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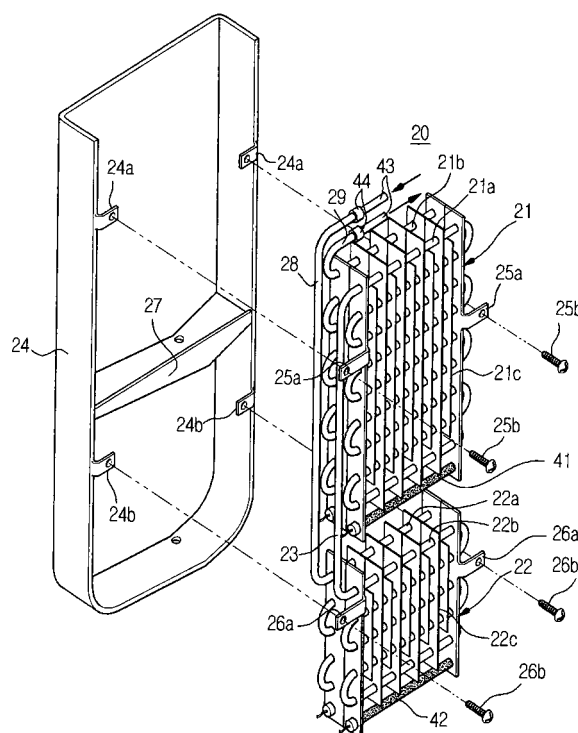
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(54) Refrigerator

(57) A refrigerator in which evaporators (20) for refrigerating a plurality of compartments (11,12) are integrally formed and pipes are easily connected with the evaporator (20). The refrigerator includes a main body (10) including a first compartment (11) disposed at an upper side thereof and a second compartment (12) disposed at a lower side thereof and separated from the first compartment (11), and an evaporator (20) in which a first refrigerating part (21) installed in the first compartment (11) is integrally connected with a second refrigerating part (22) installed in the second compartment (12) by a connection pipe (23). An inlet pipe and an outlet pipe of the evaporator (20) are disposed to one of the first refrigerating part (21) and the second refrigerating part (22), and the connection pipe (23) extends from the lower side of the second refrigerating part (22) and is connected with the upper side of the first refrigerating part (21).

Fig.2



Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates to a refrigerator. More particularly, to a refrigerator in which an evaporator for refrigerating a plurality of compartments is integrally formed such that the evaporator is easily installed.

2. Description of the Related Art

[0002] A conventional independent temperature controlled refrigerator, as disclosed in Korean Patent No. 10-234066, includes an evaporator for refrigerating a refrigerator compartment and an evaporator for refrigerating a freezer compartment. This enables easy control of temperatures of the freezer compartment and the refrigerator compartment using the evaporators.

[0003] When the evaporators are installed in the conventional refrigerator, the evaporator for the freezer compartment is installed at a rear side of the freezer compartment and the evaporator for the refrigerator compartment is installed at a rear side of the refrigerator compartment, and, afterwards, refrigerating pipes are connected to the respective evaporators. The pipes are connected to an inlet and an outlet of the evaporator for the freezer compartment at an inner rear side of the freezer compartment by welding and to an inlet and an outlet of the evaporator for the refrigerator compartment at an inner rear side of the refrigerator compartment by welding.

[0004] However, in the conventional refrigerator, since the evaporators must be independently installed in the freezer compartment and the refrigerator compartment during manufacture, the installation of the evaporators is troublesome and complicated. Particularly, since, when installing the evaporators, a worker must connect the pipes to the freezer compartment and, afterwards, must connect the pipes to the refrigerator compartment, the installation of the evaporators is difficult.

[0005] Moreover, in the conventional refrigerator, the pipes of the evaporator for the refrigerator compartment and the evaporator for the freezer compartment are connected in series so that refrigerant, passed through one of the evaporators, flows to the other of the evaporators. Additionally, defrosting heaters for defrosting the evaporators are installed in the lower sides of the evaporators.

[0006] However, in the conventional refrigerator, hot refrigerant in the lower evaporator flows toward the upper evaporator due to thermosyphoning when the evaporator positioned in the lower side thereof is defrosted, is defrosted thereby heating the upper evaporator. Due to this phenomenon, the upper evaporator is unnecessarily heated and heating of the lower evaporator is delayed thereby elongating heating time.

SUMMARY OF THE INVENTION

[0007] Accordingly, it is an aspect of the present invention to provide a refrigerator in which evaporators refrigerating a plurality of compartments are integrally formed so that the evaporators are easily installed.

[0008] Additional aspects and/or advantages of the invention will be set forth in part in the description which follows and, in part, will be apparent from the description, or may be learned by practice of the invention.

[0009] It is another aspect of the invention to provide a refrigerator in which pipes are easily connected to evaporators.

[0010] It is still another aspect of the invention to provide a refrigerator in which, when defrosting is performed in one of evaporators of compartments, heat transfer from one evaporator to the other evaporator is minimized such that defrosting time is reduced and energy is conserved.

[0011] These and/or other aspects of the present invention provides a refrigerator including a main body including a first compartment disposed at an upper side thereof and a second compartment disposed at a lower side thereof, and an evaporator including a first refrigerating part to refrigerate the first compartment integrally connected with a second refrigerating part to refrigerate the second compartment via a connection pipe, wherein the connection pipe connects an upper side of the first refrigerating part with the second refrigerating part.

[0012] The connection pipe is connected with the upper side of the second refrigerating part.

[0013] The first refrigerating part, the second refrigerating part and the connection pipe form a single pipe.

[0014] The first refrigerating part of the evaporator is spaced apart from the second refrigerating part of the evaporator.

[0015] The evaporator includes a housing to accommodate and support the first refrigerating part and the second refrigerating part, and a defrost water tray to partition an inside of the housing between the first refrigerating part and the second refrigerating part and to discharge defrost water flowed down from the first refrigerating part.

[0016] The evaporator further includes a first defrosting heater installed to a lower side of the first refrigerating part, and a second defrosting heater installed to a lower side of the second refrigerating part.

[0017] It is another aspect of the present invention to provide a refrigerator including a main body including a first compartment and a second compartment separated from the first compartment, and an evaporator including a first refrigerating part installed in the first compartment integrally formed with a second refrigerating part installed in the second compartment, wherein an inlet pipe and an outlet pipe of the evaporator are disposed to one of the first refrigerating part and the second refrigerating part.

[0018] It is yet another aspect of the present invention to provide a refrigerator including a main body including

a first compartment disposed at an upper side thereof and a second compartment disposed at a lower side thereof and separated from the first compartment, and an evaporator including a first refrigerating part installed in the first compartment and a second compartment installed in the second compartment integrally connected with each other by a connection pipe, wherein an inlet pipe and an outlet pipe of the evaporator are disposed to one of the first refrigerating part and the second refrigerating part, and the connection pipe extends from a lower side of the second refrigerating part and is connected with an upper side of the first refrigerating part.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019] These and/or other aspects and advantages of the invention will become apparent and more readily appreciated from the following description of the embodiments, taken in conjunction with the accompanying drawings of which:

FIG. 1 is a sectional view illustrating a refrigerator according to an embodiment of the present invention;

FIG. 2 is an exploded perspective view illustrating an evaporator of the refrigerator shown in FIG. 1;

FIG. 3 illustrating a piping diagram of the evaporator of the refrigerator shown in FIG. 2; and

FIG. 4 illustrating a piping diagram of an evaporator of a refrigerator according to another embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0020] Reference will now be made in detail to the embodiments of the present invention, examples of which are illustrated in the accompanying drawings, wherein like reference numerals refer to the like elements throughout. The embodiments are described below to explain the present invention by referring to the figures.

[0021] As shown in FIG. 1, a refrigerator according to an embodiment of the present invention comprises a main body 10 having first compartment 11 and a second compartment 12 divided by an intermediate partition 13. The refrigerator also includes a first door 14 coupled with the main body 10 to open and close the first compartment 11, and a second door 15 coupled with the main body 10 to open and close the second compartment 12.

[0022] At rear sides of the first compartment 11 and the second compartment 12, an evaporator 20 comprising a first refrigerating part 21 to refrigerate the first compartment 11 and a second refrigerating part 22 to refrigerate the second compartment 12 are integrally formed with each other, and a first circulation fan 31 and a second circulation fan 32 to circulate chilled air in the first and second compartments 11 and 12, respectively, are installed.

[0023] A chilled air passage 35 is formed at a rear side of the first compartment 11 to guide chilled air to the first compartment 11 and a first duct 33 and a second duct 34 respectively comprising chilled air discharge holes 33a and 34a are formed. The second duct 34 covers a front side of the first refrigerating part 21 of the evaporator 20 and comprises an inlet hole 34b, formed in a lower side thereof, through which air is introduced to the first refrigerating part 21. At the rear side of the second compartment 12, a third duct 36 is installed to cover a front side of the second refrigerating part 22 of the evaporator 20, wherein the third duct 36 comprises a chilled air supply passage 36a to guide chilled air to the second compartment 12 and an inlet hole 36b through which air is introduced from the second compartment 12 to the second refrigerating part 22. The circulation fan 32 is installed in the chilled air supply passage 36a of the third duct 36 to blow the chilled air to the second compartment 12.

[0024] The evaporator 20, as shown in FIG. 2, is structured such that the first refrigerating part 21 disposed to the first compartment 11 is spaced apart from the second refrigerating part 22 disposed to the second compartment 12 and the first refrigerating part 21 and the second refrigerating part 22 are integrally connected with each other by a connection pipe 23. The evaporator 20 comprises a housing 24 to accommodate and support the first refrigerating part 21 and the second refrigerating part 22.

[0025] The housing 24 encloses rear sides and lateral sides of the first and second refrigerating parts 21 and 22 and a lower side of the second refrigerating part 22. The first and second refrigerating parts 21 and 22 are fixed in the housing 24 such that fixtures 25a formed at the lateral sides of the first refrigerating part 21 are fixed to fixtures 24a formed at upper lateral sides of the housing 24 by fixing screws 25b, and fixtures 26a formed at the lateral sides of the second refrigerating part 22 are fixed to fixtures 24b formed at lower lateral sides of the housing 24 by fixing screws 26b. Thus, the first and second refrigerating parts 21 and 22 are securely fixed in and supported by the housing 24. Through this coupling, an integral evaporator is completed.

[0026] The evaporator 20 comprises a first defrosting heater 41 installed in a lower side of the first refrigerating part 21 and a second defrosting heater 42 installed in a lower side of the second refrigerating part 22 such that the first defrosting heater 41 heats the first refrigerating part 21 to remove frost on the first refrigerating part 21, and the second defrosting heater 42 heats the second refrigerating part 22 to remove frost on the second refrigerating part 22.

[0027] Moreover, the evaporator 20 comprises a defrost water tray 27 installed in the housing 24 to partition an inside of the housing 24 between the first refrigerating part 21 and the second refrigerating part 22, and to discharge defrost water flowed down from the first refrigerating part 21. The defrost water tray 27, as shown in FIG. 1, partitions the space between the first compartment 11

and the second compartment 12 when the evaporator 20 is installed in the main body 10 so as to block air flow between the first compartment 11 and the second compartment 12.

[0028] FIG. 3 illustrates pipe arrangement of the evaporator 20 of the refrigerator shown in FIG. 1. In FIG. 3, the first refrigerating part 21 comprises a right-sided first circulation part 21 a and a left-sided second circulation part 21 b, lower sides of which are connected with each other, and the second refrigerating part 22 comprises a left-sided first circulation part 22a and a right-sided second circulation part 22b, lower sides of which are connected with each other. Ends of a connection pipe 23 are connected with an upper side of the first circulation part 21 a of the first refrigerating part 21 and an upper side of the second circulation part 22b of the second refrigerating part 22, respectively. An inlet pipe 28 (also shown in FIG. 2) extends from the upper side of the first refrigerating part 21 to the second refrigerating part 22 and is connected with the upper side of the first circulation part 22a. An outlet pipe 29 is connected with the upper side of the second circulation part 21 b of the first refrigerating part 21. By doing so, refrigerant introduced through the inlet pipe 28 sequentially passes through the first circulation part 22a of the second refrigerating part 22, the second circulation part 22b of the second refrigerating part 22, the connection pipe 23, the first circulation part 21 a of the first refrigerating part 21, and the second circulation part 21 b of the first refrigerating part 21, and then flows through the outlet pipe 29.

[0029] When manufacturing the evaporator 20, a single long pipe is bent without seams as shown in FIG. 3 and cooling fins 21c and 22c are installed on the pipe, and then the bent pipe is folded about a folding line "A" such that the first circulation parts 21 a and 22a and the second circulation parts 21 b and 22b of the first and second refrigerating parts 21 and 22 are overlapped. That is, the first circulation part 21 a of the first refrigerating part 21 is overlapped with the second circulation part 21 b of the first refrigerating part 21 and the second circulation part 22b of the second refrigerating part 22 is overlapped with the first circulation part 22a of the second refrigerating part 22. By doing so, the evaporator 20 is formed as shown in FIG. 2.

[0030] The evaporator 20 is installed in the main body 10, as shown in FIG. 1, such that the first refrigerating part 21 is disposed at the rear side of the first compartment 11 and the second refrigerating part 22 is disposed at the rear side of the second compartment 12, and the second duct 34 is coupled with the third duct 36 so as to cover the evaporator 20. The intermediate partition 13 for partitioning the space between the first compartment 11 and the second compartment 12 is separated from the main body 10 and is coupled with the main body 10 after installation of the evaporator 20 and the second and third ducts 34 and 36. The intermediate partition 13 is separated so that the evaporator 20 is easily installed. Although the evaporator 20 is firstly installed and the sec-

ond and third ducts 34 and 36 are installed, the evaporator 20 may be installed in the main body 10 after being coupled with the second and third ducts 34 and 36.

[0031] After the installation of the evaporator 20 in the main body 10, the inlet pipe 28 and the outlet pipe 29 of the evaporator 20 are connected with pipes 43. Since the inlet pipe 28 and the outlet pipe 29 of the evaporator 20 of the present invention, as shown in FIG. 3, are positioned at the upper side of the first refrigerating part 21, the pipes 43 are easily connected. Since the connection of the pipes (i.e., the inlet pipe 28 and the outlet pipe 29 to respective pipes 43) is performed only in the space of the first compartment 11 when connecting the pipes 43, the evaporator 20 is easily installed and time for the connection of the pipes is also reduced. The pipes 43 are connected by a welding process using connectors 44.

[0032] FIG. 4 shows the arrangement of the inlet pipe 28 and the outlet pipe 29 according to another preferred embodiment of the present invention. Differing from FIG. 3, an inlet pipe 51 is disposed to the second refrigerating part 22 and an outlet pipe 52 is extended from the first refrigerating part 21 to the second refrigerating part 22. This arrangement is an alternative, whereby the connection of the pipes is performed in a space of the second refrigerating part 12.

[0033] Moreover, since the evaporator 20, as shown in FIG. 3, is installed such that the upper end of the connection pipe 23 is connected with the upper side of the first circulation part 21 a of the first refrigerating part 21 and the lower end of the connection pipe 23 is connected to the upper side of the second circulation part 22b of the second refrigerating part 22, heat transfer from the second refrigerating part 22 to the first refrigerating part 21 is minimized when defrosting is performed so that defrosting is rapidly carried out.

[0034] The upper end of the connection pipe 23 is connected with the upper side of the first refrigerating part 21 such that hot refrigerant of the second refrigerating part 22 is prevented from flowing toward the first refrigerating part 21 due to thermosyphoning. That is, when defrosting the second refrigerating part 22, refrigerant in the first refrigerating part 21 remains in the condensed state and does not flow toward the lower second refrigerating part 22.

[0035] Therefore, when defrosting the second refrigerating part 22, the second refrigerating part 22 is rapidly heated such that the defrosting time can be reduced and the problem that temperature of the compartment is unnecessarily raised due to the reduction of the defrosting time during the defrosting is minimized. Therefore, energy loss can be reduced. Since, when defrosting the first refrigerating part 21, the hot refrigerant in the first refrigerating part 21 cannot flow toward the lower second refrigerating part 22, heat transfer between the first and second refrigerating parts does not occur.

[0036] As described above, since the refrigerator of the present invention includes an evaporator in which the first refrigerating part for refrigerating the first compart-

ment and the second refrigerating part for refrigerating the second compartment are integrally connected with each other, the evaporator can be completely installed in the refrigerator by installing a single evaporator set in the refrigerator when manufacturing the refrigerator. Particularly, the connection of the pipes for the installation of the evaporator can be minimized so that the evaporator can be rapidly and easily installed.

[0037] Moreover, according to the refrigerator of the present invention, since the inlet pipe and the outlet pipe of the evaporator are disposed to one of the first refrigerating part and the second refrigerating part, the connection of the pipes is performed in only one of the compartments so that the pipes are easily connected.

[0038] Additionally, since the connection pipe for connecting the upper first refrigerating part to the lower second refrigerating part extends from the second refrigerating part to the upper side of the first refrigerating part, heat transfer between the first refrigerating part and the second refrigerating part is prevented. Thus, when defrosting the second refrigerating part, the second refrigerating part is rapidly heated to reduce the defrosting time, and due to the reduction of the defrosting time, the problem that temperature of the compartments is raised during the defrosting is minimized and energy loss can be reduced.

[0039] Although a few embodiments of the present invention have been shown and described, it would be appreciated by those skilled in the art that changes may be made in this embodiment without departing from the principles and spirit of the invention, the scope of which is defined in the claims and their equivalents.

Claims

1. A refrigerator comprising:

a main body comprising a first compartment disposed at an upper side thereof and a second compartment disposed at a lower side thereof; and

an evaporator comprising a first refrigerating part to refrigerate the first compartment and a second refrigerating part to refrigerate the second compartment are integrally connected with each other by a connection pipe;

wherein the connection pipe connects an upper side of the first refrigerating part with the second refrigerating part.

2. The refrigerator according to claim 1, wherein the connection pipe is connected with an upper side of the second refrigerating part.

3. The refrigerator according to claim 2, wherein the first refrigerating part, the second refrigerating part

and the connection pipe form a single pipe.

4. The refrigerator according to claim 3, wherein the first refrigerating part of the evaporator is spaced apart from the second refrigerating part of the evaporator.

5. The refrigerator according to claim 4, wherein the evaporator comprises:

a housing to accommodate and to support the first refrigerating part and the second refrigerating part; and

a defrost water tray to partition an inside of the housing between the first refrigerating part and the second refrigerating part and to discharge defrost water flowed down from the first refrigerating part.

6. The refrigerator according to claim 5, wherein the evaporator further comprises:

a first defrosting heater installed to a lower side of the first refrigerating part to defrost the first refrigerating part; and

a second defrosting heater installed to a lower side of the second refrigerating part to defrost the second refrigerating part.

7. A refrigerator comprising:

a main body comprising a first compartment and a second compartment separated from the first compartment; and

an evaporator comprising a first refrigerating part installed in the first compartment and a second refrigerating part installed in the second compartment which are integrally combined with each other, and an inlet pipe and an outlet pipe which are disposed to one of the first refrigerating part and the second refrigerating part.

8. A refrigerator comprising:

a main body comprising a first compartment disposed at an upper side thereof and a second compartment disposed at a lower side thereof and separated from the first compartment; and an evaporator comprising a first refrigerating part installed in the first compartment and a second refrigerating part installed in the second compartment integrally combined with each other by a connection pipe, and an inlet pipe and an outlet pipe which are disposed to one of the first refrigerating part and the second refrigerating part, and the connection pipe extends from a lower side of the second refrigerating part and is connected with an upper side of the first re-

frigerating part.

9. A refrigerator comprising:

a first compartment and a second compartment 5
to store food therein; and
a first refrigerating part and a second refrigerat-
ing part respectively corresponding to the first
compartment and the second compartment, and 10
to refrigerate the first and second compart-
ments; and
a connection pipe to integrally combine an upper
side of the first refrigerating part to the second
refrigerating part.

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10. The refrigerator of claim 9, further comprising:

an inlet pipe and an outlet pipe formed in one of
the first refrigerating part and the second refrig-
erating part. 20

11. The refrigerator of claim 10, wherein the inlet pipe is
disposed to the second refrigerating part and the out-
let pipe extends from the first refrigerating part to the
second refrigerating part. 25

12. The refrigerator of claim 10, wherein the inlet pipe is
disposed to the first refrigerating part and the outlet
pipe extends from the first refrigerating part. 30

13. The refrigerator of claim 12, wherein the first refrig-
erating part and the second refrigerating part each
comprise:

first and second circulation parts to circulate re- 35
frigerant therethrough, wherein lower sides of
the first and second circulation parts are con-
nected with each other.

14. The refrigerator of claim 13, wherein the inlet pipe 40
extends from an upper side of the first refrigerating
part to the second refrigerating part and is connected
with an upper side of the first circulation part of the
second refrigerating part, and the outlet pipe is con-
nected with an upper side of the second circulation 45
part of the first refrigerating part.

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Fig.1

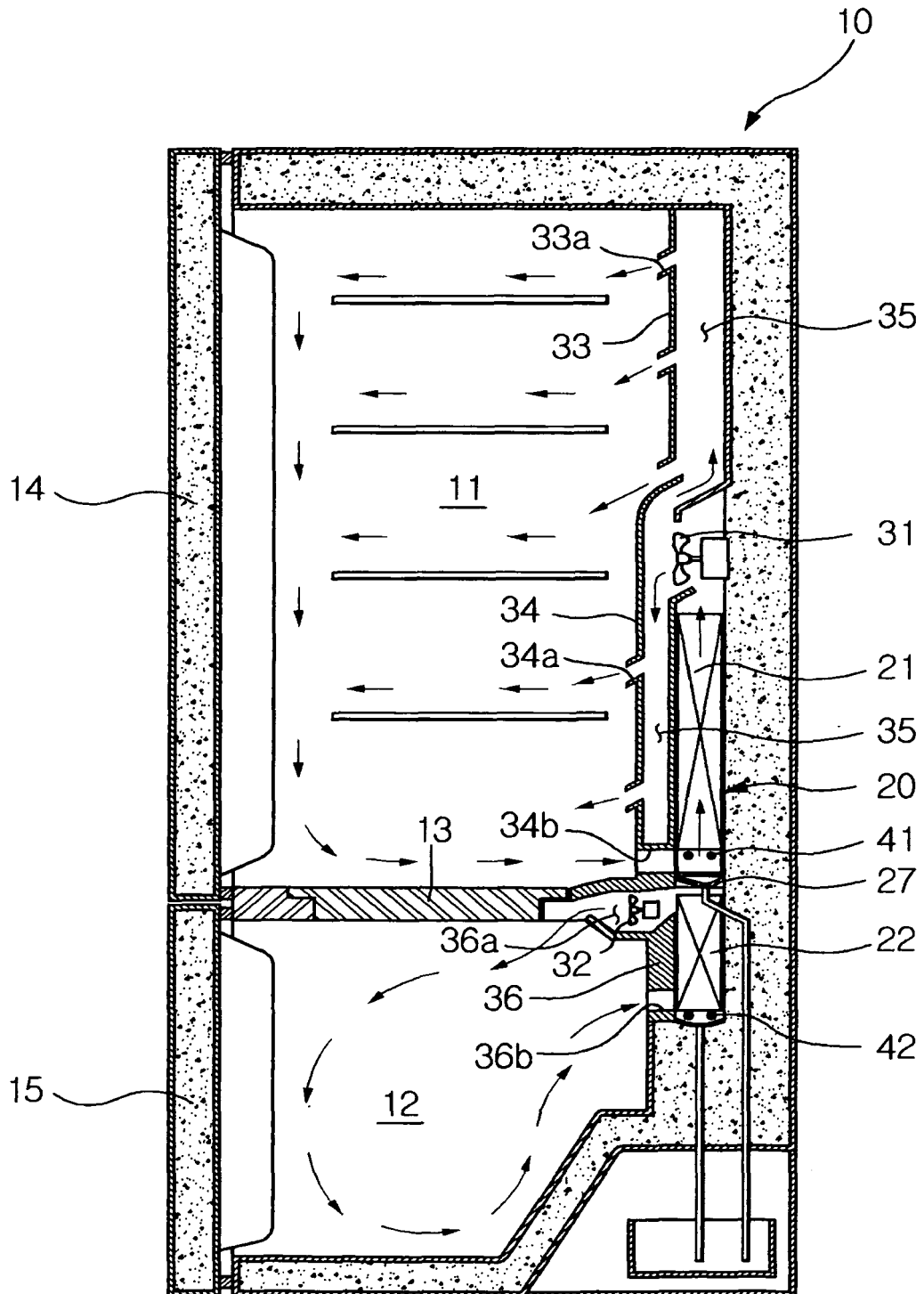


Fig.2

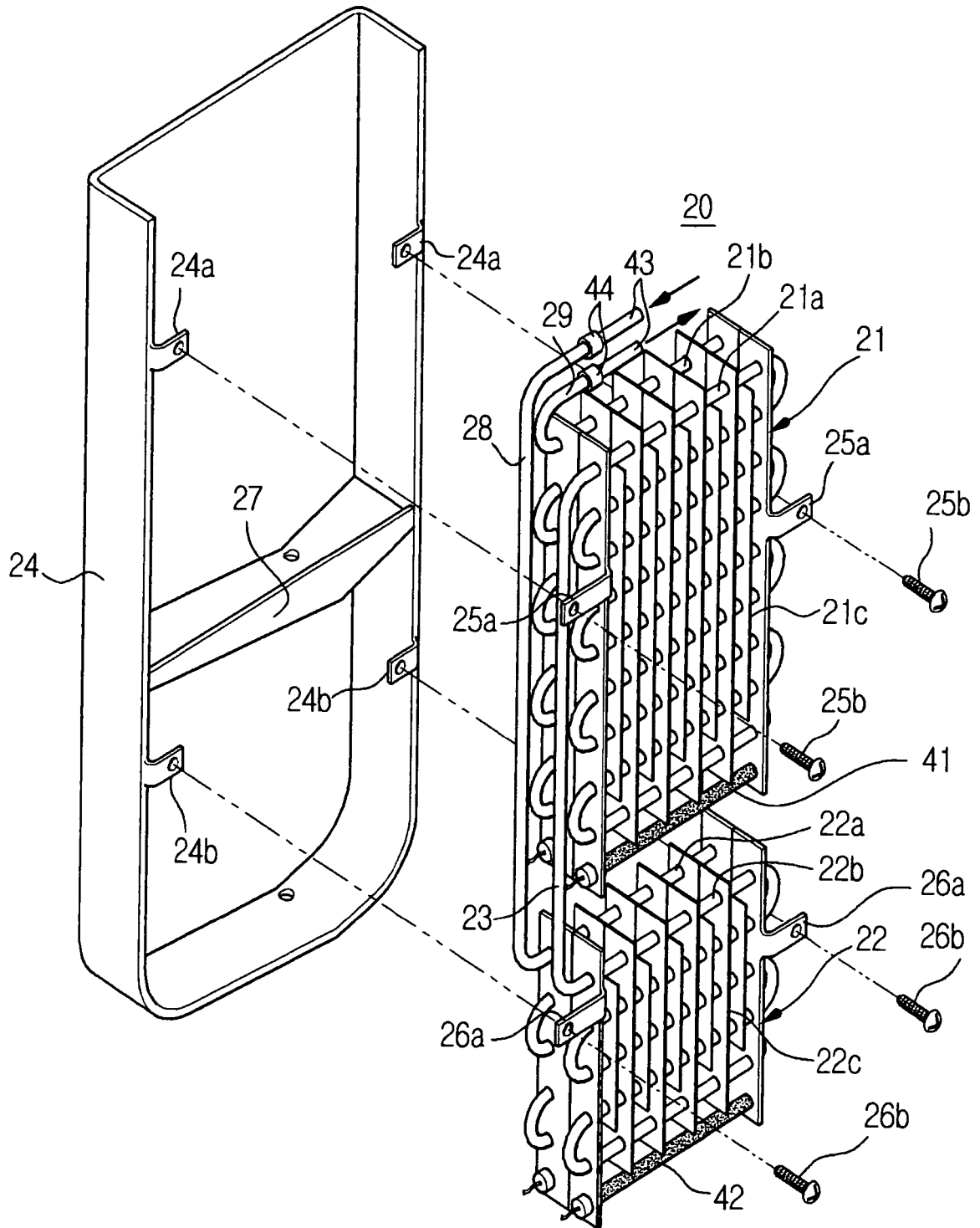


Fig.3

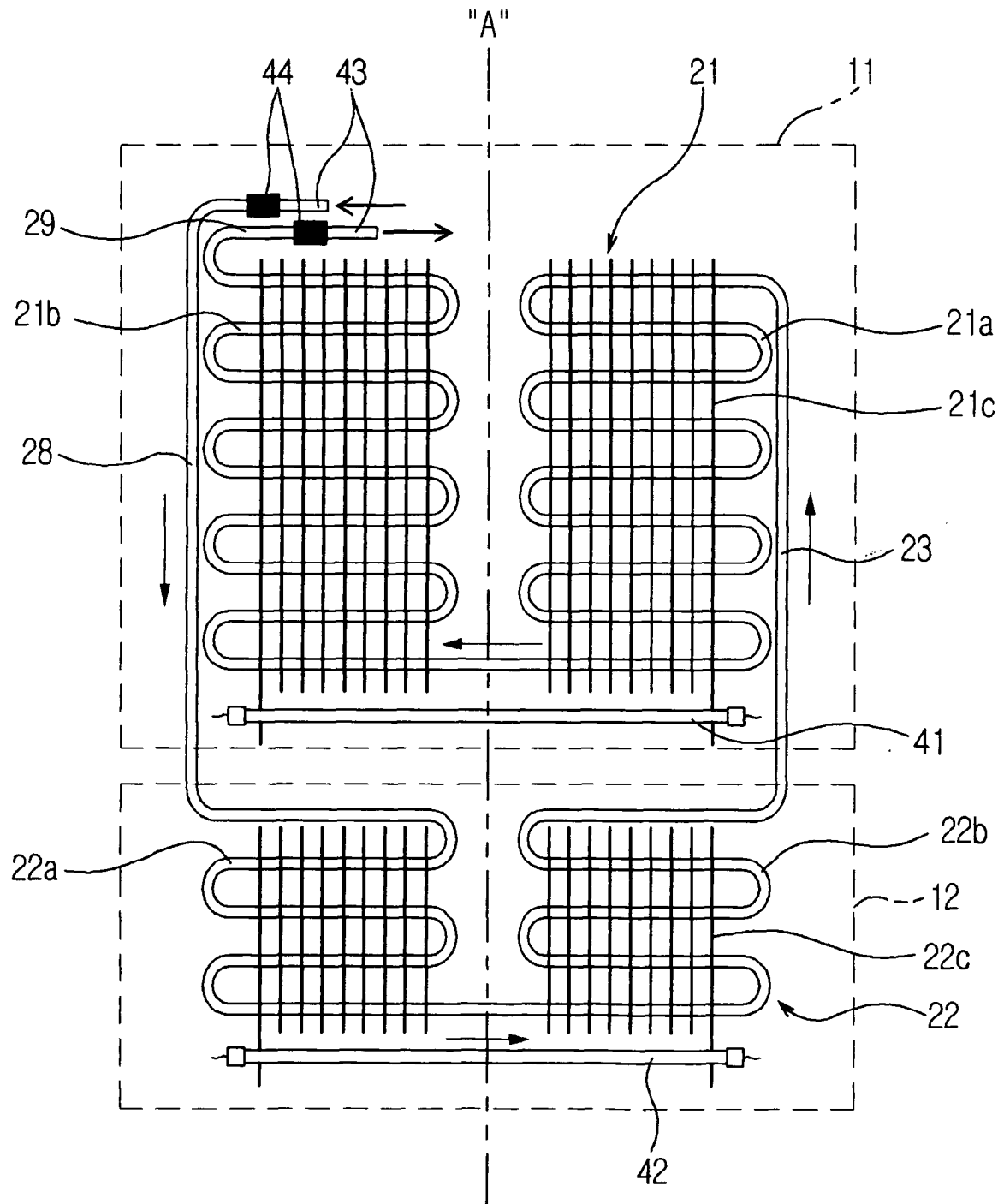
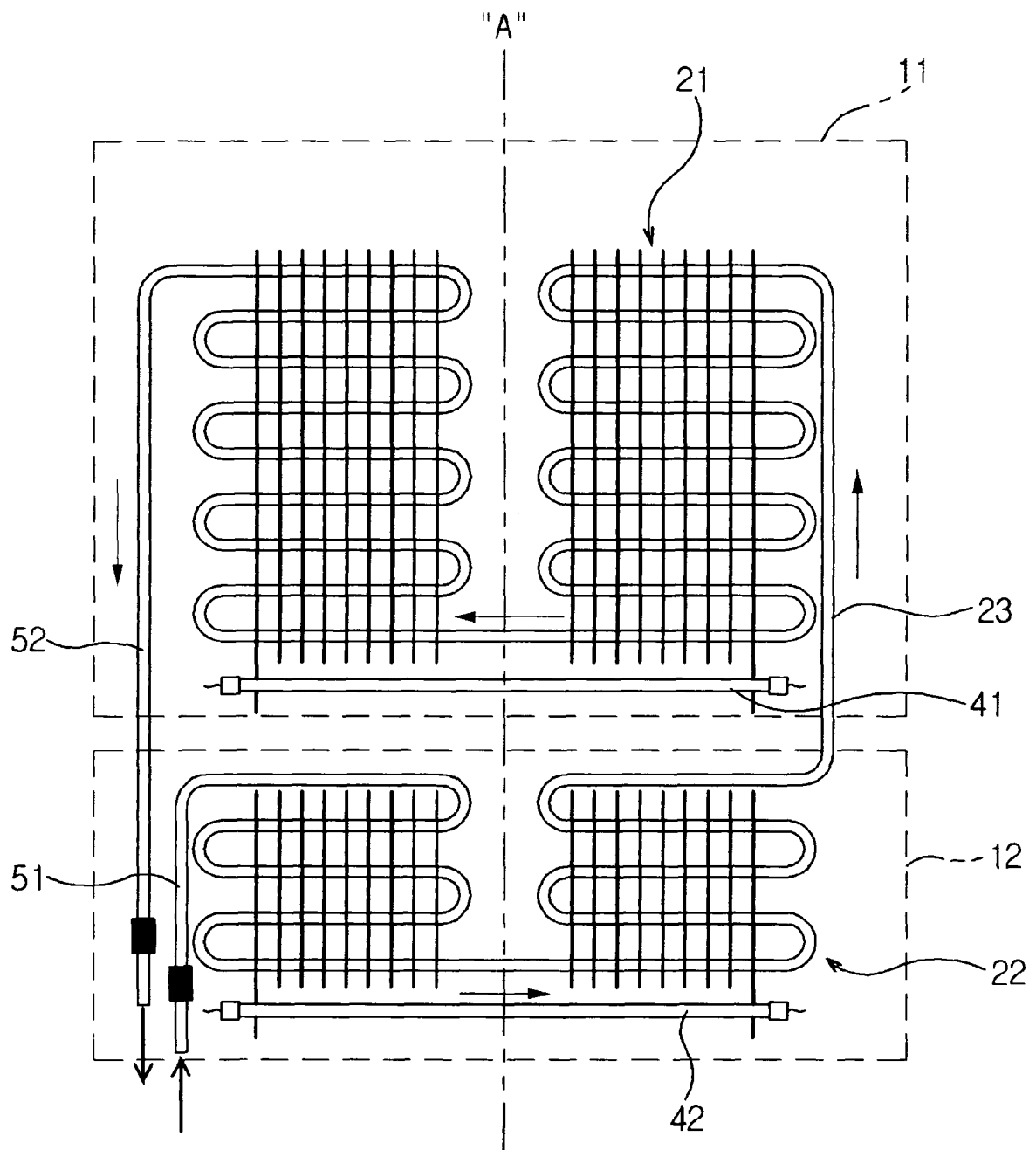


Fig.4



REFERENCES CITED IN THE DESCRIPTION

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