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(54) Hinge device for a door

(57) A hinge device for a door (2) of a structure (3) provided with connecting member, first (4) and second (5), provided with corresponding first (6, 7) and seconds (8, 9) ends and respectively fit to be fixed to door (2) and structure (3) for the door rotation between extreme closing (C) and opening (A) conditions.

The device includes a protruding arm (10) associated to the first end (7) of the second connecting member (5) and having a first rotation pivot (11) connected to the first end (6) of the first connecting member (4).

The device further includes an arm shaped mean (12) having one end which is swiveling connected to the first member (4) by a second pivot (17) positioned to a predetermined distance (D) from the first pivot (11) and the remaining end is associated, by connecting means (33), to an elastic mean (13) fixable near the second end of the second member (5).

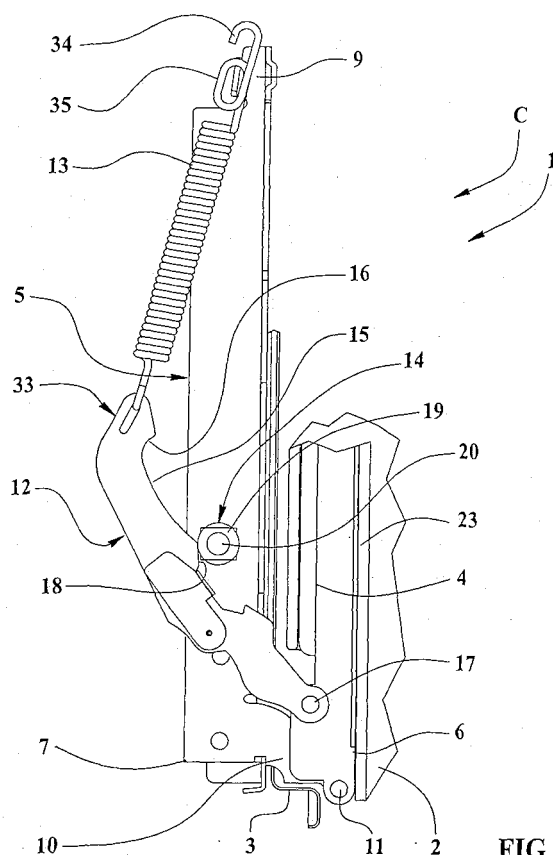


FIG.1

EP 1 574 654 A2

Description

[0001] The present invention concerns the technical field of hinges, and it refers to a hinge device for a door particularly for a household appliance such as an oven.

[0002] Ovens are known, dishwashers and similar provided with known hinges having an horizontal axle for the rotation of a door from a closed condition, in which such door is vertical to an open condition in which the door is at an almost horizontal position.

[0003] Such hinges are sometimes provided with known balancing devices, connected to the hinge portions fixed to the appliance body inside the door for balancing the weight of this latter.

[0004] A disadvantage of such known hinges consists in that the portions fixed to the door are generally of big size and therefore they are not fitted to thin doors or to oven doors or thermal insulated in which the available space is small because of many glass layers or insulators of other door components.

[0005] Other disadvantage of hinges and known devices consists in that they must be made with dimensions and specific measures for every type of oven or appliance.

[0006] Further disadvantage of the known hinges consists in that they are difficult to assembly to related elastic elements and appliance.

[0007] A purpose of the present invention is to propose a hinge device for a door also provided with a reduced space for housing the fixing portion of the relative device portion.

[0008] Other purpose is to propose a modular device provided with interchangeable parts to be used with appliances of different kind and size. Further purpose is to propose a device of easy and fast assemblage to its elastic elements and appliance.

[0009] Other purpose is to propose a hinge device fit for balancing doors of different weights and shapes.

[0010] The above-mentioned objects are achieved according to the content of the claims.

[0011] The characteristics of the invention are underlined in the following, with particular reference to the attached drawings, in which:

- figures 1 shows a side view, partially sectioned, of the hinge device for a door object of the present invention in a closing condition;
- figure 2 shows the device of figure 1 in an open condition;
- figure 3 shows a side view, partially sectioned and enlarged, of a portion of the device of figure 1 fit to be fixed to a door;
- figure 4 shows an enlarged view of a variation of a detail of figure 1;
- figure 5 shows a side view of a variation of the device of figure 1 in a partial opening condition.

[0012] With reference to figures from 1 to 3, numeral

1 indicates the hinge device for a door 2 of a structure 3 consisting, for instance, in an oven for domestic use, an appliance with horizontal rotation axle of the door or a furniture element.

5 **[0013]** The device 1 is provided with connecting members, first 4 and second 5, having a lengthened shape and provided with corresponding ends, first 6, 7 and second 8, 9.

10 **[0014]** The first connecting members, first 4 and second 5, are constituted by metal and consist, for instance, of profiles with "L", or "U" or similar shape and are respectively destined to be fixed to door 2 and to structure 3, for the rotation of the door among extreme conditions, closing C and opening A.

15 **[0015]** The device includes a protruding arm 10 associate to the first end 7 of the second connecting member 5 and having a first rotational pivot 11 connected to the first end 6 of the first connecting member 4.

20 **[0016]** The device also includes a shaped arm mean 12 whose end is swiveling connected to the first member 4 through a second pivot 17 placed to a predetermined distance D from the first pivot 11 whose entity depends on the geometric measures of the door and the structure.

25 **[0017]** The remaining end of the shaped arm mean 12 has connecting means 33 comprising a lengthened buttonhole, drawn in the same arm 12, for hooking an end of an elastic mean 13 constituted by a traction spring, whose remaining end is fixed to the second end 9 of the second member 5.

30 **[0018]** The protruding arm 10 is integral with the second connecting member 5 or is interchangeable having different sizes in order to be adapted to doors 2 and/or different structures 3 and is fixed to the second connecting member 5 through fixing elements 42.

35 **[0019]** The device 1 includes a first support mean 14 connected to the second element 5 and destined to find a cam mean 15 of the shaped arm 12, for instance of blank and shaped metallic plate, during the door rotation between the extreme conditions, closing C and opening A, or vice versa.

40 **[0020]** The cam mean 15 is made shaping, for instance by shearing, an edge of the shaped arm 12 and the first support mean 14 includes a rotating pulley mean 19, for instance made of metallic or plastic material, provided with a ring groove for such edge.

45 **[0021]** In the extreme opening condition A, the first support mean 14 engages a portion of block 16 of the cam mean 15, shaped as a circumference arc with line approximately orthogonal to the line joining the second pivot 17.

50 **[0022]** In the extreme closing condition C, the first support mean 14 engages a portion of detachable stop 18 of the cam mean 15, approximately parallel to the line joining the second pivot 17 and fit for transmitting to the door a high closing couple at this last closed condition.

55 **[0023]** The portion of the cam mean 15 interposed be-

tween the block 16 and detachable stop portions has a curved shape so that the tangent of such curved shape in correspondence of contact point with the first support mean 14 is tilted more or less in comparison to the line joining the second pivot 17.

[0024] The first support mean 14 includes a peg 20 for the free rotation of the pulley mean 19; in alternative the pulley mean 19 is connected to the peg 20 through friction means 21 in order to ensure the door stop in every intermediate opening position. The friction means include a bush, for instance made of plastic material, interposed with contact between the peg 20 and the pulley mean 19. In alternative the friction means include a plurality of springs and plans or friction cones.

[0025] Optionally the invention provides also that the cam mean 15 and the first support mean 14, having friction means, are provided with respective anti-slipping means 22 comprising related complementary teet fit for preventing slipping between said cam means 15 and support means 14 as illustrated in figure 4.

[0026] The first connecting member 4 is fixed to the joint removable door through a fixing mean 23 fixed to the door so assuring a high assembly facility and speed during production or cleaning of structure and door.

[0027] The first connecting member 4 and the fixing mean 23 are provided with respective complementary matching means 24, 25, 26, 27 destined, in a mutual engaging condition I, to allow only the axial relative leaving motion of between such member 4 and mean 23, which are also provided with joining means 28 to prevent, removably, such axial movement.

[0028] The complementary matching means 24, 25, 26, 27 include opened buttonholes and respective thorns, the first ones made and the second ones fixed in proximity of the ends of the first connecting member 4 and of the fixing mean 23.

[0029] The joining means 28 comprises a lever mean 29 swiveling connected to the first connecting member 4 and provided with a head 30 removably pushed by elastic means 31 in a respective slot 32, made in the fixing mean 23, in the mutual engagement condition I. In the joining condition, the head protrudes from the slot to allow the manual releasing of the hinge.

[0030] The device includes a stop mean 36, made of a fin or a jumper, swiveling connected to the shaped arm 12. The leaving rotation of the stop mean 36 from the shaped arm 12, allows to match removably the second member 5 removably arresting the first member 4 in order to facilitate joint and unblocking of this latter with the fixing mean 23.

[0031] The elastic mean 13, of helical kind fit for exerting an elastic traction strength, has, in correspondence of at least an end, starting from outside, a connection for tension means 34 for spring assemblage and, inside, a connection for the operative assemblage 35. The connection for the assembly tension means 34 is hook shaped and the connection for the operative assemblage 35 is buttonhole shaped with oval form.

[0032] Such conformation of the elastic mean 13 allow to carry out a greater number of coils among the operative attacks and facilitates the assemblage in comparison with the known elastic means provided with attacks for the tension means.

[0033] The operation of the device provides that the shape of the cam mean 15 causes variations of the lever arms and the orientation of the forces, of the elastic mean 13, transmitted to the door during the passages from opening to closing conditions or vice versa. Such variations allow to module, in a way determined by the shape of the cam mean 15, the closing couple transmitted to the door.

[0034] In the variation of figure 5, the connecting means 33 include an oscillating mean 37, made of blank and shaped plate approximately of triangular form, swiveling connected to the second connecting member 5.

[0035] The oscillating mean 37 has a second support mean 38, that can be made as the first 14, fit to match, during the rotation of the door between the extreme closing C and opening A conditions or vice versa, a cam profile 39 carried out on the edge of the shaped arm 12 opposed to the cam mean 15.

[0036] The fixing 40 of the elastic mean 13 to the oscillating mean 37, the support mean 38 and the swiveling connection of the oscillating mean 37 to the second connecting member 5 are set to the vertexes of a triangle.

[0037] The swiveling connection of the oscillating mean 37 to the second connecting member 5 includes a third pivot 41 or is made in the first support mean 14.

[0038] The shaped arm 12, in correspondence of the cam mean 15 and of the cam profile 39 has an approximately lengthened triangle form with right or curved sides.

[0039] Such variation, despite of a greater production complexity, allows to balance doors having weigh and dimensions greater of those of the preferred embodiment.

[0040] It must be noted that the small dimensions of the first connecting member 4 and of the fixing mean 23, together with the peculiar transmission of the spring force, allow to apply the device also to doors of ovens having many insulating layers, for instance made with five or more glass plates, and therefore very heavy but provided with small inner space for the hinge.

[0041] Obviously the invention also includes symmetrical devices in comparison to those shown and described comprising right, lefts and ambidextrous hinges.

[0042] An advantage of the present invention is to furnish a hinge device for a door also provided with a reduced space for housing the fixing portion of the related device portion.

[0043] Another advantage is to supply a modular device provided with interchangeable parts for using with appliances of different type and sizes.

[0044] A further advantage of the present invention is

to furnish a device of easy and fast assemblage to its elastic elements and to the appliance.

[0045] Another advantage is to supply an hinge device fit for balancing doors of different weights and shapes.

Claims

1. Hinge device for a door (2) of a structure (3) provided with connecting member, first (4) and second (5), provided with corresponding first (6, 7) and seconds (8, 9) ends and respectively destined to be fixed to door (2) and structure (3) for the door rotation between extreme closing (C) and opening (A) conditions; the device is **characterized in that** it includes a protruding arm (10) associated to the first end (7) of the second connecting member (5) and having a first rotation pivot (11) connected to the first end (6) of the first connecting member (4); and it includes an arm shaped mean (12) having one end swiveling connected to the first member (4) by a second pivot (17) positioned to a predetermined distance (D) from the first pivot (11) and the remaining end is associated, by connecting means (33), to an elastic mean (13) fixable near the second end of the second member (5).
2. Device according to claim 1 **characterized in that** it includes a first support mean (14) connected to the second element (5) and fit to match a cam mean (15) of the shaped arm (12) during the door rotation between the extreme closing (C) and opening (A) conditions or vice versa.
3. Device according to claim 2 **characterized in that** the cam mean (15) is made by shaping an edge of the shaped arm (12) and the first support mean (14) comprises a rotating pulley mean (19) provided with a ring groove for such edge.
4. Device according to claim 2 **characterized in that** in the extreme opening condition (A), the first support mean (14) engages a block portion (16) of the cam mean (15), approximately orthogonal to the line joining the second pivot (17).
5. Device according to claim 2 **characterized in that** in the extreme closing condition (C) the first support mean (14) engages a detachable arrest portion (18) of the cam mean (15), approximately parallel to the line joining the second pivot (17).
6. Device according to claims 4 and 5 **characterized in that** the portion of the cam mean (15) interposed between the block portion (16) and the detachable stop is curve shaped.
7. Device according to claim 3 **characterized in that** the first support mean (14) comprises a peg (20) for the rotation of the pulley mean (19).
8. Device according to claim 7 **characterized in that** the pulley mean (19) is connected to the peg (20) by friction means (21).
9. Device according to claim 8 **characterized in that** the friction means (21) include at least a bush interposed with interference between peg (20) and pulley mean (19).
10. Device according to claim 8 **characterized in that** the friction means include a plurality of springs and plans or friction cones.
11. Device according to claim 1 **characterized in that** the cam mean (15) and the first support mean (14) are provided with respective means anti-slipping (22).
12. Device according to claim 11 **characterized in that** the anti-slipping means (22) of the cam mean (15) and of the first support mean (14) comprises respective complementary teeth.
13. Device according to claim 11 **characterized in that** the first connecting member (4) is fixed to the joint removable door by a fixing mean (23) fixed to the door.
14. Device according to claim 13 **characterized in that** the first connecting member (4) and the fixing mean (23) are provided with respective complementary matching means (24, 25, 26, 27) fit, in a mutual engagement condition (I), to allow only the axial relative motion of leaving between such member (4) and mean (23) which are also provided with joining means (28) to prevent, removably, such axial movement of joint and unblocking.
15. Device according to claim 14 **characterized in that** the complementary matching means (24, 25, 26, 27) comprises buttonholes open and respective thorns made and fixed in proximity of the ends of the first connecting member (4) and of the fixing mean (23).
16. Device according to claim 14 **characterized in that** the joining means (28) comprises a lever mean (29) swiveling connected to the first connecting member (4) and provided with a head (30) removably pushed by elastic means (31) in a respective slot (32), made in the fixing mean (23), in the mutual engagement condition (I).
17. Device according to claim 16 **characterized in that**

comprises a stop mean (36) swiveling connected to the shaped arm (12) to match removably the second member (5) removably arresting the first member (4) to facilitate the joint and the unblocking of this latter with the fixing mean (23).

5

18. Device according to claim 1 **characterized in that** the connecting means (33) comprises a buttonhole, for an end of the elastic mean (13), made in the shaped arm mean (12) and the second end (9) of the second member (5) has an attack for the remaining end of the elastic mean (13). 10
19. Device according to claim 1 **characterized in that** the elastic mean (13) is of helical shape fit for exerting an elastic traction force and has, in correspondence of at least one end, starting from outside, a connection for tension means (34) of assembly of the spring and, inside, a connection for the operational assemblage (35). 15 20
20. Device according to claim 18 **characterized in that** the connection for the assembly tension means (34) is hook shaped and the connection for the operative assemblage (35) is buttonhole shaped with oval form. 25
21. Device according to claim 1 **characterized in that** the connecting means (33) comprises an oscillating mean (37) swiveling connected to the second connecting member (5) and having a second support mean (38) fit to match a cam profile (39) made on the edge of the shaped arm (12) opposite to the cam mean (15) during the rotation of the door between the extreme closing (C) and opening (A) conditions or vice versa. 30 35
22. Device according to claim 21 **characterized in that** the fixing (40) of the elastic mean (13) to the oscillating mean (37), the support mean (38) and the swiveling connection of the oscillating mean (37) to the second connecting member (5) are positioned to the vertexes of a triangle. 40
23. Device according to claim 21 **characterized in that** the swiveling connection of the oscillating mean (37) to the second connecting member (5) comprises a third pivot (41) or is made in the first support mean (14). 45 50
24. Device according to claim 21 **characterized in that** the shaped arm (12), in correspondence of the cam mean (15) and of the cam profile (39) is shaped approximately as a lengthened triangle. 55
25. Device according to claim 21 **characterized in that** the protruding arm (10) is integral with the second connecting member (5).

26. Device according to claim 21 **characterized in that** the protruding arm (10) is interchangeable, has different sizes in order to be adapted to doors (2) and or different structures (3) and is fixed to the second connecting member (5) by fixing means (42).

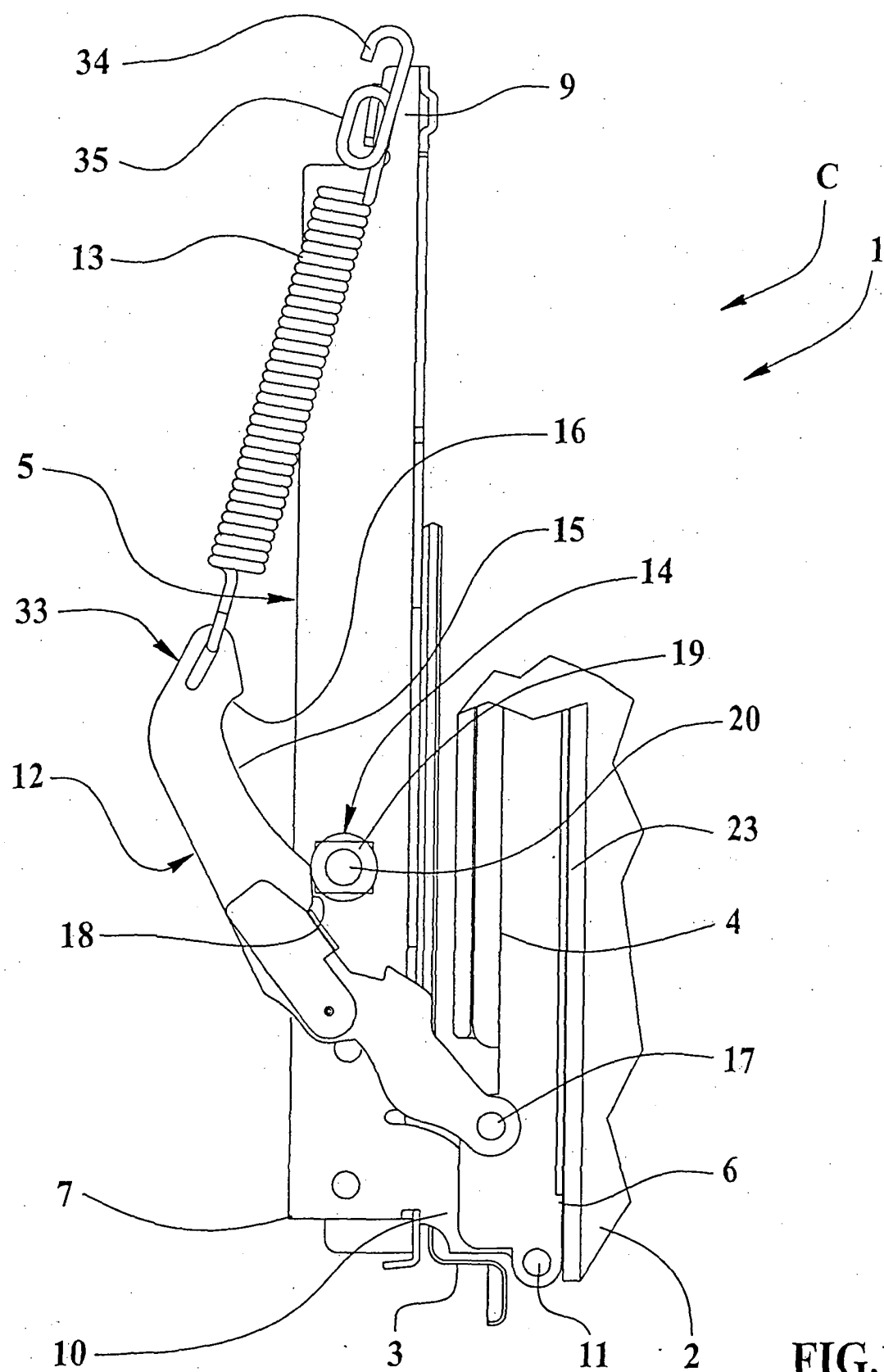


FIG.1

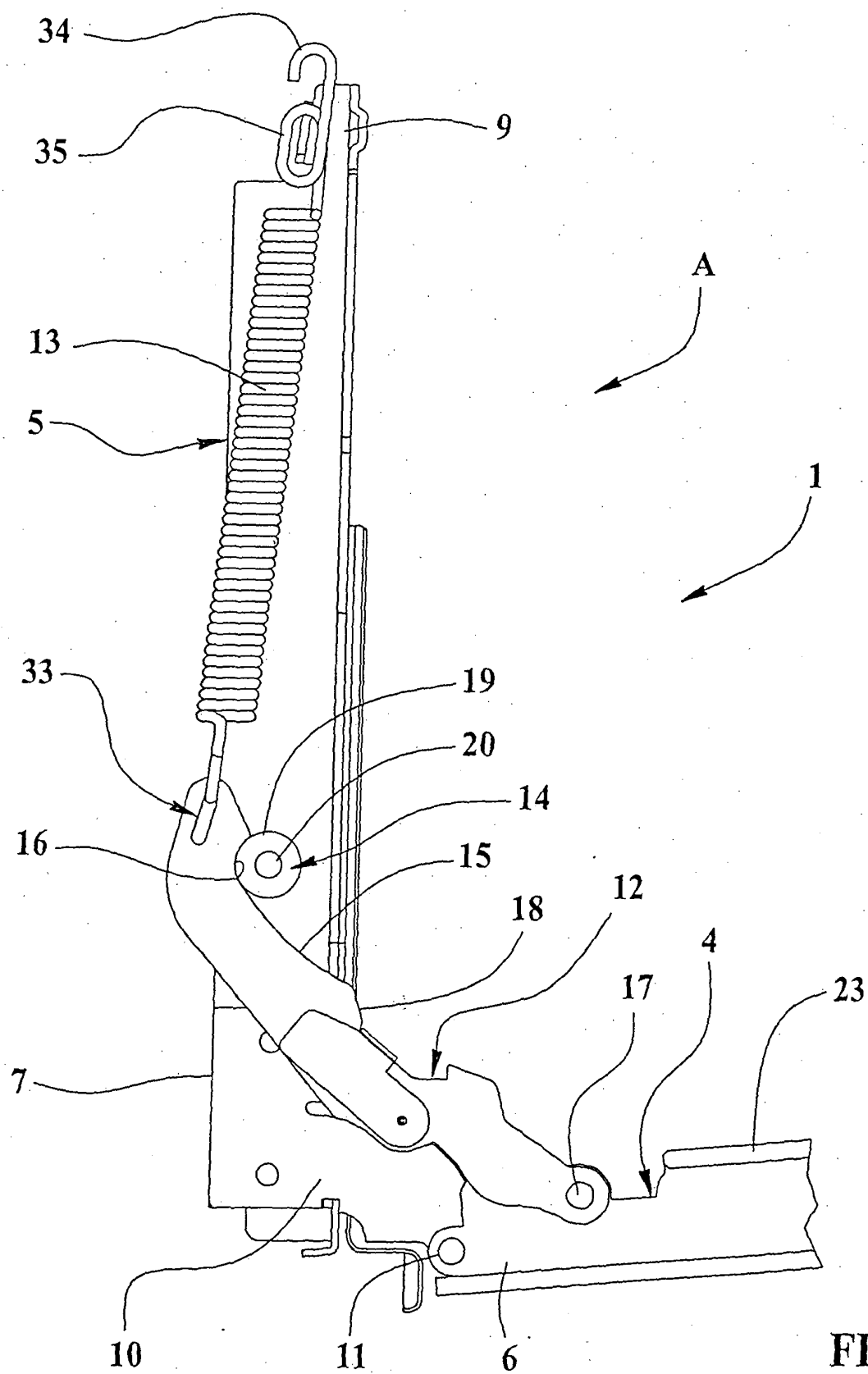
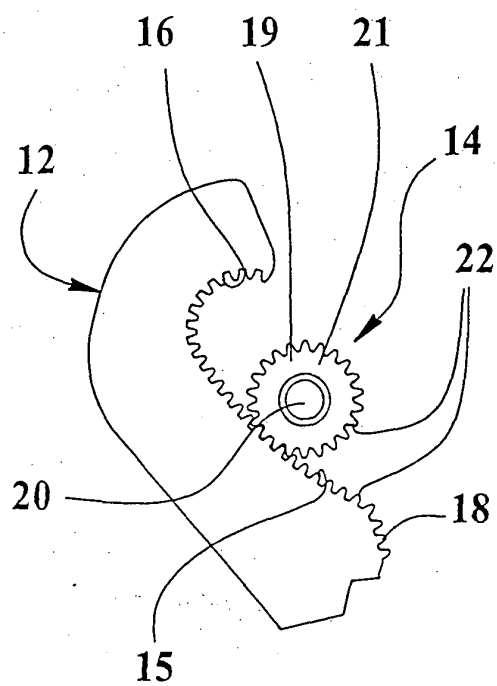
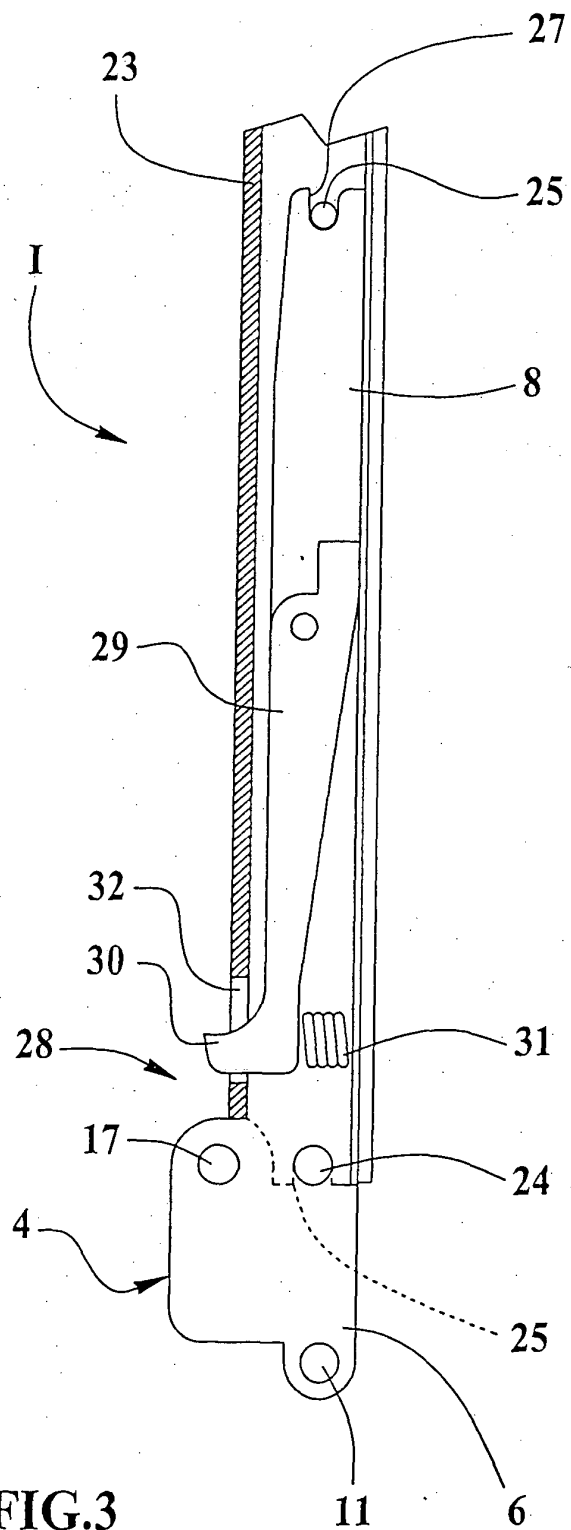


FIG.2



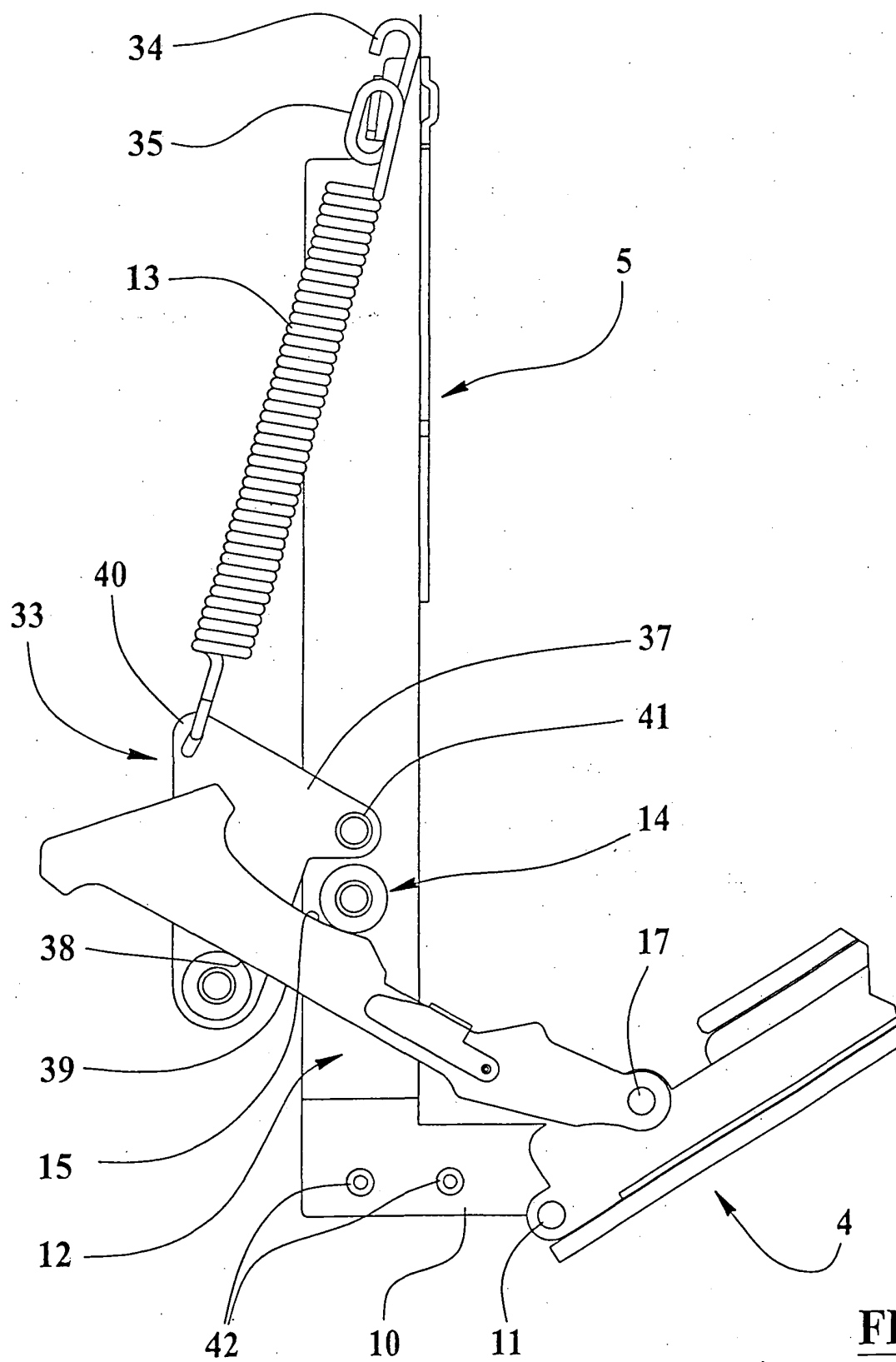


FIG.5