Dec. 12, 1933. F. X BURKE 1,939,334

REFRIGERATING DEVICE

Original Filed July 15, 1930

Fig. 1.

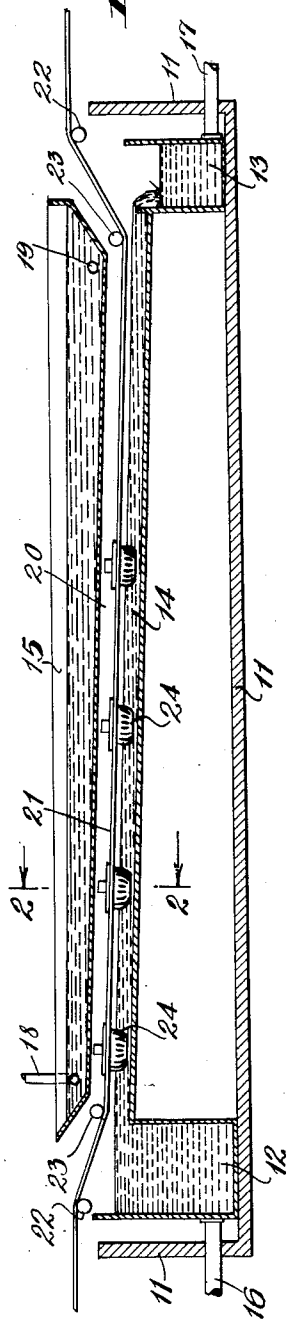


Fig. 4.

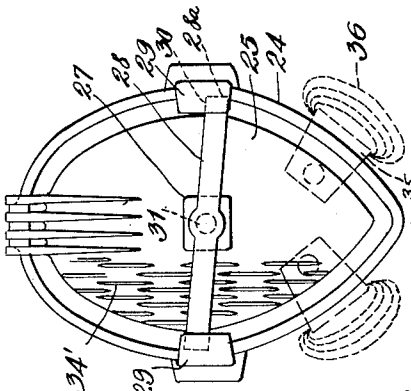


Fig. 3.

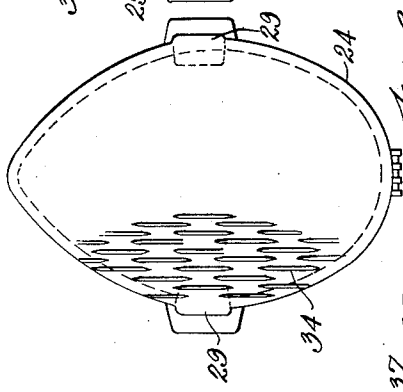


Fig. 5.

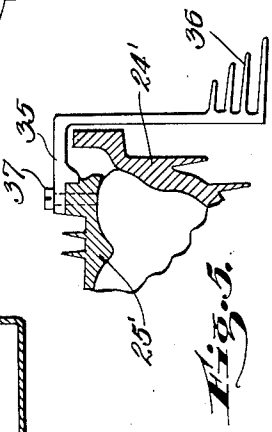
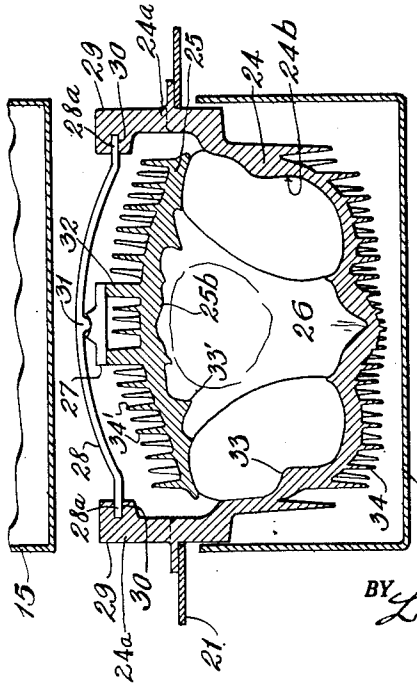


Fig. 2.



INVENTOR,
FRANCIS X. BURKE,
BY Lewis J. Doolittle
ATTORNEY

Patented Dec. 12, 1933

1,939,334

UNITED STATES PATENT OFFICE

1,939,334

REFRIGERATING DEVICE

Francis X Burke, New York, N. Y.

Application July 15, 1930, Serial No. 468,119
Renewed January 26, 1933

7 Claims. (Cl. 62—104)

This invention relates to improvements in refrigerating devices and comprises the novel features of construction and arrangement hereinafter described and illustrated.

One of the objects of my invention is to produce a refrigerating device in which a stream of refrigerating medium, such as cold brine or other cooling fluid, is caused to impinge on a receptacle or mold containing the article to be refrigerated, thereby effecting a rapid cooling of the same.

Another object of my invention is to provide a receptacle constructed with exterior surfaces of a form adapted to rapidly transfer or conduct the heat to the refrigerating medium.

A further object of my invention is to provide a receptacle or mold having interior surfaces adapted to compress the article contained therein into predetermined forms and provide a large area of contact between the article and the receptacle.

A further object of my invention is to provide the interior surface of the receptacle or mold with projections to protrude into the body, or between portions of the body, or both, of the article to be refrigerated, to indent its surface, thereby breaking the continuity of the smooth parts of the surface of the article and prevent the smooth, glassy effect that would otherwise result from freezing and, at the same time, bringing the parts of said article near to the refrigerating medium.

Another object of my invention is to arrange the said projections to produce patterns, designs, symbols, monograms, initials or names, for effect and identification.

A further object of my invention is to minimize the glassy effect of the frozen surface of the article, and further increase the area of contact of the interior surface of the receptacle or mold with the article therein contained by coarsely abrading the inner surfaces of the receptacle or mold by means of etching, mechanical abrasion, knurling, etc.

Other objects and advantages will appear hereinafter.

I attain these objects by means of the refrigerating device illustrated in the accompanying drawing, in which Fig. 1 is a longitudinal elevation, partly in section, generally or diagrammatically illustrating the refrigerating device. Fig. 2 is a cross-section of the receptacle or mold employed in the refrigerating device. Fig. 3 is a bottom plan view of the receptacle shown in Fig. 2. Fig. 4 is a top plan view of the same. Fig. 5 is a fragmentary side elevation illustrating certain parts of the receptacle.

Like reference characters refer to like parts in the several views of the drawing.

For the purpose of illustration, a brine is used as the refrigerating medium in the device as shown and described. In Fig. 1, 11 designates generally an inclosure for the refrigerating medium, which embodies therein an initial brine tank 12, a terminal brine tank 13 and a brine flume 14, which may be constructed with a downward slope toward the tank 13, for conveying a stream of brine or other refrigerating medium from the tank 12 to the tank 13, which stream has a more or less high velocity, as may be required, imparted thereto by the inclined flume, augmented by suitable pumps which supply brine to the tank 12 through an inlet pipe 16 from a source, such as a cooling tank or device, to which the brine from the tank 13 may be returned, through the outlet pipe 17, the circulation being maintained by suitable pumps, as will be understood. An overhead cooling chamber, indicated at 15, may also be supplied with the brine or cooling medium through an inlet pipe 18 and discharge pipe 19.

The overhead cooling chamber 15 is positioned above the surface of the brine flowing in the flume 14, leaving an air space 20 at the underside of said chamber 15, thereby providing an atmosphere of cold air in said space.

A conveyor 21, guided by sheaves or rollers 22 and 23, extends through the said space 20 between the flume 14 and chamber 15. One or more receptacles or molds, indicated at 24—25 in Fig. 2, are mounted upon and carried by this conveyor 21 with the lower parts 24 thereof extending into the stream of brine or cooling medium in the flume 14 and the upper parts in the cold air atmosphere in the space 20 adjacent the under surface of the chamber 15.

By means of the conveyor 21, these receptacles or molds may be moved from the outside of the enclosure 11 to a position between the flume 14 and the chamber 15. The conveyor is shown with the ends broken away but it is to be understood that the same may be endless in form and of any of the usual and suitable constructions for the purpose.

The conveyor 21 may be moved in either direction and at any desired or required speed, either in the direction of flow of the refrigerating medium in the flume 14 or in the opposite direction against said flow, or the same may be moved to carry the receptacles into the space

20 and held stationary until the refrigeration is complete, according to conditions and requirements of the use to which the device is intended.

The inclination of the flume 14 is preferably such that the stream of brine flowing therein from the tank 12 to the tank 13 may have the desired velocity, causing it to impinge upon the under or immersed part of the receptacle, 24, thereby effectively and rapidly cooling the same and, because of the high fluid velocity, the warmed fluid is quickly removed, which would otherwise remain somewhat stagnant, closely adhering to the surface of the receptacle, or, because of the viscosity of the fluid, remain as a film holding tightly to the surface.

The high velocity of the fluid and washing effect of the hydraulic impact with the receptacle surfaces will wipe or stretch this warmed film down to a minimum thickness and thus greatly reduce the retarding effect of the film to the rapid dissipation of heat which is conducted from the article in the receptacle to the outer surface of the mold or receptacle.

As shown in Figs. 2, 3, 4 and 5, the receptacles are shown in the form of sectional or split molds, comprising a lower section 24, which forms the main body of the receptacle, and an upper section 25 positioned between posts 24*a* extending from the upper portion of the lower section 24 of the mold.

The inner surface 24*b* of the lower mold section 24 is made irregular, as indicated at 33, to conform more or less to the irregularities of form of the article of food, etc., such as the body of a fowl, indicated at 26, to be refrigerated, and the entire surface is also roughened to prevent the formation of a smooth, glassy surface on the article when frozen.

The inner surface 25*b* of the upper section 25 of the mold is also roughened in a like manner and is pressed on to the body 26 of the contained article by means of an elastic or semi-elastic pad 27 positioned between a clamping bar 28 and the upper mold section 25. This clamping bar 28 may also be resilient and the ends 28*a* are engaged and held in the heads 29 of the posts 24*a* in slots 30, as shown in Figs. 2 and 4. The bar 28 may also be provided with a projection 31 at its center engaging a groove in the top of the pad 27 and a pair of ribs 32 may be provided on the upper side of the upper mold section 25 upon which the pad 27 is positioned. The upper and lower mold sections are thus held together as a unit, with their inner surfaces pressed into intimate contact with the article therein, increasing the efficiency of refrigeration.

The inner mold surfaces 24*b* and 25*b* are shaped to conform more or less to the natural shape of the article or to predetermined shapes more or less distorted from the natural to bring out certain points for desired appearance, etc.

These inner surfaces of the mold are also provided with projections, such as 33, 33', in some cases, which protrude into the body 26 of the article in the receptacle or mold, thus bringing certain thicker or more massive parts of the body in direct contact with the mold and provide a direct path for conduction of the heat therefrom to the outer surface of the mold and to the cooling fluid in contact therewith.

The inner surface of the mold may also be arranged to carry out patterns, designs, symbols, monograms, initials, names, etc. for effect and identification.

The outer surfaces of the mold sections 24 and 25, as shown in Fig. 2, are formed with projections, corrugations, grooves, ribs, or other forms of projections, indicated at 34—34', to further increase the area of the surface exposed to the refrigerating medium in order to increase the speed of refrigeration or heat transfer, which is an important feature of the present invention.

The upper and lower mold sections being pressed together causes the article to be pressed into close contact with the inner surfaces of the mold sections and by employing different bars and pads, (28 and 27), this pressure may be regulated to provide either what is known as high pressure freezing, moderate pressure freezing or freezing under natural contact, adhesion contact, expansion contact, or any other desired degree or intensity of contact, by removing the pressure bar 28, substituting other bars of greater or less resiliency, or augmenting or substituting weights, as may be required.

To further increase the rate of heat dissipation of the upper mold section 25, I may also provide conducting members, 35—36, (Fig. 4), which consist of fingers 35 in contact with the outer surface of the upper section 25 and a body 36 extending to the under side of the lower section 24.

These conducting members, 35—36, provide a direct conduction path from the upper mold section to the refrigerating medium flowing in the flume 14 and increase the efficiency of the device as a whole and the speed of refrigeration. These members, 35—36, may be of the shape shown in Figs. 4 and 5 and may be secured to and held in direct contact with the upper section 25, by means of screws 37, or may be formed integral therewith, as may be desired.

It will be seen that with the device herein shown and described as illustrative of my invention, heat is rapidly removed from the article both by direct conductivity to the refrigerating medium in the flume 14 and also by radiation to the upper tank or chamber 15, both directly and through the medium of the air in the space 20, which is cooled by the refrigerating medium in the tank or chamber 15.

The upper mold section 25 not only maintains a close contact between the article and inner surfaces of the mold sections 24—25, but also provides a means for compressing the article into a smaller space, thus reducing the maximum distance for the heat to travel, from the inner parts of the more massive portions of the article, to reach the surface and be removed, resulting in a material reduction of the time required to effect the refrigeration of the article, which is one of the principal objects of the present invention.

I do not wish to be understood as restricting myself to the details of construction as shown and described, as the same may be changed in many respects without departing from the spirit and scope of the invention as defined in the accompanying claims and it is to be understood that such showing and description is intended as illustrative only of one embodiment of my invention which I have found to be very efficient for the purposes intended.

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

1. A receptacle for articles to be refrigerated, comprising a lower section for supporting the article therein, an upper section for holding said article in place in said lower section, and means carried by said receptacle for co-operatively en-

gaging and holding said upper and lower sections together as a unit and for pressing said sections into contact with said article.

2. A receptacle for articles to be refrigerated, comprising a lower section for supporting the article therein, an upper section for holding said article in place in said lower section, and a resilient member detachably connected to said lower section and adapted to be engaged with said upper section to press said sections into contact with said article.

3. A receptacle for articles to be refrigerated, comprising a lower section in which the article is positioned, an upper section engaging said article in said lower section, projections on the inner surface of one of said sections to indent into the body of said article, and pressure means carried by said receptacle for co-operatively engaging and holding said upper and lower sections together as a unit and for pressing said sections and projections into contact with said article.

4. In a refrigerating device, a number of receptacles for articles to be refrigerated, each receptacle comprising an upper and a lower section held together as a unit, only the lower parts of said sections being in direct contact with a liquid refrigerating medium and the upper parts beng surrounded by an atmosphere of cooled air, conducting members carried by each of the said upper sections of said receptacles and extending downwardly into the liquid refrigerating medium, and means for establishing and maintaining said liquid refrigerating medium in contact with the lower parts only of said upper and lower sections of said receptacles.

5. A receptacle for articles to be refrigerated, comprising a plurality of sections forming a mold shaped to a predetermined form conforming substantially to the natural form of the article, the inner surface thereof being roughened and provided with projections, and means carried by said receptacle for holding the inner surfaces of said sections and projections thereon in close contact with said article.

6. A receptacle for articles to be refrigerated, comprising a plurality of sections forming a mold shaped to a predetermined form conforming substantially to the natural shape of the article, the inside of the mold being provided with projections adapted to indent the body of the article and other projections adapted to extend between portions of said body when the mold sections are pressed together in contact with the article, means for pressing and holding the mold sections together and in close contact with the article contained therein, and means for regulating said pressure.

7. A refrigerating device comprising a number of receptacles for articles to be refrigerated, an inclosure for a liquid refrigerating medium, a tank positioned adjacent and above said inclosure, means for establishing and maintaining a liquid refrigerating medium in said inclosure and tank, means for positioning said receptacles in the space between said tank and the refrigerating medium in said inclosure with only the lower portion of said receptacles in direct contact with the liquid refrigerating medium and the upper portion thereof extending into the space above the liquid refrigerating medium in said inclosure and adjacent the said tank, and means for maintaining a sufficiently high velocity of flow of the liquid refrigerating medium in said inclosure to cause the same to impinge against the surfaces of said receptacles in contact therewith and to remove the warmed fluid adjacent said surfaces and to exert a washing effect by impact with any film formed thereon to remove the same or to sufficiently stretch the same to materially reduce the retarding effect of the same to the rapid dissipation of the heat which is conducted from the article to the outer surfaces of the receptacle.

FRANCIS X BURKE.