This invention relates to refrigeration and particularly to refrigerated beverage coolers. In bottled beverage cooling and storing apparatus of the so-called wet type wherein the content of the bottles is cooled by submerging the bottles in a body of liquid contained in an insulated compartment it is customary to cause agitation and circulation of the liquid over an evaporator or cooling element of a refrigerating system in order to cool the liquid and more rapidly remove heat from the bottled beverages. An agitator or propeller is ordinarily employed for circulating the cooling liquid and may be continuously or intermittently operated by an electric motor disposed above the body of liquid. It has been found that if heat generated by such an electric motor is not removed therefrom a loss in operating efficiency occurs and also the covering or coating on the wire field windings of such a motor will become charred resulting in short circuits and failure of the motor. My invention is specifically directed to providing means whereby these difficulties will be eliminated.

A further and more specific object of my invention is to provide means for rapidly removing heat from a motor employed to operate a liquid refrigerant and circulating element in a bottled beverage cooling and storing compartment of a refrigerating apparatus.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings, wherein a preferred form of the present invention is clearly shown.

In the drawings:

Fig. 1 is a perspective view of a bottled beverage cooling and storage apparatus having my invention embodied therein;

Fig. 2 is an enlarged fragmentary sectional view of the apparatus shown in Fig. 1 and is taken on the line 2—2 thereof; and

Fig. 3 is a fragmentary view taken on the line 3—3 of Fig. 2, partly in section and partly in elevation.

Referring to the drawings, for illustrating the invention, I have shown in Fig. 1 thereof a refrigerating apparatus including a cabinet 10 having an access opening in its top wall which opening is normally closed by doors 11. This opening permits, when a door 11 is opened, articles stored in the cabinet to be dispensed therefrom. The cabinet 10 comprises outer metal shells or panels 12 and an inner metal open-top tank or liner 14 forming a compartment 15 within the cabinet (see Fig. 2). Any suitable or desirable insulating material 16 is interposed between the metal walls 12 and 14 of compartment 15 to insulate same. The cabinet outer shells or panels 12 extend downwardly beyond the bottom insulated wall of compartment 15 and forms a machine compartment 17 therebelow for housing the refrigerant compressing, liquefying and circulating unit (not shown) of any suitable or conventional construction.

The closed refrigerating system associated with cabinet 10 includes, in addition to the refrigerant compressing, liquefying and circulating unit, a refrigerant evaporator in the form of a cylindrical conduit coil 21 supported on a plurality of suitable brackets 22. The evaporator 21 also includes an accumulator tank 22 in which any liquid refrigerant flowing from the outlet of the evaporator is trapped and caused to be evaporated so as to prevent liquid refrigerant from entering the gaseous refrigerant return conduit 24 that is connected to the compressor of the circulating unit. Liquid refrigerant is circulated, under the control of a suitable or conventional restrictor or expansion valve (not shown), to the refrigerant evaporating conduit coil 21 through the pipe or conduit 26 leading from the condenser-receiver of the closed refrigerating system. The conduits 24 and 26 may be suitably sealed to the bottom wall of compartment 15 to prevent leakage at the point they pass through this wall.

A propeller or agitator 28 is located below the evaporator coil 21 and is operatively connected to an electric motor 29, located above the evaporator 21, by a shaft 31. This shaft 31 passes through a central tube-like part of the tank 23 and rotates in a bearing supported thereby. Motor 30 includes the usual cylindrical outer casing 35, a rotor 37 and a stator 38 surrounding the rotor and secured in contact with the inner wall surface of casing 35 (see Fig. 3). The motor also includes the usual end caps 41 and 42 fitting into the ends of casing 35 and provided with bearings in which the shaft of the rotor 37 is rotatably mounted. The stator 38 of motor 30 comprises field windings, generally represented by the reference character 43, and being in the form of suitably insulated wire wound around and into openings of a metallic pole forming member generally represented by the reference character 44 (see Fig. 3). In order to support
motor 30 within compartment 15 above the evaporator 21 I provide a bracket device 46 which includes a pair of short legs 47 attaching and secured to the compartment liner 14 by bolts 48. This bracket device 46 also includes outwardly extending relatively long legs 49 having screws 51 passing therethrough and threaded into the motor casing 38 to rigidly mount the motor in place. Bracket device 46 also includes a cross piece 52 extending between the legs 48 thereof for supporting a metallic member 54 of high heat conductive property such, for example, as copper or brass. Member 54 is secured to the cross piece portion 52 of bracket device 46 by a bolt or the like 53. The member 54 comprises an arc-like band portion 57 and a plurality of spaced apart fin-like legs 58 depending therefrom and extending a substantial distance into a body of water placed in compartment 15 and used for a purpose to be presently described. The arc-like band portion 57 of member 54 is of slightly smaller radius than the diameter of the outer wall surface of casing 36 of motor 30. Thus when member 54 is bolted in position the band portion 57 thereof springingly engages or embraces the outer wall surface of casing 36 of the motor 30 so as to be in intimate thermal contact therewith. This heat exchange relationship between member 54 with motor casing 36 and the extension of the spaced apart fin-like leg portions 58 of member 54 into the body of water in compartment 15 provides an effective means for conducting heat away from motor 30 to a plurality of points or zones in the water.

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A U-shaped, in cross-section, shroud 61 secured to liner 14 in any suitable manner such as by the bolts 48 forms a small chamber within compartment 15 and provides a shield for the motor 30 and evaporator 21. This shroud is provided with a set of lower openings 62 and a set of upper openings 63 for the ingress and egress of water circulated through the chamber and over the evaporator 21 by the propeller 28. Operation of propeller 28 draws water from compartment 15 through the openings 62 and causes the water to flow over the evaporator where it is cooled and then circulated out of the small chamber back into the compartment 15 over the plurality of bottled beverages 64 located therein. As before stated, operation of motor 30 to drive the propeller 28 causes the field windings 43 of the stator 35 to generate heat. This heat becomes excessive and the motor attains a temperature far above that desired for efficient operation thereof, and if the heat is not quickly and effectively removed from motor 30 it will cause the insulation on the wires of the field windings 43 to become charred or burnt, whereupon short circuits will occur. In the present disclosure I provide means for quickly removing heat from the motor casing 25, particularly from the field windings 43 of the motor, so as to permit the motor to operate at a temperature more desirable for efficient operation thereof and to also prevent excessive heat from damaging the motor. This means is the member 54 which embraces a portion of motor 30 to conduct heat from the casing of the motor and consequently stator 35 to the body of cold water in compartment 15.

The partitioning of the small chamber from the compartment 15 by shroud 61 and operation of propeller 28 causes the level of water in the small chamber to rise above the level of the body of water in compartment 15 to thus submerge a greater amount of the lengths of the fin-like leg portions 58 of member 54 into the liquid which renders the member 54 more effective for removing heat from the motor 30. Due to the great temperature differential between the heat ordinarily generated by a motor used for the purpose described and the normal temperature of the body of cooling fluid, the high heat conductive property of member 54 insures rapid transfer of the motor heat to the cold water. This effective heat transfer member is of low manufacturing cost and can be added to a refrigerating apparatus of the type disclosed for eliminating the difficulties hereinafore enumerated without materially increasing the retail price of the apparatus.

While the form of embodiment of the invention as herein disclosed, constitutes a preferred form, it is to be understood that other forms might be adopted, as may come within the scope of the claims which follow.

What is claimed is as follows:

1. A refrigerating apparatus including a cabinet having a plurality of walls forming an insulated compartment therein for the reception of articles to be cooled and stored, a body of liquid in said compartment, an evaporator of a refrigerating system for cooling said liquid, an agitator for circulating the liquid over said evaporator, an electric motor above the level of the body of liquid in said compartment and connected to said agitator for operating same, said motor including a casing, a rotor and a stator within said casing, said stator surrounding said rotor and engaging the inner wall surface of said motor casing, means for conducting heat directly from said motor casing to said body of liquid in said compartment, and means comprising a metallic member having an arc-like band portion embracing a part of the outer wall surface of said motor casing, the motor being below the horizontal plane of said stator and having integral spaced apart fin-like leg portions depending into said body of liquid.

2. In a refrigerating apparatus including a cabinet having a plurality of walls forming an insulated compartment therein for the reception of articles to be cooled and stored, a body of liquid in said compartment, an evaporator of a refrigerating system for cooling said liquid, an agitator for circulating the liquid over said evaporator, an electric motor connected to said agitator for operating same, said motor including a casing surrounding a rotor and a stator, said casing having its outer wall surface exposed to ambient air within said compartment above the level of the body of liquid therein, said stator engaging the inner wall surface of said casing, and a metallic member having a part thereof embracing a portion of said outer wall surface of said casing within the horizontal plane of said stator and having another integral part depending into said body of liquid for conducting heat generated by said motor directly from said casing to said liquid.

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