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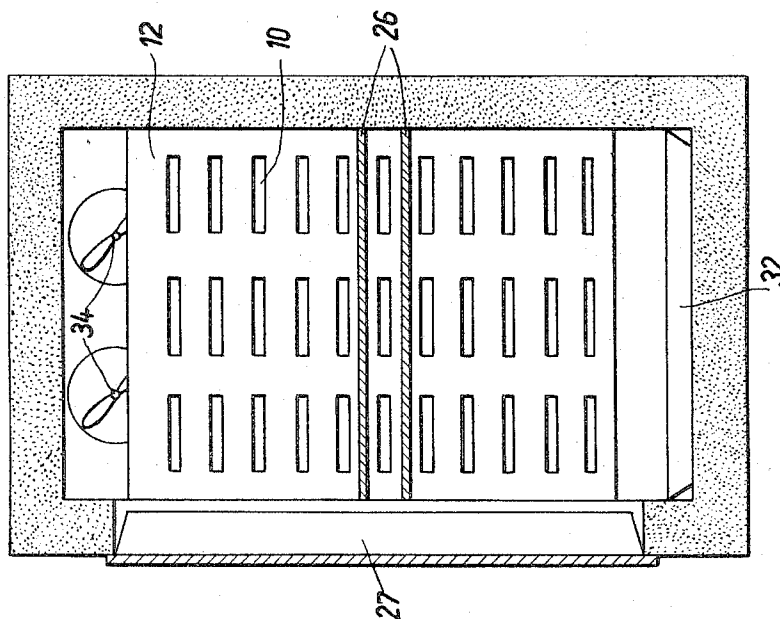
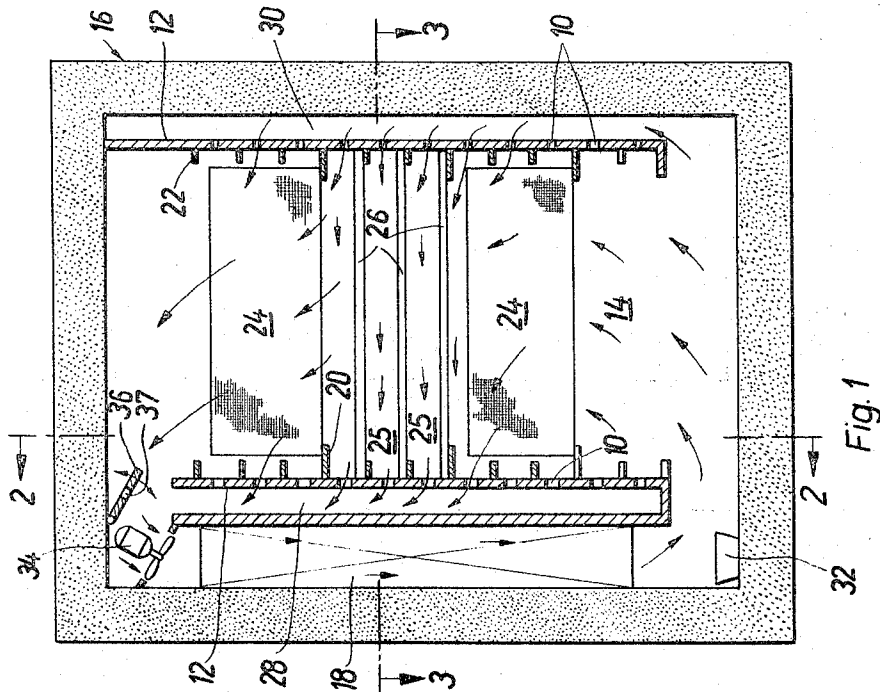
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3,301,004

REFRIGERATOR, PARTICULARLY FOR BAKERY GOODS

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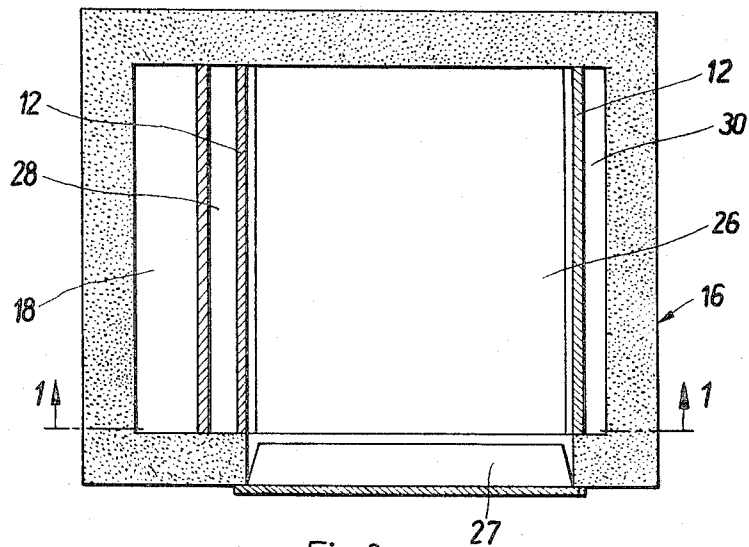
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REFRIGERATOR, PARTICULARLY FOR BAKERY GOODS

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27

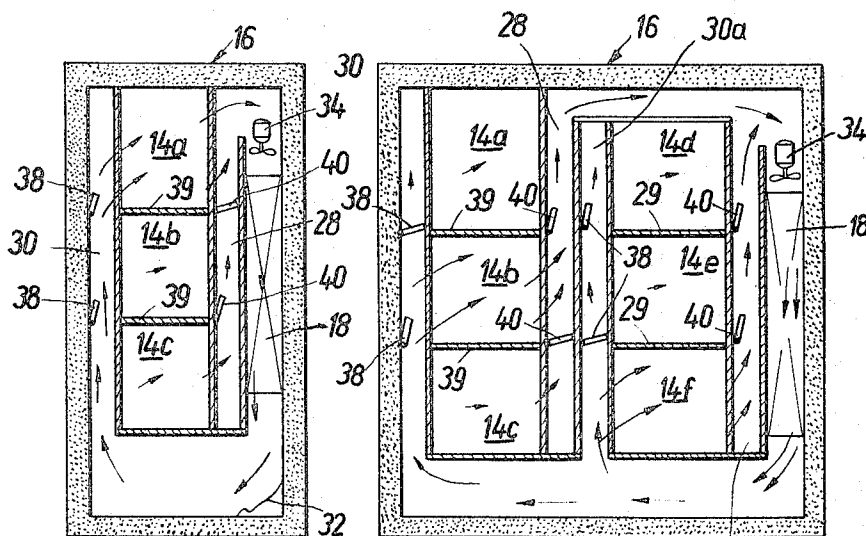


Fig. 5

Inventor:

1

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REFRIGERATOR, PARTICULARLY FOR BAKERY GOODS

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4 Claims. (Cl. 62-408)

The invention pertains to a refrigerator, particularly for freezing bakery goods, with a box type housing provided at its inside with at least one refrigerating unit through which air is forced by a blowing means and one of its lateral sides with at least one door, leading to a refrigerating chamber passed by said cooled air, the articles to be cooled by the air stream being supported in or on carrying means, such as baskets or pans which are inserted through the door into the chamber and are stacked there in superposed relation.

The main object of the invention is to provide an improved and structurally simplified refrigerator of this type which is particularly adapted to the needs of small or medium sized bakeries and which permits faster and more uniform cooling of the to be cooled articles, particularly bakery goods.

According to a further object of the invention the novel refrigerator is to be of improved operational economy by permitting intensive cooling of newly inserted batches of articles at a high cooling rate, while simultaneously cooling previously inserted and already sufficiently cooled batches at a low cooling rate. The main object of the invention is attained by a refrigerator comprising at least one pair of spaced vertical partition walls extending from adjacent a door opening to a back wall facing said door opening and defining together with said door and said back wall a refrigerating chamber, said partition walls being provided at their opposed inner sides with vertically spaced, horizontally aligned bracket means serving as holders for carrying means which are insertable through said door and serve to support the to be frozen material, at least some of said carrying means being plates extending over the entire cross section of said refrigerating chamber, air guiding channels of a width substantially smaller than said refrigerating chamber being disposed outside said partition walls in coextensive relation therewith, said channels communicating with said refrigerating chamber by openings provided in said partition walls between said vertically spaced bracket means and being closed at one of their ends, the open end of one of said channels communicating with the air inlet end of said refrigerating unit and being disposed substantially opposite the closed end of said other channel, the open end of said other channel communicating with the air outlet end of said unit and being disposed substantially opposite the closed end of said one channel.

Preferably a refrigerator of this new type comprises one refrigerating chamber or several such chambers disposed one aside the other, the chambers being subdivided into several superposed sections, with the rate of flow of cooled air through each of these sections being selectively controllable by simple regulating means.

Other features and advantages of the invention will become apparent on a perusal of the following specification taken in conjunction with the accompanying schematic drawings, in which.

FIG. 1 is a longitudinal sectional view taken on line 1-1 of FIG. 3 through a refrigerator according to one form of the invention;

FIG. 2 is a longitudinal sectional view taken on line 2-2 of FIG. 1, in which the bracket means and some of the carrying means depicted in FIG. 1 are omitted;

2

FIG. 3 is a cross sectional view taken on line 3-3 of FIG. 1;

FIG. 4 is a longitudinal sectional view similar to that shown in FIG. 1, but illustrating a second embodiment of the invention; and

FIG. 5 is a longitudinal sectional view similar to that shown in FIG. 1, illustrating a third embodiment of the invention.

In the refrigerator 16 shown in FIGURES 1-3 the refrigerating chamber 14 is disposed between two laterally spaced vertical partition walls 12, each of which is provided with slotted openings 10.

The two partition walls 12 are provided at their inner sides with vertically spaced horizontally extending rail-type bracket means 20 and 22, on which carrying means 24 resp. 26 for the to be frozen bakery goods are supported. The bracket means 20, on which basket-type carrying means 24 for stacked bakery goods, such as rolls, are supported, extend further into the refrigerating chamber 14 than the bracket means 22, serving to support plate-like carrying means for pastry or the like. In FIGURE 1 there are shown two spaced baskets 24, which are air-permeable and consist for instance of wire mesh and between these baskets three plates 26 which usually are the pans on which the goods have been baked. The refrigerating chamber can, of course, also contain only baking pans or only baskets or any other arrangement of pans and baskets. In FIGURE 2 only two baking pans 26 are shown, which have been inserted through the refrigerator door 27 into the refrigerating chamber. FIGURE 2 shows that the pans 26 extend over the entire width of the refrigerating chamber.

The partition walls 12 extend, as shown in FIGURE 3, from the opening of the door 27 to a back wall of the refrigerating chamber which may be the back wall of the refrigerator itself. On both sides of the walls 12 there are disposed vertical air guide channels 28 and 30. Air guide channel 28, referred to as suction channel hereafter, leads to the suction end of a refrigerating unit 18 disposed laterally of said channel and provided with air blowing means 34 at its suction end. Two air blowing means 34 being shown in FIGURE 2. Air guide channel 30, referred to hereafter as pressure channel, communicates with the pressure side of the refrigerating unit 18. In the embodiment shown the pressure channel is closed at its upper end and the suction channel at its lower end.

Below the refrigerating unit there is disposed a water trough 32, which can be combined with an air deflecting means as indicated in FIGURE 3. Between the refrigerating chamber 14 and the air blowing means 34 which convey the warmed up air, which flows out of the refrigerating chamber, to the refrigerating unit 18 which may be an evaporator or any other type of refrigerator apparatus, there are provided throttling means. The throttling means may be a flapper valve 36, which can have a relatively small opening 37.

The lower end of the refrigerating chamber is open, so that the cooled air leaving the refrigerating unit 18 can flow upwardly into said chamber, unless a baking pan 26 is inserted at said lower end.

The direction of flow of the cooling air is indicated by arrows. The air leaving the lower end of the refrigerating unit 18 enters the lower end of pressure channel 30 and also the refrigerating chamber, if a basket 24 is disposed at the lower end of said chamber. If due to the fact that the goods are stacked too densely in the baskets 24 vertical flow through the baskets is impeded or interrupted, air will enter from channel 30 through those of the slot-like openings 10 of the right partition wall which are disposed adjacent or above the baskets. In the spaces 25 disposed between the baking pans the air entering

3

from channel 30 through slots 10 will, however, only flow in a horizontal direction. This air directly cools the bakery goods disposed on the pan defining the bottom of a space 25 and also cools the bottom of the next higher pan. The cooling effect can be greatly enhanced, if the openings 10 in the partition wall 12 adjacent pressure channel 30 are smaller than the openings 10 in the other partition wall through which the air enters into suction channel 28, the smaller openings acting as air nozzles accelerating the air flow from the pressure channel 30.

If the bakery goods disposed in the baskets resp. on the pans have reached the desired freezing temperature, flapper valve 36 is closed, so that only the relatively small amount of air which passes an opening or openings 37 of this valve flows through the cooling chamber. The output of the refrigerating unit is then correspondingly reduced. The means for regulating the output are not shown. It is apparent that also throttling means without bypass openings 37 can be employed. These throttling means can be closed only partly for obtaining the desired throttling effect. A throttling means with a bypass opening is, however, preferred, because it simplifies operation.

It is apparent to any expert that the refrigerating unit can also be disposed above or below the cooling chamber. Furthermore the direction in which the air passes through the refrigerating unit and the refrigerating chamber can be chosen as desired. The channel arrangement will then have to be changed correspondingly. Thus, for instance in the embodiment shown in FIGURES 1-3 the cooled air could flow out of the top of unit 18 in which case the channel 30 would be open at its top end and channel 28 at its lower end.

In the modifications shown in FIGURES 4 and 5 the refrigerating chamber is closed at the top and the bottom, so that the air passes through said chamber substantially only in horizontal direction. The arrangement of the suction and pressure channels is similar to that of FIGURES 1-3. In both these further embodiments the refrigerating chamber is subdivided in vertically superposed sections by fixed horizontal partition walls 39. For simplifying illustration the bracket means and the openings in the partition walls are not shown in FIGURES 4 and 5. In the refrigerator shown in FIGURE 4 the refrigerating space between the two partition walls is subdivided by two horizontal walls 39 into three sections 14a, 14b and 14c, whereas in FIGURE 5 two rows of superposed refrigerating chambers 14a, 14b, 14c and, respectively, 14d, 14e, 14f are shown, suction channel 28 of the first row being disposed adjacent pressure channel 30a of the second row.

In each of the pressure and suction channels there are arranged throttling means 38 and 40 adjacent the ends of the horizontal walls 39. This arrangement makes it possible to cool intensively those refrigerating sections in which the carrying means have just been inserted through the doors (not shown), whereas through the other sections which may still be empty or may contain bakery goods which have already been sufficiently cooled only a small amount of air or no air is circulated. If for instance, as shown in FIGURE 3, only the goods inserted into the upper section 14a are to be intensively cooled, all the throttling means 38 in pressure channel 30 are open, whereas in suction channel 28 only the upper one of the throttling means 40 is closed, so that in case the throttling means contain bypass openings there flows through sections 14b and 14c only that small amount of air which is sufficiently to hold already frozen goods contained in these sections at the freezing temperature.

In the embodiment shown in FIGURE 5 only the sections 14b and 14f are intensively cooled. This is effected by closing the upper throttling means 38 in pressure channel 30, the lower throttling means 40 in suction channel 28 and the upper throttling means 38 in pressure

4

channel 30a all throttling means in suction channel 28a being open.

It is apparent to the expert that any desired number of refrigerating spaces, be they divided into superposed sections or not, can be arranged side by side in a refrigerator housing. In case of refrigerators with a plurality of not subdivided refrigerating chambers throttling means are only required at the outlet ends of the suction channels. It is also understood that separate doors are provided for each refrigerating chamber, which doors may also be subdivided to correspond with the individual sections of subdivided refrigerating spaces. Also in the embodiment according to FIGURES 4 and 5 the refrigerating units may be arranged at the top or at the bottom of the refrigerator housing, and it is also possible to use separate refrigerating units for each refrigerating chamber, although a refrigerator with only one refrigerating unit supplying cooled air to several sections is preferred.

I claim:

1. A refrigerator, particularly for freezing bakery goods, with a box type housing provided at its inside with at least one refrigerating unit through which air is forced by a blowing means and on one of its lateral sides with doors, said refrigerator comprising several pairs of spaced vertical partition walls extending from adjacent a door opening to a back wall facing said door opening and defining together with said doors and said back wall refrigerating chambers, said partition walls being provided at their opposed inner sides with vertically spaced, horizontally aligned bracket means serving as holders for carrying means which are insertable through said doors and serve to support the to be frozen material, at least some of said carrying means being plates extending over the entire cross section of said refrigerating chambers, air guiding channels of a width substantially smaller than said refrigerating chambers being disposed outside said partition walls in coextensive relation therewith, said channels communicating with said refrigerating chambers by openings provided in said partition walls between said vertically spaced bracket means and being closed at one of their ends, the open ends of channels at one side of the refrigerating chambers communicating with the air inlet end of said refrigerating unit and being disposed substantially opposite the closed ends of channels located on the other side of said chambers, the open ends of said last mentioned channels communicating with the air outlet end of said unit and being disposed substantially opposite the closed ends of said first mentioned channels.

2. A refrigerator according to claim 1, characterized in that the air guide channels between adjacent refrigerating chambers have one common wall.

3. A refrigerator particularly for freezing bakery goods, with a box type housing provided at its inside with at least one refrigerating unit through which air is forced by a blowing means and on one of its lateral sides with doors, said refrigerator comprising at least one pair of spaced vertical partition walls extending from adjacent a door opening to a back wall, facing said door opening and defining together with said doors and said back wall refrigerating chambers, said partition walls being provided at their opposed inner sides with vertically spaced, horizontally aligned bracket means serving as holders for carrying means which are insertable through said doors and serve to support the to be frozen material, at least some of said carrying means being plates extending over the entire cross section of said refrigerating chambers, air guiding channels of a width substantially smaller than said refrigerating chambers being disposed outside said partition walls in coextensive relation therewith, said channels communicating with said refrigerating chambers by openings provided in said partition walls between said vertically spaced bracket means and being closed at one of their ends, the open ends of channels at one side of the refrigerating chambers communicating with

5

the air inlet end of said refrigerating unit and being disposed substantially opposite the closed ends of channels located on the other side of said chambers, the open ends of said last mentioned channels communicating with the air outlet end of said unit and being disposed substantially opposite the closed ends of said first mentioned channels, the refrigerating chambers being closed at the bottom and being divided by fixed horizontal partition walls into smaller refrigerating chambers, each comprising a plurality of bracket means, air throttling means, being provided in said channels adjacent said horizontal walls.

6

4. A refrigerator according to claim 3, characterized in that the throttling means are provided with by-pass means.

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