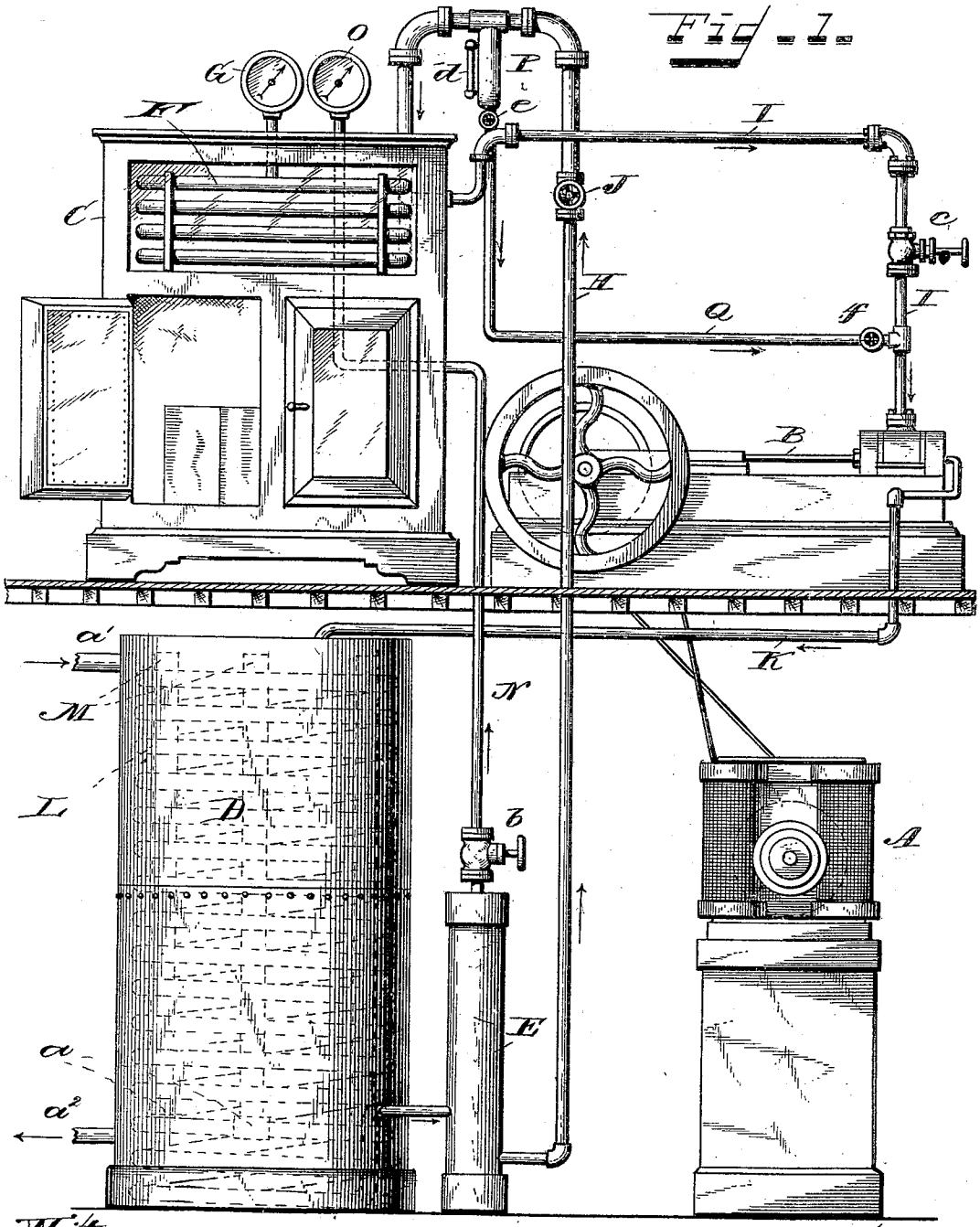
(No Model.) 2 Sheets—Sheet 1.

W. MILD.

REFRIGERATING APPARATUS.

No. 511,857. Patented Jan. 2, 1894.

Fig. 1.



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(No Model.) 2 Sheets—Sheet 2.

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REFRIGERATING APPARATUS.

No. 511,857. Patented Jan. 2, 1894.

Fig. 2.

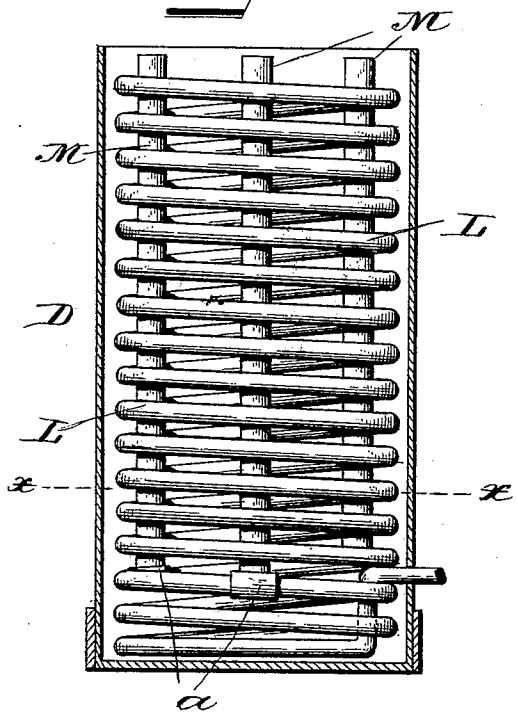


Fig. 4.

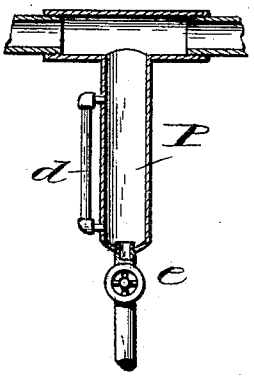
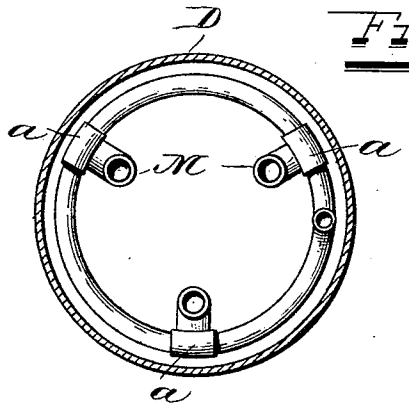


Fig. 3.



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UNITED STATES PATENT OFFICE.

WILLIAM MILD, OF HAMILTON, OHIO.

REFRIGERATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 511,857, dated January 2, 1894.

Application filed December 31, 1892. Serial No. 456,901. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM MILD, a citizen of the United States, residing at Hamilton, in the county of Butler and State of Ohio, have invented certain new and useful Improvements in Refrigerating Apparatus, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to that class of refrigerating apparatus or ice machines known as compression machines, and it has for its object the improved and simplified construction of the same.

The novelty of my invention will be hereinafter set forth and specifically pointed out in the claims.

In the accompanying drawings:—Figure 1, Sheet 1, is an elevation of an apparatus embodying my invention. Fig. 2, Sheet 2, is a sectional elevation of the condenser. Fig. 3, Sheet 2, is a sectional plan view on the dotted line *x x* of Fig. 2. Fig. 4, Sheet 2, is an enlarged sectional elevation of the expansion pipe trap.

The same letters of reference are used to indicate identical parts in all the figures.

In Fig. 1, A is the engine of any suitable construction, represented in this instance as an electric motor, and belted or otherwise suitably connected to the pump B which is of the usual or any suitable construction.

C is the refrigerator of any suitable construction, D the condenser and E the liquid ammonia tank.

Within the refrigerator C, which may be a dry compartment, as shown, or a tank filled with water or brine, is an expansion coil F to which is connected a pressure gage G, and one end of which coil is connected with a pipe H with the lower part of the ammonia tank E, while the other end is connected by a pipe I with the cylinder of the pump B. In the pipe H is an expansion valve J between which point and the tank E the pipe is of smaller diameter than the coil F and that part of the pipe H between the coil and the expansion valve. The enlarged portion of the pipe H between the expansion valve and the coil F serves as an expansion chamber. Leading from the cylinder of the pump is a pipe K which enters the top of pipe L in the condensing tank D which latter is kept filled with running water of as low a temperature as can be procured. The said tank D is provided with supply pipe a' and inlet pipe a^2 for this purpose. In about the third or fourth coil from the bottom of the condenser I place T connections *a*, Figs. 2 and 3. In this instance three are shown though any number desired may be employed, and from these I extend up vertical pipes M, closed at the top, and which I designate as sweat pipes. The lower end of the coil L is bent up and passes out of the condensing tank just below the T connections and into the lower part of tank E thereby forming a trap in the lower part of the coil L which always contains liquid ammonia. From the upper end of the ammonia tank E a pipe N extends up and has upon its upper end a gage O for indicating the pressure in the tank E. The pipe N is preferably provided with a valve *b*. The gas pipe I is likewise provided near the pump with a valve *c*.

In the pipe H between the expansion valve and the coil F there is a T connection with a short pendent pipe P with a gage glass *d* at its side. See Fig. 4. A pipe Q leads from the bottom of the pipe P back to and is connected to the pipe I between the valve *c* and the pump cylinder. The pipe Q is provided with a valve *e* just under the pipe P and also preferably with another valve *f* near the pipe I.

The apparatus thus constructed works as follows: The liquid anhydrous ammonia immediately upon passing through the valve J expands and becomes a gas which enters and passes through the coil F, extracting heat therefrom and from the chamber in which said coil is located. This gas is drawn by the pump B through the pipe I and ejected through pipe K into the coil L in condenser D where it is put under pressure and subjected to the cooling action of the water in the condenser until it returns to its liquid form and is forced out into the tank E. The above is the common and well known action of ice machines of this character and the first feature of my invention is the application of the trap P between the expansion valve and the coil F. The purpose of this trap is to collect any of the liquid ammonia which is not converted into gas, and which might otherwise pass into the coil F and to short circuit

it back through the valves *e f* and pipe Q to the pump cylinder where it acts as an efficient lubricant for the piston and the surplus accumulations of which are ejected through the pipe K into the coil L to aid in reliquefying the gas in said coil. By means of the valves *e f* or either of them the supply from the trap P to the pump is regulated as required. The glass *d* enables the attendant to see when said trap is empty and to close the valve *e* until a reaccumulation occurs.

The next feature of my invention consists in forming a trap in the coil L to prevent the gas from being forced into the tank E and the remaining feature is the provision of the sweat pipes M, by means of which I am enabled to greatly reduce the length of the coil L and still obtain the same results for any free gas remaining in the coil from which the T connections branch out passes up into the pipes M and is liquefied and flows back into the coil from the T connections. It results from the construction and arrangement that a trap is formed by the pipes M for the gas in the condenser.

Having thus fully described my invention, I claim—

1. In a refrigerating apparatus, the combination of a pump, a source of liquid ammonia supply, a refrigerating coil, a pipe connecting said coil and supply source, an expansion valve located in said pipe, an expansion chamber between said valve and coil, a trap for said expansion chamber and connections between said trap and pump, substantially as described.

2. In a refrigerating apparatus, the combination of a pump, a source of liquid ammonia supply, a refrigerating coil a pipe connecting said coil and supply source, an expansion valve in said pipe, an expansion chamber between said valve and coil, a trap connecting with said expansion chamber, a pipe connecting said trap and pump, and means for controlling the flow of ammonia to said pump, substantially as described.

3. In a refrigerating apparatus, the combination with the liquid ammonia supply tank, a condensing tank, a condensing coil within said latter tank and connected with the supply tank at a point above the bottom of said supply tank, of a series of vertical condensing pipes rising from said condensing coil at a point near its bottom.

4. In a refrigerating apparatus, the combination with a liquid ammonia supply tank, and a condensing tank, of a condensing coil within said latter tank, and a series of vertical pipes M rising from said coil at a point near its bottom, said vertical pipes being closed at their tops.

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Witnesses:
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