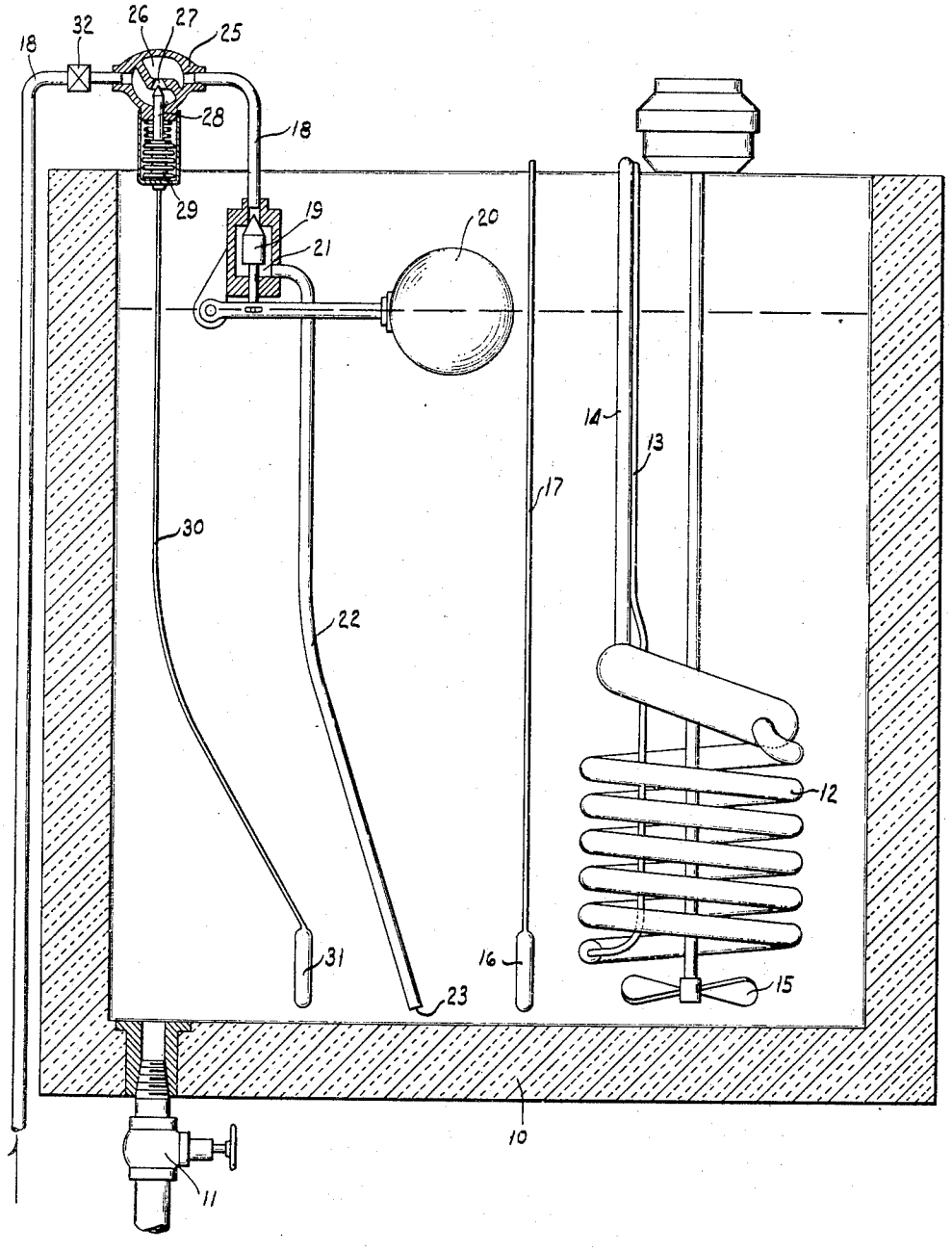
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FLUID COOLING APPARATUS WITH CONTROLS THEREFOR

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WITNESSES:

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FLUID COOLING APPARATUS WITH CONTROLS THEREFOR

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2 Claims. (Cl. 62—7)

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This invention relates to refrigerating apparatus and, more particularly, to such apparatus as used for cooling liquids to predetermined temperatures.

In liquid cooling apparatus, as used for example, in the cooling and storing of drinking water, which water is to be dispensed at a constant temperature, the irregular demands upon the system, together with the fact that the system is expected to produce a satisfactory beverage whether the temperaure of the incoming water be 60° F. or 100° F., and whether the temperature of the room in which the cooler is placed be between the same limits or even higher, have made necessary a compromise in the refrigerating capacity of the cooling unit between that which is adequate to cool and maintain the body of cooled water at the desired dispensing temperature during "peak" conditions, when the demand for water is almost constant and the room and incoming water temperatures are high, and that when the demand and the room and incoming water temperatures are more nearly normal.

This problem is accentuated in that type of water cooling system where the incoming water is admitted to the cooling and storage tank from a source under pressure, such as the ordinary city water line, through a float or other level controlled valve, for in such a case the level in the storage tank falls rapidly at times of peak draw with the result that the incoming water enters in such volume that it is insufficiently cooled before it is used for beverage purposes unless the cooling unit be inordinately large in relation to the normal operation of the apparatus.

The invention, therefore, has as an object the provision of a system wherein the cooling unit is designed to take care of the system under normal conditions of operation but in which the amount of incoming water never exceeds the capacity of the cooling unit to reduce it to the selected dispensing temperature.

The invention further contemplates the provision of temperature-responsive means associated with level control means for controlling the ingress of make-up water to the storage tank in accordance with the capacity of the refrigerating unit.

These and other objects are affected by the invention as will be apparent from the following description and claims taken in connection with the accompanying drawings, forming a part of this application, in which the single figure of the drawings is a partially diagrammatic view in vertical section of a liquid cooling apparatus embodying the invention.

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The insulated tank 10 for containing the liquid to be dispensed is provided with an outlet valve 11 through which the cooled liquid is withdrawn. The liquid can be any liquid which it is desired be withdrawn from the storage tank at a predetermined temperature, and for simplicity of description will be hereafter referred to as drinking water or simply water.

The water in the tank 10 is cooled by a refrigerant cooling unit, here shown as a coil 12, to which liquid refrigerant is fed by a small conduit 13, and from which expanded refrigerant is withdrawn through a suction conduit 14. Conduits 13 and 14 are, of course, connected to a suitable refrigerant condensing unit (not shown). Preferably the cooling unit is placed near the bottom of the storage tank and it is also preferable to provide a motor-driven agitator 15 for circulating the water in the tank to assist in maintaining a uniform temperature. The refrigerating unit is stopped and started in response to the temperature of the stored water, a thermostatic bulb for that purpose being indicated at 16 and connected to a tube 17 to a suitable temperature-responsive switch (not shown). For drinking water purposes, the switch may be set to open when the water temperature falls to 34° F. and to close when the temperature rises to 40° F.

Water is supplied to the tank 10 from a suitable source under pressure through a conduit 18. The passage of water from this conduit to the tank is controlled by a valve 19 actuated by a float 20. Valve 19 is shown in the drawing in its closed position. After passing this valve water enters the valve body 21 and then flows into conduit 22. Conduit 22 may have its discharge opening 23 disposed in the lower part of the tank and adjacent the evaporator coil 12.

A valve assembly 25 is also disposed in the inlet conduit 18 in series with float-controlled valve 19. This valve assembly 25 comprises a body 26 provided with a seat 27 and a valve proper 28. An expansible member such as a bellows 29 is provided for actuating the valve 28. The bellows 29 is connected by a conduit 30 with a bulb 31. The latter bulb is preferably disposed in the lower part of the tank and may also be disposed adjacent the discharge outlet 11 of tank 10 so as to be responsive to the temperature of the liquid to be drawn from the tank. The system comprising bellows 29, conduit 30 and bulb 31 is charged with an expansible fluid, for example, methyl chloride.

Preferably, a pressure-regulating valve 32 is provided in the intake conduit 18 so that the water enters the tank under a constant pressure.

In the operation of the system, let it first be assumed that the tank 10 is completely empty but that the water connections have been made and the refrigerating unit is operating. The float 20 will have dropped to open valve 19, but valve 28 will be closed because the fluid in the bellows system has expanded. An amount of water at least sufficient to cover the bulbs is introduced into the tank from a bucket or through a by-pass from conduit 18 disposed ahead of all the valves. When this water has been cooled to a predetermined low temperature the valve 28 unseats and remains so until the temperature of the stored water rises to a predetermined degree. When valve 28 is open, flow of liquid into the tank is under control of the float-controlled valve 19.

While the invention is shown in but one form, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various changes and modifications without departing from the spirit thereof.

What is claimed is:

1. In apparatus of the type wherein liquid is stored in a tank and is cooled therein by a refrigerating unit, and from which tank the cooled liquid is periodically withdrawn, and in which the liquid is supplied to the tank from a source under pressure, the combination of means responsive to the liquid level in the tank for controlling the admission of liquid thereto, and means in series with said first means for also controlling the admission of the liquid to the tank in response to the temperature of liquid in the tank.

2. In apparatus of the type wherein liquid is stored in a tank and is cooled therein by a refrigerating unit, and from which tank the cooled liquid is periodically withdrawn, and in which the liquid is supplied to the tank from a source under pressure, the combination of means responsive to the liquid level in the tank for controlling the admission of liquid thereto, and means in series with said first means for also controlling the admission of the liquid to the tank in response to the temperature of liquid near the bottom of the tank.

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