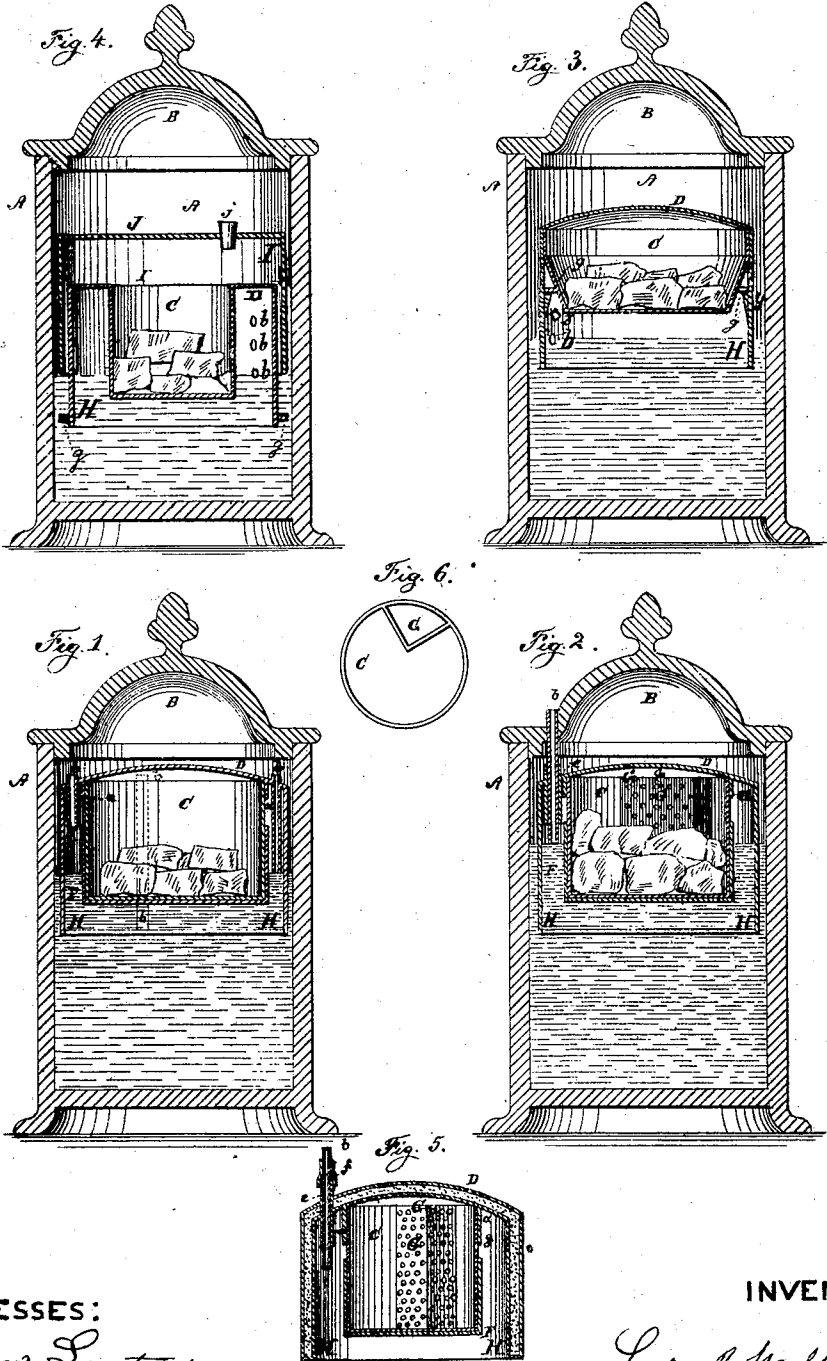


L. B. WOOLFOLK.
Liquid-Coolers.

No. 155,213.

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WITNESSES:

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IMPROVEMENT IN LIQUID-COOLERS.

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To all whom it may concern :

Be it known that I, LUCIEN B. WOOLFOLK, of Lexington, in the county of Fayette and State of Kentucky, have invented an Improved Apparatus for Cooling Liquids, of which the following is a specification:

My invention consists in cooling water, milk, or any other liquid by the agency of ice and salt, or other cooling agent, contained within a box or vessel, which, while in operation, is hermetically closed, and which is caused to float near the surface of the liquid to be cooled by means of a bell-float connected with the ice-box, and so constructed and applied that the vessel containing the cooling agent may be suspended over the liquid to be cooled, or be immersed in it in any required degree sufficient to produce a cooling effect with rapidity and success.

Figure 1 is a vertical section of a water-cooler, illustrating the application of my invention in its preferred form. Fig. 2 is a vertical section, illustrating a slight modification. Figs. 3 and 4 are vertical sections, illustrating the application of the invention under different modifications. Fig. 5 is a vertical section of my invention as given in Fig. 2, with a slight modification, and more fully delineated. Fig. 6 is a top view of the ice-box and salt-receptacle.

A represents the water case or shell. B is an external cover of a water-cooler, of any usual construction. C is a box or vessel for containing ice and salt, or other cooling agent. F is an outer casing applied to the lower part of C to moderate the conduction of heat. G is a salt-receptacle in the ice-box C, which, being filled, brings the salt in contact with the upper stratum of water, and keeps it more fully saturated, the brine in C communicating with the salt through the fine holes in G.

The effectiveness of ice and salt as a cooling agency depends upon the mixture being reduced to a very low temperature. The degree of temperature at which ice and salt will melt depends entirely upon the degree of salt saturation of the brine in which the ice floats. When water is fully saturated with salt it freezes at 3°, and at any temperature above that point saturated brine will melt ice. The temperature of the cooling agent will range

from 3° to 32°, depending upon the degree of saline saturation of the brine; but salt, when placed upon ice, soon sinks to the bottom, and it will remain there in virtue of the superior gravity of brine, while the water above in contact with the ice is very little salty. Under such conditions, the temperature of the cooling agent will not sink very low.

In order to keep the whole body of water in C saturated with salt it is necessary for the salt to come in contact with the top of the water, so that as fast as fresh water melts from the ice it may become saturated with salt. By this means the cooling agent is kept at a very low temperature, and performs its office with efficiency.

D H is a top and rim acting as a bell-float to sustain the ice-box C either above the liquid to be cooled, or partially immersed in it, as may be desired. In Figs. 1, 2, and 5, the top D of the bell-float D H is a cover, to which the ice-box C is attached by the inner flange *a*, constructed on the top D, and which is united to the box C by the bayonet-joint *g*, or other suitable fastening. In Fig. 4, the top D of the bell-float D H is constructed upon the ice-box C. In both cases the ice-box C is supported by the bell-float D H, by means of its attachment to the top D. In Fig. 3, I have shown the box C and bell-float D H in simple form, without the use of the inner flange *a*, which is employed in Figs. 1, 2, and 5. In this case the ice-box C is connected directly with the rim H of the bell-float D H by the bayonet-joint *g*, in which the points that project from the box C take hold upon projections constructed upon the inside of the rim H, and thus hold C and the bell-float D H in connection. In all these cases the ice-box C is connected with the bell-float D H, and is supported by it.

The modifications of its mode of connection all involve the same principle of construction, the ice-box C being connected with the bell-float, in order to be supported by it; in Fig. 3, connected with the rim; in Fig. 4, with the top directly; and in Figs. 1, 2, and 5 with the top through the intervention of the inner flange *a*. *b b b* are air-outlets from the interior of the bell-float D H. In Figs. 1, 2, and 5 air-outlets are afforded by tubes *b* passing through

the top D of the bell-float D H. In Figs. 3 and 4 air-outlets are afforded by holes *b b* in the rim of the bell-float D H. The action of these air-outlets is such that when all are stopped, the water does not rise in the interior of the bell-float D H, and the ice-box C is suspended above the water. When any one of the air-outlets is open, the bell-float D H sinks until the water rises within it high enough to close the open outlet, when it can rise no higher. In this manner the ice-box C may be either kept suspended over the water or immersed in it to such depth as may be desired. In Fig. 1 outlets are provided by tubes of different length. In Figs. 2 and 5 the tube *b*, moving up and down in the pipe *e*, and having the joint between them made tight by a rubber sleeve, *f*, drawn over both tubes, affords an adjustable air-outlet, by means of which the position of C relative to the water may be regulated.

In Figs. 1, 2, 3, and 5 the bell-float D H is so arranged that it both supports the ice-box C, and, by acting as a water-seal, hermetically closes the ice-box, excluding from it both air and water. In the arrangement of Fig. 4, while the bell-float supports the ice-box, it does not hermetically close it, excluding air and water. This is accomplished by the supplementary cover J I. This cover J I has an air-outlet, *j*, in the top J, and is connected with the bell-float D H by means of the bayonet-joint *g*, though in Fig. 4 they are represented as out of connection.

Its operation is as follows: When the bayonet-joint is in connection, if all the air-outlets *b* in the rim H be closed, and the air-outlet *j* in the top J of the cover J I be also closed, or if the outlet *j* be closed while the outlets *b* are open, the water will not rise in the interior of the bell-float D H, and the box C will be hermetically closed.

If it is desired to let the bell-float sink into the water, then by leaving open either of the outlets *b* and also the outlet *j*, the water will rise in the interior of the bell-float until it closes the open outlet *b*. Then, by stopping the outlet *j*, the box C is hermetically closed.

If it is desired to put down the cover J I when the bell-float is already in the water it will be necessary to open the air-outlet *j*, when the cover J I may be put down to any depth that may be desired, and by stopping the outlet *j* at any depth the cover J I will remain stationary at that point, and maintain its position permanently relative to the ice-box C and the bell-float D H, and will act as a water-seal, excluding both air and water from the interior of the box C.

Under all these different modifications it will be seen that I am enabled to employ my cooling-mixture of ice and salt in a closed chamber, protected from the access of air, and also from any communication with the water or other liquid to be cooled, while the bell-float D H supports the ice-box C either above the liquid to be cooled or immersed in it to any degree that may be desired.

The following is claimed as new:

1. The bell-float D H, of which the rim H projects downward within the liquid to be cooled, and supports the ice-box C at any desired height by a confined body of air, substantially as set forth.

2. In combination with the box C and the bell-float D H, air-outlets *b*, arranged to graduate the height above the water of the box C, or its immersion therein at such depth as may be desired, substantially as specified.

3. The combination of the box C and bell-float D H, united by the bayonet-joint *g*, for the purpose described.

4. The salt-receptacle G, in combination with the box C, for the purpose of keeping salt in contact with the upper stratum of water, thereby promoting the saturation of the brine, and inducing a low temperature of the brine in which the ice is melting, substantially as described.

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Witnesses:

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