March 15, 1949. L. A. McDONALD 2,464,522

REFRIGERATOR COOLED BY DRY ICE AND WATER ICE

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Fig 1.

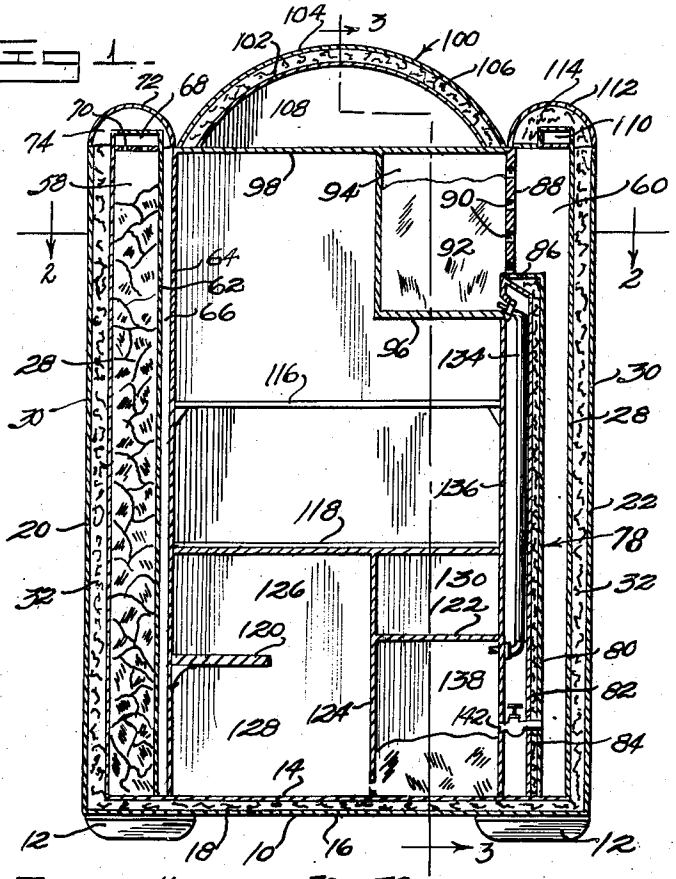
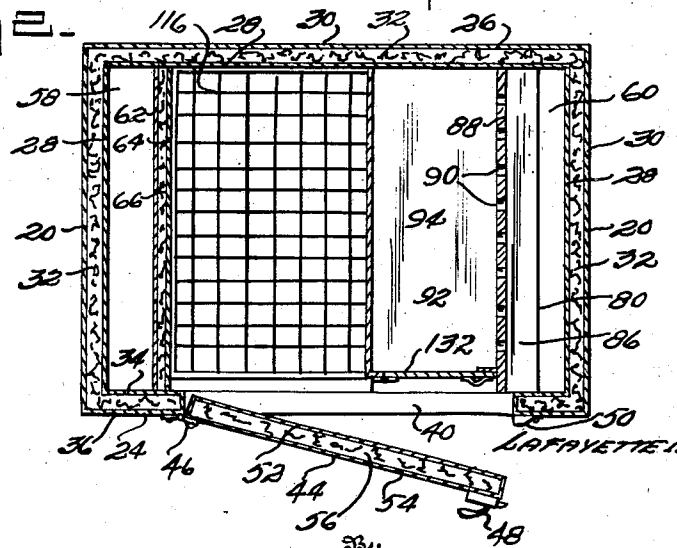



Fig 2.




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Fig 3.

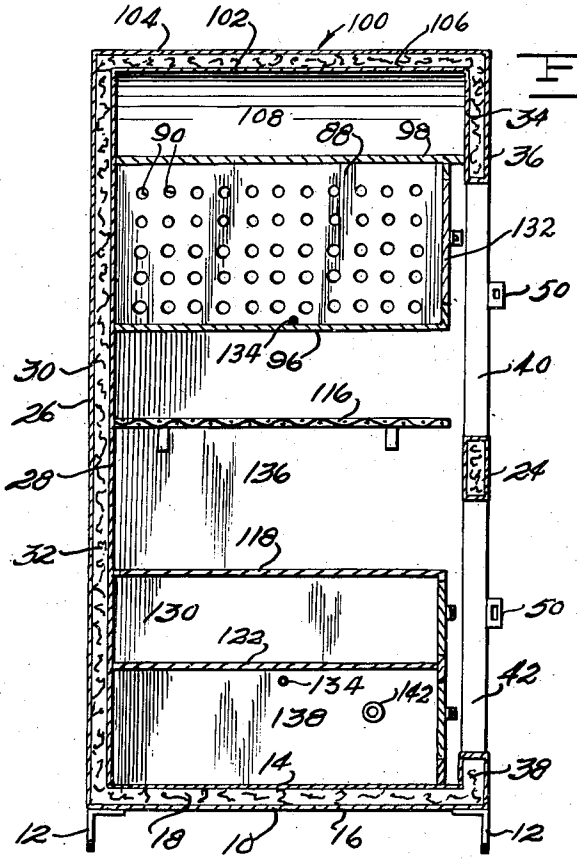
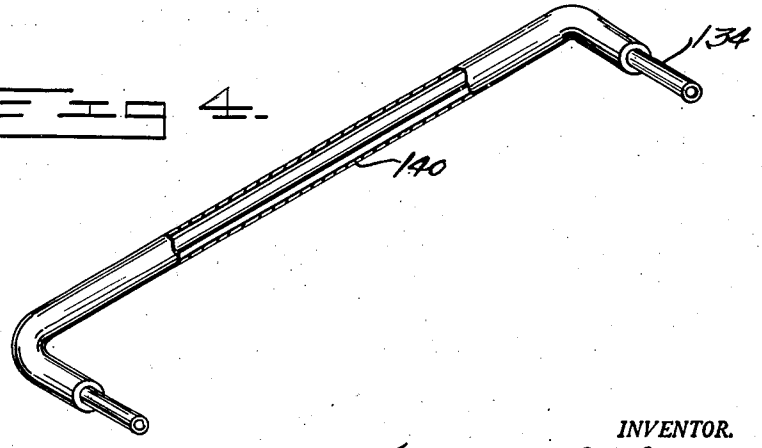



Fig 4.




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## REFRIGERATOR COOLED BY DRY ICE AND WATER ICE

Lafayette A. McDonald, Los Angeles, Calif., assignor of twenty-two and two-ninths per cent to Luther A. Merriwether, twenty-two and two-ninths per cent to James C. York, and twenty-two and two-ninths per cent to Lee A. Merriwether, all of Los Angeles, Calif.

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4 Claims. (Cl. 62—91.5)

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This invention relates to improvements in refrigerators.

An object of the invention is to provide a refrigerator which employs as a cooling agent a supply of solid carbon dioxide ice, commonly known as "dry ice."

Another object of the invention is to provide a refrigerator which employs as cooling agents, both solid carbon dioxide ice and water ice, so disposed as to cooperate for efficient and long lasting cooling effect.

A further object of the invention is to provide a refrigerator of the character described, which is simple in design, inexpensive to manufacture, and which is adapted to provide farmers, ranchers and homesteaders in remote areas, with natural ice indefinitely, without requiring the use of electricity or mechanical works.

Still another object of the invention is to provide a refrigerator of the type described, which avoids wastage of ice drippings by conducting them to a conservative compartment where they are re-frozen, the latter compartment being automatically regulated.

Other objects and advantages of the invention will become apparent from the following description of a preferred embodiment thereof as illustrated in the accompanying drawings, and in which:

Figure 1 is a sectional front elevation of my improved refrigerating device.

Figure 2 is a sectional plan view taken on line 2—2 of Figure 1.

Figure 3 is a sectional elevation taken on line 3—3 of Figure 1, and

Figure 4 is a perspective broken out view of a section of drainage tubing employed in the device.

In order to understand clearly the nature of the invention and the best means for carrying it out, reference may now be had to the drawings, in which like numerals denote similar parts throughout the several views.

As shown, my refrigerator or ice box includes a floor member 10 supported upon four legs 12, and formed of inner and outer layers 14 and 16 of sheet metal spaced to receive therebetween a layer 18 of insulating filling or packing material such as cork, rock wool, or other efficient insulation. The ice box also has left and right end walls 20 and 22 and front and rear walls 24 and 26.

The side and rear walls are also formed of inner and outer layers 28 and 30 of sheet metal suitably spaced to receive therebetween a relatively thick layer 32 of insulating filling or packing material such as cork, rock wool or other efficient insulation. The front wall 24 is also formed of inner and outer layers 34 and 36 of sheet metal suitably spaced to receive rock wool or other suitable insulation 38. However, as shown best in Figures 2 and 3, openings 40 and 42 are formed in the front wall 24 to receive upper and lower doors 44 which are hinged to the wall along one edge at 46 to afford access to the interior of the refrigerator, the doors carrying locks 48 on their opposite vertical edges for engagement with sockets 50 carried on the abutting portions of the door openings, to lock the doors when desired.

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The doors 44 are also formed of inner and outer layers 52 and 54 of sheet metal suitably spaced to receive a thick layer 56 of insulating material such as rock wool or cork, the edges of the doors, like those of the doorway openings, being closed with sheet metal as shown, to retain the insulation. Inside the ice box thus formed, there are disposed left and right hand Dry Ice compartments 58 and 60 for the reception of quantities of solid carbon dioxide.

The left hand Dry Ice compartment 58 has a right hand wall formed of inner and outer layers 62 and 64 of sheet metal spaced to receive a relatively thin layer 66 of insulating material therebetween, the said wall being secured in place as shown, to define the left hand Dry Ice compartment 58 between it and the outer wall 20 of the refrigerator. An elongated compartment 68 formed of sheet metal is supported above the Dry Ice compartment 58, its bottom wall 70 being perforated as shown, to keep its contents at or below freezing temperature, due to the refrigerating effect of the Dry Ice, this compartment being particularly suitable for such foods as ice cream and frozen meats.

An arched outer covering sheet 72 formed of sheet metal encloses the chamber 68, being spaced therefrom as shown in Figure 1, to receive the insulating material 74. On the right hand side of the refrigerator, the Dry Ice chamber 60 has an inner wall 78 formed of inner and outer layers 80 and 82 of sheet metal suitably spaced to receive a thin layer 84 of insulation, the wall being closed on top by a cross sheet 86 and surmounted by an upstanding dividing partition wall section 88, which is also formed of sheet metal and is provided with a number of holes 90, as best seen in Figure 3.

When Dry Ice is placed in the compartment 60, the coolness of the Dry Ice may seep through the holes 90 to preserve the water ice 92 which is

placed in the natural ice compartment 94 and supported upon its floor 96. The refrigerator has a ceiling member 98 formed of sheet metal, and supporting an arched cover member 100 formed of inner and outer arched layers 102 and 104 of sheet metal spaced to receive therebetween a thick layer 106 of insulating material. The arched cover member 100 thus defines therebeneath an upper Dry Ice compartment 108 which may be filled with a supply of Dry Ice. An elongated food storage compartment 110, similar in construction to compartment 68, is supported above the right hand Dry Ice compartment 60, as shown in Figure 1, and is surmounted by the arched cover member 112 formed of sheet metal and spaced therefrom to receive a thick layer 114 of insulating material.

The interior of the refrigerator is divided by shelves 116, 118, 120, 122 and partition wall 124, into food compartments. These compartments, as seen best in Figure 1, are adapted to receive various types of perishable foods requiring refrigeration, the compartments 126, 128 and 130, being intended particularly for creamery products, vegetables, and meats respectively. The uppe rice chest 94 is closed by means of an inner hinged door 132, as shown in Figure 2, and has a drainpipe 134 extending vertically through the space behind the right hand inner wall 136 of the refrigerator and the lightly insulated wall 70 of the Dry Ice compartment 60. The drainpipe 134 has its upper end extending inside the ice chest 94 to receive melted ice in the form of water therefrom and conduct it into the lower refreezing compartment 138 into which its lower end extends.

As shown best in Figure 4, the drainpipe 134 is surrounded by an outer jacket 140 spaced therefrom to receive liquid having a low freezing point, such as anti-freeze liquid, the ends of the jacket being sealed at both ends in any suitable manner, such as by means of jam nuts, to prevent leakage of the anti-freeze liquid therefrom. The anti-freeze liquid filled jacket will protect the drainpipe 134, allowing the water to flow freely therethrough, and not freeze.

To refreeze the natural ice drippings in compartment 138, a conduit 142 may be inserted therein to conduct cold Dry Ice vapors from the lower end portion of the Dry Ice chamber 60, with a hand valve in the conduit and accessible to the user of the ice box, for lowering the temperature of the water in the compartment 138 sufficiently to freeze it into a block of ice again. The ice may then be lifted out of compartment 138 and placed in ice chest 94.

The compartments 130 and 138 also have hinged doors as shown in Figure 3, and a temperature gauge with visible dial may be placed in the door of the compartment 138 to indicate when the ice drippings therein have been refrozen.

Although I have described a preferred embodiment of my invention in specific terms, it is to be understood that various changes may be made in size, shape, materials and arrangement without departing from the spirit and scope of the invention as claimed.

I claim:

1. A refrigerator comprising insulated outer left and right side walls, front and rear walls, top and bottom walls, said front walls having door apertures formed therein, doors hinged in said apertures to afford access to the inside of the refrigerator, left and right inner side walls



inside said refrigerator and spaced from the aforementioned outer side walls and defining therebetween left and right Dry Ice storage compartments, an inner top wall spaced from said aforementioned outer top wall and defining therebetween an upper Dry Ice storage compartment, ice chest means formed inside said refrigerator to receive a block of natural water ice, means for conducting cold Dry Ice vapors from said Dry Ice compartments into said ice chest whereby the rate of melting of the water ice is substantially reduced, refreezing compartment means disposed below said ice chest means, conduit means communicating between said ice chest means and said refreezing compartment means for conducting melted ice water into the refreezing compartment means, jacket means for blocking the freezing of said ice water in the conduit means, and valve means for admitting cold Dry Ice vapors into said refreezing compartment means to refreeze said ice water into a block of natural ice.

2. In a refrigerator, the combination with a compartment adapted to receive a body of water ice and an adjacent compartment adapted to contain a body of Dry Ice for retarding the melting of said water ice, of a drainage conduit for said first-mentioned compartment, a re-freezing compartment adapted to receive drainage water from said conduit, and said re-freezing compartment being juxtaposed to said second-named compartment whereby said Dry Ice therein is adapted to re-freeze said drainage water as it is received in said re-freezing compartment.

3. In a refrigerator, the combination with a compartment adapted to receive a body of water ice and an adjacent compartment adapted to contain a body of Dry Ice for retarding the melting of said water ice, of a drainage conduit for said first-mentioned compartment, a re-freezing compartment adapted to receive drainage water from said conduit, said re-freezing compartment being juxtaposed to said second-named compartment whereby said Dry Ice therein is adapted to re-freeze said drainage water as it is received in said re-freezing compartment, and said re-freezing compartment being substantially identical to said first-named compartment, whereby a re-frozen body of water is replaceable in said first-named compartment.

4. In a refrigerator, the combination with a compartment adapted to receive a body of water ice and an adjacent compartment adapted to contain a body of Dry Ice for retarding the melting of said water ice, of a drainage conduit for said first-mentioned compartment, means insulating said conduit, a re-freezing compartment adapted to receive drainage water from said conduit, and said refreezing compartment being juxtaposed to said second-named compartment whereby said Dry Ice therein is adapted to re-freeze said drainage water as it is received in said refreezing compartment.

LAFAYETTE A. McDONALD.


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