

Oct. 27, 1936.

H. B. HULL

2,058,458

REFRIGERATING APPARATUS

Filed April 30, 1931

3 Sheets-Sheet 1

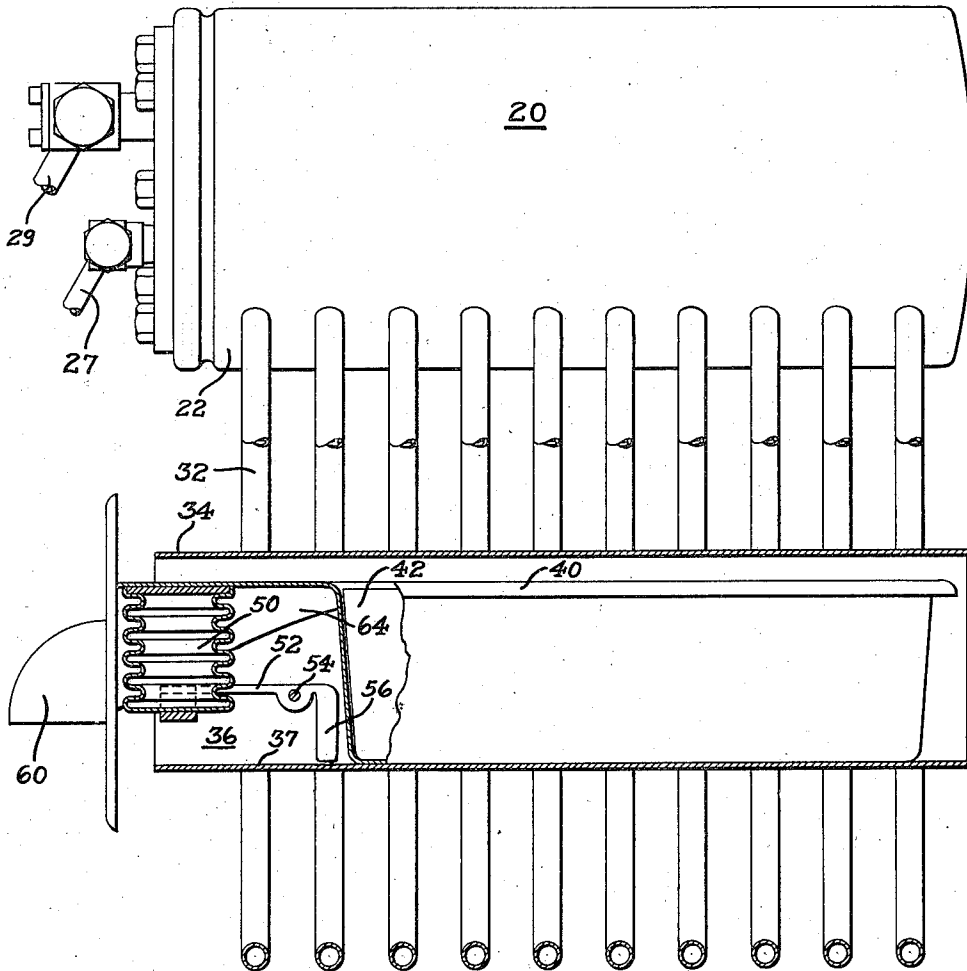


Fig. 1

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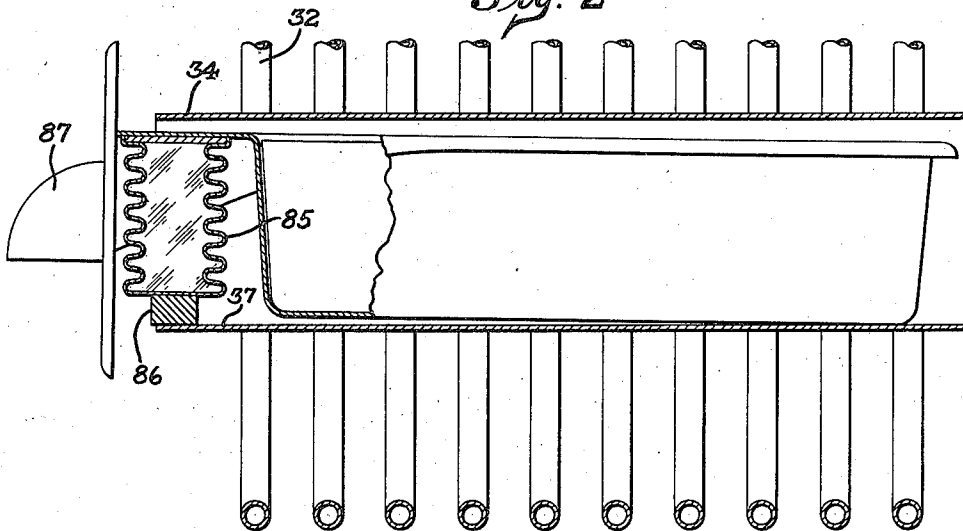
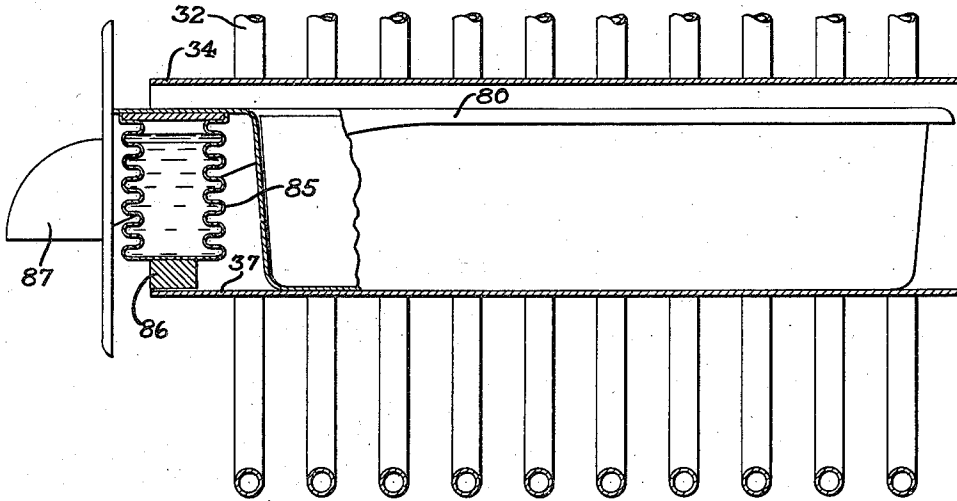
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3 Sheets-Sheet 2



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3 Sheets-Sheet 3

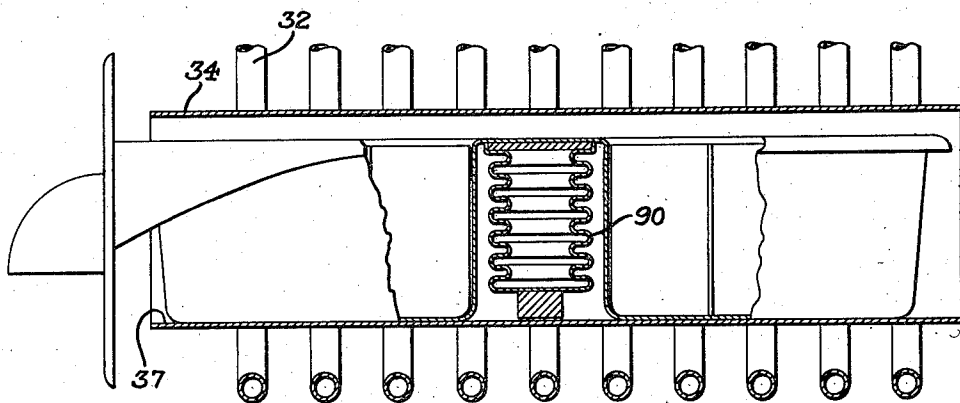


Fig. 4

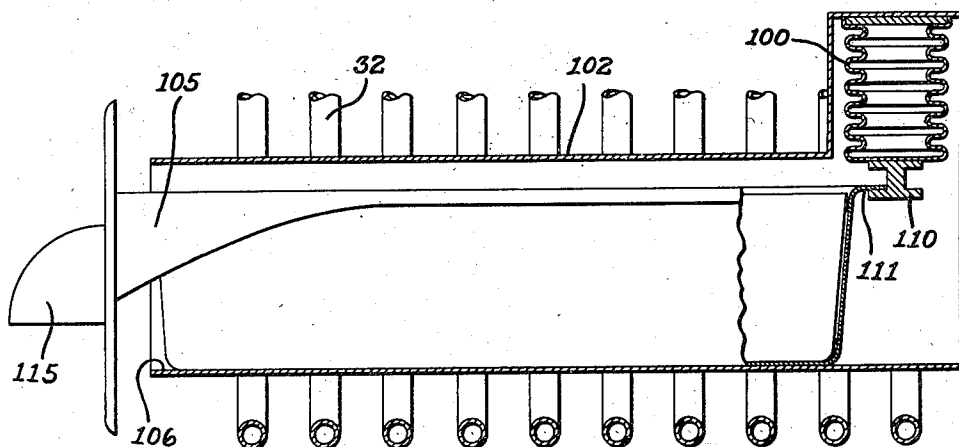


Fig. 5

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2,058,458

REFRIGERATING APPARATUS

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Application April 30, 1931, Serial No. 533,999

8 Claims. (Cl. 62—108.5)

The present invention relates to refrigerating apparatus and particularly to mechanical refrigerating apparatus including a cooling element in which substances are frozen.

Refrigerating apparatus of the type herein described are adapted among other things to receive containers adapted to contain substances to be frozen. During the process of freezing the substances the container itself is very likely to be frozen upon its support. It is among the objects of this invention to provide improved means for separating the container from its support to thus permit the ready removal of the container from the apparatus.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings, wherein a preferred form of the present invention is clearly shown.

In the drawings:

Fig. 1 is a view of a refrigerating apparatus, partly in elevation and partly in cross section, embodying features of the present invention; and

Figs. 2 to 5 are modified forms of refrigerating apparatus embodying the invention.

Referring to the drawings and particularly to Fig. 1, the numeral 20 designates a cooling or refrigerating element. The element 20 includes a header 22 adapted to contain a quantity of liquid refrigerant which is maintained at a constant level by means of a float valve mechanism, not shown herein but clearly shown in the patent to R. G. Osborne No. 1,556,708, issued Oct. 13, 1925. Refrigerant is supplied to the header by a supply conduit 27 and the evaporated refrigerant is withdrawn therefrom through a vapor conduit 29, both conduits being suitably connected to a refrigerant circulating element (not shown).

The element 20 includes a plurality of depending ducts 32. A sleeve 34 is secured to the ducts 32. The sleeve 34 provides a freezing chamber 36. The sleeve 34 also provides a shelf 37. Container or receptacle 40 adapted to contain substances such as water to be frozen is slidably supported upon the shelf 37. In the specific embodiment the receptacle or container 40 is employed for freezing ice cubes and is provided with the usual grid 42.

Due to condensation, water is likely to freeze upon the shelf 37 and cause the container 40 to be frozen tightly to the shelf 37.

In accordance with this invention I provide means for readily breaking the ice bond between the container and its supporting shelf. This means comprises a bellows 50 carried by the con-

tainer or receptacle 40 and a suitable leverage mechanism 52 operated by the bellows. The bellows 50 is sealed with a quantity of volatile gas therein. The leverage mechanism is connected to the lowermost part of the bellows and is pivoted at 54 to the walls of the container 40. A downwardly depending arm 56 of the leverage mechanism acts against the shelf 37 to raise the container or receptacle to thus break the ice bond between the container and its support in a manner about to be described.

The temperature of the volatile gas in the bellows is primarily influenced by the temperature of the water in the container or receptacle. This temperature is such by reason of the conducting surfaces of the metallic container. When warm water is placed in the container the heat of the water will be conducted to the volatile gas causing it to expand, likewise as the water is being cooled, the cooler temperature is being conducted to the volatile gas causing it to condense. Since the bellows 50 contains a volatile gas it will serve as a motor for moving at least a portion of the container or receptacle away from its support for breaking the ice bond therebetween. When the volatile gas is chilled to a certain low temperature it will cause the bellows 50 to contract sufficiently to thereby cause the leverage mechanism to raise the container 40 sufficiently to thus break the ice bond. The container is provided with a handle portion 60 which permits the ready removal of the container after the ice bond between the container and its support has been broken.

As previously stated herein the bellows is primarily influenced by the temperature of the water in the container. Thus the volatile gas will expand the bellows when the water is warm and contract the bellows when the water has been cooled. Preferably a volatile gas such as ammonia or sulphur dioxide may be used, and preferably the arrangement is such that the bellows contracts sufficiently to cause at least a portion of the container or receptacle to be moved upwardly to break the ice bond shortly after the water therein is in the frozen condition.

Preferably the container 40 is provided with a downwardly turned flange 64 between the handle and pan portions to thus serve as a shield against circulating air. This prevents any circulating air currents from influencing the action of the bellows.

If desired any number of bellows may be used, both at the front and at the rear of the container. It has been found however, that the ice

bonds are broken with less force when the bellows is placed at one corner of the container.

Figs. 2 and 3 show a modified form of apparatus embodying features of the invention. Fig. 2 shows the container resting upon its support and Fig. 3 shows the container in the position assumed after the ice bond has been broken. In this embodiment a container 80 adapted to contain substances to be frozen, such as water, is slidably supported upon the shelf portion 37 of sleeve 34. In order to provide for the ready removal of the container 80, I provide an expansible bellows 85. The bellows is carried by the container 80 and is provided with a plunger 86. Within the bellows 85 there is sealed a freezing solution, such as, a mixture of alcohol, glycerine and water, which mixture is adapted to freeze at approximately 31° F. The mixture is such that it does not freeze solid at any time. When this mixture is cooled to approximately 31° F., the mixture expands the bellows, causing the plunger or push rod 86 to act against the shelf 33 to move the container upwardly sufficiently to break the ice bond between the container and its support. The container is provided with a handle portion 87 to permit the ready removal of the tray after the ice bond has been broken. In this modification the temperature of the fluid within the bellows is primarily influenced by the temperature of the water in the container due to the metallic conducting surfaces of the container. Since the solution within the bellows freezes at 31° F., and since the water in the container freezes at 32° F., it will be apparent that the bellows causes the ice bond to be broken shortly after the water in the container has been frozen.

Fig. 4 shows a further modification embodying features of my invention. In this embodiment a bellows which contains a freezing solution as described in connection with Figs. 2 and 3 is employed to break the ice bond between the container and its support. The bellows 90 in this modification is disposed in the central portion of a container 96. Thus it will be apparent that the container itself forms a shield against circulating air. It will also be apparent that the temperature of the fluid is primarily influenced by the temperature of the water in the container due to the metallic conducting surfaces of the container.

In Fig. 5 the bellows 100 is carried by a sleeve 102. The bellows contains a volatile liquid which permits the bellows to contract sufficiently at certain low temperatures to break the ice bond between the container 105 and its supporting shelf 106 by raising the container upwardly. In this embodiment the bellows is provided with a T-shaped member 110 upon which a flanged portion 111 of container 105 rests. The temperature of the liquid in the bellows 100 is primarily influenced by the temperature of the water in the container 105 due to the metallic conducting surface of flange 111 and the T-shaped member 110. Thus when warm water is placed in the container the heat of the water will be conducted to the fluid in the bellows to thus cause the bellows 100 to assume the position shown in the drawings. When the bellows 100 is in this position the bottom of the container rests upon its supporting shelf 106. When the water in the container becomes frozen the temperature of the liquid in bellows 100 will shortly thereafter be such as to cause the bellows to contract sufficiently to break the ice bond between the container and its support. The container 105 is provided with a handle portion 115 to provide for the ready re-

moval of the container after the ice bond has been broken.

While the form of embodiment of the invention as herein disclosed constitutes a preferred form, it is to be understood that other forms might be adopted, all coming within the scope of the claims which follow.

What is claimed is as follows:

1. A cooling device comprising in combination, a cooling element having a support provided thereon for receiving and supporting a receptacle, a receptacle positioned on said support and adapted to contain a substance to be congealed or frozen, and a motor for breaking an ice bond between the receptacle and its support, said motor containing a volatile fluid adapted to condense at a temperature below the temperature at which the substance contained in said receptacle congeals or freezes for operating said motor.

2. A cooling device comprising in combination, a cooling element having a support provided thereon for receiving and supporting a receptacle, a receptacle positioned on said support and adapted to contain a substance to be congealed or frozen, and a bellows operatively connected to said receptacle for breaking an ice bond between the receptacle and its support, said bellows containing a volatile fluid adapted to condense at a temperature below the temperature at which the substance contained in said receptacle congeals or freezes for moving said bellows.

3. A cooling device comprising in combination, a cooling element having a support provided thereon for receiving and supporting a receptacle, a receptacle positioned on said support and adapted to contain a substance to be congealed or frozen, and a bellows operatively connected to said receptacle for breaking an ice bond between the receptacle and its support, said bellows containing a volatile fluid adapted to condense at a temperature below the temperature at which the substance contained in said receptacle congeals or freezes for moving said bellows to lift at least a portion of said receptacle perpendicularly away from said support.

4. A cooling device comprising in combination, a cooling element having a support provided thereon for receiving and supporting a receptacle, a receptacle positioned on said support and adapted to contain a substance to be congealed or frozen, and a device separate from said receptacle and carried by a portion of said support for breaking an ice bond between the receptacle and its support, said device containing a volatile fluid adapted to condense at a temperature below the temperature at which the substance contained in said receptacle congeals or freezes for actuating said device.

5. A cooling device comprising in combination, a cooling element having a support provided thereon for receiving and supporting a receptacle, a receptacle positioned on said support and adapted to contain a substance to be congealed or frozen, and a device separate from said receptacle and carried by a portion of said support for breaking an ice bond between the receptacle and its support, said device containing a volatile fluid adapted to condense at a temperature below the temperature at which the substance contained in said receptacle congeals or freezes for actuating said device to lift at least a portion of said receptacle upwardly away from said support.

6. A cooling device comprising in combination, a cooling element, a support member provided on said cooling element for receiving and supporting

a receptacle member, a receptacle member positioned on said support member and adapted to contain a substance to be congealed or frozen, and means for moving at least a portion of one of said members relative to the other of said members, said means being separate from the substance in said receptacle member and containing a volatile fluid adapted to condense at a temperature below the temperature at which the substance contained in said receptacle member congeals or freezes for causing said relative movement of said members.

7. A cooling device comprising in combination, a cooling element, a support member provided on said cooling element for receiving and supporting a receptacle member, a receptacle member positioned on said support member and adapted to contain a substance to be congealed or frozen by said cooling element, and means for moving at least a portion of one of said members relative to the other of said members, said means including a portion containing a volatile fluid normally in a vaporized state and adapted to condense at a temperature below the temperature at which the substance contained in said receptacle mem-

ber congeals or freezes for actuating said means to cause said relative movement of the members after the substance of said receptacle member has been congealed or frozen.

8. A cooling device comprising in combination, a cooling element, a support member provided on said cooling element for receiving and supporting a receptacle member, a receptacle member positioned on said support member and adapted to contain a substance to be congealed or frozen by said cooling element, and means for moving at least a portion of one of said members relative to the other of said members, said means including a portion containing a volatile fluid of non-freezing character at temperatures produced by said cooling element, said fluid being adapted to change from a gaseous to a liquid and from a liquid to a gaseous state between the temperature limits maintained by said cooling element, and said fluid upon being changed from one of its states to another thereof causing said means to be actuated to produce the relative movement of said members.

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