Nov. 10, 1936. E. C. BALLMAN 2,060,482

AIR COOLER

Filed July 25, 1932

Fig. 1.

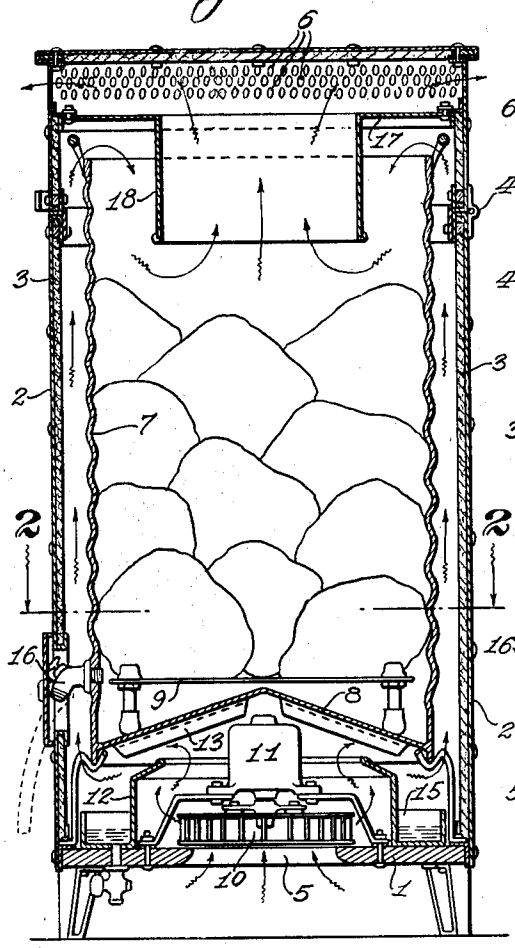


Fig. 3.

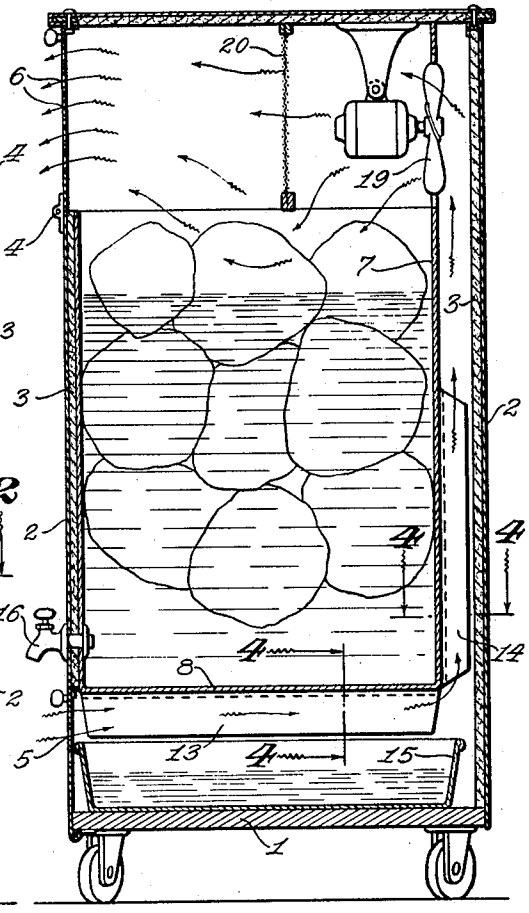


Fig. 2.

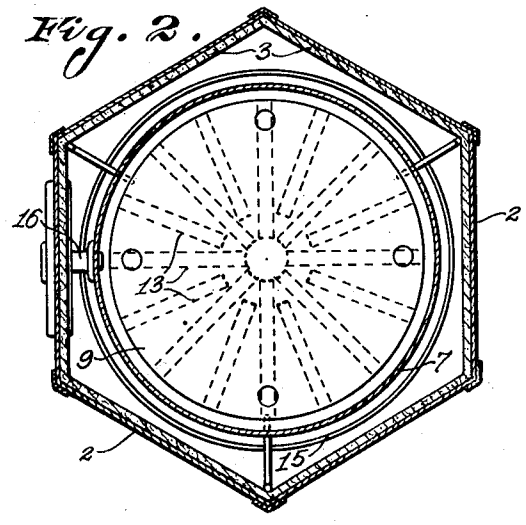
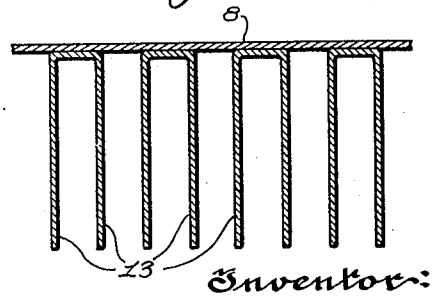


Fig. 4.



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AIR COOLER

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Application July 25, 1932, Serial No. 624,561

5 Claims. (Cl. 62—131)

This invention pertains to an air cooler adapted for cooling the air of a room by means of ice or similar refrigerant.

One of the objects of this invention is to provide a cooling device which may be loaded with ice and which has means for inducing a circulation of air through the cooler to be cooled by the ice and then discharged into the room.

Another object of this invention is to provide such an apparatus of simple construction and which will be efficient in operation.

Another object is to provide such a cooler in which a definite circulation of air is established such as to promote high efficiency in operation.

Further objects will appear from the following description taken in connection with the accompanying drawing, in which:

Figure 1 is a vertical sectional view of a cooler embodying this invention;

Figure 2 is a section on line 2—2 of Figure 1;

Figure 3 is a vertical sectional view of a cooler illustrating another embodiment of this invention; and

Figure 4 is a detail section on line 4—4 of Figure 3 somewhat enlarged.

Referring to the drawing 1 designates a base upon which is mounted a casing 2 which may be of metal or other suitable material and which may have a lining 3 of suitable heat insulating material.

The upper part of the casing is separate from the lower part and is hinged at 4 so that the top may be opened for replenishing the cooler with ice. This upper portion forms a lid or cover for the casing.

The lower part of the casing such as the base 1 is provided with an air inlet opening 5 while the upper part of the casing is provided with an outlet opening which may take the form of a series of perforations 6.

Mounted within the casing 1 is a container 7 adapted to receive ice or similar refrigerant so as to be cooled thereby. The container 7 is spaced from the bottom and side walls of the casing so as to provide an air duct through the space below the casing and up along the sides thereof from the inlet 5 to the outlet 6. In the embodiment of Figure 1 the container 7 is shown as having corrugations in its surface so as to increase the extent of cooling surface and to make the container more rigid.

The bottom 8 may be conical in form as indicated in Figure 1, or it may be flat as shown in Figure 3. Mounted within the container 6 in the embodiment of Figure 1 is a removable platform or shelf upon which the ice may rest and which is adapted to protect the bottom against impact by the ice.

In Figure 2 the casing is shown as hexagonal in shape. This forms a convenient shape and one with which a good efficiency of operation may be obtained. This casing may, of course, be of any other suitable shape such as rectangular or circular. Furthermore the container 7 is shown as circular in cross section in Figure 2. It may of course be constructed of other shapes preferably such as to conform to the shape of the casing.

In the embodiment of Figure 1 a blower 10 is mounted below the ice container and adjacent the inlet opening 5. This may be driven by a motor 11 which in the embodiment shown is mounted with its shaft vertical. A baffle 12 of suitable shape is positioned to surround the blower, and is so formed as to direct the air current toward the center of the bottom of the ice container. In order to increase the cooling surface the bottom of the ice container may have mounted therein so as to be thermally in contact therewith a set of radial fins or plates 13. In the embodiment of Figure 2 the fins 13 may also be arranged radially. In the illustration of Fig. 3 they are shown extending directly across the bottom of the container. In Figure 3 is also shown a set of similar fins 14 mounted vertically in the space between the ice container and the casing wall and preferably mounted on the ice container. Similar fins may be used in connection with Figure 1 the same either being mounted on the corrugated sides or with the sides straight throughout that portion covered by the fins.

It will be noted that the fins 13 and 14 not only serve to absorb heat from the air but also form guides defining a series of parallel air channels or paths so that the flow of air is guided from the point where it enters the casing near the floor of the room in a definite path to and along the side faces of the ice container. This is of particular advantage in such a device as this where the flow of air is in a direction opposed to the natural circulation by convection, as it tends to avoid the establishment of eddy currents when the fan is started and definitely establishes a directed flow along the proper path.

A simple construction for these fins is shown in Figure 4 in which the fins are shown as formed into channel form and secured at their back to the bottom 8, or the side wall of the container 7. The securing means may be rivets or the fin members may be soldered to the container. In any case the connection is such as to effect a good thermal contact between the fins and the container in order to provide for efficient heat transmission from one to the other.

In either embodiment a drip pan 15 may be provided to catch the condensation drip from the container. A drain cock 16 provides for emptying the container for cleaning or the like.

The upper part of the casing is provided with

means for deflecting the circulating current of air downwardly against the ice in the container. In the embodiment of Figure 1 the plate 17 is mounted in the casing which plate carries a downwardly extending tubular member 18. The walls of the member 18 extend downwardly below the upper edge of the container 7 and tend to deflect air currents coming over the top of the wall of the container downwardly so as to cause such currents to impinge upon the ice in the container. Thereafter the air flows upwardly through the tubular member 18 and out at the outlet perforations 6.

In the embodiment of Figure 3 the air circulates along the bottom and upwardly along the side passing over the top edge of the ice container and propelled by a fan 19 or the like in the upper part of the casing. A baffle 20 which is preferably constructed of pervious material such as cloth is arranged to extend downwardly in the path of the air current so as to deflect the same downwardly against the ice in the container. This baffle also serves to entrap dust and other suspended matter carried by the air current and thereby functions to clean the air before it is discharged into the room.

In the embodiment of Figure 1 the ice in the container reduces the temperature thereof while the blower 10 blows air in all directions within the baffle 12. This baffle turns the current of air radially inwardly toward the center of the bottom of the ice container after which the air turns outwardly and flows radially along the bottom and between the fins 13. The air current then turns upwardly into the space or spaces between the ice container and the casing. Upon arriving at the top of the ice container the air current is turned inwardly by the plate 17 in Figure 1 or by the top of the casing in Figure 3, and is then deflected downwardly by the baffle 18 or 20. The downwardly deflected current of air impinges on the ice in the container and then flows upwardly to the outlet 6 and out into the room.

While the drawing shows a certain definite arrangement of the fins 13 and 14, this arrangement may be varied to some extent to suit the particular conditions encountered.

It will be seen that this invention provides a cooler of simple construction which will be effective in its operation to cool the air circulated therethrough. This air is taken in at an outlet in the lower portion of the casing and is propelled through the duct provided between the casing walls and the ice container. During its travel the air is in contact with the cold portions of the container and before being finally discharged it is brought into contact with the ice itself. The arrangement of the conducting fins is such that the air current is continually in contact therewith and these fins are in thermal contact with the cold ice container. Accordingly the air gives up its heat rapidly to the ice container and is quickly reduced to a low temperature. When the operation of the fan is stopped the insulating lining of the casing serves to prevent too rapid melting of the ice.

While this device has been described as a unitary structure it will be understood that certain individual features or subcombinations thereof may be useful by themselves without reference to the other features or the rest of the combination. It is understood, therefore that the employment of such individual features and subcombinations is contemplated by this invention and within the scope of the appended claims. It is further obvious that various changes may be made, within the scope of the appended claims, in the details of construction and operation without departing from the spirit of this invention; it is to be understood, therefore, that this invention is not limited to the specific details shown and described.

Having thus described the invention, what is claimed is:

1. An air cooler, comprising, a casing, an ice container therein, an air inlet in the lower part of said casing, an air outlet in the upper part thereof, an air duct in said casing adapted to conduct a current of air from said inlet upwardly along the side wall of said container to said outlet, means in said duct at the top of said container adapted to deflect the air current downwardly against the ice therein, and means in said duct for propelling the air therethrough.

2. An air cooler, comprising, a casing, an ice container therein, an air inlet in the lower part of said casing, an air outlet in the upper part thereof, an air duct in said casing adapted to conduct a current of air from said inlet upwardly along the side wall of said container to said outlet, a pervious baffle in said duct at the top of said container adapted to deflect the air current downwardly against the ice therein, and means in said duct for propelling the air therethrough.

3. An air cooler, comprising, a casing, an ice container therein, an air inlet in the lower part of said casing, an air outlet in the upper part thereof, an air duct in said casing adapted to conduct a current of air from said inlet upwardly along the side wall of said container to said outlet, a cloth baffle in said duct at the top of said container adapted to deflect the air current downwardly against the ice therein, and means in said duct for propelling the air therethrough.

4. A room cooler, comprising, a casing, an ice container therein spaced from the bottom and a side wall thereof, an air inlet in the lower part of said casing adapted to take air near the floor of the room, an air outlet in the upper part thereof, an air duct in said casing adapted to conduct a current of air from said inlet along the bottom and side wall of said casing to said outlet, a series of heat-conduction air-guiding fins in said duct extending radially of and in contact with the bottom of said container, and a blower mounted in said casing below said container adapted to propel the air upwardly along said duct.

5. A room cooler, comprising, a casing, an ice container therein spaced from the bottom and side walls thereof, an air inlet in the lower part of said casing adapted to take air near the floor of the room, an air outlet in the upper part thereof, an air duct in said casing adapted to conduct a current of air from said inlet along the bottom and side wall of said casing to said outlet, a series of heat-conduction air-guiding fins in said duct extending radially of and in contact with the bottom of said container, and a blower mounted in said casing below said container adapted to propel the air in a plurality of radial directions along said bottom and upwardly through said duct.

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