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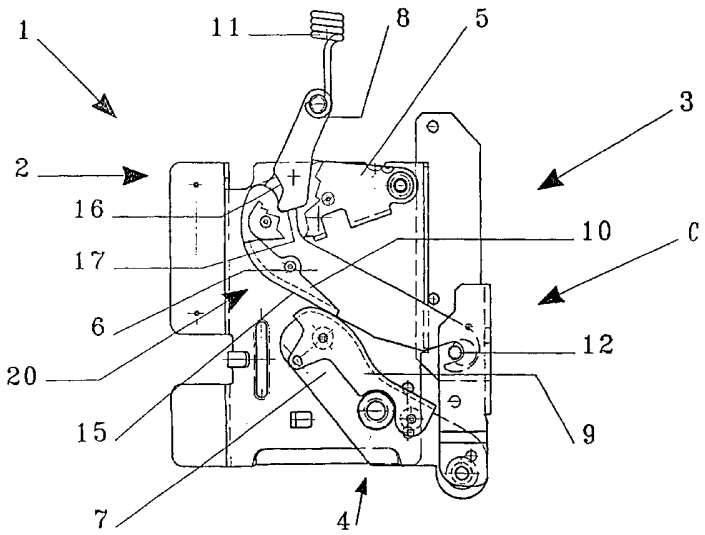
(54) Title: COUNTERBALANCED HINGE DEVICE WITH VERTICAL MOVEMENT FOR A DOOR



(57) Abstract: A counterbalanced hinge device with vertical movement for an appliance door, of the type including connection means (2) for the appliance body, support means (3), fit for fixing an appliance door, and balancing means (11), connected to the connection means (2), includes: a rocker arm (4) hinged to the connection means (2) and connected to the support means (3); linkage means (20) connected to the connection means (2), to the support means (3) and to the balancing means (11) and having a median portion (15) for sliding mating a shaped portion (7) of the rocker arm (14). The linkage means (20) are fit for transmitting to the support means (3) a counterbalancing force of the door, between a closing condition (C) and a full opening condition (A) and vice versa. The sliding contact between the median portion (15) and the shaped portion (7) causes a rotation of the rocker arm (4) and the vertical movement of the appliance door in correspondence of the passage from the closing condition (C) to the opening condition (A) and vice versa.

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COUNTERBALANCED HINGE DEVICE WITH VERTICAL MOVEMENT FOR A DOOR

TECHNICAL FIELD

The present invention relates to mechanical component for appliances, white goods and the like; particularly the present invention concerns a counterbalanced hinge device with vertical movement for a door of white goods such as dishwashing machine, washer machines or the like or appliances for private and industrial use.

The doors are connected to the structure of the corresponding appliances by means of known hinge device allowing the rotation of said doors between a closing position, in which the door is almost vertical, and an opening position, by rotating around an horizontal axis positioned in the appliance lower portion.

BACKGROUND ART

Some types of known devices can translate their rotation axes, in order to avoid interferences between door and appliance elements to which are assembled. Said devices can further include elastic means fit for counterbalancing, that is the hinge capacity to hold the door, eventually loaded by the previously unknown weight of a panel assembled during the appliance installation, in any intermediate position between the closing and the opening positions.

The main drawback of said known device consists in that the means fit for counterbalancing frequently cause irregular door movements, too hard or too yielding and very noisy, and furthermore sudden blocks or clog of the door, particularly in correspondence of quick movements.

Further drawback of said known devices consists in that they include articulation joints very complicated and thus very expensive, and have large dimensions which reduce the useful volumes of the appliance having said devices.

DISCLOSURE OF THE INVENTION

The main object of the present invention is to propose a counterbalanced hinge device with vertical

movement for door household electrical appliances and the like, fit for counterbalancing said door, countering its weight and allowing to block this latter in any extreme and intermediate position, with smooth and silent operation.

Further object is to propose a hinge device fit for counterbalancing doors having weight varying in an interval of several kilograms.

Other object of the invention is to propose a hinge device having great constructive simplicity and small encumbrance, and economically convenient as well.

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

BRIEF DESCRIPTION OF THE DRAWINGS

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

- figure 1 shows a schematic and partial side view of the hinge device object of the present invention in a closing condition;
- figure 2 shows a view of the figure 1 device in a partial opening condition;
- figure 3 shows a view of the figure 1 device in a full opening condition;
- figure 4 shows a view of a variant of the figure 1 device in a closing and partial opening condition and in which some elements have been removed for better underlining others.

BEST MODE OF CARRYING OUT THE INVENTION

Usually for the door assemblage to the related appliance there are provided two hinge devices of the type here described, which are assembled, for instance, in correspondence of the two lower corners of the opening, to be closed by the door, in such a way that the door may rotate around axes parallel to the line, joining the two hinge devices.

For simplicity in the following it will refers to a single hinge only with the same assembly orientation and keeping in mind that the same constructive and functional considerations are equally applicable for the other possible hinge device.

With reference to figures from 1 to 3, numeral 1 indicates a counterbalanced hinge device with

vertical movement for an appliance door constituted essentially by connection means 2, support means 3, balancing means 11, a rocker arm 4 and linkage means 20.

The connection means 2 allow the fixing to the appliance body, while the support means 3 connect the device 1 to an appliance door.

The rocker arm 4 is hinged to the connection means 2 and is connected to the support means 3. The linkage means 20 are connected to the connection means 2, to the support means 3 and to the balancing means 11 and they have a middle portion 15 for sliding mating a shaped portion 7 of the rocker arm 4, opposed to the connection with the support mean 3 with respect to the connection of said rocker arm 4 to the connection means 2.

The linkage means 20 substantially consist of a connecting rod 5 having the end rotatably connected respectively to the connection means 2 and to an end of a shaped lever 6, whose remaining end is fixed to the support mean 3.

The linkage means 20 further include a cam mean 8 fixed to the balancing means 11 and rotatably connected to the connecting rod 5, fit to slidably contact the shaped lever 6, in the passage of the device 1 from the closing condition C to the full opening condition A and vice versa.

The contact between the cam means 8 and the lever 6 is made by the sliding contact between a section portion 16, carried out in the cam means 8 and a corresponding section 17, carried out on the shaped lever 6, in correspondence of the connection of the latter to the connecting rod 5.

It is provided that the rocker arm 4 includes at least a first insert 9, fixed in correspondence of the shaped portion 7, and that the shaped lever 6 includes at least a second insert 10, fixed in correspondence of the median portion 15. Said inserts, first 9 and second 10, are made of synthetic material with a predetermined friction coefficient and can be removably or irremovably fixed to the rocker arm 4 and to the lever 6, respectively.

The balancing means 11 are constituted by one or more springs reacting in extension or compression. The connection mean 2 has a wall 13 provided with a folded portion to match the connecting rod 5, in correspondence of the full opening condition A.

The end of the shaped lever 6 is fixed to the support means 3 has a hook shape in such way to

removably engage a corresponding pivot 12, fixed to the support mean 3. Such connection allows a quick door assemblage and disassembling, for instance in case of maintenance.

The operation of the hinge device 1 provides that the linkage means 20 transmit to the support means 3 a counterbalancing force sufficient to balance the door in its movement from the closing condition C to the full opening condition A and vice versa, allowing in this way to firmly stop said door in any position.

The sliding stop between the median portion 15 of the shaped lever 6 and the shaped portion 7 of the rocker arm 4 causes, during the movement of the lever 6, a rotation of the rocker arm 4 and the consequent vertical movement of the appliance door in correspondence of the passage from the closing condition C to the opening condition A and vice versa. Particularly the door is in the lower position in correspondence of the closing C and opening A conditions, and progressively raises in the passage from one of these last two conditions to the other one, up to reach a upper position, in correspondence of a partial opening condition B, beyond which said door lowers again.

In figure 4 it is shown a variant of the device object of the present invention which provides the presence of elastic means 14, constituted for instance by one or more springs reacting in extension or compression, connected to the connection mean 2 and jointed to the rocker arm 4.

The operation of this variant differs substantially from the operation of the preferred embodiment because the presence of a contact force transmitted by the elastic means 14 to the rocker arm 4 and fit for maintaining always mutually in contact the median portion 15 and shaped portion 7, during the passage of the device 1 from the closing condition C to the opening condition A and vice versa.

The main advantage of the present invention is to provides a counterbalanced hinge device with vertical movement for door household electrical appliances and the like, fit for counterbalancing said door, countering its weight and allowing to block the latter in any extreme and intermediate position, with smooth and silent operation.

Further advantage is to provide a hinge device fit for counterbalancing doors having weight varying in an interval of several kilograms.

Other advantage of the invention is to provide a hinge device having great constructive simplicity and small encumbrance, and economically convenient as well.

CLAIMS

1) Counterbalanced hinge device with vertical movement for an appliance door, of the type including connection means (2) for the appliance body, support means (3), fit for fixing an appliance door, and balancing means (11), connected to the connection means (2), said device (1) being characterized in that includes:
   - a rocker arm (4) hinged to the connection means (2) and connected to the support means (3);
   - linkage means (20) connected to the connection means (2), to the support means (3) and to the balancing means (11) and having a median portion (15) for sliding mating a shaped portion (7) of the rocker arm (4);

   said linkage means (20) being fit for transmitting to the support means (3) a counterbalancing force of the door between a closing condition (C) and a full opening condition (A) and vice versa; the sliding contact between the median portion (15) and the shaped portion (7) causes a rotation of the rocker arm (4) and the vertical movement of the appliance door in correspondence of the passage from the closing condition (C) to the opening condition (A) and vice versa.

2) Device according to claim 1 characterized in that the linkage means (20) include a shaped lever (6) and a connecting rod (5) having end rotatably interconnected and the free ends fixed respectively to the support mean (3) and rotatably connected to the connection means (2).

3) Device according to claim 2 characterized in that the linkage means (20) further include a cam mean (8) fixed to the balancing means (11) and rotatably connected to the connecting rod (5) to slidably mate the shaped lever (6) in the passage of the device (1) from the closing condition (C) to the full opening condition (A) and vice versa.

4) Device according to claim 3 characterized in that the cam means (8) has a section portion (16) mating a corresponding section (17), carried out on the shaped lever (6) in correspondence of the connection of the latter with the connecting rod (5).

5) Device according to claim 1 characterized in that the rocker arm (4) includes at least a first insert (9) fixed in correspondence of the shaped portion (7).

6) Device according to claim 3 characterized in that the shaped lever (6) includes at least a

second insert (10) fixed in correspondence of the median portion (15).

7) Device according to claims 5 and 6 characterized in that the first (9) and the second (10) inserts are made of synthetic material with a predetermined friction coefficient.

8) Device according to claim 5 and 6 characterized in that the first (9) and the second (10) inserts are removably or irremovably fixed.

9) Device according to claim 1 characterized in that the balancing means (11) are constituted by at least a spring reacting in extension or compression.

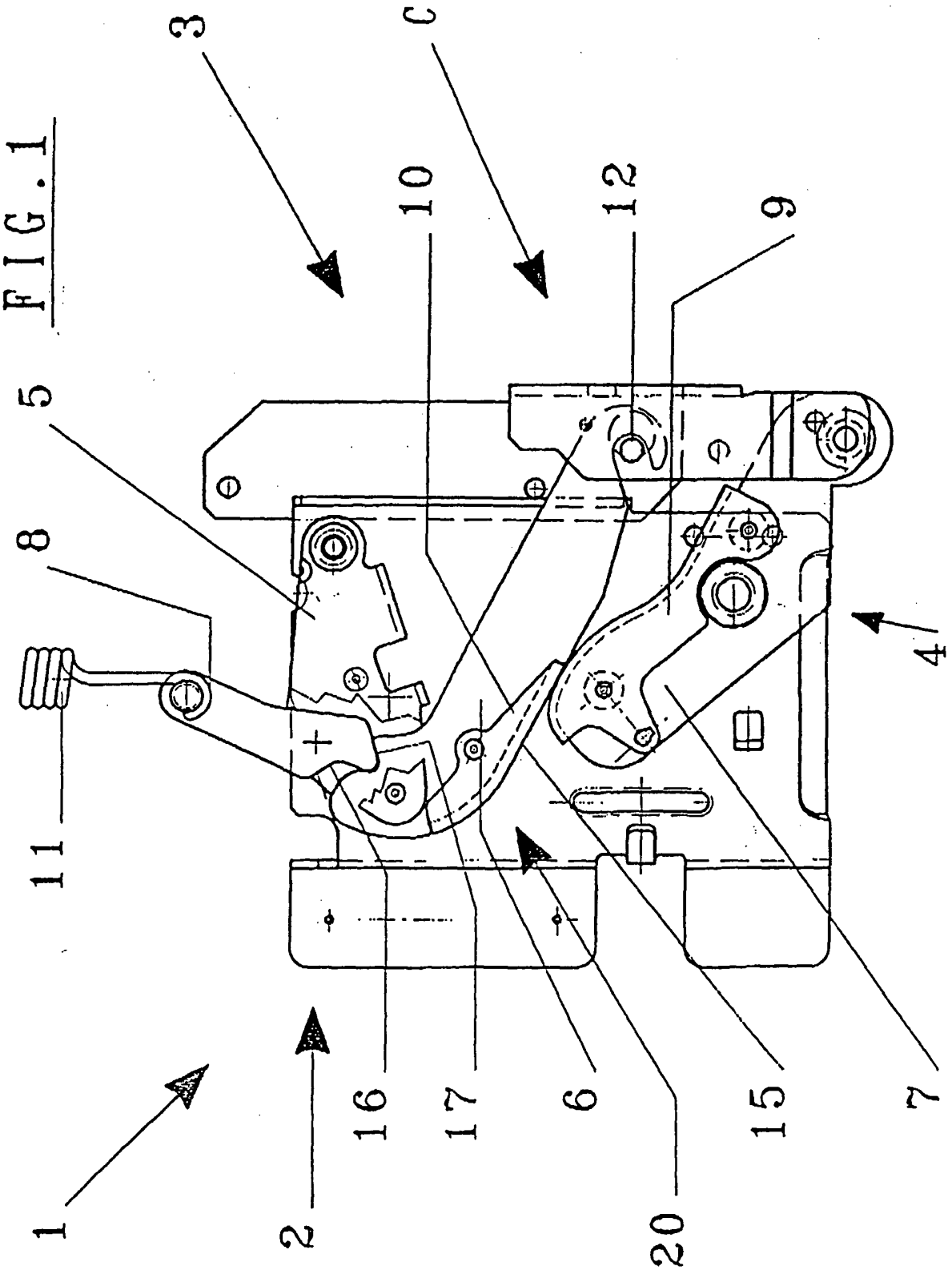
10) Device according to claim 1 characterized in that includes elastic means (14) connected to the connection mean (2) and jointed to the rocker arm (4).

11) Device according to claim 10 characterized in that the elastic means (14) are constituted by at least a spring reacting in extension or compression.

12) Device according to claim 1 characterized in that the connection mean (2) includes at least a wall (13), provided with a folded portion for contacting the connecting rod (5) in correspondence of the full opening condition (A).

13) Device according to claim 1 characterized in that the end of the shaped lever (6) fixed to the support means (3) has a hook shape removably engaging a corresponding pivot (12), fixed to the support mean (3).

FIG.1



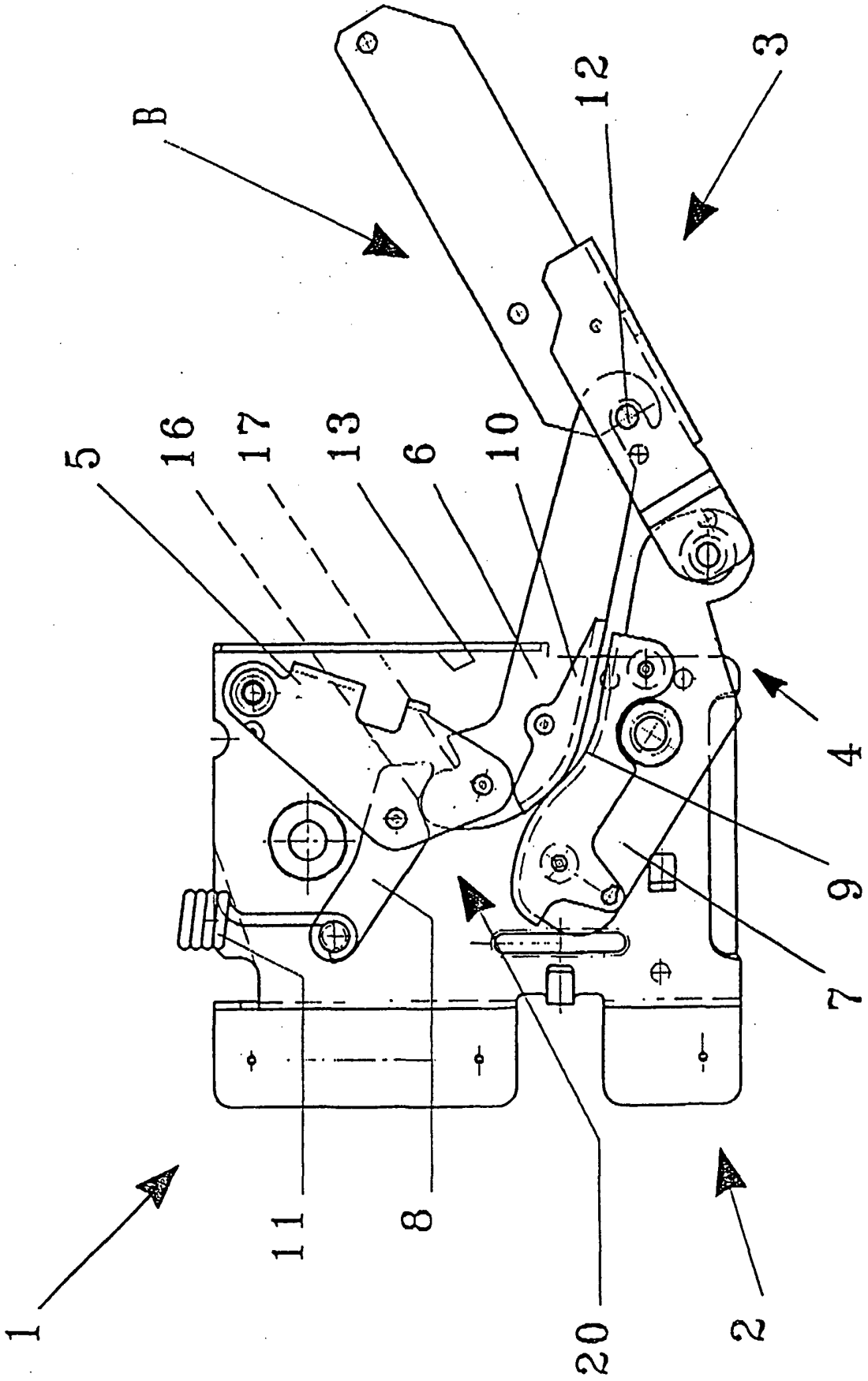


FIG.2

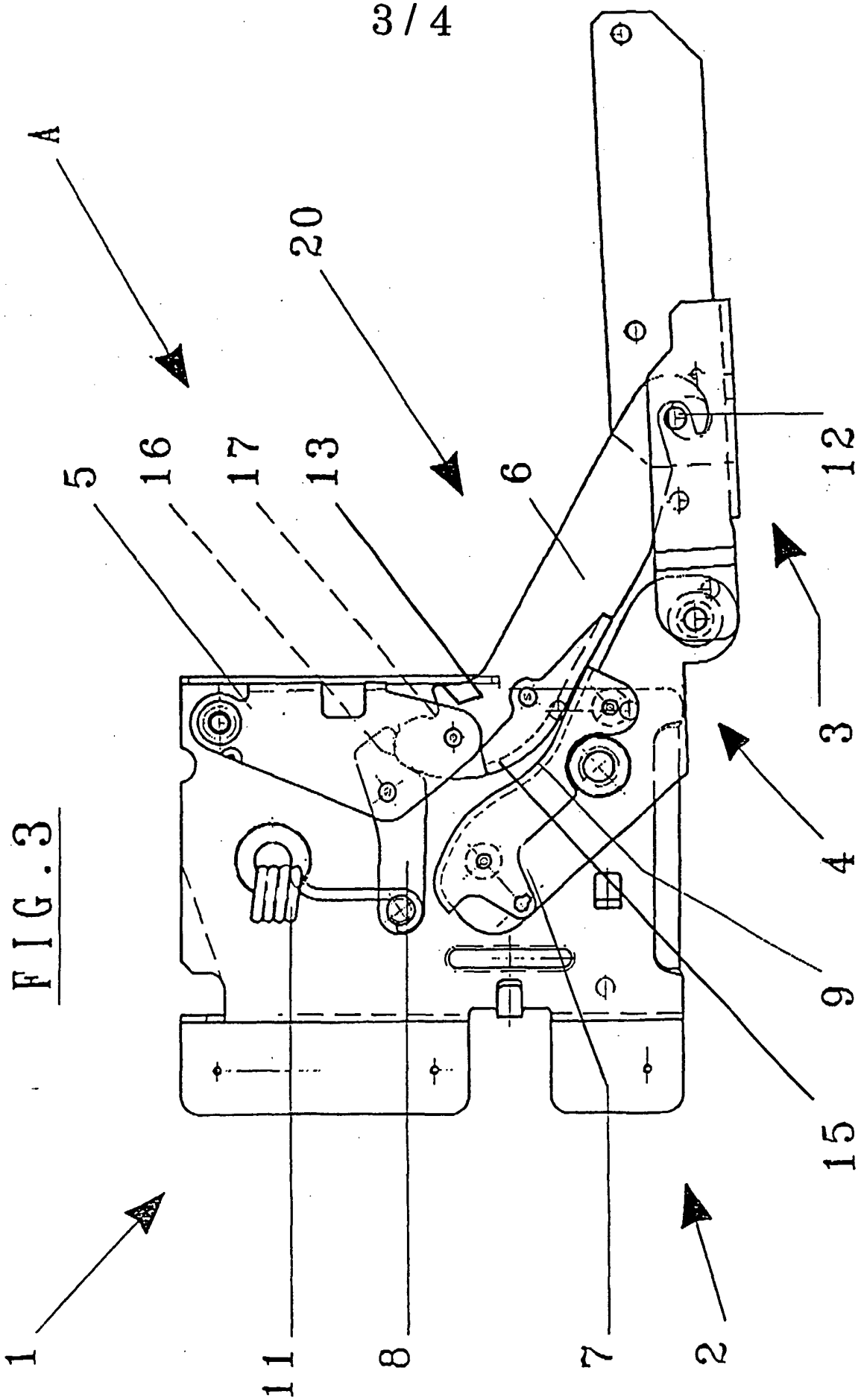


FIG.3

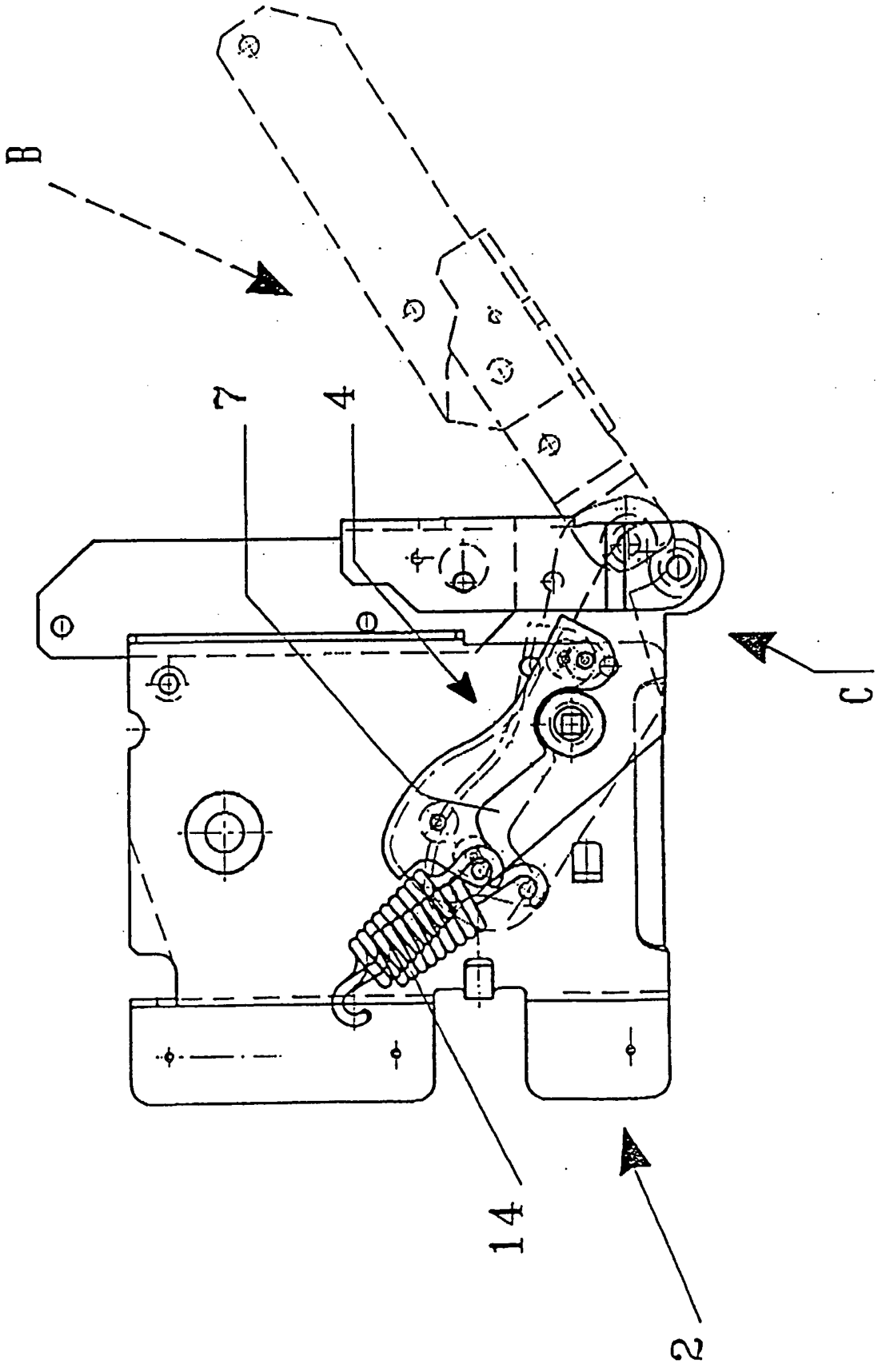


FIG. 4

INTERNATIONAL SEARCH REPORT

Internati pplication No
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A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 A47L15/42

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 A47L E05F E05D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
12 February 2003	24/02/2003

Name and mailing address of the ISA	Authorized officer
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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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INTERNATIONAL SEARCH REPORT

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