Dec. 22, 1953 C. BOLING 2,663,548

BEVERAGE COOLER

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Fig. 1.

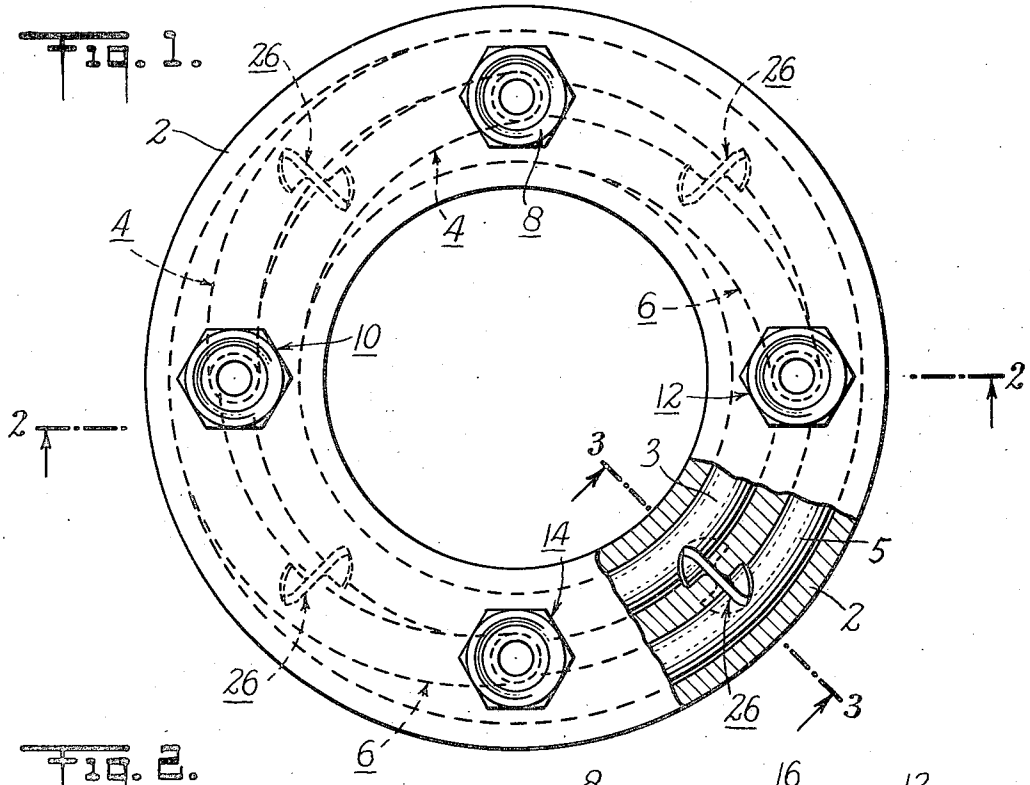
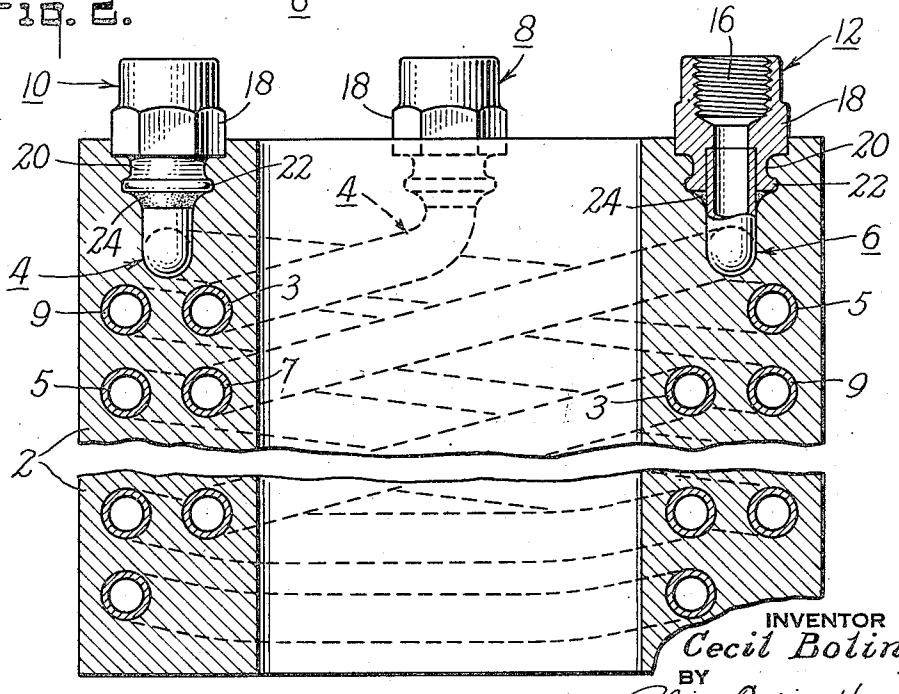


Fig. 2.



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Fig. 3.

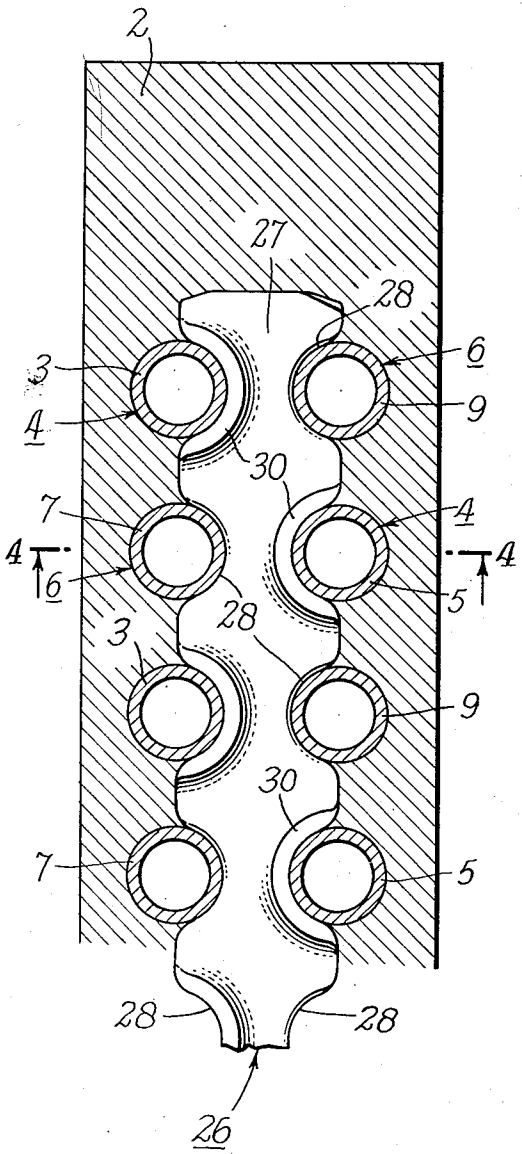


Fig. 4.

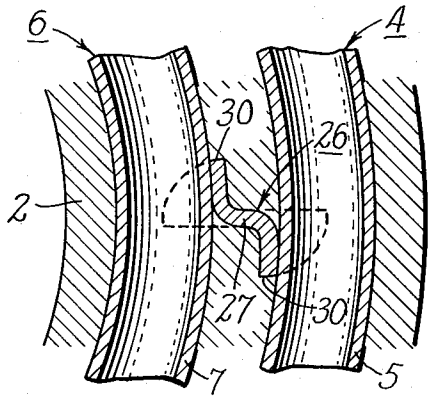
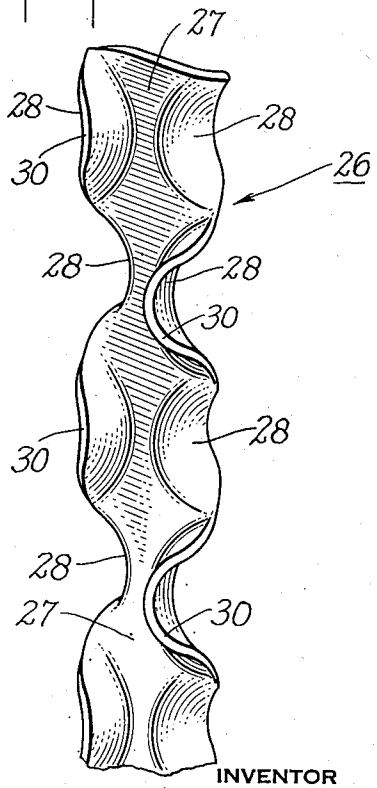


Fig. 5.



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BEVERAGE COOLER

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Application March 20, 1948, Serial No. 16,050

5 Claims. (Cl. 257—241)

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This invention relates to cooling and more in particular to units for cooling fluids such as water or other beverages. This application is a continuation-in-part of the copending application, Serial No. 663,450, filed April 19, 1946, of myself and Alexander J. Tigges, now Patent No. 2,466,676.

In the above-identified Patent No. 2,466,676 there are disclosed heat exchange units which are particularly adapted to use in cooling drinking water or other beverages. It is an object of the present invention to provide an improved unit of the character disclosed in our Patent No. 2,466,676. The specific embodiment of the present invention is particularly suited for cooling drinking water in unit water coolers and for similar purposes. A further object of the present invention is to provide units of the above character which are sturdy in construction and yet which are inexpensive to manufacture, light in weight, and thoroughly dependable in operation. A further object is to provide units of the above character which may be subjected to considerable abuse without interfering with their operation or efficiency. These and other objects will be in part obvious and in part pointed out below.

The invention accordingly consists in the features of construction, combinations of elements, and arrangements of parts as will be exemplified in the structure to be hereinafter described and the scope of the application of which will be indicated in the following claims.

In the drawings:

Figure 1 is a top plan view with parts broken away of a water cooling unit constituting one embodiment of the invention;

Figure 2 is a sectional view on the line 2—2 of Figure 1;

Figure 3 is an enlarged sectional view on the line 3—3 of Figure 1;

Figure 4 is a sectional view on the line 4—4 of Figure 3; and

Figure 5 is a perspective view of a portion of one of the coil-holding brackets which is shown in the other figures.

Referring particularly to Figures 1 and 2 of the drawings, there is shown a cylindrical block 2 of cast aluminum in which are embedded two concentric coils 4 and 6 of copper tubing. These coils are of the type disclosed in our copending application Ser. No. 663,450 filed April 19, 1946, and now Patent No. 2,466,676, wherein each coil is formed by a set of inner turns and a set of outer turns with the ends of the coils projecting toward the upper end face of the cylindrical block

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2; and, each coil end has brazed to it an attaching fitting by means of which a sealed connection is made to a pipe or other fitting. Coils 4 and 6 are substantially identical, but for purposes of discussion coil 4 has its inner turns designated 3 and its outer turns designated 5, while the inner turns of coil 6 are designated 7, and the outer turns 9. Coil 4 has the end of its inner turns connected to a fitting 8 and the end of its outer turns connected to a fitting 10, while coil 6 has its inner and outer turns connected respectively to fittings 12 and 14.

These fittings are identical, and the structure is best understood by referring to fitting 12 shown at the right in Figure 2. Each of the fittings has an internal thread 16 adapted to receive a male fitting carried for example on the end of a connecting pipe. The central portion 18 of the fitting is hexagonal and beneath this hexagonal portion there is a groove 20 which forms an anchor flange 22. The coil end is snugly received in the end of the fitting and is brazed thereto at 24. Substantially one-half the length of the fitting is embedded in block 2 and during the casting operation the aluminum flows around the end of hexagonal portion 18 and into groove 20 and becomes bonded to these surfaces of the fittings. Thus, the fitting is securely anchored into the block with the hexagonal portion preventing rotation of the fitting and with groove 20 and flange 22 locking the fitting against being pulled out of the block. It should be noted that a sufficient length of hexagonal portion 18 projects from the block to receive a wrench if such is desirable, and thus during the attaching of fitting 12 to the male fitting the block need not be relied upon to hold fitting 12 from turning.

As has been indicated above, coil 4 is formed by inner turns 3 and outer turns 5, while coil 6 is formed by inner turns 7 and outer turns 9, and the turns of the two coils are positioned alternately throughout so that the turns next adjacent each of the turns of one coil are turns of the other coil. Furthermore, the spacing between each turn and the next adjacent turns provides aluminum of sufficient thickness around each turn to withstand very substantial internal pressure. For example, during test operations water has been maintained in one coil while refrigerant is evaporated in the other and the water has been frozen solid and then thawed many times without there being any injury to the unit, such as a rupture of the water coil.

It is important that the proper spacing be maintained between the coil turns, and this

spacing is maintained during the winding and casing operations by a set of four holding brackets 26 (Figure 1) which are inserted between the inner and outer turns and are spaced equally and extend parallel to the axis of the coils. Brackets 26 are made of strip copper and are of the type shown in Figures 3, 4 and 5. Referring to Figure 5 wherein the end portion of one bracket is shown, these brackets are formed by displacing the side edge portions of a strip of copper. The main body portion 27 of the strip remains flat and there are two rows of tube-receiving pockets 28 formed somewhat like "scallops" along the strip edges. These pockets 28 are displaced alternately in opposite directions from the plane of the strip so that the top pocket on the right-hand edge of the strip in Figure 5 is at the right or far side of the plane of the strip, whereas the next lower pocket is at the left or near side of the plane of the strip. Similarly, transversely of the strip each pocket is directly opposite a pocket which is displaced in the opposite direction from the plane of the strip. That is, at the top of strip portion in Figure 5, the pocket at the right is displaced to the right beyond the plane of the strip, whereas the pocket at the left is displaced to the left in the front of the plane of the strip.

Referring to Figures 3 and 4 the turns of the coils fit snugly within pockets 28 and each pocket presents a somewhat smooth pipe-supporting surface which is a section of a cylinder. This surface receives its pipe snugly, and there is a somewhat semi-circular or "sine curve" edge 30 at each pocket which engages the pipe when the tendency for the coil to unwind tends to twist and upset the bracket. The arrangement is such that these brackets effectively hold the coil from unwinding prior to and during the casting operation; at the same time the coil walls are not subjected to excessive strain.

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

I claim:

1. In a heat exchange unit for cooling a liquid, a liquid tube adapted to have a liquid to be cooled flow therethrough, a metal block surrounding said tube with each of the ends of the tube being substantially at one flat surface of the block and with the block forming a wall of substantial thickness around the entire tube between said ends, and a pair of pipe fittings positioned respectively at said ends of said tube and each rigidly fixed to its tube end whereby the two fittings provide for the flow of liquid through said tube, each of said fittings having an embedded portion which is non-circular in cross-section with flat side surfaces and which has an anchor portion which is remote from the external portion of the fitting and which projects radially outwardly with respect to the axis of the fitting with the block having a portion which mates with said anchor portion and counteracts any tendency for the fitting to move axially of the fitting away from its position with respect to said tube, each of said fittings also having an external portion which presents flat surfaces and is adapted to receive a tool and by which a liquid connection may be made through the fitting to the tube.

2. In a heat exchange unit for cooling a liquid, a coiled liquid tube adapted to have a liquid to be cooled flow therethrough and having its two ends substantially parallel and at one side of the coiled tube, a metal block which presents a flat end surface, said block surrounding said tube with the ends of the tube being substantially at said flat end surface of the block and with the block forming a wall of substantial thickness around the entire tube between said ends, and a pair of pipe fittings positioned in alignment along said flat surface end respectively at said ends of said tube and each rigidly fixed to its tube and whereby the two fittings provide for the flow of liquid through said tube, each of said fittings having an embedded portion beneath said flat surface which is non-circular in cross-section and which has an anchor portion which projects radially outwardly with respect to the axis of the fitting remote from the external portion thereof and with the block having a portion which mates with said anchor portion and counteracts any tendency for the fitting to move axially of the fitting away from its position with respect to said tube, each of said fittings also having an external portion projecting above said flat surface which is adapted to receive a tool and by which a liquid connection may be made through the fitting to the tube.

3. In a heat exchange unit, a liquid coil formed by a single tube coiled into turns having a common axis with the turns being two concentric spirals of different radii terminating at one end of said axis at the ends of the tube and terminating at the other end of the axis in an inter-connecting portion of the tube whereby the fluid passes from one end of the tube through one spiral and thence back through the other spiral to the other end of the tube, a cylindrical metal block having an annular flat surface and surrounding said tube with the ends of the tube being substantially at said annular surface, said block forming a confining wall of substantial thickness around the entire tube between said ends, and a pair of pipe fittings positioned in alignment at said annular surface and respectively at the ends of said tube, each of said fittings being rigidly fixed to its tube end whereby the two fittings provide for the flow of fluid through said tube, each of said fittings having an embedded portion beneath said annular surface which is non-circular and which has an anchor portion which interlocks with a portion of said block so as to counteract any tendency for the fitting to move away from its position with respect to said tube, each of said fittings also having an external portion above said annular surface which is adapted to receive a tool and which provides a fluid connection to its tube end.

4. In a heat exchange unit, a pair of liquid coils, each of which is formed by a single tube coiled into turns having a common axis with the turns being two concentric spirals of different radii and terminating at one end of said axis at the ends of the tube and terminating at the other end of the axis in an inter-connecting portion of the tube whereby the fluid passes from one end of the tube through one of the spirals and thence back through the other spiral to the other end of the tube, a cylindrical metal block having an annular flat surface and surrounding said tubes with the ends of the tubes being substantially at said annular surface, said block forming a confining wall of substantial thickness around the entire tubes between said ends, and two pairs of

pipe fittings positioned in alignment at said annular surface and respectively at the ends of said tubes, each of said fittings being rigidly fixed to its tube end whereby the two fittings for each tube provide for the flow of fluid through said tube, each of said fittings having an embedded portion beneath said annular surface which is non-circular and which has an anchor portion which interlocks with a portion of said block so as to counteract any tendency for the fitting to move away from its position with respect to said tube, each of said fittings also having an external portion above said annular surface which is adapted to receive a tool and which provides a fluid connection to its tube end.

5. A unit as described in claim 4, wherein each of said fittings has its anchor portion in the form of an outwardly flaring annular flange which forms above it an annular groove within which the block extends, and wherein said non-circular portion is formed by flat sides which project above the block surface and are adapted to be engaged by a wrench.

CECIL BOLING.

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