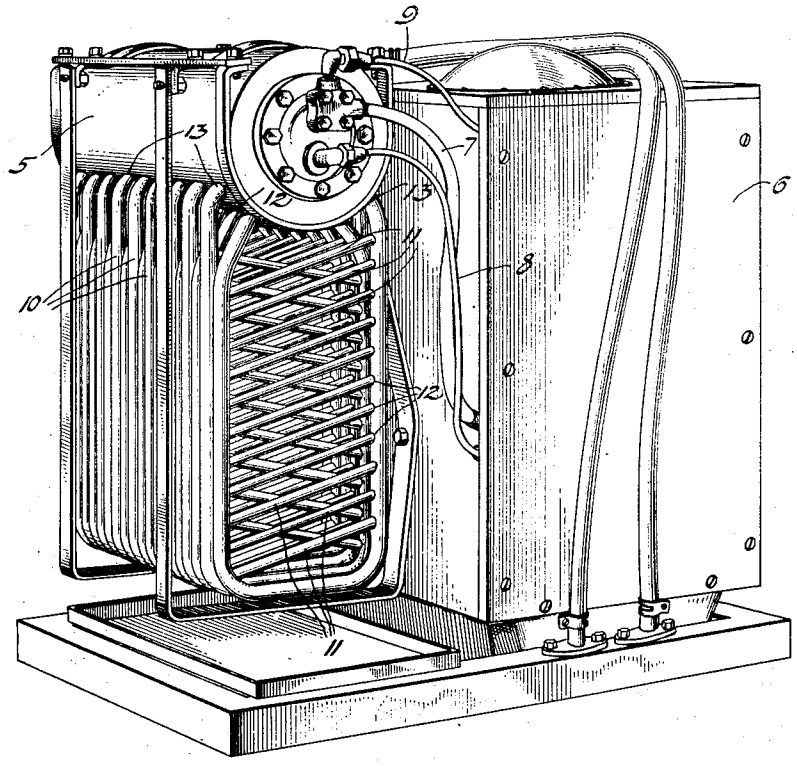
March 24, 1925. 1,531,133

J. R. REPLOGLE

VAPORIZER FOR REFRIGERATING SYSTEMS

Filed Sept. 22 1921 2 Sheets-Sheet 1

Fig. 1



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March 24, 1925. 1,531,133

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Filed Sept. 22, 1921 2 Sheets-Sheet 2

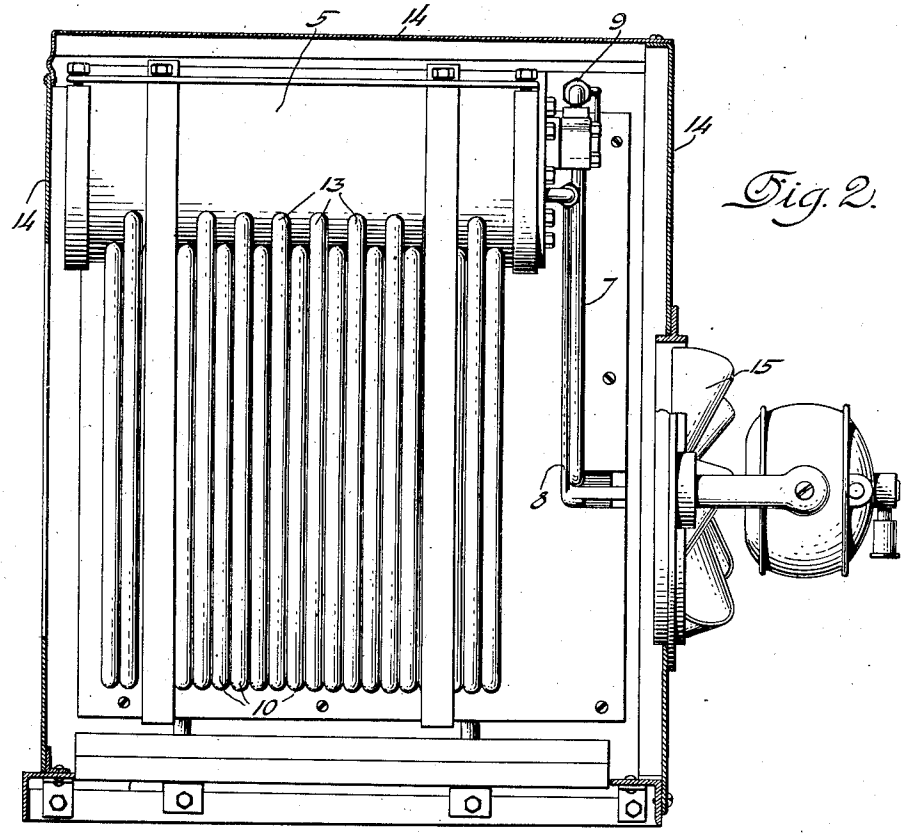


Fig. 2.

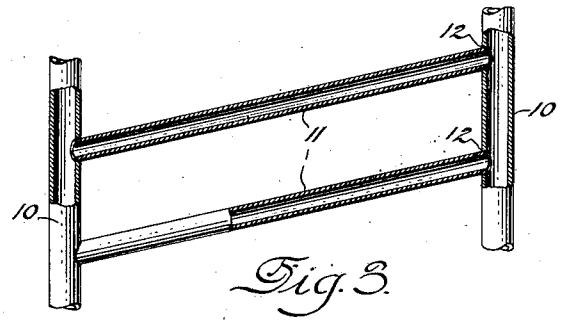


Fig. 3.

Inventor:
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Patented Mar. 24, 1925. 1,531,133

UNITED STATES PATENT OFFICE.

JOHN R. REPLOGLE, OF DETROIT, MICHIGAN, ASSIGNOR TO THE SECURITY TRUST COMPANY, TRUSTEE, OF DETROIT, MICHIGAN, A CORPORATION OF MICHIGAN.

VAPORIZER FOR REFRIGERATING SYSTEMS.

Application filed September 22, 1921. Serial No. 502,504.

To all whom it may concern:

Be it known that I, JOHN R. REPLOGLE, a citizen of the United States of America, and a resident of Detroit, county of Wayne, and State of Michigan, have invented certain new and useful Improvements in Vaporizers for Refrigerating Systems, of which the following is a full, clear, concise, and exact description, such as will enable others skilled in the art to which the invention relates to make and use the same, reference being made therein to the accompanying drawings, which form a part of this specification.

My invention relates to refrigerating systems, and particularly to the vaporizing or evaporating elements or devices of such systems wherein a highly volatile liquid in boiling at a low temperature abstracts heat from the surrounding space, and causes a reduction of the temperature therein; my present invention being in the nature of an improvement in and relating to certain parts of a refrigerating unit invented by me, and for which an application for Letters Patent of the United States was filed upon June 6, 1921, Serial No. 475,344.

The principal object of my invention is to provide an improved form of vaporizing device or boiler for use in refrigerating systems of the class described wherein the surface exposed to the action of air surrounding or flowing past the vaporizer is greatly increased, and a more effective and rapid cooling of the air secured; the increased vaporizing surface being secured without increasing the over all dimensions of the element or device in question.

Other objects of my invention will more clearly appear from the following description which, taken in connection with the drawings, comprises a disclosure of the preferred form of my invention; it being understood, however, that my invention includes such variations and modifications of the particular embodiment thereof illustrated as come within the scope of the concluding claims.

In the drawings accompanying and forming a part of this specification:

Figure 1 is a view showing the principal features of my improved vaporizing device in perspective, together with various other parts of a refrigerating system.

Figure 2 is a view showing my invention in side elevation, together with a fan whereby a current of air is made to flow past the same to thereby accomplish the cooling of the air.

Figure 3 is a fragmentary sectional view illustrating certain features of my invention upon a larger scale.

Referring to the drawings, the reference numeral 5 designates a suitable receptacle shown as a cylindrical drum within which a liquefied refrigerating medium such as sulphur dioxide or ammonia is received and held, the vapor of said medium being compressed and liquefied by a suitable pump and cooling coil located within a machinery compartment 6 which compressing and liquefying devices may be of the particular form disclosed in my application for patent hereinbefore mentioned, or of other form so long as they serve to compress and liquefy the refrigerating medium which has assumed the form of a vapor in accomplishing its cooling function. The pipes 7, 8 and 9 for conducting vaporized refrigerating medium from the receptacle 5 to the compressor, for returning liquefied refrigerating medium from the cooling and condensing coil to the said receptacle, and for connecting said receptacle with a controlling device for the system, are all as in my prior invention hereinbefore mentioned.

Depending from the receptacle 5 are a series of U-shaped tubes 10 arranged alongside and parallel with one another and the upper ends of which are connected with and are in open communication with the interior of the receptacle at oppositely located points spaced apart from one another, and which places or points of connection are preferably at different heights or in different levels. The drum 5 thus constitutes a header for the tubes 10. The vertical sides of these tubes or depending loops are connected with one another by a series of spaced cross tubes 11, the ends of which are in open communication with the interiors of the said sides. These cross tubes are preferably inclined as shown; and their ends 12 which are the higher communicate with the sides of the loops 10 which lead into the receptacle 5 at the higher level, as at 13. To avoid unduly weakening the wall of the drum 5 by close spacing of the holes therethrough to receive the ends of the tubes 10, the latter are arranged with their higher ends alternately on opposite sides of the drum. This results in

the inclination in opposite directions of the cross tubes 11 of the adjacent tubes 10 and this has an advantage which will presently be referred to further.

As is fully disclosed in my application Serial No. 475,344, above referred to, the liquid refrigerant supply tube 8 and its associated automatic float valve in the drum 5, in conjunction with the compressor, are adapted to maintain the top level of the liquid refrigerant in the drum above the higher ends 13 of the tubes 10. Thus there are unbroken circuits of the liquefied refrigerant through the tubes 10, 11 and the drum 5 for free circulation by convection. The arrangement of the higher ends of the cross tubes 11 of each loop 10 in communication with the vertical leg of the loop which itself communicates with the drum 5 at the higher level secures a better flow of vaporized refrigerating medium from the cross tubes upward through the tubular structure and into the drum. Furthermore, this flow of vaporized refrigerant upward through the upwardly inclined cross tubes 11 and into the vertical leg of the loop connected at 13 to the drum is in the same direction as the natural circulation of the liquid refrigerant through the loop and serves to augment this latter circulation, thus securing more rapid interchange of heat between the refrigerant and the air or other fluid surrounding or flowing past the vaporizer, and a more rapid and efficient cooling of the air than would otherwise result.

The compressor and condenser compartment 6 as well also as the vaporizer or boiler structure are shown as enclosed within a casing 14 through which air is caused to flow by a fan 15 and which air will become cooled by the vaporization of refrigerating medium within the vaporizing device as it flows past the same; the tubular structure described providing a vaporizing element wherein the surface exposed to the air is large as compared with the over all dimensions thereof, as will be appreciated. Furthermore, the inclination in opposite directions of the cross tubes 11 of the adjacent loops 10 insures the most effective contact with said tubes of the air currents forced over them by the fan 15, with a resultant increase of the efficiency and capacity of the vaporizer.

Having thus described and explained my invention I claim and desire to secure by Letters Patent:

1. In a vaporizer for refrigerating systems, the combination of a header adapted to receive and hold liquefied refrigerant; means for maintaining liquid refrigerant therein up to a certain level; a plurality of U-shaped tubes depending from the header each having its respective ends in direct communication with the liquid refrigerant in the header at points spaced apart from one another and at different levels below the surface level of the liquid refrigerant in said header; and a plurality of inclined cross tubes connecting the side sections of each depending tube, the higher ends of said cross tubes being connected to the side section of the depending tube which opens into the header at the higher level.

2. In a vaporizer for refrigerating systems, the combination of a header adapted to receive and hold liquefied refrigerant; a plurality of U-shaped tubes depending from the header each having its respective ends in open communication with the header at points spaced apart from one another and at different levels; and a plurality of inclined cross tubes connecting the side sections of each depending tube, the higher ends of said cross tubes being connected to the side of the depending tube which opens into the header at the higher level and the ends of the depending tubes and inclined tubes being arranged in alternation so that the cross tubes of adjacent depending tubes are inclined in opposite directions.

In testimony whereof I affix my signature.

JOHN R. REPLOGLE.