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(54) **Chest freezer or the like, comprising a freezing compartment in which a forced air circulation is provided**

Gefriertruhe oder dergleichen, mit einem Gefrierabteil versehen mit einer Zwangsluftzirkulation

Congélateur-bahut ou analogue, comprenant un compartiment congélateur ayant une circulation forcée d'air

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(56) References cited:
CH-A- 345 025
DE-A- 2 320 208
DE-B- 1 276 664
US-A- 2 322 882
US-A- 2 437 414

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Description

This invention relates to a chest freezer or the like comprising a housing containing a freezing and preservation compartment bounded by side walls and having a base wall or base, and able to receive food items to be preserved, at least one closure element being positioned at the upper loading aperture of said compartment, seal elements being associated with said closure element and/or the upper end of the walls of said housing, comprising a fan for providing a forced air circulation within the freezing and preservation compartment and for directing cold air into feed ducts provided within the freezer having, said ducts opening at the surface of the walls bounding the freezing and preservation compartment to enable forced air to flow into this latter, there being provided at least one return duct through which the forced air returns to the fan for its circulation. Freezers of the aforesaid type are known from DE-B-1276664. This patent provides an evaporator which is placed very near to the wall of the freezer, with obvious drawbacks in term of energy saving. Moreover the freezing of food is not very fast and could create problems as far as proper conservation is concerned. The food items are placed in them generally one on another within the freezing compartment so as to occupy as much as possible of the entire space of said compartment.

Although on the one hand this allows a considerable degree of loading of the freezer, on the other hand it results in at least partial obstruction of all passages between the food items and hence the impossibility of even a minimum level of air circulation between them. Consequently, frost forms on the food items, the formed ice possibly "welding" a food item to the adjacent one, with obvious drawbacks.

In addition the ice which forms in the freezing compartment can make it difficult to extract the food items from the freezing compartment and can affect their proper preservation.

Chest refrigerators having a cooling and a fast cooling compartment are also known (see CH-A-345 025).

An object of the present invention is therefore to provide a freezer of the stated type which solves the above technical problems.

A further object is to provide a freezer of the stated type in which the formation of frost on the food items can be prevented.

A further object is to provide a freezer of the stated type in which the food items can be stored in the best possible manner without limiting the capacity of the freezing compartment.

A further object is to provide a freezer of the stated type which is of simple construction, reliable and of simple use.

A further object is to provide a freezer in which at least small quantities of food can be frozen rapidly.

A further object is to provide a freezer in which the freezing compartment can be reduced in size in order to use only a part of its useful volume when the quantity of food items to be frozen is small, hence reducing the operating cost of the freezer.

These objects are attained by a freezer of the stated type, having the features reparted in the appended claim 1.

The present invention will be more apparent from the accompanying drawing, which is provided by way of non-limiting example and in which:

Figure 1 is a cross-section through a freezer constructed in accordance with the invention;
Figure 2 is a section on the line 2-2 of Figure 1;
Figure 3 is an enlarged detail of a different embodiment of the freezer of Figure 1;
Figure 4 is a cross-section through a further embodiment of the invention;
Figure 5 is an enlarged view of a part of the freezer of Figure 4;
Figure 6 is a section on the line 6-6 of Figure 4; and
Figure 7 is an enlarged detailed view of the freezer of Figure 1.

In Figures 1 to 3, a chest freezer is indicated overall by the reference numeral 1 and comprises a housing 2 containing a freezing and preservation compartment 3 bounded by side walls 4, 5, 6, 7; these latter define a loading aperture on which there is a usual closure element 9. The closure element 9 and/or the free ends 4A. 5A, 6A and 7A of said side walls 4, 5, 6 and 7 comprise usual seal elements or gaskets (not shown) for ensuring the necessary air-tightness within the compartment 3.

The housing 2 also comprises a seat 10 for a usual motor-compressor unit (not shown) forming part of the usual refrigeration circuit of the freezer 1, said circuit comprising an evaporator unit 11.

According to the invention, a forced air circulation is provided within the freezing compartment 3. This enables the food items A contained in said compartment to be better preserved and prevents the formation of frost thereon.

To achieve this, a fan 15 is provided in the compartment 3 to draw air from a duct 16 contained within a wall 17 bounding said compartment 3 on one side and on which the evaporator unit 11 is present. The duct 16 opens into a channel 18 which opens into an inlet 19 provided in said wall, said inlet connecting the channel 18 to said compartment 3.

The fan 15 is positioned, together with its motor 20, in a seat 21 which opens on one side 22 into a cavity 23 separated from the compartment 3 by the wall 17.

The cavity 23 acts as a fast freezing compartment, and can be closed by its own upper closure element (not shown) analogous to said element 9, which can be separated from it. The extent of communication between the seat 21 and the cavity 23 can be varied by any known valve means, if this cavity is not to be used for fast freezing.

The fast freezing cavity or compartment 23 communicates with the compartment 3 via feed ducts 24 provided within the freezer housing 2 (for example embedded in or associated with it) and opening via outlets and inlets 25 and 26 respectively into the compartment 3 and into the fast freezing compartment 23 at the upper ends of their bounding walls.

Specifically, at least the outlets or apertures 25 can be of the always open type (such as those of Figures 1 and 2) or can be throttled (manually or automatically by known actuators) by a panel 28 slidable on fixed guides 29 and positioned at a respective aperture 25; alternatively, the freezer 1 can comprise both throttling apertures 25 and always open apertures (as in Figure 3).

To enable the air to circulate below the food items A contained in the compartment 3, this latter comprises a grille 31 in correspondence with its base wall or base 33.

This grille supports the food items A and creates between them and the base 33 a corridor or channel 35 into which the forced air circulating within the compartment 3 can enter; this channel communicates via an aperture 36 with a duct 37 formed within the housing 2 and communicating with said channel 18. The duct 37 also communicates with the compartment 3, advantageously via the aperture 36.

The described freezer is used in the following manner.

When operated, the fan 15 draws air from the duct 16 (arrow F, Figure 1) which cools in flowing around the evaporator unit 11. The cold air is directed by the fan 15 into the fast freezing compartment 23 (arrow G, Figure 1), the cold air passing from here into the channels 24 via the apertures 26.

From the channels 24 the air passes through the apertures 25 and into the compartment 3 (arrow H, Figure 1). A direct connection 50 can be provided between the compartment 23 and the compartment 3 at the seat 21 for the fan 15 to enable cold air to flow from the fast freezing compartment to the compartment 3.

The cold forced air which thus enters the compartment 3 strikes the food items A contained in it and tends to fall to the base 33 of the compartment.

Part of this air is drawn through the channel 18 by the fan 15 (arrow K, Figure 1) whereas a further part reaches the base 33 of the freezing compartment.

At this base, a portion of this air passes (arrow W, Figure 1) into the corridor 35 present below the grille 31, to pass from the aperture 35 to the duct 37, and hence, still drawn by the fan 15, to the channel 18 where it joins the air already passing therethrough.

A further portion of the air present in proximity to the base 33 of the compartment 3 passes (arrow X, Figure 1) directly into the duct 37 and then rises to the channel 18.

The air present therein is then drawn into the duct 16 to hence resume circulation within the freezer.

Advantageously, if only a small quantity of food items are contained in the freezer 1 for freezing, and if the freezer is provided at least with some apertures 25 which can be throttled, these latter are closed (or only some of them are closed) by the respective movable panels 28.

These, because of the usual gaskets carried by them, prevent cold air not required for preserving the food items contained in the compartment 3 escaping from the closed apertures 25. This optimizes the performance of the freezer 1 on the basis of the quantity of food items to be frozen and enables its energy consumption to be reduced, with consequent reduction in its operating costs.

Advantageously a movable panel 93 is provided to vary the volume of the compartment 3 according to the load present in it. The panel 93 can be of the type longitudinally slidable (arrow P, Figure 1) on guides 94 provided on the walls 5 and 7 of the freezer housing 2 or of the type completely removable from and insertable (arrow L, Figure 3) into transverse guides 95 providable at discrete points on said walls.

Consequently, when the quantity of food items A to be preserved is reduced, some apertures 25 can be closed and the compartment 3 reduced in size (continuously or discretely) by the panel 93 (provided with seal gaskets cooperating with the walls 5 and 7 of the compartment 3). Forced air circulation is maintained in this reduced compartment portion, the food items A being placed in this portion.

This results in a considerable energy saving and operating cost for the freezer.

Air circulation within the compartment 3 is achieved in an optimum manner via the apertures 25 positioned (with respect to the figures) above the channel 18 and the recirculation duct 37 (these being in a central position and at the base 33 of the compartment respectively) such that the air contacts all food items A at every level within said compartment.

Moreover, because of the compartment 23 the food items can be frozen in a very short time, after which said food items are transferred to the compartment 3 for long-term preservation.

It should be noted that when the panel 93 on the wall 17 is closed, together with the apertures 25 (as already described), only the fast freezing compartment 23 is used. In this case, to achieve air circulation between said compartment and the seat 21 there is provided within the wall 17 a duct 103 opening into the compartment 23 and into the duct 16 respectively.

In the case under examination, when the panel 93 is in contact with the wall 17, the outlet 19 is closed by this wall.

On that mouth 104 of the duct 103 facing the compartment 23 there is advantageously positioned a movable plate 105 which closes said mouth when the panel is not in the aforesaid position, ie is distant from the wall 17.

The plate 105 can be moved along guides (not

shown) on the wall 17 either manually by the user or automatically (for example by a rotary movement about an axis parallel to said wall) by a lever mechanism 106.

Specifically (see Figure 7 in which parts corresponding to those of the previously described figures are indicated by the same reference numerals) the lever mechanism 106 comprises a member or arm 107 movable along guides 108 against a spring 109.

The arm 107 comprises an end 110 arranged to cooperate with the panel 93 when this is lying on the wall 17. This arm carries a pin 113 which cooperates with a bar 114 pivoted at one end 115 to a fixed part 116 of the freezer housing 2. The other end 119 of said bar is fixed to the flap 105.

When the panel 93 reaches the wall 17 it urges the arm 107 against the spring 109 (arrow C, Figure 7). This causes the bar 114 to rotate via its pin 113 about the pivot 115 to thus rotate the flap 105, which moves from a position in which it is parallel to the wall, ie in which it closes the mouth 104, to the position of Figure 7 perpendicular to the wall 17. In this manner it opens the duct 103 to achieve air flow from the compartment 23 to the duct 16.

To create ducts or channels for air circulation between the various layers of food items contained one above another in the compartment 3, there are provided therein support grilles comprising two spaced-apart support regions, on which the superposed food items lie.

This arrangement is shown in Figures 4 to 6. In these figures, parts corresponding to those of the already described figures are indicated by the same reference numerals.

In Figure 4, two superposed layers A1 and A2 of food items are separated by a channel 60 formed between superposed parallel shelves 61 and 62 of grilles 63 (only one of which is shown in Figure 4). The food items A2 are arranged on a first shelf 61, and the food items A1 arranged on the grille 31 touching the second shelf 62.

Each grille 63 present in the compartment 3 is associated with a side wall (for example the wall 4 in Figure 5) and can be removably arranged parallel to the grille 31 positioned on the base 33.

Each grille comprises lateral elements 65 and 66 superposed in pairs and supporting crosspieces 68 and 69 on which the food items A2 lie and against which the food items A1 touch respectively.

The lateral elements 65 and 66 are bent at the opposing ends 63A, 63B of the grid 63 and are arranged to slide in support brackets 70 associated with the side wall 4 of the compartment 3.

The lateral elements 66 comprise projections 71 which cooperate with the brackets 70 and act as a stop in arranging the respective grille 63 parallel to the support wall 4.

Each grille can be arranged either as in Figure 4, ie retracted onto the side wall with which it is associated, or can be arranged parallel to the grille 31 by extracting it (arrow Y, Figure 5) from the brackets 70.

The first arrangement gives access to the food items A1, whereas the second allows the food items A2 to be introduced into the compartment 3 to create between these and the underlying food items the channel 60 which allows the air leaving the apertures 65 to undergo forced circulation through the two layers of food items. In addition, with the second arrangement the grille 63 rests on lateral supports 75 associated with the walls 5 and 7 of the housing 2 of the freezer 1.

Hence in the example shown in Figures 4 to 6, part of the forced cold air entering the compartment 3 via the apertures 25 provided in the compartment side walls is drawn into the duct 18 after passing through the channel of each grille 63 positioned parallel to the grille 31.

Again in this case, described with reference to Figures 4 to 6, there is improved preservation of the food items contained in the freezer, frost is prevented from forming on the food items, and ice is prevented from forming between food items and parts of the freezer such as the walls and grilles.

In both the embodiments shown in the accompanying figures, a suitable sensor (of known type) connected to any known control circuit incorporating said motor-compressor unit will allow automatic defrosting of the compartment 3.

Claims

1. A chest freezer comprising a housing (2) containing a freezing and preservation compartment (3) bonded by side walls (4,5,7) and having a base wall, and able to receive food items to be preserved, at least one closure element (9) being positioned at the upper loading aperture of said compartment (3), seal elements being associated with said closure element and/or the upper end of the walls of said housing (2), comprising a fan (15) for providing a forced air circulation within the freezing and preservation compartment (3) and for directing cold air into feed ducts (24) provided within the freezer housing (2), said ducts (24) opening at the surface of said side walls (4,5,7) bounding the freezing and preservation compartment (3) to enable forced air to flow into this latter, there being provided at least one return duct (18) through which the forced air returns to the fan (15) for its circulation, characterised in that the fan (15) is positioned in a seat (21) provided in a wall (17) of the freezer housing (2) which separates the freezing and preservation compartment (3) from a fast freezing compartment (23), said seat (21) communicating with a channel (16) provided within said wall (17) on which an evaporator unit (11) of the refrigeration circuit of the freezer (1) is located, said seat (21) opening into the fast freezing compartment (23) which communicates with the freezing and preservation compartment (3) at least via

the feed ducts (24), the above channel (16) being connected to the air return duct (18), said feed ducts (24) comprising outlets (25) and inlets (26) opening at the upper ends of said side walls (4,5,7) bounding the freezing and preservation compartment (3), said outlets (25) opening into the freezing and preservation compartment (3) and said inlets (26) opening into the fast freezing compartment (23), at least part of the outlets (25) of the feed ducts (24) being throttled by panels (28) slidable on fixed guides (29) and provided with seal elements.

2. A freezer as claimed in claim 1, characterised in that in the wall (17) which separates the fast freezing compartment (23) from the freezing and preservation compartment (3) there is provided an intercommunication passage (50) between the two compartments (3,23).

3. A freezer as claimed in claim 1, characterised in that the return duct (18) opens at an intermediate position on the surface of the wall (17) supporting the evaporator unit (11).

4. A freezer as claimed in claim 1, characterised by comprising a plurality of return ducts (18,37) opening, at mutually different levels, at the surface of said side walls (4,5,7) bounding the freezing and preservation compartment (3) and/or at the surface of the wall (17) supporting the evaporator unit (11).

5. A freezer as claimed in claims 1 and 4, characterised by comprising on the wall (17) housing the fan (15) two outlets (19,36) of returns ducts (18,37) located respectively in an intermediate position on said wall and at the base (33) of the freezing and preservation compartment (3), said ducts communicating with the channel (16) connected to the seat (21) for the fan (15).

6. A freezer as claimed in claim 1, characterised by comprising at least one movable panel (93) for reducing the volume of the freezing and preservation compartment (3).

7. A freezer as claimed in claim 6, characterised in that the movable panel (93) slides longitudinally within the freezing and preservation compartment (3) along suitable guides (94) provided on two opposing side walls (5,7) of said compartment (3), said panel being able to reduce continuously the volume of said compartment (3) and comprising seal members.

8. A freezer as claimed in claim 6, characterised in that the movable panel can be inserted transversely into the freezing and preservation compartment (3) in discrete positions along guides (95) provided along opposing side walls (5,7) of said compartment.

9. A freezer as claimed in claim 1, characterised in that the wall (17) is provided with a duct (103) opening into the fast freezing compartment (23) and into the channel (16) respectively.

10. A freezer as claimed in claims 7 and 9, characterised in that it comprises a rotatable flap (105) for closing the duct (103), a lever mechanism (106) being provided for moving the flap (105) in a position substantially perpendicular to the wall (17) when the panel (93) is moved against the wall (17).

11. A freezer as claimed in claim 1, characterised in that the fast freezing compartment (23) is provided with its own closure element.

12. A freezer as claimed in claim 5, characterised in that in proximity to the base (33) of the freezing and preservation compartment (3) there is provided a grill (31) arranged to space the food items (A, A1) from said base and to create between this latter and said food items a duct (35) connected to the outlet (36) of the return duct (37) opening at said base (33).

Patentansprüche

1. Gefriertruhe mit einem Gehäuse (2), das ein Gefrier- und Frischhaltefach (3) aufweist, das durch Seitenwände (4, 5, 7) begrenzt ist, einen Boden hat und frischzuhaltende Nahrungsmittel aufnehmen kann, ferner mit mindestens einem Verschließelement (9), das an der obenliegenden Fachladeöffnung angeordnet ist, mit Abdichtelementen, die mit dem Verschließelement und/oder mit dem oberen Ende der Gehäusewände verbunden sind, und mit einem Ventilator (15) zur Zwangsbelüftung im Gefrier- und Frischhaltefach (3) und zum Durchschikken von Kaltluft durch Zuführkanäle (24), die im Gefriertruhengehäuse (2) vorgesehen sind, wobei diese Zuführkanäle (24) in die Fläche derjenigen Wände (4, 5, 7) münden, die das Gefrier- und Frischhaltefach (3) begrenzen, so daß die Zwangsluft in dieses Fach strömen kann, und wobei mindestens ein Rückführkanal (18) vorgesehen ist, durch den die Zwangsluft zum Ventilator (15) zwecks Zirkulation zurückkehrt, **dadurch gekennzeichnet,** daß

- der Ventilator (15) an einem in einer Wand (17) des Gefriertruhengehäuses (2) vorgesehenen Sitz (21) positioniert ist,
- die Wand (17) das Gefrier- und Frischhaltefach (3) vom Schnellgefrierfach (23) trennt,
- der Sitz (21) mit einem Kanal (16) in Verbindung steht, der in der genannten Wand (17)

vorgesehen ist,

- an dieser Wand eine Verdampfereinheit (11) der Kühleinrichtung der Gefriertruhe (1) angeordnet ist,
- der Sitz (21) zum Schnellgefrierfach (23) hin offen ist,
- das Schnellgefrierfach (23) über mindestens einen Zuführkanal (24) mit dem Gefrier- und Frischhaltefach (3) in Verbindung steht,
- der genannte Kanal (16) mit dem Rückführkanal (18) verbunden ist,
- die Zuführkanäle (24) Ausgänge (25) und Eingänge (26) aufweisen, die an den oberen Enden der genannten, das Gefrier- und Frischhaltefach (3) begrenzenden Seitenwände (4, 5, 7) einmünden,
- die Ausgänge (25) ins Gefrier- und Frischhaltefach (3) und die Eingänge (26) ins Schnellgefrierfach (23) münden und
- mindestens ein Teil der Ausgänge (25) der Zuführkanäle (24) durch Platten (28) gedrosselt werden, die in festangeordneten Führungen (29) gleiten können und mit Abdichtelementen versehen sind.

2. Gefriertruhe nach Anspruch 1, dadurch gekennzeichnet, daß in der Wand (17), die das Schnellgefrierfach (23) vom Gefrier- und Frischhaltefach (3) trennt, ein Verbindungsdurchlaß (50) zwischen den zwei Fächern (3, 23) vorgesehen ist.

3. Gefriertruhe nach Anspruch 1, dadurch gekennzeichnet, daß der Rückführkanal (18) an einer mittleren Position in der Fläche der die Verdampfereinheit (11) tragenden Wand (17) mündet.

4. Gefriertruhe nach Anspruch 1, dadurch gekennzeichnet, daß eine Anzahl von Rückführkanälen (18, 37) vorgesehen ist, die abwechselnd in verschiedenen Höhen in die Oberfläche derjenigen Seitenwände (4, 5, 7), die das Gefrier- und Frischhaltefach (3) begrenzen, und/oder in die Oberfläche derjenigen Wand (17) münden, die die Verdampfereinheit (11) trägt.

5. Gefriertruhe nach den Ansprüchen 1 und 4, dadurch gekennzeichnet, daß an der den Ventilator (15) aufnehmenden Wand (17) zwei Ausgänge (19, 36) der Rückführkanäle (18, 37) vorgesehen sind, wobei der eine Ausgang (19) in einer mittleren Position an dieser Wand und der andere Ausgang (36) am Boden (33) des Gefrierund Frischhaltefachs (3) angeordnet ist, und daß diese Rückführkanäle mit demjenigen Kanal (16) in Verbindung stehen, der mit dem Sitz (21) für den Ventilator (15) verbunden ist.

6. Gefriertruhe nach Anspruch 1, dadurch gekennzeichnet, daß mindestens eine bewegbare Platte (93) zur Verminderung des Volumens des Gefrier- und Frischhaltefachs (3) vorgesehen ist.

7. Gefriertruhe nach Anspruch 6, dadurch gekennzeichnet, daß die bewegbare Platte (93) in Längsrichtung im Gefrier- und Frischhaltefach (3) längs geeigneter Führungen (94) gleitet, die auf gegenüberliegenden Seitenwänden (5, 7) des Fachs (3) vorgesehen sind, und daß diese Platte das Volumen des Fachs (3) stetig ändern kann und Abdichtglieder aufweist.

8. Gefriertruhe nach Anspruch 6, dadurch gekennzeichnet, daß die bewegbare Platte (93) in Querrichtung in das Gefrier- und Frischhaltefach (3) in diskreten Positionen längs Führungen (95) eingefügt werden kann, die längs gegenüberliegender Seitenwände (5, 7) dieses Fachs vorgesehen sind.

9. Gefriertruhe nach Anspruch 1, dadurch gekennzeichnet, daß die Wand (17) mit einem weiteren Kanal (103) versehen ist, der einerseits ins Schnellgefrierfach (23) und andrerseits in den erstgenannten Kanal (16) mündet.

10. Gefriertruhe nach den Ansprüchen 7 und 9, dadurch gekennzeichnet, daß eine drehbare Klappe (105) zum Schließen des weiteren Kanals (103) und ein Hebelmechanismus (106) vorgesehen sind, der zum Bewegen der Klappe (105) in eine Position dient, in der diese Klappe im wesentlichen senkrecht zur Wand (17) steht, wenn die Platte (93) an die Wand (17) bewegt worden ist.

11. Gefriertruhe nach Anspruch 1, dadurch gekennzeichnet, daß das Schnellgefrierfach (23) mit einem eigenen Schließelement versehen ist.

12. Gefriertruhe nach Anspruch 5, dadurch gekennzeichnet, daß in der Nähe des Bodens (33) des Gefrier- und Frischhaltefachs (3) ein Gitter (31) vorgesehen ist, das so ausgebildet ist, daß es Nahrungsmittelstücke (A, A1) vom Boden (33) fernhält und zwischen diesem Boden und diesen Nahrungsmittelstücken einen Kanal (35) schafft, der mit dem Ausgang (36) des an diesem Boden mündenden Rückführkanals (37) verbunden ist.

Revendications

1. Congélateur de type bahut, comprenant un boîtier (2) contenant un compartiment (3) de congélation et de conservation délimité par des parois latérales (4, 5, 7) et ayant une paroi de base, pouvant loger des articles alimentaires à conserver, au moins un élément de fermeture (9) placé à l'orifice supérieur

de chargement du compartiment (3), des éléments d'étanchéité étant associés à l'élément de fermeture et/ou à l'extrémité supérieure des parois du boîtier (2), le congélateur comprenant un ventilateur (15) destiné à assurer une circulation forcée de l'air dans le compartiment (3) de congélation et de conservation et à diriger de l'air froid dans des conduits d'alimentation (24) formés dans le boîtier (2) du congélateur, les conduits (24) débouchant à la surface des parois latérales (4, 5, 7) délimitant le compartiment (3) de congélation et de conservation de manière que l'air puisse circuler de manière forcée dans ce compartiment, au moins un conduit de retour (18) étant disposé de manière que l'air de circulation forcée puisse revenir vers le ventilateur (15) dans sa circulation, caractérisé en ce que le ventilateur (15) est placé dans un siège (21) disposé dans une paroi (17) du boîtier (2) du congélateur qui sépare le compartiment (3) de congélation et de conservation d'un compartiment (23) de congélation rapide, le siège (21) communiquant avec un canal (16) formé dans la paroi (17) sur laquelle est placée une unité (11) à évaporateur du circuit de réfrigération du congélateur (1), le siège (21) débouchant dans le compartiment (23) de congélation rapide qui communique avec le compartiment (3) de congélation et de conservation au moins par les conduits d'alimentation (24), le canal précité (16) étant connecté au conduit (18) de retour d'air, les conduits d'alimentation (24) ayant des sorties (25) et des entrées (26) débouchant aux extrémités supérieures des parois latérales (4, 5, 7) délimitant le compartiment (3) de congélation et de conservation, les sorties (23) débouchant dans le compartiment (3) de congélation et de conservation et les entrées (26) débouchant dans le compartiment (23) de congélation rapide, une partie au moins des sorties (25) des conduits d'alimentation (24) pouvant être fermée par des panneaux (28) qui peuvent coulisser sur des guides fixes (29) et ayant des éléments d'étanchéité.

2. Congélateur selon la revendication 1, caractérisé en ce que, dans la paroi (17) qui sépare le compartiment (23) de congélation rapide du compartiment (3) de congélation et de conservation, un passage (50) d'intercommunication est placé entre les deux compartiments (3, 23).

3. Congélateur selon la revendication 1, caractérisé en ce que le conduit de retour (18) débouche en position intermédiaire à la surface de la paroi (17) de support de l'unité à évaporateur (11).

4. Congélateur selon la revendication 1, caractérisé en ce qu'il comprend plusieurs conduits de retour (18, 37) débouchant, à des niveaux mutuellement différents, à la surface des parois latérales (4, 5, 7) qui délimitent le compartiment (3) de congélation et de conservation et/ou à la surface de la paroi (17) de support de l'unité à évaporateur (11).

5. Congélateur selon les revendications 1 et 4, caractérisé en ce qu'il comprend, sur la paroi (17) logeant le ventilateur (15), deux sorties (19, 36) de conduits de retour (18, 37) placées respectivement en position intermédiaire sur la paroi et à la base (33) du compartiment (3) de congélation et de conservation, les conduits communiquant avec le canal (16) raccordé au siège (21) du ventilateur (15).

6. Congélateur selon la revendication 1, caractérisé en ce qu'il comprend au moins un panneau mobile (93) destiné à réduire le volume du compartiment de congélation et de conservation (3).

7. Congélateur selon la revendication 6, caractérisé en ce que le panneau mobile (93) coulisse longitudinalement dans le compartiment (3) de congélation et de conservation le long de guides convenables (94) placés sur les deux parois latérales opposées (5, 7) du compartiment (3), le panneau pouvant réduire de façon continue le volume du compartiment (3) et comprenant des organes d'étanchéité.

8. Congélateur selon la revendication 6, caractérisé en ce que le panneau mobile peut être introduit transversalement dans le compartiment (3) de congélation et de conservation à des positions séparées le long des guides (95) placés le long des parois latérales opposées (5, 7) du compartiment.

9. Congélateur selon la revendication 1, caractérisé en ce que la paroi (17) a un conduit (103) qui débouche dans le compartiment (23) de congélation rapide et dans le canal (16) respectivement.

10. Congélateur selon les revendications 7 et 9, caractérisé en ce qu'il comprend un volet rotatif (105) destiné à fermer le conduit (103), un mécanisme à levier (106) étant destiné à déplacer le volet (105) en position pratiquement perpendiculaire à la paroi (17) lorsque le panneau (93) est déplacé contre la paroi (17).

11. Congélateur selon la revendication 1, caractérisé en ce que le compartiment (23) de congélation rapide a son propre élémnet de fermeture.

12. Congélateur selon la revendication 5, caractérisé en ce que, à proximité de la base (33) du compartiment (3) de congélation et de conservation, une grille (31) est disposée afin qu'elle retienne les articles alimentaires (A, A1) à distance de la base et crée, entre celle-ci et les articles alimentaires, un

conduit (35) raccordé à la sortie (36) du conduit de retour (37) débouchant à la base (33).

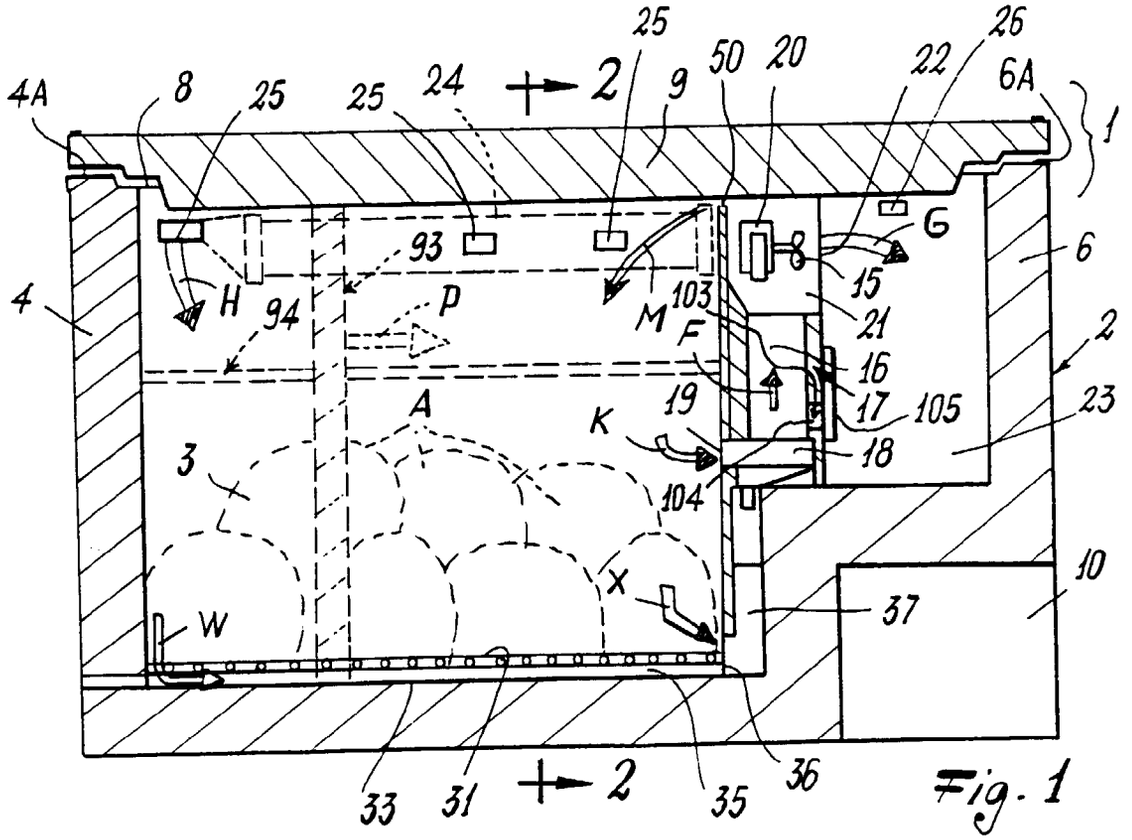


Fig. 1

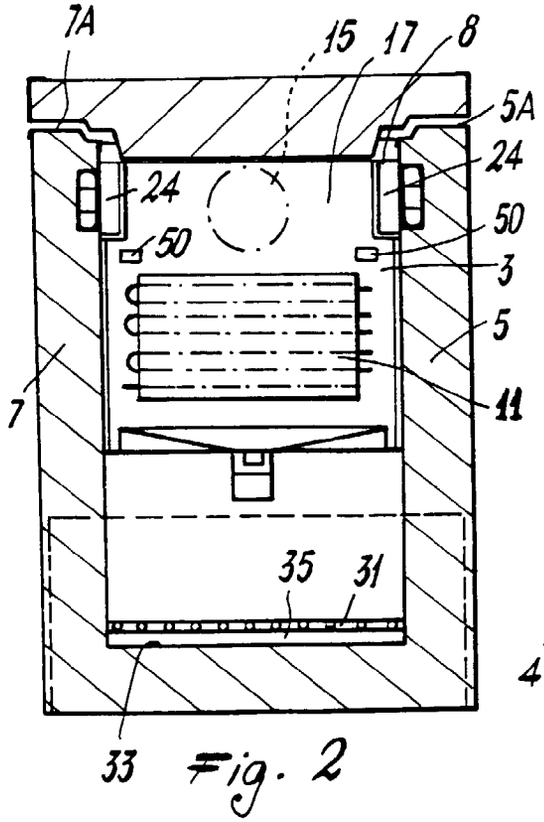


Fig. 2

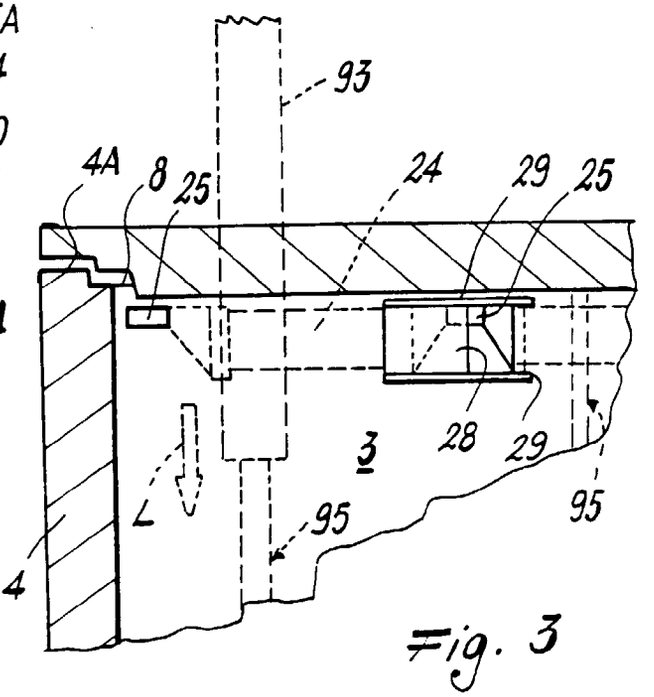


Fig. 3

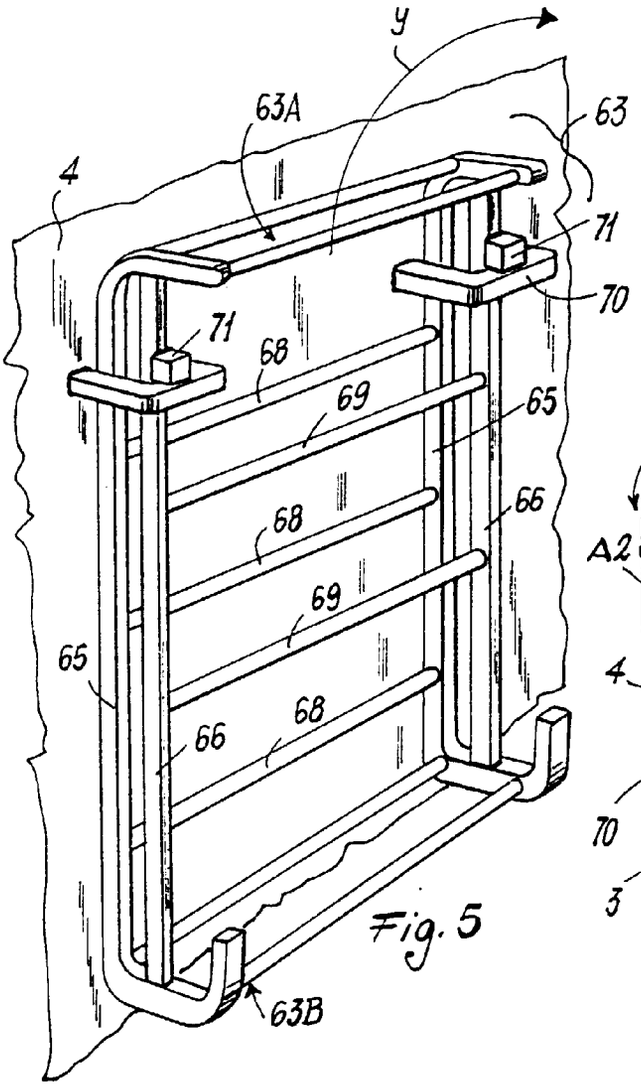


Fig. 5

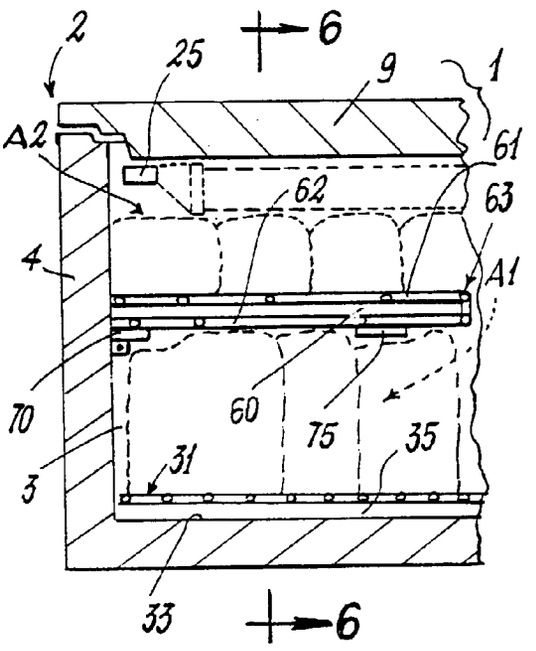


Fig. 4

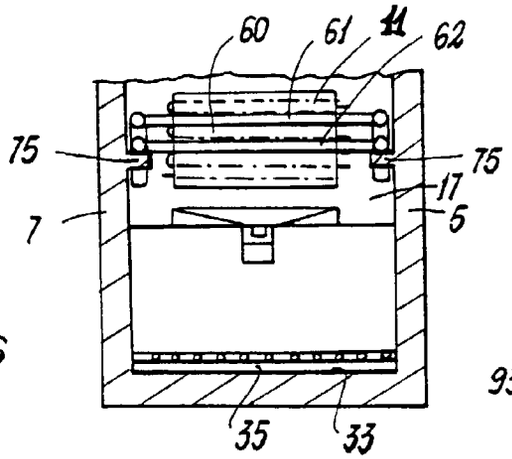


Fig. 6

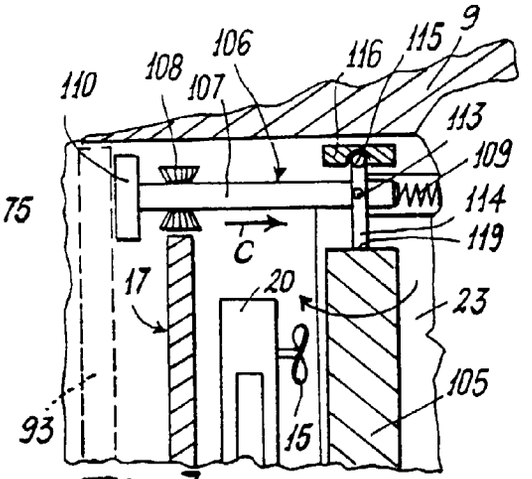


Fig. 7