June 4, 1940. C. T. BAPPLER 2,203,075

HEAT EXCHANGE APPARATUS

Filed Aug. 19, 1936

Fig. 1.

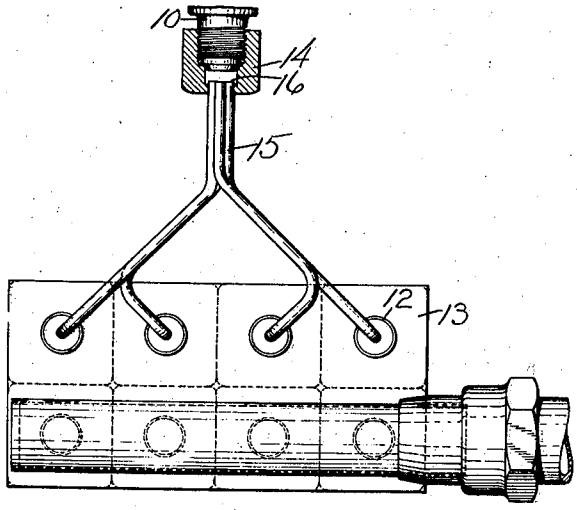


Fig. 2.

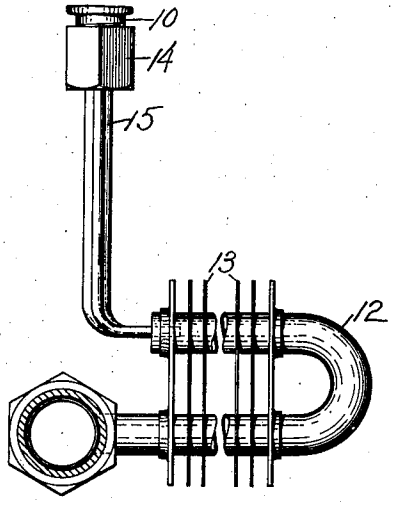


Fig. 3.

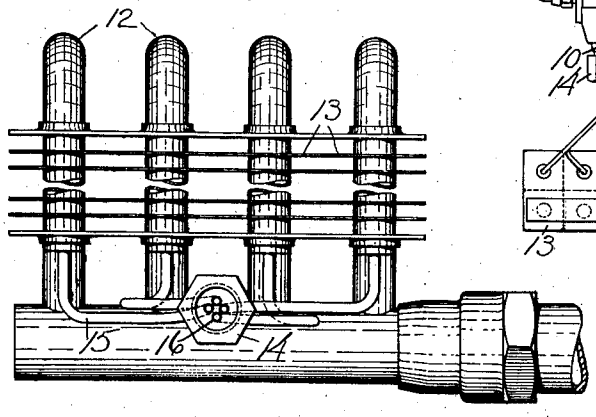


Fig. 4.

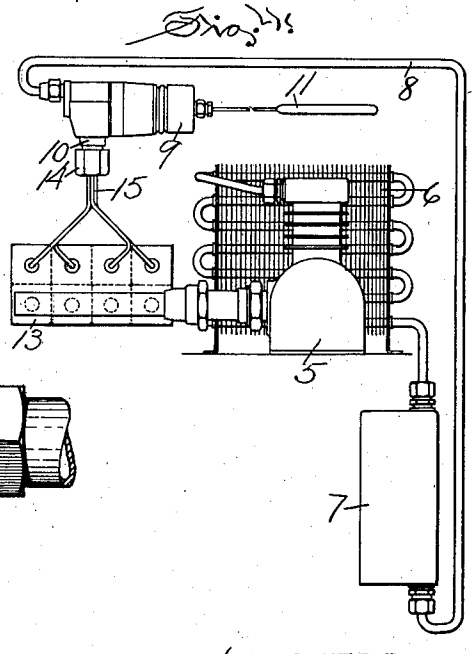
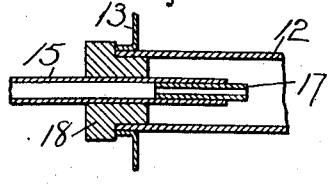


Fig. 5.



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UNITED STATES PATENT OFFICE

2,203,075

HEAT EXCHANGE APPARATUS

Charles T. Bappler, Hartford, Conn., assignor to The Bush Manufacturing Company, Hartford, Conn., a corporation of Connecticut

Application August 19, 1936, Serial No. 96,758

1 Claim. (Cl. 62—127)

My invention relates to that class of apparatus which is employed for changing temperatures of fluids for various purposes, such as reducing the temperatures of air in compartments, chambers, or in conduits, or for raising such temperatures, and an object of my invention, among others, is the production of an apparatus of this sort that shall be simple in construction and particularly efficient in operation.

One form of an apparatus embodying my invention and in the construction and use of which the objects herein set out, as well as others, may be attained, is illustrated in the accompanying drawing in which

Figure 1 is an end view of an evaporator embodying my invention.

Figure 2 is a side view of the same with parts broken out to reduce the size.

Figure 3 is a top view broken out in like manner.

Figure 4 is a diagrammatic view illustrating my improved apparatus in operation.

Figure 5 is a detail view illustrating the construction where the conducting tubes are connected to the coils.

In the use of apparatus for exchanging heat for the purpose of reducing the temperature of atmosphere or fluid in rooms, chambers, conduits and the like, for refrigerating, air conditioning and similar purposes, the refrigerant in the form of a liquid is converted into a gas which is made use of in evaporators in effecting the heat exchange. In order to obtain the best results it is important that this liquid shall be evenly distributed to the different coils of the evaporator and shall expand evenly in these different coils. It is also important that the liquid shall be supplied to the coils in such quantities as may be readily disposed of by such coils, that is, that the quantity of liquid so supplied shall be sufficient for the capacity of the coils but shall not be excessive, and to this end the tubes for supplying the liquid to the coils should be of a capacity to effect the purpose just mentioned. My improved apparatus now to be described enables these results to be obtained in a particularly simple and efficient manner.

My improved device is employed in connection with an apparatus of well-known construction and which, briefly stated, includes a compressor 5 for delivering the fluid to a condenser 6 which in turn communicates with a tank 7 into which the liquid created by the action of the compressor and condenser is delivered from the condenser. From the tank the fluid compressed into a liquid is conveyed by a pipe 8 to an expansion valve 9 having an outlet 10 from which fluid is delivered in a substantially unexpanded state, all of these parts being of well-known construction and operation, the expansion valve having the usual thermostatic control 11 connected therewith.

My improvement resides in the means for introducing the liquid from said outlet 10 to coils 12 of an evaporator which evaporator comprises such coils and radiating fins 13 which may also be of ordinary construction.

As hereinbefore stated it is my purpose to evenly distribute the fluid in the form of a liquid from the valve 9, or outlet 10 thereof, to the coils so that there shall be an even expansion in the evaporator. To effect this purpose I provide a fixture comprising a nipple 14 which is screw threadedly engaged with the outlet 10 of the expansion valve, this outlet being capable of turning movement relatively to said valve. The tubes of a set 15 of tubes are closely nested with the mouths 16 of the tubes closely associated with the outlet so that the fluid from the expansion valve is delivered in liquid form into the mouths of such tubes with substantially no chance to expand. The tubes are all practically of the same size and of the same length so that when the liquid fluid from the nipple 14 reaches the coils of the evaporator it is in substantially the same state relative to quantity and expansion in each of the tubes. The mouths of the tubes are all located in the same horizontal plane and they are all in the same relative locations relative to the outlet from the valve.

A result is that the liquid fluid from the valve is evenly distributed to the coils of the evaporator and an even expansion of the liquid takes place in such evaporator with a result that the maximum degree of efficiency is obtained in the use of the apparatus.

As hereinbefore mentioned a material and important feature of the invention consists in having the size of the opening through each tube bear a certain relation to its length so that the liquid fluid may be supplied to the coils of the evaporator in just sufficient quantities to be disposed of by such coils. All of the tubes 15 while being of the same length should all have the same relationship as between their lengths and the sizes of the openings therein.

In cases where necessity may compel the use of tubes having openings therein of certain di-

ameters but of greater lengths than may be required to effectively supply the coils, the results hereinbefore referred to may be effected by the insertion of metering tubes in the mouth of each tube 15, and as shown in Fig. 5 of the drawing, wherein said tubes 15 are each provided with a metering tube 17 in either end but preferably in that end connected with the coils 12. As shown herein each tube 15 is secured in a nipple 18 tightly fastened in the end of a coil 12 and the metering tube 17 is inserted in the end of the tube 15 and projects into the coil 12.

In accordance with the provisions of the patent statutes I have described the principles of operation of my invention, together with the device which I now consider to represent the best embodiment thereof; but I desire to have it understood that the device shown is only illustrative and that the invention may be carried out by other means and applied to uses other than those above set out.

I claim:

In a heat exchange apparatus including an expansion valve of the type herein shown and in which a minimum amount of expansion of the refrigerant occurs, the combination with said valve of a nipple, a set of tubes extending into and attached to said nipple and opening thereoutof, means for attachment of said nipple to the outlet of said expansion valve, and a metering tube located in an end of each of said tubes.

CHARLES T. BAPPLER.