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(54) **REFRIGERATOR PROVIDED WITH COOLED AIR BYPASS PASSAGES**

KÜHLSCHRANK MIT KURZSCHLUSSKANÄLEN FÜR GEKÜHLTE LUFT

REFRIGERATEUR COMPORTANT DES PASSAGES DE DERIVATION D'AIR REFRIGERE

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(56) References cited:
EP-A- 0 592 004 **WO-A-95/33963**
US-A- 5 826 441

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DescriptionTECHNICAL FIELD OF THE INVENTION

[0001] The present invention relates to a refrigerator; and, more particularly, to a refrigerator with air bypass passages which allow cooled air to circulate therein, even when some portions of an evaporator are covered with frost.

BACKGROUND ART

[0002] Generally a refrigerator is equipped with an evaporator for cooling air to be circulated therein. After a prolonged use, frost is bound to be formed on the evaporator.

[0003] If too much frost gets formed on the evaporator, the cooling performance thereof gets deteriorated and the circulation of the cooled air also gets hindered within the refrigerator by the frost blocking the air passages.

[0004] To defrost the frost from the evaporator, the refrigerator is conventionally provided with a defrosting mode. Whether to operate or not in the defrosting mode is determined by a power dissipated for driving a compressor and a variation of the temperature during the driving of the compressor.

[0005] However, in the conventional refrigerator, too much frost is usually formed on the evaporator before the refrigerator begins automatically to operate in the defrosting mode, first resulting in blocking of the cooled air passages, resulting in the performance of the refrigerator being deteriorated. US-A-5,826,441 and EP-A-0 592 004 show a refrigerator having a freezer compartment with a fan, a refrigerating compartment with a fan, and an evaporator. The refrigerator comprises a first passage formed by one exterior wall of the evaporator and a panel for flowing cooled air from the refrigerating compartment to the fan of the refrigerating compartment. Further, a second passage is provided for flowing the cooled air from the freezer compartment to the fan of the freezer compartment. Some of the cooled air flowing through these passages might not come into contact with the exterior walls of the evaporator. However, there is still a risk that these passages might be blocked by a large amount of frost formed on the exterior walls of the evaporator.

DISCLOSURE OF THE INVENTION

[0006] It is, therefore, a primary object of the present invention to provide a refrigerator with air bypass passages which allow cooled air to circulate therein, even when some portions of an evaporator are covered with frost.

[0007] The above object of the present invention is accomplished by providing a refrigerator having a freezer compartment with a fan, a refrigerating compartment

with a fan, and an evaporator, said refrigerator comprising a first bypass passage for flowing cooled air from the refrigerating compartment directly to the fan of the refrigerating compartment, thereby allowing the cooled air to bypass the evaporator; and a second bypass passage for flowing the cooled air from the freezer compartment directly to the fan of the freezer compartment, thereby allowing the cooled air to bypass the evaporator, the first bypass passage being formed by a panel, which is separated from the evaporator, and the rear wall of the refrigerator.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] The above and other objects and features of the instant invention will become apparent from the following description of preferred embodiment taken in conjunction with the accompanying drawings, in which:

Fig. 1 illustrates a schematic top view of a preferred embodiment of the present invention; Fig. 2 and 3 are sectional views of Fig. 1 along lines II-II and III-III, respectively. Fig. 4 depicts a sectional plan view of the preferred embodiment of the present invention; and Fig. 5 describes a rear view showing a first bypass passage according to the preferred embodiment of the present invention.

MODES OF CARRYING OUT THE INVENTION

[0009] A refrigerator provided with a cooled air bypass passages according to the preferred embodiment of the present invention is disclosed in Figs. 1 to 5. As shown in Figs. 1 and 2, the refrigerator 10 has a freezer compartment 18 on an upper portion thereof and a refrigerating compartment 34 on a lower portion thereof. The refrigerator 10 further has a door 12 having a grip 14 and a separating wall 41 at back of the freezer compartment 18 to thereby form a freezing space. The refrigerator 10 further has a rear wall 13 filled with urethane foams.

[0010] As shown in Figs. 2 and 4, an evaporator 20 is mounted in the rear portion of the freezer compartment 18. The evaporator 20 has a plurality of fins 22 thereon. On top of the evaporator 20 is formed a retaining space 28 for retaining a fan 32 for the refrigerating compartment 34. The fan 32 is mounted in the retaining space 28 and driven by a driving motor 30. The fan 32 blows cooled air in the retaining space 28 into the refrigerating compartment 34 through a duct 46.

[0011] The cooled air sucked into the refrigerating compartment 34 is circulated therein. The cooled air circulated in the refrigerating compartment 34 returns to the retaining space 28 after passing through an outlet 25, a first returning area 26 and a horizontal area of a second returning area 44, then ascends to the rear portion of the evaporator 20.

[0012] The cooled air passes through two passages, as it ascends to the rear portion of the evaporator 20. One of the passages is an evaporator contacting passage 35 formed between a perpendicular panel 42 and the evaporator 20 to allow the cooled air to ascend to the fins 22 of the evaporator 20. The other passage is a first bypass passage 36 formed by the perpendicular panel 42 and a rear wall 13 to allow the cooled air to be sucked directly into the retaining space 28. The cooled air sucked into the retaining space 28 enters the duct 46 by the action of the fan 32 through an inlet 52 of a cooled air inducing pipe 50. An inner wall 54 of the cooled air inducing pipe 50 formed on backside of the separating wall 41 serves to change the direction of the flow of the cooled air. The presence of the first bypass passage 36 allows the cooled air to circulate even if the evaporator contacting passage 35 gets blocked with the frost formed therein.

[0013] As shown in Fig. 3 and 4, a retaining space 29 for retaining the fan 33 for the freezer compartment 18 is formed on top of the evaporator 20. The fan 33 is mounted in the retaining space 29 and driven by a driving motor 31. The fan 33 blows the cooled air in the retaining space 29 into the freezer compartment 18 through an inlet 39 for the cooled air.

[0014] The cooled air sucked into the freezer compartment 18 is circulated therein. The cooled air circulated in the freezer compartment 18 returns to the retaining space 29 after passing through the outlet 23, a horizontal returning area 24 and a second bypass passage 40, then ascends to the front portion of the evaporator 20.

[0015] The second bypass passage 40 formed by the evaporator 20 and the separating wall 41 makes a large spare space to allow some of the cooled air to ascend therethrough to the retaining space 29 and contact the fins 22, with the rest bypassing the fins 22. The presence of the second bypass passage 40 allows the cooled air to circulate even if a large amount of frost is formed between the evaporator 20 and the separating wall 41.

[0016] As shown in Fig. 5, the first bypass passage 36 for bypassing the cooled air to a fan 32 for the refrigerating compartment 34 has a first side wall being tilted when viewed from the rear of the refrigerator 10 and a nearly perpendicular second side wall forming a passage for connecting a second returning area 44, the retaining space 28 and the inlet 52 of the cooled air inducing pipe 50. Further, it is preferable that the length of the inlet portion of the first bypass passage 36 connected to the second returning area 44 is about 2/3 of the lateral length of the evaporator 20.

[0017] According to the preferred embodiment of the present invention, the bypass passages allow the cooled air to circulate inside the refrigerator until the defrosting mode is initiated to remove the frost filling the cooled air circulation passage and around the evaporator.

[0018] Although the invention has been shown and

described with respect to the preferred embodiment, it will be understood by those skilled in the art that various changes and modifications may be made without departing from the scope of the invention as defined in the following claims.

Claims

1. A refrigerator having a freezer compartment (18) with a fan (33), a refrigerating compartment (34) with a fan (32), and an evaporator (20), said refrigerator (10) comprising:

- a first bypass passage (36) for flowing cooled air from the refrigerating compartment (34) directly to the fan (32) of the refrigerating compartment (34), thereby allowing the cooled air to bypass the evaporator (20); and
a second bypass passage (40) for flowing the cooled air from the freezer compartment (18) directly to the fan (33) of the freezer compartment (18), thereby allowing the cooled air to bypass the evaporator (20);

characterized in that

the first bypass passage (36) is formed by a panel (42), which is separated from the evaporator (20), and the rear wall (13) of the refrigerator (10).

2. The refrigerator according to claim 1, wherein the length of an inlet portion of the first bypass passage (36) is about 2/3 of the length of the evaporator (20).
3. The refrigerator according to claim 1, wherein the cooled air from the fan (32) of the refrigerating compartment (34) flows through a cooled air inducing pipe (50) mounted in front of the fan (32), changing its direction of flow to the refrigerating compartment (34).

Patentansprüche

1. Kühlschrank, der ein Gefrierfach (18) mit einem Ventilator (33), ein Kühlfach (34) mit einem Ventilator (32), und einen Verdunster (20) aufweist, wobei der Kühlschrank (10) folgendes umfaßt:

- einen ersten Umgehungsdurchgang (36) zum Durchströmen von Kühlluft vom Kühlfach (34) direkt zum Ventilator (32) des Kühlfachs (34), wodurch der Kühlluft ermöglicht wird, den Verdunster (20) zu umgehen; und
ein zweiter Umgehungsdurchgang (40) zum Durchströmen der Kühlluft vom Gefrierfach (18) direkt zum Ventilator (33) des Gefrierfachs (18), wodurch der Kühlluft ermöglicht wird, den

Verdunster (20) zu umgehen;

dadurch gekennzeichnet, daß

der erste Umgehungsdurchgang (36) durch eine Platte (42), die vom Verdunster (20) getrennt ist, und der Rückwand (13) des Kühlschranks (10) gebildet ist. 5

2. Kühlschrank nach Anspruch 1, bei dem die Länge eines Einlaßabschnitts des ersten Umgehungsdurchgangs (36) etwa 2/3 der Länge des Verdunsters (20) ist. 10
3. Kühlschrank nach Anspruch 1, bei dem die Kühlluft vom Ventilator (32) des Kühlfachs (34) durch eine Kühlluft hervorrufende Röhre (50) strömt, die vor dem Ventilator (32) angebracht ist, und ihre Strömrichtung zum Kühlfach (34) ändert. 15

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Revendications

1. Réfrigérateur possédant un compartiment de congélation (18) avec un ventilateur (33), un compartiment de réfrigération (34) avec un ventilateur (32), et un évaporateur (20), ledit réfrigérateur (10) comprenant : 25

un premier passage de dérivation (36) pour faire circuler l'air refroidi à partir du compartiment de réfrigération (34) directement vers le ventilateur du compartiment de réfrigération (34), en permettant de ce fait à l'air refroidi d'éviter l'évaporateur (20) ; et 30

un second passage de dérivation (40) pour faire circuler l'air refroidi à partir du compartiment de congélation (18) directement vers le ventilateur du compartiment de congélation (18), en permettant de ce fait à l'air refroidi d'éviter l'évaporateur (20) ; 35 40

caractérisé en ce que

le premier passage de dérivation (36) est formé par un panneau (42) qui est séparé de l'évaporateur (20) et de la paroi arrière (13) du réfrigérateur (10). 45

2. Réfrigérateur selon la revendication 1, dans lequel la longueur d'une partie d'entrée du premier passage de dérivation (36) est approximativement égale aux 2/3 de la longueur de l'évaporateur 20. 50
3. Réfrigérateur selon la revendication 1, dans lequel l'air refroidi provenant du ventilateur (32) du compartiment de réfrigération (34) circule à travers un tuyau inducteur d'air refroidi 50 monté devant le ventilateur (32), en modifiant sa direction de circulation vers le compartiment de réfrigération (34). 55

FIG. 1

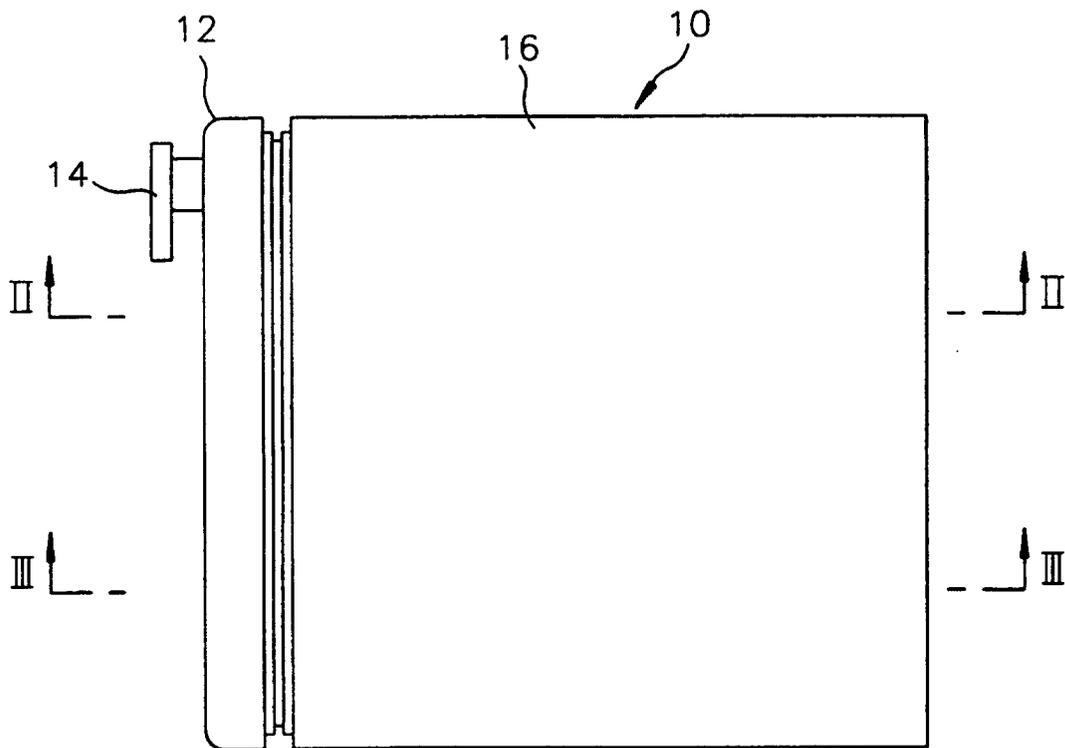


FIG. 2

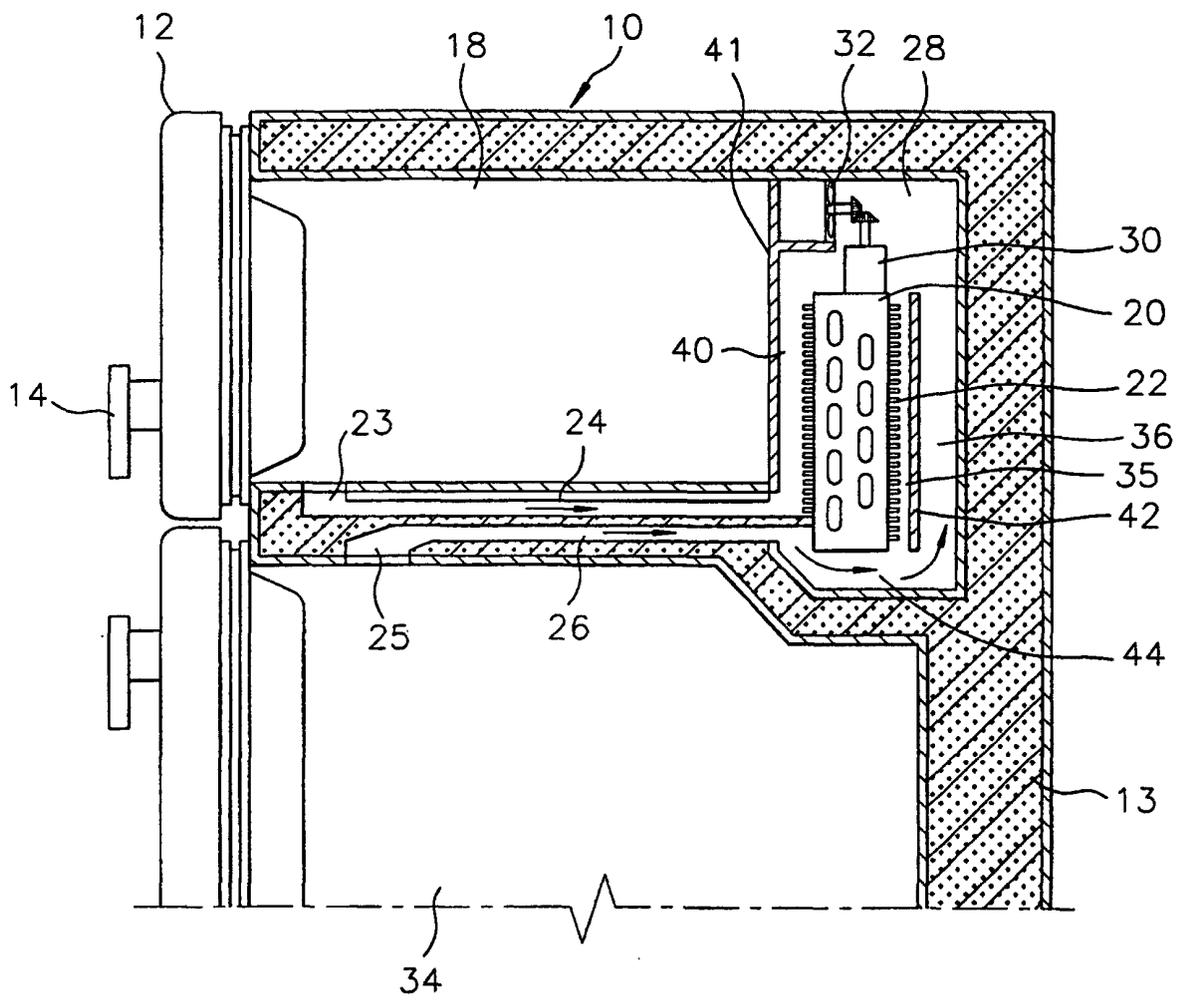


FIG. 3

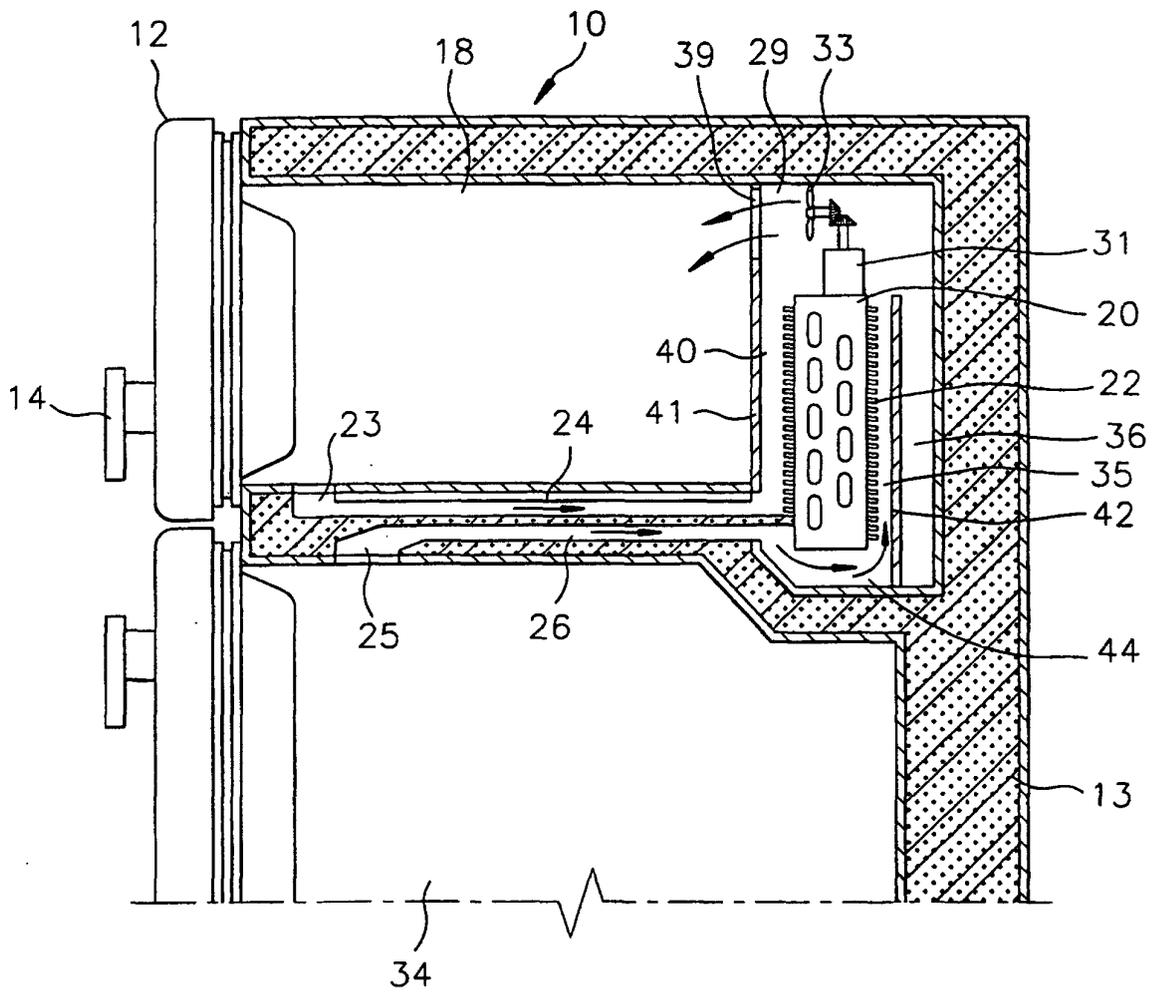


FIG. 4

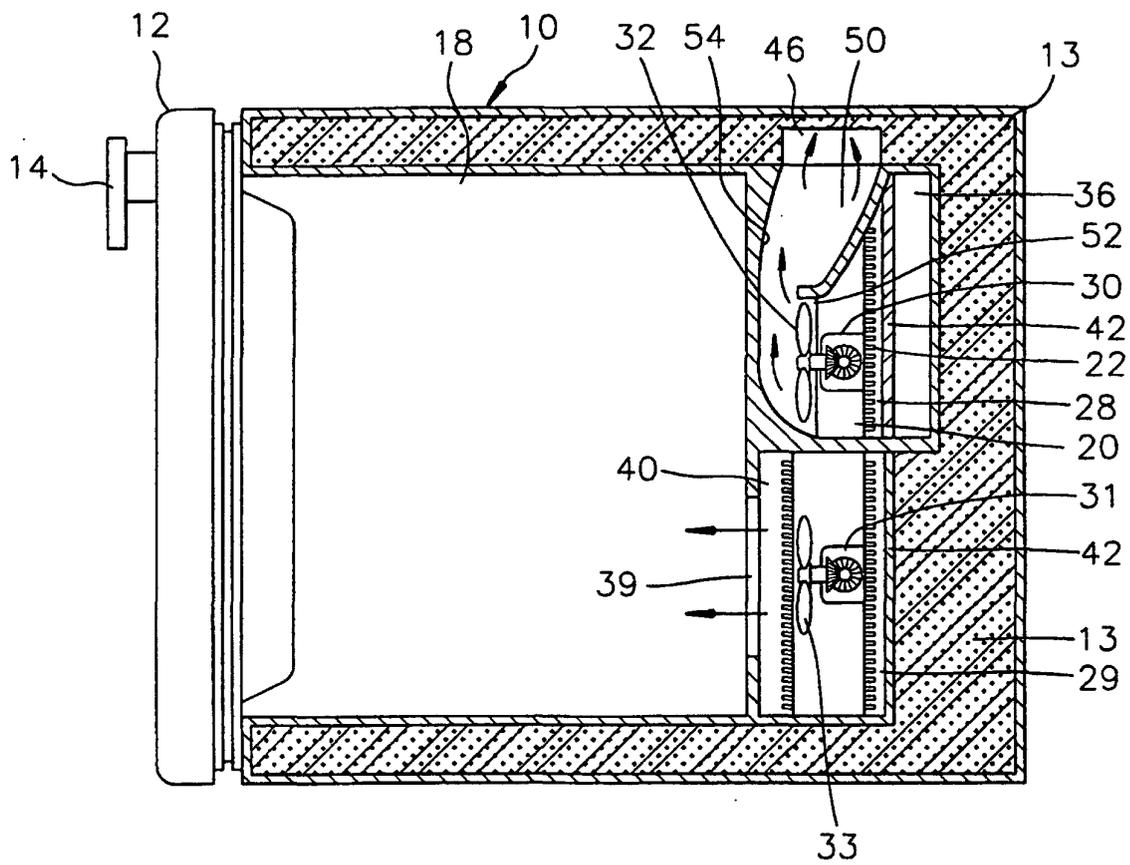


FIG. 5

