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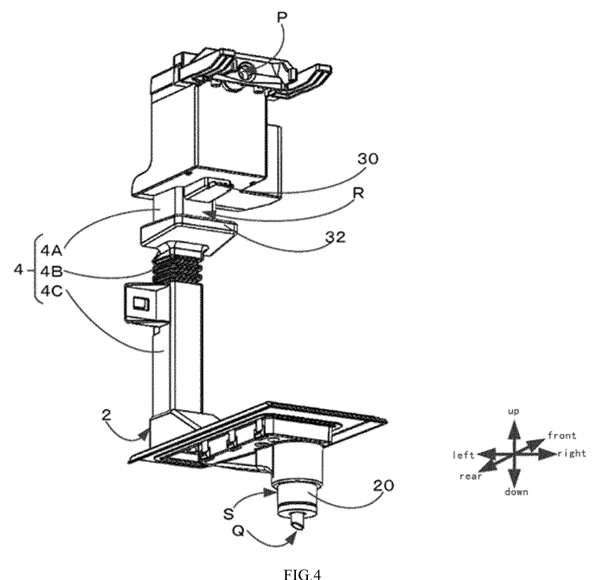
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(54) **WATER SUPPLY DEVICE AND REFRIGERATOR**

(57) A water supply device includes a housing 4, a flow path and a pump are arranged in the housing 4, and the flow path has a liquid inlet P and a liquid outlet Q; the housing 4 includes: an input side housing 4A including an input side positioning and fixing portion R, the input side positioning and fixing portion R being configured to position and fix the liquid inlet P with respect to a position of connection with a water tank; an output side housing 4C including an output side positioning and fixing portion S, the output side positioning and fixing portion S being configured to position and fix the liquid outlet Q with respect to a position of water supply to an ice making tray; and a buffer housing 4B which is connected between the input side housing 4A and the output side housing 4C and absorbs a deviation of relative positions of the input side housing and the output side housing.



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Description

TECHNICAL FIELD

[0001] The present invention relates to a water supply device and a refrigerator, and the water supply device is disposed in the refrigerator and supplies liquid in a water tank to an ice making tray.

BACKGROUND

[0002] There is known a refrigerator having a water supply device which sucks water in a water tank by a pump and supplies the water to an ice making tray through a water supply pipe. there is provided a refrigerator in which an inlet on an input side of the water supply pipe is positioned with respect to the water tank, an outlet on an output side of the water supply pipe is positioned with respect to the ice making tray, and a positional deviation of the water supply pipe on the input side and the output side is absorbed by a connection pipe (see, for example, patent document 1: Japanese Publication No. 2011-52933). In the refrigerator described in patent document 1, by positioning, the water can be reliably supplied from the water tank to the water supply pipe, and the water can be reliably supplied from the water supply pipe to the ice making tray.

[0003] However, in the refrigerator described in patent document 1, each of the input side of the water supply pipe, the pump, the connection pipe and the output side of the water supply pipe is required to be connected, and the members are mounted at predetermined positions in the refrigerator while the inlet on the input side of the water supply pipe and the outlet on the output side of the water supply pipe are positioned. Therefore, the water supply device cannot be easily provided in the refrigerator, and a long work time is required.

SUMMARY

[0004] Therefore, an object of the present invention is to solve the above-mentioned problem and provide a water supply device which is provided in a refrigerator for supplying liquid in a water tank to an ice making tray, can be easily mounted in the refrigerator in a short work time, and can realize reliable positioning of an inlet and an outlet of a flow path.

[0005] The water supply device according to the present invention is provided in the refrigerator with the water tank, and supplies the liquid in the water tank to the ice making tray,

the water supply device includes a housing, a flow path and a pump for allowing the liquid to flow are arranged in the housing, and the housing includes a liquid inlet forming an inlet of the flow path and a liquid outlet forming an outlet of the flow path, the housing includes:

an input side housing including an input side positioning and fixing portion, the input side positioning and fixing portion being configured to position and fix the liquid inlet with respect to a position of connection with the water tank;

an output side housing including an output side positioning and fixing portion, the output side positioning and fixing portion being configured to position and fix the liquid outlet with respect to a position of water supply to the ice making tray; and
a buffer housing which connects the input side housing and the output side housing and absorbs a deviation of relative positions of the input side housing and the output side housing.

[0006] According to the present invention, the water supply device can be mounted in the refrigerator only by providing the integrated housing provided therein with the flow path and the pump. In particular, the liquid inlet can be positioned with respect to the water tank by the input side positioning and fixing portion of the input side housing, the liquid outlet can be positioned with respect to the ice making tray by the output side positioning and fixing portion of the output side housing, and the deviation of the relative positions of the input side housing and the output side housing can be absorbed by the buffer housing. Thus, the liquid inlet and the liquid outlet can be reliably positioned.

[0007] As described above, the present invention can provide the water supply device which can be easily mounted in the refrigerator in the short work time and can realize reliable positioning of the liquid inlet and the liquid outlet.

[0008] Furthermore, in the water supply device according to the present invention, the buffer housing has a corrugated structure, the corrugated structure is not deformed by own weight in a state where all the members are mounted, and the corrugated housing is deformed when a load applied to the buffer housing is greater than the own weight.

[0009] According to the present invention, the corrugated structure has such a strength that the corrugated structure is not deformed by the own weight in the state where all the members are mounted, and therefore, the corrugated structure can be easily mounted to a predetermined place in the refrigerator in a state of the integrated housing. Meanwhile, even when the input side housing and the output side housing are positioned separately to cause the deviation of the relative positions, the corrugated structure can be deformed to absorb the deviation. That is, the water supply device can be easily mounted at a predetermined position within the refrigerator, and the deviation of the relative positions of the input side housing and the output side housing can be appropriately absorbed.

[0010] Furthermore, in the water supply device according to the present invention,

the output side positioning and fixing portion is formed by a truncated-cone-shaped output side insertion portion, a position of the truncated-cone-shaped output side insertion portion is determined with respect to an output side end portion of the flow path serving as the liquid outlet, and an outer diameter of the truncated cone shape is reduced towards a front end,

the output side insertion portion is inserted into a recess to position the liquid outlet with respect to the water supply position, a position of the recess is determined with respect to the water supply position, and the recess has a tapered inner surface corresponding to the output side insertion portion in shape.

[0011] According to the present invention, the truncated-cone-shaped output side insertion portion provided in the output side housing is inserted into the recess having the tapered inner surface corresponding to the output side insertion portion, such that guidance can be performed using the tapered surface, and the liquid outlet can be easily and reliably positioned in front-rear, left-right, and up-down directions with respect to the water supply position.

[0012] Furthermore, in the water supply device according to the present invention,

the input side positioning and fixing portion has an input side insertion portion, the input side insertion portion has a tapered outer surface, and a width of the tapered outer surface is reduced towards a front end,

the input side insertion portion is inserted into a tapered guide groove to position the liquid inlet in front-rear and left-right directions with respect to the connection position, the tapered guide groove is provided in a shelf, a position of the tapered guide groove is determined with respect to the connection position, and a shape of the tapered guide groove corresponds to a shape of the input side insertion portion.

[0013] According to the present invention, the input side insertion portion is inserted into the tapered guide groove, the input side insertion portion is provided in the input side housing and tapered in a width direction, and the tapered guide groove is provided in the shelf, such that guidance is performed using the tapered surface to perform positioning in the width direction, and positioning in a depth direction is performed by abutting the tapered surfaces against each other. Thus, the input side housing can be easily and reliably positioned in the front-rear and left-right directions, thus further positioning the liquid inlet with respect to the position of connection with the water tank.

[0014] Furthermore, in the water supply device according to the present invention,

the input side positioning and fixing portion has a clamping portion, and the clamping portion clamps the shelf from an upper side and a lower side, the clamping portion clamps the shelf from the upper side and the lower side to position the liquid inlet in the up-down direction with respect to the connection position.

[0015] According to the present invention, the shelf is clamped from the upper side and the lower side by the clamping portion provided in the input side housing, thus easily and reliably positioning the liquid inlet in the up-down direction.

[0016] As described above, the present invention can provide the water supply device which is provided in the refrigerator to supply the liquid in the water tank to the ice making tray, can be easily mounted in the refrigerator in the short work time, and can realize reliable positioning of the inlet and the outlet of the flow path.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017]

FIG. 1 is a side view schematically showing a refrigerator having a water supply device according to an embodiment of the present invention.

FIG. 2A is a perspective view showing an arrangement inside the refrigerator of the water supply device according to the embodiment of the present invention connected between a water tank and an ice making tray, as viewed from the left front side.

FIG. 2B is a perspective view showing the arrangement inside the refrigerator of the water supply device according to the embodiment of the present invention connected between the water tank and the ice making tray, as viewed from the left rear side.

FIG. 3 is a perspective view showing an arrangement of the water supply device according to the embodiment of the present invention, a water supply panel and the ice making tray.

FIG. 4 is a perspective view showing a shape of the water supply device according to the embodiment of the present invention.

FIG. 5A is a perspective view showing an output side housing, particularly, a periphery of a liquid outlet of the water supply device according to the embodiment of the present invention.

FIG. 5B is a side sectional view showing section A-A of FIG. 5A.

FIG. 6A is a side sectional view showing the output side housing and members around the output side housing of the water supply device according to the embodiment of the present invention.

FIG. 6B is an enlarged side sectional view showing a periphery of an output side positioning and fixing portion of FIG. 6A, showing a state immediately before an output side insertion portion of the output

side housing is fitted into a recess of the water supply panel.

FIG. 6C is a side sectional view showing a state in which the output side insertion portion of the output side housing is moved downwards from the state of FIG. 6B and fitted into the recess of the water supply panel.

FIG. 7 is a perspective view showing an arrangement of the water tank, a vegetable container, the water supply panel and the ice making tray after the water supply device is removed.

FIG. 8A is a view showing a state immediately before a connection portion of the water tank is connected to a liquid inlet of an input side housing of the water supply device.

FIG. 8B is an enlarged perspective view of a periphery of the liquid inlet of the input side housing in FIG. 8A.

FIG. 9 is a perspective view showing a periphery of an input side positioning and fixing portion of the water supply device according to the embodiment of the present invention.

FIG. 10 is a perspective view showing a region of a shelf corresponding to an input side insertion portion.

FIG. 11 is a plan sectional view showing section B-B of FIG. 10.

FIG. 12 is a side sectional view showing section C-C of FIG. 11.

FIG. 13A is a side sectional view showing section D-D of FIG. 10.

FIG. 13B is an enlarged side sectional view showing a concave-convex fitting structure of FIG. 13A.

FIG. 14A is a side sectional view showing section E-E of FIG. 10.

FIG. 14B is an enlarged side sectional view showing a concave-convex fitting structure of FIG. 14A.

FIG. 15A is a perspective view showing the shape of the water supply device according to the embodiment of the present invention.

FIG. 15B is an enlarged perspective view showing a region of a buffer housing of FIG. 15A.

opposite side is set as a rear side. Up-down, front-rear and left-right directions are shown by arrows in the drawings.

(Water supply device according to embodiment of present invention)

[0020] FIG. 1 is a side view schematically showing a refrigerator 100 having a water supply device 2 according to an embodiment of the present invention. A shape of a refrigerator body 102 of the refrigerator 100 is schematically shown by a one-dot dash line. FIGS. 2A and 2B are perspective views showing an arrangement inside the refrigerator of the water supply device 2 according to the embodiment of the present invention connected between a water tank 50 and an ice making tray 64, FIG. 2A is viewed from the left front side, and FIG. 2B is viewed from the left rear side. FIG. 3 is a perspective view showing an arrangement of the water supply device 2 according to the embodiment of the present invention, a water supply panel 60 and the ice making tray 64. In FIG. 3, a state in which a rear surface of a housing 4 of the water supply device 2 is removed to make an interior visually recognizable is shown. FIG. 4 is a perspective view showing a shape of the water supply device 2 according to the embodiment of the present invention.

[0021] In the refrigerator 100 shown in FIG. 1, a vegetable container 70 is disposed at a substantially central position in a height direction of the refrigerator body 102, and the water tank 50 is provided on a shelf 40. The water supply panel 60 is provided below the vegetable container 70, and the ice making tray 64 is provided below the water supply panel. The ice making tray 64 is mounted on a rotation shaft of a driving portion 66. By rotation of the rotation shaft of the driving portion 66, the ice making tray 64 is rotatable between an ice making position where an opening surface of the ice making tray 64 faces upwards and an ice releasing position where the opening surface faces downwards. In the ice releasing position, generated ice falls from the ice making tray 64 into an ice container disposed below. The shelf 40, the water supply panel 60 and the driving portion 66 are fixed in the refrigerator body 102.

[0022] The water supply device 2 is disposed on a rear side of the refrigerator body 102, and supplies liquid (for example, drinking water) in the water tank 50 disposed above to the ice making tray 64 disposed below. The water supply device 2 includes a housing 4, and a pipeline 10 forming a flow path and a pump 12 for allowing the liquid in the flow path to flow are disposed inside the housing 4 (see FIG. 3). A liquid inlet P serving as a flow path inlet and a liquid outlet Q serving as a flow path outlet are formed in the housing 4 (see FIG. 4). As described later, a connection portion 52 of the water tank 50 is inserted into the liquid inlet P (see FIG. 8B). The liquid outlet Q is disposed below a recess 62 of the water supply panel 60, that is, at a liquid supply position above the opening surface of the ice making tray 64 at the ice

DETAILED DESCRIPTION

[0018] Embodiments for implementing the present invention are described below with reference to accompanying drawings. Furthermore, a water supply device and a refrigerator described below are used to embody the technical idea of the present invention, and the invention will not be limited to the following content as long as there is no specific description.

[0019] In the drawings, members with the same functions are sometimes marked with the same symbols. In order to clarify the description, the sizes, positional relationships, or the like, of the members shown in each drawing are sometimes shown in an exaggerated manner. In the present specification, the refrigerator is placed on a horizontal floor, a door side is set as a front side, and an

making position.

[0023] The water supply device 2 is mounted to the shelf 40 located above and the water supply panel 60 located below. An input side positioning and fixing portion R is formed in the housing 4 and mainly formed by an input side insertion portion 30 and an input side guide portion 32. The housing 4 is mounted to the shelf 40 by the input side positioning and fixing portion R. In the water supply device 2, by the input side positioning and fixing portion R formed in the housing 4 and a corresponding part (a tapered guide groove 42, or the like, described later) provided in the shelf 40, the liquid inlet P can be positioned with respect to the connection portion 52 of the water tank 50 and the housing 4 can be fixed to the shelf 40.

[0024] Furthermore, an output side positioning and fixing portion S is formed in the housing 4 and mainly formed by an output side insertion portion 20. The housing 4 is mounted to the water supply panel 60 by the output side positioning and fixing portion S. In the water supply device 2, by the output side positioning and fixing portion S formed in the housing 4 and a corresponding part (the recess 62 described later) provided in the water supply panel 60, the liquid outlet Q can be positioned with respect to a position of water supply to the ice making tray 64 and the housing 4 can be fixed to the water supply panel 60.

[0025] The housing 4 includes an input side housing 4A, an output side housing 4C and a buffer housing 4B, the input side housing 4A includes the input side positioning and fixing portion R for positioning, the output side housing 4C includes the output side positioning and fixing portion S, and the buffer housing 4B connects the input side housing 4A and the output side housing 4C and absorbs a deviation of relative positions of the input side housing 4A and the output side housing 4C. The input side housing 4A is fixed in position by the input side positioning and fixing portion R, and the output side housing 4C is fixed in position by the output side positioning and fixing portion S. In this case, the positions of the input side housing 4A and the output side housing 4C sometimes have a slight deviation. Therefore, the buffer housing 4B has an effect of connecting the input side housing 4A and the output side housing 4C and absorbing the slight deviation of the relative positions of the input side housing 4A and the output side housing 4C.

[0026] The input side housing 4A, the buffer housing 4B and the output side housing 4C are integrally formed from a resin material having elasticity. The input side housing 4A, the buffer housing 4B and the output side housing 4C may be formed from the same resin material, or may be formed from different resin materials using two-color forming, or the like. For example, only the buffer housing 4B may be formed of a more elastic soft material.

[0027] With the water supply device 2 having the above structure, when the pump 12 is driven, the liquid in the water tank 50 is sucked in from the liquid inlet P, flows downwards in the pipeline 10, and reaches the liquid out-

let Q disposed at the water supply position below the water supply panel 60. The liquid flows down from the liquid outlet Q and is supplied to the ice making tray 64 at the ice making position.

(Output side positioning and fixing portion)

[0028] FIG. 5A is a perspective view showing the output side housing 4C, particularly, a periphery of the liquid outlet Q of the water supply device 2 according to the embodiment of the present invention. FIG. 5B is a side sectional view showing section A-A of FIG. 5A. FIG. 6A is a side sectional view showing the output side housing 4C and members around the output side housing of the water supply device 2 according to the embodiment of the present invention. FIG. 6B is an enlarged side sectional view showing a periphery of the output side positioning and fixing portion S of FIG. 6A, showing a state immediately before the output side insertion portion 20 of the output side housing 4C is fitted into the recess 62 of the water supply panel 60. FIG. 6C is a side sectional view showing a state in which the output side insertion portion 20 of the output side housing 4C is moved downwards from the state of FIG. 6B and fitted into the recess 62 of the water supply panel 60.

[0029] In the present embodiment, a fixing member 24 is mounted, and the fixing member 24 covers a body portion 4C1 of the output side housing 4C provided with the pipeline 10. A fixing surface 24A at a lower end of the fixing member 24 can hold the pipeline 10 protruding from an opening at the lower end of the fixing member 24 by a prescribed length. The truncated-cone-shaped output side insertion portion 20 is formed in a region below the fixing member 24, and an outer diameter of the truncated-cone-shaped output side insertion portion 20 becomes smaller towards a front end. That is, the pipeline 10 is fixed in a state of protruding from the opening by the predetermined length, and the opening is provided in a surface of the front end of the truncated cone, i.e., a lower surface of the output side insertion portion 20.

[0030] Thus, positions of an output side end portion having the liquid outlet Q of the flow path and the output side insertion portion 20 having the output side positioning and fixing portion S are determined by each other. In order to prevent the liquid flowing in the pipeline 10 from freezing, preferably, a region around the pipeline 10 in the output side housing 4C is covered with a heat insulating material. Furthermore, a flat-plate-shaped sealing member 22 having elasticity is mounted on the lower surface of the output side insertion portion 20. The sealing member 22 has an opening for the pipeline 10 to pass through in a central portion of the planar shape.

[0031] The water supply panel 60 is provided above the ice making tray 64 and fixed to the refrigerator body 102. The water supply panel 60 has the recess 62, and the recess 62 is provided right above the ice making tray. In the present embodiment, the recess 62 forms a region corresponding to the output side positioning and fixing

portion S. A position of the recess 62 is determined with respect to the water supply position for supplying the liquid to the ice making tray 64, and the recess 62 has a tapered inner surface corresponding to a shape of the output side insertion portion 20 on the truncated cone. That is, the recess 62 has the tapered inner surface, and an inner diameter of the tapered inner surface becomes narrower towards a bottom surface. The recess 62 has the bottom surface, and an opening 62A is formed in the bottom surface.

[0032] As shown in FIGS. 6B and 6C, when the truncated-cone-shaped output side insertion portion 20 is inserted into the recess 62, the pipeline 10 protruding from the output side insertion portion 20 passes through the opening 62A provided in the bottom surface of the recess 62. Furthermore, when the output side insertion portion 20 is pressed into the recess 62, the sealing member 22 mounted on the lower surface of the output side insertion portion 20 abuts against the bottom surface of the recess 62. At a position where the input side housing 4A is fixed to the shelf 40 (described later), the output side insertion portion 20 is further pressed into the bottom surface side of the recess 62, and the sealing member 22 is fixed in a slightly compressive deformation state. Thus, a front end portion of the pipeline 10 having the liquid outlet Q is positioned in front-rear, left-right and up-down directions with respect to the water supply position for supplying the liquid to the ice making tray 64.

[0033] As described above, since the flat-plate-shaped sealing member 22 is disposed on the lower surface of the output side insertion portion 20, when the output side insertion portion 20 is inserted into the recess 62, an insertion resistance is not generated compared with a case where the sealing member is wound around a side surface of the output side insertion portion 20. Therefore, the output side insertion portion 20 does not get caught and stop halfway in the recess 62. Furthermore, since the flat-plate-shaped sealing member 22 abuts against the bottom surface (which is a plane) of the recess 62 and is slightly compressed for sealing, a position in an insertion direction can be defined, and a stable sealing function can be obtained.

[0034] As described above, in the water supply device 2, the liquid outlet Q is positioned with respect to the water supply position S by inserting the output side insertion portion 20 into the recess 62, the position of the recess 62 is determined with respect to the water supply position, and the recess 62 has the tapered inner surface corresponding to the shape of the truncated-cone-shaped output side insertion portion 20. By inserting the output side insertion portion 20 into the recess 62, guidance can be performed using the tapered surface, and the liquid outlet Q is easily and reliably positioned in the front-rear, left-right and up-down directions with respect to the water supply position S.

(Input side positioning and fixing portion)

[0035] FIG. 7 is a perspective view showing the water tank 50, the vegetable container 70 and the ice making tray 64 after the water supply device 2 is removed. FIG. 8A is a view showing a state immediately before the connection portion 52 of the water tank 50 is connected to the liquid inlet P of the input side housing 4A of the water supply device 2. FIG. 8B is an enlarged perspective view of a periphery of the liquid inlet P of the input side housing 4A in FIG. 8A.

[0036] As shown in FIG. 7, the shelf 40 on which the water tank 50 is placed is fixed to the refrigerator body 102, the tapered guide groove 42, or the like, is formed behind the water tank 50, and the tapered guide groove 42 is configured to mount the input side housing 4A of the water supply device 2. As shown in FIGS. 8A and 8B, the connection portion 52 of the water tank 50 is required to be connected to the liquid inlet P provided in the input side housing 4A. Therefore, the liquid inlet P is required to be positioned with respect to a position of connection with the water tank 50, and the input side housing 4A is fixed to the shelf 40.

[0037] In order to easily connect the connection portion 52 of the water tank 50 to the liquid inlet P when the water tank 50 is pressed rearwards, a tank guide 38B is provided on the input side housing 4A side, and the tank guide 38B guides an outer surface of the water tank 50. Furthermore, in order to maintain the state in which the connection portion 52 of the water tank 50 is connected to the liquid inlet P, a tank engagement portion 38A is provided on the input side housing 4A side, and the tank engagement portion 38A is engaged with the water tank 50.

<Front-rear and left-right positioning and fixing mechanism>

[0038] FIG. 9 is a perspective view showing a periphery of the input side positioning and fixing portion R of the water supply device 2 according to the embodiment of the present invention. FIG. 10 is a perspective view showing a region of the shelf 40 corresponding to the input side insertion portion 30. FIG. 11 is a plan sectional view showing section B-B of FIG. 10.

[0039] As shown in FIG. 4, at a position corresponding to an upper surface of the shelf 40 in a height direction of the input side housing 4A, the input side insertion portion 30 is formed, and the input side insertion portion 30 has a tapered outer surface with a width reduced towards the front end. In the present embodiment, the input side insertion portion 30 forms a part of the input side positioning and fixing portion R.

[0040] On the other hand, the tapered guide groove 42 is formed on the shelf 40 side, the position of the tapered guide groove 42 is determined with respect to the position of connection with the water tank 50, and a shape of the tapered guide groove 42 corresponds to a shape of the

input side insertion portion 30. In the present embodiment, the tapered guide groove 42 forms a region corresponding to the input side positioning and fixing portion R.

[0041] When the input side housing 4A of the water supply device 2 is mounted to the shelf 40, by inserting the input side insertion portion 30 into the tapered guide groove 42 formed in the shelf 40, the liquid inlet P can be positioned in the front-rear and left-right directions with respect to the position of connection with the water tank 50.

[0042] That is, the input side insertion portion 30 is inserted into the tapered guide groove 42, the input side insertion portion 30 is provided in the input side housing 4A and tapered in a width direction, and the tapered guide groove 42 is provided in the shelf 40, such that guidance is performed using the tapered surface to perform positioning in the width direction, and positioning in a depth direction is performed by abutting the tapered surfaces against each other. Thus, in the water supply device 2, the input side housing 4A can be easily and reliably positioned in the front-rear and left-right directions, and then, the liquid inlet P is positioned in the front-rear and left-right directions with respect to the position of connection with the water tank 50.

<Up-down positioning and fixing mechanism>

[0043] FIG. 12 is a side sectional view showing section C-C of FIG. 11. As shown in FIG. 4, the input side guide portion 32 is formed at a position corresponding to a lower surface of the shelf 40 in the height direction of the input side housing 4A, and the shelf 40 is disposed in a space between the input side guide portion and an upper side surface where the input side insertion portion 30 is formed. Thus, as shown in FIG. 12, the input side guide portion 32 and the upper side surface on which the input side insertion portion 30 is formed form a clamping portion T which clamps the shelf 40 from an upper side and a lower side. In the present embodiment, the clamping portion T forms a part of the input side positioning and fixing portion R, and the clamped shelf 40 forms the region corresponding to the input side positioning and fixing portion R. The shelf 40 has an arcuately expanded section shape, and the input side housing 4A is firmly fixed to the shelf 40 by slightly elastically deforming the input side guide portion 32.

[0044] As described above, the input side positioning and fixing portion R has the clamping portion T which clamps the shelf 40 from the upper side and the lower side, and by the clamping portion T clamping the shelf 40 from the upper side and the lower side, the input side housing 4A is positioned in the up-down direction, and fixed to the shelf 40. Thus, in the water supply device 2, the input side housing 4A can be easily and reliably positioned in the up-down direction, and then, the liquid inlet P is positioned in the up-down direction with respect to the position of connection with the water tank 50.

<Fixing mechanism>

[0045] FIG. 13A is a side sectional view showing section D-D of FIG. 10. FIG. 13B is an enlarged side sectional view showing a concave-convex fitting structure 32A, 44 of FIG. 13A. FIG. 14A is a side sectional view showing section E-E of FIG. 10. FIG. 14B is an enlarged side sectional view showing a concave-convex fitting structure 34, 46 of FIG. 14A.

[0046] As shown in FIG. 13B, a groove portion 32A and a protruding portion 44 are fitted to form the concave-convex fitting structure 32A, 44, the groove portion 32A is formed in the input side guide portion 32 of the input side housing 4A, and the protruding portion 44 is formed in the shelf 40. Thus, a position of the input side housing 4A in the front-rear direction is kept reliably.

[0047] As shown in FIG. 14B, a concave-convex portion 34 is fitted with a concave-convex portion 46 to form the concave-convex fitting structure 34, 46, the concave-convex portion 34 is formed in the input side housing 4A, and the concave-convex portion 46 is formed in the shelf 40. Thus, the input side housing 4A is pressed by the shelf 40 and does not lift upwards. Furthermore, a convex portion 36 is fitted with a groove portion 48, the convex portion 36 is formed outside the concave-convex portion 34 of the input side housing 4A, and the groove portion 48 is formed in the shelf 40. Since a fitting direction of the concave-convex portion 34 formed in the input side housing 4A is opposite to a fitting direction of the convex portions 36 on both sides, the shelf 40 can be clamped and fixed.

[0048] With such a fixing mechanism, even when the connecting portion 52 of the water tank 50 is mounted to and detached from the liquid inlet P of the input side housing 4A, the position of the input side housing 4A can be reliably held by applying a force to the input side housing 4A.

(Buffer housing)

[0049] FIG. 15A is a perspective view showing the shape of the water supply device 2 according to the embodiment of the present invention. FIG. 15B is an enlarged perspective view showing a region of the buffer housing 4B of FIG. 15A. In the present embodiment, the buffer housing 4B has a corrugated structure, and the buffer housing 4B connects the input side housing 4A and the output side housing 4C. The corrugated structure has such a strength that the corrugated structure is not deformed by own weight in a state in which all members, such as the pipeline 10, the pump 12, electric system components related to the pump 12, or the like, are mounted. Therefore, the buffer housing can be easily mounted to a predetermined position within the refrigerator 100 in a state of the integrated housing 4.

[0050] On the other hand, when a load greater than the own weight is applied, corrugations are deformed. Thus, even when the input side housing 4A and the output

side housing 4B are positioned to generate the deviation of the relative positions, the corrugated structure can be deformed to absorb the deviation. With such a corrugated structure, the water supply device 2 can be easily mounted to a predetermined place in the refrigerator 100, and the deviation of the relative positions of the input side housing 4A and the output side housing 4C can be appropriately absorbed.

(Conclusion)

[0051] According to the above structure, the water supply device 2 can be easily mounted to the refrigerator 100 in a short time only by mounting the integrated housing 4 to the upper shelf 40 and the lower water supply panel 60 and connecting a connector of wiring of a motor for driving the pump 12 to a connector on the refrigerator body 102 side. In particular, in the case of using the tapered surface, positioning can be easily performed in a short time.

[0052] However, the input side positioning and fixing portion R and the output side positioning and fixing portion S in the present invention are not limited to the above-mentioned embodiments. Any other input side positioning and fixing mechanism may be adopted in any mechanism capable of fixing the input side housing 4A in the state where the liquid inlet P is positioned with respect to the position of connection with the water tank 50. Similarly, any other output side positioning and fixing mechanism may be adopted in any mechanism capable of fixing the output side housing 4C in the state where the liquid outlet Q is positioned with respect to the position of water supply to the ice making tray 64.

[0053] The buffer housing 4B is not limited to the corrugated structure. For example, the buffer housing 4B may be formed of a soft material having higher elasticity than the input side housing 4A and the output side housing 4C, and any other buffer mechanism may be adopted.

[0054] As described above, the water supply device 2 according to the present invention is disposed in the refrigerator 100 having the water tank 50, and supplies the liquid in the water tank 50 to the ice making tray 64, the water supply device 2 includes the housing 4, the housing 4 is provided therein with the flow path 10 and the pump 12 for allowing the liquid to flow, and includes the liquid inlet P forming the inlet of the flow path 10 and the liquid outlet Q forming the outlet of the flow path 10, and the housing 4 includes: the input side housing 4A having the input side positioning and fixing portion R for positioning and fixing the liquid inlet P with respect to the position of connection with the water tank 50; the output side housing 4C having the output side positioning and fixing portion S for positioning and fixing the liquid outlet Q with respect to the position of water supply to the ice making tray 64; and the buffer housing 4B connected between the input side housing 4A and the output side housing 4C and absorbing the deviation of the relative positions of the input side housing 4A and the output side housing

4C.

[0055] The water supply device 2 can be mounted in the refrigerator 100 as long as the integrated housing 4 in which the flow path 10 and the pump 12 are disposed is provided. Meanwhile, the liquid inlet P can be positioned with respect to the water tank 50 by the input side positioning and fixing portion R, the liquid outlet Q can be positioned with respect to the ice making tray 64 by the output side positioning and fixing portion S, and the deviation of the relative positions of the input side housing 4A and the output side housing 4C can be absorbed by the buffer housing 4B. Thus, the water supply device 2 can be provided, which can be easily mounted in the refrigerator 100 in the short work time and can realize reliable positioning of the liquid inlet P and the liquid outlet Q.

[0056] Although the embodiments and implementations of the present invention have been described, the disclosure can be changed in details of the structure, and combinations of elements, changes in the order, or the like, in the embodiments and implementations can be implemented without departing from the scope and spirit of the claimed invention.

Reference numerals

[0057]

FIGS. 1, 5B to 6C and 12 to 14B

上: up
下: down
前: front
后: rear

FIGS. 2A to 5A, 7 to 10 and 15A to 15B

上: up
下: down
前: front
后: rear
左: left
右: right

FIG. 11

前: front
后: rear
左: left
右: right

Claims

1. A water supply device, provided in a refrigerator with a water tank for supplying liquid in the water tank to an ice making tray,

wherein the water supply device comprises a housing, a flow path and a pump for allowing the liquid to flow are arranged in the housing, and the flow path has a liquid inlet and a liquid outlet, the housing comprises:

an input side housing comprising an input side positioning and fixing portion, the input side positioning and fixing portion being configured to position and fix the liquid inlet with respect to a position of connection with the water tank;

an output side housing comprising an output side positioning and fixing portion, the output side positioning and fixing portion being configured to position and fix the liquid outlet with respect to a position of water supply to the ice making tray; and

a buffer housing which connects the input side housing and the output side housing and absorbs a deviation of relative positions of the input side housing and the output side housing.

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wherein the input side positioning and fixing portion has an input side insertion portion, the input side insertion portion has a tapered outer surface, and a width of the tapered outer surface is reduced towards a front end, the input side insertion portion is inserted into a tapered guide groove to position the liquid inlet in front-rear and left-right directions with respect to the connection position, the tapered guide groove is provided in a shelf, a position of the tapered guide groove is determined with respect to the connection position, and a shape of the tapered guide groove corresponds to a shape of the input side insertion portion.
2. The water supply device according to claim 1, wherein the buffer housing has a corrugated structure, the corrugated structure is not deformed by own weight in a state where all the members are mounted, and the corrugated structure is deformed when a load greater than the own weight is applied to the buffer housing.
3. The water supply device according to claim 1 or 2,

wherein the output side positioning and fixing portion comprises a truncated-cone-shaped output side insertion portion, a position of the output side insertion portion is determined with respect to an output side end portion of the flow path with the liquid outlet, and an outer diameter of the output side insertion portion is reduced towards a front end,

the output side insertion portion is inserted into a recess to position the liquid outlet with respect to the water supply position, a position of the recess is determined with respect to the water supply position, and the recess has a tapered inner surface corresponding to the output side insertion portion in shape.

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5. The water supply device according to claim 4,

wherein the input side positioning and fixing portion has a clamping portion, and the clamping portion clamps the shelf from an upper side and a lower side,

the clamping portion clamps the shelf from the upper side and the lower side to position the liquid inlet in the up-down direction with respect to the connection position.
6. The water supply device according to claim 3, further comprising a fixing member, wherein the fixing member covers a body portion of the output side housing, a lower region of the fixing member forms the output side insertion portion, and the flow path passes through the fixing member.
7. The water supply device according to claim 3, further comprising a water supply panel, wherein the water supply panel is provided above the ice making tray, the recess is provided on the water supply panel, and the recess is located right above the ice making tray.
8. The water supply device according to claim 7, wherein a sealing member is mounted to a lower surface of the output side insertion portion, and the sealing member abuts against a bottom surface of the recess when the output side insertion portion is inserted into the recess.
9. The water supply device according to claim 4, wherein the water tank comprises a connection portion connected with the liquid inlet, and the input side housing is provided with a tank guide for guiding the water tank and a tank engagement portion engaged with the water tank.
10. A refrigerator, comprising a cabinet and a door for opening and closing the cabinet, wherein an ice making tray and a water tank for supplying water to the ice making tray are mounted in the cabinet, and the

refrigerator further comprises the water supply device according to claim 1.

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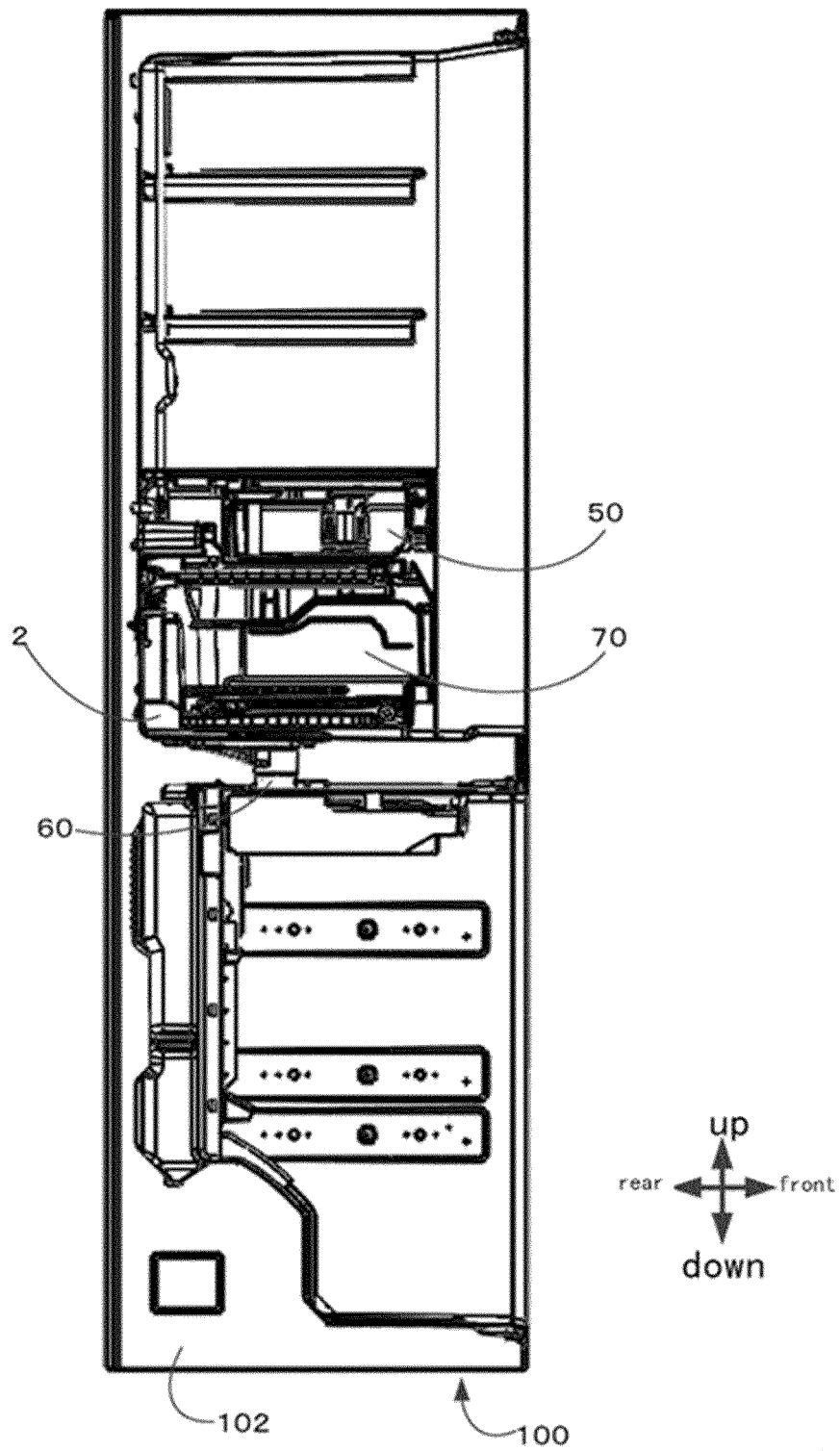


FIG.1

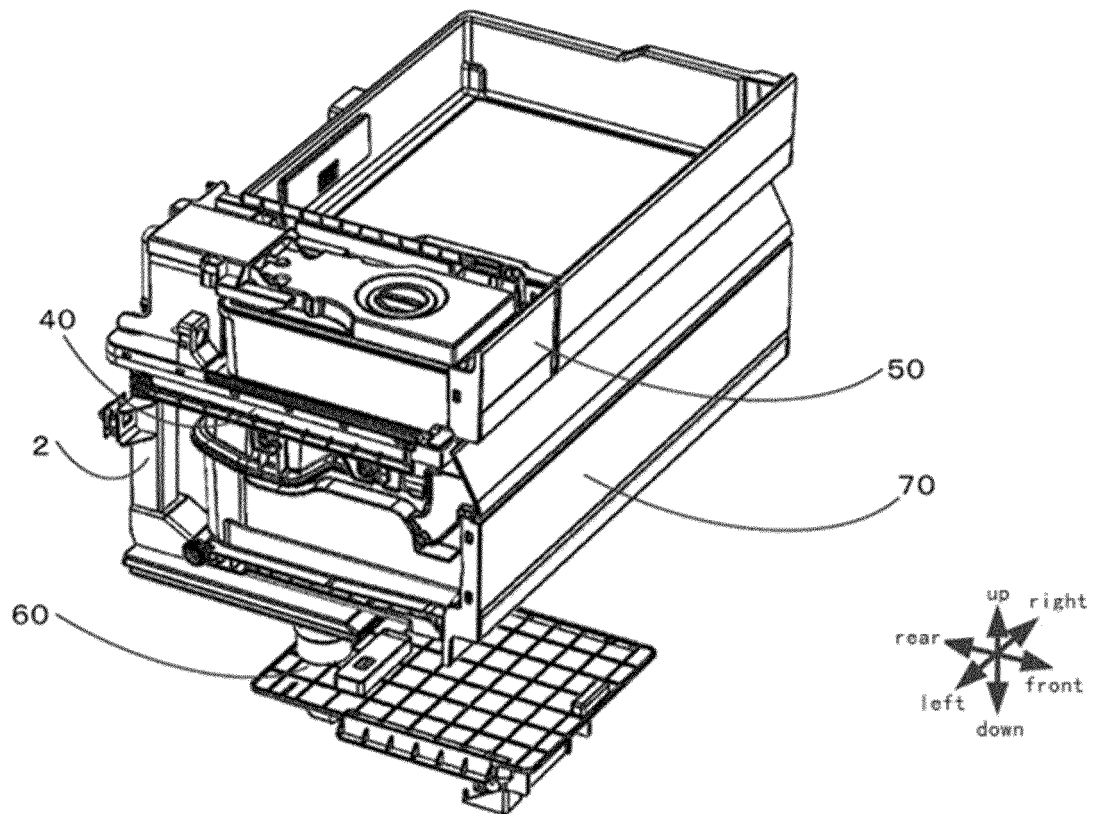


FIG. 2A

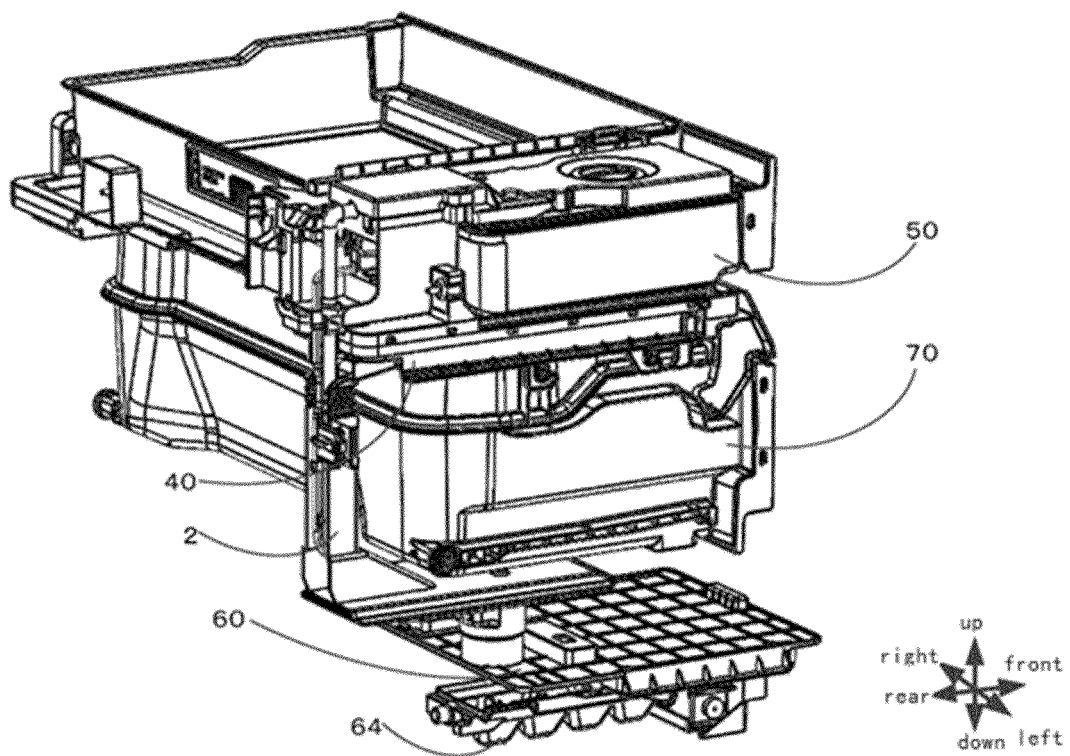


FIG. 2B

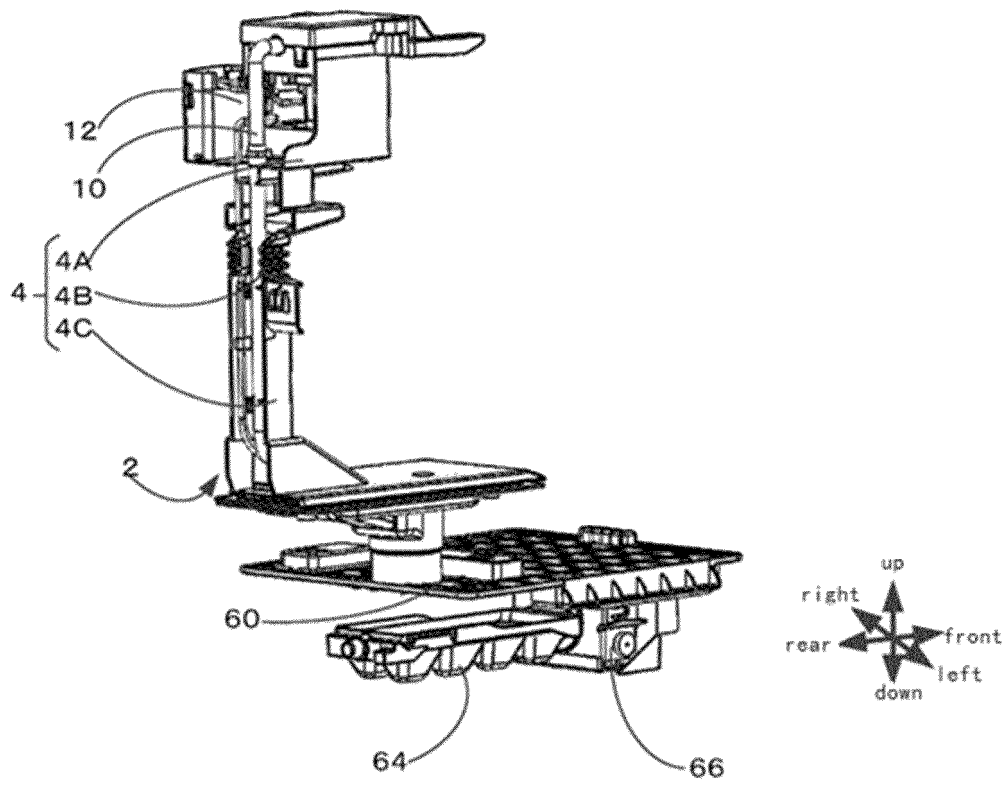


FIG.3

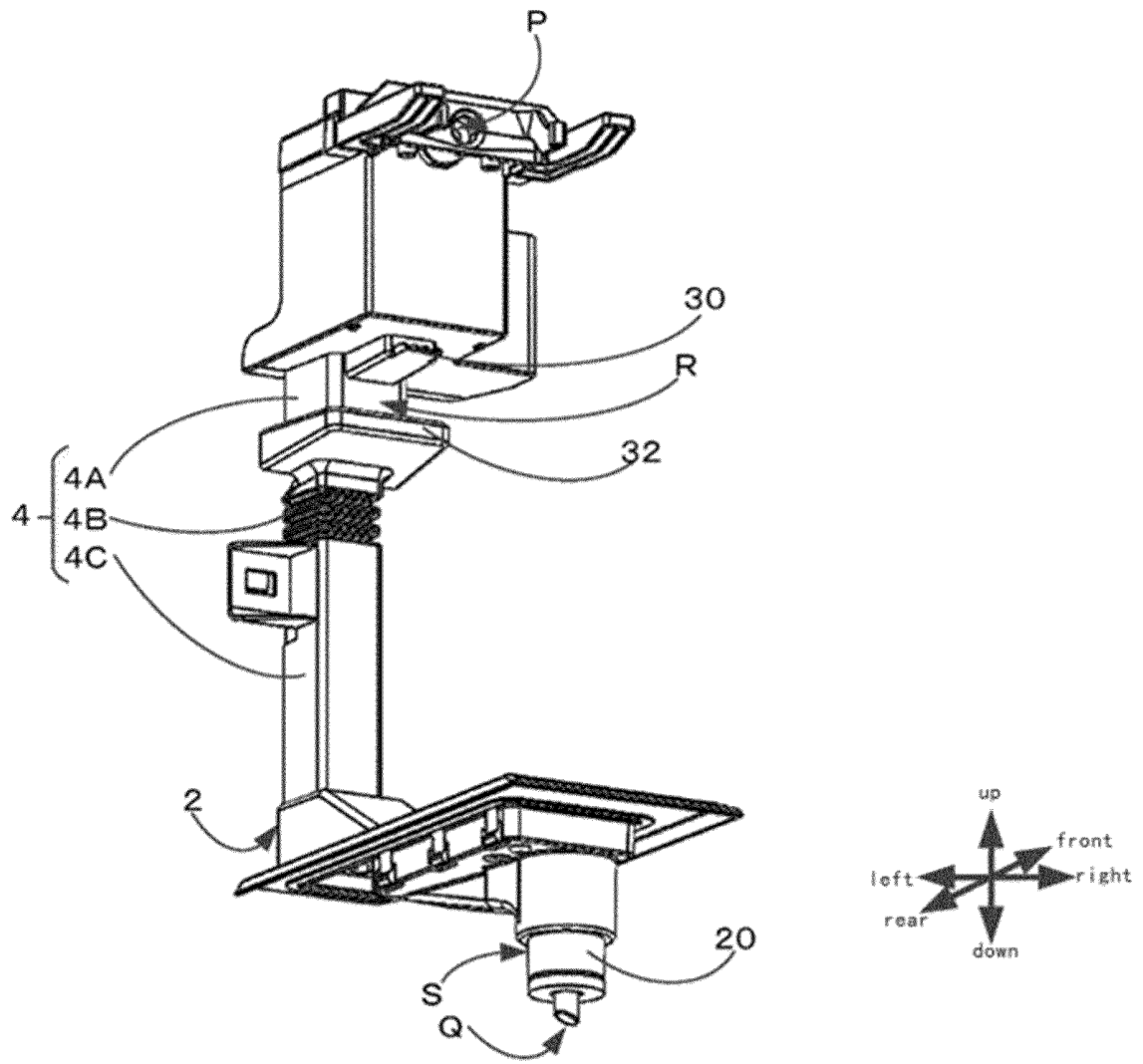


FIG. 4

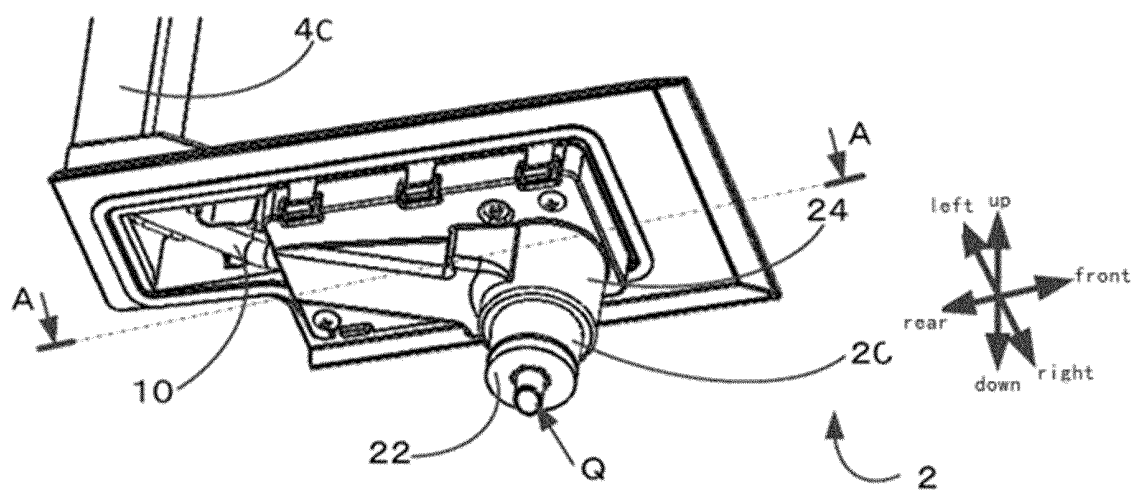


FIG. 5A

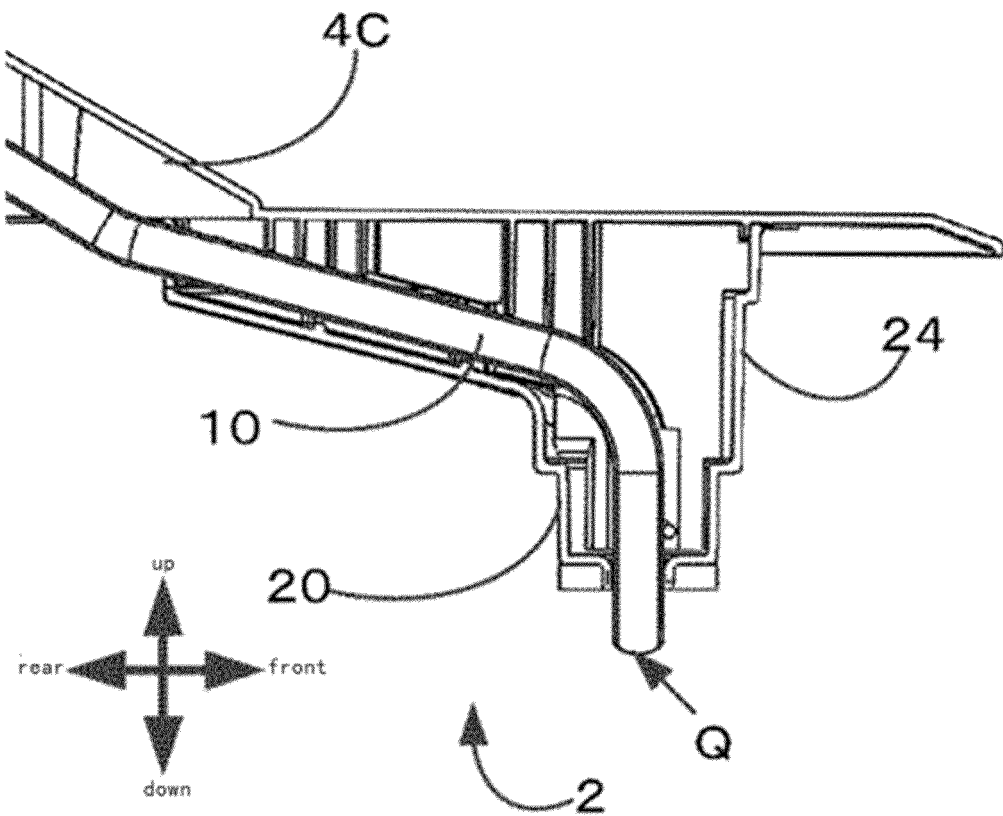


FIG. 5B

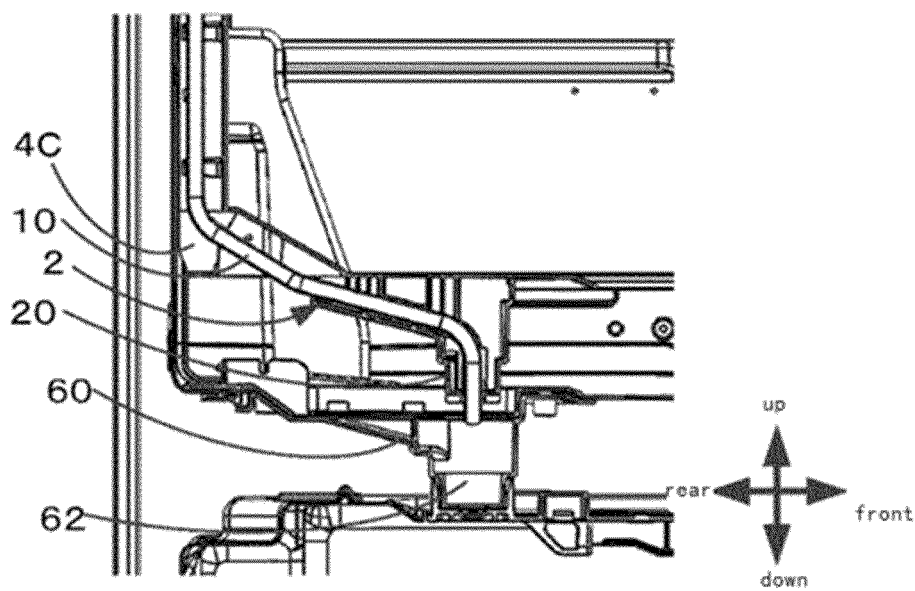


FIG. 6A

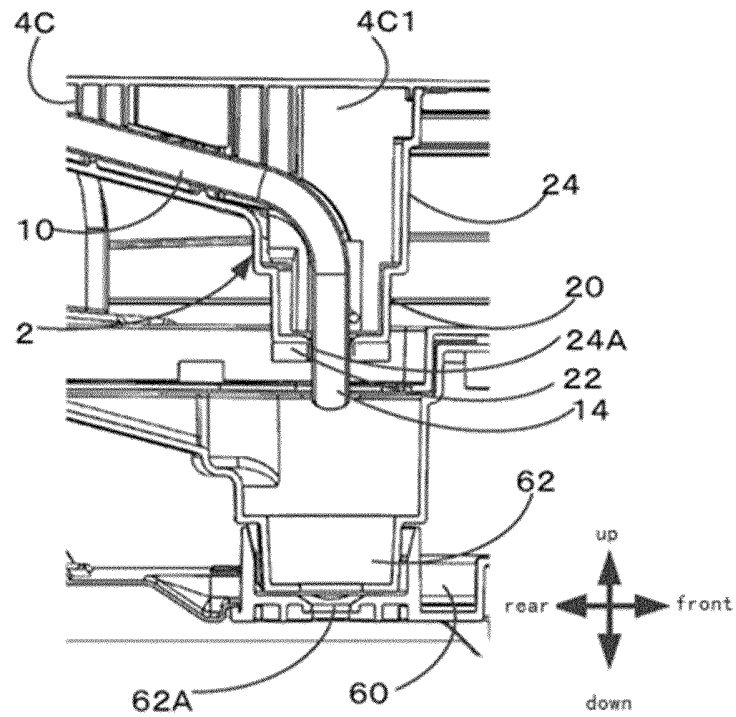


FIG. 6B

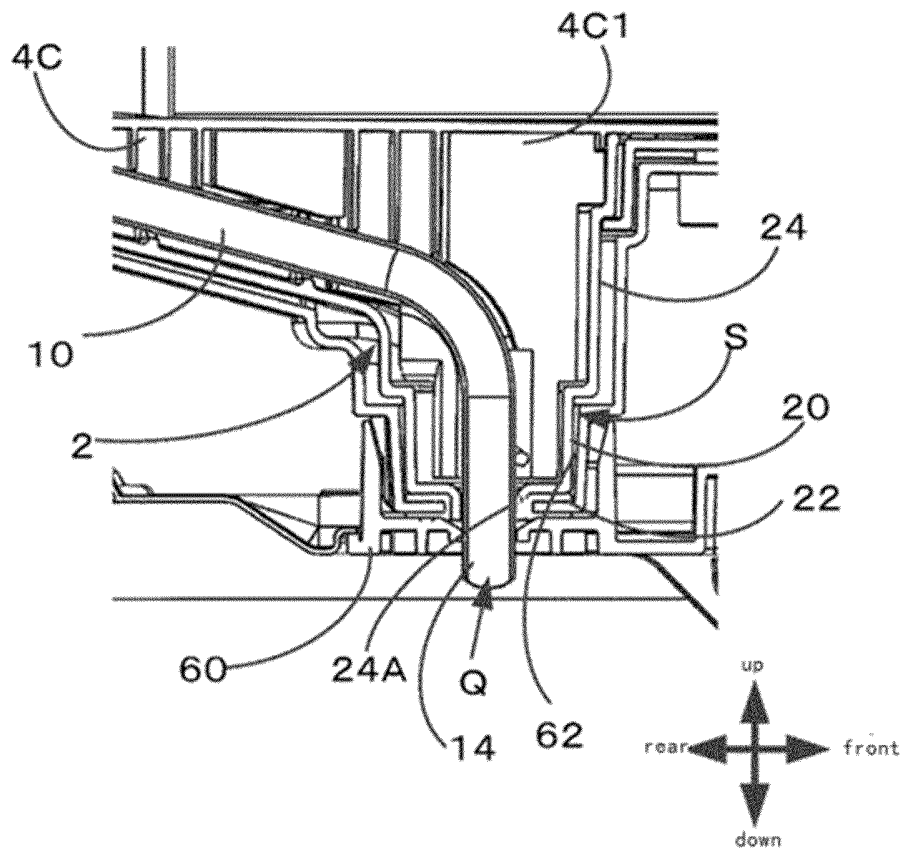


FIG. 6C

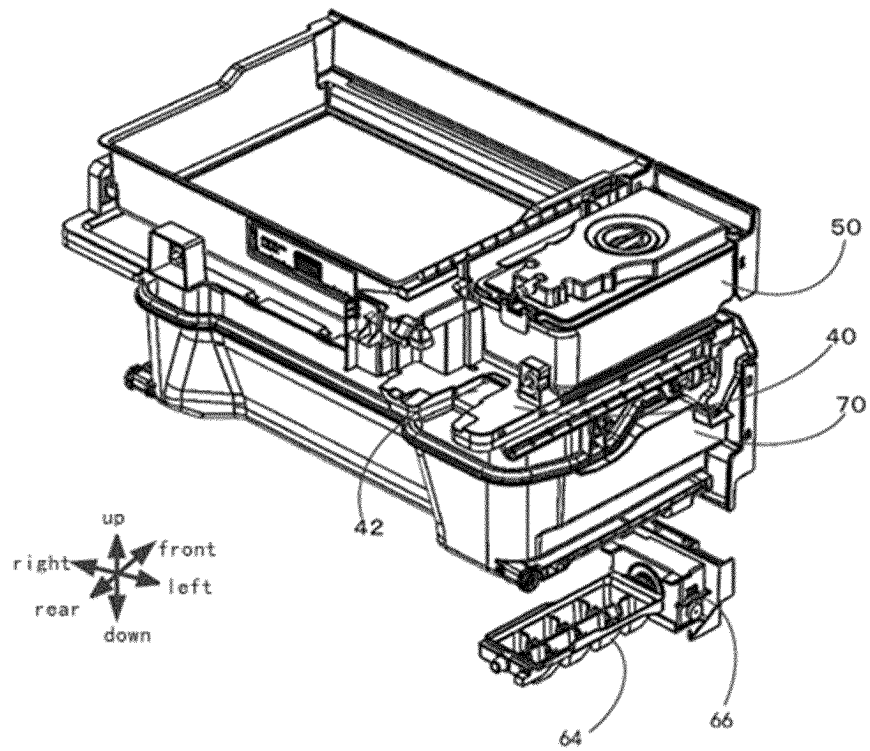


FIG. 7

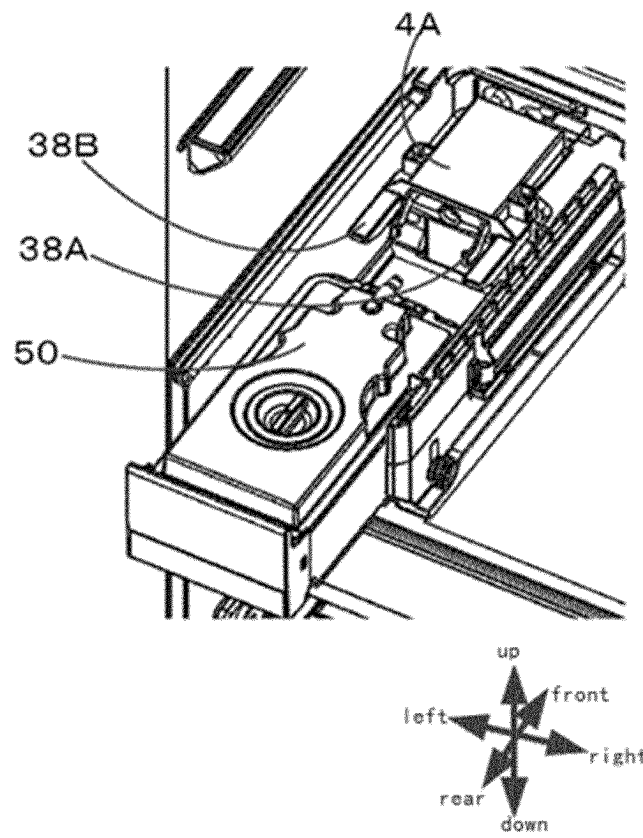


FIG. 8A

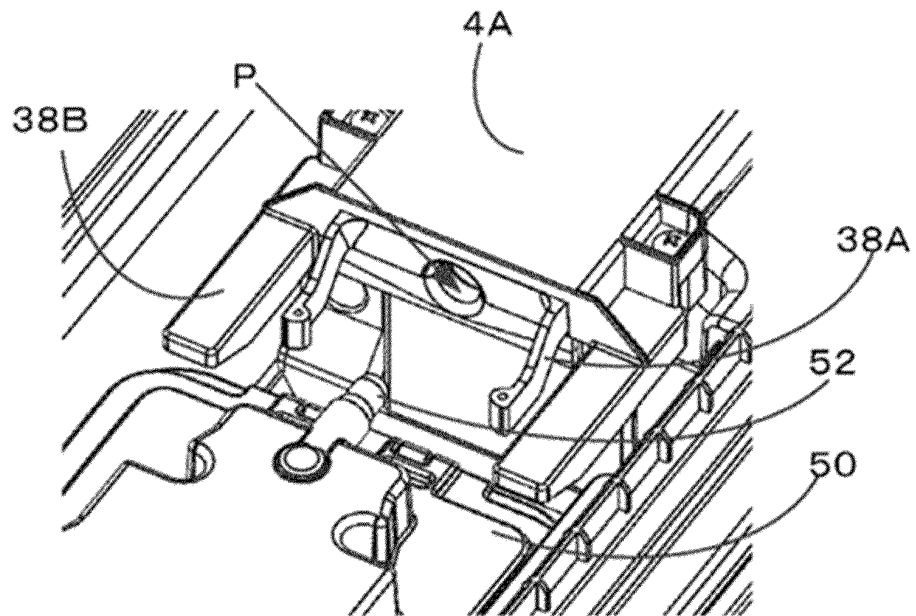


FIG. 8B

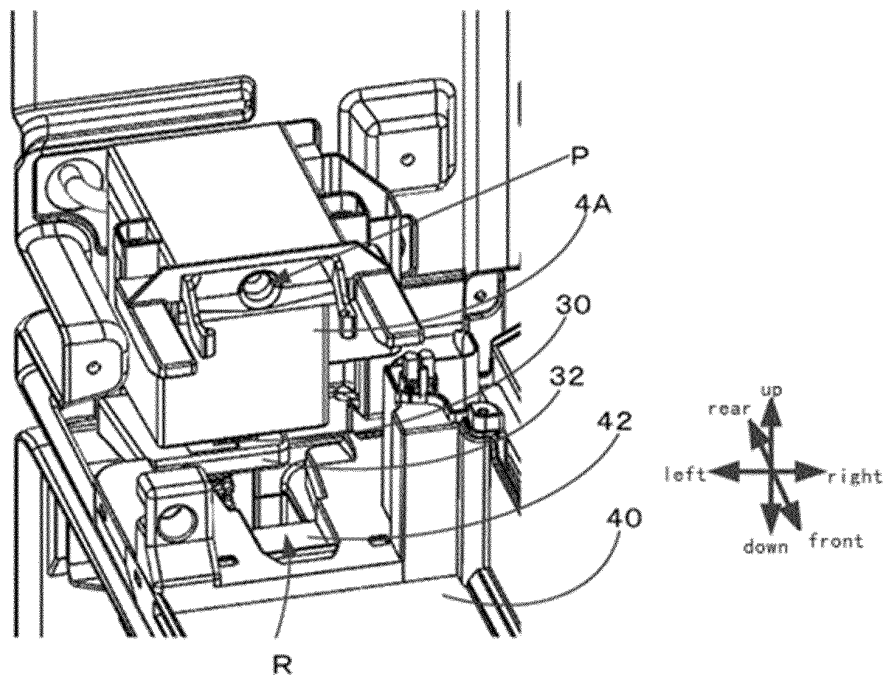


FIG. 9

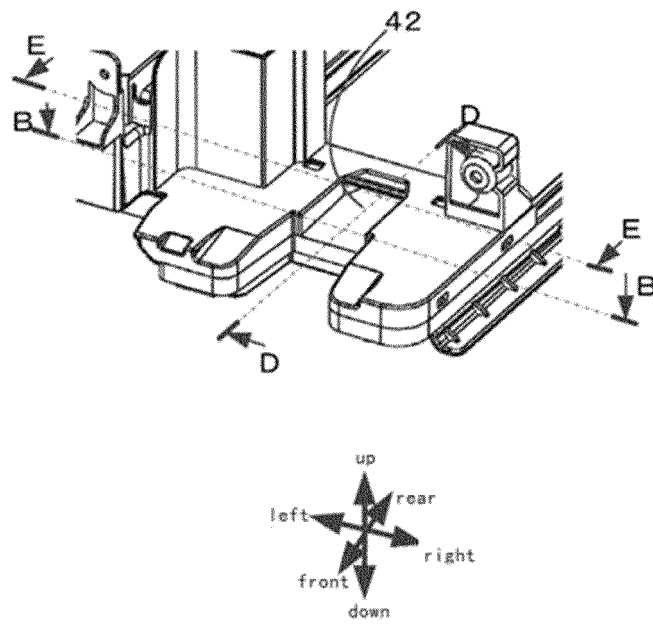


FIG. 10

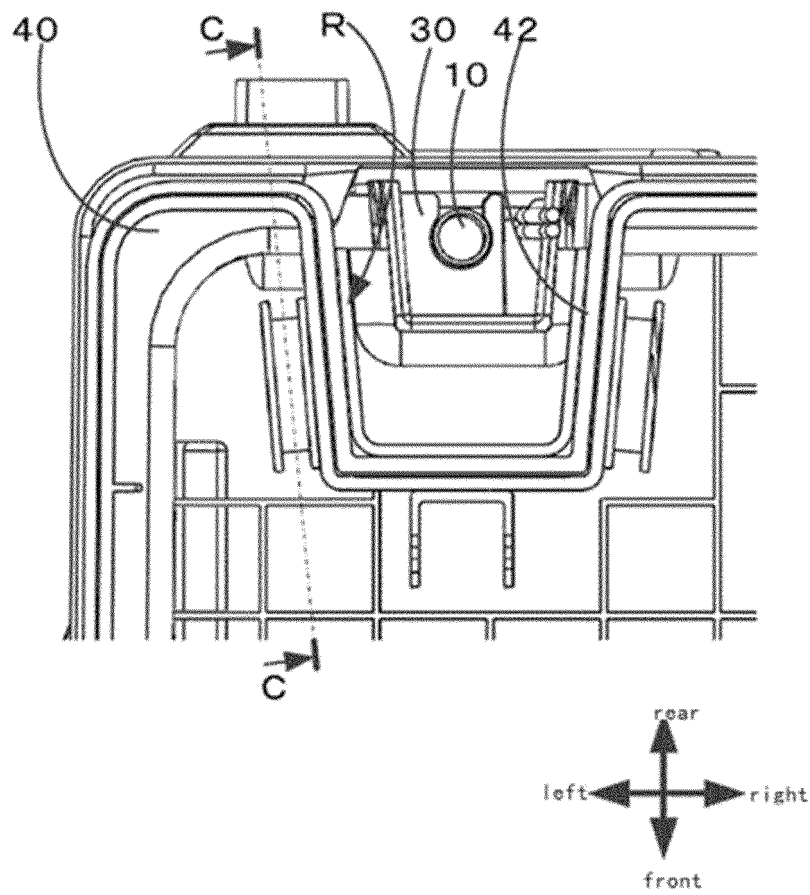


FIG. 11

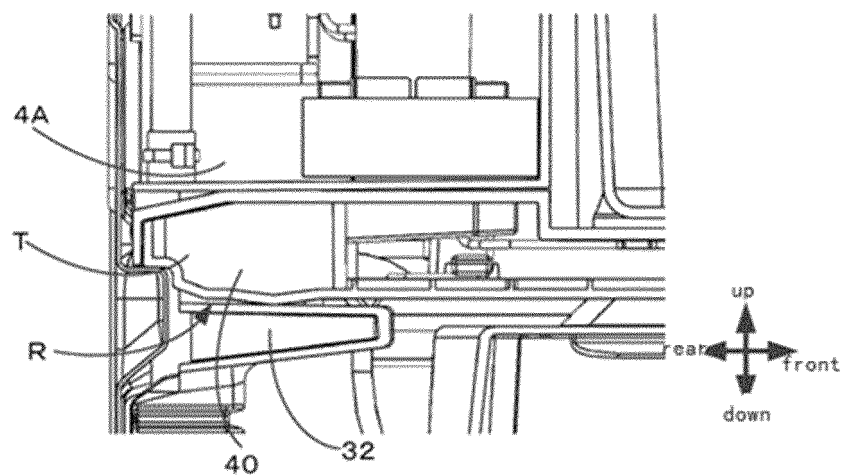


FIG.12

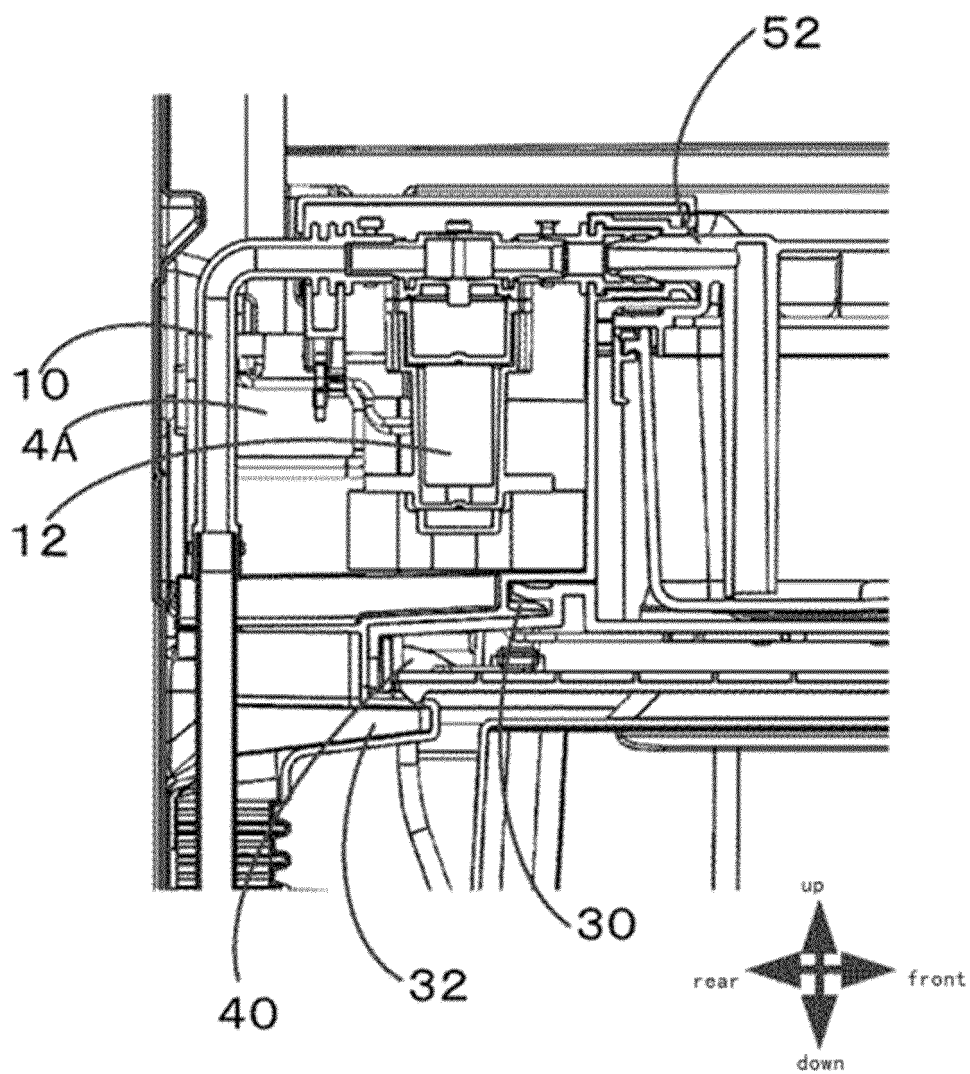


FIG.13A

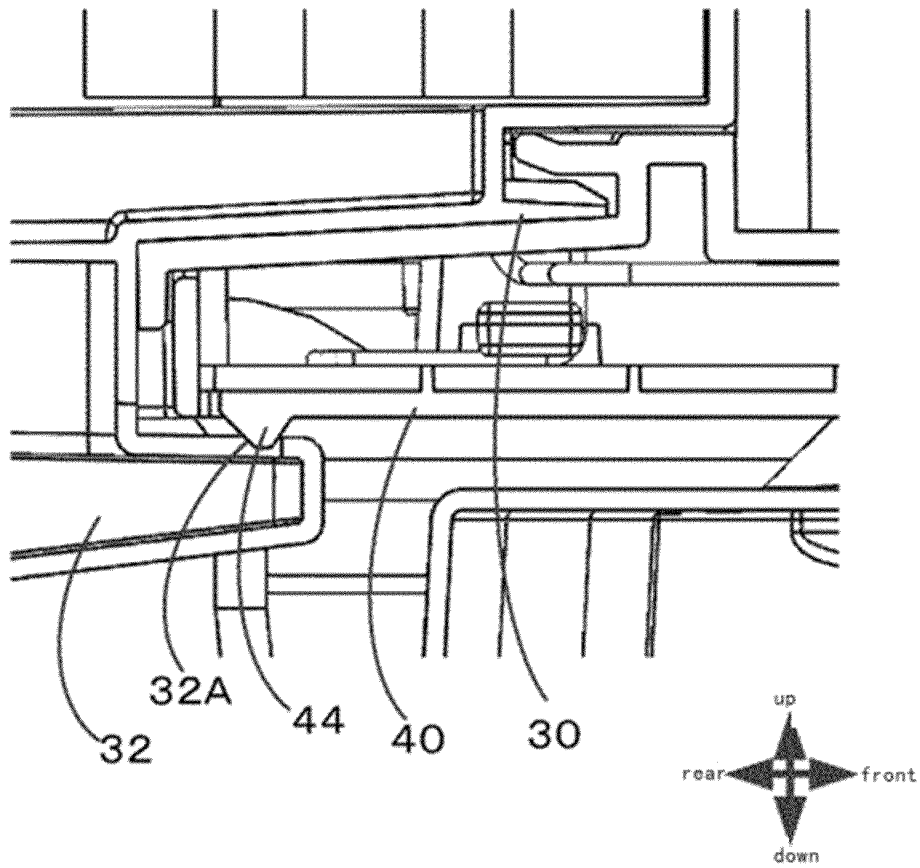


FIG. 13B

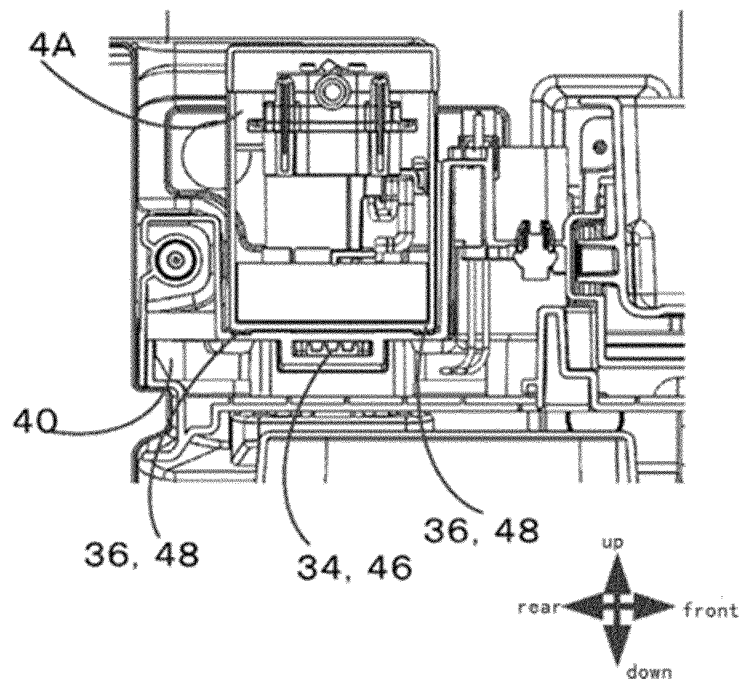


FIG. 14A

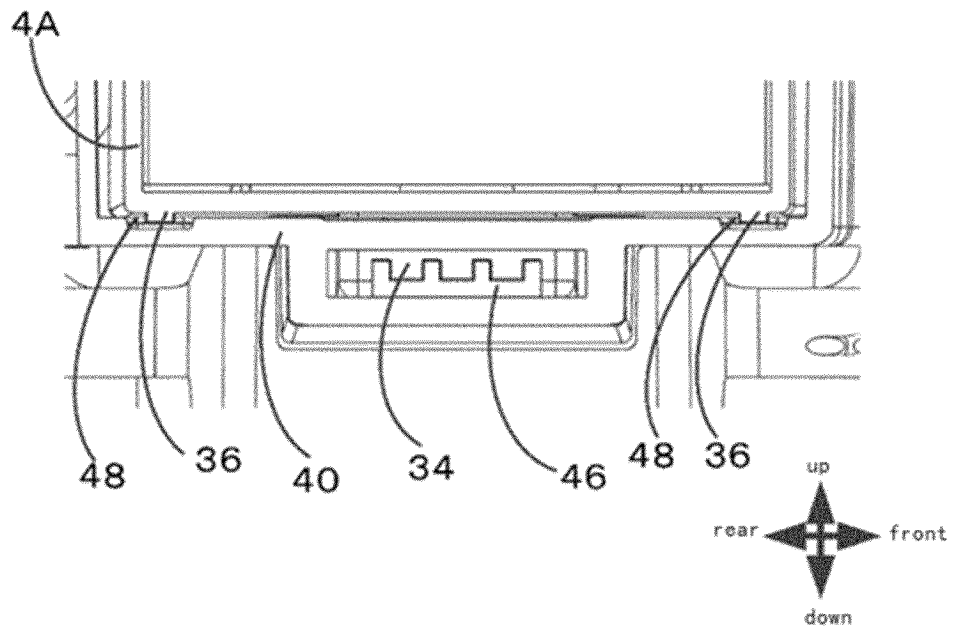


FIG. 14B

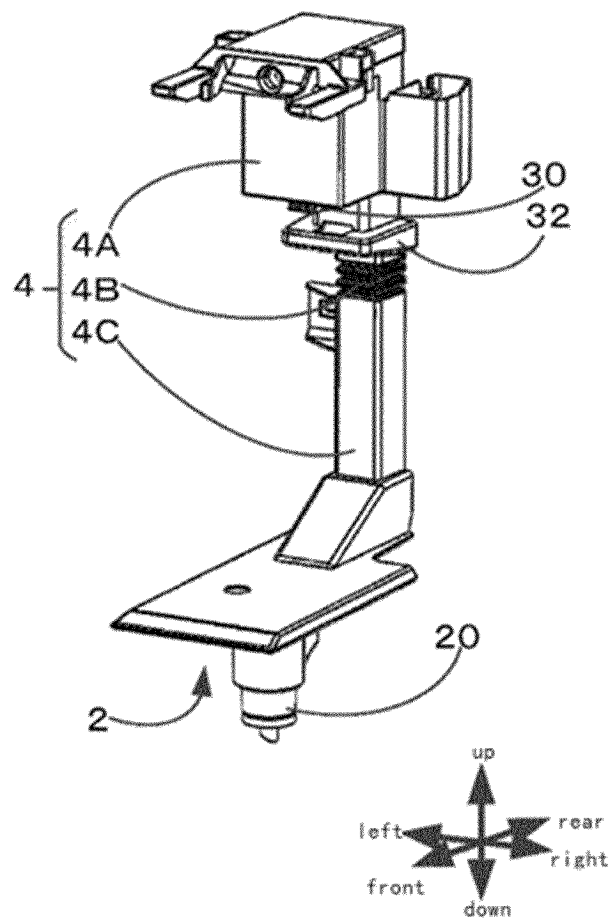


FIG. 15A

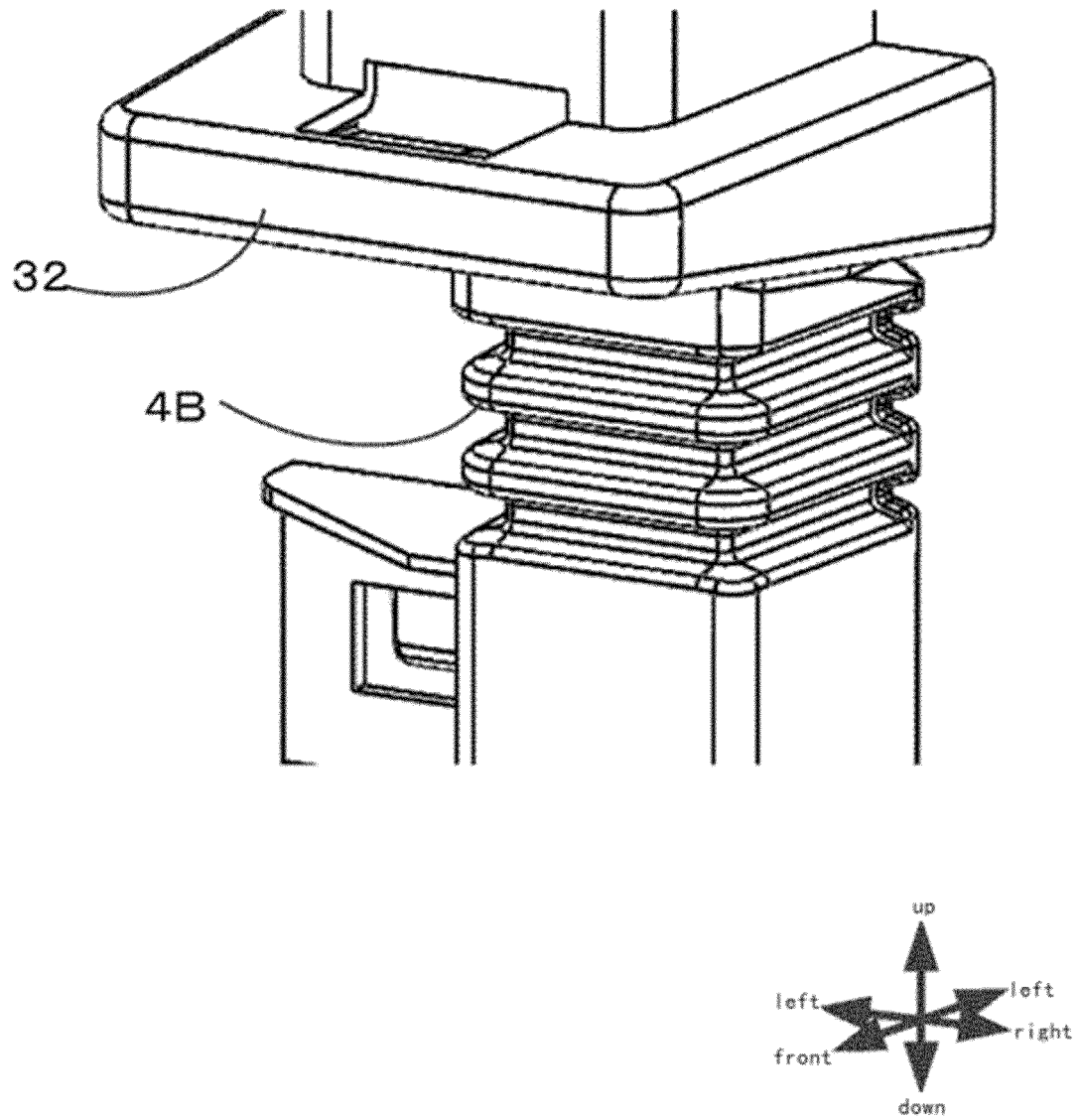


FIG.15B

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2022/083353

A. CLASSIFICATION OF SUBJECT MATTER

F25C 1/04(2018.01)i; F25C 1/22(2018.01)i; F25C 1/24(2018.01)i; F25D 11/00(2006.01)i; F25D 23/12(2006.01)i

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)

F25C1 F25D11 F25D23

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 practicable, search terms used)

CNTXT; CNKI; WPABS; DWPI; USTXT; EPTXT; WOTXT; ISI_Web of Science: 冰箱, 制冰, 水箱, 水罐, 水盒, 供水, 给水, 进, 入, 出, 排, 定位, 固定, refrigerator, ice maker, water, tank, supply, inlet, outlet, fix

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2020134975 A1 (QINDAO HAIER REFRIGERATOR CO., LTD. et al.) 02 July 2020 (2020-07-02) description, page 3, line 3 to page 5, line 6, and figures 1-8	1-10
A	CN 202393120 U (HEFEI MIDEA & ROYALSTAR FRIDGE CO., LTD. et al.) 22 August 2012 (2012-08-22) entire document	1-10
A	CN 1993589 A (PANASONIC CORP.) 04 July 2007 (2007-07-04) entire document	1-10
A	CN 1123396 A (TOSHIBA CORPORATION) 29 May 1996 (1996-05-29) entire document	1-10

☐ Further documents are listed in the continuation of Box C.
 ☒ See patent family annex.

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"E" earlier application or patent but published on or after the international filing date	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&" document member of the same patent family
"O" document referring to an oral disclosure, use, exhibition or other means	
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search

06 June 2022

Date of mailing of the international search report

14 June 2022

Name and mailing address of the ISA/CN

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Authorized officer

Facsimile No. (86-10)62019451

Telephone No.

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/CN2022/083353

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
WO 2020134975 A1	02 July 2020	JP 2020106162 A	09 July 2020
		CN 112384742 A	19 February 2021
CN 202393120 U	22 August 2012	None	
CN 1993589 A	04 July 2007	JP 2006038331 A	09 February 2006
		WO 2006011284 A1	02 February 2006
		JP 2006038422 A	09 February 2006
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		KR 0150858 B1	02 November 1998
		CN 1079530 C	20 February 2002

Form PCT/ISA/210 (patent family annex) (January 2015)

REFERENCES CITED IN THE DESCRIPTION

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