

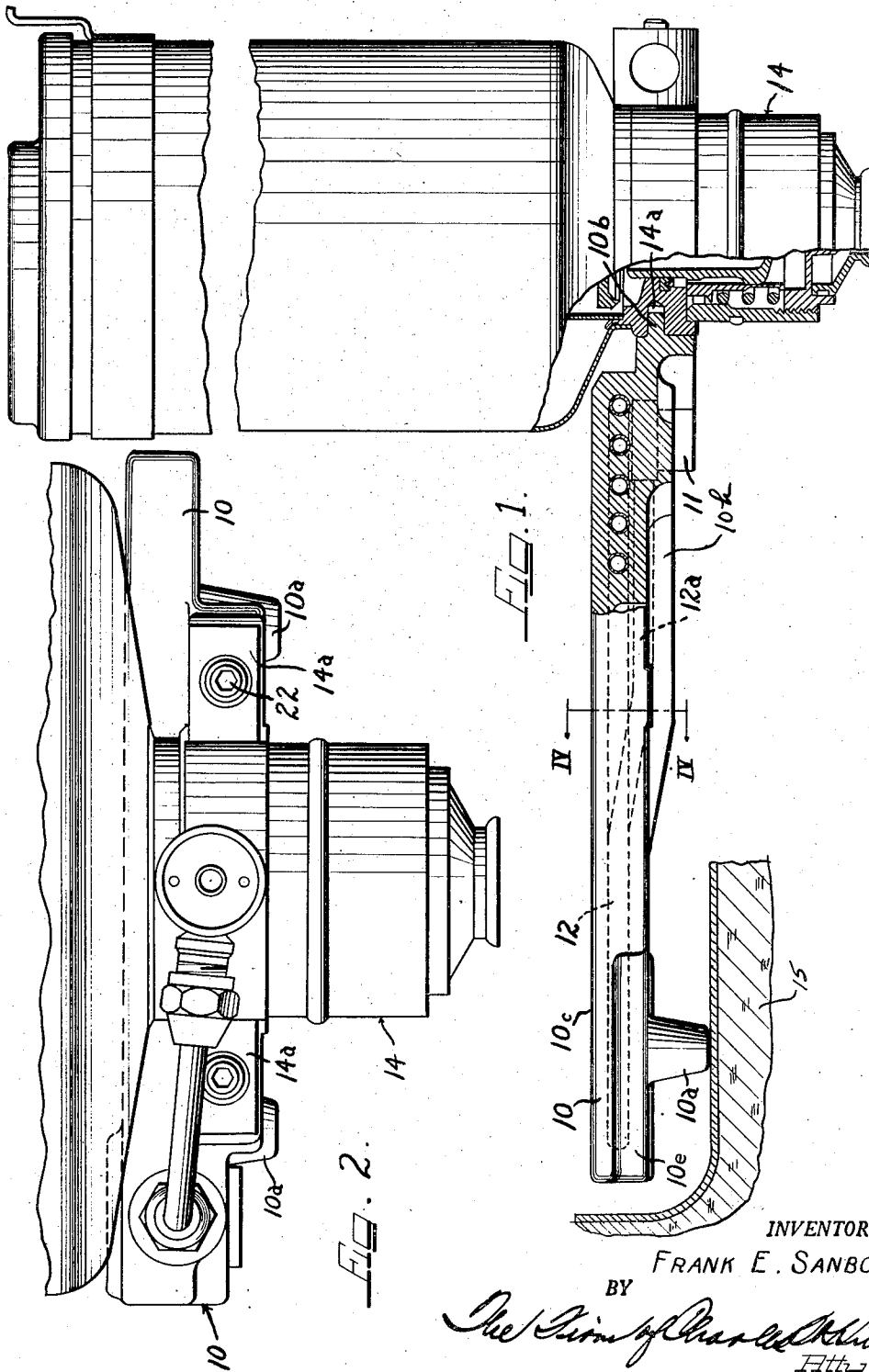
Aug. 19, 1952

F. E. SANBORN
HEAT TRANSFER MEMBER

2,607,519

Filed Nov. 22, 1946

3 Sheets-Sheet 1



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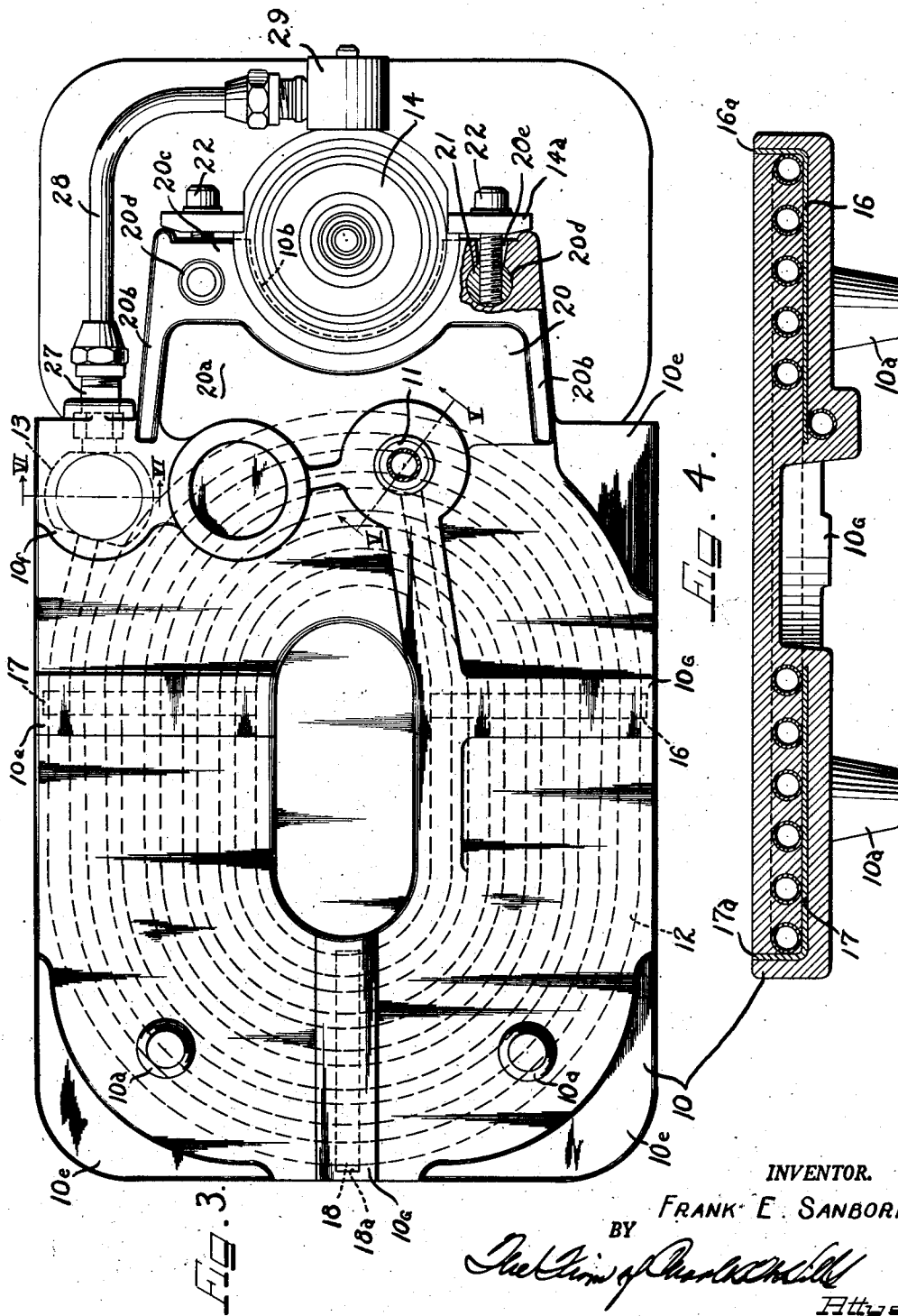
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3 Sheets-Sheet 2



UNITED STATES PATENT OFFICE

2,607,519

HEAT TRANSFER MEMBER

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Application November 22, 1946, Serial No. 711,486

2 Claims. (Cl. 225-40)

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This invention relates to improvements in heat transfer members and in particular to heat transfer members of the type used in the cooling of carbonated liquid in a soft drink dispenser unit.

Heretofore it has been the practice to locate the cooling coil in dispenser units at the bottom of the cooling chamber and permit it to rest directly on the lower wall. Cracked ice or other suitable cooling medium is placed on top this coil, while the liquid to be cooled is forced through the coil.

This system has some disadvantages. It is evident that a substantial portion of the cooling coil is not in contact with the cooling medium due to it being in supporting contact with the lower wall of the chamber and as a consequence is not as efficient as is possible with the use of this invention.

Another possible disadvantage of this system lies in the fact that dirt and foreign matter that enters the cooling chamber with the ice has a tendency to be deposited on the coils and form an insulating coating thus lowering the cooling ability of the coil. Furthermore, it is extremely difficult to clean the coils and the lower part of the cooling chamber when the coils are resting on the bottom of the chamber since dirt becomes lodged around and between the coils. Proper cleaning can be accomplished only by disconnecting and removing the coils.

Accordingly, it is an object of this invention to provide a cooling coil which cannot be reached by dirt and foreign matter in the cooling chamber.

It is another object of this invention to provide a cooling member which is held away from the walls of the cooling chamber sufficiently to allow the cooling medium to contact the entire surface of the heat transfer member.

It is a further object of this invention to provide a cooling coil encased in a housing which has high thermal conductivity and a maximum amount of contact area exposed to the cooling medium.

It is another and further object of this invention to provide a heat transfer member that has relatively flat surfaces and therefore is easily cleaned in place.

It is another and still further object of this invention to provide a heat transfer member that may be easily removed as a unit for repair or inspection.

According to the general features of this invention, the liquid to be cooled is directed through coils cast in an aluminum block which is cooled

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by cracked ice and ice water surrounding it on all sides, the top and the bottom.

An important feature of this invention is the provision of support legs which hold the aluminum block in spaced relation to the bottom wall of the cooling chamber.

In accordance with the general features of this invention there is also provided in a heat transfer unit for use in a refrigeration device such as a dispenser including a casing having a dispensing head an exteriorly cooled block having a coil therein for conducting fluid to be cooled, said block having means for attaching it to said head and means for supporting it in spaced relation to said casing so that coolant can be disposed about said block and between said block and a side of said casing supporting same.

Other objects and features of this invention will more fully appear from the following detailed description taken in connection with the accompanying drawings, in which:

Figure 1 is a fragmentary side elevational view, partly in section and partly broken away, of a cooling plate embodying the features of this invention mounted inside the casing of a dispenser unit.

Figure 2 is a fragmentary end elevation of the cooling plate of this invention showing the plate connected to a dispenser head.

Figure 3 is a bottom plan view, partly broken away and partly in section of a dispenser unit including a heat transfer member embodying the features of this invention.

Figure 4 is a sectional view taken on line IV-IV of Figure 1.

Figure 5 is a sectional view taken on line V-V of Figure 3.

Figure 6 is a sectional view taken on line VI-VI of Figure 3.

Figure 7 is a fragmentary side elevational view, partly in section and partly broken away, of the heat transfer member of this invention installed in a dispenser unit.

As shown on the drawings:

The heat transfer member of this invention comprises a plate on block 10 into which has been cast a cooling coil including an inlet connection 11, a tube 12 wound in flat, oval coils, and an outlet connection 13 (Figure 3).

The block 10 may be made of any material having high thermal conductivity characteristics. In a preferred embodiment an aluminum block is used. For the purpose of holding the block out of contact with the lower wall of the cooling chamber, there is cast integral with the block 10

two support legs 10a which project downwardly from the block near one end thereof. These support legs rest on an inner lower wall 15a of an insulated dispenser casing 15. At the opposite end, the block 10 is supported by a semi-circular projection 10b which dovetails into a portion of an annular groove 14a of a dispenser head assembly 14 which is also mounted inside the casing 15 adjacent the cooling chamber. The upper surface 10c of the block 10 is smooth and flat. The lower surface 10d has a cut-out portion 10e at each of three corners while the fourth corner has a downwardly extending portion 10f to accommodate the outlet connection 13. There is also provided on the lower surface 10d three reinforcing ribs 10g.

It is to be noted that, prior to being cast in the aluminum block, the coils of tubing are secured, as by spot-welding, to three guide strips 16, 17 and 18. As seen in Figure 4, these strips fit underneath the coils and two of them, strips 16 and 17, have upturned ends 16a and 17a while strip 18 has a downturned end 18a. When the coils are secured on the strips the coil assembly is a compact unit and the upturned and downturned ends may be used as a guide to the depth of the mold to be used in the casting operation. At the end of the block 10 adjacent the dispenser head assembly 14 there is provided an outwardly extending member 20 which is cast as an integral part of the block 10. This member 20 comprises a web 20a enclosed on its two sides by downwardly projecting arms 20b and at its outer end by a downwardly projecting cross-member 20c. As previously mentioned, this cross-member 20c includes a semi-circular projection 10b which has a supporting connection in the dispenser head unit 14. The outer end of the member 20 has two holes 20d (Figure 3) therein adapted to receive a tapped pivot member 21. A flared passage 20e connects the pivot member 21 to the outside of the member 20. A cap screw 22 is inserted through a hole in a flange 14a of the dispenser head assembly 14 and is then screwed into the pivot member 21. This arrangement provides a self-adjusting pivotal connection of block 10 to the dispenser head assembly 14.

By casting the cooling tube in a metal block or plate which has high thermal conductivity characteristics, I have provided a heat transfer member which will very efficiently cool the liquid in the tubing. It will be readily appreciated that, since the cooling medium completely surrounds the aluminum block except where the support legs 10a contact the insulated lower wall and where the block is supported adjacent the dispenser head assembly 20, there is little chance that the cooling effect of the block will be wasted on any outside member. It will therefore efficiently transfer the heat of the liquid to the cooling medium.

For convenience in connecting the inlet connection to a source of the liquid to be cooled the inlet member 11 (Figure 5) has a lower cylindrical portion 11a which extends down through the plate 10. An opening 11b is adapted to receive any suitable removable connection, as for example a connector 23 having a flexible seal ring 23a which will seal the opening 11b upon insertion therein. A chamber 11c in the inlet member 11 communicates with the connector 23 and also with the cooling tube 12 which is connected to the member 11 at 11d.

In order that a liquid passing through a cooling

coil be cool when it leaves the coil, it is necessary that its path of travel be relatively long. In the present invention this is accomplished by locating the inlet member 11 near the center of the plate 10 and winding the tube 12 in close oval-shaped coils. Normally, any inlet connection would interfere with the uniform spacing of the cooling coils and cause wasted space in the plate. However, in this invention the inlet member 11 (Figure 1) is cast into the built-up lower portion 10h of the plate 10 and the tubing 12a adjacent the inlet member 11 is sloped upwardly in this portion 10h until it reaches the level of the rest of the coil.

After being wound in a number of coils suitable to provide sufficient cooling surface for the liquid, the tubing 12 is connected into the outlet fitting 13 at an opening 13a in a chamber 13b (Figure 6). A strainer member 24, having an enlarged lower shoulder 24a, is positioned immediately below the chamber 13b on a seat 13c provided in the outlet fitting 13. The strainer 24 is securely held on this seat 13c by a cap 25 which is screwed into the member 13 and which has a lower central opening 25a adapted to fit over the strainer 24 and urge it upwardly. As an outlet means, a threaded connection 27 is secured to the outlet fitting 13 at 13d, Figure 6. This threaded connection 27 also extends outside the plate 10 as shown in Figure 3. In operation the liquid enters the outlet fitting 13 at 13a, passes down through strainer 24 and then leaves the fitting at 13d and passes into the outlet connection 27. The threaded cap 25 provides a convenient means of removing the strainer 24 for periodic cleaning.

For the purpose of transferring the cooled liquid from the coils to the dispenser head assembly 14, a tube 28 is suitably connected at one end to the outlet threaded connection 27 and at the other end to an inlet member 29 of the dispenser head assembly 14.

My invention is put into operation in the following manner. The aluminum plate 10 with the cooling coil assembly cast into it is secured to the dispenser head assembly 14 by means of the cap screws 22, after the projection 10b of the plate 10 has been positioned in the groove 14a of the dispenser head assembly. The transfer tube 28 is then secured to the outlet screw connection 27 and to the inlet member 29 of the dispenser head.

This combined assembly is then placed bodily inside the insulated dispenser casing 15. As shown in Figure 7, the dispenser head assembly 14 rests on the casing 15, being supported by a shoulder 14b. The plate 10 is supported on its two legs 10a and the inlet connection 11 is positioned over the connector 23.

A suitable cooling medium such as cracked ice is placed on top of the block 10, around the sides, and, as far as possible, underneath the block. As soon as the ice begins to melt, the cold ice water will of course completely surround the block.

The carbonated liquid enters the coils at the inlet connection under pressure and is circulated through the coils. By the time it reaches the outlet connection 13 it has been cooled off sufficiently to be transferred through the tube 28 to the dispenser head where it is mixed with flavoring and served as a cold drink. This rapid cooling is due to the length of the coil and to the fact that the ice will cool the aluminum block and it in turn will quickly cool the liquid in the coils. It is to be particularly noted that the entire surface of the coils through which the liquid flows

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is in contact with the cooling aluminum block. In this way a most efficient and rapid cooling of the liquid is accomplished.

It will, of course, be understood that various details of construction may be varied through a wide range without departing from the principles of this invention and it is, therefore, not the purpose to limit the patent granted hereon otherwise than necessitated by the scope of the appended claims.

I claim as my invention:

1. In a drink dispenser unit, a casing forming a refrigerating chamber to receive a coolant, a dispensing head mounted in said casing and having a valve therein for the dispensing of mixed refrigerated drinks, a cooling block within said casing and adapted to support and be surrounded by the cooling medium, said block being substantially flat on each side thereof and having a flat wound coil embedded therein for conducting fluid to be cooled to said dispensing head and valve, and means supporting said cooling block in generally parallel spaced relation with respect to the bottom of said casing with a relatively free, unimpeded space between the bottom of said block and the bottom of said casing comprising two widely spaced support legs at one end of said block engageable with the bottom of said casing and a yoke projecting from the opposite end of said block and having a recessed portion spaced in advance of said block having interengagement with said dispensing head, and supporting said other end of said block above the bottom of said casing.

2. In a drink dispenser, a casing forming a refrigerating cabinet to receive a coolant, a dispensing head mounted in said casing adjacent one end thereof and having a valve therein for dispensing a mixed refrigerated drink, a cooling block relatively flat and unimpeded on each side and spaced above and extending along the bottom of said casing in generally parallel spaced relation with respect thereto and having co-planar looped coils embedded therein for conducting

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fluid to be cooled to said dispenser head, an inlet fitting near the center of said block adjacent one end thereof, said coil having an inlet end sloping downwardly from the center of said block toward said one end of said block for connection with said inlet fitting, an outlet fitting adjacent the outer side of said block at the end thereof adjacent said inlet fitting, said coil having an outlet end connected to said outlet fitting, a tube connecting said outlet fitting to said dispensing head and the valve therein, and means for spacing said block above the bottom of said casing and providing a relatively free, unimpeded surface between the bottom of said block and the bottom of said casing comprising two widely spaced support legs at the end of said block opposite from said dispensing head and inlet and outlet fittings and engageable with the bottom of said casing, a yoke projecting from said block in advance of said outlet fitting and having interengagement with said dispensing head, a securing member partially encircling the opposite side of said dispensing head from said yoke, and means securing said securing member to said yoke in abutting engagement therewith and securing said yoke and cooling block to said dispensing head.

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