(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 462 743 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
29.09.2004 Bulletin 2004/40

(51) Int Cl.[7]: **F25D 23/00**, F25D 23/02

(21) Application number: **03258241.3**

(22) Date of filing: **30.12.2003**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IT LI LU MC NL PT RO SE SI SK TR
Designated Extension States:
AL LT LV MK

(30) Priority: **28.03.2003 KR 2003019468**

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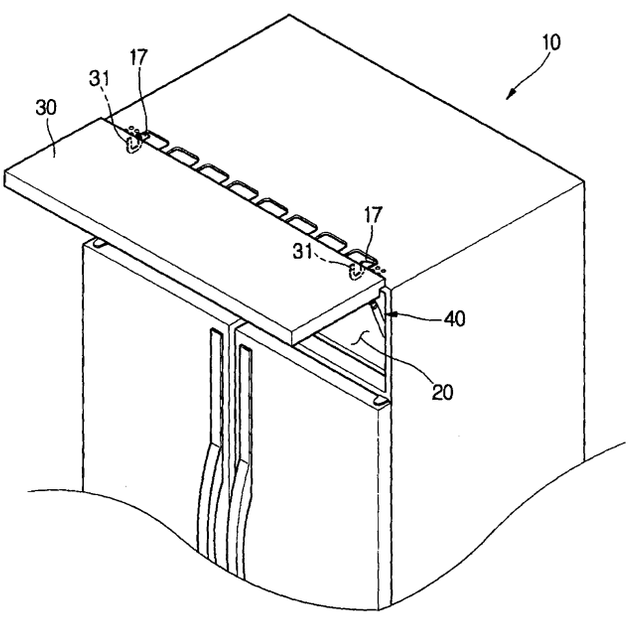
(54) Recessed refrigerator

(57) A recessed refrigerator having a unit to bias the cover (30) of a machine room (20) to be opened or closed depending on the position of the cover (30). The recessed refrigerator includes a cabinet (10) having a storage compartment (11,12), and a machine room (20) with an opening at a front surface positioned above the storage compartment (11,12). A cover (30) is hingedly coupled to the cabinet (10) to selectively open and close the front opening of the machine room (20), and a biasing unit (40) causes the cover (30) to be automatically opened and closed depending on the location of the cover (30). Thus, the cover (30) is opened and closed easily with even a small application of force.

FIG. 2



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Description

[0001] The present invention relates to a recessed refrigerator installed in a wall-recessed manner, and more particularly, to a recessed refrigerator, which allows internal components to be easily repaired and replaced.

[0002] Generally, a refrigerator generates cool air by a refrigerating cycle to maintain the freshness of stored food for a desired lengthy period of time.

[0003] Because a recessed refrigerator is usually taller than a typical refrigerator, it is often difficult for a user to make use of an upper space of the storage compartment of a recessed refrigerator.

[0004] Accordingly, in these years, components constituting a refrigerating cycle, such as an evaporator and a condenser, are installed in the hard to reach upper space of a refrigerator, so as to more efficiently utilize the storage space of the refrigerator.

[0005] The recessed refrigerator includes a cabinet that defines an external appearance. The cabinet is provided at an upper part thereof with a machine room, which houses electrical components, such as a condenser, a compressor and a blower fan. The machine room opens at its front face, to allow the electrical components in the machine room to be repaired and replaced. The machine room is provided with an access cover at the front open face, to allow the machine room to be opened when necessary.

[0006] In a conventional recessed refrigerator, where it is necessary to repair or replace electrical components in the machine room because of use for a long period, the components must be repaired or replaced while the cover of the machine room is raised.

[0007] However, since the cover to close the front open face of the machine room is usually provided with decorative elements, the cover of the machine room is heavy, thereby causing the opening or closing operation of the cover to be difficult.

[0008] An aim of the present invention is to provide a recessed refrigerator including a cover, which can be easily opened and closed.

[0009] Other aims and/or advantages of the invention will be set forth in part in the description which follows and, in part, will be obvious from the description, or may be learned by practice of the invention.

[0010] According to the present invention there is provided an apparatus and method as set forth in the appended claims. Preferred features of the invention will be apparent from the dependent claims, and the description which follows.

[0011] In one aspect of the present invention there is provided a recessed refrigerator including a cabinet having a storage compartment, and a machine room positioned on the storage compartment and opening at a front surface thereof, a cover hingedly coupled to the cabinet to selectively open the front opening of the machine room, and a biasing unit to cause the cover to be automatically opened and closed depending on a location of the cover.

[0012] The biasing unit may include a gas spring comprising a cylinder filled with gas and hingedly connected to either the cover or the cabinet, and a piston inserted at one end thereof into the cylinder and moved back and forth by compression of the gas. The other end of the piston is hingedly connected to the remaining one of the cover and the cabinet.

[0013] The cabinet may include a first pair of hinge brackets protruded from a top surface of the cabinet, and the cover may include a second pair of hinge brackets hingedly coupled to the first hinge brackets. The second hinge brackets are bent into a general "U" shape to pass through the machine room and the top panel of the cabinet.

[0014] Assuming that a point, where the first pair of hinge brackets and the second pair of hinge brackets are coupled, is designated as a cover hinge point, and a point, where the biasing unit is hingedly coupled to the cover, is designated as a first hinge point, and a point, where the biasing unit is hingedly coupled to the cabinet, is designated as a second hinge point, then the cover may be opened by the compression of the biasing unit when the first hinge point is located inside a line connecting the second hinge point to the cover hinge point, while the cover may be closed by the compression of the biasing unit when the first hinge point is located outside a line connecting the second hinge point to the cover hinge point.

[0015] For a better understanding of the invention, and to show how embodiments of the same may be carried into effect, reference will now be made, by way of example, to the accompanying diagrammatic drawings in which:

Figure 1 is a front elevation view of a recessed refrigerator in accordance with the present invention;

Figure 2 is a perspective view of a recessed refrigerator according to an embodiment of the present invention;

Figure 3 is a cross-sectional view of a biasing unit of the recessed refrigerator shown in Figure 2, in which a cover is closed by the biasing unit; and

Figure 4 is a cross-sectional view of the biasing unit shown in Figure 3, in which the cover is opened by the biasing unit.

[0016] As shown in Figure 1, a refrigerator according to an embodiment of the present invention includes a cabinet 10 defining an external appearance of the refrigerator. The cabinet 10 has a food storage compartment, partitioned by an intermediate partition wall 13 into left and right storage compartments with openings on the front surfaces thereof. One of the storage compartments forms a refrigerator compartment 12 to store food

in a cool state, while the other storage compartment forms a freezer compartment 11 to store food in a frozen state. In an embodiment of the present invention the refrigerator is of a recessed type, though the invention may be applied to any refrigerator with a top mounted machine room.

[0017] A freezer compartment door 14 is hinged to an open front of the freezer compartment 11, and a refrigerator compartment door 15 is hinged to an open front of the refrigerator compartment 12. Thus, the two compartments 11 and 12 are independently closed and opened by the two doors 14 and 15. A plurality of racks 16 or shelves are installed in each of the two compartments 11 and 12, and on an inner surface of each of the two doors 14 and 15 to store food.

[0018] In the recessed refrigerator, the top of the cabinet 10 is provided at a rear side with an air cooling compartment (not shown), which is laterally extended and houses the components constituting the refrigerating cycle, such as an evaporator (not shown) and a cool air-circulating fan (not shown). The top of the cabinet 10 is further provided with a machine room 20, in which components constituting the refrigerating cycle, such as a compressor 21, the condenser 22, and a cooling fan 23 are installed.

[0019] The front surface of the machine room 20 opens to allow the old or worn-out components to be repaired or replaced. The front surface of the machine room 20 is provided with a cover 30 to allow the machine room 20 to be selectively opened and closed as necessary.

[0020] As shown in Figure 2, the cover 30 of the machine room 20 is hingedly coupled at the upper end to the front side of the top of the cabinet 10. That is, the cover 30 is rotatably coupled to the front side of the top of the machine room 20 to selectively open or close the machine room 20. Accordingly, the cover 30 normally closes the front opening of the machine room 20 to shield the electrical components in the machine room 20 from the outside. Where the electrical components in the machine room 20 are required to be repaired or replaced, the lower side of the cover 30 is raised forward to open the machine room 20, thereby allowing the electrical components to be accessed.

[0021] The top panel of the cabinet 10 is provided at both sides of a front end with a pair of first hinge brackets 17, and the cover 30 is provided at both sides of an upper end with a pair of second hinge brackets 31. Each of the second hinge brackets 31 are hingedly coupled to each of the respective first hinge brackets 17, as more clearly shown in a detail of one end of the cabinet 10 in Figures 3 and 4. Consequently, the cover 30 is openably coupled to the front opening of the machine room 20 by the hinged connection between the first hinge brackets 17 and the second hinge brackets 31. In this specification, the hinge point where the first hinge brackets 17 and the second hinge brackets 31 are coupled, is referred to as a cover hinge point H_0.

[0022] In Figures 3 and 4, reference numeral 50, which has not been described heretofore, designates a ceiling of a building or furniture positioned above the recessed refrigerator according to the present invention.

[0023] In this embodiment, the cover hinge point H_0 is positioned at a front side of the top of the cabinet 10, so that the cover 30 is positioned at a higher level than the top surface of the cabinet 10 when the cover 30 is opened. Therefore, the front opening of the machine room 20 is completely accessible without even partial obstruction to the front opening of the machine room 20, thereby permitting the electrical and refrigeration components in the machine room 20 to be easily repaired and replaced through the front opening.

[0024] The second hinge brackets 31 are rearwardly protruded from a rear surface of the cover 30. The second hinge brackets 31 are bent into a general "U" shape, such that ends of the second hinge brackets 31 are hingedly coupled H_o to the first hinge brackets 17 through the machine room 20 and the top panel of the cabinet 10. If the second hinge brackets 31 are protruded upward from the cover 30 and thus exposed to the visual field of an observer in the front of the cabinet 10, the aesthetic appearance of the refrigerator would deteriorate.

[0025] The recessed refrigerator according to this embodiment of the present invention further includes a biasing unit, which enables the cover 30 to be opened and closed easily by even a small application of force.

[0026] As shown in Figures 3 and 4, the biasing open-close unit comprises a gas spring 40 that includes a gas filled cylinder 41 hingedly coupled at one end to the cover 30 and, and a piston 42 slidably inserted at one end into the cylinder 41 and coupled at the other end to an inner side of the machine room 20. In this specification, a hinge point, where the biasing unit 40 is hingedly coupled to the cover 30, is referred to as a first hinge point H_1, while the other hinge point, where the biasing unit 40 is hingedly coupled to the inner side of the machine room 20, is referred to as a second hinge point H_2. In another aspect of the present invention, the gas spring 40 may be oriented in a reverse orientation, with the cylinder 41 coupled to the machine room 20 and the piston 42 slidably inserted at one end into the cylinder 41 and coupled to the cover 30 at the other end.

[0027] When the cover 30 is closed, the first hinge point H_1 is located inside a line L connecting the second hinge point H_2 to the cover hinge point H_0. Consequently, the compression of the gas spring 40 serves to open the cover 30 when the first hinge point H_1 is located outside the line L connecting the second hinge point H_2 to the cover hinge point H_0, while the compression of the gas spring 40 serves to close the cover 30 when the first hinge point H_1 is located inside the line L connecting the second hinge point H_2 to the cover hinge point H_0.

[0028] Accordingly, as shown in Figure 3, when the cover 30 is in a state of closing the front opening of the machine room 20, the cover 30 is forced to be main-

tained in the closed state. When the first hinge point H_1 is moved by a user opening the cover 30 outside the line L connecting the second hinge point H_2 to the cover hinge point H_0, the compression of the gas spring 40 serves to open the cover 30 automatically.

[0029] The operations and functions of the recessed refrigerator according to this embodiment of the present invention will now be described with reference to the drawings.

[0030] When the cover 30 of the machine room 20 is in the process of being closed, compression of the gas spring 40 is used to close the cover 30 once the first hinge point H_1 is moved inside the line L connecting the second hinge point H_2 to the cover hinge point H_0, as shown in Figure 3. Therefore, the cover 30 is maintained in a state of closing the front opening of the machine room 20.

[0031] On the other hand, when the first hinge point H_1 is move d outside the line L connecting the second hinge point H_2 to the cover hinge point H_0 by a user, the compression of the gas spring 40 is used to raise the cover 30, as shown in Figure 4. Therefore, the cover 30 is biased open by the compression of the gas spring 40 after the first hinge point H_1 is moved outside the line L connecting the second hinge point H_2 to the cover hinge point H_0.

[0032] As is apparent from the above description, the present invention provides a recessed refrigerator, which includes a biasing unit to cause a cover of a machine room of the recessed refrigerator to be opened or closed depending on the position of the cover, thereby allowing the cover to be opened and closed easily by even small applications of force.

[0033] Although a few preferred embodiments have been shown and described, it will be appreciated by those skilled in the art that various changes and modifications might be made without departing from the scope of the invention, as defined in the appended claims.

[0034] Attention is directed to all papers and documents which are filed concurrently with or previous to this specification in connection with this application and which are open to public inspection with this specification, and the contents of all such papers and documents are incorporated herein by reference.

[0035] All of the features disclosed in this specification (including any accompanying claims, abstract and drawings), and/or all of the steps of any method or process so disclosed, may be combined in any combination, except combinations where at least some of such features and/or steps are mutually exclusive.

[0036] Each feature disclosed in this specification (including any accompanying claims, abstract and drawings) may be replaced by alternative features serving the same, equivalent or similar purpose, unless expressly stated otherwise. Thus, unless expressly stated otherwise, each feature disclosed is one example only of a generic series of equivalent or similar features.

[0037] The invention is not restricted to the details of the foregoing embodiment(s). The invention extends to any novel one, or any novel combination, of the features disclosed in this specification (including any accompanying claims, abstract and drawings), or to any novel one, or any novel combination, of the steps of any method or process so disclosed.

Claims

1. A recessed refrigerator comprising:

   a cabinet (10) having a storage compartment (11,12), and a machine room (20) positioned on the storage compartment (11,12) and opening at a front surface thereof;

   a cover (30) hingedly coupled to the cabinet (10) to selectively open the front opening of the machine room (20); and

   a biasing unit (40) to cause the cover (30) to be biased open and closed depending on a location of the cover (30).

2. The recessed refrigerator as set forth in claim 1, wherein the biasing unit (40) includes a gas spring (40) comprising a cylinder (41) filled with gas and hingedly connected to one of the cover (30) and the cabinet (10), and a piston (42) inserted at one end thereof into the cylinder (41) and moved back and forth by compression of the gas, the other end of the piston (42) being hingedly connected to the remaining one of the cover (30) and the cabinet (10).

3. The recessed refrigerator as set forth in claim 1 or 2, wherein the cabinet (10) includes a first hinge bracket (17) protruded from a top surface of the cabinet (10), and the cover (30) includes a second hinge bracket (31) hingedly coupled to the first hinge bracket (17), the second hinge bracket (31) being bent into a general "U" shape to pass through the machine room (20) and the top panel of the cabinet (10).

4. The recessed refrigerator as set forth in claim 3, wherein a first point (H_0), wherein the first hinge brackets and the second hinge brackets are coupled, is a cover hinge point, and a second point (H_1), wherein the biasing unit (40) is hingedly coupled to the cover (30), is a first hinge point, and a third point (H_2), where the biasing unit (40) is hingedly coupled to the cabinet (10), is a second hinge point, the cover (30) is opened by the biasing unit (40) when the first hinge point (H_1) is located outside a line connecting the second hinge point (H_2) to the cover hinge point (H_o), while the cover (30) is closed by

the biasing unit (40) when the first hinge point (H_1) is located inside a line connecting the second hinge point (H_2) to the cover hinge point (H_o).

5. A refrigerator comprising:

a cabinet (10) housing a machine room (20) disposed above a storage compartment (11,12) wherein the machine room (20) includes a movable cover (30); and

a biasing unit (40) for opening and closing the machine room cover (30) depending on the location of the cover (30).

6. The refrigerator as in claim 5, further comprising a "U" shaped hinge bracket (31) coupling the cover (30) to a hinge bracket (17) protruding from the top of the cabinet (10).

7. The refrigerator as in claim 6, wherein the "U" shaped hinge bracket (31) rearwardly protrudes from a rear surface of the cover (30).

8. The refrigerator as in claim 6 or 7, wherein:

the cover (30) is opened when the cover (30) is moved to a position where the coupling point (H_1) of the biasing unit (40) to the cover (30) is outside the line between the coupling point (H_2) of the "U" shaped hinge bracket (31) and the coupling point (H_0) of the biasing unit (40) to the cabinet (10); and

the cover (30) is closed when the cover (30) is moved to a position where the coupling point (H_1) of the biasing unit (40) to the cover (30) is inside the line between the coupling point (H_2) of the "U" shaped hinge bracket (31) and the coupling point (H_0) of the biasing unit (40) to the cabinet (10).

9. The refrigerator as in any of claims 5 to 8, wherein the biasing unit (40) includes a gas filled cylinder (41) pivotally coupled at one end to one of the cover (30) or the cabinet (10) and at the opposite end to one end of a piston (42), and the opposite end of the piston (42) is pivotally coupled to the other one of the cover (30) or cabinet (10).

10. The refrigerator as in claim 9, wherein the cover (30) is opened once the cover (30) is moved in the opening direction to a position outside a predetermined point; and where the cover (30) is closed once the cover (30) is moved in the closing direction to a position inside a predetermined point.

11. The refrigerator as in any of claims 5 to 10, wherein the cover (30) is above the top of the cabinet (10) when the cover (30) is opened.

12. A refrigerator comprising:

a cabinet (10);

a storage compartment (11,12), adapted to be climate controlled, housed in the cabinet (10);

a machine room (20), with a movable cover (30), housed in the cabinet (10) and disposed above the storage compartment (11,12), wherein said machine room (20) includes a plurality of refrigeration cycle components for controlling the climate in the storage compartment (11,12); and

a biasing unit (40) for providing opening and closing assistance to the machine room cover depending on the location of the cover (30).

13. The refrigerator as in claim 12, wherein the biasing unit (40) opens the cover (30) once the cover (30) is moved in the opening direction to a position outside a predetermined point; and where the biasing unit (40) closes the cover (30) once the cover (30) is moved in the closing direction to a position inside a predetermined point.

14. The refrigerator as in claim 12 or 13, wherein the biasing unit (40) includes at least one gas filled cylinder (41) pivotally coupled at one end to one of the cover (30) or the cabinet (10) and at the opposite end to one end of a piston (42), and the opposite end of the piston (42) is pivotally coupled to the other one of the cover (30) or cabinet (10).

15. The refrigerator as in claim 14, further comprising at least one curved hinge bracket (31) coupling the cover (30) to a hinge bracket (17) attached to the cabinet (10).

16. The refrigerator as in claim 15, wherein the cover (30) is opened when the cover (30) is moved to a position where the coupling point of the biasing unit (40) to the cover (30) is outside the line between the coupling point of the curved hinge bracket (31) and the coupling point of the biasing unit (40) to the cabinet (10); and

where the cover (30) is closed when the cover (30) is moved to a position where the coupling point of the biasing unit (40) to the cover (30) is inside the line between the coupling point of the curved hinge bracket (31) and the coupling point of the biasing unit (40) to the cabinet (10).

17. The refrigerator as in claim 16, wherein the cover

(30) is above the top of the cabinet (10) when the cover (30) is opened.

FIG. 1

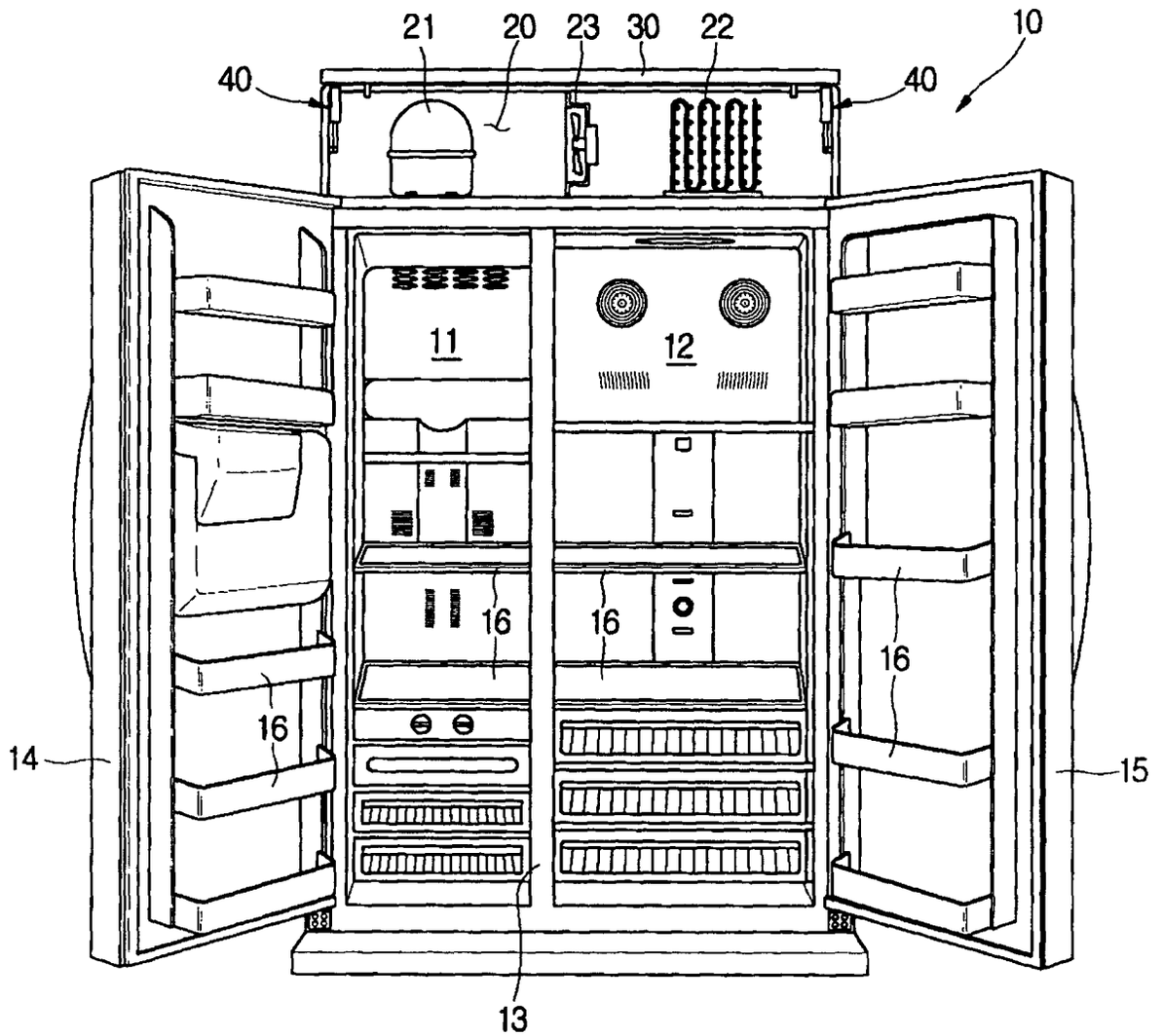


FIG. 2

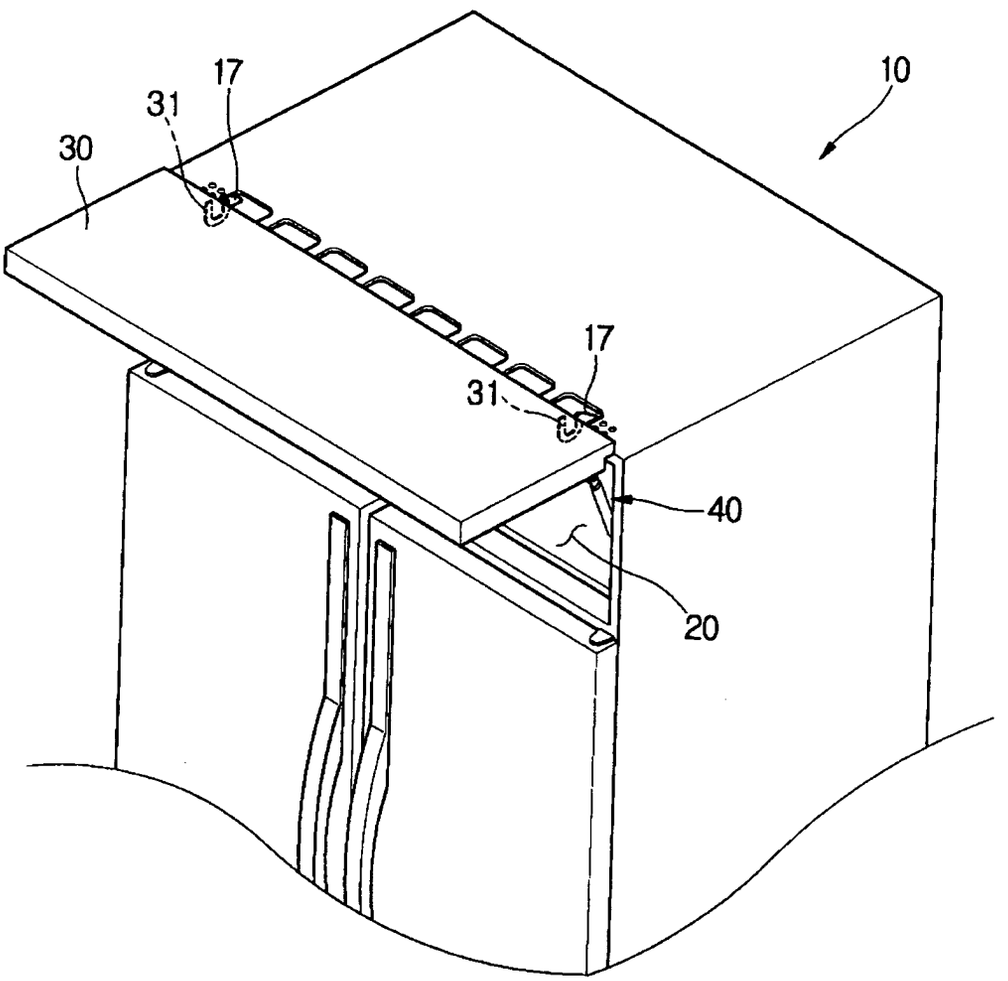


FIG. 3

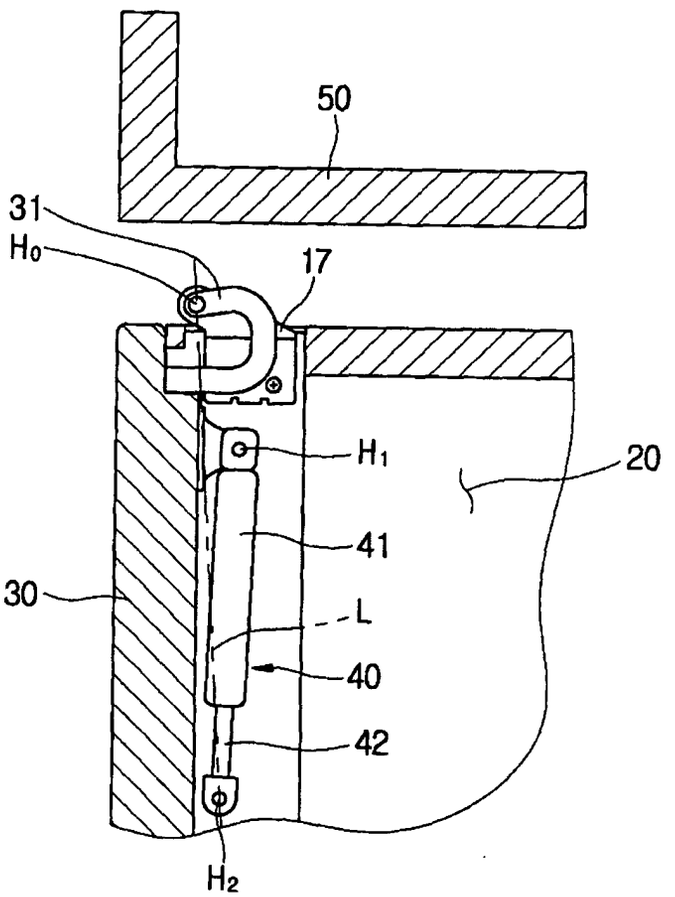
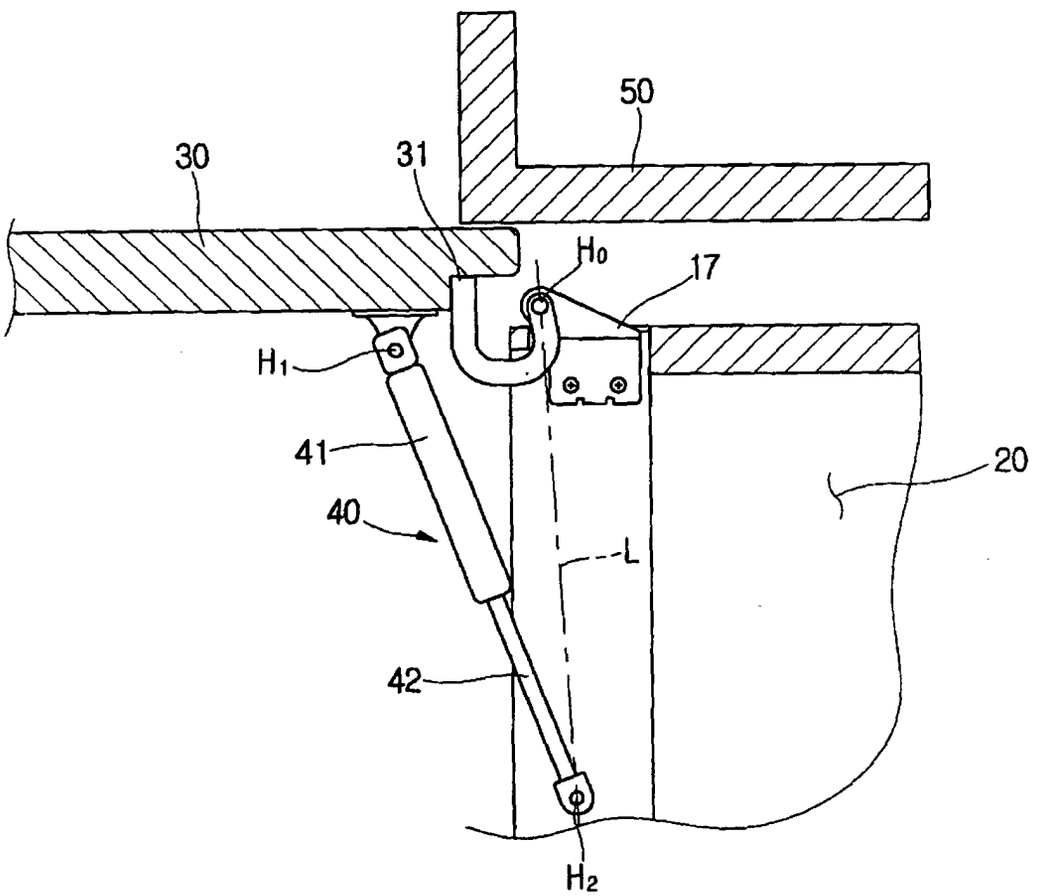


FIG. 4



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EUROPEAN SEARCH REPORT

Application Number
EP 03 25 8241

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
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A		4,8,10, 16	
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TECHNICAL FIELDS SEARCHED (Int.Cl.7)

F25D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
MUNICH	1 July 2004	Salaün, E

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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