May 19, 1942. A. L. REISER 2,283,818

SYSTEM FOR COOLING BEVERAGES

Filed Feb. 11, 1941 2 Sheets-Sheet 1

Fig. 1.

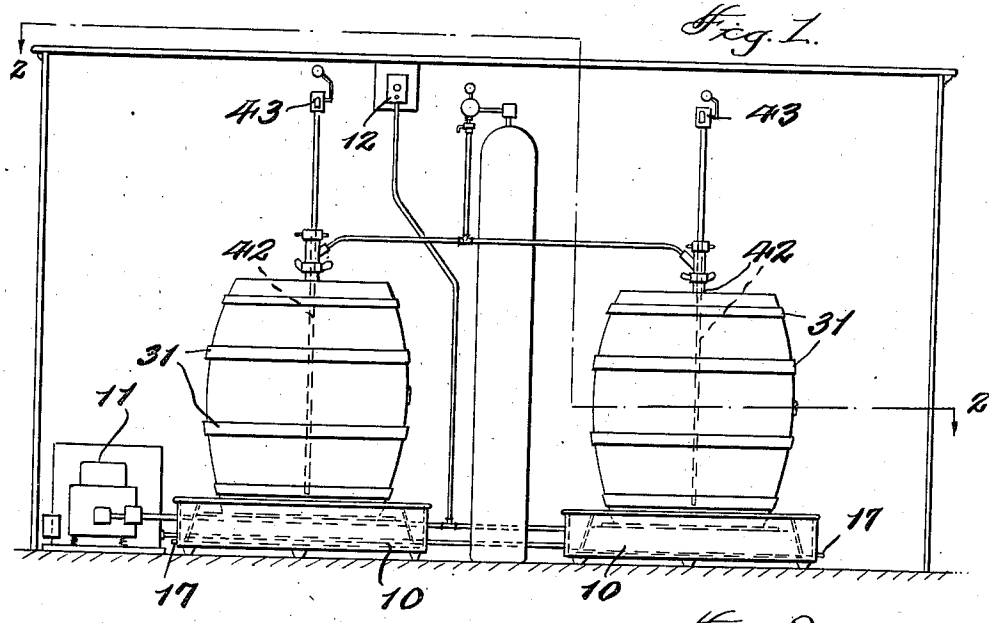


Fig. 2

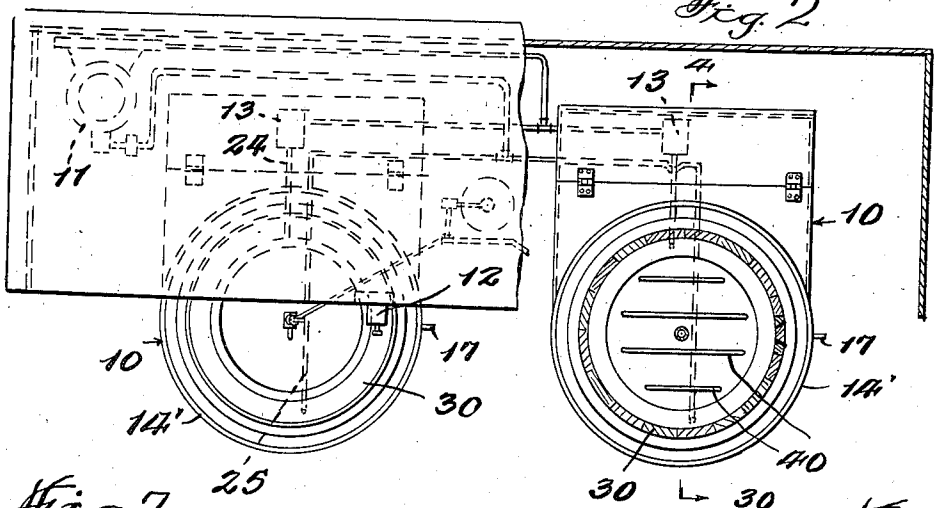


Fig. 7.

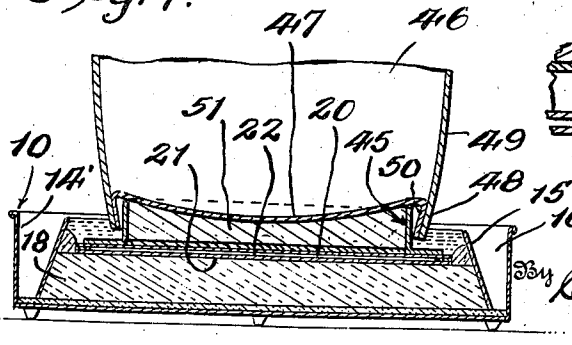
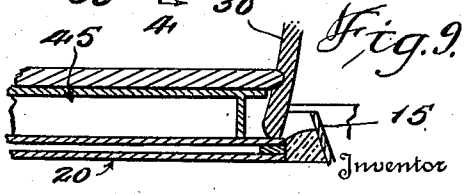


Fig. 9.



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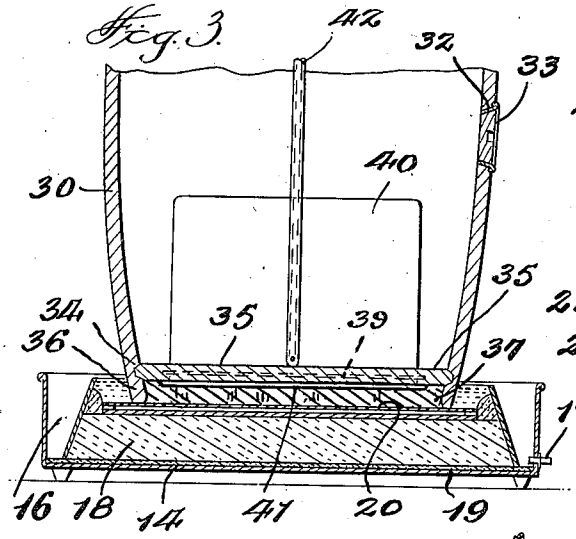
Attorney

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Fig. 3.



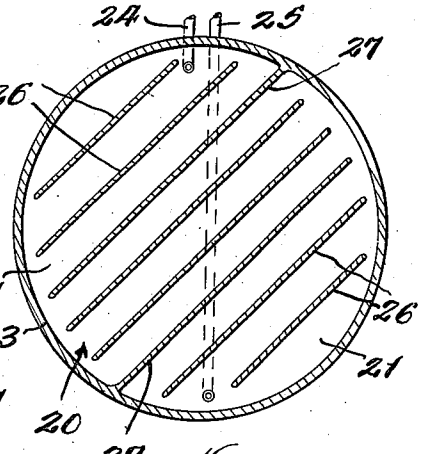
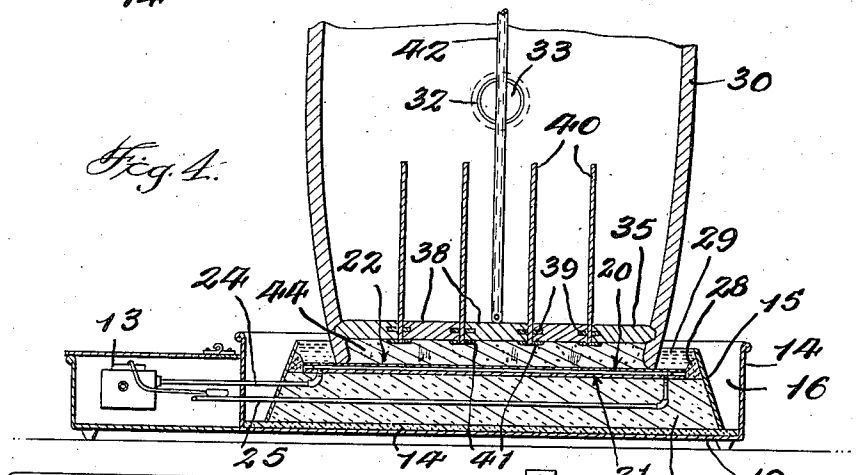


Fig. 5.

Fig. 4.



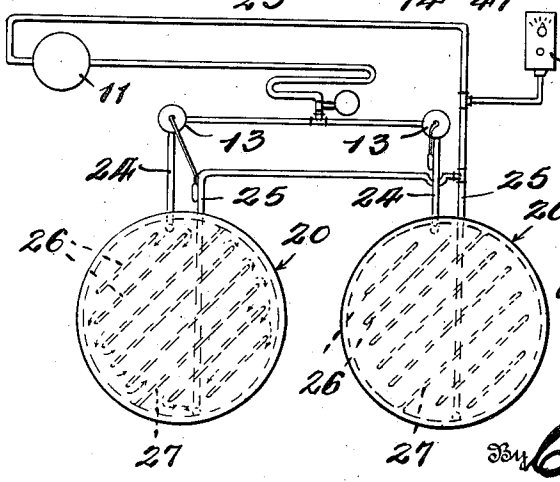


Fig. 6.

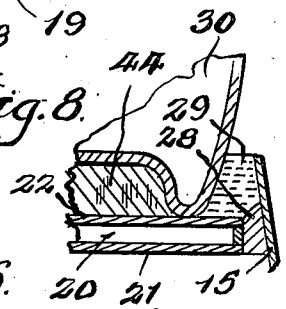


Fig. 8.

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2,283,818

SYSTEM FOR COOLING BEVERAGES

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Application February 11, 1941, Serial No. 378,467

6 Claims. (Cl. 62—141)

The invention has for an object to present an improvement in means for refrigerating material in receptacles, and particularly liquids, and more particularly beverages to be dispensed on draught, the invention being particularly applicable to use in refrigerating beer, while contained in the conventional keg or barrel, either metal or wood. It is an object of the invention to present apparatus of this kind adapted to be set in place beneath a bar, so that it may be put into use by the mere setting in place of a keg thereupon, and will require no connection or disconnection of fittings, ducts or other connections in order to effect proper refrigeration of the contents of the barrel or keg put in place upon the device.

It is another important aim of the invention to present a construction which is adapted to be produced at a low cost, and which will be of a rugged nature liable in a minimum degree to derangement or damage incident to the rough usage which will be involved in the service for which it is employed.

Another important aim of the invention is to present novel means for increasing the efficiency of heat transfer between a refrigerating unit and the liquid contents of a barrel or other container. A further important aim of the invention is to effect such improvement as last mentioned particularly in connection with the contents of wooden kegs, and to present a novel construction in refrigerating device and coordinated structure in a keg whereby such transfer is effected with high efficiency.

It is also an aim of the invention to present such apparatus that will enable the utilization of beer kegs and packages of other beverages by the use of conventional siphon, decanting or dispensing devices.

Additional objects, advantages and features of invention reside in the construction, arrangement and combination of parts involved in the embodiment of the invention, as will be more readily understood from the following description and accompanying drawings, wherein

Figure 1 is an elevational view of a bar installation utilizing my invention.

Figure 2 is a plan view thereof, partly in section.

Figure 3 is a fragmentary vertical elevation of one of the units of the device of Figures 1 and 2.

Figure 4 is a view at right angles to Figure 3.

Figure 5 is a horizontal section through one of the refrigerated bottom units of the device.

Figure 6 is a diagram of the system in which a plurality of refrigerating units embodying my invention may be incorporated.

Figure 7 is a view similar to Figure 3, showing a modification of the invention adapting it to use with some types of metal and wood barrels.

Figure 8 is a fragmentary sectional view illustrating a modified form of barrel and its relation to the refrigerated bottom.

Figure 9 is a fragmentary sectional view of a unit in which the adapter is shown in reverse position to that shown in Figure 7.

As presented in Figures 1 to 6 inclusive, the apparatus may include a plurality of an individual barrel refrigerating element 10, constructed to permit the circulation of a vaporized refrigerant therein, which may be supplied through a conventional pipe system from a compressor-condenser unit 11, shown diagrammatically in Figures 1, 2 and 6, any usual cold control device 12 being provided for controlling the temperature thereof, which may include conventional expansion valves 13, also. Each of the units 10 in the present instance may comprise a base portion 14, in which respective expansion valves 13 are located, and the forward extension portion with a pan-like receptacle 14' of circular form, having an inner concentric wall portion 15, which in the present instance is shown as frusto-conical in form, although this is not arbitrary, and an annular channel 16 is thus formed between the walls 14 and 15 for collection of condensates, as will be subsequently explained, and from which channel a drain connection 17 may be led, as desired. Within the frusto-conical wall 16 there is provided a substantial bottom body of insulating material 18, the wall 15 being set on the insulated bottom 19 of the receptacle 14. Over the insulating material 18, at a level below the upper edge of the wall 15, there is provided a double wall circular chamber or chambered plate 20, including bottom and top plates 21 and 22 having an annular spacer 23 disposed therebetween, the plates being secured together upon this spacer by any desired fastener, or by welding. The bottom plate 21 has a refrigerant supply duct 24 opening therethrough at one side, leading from the refrigerant supply of the system, while a return duct 25 leads from the opposite side of the plate, through which it opens.

These refrigerant supply and return ducts open through the plate 21 at diametrically opposite points thereof, and formed on the plate or disposed between the two in a suitable manner there is a multiplicity of parallel baffles or ribs 26 and 27. These are disposed diagonally with

respect to a diametrical line between the points of communication with the device 20 of the ducts 24 and 25, as shown. In the present instance there are two of the ribs 27, one of these being joined to the boundary spacer 23 closely adjacent the outlet to the duct 25, while the other is joined to the part 23 at a diametrically opposite point, and closely adjacent the inlet from the duct 24. There are two of the ribs 26 between the ribs 27, and two outwardly of the ribs 27 at respective sides of the device, and both ends of each of the ribs 26 stop short of the boundary spacer 23, as shown. The ends of the ribs 27 opposite their attachment to the member 23 stop short at the latter. The top plate of the unit 20 may be termed the "transfer plate" and is preferably of a metal of high heat conducting efficiency, such as aluminum, copper, or bronze, or other material of like value.

The unit 20 is disposed with its edges closely adjacent the frusto-conical wall 15, and a seal 28 is formed between the units 20 and the wall 15 a distance below the top edge of the latter, so that a pan-like inner receptacle 29 is formed, of which the unit 20 is the bottom and the upper edge portion of the wall 15 comprise the boundary wall. It should be noted that the upper edge of the wall 15 is somewhat lower than the top edge of the wall 16, so that any overflow from the receptacle 29 will be collected in the annular channel 16 within the wall 16. In practice, the depth of the receptacle 29 from the top edge of the wall 15 to the unit 20 may be approximately one and one-half to two inches, according to the nature of the barrel or other receptacle to be refrigerated, and it may be more or less than the dimensions indicated, according to requirements.

A conventional wooden barrel 30 having a special end head, is provided for coordination with the unit 10 as above described, this barrel consisting of a wall portion of conventional construction, which may be made up of staves of the usual thickness held by hoops 31, as shown in Figure 1, and having a filling bung hole at 32, closed by any usual conventional bung 33. The end portion of the barrel wall is formed with the usual circumscribing croze groove 34, into which is fitted the head 35, so as to lie spaced within the extreme of the staves, and provide the usual chime 36. The chime thus provides a space 37 between the head 35 of the barrel and its adjacent end in which the extremities of the wall staves are alined. The head 35 is formed of a plurality of head staves abutting edge to edge, and in the present instance, these staves 38 are formed in their longitudinal mutually abutted edges with opposed longitudinal grooves, receiving snugly corresponding ribs or flanges 39, which are formed as integral or attached projections from respective sides of planiform heat conductor plates 40 which are set between mutually abutting longitudinal edges of the staves 38. In practice, there have been provided four of these plates, five of the staves 38 being used in forming the head 35.

It is important that the plates 40 lie in plane extending generally parallel to the radius of the barrel on which the bung hole 32 is located, so that in the case of a beer barrel, brewery inspectors may readily see the bottom or inner face of the head 35 of the barrel. The device illustrated in the present instance, corresponds to a keg of what is known as a "half barrel" size, and in the case of larger barrels, more and larger plates 40 may be used, as desired. In the half barrel keg device, the plates usually are rectangular, having a horizontal major dimension of eight inches, and a vertical dimension of approximately seven inches adjacent the axis of the barrel, while the outermost plate may be correspondingly shorter in the horizontal dimension, as indicated in Figure 2. At their lower edges they are provided with head flanges 41, either attached or integrally formed thereon and set snugly against the outer face of the head 35. The edges of these flanges 41 are preferably bevelled, as shown in Figure 3, so as to slope downwardly toward the outer space of the head 35, in order to avoid damage to cleaning brushes by which the barrels are cleaned in breweries or other establishments. The unit 10 may have an over-all height of in the neighborhood of six inches, so that it may be readily set under a beer counter or other dispensing bar, so as to receive the standard keg thereon under the bar and to permit the insertion of the conventional draught tube 42 through the top head of the keg, connected to the usual spigot or faucet 43, which may be located under or above the counter or bar, as desired.

A body of water is introduced into the upper pan-like receptacle formed within the wall 15, and when the refrigerant supply unit has operated, this water may be frozen and congealed into a body of ice 44.

The diameter of the wall 15 at its upper part is somewhat greater than the diameter of the barrel to be refrigerated in the unit, so that the chime of such barrel may be set concentrically within the wall 15, and will then lie spaced a distance from the latter wall, so as to afford a channel at 29 therearound the barrel.

When the barrel 30 is set upright upon the body of ice 44 within the inner, pan-like receptacle, as described, the weight of the barrel and its higher temperature will cause the ice to melt under the chime so as to allow it to sink into the body of ice until the latter comes into intimate contact and high pressure engagement with the head flanges 41 of the plates 40, absorbing heat from the plates so that the latter function as conductors by which heat is transferred from the contents of the barrel to the body of ice 44, and thence to the plate 21 and refrigerant thereunder.

In case of condensation of moisture on the exterior surfaces of the barrel walls, this condensate will drain into the space 29, overflowing into space 16, where it may be withdrawn at 17, as desired.

The ice 44 may melt, and the liquid so formed then will function as an intermediate conducting medium by which heat is transferred from the plate 40 to the refrigerated bottom 20, and it may again congeal after contents of the barrel have been reduced in temperature to a certain extent. The device functions to keep the contents of the barrel in its lower part at a proper temperature for draught, while the upper part, without being so cold, is maintained at a temperature to prevent it from spoiling.

Another object of the invention is to provide a means wherein the original brewery packages of standard size and shape may be cooled and because of the great number of standard brewery packages now in use, each of which, while of standard size, may vary in the particular design as regards the barrel bottom, therefore, in Figure 7 is illustrated a modification of the device es-

pecially adapting it to use with particular styles of metal and wood barrels, and in this device the units are constructed in a manner identical with that previously described, and may be used in the same way, excepting that a supplementary annular adapter 45 is set upon the refrigerated bottom 20 and united thereto by the body of liquid in the pan-like receptacle, said annular adapter being of rapid heat conducting material and being closed at one end and open at the other so as to hold a body of water or the like with which said adapter may be filled. This adapter is reversible and in actual practice with some keg applications the closed end of said adapter may be reversed (as shown in Figure 9), providing a flat surface of high heat conducting material directly against the barrel bottom and for engagement with the exposed surfaces 41 of the plates 40 in barrels of wooden structure.

An illustration of the use of said adapter in one position is shown in Figure 7, with the closed end of said adapter in contact with the cooling unit plate 22, said annular adapter having the open end up for engagement with certain popular styles of keg having a convex bottom, said adapter wall fitting inside the chime of the barrel, said convex barrel bottom bulging downwardly inside the adapter, the bulge further being in direct contact with the substance (heat transfer solution) with which said adapter may be filled. The adapter extends a distance above the level of the top of the wall 15 sufficient to engage directly against the outer face of the barrels of wooden cooperage and some metal barrel heads. In the above instance, a metal barrel 46 is shown having a head 47 which as initially manufactured is united with the wall of the barrel 46 in a conventional way, and forming a chime 48 which includes an extended portion of the wall 49 of the barrel. The annular adapter 45 being placed in the water in the receptacle on and in pressure contact with refrigerating element 20 with the closed end of said adapter in a position to receive the platform bottom of said keg. In actual practice, ice will form in and around said adapter, however, since said adapter extends above the wall 15 and the liquid level contained in the receptacle formed by wall 15 a space exists between said liquid level and the inside of said adapter allowing for the expansion of ice due to the congealing of the liquid.

In such case, the head 47 being of metal, will function as an effective conductor by which heat is transferred from the contents of the barrel 46 to the adapter surface 45 and by the latter, to the refrigerated bottom 20, as before described. As in the first described form of the device, in the case of condensation of moisture upon the barrel 46, this will drain into the outer part of the pan-like receptacle formed by the wall 15 and bottom 20, and may overflow into the channel 16, as before described.

In this connection it has been noted through careful tests that beer and other carbonated beverages in the original package container when placed in contact with the refrigerating element of the invention will promote a rapid transfer of heat from the contents in the bottom portion of said container. Some of the CO_2 content existing in said beverage will be condensed while the CO_2 content in the upper portion of said container being at a higher temperature will tend to expand, thereby setting up an automatic turbulence or circulation of the liquid contents of the barrel, thus causing the entire contents of the barrel to become existent in a pre-cooled condition. Thus it is that the contents in the bottom of said container which is in contact with the refrigerating element will not become too cold; neither will the contents existing in the upper portion of the barrel become too warm. Thus it is that the entire contents of the barrel or any portion thereof may be maintained and draughted at a predetermined average mean temperature.

Circulation of the contents of the barrel is further promoted by reason of the fact that the entire barrel is not subjected to low temperature as is the case of a barrel contained in a cold storage room where the entire contents of said barrel would tend to become quiescent.

Circulation of the contents of a barrel used in connection with my invention is further promoted by reason of the change in temperature and pressure; furthermore, the circulation of the contents of said barrel is a fact because of the particular point of heat transfer and temperature change with respect to the barrel as evidenced by this invention. As an illustration, if the contents of an entire barrel were raised from a temperature to a higher temperature, the pressure inside of said barrel would increase but there would be no promotion of internal circulation. Likewise, if the contents of the entire barrel were gradually lowered from a temperature to a lower temperature, pressure within the barrel would reduce but there would likewise be no promotion of circulation.

A particular claim of my invention is that by reason of the bottom of said barrel being in contact with my low temperature refrigerating element and the upper portion of said barrel being exposed to normal atmospheric conditions, I promote a circulation within the barrel by means of reasons above described which enables me to control within close limits the dispensing temperature of the beverage contained within the said barrel.

While the invention has been described with particularity it will be understood that this is purely exemplary, and that various modifications in the construction, arrangement and combination of parts, substitution of equivalents, and materials, may be made without departing from the spirit of the invention, as more particularly set forth in the appended claims, wherein I claim:

1. A pan-like receptacle having a bottom, means for circulating refrigerating liquids against the under side of said bottom, a body of liquid in the pan adapted to be congealed by heat transfer to said refrigerant liquid; a beer keg of conventional construction including a wooden head formed of transverse head staves, a heat conducting plate set between at least two of the staves and extending a substantial distance within the keg and having a broadened edge portion exposed at the outer face of the head for contact with congealed liquid in said pan-like receptacle.

2. The structure of claim 1, in which said pan-like receptacle is formed with a bounding wall of a diameter adapted to fit within the chime of a barrel and to receive the head of a barrel directly thereagainst, and a body of congealed liquid in said pan-like receptacle extending above the bounding wall thereof, whereby to engage directly against the head of a barrel set thereupon, for the purposes described.

3. The structure of claim 1 in which a pan-like receptacle is provided, adapted to be reversed for contacting engagement within the bot-

tom of a barrel head, and a body of congealed liquid in said pan-like receptacle.

4. The structure of claim 1, in which said pan-like receptacle includes an upwardly extended wall portion adapted to set within the chime of a metal barrel, and a body of ice therewithin exposed above the edge portion of said wall, for intimate contact with the head of a barrel set thereover.

5. The structure of claim 1, in which said pan-like receptacle is adapted to set within the chime of a metal barrel, and a body of ice therewithin exposed for intimate contact with the head of a barrel set thereover.

6. In a beer keg of conventional construction including a head formed of a plurality of head staves set edge to edge, respective heat conducting plates set between the staves, and extending a substantial distance within the barrel and having a broadened portion externally of the barrel and disposed close against the surface of the head, each of said plates being formed with lateral flange portions fixed with relation to the plate and embedded at its longitudinal edge portion in respective head staves, for the purposes described.

ALBERT L. REISER.