

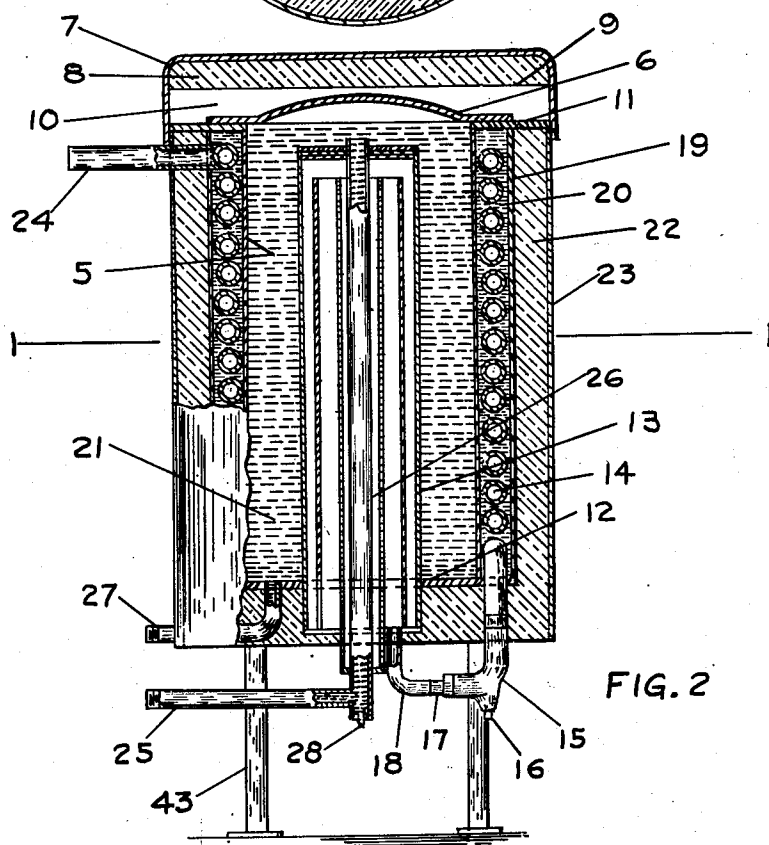
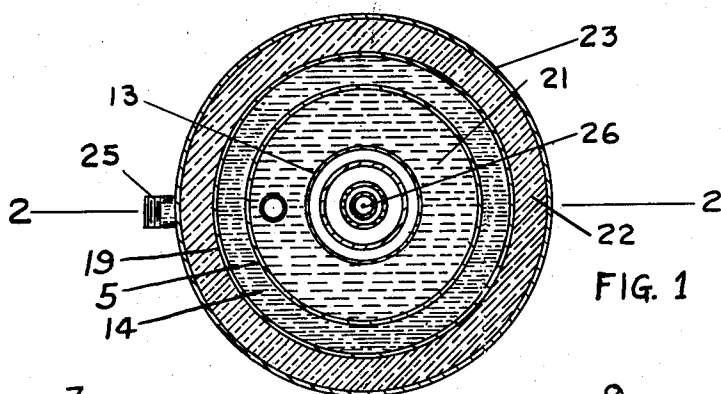
Sept. 16, 1952

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LIQUID COOLER

2,610,485

Filed July 28, 1950

2 SHEETS—SHEET 1



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2 SHEETS—SHEET 2

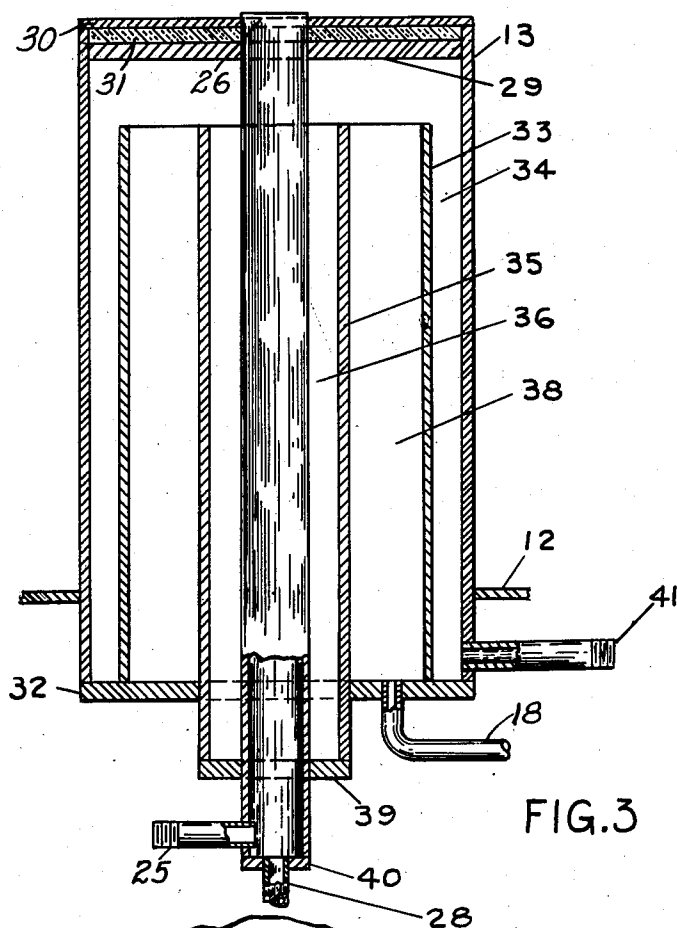


FIG. 3

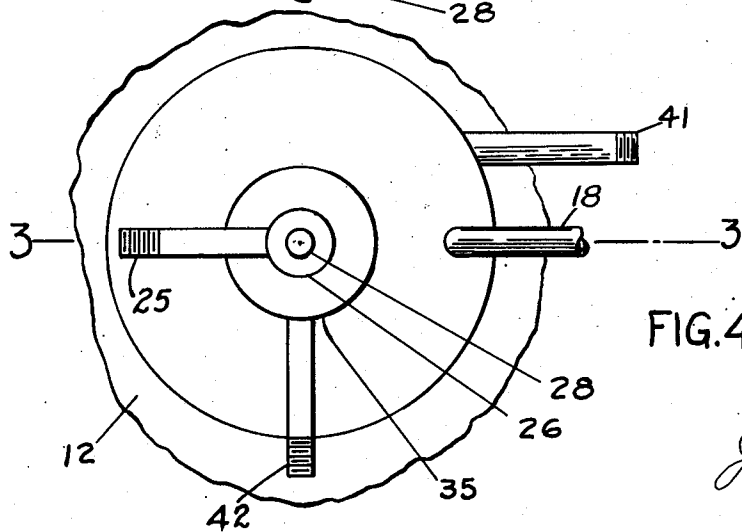


FIG. 4

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UNITED STATES PATENT OFFICE

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LIQUID COOLER

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3 Claims. (Cl. 62-141)

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My invention relates to a cooler for any and all kinds of liquids, beverages, heavy fruit juices, chemicals, and water.

One of the several objects of this new and improved cooler is easy and quick cleaning in case of a change from one kind of liquid to another.

Another object of this cooler is in the economic use of the refrigerating medium used for the operation of this cooler. The small areas in the center evaporator holds a small amount of refrigerant, thus being economical because of the high cost of some types of refrigerants that are non toxic and can or must be used in many localities.

As cooling is the principal object in this case, liquids or beverages can be cooled to their lowest temperature in liquid state. Slight freezing or congealing by cold will not injure the cooler. This feature is not found in the general tubular coolers.

The refrigerant enters the center evaporator at the bottom and flows upward to near the top of the evaporator thence downward to the bottom and out thru a pipe to the suction coil which is wrapped tightly around the outside of the cooler. The refrigerant suction leaves the top of the suction coil to go to the refrigerating condensing unit.

Another tank is placed around the suction coil and around it is placed insulation material with a sheet metal finish around the outside. Cooler is supported on floor by four legs.

The cooler can be operated on a refrigerant flooded system. This feature makes the cooler more efficient than by the use of a direct expansion system of refrigerating. The cooler can be operated on a direct expansion system, but with less efficiency.

The suction coil or coils are wound tightly together and a small amount of eutectic fluid such as glycerine and water at a low freezing point is filled in the voids between the coils of pipe. This is for the purpose of a better contact between the coils and cooler tank. Glycerine and water is a non-poisonous fluid. The entire cooler can be of welded and brazed construction.

Other objects will become apparent as the invention is more fully set forth.

To make this invention clear, reference is made to the appended drawings, in which a particular form of the invention is indicated.

These drawings, with the following description, outline the particular form by way of example, illustrate its principles and portray its objects. At the same time, the claims emphasize the scope of the invention.

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Referring to the drawings:

Figure 1 is a sectional view in plan of a cooler used in this embodiment of the invention looking along line 1-1 of Figure 2;

Figure 2 is a sectional view taken along the line 2-2 in a longitudinal direction, of Figure 1;

Figure 3 is a section of the center evaporator, taken on line 3-3 of Figure 4;

Figure 4 is partial bottom view of cooler showing the refrigerant pipe connections.

Similar reference characters refer to similar parts throughout the drawings.

In the structure shown in Figures 1 and 2 a cooler consisting of a casing 5 has a removable dished cover 6. Over this is an insulated cover 7. This cover is insulated at 8 with a holding plate 9, this plate is securely fastened in place by welding or other means to the cover 7 and leaves a space 10 between covers as indicated. Cylinder casing 5 is welded to top plate 11, said casing 5 is also welded to bottom plate 12. Top plate 11 and bottom plate 12 are both round and with side wall 5 form the cooler tank. The center evaporator 13 of which a complete description is given on detail Figures 3 and 4.

The refrigerant suction coil 14 is wound tightly against the tank wall 5 and also wound close together vertically so that each pipe is against each other making a solid coil. This pipe coil is connected at bottom with a fitting 15 having a drain connection 16 at the bottom. From this fitting a pipe 17 and L 18 connects to bottom of evaporator 13. The refrigerant suction coil 14 extends thru tank bottom 12 and is brazed or welded to same to make a tight joint. Another shell 19 is placed around outside of refrigerant suction coil 14 and welded to top head 11 and bottom plate 12, thus making a liquid tight space 20 in which coil 14 is located.

The liquid to be cooled, large volume space 21, is located between shell 5 and evaporator 13. The insulation 22 of high heat resisting material such as cork, fibre glass or similar material is held in place by a sheet steel casing 23. Refrigerant suction coil leaves the cooler shell 19 at top outlet 24 and is brazed or welded in place. The space 20 is filled with eutectic fluid made from glycerine and water or other non-toxic and non-poisonous low temperature fluid. The liquid to be cooled enters the cooler thru inlet 25 and flows upward thru refrigerated tube 26 and spills over in space 21, thence downward and out thru outlet pipe 27. Connection 28 at bottom of tube 26 can be used for either a drain or as a circulating inlet, as certain liquids to be cooled can be recirculated,

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thereby increasing the capacity of the cooler. A more complete description of the center evaporator 13 as shown in Figures 3 and 4 is as follows: the outside shell 13 is welded to a top plate 29 and also to another top plate 30. A copper plate 31 is placed between plates 29 and 30. Shell 13 is welded to a bottom plate 32. Shell 33 is welded to bottom plate 32 and is open at top thus forming space 34. Shell 35 is also welded to bottom plate 32 and extends thru plate 32 and is welded to another plate 39, this shell forms space 36 and with shell 33 forms space 38. Center tube 26 is welded at top to sheets 29 and 30 and also to bottom sheets 39 and 40. This forms the cooler inlet pipe 28 and also can be a circulating connection. Refrigerant outlet connection 18 connects to refrigerant suction coil 14. Center tube 26 is open at the top. The bottom plate of cooler body 12 is welded to evaporator shell 13.

Refrigerant liquid inlet 41 is welded in shell 13. Refrigerant liquid inlet 42 is welded in shell 35.

Legs 43, Figure 2, are cooler supports.

Having thus described the invention, what I claim is:

1. A heat exchanger for cooling liquids comprising an outer casing, a cylinder within said casing and spaced therefrom, with insulating means between said cylinder and casing, a centrally perforated bottom plate for said casing, also a top plate with a central hole, a shell within said cylinder and spaced therefrom, a pipe coil in space between the cylinder and shell, voids between the cylinder shell and pipe coil to be filled with a eutectic fluid, a second shell inwardly spaced with a cover; this space to receive a liquid to be cooled, a third shell inwardly spaced with open top end for coolant, a fourth shell inwardly spaced with open top to receive coolant gas, a fifth shell open at top and bottom, space between fourth and fifth shells for coolant, center area of fifth shell for inlet of liquid to be cooled, an outlet for the cooled liquid located in bottom plate between first and second shells, one coolant liquid inlet enters the second shell near the bottom, another coolant liquid inlet enters the fourth shell near the bottom, a coolant pipe connection from bottom plate between third and fourth shells to the bottom of the pipe coil, a coolant gas outlet at top of pipe coil.

2. A heat exchanger for cooling liquids comprising an outer casing, a cylinder within said casing and spaced therefrom, with insulating means between said cylinder and casing, a centrally perforated bottom plate for said casing, also a top plate with a central hole, a shell within said cylinder and spaced therefrom, a pipe coil in space between the cylinder and shell, voids

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between the cylinder shell and pipe coil to be filled with a eutectic fluid, a second shell inwardly spaced with a cover; this space to receive a liquid to be cooled, a third shell inwardly spaced with open top end for coolant, a fourth shell inwardly spaced with open top to receive coolant gas, a fifth shell open at top and bottom, space between fourth and fifth shells for coolant, center area of fifth shell for inlet of liquid to be cooled; means for supplying a cooling medium to the second and fourth shells and pipe coil and means for withdrawing cooling medium therefrom; means for supplying a liquid to the fifth shell and space between second and first shells and means for withdrawing cooled liquid therefrom.

3. A heat exchanger for cooling liquids comprising an outer casing, a cylinder within said casing and spaced therefrom, with insulating means between said cylinder and casing, a centrally perforated bottom plate for said casing, also a top plate with a central hole, a shell within said cylinder and spaced therefrom, a pipe coil in space between the cylinder and shell, voids between the cylinder, shell and pipe coil to be filled with a eutectic fluid, a second shell inwardly spaced with a cover; this space to receive a liquid to be cooled, a third shell inwardly spaced with open top end for coolant, a fourth shell inwardly spaced with open top to receive coolant gas, a fifth shell open at top and bottom, space between fourth and fifth shells for coolant, center area of fifth shell for inlet of liquid to be cooled; means for supplying a cooling medium to the second and fourth shells and pipe coil and means for withdrawing cooling medium therefrom; means for supplying a liquid to the fifth shell and space between second and first shells and means for withdrawing cooled liquid therefrom; means for supplying a cooling medium to the second and fourth shells and pipe coil; means for supplying a liquid to the fifth shell and space between second and first shells; cooling medium enters at bottom of second and fourth shells and travels upward to top thence downward between third and fourth shells and out through pipe coil, thus forming counterflow to liquid to be cooled.

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