(11) Application No. AU 2005201538 B2

(19) AUSTRALIAN PATENT OFFICE

(54) Title

Bottom drawer type refrigerator having a basket lift device

(51)[6] International Patent Classification(s)

F25D 11/02 (2006.01) 20060101AFI2006010

F25D 11/02 1BHAU

(21) Application No: 2005201538 (22) Application Date: 2005.04.12

(30) Priority Data

(31) Number	(32) Date	(33) Country
59930/2004	2004.07.29	KR

(43) Publication Date : 2006.02.16

(43) Publication Journal Date : 2006.02.16

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(56) Related Art

AU 2004242444

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ABSTRACT OF THE DISCLOSURE

In a refrigerator which includes a main body having a lower cooling chamber disposed at a lower portion of the main body, a base frame is disposed to be moved in inward/outward directions at a lower cooling chamber and has a drawer door at a front side thereof. A lift frame is disposed above the base frame, on which a basket is placed. A rotatable lead screw is vertically disposed at a rear surface of the drawer door, and a lift unit is formed at front of the lift frame for moving up and down along the lead screw. A driving unit rotates the lead screw clockwise or counterclockwise. When the basket is drawn out, the basket can be lifted to allow the user to take a food item out of the basket without bending his/her back. Thus, users' convenience can be enhanced.

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P001
Section 29
Regulation 3.2(2)

AUSTRALIA

Patents Act 1990

COMPLETE SPECIFICATION

STANDARD PATENT

Application Number:

Lodged:

Invention Title: **Bottom drawer type refrigerator having basket lift device**

The following statement is a full description of this invention, including the best method of performing it known to us:

BOTTOM DRAWER TYPE REFRIGERATOR HAVING BASKET LIFT DEVICE

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a refrigerator having a basket lift device and more particularly, to a basket lift device capable of making a basket received at a lower portion of a main body lifted to enhance users' convenience.

2. Description of the Background Art

Figure 1 is a perspective view of a refrigerator and Figure 2 is a sectional view of a lower portion of the refrigerator showing how a basket is received in a main body of the refrigerator in accordance with the conventional art.

A typical bottom drawer-type refrigerator includes a main body 102 having an opened front side and a receiving space, an upper cooling chamber 106 disposed at an upper portion of the main body 102, having a pair of upper ('French' style side-by-side) doors 104 respectively opening swingably at both sides, for keeping food items stored therein cold, and a lower cooling chamber 112 (e.g. a freezer compartment) disposed at a lower portion of the main body 102, separated by a barrier wall 108 from the upper cooling chamber 106 and having a drawer door 110 opening slidably outwardly.

A mechanical chamber 116, which includes a compressor 114 and other components for generating cooling air supplied to the upper cooling chamber 106 and the lower cooling chamber 112, is provided at a rear portion of the main body 102.

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A basket 120 for receiving food items therein is slidably disposed in the lower cooling chamber 112, and the drawer door 110 is fixed at the front side of the basket 120 like a drawer front panel. Accordingly, when the drawer door 110 is pulled out, the basket 120 is thereby opened, and when the drawer door 110 is pushed in, the basket 120 is thereby closed. A guide rail 124 is respectively installed between each of the outer sides of the basket 120 and inner sides of the lower cooling chamber 112 to guide the basket 120 to be slid the inward/outward directions.

One or more of drawers 126 for keeping food items therein may be provided above the basket 120 so as to be slidably opened.

In such conventional bottom drawer-type refrigerator, when a food item kept in the lower cooling chamber 112 needs to be taken out or a food item needs to be put into the lower cooling chamber 112, the drawer door 110 is pulled outwardly so that the basket 120 can be slidably moved and opened. After the food item stored in the basket 120 is taken out or the food item is put into the basket 120, the drawer door 110 is pushed inwardly so that the basket 120 can be slidably closed.

However, the conventional bottom drawer-type refrigerator has a problem in that, because the installation position of the basket is too low, a user must lower his/her posture, that is, for example, the user must bend his/her back or crouch down in order to put in or take out the food items, causing user inconvenience.

SUMMARY OF THE INVENTION

Therefore, a desired outcome of the present invention is to provide a bottom drawer type refrigerator having a basket lift device capable of enhancing user convenience by lifting a position of the basket in such a manner that when a basket disposed at a lower portion of a main body of the refrigerator is drawn out, it is lifted upwardly.

In accordance with the purpose of the present invention, as embodied and broadly described herein, there is provided a bottom drawer refrigerator including:

a main body having at least a lower cooling chamber disposed at a lower portion of the main body, a base frame disposed to be moved inwardly/outwardly at the lower cooling chamber and having a drawer door at a front side thereof;

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a lift frame disposed above the base frame, on which a basket is placed;

a lead screw rotatably disposed vertically at a rear surface of the drawer door;

a lift arm provided at a front of the lift frame and moving up and down along the lead screw as the lead screw is rotated; and

a driving unit for rotating the lead screw clockwise or counterclockwise.

The foregoing and other desired outcomes, features, aspects and advantages of the present invention will become more apparent from the following detailed description of preferred embodiments of the present invention when taken in conjunction with the accompanying drawings.

Comprises/comprising and grammatical variations thereof when used in this specification are to be taken to specify the presence of stated features, integers, steps or components or groups thereof, but do not preclude the presence or addition of one or more other features, integers, steps, components or groups thereof.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings, which are included to provide a further understanding of the invention and are incorporated in and constitute a part of this specification, illustrate embodiments of the invention and together with the description serve to explain the principles of the invention.

In the drawings:

Figure 1 is a frontal perspective view of a bottom drawer type refrigerator in accordance with the conventional art;

Figure 2 is a cross-sectional view of a lower portion of the bottom drawer refrigerator in accordance with the conventional art;

Figure 3 is a frontal perspective view of a bottom drawer type refrigerator in accordance with a first embodiment of the present invention with a basket thereof opened;

Figure 4 is a side elevation view showing a basket lift device of the refrigerator in accordance with the first embodiment of the present invention;

Figure 5 is a rear perspective view of the basket lift device of the refrigerator in accordance with the first embodiment of the present invention;

Figure 6 is top plan view of the basket lift device of the refrigerator in accordance with the first embodiment of the present invention;

Figure 7 is an enlarged view of a portion 'A' in Figure 6;

Figure 8 is a schematic block diagram of a control unit of the basket lift device of the refrigerator in accordance with the first embodiment of the present invention;

Figure 9 is a side elevation view showing an operation state of the basket

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lift device of the refrigerator in accordance with the first embodiment of the present invention;

Figure 10 is a rear perspective view of a basket lift device of a bottom drawer type refrigerator in accordance with a second embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

A bottom drawer type refrigerator having a basket lift device in accordance with the present invention will now be described with reference to the accompanying drawings.

There can be several embodiments of the refrigerator having a basket lift device, of which the most preferred ones will be described.

Figure 3 is a frontal perspective view of a refrigerator with a basket opened in accordance with a first embodiment of the present invention, and Figure 4 is a side view showing a basket lift device of the refrigerator in accordance with the first embodiment of the present invention.

A refrigerator implementing the basket lift device of the present invention includes: a main body 10 having a receiving space, an upper cooling chamber 14 disposed at an upper portion of the main body 10 and having a pair of upper (e.g. 'French') swinging doors 12 open at both sides, a lower cooling chamber 18 separated by a barrier wall 16 from the upper cooling chamber 14 and disposed at a lower portion of the main body 10, a basket 20 disposed to be slidable in inward/outward directions at the lower cooling chamber 18 for keeping food items therein, and a lift unit for lifting the basket 20 upward when the basket 20 is drawn

out.

The upper cooling chamber 14 is preferably used as a refrigerating chamber for keeping refrigerated food items, and the lower cooling chamber 18 is preferably used as a freezing chamber for keeping frozen food items.

A drawer door 22 is disposed at a front side of the lower cooling chamber 18 and pushes in or draws out the basket 20 while being moved inwardly/outwardly of the main body 10. A plurality of drawers 24 are optionally disposed at an upper portion of the lower cooling chamber 18, to keep food items, e.g. ice cubes, therein and can be drawn in or out.

The drawer door 22 includes a handle 26 at its front side, and includes one or more operation switches 28a and 28b for operating the lift unit. At an inner side of the drawer door, a base frame 30 is mounted, on which the basket 20 is mounted, and a pair of guide rails 32 are installed between the lower cooling chamber 18 and the base frame 30 to guide the base frame 30 inwardly/outwardly of the main body 10.

Each guide rail 32 includes a fixed rail 32a fixed at the bottom surface of the lower cooling chamber 18, a middle rail 32b slidably connected with the fixed rail 32a, and a moving rail 32c slidably connected with the middle rail 32b and fixed at the lower surface of the base frame 30.

Figure 5 is a rear perspective view of the basket lift device of the refrigerator in accordance with the first embodiment of the present invention, and Figure 6 is a top plan view of the basket lift device of the refrigerator in accordance with the first embodiment of the present invention.

The lift unit includes a lift frame 36, on which the basket 20 is placed, disposed above the base frame 30, a driving unit 38 driving the lift frame 38 up

and down, a guide unit guiding the lift frame 36 to be linearly moved up and down, and a control unit controlling the driving unit 32 for lifting the basket 20 when the basket 20 is drawn out.

The driving unit 38 includes a rotatable lead screw 40 mounted vertically at a rear surface of the drawer door 22, a lift arm 42 extending forwardly from a vertical riser at a front side of the lift frame 36 and engaged with the lead screw 40 so as to be moved up and down when the lead screw 40 is rotated, and a drive motor 44 connected with a lower end of the lead screw 40 and rotating the lead screw 40 clockwise or counterclockwise when power is applied thereto.

An upper end of the lead screw 40 is rotatably supported by an upper support bearing or bushing 46 fixed at the rear surface of the drawer door 22 and a lower end of the lead screw 40 is rotatably supported by a lower support bearing 48 also fixed at the rear surface of the drawer door 22.

The guide unit includes at least one guide rod 50 mounted vertically to a rear surface of the drawer door 22, and at least one guide arm 52 extending forwardly from the vertical riser of the lift frame 36 and receiving the guide rod 50 therethrough such that the guide arm 52 can move vertically along the guide rod. Both ends of the guide bar 50 are fixed at the rear surface of the drawer door 22 by respectively fixing brackets 54.

With reference to Figure 7, a pair of guide rails 56 are fixed vertically at respective sides of the base frame 30, and corresponding guide protrusions 58 are formed at the sides of the lift frame 36 and inserted to be linearly movable in the guide rails 56, for further guiding and supporting vertical movement of the lift frame 36.

With reference to Figure 8, the control unit includes switches 28a and 28b

operated by a user in order to lift the basket 20, a first sensor 60 mounted at an upper portion of the rear surface of the drawer door 22 and sensing when the lift frame 36 located at a maximum lifted position, a second sensor 62 mounted at a lower portion of the rear surface of the drawer door 22 and sensing when the lift frame 36 is located at its bottommost lowered position, and a controller 64 for turning on/off the supply of power applied to the driving motor 44 according to a signal applied from the switches 28a and 28b, the first sensor 60 and the second sensor 62.

The switches 28a and 28b are installed at the front surface of the drawer door 22. When the lift frame 36 is to be lifted, the user operates the first switch 28a. When the lift frame 36 is to be lowered, the user operates the second switch 28b.

Preferably, the first sensor 60 and the second sensor 62 are formed as limit switches or as optical sensors for supplying signals to the controller 64 when the lift frame 36 is lifted up or lowered down.

The basket lift device constructed as described above operates as follows.

Figure 9 shows an operation state of the basket lift device of the bottom drawer refrigerator in accordance with the first embodiment of the present invention.

When the user wants to put or take a food item to or out of in the basket 20, the user pulls the drawer door 22 in an outward direction to draw the basket 20 out of the lower cooling chamber 28 and operates the first switch 28a mounted at the front surface of the drawer door 22. Then, a signal is applied from the first switch 28a to the controller 64 and the controller 64 applies power to the driving motor 44 to drive the driving motor 44 in a forward direction (in the direction of lifting the basket.

Then, as the lead screw 40 is rotated according to the driving of the driving motor 44, the lift arm 42 engaged with the lead screw 40 is moved up along the lead screw 40, and the lift frame 36 is thereby lifted. When the lift frame 36 reaches the highest point, the first sensor 60 senses that and applies a corresponding signal to the controller 64, and the controller 64 cuts off power supply to the driving motor 44.

In such a state, the user puts a food item in the basket 20 or takes a food item out of the basket 20 and then operates the second switch 28b. Then, the controller 64 applies power to the driving motor 44 in the opposite direction to drive the driving motor 44 in a reverse direction, according to which, the lead screw 40 is rotated in the opposite direction to lower the lift arm 42 and thereby the lift frame 36.

When the lift frame 36 is completely lowered, the second sensor 62 senses that and applies a corresponding signal to the controller 64 and the controller cuts off power supply to the driving motor 44. When the user pushes the drawer door 22 back in, the basket 20 is received in the lower cooling chamber 18.

Figure 10 is a perspective view of a basket lift device of the refrigerator in accordance with a second embodiment of the present invention.

The basket lift device in accordance with the second embodiment of the present invention has the same basic structure as the basket lift device of the first embodiment, except that the lead screw 40 is operated manually.

In detail, a square or hexagonal drive protrusion 70, onto which a tool may be inserted, is formed at an upper end of the lead screw 40. When a tool, namely, a crank handle 72, is inserted onto the drive protrusion 70 and rotated, the lead screw 40 is rotated to thereby lift up or lower down the lift frame 36.

As so far described, the refrigerator having the basket lift device has many advantages.

That is, for example, the basket lift device is provided for the basket disposed at the lower portion of the refrigerator. Thus, when the basket is drawn out, the basket can be lifted to allow the user to take a food item out of the basket without having to bend his/her back. Thus, users' convenience can be enhanced.

As the present invention may be embodied in several forms without departing from the spirit or essential characteristics thereof, it should also be understood that the above-described embodiments are not limited by any of the details of the foregoing description, unless otherwise specified, but rather should be construed broadly within its spirit and scope as defined in the appended claims, and therefore all changes and modifications that fall within the metes and bounds of the claims, or equivalents of such metes and bounds are therefore intended to be embraced by the appended claims.

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THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A bottom drawer refrigerator including:

a main body having at least a lower cooling chamber disposed at a lower portion of the main body, a base frame disposed to be moved inwardly/outwardly at the lower cooling chamber and having a drawer door at a front side thereof;

a lift frame disposed above the base frame, on which a basket is placed;

a lead screw rotatably disposed vertically at a rear surface of the drawer door;

a lift arm provided at a front of the lift frame and moving up and down along the lead screw as the lead screw is rotated; and

a driving unit for rotating the lead screw clockwise or counterclockwise.

2. The refrigerator of claim 1, wherein guide rails are installed between the base frame and the lower cooling chamber in order to guide the base frame to be slid inwardly/outwardly of the main body.

3. The refrigerator of claim 1, wherein a first guide unit is formed between the lift frame and the drawer door in order to guide the lift frame to be lifted in a vertical direction.

4. The refrigerator of claim 2, wherein the first guide unit includes:

at least one vertical guide rod attached to a rear surface of the drawer door; and

at least one guide arm provided at the front of the lift frame and receiving the guide bar therethrough such that the guide arm can move vertically along the guide bar.

5. The refrigerator of claim 1, wherein a second guide unit is formed between the lift frame and the base frame to guide the lift frame to be moved up and down.

6. The refrigerator of claim 5, wherein the second guide unit includes:

a pair of vertical guide rails respectively fixed at each side of the base frame; and

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guide protrusions formed at each side of the lift frame and movable linearly in the corresponding guide rails.

7. The refrigerator of claim 1, wherein the driving unit includes a driving motor connected to a lower end of the lead screw and rotating the lead screw clockwise or counterclockwise when power is applied thereto.

8. The refrigerator of claim 1, wherein the driving unit includes:

a drive protrusion formed at an upper end of the lead screw; and

a crank handle engageable with the drive protrusion for rotating the lead screw manually.

9. The refrigerator of claim 1, further including:

a control unit for controlling lifting of the basket by controlling the driving unit when the base frame is drawn out.

10. The refrigerator of claim 9, wherein the control unit includes:

switch means for being manipulated by a user to lift and lower the basket;

a first sensor mounted at an upper side of a rear surface of the drawer door and sensing a maximum lifted state of the lift frame;

a second sensor mounted at a lower side of the rear surface of the drawer door and sensing a bottom lowered state of the lift frame; and

a controller for applying power to the driving motor according to signals applied from the switches and the first and second sensors.

11. The refrigerator of claim 10, wherein the switch means include a first switch installed at a front surface of the drawer door and manipulated by the user for lifting the lift frame and a second switch also installed at the front surface of the drawer door and manipulated by the user for lowering the lift frame

12. The refrigerator of claim 10, wherein the first and second sensors are limit switches or optical sensors.

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13. A bottom drawer refrigerator substantially as herein described with reference to Figures 3 to 10 of the accompanying drawings.

DATED this 25th day of October 2006

LG ELECTRONICS INC

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FIG. 1

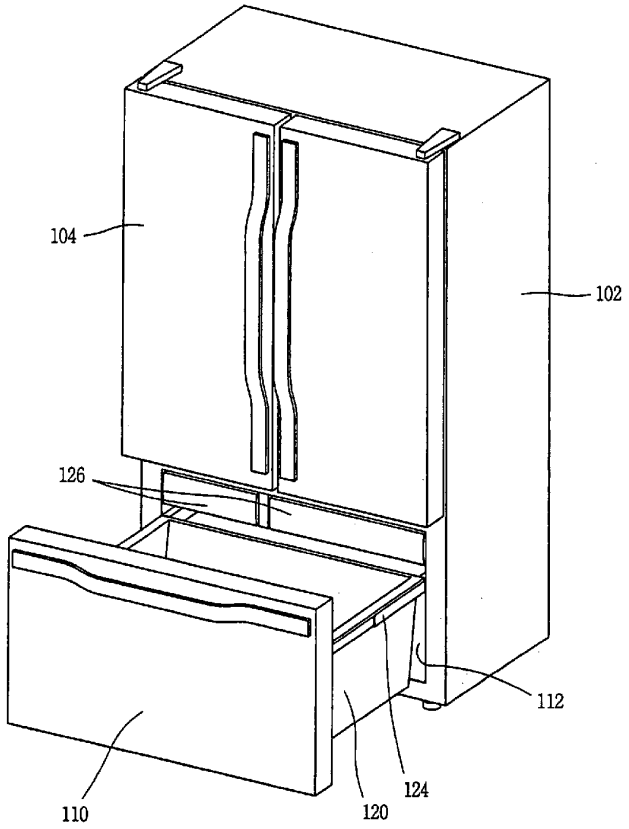

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FIG. 2

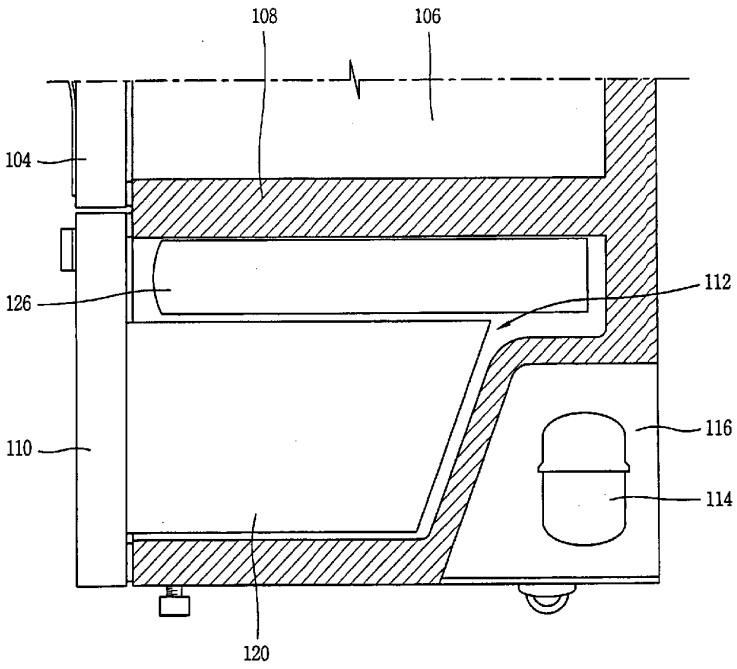

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FIG. 3

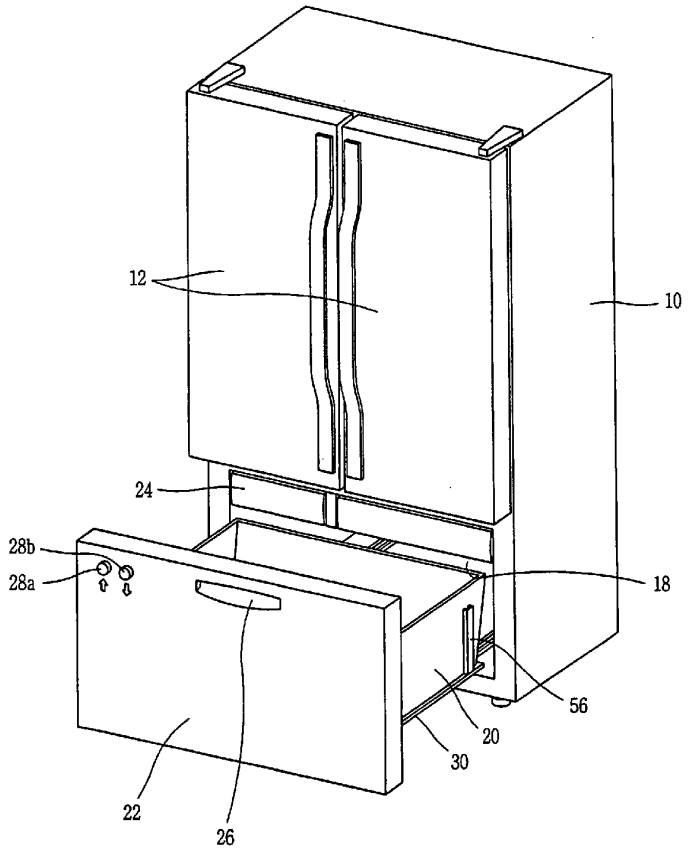

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FIG. 4

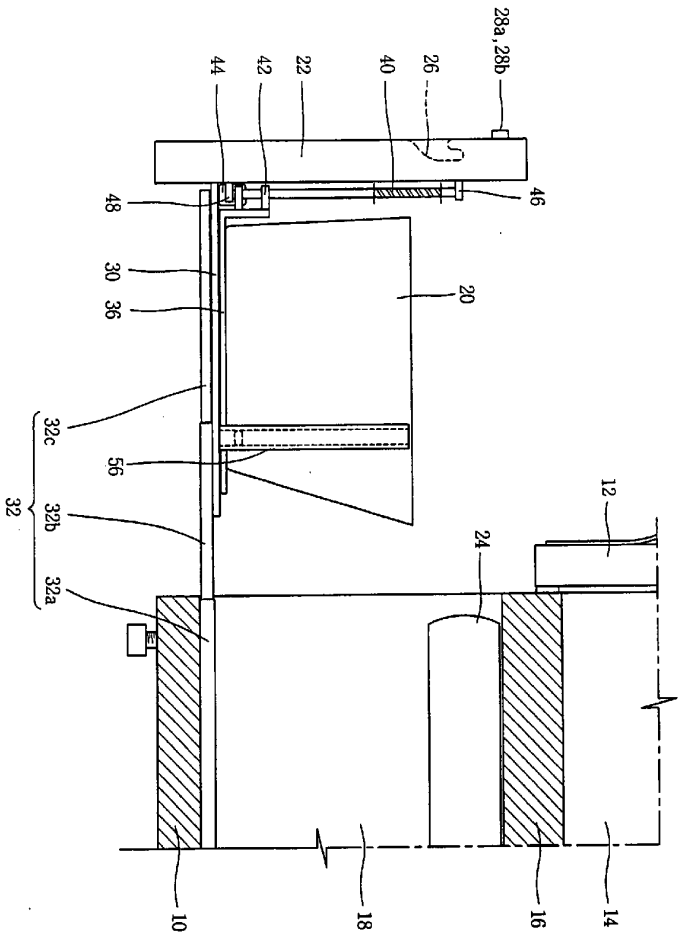

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FIG. 5

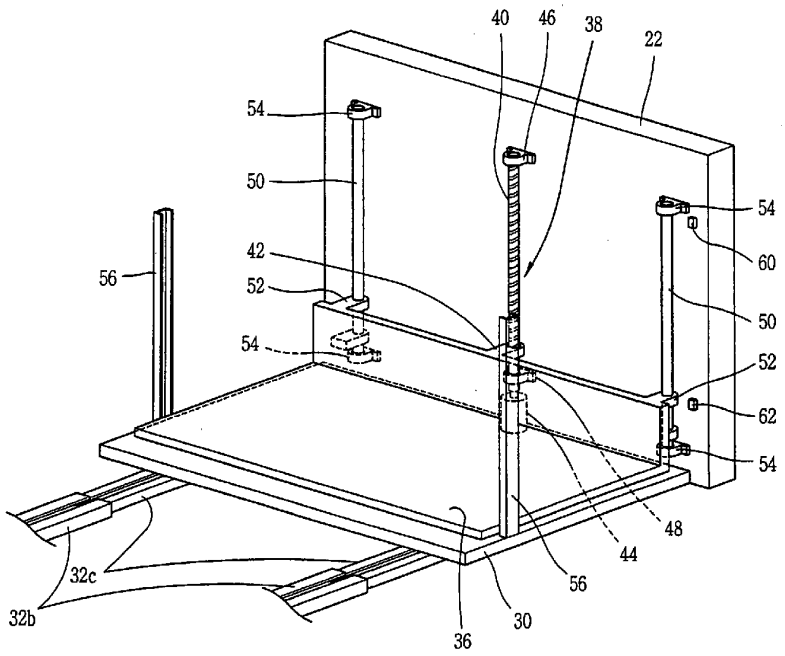

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FIG. 6

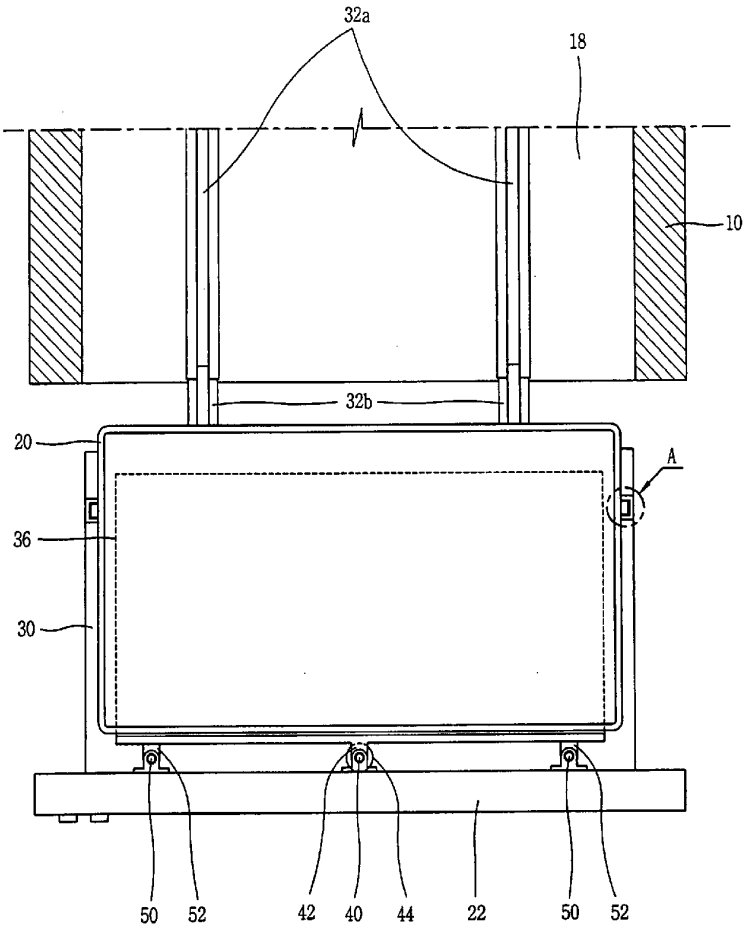

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FIG. 7

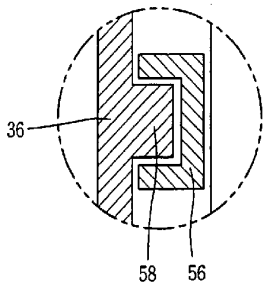

FIG. 8

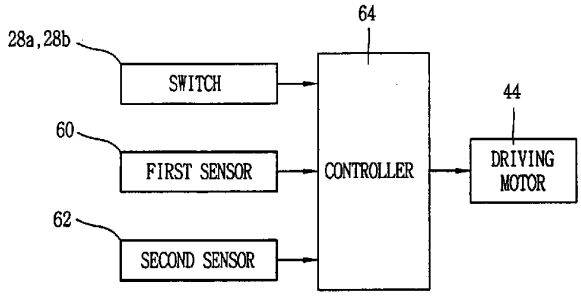

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FIG. 9

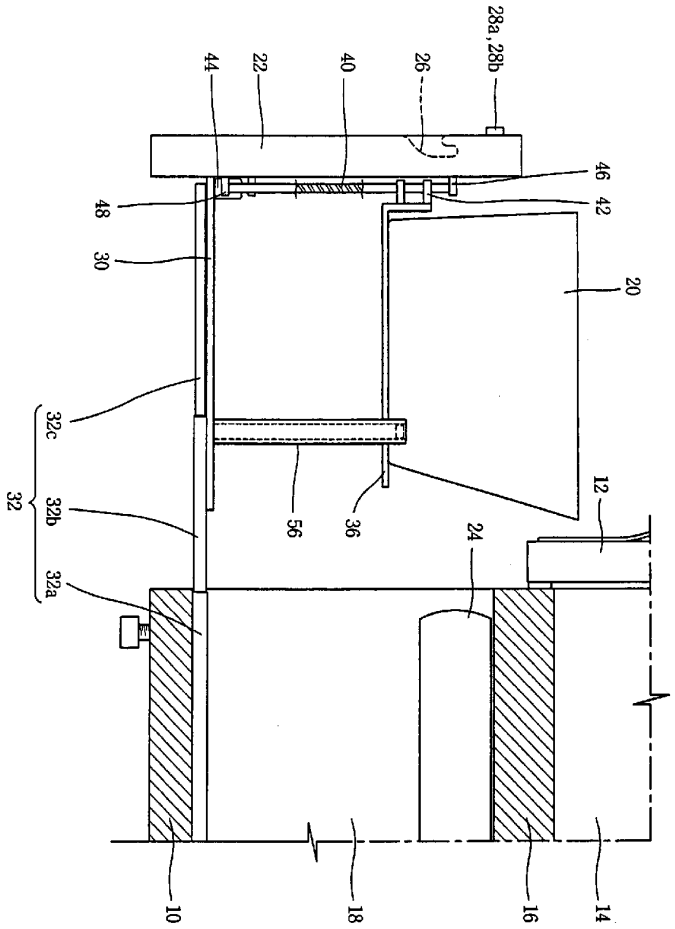

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FIG. 10