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

(11) **EP 3 850 178 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
**23.11.2022 Bulletin 2022/47**

(21) Application number: **19766027.7**

(22) Date of filing: **12.09.2019**

(51) International Patent Classification (IPC):
***E05D 7/081*** *(2006.01)* ***E05F 1/12*** *(2006.01)*
***E05F 3/10*** *(2006.01)* ***E05F 5/10*** *(2006.01)*

(52) Cooperative Patent Classification (CPC):
**E05F 5/10; E05D 7/081; E05F 1/1269; E05F 3/104;**
E05Y 2201/626; E05Y 2201/638; E05Y 2900/30

(86) International application number:
**PCT/EP2019/074402**

(87) International publication number:
**WO 2020/053352 (19.03.2020 Gazette 2020/12)**

# (54) HINGED DEVICE FOR APPLIANCES AND FURNISHINGS WITH END SPEED DAMPING

SCHWENKBARE VORRICHTUNG FÜR GERÄTE UND MÖBEL MIT ENDGESCHWINDIGKEITSDÄMPFUNG

DISPOSITIF ARTICULÉ POUR APPAREILS ET MEUBLES AVEC AMORTISSEMENT DE LA VITESSE DE FIN DE COURSE

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

(30) Priority: **14.09.2018 IT 201800008630**

(43) Date of publication of application:
**21.07.2021 Bulletin 2021/29**

(73) Proprietor: **C.M.I. Cerniere Meccaniche Industriali S.r.L.**
**40053 Valsamoggia (BO) (IT)**

(72) Inventor: **TERENZI, Emanuele**
**02100 Rieti (IT)**

(74) Representative: **Negrini, Elena**
**Agazzani & Associati S.r.l.**
**Via dell'Angelo Custode 11/6**
**40141 Bologna (IT)**

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## Description

### TECHNICAL FIELD

**[0001]** The present invention relates to the technical field concerning hinges and refers to a hinge device with damping of the closing or opening end speed and optionally having pre-fixed angular sectors of elastic opening and/or closure, for equipment, such for example household appliances, and for doors, windows and furnishings, with hatches, doors, flaps or swinging doors around vertical or horizontal hinge axis, capable of imparting to these hatches prefixed speed damping forces and elastic closing and/or opening forces, particularly, but not exclusively suitable for refrigerators.

**[0002]** In the following the equipment and furnishings can be indicated as a whole with the term equipment only.

### PRIOR ART

**[0003]** The known hinges for doors of vertical refrigerators are usually each constituted by a bracket fixed to the frame or body of the refrigerator and having a vertical axis hole for a vertical hinge pin that engages in a respective cylindrical seat with vertical axis fixed to the door or refrigerator door.

**[0004]** A disadvantage of these known hinges consists in the fact that they do not contribute in any way to the closure of the door that, for example, can remain ajar with negative consequences.

**[0005]** Another disadvantage of these known hinges consists in the fact that they do not brake or in any way dampen the closing and opening rotation of the door causing, mainly in the second case, risks of damaging the door, of objects adjacent to or supported by the door.

**[0006]** Prior art documents EP 1 764 557 A2, DE 20 2006 010482 U1, DE 10 2009 022737 A1, WO 2006/111236 A1 and WO 2011 /045148 A1 disclose a hinge for appliances and furnishings with end speed damping for closing or opening.

### DISCLOSURE OF THE INVENTION

**[0007]** An object of the present invention is to propose a hinge device for refrigerators and furniture with a vertical hinge axis that, at the same time, is very compact so that it can also be installed in current refrigerators, appliances and furnishings and able to dampen the speed of the end closing stroke of the door.

**[0008]** Another object is to propose a configurable hinge device for damping the end opening speed of the door.

**[0009]** A further object is to provide a device fit for applying to the door a resilient force for closing and/or opening or metastable positioning in angular sectors or in predeterminable angular positions.

**[0010]** Another object is to propose a device capable of braking the door homogeneously or according to the door angle.

**[0011]** A further object is to propose a device capable of braking the angular speed of the door.

**[0012]** Another object is to propose a device that can be installed in equipment and furnishings with one or more doors or doors with vertical rotation axis, such as refrigerators and some vertical furnishings, or horizontal, such as ovens, cockpit fridges and furniture with flap doors.

**[0013]** The present invention comprises parts and elements which simultaneously carry out several operative functions, contributing synergistically to the reduction of overall dimensions and costs.

### BRIEF DESCRIPTION OF THE DRAWINGS

**[0014]** The characteristics of the invention are highlighted below with particular reference to the accompanying drawings in which:

- Figure 1 shows an axonometric view of two examples of the hinge device for equipment and furniture with damping of the closing speed, object of the present invention, associated with the upper portions of two doors of a refrigerator appliance;
- Figure 2 shows an enlarged view of a detail of Figure 1 in which one of the two devices is shown;
- Figure 3 shows an axonometric view, from a different point of view, of the device of Figure 2 in which some details have been removed to better highlight others;
- Figure 4 shows an axonometric and exploded view of the device of Figure 2;
- Figures 5-7 show top orthogonal views of the device of Figure 2 associated with a portion of door, under end closure conditions, or in the absence of door seal gaskets, of intermediate opening or at about 45° and completely open or about 135°;
- Figures 8-11 show top orthogonal views of the device of Figure 2 associated with a door portion and in which some details have been removed to better highlight others, of end closure, of initial opening or of about 10°, of greater opening or of about 30° and completely open or of about 135°;
- Figures 12 and 13 show enlarged and sectioned details of details of Figures 8 and 9 respectively;
- Figures 14-17 show axonometric views of the device of Figure 2 associated with a portion of a door and in which some details have been removed to better highlight others in the same or similar conditions of Figures 8-11.

### BEST FORM TO CARRY OUT THE INVENTION

**[0015]** With reference to Figures 1-17, numeral 1 indicates the hinge device for equipment and furnishings with damping of the closing speed and with pre-fixed angular sectors for elastic opening and/or closing for refrigerators, for other household appliances and in general for

equipment and furnishings, with one or more flaps or doors A, for example with a vertical or horizontal rotation axis, object of the present invention (and for the sake of brevity, also referred to as a hinge device or simply a device); the term refrigerator will be used to indicate generally also other household appliances, apparatus and furnishings such as electric, gas and microwave ovens, dishwashers, kitchen cupboards, fixtures, furniture and the like.

**[0016]** The hinge device 1 comprises, in an operating condition of assembly to the refrigerator or apparatus, a first element 3, consisting of a metal frame, for example in the form of a box or shaped plate, fixed to a body F of the apparatus and a second element 5 fixed to a door D of said apparatus or formed in this door D where these elements first 3 and second 5 are mutually connected by a hinge pivot 7 for the rotation of the door around the longitudinal geometric axis of said hinge pivot 7 between opening A and closing C conditions.

**[0017]** The second element 5 consists of a small metal plate fixed to the upper, lower or lateral edge of the respective door D for example by means of the hinge pivot 7 and/or a second rotation pin 19, better identified in the following, fixed or screwed to the door D; alternatively or additionally, this small metal plate can be fixed to the door by glue or resin. Alternatively, the second element 5 can be integrated or incorporated into the door D or wing.

**[0018]** Said device 1 comprises a crank means 11 of approximately disk-shaped form and connected to the frame of the first element 3 by one of its 11 first rotation pin 13 almost central to the crank means 11 itself. The first rotation pin 13 is parallel to the hinge pivot 7 and is perpendicular to the geometric plane of the crank means 11.

**[0019]** The crank means 11 can be, for example, made of bent and sheared sheet metal.

**[0020]** The device 1 also comprises a connecting rod means 17, for example, made of bent and sheared sheet and having an approximately "S" shaped form, having an end rotatably connected to the second element 5 through said second rotation pin 19 which is parallel and spaced apart from the hinge pivot 7.

**[0021]** This connecting rod means 17 is also rotatably connected to the crank means 11 by means of a third rotation pin 21 parallel and distanced from the first rotation pin 13.

**[0022]** The figures illustrate the device configured to dampen the speed of the terminal rotation section for closing the door or leaf and the third rotation pin 21 is located, with respect to the first rotation pin 13, on the same side as the hinge pivot 7.

**[0023]** The portion of the connecting rod means 17 carrying the third rotation pin 21 has an arm means 27, for example consisting in an elongation or protrusion of the connecting rod means 17 itself, protruding with respect to the third rotation pin 21 in the opposite direction to the second rotation pin 19 or at least approximately parallel to the longitudinal development of the connecting rod means 17. For example, the arm means 27 can be approximately aligned with the geometric line connecting the second rotation pin 19 to the third rotation pin 21.

**[0024]** The arm means 27 is assigned to move in one of its closing directions at the end portion of the closing rotation of the door D. For example, such an arm means 27 closure direction may be approximately tangent to the crank means 11 and/or parallel to the door or flap D closed and/or almost closed.

**[0025]** The device 1 comprises a damper means 31 of the linear type housed in a respective housing means 33, and is opposed to the second rotation pin 19 with respect to the first rotation pin 13 and is approximately oriented parallel to said closure direction of the arm means 27 which, during said movement, abuts with a mobile member 37 of the damper means 31, damping the translation of the connecting rod means 17 and the rotation of the end portion for closing the door.

**[0026]** In particular, the arm means 27 can be oriented so that, during the end portion of the closing rotation of the door D, its 27 longitudinal extension is approximately perpendicular to the direction of its own closing movement or to the longitudinal axis of the damper means 31 or this extension is slightly inclined towards the damper means 31 and during this rotation portion, the movement of the arm means 27 has a component in accordance with the compression direction of the damper means 31.

**[0027]** The housing means 33 has a hollow housing 57 for the damper means 31 which can be partially closed by a closure means 51 which prevents the damper means 31 from coming out of the hollow housing 57 and which is provided with a window for the free passage of the arm means 27.

**[0028]** The linear damper means 31 can be, for example, of the type having an internally provided body with a chamber having a fluid and in which a piston equipped with a stem projecting externally from the body and where an elastic means pushes the stem outwards the chamber and the fluid acts with viscous friction onto the piston; the mobile member 37 of the damper means 31 can consist, for example, in the external head of the stem or, as shown in the figures, in the body of the damper means.

**[0029]** Alternatively and to dampen the end portion of the door-opening rotation, the invention provides, for example, that the third rotation pin 21 is connected to the half of the crank means 11 opposite to the hinge pivot 7 with respect to the first rotation pin 13, that the damper means 31 is on the same side as the hinge pivot 7 with respect to the first rotation pin 13 and that the arm means 27 is bent to meet with the movable part of the damper means 31 to dampen the end portion of the end opening rotation of the door where such opening and closing damping functions can also be implemented with other equivalent arrangements of the device elements.

**[0030]** The device 1 comprises a resilient means 15, for example consisting of a helical spring operating in elongation, connected to the first element 3 and acting

on the crank means 11 to transmit to the latter a respective elastic force acting in closing and/or in openings of the door D. The resilient means 15 can act directly onto the crank means 11, for example through a connection pin, but preferably and to modulate the action of the elastic force on the door, the resilient means 15 acts on the crank means 11 by means of the connection of one of its 15 ends, opposite to that connected to the first element 3, at one end of a rocker arm 45 centrally connected to the first element 3 by means of a respective fulcrum pin 47 parallel to the hinge pivot 7 and having, at opposite end, a rolling means 49, for example consisting of an idle wheel, with an axis of rotation parallel to the hinge pivot 7 and rolling on a shaped peripheral edge cam 43 of the crank means 11, as shown in the figures. Therefore the peripheral edge cam 43, of the crank means 11, can be shaped so that the rolling means transmits elastic forces directed towards the closure, the opening or to realize metastable positions of the door.

**[0031]** Preferably, and as illustrated in the figures, the peripheral edge cam 43 of the crank means 11, at the position of the rolling means 49 in at least one of the end portions for opening and closing said edge, has a corresponding shaping, for example with recess, to impart to the crank means 11 a force respectively for opening or closing the door D.

**[0032]** The resilient means 15 is connected to the first element 3 by fixing one of its 15 ends, opposite to that connected to the rocker arm, to a lever means 35 rotatably connected to the first element 3 through a respective fulcrum pin 38 parallel to the hinge pivot 7.

**[0033]** The housing means 33 of the damper means 31 is fixed to the lever means 35 and the crank means 11 has an edge 39 hemmed or rimmed, of an approximately arc shape intended to slide with friction on a friction surface 41 of the housing means 33 where the resilient means 15 transmits to the lever means 35 an elastic force which maintains said friction surface 41 in abutment with said edge 39. Preferably, the housing means 33 is made of synthetic material, plastic, simple or reinforced resin, or in alloy, for example zamak, and its friction surface 41 can be treated or coated with friction material so as to determine the friction coefficient according to the specific use requirements of the device.

**[0034]** The static and dynamic clutches between the rimmed edge 39 and the friction surface 41 brake the door and, if appropriate, can stabilize its position in any angular position. The invention provides that it is possible to shape the rimmed edge 39 to modulate the braking effect as a function of the opening angle of the door or flap.

**[0035]** As can be clearly seen in Figure 4, the crank means 11 is constituted by two nearly equal, parallel and spaced apart disc-shaped bodies and the connecting rod means 17 is placed between them; this arrangement allows to increase the contact and friction surface between the double edge 39 and the friction surface 41 and at the same time avoids excessive warping of the connecting rod means 17.

## Claims

1. Hinge device for appliances and furnishings with end speed damping, for closing or opening, and with predeterminable angular sectors of elastic opening and/or closure; said hinge device (1) comprising, in an operating condition of assembly to the appliance, a first element (3) fixed to a body (F) of the apparatus and a second element (5) fixed to a door (D) of said apparatus or obtained in said door (D) where said first (3) and second (5) elements are mutually connected by a hinge pivot (7) for rotation of the door around the longitudinal geometric axis of said hinge pivot (7) between end opening (A) and closing (C) conditions; said device (1) comprises a crank means (11) rotatably connected to the first element (3) by means of one of its almost central first rotation pin (13) parallel to the hinge pivot (7) and comprises a connecting rod means (17) having a rotatably end connected to the second element (5) by means of a second rotation pin (19) parallel and spaced from the hinge pivot (7); said connecting rod means (17) is also rotatably connected to the crank means (11) by means of a third rotation pin (21) parallel and spaced from the first rotation pin (13); wherein the portion of the connecting rod means (17) carrying the third rotation pin (21) has an arm means (27) projecting in opposite direction from the second rotation pin (19) or at least approximately parallel to the longitudinal extension of the connecting rod means (17) and designed to move in a closing direction at least at the end portion of the closing rotation of the door (D) and wherein said hinge device (1) comprises a damper means (31) of linear type housed in a respective housing means (33) and approximately oriented parallel to the closing direction of the arm means (27) which, during said movement, matches with a mobile member (37) of the damper means (31) damping the translation of the connecting rod means (17) and the rotation of the end closing portion of the door.

2. Device according to claim 1 **characterized in that** it comprises a resilient means (15) connected to the first element (3) and acting onto crank means (11) for transmitting to the latter a respective elastic force acting at closing and/or opening of the door (D).

3. Device according to claim 2 **characterized in that** the resilient means (15) is connected to the first element (3) by fixing an end of the resilient means (15) to a lever means (35) rotatably connected to the first element (3) by means of a respective fulcrum pin (38) parallel to the hinge pivot (7).

4. Device according to claim 3 **characterized in that** the housing means (33) of the damper means (31) is fixed to the lever means (35) and the crank means (11) has a roughly arc shaped edge (39) designed to slide with friction on a friction surface (41) of the housing means (33) where the resilient means (15) transmits to the lever means (35) an elastic force which maintains said friction surface (41) abutting with said edge (39).

5. Device according to claim 2 or claim 3 **characterized in that** the resilient means (15) acts on the crank means (11) by connecting one end of the resilient means (15) to one end of a rocker arm (45) which is centrally connected to the first element (3) by means of a respective fulcrum pin (47) parallel to the hinge pivot (7) and having, at the opposite end, a rolling means (49) with a rotation axis parallel to the hinge pivot (7) and rolling on a shaped peripheral edge cam (43) of the crank means (11).

6. Device according to claim 5 **characterized in that** the peripheral edge cam (43) of the crank means (11), at the position of the rolling means (49) in at least one of the opening and closing end portions of said edge, has at least one shape to transmit the elastic force of the resilient means (15) giving the crank means (11) a force for opening or closing the door (D) respectively.

7. Device according to any of the previous claims **characterized in that**, at least during the end portion of the closing rotation of the door (D), the longitudinal extension of the arm means (27) is approximately perpendicular to the direction of its closing motion or to the longitudinal axis of the damper means (31) or such extension is slightly inclined towards the damper means (31) and during this rotation portion the movement of the arm means (27) has a component in accordance with the compression direction of the damper means (31).

8. Device according to any of the previous claims **characterized in that** the linear damper means (31) is the type having a body internally provided with a chamber having a fluid and in which a piston slides with a stem protruding externally from the body and where a resilient means pushes the stem outwardly of the chamber and the fluid acts with viscous friction onto the piston.

9. Device according to any of previous claims **characterized in that** the housing means (33) has a hollow housing (57) for the damper means (31) and partially closable by a closure means (51) which prevents the damper means (31) coming out from the hollow housing (57) and provided with a window for the free passage of the arm means (27).

10. Device according to any of previous claims **characterized in that** the crank means (11) consists of two almost equal, parallel and spaced disc-like bodies and the connecting rod means (17) is placed between them.

**Patentansprüche**

1. Scharniervorrichtung für Anwendungen und Einrichtungen mit Endgeschwindigkeitsdämpfung für das Schließen oder Öffnen, und mit vorbestimmbaren Winkelbereichen des elastischen Öffnens und/oder Schließens; wobei die Scharniervorrichtung (1) in einem Montage-Betriebszustand an die Anwendung ein erstes Element (3) umfasst, das an einem Körper (F) des Geräts befestigt ist und ein zweites Element (5), das an einer Tür (D) des Geräts befestigt ist oder in der Tür (D) erhalten wird, bei dem das erste (3) und das zweite (5) Element miteinander durch einen Scharnierzapfen (7) verbunden sind zur Drehung der Tür um die geometrische Längsachse des Scharnierzapfens (7) zwischen End-öffnungs- (A) und Schließbedingungen (C); die Vorrichtung (1) umfasst ein Kurbelmittel (11), das drehbar mit dem ersten Element (3) mittels eines seiner fast zentralen Drehstifte (13) parallel zu dem Scharnierzapfen (7) verbunden ist und umfasst ein verbindendes Stangenmittel (17), das ein drehbares Ende aufweist, das mit dem zweiten Element (5) verbunden ist mittels eines zweiten Drehstifts (19) parallel zu und beabstandet von dem Scharnierzapfen (7); wobei das Verbindungsstangenmittel (17) ebenso drehbar mit dem Kurbelmittel (11) mittels eines dritten Drehstifts (21) parallel zu und beabstandet von dem ersten Drehstift (13) verbunden ist; wobei der Bereich des Verbindungsstangenmittels (17), der den dritten Drehstift (21) trägt, ein Armmittel (27) umfasst, das in entgegengesetzter Richtung von dem zweiten Drehstift (19) vorsteht oder zumindest annähernd parallel zu der Längserstreckung des Verbindungsstangenmittels (17) und so gestaltet ist, dass es sich in einer Schließrichtung an mindestens dem Endbereich der Schließdrehung der Tür (D) bewegt und wobei die Scharniervorrichtung (1) ein Dämpfermittel (31) des linearen Typs aufweist, das in einem entsprechenden Gehäusemittel (33) aufgenommen ist und ungefähr parallel zu der Schließrichtung des Armmittels (27) ausgerichtet ist, das während der Bewegung zu einem mobilen Element (37) des Dämpfermittels (31) passt, das die Übertragung des Verbindungsstangenmittels (17) und die Drehung des Endschließbereichs der Tür dämpft.

2. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** sie ein federndes Mittel (15) umfasst, das mit dem ersten Element (3) verbunden ist und auf Kurbelmittel (11) wirkt, um auf letztere eine ent-

sprechende Elastische Kraft zu übertragen, die beim Schließen und/oder Öffnen der Tür (D) wirkt.

3. Vorrichtung nach Anspruch 2, **dadurch gekennzeichnet, dass** das federnde Mittel (15) mit dem ersten Element (3) verbunden ist, indem ein Ende des federnden Mittels (15) an einem Hebelmittel (35) befestigt wird, das drehbar mit dem ersten Element (3) mittels eines entsprechenden Gelenkstifts (38) parallel zu dem Scharnierzapfen (7) verbunden ist.

4. Vorrichtung nach Anspruch 3, **dadurch gekennzeichnet, dass** das Gehäusemittel (33) des Dämpfermittels (31) an dem Hebelmittel (35) befestigt ist und das Kurbelmittel (11) weist eine grob bogenförmige Kante (39) auf, die so ausgeführt ist, dass sie mit Reibung auf einer Reibungsoberfläche (41) des Gehäusemittels (33) gleitet, wo das federnde Mittel (15) eine elastische Kraft auf das Hebelmittel (35) überträgt, das die Reibungsoberfläche (41) in Anschlag mit der Kante (39) hält.

5. Vorrichtung nach Anspruch 2 oder Anspruch 3, **dadurch gekennzeichnet, dass** das federnde Mittel (15) auf das Kurbelmittel (11) wirkt, durch Verbinden eines Endes des federnden Mittels (15) mit einem Ende eines Kipphebels (45), der mittig mit dem ersten Element (3) mittels eines entsprechenden Gelenkstifts (47) parallel zu dem Scharnierzapfen (7) verbunden ist und weist an dem gegenüberliegenden Ende ein Rollmittel (49) mit einer Drehungsachse parallel zu dem Scharnierzapfen (7) auf und rollt auf einer geformten peripheren Kantennocke (43) des Kurbelmittels (11).

6. Vorrichtung nach Anspruch 5, **dadurch gekennzeichnet, dass** die periphere Kantennocke (43) des Kurbelmittels (11) an der Position des Rollmittels (49) in mindestens einem der Öffnungs- und Schließendbereiche der Kante mindestens eine Form aufweist, um die elastische Kraft des federnden Mittels (15) zu übertragen, wodurch das Kurbelmittel mit einer Kraft zum Öffnen bzw. Schließen der Türe (D) bereitgestellt wird.

7. Vorrichtung nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** zumindest während des Endbereichs der Schließdrehung der Türe (D) die Längserstreckung des Armmittels (27) ungefähr senkrecht zu der Richtung seiner Schließbewegung oder zu der Längsachse des Dämpfermittels (31) ist oder eine solche Erstreckung ist geringfügig in Richtung des Dämpfermittels (31) geneigt und weist während dieses Drehbereichs die Bewegung des Armmittels (27) einen Bestandteil in Übereinstimmung mit der Kompressionsrichtung des Dämpfermittels (31) auf.

8. Vorrichtung nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** das lineare Dämpfermittel (31) von der Art ist, die einen Körper aufweist, der im Inneren mit einer Kammer versehen ist, die ein Fluid enthält und in der ein Zapfen mit einem Stamm gleitet, der nach außen von dem Körper absteht und bei dem ein federndes Mittel den Stamm aus der Kammer herauspresst und das Fluid mit viskoser Reibung auf den Zapfen wirkt.

9. Vorrichtung nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** das Gehäusemittel (33) ein hohles Gehäuse (57) für das Dämpfermittel (31) aufweist und teilweise durch ein Schließmittel schließbar ist, was das Dämpfermittel (31) daran hindert, aus dem hohlen Gehäuse (57) zu treten, und ist ausgestattet mit einem Fenster für den freien Durchgang des Armmittels (27).

10. Vorrichtung nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** das Kurbelmittel (11) aus zwei nahezu gleichen, parallelen und beabstandeten scheibenartigen Körpern besteht und das Verbindungsstangenmittel (17) ist dazwischen angeordnet.

**Revendications**

1. - Dispositif de charnière pour appareils et meubles avec amortissement de vitesse de fin de course, pour la fermeture ou l'ouverture, et avec des secteurs angulaires prédéterminables d'ouverture et/ou de fermeture élastique ; ledit dispositif de charnière (1) comprenant, dans un état de fonctionnement d'assemblage à l'appareil, un premier élément (3) fixé à un corps (F) de l'appareil et un second élément (5) fixé à une porte (D) dudit appareil ou obtenu dans ladite porte (D), lesdits premier (3) et second (5) éléments étant mutuellement reliés par un pivot de charnière (7) pour une rotation de la porte autour de l'axe géométrique longitudinal dudit pivot de charnière (7) entre des états extrêmes d'ouverture (A) et de fermeture (C) ; ledit dispositif (1) comprend un moyen de manivelle (11) relié de manière rotative au premier élément (3) à l'aide de l'un de son premier axe de rotation presque central (13) parallèle au pivot de charnière (7) et comprend un moyen de bielle (17) ayant une extrémité rotative reliée au second élément (5) à l'aide d'un deuxième axe de rotation (19) parallèle et espacé du pivot de charnière (7) ; ledit moyen de bielle (17) est également relié de manière rotative au moyen de manivelle (11) à l'aide d'un troisième axe de rotation (21) parallèle et espacé du premier axe de rotation (13) ; la partie du moyen de bielle (17) portant le troisième axe de rotation (21) ayant un moyen de bras (27) se projetant dans une direction opposée au deuxième axe de rotation (19)

ou au moins approximativement parallèlement à l'extension longitudinale du moyen de bielle (17) et agencé pour se déplacer dans une direction de fermeture au moins à la partie de fin de course de la rotation de fermeture de la porte (D), et ledit dispositif de charnière (1) comprenant un moyen d'amortisseur (31) de type linéaire reçu dans un moyen de réception respectif (33) et orienté approximativement parallèlement à la direction de fermeture du moyen de bras (27) qui, pendant ledit mouvement, est mis en correspondance avec un élément mobile (37) du moyen d'amortisseur (31) amortissant la translation du moyen de bielle (17) et la rotation de la partie de fermeture d'extrémité de la porte.

**2.** - Dispositif selon la revendication 1, **caractérisé par le fait qu'**il comprend un moyen élastique (15) relié au premier élément (3) et agissant sur le moyen de manivelle (11) pour transmettre à ce dernier une force élastique respective agissant à la fermeture et/ou à l'ouverture de la porte (D).

**3.** - Dispositif selon la revendication 2, **caractérisé par le fait que** le moyen élastique (15) est relié au premier élément (3) par fixation d'une extrémité du moyen élastique (15) à un moyen de levier (35) relié de manière rotative au premier élément (3) à l'aide d'un axe de pivotement respectif (38) parallèle au pivot de charnière (7).

**4.** - Dispositif selon la revendication 3, **caractérisé par le fait que** le moyen de réception (33) du moyen d'amortisseur (31) est fixé au moyen de levier (35) et le moyen de manivelle (11) a un bord grossièrement en forme d'arc (39) agencé pour coulisser à frottement sur une surface de frottement (41) du moyen de réception (33), le moyen élastique (15) transmettant au moyen de levier (35) une force élastique qui maintient ladite surface de frottement (41) en butée avec ledit bord (39).

**5.** - Dispositif selon la revendication 2 ou la revendication 3, **caractérisé par le fait que** le moyen élastique (15) agit sur le moyen de manivelle (11) par liaison d'une extrémité du moyen élastique (15) à une extrémité d'un bras oscillant (45) qui est relié de manière centrale au premier élément (3) à l'aide d'un axe de pivotement respectif (47) parallèle au pivot de charnière (7) et ayant, à l'extrémité opposée, un moyen roulant (49) avec un axe de rotation parallèle au pivot de charnière (7) et roulant sur une came de bord périphérique profilée (43) du moyen de manivelle (11).

**6.** - Dispositif selon la revendication 5, **caractérisé par le fait que** la came de bord périphérique (43) du moyen de manivelle (11), à la position du moyen roulant (49) dans au moins une des parties d'extrémité d'ouverture et de fermeture dudit bord, a au moins une forme pour transmettre la force élastique du moyen élastique (15) donnant au moyen de manivelle (11) une force d'ouverture ou de fermeture de la porte (D), respectivement.

**7.** - Dispositif selon l'une quelconque des revendications précédentes, **caractérisé par le fait que**, au moins pendant la partie de fin de course de la rotation de fermeture de la porte (D), l'extension longitudinale du moyen de bras (27) est approximativement perpendiculaire à la direction de son mouvement de fermeture ou à l'axe longitudinal du moyen d'amortisseur (31) ou une telle extension est légèrement inclinée vers le moyen d'amortisseur (31) et, pendant cette partie de rotation, le mouvement du moyen de bras (27) a une composante conforme à la direction de compression du moyen d'amortisseur (31).

**8.** - Dispositif selon l'une quelconque des revendications précédentes, **caractérisé par le fait que** le moyen d'amortisseur linéaire (31) est le type ayant un corps comportant intérieurement une chambre ayant un fluide et dans laquelle un piston coulisse avec une tige faisant saillie extérieurement à partir du corps, et un moyen élastique poussant la tige vers l'extérieur de la chambre et le fluide agissant avec un frottement visqueux sur le piston.

**9.** - Dispositif selon l'une quelconque des revendications précédentes, **caractérisé par le fait que** le moyen de réception (33) a un logement creux (57) pour le moyen d'amortisseur (31) et partiellement refermable par un moyen de fermeture (51) qui empêche le moyen d'amortisseur (31) de sortir du logement creux (57) et ayant une fenêtre pour le libre passage du moyen de bras (27).

**10.** - Dispositif selon l'une quelconque des revendications précédentes, **caractérisé par le fait que** le moyen de manivelle (11) consiste en deux corps en forme de disque presque égaux, parallèles et espacés et le moyen de bielle (17) est placé entre eux.

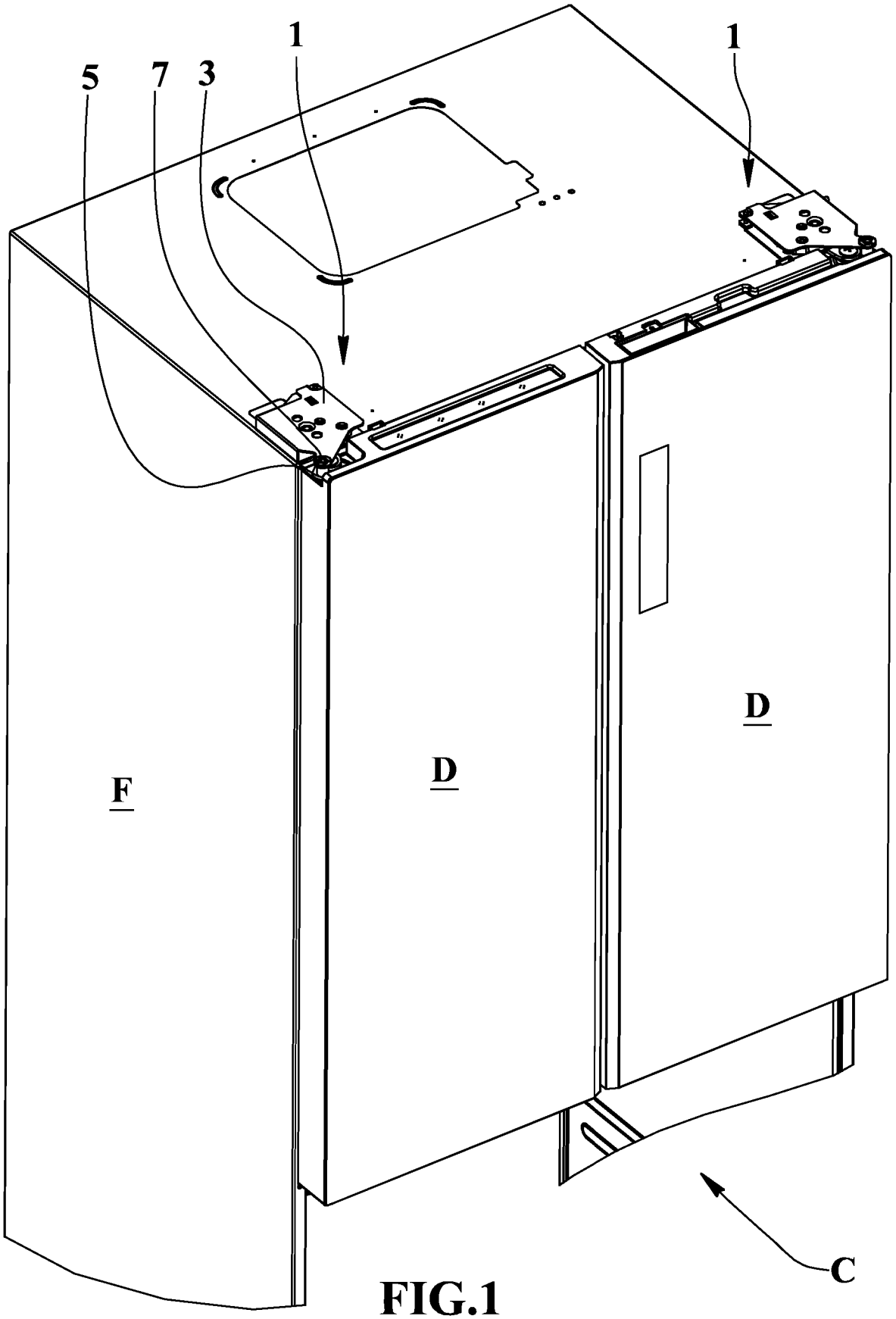



FIG.1

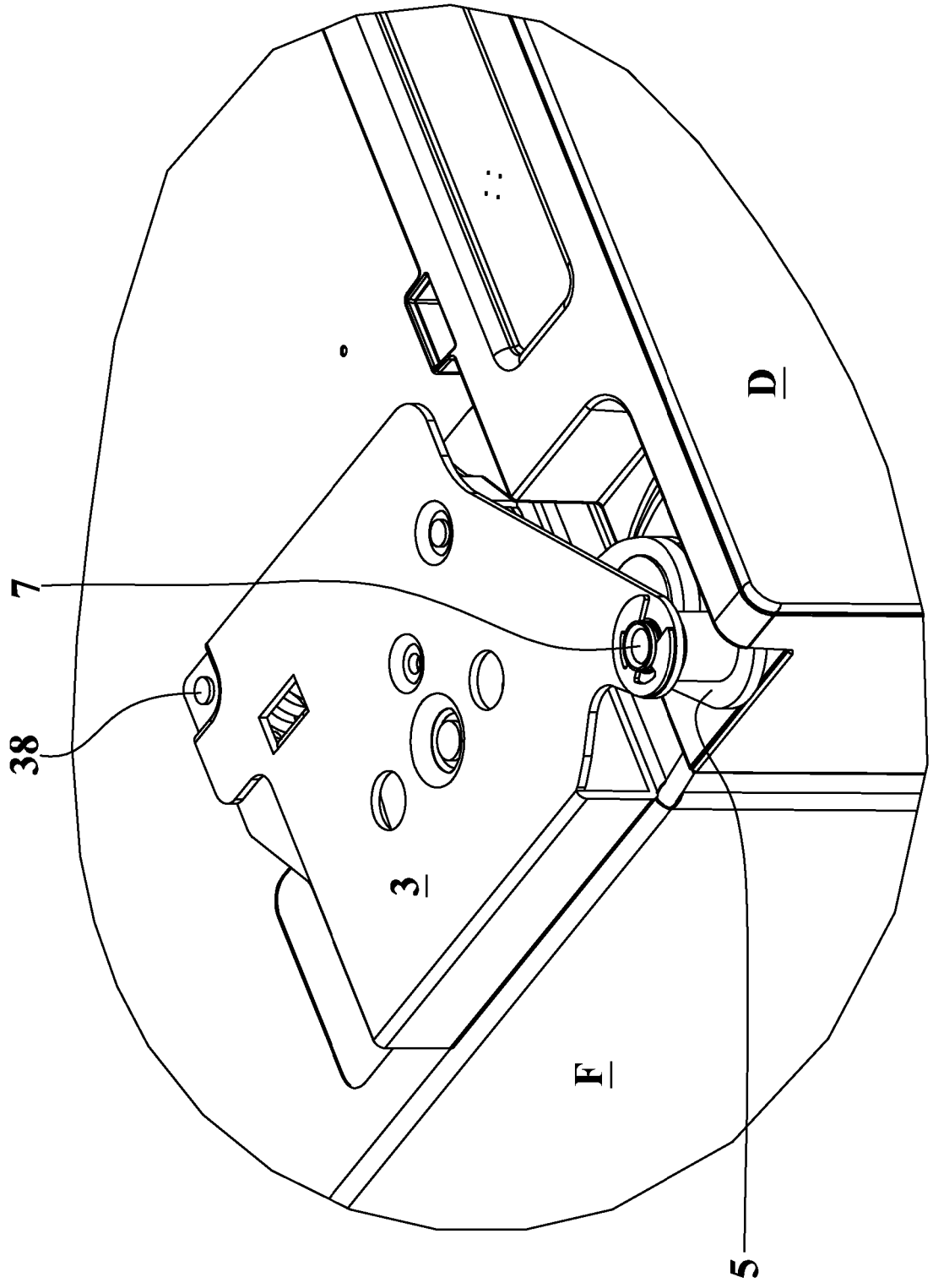



FIG.2

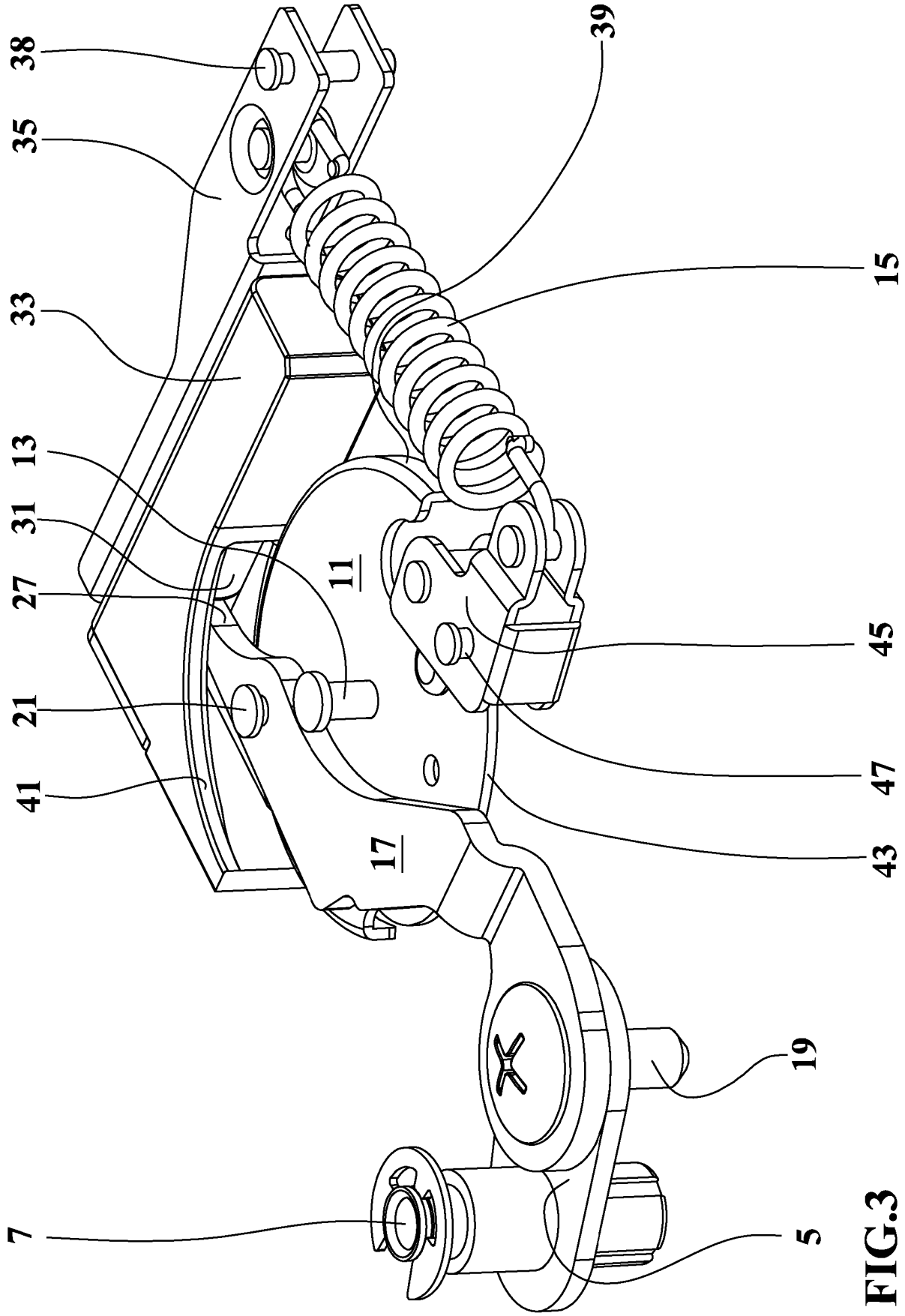



FIG.3

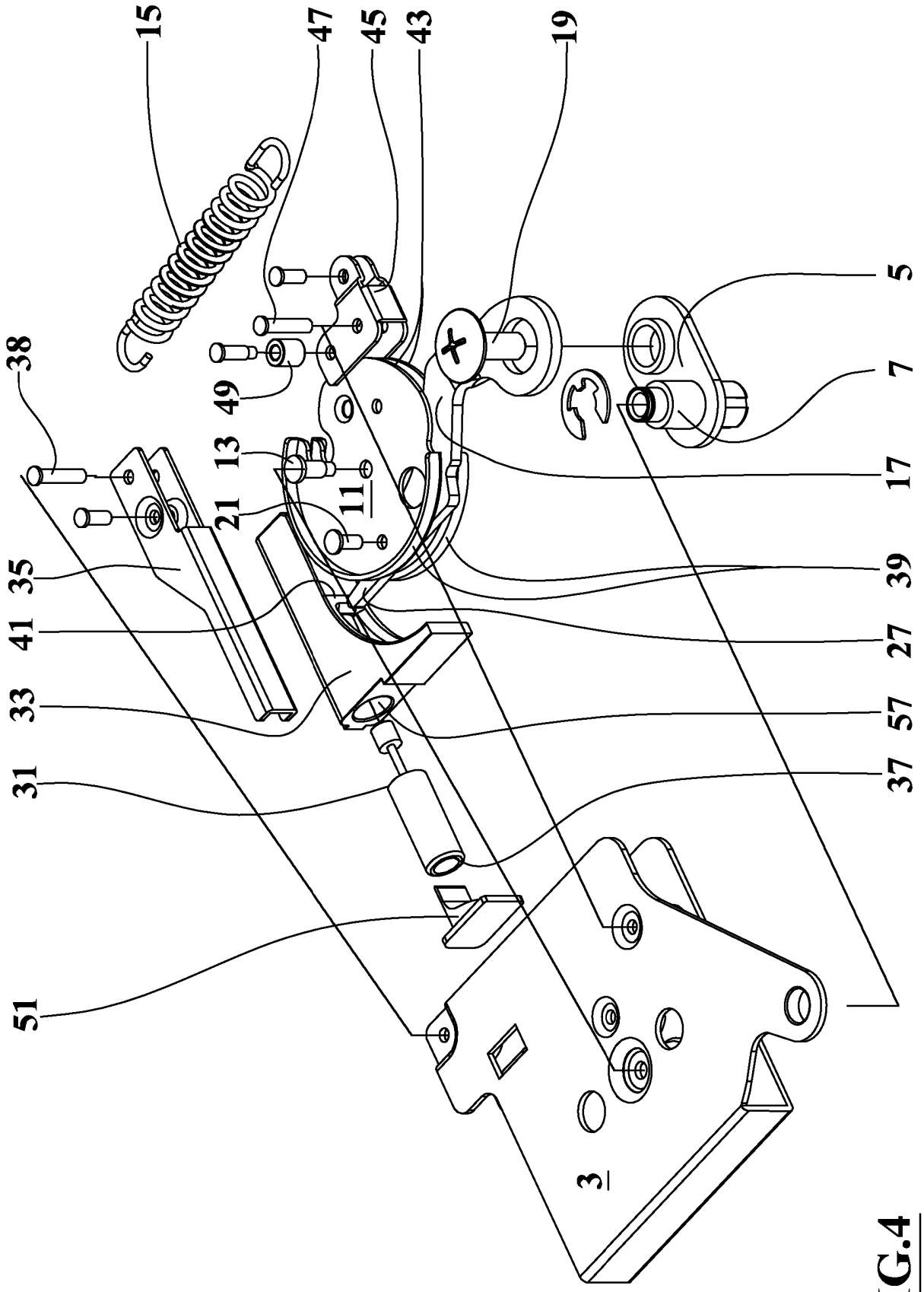



FIG.4

FIG.6

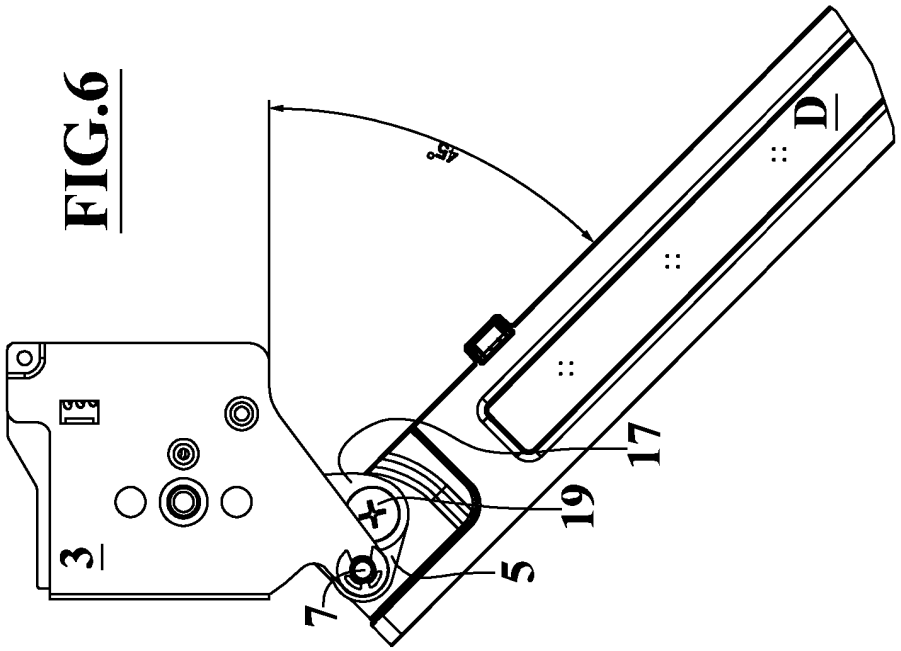



FIG.5

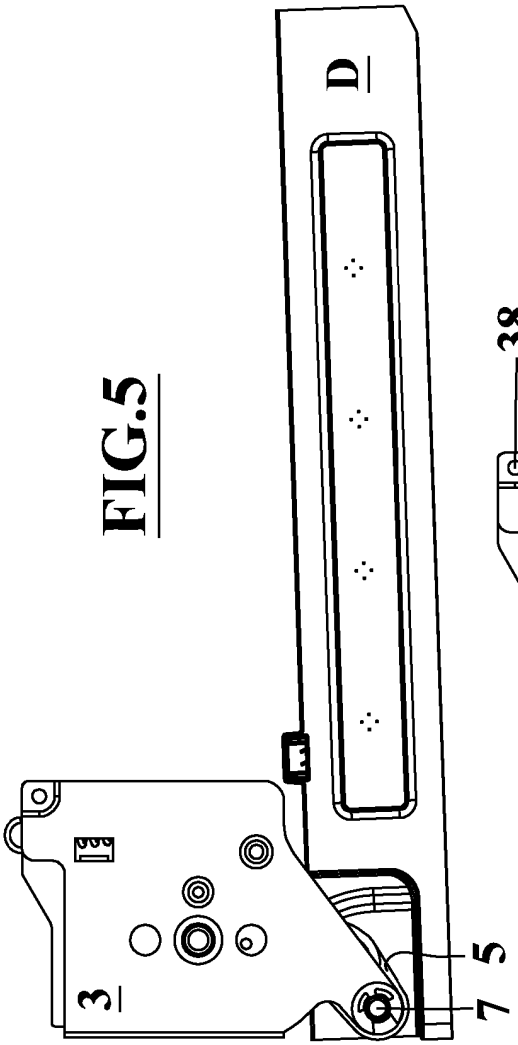
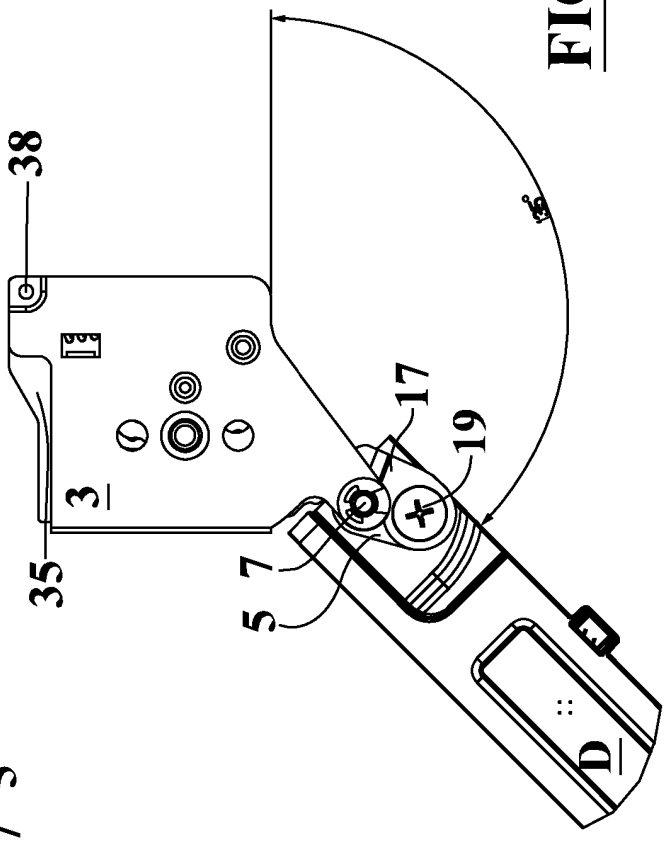



FIG.7



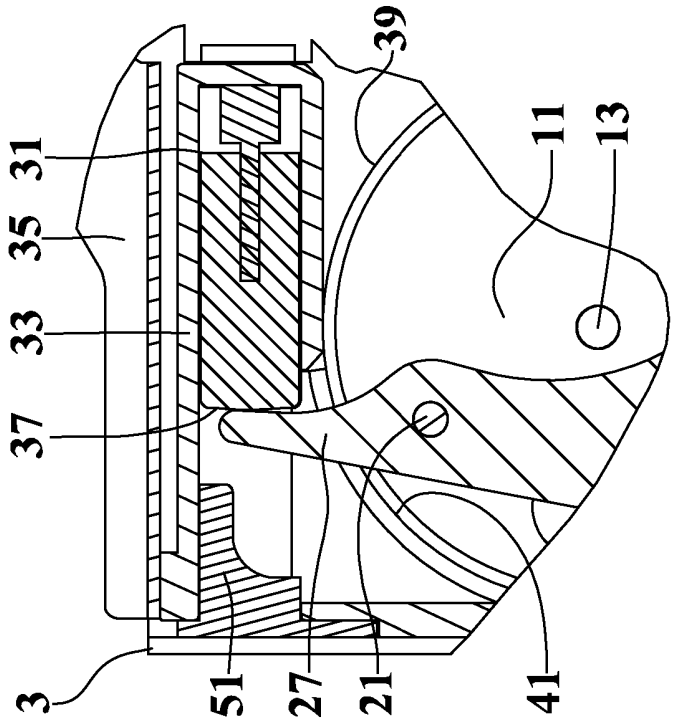

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FIG.12

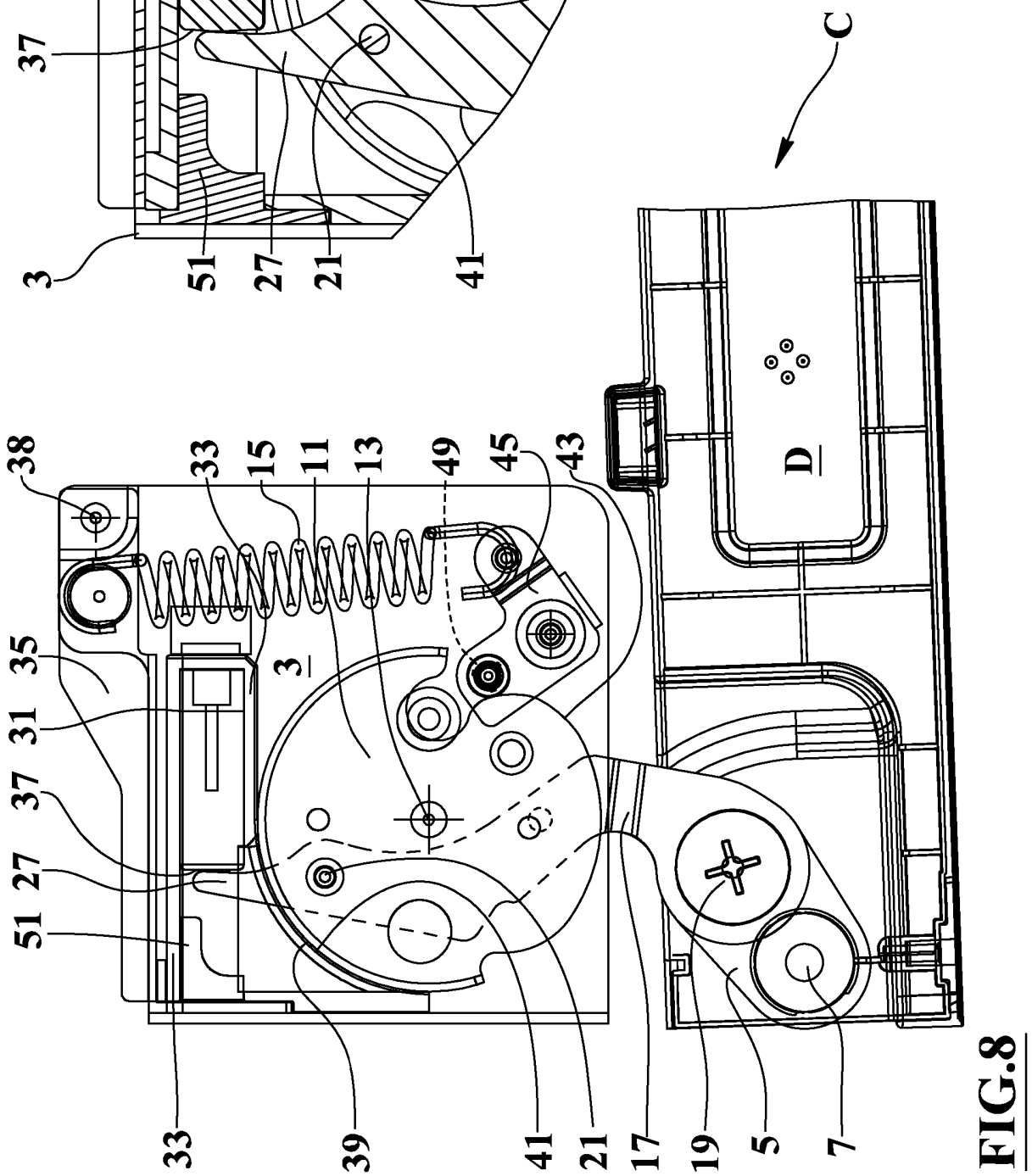
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FIG.8

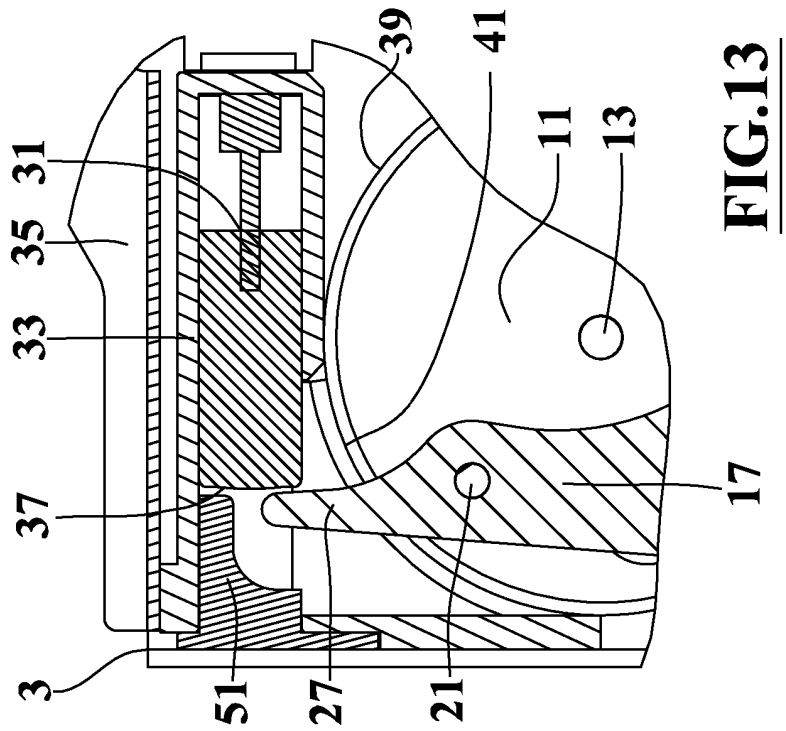
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FIG.13

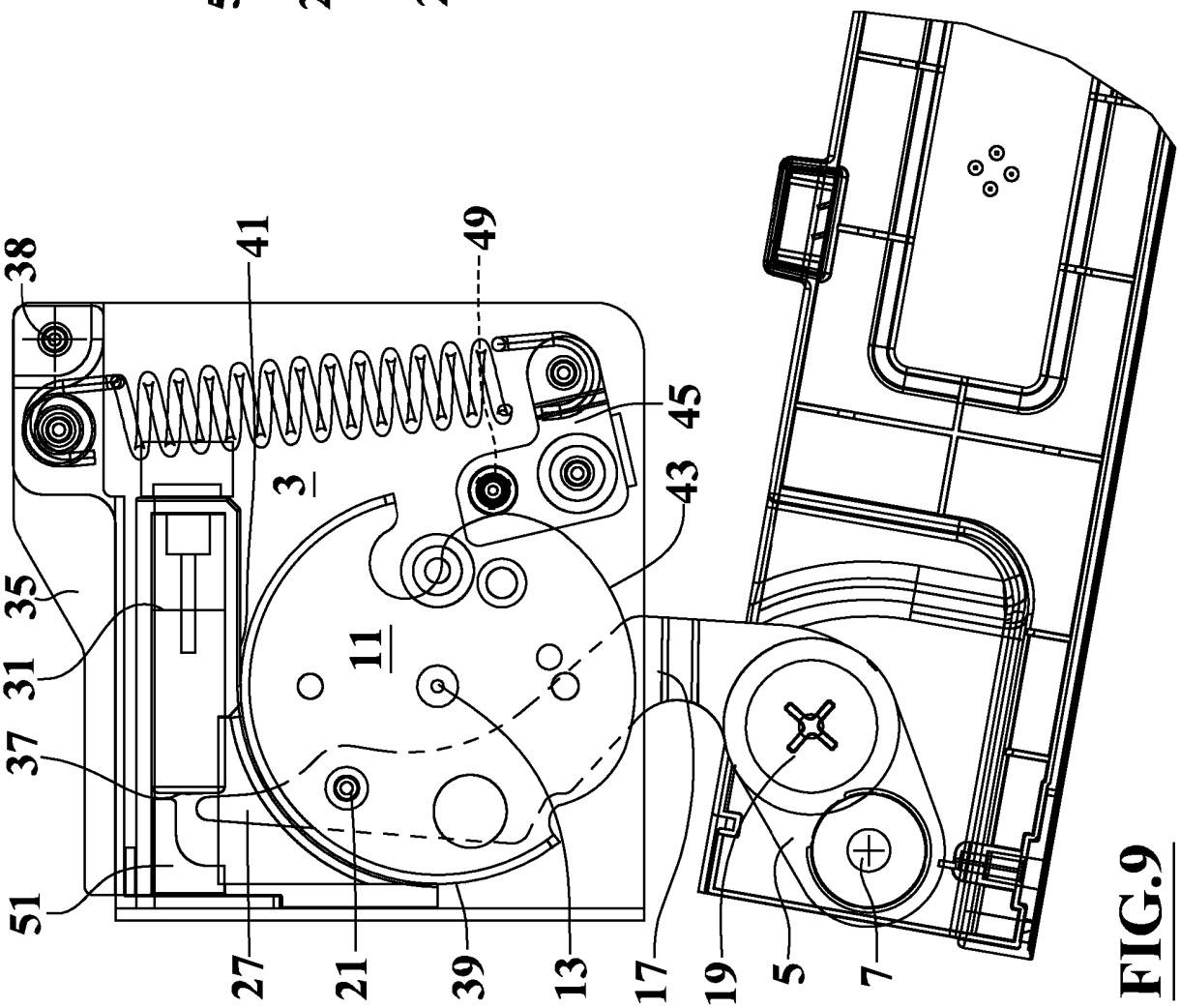
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FIG.9

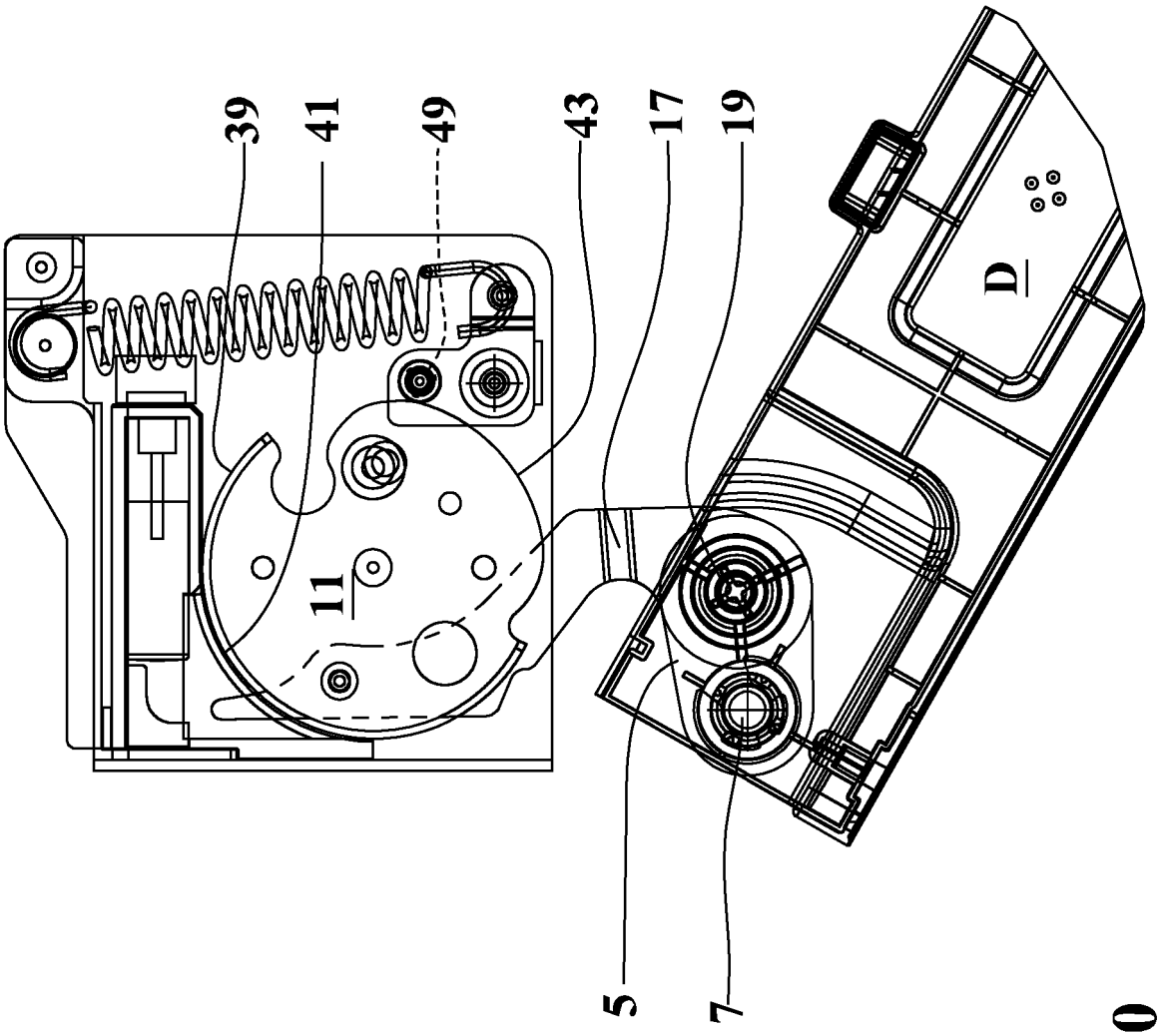


FIG.10

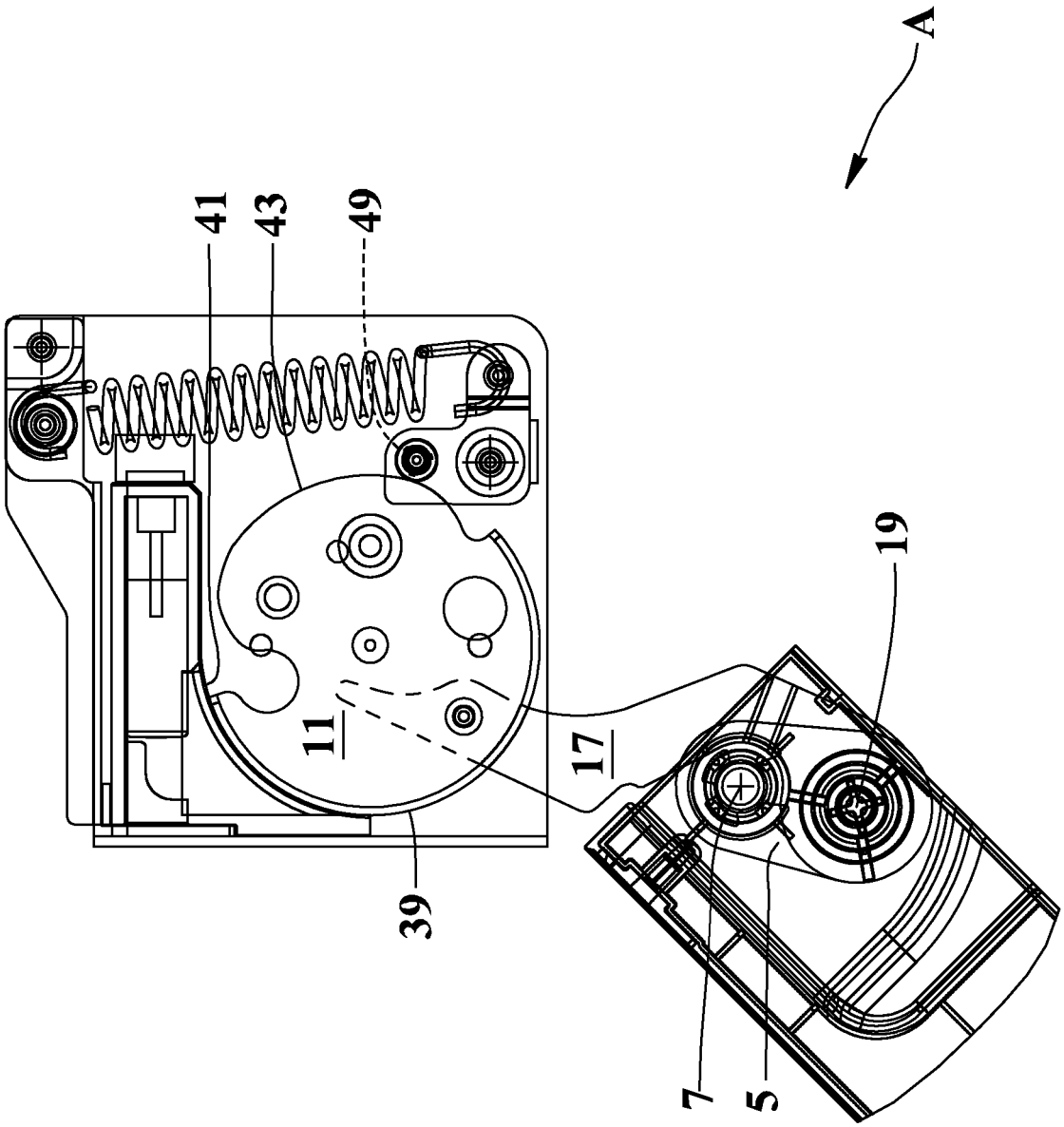


FIG.11

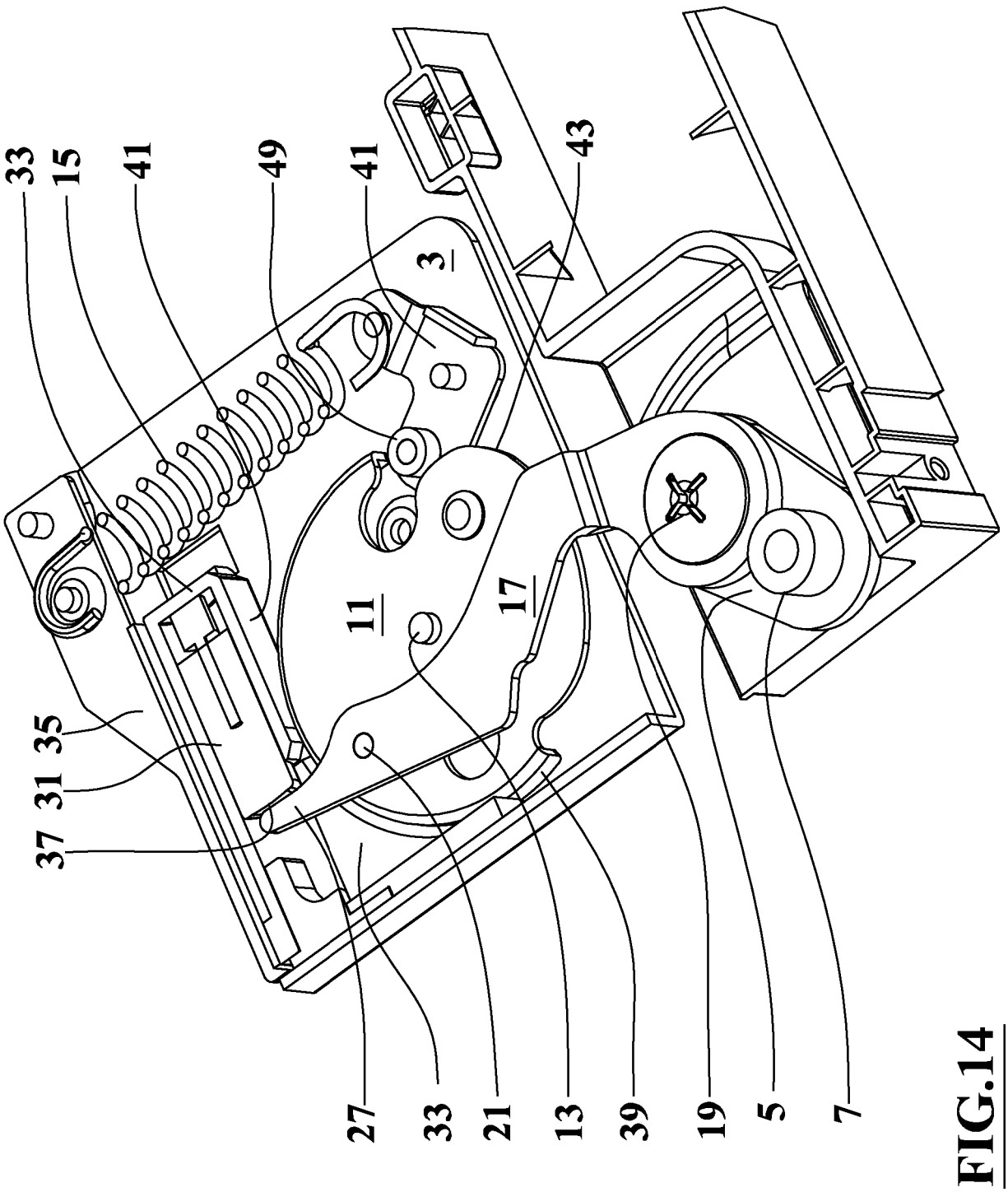


FIG.14

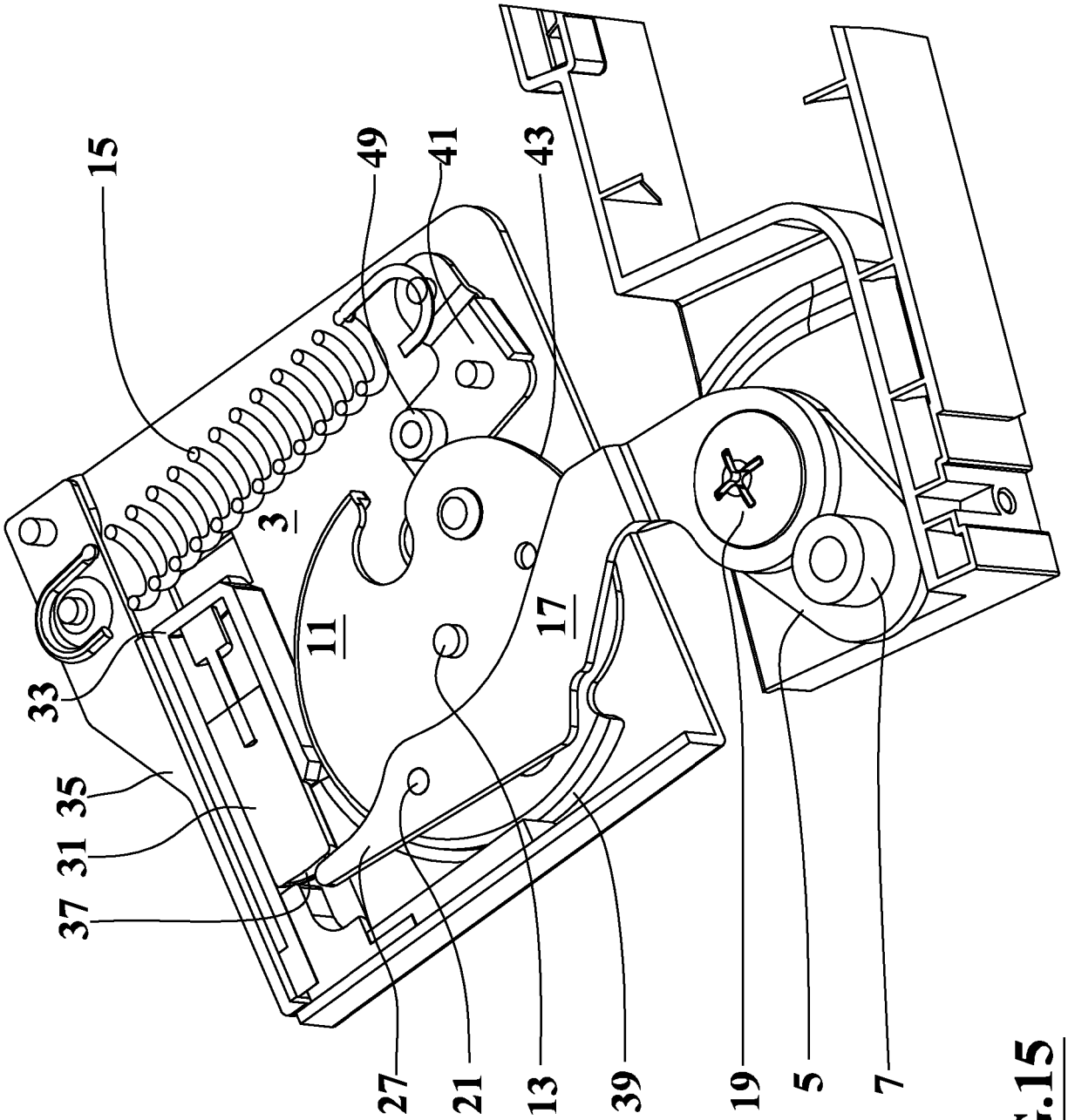


FIG.15

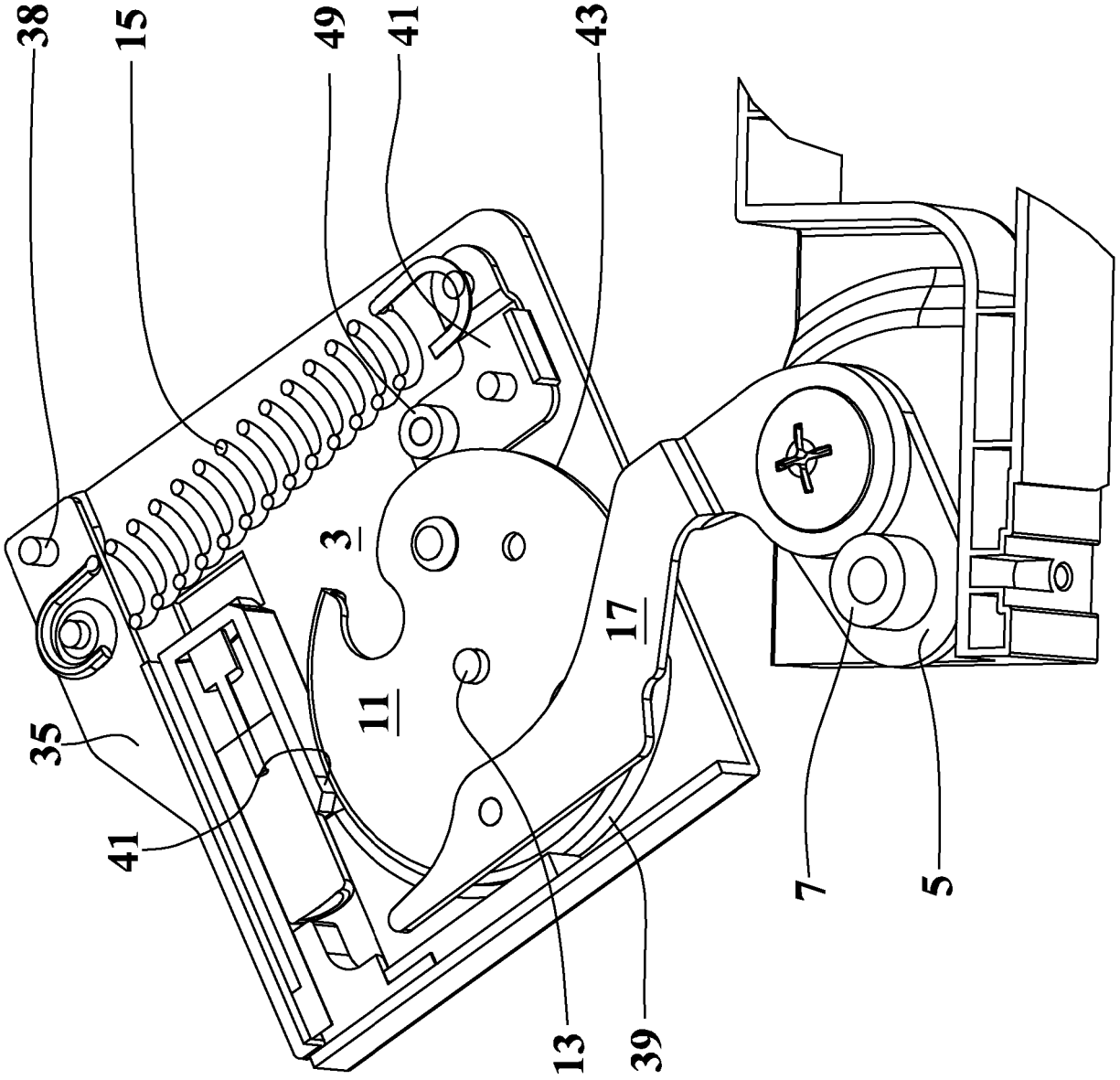


FIG.16

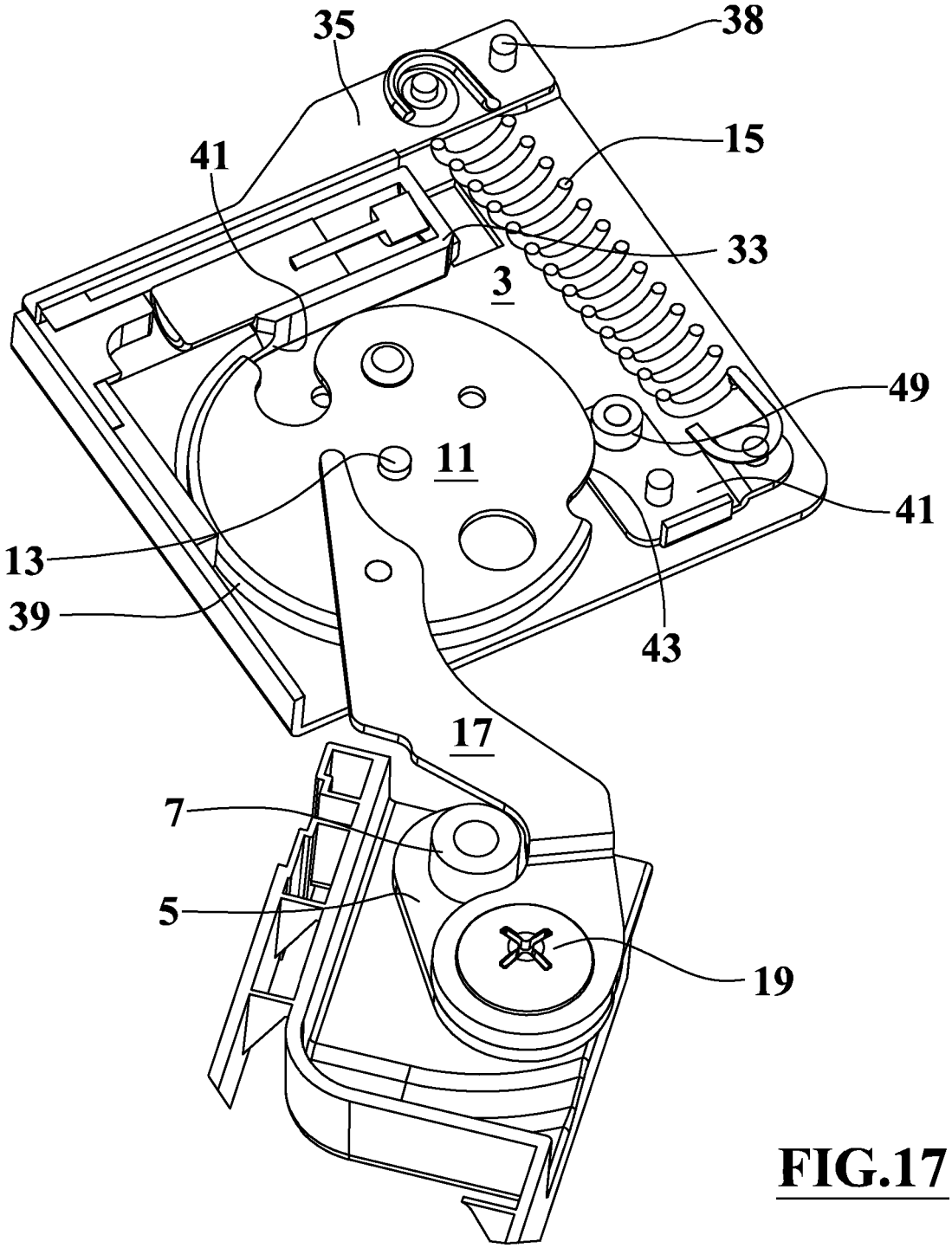


FIG.17

## REFERENCES CITED IN THE DESCRIPTION

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