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C. E. MOLESWORTH.

ICE CREAM FREEZER.

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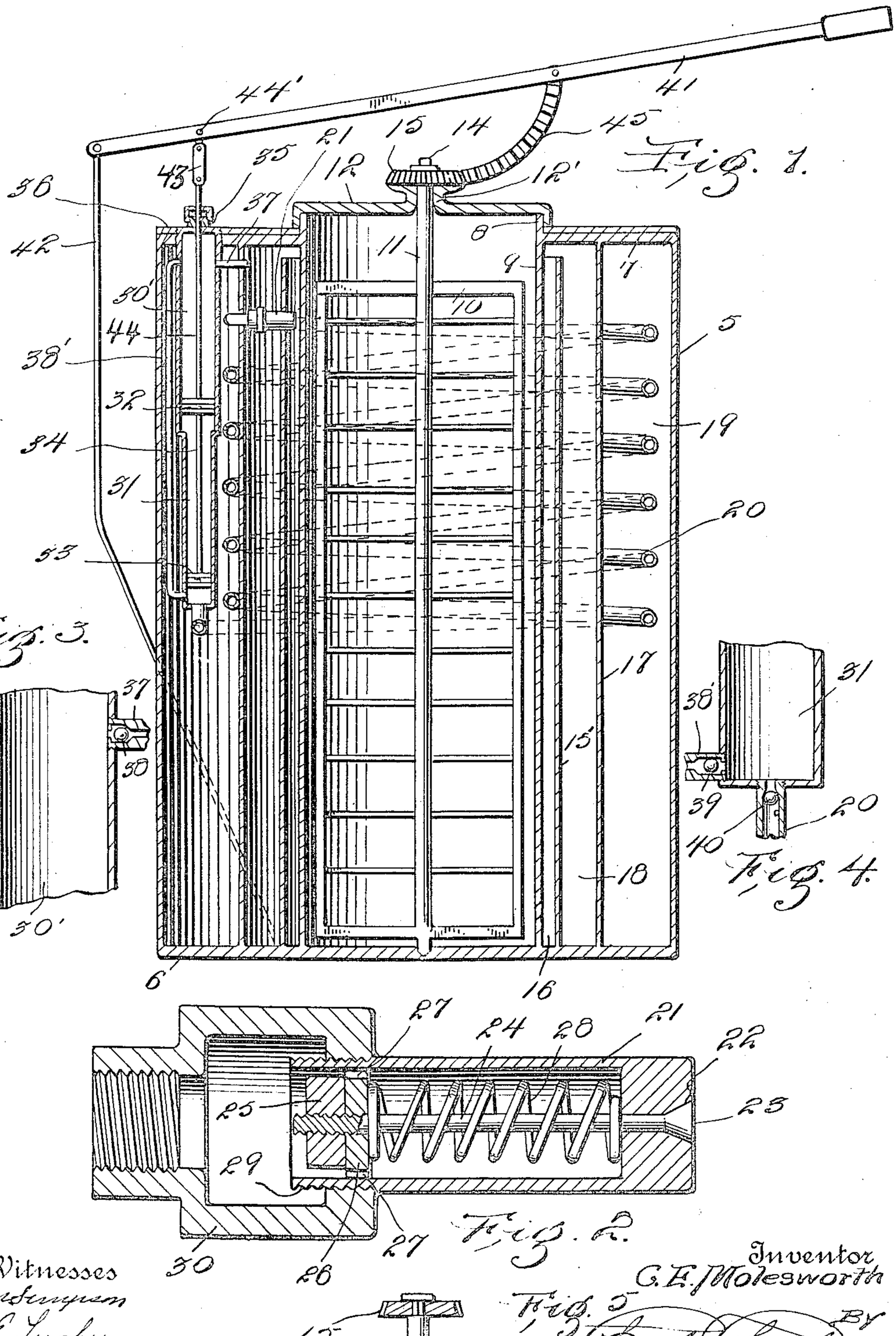

Fig. 1.

Fig. 3.

Fig. 4.

Fig. 2.

Fig. 5.

Witnesses
Chas. Simpson
M. E. Tucker.

Inventor
C. E. Molesworth
By Thompson & Chandler.
Attorneys

UNITED STATES PATENT OFFICE.

CLYDE ELDRIDGE MOLESWORTH, OF OKLAHOMA, OKLAHOMA TERRITORY.

ICE-CREAM FREEZER.

No. 816,810. Specification of Letters Patent. Patented April 3, 1906.

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To all whom it may concern:

Be it known that I, CLYDE ELDRIDGE MOLESWORTH, a citizen of the United States, residing at Oklahoma city, in the county of Oklahoma, Territory of Oklahoma, have invented certain new and useful Improvements in Ice-Cream Freezers; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to ice-cream freezers of that general class wherein the material to be frozen is placed in a can surrounded by a refrigerant, the contents of the can being stirred or agitated.

The object of the present invention is to provide an ice-cream freezer wherein the use of ice will be dispensed with and in place thereof there will be employed a highly volatile liquid which will be introduced into a chamber of the freezer in a gaseous state and will be liquefied by suitable mechanism within the freezer and then discharged against the ice-cream can, where in the process of volatilization it will absorb heat from the contents of the can, which will be given up to a cooling medium when the gas is again compressed.

A further object of the invention is to provide a freezer which will be constantly charged with its refrigerant, so that the expense and annoyance incident to the use of the ordinary freezer which employs ice will be dispensed with.

Other objects and advantages of the invention will be understood from the following description.

In the drawings forming a portion of this specification, and in which like numerals of reference indicate similar parts in the several views, Figure 1 is a vertical section through an ice-cream freezer embodying the present invention, portions thereof being shown in elevation. Fig. 2 is a detail sectional view of the relief-valve and nozzle at the discharge end of the radiating-coil. Fig. 3 is a detail sectional view of the upper portion of the pump, showing the inlet-valve of the major cylinder of the pump. Fig. 4 is a detail sectional view of the lower end of the pump, illustrating the inlet and outlet ball valves with which the minor cylinder is provided. Fig. 5 is a detail view showing the manner of mounting the gear-wheel on the dasher-shaft.

Referring now to the drawings, the present freezer comprises an outer preferably cylindrical body portion 5, which may be any desired specific dimensions, this body portion being closed at its lower end by the bottom 6, and being closed also at its upper end save for the central portion thereof by the top 7, these parts of the body portion being securely connected and hermetically sealed so that there can be no escape of fluid therefrom.

Surrounding the central opening in the top 7 of the body 5 is an annular flange 8, which forms a continuation of the cylindrical partition 9, which extends from the bottom to the top of the body 5 and forms what may be termed the "cream-can," inasmuch as it is designed to hold or contain the material that is to be frozen. In the cream-can is rotatably mounted a dasher 10, which may be of any desired specific design and which includes a shaft 11, which projects through the cap or cover 12, which is fitted over the flange 8, said cap or cover having a bearing 12′ in which the shaft 11 is snugly and rotatably fitted. The upper end of the shaft 11 above the cap or cover 12′ is reduced and squared, as shown in Fig. 5, and upon this reduced end 14 is removably disposed a bevel-gear 15, which is rotated in a manner to be presently explained.

Surrounding and concentric with the cream-can is a cylindrical partition 15′, which extends from the bottom of the body portion 5 to a line just below the top thereof, this partition 15′ being spaced slightly from the cream-can, so that there is formed an annular refrigerating-chamber 16, in which the liquefied refrigerant is permitted to expand and which for convenience may be termed the "refrigerating-chamber."

Surrounding and concentric to the partition 15′ is a partition 17, which extends continuously from the bottom to the top of the body 5 and incloses between it and the partition 15′ a refrigerant-chamber 18. Between the partition 17 and the vertical wall of the body 5 there is another chamber 19, which is filled with water in order to absorb the heat incident to compression of gas in the operation of the apparatus, as presently explained.

Within the chamber 19 and encircling the wall 17 is a worm 20, consisting, preferably, of copper pipe of any suitable diameter. At the upper end of the worm 20 is connected an automatic relief-valve comprising a cylindrical casing 21, which is passed through the

partition 15′ at a point just below the upper end of the latter and at one end of which casing within the inclosure of said partition is a valve-seat 22, in which is disposed a conical valve 23, said valve being adapted to open in the direction of the inclosure of the partition 15′. The valve 23 has a stem 24, which is threaded at its free end for engagement therewith of a nut 25, which bears against a washer 26, which fits slidably in the casing 21 and has notches 27 in its periphery which permit of passage therethrough of fluid from one side to the other of the washer. Between the washer 26 and the end of the casing in which the valve-seat is formed is a helical spring 28, which encircles the valve-stem and serves to hold the valve yieldably in its seat. The tension of the spring 28 is adjusted by manipulation of the nut 25 on the valve-stem, it being understood that the pressure within the casing 21 at which the valve will open will be determined by the tension of the spring. The end of the casing 21 opposite to the valve-seat is exteriorly threaded, as shown at 29, and is screwed into a coupling 30, which forms a cap for the casing and into which in turn is screwed the upper end of the pipe forming the worm 20. The worm 20 extends from a point near to the top of the body 5 somewhat more than half-way down said body, and the lower end thereof is connected to the lower end of a pump. The pump employed comprises an upper barrel 30′ and a lower barrel 31, the latter having substantially one-half the cross-sectional area of the former and the two barrels being in axial alinement and communicating at their ends, the minor barrel being, in fact, a mere reduced continuation of the major barrel. In the barrel 30′ is a piston 32, and in the barrel 31 is a piston 33, these pistons fitting tightly in their respective barrels and being fixed to a common piston-rod 34, which extends upwardly and through a stuffing-box 35 at the upper end of the barrel 30′. The pump in question is located within the chamber 19, and the upper end thereof is screwed into an opening in a top plate 36, which is disposed upon the top 7 of the body. Connecting the upper end of the barrel 30′ with the upper end of the refrigerant-chamber 18 is an inlet-pipe or suction-pipe 37, having an inlet-valve 38, so that when the piston 32 travels downwardly in the barrel 30′ gas, such as ammonia-gas, which has been previously placed in the chamber 18, is drawn into the barrel 30′. Connecting the upper end of the barrel 30′ with the lower end of the barrel 31 is a pipe 38′, provided with a valve 39, which opens in the direction of the barrel 31, this valve acting both as an outlet-valve for the barrel 30′ and an inlet-valve for the barrel 31. As the piston 32 moves upwardly the piston 33 in the lower barrel 31 moves also upwardly, so that the gas in the barrel 30′ above its piston is compressed and forced downwardly through the pipe 38′ into the barrel 31 below the piston 33, this action being assisted by the suction of the piston 33. In the worm 20 at its point of connection with the barrel 31 is an outlet-valve 40, and when the piston 33 travels downwardly the gas in the barrel 31, which has been previously given initial compression by the upper piston, is further compressed and is forced into the worm or radiating-coil. The valve 23 has its spring set at such a tension that the valve will not open until the compression in the worm or radiating-pipe has reached a point sufficient to liquefy the gas. The valve then opens, and the liquid in the pipe or worm is discharged against the partition or wall 9, and in trickling down it volatilizes, and in its volatilization absorbs heat from the contents of the can. This volatilization is hastened by the rarefication of the atmosphere of the chamber 18 incident to the exhausting action of the pump. The changes in the physical nature of the refrigerant are thus quickly attained, the heat of compression being taken up by the water in the chamber 19.

It is found that by the use of ammonia-gas the contents of the cream-can can be frozen in a much shorter space of time than in the ordinary method in which ice and salt are employed, it being noted, furthermore, that after being once charged with ammonia-gas no further supply of refrigerant is required, the same gas being used over and over again.

To operate the pump, a lever 41 is employed, which is fulcrumed upon a support 42, which is rockingly mounted at the bottom of the body 5 and extends upwardly and above said body, so that the lever is capable of reciprocation as well as oscillation, for a purpose to be presently explained. The piston-rod 44 is connected to the lever 41 by means of a link 43, so that when the lever is oscillated or rocked upon its fulcrum the rod, with its pistons, will be reciprocated. The pin 44′, that connects the link with the lever 41, is removable, so that the lever may be disconnected at will from the link.

To operate the dasher, which in practice is oscillated, a beveled segmental gear 45 is connected to the lever 41 and is engaged with the beveled gear or pinion 15. When the lever 41 is to be rocked to operate the piston, said lever is drawn rearwardly to a degree sufficient to disengage the segment from the gear. While the link 43 permits of longitudinal movement of the lever sufficient to give slight oscillation to the dasher, when further oscillation is desired the lever is disconnected from the link, as above described, and the lever may be then manipulated in such manner as to bring into action the entire length of the segmental gear.

It will be understood that in the present specification and drawings there has been de-

scribed and shown merely a single embodiment of the invention, it being understood that in practice modifications of the specific construction shown may be made and any suitable materials and proportions may be used for the various parts without departing from the spirit of the invention.

What is claimed is—

1. A freezing apparatus comprising a receptacle for the material to be frozen, a refrigerating-chamber surrounding the receptacle, a refrigerant-chamber surrounding the refrigerating-chamber radiating-coil exterior to the refrigerant-chamber and connected at one end with the refrigerating-chamber and a compression apparatus having an inlet connected with the refrigerant-chamber and an outlet connected with the outer end of the radiating-coil, the refrigerating-chamber and the refrigerant-chamber being in communication at their upper ends to permit of overflow of the refrigerant from the refrigerating-chamber into the refrigerant-chamber.

2. A self-contained freezing apparatus comprising a receptacle for the material to be frozen, a refrigerating-chamber in active relation to the receptacle, a refrigerant-chamber communicating with the refrigerating-chamber, a radiating-coil lying exterior to the said receptacle and chambers, and connected at one end with the refrigerating-chamber, a compressor having its outlet end connected with the coil and its inlet end connected with the refrigerant-chamber, and a water-chamber surrounding said receptacle and first-named chambers and in which the coil and compressor are contained.

3. A freezing apparatus comprising a receptacle for the material to be frozen, a refrigerating-chamber in active relation to the receptacle, a water-chamber surrounding said receptacle and refrigerating-chamber, a radiator in the water-chamber, one end of the radiator being connected with the refrigerating-chamber and having an automatic relief-valve, and a compression-pump having an inlet in communication with the refrigerating-chamber and an outlet connected with the radiator at the opposite end thereof from the relief-valve.

4. A freezing apparatus comprising a receptacle for the material to be frozen, a refrigerating-chamber surrounding the receptacle, a refrigerant-chamber surrounding the refrigerating-chamber and communicating with the latter at its upper end, a water-chamber surrounding the refrigerant-chamber, a radiating-coil in the water-chamber encircling the refrigerant-chamber, one end of said coil being connected with the refrigerating-chamber and having an automatic relief-valve, and a pump in the water-chamber having an inlet connected with the refrigerant-chamber and having an outlet connected with the lower end of the coil.

In testimony whereof I affix my signature in presence of two witnesses.

CLYDE ELDRIDGE MOLESWORTH.

Witnesses:

JOS. H. BLACKWOOD,

GEO. H. CHANDLER.