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(54) **Improvement in the door handle of a refrigeration appliance**

(57) Rotating-type handle, in particular for the door of household refrigeration appliances, comprising a support base (2) adapted to be attached with a surface (4) thereof against a wall of a door to be operated, an actuation lever (1) hinged on to a respective pin (8) fitted in said support base (2) and adapted to rotate in a plane (p) that is parallel to said surface (4), a push-off bolt (6) adapted to protrude and retract from and into said support base (2) by reciprocatingly moving back and forth, and means adapted to enable said push-off bolt (6) to move under the action of said actuation lever (1) along a respective axis (x) lying orthogonal to the plane (p) of rotation of said lever (1).
Said push-off bolt (6) extends outwards beyond the thickness of said support base (2) and forms, jointly with an inner surface (21) of said actuation lever (1), a tappet-like means, which comprises a tracking member (11) or follower situated at the outer end portion thereof, and a sliding guide (12) integral with the actuation lever (1) and adapted to engage said tracking member (11) by establishing a sliding contact therewith.

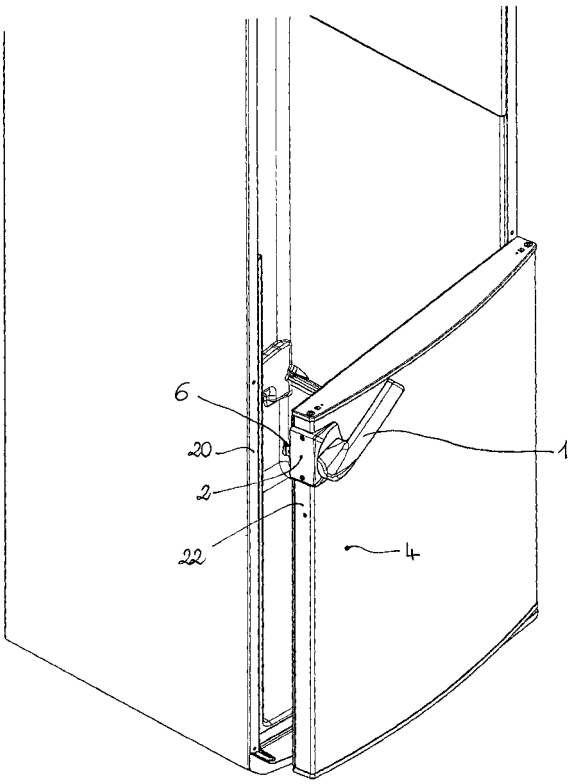



FIG. 1

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## Description

**[0001]** The present invention refers to an improved kind of handle for opening a door that is closed against an abutting jamb.

**[0002]** While reference will be made throughout the following description to a handle that is applied to a refrigerating or freezing appliance as used in homes for storing and preserving food, the same explanations as set forth hereinbelow shall be understood as equally applying to other types of handles used in different applications.

**[0003]** Widely known in the art is the fact that the doors of refrigeration appliances are generally provided all along the perimeter thereof with a magnetic member and a sealing gasket that are associated to each other so that the combined action thereof ensures the final, aggregate effect of a substantially air-tight seal between the abutment edge of the same door and the front edge of the wall of the casing of the refrigeration appliance, against which the outer perimeter of said door comes to abut, thereby closing the inner storage compartment of the appliance.

**[0004]** Anyway, this solution is largely known to all those skilled in the art, so that there is no practical point in explaining or dealing with it any further.

**[0005]** It can only be stated that the solution itself is being used universally and has proven quite effective and economic in the application. However, it still has a minor, but quite annoying drawback that is brought about by the fact that the magnetic door gasket tends to apply and stick with an excessive force against the respective abutment edge, so that opening the door requires a certain effort to be made by the user. If this is not really a problem by itself, the fact remains that -as soon as the door opens - said magnetic closing force vanishes abruptly, so that it may well happen that the user loses some of his/her static balance, since he/she has practically to produce two mutually contrasting efforts in a very short period of time.

**[0006]** This drawback may come to light in a still clearer manner when it is the door of a freezing appliance that is being opened, since the very low temperature prevailing thereinside causes the volume of air existing inside the storage compartment thereof to contract, while the resulting reduction in the internal pressure ultimately generates an unbalance condition between the pressures existing on the two opposite faces of the door that generally makes it rather difficult to open the same door, this difficulty being further aggravated by the afore-cited problem of the user tending to be brought into an out-of-balance condition.

**[0007]** In view of doing aw ay with this problem, handles have been devised and provided, in particular for the doors of refrigeration appliances, which are adapted to perform - via an appropriate leverage system - a specific separation action between the two mutually opposing and mating jambs of the door and the outer casing of the appliance.

**[0008]** Usually, these handles are designed to practically operate as first-class levers, in which the first lever arm, which includes the point of force, is comprised in a handle actuating lever, the second arm is the member that pushes against the mating jamb of the outer casing, and the pin is a rotation member positioned on the same door.

**[0009]** This kind of solution is clearly disclosed and illustrated in the patent publications EP 0 849 551, WO 03/106904, WO 97/38273, EP 0 891 524.

**[0010]** Even the solution disclosed in WO 2004/005816 makes use - albeit in a more complicated manner - of the effect of a first-class lever to separate the door of a refrigerator from the outer casing thereof.

**[0011]** Furthermore, the US patent No. 3,746,207 illustrates an altogether similar application, for use to quite similar purposes, concerning the door of a telephone booth, which must be capable of being easily opened even if it happens to be iced up.

**[0012]** Anyway, the above-described solutions are basically known since a long time now, as this is evidenced by the documents FR 1.104.983 dating back to 1954, and GB 840.661 dating back to 1958.

**[0013]** These disclosures illustrate a solution based on the common feature of having a lever operating between the handle - as seized by the user - and the jamb of the outer casing, with the respective pivot pin being secured to the door closing said outer cabinet, while the directrix determining the motion of the second arm, which pushes against the outer casing, is parallel to the plane of rotation of said lever.

**[0014]** This solution, however, although quite effective when used on rather simple appliances, has a drawback in that it cannot be practically used in the case of so-called "reversible" refrigeration appliances, i.e. appliances in which the door can be selectively hinged on the left side or the right side so as to open in the desired direction.

**[0015]** In such cases, in fact, and especially in the case of levers that are arranged to rotate on the vertical plane orthogonally to the surface of the door, it is generally not possible to use a single and same handle for both left-side hinged doors and right-side hinged doors, as all those skilled in the art are capable of readily appreciate.

**[0016]** Moreover, when it is desired - for any reason whatsoever - to use handles that are arranged to move on the vertical plane extending parallel to the surface of the door by rotating on a horizontal pin extending orthogonally to the surface of the door, these handles are not in general capable of being mounted in a symmetrical position on both sides of the door.

**[0017]** It is therefore desirable, and a main object of the present invention, to provide a rotating handle, in particular for the door of a refrigeration appliance, which is adapted to be rotated on a vertical plane parallel to the front face of the door, which it is applied to, wherein this handle is provided with means for forcedly separate it from the abutment jamb of the outer casing of the appli-

ance against which it closes, and is further capable of being equally well mounted on doors adapted to be hinged on either side for opening either way.

**[0018]** According to the present invention, these aims and objects are reached in a rotating handle incorporating the features as recited in the appended claims. Further features and advantages of the present invention will be readily understood from the description that is given below by way of nonlimiting example with reference to the accompanying drawings, in which:

- Figure 1 is a perspective diagonal view of the handle according to the present invention, as applied on the outer edge of the door of a refrigeration appliance;
- Figure 2 is a front view of the outer edge of the same door when viewed from the direction A of Figure 1;
- Figure 3 is a cross-sectional view of the same handle, as viewed along the plane of symmetry thereof;
- Figure 4 is a first exploded and perspective view of the most important parts entering the construction of the same handle, as viewed from outside, i.e. by a possible user;
- Figure 5 is a second exploded and perspective view of the same handle, as viewed from inside, i.e. for instance from a point in the door;
- Figure 6 is a third exploded and perspective view from the outside of the door of Figure 4, representing all internal component parts in a detailed manner;
- Figure 7 is a fourth exploded and perspective view of the two most important sub-assemblies of the same handle, as viewed from the inside of the door, in which some of the component parts illustrated in Figure 6 are already assembled;
- Figure 8 is a planar projection view of one of the component parts of the handle of Figure 7, as viewed along the projection plane orthogonal to the plane of symmetry and parallel to the planar outer edge of the door of the refrigerator;
- Figures 9 and 10 are respective symbolical front views of the handle according to the present invention, in two different and opposite mounting positions.

**[0019]** A rotating handle according to the present invention is substantially comprised of three major parts, i.e.:

- a support base 2, which is firmly connected to an outer surface 4 of the door which the handle is to be associated with;
- an actuating lever 1 hinged on to a respective pin 8 secured in a hole 9 provided in said support base 2, and adapted to rotate in a plane p extending parallel to said outer surface 4;
- a push-off bolt 6 that moves back and forth from said base and, when so moving outwards, is adapted to abut against and engage a wall 20 of the outer casing of the refrigerator.

**[0020]** Since - as this shall be described in greater detail further on - this push-off bolt 6 is operated by said actuating lever, a portion of which acts as a cam that is capable of rotating, but not displacing axially relative to said base, it ensues that the outward movement of the push-off bolt against said wall 20 causes a reaction to take place on the lever 1, which therefore acts on said base that, in turn, acts on the door to be operated, thereby pushing it off the wall 20 and causing it to open.

**[0021]** As this is clearly shown in the Figures, said bolt 6, which is given an elongated shape, is adapted to slide inside the base 2 in a direction of displacement X that is substantially parallel to the axis of the pin 8 of the actuating lever 1, so that such direction X of the back-and-forth movement of the bolt 6 turns out as being orthogonal to said plane of rotation p (see Figure 3).

**[0022]** Such result can be obtained with following particular features:

- the bolt 6 extends throughout the width or thickness of the base 2 and reaches out inwards with a kind of tracking member 11 projecting towards the interior of said lever 1;
- said lever 1 is in turn provided with a cam member, which shall be referred to as sliding guide 12 hereinafter, and which is adapted to engage
- by pressing thereagainst - said tracking member 11, relative to which it is capable of sliding.

**[0023]** In practice, the combination of said tracking member 11 and said sliding guide 12 forms a position control mechanism of the cam-follower kind as generally known as such in the art.

**[0024]** The configuration, geometry, dimensions and mutual positioning of the above-described parts are such that, when said lever 1 is applied on to the support base 2 by means of said pin 8 in said hole 9, and the lever is rotated thereabout, the sliding guide 12 - provided inside the same lever - pushes the tracking member 11 of the bolt 6, so that the latter displaces outwards, i.e. towards the outside of the same handle, in the desired direction so as to move into contact with and push against the wall 20 of the outer casing of the refrigerator, thereby causing the door to separate therefrom and open (see in particular Figures 5 and 6).

**[0025]** To this purpose, the cam-follower position control mechanism formed by said sliding guide 12 and said tracking member 11 is substantially shaped and sized as described below.

a) Tracking member 11: this is the inward terminal portion of the push-off bolt 6 and extends through a groove 23 provided in and along the inner portion of the face 21 of the support base 2, which is normally placed onto the outer jamb 22 of the door (Figure 1); therefore, the push-off bolt 6 is a simple rectilinear member sliding in and along said groove 23 and terminating with said tracking member that is preferably provided in the form of a member in a rounded-off shape extending from the inward-facing end portion of the bolt 6, as this is best shown in Figures 5 and 6. Anyway, this member is provided in such a manner as to be able to slide under a minimum of friction against said sliding guide 12.

b) Sliding guide 12: this guide is formed by a curved surface arranged inside the actuating lever 1, which is hollow inside. Such curved surface is arranged so that, when said lever is rotated about its pin 8, said surface comes into sliding contact with said tracking member 11, thereby pushing it in the opposite direction and, as a result, pushing the bolt in the desired direction.

**[0026]** Said sliding guide, therefore, is practically formed of a curved contour, which is indicated by the three raised webs 12A, 12B, 12C shown in Figures 5, 7 and 8, wherein these raised webs are curved relative to two distinct planes extending orthogonally to each other, i.e.:

- a plane extending orthogonally to said pin 8, such as for instance the same plane p; the projection of said raised webs on said plane parallel to the plane p must turn out as being curved in the shape of an arc of a circle (Figure 8) having said pin as the centre thereof, for the simple reason that it must represent the contact and sliding arc thereof with said tracking member 11 when the lever 1 is rotated about its fulcrum represented by the pin 8 in said hole 9;

- a plane K extending through said pin 8 and substantially orthogonal to the plane of symmetry S of the lever 1 and the handle (Figure 3).

**[0027]** The point O of deepest curvature of said sliding guide (Figures 5, 7, 8) must quite obviously correspond to the point at which the tracking member is not pushed out, but - on the contrary - is in its fully retracted position; therefore, this must be the outermost or deepest (i.e. farthest away from the outer casing) point of the guide 12.

**[0028]** All other points along the guide itself must be positioned so that the tracking member 11, when sliding upon and in contact with each one of them, is naturally pushed out with a continuous, progressive movement. For this reason, all these points must have a position - inside said lever 1 - that is closer to the door.

**[0029]** Those skilled in the art will at this point be fully capable of appreciating that the position and the inclination of said guide 12 relative to the tracking member 11 determine both the resting, i.e. inoperative position of the lever 1 and the characteristics and the articulation of the door-opening actuation mechanism.

**[0030]** It will be further appreciated that said lever 1 is fully symmetrical relative to the plane S extending horizontally through the axis of the pin 8 and said point O (Figure 8). This fact is effective in enabling said lever 1 to be mounted in either one of the two opposite positions, i.e. both on the left side and the right side of the door, as desired (reversible handle), as this is symbolically illustrated in the two Figures 9 and 10. Furthermore, if also said guide 12 is symmetrical to the same plane, as this would not only be logical, but also preferable, the possibility then arises for also the whole operation to be made symmetrical and, ultimately, a handle to be provided with a system to separate the door from the outer casing of the appliance, which is capable of being readily mounted on doors hinged on the left side and doors hinged on the right side, thereby reaching a main aim of the present invention.

**[0031]** Referring further to Figures 6 and 7, a first elastic means 30 is mounted, which acts between a point of application 31 of said base 2 and a point of application 32 of said lever 1.

**[0032]** This elastic means 30, which is positioned symmetrically relative to the handle and, as a result, symmetrically relative to both the lever 1 and the base 2, so that it practically lies in said plane of symmetry S, is provided and mounted so as to be capable of being brought into, i.e. to have a resting position, to which there corresponds the position of perfect symmetry of the lever 1 relative to the base 2 and, therefore, also the position in which the tracking member 11 comes to lie exactly at said point O of the guide 12.

**[0033]** In all other positions of the lever 1, also said elastic means 30 happens to be working in a symmetrical manner relative to such lever and, ultimately, the latter is automatically biased to elastically return into said resting, inoperative position from any working position whatsoever it may also have been previously rotated.

**[0034]** Clearly shown in Figures 6 and 7 is where said elastic means 30 is positioned relative to the base 2 and the lever 1; in an advantageous manner, said elastic means 30, which is formed of a thin metal rod, is also bent to be introduced in an appropriate arc-shaped slot 34 in the base 2, for it to be able to reach the respective point of application 32 without having to unaesthetically and impractically protrude from the same handle.

**[0035]** Most obviously, also the bolt 6 should advantageously be provided with a respective elastic means; with reference to Figures 4, 5 and 6, a spiral spring 40 is therefore arranged between a kind of spur 41, which rises inwards from said tracking member 11, and is therefore firmly joined or integral with said bolt 6, and an abutment 42 provided - again in a symmetrical arrangement - on said base 2.

**[0036]** This spiral spring 40 is provided and mounted so as to be able to act in the sense of retaining the bolt 6 within the base 2, i.e. pushing the tracking member 11 toward the user standing outside, i.e. toward the interior of the lever 1.

**[0037]** In an advantageous manner, said two springs 30 and 40 are made from a single length of appropriately processed metal wire, which - along a section thereof - is coiled into a spiral so as to provide said spring 40 adapted to rest against said abutment 42; the remaining section of said wire length is applied and stretched between a bore 43 in said same abutment piece 42 (see Figure 7) and said point of application 32 on the lever, by extending through the arc-shaped slot 34 in the base 2, as noted above.

## Claims

**1.** Rotating-type handle, in particular for the door of household refrigeration appliances, comprising

- a support base (2), adapted to be attached with a surface thereof against an outer surface (4) of a door to be operated,
- an actuation lever (1) hinged on to a respective pin (8) fitted in a hole (9) provided in said support base (2), and adapted to rotate in a plane (p) that is substantially parallel to said outer surface (4);
- a push-off bolt (6) adapted to protrude and retract from and into said support base by reciprocatingly moving back and forth, **characterized in that** it is provided with means adapted to enable said push-off bolt (6) to move under the action of said actuation lever (1) in a direction (X) that is substantially orthogonal to said plane of rotation (p) of said actuation lever (1).

**2.** Rotating-type handle according to claim 1, **characterized in that** said push-off bolt (6) extends outwards beyond the thickness of said support base, on which said lever is applied, and forms jointly with an inner surface of said actuation lever a tappet-like means.

**3.** Rotating-type handle according to claim 2, **characterized in that** said tappet-like means comprises a tracking member or follower (11) situated at the outer end portion of said push-off bolt (6), and a sliding guide (12) integral with said actuation lever and adapted to engage said tracking member (11) by establishing a sliding contact therewith.

**4.** Rotating-type handle according to claim 4, **characterized in that** said sliding guide (12) features:

- a contour in the shape of an arc of a circle around said pin (8), when projected onto a plane that is orthogonal to the axis of rotation of said pin (8),
- and a curved contour, when said guide (12) is projected onto a plane that extends through said pin (8) and is vertical when said rotating handle is mounted on a vertical wall and lies in the resting position thereof.

**5.** Rotating-type handle according to any of the preceding claims, **characterized in that** there are provided first elastic means (30) adapted to interact between said tracking member, or said bolt, and said support base, and **in that** said first elastic means are provided and arranged so as to be able to take a resting position when said tracking member (11) is positioned at the middle portion (O) of said sliding guide (12).

**6.** Rotating-type handle according to any of the preceding claims, **characterized in that** there are provided second elastic means (40) adapted to interact between said support base (2) and said actuation lever (1), and **in that** said second elastic means are provided and arranged so as to be able to take a resting position when said actuation lever (1) is so positioned as to cause said tracking member (11) to move into a position lying at the middle portion (O) of said sliding guide (12).

**7.** Rotating-type handle according to any of the preceding claims, **characterized in that** at least said actuation lever is substantially symmetrical relative to the horizontal plane passing through the axis of said pin (8), when said handle is mounted on a vertical wall and substantially at rest.

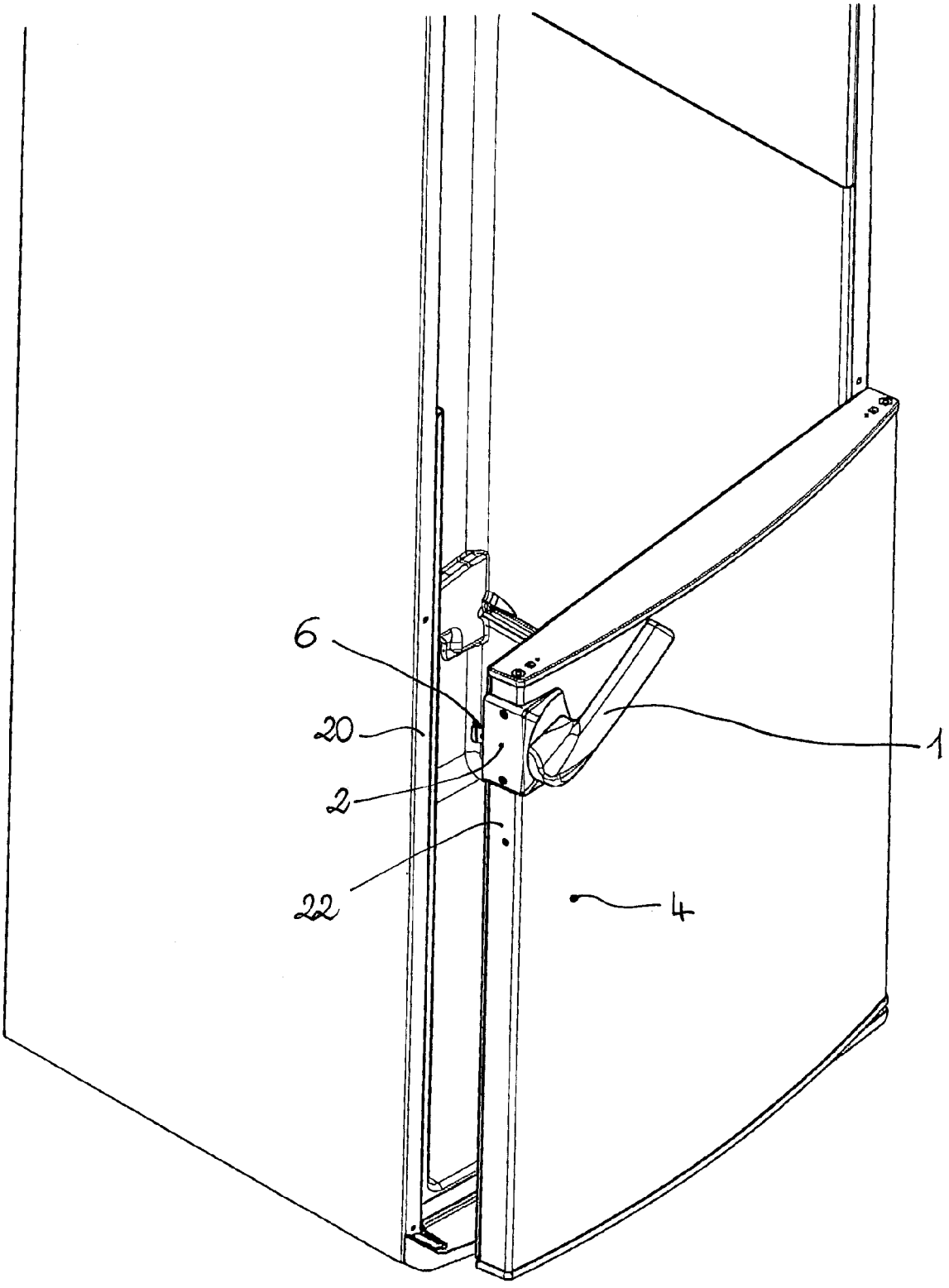



FIG. 1

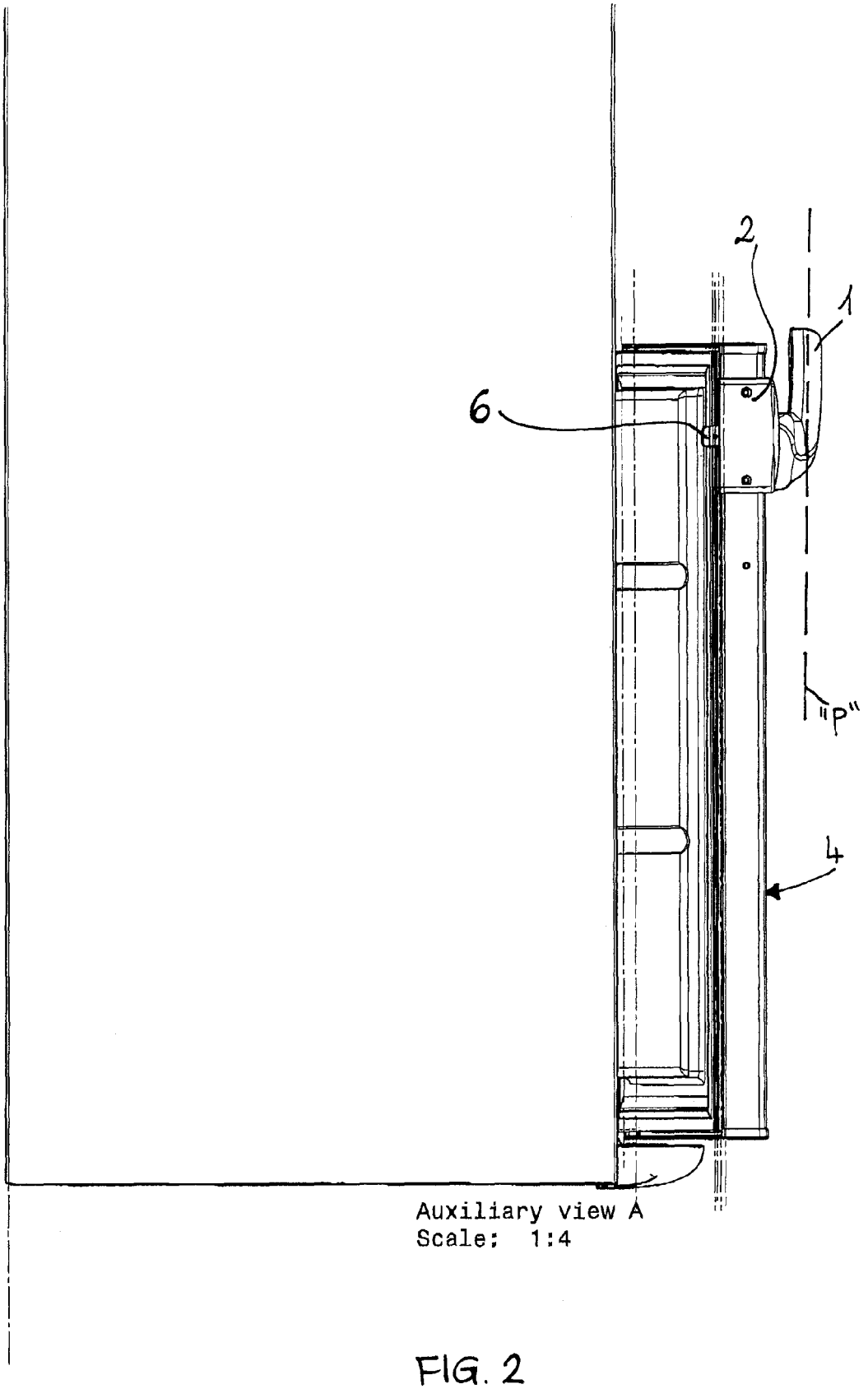



FIG. 2

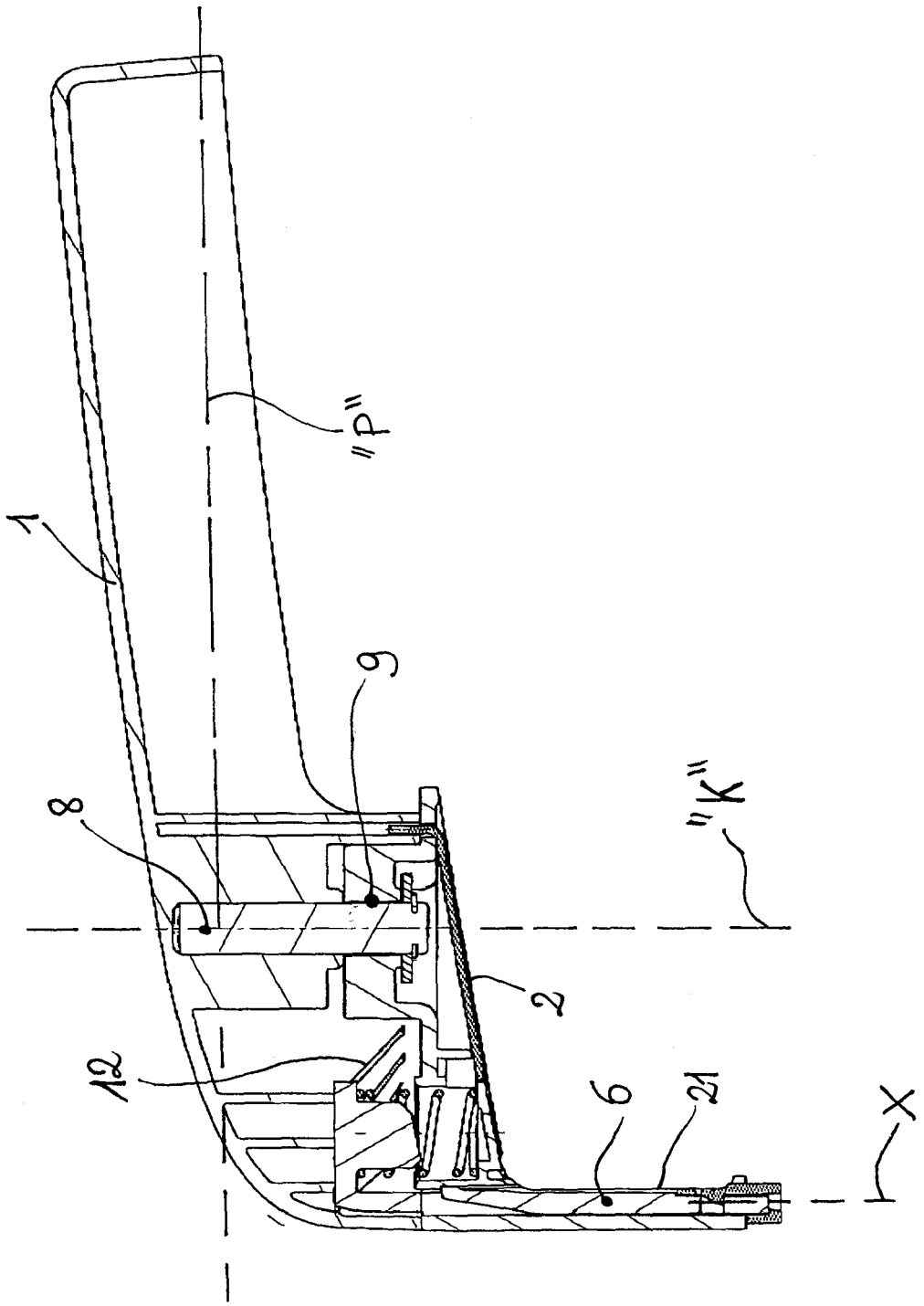



FIG. 3

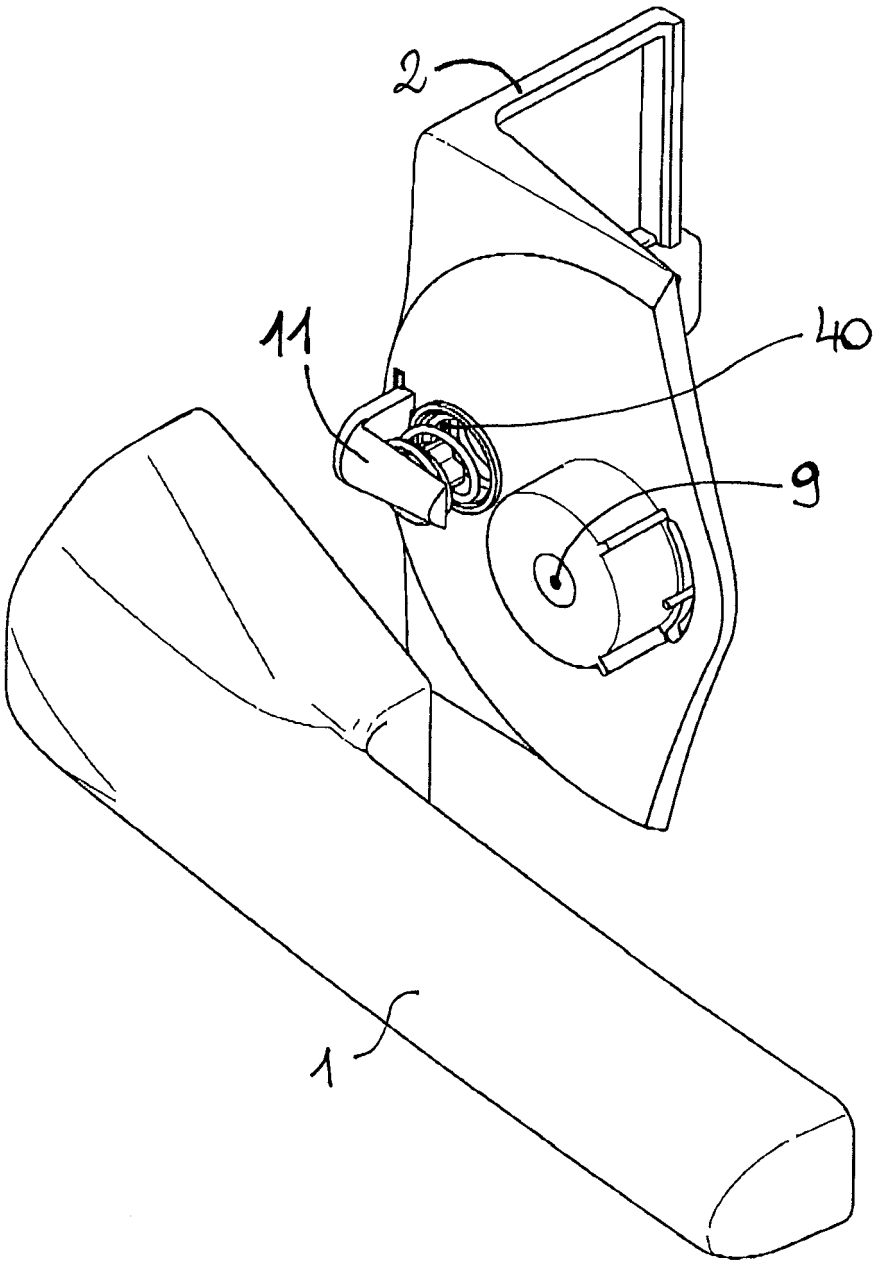



FIG. 4

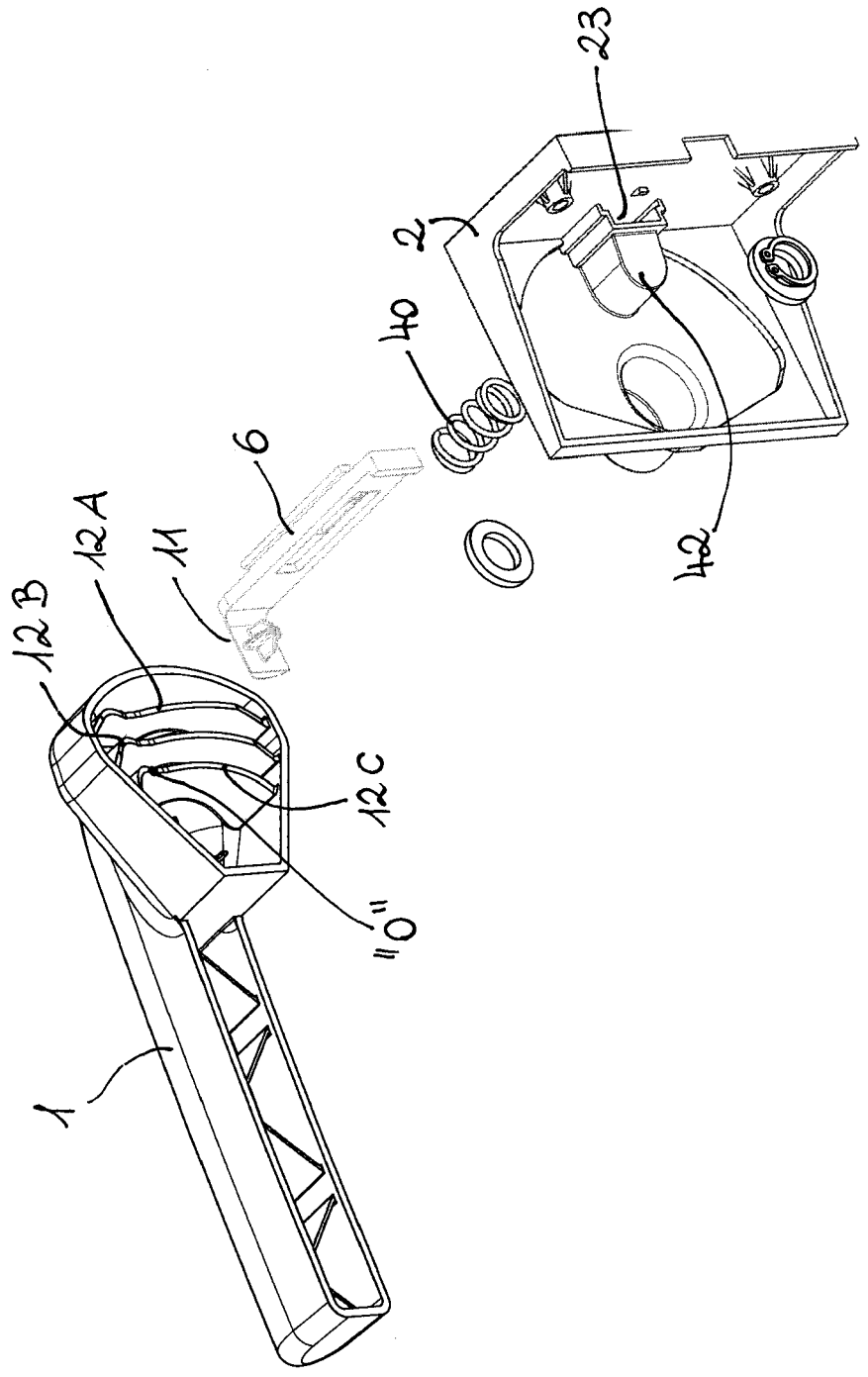



FIG. 5

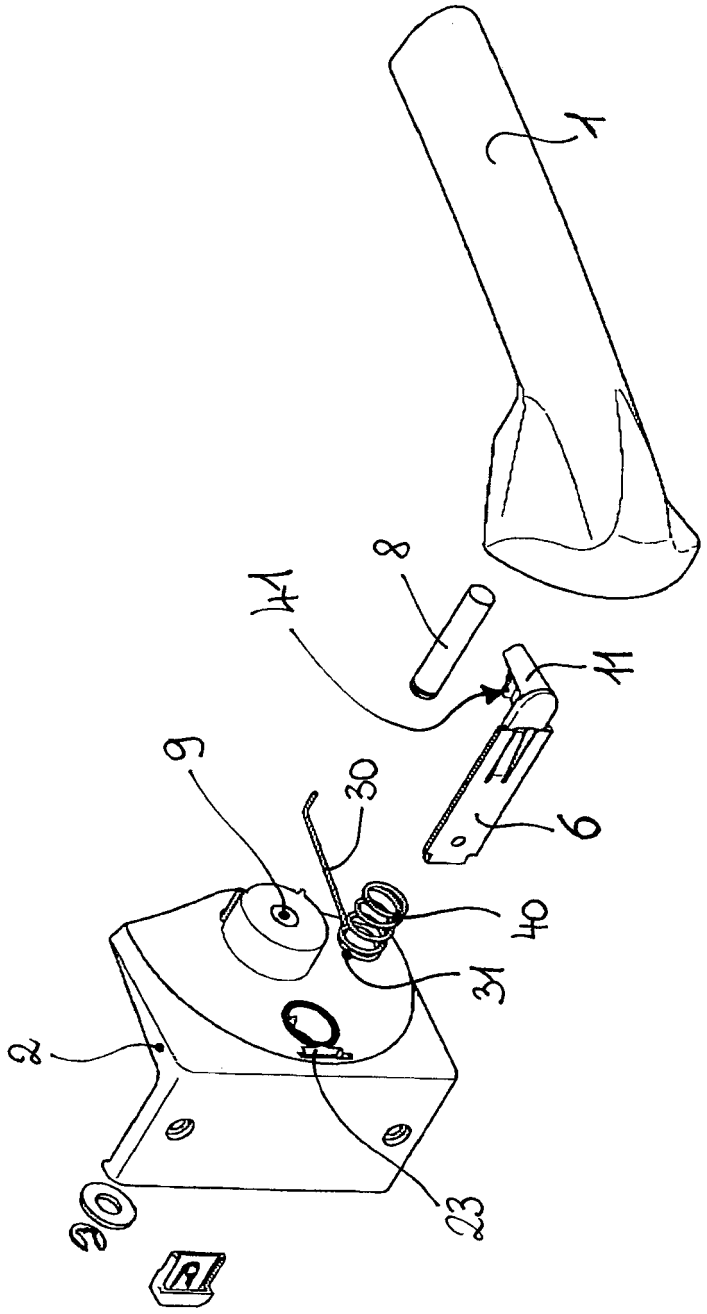



FIG. 6

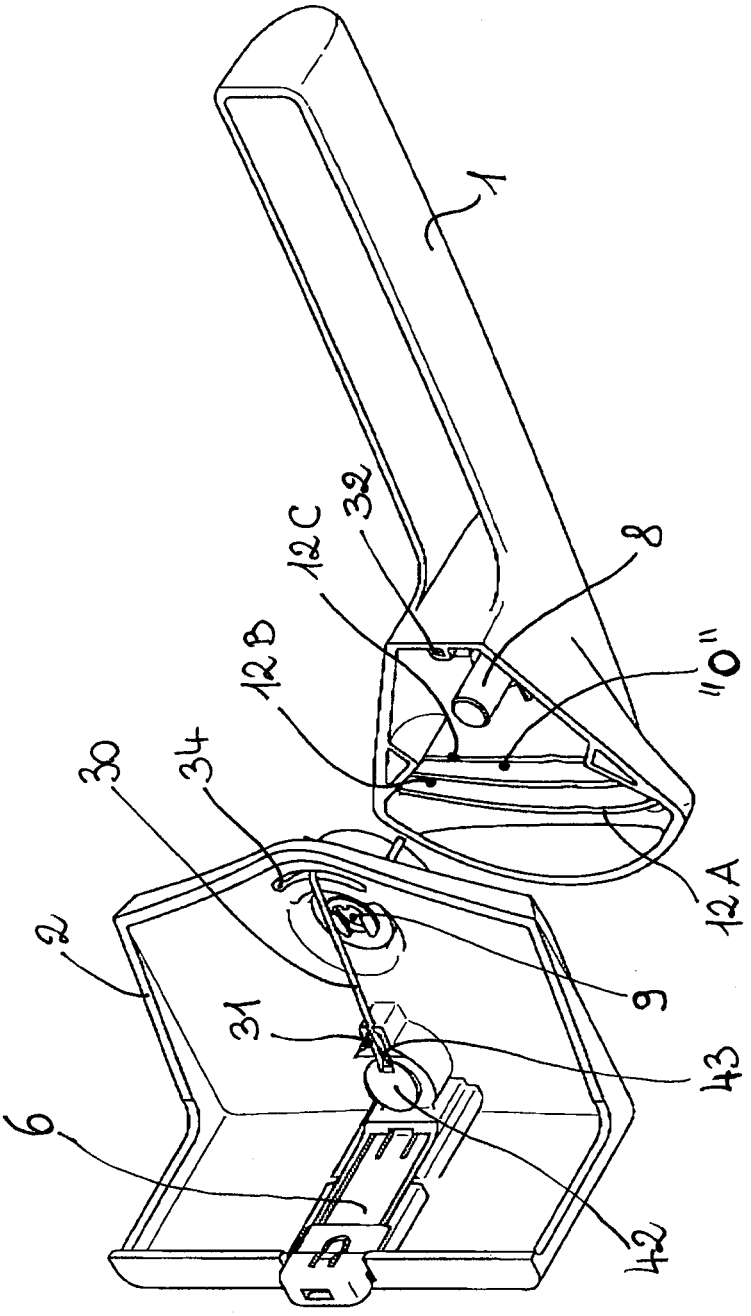



FIG. 7

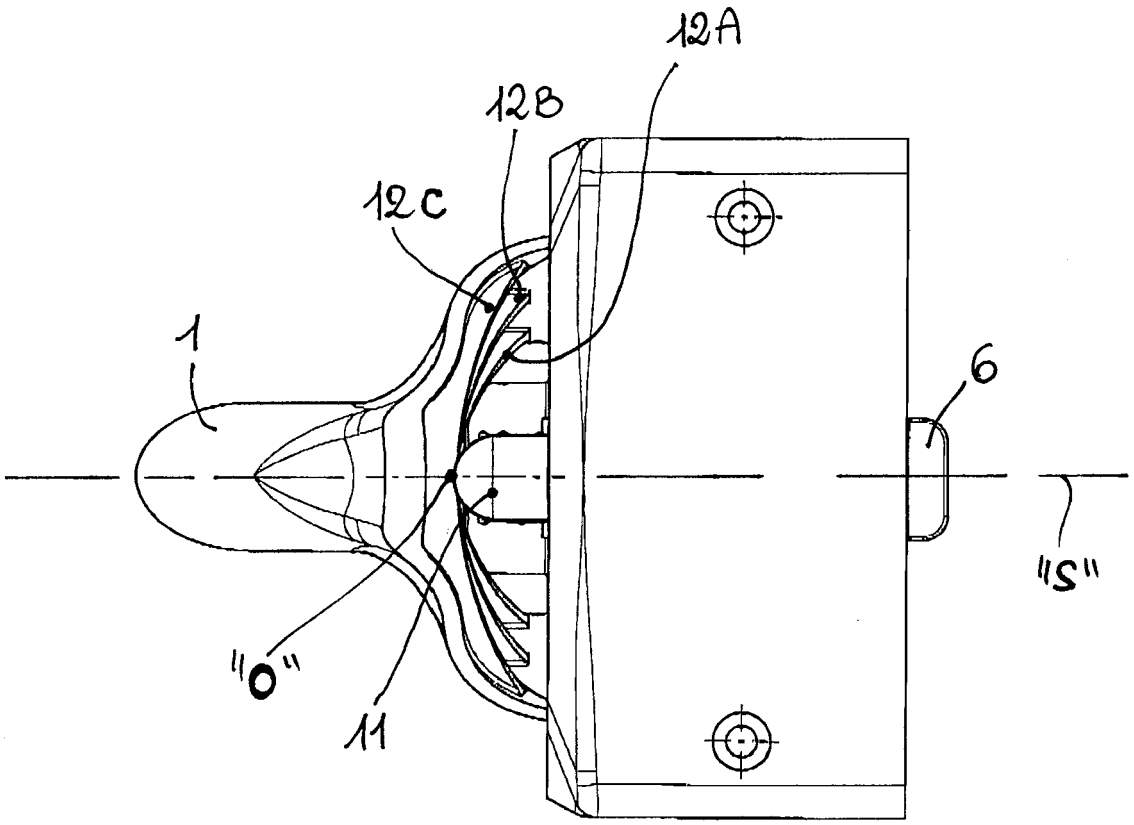



FIG. 8

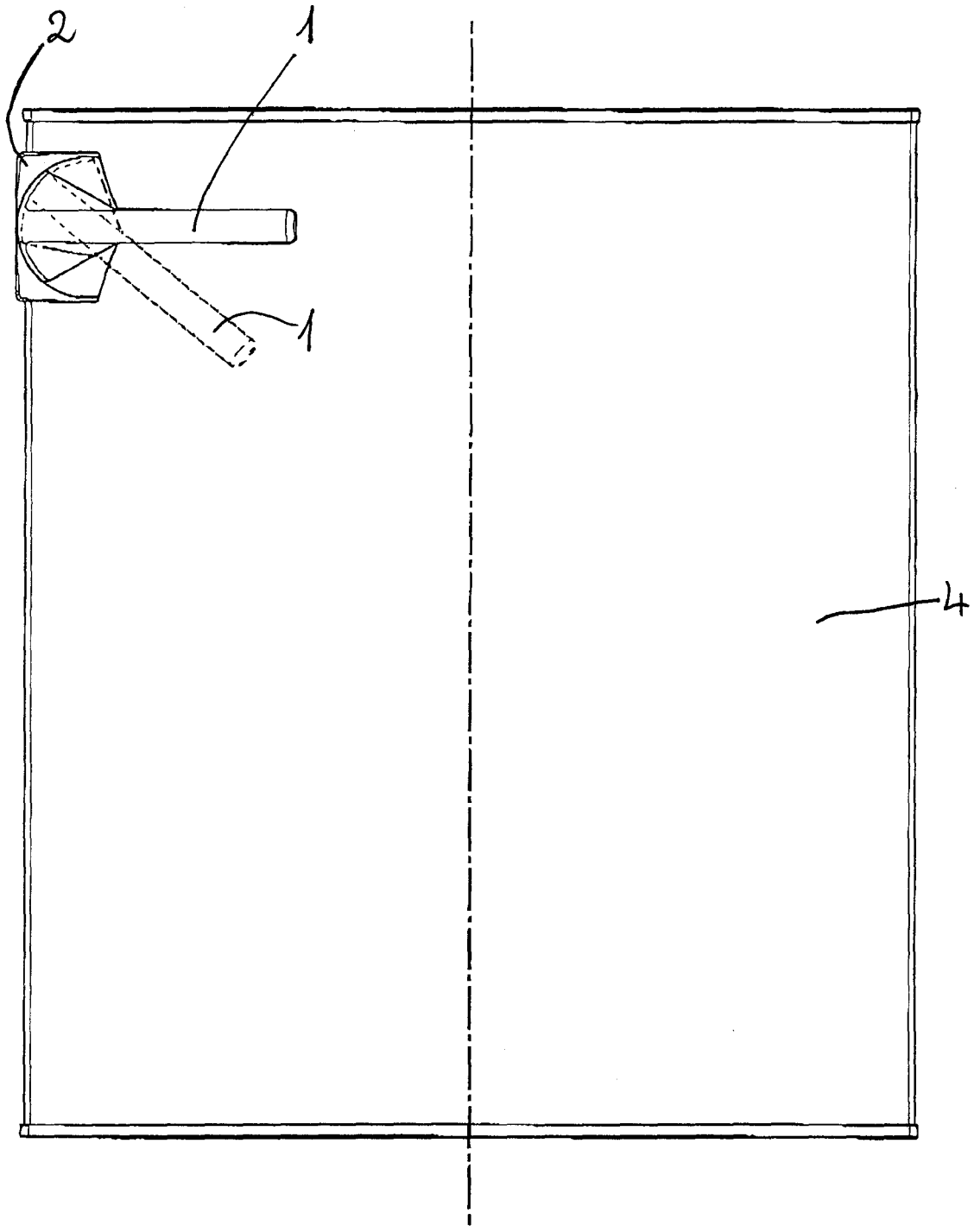



FIG. 9

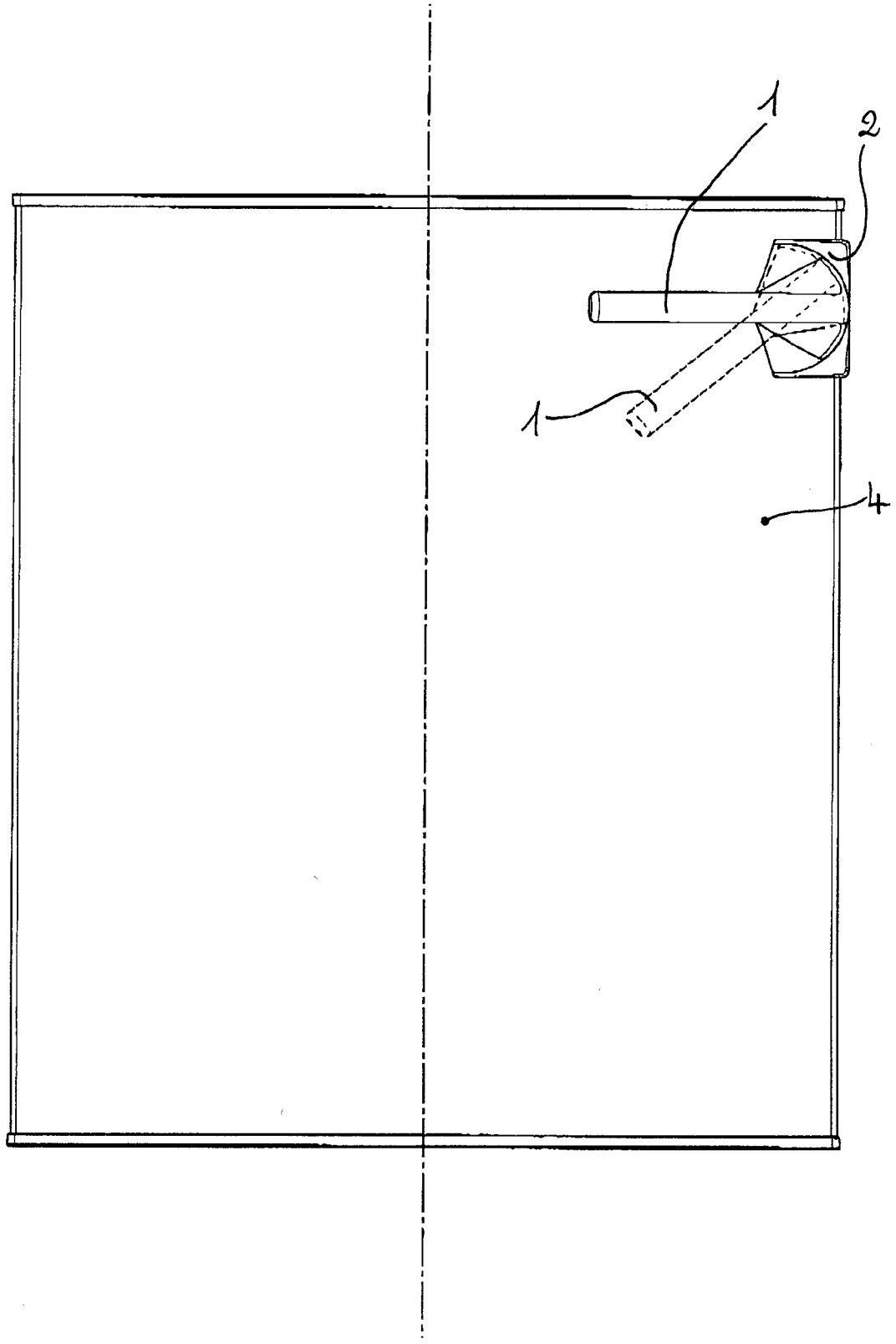



FIG. 10

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# EUROPEAN SEARCH REPORT

Application Number
EP 06 10 0009

## DOCUMENTS CONSIDERED TO BE RELEVANT

| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | CLASSIFICATION OF THE APPLICATION (IPC) |
|---|---|---|---|
| A | US 5 915 805 A (LEE ET AL)<br>29 June 1999 (1999-06-29)<br>* abstract *<br>* figures 5-10 * | 1 | INV.<br>F25D23/02<br>E05B17/00<br>E05B65/00 |
| A | DE 298 09 755 U1 (APPARATEBAU AG, LAAG, IT) 10 December 1998 (1998-12-10)<br>* figures 1-4 * | 1 | |
| A | PATENT ABSTRACTS OF JAPAN<br>vol. 2000, no. 02,<br>29 February 2000 (2000-02-29)<br>-& JP 11 324458 A (TAKIGEN MFG CO LTD),<br>26 November 1999 (1999-11-26)<br>* abstract *<br>* figures 1a,1b,2a,2b,3a,3b * | 1 | |
| A | US 5 408 853 A (YAMADA ET AL)<br>25 April 1995 (1995-04-25)<br>* abstract *<br>* figures 1-9 * | 1 | |

TECHNICAL FIELDS SEARCHED (IPC)

F25D
E05B
E05C

The present search report has been drawn up for all claims

| Place of search | Date of completion of the search | Examiner |
|---|---|---|
| The Hague | 30 June 2006 | CORREIA DOS REIS, I |

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| Patent document cited in search report | Publication date | Patent family member(s) | Publication date |
|---|---|---|---|
| US 5915805 A | 29-06-1999 | CN 1180826 A | 06-05-1998 |
| | | JP 3045983 B2 | 29-05-2000 |
| | | JP 10132448 A | 22-05-1998 |
| DE 29809755 U1 | 10-12-1998 | NONE | |
| JP 11324458 A | 26-11-1999 | JP 2903468 B2 | 07-06-1999 |
| US 5408853 A | 25-04-1995 | CN 1108345 A | 13-09-1995 |
| | | GB 2275734 A | 07-09-1994 |
| | | HK 1002498 A1 | 28-08-1998 |
| | | JP 2117993 C | 06-12-1996 |
| | | JP 6257336 A | 13-09-1994 |
| | | JP 8023238 B | 06-03-1996 |
| | | KR 9703221 B1 | 15-03-1997 |

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

## REFERENCES CITED IN THE DESCRIPTION

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### Patent documents cited in the description


- EP 0849551 A **[0009]**
- WO 03106904 A **[0009]**
- WO 9738273 A **[0009]**
- EP 0891524 A **[0009]**
- WO 2004005816 A **[0010]**
- US 3746207 A **[0011]**
- FR 1104983 **[0012]**
- GB 840661 A **[0012]**