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(54) **Soft/self closing system for built-in refrigerator door**

(57) A built-in household appliance assembly, comprising a household appliance (2) and a piece of furniture (10) housing the household appliance, the household appliance and the piece of furniture having respective doors (5, 13) connected in a sliding way with each other so that they can jointly rotate, around respective axes (7, 14), between a closed position where they are substantially parallel to a reference plane, and an open position where they form substantially a same rotation angle (α) with the reference plane and they allow access to an internal compartment (6) of the household appliance; the assembly

further comprises a coupling device (17) arranged between the doors, which comprises an elastic member (23) and a damper (25), and has a first operating mode when the rotation angle is between 0° and a limit value and a second operating mode when the rotation angle is greater than the limit value; wherein in the first operating mode the elastic member is active to allow self closing of the doors and the damper is active to allow soft closing of the doors, and in the second operating mode at least the elastic member is deactivated.

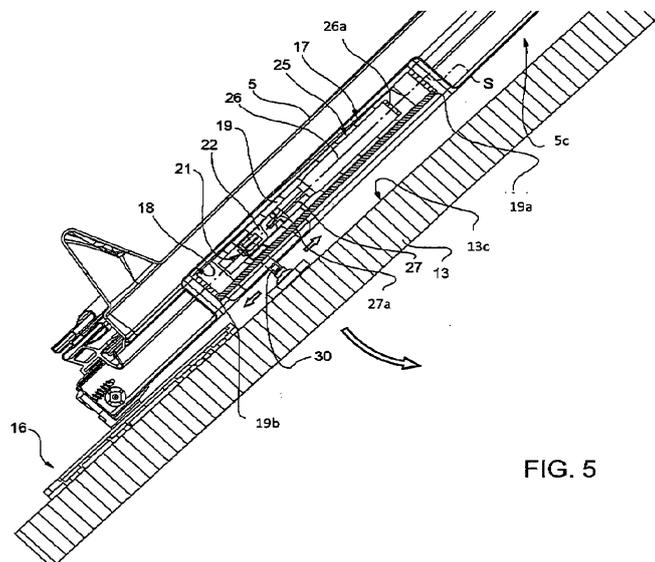


FIG. 5

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Description

[0001] The present invention relates to a sliding door system for built-in refrigerator having a soft/self closing device applied.

[0002] As it is known built-in refrigerators are enclosed in a piece of furniture that copies the external shape of the refrigerator (normally the shape is a parallelepiped) and that is provided with a front door for having access to the inner parts of the refrigerator.

[0003] The front doors are applied according to two different techniques, i.e. the so called "door on door" technique and "sliding door" technique.

[0004] In the first case ("door on door") the door of the piece of furniture is directly applied onto the door of the refrigerator and both doors are turning around the same pivots; in other words, there is a single pivot axis for both doors.

[0005] In the second case ("sliding door") the door of the refrigerator pivots on the body of the refrigerator and the door of the piece of furniture pivots on the piece of furniture; the pivoting axes are parallel but are spaced one with respect to the other. A consequence of the latter system is that during doors opening/closing one door slides with respect to the other. Doors are in fact connected one with respect to the other by a connecting element that keeps the two doors approximately parallel and facing, and at the same time permits sliding between doors.

[0006] In the "door on door" solution, a "soft closing" arrangement comprising a damper and a spring system is typically added in order to "smooth" the final movement of the door when closing.

[0007] In the "sliding door" solution the soft closing remains an open issue as it is not clear how a damper and spring system could be used, due to the particular complexity of the door coupling structure. It should in particular be avoided that the spring could cause an undesired closure of the door when the door is at the maximum aperture.

[0008] It is thus an object of the present invention to create a system that permits soft/self closing in "sliding door systems" without causing an unwanted closure of the door, unless the door is only slightly opened.

[0009] The above scope is obtained by the present invention thanks to the provision of a soft/self closing device disposed between the refrigerator door and the furniture door and operating based on the value of angle that the doors form with respect to a reference plane; in a first operating mode, operated for angles lower than a limit value, the soft/self closing device applies a soft and self closing action on the two doors, while in a second operating mode, operated for angles over the limit value, the soft/self closing device does not apply any action on the doors (at least, not a self closing action). Therefore, during doors opening, when the limit angle is reached the soft/self closing device is deactivated and, during doors closing, when the limit angle is reached the soft/self

closing device is reactivated.

[0010] More in detail, the present invention relates to a built-in household appliance assembly, comprising a household appliance, such as a refrigerator or freezer, and a piece of furniture housing the household appliance, the household appliance and the piece of furniture having respective doors connected in a sliding way with each other so that they can jointly rotate, around respective axes, between a closed position where they are substantially parallel to a reference plane, and an open position where they form substantially a same rotation angle with the reference plane and they allow access to an internal compartment of the household appliance. The assembly comprises a coupling device arranged between the doors and comprising an elastic member and a damper, the coupling device having a first operating mode when the rotation angle is between 0° and a limit value, preferably comprised between 30° and 45°, and a second operating mode when the rotation angle is greater than the limit value. In the first operating mode the elastic member, which is preferably a spring, is active to allow self closing of the doors and the damper is active to allow soft closing of the doors, and in the second operating mode at least the elastic member is inactive.

[0011] Preferably, in the second operating mode both the elastic member and the damper are inactive. In particular, the coupling device is preferably designed so that in the second operating mode the elastic member is disconnected from at least one of the doors.

[0012] Moreover, during doors closing, when the limit value of rotation angle is reached the elastic member and the damper can be automatically reactivated.

[0013] The coupling device may comprise a guide and a slide slidingly coupled to the guide, the guide being defined by a support body connected with a first one of said doors and the slide being designed to be selectively engaged with a second one of said doors.

[0014] Preferably, when the limit angle is reached during door opening, the slide reaches an end position where it disengages from the second door.

[0015] The elastic member may be coupled to the slide in such a way that when the slide moves towards said end position, the elastic member is progressively loaded.

[0016] In a preferred embodiment, the slide is engaged with a coupling member rigidly fixed to the second door in the first operating mode and disengaged from said coupling member in the second operating mode.

[0017] The slide may comprise an engagement member and a push member connected with each other, the engagement member being suitable to move between a first position where it engages with said coupling member and a second position where it is disengaged from said coupling member, and the push member being suitable to cooperate with a movable shaft of the damper.

[0018] The engagement member and the push member may be hinged with each other, and the engagement member may be suitable to rotate with respect to the push member.

[0019] The present invention also relates to an appliance suitable to form such an assembly, in particular an appliance suitable to be hosted in a piece of furniture and having a door configured to be connected in a sliding way with a door of the piece of furniture, so that the doors can jointly rotate around respective axes between a closed position where they are substantially parallel to a reference plane, and an open position where they form substantially a same rotation angle with respect to the reference plane and they allow access to an internal compartment of the appliance. According to the invention, the appliance comprises a coupling device to be arranged between the doors and comprising an elastic member and a damper, the coupling device having a first operating mode when the rotation angle is between 0° and a limit value and a second operating mode when the rotation angle is greater than the limit value; in the first operating mode, the elastic member is active to allow self closing of the doors and the damper is active to allow soft closing of the doors; in the second operating mode, at least the elastic member is inactive,

[0020] Even though the present invention will be described with reference to a built-in refrigerator or freezer, the same can be applied to other types of built-in household appliances, for example an oven, for which the self/soft closing effect is desirable.

[0021] The invention will be described with respect to the enclosed drawings wherein:

- Figure 1 shows - by means of a schematic horizontal section - a built-in assembly with a sliding door system according to the present invention, with the doors closed;
- Figure 2 shows the assembly of figure 1 with the doors opened at an angle of 45°;
- Figure 3 shows the assembly of figure 1 with the doors opened at an angle of 90°;
- Figures 4, 5 and 6 show - in an enlarged scale - details of the assembly of the present invention, in the three different conditions of figures 1, 2 and 3, respectively;
- Figures 7a-7c, 8a-8c and 9a-9c show a component of the assembly of the present invention, in the mentioned three different conditions; in particular, figures 7a, 8a and 9a are sections taken according to lines A-A, B-B and C-C of figures 7b, 8b and 9b, respectively; and
- Figure 10 shows, isolated from the rest and in enlarged scale, a subcomponent of the component of figures 7a-7c, 8a-8c and 9a-9c.

[0022] With reference to the figures, a built-in household appliance assembly 1, in particular a built-in refrigerator assembly, comprises a refrigerator 2 (shown schematically and partially) and a piece of furniture 10 housing the refrigerator 2,

[0023] The refrigerator 2 comprises a cabinet body 4 and a front door 5 (hereinafter, the "refrigerator door").

The refrigerator door 5 has a first lateral side 5a that is hinged to the cabinet body 4 and a second lateral side 5b that is free, so that the refrigerator door 5 can pivot around a first pivoting axis 7 between a closed position and an open position where it allows access to at least one internal compartment 6 of the refrigerator 2.

[0024] The piece of furniture 10 has at least a first and a second lateral wall 11a, 11b facing respective lateral walls (not numbered) of the body cabinet 4, and a front door 13 (hereinafter, the "furniture door"). The piece of furniture 10 may also comprise a top horizontal wall and a bottom horizontal wall (not shown).

[0025] The furniture door 13 has a first lateral side 13a hinged to a rim of the first lateral wall 11a of the furniture 10 (by means of known means used in the field of furniture) and a second lateral side 13b that is free, so that the furniture door 13 can rotate around a second pivoting axis 14 parallel to the first pivoting axis 7 and spaced with respect to the first pivoting axis 7 of a distance D (see figure 4). The furniture door 13 is designed to close a front rectangular aperture 12 of the piece of furniture 10, which gives access to the refrigerator 2.

[0026] As shown in figures 5 and 6, the assembly 1 comprises a sliding connection device 16 interposed between facing surfaces 5c, 13c of the first and the second door 5, 13 for coupling the refrigerator door 5 with the furniture door 13, so that they can open and close together. In particular device 16 allows a sliding movement between the first and the second door 5, 13 during rotation thereof, which is due to the fact that the doors 5, 13 have distinct rotating axes 7, 14.

[0027] When closed, the two doors 5, 13 are parallel with each other and are also parallel to a resting plane P (figure 4) where aperture 12 extends.

[0028] According to the invention, the assembly 1 further comprises a soft/self closing device 17 arranged between the first and the second door 5, 13, to apply both an elastic force and a damping force between the two doors 5, 13.

[0029] The soft/self closing device 17 and the sliding connection device 16 form together a door coupling system.

[0030] The soft/self closing device 17 comprises at least an elastic device 23 (figure 6), preferably a spring, and a damper 25 (figures 4 and 5) interposed and acting between the first and the second door 5, 13. As better described in the following, the soft/self closing device 17 has a first and a second operating mode that are operated based on the angle α that the doors 5, 13 form with the resting plane P, assuming them to be always substantially parallel with each other (thanks to the action of the connecting device 16). More in detail:

- the device 17 operates in the first operating mode for angles α from 0° to a limit value, which preferably ranges between 30° and 45°; in the first operating mode, the damper 25 and the spring 23 are active between the first and the second door 5, 13; and

- the device 17 operates in the second operating mode for angles α greater than the limit value; in the second operating mode the damper 25 and the spring 23 are inactive, in particular are disconnected from the furniture door 13.

[0031] As shown in figures from 4 to 6, the soft/self closing device 17 is housed in a recess 18 of the refrigerator door 5 facing the furniture door 13. The recess 18 has a substantially rectangular shape, a constant depth, and is located on an exterior side of the refrigerator door 5.

[0032] Reference is now made to figures 7a-7c, 8a-8c and 9a-9c, which show (not in scale and according to different views) the soft/self closing device 17 in the first operating mode (doors closed or opened at an angle α lower than the limit value), in the instant of switching between the first and the second operating mode (doors opened at an angle α corresponding to the limit value), and in the second operating mode (doors opened at an angle α higher than the limit value), respectively,

[0033] The soft/self closing device 17 comprises a rectangular supporting wall 20 and an elongated hollow body 19 fixed to the supporting wall 20, or made of a single piece with it.

[0034] The elongated body 19 is housed in the recess 18 and the supporting wall 20 is designed to close the recess 18, substantially on the plane of the door internal surface 5c. The elongated body 19 and the supporting wall 20 are rigidly fixed to a base wall of the recess 18, and therefore to the refrigerator door 5, for example by means of screws (not shown).

[0035] As shown in figure 7b, the hollow body 19 has a first and a second longitudinal portion 19a, 19b (respectively on the right and on the left in the figure) and two parallel opposite lateral walls 19c, 19d.

[0036] In the first longitudinal portion 19a of the hollow body 19, the hollow body 19 holds and houses the spring 23 and the damper 25. The damper 25 has a longitudinal axis S, substantially perpendicular to pivoting axes 7, 14 (i.e. substantially horizontal), and the spring 23 is arranged below the damper 25, side-by-side with it, with a central axis parallel to axis S.

[0037] The two lateral walls 19c, 19d have, in the second longitudinal portion 19b of the hollow body 19, respective longitudinal slots 21, identical to each other and defining together a guide for a sliding member 22 of device 17 (called simply "slide" in the following), better described later on. The slots 21 are substantially L-shape and have respective longitudinal first portions 21a, defining the longer arm of the L and extending parallel to axis S, and a second portion 21b, defining the shorter arm of the L and extending downwards from one end of the first portions 21a (the left end in figures 7a, 8a and 9a).

[0038] The sliding member 22 is coupled to the guide 21 and is designed to slide back and forth along axis S between a first end position (figure 7a) and a second end position (figures 8a and 9a).

[0039] The spring 23 has a first end 23a stably connected with an internal wall 19e of the elongated body 19 in the first longitudinal portion 19a thereof, and a second end 23b connected with the slide 22 in the second longitudinal portion 19b.

[0040] The damper 25 comprises a tubular cylindrical body 26 stably connected, at an end 26a thereof, with a bottom wall 19f of the elongated body 19, and a movable shaft 27 (see Figures 8a and 9a) extending axially from the tubular body 26 and designed to act with its free end 27a on the slide 22.

[0041] As shown in figure 10, the slide 22 comprises a push member 31, suitable to cooperate with the movable shaft 27 of the damper 25, and an engagement member 32, suitable to cooperate with the spring 23 and with a first pin member 30 rigidly connected to furniture door 13. In particular, the first pin member 30 is fixed to the internal surface 13c of the furniture door 13 by means of a fixing plate 28 (see figures 4, 5 and 6) and extends from the surface 13c towards the recess 18 of the refrigerator door 5; during doors rotation, the first pin member 30 is designed to slide horizontally through an elongated slot 24 of wall 20 to which it is slidingly coupled by means of a wheel 29. The slot 24 extends parallel to the first portion 21a of guide 21 and is located over the second longitudinal portion 19b of the hollow body 19.

[0042] The push member 31 and the engagement member 32 are hinged with each other by means of a second pin member 33, extending along an axis 34 orthogonal to axis S and substantially horizontal. The second pin member 33 engages, with its opposite ends, the two longitudinal slots 21 of the hollow body 19, so as to allow the sliding coupling between the slide 22 and the hollow body 19.

[0043] The push member 31 has a substantially plane contact surface 31a orthogonal to axis S, on which the free end 27a of shaft 27 abuts to apply the damping force of damper 25.

[0044] The engagement member 32 is a substantially flat body extending on a vertical plane containing axis S, designed to pivot, at a first side thereof (the right side in figure 7a), about axis 34. The engagement member 32 has three functional portions:

- an engagement portion 32a, at an upper part thereof, designed for engagement with the first pin member 30;
- a locking portion 32b, at a second side thereof (the left side in figure 7a), formed by two laterally protruding elements and designed to engage with the first portion 21a of guide 21 until the second end position of guide 21 is reached, and then with a delimiting wall 21c of the second portion 21b of guide 21;
- a spring coupling portion 32c; at a lower part thereof, to which the second end 23b of spring 23 is rigidly fixed.

[0045] The engagement portion 32a is forked, in par-

ticular like the head of a spanner, so as to define a seat 32d that can host the first pin member 30.

[0046] The two laterally protruding elements 32b forming the locking portion extend in opposite directions along an axis parallel to axis 34 of the second pin member 33 and, as previously mentioned, are suitable to engage, like the second pin member 33, the two longitudinal slots 21 of the hollow body 19, when the slide 22 is moving from the first to the second stop position, or vice versa.

[0047] The slide 22 has two operating conditions:

- an engagement condition, when the soft/self closing device 17 is in the first operating mode, wherein both the protruding elements 32b and the second pin member 33 engage the first portion 21a of slots 21; in this condition, rotation of the engagement member 32 is impeded (which would be caused by the pulling action of spring 23 on the spring coupling portion 32c, as better described below) and the engagement portion 32a is engaged with the first pin member 30;
- a disengagement condition, when the soft/self closing device 17 is in the second operating mode, wherein the protruding elements 32b have left the first portion 21a of slots 21 and the engagement member 32 has rotated by effect of the pulling action of spring 23; in particular, the protruding elements 32b are inside the second portion 21b of slots 21 and abut against walls 21c, thus avoiding further rotation; in this condition, the engagement portion 32a is disengaged from the first pin member 30.

[0048] The slide 22 is configured to slide along guide 21 between the first stop position (figure 4 and figures 7a-7c), at the right end of guide 21 in the representation of figure 7, where it is in the engagement condition and where the spring 23 is not tensioned (or is tensioned to a small extent), and the second stop position (figures 5, 6, 8a-8c and 9a-9c) at the left end of guide 21, where it is in the disengagement condition and where the spring 23 is tensioned.

[0049] The soft/self closing device 17 operates as follows.

[0050] When the doors 5, 13 are closed, the slide 22 is in the first stop position and in the engagement condition (figures 7a-7c), wherein it is coupled with the first pin member 30. In this condition, the spring 23 is not tensioned (or slightly tensioned) and the damper 25 is ineffective.

[0051] As a user opens the doors 3, 13 (by applying a pulling force to the furniture door 13, which is transmitted to the refrigerator door 12 by the sliding connection device 16), the linear displacement of one door with respect to the other causes the sliding movement of the first pin member 30 in the slot 24 and, as the pin member 30 mates with the engagement portion 32a of slide 22, a corresponding dragging movement of slide 22 along the guide 21. In particular, the slide 22 slides horizontally, as the second pin member 33 and the protruding members

32b both engage the first portion 21a of slide 21,

[0052] During this movement of slide 22, the spring 23 is progressively stretched and tensioned, while the shaft 27 of the damper 25 simply follows this movement. In this phase (where the doors opening angle α is lower than the limit value), the soft/self closing device 17 works in the first operating mode, wherein the damper 25 and the spring 23 are active between the first and the second door 5, 13. A connection chain between furniture door 13 and refrigerator door 5 is in fact established through pin member 30 carried by furniture door 13, slide 22 mated with pin member 30, damper 25 and spring 23 both connected with slide 22, and elongated body 19 carried by refrigerator door 5.

[0053] If the door opening is stopped before the limit value of angle α is reached, the soft/self closing device 17 keeps working in the first operating mode. In this condition, if the user leaves the doors 5, 13 free to move, the spring 23 pulls back the slide 22 towards the first stop position, and the slide 22 drags the first pin member 30 in this movement. Accordingly, the doors 5, 13 are forced back to the closed position. During sliding back of slide 22, the damper 25 applies its damping action on the slide 22 thanks to the force applied by the shaft 27 on the push member 31. Therefore, the combined action of the spring 23 and damper 25 accomplishes a self and soft closing action.

[0054] The damping action is applied also if the user, instead of leaving the doors 5, 13 free to move, pushes the doors 5, 13 to close them. In this case, the pushing action of the user simply adds to the self closing action performed by the spring 23.

[0055] When the doors 5, 13 are opened at an angle α greater than the limit value, in the absence of a mechanism for deactivating the spring, the soft/self closing device 17 would keep working in the first operating mode and the progressive spring loading would result in an excessive return force hampering further opening of the doors and tending to close them in a violent way. This would be unpleasant and potentially dangerous.

[0056] According to the present invention, the above effect is avoided thanks to the mechanism that switches, during door opening, the soft/self closing device 17 from the first operating mode to the second operating mode when the limit value of the opening angle α is reached. In particular, this switching mechanism deactivates the spring 23, so that in the second operating mode not only a further rotation of the doors 5, 13 (and thus a further displacement of one door with respect to the other) cannot cause further tensioning of the spring 23, but also the spring 23 has no more action on the furniture doors 13. Advantageously, also the damper 25 is no more operative_ as from the above limit value of opening angle α , since in the second operating condition of the soft/self closing device 17 the slide 22 is disengaged from the first pin member 30 and rests in the second stop position. In other words, the above disclosed connection chain between the two doors is interrupted by the disengagement

of the pin 30 from the slide 22.

[0057] This switching mechanism works as follows.

[0058] As shown in figures 8a-8c, as the slide 22 approaches the second stop position, the two protrusions 32b of the engagement member 32 leave the first portion 21a of guide 21, so that the engagement member 32 is no more impeded from rotating about the axis 34 of the second pin member 33 under the action of spring 23 and under the eccentric (with respect to axis 34) action of the first pin member 30. In other words, the slide 22 becomes unlocked.

[0059] Accordingly, the engagement member 32 rotates (counter-clockwise in the representation of figure 8a) and the two protruding members 32b move into the second portion 21b of guide 21, where they abut against the wall 21c. Now, with the slide in the second stop position, the soft/self closing device 17 is in the second operating condition, wherein the first pin member 30 is disengaged from slide 22 and can then move freely (direction B in figure 6 during door opening) along slot 24 (figure 6, figures 9a-9c). In this condition, for doors opening angle α over the limit value, the doors 5, 13 can freely move without any elastic pulling-back action or damping action.

[0060] When closing the doors 5, 13, starting from an opening angle α higher than the limit value, the soft/self closing device 17 works in the second operating mode, in which both the spring 23 and the damper 25 are inactive, until the limit value is reached. Then, the soft/self closing device 17 switches back from the second operating mode to the first operating mode, by the re-activation of the spring 23 and the damper 25. Accordingly, the spring 23 restarts applying a force on the doors 5, 13 tending to close them, and the damper 25 restarts applying a damping effect to smooth door closing. In other words, door closing with soft/self closing effect is performed as above outlined.

[0061] More in detail, during door closing starting from an opening angle α over the limit value, the first pin member 30 initially moves freely along slot 24, and no self/soft closing action is applied to the doors 5, 13. As the limit value of the opening angle α is reached, the first pin member 30 is received into seat 32d of engagement member 32 and re-engages with slide 22. By this engagement, the first pin member 30 applies an eccentric (with respect to axis 34) action on the engagement member 32, tending to rotate it clockwise (in the representation of figure 8a). When, by effect of this rotation, the protruding elements 32b leave the second portion 21b of guide 21 and engage with the first portion 21a, the slide 22 can start sliding along guide 21, subject to both pulling action of the spring 23 ("self closing" action) and damping action of damper 25 ("soft closing" action).

[0062] Therefore:

- when the doors opening angle α is higher than the limit value, the two doors 5, 13 interact only by means of the sliding connection device 16 (which allow a sliding reciprocal movement of the two doors 5, 13

proportional to the opening angle α), and

- when the doors opening angle α is higher than the limit value, the following additional actions are automatically applied between the two doors 5, 13 by the soft/self closing device 17: a retraction force (generated by the spring 23) tending to reduce the displacement between the two doors 5, 13 and therefore, as a consequence of this action combined to that of the sliding connection device 16, to rotate them together towards the closed position; and a smoothing force (generated by the damper 25) acting opposite the retraction force to reduce its action.

[0063] The embodiment of the present invention previously described is only a possible example of application, and various modifications can be applied to it.

[0064] For example, the parts can be inverted, so that the soft/self closing device 17 can be arranged on the furniture door 13, and the pin member 30 arranged on the refrigerator door 5. The way of operating would be exactly the same.

[0065] The elastic member 23 could be any type of device, also different from a spring, suitable to apply an axial elastic force.

[0066] Similarly, the damper 25 could be different from the one disclosed, and could be of any type suitable to apply an axial damping action.

[0067] Also the reciprocal position between spring 23 and damper 25 could be different from the one disclosed, as far as the two devices are able to apply the requested forces on the doors.

[0068] Moreover, the coupling device could have a different mechanism for engaging/disengaging the components of the two doors at the predetermined doors opening angle, provided that for angles lower than the limit value the elastic member is active to allow self closing of the doors and the damper is active to allow soft closing of the doors, and for angles higher than the limit value at least the elastic member is deactivated.

Claims

1. A built-in household appliance assembly, comprising a household appliance (2) and a piece of furniture (10) housing the household appliance, the household appliance and the piece of furniture having respective doors (5, 13) connected in a sliding way with each other so that they can jointly rotate, around respective axes (7, 14), between a closed position where they are substantially parallel to a reference plane (P), and an open position where they form substantially a same rotation angle (α) with the reference plane and they allow access to an internal compartment (6) of the household appliance; **characterized in that** it comprises a coupling device (17) arranged between the doors and comprising an elastic member (23) and a damper (25), said coupling device

- having a first operating mode when the rotation angle is between 0° and a limit value and a second operating mode when the rotation angle is greater than the limit value; wherein in the first operating mode the elastic member is active to allow self closing of the doors and the damper is active to allow soft closing of the doors, and in the second operating mode at least the elastic member is inactive. 5
2. An assembly according claim 1, wherein in the second operating mode both the elastic member and the damper are inactive. 10
 3. An assembly according to claim 1 or 2, wherein the limit value is between 30° and 45° . 15
 4. An assembly according to any of the preceding claims, wherein in the second operating mode the elastic member is disconnected from at least one of the doors. 20
 5. An assembly according to any of the preceding claims, wherein the elastic member is a spring.
 6. An assembly according to any of the preceding claims, wherein when said limit value of rotation angle is reached during doors closing, the elastic member and the damper are automatically reactivated. 25
 7. An assembly according to any of the preceding claims, wherein the coupling device (17) comprises a guide (21) and a slide (22) slidingly coupled to the guide, the guide being defined by a support body (19) connected with a first one of said doors (5) and the slide being designed to be selectively engaged with a second one of said doors (13). 30 35
 8. An assembly according to claim 7, wherein when the limit angle is reached during door opening, the slide reaches an end position where it disengages from the second door. 40
 9. An assembly according to claim 8, wherein the elastic member is coupled to the slide in such a way that when the slide moves towards said end position, the elastic member is progressively loaded. 45
 10. An assembly according to anyone of the claims from 7 to 9, wherein the slide is engaged with a coupling member (30) rigidly fixed to the second door (13) in the first operating mode and disengaged from said coupling member in the second operating mode. 50
 11. An assembly according to anyone of the claims from 7 to 10, wherein the slide (22) comprises an engagement member (32) and a push member (31) connected with each other, the engagement member being suitable to move between a first position where 55
- it engages with said coupling member and a second position where it is disengaged from said coupling member, and the push member being suitable to cooperate with a movable shaft (27) of the damper.
12. An assembly according to claim 11, wherein the engagement member (32) and the push member (31) are hinged with each other, and the engagement member is suitable to rotate with respect to the push member,
 13. An assembly according to anyone of the preceding claims, wherein the household appliance is a refrigerator or freezer.
 14. A built-in household appliance (2) suitable to be hosted in a piece of furniture (10), the household appliance having a door configured to be connected in a sliding way with a door of the piece of furniture, so that the doors can jointly rotate around respective axes (7, 14) between a closed position where they are substantially parallel to a reference plane (P), and an open position where they form substantially a same rotation angle (α) with respect to the reference plane and they allow access to an internal compartment (6) of the household appliance; **characterized in that** it comprises a coupling device (17) to be arranged between the doors and comprising an elastic member (23) and a damper (25); said coupling device having a first operating mode when the rotation angle is between 0° and a limit value and a second operating mode when the rotation angle is greater than the limit value; wherein in the first operating mode the elastic member is active to allow self closing of the doors and the damper is active to allow soft closing of the doors, and in the second operating mode at least the elastic member is inactive.

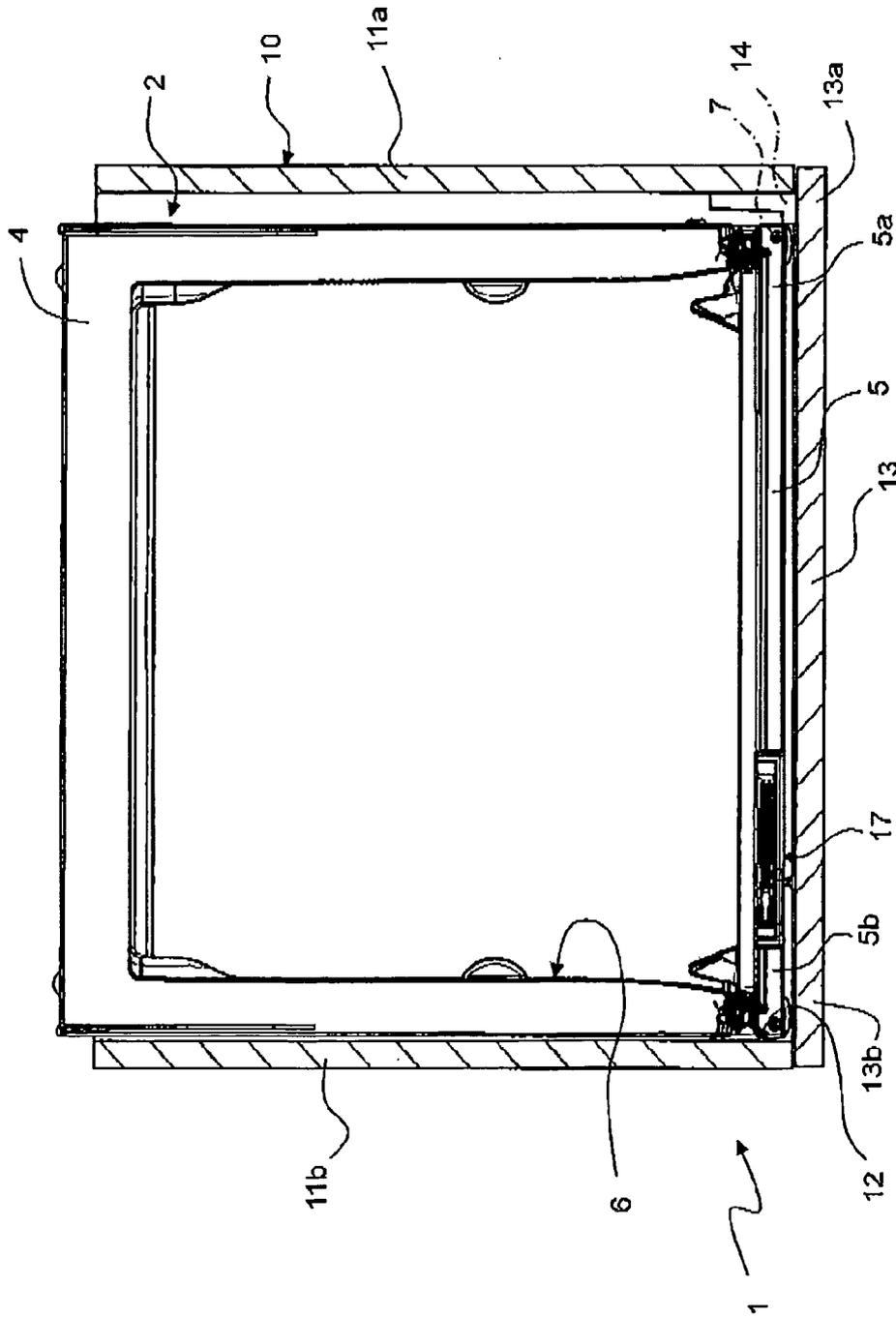


FIG. 1

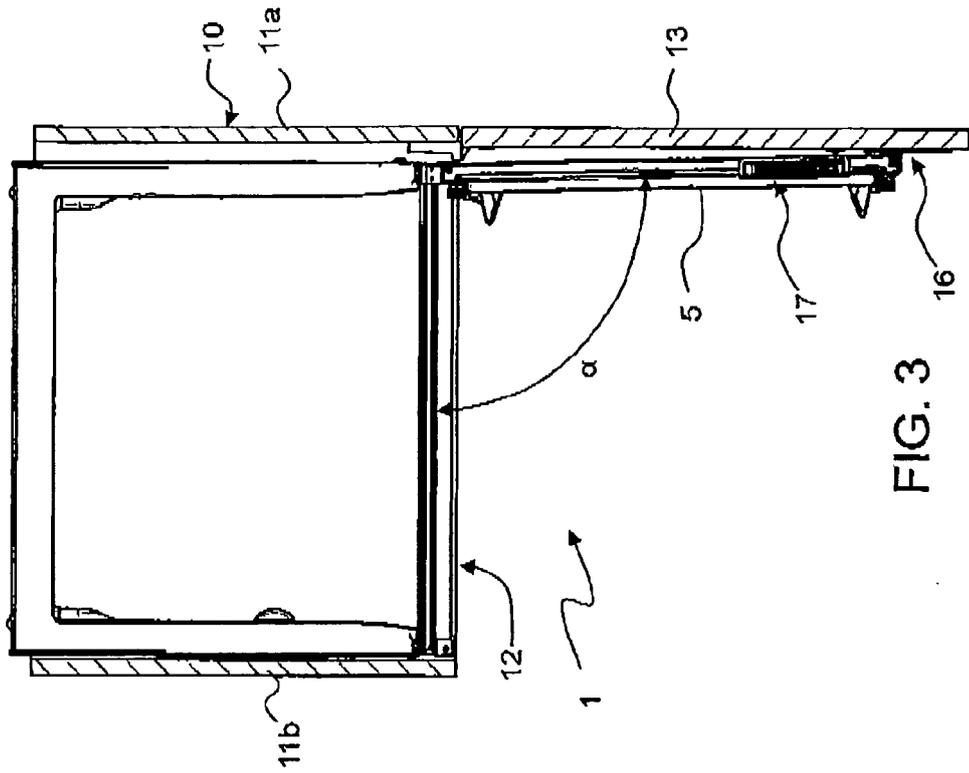


FIG. 3

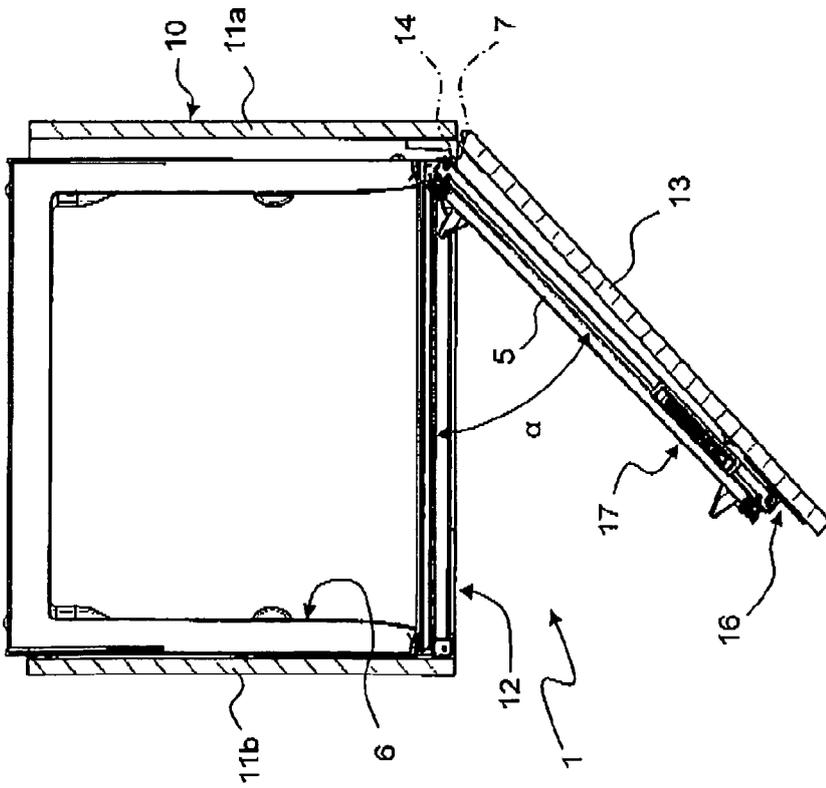


FIG. 2

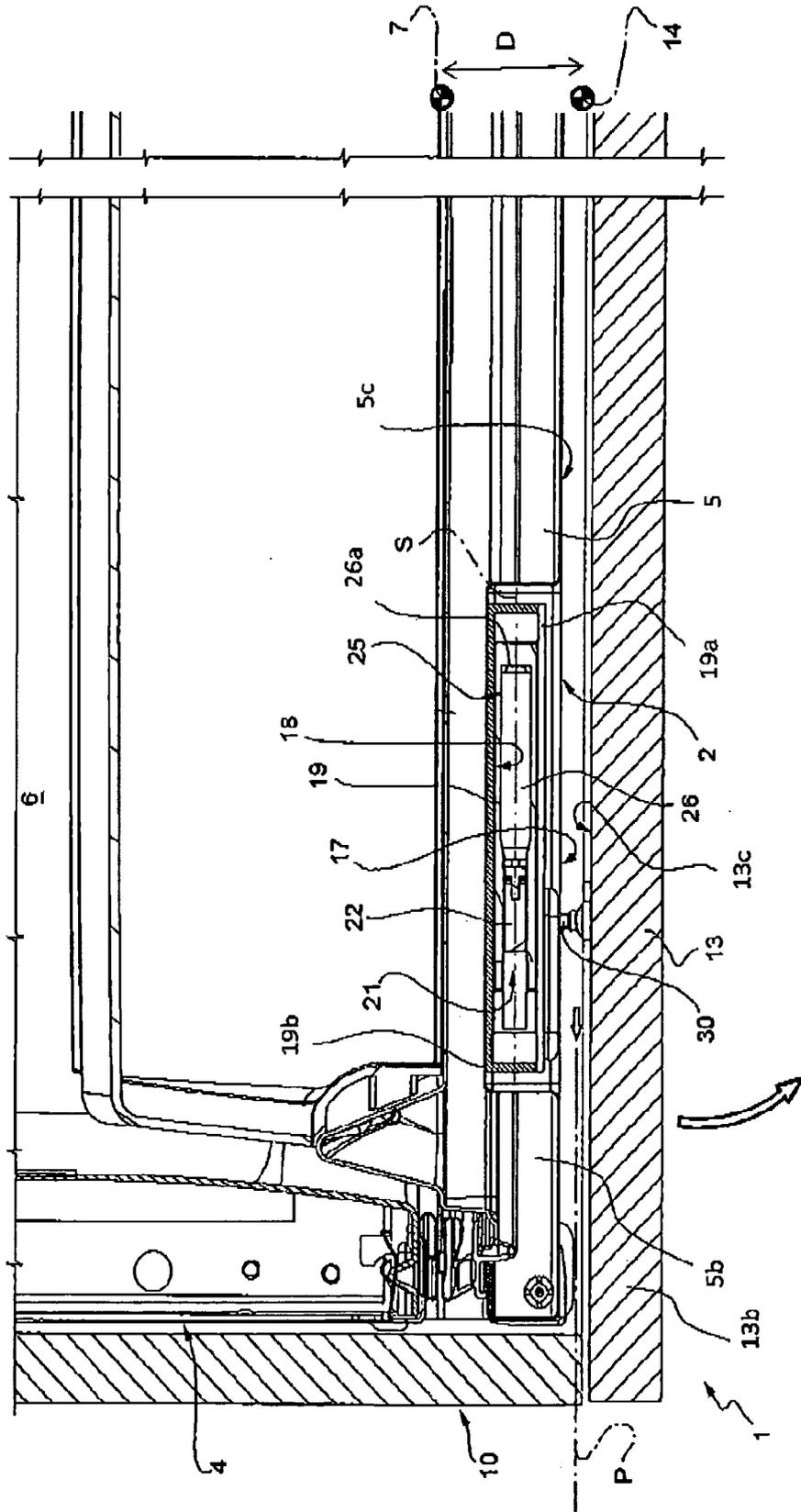


FIG. 4

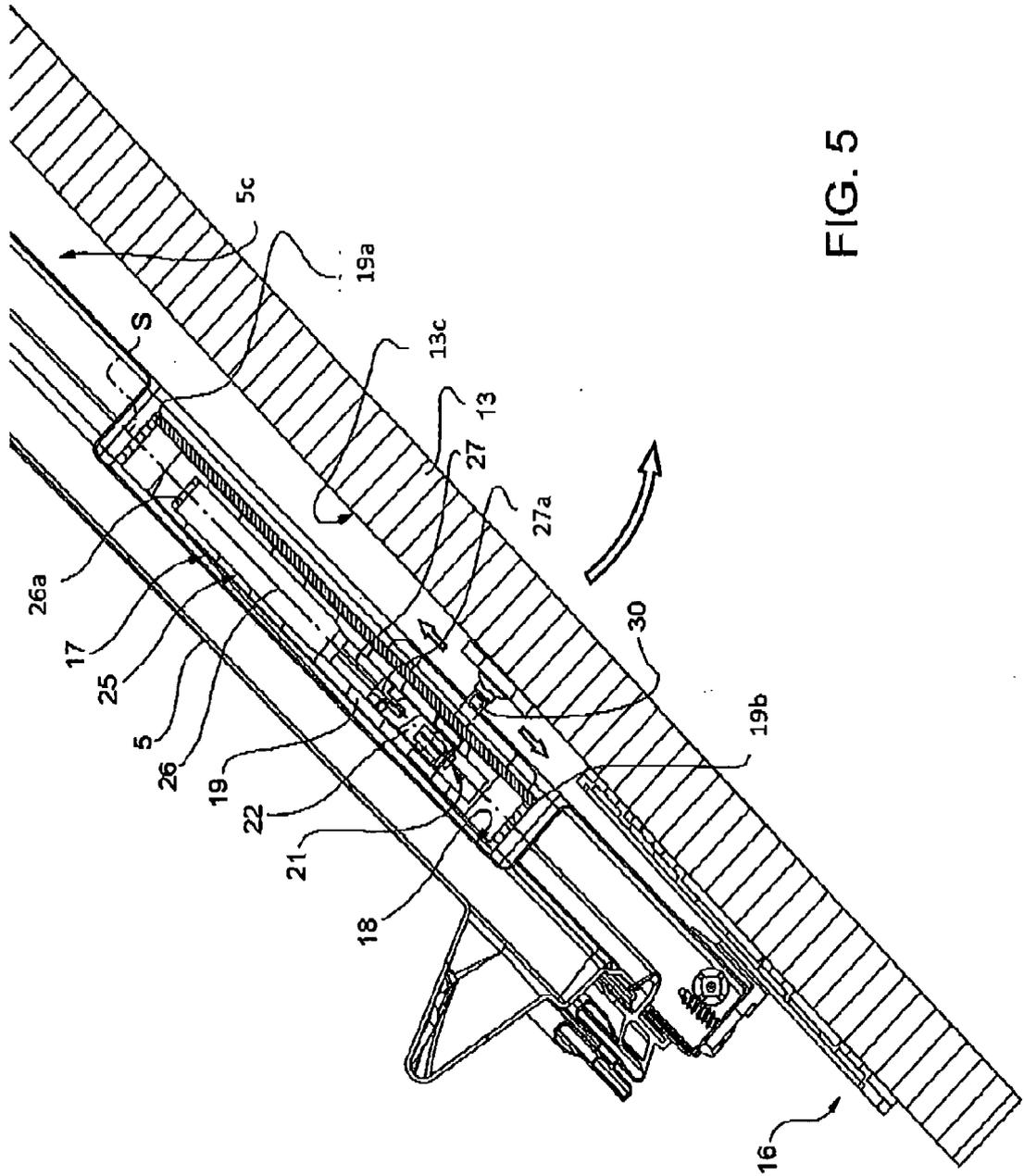


FIG. 5

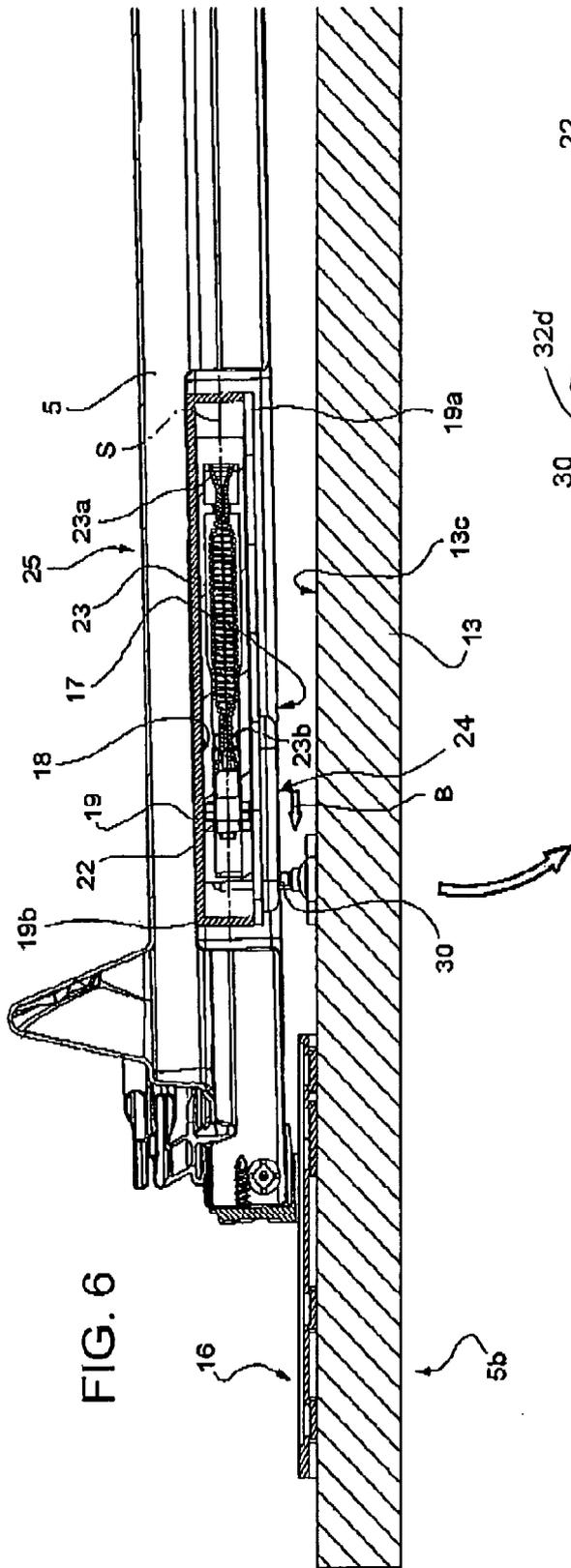


FIG. 6

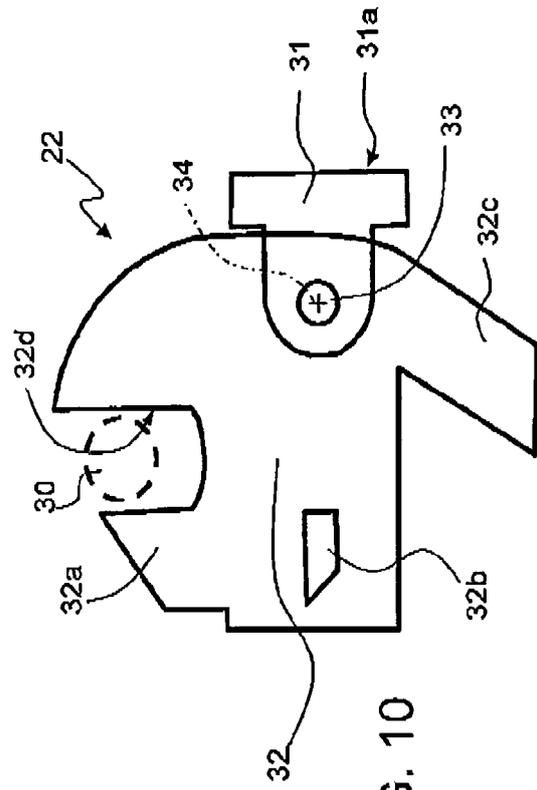
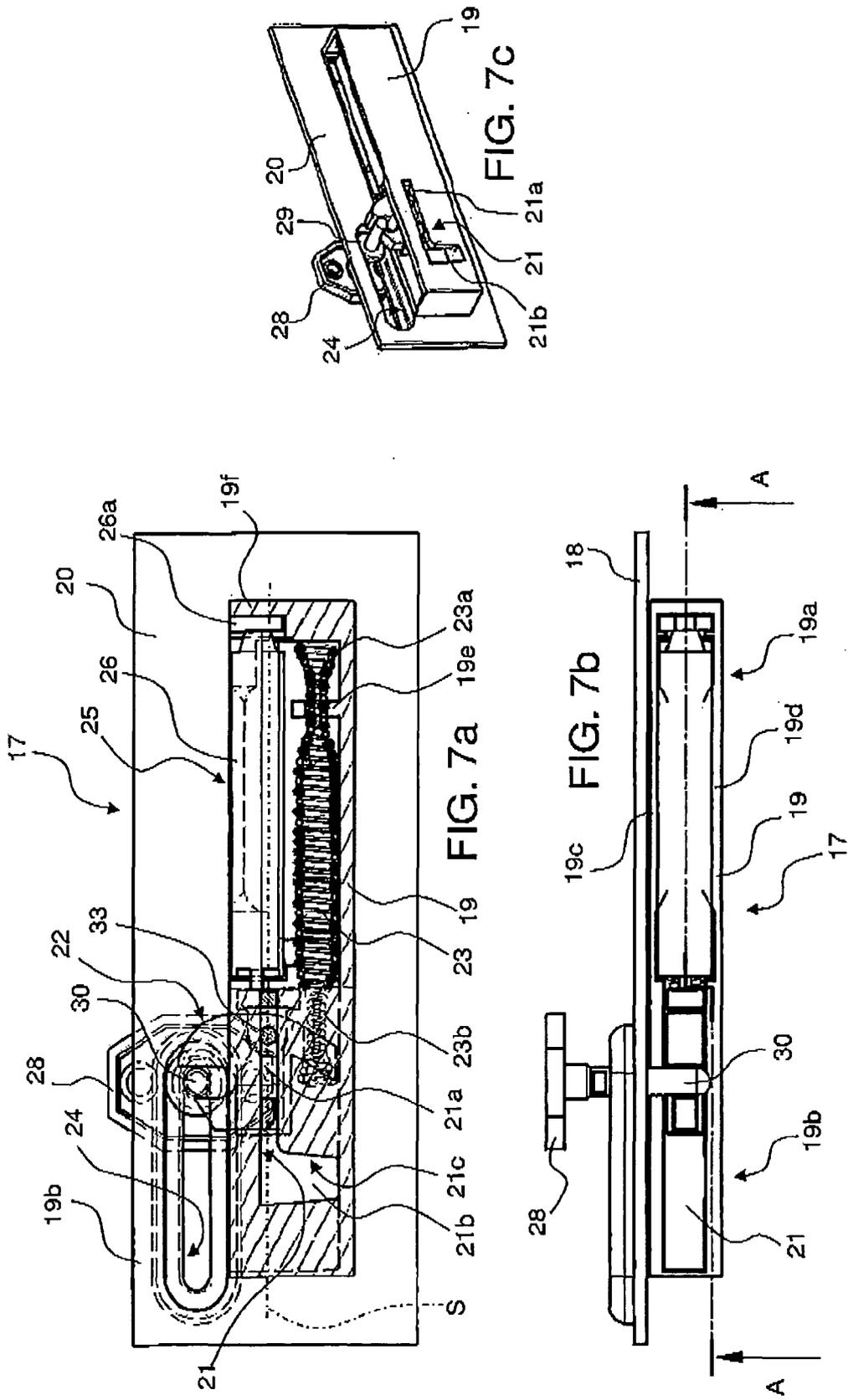


FIG. 10



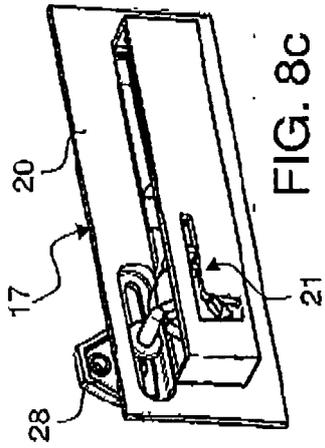


FIG. 8c

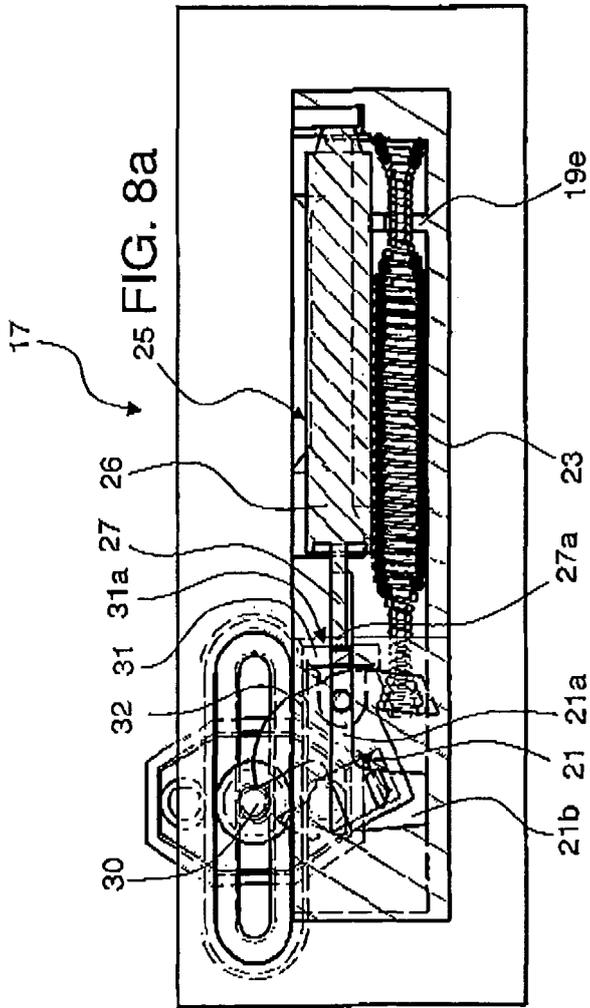


FIG. 8a

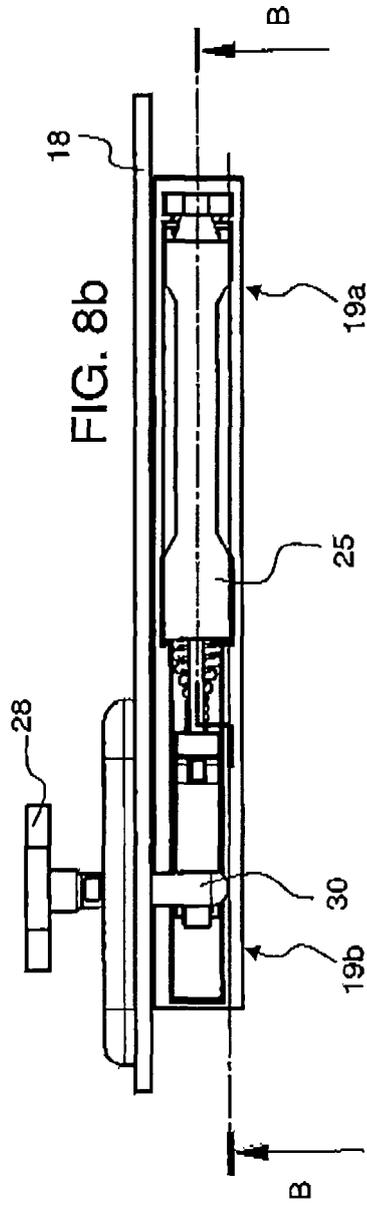


FIG. 8b

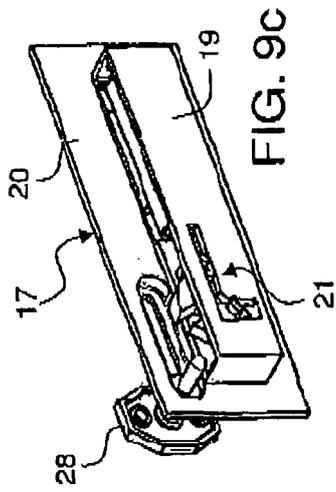


FIG. 9c

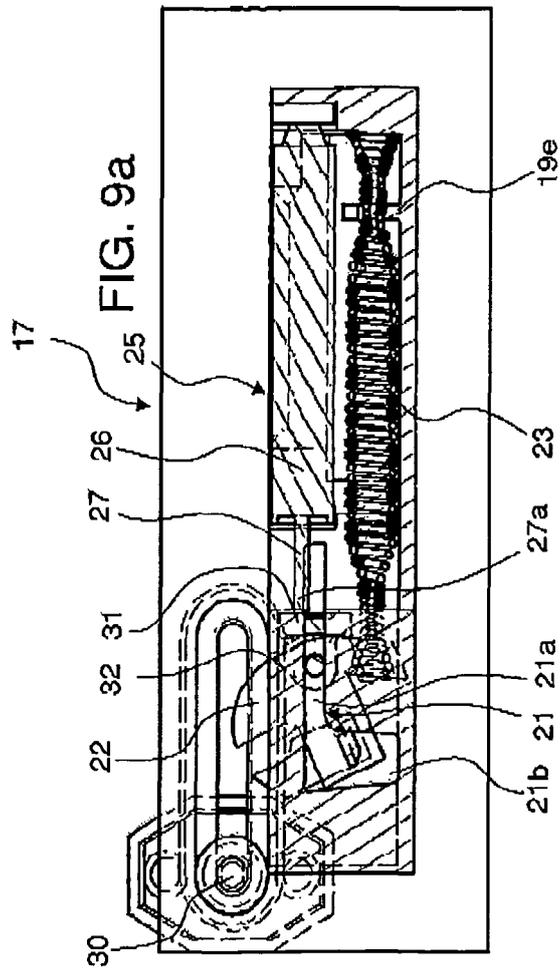


FIG. 9a

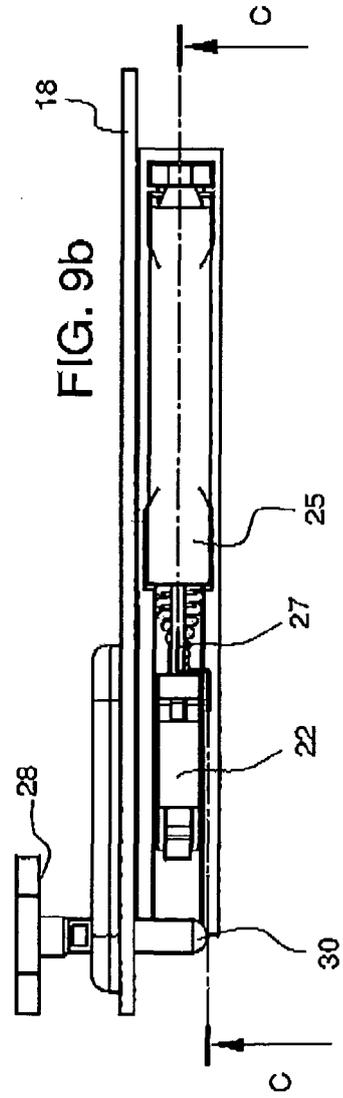


FIG. 9b



EUROPEAN SEARCH REPORT

Application Number
EP 12 00 7239

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			F25D E05F E05D A47L A47B
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 15 March 2013	Examiner Correia dos Reis, I
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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