

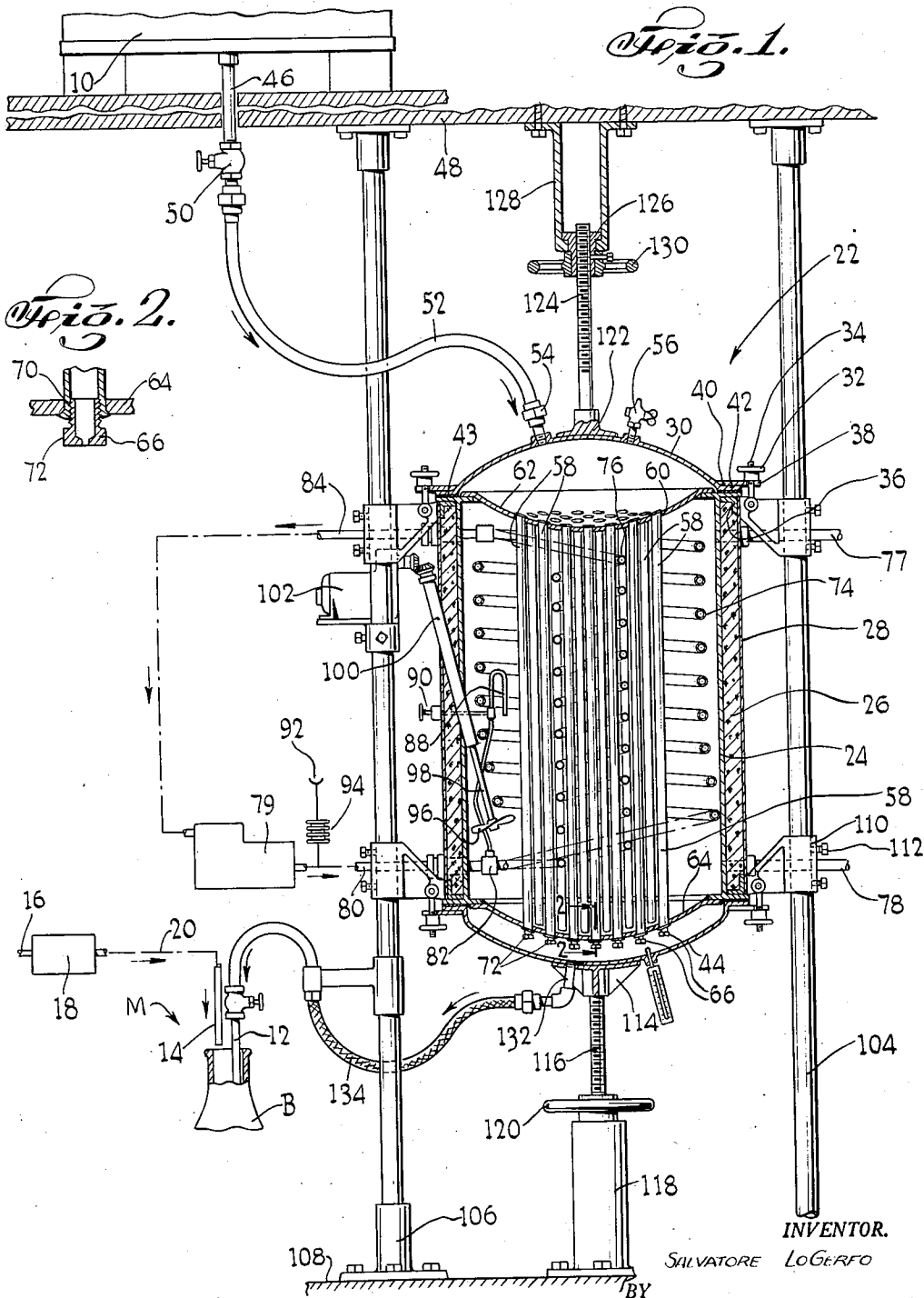
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APPARATUS FOR CHILLING FLUIDS

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APPARATUS FOR CHILLING FLUIDS

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This invention relates to apparatus for chilling fluids.

It is an object of my invention to provide a cooler which comprises relatively few and simple parts, is easy to manufacture, install and clean, maintains a uniform and accurate control of the temperature to which the liquid is cooled and can be readily disassembled for replacement or repair.

Other objects of this invention will in part be obvious and in part hereinafter pointed out.

The invention accordingly consists in the features of construction, combinations of elements, and arrangement of parts which will be exemplified in the construction hereinafter described, and of which the scope of application will be indicated in the appended claims.

In the accompanying drawings, in which is shown one of the various possible embodiments of this invention,

Fig. 1 is a side view, partially schematic and partially in section, of an apparatus embodying my invention; and

Fig. 2 is an enlarged sectional view of one of the details thereof.

Referring now to the drawings, 10 denotes a vat in which syrup is stored after the same has been made. As is customary in certain branches of the art, this vat is disposed above the filling machine M at which bottles B have syrup and cool carbonated water successively injected therein at different stations before being capped.

The syrup is fed into the bottles through a filling nozzle 12 and the carbonated water is fed into the bottles through another filling nozzle 14. The water, which is led from a source of supply, such as a city main, through a conduit 16, is cooled and charged in a conventional and combined carbonator and refrigerator 18 before being conducted through a pipe 20 to the nozzle 14.

I interpose between the vat 10 and syrup filling nozzle 12, a cooler 22 embodying my invention. As shown, said cooler may be located at a level between the bottom of the vat and the machine at which bottles B are filled, so that syrup can flow through the cooler under gravity.

The cooler comprises a tubular shell 24 having a surrounding heat insulating jacket 26 which is protected by a metal sheath 28. An upper dome 30 covers the top end of the shell where it is detachably secured by large wing nuts 32 which are threaded on eye bolts 34 pinned to a reinforcing angle iron 36 surrounding the shell beneath its upper flanged end. Said bolts are adapted to be swung into slots 38 in the periphery

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of a clamp ring 40 seated on a flange 42 on the dome so that upon tightening the nuts a gasket 43 will be clamped between the flanges of the dome and shell. By loosening the nuts 32 and swinging the bolts 34 out of the slots 38, connection between the dome and shell may be broken with great ease. A similar lower dome 44 is secured by identical means to the open bottom end of the shell 24.

Syrup flows to the cooler from the vat 10 through an outlet pipe 46 extending through the floor 48 on which the vat is supported, through a valve 50, and finally through a flexible conduit 52 to a union inlet fitting 54 on the upper dome 30. An air vent 56 facilitates the passage of syrup through the cooler.

A bank of vertical stainless steel tubes 58 in the shell have their top ends projecting through apertures 60 in an arcuately depressed header plate 62 fastened to the upper end of the shell, said projecting ends being upset to firmly secure them in position. The lower ends of said tubes are secured in like fashion to a similar, identically oriented bottom header plate 64 secured to the base of said shell. Tubes may be readily replaced upon corrosion, failure, etc. by boring out their upset ends in one of the header plates 62, 64, and withdrawing the tube from the opposite header.

Pursuant to a feature of my invention, the outlet end of each tube is restricted; for example, by a bushing 66 (Fig. 2) which greatly reduces the effective outlet of the tube. Said bushings are screwed into threads 70 tapped in the bottoms of the tubes 58 and are provided with conventional means, such as hexagonal flats 72, to facilitate their removal when the tubes are to be cleaned.

Between the upper and lower header plates 60, 64, the shell is filled with a liquid of low freezing point, e. g., a mixture of brine and glycerine, which is maintained at a desired chilling temperature by a suitable refrigerant, e. g., Freon, ammonia, sulphur dioxide or methyl chloride, which flows in parallel through helical coils 74, 76, one of which is disposed outside of the bank of tubes 58 and the other near the center of said bank. Said liquid may be admitted to the shell at inlet 77 and drained therefrom at an outlet 78. The refrigerant is supplied in liquid state by a conventional combined compressor and heat exchanger 79 and is led by a pipe 80 to a variable aperture expansion valve 82 connected to the coils 74, 76. A pipe 84 returns the expanded gas to the compressor 79. The use of a typical mechanism

ical refrigeration system such as the foregoing to cool a liquid of low freezing point which circulates through a bank of tubes having restricted outlets enables me to obtain an extremely uniform predetermined temperature in the syrup.

The temperature to which the syrup passing through the cooler is reduced is controlled by a thermostat bulb 88 which regulates the expansion valve 82. This temperature may be varied by changing the pressure in the thermostatic system by turning a screw plunger (not shown) controlled by a handle 90. Operation of the compressor 79 is controlled by a snap switch 92 actuated by a bellows 94 in the supply pipe 80.

The temperature of the low freezing point liquid passing around the several tubes 58 is kept uniform by an agitator, such as a propeller 96, whose drive shaft 98 passes through a gland 100 in the shell, jacket and cover, and is driven by a motor 102.

The weight of the cooler 22 is supported on a plurality of standards 104 connected by pipe flanges 106 to the floor 108 and roof 48 of the enclosure in which the cooler is located. Brackets 110 secured by set screws 112 to the standards are pinned to the shell.

It is desirable to arrange the cooler so that it can be easily cleaned in order to maintain the same in sanitary condition. For this purpose, the bottom dome 44 has an inverted saddle plate 114 centrally disposed therebeneath and carried by a screw 116 received in a base 118 bolted to the floor 108. Manipulation of a hand wheel 120 engaging the screw 116 and resting on the base 118 raises or lowers the saddle 114, and if the wing nuts 32 have been previously undone and the bolts 34 swung out of the slots 38 in the bottom dome, this dome can be dropped under full control, its weight being wholly supported by the saddle plate.

The top dome has a socket fitting 122 welded to its center, the ball end of a threaded rod 124 being flexibly received therein. This rod is threaded into a tapped sleeve 126 seated in a hanger 128 bolted to the ceiling 48. A hand wheel 130 is fastened by a set screw to said sleeve whereby upon rotation of the hand wheel the plate 122 will be urged upwardly. This will raise the dome 36 when the wing nuts and bolts associated therewith are undone.

It may be mentioned that when the cooler is initially installed the hand wheels 120, 130, may be used to regulate the height of said cooler prior to clamping the set screws 112.

My improved cooler can also be used to chill other potable liquids such, for example, as beer and milk.

It will thus be seen that there is provided an apparatus in which the several objects of this invention are achieved, and which is well adapted to meet the conditions of practical use.

As various possible embodiments might be made of the above invention, and as various changes might be made in the embodiment above set forth, it is to be understood that all matter herein set forth or shown in the accompanying drawings is to be interpreted as illustrative and not in a limiting sense.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. A cooler of the character described for chilling a fluid, said cooler comprising an enclosure adapted to house a liquid of low freezing point, a bank of fluid-passing tubes running through said enclosure, and means in said enclosure form-

ing a refrigerant passageway around a plurality of said tubes, the outlet end of each tube being restricted so as to impede the passage of fluid therethrough.

2. A cooler of the character described for chilling a fluid, said cooler comprising an enclosure adapted to house a liquid of low freezing point, a bank of fluid-passing tubes running through said enclosure, and means in said enclosure forming a refrigerant passageway around a plurality of said tubes, said tubes being substantially vertical and having their lower ends restricted whereby to impede passage of fluid therethrough.

3. A cooler of the character described for chilling a fluid, said cooler comprising an enclosure adapted to house a liquid of low freezing point, a bank of fluid-passing tubes running through said enclosure, and means in said enclosure forming a refrigerant passageway around a plurality of said tubes, said tubes being substantially vertical, the lower ends of the tubes being tapped, and threaded bushings with restricted openings therethrough threaded into the lower ends of the tube whereby to impede passage of fluid through the tubes.

4. A gravity cooler for chilling a fluid, said cooler comprising a tubular shell whose longitudinal axis is vertically disposed, a pair of header plates attached to the upper and lower ends of said shell, a bank of vertically extending fluid-passing tubes whose upper ends are attached to the upper header plate and whose lower ends are attached to the lower header plate, an upper dome covering the upper end of the shell, a lower dome covering the lower end of the shell, means to detachably secure said domes to said shell, a helical coil within said shell and surrounding a plurality of said tubes, the longitudinal axis of said coil being coincident with the longitudinal axis of said shell, means on the ends of said coil to connect the same to a mechanical refrigerant liquefying unit, and means to introduce a liquid of low freezing point within said shell and around said tubes.

5. A gravity cooler for chilling a fluid, said cooler comprising a tubular shell whose longitudinal axis is vertically disposed, a pair of header plates attached to the upper and lower ends of said shell, a bank of vertically extending fluid-passing tubes whose upper ends are attached to the upper header plate and whose lower ends are attached to the lower header plate, at least one end of the shell being covered by a dome detachably secured thereto, means to support said dome when detached from said shell, a helical coil within said shell and surrounding a plurality of said tubes, the longitudinal axis of said coil being coincident with the longitudinal axis of said shell, means on the ends of said coil to connect the same to a mechanical refrigerant liquefying unit, and means to introduce a liquid of low freezing point within said shell and around said tubes.

6. A gravity cooler for chilling a fluid, said cooler comprising a tubular shell whose longitudinal axis is vertically disposed, a pair of header plates attached to the upper and lower ends of said shell, a bank of vertically extending fluid-passing tubes whose upper ends are attached to the upper header plate and whose lower ends are attached to the lower header plate, at least one end of the shell being covered by a dome detachably secured thereto, means to support the dome in adjustably spaced position from said shell when

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detached therefrom, a helical coil within said shell and surrounding a plurality of said tubes, the longitudinal axis of said coil being coincident with the longitudinal axis of said shell, means on the ends of said coil to connect the same to a mechanical refrigerant liquefying unit, and means to introduce a liquid of low freezing point within said shell and around said tubes.

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