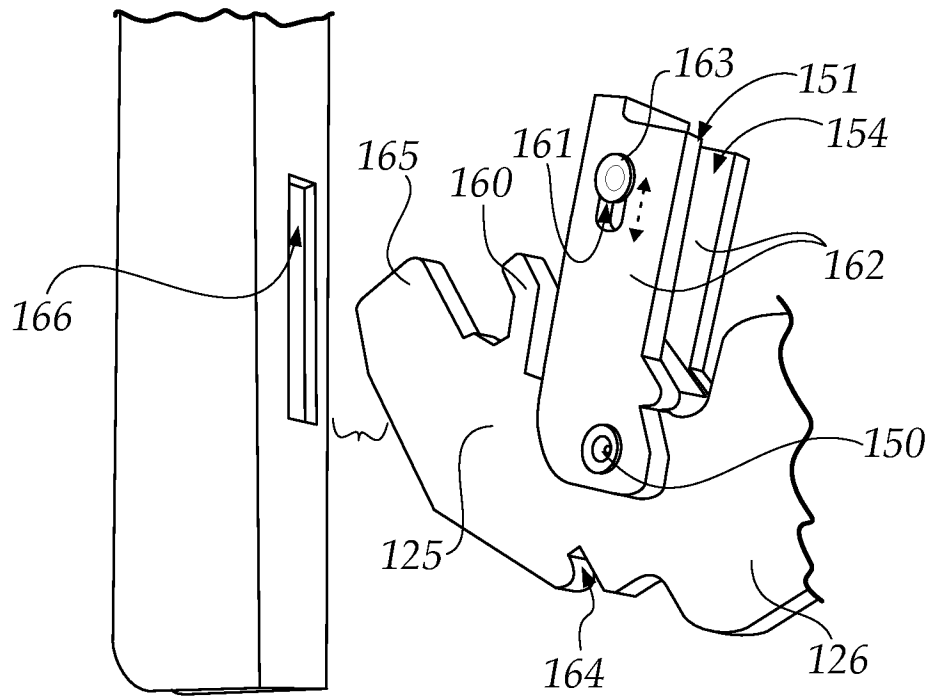


Fig. 6

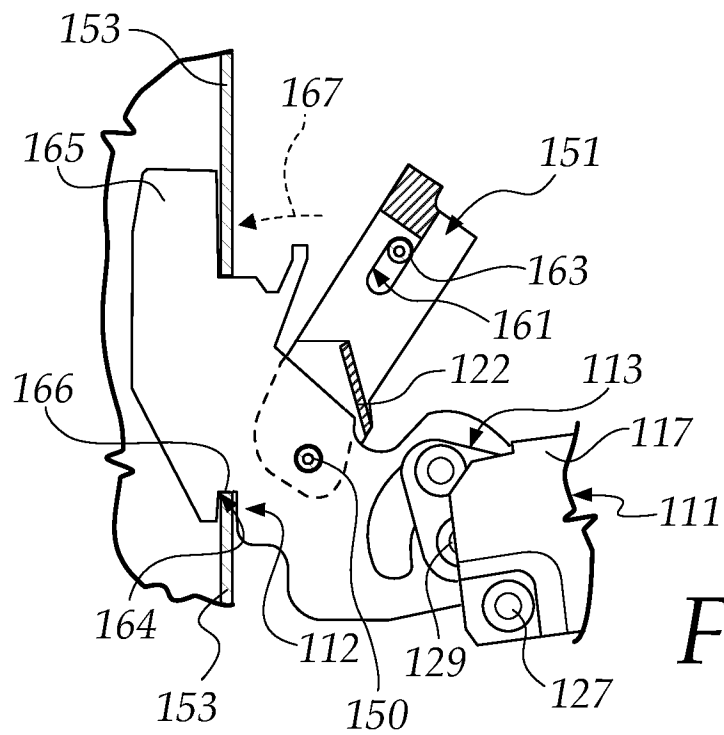
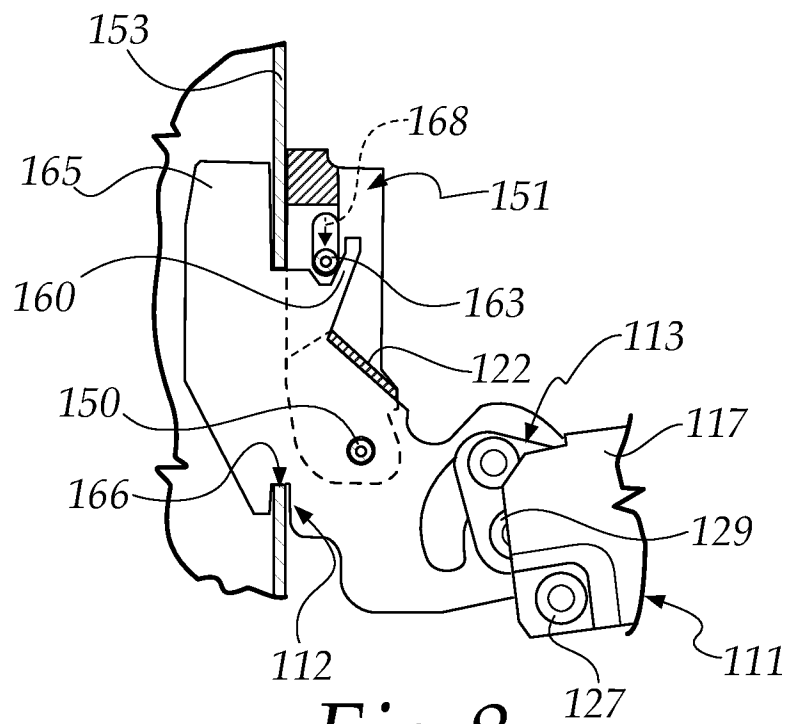


Fig. 7

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*Fig. 8*

INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2018/069497

A. CLASSIFICATION OF SUBJECT MATTER

INV. E05F1/12 E05F5/02 E05F5/10 E05D7/12
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)

E05F E05D

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2015/086470 A1 (ZANOVELLO SRL [IT]) 18 June 2015 (2015-06-18)	1-14,17
Y	claims 1-10; figures 1-6 -----	15,16
X	EP 1 847 670 A2 (NUOVA STAR SPA [IT]) 24 October 2007 (2007-10-24)	1-3, 5-13,17
	claims 1-8; figures 1-4 -----	
Y	EP 2 952 664 A1 (TURNA D O O [SI]) 9 December 2015 (2015-12-09)	15,16
	claim 1; figures 1-7 -----	



Further documents are listed in the continuation of Box C.



See patent family annex.

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Date of the actual completion of the international search

14 September 2018

Date of mailing of the international search report

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2018/069497

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