

Feb. 8, 1938.

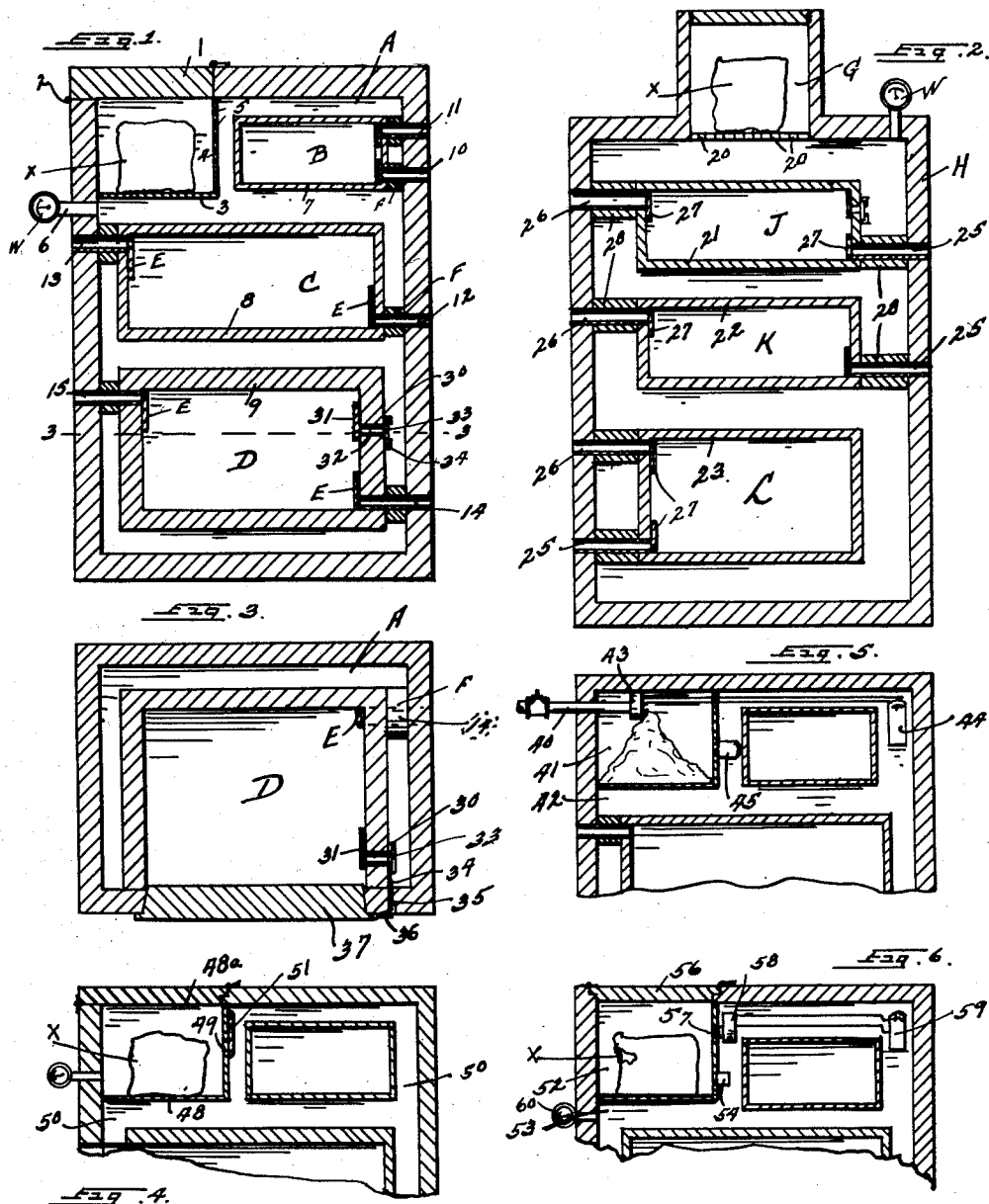
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2,107,538

REFRIGERATOR

Filed Sept. 13, 1934

2 Sheets-Sheet 1



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Fig. 7.

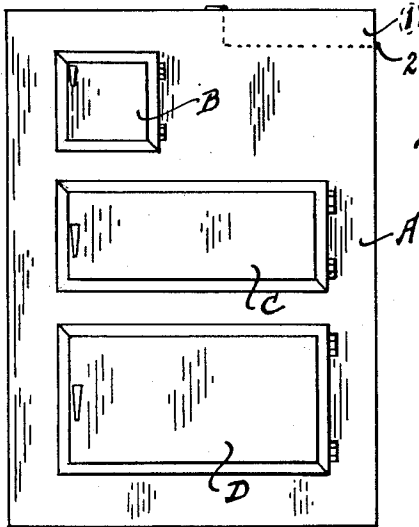
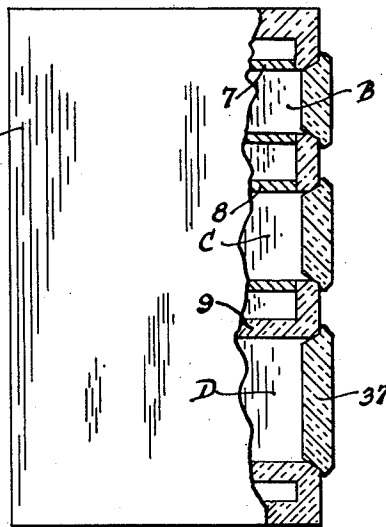


Fig. 8.



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2,107,538

REFRIGERATOR

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Application September 13, 1934, Serial No. 743,857

8 Claims. (Cl. 62—91.5)

My invention relates to refrigeration and has for its object to provide a new and efficient dry ice refrigerator.

A further object is to provide a dry ice refrigerator having different chambers therein, each to maintain a certain predetermined temperature.

A still further object is to provide a refrigerator which will have separate food compartments, each to maintain a predetermined temperature and each of which may be supplied with a door actuated closure valve to introduce a sudden rush of cold into the compartment when the door has been opened and then closed.

A still further object is to provide a carbon dioxide refrigerator having a compartment in which the solid dioxide is placed with one chamber mounted near the solid carbon dioxide for quick freezing and maintaining low temperatures below zero, and other compartments either controlled by thermostats or by insulation to maintain predetermined temperature.

A still further object is to provide a carbon dioxide refrigerator which will have the carbon dioxide introduced therein through a thermostatically controlled discharge pipe from a separate source of fluid carbon dioxide under pressure.

A still further object is to provide a carbon dioxide refrigerator which has a closed compartment for receiving the ice, and the outlet from the compartment into the refrigerator casing is controlled by the temperature in the casing.

These objects I accomplish with the device illustrated in the accompanying drawings in which similar numerals and letters of reference indicate like parts throughout the several views and as described in the specification forming a part of this application and pointed out in the appended claims.

In the drawings I have shown figures:

Figure 1 as a vertical section of a refrigerator having several food chambers and with the solid carbon dioxide chamber mounted in one corner of the entire refrigerator casing.

Figure 2 is a vertical section of a refrigerator having the ice compartment built above the housing casing of the refrigerator as an easily accessible unit.

Figure 3 is a section on line 3—3 of Figure 1.

Figure 4 is a sectional view of a portion of the refrigerator showing the ice in a separate valve controlled compartment.

Figure 5 is a view of a portion of a refrigerator showing the use of carbon dioxide snow from a

separate source such as a supply tank of carbon dioxide.

Figure 6 is a view similar to Figure 4 showing the outlet from the ice compartment thermostatically controlled.

Figure 7 is a front elevation of the refrigerator.

Figure 8 is a side elevation of the same parts cut away to show the doors for the compartments.

This invention is a continuation in part and improvement over my former patent application for Portable dry ice refrigeration, filed in the Patent Office Sept. 25, 1933, under Serial Number 690,873, issued January 14, 1936, as Patent No. 2,027,382.

In the drawings in Figure 1, I have shown a casing A preferably rectangular in form having one corner provided with an opening thereinto with a cover 1 hingedly connected thereto by hinges 2 and having the area under the opening provided with an ice support plate 3 with the sides closed as 4 with ports 5 therethrough to allow the gas from the refrigerant to spread throughout the casing A.

In one side or through the top of the casing A I provide a blow off valve 6 with a pressure gauge W formed therewith to show the pressure within the casing A. Within the casing A I then provide the separate food chamber B, C, and D. The chamber B is formed with very thin side walls 7 with practically no insulation therein so that food placed in this compartment might be very quickly frozen. Under the ice support and the chamber B I then mount the two chambers C and D with the chamber C spaced above the chamber D. Each chamber has the walls thereof formed to provide different temperatures within the chamber, due to the thickness of the insulation or the kind of insulation used. The chamber C has the walls 8 shown as made thicker than the walls 7 of the chamber B and with more insulation therein and the chamber D has the walls 9 shown thicker than the walls 8 of the chamber C. This, however, may not always be the case as different types of insulation may be used in the different walls 7, 8, and 9 to vary the temperatures in the respective chambers as desired and the thickness of the insulation nor the type of insulation should be considered as much as the fact that each chamber has a different temperature.

Further ways of varying the temperature in these three chambers are shown by inlet pipes 10 and 11 which lead into the chamber B, pipes 12

and 13 which lead into the chamber C, and pipes 14 and 15 which lead into the chamber D. These pipes are insulated by insulating means shown as F completely surrounding the pipes and the inside end of each pipe is open to the interior of its respective chamber and with the outside end of each pipe open to the atmosphere or surrounding air around the refrigerator. The inner end of each pipe is provided with a thermostatic valve E so made that it will open the end of the pipe at a predetermined temperature to allow cross draft or circulation of air through each chamber. Thus, the temperature of each chamber is controlled by the warm atmospheric air entering and passing through the chamber.

In Figure 2, I have shown the ice compartment as G mounted centrally on the top of the casing H with ports 20 to allow the gas from the ice to enter the entire chamber G. Within the chamber G, I then mount the separate food chambers J, K, and L. The side walls 21, 22, and 23, of the chambers J, K, and L, respectively, are made of like insulation, but each chamber is provided with inlet pipe 25 and outlet pipe 26 to provide entrance and circulation of air and each pipe is controlled by a thermostat valve 27 with the valve set at a predetermined position to open or close at a certain temperature. Each pipe is insulated with insulation 28 the same as the walls of the chambers. In this type of refrigerator the temperature in each chamber is controlled solely by the circulation of air and not through the type or amount of insulation in the walls of each chamber.

Each chamber may or may not be provided with a quick cooling system which is shown in part of the chambers, but is not shown in all of them as it will be optional as to whether this is built into the refrigerator or not, depending upon whether extreme quick return to cold temperatures is desired in all chambers or not. This consists of a port 30 entering the chamber in which the food is placed as shown in chamber D in Figure 1. This port passes through the wall in the chamber and the inner end is controlled by a thermostat valve 31. The port is made of a pipe 32 through the insulation of the chamber. The outside end of the port or pipe is provided with a slide valve 33 carried in guides 34 and operated by a bar 35. The bar 35 is connected to a lever 36 which is formed as a part of the hinge of the door 37 of the chamber D, thus, when the door is open the lever and link bar close the valve 33 over the end of the port 30, preventing escapement of gases from the casing A and through the chamber D, but, when the door is closed the port is opened and remains open on the slide valve side until the door is again opened. Thus, a quick shot of carbon dioxide gas is introduced into the chamber D through this port and when the temperature in the closed chamber D equals that desired, the thermostatic valve 31 closes off the inner end of the port. This applies to all times when the chamber exceeds a certain predetermined temperature this port will be opened allowing a charge of gas to enter the food chamber and cool it down quickly.

In Figure 5 the ice is not placed in the ice chamber, but is formed therein from a tank or other supply of carbon dioxide liquid which has been stored under pressure so that the liquid when passing through the tube 40 into the ice chamber 41 will be formed into semi-solid carbon dioxide by the expansion which takes place upon leaving the end of the tube. This will keep the

chambers and the interior of the refrigerator casing 42 cool. A thermostatically controlled valve 43 will be provided to control the flow of the liquid into the chamber 41 and the thermostat 44 will be set to any predetermined temperature desired, to keep the interior of the casing 42 cold.

This thermostatically controlled valve 43 may be any of the types on the market for similar purposes with any necessary electrical controls if needed to operate the valve. The chamber 41 will be provided with a blow off valve 45 to allow excess pressure to escape from the chamber 41 into the casing 42. The type shown being a ball check valve or other types may be used.

In Figure 4 I have shown the refrigerator as a casing 50 having an ice chamber 48 therein with a lid 48a therefor through which the block of dry ice may be inserted. A valve 51 will be provided for the passage of gas through the port 49 into the interior of the refrigerator casing 50 to control the flow of gas from the ice and make the ice last longer than when free escapement is allowed of the gas into the refrigerator casing. This ice chamber 48 may be insulated if desired or found necessary.

In Figure 6 I have shown the ice chamber as 52 in the casing 53 with a blow off valve 54 to allow excess pressure in the chamber 52 to pass into the casing 53 and allow excess pressure to escape to the atmosphere through the valve 60. The ice is placed in the chamber 52 through the lid 56 and the passage of gas from the ice into the casing 53 is through a controlled port 57 with the valve 58 to control the port. The valve 58 is of the electrical control type and a thermostat 59 mounted in the casing 53 controls the valve and port, therefore, the flow of gas into the casing 53; this also provides a constant predetermined temperature in the casing. Thus, the various food chambers as controlled either by the degree of insulation, or the passage of circulating air therethrough, or the combination of both, will be kept at a predetermined temperature.

Having thus described my invention I desire to secure by Letters Patent and claim:

1. In a refrigerator, the combination of a casing; means to introduce carbon dioxide gas thereinto to cool said casing; means to control the flow of said gas thermostatically; separately insulated closed food chambers in said casing; and means to maintain a predetermined temperature in each chamber.

2. In a refrigerator, the combination of different closed food chambers so constructed, by insulation means, as to maintain different temperatures in each chamber; a door for each chamber; and means by the opening and then the closing of each door to introduce an extra inflow of cold into the respective chamber.

3. In a refrigerator, the combination of a casing; separate food chambers in said casing to maintain different temperatures in each chamber; a pipe to introduce carbon dioxide liquid from an exterior source into a closed compartment in said casing; and means to regulate the forming of the carbon dioxide from the pipe into solid carbon dioxide within the compartment by the temperature in the casing.

4. In a refrigerator, the combination of a casing; separate food chambers in said casing; a carbon dioxide compartment in said casing; means to discharge carbon dioxide gas from said compartment into said casing; means to control the discharge of carbon dioxide gas from said

compartment into said casing; and means to thermostatically control the forming of the solid carbon dioxide within the compartment, depending upon the temperature in the casing.

5 5. In a refrigerator the combination of a casing; separate food chambers carried in said casing; a carbon dioxide compartment in said casing; means to form carbon dioxide ice in said compartment from an exterior source of carbon dioxide gas under pressure; means to discharge
10 sublimed carbon dioxide gas from said carbon dioxide chamber into said casing entirely surrounding said food chambers; a thermostat in said casing exterior of said carbon dioxide compartment to control the flow of carbon dioxide
15 gas from said compartment into said casing; pipes connecting each food chamber with the atmosphere; and thermostatic means to control the flow of air through said pipes depending
20 upon the temperature within each food chamber.

6. In a refrigerator of the class described, the combination of a casing; separate food chambers in said casing; insulation surrounding said chambers to control the amount of cold allowed to
25 enter said chambers; a carbon dioxide compartment

in said casing; means by a thermostat to control the flow of carbon dioxide gas from said chamber into the casing surrounding said food chambers; and means to introduce air into and draw off atmospheric air from said food chambers. 5

7. In a refrigerator, the combination of a casing; separate food chambers in said casing; a door for each food chamber; means to cool the interior of said casing by introduction of carbon dioxide gas; means to allow some of said gas to enter one of said chambers when the door has been opened and then closed; and means to introduce air from the atmosphere into and from said food chambers. 10 15

8. In a refrigerator, the combination of a casing; separate food chambers in said casing; a door for each food chamber; means to introduce carbon dioxide gas into said casing surrounding said food chambers; means to control the amount of gas in said casing by thermostat; means in each food chamber to introduce air from the atmosphere; and other means to allow air to pass from said chamber. 20 25

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