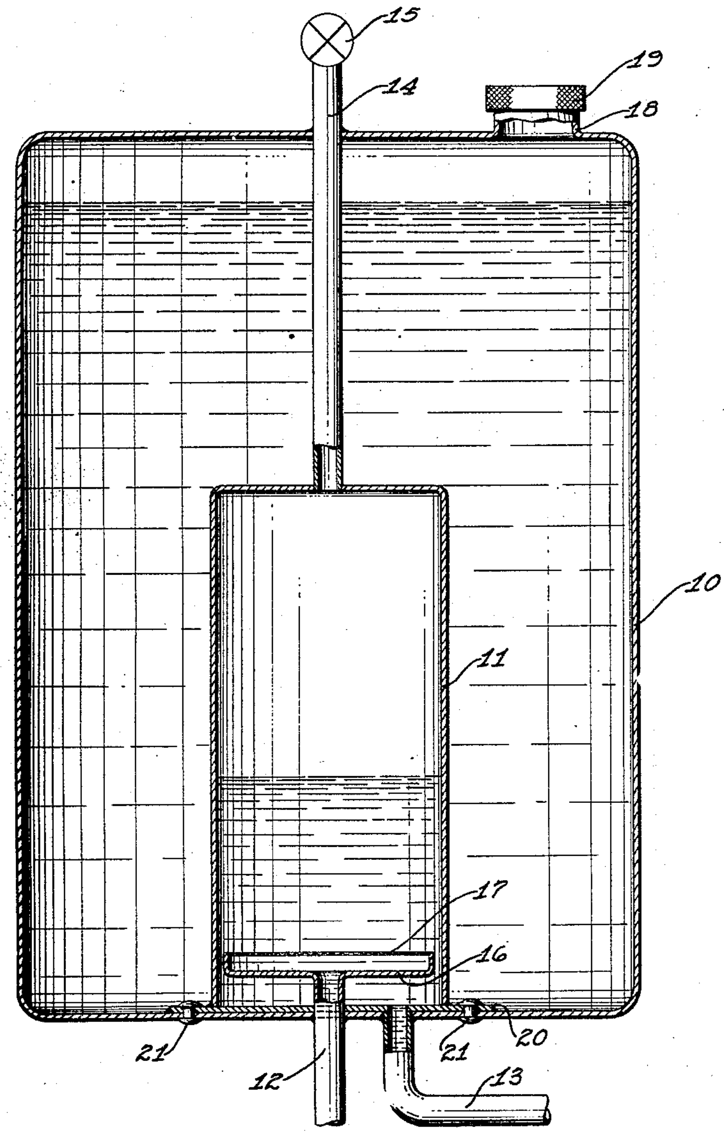
March 29, 1932. J. B. REPLOGLE 1,851,329

CONDENSER FOR REFRIGERATING SYSTEMS

Filed Aug. 23, 1929



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Patented Mar. 29, 1932 1,851,329

UNITED STATES PATENT OFFICE

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CONDENSER FOR REFRIGERATING SYSTEMS

Application filed August 23, 1929. Serial No. 387,965.

This invention relates to condensers, and more particularly to condensers forming a part of mechanical refrigerating systems.

Mechanical refrigerating systems of the domestic type must be constructed to occupy a limited space and at the same time transfer heat quickly during intermittent operation. As a result it is substantially universal practise to employ copper as the material, because of its pliability and fast heat dissipating qualities, and also to associate either running water or forced air in thermal contact with the copper refrigerant container in order to produce the required heat absorbing efficiency. Copper is expensive, installation and operating costs of running water are high, while air forcing mechanism is an added expense, and therefore in order to meet requirements of space and efficiency a material expense results. An object of the invention is to materially lessen the cost of condensers without sacrificing heat transfer efficiency or adding objectionable size.

Another object of my invention is to provide a condenser for mechanical refrigerating systems with which neither running water nor forced draft is required in order to efficiently absorb heat from the refrigerant passing intermittently therethrough.

A further object of the invention is to provide a condenser for refrigerating systems of the compression type which will function efficiently and with a low head pressure.

These and other objects of the invention will appear as the following description of the invention progresses.

In the accompanying drawings, I have illustrated in vertical section a condenser incorporating my invention.

The condenser comprises a container 10, a refrigerant receiving vessel 11 arranged within the container, a refrigerant inlet conduit 12 leading to the vessel from the compressor (not shown) and a refrigerant outlet conduit 13 leading from the vessel to the evaporator (not shown). A tube 14 extends from the upper end of the vessel to the exterior of the container, and a purging valve 15 is associated with the protruding end of such tube. The inlet conduit terminates in an enlarged flared portion 16 across the open end of which is secured a fine screen 17. The container is formed with a filler neck 18 adapted to be closed by the cap 19 which screws thereon.

The refrigerant vessel is contained wholly within the container and is closed with respect thereto, the bottom wall having a flange 20 which is secured to the bottom of the container by rivets 21, or in some conventional manner so that no leakage will result. The container is formed of a cheap sheet metal, such as galvanized iron, and is in the form of a rectangular envelope adapted to be secured along the rear wall of the cabinet to be refrigerated so that its position does not materially increase the overall dimensions of the cabinet. The refrigerant containing vessel is formed of copper, and is of a size such that it will occupy only a minor portion of the space within the container. The container is filled with water through the neck 18 as required from time to time, so that the vessel is substantially surrounded thereby. Compressed refrigerant gas passes through the conduit 12 from the compressor into the vessel through the screen 17, and condensed refrigerant leaves the vessel through the conduit 13 in a condition for admission to the evaporator. The vessel is partially filled with the liquid, condensed refrigerant, to a degree such that the screen is well submerged. Gas entering the vessel will bubble through the condensed refrigerant and will be broken up into smaller bubbles by the screen, and as such gas bubbles have a super heat, that is a heat greater than the surface liquid refrigerant in the vessel, the bubbles will yield heat to the liquid and thereby gasifying some of the liquid while lowering the incoming gas temperature. Thus the total volume of gas to be condensed in the vessel is greater than that issuing from the compressor. It is well known that heat flow from a condensing gas without super heat through metal walls to an absorbing liquid occurs about five hundred times as readily as heat flow from a non-condensing or super heated gas through metal walls to air, and therefore a very small amount of metal area or wall surface with high gas pressure is required in the vessel construction. Because of this I am able to utilize a large amount of inexpensive low pressure surface for transferring heat from the water to the surrounding air and will obtain the required condensing without water or forced draft, as the heat capacity of the water in the container will take care of the excess heat flow from the vessel while the apparatus operates intermittently. The surface area of the container need be only sufficient to provide for transferring the average heat to be dissipated during hot weather, as the heat capacity of the water will take care of the excess rate of heat transfer required during the intermittent compressor operating periods.

It will be seen that the material of the condenser is inexpensive, that no running water and installations thereof are required and that forced draft is not necessary in order to obtain heat transfer required. Further, the condenser can be formed so that the space occupied thereby will add very little to the overall dimensions of the cabinet with which it is to be associated.

Various changes can be made in the details of construction herein described without departing from the spirit of the invention and the scope of the claims.

What I claim is:

1. In a mechanical refrigerating system, a condenser comprising a closed container adapted to be filled with water, a vessel in the container adapted to be partially filled with condensed refrigerant, a conduit for admitting compressed refrigerant gas into the vessel beneath the liquid refrigerant level, and an outlet conduit through which condensed refrigerant passes from the vessel.

2. In a mechanical refrigerating system, the method of condensing the compressed refrigerant gas comprising moving the compressed gas through and in direct contact with a body of condensed refrigerant and thereby abstracting heat therefrom, collecting the gas adjacent the liquid body after passing therethrough, abstracting heat from the body of condensed refrigerant and the collected gas with a body of still water, and dissipating heat absorbed by the water with natural draft atmosphere.

3. In a mechanical refrigerating system, the method of condensing compressed refrigerant gas comprising moving the compressed gas through and in direct contact with a body of condensed refrigerant and thereby abstracting heat therefrom, breaking up the gas bubbles while moving through the condensed refrigerant body, collecting the gas adjacent the body after passing therethrough, abstracting heat from the body and the collected gas with still water, and abstracting the heat absorbed by the water with natural draft atmosphere.

4. In a mechanical refrigerating condenser, a container adapted to hold water, a vessel submerged in the water in the container, refrigerant inlet and outlet conduits connected with the bottom of said vessel, said inlet conduit terminating in a flared end interiorly of the vessel, and a screen fixed across the open end of the inlet conduit.

5. In a mechanical refrigerating system, a condenser comprising a closed container adapted to hold still water, a vessel submerged in the water in the container, refrigerant inlet and outlet conduits connected with the bottom of said vessel, the outlet end of said inlet conduit terminating in a plurality of apertures, and means for purging the vessel.

6. In a mechanical refrigerating system, a condenser comprising a closed container adapted to be filled with still water, a vessel submerged in the water in said container, an inlet conduit extending interiorly of the vessel for conducting compressed refrigerant into the vessel, an outlet conduit for conducting liquid refrigerant from the vessel, said vessel being partially filled with condensed refrigerant, and means associated with inlet conduit below the refrigerant level in the vessel for breaking up gas bubbles passing through the liquid refrigerant.

In testimony whereof, I hereunto affix my signature this 15 day of August, 1929.

JAMES B. REPLOGLE.