

March 28, 1939.

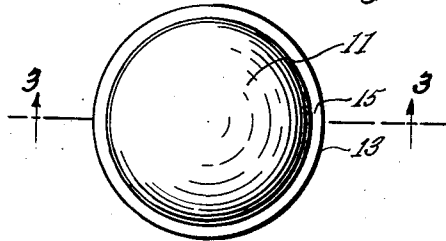
S. A. CROSBY

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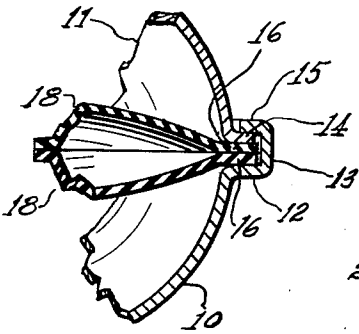
COOLING DEVICE

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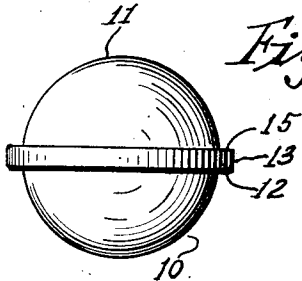
*Fig. 1.*



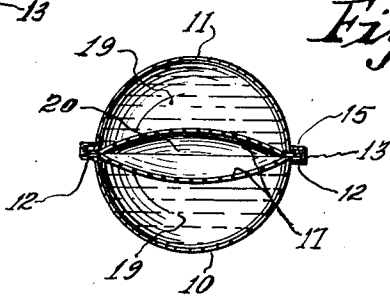
*Fig. 4.*



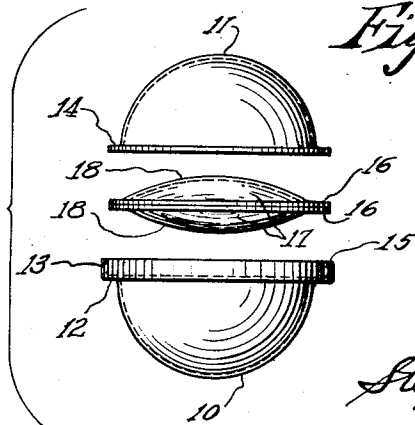
*Fig. 2.*



*Fig. 3.*



*Fig. 5.*



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# UNITED STATES PATENT OFFICE

2,152,467

## COOLING DEVICE

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11 Claims. (Cl. 62—1)

The present invention relates to the art of refrigeration and has particular reference to a novel cooling device adapted to be utilized in cooperation with a conventional refrigerating machine to cool beverages or the like, and is in general applicable for purposes such as those for which ice cubes are employed.

In its preferred embodiment the invention comprises sealed containing means enclosing a substance capable of undergoing change of state under temperature conditions usually met in the refrigerating art, and having resilient expansion compensating means cooperating with the containing means and the substance, adapted to compensate for variations in volume of the substance arising from variations in temperature. According to the invention the above mentioned combined instrumentalities are applicable to give up heat to a refrigerating machine and consequently be cooled thereby, and then subsequently be submerged in a liquid to absorb heat therefrom and consequently cool the liquid, and then subsequently be returned to the refrigerating machine to give up thereto the heat abstracted from the liquid while cooling the same.

The invention has as an object to provide an enclosed cooling device applicable for convenient storage in the ice cube compartment of a conventional refrigerating machine.

The invention has as a further object to provide an enclosed cooling device applicable for use submerged in a beverage or the like contained in a conventional drinking glass.

The invention has as a further object to provide an efficient heat conducting envelope or shell.

The invention has as a still further object to provide resilient expansion compensating instrumentalities adapted to compensate for variations in volume of a heat accumulator substance under the influence of changing temperature conditions.

The invention has as another object to provide a cooling device having an enclosing shell or envelope adapted to prevent admixture of an enclosed substance with the beverage being cooled while submerged in the same.

The invention has as still other objects to provide a cooling device which will be economical to manufacture; and convenient to use and maintain in a sanitary condition.

Further objects and advantages will be apparent from a consideration of the following description and accompanying drawing which exemplify one embodiment chosen for the purpose of illustration.

In the drawing;

Fig. 1 is a top or plan view of an embodiment of my invention,

Fig. 2 is a side elevation of the same,

Fig. 3 is a vertical section thereof taken on the line 3—3 of Fig. 1.

Fig. 4 is an enlarged fragmentary view of Fig. 3 and,

Fig. 5 is a side elevation showing the several parts disassembled but disposed in proper relation.

In the drawing, the numerals 10 and 11 designate substantially hemispherical complementary hollow shells formed from relatively thin sheet metal, preferably aluminum. Shell 10 has at its free edge an integral annular outwardly overhanging flange 12 which is provided with an outer integral annular upstanding rim or flange 13. Shell 11 has at its free edge an integral annular outwardly overhanging flange 14 adapted to be received by rim 13 on shell 10. At assembly of the shells, which will be more fully described hereinafter, upper portion or edge 15 of rim 13 is curled or crimped over flange 14 on shell 11 thus locking or clinching the shells together.

Disposed in intervening relation between the abutting faces of flanges 12 and 14, and forming a sealing gasket therefor, is annular flange 16—16, comprising an outer annular brim or flange of a resilient bladder, generally designated 17. Bladder 17 is preferably of relatively thin rubber, and comprises a pair of identical spherical shell segments of one base, 18—18, having integral with their free edges outwardly extending annular flanges or rims 16—16. Spherical segments 18—18 are disposed in complementary coaxial relationship so that the faces of flanges 16—16 are in abutment. Preferably flanges 16—16 are cemented together with any suitable adhesive cement, thus effectively sealing the bladder and forming a unitary assembly which defines therewithin a sealed cavity 20.

With the various component parts assembled the outer surface of the device defines a substantially spherical body having an outer equatorial sealed seam; and the inner surface thereof defines a substantially spherical cavity divided into two equal portions 19—19 by the resilient bladder 17 which forms a hollow partition or cofferdam disposed in the same plane with the outer equatorial seam.

In cavities 19—19 may be any suitable substance capable of absorbing and giving out heat; but a substance capable of undergoing a change of state with relatively high latent heat within

the range of temperatures encountered under ordinary conventional refrigeration conditions is preferred. Aqueous substance such as water possesses satisfactory characteristics. The cavity 20 of bladder 17 may contain any resilient substance; but a substance in the gaseous state, such for example as air is preferred.

The preferred method of assembling the several parts is as follows: The bladder 17 is first assembled by applying a suitable adhesive cement to the abutting surfaces of flanges 16—16, and then superposing one of the members 18—18 over the other in the relation shown in Fig. 4. Sufficient pressure may now be applied upon the flanges 16—16 to bring their abutting surfaces into intimate contact with the adhesive and thereby secure a satisfactory bond. The air normally enclosed by the members 18—18 is sufficient for satisfactory operation. With the bladder now assembled it will be noted that the same resiliently yields to pressure, in that the air contained therein readily undergoes contraction and expansion.

The assembled bladder 17 and the shells 10 and 11 are now submerged in water and disposed in the relation shown in Fig. 5. Cavities 19—19 will of course immediately fill with water. The bladder is now bodily lowered, the flange 16 thereof entering rim 13 of shell 10 until the under surface of flange 16 rests upon the upper surface of flange 12. With the bladder now positioned in shell 10, shell 11 is next bodily lowered, flange 14 thereof entering rim 13, and continuing downward until the under surface of flange 14 rests upon the upper surface of flange 16. With the several parts now positioned in proper relation, and with slight pressure applied to the shells urging them together, the assembly may be removed from the water and placed in a suitable press adapted to forcibly clinch or crimp edge 15 of flange 13 over flange 14. After the crimping operation the assembly is complete.

In operation the cooling device is first placed in a conventional refrigerating machine, preferably in the ice cube compartment thereof. The refrigerating machine withdraws heat from the water contained in cavities 19—19, the heat being readily conducted by the thin metallic walls of shells 10 and 11. Suffering a loss of heat the temperature of the water drops until the freezing point is reached, at which point the water undergoes change of state, solidifying into ice.

The stresses introduced in the shell by the expanding substance are negligible, since the expansion accompanying solidification of the aqueous substance is readily permitted by the bladder which constitutes a cushion and consequently the walls of the shell may be very thin, resulting in highly efficient transfer of heat. The efficiency of the device is further enhanced due to the arrangement of the bladder in the center of the shell, said arrangement permitting the aqueous substance to occupy the upper and lower cavities and thereby intimately contact substantially the entire wall area of the shell. The bladder, being an insulator of heat, is so positioned that it does not unduly obstruct the transfer of heat to and from the substance.

When the freezing process is completed the cooling device may at any desired time be removed from the refrigerating machine and be submerged in a drinking glass of beverage to cool the same. After cooling the beverage the cooling device may be returned to the refrigerating ma-

chine to give up thereto the heat taken from the beverage while cooling the same.

Several of my cooling devices may be used simultaneously in the above described manner, being applicable for purposes such as those for which ordinary ice cubes have heretofore been utilized; but having several advantages over ice cubes, one of which is of particular importance in that the melting ice within the sealed shell cannot dilute the beverage.

While I have shown and described in detail a preferred embodiment of my invention, I do not desire to be limited to the precise details herein disclosed illustratively, as many modifications may be made within the scope of the invention, which is defined in the following claims.

I claim:

1. A cooling device comprising a shell, aqueous substance within said shell, and a resilient body supported in said substance.
2. A cooling device comprising containing means, aqueous substance in said containing means, a bladder in said substance, and gaseous substance in said bladder.
3. A cooling device comprising a shell having a seam, aqueous substance in said shell, a bladder having a cavity also in said shell and supported by said seam, and gaseous substance in said cavity.
4. A cooling device comprising a shell having a seam, a resilient bladder within the shell having a flange, said flange cooperating with said seam to support said bladder, and aqueous substance within said shell in contact with said bladder.
5. A cooling device comprising a spherical shell having an equatorially disposed seam, a resilient bladder in said shell and supported by said seam, aqueous substance in said shell surrounding said bladder, and gaseous substance in said bladder.
6. A cooling device comprising a sealed shell having a plurality of joined members, a resilient bladder within said shell and having a supporting flange, said flange intervening said joined members and constituting a sealing gasket therefor, aqueous substance sealed within said shell by said gasket and in contact with said bladder, and gaseous substance in said bladder.
7. In a cooling device, containing means comprising a plurality of joined members, separate resilient means in said containing means, and aqueous substance also in said containing means and surrounding said resilient means.
8. In a cooling device, aqueous substance; means for containing said substance and for permitting transfer of heat to and from said substance to change said substance from the liquid state to the solid state, or from the solid state to the liquid state; a resilient body submerged in said substance to permit expansion of said substance within the confines of said containing means while changing from the liquid state to the solid state; said containing means being of such configuration that a portion of said substance in the solid state may move bodily toward said resilient means responsive to expansion of a portion of said substance while passing from the liquid to the solid state.
9. In a cooling device comprising aqueous substance and a shell for containing said substance, a resilient element comprising a bladder of resilient material, said bladder enclosing gaseous substance, and being arranged to contract responsive to expansion of said aqueous substance.
10. The bladder according to claim 9 charac-

terized further by having a portion constituting a gasket for sealing said shell.

5 11. In a cooling device, mutually cooperating substantially hemispherical components defining a hollow shell adapted to contain an expansible and contractible substance, expansible and con-

tractible means sustained by said shell adapted to contain an expansible and contractible substance, said means being surrounded by the expansible and contractible substance contained by said shell.

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