

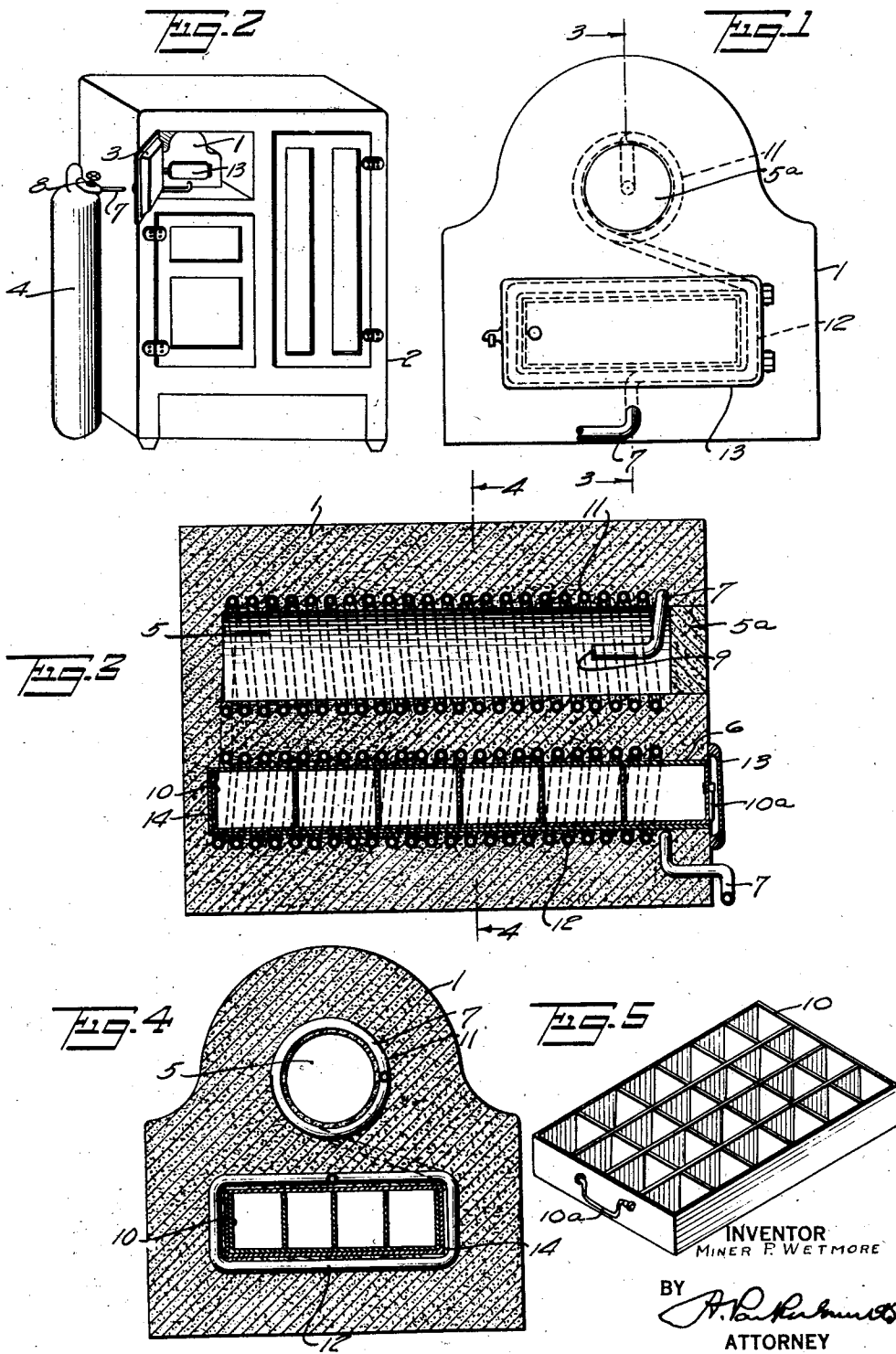
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REFRIGERATING DEVICE

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REFRIGERATING DEVICE

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My invention relates to refrigeration without the use of ice and is more particularly designed to produce a simple apparatus or unit which can be connected to a commercial container of liquid carbon dioxide and inserted in the ice compartment of any ordinary refrigerator and therein function like the ordinary block of ice.

The best form of apparatus embodying my invention at present known to me, and the best method of operating the same are illustrated in the accompanying sheet of drawings in which:

Fig. 1 is an end view of the refrigerating unit.

Fig. 2 is a perspective view of a refrigerator with said unit installed therein.

Fig. 3 is a vertical, longitudinal section on line 3—3 of Fig. 1.

Fig. 4 is a vertical cross section on line 4—4 of Fig. 3 and

Fig. 5 is a perspective view of a convenient form of pan for holding liquids to be frozen into ice in said refrigerating unit.

Throughout the drawings like reference characters refer to like parts. 1 is a block of concrete preferably made of a mixture of about one part hydraulic cement with ten parts clean cinders so as to render said block moderately porous in structure. In other words, block 1 is artificial stone cast or molded from a plastic mixture. 2 is any convenient form of refrigerator with the door of the ice compartment 3 shown open and block 1 located therein. 4 is a commercial container of liquid carbon dioxide provided with the usual regulating outlet valve 8 connected to the pipe or copper tubing 7 which extends into the refrigerator and connects with the block 1 in a manner hereinafter described.

The block 1 is molded with certain coils of the pipe 7 embedded therein and with the open end 9 of said pipe discharging into a closed cavity 5 molded therein. As shown, the block 1 is also provided with a second cavity 6 which is open to the atmosphere at one end when said end is not closed by door 13. The pipe 7 is coiled around this sec-

ond cavity 6 in a spiral 12 and then extends around the first cavity 5 in coil 11.

10 is any convenient form of pan for holding water or other liquid to be frozen, which pan is preferably divided up into compartments as shown in Fig. 5 so as to form a series of cubes of ice and is of a shape and size to be inserted in the cavity 6 as shown in Figs. 3 and 4. 14 is a case or any convenient form of lining for the cavity 6 which may, however, be dispensed with. Cavity 5 is originally formed with one end open, said end being afterwards closed by plug or cover of cement 5a. Door 13 may be omitted and pan 10 may have a handle 10a as shown in Fig. 5.

In the operation of my invention, the valve 8 is open sufficiently to permit a small stream of liquid carbon dioxide or the highly condensed vapor therefrom to pass into or through pipe 7. This carbon dioxide expands rapidly in the coil 12 chilling the cavity 6 to a point considerably below the freezing point of water. The partly expanded gas then passes on to coil 11 where it further expands and finally condenses in the form of snow in the cavity 5 or in the pores of the block 1 into which it passes in the effort to escape to the atmosphere. The deposition of the snow in the cavity 5 and in the pores of the block 1 eventually checks the further outflow of gas and valve 8 can then be closed off. The result of the above operation is to produce in the ice chamber 3 of the refrigerator a block of material at or below the temperature of ice, said material being of moderate heat conducting capacity and moderate specific heat. This will cool the interior of the refrigerator for a long time. As the temperature of the block 1 rises, the evaporation of carbon dioxide snow in cavity 5 and in the pores of block 1 increases and absorbs more heat and thereby continues the cooling action of the block 1. When the snow has all been evaporated and the block 1 raised to a temperature above that desired in the refrigerator, the valve 8 is reopened and the above described operation repeated. While I prefer to make the concrete of ten parts cinders to one of cement, the propor-

tion of cinders may be decreased if desired. Generally, however, as large a proportion as possible of cinders is used, as they increase the porosity of the mass and thereby extend the distribution of the carbon dioxide snow. It is evident that the carbon dioxide snow (commonly called dry ice) can be introduced directly into chamber 5 through the open end formed by removing plug 5a. Also, instead of using chamber 6 to hold a pan for freezing cubes of ice, I may fill it with CO₂ snow, it being immaterial in which chamber of the porous block the refrigerant is placed. In a simplified construction, the block 1 need have only one chamber into which the dry ice or CO₂ snow is introduced.

Having described my invention, I claim:

1. As a new article of manufacture, a refrigerating unit which comprises a block of moderately porous material of moderate heat conducting capacity having a closed cavity therein and means for depositing in said cavity a mass of material capable of vaporizing at room temperatures.

2. As a new article of manufacture, a refrigerating unit which comprises a block of moderately porous material of moderate heat conducting capacity having a closed cavity therein and means for depositing in said cavity a mass of material capable of vaporizing at room temperatures, said means comprising a container of liquid carbon dioxide and a pipe connecting said container with said cavity.

3. As a new article of manufacture, a refrigerating unit which comprises a block of moderately porous material of moderate heat conducting capacity having a closed cavity therein and means for depositing in said cavity a mass of material capable of vaporizing at room temperatures, said means comprising a container of liquid carbon dioxide and a pipe connecting said container with said cavity, a considerable portion of which pipe is embedded in said block but has an open end located in said cavity.

4. As a new article of manufacture, a refrigerating unit which comprises a block of moderately porous material of moderate heat conducting capacity having a closed cavity therein, a second cavity, open at one end, and a pipe for conducting a liquid capable of rapidly evaporating at room temperature embedded in said block, coiled around said second cavity and terminating at its open end in said first cavity.

5. A structure such as defined in claim 4 combined with a pan for holding liquids, which pan is adapted to fit in said second cavity.

6. A structure such as defined in claim 4 combined with a pan for holding liquids, which pan is adapted to fit in said second cavity, and a door adapted to close the open end of said second cavity.

7. As a new article of manufacture, a refrigerating unit which comprises a block of porous concrete having a closed cavity therein, and a tube molded into said concrete and opening into said cavity.

8. As a new article of manufacture, a refrigerating unit which comprises a block of porous concrete composed of one part hydraulic cement and ten parts cinders, and having a closed cavity therein, and a tube molded into said concrete and opening into said cavity.

9. A refrigerating unit comprising a heat-absorbing and heat-retaining container adapted to hold a supply of solidified carbon dioxide and pervious to the escape of carbon dioxide gas.

10. A refrigerating unit comprising a heat-absorbing and heat-retaining body having a chamber for holding a supply of solidified carbon dioxide, said body having a wall pervious to the escape of carbon dioxide gas.

11. A refrigerating unit comprising a block of porous cement, and a tube extending into said block and adapted to be connected with a source of solidified gaseous refrigerant which gradually passes through the material of said block amid lowering of temperature.

12. A refrigerating unit comprising a block of heat-absorbing and heat-retaining material pervious to the passage of a gaseous refrigerant, and a tube extending into said block and connected with a source of solidified gaseous refrigerant, whereby the refrigerant gas enters said block through said tube and gradually passes through the block into the surrounding space amid lowering of temperature.

13. A refrigerating unit comprising a block of porous cement, means for introducing carbon dioxide gas into said block which permits diffusion of the gas through its pores and thereby becomes a cold mass at or below the temperature of ice, the refrigerating gas finally escaping into the surrounding space.

14. A refrigerating unit comprising a block of heat-absorbing and heat-retaining material pervious to the escape of refrigerating gas, a tube extending into said block for introducing refrigerating gas which diffuses through the block and lowers its temperature, a case in said block, and a removable pan or drawer fitting into said case.

15. A refrigerating unit comprising a block of heat-absorbing and heat-retaining material pervious to the escape of refrigerating gas, a tube extending into said block for introducing refrigerating gas which diffuses through the block and lowers its temperature, a case in said block, and a removable pan or drawer fitting into said case, said tube having a portion closely adjacent to said case to increase the cooling effect of the gas in the freezing chamber formed by the case.

16. A refrigerating unit comprising a

block of porous cement, a tube extending into said block for introducing carbon dioxide gas which diffuses through the pores of the block and lowers its temperature, a case in
5 said block, and a removable pan or drawer fitting into said case, said tube having a coiled extension surrounding said case to increase the cooling effect of the gas in the freezing chamber formed by the case,

10 17. In the art of refrigerating through the agency of solidified carbon dioxide, the improvement which consists in charging a block of porous cement or like material with carbon dioxide which gradually passes
15 through the porous block and thereby cools it to a temperature as low as or lower than that of ice.

18. A refrigerator unit adapted to freeze cubes of ice and the like, comprising a block
20 of heat-absorbing and heat-retaining material provided with an upper chamber for holding solid CO_2 , means to allow the escape of gas through a wall of said chamber, a lower chamber in said block, and a drawer for
25 receiving substances to be frozen and adapted to be inserted in said lower chamber.

19. As a new article of manufacture for use in refrigerating systems employing carbon dioxide, a block of porous cement having
30 means for discharging carbon dioxide gas therein, said block being pervious to the escape of carbon dioxide gas.

20. As a new article of manufacture for use in refrigerating systems, a cast stone
35 cooling unit provided with a chamber for receiving a charge of solid CO_2 , means to allow the escape of gas through a wall of said chamber, a sharp freezing chamber also formed in said stone cooling unit, refrigerant
40 conducting conduits positioned in heat conducting relation to said sharp freezing chamber and surrounding said CO_2 chamber and indirect communication with the interior thereof, the walls of the cooling unit
45 adjacent the CO_2 chamber and the sharp freezing chamber being sufficiently thick to act as a conductor and retainer of cold.

21. As a new article of manufacture for use in refrigerating systems, a cast block of
50 heat absorbing and heat retaining material provided with a chamber for receiving a charge of solid CO_2 , means to allow the escape of gas through a wall of said chamber, a sharp freezing chamber also formed of said
55 heat absorbing and heat retaining material, refrigerant conducting conduits positioned in heat conducting relation to said sharp freezing chamber, said CO_2 chamber, and to said material, the walls of said block adjacent
60 said chambers and said conduits being sufficiently thick to act as a hold-over.

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