Aug. 23, 1938. E. HEITMAN 2,127,732

REFRIGERATING APPARATUS

Filed May 31, 1935

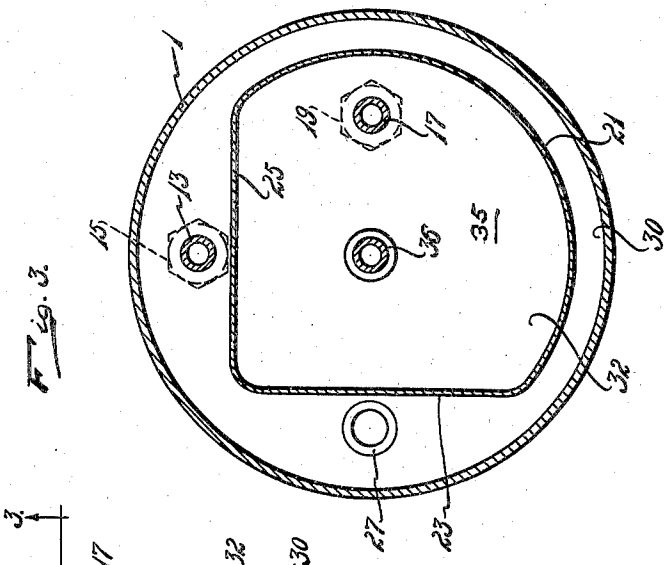


Fig. 3.

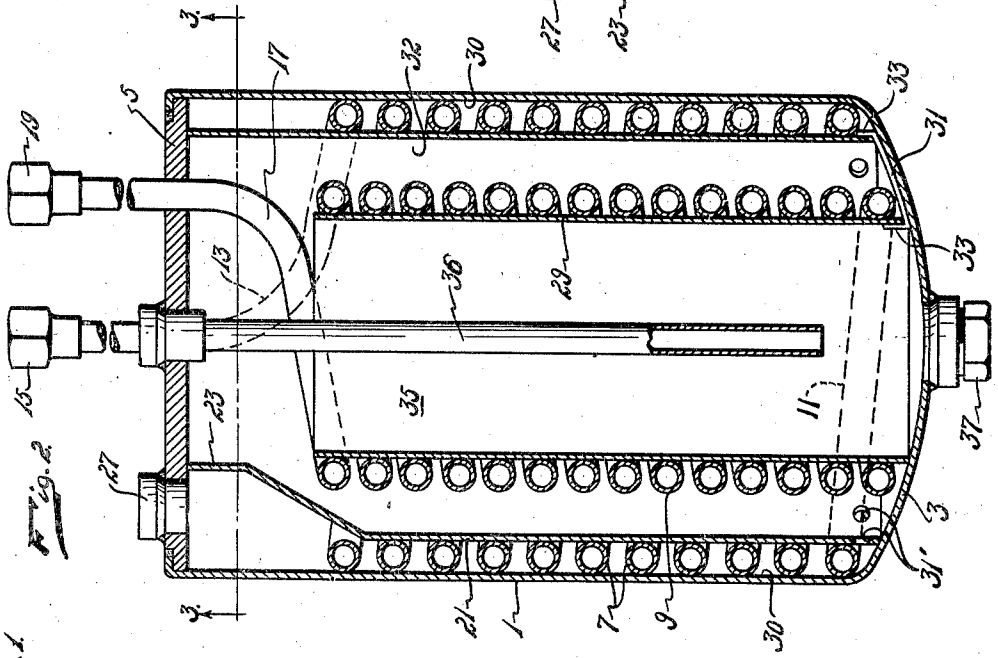


Fig. 2.

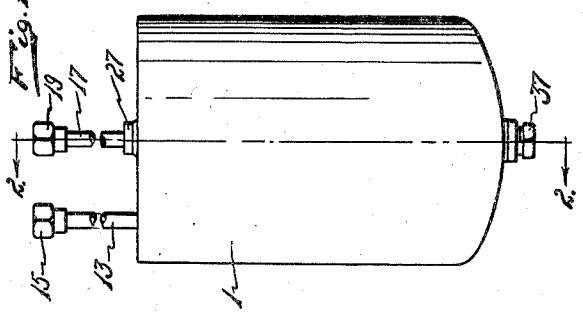


Fig. 1.

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REFRIGERATING APPARATUS

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Application May 31, 1935, Serial No. 24,317

2 Claims. (Cl. 257—205)

My invention pertains to heat exchangers and more particularly to a device for applying a refrigerant to cool water.

It is an object of my invention to provide an efficient water cooler of compact easily assembled construction comprising a cylindrical tank shell enclosing concentrically disposed baffle shields projecting from a closed end of the tank shell for intimate association with helical concentrically disposed coils of conduit projecting into the tank shell from a cover plate closing the open end of the tank shell.

It is also an object of my invention to provide a water cooler comprising a refrigerant receiving conduit and an enclosing tank comprising baffle means for passing water in intimate heat exchange relation with the conduit and storing a body of the cooled water isolated from the ambient temperature.

The invention itself, however, both as to its organization and its method of operation, together with additional objects and advantages thereof, will best be understood from the following description of a specific embodiment, when read in conjunction with the accompanying drawing, in which:

Fig. 1 is a side elevation view of the exchanger assembly;

Fig. 2 is a longitudinal sectional view thereof; and

Fig. 3 is a cross sectional view on line III—III thereof.

Referring more particularly to the drawing, my heat exchanger unit comprises a cylindrical tank shell 1 or enclosing casing which is open at the upper end and closed at the lower end by a concave bottom wall 3. The open end of the tank shell is closed by an end plate 5 of substantially rigid construction which is pushed into the end of the tank shell 1 the outer edges of which are spun over the edge of the end plate and hermetically secured thereto as by soldering or welding for example.

Enclosed within the tank shell 1 is a pair of refrigerant evaporator expansion coils 7 and 9 of helical formation. One of the coils 9 is of smaller diameter than the other 7 and is concentrically disposed therein having its bottom end connected outwardly through a conduit 11 with the lower end of the larger coil. The two interconnected expansion coils 7 and 9 are preferably coiled from one piece of conduit.

The larger coil 7 snugly engages the inner surface of the tank shell 1 and the uppermost end 13 of the larger coil is angularly turned to provide an inlet connection extending perpendicularly through the end plate 5 and at its outermost end carries a pipe coupling fixture 15 by which it may be connected to any suitable source of vaporizable liquid refrigerant. The upper end 17 of the smaller coil 9 is likewise angularly turned to pass perpendicularly through the end plate 5 and it is provided with a suitable pipe coupling fixture 19 comprising an outlet connection whereby it may be connected to a suitable suction line for drawing the vaporized refrigerant vapor therefrom.

For guiding the flow of water in intimate heat exchange relation between the spaced turns of the outermost expansion coil 7 I have provided a cylindrical baffle sleeve 21 which is disposed in concentric engaging relation inside of the turns of the larger coil 7. The upper end of the baffle sleeve 21 is provided wtih chord-like flattened portions 23 and 25. The refrigerant inlet connection 13 is extended through the space between tank shell 1 and the flattened portion 25. A water inlet connection 27 is mounted in the end plate and disposed between the outer shell and the other flattened portion of the baffle sleeve for admitting the water or other fluid which is to be cooled by passing it through the heat exchanger. To deflect the cooled fluid in intimate heat exchange relation around the turns of the smaller expansion coil, a smaller and shorter cylindrical baffle sleeve 29 is concentrically disposed in engaging relation with the inside of the smaller refrigerant coils 9. The two baffle sleeves 21 and 29 are rigidly secured to the bottom wall 3 of the tank by means of metallic strips 31 preferably welded thereto and having up-turned ends 33 which extend in flat abutting relation along the edges of the sleeves to which they may be secured, as by welding for example. A water outlet conduit 36 extending through the center of the end plate 5 passes axially into the tank and opens adjacent the bulged bottom wall 3 thereof thus removing the cold water from the body of water stored inside of the smaller baffle sleeve.

The water or other fluid to be cooled, is conducted into the upper end of the tank through the inlet fixture 27, whence it passes between the larger baffle sleeve 21 and the shell 1 of the tank flowing spirally around the channel provided between the spaced turns of the refrigerant expansion coils. Since the turns of the outermost expansion coil 7 engage both the shell 1 of the tank and the larger baffle sleeve 21 a closely restricted spiral water circulating channel 30 is defined therebetween.

When the water approaches the bottom of the tank it passes through perforations **31'** provided therein to the annular space **32** enclosed between the two baffle sleeves.

After the water enters the annular space **32** between the two baffle sleeves **21** and **29**, it passes upwardly therethrough in heat exchange relation with the turns of the smaller expansion coil **9**. The flow of water or other fluid to be heated or cooled in the heat exchanger thus parallels the flow of the refrigerant, or other heat absorbing or emitting medium, to which it is to be thermally exposed. The cold water passing up the annular space overflows the inner baffle sleeve **29** and passes into the storage chamber **35** inside of the small baffle sleeve where it is stored as a body substantially surrounded by the coils of refrigerant conduit thus isolating it from the ambient temperatures after it has been passed adjacent the refrigerant conduit. When cold water is desired it is withdrawn through the outlet conduit **36** which projects axially into the chamber **36** from the end plate and opens adjacent the bottom of the tank.

The bulged bottom wall **3** of the tank is provided with a suitable pipe coupling **37** for connection with an auxiliary outlet for draining the water from the tank. The inlet and outlet conduit connections may be hermetically sealed to the end walls of the tank in any suitable manner, as by soldering or welding, and the outer surfaces of the tank are preferably covered with heat insulating material as will be readily understood.

It will be seen that I have provided a compact heat exchanger which is of simple rugged easily sealed construction for so associating two fluids that heat is passed between them with a high degree of efficiency.

Although I have shown and described certain specific embodiments of my invention, I am fully aware that many modifications thereof are possible. My invention, therefore, is not to be restricted except insofar as necessitated by the prior art.

I claim as my invention:

1. In combination in a fluid cooler a pair of cylindrical baffle sleeves disposed in spaced concentric relation, refrigerant evaporating conduit means coiled helically about and in contact with the outer surface of each of said baffle sleeves and connected in series relation, and a tank casing disposed in snug fitting relation over the conduit means coiled on the outermost sleeve.

2. In combination in a fluid cooler a pair of cylindrical baffle sleeves disposed in spaced concentric relation, refrigerant evaporating conduit means coiled helically about the outer surface of each of said baffle sleeves and connected in series relation, a tank casing disposed in snug fitting relation over the conduit means coiled on the outermost sleeve, and abutting adjacent ends of the baffle sleeves, a cover plate on said casing abutting the opposite end of one of said baffle sleeves, inlet and outlet conduit means opening into the space in said tank casing for circulating fluid in intimate heat exchange relation around said conduit coils.

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