May 2, 1933. P. SCHLUMBOHM 1,906,815

COOLER

Filed April 5, 1929

FIG. 1.

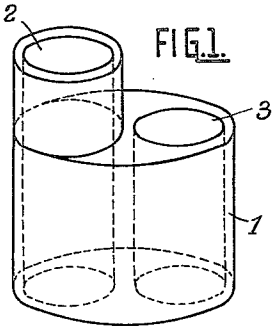


FIG. 3.

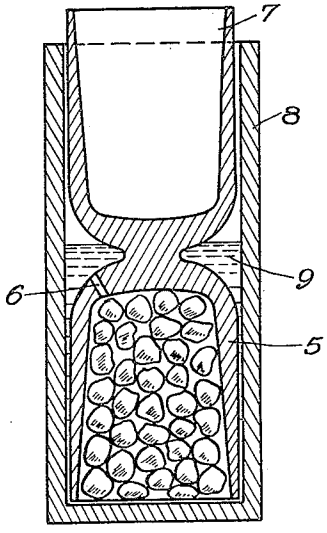


FIG. 2.

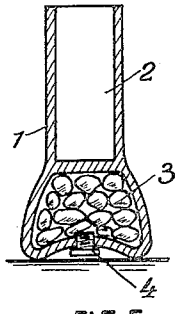


FIG. 4.

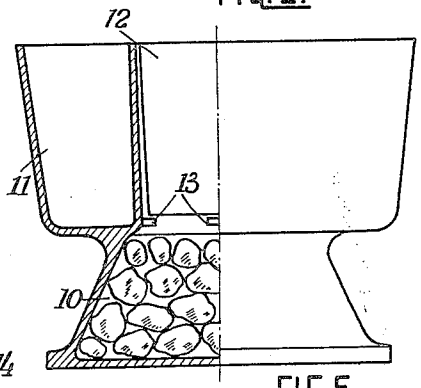


FIG. 6.

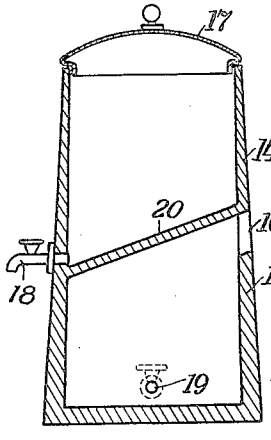
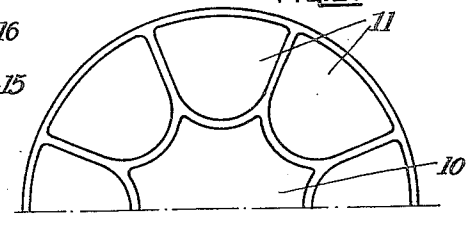


FIG. 5.



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UNITED STATES PATENT OFFICE

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COOLER

Application filed April 5, 1929, Serial No. 352,732, and in Germany April 12, 1928.

The heat exchange between the article to be cooled and the cooling medium is produced in the commonly used coolers in that the article to be cooled is enclosed as much as possible on all sides by the cooling medium or in that the cooling medium is enclosed as much as possible on all sides by the article to be cooled. Coolers of this type occupy much space; they further are uneconomical, as a portion of the cold effect used for the cooling of the article is consumed by the high specific heat of other masses, this being for instance the case when water is used as bath liquids.

According to the present invention, I produce a cooler in which the article to be cooled and the cooling medium are separated by walls of heat-conducting metal. This cooler is a hollow body of metal like aluminum, copper or silver, cast in one piece with thick homogeneous walls. In some embodiments of my invention, the thickness of these walls is proportionate at each point to the quantity of heat to be transmitted at this point and to the specific heat conductivity of the material.

For this reason a wall thickness must be chosen which is considerably above that necessary for giving the necessary stability. As a rule coolers of this kind are made of thin sheet metal and inserted in a reinforced and supporting construction of other material, whereas in the present instance the cooler consists of a thick walled hollow body of copper or aluminium which is capable of supporting itself and requires no supports. Aluminium is preferable to copper where weight is an important factor as, for the same cooling capacity, the cooler made of copper is double the weight of the aluminium construction. When I speak of aluminum, I include alloys or compounds containing aluminum.

Several embodiments of the invention are illustrated by way of example in the accompanying drawing, in which:

Fig. 1 shows in perspective view a cooler with adjacently arranged compartments for the cooling medium and the article to be cooled.

Fig. 2 shows in vertical section a cooler having these compartments arranged one above the other.

Fig. 3 shows in vertical section a cooler with superposed compartments, the compartment for the cooling medium being open at the bottom, and the cooler being enclosed by a container.

Fig. 4 shows in front elevation partly in section a cooler having a single compartment for receiving the cooling medium and a number of compartments for receiving articles to be cooled.

Fig. 5 is a top plan view of Fig. 4.

Fig. 6 shows in vertical section a liquid cooler having an upper liquid compartment and a lower compartment for receiving the cooling medium.

In the cooler illustrated in Fig. 1 the article to be cooled and the cooling medium, e. g. ice, are locally separated from each other in a thick walled hollow body 1. The compartment 2 for receiving the article in the construction illustrated serves for taking a bottle and the compartment 3 for taking ice. As the hollow body is thick walled the equalization of temperature in the walls takes place very rapidly, owing to the high specific heat conductivity of the material, e. g. of the silver, copper, aluminium from which the cooler is made. It is therefore immaterial in which part of the hollow body the cooling medium is situated.

Fig. 1 shows e. g. the arrangement of the cooling medium at the side of the article to be cooled. This is, e. g. of advantage in the case of a bottle cooler because the form, which can be rectangular or oval, occupies less table surface than the circular form hitherto used, so that this bottle cooler can conveniently be placed on the table.

In the form of construction shown in Fig. 2 the cooling medium compartment 3 is arranged vertically below the compartment 2 for the article to be cooled. The cooling medium compartment 3 is closed at the bottom by a stopper 4.

The cooler shown in Fig. 3 is similar to that illustrated in Fig. 2, only the container 5 for receiving the cooling medium is open

at the bottom. On the upper side of the container 5 which is made of good heat-conducting metal, a bore 6 is provided. On the top of the container for the cooling medium the container 7 for the article to be cooled is arranged. In this case also the two containers form a single cast block.

They are surrounded by a jacket vessel 8 made of waterproof material, which is preferably also a bad heat conductor.

When taking into use the part forming the containers 5 and 7 is turned upside down, the container 5 is filled with ice, the jacket vessel 8 is slipped over same and the whole turned again the right way up. Preferably cold water 9 is introduced so that the opening 6 is well covered. The ice will then, owing to its buoyancy, bear tightly against the inner wall of the container 5. In the cooler shown in Figs. 4 and 5 the control compartment 10, which holds ice, is surrounded by compartments 11 designed to hold the material to be cooled and arranged some at the side and some above the central compartment. The entire compartment 10 might however hold the article to be cooled, for instance a container 12 holding victuals or beverages and standing on noses 13. The container 12 forms at the same time a good closure for the charging channel.

The liquid cooler according to Fig. 6 has an upper liquid container 14 and a lower ice container 15 with filling opening 16. The upper container 14 can be shut off by a separate cover 17 or be entirely closed and provided with a tubular connection for a feed conduit. In the latter case the container may e. g. receive a liquid under pressure, such as drinking water from a main, or beer under carbonic acid gas pressure. A tap 18 serves for drawing off the cooled liquid, a tap 19 is provided for draining off the ice water. The partition 20 is preferably formed in one piece with the side walls of both containers.

The cooling device according to Fig. 6 possesses extremely good stability, takes up but little space and affords ample space for placing a vessel under the drawing-off tap 18.

All the arrangements described can be enclosed in an insulating jacket, but this is not absolutely necessary if the outer surfaces are burnished as it is well known that highly polished aluminium has the property to a particularly high degree of deflecting heat rays.

The cooling utensil is particularly adapted for natural and carbon dioxide ice as cooling medium. The cooling medium is used efficiently in the utensil, the losses through the specific heat of the metal being very slight. For the geometrical shape of the cold carrier compartment a form with low specific surface per volumetric content can be selected, e. g. a cube or cylinder.

I claim:

1. A heat exchange device of the character described comprising a body member of good heat conducting material having separate compartments, one to receive an article or articles to be cooled or heated and the other to receive a cooling or heating medium, the compartments being disposed end to end and having a single wall which comprises the closed ends of both compartments, each compartment being substantially completely open at its other end to facilitate both the manufacture of the device as a cast product and the introduction and removal of articles to be heated or cooled and the heating or cooling medium into and from the compartments.

2. A cooler comprising, in combination, a body member of good heat conducting material having a top compartment to receive an article or articles to be cooled and a separate bottom compartment to contain ice, and a container into which the body member is to be placed to retain the ice within said bottom compartment and to cause the ice by its buoyancy to rise to the top of said bottom compartment when the container is supplied with a liquid to a level to float the ice, the bottom of the bottom compartment being completely and constantly open to facilitate the placing of ice therein and to permit liquid contained within the container to enter said compartment to float the ice therein, the body of said device having a vent opening extending from the exterior thereof to an upper end portion of the bottom compartment.

3. A heat exchange device of the character described comprising, in combination, a body member of good heat conducting material having separate receptacle portions at opposite ends thereof, respectively, each of said receptacle portions having a compartment closed at it inner end and open at its outer end, one to receive a refrigerating or heating medium and the other to receive an article or articles to be cooled or heated, and a container into which the receptacle is adapted to be placed in an upright position with a refrigerating or heating medium contained in the compartment of the bottom receptacle portion, the respective receptacle portions being of substantially duplicate size and shape for selective use to contain the article or articles to be cooled or heated and the refrigerating or heating medium, respectively.

In testimony whereof I affix my signature.

PETER SCHLUMBOHM.