Jan. 12, 1932. R. O. WHITE 1,840,375

REFRIGERATING DEVICE

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Fig. 1

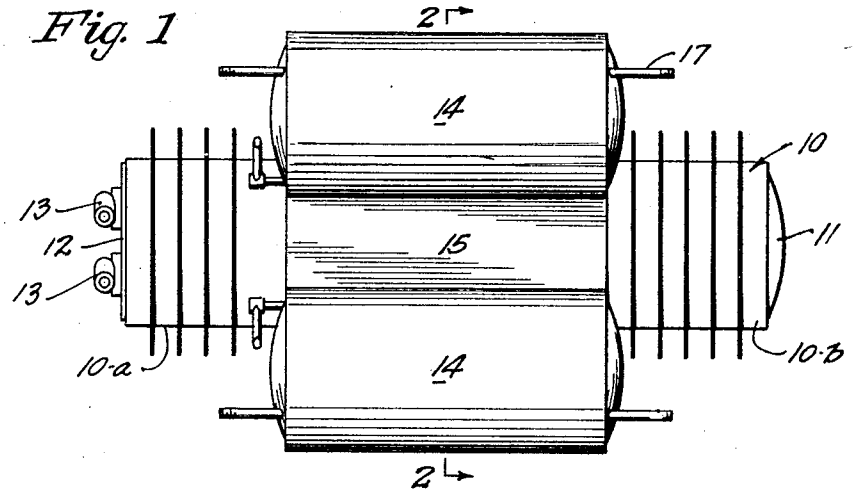



Fig. 3

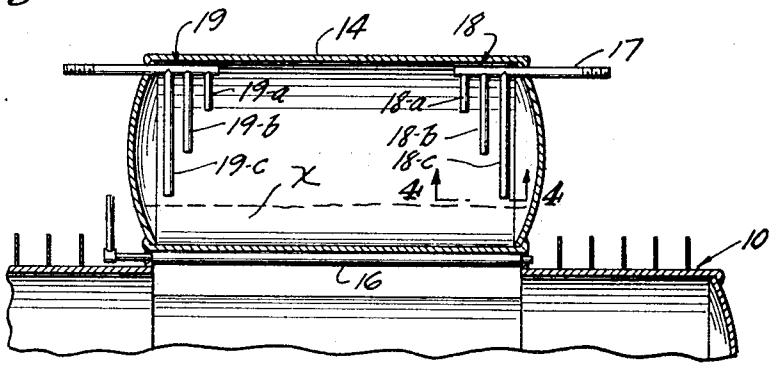



Fig. 2

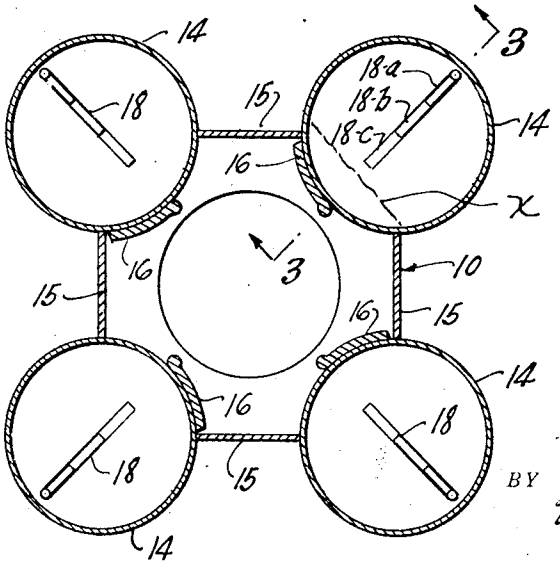
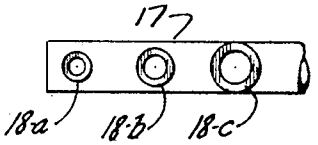



Fig. 4




INVENTOR
Robert O. White
Westall and Wallace
ATTORNEYS

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Fig. 5

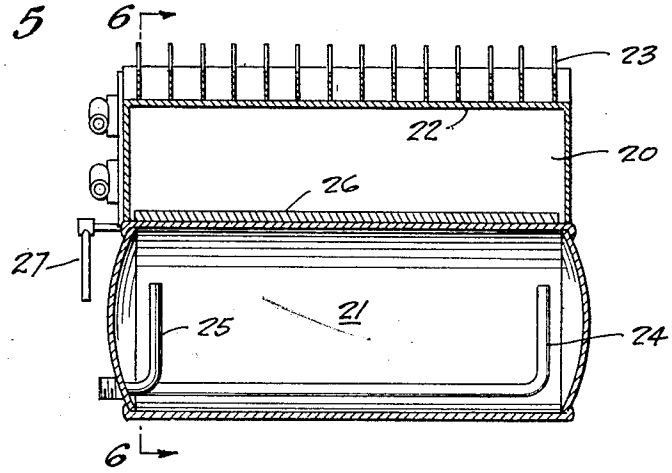



Fig. 6

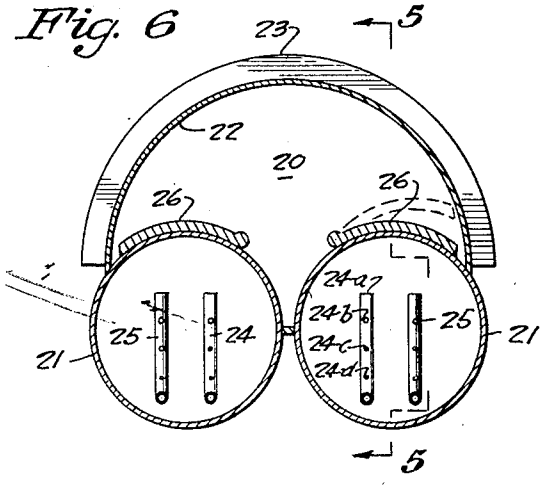



Fig. 7

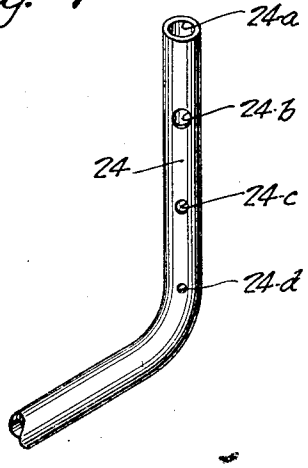
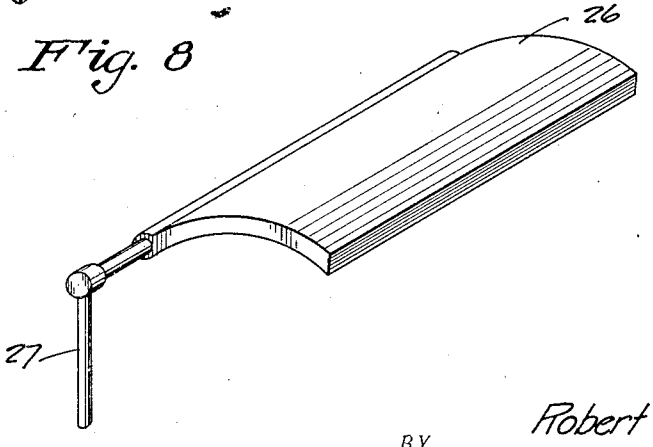



Fig. 8




INVENTOR
Robert O. White
BY
Westall and Wallace
ATTORNEYS

Patented Jan. 12, 1932 1,840,375

# UNITED STATES PATENT OFFICE

ROBERT O. WHITE, OF LOS ANGELES, CALIFORNIA

## REFRIGERATING DEVICE

Application filed November 2, 1929. Serial No. 404,450.

This invention relates to a multiple fluid cooler particularly adaptable to include a single main refrigerant control unit. In cooling chambers assemblies used for several liquids such as beverages various cabinets in common practice have heretofore been used in which a bath cooled by a refrigerant has had immersed therein several beverage containers constituting parts of flow line for beverages, a separate beverage flowing through each beverage coil or container. Chambers for the cooling of bottles or articles are also provided. This constitutes an indirect method and means for cooling the beverages and is commonly used in soda fountains. Another practice has been to place within the fluid cooling chambers, refrigerant vaporizing pipes or chambers, there being a refrigerant vaporizing chamber for each fluid cooling chamber. Such fluid cooling chambers thus have been cooled from the inside.

The present invention has for an object the provision of an assembly including a fluid cooling chamber and a vaporizing chamber wherein the fluid cooling chamber is cooled from the outside and wherein a single vaporizing chamber may be employed to cool a multiplicity of fluid cooling chambers. Thus, any fluid cooling chamber, if it becomes inoperative, will not affect the operation of the others. Furthermore, the assembly as a unit may be arranged to cool fluids, such as air, the air circulating over and about the outside of the assembly and function as a cooling medium for a storage cooler such as is used in soda fountains in common practice for bottles or other articles. Another object of this invention is to provide details of structure wherein any or all of the following features are included in the assembly: a liquid inlet having openings to direct the liquid to be cooled against an ice body therein or the section of wall of the chamber transferring heat between the vaporizing chamber and the fluid cooling chamber; a liquid outlet to take liquid from the chamber adjacent such ice body or heat transfer wall; inlet openings, outlet openings, or both having their openings disposed at different distances so that a growing ice body may close all but one inlet and outlet opening before shutting off the flow of liquid; the inlet and outlet openings being of varying cross sectional areas and disposed to take and discharge liquid from largest openings nearest the ice body or heat transfer section of wall; and outside controlled heat insulated walls movable to shield the heat transfer section of wall of the fluid cooling chambers or to expose the latter to meet the demands of individual needs.

These objects together with other objects and corresponding accomplishments are obtained by means of the embodiments of my invention illustrated in the accompanying drawings, in which:—

Fig. 1 is a plan view of an assembly wherein there is a single refrigerant control unit and vaporizing chamber, four liquid cooling chambers, and an air cooling space; Fig. 2 is a section as seen on the line 2—2 of Fig. 1; Fig. 3 is a section as seen on the line 3—3 of Fig. 2 showing a fragment of the vaporizing chamber and a liquid cooling chamber; Fig. 4 is an enlarged detail view as seen on the line 4—4 of Fig. 3; Fig. 5 is a vertical section through an assembly having a single vaporizing chamber and two liquid cooling chambers; Fig. 6 is a section as seen on the line 6—6 of Fig. 5; Fig. 7 is a perspective view on an enlarged scale showing another form of inlet, the outlet being substantially identical; and Fig. 8 is a perspective view showing the heat insulated shield.

Referring more particularly to Figs. 1 to 4 inclusive, the vaporizing chamber is marked 10 and consists of a tank having extensions 10—*a* and 10—*b* closed by a head 11 at one end and a head 12 at the other end upon which are mounted refrigerant control valves 13, these being of a form well known in the art. Disposed alongside and without the vaporizing chamber 10 are liquid cooling chambers 14. As illustrated herein, the liquid cooling chambers are four in number and are cylindrical, being of less length than the vaporizing chamber 10. However, the exact length of the liquid cooling chambers in relation to the length of the vaporizing chamber is not perti-

nent to the present invention. Walls 15 together with portions of the fluid cooling chamber walls 14 and the extensions 10—*a* and 10—*b* define a vaporizing chamber. Heat is transferred from the liquid cooling chambers 14 to the vaporizing chamber. The sections of walls of the liquid cooling chambers which form a portion of the walls of the vaporizing chamber constitute heat transfer sections. Mounted adjacent each heat transfer section is an adjustable heat insulated shield 16 later described. Each liquid cooling chamber is adapted to be operated independently so that several draught beverages may be passed therethrough. They may also be connected in series so that any two may operate as a multiple stage cooler. In such instance by-passes should be provided in order that liquid may be passed around any cooling chamber which may become inoperative. An ice body may build up on the heat transfer section of the wall of a liquid cooling chamber as indicated by X in Fig. 2. As the liquid cooling chambers are of like construction, only one will be described. Leading into one end of a chamber 14 is an inlet pipe 17. On the inside of chamber 14 and projecting laterally therefrom are three pipe sections 18—*a*, 18—*b*, and 18—*c*, of different lengths and constituting an inlet designated generally by 18. The short inlet section 18—*a* is of less cross-sectional area than 18—*b*, and 18—*b* is less than 18—*c* as best shown in Fig. 4. Liquid entering the chamber, providing the end of section 18—*c* is open will follow the path of least resistance and the large proportion will pass through section 18—*c*, being directed against the ice body X. If the ice body should build up so as to close the end of the section 18—*c*, then liquid will be delivered through section 18—*b* in greater amount than through section 18—*c*. If both sections 18—*c* and 18—*b* are closed by the ice body, then liquid will be delivered through section 18—*a*. Thus, liquid is delivered close to and against either the ice body or the heat transfer wall section to operate with the best thermal efficiency. The outlet indicated generally by 19 consists of pipe sections 19—*a* and 19—*b*, and 19—*c* which operate to take the liquid from chamber 14 adjacent the heat transfer wall or the ice body, the largest discharge openings being closest to the ice body or heat transfer section of wall.

Referring more particularly to Figs. 5 to 8 inclusive, a vaporizing chamber is marked 20 and two liquid cooling chambers 21. A wall 22 for the vaporizing chamber has fins 23 thereon. The delivery and discharge pipes for the liquid chambers are shown as entering one end of the liquid cooling chamber. The inlet pipe 24 is single and disposed along the length thereof are openings 24—*b*, 24—*c*, and 24—*d*. The opening at the end marked 24—*a* is of larger cross-section than opening 24—*b*, opening 24—*c* being less than 24—*b* and opening 24—*d* being the smallest. The operation of the inlet pipe will be obvious. Delivery pipe 25 is of similar construction. Insulating shields 26 correspond to heat insulating shields 16 shown in Figs. 1 to 4. These shields are formed of any suitable material and are of such curvature that it may lie against the outer surface of the corresponding liquid cooling chamber forming a portion of the vaporizing chamber wall. A shaft 27 is formed thereon and journalled in the end walls so that a shield may be swung to and from its liquid cooling chamber wall. One end of the shaft is shown extended to the outer side and provided with a handle 27 for manipulating the shield. When the shields lie against their chambers, the heat conductively is less, and less heat will be transferred from a cooling chamber. Although the shields are shown arranged for manual operation, they may be operated automatically by any suitable means.

It will be noted that in both forms of the invention, air may be passed around the outside of the assembly and thus cooled. The fins 23 of the form shown in Fig. 5 add to the efficiency. This cooled air may be used for any purpose desired.

What I claim is:—

1. A refrigerating assembly comprising a vaporizing chamber, a fluid cooling chamber disposed alongside of said vaporizing chamber with a heat transfer section of wall constituting both a portion of the wall of the vaporizing and fluid cooling chambers, and an inlet for fluid within said fluid cooling chamber having a multiplicity of openings disposed at different distances from the heat transfer section of wall.

2. A refrigerating assembly comprising a vaporizing chamber, a plurality of fluid cooling chambers disposed alongside of said vaporizing chamber with heat transfer sections of walls constituting both portions of the vaporizing and fluid cooling chambers, the assembly being encompassed within walls externally exposed, inlets for fluid within said fluid cooling chambers, each inlet having a multiplicity of openings disposed at different distances from the heat transfer section of its chamber wall.

3. A refrigerating assembly comprising a vaporizing chamber, a plurality of fluid cooling chambers disposed alongside of said vaporizing chamber with heat transfer sections of wall constituting both a portion of the vaporizing and fluid cooling chambers, heat insulator shields disposed intermediate said vaporizing and fluid cooling chambers and mounted to position said shields against the walls of said fluid cooling chambers to shield the latter or to position said shields out of shielding position, inlets for fluid within said

fluid cooling chambers, each inlet having a multiplicity of openings disposed at different distances from the heat transfer section of its chamber wall.

4. A refrigerating assembly comprising a vaporizing chamber, a plurality of fluid cooling chambers disposed alongside of said vaporized chamber with heat transfer sections of wall constituting both a portion of the vaporizing and fluid cooling chambers, the assembly being encompassed within walls externally exposed, heat insulator shields disposed intermediate said vaporizing and fluid cooling chambers and mounted to position said shields against the walls of said fluid cooling chambers to shield the latter or to position said shields out of shielding position, inlets for fluid within said fluid cooling chambers, each inlet having a multiplicity of openings disposed at different distances from the heat transfer section of its wall.

5. A refrigerating assembly comprising a vaporizing chamber, a plurality of fluid cooling chambers disposed alongside of said vaporizing chamber with heat transfer sections of wall constituting both portions of the vaporizing and fluid cooling chambers, the assembly being encompassed within walls externally exposed, heat transfer fins on portions of the exposed walls, heat insulator shields disposed intermediate said chambers and mounted to position said shields against the walls of said fluid cooling chambers to shield the latter or to position said shields out of shielding position, inlets for fluid within said fluid cooling chambers having a multiplicity of openings disposed at different distances from the heat transfer sections of wall.

6. A refrigerating assembly comprising a vaporizing chamber, a fluid cooling chamber disposed alongside of said vaporizing chamber with a heat transfer section of wall constituting both a portion of the wall of the vaporizing and fluid cooling chambers, an outlet for fluid within said cooling chamber having a multiplicity of openings disposed at different distances from the heat transfer section of wall.

7. A refrigerating assembly comprising a vaporizing chamber, a fluid cooling chamber disposed alongside of said vaporizing chamber with a heat transfer section of wall constituting both portions of the wall of the vaporizing and fluid cooling chambers, the assembly being encompassed within walls externally exposed, an outlet for fluid within said fluid cooling chamber having a multiplicity of openings disposed at different distances from the heat transfer section of wall.

8. A refrigerating assembly comprising a vaporizing chamber, a fluid cooling chamber disposed alongside of said vaporizing chamber with a heat transfer section of wall constituting both a portion of the wall of the vaporizing and fluid cooling chambers, a heat insulator shield disposed intermediate said chambers and mounted to position said shield against the wall of said fluid cooling chamber to shield the latter or to position said shield out of shielding position, an outlet for fluid within said fluid cooling chamber having a multiplicity of openings disposed at different distances from the heat transfer section of wall.

9. A refrigerating assembly comprising a vaporizing chamber, a fluid cooling chamber disposed alongside of said vaporizing chamber with a heat transfer section of wall constituting both a portion of the wall of the vaporizing and fluid cooling chambers, the assembly being encompassed within walls externally exposed, a heat insulator shield disposed intermediate said chambers and mounted to position said shield against the wall of said fluid cooling chamber to shield the latter or to position said shield out of shielding position, an outlet for fluid within said fluid cooling chamber having a multiplicity of openings disposed at different distances from the heat transfer section of wall.

10. A refrigerating assembly comprising a vaporizing chamber, a fluid cooling chamber disposed alongside of said vaporizing chamber, with a heat transfer section of wall constituting both a portion of the wall of the vaporizing and fluid cooling chambers, an inlet for fluid within said fluid cooling chamber having a multiplicity of openings disposed at different distances from the heat transfer section of wall, an outlet for fluid within said fluid cooling chamber having a multiplicity of openings disposed at different distances from the heat transfer section of wall.

11. A refrigerating assembly comprising a vaporizing chamber, a fluid cooling chamber disposed alongside of said vaporizing chamber with a heat transfer section of wall constituting both a portion of the wall of the vaporizing and fluid cooling chambers, the assembly being encompassed within walls externally exposed, an inlet for fluid within said fluid cooling chamber having a multiplicity of openings disposed at different distances from the heat transfer section of wall, an outlet for fluid within said fluid cooling chamber having a multiplicity of openings disposed at different distances from the heat transfer section of wall.

12. A refrigerating assembly comprising a vaporizing chamber, a fluid cooling chamber disposed alongside of said vaporizing chamber, with a heat transfer section of wall constituting both a portion of the wall of the vaporizing and fluid cooling chambers, a heat insulator shield disposed intermediate said chambers and mounted to position said shield against the wall of said fluid cooling chamber to shield the later or to position said shield out of shielding position, an inlet for

fluid within said fluid cooling chamber having a multiplicity of openings disposed at different distances from the heat transfer section of wall, an outlet for fluid within said fluid cooling chamber having a multiplicity of openings disposed at different distances from the heat transfer section of wall.

13. A refrigerating assembly comprising a vaporizing chamber, a fluid cooling chamber disposed alongside of said vaporizing chamber with a heat transfer section of wall constituting both a portion of the wall of the vaporizing and cooling chambers, the assembly being encompassed within walls externally exposed, a heat insulator shield disposed intermediate said chambers and mounted to position said shield against the wall of said fluid cooling chamber to shield the latter or to position said shield out of shielding position, an inlet for fluid within said fluid cooling chamber having a multiplicity of openings disposed at different distances from the heat transfer section of wall, and an outlet for fluid within said fluid cooling chamber having a multiplicity of openings disposed at different distances from the heat transfer section of wall.

In witness that I claim the foregoing I have hereunto subscribed my name this 23rd day of October, 1929.

ROBERT O. WHITE.