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(54) **COOLING STORAGE CABINET**

KÜHLLAGERUNG

DISPOSITIF DE STOCKAGE REFRIGERE

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Description

TECHNICAL FIELD

[0001] The present invention relates to a cooling storage cabinet including a vaporizing receptacle for collecting internal drained water such as defrost water. The vaporizing receptacle is disposed on a side face, for example on a back face, of a body of the storage cabinet.

BACKGROUND ART

[0002] A known cooling storage cabinet is disclosed in Patent Document 1. In this art, an evaporator is disposed in a ceiling portion of a storage cabinet body, and a drain pan is provided below a bottom face of the evaporator. The drain pan is connected to a drainpipe. The drainpipe extends through a wall of the storage cabinet body and protrudes from a place on an upper position of a back face. Furthermore, a vaporizing receptacle is attached below the drainpipe. The vaporizing receptacle has a box shape having an opened top face. A heater, of an immersion type, is installed in the vaporizing receptacle. When defrost operation is performed, defrost water is received by the drain pan and is collected in the vaporizing receptacle with the drainpipe. The collected water is then heated up by the heater to vaporize. The vapor rises and is exhausted from the top opening.

[Patent Document 1] Japanese Unexamined Patent Application Publication No. 8-200919

[0003] JP 7 049171 A discloses an absorption type refrigerator. An evaporation dish is set on a high-temperature double pipe of an absorption cooling system in a manner of effecting heat transfer. A part of a dilute solution pipe which connects the outer pipe of the high-temperature double pipe to the top of an absorber is passed through the evaporating dish. Thus, the evaporation dish is placed on the high-temperature double pipe in a manner of a heat exchanger and the dilute solution pipe connecting the high- temperature double pipe to the absorber is partly passed through the evaporation dish so that the evaporation of the water from defrosting can be accelerated by virtue of the heat from the high-temperature double pipe and also the heat from the dilute solution pipe. Inside the evaporation dish placed on the high-temperature double pipe in a manner of a heat exchanger, by forming ribs for making the water from defrosting stagnant on the high-temperature double pipe the water from defrosting is made to be stagnant in terms of transfer of heat from the high-temperature double pipe inside the evaporation dish. JP 7 049 171 A discloses a cooling device according to the preamble of claim 1.

DISCLOSURE OF THE INVENTION

Problem to Be Solved by the Invention

[0004] However, in this known art, a whole face of the vaporizing receptacle abuts without space on a back face of the storage cabinet body. Therefore, though the back face of the cabinet body is a heat-insulating wall, the heat of the vaporizing receptacle could be conducted to the inside of the cabinet and cause an undesired internal temperature rise while causing a temperature fall at the vaporizing receptacle side, and could result in decrease in vaporizing performance for drained water. This is a problem.

[0005] The present invention was achieved based on the circumstances as above, and its purpose is to prevent heat transfer from the vaporizing receptacle to the inside of the cabinet.

Means for Solving the Problem

[0006] The present invention relates to a cooling storage cabinet having the features of claim 1. The cooling storage cabinet has a side face, a drain head for draining internal drained water including defrost water to the outside. The drain head protrudes from the side face of the storage cabinet body. The cooling storage cabinet has also a vaporizing receptacle for collecting the internal drained water drained from the drain pipe. The vaporizing receptacle is disposed below the drain head and has a face opposed to the side face of the storage cabinet body. The cooling storage cabinet has also a heater for vaporizing the drained water. The vaporizing receptacle includes a concavity formed on the face thereof, the concavity being configured to form an air layer between the side face of the storage cabinet body.

[0007] With this configuration, the internal drained water collected in the vaporizing receptacle is heated up by the heater, vaporizes, and is exhausted. Along with this, the vaporizing receptacle itself also causes a temperature rise. On the other hand, the air layer is formed between the vaporizing receptacle and the side face of the storage cabinet body whereon the vaporizing receptacle abuts, and functions as a heat-insulating layer. Therefore, the heat of the vaporizing receptacle is difficult to be conducted to the cabinet inside.

[0008] Furthermore, the configuration may be as follows.

[0009] The vaporizing receptacle includes a thin peripheral wall disposed around a periphery of the face opposed to the side face of the storage cabinet body, and the concavity is defined by an inner side of the peripheral wall. With this configuration, the vaporizing receptacle, in addition to forming the air layer between the side face of the storage cabinet body, abuts on the side face of the storage cabinet body only at the thin peripheral wall thereof, i.e. is in line contact therewith. Therefore, the heat is still difficult to be conducted.

[0010] The vaporizing receptacle includes a box-shaped body member and a side plate member. The body member has two opened faces. One of the opened face is a face opposed to the side face of the storage cabinet body. Another opened face is a top face. The side plate

member has a flange provided on the peripheral edge thereof. The flange is orthogonally bent toward the front surface side. The side plate member is fitted in the opposed opened face of the body member, and the flange is overlapped with the edge of the opening of the opposed face and is welded thereto, thereby a box shape having an opened top face is formed. The concavity is defined by an inner side of the flange.

[0011] With this configuration, in a case where the side plate member is mounted to the opening of the opposed face of the body member and is welded thereto, the orthogonally bent flange of the side plate member is fitted in the edge of the opening of the opposed face. Therefore, in comparison with a plane plate having no flange, the side plate member is easy to be positioned, and the subsequent welding process can be smoothly operated. This results in a shorter manufacturing time of the vaporizing receptacle.

Effect of the Invention

[0012] With the present invention, heat transfer from the vaporizing receptacle to the cabinet inside is prevented. Therefore, an undesired internal temperature rise can be prevented and, on the other hand, a temperature fall in the vaporizing receptacle can be prevented. As a result, decrease in vaporizing performance for the internal drained water also can be prevented.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013]

Fig. 1 is a vertical cross-sectional view around a place provided with a vaporizing device of a refrigerator of an embodiment in accordance with the present invention;
Fig. 2 is a backside view of the refrigerator;
Fig. 3 is an exploded perspective view showing a configuration to attach a vaporizing receptacle and a duct;
Fig. 4 is an exploded perspective view showing a configuration to attach a top face plate of the duct and a cover;
Fig. 5 is a perspective view of a drain head;
Fig. 6 is an exploded perspective view of the vaporizing receptacle;
Fig. 7 is a perspective view when assembly of the vaporizing receptacle is completed;
Fig. 8 is a perspective view of a state where a vaporizing heater is supported by a bracket;
Fig. 9 is a plan view of a state where the vaporizing heater is installed in the vaporizing receptacle;
Fig. 10 is a perspective view of the bracket;
Fig. 11 is an exploded perspective view showing a configuration to attach a top face plate of the vaporizing receptacle;
Fig. 12 is a perspective view showing a configuration around a place provided with the vaporizing device;
Fig. 13 is a partially cutout backside view thereof;
Fig. 14 is a partially cutout backside view explaining a function of a blocking plate; and
Fig. 15 is a vertical cross-sectional view showing a configuration of the inside of the vaporizing device.

Explanation of Reference Symbols

[0014] 10... refrigerator body (storage cabinet body); 10A... back face (side face) (of the refrigerator body 10); 33... drain head; 35... drain outlet; 41... vaporizing receptacle; 42... body member; 42A... free edge (peripheral wall) (of the body member 42) ; 48... reverse face plate (side plate member); 49... flange (peripheral wall); 55.., concavity; 60... vaporizing heater (heater); A... air layer

BEST MODE FOR CARRYING OUT THE INVENTION

[0015] An embodiment in accordance with the present invention will hereinafter be explained with reference to Figs. 1 through 15. Illustrated in this embodiment is a case adopted to an upright refrigerator for commercial use. A configuration of the refrigerator will be explained with reference to Figs. 1 and 2.

[0016] A refrigerator body 10 is configured by a vertically elongated heat-insulating box body having a front opening. An inside of the refrigerator body 10 is defined as a storage compartment 11. The storage compartment 11 has a heat-insulating door 12 provided on the front opening thereof. The door 12 is attached so as to open and close the front opening of the storage compartment 11. Formed on the top face of the refrigerator body 10 is a machine compartment 14. The machine compartment 14 is enclosed with panels. A freezing device 15 is installed in the machine compartment 14. The freezing device 15 includes a compressor 16 and an air-cooled condenser 17 having a condenser fan 17A, and the like. The freezing device 15 is mounted on a heat-insulating base plate 18 and is unitized. The base plate 18 is mounted on a ceiling wall of the storage compartment 11 in a manner closing a window hole 19.

[0017] A drain pan 20 is disposed in a ceiling portion of the storage compartment 11 and below the window hole 19, and an evaporator chamber 21 is formed above the drain pan. The drain pan 20 serves also as an air duct. A bottom face of the drain pan 20 is formed in a manner downwardly inclined toward a rear edge (the right side in Fig. 1) thereof. The drain pan 20 has an inlet 22 that is opened in a front area thereof. The rear edge side of the drain pan 20 is notched to form an outlet 23.

[0018] The evaporator chamber 21 has an evaporator 25 and an internal fan 26 mounted therein. The internal fan 26 is disposed in the inlet 22. The evaporator 25 is circularly connected to the above-explained freezing device 15 with a refrigerant pipe to configure a known cooling cycle.

[0019] While the freezing device 15 (the compressor

16) is operated, the internal fan 26 is driven. Then, the internal air of the storage compartment 11 is drawn from the inlet 22 to the inside of the evaporator chamber 21. While the air passes the evaporator 25, cool air is generated by heat exchange. The cool air is blown out from the outlet 23 so that the cool air flows along a rear face of the storage compartment 11. The cool air is thus circularly supplied to, and cool, the inside of the storage compartment 11.

[0020] Note that, along with the operation of the compressor 16, the condenser fan 17A is also operated. External air is thus drawn in from an intake vent (not illustrated) provided in a front panel 14A of the machine compartment 14, and passes the condenser 17 and, further, the compressor 16, to be cooled. Air, after supplied for cooling, is exhausted backwardly from an exhaust vent 28 provided in a rear panel 14B of the machine compartment 14. The exhaust vent 28 is formed by arranging many slits in a matrix. The exhaust vent 28 as a whole has a laterally elongated rectangular shape in a larger area of a center portion of the rear panel 14B.

[0021] On the other hand, in order to remove frost attached to the evaporator 25 and the like, defrost operation is properly performed. The defrost operation is performed by supplying current to a defrost heater (not illustrated) attached to the evaporator 25 and thereby heating the evaporator 25. Defrosted water is received by the drain pan 20 and, thereafter, is led to, and is collected in, a vaporizing device 40, , and is continuously heated up. The drained water is thus forced to vaporize and be exhausted. Note that the vaporizing device 40 is provided on a back face 10A of the refrigerator body 10, which will be specifically explained below.

[0022] Next, a configuration of a portion provided with the vaporizing device 40 will be explained.

[0023] First, a configuration of a portion for draining the defrost water received by the drain pan 20 will be explained. A drainpipe 30 is provided at the rear edge of the drain pan 20 in a manner protruding therefrom in a posture slightly downwardly inclined toward the distal end thereof. On the other hand, a drain tubular body 32 is inserted in a place of a back wall 11A of the refrigerator body 10 and behind the drainpipe 30, as shown in Fig. 15. The drain tubular body 32 is made of synthetic resin. The drain tubular body 32 extends through the back wall 11A. The drain tubular body 32 has a posture inclined a little more steeply (than the drainpipe 30) downwardly toward the external end thereof. A drain head 33 is provided at the external end of the drain tubular body 32 in a manner protruding therefrom.

[0024] The drain head 33 is also made of synthetic resin having lower thermal conductivity. As shown also in Fig. 5, the drain head 33 is rather shorter in length. The drain head 33 has a flange 34 formed across a place slightly rearward from the lengthwise center thereof and in a posture slightly inclined from a right angle. While the flange 34 is applied onto the back face 10A of the refrigerator body 10 in a rotatable posture, the rear end portion of the drain head 33 is fitted in, and is attached to, a double tubular portion 32A of the external end portion of the drain tubular body 32. The drain head 33 then has a posture downwardly inclined toward the distal end thereof at the same angle with the drain tubular body 32, and a side of the distal end from the flange 34 protrudes from the back face 10A of the refrigerator body 10 to the outside. The distal end face of the drain head 33 is closed. A distal end face is formed in a curved manner so as to have a substantially semicircular shape as viewed from a top face thereof. The distal end portion of the drain head 33 has a round drain outlet 35 defined in a bottom face thereof. Furthermore, the top face has a round clearance opening 36 defined in a place right above the drain outlet 35. The clearance opening 36 has the same size with the drain outlet 35.

[0025] A configuration of the vaporizing device 40 is roughly as follows. As shown in Fig. 13 and also in Fig. 15, a vaporizing receptacle 41 is disposed on a place on the back face 10A of the refrigerator body 10 and below the portion where the drain head 33 protrudes. Defrost water is collected in the vaporizing receptacle 41 and is forced to vaporize by a vaporizing heater 60. Furthermore, a duct 85 is attached above the vaporizing receptacle 41 so as to upwardly guide the vapor. The vaporizing receptacle 41 and the duct 85 are covered with a cover 105.

[0026] The vaporizing receptacle 41 is configured by a body member 42 and a reverse face plate 48, as shown in Fig. 6. Each of the body member 42 and the reverse side plate 48 are made with a metal plate such as a stainless steel plate. The vaporizing receptacle 41 has, when assembly is completed, a box shape having a wide width and narrow depth and an opened top face. Note that the body member 42 has, in the above box, in addition to the opened top face, an opened reverse face to be opposed to the back face 10A of the refrigerator body 10.

[0027] Formed along top edges of a front face plate 43 and a left side face plate 44A of the body member 42 (as viewed from the backside) are outwardly and orthogonally bent narrow flanges 45. Formed along the top edge of a right side-face plate 44B is a likewise outwardly and orthogonally bent but wide attachment plate 46.

[0028] The reverse face plate 48 is a plate to be fitted in the opened reverse face of the body member 42. The reverse face plate 48 has a shallow dish shape. The reverse face plate 48 has flanges 49 that are low in height and are standing around the peripheral edges thereof. An attachment plate 50 extends upwardly from a free edge of the upper flange 49 of the reverse face plate 48. A reverse face of this attachment plate 50 and free edges of the right, left, and lower flanges 49 are positioned in a same plane. A left end portion of the attachment plate 50 protrudes beyond the left end edge of the reverse face plate 48 as viewed from the backside. The attachment plate 50 has insertion holes 53 formed in the right and left end portions thereof. The insertion holes 53 allow screws 52 (Fig. 3) to be inserted therethrough. Further-

more, the attachment plate 50 has a notched clearance concavity 54 formed by notching a place on the top edge thereof and near the right end portion thereof. This clearance concavity 54 allows the above-explained drain head 33 to be fitted therein and extend therethrough.

[0029] The reverse face plate 48 is fitted in the opened reverse face of the body member 42 as shown in Fig. 7. The right, left, and lower flanges 49 are then aligned with free edges 42A of the body member 42 or, specifically, with the free edges of the right and left side face plates 44A, 44B and with the free edge of a bottom face plate 47, respectively, and are overlapped with the inner sides. The upper flange 49 becomes flush with the left flange 45 and the attachment plate 46 of the body member 42, while a bottom of the protruding portion in the left end of the attachment plate 50 is placed on an end edge of the left flange 45.

[0030] Then, the right, left, and lower flanges 49 of the reverse face plate 48 are fixed by welding to the overlapped free edges 42A of the reverse face of the body member 42. Thus, the box-shaped vaporizing receptacle 41 having the opened top face as explained above is formed. The reverse face of the vaporizing receptacle 41 then has a concavity 55 defined by the inner sides of the flanges 49. The concavity 55 is rather shallow but covers an almost whole area inside the flanges 49 of the reverse side of the vaporizing receptacle 41.

[0031] The vaporizing heater 60 is installed in the vaporizing receptacle 41. The vaporizing heater 60 is supported by a bracket 65. The vaporizing heater 60 includes a sheathed heater of an immersion type. The sheathed heater is configured, basically, by inserting a coiled heating wire in a metal pipe and filling the metal pipe with insulating powder. The vaporizing heater 60 of this embodiment has a shape as shown in Figs. 8 and 9, which is formed as follows. A single elongated bar is bent at the lengthwise center portion thereof into a hairpin shape so that two bars run in parallel. Further, these two bars are substantially orthogonally bent at a lengthwise portion thereof. The vaporizing heater thus has a shape having vertical portions 61 and horizontal portions 62 provided at a distal end of the vertical portions 61. As shown in Fig. 14 and the like, each of the vertical portions 61 has a length dimension slightly greater than the height of the vaporizing receptacle 41. On the other hand, each of the horizontal portions 62 has a dimension slightly less than twice as long as each vertical portion 61 and shorter by a certain amount than the length dimension of a bottom face of the vaporizing receptacle 41 .

[0032] Note that, in this embodiment, only the horizontal portions 62 of the vaporizing heater 60 are heat-generating portions (see the meshed portion in Fig. 14), while the vertical portions 61 are non-heat-generating portions. For this purpose, the heating wires are removed from the vertical portions 61, or the metal pipes of the vertical portions 61 are replaced with anti-thermic pipes.

[0033] In addition, lead wires 63 are connected to two top end portions of the vertical portions 61 and extends therefrom. The connected portions are molded with molding resin (molded portions 64).

[0034] The bracket 65 is formed into a shape shown in Fig. 10 by press molding a metal plate. The bracket 65 has an attachment portion 66. The attachment portion 66 covers a right end area as viewed from the backside of the opened top face 41A of the vaporizing receptacle 41, e.g. about one-fifth of the full length of the opened top face 41A. The attachment portion 66 has a flange 67 formed by downwardly bending along an end edge at the nearer side thereof. In addition, an L-shaped support plate 68 can be placed on the right end side of the attachment portion 66. The support plate 68 is downwardly bent to form a flange 69 also along a right edge of a bottom plate 68A thereof.

[0035] As shown in Fig. 3, the two top end portions of the vertical portions 61 of the vaporizing heater 60 are inserted from below, in a posture leftwardly directing the distal end of the horizontal portions 62, through insertion holes 70 (Fig. 10) of the bracket 65. From this state, the vaporizing heater 60 is put in the vaporizing receptacle 41. Along with this, the nearer flange 67 of the attachment portion 66 of the bracket 65 is engaged on the end edge of the nearer-side flange 45 of the vaporizing receptacle 41. Along with this, a farther end edge of the attachment portion 66 of the bracket 65 is placed on the farther flange 49. Thus, the right end of the opened top face 41A is covered with the bracket 65. The horizontal portions 62 of the vaporizing heater 60 then abuts on the bottom face of the vaporizing receptacle 41. Furthermore, the support plate 68 is placed on the right end portion of the attachment portion 66, and the flange 69 is engaged with the right edge of the attachment portion 66. Then, the portions of the vertical portions 61 upwardly protruding from the top face of the attachment portion 66, including the molded portions 64, is supported by the support plate 68, and are banded with a band 72 to be fixed. While the flange 69 of the bottom plate 68A of the support plate 68 is engaged on the right end edge of the attachment plate 46 of the vaporizing receptacle 41, the bottom plate 68A and the right end edge of the attachment portion 66 are piled on the attachment plate 46, which are screwed up together to be fixed.

[0036] Thus, the vaporizing heater 60 is installed in the vaporizing receptacle 41 in a state as follows. The vaporizing heater 60 is supported by the bracket 65 at the top end portions of the vertical portions 61 thereof. The vertical portions 61 hang along a side slightly inner than the right side face of the vaporizing receptacle 41 as viewed from the backside. The horizontal portions 62 abut on a place from the right end portion to a portion near the left end portion of the bottom face.

[0037] The vaporizing heater 60 has a thermostat 73 attached to a place near the distal end of one of the horizontal portions 62 thereof. The thermostat 73 functions to directly sense the temperature of the distal end portion of the horizontal portion 62 of the vaporizing heater 60. When the sensed temperature of this place reaches a

predetermined temperature, the thermostat 73 determines that this place is released from the state immersed in the standing water, i.e. that the remaining amount of the standing water is a little, and stops supply of current to the vaporizing heater 60. Lead wires 74 of this thermostat 73 runs along the horizontal portion 62, along the vertical portions 61, and, further, through a center hole of a rubber plug 75, which is fitted in the attachment portion 66, and upwardly extends therefrom.

[0038] In addition, a backup thermostat 76 and a protective thermal fuse 77 are attached onto the attachment portion 66. The backup thermostat 76 functions to stop supply of current to the vaporizing heater 60.

[0039] On the other hand, the above-explained bracket 65 has a blocking plate 80 integrally formed therewith. Specifically, as shown in Figs. 9 and 10, the attachment portion 66 is orthogonally bent to form a hanging plate 79 along a widthwise area in the center portion of the left side edge thereof, i.e. along a widthwise area that can be fitted in the opened top face 41A of the vaporizing receptacle 41. The hanging plate 79 is short in length. Furthermore, the hanging plate 79 is bent to form the above-explained blocking plate 80 along a bottom edge thereof. The blocking plate 80 extends leftwardly from the bottom edge of the hanging plate 79. The blocking plate 80 has a length greater than one-half of the length of the attachment portion 66 and takes a posture slightly inclined downwardly toward the distal end thereof.

[0040] The vaporizing receptacle 41, wherein the vaporizing heater 60 is installed via the bracket 65 as explained above, is attached to the back face of the refrigerator body 10. The vaporizing receptacle 41 is, in a posture inclined upwardly toward the left side thereof as viewed from the backside (with the inclined angle of approximately five degrees), applied onto the back face 10A of the refrigerator body 10, while fitting the drain head 33 in the clearance concavity 65 of the attachment plate 50 and extending the drain head 33 out. Then, the screws 52 are inserted through the insertion holes 53 of right and left end portions of the attachment plate 50, and are tightened up in screw holes 82 provided in the back face 10A. The vaporizing receptacle 41 is thus attached in the inclined posture.

[0041] Note that the lead wires 63 extending from the top edges of the vaporizing heater 60, the lead wires 74 of the thermostat 73, and the like are inserted through an insertion hole 83 opened in the rear panel 14B of the machine compartment 14 to the inside and are connected to connectors (not illustrated) of an electrical equipment box installed in the machine compartment 14.

[0042] When the vaporizing receptacle 41 is attached as described above, the bottom face of the vaporizing receptacle 41 becomes a face inclined upwardly toward the left side thereof as shown in Fig. 14, and the horizontal portions 62 of the vaporizing heater 60 abut on the bottom face in the likewise inclined posture.

[0043] Along with this, the blocking plate 80 formed in a manner extending from the left side edge of the attachment portion 66 of the bracket 65 comes to, and covers, a place right below the drain outlet 35 of the drain head 33, and having a posture slightly inclined downwardly toward the distal end thereof.

[0044] Furthermore, as shown in Fig. 15, at the reverse face side of the vaporizing receptacle 41, it is only the attachment plate 50 and the free edges 42A of the body member 42 and the flanges 49 around the concavity 55, which are overlapped with the inner sides of the free edges 42A, that abut on the back face 10A of the refrigerator body 10. Or, in other words, the back face 10A of the refrigerator body 10 covers the opened face of the concavity 55. Thus, an air layer A is formed between the reverse face of the vaporizing receptacle 41 and the back face 10A of the refrigerator body 10.

[0045] The duct 85 is attached to a place above the opened top face 41A of the vaporizing receptacle 41 attached as described above. Specifically, the duct 85 is attached to a place above an area excluding the right end portion whereto the bracket 65 is attached. The duct 85 upwardly guides the vapor generated in the vaporizing receptacle 41.

[0046] The duct 85 is made with a metal plate. As shown in Fig. 3, the duct 85 has top and bottom face, both of which are opened. The duct 85 has a flat square tubular shape having a substantially tetragonal backside view. A bottom end portion of the duct 85 can be inserted in a left side area of a place where the bracket 65 is attached on the opened top face 41A of the vaporizing receptacle 41.

[0047] A reverse face plate 86 of the duct 85 has attachment plates 87 formed in a manner extending from the right and left side edges thereof, as shown in Fig. 13. A certain length of the bottom end side of each of the right and left attachment plates 87 is cut off to expose screwing points of the attachment plate 50 of the vaporizing receptacle 41 and the bracket 65.

[0048] A bottom edge of the reverse face plate 86 is slightly higher than a bottom edge of a front face plate 88, and is inclined upwardly toward the left side thereof as viewed from the backside at the same angle with the inclined angle of the vaporizing receptacle 41. Furthermore, the bottom edge of the reverse face plate 86 has a clearance concavity 89 formed by notching a place near the right end thereof as viewed from the back face. The clearance concavity 89 allows the above-explained drain head 33 to be fitted therein and thereby to be let out.

[0049] The duct 85 has a vertical posture. As shown in Fig. 13, while the drain head 33 protruding from the attachment plate 50 of the vaporizing receptacle 41 is fitted in the clearance concavity 89 and is let out, the bottom edge is inserted in the area that is in the opened top face 41A of the vaporizing receptacle 41 and on the left side of the bracket 65. Then, the reverse face of the duct 85 is applied onto the attachment plate 50 of the vaporizing receptacle 41 and, furthermore, onto the back face 10A of the refrigerator body 10. Note that the bottom edge of the reverse face plate 86 is placed on the farther-

side flange 49. Then, screws 91 are inserted through insertion holes 92 formed in top end portions of the right and left attachment plates 87, and are tightened in screw holes 93 provided in the back face 10A. Thus, the duct 85 is fixed. The top face of the duct 85 then reaches a place slightly lower than a bottom edge of an area where the exhaust vent 28 is formed in the rear panel 14B of the machine compartment 14.

[0050] A top face plate 95 is attached to the opened top face of the duct 85. As shown in Fig. 11, the top face plate 95 has substantially the same size with the size of the opened top face of the duct 85. Many slits 96 are arranged in the duct 85 along the lateral direction. Each of the slits 96 is elongated in the front-back direction. The top face plate 95 is downwardly bent at an acute angle to form attachment plate 97 along a front edge thereof. The top face plate 95 is also bent at an acute angle to form a narrow stand plate 98 along a rear edge thereof. Furthermore, the top face plate has an insertion plate 99 formed in a manner extending from a top edge of the stand plate 98 obliquely upward toward the farther side. Note that the rear panel 14B of the machine compartment 14 has an insertion groove 100 formed in a place right below an area thereof where the exhaust vent 28 is formed. The insertion groove 100 allows the insertion plate 99 to be inserted therein.

[0051] The top face plate 95 is inserted in the insertion groove 100 and, thereafter, the stand plate 98 is applied onto the inner face of the farther side of the opened top face of the duct 85. Then, the attachment plate 97, which is located at the nearer side, is overlapped with the top edge portion of the front face plate 88 of the duct 85, and is engaged thereon. Then, screws 101 are inserted through insertion holes 102 opened in the right and left sides of the attachment plate 97, and are screwed in screw holes 103 provided in the corresponding places on the top edge portion of the front face plate 88 of the duct 85. The top face plate 95 is thus fixed. The top face plate 95 then, as shown in Fig. 15, takes a posture inclined downwardly toward the farther edge side thereof, and the farther edge of the top face plate 95 is positioned within the opened top face of the duct 85.

[0052] The cover 105 is made with a metal plate. As shown in Figs. 4 and 15, the cover 105 has an opened reverse face side and has a shape similar to a set-up shallow square dish. The cover 105 can cover almost entirely the above-explained vaporizing receptacle 41 and the duct 85. Each of right, left, and bottom free edges of the cover 105 has an attachment plate 106 extending therefrom. A top face plate 107 of the cover 105 is notched to form a clearance concavity 108. The clearance concavity 108 allows the top edge portion of the duct 85 to be fitted therein and extend therethrough.

[0053] While the top edge of the duct 85 is fitted in the clearance concavity 108, the cover 105 is applied onto the back face 10A of the refrigerator body 10 and, further, onto the bottom edge portion of the rear panel 14B. Then, screws 110 are inserted through insertion holes 111 opened in the attachment plates 106, and are screwed in screw holes 112 located at the corresponding places on the back face 10A of the refrigerator body 10. The cover 105 is thus fixed. Thus, the vaporizing receptacle 41, the almost entire duct 85, and the insertion hole 83 for the lead wires 63 and the like are covered with the cover 105. On the other hand, the top face plate 95 of the duct 85 is opened upwardly.

[0054] Next, operation of this embodiment will be explained.

[0055] When defrost operation is performed while the refrigerator runs, defrost water from the evaporator 25 and the like are received by the drain pan 20 and, thereafter, flows from the rear-edge drainpipe 30 through the drain tubular body 32 to the drain head 33, and flows out of the drain outlet 35 opened in the bottom face of the distal end side of the drain head 33, and falls down. Because the blocking plate 80 is disposed in a posture inclined downwardly toward the distal end thereof at the place right below the drain outlet 35, the defrost water that has fallen down from the drain outlet 35 is received by the blocking plate 80 as shown by arrowed line X in Fig. 14 and, thereafter, falls in drops mainly from the distal end of the blocking plate 80 and is collected in the bottom portion of the vaporizing receptacle 41. Because the vaporizing receptacle 41 is attached in the inclined posture, the defrost water is collected so as to be deeper at the right side.

[0056] Along with this, the vaporizing heater 60 is supplied with current. Then, the standing water (defrost water) collected in the vaporizing receptacle 41 is heated up and is forced to vaporize, and the vapor rises. Here, there is a concern that the vapor rising from the place below the drain head 33 specifically could flow from the drain head 33 into the evaporator chamber 21 side. Here, the blocking plate 80 is disposed below the drain outlet 35, as explained above. Therefore, as shown by arrowed line Y in Fig. 14, the vapor is blocked by the blocking plate 80 and is led to the left side of the drain head 33, rises through the duct 85 together with the vapor which has risen from the left side in the vaporizing receptacle 41, runs through the slits 96 of the top face plate 95, and is exhausted upwardly. Even in an event that a part of the vapor rises around the blocking plate 80 into the area below the drain head 33 and flows into the drain outlet 35, the clearance opening 36, which is opened right above the drain outlet 35, allows the vapor which has flown into the drain outlet 35 to further rise upwardly to escape out of the clearance opening 36. Then, the vapor rises likewisely through the duct 85 and is exhausted from the slits 96. Thus, back flow of vapor from the drain head 33 is still reliably prevented.

[0057] Note that a part of the vapor exhausted from the top face of the duct 85 can contact with the rear panel 14B of the machine compartment 14 and thereby be condensed into dew, and the dew drops could fall down along the rear panel 14B. Such dew drops are received by the insertion plate 99 and flows onto the top face plate 95 of

the duct 85 and, further, flows toward the farther side following its inclination, and is collected from the slits 96 and from the two end edges of the top face plate 95 in the vaporizing receptacle 41 again to vaporize.

[0058] When the defrost operation is terminated and cooling operation is restarted, the condenser fan 17A is operated, and the external air is drawn from the front face side to cool the condenser 17 and, further, the compressor 16. Air, after supplied for cooling, is exhausted backwardly from the exhaust vent 28 of the rear panel 14B of the machine compartment 14. Therefore, the vapor exhausted upwardly from the top face plate 95 of the duct 85 receives the exhaust heat and thereby is diffused into low concentration. Thus, even in a case where a wall of the room, for example a kitchen, is located near, condensation of the vapor into dew caused by a great amount of vapor contacting with the wall can be avoided.

[0059] While the vaporizing heater is generating heat, the vaporizing receptacle 41 itself is also heated up and causes a temperature rise. On the other hand, the reverse face of the vaporizing receptacle 41 abuts on the back face 10A of the refrigerator body 10 only at the thin peripheral walls (the free edges 42A of the body member 42 and the flanges 49) around the concavity 55, i.e. is in line contact therewith. In addition to this, because the concavity 55 is provided as above, the air layer A is formed between the back face 10A of the refrigerator body 10, and this air layer A functions as a heat-insulating layer. Thus, the heat of the vaporizing receptacle 41 is difficult to be transferred to the inside of the cabinet. Therefore, an undesired internal temperature rise can be prevented and, on the other hand, a temperature fall in the vaporizing receptacle 41 can be prevented. As a result, decrease in vaporizing performance for standing water also can be prevented.

[0060] The vaporizing receptacle 41 is attached in the posture inclined upwardly toward the left side thereof. Therefore, while the level of the standing water gradually is lowered as vaporization progresses, the level of the standing water is always the shallowest at the left end side. Therefore, as the vaporization further progresses, the vaporizing heater 60 is gradually released from the state immersed in the standing water to cause a rapid temperature rise gradually from the distal end side of the horizontal portions 62 thereof. When the thermostat 73 detects the predetermined temperature, it is determined that the remaining amount of the standing water is a little, and supply of current to the vaporizing heater 60 is stopped. Vaporization of the remaining standing water thereafter is facilitated for a while further by remaining heat of the vaporizing heater 60.

[0061] Thus, because the attached vaporizing receptacle 41 has this inclined posture, a result is obtained that the place where the standing water becomes dry gradually moves from left to right. Such a result can be obtained also in a case where, for example, the installation site is inclined or has small steps and the refrigerator has to be installed in a posture somewhat upwardly inclined toward the right side thereof as viewed from the backside. Furthermore, because the vaporizing heater 60 is turned off upon detection of the temperature at the place near to the uppermost place in the bottom portion or, more specifically, the temperature of the distal end side of one of the horizontal portions 62 of the vaporizing heater 60, which is first released from the state immersed in the standing water. Therefore, heating is turned off in a state where the most part of the horizontal portions 62 is immersed in the standing water. That is, it is prevented as well as possible to heat the vaporizing receptacle 41 in an empty state.

[0062] In a case of cleaning the inside of the vaporizing receptacle 41, the cover 105 and the duct 85 are detached and thereafter, the screws 52 are unscrewed to detach the vaporizing receptacle 41. Then, the bracket 65, together with the vaporizing heater 60, is detached. The inside of the vaporizing receptacle 41 then comes to an upwardly opened state. Thus, the vaporizing receptacle 41 can be washed so that every corner thereof is cleaned up. The cover 105 and the duct 85 also can be likewise detached and washed.

[0063] Effects of this embodiment is as follows. While the vaporizing heater is generating heat, the vaporizing receptacle 41 itself is also heated up and causes temperature rise. On the other hand, the reverse face of the vaporizing receptacle 41 abuts on the back face 10A of the refrigerator body 10 only at the thin peripheral walls (the free edges 42A of the body member 42 and the flanges 49) around the concavity 55, i.e. is in line contact therewith. In addition to this, because the concavity 55 is provided as above, the air layer A is formed between the back face 10A of the refrigerator body 10, and this air layer A functions as a heat-insulating layer. Thus, the heat of the vaporizing receptacle 41 is difficult to be transferred to the inside of the cabinet. Therefore, the undesired internal temperature rise can be prevented and, on the other hand, the temperature fall in the vaporizing receptacle 41 can be prevented. As a result, decrease in vaporizing performance for the standing water also can be prevented.

[0064] The vaporizing receptacle 41 is formed by weld connecting the body member 42 and the reverse face plate 48, while the reverse face plate 48 has the orthogonally bent flanges 49 around the peripheral edges thereof; the flanges 49, which serves also for defining the concavity 55, is fitted in the free edges 42A of the reverse face of the body member 42 and is welded thereto. Therefore, in comparison with a plane plate having no flange, the reverse face plate 48 is easy to be positioned, and the subsequent welding process can be also smoothly performed. This results in a shorter manufacturing time of the vaporizing receptacle 41.

[0065] Note that the present invention is not limited to the embodiments as explained above with reference to the drawings. For example, the following embodiments are also included within the scope of the present invention.

(1) The concavity provided at the reverse face side of the vaporizing receptacle is not limited to being provided over the entire face of the reverse face as illustrated in the above embodiment. Even a comparatively small area of the concavity can form some air layer and is effective in heat insulation and, therefore, such a configuration is also included within the scope of the present invention.
(2) The vaporizing device does not have to be provided on the back face of the refrigerating cabinet as illustrated in the above embodiment. The vaporizing device can be provided on the right or left side of the refrigerating cabinet.
(3) The heater for vaporizing standing water is not limited to the heater of immersion type as illustrated in the above embodiment. The heater may be any other heater such as a cord heater provided on an outer bottom face of the vaporizing receptacle, a hot gas pipe that runs from the freezing device, or the like.
(4) Drained water to vaporize may be any internal drain water, including defrost water.

Claims

1. A cooling storage cabinet comprising:

a storage cabinet body (10) having a side face (10A);
a drain head (33) for draining internal drained water including defrost water to the outside, the drain head (33) protruding from the side face (10A) of the storage cabinet body (10);
a vaporizing receptacle (41) for collecting the internal drained water drained from the drain head (33), the vaporizing receptacle (41) being disposed below the drain head (33) and having a face opposed to the side face (10A) of the storage cabinet body (10); and
a heater (60) for vaporizing the drained water;
characterized in that the vaporizing receptacle (41) being configured by a body member (42) and a reverse face plate (48), each being made with a metal plate, the reverse face plate (48) having a shallow dish shape and having an upper, a lower, a left and a right flange (49) standing around the peripheral edges thereof; wherein:

the vaporizing receptacle (41) includes a concavity (55) formed on the reverse face plate (48), the concavity (55) being configured to form an air layer (A) between the vaporizing receptacle (41) and the side face (10A) of the storage cabinet body (10) and the vaporizing receptacle (41), when assembled, has a box shape having a wide width and a narrow depth and an open top face,
wherein an attachment plate (50) is provided extending upwardly from a free edge of the upper flange (49) of the reverse face plate (48),
wherein a reverse face of the attachment plate (50) and free edges of the right, left, and lower flanges (49) are positioned in a same plane, and
wherein the attachment plate (50) has holes (53) which allow screws (52) to be inserted therethrough so as to be tightened in screw holes (82) provided in the side face (10A) of a storage cabinet body (10) and the attachment plate (50) has a notched clearance concavity (54) formed on the top edge of the attachment plate (50) and allowing the drain head (33) to be fitted therein and extending therethrough.

2. The cooling storage cabinet according to claim 1, wherein:

said upper, lower, left and right flange (49) is a thin peripheral wall disposed around the peripheral edges of the reverse face plate (48) opposed to the side face (10A) of the storage cabinet body (10); and
the concavity (55) is defined by an inner side of the peripheral wall.

3. The cooling storage cabinet according to claim 2, wherein:

the body member (42) has two opened faces, one of the opened face being a face opposed to the side face (10A) of the storage cabinet body (10) and another opened face being a top face, and
the flange (49) of the (3) being orthogonally bent toward the front surface side;
wherein:

the reverse face plate (48) is fitted in the opposed opened face of the body member (42), and the flange (49) is overlapped with the edge of the opening of the opposed face and is welded thereto, thereby a box shape having an opened top face is formed.

Patentansprüche

1. Kühllagerschrank, der umfasst:

einen Lagerschrankkörper (10) mit einer Seitenfläche (10A);

einen Ablaufkopf (33) zum Ablaufenlassen von internem Ablaufwasser einschließlich Abtauwasser nach außen, wobei der Ablaufkopf (33) von der Seitenfläche (10A) des Lagerschrankkörpers (10) vorsteht;
ein Verdunstungsgefäß (41) zum Sammeln des inneren Ablaufwassers, das von dem Ablaufkopf (33) abgeleitet wird, wobei das Verdunstungsgefäß (41) unterhalb des Ablaufkopfs (33) angeordnet ist und eine zu der Seitenfläche (10A) des Lagerschrankkörpers (10) entgegengesetzte Fläche hat; und
eine Heizung (60) zum Verdunsten des abgelaufenen Wassers;
dadurch gekennzeichnet, dass das Verdunstungsgefäß (41) durch ein Körperelement (42) und eine rückseitige Platte (48) aufgebaut ist, die jeweils mit einer Metallplatte hergestellt sind, wobei die rückseitige Platte (48) eine flache Schalenform hat und einen oberen, einen unteren, einen linken und einen rechten Flansch (49) hat, der um ihre Umfangsränder steht;
wobei:

das Verdunstungsgefäß (41) eine Höhlung (55) auf der rückseitigen Platte (48) ausgebildet hat, wobei die Höhlung (55) aufgebaut ist, um eine Luftschicht (A) zwischen dem Verdunstungsgefäß (41) und der Seitenfläche (10A) des Lagerschrankkörpers (10) zu bilden, und das Verdunstungsgefäß (41), wenn es montiert ist, eine Kastenform mit einer großen Breite und einer schmalen Tiefe und einer offenen oberen Seite hat,
wobei eine Befestigungsplatte (50) bereitgestellt ist, die sich von einem freien Rand des oberen Flansches (49) der rückseitigen Platte (48) nach oben erstreckt,
wobei eines rückseitige Fläche der Befestigungsplatte (50) und freie Ränder der rechten, linken und unteren Flansche (49) in einer gleichen Ebene positioniert sind, und
wobei die Befestigungsplatte (50) Löcher (53) hat, die zulassen, dass Schrauben (52) durch sie eingesetzt werden, um in Schraublöchern (82), die in der Seitenfläche (10A) des Lagerschrankbehälters (10) bereitgestellt sind, festgezogen zu werden, und die Befestigungsplatte (50) eine eingekerbte Zwischenraumhöhlung (54) hat, die auf dem oberen Rand der Befestigungsplatte (50) ausgebildet ist und zulässt, dass der Ablaufkopf (33) in sie eingepasst wird und sich durch sie erstreckt.

2. Kühllagerschrank nach Anspruch 1, wobei:

der obere, untere, linke und rechte Flansch (49) eine dünne Umfangswand ist, die um die Umfangsränder der rückseitigen Platte (48) herum entgegengesetzt zu der Seitenfläche (10A) des Lagerkastenkörpers (10) angeordnet ist; und
die Höhlung (55) durch eine Innenseite der Umfangswand definiert ist.

3. Kühllagerschrank nach Anspruch 2, wobei:

das Körperelement (42) zwei offene Flächen hat, wobei eine der offenen Flächen eine Fläche entgegengesetzt zu der Seitenfläche (10A) des Lagerschrankkörpers (10) ist und eine andere offene Fläche eine obere Fläche ist, und
der Flansch (49) der rückseitigen Platte (48) orthogonal in Richtung der Vorderflächenseite gekrümmt ist;
wobei:

die rückseitige Platte(48) in die entgegengesetzte offene Seite des Körperelements (42) eingepasst ist, und der Flansch (49) mit dem Rand der Öffnung der entgegengesetzten Fläche überlappt und daran geschweißt ist, wodurch eine Kastenform mit einer offenen oberen Fläche ausgebildet wird.

Revendications

1. Armoire de stockage réfrigérée comprenant :

un corps d'armoire de stockage (10) ayant une face latérale (10A) ;
une tête d'évacuation (33) pour évacuer de l'eau évacuée interne incluant de l'eau de décongélation vers l'extérieur, la tête d'évacuation (33) faisant saillie depuis la face latérale (10A) ; du corps d'armoire de stockage (10) ;
un réservoir d'évaporation (41) pour recueillir l'eau évacuée interne évacuée de la tête d'évacuation (33), le réservoir d'évaporation (41) étant disposé en dessous de la tête d'évacuation (33) et ayant une face opposée à la face latérale (10A) ; du corps d'armoire de stockage (10) ; et un élément chauffant (60) pour évaporer l'eau évacuée ;
caractérisée en ce que le réservoir d'évaporation (41) est configuré par un élément de corps (42) et une plaque de face inverse (48), chacun étant fabriqué avec une plaque métallique, la plaque de face inverse (48) ayant une forme de plat creux et ayant une bride supérieure, une bride inférieure, une bride gauche et une bride droite (49) s'érigeant autour des bords périphériques de celle-ci ;
dans laquelle :

le réservoir d'évaporation (41) inclut une concavité (55) formée sur la plaque de face inverse (48), la concavité (55) étant configurée pour former une couche d'air (A) entre le réservoir d'évaporation (41) et la face latérale (10A) du corps d'armoire de stockage (10), et le réservoir d'évaporation (41), lorsqu'il est assemblé, a une forme de boîte ayant une large largeur et une profondeur étroite et une face supérieure ouverte,
dans laquelle une plaque de connexion (50) est prévue s'étendant vers le haut depuis un bord libre de la bride supérieure (49) de la plaque de face inverse (48), dans laquelle une face inverse de la plaque de connexion (50) et des bords libres des brides droite, gauche et inférieure (49) sont positionnés dans un même plan, et
dans laquelle la plaque de connexion (50) a des orifices (53) qui permettent à des vis (52) d'être insérées à travers eux de manière à être serrées dans des orifices de vis (82) prévus dans la face latérale (10A) d'un corps d'armoire de stockage (10), et la plaque de connexion (50) a une concavité d'espace libre entaillée (54) formée sur le bord supérieur de la plaque de connexion (50) et permettant à la tête d'évacuation (33) d'être ajustée en son sein et s'étendant à travers elle.

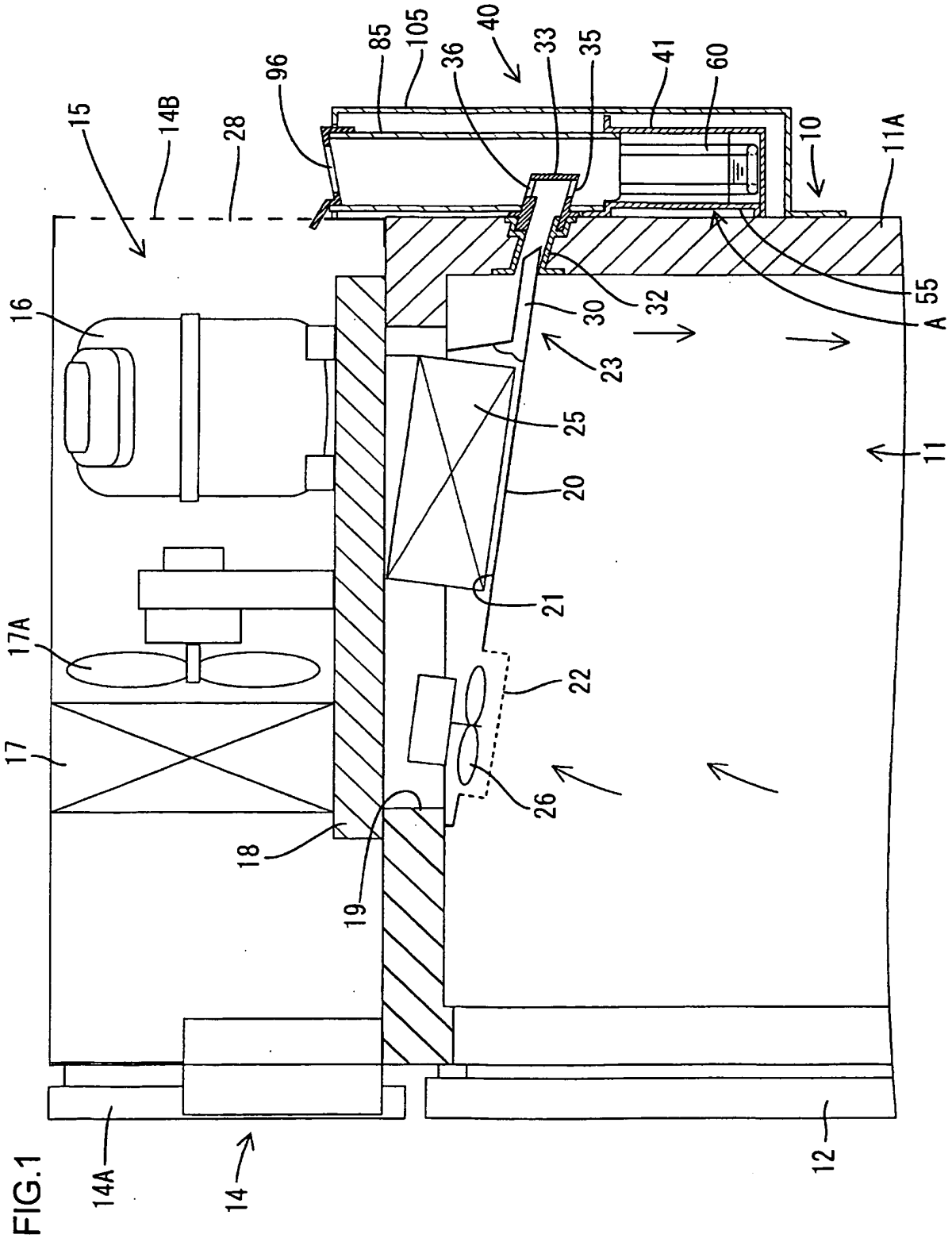
2. Armoire de stockage réfrigérée selon la revendication 1, dans laquelle :

ladite bride supérieure, inférieure, gauche et droite (49) est une fine paroi périphérique disposée autour des bords périphériques de la plaque de face inverse (48) opposée à la face latérale (10A) du corps d'armoire de stockage (10) ; et
la concavité (55) est définie par un côté interne de la paroi périphérique.

3. Armoire de stockage réfrigérée selon la revendication 2, dans laquelle :

l'élément de corps (42) a deux faces ouvertes, une de la face ouverte étant une face opposée à la face latérale (10A) ; du corps d'armoire de stockage (10) et une autre face ouverte étant une face supérieure, et
la bride (49) de la plaque de face inverse (48) étant pliée orthogonalement vers le côté de surface avant ;
dans laquelle :

la plaque de face inverse (48) est ajustée dans la face ouverte opposée de l'élément de corps (42), et la bride (49) est chevauchée avec le bord de l'ouverture de la face opposée et est soudée à celui-ci, une forme de boîte ayant une face supérieure ouverte est de ce fait formée.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11A
16
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32
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17A
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18
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14A
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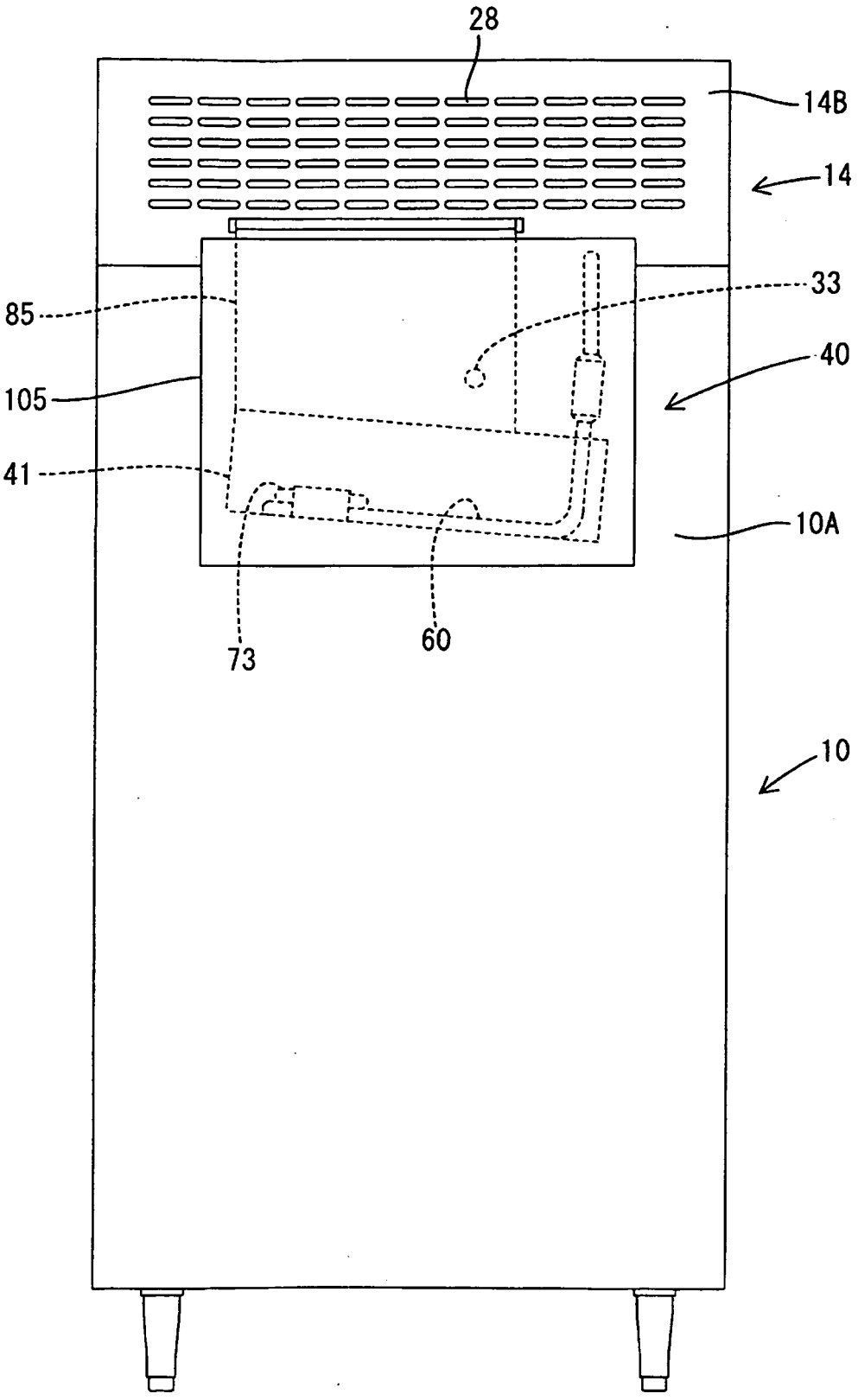
12

FIG.1

FIG.2



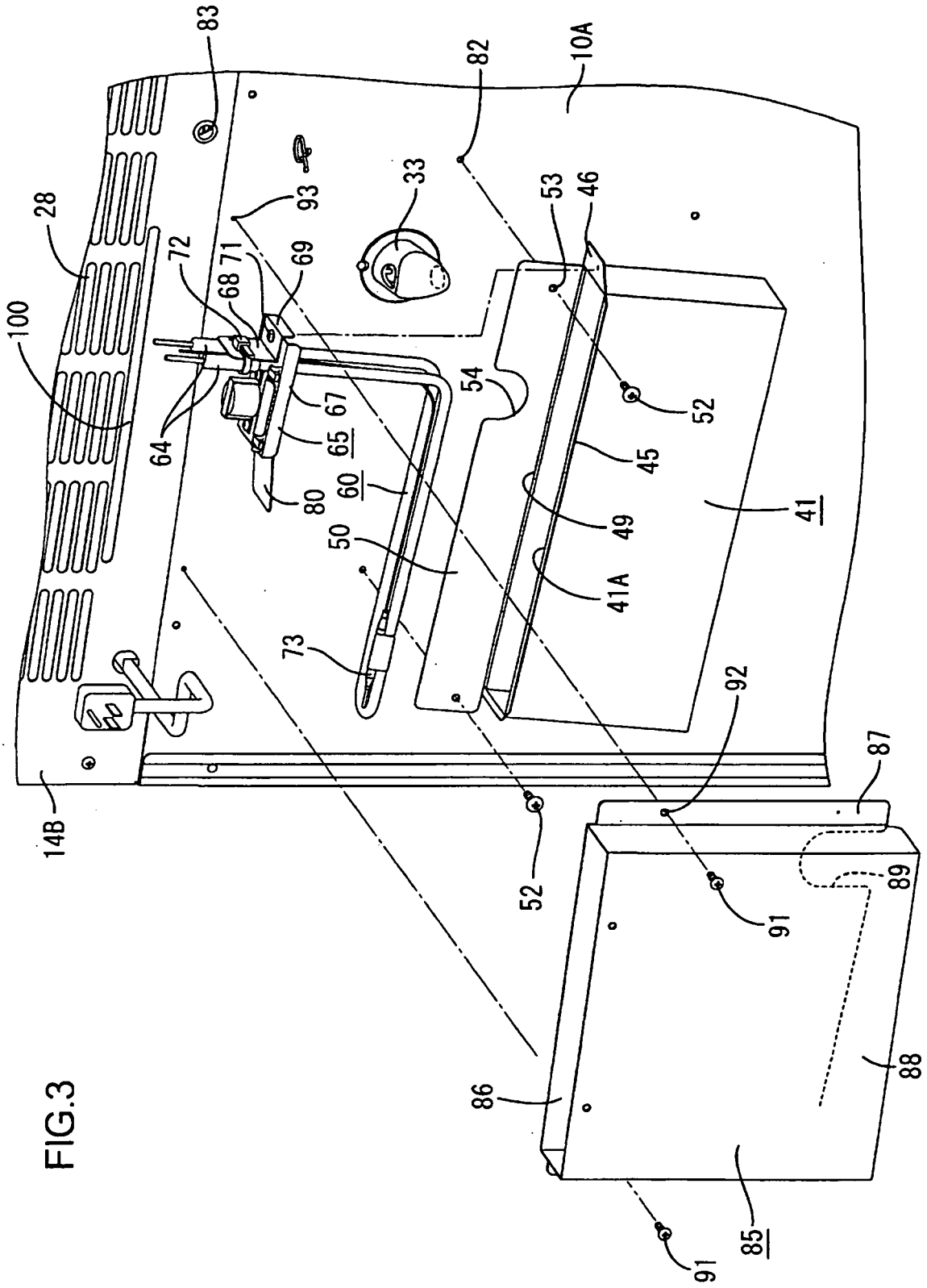

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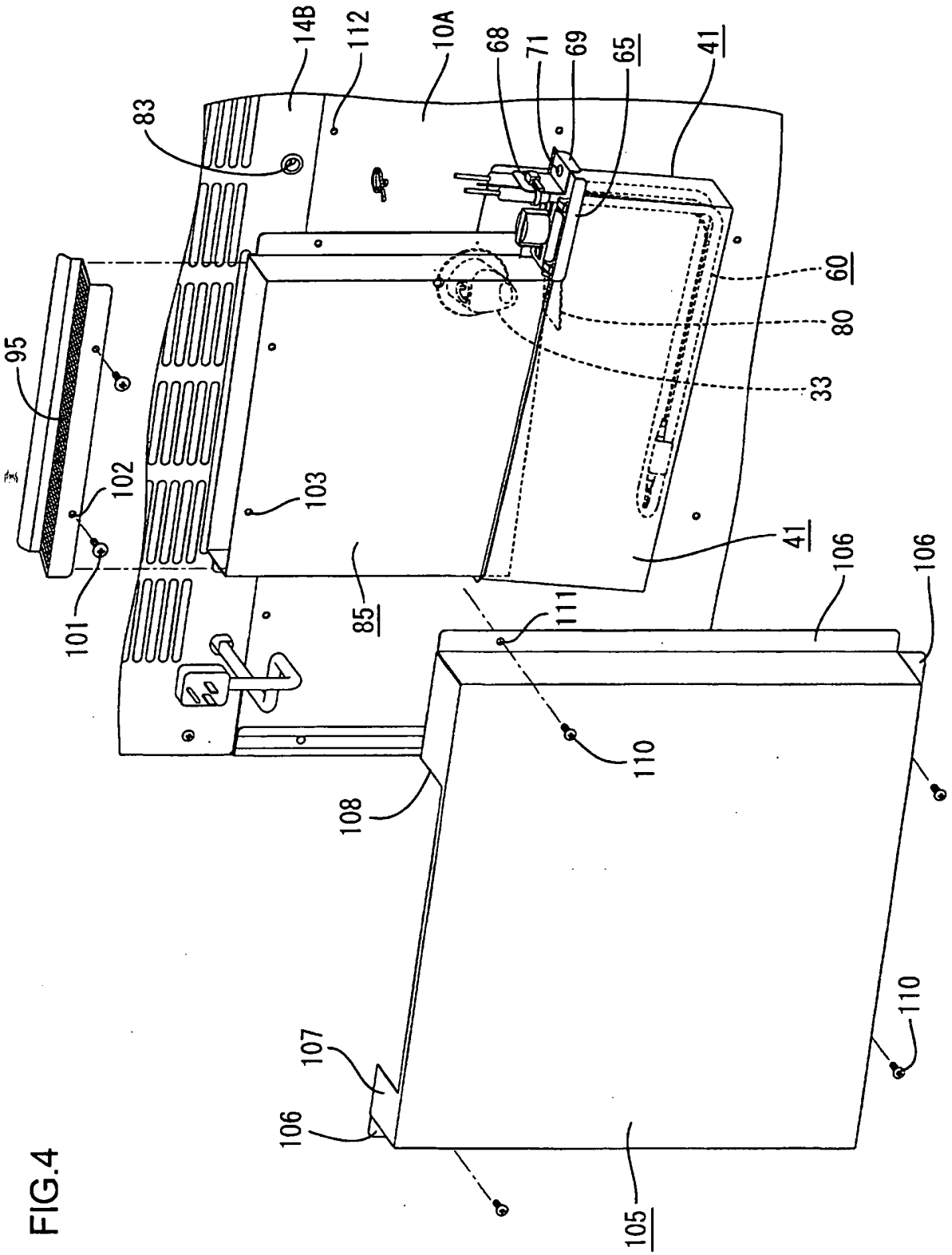
FIG.3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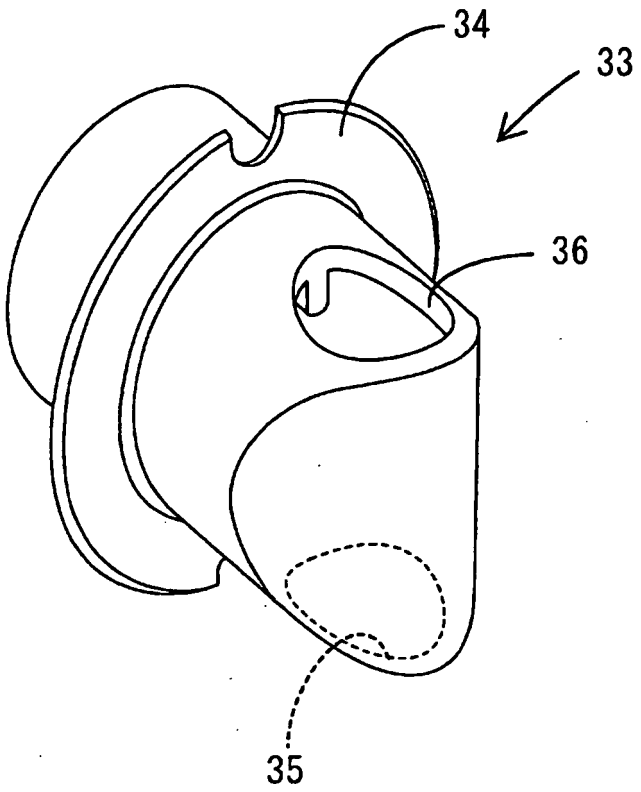
105

FIG.4

FIG.5



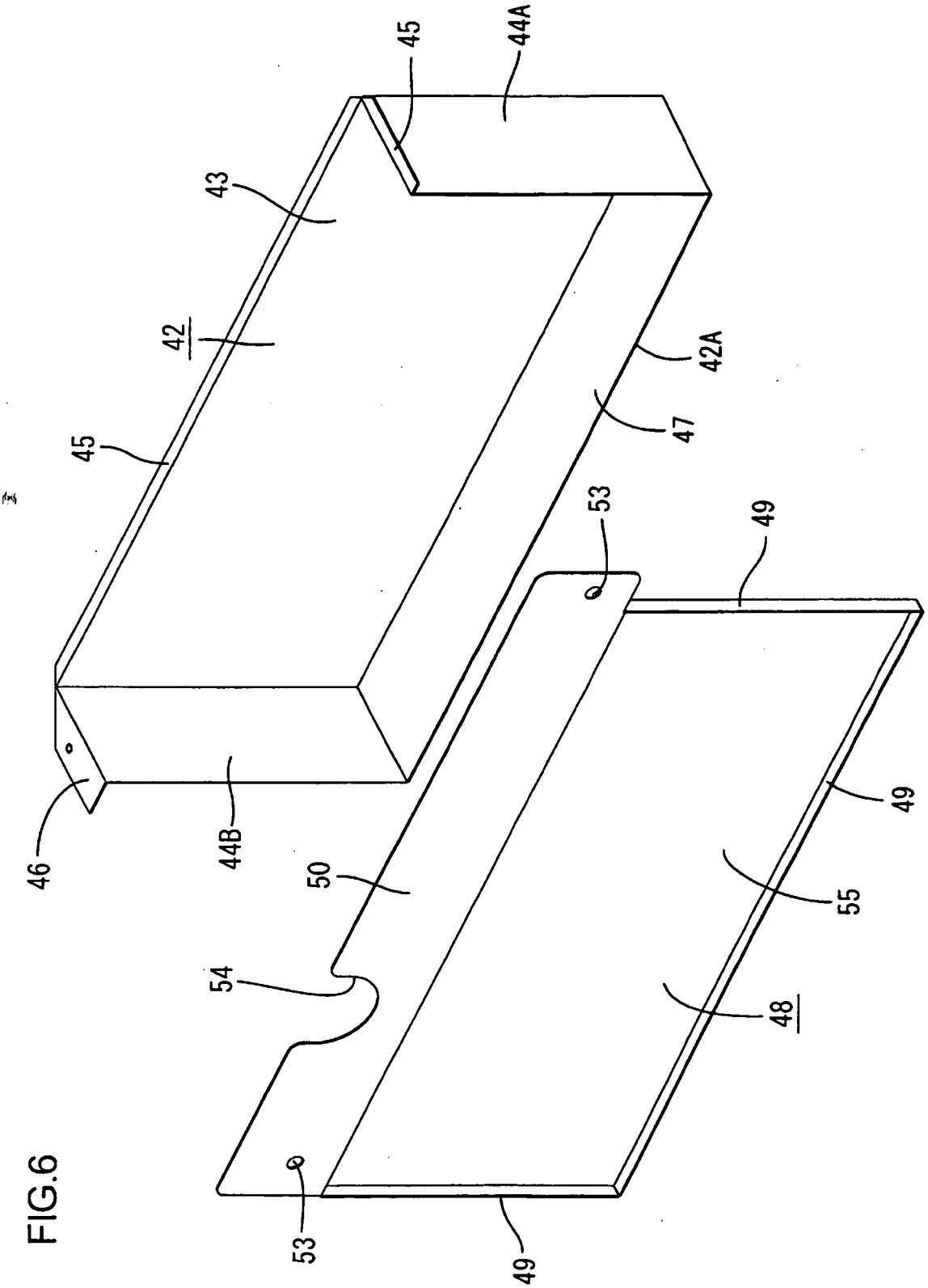


FIG.6

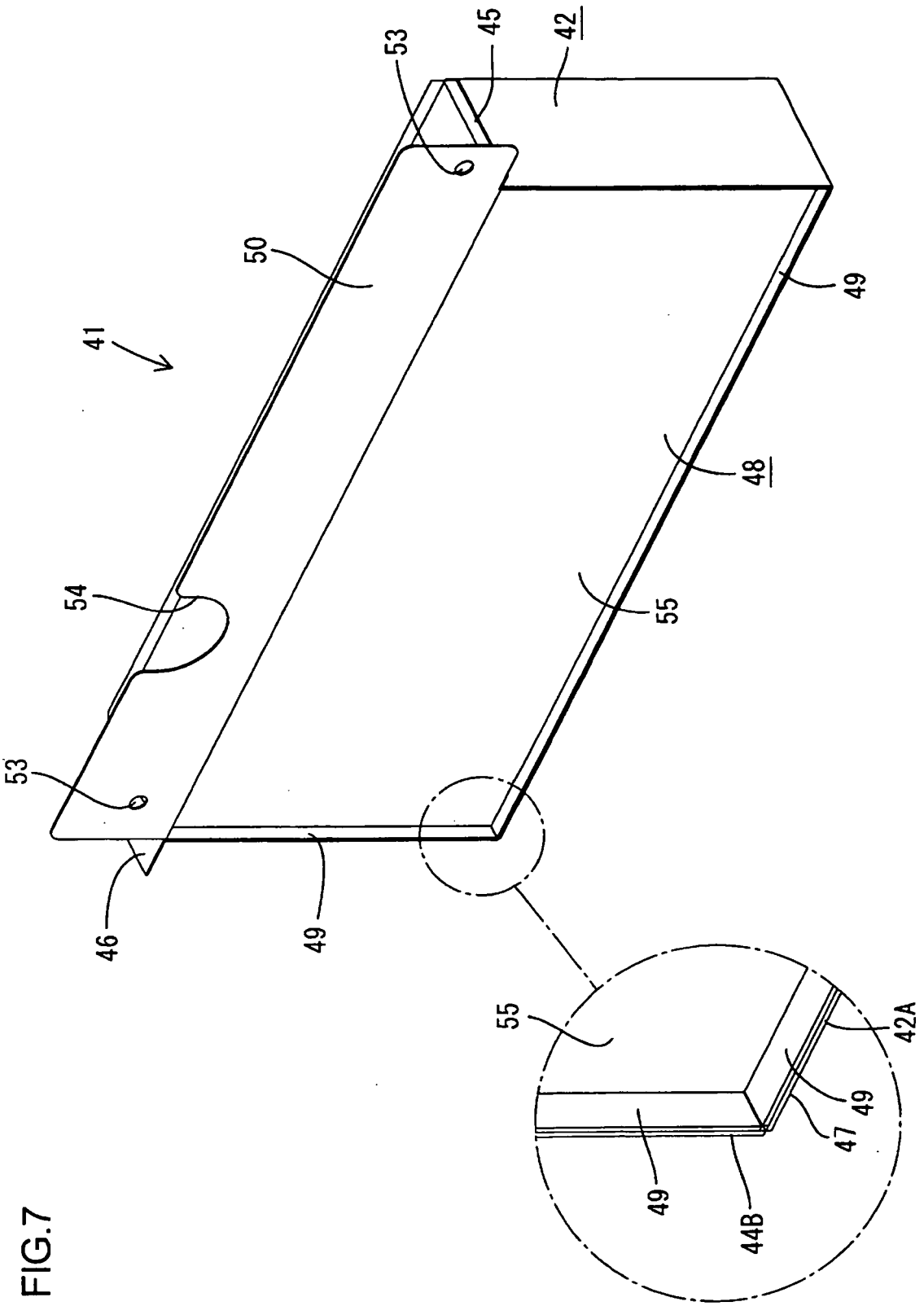


FIG.7

FIG.8

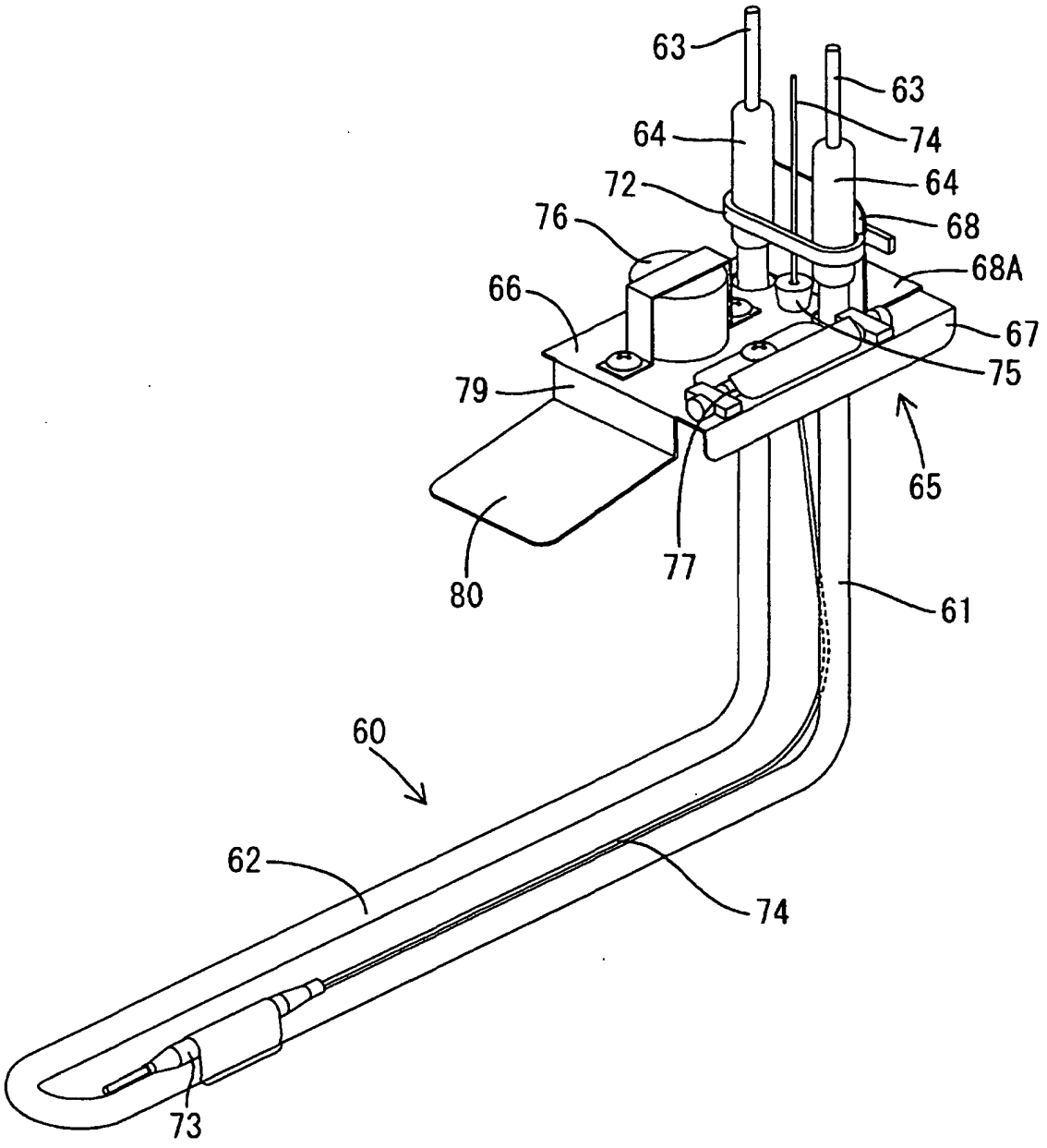
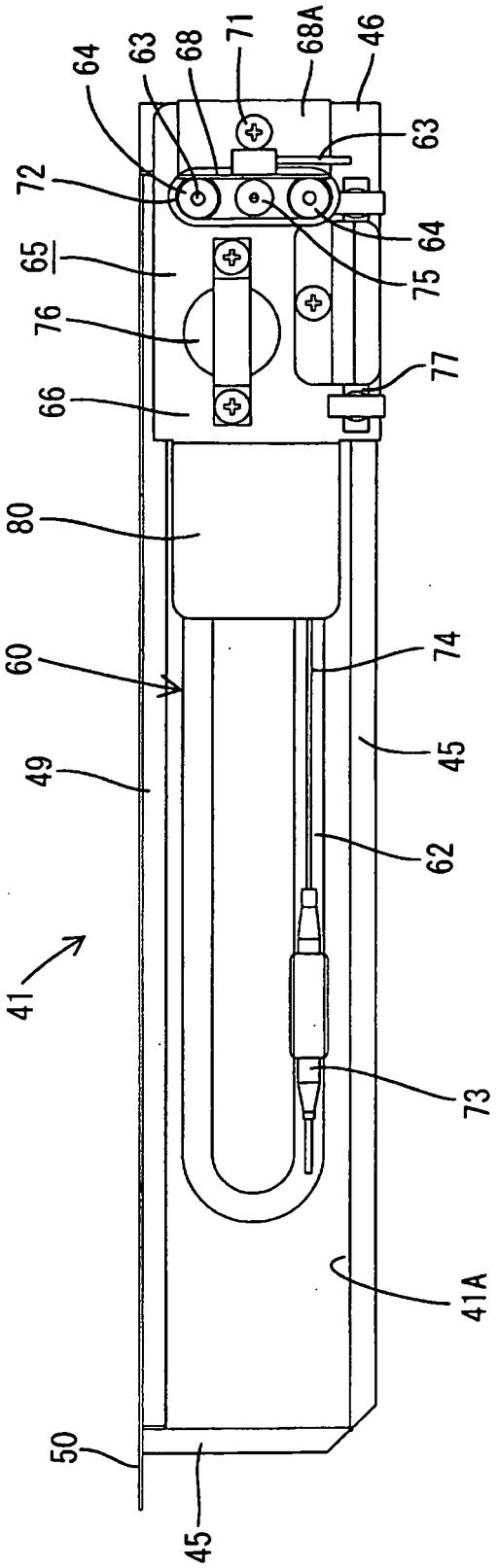


FIG.9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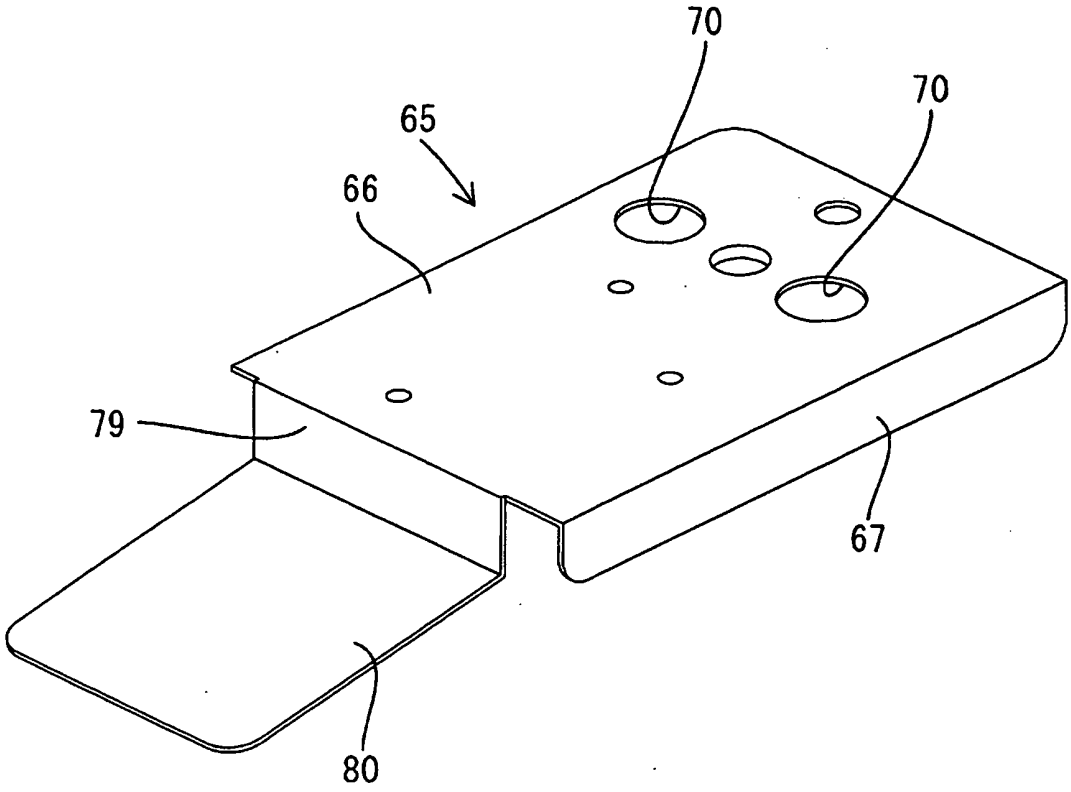
41A
50
45

FIG.10



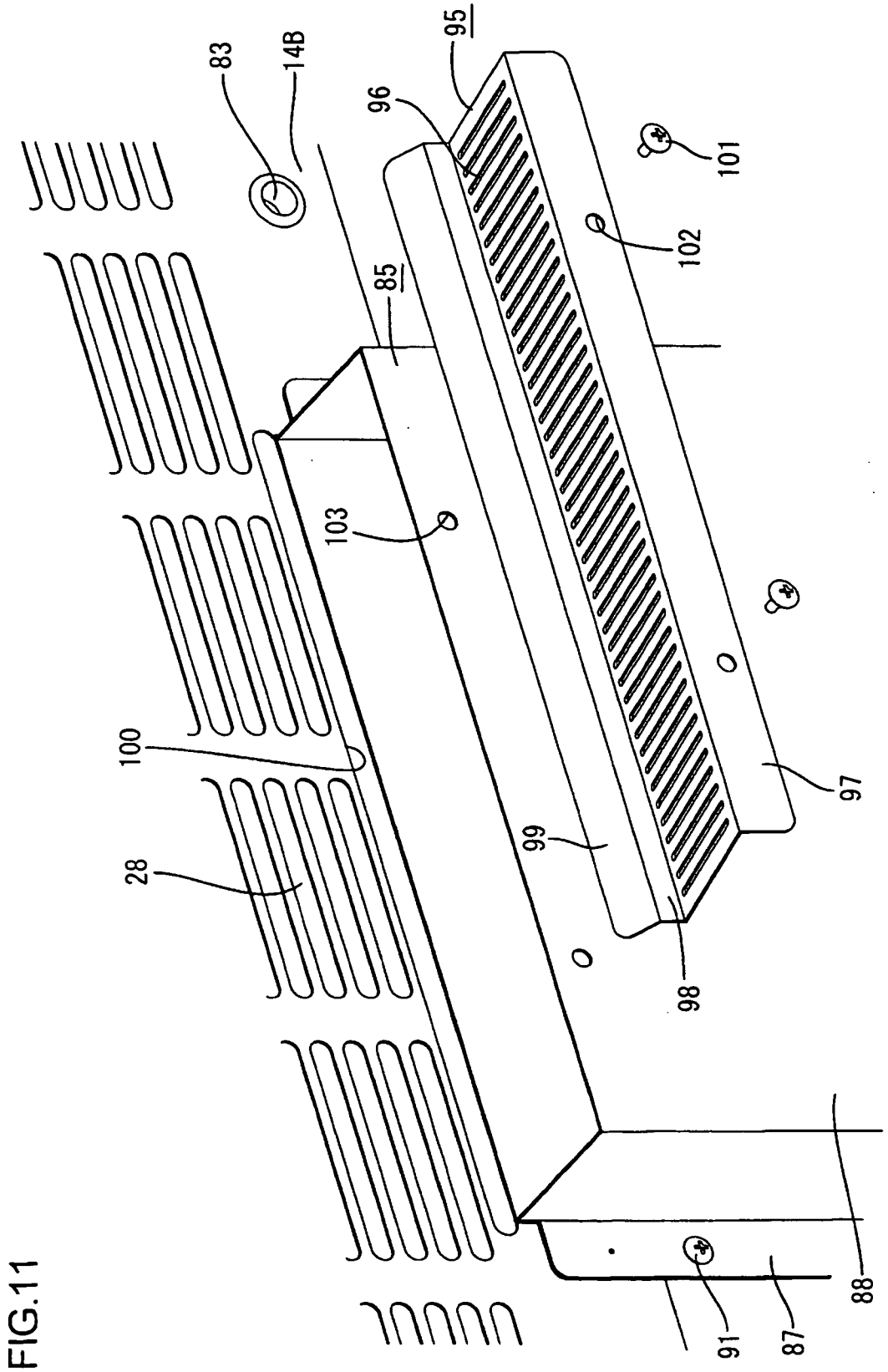
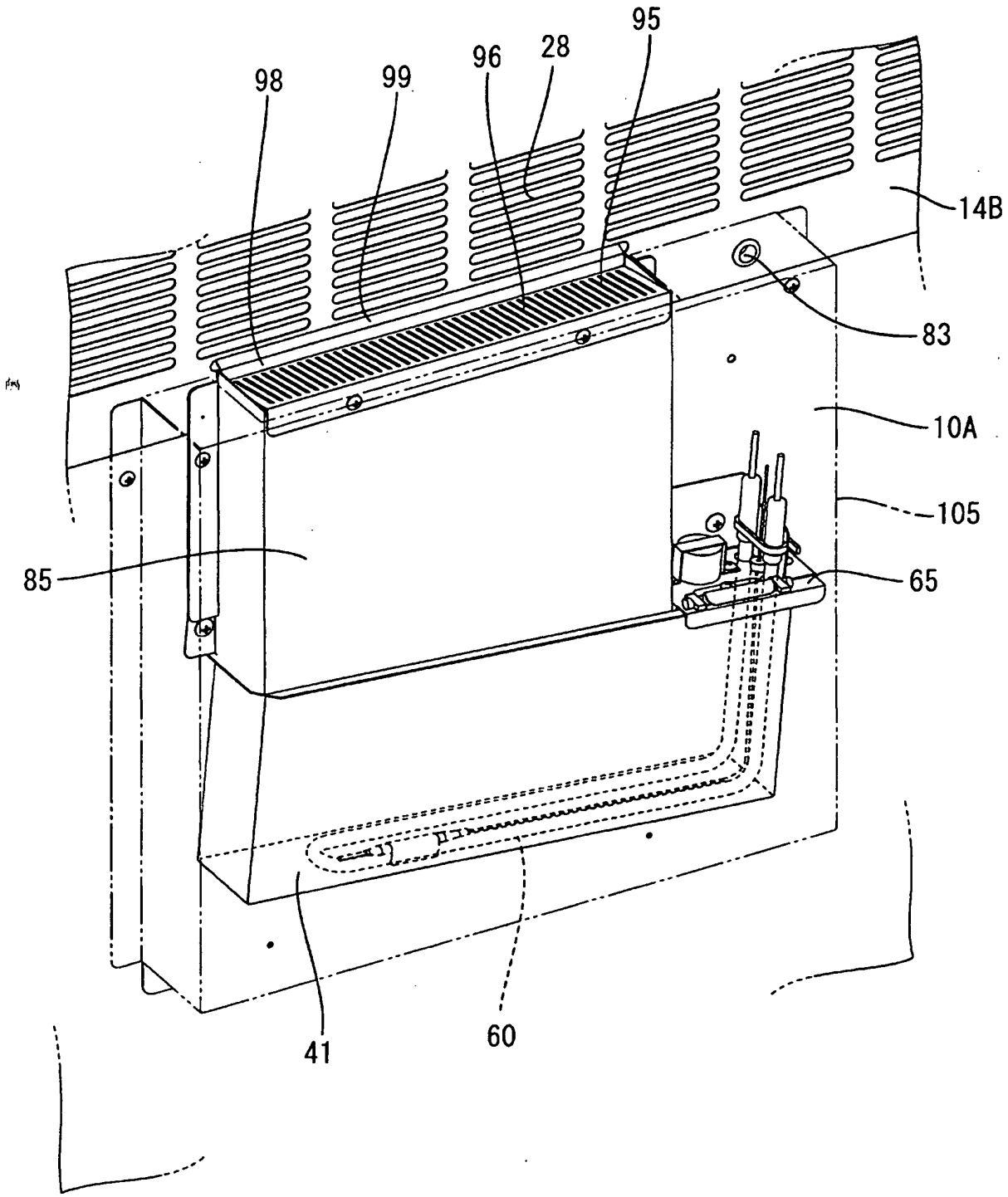


FIG.11

FIG.12



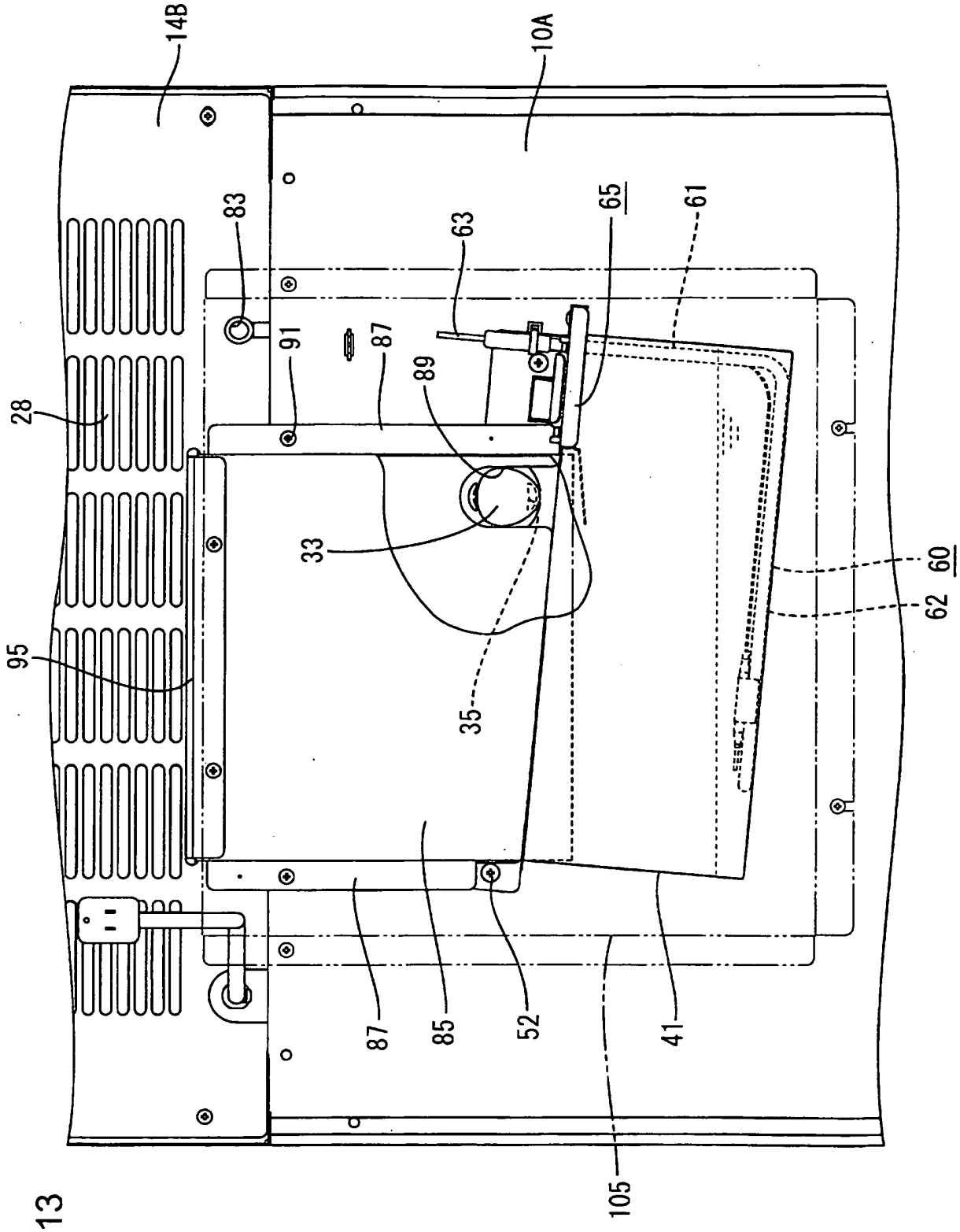
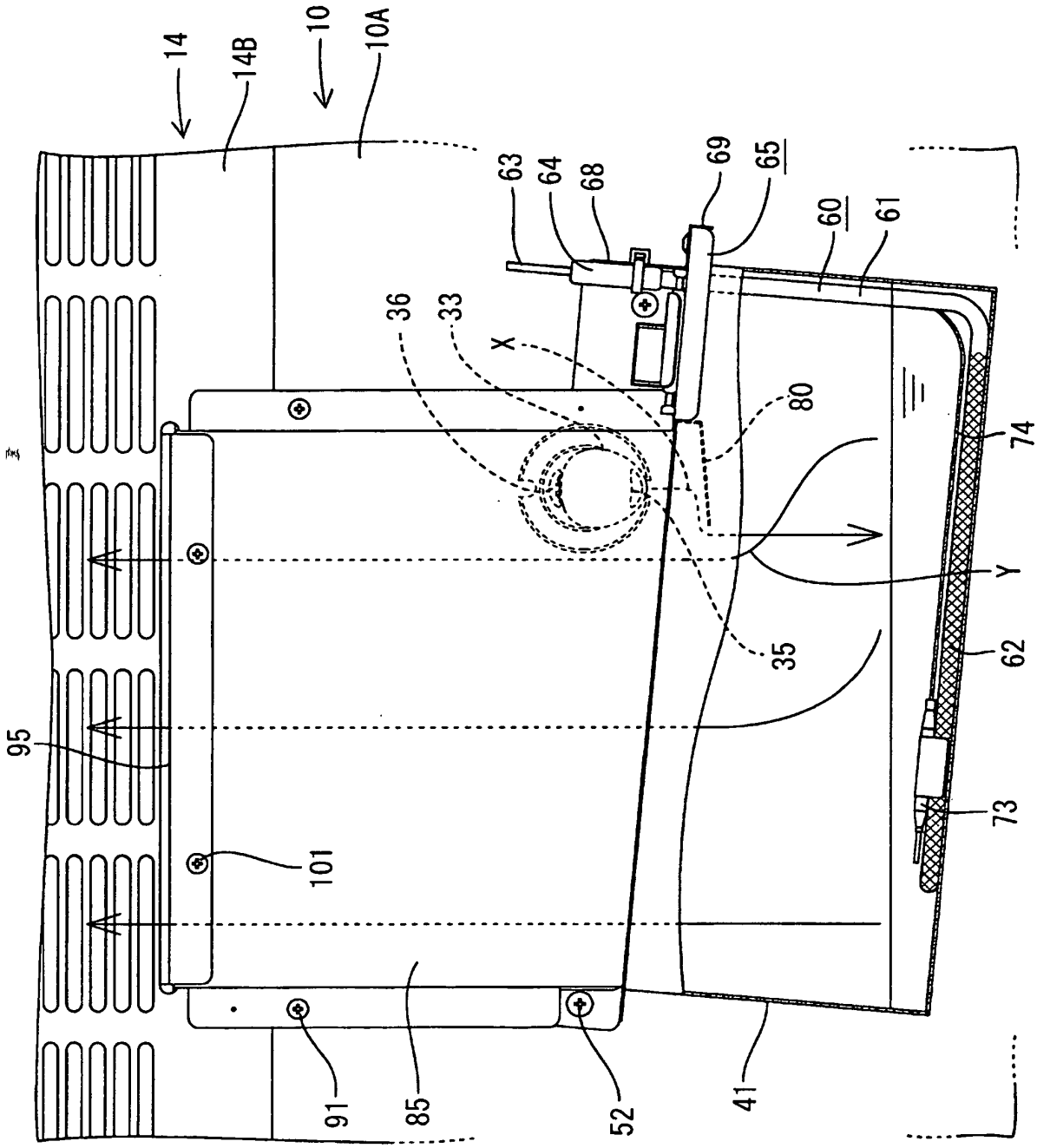


FIG.13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64
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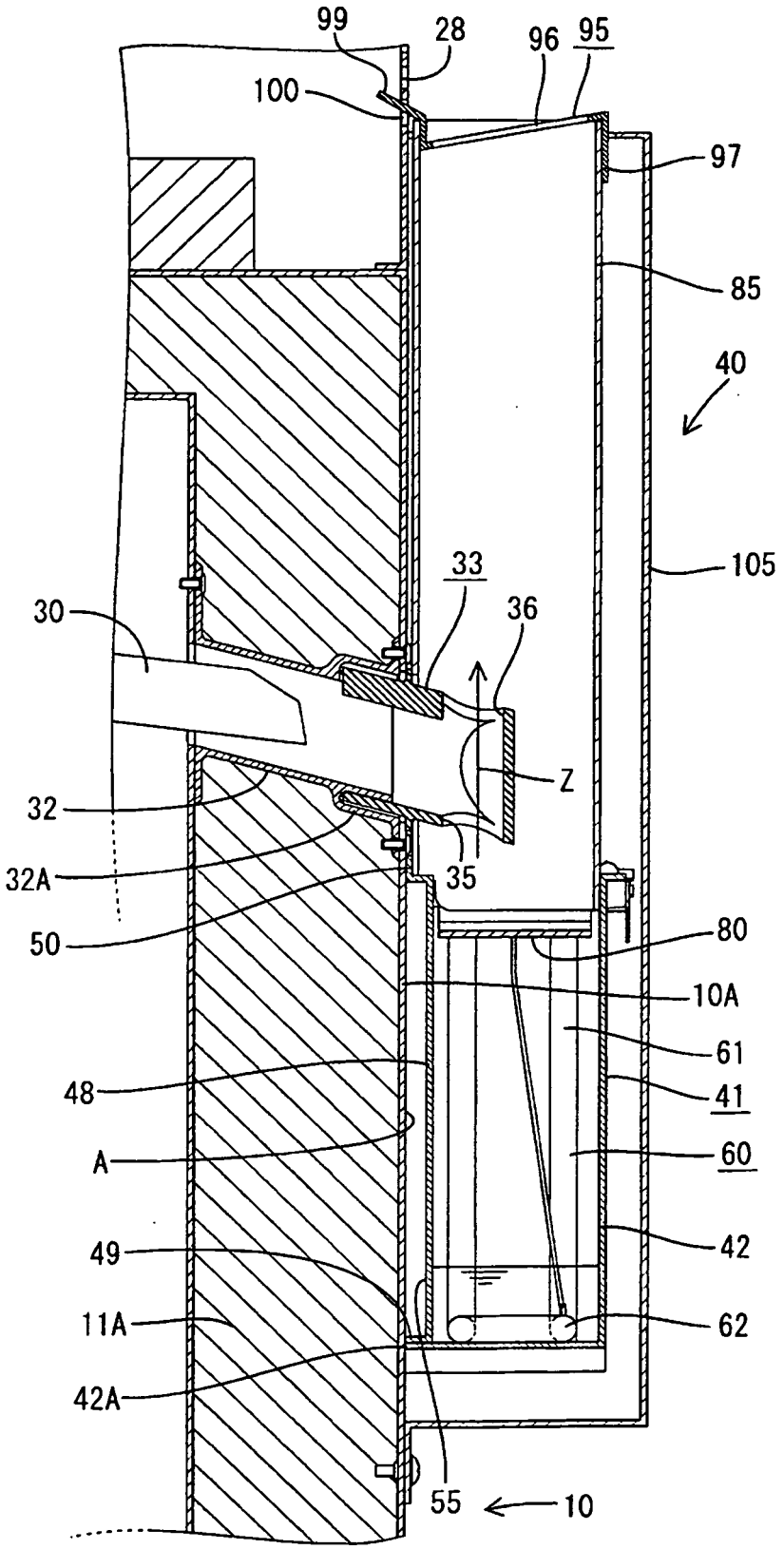
FIG.14

FIG.15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41
A
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42
49
62
11A
42A
55
10

REFERENCES CITED IN THE DESCRIPTION

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- JP 7049171 A **[0003]**