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(54) **HINGE DEVICE WITH A TRANSLATION COATING PANEL**

SCHARNIERVORRICHTUNG MIT EINER TRANSLATIONSBESCHICHTUNGSPLATTE

DISPOSITIF DE CHARNIÈRE AYANT UN PANNEAU DE REVÊTEMENT À TRANSLATION

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EP 3 014 039 B1

Description

TECHNICAL FIELD

[0001] The present invention concerns hinges for doors, hatches, doors or doors of appliances and furniture and refers to a hinge device with a door coating panel translation, particularly suitable for appliances such as dishwashers, appliances in general, mobile and furniture.

BACKGROUND OF INVENTION

[0002] There are know hinges for rotating appliance doors, which are equipped with a fixed portion designed to be fixed to appliance structure and pivoted to a movable portion intended to be fixed to appliance door for allowing the rotation between closing and opening conditions. These known hinges can be equipped with joints, for example deformable quadrilateral, intended to raise or move away door from structure during its rotation from closed condition to end opening condition so as to avoid the interference of door or panel coating applied thereto with the underlying elements, for example basic sockets.

[0003] There are also known hinges with a sliding attachment for coating panel operated by levers for moving the panel to avoid interference with sockets or other during opening of the door.

[0004] A disadvantage of such known hinges consists in that the panel excursion is not always sufficient.

[0005] Further disadvantage of such known hinges consists in that they are quite complex, expensive and bulky due to joints and guides provided to give a translational movement to the coating panel during the door rotation.

[0006] Another disadvantage consists in that pins and linear guides of said known hinges are highly stressed and subject to early wear.

[0007] Further disadvantage consists in that the rectilinear motion law of panel attacks depending on door rotating angle is not linear or regular, and in certain cases, could cause stiffeners or irregularities in door movement.

[0008] Documents WO 83/01647 A1, US 465 112 A and US 1 998 319 A disclose the features of the preamble of claim 1.

DISCLOSURE OF THE INVENTION

[0009] One object of the present invention is to propose a hinge device with a door coating panel translation that ensures an excursion of this panel, suitable for each assembly type.

[0010] Further object is to propose a device that allows to change the panel travel through simple modifications of some components.

[0011] Another object is to propose a device allowing to change the panel excursion, by lifting or lowering this latter during opening, by simple changes.

[0012] Further object is to propose a device with minimum transverse dimensions.

[0013] Another object is to propose a device that is simple, inexpensive to manufacture, wear and stress resistant.

[0014] Further object is to propose a device fit for imparting to panel a regular and proportional motion to the opening angle.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015] The characteristics of the invention are highlighted in the following with particular reference to the attached drawings in which:

- Figure 1 shows a partial side view of the hinge device with a door panel coating translation object of the present invention, in a closed condition, associated with a domestic appliance and to the panel coating, shown in dashed lines, and translating in the direction indicated;
- Figure 2 shows the device of Figure 1 in an intermediate condition;
- Figure 3 shows the device of Figure 1 in the open condition;
- Figures 4 to 6 show isometric views of the device of Figure 1.

BEST MODE OF CARRYING OUT THE INVENTION

[0016] With reference to Figures 1-6, numeral 1 indicates hinge device for appliance and furniture door, with translation of door coating panel 3 translation, object of the present invention; when said panel translation is relative to door.

[0017] Device 1 is provided with first 4 and second 5 connection members designated to be fixed respectively to a structure or frame of appliance or furniture and to door for rotation thereof from end closing C and opening A conditions.

[0018] The appliance may be, for example, a dishwasher where the door is hinged at the bottom opening by a pair of devices 1 with coincident and horizontal rotation axes.

[0019] Door coating panel 3 can have insulation and/or aesthetic functions and device 1 pushes it away from rotation axis during door opening to avoid that the lower panel edge interferes and impacts against the underlying elements, such as socket or base.

[0020] Said first 4 and second 5 connecting members are mutually pivoted by a pivot pin 6.

[0021] The pivot pin 6 is placed close to the lower end of the first connecting member 4.

[0022] Said first 4 and second 5 connection members are preferably made of metal cut and folded sheet.

[0023] Said device 1 comprises a toothed wheel means 20 made, i.e. by punching or cutting a sheet or by casting or removing from solid, in single body with the second connecting member 5. The toothed wheel means

20 is centred on rotation axis of the pivot pin 6. The toothed wheel means 20 consists, for example, in about 90° or more sector of a toothed wheel with straight teeth.

[0024] Alternatively to the realization in a single body, the invention provides that the toothed wheel means 20 is fixed to the second connecting member 5 by joint, welding, gluing, screws, rivets or similar.

[0025] The device 1 also comprises a rack means 22 slidably translating along a seat means 25 of the first connecting member 4.

[0026] The rack means 22, is made by punching or cutting a sheet, by casting or removing from solid, and is forced to slide along the seat means 25 of the first connecting member 4 into a sliding direction D perpendicular to rotation axis of pivot pin 6 and parallel to the geometrical plane of panel 3 to which is fixable via a respective attachment 23, for example "L" shaped and made with folded and cut metal sheet.

[0027] The toothed wheel means 20 is cinematically interconnected to rack means 22 by a gear cascade comprising a first intermediate gear 29 and a second intermediate toothed wheel 35 freely rotatable about respective pins 30, 36 fixed to the first connection member 4 in parallel with pivot pin 6. The teeth of the intermediate toothed wheels 29, 35 of this gear cascade are complementary to teeth of rack means 22 and to a toothed wheel means 20.

[0028] The intermediate toothed wheels 29, 35 are respectively engaged with the rack means 22 and toothed wheel means 20.

[0029] The toothed wheel means 20 carries a circular segment slot 38 centred on the axis of pivot pin 6 and slidably engaged by a pin 39 rigidly fixed to first connecting member 4.

[0030] The rotation of door and of first connecting member 4, with respect to second connecting member 5 between the closing C and opening A end conditions and vice versa, cause the rotation of toothed wheel means 20 around pivot pin 6, the motion transmission through the cascade of intermediate toothed wheels 29, 35 to rack means 22 and to connected panel 3 with subsequent translation of these latter 22, 3.

[0031] The teeth of the toothed wheel means 20, of the intermediate toothed wheels 29, 35 and of the rack means 22 are mutually compatible.

[0032] The relationship between the teeth number of the toothed wheel determines the ratio translation/angle of pivot door. Substituting the intermediate toothed wheels 29, 35 of the cascade is then possible to determine the amplitude entity of panel 3 depending on the door opening angle.

[0033] At least one of the intermediate toothed wheels 29,35 can be equipped with two different teeth crowns engaged to teeth of the respective members of the kinematic chain located downstream and upstream of this intermediate wheel so as to change the transmission ratio and the law of operation motion of the panel depending on the opening angle without changing the rotation axis position.

[0034] Alternatively the invention provides that the toothed wheel means 20 is cinematically interconnected to the rack means 22 for engaging directly or through the single toothed wheel 29 engaged with both 20, 22.

[0035] The number or the absence of the intermediate toothed wheels causes the translation direction of the door during opening, upward or downward.

[0036] The seat means 25 is concave shaped with elongated longitudinal development parallel to the sliding direction D. For example, the seat means 25 can be obtained by two 90° bends of sheet metal of the first connecting member 4 in order to give a concave shape elongated with longitudinal development parallel to the sliding direction D and with cross section "U", or similar.

[0037] At least one of the two side walls of the seat means 25, preferably both, has a guide means 27 parallel to the sliding direction D and slidably engaged by a slide means 28 fixed to the rack means 22.

[0038] Preferably the slide means 28 is partially housed in a complementary hollow seat, made in the rack means 22 and in which is blocked.

[0039] The guide means 27 consists of an elongated through slot formed in the respective side wall of the seat means 25 and the slide means 28, for example of metal or synthetic material, has an elongated shape and slides longitudinally into the slot without or with small transversal clearance.

[0040] The attachment 23 for the panel 3 is fixed to the rack means 22 via at least one screw, pin or arm through a through-slot having a longitudinal development parallel to the sliding direction D and formed in the first connecting member 4. Said through slot, for at least one screw pin or connecting arm of attachment 23 to rack means 22, is the slot of guide means 27.

[0041] The slide means 28 has a flat projecting face, through guide means 27, from the first connecting member and is designed to abut with a corresponding face of attack 23 fixed to slide means 28 and to rack means 22 through said at least one screw, pin or arm.

[0042] The operation of the device provides, starting from the closing condition C, that the progressive rotation of the second connecting member 4 of device 1 towards the door opening condition, involves the simultaneous pivoting of the toothed wheel 20 relative to the first member 4 with a consequent rotation of wheels of cascade and translation of rack means moving away from door rotation axis. This involves a corresponding translation of the panel 3 parallelly to door 3. To keep this parallelism between door and panel these two last may also be interconnected via sliding guides parallel to sliding direction D.

[0043] In the operating assembly condition, the rotation axis of pivot 6 is horizontal and below the opening to which door is associated, in this case device 1 illustrated in figures provides for lifting the door during opening; is also provided that this axis of pivot pin can be horizontal upper or lateral to vertical mouth of appliance

by providing in these cases the drop down or lateral translation of the panel during the opening of closing door of mouth. Varying the number of intermediate toothed wheels or removing them, and adopting the direct engagement of toothed wheel means with rack means, it is possible to reverse the panel translation direction obtaining, for example, its drop down during door opening whose device is with horizontal axis and below opening. It is also provided the chance to install the device associated with closing doors of horizontal mouths, such as tank appliances.

[0044] An advantage of the present invention is to provide hinge device with a door coating panel ensuring a panel movement suitable for each type of assembly.

[0045] Further advantage is to provide a device which allows to change the panel movement by simple modifications of some components.

[0046] Another advantage is to provide a device that allows to change the movement direction of the panel, by lifting or lowering it during the opening, through simple changes.

[0047] Another advantage is to provide a simple device, inexpensive to manufacture and wear and stress resistant.

[0048] Further advantage is to provide a device fit for imparting to the panel a regular and proportional motion to opening angle.

[0049] Another advantage is to provide a device which allows to fix the coating panel in a simple and fast way.

Claims

1. Hinge device for a door of household appliances and furniture in general, with a door coating panel (3) translation; said device (1) is provided with first (4) and second (5) connection members mutually pivoted by means of a pivot pin (6) and assigned to be fixed respectively to the door and to a structure or frame of the appliance or furniture for the rotation of the door and the panel between the extreme closing (C) and opening (A) conditions, said device (1) comprises a toothed wheel mean (20) fixed to the second connecting member (5) and centered on the rotation axis of the pivot pin (6) and it comprises a rack means (22) constrained to slide along the first connection member (4) in a sliding direction (D) perpendicular to the rotation axis of the pivot pin (6) and parallel to the geometrical plane of the panel (3) to which said rack means (22) is fixable via a respective attachment (23) of the device where the toothed wheel means (20) is interconnected to the rack means (22); the rotation of the door and of the first connection member (4) with respect to the second connection member (5) between the extreme closing (C) and opening (A) conditions causes the rotation of the toothed wheel means (20) and the consequent translation of the rack means (22) and of the panel (3); said device (1) being **characterized in that** the first connection member (4) has a seat means (25) for slidably housing the rack means (22), said seat means (25) is "U" or similar cross section shaped with at least one side wall provided of guide means (27) slidably engaged by slide means (28) fixed to the rack means (22), said guide means (27) is an elongated pass-through slot formed in the respective side wall of the seat means (25) and the slide means (28) is elongated shaped and slides longitudinally into said through slot (27) without, or with small, cross clearance, where the attachment (23) to the panel (3) is fixed to the rack means (22) or to the slide means (28) by at least one screw, pin or arm by said through slot (27).

2. Device according to claim 1 **characterized in that** the toothed wheel means (20) is centered on the rotation axis of the pivot pin (6) and is fixed to the second connecting member (5) by means of single body carrying out or by means of interlocking, welding, gluing, screwing, riveting or the like.

3. Device according to any of the previous claims **characterized in that** the toothed wheel means (20) directly moves the rack means (22) being such toothed wheel means (20) and rack (22) mutually engaged.

4. Device according to claim 1 or 2 **characterized in that** the toothed wheel means (20) is interconnected to an moves the rack means (22) via a first intermediate gear (29) freely pivotable around a respective pin (30) fixed to the first connection member (4) and engaged with both the toothed wheel means (20) and the rack (22) means.

5. Device according to claim 1 or 2 **characterized in that** the toothed wheel means (20) moves the rack means (22) via a gears arrangement comprising at least a first intermediate toothed wheel (29) and a second intermediate toothed wheel (35) freely pivotable around respective pins (30, 36) fixed to the first connection member (4) where the ends of these gears arrangement are meshed respectively with the toothed wheel (20) and rack (22) means.

6. Device according to claim 1 **characterized in that** the seat means (25) is concave and elongate shaped and it (25) has longitudinal development parallel to the sliding direction (D).

7. Device according to claim 1 **characterized in that** the slide means (28) has a flat face protruding, through the slot of the guide means (27), from the first connection member and assigned to abut with a face of the attachement (23) fixed to the slide means (28) and to the rack means (22) by means of said at least one screw, pin or arm.

Patentansprüche

1. Scharniervorrichtung für eine Tür von Haushaltsanwendungen und Möbeln im Allgemeinen, mit einem Translations-Türbeschichtungspaneel (3), wobei
die Vorrichtung (1) bereitgestellt ist mit ersten (4) und zweiten Verbindungselementen (5), die gegenseitig schwenkbar sind mittels eines Schwenkstifts (6) und zugeordnet sind, um entsprechend an der Tür und an einer Struktur oder einem Rahmen der Anwendung oder des Möbels für die Drehung der Tür und des Paneels zwischen dem extrem geschlossenen (C) und geöffneten Zustand (A) befestigt zu werden, wobei
die Vorrichtung (1) ein gezahntes Radmittel (20) umfasst, das an dem zweiten Verbindungselement (5) befestigt ist, auf der Drehachse des Schwenkstifts (6) zentriert ist und ein Gestellmittel (22) umfasst, das gezwungen ist, entlang des ersten Verbindungselements (4) in einer Schieberichtung (D) senkrecht zur Drehachse des Schwenkstifts (6) und parallel zur geometrischen Ebene des Paneels (3) zu gleiten, an der das Gestellmittel (22) über eine entsprechende Befestigung (23) der Vorrichtung befestigbar ist, wo das gezahnte Radmittel (20) mit dem Gestellmittel (22) verbunden ist, und
die Drehung der Tür und des ersten Verbindungselements (4) bezogen auf das zweite Verbindungselement (5) zwischen dem extrem geschlossenen (C) und geöffneten Zustand (A) bewirkt die Drehung des gezahnten Radmittels (20) und die daraus folgende Bewegung des Gestellmittels (22) und des Paneels (3),
die Vorrichtung (1) ist **dadurch gekennzeichnet, dass** das erste Verbindungselement (4) ein Sitzmittel (25) zum verschiebbaren Aufnehmen des Gestellmittels (22) aufweist, wobei das Sitzmittel (25) ein "U" ist oder eine ähnliche Querschnittsform aufweist, wobei mindestens eine Seitenwand von einem Führungsmittel (27) in verschiebbarem Eingriff mit einem Schiebemittel (28) bereitgestellt ist, das an dem Gestellmittel (22) befestigt ist, wobei das Führungsmittel (27) ein länglicher Durchgangsschlitz ist, der in der entsprechenden Seitenwand des Sitzmittels (25) gebildet ist, und das Schiebemittel (28) ist länglich und gleitet der Länge nach in den Durchgangsschlitz (27) ohne oder mit geringer Querpassung, wobei die Befestigung (23) an dem Paneel (3) an dem Gestellmittel (22) oder dem Schiebemittel (28) mit mindestens einer Schraube, einem Stift oder einem Arm durch den Durchgangsschlitz (27) befestigt ist.

2. Vorrichtung gemäß Anspruch 1, **dadurch gekennzeichnet, dass** das gezahnte Radmittel (20) auf der Drehachse des Schwenkstifts (6) zentriert ist und an dem zweiten Verbindungselement (5) befestigt ist durch Ausführung als ein einziger Körper oder mittels Verriegeln, Schweißen, Kleben, Schrauben, Nieten oder ähnlichem.

3. Vorrichtung gemäß einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** das gezahnte Radmittel (20) direkt das Gestellmittel (22) bewegt, während sich das gezahnten Radmittel (20) und das Gestell (22) in gegenseitigem Eingriff befinden.

4. Vorrichtung gemäß Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** das gezahnte Radmittel (20) verbunden ist mit einem Bewegungsmittel des Gestellmittels (22) über ein erstes Zwischenzahnrad (29), das frei schwenkbar ist um einen entsprechenden Stift (30), der an dem ersten Verbindungselement (4) befestigt ist und sowohl mit dem gezahnten Radmittel (20) als auch dem Gestellmittel (22) in Eingriff ist.

5. Vorrichtung gemäß Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** das gezahnte Radmittel (20) das Gestellmittel (22) über eine Zahnradanordnung bewegt, die mindestens ein erstes Zwischenzahnrad (29) und ein zweites Zwischenzahnrad (35) aufweist, die frei schwenkbar sind um entsprechende Stifte (30, 36), die an dem ersten Verbindungselement (4) befestigt sind, wobei die Enden dieser Zahnradanordnung entsprechend mit dem gezahnten Rad (20) und dem Gestellmittel (22) kämmen.

6. Vorrichtung gemäß Anspruch 1, **dadurch gekennzeichnet, dass** das Sitzmittel (25) konkav und länglich ist und das Sitzmittel (25) weist einen Längsverlauf parallel zur Schieberichtung (D) auf.

7. Vorrichtung gemäß Anspruch 1, **dadurch gekennzeichnet, dass** das Schiebemittel (28) eine flache Fläche aufweist, die durch den Schlitz des Führungsmittels (27) vom ersten Verbindungselement vorsteht und zugeordnet ist, um an einer Fläche der Anordnung (23) anzuliegen, die am Schiebemittel (28) und am Befestigungsmittel (22) mittels mindestens einer Schraube, einem Stift oder Arm befestigt ist.

Revendications

1. Dispositif de charnière pour une porte d'appareils électroménagers et de meubles en général, avec un panneau de revêtement de porte (3) à translation ; ledit dispositif (1) comporte des premier (4) et second (5) éléments de liaison articulés mutuellement au moyen d'un pivot (6) et destinés à être fixés respectivement à la porte et à une structure ou un bâti de l'appareil ou meuble pour la rotation de la porte et du panneau entre les états extrêmes d'ouverture (A)

et de fermeture (C), ledit dispositif (1) comprend un moyen de roue dentée (20) fixé au second élément de liaison (5) et centré sur l'axe de rotation du pivot (6) et il comprend un moyen de crémaillère (22) contraint de coulisser le long du premier élément de liaison (4) dans une direction de coulissement (D) perpendiculaire à l'axe de rotation du pivot (6) et parallèle au plan géométrique du panneau (3) auquel ledit moyen de crémaillère (22) est apte à être fixé par l'intermédiaire d'une attache respective (23) du dispositif, le moyen de roue dentée (20) étant relié de manière réciproque au moyen de crémaillère (22) ; la rotation de la porte et du premier élément de liaison (4) par rapport au second élément de liaison (5) entre les états extrêmes d'ouverture (A) et de fermeture (C) entraîne la rotation du moyen de roue dentée (20) et la translation qui en résulte du moyen de crémaillère (22) et du panneau (3) ; ledit dispositif (1) étant **caractérisé par le fait que** le premier élément de liaison (4) a un moyen de siège (25) pour recevoir de manière coulissante le moyen de crémaillère (22), ledit moyen de siège (25) est en forme de « U » ou de section transversale similaire, avec au moins une paroi latérale munie d'un moyen de guidage (27) engagé de manière coulissante par un moyen de coulisseau (28) fixé au moyen de crémaillère (22), ledit moyen de guidage (27) est une fente traversante allongée formée dans la paroi latérale respective du moyen de siège (25) et le moyen de coulisseau (28) a une forme allongée et coulisse longitudinalement dans ladite fente traversante (27) avec peu ou pas de jeu transversal, l'attache (23) sur le panneau (3) étant fixée au moyen de crémaillère (22) ou au moyen de coulisseau (28) par au moins une vis, une broche ou un bras par ladite fente traversante (27).

2. Dispositif selon la revendication 1, **caractérisé par le fait que** le moyen de roue dentée (20) est centré sur l'axe de rotation du pivot (6) et est fixé au second élément de liaison (5) au moyen d'un unique corps ou au moyen de verrouillage réciproque, soudage, collage, vissage, rivetage ou analogue.

3. Dispositif selon l'une quelconque des revendications précédentes, **caractérisé par le fait que** le moyen de roue dentée (20) déplace directement le moyen de crémaillère (22) en ayant ledit moyen de roue dentée (20) et la crémaillère (22) mutuellement engagés.

4. Dispositif selon la revendication 1 ou 2, **caractérisé par le fait que** le moyen de roue dentée (20) est relié de manière réciproque au et déplace le moyen de crémaillère (22) par l'intermédiaire d'un premier engrenage intermédiaire (29) apte à pivoter librement autour d'un pivot respectif (30) fixé au premier élément de liaison (4) et engagé avec le moyen de roue dentée (20) et le moyen de crémaillère (22).

5. Dispositif selon la revendication 1 ou 2, **caractérisé par le fait que** le moyen de roue dentée (20) déplace le moyen de crémaillère (22) par l'intermédiaire d'un agencement d'engrenages comprenant au moins une première roue dentée intermédiaire (29) et une seconde roue dentée intermédiaire (35) aptes à pivoter librement autour de pivots respectifs (30, 36) fixés au premier élément de liaison (4), les extrémités de l'agencement d'engrenages engrenant respectivement le moyen de roue dentée (20) et le moyen de crémaillère (22).

6. Dispositif selon la revendication 1, **caractérisé par le fait que** le moyen de siège (25) a une forme concave et allongée et il (25) a un développement longitudinal parallèle à la direction de coulissement (D).

7. Dispositif selon la revendication 1, **caractérisé par le fait que** le moyen de coulisseau (28) a une face plate faisant saillie, à travers la fente du moyen de guidage (27), à partir du premier élément de liaison et destinée à venir contre une face de l'attache (23) fixée au moyen de coulisseau (28) et au moyen de crémaillère (22) au moyen de ladite au moins une vis, broche ou bras.

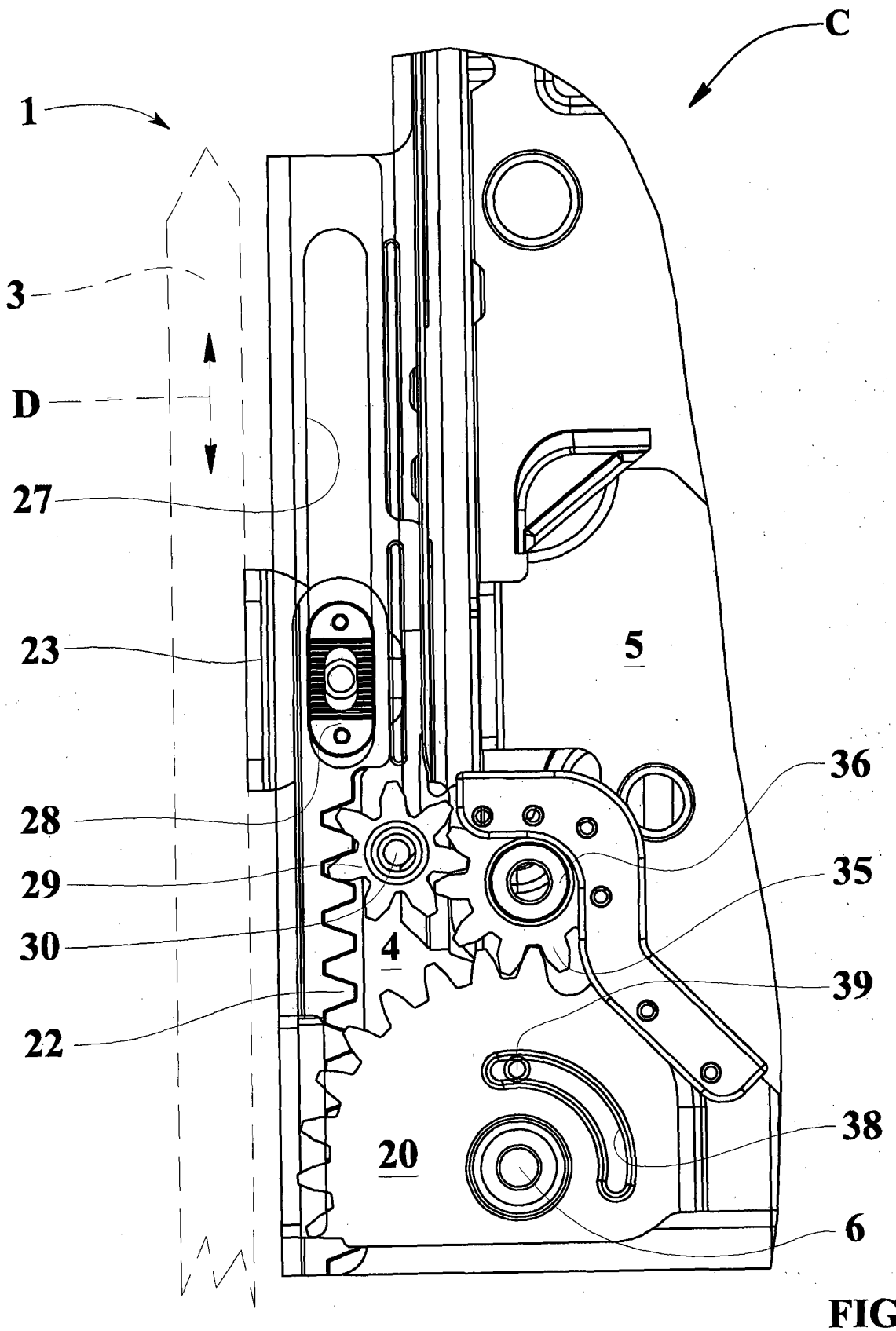


FIG.1

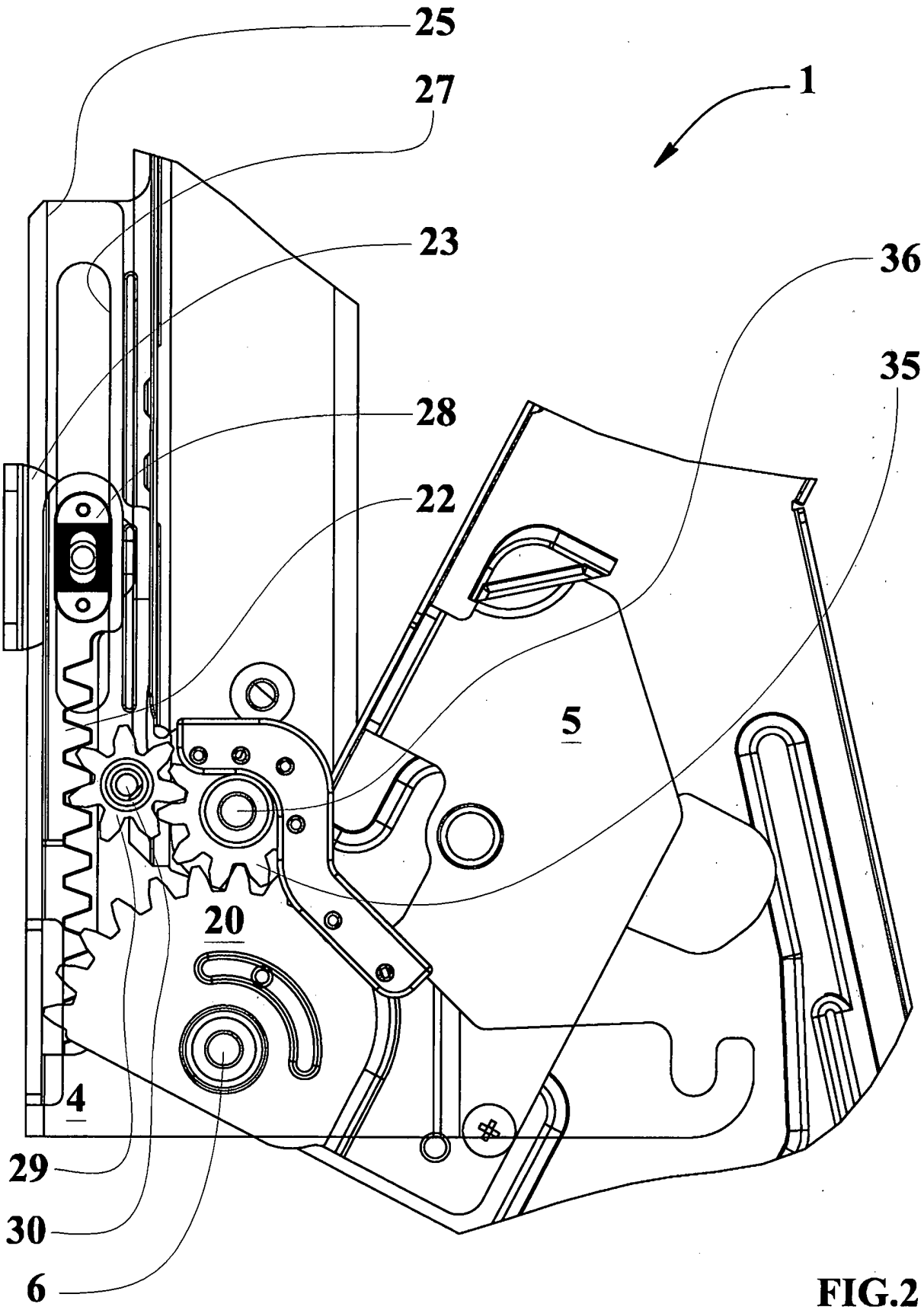


FIG.2

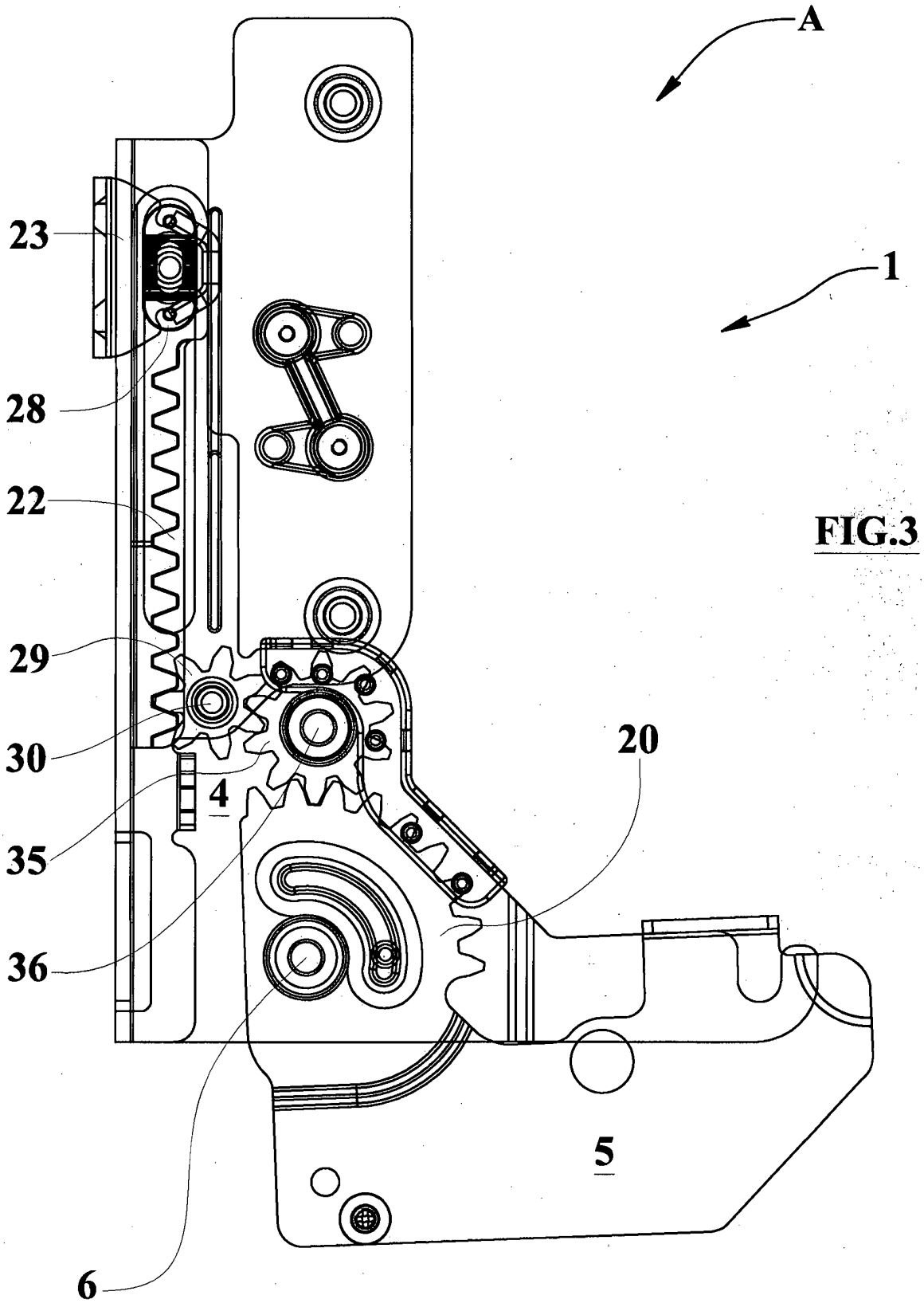


FIG.3

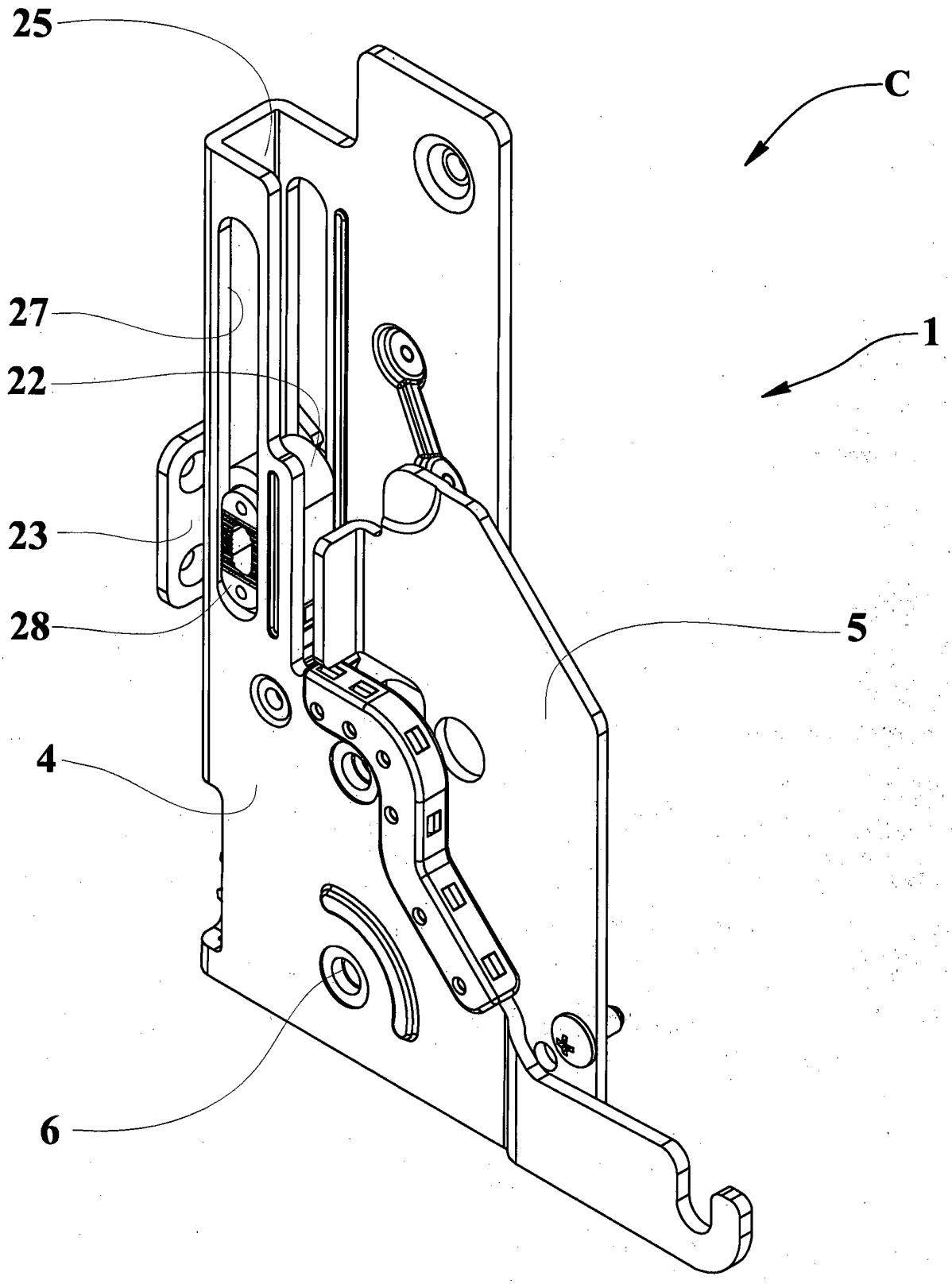


FIG.4

FIG.5

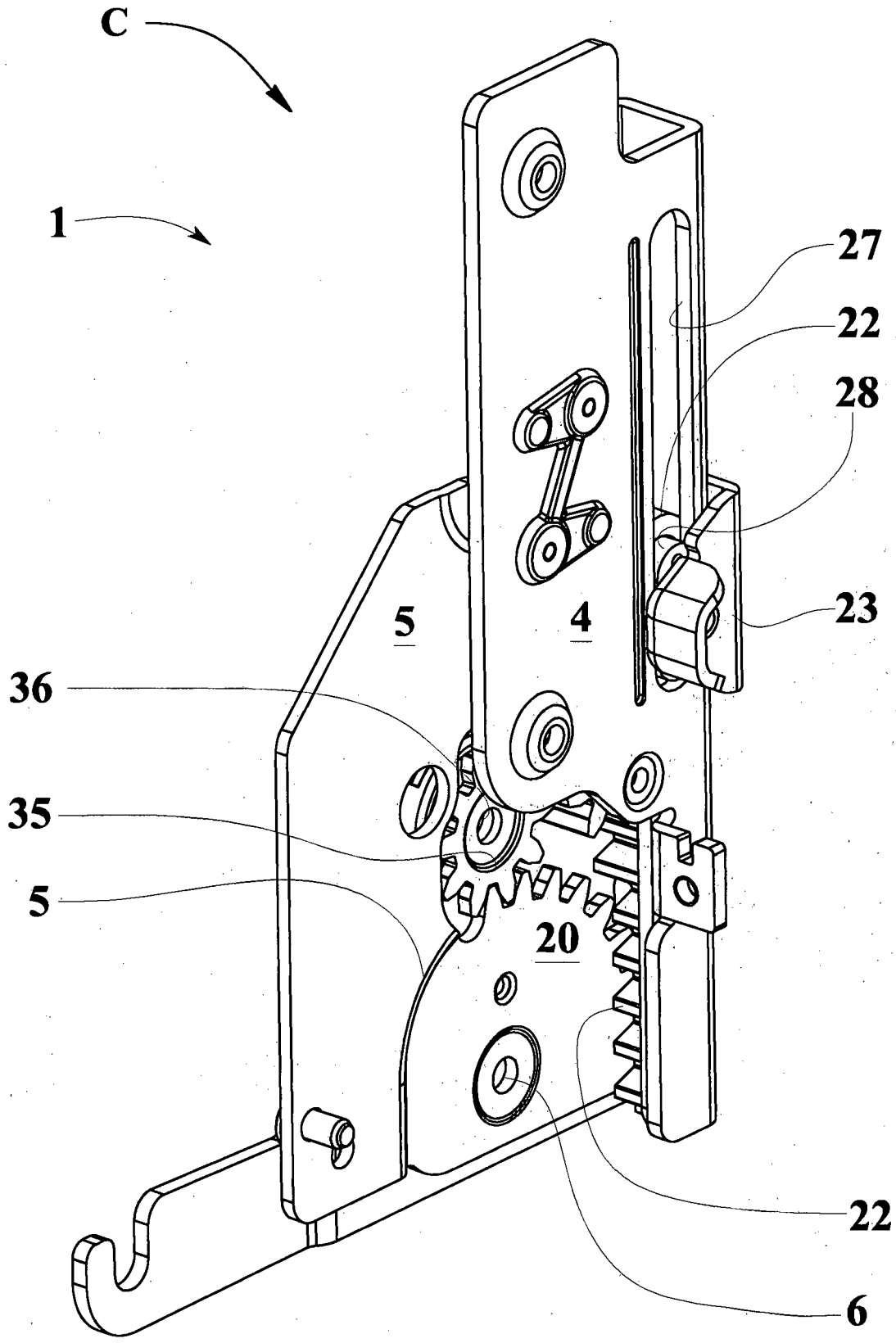
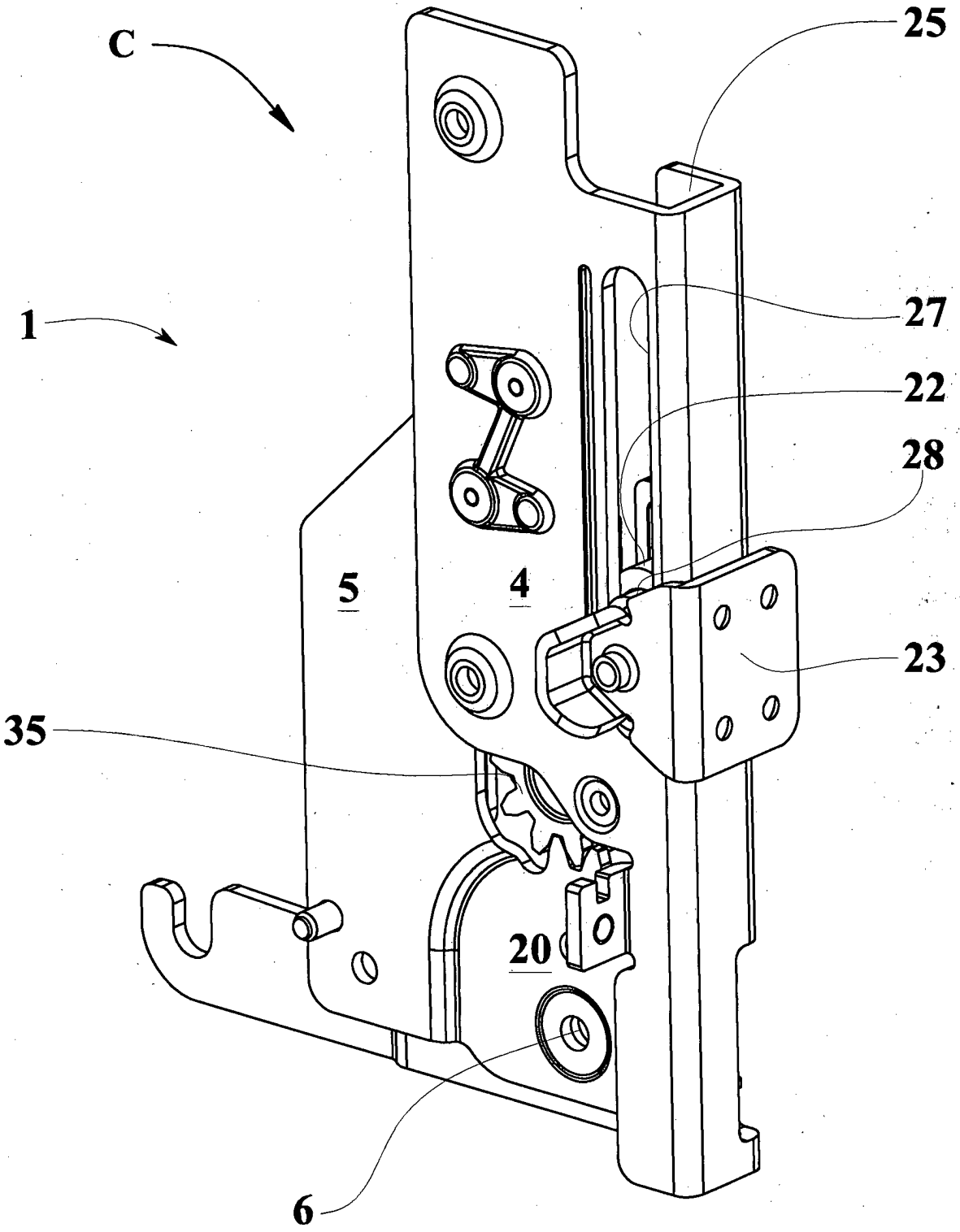


FIG.6



REFERENCES CITED IN THE DESCRIPTION

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