March 20, 1934. S. T. SHERRICK 1,951,679

REFRIGERATING APPARATUS

Filed Nov. 3, 1930

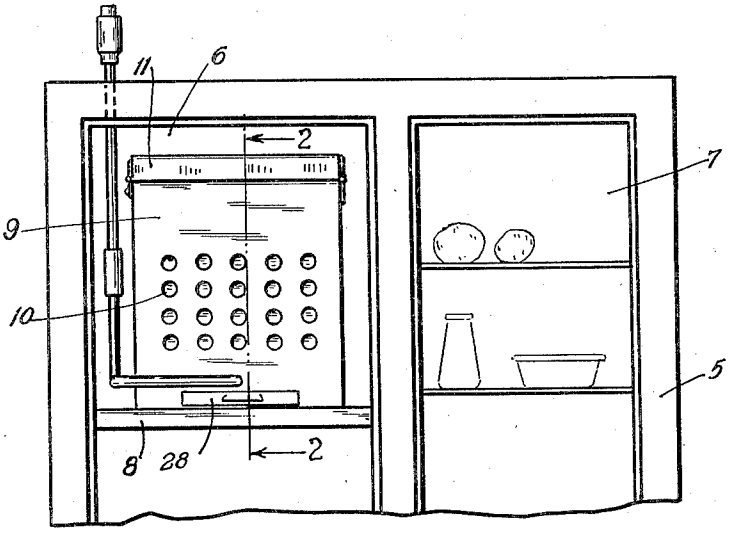


Fig. 1.

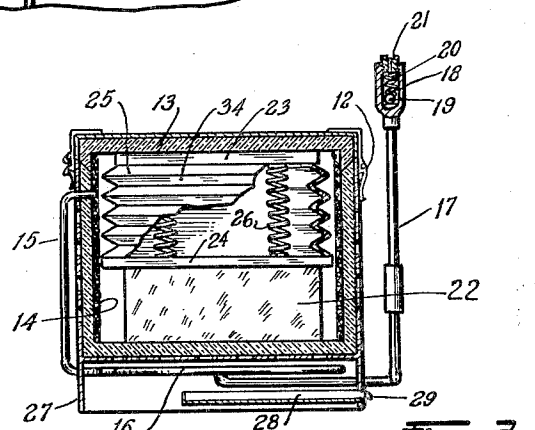


Fig. 2.

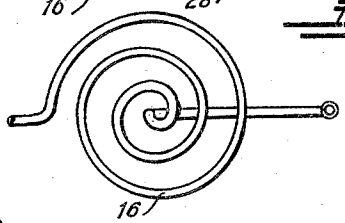


Fig. 3.

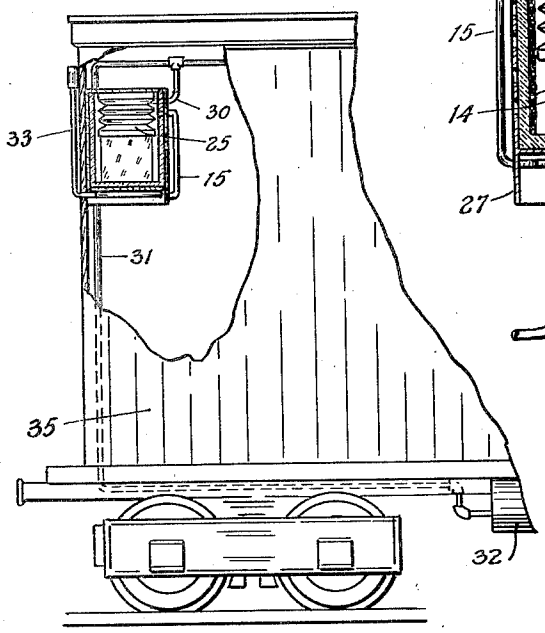


Fig. 4.

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1,951,679

UNITED STATES PATENT OFFICE

1,951,679

REFRIGERATING APPARATUS

Samuel T. Sherrick, Denver, Colo., assignor of forty-nine one-hundredths to Charles Diehl, Denver, Colo., and fifty-one one-hundredths to S & C Holding Corporation, Denver, Colo., a corporation of Colorado

Application November 3, 1930, Serial No. 493,098

11 Claims. (Cl. 62—91.5)

My invention relates to refrigerating apparatus. The apparatus is primarily intended for the use of solidified carbon dioxid (CO_2). Important objects of the invention are to retard and control the vaporization of the solidified carbon dioxid, whereby it lasts longer, and to control the vaporization automatically.

Another object of the invention is to discharge vapors from the solidified carbon dioxid outside the food chamber of the refrigerator. The carbonic acid gas is harmful in a refrigerator chamber, since it ripens and destroys the taste of fruit. Moreover, the solidified carbon dioxid does not have to be absolutely pure or free from objectionable ingredients when the gas therefrom does not come in contact with food in the refrigerator.

Still another object of the invention is to automatically reduce the size of the space inside the chamber for the solidified carbon dioxid, as the volume of same diminishes, whereby the air space is progressively reduced and the vaporization continuously retarded.

Further objects of the invention are to provide for an automatic exhaust of carbon dioxid gas.

Other objects reside in novel details of construction and in novel combinations and arrangements of parts, which will appear in the course of the following description.

In the drawing, like reference characters designate similar parts in the several views.

Figure 1 is a broken elevation of a refrigerator to which my invertion has been applied.

Figure 2 is a vertical section taken on the line 2—2 of Figure 1.

Figure 3 is a bottom view of a coil comprised in the invention.

Figure 4 is a broken elevation of a refrigerated railway car, showing a modification of my invention applied thereto.

Referring more in detail to my invention, the reference numeral 5 generally designates a refrigerator, having a cooling chamber 6 and a food chamber 7. The cooling chamber 6 has a shelf 8, upon which is supported my cooling unit.

A box 9 of the cooling unit contains apertures 10, which avoid the necessity of de-frosting the unit, for frost will not collect in said openings in sufficient thickness to prevent the radiation of cold air from the unit. A lid 11 is fastened on the body of the box 9 by any suitable fastening means 12.

The box, including the lid, is lined with insulation 13. While it is not essential, I prefer to use the insulation described in my co-pending application Serial No. 493,099, now matured into Patent No. 1,888,437. A screen 14 may be employed to assist in holding the insulation in place and to protect same. A pipe 15 opens into the interior of the unit at a point above the openings 10, in the zone of warmer gas, and connects with a coil 16 below the bottom of the ice chamber. The coil in turn connects with an outlet pipe 17, which carries a pop-valve 18.

The valve comprises a ball valve 19 moved towards its seat by a spring 20. An adjusting, threaded plug 21 bears against the spring 20.

A block of solidified carbon dioxid is shown at 22. As it vaporizes, the volume of the solid is reduced. A follower 34 employed for progressively decreasing the air space in the box 9, as the ice block is reduced in size, includes an expansible member having a relatively stationary end wall 23 fastened on the lid of the box, a relatively movable end wall 24, and a substantially non-conductive collapsible wall 25, closed by the end walls. Springs 26 tend to move the end 24 away from the end 23 and extend the wall 25.

The box has an apron 27, which encloses and thereby protects the coil and provides a support for a freezing tray 28, provided with a handle 29 for its removal.

In the construction shown in Figure 4, springs are not used to extend the ice follower. The interior of the wall 25 is connected by pipe 30 with an air pipe 31 which runs to an air tank 32, a part of the air line of a train. Outlet pipe 33 extends outside of a refrigerator car 35, to which the unit is applied, to exhaust into the atmosphere. It seems clear without further illustration that the lid may be on the side as well as on the top of the box.

In the operation of my invention the lid 11 is removed from the box and a block of solidified carbon dioxid 22 is placed therein. The lid is then fastened in place by means 12. Due to the tackiness of the insulation, it becomes a virtual seal around the lid and renders the box substantially air tight. The walls 25 of the follower are collapsed in proportion to the size of the block of solidified carbon dioxid, and as same vaporizes, the follower is expanded by the springs 26. The smaller the air space, the less gas that is accumulated before exhausting and the less solidified carbon dioxid that is required to cool the air space within the box.

As the solidified carbon dioxid vaporizes, the cold caused thereby is slowly radiated thru the

insulation into the refrigerator. As the vaporization continues, the pressure in the box, in the pipes 15 and 17 and in the coil 16 is raised. When the pressure reaches a predetermined point, the gases exhaust thru the valve 18 into the atmosphere outside of the refrigerator.

The comparative slow radiation of the cold thru the insulation progressively reducing the air space in the box as the volume of the solidified carbon dioxid diminishes, and retarding the escape of CO_2 gases slow up and control the vaporization of the solidified carbon dioxid.

The operation of the construction shown in Figure 4 seems clear from the foregoing, since the only material difference in the operation is the use of compressed air for expanding the follower instead of springs. The air continuously tends to expand the follower, the same as the springs in Figure 2.

What I claim and desire to secure by Letters Patent is:

1. A refrigerating apparatus comprising a box having a space for solidified carbon dioxid, a collapsible follower in the box disposed to progressively occupy the space left by the carbon dioxid as same vaporizes, means continuously tending to expand the follower but held in check by the remaining solid carbon dioxid, and means to to emit gas from the box.

2. A refrigerating apparatus comprising a box having a space for solidified carbon dioxid, a collapsible follower in the box disposed to progressively occupy the space left by the carbon dioxid as same vaporizes, spring means continuously tending to expand the follower but held in check by the remaining solid carbon dioxid, and means to emit gas from the box.

3. A refrigerating apparatus comprising a box having a space for solidified carbon dioxid, a collapsible follower in the box disposed to progressively occupy the space left by the carbon dioxid as same vaporizes, means supplying compressed gas to the follower, continuously tending to expand the follower but held in check by the remaining solid carbon dioxid, and means to emit carbon dioxid gas from the box.

4. A refrigerating apparatus comprising a box having a space for solidified carbon dioxid, a collapsible follower depending in the box to progressively occupy the space left by the carbon dioxid as same vaporizes, the expansion of the follower being held in check by the remaining solid carbon dioxid, and means to emit gas from the box.

5. A refrigerating apparatus comprising a box having a space for a refrigerating material, a lid for the box, a collapsible follower fastened on and depending from the lid to progressively occupy the space left by the material as same is gradually dissipated, and means for the emission of spent products of the material.

6. A refrigerating apparatus comprising an insulated box having a space for refrigerating material, a follower in the box for following the refrigerating material as it is gradually dissipated, the box having an apron by which the box may be supported, and providing a cooling space, a pipe connecting with the box at a point rearward with regard to the direction of movement of the follower, the pipe passing thru the cooling space, and valve means providing an escape for gas from the pipe when the gas reaches a predetermined pressure.

7. A refrigerating apparatus comprising an insulated box having a space for refrigerating material, a follower in the box for following the refrigerating material as it is gradually dissipated, the box having an apron by which the box may be supported, and providing a cooling space, a pipe connecting with the box at a point rearward with regard to the direction of movement of the follower, the pipe passing thru the cooling space, valve means providing an escape for gas from the pipe when the gas reaches a predetermined pressure, and a cooling or freezing tray in the cooling space.

8. A refrigerating apparatus comprising an insulated box having a space for refrigerating material, a follower in the box for following the refrigerating material as it is gradually dissipated, the box having an apron by which the box may be supported, and providing ing a cooling space, a pipe connecting with the box at a point rearward with regard to the direction of movement of the follower, the pipe having a coil in the cooling space, and valve means providing an escape for gas from the pipe when the gas reaches a predetermined pressure.

9. A refrigerator having a chamber for perishables, and a metallic box for a refrigerant disposed to chill the chamber, a non-metallic composition insulating the box from the refrigerant, the box having a plurality of openings closed by the insulating material.

10. A refrigerator having a chamber to be refrigerated, and a refrigerating unit for the chamber, comprising a container having a space for solidified carbon dioxid, and means for reducing the cubic content of said space in ratio to the reduction of volume of the carbon dioxid.

11. In a refrigerating process consisting of cooling by vaporization of solidified carbon dioxid the steps of confining the solidified carbon dioxid in a space, maintaining a determinate ratio between the volume of the carbon dioxid and the volume of the space in which it is contained, and exhausting gas from the solidified carbon dioxid.

SAMUEL T. SHERRICK.