Sept. 13, 1932. S. GORDON 1,876,915

REFRIGERATOR

Filed May 14, 1929 2 Sheets-Sheet 1

Fig. 1.

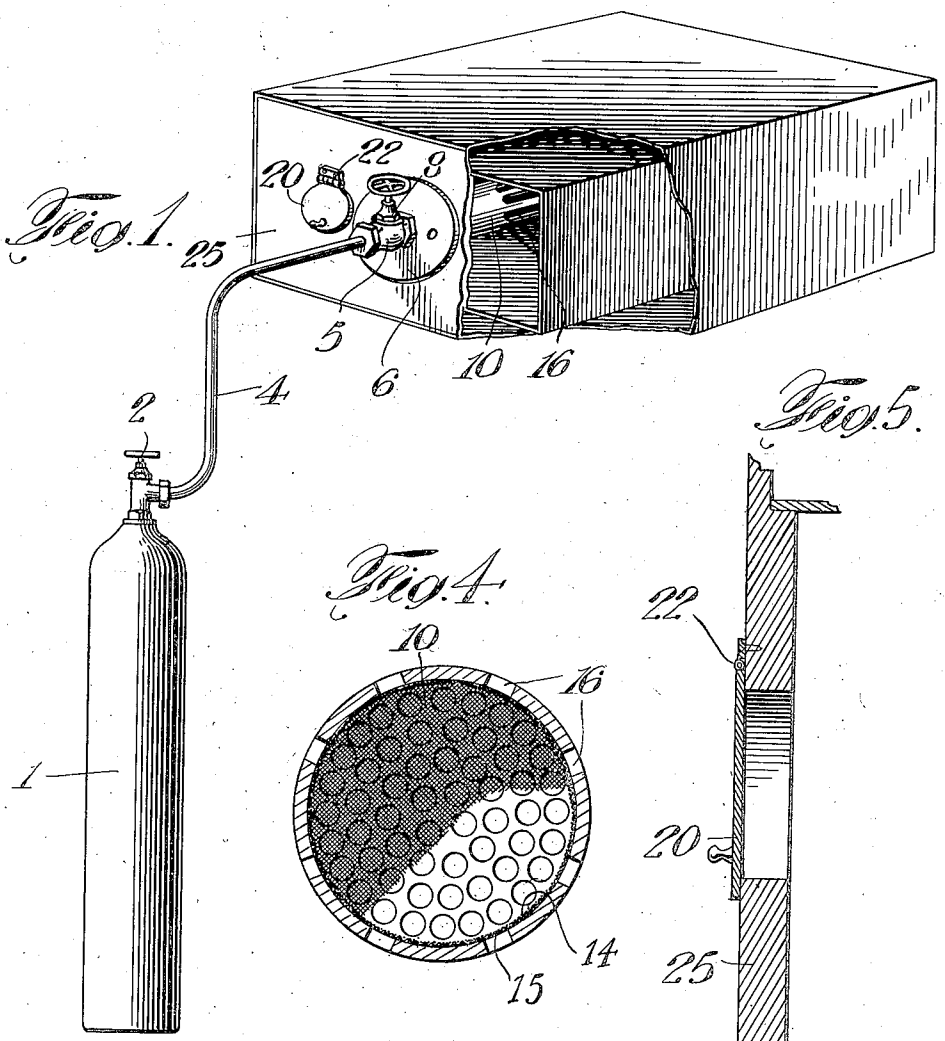


Fig. 4.

Fig. 5.

INVENTOR.

BY Samuel Gordon

Townsend & Decker

ATTORNEYS

Sept. 13, 1932. S. GORDON 1,876,915

REFRIGERATOR

Filed May 14, 1929 2 Sheets-Sheet 2

Fig. 2.

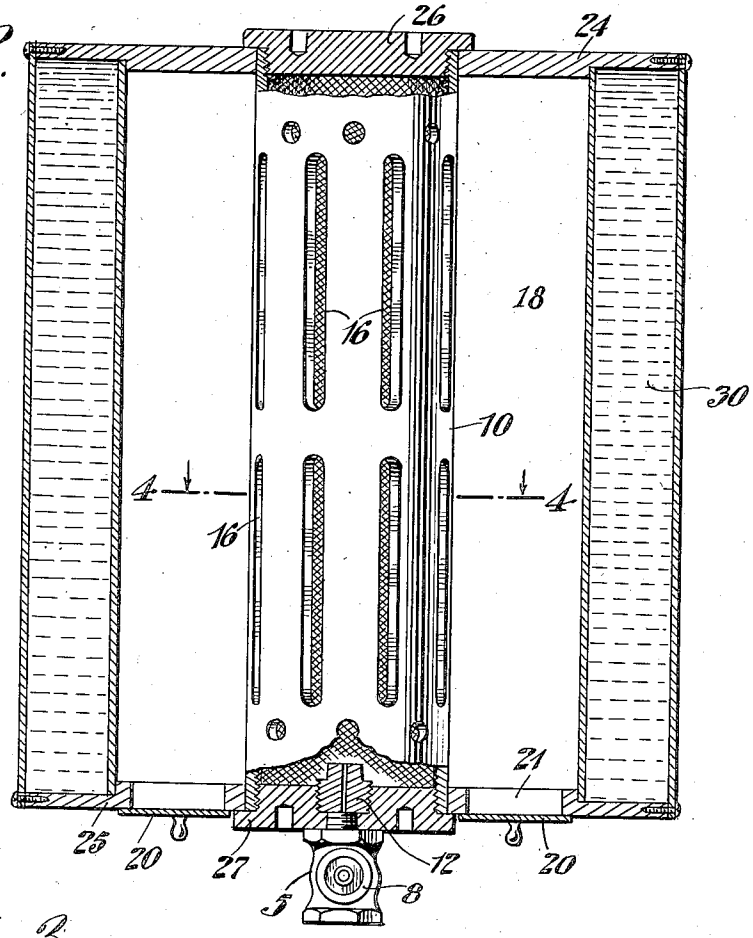
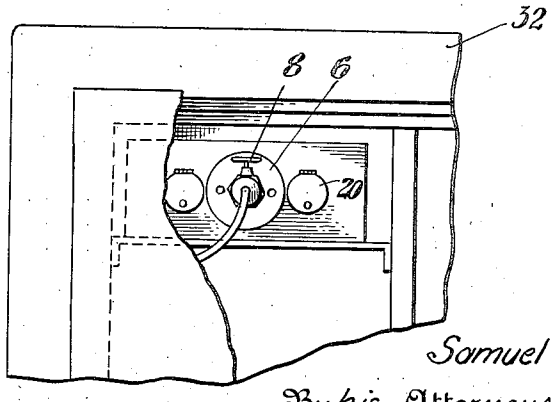


Fig. 3.



Inventor

Samuel Gordon

By his Attorneys

Townsend & Decker

Patented Sept. 13, 1932 1,876,915

UNITED STATES PATENT OFFICE

SAMUEL GORDON, OF FAR ROCKAWAY, NEW YORK, ASSIGNOR TO INTERNATIONAL DRY REFRIGERATION CORPORATION, OF WILMINGTON, DELAWARE, A CORPORATION OF DELAWARE

REFRIGERATOR

Application filed May 14, 1929. Serial No. 362,898.

This invention relates to improvements in refrigerators.

The invention is particularly applicable for use with a compressed, liquefied, gaseous refrigerant such for example as carbon dioxide.

It is the main object of the invention to provide a unit for use in a refrigerator in which the compressed, liquefied refrigerant may be discharged and expanded to form CO_2 snow and to utilize this snow for cooling the refrigerator.

The invention will be fully understood from the following description when considered in connection with the drawings, in which:

Fig. 1 is a perspective view of the cooling unit to be placed in the refrigerator showing its association with a tube of refrigerant.

Fig. 2 is a longitudinal, sectional view thereof.

Fig. 3 is an end elevational view of the same placed in a refrigerator.

Fig. 4 is a cross-sectional view of the expansion chamber taken substantially on the lines 4—4 of Fig. 2.

Fig. 5 is a cross-sectional view of one of the escapement valves.

Referring to the details of the drawings wherein I have shown my invention, the supply of liquefied refrigerant is normally contained in a tube or drum 1 provided with a usual valve 2 connected by means of a tube 4 to a coupling 5 positioned adjacent the refrigerator unit 6. An additional valve 8 is arranged between the conduit 4 and the unit 6, the valve 8 being controlled in any desired manner for providing the introduction of the requisite amount of refrigerant into the refrigerator.

The unit 6 is formed with an expansion chamber 10 into which the refrigerant passes from the conduit 4 and valve 8. A discharge nipple 12 is positioned between the valve 8 and the interior of the chamber 10 in order to limit the quantity of refrigerant which may be introduced into the unit. By providing the correct opening in the discharge nozzle 12 the most efficient operation of the system may be obtained without accurately regulating the supply at the valve 8 during the introduction of the refrigerant. The plug 12 is preferably removable so that a plug having the proper opening may be selected and introduced into the unit.

The chamber 10 is formed with slotted openings and holes extending throughout substantially the entire length of the same. This construction permits the gradual packing of the solidified material from the remote end of the chamber where it is carried by the force of the incoming liquid up to the plug 12 without causing the escaping vapors to pass through the main body of the solidified materials.

The interior of the chamber 10 is lined with a porous material 14 such for example as chamois skin, heavy canvas, muslin or the like, this material opposing the immediate escape of the gases and thus creating a slight pressure serving to increase the snow forming efficiency of the apparatus. The porous material also prevents the outward passage of the frozen particles of snow from the chamber. It is preferred to use a relatively strong wire gauge 15 encircling the interior of the chamber 10 to support the porous muslin, chamois or the like and to prevent the same from being forced outwardly through the openings 16.

The walls of the chamber 10 may, as shown, be formed as a cylindrical body swaged or otherwise secured in the ends 24 and 25 of the unit. The outer ends of the cylinder 10 are closed by plugs 26 and 27, the latter receiving the introduction valve 8 and discharge nozzle 12. The plugs 26 and 27 retain the porous lining and metal gauge in place.

A cold chamber 18 entirely surrounds the expansion chamber 10 for receiving the gases escaping through the openings 16. The chamber 18 is closed by means of displaceable closures 20 placed over the openings 21. The closures normally remain in closed position by their own weight and create an additional light pressure retaining the gases in the chamber 18 until they have performed their work. On the occurrence of any substantial pressure within the chamber 18, one or both of the closures will be displaced to

permit the escape of the gases resulting from the evaporation of the refrigerant.

The cold chamber 18 is preferably surrounded by a brine tank 30 completely encircling the side walls of the chamber 18. The brine tank 30 serves as a storage for the reduced temperature as will be readily understood.

The entire unit 6 is supported in a compartment of the refrigerator 32, the valve 8 and tube 4 being positioned at the back of the refrigerator for convenience of assembling the same and to avoid exposing the tubes at the front of the refrigerator.

In the operation of the apparatus the valve 8 is operated to admit a certain amount of compressed liquefied carbon dioxide. The material on escaping through the plug 12 expands under pressure in the chamber 10, the material being converted into CO_2 snow. The issuing material passes to the remote end of the chamber 10, the snow gradually filling and becoming packed in the chamber back toward the plug or nozzle 12. The gases pass outwardly through the openings 16 into the chamber 18 where they deposit their reduced temperature after which they escape through the escapement valves 20 into the interior of the refrigerator. The CO_2 snow then constitutes a source of reduced temperature which gradually evaporates and chills the chamber 18 and brine tank 30.

Having now described my invention, I claim:

In a refrigerator for utilizing a compressed, gaseous refrigerant, a refrigerating unit comprising an expansion chamber, a cold chamber surrounding said expansion chamber, means permitting the escape of gases from said first-named chamber to the second, a displaceable closure for normally preventing the escape of gases from said second chamber and a brine tank surrounding and forming a portion of the walls of said second-named chamber.

Signed at New York in the county of New York and State of New York this 13th day of May, A. D. 1929.

SAMUEL GORDON.